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USAAVLABS TECHNICAL REPORT 66-6

ENGINEERING LABORATORY REPORT OV-1A MOHAWK FLIGHT LOADS INVESTIGATION PROGRAM

By

David Chestnutt

January 1966

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

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ENGINEERING LABORATORY REPORT

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SUMMARY

A primary objective of this effort was to provide operational data for establishing future short takeoff and landing (STOL) aircraft design criteria. To accomplish this end, two OV-1A aircraft were selected that were participating in air-assault maneuvers. Approximately 200 hours of flight data were recorded within approximately 10 weeks. The parameters recorded were: airspeed, altitude, outside air temperature, and acceleration at the aircraft center of gravity. In addition, supplementary data were collected on the type of mission and gross weight of the aircraft. These data are presented as several frequency-of-occurrence forms, exceedance curves, and gust spectra.

FOREWORD

This program was sponsored by the Aeromechanics Division and was performed by the Engineering Laboratories Division of the United States Army Aviation Materiel Laboratories (USAAVLABS), Fort Eustis, Virginia. A contractor, Technology, Inc., provided assistance in data collection and reduction. Acknowledgment is given to Mr. Joseph Braun, Mr. C. G. Peckham, Mr. J. F. Nash, Mr. W. E. Morrin, and Mr. David Etter of Technology, Inc., for their contributions to this report and to Dr. R. G. Loewy, who served as consultant for the program. A special acknowledgment is extended to Mr. Larry E. Clay of Technology, Inc., for his help in writing the Results portion of this report.

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INTRODUCTION

A 203.9-hour statistical sample was collected on two operational aircraft of the 1st Cavalry Division, Airmobile (formerly 11th Air Assault Division). The data were recorded primarily in the maneuver area around Lugoff, South Carolina, from 9 September until mid-November 1964. The data recorded consisted of four parameters: airspeed, altitude, outside air temperature, and acceleration at approximately the aircraft center of gravity. In addition, supplementary data consisting of barometric pressure, ambient temperature, and gross weights of the aircraft before and after the flight were collected for each flight. The types of missions flown were as follows:

Mission I: Tactical training, assault force mobility, combat support mobility, aerial command post, reconnaissance - general, screening/surveillance, air escort, combat service support, and test flights.

Mission II: Fundamental training, radio relay, messenger, photo, and administrative.

The data were presented in several frequency-of-occurrence forms:

1. Diagram and tabulation of maneuver load factors versus equivalent airspeed, average time per flight, and so forth.

2. Histograms showing the percentages of flight time spent in selected ranges of the recorded parameters.

3. Exceedance curves showing the number of hours required to reach or exceed both maneuver and gust normal load factors.

In addition, for each incremental gust-induced acceleration above 5 feet per second, a gust velocity was derived; from these results, a gust spectrum was plotted and a tabulation was made of altitude versus derived gust velocity.

OBJECTIVES

The primary objectives of this program were:

1. To provide operational data for establishing future STOL aircraft design criteria.

2. To accumulate a minimum statistical sample of 200 flight hours of valid OV-1A operational data.

3. To present this information in a form for use by aircraft designers depicting U. S. Army field usage.

4. To perform limited preliminary analysis on these results.

METHOD

Two OV-1A aircraft were selected to obtain a minimum statistical sample of 200 flight hours of operational data. The aircraft were property of the 226th Aerial Surveillance and Escort Battalion of the 1st Cavalry Division, Airmobile. The maneuvers conducted from September until mid-November 1964 were of particular interest in that combat was simulated using the most advanced operational air-assault tactics. The two aircraft monitored during this maneuver were armed and flown on missions of low-level troop fire support and helicopter escort in addition to more routine missions.

Figure 1 is a schematic showing the instruments used to record continuously the parameters of altitude, airspeed, outside air temperature, and acceleration at the aircraft center of gravity. Calibrations were performed on all transducers as follows:

1. A "turnover" of ±1g was performed on the accelerometers in the field.

2. The altitude and airspeed transducers were connected to the aircraft Pitot-static system, and the entire system was recalibrated with a pressure standard in the field.

3. The temperature gauge was calibrated with a standard mercury-in-glass thermometer after installation.

Reference channels recorded along with the operational data included two mechanical reference traces timing marks at 1 pulse per second and a voltage monitor trace. The bridge balance unit was used for balancing each circuit prior to each flight and for inserting a fixed calibration signal on each analog channel per record. The chart speed was approximately 4 inches per minute, which allowed recording of up to 7-1/2 hours of flight time per 150-foot roll of oscillographic paper. The recording system was wired to start when the engine ignition switch was turned on and stop when this switch was turned off.

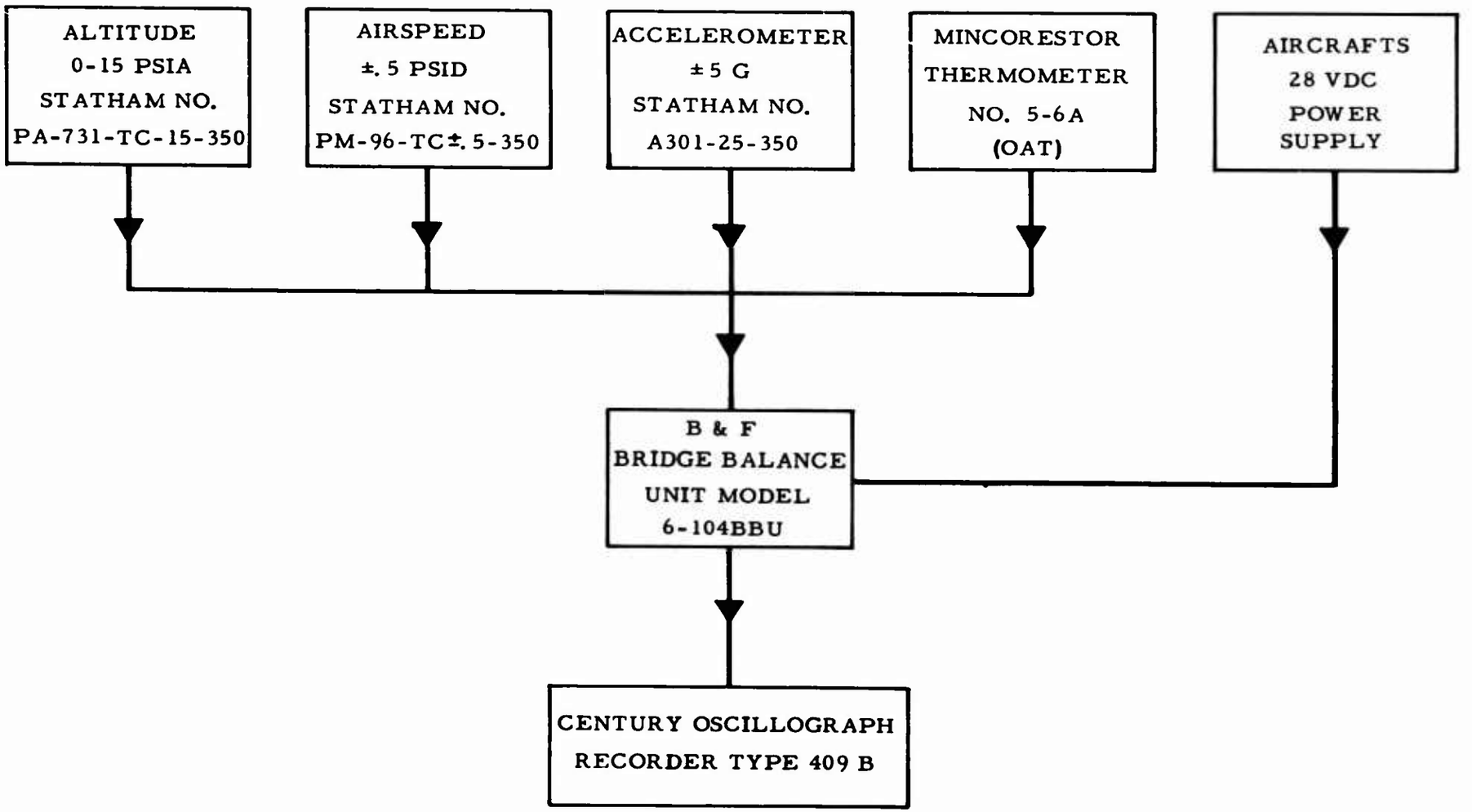


Figure 1. Block Diagram of OV-1A Recording System.

When approximately 7 hours of flight time had been recorded, the record was removed, developed in the field, marked, and sent to the data reduction facility at Technology, Inc., Dayton, Ohio.

At Technology, Inc., the data were scanned a second time for validity, and each record was converted to computer cards by using the semi-automatic Benson-Lehner Oscar K data readers. The basic methods of reducing the data involved reproducing the analog traces by reading the records at varying time intervals not exceeding 2 minutes of flight, depending on the activity of the particular trace. In addition, whenever an acceleration reading peaked outside of the ±0.25g threshold, all traces were read at that instant. These tabulations were converted to magnetic tape and combined with a computer program to obtain the print-outs in this report.

The most interesting calculation was that of derived gust velocity (U_{de}) for each gust-induced acceleration. The equation used was as follows:

$$U_{de} = \frac{1.1850\ W\ n_z}{m\ \rho_o\ S\ V_e\ K_g},$$

where U_{de} = derived gust velocity, feet per second

W = gross weight, pounds

Δn_z = incremental gust load factor = $n_z - 1.0$

m = lift curve slope (per radian) = + 4.86

ρ_o = sea level density = 0.0023779 slugs per cubic foot

S = wing area = 330 square feet

V_e = equivalent airspeed, knots

K_g = gust factor, defined as follows:

$$K_g = \frac{0.88\mu_g}{5.3 + \mu_g}$$

and

$$\mu_g = \frac{2W/\rho_o}{m\sigma \bar{c} S g}$$

where

g = dimensional constant = 32.174 feet per second squared

σ = density ratio ρ / ρ_o

$\bar{c}$ = mean aerodynamic chord = 8.15 feet

ρ = density, slugs per cubic foot

Substitution of the constant values into the equation for U_{de} yielded

$$U_{de} = (938.35\sigma + 0.3531W) \frac{\Delta n_z}{V_e}.$$

At the conclusion of the 200-hour data collection on the OV-1A, the instrumentation was removed and modified for use on other U. S. Army aircraft.

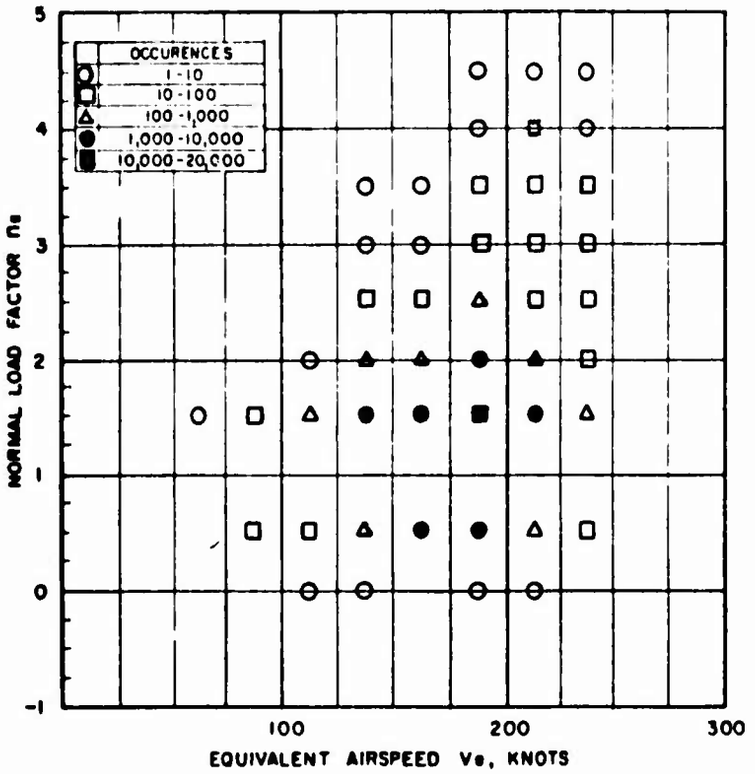
RESULTS

Results of this program are shown in Figures 2 through 18 and in the computer print-out tables in the appendix of this report.

In order to compute only gust velocities, U_{de}, over a 5-foot-per-second threshold, a $\pm 0.25g$ limit was set for reading changes in vertical acceleration. Values of U_{de} were derived primarily from changes in vertical acceleration. It is possible that not all U_{de}'s above this threshold were derived, since a combination of high gross weights accompanied by minimum airspeeds and low altitudes could have resulted in small changes in vertical accelerations, in spite of some significant gusts. As a result, the gust spectra presented in this report may be biased for U_{de} ranges below an estimated 20 feet per second.

Figures 2 through 18 are briefly described in the following:

Figure 2 shows a diagram and a tabulation of n_z data. The symbols in this figure denote the number of maneuver load factors in combinations of airspeed and load factor ranges. The design limit load factor of 7.33g was not exceeded in the data collected during this program. Mission I flights comprised nearly two-thirds of all flights, and Figure 3 shows that the average time per flight was longer for Mission I than



LOAD FACTOR n_s	EQUIVALENT AIRSPEED Ve, KNOTS								TOTAL n_s
	LESS THAN 75	75 To 100	100 To 125	125 To 150	150 To 175	175 To 200	200 To 225	225 AND ABOVE	
ABOVE 4.75									
4.25 To 4.75						1	2	1	4
3.75 To 4.25						2	16	3	21
3.25 To 3.75				2	1	22	62	25	112
2.75 To 3.25				1	6	50	37	12	106
2.25 To 2.75				23	97	223	83	21	447
1.75 To 2.25			6	161	813	1306	240	19	2545
1.25 To 1.75	1	48	271	1681	9795	12530	1386	86	25798
0.25 To 0.75		18	73	432	2067	2920	273	22	5805
-0.25 To 0.25			1	2		8	2		13
TIME (min)	2.0	61.9	392.7	1252.9	4309.9	5499.0	686.0	29.8	12234.4

Figure 2. Diagram and Tabulation of Maneuver Load Factors Versus Equivalent Airspeed - Composite for All Missions, OV-1A.

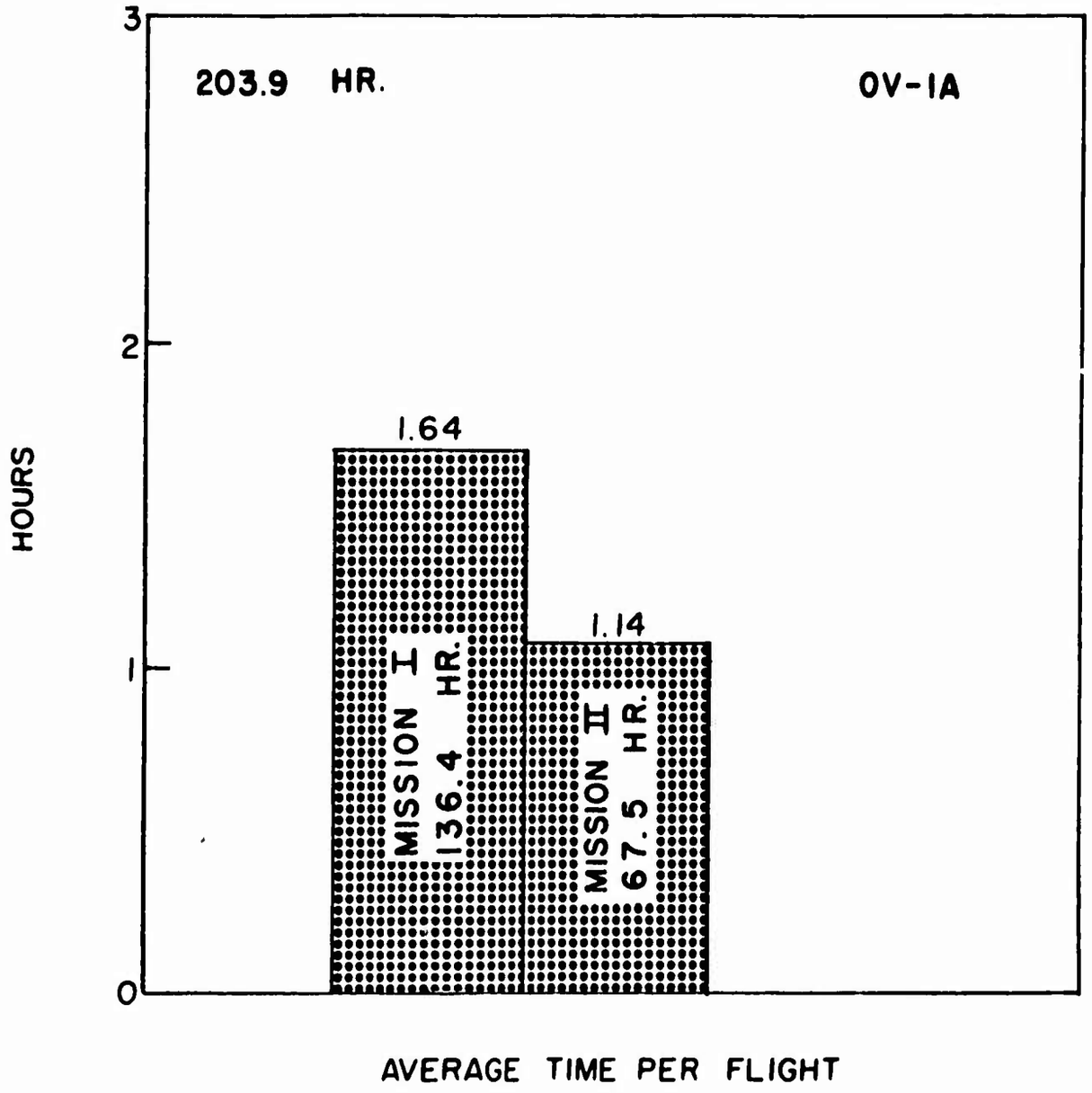


Figure 3. Average Time per Flight by Mission Types.

for Mission II. The percentages of flight time spent at selected airspeeds are presented in Figures 4 and 5.

Mission I flights are, in general, characterized by a faster acceleration to the cruise airspeed and a larger percentage of time at the cruise value than Mission II flights. Over 50 percent of the time of Mission I flights is spent in the 175- to 200-knot airspeed block; nearly 40 percent of the time of Mission II flights is spent in the 150- to 175-knot airspeed block.

The percentages of flight time spent at selected altitudes (Figures 6 and 7) show a very distinct difference between missions. Over 88 percent of the Mission I flights fall in the altitude range of from 0 to

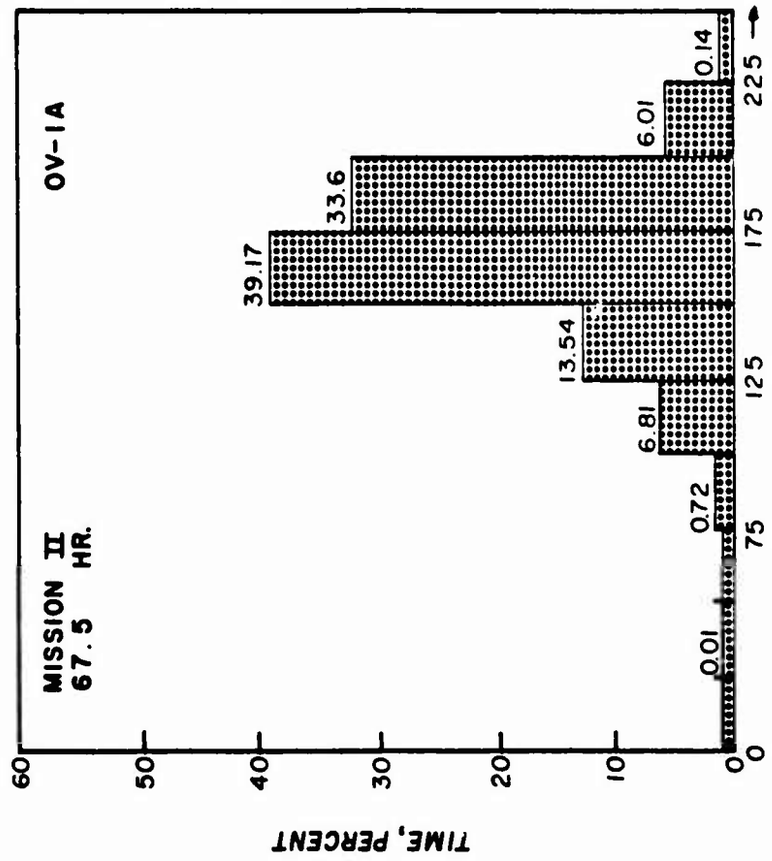


Figure 5. Percentages of Flight Time Spent at Selected Airspeeds - Mission II.

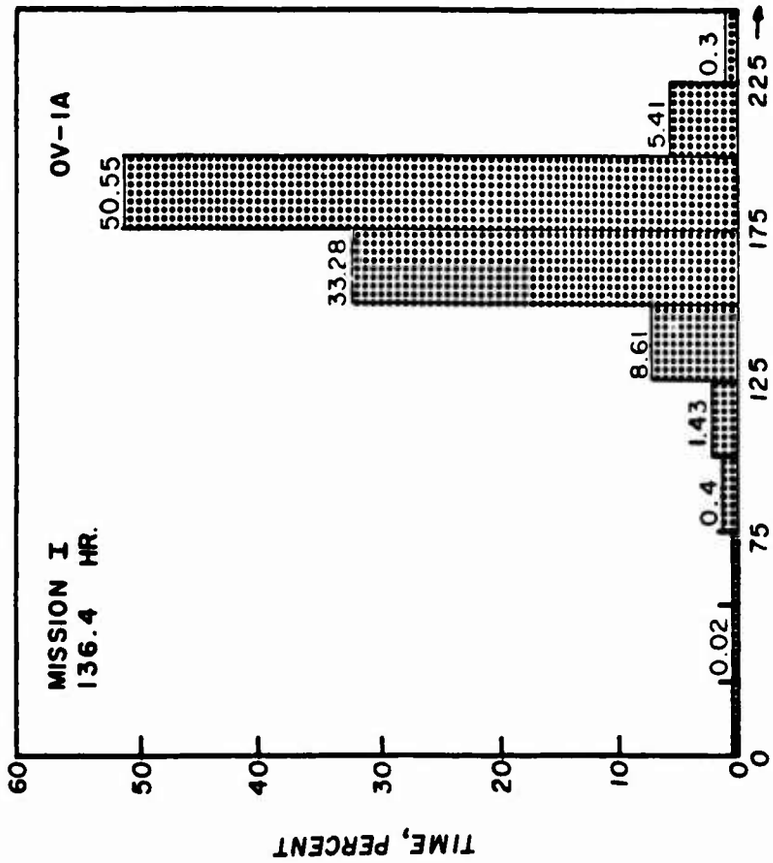


Figure 4. Percentages of Flight Time Spent at Selected Airspeeds - Mission I.

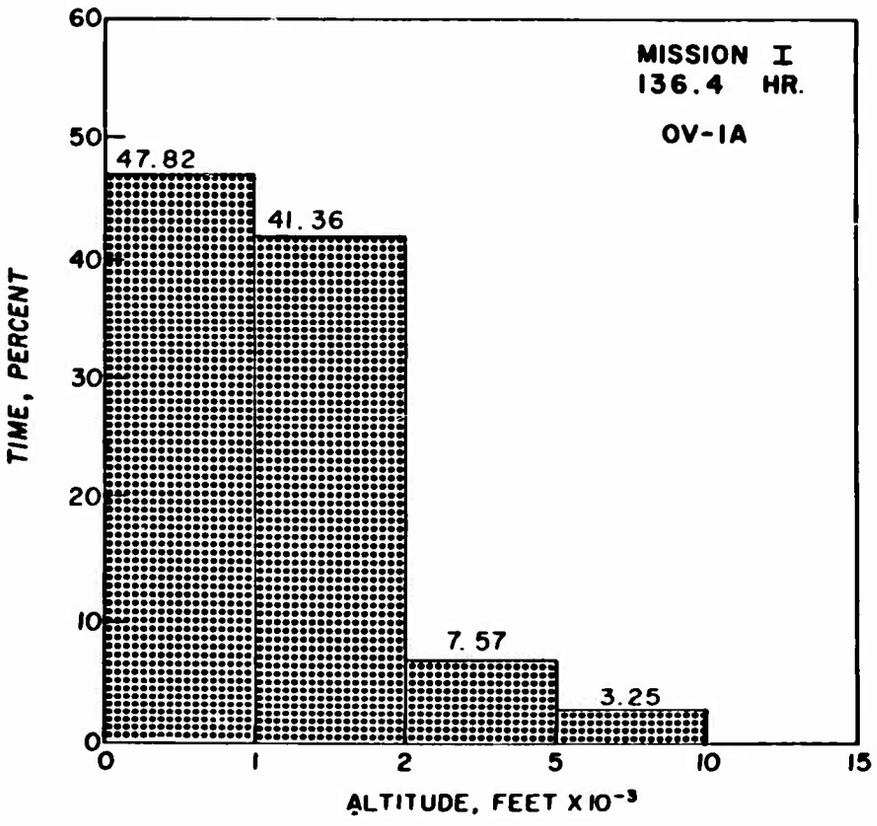


Figure 6. Percentages of Flight Time Spent at Selected Altitudes - Mission I.

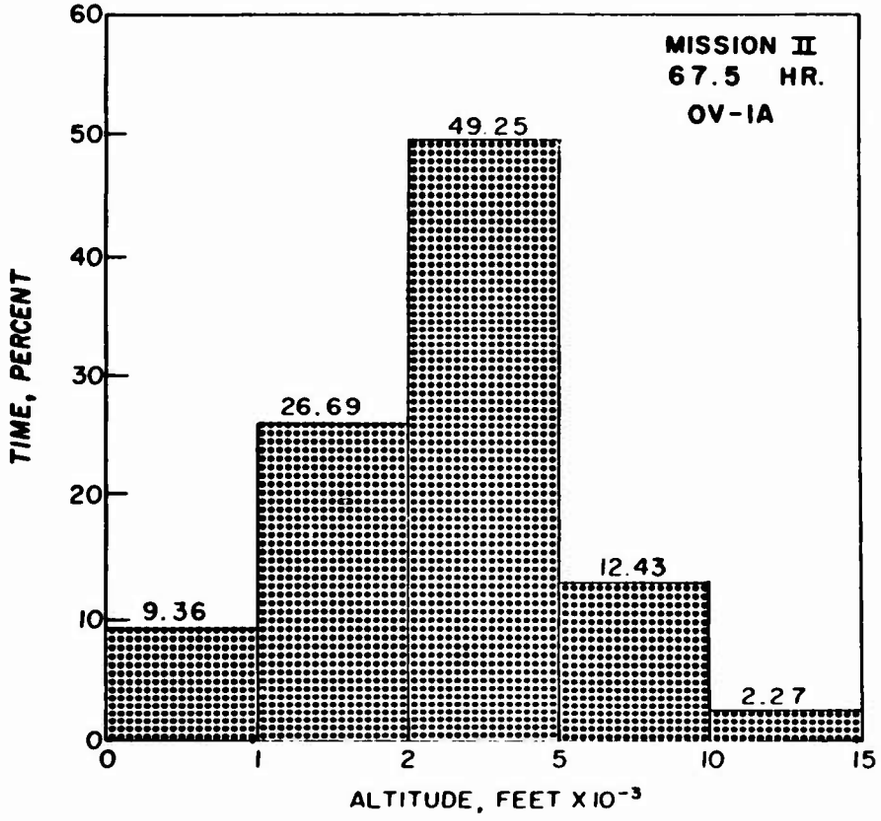


Figure 7. Percentages of Flight Time Spent at Selected Altitudes - Mission II.

2,000 feet, and 50 percent of the Mission II flights fall in the range of from 2,000 to 5,000 feet. This is to be expected, since Mission I flights are mainly of a ground support and surveillance type, whereas Mission II flights contain a large amount of cross-country flying that takes place at generally higher altitudes. A major result of the low-altitude flying of Mission I is that over three times as many gusts were encountered during this mission as during Mission II.

The percentages of flight time spent in selected gross weight ranges shown in Figures 8 and 9 indicate no definite difference between missions. Both missions had a majority of time in the gross weight range of from 13,000 to 14,000 pounds. The largest takeoff gross weight for both missions was 15,269 pounds.

Figure 10 presents the percentages of flight time spent in selected outside air temperature ranges and indicates that the majority of time was spent between the temperatures of 50° and 80° F.

The normal acceleration of the aircraft center of gravity for maneuvers is given as both the normal load factor, n_z, and the equivalent normal load factor, n_{z_e}. The equivalent normal load factor is defined as follows:

$$n_{z_e} = \frac{W_l}{W_d} \cdot n_z,$$

where

n_z = normal load factor

W_l = instantaneous gross weight

W_d = design gross weight = 11,715 pounds

For both n_z and n_{z_e}, the values recorded during Mission I were more severe than those recorded during Mission II. Four n_z peaks above 4.25g and two n_{z_e} values above 4.75g were recorded. Their corresponding values of airspeed, altitude, and gross weight are listed in Table I.

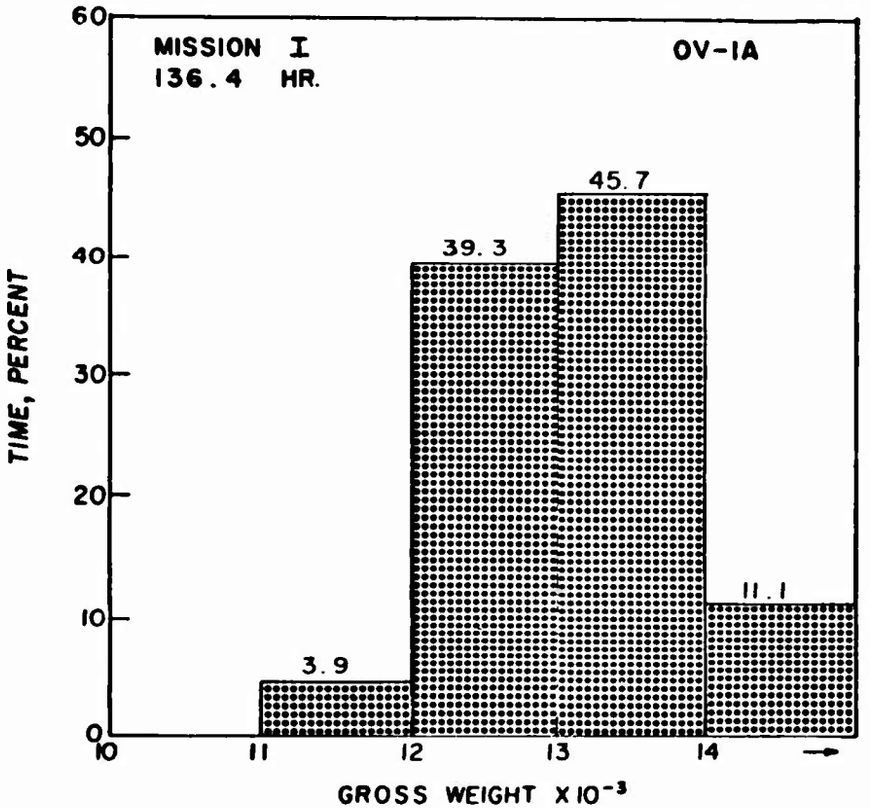


Figure 8. Percentages of Flight Time Spent in Selected Gross Weight Ranges - Mission I.

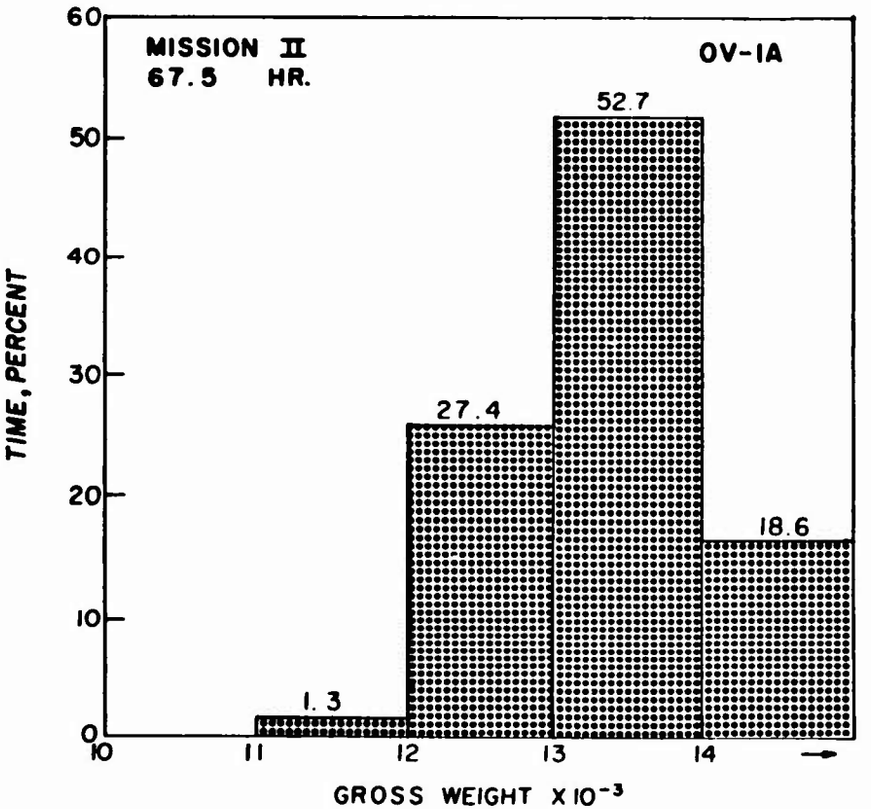


Figure 9. Percentages of Flight Time Spent in Selected Gross Weight Ranges - Mission II.

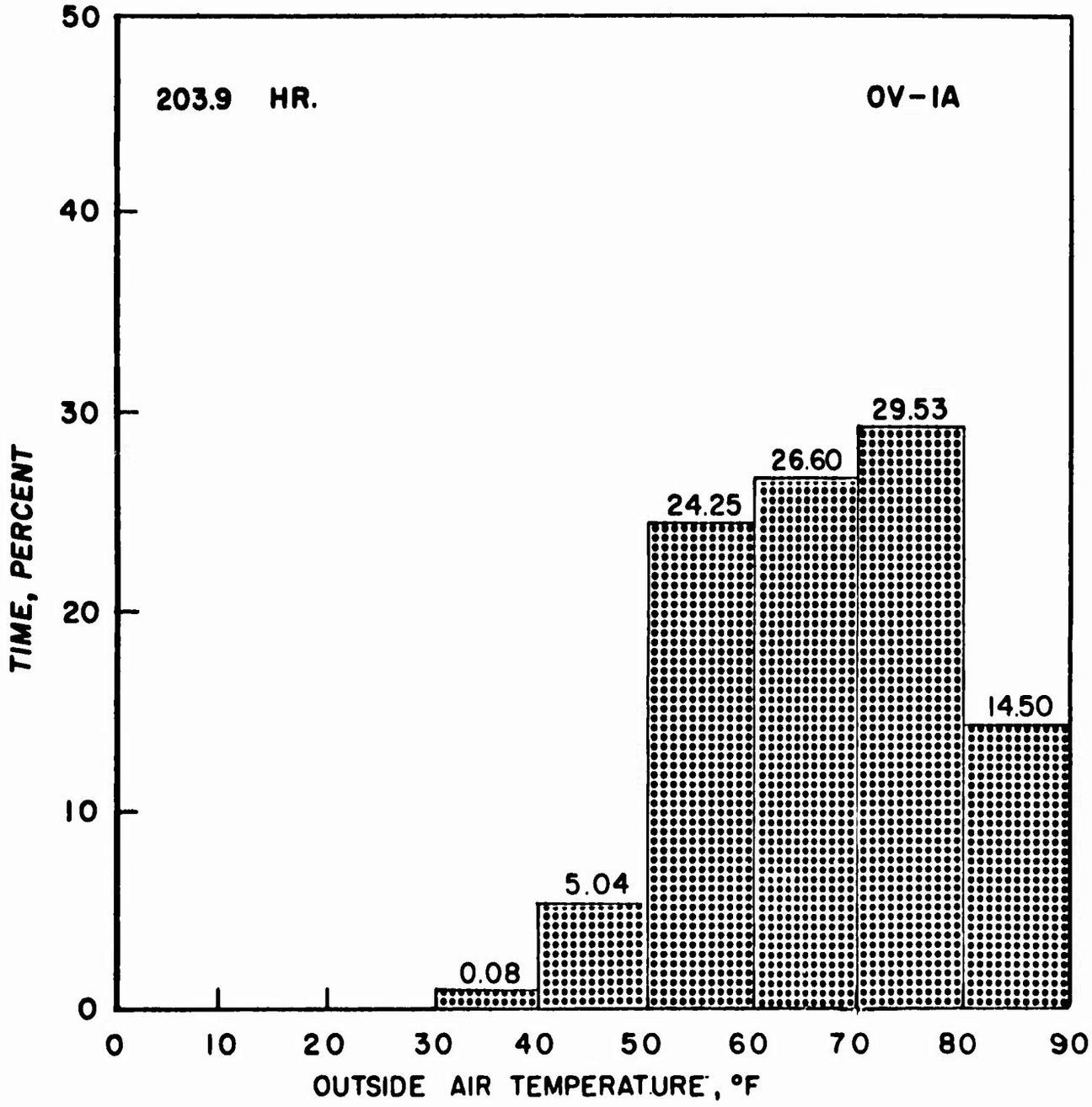


Figure 10. Percentages of Flight Time Spent in Selected Outside Air Temperature Ranges -Composite for All Missions.

TABLE I
HIGH VALUES FOR n_z

n_z	n_{z_e}	Airspeed (Knots)	Altitude (Feet)	Gross Weight (Pounds)
4.18	4.94	211	888	13,841
4.25	4.37	203	1,000	12,082
4.27	4.73	203	927	13,758
4.28	4.51	215	828	12,330
4.34	4.97	226	1,500	13,418

All values were recorded during Mission I. The highest n_z block reached during Mission II was from 2.25 to 2.75g, which had four points recorded; the highest n_{z_e} block was from 2.75 to 3.25 g, which had one point recorded.

Maneuver load factor exceedance curves indicating the time required to reach or exceed given maneuver load factors are presented in Figures 11 through 13. The exceedance values for Mission I are considerably more severe than those for Mission II. Figures 14 through 16 show the equivalent maneuver load factor exceedance curves and indicate that the exceedance values are more severe for Mission I than for Mission II.

The distances in nautical miles required to reach or exceed given derived gust velocity values for selected altitude ranges are given in Figure 17. Of the 54,255 U_{de} occurrences tabulated, 5,815 were within the threshold of -5 to +5 feet per second. The two highest U_{de}'s recorded were between 30 and 35 feet per second. The gust spectrum presented in Figure 18 is based on U. S. Air Force data and is used as a standard by the U. S. Air Force.* It provides a basis of comparison for the OV-1A gust spectrum.

*Erwin Joseph, The Spectrum of Turbulence for Aircraft Fatigue Analysis, WCLSSC-10 Memorandum, Wright-Patterson Air Force Base, Ohio, July 1959.

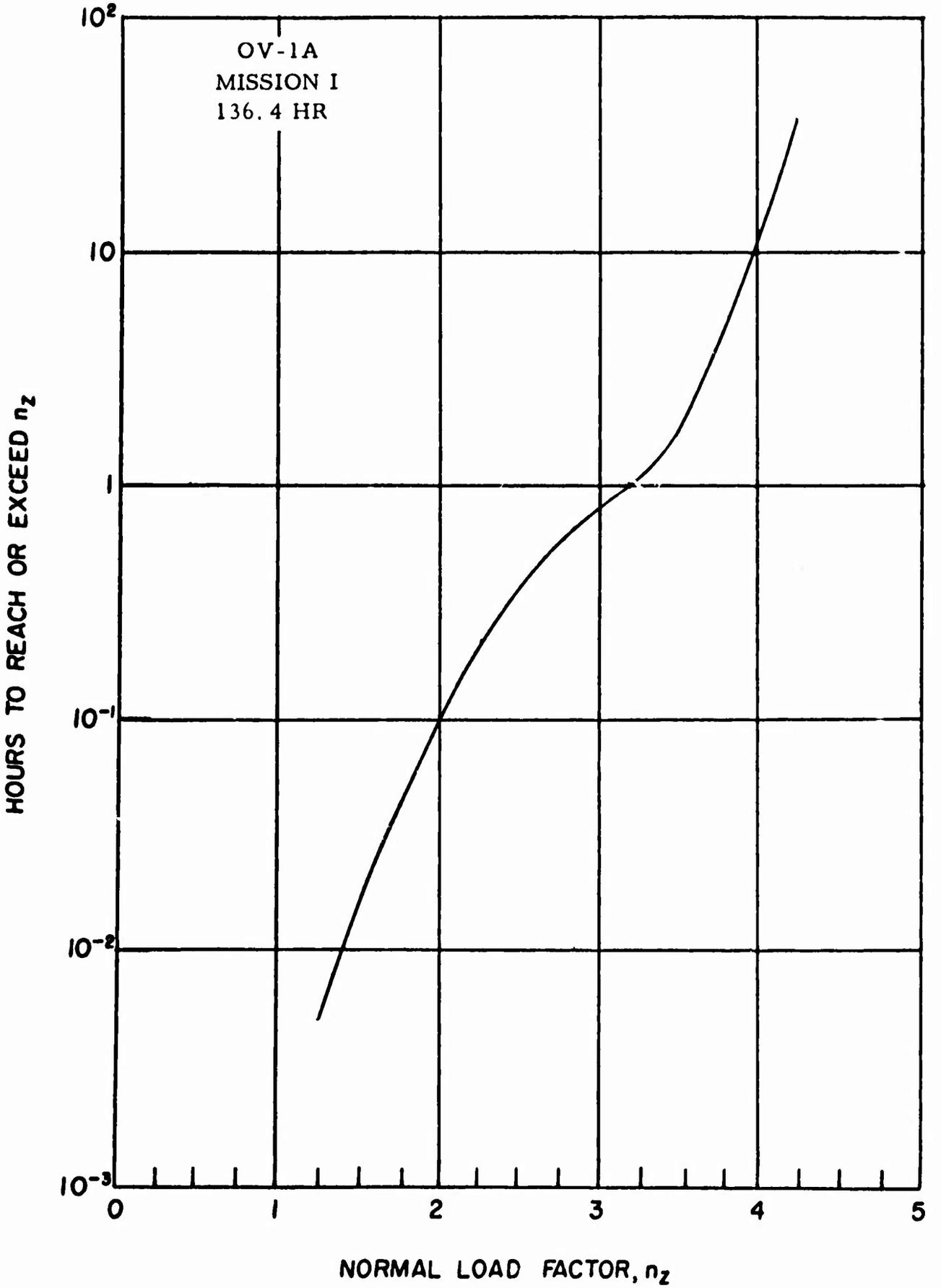


Figure 11. Maneuver Load Factor Exceedance Curve -Mission I.

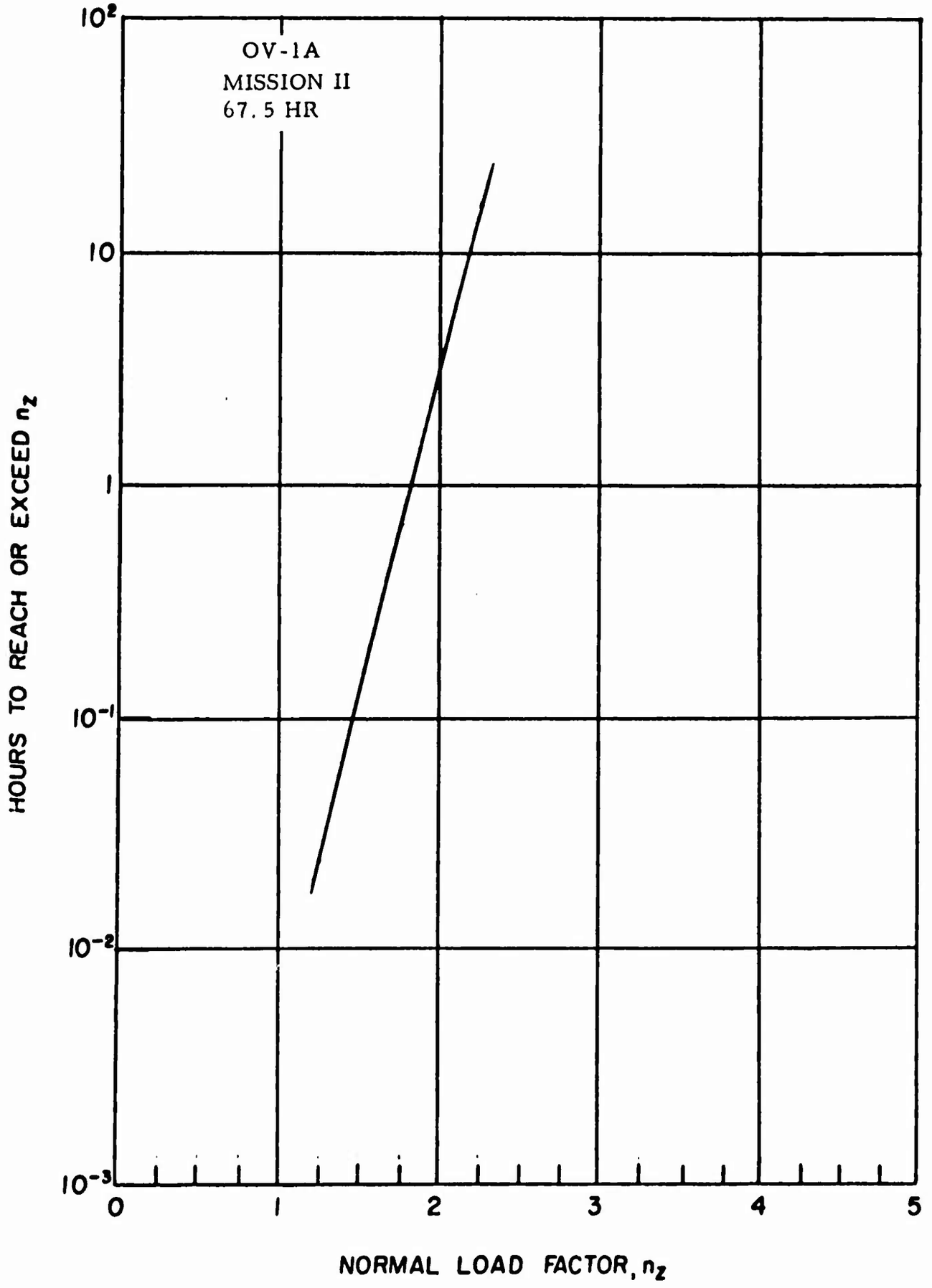


Figure 12. Maneuver Load Factor Exceedance Curve -Mission II.

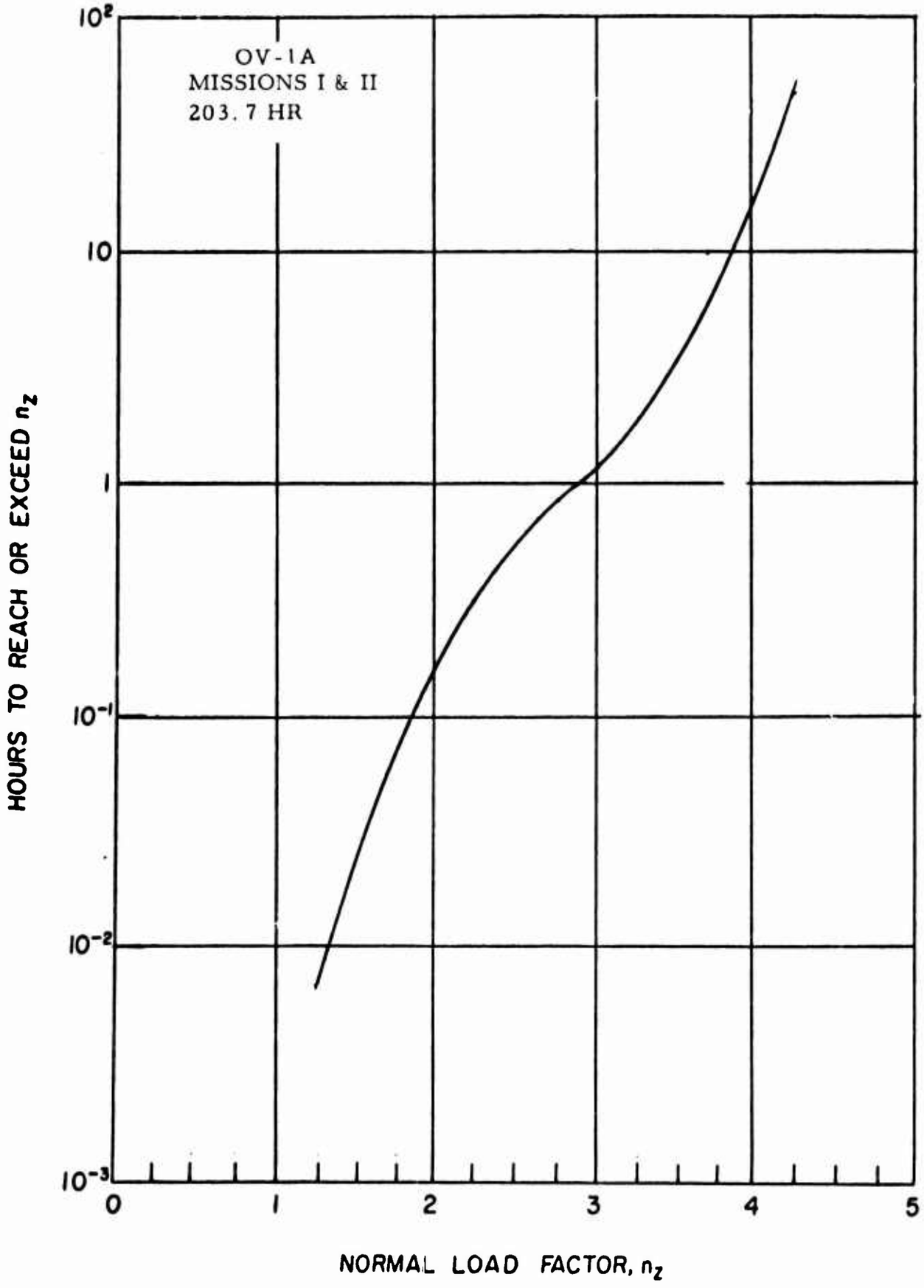


Figure 13. Maneuver Load Factor Exceedance Curve - Composite for All Missions.

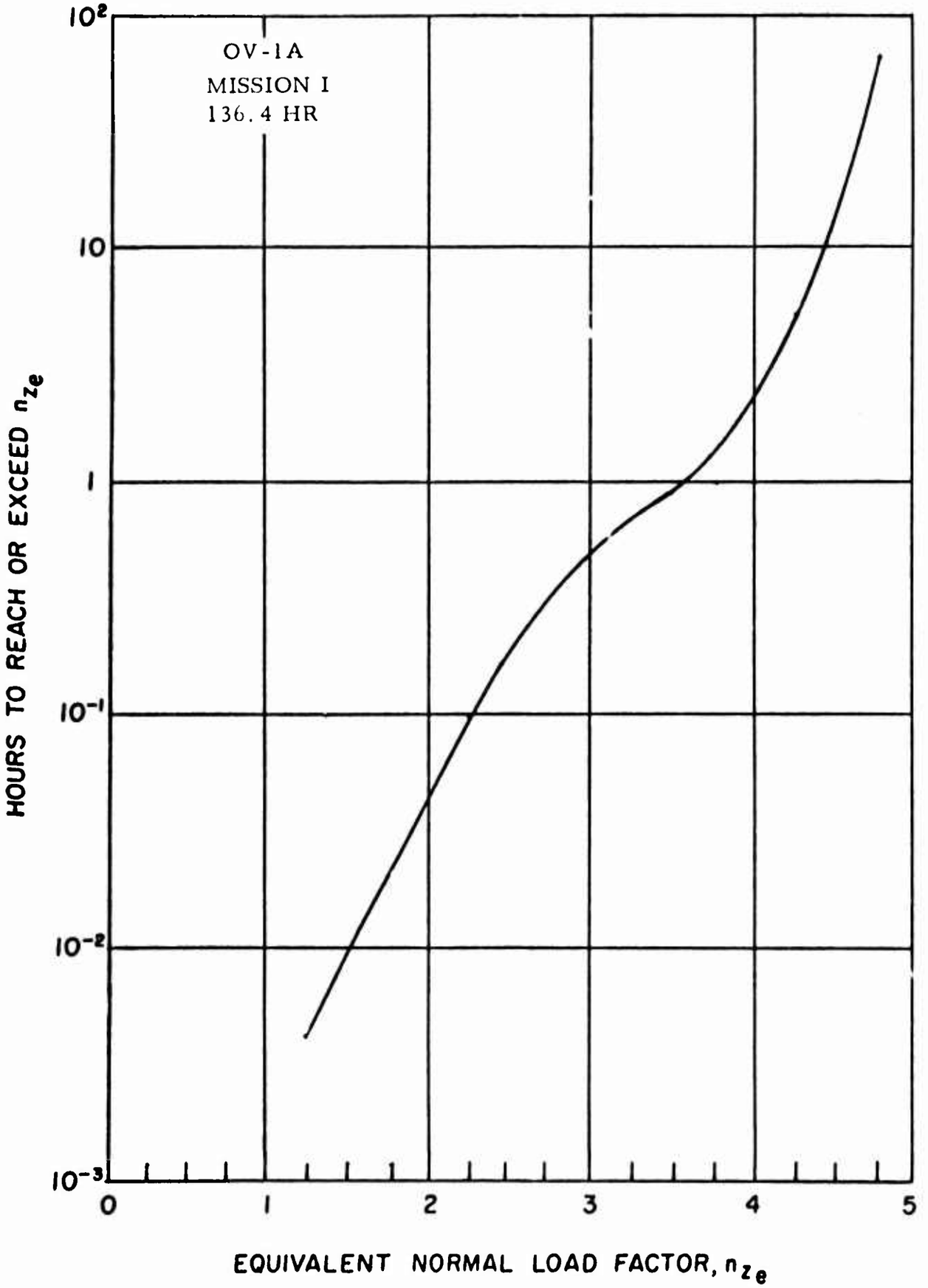


Figure 14. Equivalent Maneuver Load Factor Exceedance Curve - Mission I.

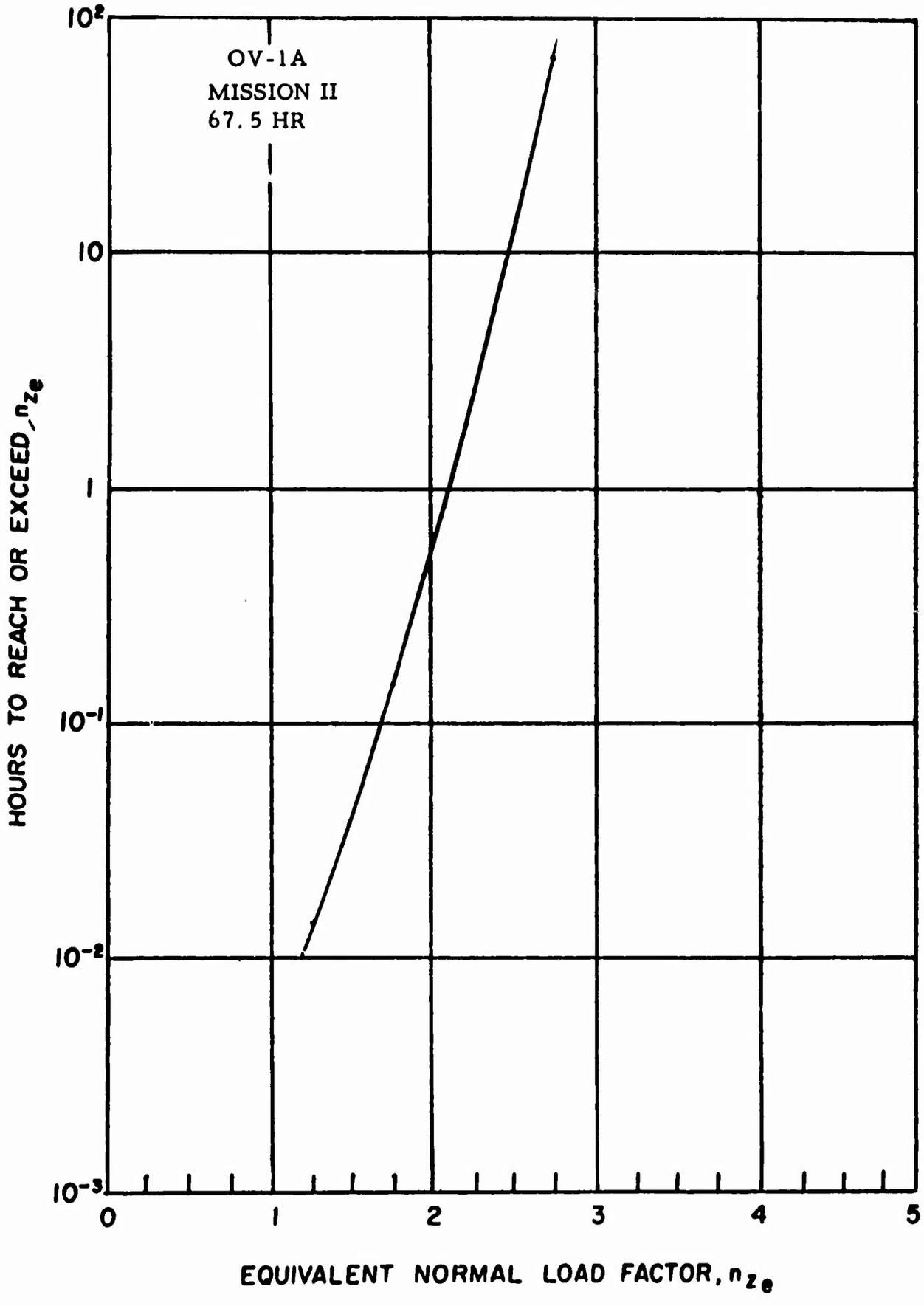


Figure 15. Equivalent Maneuver Load Factor Exceedance Curve - Mission II.

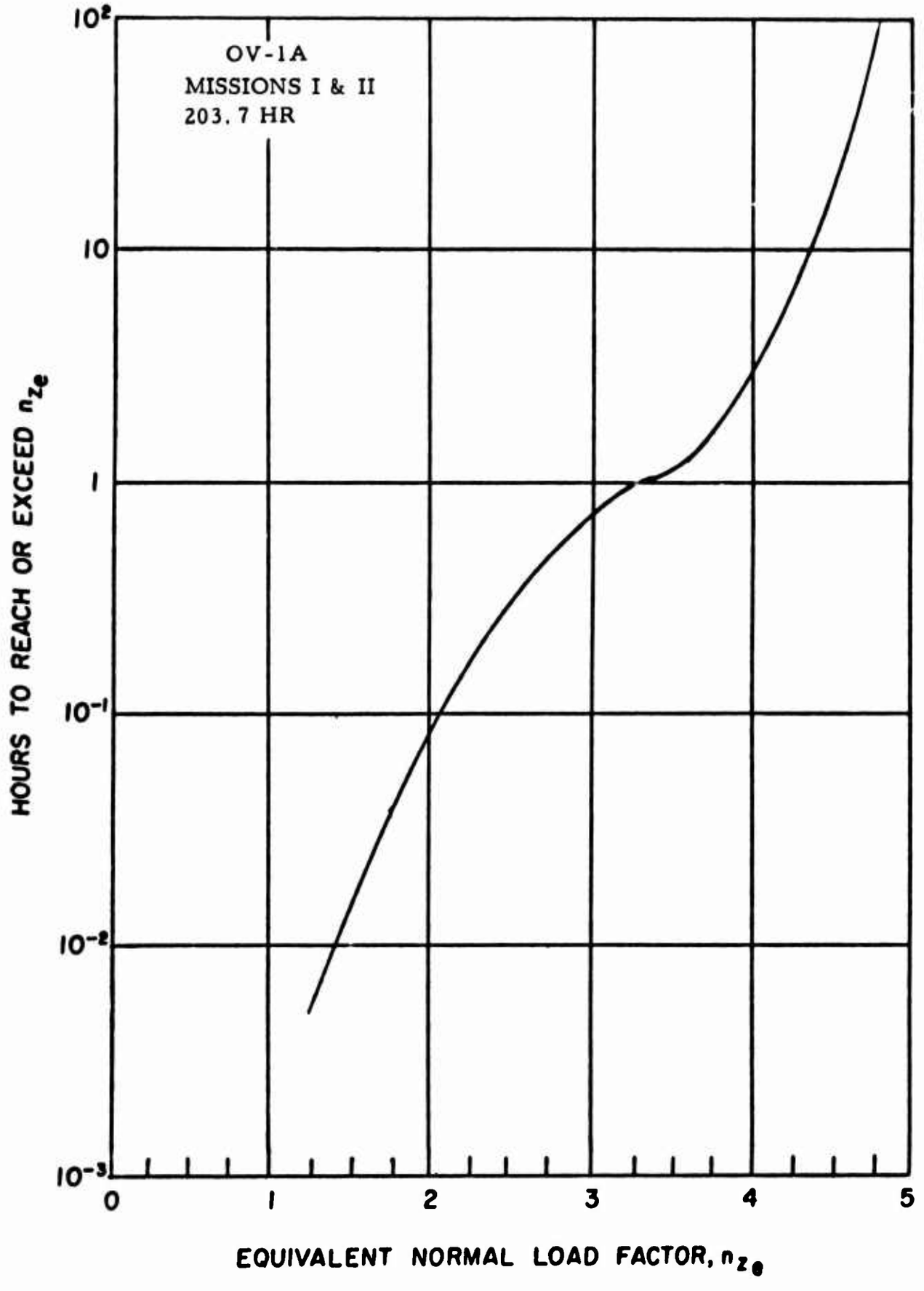


Figure 16. Equivalent Maneuver Load Factor Exceedance Curve - Composite for All Missions.

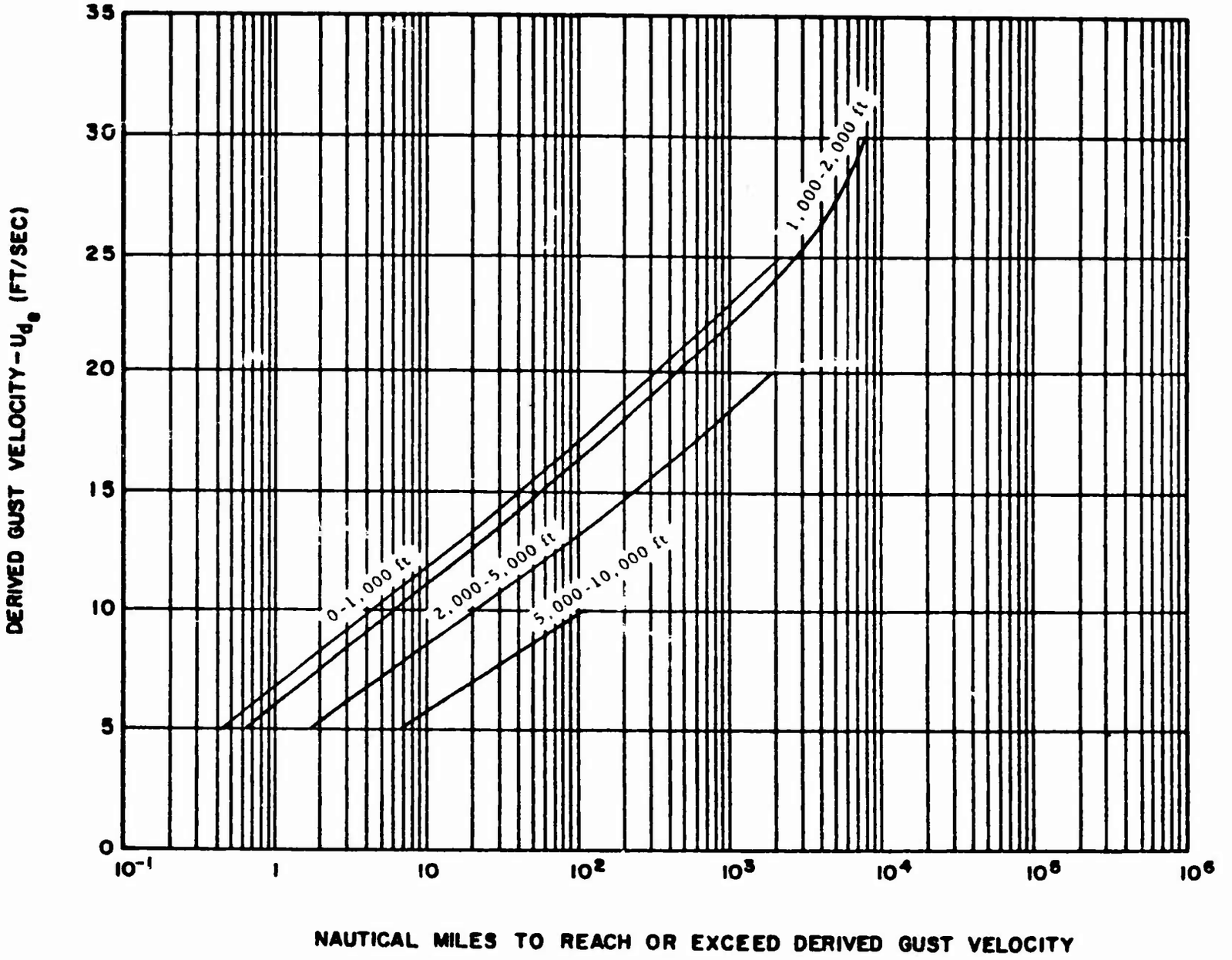


Figure 17. Gust Spectrum Based on Data From OV-1A Aircraft.

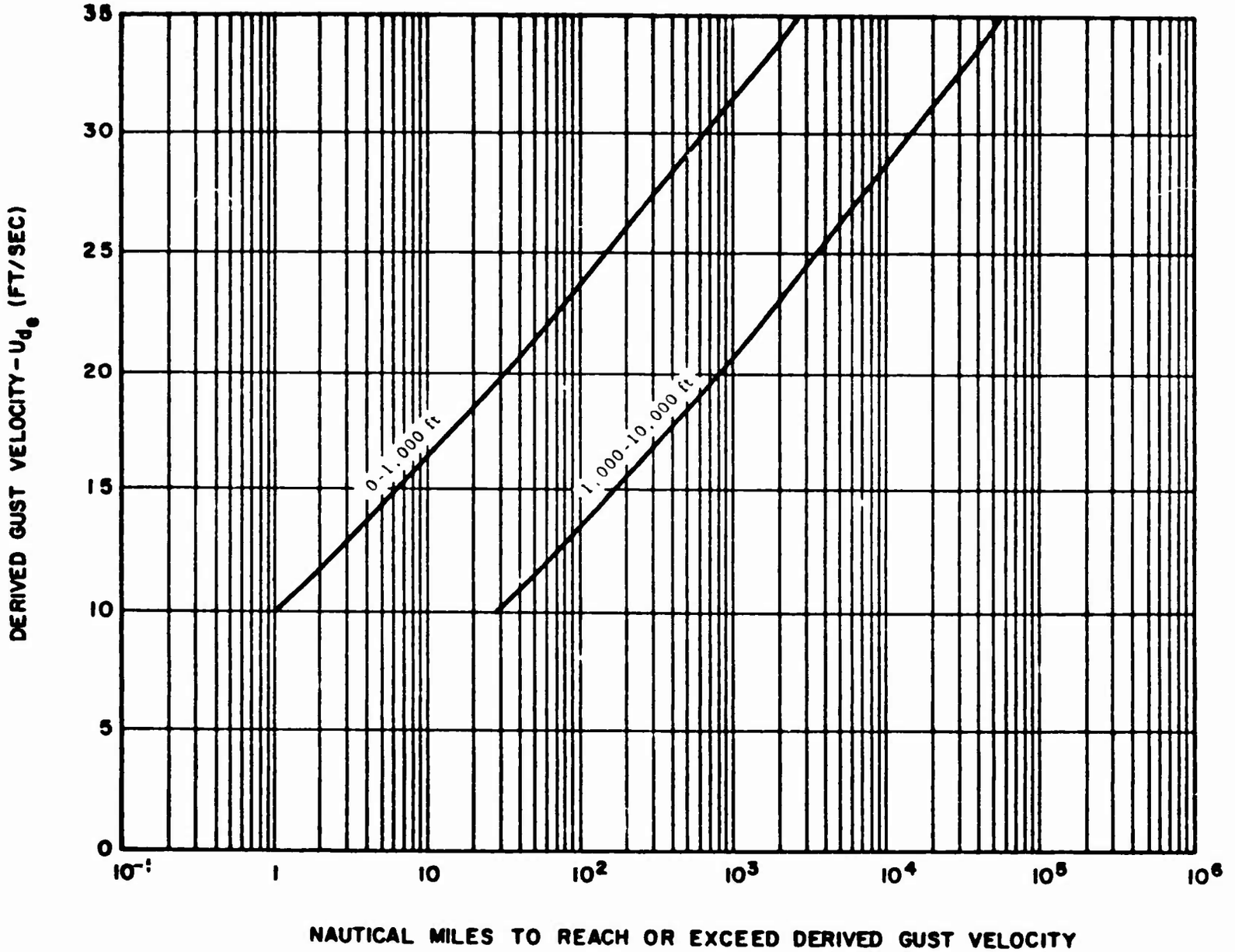


Figure 18. Standard Gust Spectrum.

DISTRIBUTION

US Army Materiel Command	5
US Army Mobility Command	5
US Army Aviation Materiel Command	4
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US Naval Aviation Safety Center	1
Federal Aviation Agency, Washington, D. C.	1
Civil Aeromedical Research Institute, FAA	2
The Surgeon General	1
Defense Documentation Center	20

APPENDIX

FLIGHT DATA PRINT-OUTS

An explanation of Tables II through XVI follows:

1. All tables are computer print-outs.

2. All times are shown in minutes unless otherwise specified. Values of time are rounded off to the nearest one-tenth of a minute.

3. Tables having no points or no time are not included.

4. The range codes for the various parameters are as follows:

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 (Knots)

Code	Range
Less	Below 75
75	75 to 100
100	100 to 125
125	125 to 150
150	150 to 175
175	175 to 200
200	200 to 225
225	Above 225

WEIGHT (Pounds)

Code	Range
Less	Below 10,000
10,000	10,000 to 11,000
11,000	11,000 to 12,000
12,000	12,000 to 13,000
13,000	13,000 to 14,000
14,000	Above 14,000

ALTITUDE (Feet)

Code	Range
Less	Below 1,000
1,000	1,000 to 2,000
2,000	2,000 to 5,000
5,000	5,000 to 10,000
10,000	10,000 to 15,000
15,000	15,000 to 20,000
20,000	20,000 to 25,000
25,000	Above 25,000

U_{de} (Feet per Second)	
Code	Range
Less	Below -40
-40	-40 to -35
-35	-35 to -30
-30	-30 to -25
-25	-25 to -20
-20	-20 to -15
-15	-15 to -10
-10	-10 to -5
-5	-5 to 0
0	0 to 5
5	5 to 10
10	10 to 15
15	15 to 20
20	20 to 25
25	25 to 30
30	30 to 35
35	35 to 40
40	40 to 45
45	Above 45

DELTA n_z (n_z-1.0), MANEUVER n_z, AND EQUIVALENT MANEUVER n_{z_e}(g)	
Code	Range
Less	Below -1.25
-1.25	-1.25 to -0.75
-0.75	-0.75 to -0.25
-0.25	-0.25 to 0.25
0.25	0.25 to 0.75
0.75	0.75 to 1.25
1.25	1.25 to 1.75
1.75	1.75 to 2.25
2.25	2.25 to 2.75
2.75	2.75 to 3.25
3.25	3.25 to 3.75
3.75	3.75 to 4.25
4.25	4.25 to 4.75
4.75	Above 4.75

An explanation of the print-out code shown on the left of the tables follows:

For the letters MMWA, the first M represents the model, the second M represents mission, W represents weight, and A represents altitude.

The first numeral represents the model number. (There was only one model during this data collection, so the model number is always 1.)

The second numeral represents the mission number. (There were two missions during the collection, numbered 1 and 2.)

The letters A through F are the weight codes as follows:

A - below 10,000 pounds

B - 10,000 pounds

C - 11,000 pounds

D - 12,000 pounds

E - 13,000 pounds

F - 14,000 pounds

TABLE II
TIME FOR ALTITUDE VERSUS AIRSPEED
BY OUTSIDE AIR TEMPERATURE

Time (Minutes) for Altitude Versus Velocity by OAT 30 Deg. F

Vel (Kts.) Alt. (Ft.)	0	75	100	125	150	175	200	225	Total
0	0.1	0.4	1.4	2.4	5.5	0.4	0.2		10.4
1,000									
2,000									
5,000									
10,000									
Total	0.1	0.4	1.4	2.4	5.5	0.4	0.2		10.4

Time (Minutes) for Altitude Versus Velocity by OAT 40 Deg. F

Vel (Kts.) Alt. (Ft.)	0	75	100	125	150	175	200	225	Total
0		4.9	10.7	18.2	24.0	12.9	3.7	0.3	74.7
1,000		0.5	11.2	60.7	89.3	88.5	16.3	1.2	267.7
2,000		2.5	45.8	73.9	86.5	50.5	1.6	0.2	261.0
5,000					1.9	10.4	1.8		14.1
10,000									
Total		7.9	67.7	152.8	201.7	162.3	23.4	1.7	617.5

Time (Minutes) for Altitude Versus Velocity by OAT 50 Deg. F

Vel (Kts.) Alt. (Ft.)	0	75	100	125	150	175	200	225	Total
0	0.7	7.6	25.6	30.9	217.4	510.1	69.3	5.2	866.8
1,000		1.4	90.9	115.2	394.2	576.2	82.2	5.2	1,265.3
2,000			65.9	90.0	246.2	203.9	76.3	2.6	684.9
5,000				42.9	22.2	79.7	1.7		146.5
10,000									
Total	0.7	9.0	182.4	279.0	880.0	1,369.9	229.5	13.0	2,963.5

Time (Minutes) for Altitude Versus Velocity by OAT 60 Deg. F

Vel (Kts.) Alt. (Ft.)	0	75	100	125	150	175	200	225	Total
0	0.7	7.6	25.6	30.9	217.4	510.1	69.3	5.2	866.8
1,000		1.4	90.9	115.2	394.2	576.2	82.2	5.2	1,265.3
2,000			65.9	90.0	246.2	203.9	76.3	2.6	684.9
5,000				42.9	22.2	79.7	1.7		146.5
10,000									
Total	0.7	9.0	182.4	279.0	880.0	1,369.9	229.5	13.0	2,963.5

Time (Minutes) for Altitude Versus Velocity by OAT 60 Deg. F

Vel (Kts.) Alt. (Ft.)	0	75	100	125	150	175	200	225	Total
0	0.6	14.3	23.0	67.2	421.4	629.0	50.8	3.5	1209.8
1,000		2.3	26.3	76.2	324.6	491.6	61.5	0.7	983.2
2,000			2.0	80.9	301.6	230.0	24.9	2.0	641.4
5,000				6.9	94.2	275.1	3.1		379.3
10,000					40.5				40.5
Total	0.6	16.6	51.3	231.2	1,182.3	1,625.7	140.3	6.2	3,254.2

Time (Minutes) for Altitude Versus Velocity by OAT 70 Deg. F

Vel (Kts.) Alt. (Ft.)	0	75	100	125	150	175	200	225	Total
0	0.6	17.8	35.2	82.8	562.9	803.0	108.8	3.1	1,614.2
1,000		1.6	17.7	96.7	385.4	540.4	37.9	0.7	1,080.4
2,000			1.2	47.1	329.0	295.7	58.1		731.1
5,000				5.1	39.2	105.3	5.4		155.0
10,000				2.2	28.9	3.7			34.8
Total	0.6	19.4	54.1	233.9	1,345.4	1,748.1	210.2	3.8	3,615.5

Time (Minutes) for Altitude Versus Velocity by OAT 80 Deg. F

Vel (Kts.) Alt. (Ft.)	0	75	100	125	150	175	200	225	Total
0		7.7	17.1	33.2	227.2	208.4	24.2	0.5	518.3
1,000		0.9	14.9	249.7	314.7	269.7	19.0	0.3	869.2
2,000			2.5	60.0	128.6	70.2	29.9	3.9	295.1
5,000			1.2	9.5	17.1	36.1	9.7	0.5	74.1
10,000									
Total	0.6	16.6	51.3	231.2	1,182.3	1,625.7	140.3	6.2	3,254.2

Time (Minutes) for Altitude Versus Velocity by OAT 70 Deg. F

Vel (Kts.) Alt. (Ft.)	0	75	100	125	150	175	200	225	Total
0	0.6	17.8	35.2	82.8	562.9	803.0	108.8	3.1	1,614.2
1,000		1.6	17.7	96.7	385.4	540.4	37.9	0.7	1,080.4
2,000			1.2	47.1	329.0	295.7	58.1		731.1
5,000				5.1	39.2	105.3	5.4		155.0
10,000				2.2	28.9	3.7			34.8
Total	0.6	19.4	54.1	233.9	1,345.4	1,748.1	210.2	3.8	3,615.5

Time (Minutes) for Altitude Versus Velocity by OAT 80 Deg. F

Vel (Kts.) Alt. (Ft.)	0	75	100	125	150	175	200	225	Total
0		7.7	17.1	33.2	227.2	208.4	24.2	0.5	518.3
1,000		0.9	14.9	249.7	314.7	269.7	19.0	0.3	869.2
2,000			2.5	60.0	128.6	70.2	29.9	3.9	295.1
5,000			1.2	9.5	17.1	36.1	9.7	0.5	74.1
10,000				1.1	7.4	8.1			16.6
Total		8.6	35.7	353.5	695.0	592.5	82.8	5.2	1,773.3

Time (Minutes) for Altitude Versus Velocity Composite - All Temperatures

Vel (Kts.) Alt. (Ft.)	0	75	100	125	150	175	200	225	Total
0	2.0	52.6	112.9	234.7	1,458.5	2,163.8	257.0	12.7	4,294.2
1,000		6.7	161.1	598.5	1,508.2	1,966.4	216.9	8.1	4,465.9
2,000		2.6	117.4	351.9	1,091.8	850.4	190.7	8.6	2,613.4
5,000			1.2	64.4	174.6	506.6	21.7	0.5	769.0
10,000				3.3	76.8	11.8			91.9
Total	2.0	61.9	392.6	1,252.8	4,309.9	5,499.0	686.3	29.9	12,234.4

TABLE III

TIME (MINUTES) FOR ALTITUDE VERSUS OUTSIDE AIR TEMPERATURE - COMPOSITE

OAT (Deg.) F	30	40	50	60	70	80	Total
Alt. (Ft.)							
0	10.4	74.7	866.8	1,209.8	1,614.2	518.3	4,294.2
1,000		267.7	1,265.3	983.2	1,080.4	869.2	4,465.8
2,000		261.0	684.9	641.4	731.1	295.1	2,613.5
5,000		14.1	146.5	379.3	155.0	74.1	769.0
10,000				40.5	34.8	16.6	91.9
Total	10.4	617.5	2,963.5	3,254.2	3,615.5	1,773.3	12,234.4

TABLE IV

TIME FOR ALTITUDE VERSUS AIRSPEED FOR MISSION I BY WEIGHT

MMW 11C

Equivalent Airspeed - VE (Knots) W - 11,000 lb

Alt (Feet)	Below	75	100	125	150	175	200	225	Total
0	0.3	8.0	10.1	5.0	14.9	63.1	1.4		102.8
1,000		1.2	7.9	29.4	64.6	82.0	5.5		190.6
2,000				2.7	9.3	13.6			25.7
5,000									
10,000									
15,000									
20,000									
25,000									
Total	0.3	9.2	18.0	37.1	88.9	158.7	6.9		319.1

MMW 11D

Equivalent Airspeed - VE (Knots) W - 12,000 lb

Alt (Feet)	Below	75	100	125	150	175	200	225	Total
0	0.5	9.7	21.8	49.9	403.7	767.0	112.2	3.5	1,368.3
1,000		2.1	21.7	176.8	437.3	732.2	79.5	1.7	1,451.4
2,000			3.0	35.0	84.4	136.4	9.0	5.4	273.2
5,000				6.6	16.2	97.7	3.3	0.5	124.2
10,000									
15,000									
20,000									
25,000									
Total	0.5	11.8	46.5	268.3	941.6	1,733.3	203.9	11.1	3,217.0

Total	0.5	11.8	46.5	268.3	941.6	1,733.3	203.9	11.1	3,217.0

MMW 11E

Equivalent Airspeed - VE (Knots) W - 13,000 lb

Alt (Feet)	Below 75	75	100	125	150	175	200	225	Total
0	0.4	7.7	21.4	111.8	769.4	930.4	93.5	6.7	1,941.2
1,000			15.6	183.9	498.0	671.6	67.7	3.1	1,439.9
2,000			1.1	42.2	105.3	81.4	11.6	1.3	243.0
5,000			1.2	2.5	31.1	83.1			118.0
10,000									
15,000									
20,000									
25,000									
Total	0.4	7.7	39.3	340.3	1,403.8	1,766.5	172.9	11.2	3,742.0

MMW 11F

Equivalent Airspeed - VE (Knots) W - 14,000 lb

Alt (Feet)	Below 75	75	100	125	150	175	200	225	Total
0	0.2	3.9	7.7	19.2	153.5	279.9	36.8	1.7	503.0
1,000		0.2	4.6	22.6	96.1	158.6	21.6	0.1	303.8
2,000			1.0	17.4	35.7	22.9	0.9		77.9
5,000					4.9	18.9			23.8
10,000									
15,000									
20,000									

MMW 11F

Equivalent Airspeed - VE (Knots) W - 14,000 lb

Alt (Feet)	Below	75	100	125	150	175	200	225	Total
0	0.2	3.9	7.7	19.2	153.5	279.9	36.8	1.7	503.0
1,000		0.2	4.6	22.6	96.1	158.6	21.6	0.1	303.8
2,000			1.0	17.4	35.7	22.9	0.9		77.9
5,000					4.9	18.9			23.8
10,000									
15,000									
20,000									
25,000									
Total	0.2	4.1	13.3	59.2	290.1	480.4	59.3	1.8	908.5

MM 11

Equivalent Airspeed - VE (Knots) All Weights

Alt (Feet)	Below	75	100	125	150	175	200	225	Total
0	1.4	29.3	61.1	185.9	1,341.4	2,040.4	243.9	12.0	3,915.3
1,000		3.5	49.7	412.7	1,096.0	1,644.4	174.3	4.9	3,385.7
2,000			5.1	97.2	234.8	254.4	21.5	6.8	619.8
5,000			1.2	9.1	52.3	199.7	3.3	0.5	266.0
10,000									
15,000									
20,000									
25,000									
Total	1.4	32.8	117.1	704.9	2,724.4	4,138.9	443.0	24.2	8,186.7

TABLE V

TIME FOR ALTITUDE VERSUS AIRSPEED FOR MISSION II BY WEIGHT

MMW 12C

Equivalent Airspeed - VE (Knots) W - 11,000 lb

Alt (Feet)	Below	75	100	125	150	175	200	225	Total
0		0.2	2.6	0.9	0.1	0.1	0.3		4.2
1,000				0.1	9.2	3.8			13.1
2,000			7.5	4.4	17.2	6.1			35.2
5,000									
10,000									
15,000									
20,000									
25,000									
Total		0.2	10.1	5.5	26.4	9.9	0.3		52.5

MMW 12D

Equivalent Airspeed - VE (Knots) W - 12,000 lb

Alt (Feet)	Below	75	100	125	150	175	200	225	Total
0	0.1	6.6	11.6	5.6	29.0	9.3	1.9		64.2
1,000		2.3	67.3	65.0	134.1	87.4	17.3	0.4	373.9
2,000		2.5	49.1	100.8	198.8	142.6	66.0	1.6	561.5
5,000				10.0	36.7	44.8	3.0		94.5
10,000					12.7	1.9			14.6
15,000									
20,000									
25,000									
Total	0.1	11.5	128.1	181.4	411.4	286.0	88.2	2.1	1,108.7

20,000									
25,000									
Total	0.1	11.5	128.1	181.4	411.4	286.0	88.2	2.1	1,108.7

MMW 12E

Equivalent Airspeed - VE (Knots) W - 13,000 lb

Alt (Feet)	Below	75	100	125	150	175	200	225	Total
0	0.5	11.5	27.4	26.4	71.8	90.2	6.8	0.7	235.3
1,000		0.4	39.4	78.9	189.2	194.5	24.2	2.7	529.3
2,000			29.9	103.4	382.9	313.7	94.4	0.2	924.5
5,000				42.5	74.0	248.3	15.0		379.7
10,000				2.1	56.7	4.9			63.8
15,000									
20,000									
25,000									
Total	0.5	12.0	96.7	253.3	774.6	851.7	140.3	3.5	2,132.7

MMW 12F

Equivalent Airspeed - VE (Knots) W - 14,000 lb

Alt (Feet)	Below	75	100	125	150	175	200	225	Total
0		5.0	10.3	16.0	16.2	23.8	4.1		75.3
1,000		0.5	4.6	41.7	79.7	36.2	1.1		163.8
2,000			25.7	46.1	258.2	133.6	8.8		472.4
5,000				2.8	11.6	13.8	0.5		28.7
10,000				1.1	7.4	5.1			13.6
15,000									

Alt (Feet)	Below	75	100	125	150	175	200	225	Total
0		5.0	10.3	16.0	16.2	23.8	4.1		75.3
1,000		0.5	4.6	41.7	79.7	36.2	1.1		163.8
2,000			25.7	46.1	258.2	133.6	8.8		472.4
5,000				2.8	11.6	13.8	0.5		28.7
10,000				1.1	7.4	5.1			13.6
15,000									
20,000									
25,000									
Total		5.5	40.7	107.7	373.1	212.5	14.4		753.9

MM 12

Equivalent Airspeed - VE (Knots) All Weights

Alt (Feet)	Below	75	100	125	150	175	200	225	Total
0	0.6	23.4	51.8	48.8	117.2	123.4	13.1	0.7	379.0
1,000		3.2	111.4	185.8	412.2	321.9	42.6	3.2	1,080.2
2,000		2.5	112.3	254.7	857.0	596.0	169.2	1.8	1,993.6
5,000				55.3	122.3	306.9	18.4		503.0
10,000				3.3	76.8	11.9			91.9
15,000									
20,000									
25,000									
Total	0.6	29.1	275.5	548.0	1,585.5	1,360.1	243.2	5.6	4,047.7

TABLE VI
TIME FOR ALTITUDE VERSUS AIRSPEED

COMP	Equivalent Airspeed - VE (Knots)								
Alt (Feet)	Below	75	100	125	150	175	200	225	Total
0	2.0	52.6	112.9	234.7	1,458.5	2,163.8	257.0	12.7	4,294.2
1,000		6.7	161.1	598.5	1,508.2	1,966.4	216.9	8.1	4,465.9
2,000		2.5	117.4	351.9	1,091.8	850.3	190.7	8.6	2,613.4
5,000			1.2	64.4	174.6	506.6	21.7	0.5	769.0
10,000				3.3	76.8	11.9			91.9
15,000									
20,000									
25,000									
Total	2.0	61.9	392.7	1,252.9	4,309.9	5,499.0	686.2	29.8	12,234.4

TABLE VII
DELTA n_z VERSUS AIRSPEED FOR MISSION I BY WEIGHT BY ALTITUDE

Load Factor Delta n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
Above 3.75									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75									
0.75 to 1.25									
0.25 to 0.75					13	152	4		169
-0.75 to -0.25		1			20	148	4		173
-1.25 to -0.75						2			2
-1.75 to -1.25									
-2.25 to -1.75									
Below -2.25									
Total		1			33	302	8		344
Time (Min)	0.3	8.0	10.1	5.0	14.9	63.1	1.4		102.8

MMWA 11CB

Altitude - 1,000 to 2,000 Feet W - 11,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor Delta n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
Above 3.75									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75									
0.75 to 1.25									
0.25 to 0.75				8	80	98	14		200
-0.75 to -0.25			1	9	84	106	13		213
-1.25 to -0.75									
-1.75 to -1.25									
-2.25 to -1.75									
Below -2.25									
Total			1	17	164	204	27		413
Time (Min)		1.2	7.9	29.4	64.6	82.0	5.5		190.6

Total		1	17	164	204	27		413
Time (Min)	1.2	7.9	29.4	64.6	82.0	5.5		190.6

MMWA 11CC — Altitude - 2,000 to 5,000 Feet W - 11,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor Delta n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
Above 3.75									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75									
0.75 to 1.25									
0.25 to 0.75					9				9
-0.75 to -0.25					3				3
-1.25 to -0.75									
-1.75 to -1.25									
-2.25 to -1.75									
Below -2.25									
Total					12				12
Time (Min)				2.7	9.3	13.6			25.7

MMWA 11DA — Altitude - 0 to 1,000 Feet W - 12,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor Delta n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
Above 3.75									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75									
0.75 to 1.25						2			2
0.25 to 0.75			4	29	339	1,019	283	11	1,685
-0.75 to -0.25			5	14	310	932	250	11	1,522
-1.25 to -0.75									
-1.75 to -1.25									
-2.25 to -1.75									
Below -2.25									
Total			9	43	649	1,953	533	22	3,209

Load Factor Delta n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
-1.75 to -1.25									
-2.25 to -1.75									
Below -2.25									
Total			9	43	649	1,953	533	22	3,209
Time (Min)	0.5	9.7	21.8	49.9	403.7	767.0	112.2	3.5	1,368.3

MMWA 11DB

Altitude - 1,000 to 2,000 Feet W - 12,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor Delta n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
Above 3.75									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75									
0.75 to 1.25						2			2
0.25 to 0.75				83	308	921	77	2	1,391
-0.75 to -0.25			3	51	282	892	100		1,328
-1.25 to -0.75									
-1.75 to -1.25									
-2.25 to -1.75									
Below -2.25									
Total			3	134	590	1,815	177	2	2,721
Time (Min)		2.1	21.7	176.8	437.3	732.2	79.5	1.7	1,451.4

MMWA 11DC

Altitude - 2,000 to 5,000 Feet W - 12,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor Delta n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
Above 3.75									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75									
0.75 to 1.25									
0.25 to 0.75			1	3	9	37	4	1	55
-0.75 to -0.25				1	13	40	2	1	57
-1.25 to -0.75									
-1.75 to -1.25									
-2.25 to -1.75									

Load Factor Delta n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
Total			3	134	590	1,815	177	2	2,721
Time (Min)		2.1	21.7	176.8	437.3	732.2	79.5	1.7	1,451.4

MMWA 11DC

Altitude - 2,000 to 5,000 Feet W - 12,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor Delta n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
Above 3.75									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75									
0.75 to 1.25									
0.25 to 0.75			1	3	9	37	4	1	55
-0.75 to -0.25				1	13	40	2	1	57
-1.25 to -0.75									
-1.75 to -1.25									
-2.25 to -1.75									
Below -2.25									
Total			1	4	22	77	6	2	112
Time (Min)			3.0	35.0	84.4	136.4	9.0	5.4	273.2

MMWA 11DD

Altitude - 5,000 to 10,000 Feet W - 12,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor Delta n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
Above 3.75									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75									
0.75 to 1.25									
0.25 to 0.75				1	1				2
-0.75 to -0.25					1				1
-1.25 to -0.75									
-1.75 to -1.25									
-2.25 to -1.75									
Below -2.25									
Total				1	2				3

MMWA 11EA

Altitude - 0 to 1,000 Feet W - 13,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor Delta n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
Above 3.75									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75									
0.75 to 1.25						6			6
0.25 to 0.75			5	61	716	1,530	119	1	2,432
-0.75 to -0.25			3	35	638	1,389	96	2	2,163
-1.25 to -0.75							1		1
-1.75 to -1.25									
-2.25 to -1.75									
Below -2.25									
Total			8	96	1,354	2,925	216	3	4,602
Time (Min)	0.4	7.7	21.4	111.8	769.4	930.4	93.5	6.7	1,941.2

MMWA 11EB

Altitude - 1,000 to 2,000 Feet W - 13,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor Delta n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
Above 3.75									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75									
0.75 to 1.25						5			5
0.25 to 0.75			3	71	408	889	85		1,456
-0.75 to -0.25			3	39	335	901	68		1,346
-1.25 to -0.75						2			2
-1.75 to -1.25									
-2.25 to -1.75									
Below -2.25									
Total			6	110	743	1,797	153		2,809
Time (Min)			15.6	183.9	498.0	671.6	67.7	3.1	1,439.9

Load Factor Delta n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
-1.75 to -1.25									
-2.25 to -1.75									
Below -2.25									
Total			6	110	743	1,797	153		2,809
Time (Min)			15.6	183.9	498.0	671.6	67.7	3.1	1,439.9

MMWA 11EC

Altitude - 2,000 to 5,000 Feet W - 13,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor Delta n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
Above 3.75									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75									
0.75 to 1.25									
0.25 to 0.75				7	35	48	1		91
-0.75 to -0.25				2	35	48	4		89
-1.25 to -0.75									
-1.75 to -1.25									
-2.25 to -1.75									
Below -2.25									
Total				9	70	96	5		180
Time (Min)			1.1	42.2	105.3	81.4	11.6	1.3	243.0

MMWA 11FA

Altitude - 0 to 1,000 Feet W - 14,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor Delta n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
Above 3.75									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75									
0.75 to 1.25									
0.25 to 0.75			4	6	135	450	79		674
-0.75 to -0.25			1	10	123	389	39	1	563
-1.25 to -0.75									

Load Factor Delta n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
0.25 to 0.75			4	6	135	450	79		674
-0.75 to -0.25			1	10	123	389	39	1	563
-1.25 to -0.75									
-1.75 to -1.25									
-2.25 to -1.75									
Below -2.25									
Total			5	16	258	839	118	1	1,237
Time (Min)	0.2	3.9	7.7	19.2	153.5	279.9	36.8	1.7	503.0

MMWA 11FB

Altitude - 1,000 to 2,000 Feet W - 14,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor Delta n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
Above 3.75									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75									
0.75 to 1.25									
0.25 to 0.75			1	7	30	89	15		142
-0.75 to -0.25				9	32	104	1		146
-1.25 to -0.75									
-1.75 to -1.25									
-2.25 to -1.75									
Below -2.25									
Total			1	16	62	193	16		288
Time (Min)		0.2	4.6	22.6	96.1	158.6	21.6	0.1	303.8

MMWA 11FC

Altitude - 2,000 to 5,000 Feet W - 14,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor Delta n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
Above 3.75									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75									
0.75 to 1.25									

Time (Min)	0.2	4.6	22.6	96.1	158.6	21.6	0.1	303.8

MMWA 11FC

Altitude - 2,000 to 5,000 Feet W - 14,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor Delta n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
Above 3.75									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75									
0.75 to 1.25									
0.25 to 0.75					2	2	1		5
-0.75 to -0.25						4			4
-1.25 to -0.75									
-1.75 to -1.25									
-2.25 to -1.75									
Below -2.25									
Total					2	6	1		9
Time (Min)			1.0	17.4	35.7	22.9	0.9		77.9

MM 11

Equivalent Airspeed - VE (Knots) All Weights

Load Factor Delta n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
Above 3.75									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75									
0.75 to 1.25						15			15
0.25 to 0.75			18	276	2,085	5,235	682	15	8,311
-0.75 to -0.25		1	16	170	1,876	4,953	577	15	7,608
-1.25 to -0.75						4	1		5
-1.75 to -1.25									
-2.25 to -1.75									
Below -2.25									
Total		1	34	446	3,961	10,207	1,260	30	15,939
Time (Min)	1.4	32.8	117.1	704.9	2,724.4	4,138.9	443.0	24.2	8,186.7

MMWA 12CA

Altitude - 0 to 1,000 Feet W - 11,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor Delta n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
Above 3.75									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75									
0.75 to 1.25									
0.25 to 0.75			1			1			2
-0.75 to -0.25							2		2
-1.25 to -0.75									
-1.75 to -1.25									
-2.25 to -1.75									
Below -2.25									
Total			1			1	2		4
Time (Min)		0.2	2.6	0.9	0.1	0.1	0.3		4.2

A

MMWA 12CB

Altitude - 1,000 to 2,000 Feet W - 11,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor Delta n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
Above 3.75									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75									
0.75 to 1.25									
0.25 to 0.75									
-0.75 to -0.25					1				1
-1.25 to -0.75									
-1.75 to -1.25									
-2.25 to -1.75									
Below -2.25									
Total					1				1
Time (Min)				0.1	9.2	3.8			13.1

Load Factor Delta n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
-1.75 to -1.25									
-2.25 to -1.75									
Below -2.25									
Total					1				1
Time (Min)				0.1	9.2	3.8			13.1

MMWA 12CC

Altitude - 2,000 to 5,000 Feet W - 11,000 lb

Equivalent Airspeed - VE (Knots)

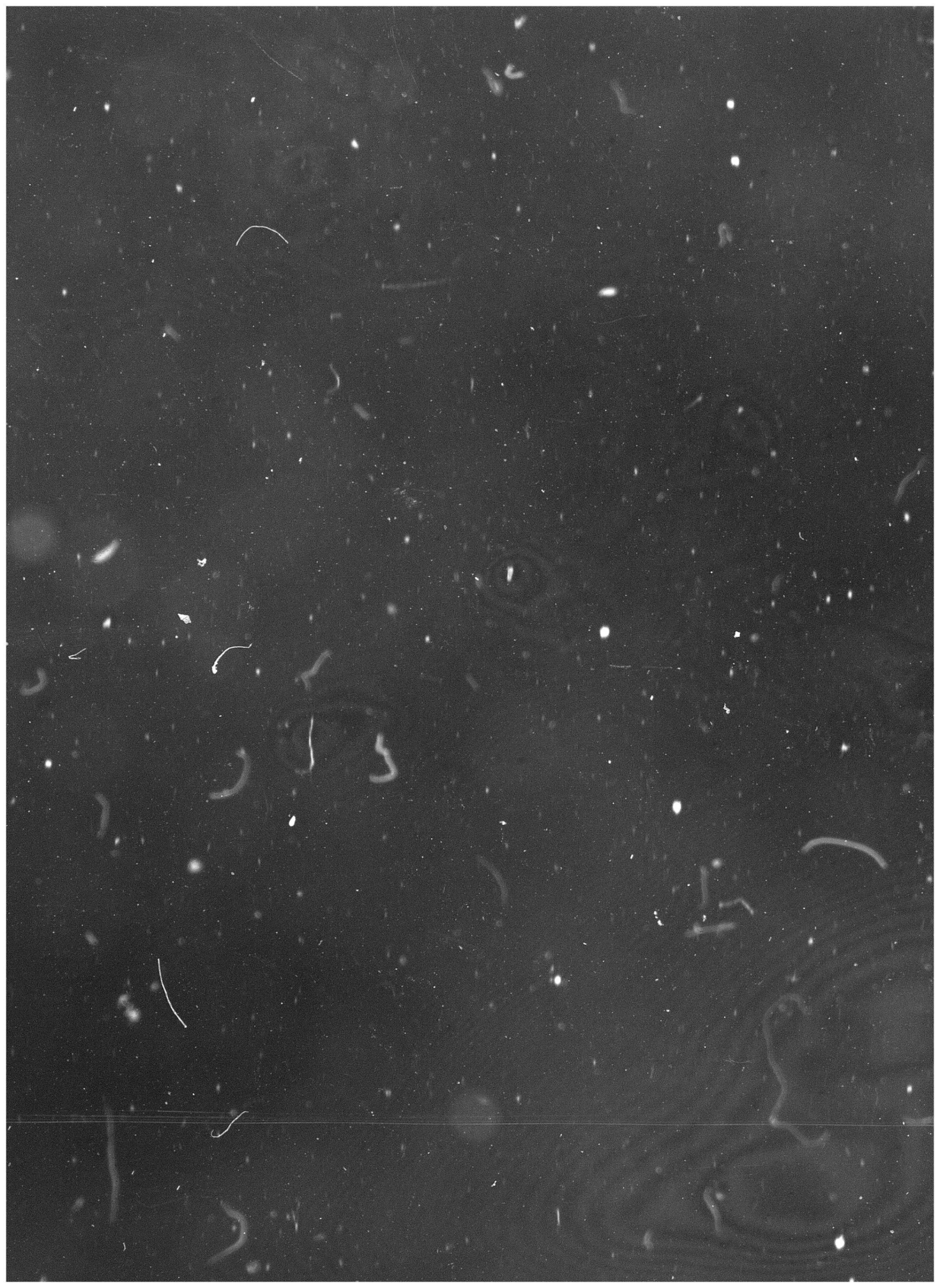
Load Factor Delta n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
Above 3.75									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75									
0.75 to 1.25									
0.25 to 0.75				2					2
-0.75 to -0.25									
-1.25 to -0.75									
-1.75 to -1.25									
-2.25 to -1.75									
Below -2.25									
Total				2					2
Time (Min)			7.5	4.4	17.2	6.1			35.2

MMWA 12DA

Altitude - 0 to 1,000 Feet W - 12,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor Delta n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
Above 3.75									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75									
0.75 to 1.25									
0.25 to 0.75			1	3	22	33	14		73
-0.75 to -0.25				2	11	23	8		44



Load Factor Delta n_z	Equivalent Airspeed - VE (Knots)								Total Delta n_z
	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	
Above 3.75									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75									
0.75 to 1.25									
0.25 to 0.75			1	3	22	33	14		73
-0.75 to -0.25				2	11	23	8		44
-1.25 to -0.75									
-1.75 to -1.25									
-2.25 to -1.75									
Below -2.25									
Total			1	5	33	56	22		117
Time (Min)	0.1	6.6	11.6	5.6	29.0	9.3	1.9		64.2

MMWA 12DB

Altitude - 1,000 to 2,000 Feet W - 12,000 lb

Load Factor Delta n_z	Equivalent Airspeed - VE (Knots)								Total Delta n_z
	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	
Above 3.75									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75									
0.75 to 1.25									
0.25 to 0.75			3	24	136	159	58		380
-0.75 to -0.25			4	20	134	159	44		361
-1.25 to -0.75						1			1
-1.75 to -1.25									
-2.25 to -1.75									
Below -2.25									
Total			7	44	270	319	102		742
Time (Min)		2.3	67.3	65.0	134.1	87.4	17.3	0.4	373.9

MMWA 12DC — Altitude - 2,000 to 5,000 Feet W - 12,000 lb

Load Factor Delta n_z	Equivalent Airspeed - VE (Knots) Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
Above 3.75									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75									
0.75 to 1.25									
0.25 to 0.75				23	73	73	24	3	196
-0.75 to -0.25				21	56	53	14	2	146
-1.25 to -0.75									
-1.75 to -1.25									
-2.25 to -1.75									
Below -2.25									
Total				44	129	126	38	5	342
Time (Min)		2.5	49.1	100.8	198.8	142.6	66.0	1.6	561.5

MMWA 12EA — Altitude - 0 to 1,000 Feet W - 13,000 lb

Load Factor Delta n_z	Equivalent Airspeed - VE (Knots) Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
Above 3.75									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75									
0.75 to 1.25									
0.25 to 0.75			4	24	20	3	3	4	58
-0.75 to -0.25			1	14	22	6	3		46
-1.25 to -0.75									
-1.75 to -1.25									
-2.25 to -1.75									
Below -2.25									
Total			5	38	42	9	6	4	104
Time (Min)	0.5	11.5	27.4	26.4	71.8	90.2	6.8	0.7	235.3

Load Factor Delta n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
-0.75 to -0.25			1	14	22	6	3		46
-1.25 to -0.75									
-1.75 to -1.25									
-2.25 to -1.75									
Below -2.25									
Total			5	38	42	9	6	4	104
Time (Min)	0.5	11.5	27.4	26.4	71.8	90.2	6.8	0.7	235.3

MMWA 12EB

Altitude - 1,000 to 2,000 Feet W - 13,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor Delta n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
Above 3.75									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75									
0.75 to 1.25									
0.25 to 0.75			3	10	104	118	33	7	275
-0.75 to -0.25			3	17	111	117	23		271
-1.25 to -0.75									
-1.75 to -1.25									
-2.25 to -1.75									
Below -2.25									
Total			6	27	215	235	56	7	546
Time (Min)		0.4	39.4	78.9	189.2	194.5	24.2	2.7	529.3

MMWA 12EC

Altitude - 2,000 to 5,000 Feet W - 13,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor Delta n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
Above 3.75									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75									
0.75 to 1.25									
0.25 to 0.75				20	38	111	30		199
-0.75 to -0.25				10	30	67	30		137
-1.25 to -0.75									
-1.75 to -1.25									
-2.25 to -1.75									

-2.25 to -1.75
Below -2.25

Equivalent Airspeed - VE (Knots)

Load Factor Delta n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
Above 3.75									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75									
0.75 to 1.25									
0.25 to 0.75				20	38	111	30		199
-0.75 to -0.25				10	30	67	30		137
-1.25 to -0.75									
-1.75 to -1.25									
-2.25 to -1.75									
Below -2.25									
Total				30	68	178	60		336
Time (Min)			29.9	103.4	382.9	313.7	94.4	0.2	924.5

MMWA 12ED

Altitude - 5,000 to 10,000 Feet W - 13,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor Delta n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
Above 3.75									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75									
0.75 to 1.25									
0.25 to 0.75					2	17			19
-0.75 to -0.25					9	26			35
-1.25 to -0.75									
-1.75 to -1.25									
-2.25 to -1.75									
Below -2.25									
Total					11	43			54
Time (Min)				42.5	74.0	248.3	15.0		379.7

MMWA 12FA — Altitude - 0 to 1,000 Feet W - 14,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor Delta n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
Above 3.75									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75									
0.75 to 1.25									
0.25 to 0.75					4	2			6
-0.75 to -0.25			1		3	6			10
-1.25 to -0.75									
-1.75 to -1.25									
-2.25 to -1.75									
Below -2.25									
Total			1		7	8			16
Time (Min)		5.0	10.3	16.0	16.2	23.8	4.1		75.3

MMWA 12FB — Altitude - 1,000 to 2,000 Feet W - 14,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor Delta n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
Above 3.75									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75									
0.75 to 1.25					1				1
0.25 to 0.75				1	40	17			58
-0.75 to -0.25				8	63	16	2		89
-1.25 to -0.75									
-1.75 to -1.25									
-2.25 to -1.75									
Below -2.25									
Total				9	104	33	2		148
Time (Min)		0.5	4.6	41.7	79.7	36.2	1.1		163.8

A

MMWA 12FC	-0.75 to -0.25				8	63	16	2	89
	-1.25 to -0.75								
	-1.75 to -1.25								
	-2.25 to -1.75								
	Below -2.25								
	Total				9	104	33	2	148
	Time (Min)		0.5	4.6	41.7	79.7	36.2	1.1	163.8

MMWA 12FC

Altitude - 2,000 to 5,000 Feet W - 14,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor Delta n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
Above 3.75									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75									
0.75 to 1.25									
0.25 to 0.75				3	33	21			57
-0.75 to -0.25				2	63	34			99
-1.25 to -0.75									
-1.75 to -1.25									
-2.25 to -1.75									
Below -2.25									
Total				5	96	55			156
Time (Min)			25.7	46.1	258.2	133.6	8.8		472.4

MMWA 12FD

Altitude - 5,000 to 10,000 Feet W - 14,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor Delta n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
Above 3.75									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75									
0.75 to 1.25									
0.25 to 0.75					4	9	2		15
-0.75 to -0.25					1	10	1		12
-1.25 to -0.75									
-1.75 to -1.25									
-2.25 to -1.75									

-2.25 to -1.75
Below -2.25

Load Factor Delta n_z	Equivalent Airspeed - VE (Knots) Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
Above 3.75									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75									
0.75 to 1.25									
0.25 to 0.75					4	9	2		15
-0.75 to -0.25					1	10	1		12
-1.25 to -0.75									
-1.75 to -1.25									
-2.25 to -1.75									
Below -2.25									
Total					5	19	3		27
Time (Min)				2.8	11.6	13.8	0.5		28.7

MM 12

Load Factor Delta n_z	Equivalent Airspeed - VE (Knots) All Weights Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
Above 3.75									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75									
0.75 to 1.25					1				1
0.25 to 0.75			12	110	476	564	164	14	1,340
-0.75 to -0.25			9	94	504	517	127	2	1,253
-1.25 to -0.75						1			1
-1.75 to -1.25									
-2.25 to -1.75									
Below -2.25									
Total			21	204	981	1,082	291	16	2,595
Time (Min)	0.6	29.1	275.5	548.0	1,585.5	1,360.1	243.2	5.6	4,047.7

TABLE IX
DELTA n_z VERSUS AIRSPEED

COMP	Equivalent Airspeed - VE (Knots)								
Load Factor Delta n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total Delta n_z
Above 3.75									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75									
0.75 to 1.25					1	15			16
0.25 to 0.75			30	386	2,561	5,799	846	29	9,651
-0.75 to -0.25		1	25	264	2,380	5,470	704	17	8,861
-1.25 to -0.75						5	1		6
-1.75 to -1.25									
-2.25 to -1.75									
Below -2.25									
Total		1	55	650	4,942	11,289	1,551	46	18,534
Time (Min)	2.0	61.9	392.7	1,252.9	4,309.9	5,499.0	686.2	29.8	12,234.4

TABLE X

MANEUVER n_z VERSUS AIRSPEED FOR MISSION I BY WEIGHT BY ALTITUDE

MMWA 11CA

Altitude - 0 to 1,000 Feet W - 11,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_z
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75						1			1
2.75 to 3.25						1			1
2.25 to 2.75					1	3	3		7
1.75 to 2.25					6	7	1		14
1.25 to 1.75		6	28	18	45	120	4		221
0.25 to 0.75		2		3	12	77			94
-0.25 to 0.25									
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total		8	28	21	64	209	8		338
Time (Min)	0.3	8.0	10.1	5.0	14.9	63.1	1.4		102.8

MMWA 11CB

Altitude - 1,000 to 2,000 Feet W - 11,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_z
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75							3		3
2.75 to 3.25						2			2
2.25 to 2.75				1	1	3			5
1.75 to 2.25				6	5	6	3		20
1.25 to 1.75			17	64	108	118	10		317
0.25 to 0.75			1	10	40	53	6		110
-0.25 to 0.25									
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total			18	81	154	182	22		457
Time (Min)		1.2	7.9	29.4	64.6	82.0	5.5		190.6

Time (Min)		1.2	7.9	29.4	64.6	82.0	5.5		190.6

MMWA 11CC

Altitude - 2,000 to 5,000 Feet W - 11,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_z
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75					1				1
1.75 to 2.25					3				3
1.25 to 1.75				5	24	3			32
0.25 to 0.75				1	1	3			5
-0.25 to 0.25									
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total				6	29	6			41
Time (Min)				2.7	9.3	13.6			25.7

MMWA 11DA

Altitude - 0 to 1,000 Feet W - 12,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_z
Above 4.75									
4.25 to 4.75						1	2		3
3.75 to 4.25						2	8		10
3.25 to 3.75					1	8	15	1	25
2.75 to 3.25					3	22	15	2	42
2.25 to 2.75					29	101	38	7	175
1.75 to 2.25				25	180	445	99	5	754
1.25 to 1.75		10	30	129	1,667	2,887	385	10	5,118
0.25 to 0.75		2	7	28	313	689	74	4	1,117
-0.25 to 0.25						1			1
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total		12	37	182	2,193	4,156	636	29	7,245
Time (Min)	0.5	9.7	21.8	49.9	403.7	767.0	112.2	3.5	1,368.3

MMWA 11DB — Altitude - 1,000 to 2,000 Feet W - 12,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_z
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75									
2.75 to 3.25					2	2	1		5
2.25 to 2.75				8	19	16	1	2	46
1.75 to 2.25				27	129	145	25	2	328
1.25 to 1.75		3	44	405	1,262	1,732	215	6	3,667
0.25 to 0.75		1	8	77	271	464	29		850
-0.25 to 0.25						1			1
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total		4	52	517	1,683	2,360	271	10	4,897
Time (Min)		2.1	21.7	176.8	437.3	732.2	79.5	1.7	1,451.4

MMWA 11DC — Altitude - 2,000 to 5,000 Feet W - 12,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_z
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75				1	1	2			4
1.75 to 2.25				1	1	5			7
1.25 to 1.75			6	46	59	134	7	6	258
0.25 to 0.75			1	12	19	17	1		50
-0.25 to 0.25									
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total			7	60	80	158	8	6	319
Time (Min)			3.0	35.0	84.4	136.4	9.0	5.4	273.2

MMWA 11DD — Altitude - 5,000 to 10,000 Feet W - 12,000 lb

Time (Min)			3.0	35.0	84.4	136.4	9.0	5.4	273.2

Time (Min)		3.0	35.0	84.4	136.4	9.0	5.4	273.2

MMWA 11DD

Altitude - 5,000 to 10,000 Feet W - 12,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_z
Above 4.75									
4.25 to 4 75									
3.75 to 4.25									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75				2	2	13	2		19
0.25 to 0.75					1	10	1	1	13
-0.25 to 0.25									
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total				2	3	23	3	1	32
Time (Min)				6.6	16.2	97.7	3.3	0.5	124.2

MMWA 11EA

Altitude - 0 to 1,000 Feet W - 13,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_z
Above 4.75									
4.25 to 4.75									
3.75 to 4.25							6	3	9
3.25 to 3.75						7	40	20	67
2.75 to 3.25					1	14	16	5	36
2.25 to 2.75				1	19	63	27	8	118
1.75 to 2.25				11	201	367	55	3	637
1.25 to 1.75		12	48	227	3,120	3,578	352	27	7,364
0.25 to 0.75		4	22	55	496	616	63	8	1,264
-0.25 to 0.25				1		3	2		6
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total		16	70	295	3,837	4,648	561	74	9,501
Time (Min)	0.4	7.7	21.4	111.8	769.4	930.4	93.5	6.7	1,941.2

TABLE X contd.

MMWA 11EB — Altitude - 1,000 to 2,000 Feet W - 13,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_z
Above 4.75									
4.25 to 4.75								1	1
3.75 to 4.25							2		2
3.25 to 3.75				1		2	1	1	5
2.75 to 3.25				1		2	2	3	8
2.25 to 2.75				8	18	19	6	2	53
1.75 to 2.25			5	55	200	190	19	3	472
1.25 to 1.75			14	304	1,589	1,995	108	2	4,012
0.25 to 0.75			2	94	300	418	38	6	858
-0.25 to 0.25				1		2			3
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total			21	464	2,107	2,628	176	18	5,414
Time (Min)			15.6	183.9	498.0	671.6	67.7	3.1	1,439.9

MMWA 11EC — Altitude - 2,000 to 5,000 Feet W - 13,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_z
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75				1					1
2.75 to 3.25						1			1
2.25 to 2.75				3	1	2			6
1.75 to 2.25			1	18	10	7			36
1.25 to 1.75			6	54	113	87	5	2	267
0.25 to 0.75				15	21	25		1	62
-0.25 to 0.25									
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total			7	91	145	122	5	3	373
Time (Min)			1.1	42.2	105.3	81.4	11.6	1.3	243.0

MMWA 11ED **Altitude - 5,000 to 10,000 Feet W - 13,000 lb**

Time (Min)	1.1	42.2	105.3	81.4	11.6	1.3	243.0

MMWA 11ED

Altitude - 5,000 to 10,000 Feet W - 13,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_z
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75					3	5			8
0.25 to 0.75			1	1	2	3			7
-0.25 to 0.25									
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total			1	1	5	8			15
Time (Min)			1.2	2.5	31.1	83.1			118.0

MMWA 11FA

Altitude - 0 to 1,000 Feet W - 14,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_z
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75						2	2	2	6
2.75 to 3.25						5	2	2	9
2.25 to 2.75					2	9	7	2	20
1.75 to 2.25				5	28	53	17		103
1.25 to 1.75		5	17	43	364	756	116	10	1,311
0.25 to 0.75		1	7	19	111	212	26		376
-0.25 to 0.25						1			1
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total		6	24	67	505	1,038	170	16	1,826
Time (Min)	0.2	3.9	7.7	19.2	153.5	279.9	36.8	1.7	503.0

TABLE X contd.

MMWA 11FB — Altitude - 1,000 to 2,000 Feet W - 14,000 lb

Load Factor n_z	Equivalent Airspeed - VE (Knots)								Total
	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	n_z
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75						1	1	1	3
2.75 to 3.25						1	1		2
2.25 to 2.75					2	4	1		7
1.75 to 2.25				10	16	31	4		61
1.25 to 1.75			1	51	139	344	34		569
0.25 to 0.75			1	11	31	80	7		130
-0.25 to 0.25									
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total			2	72	188	461	48	1	772
Time (Min)		0.2	4.6	22.6	96.1	158.6	21.6	0.1	303.8

MMWA 11FC — Altitude - 2,000 to 5,000 Feet W - 14,000 lb

Load Factor n_z	Equivalent Airspeed - VE (Knots)								Total
	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	n_z
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75						1			1
2.75 to 3.25									
2.25 to 2.75						1			1
1.75 to 2.25				1	2				3
1.25 to 1.75			1	11	17	8			37
0.25 to 0.75				4	8	3			15
-0.25 to 0.25			1						1
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total			2	16	27	13			58
Time (Min)			1.0	17.4	35.7	22.9	0.9		77.9

MMWA 11FD

Altitude - 5,000 to 10,000 Feet W - 14,000 lb

Total		2	16	27	13		58
Time (Min)		1.0	17.4	35.7	22.9	0.9	77.9

MMWA 11FD

Altitude - 5,000 to 10,000 Feet W - 14,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_z
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75					1	2			3
0.25 to 0.75									
-0.25 to 0.25									
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total					1	2			3
Time (Min)					4.9	18.9			23.8

MM 11

Equivalent Airspeed - VE (Knots)

Load Factor n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_z
Above 4.75									
4.25 to 4.75						1	2	1	4
3.75 to 4.25						2	16	3	21
3.25 to 3.75				2	1	22	62	25	112
2.75 to 3.25				1	6	50	37	12	106
2.25 to 2.75				22	94	223	83	21	443
1.75 to 2.25			6	159	781	1,256	223	13	2,438
1.25 to 1.75		36	212	1,359	8,513	11,782	1,238	63	23,203
0.25 to 0.75		10	50	330	1,626	2,670	245	20	4,951
-0.25 to 0.25			1	2		8	2		13
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total		46	269	1,875	11,021	16,014	1,908	158	31,291
Time (Min)	1.4	32.8	117.1	704.9	2,724.4	4,138.9	443.0	24.2	8,186.7

TABLE XI
MANEUVER n_z VERSUS AIRSPEED FOR MISSION II BY WEIGHT BY ALTITUDE

MMWA 12CA

Altitude - 0 to 1,000 Feet W - 11,000 lb

Load Factor n_z	Equivalent Airspeed - VE (Knots)								Total
	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	n_z
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75			2	4	1	4			11
0.25 to 0.75									
-0.25 to 0.25									
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total			2	4	1	4			11
Time (Min)		0.2	2.6	0.9	0.1	0.1	0.3		4.2

MMWA 12CB

Altitude - 1,000 to 2,000 Feet W - 11,000 lb

Load Factor n_z	Equivalent Airspeed - VE (Knots)								Total
	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	n_z
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75				1	4	1			6
0.25 to 0.75									
-0.25 to 0.25									
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total				1	4	1			6
Time (Min)				0.1	9.2	3.8			13.1

MMWA 12CC

Altitude - 2,000 to 5,000 Feet W - 11,000 lb

MMWA 12CC Altitude - 2,000 to 5,000 Feet W - 11,000 lb

Load Factor n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_z
Below -1.25									
Total				1	4	1			6
Time (Min)				0.1	9.2	3.8			13.1

MMWA 12CC Altitude - 2,000 to 5,000 Feet W - 11,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_z
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75			2						2
0.25 to 0.75			1	1					2
-0.25 to 0.25									
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total			3	1					4
Time (Min)			7.5	4.4	17.2	6.1			35.2

MMWA 12DA Altitude - 0 to 1,000 Feet W - 12,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_z
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75					2				2
1.75 to 2.25				1	4				5
1.25 to 1.75		1	9	21	198	3			232
0.25 to 0.75		2	4	3	5	1			15
-0.25 to 0.25									
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total		3	13	25	209	4			254
Time (Min)	0.1	6.6	11.6	5.6	29.0	2.3	1.2		56.3

2.25 to 2.75					2			2
1.75 to 2.25				1	4			5
1.25 to 1.75		1	9	21	198	3		232
0.25 to 0.75		2	4	3	5	1		15
-0.25 to 0.25								
-0.75 to -0.25								
-1.25 to -0.75								
Below -1.25								
Total		3	13	25	209	4		254
Time (Min)	0.1	6.6	11.6	5.6	29.0	9.3	1.9	64.2

MMWA 12DB

Altitude - 1,000 to 2,000 Feet W - 12,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_z
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25					5	11	4	1	21
1.25 to 1.75			13	45	151	142	43	4	398
0.25 to 0.75			2	10	52	53	9		126
-0.25 to 0.25									
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total			15	55	208	206	56	5	545
Time (Min)		2.3	67.3	65.0	134.1	87.4	17.3	0.4	373.9

MMWA 12DC

Altitude - 2,000 to 5,000 Feet W - 12,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_z
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25				1	2	9	2		14
1.25 to 1.75				72	71	70	20	2	235

1.25 to 1.75				72	71	70	20	2	235

Equivalent Airspeed - VE (Knots)

Load Factor n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_z
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25					5	11	4	1	21
1.25 to 1.75			13	45	151	142	43	4	398
0.25 to 0.75			2	10	52	53	9		126
-0.25 to 0.25									
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total			15	55	208	206	56	5	545
Time (Min)		2.3	67.3	65.0	134.1	87.4	17.3	0.4	373.9

MMWA 12DC

Altitude - 2,000 to 5,000 Feet W - 12,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_z
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25				1	2	9	2		14
1.25 to 1.75				72	71	70	20	2	235
0.25 to 0.75				23	22	13	5	1	64
-0.25 to 0.25									
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total				96	95	92	27	3	313
Time (Min)		2.5	49.1	100.8	198.8	142.6	66.0	1.6	561.5

TABLE XI contd.

MMWA 12DD — Altitude - 5,000 to 10,000 Feet W - 12,000 lb

Load Factor n_z	Equivalent Airspeed - VE (Knots) Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_z
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75						2	1		3
0.25 to 0.75				1		1	1		3
-0.25 to 0.25									
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total				1		3	2		6
Time (Min)				10.0	36.7	44.8	3.0		94.5

MMWA 12EA — Altitude - 0 to 1,000 Feet W - 13,00 lb

Load Factor n_z	Equivalent Airspeed - VE (Knots) Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_z
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75				1					1
1.75 to 2.25					3	10	2		15
1.25 to 1.75	1	8	24	41	156	105	9	5	349
0.25 to 0.75		5	11	14	24	19			73
-0.25 to 0.25									
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total	1	13	35	56	183	134	11	5	438
Time (Min)	0.5	11.5	27.4	26.4	71.8	90.2	6.8	0.7	235.3

A

Time (Min)	0.5	11.5	27.4	26.4	71.8	90.2	6.8	0.7	235.3

MMWA 12EB

Altitude - 1,000 to 2,000 Feet W - 13,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_z
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25					13	16	8	5	42
1.25 to 1.75			5	62	317	228	53	11	676
0.25 to 0.75			1	14	104	58	10	1	188
-0.25 to 0.25									
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total			6	76	434	302	71	17	906
Time (Min)		0.4	39.4	78.9	189.2	194.5	24.2	2.7	529.3

MMWA 12EC

Altitude - 2,000 to 5,000 Feet W - 13,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_z
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25						1			1
1.25 to 1.75			1	24	87	76	17	1	206
0.25 to 0.75			1	10	34	27	3		75
-0.25 to 0.25									
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total			2	34	121	104	20	1	282
Time (Min)			29.9	103.4	382.9	313.7	94.4	0.2	924.5

Total	2	34	121	104	20	1	282
Time (Min)	29.9	103.4	382.9	313.7	94.4	0.2	924.5

MMWA 12ED — Altitude - 5,000 to 10,000 Feet W - 13,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_z
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75					1				1
1.75 to 2.25					1				1
1.25 to 1.75				2	1	13			16
0.25 to 0.75				1	3	11			15
-0.25 to 0.25									
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total				3	6	24			33
Time (Min)				42.5	74.0	248.3	15.0		379.7

MMWA 12EE — Altitude - 10,000 .o 15,000 Feet W - 13,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_z
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75						1			1
0.25 to 0.75				1	1				2
-0.25 to 0.25									
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total				1	1	1			3
Time (Min)				2.1	56.7	4.9			63.8

TABLE XI contd.

MMWA 12FA

Altitude - 0 to 1,000 Feet W - 14,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_z
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25					1				1
1.25 to 1.75		2	3	15	29	26	1		76
0.25 to 0.75		1	3	4	7	9			24
-0.25 to 0.25									
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total		3	6	19	37	35	1		101
Time (Min)		5.0	10.3	16.0	16.2	23.8	4.1		75.3

MMWA 12FB

Altitude - 1,000 to 2,000 Feet W - 14,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_z
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25					1	1	1		3
1.25 to 1.75		1		23	119	34	3		180
0.25 to 0.75				8	93	14			115
-0.25 to 0.25									
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total		1		31	213	49	4		298
Time (Min)		0.5	4.6	41.7	79.7	36.2	1.1		163.8

MMWA 12FC

Altitude - 2,000 to 5,000 Feet W - 14,000 lb

Load Factor n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_z
Below -1.25									
Total		1		31	213	49	4		298
Time (Min)		0.5	4.6	41.7	79.7	36.2	1.1		163.8

MMWA 12FC

Altitude - 2,000 to 5,000 Feet W - 14,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_z
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25					2	2			4
1.25 to 1.75				12	143	38			193
0.25 to 0.75				12	91	38			141
-0.25 to 0.25									
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total				24	236	78			338
Time (Min)			25.7	46.1	258.2	133.6	8.8		472.4

MMWA 12FD

Altitude - 5,000 to 10,000 Feet W - 14,000 lb

Equivalent Airspeed - VE (Knots)

Load Factor n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_z
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75					5	5	1		11
0.25 to 0.75					5	6			11
-0.25 to 0.25									
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total					10	11	1		22
Time (Min)				2.8	11.6	13.8	0.5		28.7

Equivalent Airspeed - VE (Knots)

Load Factor n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_z
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75					5	5	1		11
0.25 to 0.75					5	6			11
-0.25 to 0.25									
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total					10	11	1		22
Time (Min)				2.8	11.6	13.8	0.5		28.7

MM 12

Equivalent Airspeed - VE (Knots)

Load Factor n_z	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_z
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75				1	3				4
1.75 to 2.25				2	32	50	17	6	107
1.25 to 1.75	1	12	59	322	1,282	748	148	23	2,595
0.25 to 0.75		8	23	102	441	250	28	2	854
-0.25 to 0.25									
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total	1	20	82	427	1,758	1,048	193	31	3,560
Time (Min)	0.6	29.1	275.5	548.0	1,585.5	1,360.1	243.2	5.6	4,047.7

TABLE XII
MANEUVER n_z VERSUS AIRSPEED

COMP

Load Factor n_z	Equivalent Airspeed - VE (Knots)								Total
	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	n_z
Above 4.75									
4.25 to 4.75						1	2	1	4
3.75 to 4.25						2	16	3	21
3.25 to 3.75				2	1	22	62	25	112
2.75 to 3.25				1	6	50	37	12	106
2.25 to 2.75				23	97	223	83	21	447
1.75 to 2.25			6	161	813	1,306	240	19	2,545
1.25 to 1.75	1	48	271	1,681	9,795	12,530	1,386	86	25,798
0.25 to 0.75		18	73	432	2,067	2,920	273	22	5,805
-0.25 to 0.25			1	2		8	2		13
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total	1	66	351	2,302	12,779	17,062	2,101	189	34,851
Time (Min)	2.0	61.9	392.7	1,252.9	4,309.9	5,499.0	686.2	29.8	12,234.4

TABLE XIII
EQUIVALENT MANEUVER n_{z_e} VERSUS AIRSPEED FOR MISSION I BY ALTITUDE

MMWA 110A

Altitude - 0 to 1,000 Feet

Equivalent Airspeed - VE (Knots)

Equivalent Airspeed - VE (Knots)

Load Factor n_{z_e}	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_{z_e}
Above 4.75							1		1
4.25 to 4.75						5	11	3	19
3.75 to 4.25					1	12	53	22	88
3.25 to 3.75					2	25	31	10	68
2.75 to 3.25				1	10	85	48	9	153
2.25 to 2.75				5	154	345	109	12	625
1.75 to 2.25		2	3	82	1,186	1,985	296	21	3,575
1.25 to 1.75	1	87	232	657	6,214	8,370	831	38	16,430
0.25 to 0.75		3	3	36	327	698	89	8	1,164
-0.25 to 0.25				1		3			4
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total	1	92	238	782	7,894	11,528	1,469	123	22,127
Time (Min)	1.4	29.3	61.1	185.9	1,341.4	2,040.4	243.9	12.0	3,915.3

D

MMWA 110B

Altitude - 1,000 to 2,000 Feet

Equivalent Airspeed - VE (Knots)

Load Factor n_{z_e}	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_{z_e}
Above 4.75								1	1
4.25 to 4.75						2	3	1	6
3.75 to 4.25						1	2		3
3.25 to 3.75				2	2	3	6	4	17
2.75 to 3.25				4	13	14	5	1	37
2.25 to 2.75			3	47	132	129	22	3	336
1.75 to 2.25			8	190	744	912	76	6	1,936
1.25 to 1.75		3	138	1,297	3,815	5,055	441	8	10,757
0.25 to 0.75		1	6	81	278	490	41	4	901
-0.25 to 0.25				1		1			2
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total		4	155	1,622	4,984	6,607	596	28	13,996
Time (Min)		3.5	49.7	412.7	1,096.0	1,644.4	174.3	4.9	3,385.7

0.25 to 0.75		1	6	81	278	490	41	4	901
-0.25 to 0.25				1		1			2
-0.75 to -0.25									
-1.25 to -0.75									

Load Factor n_{z_e}	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_{z_e}
-1.25 to -0.75									
Below -1.25									
Total		4	155	1,622	4,984	6,607	596	28	13,996
Time (Min)		3.5	49.7	412.7	1,096.0	1,644.4	174.3	4.9	3,385.7

MMWA 110C

Altitude - 2,000 to 5,000 Feet

Equivalent Airspeed - VE (Knots)

Load Factor n_{z_e}	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_{z_e}
Above 4.75									
4.25 to 4.75						1			1
3.75 to 4.25				1					1
3.25 to 3.75						1			1
2.75 to 3.25				3		2			5
2.25 to 2.75				10	8	6			24
1.75 to 2.25			2	25	32	44	1		104
1.25 to 1.75			17	160	311	304	20	10	822
0.25 to 0.75			1	17	24	25	1	1	69
-0.25 to 0.25									
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total			20	216	375	383	22	11	1,027
Time (Min)			5.1	97.2	234.8	254.4	21.5	6.8	619.8

MMWA 110D

Altitude - 5,000 to 10,000 Feet

Equivalent Airspeed - VE (Knots)

Load Factor n_{z_e}	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_{z_e}
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75			1	4	13	26	3		47
0.25 to 0.75					2	9			11
-0.25 to 0.25									
-0.75 to -0.25									
-1.25 to -0.75									

MMWA 110D

Altitude - 5,000 to 10,000 Feet

MMWA 110D

Altitude - 5,000 to 10,000 Feet

Equivalent Airspeed - VE (Knots)

Load Factor n_{z_e}	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_{z_e}
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75			1	4	13	26	3		47
0.25 to 0.75					2	9			11
-0.25 to 0.25									
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total			1	4	15	35	3		58
Time (Min)			1.2	9.1	52.3	199.7	3.3	0.5	266.0

MM 11

Equivalent Airspeed - VE (Knots)

Load Factor n_{z_e}	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_{z_e}
Above 4.75							1	1	2
4.25 to 4.75						8	14	4	26
3.75 to 4.25				1	1	13	55	22	92
3.25 to 3.75				2	4	29	37	14	86
2.75 to 3.25				8	23	101	53	10	195
2.25 to 2.75			3	62	294	480	131	15	985
1.75 to 2.25		2	13	297	1,962	2,941	373	27	5,615
1.25 to 1.75	1	90	388	2,118	10,353	13,755	1,295	56	28,056
0.25 to 0.75		4	10	134	631	1,222	131	13	2,145
-0.25 to 0.25				2		4			6
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total	1	96	414	2,624	13,268	18,553	2,090	162	37,208
Time (Min)	1.4	32.8	117.1	704.9	2,724.4	4,138.9	443.0	24.2	8,186.7

TABLE XIV
EQUIVALENT MANEUVER n_{z_e} VERSUS AIRSPEED FOR MISSION II BY ALTITUDE

MMWA 120A

Altitude - 0 to 1,000 Feet

Equivalent Airspeed - VE (Knots)

Load Factor n_{z_e}	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_{z_e}
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75									
2.75 to 3.25					1				1
2.25 to 2.75				1	1	1			3
1.75 to 2.25				4	81	44	4	3	136
1.25 to 1.75	2	44	112	140	487	225	15	2	1,027
0.25 to 0.75		2	2	5	4	7			20
-0.25 to 0.25									
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total	2	46	114	150	574	277	19	5	1,187
Time (Min)	0.6	23.4	51.8	48.8	117.2	123.4	13.1	0.7	379.0

MMWA 120B

Altitude - 1,000 to 2,000 Feet

Equivalent Airspeed - VE (Knots)

Load Factor n_{z_e}	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_{z_e}
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75					3	5	1	4	13
1.75 to 2.25				5	80	84	37	6	212
1.25 to 1.75		3	55	238	950	578	91	11	1,926
0.25 to 0.75				9	75	41	5		130
-0.25 to 0.25									
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total		3	55	252	1,108	708	134	21	2,281

Load Factor n_{z_e}	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_{z_e}
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total		3	55	252	1,108	708	134	21	2,281
Time (Min)		3.2	111.4	185.8	412.2	321.9	42.6	3.2	1,080.2

MMWA 120C

Altitude - 2,000 to 5,000 Feet

Equivalent Airspeed - VE (Knots)

Load Factor n_{z_e}	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_{z_e}
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75					1	3			4
1.75 to 2.25				4	45	28	7		84
1.25 to 1.75			7	278	742	382	63	8	1,480
0.25 to 0.75			2	21	24	17	3		67
-0.25 to 0.25									
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total			9	303	812	430	73	8	1,635
Time (Min)		2.5	112.3	254.7	857.0	596.0	169.2	1.8	1,993.6

MMWA 120D

Altitude - 5,000 to 10,000 Feet

Equivalent Airspeed - VE (Knots)

Load Factor n_{z_e}	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_{z_e}
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75					2				2
1.75 to 2.25				1					1
1.25 to 1.75				5	16	61	4		86
0.25 to 0.75						3			3
-0.25 to 0.25									
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total				6	18	64	4		92

Load Factor n_{z_e}		Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	n_{z_e}
Above	4.75									
4.25 to	4.75									
3.75 to	4.25									
3.25 to	3.75									
2.75 to	3.25									
2.25 to	2.75					2				2
1.75 to	2.25				1					1
1.25 to	1.75				5	16	61	4		86
0.25 to	0.75						3			3
-0.25 to	0.25									
-0.75 to	-0.25									
-1.25 to	-0.75									
Below	-1.25									
Total					6	18	64	4		92
Time (Min)					55.3	122.3	306.9	18.4		503.0

MMWA 120E

Altitude - 10,000 to 15,000 Feet

Equivalent Airspeed - VE (Knots)

Load Factor n_{z_e}		Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_{z_e}
Above	4.75									
4.25 to	4.75									
3.75 to	4.25									
3.25 to	3.75									
2.75 to	3.25									
2.25 to	2.75									
1.75 to	2.25									
1.25 to	1.75					1	1			2
0.25 to	0.75					1				1
-0.25 to	0.25									
-0.75 to	-0.25									
-1.25 to	-0.75									
Below	-1.25									
Total						2	1			3
Time (Min)					3.3	76.8	11.9			91.9

MM 12

Equivalent Airspeed - VE (Knots)

Load Factor n_{z_e}		Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_{z_e}
Above	4.75									
4.25 to	4.75									

MMWA 120E

Altitude - 10,000 to 15,000 Feet

Equivalent Airspeed - VE (Knots)

Load Factor n_{z_e}	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_{z_e}
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75									
2.75 to 3.25									
2.25 to 2.75									
1.75 to 2.25									
1.25 to 1.75					1	1			2
0.25 to 0.75					1				1
-0.25 to 0.25									
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total					2	1			3
Time (Min)				3.3	76.8	11.9			91.9

MM 12

Equivalent Airspeed - VE (Knots)

Load Factor n_{z_e}	Less Than 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200	200 to 225	225 and Above	Total n_{z_e}
Above 4.75									
4.25 to 4.75									
3.75 to 4.25									
3.25 to 3.75									
2.75 to 3.25					1				1
2.25 to 2.75				1	7	9	1	4	22
1.75 to 2.25				14	206	156	48	9	433
1.25 to 1.75	2	47	174	661	2,196	1,247	173	21	4,521
0.25 to 0.75		2	4	35	104	68	8		221
-0.25 to 0.25									
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total	2	49	178	711	2,514	1,480	230	34	5,198
Time (Min)	0.6	29.1	275.5	548.0	1,585.5	1,360.1	243.2	5.6	4,047.7

TABLE XV
EQUIVALENT AIRSPEED - V_e (KNOTS)

COMP

Load Factor NZE	Less Than 75	75 To 100	100 To 125	125 To 150	150 To 175	175 To 200	200 To 225	225 and Above	Total NZE
Above 4.75							1	1	2
4.25 to 4.75						8	14	4	26
3.75 to 4.25				1	1	13	55	22	92
3.25 to 3.75				2	4	29	37	14	86
2.75 to 3.25				8	24	101	53	10	196
2.25 to 2.75			3	63	301	489	132	19	1,007
1.75 to 2.25		2	13	311	2,168	3,097	421	36	6,048
1.25 to 1.75	3	137	562	2,779	12,549	15,002	1,468	77	32,577
0.25 to 0.75		6	14	169	735	1,290	139	13	2,366
-0.25 to 0.25				2		4			6
-0.75 to -0.25									
-1.25 to -0.75									
Below -1.25									
Total	3	145	592	3,335	15,782	20,033	2,320	196	42,406
Time (Min)	2.0	61.9	392.7	1,252.9	4,309.9	5,499.0	686.2	29.8	12,234.4

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13. ABSTRACT

A primary objective of this effort was to provide operational data for establishing future STOL aircraft design criteria.

To accomplish this end, two OV-1A aircraft were selected that were participating in air-assault maneuvers. Approximately 200 hours of flight data were recorded within approximately 10 weeks. The parameters recorded were: airspeed, altitude, outside air temperature, and acceleration at the aircraft center of gravity. In addition, supplementary data were collected on the type of mission and gross weight of the aircraft.

These data were presented as several frequency-of-occurrence forms, exceedance curves, and gust spectra.

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14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Operational Data Structural Loads Data VGH Data						

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