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**USAAVLABS TECHNICAL REPORT 68-2**

**FLIGHT LOADS INVESTIGATION OF  
CARGO AND TRANSPORT CH-47A HELICOPTERS  
OPERATING IN SOUTHEAST ASIA**

By

F. Joseph Giessler

Joseph F. Braun

April 1968

**U. S. ARMY AVIATION MATERIEL LABORATORIES  
FORT EUSTIS, VIRGINIA**

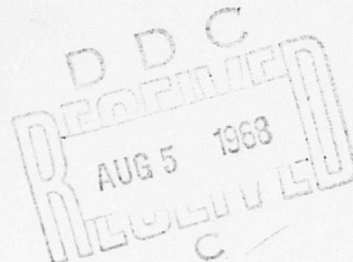
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Task IF125901A14607  
Contract DA 44-177-AMC-363(T)  
USAAVLABS Technical Report 68-2  
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F. Joseph Giessler  
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Prepared by

Technology Incorporated  
Dayton, Ohio

for

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## ABSTRACT

From a structural flight loads program on four CH-47A cargo and transport helicopters, 235.76 hours of valid multichannel flight data were recorded as the helicopters operated from air bases in Southeast Asia. Data were processed and analyzed according to four distinct flight phases, termed mission segments: (1) takeoff and ascent; (2) maneuver; (3) descent, flare, and landing; and (4) steady state. Data are presented in the form of time and occurrence tables, histograms, and exceedance curves. These data indicate the time spent in the mission segments and parameter ranges; the number of peak parameter values occurring, in the ranges of the given parameter, during each of the mission segments, and in the ranges of one or more related parameters; and the time to reach or exceed given maneuver and gust normal load factors. The largest normal load factor was 1.628, which occurred at a 93-knot airspeed and with a 22,100-pound gross weight. In contrast to a concurrent study of armed CH-47A's whose activity was mostly under maneuvering conditions, the cargo and transport CH-47A's spent over 65 percent of their time in the steady-state mission segment.

## FOREWORD

Technology Incorporated, Dayton, Ohio, prepared this report to cover its effort on a flight loads program to collect, process, and analyze 200 hours of valid flight data from four CH-47A cargo and transport helicopters operating in Southeast Asia. This flight loads program was an integral part of a comprehensive CH-47A program which also included data collected from three armed and armored CH-47A's. This program was sponsored by the U. S. Army Aviation Materiel Laboratories, Fort Eustis, Virginia, under Contract DA 44-177-AMC-363(T). The Army project monitor for all programs was Mr. William T. Alexander.

The prime Technology Incorporated personnel engaged in this program were as follows: Mr. Joseph F. Braun, project engineer, who directed the installation and operation of the data recording systems; Mr. John F. Nash, who directed the data processing; Mr. William E. Morrin, who wrote the computer programs for the data processing; and Messrs. Larry E. Clay and F. Joseph Giessler, who analyzed and compiled the data.

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## LIST OF SYMBOLS

<u>Symbol</u>		<u>Computer Equivalent</u>
$C_T$	thrust coefficient	CT
$C_T/\sigma$	thrust coefficient ratio	CT/S
$h_d$	density altitude, feet	
$n_z$	normal load factor	NZ
OAT	outside air temperature, °F	
$P_a$	atmospheric static pressure, inches of mercury	
R	rotor radius, 29.55 feet	
V	airspeed, feet per second or knots	
W	gross weight, pounds	
$\mu$	rotor tip speed ratio	MU
$\pi$	ratio of circumference to diameter of circle	
$\rho$	local air density, lb-sec <sup>2</sup> /ft <sup>4</sup>	
$\sigma$	rotor solidity, 0.062 (Reference 1)	S
$\Omega$	rotor angular velocity, radians per second	

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## INTRODUCTION

Under contract to the U. S. Army Aviation Materiel Laboratories, Fort Eustis, Virginia, Technology Incorporated conducted a multichannel flight loads program on the cargo and transport CH-47A helicopter. To acquire the desired data, three helicopters assigned to the 1st Air Cavalry Division, 228th ASHB, were each instrumented with flight loads recording systems. A fourth helicopter was instrumented midway in the program to ensure that the required number of hours of valid flight data were recorded. All recordings were made between January 1966 and May 1967 while the helicopters operated in Southeast Asia. The data were processed, analyzed, and detailed graphically and tabularly for their presentation in this report.

With normal acceleration separated into maneuver- and gust-induced categories, most of the data presentation consists of time and occurrence tables. Most of the tables are broken down into ranges of a third variable or of a third and a fourth variable for cross-correlation purposes. Significant aspects of the time tables are presented as histograms, and the occurrence data for normal accelerations are presented as exceedance curves.

## DATA RECORDING AND PROCESSING

### DATA RECORDING

An oscillograph recording system was installed in each of the CH-47A helicopters. The functional block diagram in Figure 1 illustrates the operation and integration of the components comprising the recording system. Fourteen parameters were recorded on the oscillogram: (1) airspeed, (2) altitude, (3) normal acceleration, (4) No. 1 engine torque, (5) No. 2 engine torque, (6) longitudinal cyclic control stick position, (7) collective control stick position, (8) rotor rpm, (9) outside air temperature, (10) time, (11) No. 1 gas producer rpm, (12) No. 2 gas producer rpm, (13) No. 1 exhaust gas temperature, and (14) No. 2 exhaust gas temperature. Between January 1966 and May 1967, 477 hours of flight data were recorded. Of these hours, 235 proved to be valid. The valid data represented 1081 flights and 395 engine starts.

### DATA PROCESSING

The processing of the recorded data was shared by Technology Incorporated and the U. S. Army Aviation Materiel Laboratories. Technology Incorporated received the recorded data, checked all oscillograms for evidence of any instrumentation malfunction, removed the faulty data while reporting it to the company's Instrumentation Section, and then timed the acceptable records. The oscillograms were then sent to the U. S. Army Aviation Materiel Laboratories where they were edited and reduced. Upon the receipt of the reduced data and the return of the oscillograms, Technology Incorporated performed the quality control check and directed the computer processing of the reduced data. The data processing procedures are described without further identification of the responsible organization.

### DATA EDITING

The data editors demarcated the following four mission segments in each flight: (1) takeoff and ascent; (2) maneuver; (3) descent, flare, and landing; and (4) steady state. The criteria used to distinguish the mission segments in each flight were as follows: During the first three mission segments, which comprised the transient parts of flight, the stick position traces showed no steady values from which they seemed to deviate, and the airspeed and altitude traces changed frequently. Mission Segment 1

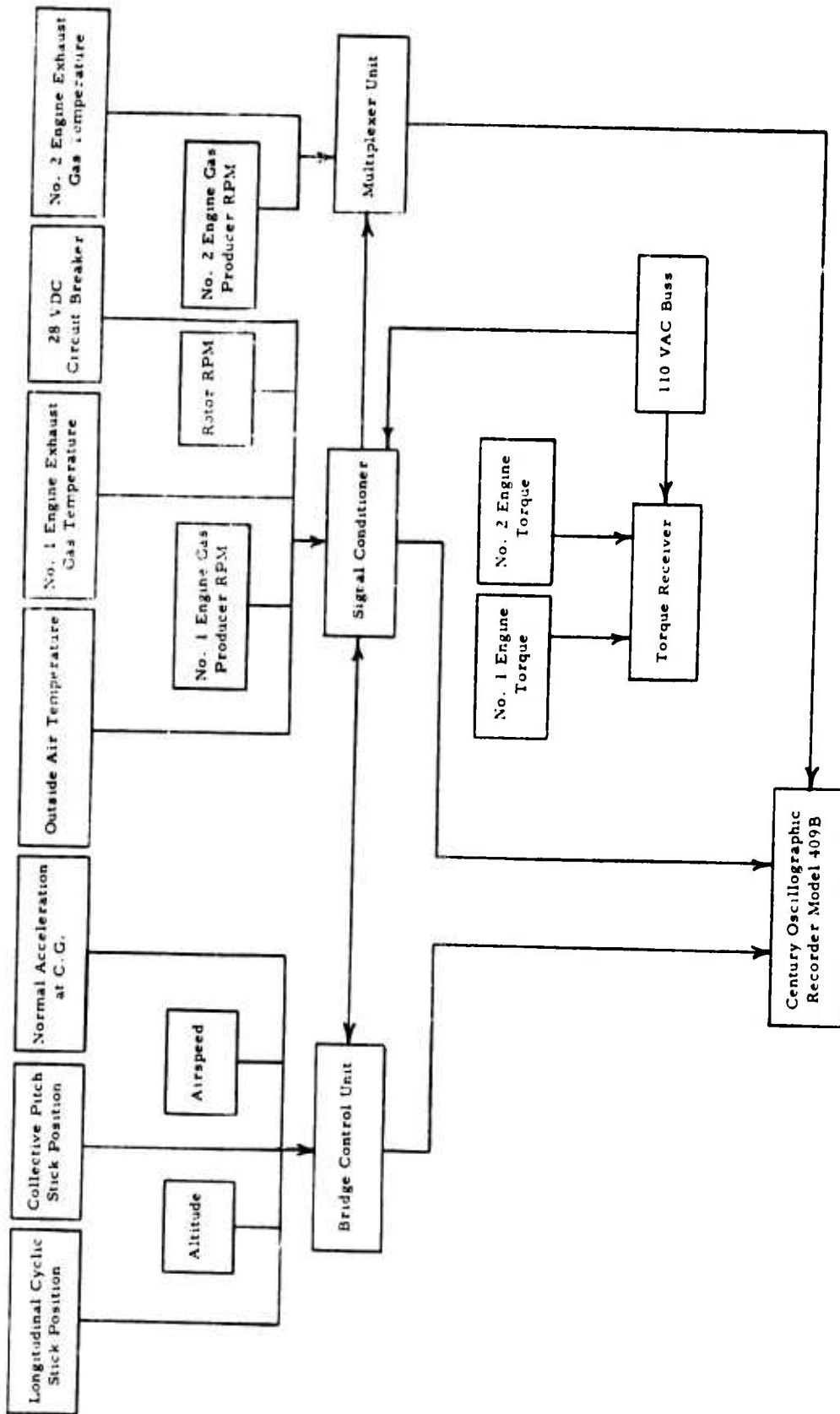


Figure 1. Block Diagram of CH-47A Instrumentation System

(takeoff and ascent) included both the takeoff and the climb to the initial steady-flight altitude and the unsteady ascents to other steady-flight altitudes. Mission Segment 2 (maneuver) consisted of those transient parts of flight whose characteristics differed from those of Mission Segments 1 and 3. During maneuvering, the normal acceleration trace was usually very active. In addition to the unsteady part of flare and landing, Mission Segment 3 (descent, flare, and landing) included the unsteady part of any descent, whether intended for a new steady-flight altitude or for landing. Mission Segment 4 (steady state) included those parts of the flight where the stick position traces were relatively steady and where the airspeed and altitude traces were steady or changing smoothly. Such characteristics prevailed during cruise, hover, and steady ascent and descent.

After demarcating the flights into mission segments, the editors marked the traces as follows to govern the data reading: The normal acceleration trace was marked wherever a peak met the following two conditions: (1) the peak fell outside prescribed threshold levels, and (2) the peak had a rise and fall (or fall and rise), each of which was 50 percent of the peak value or 0.2g, whichever was greater. Whereas the prescribed thresholds were 0.8 and 1.2g, the editors used slightly smaller levels to ensure that all valid peaks were included. However, any peaks read within the fixed threshold levels were eliminated during the computer processing. In addition, the editors identified each selected peak as being maneuver- or gust-induced. To determine whether a peak was induced by a maneuver or a gust, editors noted the behavior of the stick position traces. Whenever the peak was the result of maneuvering, one or both of these traces always deflected just before the peak and in the same sense as the peak. Confirmation of the fact that gust was the cause of the peak required either that both stick position traces were steady or that any movement of these traces just before the peak was in the direction opposite to that of the peak.

In treating the two stick position traces, the editors marked those peaks whose rise or fall was 10 percent of the full stick travel and at least 10 percent of the normal value. Each normal value depended on the mission segment. For the steady-state mission segment, the normal values were the steady values of the stick positions just before and after the peak. For the three transient mission segments (where no "steady" stick positions prevailed), an arbitrary set of normal values was chosen to approximate the stick positions during hover. The selected values are listed by aircraft serial number in Table I.

TABLE I  
STICK POSITION SELECTED VALUES

Aircraft No.	Long. Cyclic Normal (%)	Collective Normal (%)
914	49.0	48.6
908	53.8	52.2
121	44.6	45.9

In each of the three transient mission segments, all traces except those for the steady stick positions were marked at each instant that the acceleration or stick position traces peaked. Because of the unsteady state prevailing during the three transient mission segments, no elapsed time was associated with the readings at these markings. The traces marked here were read only to provide corresponding parameter values in tabulations of the peak values. During the steady-state mission segment, however, all traces except that for acceleration were marked at critical points to permit an adequate time-history representation of the parameters.

#### DATA READING AND QUALITY CONTROL

All data points selected during the editing were measured on semi-automatic oscillogram readers, and the measurements were transcribed directly to punched cards. When all data were extracted from a flight, a printout of the cards was given to the Quality Control Section for preliminary data checking. Using standard quality control techniques, this section manually remeasured random points comprising an adequate sample and compared the measurements with those produced by the semiautomatic readers. From the differences between the two sets of readings, this section established the mean and standard deviations to determine and control the desired reading accuracy. Any flights whose measurements did not meet the accuracy standard were reread by the semiautomatic readers. In addition to obtaining accurate values, this procedure ensured a uniform interpretation and measurement of the traces.

When all the data had been processed, the mean and standard deviations were calculated for the entire data sample. Assuming a normal distribution of reading errors, 99.7 percent of the readings should be within three standard deviations of the true values. Based on average calibration values, Table II shows the mean deviation and the three standard deviations for each parameter.

TABLE II  
QUALITY CONTROL VALUES FOR EACH PARAMETER

Parameter	Mean Deviation	Three Standard Deviations (99.7% Accuracy Limit)
Normal acceleration $n_z$ , g	-.0002	± .03
Airspeed, knots*	-.04	± 1.1
Altitude, feet**	-3.1	± 104
Outside air temperature, °F	-.11	± 3.6
Rotor, rpm	-.13	± 4.3
Longitudinal cyclic stick, percent	-.02	± 2.5
Collective stick, percent	-.02	± 2.8

\* Computed at a 90-knot indicated airspeed  
\*\* Computed at a 1000-foot density altitude and standard temperature

#### DATA COMPUTATIONS

The load factor  $n_z$  for each normal acceleration peak was measured directly from the oscillogram trace. However, to present load factors for positive and negative peaks conveniently, an incremental normal load factor,  $\Delta n_z$ , was derived from each  $n_z$  value by using the relationship

$$\Delta n_z = n_z - 1.0$$

The following equation (see Reference 2) was used to compute the altitude, since density altitude is normally used in describing helicopter performance:

$$h_d = 145,300 \left[ 1 - \left( \frac{518.4 P_a}{29.92 (OAT + 460)} \right)^{0.235} \right]$$

Only indicated airspeeds are presented in this report since the correction to calibrated airspeeds would not have appreciably changed the distributions. At level flight, where most of the flight time was spent, the correction is normally less than 4.6 knots for airspeeds below 110 knots. Although the correction may exceed 10 knots during extreme conditions of climb or autorotation, where the rotor thrust affects the performance of the airspeed transducer, such large corrections would be for minimal periods and therefore would not be significantly evident in the data summary.

Rotor rpm and outside air temperature were computed by applying linear calibrations to the trace measurements. With the displacements of the stick position traces representing the deflections of the longitudinal cyclic stick from the full-forward position and the deflections of the collective stick from the full-down position, the respective stick positions were computed from the trace measurements in units of percent of full deflection. By an approximate differentiation of the altitude trace, the rate of climb was computed continuously during the steady-state mission segment and at each position of stick or acceleration peak during the three transient mission segments. At the same time that the rate of climb was computed, the "longitudinal acceleration," or rate of change of airspeed, was derived by an approximate differentiation of the airspeed trace.

Through the following expressions, the rotor tip speed ratio ( $\mu$ ) and the ratio of the thrust coefficient ( $C_T$ ) to the rotor solidity ( $\sigma$ ) were each calculated as nondimensional parameters. With a consistent system of units employed, the ratio  $\mu$  was calculated by

$$\mu = \frac{V}{\Omega R}$$

and the ratio  $C_T/\sigma$  was calculated by

$$C_T/\sigma = \frac{W}{\rho \pi R^2 (\Omega R)^2 \sigma}$$

## DATA RESULTS

The final computer printout in the form of time tables and parameter peak-count tables constitutes most of the data presentation. In addition, histograms showing the percentage of time spent in given ranges of the recorded parameters summarize the time tables, and exceedance curves indicating the hours to reach or exceed given incremental load factors summarize the normal acceleration peak-count tables. Because of the bulk of these tables and figures, they are presented in the appendixes. All these data relate to flight loads. None of the engine data, therefore, are presented in this report.

As shown in Figure 2, the total flight time is distributed among the mission segments. Characteristic of the cargo-transport helicopters, the reported helicopters spent more than 65 percent of their flight time in the steady-state mission segment. Figure 3 further breaks down the data in Figure 2 by distributing the total flight time among weight ranges as well as among the mission segments, and Figure 4 distributes the total flight time among weight ranges only. As is apparent, nearly 75 percent of the total flight time was spent at weights between 20,000 and 26,000 pounds. The maximum weight of 37,071 pounds was reached when a helicopter carried a 16,000-pound sling load during a 39-minute flight.

Because of the high elevation of the flight terrain and the relatively high prevailing temperatures, more than 96 percent of the steady-state time was spent at density altitudes above 2000 feet. Figure 5 distributes the total flight time among the altitude ranges.

The histogram in Figure 6 distributes the total flight time among rotor rpm ranges. As is evident, more than 80 percent of the time was flown at rotor rpm's between 230 and 240. In comparison with the handbook values of 230 rpm for normal operation, 233 rpm for maximum power-on, and 261 for maximum power-off, this percentage appears excessive. However, a review of the detailed computer printout after the computer grouping of data within the prescribed rpm ranges revealed that the rotor rpm was below 235 most of the time. As indicated, little time was spent at rpm's over 250. The maximum recorded rotor rpm of 252 lasted briefly.

Figure 7, reflecting the tropical atmosphere, gives the percentages of steady-state flight time in the ranges of outside air temperature. As evidenced here, most of the time was spent at temperatures above 70° F.

With the steady-state flight time distributed among rate-of-climb ranges, Figure 8 shows that more than 90 percent of this flight time was at rates

between  $\pm 500$  feet per minute and that more than 97 percent of this flight time was at rates between  $\pm 1000$  feet per minute. Such rates are typical of cargo-type helicopters.

Figure 9 distributes the total flight time among airspeed ranges. Figures 10 through 17 further break down the data in Figure 9 by distributing the time among weight and altitude ranges as well as among airspeed ranges. As seen in Figure 9, more than 84 percent of the time was at airspeeds below 100 knots. The maximum recorded airspeed of 130.2 knots was reached at a weight of 25,763 pounds.

Figures 18 through 20 present exceedance curves of the incremental normal load factor for the maneuver-induced accelerations. The data in these three figures are summarized in Figure 21. This figure is a plot and tabulation of the number of maneuver load factor peaks occurring in the combined ranges of load factor,  $n_z$ , and tip speed ratio,  $\mu$ . The load factor range from 0.8g to 1.2g defines the threshold within which no peaks were measured. The same types of curves in Figures 18 through 20 are presented in Figures 22 through 24 for the gust-induced accelerations. Figure 25, summarizing the gust-induced load factor peaks, presents a plot and tabulation of the number of gust load factor peaks occurring in the combined ranges of load factor and indicated airspeed. Here again, the load factor range from 0.8g to 1.2g defines the threshold within which no peaks were measured.

To compare the data in Figure 20, Figures 26 and 27 give the exceedance curves for the maneuver-induced accelerations as taken, respectively, from Reference 3 (report on the cargo-transport CH-47A's operating from Continental Air Force Bases) and Reference 4 (report on the armed CH-47A's). The comparisons show that the maneuver loads sustained by the cargo-transport helicopters in Southeast Asia were slightly less than those encountered by the helicopters in the United States and definitely less than those met by the armed CH-47A's. Then to compare the data in Figure 24, Figure 28 gives the exceedance curves for the gust-induced accelerations also taken from Reference 4. In contrast to the first comparisons, this comparison shows that the gust loads imposed on the cargo-transport CH-47A's were greater and much more symmetric than those met by the armed helicopters.

### LITERATURE CITED

1. CH-47A Category II Stability and Control Tests, Technical Documentary Report 64-24, Air Force Flight Test Center, Edwards Air Force Base, California, October 1964.
2. von Mises, Richard, Theory of Flight, McGraw-Hill Book Company, Inc., New York, p. 11, 1945.
3. Braun, Joseph F., and F. Joseph Giessler: CH-47A Chinook Flight Loads Investigation Program, USAAVLABS Technical Report 66-68, U. S. Army Aviation Materiel Laboratories, Fort Eustis, Virginia, July 1966.
4. Giessler, F. Joseph, and Joseph F. Braun, Flight Loads Investigation of Combat Armed and Armored CH-47A Helicopters Operating in Southeast Asia, USAAVLABS Technical Report 68-1, U. S. Army Aviation Materiel Laboratories, Fort Eustis, Virginia.

APPENDIX I

ILLUSTRATIONS FOR DATA PRESENTATION

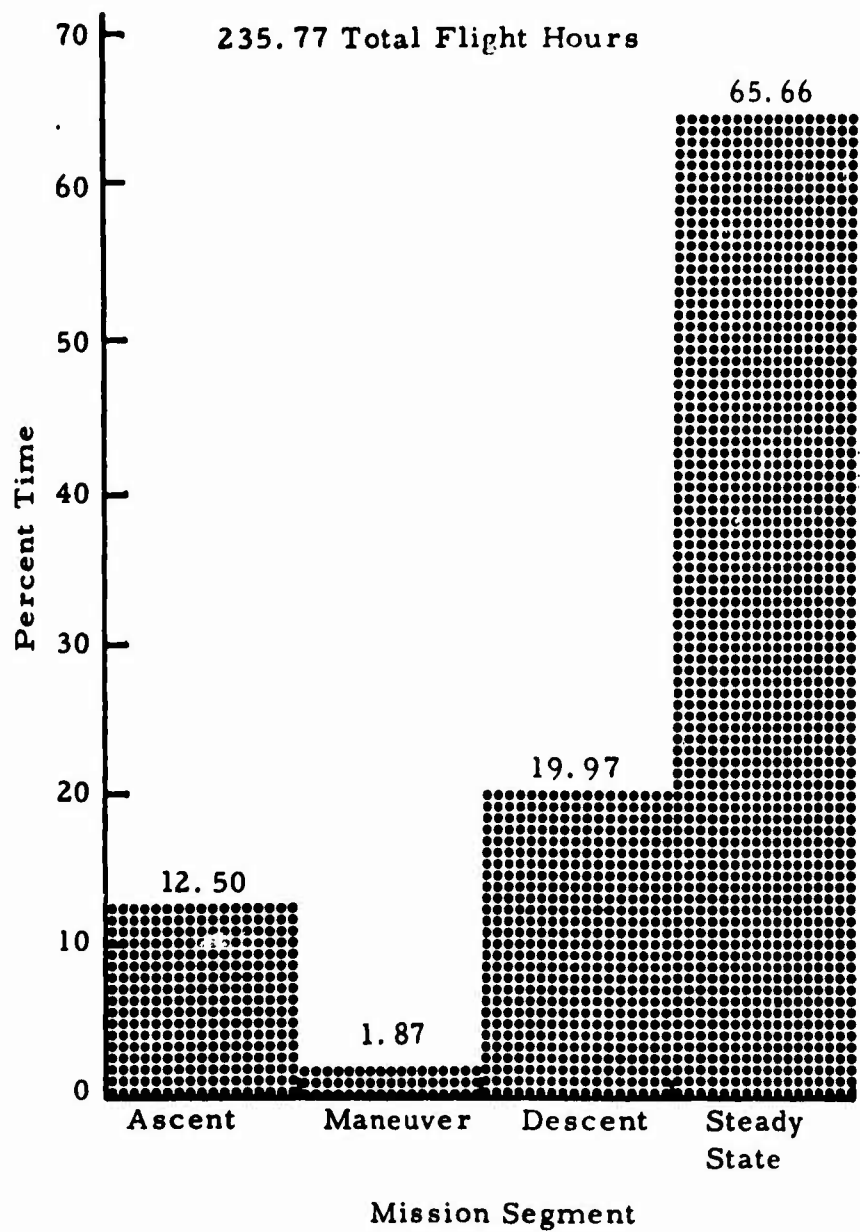
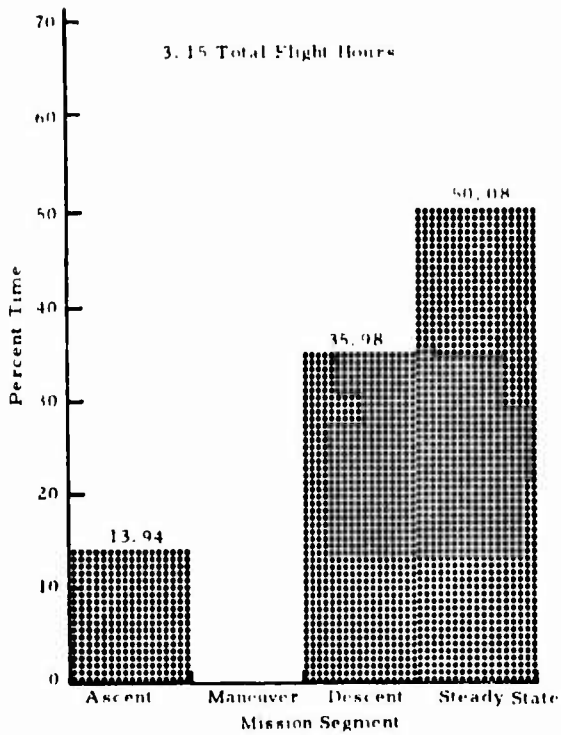
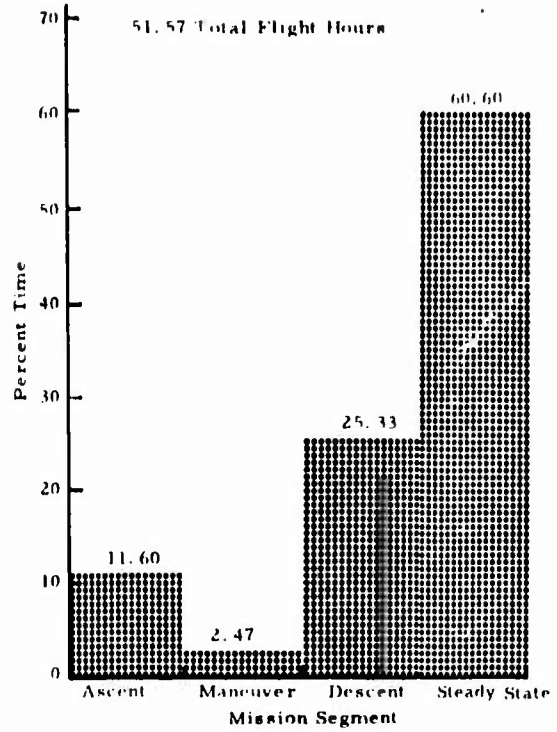


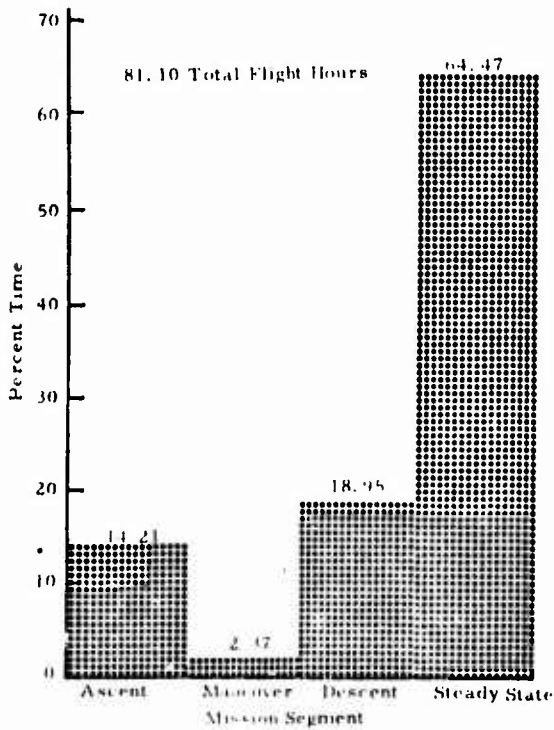
Figure 2. Percentage of Total Flight Time in Each Mission Segment



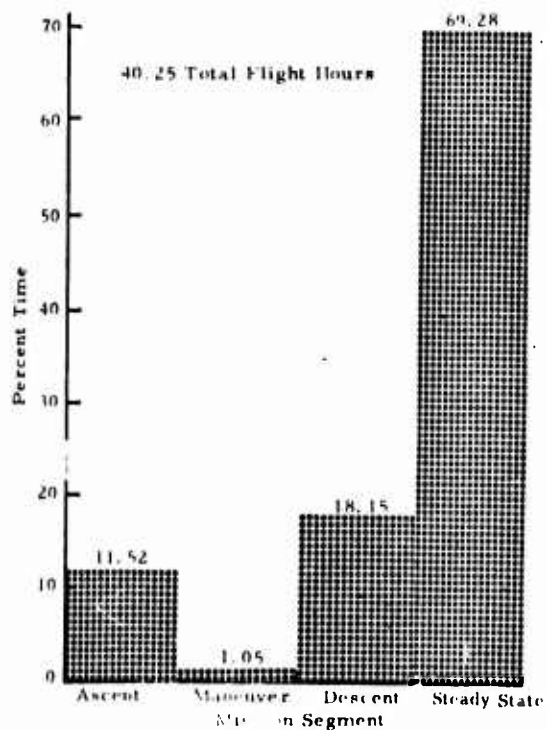
(a) Gross Weight Less Than 20,000 Pounds



(b) Gross Weight 20,000 to 22,000 Pounds

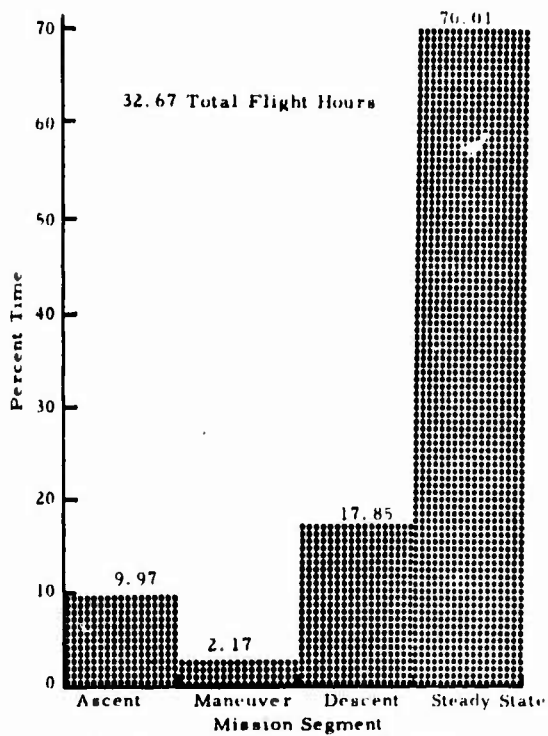


(c) Gross Weight 22,000 to 24,000 Pounds

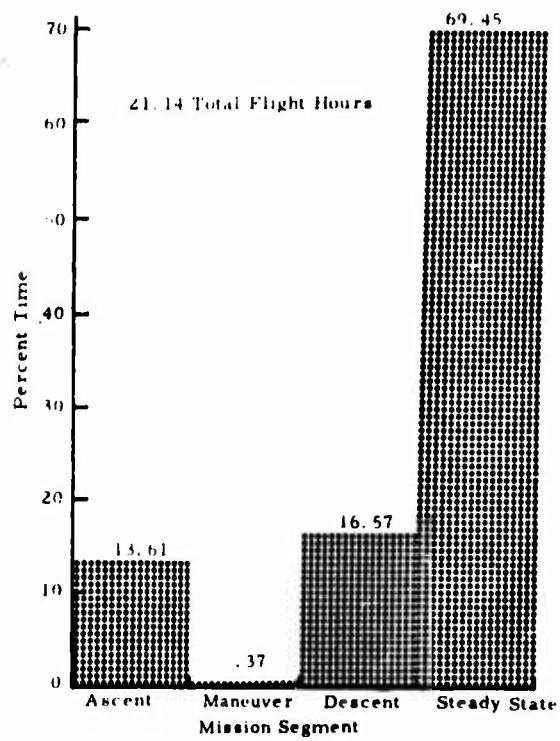


(d) Gross Weight 24,000 to 26,000 Pounds

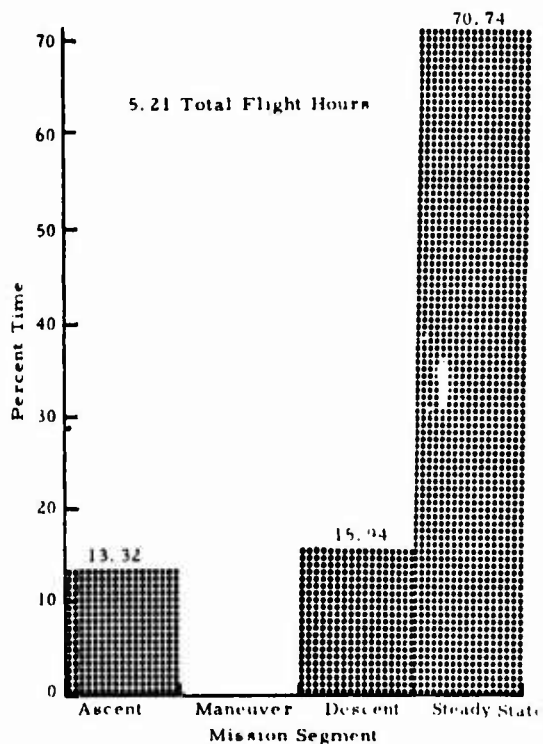
Figure 3. Flight Time in Each Gross Weight Range Broken Down by Percentage of Time in Each Mission Segment



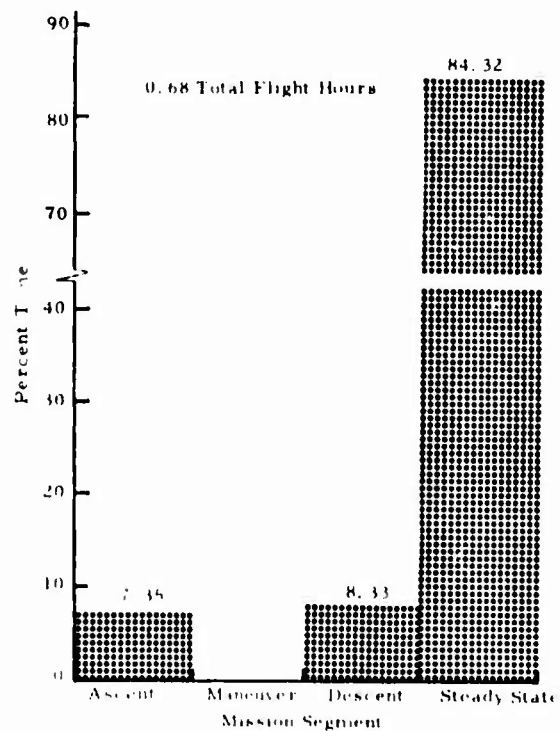
(e) Gross Weight 26,000 to 28,000 Pounds



(f) Gross Weight 28,000 to 30,000 Pounds



(g) Gross Weight 30,000 to 32,000 Pounds



(h) Gross Weight 32,000 to 34,000 Pounds

Figure 3 - contd.

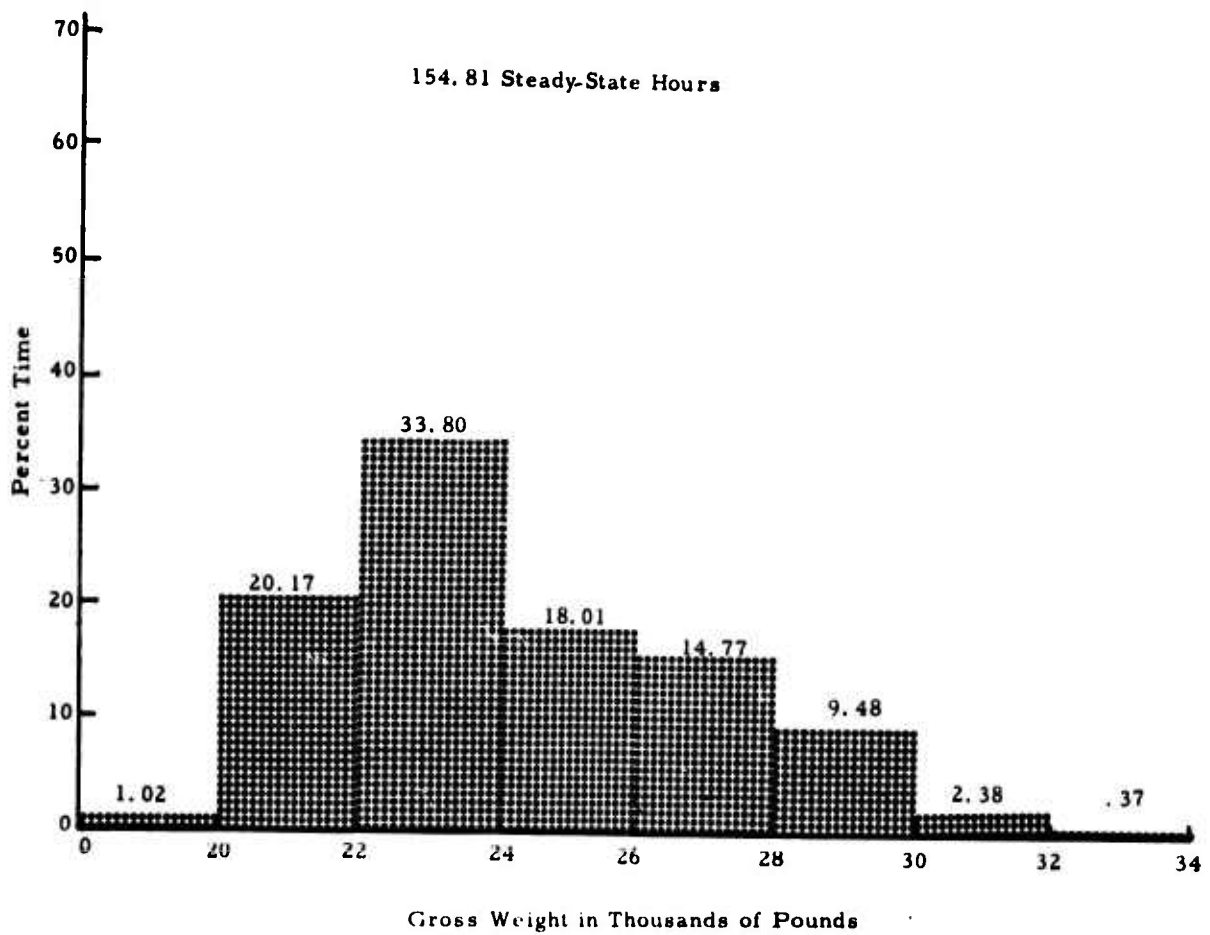


Figure 4. Percentage of Steady-State Mission Segment Flight Time in Each Gross Weight Range

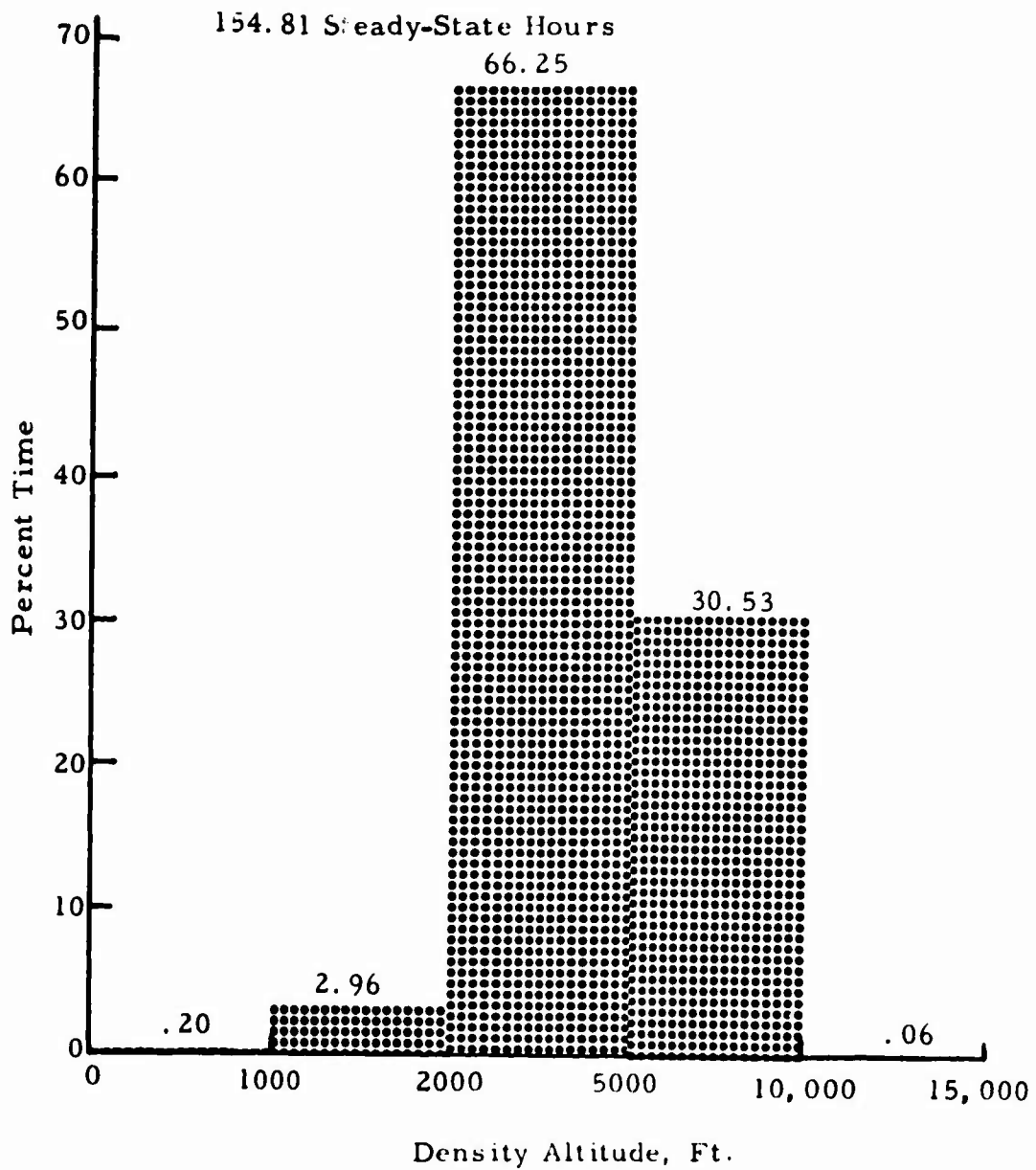


Figure 5. Percentage of Steady-State Mission Segment Flight Time in Each Density Altitude Range

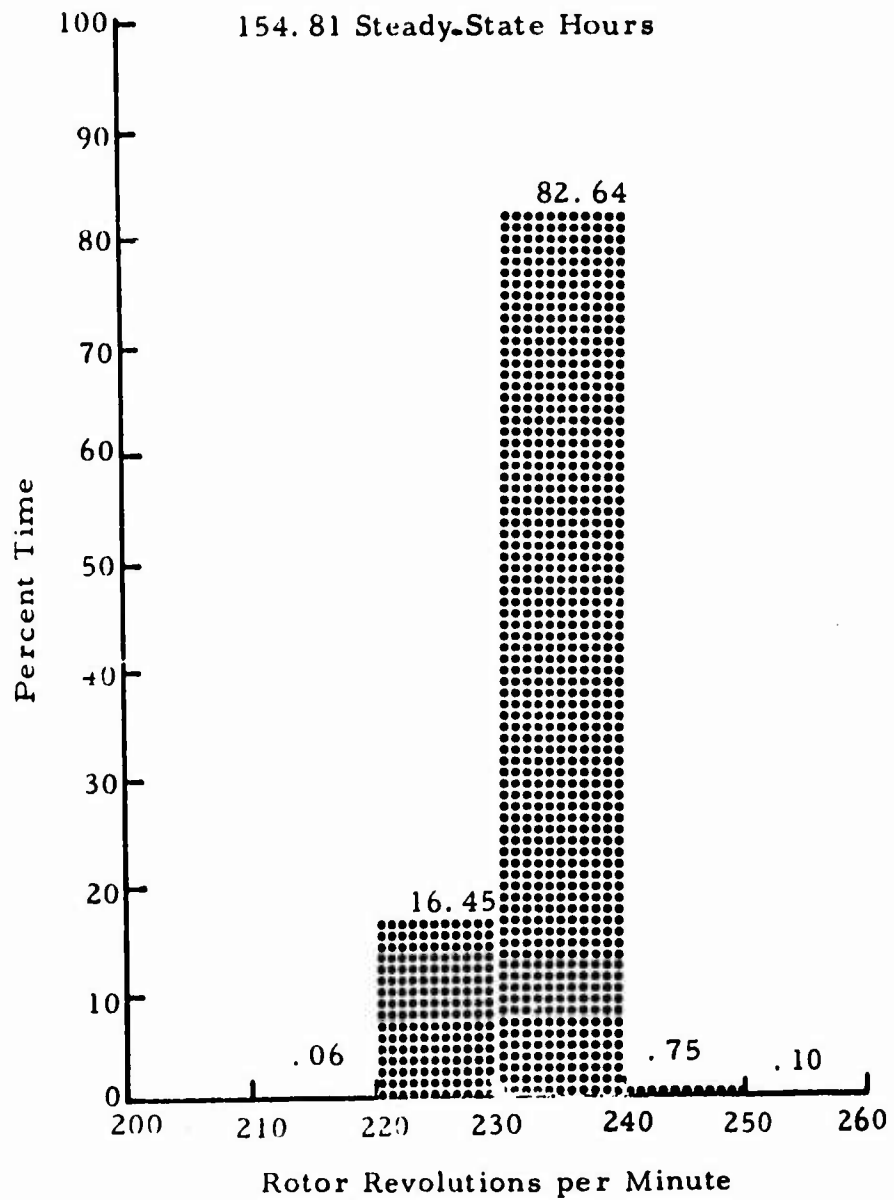


Figure 6. Percentage of Steady-State Mission Segment Flight Time in Each Rotor RPM Range

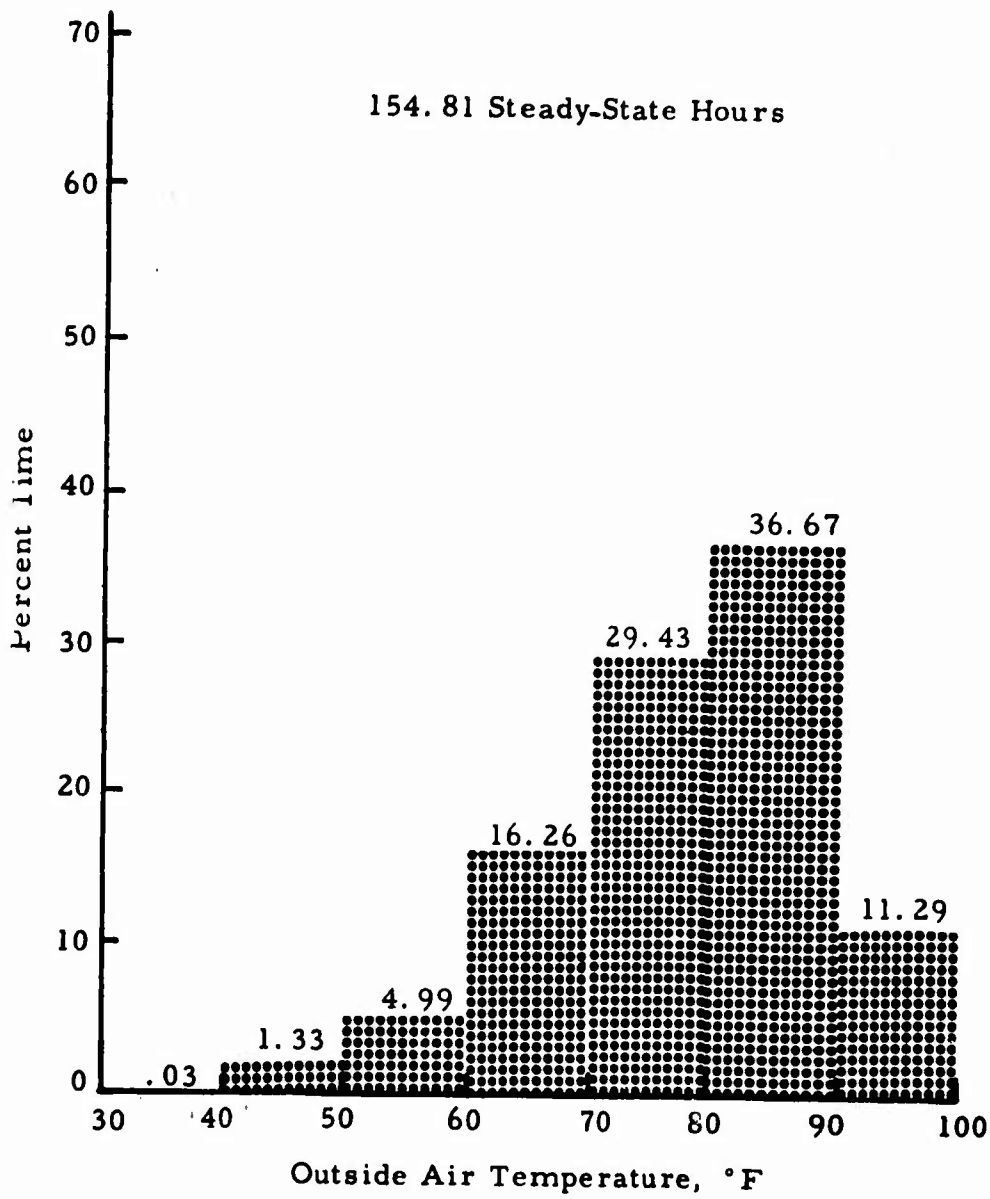


Figure 7. Percentage of Steady-State Mission Segment Flight Time in Each Outside Air Temperature Range

154.81 Steady-State Hours

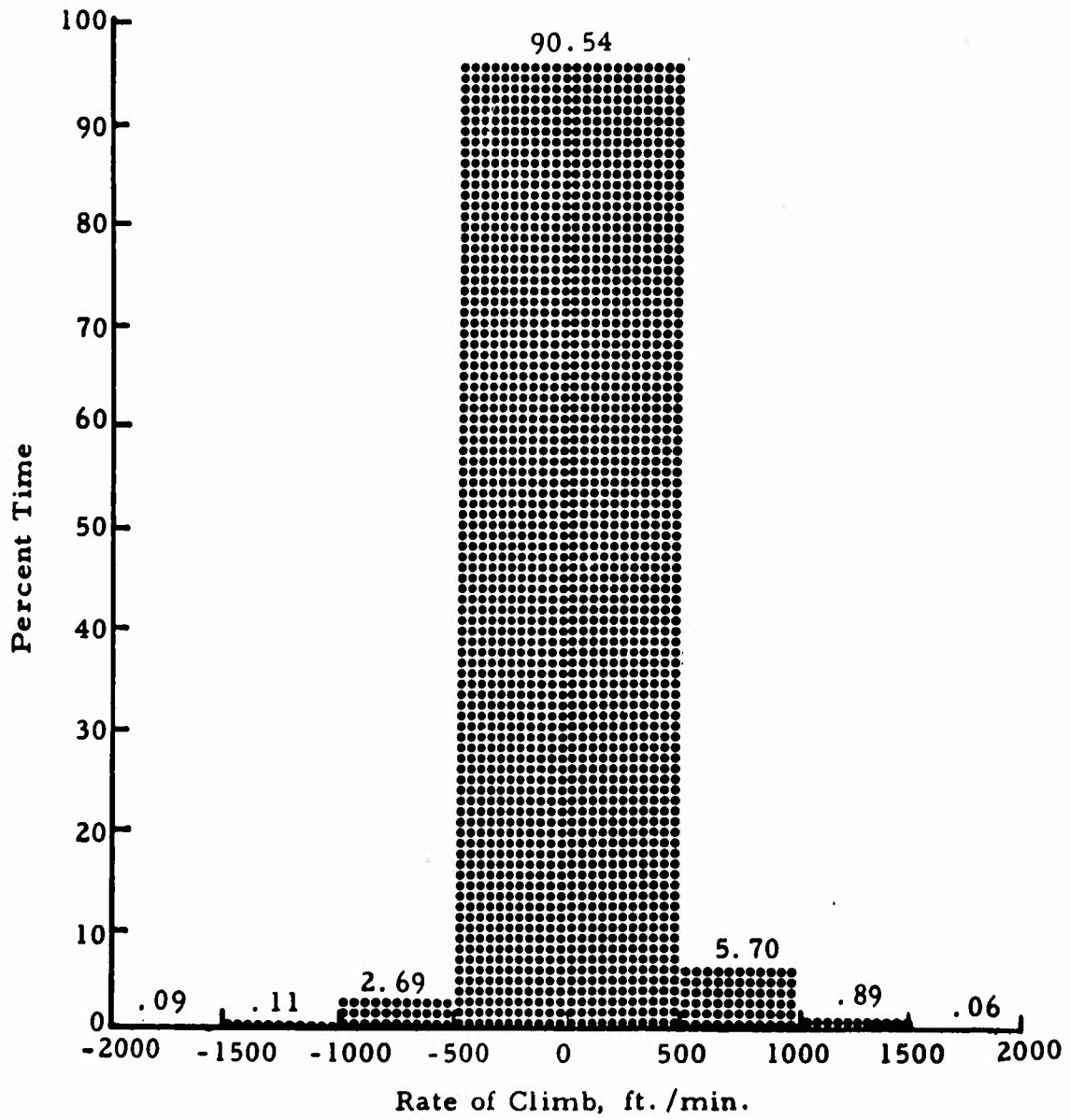


Figure 8. Percentage of Steady-State Mission Segment Flight Time in Each Rate of Climb Range

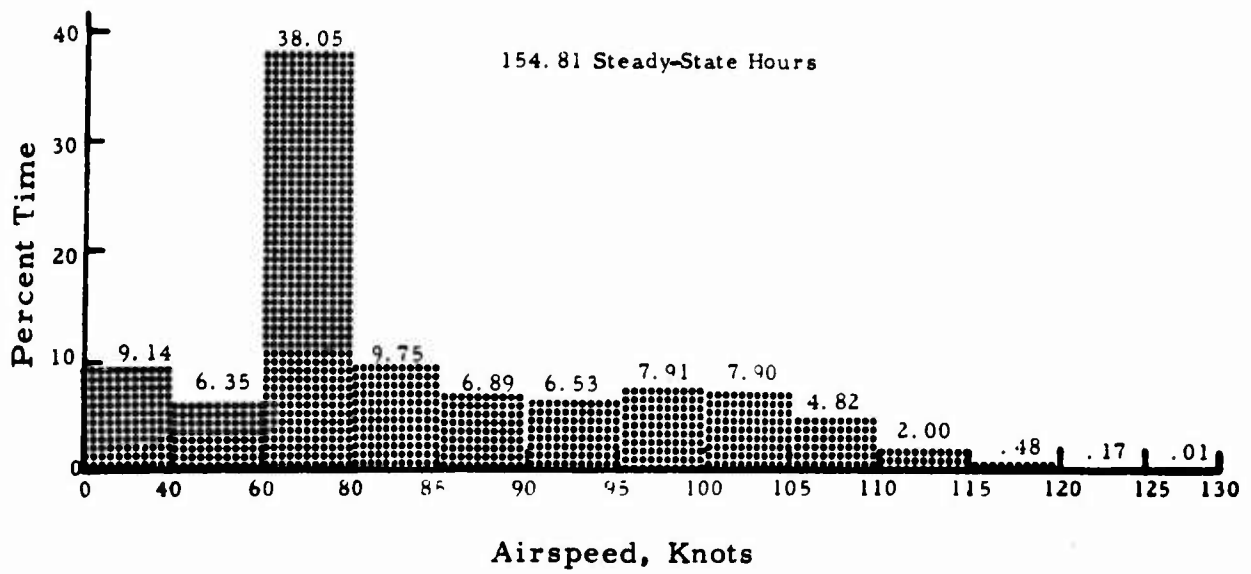


Figure 9. Percentage of Steady-State Mission Segment Flight Time in Each Airspeed Range

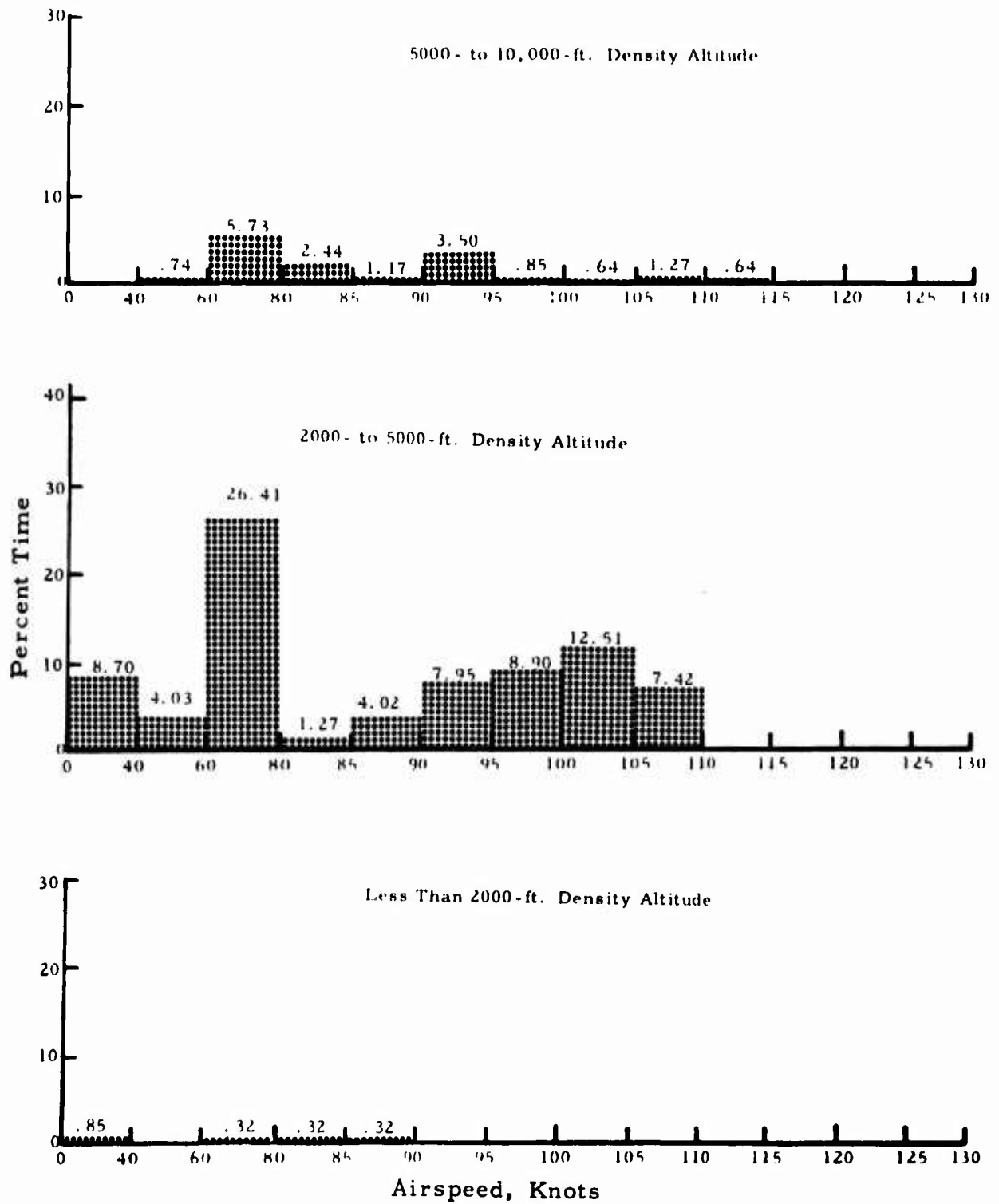


Figure 10. Time in Steady-State Mission Segment in Less Than 20,000-Pound Gross Weight Range Broken Down by Percentage of Time in Each Density Altitude-Airspeed Range

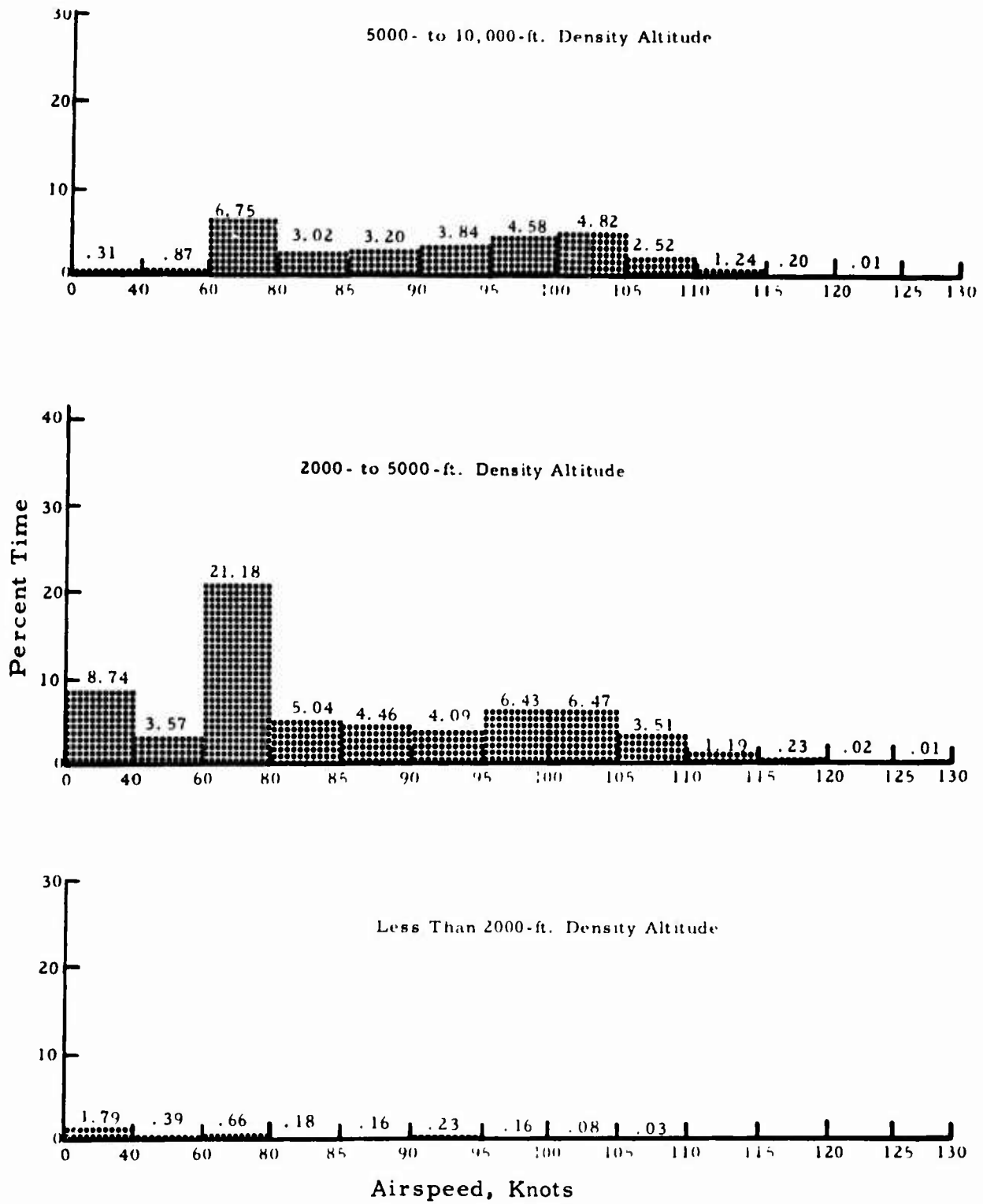


Figure 11. Time in Steady-State Mission Segment in 20,000- to 22,000-Pound Gross Weight Range Broken Down by Percentage of Time in Each Density Altitude-Airspeed Range

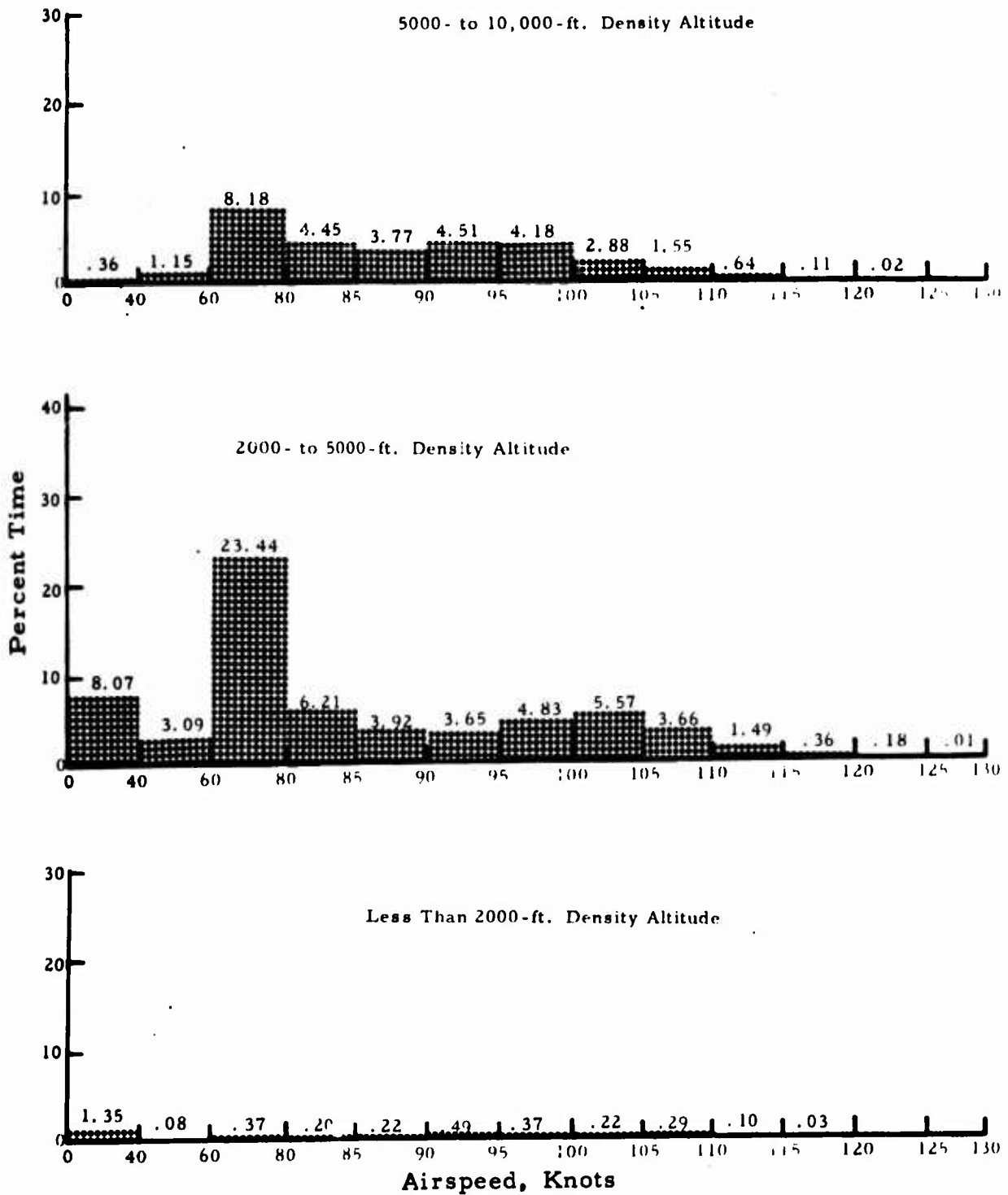


Figure 12. Time in Steady-State Mission Segment in 22,000- to 24,000-Pound Gross Weight Range Broken Down by Percentage of Time in Each Density Altitude-Airspeed Range

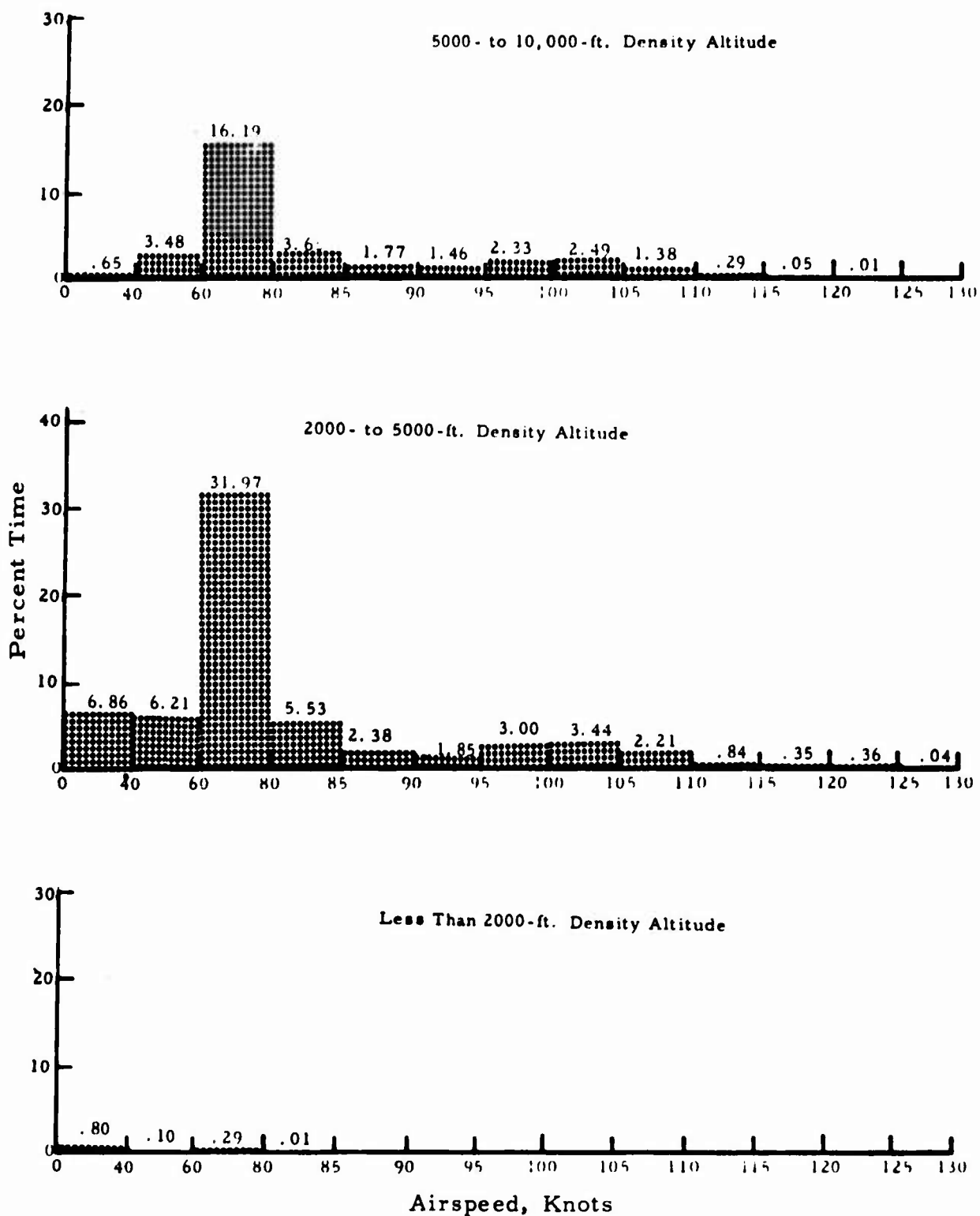


Figure 13. Time in Steady-State Mission Segment in 24,000- to 26,000-Pound Gross Weight Range Broken Down by Percentage of Time in Each Density Altitude-Airspeed Range

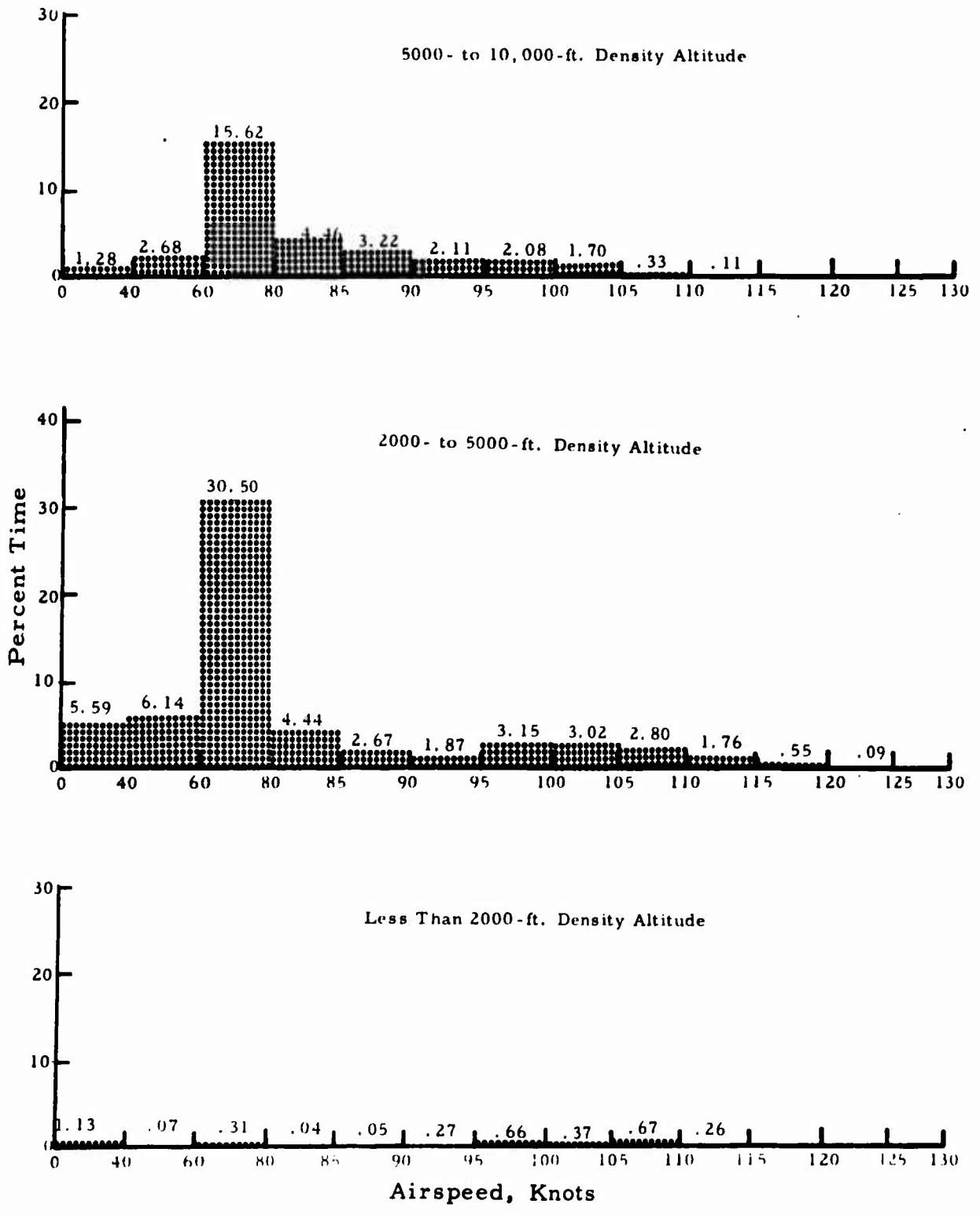


Figure 14. Time in Steady-State Mission Segment in 26,000- to 28,000-Pound Gross Weight Range Broken Down by Percentage of Time in Each Density Altitude-Airspeed Range

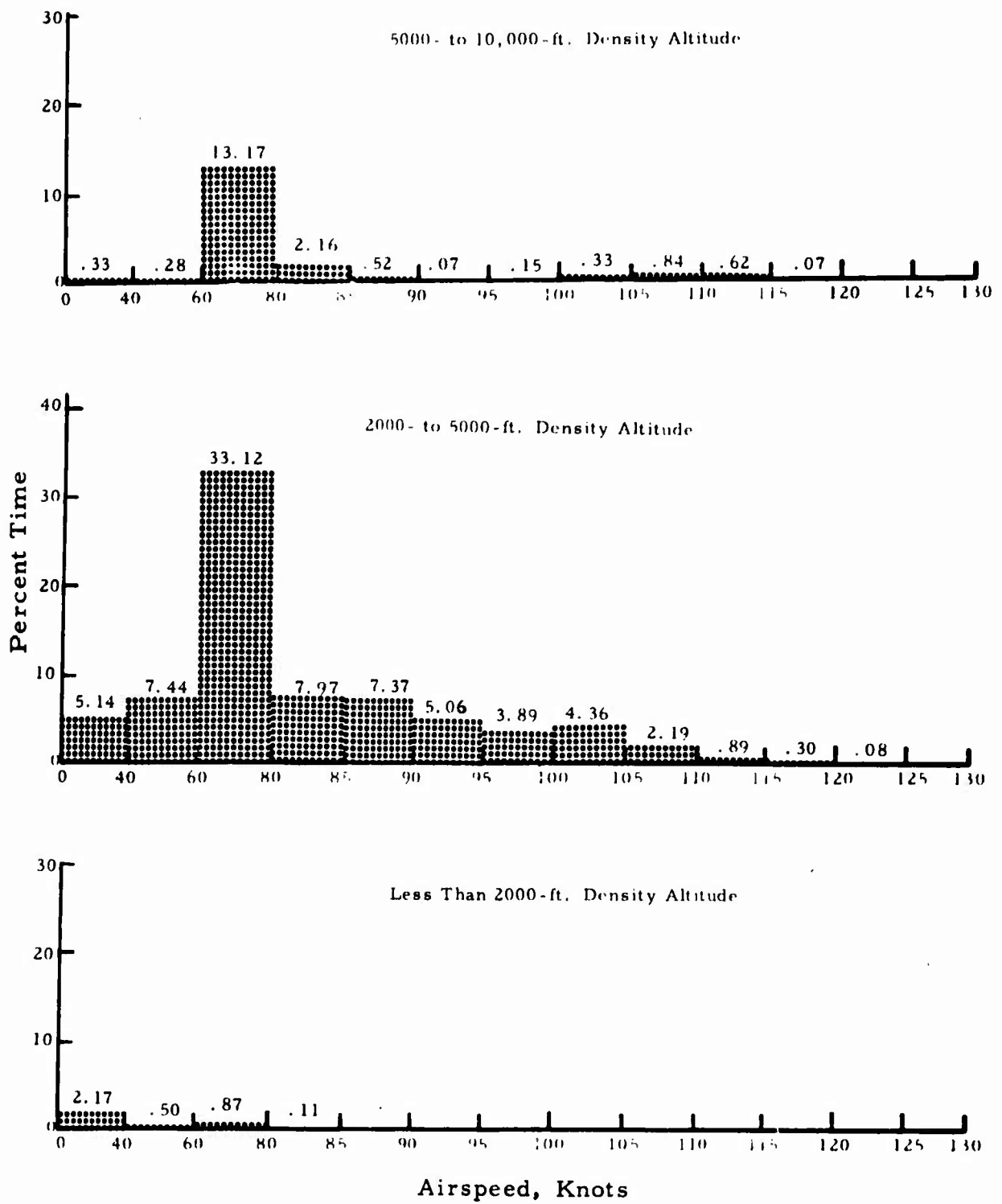


Figure 15. Time in Steady-State Mission Segment in 28,000- to 30,000-Pound Gross Weight Range Broken Down by Percentage of Time in Each Density Altitude-Airspeed Range

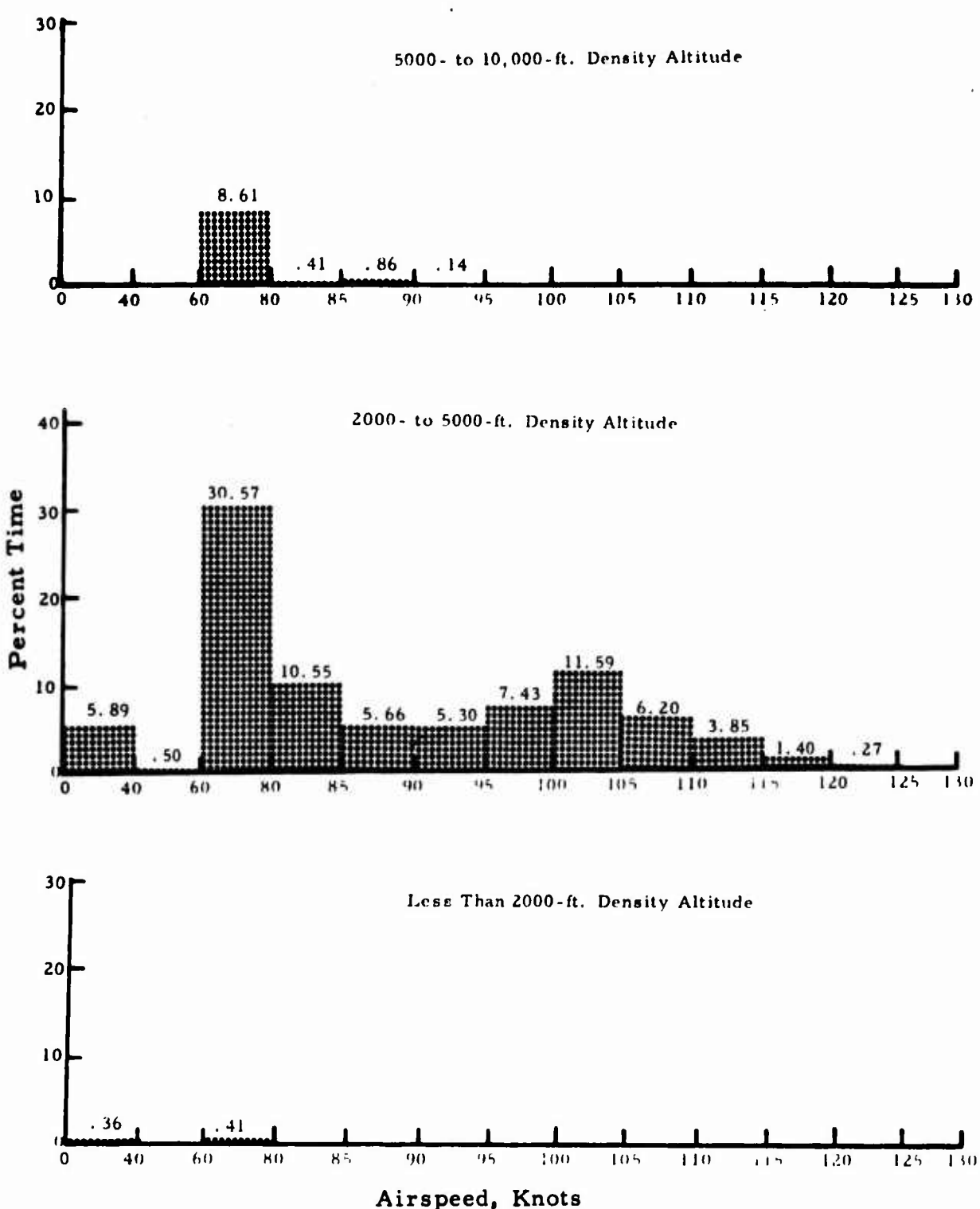


Figure 16. Time in Steady-State Mission Segment in 30,000- to 32,000-Pound Gross Weight Range Broken Down by Percentage of Time in Each Density Altitude-Airspeed Range

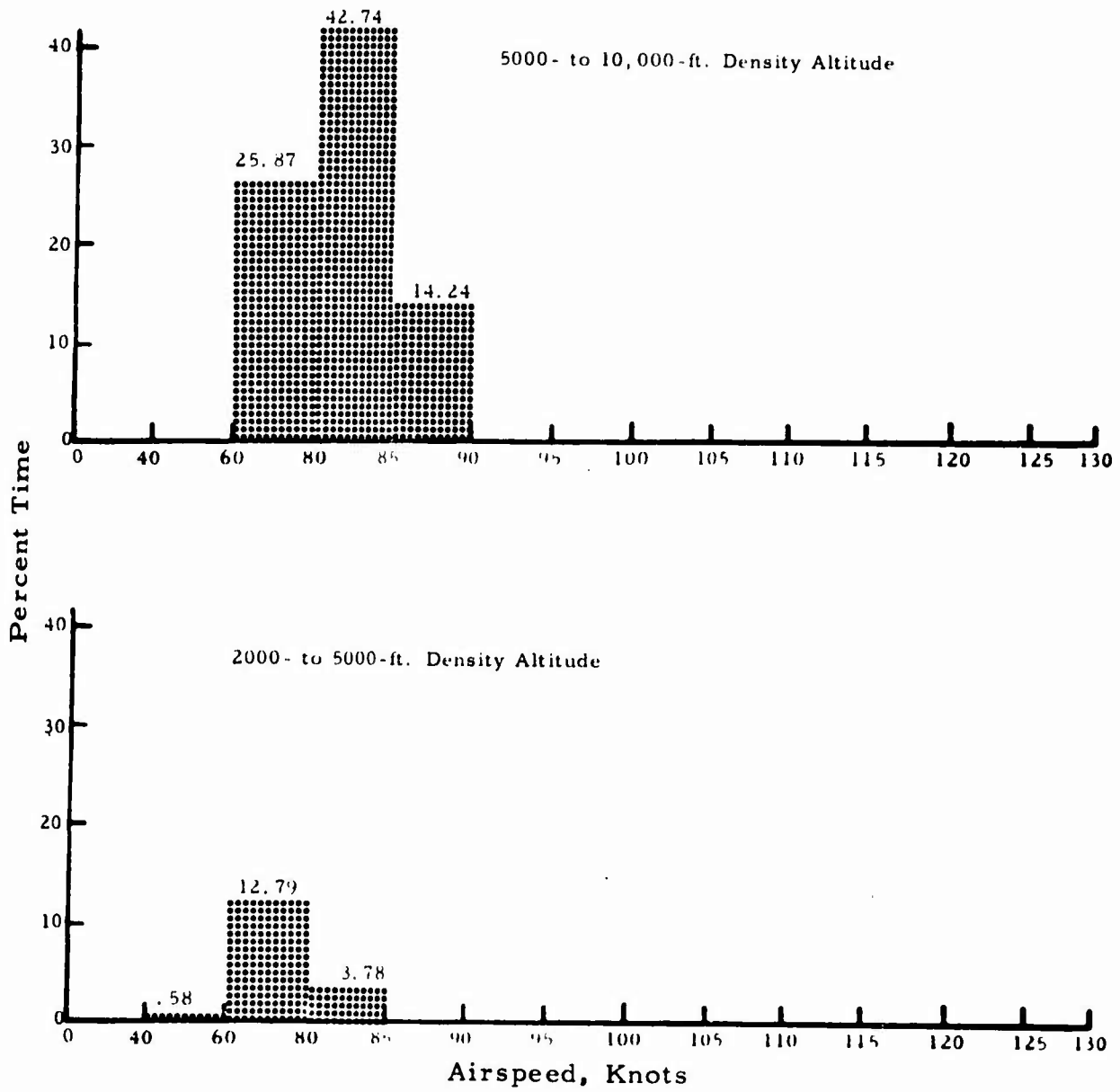
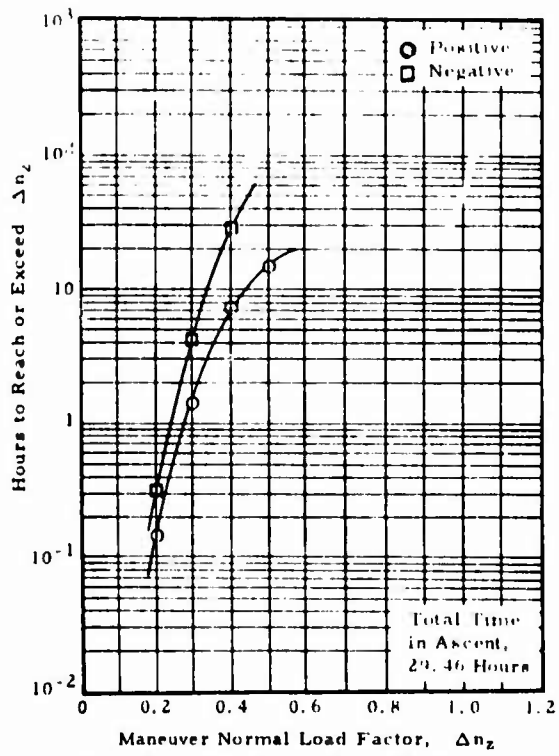
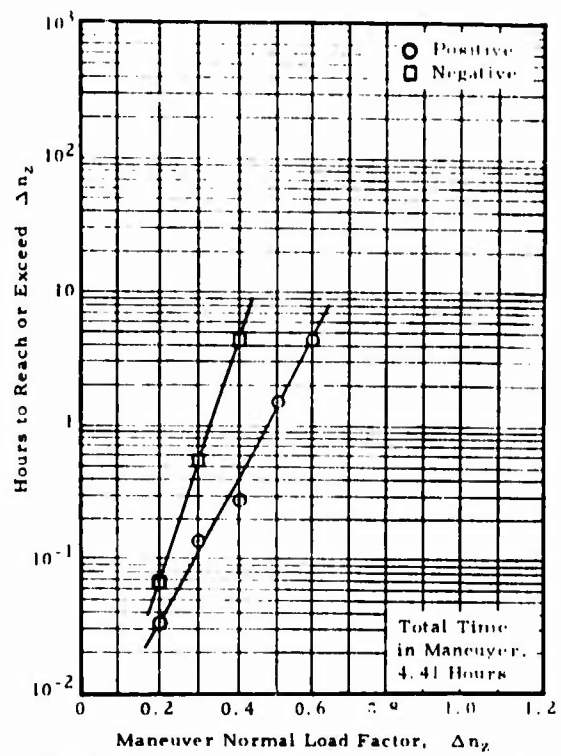


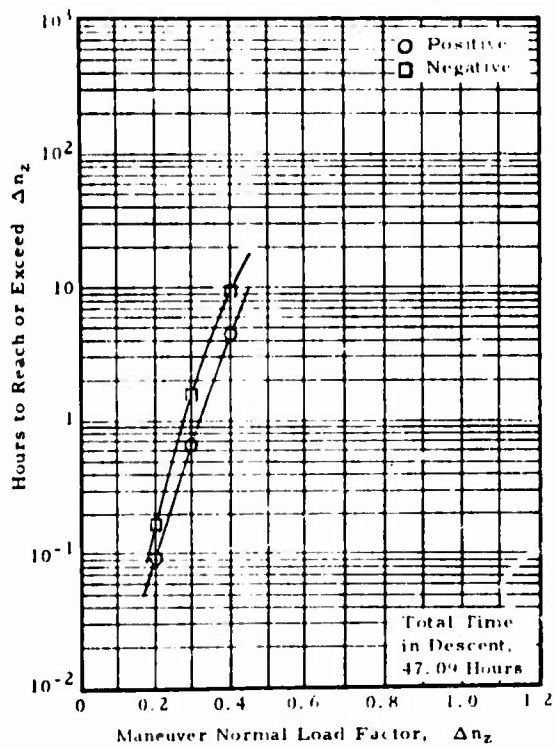
Figure 17. Time in Steady-State Mission Segment in 32,000- to 34,000-Pound Gross Weight Range Broken Down by Percentage of Time in Each Density Altitude-Airspeed Range



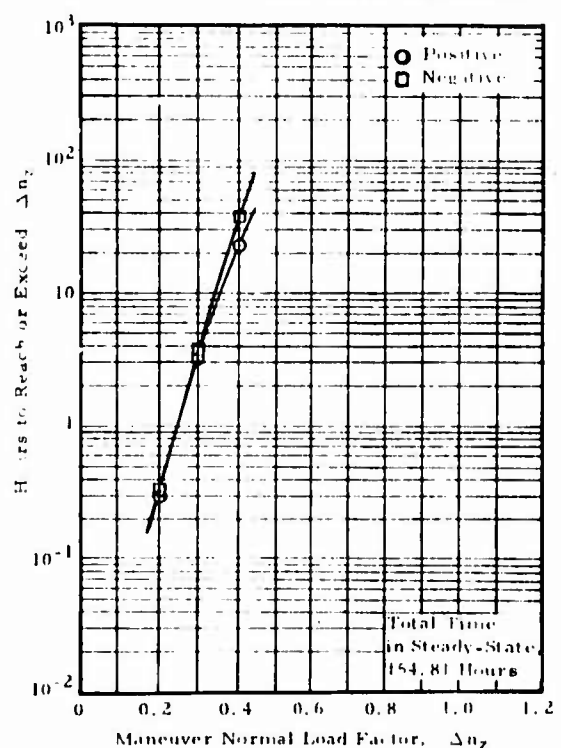
(a) Ascent Mission Segment



(b) Maneuver Mission Segment

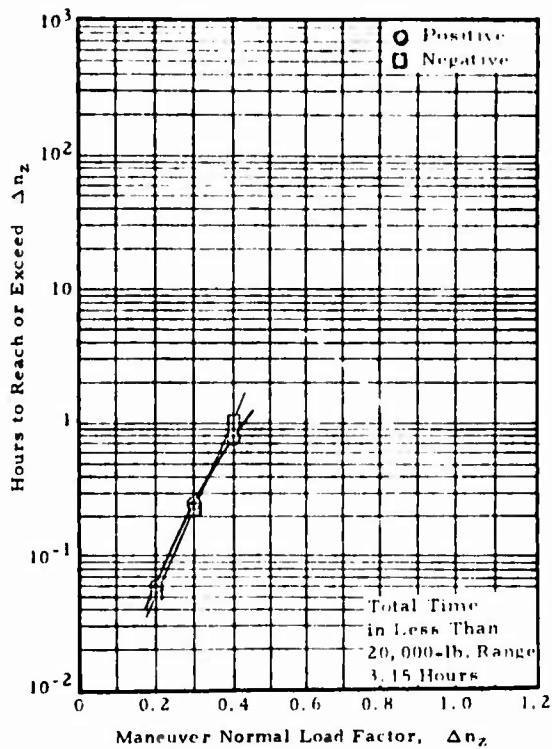


(c) Descent Mission Segment

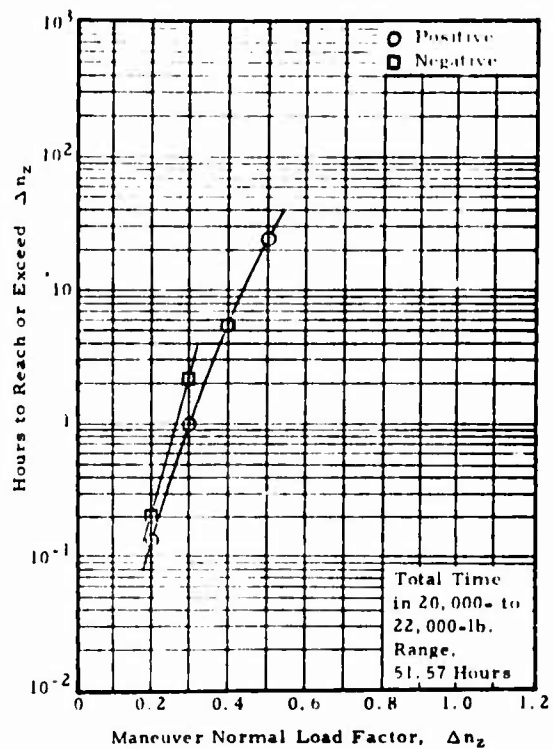


(d) Steady-State Mission Segment

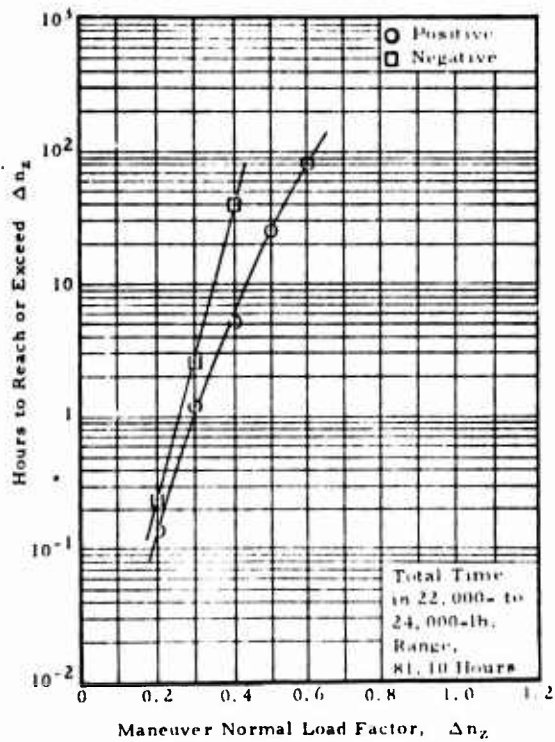
Figure 18. Exceedance Curves for Incremental Maneuver Normal Load Factor Peaks by Mission Segment



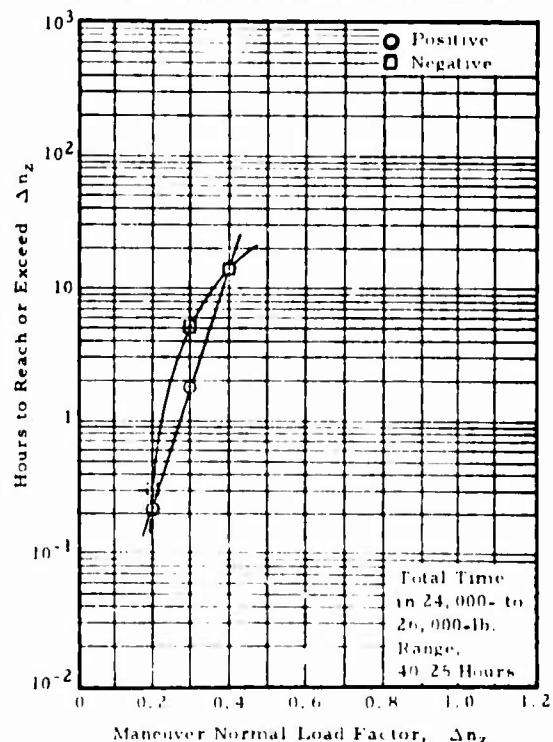
(a) Less Than 20,000 Pounds



(b) 20,000 to 22,000 Pounds

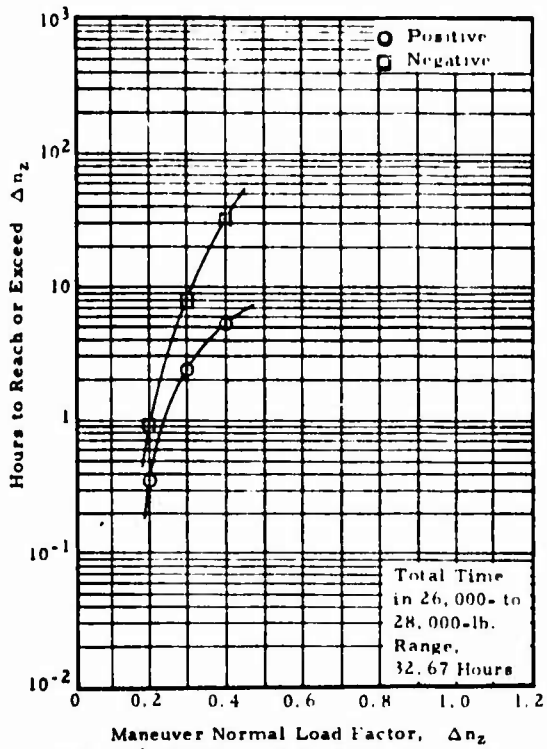


(c) 22,000 to 24,000 Pounds

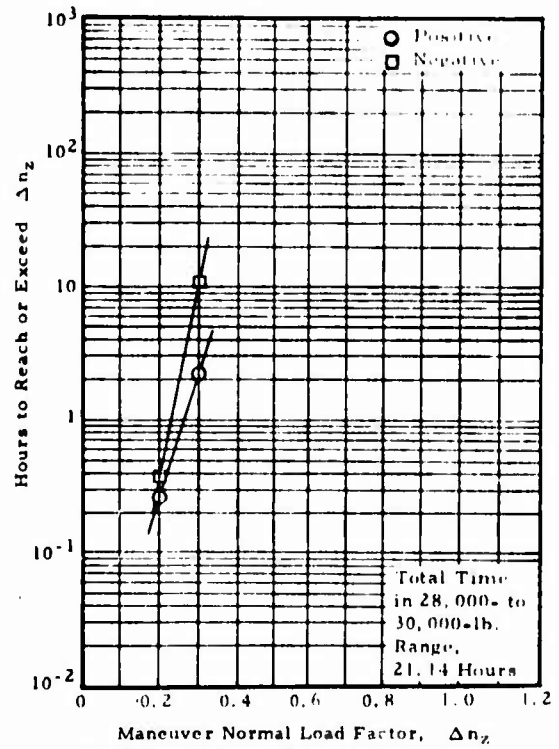


(d) 24,000 to 26,000 Pounds

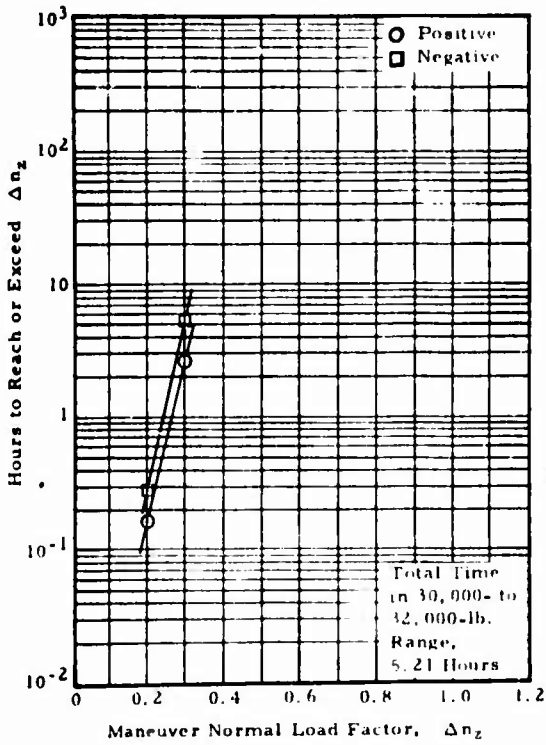
Figure 19. Exceedance Curves for Incremental Maneuver Normal Load Factor Peaks by Gross Weight Range



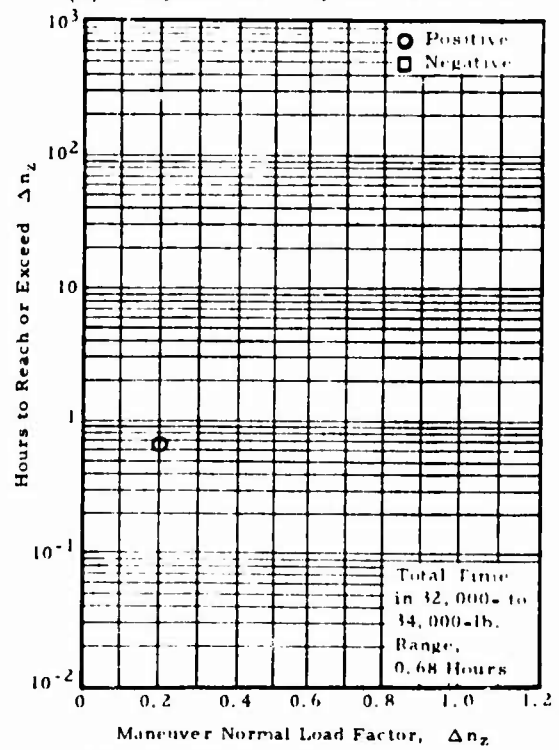
(e) 26,000 to 28,000 Pounds



(f) 28,000 to 30,000 Pounds



(g) 30,000 to 32,000 Pounds



(h) 32,000 to 34,000 Pounds

Figure 19 - contd.

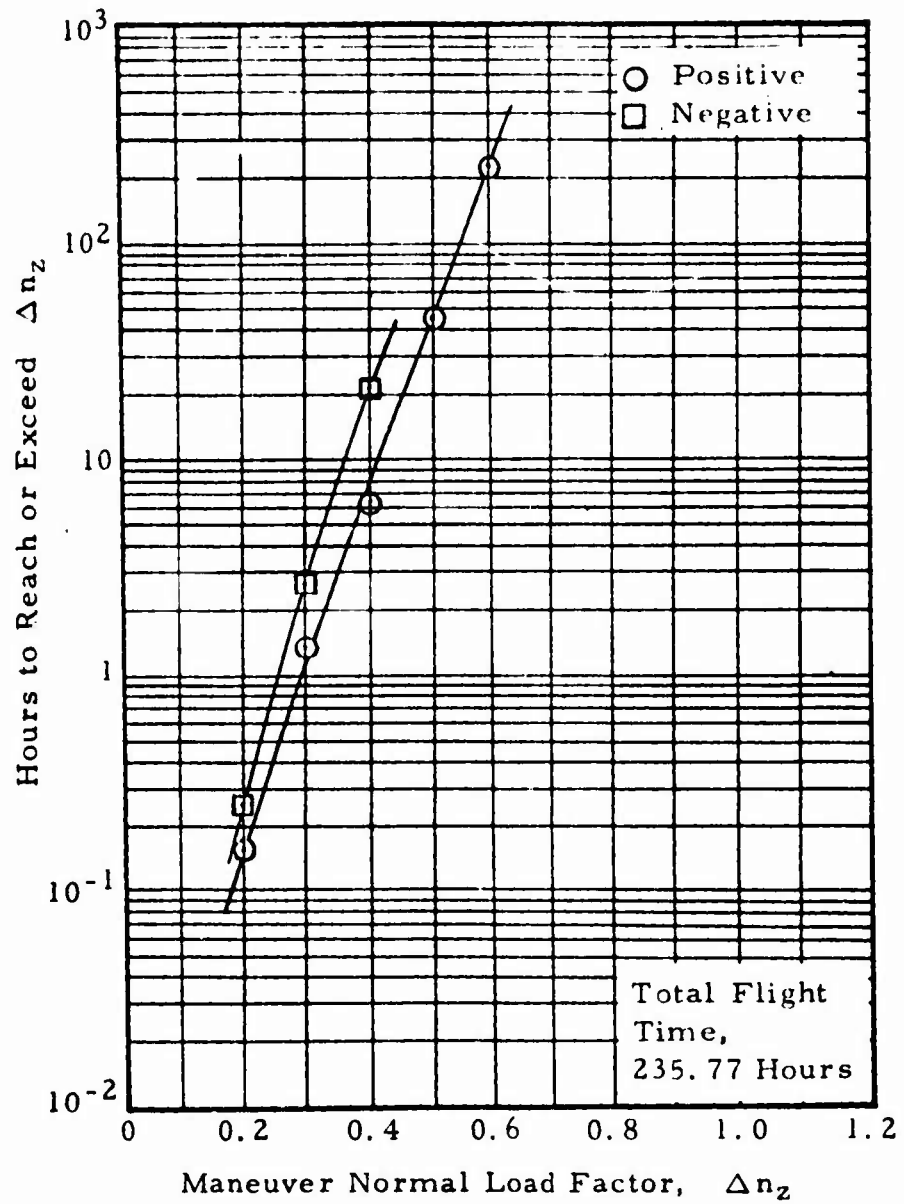
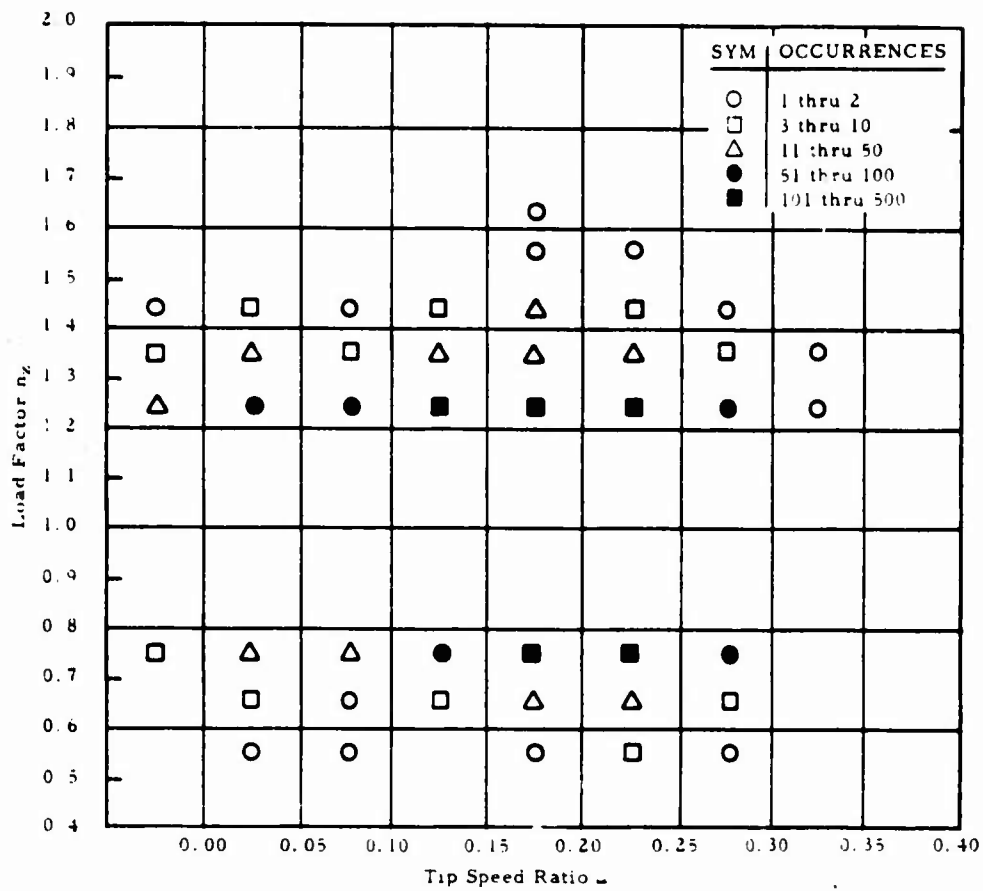
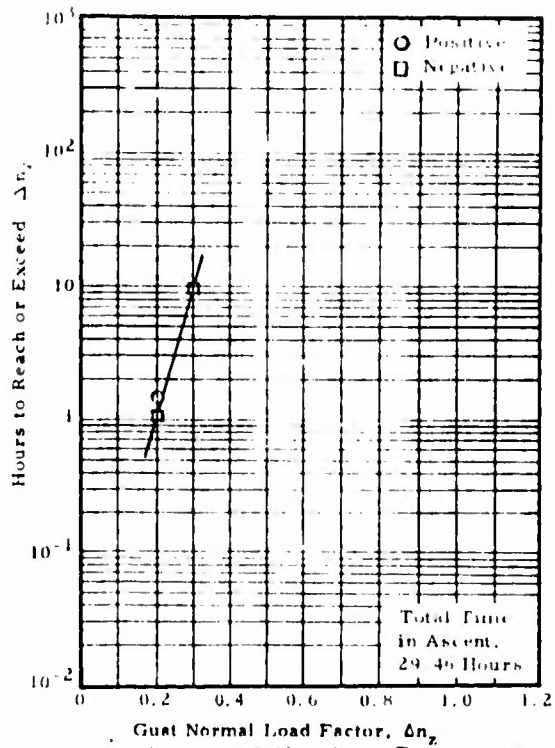


Figure 20. Exceedance Curves for the Composite of Incremental Maneuver Normal Load Factor Peaks

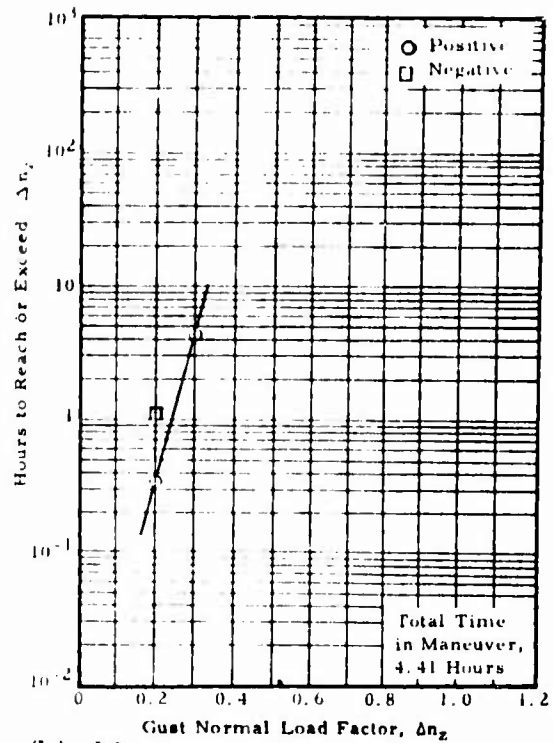


Load Factor $n_z$	Tip Speed Ratio $\mu$								Total
	Less Than 0.00	0.00 to 0.05	0.05 to 0.10	0.10 to 0.15	0.15 to 0.20	0.20 to 0.25	0.25 to 0.30	0.30 to 0.35	
1.7 to 1.8									
1.6 to 1.7					1				1
1.5 to 1.6					2	2			4
1.4 to 1.5	2	5	1	3	11	8	2		32
1.3 to 1.4	6	20	7	15	44	34	8	1	135
1.2 to 1.3	17	88	55	122	438	373	89	1	1183
0.8 to 1.2									
0.7 to 0.8	7	39	19	67	257	349	57		795
0.6 to 0.7		8	1	4	20	35	4		72
0.5 to 0.6		1	1		2	5	2		11
0.4 to 0.5									
Total	32	161	84	211	774	807	162	2	2233

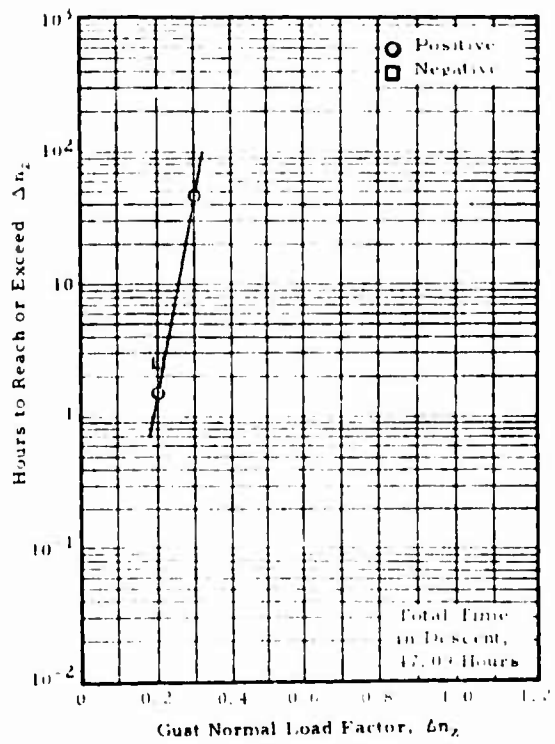
Figure 21. Diagram and Tabulation of Maneuver Normal Load Factor Peaks in Ranges of Rotor Tip Speed Ratio



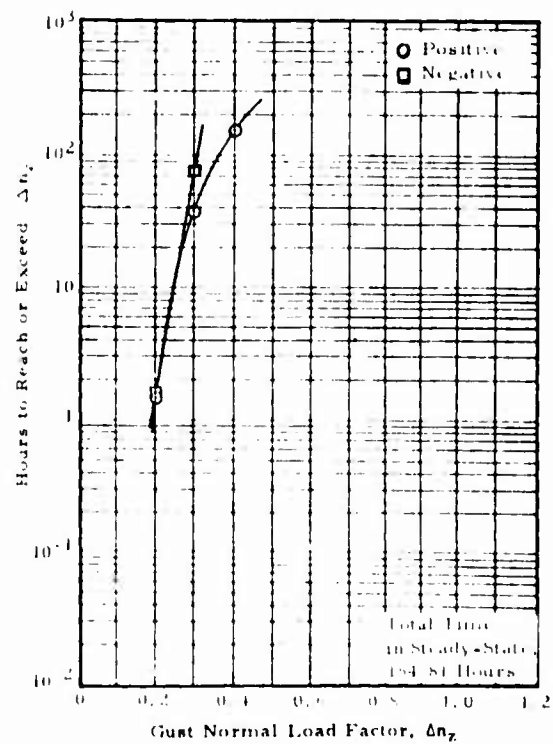
(a) Ascent Mission Segment



(b) Maneuver Mission Segment

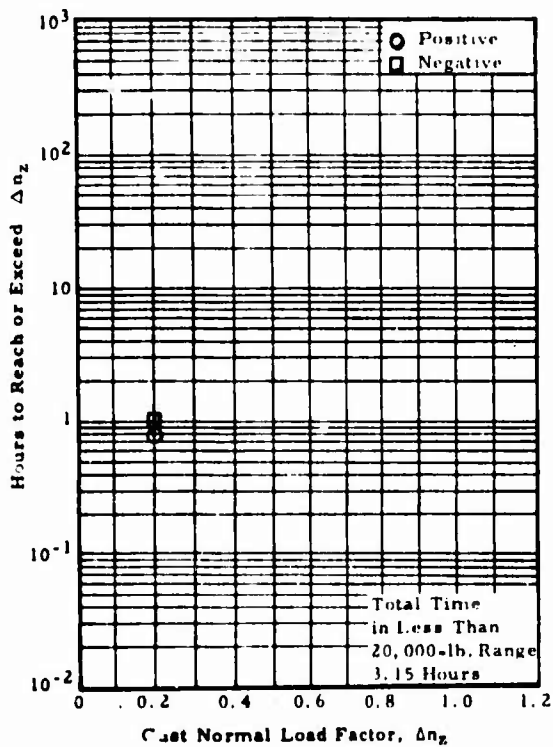


(c) Descent Mission Segment

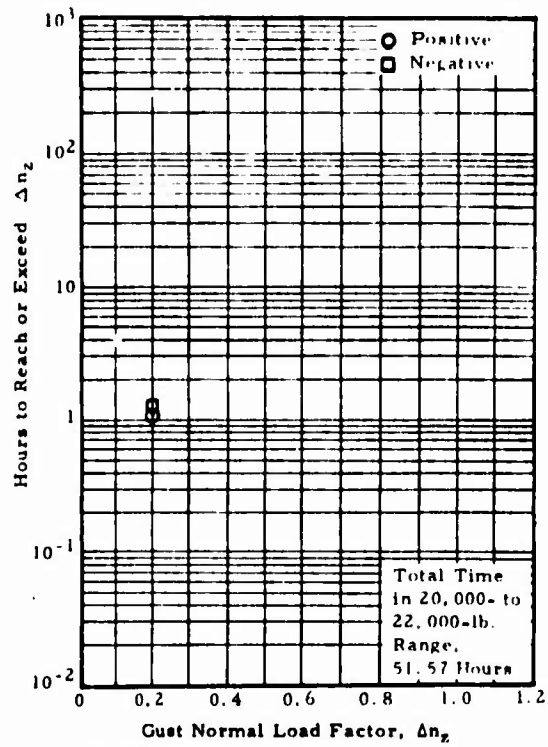


(d) Steady-State Mission Segment

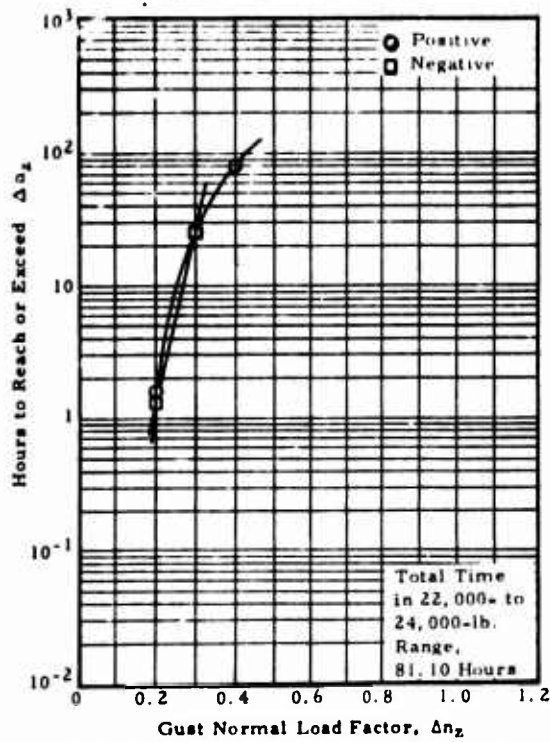
Figure 22. Exceedance Curves for Incremental Gust Normal Load Factor Peaks by Mission Segment



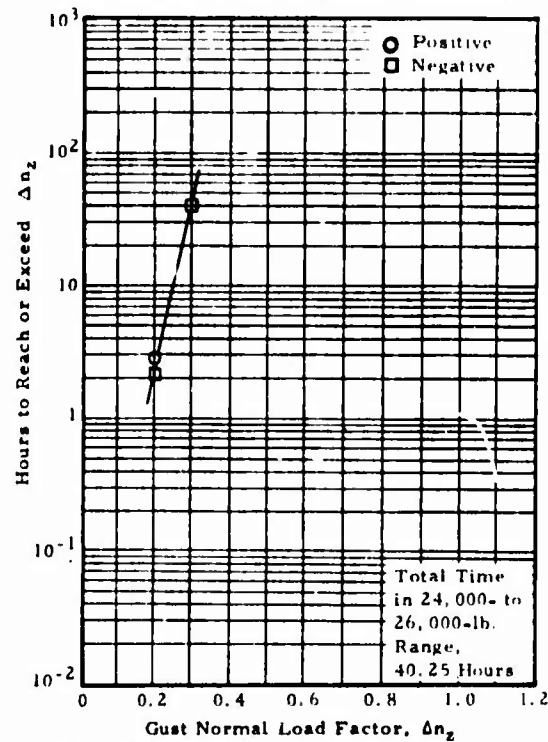
(a) Less Than 20,000 Pounds



(b) 20,000 to 22,000 Pounds

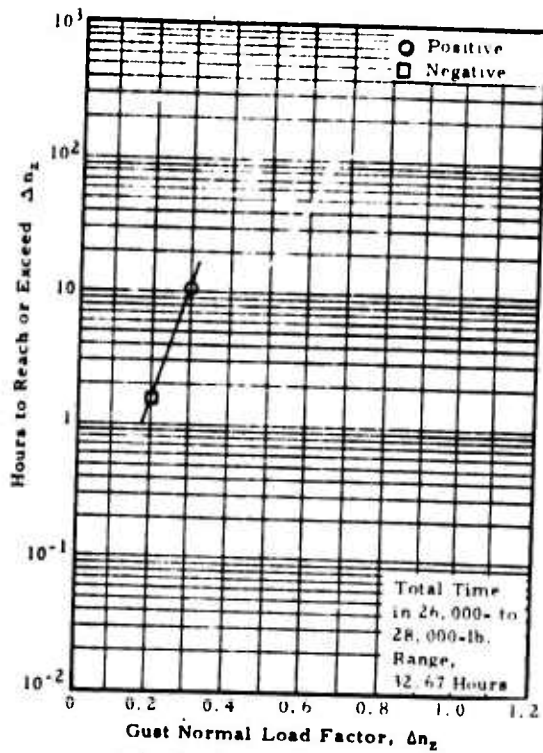


(c) 22,000 to 24,000 Pounds

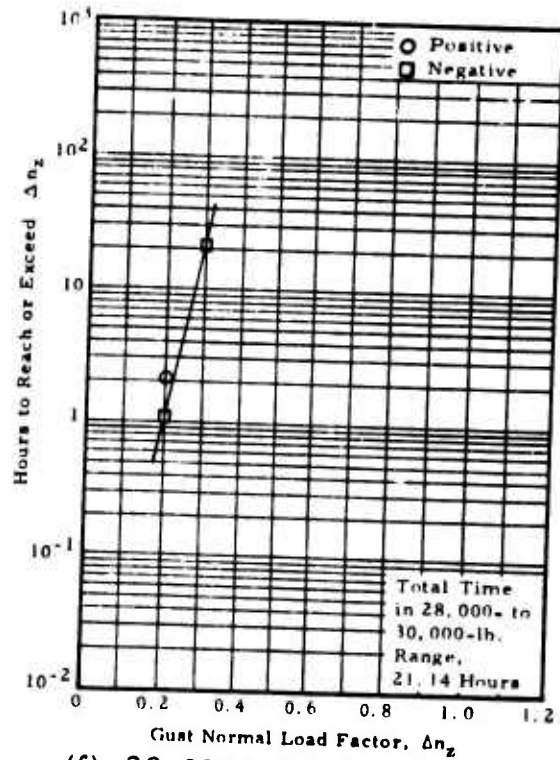


(d) 24,000 to 26,000 Pounds

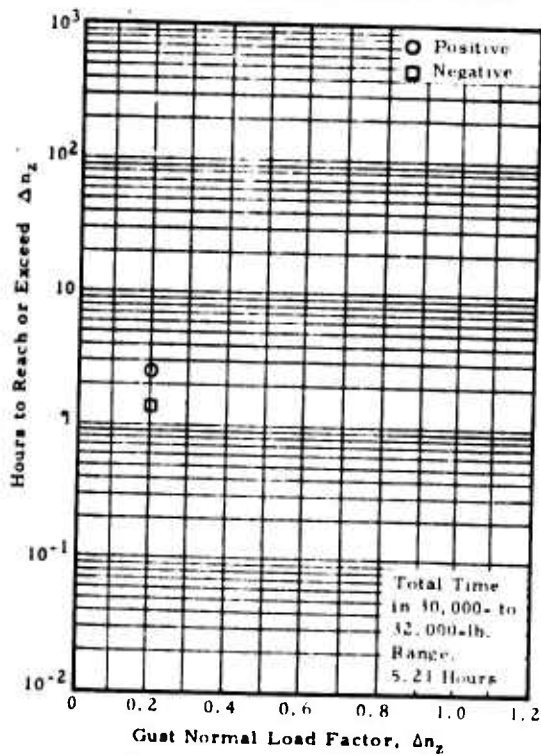
Figure 23. Exceedance Curves for Incremental Gust Normal Load Factor Peaks by Gross Weight Range



(e) 26,000 to 28,000 Pounds



(f) 28,000 to 30,000 Pounds



(g) 30,000 to 32,000 Pounds

Figure 23 - contd.

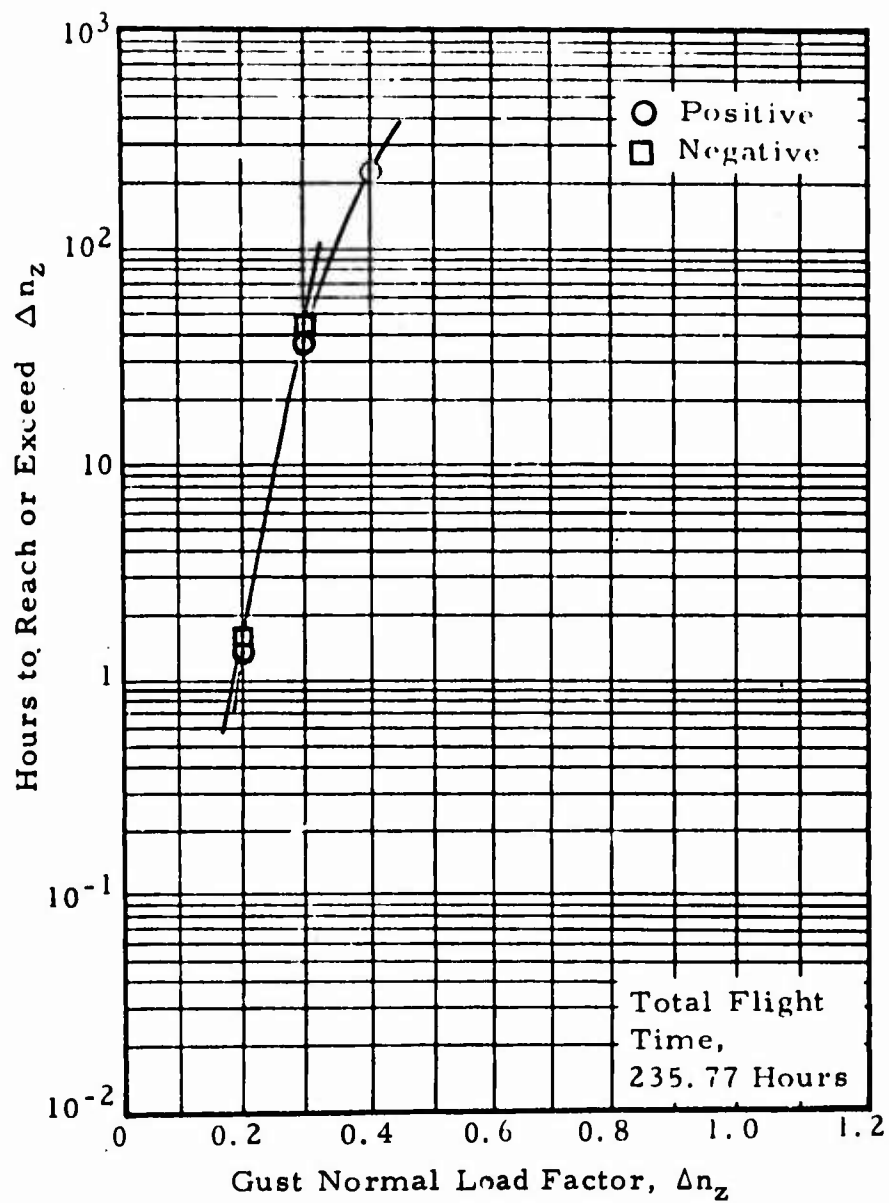
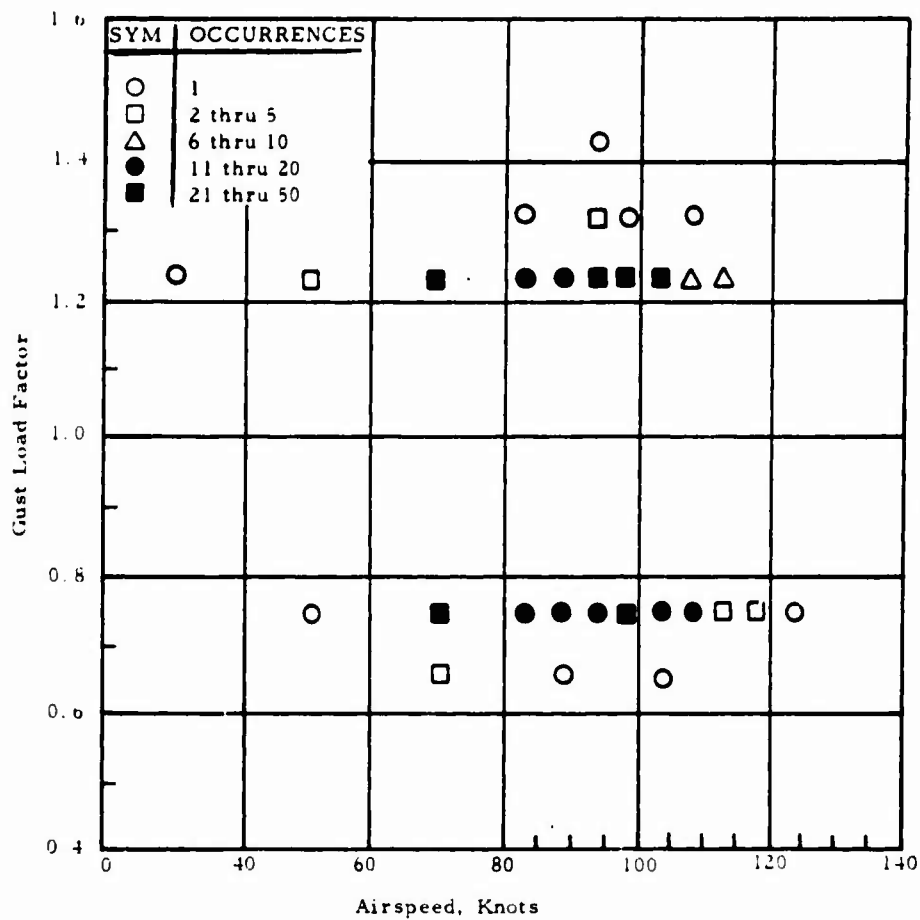


Figure 24. Exceedance Curves for Composite of Incremental Gust Normal Load Factor Peaks



Gust Load Factor $n_z$	Airspeed, Knots												Total
	Less Than 40	40 to 60	60 to 80	80 to 85	85 to 90	90 to 95	95 to 100	100 to 105	105 to 110	110 to 115	115 to 120	120 to 125	
1.5 to 1.6													
1.4 to 1.5						1							1
1.3 to 1.4				1		2	1		1				5
1.2 to 1.3	1	3	34	15	12	26	21	34	10	6			162
0.8 to 1.2													
0.7 to 0.8		1	31	19	16	14	25	16	12	3	2	1	140
0.6 to 0.7			3		1			1					5
0.5 to 0.6													
Total	1	4	68	35	29	43	47	51	23	9	2	1	313

Figure 25. Diagram and Tabulation of Gust Normal Load Factor Peaks in Ranges of Indicated Airspeeds

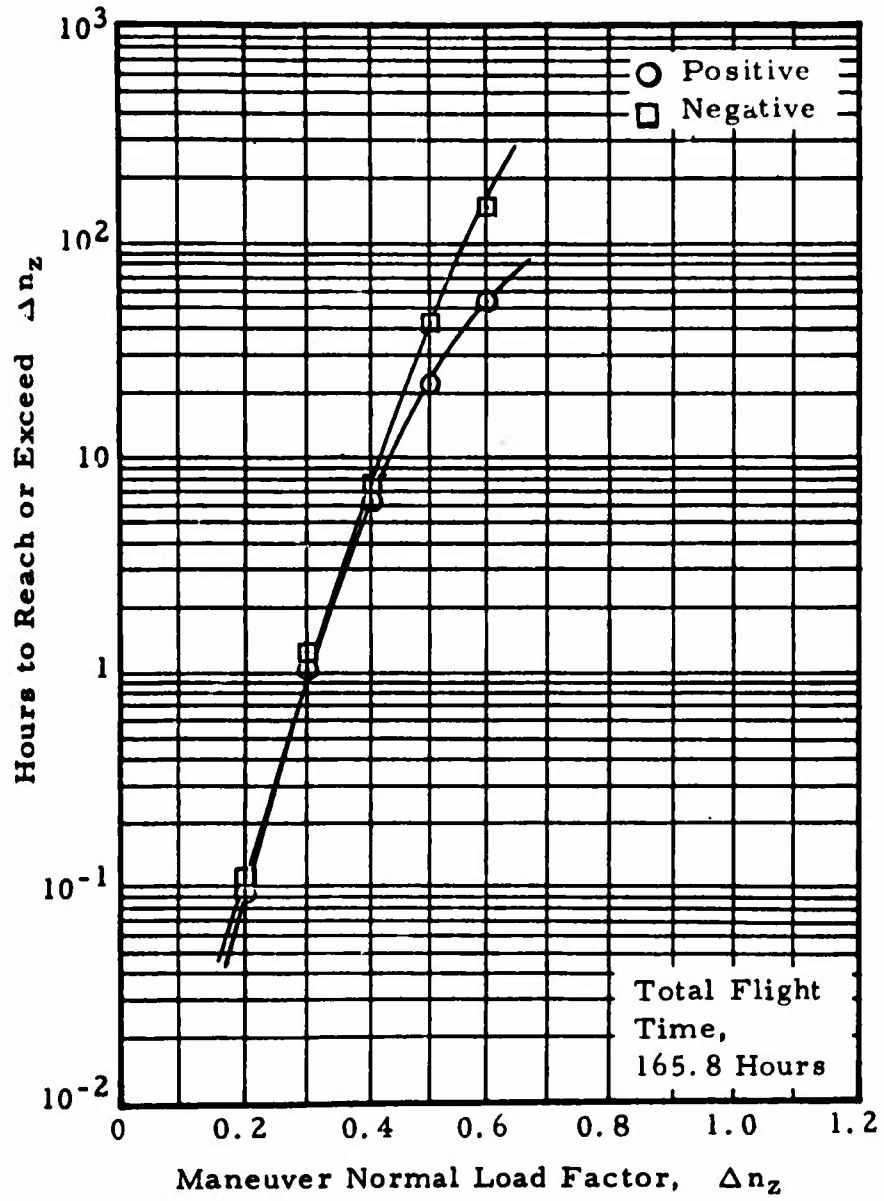


Figure 26. CH-47A Maneuver Spectrum from Reference 3

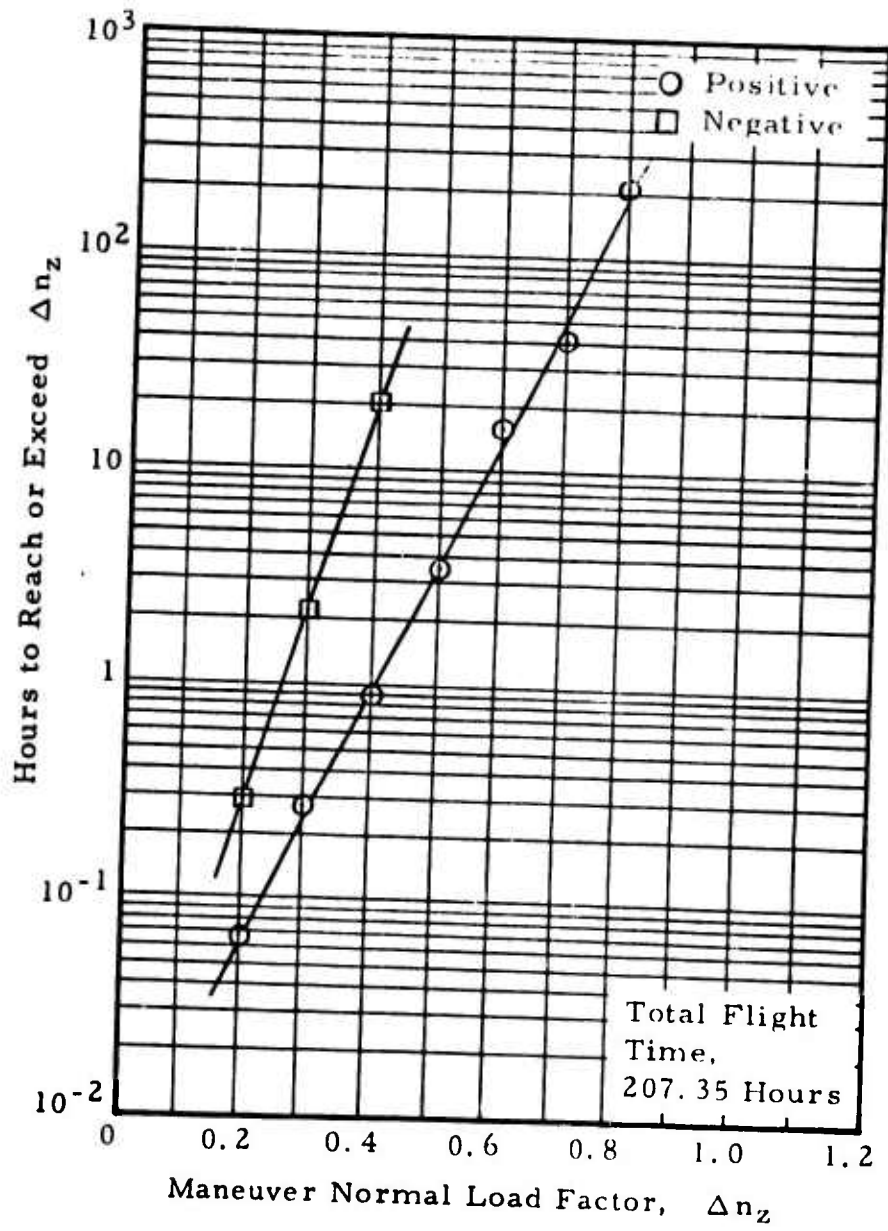


Figure 27. Armed CH-47A Maneuver Spectrum from Reference 4

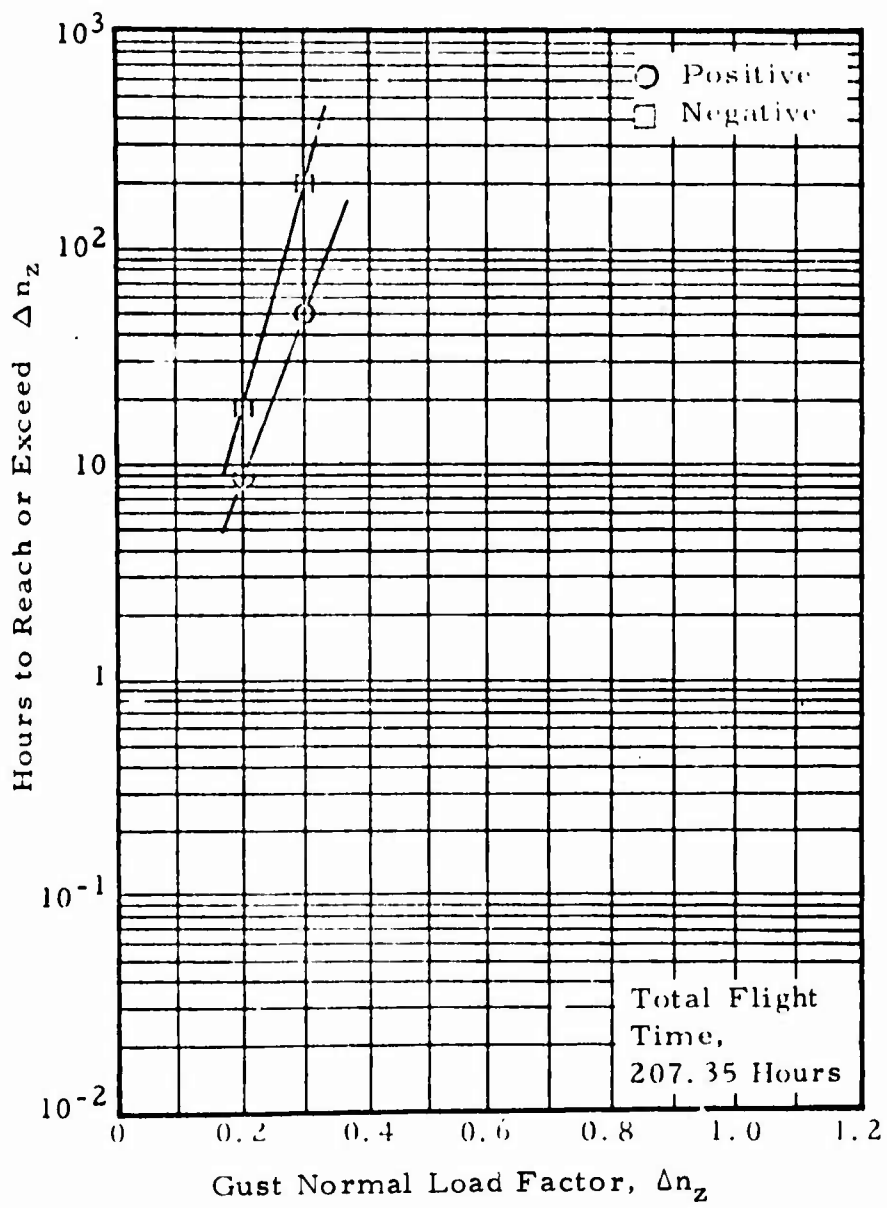


Figure 28. Armed CH-47A Gust Spectrum from Reference 4

## APPENDIX II

### TABLES FOR DATA PRESENTATION

Tables III through XXXIII listing all processed data are computer print-outs. All times in these tables were rounded off to the nearest tenth of a minute. Total times, as well as individual times, are accurate within 0.05 of a minute since the individual times comprising the respective totals were summed before the totals were rounded off. However, the addition of some printed individual times may differ from the corresponding printed total time by some fraction of a minute. Any time between 0 and up to but not including 0.05 minute was printed as "0.0," and no time measured was printed as "0." Tables having no points or time were not printed.

Table headings are arranged so that the first-mentioned parameter refers to the vertical ranges at the left of the table; the second-mentioned parameter refers to the horizontal ranges at the top of the table. Where a third or fourth parameter is mentioned, it is followed by its range in the heading. As an example, the heading "NZ GUST PEAKS VS VEL. BY MISS. SEG. ASCENT, ALT. LESS, WGT. 30,000" indicates the number of gust  $n_z$  peaks in selected airspeed ranges for ascent, altitude below 1000 feet, and weight between 30,000 and 32,000 pounds.

Tables VIII through XXI list the number of observed peaks of either the longitudinal cyclic stick position or the collective stick position as a function of two other variables. Each table consists of several subtables. In each subtable, the ordinate gives the ranges of the peak values, and the abscissa, running immediately above the subtable proper, shows the ranges of the first related variable. Then, the heading above each subtable abscissa is the individual range of the second related variable. The figures within the subtable proper represent the number of peaks in the given ordinate ranges along with the corresponding ranges of the two related variables. For example, in each subtable of Table VIII, the ordinate gives the ranges for the longitudinal cyclic stick position peaks, the abscissa gives the ranges for the steady longitudinal cyclic stick position values just before the peak occurrence, and the heading gives the range of the simultaneous steady collective stick position values. Those tables with the steady stick value as the abscissa represent the steady-state mission segment and also include the time spent in the various ranges of the steady stick values. No times are given for the tables representing the ascent, descent, or maneuver mission segments.

With the exception of the code "LESS," the code for each range gives its lower limit. The following listing gives the range codes for all parameters:

<u>Airspeed (knots)</u>		<u>Gust <math>n_z</math> and Maneuver <math>n_z</math> (g)</u>	
<u>Code</u>	<u>Range</u>	<u>Code</u>	<u>Range</u>
Less	Below 40	Less	Below 0.2
40	40 to 60	0.2	0.2 to 0.4
60	60 to 80	0.4	0.4 to 0.5
80	80 to 85	0.5	0.5 to 0.6
85	85 to 90	0.6	0.6 to 0.7
90	90 to 95	0.7	0.7 to 0.8
95	95 to 100	0.8	0.8 to 1.2
100	100 to 105	1.2	1.2 to 1.3
105	105 to 110	1.3	1.3 to 1.4
110	110 to 115	1.4	1.4 to 1.5
115	115 to 120	1.5	1.5 to 1.6
120	120 to 125	1.6	1.6 to 1.7
125	125 to 130	1.7	1.7 to 1.8
130	130 to 135	1.8	1.8 to 2.0
135	135 to 140	2.0	2.0 to 2.2
140	Above 140	2.2	2.2 to 2.4
		2.4	Above 2.4

<u>Rate of Climb (ft/min)</u>		<u>Collective &amp; Cyclic Stick Peaks (%)</u>		<u>Collective &amp; Cyclic Stick Steady (%)</u>	
<u>Code</u>	<u>Range</u>	<u>Code</u>	<u>Range</u>	<u>Code</u>	<u>Range</u>
Less	Below -2500	Less	Below -40	Less	Below 10
-2500	-2500 to -2000	-40	-40 to -30	10	10 to 20
-2000	-2000 to -1500	-30	-30 to -20	20	20 to 30
-1500	-1500 to -1000	-20	-20 to -10	30	30 to 40
-1000	-1000 to -500	-10	-10 to 10	40	40 to 50
-500	-500 to 500	10	10 to 20	50	50 to 60
500	500 to 1000	20	20 to 30	60	60 to 70
1000	1000 to 1500	30	30 to 40	70	70 to 80
1500	1500 to 2000	40	Above 40	80	80 to 90
2000	2000 to 2500			90	Above 90
2500	Above 2500				

Tip Speed Ratio	
Code	Range
Less	Below 0.00
0.00	0.00 to 0.05
0.05	0.05 to 0.10
0.10	0.10 to 0.15
0.15	0.15 to 0.20
0.20	0.20 to 0.25
0.25	0.25 to 0.30
0.30	0.30 to 0.35
0.35	Above 0.35

Weight (pounds)	
Code	Range
Less	Below 20,000
20,000	20,000 to 22,000
22,000	22,000 to 24,000
24,000	24,000 to 26,000
26,000	26,000 to 28,000
28,000	28,000 to 30,000
30,000	30,000 to 32,000
32,000	Above 32,000

Rotor RPM		Altitude (feet)		Thrust Coefficient Ratio	
Code	Range	Code	Range	Code	Range
Less	Below 210	1000	Below 1000	Less	Below 0.06
210	210 to 220	2000	1000 to 2000	0.06	0.06 to 0.09
220	220 to 230	5000	2000 to 5000	0.09	0.09 to 0.12
230	230 to 240	10,000	5000 to 10,000	0.12	0.12 to 0.15
240	240 to 250	15,000	10,000 to 15,000	0.15	Above 0.15
250	Above 250	20,000	15,000 to 20,000		
			Above 20,000		

Outside Air Temperature (°F)	
Code	Range
Less	Below 0
0	0 to 10
10	10 to 20
20	20 to 30
30	30 to 40
40	40 to 50
50	50 to 60
60	60 to 70
70	70 to 80
80	80 to 90
90	Above 90

Airspeed Acceleration (ft/sec <sup>2</sup> )	
Code	Range
Less	Below -15
-15	-15 to -12
-12	-12 to -9
-9	-9 to -6
-6	-6 to -3
-3	-3 to 3
3	3 to 6
6	6 to 9
9	9 to 12
12	Above 12

**TABLE III  
FLIGHT TIME FOR MISSION SEGMENT VERSUS WEIGHT**

	TIME(MINUTES) FOR MISSION SEGMENT VS WEIGHT										TOTAL	TOTAL (HOURS)
	LESS	20000	22000	24000	26000	28000	30000	32000	TOTAL			
ASCENT	26.3	359.1	691.5	278.2	195.4	172.6	41.6	3.0	1747.6		29.5	
MANUVR		76.4	115.5	25.4	42.5	4.7			264.5		4.4	
DESCENT	67.9	783.8	921.9	436.3	349.9	210.2	49.8	3.4	2825.1		47.1	
STEADY	94.5	1874.9	3137.1	1673.4	1372.7	880.8	221.0	34.4	9288.8		154.8	
TOTAL	188.7	3094.1	4866.0	2415.3	1960.5	1268.2	312.3	40.8	14146.0		235.8	

**TABLE IV  
STEADY-STATE TIME FOR ALTITUDE VERSUS  
AIRSPEED BY WEIGHT AND TOTAL**

TIME(MINUTES) FOR ALTITUDE VS VELOCITY BY WEIGHT LESS																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
LESS																	
1000	0.8		1.1	0.3	0.4												1.9
2000	8.2	3.8	24.9	1.7	3.8	7.5	8.4	11.8	7.0								79.6
5000		0.7	5.4	2.3	1.1	3.3	0.8	5.6	1.7	0.6							14.1
10000																	
15000																	
20000																	
TOTAL	9.0	4.5	30.6	3.8	5.4	10.8	9.2	12.4	8.7	0.6							94.5

TIME(MINUTES) FOR ALTITUDE VS VELOCITY BY WEIGHT 20000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
LESS	1.6	0.3	0.9														2.8
1000	32.0	7.1	11.5	3.8	3.0	4.3	3.7	1.5	0.6								66.2
2000	163.9	67.0	397.2	94.5	93.6	76.8	120.4	121.4	65.1	22.3	4.4	0.3	0.1				1217.7
5000	5.9	16.4	121.9	55.7	60.0	71.9	85.9	90.4	47.7	23.3	3.8	0.2					582.5
10000			4.7	1.1													5.7
15000																	
20000																	
TOTAL	203.4	90.7	536.0	154.5	146.6	153.0	239.3	213.4	113.6	45.6	8.2	0.5	0.1				1874.9

TIME(MINUTES) FOR ALTITUDE VS VELOCITY BY WEIGHT 22000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
LESS	6.7			0.6				2.9									9.2
1000	35.6	2.5	17.2	5.8	6.8	15.3	11.7	6.4	9.2	3.1	0.8						137.1
2000	253.1	97.1	735.6	194.9	122.9	114.5	151.4	174.8	114.5	46.9	11.4	5.6	0.3				2233.4
5000	11.4	36.0	256.6	139.5	118.2	141.5	131.3	90.4	48.6	25.1	3.1	0.6					997.4
10000																	
15000																	
20000																	
TOTAL	306.8	135.5	1003.9	345.8	247.9	271.3	294.4	272.1	172.6	73.1	15.5	6.1	3.3				3137.1

TIME(MINUTES) FOR ALTITUDE VS VELOCITY BY WEIGHT 24000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
LESS	0.7			1.1													1.7
1000	12.7	1.6	3.7	0.2													18.2
2000	114.8	104.0	535.3	92.9	39.9	31.0	50.2	57.6	37.3	14.0	5.8	6.1	0.7	0.1			1286.6
5000	10.9	58.2	271.0	81.3	79.6	24.5	39.2	41.6	23.1	4.9	0.9	0.1					564.9
10000																	
15000																	
20000																	
TOTAL	139.1	167.8	811.7	153.7	69.5	55.5	89.7	99.1	60.1	18.8	6.7	6.2	0.7	0.1			1673.4

TIME(MINUTES) FOR ALTITUDE VS VELOCITY BY WEIGHT 26000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
LESS	0.5																0.5
1000	19.0	9.7	4.9	0.5	0.7	3.7	9.0	5.1	9.2	3.6							51.7
2000	76.8	84.2	418.5	81.7	36.7	25.7	43.3	41.4	38.5	24.2	7.6	1.2					854.2
5000	17.6	36.8	214.3	81.2	44.2	28.9	28.6	23.4	4.5	1.5							461.1
10000																	
15000																	
20000																	
TOTAL	109.8	121.9	637.1	122.7	81.7	58.3	81.3	68.9	52.2	29.4	7.6	1.2					1372.7

TABLE IV - contd.

TIME(MINUTES) FOR ALTITUDE VS VELOCITY BY WEIGHT 2000C

	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
LESS	1.2	0.9	1.1	1.0													6.1
1000	17.9	3.5	6.4														27.9
2000	45.3	45.5	291.8	70.2	64.9	44.6	34.3	38.4	19.3	7.8	2.6	0.7					685.5
5000	2.9	2.5	116.0	19.0	4.6	0.6	1.3	2.9	7.4	5.5	0.6						163.3
10000																	
15000																	
20000																	
TOTAL	67.3	72.4	415.5	90.2	69.5	45.2	35.6	41.3	26.7	13.3	3.2	0.7					880.8

TIME(MINUTES) FOR ALTITUDE VS VELOCITY BY WEIGHT 3000C

	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
LESS	0.8		0.9														1.8
1000	13.0	1.1	67.5	23.3	12.5	11.7	16.4	25.6	13.7	8.5	3.1	0.6					197.1
2000			19.0	0.9	1.9	0.3											22.1
5000																	
10000																	
15000																	
20000																	
TOTAL	13.9	1.1	87.4	24.3	14.4	12.1	16.4	25.6	13.7	8.5	3.1	0.6					221.0

TIME(MINUTES) FOR ALTITUDE VS VELOCITY BY WEIGHT 3200C

	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
LESS																	
1000		0.2	4.4	1.3													5.9
2000			8.9	14.7	4.9												28.5
5000																	
10000																	
15000																	
20000																	
TOTAL		0.2	13.3	16.0	4.9												34.4

TIME(MINUTES) FOR ALTITUDE VS VELOCITY BY WEIGHT TOTAL

	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
LESS	10.6	1.4	4.5	1.6				0.5									18.6
1000	119.0	15.2	37.4	10.1	10.9	23.3	23.7	19.0	19.0	6.6	0.8						274.8
2000	679.1	472.9	2474.7	578.4	364.3	312.0	424.6	471.0	296.1	123.7	35.0	14.5	1.2	0.1			6153.9
5000	48.6	150.6	1313.1	354.4	264.6	273.9	287.3	249.2	132.1	55.9	8.5	0.9					2859.9
10000			4.7	1.0													5.7
15000																	
20000																	
TOTAL	849.3	590.2	3534.4	906.1	639.8	606.1	735.0	733.7	647.2	186.2	44.3	15.4	1.2	0.1			9288.0

TABLE V  
STEADY-STATE TIME FOR COLLECTIVE STICK POSITION VERSUS  
CYCLIC STICK POSITION BY RATE OF CLIMB AND TOTAL

TIME(MINUTES) FOR COLLECTIVE VS CYCLIC BY CLIMB -200C

	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS											
10											
20											
30						0.1					0.1
40						0.7					0.7
50											
60						0.7					0.7
70											
80											
90											
TOTAL						1.1					1.1

TIME(MINUTES) FOR COLLECTIVE VS CYCLIC BY CLIMB -150C

	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS											
10											
20											
30						0.7					0.7
40					4.6	2.0					6.6
50					1.1	1.3	0.1				2.5
60						0.3					0.3
70											
80											
90											
TOTAL					6.4	3.6	0.1				10.0

TABLE V - contd.

TIME(MINUTES) FOR COLLECTIVE VS CYCLIC BY CLIMB -1000

	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS											
10											
20											
30					0.5	1.3					9.8
40				7.0	65.3	17.2					89.5
50			0.8	4.7	69.3	37.9	1.4				134.2
60					4.1	9.8	0.6				14.5
70					0.2						0.2
80											
90											
TOTAL			0.8	11.7	149.5	86.2	2.0				250.2

TIME(MINUTES) FOR COLLECTIVE VS CYCLIC BY CLIMB -500

	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS											
10						1.7	0.6				2.3
20					2.5	9.5	8.7	3.6			24.3
30					61.0	692.1	156.9	11.3	1.2		922.6
40					197.6	2112.8	2519.1	35.4			4867.9
50			3.1		0.5	31.7	1278.3	1231.5	22.0		2564.0
60						11.7	13.8				25.5
70											
80											
90											
TOTAL			3.6	292.7	4104.4	3931.7	73.0	4.9			8410.3

TIME(MINUTES) FOR COLLECTIVE VS CYCLIC BY CLIMB 500

	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS											
10											
20											
30						7.4	1.2	0.1			8.7
40					1.3	1.8	102.8	77.3	2.2		183.3
50					4.6	135.0	162.7	12.1			314.4
60						7.2	13.6				20.8
70											
80											
90											
TOTAL			1.3	6.4	252.3	254.9	14.4				529.3

TIME(MINUTES) FOR COLLECTIVE VS CYCLIC BY CLIMB 1000

	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS											
10											
20											
30						0.7					0.7
40					1.7	8.5	7.0	0.2			17.4
50					0.3	27.1	30.2	1.7			58.8
60						3.0	2.7				5.7
70											
80											
90											
TOTAL					2.0	39.3	39.9	1.4			82.5

TIME(MINUTES) FOR COLLECTIVE VS CYCLIC BY CLIMB 1500

	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS											
10											
20											
30											
40											
50					0.8	0.2					1.0
60					0.4	2.6	1.1				4.1
70					0.2						0.2
80											
90											
TOTAL					1.3	2.8	1.1				5.3

TIME(MINUTES) FOR COLLECTIVE VS CYCLIC BY CLIMB TOTAL

	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS											
10						1.7	0.6				2.3
20					2.5	10.0	10.0	3.6			26.1
30					61.0	770.8	177.3	11.4	1.2		1026.8
40					197.6	2294.3	2662.8	39.3			5206.4
50			3.1		0.5	36.6	1447.0	1437.1	17.7		2956.3
60						11.7	13.8				25.5
70											
80											
90											
TOTAL			3.7	312.8	4594.7	4319.1	92.1	4.9			9286.8

**TABLE VI**  
**STEADY-STATE TIME FOR ROTOR RPM VERSUS RATE OF**  
**CLIMB BY OUTSIDE AIR TEMPERATURE AND TOTAL**

TIME(MINUTES) FOR RPM VS CLIMB BY TEMPERATURE											30
LESS	-2500	-2000	-1500	-1000	-500	500	1000	1500	2000	2500	TOTAL
210											0.1
220					0.1						0.1
230					2.6						2.6
240											
250											
TOTAL					2.7						2.7

TIME(MINUTES) FOR RPM VS CLIMB BY TEMPERATURE											40
LESS	-2500	-2000	-1500	-1000	-500	500	1000	1500	2000	2500	TOTAL
210											
220					1.3	7.8					9.1
230					6.4	103.0	4.3				114.5
240											
250											
TOTAL					7.8	111.6	4.3				123.6

TIME(MINUTES) FOR RPM VS CLIMB BY TEMPERATURE											50
LESS	-2500	-2000	-1500	-1000	-500	500	1000	1500	2000	2500	TOTAL
210											
220					3.3	126.2	5.5				135.1
230					14.6	208.3	13.2	1.9			222.1
240											
250											
TOTAL					17.9	334.5	18.8	1.9			359.1

TIME(MINUTES) FOR RPM VS CLIMB BY TEMPERATURE											60
LESS	-2500	-2000	-1500	-1000	-500	500	1000	1500	2000	2500	TOTAL
210											2.7
220				1.3	26.6	443.8	24.0	5.4			498.0
230		0.7	2.0	33.3	916.5	32.8	3.2				986.4
240					19.8	0.1					19.9
250					3.7						3.8
TOTAL		0.7	3.2	64.0	1380.5	56.8	8.6				1509.9

TIME(MINUTES) FOR RPM VS CLIMB BY TEMPERATURE											70
LESS	-2500	-2000	-1500	-1000	-500	500	1000	1500	2000	2500	TOTAL
210											2.8
220			0.1	2.1	15.6	456.1	22.1	6.2			500.3
230			1.4	44.1	2030.1	111.8	13.0	1.3			2200.4
240					13.9	1.8	0.5				15.9
250					5.4						5.4
TOTAL		0.1	3.6	59.7	2513.8	139.7	19.7	1.3			2733.7

TIME(MINUTES) FOR RPM VS CLIMB BY TEMPERATURE											80
LESS	-2500	-2000	-1500	-1000	-500	500	1000	1500	2000	2500	TOTAL
210											
220			0.2		8.2	271.4	31.2	5.9			316.9
230			2.9	71.4	2761.5	204.6	32.8	2.1			3075.2
240					13.6	1.4					14.9
250											
TOTAL		0.2	2.9	79.6	3046.5	237.1	38.8	2.1			3407.1

TIME(MINUTES) FOR RPM VS CLIMB BY TEMPERATURE											90
LESS	-2500	-2000	-1500	-1000	-500	500	1000	1500	2000	2500	TOTAL
210											0.3
220					2.0	59.6	5.2	0.6	0.8		68.2
230			0.4	23.1	853.9	69.8	12.7	1.6			960.4
240				0.7	16.9	2.5	0.2				19.7
250					0.2						0.2
TOTAL			0.4	25.3	930.8	76.6	13.5	2.2			1048.8

TIME(MINUTES) FOR RPM VS CLIMB BY TEMPERATURE											TOTAL
LESS	-2500	-2000	-1500	-1000	-500	500	1000	1500	2000	2500	TOTAL
210											5.8
220			0.3	3.4	57.1	1560.1	88.0	18.1	0.8		1527.8
230			0.7	6.6	192.9	6972.9	438.4	63.7	4.5		7678.4
240					0.2	62.7	5.7	0.7			69.3
250					0.1	9.2					9.3
TOTAL		1.1	10.3	250.2	8410.3	529.3	82.5	5.3			9288.8

**TABLE VII  
STEADY-STATE TIME FOR  $C_T/\sigma$  VERSUS  $\mu$  BY RATE  
OF CLIMB AND TOTAL**

TIME (MINUTES) FOR  $C_T/\sigma$  VERSUS  $\mu$  BY CLIMB -2000

	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
LESS										
0.00					0.1					0.1
0.09				0.7	0.2					0.9
0.12										
0.15										
TOTAL				0.7	0.3					1.1

TIME (MINUTES) FOR  $C_T/\sigma$  VERSUS  $\mu$  BY CLIMB -1500

	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
LESS										
0.00					0.7	1.2	0.3			2.4
0.09		0.2		1.7	1.9	2.9				6.5
0.12					0.4	3.7	0.1			1.2
0.15										
TOTAL		0.2		1.7	3.0	4.0	0.4			10.0

TIME (MINUTES) FOR  $C_T/\sigma$  VERSUS  $\mu$  BY CLIMB -1000

	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
LESS										
0.00					7.9	29.4	5.9			42.4
0.09		0.6	1.7	7.9	37.1	29.4	5.9			82.4
0.12		1.1	3.3	15.7	53.0	50.1	0.8			132.0
0.15					3.4	19.9	2.4	3.6		39.0
TOTAL		1.7	5.0	27.0	110.0	87.8	18.2			250.2

TIME (MINUTES) FOR  $C_T/\sigma$  VERSUS  $\mu$  BY CLIMB -500

	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
LESS										
0.00				1.6	1.4					3.0
0.09	46.7	207.2	96.5	195.4	836.7	784.3	146.9	C.0		2307.6
0.12	48.9	294.0	101.4	591.8	2049.8	1929.2	287.0	C.1		4890.2
0.15	9.6	26.6	18.0	97.1	659.4	335.5	55.4			1201.6
TOTAL	105.1	527.7	215.9	895.9	3537.2	2649.0	489.3	C.2		6410.4

TIME (MINUTES) FOR  $C_T/\sigma$  VERSUS  $\mu$  BY CLIMB 500

	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
LESS										
0.00					49.4	39.3	0.8			129.4
0.09	0.2	1.7	0.7	11.4	49.4	39.3	0.8			129.4
0.12	0.4	2.5	2.3	50.9	174.3	72.0	7.3			317.7
0.15				0.2	59.6	17.8	2.2			82.3
TOTAL	0.7	4.2	3.4	76.5	299.3	129.0	10.3			529.3

TIME (MINUTES) FOR  $C_T/\sigma$  VERSUS  $\mu$  BY CLIMB 1000

	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
LESS										
0.00					4.6	1.3				21.7
0.09			2.4	4.1	11.3	4.6	1.3			21.7
0.12			2.7	9.6	27.5	9.1	0.8			47.8
0.15				2.1	9.7	1.2				13.1
TOTAL			1.2	15.8	48.5	14.9	2.2			82.5

TIME (MINUTES) FOR  $C_T/\sigma$  VERSUS  $\mu$  BY CLIMB 1500

	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
LESS										
0.00					0.1	1.0				1.1
0.09					0.4	1.0	1.2			3.4
0.12										
0.15										
TOTAL				0.4	2.7	2.2				5.3

TIME (MINUTES) FOR  $C_T/\sigma$  VERSUS  $\mu$  BY CLIMB TOTAL

	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
LESS										
0.00				1.6	1.4					3.0
0.09	46.9	209.6	99.3	210.7	949.4	899.7	161.1	C.0		2544.6
0.12	48.9	297.6	107.7	678.9	2304.4	1624.5	303.9	C.1		4406.5
0.15	9.6	26.6	19.7	108.9	745.7	362.7	61.3			1334.7
TOTAL	105.0	533.7	226.1	1098.3	4008.9	2887.8	526.3	C.2		9268.8

**TABLE VIII  
CYCLIC STICK PEAKS VERSUS CYCLIC STICK  
STEADY BY COLLECTIVE STICK STEADY**

CYCLIC PEAKS VS CYCLIC STEADY BY COLL. STEADY 2C											
	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS											
-40											
-30											
-20											
-10											
10								1			1
20											
30											
40											
TOTAL								1			1
TIME	0.	0.	0.	0.	0.	1.7	0.6	0.	0.	0.	2.3

CYCLIC PEAKS VS CYCLIC STEADY BY COLL. STEADY 3C											
	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS											
-40											
-30											
-20						1					1
-10				1		1					2
10											
20											
30											
40											
TOTAL				1		2					3
TIME	0.	0.	0.	2.9	10.0	10.0	3.0	3.0	0.	0.	30.7

CYCLIC PEAKS VS CYCLIC STEADY BY COLL. STEADY 4C											
	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS											
-40											
-30					1						1
-20					7	3					10
-10				12	1	1					15
10				7			1				8
20											
30											
40											
TOTAL					27	4	1				32
TIME	0.	0.	0.	67.0	170.0	177.3	11.4	1.2	0.	0.	1026.0

CYCLIC PEAKS VS CYCLIC STEADY BY COLL. STEADY 5C											
	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS											
-40											
-30							1				1
-20					5	10					15
-10				23	30						53
10				14	7						21
20											
30											
40											
TOTAL					42	37					79
TIME	0.	0.	9.1	209.0	2295.3	2062.0	30.3	0.	0.	0.	5200.4

CYCLIC PEAKS VS CYCLIC STEADY BY COLL. STEADY 6C											
	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS											
-40											
-30											
-20					3	3					6
-10					3	9					12
10					7	3					10
20											
30											
40											
TOTAL					13	15					28
TIME	0.	0.	0.9	30.0	1447.0	1437.1	37.0	0.	0.	0.	2950.0

Table VIII - contd.

CYCLIC PEAKS VS CYCLIC STEADY BY COLL. STEADY 70											
LESS	LESS	10	20	30	40	50	60	70	80	90	TOTAL
-40											
-30											
-20											
-10					1						1
10											
20											
30											
40											
TOTAL					1						1
TIME	0.	0.	0.	0.	22.2	30.1	0.	0.	0.	0.	52.4

TABLE IX  
CYCLIC STICK PEAKS VERSUS CYCLIC STICK  
STEADY BY DENSITY ALTITUDE

CYCLIC PEAKS VS CYCLIC STEADY BY ALTITUDE LESS											
LESS	LESS	10	20	30	40	50	60	70	80	90	TOTAL
-40											
-30											
-20											
-10						1					1
10											
20											
30											
40											
TOTAL						1					1
TIME	0.	0.	0.	0.	4.9	13.7	0.4	0.	0.	0.	18.6

CYCLIC PEAKS VS CYCLIC STEADY BY ALTITUDE 1000											
LESS	LESS	10	20	30	40	50	60	70	80	90	TOTAL
-40											
-30					1	3					4
-20					3	6					10
-10				1	1	1	1				3
10											
20											
30											
40											
TOTAL				1	5	10	1				17
TIME	0.	0.	1.0	7.2	69.3	100.1	9.3	0.	0.	0.	274.0

CYCLIC PEAKS VS CYCLIC STEADY BY ALTITUDE 2000											
LESS	LESS	10	20	30	40	50	60	70	80	90	TOTAL
-40											
-30					1	1					2
-20					11	14					25
-10					22	41					73
10					25	9					34
20											
30											
40											
TOTAL					60	65					124
TIME	0.	0.	0.7	100.6	2740.3	3143.5	70.0	3.0	0.	0.	6153.0

CYCLIC PEAKS VS CYCLIC STEADY BY ALTITUDE 5000											
LESS	LESS	10	20	30	40	50	60	70	80	90	TOTAL
-40											
-30					3	2					3
-20					4	2					6
-10					2		1				3
10											
20											
30											
40											
TOTAL					9	2	1				12
TIME	0.	0.	3.0	117.0	1734.4	979.9	5.4	1.0	0.	0.	2035.0

**TABLE X  
CYCLIC STICK PEAKS VERSUS CYCLIC STICK  
STEADY BY AIRSPEED**

CYCLIC PEAKS VS CYCLIC STEADY BY VELOCITY LESS											
	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS											
-40											
-30					1	1					2
-20					11	16					27
-10				1	30	26					57
10					19	9	2				30
20											
30											
40											
TOTAL				1	61	52	2				116
TIME	0.	0.	1.0	30.2	329.3	461.2	22.7	4.9	0.	0.	849.3

CYCLIC PEAKS VS CYCLIC STEADY BY VELOCITY 40											
	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS											
-40											
-30											
-20					2	1					3
-10					3	3					6
10					4						4
20											
30											
40											
TOTAL					9	4					13
TIME	0.	0.	1.0	50.5	359.0	166.2	3.9	0.	0.	0.	590.2

CYCLIC PEAKS VS CYCLIC STEADY BY VELOCITY 60											
	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS											
-40											
-30											
-20											
-10						5					5
10					2	1					3
20											
30											
40											
TOTAL					2	6					8
TIME	0.	0.	1.9	107.1	2088.0	1245.0	10.7	0.	0.	0.	3536.6

CYCLIC PEAKS VS CYCLIC STEADY BY VELOCITY 80											
	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS											
-40											
-30											
-20					2						2
-10					3	2					5
10					1						1
20											
30											
40											
TOTAL					6	2					8
TIME	0.	0.	1.2	27.2	477.0	392.1	0.1	0.	0.	0.	906.0

CYCLIC PEAKS VS CYCLIC STEADY BY VELOCITY 90											
	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS											
-40											
-30											
-20											
-10						3					3
10											
20											
30											
40											
TOTAL						3					3
TIME	0.	0.	0.	4.1	299.4	333.0	3.2	0.	0.	0.	639.8

TABLE X - contd.

CYCLIC PEAKS VS CYCLIC STEADY BY VELOCITY 90										
LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS										
-40										
-30										
-20										
-10						7				7
10					1					1
20										
30										
40										
TOTAL					1	7				8
TIME	0.	0.	0.	0.6	243.0	359.1	3.4	0.	0.	606.1

CYCLIC PEAKS VS CYCLIC STEADY BY VELOCITY 95										
LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS										
-40										
-30										
-20										
-10					1	1				2
10										
20										
30										
40										
TOTAL					1	1				2
TIME	0.	0.	0.	1.8	254.7	470.7	7.8	0.	0.	735.0

CYCLIC PEAKS VS CYCLIC STEADY BY VELOCITY 100										
LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS										
-40										
-30										
-20										
-10					1	1				2
10					1					1
20										
30										
40										
TOTAL					2	1				3
TIME	0.	0.	0.	2.7	240.5	409.9	12.6	0.	0.	733.7

CYCLIC PEAKS VS CYCLIC STEADY BY VELOCITY 105										
LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS										
-40										
-30										
-20										
-10							1			1
10										
20										
30										
40										
TOTAL							1			1
TIME	0.	0.	0.	0.5	144.4	293.9	11.4	0.	0.	449.2

CYCLIC PEAKS VS CYCLIC STEADY BY VELOCITY 110										
LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS										
-40										
-30										
-20										
-10					1	1				2
10										
20										
30										
40										
TOTAL					1	1				2
TIME	0.	0.	0.	0.3	74.5	104.9	6.5	0.	0.	186.2

**TABLE XI  
CYCLIC STICK PEAKS VERSUS CYCLIC STICK  
STEADY BY ROTOR RPM AND TOTAL**

CYCLIC PEAKS VS CYCLIC STEADY BY RPM 210											
	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS											
-40											
-30											
-20											
-10					1						1
10											
20											
30											
40											
TOTAL					1						1
TIME	0.	0.	0.	0.	3.4	2.1	0.3	0.	0.	0.	5.8

CYCLIC PEAKS VS CYCLIC STEADY BY RPM 220											
	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS											
-40											
-30											
-20					7						7
-10					4	3					7
10					10	1	1				12
20											
30											
40											
TOTAL					21	4	1				26
TIME	0.	0.	0.5	119.5	1091.9	309.5	0.7	1.0	0.	0.	1527.0

CYCLIC PEAKS VS CYCLIC STEADY BY RPM 230											
	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS											
-40											
-30					1	1					2
-20					0	17					17
-10				1	31	35					67
10					16	0	1				17
20											
30											
40											
TOTAL					1	56	61	1			119
TIME	0.	0.	4.3	193.1	3426.0	3965.0	02.0	3.1	0.	0.	7076.5

CYCLIC PEAKS VS CYCLIC STEADY BY RPM 240											
	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS											
-40											
-30											
-20											
-10					1	12					13
10					1	1					2
20											
30											
40											
TOTAL					2	13					15
TIME	0.	0.	0.	0.	29.0	39.0	0.5	0.	0.	0.	69.3

CYCLIC PEAKS VS CYCLIC STEADY BY RPM 250											
	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS											
-40											
-30											
-20											
-10					2						2
10					1						1
20											
30											
40											
TOTAL					1						1
TIME	0.	0.	0.	0.	2.3	7.0	0.	0.	0.	0.	9.3

TABLE XI - contd.

LESS	CYCLIC PEAKS VS CYCLIC STEADY BY RPM										TOTAL	
	LESS	10	20	30	40	50	60	70	80	90		
-40												
-30					1	1						2
-20					15	17						32
-10				1	30	50						81
10					20	10	2					40
20												
30												
40												
TOTAL				1	65	78	2					164
TIME	0.	0.	9.7	312.0	4994.2	4319.1	92.1	4.0	0.	0.	0.	9200.7

TABLE XII  
CYCLIC STICK PEAKS VERSUS AIRSPEED  
ACCELERATION BY MISSION SEGMENT

LESS	CYCLIC PEAKS VS ACCELERATION BY MISSION SEGMENT ASCENT											TOTAL
	LESS	-19.0	-12.0	-9.0	-6.0	-3.0	3.0	6.0	9.0	12.0	19.0	
-40						1						1
-30						0						0
-20					1	210	11	1	1			224
-10					1	234	13	2				249
10						69	11					81
20						9						9
30												
40												
TOTAL					2	527	35	3	1			568

LESS	CYCLIC PEAKS VS ACCELERATION BY MISSION SEGMENT MANUVR											TOTAL
	LESS	-19.0	-12.0	-9.0	-6.0	-3.0	3.0	6.0	9.0	12.0	19.0	
-40						10						10
-30						32	2					34
-20					1	9	41					49
-10					1	2	21	1				25
10												
20												
30												
40												
TOTAL					2	5	104	3				114

LESS	CYCLIC PEAKS VS ACCELERATION BY MISSION SEGMENT DESCENT											TOTAL
	LESS	-19.0	-12.0	-9.0	-6.0	-3.0	3.0	6.0	9.0	12.0	19.0	
-40						7						7
-30						220						220
-20					2	1063	1					1066
-10			1		16	286	1					304
10					2	86	2					90
20						7						7
30												
40												
TOTAL			1		20	1669	4					1694

TABLE XIII  
CYCLIC STICK PEAKS VERSUS AIRSPEED  
BY MISSION SEGMENT

LESS	CYCLIC PEAKS VS VELOCITY BY MISSION SEGMENT ASCENT																TOTAL
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	
-40	1																1
-30	7																7
-20	182	40	1														224
-10	137	35	47	12	10	1	2	4	2			1					249
10	16	6	33	16	5	2	1	1	1								81
20	7		7		1												9
30																	
40																	
TOTAL	345	70	85	28	16	3	3	5	3			1					568

Table XIII - contd.

CYCLIC PEAKS VS VELOCITY BY MISSION SEGMENT MANUVR																	
LESS	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
-40																	10
-30	0	2															34
-20	12	14	8														45
-10	9	9	15	2	6	4	3	2	1	1	1						25
10	1		13	3	3	2	2	1									
20																	
30																	
40																	
TOTAL	26	21	36	5	9	6	9	3	1	1	1						114

CYCLIC PEAKS VS VELOCITY BY MISSION SEGMENT DESCNT																	
LESS	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
-40	7																7
-30	210	1	1														220
-20	934	100	27	2	1	1				1							1066
-10	130	93	77	10	11	3	7	4	3	2			1				304
10	44	10	20	6		4	3	1									90
20	3	1	1														7
30																	
40																	
TOTAL	1340	165	121	10	12	8	10	9	3	3		1					1694

TABLE XIV  
CYCLIC STICK PEAKS VERSUS ROTOR  
RPM BY MISSION SEGMENT

CYCLIC PEAKS VS RPM BY MISSION SEGMENT ASCENT							
LESS	LESS	210	220	230	240	250	TOTAL
-40				1			1
-30			1	7			8
-20		1	70	150	3		224
-10			27	215	7		249
10			3	75	1		81
20			3	2			5
30							
40							
TOTAL		1	100	450	11		560

CYCLIC PEAKS VS RPM BY MISSION SEGMENT MANUVR							
LESS	LESS	210	220	230	240	250	TOTAL
-40							
-30		1	6	3			10
-20		1	11	20	1	1	34
-10			7	35	2	1	45
10			3	21	1		25
20							
30							
40							
TOTAL		2	27	79	4	2	114

CYCLIC PEAKS VS RPM BY MISSION SEGMENT DESCNT							
LESS	LESS	210	220	230	240	250	TOTAL
-40			4	3			7
-30		11	127	80	2		220
-20		9	447	598	10	2	1066
-10			69	234	3		306
10		1	14	74		1	90
20		1	3	3			7
30							
40							
TOTAL		22	660	994	15	3	1694

**TABLE XV  
COLLECTIVE STICK PEAKS VERSUS COLLECTIVE STICK  
STEADY BY CYCLIC STICK STEADY**

COLLECTIVE PEAKS VS COLL. STEADY BY CYCLIC STEADY 30											
LESS	LESS	10	20	30	40	50	60	70	80	90	TOTAL
-40											
-30											
-20											
-10					1						1
10						1					1
20											
30											
40											
TOTAL					1	1					2
TIME	0.	0.	0.	2.5	67.9	209.0	36.6	0.	0.	0.	312.0

COLLECTIVE PEAKS VS COLL. STEADY BY CYCLIC STEADY 40											
LESS	LESS	10	20	30	40	50	60	70	80	90	TOTAL
-40											
-30											
-20				1	7	4	4	1			17
-10					4	20	7				31
10					5	6	1				12
20						1					1
30											
40											
TOTAL				1	16	31	12	1			61
TIME	0.	0.	0.	10.0	770.0	2299.0	1447.0	27.2	0.	0.	4894.2

COLLECTIVE PEAKS VS COLL. STEADY BY CYCLIC STEADY 50											
LESS	LESS	10	20	30	40	50	60	70	80	90	TOTAL
-40											
-30											
-20					2	7	11				20
-10				1	1	16	3				21
10					3	10	2				23
20											
30											
40											
TOTAL				1	6	41	16				64
TIME	0.	0.	1.7	10.0	177.3	2602.0	1437.1	30.1	0.	0.	4319.1

COLLECTIVE PEAKS VS COLL. STEADY BY CYCLIC STEADY 60											
LESS	LESS	10	20	30	40	50	60	70	80	90	TOTAL
-40											
-30											
-20											
-10						3	2				5
10						1					1
20						1					1
30											
40											
TOTAL						5	2				7
TIME	0.	0.	0.6	3.0	11.4	39.3	37.0	0.	0.	0.	92.1

**TABLE XVI  
COLLECTIVE STICK PEAKS VERSUS COLLECTIVE STICK  
STEADY BY DENSITY ALTITUDE**

COLLECTIVE PEAKS VS COLL. STEADY BY ALTITUDE LESS											
LESS	LESS	10	20	30	40	50	60	70	80	90	TOTAL
-40											
-30											
-20							1				1
-10						1					1
10						1					1
20											
30											
40											
TOTAL						2	1				3
TIME	0.	0.	0.	0.4	1.7	14.2	2.3	0.	0.	0.	18.6

Table XVI - contd.

COLLECTIVE PEAKS VS COLL. STEADY BY ALTITUDE 1000											
	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS											
-40											
-30											
-20											
-10					1	4	1				6
10					2	2	1				5
20						1					1
30											
40											
TOTAL					3	7	2				12
TIME	0.	0.	0.6	2.1	90.6	175.4	36.3	1.0	0.	0.	276.0

COLLECTIVE PEAKS VS COLL. STEADY BY ALTITUDE 2000											
	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS											
-40											
-30											
-20					1	0	0	0	1		2
-10					1	5	7	0			13
10						5	23	7			35
20							1				1
30											
40											
TOTAL					2	10	30	10	1		53
TIME	0.	0.	1.7	32.7	506.3	1489.0	2037.6	36.5	0.	0.	6153.0

COLLECTIVE PEAKS VS COLL. STEADY BY ALTITUDE 3000											
	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS											
-40											
-30											
-20											
-10						1	3	5			9
10						1	0	3			4
20											
30											
40											
TOTAL						2	3	8			13
TIME	0.	0.	0.	3.6	302.1	1557.1	870.0	14.1	0.	0.	2035.9

TABLE XVII  
COLLECTIVE STICK PEAKS VERSUS COLLECTIVE  
STICK STEADY BY AIRSPEED

COLLECTIVE PEAKS VS COLL. STEADY BY VELOCITY 125											
	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS											
-40											
-30											
-20						4	3	7			14
-10					1	2	7	4			14
10						5	7	7			19
20							2				2
30											
40											
TOTAL					1	11	21	18			51
TIME	0.	0.	2.3	10.7	152.7	401.7	183.2	11.2	0.	0.	649.3

COLLECTIVE PEAKS VS COLL. STEADY BY VELOCITY 40											
	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS											
-40											
-30											
-20											
-10							2	5	1		8
10					1						1
20											
30											
40											
TOTAL					1	2	5	1			9
TIME	0.	0.	0.	3.0	62.9	270.9	263.5	5.0	0.	0.	542.3

Table XVII - contd.

COLLECTIVE PEAKS VS COLL. STEADY BY VELOCITY 66											
LOSS	LESS	10	20	30	40	50	60	70	80	90	TOTAL
-40											
-30											
-20					1	2	2				5
-10					4	7	2				13
10					1						1
20											
30											
40											
TOTAL					6	9	4				19
TIME	0.	0.	0.	0.0	205.2	1672.3	1510.7	20.4	0.	0.	3034.6

COLLECTIVE PEAKS VS COLL. STEADY BY VELOCITY 68											
LOSS	LESS	10	20	30	40	50	60	70	80	90	TOTAL
-40											
-30											
-20					1						1
-10											
10											
20											
30											
40											
TOTAL					1						1
TIME	0.	0.	0.	2.3	110.0	516.6	200.5	2.4	0.	0.	900.0

COLLECTIVE PEAKS VS COLL. STEADY BY VELOCITY 69											
LOSS	LESS	10	20	30	40	50	60	70	80	90	TOTAL
-40											
-30											
-20					1	2	2	1			6
-10											
10											
20											
30											
40											
TOTAL					1	2	2	1			6
TIME	0.	0.	0.	0.0	95.5	370.6	172.7	0.2	0.	0.	639.0

COLLECTIVE PEAKS VS COLL. STEADY BY VELOCITY 96											
LOSS	LESS	10	20	30	40	50	60	70	80	90	TOTAL
-40											
-30											
-20							1				1
-10							1				1
10											
20											
30											
40											
TOTAL							1	2			3
TIME	0.	0.	0.	0.2	90.6	407.0	100.0	0.3	0.	0.	600.1

COLLECTIVE PEAKS VS COLL. STEADY BY VELOCITY 98											
LOSS	LESS	10	20	30	40	50	60	70	80	90	TOTAL
-40											
-30											
-20					1						1
-10							1				1
10											
20											
30											
40											
TOTAL					1	1					2
TIME	0.	0.	0.	3.3	104.0	517.0	100.0	0.3	0.	0.	735.0

Table XVII - contd.

COLLECTIVE PEAKS VS COLL. STEADY BY VELOCITY 100											
	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS											
-40											
-30											
-20						1					1
-10						3	1				4
10											
20											
30											
40											
TOTAL						4	1				5
TIME	0.	0.	0.	0.	79.6	927.9	130.2	0.	0.	0.	739.7

COLLECTIVE PEAKS VS COLL. STEADY BY VELOCITY 109											
	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS											
-40											
-30											
-20											
-10						1					1
10											
20											
30											
40											
TOTAL						1					1
TIME	0.	0.	0.	0.	34.1	304.3	108.8	0.	0.	0.	447.2

COLLECTIVE PEAKS VS COLL. STEADY BY VELOCITY 11C											
	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS											
-40											
-30											
-20											
-10						1					1
10											
20											
30											
40											
TOTAL						1					1
TIME	0.	0.	0.	0.	7.1	105.7	73.0	0.3	0.	0.	186.2

COLLECTIVE PEAKS VS COLL. STEADY BY VELOCITY 115											
	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS											
-40											
-30											
-20											
-10								1			1
10											
20											
30											
40											
TOTAL								1			1
TIME	0.	0.	0.	0.	2.0	22.6	19.9	0.2	0.	0.	44.1

COLLECTIVE PEAKS VS COLL. STEADY BY VELOCITY 12C											
	LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS											
-40											
-30											
-20						2					2
-10						1					3
10											
20											
30											
40											
TOTAL						5					5
TIME	0.	0.	0.	0.	0.7	12.7	2.0	0.	0.	0.	15.4

**TABLE XVIII  
COLLECTIVE STICK PEAKS VERSUS COLLECTIVE STICK  
STEADY BY ROTOR RPM AND TOTAL**

COLLECTIVE PEAKS VS COLL. STEADY BY RPM 220										
LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS										
-40										
-30										
-20				1	4	1	1			7
-10					4	11	2			17
10					3	6	1			10
20										
30										
40										
TOTAL			1	11	18	4				34
TIME	0.	0.	0.	22.8	349.9	846.1	301.4	7.6	0.	0. 1927.8

COLLECTIVE PEAKS VS COLL. STEADY BY RPM 230										
LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS										
-40										
-30										
-20					3	10	14	1		30
-10			1		2	26	9			38
10					3	19	2			26
20						2				2
30										
40										
TOTAL			1	12	37	25	1			96
TIME	0.	0.	2.3	16.2	649.8	4306.5	2637.1	44.8	0.	0. 7676.5

COLLECTIVE PEAKS VS COLL. STEADY BY RPM 240										
LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS										
-40										
-30										
-20										
-10						2	1			3
10						1				1
20										
30										
40										
TOTAL						3	1			4
TIME	0.	0.	0.	0.	7.2	43.9	16.2	0.	0.	0. 69.3

COLLECTIVE PEAKS VS COLL. STEADY BY RPM TOTAL										
LESS	10	20	30	40	50	60	70	80	90	TOTAL
LESS										
-40										
-30										
-20				1	9	11	15	1		37
-10			1		6	39	12			58
10					8	26	3			37
20						2				2
30										
40										
TOTAL			2	23	78	57	1			134
TIME	0.	0.	2.3	16.2	1028.8	5208.3	2958.2	42.4	0.	0. 9288.7

**TABLE XIX  
COLLECTIVE STICK PEAKS VERSUS AIRSPEED  
ACCELERATION BY MISSION SEGMENT**

COLLECTIVE PEAKS VS ACCELERATION BY MISSION SEG. ASCENT											
LESS	-15.0	-12.0	-9.0	-6.0	-3.0	3.0	6.0	9.0	12.0	15.0	TOTAL
LESS											
-40											
-30						2					2
-20					1	10					11
-10						156	13		1		170
10				1		609	57	13	2		732
20						144	9	1			154
30											
40											
TOTAL				2	901	72	11	1			1069

Table XIX - contd.

COLLECTIVE PEAKS VS ACCELERATION BY MISSION SEG. MANUVR

LESS	-15.0	-12.0	-9.0	-6.0	-3.0	0.0	3.0	6.0	9.0	12.0	15.0	TOTAL
-40				1	0							9
-30				1	13							14
-20			1	9	30							40
-10				1	34	1						36
10				1	51	3						55
20					2							2
30												
40												
TOTAL			1	13	140	4						166

COLLECTIVE PEAKS VS ACCELERATION BY MISSION SEG. DESCENT

LESS	-15.0	-12.0	-9.0	-6.0	-3.0	0.0	3.0	6.0	9.0	12.0	15.0	TOTAL
-40				2	11							13
-30			1	92	219					1		273
-20		1	1	97	812							871
-10				5	431							437
10				2	473	1						476
20					76							76
30												
40												
TOTAL		1	2	116	2022	2				1		2146

TABLE XX  
COLLECTIVE STICK PEAKS VERSUS AIRSPEED  
BY MISSION SEGMENT

COLLECTIVE PEAKS VS VELOCITY BY MISSION SEGMENT ASCENT

LESS	40	60	80	90	95	100	105	110	115	120	125	130	135	140	TOTAL
-40															2
-30	2														11
-20	2	3	3	3											170
-10	110	10	21	7	4	3	2	2	3						732
10	902	96	76	13	15	3	17	9	4	2					154
20	110	15	13	7	1	7	1		2						
30															
40															
TOTAL	734	132	113	29	20	8	19	11	7	2					1069

COLLECTIVE PEAKS VS VELOCITY BY MISSION SEGMENT MANUVR

LESS	40	60	80	90	95	100	105	110	115	120	125	130	135	140	TOTAL
-40	1	0													9
-30	3	2	0	1		1	1								10
-20	5	9	24	5	3	1									40
-10	2	4	14	1	3	4	2	3	2			1			36
10	7	8	13	4		4	6	5	2	3					55
20			1					1							2
30															
40															
TOTAL	17	24	60	11	6	9	9	9	5	3	3	1			166

COLLECTIVE PEAKS VS VELOCITY BY MISSION SEGMENT DESCENT

LESS	40	60	80	90	95	100	105	110	115	120	125	130	135	140	TOTAL
-40	1		7	2	2			1							13
-30	41	114	127	7	5	2		1							273
-20	240	232	247	27	24	23	7	5	4	1					871
-10	238	76	72	17	8	6	9	9	1						437
10	404	21	34	5	4	7	1	2	1			1			476
20	76	2													76
30															
40															
TOTAL	900	505	663	50	44	33	19	17	6	2	1				2146

**TABLE XXI  
COLLECTIVE STICK PEAKS VERSUS ROTOR  
RPM BY MISSION SEGMENT**

COLLECTIVE PEAKS VS RPM BY MISSION SEGMENT ASCENT							
LESS	210	220	230	240	250	TOTAL	
LESS							
-40			2			2	
-30			11			11	
-20		53	111	6		170	
-10	4	199	952	14	3	732	
10	2	45	107			154	
20							
30							
40							
TOTAL	6	257	703	20	3	1000	

COLLECTIVE PEAKS VS RPM BY MISSION SEGMENT MANUVER							
LESS	210	220	230	240	250	TOTAL	
LESS							
-40		1	6	2		9	
-30		4	13			17	
-20		2	30	1	1	34	
-10		6	29	1		36	
10		14	30	1	2	47	
20		1	1			2	
30							
40							
TOTAL		26	122	5	3	156	

COLLECTIVE PEAKS VS RPM BY MISSION SEGMENT DESCENT							
LESS	210	220	230	240	250	TOTAL	
LESS							
-40	1	2	6	4		13	
-30		103	168	2		273	
-20		250	414	7		671	
-10	2	119	317	1	2	437	
10	6	157	307	2	4	476	
20		30	37	1		70	
30							
40							
TOTAL	9	665	1400	17	6	2140	

**TABLE XXII  
GUST  $n_g$  VERSUS AIRSPEED BY MISSION  
SEGMENT BY ALTITUDE BY GROSS WEIGHT**

	GUST PEAKS VS VEL. BY MISS. SEG. ASCENT, ALT. LESS. WT. 22000																
	LESS	40	60	80	95	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2																	
0.8																	
0.7																	
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL																	

TABLE XXII - contd.

NZ GUST PEAKS VS VEL. BY MISS. SEC. ASCENT, ALT. 1000, WGT. 22000

	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2																	
0.8								1									2
0.7								1									
0.6																	
0.5																	
0.4																	
0.2																	
LESS							1		1								2
TOTAL																	

NZ GUST PEAKS VS VEL. BY MISS. SEC. ASCENT, ALT. 1000, WGT. 24000

	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2																	
0.8																	
0.7			1														1
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL			1														1

NZ GUST PEAKS VS VEL. BY MISS. SEC. ASCENT, ALT. 2000, WGT. 20000

	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2																	
0.8																	
0.7																	
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL				6		2			1								9

NZ GUST PEAKS VS VEL. BY MISS. SEC. ASCENT, ALT. 2000, WGT. 22000

	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2																	
0.8																	
0.7																	
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL			4	2	3	3	1	4	1								23

TABLE XXII - contd.

N7 GUST PEAKS VS VEL. BY MISS. SEG. ASCENT, ALT. 2000. WGT. 26000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2																	
0.8																	
0.7			1														1
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL			1														1

N7 GUST PEAKS VS VEL. BY MISS. SEG. ASCENT, ALT. 2000. WGT. 26000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2				1													1
0.8																	
0.7			1														1
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL			2														2

N7 GUST PEAKS VS VEL. BY MISS. SEG. ASCENT, ALT. 2000. WGT. 26000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2																	
0.8																	
0.7				1													1
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL			1														1

N2 GUST PEAKS VS VEL. BY MISS. SEG. ASCENT, ALT. 5000. WGT. 20000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2																	
0.8																	
0.7																	
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL						1				1							2

TABLE XXII - contd.

NZ GUST PEAKS VS VEL. BY MISS. SEG. ASCENT, ALT. 9000, WGT. 22000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2																	
0.8																	
0.7						1											1
0.6																	
0.5																	
0.4																	
0.2																	
LESS						1											1
TOTAL																	

NZ GUST PEAKS VS VEL. BY MISS. SEG. ASCENT, ALT. 5000, WGT. 24000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2																	
0.8																	
0.7																	
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL			1						1								2

NZ GUST PEAKS VS VEL. BY MISS. SEG. ASCENT, ALT. 9000, WGT. 26000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2																	
0.8																	
0.7																	
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL								1									1

NZ GUST PEAKS VS VEL. BY MISS. SEG. MANUVR, ALT. 2000, WGT. 20000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2																	
0.8																	
0.7																	
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL	1	1	1	1				1	1								6

TABLE XXII - contd.

NE GUST PEAKS VS VEL. BY MISS. SEC. MANUVR. ALT. 2000. WGT. 22000																
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3																
1.2										1						1
0.8			3													3
0.7						1										1
0.6																
0.5																
0.4																
0.2																
LESS																
TOTAL			3			1				1						5

NE GUST PEAKS VS VEL. BY MISS. SEC. MANUVR. ALT. 2000. WGT. 24000																
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3																
1.2																
0.8									1							1
0.7																
0.6																
0.5																
0.4																
0.2																
LESS																
TOTAL									1							1

NE GUST PEAKS VS VEL. BY MISS. SEC. MANUVR. ALT. 2000. WGT. 26000																
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3																
1.2																
0.8									1							1
0.7																
0.6																
0.5																
0.4																
0.2																
LESS																
TOTAL									1							1

NE GUST PEAKS VS VEL. BY MISS. SEC. DESCNT. ALT. LESS. WGT. 20000																
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3																
1.2																
0.8																
0.7																
0.6																
0.5																
0.4																
0.2																
LESS																
TOTAL																1

Table XXII - contd.

HZ GUST PEAKS VS VEL. BY MISS. SEG. DESCNT, ALT. 1000, WGT. LESS																
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3																
1.2					1											1
0.8																
0.7																
0.6																
0.5																
0.4																
0.2																
LESS																
TOTAL					1											1

HZ GUST PEAKS VS VEL. BY MISS. SEG. DESCNT, ALT. 2000, WGT. LESS																
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3																
1.2					1			1	1							3
0.8																
0.7																
0.6																
0.5																
0.4																
0.2																
LESS																
TOTAL					1			1	1							3

HZ GUST PEAKS VS VEL. BY MISS. SEG. DESCNT, ALT. 2000, WGT. 20000																
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3																
1.2																
0.8					4	2	2	2								10
0.7					1	1					3					5
0.6																
0.5																
0.4																
0.2																
LESS																
TOTAL					5	3	2	2	3							15

HZ GUST PEAKS VS VEL. BY MISS. SEG. DESCNT, ALT. 2000, WGT. 22000																
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3																
1.2																
0.8						1			1							2
0.7						2	2	1			1					6
0.6																
0.5																
0.4																
0.2																
LESS																
TOTAL						2	3	1	1	1						6

Table XXII - contd.

NZ GUST PEAKS VS VEL. BY MISS. SEG. DESCNT, ALT. 2000, WGT. 24000

LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3																
1.2			3			1										4
0.8																
0.7						1	1									2
0.6																
0.5																
0.4																
0.2																
LESS																
TOTAL			3			2	1									6

NZ GUST PEAKS VS VEL. BY MISS. SEG. DESCNT, ALT. 2000, WGT. 26000

LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3																
1.2																
0.8			1					1								2
0.7																
0.6																
0.5																
0.4																
0.2																
LESS																
TOTAL			1					1								2

NZ GUST PEAKS VS VEL. BY MISS. SEG. DESCNT, ALT. 2000, WGT. 30000

LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3																
1.2						1										1
0.8																
0.7									1							1
0.6																
0.5																
0.4																
0.2																
LESS																
TOTAL						1			1							2

NZ GUST PEAKS VS VEL. BY MISS. SEG. DESCNT, ALT. 5000, WGT. 20000

LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3																
1.2		1					1	1	2	1						6
0.8																
0.7									1	1						2
0.6																
0.5																
0.4																
0.2																
LESS																
TOTAL		1					1	1	3	2						8

Table XXII - contd.

HZ GUST PEAKS VS VEL. BY MISS. SEG. DESCNT. ALT. 5000. WGT. 24000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2																	
0.8																	
0.7																	
0.6				1													1
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL				1													1

HZ GUST PEAKS VS VEL. BY MISS. SEG. DESCNT. ALT. 5000. WGT. 24000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2																	
0.8																	
0.7																	
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL					1		1										2

HZ GUST PEAKS VS VEL. BY MISS. SEG. STEADY. ALT. 1000. WGT. 22000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2								2	1		2						5
0.8																	
0.7								1	1								3
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL								3	2		2						6
TIME	35.6	2.5	10.2	9.8	6.8	15.3	11.7	6.4	9.2	3.1	0.8	0.	0.	0.	0.	0.	107.1

HZ GUST PEAKS VS VEL. BY MISS. SEG. STEADY. ALT. 2000. WGT. LESS																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2																	
0.8																	
0.7																	
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL								1	2		3						6
TIME	8.2	3.8	24.9	1.2	3.8	7.5	8.4	11.8	7.8	0.	0.	0.	0.	0.	0.	0.	76.8

Table XXII - contd.

HZ GUST PEAKS VS VEL. BY MISS. SEC. STEADY, ALT. 2000, WGT. 20000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2			2	2	1	2	4	3		1							15
0.8																	
0.7			3	2		2	4	2	1	1	1						16
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL			5	4	1	4	8	5	1	2	1						31
TIME	103.9	67.0	397.2	94.5	83.6	76.8	120.4	121.4	68.8	22.3	4.4	0.3	0.1	0.	0.	0.	1217.7

HZ GUST PEAKS VS VEL. BY MISS. SEC. STEADY, ALT. 2000, WGT. 23000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4							1										1
1.3										1							1
1.2		1	3	2	4	4	5	10	2	1							32
0.8																	
0.7			2	5	4	2	5	3	3	1	1						26
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL		1	5	7	8	7	10	13	6	2	1						60
TIME	253.1	97.1	735.6	194.9	122.9	114.8	151.4	174.0	114.0	46.9	11.4	5.6	0.3	0.	0.	0.	2023.4

HZ GUST PEAKS VS VEL. BY MISS. SEC. STEADY, ALT. 2000, WGT. 24000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2			1	1			2			1							5
0.8																	
0.7			3	2		1	1	1									8
0.6			1														1
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL			5	3		1	3	1		1							14
TIME	114.0	104.0	535.0	92.3	39.9	31.0	96.2	57.0	37.0	14.0	5.8	0.1	0.7	0.1	0.	0.	1000.6

HZ GUST PEAKS VS VEL. BY MISS. SEC. STEADY, ALT. 2000, WGT. 26000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2			1			2	1										4
0.8																	
0.7					1	1	3	2	2	1							10
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL			1		1	3	4	2	2	1							14
TIME	76.0	84.2	410.8	61.0	36.7	29.7	43.3	41.4	30.9	24.2	7.6	1.2	0.	0.	0.	0.	859.2

TABLE XXII - contd.

N/2 GUST PEAKS VS VEL. BY MISS. SEG. STEADY, ALT. 2000, WGT. 28000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2				1	2	1	1	3	1								9
0.8																	
0.7			1	1	1	1	1	2									7
0.6								1									1
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL			1	2	3	2	2	6	1								17
TIME	45.3	65.5	291.8	70.2	84.9	88.6	34.3	34.4	19.3	7.8	2.6	0.7	0.	0.	0.	0.	685.4

N/2 GUST PEAKS VS VEL. BY MISS. SEG. STEADY, ALT. 2000, WGT. 30000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2																	
0.8								1	1								2
0.7																	
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL				2		1		1	1								5
TIME	13.0	1.1	67.5	23.3	12.5	11.7	16.4	25.6	13.7	8.4	3.1	0.6	0.	0.	0.	0.	197.1

N/2 GUST PEAKS VS VEL. BY MISS. SEG. STEADY, ALT. 5000, WGT. 20000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2																	
0.8								2	1	2							5
0.7																	
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL				2	1	1	2	3	2								11
TIME	5.9	16.4	121.9	55.7	60.0	71.9	85.9	90.4	67.2	23.3	3.8	0.2	0.	0.	0.	0.	582.5

N/2 GUST PEAKS VS VEL. BY MISS. SEG. STEADY, ALT. 9000, WGT. 22000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2																	
0.8																	
0.7																	
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL				3		3	3	3									16
TIME	11.4	16.0	256.6	139.5	118.2	141.5	131.3	90.4	88.8	20.1	3.3	0.6	0.	0.	0.	0.	997.6

TABLE XXII - contd.

NZ GUST PEAKS VS VEL. BY MISS. SEG. STEADY. ALT. 5000. WGT. 24000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2				1	1					1							3
0.9																	
0.7				1	1					1							3
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL				2	2					1							6
TIME	10.4	58.2	271.0	61.0	29.6	24.5	39.0	41.6	23.1	4.9	0.9	0.1	0.	0.	0.	0.	444.9

NZ GUST PEAKS VS VEL. BY MISS. SEG. STEADY. ALT. 5000. WGT. 26000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2																	
0.9				2				1	1	1							5
0.7				3	1	2											6
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL				5	1	2	2	1	1								12
TIME	17.6	36.8	216.3	61.2	44.2	28.9	28.6	23.4	4.5	1.5	0.	0.	0.	0.	0.	0.	461.1

NZ GUST PEAKS VS VEL. BY MISS. SEG. STEADY. ALT. 5000. WGT. 28000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2																	
0.9				1													1
0.7																	
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL				1													1
TIME	2.9	2.5	114.0	19.0	4.6	0.4	1.1	2.4	7.4	5.5	0.6	0.	0.	0.	0.	0.	143.1

**TABLE XXIII**  
**GUST  $n_z$  VERSUS  $\mu$  BY MISSION SEGMENT BY ALTITUDE BY  $C_T/\sigma$**

	Nz GUST PEAKS VS $\mu$ BY MISSION SEG. ASCENT, ALT. 1000, $C_T/\sigma$ 0.09									
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2										
0.9										
0.7					1					1
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL					1					1

	Nz GUST PEAKS VS $\mu$ BY MISSION SEG. ASCENT, ALT. 1000, $C_T/\sigma$ 0.09									
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2										
0.8										
0.7						2				2
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL						2				2

	Nz GUST PEAKS VS $\mu$ BY MISSION SEG. ASCENT, ALT. 1000, $C_T/\sigma$ 0.12									
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2										
0.8										
0.7					1					1
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL					1					1

	Nz GUST PEAKS VS $\mu$ BY MISSION SEG. ASCENT, ALT. 2000, $C_T/\sigma$ 0.09									
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2				1	4	5				10
0.8										
0.7					2	6				8
0.6					2	1				3
0.5										
0.4										
0.2										
LESS										
TOTAL				1	4	12				17

TABLE XXIII - contd.

	NE GUST PEAKS VS MU BY MISS. SEG. ASCENT. ALT. 2000. CT/S 0.12									
	LESS	0.10	0.09	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2					5	2				7
0.8										
0.7				1	4	2				7
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL				1	9	4				14

	NE GUST PEAKS VS MU BY MISS. SEG. ASCENT. ALT. 2000. CT/S 0.15									
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2										
0.8										
0.7					1					1
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL					1					1

	NE GUST PEAKS VS MU BY MISS. SEG. ASCENT. ALT. 5000. CT/S 0.09									
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2										
0.8										
0.7							1			1
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL							1			1

	NE GUST PEAKS VS MU BY MISS. SEG. ASCENT. ALT. 1000. CT/S 0.12									
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2					1	1				2
0.8										
0.7						2				2
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL					1	3				4

Table XXIII - contd.

NZ GUST PEAKS VS MU BY MISS. SEG. ASCENT, ALT. 5000, CT/S 0.15										
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2						1				1
0.8										
0.7										
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL						1				1

NZ GUST PEAKS VS MU BY MISS. SEG. MANUVR, ALT. 2000, CT/S 0.09										
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2			2		3	2	1			8
0.8					1					1
0.7										
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL			2		4	2	1			9

NZ GUST PEAKS VS MU BY MISS. SEG. MANUVR, ALT. 2000, CT/S 0.12										
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3						1				1
1.2					1	3				4
0.8						2	1			3
0.7										
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL					1	6	1			8

NZ GUST PEAKS VS MU BY MISS. SEG. DESCNT, ALT. LESS, CT/S 0.09										
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2										
0.8										
0.7						1				1
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL						1				1

Table XXIII - contd.

NZ GUST PEAKS VS MU BY MISS. SEG. DESCNT, ALT. 1000, CT/S 0.09										
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2						1				1
0.8										
0.7										
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL						1				1

NZ GUST PEAKS VS MU BY MISS. SEG. DESCNT, ALT. 2000, CT/S 0.09										
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2						0	6	1		15
0.8						6	4			10
0.7										
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL					14	10	1			25

NZ GUST PEAKS VS MU BY MISS. SEG. DESCNT, ALT. 2000, CT/S 0.12										
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2				2	2	2				6
0.8							3			3
0.7										
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL				2	2	5				9

NZ GUST PEAKS VS MU BY MISS. SEG. DESCNT, ALT. 2000, CT/S 0.15										
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2					1					1
0.8							1			1
0.7										
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL					1	1				2

Table XXIII - contd.

NZ GUST PEAKS VS MU BY MISS. SEG. DESCNT. ALT. 5000. CT/S 0.09										
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2						3				3
0.8										
0.7						1				1
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL						4				4

NZ GUST PEAKS VS MU BY MISS. SEG. DESCNT. ALT. 5000. CT/S 0.12										
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2				1		2	1			4
0.8										
0.7					1	1				2
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL				1	1	3	1			6

NZ GUST PEAKS VS MU BY MISS. SEG. DESCNT. ALT. 5000. CT/S 0.15										
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2					1					1
0.8										
0.7										
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL					1					1

NZ GUST PEAKS VS MU BY MISS. SEG. STEADY. ALT. 1000. CT/S 0.09										
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2						3	2			5
0.8										
0.7					1	2				3
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL					1	5	2			8
TIME	6.5	33.5	29.3	0.3	20.6	59.0	7.0	0.	C.	173.0

Table XXIII - contd.

NE GUST PEAKS VS NU BY MISS. SEC. STEADY, ALT. 2000, CT/S 0.09										
LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL	
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4						1				1
1.3							1			1
1.2			1	0	20	3				24
0.8					11	19	7			37
0.7										
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL				1	17	46	11			75
TIME	30.1	170.7	67.0	193.7	837.2	693.7	123.1	0.0	0.	2124.5

NE GUST PEAKS VS NU BY MISS. SEC. STEADY, ALT. 2000, CT/S 0.12										
LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL	
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2					7	10	1			18
0.8										
0.7			1	7	19	2				29
0.6				1	1					2
0.5										
0.4										
0.2										
LESS										
TOTAL				1	15	30	3			57
TIME	41.0	243.0	84.0	471.0	1497.0	743.1	182.0	0.1	0.	3203.7

NE GUST PEAKS VS NU BY MISS. SEC. STEADY, ALT. 2000, CT/S 0.15										
LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL	
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2						0				0
0.8										
0.7					2	4	1			7
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL					2	12	1			15
TIME	0.7	21.2	10.0	79.0	357.5	220.0	43.0	0.	0.	742.6

NE GUST PEAKS VS NU BY MISS. SEC. STEADY, ALT. 5000, CT/S 0.09										
LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL	
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2						2				2
0.8										
0.7				2	1					3
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL				2	1	2				5
TIME	0.	0.0	0.3	16.2	60.9	104.5	30.2	0.	0.	215.1

TABLE XXIII - contd.

N <sub>Z</sub> GUST PEAKS VS. $\mu$ BY MISS. SEG. STEADY, ALT. 5000, CT/S 0.12										
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3						1				1
1.2					4	10	3			17
0.8										
0.7					1	7				10
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL					7	10	3			20
TIME	2.1	25.2	11.4	196.4	787.0	878.0	113.2	0.	0.	2013.3

N <sub>Z</sub> GUST PEAKS VS. $\mu$ BY MISS. SEG. STEADY, ALT. 5000, CT/S 0.15										
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3						1				1
1.2					3	3				6
0.8										
0.7					3	3				6
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL					6	7				13
TIME	0.	3.2	7.0	29.2	187.8	142.9	17.5	0.	0.	587.5

TABLE XXIV  
GUST  $n_z$  VERSUS  $\mu$  BY MISSION SEGMENT

N <sub>Z</sub> GUST PEAKS VS. $\mu$ BY MISS. SEG. ASCENT										
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2					1	10	9			20
0.8										
0.7					2	8	13			23
0.6						2	1			3
0.5										
0.4										
0.2										
LESS										
TOTAL					3	20	23			46

TABLE XXIV - contd.

NZ GUST PEAKS VS MU BY MISS. SEG. MANUVR										
LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL	
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2			2		4	5	1			12
0.8										
0.7					1	2	1			4
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL			2		5	8	2			17
NZ GUST PEAKS VS MU BY MISS. SEG. DESCNT										
LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL	
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2				3	11	14	2			30
0.8										
0.7					8	10				18
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL				3	20	24	2			49
NZ GUST PEAKS VS MU BY MISS. SEG. STEADY										
LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL	
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2										
0.8										
0.7										
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL				4	49	120	20			201
TIME	105.8	533.7	226.1	1008.0	4000.9	7887.8	526.3	0.2	0.	9288.9

TABLE XXV  
GUST n<sub>Z</sub> VERSUS AIRSPEED BY MISSION SEGMENT

NZ GUST PEAKS VS VEL. BY MISS. SEG. ASCENT																
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3																
1.2																20
0.8																
0.7																23
0.6																3
0.5																
0.4																
0.2																
LESS																
TOTAL																46

TABLE XXV - contd.

N <sub>Z</sub> GUST PEAKS VS VEL. BY MISS. SEG. MANIUV																	
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL	
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3						1										1	
1.2	1	1	3	1		1	2	2		1						12	
0.8																	
0.7			1		1	1						1				4	
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL	1	1	4	1	1	3	2	2		1		1				17	
N <sub>Z</sub> GUST PEAKS VS VEL. BY MISS. SEG. DESCNT																	
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL	
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3					1											1	
1.2		1	8	5	4	5	1	4	2							30	
0.8																	
0.7			5	3	1	1	5	2	1							18	
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL	1	13	9	5	6	6	6	6	3							49	
N <sub>Z</sub> GUST PEAKS VS VEL. BY MISS. SEG. STEADY																	
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL	
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4						1										1	
1.3					1											3	
1.2		1	13	7	7	17	18	24	8	5						100	
0.8																	
0.7			17	15	9	10	19	12	8	3	2					95	
0.6			1					1								2	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL	1	31	22	16	29	38	37	17	8	2						201	
TIME	449.3	540.2	3534.6	908.0	639.8	606.1	735.0	733.7	447.2	186.2	44.3	15.4	1.2	0.1	0.	0.	9288.9

TABLE XXVI  
GUST n<sub>Z</sub> VERSUS μ

N <sub>Z</sub> GUST PEAKS VS μ COMPOSITE										
LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL	
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3						1	3		1	
1.2					2	5	45	98	12	5
0.8										167
0.7						5	45	79	11	140
0.6							1	2		4
0.5										
0.4										
0.2										
LESS										
TOTAL					2	10	96	183	24	171

**TABLE XXVII  
GUST  $n_z$  VERSUS AIRSPEED**

$n_z$	GUST PEAKS VS VELOCITY COMPOSITE														TOTAL		
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130		135	140
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	1
1.2	1	3	36	15	12	26	1	16	10	6							9
0.8																	102
0.7		1	31	19	16	16	25	16	12	3	2	1					140
0.6			3		1			1									7
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL	1	4	69	35	29	63	47	51	24	9	2	1					313

**TABLE XXVIII  
MANEUVER  $n_z$  VERSUS AIRSPEED BY MISSION SEGMENT  
BY ALTITUDE BY GROSS WEIGHT**

$n_z$	MANEUVERS VS VEL. BY MISSION SEG. ASCENT, ALT. LESS, WGT. 20000														TOTAL		
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130		135	140
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2	1	1															2
0.8																	
0.7																	
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL	1	1															2

$n_z$	MANEUVERS VS VEL. BY MISSION SEG. ASCENT, ALT. LESS, WGT. 20000														TOTAL		
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130		135	140
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	1
1.2	1		1														2
0.8																	1
0.7																	
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL	1		1		1					1							4

$n_z$	MANEUVERS VS VEL. BY MISSION SEG. ASCENT, ALT. 1000, WGT. 20000														TOTAL		
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130		135	140
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2	1		1							2							4
0.8																	
0.7										1							1
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL	1		1							1		2					5

TABLE XXVIII - contd.

NZ MANEUVERS VS VEL. BY MISS. SEG. ASCENT, ALT. 1000, WGT. 22000																
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3																
1.2	2	1	6	1		1	2									13
0.8																
0.7			2			1	1									4
0.6																
0.5																
0.4																
0.2																
LESS																
TOTAL	2	1	8	1		2	3									17

NZ MANEUVERS VS VEL. BY MISS. SEG. ASCENT, ALT. 1000, WGT. 24000																
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3																
1.2	1		1													2
0.8																
0.7																
0.6																
0.5																
0.4																
0.2																
LESS																
TOTAL	1		1													2

NZ MANEUVERS VS VEL. BY MISS. SEG. ASCENT, ALT. 1000, WGT. 26000																
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3																
1.2	1															1
0.8																
0.7																
0.6																
0.5																
0.4																
0.2																
LESS																
TOTAL	1															1

NZ MANEUVERS VS VEL. BY MISS. SEG. ASCENT, ALT. 1000, WGT. 20000																
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3																
1.2																
0.8																
0.7																
0.6																
0.5																
0.4																
0.2																
LESS																
TOTAL			1													1

TABLE XXVIII - contd.

M2 MANEUVERS VS VEL. BY MISS. SEG. ASCENT, ALT. 1000, WGT. 30000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2						1											1
0.8																	
0.7																	
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL						1											1

M2 MANEUVERS VS VEL. BY MISS. SEG. ASCENT, ALT. 2000, WGT. LESS																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2			1	3	2		1										7
0.8																	
0.7				2	1		1	1	1								6
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL		1	5	3		2	1	1									13

M2 MANEUVERS VS VEL. BY MISS. SEG. ASCENT, ALT. 2000, WGT. 20000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5					1	1											2
1.4				2													2
1.3				4	1	1		1	2								9
1.2	6	6	17	5	5		2	2	1								42
0.8																	
0.7				8	2	3	4	2	1								20
0.6				1		2	1										6
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL	6	6	32	9	9	3	8	6	2								70

M2 MANEUVERS VS VEL. BY MISS. SEG. ASCENT, ALT. 2000, WGT. 22000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3	1		2			1											6
1.2	11	4	27	8	6	1	1	4									62
0.8																	
0.7	2	2	16	6	7	2		1	2								30
0.6				1													1
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL	16	6	46	14	13	4	1	5	2								105

TABLE XXVIII - contd.

NZ MANEUVERS VS VEL. BY MISS. SEG. ASCENT, ALT. 2000. WGT. 24000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2	1	1	1														3
0.8	5	2	7	1	2				2								19
0.7		2	1														3
0.6			1														1
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL	6	5	10	1	2				2								26

NZ MANEUVERS VS VEL. BY MISS. SEG. ASCENT, ALT. 2000. WGT. 26000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2	2	1	5		1							1					10
0.8									1								2
0.7			1														1
0.6																	
0.5							1										1
0.4																	
0.2																	
LESS																	
TOTAL	2	1	6		1	1		1				1					13

NZ MANEUVERS VS VEL. BY MISS. SEG. ASCENT, ALT. 2000. WGT. 28000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2	1		7	1	2	1											11
0.8																	
0.7			2		1												3
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL	1		9	1	3	1											15

NZ MANEUVERS VS VEL. BY MISS. SEG. ASCENT, ALT. 2000. WGT. 30000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2	1		1										1				3
0.8																	
0.7			1									1					2
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL	1		2									1		1			5

TABLE XXVIII - contd.

HZ MANEUVERS VS VEL. BY MISS. SEG. ASCENT, ALT. 5000, WGT. 20000																
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3																
1.2			1			2										3
0.8																
0.7																
0.6																
0.5																
0.4																
0.2																
LESS																
TOTAL			1			2										3

HZ MANEUVERS VS VEL. BY MISS. SEG. ASCENT, ALT. 5000, WGT. 22000																
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3																
1.2			3					1								4
0.8																
0.7			1		1	1	1	1								5
0.6																
0.5																
0.4																
0.2																
LESS																
TOTAL			4		1	1	1	2								9

HZ MANEUVERS VS VEL. BY MISS. SEG. ASCENT, ALT. 5000, WGT. 24000																
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3																
1.2																
0.8																
0.7											1					1
0.6																
0.5																
0.4																
0.2																
LESS																
TOTAL										1						1

HZ MANEUVERS VS VEL. BY MISS. SEG. MANUVR, ALT. 1000, WGT. 20000																
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3																
1.2		1			1			1								3
0.8																
0.7																
0.6																
0.5																
0.4																
0.2																
LESS																
TOTAL		1			1			1								3

TABLE XXVIII - contd.

	M2 MANEUVERS VS VEL. BY MISS. SEC. MANUVR, ALT. 2000, WGT. 20000																
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3	1	1	2	1				1									2
1.2	4	2	11	3	4	4	2										30
0.8																	
0.7		3	1		2												7
0.6		1															1
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL	5	7	15	4	6	4	2	2									43

	M2 MANEUVERS VS VEL. BY MISS. SEC. MANUVR, ALT. 2000, WGT. 22000																
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3	1	2	3	2			1	1	1								9
1.2	1	3	23	4	2	3	1	10	3	2	1	1					34
0.8																	
0.7			10	3	7	5	3	4	5		1						30
0.6			2			1		1									6
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL	2	5	43	9	9	11	5	16	10	2	2	1					119

	M2 MANEUVERS VS VEL. BY MISS. SEC. MANUVR, ALT. 2000, WGT. 24000																
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4		1															1
1.3																	
1.2			1						1								2
0.8																	
0.7		1	1	1													3
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL		2	2	1					1								6

	M2 MANEUVERS VS VEL. BY MISS. SEC. MANUVR, ALT. 2000, WGT. 26000																
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2																	
0.8																	
0.7		1															1
0.6		1															2
0.5																	1
0.4																	
0.2																	
LESS																	
TOTAL		2	1	2	1	1	1	1	2			2					10

TABLE XXVIII - contd.

M2 MANEUVERS VS VEL. BY MISS. SEG. MANUVR, ALT. 5000, WGT. 20000																
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3																
1.2																
1.1																
1.0																
0.8																
0.7																
0.6																
0.5																
0.4																
0.2																
LESS																
TOTAL				1	1	2	1	1	1							7

M2 MANEUVERS VS VEL. BY MISS. SEG. MANUVR, ALT. 5000, WGT. 22000																
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3																
1.2																
1.1																
1.0																
0.8																
0.7																
0.6																
0.5																
0.4																
0.2																
LESS																
TOTAL	1		2													3

M2 MANEUVERS VS VEL. BY MISS. SEG. DESCNT, ALT. LESS, WGT. 20000																
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3																
1.2																
1.1																
1.0																
0.8																
0.7																
0.6																
0.5																
0.4																
0.2																
LESS																
TOTAL				1												1

M2 MANEUVERS VS VEL. BY MISS. SEG. DESCNT, ALT. LESS, WGT. 22000																
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3																
1.2																
1.1																
1.0																
0.8																
0.7																
0.6																
0.5																
0.4																
0.2																
LESS																
TOTAL	1		1													2

TABLE XXVIII - contd.

NZ MANEUVERS VS VEL. BY MISS. SEG. DESCNT. ALT. LESS. WGT. 24000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2		1															1
0.8																	
0.7																	
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL	1																1

NZ MANEUVERS VS VEL. BY MISS. SEG. DESCNT. ALT. 1000. WGT. LESS																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2				1		2	1										4
0.8																	
0.7	1																1
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL	1			1		2	1										5

NZ MANEUVERS VS VEL. BY MISS. SEG. DESCNT. ALT. 1000. WGT. 20000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2	2		6	1				1	1								11
0.8																	
0.7	1	1	4		1												7
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL	4	1	10	1	1			1	1								19

NZ MANEUVERS VS VEL. BY MISS. SEG. DESCNT. ALT. 1000. WGT. 22000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2	5	3	4		2	2			1								17
0.8			2														4
0.7	2																
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL	7	3	6		2	2			1								21

TABLE XXVIII - contd.

NZ MANEUVERS VS VEL. BY MISS. SEG. DESCNT. ALT. 1000. WGT. 20000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2		1															1
0.8		4															4
0.7																	
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL	5																5

NZ MANEUVERS VS VEL. BY MISS. SEG. DESCNT. ALT. 1000. WGT. 20000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2		3															3
0.8																	
0.7		1															1
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL	4																4

NZ MANEUVERS VS VEL. BY MISS. SEG. DESCNT. ALT. 1000. WGT. 20000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2		1	1	1													3
0.8																	
0.7		1															1
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL	2	1	1														4

NZ MANEUVERS VS VEL. BY MISS. SEG. DESCNT. ALT. 2000. WGT. LESS																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4			2		1												3
1.3		3		1		1											5
1.2		8	2	5	1	2											21
0.8																	
0.7		7		3	3			1	2								20
0.6		7				1											8
0.5		2															2
0.4																	
0.2																	
LESS																	
TOTAL	27	4	9	9	6	3	1	2	2								59

TABLE XXVIII - contd.

NZ MANEUVERS VS VEL. BY MISS. SEG. DESCNT. ALT. 2000. WGT. 20000																
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4				2		1										3
1.3	6	1	2	3	1	1										16
1.2	17	11	39	4	4	11	5	5	2							106
0.8																
0.7	9	4	21	8	5	5	8	3	1							64
0.6	2		3			2										7
0.5																
0.4																
0.2																
LESS																
TOTAL	34	16	65	21	14	20	13	8	5							196

NZ MANEUVERS VS VEL. BY MISS. SEG. DESCNT. ALT. 2000. WGT. 22000																
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4	2															2
1.3	6	2	4	1		1			1							15
1.2	29	15	50	5	7	7	6	2	1							122
0.8																
0.7	13	2	25	9	7	6	4	2	2	1						71
0.6		1		1	1		1		1							5
0.5									1							1
0.4																
0.2																
LESS																
TOTAL	50	20	79	16	15	14	11	4	6	1						216

NZ MANEUVERS VS VEL. BY MISS. SEG. DESCNT. ALT. 2000. WGT. 24000																
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4	1															1
1.3	2	1	1					1		1						6
1.2	7	6	12	1	4	2	2		1							35
0.8																
0.7	2	4	6	1	1					1						15
0.6																
0.5					1											1
0.4																
0.2																
LESS																
TOTAL	12	11	19	2	6	2	2	1	1	2						58

NZ MANEUVERS VS VEL. BY MISS. SEG. DESCNT. ALT. 2000. WGT. 26000																
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4	1															1
1.3	1		2		1											4
1.2	5	2	15	5	1	2	3			2						35
0.8																
0.7		3	4			2	1									10
0.6																
0.5																
0.4																
0.2																
LESS																
TOTAL	7	5	21	5	2	4	4			2						50

TABLE XXVIII - contd.

NZ MANEUVERS VS VEL. BY MISS. SEG. DESCNT. ALT. 7500. WGT. 23000																
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3																
1.2	3	6	3		1	1	1	2	1							6
0.8																21
0.7	1	1	5		2	2		1	1							13
0.6																
0.5																
0.4																
0.2																
LESS																
TOTAL	4	8	14		5	3	1	3	2							40

NZ MANEUVERS VS VEL. BY MISS. SEG. DESCNT. ALT. 2000. WGT. 30000																
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3																
1.2		4	6	1												11
0.8																
0.7			1	1	1		1									4
0.6									1							1
0.5																
0.4																
0.2																
LESS																
TOTAL		4	7	2	1		1		1							16

NZ MANEUVERS VS VEL. BY MISS. SEG. DESCNT. ALT. 5000. WGT. 20000																
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3			1		1											2
1.2	1	2			1	3			1							8
0.8																
0.7			2	1		1	1	1								6
0.6			1													1
0.5																
0.4																
0.2																
LESS																
TOTAL		1	6	1	2	4	1	1	1							17

NZ MANEUVERS VS VEL. BY MISS. SEG. DESCNT. ALT. 5000. WGT. 22000																
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3	1															1
1.2	1		4	2		1	1	2								11
0.8																
0.7		1			1		2	2	1							7
0.6																
0.5							1									1
0.4																
0.2																
LESS																
TOTAL	2	1	4	2	1	1	3	5	1							20

TABLE XXVIII - contd.

M2 MANEUVERS VS VEL. BY MISS. SEG. DESCNT, ALT. 5000. WGT. 24000																
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3																
1.2		1	1				1	1								6
0.9																
0.7		1				1		1								5
0.6																
0.5																
0.4																
0.2																
LESS																
TOTAL		2	1			1		4	1							11

M2 MANEUVERS VS VEL. BY MISS. SEG. DESCNT, ALT. 5000. WGT. 26000																
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3																
1.2			4	1	2			1								8
0.9																
0.7		1	3	1		1										6
0.6																
0.5																
0.4																
0.2																
LESS																
TOTAL		1	7	2	2	1		1								14

M2 MANEUVERS VS VEL. BY MISS. SEG. DESCNT, ALT. 5000. WGT. 28000																
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3																
1.2		1														1
0.9			1													1
0.7																
0.6																
0.5																
0.4																
0.2																
LESS																
TOTAL		1	1													2

M2 MANEUVERS VS VEL. BY MISS. SEG. STEADY, ALT. LESS, WGT. 27000																
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3																
1.2		1														1
0.9																
0.7																
0.6																
0.5																
0.4																
0.2																
LESS																
TOTAL		1														1
TIME	6.7	0.	1.5	0.6	0.	0.	0.	0.5	0.	0.	0.	0.	0.	0.	0.	9.2

TABLE XXVIII - contd.

1000. WGT. 1155																	
NZ MANEUVERS	VS VEL.	RV MISS.	SEG.	STEADY.	ALT.	1000.	105	110	115	120	125	130	135	140	TOTAL		
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2																	
0.8																	
0.7																	
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL																	2
TIME	1.8	0.	0.3	0.3	0.4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.9
1000. WGT. 2000																	
NZ MANEUVERS	VS VEL.	RV MISS.	SEG.	STEADY.	ALT.	1000.	105	110	115	120	125	130	135	140	TOTAL		
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2																	
0.8																	
0.7																	
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL																	5
TIME	32.0	7.1	11.5	3.3	3.0	4.3	3.0	1.9	0.6	0.	0.	0.	0.	0.	0.	0.	66.2
1000. WGT. 2200																	
NZ MANEUVERS	VS VEL.	RV MISS.	SEG.	STEADY.	ALT.	1000.	105	110	115	120	125	130	135	140	TOTAL		
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2																	
0.8																	
0.7																	
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL																	8
TIME	35.6	7.5	10.2	5.8	4.8	15.3	11.7	6.4	9.2	3.1	0.8	0.	0.	0.	0.	0.	107.1
1000. WGT. 2400																	
NZ MANEUVERS	VS VEL.	RV MISS.	SEG.	STEADY.	ALT.	1000.	105	110	115	120	125	130	135	140	TOTAL		
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2																	
0.8																	
0.7																	
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL																	2
TIME	15.0	0.7	4.3	0.5	0.7	3.7	9.0	5.1	9.2	3.8	0.	0.	0.	0.	0.	0.	51.7

TABLE XXVIII - contd.

NZ MANEUVERS VS VEL. BY MISS. SEG. STEADY, ALT. 2000, WGT. LESS

LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3				1			1	1								1
1.2					1	3	1	2								2
0.8																
0.7			2		2	4	4	1	2							15
0.6						1										1
0.5							1									1
0.4																
0.2																
LESS																
TOTAL			2	1	3	6	5	2								27
TIME	0.2	3.8	24.9	1.2	3.8	7.5	8.4	11.8	7.0	0.	0.	0.	0.	0.	0.	76.6

NZ MANEUVERS VS VEL. BY MISS. SEG. STEADY, ALT. 2000, WGT. 20000

LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3					2	1		1								6
1.2	2	2	16	9	6	7	8	10	6	2	2					71
0.8																
0.7	4	2	20	6	9	15	6	20	8	1						91
0.6				2	1	1	1	3								8
0.5																
0.4																
0.2																
LESS																
TOTAL	9	4	38	17	18	24	15	33	15	3	2					178
TIME	163.9	67.8	327.2	94.5	83.6	76.8	120.4	121.4	65.8	22.3	4.4	0.3	0.1	0.	0.	1217.7

NZ MANEUVERS VS VEL. BY MISS. SEG. STEADY, ALT. 2000, WGT. 22000

LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3																
1.2	13	6	31	19	16	16	16	13	9	8	1		1			149
0.8																
0.7	7	2	10	10	13	10	11	10	6	2	1					90
0.6			1	3	1	5	2	1								13
0.5						1										1
0.4																
0.2																
LESS																
TOTAL	29	8	52	34	30	34	30	24	16	11	2		2			268
TIME	293.1	97.1	735.6	194.9	122.9	114.5	191.4	174.8	114.8	46.9	11.4	5.6	0.3	0.	0.	2023.4

NZ MANEUVERS VS VEL. BY MISS. SEG. STEADY, ALT. 2000, WGT. 24000

LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4					1											1
1.3	1		3													4
1.2	2	1	14	5	2	4	5		2	4			3			42
0.8																
0.7	6	2	14	5	1	3	4	2	5	1			3			44
0.6				1												1
0.5			1													1
0.4																
0.2																
LESS																
TOTAL	9	3	32	12	3	7	9	2	7	5			6			95
TIME	114.8	104.8	535.8	92.5	39.9	31.8	90.2	97.8	37.8	14.8	9.8	6.1	0.7	0.1	0.	1088.6

TABLE XXVIII - contd.

M2 MANEUVERS VS VEL. BY MISS. SEG. STEADY, ALT. 2000, WGT. 26000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2																	
1.0																	
0.8																	
0.7																	
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL	4	3	12	7	4	5	11	8	5	5	2						66
TIME	76.8	84.2	418.5	61.0	36.7	25.7	63.3	41.4	38.5	24.2	7.6	1.2	0.	0.	0.	0.	859.2

M2 MANEUVERS VS VEL. BY MISS. SEG. STEADY, ALT. 2000, WGT. 28000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2																	
1.0																	
0.8																	
0.7																	
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL	6		14	3	12	13	3	9	11	2							73
TIME	45.3	65.5	291.8	70.2	64.9	44.6	34.3	38.4	19.3	7.8	2.6	0.7	0.	0.	0.	0.	685.9

M2 MANEUVERS VS VEL. BY MISS. SEG. STEADY, ALT. 2000, WGT. 30000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2																	
1.0																	
0.8																	
0.7																	
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL	1	1	4		2	2	2	4	7	4							28
TIME	13.0	1.1	67.5	23.3	12.5	11.7	16.4	25.6	13.7	8.5	3.1	0.6	0.	0.	0.	0.	197.1

M2 MANEUVERS VS VEL. BY MISS. SEG. STEADY, ALT. 9000, WGT. LESS																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2																	
1.0																	
0.8																	
0.7																	
0.6																	
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL					1	1	2										4
TIME	0.	0.7	5.4	2.3	1.1	3.3	0.8	0.6	1.2	0.4	0.	0.	0.	0.	0.	0.	16.1

TABLE XXVIII - contd.

M2 MANEUVERS VS VEL. BY MISS. SEG. STEADY, ALT. 5000, WGT. 20000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2			4	2		5	5	3	5	1							25
0.8																	
0.7	1		2			4	2	7	5								21
0.6							1	1									2
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL	1		6	2		9	8	11	10	1							48
TIME	5.9	16.4	121.9	55.7	60.0	71.9	85.9	92.4	47.2	23.3	3.8	0.2	0.	0.	0.	0.	502.5

M2 MANEUVERS VS VEL. BY MISS. SEG. STEADY, ALT. 5000, WGT. 22000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3								1		1							2
1.2			1	7	5	10	10	3	2	3	3						3
0.8			4	8	6	5	7	1	3	5	3						47
0.7			4	8	6	5	7	1	3	5	3						42
0.6					1	1	1	1	1	1							5
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL			9	15	12	16	20	4	6	11	6						99
TIME	11.4	36.0	256.6	139.5	110.2	141.5	131.3	90.4	48.6	20.1	3.3	0.6	0.	0.	0.	0.	997.4

M2 MANEUVERS VS VEL. BY MISS. SEG. STEADY, ALT. 5000, WGT. 24000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3				1	1		1										3
1.2			5	3		2	5	2		1	1						19
0.8			6	3		3	4	2									18
0.7			6	3		3	4	2									18
0.6						1											1
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL			12	7		6	10	4		1	1						41
TIME	10.9	50.2	271.0	61.0	29.6	24.5	39.0	41.6	23.1	4.9	0.9	0.1	0.	0.	0.	0.	504.9

M2 MANEUVERS VS VEL. BY MISS. SEG. STEADY, ALT. 5000, WGT. 26000																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3							1										1
1.2			1	3	3	2	1	1		1							12
0.8			1	2	1	2		1	1								8
0.7			1	2	1	2		1	1								8
0.6					1												1
0.5																	
0.4																	
0.2																	
LESS																	
TOTAL			2	5	5	4	1	2	2	1							22
TIME	17.6	36.0	214.3	61.2	44.2	28.9	28.6	23.4	4.5	1.5	0.	0.	0.	0.	0.	0.	461.1

TABLE XXVIII - contd.

M2 MANEUVERS VS VEL. BY MISS. SEG. STEADY, ALT. 5000, WGT. 28000																
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3																
1.2				1			1	1								3
0.8																
0.7							2									2
0.6																
0.5																
0.4																
0.2																
LESS																
TOTAL				1			3	1								5
TIME	2.9	2.5	116.0	19.0	4.6	0.6	1.3	2.9	7.4	5.5	0.6	0.	0.	0.	0.	163.3
M2 MANEUVERS VS VEL. BY MISS. SEG. STEADY, ALT. 5000, WGT. 32000																
LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4																
1.3																
1.2					1											1
0.8																
0.7																
0.6																
0.5																
0.4																
0.2																
LESS																
TOTAL					1											1
TIME	0.	0.	0.9	10.7	0.9	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	20.5

TABLE XXIX  
MANEUVER  $n_z$  VERSUS  $\mu$  BY MISSION SEGMENT  
BY ALTITUDE BY  $C_T/\sigma$

M2 MANEUVERS VS $\mu$ BY MISS. SEG. ASCENT, ALT. LESS, $C_T/\sigma$ 0.09										
LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL	
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3						1			1	
1.2				2	1	1			4	
0.8										
0.7							1		1	
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL				2	1	2	1		6	
M2 MANEUVERS VS $\mu$ BY MISS. SEG. ASCENT ALT. 1000, $C_T/\sigma$ 0.09										
LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL	
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2	1	1	1		0	3	2		10	
0.8										
0.7						2	3		5	
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL	1	1	1		10	6	2		21	

TABLE XXIX - contd.

NZ MANEUVERS VS MU BY MISS. SEG. ASCENT, ALT. 1000, CT/S 0.12										
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2		3			2					5
0.8										
0.7										
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL		3			2					5

NZ MANEUVERS VS MU BY MISS. SEG. ASCENT, ALT. 1000, CT/S 0.15										
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2					1					1
0.8										
0.7										
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL					1					1

NZ MANEUVERS VS MU BY MISS. SEG. ASCENT, ALT. 2000, CT/S 0.09										
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5					1	1				2
1.4					2	2				2
1.3					5	3				11
1.2	1	2	6	8	37	17	1			72
0.8										
0.7		1		5	22	19				47
0.6				1	1	3				5
0.5										
0.4										
0.2										
LESS										
TOTAL	1	4	6	16	60	43	1			130

NZ MANEUVERS VS MU BY MISS. SEG. ASCENT, ALT. 2000, CT/S 0.12										
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2	1	0	1	1	40	8	1			72
0.8										
0.7			1	5	10	6				22
0.6					1					1
0.5						1				1
0.4										
0.2										
LESS										
TOTAL	1	0	0	16	55	17	1			102

TABLE XXIX - contd.

	NZ MANEUVERS VS MU BY MISS. SEG. ASCENT, ALT. 2000, CT/S 0.15									
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2		1	1		3	3	2			10
0.8					3	1	1			5
0.7										
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL		1	1		4	4	3			15

	NZ MANEUVERS VS MU BY MISS. SEG. ASCENT, ALT. 5000, CT/S 0.12									
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2					4	3				7
0.8					1	4				5
0.7										
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL					5	7				12

	NZ MANEUVERS VS MU BY MISS. SEG. ASCENT, ALT. 5000, CT/S 0.15									
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2										
0.8										
0.7							1			1
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL							1			1

	NZ MANEUVERS VS MU BY MISS. SEG. MANUVR, ALT. 1000, CT/S 0.09									
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2			1			2				3
0.8										
0.7										
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL			1			2				3

TABLE XXIX - contd.

NZ MANEUVERS VS MU BY MISS. SEG. MANUVR, ALT. 2000, CT/S 0.09									
LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4									
2.2									
2.0									
1.8									
1.7									
1.6					1				1
1.5				1	1				2
1.4			2	3	1	1			7
1.3	1		1	7	2	1			12
1.2	3	1	10	17	21	5			57
0.8									
0.7			2	9	18	5			34
0.6			1		1				2
0.5									
0.4									
0.2									
LESS									
TOTAL	4	1	16	37	45	12			115

NZ MANEUVERS VS MU BY MISS. SEG. MANUVR, ALT. 2000, CT/S 0.12									
LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4									
2.2									
2.0									
1.8									
1.7									
1.6									
1.5									
1.4				2	4				6
1.3		1	2	2					5
1.2		1	4	19	9	1			34
0.8									
0.7			3	9	5	1			18
0.6			1	2	2				5
0.5									
0.4									
0.2									
LESS									
TOTAL		2	10	34	20	2			68

NZ MANEUVERS VS MU BY MISS. SEG. MANUVR, ALT. 2000, CT/S 0.15									
LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4									
2.2									
2.0									
1.8									
1.7									
1.6									
1.5									
1.4									
1.3									
1.2									
0.8									
0.7									
0.6						1			1
0.5									
0.4									
0.2									
LESS									
TOTAL					1				1

NZ MANEUVERS VS MU BY MISS. SEG. MANUVR, ALT. 5000, CT/S 0.09									
LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4									
2.2									
2.0									
1.8									
1.7									
1.6									
1.5									
1.4									
1.3									
1.2									
0.8									
0.7						1			1
0.6									
0.5									
0.4									
0.2									
LESS									
TOTAL					1				1

TABLE XXIX - contd.

NZ MANEUVERS	VS MU BY MISS. SEG. MANUVR. ALT. 5000, CT/S 0.12									
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2					2	4				6
0.8										
0.7			1		1	1				3
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL			1		3	5				9

NZ MANEUVERS	VS MU BY MISS. SEG. DESCNT, ALT. LESS, CT/S 0.09									
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3					1					1
1.2					1					1
0.8										
0.7				1						1
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL				1	2					3

NZ MANEUVERS	VS MU BY MISS. SEG. DESCNT, ALT. LESS, CT/S 0.12									
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2		1								1
0.8										
0.7										
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL	1									1

NZ MANEUVERS	VS MU BY MISS. SEG. DESCNT, ALT. 1000, CT/S 0.09									
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3		1								1
1.2			4	3	2	13	8			30
0.8										
0.7				2	4	3	1			10
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL	1	4	5	6	16	9				41

TABLE XXIX - contd.

	NZ MANEUVERS VS MU BY MISS. SEG. DESCNT, ALT. 1000, CT/S 0.12									
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3	1									1
1.2	2	4	1	3			1			11
0.8										
0.7		3	1							4
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL	3	7	2	3			1			16

	NZ MANEUVERS VS MU BY MISS. SEG. DESCNT, ALT. 1000, CT/S 0.19									
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2			1							1
0.8										
0.7										
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL			1							1

	NZ MANEUVERS VS MU BY MISS. SEG. DESCNT, ALT. 2000, CT/S 0.09									
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4	1		1	1	3	1				7
1.3	2	5	1	4	5	4	1			22
1.2	2	22	12	30	65	46				177
0.8										
0.7	3	10	5	16	42	35				111
0.6		8	1	1	3	4				17
0.5		1	1							2
0.4										
0.2										
LESS										
TOTAL	8	46	21	52	118	90	1			336

	NZ MANEUVERS VS MU BY MISS. SEG. DESCNT, ALT. 2000, CT/S 0.12									
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4	1	2								3
1.3		7	4	3	4	4	1			23
1.2	4	16	13	24	60	21	4			142
0.8										
0.7		8	5	13	27	15	3			71
0.6					1	1	1			3
0.5					1		1			2
0.4										
0.2										
LESS										
TOTAL	5	33	22	40	93	41	10			244

TABLE XXIX - contd.

MZ MANEUVERS VS MU BY MISS. SEG. DESCNT, ALT. 2000, CT/S 0.15										
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3				1	4	2				7
1.2	1	2	2	10	9	7	1			32
0.8		1		2	4	7	1			15
0.7							1			1
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL	1	3	2	13	17	16	3			55

MZ MANEUVERS VS MU BY MISS. SEG. DESCNT, ALT. 5000, CT/S 0.09										
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2				1	1	2				4
0.8										
0.7					3	2				5
0.6					1					1
0.5										
0.4										
0.2										
LESS										
TOTAL				1	5	4				10

MZ MANEUVERS VS MU BY MISS. SEG. DESCNT, ALT. 5000, CT/S 0.12										
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3		1			1	1				3
1.2			1	3	6	9	4			23
0.8				2	2	10	1			15
0.7										
0.6							1			1
0.5										
0.4										
0.2										
LESS										
TOTAL		1	1	5	9	21	5			42

MZ MANEUVERS VS MU BY MISS. SEG. DESCNT, ALT. 5000, CT/S 0.15										
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3		1								1
1.2				1	4	2				7
0.8										
0.7				1	3					4
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL	1			2	7	2				12

TABLE XXIX - contd.

	NZ MANEUVERS VS MU BY MISS. SEG. STEADY, ALT. LESS, CT/S 0.09									
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2			1							1
0.8										
0.7										
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL			1							1
TIME	2.3	4.5	1.6	0.5	2.8	0.5	0.	0.	0.	12.0

	NZ MANEUVERS VS MU BY MISS. SEG. STEADY, ALT. 1000, CT/S 0.09									
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3						1				1
1.2		2			4	1				7
0.8										
0.7		1		1	2	3				7
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL		3		1	4	5				13
TIME	6.5	33.5	29.3	8.3	28.6	59.0	7.8	0.	0.	173.0

	NZ MANEUVERS VS MU BY MISS. SEG. STEADY, ALT. 1000, CT/S 0.12									
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2		1								1
0.8										
0.7										
0.6										
0.5										
0.4										
0.2										
LESS										
TOTAL		2								2
TIME	5.4	28.6	10.3	8.6	13.0	23.3	7.9	0.	0.	97.2

	NZ MANEUVERS VS MU BY MISS. SEG. STEADY, ALT. 2000, CT/S 0.09									
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3		2				1				3
1.2		3		1	4	7		1		16
0.8	1	4	1	6	46	67	27	1		146
0.7	1	6		4	35	80	9			135
0.6					3	10				13
0.5						2				2
0.4										
0.2										
LESS										
TOTAL	2	15	1	11	88	167	24	2		315
TIME	38.1	170.7	67.9	193.7	837.2	693.7	123.1	0.0	0.	2124.5

TABLE XXIX - contd.

NZ MANEUVERS VS MU BY MISS. SEG. STEADY, ALT. 2000, CT/S 0.12

	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4			1		1					2
1.3		1	1		5	3	3			13
1.2		3	13	1	10	54	62	20		163
0.8										
0.7		3	8	1	7	51	56	15		141
0.6						6	7			13
0.5						1		1		2
0.4										
0.2										
LESS										
TOTAL	7	23	2	17	110	128	39			394
TIME	41.8	233.0	84.6	471.4	1497.0	763.1	182.8	0.1	0.	3203.7

NZ MANEUVERS VS MU BY MISS. SEG. STEADY, ALT. 2000, CT/S 0.15

	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3						2	1			3
1.2			1	1	9	22	8			41
0.8										
0.7		1	2		5	25	8			41
0.6					1					1
0.5										
0.4										
0.2										
LESS										
TOTAL		1	3	1	15	49	17			86
TIME	8.7	21.2	10.8	79.6	357.5	220.8	43.8	0.	0.	742.6

NZ MANEUVERS VS MU BY MISS. SEG. STEADY, ALT. 5000, CT/S 0.09

	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3										
1.2					2	7	1			10
0.8										
0.7			1		1	6				8
0.6						2				2
0.5										
0.4										
0.2										
LESS										
TOTAL			1		3	15	1			20
TIME	0.	0.8	0.5	16.2	80.9	106.5	30.2	0.	0.	235.1

NZ MANEUVERS VS MU BY MISS. SEG. STEADY, ALT. 5000, CT/S 0.12

	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4						1	1			2
1.3					3	2	1			6
1.2			1	24	45	16				86
0.8										
0.7			1	21	46	11				79
0.6					5	2				7
0.5										
0.4										
0.2										
LESS										
TOTAL				2	48	99	31			180
TIME	2.1	25.2	11.4	196.4	787.0	878.0	113.2	0.	0.	2013.3

Table XXIX - contd.

N2 MANEUVERS VS MU BY MISS. SEG. STEADY, ALT. 5000, CT/5 0.15										
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4										
1.3						1				1
1.2					6	6	2			12
0.8										
0.7					1	3				6
0.6					1					1
0.5										
0.4										
0.2										
LESS										
TOTAL					8	10	2			20
TIME	0.	3.2	7.0	29.2	307.0	142.9	17.5	0.	0.	507.5

TABLE XXX  
MANEUVER N<sub>2</sub> VERSUS μ BY MISSION SEGMENT

N2 MANEUVERS VS MU BY MISS. SEG. ASCENT										
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5					1	1				2
1.4					2					2
1.3		1	1	3	8	5				18
1.2	3	17	15	16	96	34	6			187
0.8										
0.7		1	1	10	30	33	3			86
0.6				1	2	3				6
0.5						1				1
0.4										
0.2										
LESS										
TOTAL	3	19	17	30	147	77	9			302

N2 MANEUVERS VS MU BY MISS. SEG. MANUVR										
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6						1	1			1
1.5					1	1				2
1.4				2	9	9	1			13
1.3		1	1	3	9	2	1			17
1.2	3	3	14	38	36	6				100
0.8										
0.7			1	5	19	25	6			56
0.6				2	2	3				7
0.5						1				1
0.4										
0.2										
LESS										
TOTAL		4	5	26	74	74	14			197

N2 MANEUVERS VS MU BY MISS. SEG. DESCENT										
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4	2	2	1	1	3	1				10
1.3	5	13	5	8	15	11	2			50
1.2	10	68	33	74	199	95	10			429
0.8										
0.7	3	22	13	39	64	70	5			236
0.6		6	1	1	5	5	2			22
0.5		1	1		1	1	1			5
0.4										
0.2										
LESS										
TOTAL	20	94	54	123	267	183	20			761

TABLE XXX - contd.

NZ MANEUVERS VS RW BY MISSION SEG. STEADY										
LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL	
2.4										
2.2										
2.0										
1.8										
1.7										
1.6										
1.5										
1.4		3			1	2	1			7
1.3	1	5		1	12	16	5			41
1.2	4	20	4	16	143	200	67	1		467
0.8										
0.7	4	16	4	13	116	221	43			417
0.6					11	24	2			37
0.5					1	2	1			4
0.4										
0.2										
LESS										
TOTAL	9	44	8	32	264	473	119	2		973
TIME	109.8	533.7	226.1	1000.0	4000.9	2007.8	526.3	0.2	0.	9200.9

TABLE XXXI  
MANEUVER  $n_z$  VERSUS AIRSPEED  
BY MISSION SEGMENT

NZ MANEUVERS VS VEL. BY MISSION SEG. ASCENT																
LESS	60	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5					1	1										2
1.4			2													2
1.3	2	1	7	3	1	1	2									10
1.2	31	16	61	18	16	6	5	7	5				1			107
0.8																
0.7	2	4	34	9	9	8	6	4	1	1						64
0.6			3		2		1									6
0.5						1										1
0.4																
0.2																
LESS																
TOTAL	39	21	127	31.	29	16	15	19	9	1	2		1			302

NZ MANEUVERS VS VEL. BY MISSION SEG. MANUVR																
LESS	60	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5						1										1
1.4			1			1			2	1	1					2
1.3	2	1	6	1	1		1	1	1							13
1.2	6	5	30	8	7	9	5	13	6	2	2	1				117
0.8																
0.7	1	5	13	5	10	5	4	5	6		2					56
0.6		2	2			1		2								7
0.5						1										1
0.4																
0.2																
LESS																
TOTAL	9	16	66	17	18	18	12	22	12	2	4	1				197

NZ MANEUVERS VS VEL. BY MISSION SEG. DESCENT																
LESS	60	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																
2.2																
2.0																
1.8																
1.7																
1.6																
1.5																
1.4	4	2		3		1										10
1.3	22	5	15	4	4	4		1	3	1						59
1.2	86	53	156	26	29	32	19	14	12	2						429
0.8																
0.7	30	19	76	24	21	18	18	14	6	2						236
0.6	5	1	4	1	2	2	1		2							22
0.5	2				1			1	1							5
0.4																
0.2																
LESS																
TOTAL	161	80	251	58	57	57	38	38	24	5						761

Table XXXI - contd.

NZ MANEUVERS VS VEL. BY MISS. SEG. STEADY																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2																	
1.1																	
1.0																	
0.8																	
0.7																	
0.6																	
0.5																	
0.4																	
0.3																	
0.2																	
LESS																	
TOTAL	61	22	191	105	94	126	118	109	81	65	13	6	2				973
TIME	849.3	990.2	3934.4	906.0	639.8	606.1	735.0	733.7	647.2	186.2	66.3	15.4	1.2	0.1	0.	0.	9288.9

TABLE XXXII  
MANEUVER  $n_z$  VERSUS  $\mu$

NZ MANEUVERS VS $\mu$ COMPOSITE											
	LESS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	TOTAL	
2.4											
2.2											
2.0											
1.8											
1.7											
1.6											
1.5											
1.4											
1.3											
1.2											
1.1											
1.0											
0.8											
0.7											
0.6											
0.5											
0.4											
0.3											
0.2											
LESS											
TOTAL	32	161	84	211	774	867	162	2		2233	

TABLE XXXIII  
MANEUVER  $n_z$  VERSUS AIRSPEED

NZ MANEUVERS VS VELOCITY COMPOSITE																	
	LESS	40	60	80	85	90	95	100	105	110	115	120	125	130	135	140	TOTAL
2.4																	
2.2																	
2.0																	
1.8																	
1.7																	
1.6																	
1.5																	
1.4																	
1.3																	
1.2																	
1.1																	
1.0																	
0.8																	
0.7																	
0.6																	
0.5																	
0.4																	
0.3																	
0.2																	
LESS																	
TOTAL	266	139	639	211	198	217	183	176	126	53	19	7	3				2233

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DOCUMENT CONTROL DATA - R&D		
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1 ORIGINATING ACTIVITY (Corporate author)		2a REPORT SECURITY CLASSIFICATION
Technology Incorporated Dayton, Ohio		Unclassified
		2b GROUP N/A
3 REPORT TITLE		
FLIGHT LOADS INVESTIGATION OF CARGO AND TRANSPORT CH-47A HELICOPTERS OPERATING IN SOUTHEAST ASIA		
4 DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final Technical Report		
5 AUTHOR(S) (Last name, first name, initial)		
Giesler, F. Joseph Braun, Joseph F.		
6 REPORT DATE	7a TOTAL NO OF PAGES	7b NO OF REFS
April 1968	125	4
8a CONTRACT OR GRANT NO	8a ORIGINATOR'S REPORT NUMBER(S)	
DA 44-177-AMC-367 F	USAAV LABS Technical Report 68-2	
b PROJECT NO	8b OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
Tasi IF125 001A 14807		
c		
d		
10 AVAILABILITY LIMITATION NOTICES		
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11 SUPPLEMENTARY NOTES		12 SPONSORING MILITARY ACTIVITY
		US Army Aviation Materiel Laboratories Fort Eustis, Virginia
13 ABSTRACT		
<p>From a structural flight loads program on four CH-47A cargo and transport helicopters, 235.76 hours of valid multichannel flight data were recorded as the helicopters operated from air bases in Southeast Asia. Data were processed and analyzed according to four distinct flight phases, termed mission segments: (1) takeoff and ascent; (2) maneuver; (3) descent, flare, and landing; and (4) steady state. Data are presented in the form of time and occurrence tables, histograms, and exceedance curves. These data indicate the time spent in the mission segments and parameter ranges; the number of peak parameter values occurring in the ranges of the given parameter, during each of the mission segments, and in the ranges of one or more related parameters; and the time to reach or exceed given maneuver and gust normal load factors. The largest normal load factor was 1.628, which occurred at a 93-knot airspeed and with a 22,100-pound gross weight. <u>In contrast to a concurrent study of armed CH-47As whose activity was mostly under maneuvering conditions, the cargo and transport CH-47As spent over 65 percent of their time in the steady-state mission segment.</u></p>		

DD FORM 1473  
1 JAN 64

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14 KEY WORDS	LINK A		LINK B		LINK C	
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