

Data Base Description

Summary

Flight test data from a highly-instrumented UH-60A aircraft were obtained on 31 flights from August 1993 to February 1994 as part of the UH-60A Airloads Program. Representative flight data were reduced from tapes and stored in an electronic data base. These flight test data are currently accessible in an electronic data base at NASA Ames Research Center for qualified users.

Data Reduction

Approximately 362 measurements were obtained on the UH-60A rotor during the test program and an additional 93 fixed-system measurements were made as well (Kufeld et al. 1994). The majority of the rotor measurements (242) were obtained from sub-surface mounted pressure transducers on one blade. The data in the rotating system were conditioned, amplified, and sampled in the hub-mounted Rotating Data Acquisition System (RDAS) and the PCM stream was transferred to the fixed system through slip rings. Fixed-system measurements were processed with the Airframe Data Acquisition System (ADAS) and recorded with the RDAS PCM stream. The data streams were recorded on primary and back-up tape systems on the aircraft.

Normal test points, or “counters” in flight test jargon, were 20 seconds in duration. However, many non-standard length counters were obtained in special circumstances. For instance, longer record lengths were required for maneuvers, during acoustic measurements, and during flight dynamics measurements.

Following a flight, the flight tapes were processed in a ground station in two stages. In the first stage, calibration files were added to the tape records and time tags were established for all of the data. Under normal circumstances the Test Director provided “time slices” for standard-length counters which defined the best five seconds for each 20-second record. Then, in this first stage, only five seconds of data were processed. The full record was processed for non-standard length counters. Different procedures were required in this first stage depending upon whether the primary or back-up tapes were used.

In the second stage, the ground-station tapes were processed using the data base manager portion of the TRENDS data base program (Bondi and Bjorkman 1994). The data were reduced to final form and stored in the TRENDS data base on an optical juke box. It was intended that the data reduction stage described here occur immediately after each flight, however, experience demonstrated that rapid data turnaround was extremely difficult and the full data base was not completed until April 1995.

Time slicing was normally accomplished during the first data processing stage, but could also be performed in the second stage. Time slicing during the second stage was the normal approach for non-standard length counters.

The VAX used for TRENDS software development and the associated juke box were decommissioned in 1996. As a consequence, the data base was moved to an SGI computer and a “disk farm” was purchased to allow storage of all of the data. This changeover was completed in

1997 and although not all of the data were accessible during this period, the entire data base is once again available for use. Some of the TRENDS code had to be re-written for use on the SGI machine and some features of the relational data base design have been lost. However, the lost features are all considered minor.

What's In the Data Base

The UH-60A Airloads data base includes all of the data from the 31 flights. In addition, during the second stage of the data reduction process a number of derived parameters were added to the data base. Whether a parameter is measured, that is, data, or has been derived can be determined within TRENDS by examining the definitions under the ITEMDEFS menu item. The code for derived parameters can be examined under the DERIVED menu item.

Approximately 960 counters are included in the data base and some of these are referred to as "pseudo-counters." Multiple time slices were obtained for some of the non-standard length records and only the first of these multiple slices was saved with the counter number set during flight. The remainder of the slices were saved as pseudo-counters and they were arbitrarily assigned numbers beyond the last counter number of the flight. Pseudo-counters can be identified in the TRENDS data base by the addition of an "*" at the end of the counter description that is printed out by WORDSCAN. The relationship of the pseudo-counters to the actual counters can be determined by the absolute start time ("Tzero") listed in WORDSCAN.

Flights 90-99, the ground acoustics flights, were flown in conjunction with a ground-based acoustic array installed by Langley Research Center. The data records for these flights were mostly non-standard in length. In some cases, two sets of time slices were obtained for the ground-acoustic data. The first set of time slices was determined as discussed previously for the other flight counters and these slices are stored in the UH-60A data base. In some cases, a second set of time slices was defined based on criteria defined by Langley Research Center and these data are stored in a separate data base. The Langley Research Center data base is accessible in TRENDS by using the TAIL_NO. option and changing the data base from "BH2" to "BHL." Note, however, that this second data base includes only aircraft data. The acoustic data obtained by Langley Research Center are not included in the UH-60A Airloads data base.

Flights 100-103 and 113-114, the airborne acoustic flights, were flown in conjunction with a Y0-3A aircraft which provided an acoustic measurement platform. The acoustic data were obtained as a part of NASA's In-flight Rotorcraft Acoustic Program (IRAP).

Integration of the blade pressures to obtain the normal force, the chord force, and the pitching moment was not initially included in the data base. Subsequently, the integrated forces and moments have been added, but only for the earlier flights.

Access

Access to the UH-60A data base can requires approval for access to both the SGI host for the data base and the data base itself. Requests for access should be forwarded to:

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The System Administrator for the SGI host for the data base is:

Ms. Linda Thompson
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The responsible authority for the UH-60A Airloads data base is:

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References

M. J. Bondi and W. S. Bjorkman, "TRENDS, A Flight Test Relational Database: User's Guide and Reference Manual," NASA TM 108806, June 1994.

Robert M. Kufeld, Dwight L. Balough, Jeffrey L. Cross, Karen F. Studebaker, Christopher D. Jennison, and William G. Bousman, "Flight Testing the UH-60A Airloads Aircraft," American Helicopter Society 50th Annual Forum Proceedings, Washington, D.C., May 11-13, 1994, pp. 557-578.

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