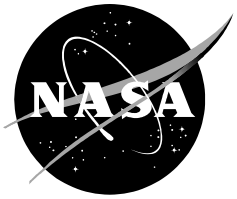
NASA/TM—2016–216632



# Use of the NLPQLP Sequential Quadratic Programming Algorithm to Solve Rotorcraft Aeromechanical Constrained Optimisation Problems

# Appendix B: Cases Run on the Hewlett-Packard Mainframe Computer

*Jane Anne Leyland*
*Ames Research Center*
*Moffett Field, California*

**April 2016**

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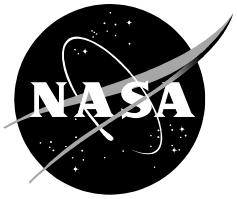

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**April 2016**

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# B.1 (6 x 4) T-Matrix NLP Control Problems

## B.1.1 The Command (DCL) File Code

**for the**
**(6 x 4) T-Matrix NLP Control Problem**
**on the**
**Hewlett-Packard Alpha Mainframe Computer**

```
$ ASSIGN  SYS$INPUT     FOR005
$ ASSIGN  SYS$OUTPUT    FOR006
$       SET TERM/WIDTH=80
$       SET VERIFY
$       SET NOVERIFY
$ !
$ ! *****   OPTIM COMMAND PROCEDURE:    OPTIM.COM      *****
$ !
$ !     ON WARNING THEN GOTO _______
$ !     ON ERROR THEN GOTO _______
$ !     ON SEVERE THEN GOTO _______
$ !
$ START:
$ !
$ ! *****   Determine if a NLP6x4 Case is to be RUN   *****
$ !
$ RUN0:
$       INQUIRE RUN00 "RUN a NLP6x4 Case?  (Y/N)"
$       IF RUN00 .EQS. "N" THEN GOTO TERM1
$ !
$ RUN1:
$ !
$       INQUIRE RUNDEMO "Enter NAME of the NLP6x4 System to be RUN"
$ !
$ ! *****   RUN this NLP6x4 Case   *****
$ !
$       ASSIGN  CDATA.DAT SYS$INPUT
$       ASSIGN  EDATA.DAT SYS$OUTPUT
$ !
$       ON ERROR THEN GOTO RUN2
$       COPY CDATA.DAT FOR005.DAT
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "   *********   INPUT    *****    INPUT   ********   "
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT " "
$       TYPE FOR005.DAT
$ !
$ RUN2:
$ !
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "   *********   OUTPUT   *****   OUTPUT   ********   "
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "RUN the NLP6x4 Case."
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "START RUN."
$       WRITE SYS$OUTPUT " "
$ !
$       SET TERM/WIDTH=132
$ !
$ ! *****   Execute  OPTIMYY   *****
$ !
$       ON ERROR THEN GOTO RUN4
$       RUN 'RUNDEMO'
$ !
$       SET TERM/WIDTH=80
$       GOTO RUN5
$ !
$ RUN4:
$       SET TERM/WIDTH=80
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "ERROR in Running the NLP6x4 Case."
$       WRITE SYS$OUTPUT " "
```

```
$ !
$ RUN5:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "END of RUN."
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "   ***********  END  **********   END   *********   "
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT " "
$ !
$       ON ERROR THEN GOTO TERM0
$       DEASSIGN SYS$OUTPUT
$       INQUIRE DSPL00 "Display the INPUT  CDATA.DAT  on screen?  (Y/N)"
$       IF DSPL00 .EQS. "N" THEN GOTO DSPL1
$       SET TERM/WIDTH=132
$       TYPE CDATA.DAT
$       SET TERM/WIDTH=80
$ DSPL1:
$       INQUIRE DSPL01 "Display the OUTPUT  EDATA.DAT  on screen?  (Y/N)"
$       IF DSPL01 .EQS. "N" THEN GOTO TERM0
$       SET TERM/WIDTH=132
$       TYPE EDATA.DAT
$       SET TERM/WIDTH=80
$       GOTO TERM0
$ !
$ ! *****   Determine if a Demo System is to be LINKed   *****
$ !
$ LINK0:
$       INQUIRE LINK00 "LINK the NLP6x4 System?  (Y/N)"
$       IF LINK00 .EQS. "N" THEN GOTO TERM2
$ !
$ LINK1:
$ !
$       INQUIRE LINKDEMO "Enter NAME of the NLP6x4 System to be LINKed"
$ !
$ ! *****   LINK the NLP6x4 System   *****
$ !
$       INQUIRE LINK0L "LINK with the IMSL Static Library? (Y/N)"
$       IF LINK0L .EQS. "N" THEN GOTO LINK3
$ !
$       INQUIRE LINK01 "LINK with /MAP/CROSS_REFERENCE Qualifiers? (Y/N)"
$       IF LINK01 .EQS. "N" THEN GOTO LINK2
$ !
$ ! *****   LINK Code with the IMSL Static Library and the
$ !                                   /MAP/CROSS_REFERENCE Qualifiers   *****
$ !
$       ON ERROR THEN GOTO LINK5
$       LINK/MAP/CROSS_REFERENCE    'LINKDEMO',   LIBA/LIBRARY,    -
          LIBB/LIBRARY,  LIBC/LIBRARY,  LINK_F90_STATIC_GFLOAT/OPT
$       GOTO LINK6
$ !
$ LINK2:
$ !
$ ! *****   LINK Code with the IMSL Static Library with NO
$ !                                   /MAP/CROSS_REFERENCE Qualifiers   *****
$ !
$       ON ERROR THEN GOTO LINK5
$       LINK                        'LINKDEMO',   LIBA/LIBRARY,    -
          LIBB/LIBRARY,  LIBC/LIBRARY,  LINK_F90_STATIC_GFLOAT/OPT
$       GOTO LINK6
$ !
$ LINK3:
$ !
$       INQUIRE LINK03 "LINK with /MAP/CROSS_REFERENCE Qualifiers? (Y/N)"
$       IF LINK03 .EQS. "N" THEN GOTO LINK4
```

```
$ !
$ !
$ ! *****   LINK Code without the IMSL Static Library but with the
$ !                                   /MAP/CROSS_REFERENCE Qualifiers   *****
$ !
$       ON ERROR THEN GOTO LINK5
$       LINK/MAP/CROSS_REFERENCE    'LINKDEMO',   LIBA/LIBRARY,    -
          LIBB/LIBRARY,  LIBC/LIBRARY
$       GOTO LINK6
$ !
$ LINK4:
$ !
$ ! *****   LINK Code without the IMSL Static Library and with NO
$ !                                   /MAP/CROSS_REFERENCE Qualifiers   *****
$ !
$       ON ERROR THEN GOTO LINK5
$       LINK                        'LINKDEMO',   LIBA/LIBRARY,    -
          LIBB/LIBRARY,  LIBC/LIBRARY
$       GOTO LINK6
$ !
$ LINK5:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "ERROR in Linking the NLP6x4 System."
$       WRITE SYS$OUTPUT " "
$       GOTO TERM5
$ !
$ LINK6:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "The NLP6x4 System was Linked Successfully."
$       WRITE SYS$OUTPUT " "
$       GOTO TERM5
$ !
$ !
$ ! *****   Edit Files   *****
$ !
$ EDIT0:
$       INQUIRE EDIT00 "EDIT a File?  (Y/N)"
$       IF EDIT00 .EQS. "N" THEN GOTO TERM3
$ !
$ ! *****   EDIT a File    *****
$ !
$ EDIT1:
$       INQUIRE EDIT01 "ENTER NAME of File to be EDITED."
$       ON ERROR THEN GOTO EDIT2
$       EDT 'EDIT01'
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "Editing File Completed Successfully."
$       WRITE SYS$OUTPUT " "
$       ON ERROR THEN GOTO EDIT3
$       @XPURGE
$       GOTO EDIT0
$ !
$ EDIT2:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "ERROR in Editing a File."
$       WRITE SYS$OUTPUT " "
$       GOTO EDIT0
$ !
$ EDIT3:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "ERROR in Purging Excess Files."
$       WRITE SYS$OUTPUT " "
$       GOTO EDIT0
$ !
$ CMPL0:
```

```
$       INQUIRE CMPL000 "COMPILE a File?  (Y/N)"
$       IF CMPL000 .EQS. "N" THEN GOTO TERM4
$ !
$ ! *****   COMPILE a File   *****
$ !
$       INQUIRE CFILE "ENTER NAME of File to be COMPILED."
$ !
$ ! *****   FORTRAN Compilation   *****
$ !
$       INQUIRE CMPL01 "Specify the /LIST Qualifier?  (Y/N)"
$       IF CMPL01 .EQS. "N" THEN GOTO CMPL1
$       ON ERROR THEN GOTO CMPL2
$       FORTRAN/LIST/CONTINUATIONS=30/NOWARNINGS 'CFILE'.FOR
$       GOTO CMPL3
$ CMPL1:
$       ON ERROR THEN GOTO CMPL2
$       FORTRAN/CONTINUATIONS=30/NOWARNINGS 'CFILE'.FOR
$       GOTO CMPL3
$ CMPL2:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "ERROR in FORTRAN Compilation."
$       WRITE SYS$OUTPUT " "
$       GOTO CMPL0
$ CMPL3:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "FORTRAN Compilation Completed Successfully."
$       WRITE SYS$OUTPUT " "
$       GOTO CMPL0
$ !
$ !
$ ! *****   Test for Termination   *****
$ !
$ !
$ TERM0:
$      INQUIRE TERM00 "Terminate Process?"
$      IF TERM00 .EQS. "N" THEN GOTO RUN0
$      DELETE FOR005.DAT;*
$      GOTO TERMINATE
$ !
$ TERM1:
$      INQUIRE TERM01 "Terminate Process?"
$      IF TERM01 .EQS. "N" THEN GOTO LINK0
$      GOTO TERMINATE
$ !
$ TERM2:
$      INQUIRE TERM02 "Terminate Process?"
$      IF TERM02 .EQS. "N" THEN GOTO EDIT0
$      GOTO TERMINATE
$ !
$ TERM3:
$      INQUIRE TERM03 "Terminate Process?"
$      IF TERM03 .EQS. "N" THEN GOTO CMPL0
$      GOTO TERMINATE
$ !
$ TERM4:
$      INQUIRE LINK000 "LINK the NLP6x4 System System?  (Y/N)"
$      IF LINK000 .EQS. "N" THEN GOTO TERM5
$      GOTO LINK1
$ !
$ TERM5:
$      INQUIRE RUN000 "RUN the NLP6x4 System?  (Y/N)"
$      IF RUN000 .EQS. "N" THEN GOTO TERMINATE
$      GOTO RUN1
$ !
$ ! *****   Termination   *****
```

```
$ !
$ TERMINATE:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "TERMINATE RUN."
$       WRITE SYS$OUTPUT " "
$ !
$       DEASSIGN SYS$INPUT
$       DEASSIGN SYS$OUTPUT
$ !
$ EXIT
```

## B.1.2 The Fortran Main Driver Code

**for the**
**(6 x 4) T-Matrix NLP Control Problem**
**on the**
**Hewlett-Packard Alpha Mainframe Computer**

```
C
      PROGRAM NLP6x4
C
C***********************************************************************
C
C
C     S E Q U E N T I A L   Q U A D R A T I C   P R O G R A M M I N G
C
C            A L G O R I T H M   F O R   C O N S T R A I N E D
C
C                    O P T I M I Z A T I O N
C
C
C
C              EASY-TO-USE VERSION WITH NUMERICAL GRADIENTS
C
C
C
C
C   GENERAL PROBLEM DESCRIPTION:
C   ----------------------------
C
C   The program solves the general nonlinear programming problem
C
C
C
C            Minimize      F(X)
C
C            subject to    G (X)   =  0  ,  j=1,...,m
C                           j                       e
C
C                          G (X)  >=  0  ,  j=m +1,...,m
C                           j                  e
C
C                          XL  <=  X  <=  XU
C
C
C
C   with differentiable, real-valued functions subject to an n-dimensional
C   vector X.
C
C
C
C   THE NUMERICAL ALGORITHM:
C   ------------------------
C
C   The used code with name 'NLPQLP' is based on a sequential quadratic programming
C   (SQP) method. In each iteration, a linearly constrained quadratic subproblem
C   is formulated by approximating the Lagrangian function quadratically and
C   by linearizing constraints. The Hessian matrix is computed by BFGS quasi-Newton
C   updates. Subsequently, a one-dimensional line search subject to an
C   augmented Lagrangian penalty function is performed to get the next iterate..
C
C
C
C   SPECIFIC PROBLEM DESCRIPTION:  Control Optimisation for a Linear Plant
C                                  [(6 x 4) T-Matrix] Model with Constraints.
C   --------
C
C   Minimize  F = Z1*Z1 + Z2*Z2 + Z3*Z3 + Z4*Z4 + Z5*Z5 + Z6*Z6
C
C   Subject to    XL(1)  <=  X1  <=  XU(1)
C                 XL(2)  <=  X2  <=  XU(2)
C                 XL(3)  <=  X3  <=  XU(3)
C                 XL(4)  <=  X4  <=  XU(4)
```

```
C
C                 X1*X4 - X2*X3   =  0   =  GEQ(1)
C
C                 DSQRT[X1*X1 + X2*X2]  <=  GMAX(1)
C                 DSQRT[X3*X3 + X4*X4]  <=  GMAX(2)
C
C                 DABS[X1 - X01]  <=  GMAX(3)
C                 DABS[X2 - X02]  <=  GMAX(4)
C                 DABS[X3 - X03]  <=  GMAX(5)
C                 DABS[X4 - X04]  <=  GMAX(6)
C
C
C
C   VERSION:
C   -------
C
C   1.0  -  January, 2004
C
C
C*********************************************************************
C
      IMPLICIT  NONE
      INTEGER   NMAX,MMAX,LMAX,MNN2X,LWA,LKWA,LACTIV
      PARAMETER (NMAX=34,MMAX=41)
      PARAMETER (MNN2X = MMAX+NMAX+NMAX+2,
     /          LWA=1.5*NMAX*NMAX+33*NMAX+9*MMAX+200,
     /          LKWA=NMAX+10,LACTIV=2*MMAX+10)
      INTEGER   KWA(LKWA),N,ME,M,L,MNN2,MAXIT,MAXFUN,IPRINT,
     /          MAX_NM,IOUT,MODE,IFAIL,I,J
      DOUBLE PRECISION X(NMAX),F,G(MMAX),DF(NMAX),
     /          DG(MMAX,NMAX),U(MNN2X),XL(NMAX),XU(NMAX),C(NMAX,NMAX),
     /          D(NMAX),WA(LWA),ACC,ACCQP,STPMIN,EPS,EPSREL,FBCK,
     /          GBCK(MMAX),TOL_NM
      LOGICAL   ACTIVE(LACTIV),LQL
      EXTERNAL  QL
C
C
C
      EXTERNAL  RAN
      REAL*8    RAN
C
      INTEGER*4  NZMX, NZMMX
      INTEGER*4  NZZ,    NXX
C
      PARAMETER  (NZMX=64,NZMMX=NZMX*NMAX)
      PARAMETER  (NZZ=6,NXX=4)
C
      INTEGER*4  CVOUT,  ICASE,  IDATA,  IE,     IG,     II,     IN,
     1           INFO,   IOPT,   IPIV(NXX),      IQ,     ISEED1, ISEED2,
     2           ISEED3, ISEED4, ITOUT,  JJ,     JSEED1, JSEED2, JSEED3,
     3           JSEED4, LWORK,          MG,     MI,     MULT,   NX,
     4           NZ
C
      REAL*8 CRAN1,      CRAN2,      CRAN3,      CRAN4,      CRAN5,
     1       CRAN6,      CRAN7,      CRAN8,      DX(NMAX),   DZ(NZMX),
     2       DZ0(NZMX),              G0(MMAX),   GEQ(MMAX),  GMAX(MMAX),
     3       ONE,        SUMF,       SUMZ,     T(NZMX,NMAX), TWO,
     4       WDT(NZMX),  XL0(NMAX),  XU0(NMAX),  X0(NMAX),   Z(NZMX),
     5       ZA(NZMX),   Z0(NZMX),   ZERO
C
      REAL*8  ALPHA,             DD(NXX,NXX),        DELTCV(NXX),
     1        DUMQ(NZZ,1),       DUMT(NXX,1),        DUMT1(NXX,1),
     2        DUMTT(NXX,NXX),    DUMX(NXX,1),        DUMX1(NXX,1),
     3        DUMXX(NXX,NXX),    DUMXX1(NXX,NXX),    DUMZ(NZZ,1),
     4        DUMZT(1,NZZ),      DUMXZ(NXX,NZZ),     EE(NXX,NXX),
```

```
     5        FF(NXX,NXX),       JJJ(1,1),          RSSDCV,
     6        THETA(NXX),        TT(NZZ,NXX),       TTT(NXX,NZZ),
     7        WDX(NXX),          WDXX(NXX,NXX),     WORK(NXX),
     8        WX(NXX),           WXX(NXX,NXX),      WZ(NZZ),
     9        WZZ(NZZ,NZZ),      ZZ(NZZ),           ZZZ(NZZ)
C
C23456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C
      DATA  ACC,       ACCQP,    ALPHA,    CRAN1,    CRAN2,    CRAN3,
     1      CRAN4,     CRAN5,    CRAN6,    CRAN7,    CRAN8,    CVOUT,
     2      EPS,       GEQ,                GMAX,               ICASE,
     3      IDATA,     IN,       IOPT,     IOUT,     IPRINT,   ITOUT,
     4      L,         LQL,
     5          ISEED1,       ISEED2,       ISEED3,       ISEED4,
     6          JSEED1,       JSEED2,       JSEED3,       JSEED4,
     7      MAXFUN,    MAXIT,    MAX_NM,   ME,       MG,       MULT,
     8      NX,        NZ,       ONE,      STPMIN,   TOL_NM,
     9      WDT,                 WDX,                WX,
     A      WZ,                  XL,                 XL0,
     B      XU,                  XU0,                T,
     C      TWO,       X0,                 ZA,                 ZERO     /
C
C23456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C
     o      1.0D-07,  0.0D+00,  1.0D+00,  2.0D+00,  3.0D+00,  1.0D+00,
     1      1.0D+00,  1.0D-01,  1.0D-01,  1.0D-01,  1.0D-01,  0,
     2      1.0D-07,  MMAX*0.0D+00,       MMAX*1.5D+00,       1,
     3      0,        5,        1,        6,        2,        0,
     4      1,        .TRUE.,
     5          78985723,     95428381,     72919329,     63237395,
     6          81692875,     68377297,     89672847,     98351973,
     7      10,       100,      0,        0,        0,        0,
     8      12,       24,       1.0D+00,  0.0D+00,  1.0D-01,
     9      NZMX*1.0D+00,       NXX*0.0D+00,        NXX*0.0D+00,
     A      NZZ*1.0D+00,        NMAX*-1.9D+00,      NMAX*-2.0D+00,
     B      NMAX*1.9D+00,       NMAX*2.0D+00,       NZMMX*0.0D+00,
     C      2.0D+00,  NMAX*0.0D+00,       NZMX*0.0D+00,       0.0D+00  /
C
C23456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C
 1900 FORMAT(//2H  )
 1901 FORMAT(//2H  )
 1902 FORMAT(///79H ***************************************************
     1*************************////6X,39H   ***************   Start Cas
     2e Number ,I3,18H   ***************/)
 1903 FORMAT(//4X,51H   *****   Solution Control Vector for Case Number
     1,I3,8H   *****)
 1904 FORMAT(5X,I2,3X,3D20.8)
 1905 FORMAT(4D20.8)
 1906 FORMAT(//45H   *****   NLP Solution Performance Index  = ,D16.8,
     18H   *****)
 1907 FORMAT(//5X,60H   *****   Initial Control Vector Estimate for Case
     1 Number  ,I3,8H   *****)
 1908 FORMAT(//15X,27H   *****   End Case Number ,I3,8H   *****)
 1909 FORMAT(//1X,40H   *****   Initial Performance Index  = ,D16.8,
     18H   *****)
 1910 FORMAT(5X,I2,3X,3D20.8)
 1911 FORMAT(/2X,8H Element,8X,7H G.L.B.,13X,5H C.V.,15X,7H L.U.B./)
 1912 FORMAT(13X,43H   *****   Completed CALL to NLPQLP   *****)
 1913 FORMAT(/7X,6H CRAN1,14X,6H CRAN2,14X,6H CRAN3,14X,6H CRAN4/
     1        7X,6H CRAN5,14X,6H CRAN6,14X,6H CRAN7,14X,6H CRAN8/)
 1914 FORMAT(/21X,21H   *****   INPUT DATA,8H   *****/)
 1915 FORMAT(//24X,22H   *****   OUTPUT DATA,8H   *****/)
 1916 FORMAT(/21X,23H Inequality Constraints//2X,8H Element,9X,6H Value,
     1 14X,7H L.U.B.,9X,15H L.U.B. - Value/)
```

```
 1917 FORMAT(//62H   *****   Initial Constraint Function Values for Case
     1 Number ,I3,8H   *****)
 1918 FORMAT(//63H   *****   Solution Constraint Function Values for Cas
     1e Number ,I3,8H   *****)
 1919 FORMAT(/22X,21H Equality Constraints//2X,8H Element,9X,6H Value,
     1 14X,7H Target,9X,15H Value - Target/)
 1920 FORMAT(//2X,54H *****   NO Constraints are Specified for Case Numb
     1er ,I3,8H   *****)
 1921 FORMAT(//1X,69H   *****   Control Vector During Previous Duty Cycl
     1e for Case Number ,I3,8H   *****)
 1922 FORMAT(/2X,8H Element,4X,7H G.L.B.,11X,5H C.V.,13X,7H L.U.B.,11X,
     1  11H Delta C.V./)
 1923 FORMAT(5X,I2,1X,4D18.8)
 1924 FORMAT(//9X,63H   *****   Measurement Vectors from Previous Duty C
     1ycle   *****//2x,8H Element,8X,7H Actual,13X,6H Ideal,14X,6H Delta
     2/)
 1925 FORMAT(//14X,47H   *****   Predicted Measurement Vector   *****//
     12X,8H Element,4X,9H Z Vector,9X,10H ZA Vector,8X,8H Delta Z,10X,
     2 8H Diag[W]/)
 1926 FORMAT(12X,53H   *****   X0, ZA, and T are Randomly Defined   ****
     1*/)
 1927 FORMAT(/4X,4H Row,16X,25H *****   T-Matrix   *****)
 1928 FORMAT(/5X,I2,1X,4D18.8/(8X,4D18.8))
 1929 FORMAT(//14X,48H   *****   T-Matrix Output is Suppressed   *****)
 1930 FORMAT(14X,51H   *****   X0, ZA, and T are Directly Input   *****)
 1931 FORMAT(//13X,31H   *****   NLP Special Control ,I2,22H-Vector Outp
     1ut   *****)
 1932 FORMAT(/2X,5H CV =,/(5X,3(D24.15,1H,)))
 1950 FORMAT(//3X,50H *****   Solve the NLPQLP Problem for Case Number ,
     1 I3,8H   *****)
C
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C
 2906 FORMAT(//51H   *****   Regulator Solution Performance Index  = ,
     1 D16.8,8H   *****)
 2931 FORMAT(//10X,37H   *****   Regulator Special Control ,I2,22H-Vecto
     1r Output   *****)
 2950 FORMAT(//2X,53H *****   Solve the Regulator Problem for Case Numbe
     1r ,I3,8H   *****)
 2960 FORMAT(/4X,4H Row,4X,49H *****   [DUMXX1] = Matrix to be Inverted
     1  *****)
 2961 FORMAT(/4X,4H Row,2X,54H *****   [DD] = The Inverse of Matrix [DUM
     1XX1]   *****)
 2962 FORMAT(/4X,4H Row,1X,56H *****   [EE] = The Identity Matrix [DUMXX
     11][DD]   *****)
 2963 FORMAT(/4X,4H Row,1X,56H *****   [FF] = The Identity Matrix [DD][D
     1UMXX1]   *****)
 2964 FORMAT(/20X,19H *****   Alpha  =  ,D18.8,8H   *****/)
 2965 FORMAT(/4X,4H Dim,18X,26H *****   WZ-Vector   *****)
 2966 FORMAT(/4X,4H Dim,18X,26H *****   WX-Vector   *****)
 2967 FORMAT(/4X,4H Dim,18X,27H *****   WDX-Vector   *****)
 2968 FORMAT(/4X,4H Dim, 9X,44H *****   The Solution Control Vector   **
     1***)
 2969 FORMAT(/4X,4H Dim, 7X,48H *****   The Solution Measurement Vector
     1  *****)
 2970 FORMAT(//5X,52H   *****   Matrix [DUMXX1] was Successfully Inverte
     1d/42X,30H to Yield Matrix [DD].   *****)
 2971 FORMAT(// 4X,48H  *****   Root-Sum-Squared Delta CV Elements  = ,
     1 D16.8,8H   *****)
 2972 FORMAT(/2X,11H Delta CV =,/(5X,3(D24.15,1H,)))
 2973 FORMAT(//5X,19H   *****   Element ,I4,44H  of Matrix [DUMXX1] has
     1an illegal value.  ,/38X,30H Regulator problem is stopped./38X,
     2 32H Go on to the next case.   *****)
 2974 FORMAT(//5X,19H   *****   Element ,I4,44H  of Matrix [DUMXX1] is z
     1ero and the matrix ,/38X,32H is singular; its inverse could ,/38X,
```

```
     2 17H not be computed.,/38X,30H Regulator problem is stopped./38X,
     3 32H Go on to the next case.   *****)
C
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C
 3961 FORMAT(/4X,4H Row,1X,40H *****   The Diagonal Matrix WZZ   *061*)
 3962 FORMAT(/4X,4H Row,1X,40H *****   The Diagonal Matrix WXX   *062*)
 3963 FORMAT(/4X,4H Row,1X,41H *****   The Diagonal Matrix WDXX   *063*)
 3964 FORMAT(/4X,4H Row,1X,34H *****   The T-Matrix [TT]   *064*)
 3965 FORMAT(/4X,4H Row,1X,52H *****   The Transpose of the T-Matrix [TT
     1T]   *065*)
 3966 FORMAT(/4X,4H Row,1X,41H *****   The DUMXZ-Matrix [DUMXZ]   *066*)
 3967 FORMAT(/4X,4H Row,1X,41H *****   The DUMXX-Matrix [DUMXX]   *067*)
 3968 FORMAT(/4X,4H Row,1X,41H *****   The DUMXX-Matrix [DUMXX]   *068*)
 3969 FORMAT(/4X,4H Row,1X,41H *****   The DUMXX-Matrix [DUMXX]   *069*)
 3970 FORMAT(/4X,4H Row,1X,39H *****   The DUMX-Vector [DUMX]   *070*)
 3971 FORMAT(/4X,4H Row,1X,39H *****   The DUMX-Vector [DUMX]   *071*)
 3972 FORMAT(/4X,4H Row,1X,39H *****   The DUMZ-Vector [DUMZ]   *072*)
 3973 FORMAT(/4X,4H Row,1X,41H *****   The DUMX1-Vector [DUMX1]   *073*)
 3974 FORMAT(/4X,4H Row,1X,41H *****   The DUMX1-Vector [DUMX1]   *074*)
 3975 FORMAT(/4X,4H Row,1X,41H *****   The DUMX1-Vector [DUMX1]   *075*)
 3976 FORMAT(/4X,4H Row,1X,39H *****   The DUMZ-Vector [DUMZ]   *076*)
 3977 FORMAT(/4X,4H Row,1X,39H *****   The DUMZ-Vector [DUMZ]   *077*)
 3978 FORMAT(/4X,4H Row,1X,41H *****   The DUMZT-Vector [DUMZT]   *078*)
 3991 FORMAT(/4X,4H Row,1X,41H *****   The DUMXX-Matrix [DUMXX]   *091*)
C
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C
C
      NAMELIST / CDATA / ALPHA,  ACC,    ACCQP,  CRAN1,  CRAN2,  CRAN3,
     1                   CRAN4,  CRAN5,  CRAN6,  CRAN7,  CRAN8,  CVOUT,
     2                   EPS,    GEQ,    GMAX,   ICASE,  IDATA,  IN,
     3                   IOPT,   IOUT,   IPRINT, ISEED1, ISEED2, ISEED3,
     4                   ISEED4, ITOUT,  JSEED1, JSEED2, JSEED3, JSEED4,
     5                   L,      LQL,    MAXFUN, MAXIT,  MAX_NM, ME,
     6                   MG,     MULT,   NX,     NZ,     STPMIN, T,
     7                   TOL_NM, WDT,    WDX,    WX,     WZ,     XL,
     8                   XL0,    XU,     XU0,    X0,     ZA
C
C
C   Set some constants and initial values
C
      MODE   = 0
C
  100 READ(IN,CDATA)
C
      IFAIL  = 0
      M      = MG
      N      = NX
      MI     = MG - ME
      MNN2   = M + N + N + 2
C
      WRITE(IOUT,1902)  ICASE
      WRITE(IOUT,1914)
      WRITE(IOUT,CDATA)
      IF (IDATA) 90, 90, 50
C
C  *****   Randomly define the T-Matrix and the X0 & ZA Vectors   *****
C
   90 WRITE(IOUT,1915)
      WRITE(IOUT,1926)
      WRITE(IOUT,1913)
      WRITE(IOUT,1905) CRAN1, CRAN2, CRAN3, CRAN4, CRAN5, CRAN6, CRAN7,
     1                 CRAN8
      WRITE(IOUT,1921)  ICASE
```

```
      WRITE(IOUT,1911)
      DO 61 II = 1, NX
C
C  *****   Define the T-Matrix   *****
C
      DO 62 JJ = 1, NZ
      T(JJ,II) = CRAN1*(TWO*RAN(ISEED1) - ONE) +
     1                  CRAN2*(TWO*RAN(JSEED1) - ONE)
   62 CONTINUE
C
C  *****   Define the Previous Actual Control Vector   *****
C
      X0(II)   = CRAN3*(TWO*RAN(ISEED2) - ONE) +
     1                  CRAN4*(TWO*RAN(JSEED2) - ONE)
      WRITE(IOUT,1904)  II,  XL0(II),  X0(II),  XU0(II)
C
C  *****   Adjust Previous Actual Control Vector
C                       to be Within Feasible Limits if Required.   *****
C
      IF (X0(II) - EPS - XL0(II)) 63, 64, 64
   63 X0(II) = XL0(II) + EPS
      GO TO 66
   64 IF (X0(II) + EPS - XU0(II)) 61, 61, 65
   65 X0(II) = XU0(II) - EPS
   66 WRITE(IOUT,1904)  II,  XL0(II),  X0(II),  XU0(II)
   61 CONTINUE
C
      WRITE(IOUT,1924)
C
C  *****   Define the Previous Ideally Computed Measurement Vector   *****
C
      DO 42 JJ = 1, NZ
      SUMZ = ZERO
      DO 47 II = 1, NX
      SUMZ = SUMZ + T(JJ,II)*X0(II)
   47 CONTINUE
      Z0(JJ) = SUMZ
C
C  *****   Define the Previous Actual Measurement Vector   *****
C
      DZ0(JJ) = CRAN5*(TWO*RAN(ISEED3) - ONE) +
     1                 CRAN6*(TWO*RAN(JSEED3) - ONE)
      ZA(JJ)  = Z0(JJ) + DZ0(JJ)
      WRITE(IOUT,1904)  JJ,  ZA(JJ),  Z0(JJ),  DZ0(JJ)
   42 CONTINUE
C
      GO TO 40
C
C  *****   Input the X0 & ZA Vectors, and the T-Matrix via TDATA   *****
C
   50 WRITE(IOUT,1915)
      WRITE(IOUT,1930)
      WRITE(IOUT,1921)  ICASE
      WRITE(IOUT,1911)
C
C  *****   Write the Previous Actual Control Vector   *****
C
      DO 31 II = 1, NX
      WRITE(IOUT,1904)  II,  XL0(II),  X0(II),  XU0(II)
C
C  *****   Adjust Previous Actual Control Vector
C                       to be Within Feasible Limits if Required.   *****
C
      IF (X0(II) - EPS - XL0(II)) 33, 34, 34
   33 X0(II) = XL0(II) + EPS
```

```
      GO TO 36
   34 IF (X0(II) + EPS - XU0(II)) 31, 31, 35
   35 X0(II) = XU0(II) - EPS
   36 WRITE(IOUT,1904)  II,  XL0(II),  X0(II),  XU0(II)
   31 CONTINUE
C
      WRITE(IOUT,1924)
C
C  *****   Define the Previous Ideally Computed Measurement Vector   *****
C
      DO 37 JJ = 1, NZ
      SUMZ = ZERO
      DO 38 II = 1, NX
      SUMZ = SUMZ + T(JJ,II)*X0(II)
   38 CONTINUE
      Z0(JJ) = SUMZ
C
C  *****   Define the Difference Between the Actual
C                         and the Ideal Previous Measurement Vector   *****
C
      DZ0(JJ) = ZA(JJ) - Z0(JJ)
      WRITE(IOUT,1904)  JJ,  ZA(JJ),  Z0(JJ),  DZ0(JJ)
   37 CONTINUE
C
C
C  *****   Define the Initial Estimate of the Control Vector   *****
C
   40 WRITE(IOUT,1907)  ICASE
      WRITE(IOUT,1922)
      DO 41 II = 1, NX
      X(II)  = X0(II)
      DX(II) = X(II) - X0(II)
      WRITE(IOUT,1923)  II,  XL(II),  X(II),  XU(II), DX(II)
      IF (X(II) - EPS - XL(II)) 43, 44, 44
   43 X(II)  = XL(II) + EPS
      DX(II) = X(II) - X0(II)
      GO TO 46
   44 IF (X(II) + EPS - XU(II)) 41, 41, 45
   45 X(II)  = XU(II) - EPS
      DX(II) = X(II) - X0(II)
   46 WRITE(IOUT,1923)  II,  XL(II),  X(II),  XU(II), DX(II)
   41 CONTINUE
C
C   *****   Write T-Matrix   ***
C
      IF (ITOUT .LE. 0)  GO TO 92
      WRITE(IOUT,1927)
      DO 91 JJ = 1, NZ
      WRITE(IOUT,1928) JJ, (T(JJ,II), II=1,NX)
   91 CONTINUE
      GO TO 93
   92 WRITE(IOUT,1929)
C
C   *****   Performance Index   *****
C
   93 SUMF = ZERO
      DO 67 JJ = 1, NZ
      SUMZ = ZERO
      DO 68 II = 1, NX
      SUMZ   =  SUMZ + T(JJ,II)*X(II)
   68 CONTINUE
      Z(JJ)  =  SUMZ + DZ0(JJ)
      DZ(JJ) =  Z(JJ) - ZA(JJ)
      SUMF = SUMF + Z(JJ)*Z(JJ)*WDT(JJ)
   67 CONTINUE
```

```
      WRITE(IOUT,1925)
      DO 48 JJ = 1, NZ
      WRITE(IOUT,1923)  JJ,  Z(JJ),  ZA(JJ),  DZ(JJ),  WDT(JJ)
   48 CONTINUE
      F = SUMF
      WRITE(IOUT,1909) F
C
C   *****   Constraint Functions   *****
C
      IF (MG) 999, 51, 71
   51 WRITE(IOUT,1920)  ICASE
      GO TO 70
   71 WRITE(IOUT,1917)  ICASE
      IF (ME) 999, 74, 72
   72 CONTINUE
      G0(1) = X(1)*X(4) - X(2)*X(3)
      G(1)  = GEQ(1) - G0(1)
      WRITE(IOUT,1919)
      DO 73 IE = 1, ME
      WRITE(IOUT,1910)  IE,  G0(IE),  GEQ(IE), -G(IE)
   73 CONTINUE
      IF (MI) 999, 70, 75
   74 IF (MI) 999, 51, 52
   52 CONTINUE
      G0(1)  = DSQRT(X(1)*X(1) + X(2)*X(2))
      G(1)   = GMAX(1) - G0(1)
      G0(2)  = DSQRT(X(3)*X(3) + X(4)*X(4))
      G(2)   = GMAX(2) - G0(2)
      G0(3)  = DABS(DX(1))
      G(3)   = GMAX(3) - G0(3)
      G0(4)  = DABS(DX(2))
      G(4)   = GMAX(4) - G0(4)
      G0(5)  = DABS(DX(3))
      G(5)   = GMAX(5) - G0(5)
      G0(6)  = DABS(DX(4))
      G(6)   = GMAX(6) - G0(6)
      WRITE(IOUT,1916)
      DO 53 IQ = 1, MI
      WRITE(IOUT,1910)  IQ,  G0(IQ),  GMAX(IQ), G(IQ)
   53 CONTINUE
      GO TO 70
   75 CONTINUE
      G0(2)  = DSQRT(X(1)*X(1) + X(2)*X(2))
      G(2)   = GMAX(1) - G0(2)
      G0(3)  = DSQRT(X(3)*X(3) + X(4)*X(4))
      G(3)   = GMAX(2) - G0(3)
      G0(4)  = DABS(DX(1))
      G(4)   = GMAX(3) - G0(4)
      G0(5)  = DABS(DX(2))
      G(5)   = GMAX(4) - G0(5)
      G0(6)  = DABS(DX(3))
      G(6)   = GMAX(5) - G0(6)
      G0(7)  = DABS(DX(4))
      G(7)   = GMAX(6) - G0(7)
      WRITE(IOUT,1916)
      DO 76 IQ = 1, MI
      IG = ME + IQ
      WRITE(IOUT,1910)  IQ,  G0(IG),  GMAX(IQ), G(IG)
   76 CONTINUE
   70 CONTINUE
C
      GO TO (96,96,200), IOPT
C
C  *****   NLPQLP Optimisation   *****
C
```

```
   96 WRITE(IOUT,1950)  ICASE
C
      I      = 0
C
    1 CONTINUE
C
C=============================================================
C
C   This is the main block to compute all function values.
C   The block is executed either for computing a steplength
C   sequentially or for approximating gradients by forward
C   differences.
C
C   *****   Performance Index   *****
C
      SUMF = ZERO
      DO 98 II = 1, NX
      DX(II) = X(II) - X0(II)
   98 CONTINUE
      DO 77 JJ = 1, NZ
      SUMZ = ZERO
      DO 78 II = 1, NX
      SUMZ   =  SUMZ + T(JJ,II)*X(II)
   78 CONTINUE
      Z(JJ)  =  SUMZ + DZ0(JJ)
      DZ(JJ) =  Z(JJ) - ZA(JJ)
      SUMF = SUMF + Z(JJ)*Z(JJ)*WDT(JJ)
   77 CONTINUE
      F = SUMF
C
C   *****   Constraint Functions   *****
C
      IF (MG) 999, 60, 88
   88 IF (ME) 999, 58, 57
   57 CONTINUE
      G0(1) = X(1)*X(4) - X(2)*X(3)
      G(1)  = GEQ(1) - G0(1)
      IF (MI) 999, 60, 59
   58 IF (MI) 999, 60, 87
   87 CONTINUE
      G0(1)  = DSQRT(X(1)*X(1) + X(2)*X(2))
      G(1)   = GMAX(1) - G0(1)
      G0(2)  = DSQRT(X(3)*X(3) + X(4)*X(4))
      G(2)   = GMAX(2) - G0(2)
      G0(3)  = DABS(DX(1))
      G(3)   = GMAX(3) - G0(3)
      G0(4)  = DABS(DX(2))
      G(4)   = GMAX(4) - G0(4)
      G0(5)  = DABS(DX(3))
      G(5)   = GMAX(5) - G0(5)
      G0(6)  = DABS(DX(4))
      G(6)   = GMAX(6) - G0(6)
      GO TO 60
   59 CONTINUE
      G0(2)  = DSQRT(X(1)*X(1) + X(2)*X(2))
      G(2)   = GMAX(1) - G0(2)
      G0(3)  = DSQRT(X(3)*X(3) + X(4)*X(4))
      G(3)   = GMAX(2) - G0(3)
      G0(4)  = DABS(DX(1))
      G(4)   = GMAX(3) - G0(4)
      G0(5)  = DABS(DX(2))
      G(5)   = GMAX(4) - G0(5)
      G0(6)  = DABS(DX(3))
      G(6)   = GMAX(5) - G0(6)
      G0(7)  = DABS(DX(4))
```

```
      G(7)   = GMAX(6) - G0(7)
   60 CONTINUE
C
C
C============================================================
C
      IF (IFAIL.EQ.-1) GOTO 4
      IF (I.GT.0) GOTO 3
    2 CONTINUE
      FBCK = F
      DO J=1,M
         GBCK(J) = G(J)
      ENDDO
      I = 0
    5 I = I + 1
      EPSREL = EPS*DMAX1(1.0D0,DABS(X(I)))
      X(I) = X(I) + EPSREL
      GOTO 1
    3 CONTINUE
      DF(I) = (F - FBCK)/EPSREL
      DO J=1,M
         DG(J,I) = (G(J) - GBCK(J))/EPSREL
      ENDDO
      X(I) = X(I) - EPSREL
   IF (I.LT.N) GOTO 5
      F = FBCK
      DO J=1,M
         G(J) = GBCK(J)
      ENDDO
C
    4 CONTINUE
C
C
      CALL NLPQLP(L,M,ME,MMAX,N,NMAX,MNN2,X,F,G,DF,DG,U,XL,XU,
     /     C,D,ACC,ACCQP,STPMIN,MAXFUN,MAXIT,MAX_NM,TOL_NM,
     /     IPRINT,MODE,IOUT,IFAIL,WA,LWA,KWA,LKWA,ACTIVE,LACTIV,
     /     LQL,QL)
C
C
      WRITE(IOUT,1912)
C
C
      IF (IFAIL.EQ.-1) GOTO 1
      IF (IFAIL.EQ.-2) GOTO 2
C
C  *****   Write the Solution Control Vector   *****
C
      WRITE(IOUT,1903)  ICASE
      WRITE(IOUT,1922)
      DO 69 II = 1, NX
      DX(II) = X(II) - X0(II)
      WRITE(IOUT,1923)  II,  XL(II),  X(II),  XU(II), DX(II)
   69 CONTINUE
C
C   *****   Performance Index   *****
C
      WRITE(IOUT,1925)
      DO 49 JJ = 1, NZ
      WRITE(IOUT,1923)  JJ,  Z(JJ),  ZA(JJ),  DZ(JJ),  WDT(JJ)
   49 CONTINUE
      WRITE(IOUT,1906) F
C
C   *****   Constraint Functions   *****
C
      IF (MG) 999, 54, 81
```

```
   54 WRITE(IOUT,1920)  ICASE
      GO TO 80
   81 WRITE(IOUT,1918)  ICASE
      IF (ME) 999, 84, 82
   82 CONTINUE
      G0(1) = X(1)*X(4) - X(2)*X(3)
      G(1)  = GEQ(1) - G0(1)
      WRITE(IOUT,1919)
      DO 83 IE = 1, ME
      WRITE(IOUT,1910)  IE,  G0(IE),  GEQ(IE), -G(IE)
   83 CONTINUE
      IF (MI) 999, 80, 85
   84 IF (MI) 999, 54, 55
   55 CONTINUE
      G0(1)  = DSQRT(X(1)*X(1) + X(2)*X(2))
      G(1)   = GMAX(1) - G0(1)
      G0(2)  = DSQRT(X(3)*X(3) + X(4)*X(4))
      G(2)   = GMAX(2) - G0(2)
      G0(3)  = DABS(DX(1))
      G(3)   = GMAX(3) - G0(3)
      G0(4)  = DABS(DX(2))
      G(4)   = GMAX(4) - G0(4)
      G0(5)  = DABS(DX(3))
      G(5)   = GMAX(5) - G0(5)
      G0(6)  = DABS(DX(4))
      G(6)   = GMAX(6) - G0(6)
      WRITE(IOUT,1916)
      DO 56 IQ = 1, MI
      WRITE(IOUT,1910)  IQ,  G0(IQ),  GMAX(IQ), G(IQ)
   56 CONTINUE
      GO TO 80
   85 CONTINUE
      G0(2)  = DSQRT(X(1)*X(1) + X(2)*X(2))
      G(2)   = GMAX(1) - G0(2)
      G0(3)  = DSQRT(X(3)*X(3) + X(4)*X(4))
      G(3)   = GMAX(2) - G0(3)
      G0(4)  = DABS(DX(1))
      G(4)   = GMAX(3) - G0(4)
      G0(5)  = DABS(DX(2))
      G(5)   = GMAX(4) - G0(5)
      G0(6)  = DABS(DX(3))
      G(6)   = GMAX(5) - G0(6)
      G0(7)  = DABS(DX(4))
      G(7)   = GMAX(6) - G0(7)
      WRITE(IOUT,1916)
      DO 86 IQ = 1, MI
      IG = ME + IQ
      WRITE(IOUT,1910)  IQ,  G0(IG),  GMAX(IQ), G(IG)
   86 CONTINUE
   80 CONTINUE
C
      GO TO (97,200,200), IOPT
C
C
C  *****   Solve the Regulator Problem   *****
C
  200 CONTINUE
C
      WRITE(IOUT,2950)  ICASE
C
C   *****   Write Alpha and the Weighting Vectors   *****
C
      WRITE(IOUT,2964)  ALPHA
      WRITE(IOUT,2965)
      WRITE(IOUT,1928)  NZZ, (WZ(I), I=1,NZZ)
```

```
      WRITE(IOUT,2966)
      WRITE(IOUT,1928)  NXX, (WX(I), I=1,NXX)
      WRITE(IOUT,2967)
      WRITE(IOUT,1928)  NXX, (WDX(I), I=1,NXX)
C
C  *****   Compute Regulator Problem Solution Control Vector   *****
C
      CALL DIAGW1(NZZ,WZ,WZZ)
C  *****   061   *****   061   *****   061   *****   061   *****
C     WRITE(IOUT,3961)
C     DO 301 I = 1, NZZ
C     WRITE(IOUT,1928)  I ,  (WZZ(I,J), J=1,NZZ)
C 301 CONTINUE
      CALL DIAGW2(NXX,WX,WXX)
C  *****   062   *****   062   *****   062   *****   062   *****
C     WRITE(IOUT,3962)
C     DO 302 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (WXX(I,J), J=1,NXX)
C 302 CONTINUE
      CALL DIAGW2(NXX,WDX,WDXX)
C  *****   063   *****   063   *****   063   *****   063   *****
C     WRITE(IOUT,3963)
C     DO 303 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (WDXX(I,J), J=1,NXX)
C 303 CONTINUE
      DO 202 I = 1, NZZ
      DO 201 J = 1, NXX
      TT(I,J)  = T(I,J)
  201 CONTINUE
  202 CONTINUE
C  *****   064   *****   064   *****   064   *****   064   *****
C     WRITE(IOUT,3964)
C     DO 304 I = 1, NZZ
C     WRITE(IOUT,1928)  I ,  (TT(I,J), J=1,NXX)
C 304 CONTINUE
      CALL TRNSP1(NZZ,NXX,TT,TTT)
C  *****   065   *****   065   *****   065   *****   065   *****
C     WRITE(IOUT,3965)
C     DO 305 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (TTT(I,J), J=1,NZZ)
C 305 CONTINUE
      CALL MMULT1(NXX,NZZ,NZZ,TTT,WZZ,DUMXZ)
C  *****   066   *****   066   *****   066   *****   066   *****
C     WRITE(IOUT,3966)
C     DO 306 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (DUMXZ(I,J), J=1,NZZ)
C 306 CONTINUE
      CALL MMULT2(NXX,NXX,NZZ,DUMXZ,TT,DUMXX)
C  *****   067   *****   067   *****   067   *****   067   *****
C     WRITE(IOUT,3967)
C     DO 307 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (DUMXX(I,J), J=1,NXX)
C 307 CONTINUE
      CALL SMDFF1(NXX,NXX,1,DUMXX,WDXX,DUMTT)
C  *****   068   *****   068   *****   068   *****   068   *****
      DO 321 I = 1,NXX
      DO 320 J = 1,NXX
      DUMXX(I,J) = DUMTT(I,J)
  320 CONTINUE
  321 CONTINUE
C     WRITE(IOUT,3968)
C     DO 308 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (DUMXX(I,J), J=1,NXX)
C 308 CONTINUE
C
```

```
C  *****   Compute the Matrix to be Inverted   *****
C
      CALL SMDFF1(NXX,NXX,1,DUMXX,WXX,DUMXX1)
C     WRITE(IOUT,2960)
C     DO 203 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (DUMXX1(I,J), J=1,NXX)
C 203 CONTINUE
C
C   *****   Compute Matrix [DD]   *****
C
C     CALL DLINRG(NXX,DUMXX1,NXX,DD,NXX)
C
      DO 210 I = 1, NXX
      DO 209 J = 1, NXX
      DD(I,J) = DUMXX1(I,J)
  209 CONTINUE
  210 CONTINUE
      LWORK = -1
      LWORK = 512
C
      CALL DGETRF(NXX,NXX,DD,NXX,IPIV,INFO)
C
      CALL DGETRI(NXX,DD,NXX,IPIV,WORK,LWORK,INFO)
C
      IF(INFO) 212, 211, 213
C
C  *****   Matrix Inversion was Successful   *****
C
  211 WRITE(IOUT,2970)
      GO TO 214
C
C  *****   Matrix Inversion Failed. An Element had an Illegal Value.
C                                                                    *****
C
  212 INFO = -INFO
      WRITE(IOUT,2973) INFO
      GO TO 89
C
C  *****   Matrix Inversion Failed. An Element on the Diagonal is Equal
C          to Zero and correspondingly the Matrix is Singular and its
C          Inverse could not be computed.
C                                                                    *****
C
  213 WRITE(IOUT,2974) INFO
      GO TO 89
C
  214 CONTINUE
C
C  *****   Matrix [DD] = The Inverted Matrix  =  [DUMXX1]-1   *****
C

C     WRITE(IOUT,2961)
C     DO 204 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (DD(I,J), J=1,NXX)
C 204 CONTINUE
C
C   *****   Matrix [EE] = The Identity Matrix = [DUMXX1][DD]   *****
C
C     CALL MMULT3(NXX,NXX,NXX,DUMXX1,DD,EE)
C     WRITE(IOUT,2962)
C     DO 205 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (EE(I,J), J=1,NXX)
C 205 CONTINUE
C
C   *****   Matrix [FF] = The Identity Matrix = [DD][DUMXX1]   *****
```

```
C
C     CALL MMULT3(NXX,NXX,NXX,DD,DUMXX1,FF)
C     WRITE(IOUT,2963)
C     DO 206 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (FF(I,J), J=1,NXX)
C 206 CONTINUE
C
C  *****   Compute the Solution Control Vector (the Theta Vector)   *****
C
      CALL MMULT3(NXX,NXX,NXX,DD,DUMXX,DUMTT)
      DO 323 I = 1,NXX
      DO 322 J = 1,NXX
      DUMXX(I,J) = DUMTT(I,J)
  322 CONTINUE
  323 CONTINUE
C  *****   069   *****   069   *****   069   *****   069   *****
C     WRITE(IOUT,3969)
C     DO 309 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (DUMXX(I,J), J=1,NXX)
C 309 CONTINUE
C
      DO 207 J = 1, NXX
      DUMX(J,1) = X0(J)
  207 CONTINUE
C  *****   070   *****   070   *****   070   *****   070   *****
C     WRITE(IOUT,3970)
C     DO 310 J = 1, NXX
C     WRITE(IOUT,1928)  J ,  DUMX(J,1)
C 310 CONTINUE
      CALL MMULT4(NXX,1,NXX,DUMXX,DUMX,DUMT)
C  *****   071   *****   071   *****   071   *****   071   *****
      DO 324 J = 1,NXX
      DUMX(J,1) = DUMT(J,1)
  324 CONTINUE
C     WRITE(IOUT,3971)
C     DO 311 J = 1, NXX
C     WRITE(IOUT,1928)  J ,  DUMX(J,1)
C 311 CONTINUE
      DO 208 I = 1, NZZ
      DUMZ(I,1) = ZA(I)
  208 CONTINUE
C  *****   072   *****   072   *****   072   *****   072   *****
C     WRITE(IOUT,3972)
C     DO 312 I = 1, NZZ
C     WRITE(IOUT,1928)  I ,  DUMZ(I,1)
C 312 CONTINUE
      CALL MMULT5(NXX,1,NZZ,DUMXZ,DUMZ,DUMX1)
C  *****   073   *****   073   *****   073   *****   073   *****
C     WRITE(IOUT,3973)
C     DO 313 J = 1, NXX
C     WRITE(IOUT,1928)  J ,  DUMX1(J,1)
C 313 CONTINUE
      CALL MMULT4(NXX,1,NXX,DD,DUMX1,DUMT1)
C  *****   074   *****   074   *****   074   *****   074   *****
      DO 325 J = 1,NXX
      DUMX1(J,1) = DUMT1(J,1)
  325 CONTINUE
C     WRITE(IOUT,3974)
C     DO 314 J = 1, NXX
C     WRITE(IOUT,1928)  J ,  DUMX1(J,1)
C 314 CONTINUE
      CALL SMULT(NXX,1,ALPHA,DUMX1,DUMT1)
C  *****   075   *****   075   *****   075   *****   075   *****
      DO 326 J = 1,NXX
      DUMX1(J,1) = DUMT1(J,1)
```

```
  326 CONTINUE
C     WRITE(IOUT,3975)
C     DO 315 J = 1, NXX
C     WRITE(IOUT,1928)  J ,  DUMX1(J,1)
C 315 CONTINUE
      CALL SMDFF2(NXX,1,0,DUMX,DUMX1,DUMT)
C
C  *****   Write the Solution Control Vector (the Theta-Vector)   *****
C
      DO 327 J = 1,NXX
      DUMX(J,1) = DUMT(J,1)
      THETA(J) = DUMX(J,1)
  327 CONTINUE
      WRITE(IOUT,2968)
      DO 318 J = 1, NXX
      WRITE(IOUT,1928)  J,  THETA(J)
  318 CONTINUE
C
C  *****   Compute the Solution Measurement Vector (the Z-Vector)   *****
C
      DO 330 J = 1,NXX
      DUMX(J,1) = THETA(J) - X0(J)
  330 CONTINUE
      CALL MMULT6(NZZ,1,NXX,TT,DUMX,DUMZ)
C  *****   076   *****   076   *****   076   *****   076   *****
      DO 331 J = 1, NZZ
      ZZ(J) = DUMZ(J,1)
  331 CONTINUE
C     WRITE(IOUT,3976)
C     DO 316 J = 1, NZZ
C     WRITE(IOUT,1928)  J ,  DUMZ(J,1)
C 316 CONTINUE
      CALL SMDFF3(NZZ,NZMX,1,ZZ,ZA,ZZZ)
C
C  *****   Write the Solution Measurement Vector (the Z-Vector)   *****
C
      DO 328 J = 1,NZZ
      ZZ(J) = ZZZ(J)
  328 CONTINUE
      WRITE(IOUT,2969)
      WRITE(IOUT,1928)  NZZ,  (ZZ(I), I=1,NZZ)
C
C   *****   Compute the Corresponding Performance Index   *****
C
      DO 319 J = 1, NZZ
      DUMZ(J,1) = ZZ(J)
  319 CONTINUE
      CALL MMULT7(NZZ,1,NZZ,WZZ,DUMZ,DUMQ)
C  *****   077   *****   077   *****   077   *****   077   *****
      DO 329 J = 1,NZZ
      DUMZ(J,1) = DUMQ(J,1)
  329 CONTINUE
C     WRITE(IOUT,3977)
C     DO 317 J = 1, NXX
C     WRITE(IOUT,1928)  J ,  DUMZ(J,1)
C 317 CONTINUE
      CALL TRNSP2(NZZ,1,DUMZ,DUMZT)
C  *****   078   *****   078   *****   078   *****   078   *****
C     WRITE(IOUT,3978)
C     I = 1
C     WRITE(IOUT,1928)  I ,  (DUMZT(1,J), J=1,NZZ)
      CALL MMULT8(1,1,NZZ,DUMZT,DUMZ,JJJ)
C
C   *****   Write the Corresponding Performance Index   *****
C
```

```
      WRITE(IOUT,2906) JJJ(1,1)
C
C   *****   End of Regulator Problem   *****
C
C
C   *****   End of Case   *****
C
C
   97 IF (CVOUT .LE. 0) GO TO 89
      GO TO (94,94,95), IOPT
   94 WRITE(IOUT,1931) NX
      WRITE(IOUT,1932) (X(II), II=1,NX)
      GO TO (89,95,95), IOPT
   95 WRITE(IOUT,2931) NXX
      WRITE(IOUT,1932) (THETA(II), II=1,NXX)
      GO TO (89,371,89), IOPT
  371 RSSDCV = ZERO
      DO 372 II = 1, NXX
      DELTCV(II) = X(II) - THETA(II)
      RSSDCV = RSSDCV + DELTCV(II)*DELTCV(II)
  372 CONTINUE
      RSSDCV = DSQRT(RSSDCV)
      WRITE(IOUT,2971) RSSDCV
      WRITE(IOUT,2972) (DELTCV(II), II=1,NXX)
   89 CVOUT = 0
      WRITE(IOUT,1908)  ICASE
C
      IF (MULT .LE. 0)  GO TO 999
      ITOUT = 0
      MULT  = 0
      WRITE(IOUT,1900)
      ICASE = ICASE + 1
      GO TO 100
  999 STOP
C
      END
C
C
C
C
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C
C
C
```

## B.1.3 Synthesised Input and Corresponding Output Data

**for the**
**(6 x 4) T-Matrix NLP Control Problem**
**on the**
**Hewlett-Packard Alpha Mainframe Computer**

```
    *********   INPUT    *****    INPUT   ********


 $CDATA
 !
 !  *****   Start of Case  1  Input Data   *****
 !                 NO Constraints
 !
  ACC     =    1.0D-8,
  ACC     =    1.0D-7,
  ACCQP   =    1.0D-12,
  CRAN1   =   15.0,
  CRAN2   =   20.0,
  CRAN3   =    7.0,
  CRAN3   =    2.0,
  CRAN4   =    5.0,
  CRAN4   =    1.5,
  CRAN5   =    0.02,
  CRAN6   =    0.02,
  CVOUT   =      0,
  CVOUT   =      1,
  GEQ     =    8.00,
  GMAX    =    3.00,  3.00,
  GMAX(3) =    1.00,  1.00,  1.00,  1.00,
  GMAX(3) =    1.50,  1.50,  1.50,  1.50,
  ICASE   =      1,
  IDATA   =      1,
  IDATA   =      0,
  IOPT    =      3,
  IOPT    =      1,
  IOPT    =      2,
  ITOUT   =      0,
  ITOUT   =      1,
  ISEED1  =  78985723,
  ISEED2  =  95428381,
  ISEED3  =  72919329,
  ISEED4  =  63237395,
  JSEED1  =  81692875,
  JSEED2  =  68377297,
  JSEED3  =  89672847,
  JSEED4  =  98351973,
  LQL     =   .FALSE.,
  LQL     =   .TRUE.,
  MAXNM   =    0,
  MAXNM   =   10,
  ME      =    0,
  MG      =    0,
  RHOB    =    0.0,
  RHOB    =  100.0,
  XL0     =   -2.3,  -2.3,  -2.3,  -2.3,
  XU0     =    2.3,   2.3,   2.3,   2.3,
  XL      =   -2.5,  -2.5,  -2.5,  -2.5,
  XU      =    2.5,   2.5,   2.5,   2.5,
 !
  MULT    =         0,
  MULT    =         1,
 !
 !  *****   End of Case  1  Input Data   *****
 !
 $END
 $CDATA
 !
 !  *****   Start of Case  2  Input Data   *****
 !            One Equality onstraint
 !           NO Inequality Constraints
```

```
!
 ACC     =    1.0D-8,
 ACC     =    1.0D-7,
 ACCQP   =    1.0D-12,
 CRAN1   =   15.0,
 CRAN2   =   20.0,
 CRAN3   =    7.0,
 CRAN3   =    2.0,
 CRAN4   =    5.0,
 CRAN4   =    1.5,
 CRAN5   =    0.02,
 CRAN6   =    0.02,
 CVOUT   =      0,
 CVOUT   =      1,
 GEQ     =    8.00,
 GMAX    =    3.00,  3.00,
 GMAX(3) =    1.00,  1.00,  1.00,  1.00,
 GMAX(3) =    1.50,  1.50,  1.50,  1.50,
 IDATA   =      1,
 IDATA   =      0,
 IOPT    =      2,
 IOPT    =      3,
 IOPT    =      1,
 ITOUT   =      1,
 ITOUT   =      0,
 ISEED1  =  78985723,
 ISEED2  =  95428381,
 ISEED3  =  72919329,
 ISEED4  =  63237395,
 JSEED1  =  81692875,
 JSEED2  =  68377297,
 JSEED3  =  89672847,
 JSEED4  =  98351973,
 LQL     =   .FALSE.,
 LQL     =   .TRUE.,
 MAXNM   =    0,
 MAXNM   =   10,
 ME      =    1,
 MG      =    1,
 RHOB    =    0.0,
 RHOB    =  100.0,
 XL0     =   -2.3,  -2.3,  -2.3,  -2.3,
 XU0     =    2.3,   2.3,   2.3,   2.3,
 XL      =   -2.5,  -2.5,  -2.5,  -2.5,
 XU      =    2.5,   2.5,   2.5,   2.5,
 MULT    =         0,
 MULT    =         1,
!
!  *****   End of Case  2  Input Data   *****
!
$END
$CDATA
!
!  *****   Start of Case  3  Input Data   *****
!            NO Equality onstraints
!           Six Inequality Constraints
!
 ACC     =    1.0D-8,
 ACC     =    1.0D-7,
 ACCQP   =    1.0D-12,
 CRAN1   =   15.0,
 CRAN2   =   20.0,
 CRAN3   =    7.0,
 CRAN3   =    2.0,
 CRAN4   =    5.0,
```

```
 CRAN4   =    1.5,
 CRAN5   =    0.02,
 CRAN6   =    0.02,
 CVOUT   =      0,
 CVOUT   =      1,
 GEQ     =    8.00,
 GMAX    =    3.00,  3.00,
 GMAX(3) =    1.00,  1.00,  1.00,  1.00,
 GMAX(3) =    1.50,  1.50,  1.50,  1.50,
 IDATA   =      1,
 IDATA   =      0,
 IOPT    =      2,
 IOPT    =      3,
 IOPT    =      1,
 ITOUT   =      1,
 ITOUT   =      0,
 ISEED1  =  78985723,
 ISEED2  =  95428381,
 ISEED3  =  72919329,
 ISEED4  =  63237395,
 JSEED1  =  81692875,
 JSEED2  =  68377297,
 JSEED3  =  89672847,
 JSEED4  =  98351973,
 LQL     =   .FALSE.,
 LQL     =   .TRUE.,
 MAXNM   =    0,
 MAXNM   =   10,
 ME      =    0,
 MG      =    6,
 RHOB    =    0.0,
 RHOB    =  100.0,
 XL0     =   -2.3,  -2.3,  -2.3,  -2.3,
 XU0     =    2.3,   2.3,   2.3,   2.3,
 XL      =   -2.5,  -2.5,  -2.5,  -2.5,
 XU      =    2.5,   2.5,   2.5,   2.5,
 MULT    =         0,
 MULT    =         1,
!
!  *****   End of Case  3  Input Data   *****
!
$END
$CDATA
!
!  *****   Start of Case  4  Input Data   *****
!             One Equality onstraint
!            Six Inequality Constraints
!
 ACC     =    1.0D-8,
 ACC     =    1.0D-7,
 ACCQP   =    1.0D-12,
 CRAN1   =   15.0,
 CRAN2   =   20.0,
 CRAN3   =    7.0,
 CRAN3   =    2.0,
 CRAN4   =    5.0,
 CRAN4   =    1.5,
 CRAN5   =    0.02,
 CRAN6   =    0.02,
 CVOUT   =      0,
 CVOUT   =      1,
 GEQ     =    8.00,
 GMAX    =    3.00,  3.00,
 GMAX(3) =    1.00,  1.00,  1.00,  1.00,
 GMAX(3) =    1.50,  1.50,  1.50,  1.50,
```

```
 IDATA   =      1,
 IDATA   =      0,
 IOPT    =      2,
 IOPT    =      3,
 IOPT    =      1,
 ITOUT   =      1,
 ITOUT   =      0,
 ISEED1  =  78985723,
 ISEED2  =  95428381,
 ISEED3  =  72919329,
 ISEED4  =  63237395,
 JSEED1  =  81692875,
 JSEED2  =  68377297,
 JSEED3  =  89672847,
 JSEED4  =  98351973,
 LQL     =   .FALSE.,
 LQL     =   .TRUE.,
 MAXNM   =    0,
 MAXNM   =   10,
 ME      =    1,
 MG      =    7,
 RHOB    =    0.0,
 RHOB    =  100.0,
 XL0     =   -2.3,  -2.3,  -2.3,  -2.3,
 XU0     =    2.3,   2.3,   2.3,   2.3,
 XL      =   -2.5,  -2.5,  -2.5,  -2.5,
 XU      =    2.5,   2.5,   2.5,   2.5,
 MULT    =         1,
 MULT    =         0,
!
!  *****   End of Case  4  Input Data   *****
!
$END


   *********   OUTPUT   *****   OUTPUT   ********


RUN the NLP6x4 Case.

START RUN.



********************************************************************************


        ***************   Start Case Number   1   ***************


                      *****   INPUT DATA   *****

&CDATA
ALPHA   =   1.00000000000000     ,
ACC     =  1.0000000000000000E-007,
ACCQP   =  1.0000000000000000E-012,
CRAN1   =   15.0000000000000     ,
CRAN2   =   20.0000000000000     ,
CRAN3   =   2.00000000000000     ,
CRAN4   =   1.50000000000000     ,
CRAN5   =  2.0000000000000000E-002,
CRAN6   =  2.0000000000000000E-002,
CRAN7   =  0.100000000000000     ,
```

```
CRAN8   =  0.100000000000000     ,
CVOUT   =           1,
EPS     =  1.000000000000000E-007,
GEQ     =   8.00000000000000     , 10*0.000000000000000E+000  ,
GMAX    = 2*3.00000000000000        , 9*1.50000000000000        ,
ICASE   =           1,
IDATA   =           0,
IN      =           5,
IOPT    =           2,
IOUT    =           6,
IPRINT  =           2,
ISEED1  =    78985723,
ISEED2  =    95428381,
ISEED3  =    72919329,
ISEED4  =    63237395,
ITOUT   =           1,
JSEED1  =    81692875,
JSEED2  =    68377297,
JSEED3  =    89672847,
JSEED4  =    98351973,
L       =           1,
LQL     = T,
MAXFUN  =          10,
MAXIT   =         100,
MAXNM   =          10,
ME      =           0,
MG      =           0,
MODE    =           0,
MULT    =           1,
RHOB    =   100.000000000000     ,
STPMIN  =  0.000000000000000E+000,
T       = 24*0.000000000000000E+000  ,
WDT     = 6*1.00000000000000        ,
WDX     = 4*0.000000000000000E+000  ,
WX      = 4*0.000000000000000E+000  ,
WZ      = 6*1.00000000000000        ,
XL      = 4*-2.50000000000000       , 4*-2.00000000000000       ,
XL0     = 4*-2.30000000000000       ,
XU      = 4*2.50000000000000        , 4*2.00000000000000        ,
XU0     = 4*2.30000000000000        ,
X0      = 4*0.000000000000000E+000  ,
ZA      = 6*0.000000000000000E+000
/
```

***** OUTPUT DATA *****

***** X0, ZA, and T are Randomly Defined *****

| CRAN1 | CRAN2 | CRAN3 | CRAN4 |
|---|---|---|---|
| CRAN5 | CRAN6 | CRAN7 | CRAN8 |
| 0.15000000D+02 | 0.20000000D+02 | 0.20000000D+01 | 0.15000000D+01 |
| 0.20000000D-01 | 0.20000000D-01 | 0.10000000D+00 | 0.10000000D+00 |

***** Control Vector During Previous Duty Cycle for Case Number 1 *****

| Element | G.L.B. | C.V. | L.U.B. |
|---|---|---|---|
| 1 | -0.23000000D+01 | 0.78395927D+00 | 0.23000000D+01 |
| 2 | -0.23000000D+01 | 0.22910524D+01 | 0.23000000D+01 |
| 3 | -0.23000000D+01 | -0.29088819D+00 | 0.23000000D+01 |
| 4 | -0.23000000D+01 | 0.65574372D+00 | 0.23000000D+01 |

***** Measurement Vectors from Previous Duty Cycle *****

| Element | Actual | Ideal | Delta |
|---|---|---|---|
| 1 | 0.39409224D+02 | 0.39420963D+02 | -0.11739089D-01 |
| 2 | -0.46865437D+02 | -0.46858421D+02 | -0.70162487D-02 |
| 3 | 0.79662038D+01 | 0.79713542D+01 | -0.51504469D-02 |
| 4 | 0.42413649D+02 | 0.42389640D+02 | 0.24008768D-01 |
| 5 | 0.13856233D+02 | 0.13874452D+02 | -0.18219316D-01 |
| 6 | 0.24296296D+02 | 0.24286124D+02 | 0.10172153D-01 |

***** Initial Control Vector Estimate for Case Number 1 *****

| Element | G.L.B. | C.V. | L.U.B. | Delta C.V. |
|---|---|---|---|---|
| 1 | -0.25000000D+01 | 0.78395927D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 2 | -0.25000000D+01 | 0.22910524D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 3 | -0.25000000D+01 | -0.29088819D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 4 | -0.25000000D+01 | 0.65574372D+00 | 0.25000000D+01 | 0.00000000D+00 |

Row ***** T-Matrix *****

| | | | | |
|---|---|---|---|---|
| 1 | 0.34788787D+00 | 0.14780229D+02 | -0.17892113D+02 | 0.12405574D+00 |
| 2 | 0.83601731D+01 | -0.24192777D+02 | -0.10221714D+02 | -0.14623272D+01 |
| 3 | -0.11511457D+01 | 0.92369419D+01 | 0.16556811D+02 | -0.11395201D+02 |
| 4 | 0.31760061D+02 | 0.65341014D+01 | 0.24324918D+01 | 0.49236619D+01 |
| 5 | -0.41143203D+01 | 0.14034983D+02 | -0.10135722D+02 | -0.27454829D+02 |
| 6 | -0.18296975D+01 | 0.12504480D+02 | 0.15932183D+02 | 0.26025379D+01 |

***** Predicted Measurement Vector *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|
| 1 | 0.39409224D+02 | 0.39409224D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 2 | -0.46865437D+02 | -0.46865437D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 3 | 0.79662038D+01 | 0.79662038D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 4 | 0.42413649D+02 | 0.42413649D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 5 | 0.13856233D+02 | 0.13856233D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 6 | 0.24296296D+02 | 0.24296296D+02 | 0.00000000D+00 | 0.10000000D+01 |

***** Initial Performance Index = 0.63941393D+04 *****

***** NO Constraints are Specified for Case Number 1 *****

***** Solve the NLPQLP Problem for Case Number 1 *****

```
------------------------------------------------------------------------
 START OF THE SEQUENTIAL QUADRATIC PROGRAMMING ALGORITHM
------------------------------------------------------------------------

 Parameters:
    N      =       4
    M      =       0
    ME     =       0
    MODE   =       0
    ACC    =   0.1000D-06
    ACCQP  =   0.1000D-11
    STPMIN =   0.0000D+00
    RHOB   =   0.1000D+03
    MAXFUN =      10
    MAXNM  =      10
    MAXIT  =     100
    IPRINT =       2

 Output in the following order:
    IT    - iteration number
    F     - objective function value
    SCV   - sum of constraint violations
    NA    - number of active constraints
    I     - number of line search iterations
    ALPHA - steplength parameter
    DELTA - additional variable to prevent inconsistency
    KKT   - Karush-Kuhn-Tucker optimality criterion


  IT         F           SCV      NA  I    ALPHA     DELTA     KKT
------------------------------------------------------------------------
   1  0.63941393D+04  0.00D+00    0  0  0.00D+00  0.00D+00  0.64D+05
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   2  0.16753228D+04  0.00D+00    0  2  0.30D+00  0.00D+00  0.23D+05
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   3  0.73269164D+03  0.00D+00    0  2  0.10D+00  0.00D+00  0.68D+04
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   4  0.58881236D+03  0.00D+00    0  3  0.49D-01  0.00D+00  0.11D+05
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   5  0.57414343D+03  0.00D+00    0  4  0.25D-02  0.00D+00  0.24D+04
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   6  0.53135752D+03  0.00D+00    0  3  0.41D-01  0.00D+00  0.92D+04
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   7  0.96517316D+02  0.00D+00    0  2  0.13D+00  0.00D+00  0.66D+03
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   8  0.43830997D+02  0.00D+00    0  2  0.14D+00  0.00D+00  0.10D+03
```

```
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
 9  0.14120353D+01  0.00D+00    0  1  0.10D+01  0.00D+00  0.28D+01
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
10  0.97304208D-04  0.00D+00    0  1  0.10D+01  0.00D+00  0.11D-05
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
11  0.96739062D-04  0.00D+00    0  1  0.10D+01  0.00D+00  0.40D-09


--- Final Convergence Analysis at Last Iterate ---

  Objective function value:      F(X)  =  0.96739062D-04
  Solution values:               X     =
    -0.56957046D-03 -0.11796791D-03 -0.46940798D-03 -0.58197946D-03
  Distances from lower bounds:   X-XL  =
     0.24994304D+01  0.24998820D+01  0.24995306D+01  0.24994180D+01
  Distances from upper bounds:   XU-X  =
     0.25005696D+01  0.25001180D+01  0.25004694D+01  0.25005820D+01
  Multipliers for lower bounds:  U     =
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
  Multipliers for upper bounds:  U     =
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
  Number of function calls:      NFUNC =      22
  Number of gradient calls:      NGRAD =      11
  Number of calls of QP solver:  NQL   =      11



           *****   Completed CALL to NLPQLP   *****


    *****   Number of Function Evaluations  =     66   *****


   *****   Solution Control Vector for Case Number   1   *****

Element     G.L.B.            C.V.              L.U.B.            Delta C.V.

   1    -0.25000000D+01   -0.56957046D-03    0.25000000D+01   -0.78452884D+00
   2    -0.25000000D+01   -0.11796791D-03    0.25000000D+01   -0.22911704D+01
   3    -0.25000000D+01   -0.46940798D-03    0.25000000D+01    0.29041878D+00
   4    -0.25000000D+01   -0.58197946D-03    0.25000000D+01   -0.65632570D+00


             *****   Predicted Measurement Vector   *****

Element     Z Vector          ZA Vector         Delta Z           Diag[W]

   1    -0.53543139D-02    0.39409224D+02   -0.39414578D+02    0.10000000D+01
   2    -0.32749326D-02   -0.46865437D+02    0.46862162D+02    0.10000000D+01
   3    -0.67257169D-02    0.79662038D+01   -0.79729295D+01    0.10000000D+01
   4     0.11415520D-02    0.42413649D+02   -0.42412507D+02    0.10000000D+01
   5     0.32015917D-02    0.13856233D+02   -0.13853031D+02    0.10000000D+01
   6     0.74610957D-03    0.24296296D+02   -0.24295550D+02    0.10000000D+01


*****   NLP Solution Performance Index  =   0.96739062D-04   *****


*****   NO Constraints are Specified for Case Number   1   *****


*****   Solve the Regulator Problem for Case Number   1   *****
```

```
                *****   Alpha  =      0.10000000D+01   *****

  Dim                   *****   WZ-Vector   *****

   6     0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
         0.10000000D+01    0.10000000D+01

  Dim                   *****   WX-Vector   *****

   4     0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00


  Dim                   *****   WDX-Vector   *****

   4     0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00


     *****   Matrix [DUMXX1] was Successfully Inverted
                                    to Yield Matrix [DD].   *****

  Dim          *****   The Solution Control Vector   *****

   1    -0.56967390D-03

   2    -0.11782527D-03

   3    -0.46951007D-03

   4    -0.58223955D-03

  Dim        *****   The Solution Measurement Vector   *****

   6    -0.53504597D-02   -0.32776779D-02   -0.67218674D-02    0.11371777D-02
         0.32149401D-02    0.74551868D-03


*****   Regulator Solution Performance Index  =   0.96738904D-04   *****


             *****   NLP Special Control  4-Vector Output   *****

CV =
    -0.569570463442268D-03,  -0.117967908229805D-03,  -0.469407978425152D-03,
    -0.581979456589788D-03,


          *****   Regulator Special Control  4-Vector Output   *****

CV =
    -0.569673895128187D-03,  -0.117825271132688D-03,  -0.469510073144330D-03,
    -0.582239546263907D-03,


   *****   Root-Sum-Squared Delta CV Elements  =   0.33032321D-06   *****

Delta CV =
     0.103431685918561D-06,  -0.142637097117412D-06,   0.102094719178715D-06,
     0.260089674119883D-06,


               *****   End Case Number   1   *****
```

```
********************************************************************************


        ***************   Start Case Number   2   ***************


                        *****   INPUT DATA   *****

&CDATA
ALPHA   =   1.00000000000000     ,
ACC     =  1.0000000000000000E-007,
ACCQP   =  1.0000000000000000E-012,
CRAN1   =   15.0000000000000     ,
CRAN2   =   20.0000000000000     ,
CRAN3   =   2.00000000000000     ,
CRAN4   =   1.50000000000000     ,
CRAN5   =  2.0000000000000000E-002,
CRAN6   =  2.0000000000000000E-002,
CRAN7   =  0.100000000000000     ,
CRAN8   =  0.100000000000000     ,
CVOUT   =           1,
EPS     =  1.0000000000000000E-007,
GEQ     =   8.00000000000000     , 10*0.0000000000000000E+000  ,
GMAX    = 2*3.00000000000000        , 9*1.50000000000000        ,
ICASE   =           2,
IDATA   =           0,
IN      =           5,
IOPT    =           1,
IOUT    =           6,
IPRINT  =           2,
ISEED1  =    78985723,
ISEED2  =    95428381,
ISEED3  =    72919329,
ISEED4  =    63237395,
ITOUT   =           0,
JSEED1  =    81692875,
JSEED2  =    68377297,
JSEED3  =    89672847,
JSEED4  =    98351973,
L       =           1,
LQL     = T,
MAXFUN  =          10,
MAXIT   =         100,
MAXNM   =          10,
ME      =           1,
MG      =           1,
MODE    =           0,
MULT    =           1,
RHOB    =   100.000000000000     ,
STPMIN  =  0.0000000000000000E+000,
T       =  0.347887873649597     ,   8.36017310619354     ,  -1.15114569664001     ,
31.7600607872009     ,
  -4.11432027816772     ,  -1.82969748973846     ,   14.7802293300629     ,  -
24.1927772760391     ,   9.23694193363190     ,
   6.53410136699677     ,   14.0349829196930     ,   12.5044798851013     ,  -
17.8921127319336     ,  -10.2217143774033     ,
   16.5568113327026     ,   2.43249177932739     ,  -10.1357221603394     ,
15.9321832656860     ,  0.124055743217468     ,
  -1.46232724189758     ,  -11.3952010869980     ,   4.92366194725037     ,  -
27.4548292160034     ,   2.60253787040710     ,
WDT     = 6*1.00000000000000        ,
WDX     = 4*0.000000000000000E+000  ,
WX      = 4*0.000000000000000E+000  ,
WZ      = 6*1.00000000000000        ,
```

```
XL      = 4*-2.50000000000000       , 4*-2.00000000000000       ,
XL0     = 4*-2.30000000000000       ,
XU      = 4*2.50000000000000        , 4*2.00000000000000        ,
XU0     = 4*2.30000000000000        ,
X0      =  0.783959269523621     ,   2.29105240106583     , -0.290888190269470     ,
0.655743718147278     ,
ZA      =   39.4092237957620     ,  -46.8654374200564     ,   7.96620379418114     ,
42.4136487086864     ,
   13.8562325663109     ,   24.2962964124183
/
```

*****  OUTPUT DATA  *****

*****  X0, ZA, and T are Randomly Defined  *****

| CRAN1 | CRAN2 | CRAN3 | CRAN4 |
|---|---|---|---|
| CRAN5 | CRAN6 | CRAN7 | CRAN8 |
| 0.15000000D+02 | 0.20000000D+02 | 0.20000000D+01 | 0.15000000D+01 |
| 0.20000000D-01 | 0.20000000D-01 | 0.10000000D+00 | 0.10000000D+00 |

*****  Control Vector During Previous Duty Cycle for Case Number  2  *****

| Element | G.L.B. | C.V. | L.U.B. |
|---|---|---|---|
| 1 | -0.23000000D+01 | 0.78395927D+00 | 0.23000000D+01 |
| 2 | -0.23000000D+01 | 0.22910524D+01 | 0.23000000D+01 |
| 3 | -0.23000000D+01 | -0.29088819D+00 | 0.23000000D+01 |
| 4 | -0.23000000D+01 | 0.65574372D+00 | 0.23000000D+01 |

*****  Measurement Vectors from Previous Duty Cycle  *****

| Element | Actual | Ideal | Delta |
|---|---|---|---|
| 1 | 0.39409224D+02 | 0.39420963D+02 | -0.11739089D-01 |
| 2 | -0.46865437D+02 | -0.46858421D+02 | -0.70162487D-02 |
| 3 | 0.79662038D+01 | 0.79713542D+01 | -0.51504469D-02 |
| 4 | 0.42413649D+02 | 0.42389640D+02 | 0.24008768D-01 |
| 5 | 0.13856233D+02 | 0.13874452D+02 | -0.18219316D-01 |
| 6 | 0.24296296D+02 | 0.24286124D+02 | 0.10172153D-01 |

*****  Initial Control Vector Estimate for Case Number  2  *****

| Element | G.L.B. | C.V. | L.U.B. | Delta C.V. |
|---|---|---|---|---|
| 1 | -0.25000000D+01 | 0.78395927D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 2 | -0.25000000D+01 | 0.22910524D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 3 | -0.25000000D+01 | -0.29088819D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 4 | -0.25000000D+01 | 0.65574372D+00 | 0.25000000D+01 | 0.00000000D+00 |

*****  T-Matrix Output is Suppressed  *****

*****  Predicted Measurement Vector  *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|
| 1 | 0.39409224D+02 | 0.39409224D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 2 | -0.46865437D+02 | -0.46865437D+02 | 0.00000000D+00 | 0.10000000D+01 |

```
   3     0.79662038D+01    0.79662038D+01    0.00000000D+00    0.10000000D+01
   4     0.42413649D+02    0.42413649D+02    0.00000000D+00    0.10000000D+01
   5     0.13856233D+02    0.13856233D+02    0.00000000D+00    0.10000000D+01
   6     0.24296296D+02    0.24296296D+02    0.00000000D+00    0.10000000D+01

 *****   Initial Performance Index  =   0.63941393D+04   *****

*****   Initial Constraint Function Values for Case Number   2   *****

                    Equality Constraints

Element          Value               Target          Value - Target

   1         0.11805165D+01      0.80000000D+01     -0.68194835D+01

 *****   Solve the NLPQLP Problem for Case Number   2   *****



 ------------------------------------------------------------------------
  START OF THE SEQUENTIAL QUADRATIC PROGRAMMING ALGORITHM
 ------------------------------------------------------------------------

  Parameters:
     N      =       4
     M      =       1
     ME     =       1
     MODE   =       0
     ACC    =   0.1000D-06
     ACCQP  =   0.1000D-11
     STPMIN =   0.0000D+00
     RHOB   =   0.1000D+03
     MAXFUN =      10
     MAXNM  =      10
     MAXIT  =     100
     IPRINT =       2

  Output in the following order:
     IT    - iteration number
     F     - objective function value
     SCV   - sum of constraint violations
     NA    - number of active constraints
     I     - number of line search iterations
     ALPHA - steplength parameter
     DELTA - additional variable to prevent inconsistency
     KKT   - Karush-Kuhn-Tucker optimality criterion

   IT         F           SCV      NA  I    ALPHA     DELTA     KKT
 ------------------------------------------------------------------------
    1  0.63941393D+04  0.68D+01    1  0  0.00D+00  0.00D+00  0.27D+06
             *****   Completed CALL to NLPQLP   *****
             *****   Completed CALL to NLPQLP   *****
    2  0.22908807D+05  0.30D+01    1  1  0.10D+01  0.00D+00  0.49D+05
             *****   Completed CALL to NLPQLP   *****
             *****   Completed CALL to NLPQLP   *****
    3  0.12303114D+05  0.13D-07    1  1  0.10D+01  0.00D+00  0.79D+04
             *****   Completed CALL to NLPQLP   *****
             *****   Completed CALL to NLPQLP   *****
             *****   Completed CALL to NLPQLP   *****
             *****   Completed CALL to NLPQLP   *****
```

```
 4  0.12162296D+05  0.52D-02    1  3  0.38D-01  0.00D+00  0.12D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 5  0.12060048D+05  0.20D-02    1  2  0.16D+00  0.00D+00  0.15D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 6  0.12042452D+05  0.25D-02    1  3  0.17D-01  0.00D+00  0.11D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 7  0.11930985D+05  0.11D-02    1  2  0.21D+00  0.00D+00  0.36D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 8  0.11904176D+05  0.14D-02    1  2  0.10D+00  0.00D+00  0.95D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 9  0.11897408D+05  0.13D-02    1  4  0.82D-02  0.00D+00  0.33D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
10  0.11872048D+05  0.15D-02    1  2  0.10D+00  0.00D+00  0.19D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
11  0.11840005D+05  0.20D-02    1  2  0.19D+00  0.00D+00  0.13D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
12  0.11809369D+05  0.25D-02    1  2  0.30D+00  0.00D+00  0.68D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
13  0.11786901D+05  0.27D-02    1  2  0.50D+00  0.00D+00  0.23D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
14  0.11777277D+05  0.14D-02    1  1  0.10D+01  0.00D+00  0.40D+01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
15  0.11775259D+05  0.17D-06    1  1  0.10D+01  0.00D+00  0.69D-02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
16  0.11775256D+05  0.49D-06    1  1  0.10D+01  0.00D+00  0.14D-02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
17  0.11775255D+05  0.49D-10    1  1  0.10D+01  0.00D+00  0.15D-06
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
18  0.11775255D+05  0.45D-13    1  1  0.10D+01  0.00D+00  0.13D-09


--- Final Convergence Analysis at Last Iterate ---

  Objective function value:      F(X)  =  0.11775255D+05
  Solution values:               X     =
     0.97346577D+00  0.24682087D+01 -0.24665435D+01  0.19641737D+01
  Distances from lower bounds:   X-XL  =
     0.34734658D+01  0.49682087D+01  0.33456463D-01  0.44641737D+01
  Distances from upper bounds:   XU-X  =
```

```
   0.15265342D+01  0.31791343D-01  0.49665435D+01  0.53582627D+00
Multipliers for lower bounds:  U     =
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
Multipliers for upper bounds:  U     =
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
Constraint values:             G(X)  =
   0.45297099D-13
Multipliers for constraints:   U     =
  -0.14718317D+04
Number of function calls:      NFUNC =      32
Number of gradient calls:      NGRAD =      18
Number of calls of QP solver:  NQL   =      18


          *****   Completed CALL to NLPQLP   *****


     *****   Number of Function Evaluations  =    104   *****


    *****   Solution Control Vector for Case Number   2   *****

Element     G.L.B.            C.V.              L.U.B.            Delta C.V.

   1    -0.25000000D+01    0.97346577D+00    0.25000000D+01    0.18950650D+00
   2    -0.25000000D+01    0.24682087D+01    0.25000000D+01    0.17715626D+00
   3    -0.25000000D+01   -0.24665435D+01    0.25000000D+01   -0.21756553D+01
   4    -0.25000000D+01    0.19641737D+01    0.25000000D+01    0.13084300D+01


          *****   Predicted Measurement Vector   *****

Element     Z Vector          ZA Vector         Delta Z           Diag[W]

   1     0.81182950D+02    0.39409224D+02    0.41773726D+02    0.10000000D+01
   2    -0.29241458D+02   -0.46865437D+02    0.17623980D+02    0.10000000D+01
   3    -0.41547304D+02    0.79662038D+01   -0.49513508D+02    0.10000000D+01
   4     0.50739948D+02    0.42413649D+02    0.83262991D+01    0.10000000D+01
   5     0.16920373D+01    0.13856233D+02   -0.12164195D+02    0.10000000D+01
   6    -0.50928968D+01    0.24296296D+02   -0.29389193D+02    0.10000000D+01


*****   NLP Solution Performance Index  =   0.11775255D+05   *****


*****   Solution Constraint Function Values for Case Number   2   *****

                  Equality Constraints

Element          Value               Target          Value - Target

   1         0.80000000D+01      0.80000000D+01     -0.45297099D-13


          *****   NLP Special Control  4-Vector Output   *****

CV =
     0.973465766044197D+00,   0.246820865722360D+01,  -0.246654353688905D+01,
     0.196417373422527D+01,


            *****   End Case Number   2   *****
```

```
********************************************************************************


        ***************   Start Case Number   3   ***************


                        *****   INPUT DATA   *****

&CDATA
ALPHA   =   1.00000000000000     ,
ACC     =  1.0000000000000000E-007,
ACCQP   =  1.0000000000000000E-012,
CRAN1   =   15.0000000000000     ,
CRAN2   =   20.0000000000000     ,
CRAN3   =   2.00000000000000     ,
CRAN4   =   1.50000000000000     ,
CRAN5   =  2.0000000000000000E-002,
CRAN6   =  2.0000000000000000E-002,
CRAN7   =  0.100000000000000     ,
CRAN8   =  0.100000000000000     ,
CVOUT   =           1,
EPS     =  1.0000000000000000E-007,
GEQ     =   8.00000000000000     , 10*0.0000000000000000E+000  ,
GMAX    = 2*3.00000000000000        , 9*1.50000000000000        ,
ICASE   =           3,
IDATA   =           0,
IN      =           5,
IOPT    =           1,
IOUT    =           6,
IPRINT  =           2,
ISEED1  =    78985723,
ISEED2  =    95428381,
ISEED3  =    72919329,
ISEED4  =    63237395,
ITOUT   =           0,
JSEED1  =    81692875,
JSEED2  =    68377297,
JSEED3  =    89672847,
JSEED4  =    98351973,
L       =           1,
LQL     = T,
MAXFUN  =          10,
MAXIT   =         100,
MAXNM   =          10,
ME      =           0,
MG      =           6,
MODE    =           0,
MULT    =           1,
RHOB    =   100.000000000000     ,
STPMIN  =  0.0000000000000000E+000,
T       =  0.347887873649597     ,   8.36017310619354     ,  -1.15114569664001
,   31.7600607872009     ,
  -4.11432027816772     ,  -1.82969748973846     ,   14.7802293300629     ,  -
24.1927772760391     ,   9.23694193363190     ,
   6.53410136699677     ,   14.0349829196930     ,   12.5044798851013     ,  -
17.8921127319336     ,  -10.2217143774033     ,
   16.5568113327026     ,   2.43249177932739     ,  -10.1357221603394     ,
15.9321832656860     ,  0.124055743217468     ,
  -1.46232724189758     ,  -11.3952010869980     ,   4.92366194725037     ,  -
27.4548292160034     ,   2.60253787040710     ,
WDT     = 6*1.00000000000000        ,
WDX     = 4*0.000000000000000E+000  ,
WX      = 4*0.000000000000000E+000  ,
WZ      = 6*1.00000000000000        ,
```

```
XL      = 4*-2.50000000000000       , 4*-2.00000000000000       ,
XL0     = 4*-2.30000000000000       ,
XU      = 4*2.50000000000000        , 4*2.00000000000000        ,
XU0     = 4*2.30000000000000        ,
X0      =  0.783959269523621     ,   2.29105240106583     , -0.290888190269470     ,
0.655743718147278     ,
ZA      =   39.4092237957620     ,  -46.8654374200564     ,   7.96620379418114     ,
42.4136487086864     ,
   13.8562325663109     ,   24.2962964124183
/
```

*****  OUTPUT DATA  *****

*****  X0, ZA, and T are Randomly Defined  *****

| CRAN1 | CRAN2 | CRAN3 | CRAN4 |
|---|---|---|---|
| CRAN5 | CRAN6 | CRAN7 | CRAN8 |
| 0.15000000D+02 | 0.20000000D+02 | 0.20000000D+01 | 0.15000000D+01 |
| 0.20000000D-01 | 0.20000000D-01 | 0.10000000D+00 | 0.10000000D+00 |

*****  Control Vector During Previous Duty Cycle for Case Number  3  *****

| Element | G.L.B. | C.V. | L.U.B. |
|---|---|---|---|
| 1 | -0.23000000D+01 | 0.78395927D+00 | 0.23000000D+01 |
| 2 | -0.23000000D+01 | 0.22910524D+01 | 0.23000000D+01 |
| 3 | -0.23000000D+01 | -0.29088819D+00 | 0.23000000D+01 |
| 4 | -0.23000000D+01 | 0.65574372D+00 | 0.23000000D+01 |

*****  Measurement Vectors from Previous Duty Cycle  *****

| Element | Actual | Ideal | Delta |
|---|---|---|---|
| 1 | 0.39409224D+02 | 0.39420963D+02 | -0.11739089D-01 |
| 2 | -0.46865437D+02 | -0.46858421D+02 | -0.70162487D-02 |
| 3 | 0.79662038D+01 | 0.79713542D+01 | -0.51504469D-02 |
| 4 | 0.42413649D+02 | 0.42389640D+02 | 0.24008768D-01 |
| 5 | 0.13856233D+02 | 0.13874452D+02 | -0.18219316D-01 |
| 6 | 0.24296296D+02 | 0.24286124D+02 | 0.10172153D-01 |

*****  Initial Control Vector Estimate for Case Number  3  *****

| Element | G.L.B. | C.V. | L.U.B. | Delta C.V. |
|---|---|---|---|---|
| 1 | -0.25000000D+01 | 0.78395927D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 2 | -0.25000000D+01 | 0.22910524D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 3 | -0.25000000D+01 | -0.29088819D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 4 | -0.25000000D+01 | 0.65574372D+00 | 0.25000000D+01 | 0.00000000D+00 |

*****  T-Matrix Output is Suppressed  *****

*****  Predicted Measurement Vector  *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|
| 1 | 0.39409224D+02 | 0.39409224D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 2 | -0.46865437D+02 | -0.46865437D+02 | 0.00000000D+00 | 0.10000000D+01 |

```
   3     0.79662038D+01    0.79662038D+01    0.00000000D+00    0.10000000D+01
   4     0.42413649D+02    0.42413649D+02    0.00000000D+00    0.10000000D+01
   5     0.13856233D+02    0.13856233D+02    0.00000000D+00    0.10000000D+01
   6     0.24296296D+02    0.24296296D+02    0.00000000D+00    0.10000000D+01

 *****   Initial Performance Index  =   0.63941393D+04   *****

*****   Initial Constraint Function Values for Case Number   3   *****

                  Inequality Constraints

Element          Value               L.U.B.          L.U.B. - Value

   1         0.24214692D+01      0.30000000D+01      0.57853077D+00
   2         0.71736724D+00      0.30000000D+01      0.22826328D+01
   3         0.00000000D+00      0.15000000D+01      0.15000000D+01
   4         0.00000000D+00      0.15000000D+01      0.15000000D+01
   5         0.00000000D+00      0.15000000D+01      0.15000000D+01
   6         0.00000000D+00      0.15000000D+01      0.15000000D+01

 *****   Solve the NLPQLP Problem for Case Number   3   *****


 ------------------------------------------------------------------------
  START OF THE SEQUENTIAL QUADRATIC PROGRAMMING ALGORITHM
 ------------------------------------------------------------------------

  Parameters:
     N      =       4
     M      =       6
     ME     =       0
     MODE   =       0
     ACC    =   0.1000D-06
     ACCQP  =   0.1000D-11
     STPMIN =   0.0000D+00
     RHOB   =   0.1000D+03
     MAXFUN =      10
     MAXNM  =      10
     MAXIT  =     100
     IPRINT =       2

  Output in the following order:
     IT    - iteration number
     F     - objective function value
     SCV   - sum of constraint violations
     NA    - number of active constraints
     I     - number of line search iterations
     ALPHA - steplength parameter
     DELTA - additional variable to prevent inconsistency
     KKT   - Karush-Kuhn-Tucker optimality criterion

   IT         F           SCV      NA  I    ALPHA     DELTA     KKT
 ------------------------------------------------------------------------
    1  0.63941393D+04  0.00D+00    6  0  0.00D+00  0.00D+00  0.63D+05
             *****   Completed CALL to NLPQLP   *****
             *****   Completed CALL to NLPQLP   *****
             *****   Completed CALL to NLPQLP   *****
    2  0.15658547D+04  0.00D+00    1  2  0.30D+00  0.00D+00  0.73D+04
             *****   Completed CALL to NLPQLP   *****
```

```
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 3  0.93338349D+03  0.00D+00    3  2  0.19D+00  0.00D+00  0.81D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 4  0.71362593D+03  0.00D+00    3  2  0.11D+00  0.00D+00  0.23D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 5  0.71024940D+03  0.00D+00    3  2  0.10D+00  0.00D+00  0.44D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 6  0.70123098D+03  0.00D+00    3  2  0.10D+00  0.00D+00  0.96D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 7  0.65415314D+03  0.00D+00    1  1  0.10D+01  0.00D+00  0.15D-01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 8  0.65414641D+03  0.00D+00    1  1  0.10D+01  0.00D+00  0.11D-03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 9  0.65414636D+03  0.00D+00    1  1  0.10D+01  0.00D+00  0.18D-07


--- Final Convergence Analysis at Last Iterate ---

  Objective function value:      F(X)  =  0.65414636D+03
  Solution values:               X     =
    -0.38795186D-01  0.79105240D+00 -0.21292813D+00  0.38199544D+00
  Distances from lower bounds:   X-XL  =
     0.24612048D+01  0.32910524D+01  0.22870719D+01  0.28819954D+01
  Distances from upper bounds:   XU-X  =
     0.25387952D+01  0.17089476D+01  0.27129281D+01  0.21180046D+01
  Multipliers for lower bounds:  U     =
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
  Multipliers for upper bounds:  U     =
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
  Constraint values:             G(X)  =
     0.22079969D+01  0.25626684D+01  0.67724554D+00  0.00000000D+00
     0.14220399D+01  0.12262517D+01
  Multipliers for constraints:   U     =
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.16536179D+04
     0.00000000D+00  0.00000000D+00
  Number of function calls:      NFUNC =      14
  Number of gradient calls:      NGRAD =       9
  Number of calls of QP solver:  NQL   =       9



          *****   Completed CALL to NLPQLP   *****


     *****   Number of Function Evaluations  =     50   *****


    *****   Solution Control Vector for Case Number   3   *****

Element     G.L.B.            C.V.              L.U.B.            Delta C.V.

   1    -0.25000000D+01   -0.38795186D-01    0.25000000D+01   -0.82275446D+00
   2    -0.25000000D+01    0.79105240D+00    0.25000000D+01   -0.15000000D+01
   3    -0.25000000D+01   -0.21292813D+00    0.25000000D+01    0.77960064D-01
   4    -0.25000000D+01    0.38199544D+00    0.25000000D+01   -0.27374828D+00
```

***** Predicted Measurement Vector *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|
| 1 | 0.15523823D+02 | 0.39409224D+02 | -0.23885401D+02 | 0.10000000D+01 |
| 2 | -0.17851217D+02 | -0.46865437D+02 | 0.29014220D+02 | 0.10000000D+01 |
| 3 | -0.53191320D+00 | 0.79662038D+01 | -0.84981170D+01 | 0.10000000D+01 |
| 4 | 0.53235588D+01 | 0.42413649D+02 | -0.37090090D+02 | 0.10000000D+01 |
| 5 | 0.29143616D+01 | 0.13856233D+02 | -0.10941871D+02 | 0.10000000D+01 |
| 6 | 0.75746024D+01 | 0.24296296D+02 | -0.16721694D+02 | 0.10000000D+01 |

***** NLP Solution Performance Index = 0.65414636D+03 *****

***** Solution Constraint Function Values for Case Number 3 *****

Inequality Constraints

| Element | Value | L.U.B. | L.U.B. - Value |
|---|---|---|---|
| 1 | 0.79200314D+00 | 0.30000000D+01 | 0.22079969D+01 |
| 2 | 0.43733157D+00 | 0.30000000D+01 | 0.25626684D+01 |
| 3 | 0.82275446D+00 | 0.15000000D+01 | 0.67724554D+00 |
| 4 | 0.15000000D+01 | 0.15000000D+01 | 0.00000000D+00 |
| 5 | 0.77960064D-01 | 0.15000000D+01 | 0.14220399D+01 |
| 6 | 0.27374828D+00 | 0.15000000D+01 | 0.12262517D+01 |

***** NLP Special Control 4-Vector Output *****

CV =
-0.387951863227875D-01, 0.791052401065827D+00, -0.212928126296347D+00,
0.381995435765150D+00,

***** End Case Number 3 *****

**********

********** Start Case Number 4 **********

***** INPUT DATA *****

```
&CDATA
ALPHA   =   1.00000000000000     ,
ACC     =  1.0000000000000000E-007,
ACCQP   =  1.0000000000000000E-012,
CRAN1   =   15.0000000000000     ,
CRAN2   =   20.0000000000000     ,
CRAN3   =   2.00000000000000     ,
CRAN4   =   1.50000000000000     ,
CRAN5   =  2.0000000000000000E-002,
CRAN6   =  2.0000000000000000E-002,
CRAN7   =  0.100000000000000     ,
CRAN8   =  0.100000000000000     ,
```

```
CVOUT   =           1,
EPS     =  1.000000000000000E-007,
GEQ     =   8.00000000000000     , 10*0.000000000000000E+000  ,
GMAX    = 2*3.00000000000000        , 9*1.50000000000000        ,
ICASE   =           4,
IDATA   =           0,
IN      =           5,
IOPT    =           1,
IOUT    =           6,
IPRINT  =           2,
ISEED1  =    78985723,
ISEED2  =    95428381,
ISEED3  =    72919329,
ISEED4  =    63237395,
ITOUT   =           0,
JSEED1  =    81692875,
JSEED2  =    68377297,
JSEED3  =    89672847,
JSEED4  =    98351973,
L       =           1,
LQL     = T,
MAXFUN  =          10,
MAXIT   =         100,
MAXNM   =          10,
ME      =           1,
MG      =           7,
MODE    =           0,
MULT    =           0,
RHOB    =   100.000000000000     ,
STPMIN  =  0.000000000000000E+000,
T       =  0.347887873649597     ,   8.36017310619354     ,  -1.15114569664001
,   31.7600607872009     ,
  -4.11432027816772     ,  -1.82969748973846     ,   14.7802293300629     ,  -
24.1927772760391     ,   9.23694193363190     ,
   6.53410136699677     ,   14.0349829196930     ,   12.5044798851013     ,  -
17.8921127319336     ,  -10.2217143774033     ,
   16.5568113327026     ,   2.43249177932739     ,  -10.1357221603394     ,
15.9321832656860     ,  0.124055743217468     ,
  -1.46232724189758     ,  -11.3952010869980     ,   4.92366194725037     ,  -
27.4548292160034     ,   2.60253787040710     ,
WDT     = 6*1.00000000000000        ,
WDX     = 4*0.000000000000000E+000  ,
WX      = 4*0.000000000000000E+000  ,
WZ      = 6*1.00000000000000        ,
XL      = 4*-2.50000000000000       , 4*-2.00000000000000       ,
XL0     = 4*-2.30000000000000       ,
XU      = 4*2.50000000000000        , 4*2.00000000000000        ,
XU0     = 4*2.30000000000000        ,
X0      =  0.783959269523621     ,   2.29105240106583     , -0.290888190269470
,  0.655743718147278     ,
ZA      =   39.4092237957620     ,  -46.8654374200564     ,   7.96620379418114
,   42.4136487086864     ,
   13.8562325663109     ,   24.2962964124183
/
```

```
                    *****   OUTPUT DATA   *****

            *****   X0, ZA, and T are Randomly Defined   *****

       CRAN1               CRAN2               CRAN3               CRAN4
       CRAN5               CRAN6               CRAN7               CRAN8

     0.15000000D+02      0.20000000D+02      0.20000000D+01      0.15000000D+01
```

```
   0.20000000D-01      0.20000000D-01      0.10000000D+00      0.10000000D+00

 *****   Control Vector During Previous Duty Cycle for Case Number   4   *****

Element         G.L.B.              C.V.                L.U.B.

   1        -0.23000000D+01      0.78395927D+00      0.23000000D+01
   2        -0.23000000D+01      0.22910524D+01      0.23000000D+01
   3        -0.23000000D+01     -0.29088819D+00      0.23000000D+01
   4        -0.23000000D+01      0.65574372D+00      0.23000000D+01


         *****   Measurement Vectors from Previous Duty Cycle   *****

Element         Actual              Ideal               Delta

   1         0.39409224D+02      0.39420963D+02     -0.11739089D-01
   2        -0.46865437D+02     -0.46858421D+02     -0.70162487D-02
   3         0.79662038D+01      0.79713542D+01     -0.51504469D-02
   4         0.42413649D+02      0.42389640D+02      0.24008768D-01
   5         0.13856233D+02      0.13874452D+02     -0.18219316D-01
   6         0.24296296D+02      0.24286124D+02      0.10172153D-01


     *****   Initial Control Vector Estimate for Case Number    4   *****

Element     G.L.B.            C.V.              L.U.B.            Delta C.V.

   1    -0.25000000D+01    0.78395927D+00    0.25000000D+01    0.00000000D+00
   2    -0.25000000D+01    0.22910524D+01    0.25000000D+01    0.00000000D+00
   3    -0.25000000D+01   -0.29088819D+00    0.25000000D+01    0.00000000D+00
   4    -0.25000000D+01    0.65574372D+00    0.25000000D+01    0.00000000D+00


              *****   T-Matrix Output is Suppressed   *****


              *****   Predicted Measurement Vector   *****

Element     Z Vector          ZA Vector         Delta Z           Diag[W]

   1     0.39409224D+02    0.39409224D+02    0.00000000D+00    0.10000000D+01
   2    -0.46865437D+02   -0.46865437D+02    0.00000000D+00    0.10000000D+01
   3     0.79662038D+01    0.79662038D+01    0.00000000D+00    0.10000000D+01
   4     0.42413649D+02    0.42413649D+02    0.00000000D+00    0.10000000D+01
   5     0.13856233D+02    0.13856233D+02    0.00000000D+00    0.10000000D+01
   6     0.24296296D+02    0.24296296D+02    0.00000000D+00    0.10000000D+01


 *****   Initial Performance Index  =   0.63941393D+04   *****


*****   Initial Constraint Function Values for Case Number   4   *****

                  Equality Constraints

Element          Value               Target          Value - Target

   1         0.11805165D+01      0.80000000D+01     -0.68194835D+01

                Inequality Constraints

Element          Value               L.U.B.          L.U.B. - Value
```

```
  1         0.24214692D+01      0.30000000D+01      0.57853077D+00
  2         0.71736724D+00      0.30000000D+01      0.22826328D+01
  3         0.00000000D+00      0.15000000D+01      0.15000000D+01
  4         0.00000000D+00      0.15000000D+01      0.15000000D+01
  5         0.00000000D+00      0.15000000D+01      0.15000000D+01
  6         0.00000000D+00      0.15000000D+01      0.15000000D+01

*****   Solve the NLPQLP Problem for Case Number   4   *****


------------------------------------------------------------------------
 START OF THE SEQUENTIAL QUADRATIC PROGRAMMING ALGORITHM
------------------------------------------------------------------------

 Parameters:
    N      =       4
    M      =       7
    ME     =       1
    MODE   =       0
    ACC    =   0.1000D-06
    ACCQP  =   0.1000D-11
    STPMIN =   0.0000D+00
    RHOB   =   0.1000D+03
    MAXFUN =      10
    MAXNM  =      10
    MAXIT  =     100
    IPRINT =       2

 Output in the following order:
    IT    - iteration number
    F     - objective function value
    SCV   - sum of constraint violations
    NA    - number of active constraints
    I     - number of line search iterations
    ALPHA - steplength parameter
    DELTA - additional variable to prevent inconsistency
    KKT   - Karush-Kuhn-Tucker optimality criterion

  IT         F           SCV      NA  I    ALPHA     DELTA     KKT
------------------------------------------------------------------------
   1  0.63941393D+04  0.68D+01    7  0  0.00D+00  0.00D+00  0.25D+06
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
   2  0.16063673D+05  0.18D+01    5  1  0.10D+01  0.00D+00  0.36D+05
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
   3  0.13682841D+05  0.41D+00    4  1  0.10D+01  0.00D+00  0.16D+04
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
   4  0.13485662D+05  0.39D-09    3  1  0.10D+01  0.00D+00  0.17D+04
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
   5  0.12709942D+05  0.26D-08    3  1  0.10D+01  0.00D+00  0.12D+01
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
   6  0.12709346D+05  0.13D-09    3  1  0.10D+01  0.00D+00  0.54D-06
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
   7  0.12709346D+05  0.00D+00    3  1  0.10D+01  0.00D+00  0.69D-13
```

```
   --- Final Convergence Analysis at Last Iterate ---

     Objective function value:      F(X)  =  0.12709346D+05
     Solution values:               X     =
        0.16478693D+01  0.24834694D+01 -0.17908882D+01  0.21557437D+01
     Distances from lower bounds:   X-XL  =
        0.41478693D+01  0.49834694D+01  0.70911181D+00  0.46557437D+01
     Distances from upper bounds:   XU-X  =
        0.85213065D+00  0.16530606D-01  0.42908882D+01  0.34425628D+00
     Multipliers for lower bounds:  U     =
        0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     Multipliers for upper bounds:  U     =
        0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     Constraint values:             G(X)  =
        0.00000000D+00  0.19548086D-01  0.19740986D+00  0.63608992D+00
        0.13075830D+01  0.00000000D+00  0.00000000D+00
     Multipliers for constraints:   U     =
       -0.20624063D+04  0.00000000D+00  0.00000000D+00  0.00000000D+00
        0.00000000D+00  0.29609957D+04  0.10577842D+04
     Number of function calls:      NFUNC =       7
     Number of gradient calls:      NGRAD =       7
     Number of calls of QP solver:  NQL   =       7


              *****   Completed CALL to NLPQLP   *****


       *****   Number of Function Evaluations  =     35   *****


     *****   Solution Control Vector for Case Number   4   *****

Element     G.L.B.            C.V.              L.U.B.            Delta C.V.

   1    -0.25000000D+01    0.16478693D+01    0.25000000D+01    0.86391008D+00
   2    -0.25000000D+01    0.24834694D+01    0.25000000D+01    0.19241699D+00
   3    -0.25000000D+01   -0.17908882D+01    0.25000000D+01   -0.15000000D+01
   4    -0.25000000D+01    0.21557437D+01    0.25000000D+01    0.15000000D+01


                *****   Predicted Measurement Vector   *****

Element     Z Vector          ZA Vector         Delta Z           Diag[W]

   1     0.69577988D+02    0.39409224D+02    0.30168764D+02    0.10000000D+01
   2    -0.31159021D+02   -0.46865437D+02    0.15706417D+02    0.10000000D+01
   3    -0.33178959D+02    0.79662038D+01   -0.41145163D+02    0.10000000D+01
   4     0.74845514D+02    0.42413649D+02    0.32431865D+02    0.10000000D+01
   5    -0.12976267D+02    0.13856233D+02   -0.26832500D+02    0.10000000D+01
   6     0.51272092D+01    0.24296296D+02   -0.19169087D+02    0.10000000D+01


*****   NLP Solution Performance Index  =   0.12709346D+05   *****


*****   Solution Constraint Function Values for Case Number   4   *****

                    Equality Constraints

Element          Value               Target          Value - Target

   1         0.80000000D+01      0.80000000D+01      0.00000000D+00

                  Inequality Constraints
```

```
  Element          Value               L.U.B.          L.U.B. - Value

     1         0.29804519D+01      0.30000000D+01      0.19548086D-01
     2         0.28025901D+01      0.30000000D+01      0.19740986D+00
     3         0.86391008D+00      0.15000000D+01      0.63608992D+00
     4         0.19241699D+00      0.15000000D+01      0.13075830D+01
     5         0.15000000D+01      0.15000000D+01      0.00000000D+00
     6         0.15000000D+01      0.15000000D+01      0.00000000D+00


               *****   NLP Special Control  4-Vector Output   *****

  CV =
       0.164786934615456D+01,   0.248346939405002D+01,  -0.179088819026947D+01,
       0.215574371814728D+01,


                 *****   End Case Number   4   *****

END of RUN.


   ***********  END  **********   END   *********
```

## B.1.4 Direct Input and Corresponding Output Data

**for the**
**(6 x 4) T-Matrix NLP Control Problem**
**on the**
**Hewlett-Packard Alpha Mainframe Computer**

```
   *********   INPUT    *****    INPUT   ********


 $CDATA
 !
 !  *****   Start of Case  1  Input Data   *****
 !                  NO Constraints
 !
  ACC     =    1.0D-8,
  ACC     =    1.0D-7,
  ACCQP   =    1.0D-12,
  CRAN1   =   15.0,
  CRAN2   =   20.0,
  CRAN3   =    7.0,
  CRAN3   =    2.0,
  CRAN4   =    5.0,
  CRAN4   =    1.5,
  CRAN5   =    0.02,
  CRAN6   =    0.02,
  CVOUT   =      0,
  CVOUT   =      1,
  GEQ     =    8.00,
  GMAX    =    3.00,  3.00,
  GMAX(3) =    1.00,  1.00,  1.00,  1.00,
  GMAX(3) =    1.50,  1.50,  1.50,  1.50,
  ICASE   =      1,
  IDATA   =      0,
  IDATA   =      1,
  IOPT    =      3,
  IOPT    =      1,
  IOPT    =      2,
  ITOUT   =      0,
  ITOUT   =      1,
  ISEED1  =  78985723,
  ISEED2  =  95428381,
  ISEED3  =  72919329,
  ISEED4  =  63237395,
  JSEED1  =  81692875,
  JSEED2  =  68377297,
  JSEED3  =  89672847,
  JSEED4  =  98351973,
  LQL     =   .FALSE.,
  LQL     =   .TRUE.,
  MAXNM   =    0,
  MAXNM   =   10,
  ME      =    0,
  MG      =    0,
  RHOB    =    0.0,
  RHOB    =  100.0,
  XL0     =   -2.3,  -2.3,  -2.3,  -2.3,
  XU0     =    2.3,   2.3,   2.3,   2.3,
  XL      =   -2.5,  -2.5,  -2.5,  -2.5,
  XU      =    2.5,   2.5,   2.5,   2.5,
 !
 !
  T   =   0.347887873649597,     8.36017310619354,    -1.15114569664001,
         31.7600607872009,      -4.11432027816772,    -1.82969748973846,
 !
         14.7802293300629,     -24.1927772760391,      9.23694193363190,
          6.53410136699677,     14.0349829196930,     12.5044798851013,
 !
        -17.8921127319336,     -10.2217143774033,     16.5568113327026,
          2.43249177932739,    -10.1357221603394,     15.9321832656860,
 !
```

```
         0.124055743217468,    -1.46232724189758,   -11.3952010869980,
         4.92366194725037,    -27.4548292160034,      2.60253787040710,
!
 X0  =   0.783959269523621,     2.29105240106583,    -0.290888190269470,
         0.655743718147278,
!
 ZA  =  39.4092237957620,     -46.8654374200564,      7.96620379418114,
        42.4136487086864,      13.8562325663109,     24.2962964124183,
!
!
 MULT    =         0,
 MULT    =         1,
!
!  *****   End of Case  1  Input Data   *****
!
$END
$CDATA
!
!  *****   Start of Case  2  Input Data   *****
!             One Equality onstraint
!            NO Inequality Constraints
!
 ACC     =    1.0D-8,
 ACC     =    1.0D-7,
 ACCQP   =    1.0D-12,
 CRAN1   =   15.0,
 CRAN2   =   20.0,
 CRAN3   =    7.0,
 CRAN3   =    2.0,
 CRAN4   =    5.0,
 CRAN4   =    1.5,
 CRAN5   =    0.02,
 CRAN6   =    0.02,
 CVOUT   =      0,
 CVOUT   =      1,
 GEQ     =    8.00,
 GMAX    =    3.00,  3.00,
 GMAX(3) =    1.00,  1.00,  1.00,  1.00,
 GMAX(3) =    1.50,  1.50,  1.50,  1.50,
 IDATA   =      0,
 IDATA   =      1,
 IOPT    =      2,
 IOPT    =      3,
 IOPT    =      1,
 ITOUT   =      1,
 ITOUT   =      0,
 ISEED1  =  78985723,
 ISEED2  =  95428381,
 ISEED3  =  72919329,
 ISEED4  =  63237395,
 JSEED1  =  81692875,
 JSEED2  =  68377297,
 JSEED3  =  89672847,
 JSEED4  =  98351973,
 LQL     =   .FALSE.,
 LQL     =   .TRUE.,
 MAXNM   =    0,
 MAXNM   =   10,
 ME      =    1,
 MG      =    1,
 RHOB    =    0.0,
 RHOB    =  100.0,
 XL0     =   -2.3,  -2.3,  -2.3,  -2.3,
 XU0     =    2.3,   2.3,   2.3,   2.3,
 XL      =   -2.5,  -2.5,  -2.5,  -2.5,
```

```
 XU      =    2.5,   2.5,   2.5,   2.5,
!
 MULT    =         0,
 MULT    =         1,
!
!  *****   End of Case  2  Input Data   *****
!
$END
$CDATA
!
!  *****   Start of Case  3  Input Data   *****
!             NO Equality onstraints
!            Six Inequality Constraints
!
 ACC     =    1.0D-8,
 ACC     =    1.0D-7,
 ACCQP   =    1.0D-12,
 CRAN1   =   15.0,
 CRAN2   =   20.0,
 CRAN3   =    7.0,
 CRAN3   =    2.0,
 CRAN4   =    5.0,
 CRAN4   =    1.5,
 CRAN5   =    0.02,
 CRAN6   =    0.02,
 CVOUT   =      0,
 CVOUT   =      1,
 GEQ     =    8.00,
 GMAX    =    3.00,  3.00,
 GMAX(3) =    1.00,  1.00,  1.00,  1.00,
 GMAX(3) =    1.50,  1.50,  1.50,  1.50,
 IDATA   =      0,
 IDATA   =      1,
 IOPT    =      2,
 IOPT    =      3,
 IOPT    =      1,
 ITOUT   =      1,
 ITOUT   =      0,
 ISEED1  =  78985723,
 ISEED2  =  95428381,
 ISEED3  =  72919329,
 ISEED4  =  63237395,
 JSEED1  =  81692875,
 JSEED2  =  68377297,
 JSEED3  =  89672847,
 JSEED4  =  98351973,
 LQL     =   .FALSE.,
 LQL     =   .TRUE.,
 MAXNM   =    0,
 MAXNM   =   10,
 ME      =    0,
 MG      =    6,
 RHOB    =    0.0,
 RHOB    =  100.0,
 XL0     =   -2.3,  -2.3,  -2.3,  -2.3,
 XU0     =    2.3,   2.3,   2.3,   2.3,
 XL      =   -2.5,  -2.5,  -2.5,  -2.5,
 XU      =    2.5,   2.5,   2.5,   2.5,
 MULT    =         0,
 MULT    =         1,
!
!  *****   End of Case  3  Input Data   *****
!
$END
$CDATA
```

```
!
!  *****   Start of Case  4  Input Data   *****
!            One Equality onstraint
!           Six Inequality Constraints
!
 ACC     =    1.0D-8,
 ACC     =    1.0D-7,
 ACCQP   =    1.0D-12,
 CRAN1   =   15.0,
 CRAN2   =   20.0,
 CRAN3   =    7.0,
 CRAN3   =    2.0,
 CRAN4   =    5.0,
 CRAN4   =    1.5,
 CRAN5   =    0.02,
 CRAN6   =    0.02,
 CVOUT   =      0,
 CVOUT   =      1,
 GEQ     =    8.00,
 GMAX    =    3.00,  3.00,
 GMAX(3) =    1.00,  1.00,  1.00,  1.00,
 GMAX(3) =    1.50,  1.50,  1.50,  1.50,
 IDATA   =      0,
 IDATA   =      1,
 IOPT    =      2,
 IOPT    =      3,
 IOPT    =      1,
 ITOUT   =      1,
 ITOUT   =      0,
 ISEED1  =  78985723,
 ISEED2  =  95428381,
 ISEED3  =  72919329,
 ISEED4  =  63237395,
 JSEED1  =  81692875,
 JSEED2  =  68377297,
 JSEED3  =  89672847,
 JSEED4  =  98351973,
 LQL     =   .FALSE.,
 LQL     =   .TRUE.,
 MAXNM   =    0,
 MAXNM   =   10,
 ME      =    1,
 MG      =    7,
 RHOB    =    0.0,
 RHOB    =  100.0,
 XL0     =   -2.3,  -2.3,  -2.3,  -2.3,
 XU0     =    2.3,   2.3,   2.3,   2.3,
 XL      =   -2.5,  -2.5,  -2.5,  -2.5,
 XU      =    2.5,   2.5,   2.5,   2.5,
 MULT    =         1,
 MULT    =         0,
!
!  *****   End of Case  4  Input Data   *****
!
$END


   *********   OUTPUT   *****   OUTPUT   ********


RUN the NLP6x4 Case.

START RUN.
```

```
********************************************************************************

        ***************   Start Case Number   1   ***************

                        *****   INPUT DATA   *****

&CDATA
ALPHA   =   1.00000000000000     ,
ACC     =  1.0000000000000000E-007,
ACCQP   =  1.0000000000000000E-012,
CRAN1   =   15.0000000000000     ,
CRAN2   =   20.0000000000000     ,
CRAN3   =   2.00000000000000     ,
CRAN4   =   1.50000000000000     ,
CRAN5   =  2.0000000000000000E-002,
CRAN6   =  2.0000000000000000E-002,
CRAN7   =  0.100000000000000     ,
CRAN8   =  0.100000000000000     ,
CVOUT   =           1,
EPS     =  1.0000000000000000E-007,
GEQ     =   8.00000000000000     , 10*0.0000000000000000E+000  ,
GMAX    = 2*3.00000000000000        , 9*1.50000000000000        ,
ICASE   =           1,
IDATA   =           1,
IN      =           5,
IOPT    =           2,
IOUT    =           6,
IPRINT  =           2,
ISEED1  =    78985723,
ISEED2  =    95428381,
ISEED3  =    72919329,
ISEED4  =    63237395,
ITOUT   =           1,
JSEED1  =    81692875,
JSEED2  =    68377297,
JSEED3  =    89672847,
JSEED4  =    98351973,
L       =           1,
LQL     = T,
MAXFUN  =          10,
MAXIT   =         100,
MAXNM   =          10,
ME      =           0,
MG      =           0,
MODE    =           0,
MULT    =           1,
RHOB    =   100.000000000000     ,
STPMIN  =  0.0000000000000000E+000,
T       =  0.347887873649597     ,   8.36017310619354     ,  -1.15114569664001
,   31.7600607872009     ,
  -4.11432027816772     ,  -1.82969748973846     ,   14.7802293300629     ,  -
24.1927772760391     ,   9.23694193363190     ,
   6.53410136699677     ,   14.0349829196930     ,   12.5044798851013     ,  -
17.8921127319336     ,  -10.2217143774033     ,
   16.5568113327026     ,   2.43249177932739     ,  -10.1357221603394     ,
15.9321832656860     ,  0.124055743217468     ,
  -1.46232724189758     ,  -11.3952010869980     ,   4.92366194725037     ,  -
27.4548292160034     ,   2.60253787040710     ,
WDT     = 6*1.00000000000000        ,
WDX     = 4*0.000000000000000E+000  ,
```

```
WX      = 4*0.000000000000000E+000  ,
WZ      = 6*1.00000000000000        ,
XL      = 4*-2.50000000000000       , 4*-2.00000000000000       ,
XL0     = 4*-2.30000000000000       ,
XU      = 4*2.50000000000000        , 4*2.00000000000000        ,
XU0     = 4*2.30000000000000        ,
X0      =  0.783959269523621     ,   2.29105240106583     , -0.290888190269470
,  0.655743718147278     ,
ZA      =   39.4092237957620     ,  -46.8654374200564     ,   7.96620379418114
,   42.4136487086864     ,
   13.8562325663109     ,   24.2962964124183
/
```

***** OUTPUT DATA *****

***** X0, ZA, and T are Directly Input *****

***** Control Vector During Previous Duty Cycle for Case Number 1 *****

| Element | G.L.B. | C.V. | L.U.B. |
|---|---|---|---|
| 1 | -0.23000000D+01 | 0.78395927D+00 | 0.23000000D+01 |
| 2 | -0.23000000D+01 | 0.22910524D+01 | 0.23000000D+01 |
| 3 | -0.23000000D+01 | -0.29088819D+00 | 0.23000000D+01 |
| 4 | -0.23000000D+01 | 0.65574372D+00 | 0.23000000D+01 |

***** Measurement Vectors from Previous Duty Cycle *****

| Element | Actual | Ideal | Delta |
|---|---|---|---|
| 1 | 0.39409224D+02 | 0.39420963D+02 | -0.11739089D-01 |
| 2 | -0.46865437D+02 | -0.46858421D+02 | -0.70162487D-02 |
| 3 | 0.79662038D+01 | 0.79713542D+01 | -0.51504469D-02 |
| 4 | 0.42413649D+02 | 0.42389640D+02 | 0.24008768D-01 |
| 5 | 0.13856233D+02 | 0.13874452D+02 | -0.18219316D-01 |
| 6 | 0.24296296D+02 | 0.24286124D+02 | 0.10172153D-01 |

***** Initial Control Vector Estimate for Case Number 1 *****

| Element | G.L.B. | C.V. | L.U.B. | Delta C.V. |
|---|---|---|---|---|
| 1 | -0.25000000D+01 | 0.78395927D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 2 | -0.25000000D+01 | 0.22910524D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 3 | -0.25000000D+01 | -0.29088819D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 4 | -0.25000000D+01 | 0.65574372D+00 | 0.25000000D+01 | 0.00000000D+00 |

Row ***** T-Matrix *****

| | | | | |
|---|---|---|---|---|
| 1 | 0.34788787D+00 | 0.14780229D+02 | -0.17892113D+02 | 0.12405574D+00 |
| 2 | 0.83601731D+01 | -0.24192777D+02 | -0.10221714D+02 | -0.14623272D+01 |
| 3 | -0.11511457D+01 | 0.92369419D+01 | 0.16556811D+02 | -0.11395201D+02 |
| 4 | 0.31760061D+02 | 0.65341014D+01 | 0.24324918D+01 | 0.49236619D+01 |

```
   5    -0.41143203D+01    0.14034983D+02   -0.10135722D+02   -0.27454829D+02

   6    -0.18296975D+01    0.12504480D+02    0.15932183D+02    0.26025379D+01


              *****   Predicted Measurement Vector   *****

Element     Z Vector          ZA Vector         Delta Z           Diag[W]

   1     0.39409224D+02    0.39409224D+02    0.00000000D+00    0.10000000D+01
   2    -0.46865437D+02   -0.46865437D+02    0.00000000D+00    0.10000000D+01
   3     0.79662038D+01    0.79662038D+01    0.00000000D+00    0.10000000D+01
   4     0.42413649D+02    0.42413649D+02    0.00000000D+00    0.10000000D+01
   5     0.13856233D+02    0.13856233D+02    0.00000000D+00    0.10000000D+01
   6     0.24296296D+02    0.24296296D+02    0.00000000D+00    0.10000000D+01

 *****   Initial Performance Index  =   0.63941393D+04   *****

*****   NO Constraints are Specified for Case Number   1   *****

 *****   Solve the NLPQLP Problem for Case Number   1   *****



 ------------------------------------------------------------------------
  START OF THE SEQUENTIAL QUADRATIC PROGRAMMING ALGORITHM
 ------------------------------------------------------------------------

  Parameters:
     N      =       4
     M      =       0
     ME     =       0
     MODE   =       0
     ACC    =   0.1000D-06
     ACCQP  =   0.1000D-11
     STPMIN =   0.0000D+00
     RHOB   =   0.1000D+03
     MAXFUN =      10
     MAXNM  =      10
     MAXIT  =     100
     IPRINT =       2

  Output in the following order:
     IT    - iteration number
     F     - objective function value
     SCV   - sum of constraint violations
     NA    - number of active constraints
     I     - number of line search iterations
     ALPHA - steplength parameter
     DELTA - additional variable to prevent inconsistency
     KKT   - Karush-Kuhn-Tucker optimality criterion

   IT         F          SCV      NA  I    ALPHA     DELTA     KKT
 ------------------------------------------------------------------------
    1  0.63941393D+04  0.00D+00    0  0  0.00D+00  0.00D+00  0.64D+05
             *****   Completed CALL to NLPQLP   *****
             *****   Completed CALL to NLPQLP   *****
             *****   Completed CALL to NLPQLP   *****
```

```
 2  0.16753228D+04  0.00D+00    0  2  0.30D+00  0.00D+00  0.23D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 3  0.73269164D+03  0.00D+00    0  2  0.10D+00  0.00D+00  0.68D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 4  0.58881236D+03  0.00D+00    0  3  0.49D-01  0.00D+00  0.11D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 5  0.57414345D+03  0.00D+00    0  4  0.25D-02  0.00D+00  0.24D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 6  0.53135752D+03  0.00D+00    0  3  0.41D-01  0.00D+00  0.92D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 7  0.96517338D+02  0.00D+00    0  2  0.13D+00  0.00D+00  0.66D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 8  0.43831014D+02  0.00D+00    0  2  0.14D+00  0.00D+00  0.10D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 9  0.14120413D+01  0.00D+00    0  1  0.10D+01  0.00D+00  0.28D+01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
10  0.97304211D-04  0.00D+00    0  1  0.10D+01  0.00D+00  0.11D-05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
11  0.96739062D-04  0.00D+00    0  1  0.10D+01  0.00D+00  0.40D-09


--- Final Convergence Analysis at Last Iterate ---

  Objective function value:      F(X)  =  0.96739062D-04
  Solution values:               X     =
    -0.56957047D-03 -0.11796791D-03 -0.46940798D-03 -0.58197946D-03
  Distances from lower bounds:   X-XL  =
     0.24994304D+01  0.24998820D+01  0.24995306D+01  0.24994180D+01
  Distances from upper bounds:   XU-X  =
     0.25005696D+01  0.25001180D+01  0.25004694D+01  0.25005820D+01
  Multipliers for lower bounds:  U     =
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
  Multipliers for upper bounds:  U     =
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
  Number of function calls:      NFUNC =      22
  Number of gradient calls:      NGRAD =      11
  Number of calls of QP solver:  NQL   =      11



          *****   Completed CALL to NLPQLP   *****


   *****   Number of Function Evaluations  =     66   *****
```

***** Solution Control Vector for Case Number 1 *****

| Element | G.L.B. | C.V. | L.U.B. | Delta C.V. |
|---|---|---|---|---|
| 1 | -0.25000000D+01 | -0.56957047D-03 | 0.25000000D+01 | -0.78452884D+00 |
| 2 | -0.25000000D+01 | -0.11796791D-03 | 0.25000000D+01 | -0.22911704D+01 |
| 3 | -0.25000000D+01 | -0.46940798D-03 | 0.25000000D+01 | 0.29041878D+00 |
| 4 | -0.25000000D+01 | -0.58197946D-03 | 0.25000000D+01 | -0.65632570D+00 |

***** Predicted Measurement Vector *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|
| 1 | -0.53543139D-02 | 0.39409224D+02 | -0.39414578D+02 | 0.10000000D+01 |
| 2 | -0.32749326D-02 | -0.46865437D+02 | 0.46862162D+02 | 0.10000000D+01 |
| 3 | -0.67257169D-02 | 0.79662038D+01 | -0.79729295D+01 | 0.10000000D+01 |
| 4 | 0.11415519D-02 | 0.42413649D+02 | -0.42412507D+02 | 0.10000000D+01 |
| 5 | 0.32015918D-02 | 0.13856233D+02 | -0.13853031D+02 | 0.10000000D+01 |
| 6 | 0.74610954D-03 | 0.24296296D+02 | -0.24295550D+02 | 0.10000000D+01 |

***** NLP Solution Performance Index = 0.96739062D-04 *****

***** NO Constraints are Specified for Case Number 1 *****

***** Solve the Regulator Problem for Case Number 1 *****

***** Alpha = 0.10000000D+01 *****

Dim ***** WZ-Vector *****

| | | | | |
|---|---|---|---|---|
| 6 | 0.10000000D+01 | 0.10000000D+01 | 0.10000000D+01 | 0.10000000D+01 |
| | 0.10000000D+01 | 0.10000000D+01 | | |

Dim ***** WX-Vector *****

| | | | | |
|---|---|---|---|---|
| 4 | 0.00000000D+00 | 0.00000000D+00 | 0.00000000D+00 | 0.00000000D+00 |

Dim ***** WDX-Vector *****

| | | | | |
|---|---|---|---|---|
| 4 | 0.00000000D+00 | 0.00000000D+00 | 0.00000000D+00 | 0.00000000D+00 |

***** Matrix [DUMXX1] was Successfully Inverted
to Yield Matrix [DD]. *****

Dim ***** The Solution Control Vector *****

| | |
|---|---|
| 1 | -0.56967390D-03 |
| 2 | -0.11782527D-03 |
| 3 | -0.46951007D-03 |
| 4 | -0.58223955D-03 |

Dim ***** The Solution Measurement Vector *****

| | | | | |
|---|---|---|---|---|
| 6 | -0.53504597D-02 | -0.32776779D-02 | -0.67218674D-02 | 0.11371777D-02 |

```
          0.32149401D-02    0.74551868D-03

  *****   Regulator Solution Performance Index  =   0.96738904D-04   *****

              *****   NLP Special Control  4-Vector Output   *****

  CV =
      -0.569570465665236D-03,  -0.117967908224437D-03,  -0.469407980061374D-03,
      -0.581979458525249D-03,

           *****   Regulator Special Control  4-Vector Output   *****

  CV =
      -0.569673895127076D-03,  -0.117825271129135D-03,  -0.469510073147272D-03,
      -0.582239546265240D-03,

     *****   Root-Sum-Squared Delta CV Elements  =   0.33032049D-06   *****

  Delta CV =
       0.103429461840651D-06,  -0.142637095301698D-06,   0.102093085898724D-06,
       0.260087739991136D-06,

                *****   End Case Number   1   *****




********************************************************************************


        ***************   Start Case Number   2   ***************

                      *****   INPUT DATA   *****

&CDATA
ALPHA   =   1.00000000000000     ,
ACC     =  1.0000000000000000E-007,
ACCQP   =  1.0000000000000000E-012,
CRAN1   =   15.0000000000000     ,
CRAN2   =   20.0000000000000     ,
CRAN3   =   2.00000000000000     ,
CRAN4   =   1.50000000000000     ,
CRAN5   =  2.0000000000000000E-002,
CRAN6   =  2.0000000000000000E-002,
CRAN7   =  0.100000000000000     ,
CRAN8   =  0.100000000000000     ,
CVOUT   =           1,
EPS     =  1.0000000000000000E-007,
GEQ     =   8.00000000000000     , 10*0.000000000000000E+000  ,
GMAX    = 2*3.00000000000000        , 9*1.50000000000000        ,
ICASE   =           2,
IDATA   =           1,
IN      =           5,
IOPT    =           1,
IOUT    =           6,
IPRINT  =           2,
```

```
ISEED1  =    78985723,
ISEED2  =    95428381,
ISEED3  =    72919329,
ISEED4  =    63237395,
ITOUT   =           0,
JSEED1  =    81692875,
JSEED2  =    68377297,
JSEED3  =    89672847,
JSEED4  =    98351973,
L       =           1,
LQL     = T,
MAXFUN  =          10,
MAXIT   =         100,
MAXNM   =          10,
ME      =           1,
MG      =           1,
MODE    =           0,
MULT    =           1,
RHOB    =   100.000000000000     ,
STPMIN  =  0.000000000000000E+000,
T       =  0.347887873649597     ,   8.36017310619354     ,  -1.15114569664001
,   31.7600607872009     ,
  -4.11432027816772     ,  -1.82969748973846     ,   14.7802293300629     ,  -
24.1927772760391     ,   9.23694193363190     ,
   6.53410136699677     ,   14.0349829196930     ,   12.5044798851013     ,  -
17.8921127319336     ,  -10.2217143774033     ,
   16.5568113327026     ,   2.43249177932739     ,  -10.1357221603394     ,
15.9321832656860     ,  0.124055743217468     ,
  -1.46232724189758     ,  -11.3952010869980     ,   4.92366194725037     ,  -
27.4548292160034     ,   2.60253787040710     ,
WDT     = 6*1.00000000000000        ,
WDX     = 4*0.000000000000000E+000  ,
WX      = 4*0.000000000000000E+000  ,
WZ      = 6*1.00000000000000        ,
XL      = 4*-2.50000000000000       , 4*-2.00000000000000       ,
XL0     = 4*-2.30000000000000       ,
XU      = 4*2.50000000000000        , 4*2.00000000000000        ,
XU0     = 4*2.30000000000000        ,
X0      =  0.783959269523621     ,   2.29105240106583     , -0.290888190269470
,  0.655743718147278     ,
ZA      =   39.4092237957620     ,  -46.8654374200564     ,   7.96620379418114
,   42.4136487086864     ,
   13.8562325663109     ,   24.2962964124183
/


                        *****   OUTPUT DATA   *****

                *****   X0, ZA, and T are Directly Input   *****


   *****   Control Vector During Previous Duty Cycle for Case Number   2
*****

  Element         G.L.B.              C.V.               L.U.B.

     1        -0.23000000D+01      0.78395927D+00      0.23000000D+01
     2        -0.23000000D+01      0.22910524D+01      0.23000000D+01
     3        -0.23000000D+01     -0.29088819D+00      0.23000000D+01
     4        -0.23000000D+01      0.65574372D+00      0.23000000D+01


           *****   Measurement Vectors from Previous Duty Cycle   *****

  Element         Actual              Ideal              Delta
```

```
   1         0.39409224D+02      0.39420963D+02     -0.11739089D-01
   2        -0.46865437D+02     -0.46858421D+02     -0.70162487D-02
   3         0.79662038D+01      0.79713542D+01     -0.51504469D-02
   4         0.42413649D+02      0.42389640D+02      0.24008768D-01
   5         0.13856233D+02      0.13874452D+02     -0.18219316D-01
   6         0.24296296D+02      0.24286124D+02      0.10172153D-01

     *****   Initial Control Vector Estimate for Case Number    2   *****

Element     G.L.B.            C.V.              L.U.B.            Delta C.V.

   1    -0.25000000D+01    0.78395927D+00    0.25000000D+01    0.00000000D+00
   2    -0.25000000D+01    0.22910524D+01    0.25000000D+01    0.00000000D+00
   3    -0.25000000D+01   -0.29088819D+00    0.25000000D+01    0.00000000D+00
   4    -0.25000000D+01    0.65574372D+00    0.25000000D+01    0.00000000D+00

              *****   T-Matrix Output is Suppressed   *****

              *****   Predicted Measurement Vector   *****

Element     Z Vector          ZA Vector         Delta Z           Diag[W]

   1     0.39409224D+02    0.39409224D+02    0.00000000D+00    0.10000000D+01
   2    -0.46865437D+02   -0.46865437D+02    0.00000000D+00    0.10000000D+01
   3     0.79662038D+01    0.79662038D+01    0.00000000D+00    0.10000000D+01
   4     0.42413649D+02    0.42413649D+02    0.00000000D+00    0.10000000D+01
   5     0.13856233D+02    0.13856233D+02    0.00000000D+00    0.10000000D+01
   6     0.24296296D+02    0.24296296D+02    0.00000000D+00    0.10000000D+01

 *****   Initial Performance Index  =   0.63941393D+04   *****

*****   Initial Constraint Function Values for Case Number   2   *****

                   Equality Constraints

Element          Value               Target          Value - Target

   1         0.11805165D+01      0.80000000D+01     -0.68194835D+01

 *****   Solve the NLPQLP Problem for Case Number   2   *****


 ------------------------------------------------------------------------
  START OF THE SEQUENTIAL QUADRATIC PROGRAMMING ALGORITHM
 ------------------------------------------------------------------------

  Parameters:
     N      =       4
     M      =       1
     ME     =       1
     MODE   =       0
     ACC    =   0.1000D-06
     ACCQP  =   0.1000D-11
     STPMIN =   0.0000D+00
     RHOB   =   0.1000D+03
     MAXFUN =      10
```

```
   MAXNM  =      10
   MAXIT  =     100
   IPRINT =       2

 Output in the following order:
   IT    - iteration number
   F     - objective function value
   SCV   - sum of constraint violations
   NA    - number of active constraints
   I     - number of line search iterations
   ALPHA - steplength parameter
   DELTA - additional variable to prevent inconsistency
   KKT   - Karush-Kuhn-Tucker optimality criterion


  IT         F          SCV      NA  I    ALPHA     DELTA     KKT
-------------------------------------------------------------------------
   1  0.63941393D+04  0.68D+01    1  0  0.00D+00  0.00D+00  0.27D+06
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   2  0.22908807D+05  0.30D+01    1  1  0.10D+01  0.00D+00  0.49D+05
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   3  0.12303114D+05  0.13D-07    1  1  0.10D+01  0.00D+00  0.79D+04
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   4  0.12162296D+05  0.52D-02    1  3  0.38D-01  0.00D+00  0.12D+04
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   5  0.12060048D+05  0.20D-02    1  2  0.16D+00  0.00D+00  0.15D+04
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   6  0.12042452D+05  0.25D-02    1  3  0.17D-01  0.00D+00  0.11D+04
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   7  0.11930985D+05  0.11D-02    1  2  0.21D+00  0.00D+00  0.36D+03
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   8  0.11904176D+05  0.14D-02    1  2  0.10D+00  0.00D+00  0.95D+03
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   9  0.11897408D+05  0.13D-02    1  4  0.82D-02  0.00D+00  0.33D+03
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
  10  0.11872048D+05  0.15D-02    1  2  0.10D+00  0.00D+00  0.19D+03
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
  11  0.11840005D+05  0.20D-02    1  2  0.19D+00  0.00D+00  0.13D+03
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
  12  0.11809369D+05  0.25D-02    1  2  0.30D+00  0.00D+00  0.68D+02
           *****   Completed CALL to NLPQLP   *****
```

```
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
  13  0.11786901D+05  0.27D-02    1  2  0.50D+00  0.00D+00  0.23D+02
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
  14  0.11777277D+05  0.14D-02    1  1  0.10D+01  0.00D+00  0.40D+01
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
  15  0.11775259D+05  0.17D-06    1  1  0.10D+01  0.00D+00  0.69D-02
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
  16  0.11775256D+05  0.48D-06    1  1  0.10D+01  0.00D+00  0.14D-02
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
  17  0.11775255D+05  0.48D-10    1  1  0.10D+01  0.00D+00  0.14D-06
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
  18  0.11775255D+05  0.48D-13    1  1  0.10D+01  0.00D+00  0.14D-09


  --- Final Convergence Analysis at Last Iterate ---

    Objective function value:      F(X)  =  0.11775255D+05
    Solution values:               X     =
       0.97346577D+00  0.24682087D+01 -0.24665435D+01  0.19641737D+01
    Distances from lower bounds:   X-XL  =
       0.34734658D+01  0.49682087D+01  0.33456462D-01  0.44641737D+01
    Distances from upper bounds:   XU-X  =
       0.15265342D+01  0.31791345D-01  0.49665435D+01  0.53582627D+00
    Multipliers for lower bounds:  U     =
       0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
    Multipliers for upper bounds:  U     =
       0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
    Constraint values:             G(X)  =
       0.47961635D-13
    Multipliers for constraints:   U     =
      -0.14718317D+04
    Number of function calls:      NFUNC =      32
    Number of gradient calls:      NGRAD =      18
    Number of calls of QP solver:  NQL   =      18



           *****   Completed CALL to NLPQLP   *****


     *****   Number of Function Evaluations  =    104   *****


    *****   Solution Control Vector for Case Number   2   *****

Element     G.L.B.            C.V.              L.U.B.            Delta C.V.

   1    -0.25000000D+01    0.97346577D+00    0.25000000D+01    0.18950650D+00
   2    -0.25000000D+01    0.24682087D+01    0.25000000D+01    0.17715625D+00
   3    -0.25000000D+01   -0.24665435D+01    0.25000000D+01   -0.21756553D+01
   4    -0.25000000D+01    0.19641737D+01    0.25000000D+01    0.13084300D+01


             *****   Predicted Measurement Vector   *****

Element     Z Vector          ZA Vector         Delta Z           Diag[W]

   1     0.81182950D+02    0.39409224D+02    0.41773726D+02    0.10000000D+01
   2    -0.29241458D+02   -0.46865437D+02    0.17623980D+02    0.10000000D+01
```

```
     3    -0.41547304D+02    0.79662038D+01   -0.49513508D+02    0.10000000D+01
     4     0.50739948D+02    0.42413649D+02    0.83262991D+01    0.10000000D+01
     5     0.16920373D+01    0.13856233D+02   -0.12164195D+02    0.10000000D+01
     6    -0.50928969D+01    0.24296296D+02   -0.29389193D+02    0.10000000D+01

  *****   NLP Solution Performance Index  =   0.11775255D+05   *****

  *****   Solution Constraint Function Values for Case Number   2   *****

                    Equality Constraints

  Element          Value               Target          Value - Target

     1         0.80000000D+01      0.80000000D+01     -0.47961635D-13

               *****   NLP Special Control  4-Vector Output   *****

  CV =
       0.973465767956168D+00,   0.246820865530903D+01,  -0.246654353782495D+01,
       0.196417373284558D+01,

                 *****   End Case Number   2   *****



********************************************************************************

        ***************   Start Case Number   3   ***************

                      *****   INPUT DATA   *****

 &CDATA
 ALPHA   =   1.00000000000000     ,
 ACC     =  1.0000000000000000E-007,
 ACCQP   =  1.0000000000000000E-012,
 CRAN1   =   15.0000000000000     ,
 CRAN2   =   20.0000000000000     ,
 CRAN3   =   2.00000000000000     ,
 CRAN4   =   1.50000000000000     ,
 CRAN5   =  2.0000000000000000E-002,
 CRAN6   =  2.0000000000000000E-002,
 CRAN7   =  0.100000000000000     ,
 CRAN8   =  0.100000000000000     ,
 CVOUT   =           1,
 EPS     =  1.0000000000000000E-007,
 GEQ     =   8.00000000000000     , 10*0.000000000000000E+000  ,
 GMAX    = 2*3.00000000000000        , 9*1.50000000000000        ,
 ICASE   =           3,
 IDATA   =           1,
 IN      =           5,
 IOPT    =           1,
 IOUT    =           6,
 IPRINT  =           2,
 ISEED1  =    78985723,
 ISEED2  =    95428381,
```

```
ISEED3  =    72919329,
ISEED4  =    63237395,
ITOUT   =           0,
JSEED1  =    81692875,
JSEED2  =    68377297,
JSEED3  =    89672847,
JSEED4  =    98351973,
L       =           1,
LQL     = T,
MAXFUN  =          10,
MAXIT   =         100,
MAXNM   =          10,
ME      =           0,
MG      =           6,
MODE    =           0,
MULT    =           1,
RHOB    =   100.000000000000     ,
STPMIN  =  0.000000000000000E+000,
T       =  0.347887873649597     ,   8.36017310619354     ,  -1.15114569664001
,   31.7600607872009     ,
  -4.11432027816772     ,  -1.82969748973846     ,   14.7802293300629     ,  -
24.1927772760391     ,   9.23694193363190     ,
   6.53410136699677     ,   14.0349829196930     ,   12.5044798851013     ,  -
17.8921127319336     ,  -10.2217143774033     ,
   16.5568113327026     ,   2.43249177932739     ,  -10.1357221603394     ,
15.9321832656860     ,  0.124055743217468     ,
  -1.46232724189758     ,  -11.3952010869980     ,   4.92366194725037     ,  -
27.4548292160034     ,   2.60253787040710     ,
WDT     = 6*1.00000000000000        ,
WDX     = 4*0.000000000000000E+000  ,
WX      = 4*0.000000000000000E+000  ,
WZ      = 6*1.00000000000000        ,
XL      = 4*-2.50000000000000       , 4*-2.00000000000000       ,
XL0     = 4*-2.30000000000000       ,
XU      = 4*2.50000000000000        , 4*2.00000000000000        ,
XU0     = 4*2.30000000000000        ,
X0      =  0.783959269523621     ,   2.29105240106583     , -0.290888190269470
,  0.655743718147278     ,
ZA      =   39.4092237957620     ,  -46.8654374200564     ,   7.96620379418114
,   42.4136487086864     ,
   13.8562325663109     ,   24.2962964124183
/
```

*****  OUTPUT DATA  *****

*****  X0, ZA, and T are Directly Input  *****

*****  Control Vector During Previous Duty Cycle for Case Number  3 *****

| Element | G.L.B. | C.V. | L.U.B. |
|---|---|---|---|
| 1 | -0.23000000D+01 | 0.78395927D+00 | 0.23000000D+01 |
| 2 | -0.23000000D+01 | 0.22910524D+01 | 0.23000000D+01 |
| 3 | -0.23000000D+01 | -0.29088819D+00 | 0.23000000D+01 |
| 4 | -0.23000000D+01 | 0.65574372D+00 | 0.23000000D+01 |

*****  Measurement Vectors from Previous Duty Cycle  *****

| Element | Actual | Ideal | Delta |
|---|---|---|---|
| 1 | 0.39409224D+02 | 0.39420963D+02 | -0.11739089D-01 |

```
   2        -0.46865437D+02     -0.46858421D+02     -0.70162487D-02
   3         0.79662038D+01      0.79713542D+01     -0.51504469D-02
   4         0.42413649D+02      0.42389640D+02      0.24008768D-01
   5         0.13856233D+02      0.13874452D+02     -0.18219316D-01
   6         0.24296296D+02      0.24286124D+02      0.10172153D-01


     *****   Initial Control Vector Estimate for Case Number    3   *****

Element     G.L.B.            C.V.              L.U.B.            Delta C.V.

   1    -0.25000000D+01    0.78395927D+00    0.25000000D+01    0.00000000D+00
   2    -0.25000000D+01    0.22910524D+01    0.25000000D+01    0.00000000D+00
   3    -0.25000000D+01   -0.29088819D+00    0.25000000D+01    0.00000000D+00
   4    -0.25000000D+01    0.65574372D+00    0.25000000D+01    0.00000000D+00


              *****   T-Matrix Output is Suppressed   *****


              *****   Predicted Measurement Vector   *****

Element     Z Vector          ZA Vector         Delta Z           Diag[W]

   1     0.39409224D+02    0.39409224D+02    0.00000000D+00    0.10000000D+01
   2    -0.46865437D+02   -0.46865437D+02    0.00000000D+00    0.10000000D+01
   3     0.79662038D+01    0.79662038D+01    0.00000000D+00    0.10000000D+01
   4     0.42413649D+02    0.42413649D+02    0.00000000D+00    0.10000000D+01
   5     0.13856233D+02    0.13856233D+02    0.00000000D+00    0.10000000D+01
   6     0.24296296D+02    0.24296296D+02    0.00000000D+00    0.10000000D+01


 *****   Initial Performance Index  =   0.63941393D+04   *****


*****   Initial Constraint Function Values for Case Number   3   *****

                  Inequality Constraints

Element          Value               L.U.B.          L.U.B. - Value

   1         0.24214692D+01      0.30000000D+01      0.57853077D+00
   2         0.71736724D+00      0.30000000D+01      0.22826328D+01
   3         0.00000000D+00      0.15000000D+01      0.15000000D+01
   4         0.00000000D+00      0.15000000D+01      0.15000000D+01
   5         0.00000000D+00      0.15000000D+01      0.15000000D+01
   6         0.00000000D+00      0.15000000D+01      0.15000000D+01


 *****   Solve the NLPQLP Problem for Case Number   3   *****



 ------------------------------------------------------------------------
  START OF THE SEQUENTIAL QUADRATIC PROGRAMMING ALGORITHM
 ------------------------------------------------------------------------

  Parameters:
     N      =       4
     M      =       6
     ME     =       0
     MODE   =       0
     ACC    =   0.1000D-06
     ACCQP  =   0.1000D-11
```

```
   STPMIN =   0.0000D+00
   RHOB   =   0.1000D+03
   MAXFUN =      10
   MAXNM  =      10
   MAXIT  =     100
   IPRINT =       2

 Output in the following order:
   IT    - iteration number
   F     - objective function value
   SCV   - sum of constraint violations
   NA    - number of active constraints
   I     - number of line search iterations
   ALPHA - steplength parameter
   DELTA - additional variable to prevent inconsistency
   KKT   - Karush-Kuhn-Tucker optimality criterion


  IT         F          SCV      NA  I    ALPHA     DELTA     KKT
-------------------------------------------------------------------------
   1  0.63941393D+04  0.00D+00    6  0  0.00D+00  0.00D+00  0.63D+05
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   2  0.15658547D+04  0.00D+00    1  2  0.30D+00  0.00D+00  0.73D+04
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   3  0.93338350D+03  0.00D+00    3  2  0.19D+00  0.00D+00  0.81D+04
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   4  0.71362593D+03  0.00D+00    3  2  0.11D+00  0.00D+00  0.23D+03
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   5  0.71024940D+03  0.00D+00    3  2  0.10D+00  0.00D+00  0.44D+03
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   6  0.70123098D+03  0.00D+00    3  2  0.10D+00  0.00D+00  0.96D+02
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   7  0.65415314D+03  0.40D-10    1  1  0.10D+01  0.00D+00  0.15D-01
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   8  0.65414641D+03  0.00D+00    1  1  0.10D+01  0.00D+00  0.11D-03
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   9  0.65414636D+03  0.00D+00    1  1  0.10D+01  0.00D+00  0.17D-07


  --- Final Convergence Analysis at Last Iterate ---

   Objective function value:      F(X)  =  0.65414636D+03
   Solution values:               X     =
     -0.38795186D-01  0.79105240D+00 -0.21292813D+00  0.38199543D+00
   Distances from lower bounds:   X-XL  =
      0.24612048D+01  0.32910524D+01  0.22870719D+01  0.28819954D+01
   Distances from upper bounds:   XU-X  =
      0.25387952D+01  0.17089476D+01  0.27129281D+01  0.21180046D+01
   Multipliers for lower bounds:  U     =
      0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   Multipliers for upper bounds:  U     =
      0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
```

```
     Constraint values:             G(X)  =
        0.22079969D+01  0.25626684D+01  0.67724554D+00  0.00000000D+00
        0.14220399D+01  0.12262517D+01
     Multipliers for constraints:   U     =
        0.00000000D+00  0.00000000D+00  0.00000000D+00  0.16536179D+04
        0.00000000D+00  0.00000000D+00
     Number of function calls:      NFUNC =      14
     Number of gradient calls:      NGRAD =       9
     Number of calls of QP solver:  NQL   =       9


              *****   Completed CALL to NLPQLP   *****


      *****   Number of Function Evaluations  =     50   *****


    *****   Solution Control Vector for Case Number   3   *****

Element     G.L.B.            C.V.              L.U.B.            Delta C.V.

   1    -0.25000000D+01   -0.38795186D-01    0.25000000D+01   -0.82275446D+00
   2    -0.25000000D+01    0.79105240D+00    0.25000000D+01   -0.15000000D+01
   3    -0.25000000D+01   -0.21292813D+00    0.25000000D+01    0.77960063D-01
   4    -0.25000000D+01    0.38199543D+00    0.25000000D+01   -0.27374828D+00


              *****   Predicted Measurement Vector   *****

Element     Z Vector          ZA Vector         Delta Z           Diag[W]

   1     0.15523823D+02    0.39409224D+02   -0.23885401D+02    0.10000000D+01
   2    -0.17851217D+02   -0.46865437D+02    0.29014220D+02    0.10000000D+01
   3    -0.53191318D+00    0.79662038D+01   -0.84981170D+01    0.10000000D+01
   4     0.53235588D+01    0.42413649D+02   -0.37090090D+02    0.10000000D+01
   5     0.29143616D+01    0.13856233D+02   -0.10941871D+02    0.10000000D+01
   6     0.75746023D+01    0.24296296D+02   -0.16721694D+02    0.10000000D+01


*****   NLP Solution Performance Index  =   0.65414636D+03   *****


*****   Solution Constraint Function Values for Case Number   3   *****

                  Inequality Constraints

Element          Value               L.U.B.          L.U.B. - Value

   1         0.79200314D+00      0.30000000D+01      0.22079969D+01
   2         0.43733157D+00      0.30000000D+01      0.25626684D+01
   3         0.82275446D+00      0.15000000D+01      0.67724554D+00
   4         0.15000000D+01      0.15000000D+01      0.00000000D+00
   5         0.77960063D-01      0.15000000D+01      0.14220399D+01
   6         0.27374828D+00      0.15000000D+01      0.12262517D+01


              *****   NLP Special Control  4-Vector Output   *****

CV =
    -0.387951862155494D-01,   0.791052401065830D+00,  -0.212928126956057D+00,
     0.381995433297951D+00,


               *****   End Case Number   3   *****
```

```
********************************************************************************


        ***************   Start Case Number   4   ***************


                        *****   INPUT DATA   *****

&CDATA
ALPHA   =   1.00000000000000     ,
ACC     =  1.0000000000000000E-007,
ACCQP   =  1.0000000000000000E-012,
CRAN1   =   15.0000000000000     ,
CRAN2   =   20.0000000000000     ,
CRAN3   =   2.00000000000000     ,
CRAN4   =   1.50000000000000     ,
CRAN5   =  2.0000000000000000E-002,
CRAN6   =  2.0000000000000000E-002,
CRAN7   =  0.100000000000000     ,
CRAN8   =  0.100000000000000     ,
CVOUT   =           1,
EPS     =  1.0000000000000000E-007,
GEQ     =   8.00000000000000     , 10*0.000000000000000E+000  ,
GMAX    = 2*3.00000000000000        , 9*1.50000000000000        ,
ICASE   =           4,
IDATA   =           1,
IN      =           5,
IOPT    =           1,
IOUT    =           6,
IPRINT  =           2,
ISEED1  =    78985723,
ISEED2  =    95428381,
ISEED3  =    72919329,
ISEED4  =    63237395,
ITOUT   =           0,
JSEED1  =    81692875,
JSEED2  =    68377297,
JSEED3  =    89672847,
JSEED4  =    98351973,
L       =           1,
LQL     = T,
MAXFUN  =          10,
MAXIT   =         100,
MAXNM   =          10,
ME      =           1,
MG      =           7,
MODE    =           0,
MULT    =           0,
RHOB    =   100.000000000000     ,
STPMIN  =  0.000000000000000E+000,
T       =  0.347887873649597     ,   8.36017310619354     ,  -1.15114569664001
,   31.7600607872009     ,
  -4.11432027816772     ,  -1.82969748973846     ,   14.7802293300629     ,  -
24.1927772760391     ,   9.23694193363190     ,
   6.53410136699677     ,   14.0349829196930     ,   12.5044798851013     ,  -
17.8921127319336     ,  -10.2217143774033     ,
   16.5568113327026     ,   2.43249177932739     ,  -10.1357221603394     ,
15.9321832656860     ,  0.124055743217468     ,
  -1.46232724189758     ,  -11.3952010869980     ,   4.92366194725037     ,  -
27.4548292160034     ,   2.60253787040710     ,
WDT     = 6*1.00000000000000        ,
WDX     = 4*0.000000000000000E+000  ,
WX      = 4*0.000000000000000E+000  ,
```

```
WZ      = 6*1.00000000000000        ,
XL      = 4*-2.50000000000000       , 4*-2.00000000000000       ,
XL0     = 4*-2.30000000000000       ,
XU      = 4*2.50000000000000        , 4*2.00000000000000        ,
XU0     = 4*2.30000000000000        ,
X0      =  0.783959269523621     ,   2.29105240106583     , -0.290888190269470
,  0.655743718147278     ,
ZA      =   39.4092237957620     ,  -46.8654374200564     ,   7.96620379418114
,   42.4136487086864     ,
   13.8562325663109     ,   24.2962964124183
/
```

***** OUTPUT DATA *****

***** X0, ZA, and T are Directly Input *****

***** Control Vector During Previous Duty Cycle for Case Number 4 *****

| Element | G.L.B. | C.V. | L.U.B. |
|---|---|---|---|
| 1 | -0.23000000D+01 | 0.78395927D+00 | 0.23000000D+01 |
| 2 | -0.23000000D+01 | 0.22910524D+01 | 0.23000000D+01 |
| 3 | -0.23000000D+01 | -0.29088819D+00 | 0.23000000D+01 |
| 4 | -0.23000000D+01 | 0.65574372D+00 | 0.23000000D+01 |

***** Measurement Vectors from Previous Duty Cycle *****

| Element | Actual | Ideal | Delta |
|---|---|---|---|
| 1 | 0.39409224D+02 | 0.39420963D+02 | -0.11739089D-01 |
| 2 | -0.46865437D+02 | -0.46858421D+02 | -0.70162487D-02 |
| 3 | 0.79662038D+01 | 0.79713542D+01 | -0.51504469D-02 |
| 4 | 0.42413649D+02 | 0.42389640D+02 | 0.24008768D-01 |
| 5 | 0.13856233D+02 | 0.13874452D+02 | -0.18219316D-01 |
| 6 | 0.24296296D+02 | 0.24286124D+02 | 0.10172153D-01 |

***** Initial Control Vector Estimate for Case Number 4 *****

| Element | G.L.B. | C.V. | L.U.B. | Delta C.V. |
|---|---|---|---|---|
| 1 | -0.25000000D+01 | 0.78395927D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 2 | -0.25000000D+01 | 0.22910524D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 3 | -0.25000000D+01 | -0.29088819D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 4 | -0.25000000D+01 | 0.65574372D+00 | 0.25000000D+01 | 0.00000000D+00 |

***** T-Matrix Output is Suppressed *****

***** Predicted Measurement Vector *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|
| 1 | 0.39409224D+02 | 0.39409224D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 2 | -0.46865437D+02 | -0.46865437D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 3 | 0.79662038D+01 | 0.79662038D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 4 | 0.42413649D+02 | 0.42413649D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 5 | 0.13856233D+02 | 0.13856233D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 6 | 0.24296296D+02 | 0.24296296D+02 | 0.00000000D+00 | 0.10000000D+01 |

```
 *****   Initial Performance Index  =   0.63941393D+04   *****

*****   Initial Constraint Function Values for Case Number   4   *****

                    Equality Constraints

Element          Value               Target          Value - Target

   1         0.11805165D+01      0.80000000D+01     -0.68194835D+01

                  Inequality Constraints

Element          Value               L.U.B.          L.U.B. - Value

   1         0.24214692D+01      0.30000000D+01      0.57853077D+00
   2         0.71736724D+00      0.30000000D+01      0.22826328D+01
   3         0.00000000D+00      0.15000000D+01      0.15000000D+01
   4         0.00000000D+00      0.15000000D+01      0.15000000D+01
   5         0.00000000D+00      0.15000000D+01      0.15000000D+01
   6         0.00000000D+00      0.15000000D+01      0.15000000D+01


 *****   Solve the NLPQLP Problem for Case Number   4   *****



 ------------------------------------------------------------------------
  START OF THE SEQUENTIAL QUADRATIC PROGRAMMING ALGORITHM
 ------------------------------------------------------------------------

  Parameters:
     N      =       4
     M      =       7
     ME     =       1
     MODE   =       0
     ACC    =   0.1000D-06
     ACCQP  =   0.1000D-11
     STPMIN =   0.0000D+00
     RHOB   =   0.1000D+03
     MAXFUN =      10
     MAXNM  =      10
     MAXIT  =     100
     IPRINT =       2

  Output in the following order:
     IT    - iteration number
     F     - objective function value
     SCV   - sum of constraint violations
     NA    - number of active constraints
     I     - number of line search iterations
     ALPHA - steplength parameter
     DELTA - additional variable to prevent inconsistency
     KKT   - Karush-Kuhn-Tucker optimality criterion


   IT         F           SCV      NA  I    ALPHA     DELTA     KKT
 ------------------------------------------------------------------------
    1  0.63941393D+04  0.68D+01    7  0  0.00D+00  0.00D+00  0.25D+06
             *****   Completed CALL to NLPQLP   *****
             *****   Completed CALL to NLPQLP   *****
    2  0.16063673D+05  0.18D+01    5  1  0.10D+01  0.00D+00  0.36D+05
             *****   Completed CALL to NLPQLP   *****
```

```
          *****   Completed CALL to NLPQLP   *****
 3  0.13682841D+05  0.41D+00    4  1  0.10D+01  0.00D+00  0.16D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 4  0.13485662D+05  0.16D-08    3  1  0.10D+01  0.00D+00  0.17D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 5  0.12709942D+05  0.97D-09    3  1  0.10D+01  0.00D+00  0.12D+01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 6  0.12709346D+05  0.16D-10    3  1  0.10D+01  0.00D+00  0.66D-07


--- Final Convergence Analysis at Last Iterate ---

  Objective function value:      F(X)  =  0.12709346D+05
  Solution values:               X     =
     0.16478693D+01  0.24834694D+01 -0.17908882D+01  0.21557437D+01
  Distances from lower bounds:   X-XL  =
     0.41478693D+01  0.49834694D+01  0.70911181D+00  0.46557437D+01
  Distances from upper bounds:   XU-X  =
     0.85213065D+00  0.16530606D-01  0.42908882D+01  0.34425628D+00
  Multipliers for lower bounds:  U     =
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
  Multipliers for upper bounds:  U     =
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
  Constraint values:             G(X)  =
    -0.15948132D-10  0.19548086D-01  0.19740986D+00  0.63608992D+00
     0.13075830D+01  0.00000000D+00  0.22204460D-15
  Multipliers for constraints:   U     =
    -0.20624063D+04  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.29609955D+04  0.10577841D+04
  Number of function calls:      NFUNC =       6
  Number of gradient calls:      NGRAD =       6
  Number of calls of QP solver:  NQL   =       6



          *****   Completed CALL to NLPQLP   *****


     *****   Number of Function Evaluations  =     30   *****


    *****   Solution Control Vector for Case Number   4   *****

Element     G.L.B.            C.V.              L.U.B.            Delta C.V.

   1    -0.25000000D+01    0.16478693D+01    0.25000000D+01    0.86391008D+00
   2    -0.25000000D+01    0.24834694D+01    0.25000000D+01    0.19241699D+00
   3    -0.25000000D+01   -0.17908882D+01    0.25000000D+01   -0.15000000D+01
   4    -0.25000000D+01    0.21557437D+01    0.25000000D+01    0.15000000D+01


             *****   Predicted Measurement Vector   *****

Element     Z Vector          ZA Vector         Delta Z           Diag[W]

   1     0.69577988D+02    0.39409224D+02    0.30168764D+02    0.10000000D+01
   2    -0.31159021D+02   -0.46865437D+02    0.15706417D+02    0.10000000D+01
   3    -0.33178959D+02    0.79662038D+01   -0.41145163D+02    0.10000000D+01
   4     0.74845514D+02    0.42413649D+02    0.32431865D+02    0.10000000D+01
   5    -0.12976267D+02    0.13856233D+02   -0.26832500D+02    0.10000000D+01
   6     0.51272092D+01    0.24296296D+02   -0.19169087D+02    0.10000000D+01
```

```
*****   NLP Solution Performance Index  =   0.12709346D+05   *****

*****   Solution Constraint Function Values for Case Number   4   *****

                    Equality Constraints

Element          Value               Target          Value - Target

   1         0.80000000D+01      0.80000000D+01      0.15948132D-10

                  Inequality Constraints

Element          Value               L.U.B.          L.U.B. - Value

   1         0.29804519D+01      0.30000000D+01      0.19548086D-01
   2         0.28025901D+01      0.30000000D+01      0.19740986D+00
   3         0.86391008D+00      0.15000000D+01      0.63608992D+00
   4         0.19241699D+00      0.15000000D+01      0.13075830D+01
   5         0.15000000D+01      0.15000000D+01      0.00000000D+00
   6         0.15000000D+01      0.15000000D+01      0.22204460D-15


             *****   NLP Special Control  4-Vector Output   *****

CV =
     0.164786934639106D+01,   0.248346939377424D+01,  -0.179088819026947D+01,
     0.215574371814728D+01,


               *****   End Case Number   4   *****

END of RUN.


   ***********  END  **********   END   *********
```

# B.2 (6 x 6) T-Matrix NLP Control Problems

## B.2.1 The Command (DCL) File Code

**for the**
**(6 x 6) T-Matrix NLP Control Problem**
**on the**
**Hewlett-Packard Alpha Mainframe Computer**

```
$ ASSIGN  SYS$COMMAND:  SYS$INPUT
$ ASSIGN  SYS$INPUT     FOR005
$ ASSIGN  SYS$OUTPUT    FOR006
$       SET TERM/WIDTH=80
$       SET VERIFY
$       SET NOVERIFY
$ !
$ ! *****   OPTIM COMMAND PROCEDURE:    OPTIM.COM      *****
$ !
$ !     ON WARNING THEN GOTO _______
$ !     ON ERROR THEN GOTO _______
$ !     ON SEVERE THEN GOTO _______
$ !
$ START:
$ !
$ ! *****   Determine if a NLP6x6 Case is to be RUN   *****
$ !
$ RUN0:
$       INQUIRE RUN00 "RUN a NLP6x6 Case?  (Y/N)"
$       IF RUN00 .EQS. "N" THEN GOTO TERM1
$ !
$ RUN1:
$ !
$       INQUIRE RUNDEMO "Enter NAME of the NLP6x6 System to be RUN"
$ !
$ ! *****   RUN this NLP6x6 Case   *****
$ !
$       ASSIGN  CDATA.DAT SYS$INPUT
$       ASSIGN  EDATA.DAT SYS$OUTPUT
$ !
$       ON ERROR THEN GOTO RUN2
$       COPY CDATA.DAT FOR005.DAT
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "   *********   INPUT    *****    INPUT   ********   "
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT " "
$       TYPE FOR005.DAT
$ !
$ RUN2:
$ !
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "   *********   OUTPUT   *****   OUTPUT   ********   "
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "RUN the NLP6x6 Case."
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "START RUN."
$       WRITE SYS$OUTPUT " "
$ !
$       SET TERM/WIDTH=132
$ !
$ ! *****   Execute  OPTIMYY   *****
$ !
$       ON ERROR THEN GOTO RUN4
$       RUN 'RUNDEMO'
$ !
$       SET TERM/WIDTH=80
$       GOTO RUN5
$ !
$ RUN4:
$       SET TERM/WIDTH=80
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "ERROR in Running the NLP6x6 Case."
```

```
$       WRITE SYS$OUTPUT " "
$ !
$ RUN5:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "END of RUN."
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "   ***********  END  **********   END   *********   "
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT " "
$ !
$       ON ERROR THEN GOTO TERM0
$       DEASSIGN SYS$OUTPUT
$       INQUIRE DSPL00 "Display the INPUT  CDATA.DAT  on screen?  (Y/N)"
$       IF DSPL00 .EQS. "N" THEN GOTO DSPL1
$       SET TERM/WIDTH=132
$       TYPE CDATA.DAT
$       SET TERM/WIDTH=80
$ DSPL1:
$       INQUIRE DSPL01 "Display the OUTPUT  EDATA.DAT  on screen?  (Y/N)"
$       IF DSPL01 .EQS. "N" THEN GOTO TERM0
$       SET TERM/WIDTH=132
$       TYPE EDATA.DAT
$       SET TERM/WIDTH=80
$       GOTO TERM0
$ !
$ ! *****   Determine if a Demo System is to be LINKed   *****
$ !
$ LINK0:
$       INQUIRE LINK00 "LINK the NLP6x6 System?  (Y/N)"
$       IF LINK00 .EQS. "N" THEN GOTO TERM2
$ !
$ LINK1:
$ !
$       INQUIRE LINKDEMO "Enter NAME of the NLP6x6 System to be LINKed"
$ !
$ ! *****   LINK the NLP6x6 System   *****
$ !
$       INQUIRE LINK0L "LINK with the IMSL Static Library? (Y/N)"
$       IF LINK0L .EQS. "N" THEN GOTO LINK3
$ !
$       INQUIRE LINK01 "LINK with /MAP/CROSS_REFERENCE Qualifiers? (Y/N)"
$       IF LINK01 .EQS. "N" THEN GOTO LINK2
$ !
$ ! *****   LINK Code with the IMSL Static Library and the
$ !                                   /MAP/CROSS_REFERENCE Qualifiers   *****
$ !
$       ON ERROR THEN GOTO LINK5
$       LINK/MAP/CROSS_REFERENCE    'LINKDEMO',   LIBA/LIBRARY,    -
          LIBB/LIBRARY,  LIBC/LIBRARY,  LINK_F90_STATIC_GFLOAT/OPT
$       GOTO LINK6
$ !
$ LINK2:
$ !
$ ! *****   LINK Code with the IMSL Static Library with NO
$ !                                   /MAP/CROSS_REFERENCE Qualifiers   *****
$ !
$       ON ERROR THEN GOTO LINK5
$       LINK                        'LINKDEMO',   LIBA/LIBRARY,    -
          LIBB/LIBRARY,  LIBC/LIBRARY,  LINK_F90_STATIC_GFLOAT/OPT
$       GOTO LINK6
$ !
$ LINK3:
$ !
$       INQUIRE LINK03 "LINK with /MAP/CROSS_REFERENCE Qualifiers? (Y/N)"
```

```
$       IF LINK03 .EQS. "N" THEN GOTO LINK4
$ !
$ !
$ ! *****   LINK Code without the IMSL Static Library but with the
$ !                                   /MAP/CROSS_REFERENCE Qualifiers   *****
$ !
$       ON ERROR THEN GOTO LINK5
$       LINK/MAP/CROSS_REFERENCE    'LINKDEMO',   LIBA/LIBRARY,    -
          LIBB/LIBRARY,  LIBC/LIBRARY
$       GOTO LINK6
$ !
$ LINK4:
$ !
$ ! *****   LINK Code without the IMSL Static Library and with NO
$ !                                   /MAP/CROSS_REFERENCE Qualifiers   *****
$ !
$       ON ERROR THEN GOTO LINK5
$       LINK                        'LINKDEMO',   LIBA/LIBRARY,    -
          LIBB/LIBRARY,  LIBC/LIBRARY
$       GOTO LINK6
$ !
$ LINK5:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "ERROR in Linking the NLP6x6 System."
$       WRITE SYS$OUTPUT " "
$       GOTO TERM5
$ !
$ LINK6:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "The NLP6x6 System was Linked Successfully."
$       WRITE SYS$OUTPUT " "
$       GOTO TERM5
$ !
$ !
$ ! *****   Edit Files   *****
$ !
$ EDIT0:
$       INQUIRE EDIT00 "EDIT a File?  (Y/N)"
$       IF EDIT00 .EQS. "N" THEN GOTO TERM3
$ !
$ ! *****   EDIT a File    *****
$ !
$ EDIT1:
$       INQUIRE EDIT01 "ENTER NAME of File to be EDITED."
$       ON ERROR THEN GOTO EDIT2
$       EDT 'EDIT01'
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "Editing File Completed Successfully."
$       WRITE SYS$OUTPUT " "
$       ON ERROR THEN GOTO EDIT3
$       @XPURGE
$       GOTO EDIT0
$ !
$ EDIT2:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "ERROR in Editing a File."
$       WRITE SYS$OUTPUT " "
$       GOTO EDIT0
$ !
$ EDIT3:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "ERROR in Purging Excess Files."
$       WRITE SYS$OUTPUT " "
$       GOTO EDIT0
$ !
```

```
$ CMPL0:
$       INQUIRE CMPL000 "COMPILE a File?  (Y/N)"
$       IF CMPL000 .EQS. "N" THEN GOTO TERM4
$ !
$ ! *****   COMPILE a File   *****
$ !
$       INQUIRE CFILE "ENTER NAME of File to be COMPILED."
$ !
$ ! *****   FORTRAN Compilation   *****
$ !
$       INQUIRE CMPL01 "Specify the /LIST Qualifier?  (Y/N)"
$       IF CMPL01 .EQS. "N" THEN GOTO CMPL1
$       ON ERROR THEN GOTO CMPL2
$       FORTRAN/LIST/CONTINUATIONS=30/NOWARNINGS 'CFILE'.FOR
$       GOTO CMPL3
$ CMPL1:
$       ON ERROR THEN GOTO CMPL2
$       FORTRAN/CONTINUATIONS=30/NOWARNINGS 'CFILE'.FOR
$       GOTO CMPL3
$ CMPL2:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "ERROR in FORTRAN Compilation."
$       WRITE SYS$OUTPUT " "
$       GOTO CMPL0
$ CMPL3:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "FORTRAN Compilation Completed Successfully."
$       WRITE SYS$OUTPUT " "
$       GOTO CMPL0
$ !
$ !
$ ! *****   Test for Termination   *****
$ !
$ !
$ TERM0:
$      INQUIRE TERM00 "Terminate Process?"
$      IF TERM00 .EQS. "N" THEN GOTO RUN0
$      DELETE FOR005.DAT;*
$      GOTO TERMINATE
$ !
$ TERM1:
$      INQUIRE TERM01 "Terminate Process?"
$      IF TERM01 .EQS. "N" THEN GOTO LINK0
$      GOTO TERMINATE
$ !
$ TERM2:
$      INQUIRE TERM02 "Terminate Process?"
$      IF TERM02 .EQS. "N" THEN GOTO EDIT0
$      GOTO TERMINATE
$ !
$ TERM3:
$      INQUIRE TERM03 "Terminate Process?"
$      IF TERM03 .EQS. "N" THEN GOTO CMPL0
$      GOTO TERMINATE
$ !
$ TERM4:
$      INQUIRE LINK000 "LINK the NLP6x6 System System?  (Y/N)"
$      IF LINK000 .EQS. "N" THEN GOTO TERM5
$      GOTO LINK1
$ !
$ TERM5:
$      INQUIRE RUN000 "RUN the NLP6x6 System?  (Y/N)"
$      IF RUN000 .EQS. "N" THEN GOTO TERMINATE
$      GOTO RUN1
$ !
```

```
$ ! *****   Termination   *****
$ !
$ TERMINATE:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "TERMINATE RUN."
$       WRITE SYS$OUTPUT " "
$ !
$       DEASSIGN SYS$INPUT
$       DEASSIGN SYS$OUTPUT
$ !
$ EXIT
```

## B.2.2 The Fortran Main Driver Code

**for the**
**(6 x 6) T-Matrix NLP Control Problem**
**on the**
**Hewlett-Packard Alpha Mainframe Computer**

```
C
      PROGRAM NLP6x6
C
C***********************************************************************
C
C
C     S E Q U E N T I A L   Q U A D R A T I C   P R O G R A M M I N G
C
C            A L G O R I T H M   F O R   C O N S T R A I N E D
C
C                    O P T I M I Z A T I O N
C
C
C
C              EASY-TO-USE VERSION WITH NUMERICAL GRADIENTS
C
C
C
C
C   GENERAL PROBLEM DESCRIPTION:
C   ----------------------------
C
C   The program solves the general nonlinear programming problem
C
C
C
C            Minimize      F(X)
C
C            subject to    G (X)   =  0  ,  j=1,...,m
C                           j                       e
C
C                          G (X)  >=  0  ,  j=m +1,...,m
C                           j                  e
C
C                          XL  <=  X  <=  XU
C
C
C
C   with differentiable, real-valued functions subject to an n-dimensional
C   vector X.
C
C
C
C   THE NUMERICAL ALGORITHM:
C   ------------------------
C
C   The used code with name 'NLPQLP' is based on a sequential quadratic programming
C   (SQP) method. In each iteration, a linearly constrained quadratic subproblem
C   is formulated by approximating the Lagrangian function quadratically and
C   by linearizing constraints. The Hessian matrix is computed by BFGS quasi-Newton
C   updates. Subsequently, a one-dimensional line search subject to an
C   augmented Lagrangian penalty function is performed to get the next iterate..
C
C
C
C   SPECIFIC PROBLEM DESCRIPTION:  Control Optimisation for a Linear Plant
C                                  [(6 x 6) T-Matrix] Model with Constraints.
C   --------
C
C   Minimize  F = Z1*Z1 + Z2*Z2 + Z3*Z3 + Z4*Z4 + Z5*Z5 + Z6*Z6
C
C   Subject to    XL(1)  <=  X1  <=  XU(1)
C                 XL(2)  <=  X2  <=  XU(2)
C                 XL(3)  <=  X3  <=  XU(3)
C                 XL(4)  <=  X4  <=  XU(4)
```

```
C                 XL(5)  <=  X5  <=  XU(5)
C                 XL(6)  <=  X6  <=  XU(6)
C
C                 X1*X4 - X2*X3   =  0   =  GEQ(1)
C
C                 DSQRT[X1*X1 + X2*X2]  <=  GMAX(1)
C                 DSQRT[X3*X3 + X4*X4]  <=  GMAX(2)
C                 DSQRT[X5*X5 + X6*X6]  <=  GMAX(3)
C
C                 DABS[X1 - X01]  <=  GMAX(4)
C                 DABS[X2 - X02]  <=  GMAX(5)
C                 DABS[X3 - X03]  <=  GMAX(6)
C                 DABS[X4 - X04]  <=  GMAX(7)
C                 DABS[X5 - X05]  <=  GMAX(8)
C                 DABS[X6 - X06]  <=  GMAX(9)
C
C
C
C   Where:        NMAX  >=  (N = NX) + 2     Use:  NMAX  =  (N = NX) + 4
C                 MMAX  >=  (M = MG) + 1     Use:  MMAX  =  (M = MG) + 4
C
C                 (N = NX)  =  Number of optimisation variables.  =   6
C                 (M = MG)  =  Total Number of Constraints.       =  10
C
C                 NMAX  =  10
C                 MMAX  =  14
C
C
C
C   VERSION:
C   -------
C
C   3.1  -  February 2010
C
C
C*********************************************************************
C
      IMPLICIT         NONE
      INTEGER          NMAX, MMAX, MNN2X, LWA, LKWA, LACTIV
      PARAMETER (      NMAX   = 10,
     /                 MMAX   = 14,
     /                 MNN2X  = MMAX + NMAX + NMAX + 2,
     /                 LWA    = 1.5*NMAX*NMAX + 33*NMAX + 9*MMAX + 200,
     /                 LKWA   = NMAX + 20,
     /                 LACTIV = 2*MMAX + 10)
      INTEGER          KWA(LKWA), N, ME, M, L, MNN2, MAXIT, MAXFUN,
     /                 IPRINT, MAXNM, IOUT, MODE, IFAIL, I, J, NFUNC
      DOUBLE PRECISION X(NMAX), F, G(MMAX), DF(NMAX), DG(MMAX,NMAX),
     /                 U(MNN2X), XL(NMAX), XU(NMAX), C(NMAX,NMAX),
     /                 D(NMAX), WA(LWA), ACC, ACCQP, STPMIN, EPS,
     /                 EPSREL, FBCK, GBCK(MMAX), RHOB
      LOGICAL          ACTIVE(LACTIV), LQL
      EXTERNAL         QL
C
C
C
C     EXTERNAL  RAN
C     REAL*8    RAN
C
      INTEGER*4  NZZ,    NXX,    NZNX
C
      PARAMETER  (NZZ=6,NXX=6,NZNX=NZZ*NXX)
C
      INTEGER*4  CVOUT,  ICASE,  IDATA,  IE,     IG,     II,     IN,
     1           INFO,   IOPT,   IPIV(NXX),      IQ,     ISEED1, ISEED2,
```

```
     2           ISEED3, ISEED4, ITOUT,  JJ,     JSEED1, JSEED2, JSEED3,
     3           JSEED4, LWORK,          MG,     MI,     MULT,   NX,
     4           NZ
C
      REAL*8 CRAN1,       CRAN2,       CRAN3,       CRAN4,       CRAN5,
     1       CRAN6,       CRAN7,       CRAN8,       DX(NXX),     DZ(NZZ),
     2       DZ0(NZZ),                 G0(MMAX),    GEQ(MMAX),   GMAX(MMAX),
     3       ONE,         SUMF,        SUMZ,        T(NZZ,NXX),  TWO,
     4       WDT(NZZ),    XL0(NXX),    XU0(NXX),    X0(NXX),     Z(NZZ),
     5       ZA(NZZ),     Z0(NZZ),     ZERO
C
      REAL*8  ALPHA,              DD(NXX,NXX),        DELTCV(NXX),
     1        DUMQ(NZZ,1),        DUMT(NXX,1),        DUMT1(NXX,1),
     2        DUMTT(NXX,NXX),     DUMX(NXX,1),        DUMX1(NXX,1),
     3        DUMXX(NXX,NXX),     DUMXX1(NXX,NXX),    DUMZ(NZZ,1),
     4        DUMZT(1,NZZ),       DUMXZ(NXX,NZZ),     EE(NXX,NXX),
     5        FF(NXX,NXX),        JJJ(1,1),           RSSDCV,
     6        THETA(NXX),         TT(NZZ,NXX),        TTT(NXX,NZZ),
     7        WDX(NXX),           WDXX(NXX,NXX),      WORK(NXX),
     8        WX(NXX),            WXX(NXX,NXX),       WZ(NZZ),
     9        WZZ(NZZ,NZZ),       ZZ(NZZ),            ZZZ(NZZ)
C

C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C
      DATA  ACC,       ACCQP,     ALPHA,     CRAN1,     CRAN2,     CRAN3,
     1      CRAN4,     CRAN5,     CRAN6,     CRAN7,     CRAN8,     CVOUT,
     2      EPS,       GEQ,                  GMAX,                 ICASE,
     3      IDATA,     IN,        IOPT,      IOUT,      IPRINT,    ITOUT,
     4      L,         LQL,
     5          ISEED1,        ISEED2,        ISEED3,        ISEED4,
     6          JSEED1,        JSEED2,        JSEED3,        JSEED4,
     7      MAXFUN,    MAXIT,     MAXNM,     ME,        MG,         MODE,
     8      MULT,                 ONE,       RHOB,      STPMIN,
     9      WDT,                  WDX,                  WX,
     A      WZ,                   XL,                   XL0,
     B      XU,                   XU0,                  T,
     C      TWO,       X0,                   ZA,                   ZERO     /
C
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C
      o      1.0D-07,  0.0D+00,  1.0D+00,  2.0D+00,  3.0D+00,  1.0D+00,
     1       1.0D+00,  1.0D-01,  1.0D-01,  1.0D-01,  1.0D-01,  0,
     2       1.0D-07,  MMAX*0.0D+00,       MMAX*1.5D+00,       1,
     3       0,        5,        1,        6,        2,        0,
     4       1,        .TRUE.,
     5           78985723,      95428381,      72919329,      63237395,
     6           81692875,      68377297,      89672847,      98351973,
     7       10,       100,      0,        0,        0,        0,
     8        0,                 1.0D+00,  100.00,   0.0D+00,
     9       NZZ*1.0D+00,        NXX*0.0D+00,        NXX*0.0D+00,
     A       NZZ*1.0D+00,        NMAX*-2.0D+00,      NXX*-1.9D+00,
     B       NMAX*2.0D+00,       NXX*1.9D+00,        NZNX*0.0D+00,
     C       2.0D+00,   NXX*0.0D+00,        NZZ*0.0D+00,       0.0D+00  /
C
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C
 1000 FORMAT(//6X,45H   *****   Number of Function Evaluations  = ,I6,
     1 8H   *****)
 1900 FORMAT(//2H  )
 1901 FORMAT(//2H  )
 1902 FORMAT(///79H ***************************************************
     1************************////6X,39H   ***************   Start Cas
     2e Number ,I3,18H   ***************/)
 1903 FORMAT(//4X,51H   *****   Solution Control Vector for Case Number
```

```
     1,I3,8H   *****)
 1904 FORMAT(5X,I2,3X,3D20.8)
 1905 FORMAT(4D20.8)
 1906 FORMAT(//45H   *****   NLP Solution Performance Index  = ,D16.8,
     18H   *****)
 1907 FORMAT(//5X,60H   *****   Initial Control Vector Estimate for Case
     1 Number  ,I3,8H   *****)
 1908 FORMAT(//15X,27H   *****   End Case Number ,I3,8H   *****)
 1909 FORMAT(//1X,40H   *****   Initial Performance Index  = ,D16.8,
     18H   *****)
 1910 FORMAT(5X,I2,3X,3D20.8)
 1911 FORMAT(/2X,8H Element,8X,7H G.L.B.,13X,5H C.V.,15X,7H L.U.B./)
 1912 FORMAT(13X,43H   *****   Completed CALL to NLPQLP   *****)
 1913 FORMAT(/7X,6H CRAN1,14X,6H CRAN2,14X,6H CRAN3,14X,6H CRAN4/
     1        7X,6H CRAN5,14X,6H CRAN6,14X,6H CRAN7,14X,6H CRAN8/)
 1914 FORMAT(/21X,21H   *****   INPUT DATA,8H   *****/)
 1915 FORMAT(//24X,22H   *****   OUTPUT DATA,8H   *****/)
 1916 FORMAT(/21X,23H Inequality Constraints//2X,8H Element,9X,6H Value,
     1 14X,7H L.U.B.,9X,15H L.U.B. - Value/)
 1917 FORMAT(//62H   *****   Initial Constraint Function Values for Case
     1 Number ,I3,8H   *****)
 1918 FORMAT(//63H   *****   Solution Constraint Function Values for Cas
     1e Number ,I3,8H   *****)
 1919 FORMAT(/22X,21H Equality Constraints//2X,8H Element,9X,6H Value,
     1 14X,7H Target,9X,15H Value - Target/)
 1920 FORMAT(//2X,54H *****   NO Constraints are Specified for Case Numb
     1er ,I3,8H   *****)
 1921 FORMAT(//1X,69H   *****   Control Vector During Previous Duty Cycl
     1e for Case Number ,I3,8H   *****)
 1922 FORMAT(/2X,8H Element,4X,7H G.L.B.,11X,5H C.V.,13X,7H L.U.B.,11X,
     1  11H Delta C.V./)
 1923 FORMAT(5X,I2,1X,4D18.8)
 1924 FORMAT(//9X,63H   *****   Measurement Vectors from Previous Duty C
     1ycle   *****//2x,8H Element,8X,7H Actual,13X,6H Ideal,14X,6H Delta
     2/)
 1925 FORMAT(//14X,47H   *****   Predicted Measurement Vector   *****//
     12X,8H Element,4X,9H Z Vector,9X,10H ZA Vector,8X,8H Delta Z,10X,
     2 8H Diag[W]/)
 1926 FORMAT(12X,53H   *****   X0, ZA, and T are Randomly Defined   ****
     1*/)
 1927 FORMAT(/4X,4H Row,16X,25H *****   T-Matrix   *****)
 1928 FORMAT(/5X,I2,1X,4D18.8/(8X,4D18.8))
 1929 FORMAT(//14X,48H   *****   T-Matrix Output is Suppressed   *****)
 1930 FORMAT(14X,51H   *****   X0, ZA, and T are Directly Input   *****)
 1931 FORMAT(//13X,31H   *****   NLP Special Control ,I2,22H-Vector Outp
     1ut   *****)
 1932 FORMAT(/2X,5H CV =,/(5X,3(D24.15,1H,)))
 1950 FORMAT(//3X,50H *****   Solve the NLPQLP Problem for Case Number ,
     1 I3,8H   *****)
C
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C
 2906 FORMAT(//51H   *****   Regulator Solution Performance Index  = ,
     1 D16.8,8H   *****)
 2931 FORMAT(//10X,37H   *****   Regulator Special Control ,I2,22H-Vecto
     1r Output   *****)
 2950 FORMAT(//2X,53H *****   Solve the Regulator Problem for Case Numbe
     1r ,I3,8H   *****)
 2960 FORMAT(/4X,4H Row,4X,49H *****   [DUMXX1] = Matrix to be Inverted
     1  *****)
 2961 FORMAT(/4X,4H Row,2X,54H *****   [DD] = The Inverse of Matrix [DUM
     1XX1]   *****)
 2962 FORMAT(/4X,4H Row,1X,56H *****   [EE] = The Identity Matrix [DUMXX
     11][DD]   *****)
 2963 FORMAT(/4X,4H Row,1X,56H *****   [FF] = The Identity Matrix [DD][D
```

```
     1UMXX1]   *****)
 2964 FORMAT(/20X,19H *****   Alpha  =  ,D18.8,8H   *****/)
 2965 FORMAT(/4X,4H Dim,18X,26H *****   WZ-Vector   *****)
 2966 FORMAT(/4X,4H Dim,18X,26H *****   WX-Vector   *****)
 2967 FORMAT(/4X,4H Dim,18X,27H *****   WDX-Vector   *****)
 2968 FORMAT(/4X,4H Dim, 9X,44H *****   The Solution Control Vector   **
     1***)
 2969 FORMAT(/4X,4H Dim, 7X,48H *****   The Solution Measurement Vector
     1  *****)
 2970 FORMAT(//5X,52H   *****   Matrix [DUMXX1] was Successfully Inverte
     1d/42X,30H to Yield Matrix [DD].   *****)
 2971 FORMAT(// 4X,48H  *****   Root-Sum-Squared Delta CV Elements  = ,
     1 D16.8,8H   *****)
 2972 FORMAT(/2X,11H Delta CV =,/(5X,3(D24.15,1H,)))
 2973 FORMAT(//5X,19H   *****   Element ,I4,44H  of Matrix [DUMXX1] has
     1an illegal value.  ,/38X,30H Regulator problem is stopped./38X,
     2 32H Go on to the next case.   *****)
 2974 FORMAT(//5X,19H   *****   Element ,I4,44H  of Matrix [DUMXX1] is z
     1ero and the matrix ,/38X,32H is singular; its inverse could ,/38X,
     2 17H not be computed.,/38X,30H Regulator problem is stopped./38X,
     3 32H Go on to the next case.   *****)
C
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C
 3961 FORMAT(/4X,4H Row,1X,40H *****   The Diagonal Matrix WZZ   *061*)
 3962 FORMAT(/4X,4H Row,1X,40H *****   The Diagonal Matrix WXX   *062*)
 3963 FORMAT(/4X,4H Row,1X,41H *****   The Diagonal Matrix WDXX   *063*)
 3964 FORMAT(/4X,4H Row,1X,34H *****   The T-Matrix [TT]   *064*)
 3965 FORMAT(/4X,4H Row,1X,52H *****   The Transpose of the T-Matrix [TT
     1T]   *065*)
 3966 FORMAT(/4X,4H Row,1X,41H *****   The DUMXZ-Matrix [DUMXZ]   *066*)
 3967 FORMAT(/4X,4H Row,1X,41H *****   The DUMXX-Matrix [DUMXX]   *067*)
 3968 FORMAT(/4X,4H Row,1X,41H *****   The DUMXX-Matrix [DUMXX]   *068*)
 3969 FORMAT(/4X,4H Row,1X,41H *****   The DUMXX-Matrix [DUMXX]   *069*)
 3970 FORMAT(/4X,4H Row,1X,39H *****   The DUMX-Vector [DUMX]   *070*)
 3971 FORMAT(/4X,4H Row,1X,39H *****   The DUMX-Vector [DUMX]   *071*)
 3972 FORMAT(/4X,4H Row,1X,39H *****   The DUMZ-Vector [DUMZ]   *072*)
 3973 FORMAT(/4X,4H Row,1X,41H *****   The DUMX1-Vector [DUMX1]   *073*)
 3974 FORMAT(/4X,4H Row,1X,41H *****   The DUMX1-Vector [DUMX1]   *074*)
 3975 FORMAT(/4X,4H Row,1X,41H *****   The DUMX1-Vector [DUMX1]   *075*)
 3976 FORMAT(/4X,4H Row,1X,39H *****   The DUMZ-Vector [DUMZ]   *076*)
 3977 FORMAT(/4X,4H Row,1X,39H *****   The DUMZ-Vector [DUMZ]   *077*)
 3978 FORMAT(/4X,4H Row,1X,41H *****   The DUMZT-Vector [DUMZT]   *078*)
 3991 FORMAT(/4X,4H Row,1X,41H *****   The DUMXX-Matrix [DUMXX]   *091*)
C
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C
C
      NAMELIST / CDATA / ALPHA,  ACC,    ACCQP,  CRAN1,  CRAN2,  CRAN3,
     1                   CRAN4,  CRAN5,  CRAN6,  CRAN7,  CRAN8,  CVOUT,
     2                   EPS,    GEQ,    GMAX,   ICASE,  IDATA,  IN,
     3                   IOPT,   IOUT,   IPRINT, ISEED1, ISEED2, ISEED3,
     4                   ISEED4, ITOUT,  JSEED1, JSEED2, JSEED3, JSEED4,
     5                   L,      LQL,    MAXFUN, MAXIT,  MAXNM,  ME,
     6                   MG,     MODE,   MULT,                   RHOB,
     7                   STPMIN, T,      WDT,    WDX,    WX,     WZ,
     8                   XL,     XL0,    XU,     XU0,    X0,     ZA
C
C
C   Set some constants and initial values
C
      MODE   = 0
C
  100 READ(IN,CDATA)
C
```

```
      IFAIL  = 0
      NFUNC  = 0
      NX     = NXX
      NZ     = NZZ
      M      = MG
      N      = NX
      MI     = MG - ME
      MNN2   = M + N + N + 2
C
      WRITE(IOUT,1902)  ICASE
      WRITE(IOUT,1914)
      WRITE(IOUT,CDATA)
      IF (IDATA) 90, 90, 50
C
C  *****   Randomly define the T-Matrix and the X0 & ZA Vectors   *****
C
   90 WRITE(IOUT,1915)
      WRITE(IOUT,1926)
      WRITE(IOUT,1913)
      WRITE(IOUT,1905) CRAN1, CRAN2, CRAN3, CRAN4, CRAN5, CRAN6, CRAN7,
     1                 CRAN8
      WRITE(IOUT,1921)  ICASE
      WRITE(IOUT,1911)
      DO 61 II = 1, NX
C
C  *****   Define the T-Matrix   *****
C
      DO 62 JJ = 1, NZ
      T(JJ,II) = CRAN1*(TWO*RAN(ISEED1) - ONE) +
     1                  CRAN2*(TWO*RAN(JSEED1) - ONE)
   62 CONTINUE
C
C  *****   Define the Previous Actual Control Vector   *****
C
      X0(II)   = CRAN3*(TWO*RAN(ISEED2) - ONE) +
     1                  CRAN4*(TWO*RAN(JSEED2) - ONE)
      WRITE(IOUT,1904)  II,  XL0(II),  X0(II),  XU0(II)
C
C  *****   Adjust Previous Actual Control Vector
C                       to be Within Feasible Limits if Required.   *****
C
      IF (X0(II) - EPS - XL0(II)) 63, 64, 64
   63 X0(II) = XL0(II) + EPS
      GO TO 66
   64 IF (X0(II) + EPS - XU0(II)) 61, 61, 65
   65 X0(II) = XU0(II) - EPS
   66 WRITE(IOUT,1904)  II,  XL0(II),  X0(II),  XU0(II)
   61 CONTINUE
C
      WRITE(IOUT,1924)
C
C  *****   Define the Previous Ideally Computed Measurement Vector   *****
C
      DO 42 JJ = 1, NZ
      SUMZ = ZERO
      DO 47 II = 1, NX
      SUMZ = SUMZ + T(JJ,II)*X0(II)
   47 CONTINUE
      Z0(JJ) = SUMZ
C
C  *****   Define the Previous Actual Measurement Vector   *****
C
      DZ0(JJ) = CRAN5*(TWO*RAN(ISEED3) - ONE) +
     1                 CRAN6*(TWO*RAN(JSEED3) - ONE)
      ZA(JJ)  = Z0(JJ) + DZ0(JJ)
```

```
      WRITE(IOUT,1904)  JJ,  ZA(JJ),  Z0(JJ),  DZ0(JJ)
   42 CONTINUE
C
      GO TO 40
C
C  *****   Input the X0 & ZA Vectors, and the T-Matrix via TDATA   *****
C
   50 WRITE(IOUT,1915)
      WRITE(IOUT,1930)
      WRITE(IOUT,1921)  ICASE
      WRITE(IOUT,1911)
C
C  *****   Write the Previous Actual Control Vector   *****
C
      DO 31 II = 1, NX
      WRITE(IOUT,1904)  II,  XL0(II),  X0(II),  XU0(II)
C
C  *****   Adjust Previous Actual Control Vector
C                     to be Within Feasible Limits if Required.   *****
C
      IF (X0(II) - EPS - XL0(II)) 33, 34, 34
   33 X0(II) = XL0(II) + EPS
      GO TO 36
   34 IF (X0(II) + EPS - XU0(II)) 31, 31, 35
   35 X0(II) = XU0(II) - EPS
   36 WRITE(IOUT,1904)  II,  XL0(II),  X0(II),  XU0(II)
   31 CONTINUE
C
      WRITE(IOUT,1924)
C
C  *****   Define the Previous Ideally Computed Measurement Vector   *****
C
      DO 37 JJ = 1, NZ
      SUMZ = ZERO
      DO 38 II = 1, NX
      SUMZ = SUMZ + T(JJ,II)*X0(II)
   38 CONTINUE
      Z0(JJ) = SUMZ
C
C  *****   Define the Difference Between the Actual
C                         and the Ideal Previous Measurement Vector   *****
C
      DZ0(JJ) = ZA(JJ) - Z0(JJ)
      WRITE(IOUT,1904)  JJ,  ZA(JJ),  Z0(JJ),  DZ0(JJ)
   37 CONTINUE
C
C
C  *****   Define the Initial Estimate of the Control Vector   *****
C
   40 WRITE(IOUT,1907)  ICASE
      WRITE(IOUT,1922)
      DO 41 II = 1, NX
      X(II)  = X0(II)
      DX(II) = X(II) - X0(II)
      WRITE(IOUT,1923)  II,  XL(II),  X(II),  XU(II), DX(II)
      IF (X(II) - EPS - XL(II)) 43, 44, 44
   43 X(II)  = XL(II) + EPS
      DX(II) = X(II) - X0(II)
      GO TO 46
   44 IF (X(II) + EPS - XU(II)) 41, 41, 45
   45 X(II)  = XU(II) - EPS
      DX(II) = X(II) - X0(II)
   46 WRITE(IOUT,1923)  II,  XL(II),  X(II),  XU(II), DX(II)
   41 CONTINUE
C
```

```
C   *****   Write T-Matrix   ***
C
      IF (ITOUT .LE. 0)  GO TO 92
      WRITE(IOUT,1927)
      DO 91 JJ = 1, NZ
      WRITE(IOUT,1928) JJ, (T(JJ,II), II=1,NX)
   91 CONTINUE
      GO TO 93
   92 WRITE(IOUT,1929)
C
C   *****   Performance Index   *****
C
   93 SUMF = ZERO
      DO 67 JJ = 1, NZ
      SUMZ = ZERO
      DO 68 II = 1, NX
      SUMZ   =  SUMZ + T(JJ,II)*X(II)
   68 CONTINUE
      Z(JJ)  =  SUMZ + DZ0(JJ)
      DZ(JJ) =  Z(JJ) - ZA(JJ)
      SUMF = SUMF + Z(JJ)*Z(JJ)*WDT(JJ)
   67 CONTINUE
      WRITE(IOUT,1925)
      DO 48 JJ = 1, NZ
      WRITE(IOUT,1923)  JJ,  Z(JJ),  ZA(JJ),  DZ(JJ),  WDT(JJ)
   48 CONTINUE
      F = SUMF
      WRITE(IOUT,1909) F
C
C   *****   Constraint Functions   *****
C
      IF (MG) 999, 51, 71
   51 WRITE(IOUT,1920)  ICASE
      GO TO 70
   71 WRITE(IOUT,1917)  ICASE
      IF (ME) 999, 74, 72
   72 CONTINUE
      G0(1) = X(1)*X(4) - X(2)*X(3)
      G(1)  = GEQ(1) - G0(1)
      WRITE(IOUT,1919)
      DO 73 IE = 1, ME
      WRITE(IOUT,1910)  IE,  G0(IE),  GEQ(IE), -G(IE)
   73 CONTINUE
      IF (MI) 999, 70, 75
   74 IF (MI) 999, 51, 52
   52 CONTINUE
      G0(1)  = DSQRT(X(1)*X(1) + X(2)*X(2))
      G(1)   = GMAX(1) - G0(1)
      G0(2)  = DSQRT(X(3)*X(3) + X(4)*X(4))
      G(2)   = GMAX(2) - G0(2)
      G0(3)  = DSQRT(X(5)*X(5) + X(6)*X(6))
      G(3)   = GMAX(3) - G0(3)
      G0(4)  = DABS(DX(1))
      G(4)   = GMAX(4) - G0(4)
      G0(5)  = DABS(DX(2))
      G(5)   = GMAX(5) - G0(5)
      G0(6)  = DABS(DX(3))
      G(6)   = GMAX(6) - G0(6)
      G0(7)  = DABS(DX(4))
      G(7)   = GMAX(7) - G0(7)
      G0(8)  = DABS(DX(5))
      G(8)   = GMAX(8) - G0(8)
      G0(9)  = DABS(DX(6))
      G(9)   = GMAX(9) - G0(9)
      WRITE(IOUT,1916)
```

```
      DO 53 IQ = 1, MI
      WRITE(IOUT,1910)  IQ,  G0(IQ),  GMAX(IQ), G(IQ)
   53 CONTINUE
      GO TO 70
   75 CONTINUE
      G0(2)  = DSQRT(X(1)*X(1) + X(2)*X(2))
      G(2)   = GMAX(1) - G0(2)
      G0(3)  = DSQRT(X(3)*X(3) + X(4)*X(4))
      G(3)   = GMAX(2) - G0(3)
      G0(4)  = DSQRT(X(5)*X(5) + X(6)*X(6))
      G(4)   = GMAX(3) - G0(4)
      G0(5)  = DABS(DX(1))
      G(5)   = GMAX(4) - G0(5)
      G0(6)  = DABS(DX(2))
      G(6)   = GMAX(5) - G0(6)
      G0(7)  = DABS(DX(3))
      G(7)   = GMAX(6) - G0(7)
      G0(8)  = DABS(DX(4))
      G(8)   = GMAX(7) - G0(8)
      G0(9)  = DABS(DX(5))
      G(9)   = GMAX(8) - G0(9)
      G0(10) = DABS(DX(6))
      G(10)  = GMAX(9) - G0(10)
      WRITE(IOUT,1916)
      DO 76 IQ = 1, MI
      IG = ME + IQ
      WRITE(IOUT,1910)  IQ,  G0(IG),  GMAX(IQ), G(IG)
   76 CONTINUE
   70 CONTINUE
C
      GO TO (96,96,200), IOPT
C
C  *****   NLPQLP Optimisation   *****
C
   96 WRITE(IOUT,1950)  ICASE
C
      I      = 0
C
    1 CONTINUE
C
C============================================================
C
C   This is the main block to compute all function values.
C   The block is executed either for computing a steplength
C   sequentially or for approximating gradients by forward
C   differences.
C
C   *****   Performance Index   *****
C
      SUMF = ZERO
      DO 98 II = 1, NX
      DX(II) = X(II) - X0(II)
   98 CONTINUE
      DO 77 JJ = 1, NZ
      SUMZ = ZERO
      DO 78 II = 1, NX
      SUMZ   =  SUMZ + T(JJ,II)*X(II)
   78 CONTINUE
      Z(JJ)  =  SUMZ + DZ0(JJ)
      DZ(JJ) =  Z(JJ) - ZA(JJ)
      SUMF = SUMF + Z(JJ)*Z(JJ)*WDT(JJ)
   77 CONTINUE
      F = SUMF
C
C   *****   Constraint Functions   *****
```

```
C
      IF (MG) 999, 60, 88
   88 IF (ME) 999, 58, 57
   57 CONTINUE
      G0(1) = X(1)*X(4) - X(2)*X(3)
      G(1)  = GEQ(1) - G0(1)
      IF (MI) 999, 60, 59
   58 IF (MI) 999, 60, 87
   87 CONTINUE
      G0(1)  = DSQRT(X(1)*X(1) + X(2)*X(2))
      G(1)   = GMAX(1) - G0(1)
      G0(2)  = DSQRT(X(3)*X(3) + X(4)*X(4))
      G(2)   = GMAX(2) - G0(2)
      G0(3)  = DSQRT(X(5)*X(5) + X(6)*X(6))
      G(3)   = GMAX(3) - G0(3)
      G0(4)  = DABS(DX(1))
      G(4)   = GMAX(4) - G0(4)
      G0(5)  = DABS(DX(2))
      G(5)   = GMAX(5) - G0(5)
      G0(6)  = DABS(DX(3))
      G(6)   = GMAX(6) - G0(6)
      G0(7)  = DABS(DX(4))
      G(7)   = GMAX(7) - G0(7)
      G0(8)  = DABS(DX(5))
      G(8)   = GMAX(8) - G0(8)
      G0(9)  = DABS(DX(6))
      G(9)   = GMAX(9) - G0(9)
      GO TO 60
   59 CONTINUE
      G0(2)  = DSQRT(X(1)*X(1) + X(2)*X(2))
      G(2)   = GMAX(1) - G0(2)
      G0(3)  = DSQRT(X(3)*X(3) + X(4)*X(4))
      G(3)   = GMAX(2) - G0(3)
      G0(4)  = DSQRT(X(5)*X(5) + X(6)*X(6))
      G(4)   = GMAX(3) - G0(4)
      G0(5)  = DABS(DX(1))
      G(5)   = GMAX(4) - G0(5)
      G0(6)  = DABS(DX(2))
      G(6)   = GMAX(5) - G0(6)
      G0(7)  = DABS(DX(3))
      G(7)   = GMAX(6) - G0(7)
      G0(8)  = DABS(DX(4))
      G(8)   = GMAX(7) - G0(8)
      G0(9)  = DABS(DX(5))
      G(9)   = GMAX(8) - G0(9)
      G0(10) = DABS(DX(6))
      G(10)  = GMAX(9) - G0(10)
   60 CONTINUE
C
C
C=============================================================
C
      NFUNC = NFUNC + 1
      IF (IFAIL.EQ.-1) GOTO 4
      IF (I.GT.0) GOTO 3
    2 CONTINUE
      FBCK = F
      DO J=1,M
         GBCK(J) = G(J)
      ENDDO
      I = 0
    5 I = I + 1
      EPSREL = EPS*DMAX1(1.0D0,DABS(X(I)))
      X(I) = X(I) + EPSREL
      GOTO 1
```

```
     3 CONTINUE
       DF(I) = (F - FBCK)/EPSREL
       DO J=1,M
          DG(J,I) = (G(J) - GBCK(J))/EPSREL
       ENDDO
       X(I) = X(I) - EPSREL
    IF (I.LT.N) GOTO 5
       F = FBCK
       DO J=1,M
          G(J) = GBCK(J)
       ENDDO
C
     4 CONTINUE
C
C
       CALL NLPQLP (     L,      M,     ME,   MMAX,      N,
      /               NMAX,   MNN2,      X,      F,      G,
      /                 DF,     DG,      U,     XL,     XU,
      /                  C,      D,    ACC,  ACCQP, STPMIN,
      /             MAXFUN,  MAXIT,  MAXNM,   RHOB, IPRINT,
      /               MODE,   IOUT,  IFAIL,     WA,    LWA,
      /                KWA,   LKWA, ACTIVE, LACTIV,    LQL,
      /                 QL)
C
C
       WRITE(IOUT,1912)
C
C
       IF (IFAIL.EQ.-1) GOTO 1
       IF (IFAIL.EQ.-2) GOTO 2
C
C   *****   Write Number of Function Evaluations   *****
C
       WRITE(IOUT,1000) NFUNC
C
C  *****   Write the Solution Control Vector   *****
C
       WRITE(IOUT,1903)  ICASE
       WRITE(IOUT,1922)
       DO 69 II = 1, NX
       DX(II) = X(II) - X0(II)
       WRITE(IOUT,1923)  II,  XL(II),  X(II),  XU(II), DX(II)
    69 CONTINUE
C
C   *****   Performance Index   *****
C
       WRITE(IOUT,1925)
       DO 49 JJ = 1, NZ
       WRITE(IOUT,1923)  JJ,  Z(JJ),  ZA(JJ),  DZ(JJ),  WDT(JJ)
    49 CONTINUE
       WRITE(IOUT,1906) F
C
C   *****   Constraint Functions   *****
C
       IF (MG) 999, 54, 81
    54 WRITE(IOUT,1920)  ICASE
       GO TO 80
    81 WRITE(IOUT,1918)  ICASE
       IF (ME) 999, 84, 82
    82 CONTINUE
       G0(1) = X(1)*X(4) - X(2)*X(3)
       G(1)  = GEQ(1) - G0(1)
       WRITE(IOUT,1919)
       DO 83 IE = 1, ME
       WRITE(IOUT,1910)  IE,  G0(IE),  GEQ(IE), -G(IE)
```

```
   83 CONTINUE
      IF (MI) 999, 80, 85
   84 IF (MI) 999, 54, 55
   55 CONTINUE
      G0(1)  = DSQRT(X(1)*X(1) + X(2)*X(2))
      G(1)   = GMAX(1) - G0(1)
      G0(2)  = DSQRT(X(3)*X(3) + X(4)*X(4))
      G(2)   = GMAX(2) - G0(2)
      G0(3)  = DSQRT(X(5)*X(5) + X(6)*X(6))
      G(3)   = GMAX(3) - G0(3)
      G0(4)  = DABS(DX(1))
      G(4)   = GMAX(4) - G0(4)
      G0(5)  = DABS(DX(2))
      G(5)   = GMAX(5) - G0(5)
      G0(6)  = DABS(DX(3))
      G(6)   = GMAX(6) - G0(6)
      G0(7)  = DABS(DX(4))
      G(7)   = GMAX(7) - G0(7)
      G0(8)  = DABS(DX(5))
      G(8)   = GMAX(8) - G0(8)
      G0(9)  = DABS(DX(6))
      G(9)   = GMAX(9) - G0(9)
      WRITE(IOUT,1916)
      DO 56 IQ = 1, MI
      WRITE(IOUT,1910)  IQ,  G0(IQ),  GMAX(IQ), G(IQ)
   56 CONTINUE
      GO TO 80
   85 CONTINUE
      G0(2)  = DSQRT(X(1)*X(1) + X(2)*X(2))
      G(2)   = GMAX(1) - G0(2)
      G0(3)  = DSQRT(X(3)*X(3) + X(4)*X(4))
      G(3)   = GMAX(2) - G0(3)
      G0(4)  = DSQRT(X(5)*X(5) + X(6)*X(6))
      G(4)   = GMAX(3) - G0(4)
      G0(5)  = DABS(DX(1))
      G(5)   = GMAX(4) - G0(5)
      G0(6)  = DABS(DX(2))
      G(6)   = GMAX(5) - G0(6)
      G0(7)  = DABS(DX(3))
      G(7)   = GMAX(6) - G0(7)
      G0(8)  = DABS(DX(4))
      G(8)   = GMAX(7) - G0(8)
      G0(9)  = DABS(DX(5))
      G(9)   = GMAX(8) - G0(9)
      G0(10) = DABS(DX(6))
      G(10)  = GMAX(9) - G0(10)
      WRITE(IOUT,1916)
      DO 86 IQ = 1, MI
      IG = ME + IQ
      WRITE(IOUT,1910)  IQ,  G0(IG),  GMAX(IQ), G(IG)
   86 CONTINUE
   80 CONTINUE
C
      GO TO (97,200,200), IOPT
C
C
C  *****   Solve the Regulator Problem   *****
C
  200 CONTINUE
C
      WRITE(IOUT,2950)  ICASE
C
C   *****   Write Alpha and the Weighting Vectors   *****
C
      WRITE(IOUT,2964)  ALPHA
```

```
      WRITE(IOUT,2965)
      WRITE(IOUT,1928)  NZZ, (WZ(I), I=1,NZZ)
      WRITE(IOUT,2966)
      WRITE(IOUT,1928)  NXX, (WX(I), I=1,NXX)
      WRITE(IOUT,2967)
      WRITE(IOUT,1928)  NXX, (WDX(I), I=1,NXX)
C
C  *****   Compute Regulator Problem Solution Control Vector   *****
C
      CALL DIAGW1(NZZ,WZ,WZZ)
C  *****   061   *****   061   *****   061   *****   061   *****
C     WRITE(IOUT,3961)
C     DO 301 I = 1, NZZ
C     WRITE(IOUT,1928)  I ,  (WZZ(I,J), J=1,NZZ)
C 301 CONTINUE
      CALL DIAGW2(NXX,WX,WXX)
C  *****   062   *****   062   *****   062   *****   062   *****
C     WRITE(IOUT,3962)
C     DO 302 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (WXX(I,J), J=1,NXX)
C 302 CONTINUE
      CALL DIAGW2(NXX,WDX,WDXX)
C  *****   063   *****   063   *****   063   *****   063   *****
C     WRITE(IOUT,3963)
C     DO 303 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (WDXX(I,J), J=1,NXX)
C 303 CONTINUE
      DO 202 I = 1, NZZ
      DO 201 J = 1, NXX
      TT(I,J)  = T(I,J)
  201 CONTINUE
  202 CONTINUE
C  *****   064   *****   064   *****   064   *****   064   *****
C     WRITE(IOUT,3964)
C     DO 304 I = 1, NZZ
C     WRITE(IOUT,1928)  I ,  (TT(I,J), J=1,NXX)
C 304 CONTINUE
      CALL TRNSP1(NZZ,NXX,TT,TTT)
C  *****   065   *****   065   *****   065   *****   065   *****
C     WRITE(IOUT,3965)
C     DO 305 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (TTT(I,J), J=1,NZZ)
C 305 CONTINUE
      CALL MMULT1(NXX,NZZ,NZZ,TTT,WZZ,DUMXZ)
C  *****   066   *****   066   *****   066   *****   066   *****
C     WRITE(IOUT,3966)
C     DO 306 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (DUMXZ(I,J), J=1,NZZ)
C 306 CONTINUE
      CALL MMULT2(NXX,NXX,NZZ,DUMXZ,TT,DUMXX)
C  *****   067   *****   067   *****   067   *****   067   *****
C     WRITE(IOUT,3967)
C     DO 307 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (DUMXX(I,J), J=1,NXX)
C 307 CONTINUE
      CALL SMDFF1(NXX,NXX,1,DUMXX,WDXX,DUMTT)
C  *****   068   *****   068   *****   068   *****   068   *****
      DO 321 I = 1,NXX
      DO 320 J = 1,NXX
      DUMXX(I,J) = DUMTT(I,J)
  320 CONTINUE
  321 CONTINUE
C     WRITE(IOUT,3968)
C     DO 308 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (DUMXX(I,J), J=1,NXX)
```

```
C 308 CONTINUE
C
C  *****   Compute the Matrix to be Inverted   *****
C
      CALL SMDFF1(NXX,NXX,1,DUMXX,WXX,DUMXX1)
C     WRITE(IOUT,2960)
C     DO 203 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (DUMXX1(I,J), J=1,NXX)
C 203 CONTINUE
C
C   *****   Compute Matrix [DD]   *****
C
C     CALL DLINRG(NXX,DUMXX1,NXX,DD,NXX)
C
      DO 210 I = 1, NXX
      DO 209 J = 1, NXX
      DD(I,J) = DUMXX1(I,J)
  209 CONTINUE
  210 CONTINUE
      LWORK = -1
      LWORK = 512
C
      CALL DGETRF(NXX,NXX,DD,NXX,IPIV,INFO)
C
      CALL DGETRI(NXX,DD,NXX,IPIV,WORK,LWORK,INFO)
C
      IF(INFO) 212, 211, 213
C
C  *****   Matrix Inversion was Successful   *****
C
  211 WRITE(IOUT,2970)
      GO TO 214
C
C  *****   Matrix Inversion Failed. An Element had an Illegal Value.
C                                                                    *****
C
  212 INFO = -INFO
      WRITE(IOUT,2973) INFO
      GO TO 89
C
C  *****   Matrix Inversion Failed. An Element on the Diagonal is Equal
C          to Zero and correspondingly the Matrix is Singular and its
C          Inverse could not be computed.
C                                                                    *****
C
  213 WRITE(IOUT,2974) INFO
      GO TO 89
C
  214 CONTINUE
C
C  *****   Matrix [DD] = The Inverted Matrix  =  [DUMXX1]-1   *****
C
C     WRITE(IOUT,2961)
C     DO 204 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (DD(I,J), J=1,NXX)
C 204 CONTINUE
C
C   *****   Matrix [EE] = The Identity Matrix = [DUMXX1][DD]   *****
C
C     CALL MMULT3(NXX,NXX,NXX,DUMXX1,DD,EE)
C     WRITE(IOUT,2962)
C     DO 205 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (EE(I,J), J=1,NXX)
C 205 CONTINUE
C
```

```
C   *****   Matrix [FF] = The Identity Matrix = [DD][DUMXX1]   *****
C
C     CALL MMULT3(NXX,NXX,NXX,DD,DUMXX1,FF)
C     WRITE(IOUT,2963)
C     DO 206 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (FF(I,J), J=1,NXX)
C 206 CONTINUE
C
C  *****   Compute the Solution Control Vector (the Theta Vector)   *****
C
      CALL MMULT3(NXX,NXX,NXX,DD,DUMXX,DUMTT)
      DO 323 I = 1,NXX
      DO 322 J = 1,NXX
      DUMXX(I,J) = DUMTT(I,J)
  322 CONTINUE
  323 CONTINUE
C  *****   069   *****   069   *****   069   *****   069   *****
C     WRITE(IOUT,3969)
C     DO 309 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (DUMXX(I,J), J=1,NXX)
C 309 CONTINUE
C
      DO 207 J = 1, NXX
      DUMX(J,1) = X0(J)
  207 CONTINUE
C  *****   070   *****   070   *****   070   *****   070   *****
C     WRITE(IOUT,3970)
C     DO 310 J = 1, NXX
C     WRITE(IOUT,1928)  J ,  DUMX(J,1)
C 310 CONTINUE
      CALL MMULT4(NXX,1,NXX,DUMXX,DUMX,DUMT)
C  *****   071   *****   071   *****   071   *****   071   *****
      DO 324 J = 1,NXX
      DUMX(J,1) = DUMT(J,1)
  324 CONTINUE
C     WRITE(IOUT,3971)
C     DO 311 J = 1, NXX
C     WRITE(IOUT,1928)  J ,  DUMX(J,1)
C 311 CONTINUE
      DO 208 I = 1, NZZ
      DUMZ(I,1) = ZA(I)
  208 CONTINUE
C  *****   072   *****   072   *****   072   *****   072   *****
C     WRITE(IOUT,3972)
C     DO 312 I = 1, NZZ
C     WRITE(IOUT,1928)  I ,  DUMZ(I,1)
C 312 CONTINUE
      CALL MMULT5(NXX,1,NZZ,DUMXZ,DUMZ,DUMX1)
C  *****   073   *****   073   *****   073   *****   073   *****
C     WRITE(IOUT,3973)
C     DO 313 J = 1, NXX
C     WRITE(IOUT,1928)  J ,  DUMX1(J,1)
C 313 CONTINUE
      CALL MMULT4(NXX,1,NXX,DD,DUMX1,DUMT1)
C  *****   074   *****   074   *****   074   *****   074   *****
      DO 325 J = 1,NXX
      DUMX1(J,1) = DUMT1(J,1)
  325 CONTINUE
C     WRITE(IOUT,3974)
C     DO 314 J = 1, NXX
C     WRITE(IOUT,1928)  J ,  DUMX1(J,1)
C 314 CONTINUE
      CALL SMULT(NXX,1,ALPHA,DUMX1,DUMT1)
C  *****   075   *****   075   *****   075   *****   075   *****
      DO 326 J = 1,NXX
```

```
      DUMX1(J,1) = DUMT1(J,1)
  326 CONTINUE
C     WRITE(IOUT,3975)
C     DO 315 J = 1, NXX
C     WRITE(IOUT,1928)  J ,  DUMX1(J,1)
C 315 CONTINUE
      CALL SMDFF2(NXX,1,0,DUMX,DUMX1,DUMT)
C
C  *****   Write the Solution Control Vector (the Theta-Vector)   *****
C
      DO 327 J = 1,NXX
      DUMX(J,1) = DUMT(J,1)
      THETA(J) = DUMX(J,1)
  327 CONTINUE
      WRITE(IOUT,2968)
      DO 318 J = 1, NXX
      WRITE(IOUT,1928)  J,  THETA(J)
  318 CONTINUE
C
C  *****   Compute the Solution Measurement Vector (the Z-Vector)   *****
C
      DO 330 J = 1,NXX
      DUMX(J,1) = THETA(J) - X0(J)
  330 CONTINUE
      CALL MMULT6(NZZ,1,NXX,TT,DUMX,DUMZ)
C  *****   076   *****   076   *****   076   *****   076   *****
      DO 331 J = 1, NZZ
      ZZ(J) = DUMZ(J,1)
  331 CONTINUE
C     WRITE(IOUT,3976)
C     DO 316 J = 1, NZZ
C     WRITE(IOUT,1928)  J ,  DUMZ(J,1)
C 316 CONTINUE
      CALL SMDFF3(NZZ,NZZ,1,ZZ,ZA,ZZZ)
C
C  *****   Write the Solution Measurement Vector (the Z-Vector)   *****
C
      DO 328 J = 1,NZZ
      ZZ(J) = ZZZ(J)
  328 CONTINUE
      WRITE(IOUT,2969)
      WRITE(IOUT,1928)  NZZ,  (ZZ(I), I=1,NZZ)
C
C   *****   Compute the Corresponding Performance Index   *****
C
      DO 319 J = 1, NZZ
      DUMZ(J,1) = ZZ(J)
  319 CONTINUE
      CALL MMULT7(NZZ,1,NZZ,WZZ,DUMZ,DUMQ)
C  *****   077   *****   077   *****   077   *****   077   *****
      DO 329 J = 1,NZZ
      DUMZ(J,1) = DUMQ(J,1)
  329 CONTINUE
C     WRITE(IOUT,3977)
C     DO 317 J = 1, NXX
C     WRITE(IOUT,1928)  J ,  DUMZ(J,1)
C 317 CONTINUE
      CALL TRNSP2(NZZ,1,DUMZ,DUMZT)
C  *****   078   *****   078   *****   078   *****   078   *****
C     WRITE(IOUT,3978)
C     I = 1
C     WRITE(IOUT,1928)  I ,  (DUMZT(1,J), J=1,NZZ)
      CALL MMULT8(1,1,NZZ,DUMZT,DUMZ,JJJ)
C
C   *****   Write the Corresponding Performance Index   *****
```

```
C
      WRITE(IOUT,2906) JJJ(1,1)
C
C   *****   End of Regulator Problem   *****
C
C
C   *****   End of Case   *****
C
C
   97 IF (CVOUT .LE. 0) GO TO 89
      GO TO (94,94,95), IOPT
   94 WRITE(IOUT,1931) NX
      WRITE(IOUT,1932) (X(II), II=1,NX)
      GO TO (89,95,95), IOPT
   95 WRITE(IOUT,2931) NXX
      WRITE(IOUT,1932) (THETA(II), II=1,NXX)
      GO TO (89,371,89), IOPT
  371 RSSDCV = ZERO
      DO 372 II = 1, NXX
      DELTCV(II) = X(II) - THETA(II)
      RSSDCV = RSSDCV + DELTCV(II)*DELTCV(II)
  372 CONTINUE
      RSSDCV = DSQRT(RSSDCV)
      WRITE(IOUT,2971) RSSDCV
      WRITE(IOUT,2972) (DELTCV(II), II=1,NXX)
   89 CVOUT = 0
      WRITE(IOUT,1908)  ICASE
C
      IF (MULT .LE. 0)  GO TO 999
      ITOUT = 0
      MULT  = 0
      WRITE(IOUT,1900)
      ICASE = ICASE + 1
      GO TO 100
  999 STOP
C
      END
C
C
C
C
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C
C
C
```

## B.2.3 Synthesised Input and Corresponding Output Data

**for the**
**(6 x 6) T-Matrix NLP Control Problem**
**on the**
**Hewlett-Packard Alpha Mainframe Computer**

```
  *********   INPUT    *****    INPUT   ********


$CDATA
!
!  *****   Start of Case  1  Input Data   *****
!                  NO Constraints
!
 ACC     =    1.0D-8,
 ACC     =    1.0D-7,
 ACCQP   =    1.0D-12,
 ALPHA   =    1.0,
 CRAN1   =   15.0,
 CRAN2   =   20.0,
 CRAN3   =    7.0,
 CRAN4   =    5.0,
 CRAN5   =    0.02,
 CRAN6   =    0.02,
 CVOUT   =      0,
 CVOUT   =      1,
 GEQ     =    8.00,
 GMAX    =    3.00,  3.00,  3.00,
 GMAX(4) =    1.00,  1.00,  1.00,  1.00,  1.00,  1.00,
 ICASE   =      1,
 IDATA   =      1,
 IDATA   =      0,
 IOPT    =      3,
 IOPT    =      1,
 IOPT    =      2,
 ITOUT   =      0,
 ITOUT   =      1,
 ISEED1  =  78985723,
 ISEED2  =  95428381,
 ISEED3  =  72919329,
 ISEED4  =  63237395,
 JSEED1  =  81692875,
 JSEED2  =  68377297,
 JSEED3  =  89672847,
 JSEED4  =  98351973,
 LQL     =   .FALSE.,
 LQL     =   .TRUE.,
 MAXNM   =    0,
 MAXNM   =   10,
 ME      =    0,
 MG      =    0,
 RHOB    =    0.0,
 RHOB    =  100.0,
 XL0     =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XU0     =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XL      =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XU      =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
!
 MULT    =         0,
 MULT    =         1,
!
!  *****   End of Case  1  Input Data   *****
!
$END
$CDATA
!
!  *****   Start of Case  2  Input Data   *****
!            Two Equality onstraints
!           NO Inequality Constraints
!
```

```
 ACC     =    1.0D-8,
 ACC     =    1.0D-7,
 ACCQP   =    1.0D-12,
 ALPHA   =    1.0,
 CRAN1   =   15.0,
 CRAN2   =   20.0,
 CRAN3   =    7.0,
 CRAN4   =    5.0,
 CRAN5   =    0.02,
 CRAN6   =    0.02,
 CVOUT   =      0,
 CVOUT   =      1,
 GEQ     =    8.00,
 GMAX    =    3.00,  3.00,  3.00,
 GMAX(4) =    1.00,  1.00,  1.00,  1.00,  1.00,  1.00,
 IDATA   =      1,
 IDATA   =      0,
 IOPT    =      2,
 IOPT    =      3,
 IOPT    =      1,
 ITOUT   =      1,
 ITOUT   =      0,
 ISEED1  =  78985723,
 ISEED2  =  95428381,
 ISEED3  =  72919329,
 ISEED4  =  63237395,
 JSEED1  =  81692875,
 JSEED2  =  68377297,
 JSEED3  =  89672847,
 JSEED4  =  98351973,
 LQL     =   .FALSE.,
 LQL     =   .TRUE.,
 MAXNM   =    0,
 MAXNM   =   10,
 ME      =    1,
 MG      =    1,
 RHOB    =    0.0,
 RHOB    =  100.0,
 XL0     =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XU0     =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XL      =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XU      =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 MULT    =         0,
 MULT    =         1,
!
!  *****   End of Case  2  Input Data   *****
!
$END
$CDATA
!
!  *****   Start of Case  3  Input Data   *****
!             NO Equality onstraints
!            12 Inequality Constraints
!
 ACC     =    1.0D-8,
 ACC     =    1.0D-7,
 ACCQP   =    1.0D-12,
 ALPHA   =    1.0,
 CRAN1   =   15.0,
 CRAN2   =   20.0,
 CRAN3   =    7.0,
 CRAN4   =    5.0,
 CRAN5   =    0.02,
 CRAN6   =    0.02,
 CVOUT   =      0,
```

```
 CVOUT   =      1,
 GEQ     =    8.00,
 GMAX    =    3.00,  3.00,  3.00,
 GMAX(4) =    1.00,  1.00,  1.00,  1.00,  1.00,  1.00,
 IDATA   =      1,
 IDATA   =      0,
 IOPT    =      2,
 IOPT    =      3,
 IOPT    =      1,
 ITOUT   =      1,
 ITOUT   =      0,
 ISEED1  =  78985723,
 ISEED2  =  95428381,
 ISEED3  =  72919329,
 ISEED4  =  63237395,
 JSEED1  =  81692875,
 JSEED2  =  68377297,
 JSEED3  =  89672847,
 JSEED4  =  98351973,
 LQL     =   .FALSE.,
 LQL     =   .TRUE.,
 MAXNM   =    0,
 MAXNM   =   10,
 ME      =    0,
 MG      =    9,
 RHOB    =    0.0,
 RHOB    =  100.0,
 XL0     =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XU0     =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XL      =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XU      =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 MULT    =         0,
 MULT    =         1,
!
!  *****   End of Case  3  Input Data   *****
!
$END
$CDATA
!
!  *****   Start of Case  4  Input Data   *****
!             Two Equality onstraints
!            12 Inequality Constraints
!
 ACC     =    1.0D-8,
 ACC     =    1.0D-7,
 ACCQP   =    1.0D-12,
 ALPHA   =    1.0,
 CRAN1   =   15.0,
 CRAN2   =   20.0,
 CRAN3   =    7.0,
 CRAN4   =    5.0,
 CRAN5   =    0.02,
 CRAN6   =    0.02,
 CVOUT   =      0,
 CVOUT   =      1,
 GEQ     =    8.00,
 GMAX    =    3.00,  3.00,  3.00,
 GMAX(4) =    1.00,  1.00,  1.00,  1.00,  1.00,  1.00,
 IDATA   =      1,
 IDATA   =      0,
 IOPT    =      2,
 IOPT    =      3,
 IOPT    =      1,
 ITOUT   =      1,
 ITOUT   =      0,
```

```
  ISEED1  =  78985723,
  ISEED2  =  95428381,
  ISEED3  =  72919329,
  ISEED4  =  63237395,
  JSEED1  =  81692875,
  JSEED2  =  68377297,
  JSEED3  =  89672847,
  JSEED4  =  98351973,
  LQL     =   .FALSE.,
  LQL     =   .TRUE.,
  MAXNM   =    0,
  MAXNM   =   10,
  ME      =    1,
  MG      =   10,
  RHOB    =    0.0,
  RHOB    =  100.0,
  XL0     =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
  XU0     =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
  XL      =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
  XU      =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
  MULT    =         1,
  MULT    =         0,
 !
 !  *****   End of Case  4  Input Data   *****
 !
 $END


   *********   OUTPUT   *****   OUTPUT   ********

RUN the NLP6x6 Case.

START RUN.

********************************************************************************


        ***************   Start Case Number   1   ***************


                     *****   INPUT DATA   *****

&CDATA
ALPHA   =   1.00000000000000     ,
ACC     =  1.0000000000000000E-007,
ACCQP   =  1.0000000000000000E-012,
CRAN1   =   15.0000000000000     ,
CRAN2   =   20.0000000000000     ,
CRAN3   =   7.00000000000000     ,
CRAN4   =   5.00000000000000     ,
CRAN5   =  2.0000000000000000E-002,
CRAN6   =  2.0000000000000000E-002,
CRAN7   =  0.100000000000000     ,
CRAN8   =  0.100000000000000     ,
CVOUT   =           1,
EPS     =  1.0000000000000000E-007,
GEQ     =   8.00000000000000     , 13*0.000000000000000E+000  ,
GMAX    = 3*3.00000000000000        , 6*1.00000000000000        ,
5*1.50000000000000        ,
ICASE   =           1,
IDATA   =           0,
IN      =           5,
```

```
IOPT    =           2,
IOUT    =           6,
IPRINT  =           2,
ISEED1  =    78985723,
ISEED2  =    95428381,
ISEED3  =    72919329,
ISEED4  =    63237395,
ITOUT   =           1,
JSEED1  =    81692875,
JSEED2  =    68377297,
JSEED3  =    89672847,
JSEED4  =    98351973,
L       =           1,
LQL     = T,
MAXFUN  =          10,
MAXIT   =         100,
MAXNM   =          10,
ME      =           0,
MG      =           0,
MODE    =           0,
MULT    =           1,
RHOB    =   100.000000000000     ,
STPMIN  =  0.000000000000000E+000,
T       = 36*0.000000000000000E+000  ,
WDT     = 6*1.00000000000000        ,
WDX     = 6*0.000000000000000E+000  ,
WX      = 6*0.000000000000000E+000  ,
WZ      = 6*1.00000000000000        ,
XL      = 6*-2.50000000000000       , 4*-2.00000000000000       ,
XL0     = 6*-2.30000000000000       ,
XU      = 6*2.50000000000000        , 4*2.00000000000000        ,
XU0     = 6*2.30000000000000        ,
X0      = 6*0.000000000000000E+000  ,
ZA      = 6*0.000000000000000E+000
/
```

***** OUTPUT DATA *****

***** X0, ZA, and T are Randomly Defined *****

| CRAN1 | CRAN2 | CRAN3 | CRAN4 |
|---|---|---|---|
| CRAN5 | CRAN6 | CRAN7 | CRAN8 |
| 0.15000000D+02 | 0.20000000D+02 | 0.70000000D+01 | 0.50000000D+01 |
| 0.20000000D-01 | 0.20000000D-01 | 0.10000000D+00 | 0.10000000D+00 |

***** Control Vector During Previous Duty Cycle for Case Number 1 *****

| Element | G.L.B. | C.V. | L.U.B. |
|---|---|---|---|
| 1 | -0.23000000D+01 | 0.26932186D+01 | 0.23000000D+01 |
| 1 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 2 | -0.23000000D+01 | 0.79428859D+01 | 0.23000000D+01 |
| 2 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 3 | -0.23000000D+01 | -0.77814293D+00 | 0.23000000D+01 |
| 4 | -0.23000000D+01 | 0.24868137D+01 | 0.23000000D+01 |
| 4 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 5 | -0.23000000D+01 | 0.17530580D+01 | 0.23000000D+01 |
| 6 | -0.23000000D+01 | -0.10085106D-02 | 0.23000000D+01 |

***** Measurement Vectors from Previous Duty Cycle *****

| Element | Actual | Ideal | Delta |
|---|---|---|---|
| 1 | 0.57501060D+02 | 0.57512799D+02 | -0.11739089D-01 |
| 2 | -0.32214465D+02 | -0.32207449D+02 | -0.70162487D-02 |
| 3 | -0.61617152D+02 | -0.61612001D+02 | -0.51504469D-02 |
| 4 | 0.77829442D+02 | 0.77805433D+02 | 0.24008768D-01 |
| 5 | -0.30334669D+02 | -0.30316450D+02 | -0.18219316D-01 |
| 6 | 0.56094925D+02 | 0.56084753D+02 | 0.10172153D-01 |

***** Initial Control Vector Estimate for Case Number 1 *****

| Element | G.L.B. | C.V. | L.U.B. | Delta C.V. |
|---|---|---|---|---|
| 1 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 2 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 3 | -0.25000000D+01 | -0.77814293D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 4 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 5 | -0.25000000D+01 | 0.17530580D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 6 | -0.25000000D+01 | -0.10085106D-02 | 0.25000000D+01 | 0.00000000D+00 |

Row ***** T-Matrix *****

| Row | | | | |
|---|---|---|---|---|
| 1 | 0.34788787D+00 | 0.14780229D+02 | -0.17892113D+02 | 0.12405574D+00 |
| | 0.48613662D+01 | 0.11972706D+02 | | |
| 2 | 0.83601731D+01 | -0.24192777D+02 | -0.10221714D+02 | -0.14623272D+01 |
| | -0.19956291D+00 | 0.32937256D+02 | | |
| 3 | -0.11511457D+01 | 0.92369419D+01 | 0.16556811D+02 | -0.11395201D+02 |
| | -0.23440781D+02 | 0.23557067D+02 | | |
| 4 | 0.31760061D+02 | 0.65341014D+01 | 0.24324918D+01 | 0.49236619D+01 |
| | -0.11242945D+02 | -0.67443871D+01 | | |
| 5 | -0.41143203D+01 | 0.14034983D+02 | -0.10135722D+02 | -0.27454829D+02 |
| | 0.12076539D+01 | -0.79359823D+01 | | |
| 6 | -0.18296975D+01 | 0.12504480D+02 | 0.15932183D+02 | 0.26025379D+01 |
| | 0.21633031D+02 | -0.20302622D+02 | | |

***** Predicted Measurement Vector *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|
| 1 | 0.57501060D+02 | 0.57501060D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 2 | -0.32214465D+02 | -0.32214465D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 3 | -0.61617152D+02 | -0.61617152D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 4 | 0.77829442D+02 | 0.77829442D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 5 | -0.30334669D+02 | -0.30334669D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 6 | 0.56094925D+02 | 0.56094925D+02 | 0.00000000D+00 | 0.10000000D+01 |

***** Initial Performance Index = 0.18265072D+05 *****

***** NO Constraints are Specified for Case Number 1 *****

***** Solve the NLPQLP Problem for Case Number 1 *****

---

START OF THE SEQUENTIAL QUADRATIC PROGRAMMING ALGORITHM

```
------------------------------------------------------------------------

 Parameters:
    N      =       6
    M      =       0
    ME     =       0
    MODE   =       0
    ACC    =   0.1000D-06
    ACCQP  =   0.1000D-11
    STPMIN =   0.0000D+00
    RHOB   =   0.1000D+03
    MAXFUN =      10
    MAXNM  =      10
    MAXIT  =     100
    IPRINT =       2

 Output in the following order:
    IT    - iteration number
    F     - objective function value
    SCV   - sum of constraint violations
    NA    - number of active constraints
    I     - number of line search iterations
    ALPHA - steplength parameter
    DELTA - additional variable to prevent inconsistency
    KKT   - Karush-Kuhn-Tucker optimality criterion


  IT         F           SCV      NA  I    ALPHA     DELTA     KKT
------------------------------------------------------------------------
   1  0.18265072D+05  0.00D+00    0  0  0.00D+00  0.00D+00  0.19D+06
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
   2  0.15669458D+04  0.00D+00    0  2  0.35D+00  0.00D+00  0.32D+05
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
   3  0.42079980D+03  0.00D+00    0  2  0.10D+00  0.00D+00  0.13D+05
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
   4  0.25091543D+03  0.00D+00    0  3  0.45D-01  0.00D+00  0.57D+04
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
   5  0.15571349D+03  0.00D+00    0  3  0.31D-01  0.00D+00  0.28D+04
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
   6  0.14148196D+03  0.00D+00    0  3  0.15D-01  0.00D+00  0.29D+04
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
   7  0.11660402D+03  0.00D+00    0  3  0.19D-01  0.00D+00  0.40D+04
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
   8  0.93864278D+02  0.00D+00    0  3  0.13D-01  0.00D+00  0.30D+04
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
```

```
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
 9  0.58328943D+02  0.00D+00    0  3  0.22D-01  0.00D+00  0.49D+03
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
10  0.54785795D+02  0.00D+00    0  3  0.16D-01  0.00D+00  0.76D+03
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
11  0.54555388D+01  0.00D+00    0  2  0.10D+00  0.00D+00  0.11D+02
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
12  0.25795407D-03  0.00D+00    0  1  0.10D+01  0.00D+00  0.54D-03
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
13  0.82227292D-06  0.00D+00    0  1  0.10D+01  0.00D+00  0.16D-05
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
14  0.71155713D-10  0.00D+00    0  1  0.10D+01  0.00D+00  0.63D-11


--- Final Convergence Analysis at Last Iterate ---

  Objective function value:      F(X)  =  0.71155713D-10
  Solution values:               X     =
    -0.59392254D-03  0.77625880D-04 -0.41050343D-03 -0.46029978D-03
     0.48527531D-04  0.27316174D-03
  Distances from lower bounds:   X-XL  =
     0.24994061D+01  0.25000776D+01  0.24995895D+01  0.24995397D+01
     0.25000485D+01  0.25002732D+01
  Distances from upper bounds:   XU-X  =
     0.25005939D+01  0.24999224D+01  0.25004105D+01  0.25004603D+01
     0.24999515D+01  0.24997268D+01
  Multipliers for lower bounds:  U     =
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00
  Multipliers for upper bounds:  U     =
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00
  Number of function calls:      NFUNC =      31
  Number of gradient calls:      NGRAD =      14
  Number of calls of QP solver:  NQL   =      14



           *****   Completed CALL to NLPQLP   *****


    *****   Number of Function Evaluations  =    115   *****


    *****   Solution Control Vector for Case Number   1   *****

Element     G.L.B.            C.V.              L.U.B.            Delta C.V.

   1    -0.25000000D+01   -0.59392254D-03    0.25000000D+01   -0.23005938D+01
   2    -0.25000000D+01    0.77625880D-04    0.25000000D+01   -0.22999223D+01
   3    -0.25000000D+01   -0.41050343D-03    0.25000000D+01    0.77773243D+00
   4    -0.25000000D+01   -0.46029978D-03    0.25000000D+01   -0.23004602D+01
   5    -0.25000000D+01    0.48527531D-04    0.25000000D+01   -0.17530094D+01
   6    -0.25000000D+01    0.27316174D-03    0.25000000D+01    0.12816723D-02
```

```
              *****   Predicted Measurement Vector   *****

Element     Z Vector          ZA Vector         Delta Z           Diag[W]

   1    -0.31161942D-05    0.57501060D+02   -0.57501063D+02    0.10000000D+01
   2     0.43571677D-06   -0.32214465D+02    0.32214465D+02    0.10000000D+01
   3    -0.14271511D-05   -0.61617152D+02    0.61617150D+02    0.10000000D+01
   4    -0.51498174D-06    0.77829442D+02   -0.77829442D+02    0.10000000D+01
   5     0.19542078D-05   -0.30334669D+02    0.30334671D+02    0.10000000D+01
   6    -0.67732192D-05    0.56094925D+02   -0.56094932D+02    0.10000000D+01


*****   NLP Solution Performance Index  =   0.71155713D-10   *****


*****   NO Constraints are Specified for Case Number   1   *****


*****   Solve the Regulator Problem for Case Number   1   *****

                  *****   Alpha  =      0.10000000D+01   *****


  Dim                   *****   WZ-Vector   *****

   6     0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
         0.10000000D+01    0.10000000D+01

  Dim                   *****   WX-Vector   *****

   6     0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
         0.00000000D+00    0.00000000D+00

  Dim                   *****   WDX-Vector   *****

   6     0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
         0.00000000D+00    0.00000000D+00


     *****   Matrix [DUMXX1] was Successfully Inverted
                                       to Yield Matrix [DD].   *****

  Dim          *****   The Solution Control Vector   *****

   1    -0.59384844D-03

   2     0.77811695D-04

   3    -0.41035318D-03

   4    -0.46023459D-03

   5     0.48766852D-04

   6     0.27341716D-03

  Dim        *****   The Solution Measurement Vector   *****

   6     0.71054274D-14   -0.28421709D-13   -0.71054274D-14   -0.56843419D-13
        -0.14210855D-13    0.00000000D+00


*****   Regulator Solution Performance Index  =   0.43418904D-26   *****
```

```
              *****   NLP Special Control  6-Vector Output   *****

  CV =
      -0.593922537948995D-03,   0.776258802692296D-04,  -0.410503428537869D-03,
      -0.460299783446231D-03,   0.485275314055613D-04,   0.273161738597659D-03,


           *****   Regulator Special Control  6-Vector Output   *****

  CV =
      -0.593848443451339D-03,   0.778116947390828D-04,  -0.410353179264300D-03,
      -0.460234586078023D-03,   0.487668522446416D-04,   0.273417158741276D-03,


     *****   Root-Sum-Squared Delta CV Elements  =   0.43515108D-06   *****

  Delta CV =
      -0.740944976556582D-07,  -0.185814469853227D-06,  -0.150249273568777D-06,
      -0.651973682074371D-07,  -0.239320839080349D-06,  -0.255420143616732D-06,


                *****   End Case Number   1   *****



********************************************************************************



        ***************   Start Case Number   2   ***************

                      *****   INPUT DATA   *****

&CDATA
ALPHA   =   1.00000000000000     ,
ACC     =  1.0000000000000000E-007,
ACCQP   =  1.0000000000000000E-012,
CRAN1   =   15.0000000000000     ,
CRAN2   =   20.0000000000000     ,
CRAN3   =   7.00000000000000     ,
CRAN4   =   5.00000000000000     ,
CRAN5   =  2.0000000000000000E-002,
CRAN6   =  2.0000000000000000E-002,
CRAN7   =  0.100000000000000     ,
CRAN8   =  0.100000000000000     ,
CVOUT   =           1,
EPS     =  1.0000000000000000E-007,
GEQ     =   8.00000000000000     , 13*0.000000000000000E+000  ,
GMAX    = 3*3.00000000000000        , 6*1.00000000000000        ,
5*1.50000000000000        ,
ICASE   =           2,
IDATA   =           0,
IN      =           5,
IOPT    =           1,
IOUT    =           6,
IPRINT  =           2,
ISEED1  =    78985723,
ISEED2  =    95428381,
ISEED3  =    72919329,
ISEED4  =    63237395,
ITOUT   =           0,
JSEED1  =    81692875,
JSEED2  =    68377297,
JSEED3  =    89672847,
```

```
JSEED4  =    98351973,
L       =           1,
LQL     = T,
MAXFUN  =          10,
MAXIT   =         100,
MAXNM   =          10,
ME      =           1,
MG      =           1,
MODE    =           0,
MULT    =           1,
RHOB    =   100.000000000000     ,
STPMIN  =  0.000000000000000E+000,
T       =  0.347887873649597     ,   8.36017310619354     ,  -1.15114569664001
,   31.7600607872009     ,
  -4.11432027816772     ,  -1.82969748973846     ,   14.7802293300629     ,  -
24.1927772760391     ,   9.23694193363190     ,
   6.53410136699677     ,   14.0349829196930     ,   12.5044798851013     ,  -
17.8921127319336     ,  -10.2217143774033     ,
   16.5568113327026     ,   2.43249177932739     ,  -10.1357221603394     ,
15.9321832656860     ,  0.124055743217468     ,
  -1.46232724189758     ,  -11.3952010869980     ,   4.92366194725037     ,  -
27.4548292160034     ,   2.60253787040710     ,
   4.86136615276337     , -0.199562907218933     ,  -23.4407806396484     ,  -
11.2429445981979     ,   1.20765388011932     ,
   21.6330313682556     ,   11.9727063179016     ,   32.9372560977936     ,
23.5570669174194     ,  -6.74438714981079     ,
  -7.93598234653473     ,  -20.3026217222214     ,
WDT     = 6*1.00000000000000        ,
WDX     = 6*0.000000000000000E+000  ,
WX      = 6*0.000000000000000E+000  ,
WZ      = 6*1.00000000000000        ,
XL      = 6*-2.50000000000000       , 4*-2.00000000000000       ,
XL0     = 6*-2.30000000000000       ,
XU      = 6*2.50000000000000        , 4*2.00000000000000        ,
XU0     = 6*2.30000000000000        ,
X0      = 2*2.29999990000000        , -0.778142929077148     ,
2.29999990000000     ,   1.75305795669556     ,
 -1.008510589599609E-003,
ZA      =   57.5010601852424     ,  -32.2144649143250     ,  -61.6171515005093
,   77.8294419023338     ,
  -30.3346693880174     ,   56.0949248596718
/
```

***** OUTPUT DATA *****

***** X0, ZA, and T are Randomly Defined *****

| CRAN1 | CRAN2 | CRAN3 | CRAN4 |
|---|---|---|---|
| CRAN5 | CRAN6 | CRAN7 | CRAN8 |
| 0.15000000D+02 | 0.20000000D+02 | 0.70000000D+01 | 0.50000000D+01 |
| 0.20000000D-01 | 0.20000000D-01 | 0.10000000D+00 | 0.10000000D+00 |

***** Control Vector During Previous Duty Cycle for Case Number 2 *****

| Element | G.L.B. | C.V. | L.U.B. |
|---|---|---|---|
| 1 | -0.23000000D+01 | 0.26932186D+01 | 0.23000000D+01 |
| 1 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 2 | -0.23000000D+01 | 0.79428859D+01 | 0.23000000D+01 |
| 2 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 3 | -0.23000000D+01 | -0.77814293D+00 | 0.23000000D+01 |

```
   4        -0.23000000D+01      0.24868137D+01      0.23000000D+01
   4        -0.23000000D+01      0.22999999D+01      0.23000000D+01
   5        -0.23000000D+01      0.17530580D+01      0.23000000D+01
   6        -0.23000000D+01     -0.10085106D-02      0.23000000D+01


        *****   Measurement Vectors from Previous Duty Cycle   *****

Element         Actual              Ideal               Delta

   1         0.57501060D+02      0.57512799D+02     -0.11739089D-01
   2        -0.32214465D+02     -0.32207449D+02     -0.70162487D-02
   3        -0.61617152D+02     -0.61612001D+02     -0.51504469D-02
   4         0.77829442D+02      0.77805433D+02      0.24008768D-01
   5        -0.30334669D+02     -0.30316450D+02     -0.18219316D-01
   6         0.56094925D+02      0.56084753D+02      0.10172153D-01


     *****   Initial Control Vector Estimate for Case Number    2   *****

Element     G.L.B.            C.V.              L.U.B.            Delta C.V.

   1    -0.25000000D+01    0.22999999D+01    0.25000000D+01    0.00000000D+00
   2    -0.25000000D+01    0.22999999D+01    0.25000000D+01    0.00000000D+00
   3    -0.25000000D+01   -0.77814293D+00    0.25000000D+01    0.00000000D+00
   4    -0.25000000D+01    0.22999999D+01    0.25000000D+01    0.00000000D+00
   5    -0.25000000D+01    0.17530580D+01    0.25000000D+01    0.00000000D+00
   6    -0.25000000D+01   -0.10085106D-02    0.25000000D+01    0.00000000D+00


              *****   T-Matrix Output is Suppressed   *****


              *****   Predicted Measurement Vector   *****

Element     Z Vector          ZA Vector         Delta Z           Diag[W]

   1     0.57501060D+02    0.57501060D+02    0.00000000D+00    0.10000000D+01
   2    -0.32214465D+02   -0.32214465D+02    0.00000000D+00    0.10000000D+01
   3    -0.61617152D+02   -0.61617152D+02    0.00000000D+00    0.10000000D+01
   4     0.77829442D+02    0.77829442D+02    0.00000000D+00    0.10000000D+01
   5    -0.30334669D+02   -0.30334669D+02    0.00000000D+00    0.10000000D+01
   6     0.56094925D+02    0.56094925D+02    0.00000000D+00    0.10000000D+01


 *****   Initial Performance Index  =   0.18265072D+05   *****


*****   Initial Constraint Function Values for Case Number   2   *****

                    Equality Constraints

Element          Value               Target          Value - Target

   1         0.70797282D+01      0.80000000D+01     -0.92027180D+00


 *****   Solve the NLPQLP Problem for Case Number   2   *****

 ---------------------------------------------------------------------
  START OF THE SEQUENTIAL QUADRATIC PROGRAMMING ALGORITHM
 ---------------------------------------------------------------------

  Parameters:
```

```
   N      =       6
   M      =       1
   ME     =       1
   MODE   =       0
   ACC    =   0.1000D-06
   ACCQP  =   0.1000D-11
   STPMIN =   0.0000D+00
   RHOB   =   0.1000D+03
   MAXFUN =      10
   MAXNM  =      10
   MAXIT  =     100
   IPRINT =       2

 Output in the following order:
   IT    - iteration number
   F     - objective function value
   SCV   - sum of constraint violations
   NA    - number of active constraints
   I     - number of line search iterations
   ALPHA - steplength parameter
   DELTA - additional variable to prevent inconsistency
   KKT   - Karush-Kuhn-Tucker optimality criterion


  IT         F           SCV      NA  I    ALPHA     DELTA     KKT
-------------------------------------------------------------------------
   1  0.18265072D+05  0.92D+00    1  0  0.00D+00  0.00D+00  0.10D+06
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
   2  0.14533132D+05  0.91D+00    1  2  0.10D+00  0.00D+00  0.18D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
   3  0.16328634D+05  0.82D+00    1  1  0.10D+01  0.00D+00  0.25D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
   4  0.13101526D+05  0.50D+00    1  2  0.39D+00  0.00D+00  0.24D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
   5  0.11839923D+05  0.42D+00    1  2  0.16D+00  0.00D+00  0.96D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
   6  0.11533676D+05  0.30D+00    1  2  0.10D+00  0.00D+00  0.28D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
   7  0.11454045D+05  0.27D+00    1  2  0.10D+00  0.00D+00  0.10D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
   8  0.11413320D+05  0.24D+00    1  3  0.11D+00  0.00D+00  0.18D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
   9  0.11319326D+05  0.21D+00    1  2  0.14D+00  0.00D+00  0.66D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  10  0.11005312D+05  0.61D-02    1  1  0.10D+01  0.00D+00  0.28D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  11  0.10994705D+05  0.45D-02    1  1  0.10D+01  0.00D+00  0.13D+02
```

```
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   12  0.11001309D+05  0.93D-05    1  1  0.10D+01  0.00D+00  0.27D-01
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   13  0.11001323D+05  0.86D-07    1  1  0.10D+01  0.00D+00  0.26D-03
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   14  0.11001323D+05  0.48D-09    1  1  0.10D+01  0.00D+00  0.14D-05
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   15  0.11001323D+05  0.43D-13    1  1  0.10D+01  0.00D+00  0.13D-09


   --- Final Convergence Analysis at Last Iterate ---

     Objective function value:      F(X)  =  0.11001323D+05
     Solution values:               X     =
        0.92162200D+00  0.25000000D+01 -0.24173715D+01  0.21229649D+01
       -0.30150271D+00  0.45139429D+00
     Distances from lower bounds:   X-XL  =
        0.34216220D+01  0.50000000D+01  0.82628479D-01  0.46229649D+01
        0.21984973D+01  0.29513943D+01
     Distances from upper bounds:   XU-X  =
        0.15783780D+01  0.00000000D+00  0.49173715D+01  0.37703507D+00
        0.28015027D+01  0.20486057D+01
     Multipliers for lower bounds:  U     =
        0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
        0.00000000D+00  0.00000000D+00
     Multipliers for upper bounds:  U     =
        0.00000000D+00  0.77791155D+03  0.00000000D+00  0.00000000D+00
        0.00000000D+00  0.00000000D+00
     Constraint values:             G(X)  =
        0.42632564D-13
     Multipliers for constraints:   U     =
       -0.14966662D+04
     Number of function calls:      NFUNC =      23
     Number of gradient calls:      NGRAD =      15
     Number of calls of QP solver:  NQL   =      15



              *****   Completed CALL to NLPQLP   *****


       *****   Number of Function Evaluations  =    113   *****


      *****   Solution Control Vector for Case Number   2   *****

Element     G.L.B.            C.V.              L.U.B.            Delta C.V.

   1    -0.25000000D+01    0.92162200D+00    0.25000000D+01   -0.13783779D+01
   2    -0.25000000D+01    0.25000000D+01    0.25000000D+01    0.20000010D+00
   3    -0.25000000D+01   -0.24173715D+01    0.25000000D+01   -0.16392286D+01
   4    -0.25000000D+01    0.21229649D+01    0.25000000D+01   -0.17703497D+00
   5    -0.25000000D+01   -0.30150271D+00    0.25000000D+01   -0.20545607D+01
   6    -0.25000000D+01    0.45139429D+00    0.25000000D+01    0.45240280D+00


               *****   Predicted Measurement Vector   *****

Element     Z Vector          ZA Vector         Delta Z           Diag[W]

   1     0.84713403D+02    0.57501060D+02    0.27212342D+02    0.10000000D+01
```

```
     2    -0.16250967D+02   -0.32214465D+02    0.15963498D+02    0.10000000D+01
     3    -0.24488306D+02   -0.61617152D+02    0.37128845D+02    0.10000000D+01
     4     0.50547958D+02    0.77829442D+02   -0.27281484D+02    0.10000000D+01
     5    -0.64528126D+01   -0.30334669D+02    0.23881857D+02    0.10000000D+01
     6    -0.19090734D+02    0.56094925D+02   -0.75185659D+02    0.10000000D+01

  *****   NLP Solution Performance Index  =   0.11001323D+05   *****

  *****   Solution Constraint Function Values for Case Number   2   *****

                     Equality Constraints

  Element          Value               Target          Value - Target

     1         0.80000000D+01      0.80000000D+01     -0.42632564D-13

               *****   NLP Special Control  6-Vector Output   *****

  CV =
       0.921622003749846D+00,   0.250000000000000D+01,  -0.241737152144529D+01,
       0.212296493402495D+01,  -0.301502713337045D+00,   0.451394294232655D+00,

                 *****   End Case Number   2   *****



*******************************************************************************


        ***************   Start Case Number   3   ***************

                      *****   INPUT DATA   *****

 &CDATA
 ALPHA   =   1.00000000000000     ,
 ACC     =  1.0000000000000000E-007,
 ACCQP   =  1.0000000000000000E-012,
 CRAN1   =   15.0000000000000     ,
 CRAN2   =   20.0000000000000     ,
 CRAN3   =   7.00000000000000     ,
 CRAN4   =   5.00000000000000     ,
 CRAN5   =  2.0000000000000000E-002,
 CRAN6   =  2.0000000000000000E-002,
 CRAN7   =  0.100000000000000     ,
 CRAN8   =  0.100000000000000     ,
 CVOUT   =           1,
 EPS     =  1.0000000000000000E-007,
 GEQ     =   8.00000000000000     , 13*0.000000000000000E+000  ,
 GMAX    = 3*3.00000000000000        , 6*1.00000000000000        ,
 5*1.50000000000000        ,
 ICASE   =           3,
 IDATA   =           0,
 IN      =           5,
 IOPT    =           1,
 IOUT    =           6,
 IPRINT  =           2,
 ISEED1  =    78985723,
 ISEED2  =    95428381,
```

```
ISEED3  =    72919329,
ISEED4  =    63237395,
ITOUT   =           0,
JSEED1  =    81692875,
JSEED2  =    68377297,
JSEED3  =    89672847,
JSEED4  =    98351973,
L       =           1,
LQL     = T,
MAXFUN  =          10,
MAXIT   =         100,
MAXNM   =          10,
ME      =           0,
MG      =           9,
MODE    =           0,
MULT    =           1,
RHOB    =   100.000000000000     ,
STPMIN  =  0.000000000000000E+000,
T       =  0.347887873649597     ,   8.36017310619354     ,  -1.15114569664001
,   31.7600607872009     ,
  -4.11432027816772     ,  -1.82969748973846     ,   14.7802293300629     ,  -
24.1927772760391     ,   9.23694193363190     ,
   6.53410136699677     ,   14.0349829196930     ,   12.5044798851013     ,  -
17.8921127319336     ,  -10.2217143774033     ,
   16.5568113327026     ,   2.43249177932739     ,  -10.1357221603394     ,
15.9321832656860     ,  0.124055743217468     ,
  -1.46232724189758     ,  -11.3952010869980     ,   4.92366194725037     ,  -
27.4548292160034     ,   2.60253787040710     ,
   4.86136615276337     , -0.199562907218933     ,  -23.4407806396484     ,  -
11.2429445981979     ,   1.20765388011932     ,
   21.6330313682556     ,   11.9727063179016     ,   32.9372560977936     ,
23.5570669174194     ,  -6.74438714981079     ,
  -7.93598234653473     ,  -20.3026217222214     ,
WDT     = 6*1.00000000000000        ,
WDX     = 6*0.000000000000000E+000  ,
WX      = 6*0.000000000000000E+000  ,
WZ      = 6*1.00000000000000        ,
XL      = 6*-2.50000000000000       , 4*-2.00000000000000       ,
XL0     = 6*-2.30000000000000       ,
XU      = 6*2.50000000000000        , 4*2.00000000000000        ,
XU0     = 6*2.30000000000000        ,
X0      = 2*2.29999990000000        , -0.778142929077148     ,
2.29999990000000     ,   1.75305795669556     ,
 -1.008510589599609E-003,
ZA      =   57.5010601852424     ,  -32.2144649143250     ,  -61.6171515005093
,   77.8294419023338     ,
  -30.3346693880174     ,   56.0949248596718
/
```

*****  OUTPUT DATA  *****

*****  X0, ZA, and T are Randomly Defined  *****

| CRAN1 | CRAN2 | CRAN3 | CRAN4 |
|---|---|---|---|
| CRAN5 | CRAN6 | CRAN7 | CRAN8 |
| 0.15000000D+02 | 0.20000000D+02 | 0.70000000D+01 | 0.50000000D+01 |
| 0.20000000D-01 | 0.20000000D-01 | 0.10000000D+00 | 0.10000000D+00 |

*****  Control Vector During Previous Duty Cycle for Case Number  3  *****

| Element | G.L.B. | C.V. | L.U.B. |
|---|---|---|---|

| | | | |
|---|---|---|---|
| 1 | -0.23000000D+01 | 0.26932186D+01 | 0.23000000D+01 |
| 1 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 2 | -0.23000000D+01 | 0.79428859D+01 | 0.23000000D+01 |
| 2 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 3 | -0.23000000D+01 | -0.77814293D+00 | 0.23000000D+01 |
| 4 | -0.23000000D+01 | 0.24868137D+01 | 0.23000000D+01 |
| 4 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 5 | -0.23000000D+01 | 0.17530580D+01 | 0.23000000D+01 |
| 6 | -0.23000000D+01 | -0.10085106D-02 | 0.23000000D+01 |

***** Measurement Vectors from Previous Duty Cycle *****

| Element | Actual | Ideal | Delta |
|---|---|---|---|
| 1 | 0.57501060D+02 | 0.57512799D+02 | -0.11739089D-01 |
| 2 | -0.32214465D+02 | -0.32207449D+02 | -0.70162487D-02 |
| 3 | -0.61617152D+02 | -0.61612001D+02 | -0.51504469D-02 |
| 4 | 0.77829442D+02 | 0.77805433D+02 | 0.24008768D-01 |
| 5 | -0.30334669D+02 | -0.30316450D+02 | -0.18219316D-01 |
| 6 | 0.56094925D+02 | 0.56084753D+02 | 0.10172153D-01 |

***** Initial Control Vector Estimate for Case Number 3 *****

| Element | G.L.B. | C.V. | L.U.B. | Delta C.V. |
|---|---|---|---|---|
| 1 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 2 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 3 | -0.25000000D+01 | -0.77814293D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 4 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 5 | -0.25000000D+01 | 0.17530580D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 6 | -0.25000000D+01 | -0.10085106D-02 | 0.25000000D+01 | 0.00000000D+00 |

***** T-Matrix Output is Suppressed *****

***** Predicted Measurement Vector *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|
| 1 | 0.57501060D+02 | 0.57501060D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 2 | -0.32214465D+02 | -0.32214465D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 3 | -0.61617152D+02 | -0.61617152D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 4 | 0.77829442D+02 | 0.77829442D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 5 | -0.30334669D+02 | -0.30334669D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 6 | 0.56094925D+02 | 0.56094925D+02 | 0.00000000D+00 | 0.10000000D+01 |

***** Initial Performance Index = 0.18265072D+05 *****

***** Initial Constraint Function Values for Case Number 3 *****

Inequality Constraints

| Element | Value | L.U.B. | L.U.B. - Value |
|---|---|---|---|
| 1 | 0.32526911D+01 | 0.30000000D+01 | -0.25269105D+00 |
| 2 | 0.24280663D+01 | 0.30000000D+01 | 0.57193370D+00 |
| 3 | 0.17530582D+01 | 0.30000000D+01 | 0.12469418D+01 |
| 4 | 0.00000000D+00 | 0.10000000D+01 | 0.10000000D+01 |
| 5 | 0.00000000D+00 | 0.10000000D+01 | 0.10000000D+01 |

```
  6         0.00000000D+00      0.10000000D+01      0.10000000D+01
  7         0.00000000D+00      0.10000000D+01      0.10000000D+01
  8         0.00000000D+00      0.10000000D+01      0.10000000D+01
  9         0.00000000D+00      0.10000000D+01      0.10000000D+01


*****   Solve the NLPQLP Problem for Case Number   3   *****



-----------------------------------------------------------------------
 START OF THE SEQUENTIAL QUADRATIC PROGRAMMING ALGORITHM
-----------------------------------------------------------------------

 Parameters:
    N      =       6
    M      =       9
    ME     =       0
    MODE   =       0
    ACC    =   0.1000D-06
    ACCQP  =   0.1000D-11
    STPMIN =   0.0000D+00
    RHOB   =   0.1000D+03
    MAXFUN =      10
    MAXNM  =      10
    MAXIT  =     100
    IPRINT =       2

 Output in the following order:
    IT    - iteration number
    F     - objective function value
    SCV   - sum of constraint violations
    NA    - number of active constraints
    I     - number of line search iterations
    ALPHA - steplength parameter
    DELTA - additional variable to prevent inconsistency
    KKT   - Karush-Kuhn-Tucker optimality criterion


  IT         F           SCV      NA  I    ALPHA     DELTA     KKT
-----------------------------------------------------------------------
   1  0.18265072D+05  0.25D+00    9  0  0.00D+00  0.00D+00  0.17D+06
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
   2  0.64028791D+03  0.38D+01    6  2  0.42D+00  0.00D+00  0.66D+04
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
   3  0.41193273D+04  0.28D-08    6  1  0.10D+01  0.00D+00  0.76D+04
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
   4  0.40326750D+04  0.17D-08    6  3  0.48D-01  0.00D+00  0.15D+03
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
   5  0.40296533D+04  0.15D-08    6  2  0.10D+00  0.00D+00  0.56D+02
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
   6  0.40071491D+04  0.40D-10    4  1  0.10D+01  0.00D+00  0.89D+00
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
   7  0.40069393D+04  0.00D+00    4  1  0.10D+01  0.00D+00  0.30D+00
```

```
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 8  0.40068217D+04  0.00D+00    4  1  0.10D+01  0.00D+00  0.21D-01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 9  0.40068121D+04  0.00D+00    4  1  0.10D+01  0.00D+00  0.38D-03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
10  0.40068119D+04  0.00D+00    4  1  0.10D+01  0.00D+00  0.15D-05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
11  0.40068119D+04  0.00D+00    4  1  0.10D+01  0.00D+00  0.16D-08


--- Final Convergence Analysis at Last Iterate ---

  Objective function value:      F(X)  =  0.40068119D+04
  Solution values:               X     =
     0.12999999D+01  0.12999999D+01  0.99998581D-02  0.12999999D+01
     0.75305796D+00  0.78812728D+00
  Distances from lower bounds:   X-XL  =
     0.37999999D+01  0.37999999D+01  0.25099999D+01  0.37999999D+01
     0.32530580D+01  0.32881273D+01
  Distances from upper bounds:   XU-X  =
     0.12000001D+01  0.12000001D+01  0.24900001D+01  0.12000001D+01
     0.17469420D+01  0.17118727D+01
  Multipliers for lower bounds:  U     =
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00
  Multipliers for upper bounds:  U     =
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00
  Constraint values:             G(X)  =
     0.11615225D+01  0.16999616D+01  0.19099354D+01  0.00000000D+00
     0.00000000D+00  0.21185721D+00  0.00000000D+00  0.00000000D+00
     0.21086421D+00
  Multipliers for constraints:   U     =
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.29480636D+04
     0.95706022D+03  0.00000000D+00  0.21342320D+04  0.21222081D+03
     0.00000000D+00
  Number of function calls:      NFUNC =      15
  Number of gradient calls:      NGRAD =      11
  Number of calls of QP solver:  NQL   =      11



          *****   Completed CALL to NLPQLP   *****


     *****   Number of Function Evaluations  =     81   *****


    *****   Solution Control Vector for Case Number   3   *****

Element     G.L.B.            C.V.              L.U.B.            Delta C.V.

   1    -0.25000000D+01    0.12999999D+01    0.25000000D+01   -0.10000000D+01
   2    -0.25000000D+01    0.12999999D+01    0.25000000D+01   -0.10000000D+01
   3    -0.25000000D+01    0.99998581D-02    0.25000000D+01    0.78814279D+00
   4    -0.25000000D+01    0.12999999D+01    0.25000000D+01   -0.10000000D+01
   5    -0.25000000D+01    0.75305796D+00    0.25000000D+01   -0.10000000D+01
   6    -0.25000000D+01    0.78812728D+00    0.25000000D+01    0.78913579D+00


          *****   Predicted Measurement Vector   *****
```

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|
| 1 | 0.32734074D+02 | 0.57501060D+02 | -0.24766986D+02 | 0.10000000D+01 |
| 2 | 0.32158300D+01 | -0.32214465D+02 | 0.35430295D+02 | 0.10000000D+01 |
| 3 | -0.32281075D+01 | -0.61617152D+02 | 0.58389044D+02 | 0.10000000D+01 |
| 4 | 0.42449475D+02 | 0.77829442D+02 | -0.35379967D+02 | 0.10000000D+01 |
| 5 | -0.28259122D+02 | -0.30334669D+02 | 0.20755479D+01 | 0.10000000D+01 |
| 6 | 0.17719881D+02 | 0.56094925D+02 | -0.38375044D+02 | 0.10000000D+01 |

***** NLP Solution Performance Index = 0.40068119D+04 *****

***** Solution Constraint Function Values for Case Number 3 *****

Inequality Constraints

| Element | Value | L.U.B. | L.U.B. - Value |
|---|---|---|---|
| 1 | 0.18384775D+01 | 0.30000000D+01 | 0.11615225D+01 |
| 2 | 0.13000384D+01 | 0.30000000D+01 | 0.16999616D+01 |
| 3 | 0.10900646D+01 | 0.30000000D+01 | 0.19099354D+01 |
| 4 | 0.10000000D+01 | 0.10000000D+01 | 0.00000000D+00 |
| 5 | 0.10000000D+01 | 0.10000000D+01 | 0.00000000D+00 |
| 6 | 0.78814279D+00 | 0.10000000D+01 | 0.21185721D+00 |
| 7 | 0.10000000D+01 | 0.10000000D+01 | 0.00000000D+00 |
| 8 | 0.10000000D+01 | 0.10000000D+01 | 0.00000000D+00 |
| 9 | 0.78913579D+00 | 0.10000000D+01 | 0.21086421D+00 |

***** NLP Special Control 6-Vector Output *****

```
CV =
     0.129999990000000D+01,   0.129999990000000D+01,   0.999985808925768D-02,
     0.129999990000000D+01,   0.753057956695557D+00,   0.788127283177925D+00,
```

***** End Case Number 3 *****

**********

*************** Start Case Number 4 ***************

***** INPUT DATA *****

```
&CDATA
ALPHA   =   1.00000000000000     ,
ACC     =  1.0000000000000000E-007,
ACCQP   =  1.0000000000000000E-012,
CRAN1   =   15.0000000000000     ,
CRAN2   =   20.0000000000000     ,
CRAN3   =   7.00000000000000     ,
CRAN4   =   5.00000000000000     ,
CRAN5   =  2.0000000000000000E-002,
CRAN6   =  2.0000000000000000E-002,
CRAN7   =  0.100000000000000     ,
CRAN8   =  0.100000000000000     ,
CVOUT   =           1,
```

```
EPS     =  1.000000000000000E-007,
GEQ     =   8.00000000000000     , 13*0.000000000000000E+000  ,
GMAX    = 3*3.00000000000000        , 6*1.00000000000000        ,
5*1.50000000000000        ,
ICASE   =           4,
IDATA   =           0,
IN      =           5,
IOPT    =           1,
IOUT    =           6,
IPRINT  =           2,
ISEED1  =    78985723,
ISEED2  =    95428381,
ISEED3  =    72919329,
ISEED4  =    63237395,
ITOUT   =           0,
JSEED1  =    81692875,
JSEED2  =    68377297,
JSEED3  =    89672847,
JSEED4  =    98351973,
L       =           1,
LQL     = T,
MAXFUN  =          10,
MAXIT   =         100,
MAXNM   =          10,
ME      =           1,
MG      =          10,
MODE    =           0,
MULT    =           0,
RHOB    =   100.000000000000     ,
STPMIN  =  0.000000000000000E+000,
T       =  0.347887873649597     ,   8.36017310619354     ,  -1.15114569664001
,   31.7600607872009     ,
  -4.11432027816772     ,  -1.82969748973846     ,   14.7802293300629     ,  -
24.1927772760391     ,   9.23694193363190     ,
   6.53410136699677     ,   14.0349829196930     ,   12.5044798851013     ,  -
17.8921127319336     ,  -10.2217143774033     ,
   16.5568113327026     ,   2.43249177932739     ,  -10.1357221603394     ,
15.9321832656860     ,  0.124055743217468     ,
  -1.46232724189758     ,  -11.3952010869980     ,   4.92366194725037     ,  -
27.4548292160034     ,   2.60253787040710     ,
   4.86136615276337     , -0.199562907218933     ,  -23.4407806396484     ,  -
11.2429445981979     ,   1.20765388011932     ,
   21.6330313682556     ,   11.9727063179016     ,   32.9372560977936     ,
23.5570669174194     ,  -6.74438714981079     ,
  -7.93598234653473     ,  -20.3026217222214     ,
WDT     = 6*1.00000000000000        ,
WDX     = 6*0.000000000000000E+000  ,
WX      = 6*0.000000000000000E+000  ,
WZ      = 6*1.00000000000000        ,
XL      = 6*-2.50000000000000       , 4*-2.00000000000000       ,
XL0     = 6*-2.30000000000000       ,
XU      = 6*2.50000000000000        , 4*2.00000000000000        ,
XU0     = 6*2.30000000000000        ,
X0      = 2*2.29999990000000        , -0.778142929077148     ,
2.29999990000000     ,   1.75305795669556     ,
 -1.008510589599609E-003,
ZA      =   57.5010601852424     ,  -32.2144649143250     ,  -61.6171515005093
,   77.8294419023338     ,
  -30.3346693880174     ,   56.0949248596718
/
```

```
                    *****   OUTPUT DATA   *****

              *****   X0, ZA, and T are Randomly Defined   *****
```

| CRAN1 | CRAN2 | CRAN3 | CRAN4 |
|---|---|---|---|
| CRAN5 | CRAN6 | CRAN7 | CRAN8 |
| 0.15000000D+02 | 0.20000000D+02 | 0.70000000D+01 | 0.50000000D+01 |
| 0.20000000D-01 | 0.20000000D-01 | 0.10000000D+00 | 0.10000000D+00 |

***** Control Vector During Previous Duty Cycle for Case Number 4 *****

| Element | G.L.B. | C.V. | L.U.B. |
|---|---|---|---|
| 1 | -0.23000000D+01 | 0.26932186D+01 | 0.23000000D+01 |
| 1 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 2 | -0.23000000D+01 | 0.79428859D+01 | 0.23000000D+01 |
| 2 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 3 | -0.23000000D+01 | -0.77814293D+00 | 0.23000000D+01 |
| 4 | -0.23000000D+01 | 0.24868137D+01 | 0.23000000D+01 |
| 4 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 5 | -0.23000000D+01 | 0.17530580D+01 | 0.23000000D+01 |
| 6 | -0.23000000D+01 | -0.10085106D-02 | 0.23000000D+01 |

***** Measurement Vectors from Previous Duty Cycle *****

| Element | Actual | Ideal | Delta |
|---|---|---|---|
| 1 | 0.57501060D+02 | 0.57512799D+02 | -0.11739089D-01 |
| 2 | -0.32214465D+02 | -0.32207449D+02 | -0.70162487D-02 |
| 3 | -0.61617152D+02 | -0.61612001D+02 | -0.51504469D-02 |
| 4 | 0.77829442D+02 | 0.77805433D+02 | 0.24008768D-01 |
| 5 | -0.30334669D+02 | -0.30316450D+02 | -0.18219316D-01 |
| 6 | 0.56094925D+02 | 0.56084753D+02 | 0.10172153D-01 |

***** Initial Control Vector Estimate for Case Number 4 *****

| Element | G.L.B. | C.V. | L.U.B. | Delta C.V. |
|---|---|---|---|---|
| 1 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 2 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 3 | -0.25000000D+01 | -0.77814293D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 4 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 5 | -0.25000000D+01 | 0.17530580D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 6 | -0.25000000D+01 | -0.10085106D-02 | 0.25000000D+01 | 0.00000000D+00 |

***** T-Matrix Output is Suppressed *****

***** Predicted Measurement Vector *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|
| 1 | 0.57501060D+02 | 0.57501060D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 2 | -0.32214465D+02 | -0.32214465D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 3 | -0.61617152D+02 | -0.61617152D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 4 | 0.77829442D+02 | 0.77829442D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 5 | -0.30334669D+02 | -0.30334669D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 6 | 0.56094925D+02 | 0.56094925D+02 | 0.00000000D+00 | 0.10000000D+01 |

***** Initial Performance Index = 0.18265072D+05 *****

```
*****   Initial Constraint Function Values for Case Number   4   *****

                    Equality Constraints

Element          Value                Target          Value - Target

   1         0.70797282D+01      0.80000000D+01     -0.92027180D+00

                  Inequality Constraints

Element          Value                L.U.B.          L.U.B. - Value

   1         0.32526911D+01      0.30000000D+01     -0.25269105D+00
   2         0.24280663D+01      0.30000000D+01      0.57193370D+00
   3         0.17530582D+01      0.30000000D+01      0.12469418D+01
   4         0.00000000D+00      0.10000000D+01      0.10000000D+01
   5         0.00000000D+00      0.10000000D+01      0.10000000D+01
   6         0.00000000D+00      0.10000000D+01      0.10000000D+01
   7         0.00000000D+00      0.10000000D+01      0.10000000D+01
   8         0.00000000D+00      0.10000000D+01      0.10000000D+01
   9         0.00000000D+00      0.10000000D+01      0.10000000D+01


 *****   Solve the NLPQLP Problem for Case Number   4   *****



 ------------------------------------------------------------------------
  START OF THE SEQUENTIAL QUADRATIC PROGRAMMING ALGORITHM
 ------------------------------------------------------------------------

  Parameters:
     N      =       6
     M      =      10
     ME     =       1
     MODE   =       0
     ACC    =   0.1000D-06
     ACCQP  =   0.1000D-11
     STPMIN =   0.0000D+00
     RHOB   =   0.1000D+03
     MAXFUN =      10
     MAXNM  =      10
     MAXIT  =     100
     IPRINT =       2

  Output in the following order:
     IT    - iteration number
     F     - objective function value
     SCV   - sum of constraint violations
     NA    - number of active constraints
     I     - number of line search iterations
     ALPHA - steplength parameter
     DELTA - additional variable to prevent inconsistency
     KKT   - Karush-Kuhn-Tucker optimality criterion


   IT         F           SCV      NA  I    ALPHA     DELTA     KKT
 ------------------------------------------------------------------------
    1  0.18265072D+05  0.12D+01   10  0  0.00D+00  0.00D+00  0.86D+05
             *****   Completed CALL to NLPQLP   *****
             *****   Completed CALL to NLPQLP   *****
             *****   Completed CALL to NLPQLP   *****
    2  0.15161814D+05  0.91D+00    3  2  0.10D+00  0.00D+00  0.12D+05
             *****   Completed CALL to NLPQLP   *****
```

```
          *****   Completed CALL to NLPQLP   *****
 3  0.12780858D+05  0.34D+00    4  1  0.10D+01  0.00D+00  0.21D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 4  0.11953825D+05  0.36D-01    4  1  0.10D+01  0.00D+00  0.25D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 5  0.11905189D+05  0.72D-02    6  2  0.34D+00  0.00D+00  0.27D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 6  0.11893706D+05  0.89D-06    3  1  0.10D+01  0.00D+00  0.25D+01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 7  0.11892424D+05  0.37D-04    3  1  0.10D+01  0.00D+00  0.12D+00
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 8  0.11892482D+05  0.14D-05    3  1  0.10D+01  0.00D+00  0.45D-02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 9  0.11892484D+05  0.19D-07    3  1  0.10D+01  0.00D+00  0.64D-04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
10  0.11892484D+05  0.00D+00    3  1  0.10D+01  0.00D+00  0.69D-12


--- Final Convergence Analysis at Last Iterate ---

  Objective function value:      F(X)  =  0.11892484D+05
  Solution values:               X     =
     0.15305583D+01  0.25000000D+01 -0.17781429D+01  0.23224484D+01
     0.75305796D+00  0.95519031D+00
  Distances from lower bounds:   X-XL  =
     0.40305583D+01  0.50000000D+01  0.72185707D+00  0.48224484D+01
     0.32530580D+01  0.34551903D+01
  Distances from upper bounds:   XU-X  =
     0.96944172D+00  0.00000000D+00  0.42781429D+01  0.17755157D+00
     0.17469420D+01  0.15448097D+01
  Multipliers for lower bounds:  U     =
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00
  Multipliers for upper bounds:  U     =
     0.00000000D+00  0.80574366D+03  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00
  Constraint values:             G(X)  =
     0.00000000D+00  0.68684826D-01  0.75011283D-01  0.17836593D+01
     0.23055838D+00  0.79999990D+00  0.00000000D+00  0.97755147D+00
     0.00000000D+00  0.43801184D-01
  Multipliers for constraints:   U     =
    -0.16858443D+04  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00  0.10885693D+04  0.00000000D+00
     0.10084761D+04  0.00000000D+00
  Number of function calls:      NFUNC =      12
  Number of gradient calls:      NGRAD =      10
  Number of calls of QP solver:  NQL   =      10



          *****   Completed CALL to NLPQLP   *****


   *****   Number of Function Evaluations  =     72   *****


 *****   Solution Control Vector for Case Number   4   *****
```

| Element | G.L.B. | C.V. | L.U.B. | Delta C.V. |
|---|---|---|---|---|
| 1 | -0.25000000D+01 | 0.15305583D+01 | 0.25000000D+01 | -0.76944162D+00 |
| 2 | -0.25000000D+01 | 0.25000000D+01 | 0.25000000D+01 | 0.20000010D+00 |
| 3 | -0.25000000D+01 | -0.17781429D+01 | 0.25000000D+01 | -0.10000000D+01 |
| 4 | -0.25000000D+01 | 0.23224484D+01 | 0.25000000D+01 | 0.22448532D-01 |
| 5 | -0.25000000D+01 | 0.75305796D+00 | 0.25000000D+01 | -0.10000000D+01 |
| 6 | -0.25000000D+01 | 0.95519031D+00 | 0.25000000D+01 | 0.95619882D+00 |

***** Predicted Measurement Vector *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|
| 1 | 0.84671248D+02 | 0.57501060D+02 | 0.27170188D+02 | 0.10000000D+01 |
| 2 | -0.16026692D+01 | -0.32214465D+02 | 0.30611796D+02 | 0.10000000D+01 |
| 3 | -0.29730617D+02 | -0.61617152D+02 | 0.31886534D+02 | 0.10000000D+01 |
| 4 | 0.57170756D+02 | 0.77829442D+02 | -0.20658686D+02 | 0.10000000D+01 |
| 5 | -0.23638572D+02 | -0.30334669D+02 | 0.66960972D+01 | 0.10000000D+01 |
| 6 | 0.30835311D+01 | 0.56094925D+02 | -0.53011394D+02 | 0.10000000D+01 |

***** NLP Solution Performance Index = 0.11892484D+05 *****

***** Solution Constraint Function Values for Case Number 4 *****

Equality Constraints

| Element | Value | Target | Value - Target |
|---|---|---|---|
| 1 | 0.80000000D+01 | 0.80000000D+01 | 0.00000000D+00 |

Inequality Constraints

| Element | Value | L.U.B. | L.U.B. - Value |
|---|---|---|---|
| 1 | 0.29313152D+01 | 0.30000000D+01 | 0.68684826D-01 |
| 2 | 0.29249887D+01 | 0.30000000D+01 | 0.75011283D-01 |
| 3 | 0.12163407D+01 | 0.30000000D+01 | 0.17836593D+01 |
| 4 | 0.76944162D+00 | 0.10000000D+01 | 0.23055838D+00 |
| 5 | 0.20000010D+00 | 0.10000000D+01 | 0.79999990D+00 |
| 6 | 0.10000000D+01 | 0.10000000D+01 | 0.00000000D+00 |
| 7 | 0.22448532D-01 | 0.10000000D+01 | 0.97755147D+00 |
| 8 | 0.10000000D+01 | 0.10000000D+01 | 0.00000000D+00 |
| 9 | 0.95619882D+00 | 0.10000000D+01 | 0.43801184D-01 |

***** NLP Special Control 6-Vector Output *****

```
CV =
     0.153055827973794D+01,   0.250000000000000D+01,  -0.177814292907715D+01,
     0.232244843229083D+01,   0.753057956695557D+00,   0.955190305747484D+00,
```

***** End Case Number 4 *****

END of RUN.

********** END ********** END *********

## B.2.4 Direct Input and Corresponding Output Data

**for the**
**(6 x 6) T-Matrix NLP Control Problem**
**on the**
**Hewlett-Packard Alpha Mainframe Computer**

```
  *********   INPUT    *****    INPUT   ********


$CDATA
!
!  *****   Start of Case  1  Input Data   *****
!                  NO Constraints
!
 ACC      =    1.0D-8,
 ACC      =    1.0D-7,
 ACCQP    =    1.0D-12,
 ALPHA    =    1.0,
 CRAN1    =   15.0,
 CRAN2    =   20.0,
 CRAN3    =    7.0,
 CRAN4    =    5.0,
 CRAN5    =    0.02,
 CRAN6    =    0.02,
 CVOUT    =      0,
 CVOUT    =      1,
 GEQ      =    8.00,
 GMAX     =    3.00,  3.00,  3.00,
 GMAX(4)  =    1.00,  1.00,  1.00,  1.00,  1.00,  1.00,
 ICASE    =      1,
 IDATA    =      0,
 IDATA    =      1,
 IOPT     =      3,
 IOPT     =      1,
 IOPT     =      2,
 ITOUT    =      0,
 ITOUT    =      1,
 ISEED1   =  78985723,
 ISEED2   =  95428381,
 ISEED3   =  72919329,
 ISEED4   =  63237395,
 JSEED1   =  81692875,
 JSEED2   =  68377297,
 JSEED3   =  89672847,
 JSEED4   =  98351973,
 LQL      =   .FALSE.,
 LQL      =   .TRUE.,
 MAXNM    =    0,
 MAXNM    =   10,
 ME       =    0,
 MG       =    0,
 RHOB     =    0.0,
 RHOB     =  100.0,
 XL0      =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XU0      =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XL       =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XU       =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
!
 WX       =  6*0.00,
 WDX      =  6*0.00,
 WZ       =  6*1.00,
!
!
 T    =   0.347887873649597,     8.36017310619354,    -1.15114569664001,
        31.7600607872009,      -4.11432027816772,    -1.82969748973846,
!
        14.7802293300629,     -24.1927772760391,      9.23694193363190,
         6.53410136699677,     14.0349829196930,     12.5044798851013,
!
       -17.8921127319336,     -10.2217143774033,     16.5568113327026,
         2.43249177932739,    -10.1357221603394,     15.9321832656860,
```

```
!
         0.124055743217468,    -1.46232724189758,   -11.3952010869980,
         4.92366194725037,    -27.4548292160034,      2.60253787040710,
!
         4.86136615276337,     -0.199562907218933,  -23.4407806396484,
       -11.2429445981979,       1.20765388011932,    21.6330313682556,
!
        11.9727063179016,      32.9372560977936,     23.5570669174194,
        -6.74438714981079,     -7.93598234653473,   -20.3026217222214,
!
 X0  =   2.29999990000000,      2.29999990000000,   -0.778142929077148,
         2.29999990000000,      1.75305795669556,-1.008510589599609D-3,
!
 ZA  =  57.5010601852424,     -32.2144649143250,    -61.6171515005093,
        77.8294419023338,     -30.3346693880174,     56.0949248596718,
!
!
 MULT    =         0,
 MULT    =         1,
!
!  *****   End of Case  1  Input Data   *****
!
$END
$CDATA
!
!  *****   Start of Case  2  Input Data   *****
!             Two Equality onstraints
!            NO Inequality Constraints
!
 ACC     =    1.0D-8,
 ACC     =    1.0D-7,
 ACCQP   =    1.0D-12,
 ALPHA   =    1.0,
 CRAN1   =   15.0,
 CRAN2   =   20.0,
 CRAN3   =    7.0,
 CRAN4   =    5.0,
 CRAN5   =    0.02,
 CRAN6   =    0.02,
 CVOUT   =      0,
 CVOUT   =      1,
 GEQ     =    8.00,
 GMAX    =    3.00,  3.00,  3.00,
 GMAX(4) =    1.00,  1.00,  1.00,  1.00,  1.00,  1.00,
 IDATA   =      0,
 IDATA   =      1,
 IOPT    =      2,
 IOPT    =      3,
 IOPT    =      1,
 ITOUT   =      1,
 ITOUT   =      0,
 ISEED1  =  78985723,
 ISEED2  =  95428381,
 ISEED3  =  72919329,
 ISEED4  =  63237395,
 JSEED1  =  81692875,
 JSEED2  =  68377297,
 JSEED3  =  89672847,
 JSEED4  =  98351973,
 LQL     =   .FALSE.,
 LQL     =   .TRUE.,
 MAXNM   =    0,
 MAXNM   =   10,
 ME      =    1,
 MG      =    1,
```

```
 RHOB    =    0.0,
 RHOB    =  100.0,
 XL0     =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XU0     =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XL      =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XU      =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 MULT    =         0,
 MULT    =         1,
!
!  *****   End of Case  2  Input Data   *****
!
$END
$CDATA
!
!  *****   Start of Case  3  Input Data   *****
!             NO Equality onstraints
!            12 Inequality Constraints
!
 ACC     =    1.0D-8,
 ACC     =    1.0D-7,
 ACCQP   =    1.0D-12,
 ALPHA   =    1.0,
 CRAN1   =   15.0,
 CRAN2   =   20.0,
 CRAN3   =    7.0,
 CRAN4   =    5.0,
 CRAN5   =    0.02,
 CRAN6   =    0.02,
 CVOUT   =      0,
 CVOUT   =      1,
 GEQ     =    8.00,
 GMAX    =    3.00,  3.00,  3.00,
 GMAX(4) =    1.00,  1.00,  1.00,  1.00,  1.00,  1.00,
 IDATA   =      0,
 IDATA   =      1,
 IOPT    =      2,
 IOPT    =      3,
 IOPT    =      1,
 ITOUT   =      1,
 ITOUT   =      0,
 ISEED1  =  78985723,
 ISEED2  =  95428381,
 ISEED3  =  72919329,
 ISEED4  =  63237395,
 JSEED1  =  81692875,
 JSEED2  =  68377297,
 JSEED3  =  89672847,
 JSEED4  =  98351973,
 LQL     =   .FALSE.,
 LQL     =   .TRUE.,
 MAXNM   =    0,
 MAXNM   =   10,
 ME      =    0,
 MG      =    9,
 RHOB    =    0.0,
 RHOB    =  100.0,
 XL0     =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XU0     =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XL      =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XU      =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 MULT    =         0,
 MULT    =         1,
!
!  *****   End of Case  3  Input Data   *****
!
```

```
 $END
 $CDATA
 !
 !  *****   Start of Case  4  Input Data   *****
 !             Two Equality onstraints
 !            12 Inequality Constraints
 !
  ACC     =    1.0D-8,
  ACC     =    1.0D-7,
  ACCQP   =    1.0D-12,
  ALPHA   =    1.0,
  CRAN1   =   15.0,
  CRAN2   =   20.0,
  CRAN3   =    7.0,
  CRAN4   =    5.0,
  CRAN5   =    0.02,
  CRAN6   =    0.02,
  CVOUT   =      0,
  CVOUT   =      1,
  GEQ     =    8.00,
  GMAX    =    3.00,  3.00,  3.00,
  GMAX(4) =    1.00,  1.00,  1.00,  1.00,  1.00,  1.00,
  IDATA   =      0,
  IDATA   =      1,
  IOPT    =      2,
  IOPT    =      3,
  IOPT    =      1,
  ITOUT   =      1,
  ITOUT   =      0,
  ISEED1  =  78985723,
  ISEED2  =  95428381,
  ISEED3  =  72919329,
  ISEED4  =  63237395,
  JSEED1  =  81692875,
  JSEED2  =  68377297,
  JSEED3  =  89672847,
  JSEED4  =  98351973,
  LQL     =   .FALSE.,
  LQL     =   .TRUE.,
  MAXNM   =    0,
  MAXNM   =   10,
  ME      =    1,
  MG      =   10,
  RHOB    =    0.0,
  RHOB    =  100.0,
  XL0     =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
  XU0     =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
  XL      =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
  XU      =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
  MULT    =         1,
  MULT    =         0,
 !
 !  *****   End of Case  4  Input Data   *****
 !
 $END


   *********   OUTPUT   *****   OUTPUT   ********

RUN the NLP6x6 Case.

START RUN.
```

```
********************************************************************************

        ***************   Start Case Number   1   ***************

                         *****   INPUT DATA   *****

&CDATA
ALPHA   =   1.00000000000000     ,
ACC     =  1.0000000000000000E-007,
ACCQP   =  1.0000000000000000E-012,
CRAN1   =   15.0000000000000     ,
CRAN2   =   20.0000000000000     ,
CRAN3   =   7.00000000000000     ,
CRAN4   =   5.00000000000000     ,
CRAN5   =  2.0000000000000000E-002,
CRAN6   =  2.0000000000000000E-002,
CRAN7   =  0.100000000000000     ,
CRAN8   =  0.100000000000000     ,
CVOUT   =           1,
EPS     =  1.0000000000000000E-007,
GEQ     =   8.00000000000000     , 13*0.0000000000000000E+000  ,
GMAX    = 3*3.00000000000000        , 6*1.00000000000000        ,
5*1.50000000000000        ,
ICASE   =           1,
IDATA   =           1,
IN      =           5,
IOPT    =           2,
IOUT    =           6,
IPRINT  =           2,
ISEED1  =    78985723,
ISEED2  =    95428381,
ISEED3  =    72919329,
ISEED4  =    63237395,
ITOUT   =           1,
JSEED1  =    81692875,
JSEED2  =    68377297,
JSEED3  =    89672847,
JSEED4  =    98351973,
L       =           1,
LQL     = T,
MAXFUN  =          10,
MAXIT   =         100,
MAXNM   =          10,
ME      =           0,
MG      =           0,
MODE    =           0,
MULT    =           1,
RHOB    =   100.000000000000     ,
STPMIN  =  0.0000000000000000E+000,
T       =  0.347887873649597     ,   8.36017310619354     ,  -1.15114569664001
,   31.7600607872009     ,
  -4.11432027816772     ,  -1.82969748973846     ,   14.7802293300629     ,  -
24.1927772760391     ,   9.23694193363190     ,
   6.53410136699677     ,   14.0349829196930     ,   12.5044798851013     ,  -
17.8921127319336     ,  -10.2217143774033     ,
   16.5568113327026     ,   2.43249177932739     ,  -10.1357221603394     ,
15.9321832656860     ,  0.124055743217468     ,
  -1.46232724189758     ,  -11.3952010869980     ,   4.92366194725037     ,  -
27.4548292160034     ,   2.60253787040710     ,
```

```
   4.86136615276337     , -0.199562907218933     ,  -23.4407806396484     ,  -
11.2429445981979     ,   1.20765388011932     ,
   21.6330313682556     ,   11.9727063179016     ,   32.9372560977936     ,
23.5570669174194     ,  -6.74438714981079     ,
  -7.93598234653473     ,  -20.3026217222214     ,
WDT     = 6*1.00000000000000        ,
WDX     = 6*0.000000000000000E+000  ,
WX      = 6*0.000000000000000E+000  ,
WZ      = 6*1.00000000000000        ,
XL      = 6*-2.50000000000000       , 4*-2.00000000000000       ,
XL0     = 6*-2.30000000000000       ,
XU      = 6*2.50000000000000        , 4*2.00000000000000        ,
XU0     = 6*2.30000000000000        ,
X0      = 2*2.29999990000000        , -0.778142929077148     ,
2.29999990000000     ,   1.75305795669556     ,
 -1.008510589599609E-003,
ZA      =   57.5010601852424     ,  -32.2144649143250     ,  -61.6171515005093
,   77.8294419023338     ,
  -30.3346693880174     ,   56.0949248596718
/
```

*****  OUTPUT DATA  *****

*****  X0, ZA, and T are Directly Input  *****

*****  Control Vector During Previous Duty Cycle for Case Number  1  *****

| Element | G.L.B. | C.V. | L.U.B. |
|---|---|---|---|
| 1 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 2 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 3 | -0.23000000D+01 | -0.77814293D+00 | 0.23000000D+01 |
| 4 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 5 | -0.23000000D+01 | 0.17530580D+01 | 0.23000000D+01 |
| 6 | -0.23000000D+01 | -0.10085106D-02 | 0.23000000D+01 |

*****  Measurement Vectors from Previous Duty Cycle  *****

| Element | Actual | Ideal | Delta |
|---|---|---|---|
| 1 | 0.57501060D+02 | 0.57512799D+02 | -0.11739089D-01 |
| 2 | -0.32214465D+02 | -0.32207449D+02 | -0.70162487D-02 |
| 3 | -0.61617152D+02 | -0.61612001D+02 | -0.51504469D-02 |
| 4 | 0.77829442D+02 | 0.77805433D+02 | 0.24008768D-01 |
| 5 | -0.30334669D+02 | -0.30316450D+02 | -0.18219316D-01 |
| 6 | 0.56094925D+02 | 0.56084753D+02 | 0.10172153D-01 |

*****  Initial Control Vector Estimate for Case Number  1  *****

| Element | G.L.B. | C.V. | L.U.B. | Delta C.V. |
|---|---|---|---|---|
| 1 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 2 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 3 | -0.25000000D+01 | -0.77814293D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 4 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 5 | -0.25000000D+01 | 0.17530580D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 6 | -0.25000000D+01 | -0.10085106D-02 | 0.25000000D+01 | 0.00000000D+00 |

Row  *****  T-Matrix  *****

| | | | | |
|---|---|---|---|---|
| 1 | 0.34788787D+00 | 0.14780229D+02 | -0.17892113D+02 | 0.12405574D+00 |

```
         0.48613662D+01    0.11972706D+02

   2     0.83601731D+01   -0.24192777D+02   -0.10221714D+02   -0.14623272D+01
        -0.19956291D+00    0.32937256D+02

   3    -0.11511457D+01    0.92369419D+01    0.16556811D+02   -0.11395201D+02
        -0.23440781D+02    0.23557067D+02

   4     0.31760061D+02    0.65341014D+01    0.24324918D+01    0.49236619D+01
        -0.11242945D+02   -0.67443871D+01

   5    -0.41143203D+01    0.14034983D+02   -0.10135722D+02   -0.27454829D+02
         0.12076539D+01   -0.79359823D+01

   6    -0.18296975D+01    0.12504480D+02    0.15932183D+02    0.26025379D+01
         0.21633031D+02   -0.20302622D+02


              *****   Predicted Measurement Vector   *****

Element     Z Vector          ZA Vector         Delta Z           Diag[W]

   1     0.57501060D+02    0.57501060D+02    0.00000000D+00    0.10000000D+01
   2    -0.32214465D+02   -0.32214465D+02    0.00000000D+00    0.10000000D+01
   3    -0.61617152D+02   -0.61617152D+02    0.00000000D+00    0.10000000D+01
   4     0.77829442D+02    0.77829442D+02    0.00000000D+00    0.10000000D+01
   5    -0.30334669D+02   -0.30334669D+02    0.00000000D+00    0.10000000D+01
   6     0.56094925D+02    0.56094925D+02    0.00000000D+00    0.10000000D+01


 *****   Initial Performance Index  =   0.18265072D+05   *****


*****   NO Constraints are Specified for Case Number   1   *****


 *****   Solve the NLPQLP Problem for Case Number   1   *****



 ------------------------------------------------------------------
  START OF THE SEQUENTIAL QUADRATIC PROGRAMMING ALGORITHM
 ------------------------------------------------------------------

  Parameters:
     N      =       6
     M      =       0
     ME     =       0
     MODE   =       0
     ACC    =   0.1000D-06
     ACCQP  =   0.1000D-11
     STPMIN =   0.0000D+00
     RHOB   =   0.1000D+03
     MAXFUN =      10
     MAXNM  =      10
     MAXIT  =     100
     IPRINT =       2

  Output in the following order:
     IT    - iteration number
     F     - objective function value
     SCV   - sum of constraint violations
     NA    - number of active constraints
     I     - number of line search iterations
```

```
   ALPHA - steplength parameter
   DELTA - additional variable to prevent inconsistency
   KKT   - Karush-Kuhn-Tucker optimality criterion

 IT         F           SCV      NA  I    ALPHA     DELTA     KKT
-------------------------------------------------------------------------
  1  0.18265072D+05  0.00D+00    0  0  0.00D+00  0.00D+00  0.19D+06
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  2  0.15669458D+04  0.00D+00    0  2  0.35D+00  0.00D+00  0.32D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  3  0.42079980D+03  0.00D+00    0  2  0.10D+00  0.00D+00  0.13D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  4  0.25091543D+03  0.00D+00    0  3  0.45D-01  0.00D+00  0.57D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  5  0.15571349D+03  0.00D+00    0  3  0.31D-01  0.00D+00  0.28D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  6  0.14148196D+03  0.00D+00    0  3  0.15D-01  0.00D+00  0.29D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  7  0.11660402D+03  0.00D+00    0  3  0.19D-01  0.00D+00  0.40D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  8  0.93864279D+02  0.00D+00    0  3  0.13D-01  0.00D+00  0.30D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  9  0.58328943D+02  0.00D+00    0  3  0.22D-01  0.00D+00  0.49D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 10  0.54785795D+02  0.00D+00    0  3  0.16D-01  0.00D+00  0.76D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 11  0.54555388D+01  0.00D+00    0  2  0.10D+00  0.00D+00  0.11D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 12  0.25795413D-03  0.00D+00    0  1  0.10D+01  0.00D+00  0.54D-03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 13  0.82227302D-06  0.00D+00    0  1  0.10D+01  0.00D+00  0.16D-05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 14  0.71155707D-10  0.00D+00    0  1  0.10D+01  0.00D+00  0.63D-11
```

```
   --- Final Convergence Analysis at Last Iterate ---

     Objective function value:      F(X)  =  0.71155707D-10
     Solution values:               X     =
       -0.59392254D-03  0.77625880D-04 -0.41050343D-03 -0.46029978D-03
        0.48527531D-04  0.27316174D-03
     Distances from lower bounds:   X-XL  =
        0.24994061D+01  0.25000776D+01  0.24995895D+01  0.24995397D+01
        0.25000485D+01  0.25002732D+01
     Distances from upper bounds:   XU-X  =
        0.25005939D+01  0.24999224D+01  0.25004105D+01  0.25004603D+01
        0.24999515D+01  0.24997268D+01
     Multipliers for lower bounds:  U     =
        0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
        0.00000000D+00  0.00000000D+00
     Multipliers for upper bounds:  U     =
        0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
        0.00000000D+00  0.00000000D+00
     Number of function calls:      NFUNC =      31
     Number of gradient calls:      NGRAD =      14
     Number of calls of QP solver:  NQL   =      14


              *****   Completed CALL to NLPQLP   *****

       *****   Number of Function Evaluations  =    115   *****

     *****   Solution Control Vector for Case Number   1   *****

Element     G.L.B.            C.V.              L.U.B.            Delta C.V.

   1    -0.25000000D+01   -0.59392254D-03    0.25000000D+01   -0.23005938D+01
   2    -0.25000000D+01    0.77625880D-04    0.25000000D+01   -0.22999223D+01
   3    -0.25000000D+01   -0.41050343D-03    0.25000000D+01    0.77773243D+00
   4    -0.25000000D+01   -0.46029978D-03    0.25000000D+01   -0.23004602D+01
   5    -0.25000000D+01    0.48527531D-04    0.25000000D+01   -0.17530094D+01
   6    -0.25000000D+01    0.27316174D-03    0.25000000D+01    0.12816723D-02


               *****   Predicted Measurement Vector   *****

Element     Z Vector          ZA Vector         Delta Z           Diag[W]

   1    -0.31161936D-05    0.57501060D+02   -0.57501063D+02    0.10000000D+01
   2     0.43571537D-06   -0.32214465D+02    0.32214465D+02    0.10000000D+01
   3    -0.14271498D-05   -0.61617152D+02    0.61617150D+02    0.10000000D+01
   4    -0.51498414D-06    0.77829442D+02   -0.77829442D+02    0.10000000D+01
   5     0.19542059D-05   -0.30334669D+02    0.30334671D+02    0.10000000D+01
   6    -0.67732205D-05    0.56094925D+02   -0.56094932D+02    0.10000000D+01


*****   NLP Solution Performance Index  =   0.71155707D-10   *****


*****   NO Constraints are Specified for Case Number   1   *****


*****   Solve the Regulator Problem for Case Number   1   *****

                  *****   Alpha  =      0.10000000D+01   *****
```

```
  Dim                    *****   WZ-Vector   *****

   6     0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
         0.10000000D+01    0.10000000D+01

  Dim                    *****   WX-Vector   *****

   6     0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
         0.00000000D+00    0.00000000D+00

  Dim                    *****   WDX-Vector   *****

   6     0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
         0.00000000D+00    0.00000000D+00


     *****   Matrix [DUMXX1] was Successfully Inverted
                                      to Yield Matrix [DD].   *****

  Dim          *****   The Solution Control Vector   *****

   1    -0.59384844D-03

   2     0.77811695D-04

   3    -0.41035318D-03

   4    -0.46023459D-03

   5     0.48766852D-04

   6     0.27341716D-03

  Dim        *****   The Solution Measurement Vector   *****

   6    -0.21316282D-13   -0.49737992D-13    0.21316282D-13    0.00000000D+00
         0.24868996D-13    0.00000000D+00


*****   Regulator Solution Performance Index  =   0.40011025D-26   *****


             *****   NLP Special Control  6-Vector Output   *****

CV =
    -0.593922538070776D-03,   0.776258803091367D-04,  -0.410503428551767D-03,
    -0.460299783345532D-03,   0.485275313306816D-04,   0.273161738618024D-03,


          *****   Regulator Special Control  6-Vector Output   *****

CV =
    -0.593848443448675D-03,   0.778116947421914D-04,  -0.410353179263967D-03,
    -0.460234586083796D-03,   0.487668522495266D-04,   0.273417158744884D-03,


   *****   Root-Sum-Squared Delta CV Elements  =   0.43515111D-06   *****

Delta CV =
    -0.740946221012510D-07,  -0.185814433054687D-06,  -0.150249287800123D-06,
    -0.651972617359106D-07,  -0.239320918845022D-06,  -0.255420126859141D-06,


               *****   End Case Number   1   *****
```

```
********************************************************************************


        ***************   Start Case Number   2   ***************


                        *****   INPUT DATA   *****

&CDATA
ALPHA   =   1.00000000000000     ,
ACC     =  1.0000000000000000E-007,
ACCQP   =  1.0000000000000000E-012,
CRAN1   =   15.0000000000000     ,
CRAN2   =   20.0000000000000     ,
CRAN3   =   7.00000000000000     ,
CRAN4   =   5.00000000000000     ,
CRAN5   =  2.0000000000000000E-002,
CRAN6   =  2.0000000000000000E-002,
CRAN7   =  0.100000000000000     ,
CRAN8   =  0.100000000000000     ,
CVOUT   =           1,
EPS     =  1.0000000000000000E-007,
GEQ     =   8.00000000000000     , 13*0.0000000000000000E+000  ,
GMAX    = 3*3.00000000000000        , 6*1.00000000000000        ,
5*1.50000000000000        ,
ICASE   =           2,
IDATA   =           1,
IN      =           5,
IOPT    =           1,
IOUT    =           6,
IPRINT  =           2,
ISEED1  =    78985723,
ISEED2  =    95428381,
ISEED3  =    72919329,
ISEED4  =    63237395,
ITOUT   =           0,
JSEED1  =    81692875,
JSEED2  =    68377297,
JSEED3  =    89672847,
JSEED4  =    98351973,
L       =           1,
LQL     = T,
MAXFUN  =          10,
MAXIT   =         100,
MAXNM   =          10,
ME      =           1,
MG      =           1,
MODE    =           0,
MULT    =           1,
RHOB    =   100.000000000000     ,
STPMIN  =  0.0000000000000000E+000,
T       =  0.347887873649597     ,   8.36017310619354     ,  -1.15114569664001
,   31.7600607872009     ,
  -4.11432027816772     ,  -1.82969748973846     ,   14.7802293300629     ,  -
24.1927772760391     ,   9.23694193363190     ,
   6.53410136699677     ,   14.0349829196930     ,   12.5044798851013     ,  -
17.8921127319336     ,  -10.2217143774033     ,
   16.5568113327026     ,   2.43249177932739     ,  -10.1357221603394     ,
15.9321832656860     ,  0.124055743217468     ,
  -1.46232724189758     ,  -11.3952010869980     ,   4.92366194725037     ,  -
27.4548292160034     ,   2.60253787040710     ,
   4.86136615276337     , -0.199562907218933     ,  -23.4407806396484     ,  -
11.2429445981979     ,   1.20765388011932     ,
```

```
   21.6330313682556     ,   11.9727063179016     ,   32.9372560977936     ,
23.5570669174194     ,  -6.74438714981079     ,
  -7.93598234653473     ,  -20.3026217222214     ,
WDT     = 6*1.00000000000000        ,
WDX     = 6*0.000000000000000E+000  ,
WX      = 6*0.000000000000000E+000  ,
WZ      = 6*1.00000000000000        ,
XL      = 6*-2.50000000000000       , 4*-2.00000000000000       ,
XL0     = 6*-2.30000000000000       ,
XU      = 6*2.50000000000000        , 4*2.00000000000000        ,
XU0     = 6*2.30000000000000        ,
X0      = 2*2.29999990000000        , -0.778142929077148     ,
2.29999990000000     ,   1.75305795669556     ,
 -1.008510589599609E-003,
ZA      =   57.5010601852424     ,  -32.2144649143250     ,  -61.6171515005093
,   77.8294419023338     ,
  -30.3346693880174     ,   56.0949248596718
/
```

*****  OUTPUT DATA  *****

*****  X0, ZA, and T are Directly Input  *****

*****  Control Vector During Previous Duty Cycle for Case Number  2  *****

| Element | G.L.B. | C.V. | L.U.B. |
|---|---|---|---|
| 1 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 2 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 3 | -0.23000000D+01 | -0.77814293D+00 | 0.23000000D+01 |
| 4 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 5 | -0.23000000D+01 | 0.17530580D+01 | 0.23000000D+01 |
| 6 | -0.23000000D+01 | -0.10085106D-02 | 0.23000000D+01 |

*****  Measurement Vectors from Previous Duty Cycle  *****

| Element | Actual | Ideal | Delta |
|---|---|---|---|
| 1 | 0.57501060D+02 | 0.57512799D+02 | -0.11739089D-01 |
| 2 | -0.32214465D+02 | -0.32207449D+02 | -0.70162487D-02 |
| 3 | -0.61617152D+02 | -0.61612001D+02 | -0.51504469D-02 |
| 4 | 0.77829442D+02 | 0.77805433D+02 | 0.24008768D-01 |
| 5 | -0.30334669D+02 | -0.30316450D+02 | -0.18219316D-01 |
| 6 | 0.56094925D+02 | 0.56084753D+02 | 0.10172153D-01 |

*****  Initial Control Vector Estimate for Case Number  2  *****

| Element | G.L.B. | C.V. | L.U.B. | Delta C.V. |
|---|---|---|---|---|
| 1 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 2 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 3 | -0.25000000D+01 | -0.77814293D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 4 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 5 | -0.25000000D+01 | 0.17530580D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 6 | -0.25000000D+01 | -0.10085106D-02 | 0.25000000D+01 | 0.00000000D+00 |

*****  T-Matrix Output is Suppressed  *****

*****  Predicted Measurement Vector  *****

```
Element     Z Vector          ZA Vector         Delta Z           Diag[W]

   1     0.57501060D+02    0.57501060D+02    0.00000000D+00    0.10000000D+01
   2    -0.32214465D+02   -0.32214465D+02    0.00000000D+00    0.10000000D+01
   3    -0.61617152D+02   -0.61617152D+02    0.00000000D+00    0.10000000D+01
   4     0.77829442D+02    0.77829442D+02    0.00000000D+00    0.10000000D+01
   5    -0.30334669D+02   -0.30334669D+02    0.00000000D+00    0.10000000D+01
   6     0.56094925D+02    0.56094925D+02    0.00000000D+00    0.10000000D+01


 *****   Initial Performance Index  =   0.18265072D+05   *****


*****   Initial Constraint Function Values for Case Number   2   *****

                   Equality Constraints

Element          Value               Target          Value - Target

   1         0.70797282D+01      0.80000000D+01     -0.92027180D+00


 *****   Solve the NLPQLP Problem for Case Number   2   *****



 ------------------------------------------------------------------------
  START OF THE SEQUENTIAL QUADRATIC PROGRAMMING ALGORITHM
 ------------------------------------------------------------------------

  Parameters:
     N      =       6
     M      =       1
     ME     =       1
     MODE   =       0
     ACC    =   0.1000D-06
     ACCQP  =   0.1000D-11
     STPMIN =   0.0000D+00
     RHOB   =   0.1000D+03
     MAXFUN =      10
     MAXNM  =      10
     MAXIT  =     100
     IPRINT =       2

  Output in the following order:
     IT    - iteration number
     F     - objective function value
     SCV   - sum of constraint violations
     NA    - number of active constraints
     I     - number of line search iterations
     ALPHA - steplength parameter
     DELTA - additional variable to prevent inconsistency
     KKT   - Karush-Kuhn-Tucker optimality criterion


   IT         F          SCV      NA  I    ALPHA     DELTA     KKT
 ------------------------------------------------------------------------
    1  0.18265072D+05  0.92D+00    1  0  0.00D+00  0.00D+00  0.10D+06
             *****   Completed CALL to NLPQLP   *****
             *****   Completed CALL to NLPQLP   *****
             *****   Completed CALL to NLPQLP   *****
    2  0.14533132D+05  0.91D+00    1  2  0.10D+00  0.00D+00  0.18D+05
             *****   Completed CALL to NLPQLP   *****
```

```
          *****   Completed CALL to NLPQLP   *****
 3  0.16328634D+05  0.82D+00    1  1  0.10D+01  0.00D+00  0.25D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 4  0.13101526D+05  0.50D+00    1  2  0.39D+00  0.00D+00  0.24D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 5  0.11839923D+05  0.42D+00    1  2  0.16D+00  0.00D+00  0.96D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 6  0.11533676D+05  0.30D+00    1  2  0.10D+00  0.00D+00  0.28D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 7  0.11454045D+05  0.27D+00    1  2  0.10D+00  0.00D+00  0.10D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 8  0.11413320D+05  0.24D+00    1  3  0.11D+00  0.00D+00  0.18D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 9  0.11319326D+05  0.21D+00    1  2  0.14D+00  0.00D+00  0.66D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
10  0.11005312D+05  0.61D-02    1  1  0.10D+01  0.00D+00  0.28D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
11  0.10994705D+05  0.45D-02    1  1  0.10D+01  0.00D+00  0.13D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
12  0.11001309D+05  0.93D-05    1  1  0.10D+01  0.00D+00  0.27D-01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
13  0.11001323D+05  0.86D-07    1  1  0.10D+01  0.00D+00  0.26D-03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
14  0.11001323D+05  0.48D-09    1  1  0.10D+01  0.00D+00  0.14D-05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
15  0.11001323D+05  0.39D-13    1  1  0.10D+01  0.00D+00  0.12D-09


--- Final Convergence Analysis at Last Iterate ---

  Objective function value:      F(X)  =  0.11001323D+05
  Solution values:               X     =
     0.92162200D+00  0.25000000D+01 -0.24173715D+01  0.21229649D+01
    -0.30150272D+00  0.45139427D+00
  Distances from lower bounds:   X-XL  =
     0.34216220D+01  0.50000000D+01  0.82628477D-01  0.46229649D+01
     0.21984973D+01  0.29513943D+01
  Distances from upper bounds:   XU-X  =
     0.15783780D+01  0.00000000D+00  0.49173715D+01  0.37703507D+00
     0.28015027D+01  0.20486057D+01
  Multipliers for lower bounds:  U     =
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00
  Multipliers for upper bounds:  U     =
     0.00000000D+00  0.77791154D+03  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00
```

```
      Constraint values:             G(X)  =
         0.39079850D-13
      Multipliers for constraints:   U     =
        -0.14966662D+04
      Number of function calls:      NFUNC =      23
      Number of gradient calls:      NGRAD =      15
      Number of calls of QP solver:  NQL   =      15


              *****   Completed CALL to NLPQLP   *****


       *****   Number of Function Evaluations  =    113   *****


     *****   Solution Control Vector for Case Number   2   *****

Element     G.L.B.            C.V.              L.U.B.            Delta C.V.

   1    -0.25000000D+01    0.92162200D+00    0.25000000D+01   -0.13783779D+01
   2    -0.25000000D+01    0.25000000D+01    0.25000000D+01    0.20000010D+00
   3    -0.25000000D+01   -0.24173715D+01    0.25000000D+01   -0.16392286D+01
   4    -0.25000000D+01    0.21229649D+01    0.25000000D+01   -0.17703497D+00
   5    -0.25000000D+01   -0.30150272D+00    0.25000000D+01   -0.20545607D+01
   6    -0.25000000D+01    0.45139427D+00    0.25000000D+01    0.45240279D+00


               *****   Predicted Measurement Vector   *****

Element     Z Vector          ZA Vector         Delta Z           Diag[W]

   1     0.84713402D+02    0.57501060D+02    0.27212342D+02    0.10000000D+01
   2    -0.16250967D+02   -0.32214465D+02    0.15963498D+02    0.10000000D+01
   3    -0.24488307D+02   -0.61617152D+02    0.37128845D+02    0.10000000D+01
   4     0.50547958D+02    0.77829442D+02   -0.27281484D+02    0.10000000D+01
   5    -0.64528123D+01   -0.30334669D+02    0.23881857D+02    0.10000000D+01
   6    -0.19090734D+02    0.56094925D+02   -0.75185659D+02    0.10000000D+01


*****   NLP Solution Performance Index  =   0.11001323D+05   *****


*****   Solution Constraint Function Values for Case Number   2   *****

                    Equality Constraints

Element          Value               Target          Value - Target

   1         0.80000000D+01      0.80000000D+01     -0.39079850D-13


              *****   NLP Special Control  6-Vector Output   *****

CV =
     0.921622003247424D+00,   0.250000000000000D+01,  -0.241737152332053D+01,
     0.212296493009549D+01,  -0.301502722511697D+00,   0.451394274735744D+00,


                *****   End Case Number   2   *****



 ****************************************************************************
```

```
        ***************   Start Case Number   3   ***************

                         *****   INPUT DATA   *****

&CDATA
ALPHA   =   1.00000000000000     ,
ACC     =  1.0000000000000000E-007,
ACCQP   =  1.0000000000000000E-012,
CRAN1   =   15.0000000000000     ,
CRAN2   =   20.0000000000000     ,
CRAN3   =   7.00000000000000     ,
CRAN4   =   5.00000000000000     ,
CRAN5   =  2.0000000000000000E-002,
CRAN6   =  2.0000000000000000E-002,
CRAN7   =  0.100000000000000     ,
CRAN8   =  0.100000000000000     ,
CVOUT   =           1,
EPS     =  1.0000000000000000E-007,
GEQ     =   8.00000000000000     , 13*0.000000000000000E+000  ,
GMAX    = 3*3.00000000000000        , 6*1.00000000000000        ,
5*1.50000000000000        ,
ICASE   =           3,
IDATA   =           1,
IN      =           5,
IOPT    =           1,
IOUT    =           6,
IPRINT  =           2,
ISEED1  =    78985723,
ISEED2  =    95428381,
ISEED3  =    72919329,
ISEED4  =    63237395,
ITOUT   =           0,
JSEED1  =    81692875,
JSEED2  =    68377297,
JSEED3  =    89672847,
JSEED4  =    98351973,
L       =           1,
LQL     = T,
MAXFUN  =          10,
MAXIT   =         100,
MAXNM   =          10,
ME      =           0,
MG      =           9,
MODE    =           0,
MULT    =           1,
RHOB    =   100.000000000000     ,
STPMIN  =  0.000000000000000E+000,
T       =  0.347887873649597     ,   8.36017310619354     ,  -1.15114569664001
,   31.7600607872009     ,
  -4.11432027816772     ,  -1.82969748973846     ,   14.7802293300629     ,  -
24.1927772760391     ,   9.23694193363190     ,
   6.53410136699677     ,   14.0349829196930     ,   12.5044798851013     ,  -
17.8921127319336     ,  -10.2217143774033     ,
   16.5568113327026     ,   2.43249177932739     ,  -10.1357221603394     ,
15.9321832656860     ,  0.124055743217468     ,
  -1.46232724189758     ,  -11.3952010869980     ,   4.92366194725037     ,  -
27.4548292160034     ,   2.60253787040710     ,
   4.86136615276337     , -0.199562907218933     ,  -23.4407806396484     ,  -
11.2429445981979     ,   1.20765388011932     ,
   21.6330313682556     ,   11.9727063179016     ,   32.9372560977936     ,
23.5570669174194     ,  -6.74438714981079     ,
```

```
  -7.93598234653473     ,  -20.3026217222214     ,
WDT     = 6*1.00000000000000        ,
WDX     = 6*0.000000000000000E+000  ,
WX      = 6*0.000000000000000E+000  ,
WZ      = 6*1.00000000000000        ,
XL      = 6*-2.50000000000000       , 4*-2.00000000000000       ,
XL0     = 6*-2.30000000000000       ,
XU      = 6*2.50000000000000        , 4*2.00000000000000        ,
XU0     = 6*2.30000000000000        ,
X0      = 2*2.29999990000000        , -0.778142929077148     ,
2.29999990000000     ,   1.75305795669556     ,
 -1.008510589599609E-003,
ZA      =   57.5010601852424     ,  -32.2144649143250     ,  -61.6171515005093
,   77.8294419023338     ,
  -30.3346693880174     ,   56.0949248596718
/
```

*****  OUTPUT DATA  *****

*****  X0, ZA, and T are Directly Input  *****

*****  Control Vector During Previous Duty Cycle for Case Number  3  *****

| Element | G.L.B. | C.V. | L.U.B. |
|---|---|---|---|
| 1 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 2 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 3 | -0.23000000D+01 | -0.77814293D+00 | 0.23000000D+01 |
| 4 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 5 | -0.23000000D+01 | 0.17530580D+01 | 0.23000000D+01 |
| 6 | -0.23000000D+01 | -0.10085106D-02 | 0.23000000D+01 |

*****  Measurement Vectors from Previous Duty Cycle  *****

| Element | Actual | Ideal | Delta |
|---|---|---|---|
| 1 | 0.57501060D+02 | 0.57512799D+02 | -0.11739089D-01 |
| 2 | -0.32214465D+02 | -0.32207449D+02 | -0.70162487D-02 |
| 3 | -0.61617152D+02 | -0.61612001D+02 | -0.51504469D-02 |
| 4 | 0.77829442D+02 | 0.77805433D+02 | 0.24008768D-01 |
| 5 | -0.30334669D+02 | -0.30316450D+02 | -0.18219316D-01 |
| 6 | 0.56094925D+02 | 0.56084753D+02 | 0.10172153D-01 |

*****  Initial Control Vector Estimate for Case Number  3  *****

| Element | G.L.B. | C.V. | L.U.B. | Delta C.V. |
|---|---|---|---|---|
| 1 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 2 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 3 | -0.25000000D+01 | -0.77814293D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 4 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 5 | -0.25000000D+01 | 0.17530580D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 6 | -0.25000000D+01 | -0.10085106D-02 | 0.25000000D+01 | 0.00000000D+00 |

*****  T-Matrix Output is Suppressed  *****

*****  Predicted Measurement Vector  *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|

```
   1     0.57501060D+02    0.57501060D+02    0.00000000D+00    0.10000000D+01
   2    -0.32214465D+02   -0.32214465D+02    0.00000000D+00    0.10000000D+01
   3    -0.61617152D+02   -0.61617152D+02    0.00000000D+00    0.10000000D+01
   4     0.77829442D+02    0.77829442D+02    0.00000000D+00    0.10000000D+01
   5    -0.30334669D+02   -0.30334669D+02    0.00000000D+00    0.10000000D+01
   6     0.56094925D+02    0.56094925D+02    0.00000000D+00    0.10000000D+01

 *****   Initial Performance Index  =   0.18265072D+05   *****

*****   Initial Constraint Function Values for Case Number   3   *****

                  Inequality Constraints

Element          Value               L.U.B.          L.U.B. - Value

   1         0.32526911D+01      0.30000000D+01     -0.25269105D+00
   2         0.24280663D+01      0.30000000D+01      0.57193370D+00
   3         0.17530582D+01      0.30000000D+01      0.12469418D+01
   4         0.00000000D+00      0.10000000D+01      0.10000000D+01
   5         0.00000000D+00      0.10000000D+01      0.10000000D+01
   6         0.00000000D+00      0.10000000D+01      0.10000000D+01
   7         0.00000000D+00      0.10000000D+01      0.10000000D+01
   8         0.00000000D+00      0.10000000D+01      0.10000000D+01
   9         0.00000000D+00      0.10000000D+01      0.10000000D+01

 *****   Solve the NLPQLP Problem for Case Number   3   *****


 ------------------------------------------------------------------------
  START OF THE SEQUENTIAL QUADRATIC PROGRAMMING ALGORITHM
 ------------------------------------------------------------------------

  Parameters:
     N      =       6
     M      =       9
     ME     =       0
     MODE   =       0
     ACC    =   0.1000D-06
     ACCQP  =   0.1000D-11
     STPMIN =   0.0000D+00
     RHOB   =   0.1000D+03
     MAXFUN =      10
     MAXNM  =      10
     MAXIT  =     100
     IPRINT =       2

  Output in the following order:
     IT    - iteration number
     F     - objective function value
     SCV   - sum of constraint violations
     NA    - number of active constraints
     I     - number of line search iterations
     ALPHA - steplength parameter
     DELTA - additional variable to prevent inconsistency
     KKT   - Karush-Kuhn-Tucker optimality criterion

    IT         F           SCV      NA  I    ALPHA     DELTA     KKT
 ------------------------------------------------------------------------
```

```
 1  0.18265072D+05  0.25D+00    9  0  0.00D+00  0.00D+00  0.17D+06
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 2  0.64028791D+03  0.38D+01    6  2  0.42D+00  0.00D+00  0.66D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 3  0.41193273D+04  0.28D-08    6  1  0.10D+01  0.00D+00  0.76D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 4  0.40326750D+04  0.17D-08    6  3  0.48D-01  0.00D+00  0.15D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 5  0.40296533D+04  0.15D-08    6  2  0.10D+00  0.00D+00  0.56D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 6  0.40071491D+04  0.40D-10    4  1  0.10D+01  0.00D+00  0.89D+00
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 7  0.40069393D+04  0.00D+00    4  1  0.10D+01  0.00D+00  0.30D+00
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 8  0.40068217D+04  0.00D+00    4  1  0.10D+01  0.00D+00  0.21D-01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 9  0.40068121D+04  0.00D+00    4  1  0.10D+01  0.00D+00  0.38D-03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
10  0.40068119D+04  0.00D+00    4  1  0.10D+01  0.00D+00  0.15D-05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
11  0.40068119D+04  0.00D+00    4  1  0.10D+01  0.00D+00  0.16D-08


--- Final Convergence Analysis at Last Iterate ---

  Objective function value:      F(X)  =  0.40068119D+04
  Solution values:               X     =
     0.12999999D+01  0.12999999D+01  0.99998599D-02  0.12999999D+01
     0.75305796D+00  0.78812728D+00
  Distances from lower bounds:   X-XL  =
     0.37999999D+01  0.37999999D+01  0.25099999D+01  0.37999999D+01
     0.32530580D+01  0.32881273D+01
  Distances from upper bounds:   XU-X  =
     0.12000001D+01  0.12000001D+01  0.24900001D+01  0.12000001D+01
     0.17469420D+01  0.17118727D+01
  Multipliers for lower bounds:  U     =
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00
  Multipliers for upper bounds:  U     =
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00
  Constraint values:             G(X)  =
     0.11615225D+01  0.16999616D+01  0.19099354D+01  0.00000000D+00
     0.00000000D+00  0.21185721D+00  0.00000000D+00  0.00000000D+00
     0.21086421D+00
  Multipliers for constraints:   U     =
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.29480636D+04
     0.95706023D+03  0.00000000D+00  0.21342320D+04  0.21222081D+03
     0.00000000D+00
  Number of function calls:      NFUNC =      15
  Number of gradient calls:      NGRAD =      11
```

Number of calls of QP solver: NQL = 11

***** Completed CALL to NLPQLP *****

***** Number of Function Evaluations = 81 *****

***** Solution Control Vector for Case Number 3 *****

| Element | G.L.B. | C.V. | L.U.B. | Delta C.V. |
|---|---|---|---|---|
| 1 | -0.25000000D+01 | 0.12999999D+01 | 0.25000000D+01 | -0.10000000D+01 |
| 2 | -0.25000000D+01 | 0.12999999D+01 | 0.25000000D+01 | -0.10000000D+01 |
| 3 | -0.25000000D+01 | 0.99998599D-02 | 0.25000000D+01 | 0.78814279D+00 |
| 4 | -0.25000000D+01 | 0.12999999D+01 | 0.25000000D+01 | -0.10000000D+01 |
| 5 | -0.25000000D+01 | 0.75305796D+00 | 0.25000000D+01 | -0.10000000D+01 |
| 6 | -0.25000000D+01 | 0.78812728D+00 | 0.25000000D+01 | 0.78913579D+00 |

***** Predicted Measurement Vector *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|
| 1 | 0.32734074D+02 | 0.57501060D+02 | -0.24766986D+02 | 0.10000000D+01 |
| 2 | 0.32158299D+01 | -0.32214465D+02 | 0.35430295D+02 | 0.10000000D+01 |
| 3 | -0.32281075D+01 | -0.61617152D+02 | 0.58389044D+02 | 0.10000000D+01 |
| 4 | 0.42449475D+02 | 0.77829442D+02 | -0.35379967D+02 | 0.10000000D+01 |
| 5 | -0.28259122D+02 | -0.30334669D+02 | 0.20755479D+01 | 0.10000000D+01 |
| 6 | 0.17719881D+02 | 0.56094925D+02 | -0.38375044D+02 | 0.10000000D+01 |

***** NLP Solution Performance Index = 0.40068119D+04 *****

***** Solution Constraint Function Values for Case Number 3 *****

Inequality Constraints

| Element | Value | L.U.B. | L.U.B. - Value |
|---|---|---|---|
| 1 | 0.18384775D+01 | 0.30000000D+01 | 0.11615225D+01 |
| 2 | 0.13000384D+01 | 0.30000000D+01 | 0.16999616D+01 |
| 3 | 0.10900646D+01 | 0.30000000D+01 | 0.19099354D+01 |
| 4 | 0.10000000D+01 | 0.10000000D+01 | 0.00000000D+00 |
| 5 | 0.10000000D+01 | 0.10000000D+01 | 0.00000000D+00 |
| 6 | 0.78814279D+00 | 0.10000000D+01 | 0.21185721D+00 |
| 7 | 0.10000000D+01 | 0.10000000D+01 | 0.00000000D+00 |
| 8 | 0.10000000D+01 | 0.10000000D+01 | 0.00000000D+00 |
| 9 | 0.78913579D+00 | 0.10000000D+01 | 0.21086421D+00 |

***** NLP Special Control 6-Vector Output *****

CV =
0.129999990000000D+01, 0.129999990000000D+01, 0.999985987984566D-02,
0.129999990000000D+01, 0.753057956695560D+00, 0.788127281510317D+00,

***** End Case Number 3 *****

```
********************************************************************************

        ***************   Start Case Number   4   ***************

                        *****   INPUT DATA   *****

&CDATA
ALPHA   =   1.00000000000000     ,
ACC     =  1.0000000000000000E-007,
ACCQP   =  1.0000000000000000E-012,
CRAN1   =   15.0000000000000     ,
CRAN2   =   20.0000000000000     ,
CRAN3   =   7.00000000000000     ,
CRAN4   =   5.00000000000000     ,
CRAN5   =  2.0000000000000000E-002,
CRAN6   =  2.0000000000000000E-002,
CRAN7   =  0.100000000000000     ,
CRAN8   =  0.100000000000000     ,
CVOUT   =           1,
EPS     =  1.0000000000000000E-007,
GEQ     =   8.00000000000000     , 13*0.0000000000000000E+000  ,
GMAX    = 3*3.00000000000000        , 6*1.00000000000000        ,
5*1.50000000000000        ,
ICASE   =           4,
IDATA   =           1,
IN      =           5,
IOPT    =           1,
IOUT    =           6,
IPRINT  =           2,
ISEED1  =    78985723,
ISEED2  =    95428381,
ISEED3  =    72919329,
ISEED4  =    63237395,
ITOUT   =           0,
JSEED1  =    81692875,
JSEED2  =    68377297,
JSEED3  =    89672847,
JSEED4  =    98351973,
L       =           1,
LQL     = T,
MAXFUN  =          10,
MAXIT   =         100,
MAXNM   =          10,
ME      =           1,
MG      =          10,
MODE    =           0,
MULT    =           0,
RHOB    =   100.000000000000     ,
STPMIN  =  0.0000000000000000E+000,
T       =  0.347887873649597     ,   8.36017310619354     ,  -1.15114569664001
,   31.7600607872009     ,
  -4.11432027816772     ,  -1.82969748973846     ,   14.7802293300629     ,  -
24.1927772760391     ,   9.23694193363190     ,
   6.53410136699677     ,   14.0349829196930     ,   12.5044798851013     ,  -
17.8921127319336     ,  -10.2217143774033     ,
   16.5568113327026     ,   2.43249177932739     ,  -10.1357221603394     ,
15.9321832656860     ,  0.124055743217468     ,
  -1.46232724189758     ,  -11.3952010869980     ,   4.92366194725037     ,  -
27.4548292160034     ,   2.60253787040710     ,
   4.86136615276337     , -0.199562907218933     ,  -23.4407806396484     ,  -
11.2429445981979     ,   1.20765388011932     ,
```

```
   21.6330313682556     ,   11.9727063179016     ,   32.9372560977936     ,
23.5570669174194     ,  -6.74438714981079     ,
  -7.93598234653473     ,  -20.3026217222214     ,
WDT     = 6*1.00000000000000        ,
WDX     = 6*0.000000000000000E+000  ,
WX      = 6*0.000000000000000E+000  ,
WZ      = 6*1.00000000000000        ,
XL      = 6*-2.50000000000000       , 4*-2.00000000000000       ,
XL0     = 6*-2.30000000000000       ,
XU      = 6*2.50000000000000        , 4*2.00000000000000        ,
XU0     = 6*2.30000000000000        ,
X0      = 2*2.29999990000000        , -0.778142929077148     ,
2.29999990000000     ,   1.75305795669556     ,
 -1.008510589599609E-003,
ZA      =   57.5010601852424     ,  -32.2144649143250     ,  -61.6171515005093
,   77.8294419023338     ,
  -30.3346693880174     ,   56.0949248596718
/
```

*****  OUTPUT DATA  *****

*****  X0, ZA, and T are Directly Input  *****

*****  Control Vector During Previous Duty Cycle for Case Number  4  *****

| Element | G.L.B. | C.V. | L.U.B. |
|---|---|---|---|
| 1 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 2 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 3 | -0.23000000D+01 | -0.77814293D+00 | 0.23000000D+01 |
| 4 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 5 | -0.23000000D+01 | 0.17530580D+01 | 0.23000000D+01 |
| 6 | -0.23000000D+01 | -0.10085106D-02 | 0.23000000D+01 |

*****  Measurement Vectors from Previous Duty Cycle  *****

| Element | Actual | Ideal | Delta |
|---|---|---|---|
| 1 | 0.57501060D+02 | 0.57512799D+02 | -0.11739089D-01 |
| 2 | -0.32214465D+02 | -0.32207449D+02 | -0.70162487D-02 |
| 3 | -0.61617152D+02 | -0.61612001D+02 | -0.51504469D-02 |
| 4 | 0.77829442D+02 | 0.77805433D+02 | 0.24008768D-01 |
| 5 | -0.30334669D+02 | -0.30316450D+02 | -0.18219316D-01 |
| 6 | 0.56094925D+02 | 0.56084753D+02 | 0.10172153D-01 |

*****  Initial Control Vector Estimate for Case Number  4  *****

| Element | G.L.B. | C.V. | L.U.B. | Delta C.V. |
|---|---|---|---|---|
| 1 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 2 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 3 | -0.25000000D+01 | -0.77814293D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 4 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 5 | -0.25000000D+01 | 0.17530580D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 6 | -0.25000000D+01 | -0.10085106D-02 | 0.25000000D+01 | 0.00000000D+00 |

*****  T-Matrix Output is Suppressed  *****

*****  Predicted Measurement Vector  *****

```
Element     Z Vector          ZA Vector         Delta Z           Diag[W]

   1     0.57501060D+02    0.57501060D+02    0.00000000D+00    0.10000000D+01
   2    -0.32214465D+02   -0.32214465D+02    0.00000000D+00    0.10000000D+01
   3    -0.61617152D+02   -0.61617152D+02    0.00000000D+00    0.10000000D+01
   4     0.77829442D+02    0.77829442D+02    0.00000000D+00    0.10000000D+01
   5    -0.30334669D+02   -0.30334669D+02    0.00000000D+00    0.10000000D+01
   6     0.56094925D+02    0.56094925D+02    0.00000000D+00    0.10000000D+01


 *****   Initial Performance Index  =   0.18265072D+05   *****


*****   Initial Constraint Function Values for Case Number   4   *****

                    Equality Constraints

Element          Value               Target          Value - Target

   1         0.70797282D+01      0.80000000D+01     -0.92027180D+00

                  Inequality Constraints

Element          Value               L.U.B.          L.U.B. - Value

   1         0.32526911D+01      0.30000000D+01     -0.25269105D+00
   2         0.24280663D+01      0.30000000D+01      0.57193370D+00
   3         0.17530582D+01      0.30000000D+01      0.12469418D+01
   4         0.00000000D+00      0.10000000D+01      0.10000000D+01
   5         0.00000000D+00      0.10000000D+01      0.10000000D+01
   6         0.00000000D+00      0.10000000D+01      0.10000000D+01
   7         0.00000000D+00      0.10000000D+01      0.10000000D+01
   8         0.00000000D+00      0.10000000D+01      0.10000000D+01
   9         0.00000000D+00      0.10000000D+01      0.10000000D+01


 *****   Solve the NLPQLP Problem for Case Number   4   *****



 ------------------------------------------------------------------------
  START OF THE SEQUENTIAL QUADRATIC PROGRAMMING ALGORITHM
 ------------------------------------------------------------------------

  Parameters:
     N      =       6
     M      =      10
     ME     =       1
     MODE   =       0
     ACC    =   0.1000D-06
     ACCQP  =   0.1000D-11
     STPMIN =   0.0000D+00
     RHOB   =   0.1000D+03
     MAXFUN =      10
     MAXNM  =      10
     MAXIT  =     100
     IPRINT =       2

  Output in the following order:
     IT    - iteration number
     F     - objective function value
     SCV   - sum of constraint violations
     NA    - number of active constraints
```

```
   I     - number of line search iterations
   ALPHA - steplength parameter
   DELTA - additional variable to prevent inconsistency
   KKT   - Karush-Kuhn-Tucker optimality criterion


 IT         F           SCV      NA  I    ALPHA     DELTA     KKT
-------------------------------------------------------------------
  1  0.18265072D+05  0.12D+01   10  0  0.00D+00  0.00D+00  0.86D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  2  0.15161814D+05  0.91D+00    3  2  0.10D+00  0.00D+00  0.12D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  3  0.12780858D+05  0.34D+00    4  1  0.10D+01  0.00D+00  0.21D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  4  0.11953825D+05  0.36D-01    4  1  0.10D+01  0.00D+00  0.25D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  5  0.11905189D+05  0.72D-02    6  2  0.34D+00  0.00D+00  0.27D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  6  0.11893706D+05  0.89D-06    3  1  0.10D+01  0.00D+00  0.25D+01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  7  0.11892424D+05  0.37D-04    3  1  0.10D+01  0.00D+00  0.12D+00
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  8  0.11892482D+05  0.14D-05    3  1  0.10D+01  0.00D+00  0.45D-02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  9  0.11892484D+05  0.19D-07    3  1  0.10D+01  0.00D+00  0.64D-04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 10  0.11892484D+05  0.00D+00    3  1  0.10D+01  0.00D+00  0.17D-11


 --- Final Convergence Analysis at Last Iterate ---

   Objective function value:      F(X)  =  0.11892484D+05
   Solution values:               X     =
      0.15305583D+01  0.25000000D+01 -0.17781429D+01  0.23224484D+01
      0.75305796D+00  0.95519031D+00
   Distances from lower bounds:   X-XL  =
      0.40305583D+01  0.50000000D+01  0.72185707D+00  0.48224484D+01
      0.32530580D+01  0.34551903D+01
   Distances from upper bounds:   XU-X  =
      0.96944172D+00  0.00000000D+00  0.42781429D+01  0.17755156D+00
      0.17469420D+01  0.15448097D+01
   Multipliers for lower bounds:  U     =
      0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
      0.00000000D+00  0.00000000D+00
   Multipliers for upper bounds:  U     =
      0.00000000D+00  0.80574366D+03  0.00000000D+00  0.00000000D+00
      0.00000000D+00  0.00000000D+00
   Constraint values:             G(X)  =
      0.00000000D+00  0.68684828D-01  0.75011279D-01  0.17836593D+01
      0.23055838D+00  0.79999990D+00  0.00000000D+00  0.97755146D+00
      0.00000000D+00  0.43801180D-01
   Multipliers for constraints:   U     =
     -0.16858443D+04  0.00000000D+00  0.00000000D+00  0.00000000D+00
      0.00000000D+00  0.00000000D+00  0.10885693D+04  0.00000000D+00
```

```
   0.10084761D+04  0.00000000D+00
 Number of function calls:      NFUNC =      12
 Number of gradient calls:      NGRAD =      10
 Number of calls of QP solver:  NQL   =      10


          *****   Completed CALL to NLPQLP   *****


      *****   Number of Function Evaluations  =     72   *****


    *****   Solution Control Vector for Case Number   4   *****

Element     G.L.B.            C.V.              L.U.B.            Delta C.V.

   1    -0.25000000D+01    0.15305583D+01    0.25000000D+01   -0.76944162D+00
   2    -0.25000000D+01    0.25000000D+01    0.25000000D+01    0.20000010D+00
   3    -0.25000000D+01   -0.17781429D+01    0.25000000D+01   -0.10000000D+01
   4    -0.25000000D+01    0.23224484D+01    0.25000000D+01    0.22448537D-01
   5    -0.25000000D+01    0.75305796D+00    0.25000000D+01   -0.10000000D+01
   6    -0.25000000D+01    0.95519031D+00    0.25000000D+01    0.95619882D+00


             *****   Predicted Measurement Vector   *****

Element     Z Vector          ZA Vector         Delta Z           Diag[W]

   1     0.84671248D+02    0.57501060D+02    0.27170188D+02    0.10000000D+01
   2    -0.16026691D+01   -0.32214465D+02    0.30611796D+02    0.10000000D+01
   3    -0.29730617D+02   -0.61617152D+02    0.31886534D+02    0.10000000D+01
   4     0.57170756D+02    0.77829442D+02   -0.20658686D+02    0.10000000D+01
   5    -0.23638572D+02   -0.30334669D+02    0.66960970D+01    0.10000000D+01
   6     0.30835311D+01    0.56094925D+02   -0.53011394D+02    0.10000000D+01


*****   NLP Solution Performance Index  =   0.11892484D+05   *****


*****   Solution Constraint Function Values for Case Number   4   *****

                  Equality Constraints

Element          Value               Target          Value - Target

   1         0.80000000D+01      0.80000000D+01      0.00000000D+00

                Inequality Constraints

Element          Value               L.U.B.          L.U.B. - Value

   1         0.29313152D+01      0.30000000D+01      0.68684828D-01
   2         0.29249887D+01      0.30000000D+01      0.75011279D-01
   3         0.12163407D+01      0.30000000D+01      0.17836593D+01
   4         0.76944162D+00      0.10000000D+01      0.23055838D+00
   5         0.20000010D+00      0.10000000D+01      0.79999990D+00
   6         0.10000000D+01      0.10000000D+01      0.00000000D+00
   7         0.22448537D-01      0.10000000D+01      0.97755146D+00
   8         0.10000000D+01      0.10000000D+01      0.00000000D+00
   9         0.95619882D+00      0.10000000D+01      0.43801180D-01


          *****   NLP Special Control  6-Vector Output   *****
```

```
  CV =
       0.153055827669856D+01,   0.250000000000000D+01,  -0.177814292907715D+01,
       0.232244843690275D+01,   0.753057956695560D+00,   0.955190309893152D+00,


                 *****   End Case Number   4   *****

END of RUN.


   ***********  END  **********   END   *********
```

## B.3 (24 x 8) T-Matrix NLP Control Problems

## B.3.1 The Command (DCL) File Code

**for the**
**(24 x 8) T-Matrix NLP Control Problem**
**on the**
**Hewlett-Packard Alpha Mainframe Computer**

```
$ ASSIGN  SYS$COMMAND:  SYS$INPUT
$ ASSIGN  SYS$INPUT     FOR005
$ ASSIGN  SYS$OUTPUT    FOR006
$       SET TERM/WIDTH=80
$       SET VERIFY
$       SET NOVERIFY
$ !
$ ! *****   OPTIM COMMAND PROCEDURE:    OPTIM.COM      *****
$ !
$ !     ON WARNING THEN GOTO _______
$ !     ON ERROR THEN GOTO _______
$ !     ON SEVERE THEN GOTO _______
$ !
$ START:
$ !
$ ! *****   Determine if a NLP24x8 Case is to be RUN   *****
$ !
$ RUN0:
$       INQUIRE RUN00 "RUN a NLP24x8 Case?  (Y/N)"
$       IF RUN00 .EQS. "N" THEN GOTO TERM1
$ !
$ RUN1:
$ !
$       INQUIRE RUNDEMO "Enter NAME of the NLP24x8 System to be RUN"
$ !
$ ! *****   RUN this NLP24x8 Case   *****
$ !
$       ASSIGN  CDATA.DAT SYS$INPUT
$       ASSIGN  EDATA.DAT SYS$OUTPUT
$ !
$       ON ERROR THEN GOTO RUN2
$       COPY CDATA.DAT FOR005.DAT
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "   *********   INPUT    *****    INPUT   ********
"
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT " "
$       TYPE FOR005.DAT
$ !
$ RUN2:
$ !
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "   *********   OUTPUT   *****   OUTPUT   ********
"
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "RUN the NLP24x8 Case."
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "START RUN."
$       WRITE SYS$OUTPUT " "
$ !
$       SET TERM/WIDTH=132
$ !
$ ! *****   Execute  OPTIMYY   *****
$ !
$       ON ERROR THEN GOTO RUN4
$       RUN 'RUNDEMO'
$ !
$       SET TERM/WIDTH=80
$       GOTO RUN5
$ !
$ RUN4:
$       SET TERM/WIDTH=80
```

```
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "ERROR in Running the NLP24x8 Case."
$       WRITE SYS$OUTPUT " "
$ !
$ RUN5:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "END of RUN."
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "   ***********  END  **********   END   *********
"
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT " "
$ !
$       ON ERROR THEN GOTO TERM0
$       DEASSIGN SYS$OUTPUT
$       INQUIRE DSPL00 "Display the INPUT  CDATA.DAT  on screen?  (Y/N)"
$       IF DSPL00 .EQS. "N" THEN GOTO DSPL1
$       SET TERM/WIDTH=132
$       TYPE CDATA.DAT
$       SET TERM/WIDTH=80
$ DSPL1:
$       INQUIRE DSPL01 "Display the OUTPUT  EDATA.DAT  on screen?  (Y/N)"
$       IF DSPL01 .EQS. "N" THEN GOTO TERM0
$       SET TERM/WIDTH=132
$       TYPE EDATA.DAT
$       SET TERM/WIDTH=80
$       GOTO TERM0
$ !
$ ! *****   Determine if a Demo System is to be LINKed   *****
$ !
$ LINK0:
$       INQUIRE LINK00 "LINK the NLP24x8 System?  (Y/N)"
$       IF LINK00 .EQS. "N" THEN GOTO TERM2
$ !
$ LINK1:
$ !
$       INQUIRE LINKDEMO "Enter NAME of the NLP24x8 System to be LINKed"
$ !
$ ! *****   LINK the NLP24x8 System   *****
$ !
$       INQUIRE LINK0L "LINK with the IMSL Static Library? (Y/N)"
$       IF LINK0L .EQS. "N" THEN GOTO LINK3
$ !
$       INQUIRE LINK01 "LINK with /MAP/CROSS_REFERENCE Qualifiers? (Y/N)"
$       IF LINK01 .EQS. "N" THEN GOTO LINK2
$ !
$ ! *****   LINK Code with the IMSL Static Library and the
$ !                                   /MAP/CROSS_REFERENCE Qualifiers   *****
$ !
$       ON ERROR THEN GOTO LINK5
$       LINK/MAP/CROSS_REFERENCE    'LINKDEMO',   LIBA/LIBRARY,    -
          LIBB/LIBRARY,  LIBC/LIBRARY,  LINK_F90_STATIC_GFLOAT/OPT
$       GOTO LINK6
$ !
$ LINK2:
$ !
$ ! *****   LINK Code with the IMSL Static Library with NO
$ !                                   /MAP/CROSS_REFERENCE Qualifiers   *****
$ !
$       ON ERROR THEN GOTO LINK5
$       LINK                        'LINKDEMO',   LIBA/LIBRARY,    -
          LIBB/LIBRARY,  LIBC/LIBRARY,  LINK_F90_STATIC_GFLOAT/OPT
$       GOTO LINK6
$ !
```

```
$ LINK3:
$ !
$       INQUIRE LINK03 "LINK with /MAP/CROSS_REFERENCE Qualifiers? (Y/N)"
$       IF LINK03 .EQS. "N" THEN GOTO LINK4
$ !
$ !
$ ! *****   LINK Code without the IMSL Static Library but with the
$ !                                     /MAP/CROSS_REFERENCE Qualifiers   *****
$ !
$       ON ERROR THEN GOTO LINK5
$       LINK/MAP/CROSS_REFERENCE    'LINKDEMO',   LIBA/LIBRARY,    -
          LIBB/LIBRARY,  LIBC/LIBRARY
$       GOTO LINK6
$ !
$ LINK4:
$ !
$ ! *****   LINK Code without the IMSL Static Library and with NO
$ !                                     /MAP/CROSS_REFERENCE Qualifiers   *****
$ !
$       ON ERROR THEN GOTO LINK5
$       LINK                        'LINKDEMO',   LIBA/LIBRARY,    -
          LIBB/LIBRARY,  LIBC/LIBRARY
$       GOTO LINK6
$ !
$ LINK5:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "ERROR in Linking the NLP24x8 System."
$       WRITE SYS$OUTPUT " "
$       GOTO TERM5
$ !
$ LINK6:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "The NLP24x8 System was Linked Successfully."
$       WRITE SYS$OUTPUT " "
$       GOTO TERM5
$ !
$ !
$ ! *****   Edit Files   *****
$ !
$ EDIT0:
$       INQUIRE EDIT00 "EDIT a File?  (Y/N)"
$       IF EDIT00 .EQS. "N" THEN GOTO TERM3
$ !
$ ! *****   EDIT a File    *****
$ !
$ EDIT1:
$       INQUIRE EDIT01 "ENTER NAME of File to be EDITED."
$       ON ERROR THEN GOTO EDIT2
$       EDT 'EDIT01'
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "Editing File Completed Successfully."
$       WRITE SYS$OUTPUT " "
$       ON ERROR THEN GOTO EDIT3
$       @XPURGE
$       GOTO EDIT0
$ !
$ EDIT2:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "ERROR in Editing a File."
$       WRITE SYS$OUTPUT " "
$       GOTO EDIT0
$ !
$ EDIT3:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "ERROR in Purging Excess Files."
```

```
$       WRITE SYS$OUTPUT " "
$       GOTO EDIT0
$ !
$ CMPL0:
$       INQUIRE CMPL000 "COMPILE a File?  (Y/N)"
$       IF CMPL000 .EQS. "N" THEN GOTO TERM4
$ !
$ ! *****   COMPILE a File   *****
$ !
$       INQUIRE CFILE "ENTER NAME of File to be COMPILED."
$ !
$ ! *****   FORTRAN Compilation   *****
$ !
$       INQUIRE CMPL01 "Specify the /LIST Qualifier?  (Y/N)"
$       IF CMPL01 .EQS. "N" THEN GOTO CMPL1
$       ON ERROR THEN GOTO CMPL2
$       FORTRAN/LIST/CONTINUATIONS=30/NOWARNINGS 'CFILE'.FOR
$       GOTO CMPL3
$ CMPL1:
$       ON ERROR THEN GOTO CMPL2
$       FORTRAN/CONTINUATIONS=30/NOWARNINGS 'CFILE'.FOR
$       GOTO CMPL3
$ CMPL2:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "ERROR in FORTRAN Compilation."
$       WRITE SYS$OUTPUT " "
$       GOTO CMPL0
$ CMPL3:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "FORTRAN Compilation Completed Successfully."
$       WRITE SYS$OUTPUT " "
$       GOTO CMPL0
$ !
$ !
$ ! *****   Test for Termination   *****
$ !
$ !
$ TERM0:
$      INQUIRE TERM00 "Terminate Process?"
$      IF TERM00 .EQS. "N" THEN GOTO RUN0
$      DELETE FOR005.DAT;*
$      GOTO TERMINATE
$ !
$ TERM1:
$      INQUIRE TERM01 "Terminate Process?"
$      IF TERM01 .EQS. "N" THEN GOTO LINK0
$      GOTO TERMINATE
$ !
$ TERM2:
$      INQUIRE TERM02 "Terminate Process?"
$      IF TERM02 .EQS. "N" THEN GOTO EDIT0
$      GOTO TERMINATE
$ !
$ TERM3:
$      INQUIRE TERM03 "Terminate Process?"
$      IF TERM03 .EQS. "N" THEN GOTO CMPL0
$      GOTO TERMINATE
$ !
$ TERM4:
$      INQUIRE LINK000 "LINK the NLP24x8 System System?  (Y/N)"
$      IF LINK000 .EQS. "N" THEN GOTO TERM5
$      GOTO LINK1
$ !
$ TERM5:
$      INQUIRE RUN000 "RUN the NLP24x8 System?  (Y/N)"
```

```
$       IF RUN000 .EQS. "N" THEN GOTO TERMINATE
$       GOTO RUN1
$ !
$ ! *****   Termination   *****
$ !
$ TERMINATE:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "TERMINATE RUN."
$       WRITE SYS$OUTPUT " "
$ !
$       DEASSIGN SYS$INPUT
$       DEASSIGN SYS$OUTPUT
$ !
$ EXIT
```

## B.3.2 The Fortran Main Driver Code

**for the**
**(24 x 8) T-Matrix NLP Control Problem**
**on the**
**Hewlett-Packard Alpha Mainframe Computer**

```
C
      PROGRAM NLP24x8
C
C***********************************************************************
C
C
C     S E Q U E N T I A L   Q U A D R A T I C   P R O G R A M M I N G
C
C            A L G O R I T H M   F O R   C O N S T R A I N E D
C
C                    O P T I M I Z A T I O N
C
C
C
C              EASY-TO-USE VERSION WITH NUMERICAL GRADIENTS
C
C
C
C
C   GENERAL PROBLEM DESCRIPTION:
C   ----------------------------
C
C   The program solves the general nonlinear programming problem
C
C
C
C            Minimize      F(X)
C
C            subject to    G (X)   =  0  ,  j=1,...,m
C                           j                        e
C
C                          G (X)  >=  0  ,  j=m +1,...,m
C                           j                  e
C
C                          XL  <=  X  <=  XU
C
C
C
C   with differentiable, real-valued functions subject to an n-dimensional
C   vector X.
C
C
C
C   THE NUMERICAL ALGORITHM:
C   ------------------------
C
C   The used code with name 'NLPQLP' is based on a sequential quadratic programming
C   (SQP) method. In each iteration, a linearly constrained quadratic subproblem
C   is formulated by approximating the Lagrangian function quadratically and
C   by linearizing constraints. The Hessian matrix is computed by BFGS quasi-Newton
C   updates. Subsequently, a one-dimensional line search subject to an
C   augmented Lagrangian penalty function is performed to get the next iterate..
C
C
C
C   SPECIFIC PROBLEM DESCRIPTION:  Control Optimisation for a Linear Plant
C                                  [(24 x 8) T-Matrix] Model with Constraints.
C   --------
C
C   Minimize  F = Z1*Z1   + Z2*Z2   + Z3*Z3   + Z4*Z4   + Z5*Z5   + Z6*Z6   +
C                 Z7*Z7   + Z8*Z8   + Z9*Z9   + Z10*Z10 + Z11*Z11 + Z12*Z12 +
C                 Z13*Z13 + Z14*Z14 + Z15*Z15 + Z16*Z16 + Z17*Z17 + Z18*Z18 +
C                 Z19*Z19 + Z20*Z20 + Z21*Z21 + Z22*Z22 + Z23*Z23 + Z24*Z24
C
C   Subject to:   XL(1)  <=  X1  <=  XU(1)
```

```
C                 XL(2)  <=  X2  <=  XU(2)
C                 XL(3)  <=  X3  <=  XU(3)
C                 XL(4)  <=  X4  <=  XU(4)
C                 XL(5)  <=  X5  <=  XU(5)
C                 XL(6)  <=  X6  <=  XU(6)
C                 XL(7)  <=  X7  <=  XU(7)
C                 XL(8)  <=  X8  <=  XU(8)
C
C                 X1*X4 - X2*X3   =  0   =  GEQ(1)
C                 X5*X8 - X6*X7   =  0   =  GEQ(2)
C
C                 DSQRT[X1*X1 + X2*X2]  <=  GMAX(1)
C                 DSQRT[X3*X3 + X4*X4]  <=  GMAX(2)
C                 DSQRT[X5*X5 + X6*X6]  <=  GMAX(3)
C                 DSQRT[X7*X7 + X8*X8]  <=  GMAX(4)
C
C                 DABS[X1 - X01]  <=  GMAX(5)
C                 DABS[X2 - X02]  <=  GMAX(6)
C                 DABS[X3 - X03]  <=  GMAX(7)
C                 DABS[X4 - X04]  <=  GMAX(8)
C                 DABS[X5 - X05]  <=  GMAX(9)
C                 DABS[X6 - X06]  <=  GMAX(10)
C                 DABS[X7 - X07]  <=  GMAX(11)
C                 DABS[X8 - X08]  <=  GMAX(12)
C
C
C
C   Where:        NMAX  >=  (N = NX) + 2     Use:  NMAX  =  (N = NX) + 4
C                 MMAX  >=  (M = MG) + 1     Use:  MMAX  =  (M = MG) + 4
C
C                 (N = NX)  =  Number of optimisation variables.  =   8
C                 (M = MG)  =  Total Number of Constraints.       =  14
C
C                 NMAX  =  12
C                 MMAX  =  18
C
C
C
C   VERSION:
C   -------
C
C   3.1  -  February 2010
C
C
C*********************************************************************
C
      IMPLICIT         NONE
      INTEGER          NMAX, MMAX, MNN2X, LWA, LKWA, LACTIV
      PARAMETER (      NMAX   = 12,
     /                 MMAX   = 18,
     /                 MNN2X  = MMAX + NMAX + NMAX + 2,
     /                 LWA    = 1.5*NMAX*NMAX + 33*NMAX + 9*MMAX + 200,
     /                 LKWA   = NMAX + 20,
     /                 LACTIV = 2*MMAX + 10)
      INTEGER          KWA(LKWA), N, ME, M, L, MNN2, MAXIT, MAXFUN,
     /                 IPRINT, MAXNM, IOUT, MODE, IFAIL, I, J, NFUNC
      DOUBLE PRECISION X(NMAX), F, G(MMAX), DF(NMAX), DG(MMAX,NMAX),
     /                 U(MNN2X), XL(NMAX), XU(NMAX), C(NMAX,NMAX),
     /                 D(NMAX), WA(LWA), ACC, ACCQP, STPMIN, EPS,
     /                 EPSREL, FBCK, GBCK(MMAX), RHOB
      LOGICAL          ACTIVE(LACTIV), LQL
      EXTERNAL         QL
C
C
C
```

```
C     EXTERNAL  RAN
C     REAL*8    RAN
C
      INTEGER*4  NZZ,    NXX,    NZNX
C
      PARAMETER  (NZZ=24,NXX=8,NZNX=NZZ*NXX)
C
      INTEGER*4  CVOUT,  ICASE,  IDATA,  IE,     IG,     II,     IN,
     1           INFO,   IOPT,   IPIV(NXX),      IQ,     ISEED1, ISEED2,
     2           ISEED3, ISEED4, ITOUT,  JJ,     JSEED1, JSEED2, JSEED3,
     3           JSEED4, LWORK,          MG,     MI,     MULT,   NX,
     4           NZ
C
      REAL*8 CRAN1,      CRAN2,      CRAN3,      CRAN4,      CRAN5,
     1       CRAN6,      CRAN7,      CRAN8,      DX(NXX),    DZ(NZZ),
     2       DZ0(NZZ),               G0(MMAX),   GEQ(MMAX),  GMAX(MMAX),
     3       ONE,        SUMF,       SUMZ,       T(NZZ,NXX), TWO,
     4       WDT(NZZ),   XL0(NXX),   XU0(NXX),   X0(NXX),    Z(NZZ),
     5       ZA(NZZ),    Z0(NZZ),    ZERO
C
      REAL*8  ALPHA,             DD(NXX,NXX),       DELTCV(NXX),
     1        DUMQ(NZZ,1),       DUMT(NXX,1),       DUMT1(NXX,1),
     2        DUMTT(NXX,NXX),    DUMX(NXX,1),       DUMX1(NXX,1),
     3        DUMXX(NXX,NXX),    DUMXX1(NXX,NXX),   DUMZ(NZZ,1),
     4        DUMZT(1,NZZ),      DUMXZ(NXX,NZZ),    EE(NXX,NXX),
     5        FF(NXX,NXX),       JJJ(1,1),          RSSDCV,
     6        THETA(NXX),        TT(NZZ,NXX),       TTT(NXX,NZZ),
     7        WDX(NXX),          WDXX(NXX,NXX),     WORK(NXX),
     8        WX(NXX),           WXX(NXX,NXX),      WZ(NZZ),
     9        WZZ(NZZ,NZZ),      ZZ(NZZ),           ZZZ(NZZ)
C
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C
      DATA  ACC,       ACCQP,     ALPHA,     CRAN1,     CRAN2,     CRAN3,
     1      CRAN4,     CRAN5,     CRAN6,     CRAN7,     CRAN8,     CVOUT,
     2      EPS,       GEQ,                  GMAX,                 ICASE,
     3      IDATA,     IN,        IOPT,      IOUT,      IPRINT,    ITOUT,
     4      L,         LQL,
     5          ISEED1,        ISEED2,        ISEED3,        ISEED4,
     6          JSEED1,        JSEED2,        JSEED3,        JSEED4,
     7      MAXFUN,    MAXIT,     MAXNM,     ME,        MG,         MODE,
     8      MULT,                 ONE,       RHOB,      STPMIN,
     9      WDT,                  WDX,                  WX,
     A      WZ,                   XL,                   XL0,
     B      XU,                   XU0,                  T,
     C      TWO,       X0,                   ZA,                   ZERO     /
C
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C
     o      1.0D-07,  0.0D+00,  1.0D+00,  2.0D+00,  3.0D+00,  1.0D+00,
     1      1.0D+00,  1.0D-01,  1.0D-01,  1.0D-01,  1.0D-01,  0,
     2      1.0D-07,  MMAX*0.0D+00,       MMAX*1.5D+00,       1,
     3      0,        5,        1,        6,        2,        0,
     4      1,        .TRUE.,
     5          78985723,      95428381,      72919329,      63237395,
     6          81692875,      68377297,      89672847,      98351973,
     7      10,       100,      0,        0,        0,        0,
     8       0,                1.0D+00,  100.00,   0.0D+00,
     9      NZZ*1.0D+00,        NXX*0.0D+00,        NXX*0.0D+00,
     A      NZZ*1.0D+00,        NMAX*-2.0D+00,      NXX*-1.9D+00,
     B      NMAX*2.0D+00,       NXX*1.9D+00,        NZNX*0.0D+00,
     C      2.0D+00,   NXX*0.0D+00,        NZZ*0.0D+00,       0.0D+00  /
C
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C
```

```
 1000 FORMAT(//6X,45H   *****   Number of Function Evaluations  = ,I6,
     1 8H   *****)
 1900 FORMAT(//2H  )
 1901 FORMAT(//2H  )
 1902 FORMAT(///79H **************************************************
     1************************////6X,39H   ***************   Start Cas
     2e Number ,I3,18H   ***************/)
 1903 FORMAT(//4X,51H   *****   Solution Control Vector for Case Number
     1,I3,8H   *****)
 1904 FORMAT(5X,I2,3X,3D20.8)
 1905 FORMAT(4D20.8)
 1906 FORMAT(//45H   *****   NLP Solution Performance Index  = ,D16.8,
     18H   *****)
 1907 FORMAT(//5X,60H   *****   Initial Control Vector Estimate for Case
     1 Number  ,I3,8H   *****)
 1908 FORMAT(//15X,27H   *****   End Case Number ,I3,8H   *****)
 1909 FORMAT(//1X,40H   *****   Initial Performance Index  = ,D16.8,
     18H   *****)
 1910 FORMAT(5X,I2,3X,3D20.8)
 1911 FORMAT(/2X,8H Element,8X,7H G.L.B.,13X,5H C.V.,15X,7H L.U.B./)
 1912 FORMAT(13X,43H   *****   Completed CALL to NLPQLP   *****)
 1913 FORMAT(/7X,6H CRAN1,14X,6H CRAN2,14X,6H CRAN3,14X,6H CRAN4/
     1        7X,6H CRAN5,14X,6H CRAN6,14X,6H CRAN7,14X,6H CRAN8/)
 1914 FORMAT(/21X,21H   *****   INPUT DATA,8H   *****/)
 1915 FORMAT(//24X,22H   *****   OUTPUT DATA,8H   *****/)
 1916 FORMAT(/21X,23H Inequality Constraints//2X,8H Element,9X,6H Value,
     1 14X,7H L.U.B.,9X,15H L.U.B. - Value/)
 1917 FORMAT(//62H   *****   Initial Constraint Function Values for Case
     1 Number ,I3,8H   *****)
 1918 FORMAT(//63H   *****   Solution Constraint Function Values for Cas
     1e Number ,I3,8H   *****)
 1919 FORMAT(/22X,21H Equality Constraints//2X,8H Element,9X,6H Value,
     1 14X,7H Target,9X,15H Value - Target/)
 1920 FORMAT(//2X,54H *****   NO Constraints are Specified for Case Numb
     1er ,I3,8H   *****)
 1921 FORMAT(//1X,69H   *****   Control Vector During Previous Duty Cycl
     1e for Case Number ,I3,8H   *****)
 1922 FORMAT(/2X,8H Element,4X,7H G.L.B.,11X,5H C.V.,13X,7H L.U.B.,11X,
     1  11H Delta C.V./)
 1923 FORMAT(5X,I2,1X,4D18.8)
 1924 FORMAT(//9X,63H   *****   Measurement Vectors from Previous Duty C
     1ycle   *****//2x,8H Element,8X,7H Actual,13X,6H Ideal,14X,6H Delta
     2/)
 1925 FORMAT(//14X,47H   *****   Predicted Measurement Vector   *****//
     12X,8H Element,4X,9H Z Vector,9X,10H ZA Vector,8X,8H Delta Z,10X,
     2 8H Diag[W]/)
 1926 FORMAT(12X,53H   *****   X0, ZA, and T are Randomly Defined   ****
     1*/)
 1927 FORMAT(/4X,4H Row,16X,25H *****   T-Matrix   *****)
 1928 FORMAT(/5X,I2,1X,4D18.8/(8X,4D18.8))
 1929 FORMAT(//14X,48H   *****   T-Matrix Output is Suppressed   *****)
 1930 FORMAT(14X,51H   *****   X0, ZA, and T are Directly Input   *****)
 1931 FORMAT(//13X,31H   *****   NLP Special Control ,I2,22H-Vector Outp
     1ut   *****)
 1932 FORMAT(/2X,5H CV =,/(5X,3(D24.15,1H,)))
 1950 FORMAT(//3X,50H *****   Solve the NLPQLP Problem for Case Number ,
     1 I3,8H   *****)
C
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C
 2906 FORMAT(//51H   *****   Regulator Solution Performance Index  = ,
     1 D16.8,8H   *****)
 2931 FORMAT(//10X,37H   *****   Regulator Special Control ,I2,22H-Vecto
     1r Output   *****)
 2950 FORMAT(//2X,53H *****   Solve the Regulator Problem for Case Numbe
```

```
     1r ,I3,8H   *****)
 2960 FORMAT(/4X,4H Row,4X,49H *****   [DUMXX1] = Matrix to be Inverted
     1  *****)
 2961 FORMAT(/4X,4H Row,2X,54H *****   [DD] = The Inverse of Matrix [DUM
     1XX1]   *****)
 2962 FORMAT(/4X,4H Row,1X,56H *****   [EE] = The Identity Matrix [DUMXX
     11][DD]   *****)
 2963 FORMAT(/4X,4H Row,1X,56H *****   [FF] = The Identity Matrix [DD][D
     1UMXX1]   *****)
 2964 FORMAT(/20X,19H *****   Alpha  =  ,D18.8,8H   *****/)
 2965 FORMAT(/4X,4H Dim,18X,26H *****   WZ-Vector   *****)
 2966 FORMAT(/4X,4H Dim,18X,26H *****   WX-Vector   *****)
 2967 FORMAT(/4X,4H Dim,18X,27H *****   WDX-Vector   *****)
 2968 FORMAT(/4X,4H Dim, 9X,44H *****   The Solution Control Vector   **
     1***)
 2969 FORMAT(/4X,4H Dim, 7X,48H *****   The Solution Measurement Vector
     1  *****)
 2970 FORMAT(//5X,52H   *****   Matrix [DUMXX1] was Successfully Inverte
     1d/42X,30H to Yield Matrix [DD].   *****)
 2971 FORMAT(// 4X,48H  *****   Root-Sum-Squared Delta CV Elements  = ,
     1 D16.8,8H   *****)
 2972 FORMAT(/2X,11H Delta CV =,/(5X,3(D24.15,1H,)))
 2973 FORMAT(//5X,19H   *****   Element ,I4,44H  of Matrix [DUMXX1] has
     1an illegal value.  ,/38X,30H Regulator problem is stopped./38X,
     2 32H Go on to the next case.   *****)
 2974 FORMAT(//5X,19H   *****   Element ,I4,44H  of Matrix [DUMXX1] is z
     1ero and the matrix ,/38X,32H is singular; its inverse could ,/38X,
     2 17H not be computed.,/38X,30H Regulator problem is stopped./38X,
     3 32H Go on to the next case.   *****)
C
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C
 3961 FORMAT(/4X,4H Row,1X,40H *****   The Diagonal Matrix WZZ   *061*)
 3962 FORMAT(/4X,4H Row,1X,40H *****   The Diagonal Matrix WXX   *062*)
 3963 FORMAT(/4X,4H Row,1X,41H *****   The Diagonal Matrix WDXX   *063*)
 3964 FORMAT(/4X,4H Row,1X,34H *****   The T-Matrix [TT]   *064*)
 3965 FORMAT(/4X,4H Row,1X,52H *****   The Transpose of the T-Matrix [TT
     1T]   *065*)
 3966 FORMAT(/4X,4H Row,1X,41H *****   The DUMXZ-Matrix [DUMXZ]   *066*)
 3967 FORMAT(/4X,4H Row,1X,41H *****   The DUMXX-Matrix [DUMXX]   *067*)
 3968 FORMAT(/4X,4H Row,1X,41H *****   The DUMXX-Matrix [DUMXX]   *068*)
 3969 FORMAT(/4X,4H Row,1X,41H *****   The DUMXX-Matrix [DUMXX]   *069*)
 3970 FORMAT(/4X,4H Row,1X,39H *****   The DUMX-Vector [DUMX]   *070*)
 3971 FORMAT(/4X,4H Row,1X,39H *****   The DUMX-Vector [DUMX]   *071*)
 3972 FORMAT(/4X,4H Row,1X,39H *****   The DUMZ-Vector [DUMZ]   *072*)
 3973 FORMAT(/4X,4H Row,1X,41H *****   The DUMX1-Vector [DUMX1]   *073*)
 3974 FORMAT(/4X,4H Row,1X,41H *****   The DUMX1-Vector [DUMX1]   *074*)
 3975 FORMAT(/4X,4H Row,1X,41H *****   The DUMX1-Vector [DUMX1]   *075*)
 3976 FORMAT(/4X,4H Row,1X,39H *****   The DUMZ-Vector [DUMZ]   *076*)
 3977 FORMAT(/4X,4H Row,1X,39H *****   The DUMZ-Vector [DUMZ]   *077*)
 3978 FORMAT(/4X,4H Row,1X,41H *****   The DUMZT-Vector [DUMZT]   *078*)
 3991 FORMAT(/4X,4H Row,1X,41H *****   The DUMXX-Matrix [DUMXX]   *091*)
C
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C
C
      NAMELIST / CDATA / ALPHA,  ACC,    ACCQP,  CRAN1,  CRAN2,  CRAN3,
     1                   CRAN4,  CRAN5,  CRAN6,  CRAN7,  CRAN8,  CVOUT,
     2                   EPS,    GEQ,    GMAX,   ICASE,  IDATA,  IN,
     3                   IOPT,   IOUT,   IPRINT, ISEED1, ISEED2, ISEED3,
     4                   ISEED4, ITOUT,  JSEED1, JSEED2, JSEED3, JSEED4,
     5                   L,      LQL,    MAXFUN, MAXIT,  MAXNM,  ME,
     6                   MG,     MODE,   MULT,                   RHOB,
     7                   STPMIN, T,      WDT,    WDX,    WX,     WZ,
     8                   XL,     XL0,    XU,     XU0,    X0,     ZA
```

```
C
C
C   Set some constants and initial values
C
      MODE   = 0
C
  100 READ(IN,CDATA)
C
      IFAIL  = 0
      NFUNC  = 0
      NX     = NXX
      NZ     = NZZ
      M      = MG
      N      = NX
      MI     = MG - ME
      MNN2   = M + N + N + 2
C
      WRITE(IOUT,1902)  ICASE
      WRITE(IOUT,1914)
      WRITE(IOUT,CDATA)
      IF (IDATA) 90, 90, 50
C
C  *****   Randomly define the T-Matrix and the X0 & ZA Vectors   *****
C
   90 WRITE(IOUT,1915)
      WRITE(IOUT,1926)
      WRITE(IOUT,1913)
      WRITE(IOUT,1905) CRAN1, CRAN2, CRAN3, CRAN4, CRAN5, CRAN6, CRAN7,
     1                 CRAN8
      WRITE(IOUT,1921)  ICASE
      WRITE(IOUT,1911)
      DO 61 II = 1, NX
C
C  *****   Define the T-Matrix   *****
C
      DO 62 JJ = 1, NZ
      T(JJ,II) = CRAN1*(TWO*RAN(ISEED1) - ONE) +
     1                  CRAN2*(TWO*RAN(JSEED1) - ONE)
   62 CONTINUE
C
C  *****   Define the Previous Actual Control Vector   *****
C
      X0(II)   = CRAN3*(TWO*RAN(ISEED2) - ONE) +
     1                  CRAN4*(TWO*RAN(JSEED2) - ONE)
      WRITE(IOUT,1904)  II,  XL0(II),  X0(II),  XU0(II)
C
C  *****   Adjust Previous Actual Control Vector
C                       to be Within Feasible Limits if Required.   *****
C
      IF (X0(II) - EPS - XL0(II)) 63, 64, 64
   63 X0(II) = XL0(II) + EPS
      GO TO 66
   64 IF (X0(II) + EPS - XU0(II)) 61, 61, 65
   65 X0(II) = XU0(II) - EPS
   66 WRITE(IOUT,1904)  II,  XL0(II),  X0(II),  XU0(II)
   61 CONTINUE
C
      WRITE(IOUT,1924)
C
C  *****   Define the Previous Ideally Computed Measurement Vector   *****
C
      DO 42 JJ = 1, NZ
      SUMZ = ZERO
      DO 47 II = 1, NX
      SUMZ = SUMZ + T(JJ,II)*X0(II)
```

```
   47 CONTINUE
      Z0(JJ) = SUMZ
C
C  *****   Define the Previous Actual Measurement Vector   *****
C
      DZ0(JJ) = CRAN5*(TWO*RAN(ISEED3) - ONE) +
     1                CRAN6*(TWO*RAN(JSEED3) - ONE)
      ZA(JJ)  = Z0(JJ) + DZ0(JJ)
      WRITE(IOUT,1904)  JJ,  ZA(JJ),  Z0(JJ),  DZ0(JJ)
   42 CONTINUE
C
      GO TO 40
C
C  *****   Input the X0 & ZA Vectors, and the T-Matrix via TDATA   *****
C
   50 WRITE(IOUT,1915)
      WRITE(IOUT,1930)
      WRITE(IOUT,1921)  ICASE
      WRITE(IOUT,1911)
C
C  *****   Write the Previous Actual Control Vector   *****
C
      DO 31 II = 1, NX
      WRITE(IOUT,1904)  II,  XL0(II),  X0(II),  XU0(II)
C
C  *****   Adjust Previous Actual Control Vector
C                      to be Within Feasible Limits if Required.   *****
C
      IF (X0(II) - EPS - XL0(II)) 33, 34, 34
   33 X0(II) = XL0(II) + EPS
      GO TO 36
   34 IF (X0(II) + EPS - XU0(II)) 31, 31, 35
   35 X0(II) = XU0(II) - EPS
   36 WRITE(IOUT,1904)  II,  XL0(II),  X0(II),  XU0(II)
   31 CONTINUE
C
      WRITE(IOUT,1924)
C
C  *****   Define the Previous Ideally Computed Measurement Vector   *****
C
      DO 37 JJ = 1, NZ
      SUMZ = ZERO
      DO 38 II = 1, NX
      SUMZ = SUMZ + T(JJ,II)*X0(II)
   38 CONTINUE
      Z0(JJ) = SUMZ
C
C  *****   Define the Difference Between the Actual
C                         and the Ideal Previous Measurement Vector   *****
C
      DZ0(JJ) = ZA(JJ) - Z0(JJ)
      WRITE(IOUT,1904)  JJ,  ZA(JJ),  Z0(JJ),  DZ0(JJ)
   37 CONTINUE
C
C
C  *****   Define the Initial Estimate of the Control Vector   *****
C
   40 WRITE(IOUT,1907)  ICASE
      WRITE(IOUT,1922)
      DO 41 II = 1, NX
      X(II)  = X0(II)
      DX(II) = X(II) - X0(II)
      WRITE(IOUT,1923)  II,  XL(II),  X(II),  XU(II), DX(II)
      IF (X(II) - EPS - XL(II)) 43, 44, 44
   43 X(II)  = XL(II) + EPS
```

```
      DX(II) = X(II) - X0(II)
      GO TO 46
   44 IF (X(II) + EPS - XU(II)) 41, 41, 45
   45 X(II)  = XU(II) - EPS
      DX(II) = X(II) - X0(II)
   46 WRITE(IOUT,1923)  II,  XL(II),  X(II),  XU(II), DX(II)
   41 CONTINUE
C
C   *****   Write T-Matrix   ***
C
      IF (ITOUT .LE. 0)  GO TO 92
      WRITE(IOUT,1927)
      DO 91 JJ = 1, NZ
      WRITE(IOUT,1928) JJ, (T(JJ,II), II=1,NX)
   91 CONTINUE
      GO TO 93
   92 WRITE(IOUT,1929)
C
C   *****   Performance Index   *****
C
   93 SUMF = ZERO
      DO 67 JJ = 1, NZ
      SUMZ = ZERO
      DO 68 II = 1, NX
      SUMZ   =  SUMZ + T(JJ,II)*X(II)
   68 CONTINUE
      Z(JJ)  =  SUMZ + DZ0(JJ)
      DZ(JJ) =  Z(JJ) - ZA(JJ)
      SUMF = SUMF + Z(JJ)*Z(JJ)*WDT(JJ)
   67 CONTINUE
      WRITE(IOUT,1925)
      DO 48 JJ = 1, NZ
      WRITE(IOUT,1923)  JJ,  Z(JJ),  ZA(JJ),  DZ(JJ),  WDT(JJ)
   48 CONTINUE
      F = SUMF
      WRITE(IOUT,1909) F
C
C   *****   Constraint Functions   *****
C
      IF (MG) 999, 51, 71
   51 WRITE(IOUT,1920)  ICASE
      GO TO 70
   71 WRITE(IOUT,1917)  ICASE
      IF (ME) 999, 74, 72
   72 CONTINUE
      G0(1) = X(1)*X(4) - X(2)*X(3)
      G(1)  = GEQ(1) - G0(1)
      G0(2) = X(5)*X(8) - X(6)*X(7)
      G(2)  = GEQ(2) - G0(2)
      WRITE(IOUT,1919)
      DO 73 IE = 1, ME
      WRITE(IOUT,1910)  IE,  G0(IE),  GEQ(IE), -G(IE)
   73 CONTINUE
      IF (MI) 999, 70, 75
   74 IF (MI) 999, 51, 52
   52 CONTINUE
      G0(1)  = DSQRT(X(1)*X(1) + X(2)*X(2))
      G(1)   = GMAX(1) - G0(1)
      G0(2)  = DSQRT(X(3)*X(3) + X(4)*X(4))
      G(2)   = GMAX(2) - G0(2)
      G0(3)  = DSQRT(X(5)*X(5) + X(6)*X(6))
      G(3)   = GMAX(3) - G0(3)
      G0(4)  = DSQRT(X(7)*X(7) + X(8)*X(8))
      G(4)   = GMAX(4) - G0(4)
      G0(5)  = DABS(DX(1))
```

```
         G(5)   = GMAX(5) - G0(5)
         G0(6)  = DABS(DX(2))
         G(6)   = GMAX(6) - G0(6)
         G0(7)  = DABS(DX(3))
         G(7)   = GMAX(7) - G0(7)
         G0(8)  = DABS(DX(4))
         G(8)   = GMAX(8) - G0(8)
         G0(9)  = DABS(DX(5))
         G(9)   = GMAX(9) - G0(9)
         G0(10) = DABS(DX(6))
         G(10)  = GMAX(10) - G0(10)
         G0(11) = DABS(DX(7))
         G(11)  = GMAX(11) - G0(11)
         G0(12) = DABS(DX(8))
         G(12)  = GMAX(12) - G0(12)
         WRITE(IOUT,1916)
         DO 53 IQ = 1, MI
         WRITE(IOUT,1910)  IQ,  G0(IQ),  GMAX(IQ), G(IQ)
      53 CONTINUE
         GO TO 70
      75 CONTINUE
         G0(3)  = DSQRT(X(1)*X(1) + X(2)*X(2))
         G(3)   = GMAX(1) - G0(3)
         G0(4)  = DSQRT(X(3)*X(3) + X(4)*X(4))
         G(4)   = GMAX(2) - G0(4)
         G0(5)  = DSQRT(X(5)*X(5) + X(6)*X(6))
         G(5)   = GMAX(3) - G0(5)
         G0(6)  = DSQRT(X(7)*X(7) + X(8)*X(8))
         G(6)   = GMAX(4) - G0(6)
         G0(7)  = DABS(DX(1))
         G(7)   = GMAX(5) - G0(7)
         G0(8)  = DABS(DX(2))
         G(8)   = GMAX(6) - G0(8)
         G0(9)  = DABS(DX(3))
         G(9)   = GMAX(7) - G0(9)
         G0(10) = DABS(DX(4))
         G(10)  = GMAX(8) - G0(10)
         G0(11) = DABS(DX(5))
         G(11)  = GMAX(9) - G0(11)
         G0(12) = DABS(DX(6))
         G(12)  = GMAX(10) - G0(12)
         G0(13) = DABS(DX(7))
         G(13)  = GMAX(11) - G0(13)
         G0(14) = DABS(DX(8))
         G(14)  = GMAX(12) - G0(14)
         WRITE(IOUT,1916)
         DO 76 IQ = 1, MI
         IG = ME + IQ
         WRITE(IOUT,1910)  IQ,  G0(IG),  GMAX(IQ), G(IG)
      76 CONTINUE
      70 CONTINUE
C
         GO TO (96,96,200), IOPT
C
C  *****   NLPQLP Optimisation   *****
C
      96 WRITE(IOUT,1950)  ICASE
C
         I      = 0
C
       1 CONTINUE
C
C============================================================
C
C   This is the main block to compute all function values.
```

```
C   The block is executed either for computing a steplength
C   sequentially or for approximating gradients by forward
C   differences.
C
C   *****   Performance Index   *****
C
      SUMF = ZERO
      DO 98 II = 1, NX
      DX(II) = X(II) - X0(II)
   98 CONTINUE
      DO 77 JJ = 1, NZ
      SUMZ = ZERO
      DO 78 II = 1, NX
      SUMZ   =  SUMZ + T(JJ,II)*X(II)
   78 CONTINUE
      Z(JJ)  =  SUMZ + DZ0(JJ)
      DZ(JJ) =  Z(JJ) - ZA(JJ)
      SUMF = SUMF + Z(JJ)*Z(JJ)*WDT(JJ)
   77 CONTINUE
      F = SUMF
C
C   *****   Constraint Functions   *****
C
      IF (MG) 999, 60, 88
   88 IF (ME) 999, 58, 57
   57 CONTINUE
      G0(1) = X(1)*X(4) - X(2)*X(3)
      G(1)  = GEQ(1) - G0(1)
      G0(2) = X(5)*X(8) - X(6)*X(7)
      G(2)  = GEQ(2) - G0(2)
      IF (MI) 999, 60, 59
   58 IF (MI) 999, 60, 87
   87 CONTINUE
      G0(1)  = DSQRT(X(1)*X(1) + X(2)*X(2))
      G(1)   = GMAX(1) - G0(1)
      G0(2)  = DSQRT(X(3)*X(3) + X(4)*X(4))
      G(2)   = GMAX(2) - G0(2)
      G0(3)  = DSQRT(X(5)*X(5) + X(6)*X(6))
      G(3)   = GMAX(3) - G0(3)
      G0(4)  = DSQRT(X(7)*X(7) + X(8)*X(8))
      G(4)   = GMAX(4) - G0(4)
      G0(5)  = DABS(DX(1))
      G(5)   = GMAX(5) - G0(5)
      G0(6)  = DABS(DX(2))
      G(6)   = GMAX(6) - G0(6)
      G0(7)  = DABS(DX(3))
      G(7)   = GMAX(7) - G0(7)
      G0(8)  = DABS(DX(4))
      G(8)   = GMAX(8) - G0(8)
      G0(9)  = DABS(DX(5))
      G(9)   = GMAX(9) - G0(9)
      G0(10) = DABS(DX(6))
      G(10)  = GMAX(10) - G0(10)
      G0(11) = DABS(DX(7))
      G(11)  = GMAX(11) - G0(11)
      G0(12) = DABS(DX(8))
      G(12)  = GMAX(12) - G0(12)
      GO TO 60
   59 CONTINUE
      G0(3)  = DSQRT(X(1)*X(1) + X(2)*X(2))
      G(3)   = GMAX(1) - G0(3)
      G0(4)  = DSQRT(X(3)*X(3) + X(4)*X(4))
      G(4)   = GMAX(2) - G0(4)
      G0(5)  = DSQRT(X(5)*X(5) + X(6)*X(6))
      G(5)   = GMAX(3) - G0(5)
```

```
      G0(6)  = DSQRT(X(7)*X(7) + X(8)*X(8))
      G(6)   = GMAX(4) - G0(6)
      G0(7)  = DABS(DX(1))
      G(7)   = GMAX(5) - G0(7)
      G0(8)  = DABS(DX(2))
      G(8)   = GMAX(6) - G0(8)
      G0(9)  = DABS(DX(3))
      G(9)   = GMAX(7) - G0(9)
      G0(10) = DABS(DX(4))
      G(10)  = GMAX(8) - G0(10)
      G0(11) = DABS(DX(5))
      G(11)  = GMAX(9) - G0(11)
      G0(12) = DABS(DX(6))
      G(12)  = GMAX(10) - G0(12)
      G0(13) = DABS(DX(7))
      G(13)  = GMAX(11) - G0(13)
      G0(14) = DABS(DX(8))
      G(14)  = GMAX(12) - G0(14)
   60 CONTINUE
C
C
C=============================================================
C
      NFUNC = NFUNC + 1
      IF (IFAIL.EQ.-1) GOTO 4
      IF (I.GT.0) GOTO 3
    2 CONTINUE
      FBCK = F
      DO J=1,M
         GBCK(J) = G(J)
      ENDDO
      I = 0
    5 I = I + 1
      EPSREL = EPS*DMAX1(1.0D0,DABS(X(I)))
      X(I) = X(I) + EPSREL
      GOTO 1
    3 CONTINUE
      DF(I) = (F - FBCK)/EPSREL
      DO J=1,M
         DG(J,I) = (G(J) - GBCK(J))/EPSREL
      ENDDO
      X(I) = X(I) - EPSREL
   IF (I.LT.N) GOTO 5
      F = FBCK
      DO J=1,M
         G(J) = GBCK(J)
      ENDDO
C
    4 CONTINUE
C
C
      CALL NLPQLP (     L,      M,     ME,   MMAX,      N,
     /               NMAX,   MNN2,      X,      F,      G,
     /                 DF,     DG,      U,     XL,     XU,
     /                  C,      D,    ACC,  ACCQP, STPMIN,
     /             MAXFUN,  MAXIT,  MAXNM,   RHOB, IPRINT,
     /               MODE,   IOUT,  IFAIL,     WA,    LWA,
     /                KWA,   LKWA, ACTIVE, LACTIV,    LQL,
     /                 QL)
C
C
      WRITE(IOUT,1912)
C
C
      IF (IFAIL.EQ.-1) GOTO 1
```

```
      IF (IFAIL.EQ.-2) GOTO 2
C
C   *****   Write Number of Function Evaluations   *****
C
      WRITE(IOUT,1000) NFUNC
C
C  *****   Write the Solution Control Vector   *****
C
      WRITE(IOUT,1903)  ICASE
      WRITE(IOUT,1922)
      DO 69 II = 1, NX
      DX(II) = X(II) - X0(II)
      WRITE(IOUT,1923)  II,  XL(II),  X(II),  XU(II), DX(II)
   69 CONTINUE
C
C   *****   Performance Index   *****
C
      WRITE(IOUT,1925)
      DO 49 JJ = 1, NZ
      WRITE(IOUT,1923)  JJ,  Z(JJ),  ZA(JJ),  DZ(JJ),  WDT(JJ)
   49 CONTINUE
      WRITE(IOUT,1906) F
C
C   *****   Constraint Functions   *****
C
      IF (MG) 999, 54, 81
   54 WRITE(IOUT,1920)  ICASE
      GO TO 80
   81 WRITE(IOUT,1918)  ICASE
      IF (ME) 999, 84, 82
   82 CONTINUE
      G0(1) = X(1)*X(4) - X(2)*X(3)
      G(1)  = GEQ(1) - G0(1)
      G0(2) = X(5)*X(8) - X(6)*X(7)
      G(2)  = GEQ(2) - G0(2)
      WRITE(IOUT,1919)
      DO 83 IE = 1, ME
      WRITE(IOUT,1910)  IE,  G0(IE),  GEQ(IE), -G(IE)
   83 CONTINUE
      IF (MI) 999, 80, 85
   84 IF (MI) 999, 54, 55
   55 CONTINUE
      G0(1)  = DSQRT(X(1)*X(1) + X(2)*X(2))
      G(1)   = GMAX(1) - G0(1)
      G0(2)  = DSQRT(X(3)*X(3) + X(4)*X(4))
      G(2)   = GMAX(2) - G0(2)
      G0(3)  = DSQRT(X(5)*X(5) + X(6)*X(6))
      G(3)   = GMAX(3) - G0(3)
      G0(4)  = DSQRT(X(7)*X(7) + X(8)*X(8))
      G(4)   = GMAX(4) - G0(4)
      G0(5)  = DABS(DX(1))
      G(5)   = GMAX(5) - G0(5)
      G0(6)  = DABS(DX(2))
      G(6)   = GMAX(6) - G0(6)
      G0(7)  = DABS(DX(3))
      G(7)   = GMAX(7) - G0(7)
      G0(8)  = DABS(DX(4))
      G(8)   = GMAX(8) - G0(8)
      G0(9)  = DABS(DX(5))
      G(9)   = GMAX(9) - G0(9)
      G0(10) = DABS(DX(6))
      G(10)  = GMAX(10) - G0(10)
      G0(11) = DABS(DX(7))
      G(11)  = GMAX(11) - G0(11)
      G0(12) = DABS(DX(8))
```

```
      G(12)  = GMAX(12) - G0(12)
      WRITE(IOUT,1916)
      DO 56 IQ = 1, MI
      WRITE(IOUT,1910)  IQ,  G0(IQ),  GMAX(IQ), G(IQ)
   56 CONTINUE
      GO TO 80
   85 CONTINUE
      G0(3)  = DSQRT(X(1)*X(1) + X(2)*X(2))
      G(3)   = GMAX(1) - G0(3)
      G0(4)  = DSQRT(X(3)*X(3) + X(4)*X(4))
      G(4)   = GMAX(2) - G0(4)
      G0(5)  = DSQRT(X(5)*X(5) + X(6)*X(6))
      G(5)   = GMAX(3) - G0(5)
      G0(6)  = DSQRT(X(7)*X(7) + X(8)*X(8))
      G(6)   = GMAX(4) - G0(6)
      G0(7)  = DABS(DX(1))
      G(7)   = GMAX(5) - G0(7)
      G0(8)  = DABS(DX(2))
      G(8)   = GMAX(6) - G0(8)
      G0(9)  = DABS(DX(3))
      G(9)   = GMAX(7) - G0(9)
      G0(10) = DABS(DX(4))
      G(10)  = GMAX(8) - G0(10)
      G0(11) = DABS(DX(5))
      G(11)  = GMAX(9) - G0(11)
      G0(12) = DABS(DX(6))
      G(12)  = GMAX(10) - G0(12)
      G0(13) = DABS(DX(7))
      G(13)  = GMAX(11) - G0(13)
      G0(14) = DABS(DX(8))
      G(14)  = GMAX(12) - G0(14)
      WRITE(IOUT,1916)
      DO 86 IQ = 1, MI
      IG = ME + IQ
      WRITE(IOUT,1910)  IQ,  G0(IG),  GMAX(IQ), G(IG)
   86 CONTINUE
   80 CONTINUE
C
      GO TO (97,200,200), IOPT
C
C
C  *****   Solve the Regulator Problem   *****
C
  200 CONTINUE
C
      WRITE(IOUT,2950)  ICASE
C
C   *****   Write Alpha and the Weighting Vectors   *****
C
      WRITE(IOUT,2964)  ALPHA
      WRITE(IOUT,2965)
      WRITE(IOUT,1928)  NZZ, (WZ(I), I=1,NZZ)
      WRITE(IOUT,2966)
      WRITE(IOUT,1928)  NXX, (WX(I), I=1,NXX)
      WRITE(IOUT,2967)
      WRITE(IOUT,1928)  NXX, (WDX(I), I=1,NXX)
C
C  *****   Compute Regulator Problem Solution Control Vector   *****
C
      CALL DIAGW1(NZZ,WZ,WZZ)
C  *****   061   *****   061   *****   061   *****   061   *****
C     WRITE(IOUT,3961)
C     DO 301 I = 1, NZZ
C     WRITE(IOUT,1928)  I ,  (WZZ(I,J), J=1,NZZ)
C 301 CONTINUE
```

```
      CALL DIAGW2(NXX,WX,WXX)
C  *****   062   *****   062   *****   062   *****   062   *****
C     WRITE(IOUT,3962)
C     DO 302 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (WXX(I,J), J=1,NXX)
C 302 CONTINUE
      CALL DIAGW2(NXX,WDX,WDXX)
C  *****   063   *****   063   *****   063   *****   063   *****
C     WRITE(IOUT,3963)
C     DO 303 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (WDXX(I,J), J=1,NXX)
C 303 CONTINUE
      DO 202 I = 1, NZZ
      DO 201 J = 1, NXX
      TT(I,J)  = T(I,J)
  201 CONTINUE
  202 CONTINUE
C  *****   064   *****   064   *****   064   *****   064   *****
C     WRITE(IOUT,3964)
C     DO 304 I = 1, NZZ
C     WRITE(IOUT,1928)  I ,  (TT(I,J), J=1,NXX)
C 304 CONTINUE
      CALL TRNSP1(NZZ,NXX,TT,TTT)
C  *****   065   *****   065   *****   065   *****   065   *****
C     WRITE(IOUT,3965)
C     DO 305 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (TTT(I,J), J=1,NZZ)
C 305 CONTINUE
      CALL MMULT1(NXX,NZZ,NZZ,TTT,WZZ,DUMXZ)
C  *****   066   *****   066   *****   066   *****   066   *****
C     WRITE(IOUT,3966)
C     DO 306 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (DUMXZ(I,J), J=1,NZZ)
C 306 CONTINUE
      CALL MMULT2(NXX,NXX,NZZ,DUMXZ,TT,DUMXX)
C  *****   067   *****   067   *****   067   *****   067   *****
C     WRITE(IOUT,3967)
C     DO 307 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (DUMXX(I,J), J=1,NXX)
C 307 CONTINUE
      CALL SMDFF1(NXX,NXX,1,DUMXX,WDXX,DUMTT)
C  *****   068   *****   068   *****   068   *****   068   *****
      DO 321 I = 1,NXX
      DO 320 J = 1,NXX
      DUMXX(I,J) = DUMTT(I,J)
  320 CONTINUE
  321 CONTINUE
C     WRITE(IOUT,3968)
C     DO 308 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (DUMXX(I,J), J=1,NXX)
C 308 CONTINUE
C
C  *****   Compute the Matrix [DUMXX1] to be Inverted   *****
C
      CALL SMDFF1(NXX,NXX,1,DUMXX,WXX,DUMXX1)
C     WRITE(IOUT,2960)
C     DO 203 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (DUMXX1(I,J), J=1,NXX)
C 203 CONTINUE
C
C   *****   Compute Matrix [DD]   *****
C
C     CALL DLINRG(NXX,DUMXX1,NXX,DD,NXX)
C
      DO 210 I = 1, NXX
```

```
      DO 209 J = 1, NXX
      DD(I,J) = DUMXX1(I,J)
  209 CONTINUE
  210 CONTINUE
      LWORK = -1
      LWORK = 512
C
      CALL DGETRF(NXX,NXX,DD,NXX,IPIV,INFO)
C
      CALL DGETRI(NXX,DD,NXX,IPIV,WORK,LWORK,INFO)
C
      IF(INFO) 212, 211, 213
C
C  *****   Matrix Inversion was Successful   *****
C
  211 WRITE(IOUT,2970)
      GO TO 214
C
C  *****   Matrix Inversion Failed. An Element had an Illegal Value.
C                                                                *****
C
  212 INFO = -INFO
      WRITE(IOUT,2973) INFO
      GO TO 89
C
C  *****   Matrix Inversion Failed. An Element on the Diagonal is Equal
C          to Zero and correspondingly the Matrix is Singular and its
C          Inverse could not be computed.
C                                                                *****
C
  213 WRITE(IOUT,2974) INFO
      GO TO 89
C
  214 CONTINUE
C
C  *****   Matrix [DD] = The Inverted Matrix  =  [DUMXX1]-1   *****
C
C     WRITE(IOUT,2961)
C     DO 204 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (DD(I,J), J=1,NXX)
C 204 CONTINUE
C
C   *****   Matrix [EE] = The Identity Matrix = [DUMXX1][DD]   *****
C
C     CALL MMULT3(NXX,NXX,NXX,DUMXX1,DD,EE)
C     WRITE(IOUT,2962)
C     DO 205 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (EE(I,J), J=1,NXX)
C 205 CONTINUE
C
C   *****   Matrix [FF] = The Identity Matrix = [DD][DUMXX1]   *****
C
C     CALL MMULT3(NXX,NXX,NXX,DD,DUMXX1,FF)
C     WRITE(IOUT,2963)
C     DO 206 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (FF(I,J), J=1,NXX)
C 206 CONTINUE
C
C  *****   Compute the Solution Control Vector (the Theta Vector)   *****
C
      CALL MMULT3(NXX,NXX,NXX,DD,DUMXX,DUMTT)
      DO 323 I = 1,NXX
      DO 322 J = 1,NXX
      DUMXX(I,J) = DUMTT(I,J)
  322 CONTINUE
```

```
  323 CONTINUE
C  *****   069   *****   069   *****   069   *****   069   *****
C     WRITE(IOUT,3969)
C     DO 309 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (DUMXX(I,J), J=1,NXX)
C 309 CONTINUE
C
      DO 207 J = 1, NXX
      DUMX(J,1) = X0(J)
  207 CONTINUE
C  *****   070   *****   070   *****   070   *****   070   *****
C     WRITE(IOUT,3970)
C     DO 310 J = 1, NXX
C     WRITE(IOUT,1928)  J ,  DUMX(J,1)
C 310 CONTINUE
      CALL MMULT4(NXX,1,NXX,DUMXX,DUMX,DUMT)
C  *****   071   *****   071   *****   071   *****   071   *****
      DO 324 J = 1,NXX
      DUMX(J,1) = DUMT(J,1)
  324 CONTINUE
C     WRITE(IOUT,3971)
C     DO 311 J = 1, NXX
C     WRITE(IOUT,1928)  J ,  DUMX(J,1)
C 311 CONTINUE
      DO 208 I = 1, NZZ
      DUMZ(I,1) = ZA(I)
  208 CONTINUE
C  *****   072   *****   072   *****   072   *****   072   *****
C     WRITE(IOUT,3972)
C     DO 312 I = 1, NZZ
C     WRITE(IOUT,1928)  I ,  DUMZ(I,1)
C 312 CONTINUE
      CALL MMULT5(NXX,1,NZZ,DUMXZ,DUMZ,DUMX1)
C  *****   073   *****   073   *****   073   *****   073   *****
C     WRITE(IOUT,3973)
C     DO 313 J = 1, NXX
C     WRITE(IOUT,1928)  J ,  DUMX1(J,1)
C 313 CONTINUE
      CALL MMULT4(NXX,1,NXX,DD,DUMX1,DUMT1)
C  *****   074   *****   074   *****   074   *****   074   *****
      DO 325 J = 1,NXX
      DUMX1(J,1) = DUMT1(J,1)
  325 CONTINUE
C     WRITE(IOUT,3974)
C     DO 314 J = 1, NXX
C     WRITE(IOUT,1928)  J ,  DUMX1(J,1)
C 314 CONTINUE
      CALL SMULT(NXX,1,ALPHA,DUMX1,DUMT1)
C  *****   075   *****   075   *****   075   *****   075   *****
      DO 326 J = 1,NXX
      DUMX1(J,1) = DUMT1(J,1)
  326 CONTINUE
C     WRITE(IOUT,3975)
C     DO 315 J = 1, NXX
C     WRITE(IOUT,1928)  J ,  DUMX1(J,1)
C 315 CONTINUE
      CALL SMDFF2(NXX,1,0,DUMX,DUMX1,DUMT)
C
C  *****   Write the Solution Control Vector (the Theta-Vector)   *****
C
      DO 327 J = 1,NXX
      DUMX(J,1) = DUMT(J,1)
      THETA(J) = DUMX(J,1)
  327 CONTINUE
      WRITE(IOUT,2968)
```

```
      DO 318 J = 1, NXX
      WRITE(IOUT,1928)  J,  THETA(J)
  318 CONTINUE
C
C  *****   Compute the Solution Measurement Vector (the Z-Vector)   *****
C
      DO 330 J = 1,NXX
      DUMX(J,1) = THETA(J) - X0(J)
  330 CONTINUE
      CALL MMULT6(NZZ,1,NXX,TT,DUMX,DUMZ)
C  *****   076   *****   076   *****   076   *****   076   *****
      DO 331 J = 1, NZZ
      ZZ(J) = DUMZ(J,1)
  331 CONTINUE
C     WRITE(IOUT,3976)
C     DO 316 J = 1, NZZ
C     WRITE(IOUT,1928)  J ,  DUMZ(J,1)
C 316 CONTINUE
      CALL SMDFF3(NZZ,NZZ,1,ZZ,ZA,ZZZ)
C
C  *****   Write the Solution Measurement Vector (the Z-Vector)   *****
C
      DO 328 J = 1,NZZ
      ZZ(J) = ZZZ(J)
  328 CONTINUE
      WRITE(IOUT,2969)
      WRITE(IOUT,1928)  NZZ,  (ZZ(I), I=1,NZZ)
C
C   *****   Compute the Corresponding Performance Index   *****
C
      DO 319 J = 1, NZZ
      DUMZ(J,1) = ZZ(J)
  319 CONTINUE
      CALL MMULT7(NZZ,1,NZZ,WZZ,DUMZ,DUMQ)
C  *****   077   *****   077   *****   077   *****   077   *****
      DO 329 J = 1,NZZ
      DUMZ(J,1) = DUMQ(J,1)
  329 CONTINUE
C     WRITE(IOUT,3977)
C     DO 317 J = 1, NXX
C     WRITE(IOUT,1928)  J ,  DUMZ(J,1)
C 317 CONTINUE
      CALL TRNSP2(NZZ,1,DUMZ,DUMZT)
C  *****   078   *****   078   *****   078   *****   078   *****
C     WRITE(IOUT,3978)
C     I = 1
C     WRITE(IOUT,1928)  I ,  (DUMZT(1,J), J=1,NZZ)
      CALL MMULT8(1,1,NZZ,DUMZT,DUMZ,JJJ)
C
C   *****   Write the Corresponding Performance Index   *****
C
      WRITE(IOUT,2906) JJJ(1,1)
C
C   *****   End of Regulator Problem   *****
C
C
C   *****   End of Case   *****
C
C
   97 IF (CVOUT .LE. 0) GO TO 89
      GO TO (94,94,95), IOPT
   94 WRITE(IOUT,1931) NX
      WRITE(IOUT,1932) (X(II), II=1,NX)
      GO TO (89,95,95), IOPT
   95 WRITE(IOUT,2931) NXX
```

```
      WRITE(IOUT,1932) (THETA(II), II=1,NXX)
      GO TO (89,371,89), IOPT
  371 RSSDCV = ZERO
      DO 372 II = 1, NXX
      DELTCV(II) = X(II) - THETA(II)
      RSSDCV = RSSDCV + DELTCV(II)*DELTCV(II)
  372 CONTINUE
      RSSDCV = DSQRT(RSSDCV)
      WRITE(IOUT,2971) RSSDCV
      WRITE(IOUT,2972) (DELTCV(II), II=1,NXX)
   89 CVOUT = 0
      WRITE(IOUT,1908)  ICASE
C
      IF (MULT .LE. 0)  GO TO 999
      ITOUT = 0
      MULT  = 0
      WRITE(IOUT,1900)
      ICASE = ICASE + 1
      GO TO 100
  999 STOP
C
      END
C
C
C
C
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C
C
```

## B.3.3 Synthesised Input and Corresponding Output Data

**for the**
**(24 x 8) T-Matrix NLP Control Problem**
**on the**
**Hewlett-Packard Alpha Mainframe Computer**

```
   *********   INPUT    *****    INPUT   ********


$CDATA
!
!  *****   Start of Case  1  Input Data   *****
!                 NO Constraints
!
 ACC     =    1.0D-8,
 ACC     =    1.0D-7,
 ACCQP   =    1.0D-12,
 CRAN1   =   15.0,
 CRAN2   =   20.0,
 CRAN3   =    7.0,
 CRAN4   =    5.0,
 CRAN5   =    0.02,
 CRAN6   =    0.02,
 CVOUT   =      0,
 CVOUT   =      1,
 GEQ     =    8.00,  0.90,
 GMAX    =    3.00,  3.00,  3.00,  3.00,
 GMAX(5) =    1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,
 GMAX(5) =    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
 ICASE   =      1,
 IDATA   =      1,
 IDATA   =      0,
 IOPT    =      3,
 IOPT    =      1,
 IOPT    =      2,
 ITOUT   =      0,
 ITOUT   =      1,
 ISEED1  =  78985723,
 ISEED2  =  95428381,
 ISEED3  =  72919329,
 ISEED4  =  63237395,
 JSEED1  =  81692875,
 JSEED2  =  68377297,
 JSEED3  =  89672847,
 JSEED4  =  98351973,
 LQL     =   .FALSE.,
 LQL     =   .TRUE.,
 MAXNM   =    0,
 MAXNM   =   10,
 ME      =    0,
 MG      =    0,
 RHOB    =    0.0,
 RHOB    =  100.0,
 XL0     =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XU0     =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XL      =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XU      =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
!
 MULT    =         0,
 MULT    =         1,
!
!  *****   End of Case  1  Input Data   *****
!
$END
$CDATA
!
!  *****   Start of Case  2  Input Data   *****
!            Two Equality onstraints
!           NO Inequality Constraints
!
```

```
 ACC     =    1.0D-8,
 ACC     =    1.0D-7,
 ACCQP   =    1.0D-12,
 CRAN1   =   15.0,
 CRAN2   =   20.0,
 CRAN3   =    7.0,
 CRAN4   =    5.0,
 CRAN5   =    0.02,
 CRAN6   =    0.02,
 CVOUT   =      0,
 CVOUT   =      1,
 GEQ     =    8.00,  0.90,
 GMAX    =    3.00,  3.00,  3.00,  3.00,
 GMAX(5) =    1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,
 GMAX(5) =    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
 IDATA   =      1,
 IDATA   =      0,
 IOPT    =      2,
 IOPT    =      3,
 IOPT    =      1,
 ITOUT   =      1,
 ITOUT   =      0,
 ISEED1  =  78985723,
 ISEED2  =  95428381,
 ISEED3  =  72919329,
 ISEED4  =  63237395,
 JSEED1  =  81692875,
 JSEED2  =  68377297,
 JSEED3  =  89672847,
 JSEED4  =  98351973,
 LQL     =   .FALSE.,
 LQL     =   .TRUE.,
 MAXNM   =    0,
 MAXNM   =   10,
 ME      =    2,
 MG      =    2,
 RHOB    =    0.0,
 RHOB    =  100.0,
 XL0     =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XU0     =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XL      =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XU      =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 MULT    =         0,
 MULT    =         1,
!
!  *****   End of Case  2  Input Data   *****
!
$END
$CDATA
!
!  *****   Start of Case  3  Input Data   *****
!             NO Equality onstraints
!            12 Inequality Constraints
!
 ACC     =    1.0D-8,
 ACC     =    1.0D-7,
 ACCQP   =    1.0D-12,
 CRAN1   =   15.0,
 CRAN2   =   20.0,
 CRAN3   =    7.0,
 CRAN4   =    5.0,
 CRAN5   =    0.02,
 CRAN6   =    0.02,
 CVOUT   =      0,
 CVOUT   =      1,
```

```
 GEQ     =    8.00,  0.90,
 GMAX    =    3.00,  3.00,  3.00,  3.00,
 GMAX(5) =    1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,
 GMAX(5) =    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
 IDATA   =      1,
 IDATA   =      0,
 IOPT    =      2,
 IOPT    =      3,
 IOPT    =      1,
 ITOUT   =      1,
 ITOUT   =      0,
 ISEED1  =  78985723,
 ISEED2  =  95428381,
 ISEED3  =  72919329,
 ISEED4  =  63237395,
 JSEED1  =  81692875,
 JSEED2  =  68377297,
 JSEED3  =  89672847,
 JSEED4  =  98351973,
 LQL     =   .FALSE.,
 LQL     =   .TRUE.,
 MAXNM   =    0,
 MAXNM   =   10,
 ME      =    0,
 MG      =   12,
 RHOB    =    0.0,
 RHOB    =  100.0,
 XL0     =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XU0     =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XL      =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XU      =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 MULT    =         0,
 MULT    =         1,
!
!  *****   End of Case  3  Input Data   *****
!
$END
$CDATA
!
!  *****   Start of Case  4  Input Data   *****
!             Two Equality onstraints
!            12 Inequality Constraints
!
 ACC     =    1.0D-8,
 ACC     =    1.0D-7,
 ACCQP   =    1.0D-12,
 CRAN1   =   15.0,
 CRAN2   =   20.0,
 CRAN3   =    7.0,
 CRAN4   =    5.0,
 CRAN5   =    0.02,
 CRAN6   =    0.02,
 CVOUT   =      0,
 CVOUT   =      1,
 GEQ     =    8.00,  0.90,
 GMAX    =    3.00,  3.00,  3.00,  3.00,
 GMAX(5) =    1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,
 GMAX(5) =    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
 IDATA   =      1,
 IDATA   =      0,
 IOPT    =      2,
 IOPT    =      3,
 IOPT    =      1,
 ITOUT   =      1,
 ITOUT   =      0,
```

```
 ISEED1  =  78985723,
 ISEED2  =  95428381,
 ISEED3  =  72919329,
 ISEED4  =  63237395,
 JSEED1  =  81692875,
 JSEED2  =  68377297,
 JSEED3  =  89672847,
 JSEED4  =  98351973,
 LQL     =   .FALSE.,
 LQL     =   .TRUE.,
 MAXNM   =    0,
 MAXNM   =   10,
 ME      =    2,
 MG      =   14,
 RHOB    =    0.0,
 RHOB    =  100.0,
 XL0     =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XU0     =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XL      =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XU      =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 MULT    =         1,
 MULT    =         0,
!
!  *****   End of Case  4  Input Data   *****
!
$END


   *********   OUTPUT   *****   OUTPUT   ********


RUN the NLP24x8 Case.

START RUN.



********************************************************************************


        ***************   Start Case Number   1   ***************


                      *****   INPUT DATA   *****

&CDATA
ALPHA   =   1.00000000000000     ,
ACC     =  1.0000000000000000E-007,
ACCQP   =  1.0000000000000000E-012,
CRAN1   =   15.0000000000000     ,
CRAN2   =   20.0000000000000     ,
CRAN3   =   7.00000000000000     ,
CRAN4   =   5.00000000000000     ,
CRAN5   =  2.0000000000000000E-002,
CRAN6   =  2.0000000000000000E-002,
CRAN7   =  0.100000000000000     ,
CRAN8   =  0.100000000000000     ,
CVOUT   =           1,
EPS     =  1.0000000000000000E-007,
GEQ     =   8.00000000000000     ,  0.900000000000000     ,
16*0.000000000000000E+000  ,
GMAX    = 4*3.00000000000000        , 14*1.50000000000000        ,
ICASE   =           1,
```

```
IDATA   =           0,
IN      =           5,
IOPT    =           2,
IOUT    =           6,
IPRINT  =           2,
ISEED1  =    78985723,
ISEED2  =    95428381,
ISEED3  =    72919329,
ISEED4  =    63237395,
ITOUT   =           1,
JSEED1  =    81692875,
JSEED2  =    68377297,
JSEED3  =    89672847,
JSEED4  =    98351973,
L       =           1,
LQL     = T,
MAXFUN  =          10,
MAXIT   =         100,
MAXNM   =          10,
ME      =           0,
MG      =           0,
MODE    =           0,
MULT    =           1,
RHOB    =   100.000000000000     ,
STPMIN  =  0.0000000000000000E+000,
T       = 192*0.0000000000000000E+000  ,
WDT     = 24*1.00000000000000        ,
WDX     = 8*0.0000000000000000E+000  ,
WX      = 8*0.0000000000000000E+000  ,
WZ      = 24*1.00000000000000        ,
XL      = 8*-2.50000000000000       , 4*-2.00000000000000       ,
XL0     = 8*-2.30000000000000       ,
XU      = 8*2.50000000000000        , 4*2.00000000000000        ,
XU0     = 8*2.30000000000000        ,
X0      = 8*0.0000000000000000E+000  ,
ZA      = 24*0.0000000000000000E+000
/
```

*****  OUTPUT DATA  *****

*****  X0, ZA, and T are Randomly Defined  *****

| CRAN1 | CRAN2 | CRAN3 | CRAN4 |
|---|---|---|---|
| CRAN5 | CRAN6 | CRAN7 | CRAN8 |
| 0.15000000D+02 | 0.20000000D+02 | 0.70000000D+01 | 0.50000000D+01 |
| 0.20000000D-01 | 0.20000000D-01 | 0.10000000D+00 | 0.10000000D+00 |

*****  Control Vector During Previous Duty Cycle for Case Number  1  *****

| Element | G.L.B. | C.V. | L.U.B. |
|---|---|---|---|
| 1 | -0.23000000D+01 | 0.26932186D+01 | 0.23000000D+01 |
| 1 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 2 | -0.23000000D+01 | 0.79428859D+01 | 0.23000000D+01 |
| 2 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 3 | -0.23000000D+01 | -0.77814293D+00 | 0.23000000D+01 |
| 4 | -0.23000000D+01 | 0.24868137D+01 | 0.23000000D+01 |
| 4 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 5 | -0.23000000D+01 | 0.17530580D+01 | 0.23000000D+01 |
| 6 | -0.23000000D+01 | -0.10085106D-02 | 0.23000000D+01 |
| 7 | -0.23000000D+01 | 0.43974723D+01 | 0.23000000D+01 |

| | | | |
|---|---|---|---|
| 7 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 8 | -0.23000000D+01 | 0.10509288D+01 | 0.23000000D+01 |

***** Measurement Vectors from Previous Duty Cycle *****

| Element | Actual | Ideal | Delta |
|---|---|---|---|
| 1 | 0.24244620D+00 | 0.25418529D+00 | -0.11739089D-01 |
| 2 | -0.89235678D+02 | -0.89228662D+02 | -0.70162487D-02 |
| 3 | -0.51740608D+02 | -0.51735457D+02 | -0.51504469D-02 |
| 4 | 0.47323930D+02 | 0.47299922D+02 | 0.24008768D-01 |
| 5 | -0.59551247D+02 | -0.59533028D+02 | -0.18219316D-01 |
| 6 | 0.95526543D+02 | 0.95516371D+02 | 0.10172153D-01 |
| 7 | 0.71206673D+02 | 0.71186083D+02 | 0.20590177D-01 |
| 8 | -0.18236228D+02 | -0.18259437D+02 | 0.23208692D-01 |
| 9 | -0.20857445D+01 | -0.20871238D+01 | 0.13792706D-02 |
| 10 | 0.34158507D+02 | 0.34133524D+02 | 0.24983239D-01 |
| 11 | -0.73767652D+02 | -0.73775161D+02 | 0.75085998D-02 |
| 12 | -0.54957941D+02 | -0.54969551D+02 | 0.11609204D-01 |
| 13 | -0.17875014D+03 | -0.17874639D+03 | -0.37421465D-02 |
| 14 | -0.90358179D+01 | -0.90497655D+01 | 0.13947675D-01 |
| 15 | -0.11181281D+02 | -0.11213480D+02 | 0.32199035D-01 |
| 16 | 0.16957353D+02 | 0.16962016D+02 | -0.46632385D-02 |
| 17 | -0.40413544D+02 | -0.40408497D+02 | -0.50467467D-02 |
| 18 | -0.72167007D+02 | -0.72153392D+02 | -0.13614869D-01 |
| 19 | -0.22843700D+02 | -0.22838498D+02 | -0.52021170D-02 |
| 20 | 0.58294386D+01 | 0.58544154D+01 | -0.24976861D-01 |
| 21 | 0.98244309D+00 | 0.98918038D+00 | -0.67372823D-02 |
| 22 | 0.71616239D+02 | 0.71593499D+02 | 0.22739236D-01 |
| 23 | -0.84885158D+02 | -0.84861559D+02 | -0.23599300D-01 |
| 24 | -0.70757525D+02 | -0.70777564D+02 | 0.20038812D-01 |

***** Initial Control Vector Estimate for Case Number 1 *****

| Element | G.L.B. | C.V. | L.U.B. | Delta C.V. |
|---|---|---|---|---|
| 1 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 2 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 3 | -0.25000000D+01 | -0.77814293D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 4 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 5 | -0.25000000D+01 | 0.17530580D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 6 | -0.25000000D+01 | -0.10085106D-02 | 0.25000000D+01 | 0.00000000D+00 |
| 7 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 8 | -0.25000000D+01 | 0.10509288D+01 | 0.25000000D+01 | 0.00000000D+00 |

Row ***** T-Matrix *****

| | | | | |
|---|---|---|---|---|
| 1 | 0.34788787D+00 | 0.48613662D+01 | -0.15004864D+02 | -0.51657379D+01 |
| | 0.44678360D+01 | -0.20186803D+02 | -0.44348490D+01 | -0.87298131D+01 |
| 2 | 0.83601731D+01 | -0.19956291D+00 | 0.19177048D+02 | -0.22291166D+01 |
| | -0.30905123D+02 | -0.22141129D+02 | -0.10440567D+02 | -0.93052626D+01 |
| 3 | -0.11511457D+01 | -0.23440781D+02 | -0.33538103D+00 | -0.27359933D+01 |
| | 0.14308993D+02 | -0.56031770D+01 | 0.68832695D+00 | -0.15049084D+02 |
| 4 | 0.31760061D+02 | -0.11242945D+02 | -0.43163258D+01 | -0.12121742D+02 |
| | 0.81309408D+01 | -0.25757778D+02 | 0.22065705D+01 | 0.50210297D+01 |
| 5 | -0.41143203D+01 | 0.12076539D+01 | -0.42565107D+01 | -0.63854355D+01 |
| | -0.23911133D+02 | 0.60927099D+01 | 0.58474422D+01 | -0.12368810D+02 |
| 6 | -0.18296975D+01 | 0.21633031D+02 | -0.12764318D+02 | 0.14563273D+02 |

| | | | | |
|---|---|---|---|---|
| | 0.21613908D+01 | 0.74385446D+01 | -0.28065044D+01 | 0.87676096D+01 |
| 7 | 0.14780229D+02 | 0.11972706D+02 | 0.14229101D+01 | -0.92500114D+01 |
| | 0.15271466D+02 | 0.29836887D+01 | -0.23326933D+01 | 0.10117740D+02 |
| 8 | -0.24192777D+02 | 0.32937256D+02 | -0.11001152D+02 | -0.87937462D+01 |
| | -0.14905338D+02 | -0.94837338D+01 | 0.32613796D+01 | -0.76954842D+01 |
| 9 | 0.92369419D+01 | 0.23557067D+02 | 0.15423179D+01 | -0.50763649D+01 |
| | -0.67476135D+01 | -0.19003999D+01 | -0.96198261D+01 | -0.29197903D+02 |
| 10 | 0.65341014D+01 | -0.67443871D+01 | -0.13437526D+02 | 0.20608492D+02 |
| | 0.91428059D+01 | 0.11349738D+02 | -0.21686362D+02 | 0.10108719D+02 |
| 11 | 0.14034983D+02 | -0.79359823D+01 | 0.36758959D+01 | -0.11987094D+02 |
| | -0.25457345D+02 | 0.15226021D+02 | -0.51898485D+01 | -0.75358689D+00 |
| 12 | 0.12504480D+02 | -0.20302622D+02 | -0.94009340D+01 | -0.16349699D+02 |
| | 0.66381598D+01 | 0.26129627D+02 | -0.17469818D+02 | 0.20767405D+02 |
| 13 | -0.17892113D+02 | -0.15685856D+01 | -0.29970443D+01 | -0.27216877D+02 |
| | -0.87419558D+01 | -0.26739252D+01 | -0.22690476D+02 | -0.59086335D+01 |
| 14 | -0.10221714D+02 | -0.49901307D+00 | -0.12723895D+02 | -0.12299746D+02 |
| | 0.12006400D+02 | 0.48412097D+01 | 0.11667386D+02 | -0.13208987D+02 |
| 15 | 0.16556811D+02 | -0.16213351D+02 | -0.66321516D+01 | 0.18890628D+02 |
| | -0.19821270D+02 | -0.23551172D+01 | -0.15228723D+02 | 0.87150323D+01 |
| 16 | 0.24324918D+01 | 0.28175950D+00 | 0.41135365D+01 | 0.69300467D+01 |
| | 0.14761470D+02 | -0.15462969D+02 | -0.24189055D+01 | -0.21265734D+02 |
| 17 | -0.10135722D+02 | 0.98153949D+00 | -0.11969437D+02 | 0.16186291D+01 |
| | -0.19885141D+02 | -0.17755651D+01 | -0.11312185D+02 | 0.27104957D+02 |
| 18 | 0.15932183D+02 | -0.25914033D+02 | 0.13099718D+02 | -0.12753741D+02 |
| | -0.66179705D+01 | 0.23661938D+02 | 0.88791895D+01 | -0.17569855D+02 |
| 19 | 0.12405574D+00 | 0.38025492D+01 | -0.25466930D+02 | -0.18049543D+02 |
| | -0.63874727D+01 | 0.65430260D+01 | -0.31003773D+01 | 0.77668649D+01 |
| 20 | -0.14623272D+01 | 0.83627516D+01 | -0.25236694D+02 | -0.36276394D+01 |
| | -0.63112229D+01 | 0.38586438D+00 | 0.24496138D+00 | -0.10285974D+02 |
| 21 | -0.11395201D+02 | -0.12958843D+02 | -0.30165619D+01 | 0.26494551D+01 |
| | -0.97135562D+01 | 0.31432775D+02 | 0.29304679D+02 | -0.16920424D+01 |
| 22 | 0.49236619D+01 | 0.58033961D+01 | -0.82595766D+00 | 0.15327406D+02 |
| | 0.24492424D+02 | 0.10487517D+02 | -0.15002079D+02 | 0.24780363D+01 |
| 23 | -0.27454829D+02 | -0.15123250D+02 | -0.27985231D+02 | -0.11342762D+02 |
| | -0.26041609D+01 | 0.22446412D+02 | 0.11504400D+02 | -0.42746699D+01 |
| 24 | 0.26025379D+01 | -0.17649091D+02 | -0.18637198D+01 | -0.13223815D+02 |
| | 0.34481406D+01 | 0.11435743D+02 | -0.25002372D+01 | -0.71257657D+01 |

***** Predicted Measurement Vector *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|
| 1 | 0.24244620D+00 | 0.24244620D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 2 | -0.89235678D+02 | -0.89235678D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 3 | -0.51740608D+02 | -0.51740608D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 4 | 0.47323930D+02 | 0.47323930D+02 | 0.00000000D+00 | 0.10000000D+01 |

```
  5    -0.59551247D+02   -0.59551247D+02    0.00000000D+00    0.10000000D+01
  6     0.95526543D+02    0.95526543D+02    0.00000000D+00    0.10000000D+01
  7     0.71206673D+02    0.71206673D+02    0.00000000D+00    0.10000000D+01
  8    -0.18236228D+02   -0.18236228D+02    0.00000000D+00    0.10000000D+01
  9    -0.20857445D+01   -0.20857445D+01    0.00000000D+00    0.10000000D+01
 10     0.34158507D+02    0.34158507D+02    0.00000000D+00    0.10000000D+01
 11    -0.73767652D+02   -0.73767652D+02    0.00000000D+00    0.10000000D+01
 12    -0.54957941D+02   -0.54957941D+02    0.00000000D+00    0.10000000D+01
 13    -0.17875014D+03   -0.17875014D+03    0.00000000D+00    0.10000000D+01
 14    -0.90358179D+01   -0.90358179D+01    0.00000000D+00    0.10000000D+01
 15    -0.11181281D+02   -0.11181281D+02    0.00000000D+00    0.10000000D+01
 16     0.16957353D+02    0.16957353D+02    0.00000000D+00    0.10000000D+01
 17    -0.40413544D+02   -0.40413544D+02    0.00000000D+00    0.10000000D+01
 18    -0.72167007D+02   -0.72167007D+02    0.00000000D+00    0.10000000D+01
 19    -0.22843700D+02   -0.22843700D+02    0.00000000D+00    0.10000000D+01
 20     0.58294386D+01    0.58294386D+01    0.00000000D+00    0.10000000D+01
 21     0.98244309D+00    0.98244309D+00    0.00000000D+00    0.10000000D+01
 22     0.71616239D+02    0.71616239D+02    0.00000000D+00    0.10000000D+01
 23    -0.84885158D+02   -0.84885158D+02    0.00000000D+00    0.10000000D+01
 24    -0.70757525D+02   -0.70757525D+02    0.00000000D+00    0.10000000D+01

 *****   Initial Performance Index  =   0.97772474D+05   *****

*****   NO Constraints are Specified for Case Number   1   *****

 *****   Solve the NLPQLP Problem for Case Number   1   *****


 ------------------------------------------------------------------------
 START OF THE SEQUENTIAL QUADRATIC PROGRAMMING ALGORITHM
 ------------------------------------------------------------------------

  Parameters:
     N      =       8
     M      =       0
     ME     =       0
     MODE   =       0
     ACC    =   0.1000D-06
     ACCQP  =   0.1000D-11
     STPMIN =   0.0000D+00
     RHOB   =   0.1000D+03
     MAXFUN =      10
     MAXNM  =      10
     MAXIT  =     100
     IPRINT =       2

  Output in the following order:
     IT    - iteration number
     F     - objective function value
     SCV   - sum of constraint violations
     NA    - number of active constraints
     I     - number of line search iterations
     ALPHA - steplength parameter
     DELTA - additional variable to prevent inconsistency
     KKT   - Karush-Kuhn-Tucker optimality criterion

   IT         F           SCV      NA  I    ALPHA     DELTA     KKT
 ------------------------------------------------------------------------
    1  0.97772474D+05  0.00D+00     0  0  0.00D+00  0.00D+00  0.92D+06
```

```
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 2  0.13407558D+05  0.00D+00    0  2  0.37D+00  0.00D+00  0.22D+06
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 3  0.46383607D+04  0.00D+00    0  2  0.13D+00  0.00D+00  0.92D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 4  0.19141049D+04  0.00D+00    0  2  0.10D+00  0.00D+00  0.56D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 5  0.12360237D+04  0.00D+00    0  3  0.27D-01  0.00D+00  0.18D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 6  0.10263670D+04  0.00D+00    0  3  0.29D-01  0.00D+00  0.28D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 7  0.88697509D+03  0.00D+00    0  3  0.10D-01  0.00D+00  0.23D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 8  0.53646833D+03  0.00D+00    0  3  0.45D-01  0.00D+00  0.25D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 9  0.28739811D+03  0.00D+00    0  3  0.27D-01  0.00D+00  0.12D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
10  0.20035109D+03  0.00D+00    0  3  0.23D-01  0.00D+00  0.11D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
11  0.12534048D+03  0.00D+00    0  3  0.15D-01  0.00D+00  0.36D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
12  0.11062757D+03  0.00D+00    0  3  0.11D-01  0.00D+00  0.28D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
13  0.87622314D+02  0.00D+00    0  3  0.10D-01  0.00D+00  0.66D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
14  0.26110242D+02  0.00D+00    0  3  0.32D-01  0.00D+00  0.91D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
```

```
   15  0.12918489D+02  0.00D+00    0  2  0.26D+00  0.00D+00  0.44D+02
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
   16  0.44324717D+00  0.00D+00    0  2  0.49D+00  0.00D+00  0.88D+00
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
   17  0.42153544D-02  0.00D+00    0  1  0.10D+01  0.00D+00  0.55D-04
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
   18  0.41894192D-02  0.00D+00    0  1  0.10D+01  0.00D+00  0.13D-06
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
   19  0.41893506D-02  0.00D+00    0  1  0.10D+01  0.00D+00  0.79D-13


   --- Final Convergence Analysis at Last Iterate ---

     Objective function value:      F(X)  =  0.41893506D-02
     Solution values:               X     =
       -0.43506230D-03 -0.22354675D-03  0.19598756D-04 -0.78176790D-04
       -0.22771980D-03 -0.12142101D-03  0.34273683D-03 -0.24719727D-03
     Distances from lower bounds:   X-XL  =
        0.24995649D+01  0.24997765D+01  0.25000196D+01  0.24999218D+01
        0.24997723D+01  0.24998786D+01  0.25003427D+01  0.24997528D+01
     Distances from upper bounds:   XU-X  =
        0.25004351D+01  0.25002235D+01  0.24999804D+01  0.25000782D+01
        0.25002277D+01  0.25001214D+01  0.24996573D+01  0.25002472D+01
     Multipliers for lower bounds:  U     =
        0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
        0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     Multipliers for upper bounds:  U     =
        0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
        0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     Number of function calls:      NFUNC =      44
     Number of gradient calls:      NGRAD =      19
     Number of calls of QP solver:  NQL   =      19



            *****   Completed CALL to NLPQLP   *****


       *****   Number of Function Evaluations  =    196   *****


      *****   Solution Control Vector for Case Number   1   *****

Element     G.L.B.            C.V.              L.U.B.            Delta C.V.

   1    -0.25000000D+01   -0.43506230D-03    0.25000000D+01   -0.23004350D+01
   2    -0.25000000D+01   -0.22354675D-03    0.25000000D+01   -0.23002234D+01
   3    -0.25000000D+01    0.19598756D-04    0.25000000D+01    0.77816253D+00
   4    -0.25000000D+01   -0.78176790D-04    0.25000000D+01   -0.23000781D+01
   5    -0.25000000D+01   -0.22771980D-03    0.25000000D+01   -0.17532857D+01
   6    -0.25000000D+01   -0.12142101D-03    0.25000000D+01    0.88708958D-03
   7    -0.25000000D+01    0.34273683D-03    0.25000000D+01   -0.22996572D+01
   8    -0.25000000D+01   -0.24719727D-03    0.25000000D+01   -0.10511760D+01


               *****   Predicted Measurement Vector   *****

Element     Z Vector          ZA Vector         Delta Z           Diag[W]

   1    -0.10796607D-01    0.24244620D+00   -0.25324280D+00    0.10000000D+01
```

```
  2    -0.16116768D-02   -0.89235678D+02    0.89234067D+02    0.10000000D+01
  3     0.21742065D-02   -0.51740608D+02    0.51742782D+02    0.10000000D+01
  4     0.14359080D-01    0.47323930D+02   -0.47309571D+02    0.10000000D+01
  5    -0.65178386D-02   -0.59551247D+02    0.59544730D+02    0.10000000D+01
  6     0.21978460D-03    0.95526543D+02   -0.95526323D+02    0.10000000D+01
  7     0.50949563D-02    0.71206673D+02   -0.71201579D+02    0.10000000D+01
  8     0.34407992D-01   -0.18236228D+02    0.18270636D+02    0.10000000D+01
  9    -0.17934319D-02   -0.20857445D+01    0.20839511D+01    0.10000000D+01
 10     0.83830729D-02    0.34158507D+02   -0.34150124D+02    0.10000000D+01
 11     0.65415662D-02   -0.73767652D+02    0.73774194D+02    0.10000000D+01
 12    -0.40019637D-02   -0.54957941D+02    0.54953939D+02    0.10000000D+01
 13     0.24602114D-02   -0.17875014D+03    0.17875260D+03    0.10000000D+01
 14     0.23159321D-01   -0.90358179D+01    0.90589772D+01    0.10000000D+01
 15     0.24440193D-01   -0.11181281D+02    0.11205721D+02    0.10000000D+01
 16    -0.33039519D-02    0.16957353D+02   -0.16960657D+02    0.10000000D+01
 17    -0.70484533D-02   -0.40413544D+02    0.40406495D+02    0.10000000D+01
 18    -0.74809037D-02   -0.72167007D+02    0.72159526D+02    0.10000000D+01
 19    -0.75158926D-02   -0.22843700D+02    0.22836184D+02    0.10000000D+01
 20    -0.22405203D-01    0.58294386D+01   -0.58518438D+01    0.10000000D+01
 21     0.97082622D-02    0.98244309D+00   -0.97273483D+00    0.10000000D+01
 22     0.54804753D-02    0.71616239D+02   -0.71610758D+02    0.10000000D+01
 23    -0.50689270D-02   -0.84885158D+02    0.84880089D+02    0.10000000D+01
 24     0.22579296D-01   -0.70757525D+02    0.70780104D+02    0.10000000D+01

*****   NLP Solution Performance Index  =   0.41893506D-02   *****

*****   NO Constraints are Specified for Case Number   1   *****

*****   Solve the Regulator Problem for Case Number   1   *****

                *****   Alpha  =      0.10000000D+01   *****

  Dim                   *****   WZ-Vector   *****

  24     0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
         0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
         0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
         0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
         0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
         0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01

  Dim                   *****   WX-Vector   *****

   8     0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
         0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00

  Dim                   *****   WDX-Vector   *****

   8     0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
         0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00


    *****   Matrix [DUMXX1] was Successfully Inverted
                                      to Yield Matrix [DD].   *****

  Dim          *****   The Solution Control Vector   *****

   1    -0.43497023D-03

   2    -0.22342174D-03
```

```
    3     0.19663902D-04

    4    -0.78179660D-04

    5    -0.22767610D-03

    6    -0.12132059D-03

    7     0.34281532D-03

    8    -0.24713655D-03

   Dim        *****   The Solution Measurement Vector   *****

   24    -0.10798767D-01   -0.16137043D-02    0.21718641D-02    0.14358097D-01
         -0.65178139D-02    0.22172384D-03    0.50983195D-02    0.34408145D-01
         -0.17896155D-02    0.83813370D-02    0.65421788D-02   -0.40031888D-02
          0.24560517D-02    0.23159969D-01    0.24436564D-01   -0.33037068D-02
         -0.70530480D-02   -0.74783125D-02   -0.75171837D-02   -0.22405739D-01
          0.97104874D-02    0.54824050D-02   -0.50719247D-02    0.22578629D-01


  *****   Regulator Solution Performance Index  =   0.41893505D-02   *****


              *****   NLP Special Control  8-Vector Output   *****

  CV =
      -0.435062297085220D-03,  -0.223546747330050D-03,   0.195987557783863D-04,
      -0.781767903011641D-04,  -0.227719802457481D-03,  -0.121421007786133D-03,
       0.342736834757421D-03,  -0.247197266122113D-03,


            *****   Regulator Special Control  8-Vector Output   *****

  CV =
      -0.434970233773146D-03,  -0.223421741132324D-03,   0.196639021826650D-04,
      -0.781796595994422D-04,  -0.227676097586560D-03,  -0.121320590886686D-03,
       0.342815318566725D-03,  -0.247136546347670D-03,


     *****   Root-Sum-Squared Delta CV Elements  =   0.22404187D-06   *****

  Delta CV =
      -0.920633120737760D-07,  -0.125006197726133D-06,  -0.651464042786779D-07,
       0.286929827803244D-08,  -0.437048709207182D-07,  -0.100416899446296D-06,
      -0.784838093035819D-07,  -0.607197744427620D-07,


                 *****   End Case Number   1   *****




*******************************************************************************


        ***************   Start Case Number   2   ***************

                       *****   INPUT DATA   *****
```

```
&CDATA
ALPHA   =   1.00000000000000     ,
ACC     =  1.0000000000000000E-007,
ACCQP   =  1.0000000000000000E-012,
CRAN1   =   15.0000000000000     ,
CRAN2   =   20.0000000000000     ,
CRAN3   =   7.00000000000000     ,
CRAN4   =   5.00000000000000     ,
CRAN5   =  2.0000000000000000E-002,
CRAN6   =  2.0000000000000000E-002,
CRAN7   =  0.100000000000000     ,
CRAN8   =  0.100000000000000     ,
CVOUT   =           1,
EPS     =  1.0000000000000000E-007,
GEQ     =   8.00000000000000     ,  0.900000000000000     ,
16*0.000000000000000E+000  ,
GMAX    = 4*3.00000000000000        , 14*1.50000000000000        ,
ICASE   =           2,
IDATA   =           0,
IN      =           5,
IOPT    =           1,
IOUT    =           6,
IPRINT  =           2,
ISEED1  =    78985723,
ISEED2  =    95428381,
ISEED3  =    72919329,
ISEED4  =    63237395,
ITOUT   =           0,
JSEED1  =    81692875,
JSEED2  =    68377297,
JSEED3  =    89672847,
JSEED4  =    98351973,
L       =           1,
LQL     = T,
MAXFUN  =          10,
MAXIT   =         100,
MAXNM   =          10,
ME      =           2,
MG      =           2,
MODE    =           0,
MULT    =           1,
RHOB    =   100.000000000000     ,
STPMIN  =  0.0000000000000000E+000,
T       =  0.347887873649597     ,   8.36017310619354     ,  -1.15114569664001
,   31.7600607872009     ,
  -4.11432027816772     ,  -1.82969748973846     ,   14.7802293300629     ,  -
24.1927772760391     ,   9.23694193363190     ,
   6.53410136699677     ,   14.0349829196930     ,   12.5044798851013     ,  -
17.8921127319336     ,  -10.2217143774033     ,
   16.5568113327026     ,   2.43249177932739     ,  -10.1357221603394     ,
15.9321832656860     ,  0.124055743217468     ,
  -1.46232724189758     ,  -11.3952010869980     ,   4.92366194725037     ,  -
27.4548292160034     ,   2.60253787040710     ,
   4.86136615276337     , -0.199562907218933     ,  -23.4407806396484     ,  -
11.2429445981979     ,   1.20765388011932     ,
   21.6330313682556     ,   11.9727063179016     ,   32.9372560977936     ,
23.5570669174194     ,  -6.74438714981079     ,
  -7.93598234653473     ,  -20.3026217222214     ,  -1.56858563423157     , -
0.499013066291809     ,  -16.2133514881134     ,
  0.281759500503540     ,  0.981539487838745     ,  -25.9140330553055     ,
3.80254924297333     ,   8.36275160312653     ,
  -12.9588425159454     ,   5.80339610576630     ,  -15.1232504844666     ,  -
17.6490908861160     ,  -15.0048637390137     ,
   19.1770482063293     , -0.335381031036377     ,  -4.31632578372955     ,  -
4.25651073455811     ,  -12.7643179893494     ,
```

```
   1.42291009426117     ,  -11.0011523962021     ,   1.54231786727905     ,  -
13.4375256299973     ,   3.67589592933655     ,
  -9.40093398094177     ,  -2.99704432487488     ,  -12.7238953113556     ,  -
6.63215160369873     ,   4.11353647708893     ,
  -11.9694370031357     ,   13.0997180938721     ,  -25.4669302701950     ,  -
25.2366936206818     ,  -3.01656186580658     ,
 -0.825957655906677     ,  -27.9852312803268     ,  -1.86371982097626     ,  -
5.16573786735535     ,  -2.22911655902863     ,
  -2.73599326610565     ,  -12.1217423677444     ,  -6.38543546199799     ,
14.5632725954056     ,  -9.25001144409180     ,
  -8.79374623298645     ,  -5.07636487483978     ,   20.6084918975830     ,  -
11.9870936870575     ,  -16.3496994972229     ,
  -27.2168767452240     ,  -12.2997462749481     ,   18.8906282186508     ,
6.93004667758942     ,   1.61862909793854     ,
  -12.7537411451340     ,  -18.0495429039001     ,  -3.62763941287994     ,
2.64945507049561     ,   15.3274059295654     ,
  -11.3427621126175     ,  -13.2238149642944     ,   4.46783602237701     ,  -
30.9051227569580     ,   14.3089932203293     ,
   8.13094079494476     ,  -23.9111328125000     ,   2.16139078140259     ,
15.2714663743973     ,  -14.9053382873535     ,
  -6.74761354923248     ,   9.14280593395233     ,  -25.4573452472687     ,
6.63815975189209     ,  -8.74195575714111     ,
   12.0063996315002     ,  -19.8212701082230     ,   14.7614699602127     ,  -
19.8851406574249     ,  -6.61797046661377     ,
  -6.38747274875641     ,  -6.31122291088104     ,  -9.71355617046356     ,
24.4924241304398     ,  -2.60416090488434     ,
   3.44814062118530     ,  -20.1868027448654     ,  -22.1411293745041     ,  -
5.60317695140839     ,  -25.7577776908875     ,
   6.09270989894867     ,   7.43854463100433     ,   2.98368871212006     ,  -
9.48373377323151     ,  -1.90039992332458     ,
   11.3497376441956     ,   15.2260208129883     ,   26.1296272277832     ,  -
2.67392516136169     ,   4.84120965003967     ,
  -2.35511720180511     ,  -15.4629689455032     ,  -1.77556514739990     ,
23.6619377136230     ,   6.54302597045898     ,
  0.385864377021790     ,   31.4327752590179     ,   10.4875171184540     ,
22.4464124441147     ,   11.4357429742813     ,
  -4.43484902381897     ,  -10.4405665397644     ,  0.688326954841614     ,
2.20657050609589     ,   5.84744215011597     ,
  -2.80650436878204     ,  -2.33269333839417     ,   3.26137959957123     ,  -
9.61982607841492     ,  -21.6863620281219     ,
  -5.18984854221344     ,  -17.4698179960251     ,  -22.6904761791229     ,
11.6673856973648     ,  -15.2287226915359     ,
  -2.41890549659729     ,  -11.3121849298477     ,   8.87918949127197     ,  -
3.10037732124329     ,  0.244961380958557     ,
   29.3046790361404     ,  -15.0020790100098     ,   11.5043997764587     ,  -
2.50023722648621     ,  -8.72981309890747     ,
  -9.30526256561279     ,  -15.0490844249725     ,   5.02102971076965     ,  -
12.3688095808029     ,   8.76760959625244     ,
   10.1177400350571     ,  -7.69548416137695     ,  -29.1979032754898     ,
10.1087188720703     , -0.753586888313293     ,
   20.7674050331116     ,  -5.90863347053528     ,  -13.2089871168137     ,
8.71503233909607     ,  -21.2657344341278     ,
   27.1049565076828     ,  -17.5698554515839     ,   7.76686489582062     ,  -
10.2859741449356     ,  -1.69204235076904     ,
   2.47803628444672     ,  -4.27466988563538     ,  -7.12576568126678     ,
WDT     = 24*1.00000000000000        ,
WDX     = 8*0.000000000000000E+000  ,
WX      = 8*0.000000000000000E+000  ,
WZ      = 24*1.00000000000000        ,
XL      = 8*-2.50000000000000       , 4*-2.00000000000000       ,
XL0     = 8*-2.30000000000000       ,
XU      = 8*2.50000000000000        , 4*2.00000000000000        ,
XU0     = 8*2.30000000000000        ,
X0      = 2*2.29999990000000        , -0.778142929077148     ,
2.29999990000000     ,   1.75305795669556     ,
```

```
 -1.008510589599609E-003,   2.29999990000000     ,   1.05092883110046     ,
ZA      =  0.242446197789848     ,  -89.2356784291655     ,  -51.7406079178323
,   47.3239303809522     ,
  -59.5512473616095     ,   95.5265427866065     ,   71.2066734864025     ,  -
18.2362282575651     ,  -2.08574452474501     ,
   34.1585067871362     ,  -73.7676519599088     ,  -54.9579413287272     ,  -
178.750136010219     ,  -9.03581786817862     ,
  -11.1812805012057     ,   16.9573528785314     ,  -40.4135437666825     ,  -
72.1670065619007     ,  -22.8437001192555     ,
   5.82943856479929     ,  0.982443093193220     ,   71.6162386820888     ,  -
84.8851581693340     ,  -70.7575249994563
/
```

*****  OUTPUT DATA  *****

*****  X0, ZA, and T are Randomly Defined  *****

| CRAN1 | CRAN2 | CRAN3 | CRAN4 |
|---|---|---|---|
| CRAN5 | CRAN6 | CRAN7 | CRAN8 |
| 0.15000000D+02 | 0.20000000D+02 | 0.70000000D+01 | 0.50000000D+01 |
| 0.20000000D-01 | 0.20000000D-01 | 0.10000000D+00 | 0.10000000D+00 |

*****  Control Vector During Previous Duty Cycle for Case Number  2  *****

| Element | G.L.B. | C.V. | L.U.B. |
|---|---|---|---|
| 1 | -0.23000000D+01 | 0.26932186D+01 | 0.23000000D+01 |
| 1 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 2 | -0.23000000D+01 | 0.79428859D+01 | 0.23000000D+01 |
| 2 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 3 | -0.23000000D+01 | -0.77814293D+00 | 0.23000000D+01 |
| 4 | -0.23000000D+01 | 0.24868137D+01 | 0.23000000D+01 |
| 4 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 5 | -0.23000000D+01 | 0.17530580D+01 | 0.23000000D+01 |
| 6 | -0.23000000D+01 | -0.10085106D-02 | 0.23000000D+01 |
| 7 | -0.23000000D+01 | 0.43974723D+01 | 0.23000000D+01 |
| 7 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 8 | -0.23000000D+01 | 0.10509288D+01 | 0.23000000D+01 |

*****  Measurement Vectors from Previous Duty Cycle  *****

| Element | Actual | Ideal | Delta |
|---|---|---|---|
| 1 | 0.24244620D+00 | 0.25418529D+00 | -0.11739089D-01 |
| 2 | -0.89235678D+02 | -0.89228662D+02 | -0.70162487D-02 |
| 3 | -0.51740608D+02 | -0.51735457D+02 | -0.51504469D-02 |
| 4 | 0.47323930D+02 | 0.47299922D+02 | 0.24008768D-01 |
| 5 | -0.59551247D+02 | -0.59533028D+02 | -0.18219316D-01 |
| 6 | 0.95526543D+02 | 0.95516371D+02 | 0.10172153D-01 |
| 7 | 0.71206673D+02 | 0.71186083D+02 | 0.20590177D-01 |
| 8 | -0.18236228D+02 | -0.18259437D+02 | 0.23208692D-01 |
| 9 | -0.20857445D+01 | -0.20871238D+01 | 0.13792706D-02 |
| 10 | 0.34158507D+02 | 0.34133524D+02 | 0.24983239D-01 |
| 11 | -0.73767652D+02 | -0.73775161D+02 | 0.75085998D-02 |
| 12 | -0.54957941D+02 | -0.54969551D+02 | 0.11609204D-01 |
| 13 | -0.17875014D+03 | -0.17874639D+03 | -0.37421465D-02 |
| 14 | -0.90358179D+01 | -0.90497655D+01 | 0.13947675D-01 |
| 15 | -0.11181281D+02 | -0.11213480D+02 | 0.32199035D-01 |
| 16 | 0.16957353D+02 | 0.16962016D+02 | -0.46632385D-02 |
| 17 | -0.40413544D+02 | -0.40408497D+02 | -0.50467467D-02 |

| | | | |
|---|---|---|---|
| 18 | -0.72167007D+02 | -0.72153392D+02 | -0.13614869D-01 |
| 19 | -0.22843700D+02 | -0.22838498D+02 | -0.52021170D-02 |
| 20 | 0.58294386D+01 | 0.58544154D+01 | -0.24976861D-01 |
| 21 | 0.98244309D+00 | 0.98918038D+00 | -0.67372823D-02 |
| 22 | 0.71616239D+02 | 0.71593499D+02 | 0.22739236D-01 |
| 23 | -0.84885158D+02 | -0.84861559D+02 | -0.23599300D-01 |
| 24 | -0.70757525D+02 | -0.70777564D+02 | 0.20038812D-01 |

***** Initial Control Vector Estimate for Case Number 2 *****

| Element | G.L.B. | C.V. | L.U.B. | Delta C.V. |
|---|---|---|---|---|
| 1 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 2 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 3 | -0.25000000D+01 | -0.77814293D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 4 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 5 | -0.25000000D+01 | 0.17530580D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 6 | -0.25000000D+01 | -0.10085106D-02 | 0.25000000D+01 | 0.00000000D+00 |
| 7 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 8 | -0.25000000D+01 | 0.10509288D+01 | 0.25000000D+01 | 0.00000000D+00 |

***** T-Matrix Output is Suppressed *****

***** Predicted Measurement Vector *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|
| 1 | 0.24244620D+00 | 0.24244620D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 2 | -0.89235678D+02 | -0.89235678D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 3 | -0.51740608D+02 | -0.51740608D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 4 | 0.47323930D+02 | 0.47323930D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 5 | -0.59551247D+02 | -0.59551247D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 6 | 0.95526543D+02 | 0.95526543D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 7 | 0.71206673D+02 | 0.71206673D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 8 | -0.18236228D+02 | -0.18236228D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 9 | -0.20857445D+01 | -0.20857445D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 10 | 0.34158507D+02 | 0.34158507D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 11 | -0.73767652D+02 | -0.73767652D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 12 | -0.54957941D+02 | -0.54957941D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 13 | -0.17875014D+03 | -0.17875014D+03 | 0.00000000D+00 | 0.10000000D+01 |
| 14 | -0.90358179D+01 | -0.90358179D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 15 | -0.11181281D+02 | -0.11181281D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 16 | 0.16957353D+02 | 0.16957353D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 17 | -0.40413544D+02 | -0.40413544D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 18 | -0.72167007D+02 | -0.72167007D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 19 | -0.22843700D+02 | -0.22843700D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 20 | 0.58294386D+01 | 0.58294386D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 21 | 0.98244309D+00 | 0.98244309D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 22 | 0.71616239D+02 | 0.71616239D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 23 | -0.84885158D+02 | -0.84885158D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 24 | -0.70757525D+02 | -0.70757525D+02 | 0.00000000D+00 | 0.10000000D+01 |

***** Initial Performance Index = 0.97772474D+05 *****

***** Initial Constraint Function Values for Case Number 2 *****

Equality Constraints

| Element | Value | Target | Value - Target |
|---|---|---|---|

```
  1         0.70797282D+01      0.80000000D+01     -0.92027180D+00
  2         0.18446587D+01      0.90000000D+00      0.94465872D+00


*****   Solve the NLPQLP Problem for Case Number   2   *****



------------------------------------------------------------------
 START OF THE SEQUENTIAL QUADRATIC PROGRAMMING ALGORITHM
------------------------------------------------------------------

 Parameters:
    N      =       8
    M      =       2
    ME     =       2
    MODE   =       0
    ACC    =   0.1000D-06
    ACCQP  =   0.1000D-11
    STPMIN =   0.0000D+00
    RHOB   =   0.1000D+03
    MAXFUN =      10
    MAXNM  =      10
    MAXIT  =     100
    IPRINT =       2

 Output in the following order:
    IT    - iteration number
    F     - objective function value
    SCV   - sum of constraint violations
    NA    - number of active constraints
    I     - number of line search iterations
    ALPHA - steplength parameter
    DELTA - additional variable to prevent inconsistency
    KKT   - Karush-Kuhn-Tucker optimality criterion

  IT         F           SCV      NA  I    ALPHA     DELTA     KKT
------------------------------------------------------------------
   1  0.97772474D+05  0.19D+01    2  0  0.00D+00  0.00D+00  0.45D+06
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
   2  0.79051831D+05  0.17D+01    2  2  0.10D+00  0.00D+00  0.12D+06
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
   3  0.70173846D+05  0.16D+01    2  2  0.15D+00  0.00D+00  0.19D+06
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
   4  0.63073207D+05  0.15D+01    2  2  0.10D+00  0.00D+00  0.79D+05
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
   5  0.59870575D+05  0.15D+01    2  2  0.10D+00  0.00D+00  0.12D+06
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
   6  0.54358109D+05  0.14D+01    2  2  0.12D+00  0.00D+00  0.69D+05
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
   7  0.52246620D+05  0.12D+01    2  2  0.11D+00  0.00D+00  0.47D+05
```

```
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 8  0.46942135D+05  0.11D+01    2  2  0.31D+00  0.00D+00  0.44D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 9  0.45528766D+05  0.98D+00    2  2  0.10D+00  0.00D+00  0.28D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
10  0.44710446D+05  0.94D+00    2  2  0.10D+00  0.00D+00  0.23D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
11  0.44042436D+05  0.90D+00    2  2  0.10D+00  0.00D+00  0.24D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
12  0.43526117D+05  0.89D+00    2  2  0.10D+00  0.00D+00  0.17D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
13  0.43207343D+05  0.86D+00    2  2  0.10D+00  0.00D+00  0.61D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
14  0.42864125D+05  0.70D+00    2  2  0.19D+00  0.00D+00  0.14D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
15  0.42501290D+05  0.62D+00    2  2  0.10D+00  0.00D+00  0.34D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
16  0.41969117D+05  0.35D-01    2  1  0.10D+01  0.00D+00  0.15D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
17  0.41913264D+05  0.32D-01    2  2  0.10D+00  0.00D+00  0.33D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
18  0.41864890D+05  0.23D-01    2  2  0.31D+00  0.00D+00  0.16D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
19  0.41783873D+05  0.32D-03    2  1  0.10D+01  0.00D+00  0.37D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
20  0.41770075D+05  0.25D-02    2  1  0.10D+01  0.00D+00  0.45D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
21  0.41739255D+05  0.39D-03    2  1  0.10D+01  0.00D+00  0.24D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
22  0.41725308D+05  0.71D-03    2  1  0.10D+01  0.00D+00  0.48D+01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
23  0.41727787D+05  0.20D-04    2  1  0.10D+01  0.00D+00  0.13D+00
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
24  0.41727723D+05  0.58D-06    2  1  0.10D+01  0.00D+00  0.46D-02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
25  0.41727721D+05  0.19D-08    2  1  0.10D+01  0.00D+00  0.13D-04
          *****   Completed CALL to NLPQLP   *****
```

```
          *****   Completed CALL to NLPQLP   *****
   26  0.41727721D+05  0.31D-12    2  1  0.10D+01  0.00D+00  0.25D-08


   --- Final Convergence Analysis at Last Iterate ---

     Objective function value:      F(X)  =  0.41727721D+05
     Solution values:               X     =
        0.25000000D+01  0.13040540D+01 -0.21446404D+01  0.20813092D+01
       -0.93134375D+00  0.53398843D+00  0.49770559D+00 -0.12517065D+01
     Distances from lower bounds:   X-XL  =
        0.50000000D+01  0.38040540D+01  0.35535959D+00  0.45813092D+01
        0.15686563D+01  0.30339884D+01  0.29977056D+01  0.12482935D+01
     Distances from upper bounds:   XU-X  =
        0.00000000D+00  0.11959460D+01  0.46446404D+01  0.41869078D+00
        0.34313437D+01  0.19660116D+01  0.20022944D+01  0.37517065D+01
     Multipliers for lower bounds:  U     =
        0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
        0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     Multipliers for upper bounds:  U     =
        0.24249386D+03  0.00000000D+00  0.00000000D+00  0.00000000D+00
        0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     Constraint values:             G(X)  =
        0.30642155D-12  0.36637360D-14
     Multipliers for constraints:   U     =
       -0.49137296D+04 -0.30196655D+04
     Number of function calls:      NFUNC =      42
     Number of gradient calls:      NGRAD =      26
     Number of calls of QP solver:  NQL   =      26


          *****   Completed CALL to NLPQLP   *****


       *****   Number of Function Evaluations  =    250   *****


     *****   Solution Control Vector for Case Number   2   *****

 Element     G.L.B.            C.V.              L.U.B.            Delta C.V.

    1    -0.25000000D+01    0.25000000D+01    0.25000000D+01    0.20000010D+00
    2    -0.25000000D+01    0.13040540D+01    0.25000000D+01   -0.99594588D+00
    3    -0.25000000D+01   -0.21446404D+01    0.25000000D+01   -0.13664975D+01
    4    -0.25000000D+01    0.20813092D+01    0.25000000D+01   -0.21869068D+00
    5    -0.25000000D+01   -0.93134375D+00    0.25000000D+01   -0.26844017D+01
    6    -0.25000000D+01    0.53398843D+00    0.25000000D+01    0.53499694D+00
    7    -0.25000000D+01    0.49770559D+00    0.25000000D+01   -0.18022943D+01
    8    -0.25000000D+01   -0.12517065D+01    0.25000000D+01   -0.23026353D+01


              *****   Predicted Measurement Vector   *****

 Element     Z Vector          ZA Vector         Delta Z           Diag[W]

    1     0.22405307D+02    0.24244620D+00    0.22162861D+02    0.10000000D+01
    2    -0.17228634D+01   -0.89235678D+02    0.87512815D+02    0.10000000D+01
    3    -0.35565239D+02   -0.51740608D+02    0.16175369D+02    0.10000000D+01
    4     0.22276938D+02    0.47323930D+02   -0.25046993D+02    0.10000000D+01
    5     0.31024788D+02   -0.59551247D+02    0.90576035D+02    0.10000000D+01
    6     0.70919929D+02    0.95526543D+02   -0.24606614D+02    0.10000000D+01
    7     0.38252909D+01    0.71206673D+02   -0.67381383D+02    0.10000000D+01
    8     0.78577204D+01   -0.18236228D+02    0.26093949D+02    0.10000000D+01
    9     0.76969136D+02   -0.20857445D+01    0.79054881D+02    0.10000000D+01
```

```
    10     0.53375458D+02    0.34158507D+02    0.19216951D+02    0.10000000D+01
    11     0.22114004D+02   -0.73767652D+02    0.95881656D+02    0.10000000D+01
    12    -0.35989073D+02   -0.54957941D+02    0.18968868D+02    0.10000000D+01
    13    -0.94182080D+02   -0.17875014D+03    0.84568056D+02    0.10000000D+01
    14    -0.10758713D+02   -0.90358179D+01   -0.17228947D+01    0.10000000D+01
    15     0.72536689D+02   -0.11181281D+02    0.83717970D+02    0.10000000D+01
    16     0.15455013D+02    0.16957353D+02   -0.15023402D+01    0.10000000D+01
    17    -0.17011180D+02   -0.40413544D+02    0.23402364D+02    0.10000000D+01
    18    -0.34047909D+01   -0.72167007D+02    0.68762216D+02    0.10000000D+01
    19     0.20492318D+02   -0.22843700D+02    0.43336018D+02    0.10000000D+01
    20     0.72878982D+02    0.58294386D+01    0.67049543D+02    0.10000000D+01
    21     0.91244458D+01    0.98244309D+00    0.81420027D+01    0.10000000D+01
    22     0.25793244D+02    0.71616239D+02   -0.45822995D+02    0.10000000D+01
    23    -0.26483816D+02   -0.84885158D+02    0.58401342D+02    0.10000000D+01
    24    -0.29444689D+02   -0.70757525D+02    0.41312836D+02    0.10000000D+01


 *****   NLP Solution Performance Index  =   0.41727721D+05   *****


 *****   Solution Constraint Function Values for Case Number   2   *****

                   Equality Constraints

 Element          Value               Target          Value - Target

    1         0.80000000D+01      0.80000000D+01     -0.30642155D-12
    2         0.90000000D+00      0.90000000D+00     -0.36637360D-14


              *****   NLP Special Control  8-Vector Output   *****

 CV =
      0.250000000000000D+01,   0.130405401645492D+01,  -0.214464040780739D+01,
      0.208130922493878D+01,  -0.931343748998726D+00,   0.533988425787823D+00,
      0.497705586120176D+00,  -0.125170649794065D+01,


                *****   End Case Number   2   *****




********************************************************************************


       ***************   Start Case Number   3   ***************


                     *****   INPUT DATA   *****

&CDATA
ALPHA   =   1.00000000000000     ,
ACC     =  1.0000000000000000E-007,
ACCQP   =  1.0000000000000000E-012,
CRAN1   =   15.0000000000000     ,
CRAN2   =   20.0000000000000     ,
CRAN3   =   7.00000000000000     ,
CRAN4   =   5.00000000000000     ,
CRAN5   =  2.0000000000000000E-002,
CRAN6   =  2.0000000000000000E-002,
CRAN7   =  0.100000000000000     ,
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 CRAN8   =  0.100000000000000     ,
 CVOUT   =           1,
 EPS     =  1.000000000000000E-007,
 GEQ     =   8.00000000000000     ,  0.900000000000000     ,
 16*0.000000000000000E+000  ,
 GMAX    = 4*3.00000000000000        , 14*1.50000000000000        ,
 ICASE   =           3,
 IDATA   =           0,
 IN      =           5,
 IOPT    =           1,
 IOUT    =           6,
 IPRINT  =           2,
 ISEED1  =    78985723,
 ISEED2  =    95428381,
 ISEED3  =    72919329,
 ISEED4  =    63237395,
 ITOUT   =           0,
 JSEED1  =    81692875,
 JSEED2  =    68377297,
 JSEED3  =    89672847,
 JSEED4  =    98351973,
 L       =           1,
 LQL     = T,
 MAXFUN  =          10,
 MAXIT   =         100,
 MAXNM   =          10,
 ME      =           0,
 MG      =          12,
 MODE    =           0,
 MULT    =           1,
 RHOB    =   100.000000000000     ,
 STPMIN  =  0.000000000000000E+000,
 T       =  0.347887873649597     ,   8.36017310619354     ,  -1.15114569664001
 ,   31.7600607872009     ,
   -4.11432027816772     ,  -1.82969748973846     ,   14.7802293300629     ,  -
 24.1927772760391     ,   9.23694193363190     ,
    6.53410136699677     ,   14.0349829196930     ,   12.5044798851013     ,  -
 17.8921127319336     ,  -10.2217143774033     ,
    16.5568113327026     ,   2.43249177932739     ,  -10.1357221603394     ,
 15.9321832656860     ,  0.124055743217468     ,
   -1.46232724189758     ,  -11.3952010869980     ,   4.92366194725037     ,  -
 27.4548292160034     ,   2.60253787040710     ,
    4.86136615276337     , -0.199562907218933     ,  -23.4407806396484     ,  -
 11.2429445981979     ,   1.20765388011932     ,
    21.6330313682556     ,   11.9727063179016     ,   32.9372560977936     ,
 23.5570669174194     ,  -6.74438714981079     ,
   -7.93598234653473     ,  -20.3026217222214     ,  -1.56858563423157     , -
 0.499013066291809     ,  -16.2133514881134     ,
   0.281759500503540     ,  0.981539487838745     ,  -25.9140330553055     ,
 3.80254924297333     ,   8.36275160312653     ,
   -12.9588425159454     ,   5.80339610576630     ,  -15.1232504844666     ,  -
 17.6490908861160     ,  -15.0048637390137     ,
    19.1770482063293     , -0.335381031036377     ,  -4.31632578372955     ,  -
 4.25651073455811     ,  -12.7643179893494     ,
    1.42291009426117     ,  -11.0011523962021     ,   1.54231786727905     ,  -
 13.4375256299973     ,   3.67589592933655     ,
   -9.40093398094177     ,  -2.99704432487488     ,  -12.7238953113556     ,  -
 6.63215160369873     ,   4.11353647708893     ,
   -11.9694370031357     ,   13.0997180938721     ,  -25.4669302701950     ,  -
 25.2366936206818     ,  -3.01656186580658     ,
  -0.825957655906677     ,  -27.9852312803268     ,  -1.86371982097626     ,  -
 5.16573786735535     ,  -2.22911655902863     ,
   -2.73599326610565     ,  -12.1217423677444     ,  -6.38543546199799     ,
 14.5632725954056     ,  -9.25001144409180     ,
```

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  -8.79374623298645     ,  -5.07636487483978     ,   20.6084918975830     ,  -
11.9870936870575     ,  -16.3496994972229     ,
  -27.2168767452240     ,  -12.2997462749481     ,   18.8906282186508     ,
6.93004667758942     ,   1.61862909793854     ,
  -12.7537411451340     ,  -18.0495429039001     ,  -3.62763941287994     ,
2.64945507049561     ,   15.3274059295654     ,
  -11.3427621126175     ,  -13.2238149642944     ,   4.46783602237701     ,  -
30.9051227569580     ,   14.3089932203293     ,
   8.13094079494476     ,  -23.9111328125000     ,   2.16139078140259     ,
15.2714663743973     ,  -14.9053382873535     ,
  -6.74761354923248     ,   9.14280593395233     ,  -25.4573452472687     ,
6.63815975189209     ,  -8.74195575714111     ,
   12.0063996315002     ,  -19.8212701082230     ,   14.7614699602127     ,  -
19.8851406574249     ,  -6.61797046661377     ,
  -6.38747274875641     ,  -6.31122291088104     ,  -9.71355617046356     ,
24.4924241304398     ,  -2.60416090488434     ,
   3.44814062118530     ,  -20.1868027448654     ,  -22.1411293745041     ,  -
5.60317695140839     ,  -25.7577776908875     ,
   6.09270989894867     ,   7.43854463100433     ,   2.98368871212006     ,  -
9.48373377323151     ,  -1.90039992332458     ,
   11.3497376441956     ,   15.2260208129883     ,   26.1296272277832     ,  -
2.67392516136169     ,   4.84120965003967     ,
  -2.35511720180511     ,  -15.4629689455032     ,  -1.77556514739990     ,
23.6619377136230     ,   6.54302597045898     ,
  0.385864377021790     ,   31.4327752590179     ,   10.4875171184540     ,
22.4464124441147     ,   11.4357429742813     ,
  -4.43484902381897     ,  -10.4405665397644     ,  0.688326954841614     ,
2.20657050609589     ,   5.84744215011597     ,
  -2.80650436878204     ,  -2.33269333839417     ,   3.26137959957123     ,  -
9.61982607841492     ,  -21.6863620281219     ,
  -5.18984854221344     ,  -17.4698179960251     ,  -22.6904761791229     ,
11.6673856973648     ,  -15.2287226915359     ,
  -2.41890549659729     ,  -11.3121849298477     ,   8.87918949127197     ,  -
3.10037732124329     ,  0.244961380958557     ,
   29.3046790361404     ,  -15.0020790100098     ,   11.5043997764587     ,  -
2.50023722648621     ,  -8.72981309890747     ,
  -9.30526256561279     ,  -15.0490844249725     ,   5.02102971076965     ,  -
12.3688095808029     ,   8.76760959625244     ,
   10.1177400350571     ,  -7.69548416137695     ,  -29.1979032754898     ,
10.1087188720703     , -0.753586888313293     ,
   20.7674050331116     ,  -5.90863347053528     ,  -13.2089871168137     ,
8.71503233909607     ,  -21.2657344341278     ,
   27.1049565076828     ,  -17.5698554515839     ,   7.76686489582062     ,  -
10.2859741449356     ,  -1.69204235076904     ,
   2.47803628444672     ,  -4.27466988563538     ,  -7.12576568126678     ,
WDT     = 24*1.00000000000000        ,
WDX     = 8*0.000000000000000E+000  ,
WX      = 8*0.000000000000000E+000  ,
WZ      = 24*1.00000000000000        ,
XL      = 8*-2.50000000000000       , 4*-2.00000000000000       ,
XL0     = 8*-2.30000000000000       ,
XU      = 8*2.50000000000000        , 4*2.00000000000000        ,
XU0     = 8*2.30000000000000        ,
X0      = 2*2.29999990000000        , -0.778142929077148     ,
2.29999990000000     ,   1.75305795669556     ,
 -1.00851058959960 9E-003,   2.29999990000000     ,   1.05092883110046     ,
ZA      =  0.242446197789848     ,  -89.2356784291655     ,  -51.7406079178323
,   47.3239303809522     ,
  -59.5512473616095     ,   95.5265427866065     ,   71.2066734864025     ,  -
18.2362282575651     ,  -2.08574452474501     ,
   34.1585067871362     ,  -73.7676519599088     ,  -54.9579413287272     ,  -
178.750136010219     ,  -9.03581786817862     ,
  -11.1812805012057     ,   16.9573528785314     ,  -40.4135437666825     ,  -
72.1670065619007     ,  -22.8437001192555     ,
```

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   5.82943856479929     ,  0.982443093193220     ,   71.6162386820888     ,  -
84.8851581693340     ,  -70.7575249994563
/
```

```
                        *****   OUTPUT DATA   *****

              *****   X0, ZA, and T are Randomly Defined   *****

      CRAN1               CRAN2               CRAN3               CRAN4
      CRAN5               CRAN6               CRAN7               CRAN8

    0.15000000D+02      0.20000000D+02      0.70000000D+01      0.50000000D+01
    0.20000000D-01      0.20000000D-01      0.10000000D+00      0.10000000D+00


   *****   Control Vector During Previous Duty Cycle for Case Number   3   *****

  Element         G.L.B.              C.V.                L.U.B.

     1        -0.23000000D+01      0.26932186D+01      0.23000000D+01
     1        -0.23000000D+01      0.22999999D+01      0.23000000D+01
     2        -0.23000000D+01      0.79428859D+01      0.23000000D+01
     2        -0.23000000D+01      0.22999999D+01      0.23000000D+01
     3        -0.23000000D+01     -0.77814293D+00      0.23000000D+01
     4        -0.23000000D+01      0.24868137D+01      0.23000000D+01
     4        -0.23000000D+01      0.22999999D+01      0.23000000D+01
     5        -0.23000000D+01      0.17530580D+01      0.23000000D+01
     6        -0.23000000D+01     -0.10085106D-02      0.23000000D+01
     7        -0.23000000D+01      0.43974723D+01      0.23000000D+01
     7        -0.23000000D+01      0.22999999D+01      0.23000000D+01
     8        -0.23000000D+01      0.10509288D+01      0.23000000D+01


          *****   Measurement Vectors from Previous Duty Cycle   *****

  Element         Actual              Ideal               Delta

     1         0.24244620D+00      0.25418529D+00     -0.11739089D-01
     2        -0.89235678D+02     -0.89228662D+02     -0.70162487D-02
     3        -0.51740608D+02     -0.51735457D+02     -0.51504469D-02
     4         0.47323930D+02      0.47299922D+02      0.24008768D-01
     5        -0.59551247D+02     -0.59533028D+02     -0.18219316D-01
     6         0.95526543D+02      0.95516371D+02      0.10172153D-01
     7         0.71206673D+02      0.71186083D+02      0.20590177D-01
     8        -0.18236228D+02     -0.18259437D+02      0.23208692D-01
     9        -0.20857445D+01     -0.20871238D+01      0.13792706D-02
    10         0.34158507D+02      0.34133524D+02      0.24983239D-01
    11        -0.73767652D+02     -0.73775161D+02      0.75085998D-02
    12        -0.54957941D+02     -0.54969551D+02      0.11609204D-01
    13        -0.17875014D+03     -0.17874639D+03     -0.37421465D-02
    14        -0.90358179D+01     -0.90497655D+01      0.13947675D-01
    15        -0.11181281D+02     -0.11213480D+02      0.32199035D-01
    16         0.16957353D+02      0.16962016D+02     -0.46632385D-02
    17        -0.40413544D+02     -0.40408497D+02     -0.50467467D-02
    18        -0.72167007D+02     -0.72153392D+02     -0.13614869D-01
    19        -0.22843700D+02     -0.22838498D+02     -0.52021170D-02
    20         0.58294386D+01      0.58544154D+01     -0.24976861D-01
    21         0.98244309D+00      0.98918038D+00     -0.67372823D-02
    22         0.71616239D+02      0.71593499D+02      0.22739236D-01
    23        -0.84885158D+02     -0.84861559D+02     -0.23599300D-01
    24        -0.70757525D+02     -0.70777564D+02      0.20038812D-01
```

***** Initial Control Vector Estimate for Case Number 3 *****

| Element | G.L.B. | C.V. | L.U.B. | Delta C.V. |
|---|---|---|---|---|
| 1 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 2 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 3 | -0.25000000D+01 | -0.77814293D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 4 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 5 | -0.25000000D+01 | 0.17530580D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 6 | -0.25000000D+01 | -0.10085106D-02 | 0.25000000D+01 | 0.00000000D+00 |
| 7 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 8 | -0.25000000D+01 | 0.10509288D+01 | 0.25000000D+01 | 0.00000000D+00 |

***** T-Matrix Output is Suppressed *****

***** Predicted Measurement Vector *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|
| 1 | 0.24244620D+00 | 0.24244620D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 2 | -0.89235678D+02 | -0.89235678D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 3 | -0.51740608D+02 | -0.51740608D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 4 | 0.47323930D+02 | 0.47323930D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 5 | -0.59551247D+02 | -0.59551247D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 6 | 0.95526543D+02 | 0.95526543D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 7 | 0.71206673D+02 | 0.71206673D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 8 | -0.18236228D+02 | -0.18236228D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 9 | -0.20857445D+01 | -0.20857445D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 10 | 0.34158507D+02 | 0.34158507D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 11 | -0.73767652D+02 | -0.73767652D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 12 | -0.54957941D+02 | -0.54957941D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 13 | -0.17875014D+03 | -0.17875014D+03 | 0.00000000D+00 | 0.10000000D+01 |
| 14 | -0.90358179D+01 | -0.90358179D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 15 | -0.11181281D+02 | -0.11181281D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 16 | 0.16957353D+02 | 0.16957353D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 17 | -0.40413544D+02 | -0.40413544D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 18 | -0.72167007D+02 | -0.72167007D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 19 | -0.22843700D+02 | -0.22843700D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 20 | 0.58294386D+01 | 0.58294386D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 21 | 0.98244309D+00 | 0.98244309D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 22 | 0.71616239D+02 | 0.71616239D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 23 | -0.84885158D+02 | -0.84885158D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 24 | -0.70757525D+02 | -0.70757525D+02 | 0.00000000D+00 | 0.10000000D+01 |

***** Initial Performance Index = 0.97772474D+05 *****

***** Initial Constraint Function Values for Case Number 3 *****

Inequality Constraints

| Element | Value | L.U.B. | L.U.B. - Value |
|---|---|---|---|
| 1 | 0.32526911D+01 | 0.30000000D+01 | -0.25269105D+00 |
| 2 | 0.24280663D+01 | 0.30000000D+01 | 0.57193370D+00 |
| 3 | 0.17530582D+01 | 0.30000000D+01 | 0.12469418D+01 |
| 4 | 0.25287252D+01 | 0.30000000D+01 | 0.47127484D+00 |
| 5 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 6 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 7 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 8 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 9 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |

```
 10          0.00000000D+00      0.15000000D+01      0.15000000D+01
 11          0.00000000D+00      0.15000000D+01      0.15000000D+01
 12          0.00000000D+00      0.15000000D+01      0.15000000D+01


*****   Solve the NLPQLP Problem for Case Number   3   *****



-----------------------------------------------------------------------
 START OF THE SEQUENTIAL QUADRATIC PROGRAMMING ALGORITHM
-----------------------------------------------------------------------

 Parameters:
    N      =       8
    M      =      12
    ME     =       0
    MODE   =       0
    ACC    =   0.1000D-06
    ACCQP  =   0.1000D-11
    STPMIN =   0.0000D+00
    RHOB   =   0.1000D+03
    MAXFUN =      10
    MAXNM  =      10
    MAXIT  =     100
    IPRINT =       2

 Output in the following order:
    IT    - iteration number
    F     - objective function value
    SCV   - sum of constraint violations
    NA    - number of active constraints
    I     - number of line search iterations
    ALPHA - steplength parameter
    DELTA - additional variable to prevent inconsistency
    KKT   - Karush-Kuhn-Tucker optimality criterion

  IT         F           SCV      NA  I    ALPHA     DELTA     KKT
-----------------------------------------------------------------------
   1  0.97772474D+05  0.25D+00   12  0  0.00D+00  0.00D+00  0.90D+06
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
   2  0.10203751D+05  0.16D+01    6  2  0.39D+00  0.00D+00  0.79D+05
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
   3  0.41107604D+04  0.11D+01    7  2  0.31D+00  0.00D+00  0.15D+05
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
   4  0.44232928D+04  0.99D+00    7  2  0.10D+00  0.00D+00  0.74D+04
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
   5  0.47122163D+04  0.89D+00    8  2  0.10D+00  0.00D+00  0.60D+04
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
   6  0.80954559D+04  0.44D+00    8  2  0.50D+00  0.00D+00  0.49D+04
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
```

```
 7  0.74338094D+04  0.25D+00    8  2  0.44D+00  0.00D+00  0.14D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 8  0.74792267D+04  0.17D+00    8  2  0.31D+00  0.00D+00  0.13D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 9  0.81589408D+04  0.10D-09    5  1  0.10D+01  0.00D+00  0.18D+01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
10  0.81581144D+04  0.00D+00    5  1  0.10D+01  0.00D+00  0.21D-01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
11  0.81581042D+04  0.00D+00    5  1  0.10D+01  0.00D+00  0.46D-04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
12  0.81581042D+04  0.00D+00    5  1  0.10D+01  0.00D+00  0.53D-06
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
13  0.81581042D+04  0.00D+00    5  1  0.10D+01  0.00D+00  0.11D-10


--- Final Convergence Analysis at Last Iterate ---

  Objective function value:      F(X)  =  0.81581042D+04
  Solution values:               X     =
     0.79999990D+00  0.79999990D+00 -0.32776191D+00  0.79999990D+00
     0.25305796D+00  0.30278330D+00  0.79999990D+00 -0.12239311D+00
  Distances from lower bounds:   X-XL  =
     0.32999999D+01  0.32999999D+01  0.21722381D+01  0.32999999D+01
     0.27530580D+01  0.28027833D+01  0.32999999D+01  0.23776069D+01
  Distances from upper bounds:   XU-X  =
     0.17000001D+01  0.17000001D+01  0.28277619D+01  0.17000001D+01
     0.22469420D+01  0.21972167D+01  0.17000001D+01  0.26223931D+01
  Multipliers for lower bounds:  U     =
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
  Multipliers for upper bounds:  U     =
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
  Constraint values:             G(X)  =
     0.18686293D+01  0.21354610D+01  0.26053913D+01  0.21906917D+01
     0.00000000D+00  0.00000000D+00  0.10496190D+01  0.00000000D+00
     0.00000000D+00  0.11962082D+01  0.00000000D+00  0.32667806D+00
  Multipliers for constraints:   U     =
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.25640593D+04  0.59722485D+04  0.00000000D+00  0.69273419D+04
     0.46627290D+04  0.00000000D+00  0.34530924D+04  0.00000000D+00
  Number of function calls:      NFUNC =      20
  Number of gradient calls:      NGRAD =      13
  Number of calls of QP solver:  NQL   =      13



          *****   Completed CALL to NLPQLP   *****


    *****   Number of Function Evaluations  =    124   *****


    *****   Solution Control Vector for Case Number   3   *****

Element     G.L.B.            C.V.              L.U.B.            Delta C.V.

   1    -0.25000000D+01    0.79999990D+00    0.25000000D+01   -0.15000000D+01
```

| | | | | |
|---|---|---|---|---|
| 2 | -0.25000000D+01 | 0.79999990D+00 | 0.25000000D+01 | -0.15000000D+01 |
| 3 | -0.25000000D+01 | -0.32776191D+00 | 0.25000000D+01 | 0.45038102D+00 |
| 4 | -0.25000000D+01 | 0.79999990D+00 | 0.25000000D+01 | -0.15000000D+01 |
| 5 | -0.25000000D+01 | 0.25305796D+00 | 0.25000000D+01 | -0.15000000D+01 |
| 6 | -0.25000000D+01 | 0.30278330D+00 | 0.25000000D+01 | 0.30379181D+00 |
| 7 | -0.25000000D+01 | 0.79999990D+00 | 0.25000000D+01 | -0.15000000D+01 |
| 8 | -0.25000000D+01 | -0.12239311D+00 | 0.25000000D+01 | -0.11733219D+01 |

***** Predicted Measurement Vector *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|
| 1 | -0.25199194D+01 | 0.24244620D+00 | -0.27623656D+01 | 0.10000000D+01 |
| 2 | -0.23285632D+02 | -0.89235678D+02 | 0.65950046D+02 | 0.10000000D+01 |
| 3 | -0.17440538D+02 | -0.51740608D+02 | 0.34300070D+02 | 0.10000000D+01 |
| 4 | 0.35643256D+01 | 0.47323930D+02 | -0.43759605D+02 | 0.10000000D+01 |
| 5 | -0.40711004D+01 | -0.59551247D+02 | 0.55480147D+02 | 0.10000000D+01 |
| 6 | 0.31168038D+02 | 0.95526543D+02 | -0.64358505D+02 | 0.10000000D+01 |
| 7 | 0.15220034D+02 | 0.71206673D+02 | -0.55986639D+02 | 0.10000000D+01 |
| 8 | 0.49709962D+00 | -0.18236228D+02 | 0.18733328D+02 | 0.10000000D+01 |
| 9 | 0.15264791D+02 | -0.20857445D+01 | 0.17350536D+02 | 0.10000000D+01 |
| 10 | 0.79117020D+01 | 0.34158507D+02 | -0.26246805D+02 | 0.10000000D+01 |
| 11 | -0.11799427D+02 | -0.73767652D+02 | 0.61968225D+02 | 0.10000000D+01 |
| 12 | -0.23151577D+02 | -0.54957941D+02 | 0.31806364D+02 | 0.10000000D+01 |
| 13 | -0.56814525D+02 | -0.17875014D+03 | 0.12193561D+03 | 0.10000000D+01 |
| 14 | 0.12227267D+01 | -0.90358179D+01 | 0.10258545D+02 | 0.10000000D+01 |
| 15 | -0.13854218D+01 | -0.11181281D+02 | 0.97958587D+01 | 0.10000000D+01 |
| 16 | 0.60837454D+01 | 0.16957353D+02 | -0.10873608D+02 | 0.10000000D+01 |
| 17 | -0.20047272D+02 | -0.40413544D+02 | 0.20366272D+02 | 0.10000000D+01 |
| 18 | -0.77521861D+01 | -0.72167007D+02 | 0.64414820D+02 | 0.10000000D+01 |
| 19 | -0.60226547D+01 | -0.22843700D+02 | 0.16821045D+02 | 0.10000000D+01 |
| 20 | 0.10839506D+02 | 0.58294386D+01 | 0.50100676D+01 | 0.10000000D+01 |
| 21 | 0.14328369D+02 | 0.98244309D+00 | 0.13345926D+02 | 0.10000000D+01 |
| 22 | 0.18205517D+02 | 0.71616239D+02 | -0.53410722D+02 | 0.10000000D+01 |
| 23 | -0.18123671D+02 | -0.84885158D+02 | 0.66761487D+02 | 0.10000000D+01 |
| 24 | -0.18778311D+02 | -0.70757525D+02 | 0.51979214D+02 | 0.10000000D+01 |

***** NLP Solution Performance Index = 0.81581042D+04 *****

***** Solution Constraint Function Values for Case Number 3 *****

Inequality Constraints

| Element | Value | L.U.B. | L.U.B. - Value |
|---|---|---|---|
| 1 | 0.11313707D+01 | 0.30000000D+01 | 0.18686293D+01 |
| 2 | 0.86453901D+00 | 0.30000000D+01 | 0.21354610D+01 |
| 3 | 0.39460874D+00 | 0.30000000D+01 | 0.26053913D+01 |
| 4 | 0.80930829D+00 | 0.30000000D+01 | 0.21906917D+01 |
| 5 | 0.15000000D+01 | 0.15000000D+01 | 0.00000000D+00 |
| 6 | 0.15000000D+01 | 0.15000000D+01 | 0.00000000D+00 |
| 7 | 0.45038102D+00 | 0.15000000D+01 | 0.10496190D+01 |
| 8 | 0.15000000D+01 | 0.15000000D+01 | 0.00000000D+00 |
| 9 | 0.15000000D+01 | 0.15000000D+01 | 0.00000000D+00 |
| 10 | 0.30379181D+00 | 0.15000000D+01 | 0.11962082D+01 |
| 11 | 0.15000000D+01 | 0.15000000D+01 | 0.00000000D+00 |
| 12 | 0.11733219D+01 | 0.15000000D+01 | 0.32667806D+00 |

***** NLP Special Control 8-Vector Output *****

CV =

```
       0.799999900000000D+00,   0.799999900000000D+00,  -0.327761907761262D+00,
       0.799999900000000D+00,   0.253057956695557D+00,   0.302783304296454D+00,
       0.799999900000000D+00,  -0.122393113759620D+00,

                *****   End Case Number   3   *****



********************************************************************************

        ***************   Start Case Number   4   ***************

                     *****   INPUT DATA   *****

&CDATA
ALPHA   =   1.00000000000000     ,
ACC     =  1.0000000000000000E-007,
ACCQP   =  1.0000000000000000E-012,
CRAN1   =   15.0000000000000     ,
CRAN2   =   20.0000000000000     ,
CRAN3   =   7.00000000000000     ,
CRAN4   =   5.00000000000000     ,
CRAN5   =  2.0000000000000000E-002,
CRAN6   =  2.0000000000000000E-002,
CRAN7   =  0.100000000000000     ,
CRAN8   =  0.100000000000000     ,
CVOUT   =           1,
EPS     =  1.0000000000000000E-007,
GEQ     =   8.00000000000000     ,  0.900000000000000     ,
16*0.000000000000000E+000  ,
GMAX    = 4*3.00000000000000        , 14*1.50000000000000        ,
ICASE   =           4,
IDATA   =           0,
IN      =           5,
IOPT    =           1,
IOUT    =           6,
IPRINT  =           2,
ISEED1  =    78985723,
ISEED2  =    95428381,
ISEED3  =    72919329,
ISEED4  =    63237395,
ITOUT   =           0,
JSEED1  =    81692875,
JSEED2  =    68377297,
JSEED3  =    89672847,
JSEED4  =    98351973,
L       =           1,
LQL     = T,
MAXFUN  =          10,
MAXIT   =         100,
MAXNM   =          10,
ME      =           2,
MG      =          14,
MODE    =           0,
MULT    =           0,
RHOB    =   100.000000000000     ,
STPMIN  =  0.000000000000000E+000,
T       =  0.347887873649597     ,   8.36017310619354     ,  -1.15114569664001
,   31.7600607872009     ,
```

-4.11432027816772 , -1.82969748973846 , 14.7802293300629 , -24.1927772760391 , 9.23694193363190 ,
6.53410136699677 , 14.0349829196930 , 12.5044798851013 , -17.8921127319336 , -10.2217143774033 ,
16.5568113327026 , 2.43249177932739 , -10.1357221603394 , 15.9321832656860 , 0.124055743217468 ,
-1.46232724189758 , -11.3952010869980 , 4.92366194725037 , -27.4548292160034 , 2.60253787040710 ,
4.86136615276337 , -0.199562907218933 , -23.4407806396484 , -11.2429445981979 , 1.20765388011932 ,
21.6330313682556 , 11.9727063179016 , 32.9372560977936 , 23.5570669174194 , -6.74438714981079 ,
-7.93598234653473 , -20.3026217222214 , -1.56858563423157 , -0.499013066291809 , -16.2133514881134 ,
0.281759500503540 , 0.981539487838745 , -25.9140330553055 , 3.80254924297333 , 8.36275160312653 ,
-12.9588425159454 , 5.80339610576630 , -15.1232504844666 , -17.6490908861160 , -15.0048637390137 ,
19.1770482063293 , -0.335381031036377 , -4.31632578372955 , -4.25651073455811 , -12.7643179893494 ,
1.42291009426117 , -11.0011523962021 , 1.54231786727905 , -13.4375256299973 , 3.67589592933655 ,
-9.40093398094177 , -2.99704432487488 , -12.7238953113556 , -6.63215160369873 , 4.11353647708893 ,
-11.9694370031357 , 13.0997180938721 , -25.4669302701950 , -25.2366936206818 , -3.01656186580658 ,
-0.825957655906677 , -27.9852312803268 , -1.86371982097626 , -5.16573786735535 , -2.22911655902863 ,
-2.73599326610565 , -12.1217423677444 , -6.38543546199799 , 14.5632725954056 , -9.25001144409180 ,
-8.79374623298645 , -5.07636487483978 , 20.6084918975830 , -11.9870936870575 , -16.3496994972229 ,
-27.2168767452240 , -12.2997462749481 , 18.8906282186508 , 6.93004667758942 , 1.61862909793854 ,
-12.7537411451340 , -18.0495429039001 , -3.62763941287994 , 2.64945507049561 , 15.3274059295654 ,
-11.3427621126175 , -13.2238149642944 , 4.46783602237701 , -30.9051227569580 , 14.3089932203293 ,
8.13094079494476 , -23.9111328125000 , 2.16139078140259 , 15.2714663743973 , -14.9053382873535 ,
-6.74761354923248 , 9.14280593395233 , -25.4573452472687 , 6.63815975189209 , -8.74195575714111 ,
12.0063996315002 , -19.8212701082230 , 14.7614699602127 , -19.8851406574249 , -6.61797046661377 ,
-6.38747274875641 , -6.31122291088104 , -9.71355617046356 , 24.4924241304398 , -2.60416090488434 ,
3.44814062118530 , -20.1868027448654 , -22.1411293745041 , -5.60317695140839 , -25.7577776908875 ,
6.09270989894867 , 7.43854463100433 , 2.98368871212006 , -9.48373377323151 , -1.90039992332458 ,
11.3497376441956 , 15.2260208129883 , 26.1296272277832 , -2.67392516136169 , 4.84120965003967 ,
-2.35511720180511 , -15.4629689455032 , -1.77556514739990 , 23.6619377136230 , 6.54302597045898 ,
0.385864377021790 , 31.4327752590179 , 10.4875171184540 , 22.4464124441147 , 11.4357429742813 ,
-4.43484902381897 , -10.4405665397644 , 0.688326954841614 , 2.20657050609589 , 5.84744215011597 ,
-2.80650436878204 , -2.33269333839417 , 3.26137959957123 , -9.61982607841492 , -21.6863620281219 ,
-5.18984854221344 , -17.4698179960251 , -22.6904761791229 , 11.6673856973648 , -15.2287226915359 ,
-2.41890549659729 , -11.3121849298477 , 8.87918949127197 , -3.10037732124329 , 0.244961380958557 ,

```
   29.3046790361404     ,  -15.0020790100098     ,   11.5043997764587     ,  -
2.50023722648621     ,  -8.72981309890747     ,
  -9.30526256561279     ,  -15.0490844249725     ,   5.02102971076965     ,  -
12.3688095808029     ,   8.76760959625244     ,
   10.1177400350571     ,  -7.69548416137695     ,  -29.1979032754898     ,
10.1087188720703     , -0.753586888313293     ,
   20.7674050331116     ,  -5.90863347053528     ,  -13.2089871168137     ,
8.71503233909607     ,  -21.2657344341278     ,
   27.1049565076828     ,  -17.5698554515839     ,   7.76686489582062     ,  -
10.2859741449356     ,  -1.69204235076904     ,
   2.47803628444672     ,  -4.27466988563538     ,  -7.12576568126678     ,
WDT     = 24*1.00000000000000        ,
WDX     = 8*0.000000000000000E+000  ,
WX      = 8*0.000000000000000E+000  ,
WZ      = 24*1.00000000000000        ,
XL      = 8*-2.50000000000000       , 4*-2.00000000000000       ,
XL0     = 8*-2.30000000000000       ,
XU      = 8*2.50000000000000        , 4*2.00000000000000        ,
XU0     = 8*2.30000000000000        ,
X0      = 2*2.29999990000000        , -0.778142929077148     ,
2.29999990000000     ,   1.75305795669556     ,
 -1.008510589599609E-003,   2.29999990000000     ,   1.05092883110046     ,
ZA      =  0.242446197789848     ,  -89.2356784291655     ,  -51.7406079178323
,   47.3239303809522     ,
  -59.5512473616095     ,   95.5265427866065     ,   71.2066734864025     ,  -
18.2362282575651     ,  -2.08574452474501     ,
   34.1585067871362     ,  -73.7676519599088     ,  -54.9579413287272     ,  -
178.750136010219     ,  -9.03581786817862     ,
  -11.1812805012057     ,   16.9573528785314     ,  -40.4135437666825     ,  -
72.1670065619007     ,  -22.8437001192555     ,
   5.82943856479929     ,  0.982443093193220     ,   71.6162386820888     ,  -
84.8851581693340     ,  -70.7575249994563
/
```

*****  OUTPUT DATA  *****

*****  X0, ZA, and T are Randomly Defined  *****

| CRAN1 | CRAN2 | CRAN3 | CRAN4 |
|---|---|---|---|
| CRAN5 | CRAN6 | CRAN7 | CRAN8 |
| 0.15000000D+02 | 0.20000000D+02 | 0.70000000D+01 | 0.50000000D+01 |
| 0.20000000D-01 | 0.20000000D-01 | 0.10000000D+00 | 0.10000000D+00 |

*****  Control Vector During Previous Duty Cycle for Case Number  4  *****

| Element | G.L.B. | C.V. | L.U.B. |
|---|---|---|---|
| 1 | -0.23000000D+01 | 0.26932186D+01 | 0.23000000D+01 |
| 1 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 2 | -0.23000000D+01 | 0.79428859D+01 | 0.23000000D+01 |
| 2 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 3 | -0.23000000D+01 | -0.77814293D+00 | 0.23000000D+01 |
| 4 | -0.23000000D+01 | 0.24868137D+01 | 0.23000000D+01 |
| 4 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 5 | -0.23000000D+01 | 0.17530580D+01 | 0.23000000D+01 |
| 6 | -0.23000000D+01 | -0.10085106D-02 | 0.23000000D+01 |
| 7 | -0.23000000D+01 | 0.43974723D+01 | 0.23000000D+01 |
| 7 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 8 | -0.23000000D+01 | 0.10509288D+01 | 0.23000000D+01 |

***** Measurement Vectors from Previous Duty Cycle *****

| Element | Actual | Ideal | Delta |
|---|---|---|---|
| 1 | 0.24244620D+00 | 0.25418529D+00 | -0.11739089D-01 |
| 2 | -0.89235678D+02 | -0.89228662D+02 | -0.70162487D-02 |
| 3 | -0.51740608D+02 | -0.51735457D+02 | -0.51504469D-02 |
| 4 | 0.47323930D+02 | 0.47299922D+02 | 0.24008768D-01 |
| 5 | -0.59551247D+02 | -0.59533028D+02 | -0.18219316D-01 |
| 6 | 0.95526543D+02 | 0.95516371D+02 | 0.10172153D-01 |
| 7 | 0.71206673D+02 | 0.71186083D+02 | 0.20590177D-01 |
| 8 | -0.18236228D+02 | -0.18259437D+02 | 0.23208692D-01 |
| 9 | -0.20857445D+01 | -0.20871238D+01 | 0.13792706D-02 |
| 10 | 0.34158507D+02 | 0.34133524D+02 | 0.24983239D-01 |
| 11 | -0.73767652D+02 | -0.73775161D+02 | 0.75085998D-02 |
| 12 | -0.54957941D+02 | -0.54969551D+02 | 0.11609204D-01 |
| 13 | -0.17875014D+03 | -0.17874639D+03 | -0.37421465D-02 |
| 14 | -0.90358179D+01 | -0.90497655D+01 | 0.13947675D-01 |
| 15 | -0.11181281D+02 | -0.11213480D+02 | 0.32199035D-01 |
| 16 | 0.16957353D+02 | 0.16962016D+02 | -0.46632385D-02 |
| 17 | -0.40413544D+02 | -0.40408497D+02 | -0.50467467D-02 |
| 18 | -0.72167007D+02 | -0.72153392D+02 | -0.13614869D-01 |
| 19 | -0.22843700D+02 | -0.22838498D+02 | -0.52021170D-02 |
| 20 | 0.58294386D+01 | 0.58544154D+01 | -0.24976861D-01 |
| 21 | 0.98244309D+00 | 0.98918038D+00 | -0.67372823D-02 |
| 22 | 0.71616239D+02 | 0.71593499D+02 | 0.22739236D-01 |
| 23 | -0.84885158D+02 | -0.84861559D+02 | -0.23599300D-01 |
| 24 | -0.70757525D+02 | -0.70777564D+02 | 0.20038812D-01 |

***** Initial Control Vector Estimate for Case Number 4 *****

| Element | G.L.B. | C.V. | L.U.B. | Delta C.V. |
|---|---|---|---|---|
| 1 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 2 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 3 | -0.25000000D+01 | -0.77814293D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 4 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 5 | -0.25000000D+01 | 0.17530580D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 6 | -0.25000000D+01 | -0.10085106D-02 | 0.25000000D+01 | 0.00000000D+00 |
| 7 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 8 | -0.25000000D+01 | 0.10509288D+01 | 0.25000000D+01 | 0.00000000D+00 |

***** T-Matrix Output is Suppressed *****

***** Predicted Measurement Vector *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|
| 1 | 0.24244620D+00 | 0.24244620D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 2 | -0.89235678D+02 | -0.89235678D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 3 | -0.51740608D+02 | -0.51740608D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 4 | 0.47323930D+02 | 0.47323930D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 5 | -0.59551247D+02 | -0.59551247D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 6 | 0.95526543D+02 | 0.95526543D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 7 | 0.71206673D+02 | 0.71206673D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 8 | -0.18236228D+02 | -0.18236228D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 9 | -0.20857445D+01 | -0.20857445D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 10 | 0.34158507D+02 | 0.34158507D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 11 | -0.73767652D+02 | -0.73767652D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 12 | -0.54957941D+02 | -0.54957941D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 13 | -0.17875014D+03 | -0.17875014D+03 | 0.00000000D+00 | 0.10000000D+01 |
| 14 | -0.90358179D+01 | -0.90358179D+01 | 0.00000000D+00 | 0.10000000D+01 |

```
  15    -0.11181281D+02   -0.11181281D+02    0.00000000D+00    0.10000000D+01
  16     0.16957353D+02    0.16957353D+02    0.00000000D+00    0.10000000D+01
  17    -0.40413544D+02   -0.40413544D+02    0.00000000D+00    0.10000000D+01
  18    -0.72167007D+02   -0.72167007D+02    0.00000000D+00    0.10000000D+01
  19    -0.22843700D+02   -0.22843700D+02    0.00000000D+00    0.10000000D+01
  20     0.58294386D+01    0.58294386D+01    0.00000000D+00    0.10000000D+01
  21     0.98244309D+00    0.98244309D+00    0.00000000D+00    0.10000000D+01
  22     0.71616239D+02    0.71616239D+02    0.00000000D+00    0.10000000D+01
  23    -0.84885158D+02   -0.84885158D+02    0.00000000D+00    0.10000000D+01
  24    -0.70757525D+02   -0.70757525D+02    0.00000000D+00    0.10000000D+01

 *****   Initial Performance Index  =   0.97772474D+05   *****

*****   Initial Constraint Function Values for Case Number   4   *****

                   Equality Constraints

Element          Value               Target          Value - Target

   1         0.70797282D+01      0.80000000D+01     -0.92027180D+00
   2         0.18446587D+01      0.90000000D+00      0.94465872D+00

                 Inequality Constraints

Element          Value               L.U.B.          L.U.B. - Value

   1         0.32526911D+01      0.30000000D+01     -0.25269105D+00
   2         0.24280663D+01      0.30000000D+01      0.57193370D+00
   3         0.17530582D+01      0.30000000D+01      0.12469418D+01
   4         0.25287252D+01      0.30000000D+01      0.47127484D+00
   5         0.00000000D+00      0.15000000D+01      0.15000000D+01
   6         0.00000000D+00      0.15000000D+01      0.15000000D+01
   7         0.00000000D+00      0.15000000D+01      0.15000000D+01
   8         0.00000000D+00      0.15000000D+01      0.15000000D+01
   9         0.00000000D+00      0.15000000D+01      0.15000000D+01
  10         0.00000000D+00      0.15000000D+01      0.15000000D+01
  11         0.00000000D+00      0.15000000D+01      0.15000000D+01
  12         0.00000000D+00      0.15000000D+01      0.15000000D+01

 *****   Solve the NLPQLP Problem for Case Number   4   *****


 ------------------------------------------------------------------
  START OF THE SEQUENTIAL QUADRATIC PROGRAMMING ALGORITHM
 ------------------------------------------------------------------

  Parameters:
     N      =       8
     M      =      14
     ME     =       2
     MODE   =       0
     ACC    =   0.1000D-06
     ACCQP  =   0.1000D-11
     STPMIN =   0.0000D+00
     RHOB   =   0.1000D+03
     MAXFUN =      10
     MAXNM  =      10
     MAXIT  =     100
     IPRINT =       2

  Output in the following order:
     IT    - iteration number
```

```
  F     - objective function value
  SCV   - sum of constraint violations
  NA    - number of active constraints
  I     - number of line search iterations
  ALPHA - steplength parameter
  DELTA - additional variable to prevent inconsistency
  KKT   - Karush-Kuhn-Tucker optimality criterion


 IT         F          SCV      NA  I    ALPHA     DELTA     KKT
-------------------------------------------------------------------
  1  0.97772474D+05  0.21D+01   14  0  0.00D+00  0.00D+00  0.47D+06
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  2  0.79236322D+05  0.17D+01    3  2  0.10D+00  0.00D+00  0.64D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  3  0.72452342D+05  0.14D+01    6  2  0.26D+00  0.00D+00  0.85D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  4  0.64908517D+05  0.10D+01    9  2  0.33D+00  0.00D+00  0.62D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  5  0.57816401D+05  0.98D+00    9  2  0.39D+00  0.00D+00  0.21D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  6  0.55006724D+05  0.30D+00    5  1  0.10D+01  0.00D+00  0.13D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  7  0.50624153D+05  0.30D+00    6  1  0.10D+01  0.00D+00  0.46D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  8  0.50742542D+05  0.24D+00    7  2  0.28D+00  0.00D+00  0.69D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  9  0.50453367D+05  0.21D+00    7  2  0.19D+00  0.00D+00  0.21D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 10  0.51288664D+05  0.34D-01    5  1  0.10D+01  0.00D+00  0.71D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 11  0.51155452D+05  0.58D-03    5  1  0.10D+01  0.00D+00  0.31D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 12  0.51144425D+05  0.76D-03    6  2  0.26D+00  0.00D+00  0.28D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 13  0.51106075D+05  0.69D-03    6  2  0.29D+00  0.00D+00  0.12D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 14  0.51103759D+05  0.34D-04    4  1  0.10D+01  0.00D+00  0.38D+00
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 15  0.51103950D+05  0.78D-09    4  1  0.10D+01  0.00D+00  0.87D-05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 16  0.51103950D+05  0.19D-11    4  1  0.10D+01  0.00D+00  0.21D-07
```

```
--- Final Convergence Analysis at Last Iterate ---

  Objective function value:      F(X)  =  0.51103950D+05
  Solution values:               X     =
     0.25000000D+01  0.13963518D+01 -0.22781429D+01  0.19275644D+01
     0.25305796D+00 -0.55830624D+00  0.17381817D+01 -0.27834617D+00
  Distances from lower bounds:   X-XL  =
     0.50000000D+01  0.38963518D+01  0.22185707D+00  0.44275644D+01
     0.27530580D+01  0.19416938D+01  0.42381817D+01  0.22216538D+01
  Distances from upper bounds:   XU-X  =
     0.00000000D+00  0.11036482D+01  0.47781429D+01  0.57243559D+00
     0.22469420D+01  0.30583062D+01  0.76181826D+00  0.27783462D+01
  Multipliers for lower bounds:  U     =
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
  Multipliers for upper bounds:  U     =
     0.15403455D+04  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
  Constraint values:             G(X)  =
    -0.17763568D-14  0.18928192D-11  0.13647100D+00  0.15801653D-01
     0.23870202D+01  0.12396727D+01  0.12999999D+01  0.59635189D+00
     0.00000000D+00  0.11275645D+01  0.00000000D+00  0.94270227D+00
     0.93818184D+00  0.17072500D+00
  Multipliers for constraints:   U     =
    -0.61025674D+04 -0.56632928D+04  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.19435354D+04  0.00000000D+00  0.10442023D+05  0.00000000D+00
     0.00000000D+00  0.00000000D+00
  Number of function calls:      NFUNC =      24
  Number of gradient calls:      NGRAD =      16
  Number of calls of QP solver:  NQL   =      16


          *****   Completed CALL to NLPQLP   *****


     *****   Number of Function Evaluations  =    152   *****


    *****   Solution Control Vector for Case Number   4   *****

Element     G.L.B.            C.V.              L.U.B.            Delta C.V.

   1    -0.25000000D+01    0.25000000D+01    0.25000000D+01    0.20000010D+00
   2    -0.25000000D+01    0.13963518D+01    0.25000000D+01   -0.90364811D+00
   3    -0.25000000D+01   -0.22781429D+01    0.25000000D+01   -0.15000000D+01
   4    -0.25000000D+01    0.19275644D+01    0.25000000D+01   -0.37243549D+00
   5    -0.25000000D+01    0.25305796D+00    0.25000000D+01   -0.15000000D+01
   6    -0.25000000D+01   -0.55830624D+00    0.25000000D+01   -0.55729773D+00
   7    -0.25000000D+01    0.17381817D+01    0.25000000D+01   -0.56181816D+00
   8    -0.25000000D+01   -0.27834617D+00    0.25000000D+01   -0.13292750D+01


             *****   Predicted Measurement Vector   *****

Element     Z Vector          ZA Vector         Delta Z           Diag[W]

   1     0.38994465D+02    0.24244620D+00    0.38752018D+02    0.10000000D+01
   2    -0.38386841D+02   -0.89235678D+02    0.50848837D+02    0.10000000D+01
   3    -0.27989764D+02   -0.51740608D+02    0.23750844D+02    0.10000000D+01
   4     0.69068987D+02    0.47323930D+02    0.21745056D+02    0.10000000D+01
   5    -0.70748823D+01   -0.59551247D+02    0.52476365D+02    0.10000000D+01
   6     0.71869164D+02    0.95526543D+02   -0.23657379D+02    0.10000000D+01
```

```
    7     0.27945564D+02    0.71206673D+02   -0.43261110D+02    0.10000000D+01
    8     0.29787389D+01   -0.18236228D+02    0.21214967D+02    0.10000000D+01
    9     0.33448629D+02   -0.20857445D+01    0.35534374D+02    0.10000000D+01
   10     0.32747969D+02    0.34158507D+02   -0.14105380D+01    0.10000000D+01
   11    -0.31220677D+02   -0.73767652D+02    0.42546975D+02    0.10000000D+01
   12    -0.56229960D+02   -0.54957941D+02   -0.12720188D+01    0.10000000D+01
   13    -0.13107379D+03   -0.17875014D+03    0.47676348D+02    0.10000000D+01
   14     0.33333068D+01   -0.90358179D+01    0.12369125D+02    0.10000000D+01
   15     0.37709441D+02   -0.11181281D+02    0.48890721D+02    0.10000000D+01
   16     0.24540205D+02    0.16957353D+02    0.75828518D+01    0.10000000D+01
   17    -0.24833653D+02   -0.40413544D+02    0.15579891D+02    0.10000000D+01
   18    -0.45356143D+02   -0.72167007D+02    0.26810863D+02    0.10000000D+01
   19     0.16019976D+02   -0.22843700D+02    0.38863676D+02    0.10000000D+01
   20     0.59973147D+02    0.58294386D+01    0.54143708D+02    0.10000000D+01
   21    -0.32100644D+01    0.98244309D+00   -0.41925075D+01    0.10000000D+01
   22     0.25438354D+02    0.71616239D+02   -0.46177885D+02    0.10000000D+01
   23    -0.39891999D+02   -0.84885158D+02    0.44993160D+02    0.10000000D+01
   24    -0.47236396D+02   -0.70757525D+02    0.23521129D+02    0.10000000D+01


*****   NLP Solution Performance Index  =   0.51103950D+05   *****


*****   Solution Constraint Function Values for Case Number   4   *****

                  Equality Constraints

Element          Value               Target          Value - Target

   1         0.80000000D+01      0.80000000D+01      0.17763568D-14
   2         0.90000000D+00      0.90000000D+00     -0.18928192D-11

                Inequality Constraints

Element          Value               L.U.B.          L.U.B. - Value

   1         0.28635290D+01      0.30000000D+01      0.13647100D+00
   2         0.29841983D+01      0.30000000D+01      0.15801653D-01
   3         0.61297976D+00      0.30000000D+01      0.23870202D+01
   4         0.17603273D+01      0.30000000D+01      0.12396727D+01
   5         0.20000010D+00      0.15000000D+01      0.12999999D+01
   6         0.90364811D+00      0.15000000D+01      0.59635189D+00
   7         0.15000000D+01      0.15000000D+01      0.00000000D+00
   8         0.37243549D+00      0.15000000D+01      0.11275645D+01
   9         0.15000000D+01      0.15000000D+01      0.00000000D+00
  10         0.55729773D+00      0.15000000D+01      0.94270227D+00
  11         0.56181816D+00      0.15000000D+01      0.93818184D+00
  12         0.13292750D+01      0.15000000D+01      0.17072500D+00


            *****   NLP Special Control  8-Vector Output   *****

CV =
     0.250000000000000D+01,   0.139635179346428D+01,  -0.227814292907715D+01,
     0.192756441408607D+01,   0.253057956695557D+00,  -0.558306239718422D+00,
     0.173818174446880D+01,  -0.278346172644618D+00,


              *****   End Case Number   4   *****

END of RUN.


 ***********  END  **********   END   *********
```

## B.3.4 Direct Input and Corresponding Output Data

**for the**
**(24 x 8) T-Matrix NLP Control Problem**
**on the**
**Hewlett-Packard Alpha Mainframe Computer**

```
   *********   INPUT    *****    INPUT   ********


$CDATA
!
!  *****   Start of Case  1  Input Data   *****
!                  NO Constraints
!
 ACC     =    1.0D-8,
 ACC     =    1.0D-7,
 ACCQP   =    1.0D-12,
 CRAN1   =   15.0,
 CRAN2   =   20.0,
 CRAN3   =    7.0,
 CRAN4   =    5.0,
 CRAN5   =    0.02,
 CRAN6   =    0.02,
 CVOUT   =      0,
 CVOUT   =      1,
 GEQ     =    8.00,  0.90,
 GMAX    =    3.00,  3.00,  3.00,  3.00,
 GMAX(5) =    1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,
 GMAX(5) =    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
 ICASE   =      1,
 IDATA   =      0,
 IDATA   =      1,
 IOPT    =      3,
 IOPT    =      1,
 IOPT    =      2,
 ITOUT   =      0,
 ITOUT   =      1,
 ISEED1  =  78985723,
 ISEED2  =  95428381,
 ISEED3  =  72919329,
 ISEED4  =  63237395,
 JSEED1  =  81692875,
 JSEED2  =  68377297,
 JSEED3  =  89672847,
 JSEED4  =  98351973,
 LQL     =   .FALSE.,
 LQL     =   .TRUE.,
 MAXNM   =    0,
 MAXNM   =   10,
 ME      =    0,
 MG      =    0,
 RHOB    =    0.0,
 RHOB    =  100.0,
 XL0     =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XU0     =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XL      =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XU      =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
!
!
 T   =   0.347887873649597,     8.36017310619354,    -1.15114569664001,
        31.7600607872009,      -4.11432027816772,    -1.82969748973846,
        14.7802293300629,     -24.1927772760391,      9.23694193363190,
         6.53410136699677,     14.0349829196930,     12.5044798851013,
       -17.8921127319336,     -10.2217143774033,     16.5568113327026,
         2.43249177932739,    -10.1357221603394,     15.9321832656860,
         0.124055743217468,    -1.46232724189758,   -11.3952010869980,
         4.92366194725037,    -27.4548292160034,      2.60253787040710,
!
         4.86136615276337,     -0.199562907218933,  -23.4407806396484,
       -11.2429445981979,       1.20765388011932,    21.6330313682556,
```

```
        11.9727063179016,      32.9372560977936,     23.5570669174194,
        -6.74438714981079,     -7.93598234653473,   -20.3026217222214,
        -1.56858563423157,     -0.499013066291809,  -16.2133514881134,
         0.281759500503540,     0.981539487838745,  -25.9140330553055,
         3.80254924297333,      8.36275160312653,   -12.9588425159454,
         5.80339610576630,    -15.1232504844666,    -17.6490908861160,
!
       -15.0048637390137,      19.1770482063293,     -0.335381031036377,
        -4.31632578372955,     -4.25651073455811,   -12.7643179893494,
         1.42291009426117,    -11.0011523962021,      1.54231786727905,
       -13.4375256299973,       3.67589592933655,    -9.40093398094177,
        -2.99704432487488,    -12.7238953113556,     -6.63215160369873,
         4.11353647708893,    -11.9694370031357,     13.0997180938721,
       -25.4669302701950,     -25.2366936206818,     -3.01656186580658,
        -0.825957655906677,   -27.9852312803268,     -1.86371982097626,
!
        -5.16573786735535,     -2.22911655902863,    -2.73599326610565,
       -12.1217423677444,      -6.38543546199799,    14.5632725954056,
        -9.25001144409180,     -8.79374623298645,    -5.07636487483978,
        20.6084918975830,     -11.9870936870575,    -16.3496994972229,
       -27.2168767452240,     -12.2997462749481,     18.8906282186508,
         6.93004667758942,      1.61862909793854,   -12.7537411451340,
       -18.0495429039001,      -3.62763941287994,     2.64945507049561,
        15.3274059295654,     -11.3427621126175,    -13.2238149642944,
!
         4.46783602237701,    -30.9051227569580,     14.3089932203293,
         8.13094079494476,    -23.9111328125000,      2.16139078140259,
        15.2714663743973,     -14.9053382873535,     -6.74761354923248,
         9.14280593395233,    -25.4573452472687,      6.63815975189209,
        -8.74195575714111,     12.0063996315002,    -19.8212701082230,
        14.7614699602127,     -19.8851406574249,     -6.61797046661377,
        -6.38747274875641,     -6.31122291088104,    -9.71355617046356,
        24.4924241304398,      -2.60416090488434,     3.44814062118530,
!
       -20.1868027448654,     -22.1411293745041,     -5.60317695140839,
       -25.7577776908875,       6.09270989894867,     7.43854463100433,
         2.98368871212006,     -9.48373377323151,    -1.90039992332458,
        11.3497376441956,      15.2260208129883,     26.1296272277832,
        -2.67392516136169,      4.84120965003967,    -2.35511720180511,
       -15.4629689455032,      -1.77556514739990,    23.6619377136230,
         6.54302597045898,      0.385864377021790,   31.4327752590179,
        10.4875171184540,      22.4464124441147,     11.4357429742813,
!
        -4.43484902381897,    -10.4405665397644,      0.688326954841614,
         2.20657050609589,      5.84744215011597,    -2.80650436878204,
        -2.33269333839417,      3.26137959957123,    -9.61982607841492,
       -21.6863620281219,      -5.18984854221344,   -17.4698179960251,
       -22.6904761791229,      11.6673856973648,    -15.2287226915359,
        -2.41890549659729,    -11.3121849298477,      8.87918949127197,
        -3.10037732124329,      0.244961380958557,   29.3046790361404,
       -15.0020790100098,      11.5043997764587,     -2.50023722648621,
!
        -8.72981309890747,     -9.30526256561279,   -15.0490844249725,
         5.02102971076965,    -12.3688095808029,      8.76760959625244,
        10.1177400350571,      -7.69548416137695,   -29.1979032754898,
        10.1087188720703,      -0.753586888313293,   20.7674050331116,
        -5.90863347053528,    -13.2089871168137,      8.71503233909607,
       -21.2657344341278,      27.1049565076828,    -17.5698554515839,
         7.76686489582062,    -10.2859741449356,     -1.69204235076904,
         2.47803628444672,     -4.27466988563538,    -7.12576568126678,
!
!
 X0  =   2.29999990000000,      2.29999990000000,    -0.778142929077148,
         2.29999990000000,      1.75305795669556, -1.008510589599609D-3,
         2.29999990000000,      1.05092883110046,
```

```
!
!
 ZA  =   0.242446197789848,   -89.2356784291655,    -51.7406079178323,
        47.3239303809522,     -59.5512473616095,     95.5265427866065,
        71.2066734864025,     -18.2362282575651,     -2.08574452474501,
        34.1585067871362,     -73.7676519599088,    -54.9579413287272,
      -178.750136010219,       -9.03581786817862,   -11.1812805012057,
        16.9573528785314,     -40.4135437666825,    -72.1670065619007,
       -22.8437001192555,       5.82943856479929,     0.982443093193220,
        71.6162386820888,     -84.8851581693340,    -70.7575249994563,
!
!
 MULT    =         0,
 MULT    =         1,
!
!  *****   End of Case  1  Input Data   *****
!
$END
$CDATA
!
!  *****   Start of Case  2  Input Data   *****
!             Two Equality onstraints
!            NO Inequality Constraints
!
 ACC     =    1.0D-8,
 ACC     =    1.0D-7,
 ACCQP   =    1.0D-12,
 CRAN1   =   15.0,
 CRAN2   =   20.0,
 CRAN3   =    7.0,
 CRAN4   =    5.0,
 CRAN5   =    0.02,
 CRAN6   =    0.02,
 CVOUT   =      0,
 CVOUT   =      1,
 GEQ     =    8.00,  0.90,
 GMAX    =    3.00,  3.00,  3.00,  3.00,
 GMAX(5) =    1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,
 GMAX(5) =    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
 IDATA   =      0,
 IDATA   =      1,
 IOPT    =      2,
 IOPT    =      3,
 IOPT    =      1,
 ITOUT   =      1,
 ITOUT   =      0,
 ISEED1  =  78985723,
 ISEED2  =  95428381,
 ISEED3  =  72919329,
 ISEED4  =  63237395,
 JSEED1  =  81692875,
 JSEED2  =  68377297,
 JSEED3  =  89672847,
 JSEED4  =  98351973,
 LQL     =   .FALSE.,
 LQL     =   .TRUE.,
 MAXNM   =    0,
 MAXNM   =   10,
 ME      =    2,
 MG      =    2,
 RHOB    =    0.0,
 RHOB    =  100.0,
 XL0     =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XU0     =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XL      =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
```

```
 XU      =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 MULT    =         0,
 MULT    =         1,
!
!  *****   End of Case  2  Input Data   *****
!
$END
$CDATA
!
!  *****   Start of Case  3  Input Data   *****
!             NO Equality onstraints
!            12 Inequality Constraints
!
 ACC     =    1.0D-8,
 ACC     =    1.0D-7,
 ACCQP   =    1.0D-12,
 CRAN1   =   15.0,
 CRAN2   =   20.0,
 CRAN3   =    7.0,
 CRAN4   =    5.0,
 CRAN5   =    0.02,
 CRAN6   =    0.02,
 CVOUT   =      0,
 CVOUT   =      1,
 GEQ     =    8.00,  0.90,
 GMAX    =    3.00,  3.00,  3.00,  3.00,
 GMAX(5) =    1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,
 GMAX(5) =    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
 IDATA   =      0,
 IDATA   =      1,
 IOPT    =      2,
 IOPT    =      3,
 IOPT    =      1,
 ITOUT   =      1,
 ITOUT   =      0,
 ISEED1  =  78985723,
 ISEED2  =  95428381,
 ISEED3  =  72919329,
 ISEED4  =  63237395,
 JSEED1  =  81692875,
 JSEED2  =  68377297,
 JSEED3  =  89672847,
 JSEED4  =  98351973,
 LQL     =   .FALSE.,
 LQL     =   .TRUE.,
 MAXNM   =    0,
 MAXNM   =   10,
 ME      =    0,
 MG      =   12,
 RHOB    =    0.0,
 RHOB    =  100.0,
 XL0     =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XU0     =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XL      =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XU      =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 MULT    =         0,
 MULT    =         1,
!
!  *****   End of Case  3  Input Data   *****
!
$END
$CDATA
!
!  *****   Start of Case  4  Input Data   *****
!             Two Equality onstraints
```

```
!            12 Inequality Constraints
!
 ACC     =    1.0D-8,
 ACC     =    1.0D-7,
 ACCQP   =    1.0D-12,
 CRAN1   =   15.0,
 CRAN2   =   20.0,
 CRAN3   =    7.0,
 CRAN4   =    5.0,
 CRAN5   =    0.02,
 CRAN6   =    0.02,
 CVOUT   =      0,
 CVOUT   =      1,
 GEQ     =    8.00,  0.90,
 GMAX    =    3.00,  3.00,  3.00,  3.00,
 GMAX(5) =    1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,
 GMAX(5) =    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
 IDATA   =      0,
 IDATA   =      1,
 IOPT    =      2,
 IOPT    =      3,
 IOPT    =      1,
 ITOUT   =      1,
 ITOUT   =      0,
 ISEED1  =  78985723,
 ISEED2  =  95428381,
 ISEED3  =  72919329,
 ISEED4  =  63237395,
 JSEED1  =  81692875,
 JSEED2  =  68377297,
 JSEED3  =  89672847,
 JSEED4  =  98351973,
 LQL     =   .FALSE.,
 LQL     =   .TRUE.,
 MAXNM   =    0,
 MAXNM   =   10,
 ME      =    2,
 MG      =   14,
 RHOB    =    0.0,
 RHOB    =  100.0,
 XL0     =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XU0     =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XL      =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XU      =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 MULT    =         1,
 MULT    =         0,
!
!  *****   End of Case  4  Input Data   *****
!
$END


   *********   OUTPUT   *****   OUTPUT   ********

RUN the NLP24x8 Case.

START RUN.



********************************************************************************
```

```
        ***************   Start Case Number   1   ***************

                        *****   INPUT DATA   *****

&CDATA
ALPHA   =   1.00000000000000     ,
ACC     =  1.0000000000000000E-007,
ACCQP   =  1.0000000000000000E-012,
CRAN1   =   15.0000000000000     ,
CRAN2   =   20.0000000000000     ,
CRAN3   =   7.00000000000000     ,
CRAN4   =   5.00000000000000     ,
CRAN5   =  2.0000000000000000E-002,
CRAN6   =  2.0000000000000000E-002,
CRAN7   =  0.100000000000000     ,
CRAN8   =  0.100000000000000     ,
CVOUT   =           1,
EPS     =  1.0000000000000000E-007,
GEQ     =   8.00000000000000     ,  0.900000000000000     ,
16*0.000000000000000E+000  ,
GMAX    = 4*3.00000000000000        , 14*1.50000000000000        ,
ICASE   =           1,
IDATA   =           1,
IN      =           5,
IOPT    =           2,
IOUT    =           6,
IPRINT  =           2,
ISEED1  =    78985723,
ISEED2  =    95428381,
ISEED3  =    72919329,
ISEED4  =    63237395,
ITOUT   =           1,
JSEED1  =    81692875,
JSEED2  =    68377297,
JSEED3  =    89672847,
JSEED4  =    98351973,
L       =           1,
LQL     = T,
MAXFUN  =          10,
MAXIT   =         100,
MAXNM   =          10,
ME      =           0,
MG      =           0,
MODE    =           0,
MULT    =           1,
RHOB    =   100.000000000000     ,
STPMIN  =  0.0000000000000000E+000,
T       =  0.347887873649597     ,   8.36017310619354     ,  -1.15114569664001
,   31.7600607872009     ,
  -4.11432027816772     ,  -1.82969748973846     ,   14.7802293300629     ,  -
24.1927772760391     ,   9.23694193363190     ,
   6.53410136699677     ,   14.0349829196930     ,   12.5044798851013     ,  -
17.8921127319336     ,  -10.2217143774033     ,
   16.5568113327026     ,   2.43249177932739     ,  -10.1357221603394     ,
15.9321832656860     ,  0.124055743217468     ,
  -1.46232724189758     ,  -11.3952010869980     ,   4.92366194725037     ,  -
27.4548292160034     ,   2.60253787040710     ,
   4.86136615276337     , -0.199562907218933     ,  -23.4407806396484     ,  -
11.2429445981979     ,   1.20765388011932     ,
   21.6330313682556     ,   11.9727063179016     ,   32.9372560977936     ,
23.5570669174194     ,  -6.74438714981079     ,
```

```
  -7.93598234653473     ,  -20.3026217222214     ,  -1.56858563423157     , -
0.499013066291809     ,  -16.2133514881134     ,
  0.281759500503540     ,  0.981539487838745     ,  -25.9140330553055     ,
3.80254924297333     ,   8.36275160312653     ,
  -12.9588425159454     ,   5.80339610576630     ,  -15.1232504844666     ,  -
17.6490908861160     ,  -15.0048637390137     ,
   19.1770482063293     , -0.335381031036377     ,  -4.31632578372955     ,  -
4.25651073455811     ,  -12.7643179893494     ,
   1.42291009426117     ,  -11.0011523962021     ,   1.54231786727905     ,  -
13.4375256299973     ,   3.67589592933655     ,
  -9.40093398094177     ,  -2.99704432487488     ,  -12.7238953113556     ,  -
6.63215160369873     ,   4.11353647708893     ,
  -11.9694370031357     ,   13.0997180938721     ,  -25.4669302701950     ,  -
25.2366936206818     ,  -3.01656186580658     ,
 -0.825957655906677     ,  -27.9852312803268     ,  -1.86371982097626     ,  -
5.16573786735535     ,  -2.22911655902863     ,
  -2.73599326610565     ,  -12.1217423677444     ,  -6.38543546199799     ,
14.5632725954056     ,  -9.25001144409180     ,
  -8.79374623298645     ,  -5.07636487483978     ,   20.6084918975830     ,  -
11.9870936870575     ,  -16.3496994972229     ,
  -27.2168767452240     ,  -12.2997462749481     ,   18.8906282186508     ,
6.93004667758942     ,   1.61862909793854     ,
  -12.7537411451340     ,  -18.0495429039001     ,  -3.62763941287994     ,
2.64945507049561     ,   15.3274059295654     ,
  -11.3427621126175     ,  -13.2238149642944     ,   4.46783602237701     ,  -
30.9051227569580     ,   14.3089932203293     ,
   8.13094079494476     ,  -23.9111328125000     ,   2.16139078140259     ,
15.2714663743973     ,  -14.9053382873535     ,
  -6.74761354923248     ,   9.14280593395233     ,  -25.4573452472687     ,
6.63815975189209     ,  -8.74195575714111     ,
   12.0063996315002     ,  -19.8212701082230     ,   14.7614699602127     ,  -
19.8851406574249     ,  -6.61797046661377     ,
  -6.38747274875641     ,  -6.31122291088104     ,  -9.71355617046356     ,
24.4924241304398     ,  -2.60416090488434     ,
   3.44814062118530     ,  -20.1868027448654     ,  -22.1411293745041     ,  -
5.60317695140839     ,  -25.7577776908875     ,
   6.09270989894867     ,   7.43854463100433     ,   2.98368871212006     ,  -
9.48373377323151     ,  -1.90039992332458     ,
   11.3497376441956     ,   15.2260208129883     ,   26.1296272277832     ,  -
2.67392516136169     ,   4.84120965003967     ,
  -2.35511720180511     ,  -15.4629689455032     ,  -1.77556514739990     ,
23.6619377136230     ,   6.54302597045898     ,
  0.385864377021790     ,   31.4327752590179     ,   10.4875171184540     ,
22.4464124441147     ,   11.4357429742813     ,
  -4.43484902381897     ,  -10.4405665397644     ,  0.688326954841614     ,
2.20657050609589     ,   5.84744215011597     ,
  -2.80650436878204     ,  -2.33269333839417     ,   3.26137959957123     ,  -
9.61982607841492     ,  -21.6863620281219     ,
  -5.18984854221344     ,  -17.4698179960251     ,  -22.6904761791229     ,
11.6673856973648     ,  -15.2287226915359     ,
  -2.41890549659729     ,  -11.3121849298477     ,   8.87918949127197     ,  -
3.10037732124329     ,  0.244961380958557     ,
   29.3046790361404     ,  -15.0020790100098     ,   11.5043997764587     ,  -
2.50023722648621     ,  -8.72981309890747     ,
  -9.30526256561279     ,  -15.0490844249725     ,   5.02102971076965     ,  -
12.3688095808029     ,   8.76760959625244     ,
   10.1177400350571     ,  -7.69548416137695     ,  -29.1979032754898     ,
10.1087188720703     , -0.753586888313293     ,
   20.7674050331116     ,  -5.90863347053528     ,  -13.2089871168137     ,
8.71503233909607     ,  -21.2657344341278     ,
   27.1049565076828     ,  -17.5698554515839     ,   7.76686489582062     ,  -
10.2859741449356     ,  -1.69204235076904     ,
   2.47803628444672     ,  -4.27466988563538     ,  -7.12576568126678     ,
WDT     = 24*1.00000000000000        ,
WDX     = 8*0.000000000000000E+000  ,
```

```
WX      = 8*0.000000000000000E+000  ,
WZ      = 24*1.00000000000000        ,
XL      = 8*-2.50000000000000       , 4*-2.00000000000000       ,
XL0     = 8*-2.30000000000000       ,
XU      = 8*2.50000000000000        , 4*2.00000000000000        ,
XU0     = 8*2.30000000000000        ,
X0      = 2*2.29999990000000        , -0.778142929077148     ,
2.29999990000000     ,   1.75305795669556     ,
 -1.008510589599609E-003,   2.29999990000000     ,   1.05092883110046     ,
ZA      =  0.242446197789848     ,  -89.2356784291655     ,  -51.7406079178323
,   47.3239303809522     ,
  -59.5512473616095     ,   95.5265427866065     ,   71.2066734864025     ,  -
18.2362282575651     ,  -2.08574452474501     ,
   34.1585067871362     ,  -73.7676519599088     ,  -54.9579413287272     ,  -
178.750136010219     ,  -9.03581786817862     ,
  -11.1812805012057     ,   16.9573528785314     ,  -40.4135437666825     ,  -
72.1670065619007     ,  -22.8437001192555     ,
   5.82943856479929     ,  0.982443093193220     ,   71.6162386820888     ,  -
84.8851581693340     ,  -70.7575249994563
/
```

*****  OUTPUT DATA  *****

*****  X0, ZA, and T are Directly Input  *****

*****  Control Vector During Previous Duty Cycle for Case Number  1  *****

| Element | G.L.B. | C.V. | L.U.B. |
|---|---|---|---|
| 1 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 2 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 3 | -0.23000000D+01 | -0.77814293D+00 | 0.23000000D+01 |
| 4 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 5 | -0.23000000D+01 | 0.17530580D+01 | 0.23000000D+01 |
| 6 | -0.23000000D+01 | -0.10085106D-02 | 0.23000000D+01 |
| 7 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 8 | -0.23000000D+01 | 0.10509288D+01 | 0.23000000D+01 |

*****  Measurement Vectors from Previous Duty Cycle  *****

| Element | Actual | Ideal | Delta |
|---|---|---|---|
| 1 | 0.24244620D+00 | 0.25418529D+00 | -0.11739089D-01 |
| 2 | -0.89235678D+02 | -0.89228662D+02 | -0.70162487D-02 |
| 3 | -0.51740608D+02 | -0.51735457D+02 | -0.51504469D-02 |
| 4 | 0.47323930D+02 | 0.47299922D+02 | 0.24008768D-01 |
| 5 | -0.59551247D+02 | -0.59533028D+02 | -0.18219316D-01 |
| 6 | 0.95526543D+02 | 0.95516371D+02 | 0.10172153D-01 |
| 7 | 0.71206673D+02 | 0.71186083D+02 | 0.20590177D-01 |
| 8 | -0.18236228D+02 | -0.18259437D+02 | 0.23208692D-01 |
| 9 | -0.20857445D+01 | -0.20871238D+01 | 0.13792706D-02 |
| 10 | 0.34158507D+02 | 0.34133524D+02 | 0.24983239D-01 |
| 11 | -0.73767652D+02 | -0.73775161D+02 | 0.75085998D-02 |
| 12 | -0.54957941D+02 | -0.54969551D+02 | 0.11609204D-01 |
| 13 | -0.17875014D+03 | -0.17874639D+03 | -0.37421465D-02 |
| 14 | -0.90358179D+01 | -0.90497655D+01 | 0.13947675D-01 |
| 15 | -0.11181281D+02 | -0.11213480D+02 | 0.32199035D-01 |
| 16 | 0.16957353D+02 | 0.16962016D+02 | -0.46632385D-02 |
| 17 | -0.40413544D+02 | -0.40408497D+02 | -0.50467467D-02 |
| 18 | -0.72167007D+02 | -0.72153392D+02 | -0.13614869D-01 |
| 19 | -0.22843700D+02 | -0.22838498D+02 | -0.52021170D-02 |
| 20 | 0.58294386D+01 | 0.58544154D+01 | -0.24976861D-01 |

| | | | |
|---|---|---|---|
| 21 | 0.98244309D+00 | 0.98918038D+00 | -0.67372823D-02 |
| 22 | 0.71616239D+02 | 0.71593499D+02 | 0.22739236D-01 |
| 23 | -0.84885158D+02 | -0.84861559D+02 | -0.23599300D-01 |
| 24 | -0.70757525D+02 | -0.70777564D+02 | 0.20038812D-01 |

***** Initial Control Vector Estimate for Case Number 1 *****

| Element | G.L.B. | C.V. | L.U.B. | Delta C.V. |
|---|---|---|---|---|
| 1 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 2 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 3 | -0.25000000D+01 | -0.77814293D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 4 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 5 | -0.25000000D+01 | 0.17530580D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 6 | -0.25000000D+01 | -0.10085106D-02 | 0.25000000D+01 | 0.00000000D+00 |
| 7 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 8 | -0.25000000D+01 | 0.10509288D+01 | 0.25000000D+01 | 0.00000000D+00 |

Row ***** T-Matrix *****

| Row | | | | |
|---|---|---|---|---|
| 1 | 0.34788787D+00 | 0.48613662D+01 | -0.15004864D+02 | -0.51657379D+01 |
| | 0.44678360D+01 | -0.20186803D+02 | -0.44348490D+01 | -0.87298131D+01 |
| 2 | 0.83601731D+01 | -0.19956291D+00 | 0.19177048D+02 | -0.22291166D+01 |
| | -0.30905123D+02 | -0.22141129D+02 | -0.10440567D+02 | -0.93052626D+01 |
| 3 | -0.11511457D+01 | -0.23440781D+02 | -0.33538103D+00 | -0.27359933D+01 |
| | 0.14308993D+02 | -0.56031770D+01 | 0.68832695D+00 | -0.15049084D+02 |
| 4 | 0.31760061D+02 | -0.11242945D+02 | -0.43163258D+01 | -0.12121742D+02 |
| | 0.81309408D+01 | -0.25757778D+02 | 0.22065705D+01 | 0.50210297D+01 |
| 5 | -0.41143203D+01 | 0.12076539D+01 | -0.42565107D+01 | -0.63854355D+01 |
| | -0.23911133D+02 | 0.60927099D+01 | 0.58474422D+01 | -0.12368810D+02 |
| 6 | -0.18296975D+01 | 0.21633031D+02 | -0.12764318D+02 | 0.14563273D+02 |
| | 0.21613908D+01 | 0.74385446D+01 | -0.28065044D+01 | 0.87676096D+01 |
| 7 | 0.14780229D+02 | 0.11972706D+02 | 0.14229101D+01 | -0.92500114D+01 |
| | 0.15271466D+02 | 0.29836887D+01 | -0.23326933D+01 | 0.10117740D+02 |
| 8 | -0.24192777D+02 | 0.32937256D+02 | -0.11001152D+02 | -0.87937462D+01 |
| | -0.14905338D+02 | -0.94837338D+01 | 0.32613796D+01 | -0.76954842D+01 |
| 9 | 0.92369419D+01 | 0.23557067D+02 | 0.15423179D+01 | -0.50763649D+01 |
| | -0.67476135D+01 | -0.19003999D+01 | -0.96198261D+01 | -0.29197903D+02 |
| 10 | 0.65341014D+01 | -0.67443871D+01 | -0.13437526D+02 | 0.20608492D+02 |
| | 0.91428059D+01 | 0.11349738D+02 | -0.21686362D+02 | 0.10108719D+02 |
| 11 | 0.14034983D+02 | -0.79359823D+01 | 0.36758959D+01 | -0.11987094D+02 |
| | -0.25457345D+02 | 0.15226021D+02 | -0.51898485D+01 | -0.75358689D+00 |
| 12 | 0.12504480D+02 | -0.20302622D+02 | -0.94009340D+01 | -0.16349699D+02 |
| | 0.66381598D+01 | 0.26129627D+02 | -0.17469818D+02 | 0.20767405D+02 |
| 13 | -0.17892113D+02 | -0.15685856D+01 | -0.29970443D+01 | -0.27216877D+02 |
| | -0.87419558D+01 | -0.26739252D+01 | -0.22690476D+02 | -0.59086335D+01 |
| 14 | -0.10221714D+02 | -0.49901307D+00 | -0.12723895D+02 | -0.12299746D+02 |
| | 0.12006400D+02 | 0.48412097D+01 | 0.11667386D+02 | -0.13208987D+02 |
| 15 | 0.16556811D+02 | -0.16213351D+02 | -0.66321516D+01 | 0.18890628D+02 |
| | -0.19821270D+02 | -0.23551172D+01 | -0.15228723D+02 | 0.87150323D+01 |

| | | | | |
|---|---|---|---|---|
| 16 | 0.24324918D+01 | 0.28175950D+00 | 0.41135365D+01 | 0.69300467D+01 |
| | 0.14761470D+02 | -0.15462969D+02 | -0.24189055D+01 | -0.21265734D+02 |
| 17 | -0.10135722D+02 | 0.98153949D+00 | -0.11969437D+02 | 0.16186291D+01 |
| | -0.19885141D+02 | -0.17755651D+01 | -0.11312185D+02 | 0.27104957D+02 |
| 18 | 0.15932183D+02 | -0.25914033D+02 | 0.13099718D+02 | -0.12753741D+02 |
| | -0.66179705D+01 | 0.23661938D+02 | 0.88791895D+01 | -0.17569855D+02 |
| 19 | 0.12405574D+00 | 0.38025492D+01 | -0.25466930D+02 | -0.18049543D+02 |
| | -0.63874727D+01 | 0.65430260D+01 | -0.31003773D+01 | 0.77668649D+01 |
| 20 | -0.14623272D+01 | 0.83627516D+01 | -0.25236694D+02 | -0.36276394D+01 |
| | -0.63112229D+01 | 0.38586438D+00 | 0.24496138D+00 | -0.10285974D+02 |
| 21 | -0.11395201D+02 | -0.12958843D+02 | -0.30165619D+01 | 0.26494551D+01 |
| | -0.97135562D+01 | 0.31432775D+02 | 0.29304679D+02 | -0.16920424D+01 |
| 22 | 0.49236619D+01 | 0.58033961D+01 | -0.82595766D+00 | 0.15327406D+02 |
| | 0.24492424D+02 | 0.10487517D+02 | -0.15002079D+02 | 0.24780363D+01 |
| 23 | -0.27454829D+02 | -0.15123250D+02 | -0.27985231D+02 | -0.11342762D+02 |
| | -0.26041609D+01 | 0.22446412D+02 | 0.11504400D+02 | -0.42746699D+01 |
| 24 | 0.26025379D+01 | -0.17649091D+02 | -0.18637198D+01 | -0.13223815D+02 |
| | 0.34481406D+01 | 0.11435743D+02 | -0.25002372D+01 | -0.71257657D+01 |

***** Predicted Measurement Vector *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|
| 1 | 0.24244620D+00 | 0.24244620D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 2 | -0.89235678D+02 | -0.89235678D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 3 | -0.51740608D+02 | -0.51740608D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 4 | 0.47323930D+02 | 0.47323930D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 5 | -0.59551247D+02 | -0.59551247D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 6 | 0.95526543D+02 | 0.95526543D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 7 | 0.71206673D+02 | 0.71206673D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 8 | -0.18236228D+02 | -0.18236228D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 9 | -0.20857445D+01 | -0.20857445D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 10 | 0.34158507D+02 | 0.34158507D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 11 | -0.73767652D+02 | -0.73767652D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 12 | -0.54957941D+02 | -0.54957941D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 13 | -0.17875014D+03 | -0.17875014D+03 | 0.00000000D+00 | 0.10000000D+01 |
| 14 | -0.90358179D+01 | -0.90358179D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 15 | -0.11181281D+02 | -0.11181281D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 16 | 0.16957353D+02 | 0.16957353D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 17 | -0.40413544D+02 | -0.40413544D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 18 | -0.72167007D+02 | -0.72167007D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 19 | -0.22843700D+02 | -0.22843700D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 20 | 0.58294386D+01 | 0.58294386D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 21 | 0.98244309D+00 | 0.98244309D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 22 | 0.71616239D+02 | 0.71616239D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 23 | -0.84885158D+02 | -0.84885158D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 24 | -0.70757525D+02 | -0.70757525D+02 | 0.00000000D+00 | 0.10000000D+01 |

***** Initial Performance Index = 0.97772474D+05 *****

***** NO Constraints are Specified for Case Number 1 *****

```
*****   Solve the NLPQLP Problem for Case Number   1   *****


------------------------------------------------------------------------
 START OF THE SEQUENTIAL QUADRATIC PROGRAMMING ALGORITHM
------------------------------------------------------------------------

 Parameters:
    N      =       8
    M      =       0
    ME     =       0
    MODE   =       0
    ACC    =   0.1000D-06
    ACCQP  =   0.1000D-11
    STPMIN =   0.0000D+00
    RHOB   =   0.1000D+03
    MAXFUN =      10
    MAXNM  =      10
    MAXIT  =     100
    IPRINT =       2

 Output in the following order:
    IT    - iteration number
    F     - objective function value
    SCV   - sum of constraint violations
    NA    - number of active constraints
    I     - number of line search iterations
    ALPHA - steplength parameter
    DELTA - additional variable to prevent inconsistency
    KKT   - Karush-Kuhn-Tucker optimality criterion

  IT         F           SCV      NA  I    ALPHA     DELTA     KKT
------------------------------------------------------------------------
   1  0.97772474D+05  0.00D+00    0  0  0.00D+00  0.00D+00  0.92D+06
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   2  0.13407558D+05  0.00D+00    0  2  0.37D+00  0.00D+00  0.22D+06
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   3  0.46383607D+04  0.00D+00    0  2  0.13D+00  0.00D+00  0.92D+05
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   4  0.19141049D+04  0.00D+00    0  2  0.10D+00  0.00D+00  0.56D+05
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   5  0.12360237D+04  0.00D+00    0  3  0.27D-01  0.00D+00  0.18D+05
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   6  0.10263670D+04  0.00D+00    0  3  0.29D-01  0.00D+00  0.28D+05
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   7  0.88697510D+03  0.00D+00    0  3  0.10D-01  0.00D+00  0.23D+05
           *****   Completed CALL to NLPQLP   *****
```

```
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 8  0.53646836D+03  0.00D+00    0  3  0.45D-01  0.00D+00  0.25D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 9  0.28739810D+03  0.00D+00    0  3  0.27D-01  0.00D+00  0.12D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
10  0.20035111D+03  0.00D+00    0  3  0.23D-01  0.00D+00  0.11D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
11  0.12534048D+03  0.00D+00    0  3  0.15D-01  0.00D+00  0.36D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
12  0.11062758D+03  0.00D+00    0  3  0.11D-01  0.00D+00  0.28D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
13  0.87622297D+02  0.00D+00    0  3  0.10D-01  0.00D+00  0.66D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
14  0.26110327D+02  0.00D+00    0  3  0.32D-01  0.00D+00  0.91D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
15  0.12918542D+02  0.00D+00    0  2  0.26D+00  0.00D+00  0.44D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
16  0.44324612D+00  0.00D+00    0  2  0.49D+00  0.00D+00  0.88D+00
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
17  0.42153544D-02  0.00D+00    0  1  0.10D+01  0.00D+00  0.55D-04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
18  0.41894192D-02  0.00D+00    0  1  0.10D+01  0.00D+00  0.13D-06
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
19  0.41893506D-02  0.00D+00    0  1  0.10D+01  0.00D+00  0.78D-13


--- Final Convergence Analysis at Last Iterate ---

  Objective function value:      F(X)  =  0.41893506D-02
  Solution values:               X     =
    -0.43506230D-03 -0.22354675D-03  0.19598756D-04 -0.78176790D-04
    -0.22771980D-03 -0.12142101D-03  0.34273683D-03 -0.24719727D-03
  Distances from lower bounds:   X-XL  =
     0.24995649D+01  0.24997765D+01  0.25000196D+01  0.24999218D+01
     0.24997723D+01  0.24998786D+01  0.25003427D+01  0.24997528D+01
  Distances from upper bounds:   XU-X  =
     0.25004351D+01  0.25002235D+01  0.24999804D+01  0.25000782D+01
     0.25002277D+01  0.25001214D+01  0.24996573D+01  0.25002472D+01
```

```
Multipliers for lower bounds:  U     =
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
Multipliers for upper bounds:  U     =
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
Number of function calls:      NFUNC =      44
Number of gradient calls:      NGRAD =      19
Number of calls of QP solver:  NQL   =      19


          *****   Completed CALL to NLPQLP   *****


      *****   Number of Function Evaluations  =    196   *****


    *****   Solution Control Vector for Case Number   1   *****

Element     G.L.B.            C.V.              L.U.B.            Delta C.V.

   1    -0.25000000D+01   -0.43506230D-03    0.25000000D+01   -0.23004350D+01
   2    -0.25000000D+01   -0.22354675D-03    0.25000000D+01   -0.23002234D+01
   3    -0.25000000D+01    0.19598756D-04    0.25000000D+01    0.77816253D+00
   4    -0.25000000D+01   -0.78176790D-04    0.25000000D+01   -0.23000781D+01
   5    -0.25000000D+01   -0.22771980D-03    0.25000000D+01   -0.17532857D+01
   6    -0.25000000D+01   -0.12142101D-03    0.25000000D+01    0.88708958D-03
   7    -0.25000000D+01    0.34273683D-03    0.25000000D+01   -0.22996572D+01
   8    -0.25000000D+01   -0.24719727D-03    0.25000000D+01   -0.10511760D+01


             *****   Predicted Measurement Vector   *****

Element     Z Vector          ZA Vector         Delta Z           Diag[W]

   1    -0.10796607D-01    0.24244620D+00   -0.25324280D+00    0.10000000D+01
   2    -0.16116768D-02   -0.89235678D+02    0.89234067D+02    0.10000000D+01
   3     0.21742065D-02   -0.51740608D+02    0.51742782D+02    0.10000000D+01
   4     0.14359080D-01    0.47323930D+02   -0.47309571D+02    0.10000000D+01
   5    -0.65178386D-02   -0.59551247D+02    0.59544730D+02    0.10000000D+01
   6     0.21978460D-03    0.95526543D+02   -0.95526323D+02    0.10000000D+01
   7     0.50949563D-02    0.71206673D+02   -0.71201579D+02    0.10000000D+01
   8     0.34407992D-01   -0.18236228D+02    0.18270636D+02    0.10000000D+01
   9    -0.17934319D-02   -0.20857445D+01    0.20839511D+01    0.10000000D+01
  10     0.83830729D-02    0.34158507D+02   -0.34150124D+02    0.10000000D+01
  11     0.65415662D-02   -0.73767652D+02    0.73774194D+02    0.10000000D+01
  12    -0.40019637D-02   -0.54957941D+02    0.54953939D+02    0.10000000D+01
  13     0.24602114D-02   -0.17875014D+03    0.17875260D+03    0.10000000D+01
  14     0.23159321D-01   -0.90358179D+01    0.90589772D+01    0.10000000D+01
  15     0.24440193D-01   -0.11181281D+02    0.11205721D+02    0.10000000D+01
  16    -0.33039519D-02    0.16957353D+02   -0.16960657D+02    0.10000000D+01
  17    -0.70484533D-02   -0.40413544D+02    0.40406495D+02    0.10000000D+01
  18    -0.74809037D-02   -0.72167007D+02    0.72159526D+02    0.10000000D+01
  19    -0.75158926D-02   -0.22843700D+02    0.22836184D+02    0.10000000D+01
  20    -0.22405203D-01    0.58294386D+01   -0.58518438D+01    0.10000000D+01
  21     0.97082622D-02    0.98244309D+00   -0.97273483D+00    0.10000000D+01
  22     0.54804753D-02    0.71616239D+02   -0.71610758D+02    0.10000000D+01
  23    -0.50689270D-02   -0.84885158D+02    0.84880089D+02    0.10000000D+01
  24     0.22579296D-01   -0.70757525D+02    0.70780104D+02    0.10000000D+01


*****   NLP Solution Performance Index  =   0.41893506D-02   *****
```

```
*****   NO Constraints are Specified for Case Number   1   *****

*****   Solve the Regulator Problem for Case Number   1   *****

                *****   Alpha  =      0.10000000D+01   *****


  Dim                   *****   WZ-Vector   *****

  24     0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
         0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
         0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
         0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
         0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
         0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01

  Dim                   *****   WX-Vector   *****

   8     0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
         0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00

  Dim                   *****   WDX-Vector   *****

   8     0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
         0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00


     *****   Matrix [DUMXX1] was Successfully Inverted
                                      to Yield Matrix [DD].   *****

  Dim          *****   The Solution Control Vector   *****

   1    -0.43497023D-03

   2    -0.22342174D-03

   3     0.19663902D-04

   4    -0.78179660D-04

   5    -0.22767610D-03

   6    -0.12132059D-03

   7     0.34281532D-03

   8    -0.24713655D-03

  Dim        *****   The Solution Measurement Vector   *****

  24    -0.10798767D-01   -0.16137043D-02    0.21718641D-02    0.14358097D-01
        -0.65178139D-02    0.22172384D-03    0.50983195D-02    0.34408145D-01
        -0.17896155D-02    0.83813370D-02    0.65421788D-02   -0.40031888D-02
         0.24560517D-02    0.23159969D-01    0.24436564D-01   -0.33037068D-02
        -0.70530480D-02   -0.74783125D-02   -0.75171837D-02   -0.22405739D-01
         0.97104874D-02    0.54824050D-02   -0.50719247D-02    0.22578629D-01


*****   Regulator Solution Performance Index  =   0.41893505D-02   *****


             *****   NLP Special Control  8-Vector Output   *****

CV =
```

```
     -0.435062297090065D-03,  -0.223546747379360D-03,   0.195987557360831D-04,
     -0.781767903155650D-04,  -0.227719802468148D-03,  -0.121421007824831D-03,
      0.342736834747348D-03,  -0.247197266125042D-03,


           *****   Regulator Special Control  8-Vector Output   *****

 CV =
     -0.434970233773146D-03,  -0.223421741131880D-03,   0.196639021814438D-04,
     -0.781796595998863D-04,  -0.227676097583451D-03,  -0.121320590890180D-03,
      0.342815318564060D-03,  -0.247136546350779D-03,


    *****   Root-Sum-Squared Delta CV Elements  =   0.22404193D-06   *****

 Delta CV =
     -0.920633169183708D-07,  -0.125006247480577D-06,  -0.651464453606838D-07,
      0.286928432123340D-08,  -0.437048846968892D-07,  -0.100416934650801D-06,
     -0.784838167126401D-07,  -0.607197742633807D-07,


               *****   End Case Number   1   *****




********************************************************************************


       ***************   Start Case Number   2   ***************


                     *****   INPUT DATA   *****

 &CDATA
 ALPHA   =   1.00000000000000     ,
 ACC     =  1.0000000000000000E-007,
 ACCQP   =  1.0000000000000000E-012,
 CRAN1   =   15.0000000000000     ,
 CRAN2   =   20.0000000000000     ,
 CRAN3   =   7.00000000000000     ,
 CRAN4   =   5.00000000000000     ,
 CRAN5   =  2.0000000000000000E-002,
 CRAN6   =  2.0000000000000000E-002,
 CRAN7   =  0.100000000000000     ,
 CRAN8   =  0.100000000000000     ,
 CVOUT   =           1,
 EPS     =  1.0000000000000000E-007,
 GEQ     =   8.00000000000000     ,  0.900000000000000     ,
 16*0.000000000000000E+000  ,
 GMAX    = 4*3.00000000000000        , 14*1.50000000000000        ,
 ICASE   =           2,
 IDATA   =           1,
 IN      =           5,
 IOPT    =           1,
 IOUT    =           6,
 IPRINT  =           2,
 ISEED1  =    78985723,
 ISEED2  =    95428381,
 ISEED3  =    72919329,
 ISEED4  =    63237395,
 ITOUT   =           0,
```

```
JSEED1  =    81692875,
JSEED2  =    68377297,
JSEED3  =    89672847,
JSEED4  =    98351973,
L       =           1,
LQL     = T,
MAXFUN  =          10,
MAXIT   =         100,
MAXNM   =          10,
ME      =           2,
MG      =           2,
MODE    =           0,
MULT    =           1,
RHOB    =   100.000000000000     ,
STPMIN  =  0.000000000000000E+000,
T       =  0.347887873649597     ,   8.36017310619354     ,  -1.15114569664001
,   31.7600607872009     ,
  -4.11432027816772     ,  -1.82969748973846     ,   14.7802293300629     ,  -
24.1927772760391     ,   9.23694193363190     ,
   6.53410136699677     ,   14.0349829196930     ,   12.5044798851013     ,  -
17.8921127319336     ,  -10.2217143774033     ,
   16.5568113327026     ,   2.43249177932739     ,  -10.1357221603394     ,
15.9321832656860     ,  0.124055743217468     ,
  -1.46232724189758     ,  -11.3952010869980     ,   4.92366194725037     ,  -
27.4548292160034     ,   2.60253787040710     ,
   4.86136615276337     , -0.199562907218933     ,  -23.4407806396484     ,  -
11.2429445981979     ,   1.20765388011932     ,
   21.6330313682556     ,   11.9727063179016     ,   32.9372560977936     ,
23.5570669174194     ,  -6.74438714981079     ,
  -7.93598234653473     ,  -20.3026217222214     ,  -1.56858563423157     , -
0.499013066291809     ,  -16.2133514881134     ,
  0.281759500503540     ,  0.981539487838745     ,  -25.9140330553055     ,
3.80254924297333     ,   8.36275160312653     ,
  -12.9588425159454     ,   5.80339610576630     ,  -15.1232504844666     ,  -
17.6490908861160     ,  -15.0048637390137     ,
   19.1770482063293     , -0.335381031036377     ,  -4.31632578372955     ,  -
4.25651073455811     ,  -12.7643179893494     ,
   1.42291009426117     ,  -11.0011523962021     ,   1.54231786727905     ,  -
13.4375256299973     ,   3.67589592933655     ,
  -9.40093398094177     ,  -2.99704432487488     ,  -12.7238953113556     ,  -
6.63215160369873     ,   4.11353647708893     ,
  -11.9694370031357     ,   13.0997180938721     ,  -25.4669302701950     ,  -
25.2366936206818     ,  -3.01656186580658     ,
 -0.825957655906677     ,  -27.9852312803268     ,  -1.86371982097626     ,  -
5.16573786735535     ,  -2.22911655902863     ,
  -2.73599326610565     ,  -12.1217423677444     ,  -6.38543546199799     ,
14.5632725954056     ,  -9.25001144409180     ,
  -8.79374623298645     ,  -5.07636487483978     ,   20.6084918975830     ,  -
11.9870936870575     ,  -16.3496994972229     ,
  -27.2168767452240     ,  -12.2997462749481     ,   18.8906282186508     ,
6.93004667758942     ,   1.61862909793854     ,
  -12.7537411451340     ,  -18.0495429039001     ,  -3.62763941287994     ,
2.64945507049561     ,   15.3274059295654     ,
  -11.3427621126175     ,  -13.2238149642944     ,   4.46783602237701     ,  -
30.9051227569580     ,   14.3089932203293     ,
   8.13094079494476     ,  -23.9111328125000     ,   2.16139078140259     ,
15.2714663743973     ,  -14.9053382873535     ,
  -6.74761354923248     ,   9.14280593395233     ,  -25.4573452472687     ,
6.63815975189209     ,  -8.74195575714111     ,
   12.0063996315002     ,  -19.8212701082230     ,   14.7614699602127     ,  -
19.8851406574249     ,  -6.61797046661377     ,
  -6.38747274875641     ,  -6.31122291088104     ,  -9.71355617046356     ,
24.4924241304398     ,  -2.60416090488434     ,
   3.44814062118530     ,  -20.1868027448654     ,  -22.1411293745041     ,  -
5.60317695140839     ,  -25.7577776908875     ,
```

```
   6.09270989894867     ,   7.43854463100433     ,   2.98368871212006     ,  -
9.48373377323151     ,  -1.90039992332458     ,
   11.3497376441956     ,   15.2260208129883     ,   26.1296272277832     ,  -
2.67392516136169     ,   4.84120965003967     ,
  -2.35511720180511     ,  -15.4629689455032     ,  -1.77556514739990     ,
23.6619377136230     ,   6.54302597045898     ,
  0.385864377021790     ,   31.4327752590179     ,   10.4875171184540     ,
22.4464124441147     ,   11.4357429742813     ,
  -4.43484902381897     ,  -10.4405665397644     ,  0.688326954841614     ,
2.20657050609589     ,   5.84744215011597     ,
  -2.80650436878204     ,  -2.33269333839417     ,   3.26137959957123     ,  -
9.61982607841492     ,  -21.6863620281219     ,
  -5.18984854221344     ,  -17.4698179960251     ,  -22.6904761791229     ,
11.6673856973648     ,  -15.2287226915359     ,
  -2.41890549659729     ,  -11.3121849298477     ,   8.87918949127197     ,  -
3.10037732124329     ,  0.244961380958557     ,
   29.3046790361404     ,  -15.0020790100098     ,   11.5043997764587     ,  -
2.50023722648621     ,  -8.72981309890747     ,
  -9.30526256561279     ,  -15.0490844249725     ,   5.02102971076965     ,  -
12.3688095808029     ,   8.76760959625244     ,
   10.1177400350571     ,  -7.69548416137695     ,  -29.1979032754898     ,
10.1087188720703     , -0.753586888313293     ,
   20.7674050331116     ,  -5.90863347053528     ,  -13.2089871168137     ,
8.71503233909607     ,  -21.2657344341278     ,
   27.1049565076828     ,  -17.5698554515839     ,   7.76686489582062     ,  -
10.2859741449356     ,  -1.69204235076904     ,
   2.47803628444672     ,  -4.27466988563538     ,  -7.12576568126678     ,
WDT     = 24*1.00000000000000        ,
WDX     = 8*0.000000000000000E+000  ,
WX      = 8*0.000000000000000E+000  ,
WZ      = 24*1.00000000000000        ,
XL      = 8*-2.50000000000000       , 4*-2.00000000000000       ,
XL0     = 8*-2.30000000000000       ,
XU      = 8*2.50000000000000        , 4*2.00000000000000        ,
XU0     = 8*2.30000000000000        ,
X0      = 2*2.29999990000000        , -0.778142929077148     ,
2.29999990000000     ,   1.75305795669556     ,
 -1.008510589599609E-003,   2.29999990000000     ,   1.05092883110046     ,
ZA      =  0.242446197789848     ,  -89.2356784291655     ,  -51.7406079178323
,   47.3239303809522     ,
  -59.5512473616095     ,   95.5265427866065     ,   71.2066734864025     ,  -
18.2362282575651     ,  -2.08574452474501     ,
   34.1585067871362     ,  -73.7676519599088     ,  -54.9579413287272     ,  -
178.750136010219     ,  -9.03581786817862     ,
  -11.1812805012057     ,   16.9573528785314     ,  -40.4135437666825     ,  -
72.1670065619007     ,  -22.8437001192555     ,
   5.82943856479929     ,  0.982443093193220     ,   71.6162386820888     ,  -
84.8851581693340     ,  -70.7575249994563
/
```

*****  OUTPUT DATA  *****

*****  X0, ZA, and T are Directly Input  *****

*****  Control Vector During Previous Duty Cycle for Case Number  2  *****

| Element | G.L.B. | C.V. | L.U.B. |
|---|---|---|---|
| 1 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 2 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 3 | -0.23000000D+01 | -0.77814293D+00 | 0.23000000D+01 |
| 4 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 5 | -0.23000000D+01 | 0.17530580D+01 | 0.23000000D+01 |

| | | | |
|---|---|---|---|
| 6 | -0.23000000D+01 | -0.10085106D-02 | 0.23000000D+01 |
| 7 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 8 | -0.23000000D+01 | 0.10509288D+01 | 0.23000000D+01 |

***** Measurement Vectors from Previous Duty Cycle *****

| Element | Actual | Ideal | Delta |
|---|---|---|---|
| 1 | 0.24244620D+00 | 0.25418529D+00 | -0.11739089D-01 |
| 2 | -0.89235678D+02 | -0.89228662D+02 | -0.70162487D-02 |
| 3 | -0.51740608D+02 | -0.51735457D+02 | -0.51504469D-02 |
| 4 | 0.47323930D+02 | 0.47299922D+02 | 0.24008768D-01 |
| 5 | -0.59551247D+02 | -0.59533028D+02 | -0.18219316D-01 |
| 6 | 0.95526543D+02 | 0.95516371D+02 | 0.10172153D-01 |
| 7 | 0.71206673D+02 | 0.71186083D+02 | 0.20590177D-01 |
| 8 | -0.18236228D+02 | -0.18259437D+02 | 0.23208692D-01 |
| 9 | -0.20857445D+01 | -0.20871238D+01 | 0.13792706D-02 |
| 10 | 0.34158507D+02 | 0.34133524D+02 | 0.24983239D-01 |
| 11 | -0.73767652D+02 | -0.73775161D+02 | 0.75085998D-02 |
| 12 | -0.54957941D+02 | -0.54969551D+02 | 0.11609204D-01 |
| 13 | -0.17875014D+03 | -0.17874639D+03 | -0.37421465D-02 |
| 14 | -0.90358179D+01 | -0.90497655D+01 | 0.13947675D-01 |
| 15 | -0.11181281D+02 | -0.11213480D+02 | 0.32199035D-01 |
| 16 | 0.16957353D+02 | 0.16962016D+02 | -0.46632385D-02 |
| 17 | -0.40413544D+02 | -0.40408497D+02 | -0.50467467D-02 |
| 18 | -0.72167007D+02 | -0.72153392D+02 | -0.13614869D-01 |
| 19 | -0.22843700D+02 | -0.22838498D+02 | -0.52021170D-02 |
| 20 | 0.58294386D+01 | 0.58544154D+01 | -0.24976861D-01 |
| 21 | 0.98244309D+00 | 0.98918038D+00 | -0.67372823D-02 |
| 22 | 0.71616239D+02 | 0.71593499D+02 | 0.22739236D-01 |
| 23 | -0.84885158D+02 | -0.84861559D+02 | -0.23599300D-01 |
| 24 | -0.70757525D+02 | -0.70777564D+02 | 0.20038812D-01 |

***** Initial Control Vector Estimate for Case Number 2 *****

| Element | G.L.B. | C.V. | L.U.B. | Delta C.V. |
|---|---|---|---|---|
| 1 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 2 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 3 | -0.25000000D+01 | -0.77814293D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 4 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 5 | -0.25000000D+01 | 0.17530580D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 6 | -0.25000000D+01 | -0.10085106D-02 | 0.25000000D+01 | 0.00000000D+00 |
| 7 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 8 | -0.25000000D+01 | 0.10509288D+01 | 0.25000000D+01 | 0.00000000D+00 |

***** T-Matrix Output is Suppressed *****

***** Predicted Measurement Vector *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|
| 1 | 0.24244620D+00 | 0.24244620D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 2 | -0.89235678D+02 | -0.89235678D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 3 | -0.51740608D+02 | -0.51740608D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 4 | 0.47323930D+02 | 0.47323930D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 5 | -0.59551247D+02 | -0.59551247D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 6 | 0.95526543D+02 | 0.95526543D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 7 | 0.71206673D+02 | 0.71206673D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 8 | -0.18236228D+02 | -0.18236228D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 9 | -0.20857445D+01 | -0.20857445D+01 | 0.00000000D+00 | 0.10000000D+01 |

```
 10     0.34158507D+02    0.34158507D+02    0.00000000D+00    0.10000000D+01
 11    -0.73767652D+02   -0.73767652D+02    0.00000000D+00    0.10000000D+01
 12    -0.54957941D+02   -0.54957941D+02    0.00000000D+00    0.10000000D+01
 13    -0.17875014D+03   -0.17875014D+03    0.00000000D+00    0.10000000D+01
 14    -0.90358179D+01   -0.90358179D+01    0.00000000D+00    0.10000000D+01
 15    -0.11181281D+02   -0.11181281D+02    0.00000000D+00    0.10000000D+01
 16     0.16957353D+02    0.16957353D+02    0.00000000D+00    0.10000000D+01
 17    -0.40413544D+02   -0.40413544D+02    0.00000000D+00    0.10000000D+01
 18    -0.72167007D+02   -0.72167007D+02    0.00000000D+00    0.10000000D+01
 19    -0.22843700D+02   -0.22843700D+02    0.00000000D+00    0.10000000D+01
 20     0.58294386D+01    0.58294386D+01    0.00000000D+00    0.10000000D+01
 21     0.98244309D+00    0.98244309D+00    0.00000000D+00    0.10000000D+01
 22     0.71616239D+02    0.71616239D+02    0.00000000D+00    0.10000000D+01
 23    -0.84885158D+02   -0.84885158D+02    0.00000000D+00    0.10000000D+01
 24    -0.70757525D+02   -0.70757525D+02    0.00000000D+00    0.10000000D+01


 *****   Initial Performance Index  =   0.97772474D+05   *****


*****   Initial Constraint Function Values for Case Number   2   *****

                  Equality Constraints

Element          Value               Target          Value - Target

   1         0.70797282D+01      0.80000000D+01     -0.92027180D+00
   2         0.18446587D+01      0.90000000D+00      0.94465872D+00


 *****   Solve the NLPQLP Problem for Case Number   2   *****



 ------------------------------------------------------------------------
  START OF THE SEQUENTIAL QUADRATIC PROGRAMMING ALGORITHM
 ------------------------------------------------------------------------

  Parameters:
     N      =       8
     M      =       2
     ME     =       2
     MODE   =       0
     ACC    =   0.1000D-06
     ACCQP  =   0.1000D-11
     STPMIN =   0.0000D+00
     RHOB   =   0.1000D+03
     MAXFUN =      10
     MAXNM  =      10
     MAXIT  =     100
     IPRINT =       2

  Output in the following order:
     IT    - iteration number
     F     - objective function value
     SCV   - sum of constraint violations
     NA    - number of active constraints
     I     - number of line search iterations
     ALPHA - steplength parameter
     DELTA - additional variable to prevent inconsistency
     KKT   - Karush-Kuhn-Tucker optimality criterion

    IT         F          SCV      NA  I    ALPHA     DELTA     KKT
```

```
------------------------------------------------------------------------
   1  0.97772474D+05  0.19D+01    2  0  0.00D+00  0.00D+00  0.45D+06
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
   2  0.79051831D+05  0.17D+01    2  2  0.10D+00  0.00D+00  0.12D+06
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
   3  0.70173846D+05  0.16D+01    2  2  0.15D+00  0.00D+00  0.19D+06
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
   4  0.63073207D+05  0.15D+01    2  2  0.10D+00  0.00D+00  0.79D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
   5  0.59870575D+05  0.15D+01    2  2  0.10D+00  0.00D+00  0.12D+06
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
   6  0.54358108D+05  0.14D+01    2  2  0.12D+00  0.00D+00  0.69D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
   7  0.52246618D+05  0.12D+01    2  2  0.11D+00  0.00D+00  0.47D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
   8  0.46942131D+05  0.11D+01    2  2  0.31D+00  0.00D+00  0.44D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
   9  0.45528772D+05  0.98D+00    2  2  0.10D+00  0.00D+00  0.28D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  10  0.44710455D+05  0.94D+00    2  2  0.10D+00  0.00D+00  0.23D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  11  0.44042443D+05  0.90D+00    2  2  0.10D+00  0.00D+00  0.24D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  12  0.43526126D+05  0.89D+00    2  2  0.10D+00  0.00D+00  0.17D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  13  0.43207348D+05  0.86D+00    2  2  0.10D+00  0.00D+00  0.61D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  14  0.42864149D+05  0.70D+00    2  2  0.19D+00  0.00D+00  0.14D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  15  0.42501310D+05  0.62D+00    2  2  0.10D+00  0.00D+00  0.34D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  16  0.41969116D+05  0.35D-01    2  1  0.10D+01  0.00D+00  0.15D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  17  0.41913260D+05  0.32D-01    2  2  0.10D+00  0.00D+00  0.33D+03
```

```
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
18  0.41864891D+05  0.23D-01    2  2  0.31D+00  0.00D+00  0.16D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
19  0.41783869D+05  0.32D-03    2  1  0.10D+01  0.00D+00  0.37D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
20  0.41770073D+05  0.25D-02    2  1  0.10D+01  0.00D+00  0.45D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
21  0.41739258D+05  0.39D-03    2  1  0.10D+01  0.00D+00  0.24D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
22  0.41725308D+05  0.71D-03    2  1  0.10D+01  0.00D+00  0.48D+01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
23  0.41727787D+05  0.20D-04    2  1  0.10D+01  0.00D+00  0.13D+00
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
24  0.41727723D+05  0.58D-06    2  1  0.10D+01  0.00D+00  0.46D-02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
25  0.41727721D+05  0.19D-08    2  1  0.10D+01  0.00D+00  0.13D-04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
26  0.41727721D+05  0.37D-12    2  1  0.10D+01  0.00D+00  0.25D-08


--- Final Convergence Analysis at Last Iterate ---

  Objective function value:      F(X)  =  0.41727721D+05
  Solution values:               X     =
     0.25000000D+01  0.13040540D+01 -0.21446404D+01  0.20813092D+01
    -0.93134374D+00  0.53398846D+00  0.49770554D+00 -0.12517065D+01
  Distances from lower bounds:   X-XL  =
     0.50000000D+01  0.38040540D+01  0.35535960D+00  0.45813092D+01
     0.15686563D+01  0.30339885D+01  0.29977055D+01  0.12482935D+01
  Distances from upper bounds:   XU-X  =
     0.00000000D+00  0.11959460D+01  0.46446404D+01  0.41869078D+00
     0.34313437D+01  0.19660115D+01  0.20022945D+01  0.37517065D+01
  Multipliers for lower bounds:  U     =
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
  Multipliers for upper bounds:  U     =
     0.24249383D+03  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
  Constraint values:             G(X)  =
     0.30020431D-12 -0.74051876D-13
  Multipliers for constraints:   U     =
    -0.49137296D+04 -0.30196655D+04
  Number of function calls:      NFUNC =      42
  Number of gradient calls:      NGRAD =      26
  Number of calls of QP solver:  NQL   =      26



          *****   Completed CALL to NLPQLP   *****


   *****   Number of Function Evaluations  =    250   *****


 *****   Solution Control Vector for Case Number   2   *****
```

| Element | G.L.B. | C.V. | L.U.B. | Delta C.V. |
|---|---|---|---|---|
| 1 | -0.25000000D+01 | 0.25000000D+01 | 0.25000000D+01 | 0.20000010D+00 |
| 2 | -0.25000000D+01 | 0.13040540D+01 | 0.25000000D+01 | -0.99594587D+00 |
| 3 | -0.25000000D+01 | -0.21446404D+01 | 0.25000000D+01 | -0.13664975D+01 |
| 4 | -0.25000000D+01 | 0.20813092D+01 | 0.25000000D+01 | -0.21869068D+00 |
| 5 | -0.25000000D+01 | -0.93134374D+00 | 0.25000000D+01 | -0.26844017D+01 |
| 6 | -0.25000000D+01 | 0.53398846D+00 | 0.25000000D+01 | 0.53499697D+00 |
| 7 | -0.25000000D+01 | 0.49770554D+00 | 0.25000000D+01 | -0.18022944D+01 |
| 8 | -0.25000000D+01 | -0.12517065D+01 | 0.25000000D+01 | -0.23026353D+01 |

***** Predicted Measurement Vector *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|
| 1 | 0.22405307D+02 | 0.24244620D+00 | 0.22162861D+02 | 0.10000000D+01 |
| 2 | -0.17228637D+01 | -0.89235678D+02 | 0.87512815D+02 | 0.10000000D+01 |
| 3 | -0.35565239D+02 | -0.51740608D+02 | 0.16175368D+02 | 0.10000000D+01 |
| 4 | 0.22276937D+02 | 0.47323930D+02 | -0.25046994D+02 | 0.10000000D+01 |
| 5 | 0.31024788D+02 | -0.59551247D+02 | 0.90576035D+02 | 0.10000000D+01 |
| 6 | 0.70919929D+02 | 0.95526543D+02 | -0.24606614D+02 | 0.10000000D+01 |
| 7 | 0.38252915D+01 | 0.71206673D+02 | -0.67381382D+02 | 0.10000000D+01 |
| 8 | 0.78577203D+01 | -0.18236228D+02 | 0.26093949D+02 | 0.10000000D+01 |
| 9 | 0.76969137D+02 | -0.20857445D+01 | 0.79054881D+02 | 0.10000000D+01 |
| 10 | 0.53375459D+02 | 0.34158507D+02 | 0.19216952D+02 | 0.10000000D+01 |
| 11 | 0.22114004D+02 | -0.73767652D+02 | 0.95881656D+02 | 0.10000000D+01 |
| 12 | -0.35989072D+02 | -0.54957941D+02 | 0.18968869D+02 | 0.10000000D+01 |
| 13 | -0.94182079D+02 | -0.17875014D+03 | 0.84568057D+02 | 0.10000000D+01 |
| 14 | -0.10758713D+02 | -0.90358179D+01 | -0.17228949D+01 | 0.10000000D+01 |
| 15 | 0.72536689D+02 | -0.11181281D+02 | 0.83717970D+02 | 0.10000000D+01 |
| 16 | 0.15455012D+02 | 0.16957353D+02 | -0.15023404D+01 | 0.10000000D+01 |
| 17 | -0.17011180D+02 | -0.40413544D+02 | 0.23402364D+02 | 0.10000000D+01 |
| 18 | -0.34047907D+01 | -0.72167007D+02 | 0.68762216D+02 | 0.10000000D+01 |
| 19 | 0.20492318D+02 | -0.22843700D+02 | 0.43336018D+02 | 0.10000000D+01 |
| 20 | 0.72878981D+02 | 0.58294386D+01 | 0.67049543D+02 | 0.10000000D+01 |
| 21 | 0.91244452D+01 | 0.98244309D+00 | 0.81420021D+01 | 0.10000000D+01 |
| 22 | 0.25793245D+02 | 0.71616239D+02 | -0.45822994D+02 | 0.10000000D+01 |
| 23 | -0.26483817D+02 | -0.84885158D+02 | 0.58401342D+02 | 0.10000000D+01 |
| 24 | -0.29444689D+02 | -0.70757525D+02 | 0.41312836D+02 | 0.10000000D+01 |

***** NLP Solution Performance Index = 0.41727721D+05 *****

***** Solution Constraint Function Values for Case Number 2 *****

Equality Constraints

| Element | Value | Target | Value - Target |
|---|---|---|---|
| 1 | 0.80000000D+01 | 0.80000000D+01 | -0.30020431D-12 |
| 2 | 0.90000000D+00 | 0.90000000D+00 | 0.74051876D-13 |

***** NLP Special Control 8-Vector Output *****

CV =
0.250000000000000D+01, 0.130405403037268D+01, -0.214464039888817D+01,
0.208130921765180D+01, -0.931343741040448D+00, 0.533988458792908D+00,
0.497705542092524D+00, -0.125170650103088D+01,

***** End Case Number 2 *****

```
********************************************************************************

        ***************   Start Case Number   3   ***************

                         *****   INPUT DATA   *****

&CDATA
ALPHA   =   1.00000000000000     ,
ACC     =  1.0000000000000000E-007,
ACCQP   =  1.0000000000000000E-012,
CRAN1   =   15.0000000000000     ,
CRAN2   =   20.0000000000000     ,
CRAN3   =   7.00000000000000     ,
CRAN4   =   5.00000000000000     ,
CRAN5   =  2.0000000000000000E-002,
CRAN6   =  2.0000000000000000E-002,
CRAN7   =  0.100000000000000     ,
CRAN8   =  0.100000000000000     ,
CVOUT   =           1,
EPS     =  1.0000000000000000E-007,
GEQ     =   8.00000000000000     ,  0.900000000000000     ,
16*0.000000000000000E+000  ,
GMAX    = 4*3.00000000000000        , 14*1.50000000000000        ,
ICASE   =           3,
IDATA   =           1,
IN      =           5,
IOPT    =           1,
IOUT    =           6,
IPRINT  =           2,
ISEED1  =    78985723,
ISEED2  =    95428381,
ISEED3  =    72919329,
ISEED4  =    63237395,
ITOUT   =           0,
JSEED1  =    81692875,
JSEED2  =    68377297,
JSEED3  =    89672847,
JSEED4  =    98351973,
L       =           1,
LQL     = T,
MAXFUN  =          10,
MAXIT   =         100,
MAXNM   =          10,
ME      =           0,
MG      =          12,
MODE    =           0,
MULT    =           1,
RHOB    =   100.000000000000     ,
STPMIN  =  0.0000000000000000E+000,
T       =  0.347887873649597     ,   8.36017310619354     ,  -1.15114569664001
,   31.7600607872009     ,
  -4.11432027816772     ,  -1.82969748973846     ,   14.7802293300629     ,  -
24.1927772760391     ,   9.23694193363190     ,
   6.53410136699677     ,   14.0349829196930     ,   12.5044798851013     ,  -
17.8921127319336     ,  -10.2217143774033     ,
   16.5568113327026     ,   2.43249177932739     ,  -10.1357221603394     ,
15.9321832656860     ,  0.124055743217468     ,
  -1.46232724189758     ,  -11.3952010869980     ,   4.92366194725037     ,  -
27.4548292160034     ,   2.60253787040710     ,
```

```
   4.86136615276337     , -0.199562907218933     ,  -23.4407806396484     ,  -
11.2429445981979     ,   1.20765388011932     ,
   21.6330313682556     ,   11.9727063179016     ,   32.9372560977936     ,
23.5570669174194     ,  -6.74438714981079     ,
  -7.93598234653473     ,  -20.3026217222214     ,  -1.56858563423157     , -
0.499013066291809     ,  -16.2133514881134     ,
  0.281759500503540     ,  0.981539487838745     ,  -25.9140330553055     ,
3.80254924297333     ,   8.36275160312653     ,
  -12.9588425159454     ,   5.80339610576630     ,  -15.1232504844666     ,  -
17.6490908861160     ,  -15.0048637390137     ,
   19.1770482063293     , -0.335381031036377     ,  -4.31632578372955     ,  -
4.25651073455811     ,  -12.7643179893494     ,
   1.42291009426117     ,  -11.0011523962021     ,   1.54231786727905     ,  -
13.4375256299973     ,   3.67589592933655     ,
  -9.40093398094177     ,  -2.99704432487488     ,  -12.7238953113556     ,  -
6.63215160369873     ,   4.11353647708893     ,
  -11.9694370031357     ,   13.0997180938721     ,  -25.4669302701950     ,  -
25.2366936206818     ,  -3.01656186580658     ,
 -0.825957655906677     ,  -27.9852312803268     ,  -1.86371982097626     ,  -
5.16573786735535     ,  -2.22911655902863     ,
  -2.73599326610565     ,  -12.1217423677444     ,  -6.38543546199799     ,
14.5632725954056     ,  -9.25001144409180     ,
  -8.79374623298645     ,  -5.07636487483978     ,   20.6084918975830     ,  -
11.9870936870575     ,  -16.3496994972229     ,
  -27.2168767452240     ,  -12.2997462749481     ,   18.8906282186508     ,
6.93004667758942     ,   1.61862909793854     ,
  -12.7537411451340     ,  -18.0495429039001     ,  -3.62763941287994     ,
2.64945507049561     ,   15.3274059295654     ,
  -11.3427621126175     ,  -13.2238149642944     ,   4.46783602237701     ,  -
30.9051227569580     ,   14.3089932203293     ,
   8.13094079494476     ,  -23.9111328125000     ,   2.16139078140259     ,
15.2714663743973     ,  -14.9053382873535     ,
  -6.74761354923248     ,   9.14280593395233     ,  -25.4573452472687     ,
6.63815975189209     ,  -8.74195575714111     ,
   12.0063996315002     ,  -19.8212701082230     ,   14.7614699602127     ,  -
19.8851406574249     ,  -6.61797046661377     ,
  -6.38747274875641     ,  -6.31122291088104     ,  -9.71355617046356     ,
24.4924241304398     ,  -2.60416090488434     ,
   3.44814062118530     ,  -20.1868027448654     ,  -22.1411293745041     ,  -
5.60317695140839     ,  -25.7577776908875     ,
   6.09270989894867     ,   7.43854463100433     ,   2.98368871212006     ,  -
9.48373377323151     ,  -1.90039992332458     ,
   11.3497376441956     ,   15.2260208129883     ,   26.1296272277832     ,  -
2.67392516136169     ,   4.84120965003967     ,
  -2.35511720180511     ,  -15.4629689455032     ,  -1.77556514739990     ,
23.6619377136230     ,   6.54302597045898     ,
  0.385864377021790     ,   31.4327752590179     ,   10.4875171184540     ,
22.4464124441147     ,   11.4357429742813     ,
  -4.43484902381897     ,  -10.4405665397644     ,  0.688326954841614     ,
2.20657050609589     ,   5.84744215011597     ,
  -2.80650436878204     ,  -2.33269333839417     ,   3.26137959957123     ,  -
9.61982607841492     ,  -21.6863620281219     ,
  -5.18984854221344     ,  -17.4698179960251     ,  -22.6904761791229     ,
11.6673856973648     ,  -15.2287226915359     ,
  -2.41890549659729     ,  -11.3121849298477     ,   8.87918949127197     ,  -
3.10037732124329     ,  0.244961380958557     ,
   29.3046790361404     ,  -15.0020790100098     ,   11.5043997764587     ,  -
2.50023722648621     ,  -8.72981309890747     ,
  -9.30526256561279     ,  -15.0490844249725     ,   5.02102971076965     ,  -
12.3688095808029     ,   8.76760959625244     ,
   10.1177400350571     ,  -7.69548416137695     ,  -29.1979032754898     ,
10.1087188720703     , -0.753586888313293     ,
   20.7674050331116     ,  -5.90863347053528     ,  -13.2089871168137     ,
8.71503233909607     ,  -21.2657344341278     ,
```

```
   27.1049565076828     ,  -17.5698554515839     ,   7.76686489582062     ,  -
10.2859741449356     ,  -1.69204235076904     ,
   2.47803628444672     ,  -4.27466988563538     ,  -7.12576568126678     ,
WDT     = 24*1.00000000000000        ,
WDX     = 8*0.0000000000000000E+000  ,
WX      = 8*0.0000000000000000E+000  ,
WZ      = 24*1.00000000000000        ,
XL      = 8*-2.50000000000000       , 4*-2.00000000000000       ,
XL0     = 8*-2.30000000000000       ,
XU      = 8*2.50000000000000        , 4*2.00000000000000        ,
XU0     = 8*2.30000000000000        ,
X0      = 2*2.29999990000000        , -0.778142929077148     ,
2.29999990000000     ,   1.75305795669556     ,
 -1.008510589599609E-003,   2.29999990000000     ,   1.05092883110046     ,
ZA      =  0.242446197789848     ,  -89.2356784291655     ,  -51.7406079178323
,   47.3239303809522     ,
  -59.5512473616095     ,   95.5265427866065     ,   71.2066734864025     ,  -
18.2362282575651     ,  -2.08574452474501     ,
   34.1585067871362     ,  -73.7676519599088     ,  -54.9579413287272     ,  -
178.750136010219     ,  -9.03581786817862     ,
  -11.1812805012057     ,   16.9573528785314     ,  -40.4135437666825     ,  -
72.1670065619007     ,  -22.8437001192555     ,
   5.82943856479929     ,  0.982443093193220     ,   71.6162386820888     ,  -
84.8851581693340     ,  -70.7575249994563
/
```

*****  OUTPUT DATA  *****

*****  X0, ZA, and T are Directly Input  *****

*****  Control Vector During Previous Duty Cycle for Case Number  3  *****

| Element | G.L.B. | C.V. | L.U.B. |
|---|---|---|---|
| 1 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 2 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 3 | -0.23000000D+01 | -0.77814293D+00 | 0.23000000D+01 |
| 4 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 5 | -0.23000000D+01 | 0.17530580D+01 | 0.23000000D+01 |
| 6 | -0.23000000D+01 | -0.10085106D-02 | 0.23000000D+01 |
| 7 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 8 | -0.23000000D+01 | 0.10509288D+01 | 0.23000000D+01 |

*****  Measurement Vectors from Previous Duty Cycle  *****

| Element | Actual | Ideal | Delta |
|---|---|---|---|
| 1 | 0.24244620D+00 | 0.25418529D+00 | -0.11739089D-01 |
| 2 | -0.89235678D+02 | -0.89228662D+02 | -0.70162487D-02 |
| 3 | -0.51740608D+02 | -0.51735457D+02 | -0.51504469D-02 |
| 4 | 0.47323930D+02 | 0.47299922D+02 | 0.24008768D-01 |
| 5 | -0.59551247D+02 | -0.59533028D+02 | -0.18219316D-01 |
| 6 | 0.95526543D+02 | 0.95516371D+02 | 0.10172153D-01 |
| 7 | 0.71206673D+02 | 0.71186083D+02 | 0.20590177D-01 |
| 8 | -0.18236228D+02 | -0.18259437D+02 | 0.23208692D-01 |
| 9 | -0.20857445D+01 | -0.20871238D+01 | 0.13792706D-02 |
| 10 | 0.34158507D+02 | 0.34133524D+02 | 0.24983239D-01 |
| 11 | -0.73767652D+02 | -0.73775161D+02 | 0.75085998D-02 |
| 12 | -0.54957941D+02 | -0.54969551D+02 | 0.11609204D-01 |
| 13 | -0.17875014D+03 | -0.17874639D+03 | -0.37421465D-02 |
| 14 | -0.90358179D+01 | -0.90497655D+01 | 0.13947675D-01 |
| 15 | -0.11181281D+02 | -0.11213480D+02 | 0.32199035D-01 |

| | | | |
|---|---|---|---|
| 16 | 0.16957353D+02 | 0.16962016D+02 | -0.46632385D-02 |
| 17 | -0.40413544D+02 | -0.40408497D+02 | -0.50467467D-02 |
| 18 | -0.72167007D+02 | -0.72153392D+02 | -0.13614869D-01 |
| 19 | -0.22843700D+02 | -0.22838498D+02 | -0.52021170D-02 |
| 20 | 0.58294386D+01 | 0.58544154D+01 | -0.24976861D-01 |
| 21 | 0.98244309D+00 | 0.98918038D+00 | -0.67372823D-02 |
| 22 | 0.71616239D+02 | 0.71593499D+02 | 0.22739236D-01 |
| 23 | -0.84885158D+02 | -0.84861559D+02 | -0.23599300D-01 |
| 24 | -0.70757525D+02 | -0.70777564D+02 | 0.20038812D-01 |

***** Initial Control Vector Estimate for Case Number 3 *****

| Element | G.L.B. | C.V. | L.U.B. | Delta C.V. |
|---|---|---|---|---|
| 1 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 2 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 3 | -0.25000000D+01 | -0.77814293D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 4 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 5 | -0.25000000D+01 | 0.17530580D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 6 | -0.25000000D+01 | -0.10085106D-02 | 0.25000000D+01 | 0.00000000D+00 |
| 7 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 8 | -0.25000000D+01 | 0.10509288D+01 | 0.25000000D+01 | 0.00000000D+00 |

***** T-Matrix Output is Suppressed *****

***** Predicted Measurement Vector *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|
| 1 | 0.24244620D+00 | 0.24244620D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 2 | -0.89235678D+02 | -0.89235678D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 3 | -0.51740608D+02 | -0.51740608D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 4 | 0.47323930D+02 | 0.47323930D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 5 | -0.59551247D+02 | -0.59551247D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 6 | 0.95526543D+02 | 0.95526543D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 7 | 0.71206673D+02 | 0.71206673D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 8 | -0.18236228D+02 | -0.18236228D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 9 | -0.20857445D+01 | -0.20857445D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 10 | 0.34158507D+02 | 0.34158507D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 11 | -0.73767652D+02 | -0.73767652D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 12 | -0.54957941D+02 | -0.54957941D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 13 | -0.17875014D+03 | -0.17875014D+03 | 0.00000000D+00 | 0.10000000D+01 |
| 14 | -0.90358179D+01 | -0.90358179D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 15 | -0.11181281D+02 | -0.11181281D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 16 | 0.16957353D+02 | 0.16957353D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 17 | -0.40413544D+02 | -0.40413544D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 18 | -0.72167007D+02 | -0.72167007D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 19 | -0.22843700D+02 | -0.22843700D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 20 | 0.58294386D+01 | 0.58294386D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 21 | 0.98244309D+00 | 0.98244309D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 22 | 0.71616239D+02 | 0.71616239D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 23 | -0.84885158D+02 | -0.84885158D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 24 | -0.70757525D+02 | -0.70757525D+02 | 0.00000000D+00 | 0.10000000D+01 |

***** Initial Performance Index = 0.97772474D+05 *****

***** Initial Constraint Function Values for Case Number 3 *****

Inequality Constraints

```
Element          Value               L.U.B.          L.U.B. - Value

   1         0.32526911D+01      0.30000000D+01     -0.25269105D+00
   2         0.24280663D+01      0.30000000D+01      0.57193370D+00
   3         0.17530582D+01      0.30000000D+01      0.12469418D+01
   4         0.25287252D+01      0.30000000D+01      0.47127484D+00
   5         0.00000000D+00      0.15000000D+01      0.15000000D+01
   6         0.00000000D+00      0.15000000D+01      0.15000000D+01
   7         0.00000000D+00      0.15000000D+01      0.15000000D+01
   8         0.00000000D+00      0.15000000D+01      0.15000000D+01
   9         0.00000000D+00      0.15000000D+01      0.15000000D+01
  10         0.00000000D+00      0.15000000D+01      0.15000000D+01
  11         0.00000000D+00      0.15000000D+01      0.15000000D+01
  12         0.00000000D+00      0.15000000D+01      0.15000000D+01


 *****   Solve the NLPQLP Problem for Case Number   3   *****


 ----------------------------------------------------------------------
  START OF THE SEQUENTIAL QUADRATIC PROGRAMMING ALGORITHM
 ----------------------------------------------------------------------

  Parameters:
     N      =       8
     M      =      12
     ME     =       0
     MODE   =       0
     ACC    =   0.1000D-06
     ACCQP  =   0.1000D-11
     STPMIN =   0.0000D+00
     RHOB   =   0.1000D+03
     MAXFUN =      10
     MAXNM  =      10
     MAXIT  =     100
     IPRINT =       2

  Output in the following order:
     IT    - iteration number
     F     - objective function value
     SCV   - sum of constraint violations
     NA    - number of active constraints
     I     - number of line search iterations
     ALPHA - steplength parameter
     DELTA - additional variable to prevent inconsistency
     KKT   - Karush-Kuhn-Tucker optimality criterion


   IT         F          SCV      NA  I    ALPHA     DELTA     KKT
 ----------------------------------------------------------------------
    1  0.97772474D+05  0.25D+00   12  0  0.00D+00  0.00D+00  0.90D+06
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
    2  0.10203751D+05  0.16D+01    6  2  0.39D+00  0.00D+00  0.79D+05
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
    3  0.41107603D+04  0.11D+01    7  2  0.31D+00  0.00D+00  0.15D+05
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
    4  0.44232928D+04  0.99D+00    7  2  0.10D+00  0.00D+00  0.74D+04
            *****   Completed CALL to NLPQLP   *****
```

```
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 5  0.47122162D+04  0.89D+00    8  2  0.10D+00  0.00D+00  0.60D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 6  0.80954557D+04  0.44D+00    8  2  0.50D+00  0.00D+00  0.49D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 7  0.74338094D+04  0.25D+00    8  2  0.44D+00  0.00D+00  0.14D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 8  0.74792267D+04  0.17D+00    8  2  0.31D+00  0.00D+00  0.13D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 9  0.81589408D+04  0.00D+00    5  1  0.10D+01  0.00D+00  0.18D+01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
10  0.81581144D+04  0.00D+00    5  1  0.10D+01  0.00D+00  0.21D-01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
11  0.81581042D+04  0.00D+00    5  1  0.10D+01  0.00D+00  0.46D-04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
12  0.81581042D+04  0.00D+00    5  1  0.10D+01  0.00D+00  0.53D-06
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
13  0.81581042D+04  0.00D+00    5  1  0.10D+01  0.00D+00  0.11D-10


--- Final Convergence Analysis at Last Iterate ---

  Objective function value:      F(X)  =  0.81581042D+04
  Solution values:               X     =
     0.79999990D+00  0.79999990D+00 -0.32776191D+00  0.79999990D+00
     0.25305796D+00  0.30278330D+00  0.79999990D+00 -0.12239311D+00
  Distances from lower bounds:   X-XL  =
     0.32999999D+01  0.32999999D+01  0.21722381D+01  0.32999999D+01
     0.27530580D+01  0.28027833D+01  0.32999999D+01  0.23776069D+01
  Distances from upper bounds:   XU-X  =
     0.17000001D+01  0.17000001D+01  0.28277619D+01  0.17000001D+01
     0.22469420D+01  0.21972167D+01  0.17000001D+01  0.26223931D+01
  Multipliers for lower bounds:  U     =
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
  Multipliers for upper bounds:  U     =
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
  Constraint values:             G(X)  =
     0.18686293D+01  0.21354610D+01  0.26053913D+01  0.21906917D+01
     0.00000000D+00  0.00000000D+00  0.10496190D+01  0.00000000D+00
     0.00000000D+00  0.11962082D+01  0.00000000D+00  0.32667806D+00
  Multipliers for constraints:   U     =
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.25640594D+04  0.59722485D+04  0.00000000D+00  0.69273419D+04
     0.46627290D+04  0.00000000D+00  0.34530924D+04  0.00000000D+00
  Number of function calls:      NFUNC =      20
  Number of gradient calls:      NGRAD =      13
  Number of calls of QP solver:  NQL   =      13



          *****   Completed CALL to NLPQLP   *****
```

***** Number of Function Evaluations = 124 *****

***** Solution Control Vector for Case Number 3 *****

| Element | G.L.B. | C.V. | L.U.B. | Delta C.V. |
|---|---|---|---|---|
| 1 | -0.25000000D+01 | 0.79999990D+00 | 0.25000000D+01 | -0.15000000D+01 |
| 2 | -0.25000000D+01 | 0.79999990D+00 | 0.25000000D+01 | -0.15000000D+01 |
| 3 | -0.25000000D+01 | -0.32776191D+00 | 0.25000000D+01 | 0.45038102D+00 |
| 4 | -0.25000000D+01 | 0.79999990D+00 | 0.25000000D+01 | -0.15000000D+01 |
| 5 | -0.25000000D+01 | 0.25305796D+00 | 0.25000000D+01 | -0.15000000D+01 |
| 6 | -0.25000000D+01 | 0.30278330D+00 | 0.25000000D+01 | 0.30379181D+00 |
| 7 | -0.25000000D+01 | 0.79999990D+00 | 0.25000000D+01 | -0.15000000D+01 |
| 8 | -0.25000000D+01 | -0.12239311D+00 | 0.25000000D+01 | -0.11733219D+01 |

***** Predicted Measurement Vector *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|
| 1 | -0.25199193D+01 | 0.24244620D+00 | -0.27623655D+01 | 0.10000000D+01 |
| 2 | -0.23285632D+02 | -0.89235678D+02 | 0.65950046D+02 | 0.10000000D+01 |
| 3 | -0.17440538D+02 | -0.51740608D+02 | 0.34300070D+02 | 0.10000000D+01 |
| 4 | 0.35643257D+01 | 0.47323930D+02 | -0.43759605D+02 | 0.10000000D+01 |
| 5 | -0.40711004D+01 | -0.59551247D+02 | 0.55480147D+02 | 0.10000000D+01 |
| 6 | 0.31168038D+02 | 0.95526543D+02 | -0.64358505D+02 | 0.10000000D+01 |
| 7 | 0.15220034D+02 | 0.71206673D+02 | -0.55986639D+02 | 0.10000000D+01 |
| 8 | 0.49709966D+00 | -0.18236228D+02 | 0.18733328D+02 | 0.10000000D+01 |
| 9 | 0.15264791D+02 | -0.20857445D+01 | 0.17350536D+02 | 0.10000000D+01 |
| 10 | 0.79117020D+01 | 0.34158507D+02 | -0.26246805D+02 | 0.10000000D+01 |
| 11 | -0.11799427D+02 | -0.73767652D+02 | 0.61968225D+02 | 0.10000000D+01 |
| 12 | -0.23151577D+02 | -0.54957941D+02 | 0.31806364D+02 | 0.10000000D+01 |
| 13 | -0.56814525D+02 | -0.17875014D+03 | 0.12193561D+03 | 0.10000000D+01 |
| 14 | 0.12227268D+01 | -0.90358179D+01 | 0.10258545D+02 | 0.10000000D+01 |
| 15 | -0.13854217D+01 | -0.11181281D+02 | 0.97958588D+01 | 0.10000000D+01 |
| 16 | 0.60837454D+01 | 0.16957353D+02 | -0.10873607D+02 | 0.10000000D+01 |
| 17 | -0.20047272D+02 | -0.40413544D+02 | 0.20366272D+02 | 0.10000000D+01 |
| 18 | -0.77521862D+01 | -0.72167007D+02 | 0.64414820D+02 | 0.10000000D+01 |
| 19 | -0.60226547D+01 | -0.22843700D+02 | 0.16821045D+02 | 0.10000000D+01 |
| 20 | 0.10839506D+02 | 0.58294386D+01 | 0.50100677D+01 | 0.10000000D+01 |
| 21 | 0.14328369D+02 | 0.98244309D+00 | 0.13345926D+02 | 0.10000000D+01 |
| 22 | 0.18205517D+02 | 0.71616239D+02 | -0.53410722D+02 | 0.10000000D+01 |
| 23 | -0.18123671D+02 | -0.84885158D+02 | 0.66761487D+02 | 0.10000000D+01 |
| 24 | -0.18778311D+02 | -0.70757525D+02 | 0.51979214D+02 | 0.10000000D+01 |

***** NLP Solution Performance Index = 0.81581042D+04 *****

***** Solution Constraint Function Values for Case Number 3 *****

Inequality Constraints

| Element | Value | L.U.B. | L.U.B. - Value |
|---|---|---|---|
| 1 | 0.11313707D+01 | 0.30000000D+01 | 0.18686293D+01 |
| 2 | 0.86453902D+00 | 0.30000000D+01 | 0.21354610D+01 |
| 3 | 0.39460874D+00 | 0.30000000D+01 | 0.26053913D+01 |
| 4 | 0.80930829D+00 | 0.30000000D+01 | 0.21906917D+01 |
| 5 | 0.15000000D+01 | 0.15000000D+01 | 0.00000000D+00 |
| 6 | 0.15000000D+01 | 0.15000000D+01 | 0.00000000D+00 |
| 7 | 0.45038102D+00 | 0.15000000D+01 | 0.10496190D+01 |
| 8 | 0.15000000D+01 | 0.15000000D+01 | 0.00000000D+00 |

```
     9         0.15000000D+01      0.15000000D+01      0.00000000D+00
    10         0.30379181D+00      0.15000000D+01      0.11962082D+01
    11         0.15000000D+01      0.15000000D+01      0.00000000D+00
    12         0.11733219D+01      0.15000000D+01      0.32667806D+00

               *****   NLP Special Control  8-Vector Output   *****

  CV =
       0.799999900000000D+00,   0.799999900000000D+00,  -0.327761909943362D+00,
       0.799999900000000D+00,   0.253057956695560D+00,   0.302783302046488D+00,
       0.799999900000000D+00,  -0.122393113636235D+00,


                *****   End Case Number   3   *****



********************************************************************************

        ***************   Start Case Number   4   ***************

                      *****   INPUT DATA   *****

&CDATA
ALPHA   =   1.00000000000000     ,
ACC     =  1.0000000000000000E-007,
ACCQP   =  1.0000000000000000E-012,
CRAN1   =   15.0000000000000     ,
CRAN2   =   20.0000000000000     ,
CRAN3   =   7.00000000000000     ,
CRAN4   =   5.00000000000000     ,
CRAN5   =  2.0000000000000000E-002,
CRAN6   =  2.0000000000000000E-002,
CRAN7   =  0.100000000000000     ,
CRAN8   =  0.100000000000000     ,
CVOUT   =           1,
EPS     =  1.0000000000000000E-007,
GEQ     =   8.00000000000000     ,  0.900000000000000     ,
16*0.000000000000000E+000  ,
GMAX    = 4*3.00000000000000        , 14*1.50000000000000        ,
ICASE   =           4,
IDATA   =           1,
IN      =           5,
IOPT    =           1,
IOUT    =           6,
IPRINT  =           2,
ISEED1  =    78985723,
ISEED2  =    95428381,
ISEED3  =    72919329,
ISEED4  =    63237395,
ITOUT   =           0,
JSEED1  =    81692875,
JSEED2  =    68377297,
JSEED3  =    89672847,
JSEED4  =    98351973,
L       =           1,
LQL     = T,
MAXFUN  =          10,
MAXIT   =         100,
MAXNM   =          10,
ME      =           2,
```

```
MG      =          14,
MODE    =           0,
MULT    =           0,
RHOB    =   100.000000000000     ,
STPMIN  =  0.000000000000000E+000,
T       =  0.347887873649597     ,   8.36017310619354     ,  -1.15114569664001
,   31.7600607872009     ,
  -4.11432027816772     ,  -1.82969748973846     ,   14.7802293300629     ,  -
24.1927772760391     ,   9.23694193363190     ,
   6.53410136699677     ,   14.0349829196930     ,   12.5044798851013     ,  -
17.8921127319336     ,  -10.2217143774033     ,
   16.5568113327026     ,   2.43249177932739     ,  -10.1357221603394     ,
15.9321832656860     ,  0.124055743217468     ,
  -1.46232724189758     ,  -11.3952010869980     ,   4.92366194725037     ,  -
27.4548292160034     ,   2.60253787040710     ,
   4.86136615276337     , -0.199562907218933     ,  -23.4407806396484     ,  -
11.2429445981979     ,   1.20765388011932     ,
   21.6330313682556     ,   11.9727063179016     ,   32.9372560977936     ,
23.5570669174194     ,  -6.74438714981079     ,
  -7.93598234653473     ,  -20.3026217222214     ,  -1.56858563423157     , -
0.499013066291809     ,  -16.2133514881134     ,
  0.281759500503540     ,  0.981539487838745     ,  -25.9140330553055     ,
3.80254924297333     ,   8.36275160312653     ,
  -12.9588425159454     ,   5.80339610576630     ,  -15.1232504844666     ,  -
17.6490908861160     ,  -15.0048637390137     ,
   19.1770482063293     , -0.335381031036377     ,  -4.31632578372955     ,  -
4.25651073455811     ,  -12.7643179893494     ,
   1.42291009426117     ,  -11.0011523962021     ,   1.54231786727905     ,  -
13.4375256299973     ,   3.67589592933655     ,
  -9.40093398094177     ,  -2.99704432487488     ,  -12.7238953113556     ,  -
6.63215160369873     ,   4.11353647708893     ,
  -11.9694370031357     ,   13.0997180938721     ,  -25.4669302701950     ,  -
25.2366936206818     ,  -3.01656186580658     ,
 -0.825957655906677     ,  -27.9852312803268     ,  -1.86371982097626     ,  -
5.16573786735535     ,  -2.22911655902863     ,
  -2.73599326610565     ,  -12.1217423677444     ,  -6.38543546199799     ,
14.5632725954056     ,  -9.25001144409180     ,
  -8.79374623298645     ,  -5.07636487483978     ,   20.6084918975830     ,  -
11.9870936870575     ,  -16.3496994972229     ,
  -27.2168767452240     ,  -12.2997462749481     ,   18.8906282186508     ,
6.93004667758942     ,   1.61862909793854     ,
  -12.7537411451340     ,  -18.0495429039001     ,  -3.62763941287994     ,
2.64945507049561     ,   15.3274059295654     ,
  -11.3427621126175     ,  -13.2238149642944     ,   4.46783602237701     ,  -
30.9051227569580     ,   14.3089932203293     ,
   8.13094079494476     ,  -23.9111328125000     ,   2.16139078140259     ,
15.2714663743973     ,  -14.9053382873535     ,
  -6.74761354923248     ,   9.14280593395233     ,  -25.4573452472687     ,
6.63815975189209     ,  -8.74195575714111     ,
   12.0063996315002     ,  -19.8212701082230     ,   14.7614699602127     ,  -
19.8851406574249     ,  -6.61797046661377     ,
  -6.38747274875641     ,  -6.31122291088104     ,  -9.71355617046356     ,
24.4924241304398     ,  -2.60416090488434     ,
   3.44814062118530     ,  -20.1868027448654     ,  -22.1411293745041     ,  -
5.60317695140839     ,  -25.7577776908875     ,
   6.09270989894867     ,   7.43854463100433     ,   2.98368871212006     ,  -
9.48373377323151     ,  -1.90039992332458     ,
   11.3497376441956     ,   15.2260208129883     ,   26.1296272277832     ,  -
2.67392516136169     ,   4.84120965003967     ,
  -2.35511720180511     ,  -15.4629689455032     ,  -1.77556514739990     ,
23.6619377136230     ,   6.54302597045898     ,
  0.385864377021790     ,   31.4327752590179     ,   10.4875171184540     ,
22.4464124441147     ,   11.4357429742813     ,
  -4.43484902381897     ,  -10.4405665397644     ,  0.688326954841614     ,
2.20657050609589     ,   5.84744215011597     ,
```

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  -2.80650436878204     ,  -2.33269333839417     ,   3.26137959957123     ,  -
9.61982607841492     ,  -21.6863620281219     ,
  -5.18984854221344     ,  -17.4698179960251     ,  -22.6904761791229     ,
11.6673856973648     ,  -15.2287226915359     ,
  -2.41890549659729     ,  -11.3121849298477     ,   8.87918949127197     ,  -
3.10037732124329     ,  0.244961380958557     ,
   29.3046790361404     ,  -15.0020790100098     ,   11.5043997764587     ,  -
2.50023722648621     ,  -8.72981309890747     ,
  -9.30526256561279     ,  -15.0490844249725     ,   5.02102971076965     ,  -
12.3688095808029     ,   8.76760959625244     ,
   10.1177400350571     ,  -7.69548416137695     ,  -29.1979032754898     ,
10.1087188720703     , -0.753586888313293     ,
   20.7674050331116     ,  -5.90863347053528     ,  -13.2089871168137     ,
8.71503233909607     ,  -21.2657344341278     ,
   27.1049565076828     ,  -17.5698554515839     ,   7.76686489582062     ,  -
10.2859741449356     ,  -1.69204235076904     ,
   2.47803628444672     ,  -4.27466988563538     ,  -7.12576568126678     ,
WDT     = 24*1.00000000000000        ,
WDX     = 8*0.000000000000000E+000  ,
WX      = 8*0.000000000000000E+000  ,
WZ      = 24*1.00000000000000        ,
XL      = 8*-2.50000000000000       , 4*-2.00000000000000       ,
XL0     = 8*-2.30000000000000       ,
XU      = 8*2.50000000000000        , 4*2.00000000000000        ,
XU0     = 8*2.30000000000000        ,
X0      = 2*2.29999990000000        , -0.778142929077148     ,
2.29999990000000     ,   1.75305795669556     ,
 -1.008510589599609E-003,   2.29999990000000     ,   1.05092883110046     ,
ZA      =  0.242446197789848     ,  -89.2356784291655     ,  -51.7406079178323
,   47.3239303809522     ,
  -59.5512473616095     ,   95.5265427866065     ,   71.2066734864025     ,  -
18.2362282575651     ,  -2.08574452474501     ,
   34.1585067871362     ,  -73.7676519599088     ,  -54.9579413287272     ,  -
178.750136010219     ,  -9.03581786817862     ,
  -11.1812805012057     ,   16.9573528785314     ,  -40.4135437666825     ,  -
72.1670065619007     ,  -22.8437001192555     ,
   5.82943856479929     ,  0.982443093193220     ,   71.6162386820888     ,  -
84.8851581693340     ,  -70.7575249994563
/
```

*****  OUTPUT DATA  *****

*****  X0, ZA, and T are Directly Input  *****

*****  Control Vector During Previous Duty Cycle for Case Number  4  *****

| Element | G.L.B. | C.V. | L.U.B. |
|---|---|---|---|
| 1 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 2 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 3 | -0.23000000D+01 | -0.77814293D+00 | 0.23000000D+01 |
| 4 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 5 | -0.23000000D+01 | 0.17530580D+01 | 0.23000000D+01 |
| 6 | -0.23000000D+01 | -0.10085106D-02 | 0.23000000D+01 |
| 7 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 8 | -0.23000000D+01 | 0.10509288D+01 | 0.23000000D+01 |

*****  Measurement Vectors from Previous Duty Cycle  *****

| Element | Actual | Ideal | Delta |
|---|---|---|---|
| 1 | 0.24244620D+00 | 0.25418529D+00 | -0.11739089D-01 |

| | | | |
|---|---|---|---|
| 2 | -0.89235678D+02 | -0.89228662D+02 | -0.70162487D-02 |
| 3 | -0.51740608D+02 | -0.51735457D+02 | -0.51504469D-02 |
| 4 | 0.47323930D+02 | 0.47299922D+02 | 0.24008768D-01 |
| 5 | -0.59551247D+02 | -0.59533028D+02 | -0.18219316D-01 |
| 6 | 0.95526543D+02 | 0.95516371D+02 | 0.10172153D-01 |
| 7 | 0.71206673D+02 | 0.71186083D+02 | 0.20590177D-01 |
| 8 | -0.18236228D+02 | -0.18259437D+02 | 0.23208692D-01 |
| 9 | -0.20857445D+01 | -0.20871238D+01 | 0.13792706D-02 |
| 10 | 0.34158507D+02 | 0.34133524D+02 | 0.24983239D-01 |
| 11 | -0.73767652D+02 | -0.73775161D+02 | 0.75085998D-02 |
| 12 | -0.54957941D+02 | -0.54969551D+02 | 0.11609204D-01 |
| 13 | -0.17875014D+03 | -0.17874639D+03 | -0.37421465D-02 |
| 14 | -0.90358179D+01 | -0.90497655D+01 | 0.13947675D-01 |
| 15 | -0.11181281D+02 | -0.11213480D+02 | 0.32199035D-01 |
| 16 | 0.16957353D+02 | 0.16962016D+02 | -0.46632385D-02 |
| 17 | -0.40413544D+02 | -0.40408497D+02 | -0.50467467D-02 |
| 18 | -0.72167007D+02 | -0.72153392D+02 | -0.13614869D-01 |
| 19 | -0.22843700D+02 | -0.22838498D+02 | -0.52021170D-02 |
| 20 | 0.58294386D+01 | 0.58544154D+01 | -0.24976861D-01 |
| 21 | 0.98244309D+00 | 0.98918038D+00 | -0.67372823D-02 |
| 22 | 0.71616239D+02 | 0.71593499D+02 | 0.22739236D-01 |
| 23 | -0.84885158D+02 | -0.84861559D+02 | -0.23599300D-01 |
| 24 | -0.70757525D+02 | -0.70777564D+02 | 0.20038812D-01 |

***** Initial Control Vector Estimate for Case Number 4 *****

| Element | G.L.B. | C.V. | L.U.B. | Delta C.V. |
|---|---|---|---|---|
| 1 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 2 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 3 | -0.25000000D+01 | -0.77814293D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 4 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 5 | -0.25000000D+01 | 0.17530580D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 6 | -0.25000000D+01 | -0.10085106D-02 | 0.25000000D+01 | 0.00000000D+00 |
| 7 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 8 | -0.25000000D+01 | 0.10509288D+01 | 0.25000000D+01 | 0.00000000D+00 |

***** T-Matrix Output is Suppressed *****

***** Predicted Measurement Vector *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|
| 1 | 0.24244620D+00 | 0.24244620D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 2 | -0.89235678D+02 | -0.89235678D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 3 | -0.51740608D+02 | -0.51740608D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 4 | 0.47323930D+02 | 0.47323930D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 5 | -0.59551247D+02 | -0.59551247D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 6 | 0.95526543D+02 | 0.95526543D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 7 | 0.71206673D+02 | 0.71206673D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 8 | -0.18236228D+02 | -0.18236228D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 9 | -0.20857445D+01 | -0.20857445D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 10 | 0.34158507D+02 | 0.34158507D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 11 | -0.73767652D+02 | -0.73767652D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 12 | -0.54957941D+02 | -0.54957941D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 13 | -0.17875014D+03 | -0.17875014D+03 | 0.00000000D+00 | 0.10000000D+01 |
| 14 | -0.90358179D+01 | -0.90358179D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 15 | -0.11181281D+02 | -0.11181281D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 16 | 0.16957353D+02 | 0.16957353D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 17 | -0.40413544D+02 | -0.40413544D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 18 | -0.72167007D+02 | -0.72167007D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 19 | -0.22843700D+02 | -0.22843700D+02 | 0.00000000D+00 | 0.10000000D+01 |

```
  20     0.58294386D+01    0.58294386D+01    0.00000000D+00    0.10000000D+01
  21     0.98244309D+00    0.98244309D+00    0.00000000D+00    0.10000000D+01
  22     0.71616239D+02    0.71616239D+02    0.00000000D+00    0.10000000D+01
  23    -0.84885158D+02   -0.84885158D+02    0.00000000D+00    0.10000000D+01
  24    -0.70757525D+02   -0.70757525D+02    0.00000000D+00    0.10000000D+01


 *****   Initial Performance Index  =   0.97772474D+05   *****


*****   Initial Constraint Function Values for Case Number   4   *****

                   Equality Constraints

Element          Value               Target          Value - Target

   1         0.70797282D+01      0.80000000D+01     -0.92027180D+00
   2         0.18446587D+01      0.90000000D+00      0.94465872D+00

                  Inequality Constraints

Element          Value               L.U.B.          L.U.B. - Value

   1         0.32526911D+01      0.30000000D+01     -0.25269105D+00
   2         0.24280663D+01      0.30000000D+01      0.57193370D+00
   3         0.17530582D+01      0.30000000D+01      0.12469418D+01
   4         0.25287252D+01      0.30000000D+01      0.47127484D+00
   5         0.00000000D+00      0.15000000D+01      0.15000000D+01
   6         0.00000000D+00      0.15000000D+01      0.15000000D+01
   7         0.00000000D+00      0.15000000D+01      0.15000000D+01
   8         0.00000000D+00      0.15000000D+01      0.15000000D+01
   9         0.00000000D+00      0.15000000D+01      0.15000000D+01
  10         0.00000000D+00      0.15000000D+01      0.15000000D+01
  11         0.00000000D+00      0.15000000D+01      0.15000000D+01
  12         0.00000000D+00      0.15000000D+01      0.15000000D+01


 *****   Solve the NLPQLP Problem for Case Number   4   *****


 ------------------------------------------------------------------------
  START OF THE SEQUENTIAL QUADRATIC PROGRAMMING ALGORITHM
 ------------------------------------------------------------------------

  Parameters:
     N      =       8
     M      =      14
     ME     =       2
     MODE   =       0
     ACC    =   0.1000D-06
     ACCQP  =   0.1000D-11
     STPMIN =   0.0000D+00
     RHOB   =   0.1000D+03
     MAXFUN =      10
     MAXNM  =      10
     MAXIT  =     100
     IPRINT =       2

  Output in the following order:
     IT    - iteration number
     F     - objective function value
     SCV   - sum of constraint violations
     NA    - number of active constraints
     I     - number of line search iterations
```

```
  ALPHA - steplength parameter
  DELTA - additional variable to prevent inconsistency
  KKT   - Karush-Kuhn-Tucker optimality criterion

 IT         F           SCV      NA  I    ALPHA     DELTA     KKT
-------------------------------------------------------------------
  1  0.97772474D+05  0.21D+01   14  0  0.00D+00  0.00D+00  0.47D+06
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  2  0.79236322D+05  0.17D+01    3  2  0.10D+00  0.00D+00  0.64D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  3  0.72452342D+05  0.14D+01    6  2  0.26D+00  0.00D+00  0.85D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  4  0.64908518D+05  0.10D+01    9  2  0.33D+00  0.00D+00  0.62D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  5  0.57816402D+05  0.98D+00    9  2  0.39D+00  0.00D+00  0.21D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  6  0.55006724D+05  0.30D+00    5  1  0.10D+01  0.00D+00  0.13D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  7  0.50624153D+05  0.30D+00    6  1  0.10D+01  0.00D+00  0.46D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  8  0.50742542D+05  0.24D+00    7  2  0.28D+00  0.00D+00  0.69D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  9  0.50453367D+05  0.21D+00    7  2  0.19D+00  0.00D+00  0.21D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 10  0.51288664D+05  0.34D-01    5  1  0.10D+01  0.00D+00  0.71D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 11  0.51155451D+05  0.58D-03    5  1  0.10D+01  0.00D+00  0.31D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 12  0.51144425D+05  0.76D-03    6  2  0.26D+00  0.00D+00  0.28D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 13  0.51106075D+05  0.69D-03    6  2  0.29D+00  0.00D+00  0.12D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 14  0.51103759D+05  0.34D-04    4  1  0.10D+01  0.00D+00  0.38D+00
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 15  0.51103950D+05  0.78D-09    4  1  0.10D+01  0.00D+00  0.87D-05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 16  0.51103950D+05  0.19D-11    4  1  0.10D+01  0.00D+00  0.21D-07

  --- Final Convergence Analysis at Last Iterate ---

    Objective function value:      F(X)  =  0.51103950D+05
```

```
Solution values:               X     =
   0.25000000D+01  0.13963518D+01 -0.22781429D+01  0.19275644D+01
   0.25305796D+00 -0.55830624D+00  0.17381817D+01 -0.27834618D+00
Distances from lower bounds:   X-XL  =
   0.50000000D+01  0.38963518D+01  0.22185707D+00  0.44275644D+01
   0.27530580D+01  0.19416938D+01  0.42381817D+01  0.22216538D+01
Distances from upper bounds:   XU-X  =
   0.00000000D+00  0.11036482D+01  0.47781429D+01  0.57243560D+00
   0.22469420D+01  0.30583062D+01  0.76181826D+00  0.27783462D+01
Multipliers for lower bounds:  U     =
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
Multipliers for upper bounds:  U     =
   0.15403455D+04  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
Constraint values:             G(X)  =
   0.88817842D-15  0.18776092D-11  0.13647099D+00  0.15801661D-01
   0.23870202D+01  0.12396727D+01  0.12999999D+01  0.59635191D+00
   0.00000000D+00  0.11275645D+01  0.00000000D+00  0.94270227D+00
   0.93818184D+00  0.17072499D+00
Multipliers for constraints:   U     =
  -0.61025674D+04 -0.56632928D+04  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.19435353D+04  0.00000000D+00  0.10442023D+05  0.00000000D+00
   0.00000000D+00  0.00000000D+00
Number of function calls:      NFUNC =      24
Number of gradient calls:      NGRAD =      16
Number of calls of QP solver:  NQL   =      16


          *****   Completed CALL to NLPQLP   *****


      *****   Number of Function Evaluations  =    152   *****


    *****   Solution Control Vector for Case Number   4   *****

Element     G.L.B.            C.V.              L.U.B.            Delta C.V.

   1    -0.25000000D+01    0.25000000D+01    0.25000000D+01    0.20000010D+00
   2    -0.25000000D+01    0.13963518D+01    0.25000000D+01   -0.90364809D+00
   3    -0.25000000D+01   -0.22781429D+01    0.25000000D+01   -0.15000000D+01
   4    -0.25000000D+01    0.19275644D+01    0.25000000D+01   -0.37243550D+00
   5    -0.25000000D+01    0.25305796D+00    0.25000000D+01   -0.15000000D+01
   6    -0.25000000D+01   -0.55830624D+00    0.25000000D+01   -0.55729773D+00
   7    -0.25000000D+01    0.17381817D+01    0.25000000D+01   -0.56181816D+00
   8    -0.25000000D+01   -0.27834618D+00    0.25000000D+01   -0.13292750D+01


          *****   Predicted Measurement Vector   *****

Element     Z Vector          ZA Vector         Delta Z           Diag[W]

   1     0.38994465D+02    0.24244620D+00    0.38752019D+02    0.10000000D+01
   2    -0.38386841D+02   -0.89235678D+02    0.50848837D+02    0.10000000D+01
   3    -0.27989764D+02   -0.51740608D+02    0.23750844D+02    0.10000000D+01
   4     0.69068987D+02    0.47323930D+02    0.21745056D+02    0.10000000D+01
   5    -0.70748821D+01   -0.59551247D+02    0.52476365D+02    0.10000000D+01
   6     0.71869164D+02    0.95526543D+02   -0.23657378D+02    0.10000000D+01
   7     0.27945564D+02    0.71206673D+02   -0.43261109D+02    0.10000000D+01
   8     0.29787395D+01   -0.18236228D+02    0.21214968D+02    0.10000000D+01
   9     0.33448630D+02   -0.20857445D+01    0.35534374D+02    0.10000000D+01
  10     0.32747968D+02    0.34158507D+02   -0.14105383D+01    0.10000000D+01
```

```
   11    -0.31220677D+02   -0.73767652D+02    0.42546975D+02    0.10000000D+01
   12    -0.56229960D+02   -0.54957941D+02   -0.12720190D+01    0.10000000D+01
   13    -0.13107379D+03   -0.17875014D+03    0.47676348D+02    0.10000000D+01
   14     0.33333069D+01   -0.90358179D+01    0.12369125D+02    0.10000000D+01
   15     0.37709440D+02   -0.11181281D+02    0.48890721D+02    0.10000000D+01
   16     0.24540205D+02    0.16957353D+02    0.75828519D+01    0.10000000D+01
   17    -0.24833653D+02   -0.40413544D+02    0.15579891D+02    0.10000000D+01
   18    -0.45356143D+02   -0.72167007D+02    0.26810863D+02    0.10000000D+01
   19     0.16019976D+02   -0.22843700D+02    0.38863676D+02    0.10000000D+01
   20     0.59973147D+02    0.58294386D+01    0.54143709D+02    0.10000000D+01
   21    -0.32100647D+01    0.98244309D+00   -0.41925078D+01    0.10000000D+01
   22     0.25438353D+02    0.71616239D+02   -0.46177885D+02    0.10000000D+01
   23    -0.39891999D+02   -0.84885158D+02    0.44993159D+02    0.10000000D+01
   24    -0.47236396D+02   -0.70757525D+02    0.23521129D+02    0.10000000D+01


*****   NLP Solution Performance Index  =   0.51103950D+05   *****


*****   Solution Constraint Function Values for Case Number   4   *****

                    Equality Constraints

Element          Value               Target          Value - Target

   1         0.80000000D+01      0.80000000D+01     -0.88817842D-15
   2         0.90000000D+00      0.90000000D+00     -0.18776092D-11

                  Inequality Constraints

Element          Value               L.U.B.          L.U.B. - Value

   1         0.28635290D+01      0.30000000D+01      0.13647099D+00
   2         0.29841983D+01      0.30000000D+01      0.15801661D-01
   3         0.61297976D+00      0.30000000D+01      0.23870202D+01
   4         0.17603273D+01      0.30000000D+01      0.12396727D+01
   5         0.20000010D+00      0.15000000D+01      0.12999999D+01
   6         0.90364809D+00      0.15000000D+01      0.59635191D+00
   7         0.15000000D+01      0.15000000D+01      0.00000000D+00
   8         0.37243550D+00      0.15000000D+01      0.11275645D+01
   9         0.15000000D+01      0.15000000D+01      0.00000000D+00
  10         0.55729773D+00      0.15000000D+01      0.94270227D+00
  11         0.56181816D+00      0.15000000D+01      0.93818184D+00
  12         0.13292750D+01      0.15000000D+01      0.17072499D+00


             *****   NLP Special Control  8-Vector Output   *****

CV =
     0.250000000000000D+01,   0.139635180694081D+01,  -0.227814292907715D+01,
     0.192756440180548D+01,   0.253057956695560D+00,  -0.558306241456996D+00,
     0.173818174159757D+01,  -0.278346178251692D+00,


               *****   End Case Number   4   *****

END of RUN.


 ***********  END  **********   END   *********
```

# B.4 (90 x 30) T-Matrix NLP Control Problems

# B.4.1 The Command (DCL) File Code

**for the**
**(90 x 30) T-Matrix NLP Control Problem**
**on the**
**Hewlett-Packard Alpha Mainframe Computer**

```
$ ASSIGN  SYS$COMMAND:  SYS$INPUT
$ ASSIGN  SYS$INPUT     FOR005
$ ASSIGN  SYS$OUTPUT    FOR006
$       SET TERM/WIDTH=80
$       SET VERIFY
$       SET NOVERIFY
$ !
$ ! *****   OPTIM COMMAND PROCEDURE:    OPTIM.COM      *****
$ !
$ !     ON WARNING THEN GOTO _______
$ !     ON ERROR THEN GOTO _______
$ !     ON SEVERE THEN GOTO _______
$ !
$ START:
$ !
$ ! *****   Determine if a NLP90x30 Case is to be RUN   *****
$ !
$ RUN0:
$       INQUIRE RUN00 "RUN a NLP90x30 Case?  (Y/N)"
$       IF RUN00 .EQS. "N" THEN GOTO TERM1
$ !
$ RUN1:
$ !
$       INQUIRE RUNDEMO "Enter NAME of the NLP90x30 System to be RUN"
$ !
$ ! *****   RUN this NLP90x30 Case   *****
$ !
$       ASSIGN  CDATA.DAT SYS$INPUT
$       ASSIGN  EDATA.DAT SYS$OUTPUT
$ !
$       ON ERROR THEN GOTO RUN2
$       COPY CDATA.DAT FOR005.DAT
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "   *********   INPUT    *****    INPUT   ********   "
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT " "
$       TYPE FOR005.DAT
$ !
$ RUN2:
$ !
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "   *********   OUTPUT   *****   OUTPUT   ********   "
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "RUN the NLP90x30 Case."
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "START RUN."
$       WRITE SYS$OUTPUT " "
$ !
$       SET TERM/WIDTH=132
$ !
$ ! *****   Execute  OPTIMYY   *****
$ !
$       ON ERROR THEN GOTO RUN4
$       RUN 'RUNDEMO'
$ !
$       SET TERM/WIDTH=80
$       GOTO RUN5
$ !
$ RUN4:
$       SET TERM/WIDTH=80
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "ERROR in Running the NLP90x30 Case."
```

```
$       WRITE SYS$OUTPUT " "
$ !
$ RUN5:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "END of RUN."
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "   ***********  END  **********   END   *********   "
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT " "
$ !
$       ON ERROR THEN GOTO TERM0
$       DEASSIGN SYS$OUTPUT
$       INQUIRE DSPL00 "Display the INPUT  CDATA.DAT  on screen?  (Y/N)"
$       IF DSPL00 .EQS. "N" THEN GOTO DSPL1
$       SET TERM/WIDTH=132
$       TYPE CDATA.DAT
$       SET TERM/WIDTH=80
$ DSPL1:
$       INQUIRE DSPL01 "Display the OUTPUT  EDATA.DAT  on screen?  (Y/N)"
$       IF DSPL01 .EQS. "N" THEN GOTO TERM0
$       SET TERM/WIDTH=132
$       TYPE EDATA.DAT
$       SET TERM/WIDTH=80
$       GOTO TERM0
$ !
$ ! *****   Determine if a Demo System is to be LINKed   *****
$ !
$ LINK0:
$       INQUIRE LINK00 "LINK the NLP90x30 System?  (Y/N)"
$       IF LINK00 .EQS. "N" THEN GOTO TERM2
$ !
$ LINK1:
$ !
$       INQUIRE LINKDEMO "Enter NAME of the NLP90x30 System to be LINKed"
$ !
$ ! *****   LINK the NLP90x30 System   *****
$ !
$       INQUIRE LINK0L "LINK with the IMSL Static Library? (Y/N)"
$       IF LINK0L .EQS. "N" THEN GOTO LINK3
$ !
$       INQUIRE LINK01 "LINK with /MAP/CROSS_REFERENCE Qualifiers? (Y/N)"
$       IF LINK01 .EQS. "N" THEN GOTO LINK2
$ !
$ ! *****   LINK Code with the IMSL Static Library and the
$ !                                   /MAP/CROSS_REFERENCE Qualifiers   *****
$ !
$       ON ERROR THEN GOTO LINK5
$       LINK/MAP/CROSS_REFERENCE    'LINKDEMO',   LIBA/LIBRARY,    -
          LIBB/LIBRARY,  LIBC/LIBRARY,  LINK_F90_STATIC_GFLOAT/OPT
$       GOTO LINK6
$ !
$ LINK2:
$ !
$ ! *****   LINK Code with the IMSL Static Library with NO
$ !                                   /MAP/CROSS_REFERENCE Qualifiers   *****
$ !
$       ON ERROR THEN GOTO LINK5
$       LINK                        'LINKDEMO',   LIBA/LIBRARY,    -
          LIBB/LIBRARY,  LIBC/LIBRARY,  LINK_F90_STATIC_GFLOAT/OPT
$       GOTO LINK6
$ !
$ LINK3:
$ !
$       INQUIRE LINK03 "LINK with /MAP/CROSS_REFERENCE Qualifiers? (Y/N)"
```

```
$       IF LINK03 .EQS. "N" THEN GOTO LINK4
$ !
$ !
$ ! *****   LINK Code without the IMSL Static Library but with the
$ !                                   /MAP/CROSS_REFERENCE Qualifiers   *****
$ !
$       ON ERROR THEN GOTO LINK5
$       LINK/MAP/CROSS_REFERENCE    'LINKDEMO',   LIBA/LIBRARY,    -
          LIBB/LIBRARY,  LIBC/LIBRARY
$       GOTO LINK6
$ !
$ LINK4:
$ !
$ ! *****   LINK Code without the IMSL Static Library and with NO
$ !                                   /MAP/CROSS_REFERENCE Qualifiers   *****
$ !
$       ON ERROR THEN GOTO LINK5
$       LINK                        'LINKDEMO',   LIBA/LIBRARY,    -
          LIBB/LIBRARY,  LIBC/LIBRARY
$       GOTO LINK6
$ !
$ LINK5:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "ERROR in Linking the NLP90x30 System."
$       WRITE SYS$OUTPUT " "
$       GOTO TERM5
$ !
$ LINK6:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "The NLP90x30 System was Linked Successfully."
$       WRITE SYS$OUTPUT " "
$       GOTO TERM5
$ !
$ !
$ ! *****   Edit Files   *****
$ !
$ EDIT0:
$       INQUIRE EDIT00 "EDIT a File?  (Y/N)"
$       IF EDIT00 .EQS. "N" THEN GOTO TERM3
$ !
$ ! *****   EDIT a File    *****
$ !
$ EDIT1:
$       INQUIRE EDIT01 "ENTER NAME of File to be EDITED."
$       ON ERROR THEN GOTO EDIT2
$       EDT 'EDIT01'
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "Editing File Completed Successfully."
$       WRITE SYS$OUTPUT " "
$       ON ERROR THEN GOTO EDIT3
$       @XPURGE
$       GOTO EDIT0
$ !
$ EDIT2:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "ERROR in Editing a File."
$       WRITE SYS$OUTPUT " "
$       GOTO EDIT0
$ !
$ EDIT3:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "ERROR in Purging Excess Files."
$       WRITE SYS$OUTPUT " "
$       GOTO EDIT0
$ !
```

```
$ CMPL0:
$       INQUIRE CMPL000 "COMPILE a File?  (Y/N)"
$       IF CMPL000 .EQS. "N" THEN GOTO TERM4
$ !
$ ! *****   COMPILE a File   *****
$ !
$       INQUIRE CFILE "ENTER NAME of File to be COMPILED."
$ !
$ ! *****   FORTRAN Compilation   *****
$ !
$       INQUIRE CMPL01 "Specify the /LIST Qualifier?  (Y/N)"
$       IF CMPL01 .EQS. "N" THEN GOTO CMPL1
$       ON ERROR THEN GOTO CMPL2
$       FORTRAN/LIST/CONTINUATIONS=30/NOWARNINGS 'CFILE'.FOR
$       GOTO CMPL3
$ CMPL1:
$       ON ERROR THEN GOTO CMPL2
$       FORTRAN/CONTINUATIONS=30/NOWARNINGS 'CFILE'.FOR
$       GOTO CMPL3
$ CMPL2:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "ERROR in FORTRAN Compilation."
$       WRITE SYS$OUTPUT " "
$       GOTO CMPL0
$ CMPL3:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "FORTRAN Compilation Completed Successfully."
$       WRITE SYS$OUTPUT " "
$       GOTO CMPL0
$ !
$ !
$ ! *****   Test for Termination   *****
$ !
$ !
$ TERM0:
$      INQUIRE TERM00 "Terminate Process?"
$      IF TERM00 .EQS. "N" THEN GOTO RUN0
$      DELETE FOR005.DAT;*
$      GOTO TERMINATE
$ !
$ TERM1:
$      INQUIRE TERM01 "Terminate Process?"
$      IF TERM01 .EQS. "N" THEN GOTO LINK0
$      GOTO TERMINATE
$ !
$ TERM2:
$      INQUIRE TERM02 "Terminate Process?"
$      IF TERM02 .EQS. "N" THEN GOTO EDIT0
$      GOTO TERMINATE
$ !
$ TERM3:
$      INQUIRE TERM03 "Terminate Process?"
$      IF TERM03 .EQS. "N" THEN GOTO CMPL0
$      GOTO TERMINATE
$ !
$ TERM4:
$      INQUIRE LINK000 "LINK the NLP90x30 System System?  (Y/N)"
$      IF LINK000 .EQS. "N" THEN GOTO TERM5
$      GOTO LINK1
$ !
$ TERM5:
$      INQUIRE RUN000 "RUN the NLP90x30 System?  (Y/N)"
$      IF RUN000 .EQS. "N" THEN GOTO TERMINATE
$      GOTO RUN1
$ !
```

```
$ ! *****   Termination   *****
$ !
$ TERMINATE:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "TERMINATE RUN."
$       WRITE SYS$OUTPUT " "
$ !
$       DEASSIGN SYS$INPUT
$       DEASSIGN SYS$OUTPUT
$ !
$ EXIT
```

## B.4.2 The Fortran Main Driver Code

**for the**
**(90 x 30) T-Matrix NLP Control Problem**
**on the**
**Hewlett-Packard Alpha Mainframe Computer**

```
C
      PROGRAM NLP90x30
C
C***********************************************************************
C
C
C     S E Q U E N T I A L   Q U A D R A T I C   P R O G R A M M I N G
C
C            A L G O R I T H M   F O R   C O N S T R A I N E D
C
C                    O P T I M I Z A T I O N
C
C
C
C              EASY-TO-USE VERSION WITH NUMERICAL GRADIENTS
C
C
C
C
C   GENERAL PROBLEM DESCRIPTION:
C   ----------------------------
C
C   The program solves the general nonlinear programming problem
C
C
C
C            Minimize      F(X)
C
C            subject to    G (X)   =  0  ,  j=1,...,m
C                           j                       e
C
C                          G (X)  >=  0  ,  j=m +1,...,m
C                           j                  e
C
C                          XL  <=  X  <=  XU
C
C
C
C   with differentiable, real-valued functions subject to an n-dimensional
C   vector X.
C
C
C
C   THE NUMERICAL ALGORITHM:
C   ------------------------
C
C   The used code with name 'NLPQLP' is based on a sequential quadratic programming
C   (SQP) method. In each iteration, a linearly constrained quadratic subproblem
C   is formulated by approximating the Lagrangian function quadratically and
C   by linearizing constraints. The Hessian matrix is computed by BFGS quasi-Newton
C   updates. Subsequently, a one-dimensional line search subject to an
C   augmented Lagrangian penalty function is performed to get the next iterate..
C
C
C
C   SPECIFIC PROBLEM DESCRIPTION:  Control Optimisation for a Linear Plant
C                                  [(90 x 30) T-Matrix] Model with Constraints.
C   --------
C
C   Minimize  F = Z1*Z1   + Z2*Z2   + Z3*Z3   + Z4*Z4   + Z5*Z5   + Z6*Z6   +
C                 Z7*Z7   + Z8*Z8   + Z9*Z9   + Z10*Z10 + Z11*Z11 + Z12*Z12 +
C                 Z13*Z13 + Z14*Z14 + Z15*Z15 + Z16*Z16 + Z17*Z17 + Z18*Z18 +
C                 Z19*Z19 + Z20*Z20 + Z21*Z21 + Z22*Z22 + Z23*Z23 + Z24*Z24 +
C                 Z25*Z25 + Z26*Z26 + Z27*Z27 + Z28*Z28 + Z29*Z29 + Z30*Z30 +
C                 Z31*Z31 + Z32*Z32 + Z33*Z33 + Z34*Z34 + Z35*Z35 + Z36*Z36 +
```

```
C                Z37*Z37 + Z38*Z38 + Z39*Z39 + Z40*Z40 + Z41*Z41 + Z42*Z42 +
C                Z43*Z43 + Z44*Z44 + Z45*Z45 + Z46*Z46 + Z47*Z47 + Z48*Z48 +
C                Z49*Z49 + Z50*Z50 + Z51*Z51 + Z52*Z52 + Z53*Z53 + Z54*Z54 +
C                Z55*Z55 + Z56*Z56 + Z57*Z57 + Z58*Z58 + Z59*Z59 + Z60*Z60 +
C                Z61*Z61 + Z62*Z62 + Z63*Z63 + Z64*Z64 + Z65*Z65 + Z66*Z66 +
C                Z67*Z67 + Z68*Z68 + Z69*Z69 + Z70*Z70 + Z71*Z71 + Z72*Z72 +
C                Z73*Z73 + Z74*Z74 + Z75*Z75 + Z76*Z76 + Z77*Z77 + Z78*Z78 +
C                Z79*Z79 + Z80*Z80 + Z81*Z81 + Z82*Z82 + Z83*Z83 + Z84*Z84 +
C                Z85*Z85 + Z86*Z86 + Z87*Z87 + Z88*Z88 + Z89*Z89 + Z90*Z90
C
C   Subject to   XL(1)   <=   X1  <=  XU(1)
C                XL(2)   <=   X2  <=  XU(2)
C                XL(3)   <=   X3  <=  XU(3)
C                XL(4)   <=   X4  <=  XU(4)
C                XL(5)   <=   X5  <=  XU(5)
C                XL(6)   <=   X6  <=  XU(6)
C                XL(7)   <=   X7  <=  XU(7)
C                XL(8)   <=   X8  <=  XU(8)
C                XL(9)   <=   X9  <=  XU(9)
C                XL(10)  <=  X10  <=  XU(10)
C                XL(11)  <=  X11  <=  XU(11)
C                XL(12)  <=  X12  <=  XU(12)
C                XL(13)  <=  X13  <=  XU(13)
C                XL(14)  <=  X14  <=  XU(14)
C                XL(15)  <=  X15  <=  XU(15)
C                XL(16)  <=  X16  <=  XU(16)
C                XL(17)  <=  X17  <=  XU(17)
C                XL(18)  <=  X18  <=  XU(18)
C                XL(19)  <=  X19  <=  XU(19)
C                XL(20)  <=  X20  <=  XU(20)
C                XL(21)  <=  X21  <=  XU(21)
C                XL(22)  <=  X22  <=  XU(22)
C                XL(23)  <=  X23  <=  XU(23)
C                XL(24)  <=  X24  <=  XU(24)
C                XL(25)  <=  X25  <=  XU(25)
C                XL(26)  <=  X26  <=  XU(26)
C                XL(27)  <=  X27  <=  XU(27)
C                XL(28)  <=  X28  <=  XU(28)
C                XL(29)  <=  X29  <=  XU(29)
C                XL(30)  <=  X30  <=  XU(30)
C
C                X1*X4   - X2*X3    =  0   GEQ(1)
C                X5*X8   - X6*X7    =  0   GEQ(2)
C                X9*X12  - X10*X11  =  0   GEQ(3)
C                X13*X16 - X14*X15  =  0   GEQ(4)
C                X17*X20 - X18*X19  =  0   GEQ(5)
C                X21*X24 - X22*X23  =  0   GEQ(6)
C                X25*X28 - X26*X27  =  0   GEQ(7)
C
C                DSQRT[X1*X1   +   X2*X2]  <=  GMAX(1)
C                DSQRT[X3*X3   +   X4*X4]  <=  GMAX(2)
C                DSQRT[X5*X5   +   X6*X6]  <=  GMAX(3)
C                DSQRT[X7*X7   +   X8*X8]  <=  GMAX(4)
C                DSQRT[X9*X9   + X10*X10]  <=  GMAX(5)
C                DSQRT[X11*X11 + X12*X12]  <=  GMAX(6)
C                DSQRT[X13*X13 + X14*X14]  <=  GMAX(7)
C                DSQRT[X15*X15 + X16*X16]  <=  GMAX(8)
C                DSQRT[X17*X17 + X18*X18]  <=  GMAX(9)
C                DSQRT[X19*X19 + X20*X20]  <=  GMAX(10)
C                DSQRT[X21*X21 + X22*X22]  <=  GMAX(11)
C                DSQRT[X23*X23 + X24*X24]  <=  GMAX(12)
C                DSQRT[X25*X25 + X26*X26]  <=  GMAX(13)
C                DSQR2[X27*X27 + X28*X28]  <=  GMAX(14)
C                DSQ2T[X29*X29 + X30*X30]  <=  GMAX(15)
C
```

```
C                 DABS[X1  -  X01]  <=  GMAX(16)
C                 DABS[X2  -  X02]  <=  GMAX(17)
C                 DABS[X3  -  X03]  <=  GMAX(18)
C                 DABS[X4  -  X04]  <=  GMAX(19)
C                 DABS[X5  -  X05]  <=  GMAX(20)
C                 DABS[X6  -  X06]  <=  GMAX(21)
C                 DABS[X7  -  X07]  <=  GMAX(22)
C                 DABS[X8  -  X08]  <=  GMAX(23)
C                 DABS[X9  -  X09]  <=  GMAX(24)
C                 DABS[X10 - X010]  <=  GMAX(25)
C                 DABS[X11 - X011]  <=  GMAX(26)
C                 DABS[X12 - X012]  <=  GMAX(27)
C                 DABS[X13 - X013]  <=  GMAX(28)
C                 DABS[X14 - X014]  <=  GMAX(29)
C                 DABS[X15 - X015]  <=  GMAX(30)
C                 DABS[X16 - X016]  <=  GMAX(31)
C                 DABS[X17 - X017]  <=  GMAX(32)
C                 DABS[X18 - X018]  <=  GMAX(33)
C                 DABS[X19 - X019]  <=  GMAX(34)
C                 DABS[X20 - X020]  <=  GMAX(35)
C                 DABS[X21 - X021]  <=  GMAX(36)
C                 DABS[X22 - X022]  <=  GMAX(37)
C                 DABS[X23 - X023]  <=  GMAX(38)
C                 DABS[X24 - X024]  <=  GMAX(39)
C                 DABS[X25 - X025]  <=  GMAX(40)
C                 DABS[X26 - X026]  <=  GMAX(41)
C                 DABS[X27 - X027]  <=  GMAX(42)
C                 DABS[X28 - X028]  <=  GMAX(43)
C                 DABS[X29 - X029]  <=  GMAX(44)
C                 DABS[X30 - X030]  <=  GMAX(45)
C
C
C
C   Where:        NMAX  >=  (N = NX) + 2     Use:  NMAX  =  (N = NX) + 4
C                 MMAX  >=  (M = MG) + 1     Use:  MMAX  =  (M = MG) + 4
C
C                 (N = NX)  =  Number of optimisation variables.  =  30
C                 (M = MG)  =  Total Number of Constraints.       =  52
C
C                 NMAX  =  34
C                 MMAX  =  56
C
C
C
C
C   VERSION:
C   -------
C
C   3.1  -  February 2010
C
C
C*********************************************************************
C
      IMPLICIT         NONE
      INTEGER          NMAX, MMAX, MNN2X, LWA, LKWA, LACTIV
      PARAMETER (      NMAX   = 34,
     /                 MMAX   = 56,
     /                 MNN2X  = MMAX + NMAX + NMAX + 2,
     /                 LWA    = 1.5*NMAX*NMAX + 33*NMAX + 9*MMAX + 200,
     /                 LKWA   = NMAX + 20,
     /                 LACTIV = 2*MMAX + 10)
      INTEGER          KWA(LKWA), N, ME, M, L, MNN2, MAXIT, MAXFUN,
     /                 IPRINT, MAXNM, IOUT, MODE, IFAIL, I, J, NFUNC
      DOUBLE PRECISION X(NMAX), F, G(MMAX), DF(NMAX), DG(MMAX,NMAX),
     /                 U(MNN2X), XL(NMAX), XU(NMAX), C(NMAX,NMAX),
```

```
     /                D(NMAX), WA(LWA), ACC, ACCQP, STPMIN, EPS,
     /                EPSREL, FBCK, GBCK(MMAX), RHOB
      LOGICAL         ACTIVE(LACTIV), LQL
      EXTERNAL        QL
C
C
C
C     EXTERNAL  RAN
C     REAL*8    RAN
C
      INTEGER*4  NZZ,    NXX,    NZNX
C
      PARAMETER  (NZZ=90,NXX=30,NZNX=NZZ*NXX)
C
      INTEGER*4  CVOUT,  ICASE,  IDATA,  IE,     IG,     II,     IN,
     1           INFO,   IOPT,   IPIV(NXX),      IQ,     ISEED1, ISEED2,
     2           ISEED3, ISEED4, ITOUT,  JJ,     JSEED1, JSEED2, JSEED3,
     3           JSEED4, LWORK,          MG,     MI,     MULT,   NX,
     4           NZ
C
      REAL*8 CRAN1,      CRAN2,      CRAN3,      CRAN4,      CRAN5,
     1       CRAN6,      CRAN7,      CRAN8,      DX(NXX),    DZ(NZZ),
     2       DZ0(NZZ),               G0(MMAX),   GEQ(MMAX),  GMAX(MMAX),
     3       ONE,        SUMF,       SUMZ,       T(NZZ,NXX), TWO,
     4       WDT(NZZ),   XL0(NXX),   XU0(NXX),   X0(NXX),    Z(NZZ),
     5       ZA(NZZ),    Z0(NZZ),    ZERO
C
      REAL*8  ALPHA,             DD(NXX,NXX),       DELTCV(NXX),
     1        DUMQ(NZZ,1),       DUMT(NXX,1),       DUMT1(NXX,1),
     2        DUMTT(NXX,NXX),    DUMX(NXX,1),       DUMX1(NXX,1),
     3        DUMXX(NXX,NXX),    DUMXX1(NXX,NXX),   DUMZ(NZZ,1),
     4        DUMZT(1,NZZ),      DUMXZ(NXX,NZZ),    EE(NXX,NXX),
     5        FF(NXX,NXX),       JJJ(1,1),          RSSDCV,
     6        THETA(NXX),        TT(NZZ,NXX),       TTT(NXX,NZZ),
     7        WDX(NXX),          WDXX(NXX,NXX),     WORK(NXX),
     8        WX(NXX),           WXX(NXX,NXX),      WZ(NZZ),
     9        WZZ(NZZ,NZZ),      ZZ(NZZ),           ZZZ(NZZ)
C
C23456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C
      DATA  ACC,       ACCQP,    ALPHA,    CRAN1,    CRAN2,    CRAN3,
     1      CRAN4,     CRAN5,    CRAN6,    CRAN7,    CRAN8,    CVOUT,
     2      EPS,       GEQ,                GMAX,               ICASE,
     3      IDATA,     IN,       IOPT,     IOUT,     IPRINT,   ITOUT,
     4      L,         LQL,
     5          ISEED1,       ISEED2,       ISEED3,       ISEED4,
     6          JSEED1,       JSEED2,       JSEED3,       JSEED4,
     7      MAXFUN,    MAXIT,    MAXNM,    ME,       MG,        MODE,
     8      MULT,                ONE,      RHOB,     STPMIN,
     9      WDT,                 WDX,                WX,
     A      WZ,                  XL,                 XL0,
     B      XU,                  XU0,                T,
     C      TWO,       X0,                 ZA,                 ZERO     /
C
C23456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C
     o      1.0D-07,  0.0D+00,  1.0D+00,  2.0D+00,  3.0D+00,  1.0D+00,
     1      1.0D+00,  1.0D-01,  1.0D-01,  1.0D-01,  1.0D-01,  0,
     2      1.0D-07,  MMAX*0.0D+00,       MMAX*1.5D+00,       1,
     3      0,        5,        1,        6,        2,        0,
     4      1,        .TRUE.,
     5          78985723,     95428381,     72919329,     63237395,
     6          81692875,     68377297,     89672847,     98351973,
     7      10,       100,      0,        0,        0,        0,
     8       0,                1.0D+00,  100.00,   0.0D+00,
```

```
     9      NZZ*1.0D+00,        NXX*0.0D+00,        NXX*0.0D+00,
     A      NZZ*1.0D+00,        NMAX*-2.0D+00,      NXX*-1.9D+00,
     B      NMAX*2.0D+00,       NXX*1.9D+00,        NZNX*0.0D+00,
     C      2.0D+00,   NXX*0.0D+00,        NZZ*0.0D+00,       0.0D+00  /
C
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C
 1000 FORMAT(//6X,45H   *****   Number of Function Evaluations  = ,I6,
     1 8H   *****)
 1900 FORMAT(//2H  )
 1901 FORMAT(//2H  )
 1902 FORMAT(///79H ***************************************************
     1*************************////6X,39H   ***************   Start Cas
     2e Number ,I3,18H   ***************/)
 1903 FORMAT(//4X,51H   *****   Solution Control Vector for Case Number
     1,I3,8H   *****)
 1904 FORMAT(5X,I2,3X,3D20.8)
 1905 FORMAT(4D20.8)
 1906 FORMAT(//45H   *****   NLP Solution Performance Index  = ,D16.8,
     18H   *****)
 1907 FORMAT(//5X,60H   *****   Initial Control Vector Estimate for Case
     1 Number  ,I3,8H   *****)
 1908 FORMAT(//15X,27H   *****   End Case Number ,I3,8H   *****)
 1909 FORMAT(//1X,40H   *****   Initial Performance Index  = ,D16.8,
     18H   *****)
 1910 FORMAT(5X,I2,3X,3D20.8)
 1911 FORMAT(/2X,8H Element,8X,7H G.L.B.,13X,5H C.V.,15X,7H L.U.B./)
 1912 FORMAT(13X,43H   *****   Completed CALL to NLPQLP   *****)
 1913 FORMAT(/7X,6H CRAN1,14X,6H CRAN2,14X,6H CRAN3,14X,6H CRAN4/
     1        7X,6H CRAN5,14X,6H CRAN6,14X,6H CRAN7,14X,6H CRAN8/)
 1914 FORMAT(/21X,21H   *****   INPUT DATA,8H   *****/)
 1915 FORMAT(//24X,22H   *****   OUTPUT DATA,8H   *****/)
 1916 FORMAT(/21X,23H Inequality Constraints//2X,8H Element,9X,6H Value,
     1 14X,7H L.U.B.,9X,15H L.U.B. - Value/)
 1917 FORMAT(//62H   *****   Initial Constraint Function Values for Case
     1 Number ,I3,8H   *****)
 1918 FORMAT(//63H   *****   Solution Constraint Function Values for Cas
     1e Number ,I3,8H   *****)
 1919 FORMAT(/22X,21H Equality Constraints//2X,8H Element,9X,6H Value,
     1 14X,7H Target,9X,15H Value - Target/)
 1920 FORMAT(//2X,54H *****   NO Constraints are Specified for Case Numb
     1er ,I3,8H   *****)
 1921 FORMAT(//1X,69H   *****   Control Vector During Previous Duty Cycl
     1e for Case Number ,I3,8H   *****)
 1922 FORMAT(/2X,8H Element,4X,7H G.L.B.,11X,5H C.V.,13X,7H L.U.B.,11X,
     1  11H Delta C.V./)
 1923 FORMAT(5X,I2,1X,4D18.8)
 1924 FORMAT(//9X,63H   *****   Measurement Vectors from Previous Duty C
     1ycle   *****//2x,8H Element,8X,7H Actual,13X,6H Ideal,14X,6H Delta
     2/)
 1925 FORMAT(//14X,47H   *****   Predicted Measurement Vector   *****//
     12X,8H Element,4X,9H Z Vector,9X,10H ZA Vector,8X,8H Delta Z,10X,
     2 8H Diag[W]/)
 1926 FORMAT(12X,53H   *****   X0, ZA, and T are Randomly Defined   ****
     1*/)
 1927 FORMAT(/4X,4H Row,16X,25H *****   T-Matrix   *****)
 1928 FORMAT(/5X,I2,1X,4D18.8/(8X,4D18.8))
 1929 FORMAT(//14X,48H   *****   T-Matrix Output is Suppressed   *****)
 1930 FORMAT(14X,51H   *****   X0, ZA, and T are Directly Input   *****)
 1931 FORMAT(//13X,31H   *****   NLP Special Control ,I2,22H-Vector Outp
     1ut   *****)
 1932 FORMAT(/2X,5H CV =,/(5X,3(D24.15,1H,)))
 1950 FORMAT(//3X,50H *****   Solve the NLPQLP Problem for Case Number ,
     1 I3,8H   *****)
C
```

```
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C
 2906 FORMAT(//51H   *****   Regulator Solution Performance Index  = ,
     1 D16.8,8H   *****)
 2931 FORMAT(//10X,37H   *****   Regulator Special Control ,I2,22H-Vecto
     1r Output   *****)
 2950 FORMAT(//2X,53H *****   Solve the Regulator Problem for Case Numbe
     1r ,I3,8H   *****)
 2960 FORMAT(/4X,4H Row,4X,49H *****   [DUMXX1] = Matrix to be Inverted
     1  *****)
 2961 FORMAT(/4X,4H Row,2X,54H *****   [DD] = The Inverse of Matrix [DUM
     1XX1]   *****)
 2962 FORMAT(/4X,4H Row,1X,56H *****   [EE] = The Identity Matrix [DUMXX
     11][DD]   *****)
 2963 FORMAT(/4X,4H Row,1X,56H *****   [FF] = The Identity Matrix [DD][D
     1UMXX1]   *****)
 2964 FORMAT(/20X,19H *****   Alpha  =  ,D18.8,8H   *****/)
 2965 FORMAT(/4X,4H Dim,18X,26H *****   WZ-Vector   *****)
 2966 FORMAT(/4X,4H Dim,18X,26H *****   WX-Vector   *****)
 2967 FORMAT(/4X,4H Dim,18X,27H *****   WDX-Vector   *****)
 2968 FORMAT(/4X,4H Dim, 9X,44H *****   The Solution Control Vector   **
     1***)
 2969 FORMAT(/4X,4H Dim, 7X,48H *****   The Solution Measurement Vector
     1  *****)
 2970 FORMAT(//5X,52H   *****   Matrix [DUMXX1] was Successfully Inverte
     1d/42X,30H to Yield Matrix [DD].   *****)
 2971 FORMAT(// 4X,48H  *****   Root-Sum-Squared Delta CV Elements  = ,
     1 D16.8,8H   *****)
 2972 FORMAT(/2X,11H Delta CV =,/(5X,3(D24.15,1H,)))
 2973 FORMAT(//5X,19H   *****   Element ,I4,44H  of Matrix [DUMXX1] has
     1an illegal value.  ,/38X,30H Regulator problem is stopped./38X,
     2 32H Go on to the next case.   *****)
 2974 FORMAT(//5X,19H   *****   Element ,I4,44H  of Matrix [DUMXX1] is z
     1ero and the matrix ,/38X,32H is singular; its inverse could ,/38X,
     2 17H not be computed.,/38X,30H Regulator problem is stopped./38X,
     3 32H Go on to the next case.   *****)
C
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C
 3961 FORMAT(/4X,4H Row,1X,40H *****   The Diagonal Matrix WZZ   *061*)
 3962 FORMAT(/4X,4H Row,1X,40H *****   The Diagonal Matrix WXX   *062*)
 3963 FORMAT(/4X,4H Row,1X,41H *****   The Diagonal Matrix WDXX   *063*)
 3964 FORMAT(/4X,4H Row,1X,34H *****   The T-Matrix [TT]   *064*)
 3965 FORMAT(/4X,4H Row,1X,52H *****   The Transpose of the T-Matrix [TT
     1T]   *065*)
 3966 FORMAT(/4X,4H Row,1X,41H *****   The DUMXZ-Matrix [DUMXZ]   *066*)
 3967 FORMAT(/4X,4H Row,1X,41H *****   The DUMXX-Matrix [DUMXX]   *067*)
 3968 FORMAT(/4X,4H Row,1X,41H *****   The DUMXX-Matrix [DUMXX]   *068*)
 3969 FORMAT(/4X,4H Row,1X,41H *****   The DUMXX-Matrix [DUMXX]   *069*)
 3970 FORMAT(/4X,4H Row,1X,39H *****   The DUMX-Vector [DUMX]   *070*)
 3971 FORMAT(/4X,4H Row,1X,39H *****   The DUMX-Vector [DUMX]   *071*)
 3972 FORMAT(/4X,4H Row,1X,39H *****   The DUMZ-Vector [DUMZ]   *072*)
 3973 FORMAT(/4X,4H Row,1X,41H *****   The DUMX1-Vector [DUMX1]   *073*)
 3974 FORMAT(/4X,4H Row,1X,41H *****   The DUMX1-Vector [DUMX1]   *074*)
 3975 FORMAT(/4X,4H Row,1X,41H *****   The DUMX1-Vector [DUMX1]   *075*)
 3976 FORMAT(/4X,4H Row,1X,39H *****   The DUMZ-Vector [DUMZ]   *076*)
 3977 FORMAT(/4X,4H Row,1X,39H *****   The DUMZ-Vector [DUMZ]   *077*)
 3978 FORMAT(/4X,4H Row,1X,41H *****   The DUMZT-Vector [DUMZT]   *078*)
 3991 FORMAT(/4X,4H Row,1X,41H *****   The DUMXX-Matrix [DUMXX]   *091*)
C
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C
C
      NAMELIST / CDATA / ALPHA,  ACC,    ACCQP,  CRAN1,  CRAN2,  CRAN3,
     1                   CRAN4,  CRAN5,  CRAN6,  CRAN7,  CRAN8,  CVOUT,
```

```
     2                   EPS,    GEQ,    GMAX,   ICASE,  IDATA,  IN,
     3                   IOPT,   IOUT,   IPRINT, ISEED1, ISEED2, ISEED3,
     4                   ISEED4, ITOUT,  JSEED1, JSEED2, JSEED3, JSEED4,
     5                   L,      LQL,    MAXFUN, MAXIT,  MAXNM,  ME,
     6                   MG,     MODE,   MULT,                   RHOB,
     7                   STPMIN, T,      WDT,    WDX,    WX,     WZ,
     8                   XL,     XL0,    XU,     XU0,    X0,     ZA
C
C
C   Set some constants and initial values
C
      MODE   = 0
C
  100 READ(IN,CDATA)
C
      IFAIL  = 0
      NFUNC  = 0
      NX     = NXX
      NZ     = NZZ
      M      = MG
      N      = NX
      MI     = MG - ME
      MNN2   = M + N + N + 2
C
      WRITE(IOUT,1902)  ICASE
      WRITE(IOUT,1914)
      WRITE(IOUT,CDATA)
      IF (IDATA) 90, 90, 50
C
C  *****   Randomly define the T-Matrix and the X0 & ZA Vectors   *****
C
   90 WRITE(IOUT,1915)
      WRITE(IOUT,1926)
      WRITE(IOUT,1913)
      WRITE(IOUT,1905) CRAN1, CRAN2, CRAN3, CRAN4, CRAN5, CRAN6, CRAN7,
     1                 CRAN8
      WRITE(IOUT,1921)  ICASE
      WRITE(IOUT,1911)
      DO 61 II = 1, NX
C
C  *****   Define the T-Matrix   *****
C
      DO 62 JJ = 1, NZ
      T(JJ,II) = CRAN1*(TWO*RAN(ISEED1) - ONE) +
     1           CRAN2*(TWO*RAN(JSEED1) - ONE)
   62 CONTINUE
C
C  *****   Define the Previous Actual Control Vector   *****
C
      X0(II)   = CRAN3*(TWO*RAN(ISEED2) - ONE) +
     1           CRAN4*(TWO*RAN(JSEED2) - ONE)
      WRITE(IOUT,1904)  II,  XL0(II),  X0(II),  XU0(II)
C
C  *****   Adjust Previous Actual Control Vector
C                      to be Within Feasible Limits if Required.   *****
C
      IF (X0(II) - EPS - XL0(II)) 63, 64, 64
   63 X0(II) = XL0(II) + EPS
      GO TO 66
   64 IF (X0(II) + EPS - XU0(II)) 61, 61, 65
   65 X0(II) = XU0(II) - EPS
   66 WRITE(IOUT,1904)  II,  XL0(II),  X0(II),  XU0(II)
   61 CONTINUE
C
      WRITE(IOUT,1924)
```

```
C
C  *****   Define the Previous Ideally Computed Measurement Vector   *****
C
      DO 42 JJ = 1, NZ
      SUMZ = ZERO
      DO 47 II = 1, NX
      SUMZ = SUMZ + T(JJ,II)*X0(II)
   47 CONTINUE
      Z0(JJ) = SUMZ
C
C  *****   Define the Previous Actual Measurement Vector   *****
C
      DZ0(JJ) = CRAN5*(TWO*RAN(ISEED3) - ONE) +
     1                CRAN6*(TWO*RAN(JSEED3) - ONE)
      ZA(JJ)  = Z0(JJ) + DZ0(JJ)
      WRITE(IOUT,1904)  JJ,  ZA(JJ),  Z0(JJ),  DZ0(JJ)
   42 CONTINUE
C
      GO TO 40
C
C  *****   Input the X0 & ZA Vectors, and the T-Matrix via TDATA   *****
C
   50 WRITE(IOUT,1915)
      WRITE(IOUT,1930)
      WRITE(IOUT,1921)  ICASE
      WRITE(IOUT,1911)
C
C  *****   Write the Previous Actual Control Vector   *****
C
      DO 31 II = 1, NX
      WRITE(IOUT,1904)  II,  XL0(II),  X0(II),  XU0(II)
C
C  *****   Adjust Previous Actual Control Vector
C                      to be Within Feasible Limits if Required.   *****
C
      IF (X0(II) - EPS - XL0(II)) 33, 34, 34
   33 X0(II) = XL0(II) + EPS
      GO TO 36
   34 IF (X0(II) + EPS - XU0(II)) 31, 31, 35
   35 X0(II) = XU0(II) - EPS
   36 WRITE(IOUT,1904)  II,  XL0(II),  X0(II),  XU0(II)
   31 CONTINUE
C
      WRITE(IOUT,1924)
C
C  *****   Define the Previous Ideally Computed Measurement Vector   *****
C
      DO 37 JJ = 1, NZ
      SUMZ = ZERO
      DO 38 II = 1, NX
      SUMZ = SUMZ + T(JJ,II)*X0(II)
   38 CONTINUE
      Z0(JJ) = SUMZ
C
C  *****   Define the Difference Between the Actual
C                          and the Ideal Previous Measurement Vector   *****
C
      DZ0(JJ) = ZA(JJ) - Z0(JJ)
      WRITE(IOUT,1904)  JJ,  ZA(JJ),  Z0(JJ),  DZ0(JJ)
   37 CONTINUE
C
C
C  *****   Define the Initial Estimate of the Control Vector   *****
C
   40 WRITE(IOUT,1907)  ICASE
```

```
      WRITE(IOUT,1922)
      DO 41 II = 1, NX
      X(II)  = X0(II)
      DX(II) = X(II) - X0(II)
      WRITE(IOUT,1923)  II,  XL(II),  X(II),  XU(II), DX(II)
      IF (X(II) - EPS - XL(II)) 43, 44, 44
   43 X(II)  = XL(II) + EPS
      DX(II) = X(II) - X0(II)
      GO TO 46
   44 IF (X(II) + EPS - XU(II)) 41, 41, 45
   45 X(II)  = XU(II) - EPS
      DX(II) = X(II) - X0(II)
   46 WRITE(IOUT,1923)  II,  XL(II),  X(II),  XU(II), DX(II)
   41 CONTINUE
C
C   *****   Write T-Matrix   ***
C
      IF (ITOUT .LE. 0)  GO TO 92
      WRITE(IOUT,1927)
      DO 91 JJ = 1, NZ
      WRITE(IOUT,1928) JJ, (T(JJ,II), II=1,NX)
   91 CONTINUE
      GO TO 93
   92 WRITE(IOUT,1929)
C
C   *****   Performance Index   *****
C
   93 SUMF = ZERO
      DO 67 JJ = 1, NZ
      SUMZ = ZERO
      DO 68 II = 1, NX
      SUMZ   =  SUMZ + T(JJ,II)*X(II)
   68 CONTINUE
      Z(JJ)  =  SUMZ + DZ0(JJ)
      DZ(JJ) =  Z(JJ) - ZA(JJ)
      SUMF = SUMF + Z(JJ)*Z(JJ)*WDT(JJ)
   67 CONTINUE
      WRITE(IOUT,1925)
      DO 48 JJ = 1, NZ
      WRITE(IOUT,1923)  JJ,  Z(JJ),  ZA(JJ),  DZ(JJ),  WDT(JJ)
   48 CONTINUE
      F = SUMF
      WRITE(IOUT,1909) F
C
C   *****   Constraint Functions   *****
C
      IF (MG) 999, 51, 71
   51 WRITE(IOUT,1920)  ICASE
      GO TO 70
   71 WRITE(IOUT,1917)  ICASE
      IF (ME) 999, 74, 72
   72 CONTINUE
      G0(1) = X(1)*X(4)   - X(2)*X(3)
      G(1)  = GEQ(1) - G0(1)
      G0(2) = X(5)*X(8)   - X(6)*X(7)
      G(2)  = GEQ(2) - G0(2)
      G0(3) = X(9)*X(12)  - X(10)*X(11)
      G(3)  = GEQ(3) - G0(3)
      G0(4) = X(13)*X(16) - X(14)*X(15)
      G(4)  = GEQ(4) - G0(4)
      G0(5) = X(17)*X(20) - X(18)*X(19)
      G(5)  = GEQ(5) - G0(5)
      G0(6) = X(21)*X(24) - X(22)*X(23)
      G(6)  = GEQ(6) - G0(6)
      G0(7) = X(25)*X(28) - X(26)*X(27)
```

```
      G(7)  = GEQ(7) - G0(7)
      WRITE(IOUT,1919)
      DO 73 IE = 1, ME
      WRITE(IOUT,1910)  IE,  G0(IE),  GEQ(IE), -G(IE)
   73 CONTINUE
      IF (MI) 999, 70, 75
   74 IF (MI) 999, 51, 52
   52 CONTINUE
      G0(1)  = DSQRT(X(1)*X(1)   + X(2)*X(2))
      G(1)   = GMAX(1)  - G0(1)
      G0(2)  = DSQRT(X(3)*X(3)   + X(4)*X(4))
      G(2)   = GMAX(2)  - G0(2)
      G0(3)  = DSQRT(X(5)*X(5)   + X(6)*X(6))
      G(3)   = GMAX(3)  - G0(3)
      G0(4)  = DSQRT(X(7)*X(7)   + X(8)*X(8))
      G(4)   = GMAX(4)  - G0(4)
      G0(5)  = DSQRT(X(9)*X(9)   + X(10)*X(10))
      G(5)   = GMAX(5)  - G0(5)
      G0(6)  = DSQRT(X(11)*X(11) + X(12)*X(12))
      G(6)   = GMAX(6)  - G0(6)
      G0(7)  = DSQRT(X(13)*X(13) + X(14)*X(14))
      G(7)   = GMAX(7)  - G0(7)
      G0(8)  = DSQRT(X(15)*X(15) + X(16)*X(16))
      G(8)   = GMAX(8)  - G0(8)
      G0(9)  = DSQRT(X(17)*X(17) + X(18)*X(18))
      G(9)   = GMAX(9)  - G0(9)
      G0(10) = DSQRT(X(19)*X(19) + X(20)*X(20))
      G(10)  = GMAX(10) - G0(10)
      G0(11) = DSQRT(X(21)*X(21) + X(22)*X(22))
      G(11)  = GMAX(11) - G0(11)
      G0(12) = DSQRT(X(23)*X(23) + X(24)*X(24))
      G(12)  = GMAX(12) - G0(12)
      G0(13) = DSQRT(X(25)*X(25) + X(26)*X(26))
      G(13)  = GMAX(13) - G0(13)
      G0(14) = DSQRT(X(27)*X(27) + X(28)*X(28))
      G(14)  = GMAX(14) - G0(14)
      G0(15) = DSQRT(X(29)*X(29) + X(30)*X(30))
      G(15)  = GMAX(15) - G0(15)
C
      G0(16) = DABS(DX(1))
      G(16)  = GMAX(16) - G0(16)
      G0(17) = DABS(DX(2))
      G(17)  = GMAX(17) - G0(17)
      G0(18) = DABS(DX(3))
      G(18)  = GMAX(18) - G0(18)
      G0(19) = DABS(DX(4))
      G(19)  = GMAX(19) - G0(19)
      G0(20) = DABS(DX(5))
      G(20)  = GMAX(20) - G0(20)
      G0(21) = DABS(DX(6))
      G(21)  = GMAX(21) - G0(21)
      G0(22) = DABS(DX(7))
      G(22)  = GMAX(22) - G0(22)
      G0(23) = DABS(DX(8))
      G(23)  = GMAX(23) - G0(23)
      G0(24) = DABS(DX(9))
      G(24)  = GMAX(24) - G0(24)
      G0(25) = DABS(DX(10))
      G(25)  = GMAX(25) - G0(25)
      G0(26) = DABS(DX(11))
      G(26)  = GMAX(26) - G0(26)
      G0(27) = DABS(DX(12))
      G(27)  = GMAX(27) - G0(27)
      G0(28) = DABS(DX(13))
      G(28)  = GMAX(28) - G0(28)
```

```
      G0(29) = DABS(DX(14))
      G(29)  = GMAX(29) - G0(29)
      G0(30) = DABS(DX(15))
      G(30)  = GMAX(30) - G0(30)
      G0(31) = DABS(DX(16))
      G(31)  = GMAX(31) - G0(31)
      G0(32) = DABS(DX(17))
      G(32)  = GMAX(32) - G0(32)
      G0(33) = DABS(DX(18))
      G(33)  = GMAX(33) - G0(33)
      G0(34) = DABS(DX(19))
      G(34)  = GMAX(34) - G0(34)
      G0(35) = DABS(DX(20))
      G(35)  = GMAX(35) - G0(35)
      G0(36) = DABS(DX(21))
      G(36)  = GMAX(36) - G0(36)
      G0(37) = DABS(DX(22))
      G(37)  = GMAX(37) - G0(37)
      G0(38) = DABS(DX(23))
      G(38)  = GMAX(38) - G0(38)
      G0(39) = DABS(DX(24))
      G(39)  = GMAX(39) - G0(39)
      G0(40) = DABS(DX(25))
      G(40)  = GMAX(40) - G0(40)
      G0(41) = DABS(DX(26))
      G(41)  = GMAX(41) - G0(41)
      G0(42) = DABS(DX(27))
      G(42)  = GMAX(42) - G0(42)
      G0(43) = DABS(DX(28))
      G(43)  = GMAX(43) - G0(43)
      G0(44) = DABS(DX(29))
      G(44)  = GMAX(44) - G0(44)
      G0(45) = DABS(DX(30))
      G(45)  = GMAX(45) - G0(45)
      WRITE(IOUT,1916)
      DO 53 IQ = 1, MI
      WRITE(IOUT,1910)  IQ,  G0(IQ),  GMAX(IQ), G(IQ)
   53 CONTINUE
      GO TO 70
   75 CONTINUE
      G0(8)  = DSQRT(X(1)*X(1)   + X(2)*X(2))
      G(8)   = GMAX(1)  - G0(8)
      G0(9)  = DSQRT(X(3)*X(3)   + X(4)*X(4))
      G(9)   = GMAX(2)  - G0(9)
      G0(10) = DSQRT(X(5)*X(5)   + X(6)*X(6))
      G(10)  = GMAX(3)  - G0(10)
      G0(11) = DSQRT(X(7)*X(7)   + X(8)*X(8))
      G(11)  = GMAX(4)  - G0(11)
      G0(12) = DSQRT(X(9)*X(9)   + X(10)*X(10))
      G(12)  = GMAX(5)  - G0(12)
      G0(13) = DSQRT(X(11)*X(11) + X(12)*X(12))
      G(13)  = GMAX(6)  - G0(13)
      G0(14) = DSQRT(X(13)*X(13) + X(14)*X(14))
      G(14)  = GMAX(7)  - G0(14)
      G0(15) = DSQRT(X(15)*X(15) + X(16)*X(16))
      G(15)  = GMAX(8)  - G0(15)
      G0(16) = DSQRT(X(17)*X(17) + X(18)*X(18))
      G(16)  = GMAX(9)  - G0(16)
      G0(17) = DSQRT(X(19)*X(19) + X(20)*X(20))
      G(17)  = GMAX(10) - G0(17)
      G0(18) = DSQRT(X(21)*X(21) + X(22)*X(22))
      G(18)  = GMAX(11) - G0(18)
      G0(19) = DSQRT(X(23)*X(23) + X(24)*X(24))
      G(19)  = GMAX(12) - G0(19)
      G0(20) = DSQRT(X(25)*X(25) + X(26)*X(26))
```

```
      G(20)  = GMAX(13) - G0(20)
      G0(21) = DSQRT(X(27)*X(27) + X(28)*X(28))
      G(21)  = GMAX(14) - G0(21)
      G0(22) = DSQRT(X(29)*X(29) + X(30)*X(30))
      G(22)  = GMAX(15) - G0(22)
C
      G0(23) = DABS(DX(1))
      G(23)  = GMAX(16) - G0(23)
      G0(24) = DABS(DX(2))
      G(24)  = GMAX(17) - G0(24)
      G0(25) = DABS(DX(3))
      G(25)  = GMAX(18) - G0(25)
      G0(26) = DABS(DX(4))
      G(26)  = GMAX(19) - G0(26)
      G0(27) = DABS(DX(5))
      G(27)  = GMAX(20) - G0(27)
      G0(28) = DABS(DX(6))
      G(28)  = GMAX(21) - G0(28)
      G0(29) = DABS(DX(7))
      G(29)  = GMAX(22) - G0(29)
      G0(30) = DABS(DX(8))
      G(30)  = GMAX(23) - G0(30)
      G0(31) = DABS(DX(9))
      G(31)  = GMAX(24) - G0(31)
      G0(32) = DABS(DX(10))
      G(32)  = GMAX(25) - G0(32)
      G0(33) = DABS(DX(11))
      G(33)  = GMAX(26) - G0(33)
      G0(34) = DABS(DX(12))
      G(34)  = GMAX(27) - G0(34)
      G0(35) = DABS(DX(13))
      G(35)  = GMAX(28) - G0(35)
      G0(36) = DABS(DX(14))
      G(36)  = GMAX(29) - G0(36)
      G0(37) = DABS(DX(15))
      G(37)  = GMAX(30) - G0(37)
      G0(38) = DABS(DX(16))
      G(38)  = GMAX(31) - G0(38)
      G0(39) = DABS(DX(17))
      G(39)  = GMAX(32) - G0(39)
      G0(40) = DABS(DX(18))
      G(40)  = GMAX(33) - G0(40)
      G0(41) = DABS(DX(19))
      G(41)  = GMAX(34) - G0(41)
      G0(42) = DABS(DX(20))
      G(42)  = GMAX(35) - G0(42)
      G0(43) = DABS(DX(21))
      G(43)  = GMAX(36) - G0(43)
      G0(44) = DABS(DX(22))
      G(44)  = GMAX(37) - G0(44)
      G0(45) = DABS(DX(23))
      G(45)  = GMAX(38) - G0(45)
      G0(46) = DABS(DX(24))
      G(46)  = GMAX(39) - G0(46)
      G0(47) = DABS(DX(25))
      G(47)  = GMAX(40) - G0(47)
      G0(48) = DABS(DX(26))
      G(48)  = GMAX(41) - G0(48)
      G0(49) = DABS(DX(27))
      G(49)  = GMAX(42) - G0(49)
      G0(50) = DABS(DX(28))
      G(50)  = GMAX(43) - G0(50)
      G0(51) = DABS(DX(29))
      G(51)  = GMAX(44) - G0(51)
      G0(52) = DABS(DX(30))
```

```
      G(52)  = GMAX(45) - G0(52)
      WRITE(IOUT,1916)
      DO 76 IQ = 1, MI
      IG = ME + IQ
      WRITE(IOUT,1910)  IQ,  G0(IG),  GMAX(IQ), G(IG)
   76 CONTINUE
   70 CONTINUE
C
      GO TO (96,96,200), IOPT
C
C  *****   NLPQLP Optimisation   *****
C
   96 WRITE(IOUT,1950)  ICASE
C
      I      = 0
C
    1 CONTINUE
C
C============================================================
C
C   This is the main block to compute all function values.
C   The block is executed either for computing a steplength
C   sequentially or for approximating gradients by forward
C   differences.
C
C   *****   Performance Index   *****
C
      SUMF = ZERO
      DO 98 II = 1, NX
      DX(II) = X(II) - X0(II)
   98 CONTINUE
      DO 77 JJ = 1, NZ
      SUMZ = ZERO
      DO 78 II = 1, NX
      SUMZ   =  SUMZ + T(JJ,II)*X(II)
   78 CONTINUE
      Z(JJ)  =  SUMZ + DZ0(JJ)
      DZ(JJ) =  Z(JJ) - ZA(JJ)
      SUMF = SUMF + Z(JJ)*Z(JJ)*WDT(JJ)
   77 CONTINUE
      F = SUMF
C
C   *****   Constraint Functions   *****
C
      IF (MG) 999, 60, 88
   88 IF (ME) 999, 58, 57
   57 CONTINUE
      G0(1) = X(1)*X(4)   - X(2)*X(3)
      G(1)  = GEQ(1) - G0(1)
      G0(2) = X(5)*X(8)   - X(6)*X(7)
      G(2)  = GEQ(2) - G0(2)
      G0(3) = X(9)*X(12)  - X(10)*X(11)
      G(3)  = GEQ(3) - G0(3)
      G0(4) = X(13)*X(16) - X(14)*X(15)
      G(4)  = GEQ(4) - G0(4)
      G0(5) = X(17)*X(20) - X(18)*X(19)
      G(5)  = GEQ(5) - G0(5)
      G0(6) = X(21)*X(24) - X(22)*X(23)
      G(6)  = GEQ(6) - G0(6)
      G0(7) = X(25)*X(28) - X(26)*X(27)
      G(7)  = GEQ(7) - G0(7)
      IF (MI) 999, 60, 59
   58 IF (MI) 999, 60, 87
   87 CONTINUE
      G0(1)  = DSQRT(X(1)*X(1)   + X(2)*X(2))
```

```
      G(1)   = GMAX(1)  - G0(1)
      G0(2)  = DSQRT(X(3)*X(3)   + X(4)*X(4))
      G(2)   = GMAX(2)  - G0(2)
      G0(3)  = DSQRT(X(5)*X(5)   + X(6)*X(6))
      G(3)   = GMAX(3)  - G0(3)
      G0(4)  = DSQRT(X(7)*X(7)   + X(8)*X(8))
      G(4)   = GMAX(4)  - G0(4)
      G0(5)  = DSQRT(X(9)*X(9)   + X(10)*X(10))
      G(5)   = GMAX(5)  - G0(5)
      G0(6)  = DSQRT(X(11)*X(11) + X(12)*X(12))
      G(6)   = GMAX(6)  - G0(6)
      G0(7)  = DSQRT(X(13)*X(13) + X(14)*X(14))
      G(7)   = GMAX(7)  - G0(7)
      G0(8)  = DSQRT(X(15)*X(15) + X(16)*X(16))
      G(8)   = GMAX(8)  - G0(8)
      G0(9)  = DSQRT(X(17)*X(17) + X(18)*X(18))
      G(9)   = GMAX(9)  - G0(9)
      G0(10) = DSQRT(X(19)*X(19) + X(20)*X(20))
      G(10)  = GMAX(10) - G0(10)
      G0(11) = DSQRT(X(21)*X(21) + X(22)*X(22))
      G(11)  = GMAX(11) - G0(11)
      G0(12) = DSQRT(X(23)*X(23) + X(24)*X(24))
      G(12)  = GMAX(12) - G0(12)
      G0(13) = DSQRT(X(25)*X(25) + X(26)*X(26))
      G(13)  = GMAX(13) - G0(13)
      G0(14) = DSQRT(X(27)*X(27) + X(28)*X(28))
      G(14)  = GMAX(14) - G0(14)
      G0(15) = DSQRT(X(29)*X(29) + X(30)*X(30))
      G(15)  = GMAX(15) - G0(15)
C
      G0(16) = DABS(DX(1))
      G(16)  = GMAX(16) - G0(16)
      G0(17) = DABS(DX(2))
      G(17)  = GMAX(17) - G0(17)
      G0(18) = DABS(DX(3))
      G(18)  = GMAX(18) - G0(18)
      G0(19) = DABS(DX(4))
      G(19)  = GMAX(19) - G0(19)
      G0(20) = DABS(DX(5))
      G(20)  = GMAX(20) - G0(20)
      G0(21) = DABS(DX(6))
      G(21)  = GMAX(21) - G0(21)
      G0(22) = DABS(DX(7))
      G(22)  = GMAX(22) - G0(22)
      G0(23) = DABS(DX(8))
      G(23)  = GMAX(23) - G0(23)
      G0(24) = DABS(DX(9))
      G(24)  = GMAX(24) - G0(24)
      G0(25) = DABS(DX(10))
      G(25)  = GMAX(25) - G0(25)
      G0(26) = DABS(DX(11))
      G(26)  = GMAX(26) - G0(26)
      G0(27) = DABS(DX(12))
      G(27)  = GMAX(27) - G0(27)
      G0(28) = DABS(DX(13))
      G(28)  = GMAX(28) - G0(28)
      G0(29) = DABS(DX(14))
      G(29)  = GMAX(29) - G0(29)
      G0(30) = DABS(DX(15))
      G(30)  = GMAX(30) - G0(30)
      G0(31) = DABS(DX(16))
      G(31)  = GMAX(31) - G0(31)
      G0(32) = DABS(DX(17))
      G(32)  = GMAX(32) - G0(32)
      G0(33) = DABS(DX(18))
```

```
      G(33)  = GMAX(33) - G0(33)
      G0(34) = DABS(DX(19))
      G(34)  = GMAX(34) - G0(34)
      G0(35) = DABS(DX(20))
      G(35)  = GMAX(35) - G0(35)
      G0(36) = DABS(DX(21))
      G(36)  = GMAX(36) - G0(36)
      G0(37) = DABS(DX(22))
      G(37)  = GMAX(37) - G0(37)
      G0(38) = DABS(DX(23))
      G(38)  = GMAX(38) - G0(38)
      G0(39) = DABS(DX(24))
      G(39)  = GMAX(39) - G0(39)
      G0(40) = DABS(DX(25))
      G(40)  = GMAX(40) - G0(40)
      G0(41) = DABS(DX(26))
      G(41)  = GMAX(41) - G0(41)
      G0(42) = DABS(DX(27))
      G(42)  = GMAX(42) - G0(42)
      G0(43) = DABS(DX(28))
      G(43)  = GMAX(43) - G0(43)
      G0(44) = DABS(DX(29))
      G(44)  = GMAX(44) - G0(44)
      G0(45) = DABS(DX(30))
      G(45)  = GMAX(45) - G0(45)
      GO TO 60
   59 CONTINUE
      G0(8)  = DSQRT(X(1)*X(1)   + X(2)*X(2))
      G(8)   = GMAX(1)  - G0(8)
      G0(9)  = DSQRT(X(3)*X(3)   + X(4)*X(4))
      G(9)   = GMAX(2)  - G0(9)
      G0(10) = DSQRT(X(5)*X(5)   + X(6)*X(6))
      G(10)  = GMAX(3)  - G0(10)
      G0(11) = DSQRT(X(7)*X(7)   + X(8)*X(8))
      G(11)  = GMAX(4)  - G0(11)
      G0(12) = DSQRT(X(9)*X(9)   + X(10)*X(10))
      G(12)  = GMAX(5)  - G0(12)
      G0(13) = DSQRT(X(11)*X(11) + X(12)*X(12))
      G(13)  = GMAX(6)  - G0(13)
      G0(14) = DSQRT(X(13)*X(13) + X(14)*X(14))
      G(14)  = GMAX(7)  - G0(14)
      G0(15) = DSQRT(X(15)*X(15) + X(16)*X(16))
      G(15)  = GMAX(8)  - G0(15)
      G0(16) = DSQRT(X(17)*X(17) + X(18)*X(18))
      G(16)  = GMAX(9)  - G0(16)
      G0(17) = DSQRT(X(19)*X(19) + X(20)*X(20))
      G(17)  = GMAX(10) - G0(17)
      G0(18) = DSQRT(X(21)*X(21) + X(22)*X(22))
      G(18)  = GMAX(11) - G0(18)
      G0(19) = DSQRT(X(23)*X(23) + X(24)*X(24))
      G(19)  = GMAX(12) - G0(19)
      G0(20) = DSQRT(X(25)*X(25) + X(26)*X(26))
      G(20)  = GMAX(13) - G0(20)
      G0(21) = DSQRT(X(27)*X(27) + X(28)*X(28))
      G(21)  = GMAX(14) - G0(21)
      G0(22) = DSQRT(X(29)*X(29) + X(30)*X(30))
      G(22)  = GMAX(15) - G0(22)
C
      G0(23) = DABS(DX(1))
      G(23)  = GMAX(16) - G0(23)
      G0(24) = DABS(DX(2))
      G(24)  = GMAX(17) - G0(24)
      G0(25) = DABS(DX(3))
      G(25)  = GMAX(18) - G0(25)
      G0(26) = DABS(DX(4))
```

```
      G(26)  = GMAX(19) - G0(26)
      G0(27) = DABS(DX(5))
      G(27)  = GMAX(20) - G0(27)
      G0(28) = DABS(DX(6))
      G(28)  = GMAX(21) - G0(28)
      G0(29) = DABS(DX(7))
      G(29)  = GMAX(22) - G0(29)
      G0(30) = DABS(DX(8))
      G(30)  = GMAX(23) - G0(30)
      G0(31) = DABS(DX(9))
      G(31)  = GMAX(24) - G0(31)
      G0(32) = DABS(DX(10))
      G(32)  = GMAX(25) - G0(32)
      G0(33) = DABS(DX(11))
      G(33)  = GMAX(26) - G0(33)
      G0(34) = DABS(DX(12))
      G(34)  = GMAX(27) - G0(34)
      G0(35) = DABS(DX(13))
      G(35)  = GMAX(28) - G0(35)
      G0(36) = DABS(DX(14))
      G(36)  = GMAX(29) - G0(36)
      G0(37) = DABS(DX(15))
      G(37)  = GMAX(30) - G0(37)
      G0(38) = DABS(DX(16))
      G(38)  = GMAX(31) - G0(38)
      G0(39) = DABS(DX(17))
      G(39)  = GMAX(32) - G0(39)
      G0(40) = DABS(DX(18))
      G(40)  = GMAX(33) - G0(40)
      G0(41) = DABS(DX(19))
      G(41)  = GMAX(34) - G0(41)
      G0(42) = DABS(DX(20))
      G(42)  = GMAX(35) - G0(42)
      G0(43) = DABS(DX(21))
      G(43)  = GMAX(36) - G0(43)
      G0(44) = DABS(DX(22))
      G(44)  = GMAX(37) - G0(44)
      G0(45) = DABS(DX(23))
      G(45)  = GMAX(38) - G0(45)
      G0(46) = DABS(DX(24))
      G(46)  = GMAX(39) - G0(46)
      G0(47) = DABS(DX(25))
      G(47)  = GMAX(40) - G0(47)
      G0(48) = DABS(DX(26))
      G(48)  = GMAX(41) - G0(48)
      G0(49) = DABS(DX(27))
      G(49)  = GMAX(42) - G0(49)
      G0(50) = DABS(DX(28))
      G(50)  = GMAX(43) - G0(50)
      G0(51) = DABS(DX(29))
      G(51)  = GMAX(44) - G0(51)
      G0(52) = DABS(DX(30))
      G(52)  = GMAX(45) - G0(52)
   60 CONTINUE
C
C
C=================================================================
C
      NFUNC = NFUNC + 1
      IF (IFAIL.EQ.-1) GOTO 4
      IF (I.GT.0) GOTO 3
    2 CONTINUE
      FBCK = F
      DO J=1,M
         GBCK(J) = G(J)
```

```
      ENDDO
      I = 0
    5 I = I + 1
      EPSREL = EPS*DMAX1(1.0D0,DABS(X(I)))
      X(I) = X(I) + EPSREL
      GOTO 1
    3 CONTINUE
      DF(I) = (F - FBCK)/EPSREL
      DO J=1,M
         DG(J,I) = (G(J) - GBCK(J))/EPSREL
      ENDDO
      X(I) = X(I) - EPSREL
   IF (I.LT.N) GOTO 5
      F = FBCK
      DO J=1,M
         G(J) = GBCK(J)
      ENDDO
C
    4 CONTINUE
C
C
      CALL NLPQLP (     L,      M,     ME,   MMAX,      N,
     /               NMAX,   MNN2,      X,      F,      G,
     /                 DF,     DG,      U,     XL,     XU,
     /                  C,      D,    ACC,  ACCQP, STPMIN,
     /             MAXFUN,  MAXIT,  MAXNM,   RHOB, IPRINT,
     /               MODE,   IOUT,  IFAIL,     WA,    LWA,
     /                KWA,   LKWA, ACTIVE, LACTIV,    LQL,
     /                 QL)
C
C
      WRITE(IOUT,1912)
C
C
      IF (IFAIL.EQ.-1) GOTO 1
      IF (IFAIL.EQ.-2) GOTO 2
C
C   *****   Write Number of Function Evaluations   *****
C
      WRITE(IOUT,1000) NFUNC
C
C  *****   Write the Solution Control Vector   *****
C
      WRITE(IOUT,1903)  ICASE
      WRITE(IOUT,1922)
      DO 69 II = 1, NX
      DX(II) = X(II) - X0(II)
      WRITE(IOUT,1923)  II,  XL(II),  X(II),  XU(II), DX(II)
   69 CONTINUE
C
C   *****   Performance Index   *****
C
      WRITE(IOUT,1925)
      DO 49 JJ = 1, NZ
      WRITE(IOUT,1923)  JJ,  Z(JJ),  ZA(JJ),  DZ(JJ),  WDT(JJ)
   49 CONTINUE
      WRITE(IOUT,1906) F
C
C   *****   Constraint Functions   *****
C
      IF (MG) 999, 54, 81
   54 WRITE(IOUT,1920)  ICASE
      GO TO 80
   81 WRITE(IOUT,1918)  ICASE
      IF (ME) 999, 84, 82
```

```
   82 CONTINUE
      G0(1) = X(1)*X(4)   - X(2)*X(3)
      G(1)  = GEQ(1) - G0(1)
      G0(2) = X(5)*X(8)   - X(6)*X(7)
      G(2)  = GEQ(2) - G0(2)
      G0(3) = X(9)*X(12)  - X(10)*X(11)
      G(3)  = GEQ(3) - G0(3)
      G0(4) = X(13)*X(16) - X(14)*X(15)
      G(4)  = GEQ(4) - G0(4)
      G0(5) = X(17)*X(20) - X(18)*X(19)
      G(5)  = GEQ(5) - G0(5)
      G0(6) = X(21)*X(24) - X(22)*X(23)
      G(6)  = GEQ(6) - G0(6)
      G0(7) = X(25)*X(28) - X(26)*X(27)
      G(7)  = GEQ(7) - G0(7)
      WRITE(IOUT,1919)
      DO 83 IE = 1, ME
      WRITE(IOUT,1910)  IE,  G0(IE),  GEQ(IE), -G(IE)
   83 CONTINUE
      IF (MI) 999, 80, 85
   84 IF (MI) 999, 54, 55
   55 CONTINUE
      G0(1)  = DSQRT(X(1)*X(1)   + X(2)*X(2))
      G(1)   = GMAX(1)  - G0(1)
      G0(2)  = DSQRT(X(3)*X(3)   + X(4)*X(4))
      G(2)   = GMAX(2)  - G0(2)
      G0(3)  = DSQRT(X(5)*X(5)   + X(6)*X(6))
      G(3)   = GMAX(3)  - G0(3)
      G0(4)  = DSQRT(X(7)*X(7)   + X(8)*X(8))
      G(4)   = GMAX(4)  - G0(4)
      G0(5)  = DSQRT(X(9)*X(9)   + X(10)*X(10))
      G(5)   = GMAX(5)  - G0(5)
      G0(6)  = DSQRT(X(11)*X(11) + X(12)*X(12))
      G(6)   = GMAX(6)  - G0(6)
      G0(7)  = DSQRT(X(13)*X(13) + X(14)*X(14))
      G(7)   = GMAX(7)  - G0(7)
      G0(8)  = DSQRT(X(15)*X(15) + X(16)*X(16))
      G(8)   = GMAX(8)  - G0(8)
      G0(9)  = DSQRT(X(17)*X(17) + X(18)*X(18))
      G(9)   = GMAX(9)  - G0(9)
      G0(10) = DSQRT(X(19)*X(19) + X(20)*X(20))
      G(10)  = GMAX(10) - G0(10)
      G0(11) = DSQRT(X(21)*X(21) + X(22)*X(22))
      G(11)  = GMAX(11) - G0(11)
      G0(12) = DSQRT(X(23)*X(23) + X(24)*X(24))
      G(12)  = GMAX(12) - G0(12)
      G0(13) = DSQRT(X(25)*X(25) + X(26)*X(26))
      G(13)  = GMAX(13) - G0(13)
      G0(14) = DSQRT(X(27)*X(27) + X(28)*X(28))
      G(14)  = GMAX(14) - G0(14)
      G0(15) = DSQRT(X(29)*X(29) + X(30)*X(30))
      G(15)  = GMAX(15) - G0(15)
C
      G0(16) = DABS(DX(1))
      G(16)  = GMAX(16) - G0(16)
      G0(17) = DABS(DX(2))
      G(17)  = GMAX(17) - G0(17)
      G0(18) = DABS(DX(3))
      G(18)  = GMAX(18) - G0(18)
      G0(19) = DABS(DX(4))
      G(19)  = GMAX(19) - G0(19)
      G0(20) = DABS(DX(5))
      G(20)  = GMAX(20) - G0(20)
      G0(21) = DABS(DX(6))
      G(21)  = GMAX(21) - G0(21)
```

```
      G0(22) = DABS(DX(7))
      G(22)  = GMAX(22) - G0(22)
      G0(23) = DABS(DX(8))
      G(23)  = GMAX(23) - G0(23)
      G0(24) = DABS(DX(9))
      G(24)  = GMAX(24) - G0(24)
      G0(25) = DABS(DX(10))
      G(25)  = GMAX(25) - G0(25)
      G0(26) = DABS(DX(11))
      G(26)  = GMAX(26) - G0(26)
      G0(27) = DABS(DX(12))
      G(27)  = GMAX(27) - G0(27)
      G0(28) = DABS(DX(13))
      G(28)  = GMAX(28) - G0(28)
      G0(29) = DABS(DX(14))
      G(29)  = GMAX(29) - G0(29)
      G0(30) = DABS(DX(15))
      G(30)  = GMAX(30) - G0(30)
      G0(31) = DABS(DX(16))
      G(31)  = GMAX(31) - G0(31)
      G0(32) = DABS(DX(17))
      G(32)  = GMAX(32) - G0(32)
      G0(33) = DABS(DX(18))
      G(33)  = GMAX(33) - G0(33)
      G0(34) = DABS(DX(19))
      G(34)  = GMAX(34) - G0(34)
      G0(35) = DABS(DX(20))
      G(35)  = GMAX(35) - G0(35)
      G0(36) = DABS(DX(21))
      G(36)  = GMAX(36) - G0(36)
      G0(37) = DABS(DX(22))
      G(37)  = GMAX(37) - G0(37)
      G0(38) = DABS(DX(23))
      G(38)  = GMAX(38) - G0(38)
      G0(39) = DABS(DX(24))
      G(39)  = GMAX(39) - G0(39)
      G0(40) = DABS(DX(25))
      G(40)  = GMAX(40) - G0(40)
      G0(41) = DABS(DX(26))
      G(41)  = GMAX(41) - G0(41)
      G0(42) = DABS(DX(27))
      G(42)  = GMAX(42) - G0(42)
      G0(43) = DABS(DX(28))
      G(43)  = GMAX(43) - G0(43)
      G0(44) = DABS(DX(29))
      G(44)  = GMAX(44) - G0(44)
      G0(45) = DABS(DX(30))
      G(45)  = GMAX(45) - G0(45)
      WRITE(IOUT,1916)
      DO 56 IQ = 1, MI
      WRITE(IOUT,1910)  IQ,  G0(IQ),  GMAX(IQ), G(IQ)
   56 CONTINUE
      GO TO 80
   85 CONTINUE
      G0(8)  = DSQRT(X(1)*X(1)   + X(2)*X(2))
      G(8)   = GMAX(1)  - G0(8)
      G0(9)  = DSQRT(X(3)*X(3)   + X(4)*X(4))
      G(9)   = GMAX(2)  - G0(9)
      G0(10) = DSQRT(X(5)*X(5)   + X(6)*X(6))
      G(10)  = GMAX(3)  - G0(10)
      G0(11) = DSQRT(X(7)*X(7)   + X(8)*X(8))
      G(11)  = GMAX(4)  - G0(11)
      G0(12) = DSQRT(X(9)*X(9)   + X(10)*X(10))
      G(12)  = GMAX(5)  - G0(12)
      G0(13) = DSQRT(X(11)*X(11) + X(12)*X(12))
```

```
      G(13)  = GMAX(6)  - G0(13)
      G0(14) = DSQRT(X(13)*X(13) + X(14)*X(14))
      G(14)  = GMAX(7)  - G0(14)
      G0(15) = DSQRT(X(15)*X(15) + X(16)*X(16))
      G(15)  = GMAX(8)  - G0(15)
      G0(16) = DSQRT(X(17)*X(17) + X(18)*X(18))
      G(16)  = GMAX(9)  - G0(16)
      G0(17) = DSQRT(X(19)*X(19) + X(20)*X(20))
      G(17)  = GMAX(10) - G0(17)
      G0(18) = DSQRT(X(21)*X(21) + X(22)*X(22))
      G(18)  = GMAX(11) - G0(18)
      G0(19) = DSQRT(X(23)*X(23) + X(24)*X(24))
      G(19)  = GMAX(12) - G0(19)
      G0(20) = DSQRT(X(25)*X(25) + X(26)*X(26))
      G(20)  = GMAX(13) - G0(20)
      G0(21) = DSQRT(X(27)*X(27) + X(28)*X(28))
      G(21)  = GMAX(14) - G0(21)
      G0(22) = DSQRT(X(29)*X(29) + X(30)*X(30))
      G(22)  = GMAX(15) - G0(22)
C
      G0(23) = DABS(DX(1))
      G(23)  = GMAX(16) - G0(23)
      G0(24) = DABS(DX(2))
      G(24)  = GMAX(17) - G0(24)
      G0(25) = DABS(DX(3))
      G(25)  = GMAX(18) - G0(25)
      G0(26) = DABS(DX(4))
      G(26)  = GMAX(19) - G0(26)
      G0(27) = DABS(DX(5))
      G(27)  = GMAX(20) - G0(27)
      G0(28) = DABS(DX(6))
      G(28)  = GMAX(21) - G0(28)
      G0(29) = DABS(DX(7))
      G(29)  = GMAX(22) - G0(29)
      G0(30) = DABS(DX(8))
      G(30)  = GMAX(23) - G0(30)
      G0(31) = DABS(DX(9))
      G(31)  = GMAX(24) - G0(31)
      G0(32) = DABS(DX(10))
      G(32)  = GMAX(25) - G0(32)
      G0(33) = DABS(DX(11))
      G(33)  = GMAX(26) - G0(33)
      G0(34) = DABS(DX(12))
      G(34)  = GMAX(27) - G0(34)
      G0(35) = DABS(DX(13))
      G(35)  = GMAX(28) - G0(35)
      G0(36) = DABS(DX(14))
      G(36)  = GMAX(29) - G0(36)
      G0(37) = DABS(DX(15))
      G(37)  = GMAX(30) - G0(37)
      G0(38) = DABS(DX(16))
      G(38)  = GMAX(31) - G0(38)
      G0(39) = DABS(DX(17))
      G(39)  = GMAX(32) - G0(39)
      G0(40) = DABS(DX(18))
      G(40)  = GMAX(33) - G0(40)
      G0(41) = DABS(DX(19))
      G(41)  = GMAX(34) - G0(41)
      G0(42) = DABS(DX(20))
      G(42)  = GMAX(35) - G0(42)
      G0(43) = DABS(DX(21))
      G(43)  = GMAX(36) - G0(43)
      G0(44) = DABS(DX(22))
      G(44)  = GMAX(37) - G0(44)
      G0(45) = DABS(DX(23))
```

```
      G(45)  = GMAX(38) - G0(45)
      G0(46) = DABS(DX(24))
      G(46)  = GMAX(39) - G0(46)
      G0(47) = DABS(DX(25))
      G(47)  = GMAX(40) - G0(47)
      G0(48) = DABS(DX(26))
      G(48)  = GMAX(41) - G0(48)
      G0(49) = DABS(DX(27))
      G(49)  = GMAX(42) - G0(49)
      G0(50) = DABS(DX(28))
      G(50)  = GMAX(43) - G0(50)
      G0(51) = DABS(DX(29))
      G(51)  = GMAX(44) - G0(51)
      G0(52) = DABS(DX(30))
      G(52)  = GMAX(45) - G0(52)
      WRITE(IOUT,1916)
      DO 86 IQ = 1, MI
      IG = ME + IQ
      WRITE(IOUT,1910)  IQ,  G0(IG),  GMAX(IQ), G(IG)
   86 CONTINUE
   80 CONTINUE
C
      GO TO (97,200,200), IOPT
C
C
C  *****   Solve the Regulator Problem   *****
C
  200 CONTINUE
C
      WRITE(IOUT,2950)  ICASE
C
C   *****   Write Alpha and the Weighting Vectors   *****
C
      WRITE(IOUT,2964)  ALPHA
      WRITE(IOUT,2965)
      WRITE(IOUT,1928)  NZZ, (WZ(I), I=1,NZZ)
      WRITE(IOUT,2966)
      WRITE(IOUT,1928)  NXX, (WX(I), I=1,NXX)
      WRITE(IOUT,2967)
      WRITE(IOUT,1928)  NXX, (WDX(I), I=1,NXX)
C
C  *****   Compute Regulator Problem Solution Control Vector   *****
C
      CALL DIAGW1(NZZ,WZ,WZZ)
C  *****   061   *****   061   *****   061   *****   061   *****
C     WRITE(IOUT,3961)
C     DO 301 I = 1, NZZ
C     WRITE(IOUT,1928)  I ,  (WZZ(I,J), J=1,NZZ)
C 301 CONTINUE
      CALL DIAGW2(NXX,WX,WXX)
C  *****   062   *****   062   *****   062   *****   062   *****
C     WRITE(IOUT,3962)
C     DO 302 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (WXX(I,J), J=1,NXX)
C 302 CONTINUE
      CALL DIAGW2(NXX,WDX,WDXX)
C  *****   063   *****   063   *****   063   *****   063   *****
C     WRITE(IOUT,3963)
C     DO 303 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (WDXX(I,J), J=1,NXX)
C 303 CONTINUE
      DO 202 I = 1, NZZ
      DO 201 J = 1, NXX
      TT(I,J)  = T(I,J)
  201 CONTINUE
```

```
  202 CONTINUE
C  *****   064   *****   064   *****   064   *****   064   *****
C     WRITE(IOUT,3964)
C     DO 304 I = 1, NZZ
C     WRITE(IOUT,1928)  I ,  (TT(I,J), J=1,NXX)
C 304 CONTINUE
      CALL TRNSP1(NZZ,NXX,TT,TTT)
C  *****   065   *****   065   *****   065   *****   065   *****
C     WRITE(IOUT,3965)
C     DO 305 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (TTT(I,J), J=1,NZZ)
C 305 CONTINUE
      CALL MMULT1(NXX,NZZ,NZZ,TTT,WZZ,DUMXZ)
C  *****   066   *****   066   *****   066   *****   066   *****
C     WRITE(IOUT,3966)
C     DO 306 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (DUMXZ(I,J), J=1,NZZ)
C 306 CONTINUE
      CALL MMULT2(NXX,NXX,NZZ,DUMXZ,TT,DUMXX)
C  *****   067   *****   067   *****   067   *****   067   *****
C     WRITE(IOUT,3967)
C     DO 307 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (DUMXX(I,J), J=1,NXX)
C 307 CONTINUE
      CALL SMDFF1(NXX,NXX,1,DUMXX,WDXX,DUMTT)
C  *****   068   *****   068   *****   068   *****   068   *****
      DO 321 I = 1,NXX
      DO 320 J = 1,NXX
      DUMXX(I,J) = DUMTT(I,J)
  320 CONTINUE
  321 CONTINUE
C     WRITE(IOUT,3968)
C     DO 308 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (DUMXX(I,J), J=1,NXX)
C 308 CONTINUE
C
C  *****   Compute the Matrix to be Inverted   *****
C
      CALL SMDFF1(NXX,NXX,1,DUMXX,WXX,DUMXX1)
C     WRITE(IOUT,2960)
C     DO 203 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (DUMXX1(I,J), J=1,NXX)
C 203 CONTINUE
C
C   *****   Compute Matrix [DD]   *****
C
C     CALL DLINRG(NXX,DUMXX1,NXX,DD,NXX)
C
      DO 210 I = 1, NXX
      DO 209 J = 1, NXX
      DD(I,J) = DUMXX1(I,J)
  209 CONTINUE
  210 CONTINUE
      LWORK = -1
      LWORK = 512
C
      CALL DGETRF(NXX,NXX,DD,NXX,IPIV,INFO)
C
      CALL DGETRI(NXX,DD,NXX,IPIV,WORK,LWORK,INFO)
C
      IF(INFO) 212, 211, 213
C
C  *****   Matrix Inversion was Successful   *****
C
  211 WRITE(IOUT,2970)
```

```
      GO TO 214
C
C  *****   Matrix Inversion Failed. An Element had an Illegal Value.
C                                                                    *****
C
  212 INFO = -INFO
      WRITE(IOUT,2973) INFO
      GO TO 89
C
C  *****   Matrix Inversion Failed. An Element on the Diagonal is Equal
C          to Zero and correspondingly the Matrix is Singular and its
C          Inverse could not be computed.
C                                                                    *****
C
  213 WRITE(IOUT,2974) INFO
      GO TO 89
C
  214 CONTINUE
C
C  *****   Matrix [DD] = The Inverted Matrix  =  [DUMXX1]-1   *****
C
C     WRITE(IOUT,2961)
C     DO 204 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (DD(I,J), J=1,NXX)
C 204 CONTINUE
C
C   *****   Matrix [EE] = The Identity Matrix = [DUMXX1][DD]   *****
C
C     CALL MMULT3(NXX,NXX,NXX,DUMXX1,DD,EE)
C     WRITE(IOUT,2962)
C     DO 205 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (EE(I,J), J=1,NXX)
C 205 CONTINUE
C
C   *****   Matrix [FF] = The Identity Matrix = [DD][DUMXX1]   *****
C
C     CALL MMULT3(NXX,NXX,NXX,DD,DUMXX1,FF)
C     WRITE(IOUT,2963)
C     DO 206 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (FF(I,J), J=1,NXX)
C 206 CONTINUE
C
C  *****   Compute the Solution Control Vector (the Theta Vector)   *****
C
      CALL MMULT3(NXX,NXX,NXX,DD,DUMXX,DUMTT)
      DO 323 I = 1,NXX
      DO 322 J = 1,NXX
      DUMXX(I,J) = DUMTT(I,J)
  322 CONTINUE
  323 CONTINUE
C  *****   069   *****   069   *****   069   *****   069   *****
C     WRITE(IOUT,3969)
C     DO 309 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (DUMXX(I,J), J=1,NXX)
C 309 CONTINUE
C
      DO 207 J = 1, NXX
      DUMX(J,1) = X0(J)
  207 CONTINUE
C  *****   070   *****   070   *****   070   *****   070   *****
C     WRITE(IOUT,3970)
C     DO 310 J = 1, NXX
C     WRITE(IOUT,1928)  J ,  DUMX(J,1)
C 310 CONTINUE
      CALL MMULT4(NXX,1,NXX,DUMXX,DUMX,DUMT)
```

```
C  *****   071   *****   071   *****   071   *****   071   *****
      DO 324 J = 1,NXX
      DUMX(J,1) = DUMT(J,1)
  324 CONTINUE
C     WRITE(IOUT,3971)
C     DO 311 J = 1, NXX
C     WRITE(IOUT,1928)  J ,  DUMX(J,1)
C 311 CONTINUE
      DO 208 I = 1, NZZ
      DUMZ(I,1) = ZA(I)
  208 CONTINUE
C  *****   072   *****   072   *****   072   *****   072   *****
C     WRITE(IOUT,3972)
C     DO 312 I = 1, NZZ
C     WRITE(IOUT,1928)  I ,  DUMZ(I,1)
C 312 CONTINUE
      CALL MMULT5(NXX,1,NZZ,DUMXZ,DUMZ,DUMX1)
C  *****   073   *****   073   *****   073   *****   073   *****
C     WRITE(IOUT,3973)
C     DO 313 J = 1, NXX
C     WRITE(IOUT,1928)  J ,  DUMX1(J,1)
C 313 CONTINUE
      CALL MMULT4(NXX,1,NXX,DD,DUMX1,DUMT1)
C  *****   074   *****   074   *****   074   *****   074   *****
      DO 325 J = 1,NXX
      DUMX1(J,1) = DUMT1(J,1)
  325 CONTINUE
C     WRITE(IOUT,3974)
C     DO 314 J = 1, NXX
C     WRITE(IOUT,1928)  J ,  DUMX1(J,1)
C 314 CONTINUE
      CALL SMULT(NXX,1,ALPHA,DUMX1,DUMT1)
C  *****   075   *****   075   *****   075   *****   075   *****
      DO 326 J = 1,NXX
      DUMX1(J,1) = DUMT1(J,1)
  326 CONTINUE
C     WRITE(IOUT,3975)
C     DO 315 J = 1, NXX
C     WRITE(IOUT,1928)  J ,  DUMX1(J,1)
C 315 CONTINUE
      CALL SMDFF2(NXX,1,0,DUMX,DUMX1,DUMT)
C
C  *****   Write the Solution Control Vector (the Theta-Vector)   *****
C
      DO 327 J = 1,NXX
      DUMX(J,1) = DUMT(J,1)
      THETA(J) = DUMX(J,1)
  327 CONTINUE
      WRITE(IOUT,2968)
      DO 318 J = 1, NXX
      WRITE(IOUT,1928)  J,  THETA(J)
  318 CONTINUE
C
C  *****   Compute the Solution Measurement Vector (the Z-Vector)   *****
C
      DO 330 J = 1,NXX
      DUMX(J,1) = THETA(J) - X0(J)
  330 CONTINUE
      CALL MMULT6(NZZ,1,NXX,TT,DUMX,DUMZ)
C  *****   076   *****   076   *****   076   *****   076   *****
      DO 331 J = 1, NZZ
      ZZ(J) = DUMZ(J,1)
  331 CONTINUE
C     WRITE(IOUT,3976)
C     DO 316 J = 1, NZZ
```

```
C     WRITE(IOUT,1928)  J ,  DUMZ(J,1)
C 316 CONTINUE
      CALL SMDFF3(NZZ,NZZ,1,ZZ,ZA,ZZZ)
C
C  *****   Write the Solution Measurement Vector (the Z-Vector)   *****
C
      DO 328 J = 1,NZZ
      ZZ(J) = ZZZ(J)
  328 CONTINUE
      WRITE(IOUT,2969)
      WRITE(IOUT,1928)  NZZ,  (ZZ(I), I=1,NZZ)
C
C   *****   Compute the Corresponding Performance Index   *****
C
      DO 319 J = 1, NZZ
      DUMZ(J,1) = ZZ(J)
  319 CONTINUE
      CALL MMULT7(NZZ,1,NZZ,WZZ,DUMZ,DUMQ)
C  *****   077   *****   077   *****   077   *****   077   *****
      DO 329 J = 1,NZZ
      DUMZ(J,1) = DUMQ(J,1)
  329 CONTINUE
C     WRITE(IOUT,3977)
C     DO 317 J = 1, NXX
C     WRITE(IOUT,1928)  J ,  DUMZ(J,1)
C 317 CONTINUE
      CALL TRNSP2(NZZ,1,DUMZ,DUMZT)
C  *****   078   *****   078   *****   078   *****   078   *****
C     WRITE(IOUT,3978)
C     I = 1
C     WRITE(IOUT,1928)  I ,  (DUMZT(1,J), J=1,NZZ)
      CALL MMULT8(1,1,NZZ,DUMZT,DUMZ,JJJ)
C
C   *****   Write the Corresponding Performance Index   *****
C
      WRITE(IOUT,2906) JJJ(1,1)
C
C   *****   End of Regulator Problem   *****
C
C
C   *****   End of Case   *****
C
C
   97 IF (CVOUT .LE. 0) GO TO 89
      GO TO (94,94,95), IOPT
   94 WRITE(IOUT,1931) NX
      WRITE(IOUT,1932) (X(II), II=1,NX)
      GO TO (89,95,95), IOPT
   95 WRITE(IOUT,2931) NXX
      WRITE(IOUT,1932) (THETA(II), II=1,NXX)
      GO TO (89,371,89), IOPT
  371 RSSDCV = ZERO
      DO 372 II = 1, NXX
      DELTCV(II) = X(II) - THETA(II)
      RSSDCV = RSSDCV + DELTCV(II)*DELTCV(II)
  372 CONTINUE
      RSSDCV = DSQRT(RSSDCV)
      WRITE(IOUT,2971) RSSDCV
      WRITE(IOUT,2972) (DELTCV(II), II=1,NXX)
   89 CVOUT = 0
      WRITE(IOUT,1908)  ICASE
C
      IF (MULT .LE. 0)  GO TO 999
      ITOUT = 0
      MULT  = 0
```

```
      WRITE(IOUT,1900)
      ICASE = ICASE + 1
      GO TO 100
  999 STOP
C
      END
C
C
C
C
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C
C
C
```

## B.4.3 Synthesised Input and Corresponding Output Data

**for the**
**(90 x 30) T-Matrix NLP Control Problem**
**on the**
**Hewlett-Packard Alpha Mainframe Computer**

```
  *********   INPUT    *****    INPUT   ********


$CDATA
!
!  *****   Start of Case  1  Input Data   *****
!                  NO Constraints
!3456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
 ACC     =    1.0D-8,
 ACC     =    1.0D-7,
 ACCQP   =    1.0D-12,
 ALPHA   =    1.0,
 CRAN1   =    1.5,
 CRAN2   =    2.0,
 CRAN3   =    0.5,
 CRAN4   =    2.0,
 CRAN5   =    0.002,
 CRAN6   =    0.002,
 CVOUT   =      0,
 CVOUT   =      1,
 GEQ     =    8.00,  0.90,  8.00,  0.90,  8.00,  0.90,  8.00,
 GEQ     =    4.00,  0.90,  4.00,  0.90,  4.00,  0.90,  4.00,
 GEQ     =    2.50,  0.00,  2.50,  0.00,  2.50,  0.00,  2,50,
 GMAX    =    3.00,  3.00,  3.00,  3.00,  3.00,  3.00,  3.00,  3.00,
 GMAX(9) =    3.00,  3.00,  3.00,  3.00,  3.00,  3.00,  3.00,
 GMAX(16)=    1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,
 GMAX(24)=    1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,
 GMAX(32)=    1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,
 GMAX(40)=    1.00,  1.00,  1.00,  1.00,  1.00,  1.00,
 GMAX(16)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
 GMAX(24)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
 GMAX(32)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
 GMAX(40)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
 ICASE   =      1,
 IDATA   =      1,
 IDATA   =      0,
 IOPT    =      3,
 IOPT    =      1,
 IOPT    =      2,
 ITOUT   =      0,
 ITOUT   =      1,
 ISEED1  =  78985723,
 ISEED2  =  95428381,
 ISEED3  =  72919329,
 ISEED4  =  63237395,
 JSEED1  =  81692875,
 JSEED2  =  68377297,
 JSEED3  =  89672847,
 JSEED4  =  98351973,
 LQL     =   .TRUE.,
 LQL     =   .FALSE.,
 MAXIT   =  200,
 MAXNM   =    0,
 MAXNM   =   10,
 ME      =    0,
 MG      =    0,
 RHOB    =    0.0,
 RHOB    =  100.0,
 XL0     =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XL0(9)  =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XL0(17) =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XL0(25) =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XU0     =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XU0(9)  =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
```

```
 XU0(17) =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XU0(25) =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XL      =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XL(9)   =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XL(17)  =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XL(25)  =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XU      =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(9)   =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(17)  =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(25)  =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 WX      = 30*0.00,
 WDX     = 30*0.00,
 WZ      = 90*1.00,
!
 MULT    =         0,
 MULT    =         1,
!
!  *****   End of Case  1  Input Data   *****
!
$END
$CDATA
!
!  *****   Start of Case  2  Input Data   *****
!             7 Equality onstraints
!           NO Inequality Constraints
!
 ACC     =    1.0D-8,
 ACC     =    1.0D-7,
 ACCQP   =    1.0D-12,
 ALPHA   =    1.0,
 CRAN1   =    1.5,
 CRAN2   =    2.0,
 CRAN3   =    0.5,
 CRAN4   =    2.0,
 CRAN5   =    0.002,
 CRAN6   =    0.002,
 CVOUT   =      0,
 CVOUT   =      1,
 GEQ     =    8.00,  0.90,  8.00,  0.90,  8.00,  0.90,  8.00,
 GEQ     =    4.00,  0.90,  4.00,  0.90,  4.00,  0.90,  4.00,
 GEQ     =    2.50,  0.00,  2.50,  0.00,  2.50,  0.00,  2,50,
 GMAX    =    3.00,  3.00,  3.00,  3.00,  3.00,  3.00,  3.00,  3.00,
 GMAX(9) =    3.00,  3.00,  3.00,  3.00,  3.00,  3.00,  3.00,
 GMAX(16)=    1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,
 GMAX(24)=    1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,
 GMAX(32)=    1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,
 GMAX(40)=    1.00,  1.00,  1.00,  1.00,  1.00,  1.00,
 GMAX(16)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
 GMAX(24)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
 GMAX(32)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
 GMAX(40)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
 IDATA   =      1,
 IDATA   =      0,
 IOPT    =      2,
 IOPT    =      3,
 IOPT    =      1,
 ITOUT   =      1,
 ITOUT   =      0,
 ISEED1  =  78985723,
 ISEED2  =  95428381,
 ISEED3  =  72919329,
 ISEED4  =  63237395,
 JSEED1  =  81692875,
 JSEED2  =  68377297,
 JSEED3  =  89672847,
```

```
 JSEED4  =  98351973,
 LQL     =   .TRUE.,
 LQL     =   .FALSE.,
 MAXIT   =  200,
 MAXNM   =    0,
 MAXNM   =   10,
 ME      =    7,
 MG      =    7,
 RHOB    =    0.0,
 RHOB    =  100.0,
 XL0     =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XL0(9)  =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XL0(17) =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XL0(25) =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XU0     =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XU0(9)  =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XU0(17) =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XU0(25) =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XL      =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XL(9)   =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XL(17)  =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XL(25)  =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XU      =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(9)   =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(17)  =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(25)  =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 WX      = 30*0.00,
 WDX     = 30*0.00,
 WZ      = 90*1.00,
 MULT    =         0,
 MULT    =         1,
!
!  *****   End of Case  2  Input Data   *****
!
$END
$CDATA
!
!  *****   Start of Case  3  Input Data   *****
!            NO Equality onstraints
!           45 Inequality Constraints
!
 ACC     =    1.0D-8,
 ACC     =    1.0D-7,
 ACCQP   =    1.0D-12,
 ALPHA   =    1.0,
 CRAN1   =    1.5,
 CRAN2   =    2.0,
 CRAN3   =    0.5,
 CRAN4   =    2.0,
 CRAN5   =    0.002,
 CRAN6   =    0.002,
 CVOUT   =      0,
 CVOUT   =      1,
 GEQ     =    8.00,  0.90,  8.00,  0.90,  8.00,  0.90,  8.00,
 GEQ     =    4.00,  0.90,  4.00,  0.90,  4.00,  0.90,  4.00,
 GEQ     =    2.50,  0.00,  2.50,  0.00,  2.50,  0.00,  2,50,
 GMAX    =    3.00,  3.00,  3.00,  3.00,  3.00,  3.00,  3.00,  3.00,
 GMAX(9) =    3.00,  3.00,  3.00,  3.00,  3.00,  3.00,  3.00,
 GMAX(16)=    1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,
 GMAX(24)=    1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,
 GMAX(32)=    1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,
 GMAX(40)=    1.00,  1.00,  1.00,  1.00,  1.00,  1.00,
 GMAX(16)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
 GMAX(24)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
 GMAX(32)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
```

```
 GMAX(40)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
 IDATA   =      1,
 IDATA   =      0,
 IOPT    =      2,
 IOPT    =      3,
 IOPT    =      1,
 ITOUT   =      1,
 ITOUT   =      0,
 ISEED1  =  78985723,
 ISEED2  =  95428381,
 ISEED3  =  72919329,
 ISEED4  =  63237395,
 JSEED1  =  81692875,
 JSEED2  =  68377297,
 JSEED3  =  89672847,
 JSEED4  =  98351973,
 LQL     =   .TRUE.,
 LQL     =   .FALSE.,
 MAXNM   =    0,
 MAXNM   =   10,
 MAXIT   =  200,
 ME      =    0,
 MG      =   45,
 RHOB    =    0.0,
 RHOB    =  100.0,
 XL0     =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XL0(9)  =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XL0(17) =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XL0(25) =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XU0     =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XU0(9)  =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XU0(17) =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XU0(25) =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XL      =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XL(9)   =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XL(17)  =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XL(25)  =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XU      =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(9)   =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(17)  =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(25)  =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 WX      = 30*0.00,
 WDX     = 30*0.00,
 WZ      = 90*1.00,
 MULT    =         0,
 MULT    =         1,
!
!  *****   End of Case  3  Input Data   *****
!
$END
$CDATA
!
!  *****   Start of Case  4  Input Data   *****
!             7 Equality onstraints
!            45 Inequality Constraints
!
 ACC     =    1.0D-8,
 ACC     =    1.0D-7,
 ACCQP   =    1.0D-12,
 ALPHA   =    1.0,
 CRAN1   =    1.5,
 CRAN2   =    2.0,
 CRAN3   =    0.5,
 CRAN4   =    2.0,
 CRAN5   =    0.002,
```

```
 CRAN6   =    0.002,
 CVOUT   =      0,
 CVOUT   =      1,
 GEQ     =    8.00,  0.90,  8.00,  0.90,  8.00,  0.90,  8.00,
 GEQ     =    4.00,  0.90,  4.00,  0.90,  4.00,  0.90,  4.00,
 GEQ     =    2.50,  0.00,  2.50,  0.00,  2.50,  0.00,  2,50,
 GMAX    =    3.00,  3.00,  3.00,  3.00,  3.00,  3.00,  3.00,  3.00,
 GMAX(9) =    3.00,  3.00,  3.00,  3.00,  3.00,  3.00,  3.00,
 GMAX(16)=    1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,
 GMAX(24)=    1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,
 GMAX(32)=    1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,  1.00,
 GMAX(40)=    1.00,  1.00,  1.00,  1.00,  1.00,  1.00,
 GMAX(16)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
 GMAX(24)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
 GMAX(32)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
 GMAX(40)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
 IDATA   =      1,
 IDATA   =      0,
 IOPT    =      2,
 IOPT    =      3,
 IOPT    =      1,
 ITOUT   =      1,
 ITOUT   =      0,
 ISEED1  =  78985723,
 ISEED2  =  95428381,
 ISEED3  =  72919329,
 ISEED4  =  63237395,
 JSEED1  =  81692875,
 JSEED2  =  68377297,
 JSEED3  =  89672847,
 JSEED4  =  98351973,
 LQL     =   .TRUE.,
 LQL     =   .FALSE.,
 MAXIT   =  200,
 MAXNM   =    0,
 MAXNM   =   10,
 ME      =    7,
 MG      =   52,
 RHOB    =    0.0,
 RHOB    =  100.0,
 XL0     =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XL0(9)  =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XL0(17) =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XL0(25) =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XU0     =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XU0(9)  =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XU0(17) =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XU0(25) =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XL      =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XL(9)   =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XL(17)  =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XL(25)  =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XU      =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(9)   =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(17)  =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(25)  =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 WX      = 30*0.00,
 WDX     = 30*0.00,
 WZ      = 90*1.00,
 MULT    =         1,
 MULT    =         0,
!
!  *****   End of Case  4  Input Data   *****
!
$END
```

```
   *********   OUTPUT   *****   OUTPUT   ********

RUN the NLP90x30 Case.

START RUN.



********************************************************************************


        ***************   Start Case Number   1   ***************


                      *****   INPUT DATA   *****

&CDATA
ALPHA   =   1.00000000000000     ,
ACC     =  1.0000000000000000E-007,
ACCQP   =  1.0000000000000000E-012,
CRAN1   =   1.50000000000000     ,
CRAN2   =   2.00000000000000     ,
CRAN3   =  0.500000000000000     ,
CRAN4   =   2.00000000000000     ,
CRAN5   =  2.0000000000000000E-003,
CRAN6   =  2.0000000000000000E-003,
CRAN7   =  0.100000000000000     ,
CRAN8   =  0.100000000000000     ,
CVOUT   =           1,
EPS     =  1.0000000000000000E-007,
GEQ     =   2.50000000000000     ,  0.000000000000000E+000,   2.50000000000000
,  0.000000000000000E+000,
   2.50000000000000     ,  0.000000000000000E+000,   2.00000000000000     ,
50.0000000000000     ,
 48*0.000000000000000E+000  ,
GMAX    = 15*3.00000000000000        , 41*1.50000000000000        ,
ICASE   =           1,
IDATA   =           0,
IN      =           5,
IOPT    =           2,
IOUT    =           6,
IPRINT  =           2,
ISEED1  =    78985723,
ISEED2  =    95428381,
ISEED3  =    72919329,
ISEED4  =    63237395,
ITOUT   =           1,
JSEED1  =    81692875,
JSEED2  =    68377297,
JSEED3  =    89672847,
JSEED4  =    98351973,
L       =           1,
LQL     = F,
MAXFUN  =          10,
MAXIT   =         200,
MAXNM   =          10,
ME      =           0,
MG      =           0,
MODE    =           0,
MULT    =           1,
```

```
RHOB    =   100.000000000000     ,
STPMIN  =  0.000000000000000E+000,
T       = 2700*0.000000000000000E+000  ,
WDT     = 90*1.00000000000000        ,
WDX     = 30*0.000000000000000E+000  ,
WX      = 30*0.000000000000000E+000  ,
WZ      = 90*1.00000000000000        ,
XL      = 30*-2.50000000000000       , 4*-2.00000000000000       ,
XL0     = 30*-2.30000000000000       ,
XU      = 30*2.50000000000000        , 4*2.00000000000000        ,
XU0     = 30*2.30000000000000        ,
X0      = 30*0.000000000000000E+000  ,
ZA      = 90*0.000000000000000E+000
/
```

***** OUTPUT DATA *****

***** X0, ZA, and T are Randomly Defined *****

| CRAN1 | CRAN2 | CRAN3 | CRAN4 |
|---|---|---|---|
| CRAN5 | CRAN6 | CRAN7 | CRAN8 |
| 0.15000000D+01 | 0.20000000D+01 | 0.50000000D+00 | 0.20000000D+01 |
| 0.20000000D-02 | 0.20000000D-02 | 0.10000000D+00 | 0.10000000D+00 |

***** Control Vector During Previous Duty Cycle for Case Number 1 *****

| Element | G.L.B. | C.V. | L.U.B. |
|---|---|---|---|
| 1 | -0.23000000D+01 | 0.52514237D+00 | 0.23000000D+01 |
| 2 | -0.23000000D+01 | 0.10654470D+01 | 0.23000000D+01 |
| 3 | -0.23000000D+01 | -0.16324993D+01 | 0.23000000D+01 |
| 4 | -0.23000000D+01 | -0.10821833D+01 | 0.23000000D+01 |
| 5 | -0.23000000D+01 | 0.16853635D+01 | 0.23000000D+01 |
| 6 | -0.23000000D+01 | -0.62707371D+00 | 0.23000000D+01 |
| 7 | -0.23000000D+01 | -0.34970790D+00 | 0.23000000D+01 |
| 8 | -0.23000000D+01 | 0.33250749D-01 | 0.23000000D+01 |
| 9 | -0.23000000D+01 | -0.39897633D+00 | 0.23000000D+01 |
| 10 | -0.23000000D+01 | 0.11151077D+01 | 0.23000000D+01 |
| 11 | -0.23000000D+01 | -0.62047988D+00 | 0.23000000D+01 |
| 12 | -0.23000000D+01 | 0.10884261D+01 | 0.23000000D+01 |
| 13 | -0.23000000D+01 | 0.50843394D+00 | 0.23000000D+01 |
| 14 | -0.23000000D+01 | 0.37141562D-01 | 0.23000000D+01 |
| 15 | -0.23000000D+01 | -0.16568323D+01 | 0.23000000D+01 |
| 16 | -0.23000000D+01 | 0.26060474D+00 | 0.23000000D+01 |
| 17 | -0.23000000D+01 | 0.17213548D+01 | 0.23000000D+01 |
| 18 | -0.23000000D+01 | 0.12643167D+01 | 0.23000000D+01 |
| 19 | -0.23000000D+01 | -0.89182526D+00 | 0.23000000D+01 |
| 20 | -0.23000000D+01 | 0.53342646D+00 | 0.23000000D+01 |
| 21 | -0.23000000D+01 | -0.76506066D+00 | 0.23000000D+01 |
| 22 | -0.23000000D+01 | 0.10322240D+01 | 0.23000000D+01 |
| 23 | -0.23000000D+01 | -0.13116534D+01 | 0.23000000D+01 |
| 24 | -0.23000000D+01 | -0.15851357D+01 | 0.23000000D+01 |
| 25 | -0.23000000D+01 | 0.12661996D+01 | 0.23000000D+01 |
| 26 | -0.23000000D+01 | 0.11542239D+01 | 0.23000000D+01 |
| 27 | -0.23000000D+01 | 0.11097218D+01 | 0.23000000D+01 |
| 28 | -0.23000000D+01 | 0.13846745D+01 | 0.23000000D+01 |
| 29 | -0.23000000D+01 | 0.20903717D+01 | 0.23000000D+01 |
| 30 | -0.23000000D+01 | -0.11019039D+01 | 0.23000000D+01 |

***** Measurement Vectors from Previous Duty Cycle *****

| Element | Actual | Ideal | Delta |
|---|---|---|---|
| 1 | 0.10103102D+02 | 0.10104275D+02 | -0.11739089D-02 |
| 2 | -0.14931111D+01 | -0.14924095D+01 | -0.70162487D-03 |
| 3 | 0.20085912D+01 | 0.20091062D+01 | -0.51504469D-03 |
| 4 | 0.19780642D+02 | 0.19778241D+02 | 0.24008768D-02 |
| 5 | -0.66669493D+01 | -0.66651274D+01 | -0.18219316D-02 |
| 6 | -0.98458102D+00 | -0.98559824D+00 | 0.10172153D-02 |
| 7 | -0.15767790D+01 | -0.15788380D+01 | 0.20590177D-02 |
| 8 | 0.11137274D+02 | 0.11134954D+02 | 0.23208692D-02 |
| 9 | 0.89017246D-01 | 0.88879319D-01 | 0.13792706D-03 |
| 10 | 0.10696431D+02 | 0.10693933D+02 | 0.24983239D-02 |
| 11 | 0.12655324D+02 | 0.12654573D+02 | 0.75085998D-03 |
| 12 | -0.10418072D+02 | -0.10419233D+02 | 0.11609204D-02 |
| 13 | -0.21780155D+01 | -0.21776413D+01 | -0.37421465D-03 |
| 14 | -0.40642447D+01 | -0.40656395D+01 | 0.13947675D-02 |
| 15 | -0.19464792D+01 | -0.19496991D+01 | 0.32199035D-02 |
| 16 | 0.42969870D+01 | 0.42974533D+01 | -0.46632385D-03 |
| 17 | -0.82003725D+01 | -0.81998678D+01 | -0.50467467D-03 |
| 18 | -0.15849261D+02 | -0.15847900D+02 | -0.13614869D-02 |
| 19 | -0.68980267D+01 | -0.68975064D+01 | -0.52021170D-03 |
| 20 | 0.90509444D+01 | 0.90534421D+01 | -0.24976861D-02 |
| 21 | -0.10285179D+02 | -0.10284505D+02 | -0.67372823D-03 |
| 22 | 0.18947733D+02 | 0.18945459D+02 | 0.22739236D-02 |
| 23 | -0.56718279D+01 | -0.56694679D+01 | -0.23599300D-02 |
| 24 | 0.14949795D+02 | 0.14947791D+02 | 0.20038812D-02 |
| 25 | 0.12199872D+01 | 0.12219031D+01 | -0.19159384D-02 |
| 26 | -0.19580384D+01 | -0.19581031D+01 | 0.64691544D-04 |
| 27 | -0.15812464D+02 | -0.15808666D+02 | -0.37973917D-02 |
| 28 | 0.13408038D+02 | 0.13406054D+02 | 0.19835744D-02 |
| 29 | -0.57171648D+01 | -0.57166864D+01 | -0.47830105D-03 |
| 30 | 0.65553521D+01 | 0.65551029D+01 | 0.24921107D-03 |
| 31 | 0.11984460D+01 | 0.11976584D+01 | 0.78764153D-03 |
| 32 | 0.41049113D+01 | 0.41032964D+01 | 0.16149530D-02 |
| 33 | -0.45120871D+01 | -0.45112859D+01 | -0.80120182D-03 |
| 34 | -0.73335053D+01 | -0.73353247D+01 | 0.18193855D-02 |
| 35 | 0.55938702D+01 | 0.55907057D+01 | 0.31645451D-02 |
| 36 | 0.57718476D+01 | 0.57718665D+01 | -0.18908978D-04 |
| 37 | 0.62566531D+01 | 0.62546603D+01 | 0.19928141D-02 |
| 38 | -0.36837182D+01 | -0.36854161D+01 | 0.16978738D-02 |
| 39 | -0.65993453D+00 | -0.66239682D+00 | 0.24622853D-02 |
| 40 | 0.62197216D+01 | 0.62201300D+01 | -0.40833139D-03 |
| 41 | 0.83986184D+01 | 0.83976410D+01 | 0.97745967D-03 |
| 42 | -0.10200539D+02 | -0.10196727D+02 | -0.38112261D-02 |
| 43 | -0.82438433D+01 | -0.82422779D+01 | -0.15654478D-02 |
| 44 | 0.54771435D+01 | 0.54770325D+01 | 0.11099815D-03 |
| 45 | -0.94879613D+01 | -0.94905046D+01 | 0.25433128D-02 |
| 46 | -0.17651308D+01 | -0.17652076D+01 | 0.76744080D-04 |
| 47 | 0.13040716D+02 | 0.13040062D+02 | 0.65458679D-03 |
| 48 | -0.10674486D+02 | -0.10674158D+02 | -0.32801104D-03 |
| 49 | -0.36522650D+01 | -0.36529006D+01 | 0.63560677D-03 |
| 50 | 0.47958857D+01 | 0.47951361D+01 | 0.74956203D-03 |
| 51 | 0.66130432D+01 | 0.66095285D+01 | 0.35146902D-02 |
| 52 | 0.36281941D+01 | 0.36280430D+01 | 0.15105152D-03 |
| 53 | 0.12435527D+02 | 0.12434542D+02 | 0.98421431D-03 |
| 54 | -0.61849852D+01 | -0.61837043D+01 | -0.12808800D-02 |
| 55 | -0.11997359D+02 | -0.11996264D+02 | -0.10945754D-02 |
| 56 | 0.63235337D-01 | 0.64456403D-01 | -0.12210660D-02 |
| 57 | 0.18977414D+01 | 0.18955406D+01 | 0.22008123D-02 |
| 58 | -0.16787637D+01 | -0.16786796D+01 | -0.84141493D-04 |
| 59 | 0.21314643D+02 | 0.21314194D+02 | 0.44949913D-03 |
| 60 | 0.16361959D+02 | 0.16359496D+02 | 0.24625027D-02 |
| 61 | -0.10599311D+02 | -0.10597929D+02 | -0.13817616D-02 |
| 62 | 0.11750094D+01 | 0.11758778D+01 | -0.86836147D-03 |

| | | | |
|---|---|---|---|
| 63 | -0.96800973D+01 | -0.96792626D+01 | -0.83465552D-03 |
| 64 | 0.11139557D+02 | 0.11140365D+02 | -0.80754423D-03 |
| 65 | -0.15543449D+02 | -0.15543196D+02 | -0.25296474D-03 |
| 66 | -0.62421679D+01 | -0.62421539D+01 | -0.13951063D-04 |
| 67 | -0.26618426D+01 | -0.26582780D+01 | -0.35646253D-02 |
| 68 | -0.30206798D+01 | -0.30195918D+01 | -0.10880249D-02 |
| 69 | -0.48546084D+01 | -0.48578326D+01 | 0.32241783D-02 |
| 70 | -0.88965933D+01 | -0.88953844D+01 | -0.12088470D-02 |
| 71 | 0.64799684D-01 | 0.62645748D-01 | 0.21539359D-02 |
| 72 | -0.30426159D+01 | -0.30448372D+01 | 0.22213166D-02 |
| 73 | -0.14036280D+02 | -0.14032409D+02 | -0.38710032D-02 |
| 74 | 0.55782433D+01 | 0.55805536D+01 | -0.23103285D-02 |
| 75 | 0.15480107D+02 | 0.15480177D+02 | -0.70056200D-04 |
| 76 | 0.28119730D+01 | 0.28106797D+01 | 0.12933376D-02 |
| 77 | -0.63907507D+00 | -0.63661635D+00 | -0.24587235D-02 |
| 78 | 0.10076465D+02 | 0.10074024D+02 | 0.24416049D-02 |
| 79 | 0.31509518D+02 | 0.31510299D+02 | -0.78079367D-03 |
| 80 | -0.25604104D+01 | -0.25597853D+01 | -0.62503886D-03 |
| 81 | 0.61949384D+01 | 0.61937218D+01 | 0.12165546D-02 |
| 82 | -0.57178051D+01 | -0.57200394D+01 | 0.22342911D-02 |
| 83 | -0.37930729D+01 | -0.37933343D+01 | 0.26143742D-03 |
| 84 | 0.11819272D+01 | 0.11846776D+01 | -0.27504201D-02 |
| 85 | 0.37712380D+01 | 0.37719844D+01 | -0.74640012D-03 |
| 86 | -0.86271576D+01 | -0.86260485D+01 | -0.11090982D-02 |
| 87 | 0.29655601D+01 | 0.29658632D+01 | -0.30304456D-03 |
| 88 | -0.43119955D+01 | -0.43130309D+01 | 0.10353937D-02 |
| 89 | 0.10319364D+02 | 0.10317735D+02 | 0.16290786D-02 |
| 90 | 0.65706725D+01 | 0.65718202D+01 | -0.11476245D-02 |

***** Initial Control Vector Estimate for Case Number 1 *****

| Element | G.L.B. | C.V. | L.U.B. | Delta C.V. |
|---|---|---|---|---|
| 1 | -0.25000000D+01 | 0.52514237D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 2 | -0.25000000D+01 | 0.10654470D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 3 | -0.25000000D+01 | -0.16324993D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 4 | -0.25000000D+01 | -0.10821833D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 5 | -0.25000000D+01 | 0.16853635D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 6 | -0.25000000D+01 | -0.62707371D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 7 | -0.25000000D+01 | -0.34970790D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 8 | -0.25000000D+01 | 0.33250749D-01 | 0.25000000D+01 | 0.00000000D+00 |
| 9 | -0.25000000D+01 | -0.39897633D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 10 | -0.25000000D+01 | 0.11151077D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 11 | -0.25000000D+01 | -0.62047988D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 12 | -0.25000000D+01 | 0.10884261D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 13 | -0.25000000D+01 | 0.50843394D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 14 | -0.25000000D+01 | 0.37141562D-01 | 0.25000000D+01 | 0.00000000D+00 |
| 15 | -0.25000000D+01 | -0.16568323D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 16 | -0.25000000D+01 | 0.26060474D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 17 | -0.25000000D+01 | 0.17213548D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 18 | -0.25000000D+01 | 0.12643167D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 19 | -0.25000000D+01 | -0.89182526D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 20 | -0.25000000D+01 | 0.53342646D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 21 | -0.25000000D+01 | -0.76506066D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 22 | -0.25000000D+01 | 0.10322240D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 23 | -0.25000000D+01 | -0.13116534D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 24 | -0.25000000D+01 | -0.15851357D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 25 | -0.25000000D+01 | 0.12661996D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 26 | -0.25000000D+01 | 0.11542239D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 27 | -0.25000000D+01 | 0.11097218D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 28 | -0.25000000D+01 | 0.13846745D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 29 | -0.25000000D+01 | 0.20903717D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 30 | -0.25000000D+01 | -0.11019039D+01 | 0.25000000D+01 | 0.00000000D+00 |

Row ***** T-Matrix *****

| | | | | |
|---|---|---|---|---|
| 1 | 0.34788787D-01 | -0.18049543D+01 | -0.59086335D+00 | 0.20419300D+01 |
| | -0.48626399D+00 | 0.24280791D+01 | -0.75370282D+00 | -0.10128779D+01 |
| | 0.33270633D+00 | -0.17225484D+01 | -0.21250638D+01 | 0.33747256D-01 |
| | 0.49759197D+00 | 0.24311996D+01 | -0.27662848D+01 | 0.62805021D+00 |
| | 0.54046869D+00 | 0.31020783D+01 | -0.91466856D+00 | -0.24533407D+01 |
| | -0.80657554D+00 | -0.65798485D+00 | -0.29034041D+01 | -0.13271046D+00 |
| | 0.13748878D+01 | 0.21690637D+01 | 0.22310116D+01 | -0.24805427D+00 |
| | -0.15115445D+01 | 0.50685489D+00 | | |
| 2 | 0.83601731D+00 | -0.36276394D+00 | -0.13208987D+01 | 0.67596734D-01 |
| | -0.76124930D+00 | -0.84698200D-04 | -0.48131096D+00 | 0.56136882D+00 |
| | 0.71347129D+00 | 0.13158457D+01 | 0.19836896D+01 | -0.10951260D+01 |
| | 0.12009082D+01 | -0.24589081D+01 | 0.14904487D+01 | 0.18073808D+01 |
| | -0.34984750D+00 | -0.15352131D+01 | -0.22675562D+00 | 0.22235906D+00 |
| | -0.34657753D+00 | -0.32797682D+00 | 0.18003014D+01 | 0.84162176D+00 |
| | -0.85667038D+00 | -0.93075663D+00 | -0.24769044D+00 | 0.21519642D+01 |
| | 0.21526441D+01 | -0.10278692D+01 | | |
| 3 | -0.11511457D+00 | 0.26494551D+00 | 0.87150323D+00 | 0.18477481D+01 |
| | 0.27979487D+00 | -0.84691644D+00 | -0.16540338D+01 | 0.12021026D+01 |
| | 0.75942910D+00 | -0.83635014D+00 | 0.47096634D+00 | -0.23942572D+00 |
| | 0.25448445D+01 | -0.13034515D+01 | -0.21795045D+01 | -0.10059794D+01 |
| | -0.60060555D+00 | 0.38392276D+00 | -0.77724284D+00 | 0.13776475D+00 |
| | 0.32556828D+01 | -0.17267525D-01 | 0.10433689D+01 | -0.95770955D-02 |
| | -0.23449827D+01 | -0.42016745D+00 | 0.28106564D+00 | 0.10252332D+01 |
| | 0.29993615D+01 | 0.10955107D+00 | | |
| 4 | 0.31760061D+01 | 0.15327406D+01 | -0.21265734D+01 | -0.87382120D+00 |
| | 0.21537052D+01 | 0.23392159D+01 | -0.14506991D+01 | 0.10383505D+01 |
| | 0.16321123D-01 | -0.85831082D+00 | -0.18132197D+01 | 0.11158358D+01 |
| | -0.21203529D+01 | -0.73121130D-01 | -0.11761931D+01 | 0.23607254D-01 |
| | 0.79606092D+00 | -0.18189230D+01 | 0.62729114D+00 | 0.22826551D+01 |
| | -0.12200850D+01 | 0.23686640D+01 | -0.55024838D+00 | 0.52975351D+00 |
| | -0.26045715D+01 | 0.24731239D+01 | 0.19484541D+01 | 0.83972579D+00 |
| | 0.90707570D+00 | 0.60056102D+00 | | |
| 5 | -0.41143203D+00 | -0.11342762D+01 | 0.27104957D+01 | 0.30594182D+01 |
| | -0.71672982D+00 | 0.13281837D+01 | 0.16860515D+01 | -0.16160113D+00 |
| | 0.29933137D+00 | -0.16588228D+01 | 0.73350900D+00 | -0.13251286D+01 |
| | -0.26407734D+01 | -0.23916048D+01 | -0.46991444D+00 | 0.54099071D+00 |
| | 0.11383728D+01 | 0.18240685D+01 | -0.26055828D+01 | 0.27207399D+01 |
| | 0.19702069D+01 | -0.73132849D+00 | -0.10211360D+00 | 0.15618844D+01 |
| | -0.11362359D+01 | -0.17828766D+01 | 0.17884504D+01 | 0.20404232D+01 |
| | 0.18337557D+01 | -0.84050745D+00 | | |
| 6 | -0.18296975D+00 | -0.13223815D+01 | -0.17569855D+01 | 0.19689102D+01 |
| | -0.17970631D+01 | 0.13426725D+01 | 0.91028869D+00 | -0.16210772D+01 |
| | -0.14678532D+01 | 0.17795066D+01 | 0.17505156D+01 | -0.12907742D+01 |
| | -0.56598175D+00 | 0.25512761D+00 | 0.49806476D+00 | 0.17070823D+01 |
| | 0.12816227D+01 | -0.38722318D+00 | -0.29812863D+01 | -0.11897539D+01 |
| | 0.12327609D+01 | 0.18910689D+01 | -0.86808521D+00 | 0.79735214D+00 |
| | 0.33347827D+00 | -0.14943686D+01 | 0.49556041D+00 | 0.10008073D+01 |
| | -0.31591976D+00 | -0.67518353D-02 | | |
| 7 | 0.14780229D+01 | 0.44678360D+00 | 0.77668649D+00 | 0.66418779D+00 |
| | 0.66827440D+00 | 0.10730227D+01 | 0.74364144D+00 | 0.28242651D+01 |
| | 0.86502361D+00 | -0.32557665D+01 | 0.38143247D+00 | -0.14690601D+01 |
| | -0.27838843D+01 | 0.14240717D+01 | 0.18417188D+01 | 0.24892317D+01 |
| | 0.14087623D+01 | -0.10929360D+01 | -0.45693386D+00 | 0.90788245D+00 |
| | 0.57774609D+00 | -0.75756252D+00 | 0.23540056D+00 | -0.26705645D+01 |
| | -0.97387654D+00 | 0.24704463D+01 | 0.18769598D+01 | 0.17728137D+01 |
| | -0.24157101D+00 | 0.16712016D+01 | | |

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 8    -0.24192777D+01   -0.30905123D+01   -0.10285974D+01   -0.20685011D+00
       0.51371932D-01   -0.23836254D+01    0.15765571D+01   -0.83052343D+00
      -0.65670496D+00   -0.15219651D+01    0.11720343D+01    0.50778693D+00
      -0.10845453D+01    0.21425092D+00   -0.30587709D+00   -0.12348017D+01
       0.81281322D+00   -0.98589605D+00    0.60618222D-01    0.25526969D+01
      -0.26520284D+01    0.19207398D+01   -0.31162876D+01   -0.11988447D+01
      -0.16546896D+01   -0.17213647D+01   -0.12546152D+01    0.48984593D+00
       0.29476314D+01   -0.17566367D+01

 9     0.92369419D+00    0.14308993D+01   -0.16920424D+00   -0.91653651D+00
      -0.77740890D+00   -0.16165466D+01    0.12434421D+01   -0.40841955D+00
       0.20530186D+01   -0.59435111D+00   -0.27488348D+01    0.13546582D+01
      -0.24423515D+01   -0.88814718D+00    0.38741440D+00    0.34923425D+01
       0.12119768D+01    0.11509166D+01   -0.11524349D+01   -0.27543209D+01
       0.10606529D+01   -0.41687006D+00    0.11314970D+01    0.20103147D+01
      -0.17336933D+01    0.10696726D+01   -0.13273358D-02   -0.18177987D+01
       0.19708775D+01    0.87456965D+00

10     0.65341014D+00    0.81309408D+00    0.24780363D+00   -0.24004275D+00
      -0.18389577D+01   -0.12539401D+01    0.13137587D+01   -0.21178011D+01
      -0.38908005D-01   -0.22540224D+00    0.74328762D+00    0.28943515D+01
       0.23726964D+00   -0.41933721D+00    0.33731872D+00   -0.36901075D+00
       0.42974770D-01    0.68123257D+00   -0.15177094D+01    0.82909060D+00
      -0.75143677D+00   -0.79630286D+00    0.37866694D+00   -0.56532085D+00
       0.55111200D+00    0.22374946D+00    0.23319542D+01    0.47196555D+00
       0.25466843D+01    0.16657765D+01

11     0.14034983D+01   -0.23911133D+01   -0.42746699D+00   -0.49510860D+00
       0.30502255D+01   -0.13797352D+01    0.10096793D+01    0.60452294D+00
       0.16871893D+01   -0.30213267D+00    0.14548385D+00   -0.16798437D-01
      -0.30128326D+01    0.81490171D+00   -0.27160205D+01    0.81497157D+00
      -0.76250011D+00    0.20772048D+01   -0.66307348D+00   -0.53001827D+00
       0.29543281D-01    0.17832106D+00    0.16951507D+00   -0.21241837D+01
      -0.23937720D+00   -0.83291954D+00    0.75856978D+00    0.11913212D+01
      -0.51513791D-01    0.52767682D+00

12     0.12504480D+01    0.21613908D+00   -0.71257657D+00    0.35396373D+00
      -0.19707905D+01    0.89880407D-01    0.15663478D+01   -0.11976115D+01
      -0.50872481D+00   -0.19835549D+01    0.14415987D+01    0.76949209D+00
      -0.33165921D+01   -0.53716248D+00    0.18775249D+00    0.22765091D+01
      -0.96592486D-01   -0.15242866D+01    0.21790551D+01    0.18701982D+00
       0.15380023D+01    0.14723951D+01    0.12585645D+01   -0.12207830D+01
      -0.15367606D+01    0.10943868D+01   -0.33020949D+00   -0.16193294D+01
       0.10073752D+01    0.12339067D+00

13    -0.17892113D+01    0.15271466D+01    0.52569807D-01   -0.61978996D-01
       0.48474944D+00   -0.10282601D+01    0.10922446D+01   -0.80565202D+00
      -0.20917963D+01    0.85684478D+00   -0.11992151D+01   -0.92848420D+00
       0.13179453D+01   -0.26466566D+00   -0.11191401D+01    0.12160565D+01
      -0.15333992D+01   -0.93336177D+00   -0.82930237D+00   -0.71640331D+00
       0.29020715D+00   -0.12505686D+00    0.81791377D+00   -0.24669033D+00
      -0.25117097D+01    0.21989715D+00   -0.22341611D+01   -0.14451305D+01
       0.41644257D+00   -0.25201858D+01

14    -0.10221714D+01   -0.14905338D+01    0.96043754D+00   -0.82375538D+00
      -0.18308226D+01    0.11167140D+01    0.22575186D+01   -0.15697230D+01
       0.27281477D+01   -0.58554006D+00   -0.25740510D+01    0.54080480D+00
       0.11725867D+01   -0.16982687D+00   -0.18791865D+01   -0.16940874D+00
      -0.13433673D+01   -0.13492414D+01    0.92743337D+00   -0.24765605D+00
       0.23242314D+01    0.45419860D+00   -0.15038672D+01    0.35160476D+00
      -0.27484852D+00    0.11036924D+01    0.17395032D+01   -0.70785964D+00
       0.22934995D+01    0.23042967D+01

15     0.16556811D+01   -0.67476135D+00    0.14726536D+01   -0.94577169D+00
       0.19300950D+01   -0.16645240D+01    0.15666226D+01   -0.21882741D+01
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      -0.54739070D+00   -0.16524265D+01   -0.11080921D+01   -0.11472308D+01
      -0.15981092D+01    0.23540372D+00    0.24874368D+01    0.11256024D+01
       0.29744897D+01    0.26035160D+00   -0.20811915D+01   -0.23299166D+01
      -0.64445716D+00   -0.19423575D+01   -0.59475148D+00    0.20102619D+01
       0.50197691D+00    0.93517011D+00   -0.12409405D+01   -0.14054233D+00
      -0.12617893D+01   -0.25151752D+01

16     0.24324918D+00    0.91428059D+00    0.71187890D+00    0.15135730D+01
      -0.32476227D+01    0.10103601D+01    0.10621778D+01    0.11108882D+01
      -0.17125529D+01    0.15722198D+01   -0.17959443D+01   -0.10674818D+01
      -0.79578871D+00    0.21173103D+01   -0.12081200D+01   -0.75014979D+00
       0.20401242D+01   -0.75629085D+00   -0.78652257D+00   -0.99428147D+00
       0.84832311D-02   -0.16726127D+01   -0.18844749D+01   -0.20707780D+00
       0.10550680D+01    0.12819742D+01   -0.50855923D+00   -0.10476214D+00
       0.14772815D+01    0.38102400D+00

17    -0.10135722D+01   -0.25457345D+01   -0.23344523D+00    0.98582131D+00
      -0.10312442D+01    0.25697926D+01    0.57608461D+00   -0.10464070D+01
       0.16998178D+01    0.26660886D+01    0.19437744D+01   -0.18832201D+01
       0.67976797D+00   -0.14798211D+01   -0.62518561D+00   -0.20889926D+01
       0.36072636D+00   -0.23416090D+00    0.68671119D+00   -0.30031850D+01
      -0.10543939D+01   -0.16669511D+01    0.12143666D+01   -0.16446406D+01
       0.14994422D+01   -0.13000563D+01    0.23276556D+01    0.11966197D+01
      -0.16267810D+01   -0.42730391D-01

18     0.15932183D+01    0.66381598D+00    0.11822196D+01    0.70029134D+00
      -0.98903477D+00    0.10109347D+01   -0.14020965D+01    0.27245868D+01
      -0.27517593D+00    0.90636075D-01   -0.24246556D+01   -0.21105184D+01
      -0.20943733D+01    0.22580321D+01    0.20754437D+01    0.38337076D+00
      -0.98227710D+00   -0.23229015D+00   -0.25253090D+01    0.10177571D+01
      -0.92125392D+00   -0.16383774D+01   -0.89381999D+00    0.33463908D+01
      -0.10181210D+01   -0.15805209D+01   -0.13687581D+00    0.34691250D+00
      -0.11938065D+00    0.67163610D+00

19     0.12405574D-01   -0.87419558D+00   -0.22499349D+01    0.14438222D+01
      -0.16365026D+01    0.12652310D+01    0.16113843D+01    0.48729527D+00
       0.88261575D+00   -0.18457589D+01    0.14771112D+01   -0.23825272D+01
      -0.12569126D+01   -0.29712014D+01   -0.16360176D+00    0.20572878D+01
      -0.88243270D+00   -0.20296127D+01    0.45214194D+00    0.46991950D+00
       0.19299929D+01   -0.76410770D-01   -0.12308168D+01   -0.21173779D+01
       0.14200349D+01    0.26162565D-01   -0.86498761D+00   -0.30769475D+01
       0.25200535D+01   -0.74838001D+00

20    -0.14623272D+00    0.12006400D+01   -0.17324513D+01    0.37595111D+00
       0.14074014D+01   -0.27451842D+01   -0.12858154D+01    0.14111638D-01
       0.40030771D+00    0.29467827D+00    0.15965191D+01    0.24898642D+00
       0.13199839D+01    0.11054080D+01    0.22167778D+01    0.18272125D+01
      -0.27180819D+01   -0.23055850D+01    0.10059714D-01   -0.11339843D+00
      -0.13200204D+01    0.13948543D+01    0.72597682D+00   -0.21590946D+01
       0.13993096D+01   -0.96835941D+00    0.17279732D+00    0.32708102D+00
       0.15917123D+01   -0.18500350D+01

21    -0.11395201D+01   -0.19821270D+01   -0.16559333D+01    0.58131433D+00
      -0.18987870D+00   -0.10532600D+00   -0.19797348D+01   -0.30656183D+00
      -0.11304684D+01   -0.28572021D+01   -0.61516166D-02    0.25031072D+00
      -0.10082228D+01    0.24318781D+01   -0.34886003D+00    0.17466696D+01
      -0.21788531D+01    0.25666193D+01   -0.21793362D+01   -0.13038873D+01
       0.25232309D+01    0.12074996D+01   -0.49052912D+00    0.15080497D+01
      -0.72501063D-01   -0.15960244D+01   -0.30480308D+01   -0.82284248D+00
       0.98237818D+00    0.19401826D+01

22     0.49236619D+00    0.14761470D+01   -0.16486092D+01   -0.19465649D+00
       0.12737737D+01   -0.73390782D+00   -0.22903458D+01   -0.90636355D+00
      -0.29832590D+00    0.92654490D+00   -0.18779003D+01   -0.27013344D+00
      -0.91720575D+00   -0.16010481D+01    0.59616804D+00   -0.22529366D+01
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        0.18152295D+01   -0.21701015D+01    0.43086439D+00    0.18101535D+01
        0.54462135D-01   -0.18475038D+00   -0.13359750D+01   -0.25086493D+01
        0.44187367D+00    0.20679140D+00   -0.41791785D+00   -0.18919523D+01
        0.18957630D+01   -0.25186296D+01

23     -0.27454829D+01   -0.19885141D+01    0.12233369D+01    0.29191846D+00
       -0.27119162D+01    0.72892022D+00   -0.28810259D+01   -0.26072054D+01
        0.29478882D+01    0.15479860D+01    0.31892002D+00    0.16583693D+00
        0.52349782D+00    0.32234764D+01   -0.32643021D+01   -0.20705323D+01
        0.11133804D+01   -0.17331625D+01   -0.61923051D+00    0.49411374D+00
       -0.33418956D+01   -0.15050039D+01   -0.14460137D+01    0.21172842D+01
       -0.12139563D+01    0.89168835D+00    0.18455452D+01    0.77114874D+00
       -0.52841908D+00    0.27812874D+01

24     0.26025379D+00   -0.66179705D+00   -0.13400436D+01   -0.14699085D+01
       0.16714721D+01    0.18081345D+01   -0.15669932D+01   -0.10558310D+01
      -0.30626827D+00   -0.13844520D+00   -0.24954805D+01    0.12033517D+01
      -0.15044087D+01    0.13077228D+01   -0.20557937D+01   -0.58131236D+00
      -0.91448647D+00    0.12103537D+01    0.13696917D+01   -0.47250271D-01
       0.61850649D+00    0.89738393D+00   -0.17155969D+01   -0.12893460D+01
      -0.73473483D+00    0.33236027D-01    0.19779617D+01   -0.15064280D+01
       0.16438097D+01    0.17535856D+01

25     0.48613662D+00   -0.63874727D+00   -0.24623032D+01    0.29034922D+01
      -0.84659159D-01   -0.93431097D+00    0.23531667D+01    0.82438999D+00
      -0.62280679D+00   -0.12610133D+01   -0.13283696D+01    0.31847453D+00
       0.12534916D-01    0.21196579D+01    0.14094718D+01   -0.65757203D+00
       0.34581161D+00   -0.10622692D+01    0.22582821D+01    0.14938623D+01
      -0.35359555D+00    0.14167027D+01   -0.54756188D+00    0.16952395D+00
      -0.39754391D+00    0.58799320D+00    0.84918064D+00    0.15359947D+01
       0.13071995D+01    0.24178976D+01

26    -0.19956291D-01   -0.63112229D+00    0.20139110D+00    0.32506341D+00
      -0.13162615D+01   -0.91386288D+00    0.88832223D+00   -0.19003040D+00
       0.13787073D+01   -0.90849203D+00   -0.31403315D+01    0.17267529D+01
      -0.12204559D+01   -0.23269755D+01    0.18241950D+01    0.11586435D+01
       0.18806886D+01   -0.18548505D+01    0.12988335D+01   -0.40481615D+00
      -0.47130710D+00    0.24916428D+00    0.46219742D+00   -0.13613206D+00
      -0.94301367D+00    0.11160597D+01    0.70598543D-01    0.26242809D+01
       0.98314148D+00    0.27919272D+01

27    -0.23440781D+01   -0.97135562D+00    0.19038657D+01    0.81794709D+00
      -0.18438260D+01    0.24264772D+01    0.25386024D+01   -0.21860542D+01
      -0.30438390D+01    0.23815813D+01    0.14540163D+01   -0.89695102D+00
      -0.26589133D+01    0.14463001D+00   -0.16580411D+01    0.36528170D+00
       0.29274976D+00    0.33720726D+00   -0.85346121D+00   -0.12224436D+01
      -0.26960047D+01   -0.46811426D+00   -0.46517414D+00    0.25000005D+01
       0.56691170D-02    0.11448048D+01   -0.28199441D+01   -0.25252147D+01
      -0.13939288D+01   -0.13592504D+01

28    -0.11242945D+01    0.24492424D+01   -0.89005238D+00   -0.19895530D+00
      -0.12079028D+01    0.13627564D+01   -0.22678683D+01   -0.15649277D+01
       0.10976380D+01    0.44781089D+00   -0.52338356D+00    0.50172287D+00
       0.25428257D+01    0.45815349D+00    0.77679133D+00   -0.34532279D+00
      -0.54397821D-01    0.15748394D+01   -0.70537692D+00    0.10501188D+01
      -0.23457563D+01   -0.31777536D+01   -0.10852048D+01   -0.45600152D+00
       0.15727513D+01    0.25465908D+01   -0.69865119D+00    0.19518015D+01
       0.17487420D+01    0.29569430D+01

29     0.12076539D+00   -0.26041609D+00   -0.10115469D+01    0.37172365D+00
      -0.63155037D+00   -0.76005942D+00    0.61534059D+00    0.26749551D-01
      -0.12344146D+01   -0.11413462D+01    0.42820251D+00    0.25176317D+01
       0.44596374D+00    0.12121956D+01   -0.78227937D+00   -0.20763586D+01
      -0.11775107D+01   -0.24068753D+01   -0.16640828D+01    0.66517597D+00
      -0.20241201D-01   -0.22467102D+01   -0.50171614D-02   -0.25567901D+01
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      -0.26208612D+01    0.24995314D+01   -0.12139523D+00   -0.30087492D+01
      -0.11236558D+01    0.10188591D+00

30     0.21633031D+01    0.34481406D+00   -0.15095847D+01    0.58982098D+00
       0.46519870D+00    0.47183901D+00    0.19802136D+01   -0.42002887D+00
       0.22364651D+01    0.36575127D+00   -0.46283418D+00   -0.67393470D+00
      -0.71440089D+00   -0.85201049D+00    0.17652092D+01   -0.98133540D+00
       0.53004432D+00   -0.14466646D+01    0.14836739D+01    0.44680417D-01
      -0.25290847D-01   -0.13446927D-01    0.48704892D+00   -0.19247351D+01
      -0.24702036D+00   -0.85847014D+00    0.36724764D+00    0.71620119D+00
       0.32302371D+01   -0.81708193D+00

31     0.11972706D+01   -0.20186803D+01    0.15074143D+01   -0.16395934D+01
       0.18222669D+01    0.46505004D+00    0.23852942D+01    0.49215674D-01
      -0.57393527D+00   -0.29159178D+01   -0.47787207D+00    0.22749484D-01
       0.30517113D+01    0.15073330D+01    0.25286311D+00    0.11590615D+01
       0.16546678D+01   -0.16579875D+01    0.28961514D+01   -0.95889962D+00
       0.21985131D+01    0.12449525D+01   -0.99370021D+00    0.47428799D+00
      -0.14368520D+01    0.13464342D+01   -0.15622734D+01    0.23165974D+01
       0.22654959D+01    0.98651761D+00

32     0.32937256D+01   -0.22141129D+01   -0.13908750D+01    0.19316204D+01
      -0.83227229D+00    0.55213505D+00   -0.10065770D+00    0.12985781D+01
       0.88588142D+00   -0.51551545D+00   -0.31256387D+01   -0.16956559D+01
      -0.23419339D+01   -0.10093553D+01    0.29003203D-01   -0.76248258D+00
       0.12547690D+01    0.14691083D+01    0.28295583D+00    0.17808011D+01
       0.12622458D+00    0.63141745D+00   -0.86883765D+00   -0.13854821D+01
       0.20840579D+01   -0.11307073D+00    0.35671371D+00   -0.91737449D+00
      -0.14545764D+01   -0.12099184D+01

33     0.23557067D+01   -0.56031770D+00    0.26674710D+01    0.97716868D-01
      -0.22122266D+01   -0.57535040D+00    0.68442416D+00    0.15014057D+01
      -0.43369889D-01   -0.12482333D+00    0.22657211D+01    0.17562597D+01
       0.98950654D+00    0.18525905D+01   -0.75910753D+00   -0.18924028D+01
       0.64137888D+00   -0.14299977D+00   -0.50993282D+00    0.11701810D+01
      -0.78120178D+00    0.39174861D+00   -0.17259496D+01    0.11489233D+01
      -0.21837817D+01   -0.26596324D+01    0.87690151D+00   -0.12791204D+00
       0.86482388D+00   -0.84397006D+00

34    -0.67443871D+00   -0.25757778D+01   -0.24321221D+01   -0.27797873D+01
      -0.12598290D+01   -0.86362743D+00    0.25054970D+01   -0.14028487D+01
       0.50338709D+00   -0.40299094D+00    0.10161752D+00   -0.18695899D+01
       0.12427059D+01    0.59935427D+00    0.21325910D+00   -0.13484275D+01
      -0.15857014D+01    0.15251178D+00    0.46068591D+00   -0.75576514D+00
      -0.18122238D+01   -0.13056427D+01   -0.60657787D+00   -0.11850297D-01
       0.39345527D+00    0.18669293D+01   -0.32812318D+01    0.26586431D+00
      -0.24678765D+01   -0.21456810D+01

35    -0.79359823D+00    0.60927099D+00    0.78302801D+00   -0.12380809D+00
      -0.21114385D+01    0.13274497D+00    0.11801368D+01   -0.33890176D+00
       0.14502234D+01   -0.15722752D+00    0.16301038D+01    0.33227672D+01
       0.46229696D+00   -0.11808108D+01    0.60755545D+00    0.24690194D+01
      -0.79794812D+00    0.28506323D+01    0.13039190D+00    0.73702931D-01
       0.53006971D+00    0.25771182D+01   -0.17070085D+01   -0.24744775D+01
       0.57969934D+00    0.94512117D+00    0.16119114D+01   -0.20106337D+01
      -0.17409915D+01   -0.10248492D+01

36    -0.20302622D+01    0.74385446D+00    0.98875505D+00   -0.12896225D+01
       0.69987178D-01   -0.24163894D+01    0.18878915D+01    0.14025681D+01
       0.15019994D+01    0.47320509D+00    0.16482375D+01    0.21686739D+00
       0.14140384D+01    0.15978428D+01    0.25036293D+00    0.27081399D+01
      -0.47623497D+00    0.13376151D+01   -0.19383830D+01   -0.13924187D+01
      -0.26063724D+01    0.19960132D+01    0.64277023D+00    0.13324831D+01
       0.12687532D+01    0.15909452D+01    0.11715353D+00   -0.44150108D+00
       0.47733748D+00    0.17082517D+01
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37    -0.15685856D+00    0.29836887D+00   -0.26695800D+01    0.76745093D-01
      -0.39001286D-01    0.41935301D+00   -0.22060001D+01    0.99113613D+00
      -0.13928377D+01    0.28098411D+01    0.11332304D+01   -0.21811687D+01
      -0.17768986D+01   -0.15742773D+01   -0.67364544D+00   -0.14775358D+01
      -0.70210457D-01    0.75248826D+00    0.84459609D+00    0.40558219D-01
      -0.15172171D+01    0.65093350D+00    0.51348799D+00    0.28948224D+00
       0.15397980D+01   -0.19846371D+01    0.68670028D+00    0.19779021D+01
       0.24079078D+00    0.32442923D+01

38    -0.49901307D-01   -0.94837338D+00   -0.12065784D+01    0.17184300D+01
      -0.17665096D+01    0.32968839D+01   -0.12098998D+01   -0.22004691D+01
      -0.18949097D+01   -0.20606441D+01    0.11052467D+01    0.28849754D+01
      -0.15994442D+01    0.12589897D+01   -0.40642619D-02    0.10826223D+01
      -0.35543066D+00   -0.13802223D+01    0.42096299D+00    0.23236334D+01
       0.13418561D+01    0.13388993D+01    0.11311048D+00    0.26286423D+00
       0.13306972D+01   -0.18816410D+01    0.71391320D+00    0.17417551D+01
      -0.80105281D+00   -0.19608701D+01

39    -0.16213351D+01   -0.19003999D+00   -0.13753736D+00   -0.75050610D+00
       0.96160913D+00    0.49756426D+00   -0.15577169D+01    0.28182151D+01
       0.25007357D+01    0.39155579D+00    0.29899603D+00   -0.60707712D+00
      -0.23513436D-02    0.17067713D+00    0.13013017D+01    0.66325527D+00
       0.17823818D+01   -0.55389369D+00    0.49886912D+00    0.20491361D+01
      -0.13283964D+01    0.43528289D+00    0.24367898D+01    0.78085291D+00
       0.29393176D+01   -0.51763296D-01   -0.71746910D+00    0.29163516D+00
      -0.18999332D+01   -0.13135837D+01

40     0.28175950D-01    0.11349738D+01   -0.15572212D+01   -0.16884701D+01
      -0.60187185D+00    0.28632337D+00   -0.93197155D+00   -0.68240434D+00
       0.32343161D+00    0.37199563D+00    0.38020259D+00    0.80603844D+00
      -0.40369916D+00    0.25172895D+01   -0.37850171D+00   -0.16066007D+01
       0.35276264D+00    0.13711655D+00   -0.60156858D+00   -0.12045988D+01
       0.42954683D-02    0.15707654D+01   -0.35527289D+00   -0.25703490D+00
       0.17319688D+01   -0.12208319D+01   -0.85328889D+00   -0.10392751D+01
      -0.45691365D+00    0.10466474D+00

41     0.98153949D-01    0.15226021D+01    0.13127317D+01    0.71251154D-01
       0.13366892D+01    0.91111302D-01    0.67452639D+00    0.10255426D+01
      -0.18976012D+01   -0.26253747D+01    0.22579646D+00    0.12845770D+01
      -0.82895458D-01    0.68111426D+00    0.27367270D+00   -0.28761506D+00
      -0.12984157D-01    0.25170954D+01   -0.73622531D+00    0.15834582D+01
      -0.13109429D+01    0.12145864D+01    0.67278868D+00   -0.11340456D+01
       0.13696963D+01   -0.16294409D+01   -0.78645337D+00   -0.16826023D+01
       0.24562729D+01    0.10988916D+01

42    -0.25914033D+01    0.26129627D+01    0.74086249D-01    0.22481066D+01
      -0.22007629D+01   -0.10173427D+01    0.87202185D+00    0.22175360D+00
      -0.40881062D+00   -0.98511320D+00   -0.45657331D+00    0.24644086D+01
      -0.14935062D+01    0.18928277D+01   -0.69353467D+00   -0.12779773D+01
      -0.17928068D+01   -0.73250943D+00    0.26601251D+01   -0.10992363D+01
      -0.50740224D+00   -0.27168891D+01   -0.21372686D+01   -0.13763427D+01
       0.55905211D+00   -0.83496010D+00   -0.52703583D+00   -0.65027171D+00
      -0.16777999D+01   -0.16298646D+01

43     0.38025492D+00   -0.26739252D+00    0.10832411D+01    0.14883934D+01
      -0.24767755D+01    0.15966386D+00   -0.23141609D+01   -0.69363493D+00
      -0.21198369D+01    0.22339154D+01    0.94727695D+00    0.12530316D+01
      -0.19559861D+01   -0.25868630D+00    0.22675353D+01    0.13972120D+01
       0.63634610D+00    0.23270023D+01    0.11933845D+01    0.18553937D+01
       0.22468061D+01    0.12003947D+01   -0.98591292D+00   -0.59693903D+00
      -0.18149267D+01    0.15275258D+00    0.16960126D+00   -0.60147756D+00
      -0.19546883D+01   -0.11273611D+00

44     0.83627516D+00    0.48412097D+00    0.13955498D+01   -0.13761055D+00
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      -0.39366174D+00   -0.21602105D+01   -0.77049929D+00   -0.16527809D+01
      -0.19951571D+01   -0.68200892D+00   -0.51654512D+00    0.65542263D+00
       0.25084674D-01   -0.18922120D+00   -0.15863217D+01    0.49689591D-01
       0.79420924D+00   -0.22648296D+01    0.88391954D+00   -0.79463172D+00
      -0.13388969D+01    0.74161351D-01    0.19845502D+01   -0.96726847D+00
       0.18467839D+01   -0.15197577D+01    0.22142071D+01    0.56174141D+00
       0.65729177D+00    0.44141448D+00

45    -0.12958843D+01   -0.23551172D+00   -0.17562289D+01    0.13899612D+01
       0.20037228D+00   -0.56414992D+00    0.39446330D+00   -0.90725851D+00
      -0.48477197D+00   -0.16676313D+01   -0.22349154D+01    0.14042548D+01
      -0.24127166D+01   -0.29557264D+00    0.36714196D+00    0.20318246D+01
      -0.17524661D+01    0.49802661D+00    0.14492640D+01   -0.39407015D+00
      -0.22630518D+01    0.26298916D+00    0.92102891D+00   -0.25533932D+00
       0.53654635D+00   -0.11263396D+01   -0.19107066D+01   -0.20693303D+01
      -0.14900223D+01   -0.93788689D+00

46     0.58033961D+00   -0.15462969D+01    0.10352688D+01    0.24326581D+00
       0.53407979D+00    0.17505063D+01    0.11976808D+01    0.25825483D+01
      -0.16947219D+01    0.38887715D+00   -0.36107951D+00   -0.49870491D+00
       0.20946431D+01    0.98287165D-01   -0.28616599D+01    0.10969282D+01
      -0.20655130D+01    0.32254553D+01   -0.77415884D+00   -0.20374656D-01
       0.29224223D+00   -0.58400917D+00    0.56664008D+00    0.98521173D+00
       0.73647553D+00   -0.11414671D+01    0.14085341D+01    0.14505498D+01
      -0.23345948D+01    0.10913898D+01

47    -0.15123250D+01   -0.17755651D+00    0.98847300D+00   -0.86272436D+00
       0.36877888D+00   -0.12649426D+01    0.26247587D+01    0.20366401D+01
       0.12711530D+01   -0.62142658D+00    0.26133095D+01    0.96922231D+00
       0.19225374D+01   -0.14002355D+01    0.30406535D-01   -0.24930203D+00
       0.11076168D+01    0.19844787D+01   -0.23569356D+01   -0.12350809D+01
      -0.31112746D+01    0.93966544D-01   -0.17140131D+01    0.60649210D+00
      -0.23609512D+01    0.10137098D+01    0.51018655D-01    0.10358559D+01
       0.28883290D+01    0.21474904D+00

48    -0.17649091D+01    0.23661938D+01    0.18549203D+01    0.50397438D+00
      -0.80547571D+00   -0.30123323D+00   -0.15243422D+01   -0.12922486D+01
      -0.17088262D+01    0.17026939D+01    0.17000546D+01    0.22267931D+01
       0.17531073D+01    0.11525059D+01    0.11524488D+01    0.19684731D+01
      -0.20020945D+01   -0.10263271D+01    0.82345045D+00    0.20692486D+00
       0.37680531D+00    0.18987101D+00   -0.15466768D+00    0.18115583D+01
      -0.51866162D+00   -0.67252755D-01   -0.17007989D+00   -0.14619259D+01
      -0.98752779D+00   -0.14858145D+01

49    -0.15004864D+01    0.65430260D+00    0.15080799D+01   -0.19843675D+01
      -0.38667876D+00    0.12895697D+00    0.22297174D+01    0.69093931D+00
      -0.18905543D+01   -0.16225517D+01   -0.91049069D+00    0.13880546D+01
      -0.26249955D+01   -0.15592819D+01   -0.25008605D+01   -0.25176997D+01
      -0.16493575D+01   -0.13694801D+01    0.29091716D+01   -0.18870234D+01
       0.15793614D+01   -0.17811255D+01   -0.73587364D+00    0.52906257D+00
       0.15678462D+01   -0.59978724D-01   -0.22993952D+00    0.12474210D+01
       0.46029443D+00   -0.16951277D+01

50     0.19177048D+01    0.38586438D-01    0.59109640D+00    0.17369944D+01
       0.49315614D+00   -0.51978648D-01   -0.62606913D+00    0.49817014D+00
      -0.16862980D+01    0.99904311D+00   -0.66196346D+00    0.15468650D+01
      -0.80993372D+00   -0.10379530D+01    0.20881143D+01   -0.19780874D+01
      -0.14531960D+01    0.23897156D+01   -0.14102354D+01    0.11930679D+01
      -0.20679338D+01   -0.54508960D+00    0.96050495D+00   -0.21698539D+01
       0.58986568D+00   -0.16489386D+01    0.23232853D+01    0.13466412D+00
       0.94842732D-01    0.12550579D+01

51    -0.33538103D-01    0.31432775D+01   -0.15434473D+01   -0.51681006D+00
      -0.18399882D+00   -0.11011095D+01    0.10388724D+01    0.31287388D+01
       0.87816775D-01   -0.20840340D+01   -0.11297938D+01   -0.15732958D+01
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       0.89388067D+00   -0.17708374D+01    0.13464528D+00    0.37318003D+00
      -0.15509716D+01    0.24785086D+01    0.99772811D+00    0.21357501D+01
      -0.28858018D+00   -0.23939742D+01

52    -0.43163258D+00    0.10487517D+01    0.64130813D+00    0.46040589D+00
       0.14031972D+01    0.24800345D+01    0.89978313D+00   -0.11269535D+01
       0.14410400D+01    0.86539525D+00   -0.71298093D+00    0.42809248D-01
      -0.17200110D+01   -0.10837424D+00   -0.62400728D+00   -0.14406508D+01
       0.12789403D+01   -0.33693928D+00   -0.36963218D+00   -0.27761923D+01
      -0.25420160D+01    0.55090547D-01   -0.16386670D+00    0.18357915D+00
      -0.38705289D-01   -0.18698209D+01   -0.90425336D+00    0.31295758D+01
       0.82521796D-01    0.61637866D+00

53    -0.42565107D+00    0.22446412D+01    0.53181469D+00    0.17845565D+01
      -0.15578442D+01    0.15182630D+01   -0.18604658D+01   -0.53698564D+00
      -0.78494197D+00    0.19900886D+01    0.13207829D+00   -0.19224411D+00
       0.15807407D+01   -0.27742624D+00    0.46242195D+00    0.16946219D+01
       0.21446744D+01   -0.10476912D+01   -0.12269843D+00    0.18237585D+00
      -0.24898064D+01    0.60719073D-01   -0.10964561D+01   -0.13603432D+01
       0.67107469D+00   -0.64273036D+00    0.14689434D+00    0.68443251D+00
       0.17166139D+01   -0.32483059D+00

54    -0.12764318D+01    0.11435743D+01    0.19298403D+01   -0.44953066D+00
      -0.72588098D+00    0.91528851D+00   -0.15086364D+01   -0.37558317D-01
       0.85874367D+00   -0.15704730D+01   -0.46567744D+00   -0.95451236D-01
       0.11935925D+01   -0.53119910D+00   -0.95801204D+00    0.84854084D+00
      -0.46850204D+00   -0.97142690D+00   -0.16404921D+01   -0.14691226D+01
      -0.42200965D+00   -0.21886026D+01   -0.11088262D+01   -0.52188140D+00
      -0.25301871D+01    0.22835619D+01    0.18601850D+01    0.94815075D-01
      -0.11840618D+01    0.12942282D+01

55     0.14229101D+00   -0.44348490D+00    0.16386682D+00   -0.61571944D+00
      -0.28625870D+01    0.20664092D+01    0.41720867D-02    0.89760011D+00
      -0.41800755D+00    0.10136662D+01   -0.86380982D+00    0.28710347D+00
      -0.74001843D+00   -0.36620778D+00    0.80110073D-01    0.18714571D+01
       0.10532941D+01   -0.47949135D+00   -0.13087857D+00   -0.28121059D+01
       0.22500962D+00   -0.15754196D+01   -0.51113218D+00   -0.80270666D+00
      -0.14849260D+01   -0.63485622D+00    0.12939936D+00   -0.19824392D+00
      -0.19514955D+01    0.10535350D+01

56    -0.11001152D+01   -0.10440567D+01    0.21333625D+01    0.88271964D+00
       0.20030846D+01   -0.11732870D+01    0.11842746D+01   -0.16500477D+01
       0.65111029D+00   -0.79616845D-01   -0.14684795D+01   -0.20433906D+01
       0.67389733D+00   -0.15951440D+01    0.21288453D+01    0.67628741D+00
       0.19990979D+01    0.22801042D-01    0.36071891D+00   -0.32057869D+00
      -0.17912779D+01   -0.64857763D+00   -0.13697731D+01   -0.11256997D+01
       0.65827906D+00    0.21247232D+01   -0.49053860D+00    0.51058233D+00
      -0.18415834D+01   -0.38172883D+00

57     0.15423179D+00    0.68832695D-01    0.22250450D+00   -0.42905319D+00
      -0.94260859D+00   -0.17374691D+01   -0.13230426D+01    0.86723381D+00
      -0.14462156D+01   -0.32574058D-01    0.16140565D+01   -0.19337256D+01
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       0.17039027D+01   -0.21426519D+01   -0.48927474D+00   -0.20306224D+01
       0.12456934D+01   -0.15934552D+01    0.15456378D+00    0.55004597D-01
       0.26920044D+01   -0.48831517D+00    0.29972427D+01   -0.56457788D+00
       0.16870943D+01    0.13795424D+01

58    -0.13437526D+01    0.22065705D+00    0.17999125D+00   -0.26704037D+00
      -0.15029848D-01    0.17657129D+01   -0.21547389D+00   -0.10159796D+01
      -0.16481506D+01   -0.18297623D+01    0.28542197D+00   -0.14729880D+01
      -0.53706574D+00   -0.69838840D+00   -0.24881940D+01   -0.13153327D+01
       0.18744323D+01    0.11864555D+01   -0.17037170D+01   -0.10561574D+01
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      0.18149757D+01    0.66102147D+00    0.15784531D+01    0.31371588D+01
     -0.19296141D+01    0.58408386D+00    0.57092673D+00   -0.28128589D+01
      0.19309407D+01   -0.23876704D+01

59    0.36758959D+00    0.58474422D+00   -0.21663641D+01   -0.20158869D+00
      0.91951960D+00    0.20397500D+01    0.44047982D+00   -0.67851871D+00
     -0.92485845D-01    0.21588768D+01    0.83359367D+00    0.12084946D+01
     -0.15724314D+01    0.20211670D+01   -0.10586000D+01   -0.17001231D+01
      0.21863338D+01   -0.69686377D+00   -0.10163566D+01   -0.71549702D+00
     -0.14344282D+01    0.10885125D+00   -0.28079090D+01   -0.15639734D+01
     -0.50089300D+00    0.21125084D+01    0.34373760D+00   -0.33829403D+00
      0.16228038D+00    0.13511300D-01

60   -0.94009340D+00   -0.28065044D+00   -0.57914364D+00   -0.51728463D+00
      0.23200933D+01   -0.14842541D+01    0.25133039D+01   -0.15999497D+01
      0.12208551D+00   -0.15164319D+01   -0.15141883D+01    0.15239416D+01
     -0.25896019D+00    0.20047380D+01   -0.14184170D+01    0.22026501D+01
      0.90236813D+00    0.23337971D+01    0.28021139D+00    0.35725176D+00
     -0.50536984D+00   -0.17360783D+01   -0.14581795D+01   -0.10710969D+01
     -0.11550773D+01   -0.14456046D+00   -0.13862972D+01    0.38860625D+00
      0.25567708D+01    0.12268447D+01

61   -0.29970443D+00   -0.23326933D+00   -0.85974526D+00    0.16793333D+01
      0.15290557D+01    0.10685779D+01   -0.58801156D+00    0.87224305D-01
      0.13428769D+01   -0.41553760D+00   -0.46742356D+00   -0.18622882D+01
     -0.10701841D+00    0.12689906D+01   -0.63283640D+00   -0.13851780D+00
     -0.23137312D+01   -0.95808142D+00   -0.10562027D+01    0.10444114D+01
     -0.23721082D+01   -0.17864621D+00    0.22563338D-02    0.41701567D+00
      0.19763363D+01   -0.16305397D+01    0.85537803D+00   -0.13435940D+01
     -0.23890012D+01    0.19506591D+01

62   -0.12723895D+01    0.32613796D+00    0.27262545D+00   -0.10657001D+00
      0.36130959D+00   -0.36343116D+00    0.64467663D+00    0.15215191D+01
      0.17251706D+00    0.22521641D+01   -0.14612766D+01   -0.38270944D+00
      0.23557158D+01   -0.20755113D+01   -0.36390448D+00   -0.22759110D+01
     -0.90351224D-01    0.27626413D+00   -0.84617174D+00   -0.25355786D+01
     -0.13416481D+00   -0.18919937D+01   -0.14557189D+00    0.87784791D+00
      0.57958508D+00    0.32671671D+01   -0.88186163D+00    0.23213730D+01
     -0.29164839D+01    0.79775751D-01

63   -0.66321516D+00   -0.96198261D+00   -0.20259887D+01   -0.65988791D+00
     -0.16981153D+01    0.19867545D+00    0.17962348D+00    0.81960726D+00
     -0.14043832D+01    0.27261189D+01   -0.19003886D+01   -0.13437472D+01
     -0.10492752D+01    0.52778959D+00    0.49690032D+00   -0.88884097D+00
     -0.44856912D+00    0.30098593D+00   -0.12178171D+01    0.11268938D+01
      0.37913609D+00   -0.10581005D+00    0.51587051D+00    0.20950605D+01
      0.37062496D+00   -0.19104123D-01   -0.12774529D+01   -0.10636236D+01
     -0.26112312D+01    0.45938492D-01

64    0.41135365D+00   -0.21686362D+01   -0.19945675D+01    0.12224716D+01
      0.18862497D+01    0.23241718D+01    0.14395776D+01    0.14733109D+01
     -0.23430954D+01    0.31414354D+00    0.30624993D+01   -0.25654030D+00
     -0.36636353D+00   -0.10808067D+01   -0.58288538D+00    0.16606278D+01
      0.27951844D+01   -0.18166858D+00    0.60401922D+00    0.14419421D+01
     -0.14421518D+01    0.82393020D+00   -0.13181224D+01    0.17474619D+01
      0.17071290D+01   -0.14835107D+01    0.26303134D+01    0.59619331D+00
     -0.10812902D+00   -0.58098674D-01

65   -0.11969437D+01   -0.51898485D+00   -0.77147847D+00    0.18980916D+01
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      0.17553863D+01   -0.41198081D+00   -0.22968161D+00   -0.96896124D+00
     -0.13434719D+01   -0.12295229D+01    0.70444196D+00   -0.10861448D+01
      0.61005360D+00    0.34624052D+00   -0.97325742D+00    0.51692820D+00
     -0.97177333D+00   -0.19486808D+01    0.26232699D+01   -0.54638249D+00
     -0.28722340D+00    0.41597313D+00   -0.87011021D+00   -0.15003031D+01
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      -0.95137781D+00    0.15498999D+01   -0.17492942D+01    0.10710168D+00
       0.78847426D+00   -0.21007083D+01    0.21314190D+01    0.18246516D+01
      -0.24995750D+00    0.20878239D+01    0.11176777D+00   -0.92282915D+00
       0.18028277D+01    0.50082111D+00    0.10425192D+00   -0.26536727D+00
       0.16000835D+01    0.58519220D+00   -0.13540553D+01    0.92097908D+00
      -0.22239184D+01    0.28748210D+01   -0.62299222D+00    0.57075965D+00
      -0.79412276D+00    0.15784578D+01

67    -0.25466930D+01   -0.22690476D+01    0.10585564D+01   -0.25560299D+01
       0.12992129D+01    0.20633773D+01    0.20072477D+01    0.41751510D+00
       0.14459336D+00   -0.80176169D+00    0.10019380D+01   -0.11714864D+00
       0.69146115D+00   -0.20734469D+01    0.26991394D+01   -0.88398784D+00
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      -0.82322454D+00    0.16470108D+01   -0.12279958D+01    0.12672049D+00
       0.21916725D+01   -0.96917981D+00    0.25676852D+01    0.80209899D+00
      -0.22476357D+01    0.15140724D+01

68    -0.25236694D+01    0.11667386D+01    0.24398236D+01   -0.42485183D+00
      -0.64275819D+00    0.41981071D+00    0.59582198D+00   -0.63071227D+00
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      -0.28798938D+00    0.13174295D-01   -0.11999332D+01    0.17566584D+01
      -0.22763504D+01   -0.59867483D+00   -0.41633111D+00   -0.52730006D+00
       0.65419459D+00    0.17310225D+01   -0.25293469D+01   -0.28084280D+01
       0.51811635D-01    0.47409290D+00

69    -0.30165619D+00   -0.15228723D+01   -0.18174198D+01    0.29172272D+01
      -0.26524590D+01    0.19217052D+01    0.84246653D+00   -0.16545225D+01
       0.15649996D+01    0.47682869D+00   -0.30946145D+01   -0.31946069D+00
       0.25424330D+01   -0.36816633D+00    0.18185526D+00    0.26567741D+01
      -0.12237889D+00    0.94472158D+00   -0.11730623D+01    0.16484973D+01
       0.77948976D+00    0.11378602D+01   -0.25484341D+01    0.92193103D+00
       0.58568704D+00   -0.99381131D+00   -0.45362687D+00   -0.33003426D+01
      -0.40733737D+00   -0.86208051D+00

70    -0.82595766D-01   -0.24189055D+00    0.26457938D+01    0.19884890D+01
       0.23152304D+01    0.27439648D+00   -0.66615474D+00    0.79918057D+00
       0.29627715D+01    0.87747097D-01    0.10806071D+01    0.17580801D+00
       0.13082334D+01    0.11472979D+01   -0.42789167D+00    0.74307549D+00
       0.43416053D+00    0.99404329D+00   -0.22335877D+01   -0.19181969D+01
       0.15984514D+01   -0.11200232D+01    0.22158815D+01    0.18793172D+01
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      -0.36591971D+00    0.98471677D+00

71    -0.27985231D+01   -0.11312185D+01    0.23522351D+01    0.19625897D+01
       0.65956616D+00    0.30747908D+00    0.38137752D+00    0.62821782D+00
      -0.13231578D+01    0.16188615D+01    0.24624144D+01   -0.95270991D-01
       0.13899190D+01    0.72800988D+00   -0.37664115D-01    0.24976305D+01
       0.10529029D+01    0.15940022D+01    0.34316522D+00    0.10692778D+01
       0.44559592D+00    0.31337408D+01   -0.22735900D+01    0.15689526D+01
      -0.90579998D+00   -0.54171866D+00   -0.72998363D+00    0.28754408D+01
       0.30451810D+00    0.34216599D+01

72    -0.18637198D+00    0.88791895D+00    0.54617506D+00    0.21227042D+01
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      -0.16916364D+00    0.16090792D+00    0.15043875D+01   -0.25788409D+00
      -0.16737035D+01   -0.10682591D+01   -0.41117787D+00   -0.11431554D+01
       0.95690691D+00    0.11514801D+01    0.96413791D-01   -0.10376306D+01
       0.18892730D+01   -0.16381937D+01    0.24386714D+01   -0.20040898D+01
       0.13174044D+01    0.46356738D-01    0.17625161D+01    0.28337118D+01
      -0.22306440D+01   -0.13595105D+01
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       0.20535704D+01   -0.22291166D+01    0.54949993D+00   -0.78386676D+00
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      -0.37564355D+00   -0.24120401D+01    0.22210121D+01   -0.91712296D-01
       0.21421742D+00   -0.13852755D+01   -0.38377690D+00    0.52508134D+00
      -0.21845711D+01    0.28293180D+01    0.12434357D+01   -0.33666223D+00
      -0.23280185D+01   -0.20232778D+01

74    -0.22291166D+00    0.24496138D-01   -0.62675267D+00   -0.31153560D-01
      -0.12884659D+01   -0.31711255D+01   -0.15820754D+00    0.35484260D+00
       0.63412666D-01    0.21527905D+01   -0.57094616D+00   -0.18678924D+01
      -0.10006557D+01   -0.11631093D+01    0.11766825D+01   -0.38578045D+00
       0.69626433D+00    0.82246900D+00   -0.89753586D+00    0.53278625D+00
      -0.12113114D+01   -0.57314342D+00   -0.71164310D-01   -0.21559153D+01
      -0.12152135D+00   -0.28186870D+01   -0.12609929D+00   -0.90179569D+00
       0.11071085D+01   -0.17685834D+01

75    -0.27359933D+00    0.29304679D+01   -0.16396534D+00    0.27725160D+00
      -0.10381651D+01   -0.45064390D+00   -0.22191277D+01   -0.37268537D+00
      -0.13358408D+00    0.11044180D+01   -0.65819758D+00   -0.44564712D+00
       0.73450208D+00    0.32255995D+01    0.29600286D+00   -0.44678932D+00
      -0.69685900D+00    0.11286005D+01   -0.28934969D+01    0.17963529D-01
       0.29415210D+01   -0.43004608D+00   -0.23211110D+00   -0.18967542D+01
       0.26529248D+01    0.11146029D+01   -0.53549671D+00   -0.21019207D+01
       0.18891822D+01   -0.32840204D+01

76    -0.12121742D+01   -0.15002079D+01   -0.89590478D+00   -0.14938461D+01
       0.12477040D-02    0.14879310D+01    0.10862428D+01   -0.19895488D+01
       0.14845371D+01    0.20599141D+01    0.29614846D+01    0.26125440D+01
       0.33377290D+00   -0.30609061D+01   -0.23759738D+01    0.17228270D+01
      -0.23383035D+01   -0.16809011D+01    0.83368063D-01    0.17346661D+01
      -0.20643976D+01   -0.28451515D+01   -0.16665536D+01    0.96663952D-01
      -0.21222706D+01   -0.14839302D+01    0.17842749D+01    0.24474259D+01
      -0.71849406D-01    0.33126473D-02

77    -0.63854355D+00    0.11504400D+01    0.77795649D+00    0.15563226D+01
      -0.80301696D+00   -0.82258105D-01   -0.12901372D+01   -0.13376826D+00
      -0.14905280D+01    0.22316539D+00   -0.22073558D+01   -0.11832891D+01
       0.37058055D+00   -0.17041456D+01    0.87789613D+00    0.95712459D+00
      -0.12790766D+01    0.28496320D+01    0.21558974D+01   -0.13259438D+01
      -0.86234921D+00   -0.75879562D+00   -0.21705608D+01    0.50576133D+00
       0.19145269D+01   -0.15591351D+01   -0.89984685D+00   -0.73087835D+00
       0.24545078D+01    0.18156963D+01

78     0.14563273D+01   -0.25002372D+00    0.16857769D+01    0.16731420D+01
      -0.55883420D+00    0.51798189D+00    0.51787168D+00   -0.12373779D+01
      -0.12588487D+01    0.83428854D+00   -0.83775097D+00    0.24133247D+01
      -0.35389721D+00   -0.16133802D+01   -0.25712212D+01    0.65357971D+00
       0.24727567D+01   -0.17622402D+01    0.16981925D+01   -0.15927139D+01
      -0.58171839D+00   -0.24280602D+00    0.15568492D+01   -0.54319817D+00
       0.14762930D+01    0.11152510D+01   -0.15059990D+01    0.29683352D+01
       0.14153712D+01    0.33974177D+00

79    -0.92500114D+00   -0.87298131D+00   -0.10666562D+01   -0.17506120D+01
      -0.20944036D+01   -0.25000991D+01   -0.11312056D+00   -0.34498286D+01
      -0.14097946D+01    0.14938600D+01    0.38882393D+00   -0.64397693D-01
      -0.31311291D+00    0.45981956D+00    0.33406180D+00    0.12003785D+00
       0.28497116D+01    0.83934021D+00   -0.15277255D+01   -0.11374254D+01
       0.29946053D+00   -0.13490518D+01   -0.29651059D+01   -0.21403747D+01
       0.11068295D+01    0.32889628D+01    0.11745565D+01    0.19499982D+01
       0.22881317D+01   -0.33651745D+01

80    -0.87937462D+00   -0.93052626D+00   -0.85094470D+00   -0.60123801D-02
      -0.13432625D+01   -0.13295692D+01   -0.31219696D+01    0.28014491D+01
```

```
      -0.30967457D+01    0.43054295D+00   -0.31221581D+00   -0.18745227D+01
      -0.38319165D+00    0.28767037D+00   -0.67112452D+00    0.91568136D+00
      -0.24864274D+00    0.14009262D+01    0.25509476D+01   -0.28162560D+01
      -0.15476727D+01    0.23479413D+01    0.12811875D+00   -0.51806378D+00
      -0.38674754D+00   -0.16153694D+01   -0.25531265D+01   -0.15558673D+01
       0.19949143D+01    0.17674578D+01

81    -0.50763649D+00   -0.15049084D+01    0.12538058D+00   -0.22633739D+01
       0.12144876D+01   -0.68587065D-03    0.70324814D+00   -0.26920253D+01
       0.89489454D+00   -0.82311320D+00   -0.14177279D+01    0.15995955D+01
       0.13389146D+01   -0.18860833D+01   -0.88811952D+00   -0.79224211D+00
      -0.49303168D+00   -0.14186133D+01    0.24069435D+01    0.10317705D+01
      -0.11866052D+01   -0.25391698D-01   -0.19471488D+01   -0.13031405D+00
       0.27377796D+01    0.65174878D-01   -0.18769082D+01   -0.21734985D+01
       0.17487831D+01    0.56541359D+00

82     0.20608492D+01    0.50210297D+00    0.92673957D+00    0.10326858D+01
       0.45968503D+00    0.64075470D+00   -0.13391386D+01   -0.24737442D+01
       0.49107403D+00   -0.59871346D+00    0.96237075D+00   -0.52132136D+00
      -0.48811698D+00   -0.87437326D+00    0.48601693D+00   -0.13645232D+01
       0.81312209D+00    0.82080418D+00    0.19276178D+00    0.38090718D+00
      -0.62029052D+00    0.12468383D+01    0.23907967D+01    0.35710001D+00
       0.17127383D+01   -0.24328705D+01   -0.16094220D+00   -0.35430145D+00
      -0.28575867D+00    0.56135046D+00

83    -0.11987094D+01   -0.12368810D+01    0.99121541D+00   -0.14089943D+01
      -0.35237074D-02   -0.70513898D+00    0.10504263D+01   -0.10704339D-01
      -0.99411690D+00   -0.53579772D+00    0.65768361D-02    0.18605969D+01
       0.12650445D+01    0.92946970D+00    0.27125903D+01    0.17642681D+01
      -0.46305233D+00    0.14763588D+00   -0.11267437D+01   -0.10969607D+01
      -0.83601338D+00    0.28918958D+01   -0.46564102D-01    0.54684061D+00
      -0.86758453D+00   -0.91825390D+00   -0.21012366D+01   -0.12308707D+01
      -0.50699890D-01   -0.30744374D+01

84    -0.16349699D+01    0.87676096D+00    0.32717671D+01    0.21843801D+01
       0.16333079D+01   -0.23754835D+00   -0.10989280D+01    0.67194664D+00
      -0.65412140D+00    0.19934632D+01    0.28286362D+00    0.57801962D+00
      -0.16323194D+01   -0.14355509D+01   -0.20828792D+01    0.24152178D+00
       0.45726842D+00    0.82917392D-01    0.95232153D+00    0.20331751D+01
      -0.15827972D+01   -0.62725520D+00    0.18670824D+01    0.74026603D+00
       0.28069416D+01    0.14019471D+00   -0.22857005D+01    0.13912022D-01
       0.12182299D+01    0.17024300D+01

85    -0.27216877D+01    0.10117740D+01    0.17016157D+01   -0.26631355D-01
      -0.20287024D+01    0.17867385D+01    0.15421629D+00    0.16923125D+01
      -0.48978776D+00    0.15213588D+01   -0.88478482D+00    0.12492695D+01
      -0.26513895D+01   -0.30478368D+01   -0.13645128D+01   -0.13175654D+01
       0.10843947D+01   -0.19711248D+01   -0.88768363D-01    0.23769873D+01
      -0.12101067D+01    0.13511902D+00    0.52030087D+00    0.44204557D+00
       0.65443939D+00    0.12161928D+00   -0.28972030D-01    0.29001172D+01
       0.93944836D+00    0.15190619D+00

86    -0.12299746D+01   -0.76954842D+00   -0.86656809D-01   -0.37325764D+00
      -0.34335656D+01    0.22626514D+01    0.15811106D+01    0.13400369D+01
       0.86360013D+00   -0.32536930D+01   -0.18520588D+00   -0.21942971D+01
      -0.18066539D+01   -0.10387568D+01   -0.15202553D+01   -0.29095391D+01
       0.20694913D+01   -0.59195018D+00   -0.11264974D+01    0.15855426D+00
      -0.84613520D+00    0.55222088D+00   -0.32693577D+00   -0.13528614D+01
      -0.15151790D+01    0.13079566D+00    0.94464719D+00    0.22041725D+01
      -0.32317430D+01   -0.19784996D+01

87     0.18890628D+01   -0.29197903D+01   -0.22803641D+01    0.48217851D+00
       0.20801465D+01    0.20898693D+01   -0.12507309D+01   -0.19799675D+01
       0.97263455D-02    0.26900063D+01    0.10394636D+01    0.96095800D-01
      -0.76260930D+00   -0.87191069D+00   -0.15006748D+01    0.60528934D-01
```

| | | | | |
|---|---|---|---|---|
| | -0.22902495D+01 | -0.38863426D+00 | -0.34977913D-01 | 0.20862192D+00 |
| | 0.29364431D+00 | 0.13556875D+01 | -0.11076099D+00 | -0.76412773D+00 |
| | -0.87815976D+00 | -0.10531580D+01 | -0.11568707D+01 | 0.20055631D+01 |
| | -0.12487589D+01 | 0.14378190D-01 | | |
| 88 | 0.69300467D+00 | 0.10108719D+01 | 0.15591620D+01 | -0.13931839D+01 |
| | -0.35712016D+00 | 0.11942534D+01 | 0.26968044D+00 | 0.26449347D+01 |
| | -0.21854708D+01 | -0.19465762D+01 | 0.17206931D+01 | -0.27416015D+01 |
| | 0.35551530D+00 | -0.19788222D+01 | 0.90622824D+00 | -0.13103973D+01 |
| | 0.17689303D+01 | 0.24253906D+01 | -0.86614847D+00 | 0.13230937D+01 |
| | -0.12799645D+01 | 0.99878317D+00 | -0.11374432D+01 | -0.15234158D+01 |
| | -0.59459531D+00 | -0.15488111D+01 | -0.18968431D+01 | 0.25446916D+00 |
| | -0.15154368D+01 | 0.21043183D+01 | | |
| 89 | 0.16186291D+00 | -0.75358689D-01 | -0.22238399D+01 | 0.11992670D+01 |
| | 0.71479082D-01 | 0.90401900D+00 | -0.42749268D+00 | 0.10135522D+01 |
| | -0.12664534D+01 | -0.50375998D-01 | 0.57041109D+00 | -0.26615217D+01 |
| | 0.11097065D+01 | 0.74967581D+00 | -0.70388162D+00 | 0.18199658D+00 |
| | -0.17516686D+01 | 0.23120346D+01 | 0.42087436D-02 | 0.17711149D+01 |
| | -0.18541477D+01 | -0.33844948D-01 | -0.10548276D+01 | -0.17899020D+01 |
| | -0.79411924D-01 | 0.11775386D+01 | 0.94548821D+00 | -0.48827946D-01 |
| | -0.70092762D+00 | -0.18253125D+01 | | |
| 90 | -0.12753741D+01 | 0.20767405D+01 | -0.38946521D+00 | 0.21928435D+01 |
| | 0.51892400D-02 | -0.23083115D+01 | 0.15185680D+01 | -0.95360702D+00 |
| | -0.65948164D+00 | 0.15900022D+01 | -0.26723981D+00 | -0.64240855D+00 |
| | -0.26656327D+01 | -0.26253424D+01 | 0.60884941D+00 | 0.13449237D+01 |
| | -0.98903877D+00 | -0.10593165D+01 | -0.29863560D+00 | -0.85118973D+00 |
| | -0.31127377D+01 | 0.37555301D+00 | 0.11714160D+00 | -0.73675078D+00 |
| | -0.18922648D+01 | 0.42207372D+00 | 0.93134022D+00 | 0.52995527D+00 |
| | 0.26416119D+01 | -0.49622208D+00 | | |

***** Predicted Measurement Vector *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|
| 1 | 0.10103102D+02 | 0.10103102D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 2 | -0.14931111D+01 | -0.14931111D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 3 | 0.20085912D+01 | 0.20085912D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 4 | 0.19780642D+02 | 0.19780642D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 5 | -0.66669493D+01 | -0.66669493D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 6 | -0.98458102D+00 | -0.98458102D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 7 | -0.15767790D+01 | -0.15767790D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 8 | 0.11137274D+02 | 0.11137274D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 9 | 0.89017246D-01 | 0.89017246D-01 | 0.00000000D+00 | 0.10000000D+01 |
| 10 | 0.10696431D+02 | 0.10696431D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 11 | 0.12655324D+02 | 0.12655324D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 12 | -0.10418072D+02 | -0.10418072D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 13 | -0.21780155D+01 | -0.21780155D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 14 | -0.40642447D+01 | -0.40642447D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 15 | -0.19464792D+01 | -0.19464792D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 16 | 0.42969870D+01 | 0.42969870D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 17 | -0.82003725D+01 | -0.82003725D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 18 | -0.15849261D+02 | -0.15849261D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 19 | -0.68980267D+01 | -0.68980267D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 20 | 0.90509444D+01 | 0.90509444D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 21 | -0.10285179D+02 | -0.10285179D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 22 | 0.18947733D+02 | 0.18947733D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 23 | -0.56718279D+01 | -0.56718279D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 24 | 0.14949795D+02 | 0.14949795D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 25 | 0.12199872D+01 | 0.12199872D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 26 | -0.19580384D+01 | -0.19580384D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 27 | -0.15812464D+02 | -0.15812464D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 28 | 0.13408038D+02 | 0.13408038D+02 | 0.00000000D+00 | 0.10000000D+01 |

| | | | | |
|---|---|---|---|---|
| 29 | -0.57171648D+01 | -0.57171648D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 30 | 0.65553521D+01 | 0.65553521D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 31 | 0.11984460D+01 | 0.11984460D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 32 | 0.41049113D+01 | 0.41049113D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 33 | -0.45120871D+01 | -0.45120871D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 34 | -0.73335053D+01 | -0.73335053D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 35 | 0.55938702D+01 | 0.55938702D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 36 | 0.57718476D+01 | 0.57718476D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 37 | 0.62566531D+01 | 0.62566531D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 38 | -0.36837182D+01 | -0.36837182D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 39 | -0.65993453D+00 | -0.65993453D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 40 | 0.62197216D+01 | 0.62197216D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 41 | 0.83986184D+01 | 0.83986184D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 42 | -0.10200539D+02 | -0.10200539D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 43 | -0.82438433D+01 | -0.82438433D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 44 | 0.54771435D+01 | 0.54771435D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 45 | -0.94879613D+01 | -0.94879613D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 46 | -0.17651308D+01 | -0.17651308D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 47 | 0.13040716D+02 | 0.13040716D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 48 | -0.10674486D+02 | -0.10674486D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 49 | -0.36522650D+01 | -0.36522650D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 50 | 0.47958857D+01 | 0.47958857D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 51 | 0.66130432D+01 | 0.66130432D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 52 | 0.36281941D+01 | 0.36281941D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 53 | 0.12435527D+02 | 0.12435527D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 54 | -0.61849852D+01 | -0.61849852D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 55 | -0.11997359D+02 | -0.11997359D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 56 | 0.63235337D-01 | 0.63235337D-01 | 0.00000000D+00 | 0.10000000D+01 |
| 57 | 0.18977414D+01 | 0.18977414D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 58 | -0.16787637D+01 | -0.16787637D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 59 | 0.21314643D+02 | 0.21314643D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 60 | 0.16361959D+02 | 0.16361959D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 61 | -0.10599311D+02 | -0.10599311D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 62 | 0.11750094D+01 | 0.11750094D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 63 | -0.96800973D+01 | -0.96800973D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 64 | 0.11139557D+02 | 0.11139557D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 65 | -0.15543449D+02 | -0.15543449D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 66 | -0.62421679D+01 | -0.62421679D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 67 | -0.26618426D+01 | -0.26618426D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 68 | -0.30206798D+01 | -0.30206798D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 69 | -0.48546084D+01 | -0.48546084D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 70 | -0.88965933D+01 | -0.88965933D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 71 | 0.64799684D-01 | 0.64799684D-01 | 0.00000000D+00 | 0.10000000D+01 |
| 72 | -0.30426159D+01 | -0.30426159D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 73 | -0.14036280D+02 | -0.14036280D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 74 | 0.55782433D+01 | 0.55782433D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 75 | 0.15480107D+02 | 0.15480107D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 76 | 0.28119730D+01 | 0.28119730D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 77 | -0.63907507D+00 | -0.63907507D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 78 | 0.10076465D+02 | 0.10076465D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 79 | 0.31509518D+02 | 0.31509518D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 80 | -0.25604104D+01 | -0.25604104D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 81 | 0.61949384D+01 | 0.61949384D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 82 | -0.57178051D+01 | -0.57178051D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 83 | -0.37930729D+01 | -0.37930729D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 84 | 0.11819272D+01 | 0.11819272D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 85 | 0.37712380D+01 | 0.37712380D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 86 | -0.86271576D+01 | -0.86271576D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 87 | 0.29655601D+01 | 0.29655601D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 88 | -0.43119955D+01 | -0.43119955D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 89 | 0.10319364D+02 | 0.10319364D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 90 | 0.65706725D+01 | 0.65706725D+01 | 0.00000000D+00 | 0.10000000D+01 |

***** Initial Performance Index = 0.75043169D+04 *****

```
*****   NO Constraints are Specified for Case Number   1   *****

 *****   Solve the NLPQLP Problem for Case Number   1   *****


 ------------------------------------------------------------------
  START OF THE SEQUENTIAL QUADRATIC PROGRAMMING ALGORITHM
 ------------------------------------------------------------------

  Parameters:
     N      =      30
     M      =       0
     ME     =       0
     MODE   =       0
     ACC    =   0.1000D-06
     ACCQP  =   0.1000D-11
     STPMIN =   0.0000D+00
     RHOB   =   0.1000D+03
     MAXFUN =      10
     MAXNM  =      10
     MAXIT  =     200
     IPRINT =       2

  Output in the following order:
     IT    - iteration number
     F     - objective function value
     SCV   - sum of constraint violations
     NA    - number of active constraints
     I     - number of line search iterations
     ALPHA - steplength parameter
     DELTA - additional variable to prevent inconsistency
     KKT   - Karush-Kuhn-Tucker optimality criterion

   IT         F           SCV      NA  I    ALPHA     DELTA     KKT
 ------------------------------------------------------------------
    1  0.75043169D+04  0.00D+00    0  0  0.00D+00  0.00D+00  0.89D+05
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
    2  0.88929353D+03  0.00D+00    0  2  0.30D+00  0.00D+00  0.22D+05
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
    3  0.31119386D+03  0.00D+00    0  2  0.10D+00  0.00D+00  0.12D+05
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
    4  0.19995008D+03  0.00D+00    0  3  0.22D-01  0.00D+00  0.62D+04
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
    5  0.13781759D+03  0.00D+00    0  3  0.29D-01  0.00D+00  0.38D+04
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
    6  0.10790414D+03  0.00D+00    0  3  0.23D-01  0.00D+00  0.21D+04
```

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          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 7  0.91528760D+02  0.00D+00    0  3  0.20D-01  0.00D+00  0.31D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 8  0.65907929D+02  0.00D+00    0  3  0.13D-01  0.00D+00  0.42D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 9  0.37159342D+02  0.00D+00    0  3  0.22D-01  0.00D+00  0.18D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
10  0.26572227D+02  0.00D+00    0  3  0.19D-01  0.00D+00  0.11D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
11  0.21643615D+02  0.00D+00    0  3  0.14D-01  0.00D+00  0.70D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
12  0.19262617D+02  0.00D+00    0  3  0.10D-01  0.00D+00  0.52D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
13  0.18879498D+02  0.00D+00    0  4  0.10D-02  0.00D+00  0.63D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
14  0.13405224D+02  0.00D+00    0  3  0.17D-01  0.00D+00  0.13D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
15  0.65752454D+01  0.00D+00    0  3  0.11D-01  0.00D+00  0.42D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
16  0.51187115D+01  0.00D+00    0  3  0.10D-01  0.00D+00  0.17D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
17  0.48085889D+01  0.00D+00    0  4  0.37D-02  0.00D+00  0.86D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
18  0.46023771D+01  0.00D+00    0  4  0.43D-02  0.00D+00  0.46D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
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          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
19  0.45043311D+01  0.00D+00    0  4  0.32D-02  0.00D+00  0.28D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
20  0.43447615D+01  0.00D+00    0  3  0.10D-01  0.00D+00  0.95D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
21  0.37296993D+01  0.00D+00    0  3  0.12D-01  0.00D+00  0.26D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
22  0.21827319D+01  0.00D+00    0  3  0.10D-01  0.00D+00  0.31D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
23  0.10655850D+01  0.00D+00    0  3  0.10D-01  0.00D+00  0.23D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
24  0.87463856D+00  0.00D+00    0  4  0.14D-02  0.00D+00  0.87D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
25  0.74499927D+00  0.00D+00    0  4  0.26D-02  0.00D+00  0.13D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
26  0.74152862D+00  0.00D+00    0  5  0.27D-03  0.00D+00  0.30D+01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
27  0.72854406D+00  0.00D+00    0  3  0.10D-01  0.00D+00  0.49D+01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
28  0.68562390D+00  0.00D+00    0  3  0.13D-01  0.00D+00  0.20D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
29  0.50085309D+00  0.00D+00    0  3  0.16D-01  0.00D+00  0.45D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
30  0.35193826D+00  0.00D+00    0  4  0.39D-02  0.00D+00  0.59D+02
          *****   Completed CALL to NLPQLP   *****
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          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
31  0.21459532D+00  0.00D+00    0  3  0.10D-01  0.00D+00  0.14D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
32  0.18603806D+00  0.00D+00    0  4  0.29D-02  0.00D+00  0.75D+00
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
33  0.18367622D+00  0.00D+00    0  4  0.41D-02  0.00D+00  0.78D+00
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
34  0.40637748D-01  0.00D+00    0  2  0.34D+00  0.00D+00  0.14D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
35  0.56071018D-02  0.00D+00    0  4  0.42D-02  0.00D+00  0.12D+01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
36  0.26365689D-02  0.00D+00    0  4  0.44D-02  0.00D+00  0.50D-02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
37  0.16065571D-03  0.00D+00    0  1  0.10D+01  0.00D+00  0.13D-06
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
38  0.16059087D-03  0.00D+00    0  1  0.10D+01  0.00D+00  0.57D-09


--- Final Convergence Analysis at Last Iterate ---

  Objective function value:      F(X)  =  0.16059087D-03
  Solution values:               X     =
    -0.27798238D-03 -0.22026049D-03  0.36927487D-03  0.30005974D-03
     0.47167280D-04 -0.35392981D-04 -0.99705462D-04  0.11353055D-03
     0.90405330D-05  0.17661640D-03  0.98185183D-04 -0.19037273D-03
    -0.19202043D-03  0.12650889D-03  0.24965437D-03 -0.27650397D-03
    -0.36824638D-03 -0.15058526D-03  0.13797076D-03 -0.26429615D-03
    -0.89175066D-05 -0.80613623D-04 -0.10701397D-03  0.17251914D-03
    -0.14397856D-03  0.47398308D-04  0.13012923D-03 -0.15716615D-03
     0.31747098D-04 -0.23698066D-04
  Distances from lower bounds:   X-XL  =
     0.24997220D+01  0.24997797D+01  0.25003693D+01  0.25003001D+01
     0.25000472D+01  0.24999646D+01  0.24999003D+01  0.25001135D+01
     0.25000090D+01  0.25001766D+01  0.25000982D+01  0.24998096D+01
     0.24998080D+01  0.25001265D+01  0.25002497D+01  0.24997235D+01
     0.24996318D+01  0.24998494D+01  0.25001380D+01  0.24997357D+01
     0.24999911D+01  0.24999194D+01  0.24998930D+01  0.25001725D+01
     0.24998560D+01  0.25000474D+01  0.25001301D+01  0.24998428D+01
     0.25000317D+01  0.24999763D+01
  Distances from upper bounds:   XU-X  =
     0.25002780D+01  0.25002203D+01  0.24996307D+01  0.24996999D+01
     0.24999528D+01  0.25000354D+01  0.25000997D+01  0.24998865D+01
     0.24999910D+01  0.24998234D+01  0.24999018D+01  0.25001904D+01
```

```
   0.25001920D+01  0.24998735D+01  0.24997503D+01  0.25002765D+01
   0.25003682D+01  0.25001506D+01  0.24998620D+01  0.25002643D+01
   0.25000089D+01  0.25000806D+01  0.25001070D+01  0.24998275D+01
   0.25001440D+01  0.24999526D+01  0.24998699D+01  0.25001572D+01
   0.24999683D+01  0.25000237D+01
 Multipliers for lower bounds:  U     =
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00
 Multipliers for upper bounds:  U     =
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00
 Number of function calls:      NFUNC =     118
 Number of gradient calls:      NGRAD =      38
 Number of calls of QP solver:  NQL   =      38


          *****   Completed CALL to NLPQLP   *****


       *****   Number of Function Evaluations  =   1258   *****


     *****   Solution Control Vector for Case Number   1   *****

Element     G.L.B.            C.V.              L.U.B.            Delta C.V.

   1    -0.25000000D+01   -0.27798238D-03    0.25000000D+01   -0.52542035D+00
   2    -0.25000000D+01   -0.22026049D-03    0.25000000D+01   -0.10656673D+01
   3    -0.25000000D+01    0.36927487D-03    0.25000000D+01    0.16328686D+01
   4    -0.25000000D+01    0.30005974D-03    0.25000000D+01    0.10824834D+01
   5    -0.25000000D+01    0.47167280D-04    0.25000000D+01   -0.16853163D+01
   6    -0.25000000D+01   -0.35392981D-04    0.25000000D+01    0.62703831D+00
   7    -0.25000000D+01   -0.99705462D-04    0.25000000D+01    0.34960820D+00
   8    -0.25000000D+01    0.11353055D-03    0.25000000D+01   -0.33137219D-01
   9    -0.25000000D+01    0.90405330D-05    0.25000000D+01    0.39898537D+00
  10    -0.25000000D+01    0.17661640D-03    0.25000000D+01   -0.11149310D+01
  11    -0.25000000D+01    0.98185183D-04    0.25000000D+01    0.62057807D+00
  12    -0.25000000D+01   -0.19037273D-03    0.25000000D+01   -0.10886165D+01
  13    -0.25000000D+01   -0.19202043D-03    0.25000000D+01   -0.50862596D+00
  14    -0.25000000D+01    0.12650889D-03    0.25000000D+01   -0.37015053D-01
  15    -0.25000000D+01    0.24965437D-03    0.25000000D+01    0.16570820D+01
  16    -0.25000000D+01   -0.27650397D-03    0.25000000D+01   -0.26088124D+00
  17    -0.25000000D+01   -0.36824638D-03    0.25000000D+01   -0.17217230D+01
  18    -0.25000000D+01   -0.15058526D-03    0.25000000D+01   -0.12644673D+01
  19    -0.25000000D+01    0.13797076D-03    0.25000000D+01    0.89196323D+00
  20    -0.25000000D+01   -0.26429615D-03    0.25000000D+01   -0.53369076D+00
  21    -0.25000000D+01   -0.89175066D-05    0.25000000D+01    0.76505175D+00
  22    -0.25000000D+01   -0.80613623D-04    0.25000000D+01   -0.10323046D+01
  23    -0.25000000D+01   -0.10701397D-03    0.25000000D+01    0.13115464D+01
  24    -0.25000000D+01    0.17251914D-03    0.25000000D+01    0.15853082D+01
  25    -0.25000000D+01   -0.14397856D-03    0.25000000D+01   -0.12663436D+01
  26    -0.25000000D+01    0.47398308D-04    0.25000000D+01   -0.11541765D+01
```

| | | | | |
|---|---|---|---|---|
| 27 | -0.25000000D+01 | 0.13012923D-03 | 0.25000000D+01 | -0.11095917D+01 |
| 28 | -0.25000000D+01 | -0.15716615D-03 | 0.25000000D+01 | -0.13848317D+01 |
| 29 | -0.25000000D+01 | 0.31747098D-04 | 0.25000000D+01 | -0.20903399D+01 |
| 30 | -0.25000000D+01 | -0.23698066D-04 | 0.25000000D+01 | 0.11018802D+01 |

***** Predicted Measurement Vector *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|
| 1 | -0.13304601D-02 | 0.10103102D+02 | -0.10104432D+02 | 0.10000000D+01 |
| 2 | -0.12196168D-02 | -0.14931111D+01 | 0.14918915D+01 | 0.10000000D+01 |
| 3 | -0.12457743D-03 | 0.20085912D+01 | -0.20087157D+01 | 0.10000000D+01 |
| 4 | 0.32704313D-04 | 0.19780642D+02 | -0.19780609D+02 | 0.10000000D+01 |
| 5 | -0.12159317D-02 | -0.66669493D+01 | 0.66657334D+01 | 0.10000000D+01 |
| 6 | 0.74111781D-03 | -0.98458102D+00 | 0.98532214D+00 | 0.10000000D+01 |
| 7 | 0.16006847D-02 | -0.15767790D+01 | 0.15783797D+01 | 0.10000000D+01 |
| 8 | 0.25413452D-02 | 0.11137274D+02 | -0.11134733D+02 | 0.10000000D+01 |
| 9 | -0.12208271D-02 | 0.89017246D-01 | -0.90238073D-01 | 0.10000000D+01 |
| 10 | 0.90072648D-03 | 0.10696431D+02 | -0.10695530D+02 | 0.10000000D+01 |
| 11 | 0.89348143D-05 | 0.12655324D+02 | -0.12655315D+02 | 0.10000000D+01 |
| 12 | 0.39929609D-03 | -0.10418072D+02 | 0.10418471D+02 | 0.10000000D+01 |
| 13 | -0.25582270D-04 | -0.21780155D+01 | 0.21779899D+01 | 0.10000000D+01 |
| 14 | 0.19856048D-02 | -0.40642447D+01 | 0.40662303D+01 | 0.10000000D+01 |
| 15 | 0.29916702D-02 | -0.19464792D+01 | 0.19494709D+01 | 0.10000000D+01 |
| 16 | 0.14318349D-03 | 0.42969870D+01 | -0.42968438D+01 | 0.10000000D+01 |
| 17 | 0.16786533D-02 | -0.82003725D+01 | 0.82020512D+01 | 0.10000000D+01 |
| 18 | 0.91225105D-03 | -0.15849261D+02 | 0.15850174D+02 | 0.10000000D+01 |
| 19 | -0.83004326D-03 | -0.68980267D+01 | 0.68971966D+01 | 0.10000000D+01 |
| 20 | -0.22089668D-02 | 0.90509444D+01 | -0.90531534D+01 | 0.10000000D+01 |
| 21 | -0.52650764D-03 | -0.10285179D+02 | 0.10284653D+02 | 0.10000000D+01 |
| 22 | 0.14023000D-02 | 0.18947733D+02 | -0.18946331D+02 | 0.10000000D+01 |
| 23 | 0.14247710D-03 | -0.56718279D+01 | 0.56719703D+01 | 0.10000000D+01 |
| 24 | 0.16446743D-02 | 0.14949795D+02 | -0.14948150D+02 | 0.10000000D+01 |
| 25 | -0.18155261D-02 | 0.12199872D+01 | -0.12218027D+01 | 0.10000000D+01 |
| 26 | -0.93390210D-03 | -0.19580384D+01 | 0.19571045D+01 | 0.10000000D+01 |
| 27 | -0.12761431D-02 | -0.15812464D+02 | 0.15811187D+02 | 0.10000000D+01 |
| 28 | 0.31762151D-03 | 0.13408038D+02 | -0.13407720D+02 | 0.10000000D+01 |
| 29 | 0.65054359D-04 | -0.57171648D+01 | 0.57172298D+01 | 0.10000000D+01 |
| 30 | -0.25472623D-03 | 0.65553521D+01 | -0.65556068D+01 | 0.10000000D+01 |
| 31 | -0.30920301D-03 | 0.11984460D+01 | -0.11987552D+01 | 0.10000000D+01 |
| 32 | 0.37921546D-03 | 0.41049113D+01 | -0.41045321D+01 | 0.10000000D+01 |
| 33 | 0.77695095D-04 | -0.45120871D+01 | 0.45121648D+01 | 0.10000000D+01 |
| 34 | 0.15105172D-02 | -0.73335053D+01 | 0.73350158D+01 | 0.10000000D+01 |
| 35 | 0.18485830D-02 | 0.55938702D+01 | -0.55920217D+01 | 0.10000000D+01 |
| 36 | -0.68219123D-04 | 0.57718476D+01 | -0.57719158D+01 | 0.10000000D+01 |
| 37 | 0.20845088D-02 | 0.62566531D+01 | -0.62545686D+01 | 0.10000000D+01 |
| 38 | 0.26101622D-03 | -0.36837182D+01 | 0.36839792D+01 | 0.10000000D+01 |
| 39 | 0.17929212D-02 | -0.65993453D+00 | 0.66172745D+00 | 0.10000000D+01 |
| 40 | -0.13927632D-02 | 0.62197216D+01 | -0.62211144D+01 | 0.10000000D+01 |
| 41 | -0.53182357D-03 | 0.83986184D+01 | -0.83991503D+01 | 0.10000000D+01 |
| 42 | -0.15376338D-02 | -0.10200539D+02 | 0.10199001D+02 | 0.10000000D+01 |
| 43 | -0.68263683D-03 | -0.82438433D+01 | 0.82431607D+01 | 0.10000000D+01 |
| 44 | -0.67985503D-03 | 0.54771435D+01 | -0.54778234D+01 | 0.10000000D+01 |
| 45 | 0.24327126D-02 | -0.94879613D+01 | 0.94903940D+01 | 0.10000000D+01 |
| 46 | -0.42375327D-03 | -0.17651308D+01 | 0.17647071D+01 | 0.10000000D+01 |
| 47 | 0.67714994D-03 | 0.13040716D+02 | -0.13040039D+02 | 0.10000000D+01 |
| 48 | 0.15804168D-02 | -0.10674486D+02 | 0.10676066D+02 | 0.10000000D+01 |
| 49 | 0.20379680D-02 | -0.36522650D+01 | 0.36543030D+01 | 0.10000000D+01 |
| 50 | 0.13278396D-02 | 0.47958857D+01 | -0.47945578D+01 | 0.10000000D+01 |
| 51 | 0.20954145D-02 | 0.66130432D+01 | -0.66109478D+01 | 0.10000000D+01 |
| 52 | 0.44803652D-03 | 0.36281941D+01 | -0.36277461D+01 | 0.10000000D+01 |
| 53 | 0.88958345D-04 | 0.12435527D+02 | -0.12435438D+02 | 0.10000000D+01 |
| 54 | -0.26688135D-03 | -0.61849852D+01 | 0.61847183D+01 | 0.10000000D+01 |
| 55 | -0.10376702D-02 | -0.11997359D+02 | 0.11996321D+02 | 0.10000000D+01 |

| | | | | |
|---|---|---|---|---|
| 56 | -0.32416729D-03 | 0.63235337D-01 | -0.63559505D-01 | 0.10000000D+01 |
| 57 | 0.28838012D-02 | 0.18977414D+01 | -0.18948576D+01 | 0.10000000D+01 |
| 58 | 0.21525168D-03 | -0.16787637D+01 | 0.16789790D+01 | 0.10000000D+01 |
| 59 | -0.13767577D-03 | 0.21314643D+02 | -0.21314781D+02 | 0.10000000D+01 |
| 60 | 0.12740705D-03 | 0.16361959D+02 | -0.16361831D+02 | 0.10000000D+01 |
| 61 | -0.12847600D-03 | -0.10599311D+02 | 0.10599183D+02 | 0.10000000D+01 |
| 62 | 0.13595815D-03 | 0.11750094D+01 | -0.11748735D+01 | 0.10000000D+01 |
| 63 | -0.39240223D-03 | -0.96800973D+01 | 0.96797049D+01 | 0.10000000D+01 |
| 64 | -0.20511002D-02 | 0.11139557D+02 | -0.11141609D+02 | 0.10000000D+01 |
| 65 | 0.18744721D-03 | -0.15543449D+02 | 0.15543636D+02 | 0.10000000D+01 |
| 66 | 0.30540074D-03 | -0.62421679D+01 | 0.62424733D+01 | 0.10000000D+01 |
| 67 | -0.31517961D-02 | -0.26618426D+01 | 0.26586908D+01 | 0.10000000D+01 |
| 68 | 0.46714719D-03 | -0.30206798D+01 | 0.30211469D+01 | 0.10000000D+01 |
| 69 | 0.19880756D-02 | -0.48546084D+01 | 0.48565965D+01 | 0.10000000D+01 |
| 70 | -0.19449559D-03 | -0.88965933D+01 | 0.88963988D+01 | 0.10000000D+01 |
| 71 | 0.32322546D-02 | 0.64799684D-01 | -0.61567429D-01 | 0.10000000D+01 |
| 72 | 0.24233697D-02 | -0.30426159D+01 | 0.30450393D+01 | 0.10000000D+01 |
| 73 | -0.17883144D-02 | -0.14036280D+02 | 0.14034492D+02 | 0.10000000D+01 |
| 74 | -0.21273745D-02 | 0.55782433D+01 | -0.55803707D+01 | 0.10000000D+01 |
| 75 | -0.33460886D-03 | 0.15480107D+02 | -0.15480442D+02 | 0.10000000D+01 |
| 76 | 0.63508123D-03 | 0.28119730D+01 | -0.28113379D+01 | 0.10000000D+01 |
| 77 | -0.12381284D-02 | -0.63907507D+00 | 0.63783695D+00 | 0.10000000D+01 |
| 78 | 0.60429391D-03 | 0.10076465D+02 | -0.10075861D+02 | 0.10000000D+01 |
| 79 | -0.22080656D-02 | 0.31509518D+02 | -0.31511726D+02 | 0.10000000D+01 |
| 80 | 0.79620147D-03 | -0.25604104D+01 | 0.25612066D+01 | 0.10000000D+01 |
| 81 | 0.60018985D-04 | 0.61949384D+01 | -0.61948783D+01 | 0.10000000D+01 |
| 82 | 0.14929431D-02 | -0.57178051D+01 | 0.57192980D+01 | 0.10000000D+01 |
| 83 | 0.56481255D-03 | -0.37930729D+01 | 0.37936377D+01 | 0.10000000D+01 |
| 84 | -0.18380411D-02 | 0.11819272D+01 | -0.11837653D+01 | 0.10000000D+01 |
| 85 | -0.73199439D-03 | 0.37712380D+01 | -0.37719700D+01 | 0.10000000D+01 |
| 86 | -0.16767684D-02 | -0.86271576D+01 | 0.86254808D+01 | 0.10000000D+01 |
| 87 | -0.57384957D-03 | 0.29655601D+01 | -0.29661340D+01 | 0.10000000D+01 |
| 88 | -0.47903594D-03 | -0.43119955D+01 | 0.43115165D+01 | 0.10000000D+01 |
| 89 | 0.13379375D-02 | 0.10319364D+02 | -0.10318026D+02 | 0.10000000D+01 |
| 90 | 0.40794814D-03 | 0.65706725D+01 | -0.65702646D+01 | 0.10000000D+01 |

***** NLP Solution Performance Index = 0.16059087D-03 *****

***** NO Constraints are Specified for Case Number 1 *****

***** Solve the Regulator Problem for Case Number 1 *****

***** Alpha = 0.10000000D+01 *****

| Dim | ***** WZ-Vector ***** | | | |
|---|---|---|---|---|
| 90 | 0.10000000D+01 | 0.10000000D+01 | 0.10000000D+01 | 0.10000000D+01 |
| | 0.10000000D+01 | 0.10000000D+01 | 0.10000000D+01 | 0.10000000D+01 |
| | 0.10000000D+01 | 0.10000000D+01 | 0.10000000D+01 | 0.10000000D+01 |
| | 0.10000000D+01 | 0.10000000D+01 | 0.10000000D+01 | 0.10000000D+01 |
| | 0.10000000D+01 | 0.10000000D+01 | 0.10000000D+01 | 0.10000000D+01 |
| | 0.10000000D+01 | 0.10000000D+01 | 0.10000000D+01 | 0.10000000D+01 |
| | 0.10000000D+01 | 0.10000000D+01 | 0.10000000D+01 | 0.10000000D+01 |
| | 0.10000000D+01 | 0.10000000D+01 | 0.10000000D+01 | 0.10000000D+01 |
| | 0.10000000D+01 | 0.10000000D+01 | 0.10000000D+01 | 0.10000000D+01 |
| | 0.10000000D+01 | 0.10000000D+01 | 0.10000000D+01 | 0.10000000D+01 |
| | 0.10000000D+01 | 0.10000000D+01 | 0.10000000D+01 | 0.10000000D+01 |
| | 0.10000000D+01 | 0.10000000D+01 | 0.10000000D+01 | 0.10000000D+01 |
| | 0.10000000D+01 | 0.10000000D+01 | 0.10000000D+01 | 0.10000000D+01 |
| | 0.10000000D+01 | 0.10000000D+01 | 0.10000000D+01 | 0.10000000D+01 |
| | 0.10000000D+01 | 0.10000000D+01 | 0.10000000D+01 | 0.10000000D+01 |
| | 0.10000000D+01 | 0.10000000D+01 | 0.10000000D+01 | 0.10000000D+01 |

```
        0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
        0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
        0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
        0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
        0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
        0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
        0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
        0.10000000D+01    0.10000000D+01

Dim                    *****   WX-Vector   *****

30      0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00

Dim                    *****   WDX-Vector   *****

30      0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00


   *****   Matrix [DUMXX1] was Successfully Inverted
                                      to Yield Matrix [DD].   *****

Dim          *****   The Solution Control Vector   *****

 1    -0.27777924D-03

 2    -0.22000501D-03

 3     0.36901454D-03

 4     0.29995038D-03

 5     0.47447493D-04

 6    -0.35492716D-04

 7    -0.99609804D-04

 8     0.11351115D-03

 9     0.90479776D-05

10     0.17692321D-03

11     0.98064280D-04

12    -0.19027780D-03

13    -0.19190821D-03

14     0.12675644D-03
```

| | |
|---|---|
| 15 | 0.24953225D-03 |
| 16 | -0.27657491D-03 |
| 17 | -0.36797178D-03 |
| 18 | -0.15014408D-03 |
| 19 | 0.13809938D-03 |
| 20 | -0.26410925D-03 |
| 21 | -0.89115079D-05 |
| 22 | -0.80275063D-04 |
| 23 | -0.10726489D-03 |
| 24 | 0.17224764D-03 |
| 25 | -0.14375006D-03 |
| 26 | 0.47744583D-04 |
| 27 | 0.13045552D-03 |
| 28 | -0.15692855D-03 |
| 29 | 0.32178643D-04 |
| 30 | -0.23874954D-04 |

Dim ***** The Solution Measurement Vector *****

| Dim | | | | |
|---|---|---|---|---|
| 90 | -0.13283100D-02 | -0.12206207D-02 | -0.12440822D-03 | 0.36583372D-04 |
| | -0.12172328D-02 | 0.74053253D-03 | 0.16009096D-02 | 0.25427708D-02 |
| | -0.12211911D-02 | 0.90259913D-03 | 0.11026384D-04 | 0.39803624D-03 |
| | -0.26711921D-04 | 0.19856417D-02 | 0.29907853D-02 | 0.14433453D-03 |
| | 0.16769715D-02 | 0.90922588D-03 | -0.83175073D-03 | -0.22073870D-02 |
| | -0.52928205D-03 | 0.14055186D-02 | 0.14051053D-03 | 0.16479379D-02 |
| | -0.18133743D-02 | -0.93482645D-03 | -0.12797582D-02 | 0.31970066D-03 |
| | 0.63071857D-04 | -0.25224686D-03 | -0.30787916D-03 | 0.38096326D-03 |
| | 0.77407888D-04 | 0.15092175D-02 | 0.18505781D-02 | -0.67240661D-04 |
| | 0.20850593D-02 | 0.26018289D-03 | 0.17925992D-02 | -0.13914983D-02 |
| | -0.53023410D-03 | -0.15391860D-02 | -0.68270684D-03 | -0.67992056D-03 |
| | 0.24302165D-02 | -0.42423858D-03 | 0.67873894D-03 | 0.15787216D-02 |
| | 0.20369056D-02 | 0.13289226D-02 | 0.20965888D-02 | 0.44786631D-03 |
| | 0.90625913D-04 | -0.26950257D-03 | -0.10409802D-02 | -0.32402618D-03 |
| | 0.28830081D-02 | 0.21463449D-03 | -0.13360570D-03 | 0.13030467D-03 |
| | -0.13105232D-03 | 0.13560048D-03 | -0.39413332D-03 | -0.20494433D-02 |
| | 0.18415482D-03 | 0.30498184D-03 | -0.31523006D-02 | 0.46626275D-03 |
| | 0.19876823D-02 | -0.19664133D-03 | 0.32327711D-02 | 0.24233243D-02 |
| | -0.17905428D-02 | -0.21266293D-02 | -0.33067721D-03 | 0.63332398D-03 |
| | -0.12379506D-02 | 0.60512240D-03 | -0.22020932D-02 | 0.79519127D-03 |
| | 0.60498406D-04 | 0.14920773D-02 | 0.56399920D-03 | -0.18387755D-02 |
| | -0.73271330D-03 | -0.16789523D-02 | -0.57387031D-03 | -0.48043074D-03 |
| | 0.13407930D-02 | 0.40857571D-03 | | |

***** Regulator Solution Performance Index = 0.16059056D-03 *****

***** NLP Special Control 30-Vector Output *****

CV =

```
     -0.277982383568173D-03,  -0.220260490812568D-03,   0.369274870723073D-03,
      0.300059742590578D-03,   0.471672800386837D-04,  -0.353929813815269D-04,
     -0.997054618679939D-04,   0.113530550610971D-03,   0.904053303597272D-05,
      0.176616403310380D-03,   0.981851832027774D-04,  -0.190372728297288D-03,
     -0.192020426099640D-03,   0.126508886511288D-03,   0.249654371819654D-03,
     -0.276503970006279D-03,  -0.368246384674666D-03,  -0.150585258799428D-03,
      0.137970762553596D-03,  -0.264296146187818D-03,  -0.891750664291932D-05,
     -0.806136233172258D-04,  -0.107013969652083D-03,   0.172519141589351D-03,
     -0.143978557059717D-03,   0.473983081423769D-04,   0.130129226266165D-03,
     -0.157166148756311D-03,   0.317470981573880D-04,  -0.236980664747743D-04,


           *****   Regulator Special Control 30-Vector Output   *****

 CV =
     -0.277779244541088D-03,  -0.220005010411528D-03,   0.369014536739876D-03,
      0.299950376122737D-03,   0.474474934404334D-04,  -0.354927159167406D-04,
     -0.996098043296589D-04,   0.113511152847336D-03,   0.904797760503673D-05,
      0.176923213598190D-03,   0.980642796307718D-04,  -0.190277796919380D-03,
     -0.191908210867453D-03,   0.126756435310627D-03,   0.249532245148565D-03,
     -0.276574914854000D-03,  -0.367971779649645D-03,  -0.150144081421999D-03,
      0.138099381202017D-03,  -0.264109253601097D-03,  -0.891150788995265D-05,
     -0.802750634167904D-04,  -0.107264892569292D-03,   0.172247641452516D-03,
     -0.143750056593728D-03,   0.477445832038903D-04,   0.130455523066786D-03,
     -0.156928554911229D-03,   0.321786432602167D-04,  -0.238749542236238D-04,


    *****   Root-Sum-Squared Delta CV Elements  =   0.12733076D-05   *****

 Delta CV =
     -0.203139027084927D-06,  -0.255480401039861D-06,   0.260333983197300D-06,
      0.109366467841135D-06,  -0.280213401749753D-06,   0.997345352136866D-07,
     -0.956575383349292D-07,   0.193977636354117D-07,  -0.744456906400977D-08,
     -0.306810287810014D-06,   0.120903572005553D-06,  -0.949313779077571D-07,
     -0.112215232187218D-06,  -0.247548799338262D-06,   0.122126671089006D-06,
      0.709448477208600D-07,  -0.274605025020675D-06,  -0.441177377428830D-06,
     -0.128618648420560D-06,  -0.186892586721550D-06,  -0.599875296666465D-08,
     -0.338559900435459D-06,   0.250922917208985D-06,   0.271500136835007D-06,
     -0.228500465989355D-06,  -0.346275061513402D-06,  -0.326296800620603D-06,
     -0.237593845082420D-06,  -0.431545102828730D-06,   0.176887748849519D-06,


                *****   End Case Number   1   *****




 ********************************************************************************



        ***************   Start Case Number   2   ***************

                      *****   INPUT DATA   *****

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1.51543682813644     , -0.700927615165710     ,
   2.64161193370819     ,  0.506854891777039     ,  -1.02786916494370     ,
0.109551072120667     ,  0.600561022758484     ,
 -0.840507447719574     , -6.751835346221924E-003,   1.67120158672333     ,  -
1.75663667917252     ,  0.874569654464722     ,
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   1.66577649116516     ,  0.527676820755005     ,  0.123390674591064     ,  -
2.52018582820892     ,   2.30429667234421     ,
  -2.51517516374588     ,  0.381024003028870     , -4.273039102554321E-002,
0.671636104583740     , -0.748380005359650     ,
  -1.85003501176834     ,   1.94018262624741     ,  -2.51862961053848     ,
2.78128743171692     ,   1.75358563661575     ,
   2.41789764165878     ,   2.79192715883255     ,  -1.35925036668777     ,
2.95694297552109     ,  0.101885914802551     ,
 -0.817081928253174     ,  0.986517608165741     ,  -1.20991837978363     , -
0.843970060348511     ,  -2.14568102359772     ,
  -1.02484917640686     ,   1.70825171470642     ,   3.24429231882095     ,  -
1.96087008714676     ,  -1.31358367204666     ,
  0.104664742946625     ,   1.09889161586761     ,  -1.62986463308334     , -
0.112736105918884     ,  0.441414475440979     ,
 -0.937886893749237     ,   1.09138977527618     ,  0.214749038219452     ,  -
1.48581445217133     ,  -1.69512766599655     ,
   1.25505787134171     ,  -2.39397418498993     ,  0.616378664970398     , -
0.324830591678619     ,   1.29422819614410     ,
   1.05353504419327     , -0.381728827953339     ,   1.37954235076904     ,  -
2.38767039775848     ,  1.351130008697510E-002,
   1.22684466838837     ,   1.95065909624100     ,  7.977575063705444E-002,
4.593849182128906E-002, -5.809867382049561E-002,
  0.204166471958160     ,   1.57845777273178     ,   1.51407235860825     ,
0.474092900753021     , -0.862080514431000     ,
  0.984716773033142     ,   3.42165988683701     ,  -1.35951048135757     ,  -
2.02327781915665     ,  -1.76858341693878     ,
  -3.28402036428452     ,  3.312647342681885E-003,   1.81569629907608     ,
0.339741766452789     ,  -3.36517453193665     ,
   1.76745784282684     ,  0.565413594245911     ,  0.561350464820862     ,  -
3.07443737983704     ,   1.70243000984192     ,
  0.151906192302704     ,  -1.97849959135056     ,  1.437819004058838E-002,
2.10431826114655     ,  -1.82531249523163     ,
 -0.496222078800201     ,
WDT     = 90*1.00000000000000        ,
WDX     = 30*0.000000000000000E+000  ,
WX      = 30*0.000000000000000E+000  ,
WZ      = 90*1.00000000000000        ,
XL      = 30*-2.50000000000000       , 4*-2.00000000000000       ,
XL0     = 30*-2.30000000000000       ,
XU      = 30*2.50000000000000        , 4*2.00000000000000        ,
XU0     = 30*2.30000000000000        ,
X0      =  0.525142371654510     ,   1.06544703245163     ,  -1.63249933719635
,  -1.08218330144882     ,
   1.68536347150803     , -0.627073705196381     , -0.349707901477814     ,
3.325074911117554E-002, -0.398976325988770     ,
   1.11510765552521     , -0.620479881763458     ,   1.08842611312866     ,
0.508433938026428     ,  3.714156150817871E-002,
  -1.65683233737946     ,  0.260604739189148     ,   1.72135478258133     ,
1.26431673765182     , -0.891825258731842     ,
  0.533426463603973     , -0.765060663223267     ,   1.03222399950027     ,  -
1.31165337562561     ,  -1.58513569831848     ,
   1.26619964838028     ,   1.15422391891479     ,   1.10972183942795     ,
1.38467454910278     ,   2.09037166833878     ,
  -1.10190385580063     ,
ZA      =   10.1031015556637     ,  -1.49311112375127     ,   2.00859116773819
,   19.7806418202464     ,
  -6.66694933560947     , -0.984581022045185     ,  -1.57677903081856     ,
11.1372744068072     ,  8.901724622828734E-002,
   10.6964312149369     ,   12.6553238561087     ,  -10.4180721917858     ,  -
2.17801549121238     ,  -4.06424468879685     ,
  -1.94647919370231     ,   4.29698698516557     ,  -8.20037251283600     ,  -
15.8492614842374     ,  -6.89802665039441     ,
   9.05094441903210     ,  -10.2851791741196     ,   18.9477331622120     ,  -
5.67182785974489     ,   14.9497947546899     ,
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   1.21998717704465     ,  -1.95803840328898     ,  -15.8124635731407     ,
13.4080377900305     ,  -5.71716475083855     ,
   6.55535206722717     ,   1.19844599564803     ,   4.10491132049296     ,  -
4.51208707311713     ,  -7.33350531247251     ,
   5.59387024428836     ,   5.77184757041848     ,   6.25665309690135     ,  -
3.68371819166766     , -0.659934530002697     ,
   6.21972162468774     ,   8.39861842905735     ,  -10.2005385050841     ,  -
8.24384331201786     ,   5.47714353239403     ,
  -9.48796129777687     ,  -1.76513080861804     ,   13.0407163500420     ,  -
10.6744857626338     ,  -3.65226503129352     ,
   4.79588567827548     ,   6.61304322092141     ,   3.62819409978617     ,
12.4355266715870     ,  -6.18498522687470     ,
  -11.9973587047075     ,  6.323533737129947E-002,   1.89774138784780     ,  -
1.67876370645145     ,   21.3146432044124     ,
   16.3619586738246     ,  -10.5993111607977     ,   1.17500943851861     ,  -
9.68009726904937     ,   11.1395574861649     ,
  -15.5434487445720     ,  -6.24216787049048     ,  -2.66184264552074     ,  -
3.02067979162731     ,  -4.85460838280633     ,
  -8.89659327371903     ,  6.479968354098761E-002,  -3.04261589156117     ,  -
14.0362803053454     ,   5.57824331267648     ,
   15.4801070549716     ,   2.81197299280570     , -0.639075074950806     ,
10.0764651948843     ,   31.5095183393081     ,
  -2.56041038623617     ,   6.19493836409276     ,  -5.71780510606202     ,  -
3.79307287538332     ,   1.18192722434093     ,
   3.77123801904272     ,  -8.62715757895982     ,   2.96556011529116     ,  -
4.31199548703144     ,   10.3193644051495     ,
   6.57067253794001
/
```

*****  OUTPUT DATA  *****

*****  X0, ZA, and T are Randomly Defined  *****

| CRAN1 | CRAN2 | CRAN3 | CRAN4 |
|---|---|---|---|
| CRAN5 | CRAN6 | CRAN7 | CRAN8 |
| 0.15000000D+01 | 0.20000000D+01 | 0.50000000D+00 | 0.20000000D+01 |
| 0.20000000D-02 | 0.20000000D-02 | 0.10000000D+00 | 0.10000000D+00 |

*****  Control Vector During Previous Duty Cycle for Case Number  2  *****

| Element | G.L.B. | C.V. | L.U.B. |
|---|---|---|---|
| 1 | -0.23000000D+01 | 0.52514237D+00 | 0.23000000D+01 |
| 2 | -0.23000000D+01 | 0.10654470D+01 | 0.23000000D+01 |
| 3 | -0.23000000D+01 | -0.16324993D+01 | 0.23000000D+01 |
| 4 | -0.23000000D+01 | -0.10821833D+01 | 0.23000000D+01 |
| 5 | -0.23000000D+01 | 0.16853635D+01 | 0.23000000D+01 |
| 6 | -0.23000000D+01 | -0.62707371D+00 | 0.23000000D+01 |
| 7 | -0.23000000D+01 | -0.34970790D+00 | 0.23000000D+01 |
| 8 | -0.23000000D+01 | 0.33250749D-01 | 0.23000000D+01 |
| 9 | -0.23000000D+01 | -0.39897633D+00 | 0.23000000D+01 |
| 10 | -0.23000000D+01 | 0.11151077D+01 | 0.23000000D+01 |
| 11 | -0.23000000D+01 | -0.62047988D+00 | 0.23000000D+01 |
| 12 | -0.23000000D+01 | 0.10884261D+01 | 0.23000000D+01 |
| 13 | -0.23000000D+01 | 0.50843394D+00 | 0.23000000D+01 |
| 14 | -0.23000000D+01 | 0.37141562D-01 | 0.23000000D+01 |
| 15 | -0.23000000D+01 | -0.16568323D+01 | 0.23000000D+01 |
| 16 | -0.23000000D+01 | 0.26060474D+00 | 0.23000000D+01 |
| 17 | -0.23000000D+01 | 0.17213548D+01 | 0.23000000D+01 |
| 18 | -0.23000000D+01 | 0.12643167D+01 | 0.23000000D+01 |
| 19 | -0.23000000D+01 | -0.89182526D+00 | 0.23000000D+01 |

| | | | |
|---|---|---|---|
| 20 | -0.23000000D+01 | 0.53342646D+00 | 0.23000000D+01 |
| 21 | -0.23000000D+01 | -0.76506066D+00 | 0.23000000D+01 |
| 22 | -0.23000000D+01 | 0.10322240D+01 | 0.23000000D+01 |
| 23 | -0.23000000D+01 | -0.13116534D+01 | 0.23000000D+01 |
| 24 | -0.23000000D+01 | -0.15851357D+01 | 0.23000000D+01 |
| 25 | -0.23000000D+01 | 0.12661996D+01 | 0.23000000D+01 |
| 26 | -0.23000000D+01 | 0.11542239D+01 | 0.23000000D+01 |
| 27 | -0.23000000D+01 | 0.11097218D+01 | 0.23000000D+01 |
| 28 | -0.23000000D+01 | 0.13846745D+01 | 0.23000000D+01 |
| 29 | -0.23000000D+01 | 0.20903717D+01 | 0.23000000D+01 |
| 30 | -0.23000000D+01 | -0.11019039D+01 | 0.23000000D+01 |

***** Measurement Vectors from Previous Duty Cycle *****

| Element | Actual | Ideal | Delta |
|---|---|---|---|
| 1 | 0.10103102D+02 | 0.10104275D+02 | -0.11739089D-02 |
| 2 | -0.14931111D+01 | -0.14924095D+01 | -0.70162487D-03 |
| 3 | 0.20085912D+01 | 0.20091062D+01 | -0.51504469D-03 |
| 4 | 0.19780642D+02 | 0.19778241D+02 | 0.24008768D-02 |
| 5 | -0.66669493D+01 | -0.66651274D+01 | -0.18219316D-02 |
| 6 | -0.98458102D+00 | -0.98559824D+00 | 0.10172153D-02 |
| 7 | -0.15767790D+01 | -0.15788380D+01 | 0.20590177D-02 |
| 8 | 0.11137274D+02 | 0.11134954D+02 | 0.23208692D-02 |
| 9 | 0.89017246D-01 | 0.88879319D-01 | 0.13792706D-03 |
| 10 | 0.10696431D+02 | 0.10693933D+02 | 0.24983239D-02 |
| 11 | 0.12655324D+02 | 0.12654573D+02 | 0.75085998D-03 |
| 12 | -0.10418072D+02 | -0.10419233D+02 | 0.11609204D-02 |
| 13 | -0.21780155D+01 | -0.21776413D+01 | -0.37421465D-03 |
| 14 | -0.40642447D+01 | -0.40656395D+01 | 0.13947675D-02 |
| 15 | -0.19464792D+01 | -0.19496991D+01 | 0.32199035D-02 |
| 16 | 0.42969870D+01 | 0.42974533D+01 | -0.46632385D-03 |
| 17 | -0.82003725D+01 | -0.81998678D+01 | -0.50467467D-03 |
| 18 | -0.15849261D+02 | -0.15847900D+02 | -0.13614869D-02 |
| 19 | -0.68980267D+01 | -0.68975064D+01 | -0.52021170D-03 |
| 20 | 0.90509444D+01 | 0.90534421D+01 | -0.24976861D-02 |
| 21 | -0.10285179D+02 | -0.10284505D+02 | -0.67372823D-03 |
| 22 | 0.18947733D+02 | 0.18945459D+02 | 0.22739236D-02 |
| 23 | -0.56718279D+01 | -0.56694679D+01 | -0.23599300D-02 |
| 24 | 0.14949795D+02 | 0.14947791D+02 | 0.20038812D-02 |
| 25 | 0.12199872D+01 | 0.12219031D+01 | -0.19159384D-02 |
| 26 | -0.19580384D+01 | -0.19581031D+01 | 0.64691544D-04 |
| 27 | -0.15812464D+02 | -0.15808666D+02 | -0.37973917D-02 |
| 28 | 0.13408038D+02 | 0.13406054D+02 | 0.19835744D-02 |
| 29 | -0.57171648D+01 | -0.57166864D+01 | -0.47830105D-03 |
| 30 | 0.65553521D+01 | 0.65551029D+01 | 0.24921107D-03 |
| 31 | 0.11984460D+01 | 0.11976584D+01 | 0.78764153D-03 |
| 32 | 0.41049113D+01 | 0.41032964D+01 | 0.16149530D-02 |
| 33 | -0.45120871D+01 | -0.45112859D+01 | -0.80120182D-03 |
| 34 | -0.73335053D+01 | -0.73353247D+01 | 0.18193855D-02 |
| 35 | 0.55938702D+01 | 0.55907057D+01 | 0.31645451D-02 |
| 36 | 0.57718476D+01 | 0.57718665D+01 | -0.18908978D-04 |
| 37 | 0.62566531D+01 | 0.62546603D+01 | 0.19928141D-02 |
| 38 | -0.36837182D+01 | -0.36854161D+01 | 0.16978738D-02 |
| 39 | -0.65993453D+00 | -0.66239682D+00 | 0.24622853D-02 |
| 40 | 0.62197216D+01 | 0.62201300D+01 | -0.40833139D-03 |
| 41 | 0.83986184D+01 | 0.83976410D+01 | 0.97745967D-03 |
| 42 | -0.10200539D+02 | -0.10196727D+02 | -0.38112261D-02 |
| 43 | -0.82438433D+01 | -0.82422779D+01 | -0.15654478D-02 |
| 44 | 0.54771435D+01 | 0.54770325D+01 | 0.11099815D-03 |
| 45 | -0.94879613D+01 | -0.94905046D+01 | 0.25433128D-02 |
| 46 | -0.17651308D+01 | -0.17652076D+01 | 0.76744080D-04 |
| 47 | 0.13040716D+02 | 0.13040062D+02 | 0.65458679D-03 |
| 48 | -0.10674486D+02 | -0.10674158D+02 | -0.32801104D-03 |

| | | | |
|---|---|---|---|
| 49 | -0.36522650D+01 | -0.36529006D+01 | 0.63560677D-03 |
| 50 | 0.47958857D+01 | 0.47951361D+01 | 0.74956203D-03 |
| 51 | 0.66130432D+01 | 0.66095285D+01 | 0.35146902D-02 |
| 52 | 0.36281941D+01 | 0.36280430D+01 | 0.15105152D-03 |
| 53 | 0.12435527D+02 | 0.12434542D+02 | 0.98421431D-03 |
| 54 | -0.61849852D+01 | -0.61837043D+01 | -0.12808800D-02 |
| 55 | -0.11997359D+02 | -0.11996264D+02 | -0.10945754D-02 |
| 56 | 0.63235337D-01 | 0.64456403D-01 | -0.12210660D-02 |
| 57 | 0.18977414D+01 | 0.18955406D+01 | 0.22008123D-02 |
| 58 | -0.16787637D+01 | -0.16786796D+01 | -0.84141493D-04 |
| 59 | 0.21314643D+02 | 0.21314194D+02 | 0.44949913D-03 |
| 60 | 0.16361959D+02 | 0.16359496D+02 | 0.24625027D-02 |
| 61 | -0.10599311D+02 | -0.10597929D+02 | -0.13817616D-02 |
| 62 | 0.11750094D+01 | 0.11758778D+01 | -0.86836147D-03 |
| 63 | -0.96800973D+01 | -0.96792626D+01 | -0.83465552D-03 |
| 64 | 0.11139557D+02 | 0.11140365D+02 | -0.80754423D-03 |
| 65 | -0.15543449D+02 | -0.15543196D+02 | -0.25296474D-03 |
| 66 | -0.62421679D+01 | -0.62421539D+01 | -0.13951063D-04 |
| 67 | -0.26618426D+01 | -0.26582780D+01 | -0.35646253D-02 |
| 68 | -0.30206798D+01 | -0.30195918D+01 | -0.10880249D-02 |
| 69 | -0.48546084D+01 | -0.48578326D+01 | 0.32241783D-02 |
| 70 | -0.88965933D+01 | -0.88953844D+01 | -0.12088470D-02 |
| 71 | 0.64799684D-01 | 0.62645748D-01 | 0.21539359D-02 |
| 72 | -0.30426159D+01 | -0.30448372D+01 | 0.22213166D-02 |
| 73 | -0.14036280D+02 | -0.14032409D+02 | -0.38710032D-02 |
| 74 | 0.55782433D+01 | 0.55805536D+01 | -0.23103285D-02 |
| 75 | 0.15480107D+02 | 0.15480177D+02 | -0.70056200D-04 |
| 76 | 0.28119730D+01 | 0.28106797D+01 | 0.12933376D-02 |
| 77 | -0.63907507D+00 | -0.63661635D+00 | -0.24587235D-02 |
| 78 | 0.10076465D+02 | 0.10074024D+02 | 0.24416049D-02 |
| 79 | 0.31509518D+02 | 0.31510299D+02 | -0.78079367D-03 |
| 80 | -0.25604104D+01 | -0.25597853D+01 | -0.62503886D-03 |
| 81 | 0.61949384D+01 | 0.61937218D+01 | 0.12165546D-02 |
| 82 | -0.57178051D+01 | -0.57200394D+01 | 0.22342911D-02 |
| 83 | -0.37930729D+01 | -0.37933343D+01 | 0.26143742D-03 |
| 84 | 0.11819272D+01 | 0.11846776D+01 | -0.27504201D-02 |
| 85 | 0.37712380D+01 | 0.37719844D+01 | -0.74640012D-03 |
| 86 | -0.86271576D+01 | -0.86260485D+01 | -0.11090982D-02 |
| 87 | 0.29655601D+01 | 0.29658632D+01 | -0.30304456D-03 |
| 88 | -0.43119955D+01 | -0.43130309D+01 | 0.10353937D-02 |
| 89 | 0.10319364D+02 | 0.10317735D+02 | 0.16290786D-02 |
| 90 | 0.65706725D+01 | 0.65718202D+01 | -0.11476245D-02 |

***** Initial Control Vector Estimate for Case Number 2 *****

| Element | G.L.B. | C.V. | L.U.B. | Delta C.V. |
|---|---|---|---|---|
| 1 | -0.25000000D+01 | 0.52514237D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 2 | -0.25000000D+01 | 0.10654470D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 3 | -0.25000000D+01 | -0.16324993D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 4 | -0.25000000D+01 | -0.10821833D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 5 | -0.25000000D+01 | 0.16853635D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 6 | -0.25000000D+01 | -0.62707371D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 7 | -0.25000000D+01 | -0.34970790D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 8 | -0.25000000D+01 | 0.33250749D-01 | 0.25000000D+01 | 0.00000000D+00 |
| 9 | -0.25000000D+01 | -0.39897633D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 10 | -0.25000000D+01 | 0.11151077D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 11 | -0.25000000D+01 | -0.62047988D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 12 | -0.25000000D+01 | 0.10884261D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 13 | -0.25000000D+01 | 0.50843394D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 14 | -0.25000000D+01 | 0.37141562D-01 | 0.25000000D+01 | 0.00000000D+00 |
| 15 | -0.25000000D+01 | -0.16568323D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 16 | -0.25000000D+01 | 0.26060474D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 17 | -0.25000000D+01 | 0.17213548D+01 | 0.25000000D+01 | 0.00000000D+00 |

| | | | | |
|---|---|---|---|---|
| 18 | -0.25000000D+01 | 0.12643167D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 19 | -0.25000000D+01 | -0.89182526D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 20 | -0.25000000D+01 | 0.53342646D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 21 | -0.25000000D+01 | -0.76506066D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 22 | -0.25000000D+01 | 0.10322240D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 23 | -0.25000000D+01 | -0.13116534D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 24 | -0.25000000D+01 | -0.15851357D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 25 | -0.25000000D+01 | 0.12661996D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 26 | -0.25000000D+01 | 0.11542239D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 27 | -0.25000000D+01 | 0.11097218D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 28 | -0.25000000D+01 | 0.13846745D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 29 | -0.25000000D+01 | 0.20903717D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 30 | -0.25000000D+01 | -0.11019039D+01 | 0.25000000D+01 | 0.00000000D+00 |

***** T-Matrix Output is Suppressed *****

***** Predicted Measurement Vector *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|
| 1 | 0.10103102D+02 | 0.10103102D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 2 | -0.14931111D+01 | -0.14931111D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 3 | 0.20085912D+01 | 0.20085912D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 4 | 0.19780642D+02 | 0.19780642D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 5 | -0.66669493D+01 | -0.66669493D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 6 | -0.98458102D+00 | -0.98458102D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 7 | -0.15767790D+01 | -0.15767790D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 8 | 0.11137274D+02 | 0.11137274D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 9 | 0.89017246D-01 | 0.89017246D-01 | 0.00000000D+00 | 0.10000000D+01 |
| 10 | 0.10696431D+02 | 0.10696431D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 11 | 0.12655324D+02 | 0.12655324D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 12 | -0.10418072D+02 | -0.10418072D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 13 | -0.21780155D+01 | -0.21780155D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 14 | -0.40642447D+01 | -0.40642447D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 15 | -0.19464792D+01 | -0.19464792D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 16 | 0.42969870D+01 | 0.42969870D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 17 | -0.82003725D+01 | -0.82003725D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 18 | -0.15849261D+02 | -0.15849261D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 19 | -0.68980267D+01 | -0.68980267D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 20 | 0.90509444D+01 | 0.90509444D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 21 | -0.10285179D+02 | -0.10285179D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 22 | 0.18947733D+02 | 0.18947733D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 23 | -0.56718279D+01 | -0.56718279D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 24 | 0.14949795D+02 | 0.14949795D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 25 | 0.12199872D+01 | 0.12199872D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 26 | -0.19580384D+01 | -0.19580384D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 27 | -0.15812464D+02 | -0.15812464D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 28 | 0.13408038D+02 | 0.13408038D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 29 | -0.57171648D+01 | -0.57171648D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 30 | 0.65553521D+01 | 0.65553521D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 31 | 0.11984460D+01 | 0.11984460D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 32 | 0.41049113D+01 | 0.41049113D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 33 | -0.45120871D+01 | -0.45120871D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 34 | -0.73335053D+01 | -0.73335053D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 35 | 0.55938702D+01 | 0.55938702D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 36 | 0.57718476D+01 | 0.57718476D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 37 | 0.62566531D+01 | 0.62566531D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 38 | -0.36837182D+01 | -0.36837182D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 39 | -0.65993453D+00 | -0.65993453D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 40 | 0.62197216D+01 | 0.62197216D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 41 | 0.83986184D+01 | 0.83986184D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 42 | -0.10200539D+02 | -0.10200539D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 43 | -0.82438433D+01 | -0.82438433D+01 | 0.00000000D+00 | 0.10000000D+01 |

| | | | | |
|---|---|---|---|---|
| 44 | 0.54771435D+01 | 0.54771435D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 45 | -0.94879613D+01 | -0.94879613D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 46 | -0.17651308D+01 | -0.17651308D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 47 | 0.13040716D+02 | 0.13040716D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 48 | -0.10674486D+02 | -0.10674486D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 49 | -0.36522650D+01 | -0.36522650D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 50 | 0.47958857D+01 | 0.47958857D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 51 | 0.66130432D+01 | 0.66130432D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 52 | 0.36281941D+01 | 0.36281941D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 53 | 0.12435527D+02 | 0.12435527D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 54 | -0.61849852D+01 | -0.61849852D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 55 | -0.11997359D+02 | -0.11997359D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 56 | 0.63235337D-01 | 0.63235337D-01 | 0.00000000D+00 | 0.10000000D+01 |
| 57 | 0.18977414D+01 | 0.18977414D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 58 | -0.16787637D+01 | -0.16787637D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 59 | 0.21314643D+02 | 0.21314643D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 60 | 0.16361959D+02 | 0.16361959D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 61 | -0.10599311D+02 | -0.10599311D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 62 | 0.11750094D+01 | 0.11750094D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 63 | -0.96800973D+01 | -0.96800973D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 64 | 0.11139557D+02 | 0.11139557D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 65 | -0.15543449D+02 | -0.15543449D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 66 | -0.62421679D+01 | -0.62421679D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 67 | -0.26618426D+01 | -0.26618426D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 68 | -0.30206798D+01 | -0.30206798D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 69 | -0.48546084D+01 | -0.48546084D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 70 | -0.88965933D+01 | -0.88965933D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 71 | 0.64799684D-01 | 0.64799684D-01 | 0.00000000D+00 | 0.10000000D+01 |
| 72 | -0.30426159D+01 | -0.30426159D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 73 | -0.14036280D+02 | -0.14036280D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 74 | 0.55782433D+01 | 0.55782433D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 75 | 0.15480107D+02 | 0.15480107D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 76 | 0.28119730D+01 | 0.28119730D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 77 | -0.63907507D+00 | -0.63907507D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 78 | 0.10076465D+02 | 0.10076465D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 79 | 0.31509518D+02 | 0.31509518D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 80 | -0.25604104D+01 | -0.25604104D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 81 | 0.61949384D+01 | 0.61949384D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 82 | -0.57178051D+01 | -0.57178051D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 83 | -0.37930729D+01 | -0.37930729D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 84 | 0.11819272D+01 | 0.11819272D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 85 | 0.37712380D+01 | 0.37712380D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 86 | -0.86271576D+01 | -0.86271576D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 87 | 0.29655601D+01 | 0.29655601D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 88 | -0.43119955D+01 | -0.43119955D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 89 | 0.10319364D+02 | 0.10319364D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 90 | 0.65706725D+01 | 0.65706725D+01 | 0.00000000D+00 | 0.10000000D+01 |

***** Initial Performance Index = 0.75043169D+04 *****

***** Initial Constraint Function Values for Case Number 2 *****

Equality Constraints

| Element | Value | Target | Value - Target |
|---|---|---|---|
| 1 | 0.11710413D+01 | 0.25000000D+01 | -0.13289587D+01 |
| 2 | -0.16325303D+00 | 0.00000000D+00 | -0.16325303D+00 |
| 3 | 0.25764561D+00 | 0.25000000D+01 | -0.22423544D+01 |
| 4 | 0.19403763D+00 | 0.00000000D+00 | 0.19403763D+00 |
| 5 | 0.20457658D+01 | 0.25000000D+01 | -0.45423420D+00 |
| 6 | 0.25666451D+01 | 0.00000000D+00 | 0.25666451D+01 |
| 7 | 0.47240694D+00 | 0.20000000D+01 | -0.15275931D+01 |

```
*****   Solve the NLPQLP Problem for Case Number   2   *****


------------------------------------------------------------------------
 START OF THE SEQUENTIAL QUADRATIC PROGRAMMING ALGORITHM
------------------------------------------------------------------------

 Parameters:
    N      =      30
    M      =       7
    ME     =       7
    MODE   =       0
    ACC    =   0.1000D-06
    ACCQP  =   0.1000D-11
    STPMIN =   0.0000D+00
    RHOB   =   0.1000D+03
    MAXFUN =      10
    MAXNM  =      10
    MAXIT  =     200
    IPRINT =       2

 Output in the following order:
    IT    - iteration number
    F     - objective function value
    SCV   - sum of constraint violations
    NA    - number of active constraints
    I     - number of line search iterations
    ALPHA - steplength parameter
    DELTA - additional variable to prevent inconsistency
    KKT   - Karush-Kuhn-Tucker optimality criterion

  IT         F           SCV      NA  I    ALPHA     DELTA     KKT
------------------------------------------------------------------------
   1  0.75043169D+04  0.85D+01    7  0  0.00D+00  0.00D+00  0.73D+05
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   2  0.45654644D+04  0.79D+01    7  2  0.10D+00  0.00D+00  0.26D+05
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   3  0.36876481D+04  0.73D+01    7  2  0.10D+00  0.00D+00  0.29D+05
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   4  0.26273094D+04  0.68D+01    7  2  0.10D+00  0.00D+00  0.20D+05
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   5  0.21375568D+04  0.65D+01    7  2  0.10D+00  0.00D+00  0.93D+04
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   6  0.21410954D+04  0.58D+01    7  2  0.10D+00  0.00D+00  0.79D+04
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   7  0.20770213D+04  0.55D+01    7  2  0.10D+00  0.00D+00  0.84D+04
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
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          *****   Completed CALL to NLPQLP   *****
 8  0.19479275D+04  0.51D+01    7  2  0.10D+00  0.00D+00  0.95D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 9  0.18882843D+04  0.46D+01    7  2  0.10D+00  0.00D+00  0.60D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
10  0.18722698D+04  0.41D+01    7  2  0.10D+00  0.00D+00  0.51D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
11  0.18690858D+04  0.39D+01    7  2  0.10D+00  0.00D+00  0.54D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
12  0.17710423D+04  0.34D+01    7  2  0.10D+00  0.00D+00  0.27D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
13  0.17607860D+04  0.33D+01    7  3  0.30D-01  0.00D+00  0.22D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
14  0.17872421D+04  0.29D+01    7  2  0.10D+00  0.00D+00  0.23D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
15  0.17680677D+04  0.28D+01    7  3  0.34D-01  0.00D+00  0.35D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
16  0.17369406D+04  0.27D+01    7  3  0.45D-01  0.00D+00  0.20D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
17  0.17372486D+04  0.26D+01    7  3  0.41D-01  0.00D+00  0.14D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
18  0.17980319D+04  0.22D+01    7  2  0.10D+00  0.00D+00  0.16D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
19  0.18468624D+04  0.19D+01    7  2  0.10D+00  0.00D+00  0.23D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
20  0.18274198D+04  0.18D+01    7  3  0.39D-01  0.00D+00  0.15D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
21  0.18744625D+04  0.15D+01    7  2  0.10D+00  0.00D+00  0.15D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
22  0.18663882D+04  0.13D+01    7  2  0.10D+00  0.00D+00  0.30D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
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          *****   Completed CALL to NLPQLP   *****
23  0.18113815D+04  0.12D+01    7  2  0.10D+00  0.00D+00  0.15D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
24  0.18128615D+04  0.98D+00    7  2  0.10D+00  0.00D+00  0.15D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
25  0.17936375D+04  0.85D+00    7  2  0.10D+00  0.00D+00  0.24D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
26  0.17543193D+04  0.90D+00    7  2  0.10D+00  0.00D+00  0.14D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
27  0.17129426D+04  0.74D+00    7  2  0.10D+00  0.00D+00  0.20D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
28  0.16491203D+04  0.65D+00    7  2  0.10D+00  0.00D+00  0.14D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
29  0.16016105D+04  0.56D+00    7  2  0.10D+00  0.00D+00  0.15D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
30  0.15806402D+04  0.53D+00    7  2  0.10D+00  0.00D+00  0.10D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
31  0.15479474D+04  0.54D+00    7  2  0.10D+00  0.00D+00  0.51D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
32  0.15355322D+04  0.53D+00    7  2  0.10D+00  0.00D+00  0.46D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
33  0.15261818D+04  0.56D+00    7  2  0.10D+00  0.00D+00  0.76D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
34  0.15253410D+04  0.59D+00    7  2  0.10D+00  0.00D+00  0.25D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
35  0.15231249D+04  0.58D+00    7  3  0.42D-01  0.00D+00  0.15D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
36  0.14745755D+04  0.77D-01    7  1  0.10D+01  0.00D+00  0.26D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
37  0.14727904D+04  0.66D-01    7  1  0.10D+01  0.00D+00  0.16D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
38  0.14669344D+04  0.73D-02    7  1  0.10D+01  0.00D+00  0.23D+01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
39  0.14658403D+04  0.21D-03    7  1  0.10D+01  0.00D+00  0.64D-01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
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40  0.14658153D+04  0.45D-04    7  1  0.10D+01  0.00D+00  0.12D-01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
41  0.14658123D+04  0.86D-05    7  1  0.10D+01  0.00D+00  0.16D-02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
42  0.14658120D+04  0.10D-05    7  1  0.10D+01  0.00D+00  0.20D-03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
43  0.14658119D+04  0.98D-07    7  1  0.10D+01  0.00D+00  0.79D-05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
44  0.14658119D+04  0.10D-07    7  1  0.10D+01  0.00D+00  0.27D-05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
45  0.14658119D+04  0.63D-09    7  1  0.10D+01  0.00D+00  0.92D-07


--- Final Convergence Analysis at Last Iterate ---

  Objective function value:      F(X)  =  0.14658119D+04
  Solution values:               X     =
     0.17303320D+01  0.57484171D+00 -0.26242236D+00  0.13576288D+01
    -0.45844296D+00 -0.18900751D+00 -0.32870199D+00 -0.13551772D+00
     0.36226960D+00 -0.15135970D+01  0.15817803D+01  0.29210890D+00
    -0.25018908D+00 -0.94219851D+00 -0.15711705D+00 -0.59169429D+00
    -0.17488019D+01  0.12104995D+00 -0.53901807D+00 -0.13922400D+01
    -0.70543672D+00  0.58178625D+00 -0.99257626D+00  0.81859535D+00
     0.10283498D+01  0.11792580D+01 -0.10668922D+01  0.72140701D+00
     0.12799554D+00 -0.12691783D+00
  Distances from lower bounds:   X-XL  =
     0.42303320D+01  0.30748417D+01  0.22375776D+01  0.38576288D+01
     0.20415570D+01  0.23109925D+01  0.21712980D+01  0.23644823D+01
     0.28622696D+01  0.98640304D+00  0.40817803D+01  0.27921089D+01
     0.22498109D+01  0.15578015D+01  0.23428830D+01  0.19083057D+01
     0.75119813D+00  0.26210500D+01  0.19609819D+01  0.11077600D+01
     0.17945633D+01  0.30817863D+01  0.15074237D+01  0.33185954D+01
     0.35283498D+01  0.36792580D+01  0.14331078D+01  0.32214070D+01
     0.26279955D+01  0.23730822D+01
  Distances from upper bounds:   XU-X  =
     0.76966797D+00  0.19251583D+01  0.27624224D+01  0.11423712D+01
     0.29584430D+01  0.26890075D+01  0.28287020D+01  0.26355177D+01
     0.21377304D+01  0.40135970D+01  0.91821972D+00  0.22078911D+01
     0.27501891D+01  0.34421985D+01  0.26571170D+01  0.30916943D+01
     0.42488019D+01  0.23789500D+01  0.30390181D+01  0.38922400D+01
     0.32054367D+01  0.19182137D+01  0.34925763D+01  0.16814046D+01
     0.14716502D+01  0.13207420D+01  0.35668922D+01  0.17785930D+01
     0.23720045D+01  0.26269178D+01
  Multipliers for lower bounds:  U     =
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00
  Multipliers for upper bounds:  U     =
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
```

```
   0.00000000D+00  0.00000000D+00
 Constraint values:            G(X)  =
   0.29013680D-10  0.24401356D-09 -0.16563551D-09 -0.19687613D-10
   0.16257973D-09  0.12605472D-11 -0.12489565D-10
 Multipliers for constraints:   U     =
  -0.13474253D+03 -0.38055172D+02 -0.19345381D+03  0.36780359D+02
  -0.16595434D+03  0.16444802D+02 -0.11522545D+03
 Number of function calls:      NFUNC =      85
 Number of gradient calls:      NGRAD =      45
 Number of calls of QP solver:  NQL   =      45


          *****   Completed CALL to NLPQLP   *****


      *****   Number of Function Evaluations  =   1435   *****


    *****   Solution Control Vector for Case Number   2   *****

Element     G.L.B.            C.V.              L.U.B.            Delta C.V.

   1    -0.25000000D+01    0.17303320D+01    0.25000000D+01    0.12051897D+01
   2    -0.25000000D+01    0.57484171D+00    0.25000000D+01   -0.49060532D+00
   3    -0.25000000D+01   -0.26242236D+00    0.25000000D+01    0.13700770D+01
   4    -0.25000000D+01    0.13576288D+01    0.25000000D+01    0.24398121D+01
   5    -0.25000000D+01   -0.45844296D+00    0.25000000D+01   -0.21438064D+01
   6    -0.25000000D+01   -0.18900751D+00    0.25000000D+01    0.43806620D+00
   7    -0.25000000D+01   -0.32870199D+00    0.25000000D+01    0.21005910D-01
   8    -0.25000000D+01   -0.13551772D+00    0.25000000D+01   -0.16876847D+00
   9    -0.25000000D+01    0.36226960D+00    0.25000000D+01    0.76124592D+00
  10    -0.25000000D+01   -0.15135970D+01    0.25000000D+01   -0.26287046D+01
  11    -0.25000000D+01    0.15817803D+01    0.25000000D+01    0.22022602D+01
  12    -0.25000000D+01    0.29210890D+00    0.25000000D+01   -0.79631721D+00
  13    -0.25000000D+01   -0.25018908D+00    0.25000000D+01   -0.75862302D+00
  14    -0.25000000D+01   -0.94219851D+00    0.25000000D+01   -0.97934007D+00
  15    -0.25000000D+01   -0.15711705D+00    0.25000000D+01    0.14997153D+01
  16    -0.25000000D+01   -0.59169429D+00    0.25000000D+01   -0.85229902D+00
  17    -0.25000000D+01   -0.17488019D+01    0.25000000D+01   -0.34701567D+01
  18    -0.25000000D+01    0.12104995D+00    0.25000000D+01   -0.11432668D+01
  19    -0.25000000D+01   -0.53901807D+00    0.25000000D+01    0.35280719D+00
  20    -0.25000000D+01   -0.13922400D+01    0.25000000D+01   -0.19256664D+01
  21    -0.25000000D+01   -0.70543672D+00    0.25000000D+01    0.59623946D-01
  22    -0.25000000D+01    0.58178625D+00    0.25000000D+01   -0.45043775D+00
  23    -0.25000000D+01   -0.99257626D+00    0.25000000D+01    0.31907712D+00
  24    -0.25000000D+01    0.81859535D+00    0.25000000D+01    0.24037311D+01
  25    -0.25000000D+01    0.10283498D+01    0.25000000D+01   -0.23784983D+00
  26    -0.25000000D+01    0.11792580D+01    0.25000000D+01    0.25034090D-01
  27    -0.25000000D+01   -0.10668922D+01    0.25000000D+01   -0.21766141D+01
  28    -0.25000000D+01    0.72140701D+00    0.25000000D+01   -0.66326754D+00
  29    -0.25000000D+01    0.12799554D+00    0.25000000D+01   -0.19623761D+01
  30    -0.25000000D+01   -0.12691783D+00    0.25000000D+01    0.97498603D+00


              *****   Predicted Measurement Vector   *****

Element     Z Vector          ZA Vector         Delta Z           Diag[W]

   1     0.65749484D+01    0.10103102D+02   -0.35281531D+01    0.10000000D+01
   2     0.33427418D+01   -0.14931111D+01    0.48358529D+01    0.10000000D+01
   3     0.22667347D+01    0.20085912D+01    0.25814356D+00    0.10000000D+01
   4     0.10855340D+01    0.19780642D+02   -0.18695108D+02    0.10000000D+01
   5    -0.27260341D+00   -0.66669493D+01    0.63943459D+01    0.10000000D+01
   6     0.19830053D+01   -0.98458102D+00    0.29675863D+01    0.10000000D+01
```

| | | | | |
|---|---|---|---|---|
| 7 | -0.55059198D+00 | -0.15767790D+01 | 0.10261871D+01 | 0.10000000D+01 |
| 8 | -0.25005901D+01 | 0.11137274D+02 | -0.13637864D+02 | 0.10000000D+01 |
| 9 | -0.11414329D+01 | 0.89017246D-01 | -0.12304501D+01 | 0.10000000D+01 |
| 10 | 0.26911130D+01 | 0.10696431D+02 | -0.80053183D+01 | 0.10000000D+01 |
| 11 | -0.22819376D+00 | 0.12655324D+02 | -0.12883518D+02 | 0.10000000D+01 |
| 12 | 0.38532599D+01 | -0.10418072D+02 | 0.14271332D+02 | 0.10000000D+01 |
| 13 | -0.53285690D+01 | -0.21780155D+01 | -0.31505535D+01 | 0.10000000D+01 |
| 14 | -0.45829557D+01 | -0.40642447D+01 | -0.51871106D+00 | 0.10000000D+01 |
| 15 | 0.31123840D+01 | -0.19464792D+01 | 0.50588632D+01 | 0.10000000D+01 |
| 16 | -0.16273414D+01 | 0.42969870D+01 | -0.59243284D+01 | 0.10000000D+01 |
| 17 | -0.16550407D+01 | -0.82003725D+01 | 0.65453318D+01 | 0.10000000D+01 |
| 18 | -0.37150855D+00 | -0.15849261D+02 | 0.15477753D+02 | 0.10000000D+01 |
| 19 | 0.77545899D+01 | -0.68980267D+01 | 0.14652617D+02 | 0.10000000D+01 |
| 20 | 0.58585427D+01 | 0.90509444D+01 | -0.31924018D+01 | 0.10000000D+01 |
| 21 | 0.82080583D+01 | -0.10285179D+02 | 0.18493237D+02 | 0.10000000D+01 |
| 22 | -0.60023098D+01 | 0.18947733D+02 | -0.24950043D+02 | 0.10000000D+01 |
| 23 | -0.54580673D+01 | -0.56718279D+01 | 0.21376056D+00 | 0.10000000D+01 |
| 24 | -0.78269925D+01 | 0.14949795D+02 | -0.22776787D+02 | 0.10000000D+01 |
| 25 | 0.30517074D+00 | 0.12199872D+01 | -0.91481644D+00 | 0.10000000D+01 |
| 26 | -0.23686159D+01 | -0.19580384D+01 | -0.41057752D+00 | 0.10000000D+01 |
| 27 | 0.21102986D+01 | -0.15812464D+02 | 0.17922762D+02 | 0.10000000D+01 |
| 28 | 0.50708501D+01 | 0.13408038D+02 | -0.83371877D+01 | 0.10000000D+01 |
| 29 | 0.25967137D+00 | -0.57171648D+01 | 0.59768361D+01 | 0.10000000D+01 |
| 30 | 0.21726582D+00 | 0.65553521D+01 | -0.63380862D+01 | 0.10000000D+01 |
| 31 | -0.20359367D+01 | 0.11984460D+01 | -0.32343827D+01 | 0.10000000D+01 |
| 32 | 0.14881908D+01 | 0.41049113D+01 | -0.26167205D+01 | 0.10000000D+01 |
| 33 | 0.21437046D+01 | -0.45120871D+01 | 0.66557917D+01 | 0.10000000D+01 |
| 34 | 0.55832569D+01 | -0.73335053D+01 | 0.12916762D+02 | 0.10000000D+01 |
| 35 | 0.37699552D+01 | 0.55938702D+01 | -0.18239150D+01 | 0.10000000D+01 |
| 36 | 0.35281199D+01 | 0.57718476D+01 | -0.22437276D+01 | 0.10000000D+01 |
| 37 | 0.97682640D+00 | 0.62566531D+01 | -0.52798267D+01 | 0.10000000D+01 |
| 38 | 0.32183944D+01 | -0.36837182D+01 | 0.69021126D+01 | 0.10000000D+01 |
| 39 | -0.74820903D+01 | -0.65993453D+00 | -0.68221558D+01 | 0.10000000D+01 |
| 40 | 0.14523360D+01 | 0.62197216D+01 | -0.47673856D+01 | 0.10000000D+01 |
| 41 | 0.11746123D+01 | 0.83986184D+01 | -0.72240061D+01 | 0.10000000D+01 |
| 42 | 0.43181552D+01 | -0.10200539D+02 | 0.14518694D+02 | 0.10000000D+01 |
| 43 | -0.55268380D+01 | -0.82438433D+01 | 0.27170053D+01 | 0.10000000D+01 |
| 44 | -0.23150399D+01 | 0.54771435D+01 | -0.77921834D+01 | 0.10000000D+01 |
| 45 | 0.20428229D+01 | -0.94879613D+01 | 0.11530784D+02 | 0.10000000D+01 |
| 46 | -0.12168506D+01 | -0.17651308D+01 | 0.54828016D+00 | 0.10000000D+01 |
| 47 | 0.71245224D+01 | 0.13040716D+02 | -0.59161939D+01 | 0.10000000D+01 |
| 48 | -0.41866866D+00 | -0.10674486D+02 | 0.10255817D+02 | 0.10000000D+01 |
| 49 | 0.45134605D+01 | -0.36522650D+01 | 0.81657255D+01 | 0.10000000D+01 |
| 50 | 0.12461249D+01 | 0.47958857D+01 | -0.35497607D+01 | 0.10000000D+01 |
| 51 | -0.21079960D+01 | 0.66130432D+01 | -0.87210392D+01 | 0.10000000D+01 |
| 52 | 0.34728054D+01 | 0.36281941D+01 | -0.15538869D+00 | 0.10000000D+01 |
| 53 | -0.21723228D+01 | 0.12435527D+02 | -0.14607849D+02 | 0.10000000D+01 |
| 54 | 0.95356508D+00 | -0.61849852D+01 | 0.71385503D+01 | 0.10000000D+01 |
| 55 | -0.57275840D+01 | -0.11997359D+02 | 0.62697747D+01 | 0.10000000D+01 |
| 56 | -0.27222092D+01 | 0.63235337D-01 | -0.27854446D+01 | 0.10000000D+01 |
| 57 | 0.59845553D+00 | 0.18977414D+01 | -0.12992859D+01 | 0.10000000D+01 |
| 58 | -0.25949935D+01 | -0.16787637D+01 | -0.91622981D+00 | 0.10000000D+01 |
| 59 | 0.41851648D-01 | 0.21314643D+02 | -0.21272792D+02 | 0.10000000D+01 |
| 60 | -0.76975293D+01 | 0.16361959D+02 | -0.24059488D+02 | 0.10000000D+01 |
| 61 | 0.26029795D+01 | -0.10599311D+02 | 0.13202291D+02 | 0.10000000D+01 |
| 62 | 0.49697052D+01 | 0.11750094D+01 | 0.37946958D+01 | 0.10000000D+01 |
| 63 | -0.79187336D+01 | -0.96800973D+01 | 0.17613636D+01 | 0.10000000D+01 |
| 64 | -0.20498766D+01 | 0.11139557D+02 | -0.13189434D+02 | 0.10000000D+01 |
| 65 | -0.11973051D+01 | -0.15543449D+02 | 0.14346144D+02 | 0.10000000D+01 |
| 66 | 0.10213946D+02 | -0.62421679D+01 | 0.16456114D+02 | 0.10000000D+01 |
| 67 | -0.61639301D+01 | -0.26618426D+01 | -0.35020875D+01 | 0.10000000D+01 |
| 68 | -0.29377365D+01 | -0.30206798D+01 | 0.82943244D-01 | 0.10000000D+01 |
| 69 | -0.35369182D+01 | -0.48546084D+01 | 0.13176902D+01 | 0.10000000D+01 |
| 70 | 0.53126128D+01 | -0.88965933D+01 | 0.14209206D+02 | 0.10000000D+01 |
| 71 | -0.29669218D+01 | 0.64799684D-01 | -0.30317215D+01 | 0.10000000D+01 |

| | | | | |
|---|---|---|---|---|
| 72 | 0.18773168D+01 | -0.30426159D+01 | 0.49199327D+01 | 0.10000000D+01 |
| 73 | 0.57232554D+01 | -0.14036280D+02 | 0.19759536D+02 | 0.10000000D+01 |
| 74 | -0.85003547D+01 | 0.55782433D+01 | -0.14078598D+02 | 0.10000000D+01 |
| 75 | 0.73657976D-01 | 0.15480107D+02 | -0.15406449D+02 | 0.10000000D+01 |
| 76 | -0.12188255D+01 | 0.28119730D+01 | -0.40307985D+01 | 0.10000000D+01 |
| 77 | 0.50301050D+01 | -0.63907507D+00 | 0.56691801D+01 | 0.10000000D+01 |
| 78 | 0.54134741D+01 | 0.10076465D+02 | -0.46629911D+01 | 0.10000000D+01 |
| 79 | -0.13062797D+01 | 0.31509518D+02 | -0.32815798D+02 | 0.10000000D+01 |
| 80 | 0.63189168D+00 | -0.25604104D+01 | 0.31923021D+01 | 0.10000000D+01 |
| 81 | 0.65797187D+00 | 0.61949384D+01 | -0.55369665D+01 | 0.10000000D+01 |
| 82 | 0.54162508D+01 | -0.57178051D+01 | 0.11134056D+02 | 0.10000000D+01 |
| 83 | -0.13336488D+01 | -0.37930729D+01 | 0.24594240D+01 | 0.10000000D+01 |
| 84 | -0.53609890D+00 | 0.11819272D+01 | -0.17180261D+01 | 0.10000000D+01 |
| 85 | -0.48630702D+01 | 0.37712380D+01 | -0.86343083D+01 | 0.10000000D+01 |
| 86 | 0.93095670D+00 | -0.86271576D+01 | 0.95581143D+01 | 0.10000000D+01 |
| 87 | 0.51172940D+01 | 0.29655601D+01 | 0.21517339D+01 | 0.10000000D+01 |
| 88 | 0.19547676D+01 | -0.43119955D+01 | 0.62667631D+01 | 0.10000000D+01 |
| 89 | 0.31609878D+01 | 0.10319364D+02 | -0.71583766D+01 | 0.10000000D+01 |
| 90 | 0.41062279D+01 | 0.65706725D+01 | -0.24644447D+01 | 0.10000000D+01 |

***** NLP Solution Performance Index = 0.14658119D+04 *****

***** Solution Constraint Function Values for Case Number 2 *****

Equality Constraints

| Element | Value | Target | Value - Target |
|---|---|---|---|
| 1 | 0.25000000D+01 | 0.25000000D+01 | -0.29013680D-10 |
| 2 | -0.24401356D-09 | 0.00000000D+00 | -0.24401356D-09 |
| 3 | 0.25000000D+01 | 0.25000000D+01 | 0.16563551D-09 |
| 4 | 0.19687613D-10 | 0.00000000D+00 | 0.19687613D-10 |
| 5 | 0.25000000D+01 | 0.25000000D+01 | -0.16257973D-09 |
| 6 | -0.12605472D-11 | 0.00000000D+00 | -0.12605472D-11 |
| 7 | 0.20000000D+01 | 0.20000000D+01 | 0.12489565D-10 |

***** NLP Special Control 30-Vector Output *****

CV =

0.173033203495072D+01, 0.574841712649786D+00, -0.262422362989096D+00,
0.135762884344890D+01, -0.458442957304255D+00, -0.189007507834546D+00,
-0.328701991351033D+00, -0.135517719209427D+00, 0.362269595093311D+00,
-0.151359696040217D+01, 0.158178028244977D+01, 0.292108899170331D+00,
-0.250189082225930D+00, -0.942198512375316D+00, -0.157117049399088D+00,
-0.591694285438984D+00, -0.174880187032799D+01, 0.121049950116131D+00,
-0.539018068098912D+00, -0.139223998492506D+01, -0.705436717681903D+00,
0.581786252070189D+00, -0.992576256052333D+00, 0.818595354380463D+00,
0.102834982240151D+01, 0.117925800934959D+01, -0.106689224929140D+01,
0.721407009328932D+00, 0.127995536202591D+00, -0.126917829127300D+00,

***** End Case Number 2 *****

**********

```
        ***************   Start Case Number   3   ***************

                        *****   INPUT DATA   *****

&CDATA
ALPHA   =   1.00000000000000     ,
ACC     =  1.0000000000000000E-007,
ACCQP   =  1.0000000000000000E-012,
CRAN1   =   1.50000000000000     ,
CRAN2   =   2.00000000000000     ,
CRAN3   =  0.500000000000000     ,
CRAN4   =   2.00000000000000     ,
CRAN5   =  2.0000000000000000E-003,
CRAN6   =  2.0000000000000000E-003,
CRAN7   =  0.100000000000000     ,
CRAN8   =  0.100000000000000     ,
CVOUT   =           1,
EPS     =  1.0000000000000000E-007,
GEQ     =   2.50000000000000     ,  0.0000000000000000E+000,   2.50000000000000
,  0.0000000000000000E+000,
   2.50000000000000     ,  0.0000000000000000E+000,   2.00000000000000     ,
50.0000000000000     ,
 48*0.0000000000000000E+000  ,
GMAX    = 15*3.00000000000000        , 41*1.50000000000000        ,
ICASE   =           3,
IDATA   =           0,
IN      =           5,
IOPT    =           1,
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 -0.840507447719574     , -6.751835346221924E-003,   1.67120158672333     ,  -
1.75663667917252     ,  0.874569654464722     ,
   1.66577649116516     ,  0.527676820755005     ,  0.123390674591064     ,  -
2.52018582820892     ,   2.30429667234421     ,
  -2.51517516374588     ,  0.381024003028870     , -4.273039102554321E-002,
0.671636104583740     , -0.748380005359650     ,
  -1.85003501176834     ,   1.94018262624741     ,  -2.51862961053848     ,
2.78128743171692     ,   1.75358563661575     ,
   2.41789764165878     ,   2.79192715883255     ,  -1.35925036668777     ,
2.95694297552109     ,  0.101885914802551     ,
 -0.817081928253174     ,  0.986517608165741     ,  -1.20991837978363     , -
0.843970060348511     ,  -2.14568102359772     ,
  -1.02484917640686     ,   1.70825171470642     ,   3.24429231882095     ,  -
1.96087008714676     ,  -1.31358367204666     ,
  0.104664742946625     ,   1.09889161586761     ,  -1.62986463308334     , -
0.112736105918884     ,  0.441414475440979     ,
 -0.937886893749237     ,   1.09138977527618     ,  0.214749038219452     ,  -
1.48581445217133     ,  -1.69512766599655     ,
   1.25505787134171     ,  -2.39397418498993     ,  0.616378664970398     , -
0.324830591678619     ,   1.29422819614410     ,
   1.05353504419327     , -0.381728827953339     ,   1.37954235076904     ,  -
2.38767039775848     ,  1.351130008697510E-002,
   1.22684466838837     ,   1.95065909624100     ,  7.977575063705444E-002,
4.593849182128906E-002, -5.809867382049561E-002,
  0.204166471958160     ,   1.57845777273178     ,   1.51407235860825     ,
0.474092900753021     , -0.862080514431000     ,
  0.984716773033142     ,   3.42165988683701     ,  -1.35951048135757     ,  -
2.02327781915665     ,  -1.76858341693878     ,
  -3.28402036428452     ,  3.312647342681885E-003,   1.81569629907608     ,
0.339741766452789     ,  -3.36517453193665     ,
   1.76745784282684     ,  0.565413594245911     ,  0.561350464820862     ,  -
3.07443737983704     ,   1.70243000984192     ,
  0.151906192302704     ,  -1.97849959135056     ,  1.437819004058838E-002,
2.10431826114655     ,  -1.82531249523163     ,
 -0.496222078800201     ,
WDT     = 90*1.00000000000000        ,
WDX     = 30*0.000000000000000E+000  ,
WX      = 30*0.000000000000000E+000  ,
WZ      = 90*1.00000000000000        ,
XL      = 30*-2.50000000000000       , 4*-2.00000000000000       ,
XL0     = 30*-2.30000000000000       ,
XU      = 30*2.50000000000000        , 4*2.00000000000000        ,
XU0     = 30*2.30000000000000        ,
X0      =  0.525142371654510     ,   1.06544703245163     ,  -1.63249933719635
,  -1.08218330144882     ,
   1.68536347150803     , -0.627073705196381     , -0.349707901477814     ,
3.325074911117554E-002, -0.398976325988770     ,
   1.11510765552521     , -0.620479881763458     ,   1.08842611312866     ,
0.508433938026428     ,  3.714156150817871E-002,
  -1.65683233737946     ,  0.260604739189148     ,   1.72135478258133     ,
1.26431673765182     , -0.891825258731842     ,
  0.533426463603973     , -0.765060663223267     ,   1.03222399950027     ,  -
1.31165337562561     ,  -1.58513569831848     ,
   1.26619964838028     ,   1.15422391891479     ,   1.10972183942795     ,
1.38467454910278     ,   2.09037166833878     ,
  -1.10190385580063     ,
```

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ZA      =   10.1031015556637     ,  -1.49311112375127     ,   2.00859116773819
,   19.7806418202464     ,
  -6.66694933560947     , -0.984581022045185     ,  -1.57677903081856     ,
11.1372744068072     ,  8.901724622828734E-002,
   10.6964312149369     ,   12.6553238561087     ,  -10.4180721917858     ,  -
2.17801549121238     ,  -4.06424468879685     ,
  -1.94647919370231     ,   4.29698698516557     ,  -8.20037251283600     ,  -
15.8492614842374     ,  -6.89802665039441     ,
   9.05094441903210     ,  -10.2851791741196     ,   18.9477331622120     ,  -
5.67182785974489     ,   14.9497947546899     ,
   1.21998717704465     ,  -1.95803840328898     ,  -15.8124635731407     ,
13.4080377900305     ,  -5.71716475083855     ,
   6.55535206722717     ,   1.19844599564803     ,   4.10491132049296     ,  -
4.51208707311713     ,  -7.33350531247251     ,
   5.59387024428836     ,   5.77184757041848     ,   6.25665309690135     ,  -
3.68371819166766     , -0.659934530002697     ,
   6.21972162468774     ,   8.39861842905735     ,  -10.2005385050841     ,  -
8.24384331201786     ,   5.47714353239403     ,
  -9.48796129777687     ,  -1.76513080861804     ,   13.0407163500420     ,  -
10.6744857626338     ,  -3.65226503129352     ,
   4.79588567827548     ,   6.61304322092141     ,   3.62819409978617     ,
12.4355266715870     ,  -6.18498522687470     ,
  -11.9973587047075     ,  6.323533737129947E-002,   1.89774138784780     ,  -
1.67876370645145     ,   21.3146432044124     ,
   16.3619586738246     ,  -10.5993111607977     ,   1.17500943851861     ,  -
9.68009726904937     ,   11.1395574861649     ,
  -15.5434487445720     ,  -6.24216787049048     ,  -2.66184264552074     ,  -
3.02067979162731     ,  -4.85460838280633     ,
  -8.89659327371903     ,  6.479968354098761E-002,  -3.04261589156117     ,  -
14.0362803053454     ,   5.57824331267648     ,
   15.4801070549716     ,   2.81197299280570     , -0.639075074950806     ,
10.0764651948843     ,   31.5095183393081     ,
  -2.56041038623617     ,   6.19493836409276     ,  -5.71780510606202     ,  -
3.79307287538332     ,   1.18192722434093     ,
   3.77123801904272     ,  -8.62715757895982     ,   2.96556011529116     ,  -
4.31199548703144     ,   10.3193644051495     ,
   6.57067253794001
/
```

*****  OUTPUT DATA  *****

*****  X0, ZA, and T are Randomly Defined  *****

| CRAN1 | CRAN2 | CRAN3 | CRAN4 |
|---|---|---|---|
| CRAN5 | CRAN6 | CRAN7 | CRAN8 |
| 0.15000000D+01 | 0.20000000D+01 | 0.50000000D+00 | 0.20000000D+01 |
| 0.20000000D-02 | 0.20000000D-02 | 0.10000000D+00 | 0.10000000D+00 |

*****  Control Vector During Previous Duty Cycle for Case Number  3  *****

| Element | G.L.B. | C.V. | L.U.B. |
|---|---|---|---|
| 1 | -0.23000000D+01 | 0.52514237D+00 | 0.23000000D+01 |
| 2 | -0.23000000D+01 | 0.10654470D+01 | 0.23000000D+01 |
| 3 | -0.23000000D+01 | -0.16324993D+01 | 0.23000000D+01 |
| 4 | -0.23000000D+01 | -0.10821833D+01 | 0.23000000D+01 |
| 5 | -0.23000000D+01 | 0.16853635D+01 | 0.23000000D+01 |
| 6 | -0.23000000D+01 | -0.62707371D+00 | 0.23000000D+01 |
| 7 | -0.23000000D+01 | -0.34970790D+00 | 0.23000000D+01 |
| 8 | -0.23000000D+01 | 0.33250749D-01 | 0.23000000D+01 |
| 9 | -0.23000000D+01 | -0.39897633D+00 | 0.23000000D+01 |

| | | | |
|---|---|---|---|
| 10 | -0.23000000D+01 | 0.11151077D+01 | 0.23000000D+01 |
| 11 | -0.23000000D+01 | -0.62047988D+00 | 0.23000000D+01 |
| 12 | -0.23000000D+01 | 0.10884261D+01 | 0.23000000D+01 |
| 13 | -0.23000000D+01 | 0.50843394D+00 | 0.23000000D+01 |
| 14 | -0.23000000D+01 | 0.37141562D-01 | 0.23000000D+01 |
| 15 | -0.23000000D+01 | -0.16568323D+01 | 0.23000000D+01 |
| 16 | -0.23000000D+01 | 0.26060474D+00 | 0.23000000D+01 |
| 17 | -0.23000000D+01 | 0.17213548D+01 | 0.23000000D+01 |
| 18 | -0.23000000D+01 | 0.12643167D+01 | 0.23000000D+01 |
| 19 | -0.23000000D+01 | -0.89182526D+00 | 0.23000000D+01 |
| 20 | -0.23000000D+01 | 0.53342646D+00 | 0.23000000D+01 |
| 21 | -0.23000000D+01 | -0.76506066D+00 | 0.23000000D+01 |
| 22 | -0.23000000D+01 | 0.10322240D+01 | 0.23000000D+01 |
| 23 | -0.23000000D+01 | -0.13116534D+01 | 0.23000000D+01 |
| 24 | -0.23000000D+01 | -0.15851357D+01 | 0.23000000D+01 |
| 25 | -0.23000000D+01 | 0.12661996D+01 | 0.23000000D+01 |
| 26 | -0.23000000D+01 | 0.11542239D+01 | 0.23000000D+01 |
| 27 | -0.23000000D+01 | 0.11097218D+01 | 0.23000000D+01 |
| 28 | -0.23000000D+01 | 0.13846745D+01 | 0.23000000D+01 |
| 29 | -0.23000000D+01 | 0.20903717D+01 | 0.23000000D+01 |
| 30 | -0.23000000D+01 | -0.11019039D+01 | 0.23000000D+01 |

***** Measurement Vectors from Previous Duty Cycle *****

| Element | Actual | Ideal | Delta |
|---|---|---|---|
| 1 | 0.10103102D+02 | 0.10104275D+02 | -0.11739089D-02 |
| 2 | -0.14931111D+01 | -0.14924095D+01 | -0.70162487D-03 |
| 3 | 0.20085912D+01 | 0.20091062D+01 | -0.51504469D-03 |
| 4 | 0.19780642D+02 | 0.19778241D+02 | 0.24008768D-02 |
| 5 | -0.66669493D+01 | -0.66651274D+01 | -0.18219316D-02 |
| 6 | -0.98458102D+00 | -0.98559824D+00 | 0.10172153D-02 |
| 7 | -0.15767790D+01 | -0.15788380D+01 | 0.20590177D-02 |
| 8 | 0.11137274D+02 | 0.11134954D+02 | 0.23208692D-02 |
| 9 | 0.89017246D-01 | 0.88879319D-01 | 0.13792706D-03 |
| 10 | 0.10696431D+02 | 0.10693933D+02 | 0.24983239D-02 |
| 11 | 0.12655324D+02 | 0.12654573D+02 | 0.75085998D-03 |
| 12 | -0.10418072D+02 | -0.10419233D+02 | 0.11609204D-02 |
| 13 | -0.21780155D+01 | -0.21776413D+01 | -0.37421465D-03 |
| 14 | -0.40642447D+01 | -0.40656395D+01 | 0.13947675D-02 |
| 15 | -0.19464792D+01 | -0.19496991D+01 | 0.32199035D-02 |
| 16 | 0.42969870D+01 | 0.42974533D+01 | -0.46632385D-03 |
| 17 | -0.82003725D+01 | -0.81998678D+01 | -0.50467467D-03 |
| 18 | -0.15849261D+02 | -0.15847900D+02 | -0.13614869D-02 |
| 19 | -0.68980267D+01 | -0.68975064D+01 | -0.52021170D-03 |
| 20 | 0.90509444D+01 | 0.90534421D+01 | -0.24976861D-02 |
| 21 | -0.10285179D+02 | -0.10284505D+02 | -0.67372823D-03 |
| 22 | 0.18947733D+02 | 0.18945459D+02 | 0.22739236D-02 |
| 23 | -0.56718279D+01 | -0.56694679D+01 | -0.23599300D-02 |
| 24 | 0.14949795D+02 | 0.14947791D+02 | 0.20038812D-02 |
| 25 | 0.12199872D+01 | 0.12219031D+01 | -0.19159384D-02 |
| 26 | -0.19580384D+01 | -0.19581031D+01 | 0.64691544D-04 |
| 27 | -0.15812464D+02 | -0.15808666D+02 | -0.37973917D-02 |
| 28 | 0.13408038D+02 | 0.13406054D+02 | 0.19835744D-02 |
| 29 | -0.57171648D+01 | -0.57166864D+01 | -0.47830105D-03 |
| 30 | 0.65553521D+01 | 0.65551029D+01 | 0.24921107D-03 |
| 31 | 0.11984460D+01 | 0.11976584D+01 | 0.78764153D-03 |
| 32 | 0.41049113D+01 | 0.41032964D+01 | 0.16149530D-02 |
| 33 | -0.45120871D+01 | -0.45112859D+01 | -0.80120182D-03 |
| 34 | -0.73335053D+01 | -0.73353247D+01 | 0.18193855D-02 |
| 35 | 0.55938702D+01 | 0.55907057D+01 | 0.31645451D-02 |
| 36 | 0.57718476D+01 | 0.57718665D+01 | -0.18908978D-04 |
| 37 | 0.62566531D+01 | 0.62546603D+01 | 0.19928141D-02 |
| 38 | -0.36837182D+01 | -0.36854161D+01 | 0.16978738D-02 |

| | | | |
|---|---|---|---|
| 39 | -0.65993453D+00 | -0.66239682D+00 | 0.24622853D-02 |
| 40 | 0.62197216D+01 | 0.62201300D+01 | -0.40833139D-03 |
| 41 | 0.83986184D+01 | 0.83976410D+01 | 0.97745967D-03 |
| 42 | -0.10200539D+02 | -0.10196727D+02 | -0.38112261D-02 |
| 43 | -0.82438433D+01 | -0.82422779D+01 | -0.15654478D-02 |
| 44 | 0.54771435D+01 | 0.54770325D+01 | 0.11099815D-03 |
| 45 | -0.94879613D+01 | -0.94905046D+01 | 0.25433128D-02 |
| 46 | -0.17651308D+01 | -0.17652076D+01 | 0.76744080D-04 |
| 47 | 0.13040716D+02 | 0.13040062D+02 | 0.65458679D-03 |
| 48 | -0.10674486D+02 | -0.10674158D+02 | -0.32801104D-03 |
| 49 | -0.36522650D+01 | -0.36529006D+01 | 0.63560677D-03 |
| 50 | 0.47958857D+01 | 0.47951361D+01 | 0.74956203D-03 |
| 51 | 0.66130432D+01 | 0.66095285D+01 | 0.35146902D-02 |
| 52 | 0.36281941D+01 | 0.36280430D+01 | 0.15105152D-03 |
| 53 | 0.12435527D+02 | 0.12434542D+02 | 0.98421431D-03 |
| 54 | -0.61849852D+01 | -0.61837043D+01 | -0.12808800D-02 |
| 55 | -0.11997359D+02 | -0.11996264D+02 | -0.10945754D-02 |
| 56 | 0.63235337D-01 | 0.64456403D-01 | -0.12210660D-02 |
| 57 | 0.18977414D+01 | 0.18955406D+01 | 0.22008123D-02 |
| 58 | -0.16787637D+01 | -0.16786796D+01 | -0.84141493D-04 |
| 59 | 0.21314643D+02 | 0.21314194D+02 | 0.44949913D-03 |
| 60 | 0.16361959D+02 | 0.16359496D+02 | 0.24625027D-02 |
| 61 | -0.10599311D+02 | -0.10597929D+02 | -0.13817616D-02 |
| 62 | 0.11750094D+01 | 0.11758778D+01 | -0.86836147D-03 |
| 63 | -0.96800973D+01 | -0.96792626D+01 | -0.83465552D-03 |
| 64 | 0.11139557D+02 | 0.11140365D+02 | -0.80754423D-03 |
| 65 | -0.15543449D+02 | -0.15543196D+02 | -0.25296474D-03 |
| 66 | -0.62421679D+01 | -0.62421539D+01 | -0.13951063D-04 |
| 67 | -0.26618426D+01 | -0.26582780D+01 | -0.35646253D-02 |
| 68 | -0.30206798D+01 | -0.30195918D+01 | -0.10880249D-02 |
| 69 | -0.48546084D+01 | -0.48578326D+01 | 0.32241783D-02 |
| 70 | -0.88965933D+01 | -0.88953844D+01 | -0.12088470D-02 |
| 71 | 0.64799684D-01 | 0.62645748D-01 | 0.21539359D-02 |
| 72 | -0.30426159D+01 | -0.30448372D+01 | 0.22213166D-02 |
| 73 | -0.14036280D+02 | -0.14032409D+02 | -0.38710032D-02 |
| 74 | 0.55782433D+01 | 0.55805536D+01 | -0.23103285D-02 |
| 75 | 0.15480107D+02 | 0.15480177D+02 | -0.70056200D-04 |
| 76 | 0.28119730D+01 | 0.28106797D+01 | 0.12933376D-02 |
| 77 | -0.63907507D+00 | -0.63661635D+00 | -0.24587235D-02 |
| 78 | 0.10076465D+02 | 0.10074024D+02 | 0.24416049D-02 |
| 79 | 0.31509518D+02 | 0.31510299D+02 | -0.78079367D-03 |
| 80 | -0.25604104D+01 | -0.25597853D+01 | -0.62503886D-03 |
| 81 | 0.61949384D+01 | 0.61937218D+01 | 0.12165546D-02 |
| 82 | -0.57178051D+01 | -0.57200394D+01 | 0.22342911D-02 |
| 83 | -0.37930729D+01 | -0.37933343D+01 | 0.26143742D-03 |
| 84 | 0.11819272D+01 | 0.11846776D+01 | -0.27504201D-02 |
| 85 | 0.37712380D+01 | 0.37719844D+01 | -0.74640012D-03 |
| 86 | -0.86271576D+01 | -0.86260485D+01 | -0.11090982D-02 |
| 87 | 0.29655601D+01 | 0.29658632D+01 | -0.30304456D-03 |
| 88 | -0.43119955D+01 | -0.43130309D+01 | 0.10353937D-02 |
| 89 | 0.10319364D+02 | 0.10317735D+02 | 0.16290786D-02 |
| 90 | 0.65706725D+01 | 0.65718202D+01 | -0.11476245D-02 |

***** Initial Control Vector Estimate for Case Number 3 *****

| Element | G.L.B. | C.V. | L.U.B. | Delta C.V. |
|---|---|---|---|---|
| 1 | -0.25000000D+01 | 0.52514237D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 2 | -0.25000000D+01 | 0.10654470D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 3 | -0.25000000D+01 | -0.16324993D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 4 | -0.25000000D+01 | -0.10821833D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 5 | -0.25000000D+01 | 0.16853635D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 6 | -0.25000000D+01 | -0.62707371D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 7 | -0.25000000D+01 | -0.34970790D+00 | 0.25000000D+01 | 0.00000000D+00 |

| | | | | |
|---|---|---|---|---|
| 8 | -0.25000000D+01 | 0.33250749D-01 | 0.25000000D+01 | 0.00000000D+00 |
| 9 | -0.25000000D+01 | -0.39897633D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 10 | -0.25000000D+01 | 0.11151077D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 11 | -0.25000000D+01 | -0.62047988D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 12 | -0.25000000D+01 | 0.10884261D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 13 | -0.25000000D+01 | 0.50843394D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 14 | -0.25000000D+01 | 0.37141562D-01 | 0.25000000D+01 | 0.00000000D+00 |
| 15 | -0.25000000D+01 | -0.16568323D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 16 | -0.25000000D+01 | 0.26060474D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 17 | -0.25000000D+01 | 0.17213548D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 18 | -0.25000000D+01 | 0.12643167D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 19 | -0.25000000D+01 | -0.89182526D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 20 | -0.25000000D+01 | 0.53342646D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 21 | -0.25000000D+01 | -0.76506066D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 22 | -0.25000000D+01 | 0.10322240D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 23 | -0.25000000D+01 | -0.13116534D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 24 | -0.25000000D+01 | -0.15851357D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 25 | -0.25000000D+01 | 0.12661996D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 26 | -0.25000000D+01 | 0.11542239D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 27 | -0.25000000D+01 | 0.11097218D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 28 | -0.25000000D+01 | 0.13846745D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 29 | -0.25000000D+01 | 0.20903717D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 30 | -0.25000000D+01 | -0.11019039D+01 | 0.25000000D+01 | 0.00000000D+00 |

***** T-Matrix Output is Suppressed *****

***** Predicted Measurement Vector *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|
| 1 | 0.10103102D+02 | 0.10103102D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 2 | -0.14931111D+01 | -0.14931111D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 3 | 0.20085912D+01 | 0.20085912D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 4 | 0.19780642D+02 | 0.19780642D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 5 | -0.66669493D+01 | -0.66669493D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 6 | -0.98458102D+00 | -0.98458102D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 7 | -0.15767790D+01 | -0.15767790D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 8 | 0.11137274D+02 | 0.11137274D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 9 | 0.89017246D-01 | 0.89017246D-01 | 0.00000000D+00 | 0.10000000D+01 |
| 10 | 0.10696431D+02 | 0.10696431D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 11 | 0.12655324D+02 | 0.12655324D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 12 | -0.10418072D+02 | -0.10418072D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 13 | -0.21780155D+01 | -0.21780155D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 14 | -0.40642447D+01 | -0.40642447D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 15 | -0.19464792D+01 | -0.19464792D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 16 | 0.42969870D+01 | 0.42969870D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 17 | -0.82003725D+01 | -0.82003725D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 18 | -0.15849261D+02 | -0.15849261D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 19 | -0.68980267D+01 | -0.68980267D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 20 | 0.90509444D+01 | 0.90509444D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 21 | -0.10285179D+02 | -0.10285179D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 22 | 0.18947733D+02 | 0.18947733D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 23 | -0.56718279D+01 | -0.56718279D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 24 | 0.14949795D+02 | 0.14949795D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 25 | 0.12199872D+01 | 0.12199872D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 26 | -0.19580384D+01 | -0.19580384D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 27 | -0.15812464D+02 | -0.15812464D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 28 | 0.13408038D+02 | 0.13408038D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 29 | -0.57171648D+01 | -0.57171648D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 30 | 0.65553521D+01 | 0.65553521D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 31 | 0.11984460D+01 | 0.11984460D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 32 | 0.41049113D+01 | 0.41049113D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 33 | -0.45120871D+01 | -0.45120871D+01 | 0.00000000D+00 | 0.10000000D+01 |

| | | | | |
|---|---|---|---|---|
| 34 | -0.73335053D+01 | -0.73335053D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 35 | 0.55938702D+01 | 0.55938702D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 36 | 0.57718476D+01 | 0.57718476D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 37 | 0.62566531D+01 | 0.62566531D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 38 | -0.36837182D+01 | -0.36837182D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 39 | -0.65993453D+00 | -0.65993453D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 40 | 0.62197216D+01 | 0.62197216D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 41 | 0.83986184D+01 | 0.83986184D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 42 | -0.10200539D+02 | -0.10200539D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 43 | -0.82438433D+01 | -0.82438433D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 44 | 0.54771435D+01 | 0.54771435D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 45 | -0.94879613D+01 | -0.94879613D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 46 | -0.17651308D+01 | -0.17651308D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 47 | 0.13040716D+02 | 0.13040716D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 48 | -0.10674486D+02 | -0.10674486D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 49 | -0.36522650D+01 | -0.36522650D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 50 | 0.47958857D+01 | 0.47958857D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 51 | 0.66130432D+01 | 0.66130432D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 52 | 0.36281941D+01 | 0.36281941D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 53 | 0.12435527D+02 | 0.12435527D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 54 | -0.61849852D+01 | -0.61849852D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 55 | -0.11997359D+02 | -0.11997359D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 56 | 0.63235337D-01 | 0.63235337D-01 | 0.00000000D+00 | 0.10000000D+01 |
| 57 | 0.18977414D+01 | 0.18977414D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 58 | -0.16787637D+01 | -0.16787637D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 59 | 0.21314643D+02 | 0.21314643D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 60 | 0.16361959D+02 | 0.16361959D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 61 | -0.10599311D+02 | -0.10599311D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 62 | 0.11750094D+01 | 0.11750094D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 63 | -0.96800973D+01 | -0.96800973D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 64 | 0.11139557D+02 | 0.11139557D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 65 | -0.15543449D+02 | -0.15543449D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 66 | -0.62421679D+01 | -0.62421679D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 67 | -0.26618426D+01 | -0.26618426D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 68 | -0.30206798D+01 | -0.30206798D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 69 | -0.48546084D+01 | -0.48546084D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 70 | -0.88965933D+01 | -0.88965933D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 71 | 0.64799684D-01 | 0.64799684D-01 | 0.00000000D+00 | 0.10000000D+01 |
| 72 | -0.30426159D+01 | -0.30426159D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 73 | -0.14036280D+02 | -0.14036280D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 74 | 0.55782433D+01 | 0.55782433D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 75 | 0.15480107D+02 | 0.15480107D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 76 | 0.28119730D+01 | 0.28119730D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 77 | -0.63907507D+00 | -0.63907507D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 78 | 0.10076465D+02 | 0.10076465D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 79 | 0.31509518D+02 | 0.31509518D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 80 | -0.25604104D+01 | -0.25604104D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 81 | 0.61949384D+01 | 0.61949384D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 82 | -0.57178051D+01 | -0.57178051D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 83 | -0.37930729D+01 | -0.37930729D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 84 | 0.11819272D+01 | 0.11819272D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 85 | 0.37712380D+01 | 0.37712380D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 86 | -0.86271576D+01 | -0.86271576D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 87 | 0.29655601D+01 | 0.29655601D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 88 | -0.43119955D+01 | -0.43119955D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 89 | 0.10319364D+02 | 0.10319364D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 90 | 0.65706725D+01 | 0.65706725D+01 | 0.00000000D+00 | 0.10000000D+01 |

***** Initial Performance Index = 0.75043169D+04 *****

***** Initial Constraint Function Values for Case Number 3 *****

Inequality Constraints

| Element | Value | L.U.B. | L.U.B. - Value |
|---|---|---|---|
| 1 | 0.11878350D+01 | 0.30000000D+01 | 0.18121650D+01 |
| 2 | 0.19586155D+01 | 0.30000000D+01 | 0.10413845D+01 |
| 3 | 0.17982412D+01 | 0.30000000D+01 | 0.12017588D+01 |
| 4 | 0.35128511D+00 | 0.30000000D+01 | 0.26487149D+01 |
| 5 | 0.11843341D+01 | 0.30000000D+01 | 0.18156659D+01 |
| 6 | 0.12528634D+01 | 0.30000000D+01 | 0.17471366D+01 |
| 7 | 0.50978875D+00 | 0.30000000D+01 | 0.24902113D+01 |
| 8 | 0.16772025D+01 | 0.30000000D+01 | 0.13227975D+01 |
| 9 | 0.21357807D+01 | 0.30000000D+01 | 0.86421932D+00 |
| 10 | 0.10391805D+01 | 0.30000000D+01 | 0.19608195D+01 |
| 11 | 0.12848363D+01 | 0.30000000D+01 | 0.17151637D+01 |
| 12 | 0.20574474D+01 | 0.30000000D+01 | 0.94255261D+00 |
| 13 | 0.17133285D+01 | 0.30000000D+01 | 0.12866715D+01 |
| 14 | 0.17744876D+01 | 0.30000000D+01 | 0.12255124D+01 |
| 15 | 0.23630163D+01 | 0.30000000D+01 | 0.63698375D+00 |
| 16 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 17 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 18 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 19 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 20 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 21 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 22 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 23 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 24 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 25 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 26 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 27 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 28 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 29 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 30 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 31 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 32 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 33 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 34 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 35 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 36 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 37 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 38 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 39 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 40 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 41 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 42 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 43 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 44 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 45 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |

***** Solve the NLPQLP Problem for Case Number 3 *****

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START OF THE SEQUENTIAL QUADRATIC PROGRAMMING ALGORITHM

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Parameters:

N = 30
M = 45
ME = 0
MODE = 0
ACC = 0.1000D-06

```
   ACCQP  =   0.1000D-11
   STPMIN =   0.0000D+00
   RHOB   =   0.1000D+03
   MAXFUN =      10
   MAXNM  =      10
   MAXIT  =     200
   IPRINT =       2

 Output in the following order:
   IT    - iteration number
   F     - objective function value
   SCV   - sum of constraint violations
   NA    - number of active constraints
   I     - number of line search iterations
   ALPHA - steplength parameter
   DELTA - additional variable to prevent inconsistency
   KKT   - Karush-Kuhn-Tucker optimality criterion


  IT         F          SCV      NA  I    ALPHA     DELTA     KKT
-------------------------------------------------------------------------
   1  0.75043169D+04  0.00D+00   45  0  0.00D+00  0.00D+00  0.69D+05
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   2  0.14306362D+04  0.11D+00   15  2  0.35D+00  0.00D+00  0.11D+05
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   3  0.72708845D+03  0.88D-01   26  2  0.23D+00  0.00D+00  0.73D+04
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   4  0.56203669D+03  0.79D-01   27  2  0.10D+00  0.00D+00  0.41D+04
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   5  0.53401554D+03  0.71D-01   28  2  0.10D+00  0.00D+00  0.27D+04
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   6  0.48072579D+03  0.64D-01   28  2  0.10D+00  0.00D+00  0.25D+04
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   7  0.40208601D+03  0.58D-01   30  2  0.10D+00  0.00D+00  0.23D+04
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   8  0.36307328D+03  0.52D-01   30  2  0.10D+00  0.00D+00  0.18D+04
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   9  0.30750028D+03  0.46D-01   30  2  0.11D+00  0.00D+00  0.18D+04
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
  10  0.26249788D+03  0.42D-01   30  2  0.10D+00  0.00D+00  0.12D+04
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
  11  0.24924213D+03  0.40D-01   30  3  0.36D-01  0.00D+00  0.91D+03
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
```

```
          *****   Completed CALL to NLPQLP   *****
12  0.24034947D+03  0.36D-01   30  2  0.10D+00  0.00D+00  0.12D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
13  0.21826715D+03  0.33D-01   30  2  0.10D+00  0.00D+00  0.83D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
14  0.20875901D+03  0.31D-01   30  3  0.37D-01  0.00D+00  0.73D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
15  0.19971999D+03  0.30D-01   30  3  0.33D-01  0.00D+00  0.80D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
16  0.18604850D+03  0.29D-01   30  3  0.49D-01  0.00D+00  0.87D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
17  0.17856052D+03  0.26D-01   30  2  0.10D+00  0.00D+00  0.55D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
18  0.15906577D+03  0.23D-01   30  2  0.13D+00  0.00D+00  0.34D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
19  0.15023988D+03  0.20D-01   30  2  0.10D+00  0.00D+00  0.47D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
20  0.14475430D+03  0.18D-01   30  2  0.10D+00  0.00D+00  0.31D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
21  0.14195042D+03  0.18D-01   30  3  0.28D-01  0.00D+00  0.28D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
22  0.13783495D+03  0.17D-01   30  3  0.49D-01  0.00D+00  0.23D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
23  0.12882220D+03  0.15D-01   30  2  0.12D+00  0.00D+00  0.30D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
24  0.12526764D+03  0.14D-01   30  3  0.30D-01  0.00D+00  0.18D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
25  0.12427305D+03  0.14D-01   30  3  0.19D-01  0.00D+00  0.15D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
26  0.12000890D+03  0.13D-01   30  2  0.11D+00  0.00D+00  0.14D+03
```

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          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
27  0.11179352D+03  0.10D-01   30  2  0.19D+00  0.00D+00  0.91D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
28  0.11074321D+03  0.99D-02   30  3  0.37D-01  0.00D+00  0.70D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
29  0.10844145D+03  0.88D-02   30  2  0.10D+00  0.00D+00  0.11D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
30  0.10523766D+03  0.79D-02   30  2  0.10D+00  0.00D+00  0.64D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
31  0.10311355D+03  0.69D-02   30  2  0.13D+00  0.00D+00  0.44D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
32  0.10081762D+03  0.57D-02   30  2  0.18D+00  0.00D+00  0.37D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
33  0.98633546D+02  0.48D-02   30  2  0.16D+00  0.00D+00  0.21D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
34  0.90721672D+02  0.69D-10    8  1  0.10D+01  0.00D+00  0.13D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
35  0.90672596D+02  0.68D-10    9  3  0.11D-01  0.00D+00  0.66D+00
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
36  0.90402213D+02  0.00D+00    7  1  0.10D+01  0.00D+00  0.31D-01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
37  0.90388804D+02  0.00D+00    7  1  0.10D+01  0.00D+00  0.19D-02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
38  0.90388385D+02  0.00D+00    7  1  0.10D+01  0.00D+00  0.66D-03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
39  0.90388162D+02  0.00D+00    7  1  0.10D+01  0.00D+00  0.11D-03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
40  0.90388118D+02  0.00D+00    7  1  0.10D+01  0.00D+00  0.58D-05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
41  0.90388115D+02  0.00D+00    7  1  0.10D+01  0.00D+00  0.56D-07


--- Final Convergence Analysis at Last Iterate ---

  Objective function value:      F(X)  =  0.90388115D+02
  Solution values:               X     =
    -0.16504152D+00 -0.18835080D+00 -0.13249934D+00 -0.11386398D-01
     0.18536347D+00  0.21608495D+00 -0.32575999D-01  0.20138834D+00
     0.20403620D-01  0.83337190D-01 -0.12050547D-02  0.41265113D-01
     0.34300886D-01  0.11594985D+00 -0.15683234D+00  0.27375593D-01
```

```
   0.22135478D+00  0.97870971D-01  0.70393312D-01 -0.26048663D-01
  -0.33947951D-01 -0.16411308D+00  0.18834662D+00 -0.85135698D-01
  -0.21516197D-01  0.28635459D-01  0.46076971D-01 -0.10196946D+00
   0.59037167D+00 -0.16749035D+00
Distances from lower bounds:   X-XL  =
   0.23349585D+01  0.23116492D+01  0.23675007D+01  0.24886136D+01
   0.26853635D+01  0.27160850D+01  0.24674240D+01  0.27013883D+01
   0.25204036D+01  0.25833372D+01  0.24987949D+01  0.25412651D+01
   0.25343009D+01  0.26159498D+01  0.23431677D+01  0.25273756D+01
   0.27213548D+01  0.25978710D+01  0.25703933D+01  0.24739513D+01
   0.24660520D+01  0.23358869D+01  0.26883466D+01  0.24148643D+01
   0.24784838D+01  0.25286355D+01  0.25460770D+01  0.23980305D+01
   0.30903717D+01  0.23325097D+01
Distances from upper bounds:   XU-X  =
   0.26650415D+01  0.26883508D+01  0.26324993D+01  0.25113864D+01
   0.23146365D+01  0.22839150D+01  0.25325760D+01  0.22986117D+01
   0.24795964D+01  0.24166628D+01  0.25012051D+01  0.24587349D+01
   0.24656991D+01  0.23840502D+01  0.26568323D+01  0.24726244D+01
   0.22786452D+01  0.24021290D+01  0.24296067D+01  0.25260487D+01
   0.25339480D+01  0.26641131D+01  0.23116534D+01  0.25851357D+01
   0.25215162D+01  0.24713645D+01  0.24539230D+01  0.26019695D+01
   0.19096283D+01  0.26674903D+01
Multipliers for lower bounds:  U     =
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00
Multipliers for upper bounds:  U     =
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00
Constraint values:             G(X)  =
   0.27495709D+01  0.28670123D+01  0.27153031D+01  0.27959940D+01
   0.29142014D+01  0.29587173D+01  0.28790830D+01  0.28407963D+01
   0.27579738D+01  0.29249417D+01  0.28324125D+01  0.27933057D+01
   0.29641819D+01  0.28881034D+01  0.23863293D+01  0.80981611D+00
   0.24620216D+00  0.00000000D+00  0.42920310D+00  0.00000000D+00
   0.65684134D+00  0.11828681D+01  0.13318624D+01  0.10806201D+01
   0.46822953D+00  0.88072517D+00  0.45283900D+00  0.10258669D+01
   0.14211917D+01  0.00000000D+00  0.12667709D+01  0.00000000D+00
   0.33355423D+00  0.53778143D+00  0.94052487D+00  0.76888729D+00
   0.30366292D+00  0.00000000D+00  0.00000000D+00  0.21228415D+00
   0.37441154D+00  0.43635513D+00  0.13355990D-01  0.00000000D+00
   0.56558649D+00
Multipliers for constraints:   U     =
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.37725637D+02  0.00000000D+00  0.56855447D+02
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.87373248D+02  0.00000000D+00  0.59041967D+02
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.41546774D+01  0.29732494D+02  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.23149085D+03
```

0.00000000D+00
Number of function calls: NFUNC = 84
Number of gradient calls: NGRAD = 41
Number of calls of QP solver: NQL = 41

***** Completed CALL to NLPQLP *****

***** Number of Function Evaluations = 1314 *****

***** Solution Control Vector for Case Number 3 *****

| Element | G.L.B. | C.V. | L.U.B. | Delta C.V. |
|---|---|---|---|---|
| 1 | -0.25000000D+01 | -0.16504152D+00 | 0.25000000D+01 | -0.69018389D+00 |
| 2 | -0.25000000D+01 | -0.18835080D+00 | 0.25000000D+01 | -0.12537978D+01 |
| 3 | -0.25000000D+01 | -0.13249934D+00 | 0.25000000D+01 | 0.15000000D+01 |
| 4 | -0.25000000D+01 | -0.11386398D-01 | 0.25000000D+01 | 0.10707969D+01 |
| 5 | -0.25000000D+01 | 0.18536347D+00 | 0.25000000D+01 | -0.15000000D+01 |
| 6 | -0.25000000D+01 | 0.21608495D+00 | 0.25000000D+01 | 0.84315866D+00 |
| 7 | -0.25000000D+01 | -0.32575999D-01 | 0.25000000D+01 | 0.31713190D+00 |
| 8 | -0.25000000D+01 | 0.20138834D+00 | 0.25000000D+01 | 0.16813759D+00 |
| 9 | -0.25000000D+01 | 0.20403620D-01 | 0.25000000D+01 | 0.41937995D+00 |
| 10 | -0.25000000D+01 | 0.83337190D-01 | 0.25000000D+01 | -0.10317705D+01 |
| 11 | -0.25000000D+01 | -0.12050547D-02 | 0.25000000D+01 | 0.61927483D+00 |
| 12 | -0.25000000D+01 | 0.41265113D-01 | 0.25000000D+01 | -0.10471610D+01 |
| 13 | -0.25000000D+01 | 0.34300886D-01 | 0.25000000D+01 | -0.47413305D+00 |
| 14 | -0.25000000D+01 | 0.11594985D+00 | 0.25000000D+01 | 0.78808286D-01 |
| 15 | -0.25000000D+01 | -0.15683234D+00 | 0.25000000D+01 | 0.15000000D+01 |
| 16 | -0.25000000D+01 | 0.27375593D-01 | 0.25000000D+01 | -0.23322915D+00 |
| 17 | -0.25000000D+01 | 0.22135478D+00 | 0.25000000D+01 | -0.15000000D+01 |
| 18 | -0.25000000D+01 | 0.97870971D-01 | 0.25000000D+01 | -0.11664458D+01 |
| 19 | -0.25000000D+01 | 0.70393312D-01 | 0.25000000D+01 | 0.96221857D+00 |
| 20 | -0.25000000D+01 | -0.26048663D-01 | 0.25000000D+01 | -0.55947513D+00 |
| 21 | -0.25000000D+01 | -0.33947951D-01 | 0.25000000D+01 | 0.73111271D+00 |
| 22 | -0.25000000D+01 | -0.16411308D+00 | 0.25000000D+01 | -0.11963371D+01 |
| 23 | -0.25000000D+01 | 0.18834662D+00 | 0.25000000D+01 | 0.15000000D+01 |
| 24 | -0.25000000D+01 | -0.85135698D-01 | 0.25000000D+01 | 0.15000000D+01 |
| 25 | -0.25000000D+01 | -0.21516197D-01 | 0.25000000D+01 | -0.12877158D+01 |
| 26 | -0.25000000D+01 | 0.28635459D-01 | 0.25000000D+01 | -0.11255885D+01 |
| 27 | -0.25000000D+01 | 0.46076971D-01 | 0.25000000D+01 | -0.10636449D+01 |
| 28 | -0.25000000D+01 | -0.10196946D+00 | 0.25000000D+01 | -0.14866440D+01 |
| 29 | -0.25000000D+01 | 0.59037167D+00 | 0.25000000D+01 | -0.15000000D+01 |
| 30 | -0.25000000D+01 | -0.16749035D+00 | 0.25000000D+01 | 0.93441351D+00 |

***** Predicted Measurement Vector *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|
| 1 | 0.46631688D+00 | 0.10103102D+02 | -0.96367847D+01 | 0.10000000D+01 |
| 2 | 0.10274699D+01 | -0.14931111D+01 | 0.25205810D+01 | 0.10000000D+01 |
| 3 | 0.18178667D+01 | 0.20085912D+01 | -0.19072443D+00 | 0.10000000D+01 |
| 4 | 0.77602563D+00 | 0.19780642D+02 | -0.19004616D+02 | 0.10000000D+01 |
| 5 | 0.63361051D+00 | -0.66669493D+01 | 0.73005598D+01 | 0.10000000D+01 |
| 6 | -0.69788965D+00 | -0.98458102D+00 | 0.28669138D+00 | 0.10000000D+01 |
| 7 | 0.98309359D-01 | -0.15767790D+01 | 0.16750884D+01 | 0.10000000D+01 |
| 8 | 0.15034100D+01 | 0.11137274D+02 | -0.96338644D+01 | 0.10000000D+01 |
| 9 | 0.61073512D+00 | 0.89017246D-01 | 0.52171787D+00 | 0.10000000D+01 |
| 10 | 0.12751120D+00 | 0.10696431D+02 | -0.10568920D+02 | 0.10000000D+01 |
| 11 | 0.10457952D+01 | 0.12655324D+02 | -0.11609529D+02 | 0.10000000D+01 |
| 12 | -0.26902739D+00 | -0.10418072D+02 | 0.10149045D+02 | 0.10000000D+01 |

| | | | | |
|---|---|---|---|---|
| 13 | 0.37399090D+00 | -0.21780155D+01 | 0.25520064D+01 | 0.10000000D+01 |
| 14 | 0.52174569D+00 | -0.40642447D+01 | 0.45859904D+01 | 0.10000000D+01 |
| 15 | -0.10975977D+01 | -0.19464792D+01 | 0.84888147D+00 | 0.10000000D+01 |
| 16 | 0.10170112D+01 | 0.42969870D+01 | -0.32799758D+01 | 0.10000000D+01 |
| 17 | 0.69411516D+00 | -0.82003725D+01 | 0.88944877D+01 | 0.10000000D+01 |
| 18 | -0.97725603D+00 | -0.15849261D+02 | 0.14872005D+02 | 0.10000000D+01 |
| 19 | 0.12961921D+01 | -0.68980267D+01 | 0.81942187D+01 | 0.10000000D+01 |
| 20 | 0.12920104D+00 | 0.90509444D+01 | -0.89217434D+01 | 0.10000000D+01 |
| 21 | 0.11657265D+00 | -0.10285179D+02 | 0.10401752D+02 | 0.10000000D+01 |
| 22 | 0.13973558D+01 | 0.18947733D+02 | -0.17550377D+02 | 0.10000000D+01 |
| 23 | 0.13454034D+00 | -0.56718279D+01 | 0.58063682D+01 | 0.10000000D+01 |
| 24 | 0.18286661D+01 | 0.14949795D+02 | -0.13121129D+02 | 0.10000000D+01 |
| 25 | 0.13646376D+00 | 0.12199872D+01 | -0.10835234D+01 | 0.10000000D+01 |
| 26 | -0.64421948D+00 | -0.19580384D+01 | 0.13138189D+01 | 0.10000000D+01 |
| 27 | -0.24032800D+00 | -0.15812464D+02 | 0.15572136D+02 | 0.10000000D+01 |
| 28 | 0.61149244D+00 | 0.13408038D+02 | -0.12796545D+02 | 0.10000000D+01 |
| 29 | -0.22857165D+00 | -0.57171648D+01 | 0.54885931D+01 | 0.10000000D+01 |
| 30 | 0.17387203D+01 | 0.65553521D+01 | -0.48166317D+01 | 0.10000000D+01 |
| 31 | 0.12510278D+01 | 0.11984460D+01 | 0.52581790D-01 | 0.10000000D+01 |
| 32 | -0.39943065D+00 | 0.41049113D+01 | -0.45043420D+01 | 0.10000000D+01 |
| 33 | -0.24133932D+00 | -0.45120871D+01 | 0.42707478D+01 | 0.10000000D+01 |
| 34 | -0.12432094D+01 | -0.73335053D+01 | 0.60902960D+01 | 0.10000000D+01 |
| 35 | -0.15539117D+01 | 0.55938702D+01 | -0.71477819D+01 | 0.10000000D+01 |
| 36 | -0.10567808D+00 | 0.57718476D+01 | -0.58775257D+01 | 0.10000000D+01 |
| 37 | 0.87480731D-01 | 0.62566531D+01 | -0.61691724D+01 | 0.10000000D+01 |
| 38 | -0.54392218D+00 | -0.36837182D+01 | 0.31397960D+01 | 0.10000000D+01 |
| 39 | 0.78773611D+00 | -0.65993453D+00 | 0.14476706D+01 | 0.10000000D+01 |
| 40 | -0.30149321D+00 | 0.62197216D+01 | -0.65212148D+01 | 0.10000000D+01 |
| 41 | 0.13399418D+01 | 0.83986184D+01 | -0.70586767D+01 | 0.10000000D+01 |
| 42 | -0.12477494D+01 | -0.10200539D+02 | 0.89527891D+01 | 0.10000000D+01 |
| 43 | -0.19107281D+01 | -0.82438433D+01 | 0.63331152D+01 | 0.10000000D+01 |
| 44 | -0.29867725D+00 | 0.54771435D+01 | -0.57758208D+01 | 0.10000000D+01 |
| 45 | -0.65131124D+00 | -0.94879613D+01 | 0.88366501D+01 | 0.10000000D+01 |
| 46 | -0.22564937D+00 | -0.17651308D+01 | 0.15394814D+01 | 0.10000000D+01 |
| 47 | 0.18523754D+01 | 0.13040716D+02 | -0.11188341D+02 | 0.10000000D+01 |
| 48 | -0.14694706D+01 | -0.10674486D+02 | 0.92050152D+01 | 0.10000000D+01 |
| 49 | 0.99833217D-01 | -0.36522650D+01 | 0.37520982D+01 | 0.10000000D+01 |
| 50 | -0.45014998D+00 | 0.47958857D+01 | -0.52460357D+01 | 0.10000000D+01 |
| 51 | -0.63986630D-01 | 0.66130432D+01 | -0.66770299D+01 | 0.10000000D+01 |
| 52 | 0.27354862D+00 | 0.36281941D+01 | -0.33546455D+01 | 0.10000000D+01 |
| 53 | 0.10017484D+01 | 0.12435527D+02 | -0.11433778D+02 | 0.10000000D+01 |
| 54 | -0.90252536D+00 | -0.61849852D+01 | 0.52824599D+01 | 0.10000000D+01 |
| 55 | -0.61493659D+00 | -0.11997359D+02 | 0.11382422D+02 | 0.10000000D+01 |
| 56 | -0.12896291D+01 | 0.63235337D-01 | -0.13528645D+01 | 0.10000000D+01 |
| 57 | 0.57795357D+00 | 0.18977414D+01 | -0.13197878D+01 | 0.10000000D+01 |
| 58 | 0.25580620D+01 | -0.16787637D+01 | 0.42368257D+01 | 0.10000000D+01 |
| 59 | 0.13190970D+01 | 0.21314643D+02 | -0.19995546D+02 | 0.10000000D+01 |
| 60 | 0.22238598D+01 | 0.16361959D+02 | -0.14138099D+02 | 0.10000000D+01 |
| 61 | -0.13893418D+01 | -0.10599311D+02 | 0.92099694D+01 | 0.10000000D+01 |
| 62 | -0.13062631D+01 | 0.11750094D+01 | -0.24812725D+01 | 0.10000000D+01 |
| 63 | -0.12483842D+01 | -0.96800973D+01 | 0.84317130D+01 | 0.10000000D+01 |
| 64 | 0.17045804D+01 | 0.11139557D+02 | -0.94349771D+01 | 0.10000000D+01 |
| 65 | 0.68403382D+00 | -0.15543449D+02 | 0.16227483D+02 | 0.10000000D+01 |
| 66 | -0.24091341D+00 | -0.62421679D+01 | 0.60012545D+01 | 0.10000000D+01 |
| 67 | -0.12042756D+01 | -0.26618426D+01 | 0.14575670D+01 | 0.10000000D+01 |
| 68 | 0.57926259D-01 | -0.30206798D+01 | 0.30786061D+01 | 0.10000000D+01 |
| 69 | -0.39202530D+00 | -0.48546084D+01 | 0.44625831D+01 | 0.10000000D+01 |
| 70 | 0.51443116D+00 | -0.88965933D+01 | 0.94110244D+01 | 0.10000000D+01 |
| 71 | -0.46876464D+00 | 0.64799684D-01 | -0.53356432D+00 | 0.10000000D+01 |
| 72 | -0.27487240D+00 | -0.30426159D+01 | 0.27677435D+01 | 0.10000000D+01 |
| 73 | -0.14722939D+01 | -0.14036280D+02 | 0.12563986D+02 | 0.10000000D+01 |
| 74 | 0.42658809D+00 | 0.55782433D+01 | -0.51516552D+01 | 0.10000000D+01 |
| 75 | 0.13017732D+01 | 0.15480107D+02 | -0.14178334D+02 | 0.10000000D+01 |
| 76 | 0.17416794D+00 | 0.28119730D+01 | -0.26378051D+01 | 0.10000000D+01 |
| 77 | 0.23573645D+00 | -0.63907507D+00 | 0.87481153D+00 | 0.10000000D+01 |

| | | | | |
|---|---|---|---|---|
| 78 | 0.10171855D+01 | 0.10076465D+02 | -0.90592797D+01 | 0.10000000D+01 |
| 79 | 0.12542623D+01 | 0.31509518D+02 | -0.30255256D+02 | 0.10000000D+01 |
| 80 | 0.15636666D+01 | -0.25604104D+01 | 0.41240770D+01 | 0.10000000D+01 |
| 81 | 0.59896540D+00 | 0.61949384D+01 | -0.55959730D+01 | 0.10000000D+01 |
| 82 | -0.93238893D+00 | -0.57178051D+01 | 0.47854162D+01 | 0.10000000D+01 |
| 83 | -0.22201103D+00 | -0.37930729D+01 | 0.35710618D+01 | 0.10000000D+01 |
| 84 | 0.11929122D+01 | 0.11819272D+01 | 0.10984931D-01 | 0.10000000D+01 |
| 85 | 0.56129137D+00 | 0.37712380D+01 | -0.32099467D+01 | 0.10000000D+01 |
| 86 | -0.13471119D+01 | -0.86271576D+01 | 0.72800456D+01 | 0.10000000D+01 |
| 87 | -0.39932371D+00 | 0.29655601D+01 | -0.33648838D+01 | 0.10000000D+01 |
| 88 | -0.15595206D+01 | -0.43119955D+01 | 0.27524749D+01 | 0.10000000D+01 |
| 89 | 0.58735614D+00 | 0.10319364D+02 | -0.97320083D+01 | 0.10000000D+01 |
| 90 | 0.23552103D+00 | 0.65706725D+01 | -0.63351515D+01 | 0.10000000D+01 |

***** NLP Solution Performance Index = 0.90388115D+02 *****

***** Solution Constraint Function Values for Case Number 3 *****

Inequality Constraints

| Element | Value | L.U.B. | L.U.B. - Value |
|---|---|---|---|
| 1 | 0.25042909D+00 | 0.30000000D+01 | 0.27495709D+01 |
| 2 | 0.13298769D+00 | 0.30000000D+01 | 0.28670123D+01 |
| 3 | 0.28469690D+00 | 0.30000000D+01 | 0.27153031D+01 |
| 4 | 0.20400603D+00 | 0.30000000D+01 | 0.27959940D+01 |
| 5 | 0.85798572D-01 | 0.30000000D+01 | 0.29142014D+01 |
| 6 | 0.41282705D-01 | 0.30000000D+01 | 0.29587173D+01 |
| 7 | 0.12091699D+00 | 0.30000000D+01 | 0.28790830D+01 |
| 8 | 0.15920366D+00 | 0.30000000D+01 | 0.28407963D+01 |
| 9 | 0.24202617D+00 | 0.30000000D+01 | 0.27579738D+01 |
| 10 | 0.75058319D-01 | 0.30000000D+01 | 0.29249417D+01 |
| 11 | 0.16758749D+00 | 0.30000000D+01 | 0.28324125D+01 |
| 12 | 0.20669431D+00 | 0.30000000D+01 | 0.27933057D+01 |
| 13 | 0.35818099D-01 | 0.30000000D+01 | 0.29641819D+01 |
| 14 | 0.11189664D+00 | 0.30000000D+01 | 0.28881034D+01 |
| 15 | 0.61367070D+00 | 0.30000000D+01 | 0.23863293D+01 |
| 16 | 0.69018389D+00 | 0.15000000D+01 | 0.80981611D+00 |
| 17 | 0.12537978D+01 | 0.15000000D+01 | 0.24620216D+00 |
| 18 | 0.15000000D+01 | 0.15000000D+01 | 0.00000000D+00 |
| 19 | 0.10707969D+01 | 0.15000000D+01 | 0.42920310D+00 |
| 20 | 0.15000000D+01 | 0.15000000D+01 | 0.00000000D+00 |
| 21 | 0.84315866D+00 | 0.15000000D+01 | 0.65684134D+00 |
| 22 | 0.31713190D+00 | 0.15000000D+01 | 0.11828681D+01 |
| 23 | 0.16813759D+00 | 0.15000000D+01 | 0.13318624D+01 |
| 24 | 0.41937995D+00 | 0.15000000D+01 | 0.10806201D+01 |
| 25 | 0.10317705D+01 | 0.15000000D+01 | 0.46822953D+00 |
| 26 | 0.61927483D+00 | 0.15000000D+01 | 0.88072517D+00 |
| 27 | 0.10471610D+01 | 0.15000000D+01 | 0.45283900D+00 |
| 28 | 0.47413305D+00 | 0.15000000D+01 | 0.10258669D+01 |
| 29 | 0.78808286D-01 | 0.15000000D+01 | 0.14211917D+01 |
| 30 | 0.15000000D+01 | 0.15000000D+01 | 0.00000000D+00 |
| 31 | 0.23322915D+00 | 0.15000000D+01 | 0.12667709D+01 |
| 32 | 0.15000000D+01 | 0.15000000D+01 | 0.00000000D+00 |
| 33 | 0.11664458D+01 | 0.15000000D+01 | 0.33355423D+00 |
| 34 | 0.96221857D+00 | 0.15000000D+01 | 0.53778143D+00 |
| 35 | 0.55947513D+00 | 0.15000000D+01 | 0.94052487D+00 |
| 36 | 0.73111271D+00 | 0.15000000D+01 | 0.76888729D+00 |
| 37 | 0.11963371D+01 | 0.15000000D+01 | 0.30366292D+00 |
| 38 | 0.15000000D+01 | 0.15000000D+01 | 0.00000000D+00 |
| 39 | 0.15000000D+01 | 0.15000000D+01 | 0.00000000D+00 |
| 40 | 0.12877158D+01 | 0.15000000D+01 | 0.21228415D+00 |
| 41 | 0.11255885D+01 | 0.15000000D+01 | 0.37441154D+00 |

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    42         0.10636449D+01      0.15000000D+01      0.43635513D+00
    43         0.14866440D+01      0.15000000D+01      0.13355990D-01
    44         0.15000000D+01      0.15000000D+01      0.00000000D+00
    45         0.93441351D+00      0.15000000D+01      0.56558649D+00

               *****   NLP Special Control 30-Vector Output   *****

 CV =
     -0.165041522040110D+00,  -0.188350803605022D+00,  -0.132499337196350D+00,
     -0.113863978131065D-01,   0.185363471508026D+00,   0.216084953115406D+00,
     -0.325759991752352D-01,   0.201388342605766D+00,   0.204036199628215D-01,
      0.833371896625835D-01,  -0.120505473431415D-02,   0.412651134147717D-01,
      0.343008858071222D-01,   0.115949847922097D+00,  -0.156832337379456D+00,
      0.273755932429157D-01,   0.221354782581329D+00,   0.978709707574077D-01,
      0.703933123858925D-01,  -0.260486631641259D-01,  -0.339479511568655D-01,
     -0.164113077815971D+00,   0.188346624374390D+00,  -0.851356983184813D-01,
     -0.215161973896874D-01,   0.286354586494533D-01,   0.460769712035327D-01,
     -0.101969460944807D+00,   0.590371668338776D+00,  -0.167490349666103D+00,

                *****   End Case Number   3   *****



********************************************************************************


        ***************   Start Case Number   4   ***************

                        *****   INPUT DATA   *****

 &CDATA
 ALPHA   =   1.00000000000000     ,
 ACC     =  1.0000000000000000E-007,
 ACCQP   =  1.0000000000000000E-012,
 CRAN1   =   1.50000000000000     ,
 CRAN2   =   2.00000000000000     ,
 CRAN3   =  0.500000000000000     ,
 CRAN4   =   2.00000000000000     ,
 CRAN5   =  2.0000000000000000E-003,
 CRAN6   =  2.0000000000000000E-003,
 CRAN7   =  0.100000000000000     ,
 CRAN8   =  0.100000000000000     ,
 CVOUT   =           1,
 EPS     =  1.0000000000000000E-007,
 GEQ     =   2.50000000000000     ,  0.000000000000000E+000,   2.50000000000000
 ,  0.000000000000000E+000,
    2.50000000000000     ,  0.000000000000000E+000,   2.00000000000000     ,
 50.0000000000000     ,
  48*0.000000000000000E+000  ,
 GMAX    = 15*3.00000000000000        , 41*1.50000000000000        ,
 ICASE   =           4,
 IDATA   =           0,
 IN      =           5,
 IOPT    =           1,
 IOUT    =           6,
 IPRINT  =           2,
 ISEED1  =    78985723,
 ISEED2  =    95428381,
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ISEED3  =    72919329,
ISEED4  =    63237395,
ITOUT   =           0,
JSEED1  =    81692875,
JSEED2  =    68377297,
JSEED3  =    89672847,
JSEED4  =    98351973,
L       =           1,
LQL     = F,
MAXFUN  =          10,
MAXIT   =         200,
MAXNM   =          10,
ME      =           7,
MG      =          52,
MODE    =           0,
MULT    =           0,
RHOB    =   100.000000000000     ,
STPMIN  =  0.000000000000000E+000,
T       =  3.478878736495972E-002,  0.836017310619354     , -0.115114569664001
,   3.17600607872009     ,
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   6.57067253794001
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*****  OUTPUT DATA  *****

*****  X0, ZA, and T are Randomly Defined  *****

| CRAN1 | CRAN2 | CRAN3 | CRAN4 |
|---|---|---|---|
| CRAN5 | CRAN6 | CRAN7 | CRAN8 |
| 0.15000000D+01 | 0.20000000D+01 | 0.50000000D+00 | 0.20000000D+01 |
| 0.20000000D-02 | 0.20000000D-02 | 0.10000000D+00 | 0.10000000D+00 |

*****  Control Vector During Previous Duty Cycle for Case Number  4  *****

| Element | G.L.B. | C.V. | L.U.B. |
|---|---|---|---|
| 1 | -0.23000000D+01 | 0.52514237D+00 | 0.23000000D+01 |
| 2 | -0.23000000D+01 | 0.10654470D+01 | 0.23000000D+01 |
| 3 | -0.23000000D+01 | -0.16324993D+01 | 0.23000000D+01 |
| 4 | -0.23000000D+01 | -0.10821833D+01 | 0.23000000D+01 |
| 5 | -0.23000000D+01 | 0.16853635D+01 | 0.23000000D+01 |
| 6 | -0.23000000D+01 | -0.62707371D+00 | 0.23000000D+01 |
| 7 | -0.23000000D+01 | -0.34970790D+00 | 0.23000000D+01 |
| 8 | -0.23000000D+01 | 0.33250749D-01 | 0.23000000D+01 |
| 9 | -0.23000000D+01 | -0.39897633D+00 | 0.23000000D+01 |
| 10 | -0.23000000D+01 | 0.11151077D+01 | 0.23000000D+01 |
| 11 | -0.23000000D+01 | -0.62047988D+00 | 0.23000000D+01 |
| 12 | -0.23000000D+01 | 0.10884261D+01 | 0.23000000D+01 |
| 13 | -0.23000000D+01 | 0.50843394D+00 | 0.23000000D+01 |
| 14 | -0.23000000D+01 | 0.37141562D-01 | 0.23000000D+01 |
| 15 | -0.23000000D+01 | -0.16568323D+01 | 0.23000000D+01 |
| 16 | -0.23000000D+01 | 0.26060474D+00 | 0.23000000D+01 |
| 17 | -0.23000000D+01 | 0.17213548D+01 | 0.23000000D+01 |
| 18 | -0.23000000D+01 | 0.12643167D+01 | 0.23000000D+01 |
| 19 | -0.23000000D+01 | -0.89182526D+00 | 0.23000000D+01 |
| 20 | -0.23000000D+01 | 0.53342646D+00 | 0.23000000D+01 |
| 21 | -0.23000000D+01 | -0.76506066D+00 | 0.23000000D+01 |
| 22 | -0.23000000D+01 | 0.10322240D+01 | 0.23000000D+01 |
| 23 | -0.23000000D+01 | -0.13116534D+01 | 0.23000000D+01 |
| 24 | -0.23000000D+01 | -0.15851357D+01 | 0.23000000D+01 |
| 25 | -0.23000000D+01 | 0.12661996D+01 | 0.23000000D+01 |
| 26 | -0.23000000D+01 | 0.11542239D+01 | 0.23000000D+01 |
| 27 | -0.23000000D+01 | 0.11097218D+01 | 0.23000000D+01 |
| 28 | -0.23000000D+01 | 0.13846745D+01 | 0.23000000D+01 |
| 29 | -0.23000000D+01 | 0.20903717D+01 | 0.23000000D+01 |
| 30 | -0.23000000D+01 | -0.11019039D+01 | 0.23000000D+01 |

*****  Measurement Vectors from Previous Duty Cycle  *****

| Element | Actual | Ideal | Delta |
|---|---|---|---|
| 1 | 0.10103102D+02 | 0.10104275D+02 | -0.11739089D-02 |
| 2 | -0.14931111D+01 | -0.14924095D+01 | -0.70162487D-03 |
| 3 | 0.20085912D+01 | 0.20091062D+01 | -0.51504469D-03 |
| 4 | 0.19780642D+02 | 0.19778241D+02 | 0.24008768D-02 |
| 5 | -0.66669493D+01 | -0.66651274D+01 | -0.18219316D-02 |

| | | | |
|---|---|---|---|
| 6 | -0.98458102D+00 | -0.98559824D+00 | 0.10172153D-02 |
| 7 | -0.15767790D+01 | -0.15788380D+01 | 0.20590177D-02 |
| 8 | 0.11137274D+02 | 0.11134954D+02 | 0.23208692D-02 |
| 9 | 0.89017246D-01 | 0.88879319D-01 | 0.13792706D-03 |
| 10 | 0.10696431D+02 | 0.10693933D+02 | 0.24983239D-02 |
| 11 | 0.12655324D+02 | 0.12654573D+02 | 0.75085998D-03 |
| 12 | -0.10418072D+02 | -0.10419233D+02 | 0.11609204D-02 |
| 13 | -0.21780155D+01 | -0.21776413D+01 | -0.37421465D-03 |
| 14 | -0.40642447D+01 | -0.40656395D+01 | 0.13947675D-02 |
| 15 | -0.19464792D+01 | -0.19496991D+01 | 0.32199035D-02 |
| 16 | 0.42969870D+01 | 0.42974533D+01 | -0.46632385D-03 |
| 17 | -0.82003725D+01 | -0.81998678D+01 | -0.50467467D-03 |
| 18 | -0.15849261D+02 | -0.15847900D+02 | -0.13614869D-02 |
| 19 | -0.68980267D+01 | -0.68975064D+01 | -0.52021170D-03 |
| 20 | 0.90509444D+01 | 0.90534421D+01 | -0.24976861D-02 |
| 21 | -0.10285179D+02 | -0.10284505D+02 | -0.67372823D-03 |
| 22 | 0.18947733D+02 | 0.18945459D+02 | 0.22739236D-02 |
| 23 | -0.56718279D+01 | -0.56694679D+01 | -0.23599300D-02 |
| 24 | 0.14949795D+02 | 0.14947791D+02 | 0.20038812D-02 |
| 25 | 0.12199872D+01 | 0.12219031D+01 | -0.19159384D-02 |
| 26 | -0.19580384D+01 | -0.19581031D+01 | 0.64691544D-04 |
| 27 | -0.15812464D+02 | -0.15808666D+02 | -0.37973917D-02 |
| 28 | 0.13408038D+02 | 0.13406054D+02 | 0.19835744D-02 |
| 29 | -0.57171648D+01 | -0.57166864D+01 | -0.47830105D-03 |
| 30 | 0.65553521D+01 | 0.65551029D+01 | 0.24921107D-03 |
| 31 | 0.11984460D+01 | 0.11976584D+01 | 0.78764153D-03 |
| 32 | 0.41049113D+01 | 0.41032964D+01 | 0.16149530D-02 |
| 33 | -0.45120871D+01 | -0.45112859D+01 | -0.80120182D-03 |
| 34 | -0.73335053D+01 | -0.73353247D+01 | 0.18193855D-02 |
| 35 | 0.55938702D+01 | 0.55907057D+01 | 0.31645451D-02 |
| 36 | 0.57718476D+01 | 0.57718665D+01 | -0.18908978D-04 |
| 37 | 0.62566531D+01 | 0.62546603D+01 | 0.19928141D-02 |
| 38 | -0.36837182D+01 | -0.36854161D+01 | 0.16978738D-02 |
| 39 | -0.65993453D+00 | -0.66239682D+00 | 0.24622853D-02 |
| 40 | 0.62197216D+01 | 0.62201300D+01 | -0.40833139D-03 |
| 41 | 0.83986184D+01 | 0.83976410D+01 | 0.97745967D-03 |
| 42 | -0.10200539D+02 | -0.10196727D+02 | -0.38112261D-02 |
| 43 | -0.82438433D+01 | -0.82422779D+01 | -0.15654478D-02 |
| 44 | 0.54771435D+01 | 0.54770325D+01 | 0.11099815D-03 |
| 45 | -0.94879613D+01 | -0.94905046D+01 | 0.25433128D-02 |
| 46 | -0.17651308D+01 | -0.17652076D+01 | 0.76744080D-04 |
| 47 | 0.13040716D+02 | 0.13040062D+02 | 0.65458679D-03 |
| 48 | -0.10674486D+02 | -0.10674158D+02 | -0.32801104D-03 |
| 49 | -0.36522650D+01 | -0.36529006D+01 | 0.63560677D-03 |
| 50 | 0.47958857D+01 | 0.47951361D+01 | 0.74956203D-03 |
| 51 | 0.66130432D+01 | 0.66095285D+01 | 0.35146902D-02 |
| 52 | 0.36281941D+01 | 0.36280430D+01 | 0.15105152D-03 |
| 53 | 0.12435527D+02 | 0.12434542D+02 | 0.98421431D-03 |
| 54 | -0.61849852D+01 | -0.61837043D+01 | -0.12808800D-02 |
| 55 | -0.11997359D+02 | -0.11996264D+02 | -0.10945754D-02 |
| 56 | 0.63235337D-01 | 0.64456403D-01 | -0.12210660D-02 |
| 57 | 0.18977414D+01 | 0.18955406D+01 | 0.22008123D-02 |
| 58 | -0.16787637D+01 | -0.16786796D+01 | -0.84141493D-04 |
| 59 | 0.21314643D+02 | 0.21314194D+02 | 0.44949913D-03 |
| 60 | 0.16361959D+02 | 0.16359496D+02 | 0.24625027D-02 |
| 61 | -0.10599311D+02 | -0.10597929D+02 | -0.13817616D-02 |
| 62 | 0.11750094D+01 | 0.11758778D+01 | -0.86836147D-03 |
| 63 | -0.96800973D+01 | -0.96792626D+01 | -0.83465552D-03 |
| 64 | 0.11139557D+02 | 0.11140365D+02 | -0.80754423D-03 |
| 65 | -0.15543449D+02 | -0.15543196D+02 | -0.25296474D-03 |
| 66 | -0.62421679D+01 | -0.62421539D+01 | -0.13951063D-04 |
| 67 | -0.26618426D+01 | -0.26582780D+01 | -0.35646253D-02 |
| 68 | -0.30206798D+01 | -0.30195918D+01 | -0.10880249D-02 |
| 69 | -0.48546084D+01 | -0.48578326D+01 | 0.32241783D-02 |
| 70 | -0.88965933D+01 | -0.88953844D+01 | -0.12088470D-02 |

| | | | |
|---|---|---|---|
| 71 | 0.64799684D-01 | 0.62645748D-01 | 0.21539359D-02 |
| 72 | -0.30426159D+01 | -0.30448372D+01 | 0.22213166D-02 |
| 73 | -0.14036280D+02 | -0.14032409D+02 | -0.38710032D-02 |
| 74 | 0.55782433D+01 | 0.55805536D+01 | -0.23103285D-02 |
| 75 | 0.15480107D+02 | 0.15480177D+02 | -0.70056200D-04 |
| 76 | 0.28119730D+01 | 0.28106797D+01 | 0.12933376D-02 |
| 77 | -0.63907507D+00 | -0.63661635D+00 | -0.24587235D-02 |
| 78 | 0.10076465D+02 | 0.10074024D+02 | 0.24416049D-02 |
| 79 | 0.31509518D+02 | 0.31510299D+02 | -0.78079367D-03 |
| 80 | -0.25604104D+01 | -0.25597853D+01 | -0.62503886D-03 |
| 81 | 0.61949384D+01 | 0.61937218D+01 | 0.12165546D-02 |
| 82 | -0.57178051D+01 | -0.57200394D+01 | 0.22342911D-02 |
| 83 | -0.37930729D+01 | -0.37933343D+01 | 0.26143742D-03 |
| 84 | 0.11819272D+01 | 0.11846776D+01 | -0.27504201D-02 |
| 85 | 0.37712380D+01 | 0.37719844D+01 | -0.74640012D-03 |
| 86 | -0.86271576D+01 | -0.86260485D+01 | -0.11090982D-02 |
| 87 | 0.29655601D+01 | 0.29658632D+01 | -0.30304456D-03 |
| 88 | -0.43119955D+01 | -0.43130309D+01 | 0.10353937D-02 |
| 89 | 0.10319364D+02 | 0.10317735D+02 | 0.16290786D-02 |
| 90 | 0.65706725D+01 | 0.65718202D+01 | -0.11476245D-02 |

***** Initial Control Vector Estimate for Case Number 4 *****

| Element | G.L.B. | C.V. | L.U.B. | Delta C.V. |
|---|---|---|---|---|
| 1 | -0.25000000D+01 | 0.52514237D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 2 | -0.25000000D+01 | 0.10654470D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 3 | -0.25000000D+01 | -0.16324993D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 4 | -0.25000000D+01 | -0.10821833D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 5 | -0.25000000D+01 | 0.16853635D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 6 | -0.25000000D+01 | -0.62707371D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 7 | -0.25000000D+01 | -0.34970790D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 8 | -0.25000000D+01 | 0.33250749D-01 | 0.25000000D+01 | 0.00000000D+00 |
| 9 | -0.25000000D+01 | -0.39897633D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 10 | -0.25000000D+01 | 0.11151077D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 11 | -0.25000000D+01 | -0.62047988D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 12 | -0.25000000D+01 | 0.10884261D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 13 | -0.25000000D+01 | 0.50843394D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 14 | -0.25000000D+01 | 0.37141562D-01 | 0.25000000D+01 | 0.00000000D+00 |
| 15 | -0.25000000D+01 | -0.16568323D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 16 | -0.25000000D+01 | 0.26060474D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 17 | -0.25000000D+01 | 0.17213548D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 18 | -0.25000000D+01 | 0.12643167D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 19 | -0.25000000D+01 | -0.89182526D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 20 | -0.25000000D+01 | 0.53342646D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 21 | -0.25000000D+01 | -0.76506066D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 22 | -0.25000000D+01 | 0.10322240D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 23 | -0.25000000D+01 | -0.13116534D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 24 | -0.25000000D+01 | -0.15851357D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 25 | -0.25000000D+01 | 0.12661996D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 26 | -0.25000000D+01 | 0.11542239D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 27 | -0.25000000D+01 | 0.11097218D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 28 | -0.25000000D+01 | 0.13846745D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 29 | -0.25000000D+01 | 0.20903717D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 30 | -0.25000000D+01 | -0.11019039D+01 | 0.25000000D+01 | 0.00000000D+00 |

***** T-Matrix Output is Suppressed *****

***** Predicted Measurement Vector *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| 1 | 0.10103102D+02 | 0.10103102D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 2 | -0.14931111D+01 | -0.14931111D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 3 | 0.20085912D+01 | 0.20085912D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 4 | 0.19780642D+02 | 0.19780642D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 5 | -0.66669493D+01 | -0.66669493D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 6 | -0.98458102D+00 | -0.98458102D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 7 | -0.15767790D+01 | -0.15767790D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 8 | 0.11137274D+02 | 0.11137274D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 9 | 0.89017246D-01 | 0.89017246D-01 | 0.00000000D+00 | 0.10000000D+01 |
| 10 | 0.10696431D+02 | 0.10696431D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 11 | 0.12655324D+02 | 0.12655324D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 12 | -0.10418072D+02 | -0.10418072D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 13 | -0.21780155D+01 | -0.21780155D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 14 | -0.40642447D+01 | -0.40642447D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 15 | -0.19464792D+01 | -0.19464792D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 16 | 0.42969870D+01 | 0.42969870D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 17 | -0.82003725D+01 | -0.82003725D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 18 | -0.15849261D+02 | -0.15849261D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 19 | -0.68980267D+01 | -0.68980267D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 20 | 0.90509444D+01 | 0.90509444D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 21 | -0.10285179D+02 | -0.10285179D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 22 | 0.18947733D+02 | 0.18947733D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 23 | -0.56718279D+01 | -0.56718279D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 24 | 0.14949795D+02 | 0.14949795D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 25 | 0.12199872D+01 | 0.12199872D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 26 | -0.19580384D+01 | -0.19580384D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 27 | -0.15812464D+02 | -0.15812464D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 28 | 0.13408038D+02 | 0.13408038D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 29 | -0.57171648D+01 | -0.57171648D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 30 | 0.65553521D+01 | 0.65553521D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 31 | 0.11984460D+01 | 0.11984460D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 32 | 0.41049113D+01 | 0.41049113D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 33 | -0.45120871D+01 | -0.45120871D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 34 | -0.73335053D+01 | -0.73335053D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 35 | 0.55938702D+01 | 0.55938702D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 36 | 0.57718476D+01 | 0.57718476D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 37 | 0.62566531D+01 | 0.62566531D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 38 | -0.36837182D+01 | -0.36837182D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 39 | -0.65993453D+00 | -0.65993453D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 40 | 0.62197216D+01 | 0.62197216D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 41 | 0.83986184D+01 | 0.83986184D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 42 | -0.10200539D+02 | -0.10200539D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 43 | -0.82438433D+01 | -0.82438433D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 44 | 0.54771435D+01 | 0.54771435D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 45 | -0.94879613D+01 | -0.94879613D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 46 | -0.17651308D+01 | -0.17651308D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 47 | 0.13040716D+02 | 0.13040716D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 48 | -0.10674486D+02 | -0.10674486D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 49 | -0.36522650D+01 | -0.36522650D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 50 | 0.47958857D+01 | 0.47958857D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 51 | 0.66130432D+01 | 0.66130432D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 52 | 0.36281941D+01 | 0.36281941D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 53 | 0.12435527D+02 | 0.12435527D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 54 | -0.61849852D+01 | -0.61849852D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 55 | -0.11997359D+02 | -0.11997359D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 56 | 0.63235337D-01 | 0.63235337D-01 | 0.00000000D+00 | 0.10000000D+01 |
| 57 | 0.18977414D+01 | 0.18977414D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 58 | -0.16787637D+01 | -0.16787637D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 59 | 0.21314643D+02 | 0.21314643D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 60 | 0.16361959D+02 | 0.16361959D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 61 | -0.10599311D+02 | -0.10599311D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 62 | 0.11750094D+01 | 0.11750094D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 63 | -0.96800973D+01 | -0.96800973D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 64 | 0.11139557D+02 | 0.11139557D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 65 | -0.15543449D+02 | -0.15543449D+02 | 0.00000000D+00 | 0.10000000D+01 |

| | | | | |
|---|---|---|---|---|
| 66 | -0.62421679D+01 | -0.62421679D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 67 | -0.26618426D+01 | -0.26618426D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 68 | -0.30206798D+01 | -0.30206798D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 69 | -0.48546084D+01 | -0.48546084D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 70 | -0.88965933D+01 | -0.88965933D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 71 | 0.64799684D-01 | 0.64799684D-01 | 0.00000000D+00 | 0.10000000D+01 |
| 72 | -0.30426159D+01 | -0.30426159D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 73 | -0.14036280D+02 | -0.14036280D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 74 | 0.55782433D+01 | 0.55782433D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 75 | 0.15480107D+02 | 0.15480107D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 76 | 0.28119730D+01 | 0.28119730D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 77 | -0.63907507D+00 | -0.63907507D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 78 | 0.10076465D+02 | 0.10076465D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 79 | 0.31509518D+02 | 0.31509518D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 80 | -0.25604104D+01 | -0.25604104D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 81 | 0.61949384D+01 | 0.61949384D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 82 | -0.57178051D+01 | -0.57178051D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 83 | -0.37930729D+01 | -0.37930729D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 84 | 0.11819272D+01 | 0.11819272D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 85 | 0.37712380D+01 | 0.37712380D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 86 | -0.86271576D+01 | -0.86271576D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 87 | 0.29655601D+01 | 0.29655601D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 88 | -0.43119955D+01 | -0.43119955D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 89 | 0.10319364D+02 | 0.10319364D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 90 | 0.65706725D+01 | 0.65706725D+01 | 0.00000000D+00 | 0.10000000D+01 |

***** Initial Performance Index = 0.75043169D+04 *****

***** Initial Constraint Function Values for Case Number 4 *****

Equality Constraints

| Element | Value | Target | Value - Target |
|---|---|---|---|
| 1 | 0.11710413D+01 | 0.25000000D+01 | -0.13289587D+01 |
| 2 | -0.16325303D+00 | 0.00000000D+00 | -0.16325303D+00 |
| 3 | 0.25764561D+00 | 0.25000000D+01 | -0.22423544D+01 |
| 4 | 0.19403763D+00 | 0.00000000D+00 | 0.19403763D+00 |
| 5 | 0.20457658D+01 | 0.25000000D+01 | -0.45423420D+00 |
| 6 | 0.25666451D+01 | 0.00000000D+00 | 0.25666451D+01 |
| 7 | 0.47240694D+00 | 0.20000000D+01 | -0.15275931D+01 |

Inequality Constraints

| Element | Value | L.U.B. | L.U.B. - Value |
|---|---|---|---|
| 1 | 0.11878350D+01 | 0.30000000D+01 | 0.18121650D+01 |
| 2 | 0.19586155D+01 | 0.30000000D+01 | 0.10413845D+01 |
| 3 | 0.17982412D+01 | 0.30000000D+01 | 0.12017588D+01 |
| 4 | 0.35128511D+00 | 0.30000000D+01 | 0.26487149D+01 |
| 5 | 0.11843341D+01 | 0.30000000D+01 | 0.18156659D+01 |
| 6 | 0.12528634D+01 | 0.30000000D+01 | 0.17471366D+01 |
| 7 | 0.50978875D+00 | 0.30000000D+01 | 0.24902113D+01 |
| 8 | 0.16772025D+01 | 0.30000000D+01 | 0.13227975D+01 |
| 9 | 0.21357807D+01 | 0.30000000D+01 | 0.86421932D+00 |
| 10 | 0.10391805D+01 | 0.30000000D+01 | 0.19608195D+01 |
| 11 | 0.12848363D+01 | 0.30000000D+01 | 0.17151637D+01 |
| 12 | 0.20574474D+01 | 0.30000000D+01 | 0.94255261D+00 |
| 13 | 0.17133285D+01 | 0.30000000D+01 | 0.12866715D+01 |
| 14 | 0.17744876D+01 | 0.30000000D+01 | 0.12255124D+01 |
| 15 | 0.23630163D+01 | 0.30000000D+01 | 0.63698375D+00 |
| 16 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 17 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |

```
 18         0.00000000D+00      0.15000000D+01      0.15000000D+01
 19         0.00000000D+00      0.15000000D+01      0.15000000D+01
 20         0.00000000D+00      0.15000000D+01      0.15000000D+01
 21         0.00000000D+00      0.15000000D+01      0.15000000D+01
 22         0.00000000D+00      0.15000000D+01      0.15000000D+01
 23         0.00000000D+00      0.15000000D+01      0.15000000D+01
 24         0.00000000D+00      0.15000000D+01      0.15000000D+01
 25         0.00000000D+00      0.15000000D+01      0.15000000D+01
 26         0.00000000D+00      0.15000000D+01      0.15000000D+01
 27         0.00000000D+00      0.15000000D+01      0.15000000D+01
 28         0.00000000D+00      0.15000000D+01      0.15000000D+01
 29         0.00000000D+00      0.15000000D+01      0.15000000D+01
 30         0.00000000D+00      0.15000000D+01      0.15000000D+01
 31         0.00000000D+00      0.15000000D+01      0.15000000D+01
 32         0.00000000D+00      0.15000000D+01      0.15000000D+01
 33         0.00000000D+00      0.15000000D+01      0.15000000D+01
 34         0.00000000D+00      0.15000000D+01      0.15000000D+01
 35         0.00000000D+00      0.15000000D+01      0.15000000D+01
 36         0.00000000D+00      0.15000000D+01      0.15000000D+01
 37         0.00000000D+00      0.15000000D+01      0.15000000D+01
 38         0.00000000D+00      0.15000000D+01      0.15000000D+01
 39         0.00000000D+00      0.15000000D+01      0.15000000D+01
 40         0.00000000D+00      0.15000000D+01      0.15000000D+01
 41         0.00000000D+00      0.15000000D+01      0.15000000D+01
 42         0.00000000D+00      0.15000000D+01      0.15000000D+01
 43         0.00000000D+00      0.15000000D+01      0.15000000D+01
 44         0.00000000D+00      0.15000000D+01      0.15000000D+01
 45         0.00000000D+00      0.15000000D+01      0.15000000D+01

*****   Solve the NLPQLP Problem for Case Number   4   *****


------------------------------------------------------------------------
 START OF THE SEQUENTIAL QUADRATIC PROGRAMMING ALGORITHM
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 Parameters:
    N      =      30
    M      =      52
    ME     =       7
    MODE   =       0
    ACC    =   0.1000D-06
    ACCQP  =   0.1000D-11
    STPMIN =   0.0000D+00
    RHOB   =   0.1000D+03
    MAXFUN =      10
    MAXNM  =      10
    MAXIT  =     200
    IPRINT =       2

 Output in the following order:
    IT    - iteration number
    F     - objective function value
    SCV   - sum of constraint violations
    NA    - number of active constraints
    I     - number of line search iterations
    ALPHA - steplength parameter
    DELTA - additional variable to prevent inconsistency
    KKT   - Karush-Kuhn-Tucker optimality criterion

  IT         F          SCV      NA  I    ALPHA     DELTA     KKT
```

```
---------------------------------------------------------------------
   1  0.75043169D+04  0.85D+01   52  0  0.00D+00  0.00D+00  0.58D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
   2  0.50833121D+04  0.79D+01   19  2  0.10D+00  0.00D+00  0.16D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
   3  0.45591925D+04  0.64D+01   28  2  0.31D+00  0.00D+00  0.15D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
   4  0.34832130D+04  0.54D+01   29  2  0.21D+00  0.00D+00  0.14D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
   5  0.30659390D+04  0.50D+01   30  2  0.10D+00  0.00D+00  0.71D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
   6  0.30589548D+04  0.39D+01   31  2  0.19D+00  0.00D+00  0.52D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
   7  0.29658930D+04  0.33D+01   32  2  0.14D+00  0.00D+00  0.58D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
   8  0.27273272D+04  0.29D+01   33  2  0.13D+00  0.00D+00  0.38D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
   9  0.26815018D+04  0.27D+01   33  2  0.10D+00  0.00D+00  0.23D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  10  0.26684359D+04  0.24D+01   34  2  0.10D+00  0.00D+00  0.21D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  11  0.26322300D+04  0.22D+01   34  2  0.10D+00  0.00D+00  0.25D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  12  0.25966304D+04  0.21D+01   34  2  0.10D+00  0.00D+00  0.14D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  13  0.26072579D+04  0.17D+01   34  2  0.13D+00  0.00D+00  0.14D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  14  0.26089698D+04  0.16D+01   35  2  0.10D+00  0.00D+00  0.12D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  15  0.26323634D+04  0.14D+01   36  2  0.10D+00  0.00D+00  0.10D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  16  0.26227460D+04  0.13D+01   36  2  0.10D+00  0.00D+00  0.15D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
```

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17  0.26015836D+04  0.12D+01   36  2  0.10D+00  0.00D+00  0.13D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
18  0.25882903D+04  0.11D+01   36  2  0.10D+00  0.00D+00  0.58D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
19  0.25969402D+04  0.96D+00   36  2  0.10D+00  0.00D+00  0.61D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
20  0.26088355D+04  0.83D+00   36  2  0.10D+00  0.00D+00  0.61D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
21  0.26090242D+04  0.76D+00   36  2  0.10D+00  0.00D+00  0.45D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
22  0.26103392D+04  0.66D+00   36  2  0.10D+00  0.00D+00  0.68D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
23  0.26047321D+04  0.61D+00   36  2  0.10D+00  0.00D+00  0.35D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
24  0.26101448D+04  0.38D+00   36  2  0.44D+00  0.00D+00  0.49D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
25  0.26130549D+04  0.35D+00   36  2  0.10D+00  0.00D+00  0.25D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
26  0.26119161D+04  0.33D+00   36  2  0.10D+00  0.00D+00  0.70D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
27  0.26015503D+04  0.35D+00   36  2  0.10D+00  0.00D+00  0.14D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
28  0.26036056D+04  0.30D+00   36  2  0.12D+00  0.00D+00  0.20D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
29  0.25996636D+04  0.28D+00   36  2  0.11D+00  0.00D+00  0.11D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
30  0.25967326D+04  0.22D-01   13  1  0.10D+01  0.00D+00  0.11D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
31  0.25922341D+04  0.35D-03   13  1  0.10D+01  0.00D+00  0.24D+00
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
32  0.25921504D+04  0.13D-03   13  1  0.10D+01  0.00D+00  0.52D-01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
33  0.25921312D+04  0.13D-04   13  1  0.10D+01  0.00D+00  0.67D-02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
34  0.25921283D+04  0.13D-05   13  1  0.10D+01  0.00D+00  0.58D-03
          *****   Completed CALL to NLPQLP   *****
```

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          *****   Completed CALL to NLPQLP   *****
35  0.25921281D+04  0.16D-07   13  1  0.10D+01  0.00D+00  0.13D-04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
36  0.25921281D+04  0.15D-08   13  1  0.10D+01  0.00D+00  0.43D-06
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
37  0.25921281D+04  0.10D-09   13  1  0.10D+01  0.00D+00  0.14D-07


--- Final Convergence Analysis at Last Iterate ---

  Objective function value:      F(X)  =  0.25921281D+04
  Solution values:               X     =
    -0.97485763D+00  0.11346635D+01 -0.14039385D+01 -0.93039460D+00
     0.18536347D+00  0.15347050D+00  0.34015652D+00  0.28163042D+00
     0.11010237D+01  0.91535204D+00 -0.10250799D+01  0.14183991D+01
     0.23415690D-01 -0.10114627D-01 -0.44567394D+00  0.19251305D+00
     0.11848184D+01  0.10411440D+01 -0.99999580D+00  0.12312945D+01
     0.67250606D+00  0.38884824D+00 -0.14724066D+00 -0.85135698D-01
     0.14104012D+01  0.31328211D-01 -0.39027816D+00  0.14093672D+01
     0.59037167D+00 -0.29588202D+00
  Distances from lower bounds:   X-XL  =
     0.15251424D+01  0.36346635D+01  0.10960615D+01  0.15696054D+01
     0.26853635D+01  0.26534705D+01  0.28401565D+01  0.27816304D+01
     0.36010237D+01  0.34153520D+01  0.14749201D+01  0.39183991D+01
     0.25234157D+01  0.24898854D+01  0.20543261D+01  0.26925130D+01
     0.36848184D+01  0.35411440D+01  0.15000042D+01  0.37312945D+01
     0.31725061D+01  0.28888482D+01  0.23527593D+01  0.24148643D+01
     0.39104012D+01  0.25313282D+01  0.21097218D+01  0.39093672D+01
     0.30903717D+01  0.22041180D+01
  Distances from upper bounds:   XU-X  =
     0.34748576D+01  0.13653365D+01  0.39039385D+01  0.34303946D+01
     0.23146365D+01  0.23465295D+01  0.21598435D+01  0.22183696D+01
     0.13989763D+01  0.15846480D+01  0.35250799D+01  0.10816009D+01
     0.24765843D+01  0.25101146D+01  0.29456739D+01  0.23074870D+01
     0.13151816D+01  0.14588560D+01  0.34999958D+01  0.12687055D+01
     0.18274939D+01  0.21111518D+01  0.26472407D+01  0.25851357D+01
     0.10895988D+01  0.24686718D+01  0.28902782D+01  0.10906328D+01
     0.19096283D+01  0.27958820D+01
  Multipliers for lower bounds:  U     =
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00
  Multipliers for upper bounds:  U     =
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
     0.00000000D+00  0.00000000D+00
  Constraint values:             G(X)  =
     0.16084911D-11 -0.14408211D-10  0.19495516D-12 -0.77183750D-10
    -0.80526696D-11 -0.66988082D-13  0.13682389D-11  0.15040693D+01
     0.13157562D+01  0.27593492D+01  0.25583869D+01  0.15681751D+01
     0.12499586D+01  0.29744931D+01  0.25145244D+01  0.14227317D+01
     0.14137851D+01  0.22231684D+01  0.28299180D+01  0.15892509D+01
     0.15375934D+01  0.23396328D+01 -0.22204460D-15  0.14307835D+01
```

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   0.12714391D+01  0.13482113D+01  0.15543122D-14  0.71945579D+00
   0.81013558D+00  0.12516203D+01  0.00000000D+00  0.13002444D+01
   0.10954000D+01  0.11700270D+01  0.10149818D+01  0.14527438D+01
   0.28884160D+00  0.14319083D+01  0.96346363D+00  0.12768272D+01
   0.13918295D+01  0.80213194D+00  0.62433279D-01  0.85662424D+00
   0.33558729D+00  0.00000000D+00  0.13557984D+01  0.37710429D+00
  -0.22204460D-15  0.14753073D+01  0.00000000D+00  0.69397817D+00
 Multipliers for constraints:   U     =
  -0.19775794D+03  0.90837241D+02 -0.30737554D+03 -0.26429502D+02
  -0.25539449D+03 -0.32070190D+03 -0.32638816D+03  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.40625725D+02  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.14044554D+03  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.14303239D+03  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.33186650D+03  0.00000000D+00  0.00000000D+00
   0.55009081D+02  0.00000000D+00  0.40608839D+03  0.00000000D+00
 Number of function calls:      NFUNC =      65
 Number of gradient calls:      NGRAD =      37
 Number of calls of QP solver:  NQL   =      37


        *****   Completed CALL to NLPQLP   *****


     *****   Number of Function Evaluations  =   1175   *****


    *****   Solution Control Vector for Case Number   4   *****

Element     G.L.B.            C.V.              L.U.B.            Delta C.V.

   1    -0.25000000D+01   -0.97485763D+00    0.25000000D+01   -0.15000000D+01
   2    -0.25000000D+01    0.11346635D+01    0.25000000D+01    0.69216472D-01
   3    -0.25000000D+01   -0.14039385D+01    0.25000000D+01    0.22856088D+00
   4    -0.25000000D+01   -0.93039460D+00    0.25000000D+01    0.15178870D+00
   5    -0.25000000D+01    0.18536347D+00    0.25000000D+01   -0.15000000D+01
   6    -0.25000000D+01    0.15347050D+00    0.25000000D+01    0.78054421D+00
   7    -0.25000000D+01    0.34015652D+00    0.25000000D+01    0.68986442D+00
   8    -0.25000000D+01    0.28163042D+00    0.25000000D+01    0.24837967D+00
   9    -0.25000000D+01    0.11010237D+01    0.25000000D+01    0.15000000D+01
  10    -0.25000000D+01    0.91535204D+00    0.25000000D+01   -0.19975562D+00
  11    -0.25000000D+01   -0.10250799D+01    0.25000000D+01   -0.40460001D+00
  12    -0.25000000D+01    0.14183991D+01    0.25000000D+01    0.32997303D+00
  13    -0.25000000D+01    0.23415690D-01    0.25000000D+01   -0.48501825D+00
  14    -0.25000000D+01   -0.10114627D-01    0.25000000D+01   -0.47256189D-01
  15    -0.25000000D+01   -0.44567394D+00    0.25000000D+01    0.12111584D+01
  16    -0.25000000D+01    0.19251305D+00    0.25000000D+01   -0.68091692D-01
  17    -0.25000000D+01    0.11848184D+01    0.25000000D+01   -0.53653637D+00
  18    -0.25000000D+01    0.10411440D+01    0.25000000D+01   -0.22317278D+00
  19    -0.25000000D+01   -0.99999580D+00    0.25000000D+01   -0.10817054D+00
  20    -0.25000000D+01    0.12312945D+01    0.25000000D+01    0.69786806D+00
  21    -0.25000000D+01    0.67250606D+00    0.25000000D+01    0.14375667D+01
  22    -0.25000000D+01    0.38884824D+00    0.25000000D+01   -0.64337576D+00
  23    -0.25000000D+01   -0.14724066D+00    0.25000000D+01    0.11644127D+01
  24    -0.25000000D+01   -0.85135698D-01    0.25000000D+01    0.15000000D+01
  25    -0.25000000D+01    0.14104012D+01    0.25000000D+01    0.14420157D+00
  26    -0.25000000D+01    0.31328211D-01    0.25000000D+01   -0.11228957D+01
  27    -0.25000000D+01   -0.39027816D+00    0.25000000D+01   -0.15000000D+01
  28    -0.25000000D+01    0.14093672D+01    0.25000000D+01    0.24692696D-01
```

| | | | | |
|---|---|---|---|---|
| 29 | -0.25000000D+01 | 0.59037167D+00 | 0.25000000D+01 | -0.15000000D+01 |
| 30 | -0.25000000D+01 | -0.29588202D+00 | 0.25000000D+01 | 0.80602183D+00 |

***** Predicted Measurement Vector *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|
| 1 | 0.93037349D-01 | 0.10103102D+02 | -0.10010064D+02 | 0.10000000D+01 |
| 2 | -0.18508458D+00 | -0.14931111D+01 | 0.13080265D+01 | 0.10000000D+01 |
| 3 | -0.31591398D+00 | 0.20085912D+01 | -0.23245052D+01 | 0.10000000D+01 |
| 4 | 0.47087571D+01 | 0.19780642D+02 | -0.15071885D+02 | 0.10000000D+01 |
| 5 | 0.14917767D+01 | -0.66669493D+01 | 0.81587260D+01 | 0.10000000D+01 |
| 6 | 0.12302141D+01 | -0.98458102D+00 | 0.22147951D+01 | 0.10000000D+01 |
| 7 | -0.40015472D+01 | -0.15767790D+01 | -0.24247682D+01 | 0.10000000D+01 |
| 8 | 0.13060134D+01 | 0.11137274D+02 | -0.98312610D+01 | 0.10000000D+01 |
| 9 | 0.51767511D+01 | 0.89017246D-01 | 0.50877339D+01 | 0.10000000D+01 |
| 10 | 0.63894463D+01 | 0.10696431D+02 | -0.43069850D+01 | 0.10000000D+01 |
| 11 | 0.28917490D+01 | 0.12655324D+02 | -0.97635749D+01 | 0.10000000D+01 |
| 12 | -0.87902803D+01 | -0.10418072D+02 | 0.16277919D+01 | 0.10000000D+01 |
| 13 | -0.38059914D+01 | -0.21780155D+01 | -0.16279759D+01 | 0.10000000D+01 |
| 14 | 0.19350336D+01 | -0.40642447D+01 | 0.59992783D+01 | 0.10000000D+01 |
| 15 | -0.43251952D+01 | -0.19464792D+01 | -0.23787160D+01 | 0.10000000D+01 |
| 16 | 0.20347100D+01 | 0.42969870D+01 | -0.22622770D+01 | 0.10000000D+01 |
| 17 | -0.65229233D+01 | -0.82003725D+01 | 0.16774492D+01 | 0.10000000D+01 |
| 18 | -0.47510256D+01 | -0.15849261D+02 | 0.11098236D+02 | 0.10000000D+01 |
| 19 | -0.54431651D+01 | -0.68980267D+01 | 0.14548616D+01 | 0.10000000D+01 |
| 20 | -0.41345569D+00 | 0.90509444D+01 | -0.94644001D+01 | 0.10000000D+01 |
| 21 | -0.56280364D+00 | -0.10285179D+02 | 0.97223755D+01 | 0.10000000D+01 |
| 22 | 0.61939434D+01 | 0.18947733D+02 | -0.12753790D+02 | 0.10000000D+01 |
| 23 | -0.25798332D+01 | -0.56718279D+01 | 0.30919947D+01 | 0.10000000D+01 |
| 24 | 0.29574399D+01 | 0.14949795D+02 | -0.11992355D+02 | 0.10000000D+01 |
| 25 | 0.23753115D+00 | 0.12199872D+01 | -0.98245603D+00 | 0.10000000D+01 |
| 26 | 0.46959686D+01 | -0.19580384D+01 | 0.66540070D+01 | 0.10000000D+01 |
| 27 | -0.10093326D+02 | -0.15812464D+02 | 0.57191375D+01 | 0.10000000D+01 |
| 28 | 0.13031596D+02 | 0.13408038D+02 | -0.37644142D+00 | 0.10000000D+01 |
| 29 | -0.92724518D+01 | -0.57171648D+01 | -0.35552871D+01 | 0.10000000D+01 |
| 30 | 0.23017542D+01 | 0.65553521D+01 | -0.42535978D+01 | 0.10000000D+01 |
| 31 | -0.42637071D+01 | 0.11984460D+01 | -0.54621531D+01 | 0.10000000D+01 |
| 32 | 0.22991633D+01 | 0.41049113D+01 | -0.18057481D+01 | 0.10000000D+01 |
| 33 | -0.72071589D+01 | -0.45120871D+01 | -0.26950718D+01 | 0.10000000D+01 |
| 34 | -0.23743347D+01 | -0.73335053D+01 | 0.49591706D+01 | 0.10000000D+01 |
| 35 | 0.56043691D+01 | 0.55938702D+01 | 0.10498893D-01 | 0.10000000D+01 |
| 36 | 0.52611335D+01 | 0.57718476D+01 | -0.51071408D+00 | 0.10000000D+01 |
| 37 | 0.33784870D+01 | 0.62566531D+01 | -0.28781661D+01 | 0.10000000D+01 |
| 38 | 0.34304965D+01 | -0.36837182D+01 | 0.71142147D+01 | 0.10000000D+01 |
| 39 | 0.10779353D+02 | -0.65993453D+00 | 0.11439287D+02 | 0.10000000D+01 |
| 40 | 0.70539864D+01 | 0.62197216D+01 | 0.83426478D+00 | 0.10000000D+01 |
| 41 | 0.32362753D+01 | 0.83986184D+01 | -0.51623431D+01 | 0.10000000D+01 |
| 42 | -0.26156589D+01 | -0.10200539D+02 | 0.75848796D+01 | 0.10000000D+01 |
| 43 | -0.34139893D+01 | -0.82438433D+01 | 0.48298541D+01 | 0.10000000D+01 |
| 44 | -0.54906331D+01 | 0.54771435D+01 | -0.10967777D+02 | 0.10000000D+01 |
| 45 | -0.26804415D+01 | -0.94879613D+01 | 0.68075198D+01 | 0.10000000D+01 |
| 46 | -0.55170483D+00 | -0.17651308D+01 | 0.12134260D+01 | 0.10000000D+01 |
| 47 | 0.36963797D+01 | 0.13040716D+02 | -0.93443367D+01 | 0.10000000D+01 |
| 48 | -0.54429835D+01 | -0.10674486D+02 | 0.52315023D+01 | 0.10000000D+01 |
| 49 | -0.59374046D+00 | -0.36522650D+01 | 0.30585246D+01 | 0.10000000D+01 |
| 50 | -0.18154090D+01 | 0.47958857D+01 | -0.66112946D+01 | 0.10000000D+01 |
| 51 | 0.81292683D+01 | 0.66130432D+01 | 0.15162251D+01 | 0.10000000D+01 |
| 52 | 0.49965523D+01 | 0.36281941D+01 | 0.13683582D+01 | 0.10000000D+01 |
| 53 | 0.37924728D+01 | 0.12435527D+02 | -0.86430539D+01 | 0.10000000D+01 |
| 54 | -0.76282104D+01 | -0.61849852D+01 | -0.14432252D+01 | 0.10000000D+01 |
| 55 | -0.49967575D+01 | -0.11997359D+02 | 0.70006012D+01 | 0.10000000D+01 |
| 56 | -0.39268067D+01 | 0.63235337D-01 | -0.39900421D+01 | 0.10000000D+01 |
| 57 | -0.64258228D+01 | 0.18977414D+01 | -0.83235642D+01 | 0.10000000D+01 |

| | | | | |
|---|---|---|---|---|
| 58 | -0.37628553D+01 | -0.16787637D+01 | -0.20840915D+01 | 0.10000000D+01 |
| 59 | 0.72630650D+01 | 0.21314643D+02 | -0.14051578D+02 | 0.10000000D+01 |
| 60 | 0.95424639D+01 | 0.16361959D+02 | -0.68194947D+01 | 0.10000000D+01 |
| 61 | -0.54573525D+01 | -0.10599311D+02 | 0.51419587D+01 | 0.10000000D+01 |
| 62 | 0.48074420D+01 | 0.11750094D+01 | 0.36324325D+01 | 0.10000000D+01 |
| 63 | 0.39020705D+01 | -0.96800973D+01 | 0.13582168D+02 | 0.10000000D+01 |
| 64 | 0.10159464D+01 | 0.11139557D+02 | -0.10123611D+02 | 0.10000000D+01 |
| 65 | -0.21339877D+01 | -0.15543449D+02 | 0.13409461D+02 | 0.10000000D+01 |
| 66 | -0.48463875D+01 | -0.62421679D+01 | 0.13957803D+01 | 0.10000000D+01 |
| 67 | 0.34598147D+01 | -0.26618426D+01 | 0.61216574D+01 | 0.10000000D+01 |
| 68 | -0.18953068D+01 | -0.30206798D+01 | 0.11253729D+01 | 0.10000000D+01 |
| 69 | 0.50429353D+01 | -0.48546084D+01 | 0.98975437D+01 | 0.10000000D+01 |
| 70 | 0.26970071D+01 | -0.88965933D+01 | 0.11593600D+02 | 0.10000000D+01 |
| 71 | 0.24932110D+01 | 0.64799684D-01 | 0.24284113D+01 | 0.10000000D+01 |
| 72 | 0.30217822D+01 | -0.30426159D+01 | 0.60643981D+01 | 0.10000000D+01 |
| 73 | -0.12877530D+02 | -0.14036280D+02 | 0.11587502D+01 | 0.10000000D+01 |
| 74 | 0.19249862D+01 | 0.55782433D+01 | -0.36532571D+01 | 0.10000000D+01 |
| 75 | 0.11497508D+02 | 0.15480107D+02 | -0.39825989D+01 | 0.10000000D+01 |
| 76 | 0.27297749D+01 | 0.28119730D+01 | -0.82198092D-01 | 0.10000000D+01 |
| 77 | -0.23375810D+01 | -0.63907507D+00 | -0.16985059D+01 | 0.10000000D+01 |
| 78 | 0.35089907D+01 | 0.10076465D+02 | -0.65674744D+01 | 0.10000000D+01 |
| 79 | 0.11415858D+02 | 0.31509518D+02 | -0.20093661D+02 | 0.10000000D+01 |
| 80 | -0.10710565D+02 | -0.25604104D+01 | -0.81501545D+01 | 0.10000000D+01 |
| 81 | 0.33622105D+01 | 0.61949384D+01 | -0.28327279D+01 | 0.10000000D+01 |
| 82 | -0.35352156D+01 | -0.57178051D+01 | 0.21825895D+01 | 0.10000000D+01 |
| 83 | -0.12552339D+01 | -0.37930729D+01 | 0.25378390D+01 | 0.10000000D+01 |
| 84 | 0.42508893D+01 | 0.11819272D+01 | 0.30689620D+01 | 0.10000000D+01 |
| 85 | 0.12626815D+02 | 0.37712380D+01 | 0.88555770D+01 | 0.10000000D+01 |
| 86 | -0.11958660D+01 | -0.86271576D+01 | 0.74312916D+01 | 0.10000000D+01 |
| 87 | -0.12187799D+01 | 0.29655601D+01 | -0.41843400D+01 | 0.10000000D+01 |
| 88 | -0.42994235D+01 | -0.43119955D+01 | 0.12571944D-01 | 0.10000000D+01 |
| 89 | -0.22072337D+01 | 0.10319364D+02 | -0.12526598D+02 | 0.10000000D+01 |
| 90 | -0.34482543D+01 | 0.65706725D+01 | -0.10018927D+02 | 0.10000000D+01 |

***** NLP Solution Performance Index = 0.25921281D+04 *****

***** Solution Constraint Function Values for Case Number 4 *****

Equality Constraints

| Element | Value | Target | Value - Target |
|---|---|---|---|
| 1 | 0.25000000D+01 | 0.25000000D+01 | -0.16084911D-11 |
| 2 | 0.14408211D-10 | 0.00000000D+00 | 0.14408211D-10 |
| 3 | 0.25000000D+01 | 0.25000000D+01 | -0.19495516D-12 |
| 4 | 0.77183750D-10 | 0.00000000D+00 | 0.77183750D-10 |
| 5 | 0.25000000D+01 | 0.25000000D+01 | 0.80526696D-11 |
| 6 | 0.66988082D-13 | 0.00000000D+00 | 0.66988082D-13 |
| 7 | 0.20000000D+01 | 0.20000000D+01 | -0.13682389D-11 |

Inequality Constraints

| Element | Value | L.U.B. | L.U.B. - Value |
|---|---|---|---|
| 1 | 0.14959307D+01 | 0.30000000D+01 | 0.15040693D+01 |
| 2 | 0.16842438D+01 | 0.30000000D+01 | 0.13157562D+01 |
| 3 | 0.24065081D+00 | 0.30000000D+01 | 0.27593492D+01 |
| 4 | 0.44161312D+00 | 0.30000000D+01 | 0.25583869D+01 |
| 5 | 0.14318249D+01 | 0.30000000D+01 | 0.15681751D+01 |
| 6 | 0.17500414D+01 | 0.30000000D+01 | 0.12499586D+01 |
| 7 | 0.25506867D-01 | 0.30000000D+01 | 0.29744931D+01 |
| 8 | 0.48547557D+00 | 0.30000000D+01 | 0.25145244D+01 |
| 9 | 0.15772683D+01 | 0.30000000D+01 | 0.14227317D+01 |

```
    10         0.15862149D+01      0.30000000D+01      0.14137851D+01
    11         0.77683161D+00      0.30000000D+01      0.22231684D+01
    12         0.17008204D+00      0.30000000D+01      0.28299180D+01
    13         0.14107491D+01      0.30000000D+01      0.15892509D+01
    14         0.14624066D+01      0.30000000D+01      0.15375934D+01
    15         0.66036723D+00      0.30000000D+01      0.23396328D+01
    16         0.15000000D+01      0.15000000D+01     -0.22204460D-15
    17         0.69216472D-01      0.15000000D+01      0.14307835D+01
    18         0.22856088D+00      0.15000000D+01      0.12714391D+01
    19         0.15178870D+00      0.15000000D+01      0.13482113D+01
    20         0.15000000D+01      0.15000000D+01      0.15543122D-14
    21         0.78054421D+00      0.15000000D+01      0.71945579D+00
    22         0.68986442D+00      0.15000000D+01      0.81013558D+00
    23         0.24837967D+00      0.15000000D+01      0.12516203D+01
    24         0.15000000D+01      0.15000000D+01      0.00000000D+00
    25         0.19975562D+00      0.15000000D+01      0.13002444D+01
    26         0.40460001D+00      0.15000000D+01      0.10954000D+01
    27         0.32997303D+00      0.15000000D+01      0.11700270D+01
    28         0.48501825D+00      0.15000000D+01      0.10149818D+01
    29         0.47256189D-01      0.15000000D+01      0.14527438D+01
    30         0.12111584D+01      0.15000000D+01      0.28884160D+00
    31         0.68091692D-01      0.15000000D+01      0.14319083D+01
    32         0.53653637D+00      0.15000000D+01      0.96346363D+00
    33         0.22317278D+00      0.15000000D+01      0.12768272D+01
    34         0.10817054D+00      0.15000000D+01      0.13918295D+01
    35         0.69786806D+00      0.15000000D+01      0.80213194D+00
    36         0.14375667D+01      0.15000000D+01      0.62433279D-01
    37         0.64337576D+00      0.15000000D+01      0.85662424D+00
    38         0.11644127D+01      0.15000000D+01      0.33558729D+00
    39         0.15000000D+01      0.15000000D+01      0.00000000D+00
    40         0.14420157D+00      0.15000000D+01      0.13557984D+01
    41         0.11228957D+01      0.15000000D+01      0.37710429D+00
    42         0.15000000D+01      0.15000000D+01     -0.22204460D-15
    43         0.24692696D-01      0.15000000D+01      0.14753073D+01
    44         0.15000000D+01      0.15000000D+01      0.00000000D+00
    45         0.80602183D+00      0.15000000D+01      0.69397817D+00

              *****   NLP Special Control 30-Vector Output   *****

  CV =
      -0.974857628345490D+00,   0.113466350435622D+01,  -0.140393845386856D+01,
      -0.930394600871915D+00,   0.185363471508028D+00,   0.153470499976475D+00,
       0.340156522009774D+00,   0.281630415598070D+00,   0.110102367401123D+01,
       0.915352038072862D+00,  -0.102507988888256D+01,   0.141839914198586D+01,
       0.234156902901393D-01,  -0.101146273937883D-01,  -0.445673936769721D+00,
       0.192513047058474D+00,   0.118481841044804D+01,   0.104114396150178D+01,
      -0.999995795404881D+00,   0.123129452009732D+01,   0.672506057741961D+00,
       0.388848238302152D+00,  -0.147240664119581D+00,  -0.851356983184814D-01,
       0.141040122144431D+01,   0.313282108746146D-01,  -0.390278160572052D+00,
       0.140936724476806D+01,   0.590371668338776D+00,  -0.295882022609138D+00,

                *****   End Case Number   4   *****

END of RUN.

   ***********  END  **********   END   *********
```

# B.5 (90 x 60) T-Matrix NLP Control Problems

## B.5.1 The Command (DCL) File Code

**for the**
**(90 x 60) T-Matrix NLP Control Problem**
**on the**
**Hewlett-Packard Alpha Mainframe Computer**

```
$ ASSIGN  SYS$COMMAND:  SYS$INPUT
$ ASSIGN  SYS$INPUT     FOR005
$ ASSIGN  SYS$OUTPUT    FOR006
$       SET TERM/WIDTH=80
$       SET VERIFY
$       SET NOVERIFY
$ !
$ ! *****   OPTIM COMMAND PROCEDURE:    OPTIM.COM      *****
$ !
$ !     ON WARNING THEN GOTO _______
$ !     ON ERROR THEN GOTO _______
$ !     ON SEVERE THEN GOTO _______
$ !
$ START:
$ !
$ ! *****   Determine if a NLP90x60 Case is to be RUN   *****
$ !
$ RUN0:
$       INQUIRE RUN00 "RUN a NLP90x60 Case?  (Y/N)"
$       IF RUN00 .EQS. "N" THEN GOTO TERM1
$ !
$ RUN1:
$ !
$       INQUIRE RUNDEMO "Enter NAME of the NLP90x60 System to be RUN"
$ !
$ ! *****   RUN this NLP90x60 Case   *****
$ !
$       ASSIGN  CDATA.DAT SYS$INPUT
$       ASSIGN  EDATA.DAT SYS$OUTPUT
$ !
$       ON ERROR THEN GOTO RUN2
$       COPY CDATA.DAT FOR005.DAT
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "   *********   INPUT    *****    INPUT   ********   "
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT " "
$       TYPE FOR005.DAT
$ !
$ RUN2:
$ !
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "   *********   OUTPUT   *****   OUTPUT   ********   "
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "RUN the NLP90x60 Case."
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "START RUN."
$       WRITE SYS$OUTPUT " "
$ !
$       SET TERM/WIDTH=132
$ !
$ ! *****   Execute  OPTIMYY   *****
$ !
$       ON ERROR THEN GOTO RUN4
$       RUN 'RUNDEMO'
$ !
$       SET TERM/WIDTH=80
$       GOTO RUN5
$ !
$ RUN4:
$       SET TERM/WIDTH=80
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "ERROR in Running the NLP90x60 Case."
```

```
$       WRITE SYS$OUTPUT " "
$ !
$ RUN5:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "END of RUN."
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "   ***********  END  **********   END   *********   "
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT " "
$ !
$       ON ERROR THEN GOTO TERM0
$       DEASSIGN SYS$OUTPUT
$       INQUIRE DSPL00 "Display the INPUT  CDATA.DAT  on screen?  (Y/N)"
$       IF DSPL00 .EQS. "N" THEN GOTO DSPL1
$       SET TERM/WIDTH=132
$       TYPE CDATA.DAT
$       SET TERM/WIDTH=80
$ DSPL1:
$       INQUIRE DSPL01 "Display the OUTPUT  EDATA.DAT  on screen?  (Y/N)"
$       IF DSPL01 .EQS. "N" THEN GOTO TERM0
$       SET TERM/WIDTH=132
$       TYPE EDATA.DAT
$       SET TERM/WIDTH=80
$       GOTO TERM0
$ !
$ ! *****   Determine if a Demo System is to be LINKed   *****
$ !
$ LINK0:
$       INQUIRE LINK00 "LINK the NLP90x60 System?  (Y/N)"
$       IF LINK00 .EQS. "N" THEN GOTO TERM2
$ !
$ LINK1:
$ !
$       INQUIRE LINKDEMO "Enter NAME of the NLP90x60 System to be LINKed"
$ !
$ ! *****   LINK the NLP90x60 System   *****
$ !
$       INQUIRE LINK0L "LINK with the IMSL Static Library? (Y/N)"
$       IF LINK0L .EQS. "N" THEN GOTO LINK3
$ !
$       INQUIRE LINK01 "LINK with /MAP/CROSS_REFERENCE Qualifiers? (Y/N)"
$       IF LINK01 .EQS. "N" THEN GOTO LINK2
$ !
$ ! *****   LINK Code with the IMSL Static Library and the
$ !                                   /MAP/CROSS_REFERENCE Qualifiers   *****
$ !
$       ON ERROR THEN GOTO LINK5
$       LINK/MAP/CROSS_REFERENCE    'LINKDEMO',   LIBA/LIBRARY,    -
          LIBB/LIBRARY,  LIBC/LIBRARY,  LINK_F90_STATIC_GFLOAT/OPT
$       GOTO LINK6
$ !
$ LINK2:
$ !
$ ! *****   LINK Code with the IMSL Static Library with NO
$ !                                   /MAP/CROSS_REFERENCE Qualifiers   *****
$ !
$       ON ERROR THEN GOTO LINK5
$       LINK                        'LINKDEMO',   LIBA/LIBRARY,    -
          LIBB/LIBRARY,  LIBC/LIBRARY,  LINK_F90_STATIC_GFLOAT/OPT
$       GOTO LINK6
$ !
$ LINK3:
$ !
$       INQUIRE LINK03 "LINK with /MAP/CROSS_REFERENCE Qualifiers? (Y/N)"
```

```
$       IF LINK03 .EQS. "N" THEN GOTO LINK4
$ !
$ !
$ ! *****   LINK Code without the IMSL Static Library but with the
$ !                                   /MAP/CROSS_REFERENCE Qualifiers   *****
$ !
$       ON ERROR THEN GOTO LINK5
$       LINK/MAP/CROSS_REFERENCE    'LINKDEMO',   LIBA/LIBRARY,    -
          LIBB/LIBRARY,  LIBC/LIBRARY
$       GOTO LINK6
$ !
$ LINK4:
$ !
$ ! *****   LINK Code without the IMSL Static Library and with NO
$ !                                   /MAP/CROSS_REFERENCE Qualifiers   *****
$ !
$       ON ERROR THEN GOTO LINK5
$       LINK                        'LINKDEMO',   LIBA/LIBRARY,    -
          LIBB/LIBRARY,  LIBC/LIBRARY
$       GOTO LINK6
$ !
$ LINK5:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "ERROR in Linking the NLP90x60 System."
$       WRITE SYS$OUTPUT " "
$       GOTO TERM5
$ !
$ LINK6:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "The NLP90x60 System was Linked Successfully."
$       WRITE SYS$OUTPUT " "
$       GOTO TERM5
$ !
$ !
$ ! *****   Edit Files   *****
$ !
$ EDIT0:
$       INQUIRE EDIT00 "EDIT a File?  (Y/N)"
$       IF EDIT00 .EQS. "N" THEN GOTO TERM3
$ !
$ ! *****   EDIT a File    *****
$ !
$ EDIT1:
$       INQUIRE EDIT01 "ENTER NAME of File to be EDITED."
$       ON ERROR THEN GOTO EDIT2
$       EDT 'EDIT01'
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "Editing File Completed Successfully."
$       WRITE SYS$OUTPUT " "
$       ON ERROR THEN GOTO EDIT3
$       @XPURGE
$       GOTO EDIT0
$ !
$ EDIT2:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "ERROR in Editing a File."
$       WRITE SYS$OUTPUT " "
$       GOTO EDIT0
$ !
$ EDIT3:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "ERROR in Purging Excess Files."
$       WRITE SYS$OUTPUT " "
$       GOTO EDIT0
$ !
```

```
$ CMPL0:
$       INQUIRE CMPL000 "COMPILE a File?  (Y/N)"
$       IF CMPL000 .EQS. "N" THEN GOTO TERM4
$ !
$ ! *****   COMPILE a File   *****
$ !
$       INQUIRE CFILE "ENTER NAME of File to be COMPILED."
$ !
$ ! *****   FORTRAN Compilation   *****
$ !
$       INQUIRE CMPL01 "Specify the /LIST Qualifier?  (Y/N)"
$       IF CMPL01 .EQS. "N" THEN GOTO CMPL1
$       ON ERROR THEN GOTO CMPL2
$       FORTRAN/LIST/CONTINUATIONS=30/NOWARNINGS 'CFILE'.FOR
$       GOTO CMPL3
$ CMPL1:
$       ON ERROR THEN GOTO CMPL2
$       FORTRAN/CONTINUATIONS=30/NOWARNINGS 'CFILE'.FOR
$       GOTO CMPL3
$ CMPL2:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "ERROR in FORTRAN Compilation."
$       WRITE SYS$OUTPUT " "
$       GOTO CMPL0
$ CMPL3:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "FORTRAN Compilation Completed Successfully."
$       WRITE SYS$OUTPUT " "
$       GOTO CMPL0
$ !
$ !
$ ! *****   Test for Termination   *****
$ !
$ !
$ TERM0:
$      INQUIRE TERM00 "Terminate Process?"
$      IF TERM00 .EQS. "N" THEN GOTO RUN0
$      DELETE FOR005.DAT;*
$      GOTO TERMINATE
$ !
$ TERM1:
$      INQUIRE TERM01 "Terminate Process?"
$      IF TERM01 .EQS. "N" THEN GOTO LINK0
$      GOTO TERMINATE
$ !
$ TERM2:
$      INQUIRE TERM02 "Terminate Process?"
$      IF TERM02 .EQS. "N" THEN GOTO EDIT0
$      GOTO TERMINATE
$ !
$ TERM3:
$      INQUIRE TERM03 "Terminate Process?"
$      IF TERM03 .EQS. "N" THEN GOTO CMPL0
$      GOTO TERMINATE
$ !
$ TERM4:
$      INQUIRE LINK000 "LINK the NLP90x60 System System?  (Y/N)"
$      IF LINK000 .EQS. "N" THEN GOTO TERM5
$      GOTO LINK1
$ !
$ TERM5:
$      INQUIRE RUN000 "RUN the NLP90x60 System?  (Y/N)"
$      IF RUN000 .EQS. "N" THEN GOTO TERMINATE
$      GOTO RUN1
$ !
```

```
$ ! *****   Termination   *****
$ !
$ TERMINATE:
$       WRITE SYS$OUTPUT " "
$       WRITE SYS$OUTPUT "TERMINATE RUN."
$       WRITE SYS$OUTPUT " "
$ !
$       DEASSIGN SYS$INPUT
$       DEASSIGN SYS$OUTPUT
$ !
$ EXIT
```

## B.5.2 The Fortran Main Driver Code

**for the**
**(90 x 60) T-Matrix NLP Control Problem**
**on the**
**Hewlett-Packard Alpha Mainframe Computer**

```
C
      PROGRAM NLP90x60
C
C***********************************************************************
C
C
C     S E Q U E N T I A L   Q U A D R A T I C   P R O G R A M M I N G
C
C            A L G O R I T H M   F O R   C O N S T R A I N E D
C
C                     O P T I M I Z A T I O N
C
C
C
C              EASY-TO-USE VERSION WITH NUMERICAL GRADIENTS
C
C
C
C
C   GENERAL PROBLEM DESCRIPTION:
C   ----------------------------
C
C   The program solves the general nonlinear programming problem
C
C
C
C            Minimize      F(X)
C
C            subject to    G (X)   =  0  ,  j=1,...,m
C                           j                        e
C
C                          G (X)  >=  0  ,  j=m +1,...,m
C                           j                  e
C
C                          XL  <=  X  <=  XU
C
C
C
C   with differentiable, real-valued functions subject to an n-dimensional
C   vector X.
C
C
C
C   THE NUMERICAL ALGORITHM:
C   ------------------------
C
C   The used code with name 'NLPQLP' is based on a sequential quadratic programming
C   (SQP) method. In each iteration, a linearly constrained quadratic subproblem
C   is formulated by approximating the Lagrangian function quadratically and
C   by linearizing constraints. The Hessian matrix is computed by BFGS quasi-Newton
C   updates. Subsequently, a one-dimensional line search subject to an
C   augmented Lagrangian penalty function is performed to get the next iterate..
C
C
C
C   SPECIFIC PROBLEM DESCRIPTION:  Control Optimisation for a Linear Plant
C                                  [(90 x 60) T-Matrix] Model with Constraints.
C   --------
C
C   Minimize  F = Z1*Z1   + Z2*Z2   + Z3*Z3   + Z4*Z4   + Z5*Z5   + Z6*Z6   +
C                 Z7*Z7   + Z8*Z8   + Z9*Z9   + Z10*Z10 + Z11*Z11 + Z12*Z12 +
C                 Z13*Z13 + Z14*Z14 + Z15*Z15 + Z16*Z16 + Z17*Z17 + Z18*Z18 +
C                 Z19*Z19 + Z20*Z20 + Z21*Z21 + Z22*Z22 + Z23*Z23 + Z24*Z24 +
C                 Z25*Z25 + Z26*Z26 + Z27*Z27 + Z28*Z28 + Z29*Z29 + Z30*Z30 +
C                 Z31*Z31 + Z32*Z32 + Z33*Z33 + Z34*Z34 + Z35*Z35 + Z36*Z36 +
```

```
C                 Z37*Z37 + Z38*Z38 + Z39*Z39 + Z40*Z40 + Z41*Z41 + Z42*Z42 +
C                 Z43*Z43 + Z44*Z44 + Z45*Z45 + Z46*Z46 + Z47*Z47 + Z48*Z48 +
C                 Z49*Z49 + Z50*Z50 + Z51*Z51 + Z52*Z52 + Z53*Z53 + Z54*Z54 +
C                 Z55*Z55 + Z56*Z56 + Z57*Z57 + Z58*Z58 + Z59*Z59 + Z60*Z60 +
C                 Z61*Z61 + Z62*Z62 + Z63*Z63 + Z64*Z64 + Z65*Z65 + Z66*Z66 +
C                 Z67*Z67 + Z68*Z68 + Z69*Z69 + Z70*Z70 + Z71*Z71 + Z72*Z72 +
C                 Z73*Z73 + Z74*Z74 + Z75*Z75 + Z76*Z76 + Z77*Z77 + Z78*Z78 +
C                 Z79*Z79 + Z80*Z80 + Z81*Z81 + Z82*Z82 + Z83*Z83 + Z84*Z84 +
C                 Z85*Z85 + Z86*Z86 + Z87*Z87 + Z88*Z88 + Z89*Z89 + Z90*Z90
C
C   Subject to    XL(1)   <=   X1  <=  XU(1)
C                 XL(2)   <=   X2  <=  XU(2)
C                 XL(3)   <=   X3  <=  XU(3)
C                 XL(4)   <=   X4  <=  XU(4)
C                 XL(5)   <=   X5  <=  XU(5)
C                 XL(6)   <=   X6  <=  XU(6)
C                 XL(7)   <=   X7  <=  XU(7)
C                 XL(8)   <=   X8  <=  XU(8)
C                 XL(9)   <=   X9  <=  XU(9)
C                 XL(10)  <=  X10  <=  XU(10)
C                 XL(11)  <=  X11  <=  XU(11)
C                 XL(12)  <=  X12  <=  XU(12)
C                 XL(13)  <=  X13  <=  XU(13)
C                 XL(14)  <=  X14  <=  XU(14)
C                 XL(15)  <=  X15  <=  XU(15)
C                 XL(16)  <=  X16  <=  XU(16)
C                 XL(17)  <=  X17  <=  XU(17)
C                 XL(18)  <=  X18  <=  XU(18)
C                 XL(19)  <=  X19  <=  XU(19)
C                 XL(20)  <=  X20  <=  XU(20)
C                 XL(21)  <=  X21  <=  XU(21)
C                 XL(22)  <=  X22  <=  XU(22)
C                 XL(23)  <=  X23  <=  XU(23)
C                 XL(24)  <=  X24  <=  XU(24)
C                 XL(25)  <=  X25  <=  XU(25)
C                 XL(26)  <=  X26  <=  XU(26)
C                 XL(27)  <=  X27  <=  XU(27)
C                 XL(28)  <=  X28  <=  XU(28)
C                 XL(29)  <=  X29  <=  XU(29)
C                 XL(30)  <=  X30  <=  XU(30)
C                 XL(31)  <=  X31  <=  XU(31)
C                 XL(32)  <=  X32  <=  XU(32)
C                 XL(33)  <=  X33  <=  XU(33)
C                 XL(34)  <=  X34  <=  XU(34)
C                 XL(35)  <=  X35  <=  XU(35)
C                 XL(36)  <=  X36  <=  XU(36)
C                 XL(37)  <=  X37  <=  XU(37)
C                 XL(38)  <=  X38  <=  XU(38)
C                 XL(39)  <=  X39  <=  XU(39)
C                 XL(40)  <=  X40  <=  XU(40)
C                 XL(41)  <=  X41  <=  XU(41)
C                 XL(42)  <=  X42  <=  XU(42)
C                 XL(43)  <=  X43  <=  XU(43)
C                 XL(44)  <=  X44  <=  XU(44)
C                 XL(45)  <=  X45  <=  XU(45)
C                 XL(46)  <=  X46  <=  XU(46)
C                 XL(47)  <=  X47  <=  XU(47)
C                 XL(48)  <=  X48  <=  XU(48)
C                 XL(49)  <=  X49  <=  XU(49)
C                 XL(50)  <=  X50  <=  XU(50)
C                 XL(51)  <=  X51  <=  XU(51)
C                 XL(52)  <=  X52  <=  XU(52)
C                 XL(53)  <=  X53  <=  XU(53)
C                 XL(54)  <=  X54  <=  XU(54)
C                 XL(55)  <=  X55  <=  XU(55)
```

```
C                 XL(56)  <=  X56  <=  XU(56)
C                 XL(57)  <=  X57  <=  XU(57)
C                 XL(58)  <=  X58  <=  XU(58)
C                 XL(59)  <=  X59  <=  XU(59)
C                 XL(60)  <=  X60  <=  XU(60)
C
C                 X1*X4   - X2*X3    =  0   GEQ(1)
C                 X5*X8   - X6*X7    =  0   GEQ(2)
C                 X9*X12  - X10*X11  =  0   GEQ(3)
C                 X13*X16 - X14*X15  =  0   GEQ(4)
C                 X17*X20 - X18*X19  =  0   GEQ(5)
C                 X21*X24 - X22*X23  =  0   GEQ(6)
C                 X25*X28 - X26*X27  =  0   GEQ(7)
C                 X29*X32 - X30*X31  =  0   GEQ(8)
C                 X33*X36 - X34*X35  =  0   GEQ(9)
C                 X37*X40 - X38*X39  =  0   GEQ(10)
C                 X41*X44 - X42*X43  =  0   GEQ(11)
C                 X45*X48 - X46*X47  =  0   GEQ(12)
C                 X49*X52 - X50*X51  =  0   GEQ(13)
C                 X53*X56 - X54*X55  =  0   GEQ(14)
C                 X57*X60 - X58*X59  =  0   GEQ(15)
C
C                 DSQRT[X1*X1   +   X2*X2]  <=  GMAX(1)
C                 DSQRT[X3*X3   +   X4*X4]  <=  GMAX(2)
C                 DSQRT[X5*X5   +   X6*X6]  <=  GMAX(3)
C                 DSQRT[X7*X7   +   X8*X8]  <=  GMAX(4)
C                 DSQRT[X9*X9   + X10*X10]  <=  GMAX(5)
C                 DSQRT[X11*X11 + X12*X12]  <=  GMAX(6)
C                 DSQRT[X13*X13 + X14*X14]  <=  GMAX(7)
C                 DSQRT[X15*X15 + X16*X16]  <=  GMAX(8)
C                 DSQRT[X17*X17 + X18*X18]  <=  GMAX(9)
C                 DSQRT[X19*X19 + X20*X20]  <=  GMAX(10)
C                 DSQRT[X21*X21 + X22*X22]  <=  GMAX(11)
C                 DSQRT[X23*X23 + X24*X24]  <=  GMAX(12)
C                 DSQRT[X25*X25 + X26*X26]  <=  GMAX(13)
C                 DSQR2[X27*X27 + X28*X28]  <=  GMAX(14)
C                 DSQ2T[X29*X29 + X30*X30]  <=  GMAX(15)
C                 DSQRT[X31*X31 + X32*X32]  <=  GMAX(16)
C                 DSQRT[X33*X33 + X34*X34]  <=  GMAX(17)
C                 DSQRT[X35*X35 + X36*X36]  <=  GMAX(18)
C                 DSQR2[X37*X37 + X38*X38]  <=  GMAX(19)
C                 DSQ2T[X39*X39 + X40*X40]  <=  GMAX(20)
C                 DSQRT[X41*X41 + X42*X42]  <=  GMAX(21)
C                 DSQRT[X43*X43 + X44*X44]  <=  GMAX(22)
C                 DSQRT[X45*X45 + X46*X46]  <=  GMAX(23)
C                 DSQR2[X47*X47 + X48*X48]  <=  GMAX(24)
C                 DSQ2T[X49*X49 + X50*X50]  <=  GMAX(25)
C                 DSQRT[X51*X51 + X52*X52]  <=  GMAX(26)
C                 DSQRT[X53*X53 + X54*X54]  <=  GMAX(27)
C                 DSQRT[X55*X55 + X56*X56]  <=  GMAX(28)
C                 DSQR2[X57*X57 + X58*X58]  <=  GMAX(29)
C                 DSQ2T[X59*X59 + X60*X60]  <=  GMAX(30)
C
C                 DABS[X1  -  X01]  <=  GMAX(31)
C                 DABS[X2  -  X02]  <=  GMAX(32)
C                 DABS[X3  -  X03]  <=  GMAX(33)
C                 DABS[X4  -  X04]  <=  GMAX(34)
C                 DABS[X5  -  X05]  <=  GMAX(35)
C                 DABS[X6  -  X06]  <=  GMAX(36)
C                 DABS[X7  -  X07]  <=  GMAX(37)
C                 DABS[X8  -  X08]  <=  GMAX(38)
C                 DABS[X9  -  X09]  <=  GMAX(39)
C                 DABS[X10 - X010]  <=  GMAX(40)
C                 DABS[X11 - X011]  <=  GMAX(41)
C                 DABS[X12 - X012]  <=  GMAX(42)
```

```
C                DABS[X13 - X013]  <=  GMAX(43)
C                DABS[X14 - X014]  <=  GMAX(44)
C                DABS[X15 - X015]  <=  GMAX(45)
C                DABS[X16 - X016]  <=  GMAX(46)
C                DABS[X17 - X017]  <=  GMAX(47)
C                DABS[X18 - X018]  <=  GMAX(48)
C                DABS[X19 - X019]  <=  GMAX(49)
C                DABS[X20 - X020]  <=  GMAX(50)
C                DABS[X21 - X021]  <=  GMAX(51)
C                DABS[X22 - X022]  <=  GMAX(52)
C                DABS[X23 - X023]  <=  GMAX(53)
C                DABS[X24 - X024]  <=  GMAX(54)
C                DABS[X25 - X025]  <=  GMAX(55)
C                DABS[X26 - X026]  <=  GMAX(56)
C                DABS[X27 - X027]  <=  GMAX(57)
C                DABS[X28 - X028]  <=  GMAX(58)
C                DABS[X29 - X029]  <=  GMAX(59)
C                DABS[X30 - X030]  <=  GMAX(60)
C                DABS[X31 - X031]  <=  GMAX(61)
C                DABS[X32 - X032]  <=  GMAX(62)
C                DABS[X33 - X033]  <=  GMAX(63)
C                DABS[X34 - X034]  <=  GMAX(64)
C                DABS[X35 - X035]  <=  GMAX(65)
C                DABS[X36 - X036]  <=  GMAX(66)
C                DABS[X37 - X037]  <=  GMAX(67)
C                DABS[X38 - X038]  <=  GMAX(68)
C                DABS[X39 - X039]  <=  GMAX(69)
C                DABS[X40 - X040]  <=  GMAX(70)
C                DABS[X41 - X041]  <=  GMAX(71)
C                DABS[X42 - X042]  <=  GMAX(72)
C                DABS[X43 - X043]  <=  GMAX(73)
C                DABS[X44 - X044]  <=  GMAX(74)
C                DABS[X45 - X045]  <=  GMAX(75)
C                DABS[X46 - X046]  <=  GMAX(76)
C                DABS[X47 - X047]  <=  GMAX(77)
C                DABS[X48 - X048]  <=  GMAX(78)
C                DABS[X49 - X049]  <=  GMAX(79)
C                DABS[X50 - X050]  <=  GMAX(80)
C                DABS[X51 - X051]  <=  GMAX(81)
C                DABS[X52 - X052]  <=  GMAX(82)
C                DABS[X53 - X053]  <=  GMAX(83)
C                DABS[X54 - X054]  <=  GMAX(84)
C                DABS[X55 - X055]  <=  GMAX(85)
C                DABS[X56 - X056]  <=  GMAX(86)
C                DABS[X57 - X057]  <=  GMAX(87)
C                DABS[X58 - X058]  <=  GMAX(88)
C                DABS[X59 - X059]  <=  GMAX(89)
C                DABS[X60 - X060]  <=  GMAX(90)
C
C
C
C   Where:       NMAX  >=  (N = NX) + 2     Use:  NMAX  =  (N = NX) + 4
C                MMAX  >=  (M = MG) + 1     Use:  MMAX  =  (M = MG) + 4
C
C                (N = NX)  =  Number of optimisation variables.  =  60
C                (M = MG)  =  Total Number of Constraints.       = 105
C
C                NMAX  =  64
C                MMAX  = 109
C
C
C
C   VERSION:
C   -------
C
```

```
C   3.1  -  February 2010
C
C
C*********************************************************************
C
      IMPLICIT         NONE
      INTEGER          NMAX, MMAX, MNN2X, LWA, LKWA, LACTIV
      PARAMETER (      NMAX   =  64,
     /                 MMAX   = 109,
     /                 MNN2X  = MMAX + NMAX + NMAX + 2,
     /                 LWA    = 1.5*NMAX*NMAX + 33*NMAX + 9*MMAX + 200,
     /                 LKWA   = NMAX + 20,
     /                 LACTIV = 2*MMAX + 10)
      INTEGER          KWA(LKWA), N, ME, M, L, MNN2, MAXIT, MAXFUN,
     /                 IPRINT, MAXNM, IOUT, MODE, IFAIL, I, J, NFUNC
      DOUBLE PRECISION X(NMAX), F, G(MMAX), DF(NMAX), DG(MMAX,NMAX),
     /                 U(MNN2X), XL(NMAX), XU(NMAX), C(NMAX,NMAX),
     /                 D(NMAX), WA(LWA), ACC, ACCQP, STPMIN, EPS,
     /                 EPSREL, FBCK, GBCK(MMAX), RHOB
      LOGICAL          ACTIVE(LACTIV), LQL
      EXTERNAL         QL
C
C
C
C     EXTERNAL  RAN
C     REAL*8    RAN
C
      INTEGER*4  NZZ,    NXX,    NZNX
C
      PARAMETER  (NZZ=90,NXX=60,NZNX=NZZ*NXX)
C
      INTEGER*4  CVOUT,  ICASE,  IDATA,  IE,     IG,     II,     IN,
     1           INFO,   IOPT,   IPIV(NXX),      IQ,     ISEED1, ISEED2,
     2           ISEED3, ISEED4, ITOUT,  JJ,     JSEED1, JSEED2, JSEED3,
     3           JSEED4, LWORK,          MG,     MI,     MULT,   NX,
     4           NZ
C
      REAL*8 CRAN1,      CRAN2,      CRAN3,      CRAN4,      CRAN5,
     1       CRAN6,      CRAN7,      CRAN8,      DX(NXX),    DZ(NZZ),
     2       DZ0(NZZ),               G0(MMAX),   GEQ(MMAX),  GMAX(MMAX),
     3       ONE,        SUMF,       SUMZ,       T(NZZ,NXX), TWO,
     4       WDT(NZZ),   XL0(NXX),   XU0(NXX),   X0(NXX),    Z(NZZ),
     5       ZA(NZZ),    Z0(NZZ),    ZERO
C
      REAL*8  ALPHA,             DD(NXX,NXX),       DELTCV(NXX),
     1        DUMQ(NZZ,1),       DUMT(NXX,1),       DUMT1(NXX,1),
     2        DUMTT(NXX,NXX),    DUMX(NXX,1),       DUMX1(NXX,1),
     3        DUMXX(NXX,NXX),    DUMXX1(NXX,NXX),   DUMZ(NZZ,1),
     4        DUMZT(1,NZZ),      DUMXZ(NXX,NZZ),    EE(NXX,NXX),
     5        FF(NXX,NXX),       JJJ(1,1),          RSSDCV,
     6        THETA(NXX),        TT(NZZ,NXX),       TTT(NXX,NZZ),
     7        WDX(NXX),          WDXX(NXX,NXX),     WORK(NXX),
     8        WX(NXX),           WXX(NXX,NXX),      WZ(NZZ),
     9        WZZ(NZZ,NZZ),      ZZ(NZZ),           ZZZ(NZZ)
C
C234567890123456789012345678901234567890123456789012345678901234567890123456789
C
      DATA  ACC,      ACCQP,    ALPHA,    CRAN1,    CRAN2,    CRAN3,
     1      CRAN4,    CRAN5,    CRAN6,    CRAN7,    CRAN8,    CVOUT,
     2      EPS,      GEQ,                GMAX,               ICASE,
     3      IDATA,    IN,       IOPT,     IOUT,     IPRINT,   ITOUT,
     4      L,        LQL,
     5          ISEED1,       ISEED2,       ISEED3,       ISEED4,
     6          JSEED1,       JSEED2,       JSEED3,       JSEED4,
     7      MAXFUN,   MAXIT,    MAXNM,    ME,       MG,       MODE,
```

```
     8      MULT,               ONE,      RHOB,     STPMIN,
     9      WDT,                WDX,                WX,
     A      WZ,                 XL,                 XL0,
     B      XU,                 XU0,                T,
     C      TWO,      X0,               ZA,                 ZERO     /
C
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C
     o      1.0D-07,  0.0D+00,  1.0D+00,  2.0D+00,  3.0D+00,  1.0D+00,
     1      1.0D+00,  1.0D-01,  1.0D-01,  1.0D-01,  1.0D-01,  0,
     2      1.0D-07,  MMAX*0.0D+00,       MMAX*1.5D+00,       1,
     3      0,        5,        1,        6,        2,        0,
     4      1,        .TRUE.,
     5          78985723,     95428381,     72919329,     63237395,
     6          81692875,     68377297,     89672847,     98351973,
     7      10,       100,      0,        0,        0,        0,
     8       0,                 1.0D+00,  100.00,   0.0D+00,
     9      NZZ*1.0D+00,       NXX*0.0D+00,        NXX*0.0D+00,
     A      NZZ*1.0D+00,       NMAX*-2.0D+00,      NXX*-1.9D+00,
     B      NMAX*2.0D+00,      NXX*1.9D+00,        NZNX*0.0D+00,
     C      2.0D+00,   NXX*0.0D+00,        NZZ*0.0D+00,       0.0D+00  /
C
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C
 1000 FORMAT(//6X,45H   *****   Number of Function Evaluations  = ,I6,
     1 8H   *****)
 1900 FORMAT(//2H  )
 1901 FORMAT(//2H  )
 1902 FORMAT(///79H ***************************************************
     1*************************////6X,39H   ***************   Start Cas
     2e Number ,I3,18H   ***************/)
 1903 FORMAT(//4X,51H   *****   Solution Control Vector for Case Number
     1,I3,8H   *****)
 1904 FORMAT(5X,I2,3X,3D20.8)
 1905 FORMAT(4D20.8)
 1906 FORMAT(//45H   *****   NLP Solution Performance Index  = ,D16.8,
     18H   *****)
 1907 FORMAT(//5X,60H   *****   Initial Control Vector Estimate for Case
     1 Number  ,I3,8H   *****)
 1908 FORMAT(//15X,27H   *****   End Case Number ,I3,8H   *****)
 1909 FORMAT(//1X,40H   *****   Initial Performance Index  = ,D16.8,
     18H   *****)
 1910 FORMAT(5X,I2,3X,3D20.8)
 1911 FORMAT(/2X,8H Element,8X,7H G.L.B.,13X,5H C.V.,15X,7H L.U.B./)
 1912 FORMAT(13X,43H   *****   Completed CALL to NLPQLP   *****)
 1913 FORMAT(/7X,6H CRAN1,14X,6H CRAN2,14X,6H CRAN3,14X,6H CRAN4/
     1        7X,6H CRAN5,14X,6H CRAN6,14X,6H CRAN7,14X,6H CRAN8/)
 1914 FORMAT(/21X,21H   *****   INPUT DATA,8H   *****/)
 1915 FORMAT(//24X,22H   *****   OUTPUT DATA,8H   *****/)
 1916 FORMAT(/21X,23H Inequality Constraints//2X,8H Element,9X,6H Value,
     1 14X,7H L.U.B.,9X,15H L.U.B. - Value/)
 1917 FORMAT(//62H   *****   Initial Constraint Function Values for Case
     1 Number ,I3,8H   *****)
 1918 FORMAT(//63H   *****   Solution Constraint Function Values for Cas
     1e Number ,I3,8H   *****)
 1919 FORMAT(/22X,21H Equality Constraints//2X,8H Element,9X,6H Value,
     1 14X,7H Target,9X,15H Value - Target/)
 1920 FORMAT(//2X,54H *****   NO Constraints are Specified for Case Numb
     1er ,I3,8H   *****)
 1921 FORMAT(//1X,69H   *****   Control Vector During Previous Duty Cycl
     1e for Case Number ,I3,8H   *****)
 1922 FORMAT(/2X,8H Element,4X,7H G.L.B.,11X,5H C.V.,13X,7H L.U.B.,11X,
     1  11H Delta C.V./)
 1923 FORMAT(5X,I2,1X,4D18.8)
 1924 FORMAT(//9X,63H   *****   Measurement Vectors from Previous Duty C
```

```
     1ycle   *****//2x,8H Element,8X,7H Actual,13X,6H Ideal,14X,6H Delta
     2/)
 1925 FORMAT(//14X,47H   *****   Predicted Measurement Vector   *****//
     12X,8H Element,4X,9H Z Vector,9X,10H ZA Vector,8X,8H Delta Z,10X,
     2 8H Diag[W]/)
 1926 FORMAT(12X,53H   *****   X0, ZA, and T are Randomly Defined   ****
     1*/)
 1927 FORMAT(/4X,4H Row,16X,25H *****   T-Matrix   *****)
 1928 FORMAT(/5X,I2,1X,4D18.8/(8X,4D18.8))
 1929 FORMAT(//14X,48H   *****   T-Matrix Output is Suppressed   *****)
 1930 FORMAT(14X,51H   *****   X0, ZA, and T are Directly Input   *****)
 1931 FORMAT(//13X,31H   *****   NLP Special Control ,I2,22H-Vector Outp
     1ut   *****)
 1932 FORMAT(/2X,5H CV =,/(5X,3(D24.15,1H,)))
 1950 FORMAT(//3X,50H *****   Solve the NLPQLP Problem for Case Number ,
     1 I3,8H   *****)
C
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C
 2906 FORMAT(//51H   *****   Regulator Solution Performance Index  = ,
     1 D16.8,8H   *****)
 2931 FORMAT(//10X,37H   *****   Regulator Special Control ,I2,22H-Vecto
     1r Output   *****)
 2950 FORMAT(//2X,53H *****   Solve the Regulator Problem for Case Numbe
     1r ,I3,8H   *****)
 2960 FORMAT(/4X,4H Row,4X,49H *****   [DUMXX1] = Matrix to be Inverted
     1  *****)
 2961 FORMAT(/4X,4H Row,2X,54H *****   [DD] = The Inverse of Matrix [DUM
     1XX1]   *****)
 2962 FORMAT(/4X,4H Row,1X,56H *****   [EE] = The Identity Matrix [DUMXX
     11][DD]   *****)
 2963 FORMAT(/4X,4H Row,1X,56H *****   [FF] = The Identity Matrix [DD][D
     1UMXX1]   *****)
 2964 FORMAT(/20X,19H *****   Alpha  =  ,D18.8,8H   *****/)
 2965 FORMAT(/4X,4H Dim,18X,26H *****   WZ-Vector   *****)
 2966 FORMAT(/4X,4H Dim,18X,26H *****   WX-Vector   *****)
 2967 FORMAT(/4X,4H Dim,18X,27H *****   WDX-Vector   *****)
 2968 FORMAT(/4X,4H Dim, 9X,44H *****   The Solution Control Vector   **
     1***)
 2969 FORMAT(/4X,4H Dim, 7X,48H *****   The Solution Measurement Vector
     1  *****)
 2970 FORMAT(//5X,52H   *****   Matrix [DUMXX1] was Successfully Inverte
     1d/42X,30H to Yield Matrix [DD].   *****)
 2971 FORMAT(// 4X,48H  *****   Root-Sum-Squared Delta CV Elements  = ,
     1 D16.8,8H   *****)
 2972 FORMAT(/2X,11H Delta CV =,/(5X,3(D24.15,1H,)))
 2973 FORMAT(//5X,19H   *****   Element ,I4,44H  of Matrix [DUMXX1] has
     1an illegal value.  ,/38X,30H Regulator problem is stopped./38X,
     2 32H Go on to the next case.   *****)
 2974 FORMAT(//5X,19H   *****   Element ,I4,44H  of Matrix [DUMXX1] is z
     1ero and the matrix ,/38X,32H is singular; its inverse could ,/38X,
     2 17H not be computed.,/38X,30H Regulator problem is stopped./38X,
     3 32H Go on to the next case.   *****)
C
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C
 3961 FORMAT(/4X,4H Row,1X,40H *****   The Diagonal Matrix WZZ   *061*)
 3962 FORMAT(/4X,4H Row,1X,40H *****   The Diagonal Matrix WXX   *062*)
 3963 FORMAT(/4X,4H Row,1X,41H *****   The Diagonal Matrix WDXX   *063*)
 3964 FORMAT(/4X,4H Row,1X,34H *****   The T-Matrix [TT]   *064*)
 3965 FORMAT(/4X,4H Row,1X,52H *****   The Transpose of the T-Matrix [TT
     1T]   *065*)
 3966 FORMAT(/4X,4H Row,1X,41H *****   The DUMXZ-Matrix [DUMXZ]   *066*)
 3967 FORMAT(/4X,4H Row,1X,41H *****   The DUMXX-Matrix [DUMXX]   *067*)
 3968 FORMAT(/4X,4H Row,1X,41H *****   The DUMXX-Matrix [DUMXX]   *068*)
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 3969 FORMAT(/4X,4H Row,1X,41H *****   The DUMXX-Matrix [DUMXX]   *069*)
 3970 FORMAT(/4X,4H Row,1X,39H *****   The DUMX-Vector [DUMX]   *070*)
 3971 FORMAT(/4X,4H Row,1X,39H *****   The DUMX-Vector [DUMX]   *071*)
 3972 FORMAT(/4X,4H Row,1X,39H *****   The DUMZ-Vector [DUMZ]   *072*)
 3973 FORMAT(/4X,4H Row,1X,41H *****   The DUMX1-Vector [DUMX1]   *073*)
 3974 FORMAT(/4X,4H Row,1X,41H *****   The DUMX1-Vector [DUMX1]   *074*)
 3975 FORMAT(/4X,4H Row,1X,41H *****   The DUMX1-Vector [DUMX1]   *075*)
 3976 FORMAT(/4X,4H Row,1X,39H *****   The DUMZ-Vector [DUMZ]   *076*)
 3977 FORMAT(/4X,4H Row,1X,39H *****   The DUMZ-Vector [DUMZ]   *077*)
 3978 FORMAT(/4X,4H Row,1X,41H *****   The DUMZT-Vector [DUMZT]   *078*)
 3991 FORMAT(/4X,4H Row,1X,41H *****   The DUMXX-Matrix [DUMXX]   *091*)
C
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C
C
      NAMELIST / CDATA / ALPHA,  ACC,    ACCQP,  CRAN1,  CRAN2,  CRAN3,
     1                   CRAN4,  CRAN5,  CRAN6,  CRAN7,  CRAN8,  CVOUT,
     2                   EPS,    GEQ,    GMAX,   ICASE,  IDATA,  IN,
     3                   IOPT,   IOUT,   IPRINT, ISEED1, ISEED2, ISEED3,
     4                   ISEED4, ITOUT,  JSEED1, JSEED2, JSEED3, JSEED4,
     5                   L,      LQL,    MAXFUN, MAXIT,  MAXNM,  ME,
     6                   MG,     MODE,   MULT,                   RHOB,
     7                   STPMIN, T,      WDT,    WDX,    WX,     WZ,
     8                   XL,     XL0,    XU,     XU0,    X0,     ZA
C
C
C   Set some constants and initial values
C
      MODE   = 0
C
  100 READ(IN,CDATA)
C
      IFAIL  = 0
      NFUNC  = 0
      NX     = NXX
      NZ     = NZZ
      M      = MG
      N      = NX
      MI     = MG - ME
      MNN2   = M + N + N + 2
C
      WRITE(IOUT,1902)  ICASE
      WRITE(IOUT,1914)
      WRITE(IOUT,CDATA)
      IF (IDATA) 90, 90, 50
C
C  *****   Randomly define the T-Matrix and the X0 & ZA Vectors   *****
C
   90 WRITE(IOUT,1915)
      WRITE(IOUT,1926)
      WRITE(IOUT,1913)
      WRITE(IOUT,1905) CRAN1, CRAN2, CRAN3, CRAN4, CRAN5, CRAN6, CRAN7,
     1                 CRAN8
      WRITE(IOUT,1921)  ICASE
      WRITE(IOUT,1911)
      DO 61 II = 1, NX
C
C  *****   Define the T-Matrix   *****
C
      DO 62 JJ = 1, NZ
      T(JJ,II) = CRAN1*(TWO*RAN(ISEED1) - ONE) +
     1           CRAN2*(TWO*RAN(JSEED1) - ONE)
   62 CONTINUE
C
C  *****   Define the Previous Actual Control Vector   *****
```

```
C
      X0(II)   = CRAN3*(TWO*RAN(ISEED2) - ONE) +
     1                  CRAN4*(TWO*RAN(JSEED2) - ONE)
      WRITE(IOUT,1904)  II,  XL0(II),  X0(II),  XU0(II)
C
C  *****   Adjust Previous Actual Control Vector
C                      to be Within Feasible Limits if Required.   *****
C
      IF (X0(II) - EPS - XL0(II)) 63, 64, 64
   63 X0(II) = XL0(II) + EPS
      GO TO 66
   64 IF (X0(II) + EPS - XU0(II)) 61, 61, 65
   65 X0(II) = XU0(II) - EPS
   66 WRITE(IOUT,1904)  II,  XL0(II),  X0(II),  XU0(II)
   61 CONTINUE
C
      WRITE(IOUT,1924)
C
C  *****   Define the Previous Ideally Computed Measurement Vector   *****
C
      DO 42 JJ = 1, NZ
      SUMZ = ZERO
      DO 47 II = 1, NX
      SUMZ = SUMZ + T(JJ,II)*X0(II)
   47 CONTINUE
      Z0(JJ) = SUMZ
C
C  *****   Define the Previous Actual Measurement Vector   *****
C
      DZ0(JJ) = CRAN5*(TWO*RAN(ISEED3) - ONE) +
     1                 CRAN6*(TWO*RAN(JSEED3) - ONE)
      ZA(JJ)  = Z0(JJ) + DZ0(JJ)
      WRITE(IOUT,1904)  JJ,  ZA(JJ),  Z0(JJ),  DZ0(JJ)
   42 CONTINUE
C
      GO TO 40
C
C  *****   Input the X0 & ZA Vectors, and the T-Matrix via TDATA   *****
C
   50 WRITE(IOUT,1915)
      WRITE(IOUT,1930)
      WRITE(IOUT,1921)  ICASE
      WRITE(IOUT,1911)
C
C  *****   Write the Previous Actual Control Vector   *****
C
      DO 31 II = 1, NX
      WRITE(IOUT,1904)  II,  XL0(II),  X0(II),  XU0(II)
C
C  *****   Adjust Previous Actual Control Vector
C                      to be Within Feasible Limits if Required.   *****
C
      IF (X0(II) - EPS - XL0(II)) 33, 34, 34
   33 X0(II) = XL0(II) + EPS
      GO TO 36
   34 IF (X0(II) + EPS - XU0(II)) 31, 31, 35
   35 X0(II) = XU0(II) - EPS
   36 WRITE(IOUT,1904)  II,  XL0(II),  X0(II),  XU0(II)
   31 CONTINUE
C
      WRITE(IOUT,1924)
C
C  *****   Define the Previous Ideally Computed Measurement Vector   *****
C
      DO 37 JJ = 1, NZ
```

```
      SUMZ = ZERO
      DO 38 II = 1, NX
      SUMZ = SUMZ + T(JJ,II)*X0(II)
   38 CONTINUE
      Z0(JJ) = SUMZ
C
C  *****   Define the Difference Between the Actual
C                         and the Ideal Previous Measurement Vector   *****
C
      DZ0(JJ) = ZA(JJ) - Z0(JJ)
      WRITE(IOUT,1904)  JJ,  ZA(JJ),  Z0(JJ),  DZ0(JJ)
   37 CONTINUE
C
C
C  *****   Define the Initial Estimate of the Control Vector   *****
C
   40 WRITE(IOUT,1907)  ICASE
      WRITE(IOUT,1922)
      DO 41 II = 1, NX
      X(II)  = X0(II)
      DX(II) = X(II) - X0(II)
      WRITE(IOUT,1923)  II,  XL(II),  X(II),  XU(II), DX(II)
      IF (X(II) - EPS - XL(II)) 43, 44, 44
   43 X(II)  = XL(II) + EPS
      DX(II) = X(II) - X0(II)
      GO TO 46
   44 IF (X(II) + EPS - XU(II)) 41, 41, 45
   45 X(II)  = XU(II) - EPS
      DX(II) = X(II) - X0(II)
   46 WRITE(IOUT,1923)  II,  XL(II),  X(II),  XU(II), DX(II)
   41 CONTINUE
C
C   *****   Write T-Matrix   ***
C
      IF (ITOUT .LE. 0)  GO TO 92
      WRITE(IOUT,1927)
      DO 91 JJ = 1, NZ
      WRITE(IOUT,1928) JJ, (T(JJ,II), II=1,NX)
   91 CONTINUE
      GO TO 93
   92 WRITE(IOUT,1929)
C
C   *****   Performance Index   *****
C
   93 SUMF = ZERO
      DO 67 JJ = 1, NZ
      SUMZ = ZERO
      DO 68 II = 1, NX
      SUMZ   =  SUMZ + T(JJ,II)*X(II)
   68 CONTINUE
      Z(JJ)  =  SUMZ + DZ0(JJ)
      DZ(JJ) =  Z(JJ) - ZA(JJ)
      SUMF = SUMF + Z(JJ)*Z(JJ)*WDT(JJ)
   67 CONTINUE
      WRITE(IOUT,1925)
      DO 48 JJ = 1, NZ
      WRITE(IOUT,1923)  JJ,  Z(JJ),  ZA(JJ),  DZ(JJ),  WDT(JJ)
   48 CONTINUE
      F = SUMF
      WRITE(IOUT,1909) F
C
C   *****   Constraint Functions   *****
C
      IF (MG) 999, 51, 71
   51 WRITE(IOUT,1920)  ICASE
```

```
      GO TO 70
   71 WRITE(IOUT,1917)  ICASE
      IF (ME) 999, 74, 72
   72 CONTINUE
      G0(1)  = X(1)*X(4)   - X(2)*X(3)
      G(1)   = GEQ(1)  - G0(1)
      G0(2)  = X(5)*X(8)   - X(6)*X(7)
      G(2)   = GEQ(2)  - G0(2)
      G0(3)  = X(9)*X(12)  - X(10)*X(11)
      G(3)   = GEQ(3)  - G0(3)
      G0(4)  = X(13)*X(16) - X(14)*X(15)
      G(4)   = GEQ(4)  - G0(4)
      G0(5)  = X(17)*X(20) - X(18)*X(19)
      G(5)   = GEQ(5)  - G0(5)
      G0(6)  = X(21)*X(24) - X(22)*X(23)
      G(6)   = GEQ(6)  - G0(6)
      G0(7)  = X(25)*X(28) - X(26)*X(27)
      G(7)   = GEQ(7)  - G0(7)
      G0(8)  = X(29)*X(32) - X(30)*X(31)
      G(8)   = GEQ(8)  - G0(8)
      G0(9)  = X(33)*X(36) - X(34)*X(35)
      G(9)   = GEQ(9)  - G0(9)
      G0(10) = X(37)*X(40) - X(38)*X(39)
      G(10)  = GEQ(10) - G0(10)
      G0(11) = X(41)*X(44) - X(42)*X(43)
      G(11)  = GEQ(11) - G0(11)
      G0(12) = X(45)*X(48) - X(46)*X(47)
      G(12)  = GEQ(12) - G0(12)
      G0(13) = X(49)*X(52) - X(50)*X(51)
      G(13)  = GEQ(13) - G0(13)
      G0(14) = X(53)*X(56) - X(54)*X(55)
      G(14)  = GEQ(14) - G0(14)
      G0(15) = X(57)*X(60) - X(58)*X(59)
      G(15)  = GEQ(15) - G0(15)
      WRITE(IOUT,1919)
      DO 73 IE = 1, ME
      WRITE(IOUT,1910)  IE,  G0(IE),  GEQ(IE), -G(IE)
   73 CONTINUE
      IF (MI) 999, 70, 75
   74 IF (MI) 999, 51, 52
   52 CONTINUE
      G0(1)  = DSQRT(X(1)*X(1)   + X(2)*X(2))
      G(1)   = GMAX(1)  - G0(1)
      G0(2)  = DSQRT(X(3)*X(3)   + X(4)*X(4))
      G(2)   = GMAX(2)  - G0(2)
      G0(3)  = DSQRT(X(5)*X(5)   + X(6)*X(6))
      G(3)   = GMAX(3)  - G0(3)
      G0(4)  = DSQRT(X(7)*X(7)   + X(8)*X(8))
      G(4)   = GMAX(4)  - G0(4)
      G0(5)  = DSQRT(X(9)*X(9)   + X(10)*X(10))
      G(5)   = GMAX(5)  - G0(5)
      G0(6)  = DSQRT(X(11)*X(11) + X(12)*X(12))
      G(6)   = GMAX(6)  - G0(6)
      G0(7)  = DSQRT(X(13)*X(13) + X(14)*X(14))
      G(7)   = GMAX(7)  - G0(7)
      G0(8)  = DSQRT(X(15)*X(15) + X(16)*X(16))
      G(8)   = GMAX(8)  - G0(8)
      G0(9)  = DSQRT(X(17)*X(17) + X(18)*X(18))
      G(9)   = GMAX(9)  - G0(9)
      G0(10) = DSQRT(X(19)*X(19) + X(20)*X(20))
      G(10)  = GMAX(10) - G0(10)
      G0(11) = DSQRT(X(21)*X(21) + X(22)*X(22))
      G(11)  = GMAX(11) - G0(11)
      G0(12) = DSQRT(X(23)*X(23) + X(24)*X(24))
      G(12)  = GMAX(12) - G0(12)
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```
      G0(13) = DSQRT(X(25)*X(25) + X(26)*X(26))
      G(13)  = GMAX(13) - G0(13)
      G0(14) = DSQRT(X(27)*X(27) + X(28)*X(28))
      G(14)  = GMAX(14) - G0(14)
      G0(15) = DSQRT(X(29)*X(29) + X(30)*X(30))
      G(15)  = GMAX(15) - G0(15)
      G0(16) = DSQRT(X(31)*X(31) + X(32)*X(32))
      G(16)  = GMAX(16) - G0(16)
      G0(17) = DSQRT(X(33)*X(33) + X(34)*X(34))
      G(17)  = GMAX(17) - G0(17)
      G0(18) = DSQRT(X(35)*X(35) + X(36)*X(36))
      G(18)  = GMAX(18) - G0(18)
      G0(19) = DSQRT(X(37)*X(37) + X(38)*X(38))
      G(19)  = GMAX(19) - G0(19)
      G0(20) = DSQRT(X(39)*X(39) + X(40)*X(40))
      G(20)  = GMAX(20) - G0(20)
      G0(21) = DSQRT(X(41)*X(41) + X(42)*X(42))
      G(21)  = GMAX(21) - G0(21)
      G0(22) = DSQRT(X(43)*X(43) + X(44)*X(44))
      G(22)  = GMAX(22) - G0(22)
      G0(23) = DSQRT(X(45)*X(45) + X(46)*X(46))
      G(23)  = GMAX(23) - G0(23)
      G0(24) = DSQRT(X(47)*X(47) + X(48)*X(48))
      G(24)  = GMAX(24) - G0(24)
      G0(25) = DSQRT(X(49)*X(49) + X(50)*X(50))
      G(25)  = GMAX(25) - G0(25)
      G0(26) = DSQRT(X(51)*X(51) + X(52)*X(52))
      G(26)  = GMAX(26) - G0(26)
      G0(27) = DSQRT(X(53)*X(53) + X(54)*X(54))
      G(27)  = GMAX(27) - G0(27)
      G0(28) = DSQRT(X(55)*X(55) + X(56)*X(56))
      G(28)  = GMAX(18) - G0(28)
      G0(29) = DSQRT(X(57)*X(57) + X(58)*X(58))
      G(29)  = GMAX(19) - G0(29)
      G0(30) = DSQRT(X(59)*X(59) + X(60)*X(60))
      G(30)  = GMAX(30) - G0(30)
C
      G0(31) = DABS(DX(1))
      G(31)  = GMAX(31) - G0(31)
      G0(32) = DABS(DX(2))
      G(32)  = GMAX(32) - G0(32)
      G0(33) = DABS(DX(3))
      G(33)  = GMAX(33) - G0(33)
      G0(34) = DABS(DX(4))
      G(34)  = GMAX(34) - G0(34)
      G0(35) = DABS(DX(5))
      G(35)  = GMAX(35) - G0(35)
      G0(36) = DABS(DX(6))
      G(36)  = GMAX(36) - G0(36)
      G0(37) = DABS(DX(7))
      G(37)  = GMAX(37) - G0(37)
      G0(38) = DABS(DX(8))
      G(38)  = GMAX(38) - G0(38)
      G0(39) = DABS(DX(9))
      G(39)  = GMAX(39) - G0(39)
      G0(40) = DABS(DX(10))
      G(40)  = GMAX(40) - G0(40)
      G0(41) = DABS(DX(11))
      G(41)  = GMAX(41) - G0(41)
      G0(42) = DABS(DX(12))
      G(42)  = GMAX(42) - G0(42)
      G0(43) = DABS(DX(13))
      G(43)  = GMAX(43) - G0(43)
      G0(44) = DABS(DX(14))
      G(44)  = GMAX(44) - G0(44)
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G0(45) = DABS(DX(15))
G(45)  = GMAX(45) - G0(45)
G0(46) = DABS(DX(16))
G(46)  = GMAX(46) - G0(46)
G0(47) = DABS(DX(17))
G(47)  = GMAX(47) - G0(47)
G0(48) = DABS(DX(18))
G(48)  = GMAX(48) - G0(48)
G0(49) = DABS(DX(19))
G(49)  = GMAX(49) - G0(49)
G0(50) = DABS(DX(20))
G(50)  = GMAX(50) - G0(50)
G0(51) = DABS(DX(21))
G(51)  = GMAX(51) - G0(51)
G0(52) = DABS(DX(22))
G(52)  = GMAX(52) - G0(52)
G0(53) = DABS(DX(23))
G(53)  = GMAX(53) - G0(53)
G0(54) = DABS(DX(24))
G(54)  = GMAX(54) - G0(54)
G0(55) = DABS(DX(25))
G(55)  = GMAX(55) - G0(55)
G0(56) = DABS(DX(26))
G(56)  = GMAX(56) - G0(56)
G0(57) = DABS(DX(27))
G(57)  = GMAX(57) - G0(57)
G0(58) = DABS(DX(28))
G(58)  = GMAX(58) - G0(58)
G0(59) = DABS(DX(29))
G(59)  = GMAX(59) - G0(59)
G0(60) = DABS(DX(30))
G(60)  = GMAX(60) - G0(60)
G0(61) = DABS(DX(31))
G(61)  = GMAX(61) - G0(61)
G0(62) = DABS(DX(32))
G(62)  = GMAX(62) - G0(62)
G0(63) = DABS(DX(33))
G(63)  = GMAX(63) - G0(63)
G0(64) = DABS(DX(34))
G(64)  = GMAX(64) - G0(64)
G0(65) = DABS(DX(35))
G(65)  = GMAX(65) - G0(65)
G0(66) = DABS(DX(36))
G(66)  = GMAX(66) - G0(66)
G0(67) = DABS(DX(37))
G(67)  = GMAX(67) - G0(67)
G0(68) = DABS(DX(38))
G(68)  = GMAX(68) - G0(68)
G0(69) = DABS(DX(39))
G(69)  = GMAX(69) - G0(69)
G0(70) = DABS(DX(40))
G(70)  = GMAX(70) - G0(70)
G0(71) = DABS(DX(41))
G(71)  = GMAX(71) - G0(71)
G0(72) = DABS(DX(42))
G(72)  = GMAX(72) - G0(72)
G0(73) = DABS(DX(43))
G(73)  = GMAX(73) - G0(73)
G0(74) = DABS(DX(44))
G(74)  = GMAX(74) - G0(74)
G0(75) = DABS(DX(45))
G(75)  = GMAX(75) - G0(75)
G0(76) = DABS(DX(46))
G(76)  = GMAX(76) - G0(76)
G0(77) = DABS(DX(47))
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      G(77)  = GMAX(77) - G0(77)
      G0(78) = DABS(DX(48))
      G(78)  = GMAX(78) - G0(78)
      G0(79) = DABS(DX(49))
      G(79)  = GMAX(79) - G0(79)
      G0(80) = DABS(DX(50))
      G(80)  = GMAX(80) - G0(80)
      G0(81) = DABS(DX(51))
      G(81)  = GMAX(81) - G0(81)
      G0(82) = DABS(DX(52))
      G(82)  = GMAX(82) - G0(82)
      G0(83) = DABS(DX(53))
      G(83)  = GMAX(83) - G0(83)
      G0(84) = DABS(DX(54))
      G(84)  = GMAX(84) - G0(84)
      G0(85) = DABS(DX(55))
      G(85)  = GMAX(85) - G0(85)
      G0(86) = DABS(DX(56))
      G(86)  = GMAX(86) - G0(86)
      G0(87) = DABS(DX(57))
      G(87)  = GMAX(87) - G0(87)
      G0(88) = DABS(DX(58))
      G(88)  = GMAX(88) - G0(88)
      G0(89) = DABS(DX(59))
      G(89)  = GMAX(89) - G0(89)
      G0(90) = DABS(DX(60))
      G(90)  = GMAX(90) - G0(90)
      WRITE(IOUT,1916)
      DO 53 IQ = 1, MI
      WRITE(IOUT,1910)  IQ,  G0(IQ),  GMAX(IQ), G(IQ)
   53 CONTINUE
      GO TO 70
   75 CONTINUE
      G0(16)  = DSQRT(X(1)*X(1)   + X(2)*X(2))
      G(16)   = GMAX(1)  - G0(16)
      G0(17)  = DSQRT(X(3)*X(3)   + X(4)*X(4))
      G(17)   = GMAX(2)  - G0(17)
      G0(18)  = DSQRT(X(5)*X(5)   + X(6)*X(6))
      G(18)   = GMAX(3)  - G0(18)
      G0(19)  = DSQRT(X(7)*X(7)   + X(8)*X(8))
      G(19)   = GMAX(4)  - G0(19)
      G0(20)  = DSQRT(X(9)*X(9)   + X(10)*X(10))
      G(20)   = GMAX(5)  - G0(20)
      G0(21)  = DSQRT(X(11)*X(11) + X(12)*X(12))
      G(21)   = GMAX(6)  - G0(21)
      G0(22)  = DSQRT(X(13)*X(13) + X(14)*X(14))
      G(22)   = GMAX(7)  - G0(22)
      G0(23)  = DSQRT(X(15)*X(15) + X(16)*X(16))
      G(23)   = GMAX(8)  - G0(23)
      G0(24)  = DSQRT(X(17)*X(17) + X(18)*X(18))
      G(24)   = GMAX(9)  - G0(24)
      G0(25)  = DSQRT(X(19)*X(19) + X(20)*X(20))
      G(25)   = GMAX(10) - G0(25)
      G0(26)  = DSQRT(X(21)*X(21) + X(22)*X(22))
      G(26)   = GMAX(11) - G0(26)
      G0(27)  = DSQRT(X(23)*X(23) + X(24)*X(24))
      G(27)   = GMAX(12) - G0(27)
      G0(28)  = DSQRT(X(25)*X(25) + X(26)*X(26))
      G(28)   = GMAX(13) - G0(28)
      G0(29)  = DSQRT(X(27)*X(27) + X(28)*X(28))
      G(29)   = GMAX(14) - G0(29)
      G0(30)  = DSQRT(X(29)*X(29) + X(30)*X(30))
      G(30)   = GMAX(15) - G0(30)
      G0(31)  = DSQRT(X(31)*X(31) + X(32)*X(32))
      G(31)   = GMAX(16) - G0(31)
```

```
      G0(32)  = DSQRT(X(33)*X(33) + X(34)*X(34))
      G(32)   = GMAX(17) - G0(32)
      G0(33)  = DSQRT(X(35)*X(35) + X(36)*X(36))
      G(33)   = GMAX(18) - G0(33)
      G0(34)  =  DSQRT(X(37)*X(37) + X(38)*X(38))
      G(34)   = GMAX(19) - G0(34)
      G0(35)  = DSQRT(X(39)*X(39) + X(40)*X(40))
      G(35)   = GMAX(20) - G0(35)
      G0(36)  = DSQRT(X(41)*X(41) + X(42)*X(42))
      G(36)   = GMAX(21) - G0(36)
      G0(37)  = DSQRT(X(43)*X(43) + X(44)*X(44))
      G(37)   = GMAX(22) - G0(37)
      G0(38)  = DSQRT(X(45)*X(45) + X(46)*X(46))
      G(38)   = GMAX(23) - G0(38)
      G0(39)  = DSQRT(X(47)*X(47) + X(48)*X(48))
      G(39)   = GMAX(24) - G0(39)
      G0(40)  = DSQRT(X(49)*X(49) + X(50)*X(50))
      G(40)   = GMAX(25) - G0(40)
      G0(41)  = DSQRT(X(51)*X(51) + X(52)*X(52))
      G(41)   = GMAX(26) - G0(41)
      G0(42)  = DSQRT(X(53)*X(53) + X(54)*X(54))
      G(42)   = GMAX(27) - G0(42)
      G0(43)  = DSQRT(X(55)*X(55) + X(56)*X(56))
      G(43)   = GMAX(18) - G0(43)
      G0(44)  = DSQRT(X(57)*X(57) + X(58)*X(58))
      G(44)   = GMAX(19) - G0(44)
      G0(45)  = DSQRT(X(59)*X(59) + X(60)*X(60))
      G(45)   = GMAX(30) - G0(45)
C
      G0(46)  = DABS(DX(1))
      G(46)   = GMAX(31) - G0(46)
      G0(47)  = DABS(DX(2))
      G(47)   = GMAX(32) - G0(47)
      G0(48)  = DABS(DX(3))
      G(48)   = GMAX(33) - G0(49)
      G0(49)  = DABS(DX(4))
      G(49)   = GMAX(34) - G0(49)
      G0(50)  = DABS(DX(5))
      G(50)   = GMAX(35) - G0(50)
      G0(51)  = DABS(DX(6))
      G(51)   = GMAX(36) - G0(51)
      G0(52)  = DABS(DX(7))
      G(52)   = GMAX(37) - G0(52)
      G0(53)  = DABS(DX(8))
      G(53)   = GMAX(38) - G0(53)
      G0(54)  = DABS(DX(9))
      G(54)   = GMAX(39) - G0(54)
      G0(55)  = DABS(DX(10))
      G(55)   = GMAX(40) - G0(55)
      G0(56)  = DABS(DX(11))
      G(56)   = GMAX(41) - G0(56)
      G0(57)  = DABS(DX(12))
      G(57)   = GMAX(42) - G0(57)
      G0(58)  = DABS(DX(13))
      G(58)   = GMAX(43) - G0(58)
      G0(59)  = DABS(DX(14))
      G(59)   = GMAX(44) - G0(59)
      G0(60)  = DABS(DX(15))
      G(60)   = GMAX(45) - G0(60)
      G0(61)  = DABS(DX(16))
      G(61)   = GMAX(46) - G0(61)
      G0(62)  = DABS(DX(17))
      G(62)   = GMAX(47) - G0(62)
      G0(63)  = DABS(DX(18))
      G(63)   = GMAX(48) - G0(63)
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G0(64)  = DABS(DX(19))
G(64)   = GMAX(49) - G0(64)
G0(65)  = DABS(DX(20))
G(65)   = GMAX(50) - G0(65)
G0(66)  = DABS(DX(21))
G(66)   = GMAX(51) - G0(66)
G0(67)  = DABS(DX(22))
G(67)   = GMAX(52) - G0(67)
G0(68)  = DABS(DX(23))
G(68)   = GMAX(53) - G0(68)
G0(69)  = DABS(DX(24))
G(69)   = GMAX(54) - G0(69)
G0(70)  = DABS(DX(25))
G(70)   = GMAX(55) - G0(70)
G0(71)  = DABS(DX(26))
G(71)   = GMAX(56) - G0(71)
G0(72)  = DABS(DX(27))
G(72)   = GMAX(57) - G0(72)
G0(73)  = DABS(DX(28))
G(73)   = GMAX(58) - G0(73)
G0(74)  = DABS(DX(29))
G(74)   = GMAX(59) - G0(74)
G0(75)  = DABS(DX(30))
G(75)   = GMAX(60) - G0(75)
G0(76)  = DABS(DX(31))
G(76)   = GMAX(61) - G0(76)
G0(77)  = DABS(DX(32))
G(77)   = GMAX(62) - G0(77)
G0(78)  = DABS(DX(33))
G(78)   = GMAX(63) - G0(78)
G0(79)  = DABS(DX(34))
G(79)   = GMAX(64) - G0(79)
G0(80)  = DABS(DX(35))
G(80)   = GMAX(65) - G0(80)
G0(81)  = DABS(DX(36))
G(81)   = GMAX(66) - G0(81)
G0(82)  = DABS(DX(37))
G(82)   = GMAX(67) - G0(82)
G0(83)  = DABS(DX(38))
G(83)   = GMAX(68) - G0(83)
G0(84)  = DABS(DX(39))
G(84)   = GMAX(69) - G0(84)
G0(85)  = DABS(DX(40))
G(85)   = GMAX(70) - G0(85)
G0(86)  = DABS(DX(41))
G(86)   = GMAX(71) - G0(86)
G0(87)  = DABS(DX(42))
G(87)   = GMAX(72) - G0(87)
G0(88)  = DABS(DX(43))
G(88)   = GMAX(73) - G0(88)
G0(89)  = DABS(DX(44))
G(89)   = GMAX(74) - G0(89)
G0(90)  = DABS(DX(45))
G(90)   = GMAX(75) - G0(90)
G0(91)  = DABS(DX(46))
G(91)   = GMAX(76) - G0(91)
G0(92)  = DABS(DX(47))
G(92)   = GMAX(77) - G0(92)
G0(93)  = DABS(DX(48))
G(93)   = GMAX(78) - G0(93)
G0(94)  = DABS(DX(49))
G(94)   = GMAX(79) - G0(94)
G0(95)  = DABS(DX(50))
G(95)   = GMAX(80) - G0(95)
G0(96)  = DABS(DX(51))
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      G(96)   = GMAX(81) - G0(96)
      G0(97)  = DABS(DX(52))
      G(97)   = GMAX(82) - G0(97)
      G0(98)  = DABS(DX(53))
      G(98)   = GMAX(83) - G0(98)
      G0(99)  = DABS(DX(54))
      G(99)   = GMAX(84) - G0(99)
      G0(100) = DABS(DX(55))
      G(100)  = GMAX(85) - G0(100)
      G0(101) = DABS(DX(56))
      G(101)  = GMAX(86) - G0(101)
      G0(102) = DABS(DX(57))
      G(102)  = GMAX(87) - G0(102)
      G0(103) = DABS(DX(58))
      G(103)  = GMAX(88) - G0(103)
      G0(104) = DABS(DX(59))
      G(104)  = GMAX(89) - G0(104)
      G0(105) = DABS(DX(60))
      G(105)  = GMAX(90) - G0(105)
      WRITE(IOUT,1916)
      DO 76 IQ = 1, MI
      IG = ME + IQ
      WRITE(IOUT,1910)  IQ,  G0(IG),  GMAX(IQ), G(IG)
   76 CONTINUE
   70 CONTINUE
C
      GO TO (96,96,200), IOPT
C
C  *****   NLPQLP Optimisation   *****
C
   96 WRITE(IOUT,1950)  ICASE
C
      I      = 0
C
    1 CONTINUE
C
C============================================================
C
C   This is the main block to compute all function values.
C   The block is executed either for computing a steplength
C   sequentially or for approximating gradients by forward
C   differences.
C
C   *****   Performance Index   *****
C
      SUMF = ZERO
      DO 98 II = 1, NX
      DX(II) = X(II) - X0(II)
   98 CONTINUE
      DO 77 JJ = 1, NZ
      SUMZ = ZERO
      DO 78 II = 1, NX
      SUMZ   =  SUMZ + T(JJ,II)*X(II)
   78 CONTINUE
      Z(JJ)  =  SUMZ + DZ0(JJ)
      DZ(JJ) =  Z(JJ) - ZA(JJ)
      SUMF = SUMF + Z(JJ)*Z(JJ)*WDT(JJ)
   77 CONTINUE
      F = SUMF
C
C   *****   Constraint Functions   *****
C
      IF (MG) 999, 60, 88
   88 IF (ME) 999, 58, 57
   57 CONTINUE
```

```
      G0(1)  = X(1)*X(4)   - X(2)*X(3)
      G(1)   = GEQ(1)  - G0(1)
      G0(2)  = X(5)*X(8)   - X(6)*X(7)
      G(2)   = GEQ(2)  - G0(2)
      G0(3)  = X(9)*X(12)  - X(10)*X(11)
      G(3)   = GEQ(3)  - G0(3)
      G0(4)  = X(13)*X(16) - X(14)*X(15)
      G(4)   = GEQ(4)  - G0(4)
      G0(5)  = X(17)*X(20) - X(18)*X(19)
      G(5)   = GEQ(5)  - G0(5)
      G0(6)  = X(21)*X(24) - X(22)*X(23)
      G(6)   = GEQ(6)  - G0(6)
      G0(7)  = X(25)*X(28) - X(26)*X(27)
      G(7)   = GEQ(7)  - G0(7)
      G0(8)  = X(29)*X(32) - X(30)*X(31)
      G(8)   = GEQ(8)  - G0(8)
      G0(9)  = X(33)*X(36) - X(34)*X(35)
      G(9)   = GEQ(9)  - G0(9)
      G0(10) = X(37)*X(40) - X(38)*X(39)
      G(10)  = GEQ(10) - G0(10)
      G0(11) = X(41)*X(44) - X(42)*X(43)
      G(11)  = GEQ(11) - G0(11)
      G0(12) = X(45)*X(48) - X(46)*X(47)
      G(12)  = GEQ(12) - G0(12)
      G0(13) = X(49)*X(52) - X(50)*X(51)
      G(13)  = GEQ(13) - G0(13)
      G0(14) = X(53)*X(56) - X(54)*X(55)
      G(14)  = GEQ(14) - G0(14)
      G0(15) = X(57)*X(60) - X(58)*X(59)
      G(15)  = GEQ(15) - G0(15)
      IF (MI) 999, 60, 59
   58 IF (MI) 999, 60, 87
   87 CONTINUE
      G0(1)  = DSQRT(X(1)*X(1)   + X(2)*X(2))
      G(1)   = GMAX(1)  - G0(1)
      G0(2)  = DSQRT(X(3)*X(3)   + X(4)*X(4))
      G(2)   = GMAX(2)  - G0(2)
      G0(3)  = DSQRT(X(5)*X(5)   + X(6)*X(6))
      G(3)   = GMAX(3)  - G0(3)
      G0(4)  = DSQRT(X(7)*X(7)   + X(8)*X(8))
      G(4)   = GMAX(4)  - G0(4)
      G0(5)  = DSQRT(X(9)*X(9)   + X(10)*X(10))
      G(5)   = GMAX(5)  - G0(5)
      G0(6)  = DSQRT(X(11)*X(11) + X(12)*X(12))
      G(6)   = GMAX(6)  - G0(6)
      G0(7)  = DSQRT(X(13)*X(13) + X(14)*X(14))
      G(7)   = GMAX(7)  - G0(7)
      G0(8)  = DSQRT(X(15)*X(15) + X(16)*X(16))
      G(8)   = GMAX(8)  - G0(8)
      G0(9)  = DSQRT(X(17)*X(17) + X(18)*X(18))
      G(9)   = GMAX(9)  - G0(9)
      G0(10) = DSQRT(X(19)*X(19) + X(20)*X(20))
      G(10)  = GMAX(10) - G0(10)
      G0(11) = DSQRT(X(21)*X(21) + X(22)*X(22))
      G(11)  = GMAX(11) - G0(11)
      G0(12) = DSQRT(X(23)*X(23) + X(24)*X(24))
      G(12)  = GMAX(12) - G0(12)
      G0(13) = DSQRT(X(25)*X(25) + X(26)*X(26))
      G(13)  = GMAX(13) - G0(13)
      G0(14) = DSQRT(X(27)*X(27) + X(28)*X(28))
      G(14)  = GMAX(14) - G0(14)
      G0(15) = DSQRT(X(29)*X(29) + X(30)*X(30))
      G(15)  = GMAX(15) - G0(15)
      G0(16) = DSQRT(X(31)*X(31) + X(32)*X(32))
      G(16)  = GMAX(16) - G0(16)
```

```
      G0(17) = DSQRT(X(33)*X(33) + X(34)*X(34))
      G(17)  = GMAX(17) - G0(17)
      G0(18) = DSQRT(X(35)*X(35) + X(36)*X(36))
      G(18)  = GMAX(18) - G0(18)
      G0(19) = DSQRT(X(37)*X(37) + X(38)*X(38))
      G(19)  = GMAX(19) - G0(19)
      G0(20) = DSQRT(X(39)*X(39) + X(40)*X(40))
      G(20)  = GMAX(20) - G0(20)
      G0(21) = DSQRT(X(41)*X(41) + X(42)*X(42))
      G(21)  = GMAX(21) - G0(21)
      G0(22) = DSQRT(X(43)*X(43) + X(44)*X(44))
      G(22)  = GMAX(22) - G0(22)
      G0(23) = DSQRT(X(45)*X(45) + X(46)*X(46))
      G(23)  = GMAX(23) - G0(23)
      G0(24) = DSQRT(X(47)*X(47) + X(48)*X(48))
      G(24)  = GMAX(24) - G0(24)
      G0(25) = DSQRT(X(49)*X(49) + X(50)*X(50))
      G(25)  = GMAX(25) - G0(25)
      G0(26) = DSQRT(X(51)*X(51) + X(52)*X(52))
      G(26)  = GMAX(26) - G0(26)
      G0(27) = DSQRT(X(53)*X(53) + X(54)*X(54))
      G(27)  = GMAX(27) - G0(27)
      G0(28) = DSQRT(X(55)*X(55) + X(56)*X(56))
      G(28)  = GMAX(18) - G0(28)
      G0(29) = DSQRT(X(57)*X(57) + X(58)*X(58))
      G(29)  = GMAX(19) - G0(29)
      G0(30) = DSQRT(X(59)*X(59) + X(60)*X(60))
      G(30)  = GMAX(30) - G0(30)
C
      G0(31) = DABS(DX(1))
      G(31)  = GMAX(31) - G0(31)
      G0(32) = DABS(DX(2))
      G(32)  = GMAX(32) - G0(32)
      G0(33) = DABS(DX(3))
      G(33)  = GMAX(33) - G0(33)
      G0(34) = DABS(DX(4))
      G(34)  = GMAX(34) - G0(34)
      G0(35) = DABS(DX(5))
      G(35)  = GMAX(35) - G0(35)
      G0(36) = DABS(DX(6))
      G(36)  = GMAX(36) - G0(36)
      G0(37) = DABS(DX(7))
      G(37)  = GMAX(37) - G0(37)
      G0(38) = DABS(DX(8))
      G(38)  = GMAX(38) - G0(38)
      G0(39) = DABS(DX(9))
      G(39)  = GMAX(39) - G0(39)
      G0(40) = DABS(DX(10))
      G(40)  = GMAX(40) - G0(40)
      G0(41) = DABS(DX(11))
      G(41)  = GMAX(41) - G0(41)
      G0(42) = DABS(DX(12))
      G(42)  = GMAX(42) - G0(42)
      G0(43) = DABS(DX(13))
      G(43)  = GMAX(43) - G0(43)
      G0(44) = DABS(DX(14))
      G(44)  = GMAX(44) - G0(44)
      G0(45) = DABS(DX(15))
      G(45)  = GMAX(45) - G0(45)
      G0(46) = DABS(DX(16))
      G(46)  = GMAX(46) - G0(46)
      G0(47) = DABS(DX(17))
      G(47)  = GMAX(47) - G0(47)
      G0(48) = DABS(DX(18))
      G(48)  = GMAX(48) - G0(48)
```

```
G0(49) = DABS(DX(19))
G(49)  = GMAX(49) - G0(49)
G0(50) = DABS(DX(20))
G(50)  = GMAX(50) - G0(50)
G0(51) = DABS(DX(21))
G(51)  = GMAX(51) - G0(51)
G0(52) = DABS(DX(22))
G(52)  = GMAX(52) - G0(52)
G0(53) = DABS(DX(23))
G(53)  = GMAX(53) - G0(53)
G0(54) = DABS(DX(24))
G(54)  = GMAX(54) - G0(54)
G0(55) = DABS(DX(25))
G(55)  = GMAX(55) - G0(55)
G0(56) = DABS(DX(26))
G(56)  = GMAX(56) - G0(56)
G0(57) = DABS(DX(27))
G(57)  = GMAX(57) - G0(57)
G0(58) = DABS(DX(28))
G(58)  = GMAX(58) - G0(58)
G0(59) = DABS(DX(29))
G(59)  = GMAX(59) - G0(59)
G0(60) = DABS(DX(30))
G(60)  = GMAX(60) - G0(60)
G0(61) = DABS(DX(31))
G(61)  = GMAX(61) - G0(61)
G0(62) = DABS(DX(32))
G(62)  = GMAX(62) - G0(62)
G0(63) = DABS(DX(33))
G(63)  = GMAX(63) - G0(63)
G0(64) = DABS(DX(34))
G(64)  = GMAX(64) - G0(64)
G0(65) = DABS(DX(35))
G(65)  = GMAX(65) - G0(65)
G0(66) = DABS(DX(36))
G(66)  = GMAX(66) - G0(66)
G0(67) = DABS(DX(37))
G(67)  = GMAX(67) - G0(67)
G0(68) = DABS(DX(38))
G(68)  = GMAX(68) - G0(68)
G0(69) = DABS(DX(39))
G(69)  = GMAX(69) - G0(69)
G0(70) = DABS(DX(40))
G(70)  = GMAX(70) - G0(70)
G0(71) = DABS(DX(41))
G(71)  = GMAX(71) - G0(71)
G0(72) = DABS(DX(42))
G(72)  = GMAX(72) - G0(72)
G0(73) = DABS(DX(43))
G(73)  = GMAX(73) - G0(73)
G0(74) = DABS(DX(44))
G(74)  = GMAX(74) - G0(74)
G0(75) = DABS(DX(45))
G(75)  = GMAX(75) - G0(75)
G0(76) = DABS(DX(46))
G(76)  = GMAX(76) - G0(76)
G0(77) = DABS(DX(47))
G(77)  = GMAX(77) - G0(77)
G0(78) = DABS(DX(48))
G(78)  = GMAX(78) - G0(78)
G0(79) = DABS(DX(49))
G(79)  = GMAX(79) - G0(79)
G0(80) = DABS(DX(50))
G(80)  = GMAX(80) - G0(80)
G0(81) = DABS(DX(51))
```

```
      G(81)  = GMAX(81) - G0(81)
      G0(82) = DABS(DX(52))
      G(82)  = GMAX(82) - G0(82)
      G0(83) = DABS(DX(53))
      G(83)  = GMAX(83) - G0(83)
      G0(84) = DABS(DX(54))
      G(84)  = GMAX(84) - G0(84)
      G0(85) = DABS(DX(55))
      G(85)  = GMAX(85) - G0(85)
      G0(86) = DABS(DX(56))
      G(86)  = GMAX(86) - G0(86)
      G0(87) = DABS(DX(57))
      G(87)  = GMAX(87) - G0(87)
      G0(88) = DABS(DX(58))
      G(88)  = GMAX(88) - G0(88)
      G0(89) = DABS(DX(59))
      G(89)  = GMAX(89) - G0(89)
      G0(90) = DABS(DX(60))
      G(90)  = GMAX(90) - G0(90)
      GO TO 60
   59 CONTINUE
      G0(16)  = DSQRT(X(1)*X(1)   + X(2)*X(2))
      G(16)   = GMAX(1)  - G0(16)
      G0(17)  = DSQRT(X(3)*X(3)   + X(4)*X(4))
      G(17)   = GMAX(2)  - G0(17)
      G0(18)  = DSQRT(X(5)*X(5)   + X(6)*X(6))
      G(18)   = GMAX(3)  - G0(18)
      G0(19)  = DSQRT(X(7)*X(7)   + X(8)*X(8))
      G(19)   = GMAX(4)  - G0(19)
      G0(20)  = DSQRT(X(9)*X(9)   + X(10)*X(10))
      G(20)   = GMAX(5)  - G0(20)
      G0(21)  = DSQRT(X(11)*X(11) + X(12)*X(12))
      G(21)   = GMAX(6)  - G0(21)
      G0(22)  = DSQRT(X(13)*X(13) + X(14)*X(14))
      G(22)   = GMAX(7)  - G0(22)
      G0(23)  = DSQRT(X(15)*X(15) + X(16)*X(16))
      G(23)   = GMAX(8)  - G0(23)
      G0(24)  = DSQRT(X(17)*X(17) + X(18)*X(18))
      G(24)   = GMAX(9)  - G0(24)
      G0(25)  = DSQRT(X(19)*X(19) + X(20)*X(20))
      G(25)   = GMAX(10) - G0(25)
      G0(26)  = DSQRT(X(21)*X(21) + X(22)*X(22))
      G(26)   = GMAX(11) - G0(26)
      G0(27)  = DSQRT(X(23)*X(23) + X(24)*X(24))
      G(27)   = GMAX(12) - G0(27)
      G0(28)  = DSQRT(X(25)*X(25) + X(26)*X(26))
      G(28)   = GMAX(13) - G0(28)
      G0(29)  = DSQRT(X(27)*X(27) + X(28)*X(28))
      G(29)   = GMAX(14) - G0(29)
      G0(30)  = DSQRT(X(29)*X(29) + X(30)*X(30))
      G(30)   = GMAX(15) - G0(30)
      G0(31)  = DSQRT(X(31)*X(31) + X(32)*X(32))
      G(31)   = GMAX(16) - G0(31)
      G0(32)  = DSQRT(X(33)*X(33) + X(34)*X(34))
      G(32)   = GMAX(17) - G0(32)
      G0(33)  = DSQRT(X(35)*X(35) + X(36)*X(36))
      G(33)   = GMAX(18) - G0(33)
      G0(34)  =  DSQRT(X(37)*X(37) + X(38)*X(38))
      G(34)   = GMAX(19) - G0(34)
      G0(35)  = DSQRT(X(39)*X(39) + X(40)*X(40))
      G(35)   = GMAX(20) - G0(35)
      G0(36)  = DSQRT(X(41)*X(41) + X(42)*X(42))
      G(36)   = GMAX(21) - G0(36)
      G0(37)  = DSQRT(X(43)*X(43) + X(44)*X(44))
      G(37)   = GMAX(22) - G0(37)
```

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      G0(38)  = DSQRT(X(45)*X(45) + X(46)*X(46))
      G(38)   = GMAX(23) - G0(38)
      G0(39)  = DSQRT(X(47)*X(47) + X(48)*X(48))
      G(39)   = GMAX(24) - G0(39)
      G0(40)  = DSQRT(X(49)*X(49) + X(50)*X(50))
      G(40)   = GMAX(25) - G0(40)
      G0(41)  = DSQRT(X(51)*X(51) + X(52)*X(52))
      G(41)   = GMAX(26) - G0(41)
      G0(42)  = DSQRT(X(53)*X(53) + X(54)*X(54))
      G(42)   = GMAX(27) - G0(42)
      G0(43)  = DSQRT(X(55)*X(55) + X(56)*X(56))
      G(43)   = GMAX(18) - G0(43)
      G0(44)  = DSQRT(X(57)*X(57) + X(58)*X(58))
      G(44)   = GMAX(19) - G0(44)
      G0(45)  = DSQRT(X(59)*X(59) + X(60)*X(60))
      G(45)   = GMAX(30) - G0(45)
C
      G0(46)  = DABS(DX(1))
      G(46)   = GMAX(31) - G0(46)
      G0(47)  = DABS(DX(2))
      G(47)   = GMAX(32) - G0(47)
      G0(48)  = DABS(DX(3))
      G(48)   = GMAX(33) - G0(49)
      G0(49)  = DABS(DX(4))
      G(49)   = GMAX(34) - G0(49)
      G0(50)  = DABS(DX(5))
      G(50)   = GMAX(35) - G0(50)
      G0(51)  = DABS(DX(6))
      G(51)   = GMAX(36) - G0(51)
      G0(52)  = DABS(DX(7))
      G(52)   = GMAX(37) - G0(52)
      G0(53)  = DABS(DX(8))
      G(53)   = GMAX(38) - G0(53)
      G0(54)  = DABS(DX(9))
      G(54)   = GMAX(39) - G0(54)
      G0(55)  = DABS(DX(10))
      G(55)   = GMAX(40) - G0(55)
      G0(56)  = DABS(DX(11))
      G(56)   = GMAX(41) - G0(56)
      G0(57)  = DABS(DX(12))
      G(57)   = GMAX(42) - G0(57)
      G0(58)  = DABS(DX(13))
      G(58)   = GMAX(43) - G0(58)
      G0(59)  = DABS(DX(14))
      G(59)   = GMAX(44) - G0(59)
      G0(60)  = DABS(DX(15))
      G(60)   = GMAX(45) - G0(60)
      G0(61)  = DABS(DX(16))
      G(61)   = GMAX(46) - G0(61)
      G0(62)  = DABS(DX(17))
      G(62)   = GMAX(47) - G0(62)
      G0(63)  = DABS(DX(18))
      G(63)   = GMAX(48) - G0(63)
      G0(64)  = DABS(DX(19))
      G(64)   = GMAX(49) - G0(64)
      G0(65)  = DABS(DX(20))
      G(65)   = GMAX(50) - G0(65)
      G0(66)  = DABS(DX(21))
      G(66)   = GMAX(51) - G0(66)
      G0(67)  = DABS(DX(22))
      G(67)   = GMAX(52) - G0(67)
      G0(68)  = DABS(DX(23))
      G(68)   = GMAX(53) - G0(68)
      G0(69)  = DABS(DX(24))
      G(69)   = GMAX(54) - G0(69)
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G0(70)  = DABS(DX(25))
G(70)   = GMAX(55) - G0(70)
G0(71)  = DABS(DX(26))
G(71)   = GMAX(56) - G0(71)
G0(72)  = DABS(DX(27))
G(72)   = GMAX(57) - G0(72)
G0(73)  = DABS(DX(28))
G(73)   = GMAX(58) - G0(73)
G0(74)  = DABS(DX(29))
G(74)   = GMAX(59) - G0(74)
G0(75)  = DABS(DX(30))
G(75)   = GMAX(60) - G0(75)
G0(76)  = DABS(DX(31))
G(76)   = GMAX(61) - G0(76)
G0(77)  = DABS(DX(32))
G(77)   = GMAX(62) - G0(77)
G0(78)  = DABS(DX(33))
G(78)   = GMAX(63) - G0(78)
G0(79)  = DABS(DX(34))
G(79)   = GMAX(64) - G0(79)
G0(80)  = DABS(DX(35))
G(80)   = GMAX(65) - G0(80)
G0(81)  = DABS(DX(36))
G(81)   = GMAX(66) - G0(81)
G0(82)  = DABS(DX(37))
G(82)   = GMAX(67) - G0(82)
G0(83)  = DABS(DX(38))
G(83)   = GMAX(68) - G0(83)
G0(84)  = DABS(DX(39))
G(84)   = GMAX(69) - G0(84)
G0(85)  = DABS(DX(40))
G(85)   = GMAX(70) - G0(85)
G0(86)  = DABS(DX(41))
G(86)   = GMAX(71) - G0(86)
G0(87)  = DABS(DX(42))
G(87)   = GMAX(72) - G0(87)
G0(88)  = DABS(DX(43))
G(88)   = GMAX(73) - G0(88)
G0(89)  = DABS(DX(44))
G(89)   = GMAX(74) - G0(89)
G0(90)  = DABS(DX(45))
G(90)   = GMAX(75) - G0(90)
G0(91)  = DABS(DX(46))
G(91)   = GMAX(76) - G0(91)
G0(92)  = DABS(DX(47))
G(92)   = GMAX(77) - G0(92)
G0(93)  = DABS(DX(48))
G(93)   = GMAX(78) - G0(93)
G0(94)  = DABS(DX(49))
G(94)   = GMAX(79) - G0(94)
G0(95)  = DABS(DX(50))
G(95)   = GMAX(80) - G0(95)
G0(96)  = DABS(DX(51))
G(96)   = GMAX(81) - G0(96)
G0(97)  = DABS(DX(52))
G(97)   = GMAX(82) - G0(97)
G0(98)  = DABS(DX(53))
G(98)   = GMAX(83) - G0(98)
G0(99)  = DABS(DX(54))
G(99)   = GMAX(84) - G0(99)
G0(100) = DABS(DX(55))
G(100)  = GMAX(85) - G0(100)
G0(101) = DABS(DX(56))
G(101)  = GMAX(86) - G0(101)
G0(102) = DABS(DX(57))
```

```
      G(102)  = GMAX(87) - G0(102)
      G0(103) = DABS(DX(58))
      G(103)  = GMAX(88) - G0(103)
      G0(104) = DABS(DX(59))
      G(104)  = GMAX(89) - G0(104)
      G0(105) = DABS(DX(60))
      G(105)  = GMAX(90) - G0(105)
   60 CONTINUE
C
C
C=============================================================
C
      NFUNC = NFUNC + 1
      IF (IFAIL.EQ.-1) GOTO 4
      IF (I.GT.0) GOTO 3
    2 CONTINUE
      FBCK = F
      DO J=1,M
         GBCK(J) = G(J)
      ENDDO
      I = 0
    5 I = I + 1
      EPSREL = EPS*DMAX1(1.0D0,DABS(X(I)))
      X(I) = X(I) + EPSREL
      GOTO 1
    3 CONTINUE
      DF(I) = (F - FBCK)/EPSREL
      DO J=1,M
         DG(J,I) = (G(J) - GBCK(J))/EPSREL
      ENDDO
      X(I) = X(I) - EPSREL
  IF (I.LT.N) GOTO 5
      F = FBCK
      DO J=1,M
         G(J) = GBCK(J)
      ENDDO
C
    4 CONTINUE
C
C
      CALL NLPQLP (     L,      M,     ME,   MMAX,      N,
     /               NMAX,   MNN2,      X,      F,      G,
     /                 DF,     DG,      U,     XL,     XU,
     /                  C,      D,    ACC,  ACCQP, STPMIN,
     /             MAXFUN,  MAXIT,  MAXNM,   RHOB, IPRINT,
     /               MODE,   IOUT,  IFAIL,     WA,    LWA,
     /                KWA,   LKWA, ACTIVE, LACTIV,    LQL,
     /                 QL)
C
C
      WRITE(IOUT,1912)
C
C
      IF (IFAIL.EQ.-1) GOTO 1
      IF (IFAIL.EQ.-2) GOTO 2
C
C   *****   Write Number of Function Evaluations   *****
C
      WRITE(IOUT,1000) NFUNC
C
C  *****   Write the Solution Control Vector   *****
C
      WRITE(IOUT,1903)  ICASE
      WRITE(IOUT,1922)
      DO 69 II = 1, NX
```

```
      DX(II) = X(II) - X0(II)
      WRITE(IOUT,1923)  II,  XL(II),  X(II),  XU(II), DX(II)
   69 CONTINUE
C
C   *****   Performance Index   *****
C
      WRITE(IOUT,1925)
      DO 49 JJ = 1, NZ
      WRITE(IOUT,1923)  JJ,  Z(JJ),  ZA(JJ),  DZ(JJ),  WDT(JJ)
   49 CONTINUE
      WRITE(IOUT,1906) F
C
C   *****   Constraint Functions   *****
C
      IF (MG) 999, 54, 81
   54 WRITE(IOUT,1920)  ICASE
      GO TO 80
   81 WRITE(IOUT,1918)  ICASE
      IF (ME) 999, 84, 82
   82 CONTINUE
      G0(1)  = X(1)*X(4)   - X(2)*X(3)
      G(1)   = GEQ(1)  - G0(1)
      G0(2)  = X(5)*X(8)   - X(6)*X(7)
      G(2)   = GEQ(2)  - G0(2)
      G0(3)  = X(9)*X(12)  - X(10)*X(11)
      G(3)   = GEQ(3)  - G0(3)
      G0(4)  = X(13)*X(16) - X(14)*X(15)
      G(4)   = GEQ(4)  - G0(4)
      G0(5)  = X(17)*X(20) - X(18)*X(19)
      G(5)   = GEQ(5)  - G0(5)
      G0(6)  = X(21)*X(24) - X(22)*X(23)
      G(6)   = GEQ(6)  - G0(6)
      G0(7)  = X(25)*X(28) - X(26)*X(27)
      G(7)   = GEQ(7)  - G0(7)
      G0(8)  = X(29)*X(32) - X(30)*X(31)
      G(8)   = GEQ(8)  - G0(8)
      G0(9)  = X(33)*X(36) - X(34)*X(35)
      G(9)   = GEQ(9)  - G0(9)
      G0(10) = X(37)*X(40) - X(38)*X(39)
      G(10)  = GEQ(10) - G0(10)
      G0(11) = X(41)*X(44) - X(42)*X(43)
      G(11)  = GEQ(11) - G0(11)
      G0(12) = X(45)*X(48) - X(46)*X(47)
      G(12)  = GEQ(12) - G0(12)
      G0(13) = X(49)*X(52) - X(50)*X(51)
      G(13)  = GEQ(13) - G0(13)
      G0(14) = X(53)*X(56) - X(54)*X(55)
      G(14)  = GEQ(14) - G0(14)
      G0(15) = X(57)*X(60) - X(58)*X(59)
      G(15)  = GEQ(15) - G0(15)
      WRITE(IOUT,1919)
      DO 83 IE = 1, ME
      WRITE(IOUT,1910)  IE,  G0(IE),  GEQ(IE), -G(IE)
   83 CONTINUE
      IF (MI) 999, 80, 85
   84 IF (MI) 999, 54, 55
   55 CONTINUE
      G0(1)  = DSQRT(X(1)*X(1)   + X(2)*X(2))
      G(1)   = GMAX(1)  - G0(1)
      G0(2)  = DSQRT(X(3)*X(3)   + X(4)*X(4))
      G(2)   = GMAX(2)  - G0(2)
      G0(3)  = DSQRT(X(5)*X(5)   + X(6)*X(6))
      G(3)   = GMAX(3)  - G0(3)
      G0(4)  = DSQRT(X(7)*X(7)   + X(8)*X(8))
      G(4)   = GMAX(4)  - G0(4)
```

```
      G0(5)  = DSQRT(X(9)*X(9)   + X(10)*X(10))
      G(5)   = GMAX(5)  - G0(5)
      G0(6)  = DSQRT(X(11)*X(11) + X(12)*X(12))
      G(6)   = GMAX(6)  - G0(6)
      G0(7)  = DSQRT(X(13)*X(13) + X(14)*X(14))
      G(7)   = GMAX(7)  - G0(7)
      G0(8)  = DSQRT(X(15)*X(15) + X(16)*X(16))
      G(8)   = GMAX(8)  - G0(8)
      G0(9)  = DSQRT(X(17)*X(17) + X(18)*X(18))
      G(9)   = GMAX(9)  - G0(9)
      G0(10) = DSQRT(X(19)*X(19) + X(20)*X(20))
      G(10)  = GMAX(10) - G0(10)
      G0(11) = DSQRT(X(21)*X(21) + X(22)*X(22))
      G(11)  = GMAX(11) - G0(11)
      G0(12) = DSQRT(X(23)*X(23) + X(24)*X(24))
      G(12)  = GMAX(12) - G0(12)
      G0(13) = DSQRT(X(25)*X(25) + X(26)*X(26))
      G(13)  = GMAX(13) - G0(13)
      G0(14) = DSQRT(X(27)*X(27) + X(28)*X(28))
      G(14)  = GMAX(14) - G0(14)
      G0(15) = DSQRT(X(29)*X(29) + X(30)*X(30))
      G(15)  = GMAX(15) - G0(15)
      G0(16) = DSQRT(X(31)*X(31) + X(32)*X(32))
      G(16)  = GMAX(16) - G0(16)
      G0(17) = DSQRT(X(33)*X(33) + X(34)*X(34))
      G(17)  = GMAX(17) - G0(17)
      G0(18) = DSQRT(X(35)*X(35) + X(36)*X(36))
      G(18)  = GMAX(18) - G0(18)
      G0(19) = DSQRT(X(37)*X(37) + X(38)*X(38))
      G(19)  = GMAX(19) - G0(19)
      G0(20) = DSQRT(X(39)*X(39) + X(40)*X(40))
      G(20)  = GMAX(20) - G0(20)
      G0(21) = DSQRT(X(41)*X(41) + X(42)*X(42))
      G(21)  = GMAX(21) - G0(21)
      G0(22) = DSQRT(X(43)*X(43) + X(44)*X(44))
      G(22)  = GMAX(22) - G0(22)
      G0(23) = DSQRT(X(45)*X(45) + X(46)*X(46))
      G(23)  = GMAX(23) - G0(23)
      G0(24) = DSQRT(X(47)*X(47) + X(48)*X(48))
      G(24)  = GMAX(24) - G0(24)
      G0(25) = DSQRT(X(49)*X(49) + X(50)*X(50))
      G(25)  = GMAX(25) - G0(25)
      G0(26) = DSQRT(X(51)*X(51) + X(52)*X(52))
      G(26)  = GMAX(26) - G0(26)
      G0(27) = DSQRT(X(53)*X(53) + X(54)*X(54))
      G(27)  = GMAX(27) - G0(27)
      G0(28) = DSQRT(X(55)*X(55) + X(56)*X(56))
      G(28)  = GMAX(18) - G0(28)
      G0(29) = DSQRT(X(57)*X(57) + X(58)*X(58))
      G(29)  = GMAX(19) - G0(29)
      G0(30) = DSQRT(X(59)*X(59) + X(60)*X(60))
      G(30)  = GMAX(30) - G0(30)
C
      G0(31) = DABS(DX(1))
      G(31)  = GMAX(31) - G0(31)
      G0(32) = DABS(DX(2))
      G(32)  = GMAX(32) - G0(32)
      G0(33) = DABS(DX(3))
      G(33)  = GMAX(33) - G0(33)
      G0(34) = DABS(DX(4))
      G(34)  = GMAX(34) - G0(34)
      G0(35) = DABS(DX(5))
      G(35)  = GMAX(35) - G0(35)
      G0(36) = DABS(DX(6))
      G(36)  = GMAX(36) - G0(36)
```

```
G0(37) = DABS(DX(7))
G(37)  = GMAX(37) - G0(37)
G0(38) = DABS(DX(8))
G(38)  = GMAX(38) - G0(38)
G0(39) = DABS(DX(9))
G(39)  = GMAX(39) - G0(39)
G0(40) = DABS(DX(10))
G(40)  = GMAX(40) - G0(40)
G0(41) = DABS(DX(11))
G(41)  = GMAX(41) - G0(41)
G0(42) = DABS(DX(12))
G(42)  = GMAX(42) - G0(42)
G0(43) = DABS(DX(13))
G(43)  = GMAX(43) - G0(43)
G0(44) = DABS(DX(14))
G(44)  = GMAX(44) - G0(44)
G0(45) = DABS(DX(15))
G(45)  = GMAX(45) - G0(45)
G0(46) = DABS(DX(16))
G(46)  = GMAX(46) - G0(46)
G0(47) = DABS(DX(17))
G(47)  = GMAX(47) - G0(47)
G0(48) = DABS(DX(18))
G(48)  = GMAX(48) - G0(48)
G0(49) = DABS(DX(19))
G(49)  = GMAX(49) - G0(49)
G0(50) = DABS(DX(20))
G(50)  = GMAX(50) - G0(50)
G0(51) = DABS(DX(21))
G(51)  = GMAX(51) - G0(51)
G0(52) = DABS(DX(22))
G(52)  = GMAX(52) - G0(52)
G0(53) = DABS(DX(23))
G(53)  = GMAX(53) - G0(53)
G0(54) = DABS(DX(24))
G(54)  = GMAX(54) - G0(54)
G0(55) = DABS(DX(25))
G(55)  = GMAX(55) - G0(55)
G0(56) = DABS(DX(26))
G(56)  = GMAX(56) - G0(56)
G0(57) = DABS(DX(27))
G(57)  = GMAX(57) - G0(57)
G0(58) = DABS(DX(28))
G(58)  = GMAX(58) - G0(58)
G0(59) = DABS(DX(29))
G(59)  = GMAX(59) - G0(59)
G0(60) = DABS(DX(30))
G(60)  = GMAX(60) - G0(60)
G0(61) = DABS(DX(31))
G(61)  = GMAX(61) - G0(61)
G0(62) = DABS(DX(32))
G(62)  = GMAX(62) - G0(62)
G0(63) = DABS(DX(33))
G(63)  = GMAX(63) - G0(63)
G0(64) = DABS(DX(34))
G(64)  = GMAX(64) - G0(64)
G0(65) = DABS(DX(35))
G(65)  = GMAX(65) - G0(65)
G0(66) = DABS(DX(36))
G(66)  = GMAX(66) - G0(66)
G0(67) = DABS(DX(37))
G(67)  = GMAX(67) - G0(67)
G0(68) = DABS(DX(38))
G(68)  = GMAX(68) - G0(68)
G0(69) = DABS(DX(39))
```

```
      G(69)  = GMAX(69) - G0(69)
      G0(70) = DABS(DX(40))
      G(70)  = GMAX(70) - G0(70)
      G0(71) = DABS(DX(41))
      G(71)  = GMAX(71) - G0(71)
      G0(72) = DABS(DX(42))
      G(72)  = GMAX(72) - G0(72)
      G0(73) = DABS(DX(43))
      G(73)  = GMAX(73) - G0(73)
      G0(74) = DABS(DX(44))
      G(74)  = GMAX(74) - G0(74)
      G0(75) = DABS(DX(45))
      G(75)  = GMAX(75) - G0(75)
      G0(76) = DABS(DX(46))
      G(76)  = GMAX(76) - G0(76)
      G0(77) = DABS(DX(47))
      G(77)  = GMAX(77) - G0(77)
      G0(78) = DABS(DX(48))
      G(78)  = GMAX(78) - G0(78)
      G0(79) = DABS(DX(49))
      G(79)  = GMAX(79) - G0(79)
      G0(80) = DABS(DX(50))
      G(80)  = GMAX(80) - G0(80)
      G0(81) = DABS(DX(51))
      G(81)  = GMAX(81) - G0(81)
      G0(82) = DABS(DX(52))
      G(82)  = GMAX(82) - G0(82)
      G0(83) = DABS(DX(53))
      G(83)  = GMAX(83) - G0(83)
      G0(84) = DABS(DX(54))
      G(84)  = GMAX(84) - G0(84)
      G0(85) = DABS(DX(55))
      G(85)  = GMAX(85) - G0(85)
      G0(86) = DABS(DX(56))
      G(86)  = GMAX(86) - G0(86)
      G0(87) = DABS(DX(57))
      G(87)  = GMAX(87) - G0(87)
      G0(88) = DABS(DX(58))
      G(88)  = GMAX(88) - G0(88)
      G0(89) = DABS(DX(59))
      G(89)  = GMAX(89) - G0(89)
      G0(90) = DABS(DX(60))
      G(90)  = GMAX(90) - G0(90)
      WRITE(IOUT,1916)
      DO 56 IQ = 1, MI
      WRITE(IOUT,1910)  IQ,  G0(IQ),  GMAX(IQ), G(IQ)
   56 CONTINUE
      GO TO 80
   85 CONTINUE
      G0(16)  = DSQRT(X(1)*X(1)   + X(2)*X(2))
      G(16)   = GMAX(1)  - G0(16)
      G0(17)  = DSQRT(X(3)*X(3)   + X(4)*X(4))
      G(17)   = GMAX(2)  - G0(17)
      G0(18)  = DSQRT(X(5)*X(5)   + X(6)*X(6))
      G(18)   = GMAX(3)  - G0(18)
      G0(19)  = DSQRT(X(7)*X(7)   + X(8)*X(8))
      G(19)   = GMAX(4)  - G0(19)
      G0(20)  = DSQRT(X(9)*X(9)   + X(10)*X(10))
      G(20)   = GMAX(5)  - G0(20)
      G0(21)  = DSQRT(X(11)*X(11) + X(12)*X(12))
      G(21)   = GMAX(6)  - G0(21)
      G0(22)  = DSQRT(X(13)*X(13) + X(14)*X(14))
      G(22)   = GMAX(7)  - G0(22)
      G0(23)  = DSQRT(X(15)*X(15) + X(16)*X(16))
      G(23)   = GMAX(8)  - G0(23)
```

```
      G0(24)  = DSQRT(X(17)*X(17) + X(18)*X(18))
      G(24)   = GMAX(9)  - G0(24)
      G0(25)  = DSQRT(X(19)*X(19) + X(20)*X(20))
      G(25)   = GMAX(10) - G0(25)
      G0(26)  = DSQRT(X(21)*X(21) + X(22)*X(22))
      G(26)   = GMAX(11) - G0(26)
      G0(27)  = DSQRT(X(23)*X(23) + X(24)*X(24))
      G(27)   = GMAX(12) - G0(27)
      G0(28)  = DSQRT(X(25)*X(25) + X(26)*X(26))
      G(28)   = GMAX(13) - G0(28)
      G0(29)  = DSQRT(X(27)*X(27) + X(28)*X(28))
      G(29)   = GMAX(14) - G0(29)
      G0(30)  = DSQRT(X(29)*X(29) + X(30)*X(30))
      G(30)   = GMAX(15) - G0(30)
      G0(31)  = DSQRT(X(31)*X(31) + X(32)*X(32))
      G(31)   = GMAX(16) - G0(31)
      G0(32)  = DSQRT(X(33)*X(33) + X(34)*X(34))
      G(32)   = GMAX(17) - G0(32)
      G0(33)  = DSQRT(X(35)*X(35) + X(36)*X(36))
      G(33)   = GMAX(18) - G0(33)
      G0(34)  =  DSQRT(X(37)*X(37) + X(38)*X(38))
      G(34)   = GMAX(19) - G0(34)
      G0(35)  = DSQRT(X(39)*X(39) + X(40)*X(40))
      G(35)   = GMAX(20) - G0(35)
      G0(36)  = DSQRT(X(41)*X(41) + X(42)*X(42))
      G(36)   = GMAX(21) - G0(36)
      G0(37)  = DSQRT(X(43)*X(43) + X(44)*X(44))
      G(37)   = GMAX(22) - G0(37)
      G0(38)  = DSQRT(X(45)*X(45) + X(46)*X(46))
      G(38)   = GMAX(23) - G0(38)
      G0(39)  = DSQRT(X(47)*X(47) + X(48)*X(48))
      G(39)   = GMAX(24) - G0(39)
      G0(40)  = DSQRT(X(49)*X(49) + X(50)*X(50))
      G(40)   = GMAX(25) - G0(40)
      G0(41)  = DSQRT(X(51)*X(51) + X(52)*X(52))
      G(41)   = GMAX(26) - G0(41)
      G0(42)  = DSQRT(X(53)*X(53) + X(54)*X(54))
      G(42)   = GMAX(27) - G0(42)
      G0(43)  = DSQRT(X(55)*X(55) + X(56)*X(56))
      G(43)   = GMAX(18) - G0(43)
      G0(44)  = DSQRT(X(57)*X(57) + X(58)*X(58))
      G(44)   = GMAX(19) - G0(44)
      G0(45)  = DSQRT(X(59)*X(59) + X(60)*X(60))
      G(45)   = GMAX(30) - G0(45)
C
      G0(46)  = DABS(DX(1))
      G(46)   = GMAX(31) - G0(46)
      G0(47)  = DABS(DX(2))
      G(47)   = GMAX(32) - G0(47)
      G0(48)  = DABS(DX(3))
      G(48)   = GMAX(33) - G0(49)
      G0(49)  = DABS(DX(4))
      G(49)   = GMAX(34) - G0(49)
      G0(50)  = DABS(DX(5))
      G(50)   = GMAX(35) - G0(50)
      G0(51)  = DABS(DX(6))
      G(51)   = GMAX(36) - G0(51)
      G0(52)  = DABS(DX(7))
      G(52)   = GMAX(37) - G0(52)
      G0(53)  = DABS(DX(8))
      G(53)   = GMAX(38) - G0(53)
      G0(54)  = DABS(DX(9))
      G(54)   = GMAX(39) - G0(54)
      G0(55)  = DABS(DX(10))
      G(55)   = GMAX(40) - G0(55)
```

```
G0(56)  = DABS(DX(11))
G(56)   = GMAX(41) - G0(56)
G0(57)  = DABS(DX(12))
G(57)   = GMAX(42) - G0(57)
G0(58)  = DABS(DX(13))
G(58)   = GMAX(43) - G0(58)
G0(59)  = DABS(DX(14))
G(59)   = GMAX(44) - G0(59)
G0(60)  = DABS(DX(15))
G(60)   = GMAX(45) - G0(60)
G0(61)  = DABS(DX(16))
G(61)   = GMAX(46) - G0(61)
G0(62)  = DABS(DX(17))
G(62)   = GMAX(47) - G0(62)
G0(63)  = DABS(DX(18))
G(63)   = GMAX(48) - G0(63)
G0(64)  = DABS(DX(19))
G(64)   = GMAX(49) - G0(64)
G0(65)  = DABS(DX(20))
G(65)   = GMAX(50) - G0(65)
G0(66)  = DABS(DX(21))
G(66)   = GMAX(51) - G0(66)
G0(67)  = DABS(DX(22))
G(67)   = GMAX(52) - G0(67)
G0(68)  = DABS(DX(23))
G(68)   = GMAX(53) - G0(68)
G0(69)  = DABS(DX(24))
G(69)   = GMAX(54) - G0(69)
G0(70)  = DABS(DX(25))
G(70)   = GMAX(55) - G0(70)
G0(71)  = DABS(DX(26))
G(71)   = GMAX(56) - G0(71)
G0(72)  = DABS(DX(27))
G(72)   = GMAX(57) - G0(72)
G0(73)  = DABS(DX(28))
G(73)   = GMAX(58) - G0(73)
G0(74)  = DABS(DX(29))
G(74)   = GMAX(59) - G0(74)
G0(75)  = DABS(DX(30))
G(75)   = GMAX(60) - G0(75)
G0(76)  = DABS(DX(31))
G(76)   = GMAX(61) - G0(76)
G0(77)  = DABS(DX(32))
G(77)   = GMAX(62) - G0(77)
G0(78)  = DABS(DX(33))
G(78)   = GMAX(63) - G0(78)
G0(79)  = DABS(DX(34))
G(79)   = GMAX(64) - G0(79)
G0(80)  = DABS(DX(35))
G(80)   = GMAX(65) - G0(80)
G0(81)  = DABS(DX(36))
G(81)   = GMAX(66) - G0(81)
G0(82)  = DABS(DX(37))
G(82)   = GMAX(67) - G0(82)
G0(83)  = DABS(DX(38))
G(83)   = GMAX(68) - G0(83)
G0(84)  = DABS(DX(39))
G(84)   = GMAX(69) - G0(84)
G0(85)  = DABS(DX(40))
G(85)   = GMAX(70) - G0(85)
G0(86)  = DABS(DX(41))
G(86)   = GMAX(71) - G0(86)
G0(87)  = DABS(DX(42))
G(87)   = GMAX(72) - G0(87)
G0(88)  = DABS(DX(43))
```

```
      G(88)   = GMAX(73) - G0(88)
      G0(89)  = DABS(DX(44))
      G(89)   = GMAX(74) - G0(89)
      G0(90)  = DABS(DX(45))
      G(90)   = GMAX(75) - G0(90)
      G0(91)  = DABS(DX(46))
      G(91)   = GMAX(76) - G0(91)
      G0(92)  = DABS(DX(47))
      G(92)   = GMAX(77) - G0(92)
      G0(93)  = DABS(DX(48))
      G(93)   = GMAX(78) - G0(93)
      G0(94)  = DABS(DX(49))
      G(94)   = GMAX(79) - G0(94)
      G0(95)  = DABS(DX(50))
      G(95)   = GMAX(80) - G0(95)
      G0(96)  = DABS(DX(51))
      G(96)   = GMAX(81) - G0(96)
      G0(97)  = DABS(DX(52))
      G(97)   = GMAX(82) - G0(97)
      G0(98)  = DABS(DX(53))
      G(98)   = GMAX(83) - G0(98)
      G0(99)  = DABS(DX(54))
      G(99)   = GMAX(84) - G0(99)
      G0(100) = DABS(DX(55))
      G(100)  = GMAX(85) - G0(100)
      G0(101) = DABS(DX(56))
      G(101)  = GMAX(86) - G0(101)
      G0(102) = DABS(DX(57))
      G(102)  = GMAX(87) - G0(102)
      G0(103) = DABS(DX(58))
      G(103)  = GMAX(88) - G0(103)
      G0(104) = DABS(DX(59))
      G(104)  = GMAX(89) - G0(104)
      G0(105) = DABS(DX(60))
      G(105)  = GMAX(90) - G0(105)
      WRITE(IOUT,1916)
      DO 86 IQ = 1, MI
      IG = ME + IQ
      WRITE(IOUT,1910)  IQ,  G0(IG),  GMAX(IQ), G(IG)
   86 CONTINUE
   80 CONTINUE
C
      GO TO (97,200,200), IOPT
C
C
C  *****   Solve the Regulator Problem   *****
C
  200 CONTINUE
C
      WRITE(IOUT,2950)  ICASE
C
C   *****   Write Alpha and the Weighting Vectors   *****
C
      WRITE(IOUT,2964)  ALPHA
      WRITE(IOUT,2965)
      WRITE(IOUT,1928)  NZZ, (WZ(I), I=1,NZZ)
      WRITE(IOUT,2966)
      WRITE(IOUT,1928)  NXX, (WX(I), I=1,NXX)
      WRITE(IOUT,2967)
      WRITE(IOUT,1928)  NXX, (WDX(I), I=1,NXX)
C
C  *****   Compute Regulator Problem Solution Control Vector   *****
C
      CALL DIAGW1(NZZ,WZ,WZZ)
C  *****   061   *****   061   *****   061   *****   061   *****
```

```
C     WRITE(IOUT,3961)
C     DO 301 I = 1, NZZ
C     WRITE(IOUT,1928)  I ,  (WZZ(I,J), J=1,NZZ)
C 301 CONTINUE
      CALL DIAGW2(NXX,WX,WXX)
C  *****   062   *****   062   *****   062   *****   062   *****
C     WRITE(IOUT,3962)
C     DO 302 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (WXX(I,J), J=1,NXX)
C 302 CONTINUE
      CALL DIAGW2(NXX,WDX,WDXX)
C  *****   063   *****   063   *****   063   *****   063   *****
C     WRITE(IOUT,3963)
C     DO 303 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (WDXX(I,J), J=1,NXX)
C 303 CONTINUE
      DO 202 I = 1, NZZ
      DO 201 J = 1, NXX
      TT(I,J)  = T(I,J)
  201 CONTINUE
  202 CONTINUE
C  *****   064   *****   064   *****   064   *****   064   *****
C     WRITE(IOUT,3964)
C     DO 304 I = 1, NZZ
C     WRITE(IOUT,1928)  I ,  (TT(I,J), J=1,NXX)
C 304 CONTINUE
      CALL TRNSP1(NZZ,NXX,TT,TTT)
C  *****   065   *****   065   *****   065   *****   065   *****
C     WRITE(IOUT,3965)
C     DO 305 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (TTT(I,J), J=1,NZZ)
C 305 CONTINUE
      CALL MMULT1(NXX,NZZ,NZZ,TTT,WZZ,DUMXZ)
C  *****   066   *****   066   *****   066   *****   066   *****
C     WRITE(IOUT,3966)
C     DO 306 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (DUMXZ(I,J), J=1,NZZ)
C 306 CONTINUE
      CALL MMULT2(NXX,NXX,NZZ,DUMXZ,TT,DUMXX)
C  *****   067   *****   067   *****   067   *****   067   *****
C     WRITE(IOUT,3967)
C     DO 307 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (DUMXX(I,J), J=1,NXX)
C 307 CONTINUE
      CALL SMDFF1(NXX,NXX,1,DUMXX,WDXX,DUMTT)
C  *****   068   *****   068   *****   068   *****   068   *****
      DO 321 I = 1,NXX
      DO 320 J = 1,NXX
      DUMXX(I,J) = DUMTT(I,J)
  320 CONTINUE
  321 CONTINUE
C     WRITE(IOUT,3968)
C     DO 308 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (DUMXX(I,J), J=1,NXX)
C 308 CONTINUE
C
C  *****   Compute the Matrix to be Inverted   *****
C
      CALL SMDFF1(NXX,NXX,1,DUMXX,WXX,DUMXX1)
C     WRITE(IOUT,2960)
C     DO 203 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (DUMXX1(I,J), J=1,NXX)
C 203 CONTINUE
C
C   *****   Compute Matrix [DD]   *****
```

```
C
C     CALL DLINRG(NXX,DUMXX1,NXX,DD,NXX)
C
      DO 210 I = 1, NXX
      DO 209 J = 1, NXX
      DD(I,J) = DUMXX1(I,J)
  209 CONTINUE
  210 CONTINUE
      LWORK = -1
      LWORK = 512
C
      CALL DGETRF(NXX,NXX,DD,NXX,IPIV,INFO)
C
      CALL DGETRI(NXX,DD,NXX,IPIV,WORK,LWORK,INFO)
C
      IF(INFO) 212, 211, 213
C
C  *****   Matrix Inversion was Successful   *****
C
  211 WRITE(IOUT,2970)
      GO TO 214
C
C  *****   Matrix Inversion Failed. An Element had an Illegal Value.
C                                                                    *****
C
  212 INFO = -INFO
      WRITE(IOUT,2973) INFO
      GO TO 89
C
C  *****   Matrix Inversion Failed. An Element on the Diagonal is Equal
C          to Zero and correspondingly the Matrix is Singular and its
C          Inverse could not be computed.
C                                                                    *****
C
  213 WRITE(IOUT,2974) INFO
      GO TO 89
C
  214 CONTINUE
C
C  *****   Matrix [DD] = The Inverted Matrix  =  [DUMXX1]-1   *****
C
C     WRITE(IOUT,2961)
C     DO 204 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (DD(I,J), J=1,NXX)
C 204 CONTINUE
C
C   *****   Matrix [EE] = The Identity Matrix = [DUMXX1][DD]   *****
C
C     CALL MMULT3(NXX,NXX,NXX,DUMXX1,DD,EE)
C     WRITE(IOUT,2962)
C     DO 205 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (EE(I,J), J=1,NXX)
C 205 CONTINUE
C
C   *****   Matrix [FF] = The Identity Matrix = [DD][DUMXX1]   *****
C
C     CALL MMULT3(NXX,NXX,NXX,DD,DUMXX1,FF)
C     WRITE(IOUT,2963)
C     DO 206 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (FF(I,J), J=1,NXX)
C 206 CONTINUE
C
C  *****   Compute the Solution Control Vector (the Theta Vector)   *****
C
      CALL MMULT3(NXX,NXX,NXX,DD,DUMXX,DUMTT)
```

```
      DO 323 I = 1,NXX
      DO 322 J = 1,NXX
      DUMXX(I,J) = DUMTT(I,J)
  322 CONTINUE
  323 CONTINUE
C  *****   069   *****   069   *****   069   *****   069   *****
C     WRITE(IOUT,3969)
C     DO 309 I = 1, NXX
C     WRITE(IOUT,1928)  I ,  (DUMXX(I,J), J=1,NXX)
C 309 CONTINUE
C
      DO 207 J = 1, NXX
      DUMX(J,1) = X0(J)
  207 CONTINUE
C  *****   070   *****   070   *****   070   *****   070   *****
C     WRITE(IOUT,3970)
C     DO 310 J = 1, NXX
C     WRITE(IOUT,1928)  J ,  DUMX(J,1)
C 310 CONTINUE
      CALL MMULT4(NXX,1,NXX,DUMXX,DUMX,DUMT)
C  *****   071   *****   071   *****   071   *****   071   *****
      DO 324 J = 1,NXX
      DUMX(J,1) = DUMT(J,1)
  324 CONTINUE
C     WRITE(IOUT,3971)
C     DO 311 J = 1, NXX
C     WRITE(IOUT,1928)  J ,  DUMX(J,1)
C 311 CONTINUE
      DO 208 I = 1, NZZ
      DUMZ(I,1) = ZA(I)
  208 CONTINUE
C  *****   072   *****   072   *****   072   *****   072   *****
C     WRITE(IOUT,3972)
C     DO 312 I = 1, NZZ
C     WRITE(IOUT,1928)  I ,  DUMZ(I,1)
C 312 CONTINUE
      CALL MMULT5(NXX,1,NZZ,DUMXZ,DUMZ,DUMX1)
C  *****   073   *****   073   *****   073   *****   073   *****
C     WRITE(IOUT,3973)
C     DO 313 J = 1, NXX
C     WRITE(IOUT,1928)  J ,  DUMX1(J,1)
C 313 CONTINUE
      CALL MMULT4(NXX,1,NXX,DD,DUMX1,DUMT1)
C  *****   074   *****   074   *****   074   *****   074   *****
      DO 325 J = 1,NXX
      DUMX1(J,1) = DUMT1(J,1)
  325 CONTINUE
C     WRITE(IOUT,3974)
C     DO 314 J = 1, NXX
C     WRITE(IOUT,1928)  J ,  DUMX1(J,1)
C 314 CONTINUE
      CALL SMULT(NXX,1,ALPHA,DUMX1,DUMT1)
C  *****   075   *****   075   *****   075   *****   075   *****
      DO 326 J = 1,NXX
      DUMX1(J,1) = DUMT1(J,1)
  326 CONTINUE
C     WRITE(IOUT,3975)
C     DO 315 J = 1, NXX
C     WRITE(IOUT,1928)  J ,  DUMX1(J,1)
C 315 CONTINUE
      CALL SMDFF2(NXX,1,0,DUMX,DUMX1,DUMT)
C
C  *****   Write the Solution Control Vector (the Theta-Vector)   *****
C
      DO 327 J = 1,NXX
```

```
      DUMX(J,1) = DUMT(J,1)
      THETA(J) = DUMX(J,1)
  327 CONTINUE
      WRITE(IOUT,2968)
      DO 318 J = 1, NXX
      WRITE(IOUT,1928)  J,  THETA(J)
  318 CONTINUE
C
C  *****   Compute the Solution Measurement Vector (the Z-Vector)   *****
C
      DO 330 J = 1,NXX
      DUMX(J,1) = THETA(J) - X0(J)
  330 CONTINUE
      CALL MMULT6(NZZ,1,NXX,TT,DUMX,DUMZ)
C  *****   076   *****   076   *****   076   *****   076   *****
      DO 331 J = 1, NZZ
      ZZ(J) = DUMZ(J,1)
  331 CONTINUE
C     WRITE(IOUT,3976)
C     DO 316 J = 1, NZZ
C     WRITE(IOUT,1928)  J ,  DUMZ(J,1)
C 316 CONTINUE
      CALL SMDFF3(NZZ,NZZ,1,ZZ,ZA,ZZZ)
C
C  *****   Write the Solution Measurement Vector (the Z-Vector)   *****
C
      DO 328 J = 1,NZZ
      ZZ(J) = ZZZ(J)
  328 CONTINUE
      WRITE(IOUT,2969)
      WRITE(IOUT,1928)  NZZ,  (ZZ(I), I=1,NZZ)
C
C   *****   Compute the Corresponding Performance Index   *****
C
      DO 319 J = 1, NZZ
      DUMZ(J,1) = ZZ(J)
  319 CONTINUE
      CALL MMULT7(NZZ,1,NZZ,WZZ,DUMZ,DUMQ)
C  *****   077   *****   077   *****   077   *****   077   *****
      DO 329 J = 1,NZZ
      DUMZ(J,1) = DUMQ(J,1)
  329 CONTINUE
C     WRITE(IOUT,3977)
C     DO 317 J = 1, NXX
C     WRITE(IOUT,1928)  J ,  DUMZ(J,1)
C 317 CONTINUE
      CALL TRNSP2(NZZ,1,DUMZ,DUMZT)
C  *****   078   *****   078   *****   078   *****   078   *****
C     WRITE(IOUT,3978)
C     I = 1
C     WRITE(IOUT,1928)  I ,  (DUMZT(1,J), J=1,NZZ)
      CALL MMULT8(1,1,NZZ,DUMZT,DUMZ,JJJ)
C
C   *****   Write the Corresponding Performance Index   *****
C
      WRITE(IOUT,2906) JJJ(1,1)
C
C   *****   End of Regulator Problem   *****
C
C
C   *****   End of Case   *****
C
C
   97 IF (CVOUT .LE. 0) GO TO 89
      GO TO (94,94,95), IOPT
```

```
   94 WRITE(IOUT,1931) NX
      WRITE(IOUT,1932) (X(II), II=1,NX)
      GO TO (89,95,95), IOPT
   95 WRITE(IOUT,2931) NXX
      WRITE(IOUT,1932) (THETA(II), II=1,NXX)
      GO TO (89,371,89), IOPT
  371 RSSDCV = ZERO
      DO 372 II = 1, NXX
      DELTCV(II) = X(II) - THETA(II)
      RSSDCV = RSSDCV + DELTCV(II)*DELTCV(II)
  372 CONTINUE
      RSSDCV = DSQRT(RSSDCV)
      WRITE(IOUT,2971) RSSDCV
      WRITE(IOUT,2972) (DELTCV(II), II=1,NXX)
   89 CVOUT = 0
      WRITE(IOUT,1908)  ICASE
C
      IF (MULT .LE. 0)  GO TO 999
      ITOUT = 0
      MULT  = 0
      WRITE(IOUT,1900)
      ICASE = ICASE + 1
      GO TO 100
  999 STOP
C
      END
C
C
C
C
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C
C
C
```

## B.5.3 Synthesised Input and Corresponding Output Data

**for the**
**(90 x 60) T-Matrix NLP Control Problem**
**on the**
**Hewlett-Packard Alpha Mainframe Computer**

```
  *********   INPUT    *****    INPUT   ********


$CDATA
!
!  *****   Start of Case  1  Input Data   *****
!                  NO Constraints
!3456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
 ACC     =    1.0D-8,
 ACC     =    1.0D-7,
 ACCQP   =    1.0D-12,
 ACCQP   =    1.0D-6,
 ACCQP   =    0.0,
 ALPHA   =    1.0,
 CRAN1   =    1.7,
 CRAN2   =    1.6,
 CRAN3   =    1.3,
 CRAN4   =    1.7,
 CRAN5   =    0.001,
 CRAN6   =    0.001,
 CVOUT   =      0,
 CVOUT   =      1,
 GEQ     =    2.50,  0.00,  2.50,  0.00,  2.50,  0.00,  2.50,  0.00,
 GEQ(9)  =    2.50,  0.00,  2.50,  0.00,  2.50,  0.00,  2.50,
 GMAX    =    3.00,  3.00,  3.00,  3.00,  3.00,  3.00,  3.00,  3.00,
 GMAX(9) =    3.00,  3.00,  3.00,  3.00,  3.00,  3.00,  3.00,  3.00,
 GMAX(17)=    3.00,  3.00,  3.00,  3.00,  3.00,  3.00,  3.00,  3,00,
 GMAX(25)=    3.00,  3.00,  3.00,  3.00,  3.00,  3.00,
 GMAX(31)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
 GMAX(39)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
 GMAX(47)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
 GMAX(55)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
 GMAX(63)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
 GMAX(71)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
 GMAX(79)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
 GMAX(87)=    1.50,  1.50,  1.50,  1.50,
 ICASE   =      1,
 IDATA   =      1,
 IDATA   =      0,
 IOPT    =      3,
 IOPT    =      1,
 IOPT    =      2,
 ITOUT   =      0,
 ITOUT   =      1,
 ISEED1  =  78985723,
 ISEED2  =  95428381,
 ISEED3  =  72919329,
 ISEED4  =  63237395,
 JSEED1  =  81692875,
 JSEED2  =  68377297,
 JSEED3  =  89672847,
 JSEED4  =  98351973,
 LQL     =   .FALSE.,
 LQL     =   .TRUE.,
 MAXIT   =  300,
 MAXIT   = 1000,
 MAXNM   =    0,
 MAXNM   =   10,
 MAXNM   =   40,
 MAXFUN  =   10,
 MAXFUN  =   40,
 ME      =    0,
 MG      =    0,
 RHOB    =    0.0,
```

```
 RHOB     =  100.0,
 XL0      =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XL0(9)   =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XL0(17)  =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XL0(25)  =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XL0(33)  =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XL0(41)  =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XL0(49)  =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XL0(57)  =   -2.3,  -2.3,  -2.3,  -2.3,
 XU0      =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XU0(9)   =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XU0(17)  =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XU0(25)  =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XU0(33)  =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XU0(41)  =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XU0(49)  =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XU0(57)  =    2.3,   2.3,   2.3,   2.3,
 XL       =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XL(9)    =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XL(17)   =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XL(25)   =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XL(33)   =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XL(41)   =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XL(49)   =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XL(57)   =   -2.5,  -2.5,  -2.5,  -2.5,
 XU       =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(9)    =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(17)   =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(25)   =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(33)   =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(41)   =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(49)   =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(57)   =    2.5,   2.5,   2.5,   2.5,
 WX       = 60*0.00,
 WDX      = 60*0.00,
 WZ       = 90*1.00,
 MULT     =         0,
 MULT     =         1,
!
!  *****   End of Case  1  Input Data   *****
!
$END
$CDATA
!
!  *****   Start of Case  2  Input Data   *****
!            15 Equality onstraints
!           NO Inequality Constraints
!
 ACC      =    1.0D-8,
 ACC      =    1.0D-7,
 ACCQP    =    1.0D-12,
 ACCQP    =    1.0D-6,
 ACCQP    =    0.0,
 ALPHA    =    1.0,
 CRAN1    =    1.7,
 CRAN2    =    1.6,
 CRAN3    =    1.3,
 CRAN4    =    1.7,
 CRAN5    =    0.002,
 CRAN5    =    0.001,
 CRAN6    =    0.002,
 CRAN6    =    0.001,
 CVOUT    =      0,
 CVOUT    =      1,
 GEQ      =    2.50,  0.00,  2.50,  0.00,  2.50,  0.00,  2.50,  0.00,
```

```
GEQ(9)  =    2.50,  0.00,  2.50,  0.00,  2.50,  0.00,  2.50,
GMAX    =    3.00,  3.00,  3.00,  3.00,  3.00,  3.00,  3.00,  3.00,
GMAX(9) =    3.00,  3.00,  3.00,  3.00,  3.00,  3.00,  3.00,  3.00,
GMAX(17)=    3.00,  3.00,  3.00,  3.00,  3.00,  3.00,  3.00,  3,00,
GMAX(25)=    3.00,  3.00,  3.00,  3.00,  3.00,  3.00,
GMAX(31)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
GMAX(39)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
GMAX(47)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
GMAX(55)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
GMAX(63)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
GMAX(71)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
GMAX(79)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
GMAX(87)=    1.50,  1.50,  1.50,  1.50,
IDATA   =      1,
IDATA   =      0,
IOPT    =      2,
IOPT    =      3,
IOPT    =      1,
ITOUT   =      1,
ITOUT   =      0,
ISEED1  =  78985723,
ISEED2  =  95428381,
ISEED3  =  72919329,
ISEED4  =  63237395,
JSEED1  =  81692875,
JSEED2  =  68377297,
JSEED3  =  89672847,
JSEED4  =  98351973,
LQL     =   .FALSE.,
LQL     =   .TRUE.,
MAXIT   =  300,
MAXIT   = 1000,
MAXNM   =    0,
MAXNM   =   10,
MAXNM   =   40,
MAXFUN  =   10,
MAXFUN  =   40,
ME      =   15,
MG      =   15,
RHOB    =    0.0,
RHOB    =  100.0,
XL0     =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
XL0(9)  =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
XL0(17) =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
XL0(25) =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
XL0(33) =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
XL0(41) =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
XL0(49) =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
XL0(57) =   -2.3,  -2.3,  -2.3,  -2.3,
XU0     =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
XU0(9)  =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
XU0(17) =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
XU0(25) =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
XU0(33) =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
XU0(41) =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
XU0(49) =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
XU0(57) =    2.3,   2.3,   2.3,   2.3,
XL      =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
XL(9)   =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
XL(17)  =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
XL(25)  =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
XL(33)  =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
XL(41)  =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
XL(49)  =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
XL(57)  =   -2.5,  -2.5,  -2.5,  -2.5,
```

```
 XU      =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(9)   =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(17)  =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(25)  =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(33)  =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(41)  =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(49)  =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(57)  =    2.5,   2.5,   2.5,   2.5,
 WX      = 60*0.00,
 WDX     = 60*0.00,
 WZ      = 90*1.00,
 MULT    =         0,
 MULT    =         1,
!
!  *****   End of Case  2  Input Data   *****
!
$END
$CDATA
!
!  *****   Start of Case  3  Input Data   *****
!             NO Equality onstraints
!            90 Inequality Constraints
!
 ACC     =    1.0D-8,
 ACC     =    1.0D-7,
 ACCQP   =    1.0D-12,
 ACCQP   =    1.0D-6,
 ACCQP   =    0.0,
 ALPHA   =    1.0,
 CRAN1   =    1.7,
 CRAN2   =    1.6,
 CRAN3   =    1.3,
 CRAN4   =    1.7,
 CRAN5   =    0.002,
 CRAN5   =    0.001,
 CRAN6   =    0.002,
 CRAN6   =    0.001,
 CVOUT   =      0,
 CVOUT   =      1,
 GEQ     =    2.50,  0.00,  2.50,  0.00,  2.50,  0.00,  2.50,  0.00,
 GEQ(9)  =    2.50,  0.00,  2.50,  0.00,  2.50,  0.00,  2.50,
 GMAX    =    3.00,  3.00,  3.00,  3.00,  3.00,  3.00,  3.00,  3.00,
 GMAX(9) =    3.00,  3.00,  3.00,  3.00,  3.00,  3.00,  3.00,  3.00,
 GMAX(17)=    3.00,  3.00,  3.00,  3.00,  3.00,  3.00,  3.00,  3,00,
 GMAX(25)=    3.00,  3.00,  3.00,  3.00,  3.00,  3.00,
 GMAX(31)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
 GMAX(39)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
 GMAX(47)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
 GMAX(55)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
 GMAX(63)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
 GMAX(71)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
 GMAX(79)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
 GMAX(87)=    1.50,  1.50,  1.50,  1.50,
 IDATA   =      1,
 IDATA   =      0,
 IOPT    =      2,
 IOPT    =      3,
 IOPT    =      1,
 ITOUT   =      1,
 ITOUT   =      0,
 ISEED1  =  78985723,
 ISEED2  =  95428381,
 ISEED3  =  72919329,
 ISEED4  =  63237395,
 JSEED1  =  81692875,
```

```
 JSEED2  =  68377297,
 JSEED3  =  89672847,
 JSEED4  =  98351973,
 LQL     =   .FALSE.,
 LQL     =   .TRUE.,
 MAXIT   =  300,
 MAXIT   = 1000,
 MAXNM   =    0,
 MAXNM   =   10,
 MAXNM   =   40,
 MAXFUN  =   10,
 MAXFUN  =   40,
 ME      =    0,
 MG      =   90,
 RHOB    =    0.0,
 RHOB    =  100.0,
 XL0     =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XL0(9)  =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XL0(17) =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XL0(25) =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XL0(33) =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XL0(41) =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XL0(49) =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
 XL0(57) =   -2.3,  -2.3,  -2.3,  -2.3,
 XU0     =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XU0(9)  =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XU0(17) =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XU0(25) =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XU0(33) =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XU0(41) =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XU0(49) =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XU0(57) =    2.3,   2.3,   2.3,   2.3,
 XL      =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XL(9)   =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XL(17)  =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XL(25)  =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XL(33)  =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XL(41)  =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XL(49)  =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XL(57)  =   -2.5,  -2.5,  -2.5,  -2.5,
 XU      =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(9)   =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(17)  =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(25)  =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(33)  =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(41)  =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(49)  =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(57)  =    2.5,   2.5,   2.5,   2.5,
 WX      = 60*0.00,
 WDX     = 60*0.00,
 WZ      = 90*1.00,
 MULT    =         0,
 MULT    =         1,
!
!  *****   End of Case  3  Input Data   *****
!
$END
$CDATA
!
!  *****   Start of Case  4  Input Data   *****
!            15 Equality onstraints
!            90 Inequality Constraints
!
 ACC     =    1.0D-8,
 ACC     =    1.0D-7,
```

```
ACCQP   =    1.0D-12,
ACCQP   =    1.0D-6,
ACCQP   =    0.0,
ALPHA   =    1.0,
CRAN1   =    1.7,
CRAN2   =    1.6,
CRAN3   =    1.3,
CRAN4   =    1.7,
CRAN5   =    0.002,
CRAN5   =    0.001,
CRAN6   =    0.002,
CRAN6   =    0.001,
CVOUT   =      0,
CVOUT   =      1,
GEQ     =    2.50,  0.00,  2.50,  0.00,  2.50,  0.00,  2.50,  0.00,
GEQ(9)  =    2.50,  0.00,  2.50,  0.00,  2.50,  0.00,  2.50,
GMAX    =    3.00,  3.00,  3.00,  3.00,  3.00,  3.00,  3.00,  3.00,
GMAX(9) =    3.00,  3.00,  3.00,  3.00,  3.00,  3.00,  3.00,  3.00,
GMAX(17)=    3.00,  3.00,  3.00,  3.00,  3.00,  3.00,  3.00,  3,00,
GMAX(25)=    3.00,  3.00,  3.00,  3.00,  3.00,  3.00,
GMAX(31)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
GMAX(39)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
GMAX(47)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
GMAX(55)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
GMAX(63)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
GMAX(71)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
GMAX(79)=    1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,  1.50,
GMAX(87)=    1.50,  1.50,  1.50,  1.50,
IDATA   =      1,
IDATA   =      0,
IOPT    =      2,
IOPT    =      3,
IOPT    =      1,
ITOUT   =      1,
ITOUT   =      0,
ISEED1  =  78985723,
ISEED2  =  95428381,
ISEED3  =  72919329,
ISEED4  =  63237395,
JSEED1  =  81692875,
JSEED2  =  68377297,
JSEED3  =  89672847,
JSEED4  =  98351973,
LQL     =   .FALSE.,
LQL     =   .TRUE.,
MAXIT   =  300,
MAXIT   = 1000,
MAXNM   =    0,
MAXNM   =   10,
MAXNM   =   40,
MAXFUN  =   10,
MAXFUN  =   40,
ME      =   15,
MG      =  105,
RHOB    =    0.0,
RHOB    =  100.0,
XL0     =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
XL0(9)  =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
XL0(17) =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
XL0(25) =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
XL0(33) =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
XL0(41) =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
XL0(49) =   -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,  -2.3,
XL0(57) =   -2.3,  -2.3,  -2.3,  -2.3,
XU0     =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
```

```
 XU0(9)  =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XU0(17) =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XU0(25) =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XU0(33) =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XU0(41) =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XU0(49) =    2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,   2.3,
 XU0(57) =    2.3,   2.3,   2.3,   2.3,
 XL      =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XL(9)   =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XL(17)  =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XL(25)  =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XL(33)  =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XL(41)  =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XL(49)  =   -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,  -2.5,
 XL(57)  =   -2.5,  -2.5,  -2.5,  -2.5,
 XU      =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(9)   =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(17)  =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(25)  =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(33)  =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(41)  =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(49)  =    2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,   2.5,
 XU(57)  =    2.5,   2.5,   2.5,   2.5,
 WX      = 60*0.00,
 WDX     = 60*0.00,
 WZ      = 90*1.00,
 MULT    =         1,
 MULT    =         0,
!
!  *****   End of Case  4  Input Data   *****
!
 $END


   *********   OUTPUT   *****   OUTPUT   ********

RUN the NLP90x60 Case.

START RUN.



********************************************************************************


        ***************   Start Case Number   1   ***************

                        *****   INPUT DATA   *****

&CDATA
ALPHA   =   1.00000000000000     ,
ACC     =  1.0000000000000000E-007,
ACCQP   =  0.0000000000000000E+000,
CRAN1   =   1.70000000000000     ,
CRAN2   =   1.60000000000000     ,
CRAN3   =   1.30000000000000     ,
CRAN4   =   1.70000000000000     ,
CRAN5   =  1.0000000000000000E-003,
CRAN6   =  1.0000000000000000E-003,
CRAN7   =  0.100000000000000     ,
CRAN8   =  0.100000000000000     ,
```

```
CVOUT   =           1,
EPS     =  1.000000000000000E-007,
GEQ     =   2.50000000000000     ,  0.000000000000000E+000,   2.50000000000000
,  0.000000000000000E+000,
   2.50000000000000     ,  0.000000000000000E+000,   2.50000000000000     ,
0.000000000000000E+000,   2.50000000000000     ,
  0.000000000000000E+000,   2.50000000000000     ,  0.000000000000000E+000,
2.50000000000000     ,  0.000000000000000E+000,
   2.50000000000000     , 94*0.000000000000000E+000  ,
GMAX    = 30*3.00000000000000        , 79*1.50000000000000        ,
ICASE   =           1,
IDATA   =           0,
IN      =           5,
IOPT    =           2,
IOUT    =           6,
IPRINT  =           2,
ISEED1  =    78985723,
ISEED2  =    95428381,
ISEED3  =    72919329,
ISEED4  =    63237395,
ITOUT   =           1,
JSEED1  =    81692875,
JSEED2  =    68377297,
JSEED3  =    89672847,
JSEED4  =    98351973,
L       =           1,
LQL     = T,
MAXFUN  =          40,
MAXIT   =        1000,
MAXNM   =          40,
ME      =           0,
MG      =           0,
MODE    =           0,
MULT    =           1,
RHOB    =   100.000000000000     ,
STPMIN  =  0.000000000000000E+000,
T       = 5400*0.000000000000000E+000  ,
WDT     = 90*1.00000000000000        ,
WDX     = 60*0.000000000000000E+000  ,
WX      = 60*0.000000000000000E+000  ,
WZ      = 90*1.00000000000000        ,
XL      = 60*-2.50000000000000       , 4*-2.00000000000000       ,
XL0     = 60*-2.30000000000000       ,
XU      = 60*2.50000000000000        , 4*2.00000000000000        ,
XU0     = 60*2.30000000000000        ,
X0      = 60*0.000000000000000E+000  ,
ZA      = 90*0.000000000000000E+000
/
```

***** OUTPUT DATA *****

***** X0, ZA, and T are Randomly Defined *****

| CRAN1 | CRAN2 | CRAN3 | CRAN4 |
|---|---|---|---|
| CRAN5 | CRAN6 | CRAN7 | CRAN8 |
| 0.17000000D+01 | 0.16000000D+01 | 0.13000000D+01 | 0.17000000D+01 |
| 0.10000000D-02 | 0.10000000D-02 | 0.10000000D+00 | 0.10000000D+00 |

***** Control Vector During Previous Duty Cycle for Case Number 1 *****

| Element | G.L.B. | C.V. | L.U.B. |
|---|---|---|---|

| | | | |
|---|---|---|---|
| 1 | -0.23000000D+01 | 0.65642620D+00 | 0.23000000D+01 |
| 2 | -0.23000000D+01 | 0.17089969D+01 | 0.23000000D+01 |
| 3 | -0.23000000D+01 | -0.88497796D+00 | 0.23000000D+01 |
| 4 | -0.23000000D+01 | -0.12972747D+00 | 0.23000000D+01 |
| 5 | -0.23000000D+01 | 0.10581578D+01 | 0.23000000D+01 |
| 6 | -0.23000000D+01 | -0.29460547D+00 | 0.23000000D+01 |
| 7 | -0.23000000D+01 | 0.50496989D+00 | 0.23000000D+01 |
| 8 | -0.23000000D+01 | 0.17553735D+00 | 0.23000000D+01 |
| 9 | -0.23000000D+01 | -0.10060560D+01 | 0.23000000D+01 |
| 10 | -0.23000000D+01 | 0.53180416D+00 | 0.23000000D+01 |
| 11 | -0.23000000D+01 | -0.80998665D+00 | 0.23000000D+01 |
| 12 | -0.23000000D+01 | 0.12465305D+01 | 0.23000000D+01 |
| 13 | -0.23000000D+01 | 0.26795959D-01 | 0.23000000D+01 |
| 14 | -0.23000000D+01 | -0.41307353D+00 | 0.23000000D+01 |
| 15 | -0.23000000D+01 | -0.17636375D+01 | 0.23000000D+01 |
| 16 | -0.23000000D+01 | -0.65961885D-01 | 0.23000000D+01 |
| 17 | -0.23000000D+01 | 0.12896297D+01 | 0.23000000D+01 |
| 18 | -0.23000000D+01 | 0.18441464D+01 | 0.23000000D+01 |
| 19 | -0.23000000D+01 | -0.12306955D+01 | 0.23000000D+01 |
| 20 | -0.23000000D+01 | -0.90510273D-01 | 0.23000000D+01 |
| 21 | -0.23000000D+01 | 0.14925529D+00 | 0.23000000D+01 |
| 22 | -0.23000000D+01 | 0.72558129D+00 | 0.23000000D+01 |
| 23 | -0.23000000D+01 | -0.41573591D+00 | 0.23000000D+01 |
| 24 | -0.23000000D+01 | -0.16615798D+01 | 0.23000000D+01 |
| 25 | -0.23000000D+01 | 0.34731996D+00 | 0.23000000D+01 |
| 26 | -0.23000000D+01 | 0.65151795D+00 | 0.23000000D+01 |
| 27 | -0.23000000D+01 | 0.17129398D+01 | 0.23000000D+01 |
| 28 | -0.23000000D+01 | 0.44494768D+00 | 0.23000000D+01 |
| 29 | -0.23000000D+01 | 0.24994527D+01 | 0.23000000D+01 |
| 29 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 30 | -0.23000000D+01 | -0.87850603D+00 | 0.23000000D+01 |
| 31 | -0.23000000D+01 | -0.19242286D+01 | 0.23000000D+01 |
| 32 | -0.23000000D+01 | -0.11264835D+01 | 0.23000000D+01 |
| 33 | -0.23000000D+01 | -0.12661358D+01 | 0.23000000D+01 |
| 34 | -0.23000000D+01 | 0.83265233D-01 | 0.23000000D+01 |
| 35 | -0.23000000D+01 | -0.11480165D+01 | 0.23000000D+01 |
| 36 | -0.23000000D+01 | 0.54156697D-01 | 0.23000000D+01 |
| 37 | -0.23000000D+01 | -0.49352968D-01 | 0.23000000D+01 |
| 38 | -0.23000000D+01 | 0.24591752D+00 | 0.23000000D+01 |
| 39 | -0.23000000D+01 | -0.90154399D+00 | 0.23000000D+01 |
| 40 | -0.23000000D+01 | -0.72249388D+00 | 0.23000000D+01 |
| 41 | -0.23000000D+01 | -0.91696883D+00 | 0.23000000D+01 |
| 42 | -0.23000000D+01 | -0.11066319D+01 | 0.23000000D+01 |
| 43 | -0.23000000D+01 | -0.35132294D+00 | 0.23000000D+01 |
| 44 | -0.23000000D+01 | -0.31414621D+00 | 0.23000000D+01 |
| 45 | -0.23000000D+01 | 0.12418430D+01 | 0.23000000D+01 |
| 46 | -0.23000000D+01 | -0.13454949D+01 | 0.23000000D+01 |
| 47 | -0.23000000D+01 | 0.20230187D+01 | 0.23000000D+01 |
| 48 | -0.23000000D+01 | -0.21135574D+01 | 0.23000000D+01 |
| 49 | -0.23000000D+01 | -0.47558579D+00 | 0.23000000D+01 |
| 50 | -0.23000000D+01 | 0.15862220D+01 | 0.23000000D+01 |
| 51 | -0.23000000D+01 | -0.81840509D+00 | 0.23000000D+01 |
| 52 | -0.23000000D+01 | -0.80670699D+00 | 0.23000000D+01 |
| 53 | -0.23000000D+01 | -0.26308009D+01 | 0.23000000D+01 |
| 53 | -0.23000000D+01 | -0.22999999D+01 | 0.23000000D+01 |
| 54 | -0.23000000D+01 | 0.25589538D-01 | 0.23000000D+01 |
| 55 | -0.23000000D+01 | 0.65094604D+00 | 0.23000000D+01 |
| 56 | -0.23000000D+01 | 0.12037879D+01 | 0.23000000D+01 |
| 57 | -0.23000000D+01 | 0.16373389D+01 | 0.23000000D+01 |
| 58 | -0.23000000D+01 | 0.11674187D+01 | 0.23000000D+01 |
| 59 | -0.23000000D+01 | 0.18558007D+01 | 0.23000000D+01 |
| 60 | -0.23000000D+01 | 0.15162762D+01 | 0.23000000D+01 |

***** Measurement Vectors from Previous Duty Cycle *****

| Element | Actual | Ideal | Delta |
|---|---|---|---|
| 1 | -0.44621660D+00 | -0.44562965D+00 | -0.58695447D-03 |
| 2 | 0.56421813D+01 | 0.56425321D+01 | -0.35081244D-03 |
| 3 | 0.57055749D+01 | 0.57058324D+01 | -0.25752234D-03 |
| 4 | 0.87407249D+01 | 0.87395245D+01 | 0.12004384D-02 |
| 5 | 0.24828416D+02 | 0.24829327D+02 | -0.91096580D-03 |
| 6 | 0.18356290D+01 | 0.18351204D+01 | 0.50860763D-03 |
| 7 | -0.10340493D+02 | -0.10341523D+02 | 0.10295088D-02 |
| 8 | 0.20241354D+02 | 0.20240194D+02 | 0.11604346D-02 |
| 9 | 0.13159404D+02 | 0.13159335D+02 | 0.68963528D-04 |
| 10 | 0.19920099D+02 | 0.19918850D+02 | 0.12491620D-02 |
| 11 | 0.14906948D+02 | 0.14906573D+02 | 0.37542999D-03 |
| 12 | -0.92556462D+01 | -0.92562267D+01 | 0.58046019D-03 |
| 13 | 0.90220157D+01 | 0.90222028D+01 | -0.18710732D-03 |
| 14 | 0.15406756D+02 | 0.15406058D+02 | 0.69738376D-03 |
| 15 | 0.81055087D+01 | 0.81038987D+01 | 0.16099517D-02 |
| 16 | -0.52157011D+00 | -0.52133695D+00 | -0.23316193D-03 |
| 17 | -0.13099967D+02 | -0.13099715D+02 | -0.25233734D-03 |
| 18 | -0.64227152D+01 | -0.64220344D+01 | -0.68074346D-03 |
| 19 | 0.94979922D+00 | 0.95005933D+00 | -0.26010585D-03 |
| 20 | -0.15427329D+02 | -0.15426080D+02 | -0.12488431D-02 |
| 21 | -0.28148452D+01 | -0.28145083D+01 | -0.33686411D-03 |
| 22 | 0.10617943D+02 | 0.10616806D+02 | 0.11369618D-02 |
| 23 | -0.92399517D+01 | -0.92387717D+01 | -0.11799650D-02 |
| 24 | 0.19570712D+02 | 0.19569710D+02 | 0.10019406D-02 |
| 25 | -0.14247969D+02 | -0.14247011D+02 | -0.95796919D-03 |
| 26 | -0.15439722D+02 | -0.15439754D+02 | 0.32345772D-04 |
| 27 | -0.17684608D+02 | -0.17682710D+02 | -0.18986958D-02 |
| 28 | 0.16022332D+02 | 0.16021340D+02 | 0.99178720D-03 |
| 29 | -0.24164769D+01 | -0.24162378D+01 | -0.23915052D-03 |
| 30 | 0.66078084D+01 | 0.66076838D+01 | 0.12460554D-03 |
| 31 | 0.23772642D+01 | 0.23768704D+01 | 0.39382076D-03 |
| 32 | -0.28880709D+01 | -0.28888783D+01 | 0.80747652D-03 |
| 33 | -0.89958224D+01 | -0.89954218D+01 | -0.40060091D-03 |
| 34 | -0.30031457D+02 | -0.30032367D+02 | 0.90969276D-03 |
| 35 | 0.25031023D+02 | 0.25029441D+02 | 0.15822725D-02 |
| 36 | 0.73882591D+00 | 0.73883536D+00 | -0.94544888D-05 |
| 37 | 0.94699474D+01 | 0.94689509D+01 | 0.99640703D-03 |
| 38 | -0.67873620D+01 | -0.67882109D+01 | 0.84893692D-03 |
| 39 | -0.20285243D+01 | -0.20297554D+01 | 0.12311426D-02 |
| 40 | 0.76200027D+01 | 0.76202068D+01 | -0.20416570D-03 |
| 41 | 0.21726570D+02 | 0.21726081D+02 | 0.48872983D-03 |
| 42 | 0.11466424D+02 | 0.11468329D+02 | -0.19056131D-02 |
| 43 | 0.37694576D+00 | 0.37772848D+00 | -0.78272390D-03 |
| 44 | 0.19482290D+02 | 0.19482235D+02 | 0.55499077D-04 |
| 45 | 0.39711930D+01 | 0.39699214D+01 | 0.12716564D-02 |
| 46 | 0.58437420D+01 | 0.58437037D+01 | 0.38372040D-04 |
| 47 | 0.16101706D+02 | 0.16101379D+02 | 0.32729340D-03 |
| 48 | -0.18363749D+02 | -0.18363585D+02 | -0.16400552D-03 |
| 49 | -0.10232301D+02 | -0.10232619D+02 | 0.31780338D-03 |
| 50 | 0.15978594D+02 | 0.15978219D+02 | 0.37478101D-03 |
| 51 | -0.27068691D+01 | -0.27086265D+01 | 0.17573451D-02 |
| 52 | -0.39230030D+00 | -0.39237582D+00 | 0.75525761D-04 |
| 53 | 0.12150130D+02 | 0.12149637D+02 | 0.49210715D-03 |
| 54 | 0.13987658D+02 | 0.13988298D+02 | -0.64043999D-03 |
| 55 | -0.13766257D+01 | -0.13760784D+01 | -0.54728770D-03 |
| 56 | -0.48350707D+01 | -0.48344602D+01 | -0.61053300D-03 |
| 57 | -0.11311830D+02 | -0.11312930D+02 | 0.11004062D-02 |
| 58 | 0.12979851D+02 | 0.12979893D+02 | -0.42070746D-04 |
| 59 | 0.20434806D+02 | 0.20434581D+02 | 0.22474957D-03 |
| 60 | 0.13939232D+02 | 0.13938000D+02 | 0.12312514D-02 |
| 61 | -0.25401724D+02 | -0.25401033D+02 | -0.69088078D-03 |

| | | | |
|---|---|---|---|
| 62 | 0.14934380D+02 | 0.14934814D+02 | -0.43418074D-03 |
| 63 | -0.18812718D+01 | -0.18808544D+01 | -0.41732776D-03 |
| 64 | -0.56020049D+01 | -0.56016011D+01 | -0.40377212D-03 |
| 65 | -0.84015122D+01 | -0.84013857D+01 | -0.12648237D-03 |
| 66 | -0.77668403D+01 | -0.77668333D+01 | -0.69755316D-05 |
| 67 | -0.11134381D+02 | -0.11132599D+02 | -0.17823126D-02 |
| 68 | 0.11461872D+02 | 0.11462416D+02 | -0.54401243D-03 |
| 69 | -0.96119309D+00 | -0.96280518D+00 | 0.16120892D-02 |
| 70 | -0.83906497D+01 | -0.83900453D+01 | -0.60442352D-03 |
| 71 | -0.36111385D+00 | -0.36219082D+00 | 0.10769680D-02 |
| 72 | -0.55116874D+01 | -0.55127981D+01 | 0.11106583D-02 |
| 73 | -0.58971041D+01 | -0.58951686D+01 | -0.19355016D-02 |
| 74 | 0.27720904D+01 | 0.27732456D+01 | -0.11551642D-02 |
| 75 | 0.20882069D+02 | 0.20882105D+02 | -0.35028100D-04 |
| 76 | -0.22988300D+01 | -0.22994766D+01 | 0.64666879D-03 |
| 77 | -0.14943892D+02 | -0.14942662D+02 | -0.12293618D-02 |
| 78 | 0.79217715D+01 | 0.79205507D+01 | 0.12208024D-02 |
| 79 | 0.30384271D+02 | 0.30384662D+02 | -0.39039683D-03 |
| 80 | -0.65068005D+01 | -0.65064880D+01 | -0.31251943D-03 |
| 81 | -0.50723573D+01 | -0.50729656D+01 | 0.60827732D-03 |
| 82 | 0.96221191D+01 | 0.96210020D+01 | 0.11171455D-02 |
| 83 | 0.30796878D+01 | 0.30795571D+01 | 0.13071871D-03 |
| 84 | 0.69542200D-01 | 0.70917410D-01 | -0.13752100D-02 |
| 85 | -0.11091257D+01 | -0.11087525D+01 | -0.37320006D-03 |
| 86 | -0.17117079D+02 | -0.17116524D+02 | -0.55454910D-03 |
| 87 | -0.10792018D+02 | -0.10791866D+02 | -0.15152228D-03 |
| 88 | -0.16779177D+01 | -0.16784354D+01 | 0.51769686D-03 |
| 89 | 0.14964074D+02 | 0.14963259D+02 | 0.81453931D-03 |
| 90 | 0.21504235D+02 | 0.21504809D+02 | -0.57381225D-03 |

***** Initial Control Vector Estimate for Case Number 1 *****

| Element | G.L.B. | C.V. | L.U.B. | Delta C.V. |
|---|---|---|---|---|
| 1 | -0.25000000D+01 | 0.65642620D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 2 | -0.25000000D+01 | 0.17089969D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 3 | -0.25000000D+01 | -0.88497796D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 4 | -0.25000000D+01 | -0.12972747D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 5 | -0.25000000D+01 | 0.10581578D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 6 | -0.25000000D+01 | -0.29460547D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 7 | -0.25000000D+01 | 0.50496989D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 8 | -0.25000000D+01 | 0.17553735D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 9 | -0.25000000D+01 | -0.10060560D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 10 | -0.25000000D+01 | 0.53180416D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 11 | -0.25000000D+01 | -0.80998665D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 12 | -0.25000000D+01 | 0.12465305D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 13 | -0.25000000D+01 | 0.26795959D-01 | 0.25000000D+01 | 0.00000000D+00 |
| 14 | -0.25000000D+01 | -0.41307353D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 15 | -0.25000000D+01 | -0.17636375D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 16 | -0.25000000D+01 | -0.65961885D-01 | 0.25000000D+01 | 0.00000000D+00 |
| 17 | -0.25000000D+01 | 0.12896297D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 18 | -0.25000000D+01 | 0.18441464D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 19 | -0.25000000D+01 | -0.12306955D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 20 | -0.25000000D+01 | -0.90510273D-01 | 0.25000000D+01 | 0.00000000D+00 |
| 21 | -0.25000000D+01 | 0.14925529D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 22 | -0.25000000D+01 | 0.72558129D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 23 | -0.25000000D+01 | -0.41573591D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 24 | -0.25000000D+01 | -0.16615798D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 25 | -0.25000000D+01 | 0.34731996D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 26 | -0.25000000D+01 | 0.65151795D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 27 | -0.25000000D+01 | 0.17129398D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 28 | -0.25000000D+01 | 0.44494768D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 29 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 30 | -0.25000000D+01 | -0.87850603D+00 | 0.25000000D+01 | 0.00000000D+00 |

| | | | | |
|---|---|---|---|---|
| 31 | -0.25000000D+01 | -0.19242286D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 32 | -0.25000000D+01 | -0.11264835D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 33 | -0.25000000D+01 | -0.12661358D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 34 | -0.25000000D+01 | 0.83265233D-01 | 0.25000000D+01 | 0.00000000D+00 |
| 35 | -0.25000000D+01 | -0.11480165D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 36 | -0.25000000D+01 | 0.54156697D-01 | 0.25000000D+01 | 0.00000000D+00 |
| 37 | -0.25000000D+01 | -0.49352968D-01 | 0.25000000D+01 | 0.00000000D+00 |
| 38 | -0.25000000D+01 | 0.24591752D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 39 | -0.25000000D+01 | -0.90154399D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 40 | -0.25000000D+01 | -0.72249388D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 41 | -0.25000000D+01 | -0.91696883D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 42 | -0.25000000D+01 | -0.11066319D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 43 | -0.25000000D+01 | -0.35132294D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 44 | -0.25000000D+01 | -0.31414621D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 45 | -0.25000000D+01 | 0.12418430D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 46 | -0.25000000D+01 | -0.13454949D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 47 | -0.25000000D+01 | 0.20230187D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 48 | -0.25000000D+01 | -0.21135574D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 49 | -0.25000000D+01 | -0.47558579D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 50 | -0.25000000D+01 | 0.15862220D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 51 | -0.25000000D+01 | -0.81840509D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 52 | -0.25000000D+01 | -0.80670699D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 53 | -0.25000000D+01 | -0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 54 | -0.25000000D+01 | 0.25589538D-01 | 0.25000000D+01 | 0.00000000D+00 |
| 55 | -0.25000000D+01 | 0.65094604D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 56 | -0.25000000D+01 | 0.12037879D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 57 | -0.25000000D+01 | 0.16373389D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 58 | -0.25000000D+01 | 0.11674187D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 59 | -0.25000000D+01 | 0.18558007D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 60 | -0.25000000D+01 | 0.15162762D+01 | 0.25000000D+01 | 0.00000000D+00 |

Row ***** T-Matrix *****

| | | | | |
|---|---|---|---|---|
| 1 | -0.27276443D+00 | -0.15918383D+01 | -0.92126584D-01 | 0.20652630D+01 |
| | -0.46295671D+00 | 0.21057602D+01 | -0.69092256D+00 | -0.10133005D+01 |
| | -0.12843544D+00 | -0.16005928D+01 | -0.21870661D+01 | -0.16880542D+00 |
| | 0.37875166D+00 | 0.21604650D+01 | -0.26363957D+01 | 0.30709107D+00 |
| | 0.17544055D+00 | 0.29099415D+01 | -0.78074822D+00 | -0.24465675D+01 |
| | -0.30303893D+00 | -0.18502505D+00 | -0.27295998D+01 | -0.44480190D+00 |
| | 0.15842460D+01 | 0.18228189D+01 | 0.21957938D+01 | 0.96036196D-01 |
| | -0.13915593D+01 | 0.33232458D+00 | 0.65575624D+00 | -0.15150124D+00 |
| | 0.63301215D+00 | 0.60292814D+00 | 0.17230501D+01 | -0.21982243D+01 |
| | -0.21866415D+01 | 0.10113307D+00 | 0.21512366D+01 | -0.19730694D+01 |
| | 0.33918452D-01 | -0.15504456D-01 | -0.11194657D+01 | -0.22036704D+00 |
| | -0.41721935D+00 | 0.17231072D+01 | -0.61882098D+00 | 0.74039358D+00 |
| | 0.63792944D-01 | -0.13414183D+01 | 0.63428296D+00 | -0.60770053D+00 |
| | 0.11461719D+01 | 0.90053792D+00 | 0.17501946D+01 | 0.93624766D+00 |
| | -0.24838793D+00 | -0.39415669D-01 | 0.24243571D+01 | -0.18563208D+01 |
| 2 | 0.84082671D+00 | 0.14644824D+00 | -0.87385937D+00 | 0.45433062D+00 |
| | -0.95035000D+00 | -0.24363588D+00 | -0.71385410D+00 | 0.56822269D+00 |
| | 0.91197011D+00 | 0.14655231D+01 | 0.19444054D+01 | -0.80696052D+00 |
| | 0.14168110D+01 | -0.22293998D+01 | 0.15988729D+01 | 0.18800392D+01 |
| | -0.47865144D+00 | -0.14324255D+01 | -0.48532286D+00 | 0.45995402D-01 |
| | -0.37916772D+00 | -0.66897418D+00 | 0.18877935D+01 | 0.59624398D+00 |
| | -0.10939927D+01 | -0.51906794D+00 | 0.96217585D-01 | 0.21352293D+01 |
| | 0.18080364D+01 | -0.86303397D+00 | -0.17613653D+01 | 0.56455132D+00 |
| | 0.13092161D+00 | 0.86029201D+00 | -0.39406252D-01 | 0.16685135D+01 |
| | 0.22714259D+01 | -0.10171368D+01 | -0.24318219D+01 | -0.13128321D+01 |
| | 0.52649567D+00 | -0.27578161D+00 | 0.18291771D+01 | 0.67686323D+00 |
| | -0.91181746D+00 | 0.95778131D-01 | 0.46175972D+00 | -0.54170789D+00 |
| | -0.47393575D+00 | 0.79264246D+00 | -0.48935604D+00 | 0.55203596D+00 |
| | -0.64283210D+00 | 0.67288748D+00 | 0.20107707D+01 | -0.69838562D+00 |
| | 0.21033910D+01 | -0.17756380D+01 | 0.17384748D+01 | -0.24159691D+01 |

| | | | | |
|---|---|---|---|---|
| 3 | -0.33546541D+00 | -0.15871463D+00 | 0.62966874D+00 | 0.15706967D+01 |
| | 0.48272563D+00 | -0.68329382D+00 | -0.15772767D+01 | 0.99117643D+00 |
| | 0.47317021D+00 | -0.76942388D+00 | 0.35431714D+00 | 0.25719734D+00 |
| | 0.23325602D+01 | -0.99028959D+00 | -0.22311347D+01 | -0.56007084D+00 |
| | -0.56190742D+00 | 0.62266070D+00 | -0.95890700D+00 | 0.47551955D+00 |
| | 0.30814539D+01 | 0.35573256D-01 | 0.82876939D+00 | -0.10296381D-01 |
| | -0.23596947D+01 | -0.69445086D+00 | 0.62942278D-01 | 0.75991322D+00 |
| | 0.28872653D+01 | 0.31150339D+00 | 0.87567385D+00 | 0.81488619D+00 |
| | -0.15636037D+01 | -0.10774757D+01 | -0.11347273D+01 | -0.30282233D+01 |
| | -0.10728122D+01 | 0.20037331D+01 | 0.89902959D+00 | 0.10762310D-01 |
| | 0.14604090D+00 | 0.45964282D+00 | 0.20534514D+01 | 0.10871565D+01 |
| | 0.12852524D+01 | -0.14849819D+01 | 0.69199681D+00 | 0.23810153D+01 |
| | 0.25394995D+01 | 0.24332345D+01 | 0.12803083D+01 | -0.12157519D+01 |
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| 4 | 0.29624655D+01 | 0.13488765D+01 | -0.21945715D+01 | -0.93509094D+00 |
| | 0.19781497D+01 | 0.19878696D+01 | -0.11153799D+01 | 0.97625147D+00 |
| | 0.56430101D-03 | -0.33000820D+00 | -0.14552336D+01 | 0.77459193D+00 |
| | -0.19841750D+01 | 0.10910164D+00 | -0.12212855D+01 | 0.77348185D-01 |
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| | -0.14364756D+01 | 0.20285043D+01 | -0.72285919D+00 | 0.44755305D+00 |
| | -0.23497377D+01 | 0.23923138D+01 | 0.15841869D+01 | 0.65387725D+00 |
| | 0.93453830D+00 | 0.44498847D+00 | -0.66234767D-01 | 0.17947121D+01 |
| | 0.18728174D+01 | 0.45071669D+00 | 0.11263780D+01 | -0.15514528D+01 |
| | -0.28439753D+01 | -0.11427310D+01 | -0.25243027D+01 | -0.43914860D+00 |
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| | | | | |
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| | -0.16868073D+00 | -0.12746758D+01 | -0.17419553D+01 | -0.62085069D+00 |
| | 0.10430054D+01 | 0.13057335D+01 | -0.33259907D+00 | 0.21381994D+00 |
| | 0.14450406D+01 | 0.44617126D+00 | -0.85183710D+00 | 0.14291189D+01 |
| | 0.40805615D+00 | -0.12964643D+00 | 0.18248620D+01 | -0.68566728D+00 |
| | 0.18709325D+01 | 0.61468004D+00 | 0.14221151D+01 | 0.18329538D+01 |
| | -0.49865375D+00 | 0.24231553D+01 | -0.23107914D+00 | 0.11113544D+01 |
| | 0.44381831D+00 | 0.22981030D+00 | -0.70954249D+00 | 0.14149555D+01 |
| | -0.15447418D+01 | 0.13286252D+01 | 0.12873792D+01 | 0.12119012D+01 |
| | 0.16280135D+01 | 0.23095067D+00 | 0.20261303D+00 | -0.27577060D+00 |
| | -0.20995840D+01 | 0.22104298D+01 | 0.20756563D+01 | 0.15665438D+01 |
| 17 | -0.98221993D+00 | -0.23055406D+01 | -0.61298488D+00 | 0.71851186D+00 |
| | -0.82867711D+00 | 0.24407241D+01 | 0.13378339D+00 | -0.72290114D+00 |
| | 0.17647063D+01 | 0.23624405D+01 | 0.17246856D+01 | -0.18887206D+01 |
| | 0.85386546D+00 | -0.10503037D+01 | -0.80571086D+00 | -0.17600808D+01 |
| | 0.62221379D+00 | -0.30431414D-01 | 0.23725579D+00 | -0.28725719D+01 |
| | -0.11947480D+01 | -0.13623908D+01 | 0.90170227D+00 | -0.17260054D+01 |
| | 0.15526776D+01 | -0.10731727D+01 | 0.21200592D+01 | 0.94332137D+00 |
| | -0.12720061D+01 | 0.14175856D-01 | 0.14774307D+01 | 0.16278577D+01 |
| | 0.12456209D+01 | 0.14645350D+01 | 0.22174533D+01 | -0.14846495D+00 |
| | -0.55449833D+00 | -0.47803545D-01 | 0.10856559D+01 | 0.19100008D+01 |
| | -0.49478471D+00 | -0.28015231D+00 | -0.38968133D+00 | -0.51645648D-01 |
| | 0.28958350D+00 | -0.42494354D+00 | 0.82083280D+00 | 0.57637875D+00 |
| | 0.26377814D+01 | -0.13757443D+01 | 0.40355957D+00 | 0.42127663D+00 |
| | -0.51205367D+00 | -0.18557728D+01 | 0.18951899D+01 | -0.31820944D+01 |
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| 18 | 0.14642629D+01 | 0.21875877D+00 | 0.75574548D+00 | 0.70318271D+00 |
| | -0.10873719D+01 | 0.77852881D+00 | -0.15073300D+01 | 0.25552316D+01 |
| | -0.49252384D+00 | 0.21807121D+00 | -0.22670189D+01 | -0.20247650D+01 |
| | -0.17568220D+01 | 0.21915558D+01 | 0.17764634D+01 | -0.96935511D-02 |
| | -0.11060250D+01 | -0.44207475D+00 | -0.23607045D+01 | 0.73604308D+00 |
| | -0.10410994D+01 | -0.15648075D+01 | -0.11072782D+01 | 0.31545717D+01 |
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| | -0.16673309D+00 | 0.72810049D+00 | -0.92380437D+00 | 0.25119522D+01 |
| | 0.11940344D+01 | 0.23887877D+01 | -0.50289165D+00 | 0.67513456D+00 |
| | -0.16260722D+01 | -0.23284413D+01 | -0.19810355D-01 | 0.12683649D+01 |
| | -0.26772854D+00 | -0.83327153D+00 | -0.10854083D+01 | 0.18996281D+01 |
| | -0.93978661D+00 | -0.21303732D+00 | -0.88593605D+00 | -0.90780008D-01 |
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| | 0.17688244D+01 | 0.27752134D+01 | 0.12964605D+01 | 0.52960063D+00 |
| 19 | -0.41151918D+00 | -0.53075209D+00 | -0.19944930D+01 | 0.15473166D+01 |
| | -0.16878236D+01 | 0.82160122D+00 | 0.16339442D+01 | 0.91510320D-01 |
| | 0.47871524D+00 | -0.16285608D+01 | 0.12833145D+01 | -0.22800439D+01 |
| | -0.92539173D+00 | -0.28241738D+01 | 0.36714866D+00 | 0.18977444D+01 |

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      -0.83078451D+00   -0.20453438D+01    0.31913229D+00    0.76353763D+00
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       0.23328311D+01   -0.81026396D+00   -0.22319442D+01   -0.16655629D+00
      -0.10251696D+01    0.98944869D+00    0.11907644D+01    0.16831437D+01
       0.43203381D+00   -0.30190346D+00    0.13555703D+00    0.51656497D+00
      -0.21279322D+01   -0.16269020D+01    0.15196290D+00   -0.23819024D+01
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       0.23088165D+01   -0.12307904D+00   -0.15030585D+01    0.17168524D+01
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20     0.19624541D+00    0.12991670D+01   -0.14136881D+01    0.22694477D+00
       0.11212373D+01   -0.26108734D+01   -0.14917323D+01   -0.56566167D-01
       0.59547580D+00   -0.55391800D-01    0.14579295D+01   -0.13787555D+00
       0.11367906D+01    0.13492702D+01    0.22157190D+01    0.19229679D+01
      -0.26310438D+01   -0.20362871D+01   -0.34536767D-01    0.19500554D+00
      -0.10365116D+01    0.95164881D+00    0.27994096D+00   -0.21037104D+01
       0.11689420D+01   -0.60642463D+00    0.29393175D+00    0.10130538D+00
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       0.24580358D+01    0.21142238D+01   -0.24487894D+01    0.98917862D+00
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22    -0.71647334D-01    0.15334564D+01   -0.14395019D+01   -0.75208259D-01
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24     0.54330142D+00   -0.85111952D-01   -0.13068051D+01   -0.11258267D+01
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       0.31437992D+00    0.87813199D+00   -0.19744738D+01   -0.20839327D+01
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       -0.88028381D+00    0.16317019D+01   -0.41860727D+00   -0.25494354D+01

28     -0.62112843D+00    0.22518753D+01   -0.89658664D+00    0.16431446D+00
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        0.88247278D+00   -0.57113389D+00   -0.57435654D+00   -0.33618715D+00

29     -0.49501315D+00    0.19072696D+00   -0.11272802D+01    0.64905276D+00
       -0.94131521D+00   -0.90524958D+00    0.21888468D+00    0.40241476D+00
       -0.87387156D+00   -0.79157767D+00    0.49400020D-01    0.22134582D+01
        0.16253841D+00    0.10340675D+01   -0.83087313D+00   -0.19248975D+01
       -0.80953013D+00   -0.23550536D+01   -0.12864707D+01    0.28538250D+00
        0.14569820D+00   -0.21620114D+01    0.73283839D-01   -0.22810693D+01
       -0.25294216D+01    0.22240274D+01   -0.14361126D+00   -0.27640355D+01
       -0.10550957D+01    0.55533862D-01    0.18877734D+01   -0.11712314D+01
        0.55426823D+00   -0.81471086D-02    0.12464079D+01    0.30568039D+00
       -0.40407981D+00    0.20193514D+00    0.23399120D+01   -0.22874272D+01
        0.12221272D+01   -0.19954273D+01    0.20166648D+01   -0.11081592D+01
        0.10210327D+01   -0.11538661D+01    0.51541412D+00    0.17888448D+00
        0.83501642D+00   -0.78420300D+00    0.28523858D+01   -0.36390648D+00
        0.61655271D+00    0.69828424D+00   -0.15410693D+00   -0.17756678D+01
       -0.47842921D+00    0.23640966D+01    0.17784459D+01   -0.88077855D-01

30     0.18798284D+01   -0.57357311D-01   -0.10988621D+01    0.23353941D+00
       0.11524631D+00   -0.68877041D-01    0.19645947D+01   -0.53983927D-03
       0.21795137D+01    0.12868562D+00   -0.77203215D+00   -0.43761935D+00
      -0.10208342D+01   -0.77523966D+00    0.18404131D+01   -0.91796308D+00
       0.57658401D+00   -0.97766061D+00    0.11715820D+01   -0.31143681D+00
      -0.35882962D+00    0.44852331D+00    0.25654334D+00   -0.17632115D+01
      -0.61198361D+00   -0.44743158D+00   -0.71794426D-01    0.44803331D+00
       0.30040771D+01   -0.70856571D+00   -0.76276219D+00   -0.11605928D+01
       0.16184231D+00    0.13028293D+01   -0.22405072D+01   -0.19593950D+01
       0.28205075D+01    0.46575848D+00    0.13909284D+01   -0.19017963D+01
       0.91464785D+00    0.16485706D+01   -0.21699715D+01   -0.23254043D+00
       0.33038771D+00    0.14445033D+01    0.11477265D+01   -0.83951116D-02
       0.13690742D+01   -0.10526750D+00   -0.35517374D+00    0.25686448D+01
       0.22984483D+01    0.13989179D+01   -0.20307612D+00    0.20565476D+00
       0.59131707D+00    0.24132489D+01   -0.11317000D+00    0.36057625D+00

31     0.10795714D+01   -0.19939042D+01    0.13046036D+01   -0.16538907D+01
       0.17616359D+01    0.54520100D+00    0.24038809D+01    0.53588889D+00
      -0.95056682D+00   -0.28033530D+01   -0.87440559D+00    0.48675498D+00
       0.28059695D+01    0.11911126D+01   -0.28778790D+00    0.10218851D+01
       0.17022953D+01   -0.16261356D+01    0.26171763D+01   -0.12195884D+01
       0.22077397D+01    0.10668652D+01   -0.58611318D+00    0.74828062D+00
      -0.10823539D+01    0.13683844D+01   -0.13578127D+01    0.22266119D+01
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        0.20186044D+01    0.89010717D+00   -0.16076515D+01    0.23755776D+00
        0.69118650D+00   -0.46825750D+00    0.22265527D+01    0.36766257D+00
        0.28501806D+01    0.14931350D+01    0.63787801D+00    0.14487222D+01
       -0.27776734D+01   -0.47612803D+00    0.46782839D-01    0.76143491D-01
       -0.43845168D+00    0.21039420D+00   -0.46490928D+00   -0.23519675D+00
        0.60168889D+00   -0.24993953D+01   -0.68252587D+00   -0.16575919D+01
       -0.20532534D+01    0.65978324D-01   -0.30495606D+01    0.38035340D+00
        0.24986065D+01   -0.16988290D+01    0.10788096D+01   -0.11379169D+01

32      0.31241745D+01   -0.21556951D+01   -0.92486655D+00    0.20315469D+01
       -0.95257721D+00    0.49933256D+00   -0.33799558D+00    0.93048114D+00
        0.92027850D+00   -0.58084805D+00   -0.29001780D+01   -0.17003114D+01
       -0.22813169D+01   -0.83254251D+00   -0.19739310D+00   -0.19894892D+00
        0.83956206D+00    0.10452360D+01    0.55595027D+00    0.18640160D+01
        0.19887022D+00    0.72318879D+00   -0.84119085D+00   -0.98823104D+00
        0.21171414D+01    0.36165323D+00    0.25280496D+00   -0.92509544D+00
       -0.16074662D+01   -0.13819749D+01   -0.86098104D+00    0.92599583D-01
        0.56137601D+00   -0.32583205D+01   -0.20177100D+01   -0.16987160D+01
        0.34621589D+00   -0.64360591D+00    0.10030109D+01    0.21081305D+00
        0.49136652D+00    0.53026993D+00    0.45642575D+00    0.76813940D+00
        0.98595178D+00    0.33315398D+00    0.19942662D+00    0.40848413D+00
        0.22744556D+01   -0.11843998D+00    0.84485058D+00   -0.80599016D+00
        0.65476782D+00    0.10710918D+01    0.50327597D+00   -0.16000829D+00
        0.66372950D+00   -0.60363582D+00    0.71231990D+00   -0.19715104D+01

33      0.20309272D+01   -0.89763747D+00    0.26078442D+01   -0.75591767D-01
       -0.19523384D+01   -0.39185574D+00    0.39451108D+00    0.14142727D+01
        0.12810357D+00    0.21619282D+00    0.22122530D+01    0.14101464D+01
        0.54710931D+00    0.17337588D+01   -0.92802058D+00   -0.15851444D+01
        0.71560678D+00   -0.57757332D+00   -0.25921091D+00    0.11416137D+01
       -0.41979491D+00    0.14459764D+00   -0.17896711D+01    0.87925702D+00
       -0.19396961D+01   -0.23525237D+01    0.40265362D+00    0.19497833D+00
        0.52270273D+00   -0.10154466D+01    0.11135849D+01   -0.22543703D+00
        0.12937104D+01   -0.32540889D+00   -0.80642897D+00    0.10001207D+01
        0.12087544D+01    0.19981063D+01    0.36604605D+00    0.16653216D+01
       -0.24005097D+01   -0.11686442D+01   -0.11167109D+01    0.42813088D+00
       -0.81589139D-01    0.20178209D+01   -0.18021570D+00   -0.79895816D+00
       -0.15990441D+01   -0.15228090D+01   -0.17969206D+01   -0.72118886D+00
       -0.63487889D+00    0.85184907D+00   -0.16178544D+01    0.20369265D+00
       -0.10514322D+01   -0.70914606D+00   -0.36676323D+00   -0.16318267D+01

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        0.90811008D+00    0.21061544D+00    0.35788615D+00   -0.13214364D+01
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       -0.18005408D+01   -0.97666301D+00   -0.58073511D+00    0.40522927D+00
        0.74275513D+00    0.15542107D+01   -0.31078432D+01   -0.20137346D-01
       -0.24330950D+01   -0.18579839D+01    0.14045211D+01   -0.89667261D+00
        0.29597913D+00   -0.10527169D+01    0.27649439D+01   -0.10539892D+01
        0.12702468D+01    0.61226757D+00    0.28409829D+01   -0.10800135D+01
        0.24035974D+01   -0.27225183D+00    0.11034024D+00    0.11895621D+01
        0.15284633D+01    0.10873234D+01   -0.50046612D+00    0.96932657D+00
       -0.17175894D+00   -0.18707914D+01   -0.28899311D+01   -0.21903041D+01
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        0.24797074D+00    0.39913415D+00    0.24565780D+00    0.17883306D+00

35     -0.45634950D+00    0.97682391D+00    0.11126291D+01    0.18446344D+00
       -0.17880273D+01    0.12363731D+00    0.12980660D+01   -0.10326996D+00
        0.14770773D+01   -0.50413251D+00    0.12756481D+01    0.31500747D+01
        0.66373210D+00   -0.13832348D+01    0.65146006D+00    0.23144463D+01
       -0.26810207D+00    0.27435048D+01    0.19158396D+00   -0.80407858D-02
        0.66071184D+00    0.24730433D+01   -0.15751651D+01   -0.24084968D+01
        0.36997365D+00    0.98547981D+00    0.17829930D+01   -0.18591483D+01
       -0.18208712D+01   -0.87508516D+00   -0.32146050D+00    0.53627205D+00
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        -0.71046270D+00   -0.27115358D+00   -0.73586674D+00    0.19530221D+01
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        -0.75567386D+00    0.19528282D+01    0.11188631D+00   -0.11705788D+01
        -0.12138547D+01    0.31139721D+01   -0.62747444D+00   -0.25058553D+01
        -0.20347785D+01   -0.36126292D-01   -0.22817194D+01    0.29240356D+01
         0.31000841D+01    0.14087064D+01    0.55309972D+00   -0.76612062D+00

36      -0.17981860D+01    0.45746771D+00    0.60192660D+00   -0.12854596D+01
        -0.24582756D+00   -0.22759914D+01    0.19399535D+01    0.14559075D+01
         0.10724639D+01    0.89743805D-01    0.13477030D+01    0.51580225D+00
         0.11359192D+01    0.15753189D+01    0.29785665D+00    0.24988977D+01
        -0.13981704D+00    0.95254066D+00   -0.18655294D+01   -0.94932449D+00
        -0.24858902D+01    0.20455460D+01    0.53352290D+00    0.13523472D+01
         0.13240620D+01    0.15194760D+01    0.15095937D+00    0.10327600D+00
         0.46570642D+00    0.13566472D+01    0.58240914D-01   -0.10091009D+01
         0.14433102D+01    0.32202222D+01   -0.26346090D+01    0.24814901D+00
        -0.54346107D+00   -0.89461575D+00   -0.96845846D+00    0.12983760D+01
        -0.84524723D+00    0.20780062D+01   -0.19370200D+01   -0.13122303D+01
        -0.10211965D+01    0.29008243D+01   -0.15013028D+01   -0.26947195D+01
        -0.23096680D+01   -0.45289050D+00    0.38343288D+00    0.69004238D+00
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        -0.48539143D+00    0.95036823D+00    0.58448088D-01    0.22580175D+00

37      -0.48712552D+00    0.25257732D+00   -0.25235629D+01    0.55300117D-02
        -0.24733790D+00   -0.29609394D-01   -0.19322705D+01    0.68995231D+00
        -0.13794546D+01    0.27212082D+01    0.71231877D+00   -0.18500138D+01
        -0.15857740D+01   -0.16766406D+01   -0.72996575D+00   -0.16282964D+01
         0.38056321D+00    0.44227912D+00    0.11668552D+01    0.51621158D+00
        -0.15410664D+01    0.23074398D+00    0.90702010D+00   -0.12136037D+00
         0.16620898D+01   -0.18933934D+01    0.82263614D+00    0.19846221D+01
        -0.30547904D+00    0.30680295D+01   -0.13921152D+00    0.12242832D+01
        -0.15916891D+01   -0.22537805D+01    0.81497312D-02    0.22372142D+00
        -0.27035018D+01   -0.40433816D+00    0.95308925D+00   -0.12460071D+01
        -0.21760648D+01    0.20218562D+01    0.27852824D+01   -0.20224025D+01
         0.59564804D+00   -0.17534513D+01    0.27328207D+01    0.24324621D+01
        -0.14373049D+01    0.71046772D+00    0.33681951D+00   -0.46574461D-01
        -0.27344729D+01   -0.13864425D+01    0.46352950D+00   -0.10687780D+01
         0.11484623D+00   -0.60728588D+00    0.35394440D+00   -0.14910339D+01

38      -0.60180128D-01   -0.92608398D+00   -0.75062935D+00    0.17631751D+01
        -0.17702940D+01    0.31123434D+01   -0.97758353D+00   -0.18668875D+01
        -0.15410882D+01   -0.18475262D+01    0.11582107D+01    0.26225222D+01
        -0.12176511D+01    0.11238127D+01    0.40877804D+00    0.59664596D+00
        -0.67086533D+00   -0.12153384D+01    0.53374807D+00    0.20251076D+01
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         0.10997899D+01   -0.17721381D+01    0.46546917D+00    0.18837332D+01
        -0.71152549D+00   -0.18592796D+01   -0.19119890D+00   -0.11612716D+01
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        -0.91676068D-01   -0.57937412D+00   -0.63134181D-01   -0.20237536D+01
        -0.71581054D-01   -0.21559480D+00   -0.27972837D+01    0.11887806D+01

39      -0.15706438D+01   -0.28396747D+00   -0.59676464D+00   -0.10535349D+01
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       -0.81478477D-02    0.36884739D+00   -0.13601804D-01   -0.59210552D+00
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        0.23872815D+01    0.87952757D-01    0.28296940D+01   -0.14991938D+01

40      0.42853959D+00    0.12585588D+01   -0.15266958D+01   -0.15877940D+01
       -0.43366296D+00    0.22564067D+00   -0.88046494D+00   -0.10336935D+01
        0.46680996D+00   -0.16594471D+00   -0.70250762D-01    0.10692901D+01
       -0.35441628D+00    0.24968497D+01   -0.10816759D+00   -0.14849912D+01
        0.39200312D+00    0.48897321D+00   -0.76327555D+00   -0.13417605D+01
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        0.14145294D+01   -0.12224543D+01   -0.52275357D+00   -0.66949602D+00
       -0.40466214D+00    0.20019909D+00   -0.13988006D+01   -0.51573491D+00
        0.16179010D+00   -0.21806520D+00   -0.93929988D+00    0.23498373D+01
        0.15502416D+00    0.23060395D+01    0.14141268D+00   -0.13082975D+01
       -0.78432101D+00   -0.14502671D+01    0.46033647D+00    0.32979898D+00
       -0.26555609D+01    0.14790898D+01   -0.17298969D+01   -0.37180686D+00
       -0.94991765D+00   -0.20685382D+01   -0.24922638D+00    0.71252155D-01
        0.48502723D+00    0.18539951D+00    0.12891354D+01    0.21273152D+01
        0.25683787D+01    0.21807337D+00   -0.54501927D-01   -0.13461113D-03

41      0.13801932D-01    0.14121227D+01    0.12706468D+01    0.46634822D+00
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       -0.16979431D+01   -0.24252660D+01   -0.13713927D+00    0.10153033D+01
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        0.94479716D+00   -0.16907794D+01   -0.10436001D+01   -0.14098551D+01
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       -0.64239488D+00    0.15692292D+01   -0.88942138D+00    0.15462837D+01
       -0.44443691D+00    0.13225849D+01   -0.11774853D+01    0.13199278D+01

42     -0.23005701D+01    0.23104010D+01    0.11203097D+00    0.20070170D+01
       -0.21065009D+01   -0.60865093D+00    0.74237944D+00   -0.22140632D+00
       -0.22260566D+00   -0.87908415D+00   -0.86417903D+00    0.23975247D+01
       -0.10736421D+01    0.17701781D+01   -0.95413660D+00   -0.91150591D+00
       -0.16806690D+01   -0.52056135D+00    0.25724865D+01   -0.69462746D+00
       -0.20362524D+00   -0.24749771D+01   -0.20866859D+01   -0.95823551D+00
        0.80359342D+00   -0.10264236D+01   -0.19771392D+00   -0.27094425D+00
       -0.15744444D+01   -0.12761389D+01   -0.56417054D+00    0.32195917D+00
       -0.89478447D+00   -0.46394717D+00   -0.25134678D+01    0.21715621D+01
       -0.21486639D+01   -0.75146248D+00    0.20431248D+00    0.48587402D+00
       -0.24665898D+01   -0.17791188D-01    0.10050926D+01    0.13778718D+01
       -0.27359178D+01   -0.26773539D+00   -0.45302966D+00   -0.89895234D+00
        0.66907053D+00    0.13475035D+01   -0.11061104D+01   -0.92754364D+00
        0.24458907D+00    0.89712209D+00    0.36681492D+00    0.10832609D+01
        0.14022692D+01    0.12250120D+01    0.48240025D+00    0.18967802D+01

43      0.73770000D+00    0.94261670D-01    0.10853723D+01    0.12693284D+01
       -0.22961843D+01   -0.30549401D+00   -0.21873415D+01   -0.90570399D+00
       -0.19315059D+01    0.19519613D+01    0.82893217D+00    0.12469151D+01
       -0.19624545D+01   -0.34480171D+00    0.19515942D+01    0.12099153D+01
        0.28439503D+00    0.21685081D+01    0.12842151D+01    0.17837388D+01
        0.22215661D+01    0.10252612D+01   -0.89323146D+00   -0.75135046D+00
       -0.15903335D+01   -0.41232860D-01   -0.29663368D+00   -0.43565751D+00
       -0.16961283D+01   -0.22936609D+00   -0.47250605D+00   -0.15929468D+01
       -0.18620902D+01   -0.23633729D+01   -0.10952573D+01   -0.35583268D+00
       -0.24544559D+01    0.10500293D+01    0.27304537D+00   -0.13536706D+01
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       0.44939133D+00    0.13082069D+00   -0.71635050D+00   -0.14972622D+01
       0.21417411D+01   -0.26539376D+00    0.17505273D+01   -0.23944651D+00
       0.75401100D+00    0.15754886D+00    0.71644722D+00   -0.30656419D+01

44     0.80937494D+00    0.77476952D+00    0.99599600D+00   -0.33887551D+00
      -0.74096217D+00   -0.21511803D+01   -0.68221458D+00   -0.14505768D+01
      -0.17604983D+01   -0.97347151D+00   -0.87088526D+00    0.19510714D+00
      -0.34691919D+00   -0.49651951D+00   -0.17181957D+01    0.45728072D+00
       0.10849874D+01   -0.21052192D+01    0.46428288D+00   -0.72703400D+00
      -0.14423713D+01   -0.22627593D+00    0.17996348D+01   -0.81047544D+00
       0.18724032D+01   -0.15020315D+01    0.22311479D+01    0.78457860D+00
       0.33899872D+00    0.52320688D+00   -0.25046414D+01   -0.82656597D+00
      -0.10781177D+00   -0.13956621D+01    0.82599902D-01   -0.39599825D+00
       0.19961267D+01    0.28414001D+00    0.38504891D+00    0.25392189D+01
      -0.86385136D+00   -0.13055950D+00   -0.16772861D+00   -0.97302806D+00
       0.49806442D+00   -0.50521033D+00    0.14142713D+01   -0.22424822D+01
       0.26349573D+01   -0.32636834D+00   -0.14079635D+01   -0.59159425D+00
       0.11214809D+01    0.73697653D+00    0.13955845D+01    0.76899588D-01
       0.59565479D+00   -0.14404277D+01    0.21095115D+01   -0.18001008D+01

45    -0.86994612D+00    0.17042841D+00   -0.13388184D+01    0.10193813D+01
       0.50582017D+00   -0.45417327D+00    0.53077369D+00   -0.87171302D+00
      -0.43744178D+00   -0.14982561D+01   -0.21552840D+01    0.14718844D+01
      -0.23480388D+01    0.11587102D+00    0.75804067D+00    0.19415066D+01
      -0.15958230D+01    0.62667775D+00    0.15649763D+01   -0.28905606D+00
      -0.19413325D+01   -0.23885186D+00    0.99855756D+00   -0.31706926D+00
       0.32568049D-01   -0.11999874D+01   -0.18322644D+01   -0.17268717D+01
      -0.16734535D+01   -0.81951605D+00   -0.86801521D+00   -0.66839039D+00
       0.36816293D+00    0.23649079D+00   -0.48658452D+00    0.26018434D+01
      -0.30727116D+00    0.12764137D+01   -0.85361935D+00   -0.88282135D+00
      -0.13383334D+01    0.19831700D+00    0.36458662D+00    0.11348296D+01
      -0.18163128D+00    0.20426846D+01    0.15257020D+01   -0.19926408D+01
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       0.37614375D+00   -0.34824486D+00   -0.11626957D+01    0.23954594D+01
      -0.20984128D+01    0.19091326D+01   -0.93057511D+00    0.18612607D+01

46     0.49912258D+00   -0.16661599D+01    0.76266112D+00    0.26012465D+00
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      -0.18460436D+01    0.56237965D+00    0.10225593D+00   -0.18993068D+00
       0.21262710D+01    0.10019773D+00   -0.26809408D+01    0.92503569D+00
      -0.16813035D+01    0.30295823D+01   -0.64666593D+00   -0.40324366D+00
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       0.10593435D+01   -0.71937728D+00    0.93301915D+00    0.11192185D+01
      -0.21437573D+01    0.84692166D+00   -0.15233935D+01   -0.28414637D+01
       0.18604520D+01   -0.17973320D+01    0.31136389D+00   -0.14721446D+01
       0.13025300D+01   -0.77149711D+00   -0.26176545D+01   -0.57500229D+00
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       0.10004833D+00   -0.65659472D+00   -0.76610605D+00   -0.51291198D+00
       0.14837061D+01   -0.91455618D+00   -0.81594470D+00    0.17961583D+01
      -0.86208062D+00    0.10838924D+01   -0.10796663D+01    0.83281965D+00

47    -0.10925130D+01   -0.19546695D+00    0.10487427D+01   -0.83970460D+00
       0.30932995D+00   -0.12696694D+01    0.25591812D+01    0.17535015D+01
       0.82622757D+00   -0.97858682D+00    0.23274403D+01    0.49373374D+00
       0.20301468D+01   -0.14390257D+01   -0.28450485D+00    0.10160630D+00
       0.12659415D+01    0.16303886D+01   -0.21513624D+01   -0.81521822D+00
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      -0.22082579D+00   -0.90146089D+00   -0.23928107D+01    0.44858147D+00
      -0.73534567D+00    0.27183760D+00    0.44019197D+00    0.13800583D+01
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      -0.18902470D+01    0.33478382D+00    0.11293913D+01    0.10662624D+01
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48    -0.13700108D+01    0.21105611D+01    0.18228419D+01    0.85653106D+00
      -0.48434663D+00   -0.37670761D+00   -0.16968014D+01   -0.13908478D+01
      -0.14631867D+01    0.14026150D+01    0.13974774D+01    0.19073206D+01
       0.14249525D+01    0.11464765D+01    0.13373503D+01    0.16561551D+01
      -0.18744942D+01   -0.12731646D+01    0.11565284D+01    0.50255939D+00
       0.17090912D+00    0.29708329D+00    0.20755783D+00    0.16363937D+01
      -0.35885623D+00   -0.11303313D+00   -0.13388292D+00   -0.15208537D+01
      -0.10882155D+01   -0.13149904D+01    0.26228142D+01    0.20601063D+01
      -0.14104533D+01   -0.79156612D+00    0.36248320D+00   -0.31996545D+00
      -0.16466786D+00    0.56058215D+00    0.24309808D+01    0.20623363D+01
       0.14747766D+01    0.11758399D+01    0.89483786D-01    0.59173265D+00
       0.18962972D+01   -0.27479430D+01    0.35628539D+00    0.64043182D+00
       0.11366379D+01   -0.21295311D+01   -0.56390737D+00   -0.20181969D+01
      -0.10460826D+01   -0.13968802D+01    0.23368227D+01   -0.21084542D+01
       0.88176310D-01    0.40778373D+00   -0.72609948D+00    0.73636355D+00

49    -0.10732796D+01    0.36093335D+00    0.10799646D+01   -0.20481910D+01
       0.77567732D-01   -0.12233722D-01    0.22445170D+01    0.54744866D+00
      -0.18158951D+01   -0.17745318D+01   -0.12180810D+01    0.94176993D+00
      -0.23489535D+01   -0.12031094D+01   -0.23346394D+01   -0.24050046D+01
      -0.16222276D+01   -0.13934388D+01    0.26703146D+01   -0.19074192D+01
       0.13329381D+01   -0.15378295D+01   -0.58210455D+00    0.48544697D+00
       0.11665826D+01   -0.66445637D-01   -0.54428047D+00    0.11677156D+01
       0.45973898D+00   -0.14508206D+01    0.11762638D+01   -0.19080560D+01
      -0.17884569D+01    0.13012698D+00    0.29727256D+01    0.15218588D+01
       0.16384331D+00   -0.73842326D+00    0.32381690D-01   -0.77410173D-01
      -0.36690176D-01   -0.89820720D+00   -0.30325521D+01   -0.61159471D+00
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       0.24496875D+01   -0.77659692D+00    0.12850249D+01   -0.23303783D+00
       0.33803216D+00   -0.70739868D+00   -0.38060342D+00   -0.14114599D+01
      -0.27368710D+01    0.42664344D+00   -0.15428815D+01   -0.48915412D+00

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      -0.65624559D-01    0.44663354D+00   -0.44028643D+00    0.14180007D+00
      -0.14515561D+01    0.10846147D+01   -0.82006283D+00    0.11102845D+01
      -0.86378654D+00   -0.96052883D+00    0.20104720D+01   -0.18402274D+01
      -0.12173810D+01    0.23851357D+01   -0.10288419D+01    0.12775707D+01
      -0.18791748D+01   -0.33445113D+00    0.12353397D+01   -0.18565473D+01
       0.51464839D+00   -0.15135446D+01    0.23060362D+01    0.56520761D+00
       0.12847880D+00    0.89470080D+00   -0.82038623D+00    0.13016870D+01
      -0.51529778D+00    0.15450286D+01   -0.60304145D+00    0.47335092D+00
       0.10862191D+00   -0.17456229D+01    0.21821465D+01    0.76031497D+00
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       0.21573820D+01   -0.20328548D+01   -0.78715582D+00   -0.70033185D+00
      -0.52328693D+00    0.29087913D-01   -0.30044920D+01    0.51798935D+00
       0.15550660D+01    0.20881908D+01   -0.88983200D+00    0.69206998D+00
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       0.27358793D+00   -0.17376090D+01   -0.89699322D+00   -0.13529508D+01
      -0.86592786D+00   -0.76216496D+00    0.17019837D+01    0.35349581D+00
       0.21234627D+01   -0.16493338D+01   -0.14684958D+01    0.11475857D+01
       0.10872797D+01   -0.15828471D+01   -0.10893837D+00    0.14619157D+00
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       0.11928263D+00   -0.22967937D+01    0.13650442D+01    0.23644226D+00
      -0.48302739D+00   -0.20125733D+01   -0.85905735D+00    0.68516023D+00
      -0.23714354D+01    0.57882899D+00    0.22877948D+01   -0.11857407D+01
      -0.12205507D+01    0.59845476D+00    0.15214873D+01   -0.65090342D+00
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       0.24845266D-01   -0.21482859D+01    0.30169170D+00    0.21131260D+01

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      -0.15701180D+01    0.36903119D-01   -0.88149256D+00   -0.11860765D+01
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      -0.22657915D+01    0.35418694D+00   -0.24470941D+00    0.31572286D+00
       0.15582999D+00   -0.16560127D+01   -0.42000206D+00    0.29632040D+01
       0.35700624D+00    0.77691677D+00   -0.75686582D+00    0.24384370D+01
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      -0.54980075D+00    0.12519370D+01   -0.24507589D+01    0.19150303D+01

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      -0.87177252D+00    0.20456540D+01    0.37572186D+00    0.17662717D+00
       0.13394877D+01   -0.11768770D+00    0.21148261D+00    0.16857827D+01
       0.18076598D+01   -0.10517642D+01    0.24107432D-01    0.42269350D+00
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       0.44717997D+00    0.90826950D+00   -0.26479275D+01    0.43635727D+00
      -0.77510530D+00    0.10435958D+01    0.15468396D+01    0.28329309D+01

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      -0.45030907D+00   -0.17375746D+01    0.28772229D+00    0.95094768D+00
      -0.13198881D+01   -0.90819458D+00    0.90716258D+00   -0.18279538D+01
       0.27107531D+00   -0.46101009D+00   -0.52735307D+00    0.13201861D+01

55     0.52893630D+00   -0.21107624D+00   -0.41075337D-01   -0.42667177D+00
      -0.27148852D+01    0.17283276D+01   -0.34493752D+00    0.55994617D+00
      -0.80685517D+00    0.53073483D+00   -0.10437884D+01    0.14657596D+00
      -0.51173867D+00    0.10969790D+00    0.24601407D+00    0.17847767D+01
       0.71725913D+00   -0.22500265D+00   -0.19614842D+00   -0.26450476D+01
       0.39122874D+00   -0.13427489D+01   -0.22366959D+00   -0.94028755D+00
      -0.16242117D+01   -0.62997627D+00    0.28626512D+00    0.15472938D+00
      -0.17811806D+01    0.90943617D+00   -0.25208365D+01   -0.10829006D+01
       0.81570103D+00   -0.10087254D+01   -0.16927904D+01   -0.11487986D+01
       0.12120451D+01    0.62560056D+00    0.85074985D+00    0.19320564D+01
       0.17439288D+01   -0.20711405D+01   -0.14227233D+01    0.10861868D+01
       0.91562998D+00   -0.20265094D+01   -0.10620871D+01    0.29099759D+01
       0.26148622D+01    0.20750361D+01    0.13013960D+01   -0.13744729D+01
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        0.10655083D+01   -0.88324949D+00    0.12255620D+01    0.74023712D-01
        0.23178545D+01   -0.88289654D-01   -0.33366879D+00   -0.45341238D+00

56     -0.10966269D+01   -0.81202383D+00    0.21825990D+01    0.61680439D+00
        0.20131292D+01   -0.92919172D+00    0.93174779D+00   -0.14699127D+01
        0.93431427D+00   -0.65556419D-01   -0.16062317D+01   -0.17373800D+01
        0.12794064D+00   -0.16652236D+01    0.21515415D+01    0.54758549D+00
        0.19967070D+01   -0.29867909D+00    0.23647095D+00   -0.57168939D+00
       -0.16044541D+01   -0.71786538D+00   -0.10172198D+01   -0.90306154D+00
        0.72967136D+00    0.19762392D+01   -0.33069048D+00    0.42059910D+00
       -0.15598757D+01   -0.74645797D+00   -0.65118728D+00   -0.20449163D+01
        0.27682024D+00    0.17622592D+01    0.26475390D+00    0.16460134D+01
       -0.64090333D+00   -0.17761636D+01   -0.11443952D+01   -0.38248612D+00
       -0.17624129D+00    0.61537158D+00    0.19466416D+01   -0.35161420D+00
       -0.17393733D+01    0.28395360D+01   -0.18707593D+01   -0.64223659D-01
        0.25355834D+01    0.10819968D+01   -0.87232285D+00   -0.22536469D+01
       -0.11988799D+01   -0.17436616D+01   -0.24465795D+01   -0.12450268D+01
       -0.10561624D+00    0.93648486D+00    0.10469320D+01    0.10708573D+01

57      0.29002357D+00   -0.57832730D-01   -0.26237280D+00   -0.13072493D+00
       -0.77219715D+00   -0.15242849D+01   -0.14967628D+01    0.10101615D+01
       -0.12308265D+01    0.30490782D+00    0.16063891D+01   -0.16839088D+01
        0.15441309D+01   -0.19214386D+01    0.23988968D+00   -0.60272493D+00
        0.13628828D+01   -0.20529104D+01   -0.17187490D+00   -0.19971725D+01
        0.13779587D+01   -0.12285089D+01   -0.14207947D+00    0.24850101D+00
        0.24838192D+01   -0.53016819D+00    0.27468995D+01   -0.41807836D+00
        0.13539657D+01    0.15012305D+01    0.23493432D+01    0.26853213D+01
        0.15155491D+01   -0.19126588D+01   -0.15004499D+01    0.11577338D+00
       -0.53852005D+00   -0.10286598D+01   -0.16073054D+01    0.88292738D+00
       -0.59996281D+00   -0.28559122D+00    0.20318785D+00   -0.43575718D+00
       -0.19580221D+01   -0.18702821D+01    0.54053545D+00   -0.42276740D-01
       -0.17748534D+01   -0.34608679D+00   -0.57302153D-01    0.47215090D+00
        0.37658443D+00    0.56097412D-01   -0.19305056D+00   -0.15451777D+01
       -0.23878613D+01    0.20843174D+01   -0.24417620D+01    0.45678033D+00

58     -0.15439204D+01    0.36538063D+00   -0.21255054D+00    0.16673629D+00
        0.13297580D+00    0.17864348D+01   -0.99363184D-01   -0.11398829D+01
       -0.13369298D+01   -0.18955164D+01   -0.97955537D-01   -0.16777859D+01
       -0.50796509D-02   -0.84018263D+00   -0.22475194D+01   -0.13972158D+01
        0.19675015D+01    0.11424215D+01   -0.16165570D+01   -0.11012602D+01
        0.16426282D+01    0.33377266D+00    0.15232929D+01    0.29396969D+01
       -0.18751241D+01    0.23613666D+00    0.81092643D+00   -0.26389799D+01
        0.18690037D+01   -0.23106353D+01    0.27969452D+01   -0.93562948D+00
       -0.25251246D+01   -0.12248101D+01   -0.16766909D+00    0.16575333D+00
       -0.16301186D+01    0.13090247D+01    0.64461389D+00   -0.24689376D+01
        0.21788614D+01   -0.80742157D-01   -0.59845239D+00   -0.30087008D+00
       -0.18184748D+01    0.71405058D+00   -0.73772068D+00   -0.20772821D+00
        0.12573754D+01   -0.12643653D+01   -0.38397778D+00   -0.19856664D+01
       -0.10818712D+01    0.24021078D+01   -0.39177254D+00   -0.63760185D-01
        0.12276386D+01   -0.26326792D+00    0.11542553D+01    0.21690392D+01

59      0.57144177D+00    0.49697948D+00   -0.18370400D+01   -0.48125437D+00
        0.72027398D+00    0.20841989D+01    0.48974246D+00   -0.95447594D+00
        0.41108555D+00    0.21899840D+01    0.93065523D+00    0.12202809D+01
       -0.14268999D+01    0.16354986D+01   -0.11066913D+01   -0.16904894D+01
        0.19804986D+01   -0.48628004D+00   -0.56367260D+00   -0.31898656D+00
       -0.13010939D+01    0.55779909D+00   -0.26654175D+01   -0.16589940D+01
       -0.13062561D+00    0.17469195D+01    0.48192739D+00    0.10872855D+00
       -0.17013279D+00   -0.50343060D-01   -0.36856868D+00   -0.13714432D+01
       -0.22257562D+01   -0.59516153D+00    0.87311544D+00   -0.23803905D+01
        0.21487439D+01    0.22399021D+01    0.12491848D+01   -0.16371414D+01
       -0.81402777D+00   -0.57324404D+00    0.10676389D+00    0.22573833D+00
       -0.22361748D+00    0.29751379D+01    0.11881321D+01   -0.97574519D+00
       -0.12273761D+00   -0.63652537D+00    0.28584560D+01    0.16225953D+01
        0.65921614D+00    0.10072412D+01    0.24710249D+01    0.11702375D+01
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        0.79015150D+00    0.23648205D+01   -0.73001517D+00    0.57655911D+00

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        0.22230560D+01   -0.14482335D+01    0.22338960D+01   -0.12891297D+01
       -0.30718750D+00   -0.13725447D+01   -0.11695499D+01    0.11928702D+01
        0.25494875D+00    0.18692631D+01   -0.10407921D+01    0.19971390D+01
        0.46857804D+00    0.23417819D+01   -0.86640680D-01    0.13792050D+00
       -0.39521945D-01   -0.13579876D+01   -0.13112810D+01   -0.12484834D+01
       -0.11581137D+01   -0.19946239D+00   -0.11557285D+01    0.59120880D+00
        0.23127978D+01    0.12701938D+01    0.21502212D+01   -0.19031914D+00
        0.18537619D+01   -0.79775741D+00    0.22235372D+01    0.22894015D+00
        0.40517856D+00   -0.98995727D+00   -0.26490002D+01   -0.10226012D+00
        0.93409632D+00   -0.77977841D+00    0.99749207D-01    0.17365001D+01
        0.38850847D+00   -0.11886520D+01    0.31533132D+00    0.69730759D-01
       -0.16085041D+00    0.24010351D+00   -0.29275641D+00   -0.25540470D+01
       -0.99120696D+00    0.27549541D+01   -0.25780157D+01    0.74512087D+00
       -0.14109524D+01    0.17973227D+01    0.40359747D+00   -0.26456428D-01

61     -0.68707871D-01    0.13098633D+00   -0.10108627D+01    0.16660733D+01
        0.12620719D+01    0.57789227D+00   -0.61684397D+00   -0.28724004D+00
        0.10824192D+01    0.12750583D+00   -0.23785989D+00   -0.18345638D+01
       -0.13353597D+00    0.95632160D+00   -0.57770097D-01   -0.58771559D+00
       -0.21621155D+01   -0.65854288D+00   -0.11626437D+01    0.85129052D+00
       -0.23242334D+01   -0.63661354D+00    0.13385016D+00    0.51172659D+00
        0.18579633D+01   -0.12538238D+01    0.80255148D+00   -0.13868641D+01
       -0.21580459D+01    0.20352174D+01   -0.55158099D+00    0.61816669D-01
        0.88320429D+00    0.19124612D+01    0.12976395D+01   -0.21151931D+01
        0.20910242D+01   -0.95084563D+00    0.16222371D+01    0.14013692D+01
        0.72192942D+00    0.16960712D+01    0.40218279D+00   -0.86802582D+00
        0.71049875D+00    0.16112497D+01    0.10250036D+01   -0.35521392D+00
       -0.96226535D+00   -0.47477498D+00    0.16228919D+01    0.31396450D+01
        0.15369223D+01    0.54376531D+00   -0.95268425D+00    0.17695539D+01
        0.73698882D+00   -0.17118960D+01   -0.91887339D+00    0.49966121D+00

62     -0.13706313D+01    0.70030752D+00    0.34116273D+00    0.38386202D-01
        0.54602277D-01   -0.33415195D+00    0.41898276D+00    0.12420419D+01
       -0.17548366D+00    0.21171300D+01   -0.13307360D+01   -0.68584443D+00
        0.20149330D+01   -0.18140836D+01    0.90918112D-01   -0.19189838D+01
       -0.54404113D+00    0.30347129D+00   -0.62321012D+00   -0.23997518D+01
       -0.26684246D+00   -0.16388959D+01    0.10857905D+00    0.86510820D+00
        0.27622027D+00    0.30582177D+01   -0.36073776D+00    0.20962823D+01
       -0.26648607D+01    0.43785554D+00   -0.27369850D+01   -0.11788173D+01
       -0.15612133D+00   -0.25902524D+01   -0.92736721D+00   -0.25925571D+00
       -0.24284533D+01   -0.93914216D+00    0.13044543D+01   -0.81627821D+00
       -0.18389324D+01    0.15343132D+00    0.13707826D+01   -0.24515133D+01
        0.55352831D-01    0.14105403D+01    0.17980615D+00   -0.16676758D+01
       -0.48902537D+00   -0.10868466D-01   -0.14569777D+01    0.94822952D+00
       -0.90066442D+00    0.17405738D+01    0.70158243D-01    0.32920573D+00
        0.95342410D-01    0.12587034D+01    0.23515928D+01   -0.12799399D+01

63     -0.52448959D+00   -0.10447806D+01   -0.18255316D+01   -0.68052742D+00
       -0.12643079D+01    0.83308446D-01    0.12845180D+00    0.41048827D+00
       -0.10674929D+01    0.24586794D+01   -0.19941348D+01   -0.97475866D+00
       -0.97968153D+00    0.27797771D+00    0.63662691D+00   -0.10822800D+01
       -0.35877727D+00    0.66962450D+00   -0.10836820D+01    0.13500547D+01
        0.65281296D-01   -0.49407556D+00    0.46516501D+00    0.21733773D+01
        0.46825653D+00    0.52676129D-01   -0.13754749D+01   -0.65381976D+00
       -0.24531537D+01    0.25628114D+00   -0.60912954D+00   -0.10982343D+00
       -0.52858226D+00    0.26835349D+00   -0.71272883D+00   -0.71634128D+00
        0.77624160D+00    0.60782893D+00   -0.82761798D+00   -0.17076419D+01
       -0.12773490D-01    0.16057441D+00    0.18692530D+00    0.83780452D+00
       -0.12845147D-01    0.10164974D+01    0.23767593D+00    0.10318543D+00
        0.11184148D+01   -0.25584481D+00    0.21894425D+00   -0.52329459D+00
       -0.17767641D+01    0.30286448D+00   -0.18284372D+01    0.33244530D+00
       -0.77857600D+00    0.13923105D+01    0.17793691D+01   -0.55127761D+00
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64     0.44628347D+00   -0.21434188D+01   -0.18246192D+01    0.86931956D+00
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      -0.20678273D+01    0.53211076D+00    0.29069308D+01    0.21038332D+00
      -0.11680126D-02   -0.13381840D+01   -0.60762007D+00    0.14211720D+01
       0.26271728D+01    0.11272851D+00    0.37880086D+00    0.13455270D+01
      -0.14792028D+01    0.91311795D+00   -0.10979836D+01    0.14071709D+01
       0.14238223D+01   -0.12956724D+01    0.23514503D+01    0.53567286D+00
       0.14392786D+00   -0.30180366D+00   -0.17630760D+01    0.20176222D+01
       0.56290200D+00   -0.78019392D-01    0.54295412D+00   -0.19647020D+01
      -0.96531149D+00    0.17507763D+01    0.14705487D+01   -0.13071572D+01
       0.37093444D+00    0.52744009D+00    0.76650482D+00   -0.47006615D+00
      -0.38596426D+00    0.47001219D+00   -0.55979519D+00    0.31229542D+01
      -0.20231522D+00   -0.25333621D+01    0.16679131D+01   -0.18263335D+01
      -0.10508205D+00    0.35798867D+00    0.10845734D+01   -0.21146174D+01
      -0.20463396D+01   -0.92814577D-01    0.18631056D+01    0.12266372D+01

65    -0.10295238D+01   -0.77830528D+00   -0.10098710D+01    0.16389068D+01
      -0.14284274D+01    0.20255466D+01   -0.29204414D+00   -0.16610592D+01
       0.18478313D+01   -0.34968007D-01   -0.39538386D+00   -0.62304077D+00
      -0.12552371D+01   -0.82296047D+00    0.30151755D+00   -0.12559802D+01
       0.21113704D+00    0.45747981D+00   -0.58155596D+00    0.82125645D+00
      -0.45140778D+00   -0.18422315D+01    0.25919160D+01   -0.90488700D+00
      -0.12551665D-02    0.21881090D+00   -0.86895148D+00   -0.15899226D+01
      -0.63220125D+00    0.14248699D+00   -0.89088655D-01    0.25589163D+01
       0.68865455D+00   -0.69936606D+00    0.15033883D+01   -0.13895894D+01
       0.13205189D+01    0.15815330D+01   -0.26544636D+01    0.77458746D+00
       0.30860145D+01    0.13738924D+01    0.34544555D+00    0.80545666D+00
       0.14457880D+01    0.48833185D+00   -0.26744023D+01   -0.26587563D+01
      -0.24893787D+01   -0.38363292D+00    0.10372612D+00    0.13821260D+01
      -0.70896060D+00   -0.27310609D+00    0.30111751D+01   -0.94535220D-01
       0.58442045D+00    0.20017341D+00    0.26487592D+01   -0.98145916D+00

66     0.12343245D+01   -0.15506550D+01    0.23069104D+00    0.12769327D+01
      -0.44025956D+00    0.10974011D+01   -0.13870973D+01    0.31835594D+00
       0.27358671D+00   -0.18037887D+01    0.20409484D+01    0.18047825D+01
      -0.36060082D+00    0.21505557D+01    0.52323160D+00   -0.88098569D+00
       0.18357400D+01    0.48639364D+00    0.13220457D+00    0.18124228D+00
       0.15261206D+01    0.13016062D+00   -0.13319574D+01    0.57209533D+00
      -0.18835771D+01    0.26755648D+01   -0.99018508D+00    0.64318635D+00
      -0.70017875D+00    0.14378850D+01    0.15415649D+00    0.15157783D-01
      -0.13107956D+01    0.24957655D+01   -0.30585596D+01    0.26323088D+00
       0.15370972D+01   -0.18794846D+01   -0.53055127D+00    0.19025143D+00
       0.15430830D+01   -0.60709658D+00   -0.40545421D+00   -0.31276459D+00
      -0.65127555D+00   -0.39254415D+00   -0.67965097D+00    0.58141825D+00
       0.11199866D+01   -0.93574682D+00   -0.11260988D+01    0.87180051D+00
       0.61715801D+00   -0.25517732D+01   -0.11306575D+01    0.75219357D+00
      -0.44772681D+00    0.13959563D+01    0.35908146D+00   -0.97823110D+00

67    -0.22327724D+01   -0.21758864D+01    0.61509718D+00   -0.25181221D+01
       0.13261538D+01    0.20182904D+01    0.17821194D+01   -0.62024128D-01
       0.17728956D+00   -0.46206273D+00    0.10876654D+01   -0.59350157D-01
       0.66722854D+00   -0.20535094D+01    0.24932408D+01   -0.39762217D+00
       0.53244479D+00    0.73349781D+00   -0.54996514D+00    0.43499115D+00
      -0.96672254D+00    0.14704764D+01   -0.13483435D+01    0.27428344D+00
       0.20254147D+01   -0.99572636D+00    0.25243696D+01    0.44212022D+00
      -0.20311216D+01    0.14879255D+01   -0.74517508D+00    0.23460481D+01
      -0.15254927D+01    0.10490166D+01    0.55529629D+00    0.51640413D+00
       0.58794349D+00    0.28955390D+01   -0.18335860D+01   -0.19190745D+01
       0.11115313D-01   -0.14074806D+00    0.49740094D+00   -0.72314162D+00
      -0.13387777D+01   -0.23458779D-01    0.10038044D+01   -0.23994321D+01
       0.36721888D+00   -0.26932216D+01    0.19027317D+01    0.19464691D+00
       0.13037994D+01   -0.12118200D+01    0.82558585D+00   -0.92747408D+00
      -0.16371175D+01    0.53116788D+00    0.40829754D+00   -0.22194179D+01
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      -0.66032776D+00    0.31885415D+00    0.80623801D+00   -0.32566695D+00
      -0.11729478D+01    0.20044509D+01    0.38392342D+00   -0.12383797D+01
       0.41484356D+00   -0.25892437D-01   -0.74007993D+00   -0.21483642D+01
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      -0.19404032D+01   -0.50507581D-01    0.89015210D-01   -0.90128175D+00
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      -0.46464765D-01   -0.26628633D+01   -0.18386669D+01    0.19292266D+01
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       0.24624388D+00   -0.91729884D+00   -0.20069802D+00   -0.32368228D+00
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       0.94945830D+00    0.52101123D-01    0.21130800D+01    0.32320740D+01

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      -0.25650997D+01    0.17514917D+01    0.46692415D+00   -0.16784406D+01
       0.14768527D+01    0.23323276D+00   -0.29697557D+01   -0.63054751D+00
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| | -0.81800364D+00 | 0.22301778D+00 | -0.30756460D+00 | 0.24101907D+01 |
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| | 0.45603666D+00 | -0.15076845D+01 | 0.98453689D-01 | -0.29085207D+00 |
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| | 0.85097749D+00 | 0.46631652D+00 | 0.12608635D-01 | 0.14753922D+01 |
| | -0.23158850D+01 | -0.29228357D+00 | 0.84665529D+00 | 0.56598456D+00 |
| | 0.20529314D+00 | 0.13972243D+01 | 0.14643738D+01 | -0.10178617D+01 |
| | -0.36994885D+00 | 0.14378440D+00 | 0.24618391D+01 | -0.82753546D+00 |
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| | 0.25680908D+00 | 0.11219733D+01 | 0.10675961D+01 | -0.19599138D+01 |

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| | 0.10930037D+00 | -0.29080367D+01 | -0.22845842D+01 | 0.15943749D+01 |
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| | 0.14585459D+00 | 0.88152725D+00 | 0.24485254D+01 | 0.20595804D+00 |
| | -0.99372393D+00 | 0.14986450D+01 | -0.75716510D+00 | 0.19298964D+01 |
| | -0.21771230D+01 | 0.18587646D+01 | 0.97921114D+00 | -0.83010097D+00 |
| 77 | -0.41676565D+00 | 0.10028784D+01 | 0.11101853D+01 | 0.17351830D+01 |
| | -0.10350269D+01 | -0.41382859D+00 | -0.80015503D+00 | -0.47867824D+00 |
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| | -0.28440133D+01 | 0.22267518D+00 | -0.57126007D+00 | -0.18489877D+01 |

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      -0.29647268D+00    0.68817987D+00   -0.65723418D+00    0.10463428D+01
      -0.38178309D+00    0.13091624D+01    0.25192251D+01   -0.25268596D+01
      -0.13704875D+01    0.20809577D+01   -0.29309578D+00   -0.64382257D+00
      -0.64964477D+00   -0.15013067D+01   -0.23113402D+01   -0.14497080D+01
       0.17752155D+01    0.17897110D+01   -0.87678535D+00   -0.43343962D+00
      -0.20343572D+01   -0.76651109D+00   -0.25544286D-01   -0.41403228D+00
       0.52331104D+00   -0.23093659D+00   -0.47177008D+00   -0.20394185D+01
       0.65056427D+00    0.89950275D-01    0.21966417D+01    0.80222217D+00
      -0.14015339D+01   -0.57343230D+00   -0.30901504D+01    0.25863577D+00
       0.90234509D+00    0.12161574D+01   -0.13046368D+01    0.18771655D+01
       0.20484089D+00   -0.19397930D+01    0.44484026D+00   -0.74407691D+00
      -0.15335470D+01    0.11693709D+01    0.46838350D+00    0.38246176D+00

81    -0.32971493D+00   -0.15038696D+01    0.33973769D+00   -0.21692692D+01
       0.11767313D+01    0.47115263D+00    0.41738050D+00   -0.23983511D+01
       0.86467792D+00   -0.44289055D+00   -0.94657555D+00    0.16808605D+01
       0.13313684D+01   -0.18966345D+01   -0.10965675D+01   -0.93630437D+00
       0.35899866D-01   -0.10543494D+01    0.21674379D+01    0.95040374D+00
      -0.11761685D+01   -0.32245657D+00   -0.16166966D+01   -0.56361071D+00
       0.26892944D+01   -0.14054338D+00   -0.19424194D+01   -0.18600562D+01
       0.13746007D+01    0.76511948D+00    0.15338698D+01   -0.83251846D+00
       0.40735344D+00   -0.23344353D+01    0.89867872D+00    0.61627361D+00
      -0.10249449D+01   -0.14938868D+00    0.72478220D+00   -0.13853166D+01
       0.28372176D+01   -0.12121506D+01    0.65208163D+00    0.49989884D+00
       0.24749717D+01    0.24191241D+01    0.60596420D+00    0.73316796D+00
       0.10781759D+01    0.79452027D+00   -0.54683789D+00   -0.20474656D+01
      -0.20299738D+01   -0.75615268D+00   -0.27048872D+01    0.11630693D+01
       0.26916553D+00   -0.11143771D+01   -0.20011831D+01   -0.33539239D+00

82     0.21256195D+01    0.65208614D+00    0.11583639D+01    0.74802145D+00
       0.27633768D+00    0.45543480D+00   -0.11312175D+01   -0.22897148D+01
       0.25671464D+00   -0.20075387D+00    0.58778498D+00   -0.31862009D-01
      -0.95617247D-01   -0.43545474D+00    0.79435526D+00   -0.12010150D+01
       0.78372020D+00    0.55900563D+00   -0.21925433D+00    0.60591435D-01
      -0.16922798D+00    0.12712455D+01    0.23911501D+01   -0.21087174D+00
       0.16856732D+01   -0.23873754D+01   -0.15212510D+00   -0.41528211D+00
      -0.28743011D+00    0.44654109D+00   -0.29349887D+01    0.11844837D+01
      -0.20929589D+01   -0.14947711D+01   -0.19503930D+01    0.18230945D+01
       0.91021085D-01    0.69405397D+00   -0.18096622D+01    0.78081254D+00
      -0.12047793D+01   -0.10166882D+01   -0.76631972D+00    0.11904073D+00
      -0.17095002D+00   -0.71247603D+00   -0.26524171D+01   -0.15966316D+01
       0.13803877D+00    0.53223469D+00    0.47263821D+00   -0.78588132D+00
       0.13487601D+01    0.17083081D+01   -0.12392450D+01    0.12443962D+01
       0.10012513D+01    0.21137251D+01   -0.14986712D+01   -0.41436735D+00

83    -0.11765534D+01   -0.84977700D+00    0.65284401D+00   -0.12926507D+01
       0.37971733D+00   -0.16539253D+00    0.11551939D+01   -0.89114082D-01
      -0.11615647D+01   -0.26466663D+00   -0.26001526D+00    0.15284200D+01
       0.82976360D+00    0.98983605D+00    0.25315882D+01    0.15101008D+01
      -0.82391037D+00    0.38275601D+00   -0.66609643D+00   -0.98597591D+00
      -0.79899076D+00    0.26767971D+01    0.35809393D+00    0.10584208D+00
      -0.62418851D+00   -0.61891313D+00   -0.19121807D+01   -0.11041278D+01
       0.10346154D+00   -0.28429646D+01   -0.51802697D+00    0.13137072D+01
       0.24008732D+00   -0.73830520D+00    0.11491336D+00   -0.67967614D+00
       0.15539624D+01    0.42861892D+00   -0.15458004D+01   -0.28423075D+01
      -0.22780094D+01   -0.13777757D-01   -0.31241737D+01   -0.21641133D+01
       0.10636911D+01   -0.38636048D+00   -0.19830422D+01   -0.94230775D+00
      -0.17873191D+01    0.17340851D+01    0.86616144D+00    0.13807168D+01
       0.17256615D+01    0.94571227D+00   -0.22088571D+01   -0.23830008D+01
       0.20289022D+01    0.88997269D+00    0.17039813D+01   -0.72988125D+00

84    -0.17469179D+01    0.56096616D+00    0.30968217D+01    0.19212814D+01
       0.17097597D+01   -0.89254856D-01   -0.13038474D+01    0.98984916D+00
      -0.50380116D+00    0.19471609D+01   -0.16841464D+00    0.25141096D+00
      -0.16460407D+01   -0.11950532D+01   -0.21192911D+01    0.35793039D+00
```

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         0.75242077D+00   -0.73480964D-02    0.59639330D+00    0.20373354D+01
        -0.16694201D+01   -0.81187296D-01    0.15923359D+01    0.21343967D+00
         0.27263467D+01   -0.29437348D+00   -0.19838916D+01    0.13365448D-01
         0.13933415D+01    0.12901209D+01    0.16097046D+01    0.16624649D+01
         0.40519230D+00    0.14128276D+01    0.35758575D+00    0.66741848D-01
         0.47331464D-01   -0.25060465D+01   -0.20777715D+01   -0.91722590D+00
         0.19629186D+00   -0.16029478D+01    0.46717199D+00   -0.92486509D+00
         0.12865046D+01   -0.71980251D+00   -0.13243641D+00    0.17613150D+01
         0.22645955D+01   -0.16653473D+01   -0.89179347D+00   -0.65585520D+00
         0.93118206D+00   -0.18895525D+00    0.10691072D+01    0.19317152D+01
         0.67017059D+00    0.11330353D+01    0.29852102D+00   -0.15519921D+00

85      -0.24586520D+01    0.58171450D+00    0.15971010D+01   -0.39560914D+00
        -0.19818421D+01    0.14686325D+01    0.17605090D+00    0.17023555D+01
        -0.82163173D+00    0.14738955D+01   -0.62276237D+00    0.11168012D+01
        -0.23716036D+01   -0.29151008D+01   -0.15022780D+01   -0.14904921D+01
         0.13620989D+01   -0.17193228D+01   -0.49850409D+00    0.21243228D+01
        -0.13708696D+01   -0.30286313D+00    0.45659184D+00   -0.12885420D+00
         0.44080340D+00    0.52979144D+00    0.40969217D+00    0.27474123D+01
         0.91344752D+00    0.37399551D+00    0.22982385D+01   -0.12029202D+01
        -0.75073141D+00   -0.99732019D+00   -0.20999589D+01   -0.79288919D+00
         0.29547089D+01    0.22815851D+01    0.18203884D+01    0.21414576D+01
        -0.11036947D+01   -0.77800374D+00    0.27166559D+01   -0.28874531D+01
        -0.14059505D+01    0.15709767D+01    0.76041634D+00    0.12902629D+01
        -0.10477528D+01    0.13910413D+00   -0.26295198D+00    0.54843365D+00
         0.30278773D+01   -0.53429717D+00   -0.18171543D+01    0.84881414D+00
         0.23645153D+00    0.82157928D+00    0.35962778D+00    0.21625712D+01

86      -0.12209097D+01   -0.94793439D+00   -0.11196613D-01   -0.10163422D+00
        -0.32358252D+01    0.21958681D+01    0.16760224D+01    0.99469460D+00
         0.73014824D+00   -0.31019882D+01    0.24091076D+00   -0.20461350D+01
        -0.16750855D+01   -0.10969345D+01   -0.16258105D+01   -0.27824899D+01
         0.20182411D+01   -0.48669868D+00   -0.11656598D+01    0.73051703D-01
        -0.58456954D+00   -0.38259852D-01   -0.24497185D+00   -0.12295026D+01
        -0.15415096D+01    0.17269937D+00    0.64002359D+00    0.22267366D+01
        -0.30851911D+01   -0.16901596D+01    0.12456230D+01   -0.12826621D+01
         0.15332248D+00   -0.12882867D+01    0.23505724D+01    0.55584635D+00
        -0.79180907D+00   -0.15851934D+01    0.10134878D+01   -0.83942058D+00
        -0.10700323D+01   -0.53590754D+00    0.51777811D+00    0.25089252D+01
        -0.23757277D+01    0.20110727D+01    0.10040664D+01   -0.62086253D+00
         0.57796205D+00   -0.80067213D+00   -0.60988809D+00   -0.12203653D+01
         0.27280351D+00   -0.96243675D+00    0.17782323D+01    0.36579489D+00
        -0.17133547D+01   -0.15398458D+01   -0.84977529D+00    0.24425379D+00

87      0.19924119D+01   -0.26612461D+01   -0.19219258D+01    0.39870107D-01
        0.18138491D+01    0.18289534D+01   -0.13919234D+01   -0.20291898D+01
        0.21964906D+00    0.23878494D+01    0.88710064D+00   -0.92178583D-01
       -0.10682824D+01   -0.11472266D+01   -0.12934474D+01    0.41608588D+00
       -0.20867928D+01   -0.77552675D+00   -0.14173446D+00   -0.16818160D+00
       -0.28747725D-01    0.14417205D+01   -0.14401554D+00   -0.49437408D+00
       -0.70279651D+00   -0.80657793D+00   -0.80565012D+00    0.20833668D+01
       -0.14556368D+01   -0.23177202D+00   -0.85461730D+00   -0.77548972D+00
       -0.35678221D+00   -0.25835861D+00    0.22924690D+01   -0.10420042D+01
       -0.24458271D+01    0.50062783D+00    0.80184364D+00    0.67559235D+00
       -0.12422108D+01    0.10057247D+01   -0.13684244D+01   -0.43724203D+00
       -0.13174855D+01   -0.10093497D+01   -0.32194963D+00    0.86699897D+00
       -0.73008065D+00   -0.12005861D+01   -0.54004304D+00   -0.59627060D+00
        0.20774310D+01   -0.53907568D+00    0.93977054D+00   -0.10036960D+00
        0.13185693D+01    0.60109972D+00   -0.29172625D+01    0.27735096D+01

88      0.91038812D+00    0.79954677D+00    0.17341411D+01   -0.11922831D+01
       -0.45019505D+00    0.79045550D+00   -0.15274223D+00    0.25080552D+01
       -0.22348002D+01   -0.20242721D+01    0.17638450D+01   -0.26649728D+01
        0.22241906D+00   -0.17764861D+01    0.69583670D+00   -0.94795992D+00
        0.19149334D+01    0.21490218D+01   -0.43537331D+00    0.14810831D+01
```

| | | | | |
|---|---|---|---|---|
| | -0.97561620D+00 | 0.12094393D+01 | -0.79463375D+00 | -0.11086014D+01 |
| | -0.31369281D-01 | -0.13136437D+01 | -0.18412391D+01 | 0.47565455D+00 |
| | -0.11627003D+01 | 0.19556865D+01 | -0.25496331D+01 | -0.10863840D+01 |
| | -0.98517282D+00 | 0.45089447D-01 | -0.14426109D+01 | 0.62331648D+00 |
| | 0.21910096D+01 | -0.23211087D+01 | -0.22370231D+01 | 0.29973117D+00 |
| | -0.18409509D+01 | 0.16105084D+01 | 0.98021269D-01 | -0.59052277D-01 |
| | -0.79890053D+00 | 0.14423679D+01 | -0.12954826D+00 | -0.23816148D+00 |
| | -0.53868477D+00 | 0.15333304D+01 | -0.61796662D+00 | 0.27952326D+01 |
| | 0.19063965D+01 | 0.59361119D+00 | -0.76733660D+00 | 0.11805870D+01 |
| | -0.52636317D+00 | -0.43279753D+00 | 0.41216856D+00 | -0.24598405D+01 |
| 89 | 0.61895860D+00 | -0.91686141D-01 | -0.21894164D+01 | 0.81842754D+00 |
| | 0.28186679D+00 | 0.98593590D+00 | -0.34169892D+00 | 0.12852385D+01 |
| | -0.79911443D+00 | -0.31601083D-01 | 0.23003972D+00 | -0.23961963D+01 |
| | 0.10844771D+01 | 0.70447000D+00 | -0.63808329D+00 | -0.23212142D+00 |
| | -0.14614966D+01 | 0.21992025D+01 | 0.41381632D+00 | 0.15398109D+01 |
| | -0.16216641D+01 | -0.22707911D+00 | -0.74975072D+00 | -0.17717269D+01 |
| | -0.22153555D+00 | 0.75770473D+00 | 0.65871215D+00 | 0.20349737D+00 |
| | -0.34039290D+00 | -0.16686268D+01 | -0.39445348D+00 | 0.35001184D+00 |
| | -0.12866808D+01 | -0.91102983D+00 | -0.67070085D+00 | -0.34312792D+00 |
| | 0.64103079D-01 | 0.15174760D+00 | -0.92841982D+00 | 0.54539731D+00 |
| | 0.13690169D+01 | -0.78634917D+00 | 0.20454233D+01 | 0.15344039D+01 |
| | 0.19547845D+01 | -0.74698722D-01 | 0.10411449D+01 | 0.42941260D-01 |
| | 0.11924048D+01 | 0.16154831D+01 | -0.73029660D+00 | -0.66947592D+00 |
| | 0.11092609D+01 | -0.20498739D+01 | 0.26435588D+01 | -0.25132203D-01 |
| | 0.12387293D+01 | -0.18712095D+01 | 0.20950319D+01 | -0.29128766D+01 |
| 90 | -0.93269340D+00 | 0.19542789D+01 | -0.38780854D+00 | 0.19888507D+01 |
| | -0.32855703D+00 | -0.19899855D+01 | 0.16080379D+01 | -0.65550600D+00 |
| | -0.42079680D+00 | 0.11538809D+01 | 0.22307277D+00 | -0.48075739D+00 |
| | -0.24376617D+01 | -0.25463412D+01 | 0.83426573D+00 | 0.14270623D+01 |
| | -0.10935457D+01 | -0.10622391D+01 | 0.87714362D-01 | -0.78498776D+00 |
| | -0.29065660D+01 | 0.28702958D+00 | 0.27481711D+00 | -0.60120789D+00 |
| | -0.18286407D+01 | 0.11403344D+00 | 0.11959444D+01 | 0.78578813D+00 |
| | 0.24119318D+01 | -0.77013654D+00 | 0.51161058D+00 | 0.58562040D+00 |
| | 0.14553966D+01 | 0.14984307D+01 | -0.18188537D+01 | 0.50819037D+00 |
| | -0.16570372D+01 | 0.87826295D+00 | -0.10111308D+01 | 0.16492265D+01 |
| | 0.83672527D+00 | -0.11481985D+01 | -0.44224228D+00 | -0.43666819D+00 |
| | 0.10270876D+01 | 0.42197931D-01 | 0.45062077D+00 | -0.67546873D+00 |
| | 0.82768314D+00 | 0.22176116D+01 | -0.10412287D+01 | -0.14256825D+01 |
| | 0.15779707D+00 | 0.12830059D+01 | -0.22180239D+00 | 0.21571983D+01 |
| | 0.26122883D+01 | 0.25944506D+00 | 0.17323433D+00 | -0.16562559D+01 |

***** Predicted Measurement Vector *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|
| 1 | -0.44621660D+00 | -0.44621660D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 2 | 0.56421813D+01 | 0.56421813D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 3 | 0.57055749D+01 | 0.57055749D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 4 | 0.87407249D+01 | 0.87407249D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 5 | 0.24828416D+02 | 0.24828416D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 6 | 0.18356290D+01 | 0.18356290D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 7 | -0.10340493D+02 | -0.10340493D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 8 | 0.20241354D+02 | 0.20241354D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 9 | 0.13159404D+02 | 0.13159404D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 10 | 0.19920099D+02 | 0.19920099D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 11 | 0.14906948D+02 | 0.14906948D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 12 | -0.92556462D+01 | -0.92556462D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 13 | 0.90220157D+01 | 0.90220157D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 14 | 0.15406756D+02 | 0.15406756D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 15 | 0.81055087D+01 | 0.81055087D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 16 | -0.52157011D+00 | -0.52157011D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 17 | -0.13099967D+02 | -0.13099967D+02 | 0.00000000D+00 | 0.10000000D+01 |

| | | | | |
|---|---|---|---|---|
| 18 | -0.64227152D+01 | -0.64227152D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 19 | 0.94979922D+00 | 0.94979922D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 20 | -0.15427329D+02 | -0.15427329D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 21 | -0.28148452D+01 | -0.28148452D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 22 | 0.10617943D+02 | 0.10617943D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 23 | -0.92399517D+01 | -0.92399517D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 24 | 0.19570712D+02 | 0.19570712D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 25 | -0.14247969D+02 | -0.14247969D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 26 | -0.15439722D+02 | -0.15439722D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 27 | -0.17684608D+02 | -0.17684608D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 28 | 0.16022332D+02 | 0.16022332D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 29 | -0.24164769D+01 | -0.24164769D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 30 | 0.66078084D+01 | 0.66078084D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 31 | 0.23772642D+01 | 0.23772642D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 32 | -0.28880709D+01 | -0.28880709D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 33 | -0.89958224D+01 | -0.89958224D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 34 | -0.30031457D+02 | -0.30031457D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 35 | 0.25031023D+02 | 0.25031023D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 36 | 0.73882591D+00 | 0.73882591D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 37 | 0.94699474D+01 | 0.94699474D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 38 | -0.67873620D+01 | -0.67873620D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 39 | -0.20285243D+01 | -0.20285243D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 40 | 0.76200027D+01 | 0.76200027D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 41 | 0.21726570D+02 | 0.21726570D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 42 | 0.11466424D+02 | 0.11466424D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 43 | 0.37694576D+00 | 0.37694576D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 44 | 0.19482290D+02 | 0.19482290D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 45 | 0.39711930D+01 | 0.39711930D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 46 | 0.58437420D+01 | 0.58437420D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 47 | 0.16101706D+02 | 0.16101706D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 48 | -0.18363749D+02 | -0.18363749D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 49 | -0.10232301D+02 | -0.10232301D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 50 | 0.15978594D+02 | 0.15978594D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 51 | -0.27068691D+01 | -0.27068691D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 52 | -0.39230030D+00 | -0.39230030D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 53 | 0.12150130D+02 | 0.12150130D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 54 | 0.13987658D+02 | 0.13987658D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 55 | -0.13766257D+01 | -0.13766257D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 56 | -0.48350707D+01 | -0.48350707D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 57 | -0.11311830D+02 | -0.11311830D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 58 | 0.12979851D+02 | 0.12979851D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 59 | 0.20434806D+02 | 0.20434806D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 60 | 0.13939232D+02 | 0.13939232D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 61 | -0.25401724D+02 | -0.25401724D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 62 | 0.14934380D+02 | 0.14934380D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 63 | -0.18812718D+01 | -0.18812718D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 64 | -0.56020049D+01 | -0.56020049D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 65 | -0.84015122D+01 | -0.84015122D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 66 | -0.77668403D+01 | -0.77668403D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 67 | -0.11134381D+02 | -0.11134381D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 68 | 0.11461872D+02 | 0.11461872D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 69 | -0.96119309D+00 | -0.96119309D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 70 | -0.83906497D+01 | -0.83906497D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 71 | -0.36111385D+00 | -0.36111385D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 72 | -0.55116874D+01 | -0.55116874D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 73 | -0.58971041D+01 | -0.58971041D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 74 | 0.27720904D+01 | 0.27720904D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 75 | 0.20882069D+02 | 0.20882069D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 76 | -0.22988300D+01 | -0.22988300D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 77 | -0.14943892D+02 | -0.14943892D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 78 | 0.79217715D+01 | 0.79217715D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 79 | 0.30384271D+02 | 0.30384271D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 80 | -0.65068005D+01 | -0.65068005D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 81 | -0.50723573D+01 | -0.50723573D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 82 | 0.96221191D+01 | 0.96221191D+01 | 0.00000000D+00 | 0.10000000D+01 |

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 83     0.30796878D+01    0.30796878D+01    0.00000000D+00    0.10000000D+01
 84     0.69542200D-01    0.69542200D-01    0.00000000D+00    0.10000000D+01
 85    -0.11091257D+01   -0.11091257D+01    0.00000000D+00    0.10000000D+01
 86    -0.17117079D+02   -0.17117079D+02    0.00000000D+00    0.10000000D+01
 87    -0.10792018D+02   -0.10792018D+02    0.00000000D+00    0.10000000D+01
 88    -0.16779177D+01   -0.16779177D+01    0.00000000D+00    0.10000000D+01
 89     0.14964074D+02    0.14964074D+02    0.00000000D+00    0.10000000D+01
 90     0.21504235D+02    0.21504235D+02    0.00000000D+00    0.10000000D+01

 *****   Initial Performance Index  =   0.14091440D+05   *****

*****   NO Constraints are Specified for Case Number   1   *****

 *****   Solve the NLPQLP Problem for Case Number   1   *****



 ------------------------------------------------------------------------
 START OF THE SEQUENTIAL QUADRATIC PROGRAMMING ALGORITHM
 ------------------------------------------------------------------------

  Parameters:
     N      =      60
     M      =       0
     ME     =       0
     MODE   =       0
     ACC    =   0.1000D-06
     ACCQP  =   0.1000D-13
     STPMIN =   0.0000D+00
     RHOB   =   0.1000D+03
     MAXFUN =      40
     MAXNM  =      40
     MAXIT  =    1000
     IPRINT =       2

  Output in the following order:
     IT    - iteration number
     F     - objective function value
     SCV   - sum of constraint violations
     NA    - number of active constraints
     I     - number of line search iterations
     ALPHA - steplength parameter
     DELTA - additional variable to prevent inconsistency
     KKT   - Karush-Kuhn-Tucker optimality criterion

   IT         F          SCV      NA  I    ALPHA     DELTA     KKT
 ------------------------------------------------------------------------
    1  0.14091440D+05  0.00D+00    0  0  0.00D+00  0.00D+00  0.17D+06
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
    2  0.32184142D+04  0.00D+00    0  2  0.25D+00  0.00D+00  0.67D+05
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
    3  0.10800549D+04  0.00D+00    0  2  0.10D+00  0.00D+00  0.26D+05
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
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 4  0.93251803D+03  0.00D+00    0  3  0.12D-01  0.00D+00  0.18D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 5  0.83599739D+03  0.00D+00    0  3  0.11D-01  0.00D+00  0.13D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 6  0.67574920D+03  0.00D+00    0  3  0.37D-01  0.00D+00  0.13D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 7  0.50564713D+03  0.00D+00    0  3  0.23D-01  0.00D+00  0.15D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 8  0.32844747D+03  0.00D+00    0  3  0.41D-01  0.00D+00  0.72D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 9  0.29617264D+03  0.00D+00    0  3  0.10D-01  0.00D+00  0.49D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
10  0.25051364D+03  0.00D+00    0  3  0.26D-01  0.00D+00  0.59D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
11  0.17302236D+03  0.00D+00    0  3  0.25D-01  0.00D+00  0.79D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
12  0.13421740D+03  0.00D+00    0  3  0.10D-01  0.00D+00  0.49D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
13  0.10421205D+03  0.00D+00    0  3  0.20D-01  0.00D+00  0.29D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
14  0.97516480D+02  0.00D+00    0  4  0.47D-02  0.00D+00  0.20D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
15  0.89172531D+02  0.00D+00    0  3  0.12D-01  0.00D+00  0.18D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
16  0.80175740D+02  0.00D+00    0  3  0.10D-01  0.00D+00  0.23D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
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          *****   Completed CALL to NLPQLP   *****
17  0.66347114D+02  0.00D+00    0  3  0.10D-01  0.00D+00  0.41D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
18  0.45386572D+02  0.00D+00    0  3  0.10D-01  0.00D+00  0.21D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
19  0.37991927D+02  0.00D+00    0  3  0.11D-01  0.00D+00  0.11D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
20  0.36498712D+02  0.00D+00    0  4  0.24D-02  0.00D+00  0.87D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
21  0.32728773D+02  0.00D+00    0  3  0.12D-01  0.00D+00  0.69D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
22  0.31804252D+02  0.00D+00    0  4  0.23D-02  0.00D+00  0.58D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
23  0.29447874D+02  0.00D+00    0  3  0.10D-01  0.00D+00  0.68D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
24  0.26100174D+02  0.00D+00    0  3  0.10D-01  0.00D+00  0.88D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
25  0.23700452D+02  0.00D+00    0  4  0.43D-02  0.00D+00  0.14D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
26  0.16672668D+02  0.00D+00    0  3  0.10D-01  0.00D+00  0.12D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
27  0.15941781D+02  0.00D+00    0  4  0.10D-02  0.00D+00  0.66D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
28  0.14306356D+02  0.00D+00    0  3  0.10D-01  0.00D+00  0.38D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
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          *****   Completed CALL to NLPQLP   *****
29  0.13958675D+02  0.00D+00    0  4  0.14D-02  0.00D+00  0.22D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
30  0.13265403D+02  0.00D+00    0  3  0.10D-01  0.00D+00  0.15D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
31  0.12525771D+02  0.00D+00    0  3  0.10D-01  0.00D+00  0.19D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
32  0.11390152D+02  0.00D+00    0  3  0.10D-01  0.00D+00  0.35D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
33  0.92630236D+01  0.00D+00    0  3  0.10D-01  0.00D+00  0.51D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
34  0.81725462D+01  0.00D+00    0  4  0.31D-02  0.00D+00  0.56D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
35  0.77291049D+01  0.00D+00    0  4  0.12D-02  0.00D+00  0.34D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
36  0.65692912D+01  0.00D+00    0  3  0.10D-01  0.00D+00  0.27D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
37  0.59844877D+01  0.00D+00    0  4  0.38D-02  0.00D+00  0.18D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
38  0.53081798D+01  0.00D+00    0  3  0.10D-01  0.00D+00  0.16D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
39  0.50177802D+01  0.00D+00    0  4  0.30D-02  0.00D+00  0.96D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
40  0.46139315D+01  0.00D+00    0  3  0.10D-01  0.00D+00  0.78D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
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          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
41  0.46052572D+01  0.00D+00    0  5  0.13D-03  0.00D+00  0.70D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
42  0.43025108D+01  0.00D+00    0  3  0.10D-01  0.00D+00  0.68D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
43  0.42028172D+01  0.00D+00    0  4  0.16D-02  0.00D+00  0.14D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
44  0.39897548D+01  0.00D+00    0  4  0.17D-02  0.00D+00  0.19D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
45  0.38244272D+01  0.00D+00    0  4  0.10D-02  0.00D+00  0.19D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
46  0.29064444D+01  0.00D+00    0  3  0.10D-01  0.00D+00  0.14D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
47  0.25552897D+01  0.00D+00    0  4  0.41D-02  0.00D+00  0.12D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
48  0.21097285D+01  0.00D+00    0  3  0.10D-01  0.00D+00  0.85D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
49  0.19299963D+01  0.00D+00    0  4  0.33D-02  0.00D+00  0.27D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
50  0.18104240D+01  0.00D+00    0  3  0.10D-01  0.00D+00  0.22D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
51  0.17329173D+01  0.00D+00    0  3  0.10D-01  0.00D+00  0.18D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
52  0.16361568D+01  0.00D+00    0  3  0.10D-01  0.00D+00  0.21D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
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          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
53  0.16035520D+01  0.00D+00    0  4  0.16D-02  0.00D+00  0.29D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
54  0.13845688D+01  0.00D+00    0  3  0.13D-01  0.00D+00  0.37D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
55  0.10991668D+01  0.00D+00    0  3  0.10D-01  0.00D+00  0.83D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
56  0.79335796D+00  0.00D+00    0  4  0.46D-02  0.00D+00  0.45D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
57  0.58191740D+00  0.00D+00    0  3  0.10D-01  0.00D+00  0.15D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
58  0.52121748D+00  0.00D+00    0  3  0.10D-01  0.00D+00  0.55D+01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
59  0.48976509D+00  0.00D+00    0  3  0.10D-01  0.00D+00  0.27D+01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
60  0.46184564D+00  0.00D+00    0  3  0.14D-01  0.00D+00  0.30D+01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
61  0.40199012D+00  0.00D+00    0  3  0.30D-01  0.00D+00  0.13D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
62  0.30677797D+00  0.00D+00    0  3  0.10D-01  0.00D+00  0.17D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
63  0.14228537D+00  0.00D+00    0  3  0.16D-01  0.00D+00  0.12D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
64  0.72545273D-01  0.00D+00    0  3  0.10D-01  0.00D+00  0.41D+01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
65  0.41582172D-01  0.00D+00    0  3  0.12D-01  0.00D+00  0.33D+00
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          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
66  0.38263639D-01  0.00D+00    0  3  0.16D-01  0.00D+00  0.13D+00
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
67  0.34792441D-01  0.00D+00    0  3  0.46D-01  0.00D+00  0.47D+00
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
68  0.21628454D-01  0.00D+00    0  2  0.10D+00  0.00D+00  0.13D+01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
69  0.39007223D-02  0.00D+00    0  3  0.23D-01  0.00D+00  0.45D-01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
70  0.35448948D-02  0.00D+00    0  3  0.10D-01  0.00D+00  0.83D-02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
71  0.12879880D-03  0.00D+00    0  1  0.10D+01  0.00D+00  0.23D-03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
72  0.12522020D-04  0.00D+00    0  1  0.10D+01  0.00D+00  0.46D-09


--- Final Convergence Analysis at Last Iterate ---

  Objective function value:      F(X)  =  0.12522020D-04
  Solution values:               X     =
    -0.30495642D-03 -0.93588087D-04  0.29799277D-03  0.15789739D-03
     0.98992418D-04  0.53891228D-04 -0.18823462D-05 -0.32155040D-04
    -0.76088125D-04  0.93302019D-04  0.35215759D-04 -0.39655494D-04
    -0.13882302D-03 -0.14924192D-04  0.14580318D-04 -0.15102104D-03
    -0.19332723D-03 -0.20158866D-03  0.16392584D-04 -0.87989822D-04
     0.83238752D-04 -0.12898304D-03  0.35984582D-04 -0.32020571D-04
    -0.33287890D-04  0.33465276D-04  0.10012392D-03 -0.87108531D-04
     0.40680008D-04  0.37219932D-06 -0.20724602D-03 -0.11857920D-03
     0.11789523D-03  0.25368815D-03 -0.95601118D-04 -0.56616985D-05
     0.28193100D-04  0.54888927D-04  0.34843740D-04 -0.12273914D-03
    -0.28029762D-04  0.27011330D-04  0.10931013D-03  0.22280593D-03
    -0.63190430D-04  0.19884558D-04 -0.79709924D-04  0.19100187D-03
    -0.11309347D-03 -0.19084667D-03 -0.18546993D-04 -0.41832744D-04
     0.86039792D-04  0.38088557D-04  0.42828875D-04 -0.12128258D-03
     0.30927906D-04 -0.21353255D-04 -0.67643405D-04 -0.21964743D-03
  Distances from lower bounds:   X-XL  =
     0.24996950D+01  0.24999064D+01  0.25002980D+01  0.25001579D+01
     0.25000990D+01  0.25000539D+01  0.24999981D+01  0.24999678D+01
     0.24999239D+01  0.25000933D+01  0.25000352D+01  0.24999603D+01
     0.24998612D+01  0.24999851D+01  0.25000146D+01  0.24998490D+01
     0.24998067D+01  0.24997984D+01  0.25000164D+01  0.24999120D+01
     0.25000832D+01  0.24998710D+01  0.25000360D+01  0.24999680D+01
     0.24999667D+01  0.25000335D+01  0.25001001D+01  0.24999129D+01
     0.25000407D+01  0.25000004D+01  0.24997928D+01  0.24998814D+01
     0.25001179D+01  0.25002537D+01  0.24999044D+01  0.24999943D+01
     0.25000282D+01  0.25000549D+01  0.25000348D+01  0.24998773D+01
     0.24999720D+01  0.25000270D+01  0.25001093D+01  0.25002228D+01
     0.24999368D+01  0.25000199D+01  0.24999203D+01  0.25001910D+01
     0.24998869D+01  0.24998092D+01  0.24999815D+01  0.24999582D+01
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   0.25000860D+01  0.25000381D+01  0.25000428D+01  0.24998787D+01
   0.25000309D+01  0.24999786D+01  0.24999324D+01  0.24997804D+01
 Distances from upper bounds:   XU-X  =
   0.25003050D+01  0.25000936D+01  0.24997020D+01  0.24998421D+01
   0.24999010D+01  0.24999461D+01  0.25000019D+01  0.25000322D+01
   0.25000761D+01  0.24999067D+01  0.24999648D+01  0.25000397D+01
   0.25001388D+01  0.25000149D+01  0.24999854D+01  0.25001510D+01
   0.25001933D+01  0.25002016D+01  0.24999836D+01  0.25000880D+01
   0.24999168D+01  0.25001290D+01  0.24999640D+01  0.25000320D+01
   0.25000333D+01  0.24999665D+01  0.24998999D+01  0.25000871D+01
   0.24999593D+01  0.24999996D+01  0.25002072D+01  0.25001186D+01
   0.24998821D+01  0.24997463D+01  0.25000956D+01  0.25000057D+01
   0.24999718D+01  0.24999451D+01  0.24999652D+01  0.25001227D+01
   0.25000280D+01  0.24999730D+01  0.24998907D+01  0.24997772D+01
   0.25000632D+01  0.24999801D+01  0.25000797D+01  0.24998090D+01
   0.25001131D+01  0.25001908D+01  0.25000185D+01  0.25000418D+01
   0.24999140D+01  0.24999619D+01  0.24999572D+01  0.25001213D+01
   0.24999691D+01  0.25000214D+01  0.25000676D+01  0.25002196D+01
 Multipliers for lower bounds:  U     =
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
 Multipliers for upper bounds:  U     =
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
 Number of function calls:      NFUNC =     226
 Number of gradient calls:      NGRAD =      72
 Number of calls of QP solver:  NQL   =      72


         *****   Completed CALL to NLPQLP   *****


       *****   Number of Function Evaluations  =   4546   *****


     *****   Solution Control Vector for Case Number   1   *****

Element     G.L.B.            C.V.              L.U.B.            Delta C.V.
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| | | | | |
|---|---|---|---|---|
| 1 | -0.25000000D+01 | -0.30495642D-03 | 0.25000000D+01 | -0.65673116D+00 |
| 2 | -0.25000000D+01 | -0.93588087D-04 | 0.25000000D+01 | -0.17090905D+01 |
| 3 | -0.25000000D+01 | 0.29799277D-03 | 0.25000000D+01 | 0.88527595D+00 |
| 4 | -0.25000000D+01 | 0.15789739D-03 | 0.25000000D+01 | 0.12988537D+00 |
| 5 | -0.25000000D+01 | 0.98992418D-04 | 0.25000000D+01 | -0.10580588D+01 |
| 6 | -0.25000000D+01 | 0.53891228D-04 | 0.25000000D+01 | 0.29465936D+00 |
| 7 | -0.25000000D+01 | -0.18823462D-05 | 0.25000000D+01 | -0.50497178D+00 |
| 8 | -0.25000000D+01 | -0.32155040D-04 | 0.25000000D+01 | -0.17556950D+00 |
| 9 | -0.25000000D+01 | -0.76088125D-04 | 0.25000000D+01 | 0.10059799D+01 |
| 10 | -0.25000000D+01 | 0.93302019D-04 | 0.25000000D+01 | -0.53171085D+00 |
| 11 | -0.25000000D+01 | 0.35215759D-04 | 0.25000000D+01 | 0.81002187D+00 |
| 12 | -0.25000000D+01 | -0.39655494D-04 | 0.25000000D+01 | -0.12465702D+01 |
| 13 | -0.25000000D+01 | -0.13882302D-03 | 0.25000000D+01 | -0.26934782D-01 |
| 14 | -0.25000000D+01 | -0.14924192D-04 | 0.25000000D+01 | 0.41305860D+00 |
| 15 | -0.25000000D+01 | 0.14580318D-04 | 0.25000000D+01 | 0.17636521D+01 |
| 16 | -0.25000000D+01 | -0.15102104D-03 | 0.25000000D+01 | 0.65810864D-01 |
| 17 | -0.25000000D+01 | -0.19332723D-03 | 0.25000000D+01 | -0.12898230D+01 |
| 18 | -0.25000000D+01 | -0.20158866D-03 | 0.25000000D+01 | -0.18443480D+01 |
| 19 | -0.25000000D+01 | 0.16392584D-04 | 0.25000000D+01 | 0.12307119D+01 |
| 20 | -0.25000000D+01 | -0.87989822D-04 | 0.25000000D+01 | 0.90422283D-01 |
| 21 | -0.25000000D+01 | 0.83238752D-04 | 0.25000000D+01 | -0.14917205D+00 |
| 22 | -0.25000000D+01 | -0.12898304D-03 | 0.25000000D+01 | -0.72571027D+00 |
| 23 | -0.25000000D+01 | 0.35984582D-04 | 0.25000000D+01 | 0.41577190D+00 |
| 24 | -0.25000000D+01 | -0.32020571D-04 | 0.25000000D+01 | 0.16615478D+01 |
| 25 | -0.25000000D+01 | -0.33287890D-04 | 0.25000000D+01 | -0.34735325D+00 |
| 26 | -0.25000000D+01 | 0.33465276D-04 | 0.25000000D+01 | -0.65148449D+00 |
| 27 | -0.25000000D+01 | 0.10012392D-03 | 0.25000000D+01 | -0.17128397D+01 |
| 28 | -0.25000000D+01 | -0.87108531D-04 | 0.25000000D+01 | -0.44503479D+00 |
| 29 | -0.25000000D+01 | 0.40680008D-04 | 0.25000000D+01 | -0.22999592D+01 |
| 30 | -0.25000000D+01 | 0.37219932D-06 | 0.25000000D+01 | 0.87850640D+00 |
| 31 | -0.25000000D+01 | -0.20724602D-03 | 0.25000000D+01 | 0.19240213D+01 |
| 32 | -0.25000000D+01 | -0.11857920D-03 | 0.25000000D+01 | 0.11263649D+01 |
| 33 | -0.25000000D+01 | 0.11789523D-03 | 0.25000000D+01 | 0.12662537D+01 |
| 34 | -0.25000000D+01 | 0.25368815D-03 | 0.25000000D+01 | -0.83011545D-01 |
| 35 | -0.25000000D+01 | -0.95601118D-04 | 0.25000000D+01 | 0.11479209D+01 |
| 36 | -0.25000000D+01 | -0.56616985D-05 | 0.25000000D+01 | -0.54162358D-01 |
| 37 | -0.25000000D+01 | 0.28193100D-04 | 0.25000000D+01 | 0.49381161D-01 |
| 38 | -0.25000000D+01 | 0.54888927D-04 | 0.25000000D+01 | -0.24586263D+00 |
| 39 | -0.25000000D+01 | 0.34843740D-04 | 0.25000000D+01 | 0.90157883D+00 |
| 40 | -0.25000000D+01 | -0.12273914D-03 | 0.25000000D+01 | 0.72237114D+00 |
| 41 | -0.25000000D+01 | -0.28029762D-04 | 0.25000000D+01 | 0.91694080D+00 |
| 42 | -0.25000000D+01 | 0.27011330D-04 | 0.25000000D+01 | 0.11066589D+01 |
| 43 | -0.25000000D+01 | 0.10931013D-03 | 0.25000000D+01 | 0.35143225D+00 |
| 44 | -0.25000000D+01 | 0.22280593D-03 | 0.25000000D+01 | 0.31436901D+00 |
| 45 | -0.25000000D+01 | -0.63190430D-04 | 0.25000000D+01 | -0.12419062D+01 |
| 46 | -0.25000000D+01 | 0.19884558D-04 | 0.25000000D+01 | 0.13455148D+01 |
| 47 | -0.25000000D+01 | -0.79709924D-04 | 0.25000000D+01 | -0.20230984D+01 |
| 48 | -0.25000000D+01 | 0.19100187D-03 | 0.25000000D+01 | 0.21137484D+01 |
| 49 | -0.25000000D+01 | -0.11309347D-03 | 0.25000000D+01 | 0.47547270D+00 |
| 50 | -0.25000000D+01 | -0.19084667D-03 | 0.25000000D+01 | -0.15864128D+01 |
| 51 | -0.25000000D+01 | -0.18546993D-04 | 0.25000000D+01 | 0.81838654D+00 |
| 52 | -0.25000000D+01 | -0.41832744D-04 | 0.25000000D+01 | 0.80666516D+00 |
| 53 | -0.25000000D+01 | 0.86039792D-04 | 0.25000000D+01 | 0.23000859D+01 |
| 54 | -0.25000000D+01 | 0.38088557D-04 | 0.25000000D+01 | -0.25551449D-01 |
| 55 | -0.25000000D+01 | 0.42828875D-04 | 0.25000000D+01 | -0.65090322D+00 |
| 56 | -0.25000000D+01 | -0.12128258D-03 | 0.25000000D+01 | -0.12039092D+01 |
| 57 | -0.25000000D+01 | 0.30927906D-04 | 0.25000000D+01 | -0.16373080D+01 |
| 58 | -0.25000000D+01 | -0.21353255D-04 | 0.25000000D+01 | -0.11674400D+01 |
| 59 | -0.25000000D+01 | -0.67643405D-04 | 0.25000000D+01 | -0.18558684D+01 |
| 60 | -0.25000000D+01 | -0.21964743D-03 | 0.25000000D+01 | -0.15164959D+01 |

***** Predicted Measurement Vector *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|
| 1 | 0.21615163D-03 | -0.44621660D+00 | 0.44643275D+00 | 0.10000000D+01 |
| 2 | 0.60257513D-03 | 0.56421813D+01 | -0.56415787D+01 | 0.10000000D+01 |
| 3 | 0.31100633D-05 | 0.57055749D+01 | -0.57055718D+01 | 0.10000000D+01 |
| 4 | 0.14478894D-03 | 0.87407249D+01 | -0.87405802D+01 | 0.10000000D+01 |
| 5 | -0.29310082D-03 | 0.24828416D+02 | -0.24828709D+02 | 0.10000000D+01 |
| 6 | -0.21905038D-03 | 0.18356290D+01 | -0.18358481D+01 | 0.10000000D+01 |
| 7 | 0.34044674D-05 | -0.10340493D+02 | 0.10340496D+02 | 0.10000000D+01 |
| 8 | 0.83392288D-03 | 0.20241354D+02 | -0.20240520D+02 | 0.10000000D+01 |
| 9 | -0.11235671D-03 | 0.13159404D+02 | -0.13159516D+02 | 0.10000000D+01 |
| 10 | 0.26125773D-03 | 0.19920099D+02 | -0.19919837D+02 | 0.10000000D+01 |
| 11 | 0.31010277D-03 | 0.14906948D+02 | -0.14906638D+02 | 0.10000000D+01 |
| 12 | -0.78789885D-04 | -0.92556462D+01 | 0.92555674D+01 | 0.10000000D+01 |
| 13 | 0.37598817D-03 | 0.90220157D+01 | -0.90216397D+01 | 0.10000000D+01 |
| 14 | -0.97511930D-04 | 0.15406756D+02 | -0.15406853D+02 | 0.10000000D+01 |
| 15 | 0.33974353D-03 | 0.81055087D+01 | -0.81051689D+01 | 0.10000000D+01 |
| 16 | -0.29411758D-03 | -0.52157011D+00 | 0.52127599D+00 | 0.10000000D+01 |
| 17 | 0.16289714D-03 | -0.13099967D+02 | 0.13100130D+02 | 0.10000000D+01 |
| 18 | 0.43793180D-04 | -0.64227152D+01 | 0.64227589D+01 | 0.10000000D+01 |
| 19 | -0.31919701D-03 | 0.94979922D+00 | -0.95011842D+00 | 0.10000000D+01 |
| 20 | -0.35141008D-03 | -0.15427329D+02 | 0.15426978D+02 | 0.10000000D+01 |
| 21 | 0.79610884D-04 | -0.28148452D+01 | 0.28149248D+01 | 0.10000000D+01 |
| 22 | -0.40496656D-03 | 0.10617943D+02 | -0.10618348D+02 | 0.10000000D+01 |
| 23 | 0.39437859D-03 | -0.92399517D+01 | 0.92403461D+01 | 0.10000000D+01 |
| 24 | 0.14335247D-03 | 0.19570712D+02 | -0.19570569D+02 | 0.10000000D+01 |
| 25 | -0.47638793D-03 | -0.14247969D+02 | 0.14247493D+02 | 0.10000000D+01 |
| 26 | 0.53663526D-04 | -0.15439722D+02 | 0.15439775D+02 | 0.10000000D+01 |
| 27 | 0.12742214D-04 | -0.17684608D+02 | 0.17684621D+02 | 0.10000000D+01 |
| 28 | -0.34910673D-04 | 0.16022332D+02 | -0.16022367D+02 | 0.10000000D+01 |
| 29 | 0.62704862D-03 | -0.24164769D+01 | 0.24171040D+01 | 0.10000000D+01 |
| 30 | 0.39578971D-03 | 0.66078084D+01 | -0.66074126D+01 | 0.10000000D+01 |
| 31 | 0.34113377D-03 | 0.23772642D+01 | -0.23769231D+01 | 0.10000000D+01 |
| 32 | -0.25860714D-03 | -0.28880709D+01 | 0.28878123D+01 | 0.10000000D+01 |
| 33 | 0.72403211D-04 | -0.89958224D+01 | 0.89958948D+01 | 0.10000000D+01 |
| 34 | 0.45072747D-03 | -0.30031457D+02 | 0.30031908D+02 | 0.10000000D+01 |
| 35 | 0.43678967D-03 | 0.25031023D+02 | -0.25030587D+02 | 0.10000000D+01 |
| 36 | -0.11750924D-03 | 0.73882591D+00 | -0.73894342D+00 | 0.10000000D+01 |
| 37 | 0.28993278D-03 | 0.94699474D+01 | -0.94696574D+01 | 0.10000000D+01 |
| 38 | 0.45655421D-04 | -0.67873620D+01 | 0.67874077D+01 | 0.10000000D+01 |
| 39 | 0.51360846D-03 | -0.20285243D+01 | 0.20290379D+01 | 0.10000000D+01 |
| 40 | 0.86802442D-04 | 0.76200027D+01 | -0.76199159D+01 | 0.10000000D+01 |
| 41 | -0.20943708D-04 | 0.21726570D+02 | -0.21726591D+02 | 0.10000000D+01 |
| 42 | -0.89972111D-03 | 0.11466424D+02 | -0.11467323D+02 | 0.10000000D+01 |
| 43 | 0.24943443D-03 | 0.37694576D+00 | -0.37669632D+00 | 0.10000000D+01 |
| 44 | -0.34009703D-03 | 0.19482290D+02 | -0.19482630D+02 | 0.10000000D+01 |
| 45 | 0.46071276D-03 | 0.39711930D+01 | -0.39707323D+01 | 0.10000000D+01 |
| 46 | 0.54814665D-04 | 0.58437420D+01 | -0.58436872D+01 | 0.10000000D+01 |
| 47 | -0.17898402D-03 | 0.16101706D+02 | -0.16101885D+02 | 0.10000000D+01 |
| 48 | 0.28007231D-03 | -0.18363749D+02 | 0.18364029D+02 | 0.10000000D+01 |
| 49 | 0.96814914D-03 | -0.10232301D+02 | 0.10233269D+02 | 0.10000000D+01 |
| 50 | -0.29585016D-04 | 0.15978594D+02 | -0.15978624D+02 | 0.10000000D+01 |
| 51 | 0.29103100D-03 | -0.27068691D+01 | 0.27071602D+01 | 0.10000000D+01 |
| 52 | 0.48696452D-03 | -0.39230030D+00 | 0.39278726D+00 | 0.10000000D+01 |
| 53 | -0.34414450D-04 | 0.12150130D+02 | -0.12150164D+02 | 0.10000000D+01 |
| 54 | 0.65436333D-04 | 0.13987658D+02 | -0.13987593D+02 | 0.10000000D+01 |
| 55 | -0.66246237D-04 | -0.13766257D+01 | 0.13765595D+01 | 0.10000000D+01 |
| 56 | 0.55929698D-03 | -0.48350707D+01 | 0.48356300D+01 | 0.10000000D+01 |
| 57 | 0.90740092D-03 | -0.11311830D+02 | 0.11312737D+02 | 0.10000000D+01 |
| 58 | -0.43624548D-03 | 0.12979851D+02 | -0.12980288D+02 | 0.10000000D+01 |
| 59 | -0.21486898D-03 | 0.20434806D+02 | -0.20435021D+02 | 0.10000000D+01 |
| 60 | 0.23985274D-04 | 0.13939232D+02 | -0.13939208D+02 | 0.10000000D+01 |
| 61 | 0.12948871D-04 | -0.25401724D+02 | 0.25401737D+02 | 0.10000000D+01 |
| 62 | -0.28254967D-04 | 0.14934380D+02 | -0.14934408D+02 | 0.10000000D+01 |
| 63 | -0.42781739D-03 | -0.18812718D+01 | 0.18808439D+01 | 0.10000000D+01 |

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  64     0.18685765D-03   -0.56020049D+01    0.56021918D+01    0.10000000D+01
  65     0.25314327D-03   -0.84015122D+01    0.84017653D+01    0.10000000D+01
  66     0.21469433D-03   -0.77668403D+01    0.77670550D+01    0.10000000D+01
  67    -0.71982817D-03   -0.11134381D+02    0.11133661D+02    0.10000000D+01
  68     0.10682839D-03    0.11461872D+02   -0.11461765D+02    0.10000000D+01
  69     0.80117251D-03   -0.96119309D+00    0.96199426D+00    0.10000000D+01
  70    -0.76298236D-03   -0.83906497D+01    0.83898867D+01    0.10000000D+01
  71     0.40396289D-03   -0.36111385D+00    0.36151781D+00    0.10000000D+01
  72     0.35556046D-03   -0.55116874D+01    0.55120430D+01    0.10000000D+01
  73    -0.46586411D-03   -0.58971041D+01    0.58966383D+01    0.10000000D+01
  74    -0.31889813D-03    0.27720904D+01   -0.27724093D+01    0.10000000D+01
  75     0.55239797D-03    0.20882069D+02   -0.20881517D+02    0.10000000D+01
  76    -0.81692189D-04   -0.22988300D+01    0.22987483D+01    0.10000000D+01
  77     0.87334950D-04   -0.14943892D+02    0.14943979D+02    0.10000000D+01
  78    -0.36150159D-03    0.79217715D+01   -0.79221330D+01    0.10000000D+01
  79    -0.40883264D-03    0.30384271D+02   -0.30384680D+02    0.10000000D+01
  80    -0.41890298D-03   -0.65068005D+01    0.65063816D+01    0.10000000D+01
  81    -0.45887707D-03   -0.50723573D+01    0.50718984D+01    0.10000000D+01
  82     0.52444455D-03    0.96221191D+01   -0.96215947D+01    0.10000000D+01
  83    -0.51893252D-03    0.30796878D+01   -0.30802067D+01    0.10000000D+01
  84    -0.10008971D-04    0.69542200D-01   -0.69552209D-01    0.10000000D+01
  85     0.81547071D-04   -0.11091257D+01    0.11092072D+01    0.10000000D+01
  86    -0.32853309D-03   -0.17117079D+02    0.17116750D+02    0.10000000D+01
  87    -0.24147398D-03   -0.10792018D+02    0.10791776D+02    0.10000000D+01
  88     0.44605027D-04   -0.16779177D+01    0.16779623D+01    0.10000000D+01
  89     0.12671327D-03    0.14964074D+02   -0.14963947D+02    0.10000000D+01
  90     0.66760275D-04    0.21504235D+02   -0.21504168D+02    0.10000000D+01


*****   NLP Solution Performance Index  =   0.12522020D-04   *****


*****   NO Constraints are Specified for Case Number   1   *****


*****   Solve the Regulator Problem for Case Number   1   *****

                  *****   Alpha  =      0.10000000D+01   *****


  Dim                  *****   WZ-Vector   *****

  90     0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
         0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
         0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
         0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
         0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
         0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
         0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
         0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
         0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
         0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
         0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
         0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
         0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
         0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
         0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
         0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
         0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
         0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
         0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
         0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
         0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
         0.10000000D+01    0.10000000D+01    0.10000000D+01    0.10000000D+01
         0.10000000D+01    0.10000000D+01
```

```
Dim                    *****   WX-Vector   *****

60      0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00

Dim                    *****   WDX-Vector   *****

60      0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00
        0.00000000D+00    0.00000000D+00    0.00000000D+00    0.00000000D+00


   *****   Matrix [DUMXX1] was Successfully Inverted
                                    to Yield Matrix [DD].   *****

Dim          *****   The Solution Control Vector   *****

 1    -0.30498589D-03

 2    -0.94241775D-04

 3     0.29795504D-03

 4     0.15822723D-03

 5     0.98924026D-04

 6     0.53557967D-04

 7    -0.13317583D-05

 8    -0.31510443D-04

 9    -0.76190268D-04

10     0.93445905D-04

11     0.34932462D-04
```

```
12    -0.39012067D-04
13    -0.13821180D-03
14    -0.14902491D-04
15     0.15208949D-04
16    -0.15138628D-03
17    -0.19246399D-03
18    -0.20222407D-03
19     0.16550692D-04
20    -0.88150824D-04
21     0.83349159D-04
22    -0.12846574D-03
23     0.36296674D-04
24    -0.32036948D-04
25    -0.32961584D-04
26     0.33770191D-04
27     0.99994535D-04
28    -0.87176559D-04
29     0.40282570D-04
30     0.61362664D-06
31    -0.20727884D-03
32    -0.11871569D-03
33     0.11716918D-03
34     0.25412137D-03
35    -0.95283964D-04
36    -0.58794095D-05
37     0.27809270D-04
38     0.54774591D-04
39     0.34582624D-04
40    -0.12267274D-03
41    -0.28016211D-04
42     0.26272124D-04
43     0.10943581D-03
44     0.22313159D-03
```

```
45    -0.62856752D-04

46     0.19665242D-04

47    -0.79132146D-04

48     0.19111563D-03

49    -0.11333622D-03

50    -0.19011076D-03

51    -0.18875281D-04

52    -0.41882151D-04

53     0.86280141D-04

54     0.38992731D-04

55     0.43582991D-04

56    -0.12093818D-03

57     0.30877547D-04

58    -0.21670308D-04

59    -0.68024270D-04

60    -0.21910062D-03

Dim        *****   The Solution Measurement Vector   *****

90     0.21379169D-03    0.60343803D-03    0.37894505D-05    0.14163510D-03
      -0.29183897D-03   -0.21751545D-03    0.37866365D-05    0.83478135D-03
      -0.11238299D-03    0.26201378D-03    0.31142569D-03   -0.79713222D-04
       0.37491595D-03   -0.99260484D-04    0.33955146D-03   -0.29491579D-03
       0.16169262D-03    0.44504305D-04   -0.32036020D-03   -0.35364573D-03
       0.77959770D-04   -0.40474782D-03    0.39576630D-03    0.14350563D-03
      -0.47343495D-03    0.52648726D-04    0.13220310D-04   -0.35762341D-04
       0.62819564D-03    0.39585064D-03    0.34150840D-03   -0.25951371D-03
       0.70190725D-04    0.45072063D-03    0.43974181D-03   -0.11752813D-03
       0.28807525D-03    0.44548521D-04    0.51572932D-03    0.84349250D-04
      -0.20443058D-04   -0.89898082D-03    0.24821699D-03   -0.33973009D-03
       0.46060260D-03    0.53671120D-04   -0.18028550D-03    0.27848038D-03
       0.96640695D-03   -0.27487796D-04    0.29293085D-03    0.48527087D-03
      -0.35318696D-04    0.63103127D-04   -0.64875434D-04    0.55755253D-03
       0.90838710D-03   -0.43874186D-03   -0.21190360D-03    0.23201134D-04
       0.10834798D-04   -0.25763671D-04   -0.42906188D-03    0.18677429D-03
       0.24994039D-03    0.21420491D-03   -0.71963508D-03    0.10771188D-03
       0.80205633D-03   -0.76354742D-03    0.40394933D-03    0.35198124D-03
      -0.46852742D-03   -0.32294501D-03    0.55137350D-03   -0.84748418D-04
       0.88866889D-04   -0.35867692D-03   -0.40816206D-03   -0.42087898D-03
      -0.45790465D-03    0.52480857D-03   -0.51982385D-03   -0.83858369D-05
       0.80497303D-04   -0.32597380D-03   -0.24188464D-03    0.44047336D-04
       0.12591782D-03    0.66997463D-04

*****   Regulator Solution Performance Index  =   0.12521786D-04   *****

             *****   NLP Special Control 60-Vector Output   *****
```

```
CV =
    -0.304956415460860D-03,  -0.935880867231721D-04,   0.297992773693802D-03,
     0.157897391623667D-03,   0.989924176648193D-04,   0.538912283111094D-04,
    -0.188234616433714D-05,  -0.321550397874410D-04,  -0.760881247922456D-04,
     0.933020185966686D-04,   0.352157587557622D-04,  -0.396554935857021D-04,
    -0.138823015966060D-03,  -0.149241915457280D-04,   0.145803176098780D-04,
    -0.151021040392515D-03,  -0.193327234578534D-03,  -0.201588663675490D-03,
     0.163925839977688D-04,  -0.879898215573355D-04,   0.832387519099177D-04,
    -0.128983042150463D-03,   0.359845820677918D-04,  -0.320205708377568D-04,
    -0.332878900574310D-04,   0.334652756134581D-04,   0.100123916740070D-03,
    -0.871085309108563D-04,   0.406800075383573D-04,   0.372199315352372D-06,
    -0.207246023521227D-03,  -0.118579202901944D-03,   0.117895234908009D-03,
     0.253688148144969D-03,  -0.956011180357414D-04,  -0.566169849886058D-05,
     0.281930998745633D-04,   0.548889272810571D-04,   0.348437400675967D-04,
    -0.122739139837625D-03,  -0.280297621626237D-04,   0.270113298771723D-04,
     0.109310131027582D-03,   0.222805930633300D-03,  -0.631904295744189D-04,
     0.198845578541940D-04,  -0.797099241229073D-04,   0.191001872824661D-03,
    -0.113093467446159D-03,  -0.190846666352437D-03,  -0.185469930255538D-04,
    -0.418327442399298D-04,   0.860397922841984D-04,   0.380885565207862D-04,
     0.428288748496497D-04,  -0.121282577886179D-03,   0.309279056748126D-04,
    -0.213532545180602D-04,  -0.676434054784955D-04,  -0.219647427177192D-03,


          *****   Regulator Special Control 60-Vector Output   *****

CV =
    -0.304985892696785D-03,  -0.942417749969504D-04,   0.297955042156239D-03,
     0.158227228865410D-03,   0.989240255377943D-04,   0.535579666379182D-04,
    -0.133175834193811D-05,  -0.315104430851643D-04,  -0.761902680475046D-04,
     0.934459047879921D-04,   0.349324618706959D-04,  -0.390120669602201D-04,
    -0.138211802474413D-03,  -0.149024909565365D-04,   0.152089491349816D-04,
    -0.151386277504717D-03,  -0.192463994246106D-03,  -0.202224072163970D-03,
     0.165506916185443D-04,  -0.881508239642254D-04,   0.833491588262680D-04,
    -0.128465735266370D-03,   0.362966735369397D-04,  -0.320369477080362D-04,
    -0.329615837961206D-04,   0.337701913630806D-04,   0.999945349910991D-04,
    -0.871765587665552D-04,   0.402825698615494D-04,   0.613626638945597D-06,
    -0.207278841233727D-03,  -0.118715693635307D-03,   0.117169177398235D-03,
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                 *****   End Case Number   1   *****



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        ***************   Start Case Number   2   ***************

                      *****   INPUT DATA   *****

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 ACCQP   =  0.0000000000000000E+000,
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 CRAN2   =   1.60000000000000     ,
 CRAN3   =   1.30000000000000     ,
 CRAN4   =   1.70000000000000     ,
 CRAN5   =  1.0000000000000000E-003,
 CRAN6   =  1.0000000000000000E-003,
 CRAN7   =  0.100000000000000     ,
 CRAN8   =  0.100000000000000     ,
 CVOUT   =           1,
 EPS     =  1.0000000000000000E-007,
 GEQ     =   2.50000000000000     ,  0.000000000000000E+000,   2.50000000000000
 ,  0.000000000000000E+000,
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 ISEED2  =    95428381,
 ISEED3  =    72919329,
 ISEED4  =    63237395,
 ITOUT   =           0,
 JSEED1  =    81692875,
 JSEED2  =    68377297,
 JSEED3  =    89672847,
 JSEED4  =    98351973,
 L       =           1,
 LQL     = T,
 MAXFUN  =          40,
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ME      =          15,
MG      =          15,
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WDX     = 60*0.000000000000000E+000  ,
WX      = 60*0.000000000000000E+000  ,
WZ      = 90*1.00000000000000        ,
XL      = 60*-2.50000000000000       , 4*-2.00000000000000       ,
XL0     = 60*-2.30000000000000       ,
XU      = 60*2.50000000000000        , 4*2.00000000000000        ,
XU0     = 60*2.30000000000000        ,
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, -0.129727470874786     ,
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/
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*****  OUTPUT DATA  *****

***** X0, ZA, and T are Randomly Defined *****

| CRAN1 | CRAN2 | CRAN3 | CRAN4 |
|---|---|---|---|
| CRAN5 | CRAN6 | CRAN7 | CRAN8 |
| 0.17000000D+01 | 0.16000000D+01 | 0.13000000D+01 | 0.17000000D+01 |
| 0.10000000D-02 | 0.10000000D-02 | 0.10000000D+00 | 0.10000000D+00 |

***** Control Vector During Previous Duty Cycle for Case Number 2 *****

| Element | G.L.B. | C.V. | L.U.B. |
|---|---|---|---|
| 1 | -0.23000000D+01 | 0.65642620D+00 | 0.23000000D+01 |
| 2 | -0.23000000D+01 | 0.17089969D+01 | 0.23000000D+01 |
| 3 | -0.23000000D+01 | -0.88497796D+00 | 0.23000000D+01 |
| 4 | -0.23000000D+01 | -0.12972747D+00 | 0.23000000D+01 |
| 5 | -0.23000000D+01 | 0.10581578D+01 | 0.23000000D+01 |
| 6 | -0.23000000D+01 | -0.29460547D+00 | 0.23000000D+01 |
| 7 | -0.23000000D+01 | 0.50496989D+00 | 0.23000000D+01 |
| 8 | -0.23000000D+01 | 0.17553735D+00 | 0.23000000D+01 |
| 9 | -0.23000000D+01 | -0.10060560D+01 | 0.23000000D+01 |
| 10 | -0.23000000D+01 | 0.53180416D+00 | 0.23000000D+01 |
| 11 | -0.23000000D+01 | -0.80998665D+00 | 0.23000000D+01 |
| 12 | -0.23000000D+01 | 0.12465305D+01 | 0.23000000D+01 |
| 13 | -0.23000000D+01 | 0.26795959D-01 | 0.23000000D+01 |
| 14 | -0.23000000D+01 | -0.41307353D+00 | 0.23000000D+01 |
| 15 | -0.23000000D+01 | -0.17636375D+01 | 0.23000000D+01 |
| 16 | -0.23000000D+01 | -0.65961885D-01 | 0.23000000D+01 |
| 17 | -0.23000000D+01 | 0.12896297D+01 | 0.23000000D+01 |
| 18 | -0.23000000D+01 | 0.18441464D+01 | 0.23000000D+01 |
| 19 | -0.23000000D+01 | -0.12306955D+01 | 0.23000000D+01 |
| 20 | -0.23000000D+01 | -0.90510273D-01 | 0.23000000D+01 |
| 21 | -0.23000000D+01 | 0.14925529D+00 | 0.23000000D+01 |
| 22 | -0.23000000D+01 | 0.72558129D+00 | 0.23000000D+01 |
| 23 | -0.23000000D+01 | -0.41573591D+00 | 0.23000000D+01 |
| 24 | -0.23000000D+01 | -0.16615798D+01 | 0.23000000D+01 |
| 25 | -0.23000000D+01 | 0.34731996D+00 | 0.23000000D+01 |
| 26 | -0.23000000D+01 | 0.65151795D+00 | 0.23000000D+01 |
| 27 | -0.23000000D+01 | 0.17129398D+01 | 0.23000000D+01 |
| 28 | -0.23000000D+01 | 0.44494768D+00 | 0.23000000D+01 |
| 29 | -0.23000000D+01 | 0.24994527D+01 | 0.23000000D+01 |
| 29 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 30 | -0.23000000D+01 | -0.87850603D+00 | 0.23000000D+01 |
| 31 | -0.23000000D+01 | -0.19242286D+01 | 0.23000000D+01 |
| 32 | -0.23000000D+01 | -0.11264835D+01 | 0.23000000D+01 |
| 33 | -0.23000000D+01 | -0.12661358D+01 | 0.23000000D+01 |
| 34 | -0.23000000D+01 | 0.83265233D-01 | 0.23000000D+01 |
| 35 | -0.23000000D+01 | -0.11480165D+01 | 0.23000000D+01 |
| 36 | -0.23000000D+01 | 0.54156697D-01 | 0.23000000D+01 |
| 37 | -0.23000000D+01 | -0.49352968D-01 | 0.23000000D+01 |
| 38 | -0.23000000D+01 | 0.24591752D+00 | 0.23000000D+01 |
| 39 | -0.23000000D+01 | -0.90154399D+00 | 0.23000000D+01 |
| 40 | -0.23000000D+01 | -0.72249388D+00 | 0.23000000D+01 |
| 41 | -0.23000000D+01 | -0.91696883D+00 | 0.23000000D+01 |
| 42 | -0.23000000D+01 | -0.11066319D+01 | 0.23000000D+01 |
| 43 | -0.23000000D+01 | -0.35132294D+00 | 0.23000000D+01 |
| 44 | -0.23000000D+01 | -0.31414621D+00 | 0.23000000D+01 |
| 45 | -0.23000000D+01 | 0.12418430D+01 | 0.23000000D+01 |
| 46 | -0.23000000D+01 | -0.13454949D+01 | 0.23000000D+01 |
| 47 | -0.23000000D+01 | 0.20230187D+01 | 0.23000000D+01 |
| 48 | -0.23000000D+01 | -0.21135574D+01 | 0.23000000D+01 |
| 49 | -0.23000000D+01 | -0.47558579D+00 | 0.23000000D+01 |
| 50 | -0.23000000D+01 | 0.15862220D+01 | 0.23000000D+01 |

| | | | |
|---|---|---|---|
| 51 | -0.23000000D+01 | -0.81840509D+00 | 0.23000000D+01 |
| 52 | -0.23000000D+01 | -0.80670699D+00 | 0.23000000D+01 |
| 53 | -0.23000000D+01 | -0.26308009D+01 | 0.23000000D+01 |
| 53 | -0.23000000D+01 | -0.22999999D+01 | 0.23000000D+01 |
| 54 | -0.23000000D+01 | 0.25589538D-01 | 0.23000000D+01 |
| 55 | -0.23000000D+01 | 0.65094604D+00 | 0.23000000D+01 |
| 56 | -0.23000000D+01 | 0.12037879D+01 | 0.23000000D+01 |
| 57 | -0.23000000D+01 | 0.16373389D+01 | 0.23000000D+01 |
| 58 | -0.23000000D+01 | 0.11674187D+01 | 0.23000000D+01 |
| 59 | -0.23000000D+01 | 0.18558007D+01 | 0.23000000D+01 |
| 60 | -0.23000000D+01 | 0.15162762D+01 | 0.23000000D+01 |

***** Measurement Vectors from Previous Duty Cycle *****

| Element | Actual | Ideal | Delta |
|---|---|---|---|
| 1 | -0.44621660D+00 | -0.44562965D+00 | -0.58695447D-03 |
| 2 | 0.56421813D+01 | 0.56425321D+01 | -0.35081244D-03 |
| 3 | 0.57055749D+01 | 0.57058324D+01 | -0.25752234D-03 |
| 4 | 0.87407249D+01 | 0.87395245D+01 | 0.12004384D-02 |
| 5 | 0.24828416D+02 | 0.24829327D+02 | -0.91096580D-03 |
| 6 | 0.18356290D+01 | 0.18351204D+01 | 0.50860763D-03 |
| 7 | -0.10340493D+02 | -0.10341523D+02 | 0.10295088D-02 |
| 8 | 0.20241354D+02 | 0.20240194D+02 | 0.11604346D-02 |
| 9 | 0.13159404D+02 | 0.13159335D+02 | 0.68963528D-04 |
| 10 | 0.19920099D+02 | 0.19918850D+02 | 0.12491620D-02 |
| 11 | 0.14906948D+02 | 0.14906573D+02 | 0.37542999D-03 |
| 12 | -0.92556462D+01 | -0.92562267D+01 | 0.58046019D-03 |
| 13 | 0.90220157D+01 | 0.90222028D+01 | -0.18710732D-03 |
| 14 | 0.15406756D+02 | 0.15406058D+02 | 0.69738376D-03 |
| 15 | 0.81055087D+01 | 0.81038987D+01 | 0.16099517D-02 |
| 16 | -0.52157011D+00 | -0.52133695D+00 | -0.23316193D-03 |
| 17 | -0.13099967D+02 | -0.13099715D+02 | -0.25233734D-03 |
| 18 | -0.64227152D+01 | -0.64220344D+01 | -0.68074346D-03 |
| 19 | 0.94979922D+00 | 0.95005933D+00 | -0.26010585D-03 |
| 20 | -0.15427329D+02 | -0.15426080D+02 | -0.12488431D-02 |
| 21 | -0.28148452D+01 | -0.28145083D+01 | -0.33686411D-03 |
| 22 | 0.10617943D+02 | 0.10616806D+02 | 0.11369618D-02 |
| 23 | -0.92399517D+01 | -0.92387717D+01 | -0.11799650D-02 |
| 24 | 0.19570712D+02 | 0.19569710D+02 | 0.10019406D-02 |
| 25 | -0.14247969D+02 | -0.14247011D+02 | -0.95796919D-03 |
| 26 | -0.15439722D+02 | -0.15439754D+02 | 0.32345772D-04 |
| 27 | -0.17684608D+02 | -0.17682710D+02 | -0.18986958D-02 |
| 28 | 0.16022332D+02 | 0.16021340D+02 | 0.99178720D-03 |
| 29 | -0.24164769D+01 | -0.24162378D+01 | -0.23915052D-03 |
| 30 | 0.66078084D+01 | 0.66076838D+01 | 0.12460554D-03 |
| 31 | 0.23772642D+01 | 0.23768704D+01 | 0.39382076D-03 |
| 32 | -0.28880709D+01 | -0.28888783D+01 | 0.80747652D-03 |
| 33 | -0.89958224D+01 | -0.89954218D+01 | -0.40060091D-03 |
| 34 | -0.30031457D+02 | -0.30032367D+02 | 0.90969276D-03 |
| 35 | 0.25031023D+02 | 0.25029441D+02 | 0.15822725D-02 |
| 36 | 0.73882591D+00 | 0.73883536D+00 | -0.94544888D-05 |
| 37 | 0.94699474D+01 | 0.94689509D+01 | 0.99640703D-03 |
| 38 | -0.67873620D+01 | -0.67882109D+01 | 0.84893692D-03 |
| 39 | -0.20285243D+01 | -0.20297554D+01 | 0.12311426D-02 |
| 40 | 0.76200027D+01 | 0.76202068D+01 | -0.20416570D-03 |
| 41 | 0.21726570D+02 | 0.21726081D+02 | 0.48872983D-03 |
| 42 | 0.11466424D+02 | 0.11468329D+02 | -0.19056131D-02 |
| 43 | 0.37694576D+00 | 0.37772848D+00 | -0.78272390D-03 |
| 44 | 0.19482290D+02 | 0.19482235D+02 | 0.55499077D-04 |
| 45 | 0.39711930D+01 | 0.39699214D+01 | 0.12716564D-02 |
| 46 | 0.58437420D+01 | 0.58437037D+01 | 0.38372040D-04 |
| 47 | 0.16101706D+02 | 0.16101379D+02 | 0.32729340D-03 |
| 48 | -0.18363749D+02 | -0.18363585D+02 | -0.16400552D-03 |

| | | | |
|---|---|---|---|
| 49 | -0.10232301D+02 | -0.10232619D+02 | 0.31780338D-03 |
| 50 | 0.15978594D+02 | 0.15978219D+02 | 0.37478101D-03 |
| 51 | -0.27068691D+01 | -0.27086265D+01 | 0.17573451D-02 |
| 52 | -0.39230030D+00 | -0.39237582D+00 | 0.75525761D-04 |
| 53 | 0.12150130D+02 | 0.12149637D+02 | 0.49210715D-03 |
| 54 | 0.13987658D+02 | 0.13988298D+02 | -0.64043999D-03 |
| 55 | -0.13766257D+01 | -0.13760784D+01 | -0.54728770D-03 |
| 56 | -0.48350707D+01 | -0.48344602D+01 | -0.61053300D-03 |
| 57 | -0.11311830D+02 | -0.11312930D+02 | 0.11004062D-02 |
| 58 | 0.12979851D+02 | 0.12979893D+02 | -0.42070746D-04 |
| 59 | 0.20434806D+02 | 0.20434581D+02 | 0.22474957D-03 |
| 60 | 0.13939232D+02 | 0.13938000D+02 | 0.12312514D-02 |
| 61 | -0.25401724D+02 | -0.25401033D+02 | -0.69088078D-03 |
| 62 | 0.14934380D+02 | 0.14934814D+02 | -0.43418074D-03 |
| 63 | -0.18812718D+01 | -0.18808544D+01 | -0.41732776D-03 |
| 64 | -0.56020049D+01 | -0.56016011D+01 | -0.40377212D-03 |
| 65 | -0.84015122D+01 | -0.84013857D+01 | -0.12648237D-03 |
| 66 | -0.77668403D+01 | -0.77668333D+01 | -0.69755316D-05 |
| 67 | -0.11134381D+02 | -0.11132599D+02 | -0.17823126D-02 |
| 68 | 0.11461872D+02 | 0.11462416D+02 | -0.54401243D-03 |
| 69 | -0.96119309D+00 | -0.96280518D+00 | 0.16120892D-02 |
| 70 | -0.83906497D+01 | -0.83900453D+01 | -0.60442352D-03 |
| 71 | -0.36111385D+00 | -0.36219082D+00 | 0.10769680D-02 |
| 72 | -0.55116874D+01 | -0.55127981D+01 | 0.11106583D-02 |
| 73 | -0.58971041D+01 | -0.58951686D+01 | -0.19355016D-02 |
| 74 | 0.27720904D+01 | 0.27732456D+01 | -0.11551642D-02 |
| 75 | 0.20882069D+02 | 0.20882105D+02 | -0.35028100D-04 |
| 76 | -0.22988300D+01 | -0.22994766D+01 | 0.64666879D-03 |
| 77 | -0.14943892D+02 | -0.14942662D+02 | -0.12293618D-02 |
| 78 | 0.79217715D+01 | 0.79205507D+01 | 0.12208024D-02 |
| 79 | 0.30384271D+02 | 0.30384662D+02 | -0.39039683D-03 |
| 80 | -0.65068005D+01 | -0.65064880D+01 | -0.31251943D-03 |
| 81 | -0.50723573D+01 | -0.50729656D+01 | 0.60827732D-03 |
| 82 | 0.96221191D+01 | 0.96210020D+01 | 0.11171455D-02 |
| 83 | 0.30796878D+01 | 0.30795571D+01 | 0.13071871D-03 |
| 84 | 0.69542200D-01 | 0.70917410D-01 | -0.13752100D-02 |
| 85 | -0.11091257D+01 | -0.11087525D+01 | -0.37320006D-03 |
| 86 | -0.17117079D+02 | -0.17116524D+02 | -0.55454910D-03 |
| 87 | -0.10792018D+02 | -0.10791866D+02 | -0.15152228D-03 |
| 88 | -0.16779177D+01 | -0.16784354D+01 | 0.51769686D-03 |
| 89 | 0.14964074D+02 | 0.14963259D+02 | 0.81453931D-03 |
| 90 | 0.21504235D+02 | 0.21504809D+02 | -0.57381225D-03 |

***** Initial Control Vector Estimate for Case Number 2 *****

| Element | G.L.B. | C.V. | L.U.B. | Delta C.V. |
|---|---|---|---|---|
| 1 | -0.25000000D+01 | 0.65642620D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 2 | -0.25000000D+01 | 0.17089969D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 3 | -0.25000000D+01 | -0.88497796D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 4 | -0.25000000D+01 | -0.12972747D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 5 | -0.25000000D+01 | 0.10581578D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 6 | -0.25000000D+01 | -0.29460547D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 7 | -0.25000000D+01 | 0.50496989D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 8 | -0.25000000D+01 | 0.17553735D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 9 | -0.25000000D+01 | -0.10060560D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 10 | -0.25000000D+01 | 0.53180416D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 11 | -0.25000000D+01 | -0.80998665D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 12 | -0.25000000D+01 | 0.12465305D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 13 | -0.25000000D+01 | 0.26795959D-01 | 0.25000000D+01 | 0.00000000D+00 |
| 14 | -0.25000000D+01 | -0.41307353D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 15 | -0.25000000D+01 | -0.17636375D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 16 | -0.25000000D+01 | -0.65961885D-01 | 0.25000000D+01 | 0.00000000D+00 |
| 17 | -0.25000000D+01 | 0.12896297D+01 | 0.25000000D+01 | 0.00000000D+00 |

| | | | | |
|---|---|---|---|---|
| 18 | -0.25000000D+01 | 0.18441464D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 19 | -0.25000000D+01 | -0.12306955D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 20 | -0.25000000D+01 | -0.90510273D-01 | 0.25000000D+01 | 0.00000000D+00 |
| 21 | -0.25000000D+01 | 0.14925529D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 22 | -0.25000000D+01 | 0.72558129D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 23 | -0.25000000D+01 | -0.41573591D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 24 | -0.25000000D+01 | -0.16615798D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 25 | -0.25000000D+01 | 0.34731996D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 26 | -0.25000000D+01 | 0.65151795D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 27 | -0.25000000D+01 | 0.17129398D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 28 | -0.25000000D+01 | 0.44494768D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 29 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 30 | -0.25000000D+01 | -0.87850603D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 31 | -0.25000000D+01 | -0.19242286D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 32 | -0.25000000D+01 | -0.11264835D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 33 | -0.25000000D+01 | -0.12661358D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 34 | -0.25000000D+01 | 0.83265233D-01 | 0.25000000D+01 | 0.00000000D+00 |
| 35 | -0.25000000D+01 | -0.11480165D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 36 | -0.25000000D+01 | 0.54156697D-01 | 0.25000000D+01 | 0.00000000D+00 |
| 37 | -0.25000000D+01 | -0.49352968D-01 | 0.25000000D+01 | 0.00000000D+00 |
| 38 | -0.25000000D+01 | 0.24591752D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 39 | -0.25000000D+01 | -0.90154399D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 40 | -0.25000000D+01 | -0.72249388D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 41 | -0.25000000D+01 | -0.91696883D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 42 | -0.25000000D+01 | -0.11066319D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 43 | -0.25000000D+01 | -0.35132294D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 44 | -0.25000000D+01 | -0.31414621D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 45 | -0.25000000D+01 | 0.12418430D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 46 | -0.25000000D+01 | -0.13454949D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 47 | -0.25000000D+01 | 0.20230187D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 48 | -0.25000000D+01 | -0.21135574D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 49 | -0.25000000D+01 | -0.47558579D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 50 | -0.25000000D+01 | 0.15862220D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 51 | -0.25000000D+01 | -0.81840509D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 52 | -0.25000000D+01 | -0.80670699D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 53 | -0.25000000D+01 | -0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 54 | -0.25000000D+01 | 0.25589538D-01 | 0.25000000D+01 | 0.00000000D+00 |
| 55 | -0.25000000D+01 | 0.65094604D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 56 | -0.25000000D+01 | 0.12037879D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 57 | -0.25000000D+01 | 0.16373389D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 58 | -0.25000000D+01 | 0.11674187D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 59 | -0.25000000D+01 | 0.18558007D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 60 | -0.25000000D+01 | 0.15162762D+01 | 0.25000000D+01 | 0.00000000D+00 |

***** T-Matrix Output is Suppressed *****

***** Predicted Measurement Vector *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|
| 1 | -0.44621660D+00 | -0.44621660D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 2 | 0.56421813D+01 | 0.56421813D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 3 | 0.57055749D+01 | 0.57055749D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 4 | 0.87407249D+01 | 0.87407249D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 5 | 0.24828416D+02 | 0.24828416D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 6 | 0.18356290D+01 | 0.18356290D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 7 | -0.10340493D+02 | -0.10340493D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 8 | 0.20241354D+02 | 0.20241354D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 9 | 0.13159404D+02 | 0.13159404D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 10 | 0.19920099D+02 | 0.19920099D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 11 | 0.14906948D+02 | 0.14906948D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 12 | -0.92556462D+01 | -0.92556462D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 13 | 0.90220157D+01 | 0.90220157D+01 | 0.00000000D+00 | 0.10000000D+01 |

| | | | | |
|---|---|---|---|---|
| 14 | 0.15406756D+02 | 0.15406756D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 15 | 0.81055087D+01 | 0.81055087D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 16 | -0.52157011D+00 | -0.52157011D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 17 | -0.13099967D+02 | -0.13099967D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 18 | -0.64227152D+01 | -0.64227152D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 19 | 0.94979922D+00 | 0.94979922D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 20 | -0.15427329D+02 | -0.15427329D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 21 | -0.28148452D+01 | -0.28148452D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 22 | 0.10617943D+02 | 0.10617943D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 23 | -0.92399517D+01 | -0.92399517D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 24 | 0.19570712D+02 | 0.19570712D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 25 | -0.14247969D+02 | -0.14247969D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 26 | -0.15439722D+02 | -0.15439722D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 27 | -0.17684608D+02 | -0.17684608D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 28 | 0.16022332D+02 | 0.16022332D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 29 | -0.24164769D+01 | -0.24164769D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 30 | 0.66078084D+01 | 0.66078084D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 31 | 0.23772642D+01 | 0.23772642D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 32 | -0.28880709D+01 | -0.28880709D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 33 | -0.89958224D+01 | -0.89958224D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 34 | -0.30031457D+02 | -0.30031457D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 35 | 0.25031023D+02 | 0.25031023D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 36 | 0.73882591D+00 | 0.73882591D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 37 | 0.94699474D+01 | 0.94699474D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 38 | -0.67873620D+01 | -0.67873620D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 39 | -0.20285243D+01 | -0.20285243D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 40 | 0.76200027D+01 | 0.76200027D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 41 | 0.21726570D+02 | 0.21726570D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 42 | 0.11466424D+02 | 0.11466424D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 43 | 0.37694576D+00 | 0.37694576D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 44 | 0.19482290D+02 | 0.19482290D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 45 | 0.39711930D+01 | 0.39711930D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 46 | 0.58437420D+01 | 0.58437420D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 47 | 0.16101706D+02 | 0.16101706D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 48 | -0.18363749D+02 | -0.18363749D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 49 | -0.10232301D+02 | -0.10232301D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 50 | 0.15978594D+02 | 0.15978594D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 51 | -0.27068691D+01 | -0.27068691D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 52 | -0.39230030D+00 | -0.39230030D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 53 | 0.12150130D+02 | 0.12150130D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 54 | 0.13987658D+02 | 0.13987658D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 55 | -0.13766257D+01 | -0.13766257D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 56 | -0.48350707D+01 | -0.48350707D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 57 | -0.11311830D+02 | -0.11311830D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 58 | 0.12979851D+02 | 0.12979851D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 59 | 0.20434806D+02 | 0.20434806D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 60 | 0.13939232D+02 | 0.13939232D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 61 | -0.25401724D+02 | -0.25401724D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 62 | 0.14934380D+02 | 0.14934380D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 63 | -0.18812718D+01 | -0.18812718D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 64 | -0.56020049D+01 | -0.56020049D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 65 | -0.84015122D+01 | -0.84015122D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 66 | -0.77668403D+01 | -0.77668403D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 67 | -0.11134381D+02 | -0.11134381D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 68 | 0.11461872D+02 | 0.11461872D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 69 | -0.96119309D+00 | -0.96119309D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 70 | -0.83906497D+01 | -0.83906497D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 71 | -0.36111385D+00 | -0.36111385D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 72 | -0.55116874D+01 | -0.55116874D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 73 | -0.58971041D+01 | -0.58971041D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 74 | 0.27720904D+01 | 0.27720904D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 75 | 0.20882069D+02 | 0.20882069D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 76 | -0.22988300D+01 | -0.22988300D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 77 | -0.14943892D+02 | -0.14943892D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 78 | 0.79217715D+01 | 0.79217715D+01 | 0.00000000D+00 | 0.10000000D+01 |

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 79     0.30384271D+02    0.30384271D+02    0.00000000D+00    0.10000000D+01
 80    -0.65068005D+01   -0.65068005D+01    0.00000000D+00    0.10000000D+01
 81    -0.50723573D+01   -0.50723573D+01    0.00000000D+00    0.10000000D+01
 82     0.96221191D+01    0.96221191D+01    0.00000000D+00    0.10000000D+01
 83     0.30796878D+01    0.30796878D+01    0.00000000D+00    0.10000000D+01
 84     0.69542200D-01    0.69542200D-01    0.00000000D+00    0.10000000D+01
 85    -0.11091257D+01   -0.11091257D+01    0.00000000D+00    0.10000000D+01
 86    -0.17117079D+02   -0.17117079D+02    0.00000000D+00    0.10000000D+01
 87    -0.10792018D+02   -0.10792018D+02    0.00000000D+00    0.10000000D+01
 88    -0.16779177D+01   -0.16779177D+01    0.00000000D+00    0.10000000D+01
 89     0.14964074D+02    0.14964074D+02    0.00000000D+00    0.10000000D+01
 90     0.21504235D+02    0.21504235D+02    0.00000000D+00    0.10000000D+01


 *****   Initial Performance Index  =   0.14091440D+05   *****


*****   Initial Constraint Function Values for Case Number   2   *****

                   Equality Constraints

Element          Value               Target          Value - Target

   1         0.14272681D+01      0.25000000D+01     -0.10727319D+01
   2         0.33451310D+00      0.00000000D+00      0.33451310D+00
   3        -0.82332528D+00      0.25000000D+01     -0.33233253D+01
   4        -0.73027948D+00      0.00000000D+00     -0.73027948D+00
   5         0.21528580D+01      0.25000000D+01     -0.34714205D+00
   6         0.53650626D-01      0.00000000D+00      0.53650626D-01
   7        -0.96147181D+00      0.25000000D+01     -0.34614718D+01
   8        -0.42813582D+01      0.00000000D+00     -0.42813582D+01
   9         0.27020132D-01      0.25000000D+01     -0.24729799D+01
  10         0.25736268D+00      0.00000000D+00      0.25736268D+00
  11        -0.10072288D+00      0.25000000D+01     -0.26007229D+01
  12         0.97254892D-01      0.00000000D+00      0.97254892D-01
  13         0.16818305D+01      0.25000000D+01     -0.81816948D+00
  14        -0.27853695D+01      0.00000000D+00     -0.27853695D+01
  15         0.31616173D+00      0.25000000D+01     -0.21838383D+01


 *****   Solve the NLPQLP Problem for Case Number   2   *****



 ------------------------------------------------------------------
  START OF THE SEQUENTIAL QUADRATIC PROGRAMMING ALGORITHM
 ------------------------------------------------------------------

  Parameters:
     N      =      60
     M      =      15
     ME     =      15
     MODE   =       0
     ACC    =   0.1000D-06
     ACCQP  =   0.1000D-13
     STPMIN =   0.0000D+00
     RHOB   =   0.1000D+03
     MAXFUN =      40
     MAXNM  =      40
     MAXIT  =    1000
     IPRINT =       2

  Output in the following order:
     IT    - iteration number
```

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  F     - objective function value
  SCV   - sum of constraint violations
  NA    - number of active constraints
  I     - number of line search iterations
  ALPHA - steplength parameter
  DELTA - additional variable to prevent inconsistency
  KKT   - Karush-Kuhn-Tucker optimality criterion

 IT         F           SCV      NA  I    ALPHA     DELTA     KKT
-------------------------------------------------------------------
  1  0.14091440D+05  0.25D+02   15  0  0.00D+00  0.00D+00  0.14D+06
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  2  0.83928434D+04  0.23D+02   15  2  0.10D+00  0.00D+00  0.59D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  3  0.59163153D+04  0.20D+02   15  2  0.12D+00  0.00D+00  0.45D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  4  0.41408149D+04  0.18D+02   15  2  0.10D+00  0.00D+00  0.31D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  5  0.35281045D+04  0.17D+02   15  2  0.10D+00  0.00D+00  0.22D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  6  0.35906963D+04  0.14D+02   15  2  0.18D+00  0.00D+00  0.17D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  7  0.34831274D+04  0.12D+02   15  2  0.10D+00  0.00D+00  0.19D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  8  0.33480953D+04  0.11D+02   15  2  0.10D+00  0.00D+00  0.14D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
  9  0.32607183D+04  0.97D+01   15  2  0.10D+00  0.00D+00  0.17D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 10  0.26502682D+04  0.90D+01   15  2  0.10D+00  0.00D+00  0.16D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 11  0.23854544D+04  0.81D+01   15  2  0.10D+00  0.00D+00  0.80D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 12  0.24248348D+04  0.73D+01   15  2  0.10D+00  0.00D+00  0.85D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 13  0.22923843D+04  0.65D+01   15  2  0.10D+00  0.00D+00  0.12D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 14  0.20944324D+04  0.64D+01   15  2  0.10D+00  0.00D+00  0.70D+04
          *****   Completed CALL to NLPQLP   *****
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          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
15  0.21039165D+04  0.58D+01   15  2  0.10D+00  0.00D+00  0.78D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
16  0.19769796D+04  0.54D+01   15  2  0.10D+00  0.00D+00  0.92D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
17  0.19344958D+04  0.51D+01   15  2  0.10D+00  0.00D+00  0.50D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
18  0.19167788D+04  0.47D+01   15  2  0.10D+00  0.00D+00  0.67D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
19  0.17970916D+04  0.43D+01   15  2  0.10D+00  0.00D+00  0.77D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
20  0.17075348D+04  0.41D+01   15  3  0.49D-01  0.00D+00  0.54D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
21  0.16477689D+04  0.40D+01   15  3  0.48D-01  0.00D+00  0.45D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
22  0.16508130D+04  0.36D+01   15  2  0.10D+00  0.00D+00  0.48D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
23  0.16800520D+04  0.34D+01   15  2  0.10D+00  0.00D+00  0.37D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
24  0.16377807D+04  0.33D+01   15  3  0.41D-01  0.00D+00  0.37D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
25  0.15656845D+04  0.33D+01   15  2  0.10D+00  0.00D+00  0.55D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
26  0.14910866D+04  0.31D+01   15  3  0.47D-01  0.00D+00  0.31D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
27  0.14725556D+04  0.30D+01   15  3  0.29D-01  0.00D+00  0.20D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
28  0.14680340D+04  0.29D+01   15  3  0.27D-01  0.00D+00  0.15D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
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29  0.14660491D+04  0.28D+01   15  3  0.32D-01  0.00D+00  0.12D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
30  0.15219999D+04  0.26D+01   15  2  0.10D+00  0.00D+00  0.98D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
31  0.15229891D+04  0.25D+01   15  3  0.42D-01  0.00D+00  0.15D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
32  0.15450660D+04  0.22D+01   15  2  0.10D+00  0.00D+00  0.28D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
33  0.15190021D+04  0.21D+01   15  3  0.39D-01  0.00D+00  0.20D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
34  0.15067456D+04  0.20D+01   15  3  0.41D-01  0.00D+00  0.11D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
35  0.14990739D+04  0.19D+01   15  3  0.45D-01  0.00D+00  0.11D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
36  0.14890307D+04  0.18D+01   15  3  0.40D-01  0.00D+00  0.15D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
37  0.14767717D+04  0.18D+01   15  3  0.32D-01  0.00D+00  0.57D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
38  0.14760684D+04  0.17D+01   15  3  0.23D-01  0.00D+00  0.30D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
39  0.14769865D+04  0.17D+01   15  3  0.20D-01  0.00D+00  0.26D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
40  0.14831485D+04  0.16D+01   15  3  0.46D-01  0.00D+00  0.25D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
41  0.14923869D+04  0.14D+01   15  2  0.10D+00  0.00D+00  0.42D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
42  0.14896675D+04  0.14D+01   15  3  0.27D-01  0.00D+00  0.50D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
```

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          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
43  0.14880691D+04  0.14D+01   15  3  0.23D-01  0.00D+00  0.30D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
44  0.14881392D+04  0.14D+01   15  3  0.18D-01  0.00D+00  0.18D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
45  0.14921045D+04  0.13D+01   15  3  0.43D-01  0.00D+00  0.15D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
46  0.15037325D+04  0.12D+01   15  2  0.10D+00  0.00D+00  0.21D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
47  0.15160890D+04  0.10D+01   15  2  0.10D+00  0.00D+00  0.49D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
48  0.15125318D+04  0.10D+01   15  3  0.27D-01  0.00D+00  0.28D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
49  0.15118266D+04  0.98D+00   15  3  0.14D-01  0.00D+00  0.15D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
50  0.15123915D+04  0.96D+00   15  3  0.28D-01  0.00D+00  0.21D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
51  0.15243041D+04  0.85D+00   15  2  0.10D+00  0.00D+00  0.73D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
52  0.15174017D+04  0.80D+00   15  3  0.45D-01  0.00D+00  0.18D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
53  0.15171815D+04  0.79D+00   15  3  0.20D-01  0.00D+00  0.11D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
54  0.15179974D+04  0.75D+00   15  3  0.42D-01  0.00D+00  0.12D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
55  0.15233237D+04  0.64D+00   15  2  0.10D+00  0.00D+00  0.27D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
56  0.15197351D+04  0.61D+00   15  3  0.46D-01  0.00D+00  0.14D+03
          *****   Completed CALL to NLPQLP   *****
```

```
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
57  0.15207216D+04  0.57D+00   15  3  0.40D-01  0.00D+00  0.71D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
58  0.15283431D+04  0.52D+00   15  2  0.10D+00  0.00D+00  0.77D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
59  0.15293804D+04  0.48D+00   15  2  0.10D+00  0.00D+00  0.94D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
60  0.15286253D+04  0.44D+00   15  2  0.10D+00  0.00D+00  0.67D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
61  0.15281800D+04  0.42D+00   15  3  0.42D-01  0.00D+00  0.29D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
62  0.15317890D+04  0.36D-01   15  1  0.10D+01  0.00D+00  0.62D+01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
63  0.15289257D+04  0.19D-02   15  1  0.10D+01  0.00D+00  0.24D+00
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
64  0.15288159D+04  0.24D-04   15  1  0.10D+01  0.00D+00  0.27D-02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
65  0.15288155D+04  0.39D-05   15  1  0.10D+01  0.00D+00  0.61D-03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
66  0.15288152D+04  0.34D-06   15  1  0.10D+01  0.00D+00  0.56D-04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
67  0.15288152D+04  0.62D-07   15  1  0.10D+01  0.00D+00  0.94D-05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
68  0.15288152D+04  0.12D-07   15  1  0.10D+01  0.00D+00  0.19D-05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
69  0.15288152D+04  0.42D-08   15  1  0.10D+01  0.00D+00  0.57D-06
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
70  0.15288152D+04  0.22D-10   15  1  0.10D+01  0.00D+00  0.24D-08


--- Final Convergence Analysis at Last Iterate ---

  Objective function value:      F(X)  =  0.15288152D+04
  Solution values:               X     =
     0.18695673D+01  0.47507043D+00 -0.38725119D+00  0.12388045D+01
    -0.47822448D+00  0.11101801D+00  0.20205830D+01 -0.46907073D+00
    -0.16672934D+01 -0.45276637D+00 -0.52461573D+00 -0.16418996D+01
     0.15628709D+01  0.25559540D+00 -0.75784605D+00 -0.12393984D+00
     0.12900352D+01 -0.73177330D+00  0.21222622D+00  0.18175461D+01
     0.33463747D+00  0.51540205D+00 -0.19760832D+00 -0.30435246D+00
     0.14311336D+01  0.60064778D+00 -0.13288834D+01  0.11891336D+01
    -0.13449772D+01 -0.18756372D+00  0.95063470D+00  0.13257071D+00
    -0.46090442D+00  0.20222020D+01 -0.88244072D+00 -0.15524403D+01
    -0.21568543D+00  0.85548871D+00  0.25082651D+00 -0.99487133D+00
    -0.30514020D+00 -0.22485445D+01  0.93704360D+00 -0.12879841D+01
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   0.14607599D+00 -0.11924526D+01  0.12544333D+00 -0.10240233D+01
  -0.45462219D+00  0.16981418D+01 -0.15077677D+01  0.13286504D+00
  -0.20176837D+01  0.75830851D-01  0.16428916D+01 -0.61744994D-01
   0.52355133D+00  0.12643075D+01 -0.16387066D+01  0.81782041D+00
Distances from lower bounds:   X-XL  =
   0.43695673D+01  0.29750704D+01  0.21127488D+01  0.37388045D+01
   0.20217755D+01  0.26110180D+01  0.45205830D+01  0.20309293D+01
   0.83270657D+00  0.20472336D+01  0.19753843D+01  0.85810044D+00
   0.40628709D+01  0.27555954D+01  0.17421539D+01  0.23760602D+01
   0.37900352D+01  0.17682267D+01  0.27122262D+01  0.43175461D+01
   0.28346375D+01  0.30154020D+01  0.23023917D+01  0.21956475D+01
   0.39311336D+01  0.31006478D+01  0.11711166D+01  0.36891336D+01
   0.11550228D+01  0.23124363D+01  0.34506347D+01  0.26325707D+01
   0.20390956D+01  0.45222020D+01  0.16175593D+01  0.94755970D+00
   0.22843146D+01  0.33554887D+01  0.27508265D+01  0.15051287D+01
   0.21948598D+01  0.25145547D+00  0.34370436D+01  0.12120159D+01
   0.26460760D+01  0.13075474D+01  0.26254433D+01  0.14759767D+01
   0.20453778D+01  0.41981418D+01  0.99223229D+00  0.26328650D+01
   0.48231630D+00  0.25758309D+01  0.41428916D+01  0.24382550D+01
   0.30235513D+01  0.37643075D+01  0.86129344D+00  0.33178204D+01
Distances from upper bounds:   XU-X  =
   0.63043269D+00  0.20249296D+01  0.28872512D+01  0.12611955D+01
   0.29782245D+01  0.23889820D+01  0.47941703D+00  0.29690707D+01
   0.41672934D+01  0.29527664D+01  0.30246157D+01  0.41418996D+01
   0.93712909D+00  0.22444046D+01  0.32578461D+01  0.26239398D+01
   0.12099648D+01  0.32317733D+01  0.22877738D+01  0.68245387D+00
   0.21653625D+01  0.19845980D+01  0.26976083D+01  0.28043525D+01
   0.10688664D+01  0.18993522D+01  0.38288834D+01  0.13108664D+01
   0.38449772D+01  0.26875637D+01  0.15493653D+01  0.23674293D+01
   0.29609044D+01  0.47779798D+00  0.33824407D+01  0.40524403D+01
   0.27156854D+01  0.16445113D+01  0.22491735D+01  0.34948713D+01
   0.28051402D+01  0.47485445D+01  0.15629564D+01  0.37879841D+01
   0.23539240D+01  0.36924526D+01  0.23745567D+01  0.35240233D+01
   0.29546222D+01  0.80185818D+00  0.40077677D+01  0.23671350D+01
   0.45176837D+01  0.24241691D+01  0.85710840D+00  0.25617450D+01
   0.19764487D+01  0.12356925D+01  0.41387066D+01  0.16821796D+01
Multipliers for lower bounds:  U     =
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
Multipliers for upper bounds:  U     =
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
```

```
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
 Constraint values:             G(X)  =
  -0.46522786D-11  0.54694860D-11 -0.41833204D-12  0.81368245D-12
  -0.48183679D-12 -0.13100632D-13  0.45119464D-12 -0.52316484D-12
   0.28377301D-12 -0.11295409D-11  0.14610535D-12 -0.11465828D-12
   0.63509198D-11 -0.60852712D-12  0.46629367D-13
 Multipliers for constraints:   U     =
  -0.94920808D+02  0.67270205D+02 -0.65728200D+02  0.49231380D+02
  -0.45195232D+02 -0.77494295D+02 -0.12062310D+03  0.19249936D+02
  -0.87152343D+02 -0.14897940D+02 -0.66164392D+02 -0.86494333D+02
  -0.22587432D+02  0.25930088D+02 -0.10915103D+03
 Number of function calls:      NFUNC =     159
 Number of gradient calls:      NGRAD =      70
 Number of calls of QP solver:  NQL   =      70


          *****   Completed CALL to NLPQLP   *****


       *****   Number of Function Evaluations  =   4359   *****


     *****   Solution Control Vector for Case Number   2   *****

Element     G.L.B.            C.V.              L.U.B.            Delta C.V.

   1    -0.25000000D+01    0.18695673D+01    0.25000000D+01    0.12131411D+01
   2    -0.25000000D+01    0.47507043D+00    0.25000000D+01   -0.12339265D+01
   3    -0.25000000D+01   -0.38725119D+00    0.25000000D+01    0.49772677D+00
   4    -0.25000000D+01    0.12388045D+01    0.25000000D+01    0.13685320D+01
   5    -0.25000000D+01   -0.47822448D+00    0.25000000D+01   -0.15363822D+01
   6    -0.25000000D+01    0.11101801D+00    0.25000000D+01    0.40562348D+00
   7    -0.25000000D+01    0.20205830D+01    0.25000000D+01    0.15156131D+01
   8    -0.25000000D+01   -0.46907073D+00    0.25000000D+01   -0.64460807D+00
   9    -0.25000000D+01   -0.16672934D+01    0.25000000D+01   -0.66123741D+00
  10    -0.25000000D+01   -0.45276637D+00    0.25000000D+01   -0.98457052D+00
  11    -0.25000000D+01   -0.52461573D+00    0.25000000D+01    0.28537092D+00
  12    -0.25000000D+01   -0.16418996D+01    0.25000000D+01   -0.28884301D+01
  13    -0.25000000D+01    0.15628709D+01    0.25000000D+01    0.15360750D+01
  14    -0.25000000D+01    0.25559540D+00    0.25000000D+01    0.66866893D+00
  15    -0.25000000D+01   -0.75784605D+00    0.25000000D+01    0.10057915D+01
  16    -0.25000000D+01   -0.12393984D+00    0.25000000D+01   -0.57977950D-01
  17    -0.25000000D+01    0.12900352D+01    0.25000000D+01    0.40554287D-03
  18    -0.25000000D+01   -0.73177330D+00    0.25000000D+01   -0.25759197D+01
  19    -0.25000000D+01    0.21222622D+00    0.25000000D+01    0.14429217D+01
  20    -0.25000000D+01    0.18175461D+01    0.25000000D+01    0.19080564D+01
  21    -0.25000000D+01    0.33463747D+00    0.25000000D+01    0.18538218D+00
  22    -0.25000000D+01    0.51540205D+00    0.25000000D+01   -0.21017924D+00
  23    -0.25000000D+01   -0.19760832D+00    0.25000000D+01    0.21812759D+00
  24    -0.25000000D+01   -0.30435246D+00    0.25000000D+01    0.13572274D+01
  25    -0.25000000D+01    0.14311336D+01    0.25000000D+01    0.10838136D+01
  26    -0.25000000D+01    0.60064778D+00    0.25000000D+01   -0.50870169D-01
  27    -0.25000000D+01   -0.13288834D+01    0.25000000D+01   -0.30418232D+01
  28    -0.25000000D+01    0.11891336D+01    0.25000000D+01    0.74418596D+00
  29    -0.25000000D+01   -0.13449772D+01    0.25000000D+01   -0.36449771D+01
  30    -0.25000000D+01   -0.18756372D+00    0.25000000D+01    0.69094231D+00
  31    -0.25000000D+01    0.95063470D+00    0.25000000D+01    0.28748633D+01
  32    -0.25000000D+01    0.13257071D+00    0.25000000D+01    0.12590542D+01
  33    -0.25000000D+01   -0.46090442D+00    0.25000000D+01    0.80523138D+00
  34    -0.25000000D+01    0.20222020D+01    0.25000000D+01    0.19389368D+01
  35    -0.25000000D+01   -0.88244072D+00    0.25000000D+01    0.26557582D+00
  36    -0.25000000D+01   -0.15524403D+01    0.25000000D+01   -0.16065970D+01
```

| | | | | |
|---|---|---|---|---|
| 37 | -0.25000000D+01 | -0.21568543D+00 | 0.25000000D+01 | -0.16633246D+00 |
| 38 | -0.25000000D+01 | 0.85548871D+00 | 0.25000000D+01 | 0.60957119D+00 |
| 39 | -0.25000000D+01 | 0.25082651D+00 | 0.25000000D+01 | 0.11523705D+01 |
| 40 | -0.25000000D+01 | -0.99487133D+00 | 0.25000000D+01 | -0.27237746D+00 |
| 41 | -0.25000000D+01 | -0.30514020D+00 | 0.25000000D+01 | 0.61182863D+00 |
| 42 | -0.25000000D+01 | -0.22485445D+01 | 0.25000000D+01 | -0.11419127D+01 |
| 43 | -0.25000000D+01 | 0.93704360D+00 | 0.25000000D+01 | 0.12883665D+01 |
| 44 | -0.25000000D+01 | -0.12879841D+01 | 0.25000000D+01 | -0.97383794D+00 |
| 45 | -0.25000000D+01 | 0.14607599D+00 | 0.25000000D+01 | -0.10957670D+01 |
| 46 | -0.25000000D+01 | -0.11924526D+01 | 0.25000000D+01 | 0.15304231D+00 |
| 47 | -0.25000000D+01 | 0.12544333D+00 | 0.25000000D+01 | -0.18975754D+01 |
| 48 | -0.25000000D+01 | -0.10240233D+01 | 0.25000000D+01 | 0.10895340D+01 |
| 49 | -0.25000000D+01 | -0.45462219D+00 | 0.25000000D+01 | 0.20963609D-01 |
| 50 | -0.25000000D+01 | 0.16981418D+01 | 0.25000000D+01 | 0.11191985D+00 |
| 51 | -0.25000000D+01 | -0.15077677D+01 | 0.25000000D+01 | -0.68936262D+00 |
| 52 | -0.25000000D+01 | 0.13286504D+00 | 0.25000000D+01 | 0.93957203D+00 |
| 53 | -0.25000000D+01 | -0.20176837D+01 | 0.25000000D+01 | 0.28231620D+00 |
| 54 | -0.25000000D+01 | 0.75830851D-01 | 0.25000000D+01 | 0.50241314D-01 |
| 55 | -0.25000000D+01 | 0.16428916D+01 | 0.25000000D+01 | 0.99194555D+00 |
| 56 | -0.25000000D+01 | -0.61744994D-01 | 0.25000000D+01 | -0.12655329D+01 |
| 57 | -0.25000000D+01 | 0.52355133D+00 | 0.25000000D+01 | -0.11137876D+01 |
| 58 | -0.25000000D+01 | 0.12643075D+01 | 0.25000000D+01 | 0.96888872D-01 |
| 59 | -0.25000000D+01 | -0.16387066D+01 | 0.25000000D+01 | -0.34945073D+01 |
| 60 | -0.25000000D+01 | 0.81782041D+00 | 0.25000000D+01 | -0.69845583D+00 |

***** Predicted Measurement Vector *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|
| 1 | -0.29907866D+01 | -0.44621660D+00 | -0.25445700D+01 | 0.10000000D+01 |
| 2 | -0.31432633D+01 | 0.56421813D+01 | -0.87854446D+01 | 0.10000000D+01 |
| 3 | 0.32805105D+00 | 0.57055749D+01 | -0.53775239D+01 | 0.10000000D+01 |
| 4 | 0.98254935D+00 | 0.87407249D+01 | -0.77581756D+01 | 0.10000000D+01 |
| 5 | 0.83107759D+00 | 0.24828416D+02 | -0.23997339D+02 | 0.10000000D+01 |
| 6 | 0.29741257D+01 | 0.18356290D+01 | 0.11384966D+01 | 0.10000000D+01 |
| 7 | 0.22019680D+01 | -0.10340493D+02 | 0.12542461D+02 | 0.10000000D+01 |
| 8 | 0.33487419D+01 | 0.20241354D+02 | -0.16892612D+02 | 0.10000000D+01 |
| 9 | -0.21846613D+01 | 0.13159404D+02 | -0.15344065D+02 | 0.10000000D+01 |
| 10 | -0.14999096D+01 | 0.19920099D+02 | -0.21420008D+02 | 0.10000000D+01 |
| 11 | -0.22846132D+01 | 0.14906948D+02 | -0.17191561D+02 | 0.10000000D+01 |
| 12 | -0.44324759D+01 | -0.92556462D+01 | 0.48231704D+01 | 0.10000000D+01 |
| 13 | 0.22372167D+00 | 0.90220157D+01 | -0.87982940D+01 | 0.10000000D+01 |
| 14 | 0.43660476D+01 | 0.15406756D+02 | -0.11040708D+02 | 0.10000000D+01 |
| 15 | 0.92159043D+00 | 0.81055087D+01 | -0.71839182D+01 | 0.10000000D+01 |
| 16 | -0.32323972D+01 | -0.52157011D+00 | -0.27108271D+01 | 0.10000000D+01 |
| 17 | 0.77875157D-01 | -0.13099967D+02 | 0.13177842D+02 | 0.10000000D+01 |
| 18 | 0.23270879D+01 | -0.64227152D+01 | 0.87498031D+01 | 0.10000000D+01 |
| 19 | 0.24814814D+01 | 0.94979922D+00 | 0.15316822D+01 | 0.10000000D+01 |
| 20 | 0.19055066D+01 | -0.15427329D+02 | 0.17332836D+02 | 0.10000000D+01 |
| 21 | -0.21716876D+01 | -0.28148452D+01 | 0.64315758D+00 | 0.10000000D+01 |
| 22 | -0.11114707D+02 | 0.10617943D+02 | -0.21732650D+02 | 0.10000000D+01 |
| 23 | -0.90058189D+01 | -0.92399517D+01 | 0.23413278D+00 | 0.10000000D+01 |
| 24 | -0.52656790D+01 | 0.19570712D+02 | -0.24836391D+02 | 0.10000000D+01 |
| 25 | -0.81299600D+00 | -0.14247969D+02 | 0.13434973D+02 | 0.10000000D+01 |
| 26 | -0.24263622D+01 | -0.15439722D+02 | 0.13013359D+02 | 0.10000000D+01 |
| 27 | 0.41274133D+01 | -0.17684608D+02 | 0.21812022D+02 | 0.10000000D+01 |
| 28 | 0.31614769D+01 | 0.16022332D+02 | -0.12860855D+02 | 0.10000000D+01 |
| 29 | 0.30789069D+01 | -0.24164769D+01 | 0.54953839D+01 | 0.10000000D+01 |
| 30 | 0.30946023D+00 | 0.66078084D+01 | -0.62983481D+01 | 0.10000000D+01 |
| 31 | 0.10629582D+01 | 0.23772642D+01 | -0.13143060D+01 | 0.10000000D+01 |
| 32 | 0.28998826D+01 | -0.28880709D+01 | 0.57879534D+01 | 0.10000000D+01 |
| 33 | -0.37119276D+01 | -0.89958224D+01 | 0.52838948D+01 | 0.10000000D+01 |
| 34 | 0.88205905D-01 | -0.30031457D+02 | 0.30119663D+02 | 0.10000000D+01 |
| 35 | -0.12648282D+01 | 0.25031023D+02 | -0.26295851D+02 | 0.10000000D+01 |

| | | | | |
|---|---|---|---|---|
| 36 | -0.34422561D+01 | 0.73882591D+00 | -0.41810820D+01 | 0.10000000D+01 |
| 37 | 0.48271646D+01 | 0.94699474D+01 | -0.46427828D+01 | 0.10000000D+01 |
| 38 | 0.37089468D+01 | -0.67873620D+01 | 0.10496309D+02 | 0.10000000D+01 |
| 39 | 0.21525573D+01 | -0.20285243D+01 | 0.41810816D+01 | 0.10000000D+01 |
| 40 | -0.31128737D+01 | 0.76200027D+01 | -0.10732876D+02 | 0.10000000D+01 |
| 41 | 0.53693142D+01 | 0.21726570D+02 | -0.16357256D+02 | 0.10000000D+01 |
| 42 | 0.30067833D+01 | 0.11466424D+02 | -0.84596403D+01 | 0.10000000D+01 |
| 43 | -0.50519836D+01 | 0.37694576D+00 | -0.54289294D+01 | 0.10000000D+01 |
| 44 | -0.38185273D+01 | 0.19482290D+02 | -0.23300818D+02 | 0.10000000D+01 |
| 45 | -0.28129782D+01 | 0.39711930D+01 | -0.67841713D+01 | 0.10000000D+01 |
| 46 | 0.68583457D+00 | 0.58437420D+01 | -0.51579075D+01 | 0.10000000D+01 |
| 47 | -0.40849294D+01 | 0.16101706D+02 | -0.20186636D+02 | 0.10000000D+01 |
| 48 | -0.69390996D+00 | -0.18363749D+02 | 0.17669839D+02 | 0.10000000D+01 |
| 49 | -0.92208001D+01 | -0.10232301D+02 | 0.10115006D+01 | 0.10000000D+01 |
| 50 | 0.29664173D+01 | 0.15978594D+02 | -0.13012177D+02 | 0.10000000D+01 |
| 51 | 0.13353164D+01 | -0.27068691D+01 | 0.40421856D+01 | 0.10000000D+01 |
| 52 | 0.45214232D+01 | -0.39230030D+00 | 0.49137235D+01 | 0.10000000D+01 |
| 53 | -0.86373771D+00 | 0.12150130D+02 | -0.13013867D+02 | 0.10000000D+01 |
| 54 | -0.18850903D+01 | 0.13987658D+02 | -0.15872748D+02 | 0.10000000D+01 |
| 55 | -0.45492408D+01 | -0.13766257D+01 | -0.31726151D+01 | 0.10000000D+01 |
| 56 | 0.19557245D+01 | -0.48350707D+01 | 0.67907952D+01 | 0.10000000D+01 |
| 57 | 0.50742516D+01 | -0.11311830D+02 | 0.16386081D+02 | 0.10000000D+01 |
| 58 | -0.13001307D+01 | 0.12979851D+02 | -0.14279982D+02 | 0.10000000D+01 |
| 59 | 0.87060928D+01 | 0.20434806D+02 | -0.11728713D+02 | 0.10000000D+01 |
| 60 | -0.55155549D+01 | 0.13939232D+02 | -0.19454786D+02 | 0.10000000D+01 |
| 61 | -0.64497259D+01 | -0.25401724D+02 | 0.18951998D+02 | 0.10000000D+01 |
| 62 | 0.41509607D+01 | 0.14934380D+02 | -0.10783419D+02 | 0.10000000D+01 |
| 63 | 0.43140361D+01 | -0.18812718D+01 | 0.61953078D+01 | 0.10000000D+01 |
| 64 | 0.90945952D-01 | -0.56020049D+01 | 0.56929508D+01 | 0.10000000D+01 |
| 65 | -0.41264245D+01 | -0.84015122D+01 | 0.42750877D+01 | 0.10000000D+01 |
| 66 | 0.41223837D+01 | -0.77668403D+01 | 0.11889224D+02 | 0.10000000D+01 |
| 67 | -0.63647548D+01 | -0.11134381D+02 | 0.47696261D+01 | 0.10000000D+01 |
| 68 | -0.96839961D+00 | 0.11461872D+02 | -0.12430271D+02 | 0.10000000D+01 |
| 69 | -0.14087383D+01 | -0.96119309D+00 | -0.44754519D+00 | 0.10000000D+01 |
| 70 | 0.72241859D+00 | -0.83906497D+01 | 0.91130683D+01 | 0.10000000D+01 |
| 71 | 0.32255429D+00 | -0.36111385D+00 | 0.68366814D+00 | 0.10000000D+01 |
| 72 | -0.74590498D+01 | -0.55116874D+01 | -0.19473624D+01 | 0.10000000D+01 |
| 73 | 0.53554083D+00 | -0.58971041D+01 | 0.64326449D+01 | 0.10000000D+01 |
| 74 | -0.10553942D+02 | 0.27720904D+01 | -0.13326032D+02 | 0.10000000D+01 |
| 75 | -0.12197902D+01 | 0.20882069D+02 | -0.22101860D+02 | 0.10000000D+01 |
| 76 | -0.46658282D+01 | -0.22988300D+01 | -0.23669982D+01 | 0.10000000D+01 |
| 77 | 0.77322905D+01 | -0.14943892D+02 | 0.22676182D+02 | 0.10000000D+01 |
| 78 | 0.56394837D+01 | 0.79217715D+01 | -0.22822878D+01 | 0.10000000D+01 |
| 79 | 0.68898407D+01 | 0.30384271D+02 | -0.23494431D+02 | 0.10000000D+01 |
| 80 | -0.27231360D+01 | -0.65068005D+01 | 0.37836645D+01 | 0.10000000D+01 |
| 81 | -0.93129109D+00 | -0.50723573D+01 | 0.41410662D+01 | 0.10000000D+01 |
| 82 | 0.20933604D+01 | 0.96221191D+01 | -0.75287587D+01 | 0.10000000D+01 |
| 83 | -0.71012305D+01 | 0.30796878D+01 | -0.10180918D+02 | 0.10000000D+01 |
| 84 | 0.56074990D+01 | 0.69542200D-01 | 0.55379568D+01 | 0.10000000D+01 |
| 85 | 0.22452744D+01 | -0.11091257D+01 | 0.33544001D+01 | 0.10000000D+01 |
| 86 | 0.34348191D+01 | -0.17117079D+02 | 0.20551898D+02 | 0.10000000D+01 |
| 87 | 0.15773161D+01 | -0.10792018D+02 | 0.12369334D+02 | 0.10000000D+01 |
| 88 | -0.36072346D-01 | -0.16779177D+01 | 0.16418454D+01 | 0.10000000D+01 |
| 89 | 0.71711890D+01 | 0.14964074D+02 | -0.77928848D+01 | 0.10000000D+01 |
| 90 | 0.22170452D+01 | 0.21504235D+02 | -0.19287190D+02 | 0.10000000D+01 |

***** NLP Solution Performance Index = 0.15288152D+04 *****

***** Solution Constraint Function Values for Case Number 2 *****

Equality Constraints

| Element | Value | Target | Value - Target |
|---|---|---|---|

```
     1         0.25000000D+01      0.25000000D+01      0.46522786D-11
     2        -0.54694860D-11      0.00000000D+00     -0.54694860D-11
     3         0.25000000D+01      0.25000000D+01      0.41833204D-12
     4        -0.81368245D-12      0.00000000D+00     -0.81368245D-12
     5         0.25000000D+01      0.25000000D+01      0.48183679D-12
     6         0.13100632D-13      0.00000000D+00      0.13100632D-13
     7         0.25000000D+01      0.25000000D+01     -0.45119464D-12
     8         0.52316484D-12      0.00000000D+00      0.52316484D-12
     9         0.25000000D+01      0.25000000D+01     -0.28377301D-12
    10         0.11295409D-11      0.00000000D+00      0.11295409D-11
    11         0.25000000D+01      0.25000000D+01     -0.14610535D-12
    12         0.11465828D-12      0.00000000D+00      0.11465828D-12
    13         0.25000000D+01      0.25000000D+01     -0.63509198D-11
    14         0.60852712D-12      0.00000000D+00      0.60852712D-12
    15         0.25000000D+01      0.25000000D+01     -0.46629367D-13


              *****   NLP Special Control 60-Vector Output   *****

 CV =
      0.186956730862031D+01,   0.475070429293926D+00,  -0.387251189740006D+00,
      0.123880450860015D+01,  -0.478224475890492D+00,   0.111018011027891D+00,
      0.202058296684339D+01,  -0.469070725986190D+00,  -0.166729343377801D+01,
     -0.452766368557184D+00,  -0.524615734827696D+00,  -0.164189956349987D+01,
      0.156287091341795D+01,   0.255595398512027D+00,  -0.757846054335619D+00,
     -0.123939835725699D+00,   0.129003521682952D+01,  -0.731773304480489D+00,
      0.212226219594297D+00,   0.181754613161109D+01,   0.334637467795603D+00,
      0.515402046790174D+00,  -0.197608324559912D+00,  -0.304352455246140D+00,
      0.143113359909825D+01,   0.600647782628323D+00,  -0.132888344364452D+01,
      0.118913364012646D+01,  -0.134497719061281D+01,  -0.187563715440666D+00,
      0.950634695071558D+00,   0.132570705792164D+00,  -0.460904420140850D+00,
      0.202220201803493D+01,  -0.882440719472051D+00,  -0.155244030002679D+01,
     -0.215685427922264D+00,   0.855488709660175D+00,   0.250826512079634D+00,
     -0.994871332921182D+00,  -0.305140200109976D+00,  -0.224854452815356D+01,
      0.937043600140078D+00,  -0.128798414670346D+01,   0.146075989832218D+00,
     -0.119245257228033D+01,   0.125443331645032D+00,  -0.102402334337924D+01,
     -0.454622185454396D+00,   0.169814181695124D+01,  -0.150776770840463D+01,
      0.132865042291404D+00,  -0.201768369819104D+01,   0.758308514638648D-01,
      0.164289159591941D+01,  -0.617449943683934D-01,   0.523551325500880D+00,
      0.126430753070857D+01,  -0.163870655821466D+01,   0.817820406467335D+00,


                *****   End Case Number   2   *****




**************************************************************************


        ***************   Start Case Number   3   ***************

                        *****   INPUT DATA   *****

&CDATA
ALPHA   =   1.00000000000000     ,
ACC     =  1.000000000000000E-007,
ACCQP   =  0.000000000000000E+000,
CRAN1   =   1.70000000000000     ,
CRAN2   =   1.60000000000000     ,
```

```
CRAN3   =   1.30000000000000     ,
CRAN4   =   1.70000000000000     ,
CRAN5   =  1.0000000000000000E-003,
CRAN6   =  1.0000000000000000E-003,
CRAN7   =  0.100000000000000     ,
CRAN8   =  0.100000000000000     ,
CVOUT   =           1,
EPS     =  1.0000000000000000E-007,
GEQ     =   2.50000000000000     ,  0.0000000000000000E+000,   2.50000000000000
,  0.0000000000000000E+000,
   2.50000000000000     ,  0.0000000000000000E+000,   2.50000000000000     ,
0.0000000000000000E+000,   2.50000000000000     ,
  0.0000000000000000E+000,   2.50000000000000     ,  0.0000000000000000E+000,
2.50000000000000     ,  0.0000000000000000E+000,
   2.50000000000000     , 94*0.0000000000000000E+000  ,
GMAX    = 30*3.00000000000000        , 79*1.50000000000000        ,
ICASE   =           3,
IDATA   =           0,
IN      =           5,
IOPT    =           1,
IOUT    =           6,
IPRINT  =           2,
ISEED1  =    78985723,
ISEED2  =    95428381,
ISEED3  =    72919329,
ISEED4  =    63237395,
ITOUT   =           0,
JSEED1  =    81692875,
JSEED2  =    68377297,
JSEED3  =    89672847,
JSEED4  =    98351973,
L       =           1,
LQL     = T,
MAXFUN  =          40,
MAXIT   =        1000,
MAXNM   =          40,
ME      =           0,
MG      =          90,
MODE    =           0,
MULT    =           1,
RHOB    =   100.000000000000     ,
STPMIN  =  0.0000000000000000E+000,
T       = -0.272764432430267     ,  0.840826714038849     , -0.335465407371521
,   2.96246552467346     ,
 -0.644930791854858     , -0.108974421024323     ,   1.45970165729523     ,  -
2.25246042013168     ,   1.22777012586594     ,
  0.471573555469513     ,  0.930861783027649     ,   1.11772661209106     ,  -
1.92493743896484     ,  -1.09232913255692     ,
   1.53228187561035     ,  0.379600238800049     , -0.982219934463501     ,
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0.817989349365234     ,  -1.28878483772278     ,
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*****  OUTPUT DATA  *****

*****  X0, ZA, and T are Randomly Defined  *****

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|---|---|---|---|
| CRAN5 | CRAN6 | CRAN7 | CRAN8 |
| 0.17000000D+01 | 0.16000000D+01 | 0.13000000D+01 | 0.17000000D+01 |
| 0.10000000D-02 | 0.10000000D-02 | 0.10000000D+00 | 0.10000000D+00 |

*****  Control Vector During Previous Duty Cycle for Case Number  3  *****

| Element | G.L.B. | C.V. | L.U.B. |
|---|---|---|---|
| 1 | -0.23000000D+01 | 0.65642620D+00 | 0.23000000D+01 |
| 2 | -0.23000000D+01 | 0.17089969D+01 | 0.23000000D+01 |
| 3 | -0.23000000D+01 | -0.88497796D+00 | 0.23000000D+01 |
| 4 | -0.23000000D+01 | -0.12972747D+00 | 0.23000000D+01 |
| 5 | -0.23000000D+01 | 0.10581578D+01 | 0.23000000D+01 |
| 6 | -0.23000000D+01 | -0.29460547D+00 | 0.23000000D+01 |
| 7 | -0.23000000D+01 | 0.50496989D+00 | 0.23000000D+01 |
| 8 | -0.23000000D+01 | 0.17553735D+00 | 0.23000000D+01 |
| 9 | -0.23000000D+01 | -0.10060560D+01 | 0.23000000D+01 |
| 10 | -0.23000000D+01 | 0.53180416D+00 | 0.23000000D+01 |
| 11 | -0.23000000D+01 | -0.80998665D+00 | 0.23000000D+01 |
| 12 | -0.23000000D+01 | 0.12465305D+01 | 0.23000000D+01 |
| 13 | -0.23000000D+01 | 0.26795959D-01 | 0.23000000D+01 |

| | | | |
|---|---|---|---|
| 14 | -0.23000000D+01 | -0.41307353D+00 | 0.23000000D+01 |
| 15 | -0.23000000D+01 | -0.17636375D+01 | 0.23000000D+01 |
| 16 | -0.23000000D+01 | -0.65961885D-01 | 0.23000000D+01 |
| 17 | -0.23000000D+01 | 0.12896297D+01 | 0.23000000D+01 |
| 18 | -0.23000000D+01 | 0.18441464D+01 | 0.23000000D+01 |
| 19 | -0.23000000D+01 | -0.12306955D+01 | 0.23000000D+01 |
| 20 | -0.23000000D+01 | -0.90510273D-01 | 0.23000000D+01 |
| 21 | -0.23000000D+01 | 0.14925529D+00 | 0.23000000D+01 |
| 22 | -0.23000000D+01 | 0.72558129D+00 | 0.23000000D+01 |
| 23 | -0.23000000D+01 | -0.41573591D+00 | 0.23000000D+01 |
| 24 | -0.23000000D+01 | -0.16615798D+01 | 0.23000000D+01 |
| 25 | -0.23000000D+01 | 0.34731996D+00 | 0.23000000D+01 |
| 26 | -0.23000000D+01 | 0.65151795D+00 | 0.23000000D+01 |
| 27 | -0.23000000D+01 | 0.17129398D+01 | 0.23000000D+01 |
| 28 | -0.23000000D+01 | 0.44494768D+00 | 0.23000000D+01 |
| 29 | -0.23000000D+01 | 0.24994527D+01 | 0.23000000D+01 |
| 29 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 30 | -0.23000000D+01 | -0.87850603D+00 | 0.23000000D+01 |
| 31 | -0.23000000D+01 | -0.19242286D+01 | 0.23000000D+01 |
| 32 | -0.23000000D+01 | -0.11264835D+01 | 0.23000000D+01 |
| 33 | -0.23000000D+01 | -0.12661358D+01 | 0.23000000D+01 |
| 34 | -0.23000000D+01 | 0.83265233D-01 | 0.23000000D+01 |
| 35 | -0.23000000D+01 | -0.11480165D+01 | 0.23000000D+01 |
| 36 | -0.23000000D+01 | 0.54156697D-01 | 0.23000000D+01 |
| 37 | -0.23000000D+01 | -0.49352968D-01 | 0.23000000D+01 |
| 38 | -0.23000000D+01 | 0.24591752D+00 | 0.23000000D+01 |
| 39 | -0.23000000D+01 | -0.90154399D+00 | 0.23000000D+01 |
| 40 | -0.23000000D+01 | -0.72249388D+00 | 0.23000000D+01 |
| 41 | -0.23000000D+01 | -0.91696883D+00 | 0.23000000D+01 |
| 42 | -0.23000000D+01 | -0.11066319D+01 | 0.23000000D+01 |
| 43 | -0.23000000D+01 | -0.35132294D+00 | 0.23000000D+01 |
| 44 | -0.23000000D+01 | -0.31414621D+00 | 0.23000000D+01 |
| 45 | -0.23000000D+01 | 0.12418430D+01 | 0.23000000D+01 |
| 46 | -0.23000000D+01 | -0.13454949D+01 | 0.23000000D+01 |
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| 51 | -0.23000000D+01 | -0.81840509D+00 | 0.23000000D+01 |
| 52 | -0.23000000D+01 | -0.80670699D+00 | 0.23000000D+01 |
| 53 | -0.23000000D+01 | -0.26308009D+01 | 0.23000000D+01 |
| 53 | -0.23000000D+01 | -0.22999999D+01 | 0.23000000D+01 |
| 54 | -0.23000000D+01 | 0.25589538D-01 | 0.23000000D+01 |
| 55 | -0.23000000D+01 | 0.65094604D+00 | 0.23000000D+01 |
| 56 | -0.23000000D+01 | 0.12037879D+01 | 0.23000000D+01 |
| 57 | -0.23000000D+01 | 0.16373389D+01 | 0.23000000D+01 |
| 58 | -0.23000000D+01 | 0.11674187D+01 | 0.23000000D+01 |
| 59 | -0.23000000D+01 | 0.18558007D+01 | 0.23000000D+01 |
| 60 | -0.23000000D+01 | 0.15162762D+01 | 0.23000000D+01 |

***** Measurement Vectors from Previous Duty Cycle *****

| Element | Actual | Ideal | Delta |
|---|---|---|---|
| 1 | -0.44621660D+00 | -0.44562965D+00 | -0.58695447D-03 |
| 2 | 0.56421813D+01 | 0.56425321D+01 | -0.35081244D-03 |
| 3 | 0.57055749D+01 | 0.57058324D+01 | -0.25752234D-03 |
| 4 | 0.87407249D+01 | 0.87395245D+01 | 0.12004384D-02 |
| 5 | 0.24828416D+02 | 0.24829327D+02 | -0.91096580D-03 |
| 6 | 0.18356290D+01 | 0.18351204D+01 | 0.50860763D-03 |
| 7 | -0.10340493D+02 | -0.10341523D+02 | 0.10295088D-02 |
| 8 | 0.20241354D+02 | 0.20240194D+02 | 0.11604346D-02 |
| 9 | 0.13159404D+02 | 0.13159335D+02 | 0.68963528D-04 |
| 10 | 0.19920099D+02 | 0.19918850D+02 | 0.12491620D-02 |

| | | | |
|---|---|---|---|
| 11 | 0.14906948D+02 | 0.14906573D+02 | 0.37542999D-03 |
| 12 | -0.92556462D+01 | -0.92562267D+01 | 0.58046019D-03 |
| 13 | 0.90220157D+01 | 0.90222028D+01 | -0.18710732D-03 |
| 14 | 0.15406756D+02 | 0.15406058D+02 | 0.69738376D-03 |
| 15 | 0.81055087D+01 | 0.81038987D+01 | 0.16099517D-02 |
| 16 | -0.52157011D+00 | -0.52133695D+00 | -0.23316193D-03 |
| 17 | -0.13099967D+02 | -0.13099715D+02 | -0.25233734D-03 |
| 18 | -0.64227152D+01 | -0.64220344D+01 | -0.68074346D-03 |
| 19 | 0.94979922D+00 | 0.95005933D+00 | -0.26010585D-03 |
| 20 | -0.15427329D+02 | -0.15426080D+02 | -0.12488431D-02 |
| 21 | -0.28148452D+01 | -0.28145083D+01 | -0.33686411D-03 |
| 22 | 0.10617943D+02 | 0.10616806D+02 | 0.11369618D-02 |
| 23 | -0.92399517D+01 | -0.92387717D+01 | -0.11799650D-02 |
| 24 | 0.19570712D+02 | 0.19569710D+02 | 0.10019406D-02 |
| 25 | -0.14247969D+02 | -0.14247011D+02 | -0.95796919D-03 |
| 26 | -0.15439722D+02 | -0.15439754D+02 | 0.32345772D-04 |
| 27 | -0.17684608D+02 | -0.17682710D+02 | -0.18986958D-02 |
| 28 | 0.16022332D+02 | 0.16021340D+02 | 0.99178720D-03 |
| 29 | -0.24164769D+01 | -0.24162378D+01 | -0.23915052D-03 |
| 30 | 0.66078084D+01 | 0.66076838D+01 | 0.12460554D-03 |
| 31 | 0.23772642D+01 | 0.23768704D+01 | 0.39382076D-03 |
| 32 | -0.28880709D+01 | -0.28888783D+01 | 0.80747652D-03 |
| 33 | -0.89958224D+01 | -0.89954218D+01 | -0.40060091D-03 |
| 34 | -0.30031457D+02 | -0.30032367D+02 | 0.90969276D-03 |
| 35 | 0.25031023D+02 | 0.25029441D+02 | 0.15822725D-02 |
| 36 | 0.73882591D+00 | 0.73883536D+00 | -0.94544888D-05 |
| 37 | 0.94699474D+01 | 0.94689509D+01 | 0.99640703D-03 |
| 38 | -0.67873620D+01 | -0.67882109D+01 | 0.84893692D-03 |
| 39 | -0.20285243D+01 | -0.20297554D+01 | 0.12311426D-02 |
| 40 | 0.76200027D+01 | 0.76202068D+01 | -0.20416570D-03 |
| 41 | 0.21726570D+02 | 0.21726081D+02 | 0.48872983D-03 |
| 42 | 0.11466424D+02 | 0.11468329D+02 | -0.19056131D-02 |
| 43 | 0.37694576D+00 | 0.37772848D+00 | -0.78272390D-03 |
| 44 | 0.19482290D+02 | 0.19482235D+02 | 0.55499077D-04 |
| 45 | 0.39711930D+01 | 0.39699214D+01 | 0.12716564D-02 |
| 46 | 0.58437420D+01 | 0.58437037D+01 | 0.38372040D-04 |
| 47 | 0.16101706D+02 | 0.16101379D+02 | 0.32729340D-03 |
| 48 | -0.18363749D+02 | -0.18363585D+02 | -0.16400552D-03 |
| 49 | -0.10232301D+02 | -0.10232619D+02 | 0.31780338D-03 |
| 50 | 0.15978594D+02 | 0.15978219D+02 | 0.37478101D-03 |
| 51 | -0.27068691D+01 | -0.27086265D+01 | 0.17573451D-02 |
| 52 | -0.39230030D+00 | -0.39237582D+00 | 0.75525761D-04 |
| 53 | 0.12150130D+02 | 0.12149637D+02 | 0.49210715D-03 |
| 54 | 0.13987658D+02 | 0.13988298D+02 | -0.64043999D-03 |
| 55 | -0.13766257D+01 | -0.13760784D+01 | -0.54728770D-03 |
| 56 | -0.48350707D+01 | -0.48344602D+01 | -0.61053300D-03 |
| 57 | -0.11311830D+02 | -0.11312930D+02 | 0.11004062D-02 |
| 58 | 0.12979851D+02 | 0.12979893D+02 | -0.42070746D-04 |
| 59 | 0.20434806D+02 | 0.20434581D+02 | 0.22474957D-03 |
| 60 | 0.13939232D+02 | 0.13938000D+02 | 0.12312514D-02 |
| 61 | -0.25401724D+02 | -0.25401033D+02 | -0.69088078D-03 |
| 62 | 0.14934380D+02 | 0.14934814D+02 | -0.43418074D-03 |
| 63 | -0.18812718D+01 | -0.18808544D+01 | -0.41732776D-03 |
| 64 | -0.56020049D+01 | -0.56016011D+01 | -0.40377212D-03 |
| 65 | -0.84015122D+01 | -0.84013857D+01 | -0.12648237D-03 |
| 66 | -0.77668403D+01 | -0.77668333D+01 | -0.69755316D-05 |
| 67 | -0.11134381D+02 | -0.11132599D+02 | -0.17823126D-02 |
| 68 | 0.11461872D+02 | 0.11462416D+02 | -0.54401243D-03 |
| 69 | -0.96119309D+00 | -0.96280518D+00 | 0.16120892D-02 |
| 70 | -0.83906497D+01 | -0.83900453D+01 | -0.60442352D-03 |
| 71 | -0.36111385D+00 | -0.36219082D+00 | 0.10769680D-02 |
| 72 | -0.55116874D+01 | -0.55127981D+01 | 0.11106583D-02 |
| 73 | -0.58971041D+01 | -0.58951686D+01 | -0.19355016D-02 |
| 74 | 0.27720904D+01 | 0.27732456D+01 | -0.11551642D-02 |
| 75 | 0.20882069D+02 | 0.20882105D+02 | -0.35028100D-04 |

| | | | |
|---|---|---|---|
| 76 | -0.22988300D+01 | -0.22994766D+01 | 0.64666879D-03 |
| 77 | -0.14943892D+02 | -0.14942662D+02 | -0.12293618D-02 |
| 78 | 0.79217715D+01 | 0.79205507D+01 | 0.12208024D-02 |
| 79 | 0.30384271D+02 | 0.30384662D+02 | -0.39039683D-03 |
| 80 | -0.65068005D+01 | -0.65064880D+01 | -0.31251943D-03 |
| 81 | -0.50723573D+01 | -0.50729656D+01 | 0.60827732D-03 |
| 82 | 0.96221191D+01 | 0.96210020D+01 | 0.11171455D-02 |
| 83 | 0.30796878D+01 | 0.30795571D+01 | 0.13071871D-03 |
| 84 | 0.69542200D-01 | 0.70917410D-01 | -0.13752100D-02 |
| 85 | -0.11091257D+01 | -0.11087525D+01 | -0.37320006D-03 |
| 86 | -0.17117079D+02 | -0.17116524D+02 | -0.55454910D-03 |
| 87 | -0.10792018D+02 | -0.10791866D+02 | -0.15152228D-03 |
| 88 | -0.16779177D+01 | -0.16784354D+01 | 0.51769686D-03 |
| 89 | 0.14964074D+02 | 0.14963259D+02 | 0.81453931D-03 |
| 90 | 0.21504235D+02 | 0.21504809D+02 | -0.57381225D-03 |

***** Initial Control Vector Estimate for Case Number 3 *****

| Element | G.L.B. | C.V. | L.U.B. | Delta C.V. |
|---|---|---|---|---|
| 1 | -0.25000000D+01 | 0.65642620D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 2 | -0.25000000D+01 | 0.17089969D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 3 | -0.25000000D+01 | -0.88497796D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 4 | -0.25000000D+01 | -0.12972747D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 5 | -0.25000000D+01 | 0.10581578D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 6 | -0.25000000D+01 | -0.29460547D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 7 | -0.25000000D+01 | 0.50496989D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 8 | -0.25000000D+01 | 0.17553735D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 9 | -0.25000000D+01 | -0.10060560D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 10 | -0.25000000D+01 | 0.53180416D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 11 | -0.25000000D+01 | -0.80998665D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 12 | -0.25000000D+01 | 0.12465305D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 13 | -0.25000000D+01 | 0.26795959D-01 | 0.25000000D+01 | 0.00000000D+00 |
| 14 | -0.25000000D+01 | -0.41307353D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 15 | -0.25000000D+01 | -0.17636375D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 16 | -0.25000000D+01 | -0.65961885D-01 | 0.25000000D+01 | 0.00000000D+00 |
| 17 | -0.25000000D+01 | 0.12896297D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 18 | -0.25000000D+01 | 0.18441464D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 19 | -0.25000000D+01 | -0.12306955D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 20 | -0.25000000D+01 | -0.90510273D-01 | 0.25000000D+01 | 0.00000000D+00 |
| 21 | -0.25000000D+01 | 0.14925529D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 22 | -0.25000000D+01 | 0.72558129D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 23 | -0.25000000D+01 | -0.41573591D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 24 | -0.25000000D+01 | -0.16615798D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 25 | -0.25000000D+01 | 0.34731996D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 26 | -0.25000000D+01 | 0.65151795D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 27 | -0.25000000D+01 | 0.17129398D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 28 | -0.25000000D+01 | 0.44494768D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 29 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 30 | -0.25000000D+01 | -0.87850603D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 31 | -0.25000000D+01 | -0.19242286D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 32 | -0.25000000D+01 | -0.11264835D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 33 | -0.25000000D+01 | -0.12661358D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 34 | -0.25000000D+01 | 0.83265233D-01 | 0.25000000D+01 | 0.00000000D+00 |
| 35 | -0.25000000D+01 | -0.11480165D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 36 | -0.25000000D+01 | 0.54156697D-01 | 0.25000000D+01 | 0.00000000D+00 |
| 37 | -0.25000000D+01 | -0.49352968D-01 | 0.25000000D+01 | 0.00000000D+00 |
| 38 | -0.25000000D+01 | 0.24591752D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 39 | -0.25000000D+01 | -0.90154399D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 40 | -0.25000000D+01 | -0.72249388D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 41 | -0.25000000D+01 | -0.91696883D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 42 | -0.25000000D+01 | -0.11066319D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 43 | -0.25000000D+01 | -0.35132294D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 44 | -0.25000000D+01 | -0.31414621D+00 | 0.25000000D+01 | 0.00000000D+00 |

| | | | | |
|---|---|---|---|---|
| 45 | -0.25000000D+01 | 0.12418430D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 46 | -0.25000000D+01 | -0.13454949D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 47 | -0.25000000D+01 | 0.20230187D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 48 | -0.25000000D+01 | -0.21135574D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 49 | -0.25000000D+01 | -0.47558579D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 50 | -0.25000000D+01 | 0.15862220D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 51 | -0.25000000D+01 | -0.81840509D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 52 | -0.25000000D+01 | -0.80670699D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 53 | -0.25000000D+01 | -0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 54 | -0.25000000D+01 | 0.25589538D-01 | 0.25000000D+01 | 0.00000000D+00 |
| 55 | -0.25000000D+01 | 0.65094604D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 56 | -0.25000000D+01 | 0.12037879D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 57 | -0.25000000D+01 | 0.16373389D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 58 | -0.25000000D+01 | 0.11674187D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 59 | -0.25000000D+01 | 0.18558007D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 60 | -0.25000000D+01 | 0.15162762D+01 | 0.25000000D+01 | 0.00000000D+00 |

***** T-Matrix Output is Suppressed *****

***** Predicted Measurement Vector *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|
| 1 | -0.44621660D+00 | -0.44621660D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 2 | 0.56421813D+01 | 0.56421813D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 3 | 0.57055749D+01 | 0.57055749D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 4 | 0.87407249D+01 | 0.87407249D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 5 | 0.24828416D+02 | 0.24828416D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 6 | 0.18356290D+01 | 0.18356290D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 7 | -0.10340493D+02 | -0.10340493D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 8 | 0.20241354D+02 | 0.20241354D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 9 | 0.13159404D+02 | 0.13159404D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 10 | 0.19920099D+02 | 0.19920099D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 11 | 0.14906948D+02 | 0.14906948D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 12 | -0.92556462D+01 | -0.92556462D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 13 | 0.90220157D+01 | 0.90220157D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 14 | 0.15406756D+02 | 0.15406756D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 15 | 0.81055087D+01 | 0.81055087D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 16 | -0.52157011D+00 | -0.52157011D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 17 | -0.13099967D+02 | -0.13099967D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 18 | -0.64227152D+01 | -0.64227152D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 19 | 0.94979922D+00 | 0.94979922D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 20 | -0.15427329D+02 | -0.15427329D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 21 | -0.28148452D+01 | -0.28148452D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 22 | 0.10617943D+02 | 0.10617943D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 23 | -0.92399517D+01 | -0.92399517D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 24 | 0.19570712D+02 | 0.19570712D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 25 | -0.14247969D+02 | -0.14247969D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 26 | -0.15439722D+02 | -0.15439722D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 27 | -0.17684608D+02 | -0.17684608D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 28 | 0.16022332D+02 | 0.16022332D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 29 | -0.24164769D+01 | -0.24164769D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 30 | 0.66078084D+01 | 0.66078084D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 31 | 0.23772642D+01 | 0.23772642D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 32 | -0.28880709D+01 | -0.28880709D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 33 | -0.89958224D+01 | -0.89958224D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 34 | -0.30031457D+02 | -0.30031457D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 35 | 0.25031023D+02 | 0.25031023D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 36 | 0.73882591D+00 | 0.73882591D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 37 | 0.94699474D+01 | 0.94699474D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 38 | -0.67873620D+01 | -0.67873620D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 39 | -0.20285243D+01 | -0.20285243D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 40 | 0.76200027D+01 | 0.76200027D+01 | 0.00000000D+00 | 0.10000000D+01 |

| | | | | |
|---|---|---|---|---|
| 41 | 0.21726570D+02 | 0.21726570D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 42 | 0.11466424D+02 | 0.11466424D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 43 | 0.37694576D+00 | 0.37694576D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 44 | 0.19482290D+02 | 0.19482290D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 45 | 0.39711930D+01 | 0.39711930D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 46 | 0.58437420D+01 | 0.58437420D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 47 | 0.16101706D+02 | 0.16101706D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 48 | -0.18363749D+02 | -0.18363749D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 49 | -0.10232301D+02 | -0.10232301D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 50 | 0.15978594D+02 | 0.15978594D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 51 | -0.27068691D+01 | -0.27068691D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 52 | -0.39230030D+00 | -0.39230030D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 53 | 0.12150130D+02 | 0.12150130D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 54 | 0.13987658D+02 | 0.13987658D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 55 | -0.13766257D+01 | -0.13766257D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 56 | -0.48350707D+01 | -0.48350707D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 57 | -0.11311830D+02 | -0.11311830D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 58 | 0.12979851D+02 | 0.12979851D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 59 | 0.20434806D+02 | 0.20434806D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 60 | 0.13939232D+02 | 0.13939232D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 61 | -0.25401724D+02 | -0.25401724D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 62 | 0.14934380D+02 | 0.14934380D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 63 | -0.18812718D+01 | -0.18812718D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 64 | -0.56020049D+01 | -0.56020049D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 65 | -0.84015122D+01 | -0.84015122D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 66 | -0.77668403D+01 | -0.77668403D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 67 | -0.11134381D+02 | -0.11134381D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 68 | 0.11461872D+02 | 0.11461872D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 69 | -0.96119309D+00 | -0.96119309D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 70 | -0.83906497D+01 | -0.83906497D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 71 | -0.36111385D+00 | -0.36111385D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 72 | -0.55116874D+01 | -0.55116874D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 73 | -0.58971041D+01 | -0.58971041D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 74 | 0.27720904D+01 | 0.27720904D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 75 | 0.20882069D+02 | 0.20882069D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 76 | -0.22988300D+01 | -0.22988300D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 77 | -0.14943892D+02 | -0.14943892D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 78 | 0.79217715D+01 | 0.79217715D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 79 | 0.30384271D+02 | 0.30384271D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 80 | -0.65068005D+01 | -0.65068005D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 81 | -0.50723573D+01 | -0.50723573D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 82 | 0.96221191D+01 | 0.96221191D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 83 | 0.30796878D+01 | 0.30796878D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 84 | 0.69542200D-01 | 0.69542200D-01 | 0.00000000D+00 | 0.10000000D+01 |
| 85 | -0.11091257D+01 | -0.11091257D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 86 | -0.17117079D+02 | -0.17117079D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 87 | -0.10792018D+02 | -0.10792018D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 88 | -0.16779177D+01 | -0.16779177D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 89 | 0.14964074D+02 | 0.14964074D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 90 | 0.21504235D+02 | 0.21504235D+02 | 0.00000000D+00 | 0.10000000D+01 |

***** Initial Performance Index = 0.14091440D+05 *****

***** Initial Constraint Function Values for Case Number 3 *****

Inequality Constraints

| Element | Value | L.U.B. | L.U.B. - Value |
|---|---|---|---|
| 1 | 0.18307282D+01 | 0.30000000D+01 | 0.11692718D+01 |
| 2 | 0.89443569D+00 | 0.30000000D+01 | 0.21055643D+01 |
| 3 | 0.10984035D+01 | 0.30000000D+01 | 0.19015965D+01 |
| 4 | 0.53461010D+00 | 0.30000000D+01 | 0.24653899D+01 |

| | | | |
|---|---|---|---|
| 5 | 0.11379650D+01 | 0.30000000D+01 | 0.18620350D+01 |
| 6 | 0.14865789D+01 | 0.30000000D+01 | 0.15134211D+01 |
| 7 | 0.41394174D+00 | 0.30000000D+01 | 0.25860583D+01 |
| 8 | 0.17648706D+01 | 0.30000000D+01 | 0.12351294D+01 |
| 9 | 0.22503379D+01 | 0.30000000D+01 | 0.74966208D+00 |
| 10 | 0.12340192D+01 | 0.30000000D+01 | 0.17659808D+01 |
| 11 | 0.74077348D+00 | 0.30000000D+01 | 0.22592265D+01 |
| 12 | 0.17128000D+01 | 0.30000000D+01 | 0.12872000D+01 |
| 13 | 0.73831348D+00 | 0.30000000D+01 | 0.22616865D+01 |
| 14 | 0.17697856D+01 | 0.30000000D+01 | 0.12302144D+01 |
| 15 | 0.24620667D+01 | 0.30000000D+01 | 0.53793331D+00 |
| 16 | 0.22297131D+01 | 0.30000000D+01 | 0.77028689D+00 |
| 17 | 0.12688707D+01 | 0.30000000D+01 | 0.17311293D+01 |
| 18 | 0.11492932D+01 | 0.30000000D+01 | 0.18507068D+01 |
| 19 | 0.25082094D+00 | 0.30000000D+01 | 0.27491791D+01 |
| 20 | 0.11553263D+01 | 0.30000000D+01 | 0.18446737D+01 |
| 21 | 0.14371729D+01 | 0.30000000D+01 | 0.15628271D+01 |
| 22 | 0.47129147D+00 | 0.30000000D+01 | 0.25287085D+01 |
| 23 | 0.18309917D+01 | 0.30000000D+01 | 0.11690083D+01 |
| 24 | 0.29257015D+01 | 0.30000000D+01 | 0.74298475D-01 |
| 25 | 0.16559837D+01 | 0.30000000D+01 | 0.13440163D+01 |
| 26 | 0.11491575D+01 | 0.30000000D+01 | 0.18508425D+01 |
| 27 | 0.23001422D+01 | 0.30000000D+01 | 0.69985775D+00 |
| 28 | 0.13685160D+01 | 0.30000000D+01 | 0.16314840D+01 |
| 29 | 0.20109065D+01 | 0.30000000D+01 | 0.98909346D+00 |
| 30 | 0.23964745D+01 | 0.30000000D+01 | 0.60352551D+00 |
| 31 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 32 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 33 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 34 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 35 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 36 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 37 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 38 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 39 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 40 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 41 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 42 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 43 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 44 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 45 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 46 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 47 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 48 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 49 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 50 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 51 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 52 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 53 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 54 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 55 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 56 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 57 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 58 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 59 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 60 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 61 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 62 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 63 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 64 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 65 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 66 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 67 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 68 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 69 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |

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 70         0.00000000D+00      0.15000000D+01      0.15000000D+01
 71         0.00000000D+00      0.15000000D+01      0.15000000D+01
 72         0.00000000D+00      0.15000000D+01      0.15000000D+01
 73         0.00000000D+00      0.15000000D+01      0.15000000D+01
 74         0.00000000D+00      0.15000000D+01      0.15000000D+01
 75         0.00000000D+00      0.15000000D+01      0.15000000D+01
 76         0.00000000D+00      0.15000000D+01      0.15000000D+01
 77         0.00000000D+00      0.15000000D+01      0.15000000D+01
 78         0.00000000D+00      0.15000000D+01      0.15000000D+01
 79         0.00000000D+00      0.15000000D+01      0.15000000D+01
 80         0.00000000D+00      0.15000000D+01      0.15000000D+01
 81         0.00000000D+00      0.15000000D+01      0.15000000D+01
 82         0.00000000D+00      0.15000000D+01      0.15000000D+01
 83         0.00000000D+00      0.15000000D+01      0.15000000D+01
 84         0.00000000D+00      0.15000000D+01      0.15000000D+01
 85         0.00000000D+00      0.15000000D+01      0.15000000D+01
 86         0.00000000D+00      0.15000000D+01      0.15000000D+01
 87         0.00000000D+00      0.15000000D+01      0.15000000D+01
 88         0.00000000D+00      0.15000000D+01      0.15000000D+01
 89         0.00000000D+00      0.15000000D+01      0.15000000D+01
 90         0.00000000D+00      0.15000000D+01      0.15000000D+01

*****   Solve the NLPQLP Problem for Case Number   3   *****


-----------------------------------------------------------------------
 START OF THE SEQUENTIAL QUADRATIC PROGRAMMING ALGORITHM
-----------------------------------------------------------------------

 Parameters:
    N      =      60
    M      =      90
    ME     =       0
    MODE   =       0
    ACC    =   0.1000D-06
    ACCQP  =   0.1000D-13
    STPMIN =   0.0000D+00
    RHOB   =   0.1000D+03
    MAXFUN =      40
    MAXNM  =      40
    MAXIT  =    1000
    IPRINT =       2

 Output in the following order:
    IT    - iteration number
    F     - objective function value
    SCV   - sum of constraint violations
    NA    - number of active constraints
    I     - number of line search iterations
    ALPHA - steplength parameter
    DELTA - additional variable to prevent inconsistency
    KKT   - Karush-Kuhn-Tucker optimality criterion

  IT         F          SCV      NA  I    ALPHA     DELTA     KKT
-----------------------------------------------------------------------
   1  0.14091440D+05  0.00D+00   90  0  0.00D+00  0.00D+00  0.12D+06
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
            *****   Completed CALL to NLPQLP   *****
   2  0.42156794D+04  0.19D-01   35  2  0.32D+00  0.00D+00  0.33D+05
            *****   Completed CALL to NLPQLP   *****
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          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 3  0.21009455D+04  0.15D-01   49  2  0.22D+00  0.00D+00  0.19D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 4  0.14935252D+04  0.13D-01   52  2  0.10D+00  0.00D+00  0.90D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 5  0.13925459D+04  0.12D-01   57  2  0.10D+00  0.00D+00  0.63D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 6  0.12543571D+04  0.11D-01   59  2  0.10D+00  0.00D+00  0.64D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 7  0.10490714D+04  0.98D-02   59  2  0.10D+00  0.00D+00  0.57D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 8  0.93426846D+03  0.89D-02   59  2  0.10D+00  0.00D+00  0.40D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 9  0.84719283D+03  0.80D-02   60  2  0.10D+00  0.00D+00  0.39D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
10  0.73837019D+03  0.72D-02   60  2  0.10D+00  0.00D+00  0.45D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
11  0.68004428D+03  0.69D-02   60  3  0.41D-01  0.00D+00  0.28D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
12  0.64709818D+03  0.66D-02   60  3  0.41D-01  0.00D+00  0.20D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
13  0.61226181D+03  0.59D-02   60  2  0.10D+00  0.00D+00  0.20D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
14  0.57732156D+03  0.57D-02   60  3  0.48D-01  0.00D+00  0.25D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
15  0.54680217D+03  0.55D-02   61  3  0.31D-01  0.00D+00  0.15D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
16  0.53497774D+03  0.53D-02   61  3  0.26D-01  0.00D+00  0.11D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
17  0.52080440D+03  0.51D-02   61  3  0.40D-01  0.00D+00  0.11D+04
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          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 18  0.50584777D+03  0.49D-02   61  3  0.38D-01  0.00D+00  0.15D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 19  0.47618727D+03  0.47D-02   61  3  0.50D-01  0.00D+00  0.11D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 20  0.46865482D+03  0.46D-02   61  3  0.21D-01  0.00D+00  0.85D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 21  0.46064492D+03  0.44D-02   61  3  0.31D-01  0.00D+00  0.72D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 22  0.44572898D+03  0.40D-02   61  2  0.10D+00  0.00D+00  0.67D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 23  0.43084774D+03  0.36D-02   61  2  0.10D+00  0.00D+00  0.79D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 24  0.41893844D+03  0.35D-02   61  3  0.39D-01  0.00D+00  0.13D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 25  0.40358689D+03  0.33D-02   61  3  0.34D-01  0.00D+00  0.89D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 26  0.39665186D+03  0.33D-02   61  3  0.25D-01  0.00D+00  0.76D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 27  0.38830232D+03  0.31D-02   61  3  0.36D-01  0.00D+00  0.55D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 28  0.38280532D+03  0.30D-02   61  3  0.30D-01  0.00D+00  0.51D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 29  0.37395352D+03  0.29D-02   61  3  0.50D-01  0.00D+00  0.54D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 30  0.36483889D+03  0.28D-02   61  3  0.44D-01  0.00D+00  0.48D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
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          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
31  0.36015030D+03  0.27D-02   61  3  0.29D-01  0.00D+00  0.33D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
32  0.35566415D+03  0.26D-02   61  3  0.45D-01  0.00D+00  0.31D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
33  0.34728181D+03  0.23D-02   61  2  0.10D+00  0.00D+00  0.29D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
34  0.34260794D+03  0.21D-02   61  2  0.10D+00  0.00D+00  0.34D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
35  0.33665437D+03  0.19D-02   61  2  0.10D+00  0.00D+00  0.51D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
36  0.32959664D+03  0.18D-02   61  3  0.38D-01  0.00D+00  0.35D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
37  0.32634402D+03  0.17D-02   61  3  0.27D-01  0.00D+00  0.25D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
38  0.32087602D+03  0.16D-02   61  2  0.10D+00  0.00D+00  0.49D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
39  0.31641300D+03  0.14D-02   61  2  0.10D+00  0.00D+00  0.40D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
40  0.31399315D+03  0.14D-02   61  3  0.18D-01  0.00D+00  0.19D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
41  0.31254137D+03  0.14D-02   61  3  0.20D-01  0.00D+00  0.18D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
42  0.30916837D+03  0.12D-02   61  2  0.10D+00  0.00D+00  0.46D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
43  0.29822949D+03  0.11D-02   61  2  0.10D+00  0.00D+00  0.24D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
44  0.29498453D+03  0.11D-02   61  3  0.43D-01  0.00D+00  0.17D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
45  0.29229121D+03  0.95D-03   61  2  0.10D+00  0.00D+00  0.14D+03
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          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
46  0.28840872D+03  0.86D-03   61  2  0.10D+00  0.00D+00  0.23D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
47  0.28504893D+03  0.82D-03   61  3  0.41D-01  0.00D+00  0.10D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
48  0.28359237D+03  0.79D-03   61  3  0.42D-01  0.00D+00  0.95D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
49  0.27811767D+03  0.66D-03   61  2  0.16D+00  0.00D+00  0.14D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
50  0.27617703D+03  0.60D-03   61  2  0.10D+00  0.00D+00  0.74D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
51  0.27367812D+03  0.53D-03   61  2  0.11D+00  0.00D+00  0.55D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
52  0.26954493D+03  0.43D-03   61  2  0.19D+00  0.00D+00  0.92D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
53  0.26854653D+03  0.42D-03   61  3  0.28D-01  0.00D+00  0.46D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
54  0.26797313D+03  0.38D-03   61  2  0.10D+00  0.00D+00  0.41D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
55  0.26630062D+03  0.34D-03   61  2  0.11D+00  0.00D+00  0.38D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
56  0.26463746D+03  0.29D-03   61  2  0.14D+00  0.00D+00  0.31D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
57  0.26233282D+03  0.23D-03   61  2  0.21D+00  0.00D+00  0.22D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
58  0.25570735D+03  0.21D-09   20  1  0.10D+01  0.00D+00  0.19D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
59  0.25523014D+03  0.46D-10   22  2  0.10D+00  0.00D+00  0.61D+01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
60  0.25378278D+03  0.23D-10   22  2  0.50D+00  0.00D+00  0.15D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
```

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61  0.25373883D+03  0.21D-10   22  2  0.10D+00  0.00D+00  0.78D+00
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
62  0.25358569D+03  0.00D+00   16  1  0.10D+01  0.00D+00  0.74D+00
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
63  0.25344241D+03  0.00D+00   16  2  0.39D+00  0.00D+00  0.92D-01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
64  0.25340651D+03  0.00D+00   16  1  0.10D+01  0.00D+00  0.41D-02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
65  0.25340463D+03  0.00D+00   16  1  0.10D+01  0.00D+00  0.19D-03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
66  0.25340459D+03  0.00D+00   16  1  0.10D+01  0.00D+00  0.43D-04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
67  0.25340457D+03  0.00D+00   16  1  0.10D+01  0.00D+00  0.22D-06
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
68  0.25340457D+03  0.00D+00   16  1  0.10D+01  0.00D+00  0.19D-07


--- Final Convergence Analysis at Last Iterate ---

  Objective function value:      F(X)  =  0.25340457D+03
  Solution values:               X     =
     0.24590531D+00  0.20899689D+00  0.20773654D+00 -0.96691890D-01
     0.11173671D+00  0.43132128D+00  0.17727184D-01  0.11673853D+00
    -0.17642708D+00  0.61345210D-01  0.51700182D-01 -0.25346947D+00
    -0.24123768D+00  0.16518593D+00 -0.26363751D+00  0.57846055D-01
    -0.21037033D+00  0.34414643D+00  0.21515434D+00  0.68242665D-01
    -0.10312284D+00 -0.26494154D-01  0.18526579D+00 -0.16157981D+00
     0.19513581D-01  0.60451901D-01  0.21293979D+00 -0.26015659D-01
     0.79999990D+00 -0.53072550D-01 -0.42422856D+00 -0.15500668D+00
     0.23386420D+00 -0.35429475D-01 -0.12535430D+00  0.15165266D+00
    -0.38288009D-01  0.17939940D+00  0.50714609D+00 -0.31133131D-01
     0.16062244D+00 -0.59453087D-01  0.15017628D-01  0.95723764D-01
    -0.51798094D-01  0.51864650D-01  0.52301869D+00 -0.61355737D+00
    -0.35785766D-01  0.86221969D-01  0.25050750D+00 -0.67497060D-01
    -0.79999990D+00 -0.38189109D+00 -0.24760926D-01 -0.24941770D+00
     0.13733894D+00  0.33788846D+00  0.35580072D+00  0.42613809D-01
  Distances from lower bounds:   X-XL  =
     0.27459053D+01  0.27089969D+01  0.27077365D+01  0.24033081D+01
     0.26117367D+01  0.29313213D+01  0.25177272D+01  0.26167385D+01
     0.23235729D+01  0.25613452D+01  0.25517002D+01  0.22465305D+01
     0.22587623D+01  0.26651859D+01  0.22363625D+01  0.25578461D+01
     0.22896297D+01  0.28441464D+01  0.27151543D+01  0.25682427D+01
     0.23968772D+01  0.24735058D+01  0.26852658D+01  0.23384202D+01
     0.25195136D+01  0.25604519D+01  0.27129398D+01  0.24739843D+01
     0.32999999D+01  0.24469275D+01  0.20757714D+01  0.23449933D+01
     0.27338642D+01  0.24645705D+01  0.23746457D+01  0.26516527D+01
     0.24617120D+01  0.26793994D+01  0.30071461D+01  0.24688669D+01
     0.26606224D+01  0.24405469D+01  0.25150176D+01  0.25957238D+01
     0.24482019D+01  0.25518646D+01  0.30230187D+01  0.18864426D+01
     0.24642142D+01  0.25862220D+01  0.27505075D+01  0.24325029D+01
     0.17000001D+01  0.21181089D+01  0.24752391D+01  0.22505823D+01
     0.26373389D+01  0.28378885D+01  0.28558007D+01  0.25426138D+01
  Distances from upper bounds:   XU-X  =
     0.22540947D+01  0.22910031D+01  0.22922635D+01  0.25966919D+01
     0.23882633D+01  0.20686787D+01  0.24822728D+01  0.23832615D+01
     0.26764271D+01  0.24386548D+01  0.24482998D+01  0.27534695D+01
     0.27412377D+01  0.23348141D+01  0.27636375D+01  0.24421539D+01
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   0.27103703D+01  0.21558536D+01  0.22848457D+01  0.24317573D+01
   0.26031228D+01  0.25264942D+01  0.23147342D+01  0.26615798D+01
   0.24804864D+01  0.24395481D+01  0.22870602D+01  0.25260157D+01
   0.17000001D+01  0.25530725D+01  0.29242286D+01  0.26550067D+01
   0.22661358D+01  0.25354295D+01  0.26253543D+01  0.23483473D+01
   0.25382880D+01  0.23206006D+01  0.19928539D+01  0.25311331D+01
   0.23393776D+01  0.25594531D+01  0.24849824D+01  0.24042762D+01
   0.25517981D+01  0.24481354D+01  0.19769813D+01  0.31135574D+01
   0.25357858D+01  0.24137780D+01  0.22494925D+01  0.25674971D+01
   0.32999999D+01  0.28818911D+01  0.25247609D+01  0.27494177D+01
   0.23626611D+01  0.21621115D+01  0.21441993D+01  0.24573862D+01
Multipliers for lower bounds:  U     =
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
Multipliers for upper bounds:  U     =
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
Constraint values:             G(X)  =
   0.26772786D+01  0.27708629D+01  0.25544406D+01  0.28819232D+01
   0.28132120D+01  0.27413116D+01  0.27076269D+01  0.27300909D+01
   0.25966485D+01  0.27742824D+01  0.28935281D+01  0.27541719D+01
   0.29364767D+01  0.27854769D+01  0.21982416D+01  0.25483398D+01
   0.27634673D+01  0.28032458D+01  0.28165603D+01  0.24918992D+01
   0.28287276D+01  0.29031054D+01  0.29266994D+01  0.21937735D+01
   0.29066466D+01  0.27405586D+01  0.21135235D+01  0.27493562D+01
   0.26352664D+01  0.26416565D+01  0.10894791D+01  0.00000000D+00
   0.40728550D+00  0.14669644D+01  0.55357896D+00  0.77407325D+00
   0.10127573D+01  0.14412012D+01  0.67037106D+00  0.10295411D+01
   0.63831317D+00  0.00000000D+00  0.12319664D+01  0.92174054D+00
   0.00000000D+00  0.13761921D+01  0.00000000D+00  0.00000000D+00
   0.54150169D-01  0.13412471D+01  0.12476219D+01  0.74792456D+00
   0.89899830D+00  0.00000000D+00  0.11721936D+01  0.90893395D+00
   0.00000000D+00  0.10290367D+01  0.00000000D+00  0.67456652D+00
   0.00000000D+00  0.52852322D+00  0.00000000D+00  0.13813053D+01
   0.47733776D+00  0.14025040D+01  0.14889350D+01  0.14334819D+01
   0.91309921D-01  0.80863926D+00  0.42240872D+00  0.45282121D+00
   0.11336594D+01  0.10901300D+01  0.20635892D+00  0.10264047D+00
   0.00000000D+00  0.00000000D+00  0.10602000D+01  0.00000000D+00
   0.43108741D+00  0.76079007D+00  0.00000000D+00  0.10925194D+01
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   0.82429303D+00  0.46794401D-01  0.00000000D+00  0.67046980D+00
   0.00000000D+00  0.26337569D-01
 Multipliers for constraints:   U     =
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.50615081D+02
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.35744415D+02  0.00000000D+00  0.00000000D+00
   0.58213870D+02  0.00000000D+00  0.64565810D+02  0.28613354D+02
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.86009587D+02  0.00000000D+00  0.00000000D+00
   0.76717389D+02  0.00000000D+00  0.18662108D+03  0.00000000D+00
   0.88300170D+02  0.00000000D+00  0.68502625D+01  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.94677148D+02  0.91216536D+02  0.00000000D+00  0.68685161D+02
   0.00000000D+00  0.00000000D+00  0.15682754D+03  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.62370643D+02  0.00000000D+00
   0.92217013D+02  0.00000000D+00
 Number of function calls:      NFUNC =     155
 Number of gradient calls:      NGRAD =      68
 Number of calls of QP solver:  NQL   =      68


          *****   Completed CALL to NLPQLP   *****


       *****   Number of Function Evaluations  =   4235   *****


     *****   Solution Control Vector for Case Number   3   *****

Element     G.L.B.            C.V.              L.U.B.            Delta C.V.

   1    -0.25000000D+01    0.24590531D+00    0.25000000D+01   -0.41052090D+00
   2    -0.25000000D+01    0.20899689D+00    0.25000000D+01   -0.15000000D+01
   3    -0.25000000D+01    0.20773654D+00    0.25000000D+01    0.10927145D+01
   4    -0.25000000D+01   -0.96691890D-01    0.25000000D+01    0.33035581D-01
   5    -0.25000000D+01    0.11173671D+00    0.25000000D+01   -0.94642104D+00
   6    -0.25000000D+01    0.43132128D+00    0.25000000D+01    0.72592675D+00
   7    -0.25000000D+01    0.17727184D-01    0.25000000D+01   -0.48724271D+00
   8    -0.25000000D+01    0.11673853D+00    0.25000000D+01   -0.58798818D-01
   9    -0.25000000D+01   -0.17642708D+00    0.25000000D+01    0.82962894D+00
  10    -0.25000000D+01    0.61345210D-01    0.25000000D+01   -0.47045895D+00
  11    -0.25000000D+01    0.51700182D-01    0.25000000D+01    0.86168683D+00
  12    -0.25000000D+01   -0.25346947D+00    0.25000000D+01   -0.15000000D+01
  13    -0.25000000D+01   -0.24123768D+00    0.25000000D+01   -0.26803364D+00
  14    -0.25000000D+01    0.16518593D+00    0.25000000D+01    0.57825946D+00
  15    -0.25000000D+01   -0.26363751D+00    0.25000000D+01    0.15000000D+01
  16    -0.25000000D+01    0.57846055D-01    0.25000000D+01    0.12380794D+00
  17    -0.25000000D+01   -0.21037033D+00    0.25000000D+01   -0.15000000D+01
  18    -0.25000000D+01    0.34414643D+00    0.25000000D+01   -0.15000000D+01
  19    -0.25000000D+01    0.21515434D+00    0.25000000D+01    0.14458498D+01
  20    -0.25000000D+01    0.68242665D-01    0.25000000D+01    0.15875294D+00
  21    -0.25000000D+01   -0.10312284D+00    0.25000000D+01   -0.25237813D+00
  22    -0.25000000D+01   -0.26494154D-01    0.25000000D+01   -0.75207544D+00
  23    -0.25000000D+01    0.18526579D+00    0.25000000D+01    0.60100170D+00
```

| | | | | |
|---|---|---|---|---|
| 24 | -0.25000000D+01 | -0.16157981D+00 | 0.25000000D+01 | 0.15000000D+01 |
| 25 | -0.25000000D+01 | 0.19513581D-01 | 0.25000000D+01 | -0.32780638D+00 |
| 26 | -0.25000000D+01 | 0.60451901D-01 | 0.25000000D+01 | -0.59106605D+00 |
| 27 | -0.25000000D+01 | 0.21293979D+00 | 0.25000000D+01 | -0.15000000D+01 |
| 28 | -0.25000000D+01 | -0.26015659D-01 | 0.25000000D+01 | -0.47096334D+00 |
| 29 | -0.25000000D+01 | 0.79999990D+00 | 0.25000000D+01 | -0.15000000D+01 |
| 30 | -0.25000000D+01 | -0.53072550D-01 | 0.25000000D+01 | 0.82543348D+00 |
| 31 | -0.25000000D+01 | -0.42422856D+00 | 0.25000000D+01 | 0.15000000D+01 |
| 32 | -0.25000000D+01 | -0.15500668D+00 | 0.25000000D+01 | 0.97147678D+00 |
| 33 | -0.25000000D+01 | 0.23386420D+00 | 0.25000000D+01 | 0.15000000D+01 |
| 34 | -0.25000000D+01 | -0.35429475D-01 | 0.25000000D+01 | -0.11869471D+00 |
| 35 | -0.25000000D+01 | -0.12535430D+00 | 0.25000000D+01 | 0.10226622D+01 |
| 36 | -0.25000000D+01 | 0.15165266D+00 | 0.25000000D+01 | 0.97495965D-01 |
| 37 | -0.25000000D+01 | -0.38288009D-01 | 0.25000000D+01 | 0.11064959D-01 |
| 38 | -0.25000000D+01 | 0.17939940D+00 | 0.25000000D+01 | -0.66518119D-01 |
| 39 | -0.25000000D+01 | 0.50714609D+00 | 0.25000000D+01 | 0.14086901D+01 |
| 40 | -0.25000000D+01 | -0.31133131D-01 | 0.25000000D+01 | 0.69136074D+00 |
| 41 | -0.25000000D+01 | 0.16062244D+00 | 0.25000000D+01 | 0.10775913D+01 |
| 42 | -0.25000000D+01 | -0.59453087D-01 | 0.25000000D+01 | 0.10471788D+01 |
| 43 | -0.25000000D+01 | 0.15017628D-01 | 0.25000000D+01 | 0.36634057D+00 |
| 44 | -0.25000000D+01 | 0.95723764D-01 | 0.25000000D+01 | 0.40986997D+00 |
| 45 | -0.25000000D+01 | -0.51798094D-01 | 0.25000000D+01 | -0.12936411D+01 |
| 46 | -0.25000000D+01 | 0.51864650D-01 | 0.25000000D+01 | 0.13973595D+01 |
| 47 | -0.25000000D+01 | 0.52301869D+00 | 0.25000000D+01 | -0.15000000D+01 |
| 48 | -0.25000000D+01 | -0.61355737D+00 | 0.25000000D+01 | 0.15000000D+01 |
| 49 | -0.25000000D+01 | -0.35785766D-01 | 0.25000000D+01 | 0.43980003D+00 |
| 50 | -0.25000000D+01 | 0.86221969D-01 | 0.25000000D+01 | -0.15000000D+01 |
| 51 | -0.25000000D+01 | 0.25050750D+00 | 0.25000000D+01 | 0.10689126D+01 |
| 52 | -0.25000000D+01 | -0.67497060D-01 | 0.25000000D+01 | 0.73920993D+00 |
| 53 | -0.25000000D+01 | -0.79999990D+00 | 0.25000000D+01 | 0.15000000D+01 |
| 54 | -0.25000000D+01 | -0.38189109D+00 | 0.25000000D+01 | -0.40748063D+00 |
| 55 | -0.25000000D+01 | -0.24760926D-01 | 0.25000000D+01 | -0.67570697D+00 |
| 56 | -0.25000000D+01 | -0.24941770D+00 | 0.25000000D+01 | -0.14532056D+01 |
| 57 | -0.25000000D+01 | 0.13733894D+00 | 0.25000000D+01 | -0.15000000D+01 |
| 58 | -0.25000000D+01 | 0.33788846D+00 | 0.25000000D+01 | -0.82953020D+00 |
| 59 | -0.25000000D+01 | 0.35580072D+00 | 0.25000000D+01 | -0.15000000D+01 |
| 60 | -0.25000000D+01 | 0.42613809D-01 | 0.25000000D+01 | -0.14736624D+01 |

***** Predicted Measurement Vector *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|
| 1 | -0.19473253D+00 | -0.44621660D+00 | 0.25148407D+00 | 0.10000000D+01 |
| 2 | 0.10732585D+01 | 0.56421813D+01 | -0.45689228D+01 | 0.10000000D+01 |
| 3 | -0.25503348D+00 | 0.57055749D+01 | -0.59606084D+01 | 0.10000000D+01 |
| 4 | 0.11361883D+01 | 0.87407249D+01 | -0.76045367D+01 | 0.10000000D+01 |
| 5 | 0.21925060D+01 | 0.24828416D+02 | -0.22635910D+02 | 0.10000000D+01 |
| 6 | -0.58824542D+00 | 0.18356290D+01 | -0.24238745D+01 | 0.10000000D+01 |
| 7 | 0.41250726D+00 | -0.10340493D+02 | 0.10753000D+02 | 0.10000000D+01 |
| 8 | 0.31220525D+01 | 0.20241354D+02 | -0.17119302D+02 | 0.10000000D+01 |
| 9 | 0.69517354D+00 | 0.13159404D+02 | -0.12464231D+02 | 0.10000000D+01 |
| 10 | 0.11891732D+01 | 0.19920099D+02 | -0.18730926D+02 | 0.10000000D+01 |
| 11 | -0.26535078D+00 | 0.14906948D+02 | -0.15172299D+02 | 0.10000000D+01 |
| 12 | -0.30710792D+00 | -0.92556462D+01 | 0.89485383D+01 | 0.10000000D+01 |
| 13 | -0.80406366D+00 | 0.90220157D+01 | -0.98260793D+01 | 0.10000000D+01 |
| 14 | 0.23909968D+01 | 0.15406756D+02 | -0.13015759D+02 | 0.10000000D+01 |
| 15 | -0.77687682D+00 | 0.81055087D+01 | -0.88823855D+01 | 0.10000000D+01 |
| 16 | 0.12670448D+01 | -0.52157011D+00 | 0.17886149D+01 | 0.10000000D+01 |
| 17 | 0.18823048D+01 | -0.13099967D+02 | 0.14982272D+02 | 0.10000000D+01 |
| 18 | 0.13459904D+00 | -0.64227152D+01 | 0.65573142D+01 | 0.10000000D+01 |
| 19 | 0.13219252D+01 | 0.94979922D+00 | 0.37212594D+00 | 0.10000000D+01 |
| 20 | -0.14363776D+01 | -0.15427329D+02 | 0.13990952D+02 | 0.10000000D+01 |
| 21 | -0.24163735D+00 | -0.28148452D+01 | 0.25732078D+01 | 0.10000000D+01 |
| 22 | -0.92195487D+00 | 0.10617943D+02 | -0.11539898D+02 | 0.10000000D+01 |

| | | | | |
|---|---|---|---|---|
| 23 | -0.12852420D+01 | -0.92399517D+01 | 0.79547097D+01 | 0.10000000D+01 |
| 24 | 0.15231388D+01 | 0.19570712D+02 | -0.18047574D+02 | 0.10000000D+01 |
| 25 | -0.31421142D+01 | -0.14247969D+02 | 0.11105855D+02 | 0.10000000D+01 |
| 26 | 0.13098123D+00 | -0.15439722D+02 | 0.15570703D+02 | 0.10000000D+01 |
| 27 | -0.20739579D+01 | -0.17684608D+02 | 0.15610650D+02 | 0.10000000D+01 |
| 28 | 0.15652542D+01 | 0.16022332D+02 | -0.14457078D+02 | 0.10000000D+01 |
| 29 | 0.69942655D+00 | -0.24164769D+01 | 0.31159035D+01 | 0.10000000D+01 |
| 30 | 0.20056959D+01 | 0.66078084D+01 | -0.46021124D+01 | 0.10000000D+01 |
| 31 | 0.26266453D+01 | 0.23772642D+01 | 0.24938112D+00 | 0.10000000D+01 |
| 32 | 0.24009921D+00 | -0.28880709D+01 | 0.31281701D+01 | 0.10000000D+01 |
| 33 | 0.21222826D+00 | -0.89958224D+01 | 0.92080507D+01 | 0.10000000D+01 |
| 34 | -0.49807977D+01 | -0.30031457D+02 | 0.25050660D+02 | 0.10000000D+01 |
| 35 | 0.19171239D+01 | 0.25031023D+02 | -0.23113899D+02 | 0.10000000D+01 |
| 36 | -0.15370358D+00 | 0.73882591D+00 | -0.89252949D+00 | 0.10000000D+01 |
| 37 | 0.32700246D+01 | 0.94699474D+01 | -0.61999227D+01 | 0.10000000D+01 |
| 38 | 0.60935829D+00 | -0.67873620D+01 | 0.73967203D+01 | 0.10000000D+01 |
| 39 | 0.74963313D+00 | -0.20285243D+01 | 0.27781574D+01 | 0.10000000D+01 |
| 40 | -0.16323590D+00 | 0.76200027D+01 | -0.77832386D+01 | 0.10000000D+01 |
| 41 | 0.25992728D+01 | 0.21726570D+02 | -0.19127297D+02 | 0.10000000D+01 |
| 42 | -0.63043615D+00 | 0.11466424D+02 | -0.12096860D+02 | 0.10000000D+01 |
| 43 | -0.15899825D+01 | 0.37694576D+00 | -0.19669282D+01 | 0.10000000D+01 |
| 44 | 0.20801707D+01 | 0.19482290D+02 | -0.17402120D+02 | 0.10000000D+01 |
| 45 | 0.53653101D+00 | 0.39711930D+01 | -0.34346620D+01 | 0.10000000D+01 |
| 46 | -0.83752116D+00 | 0.58437420D+01 | -0.66812632D+01 | 0.10000000D+01 |
| 47 | 0.10083047D+01 | 0.16101706D+02 | -0.15093402D+02 | 0.10000000D+01 |
| 48 | -0.54568713D+00 | -0.18363749D+02 | 0.17818062D+02 | 0.10000000D+01 |
| 49 | 0.68590537D+00 | -0.10232301D+02 | 0.10918206D+02 | 0.10000000D+01 |
| 50 | -0.50141819D+00 | 0.15978594D+02 | -0.16480012D+02 | 0.10000000D+01 |
| 51 | -0.33768489D+01 | -0.27068691D+01 | -0.66997978D+00 | 0.10000000D+01 |
| 52 | -0.66718708D+00 | -0.39230030D+00 | -0.27488678D+00 | 0.10000000D+01 |
| 53 | 0.27825962D+01 | 0.12150130D+02 | -0.93675333D+01 | 0.10000000D+01 |
| 54 | 0.12711477D+01 | 0.13987658D+02 | -0.12716510D+02 | 0.10000000D+01 |
| 55 | -0.92617680D+00 | -0.13766257D+01 | 0.45044893D+00 | 0.10000000D+01 |
| 56 | -0.72442127D+00 | -0.48350707D+01 | 0.41106495D+01 | 0.10000000D+01 |
| 57 | -0.24176006D+01 | -0.11311830D+02 | 0.88942292D+01 | 0.10000000D+01 |
| 58 | 0.20117107D+01 | 0.12979851D+02 | -0.10968141D+02 | 0.10000000D+01 |
| 59 | 0.23102271D+01 | 0.20434806D+02 | -0.18124579D+02 | 0.10000000D+01 |
| 60 | 0.93211108D-01 | 0.13939232D+02 | -0.13846020D+02 | 0.10000000D+01 |
| 61 | -0.23093173D+01 | -0.25401724D+02 | 0.23092406D+02 | 0.10000000D+01 |
| 62 | 0.54825326D+00 | 0.14934380D+02 | -0.14386126D+02 | 0.10000000D+01 |
| 63 | -0.22390442D+00 | -0.18812718D+01 | 0.16573673D+01 | 0.10000000D+01 |
| 64 | 0.12723239D+01 | -0.56020049D+01 | 0.68743287D+01 | 0.10000000D+01 |
| 65 | 0.30431439D+00 | -0.84015122D+01 | 0.87058266D+01 | 0.10000000D+01 |
| 66 | -0.21395976D+01 | -0.77668403D+01 | 0.56272427D+01 | 0.10000000D+01 |
| 67 | -0.10783122D+01 | -0.11134381D+02 | 0.10056069D+02 | 0.10000000D+01 |
| 68 | 0.85844502D+00 | 0.11461872D+02 | -0.10603427D+02 | 0.10000000D+01 |
| 69 | -0.22881152D+01 | -0.96119309D+00 | -0.13269221D+01 | 0.10000000D+01 |
| 70 | 0.11911290D+01 | -0.83906497D+01 | 0.95817787D+01 | 0.10000000D+01 |
| 71 | -0.15432708D+00 | -0.36111385D+00 | 0.20678676D+00 | 0.10000000D+01 |
| 72 | 0.72927979D+00 | -0.55116874D+01 | 0.62409672D+01 | 0.10000000D+01 |
| 73 | -0.56956043D+00 | -0.58971041D+01 | 0.53275437D+01 | 0.10000000D+01 |
| 74 | 0.18110978D+01 | 0.27720904D+01 | -0.96099267D+00 | 0.10000000D+01 |
| 75 | 0.23991940D+01 | 0.20882069D+02 | -0.18482875D+02 | 0.10000000D+01 |
| 76 | -0.12853485D+01 | -0.22988300D+01 | 0.10134814D+01 | 0.10000000D+01 |
| 77 | -0.29342957D+01 | -0.14943892D+02 | 0.12009596D+02 | 0.10000000D+01 |
| 78 | 0.79522786D+00 | 0.79217715D+01 | -0.71265437D+01 | 0.10000000D+01 |
| 79 | 0.18354239D+01 | 0.30384271D+02 | -0.28548847D+02 | 0.10000000D+01 |
| 80 | 0.12112555D+01 | -0.65068005D+01 | 0.77180560D+01 | 0.10000000D+01 |
| 81 | 0.87835546D+00 | -0.50723573D+01 | 0.59507128D+01 | 0.10000000D+01 |
| 82 | -0.12617424D+01 | 0.96221191D+01 | -0.10883861D+02 | 0.10000000D+01 |
| 83 | -0.25443746D+01 | 0.30796878D+01 | -0.56240624D+01 | 0.10000000D+01 |
| 84 | -0.21220776D+01 | 0.69542200D-01 | -0.21916198D+01 | 0.10000000D+01 |
| 85 | -0.11448867D+01 | -0.11091257D+01 | -0.35761089D-01 | 0.10000000D+01 |
| 86 | -0.21251879D+01 | -0.17117079D+02 | 0.14991891D+02 | 0.10000000D+01 |
| 87 | -0.30579647D+01 | -0.10792018D+02 | 0.77340528D+01 | 0.10000000D+01 |

| | | | | |
|---|---|---|---|---|
| 88 | -0.21224554D+01 | -0.16779177D+01 | -0.44453772D+00 | 0.10000000D+01 |
| 89 | 0.27652002D+01 | 0.14964074D+02 | -0.12198874D+02 | 0.10000000D+01 |
| 90 | 0.16973120D+01 | 0.21504235D+02 | -0.19806923D+02 | 0.10000000D+01 |

***** NLP Solution Performance Index = 0.25340457D+03 *****

***** Solution Constraint Function Values for Case Number 3 *****

Inequality Constraints

| Element | Value | L.U.B. | L.U.B. - Value |
|---|---|---|---|
| 1 | 0.32272143D+00 | 0.30000000D+01 | 0.26772786D+01 |
| 2 | 0.22913706D+00 | 0.30000000D+01 | 0.27708629D+01 |
| 3 | 0.44555936D+00 | 0.30000000D+01 | 0.25544406D+01 |
| 4 | 0.11807683D+00 | 0.30000000D+01 | 0.28819232D+01 |
| 5 | 0.18678798D+00 | 0.30000000D+01 | 0.28132120D+01 |
| 6 | 0.25868838D+00 | 0.30000000D+01 | 0.27413116D+01 |
| 7 | 0.29237307D+00 | 0.30000000D+01 | 0.27076269D+01 |
| 8 | 0.26990906D+00 | 0.30000000D+01 | 0.27300909D+01 |
| 9 | 0.40335151D+00 | 0.30000000D+01 | 0.25966485D+01 |
| 10 | 0.22571764D+00 | 0.30000000D+01 | 0.27742824D+01 |
| 11 | 0.10647188D+00 | 0.30000000D+01 | 0.28935281D+01 |
| 12 | 0.24582809D+00 | 0.30000000D+01 | 0.27541719D+01 |
| 13 | 0.63523320D-01 | 0.30000000D+01 | 0.29364767D+01 |
| 14 | 0.21452312D+00 | 0.30000000D+01 | 0.27854769D+01 |
| 15 | 0.80175840D+00 | 0.30000000D+01 | 0.21982416D+01 |
| 16 | 0.45166021D+00 | 0.30000000D+01 | 0.25483398D+01 |
| 17 | 0.23653269D+00 | 0.30000000D+01 | 0.27634673D+01 |
| 18 | 0.19675424D+00 | 0.30000000D+01 | 0.28032458D+01 |
| 19 | 0.18343968D+00 | 0.30000000D+01 | 0.28165603D+01 |
| 20 | 0.50810081D+00 | 0.30000000D+01 | 0.24918992D+01 |
| 21 | 0.17127241D+00 | 0.30000000D+01 | 0.28287276D+01 |
| 22 | 0.96894624D-01 | 0.30000000D+01 | 0.29031054D+01 |
| 23 | 0.73300644D-01 | 0.30000000D+01 | 0.29266994D+01 |
| 24 | 0.80622652D+00 | 0.30000000D+01 | 0.21937735D+01 |
| 25 | 0.93353356D-01 | 0.30000000D+01 | 0.29066466D+01 |
| 26 | 0.25944144D+00 | 0.30000000D+01 | 0.27405586D+01 |
| 27 | 0.88647653D+00 | 0.30000000D+01 | 0.21135235D+01 |
| 28 | 0.25064376D+00 | 0.30000000D+01 | 0.27493562D+01 |
| 29 | 0.36473359D+00 | 0.30000000D+01 | 0.26352664D+01 |
| 30 | 0.35834354D+00 | 0.30000000D+01 | 0.26416565D+01 |
| 31 | 0.41052090D+00 | 0.15000000D+01 | 0.10894791D+01 |
| 32 | 0.15000000D+01 | 0.15000000D+01 | 0.00000000D+00 |
| 33 | 0.10927145D+01 | 0.15000000D+01 | 0.40728550D+00 |
| 34 | 0.33035581D-01 | 0.15000000D+01 | 0.14669644D+01 |
| 35 | 0.94642104D+00 | 0.15000000D+01 | 0.55357896D+00 |
| 36 | 0.72592675D+00 | 0.15000000D+01 | 0.77407325D+00 |
| 37 | 0.48724271D+00 | 0.15000000D+01 | 0.10127573D+01 |
| 38 | 0.58798818D-01 | 0.15000000D+01 | 0.14412012D+01 |
| 39 | 0.82962894D+00 | 0.15000000D+01 | 0.67037106D+00 |
| 40 | 0.47045895D+00 | 0.15000000D+01 | 0.10295411D+01 |
| 41 | 0.86168683D+00 | 0.15000000D+01 | 0.63831317D+00 |
| 42 | 0.15000000D+01 | 0.15000000D+01 | 0.00000000D+00 |
| 43 | 0.26803364D+00 | 0.15000000D+01 | 0.12319664D+01 |
| 44 | 0.57825946D+00 | 0.15000000D+01 | 0.92174054D+00 |
| 45 | 0.15000000D+01 | 0.15000000D+01 | 0.00000000D+00 |
| 46 | 0.12380794D+00 | 0.15000000D+01 | 0.13761921D+01 |
| 47 | 0.15000000D+01 | 0.15000000D+01 | 0.00000000D+00 |
| 48 | 0.15000000D+01 | 0.15000000D+01 | 0.00000000D+00 |
| 49 | 0.14458498D+01 | 0.15000000D+01 | 0.54150169D-01 |
| 50 | 0.15875294D+00 | 0.15000000D+01 | 0.13412471D+01 |
| 51 | 0.25237813D+00 | 0.15000000D+01 | 0.12476219D+01 |

| | | | |
|---|---|---|---|
| 52 | 0.75207544D+00 | 0.15000000D+01 | 0.74792456D+00 |
| 53 | 0.60100170D+00 | 0.15000000D+01 | 0.89899830D+00 |
| 54 | 0.15000000D+01 | 0.15000000D+01 | 0.00000000D+00 |
| 55 | 0.32780638D+00 | 0.15000000D+01 | 0.11721936D+01 |
| 56 | 0.59106605D+00 | 0.15000000D+01 | 0.90893395D+00 |
| 57 | 0.15000000D+01 | 0.15000000D+01 | 0.00000000D+00 |
| 58 | 0.47096334D+00 | 0.15000000D+01 | 0.10290367D+01 |
| 59 | 0.15000000D+01 | 0.15000000D+01 | 0.00000000D+00 |
| 60 | 0.82543348D+00 | 0.15000000D+01 | 0.67456652D+00 |
| 61 | 0.15000000D+01 | 0.15000000D+01 | 0.00000000D+00 |
| 62 | 0.97147678D+00 | 0.15000000D+01 | 0.52852322D+00 |
| 63 | 0.15000000D+01 | 0.15000000D+01 | 0.00000000D+00 |
| 64 | 0.11869471D+00 | 0.15000000D+01 | 0.13813053D+01 |
| 65 | 0.10226622D+01 | 0.15000000D+01 | 0.47733776D+00 |
| 66 | 0.97495965D-01 | 0.15000000D+01 | 0.14025040D+01 |
| 67 | 0.11064959D-01 | 0.15000000D+01 | 0.14889350D+01 |
| 68 | 0.66518119D-01 | 0.15000000D+01 | 0.14334819D+01 |
| 69 | 0.14086901D+01 | 0.15000000D+01 | 0.91309921D-01 |
| 70 | 0.69136074D+00 | 0.15000000D+01 | 0.80863926D+00 |
| 71 | 0.10775913D+01 | 0.15000000D+01 | 0.42240872D+00 |
| 72 | 0.10471788D+01 | 0.15000000D+01 | 0.45282121D+00 |
| 73 | 0.36634057D+00 | 0.15000000D+01 | 0.11336594D+01 |
| 74 | 0.40986997D+00 | 0.15000000D+01 | 0.10901300D+01 |
| 75 | 0.12936411D+01 | 0.15000000D+01 | 0.20635892D+00 |
| 76 | 0.13973595D+01 | 0.15000000D+01 | 0.10264047D+00 |
| 77 | 0.15000000D+01 | 0.15000000D+01 | 0.00000000D+00 |
| 78 | 0.15000000D+01 | 0.15000000D+01 | 0.00000000D+00 |
| 79 | 0.43980003D+00 | 0.15000000D+01 | 0.10602000D+01 |
| 80 | 0.15000000D+01 | 0.15000000D+01 | 0.00000000D+00 |
| 81 | 0.10689126D+01 | 0.15000000D+01 | 0.43108741D+00 |
| 82 | 0.73920993D+00 | 0.15000000D+01 | 0.76079007D+00 |
| 83 | 0.15000000D+01 | 0.15000000D+01 | 0.00000000D+00 |
| 84 | 0.40748063D+00 | 0.15000000D+01 | 0.10925194D+01 |
| 85 | 0.67570697D+00 | 0.15000000D+01 | 0.82429303D+00 |
| 86 | 0.14532056D+01 | 0.15000000D+01 | 0.46794401D-01 |
| 87 | 0.15000000D+01 | 0.15000000D+01 | 0.00000000D+00 |
| 88 | 0.82953020D+00 | 0.15000000D+01 | 0.67046980D+00 |
| 89 | 0.15000000D+01 | 0.15000000D+01 | 0.00000000D+00 |
| 90 | 0.14736624D+01 | 0.15000000D+01 | 0.26337569D-01 |

***** NLP Special Control 60-Vector Output *****

```
CV =
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                *****   End Case Number   3   *****


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        ***************   Start Case Number   4   ***************

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CRAN3   =   1.30000000000000     ,
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CRAN7   =  0.100000000000000     ,
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ISEED3  =    72919329,
ISEED4  =    63237395,
ITOUT   =           0,
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JSEED3  =    89672847,
JSEED4  =    98351973,
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WDX     = 60*0.000000000000000E+000  ,
WX      = 60*0.000000000000000E+000  ,
WZ      = 90*1.00000000000000        ,
XL      = 60*-2.50000000000000       , 4*-2.00000000000000       ,
XL0     = 60*-2.30000000000000       ,
XU      = 60*2.50000000000000        , 4*2.00000000000000        ,
XU0     = 60*2.30000000000000        ,
X0      =  0.656426203250885     ,   1.70899689197540     , -0.884977960586548
, -0.129727470874786     ,
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   21.5042352376753
/
```

```
                    *****   OUTPUT DATA   *****

            *****   X0, ZA, and T are Randomly Defined   *****

      CRAN1               CRAN2               CRAN3               CRAN4
      CRAN5               CRAN6               CRAN7               CRAN8
```

| | | | |
|---|---|---|---|
| 0.17000000D+01 | 0.16000000D+01 | 0.13000000D+01 | 0.17000000D+01 |
| 0.10000000D-02 | 0.10000000D-02 | 0.10000000D+00 | 0.10000000D+00 |

***** Control Vector During Previous Duty Cycle for Case Number 4 *****

| Element | G.L.B. | C.V. | L.U.B. |
|---|---|---|---|
| 1 | -0.23000000D+01 | 0.65642620D+00 | 0.23000000D+01 |
| 2 | -0.23000000D+01 | 0.17089969D+01 | 0.23000000D+01 |
| 3 | -0.23000000D+01 | -0.88497796D+00 | 0.23000000D+01 |
| 4 | -0.23000000D+01 | -0.12972747D+00 | 0.23000000D+01 |
| 5 | -0.23000000D+01 | 0.10581578D+01 | 0.23000000D+01 |
| 6 | -0.23000000D+01 | -0.29460547D+00 | 0.23000000D+01 |
| 7 | -0.23000000D+01 | 0.50496989D+00 | 0.23000000D+01 |
| 8 | -0.23000000D+01 | 0.17553735D+00 | 0.23000000D+01 |
| 9 | -0.23000000D+01 | -0.10060560D+01 | 0.23000000D+01 |
| 10 | -0.23000000D+01 | 0.53180416D+00 | 0.23000000D+01 |
| 11 | -0.23000000D+01 | -0.80998665D+00 | 0.23000000D+01 |
| 12 | -0.23000000D+01 | 0.12465305D+01 | 0.23000000D+01 |
| 13 | -0.23000000D+01 | 0.26795959D-01 | 0.23000000D+01 |
| 14 | -0.23000000D+01 | -0.41307353D+00 | 0.23000000D+01 |
| 15 | -0.23000000D+01 | -0.17636375D+01 | 0.23000000D+01 |
| 16 | -0.23000000D+01 | -0.65961885D-01 | 0.23000000D+01 |
| 17 | -0.23000000D+01 | 0.12896297D+01 | 0.23000000D+01 |
| 18 | -0.23000000D+01 | 0.18441464D+01 | 0.23000000D+01 |
| 19 | -0.23000000D+01 | -0.12306955D+01 | 0.23000000D+01 |
| 20 | -0.23000000D+01 | -0.90510273D-01 | 0.23000000D+01 |
| 21 | -0.23000000D+01 | 0.14925529D+00 | 0.23000000D+01 |
| 22 | -0.23000000D+01 | 0.72558129D+00 | 0.23000000D+01 |
| 23 | -0.23000000D+01 | -0.41573591D+00 | 0.23000000D+01 |
| 24 | -0.23000000D+01 | -0.16615798D+01 | 0.23000000D+01 |
| 25 | -0.23000000D+01 | 0.34731996D+00 | 0.23000000D+01 |
| 26 | -0.23000000D+01 | 0.65151795D+00 | 0.23000000D+01 |
| 27 | -0.23000000D+01 | 0.17129398D+01 | 0.23000000D+01 |
| 28 | -0.23000000D+01 | 0.44494768D+00 | 0.23000000D+01 |
| 29 | -0.23000000D+01 | 0.24994527D+01 | 0.23000000D+01 |
| 29 | -0.23000000D+01 | 0.22999999D+01 | 0.23000000D+01 |
| 30 | -0.23000000D+01 | -0.87850603D+00 | 0.23000000D+01 |
| 31 | -0.23000000D+01 | -0.19242286D+01 | 0.23000000D+01 |
| 32 | -0.23000000D+01 | -0.11264835D+01 | 0.23000000D+01 |
| 33 | -0.23000000D+01 | -0.12661358D+01 | 0.23000000D+01 |
| 34 | -0.23000000D+01 | 0.83265233D-01 | 0.23000000D+01 |
| 35 | -0.23000000D+01 | -0.11480165D+01 | 0.23000000D+01 |
| 36 | -0.23000000D+01 | 0.54156697D-01 | 0.23000000D+01 |
| 37 | -0.23000000D+01 | -0.49352968D-01 | 0.23000000D+01 |
| 38 | -0.23000000D+01 | 0.24591752D+00 | 0.23000000D+01 |
| 39 | -0.23000000D+01 | -0.90154399D+00 | 0.23000000D+01 |
| 40 | -0.23000000D+01 | -0.72249388D+00 | 0.23000000D+01 |
| 41 | -0.23000000D+01 | -0.91696883D+00 | 0.23000000D+01 |
| 42 | -0.23000000D+01 | -0.11066319D+01 | 0.23000000D+01 |
| 43 | -0.23000000D+01 | -0.35132294D+00 | 0.23000000D+01 |
| 44 | -0.23000000D+01 | -0.31414621D+00 | 0.23000000D+01 |
| 45 | -0.23000000D+01 | 0.12418430D+01 | 0.23000000D+01 |
| 46 | -0.23000000D+01 | -0.13454949D+01 | 0.23000000D+01 |
| 47 | -0.23000000D+01 | 0.20230187D+01 | 0.23000000D+01 |
| 48 | -0.23000000D+01 | -0.21135574D+01 | 0.23000000D+01 |
| 49 | -0.23000000D+01 | -0.47558579D+00 | 0.23000000D+01 |
| 50 | -0.23000000D+01 | 0.15862220D+01 | 0.23000000D+01 |
| 51 | -0.23000000D+01 | -0.81840509D+00 | 0.23000000D+01 |
| 52 | -0.23000000D+01 | -0.80670699D+00 | 0.23000000D+01 |
| 53 | -0.23000000D+01 | -0.26308009D+01 | 0.23000000D+01 |
| 53 | -0.23000000D+01 | -0.22999999D+01 | 0.23000000D+01 |
| 54 | -0.23000000D+01 | 0.25589538D-01 | 0.23000000D+01 |
| 55 | -0.23000000D+01 | 0.65094604D+00 | 0.23000000D+01 |

| | | | |
|---|---|---|---|
| 56 | -0.23000000D+01 | 0.12037879D+01 | 0.23000000D+01 |
| 57 | -0.23000000D+01 | 0.16373389D+01 | 0.23000000D+01 |
| 58 | -0.23000000D+01 | 0.11674187D+01 | 0.23000000D+01 |
| 59 | -0.23000000D+01 | 0.18558007D+01 | 0.23000000D+01 |
| 60 | -0.23000000D+01 | 0.15162762D+01 | 0.23000000D+01 |

***** Measurement Vectors from Previous Duty Cycle *****

| Element | Actual | Ideal | Delta |
|---|---|---|---|
| 1 | -0.44621660D+00 | -0.44562965D+00 | -0.58695447D-03 |
| 2 | 0.56421813D+01 | 0.56425321D+01 | -0.35081244D-03 |
| 3 | 0.57055749D+01 | 0.57058324D+01 | -0.25752234D-03 |
| 4 | 0.87407249D+01 | 0.87395245D+01 | 0.12004384D-02 |
| 5 | 0.24828416D+02 | 0.24829327D+02 | -0.91096580D-03 |
| 6 | 0.18356290D+01 | 0.18351204D+01 | 0.50860763D-03 |
| 7 | -0.10340493D+02 | -0.10341523D+02 | 0.10295088D-02 |
| 8 | 0.20241354D+02 | 0.20240194D+02 | 0.11604346D-02 |
| 9 | 0.13159404D+02 | 0.13159335D+02 | 0.68963528D-04 |
| 10 | 0.19920099D+02 | 0.19918850D+02 | 0.12491620D-02 |
| 11 | 0.14906948D+02 | 0.14906573D+02 | 0.37542999D-03 |
| 12 | -0.92556462D+01 | -0.92562267D+01 | 0.58046019D-03 |
| 13 | 0.90220157D+01 | 0.90222028D+01 | -0.18710732D-03 |
| 14 | 0.15406756D+02 | 0.15406058D+02 | 0.69738376D-03 |
| 15 | 0.81055087D+01 | 0.81038987D+01 | 0.16099517D-02 |
| 16 | -0.52157011D+00 | -0.52133695D+00 | -0.23316193D-03 |
| 17 | -0.13099967D+02 | -0.13099715D+02 | -0.25233734D-03 |
| 18 | -0.64227152D+01 | -0.64220344D+01 | -0.68074346D-03 |
| 19 | 0.94979922D+00 | 0.95005933D+00 | -0.26010585D-03 |
| 20 | -0.15427329D+02 | -0.15426080D+02 | -0.12488431D-02 |
| 21 | -0.28148452D+01 | -0.28145083D+01 | -0.33686411D-03 |
| 22 | 0.10617943D+02 | 0.10616806D+02 | 0.11369618D-02 |
| 23 | -0.92399517D+01 | -0.92387717D+01 | -0.11799650D-02 |
| 24 | 0.19570712D+02 | 0.19569710D+02 | 0.10019406D-02 |
| 25 | -0.14247969D+02 | -0.14247011D+02 | -0.95796919D-03 |
| 26 | -0.15439722D+02 | -0.15439754D+02 | 0.32345772D-04 |
| 27 | -0.17684608D+02 | -0.17682710D+02 | -0.18986958D-02 |
| 28 | 0.16022332D+02 | 0.16021340D+02 | 0.99178720D-03 |
| 29 | -0.24164769D+01 | -0.24162378D+01 | -0.23915052D-03 |
| 30 | 0.66078084D+01 | 0.66076838D+01 | 0.12460554D-03 |
| 31 | 0.23772642D+01 | 0.23768704D+01 | 0.39382076D-03 |
| 32 | -0.28880709D+01 | -0.28888783D+01 | 0.80747652D-03 |
| 33 | -0.89958224D+01 | -0.89954218D+01 | -0.40060091D-03 |
| 34 | -0.30031457D+02 | -0.30032367D+02 | 0.90969276D-03 |
| 35 | 0.25031023D+02 | 0.25029441D+02 | 0.15822725D-02 |
| 36 | 0.73882591D+00 | 0.73883536D+00 | -0.94544888D-05 |
| 37 | 0.94699474D+01 | 0.94689509D+01 | 0.99640703D-03 |
| 38 | -0.67873620D+01 | -0.67882109D+01 | 0.84893692D-03 |
| 39 | -0.20285243D+01 | -0.20297554D+01 | 0.12311426D-02 |
| 40 | 0.76200027D+01 | 0.76202068D+01 | -0.20416570D-03 |
| 41 | 0.21726570D+02 | 0.21726081D+02 | 0.48872983D-03 |
| 42 | 0.11466424D+02 | 0.11468329D+02 | -0.19056131D-02 |
| 43 | 0.37694576D+00 | 0.37772848D+00 | -0.78272390D-03 |
| 44 | 0.19482290D+02 | 0.19482235D+02 | 0.55499077D-04 |
| 45 | 0.39711930D+01 | 0.39699214D+01 | 0.12716564D-02 |
| 46 | 0.58437420D+01 | 0.58437037D+01 | 0.38372040D-04 |
| 47 | 0.16101706D+02 | 0.16101379D+02 | 0.32729340D-03 |
| 48 | -0.18363749D+02 | -0.18363585D+02 | -0.16400552D-03 |
| 49 | -0.10232301D+02 | -0.10232619D+02 | 0.31780338D-03 |
| 50 | 0.15978594D+02 | 0.15978219D+02 | 0.37478101D-03 |
| 51 | -0.27068691D+01 | -0.27086265D+01 | 0.17573451D-02 |
| 52 | -0.39230030D+00 | -0.39237582D+00 | 0.75525761D-04 |
| 53 | 0.12150130D+02 | 0.12149637D+02 | 0.49210715D-03 |
| 54 | 0.13987658D+02 | 0.13988298D+02 | -0.64043999D-03 |

| | | | |
|---|---|---|---|
| 55 | -0.13766257D+01 | -0.13760784D+01 | -0.54728770D-03 |
| 56 | -0.48350707D+01 | -0.48344602D+01 | -0.61053300D-03 |
| 57 | -0.11311830D+02 | -0.11312930D+02 | 0.11004062D-02 |
| 58 | 0.12979851D+02 | 0.12979893D+02 | -0.42070746D-04 |
| 59 | 0.20434806D+02 | 0.20434581D+02 | 0.22474957D-03 |
| 60 | 0.13939232D+02 | 0.13938000D+02 | 0.12312514D-02 |
| 61 | -0.25401724D+02 | -0.25401033D+02 | -0.69088078D-03 |
| 62 | 0.14934380D+02 | 0.14934814D+02 | -0.43418074D-03 |
| 63 | -0.18812718D+01 | -0.18808544D+01 | -0.41732776D-03 |
| 64 | -0.56020049D+01 | -0.56016011D+01 | -0.40377212D-03 |
| 65 | -0.84015122D+01 | -0.84013857D+01 | -0.12648237D-03 |
| 66 | -0.77668403D+01 | -0.77668333D+01 | -0.69755316D-05 |
| 67 | -0.11134381D+02 | -0.11132599D+02 | -0.17823126D-02 |
| 68 | 0.11461872D+02 | 0.11462416D+02 | -0.54401243D-03 |
| 69 | -0.96119309D+00 | -0.96280518D+00 | 0.16120892D-02 |
| 70 | -0.83906497D+01 | -0.83900453D+01 | -0.60442352D-03 |
| 71 | -0.36111385D+00 | -0.36219082D+00 | 0.10769680D-02 |
| 72 | -0.55116874D+01 | -0.55127981D+01 | 0.11106583D-02 |
| 73 | -0.58971041D+01 | -0.58951686D+01 | -0.19355016D-02 |
| 74 | 0.27720904D+01 | 0.27732456D+01 | -0.11551642D-02 |
| 75 | 0.20882069D+02 | 0.20882105D+02 | -0.35028100D-04 |
| 76 | -0.22988300D+01 | -0.22994766D+01 | 0.64666879D-03 |
| 77 | -0.14943892D+02 | -0.14942662D+02 | -0.12293618D-02 |
| 78 | 0.79217715D+01 | 0.79205507D+01 | 0.12208024D-02 |
| 79 | 0.30384271D+02 | 0.30384662D+02 | -0.39039683D-03 |
| 80 | -0.65068005D+01 | -0.65064880D+01 | -0.31251943D-03 |
| 81 | -0.50723573D+01 | -0.50729656D+01 | 0.60827732D-03 |
| 82 | 0.96221191D+01 | 0.96210020D+01 | 0.11171455D-02 |
| 83 | 0.30796878D+01 | 0.30795571D+01 | 0.13071871D-03 |
| 84 | 0.69542200D-01 | 0.70917410D-01 | -0.13752100D-02 |
| 85 | -0.11091257D+01 | -0.11087525D+01 | -0.37320006D-03 |
| 86 | -0.17117079D+02 | -0.17116524D+02 | -0.55454910D-03 |
| 87 | -0.10792018D+02 | -0.10791866D+02 | -0.15152228D-03 |
| 88 | -0.16779177D+01 | -0.16784354D+01 | 0.51769686D-03 |
| 89 | 0.14964074D+02 | 0.14963259D+02 | 0.81453931D-03 |
| 90 | 0.21504235D+02 | 0.21504809D+02 | -0.57381225D-03 |

***** Initial Control Vector Estimate for Case Number 4 *****

| Element | G.L.B. | C.V. | L.U.B. | Delta C.V. |
|---|---|---|---|---|
| 1 | -0.25000000D+01 | 0.65642620D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 2 | -0.25000000D+01 | 0.17089969D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 3 | -0.25000000D+01 | -0.88497796D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 4 | -0.25000000D+01 | -0.12972747D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 5 | -0.25000000D+01 | 0.10581578D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 6 | -0.25000000D+01 | -0.29460547D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 7 | -0.25000000D+01 | 0.50496989D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 8 | -0.25000000D+01 | 0.17553735D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 9 | -0.25000000D+01 | -0.10060560D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 10 | -0.25000000D+01 | 0.53180416D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 11 | -0.25000000D+01 | -0.80998665D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 12 | -0.25000000D+01 | 0.12465305D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 13 | -0.25000000D+01 | 0.26795959D-01 | 0.25000000D+01 | 0.00000000D+00 |
| 14 | -0.25000000D+01 | -0.41307353D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 15 | -0.25000000D+01 | -0.17636375D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 16 | -0.25000000D+01 | -0.65961885D-01 | 0.25000000D+01 | 0.00000000D+00 |
| 17 | -0.25000000D+01 | 0.12896297D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 18 | -0.25000000D+01 | 0.18441464D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 19 | -0.25000000D+01 | -0.12306955D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 20 | -0.25000000D+01 | -0.90510273D-01 | 0.25000000D+01 | 0.00000000D+00 |
| 21 | -0.25000000D+01 | 0.14925529D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 22 | -0.25000000D+01 | 0.72558129D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 23 | -0.25000000D+01 | -0.41573591D+00 | 0.25000000D+01 | 0.00000000D+00 |

| | | | | |
|---|---|---|---|---|
| 24 | -0.25000000D+01 | -0.16615798D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 25 | -0.25000000D+01 | 0.34731996D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 26 | -0.25000000D+01 | 0.65151795D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 27 | -0.25000000D+01 | 0.17129398D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 28 | -0.25000000D+01 | 0.44494768D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 29 | -0.25000000D+01 | 0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 30 | -0.25000000D+01 | -0.87850603D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 31 | -0.25000000D+01 | -0.19242286D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 32 | -0.25000000D+01 | -0.11264835D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 33 | -0.25000000D+01 | -0.12661358D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 34 | -0.25000000D+01 | 0.83265233D-01 | 0.25000000D+01 | 0.00000000D+00 |
| 35 | -0.25000000D+01 | -0.11480165D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 36 | -0.25000000D+01 | 0.54156697D-01 | 0.25000000D+01 | 0.00000000D+00 |
| 37 | -0.25000000D+01 | -0.49352968D-01 | 0.25000000D+01 | 0.00000000D+00 |
| 38 | -0.25000000D+01 | 0.24591752D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 39 | -0.25000000D+01 | -0.90154399D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 40 | -0.25000000D+01 | -0.72249388D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 41 | -0.25000000D+01 | -0.91696883D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 42 | -0.25000000D+01 | -0.11066319D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 43 | -0.25000000D+01 | -0.35132294D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 44 | -0.25000000D+01 | -0.31414621D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 45 | -0.25000000D+01 | 0.12418430D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 46 | -0.25000000D+01 | -0.13454949D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 47 | -0.25000000D+01 | 0.20230187D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 48 | -0.25000000D+01 | -0.21135574D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 49 | -0.25000000D+01 | -0.47558579D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 50 | -0.25000000D+01 | 0.15862220D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 51 | -0.25000000D+01 | -0.81840509D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 52 | -0.25000000D+01 | -0.80670699D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 53 | -0.25000000D+01 | -0.22999999D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 54 | -0.25000000D+01 | 0.25589538D-01 | 0.25000000D+01 | 0.00000000D+00 |
| 55 | -0.25000000D+01 | 0.65094604D+00 | 0.25000000D+01 | 0.00000000D+00 |
| 56 | -0.25000000D+01 | 0.12037879D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 57 | -0.25000000D+01 | 0.16373389D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 58 | -0.25000000D+01 | 0.11674187D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 59 | -0.25000000D+01 | 0.18558007D+01 | 0.25000000D+01 | 0.00000000D+00 |
| 60 | -0.25000000D+01 | 0.15162762D+01 | 0.25000000D+01 | 0.00000000D+00 |

***** T-Matrix Output is Suppressed *****

***** Predicted Measurement Vector *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|
| 1 | -0.44621660D+00 | -0.44621660D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 2 | 0.56421813D+01 | 0.56421813D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 3 | 0.57055749D+01 | 0.57055749D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 4 | 0.87407249D+01 | 0.87407249D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 5 | 0.24828416D+02 | 0.24828416D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 6 | 0.18356290D+01 | 0.18356290D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 7 | -0.10340493D+02 | -0.10340493D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 8 | 0.20241354D+02 | 0.20241354D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 9 | 0.13159404D+02 | 0.13159404D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 10 | 0.19920099D+02 | 0.19920099D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 11 | 0.14906948D+02 | 0.14906948D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 12 | -0.92556462D+01 | -0.92556462D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 13 | 0.90220157D+01 | 0.90220157D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 14 | 0.15406756D+02 | 0.15406756D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 15 | 0.81055087D+01 | 0.81055087D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 16 | -0.52157011D+00 | -0.52157011D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 17 | -0.13099967D+02 | -0.13099967D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 18 | -0.64227152D+01 | -0.64227152D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 19 | 0.94979922D+00 | 0.94979922D+00 | 0.00000000D+00 | 0.10000000D+01 |

| | | | | |
|---|---|---|---|---|
| 20 | -0.15427329D+02 | -0.15427329D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 21 | -0.28148452D+01 | -0.28148452D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 22 | 0.10617943D+02 | 0.10617943D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 23 | -0.92399517D+01 | -0.92399517D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 24 | 0.19570712D+02 | 0.19570712D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 25 | -0.14247969D+02 | -0.14247969D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 26 | -0.15439722D+02 | -0.15439722D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 27 | -0.17684608D+02 | -0.17684608D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 28 | 0.16022332D+02 | 0.16022332D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 29 | -0.24164769D+01 | -0.24164769D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 30 | 0.66078084D+01 | 0.66078084D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 31 | 0.23772642D+01 | 0.23772642D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 32 | -0.28880709D+01 | -0.28880709D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 33 | -0.89958224D+01 | -0.89958224D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 34 | -0.30031457D+02 | -0.30031457D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 35 | 0.25031023D+02 | 0.25031023D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 36 | 0.73882591D+00 | 0.73882591D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 37 | 0.94699474D+01 | 0.94699474D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 38 | -0.67873620D+01 | -0.67873620D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 39 | -0.20285243D+01 | -0.20285243D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 40 | 0.76200027D+01 | 0.76200027D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 41 | 0.21726570D+02 | 0.21726570D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 42 | 0.11466424D+02 | 0.11466424D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 43 | 0.37694576D+00 | 0.37694576D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 44 | 0.19482290D+02 | 0.19482290D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 45 | 0.39711930D+01 | 0.39711930D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 46 | 0.58437420D+01 | 0.58437420D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 47 | 0.16101706D+02 | 0.16101706D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 48 | -0.18363749D+02 | -0.18363749D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 49 | -0.10232301D+02 | -0.10232301D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 50 | 0.15978594D+02 | 0.15978594D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 51 | -0.27068691D+01 | -0.27068691D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 52 | -0.39230030D+00 | -0.39230030D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 53 | 0.12150130D+02 | 0.12150130D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 54 | 0.13987658D+02 | 0.13987658D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 55 | -0.13766257D+01 | -0.13766257D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 56 | -0.48350707D+01 | -0.48350707D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 57 | -0.11311830D+02 | -0.11311830D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 58 | 0.12979851D+02 | 0.12979851D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 59 | 0.20434806D+02 | 0.20434806D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 60 | 0.13939232D+02 | 0.13939232D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 61 | -0.25401724D+02 | -0.25401724D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 62 | 0.14934380D+02 | 0.14934380D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 63 | -0.18812718D+01 | -0.18812718D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 64 | -0.56020049D+01 | -0.56020049D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 65 | -0.84015122D+01 | -0.84015122D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 66 | -0.77668403D+01 | -0.77668403D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 67 | -0.11134381D+02 | -0.11134381D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 68 | 0.11461872D+02 | 0.11461872D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 69 | -0.96119309D+00 | -0.96119309D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 70 | -0.83906497D+01 | -0.83906497D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 71 | -0.36111385D+00 | -0.36111385D+00 | 0.00000000D+00 | 0.10000000D+01 |
| 72 | -0.55116874D+01 | -0.55116874D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 73 | -0.58971041D+01 | -0.58971041D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 74 | 0.27720904D+01 | 0.27720904D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 75 | 0.20882069D+02 | 0.20882069D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 76 | -0.22988300D+01 | -0.22988300D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 77 | -0.14943892D+02 | -0.14943892D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 78 | 0.79217715D+01 | 0.79217715D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 79 | 0.30384271D+02 | 0.30384271D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 80 | -0.65068005D+01 | -0.65068005D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 81 | -0.50723573D+01 | -0.50723573D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 82 | 0.96221191D+01 | 0.96221191D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 83 | 0.30796878D+01 | 0.30796878D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 84 | 0.69542200D-01 | 0.69542200D-01 | 0.00000000D+00 | 0.10000000D+01 |

| | | | | |
|---|---|---|---|---|
| 85 | -0.11091257D+01 | -0.11091257D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 86 | -0.17117079D+02 | -0.17117079D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 87 | -0.10792018D+02 | -0.10792018D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 88 | -0.16779177D+01 | -0.16779177D+01 | 0.00000000D+00 | 0.10000000D+01 |
| 89 | 0.14964074D+02 | 0.14964074D+02 | 0.00000000D+00 | 0.10000000D+01 |
| 90 | 0.21504235D+02 | 0.21504235D+02 | 0.00000000D+00 | 0.10000000D+01 |

***** Initial Performance Index = 0.14091440D+05 *****

***** Initial Constraint Function Values for Case Number 4 *****

Equality Constraints

| Element | Value | Target | Value - Target |
|---|---|---|---|
| 1 | 0.14272681D+01 | 0.25000000D+01 | -0.10727319D+01 |
| 2 | 0.33451310D+00 | 0.00000000D+00 | 0.33451310D+00 |
| 3 | -0.82332528D+00 | 0.25000000D+01 | -0.33233253D+01 |
| 4 | -0.73027948D+00 | 0.00000000D+00 | -0.73027948D+00 |
| 5 | 0.21528580D+01 | 0.25000000D+01 | -0.34714205D+00 |
| 6 | 0.53650626D-01 | 0.00000000D+00 | 0.53650626D-01 |
| 7 | -0.96147181D+00 | 0.25000000D+01 | -0.34614718D+01 |
| 8 | -0.42813582D+01 | 0.00000000D+00 | -0.42813582D+01 |
| 9 | 0.27020132D-01 | 0.25000000D+01 | -0.24729799D+01 |
| 10 | 0.25736268D+00 | 0.00000000D+00 | 0.25736268D+00 |
| 11 | -0.10072288D+00 | 0.25000000D+01 | -0.26007229D+01 |
| 12 | 0.97254892D-01 | 0.00000000D+00 | 0.97254892D-01 |
| 13 | 0.16818305D+01 | 0.25000000D+01 | -0.81816948D+00 |
| 14 | -0.27853695D+01 | 0.00000000D+00 | -0.27853695D+01 |
| 15 | 0.31616173D+00 | 0.25000000D+01 | -0.21838383D+01 |

Inequality Constraints

| Element | Value | L.U.B. | L.U.B. - Value |
|---|---|---|---|
| 1 | 0.18307282D+01 | 0.30000000D+01 | 0.11692718D+01 |
| 2 | 0.89443569D+00 | 0.30000000D+01 | 0.21055643D+01 |
| 3 | 0.10984035D+01 | 0.30000000D+01 | 0.19015965D+01 |
| 4 | 0.53461010D+00 | 0.30000000D+01 | 0.24653899D+01 |
| 5 | 0.11379650D+01 | 0.30000000D+01 | 0.18620350D+01 |
| 6 | 0.14865789D+01 | 0.30000000D+01 | 0.15134211D+01 |
| 7 | 0.41394174D+00 | 0.30000000D+01 | 0.25860583D+01 |
| 8 | 0.17648706D+01 | 0.30000000D+01 | 0.12351294D+01 |
| 9 | 0.22503379D+01 | 0.30000000D+01 | 0.74966208D+00 |
| 10 | 0.12340192D+01 | 0.30000000D+01 | 0.17659808D+01 |
| 11 | 0.74077348D+00 | 0.30000000D+01 | 0.22592265D+01 |
| 12 | 0.17128000D+01 | 0.30000000D+01 | 0.12872000D+01 |
| 13 | 0.73831348D+00 | 0.30000000D+01 | 0.22616865D+01 |
| 14 | 0.17697856D+01 | 0.30000000D+01 | 0.12302144D+01 |
| 15 | 0.24620667D+01 | 0.30000000D+01 | 0.53793331D+00 |
| 16 | 0.22297131D+01 | 0.30000000D+01 | 0.77028689D+00 |
| 17 | 0.12688707D+01 | 0.30000000D+01 | 0.17311293D+01 |
| 18 | 0.11492932D+01 | 0.30000000D+01 | 0.18507068D+01 |
| 19 | 0.25082094D+00 | 0.30000000D+01 | 0.27491791D+01 |
| 20 | 0.11553263D+01 | 0.30000000D+01 | 0.18446737D+01 |
| 21 | 0.14371729D+01 | 0.30000000D+01 | 0.15628271D+01 |
| 22 | 0.47129147D+00 | 0.30000000D+01 | 0.25287085D+01 |
| 23 | 0.18309917D+01 | 0.30000000D+01 | 0.11690083D+01 |
| 24 | 0.29257015D+01 | 0.30000000D+01 | 0.74298475D-01 |
| 25 | 0.16559837D+01 | 0.30000000D+01 | 0.13440163D+01 |
| 26 | 0.11491575D+01 | 0.30000000D+01 | 0.18508425D+01 |
| 27 | 0.23001422D+01 | 0.30000000D+01 | 0.69985775D+00 |
| 28 | 0.13685160D+01 | 0.30000000D+01 | 0.16314840D+01 |

| | | | |
|---|---|---|---|
| 29 | 0.20109065D+01 | 0.30000000D+01 | 0.98909346D+00 |
| 30 | 0.23964745D+01 | 0.30000000D+01 | 0.60352551D+00 |
| 31 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 32 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 33 | 0.00000000D+00 | 0.15000000D+01 | 0.54150169D-01 |
| 34 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 35 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 36 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 37 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 38 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 39 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 40 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 41 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 42 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 43 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 44 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 45 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 46 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 47 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 48 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 49 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 50 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 51 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 52 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 53 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 54 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 55 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 56 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 57 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 58 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 59 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 60 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 61 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 62 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 63 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 64 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 65 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 66 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 67 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 68 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 69 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 70 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 71 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 72 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 73 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 74 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 75 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 76 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 77 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 78 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 79 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 80 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 81 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 82 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 83 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 84 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 85 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 86 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 87 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 88 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 89 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |
| 90 | 0.00000000D+00 | 0.15000000D+01 | 0.15000000D+01 |

***** Solve the NLPQLP Problem for Case Number 4 *****

```
------------------------------------------------------------------------
 START OF THE SEQUENTIAL QUADRATIC PROGRAMMING ALGORITHM
------------------------------------------------------------------------

 Parameters:
    N      =      60
    M      =     105
    ME     =      15
    MODE   =       0
    ACC    =   0.1000D-06
    ACCQP  =   0.1000D-13
    STPMIN =   0.0000D+00
    RHOB   =   0.1000D+03
    MAXFUN =      40
    MAXNM  =      40
    MAXIT  =    1000
    IPRINT =       2

 Output in the following order:
    IT    - iteration number
    F     - objective function value
    SCV   - sum of constraint violations
    NA    - number of active constraints
    I     - number of line search iterations
    ALPHA - steplength parameter
    DELTA - additional variable to prevent inconsistency
    KKT   - Karush-Kuhn-Tucker optimality criterion

  IT         F           SCV      NA  I    ALPHA     DELTA     KKT
------------------------------------------------------------------------
   1  0.14091440D+05  0.25D+02  105  0  0.00D+00  0.00D+00  0.10D+06
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   2  0.97832648D+04  0.23D+02   41  2  0.10D+00  0.00D+00  0.40D+05
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   3  0.72708835D+04  0.19D+02   56  2  0.33D+00  0.00D+00  0.33D+05
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   4  0.60564579D+04  0.17D+02   65  2  0.15D+00  0.00D+00  0.23D+05
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   5  0.88116890D+04  0.13D+02   71  2  0.49D+00  0.00D+00  0.19D+05
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   6  0.71739198D+04  0.93D+01   72  2  0.29D+00  0.00D+00  0.43D+05
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   7  0.55959662D+04  0.95D+01   75  2  0.10D+00  0.00D+00  0.23D+05
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   8  0.48285515D+04  0.89D+01   75  2  0.24D+00  0.00D+00  0.11D+05
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
   9  0.51713127D+04  0.62D+01   75  2  0.33D+00  0.00D+00  0.83D+04
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          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 10  0.48035180D+04  0.54D+01   76  2  0.14D+00  0.00D+00  0.15D+05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 11  0.43848675D+04  0.50D+01   77  2  0.10D+00  0.00D+00  0.71D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 12  0.42826613D+04  0.48D+01   77  2  0.10D+00  0.00D+00  0.33D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 13  0.42643037D+04  0.42D+01   77  2  0.13D+00  0.00D+00  0.29D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 14  0.42591541D+04  0.37D+01   77  2  0.10D+00  0.00D+00  0.23D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 15  0.42618411D+04  0.33D+01   77  2  0.10D+00  0.00D+00  0.26D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 16  0.42362889D+04  0.30D+01   77  2  0.10D+00  0.00D+00  0.21D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 17  0.42405939D+04  0.28D+01   78  2  0.10D+00  0.00D+00  0.15D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 18  0.42561728D+04  0.25D+01   78  2  0.10D+00  0.00D+00  0.17D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 19  0.42336904D+04  0.23D+01   78  2  0.10D+00  0.00D+00  0.16D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 20  0.42534899D+04  0.21D+01   78  2  0.10D+00  0.00D+00  0.13D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 21  0.42760269D+04  0.19D+01   78  2  0.10D+00  0.00D+00  0.14D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 22  0.42652043D+04  0.19D+01   78  2  0.10D+00  0.00D+00  0.20D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 23  0.42549914D+04  0.15D+01   78  2  0.10D+00  0.00D+00  0.13D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 24  0.42475037D+04  0.14D+01   78  2  0.10D+00  0.00D+00  0.10D+04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
 25  0.42328326D+04  0.13D+01   78  2  0.10D+00  0.00D+00  0.10D+04
          *****   Completed CALL to NLPQLP   *****
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          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
26  0.42253751D+04  0.12D+01   78  3  0.35D-01  0.00D+00  0.80D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
27  0.42478391D+04  0.11D+01   78  2  0.10D+00  0.00D+00  0.79D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
28  0.42485760D+04  0.10D+01   78  2  0.10D+00  0.00D+00  0.63D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
29  0.42428324D+04  0.89D+00   78  2  0.10D+00  0.00D+00  0.81D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
30  0.42289175D+04  0.81D+00   78  2  0.10D+00  0.00D+00  0.63D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
31  0.42435124D+04  0.74D+00   78  2  0.10D+00  0.00D+00  0.56D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
32  0.42445319D+04  0.63D+00   78  2  0.10D+00  0.00D+00  0.62D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
33  0.42375925D+04  0.60D+00   78  2  0.10D+00  0.00D+00  0.40D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
34  0.42355572D+04  0.55D+00   78  2  0.10D+00  0.00D+00  0.58D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
35  0.42369247D+04  0.53D+00   78  2  0.10D+00  0.00D+00  0.32D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
36  0.42373580D+04  0.45D+00   78  2  0.10D+00  0.00D+00  0.34D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
37  0.42264830D+04  0.38D+00   78  2  0.16D+00  0.00D+00  0.25D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
38  0.42331322D+04  0.33D+00   78  2  0.10D+00  0.00D+00  0.18D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
39  0.42340772D+04  0.31D+00   78  3  0.50D-01  0.00D+00  0.20D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
40  0.42327624D+04  0.26D+00   78  2  0.10D+00  0.00D+00  0.15D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
41  0.42333977D+04  0.22D+00   78  2  0.10D+00  0.00D+00  0.11D+03
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          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
42  0.42350709D+04  0.19D+00   78  2  0.10D+00  0.00D+00  0.14D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
43  0.42346948D+04  0.18D+00   78  2  0.10D+00  0.00D+00  0.97D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
44  0.42362357D+04  0.16D+00   78  2  0.10D+00  0.00D+00  0.83D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
45  0.42363929D+04  0.14D+00   78  2  0.10D+00  0.00D+00  0.16D+03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
46  0.42346170D+04  0.13D+00   78  2  0.10D+00  0.00D+00  0.67D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
47  0.42346049D+04  0.12D+00   78  2  0.12D+00  0.00D+00  0.77D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
48  0.42336246D+04  0.11D+00   78  2  0.10D+00  0.00D+00  0.48D+02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
49  0.42326894D+04  0.19D-01   31  1  0.10D+01  0.00D+00  0.90D+01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
50  0.42295831D+04  0.97D-02   30  1  0.10D+01  0.00D+00  0.31D+01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
51  0.42283942D+04  0.13D-02   30  1  0.10D+01  0.00D+00  0.52D+00
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
52  0.42281571D+04  0.18D-03   31  1  0.10D+01  0.00D+00  0.63D-01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
53  0.42281376D+04  0.99D-04   31  1  0.10D+01  0.00D+00  0.42D-01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
54  0.42281232D+04  0.34D-04   31  1  0.10D+01  0.00D+00  0.14D-01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
55  0.42281190D+04  0.16D-04   31  1  0.10D+01  0.00D+00  0.69D-02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
56  0.42281157D+04  0.45D-06   31  1  0.10D+01  0.00D+00  0.14D+01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
57  0.42281111D+04  0.94D-05   32  3  0.10D-01  0.00D+00  0.57D-02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
58  0.42281081D+04  0.32D-05   31  1  0.10D+01  0.00D+00  0.80D-02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
59  0.42281048D+04  0.87D-05   30  1  0.10D+01  0.00D+00  0.63D-02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
```

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60  0.42281002D+04  0.18D-05   30  1  0.10D+01  0.00D+00  0.85D-02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
61  0.42281004D+04  0.37D-04   31  1  0.10D+01  0.00D+00  0.12D-01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
62  0.42280950D+04  0.23D-05   31  1  0.10D+01  0.00D+00  0.42D-02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
63  0.42280945D+04  0.76D-05   31  1  0.10D+01  0.00D+00  0.31D-02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
64  0.42280933D+04  0.41D-05   30  1  0.10D+01  0.00D+00  0.33D-02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
65  0.42280928D+04  0.81D-05   31  1  0.10D+01  0.00D+00  0.37D-01
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
66  0.42280932D+04  0.12D-04   31  3  0.10D-01  0.00D+00  0.33D-02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
67  0.42280917D+04  0.70D-06   30  1  0.10D+01  0.00D+00  0.45D-03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
68  0.42280914D+04  0.64D-06   30  1  0.10D+01  0.00D+00  0.88D-03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
69  0.42280910D+04  0.20D-05   30  1  0.10D+01  0.00D+00  0.19D-02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
70  0.42280902D+04  0.32D-05   31  1  0.10D+01  0.00D+00  0.22D-02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
71  0.42280889D+04  0.22D-06   31  1  0.10D+01  0.00D+00  0.38D-02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
72  0.42280873D+04  0.13D-05   31  1  0.10D+01  0.00D+00  0.12D-02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
73  0.42280866D+04  0.81D-06   31  1  0.10D+01  0.00D+00  0.12D-02
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
74  0.42280861D+04  0.18D-05   30  1  0.10D+01  0.00D+00  0.70D-03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
75  0.42280858D+04  0.58D-06   31  1  0.10D+01  0.00D+00  0.30D-03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
76  0.42280857D+04  0.60D-06   30  1  0.10D+01  0.00D+00  0.17D-03
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
77  0.42280857D+04  0.64D-08   30  1  0.10D+01  0.00D+00  0.20D-05
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
78  0.42280857D+04  0.26D-08   30  1  0.10D+01  0.00D+00  0.77D-06
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
79  0.42280857D+04  0.26D-09   30  1  0.10D+01  0.00D+00  0.12D-06
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
80  0.42280857D+04  0.18D-09   30  1  0.10D+01  0.00D+00  0.12D-06
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
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 81  0.42280857D+04  0.11D-09   30  1  0.10D+01  0.00D+00  0.21D-06
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
 82  0.42280857D+04  0.22D-09   30  1  0.10D+01  0.00D+00  0.52D-06
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
 83  0.42280857D+04  0.72D-09   30  1  0.10D+01  0.00D+00  0.14D-05
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
 84  0.42280857D+04  0.16D-08   30  1  0.10D+01  0.00D+00  0.36D-05
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
 85  0.42280856D+04  0.45D-08   30  1  0.10D+01  0.00D+00  0.93D-05
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
 86  0.42280856D+04  0.11D-07   30  1  0.10D+01  0.00D+00  0.24D-04
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
 87  0.42280856D+04  0.29D-07   30  1  0.10D+01  0.00D+00  0.64D-04
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
 88  0.42280856D+04  0.78D-07   30  1  0.10D+01  0.00D+00  0.17D-03
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
 89  0.42280855D+04  0.21D-06   30  1  0.10D+01  0.00D+00  0.44D-03
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
 90  0.42280852D+04  0.55D-06   30  1  0.10D+01  0.00D+00  0.12D-02
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
 91  0.42280845D+04  0.15D-05   30  1  0.10D+01  0.00D+00  0.30D-02
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
 92  0.42280827D+04  0.42D-05   30  1  0.10D+01  0.00D+00  0.80D-02
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
 93  0.42280782D+04  0.12D-04   30  1  0.10D+01  0.00D+00  0.21D-01
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
 94  0.42280670D+04  0.36D-04   30  1  0.10D+01  0.00D+00  0.55D-01
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
 95  0.42280404D+04  0.11D-03   30  1  0.10D+01  0.00D+00  0.14D+00
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
 96  0.42279824D+04  0.35D-03   30  1  0.10D+01  0.00D+00  0.35D+00
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
 97  0.42278665D+04  0.98D-03   30  1  0.10D+01  0.00D+00  0.71D+00
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
 98  0.42276226D+04  0.18D-02   30  1  0.10D+01  0.00D+00  0.96D+00
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
 99  0.42271692D+04  0.11D-02   30  1  0.10D+01  0.00D+00  0.52D+00
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
100  0.42269040D+04  0.18D-03   30  1  0.10D+01  0.00D+00  0.81D-01
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
101  0.42268892D+04  0.18D-03   30  1  0.10D+01  0.00D+00  0.51D-01
           *****   Completed CALL to NLPQLP   *****
           *****   Completed CALL to NLPQLP   *****
102  0.42268676D+04  0.22D-04   30  1  0.10D+01  0.00D+00  0.58D-02
           *****   Completed CALL to NLPQLP   *****
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          *****   Completed CALL to NLPQLP   *****
103  0.42268648D+04  0.22D-06   30  1  0.10D+01  0.00D+00  0.57D-04
          *****   Completed CALL to NLPQLP   *****
          *****   Completed CALL to NLPQLP   *****
104  0.42268648D+04  0.33D-09   30  1  0.10D+01  0.00D+00  0.78D-07


 --- Final Convergence Analysis at Last Iterate ---

   Objective function value:      F(X)  =  0.42268648D+04
   Solution values:               X     =
      0.78484122D+00  0.12837175D+01 -0.16147843D+01  0.54415236D+00
     -0.15194435D+00 -0.25769985D-01  0.20049699D+01  0.34004584D+00
     -0.77962275D+00  0.15085792D+01 -0.15261972D+01 -0.25346947D+00
      0.10254133D+01  0.87610795D+00 -0.26363751D+00 -0.22525055D+00
      0.17985022D+01  0.34414643D+00  0.10161491D+00  0.14094897D+01
      0.69845607D+00  0.32531426D+00 -0.34691501D+00 -0.16157981D+00
      0.14843494D+01 -0.84848205D+00  0.42546574D+00  0.14410353D+01
      0.79999990D+00  0.22431775D+00 -0.42422856D+00 -0.11895251D+00
     -0.10628128D+01  0.15832652D+01 -0.60845093D+00 -0.14458433D+01
      0.37899669D-01  0.84824594D+00 -0.29564080D-01 -0.66168415D+00
     -0.54654741D-02 -0.25000000D+01  0.99895964D+00 -0.47587910D+00
      0.42787623D+00 -0.81201574D+00  0.52301869D+00 -0.99257538D+00
     -0.48128512D+00  0.12136039D+01 -0.17023058D+01 -0.90190823D+00
     -0.79999990D+00 -0.12469842D+01 -0.19003420D+00 -0.29621210D+00
      0.11982025D+01 -0.19704354D-02  0.35580072D+00  0.20858735D+01
   Distances from lower bounds:   X-XL  =
      0.32848412D+01  0.37837175D+01  0.88521574D+00  0.30441524D+01
      0.23480556D+01  0.24742300D+01  0.45049699D+01  0.28400458D+01
      0.17203772D+01  0.40085792D+01  0.97380279D+00  0.22465305D+01
      0.35254133D+01  0.33761080D+01  0.22363625D+01  0.22747495D+01
      0.42985022D+01  0.28441464D+01  0.26016149D+01  0.39094897D+01
      0.31984561D+01  0.28253143D+01  0.21530850D+01  0.23384202D+01
      0.39843494D+01  0.16515180D+01  0.29254657D+01  0.39410353D+01
      0.32999999D+01  0.27243178D+01  0.20757714D+01  0.23810475D+01
      0.14371872D+01  0.40832652D+01  0.18915491D+01  0.10541567D+01
      0.25378997D+01  0.33482459D+01  0.24704359D+01  0.18383159D+01
      0.24945345D+01  0.00000000D+00  0.34989596D+01  0.20241209D+01
      0.29278762D+01  0.16879843D+01  0.30230187D+01  0.15074246D+01
      0.20187149D+01  0.37136039D+01  0.79769419D+00  0.15980918D+01
      0.17000001D+01  0.12530158D+01  0.23099658D+01  0.22037879D+01
      0.36982025D+01  0.24980296D+01  0.28558007D+01  0.45858735D+01
   Distances from upper bounds:   XU-X  =
      0.17151588D+01  0.12162825D+01  0.41147843D+01  0.19558476D+01
      0.26519444D+01  0.25257700D+01  0.49503011D+00  0.21599542D+01
      0.32796228D+01  0.99142076D+00  0.40261972D+01  0.27534695D+01
      0.14745867D+01  0.16238920D+01  0.27636375D+01  0.27252505D+01
      0.70149778D+00  0.21558536D+01  0.23983851D+01  0.10905103D+01
      0.18015439D+01  0.21746857D+01  0.28469150D+01  0.26615798D+01
      0.10156506D+01  0.33484820D+01  0.20745343D+01  0.10589647D+01
      0.17000001D+01  0.22756822D+01  0.29242286D+01  0.26189525D+01
      0.35628128D+01  0.91673477D+00  0.31084509D+01  0.39458433D+01
      0.24621003D+01  0.16517541D+01  0.25295641D+01  0.31616841D+01
      0.25054655D+01  0.50000000D+01  0.15010404D+01  0.29758791D+01
      0.20721238D+01  0.33120157D+01  0.19769813D+01  0.34925754D+01
      0.29812851D+01  0.12863961D+01  0.42023058D+01  0.34019082D+01
      0.32999999D+01  0.37469842D+01  0.26900342D+01  0.27962121D+01
      0.13017975D+01  0.25019704D+01  0.21441993D+01  0.41412647D+00
   Multipliers for lower bounds:  U     =
      0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
      0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
      0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
      0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
      0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
      0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
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   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.12860816D+03  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
Multipliers for upper bounds:  U     =
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
Constraint values:             G(X)  =
  -0.28084202D-11 -0.27780209D-11  0.14024337D-11 -0.18912399D-10
  -0.44408921D-15 -0.33170272D-11  0.34106051D-12  0.12490009D-15
   0.66613381D-14  0.17501358D-10 -0.86557428D-11 -0.48465676D-11
  -0.25062219D-09 -0.13936019D-10 -0.10742518D-11  0.14953717D+01
   0.12959959D+01  0.28458858D+01  0.96639840D+00  0.13018766D+01
   0.14528980D+01  0.16512830D+01  0.26532399D+01  0.11688673D+01
   0.15868521D+01  0.22295000D+01  0.26173016D+01  0.12902588D+01
   0.14974675D+01  0.21691460D+01  0.25594100D+01  0.10930915D+01
   0.14313460D+01  0.21509078D+01  0.23376557D+01  0.49999403D+00
   0.18934824D+01  0.20821505D+01  0.18780577D+01  0.16944466D+01
   0.10735308D+01  0.15184570D+01  0.26480702D+01  0.18017959D+01
   0.88399846D+00  0.13715850D+01  0.10747206D+01  0.82611590D+00
   0.82612017D+00  0.28989790D+00  0.12311645D+01  0.00000000D+00
   0.13354915D+01  0.12735667D+01  0.52322491D+00  0.78378944D+00
   0.00000000D+00  0.50138263D+00  0.21081852D+00  0.00000000D+00
   0.13407113D+01  0.99112745D+00  0.00000000D+00  0.16768960D+00
   0.00000000D+00  0.95079922D+00  0.10997330D+01  0.14311791D+01
   0.00000000D+00  0.36297054D+00  0.00000000D+00  0.21252595D+00
   0.50391235D+00  0.00000000D+00  0.39717622D+00  0.00000000D+00
   0.49246905D+00  0.12966770D+01  0.00000000D+00  0.96043439D+00
   0.00000000D+00  0.14127474D+01  0.89767158D+00  0.62802009D+00
   0.14391903D+01  0.58849664D+00  0.10663188D+00  0.14971742D+00
   0.13382671D+01  0.68603325D+00  0.96652086D+00  0.00000000D+00
   0.37901800D+00  0.14943007D+01  0.11273819D+01  0.61609928D+00
   0.14047988D+01  0.00000000D+00  0.22742621D+00  0.65901976D+00
   0.00000000D+00  0.10608636D+01  0.33061091D+00  0.00000000D+00
   0.93040271D+00
Multipliers for constraints:   U     =
  -0.16131284D+03  0.33520062D+02 -0.29878554D+03  0.57241076D+02
  -0.34350462D+03 -0.27735923D+03 -0.23637679D+03 -0.16033889D+03
  -0.20291801D+03 -0.17942454D+02 -0.15107190D+03 -0.46284921D+02
  -0.13659025D+03  0.17690994D+03 -0.24146006D+03  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
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   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.67244135D+02
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.32877016D+03  0.00000000D+00  0.00000000D+00  0.41892897D+02
   0.00000000D+00  0.00000000D+00  0.23381992D+03  0.00000000D+00
   0.39317813D+03  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.29698689D+03  0.00000000D+00  0.28187371D+02  0.00000000D+00
   0.00000000D+00  0.68465040D+03  0.00000000D+00  0.23539271D+03
   0.00000000D+00  0.00000000D+00  0.81294716D+02  0.00000000D+00
   0.17134642D+03  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.13211959D+03
   0.00000000D+00  0.00000000D+00  0.00000000D+00  0.00000000D+00
   0.00000000D+00  0.11679578D+03  0.00000000D+00  0.00000000D+00
   0.69354171D+02  0.00000000D+00  0.00000000D+00  0.44546485D+03
   0.00000000D+00
 Number of function calls:      NFUNC =     157
 Number of gradient calls:      NGRAD =     104
 Number of calls of QP solver:  NQL   =     104


        *****   Completed CALL to NLPQLP   *****


     *****   Number of Function Evaluations  =   6397   *****


    *****   Solution Control Vector for Case Number   4   *****

Element     G.L.B.            C.V.              L.U.B.            Delta C.V.

   1    -0.25000000D+01    0.78484122D+00    0.25000000D+01    0.12841501D+00
   2    -0.25000000D+01    0.12837175D+01    0.25000000D+01   -0.42527940D+00
   3    -0.25000000D+01   -0.16147843D+01    0.25000000D+01   -0.72980630D+00
   4    -0.25000000D+01    0.54415236D+00    0.25000000D+01    0.67387983D+00
   5    -0.25000000D+01   -0.15194435D+00    0.25000000D+01   -0.12101021D+01
   6    -0.25000000D+01   -0.25769985D-01    0.25000000D+01    0.26883548D+00
   7    -0.25000000D+01    0.20049699D+01    0.25000000D+01    0.15000000D+01
   8    -0.25000000D+01    0.34004584D+00    0.25000000D+01    0.16450849D+00
   9    -0.25000000D+01   -0.77962275D+00    0.25000000D+01    0.22643327D+00
  10    -0.25000000D+01    0.15085792D+01    0.25000000D+01    0.97677509D+00
  11    -0.25000000D+01   -0.15261972D+01    0.25000000D+01   -0.71621056D+00
  12    -0.25000000D+01   -0.25346947D+00    0.25000000D+01   -0.15000000D+01
  13    -0.25000000D+01    0.10254133D+01    0.25000000D+01    0.99861737D+00
  14    -0.25000000D+01    0.87610795D+00    0.25000000D+01    0.12891815D+01
  15    -0.25000000D+01   -0.26363751D+00    0.25000000D+01    0.15000000D+01
  16    -0.25000000D+01   -0.22525055D+00    0.25000000D+01   -0.15928866D+00
  17    -0.25000000D+01    0.17985022D+01    0.25000000D+01    0.50887255D+00
  18    -0.25000000D+01    0.34414643D+00    0.25000000D+01   -0.15000000D+01
  19    -0.25000000D+01    0.10161491D+00    0.25000000D+01    0.13323104D+01
  20    -0.25000000D+01    0.14094897D+01    0.25000000D+01    0.15000000D+01
  21    -0.25000000D+01    0.69845607D+00    0.25000000D+01    0.54920078D+00
  22    -0.25000000D+01    0.32531426D+00    0.25000000D+01   -0.40026703D+00
  23    -0.25000000D+01   -0.34691501D+00    0.25000000D+01    0.68820898D-01
  24    -0.25000000D+01   -0.16157981D+00    0.25000000D+01    0.15000000D+01
  25    -0.25000000D+01    0.14843494D+01    0.25000000D+01    0.11370295D+01
  26    -0.25000000D+01   -0.84848205D+00    0.25000000D+01   -0.15000000D+01
  27    -0.25000000D+01    0.42546574D+00    0.25000000D+01   -0.12874740D+01
  28    -0.25000000D+01    0.14410353D+01    0.25000000D+01    0.99608765D+00
  29    -0.25000000D+01    0.79999990D+00    0.25000000D+01   -0.15000000D+01
  30    -0.25000000D+01    0.22431775D+00    0.25000000D+01    0.11028238D+01
  31    -0.25000000D+01   -0.42422856D+00    0.25000000D+01    0.15000000D+01
  32    -0.25000000D+01   -0.11895251D+00    0.25000000D+01    0.10075310D+01
  33    -0.25000000D+01   -0.10628128D+01    0.25000000D+01    0.20332298D+00
```

| | | | | |
|---|---|---|---|---|
| 34 | -0.25000000D+01 | 0.15832652D+01 | 0.25000000D+01 | 0.15000000D+01 |
| 35 | -0.25000000D+01 | -0.60845093D+00 | 0.25000000D+01 | 0.53956561D+00 |
| 36 | -0.25000000D+01 | -0.14458433D+01 | 0.25000000D+01 | -0.15000000D+01 |
| 37 | -0.25000000D+01 | 0.37899669D-01 | 0.25000000D+01 | 0.87252637D-01 |
| 38 | -0.25000000D+01 | 0.84824594D+00 | 0.25000000D+01 | 0.60232842D+00 |
| 39 | -0.25000000D+01 | -0.29564080D-01 | 0.25000000D+01 | 0.87197991D+00 |
| 40 | -0.25000000D+01 | -0.66168415D+00 | 0.25000000D+01 | 0.60809725D-01 |
| 41 | -0.25000000D+01 | -0.54654741D-02 | 0.25000000D+01 | 0.91150336D+00 |
| 42 | -0.25000000D+01 | -0.25000000D+01 | 0.25000000D+01 | -0.13933681D+01 |
| 43 | -0.25000000D+01 | 0.99895964D+00 | 0.25000000D+01 | 0.13502826D+01 |
| 44 | -0.25000000D+01 | -0.47587910D+00 | 0.25000000D+01 | -0.16173289D+00 |
| 45 | -0.25000000D+01 | 0.42787623D+00 | 0.25000000D+01 | -0.81396675D+00 |
| 46 | -0.25000000D+01 | -0.81201574D+00 | 0.25000000D+01 | 0.53347914D+00 |
| 47 | -0.25000000D+01 | 0.52301869D+00 | 0.25000000D+01 | -0.15000000D+01 |
| 48 | -0.25000000D+01 | -0.99257538D+00 | 0.25000000D+01 | 0.11209820D+01 |
| 49 | -0.25000000D+01 | -0.48128512D+00 | 0.25000000D+01 | -0.56993241D-02 |
| 50 | -0.25000000D+01 | 0.12136039D+01 | 0.25000000D+01 | -0.37261806D+00 |
| 51 | -0.25000000D+01 | -0.17023058D+01 | 0.25000000D+01 | -0.88390072D+00 |
| 52 | -0.25000000D+01 | -0.90190823D+00 | 0.25000000D+01 | -0.95201246D-01 |
| 53 | -0.25000000D+01 | -0.79999990D+00 | 0.25000000D+01 | 0.15000000D+01 |
| 54 | -0.25000000D+01 | -0.12469842D+01 | 0.25000000D+01 | -0.12725738D+01 |
| 55 | -0.25000000D+01 | -0.19003420D+00 | 0.25000000D+01 | -0.84098024D+00 |
| 56 | -0.25000000D+01 | -0.29621210D+00 | 0.25000000D+01 | -0.15000000D+01 |
| 57 | -0.25000000D+01 | 0.11982025D+01 | 0.25000000D+01 | -0.43913642D+00 |
| 58 | -0.25000000D+01 | -0.19704354D-02 | 0.25000000D+01 | -0.11693891D+01 |
| 59 | -0.25000000D+01 | 0.35580072D+00 | 0.25000000D+01 | -0.15000000D+01 |
| 60 | -0.25000000D+01 | 0.20858735D+01 | 0.25000000D+01 | 0.56959729D+00 |

***** Predicted Measurement Vector *****

| Element | Z Vector | ZA Vector | Delta Z | Diag[W] |
|---|---|---|---|---|
| 1 | -0.77128477D+01 | -0.44621660D+00 | -0.72666311D+01 | 0.10000000D+01 |
| 2 | 0.73479353D+00 | 0.56421813D+01 | -0.49073878D+01 | 0.10000000D+01 |
| 3 | -0.11947692D+00 | 0.57055749D+01 | -0.58250518D+01 | 0.10000000D+01 |
| 4 | 0.72373646D+01 | 0.87407249D+01 | -0.15033604D+01 | 0.10000000D+01 |
| 5 | 0.83336467D+01 | 0.24828416D+02 | -0.16494770D+02 | 0.10000000D+01 |
| 6 | 0.51619281D+01 | 0.18356290D+01 | 0.33262991D+01 | 0.10000000D+01 |
| 7 | -0.78219260D+01 | -0.10340493D+02 | 0.25185671D+01 | 0.10000000D+01 |
| 8 | 0.49670942D+01 | 0.20241354D+02 | -0.15274260D+02 | 0.10000000D+01 |
| 9 | 0.63323167D+01 | 0.13159404D+02 | -0.68270874D+01 | 0.10000000D+01 |
| 10 | 0.10663191D+02 | 0.19920099D+02 | -0.92569073D+01 | 0.10000000D+01 |
| 11 | 0.43205220D+00 | 0.14906948D+02 | -0.14474896D+02 | 0.10000000D+01 |
| 12 | -0.12009200D+02 | -0.92556462D+01 | -0.27535539D+01 | 0.10000000D+01 |
| 13 | -0.13690976D+00 | 0.90220157D+01 | -0.91589254D+01 | 0.10000000D+01 |
| 14 | 0.11866619D+02 | 0.15406756D+02 | -0.35401365D+01 | 0.10000000D+01 |
| 15 | 0.12093538D+01 | 0.81055087D+01 | -0.68961548D+01 | 0.10000000D+01 |
| 16 | 0.34779650D+01 | -0.52157011D+00 | 0.39995351D+01 | 0.10000000D+01 |
| 17 | 0.11167401D+01 | -0.13099967D+02 | 0.14216707D+02 | 0.10000000D+01 |
| 18 | 0.34567803D+01 | -0.64227152D+01 | 0.98794955D+01 | 0.10000000D+01 |
| 19 | 0.16729678D+01 | 0.94979922D+00 | 0.72316859D+00 | 0.10000000D+01 |
| 20 | -0.12805037D+02 | -0.15427329D+02 | 0.26222922D+01 | 0.10000000D+01 |
| 21 | -0.14397684D+01 | -0.28148452D+01 | 0.13750768D+01 | 0.10000000D+01 |
| 22 | 0.30869035D+01 | 0.10617943D+02 | -0.75310395D+01 | 0.10000000D+01 |
| 23 | -0.47945095D+01 | -0.92399517D+01 | 0.44454421D+01 | 0.10000000D+01 |
| 24 | 0.81120975D+00 | 0.19570712D+02 | -0.18759503D+02 | 0.10000000D+01 |
| 25 | 0.27612382D+01 | -0.14247969D+02 | 0.17009208D+02 | 0.10000000D+01 |
| 26 | -0.61183823D+00 | -0.15439722D+02 | 0.14827883D+02 | 0.10000000D+01 |
| 27 | -0.15073639D+02 | -0.17684608D+02 | 0.26109688D+01 | 0.10000000D+01 |
| 28 | 0.54689331D+01 | 0.16022332D+02 | -0.10553399D+02 | 0.10000000D+01 |
| 29 | -0.73385554D+01 | -0.24164769D+01 | -0.49220784D+01 | 0.10000000D+01 |
| 30 | 0.47812929D+01 | 0.66078084D+01 | -0.18265154D+01 | 0.10000000D+01 |
| 31 | 0.70946244D+01 | 0.23772642D+01 | 0.47173603D+01 | 0.10000000D+01 |
| 32 | -0.29868820D+01 | -0.28880709D+01 | -0.98811191D-01 | 0.10000000D+01 |

| | | | | |
|---|---|---|---|---|
| 33 | -0.48864139D+01 | -0.89958224D+01 | 0.41094086D+01 | 0.10000000D+01 |
| 34 | -0.35452148D+01 | -0.30031457D+02 | 0.26486243D+02 | 0.10000000D+01 |
| 35 | 0.47459603D+01 | 0.25031023D+02 | -0.20285063D+02 | 0.10000000D+01 |
| 36 | -0.62181236D+01 | 0.73882591D+00 | -0.69569495D+01 | 0.10000000D+01 |
| 37 | 0.10337261D+02 | 0.94699474D+01 | 0.86731351D+00 | 0.10000000D+01 |
| 38 | -0.32646281D+01 | -0.67873620D+01 | 0.35227339D+01 | 0.10000000D+01 |
| 39 | 0.89035165D+01 | -0.20285243D+01 | 0.10932041D+02 | 0.10000000D+01 |
| 40 | 0.49401711D+01 | 0.76200027D+01 | -0.26798316D+01 | 0.10000000D+01 |
| 41 | 0.52144552D+01 | 0.21726570D+02 | -0.16512115D+02 | 0.10000000D+01 |
| 42 | 0.63419574D+01 | 0.11466424D+02 | -0.51244661D+01 | 0.10000000D+01 |
| 43 | -0.67264990D+01 | 0.37694576D+00 | -0.71034448D+01 | 0.10000000D+01 |
| 44 | 0.33869624D+01 | 0.19482290D+02 | -0.16095328D+02 | 0.10000000D+01 |
| 45 | -0.51580515D+01 | 0.39711930D+01 | -0.91292446D+01 | 0.10000000D+01 |
| 46 | 0.33726664D+01 | 0.58437420D+01 | -0.24710756D+01 | 0.10000000D+01 |
| 47 | -0.10082688D+02 | 0.16101706D+02 | -0.26184395D+02 | 0.10000000D+01 |
| 48 | -0.78027026D+01 | -0.18363749D+02 | 0.10561046D+02 | 0.10000000D+01 |
| 49 | -0.13410062D+02 | -0.10232301D+02 | -0.31777614D+01 | 0.10000000D+01 |
| 50 | 0.11050082D+02 | 0.15978594D+02 | -0.49285116D+01 | 0.10000000D+01 |
| 51 | 0.71533880D+01 | -0.27068691D+01 | 0.98602572D+01 | 0.10000000D+01 |
| 52 | 0.50062608D+01 | -0.39230030D+00 | 0.53985611D+01 | 0.10000000D+01 |
| 53 | 0.11906091D+02 | 0.12150130D+02 | -0.24403854D+00 | 0.10000000D+01 |
| 54 | -0.63092888D+01 | 0.13987658D+02 | -0.20296947D+02 | 0.10000000D+01 |
| 55 | 0.12255297D+01 | -0.13766257D+01 | 0.26021555D+01 | 0.10000000D+01 |
| 56 | 0.22430558D+01 | -0.48350707D+01 | 0.70781265D+01 | 0.10000000D+01 |
| 57 | -0.40778019D+01 | -0.11311830D+02 | 0.72340280D+01 | 0.10000000D+01 |
| 58 | 0.32125890D-01 | 0.12979851D+02 | -0.12947725D+02 | 0.10000000D+01 |
| 59 | 0.85113249D+01 | 0.20434806D+02 | -0.11923481D+02 | 0.10000000D+01 |
| 60 | 0.17068784D+01 | 0.13939232D+02 | -0.12232353D+02 | 0.10000000D+01 |
| 61 | -0.89812057D+01 | -0.25401724D+02 | 0.16420518D+02 | 0.10000000D+01 |
| 62 | -0.31848861D+00 | 0.14934380D+02 | -0.15252868D+02 | 0.10000000D+01 |
| 63 | 0.86216819D+01 | -0.18812718D+01 | 0.10502954D+02 | 0.10000000D+01 |
| 64 | 0.80790760D+01 | -0.56020049D+01 | 0.13681081D+02 | 0.10000000D+01 |
| 65 | -0.89744330D+01 | -0.84015122D+01 | -0.57292076D+00 | 0.10000000D+01 |
| 66 | -0.26913651D+01 | -0.77668403D+01 | 0.50754751D+01 | 0.10000000D+01 |
| 67 | -0.46479734D+01 | -0.11134381D+02 | 0.64864075D+01 | 0.10000000D+01 |
| 68 | 0.31687145D+01 | 0.11461872D+02 | -0.82931572D+01 | 0.10000000D+01 |
| 69 | 0.29595448D+01 | -0.96119309D+00 | 0.39207379D+01 | 0.10000000D+01 |
| 70 | -0.11090915D+01 | -0.83906497D+01 | 0.72815582D+01 | 0.10000000D+01 |
| 71 | 0.17431336D+01 | -0.36111385D+00 | 0.21042475D+01 | 0.10000000D+01 |
| 72 | -0.13377783D+01 | -0.55116874D+01 | 0.41739091D+01 | 0.10000000D+01 |
| 73 | -0.12166988D+02 | -0.58971041D+01 | -0.62698838D+01 | 0.10000000D+01 |
| 74 | -0.15501102D+01 | 0.27720904D+01 | -0.43222007D+01 | 0.10000000D+01 |
| 75 | 0.78021417D+01 | 0.20882069D+02 | -0.13079928D+02 | 0.10000000D+01 |
| 76 | -0.10404248D+02 | -0.22988300D+01 | -0.81054177D+01 | 0.10000000D+01 |
| 77 | 0.41812629D+00 | -0.14943892D+02 | 0.15362018D+02 | 0.10000000D+01 |
| 78 | 0.69423947D+01 | 0.79217715D+01 | -0.97937680D+00 | 0.10000000D+01 |
| 79 | 0.14266170D+02 | 0.30384271D+02 | -0.16118101D+02 | 0.10000000D+01 |
| 80 | -0.58630629D+00 | -0.65068005D+01 | 0.59204942D+01 | 0.10000000D+01 |
| 81 | 0.25085767D+00 | -0.50723573D+01 | 0.53232150D+01 | 0.10000000D+01 |
| 82 | 0.42192894D-01 | 0.96221191D+01 | -0.95799262D+01 | 0.10000000D+01 |
| 83 | -0.54624354D+01 | 0.30796878D+01 | -0.85421232D+01 | 0.10000000D+01 |
| 84 | 0.31873049D+01 | 0.69542200D-01 | 0.31177627D+01 | 0.10000000D+01 |
| 85 | 0.13806710D+02 | -0.11091257D+01 | 0.14915835D+02 | 0.10000000D+01 |
| 86 | -0.10210408D+02 | -0.17117079D+02 | 0.69066711D+01 | 0.10000000D+01 |
| 87 | -0.33951807D+01 | -0.10792018D+02 | 0.73968368D+01 | 0.10000000D+01 |
| 88 | -0.11245897D+02 | -0.16779177D+01 | -0.95679796D+01 | 0.10000000D+01 |
| 89 | 0.11438618D+02 | 0.14964074D+02 | -0.35254558D+01 | 0.10000000D+01 |
| 90 | 0.56270722D+01 | 0.21504235D+02 | -0.15877163D+02 | 0.10000000D+01 |

***** NLP Solution Performance Index = 0.42268648D+04 *****

***** Solution Constraint Function Values for Case Number 4 *****

Equality Constraints

| Element | Value | Target | Value - Target |
|---|---|---|---|
| 1 | 0.25000000D+01 | 0.25000000D+01 | 0.28084202D-11 |
| 2 | 0.27780209D-11 | 0.00000000D+00 | 0.27780209D-11 |
| 3 | 0.25000000D+01 | 0.25000000D+01 | -0.14024337D-11 |
| 4 | 0.18912399D-10 | 0.00000000D+00 | 0.18912399D-10 |
| 5 | 0.25000000D+01 | 0.25000000D+01 | 0.44408921D-15 |
| 6 | 0.33170272D-11 | 0.00000000D+00 | 0.33170272D-11 |
| 7 | 0.25000000D+01 | 0.25000000D+01 | -0.34106051D-12 |
| 8 | -0.12490009D-15 | 0.00000000D+00 | -0.12490009D-15 |
| 9 | 0.25000000D+01 | 0.25000000D+01 | -0.66613381D-14 |
| 10 | -0.17501358D-10 | 0.00000000D+00 | -0.17501358D-10 |
| 11 | 0.25000000D+01 | 0.25000000D+01 | 0.86557428D-11 |
| 12 | 0.48465676D-11 | 0.00000000D+00 | 0.48465676D-11 |
| 13 | 0.25000000D+01 | 0.25000000D+01 | 0.25062219D-09 |
| 14 | 0.13936019D-10 | 0.00000000D+00 | 0.13936019D-10 |
| 15 | 0.25000000D+01 | 0.25000000D+01 | 0.10742518D-11 |

Inequality Constraints

| Element | Value | L.U.B. | L.U.B. - Value |
|---|---|---|---|
| 1 | 0.15046283D+01 | 0.30000000D+01 | 0.14953717D+01 |
| 2 | 0.17040041D+01 | 0.30000000D+01 | 0.12959959D+01 |
| 3 | 0.15411417D+00 | 0.30000000D+01 | 0.28458858D+01 |
| 4 | 0.20336016D+01 | 0.30000000D+01 | 0.96639840D+00 |
| 5 | 0.16981234D+01 | 0.30000000D+01 | 0.13018766D+01 |
| 6 | 0.15471020D+01 | 0.30000000D+01 | 0.14528980D+01 |
| 7 | 0.13487170D+01 | 0.30000000D+01 | 0.16512830D+01 |
| 8 | 0.34676007D+00 | 0.30000000D+01 | 0.26532399D+01 |
| 9 | 0.18311327D+01 | 0.30000000D+01 | 0.11688673D+01 |
| 10 | 0.14131479D+01 | 0.30000000D+01 | 0.15868521D+01 |
| 11 | 0.77049999D+00 | 0.30000000D+01 | 0.22295000D+01 |
| 12 | 0.38269840D+00 | 0.30000000D+01 | 0.26173016D+01 |
| 13 | 0.17097412D+01 | 0.30000000D+01 | 0.12902588D+01 |
| 14 | 0.15025325D+01 | 0.30000000D+01 | 0.14974675D+01 |
| 15 | 0.83085395D+00 | 0.30000000D+01 | 0.21691460D+01 |
| 16 | 0.44059003D+00 | 0.30000000D+01 | 0.25594100D+01 |
| 17 | 0.19069085D+01 | 0.30000000D+01 | 0.10930915D+01 |
| 18 | 0.15686540D+01 | 0.30000000D+01 | 0.14313460D+01 |
| 19 | 0.84909220D+00 | 0.30000000D+01 | 0.21509078D+01 |
| 20 | 0.66234428D+00 | 0.30000000D+01 | 0.23376557D+01 |
| 21 | 0.25000060D+01 | 0.30000000D+01 | 0.49999403D+00 |
| 22 | 0.11065176D+01 | 0.30000000D+01 | 0.18934824D+01 |
| 23 | 0.91784946D+00 | 0.30000000D+01 | 0.20821505D+01 |
| 24 | 0.11219423D+01 | 0.30000000D+01 | 0.18780577D+01 |
| 25 | 0.13055534D+01 | 0.30000000D+01 | 0.16944466D+01 |
| 26 | 0.19264692D+01 | 0.30000000D+01 | 0.10735308D+01 |
| 27 | 0.14815430D+01 | 0.30000000D+01 | 0.15184570D+01 |
| 28 | 0.35192983D+00 | 0.30000000D+01 | 0.26480702D+01 |
| 29 | 0.11982041D+01 | 0.30000000D+01 | 0.18017959D+01 |
| 30 | 0.21160015D+01 | 0.30000000D+01 | 0.88399846D+00 |
| 31 | 0.12841501D+00 | 0.15000000D+01 | 0.13715850D+01 |
| 32 | 0.42527940D+00 | 0.15000000D+01 | 0.10747206D+01 |
| 33 | 0.72980630D+00 | 0.15000000D+01 | 0.82612017D+00 |
| 34 | 0.67387983D+00 | 0.15000000D+01 | 0.82612017D+00 |
| 35 | 0.12101021D+01 | 0.15000000D+01 | 0.28989790D+00 |
| 36 | 0.26883548D+00 | 0.15000000D+01 | 0.12311645D+01 |
| 37 | 0.15000000D+01 | 0.15000000D+01 | 0.00000000D+00 |
| 38 | 0.16450849D+00 | 0.15000000D+01 | 0.13354915D+01 |
| 39 | 0.22643327D+00 | 0.15000000D+01 | 0.12735667D+01 |
| 40 | 0.97677509D+00 | 0.15000000D+01 | 0.52322491D+00 |
| 41 | 0.71621056D+00 | 0.15000000D+01 | 0.78378944D+00 |

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 42         0.15000000D+01      0.15000000D+01      0.00000000D+00
 43         0.99861737D+00      0.15000000D+01      0.50138263D+00
 44         0.12891815D+01      0.15000000D+01      0.21081852D+00
 45         0.15000000D+01      0.15000000D+01      0.00000000D+00
 46         0.15928866D+00      0.15000000D+01      0.13407113D+01
 47         0.50887255D+00      0.15000000D+01      0.99112745D+00
 48         0.15000000D+01      0.15000000D+01      0.00000000D+00
 49         0.13323104D+01      0.15000000D+01      0.16768960D+00
 50         0.15000000D+01      0.15000000D+01      0.00000000D+00
 51         0.54920078D+00      0.15000000D+01      0.95079922D+00
 52         0.40026703D+00      0.15000000D+01      0.10997330D+01
 53         0.68820898D-01      0.15000000D+01      0.14311791D+01
 54         0.15000000D+01      0.15000000D+01      0.00000000D+00
 55         0.11370295D+01      0.15000000D+01      0.36297054D+00
 56         0.15000000D+01      0.15000000D+01      0.00000000D+00
 57         0.12874740D+01      0.15000000D+01      0.21252595D+00
 58         0.99608765D+00      0.15000000D+01      0.50391235D+00
 59         0.15000000D+01      0.15000000D+01      0.00000000D+00
 60         0.11028238D+01      0.15000000D+01      0.39717622D+00
 61         0.15000000D+01      0.15000000D+01      0.00000000D+00
 62         0.10075310D+01      0.15000000D+01      0.49246905D+00
 63         0.20332298D+00      0.15000000D+01      0.12966770D+01
 64         0.15000000D+01      0.15000000D+01      0.00000000D+00
 65         0.53956561D+00      0.15000000D+01      0.96043439D+00
 66         0.15000000D+01      0.15000000D+01      0.00000000D+00
 67         0.87252637D-01      0.15000000D+01      0.14127474D+01
 68         0.60232842D+00      0.15000000D+01      0.89767158D+00
 69         0.87197991D+00      0.15000000D+01      0.62802009D+00
 70         0.60809725D-01      0.15000000D+01      0.14391903D+01
 71         0.91150336D+00      0.15000000D+01      0.58849664D+00
 72         0.13933681D+01      0.15000000D+01      0.10663188D+00
 73         0.13502826D+01      0.15000000D+01      0.14971742D+00
 74         0.16173289D+00      0.15000000D+01      0.13382671D+01
 75         0.81396675D+00      0.15000000D+01      0.68603325D+00
 76         0.53347914D+00      0.15000000D+01      0.96652086D+00
 77         0.15000000D+01      0.15000000D+01      0.00000000D+00
 78         0.11209820D+01      0.15000000D+01      0.37901800D+00
 79         0.56993241D-02      0.15000000D+01      0.14943007D+01
 80         0.37261806D+00      0.15000000D+01      0.11273819D+01
 81         0.88390072D+00      0.15000000D+01      0.61609928D+00
 82         0.95201246D-01      0.15000000D+01      0.14047988D+01
 83         0.15000000D+01      0.15000000D+01      0.00000000D+00
 84         0.12725738D+01      0.15000000D+01      0.22742621D+00
 85         0.84098024D+00      0.15000000D+01      0.65901976D+00
 86         0.15000000D+01      0.15000000D+01      0.00000000D+00
 87         0.43913642D+00      0.15000000D+01      0.10608636D+01
 88         0.11693891D+01      0.15000000D+01      0.33061091D+00
 89         0.15000000D+01      0.15000000D+01      0.00000000D+00
 90         0.56959729D+00      0.15000000D+01      0.93040271D+00


            *****   NLP Special Control 60-Vector Output   *****

CV =
     0.784841215797660D+00,   0.128371749245809D+01,  -0.161478425806776D+01,
     0.544152362005126D+00,  -0.151944350183053D+00,  -0.257699851837190D-01,
     0.200496989488602D+01,   0.340045841915089D+00,  -0.779622752855611D+00,
     0.150857924261364D+01,  -0.152619721338280D+01,  -0.253469467163086D+00,
     0.102541333202262D+01,   0.876107952720768D+00,  -0.263637506961823D+00,
    -0.225250549464010D+00,   0.179850222429322D+01,   0.344146430492401D+00,
     0.101614911752388D+00,   0.140948972702026D+01,   0.698456066129337D+00,
     0.325314255204353D+00,  -0.346915014497723D+00,  -0.161579811573029D+00,
     0.148434941710717D+01,  -0.848482048511505D+00,   0.425465738656990D+00,
     0.144103533429560D+01,   0.799999900000000D+00,   0.224317752542133D+00,
    -0.424228560924530D+00,  -0.118952511557531D+00,  -0.106281281786128D+01,
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       0.158326523303986D+01,  -0.608450930793650D+00,  -0.144584330320358D+01,
       0.378996694209730D-01,   0.848245939504021D+00,  -0.295640796575953D-01,
      -0.661684149897953D+00,  -0.546547407401050D-02,  -0.250000000000000D+01,
       0.998959638057919D+00,  -0.475879096422047D+00,   0.427876232021413D+00,
      -0.812015739768876D+00,   0.523018693923950D+00,  -0.992575375473315D+00,
      -0.481285118567052D+00,   0.121360390747221D+01,  -0.170230581497125D+01,
      -0.901908234314893D+00,  -0.799999900000000D+00,  -0.124698424802566D+01,
      -0.190034197726378D+00,  -0.296212100982666D+00,   0.119820252045078D+01,
      -0.197043539645231D-02,   0.355800724029541D+00,   0.208587352722317D+01,

                  *****   End Case Number   4   *****

END of RUN.

   ***********  END  **********   END   *********
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