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### PROBABILITIES OF GOOD, MARGINAL, AND POOR FLYING CONDITIONS FOR SPACE SHUTTLE FERRY FLIGHTS

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16. ABSTRACT Empirical probabilities are provided for good, marginal, and poor flying weather for ferrying the Space Shuttle Orbiter from Edwards AFB, California, to Kennedy Space Center, Florida, and from Edwards AFB to Marshall Space Flight Center, Alabama. Results are given by month for each overall route plus segments of each route. The Edwards AFB to Kennedy Space Center route is divided into three segments: (1) Edwards to Midland, Texas, (2) Midland, Texas, to Shreveport, Louisiana, and (3) Shreveport, Louisiana, to Kennedy Space Center. The Edwards AFB to Marshall Space Flight Center route utilizes only two segments: (1) Edwards AFB to Midland, Texas, and (2) Midland, Texas, to Huntsville, Alabama.  The report describes the criteria for defining a day as good, marginal, or poor and the method of computing the relative frequencies and conditional probabilities for monthly reference periods.					
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## FOREWORD

The purpose of this report is to present empirical probabilities of good, marginal, or poor Orbiter ferry weather across the southern United States from Edwards AFB, California, to Kennedy Space Center, Florida, and from Edwards AFB to Marshall Space Flight Center, Alabama.

To develop these probability statements, it was first necessary to establish criteria by which good, marginal, and poor enroute ferry flight weather could be identified from a surface weather map. Current Orbiter ferry guidelines received from NASA/Johnson Space Center indicate that ferry flights are to be conducted under VFR and are to avoid turbulence. The criteria listed on page 1 were selected as indicators of turbulence or thick clouds that would make VFR flight difficult or impossible. An interpretation of each category is:

- Good - No indications of turbulence.<sup>1</sup> No thick clouds to hinder VFR flight.
- Margin - Some turbulent areas present. Some thick or layered clouds, making VFR flight doubtful.
- Poor - Turbulence very likely. Thick clouds present precluding VFR flight.

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<sup>1</sup> CAT indicators were not included in this study.

Several examples of questions that can be answered from the tables provided are given on page 5.

Weather requirements (especially light ground winds at Marshall Space Flight Center) for the Orbiter/Carrier aircraft demate operation were not considered in this study. If several hours of light winds at the terminal were to become a prerequisite for the ferry operation, the "good" probability values in this report would be reduced considerably.

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Section I

INTRODUCTION

Current plans call for the Space Shuttle Orbiter to be ferried on the 747 Carrier Aircraft from Edwards Air Force Base, CA to Kennedy Space Center, FL and to Marshall Space Flight Center, AL. This study provides the empirical probability of having one day of good, marginal and poor flying weather each month across the southern United States conditional upon the prior one, two and three days' flying weather. Results are given by month for each overall route plus segments of each route. The Edwards AFB to KSC route is divided into three segments: Western-Edwards to Midland, TX; Middle-Midland, TX to Shreveport, LA; Eastern-Shreveport, LA to Kennedy Space Center. The Edwards AFB to Marshall Space Flight Center route utilizes only two segments; Western-Edwards to Midland, TX; Eastern-Midland, TX to Huntsville, AL.

Eleven years (1966-76) of the 0700 EST Daily Weather Maps (1) were examined along the proposed route. Each of the three segments was classified as good (1), marginal (2) or poor (3) for aircraft operations using the following criteria:

- |              |  |
|--------------|--|
| Good (1)     | (a) no fronts  |
|              | (b) no gusts or squall lines   |
|              | (c) terminal conditions VFR  |
|              | (d) no thunderstorms   |
|              | (e) no significant precipitation occurring                             |
| Marginal (2) | (a) frontal system diffuse or dissipating (frontolysis)                |
|              | (b) terminal conditions expected to deteriorate within 6 hours to <VFR |
|              | (c) isolated thunderstorms   |

- (d) some widespread middle or high cloud cover
  - (e) isolated precipitation areas
- Poor (3)
- (a) well developed frontal system or frontogenesis
  - (b) gustiness or squall lines
  - (c) terminal conditions <VFR now
  - (d) line of well developed thunderstorms
  - (e) widespread middle or low cloud cover
  - (f) broad band of precipitation occurring

The coded data for each segment for each of the 4,018 days were placed on magnetic tape in chronological order. The code numbers 1, 2 and 3 describe the good, marginal and poor weather conditions, while their position on tape determines the route segment being described. For example, the symbolic form is W,M,E; W,M,E; W,M,E; W,M,E; and the actual data might be 111, 111, 111, 123 for any four days. The coded data were inventoried and edited for serial completeness prior to processing.

Section II  
PROGRAM AND ANALYSIS

The program examines the daily codes and identifies overlapping sequences of two, three and four days. The last day of each sequence is considered to be the post condition, while the other days in the sequence are considered to be the prior condition. All days in each prior condition are, by definition, of the same type. In the example given in the introduction, an analysis of the Western segment would show one sequence of 3 prior good days and 1 post good day. It also would show: two sequences of 2 prior good days and 1 post good day; and three sequences of 1 prior good day and 1 post good day.

The same procedure is followed for each segment. When the entire route is analyzed, all three codes (W,M,E) must be examined each day. The criteria for good is that all positions be coded "1"; for marginal, at least one segment of the route must be a "2", but none can be a "3", while for poor conditions, at least one segment must be a "3". In the above example, the ENTIRE ROUTE analysis would show one sequence of 3 prior good days and 1 post poor day. It also would show: one sequence of 2 prior good days and 1 post good day; one sequence of 2 prior good days and 1 post poor day; two sequences of 1 prior good day and 1 post good day and one sequence of 1 prior good day and 1 post poor day.

### Section III

#### Figures and Tables

The figures show the percent frequency of occurrence of at least one and two good, marginal, and poor days over the entire ferry route from Edwards AFB to Kennedy Space Center. For example, of the 341 days in the 11 Januaries 103 or 30.2% were good, 178 or 52.2% were marginal, and 60 or 17.6% were poor. These are the values shown by bar graphs for January in Figure 1. Those in Figure 2 were counted in a similar way - there were 56 occasions (16.4%) when the entire route was classified good on at least two successive days. The marginal or poor classification was assigned if any part of the route fell into that category.

The tables show the frequency (F), conditional empirical probabilities (CP) and the empirical probability of having the indicated types of days followed by a good, marginal, or poor day (%). Total frequencies are shown for each type (TOT F) and a grand total (N) gives the number of observations for each month for the 11-year period.

The other headings are explained as follows:

**TYPE:** This is the condition of the current day, or days, while the condition of the day following is shown in the frequency columns of the good, marginal and poor fields across the page.

**DAYS:** This is the number of days defined by type. A "1" is added to the appropriate frequency cell under the proper field.



CP and %: These columns contain the conditional probabilities and percentages, where

$$CP = F/TOTAL F$$

$$\% = F/N$$

The following series of questions and answers illustrate some of the information the mission planner can obtain from the tables. Table 1 Edwards AFB to Kennedy Space Center, Entire Route, January is used in all examples.

- Q. What are the chances of having a good day over the entire route?
- A. Of the 341 days examined 103 were good.  $103/341 = 0.302$  or 30.2%.
- Q. How many times did 2 successive good days occur? 3 good days? 4 good days?
- A. Two successive good days occurred 56 times. Three successive good days occurred 30 times. Four successive good days occurred 13 times.
- Q. What is the probability (%) of 2,3,4 successive good days?
- A.  $(56/341) \times 100 = 16.4\%$ ;  $(30/341) \times 100 = 8.8\%$ ;  $(13/341) \times 100 = 3.8\%$ .
- Q. What is the conditional probability ( $\phi$ ) that tomorrow will be good given that today is good?
- A.  $(56/103) \times 100 = 54.4\%$ .
- Q. Suppose it is known that the entire route has been good for 2 days. What is the conditional probability (%) that tomorrow will be good? Marginal? Poor?
- A. Good  $(30/56) \times 100 = 53.6\%$   
Marginal  $(18/56) \times 100 = 32.1\%$   
Poor  $(8/56) \times 100 = 14.3\%$
- Q. On how many days and with what percent frequency did at least one segment of the route have poor weather?
- A. 60 days  
 $(60/341) \times 100 = 17.6\%$

#### Section IV

#### CONCLUSIONS

The tables show that the greatest likelihood of having two, three and four consecutive days of favorable weather along the entire route is during the months of June, July and August, while the least favorable months are April and November. In addition, all three segments show the highest percentages of good conditions during the summer months.

These tables should prove useful in determining the months with the optimum flying weather as well as the likelihood of having 2, 3 or 4 consecutive good days along each segment of the route.

FIGURE 1

PERCENT FREQUENCY OF OCCURRENCE OF AT LEAST ONE  
GOOD-MARGINAL-POOR DAY OVER ENTIRE FERRY ROUTE  
FROM EDWARDS AFB TO KSC

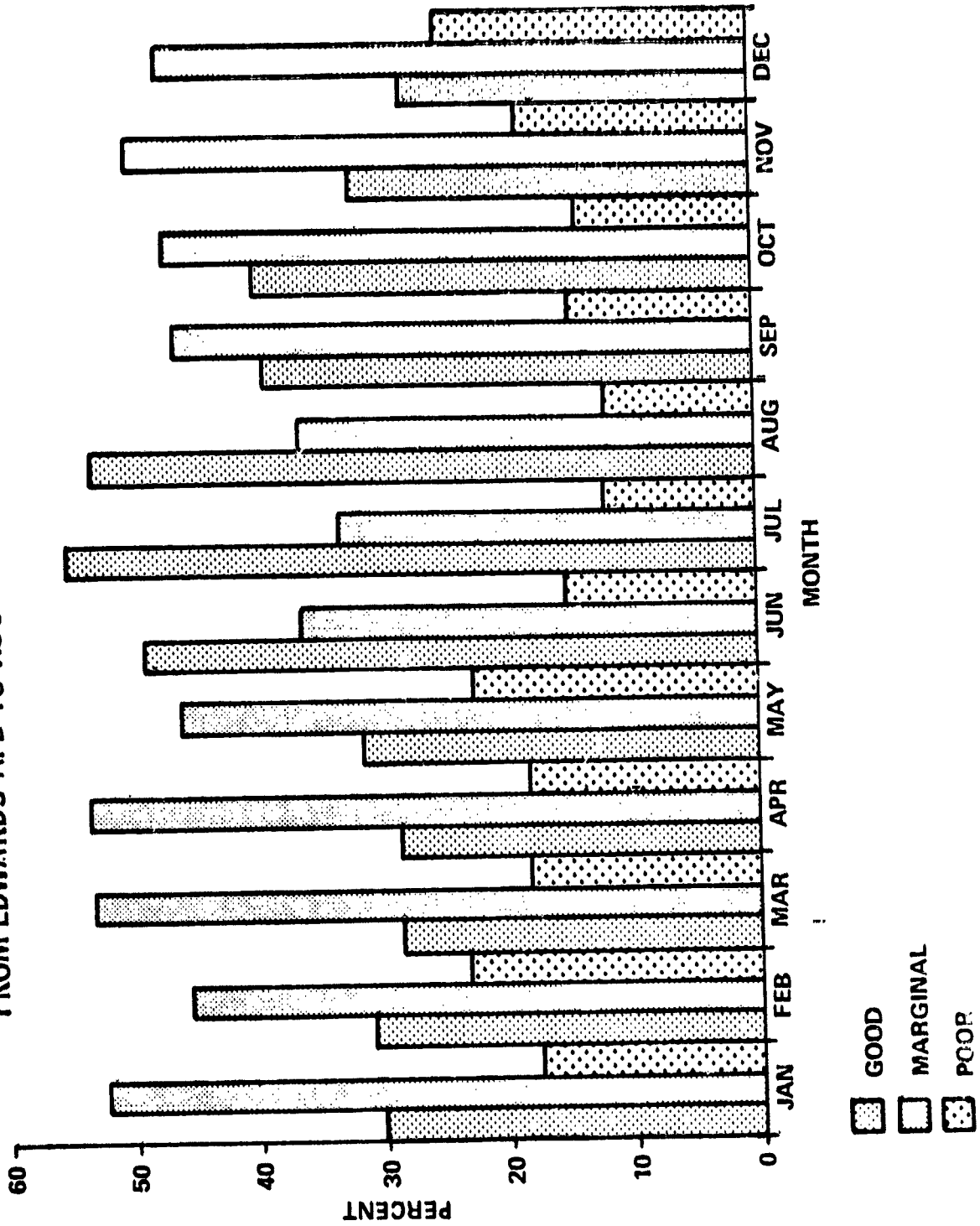


FIGURE 2

PERCENT FREQUENCY OF OCCURRENCE OF AT LEAST TWO GOOD-MARGINAL-POOR DAYS OVER ENTIRE FERRY ROUTE FROM EDWARDS AFB TO KSC

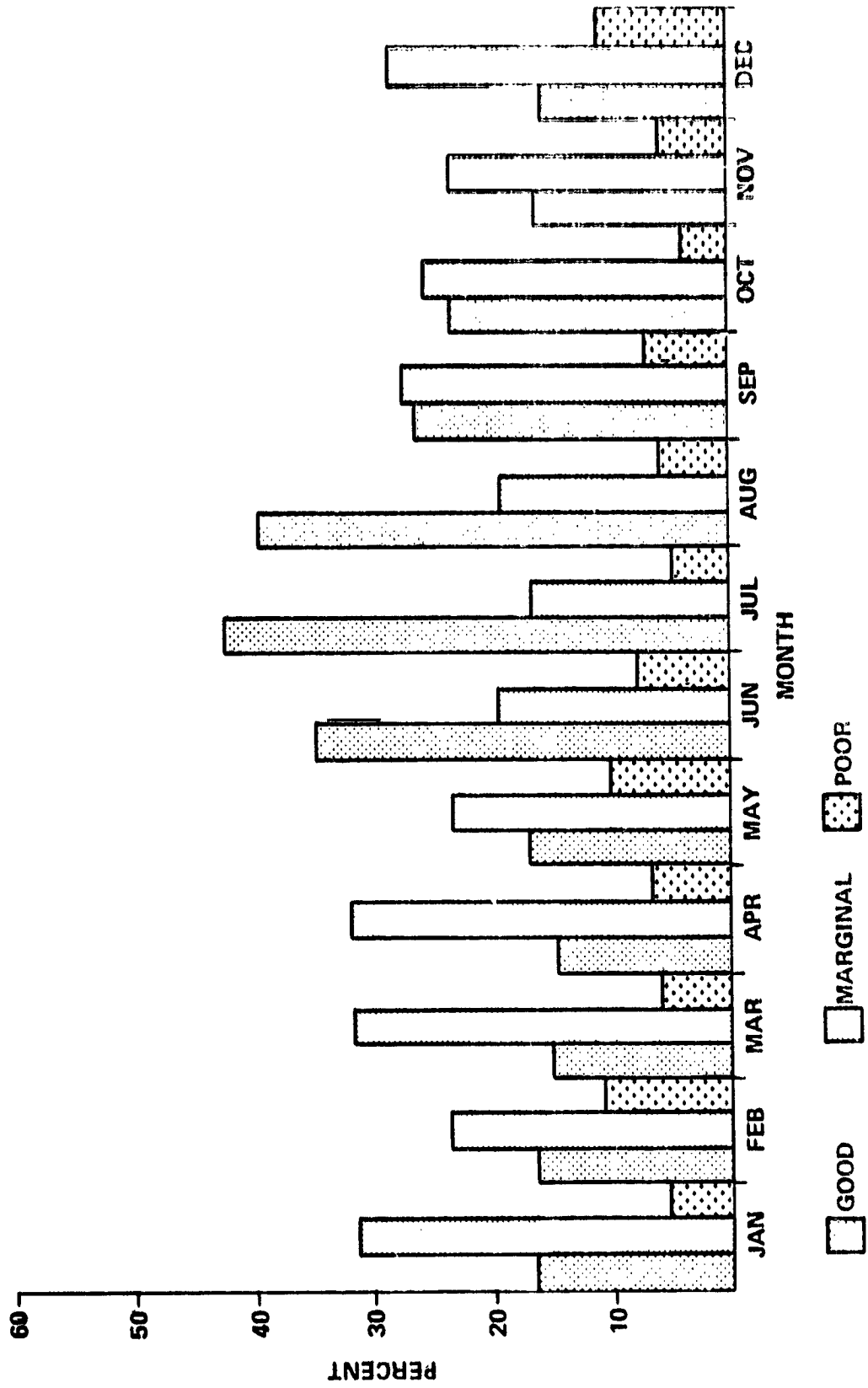




TABLE 1 EDWARDS AFB TO KENNEDY SPACE CENTER  
ENTIRE ROUTE

ENTIRE ROUTE	ENTIRE ROUTE	TYPE	DAYS	GUJD		MARGINAL		POJR		TOTAL	
				F	CP	F	CP	F	CP		
66-76 5	GOOD	GOOD	1	38	54.2	17.2	41	38.3	8	7.5	107
			2	33	56.9	9.7	21	36.2	4	6.9	58
			3	17	51.5	5.0	13	39.4	3	9.1	33
MARG	MARG	MARG	1	42	26.8	12.3	80	51.0	35	22.3	157
			2	20	26.0	5.9	40	51.9	17	22.1	77
			3	12	30.8	3.5	21	53.8	6	15.4	39
POOR	POOR	POOR	1	6	7.8	1.8	37	48.1	34	44.2	77
			2	3	9.1	.9	15	45.5	15	45.5	33
			3	3	20.0	.8	10	66.7	2	13.3	15
6	GOOD	GOOD	1	114	70.8	34.5	33	20.5	14	6.7	161
			2	74	68.5	22.4	29	26.9	5	4.6	108
			3	46	66.7	13.9	19	27.5	4	5.8	69
MARG	MARG	MARG	1	47	39.5	14.2	65	54.6	7	5.9	119
			2	20	31.3	6.1	40	62.5	4	6.3	64
			3	13	32.5	3.9	26	65.0	1	2.5	40
POOR	POOR	POOR	1	6	12.0	1.8	18	36.0	26	52.0	50
			2	1	4.0	.3	12	48.0	12	48.0	25
			3	1	8.3	.3	4	33.3	7	58.3	12
7	GOOD	GOOD	1	144	77.0	42.2	40	21.4	3	1.6	187
			2	113	79.6	33.1	27	19.0	2	1.4	142
			3	96	86.5	28.2	14	12.6	1	.9	111
MARG	MARG	MARG	1	34	30.1	10.0	57	50.4	22	19.5	113
			2	12	22.6	3.5	28	52.8	13	24.5	53
			3	5	20.0	1.5	13	52.0	7	28.0	25
POOR	POOR	POOR	1	5	12.2	1.5	20	48.8	16	39.0	41
			2	1	6.3	.3	7	43.8	8	50.0	16
			3	3			3	37.5	5	62.5	5
8	GOOD	GOOD	1	135	75.8	39.6	39	21.9	4	2.2	176
			2	102	77.9	29.9	26	19.8	3	2.3	131
			3	78	76.8	22.9	19	19.2	2	2.0	59
MARG	MARG	MARG	1	41	33.3	12.0	66	53.7	16	13.0	123
			2	20	30.8	5.9	36	55.4	9	13.8	65
			3	10	28.6	2.9	20	57.1	5	14.3	35
POOR	POOR	POOR	1	4	10.0	1.2	16	40.0	20	50.0	40
			2	2	10.0	.6	6	30.0	12	60.0	20
			3	1	8.3	.3	4	33.3	7	58.3	12

TABLE 1 EDWARDS AFB TO KENNEDY SPACE CENTER  
ENTIRE ROUTE

ENTIRE ROUTE YA NO	TYPE	DAYS	GOOD			MARGINAL			POOR			TOTAL F	%	330
			F	CP	%	F	CP	%	F	CP	%			
66-76 9	GOOD	1	86	66.7	26.1	36	27.9	10.9	7	5.4	2.1	129	39.1	530
		2	54	66.7	16.4	26	32.1	7.9	1	1.2	.3	81		
		3	34	68.0	10.3	16	32.0	4.9				50		
	MARG	1	42	27.6	12.7	90	59.2	27.3	20	13.2	6.1	152	45.1	
		2	25	28.4	7.0	49	55.7	14.8	14	15.9	4.2	88		
		3	10	20.8	3.0	27	56.3	8.2	11	22.9	3.3	48		
	POOR	1	3	6.1	.9	23	46.9	7.0	23	46.9	7.0	49	14.2	
		2	2	8.7	.6	10	43.5	3.0	11	47.8	3.3	23		
		3	1	9.1	.3	5	45.5	1.5	5	45.5	1.5	11		
10	GOOD	1	79	58.5	23.2	50	37.0	14.7	6	4.4	1.8	135	39.5	341
		2	46	59.0	13.5	29	37.2	8.5	3	3.6	.9	76		
		3	25	55.6	7.3	17	37.8	5.0	3	6.7	.9	45		
	MARG	1	46	23.8	13.5	87	54.4	25.5	27	16.9	7.9	160	45.9	
		2	26	30.2	7.6	50	58.1	14.7	10	11.6	2.9	86		
		3	16	32.7	4.7	26	53.1	7.6	7	14.3	2.1	49		
	POOR	1	6	13.0	1.8	27	58.7	7.9	13	28.3	3.8	46	13.5	
		2	1	8.3	.3	9	75.0	2.6	2	16.7	.6	12		
		3				1	100.0	.9				1		
11	GOOD	1	53	50.5	16.1	44	41.9	13.3	6	7.6	2.4	105	31.5	330
		2	26	51.0	7.9	20	39.2	6.1	5	9.8	1.5	51		
		3	10	41.7	3.0	11	45.8	3.3	3	12.5	.9	24		
	MARG	1	47	28.7	14.2	84	51.2	25.2	33	20.1	10.0	164	49.7	
		2	24	29.3	7.3	41	50.7	12.4	17	20.7	5.2	82		
		3	13	31.7	3.9	20	48.8	6.1	8	19.5	2.4	41		
	POOR	1	5	8.2	1.5	37	60.7	11.2	19	31.1	5.8	61	18.5	
		2	3	15.8	.9	13	68.4	3.5	3	15.8	.9	19		
		3				2	66.7	.6	1	33.3	.3	3		
12	GOOD	1	53	56.4	15.5	28	29.8	8.4	13	13.8	3.8	94	27.5	341
		2	27	50.9	7.9	19	35.8	5.6	7	13.2	2.1	53		
		3	14	51.9	4.1	9	33.3	2.0	4	14.6	1.2	27		
	MARG	1	28	17.4	8.2	97	60.2	28.4	39	22.4	10.6	161	47.2	
		2	17	18.3	5.0	56	60.2	16.4	20	21.5	5.9	93		
		3	11	20.4	3.2	35	64.8	10.3	8	14.8	2.3	54		
	POOR	1	14	16.5	4.1	34	40.0	10.0	37	43.5	10.9	85	24.9	
		2	8	22.2	2.3	14	38.9	4.1	14	38.9	4.1	36		
		3	4	30.8	1.2	4	30.8	1.2	5	38.5	1.5	13		

TABLE 2 EDWARDS AFB TO KENNEDY SPACE CENTER  
WESTERN SEGMENT-EAFB TO MIDLAND, TX.

WESTERN		GOOD			MARGINAL			POOR			TOTAL				
YR	WD	TYPE	DAYS	F	CP	%	F	CP	%	F	CP	%	F	CP	%
66-76	1	GOOD	1	223	82.8	65.4	42	15.8	12.3	1	.4	.3	266	78.0	341
			2	183	83.9	53.7	34	15.6	10.0	1	.5	.3	218		
			3	149	83.7	43.7	28	15.7	9.2	1	.6	.3	178		
		MARG	1	42	56.3	12.3	28	38.9	8.2	2	2.8	.6	72	21.1	
			2	15	57.7	4.4	10	38.5	2.9	1	3.8	.3	26		
			3	7	70.0	2.1	2	20.0	.6	1	10.0	.3	10		
		POOR	1				3	100.0	.9				3	.9	
			2												
			3												
2		GOOD	1	170	76.6	54.7	47	21.2	15.1	5	2.3	1.6	222	71.4	311
			2	123	76.4	39.5	34	21.1	10.9	4	2.5	1.3	161		
			3	86	73.5	27.7	28	23.9	9.0	3	2.6	1.0	117		
		MARG	1	49	62.8	15.8	26	33.3	8.4	3	3.8	1.0	78	25.1	
			2	18	69.2	5.8	6	23.1	1.9	2	7.7	.6	26		
			3	5	83.3	1.6				1	16.7	.3	6		
		POOR	1	4	36.4	1.3	4	36.4	1.3	3	27.3	1.0	11	3.3	
			2	2	66.7	.6				1	33.3	.3	3		
			3	1	100.0	.3							1		
3		GOOD	1	191	77.6	56.0	53	21.5	15.2	2	.8	.6	246	72.1	341
			2	140	76.1	41.1	42	22.8	12.3	2	1.1	.6	184		
			3	106	78.5	31.1	28	20.7	8.2	1	.7	.3	135		
		MARG	1	51	57.3	15.0	34	38.2	10.0	4	4.5	1.2	89	26.1	
			2	19	55.9	5.6	12	35.3	3.2	3	8.8	.9	34		
			3	8	66.7	2.3	2	16.7	.6	2	16.7	.6	12		
		POOR	1	4	66.7	1.2	2	33.3	.6				6	1.8	
			2												
			3												
4		GOOD	1	205	82.3	62.1	44	17.7	13.3				249	75.5	333
			2	161	82.1	43.8	35	17.9	10.6				196		
			3	128	83.1	38.8	26	16.9	7.9				154		
		MARG	1	42	55.3	12.7	30	39.5	9.1	4	5.3	1.2	76	23.0	
			2	18	62.1	5.5	9	31.0	2.7	2	6.9	.6	29		
			3	4	50.0	1.2	4	50.0	1.2				8		
		POOR	1	3	60.0	.9	1	20.0	.3	1	20.0	.3	5	1.5	
			2	1	100.0	.3							1		
			3												



TABLE 2 EDWARDS AFB TO KENNEDY SPACE CENTER  
WESTERN SEGMENT-EABF TO MIDLAND, TX.

YR	MO	WESTERN	TYPE	DAYS	GOOD			MARGINAL			POOR			TOTAL		
					F	CP	%	F	CP	%	F	CP	%	F	CP	%
66-76	5		GOOD	1	227	82.8	65.6	45	16.4	13.2	2	1.7	.6	274	80.4	341
				2	183	82.8	53.7	36	16.3	10.6	2	1.9	.6	221		
				3	146	82.5	42.2	29	16.4	8.5	2	1.1	.6	177		
			MARG	1	41	66.1	12.0	18	29.0	5.3	3	4.8	.9	62	13.2	
				2	11	64.7	3.2	5	29.4	1.5	1	5.9	.3	17		
				3	5	100.0	1.5							5		
			POOR	1	3	60.0	.9	1	20.0	.3	1	20.0	.3	5	1.5	
				2	1	100.0	.3							1		
				3												
6			GOOD	1	248	89.2	75.2	22	7.9	6.7	8	2.9	2.4	278	84.2	330
				2	216	90.4	65.5	20	8.4	6.1	3	1.3	.9	239		
				3	189	91.3	57.3	16	7.7	4.8	2	1.0	.6	207		
			MARG	1	25	64.1	7.6	13	33.3	3.9	1	2.6	.3	39	11.8	
				2	7	53.8	2.1	6	46.2	1.8				13		
				3	5	83.3	1.5	1	16.7	.5				6		
			POOR	1	9	69.2	2.7	1	7.7	.3	3	23.1	.9	13	3.9	
				2	2	66.7	.6	1	33.3	.3				3		
				3												
7			GOOD	1	282	92.8	82.7	21	6.9	6.2	1	.3	.3	304	89.1	341
				2	254	92.7	74.5	19	6.9	5.6	1	.4	.3	274		
				3	232	94.3	65.0	14	5.7	4.1				246		
			MARG	1	20	58.8	5.9	13	38.2	3.8	1	2.9	.3	34	10.0	
				2	6	46.2	1.8	6	46.2	1.8	1	7.7	.3	13		
				3	4	66.7	1.2	2	33.3	.6				6		
			POOR	1	1	33.3	.3	1	33.3	.3	1	33.3	.3	3	.9	
				2	1	100.0	.3							1		
				3												
8			GOOD	1	285	92.5	83.6	22	7.1	6.5	1	.3	.3	308	90.3	341
				2	258	93.1	75.7	19	6.9	5.6				277		
				3	233	92.8	68.3	18	7.2	5.3				251		
			MARG	1	20	69.0	5.9	7	24.1	2.1	2	6.9	.6	29	8.5	
				2	3	50.0	.9	2	33.3	.6	1	16.7	.3	6		
				3	1	50.0	.3	1	50.0	.3				2		
			POOR	1	1	25.0	.3	2	50.0	.6	1	25.0	.3	4	1.2	
				2										1		
				3												

TABLE 2 EDWARDS AFB TO KENNEDY SPACE CENTER  
WESTERN SEGMENT-FAFB TO MIDLAND, TX.

WESTERN	YR	M3	TYPE	DAYS	GOOD			MARGINAL			POOR			TOTAL	
					F	CP	%	F	CP	%	F	CP	%	F	%
66-76	9	GOOD	1	230	86.1	69.7	34	12.7	10.3	3	1.1	.9	267	80.9	330
			2	190	86.4	57.6	29	13.2	8.8	1	.5	.3	220		
			3	196	86.7	47.3	24	13.3	7.3				180		
	MARG	1	36	61.0	10.9	22	37.3	6.7	1	1.7	.3	59	17.9		
		2	14	63.6	4.2	8	36.4	2.4				22			
		3	6	75.0	1.8	2	25.0	.6				8			
	POOR	1	3	75.0	.9	1	25.0	.3				4	1.2		
		2													
		3													
10	GOOD	1	233	84.4	68.3	41	14.9	12.0	2	.7	.6	274	80.9	341	
		2	189	83.3	55.4	37	16.3	10.4	1	.4	.3	227			
		3	193	82.7	44.9	31	16.8	9.1	1	.5	.3	185			
	MARG	1	37	61.7	10.9	20	33.3	5.4	3	5.0	.9	60	17.6		
		2	15	75.0	4.4	3	15.0	.4	2	10.0	.6	20			
		3	3	100.0	.9							3			
	POOR	1	4	80.0	1.2	1	20.0	.3				5	1.5		
		2													
		3													
11	GOOD	1	226	86.9	68.5	33	12.7	10.0	1	.4	.3	260	78.9	330	
		2	190	86.8	57.6	29	13.2	8.8				219			
		3	162	88.5	49.1	21	11.5	6.4				183			
	MARG	1	31	49.2	9.4	26	41.3	7.9	6	9.5	1.8	63	19.1		
		2	12	45.2	3.6	14	53.8	4.2				26			
		3	5	35.7	1.5	9	64.3	2.7				14			
	POOR	1	4	57.1	1.2	3	42.9	.9				7	2.1		
		2													
		3													
12	GOOD	1	231	85.2	67.7	36	13.3	10.6	4	1.5	1.2	271	79.5	341	
		2	191	85.3	55.0	30	13.4	8.8	3	1.3	.9	224			
		3	154	83.7	43.2	28	15.2	8.2	2	1.1	.6	164			
	MARG	1	36	61.0	10.6	20	33.9	5.9	3	5.1	.9	59	17.3		
		2	11	57.9	3.2	8	42.1	2.3				19			
		3	4	50.0	1.2	4	50.0	1.2				8			
	POOR	1	4	40.0	1.2	3	30.0	.4	3	30.0	.9	10	2.9		
		2				2	66.7	.6	1	33.3	.3	3			
		3				1	100.0	.3				1			

TABLE 3 EDWARDS AFB TO KENNEDY SPACE CENTER  
MIDDLE SEGMENT-MIDLAND, TX TO SHREVEPORT, LA.

MIDDLE	VR MJ	TYPE	DAYS	GOOD				MARGINAL				TOTAL F	TOTAL %	N	
				F	CP	%	F	CP	%						
66-76	1	GOOD	1	191	72.6	44.3	31	24.5	15.0	6	2.9	1.8	208	61.0	341
			2	109	73.2	32.0	35	23.5	10.3	5	3.4	1.5	149		
			3	77	72.0	22.6	26	24.3	7.6	4	3.7	1.2	107		
		MARG	1	49	42.6	14.4	56	48.7	16.4	10	8.7	2.9	115	33.7	
			2	23	43.4	6.7	27	50.9	7.9	3	5.7	.9	53		
			3	11	44.0	3.2	11	44.0	3.2	3	12.0	.9	25		
		POOR	1	5	27.8	1.5	10	55.6	2.9	3	16.7	.9	18	5.3	
			2	1	33.3	.3	2	66.7	.6				3		
			3												
2		GOOD	1	152	75.2	48.9	47	21.8	14.1	6	3.0	1.9	202	65.0	311
			2	106	71.6	34.1	38	25.7	12.2	4	2.7	1.3	148		
			3	71	68.9	22.8	28	27.2	9.0	4	3.9	1.3	103		
		MARG	1	45	48.4	14.5	40	43.0	12.9	8	8.6	2.6	93	29.9	
			2	28	71.8	9.0	8	20.5	2.6	3	7.7	1.0	39		
			3	5	62.5	1.6	3	37.5	1.0				8		
		POOR	1	8	50.0	2.6	7	43.8	2.3	1	6.3	.3	16	5.1	
			2	1	100.0	.3							1		
			3												
3		GOOD	1	147	67.4	43.1	63	28.9	18.3	8	3.7	2.3	218	63.9	341
			2	84	59.6	24.6	51	36.2	15.0	6	4.3	1.8	141		
			3	48	60.0	14.1	28	35.0	8.2	4	5.0	1.2	80		
		MARG	1	61	56.5	17.9	41	38.0	12.0	6	5.0	1.8	108	31.7	
			2	20	50.0	5.9	16	40.0	4.7	4	10.0	1.2	40		
			3	8	50.0	2.3	7	43.8	2.1	1	6.3	.3	16		
		POOR	1	9	60.0	2.6	5	33.3	1.2	1	6.7	.3	15	4.4	
			2	1	100.0	.3							1		
			3												
4		GOOD	1	143	73.7	43.3	45	23.2	13.6	6	3.1	1.8	194	53.9	330
			2	99	70.7	32.0	35	25.0	10.6	6	4.3	1.8	140		
			3	64	66.0	19.4	28	28.9	8.5	5	5.2	1.5	97		
		MARG	1	37	34.6	11.2	53	49.5	16.1	17	15.9	5.2	107	32.4	
			2	16	32.7	4.8	26	52.1	7.9	7	14.3	2.1	49		
			3	6	25.0	1.8	13	54.2	3.9	5	20.8	1.5	24		
		POOR	1	11	37.9	3.3	10	34.5	3.0	5	27.6	2.4	29	8.9	
			2	4	57.1	1.2	3			3	42.9	.9	7		
			3	1	50.0	.3	1			1	50.0	.3	2		

TABLE 3 EDWARDS AFB TO KENNEDY SPACE CENTER  
MIDDLE SEGMENT-MIDLAD, TX TO SHREVEPORT, LA.

MIDDLE	YR	TYPE	DAYS	GOOD			MARGINAL			POOR	TOTAL	%	3*1
				F	CP	%	F	CP	%				
68-76	5	GOOD	1	152	73.8	44.6	42	20.4	12.3	12	206	60.4	3*1
			2	107	71.8	31.4	33	22.1	9.7	9	149		
			3	74	70.5	21.7	26	24.8	7.6	5	105		
		MARG	1	42	43.8	12.3	39	40.6	11.4	15	96	48.2	
			2	15	40.5	4.4	15	40.5	4.4	7	37		
			3	7	50.0	2.1	5	35.7	1.5	2	14		
		POOR	1	12	30.8	3.5	14	35.9	4.1	13	39	11.4	
			2	4	33.3	1.2	5	41.7	1.5	3	12		
			3	2	66.7	.6	1	33.3	.3	3	3		
6		GOOD	1	203	83.5	61.5	35	14.4	10.6	5	243	73.6	330
			2	164	83.2	49.7	29	14.7	8.6	4	197		
			3	133	83.6	40.3	24	15.1	7.3	2	159		
		MARG	1	37	56.9	11.2	22	33.8	6.7	6	65	19.7	
			2	14	66.7	4.2	6	28.6	1.4	1	21		
			3	4	80.0	1.2	1	20.0	.3	5	5		
		POOR	1	7	31.8	2.1	7	31.8	2.1	6	22	6.7	
			2	3	37.5	.9	2	25.0	.6	3	8		
			3	1	33.3	.3	1	33.3	.3	1	3		
7		GOOD	1	240	88.2	70.4	29	10.7	8.3	3	272	79.9	341
			2	209	90.1	61.3	22	9.5	6.5	1	232		
			3	184	90.2	54.0	19	9.3	5.6	1	204		
		MARG	1	31	53.4	9.1	22	37.9	6.2	5	59	17.0	
			2	13	61.8	3.8	6	28.6	1.8	2	21		
			3	5	83.3	1.5	1	16.7	.3	6	6		
		POOR	1	3	27.3	.9	5	45.5	1.7	3	11	3.2	
			2	2	66.7	.5				3	3		
			3	1	100.0	.3				1	1		
8		GOOD	1	229	85.4	67.2	33	12.3	9.7	6	268	75.5	341
			2	192	86.1	56.3	25	11.2	7.3	6	223		
			3	162	86.6	47.5	20	10.7	5.9	5	187		
		MARG	1	35	55.6	10.3	26	41.3	7.6	2	63	18.5	
			2	14	53.8	4.1	10	38.5	2.9	2	26		
			3	3	30.0	.9	5	50.0	1.5	2	10		
		POOR	1	2	20.0	.6	5	50.0	1.5	3	10	2.9	
			2				2	66.7	.6	1	3		
			3				1	100.0	.3	1	1		

TABLE 3 EDWARDS AFB TO KENNEDY SPACE CENTER  
MIDDLE SEGMENT-MIDLAND, TX TO SHREVEPORT, LA.

MIDDLE			GOOD			MARGINAL			POOR			TOTAL			
VR	MO	TYPE	DAYS	F	CP	%	F	CP	%	F	CP	%	F	CP	%
66-76	9	GOOD	1	166	76.5	50.3	42	19.4	12.7	9	4.1	2.7	217	65.8	330
			2	119	75.8	30.1	30	19.1	9.1	8	5.1	2.4	157		
			3	82	73.9	24.8	23	20.7	7.0	6	5.4	1.8	111		
10	MARG	POOR	1	45	50.0	13.6	38	42.2	11.5	7	7.8	2.1	90	27.3	
			2	21	55.3	6.4	16	42.1	4.8	1	2.6	.3	38		
			3	8	50.0	2.4	7	43.8	2.1	1	6.3	.3	16		
11	GOOD	POOR	1	8	36.8	2.4	9	39.1	2.7	6	26.1	1.8	23	7.0	
			2	2	33.3	.6	2	33.3	.6	2	33.3	.6	6		
			3	1	50.0	.3	1	50.0	.3				2		
12	MARG	POOR	1	190	76.3	55.7	52	20.9	15.2	7	2.8	2.1	249	73.0	341
			2	140	74.9	41.1	41	21.9	12.0	6	3.2	1.8	187		
			3	103	74.6	30.2	30	21.7	8.8	5	3.6	1.5	138		
11	GOOD	MARG	1	48	64.0	14.1	20	26.7	5.9	7	9.3	2.1	75	22.0	
			2	13	65.0	3.8	4	20.0	1.2	3	15.0	.9	20		
			3	3	75.0	.9				1	23.0	.3	4		
12	MARG	POOR	1	8	47.1	2.3	6	35.3	1.8	3	17.6	.9	17	5.0	
			2	2	66.7	.6	1	33.3	.3				3		
			3												
11	GOOD	MARG	1	159	71.9	46.2	52	23.5	15.8	10	4.5	3.0	221	67.0	330
			2	113	73.4	34.2	33	21.4	10.0	8	5.2	2.4	154		
			3	80	73.4	24.2	23	21.1	7.0	6	5.5	1.8	109		
12	MARG	POOR	1	51	58.6	15.5	26	29.9	7.9	10	11.5	3.0	87	26.4	
			2	18	69.2	5.3	8	30.8	2.4				26		
			3	4	50.0	1.2	4	50.0	1.2				8		
12	GOOD	POOR	1	10	45.5	3.0	9	40.9	2.7	3	13.6	.9	22	5.7	
			2	2	66.7	.6	1	33.3	.3				3		
			3												
12	MARG	POOR	1	167	74.6	49.0	44	19.6	12.9	13	5.8	3.8	224	55.7	341
			2	124	76.5	36.4	28	17.3	8.2	10	6.2	2.9	162		
			3	92	75.4	27.0	21	17.2	6.2	9	7.4	2.6	122		
12	MARG	POOR	1	47	52.2	13.8	36	40.0	10.6	7	7.8	2.1	90	26.4	
			2	22	62.9	6.5	11	31.4	3.2	2	5.7	.6	35		
			3	8	72.7	2.3	3	27.3	.9				11		
12	POOR	POOR	1	13	50.0	3.8	8	30.8	2.3	5	19.2	1.3	26	7.6	
			2	2	40.0	.6	1	20.0	.3	2	40.0	.6	5		
			3	1	50.0	.3				1	50.0	.3	2		

TABLE 4 EDWARDS AFB TO KENNEDY SPACE CENTER  
EASTERN SEGMENT-SHEVEPORT, LA TO KSC.

EASTERN	VR MD	TYPE	DAYS	GOOD			MARGINAL			POOR			TOTAL		
				F	CP	%	F	CP	%	F	CP	%	F	%	N
1	66-76	GOOD	1	112	64.0	32.8	47	26.9	13.8	16	9.1	4.7	175	51.3	341
			2	72	66.1	21.1	27	24.8	7.9	10	9.2	2.9	109		
			3	44	63.8	12.9	18	26.1	5.3	7	10.1	2.1	69		
	4	MARG	1	52	42.3	15.2	56	45.5	16.4	15	12.2	4.4	123	36.1	
			2	20	37.0	5.9	28	51.9	8.2	6	11.1	1.8	54		
			3	9	33.3	2.6	16	59.3	4.7	2	7.4	.6	27		
	2	POOR	1	11	25.6	3.2	21	48.8	6.2	11	25.6	3.2	43	12.6	311
			2	2	18.2	.6	6	54.5	1.8	3	27.3	.9	11		
			3	1	33.3	.3	1	33.3	.3	1	33.3	.3	3		
3	GOOD	1	112	67.1	36.0	34	20.4	10.9	21	12.6	6.8	167	53.7	311	
		2	64	60.4	20.6	25	23.6	8.0	17	16.0	5.5	106			
		3	37	62.7	11.9	9	15.3	2.9	13	22.0	4.2	59			
	4	MARG	1	44	50.6	14.1	31	35.6	10.0	12	13.6	3.9	87	26.9	
			2	18	60.0	5.8	8	26.7	2.6	4	13.3	1.3	30		
			3	6	75.0	1.9	1	12.5	.3	1	12.5	.3	8		
	3	POOR	1	13	22.8	4.2	21	36.8	6.8	23	40.4	7.4	57	19.3	341
			2	5	21.7	1.6	7	30.4	2.3	11	47.8	3.5	23		
			3	4	36.4	1.3	2	18.2	.6	5	45.5	1.6	11		
4		GOOD	1	133	69.6	39.0	41	21.3	12.0	17	8.9	5.0	191	55.3	341
			2	84	65.1	24.6	29	22.5	8.2	16	12.4	4.7	129		
			3	53	66.3	15.5	20	25.0	5.9	7	8.8	2.1	80		
3		MARG	1	42	41.2	12.3	41	40.2	12.0	19	18.6	5.6	102	29.9	
			2	13	32.5	3.9	17	42.5	5.0	10	25.0	2.9	40		
			3	5	31.3	1.5	5	31.3	1.5	6	37.5	1.6	16		
4	POOR	1	13	27.1	3.8	22	45.8	6.5	13	27.1	3.8	48	14.1	330	
		2	5	41.7	1.5	4	33.3	1.2	3	25.0	.9	12			
		3							2	100.0	.6	2			
4	GOOD	1	147	71.7	44.5	38	18.5	11.5	20	9.8	6.1	205	62.1	330	
		2	103	71.5	31.2	28	19.4	8.2	13	9.0	3.9	144			
		3	72	70.6	21.8	21	20.6	6.4	9	8.8	2.7	102			
	4	MARG	1	47	51.1	14.2	36	39.1	10.9	9	9.6	2.7	92	27.9	
			2	19	54.3	5.8	14	40.0	4.2	2	5.7	.6	35		
			3	7	53.8	2.1	5	38.5	1.2	1	7.7	.3	13		
	4	POOR	1	13	39.4	3.9	14	42.4	4.4	6	18.2	1.8	33	10.0	
			2	3	50.0	.9	3	50.0	.9				6		
			3												

TABLE 4 EDWARDS AFB TO KENNEDY SPACE CENTER  
EASTERN SEGMENT-SHREVEPORT, LA TO KSC.

EASTERN YR MO	TYPE	DAYS	GOOD			MARGINAL			POOR			TOTAL F	%	N
			F	CP	%	F	CP	%	F	CP	%			
66-76 5	GOOD	1	142	73.2	41.6	37	19.1	10.9	15	7.7	4.4	194	55.9	341
		2	100	73.5	29.3	26	19.1	7.6	10	7.4	2.9	136		
		3	66	69.5	19.4	20	21.1	5.9	9	9.5	2.6	95		
	MARG	1	44	43.6	12.9	44	43.6	12.9	13	12.9	3.8	101	29.6	330
		2	19	44.2	5.6	19	44.2	5.6	5	11.6	1.5	43		
		3	9	47.4	2.6	8	42.1	2.3	2	10.5	.6	19		
	POOR	1	9	19.6	2.6	21	45.7	6.2	16	34.8	4.7	46	13.5	330
		2	5	31.3	1.5	8	50.0	2.3	3	18.8	.9	16		
		3	1	33.3	.3	2	66.7	.6	3	3.0	.3	5		
6	GOOD	1	186	81.9	55.4	32	14.1	9.7	9	4.0	2.7	227	68.3	330
		2	148	82.7	44.8	25	14.0	7.6	6	3.4	1.8	179		
		3	113	80.1	34.2	22	15.6	6.7	6	4.3	1.8	141		
:	MARG	1	39	50.6	11.8	34	44.2	10.3	4	5.2	1.2	77	23.3	330
		2	15	45.5	4.5	17	51.5	5.2	1	3.0	.3	33		
		3	9	52.9	2.7	8	47.1	2.4	1	3.0	.3	17		
	POOR	1	3	11.5	.9	10	38.5	3.0	13	50.0	3.9	26	7.9	341
		2	2	15.4	.6	5	38.5	1.5	6	46.2	1.8	13		
		3	1	16.7	.3	2	33.3	.6	3	50.0	.9	6		
7	GOOD	1	181	80.8	53.1	37	16.5	10.9	6	2.7	1.8	224	65.7	341
		2	149	83.7	43.7	27	15.2	7.9	2	1.1	.6	178		
		3	126	86.3	37.0	19	13.0	5.6	1	.7	.3	146		
	MARG	1	31	35.3	9.1	31	38.3	9.1	19	23.5	5.6	81	23.8	341
		2	9	32.1	2.6	12	42.9	3.5	7	23.0	2.1	28		
		3	2	20.0	.6	3	30.0	.9	5	50.0	1.5	10		
	POOR	1	8	22.2	2.3	17	47.2	9.0	11	30.6	3.2	35	10.5	341
		2	2	18.2	.6	6	54.5	1.8	3	27.3	.7	11		
		3	1	33.3	.3	3	30.0	.6	2	66.7	.6	3		
:8	GOOD	1	180	82.6	52.8	34	15.6	10.0	4	1.8	1.2	218	63.9	341
		2	149	85.6	43.7	23	13.2	6.7	2	1.1	.6	174		
		3	127	88.2	37.2	16	11.1	4.7	1	.7	.3	144		
	MARG	1	37	39.8	10.9	45	48.4	13.4	11	11.8	3.2	93	27.3	341
		2	12	28.6	3.5	23	54.8	6.7	7	16.7	2.1	42		
		3	6	30.0	1.5	11	55.0	3.2	3	15.0	.9	20		
	POOR	1	4	13.3	1.2	12	40.0	3.3	14	46.7	4.1	30	8.8	341
		2	2	14.3	.6	5	35.7	1.5	7	50.0	2.1	14		
		3	1	14.3	.3	3	47.9	.5	3	42.5	.9	7		

TABLE 4 EDWARDS AFB TO KENNEDY SPACE CENTER  
EASTERN SEGMENT-SHREVEPORT, LA TO KSC.

EASTERN	YR	MO	TYPE	DAYS	GOOD			MARGINAL			POOR			TOTAL				
					F	CP	Z	F	CP	Z	F	CP	Z					
66-76	9	GOOD	1	159	79.3	48.2	36	17.7	10.9	36	17.7	10.9	4	3.9	2.4	203	61.5	330
			2	122	79.2	37.0	28	18.2	8.5	28	18.2	8.5	4	2.6	1.2	154		
			3	91	77.1	27.6	24	20.3	7.3	24	20.3	7.3	3	2.5	.9	116		
		MARG	1	38	60.0	11.5	46	48.4	13.9	46	48.4	13.9	11	11.6	3.3	95	28.9	
			2	18	60.9	5.5	18	40.9	5.5	18	40.9	5.5	8	18.2	2.4	44		
			3	5	29.4	1.5	8	47.1	2.4	8	47.1	2.4	4	23.5	1.2	17		
		POOR	1	6	16.8	1.8	11	34.4	3.3	11	34.4	3.3	15	46.9	4.5	32	9.7	
			2	3	20.0	.9	6	40.0	1.8	6	40.0	1.8	6	40.0	1.8	15		
			3				3	50.0	.9	3	50.0	.9	3	50.0	.9	6		
10	GOOD	1	151	74.0	44.3	45	22.1	13.2	45	22.1	13.2	8	3.9	2.3	264	59.8	341	
		2	103	71.0	30.2	35	24.1	10.3	35	24.1	10.3	7	4.8	2.1	145			
		3	69	71.1	20.2	24	24.7	7.0	24	24.7	7.0	4	4.1	1.2	97			
		MARG	1	47	42.7	13.8	50	45.5	14.7	50	45.5	14.7	13	11.8	3.8	110	32.3	
			2	23	46.0	6.7	25	50.0	7.3	25	50.0	7.3	2	4.0	.6	50		
			3	10	40.0	2.9	15	60.0	4.4	15	60.0	4.4	2	4.0	.6	25		
		POOR	1	6	22.2	1.8	15	55.6	4.4	15	55.6	4.4	6	22.2	1.8	27	7.9	
			2				4	80.0	1.2	4	80.0	1.2	1	20.0	.5	5		
			3				1	100.0	.3	1	100.0	.3				1		
11	GOOD	1	120	65.6	36.4	49	26.8	14.8	49	26.8	14.8	14	7.7	4.2	183	55.5	330	
		2	72	63.2	21.8	32	28.1	9.7	32	28.1	9.7	10	6.8	3.0	114			
		3	46	67.6	13.9	17	25.0	5.2	17	25.0	5.2	5	7.4	1.5	68			
		MARG	1	35	50.9	16.7	36	39.3	10.9	36	39.3	10.9	17	15.7	5.2	108	32.7	
			2	14	40.0	4.2	13	37.1	3.9	13	37.1	3.9	8	22.9	2.4	35		
			3	4	30.8	1.2	5	38.5	1.5	5	38.5	1.5	4	30.8	1.2	13		
		POOR	1	8	20.5	2.4	24	61.5	7.3	24	61.5	7.3	7	17.9	2.1	39	11.8	
			2	2	26.6	.6	4	57.1	1.2	4	57.1	1.2	1	14.3	.3	7		
			3				1	100.0	.3	1	100.0	.3				1		
12	GOOD	1	99	61.5	29.0	38	23.6	11.1	38	23.6	11.1	24	14.9	7.0	161	47.2	341	
		2	54	54.5	15.6	28	28.3	6.2	28	28.3	6.2	17	17.2	5.0	99			
		3	28	51.9	8.2	17	31.5	5.0	17	31.5	5.0	9	16.7	2.6	54			
		MARG	1	42	36.5	12.3	53	46.1	15.2	53	46.1	15.2	20	17.4	5.9	115	33.7	
			2	20	40.0	5.9	22	44.0	6.5	22	44.0	6.5	8	16.0	2.3	50		
			3	6	30.0	1.3	13	65.0	3.8	13	65.0	3.8	1	5.0	.3	20		
		POOR	1	18	26.1	5.3	25	39.1	7.3	25	39.1	7.3	21	32.8	6.2	64	18.8	
			2	8	40.0	2.3	7	35.0	2.1	7	35.0	2.1	5	25.0	1.5	20		
			3				3	75.0	.9	3	75.0	.9	1	25.0	.3	4		



TABLE 5 EDWARDS AFB TO MARSHALL SPACE FLIGHT CENTER  
ENTIRE ROUTE

ENTIRE ROUTE	YR	MO	TYPE	DAYS	GOOD			MARGINAL			POOR			TOTAL	%	V
					F	CP	Z	F	CP	Z	F	CP	Z			
66-76 1			GOOD	1	47	48.0	13.8	41	41.8	12.0	41	10.2	2.9	93	29.7	3-1
				2	19	41.3	5.6	20	43.5	5.9	7	19.2	2.1	45		
				3	7	36.8	2.1	8	42.1	2.3	4	21.1	1.2	19		
			MARG	1	34	25.6	10.0	48	36.1	14.1	51	36.3	15.0	133	39.0	
				2	13	28.3	3.8	18	39.1	5.2	15	32.6	4.4	46		
				3	4	22.2	1.2	7	38.9	2.1	7	38.9	2.1	18		
			POOR	1	17	15.5	5.0	42	38.2	12.3	51	66.4	15.0	110	32.3	
				2	8	16.3	2.3	18	36.7	5.3	23	46.9	8.2	49		
				3	4	18.2	1.2	10	45.5	2.9	6	36.4	2.3	22		
2			GOOD	1	47	46.5	15.1	35	34.7	11.3	19	18.8	6.1	101	32.5	3-1
				2	18	39.1	5.8	18	39.1	5.8	10	21.7	3.2	45		
				3	6	35.3	1.9	8	47.1	2.6	3	17.6	1.0	17		
			MARG	1	45	34.9	14.5	60	46.5	19.3	24	18.6	7.7	129	41.5	
				2	23	39.0	7.4	24	40.7	7.7	12	20.3	3.9	59		
				3	13	56.5	4.2	8	34.8	2.6	2	8.7	.6	23		
			POOR	1	12	14.8	3.9	33	40.7	10.6	36	44.4	11.6	81	25.0	
				2	9	25.0	2.9	18	50.0	5.8	9	25.0	2.9	36		
				3	2	22.2	.6	4	44.4	1.3	3	33.3	1.0	9		
3			GOOD	1	42	45.7	12.3	36	39.1	10.6	14	15.2	4.1	92	27.0	3-1
				2	15	38.5	4.4	18	46.2	5.3	6	15.4	1.8	39		
				3	4	30.8	1.2	9	69.2	2.6				13		
			MARG	1	36	26.3	10.6	65	47.4	19.1	36	26.3	10.6	137	40.1	
				2	17	27.0	5.0	27	42.9	7.9	19	30.2	5.6	63		
				3	7	26.9	2.1	11	42.3	3.2	8	30.6	2.3	25		
			POOR	1	15	13.4	4.4	35	31.3	10.3	62	55.4	16.2	112	33.8	
				2	9	14.8	2.6	19	31.1	5.6	33	54.1	9.7	61		
				3	5	15.6	1.3	11	34.4	3.2	16	50.0	4.7	32		
4			GOOD	1	49	52.1	14.8	35	37.2	10.6	10	10.6	3.0	94	28.8	3-3
				2	23	48.9	7.0	19	40.4	5.8	5	10.6	1.5	47		
				3	10	45.5	3.0	10	45.5	3.0	2	9.1	.6	22		
			MARG	1	27	22.1	8.2	54	44.3	16.4	41	33.6	12.0	122	37.0	
				2	8	14.8	2.4	24	44.4	7.3	22	40.7	6.7	54		
				3	4	16.7	1.2	8	33.3	2.4	12	50.0	3.6	26		
			POOR	1	15	13.2	4.5	31	27.2	9.4	68	59.6	20.6	114	34.5	
				2	10	16.1	3.0	17	27.4	5.4	35	56.5	10.6	62		
				3	5	15.0	1.5	8	25.0	2.4	19	59.4	5.8	32		

TABLE 5 EDWARDS AFB TO MARSHALL SPACE FLIGHT CENTER  
ENTIRE ROUTE

ENTIRE ROUTE	ENTIRE ROUTE	ENTIRE ROUTE	GOOD			MARGINAL			POOR			TOTAL
			F	CP	%	F	CP	%	F	CP	%	
66-76 5	GOOD	1	53	53.0	15.3	36	36.0	10.6	11	11.2	3.2	100
		2	27	52.9	7.9	17	33.3	5.0	7	13.7	2.1	25.3
		3	12	44.4	3.5	10	37.0	2.6	5	18.5	1.5	27
	MARG	1	34	26.4	10.0	58	45.0	17.0	37	29.7	10.9	129
		2	14	24.6	4.1	25	43.9	7.3	18	31.6	5.3	57
		3	7	29.2	2.1	7	29.2	2.1	10	41.7	2.9	24
	POOR	1	13	11.6	3.8	30	33.9	11.1	61	54.5	17.9	112
		2	9	15.3	2.6	20	33.9	5.9	30	50.8	6.8	59
		3	5	17.2	1.5	9	31.0	2.6	15	51.7	4.4	29
6	GOOD	1	118	74.2	35.8	26	16.4	7.9	15	9.4	4.5	159
		2	86	77.5	28.1	16	14.4	4.6	9	8.1	2.7	111
		3	59	73.8	17.9	15	18.8	4.5	6	7.5	1.8	80
	MARG	1	36	37.1	10.9	36	37.1	10.9	25	25.8	7.6	97
		2	15	41.7	4.5	15	41.7	4.5	6	16.7	1.8	36
		3	5	33.3	1.5	7	46.7	2.1	3	20.0	.9	15
	POOR	1	11	14.9	3.2	33	44.6	10.0	30	40.5	9.1	74
		2	4	13.8	1.2	10	34.5	3.0	15	51.7	4.9	29
		3	3	20.0	.9	5	33.3	1.5	7	45.7	2.1	15
7	GOOD	1	103	64.0	30.2	49	30.4	14.4	9	5.6	2.6	161
		2	65	63.7	19.1	31	30.4	9.4	6	5.9	1.8	102
		3	42	65.6	12.3	19	29.7	5.6	3	4.7	.9	64
	MARG	1	47	35.9	13.8	63	48.1	18.3	21	15.6	6.2	131
		2	25	41.7	7.3	27	48.0	7.9	6	13.3	2.3	60
		3	9	34.6	2.6	12	46.2	3.5	5	19.2	1.5	25
	POOR	1	6	12.2	1.8	22	44.9	6.5	21	42.2	6.2	49
		2	3	15.0	.9	10	50.0	2.9	7	35.0	2.1	20
		3				2	28.6	.6	5	71.4	1.5	7
8	GOOD	1	111	66.5	32.6	44	26.3	12.9	12	7.2	3.3	167
		2	72	65.5	21.1	31	28.2	9.1	7	6.4	2.1	100
		3	43	59.7	12.6	24	33.3	7.0	5	6.9	1.8	72
	MARG	1	49	39.8	14.4	58	47.2	17.0	16	13.2	4.7	123
		2	24	43.6	7.0	23	41.8	6.7	8	14.5	2.3	55
		3	10	43.5	2.9	10	43.5	2.9	3	19.0	.9	23
	POOR	1	5	9.8	1.5	26	51.0	7.6	20	39.2	5.9	51
		2	1	5.0	.3	7	35.0	2.1	12	60.3	3.9	20
		3		6.3	.3	4	33.3	1.2	7	58.3	2.1	12

TABLE 5 EDWARDS AFB TO MARSHALL SPACE FLIGHT CENTER  
ENTIRE ROUTE

ENTIRE ROUTE		GOOD			MARGINAL			POOR			TOTAL					
YR	WT	DAYS	F	CP	\$	F	CP	\$	F	CP	\$	F	CP	\$	N	
66-76	9	GOOD	1	90	69.2	27.3	30	23.1	9.1	10	7.7	3.0	130	7.7	39.4	330
		GOOD	2	55	64.7	16.7	20	23.5	6.1	10	11.6	3.0	85	11.6	3.0	85
		GOOD	3	31	62.0	9.4	12	24.0	3.6	7	14.0	2.1	50	14.0	2.1	50
		MARG	1	40	31.5	12.1	52	40.9	15.8	35	27.6	10.6	127	27.6	39.5	330
		MARG	2	13	25.0	3.9	27	51.9	8.2	12	23.1	3.6	52	23.1	3.6	52
		MARG	3	10	37.0	3.0	11	40.7	3.3	6	22.2	1.8	27	22.2	1.8	27
		POOR	1	6	8.2	1.8	37	50.7	11.2	30	41.1	9.1	73	41.1	9.1	73
		POOR	2	4	13.3	1.2	13	43.3	3.9	13	43.3	3.9	30	43.3	3.9	30
		POOR	3	2	15.4	.6	6	46.2	1.8	5	38.5	1.5	13	38.5	1.5	13
10		GOOD	1	92	62.2	27.0	45	30.4	13.2	11	7.6	3.2	148	7.6	43.4	341
		GOOD	2	55	59.8	16.1	30	32.6	8.8	7	7.6	2.2	52	7.6	2.2	52
		GOOD	3	33	60.0	9.7	17	30.9	5.0	5	9.1	1.5	55	9.1	1.5	55
		MARG	1	41	34.7	12.0	45	38.1	13.2	32	27.1	9.4	118	27.1	34.5	341
		MARG	2	15	34.1	4.4	13	29.5	3.8	16	35.4	4.7	44	35.4	4.7	44
		MARG	3	3	23.1	.9	5	38.5	1.5	5	38.5	1.5	13	38.5	1.5	13
		POOR	1	11	14.7	3.2	30	40.0	8.8	34	45.3	10.0	75	45.3	10.0	75
		POOR	2	4	12.9	1.2	12	38.7	3.5	15	48.4	4.4	31	48.4	4.4	31
		POOR	3	2	15.4	.6	5	38.5	1.5	6	46.2	1.8	13	46.2	1.8	13
11		GOOD	1	67	55.4	20.3	49	37.2	13.0	9	7.4	2.7	121	7.4	35.7	330
		GOOD	2	36	56.3	10.9	26	40.6	7.9	2	3.1	.6	64	3.1	.6	64
		GOOD	3	18	52.9	5.5	15	44.1	4.5	1	2.9	.3	34	2.9	.3	34
		MARG	1	37	28.5	11.2	57	43.8	17.3	36	27.7	10.9	130	27.7	39.4	330
		MARG	2	14	25.0	4.2	22	39.5	6.7	20	35.7	6.1	52	35.7	6.1	52
		MARG	3	3	13.6	.9	7	31.8	2.1	12	54.5	3.6	22	54.5	3.6	22
		POOR	1	17	21.5	5.2	30	38.0	9.1	32	40.9	9.7	79	40.9	9.7	79
		POOR	2	6	19.4	1.8	17	54.8	5.2	8	22.8	2.4	31	22.8	2.4	31
		POOR	3				7	87.5	2.1	1	12.5	.3	8	12.5	.3	8
12		GOOD	1	50	50.0	14.7	36	36.0	10.0	14	14.0	6.1	100	14.0	29.3	341
		GOOD	2	22	44.9	6.5	20	40.8	5.9	7	14.5	2.1	49	14.5	2.1	49
		GOOD	3	9	40.9	2.6	10	43.5	2.9	3	13.6	.9	22	13.6	.9	22
		MARG	1	37	26.6	10.9	64	46.0	18.8	38	27.3	11.1	139	27.3	40.8	330
		MARG	2	13	21.3	3.8	29	47.5	8.5	19	31.1	5.6	61	31.1	5.6	61
		MARG	3	6	21.4	1.8	13	46.4	3.8	9	32.1	2.6	28	32.1	2.6	28
		POOR	1	11	10.9	3.2	40	39.6	11.7	30	49.5	14.7	101	49.5	14.7	101
		POOR	2	5	10.4	1.5	21	43.8	6.2	22	45.8	6.5	48	45.8	6.5	48
		POOR	3	2	9.5	.6	8	38.1	2.3	11	52.4	3.2	21	52.4	3.2	21





TABLE 6 EDWARDS AFB TO MARSHALL SPACE FLIGHT CENTER  
WESTERN SEGMENT-EAFB TO MIDLAND, TX.

WESTERN	YR	MO	TYPE	DAYS	GOOD			MARGINAL			POOR			TOTAL		
					F	CP	%	F	CP	%	F	CP	%	F	CP	%
9	66-76	9	GOOD	1	230	86.1	69.7	34	12.7	10.3	3	1.1	.9	267	80.9	330
				2	190	86.4	57.6	29	13.2	8.8	1	.5	.3	220		
				3	156	86.7	47.3	24	13.3	7.3				180		
	MARG	1	36	61.0	10.9	22	37.3	6.7	1	1.7	.3	59	17.9			
		2	14	63.6	4.2	8	36.4	2.4				22				
		3	6	75.0	1.8	2	25.0	.6				8				
	POOR	1	3	75.0	.9	1	25.0	.3				4	1.2			
		2														
		3														
10	GOOD	1	233	84.4	68.3	41	14.9	12.0	2	.7	.6	276	80.9	341		
		2	189	83.3	55.4	37	16.3	10.9	1	.4	.3	227				
		3	193	82.7	44.9	31	16.8	9.1	1	.5	.3	185				
	MARG	1	37	61.7	10.9	20	33.3	5.9	3	5.0	.9	60	17.6			
		2	15	75.0	4.4	3	15.0	.9	2	10.0	.6	20				
		3	3	100.0	.9				3			3				
	POOR	1	4	80.0	1.2	1	20.0	.3				5	1.5			
		2														
		3														
11	GOOD	1	226	86.9	68.5	33	12.7	10.0	1	.4	.3	260	79.8	337		
		2	190	86.8	57.6	29	13.2	8.8				219				
		3	162	88.5	49.1	21	11.5	6.4				183				
	MARG	1	31	49.2	9.4	26	41.3	7.9	6	9.5	1.8	63	19.1			
		2	12	46.2	3.6	14	53.8	4.2				26				
		3	5	35.7	1.5	9	64.3	2.7				14				
	POOR	1	4	57.1	1.2	3	42.9	.9				7	2.1			
		2														
		3														
12	GOOD	1	231	85.2	67.7	36	13.3	10.6	4	1.5	1.2	271	79.5	341		
		2	191	85.3	56.0	30	13.4	8.8	3	1.3	.9	224				
		3	194	83.7	45.2	28	15.2	8.2	2	1.1	.6	184				
	MARG	1	36	61.0	10.6	20	33.9	5.9	3	5.1	.9	59	17.3			
		2	11	57.9	3.2	8	42.1	2.3				19				
		3	4	50.0	1.2	4	50.0	1.2				8				
	POOR	1	4	40.0	1.2	3	30.0	.9	3	30.0	.9	10	2.9			
		2				2	66.7	.6	1	33.3	.3	3				
		3				1	100.0	.3				1				

TABLE 7 EDWARDS AFB TO MARSHALL SPACE FLIGHT CENTER  
EASTERN SEGMENT-MIDLAND, TX TO MSFC.

EASTERN	YR	WJ	TYPE	DAYS	GOOD				MARGINAL				POOR			TOTAL F	%	N
					F	CP	%	F	CP	%	F	CP	%					
06-76	1	GOOD	1	65	53.7	19.1	39	32.2	11.4	17	14.0	5.0	121	35.5	341			
			2	27	42.9	7.9	23	36.5	3.8	13	20.6	3.8	63					
			3	13	50.0	3.8	9	34.6	2.6	4	15.4	1.2	26					
	MARG		1	37	33.0	12.9	32	28.6	9.4	43	38.4	12.6	112	32.9				
			2	11	35.5	3.2	9	29.0	2.6	11	35.5	3.2	31					
			3	3	33.3	.9	1	11.1	.3	5	55.6	1.5	9					
2	GOOD		1	20	18.5	5.9	38	35.2	11.1	50	46.3	14.7	108	31.7				
			2	10	20.8	2.9	16	33.3	4.7	22	45.8	6.5	48					
			3	4	19.0	1.2	9	42.9	2.6	8	38.1	2.3	21					
	MARG		1	67	52.3	21.5	38	29.7	12.2	23	18.0	7.4	128	41.2	311			
			2	29	43.9	9.3	22	33.3	7.1	15	22.7	4.8	66					
			3	11	39.3	3.5	12	42.9	3.9	5	17.9	1.6	28					
3	GOOD		1	48	45.3	15.4	40	37.7	12.9	18	17.0	5.8	106	34.1				
			2	18	45.0	5.8	17	42.5	5.5	5	12.5	1.6	48					
			3	10	58.8	3.2	6	35.3	1.4	1	5.9	.3	17					
	MARG		1	16	20.8	5.1	27	35.1	8.7	34	44.2	10.9	77	24.8				
			2	9	26.5	2.9	16	47.1	5.1	9	26.5	2.9	34					
			3	3	33.3	1.0	3	33.3	1.0	3	33.3	1.0	9					
4	GOOD		1	64	50.8	18.8	41	32.5	12.0	21	16.7	6.2	126	37.0	341			
			2	25	41.0	7.3	24	39.3	7.0	12	19.7	3.5	61					
			3	11	47.8	3.2	10	43.5	2.9	2	8.7	.6	23					
	MARG		1	44	41.5	12.9	33	31.1	9.7	29	27.4	8.5	106	31.1				
			2	16	50.0	4.7	6	18.8	1.8	10	31.3	2.9	32					
			3	4	66.7	1.2				2	33.3	.6	6					
	POOR		1	18	16.5	5.3	32	29.4	9.4	59	54.1	17.3	109	32.0				
			2	10	17.2	2.9	18	31.0	5.3	30	51.7	8.8	58					
			3	6	20.0	1.8	9	30.0	2.6	15	50.0	4.4	30					
4	GOOD		1	69	59.5	20.9	32	27.6	9.7	15	12.9	4.5	116	35.2	330			
			2	32	47.8	9.7	23	37.3	7.6	10	14.9	3.0	67					
			3	16	51.6	4.8	11	35.5	3.3	4	12.9	1.2	31					
	MARG		1	26	26.0	7.9	38	38.0	11.5	36	36.0	10.8	100	30.3				
			2	8	21.1	2.4	14	36.8	4.2	16	42.1	4.8	38					
			3	3	21.4	.9	5	35.7	1.5	6	42.9	1.8	14					
	POOR		1	18	15.8	5.5	28	24.6	8.5	68	59.6	20.6	114	34.5				
			2	11	17.7	3.3	16	25.8	4.8	35	56.5	10.6	62					
			3	5	15.6	1.5	8	25.0	2.4	19	59.4	5.8	32					

TABLE 7 EDWARDS AFB TO MARSHALL SPACE FLIGHT CENTER  
EASTERN SEGMENT-MIDLAND, TX TO NSFC.

EASTERN		GOOD										MARGINAL			POOR			TOTAL				
YR	WJ	TYPE	DAYS	F	CP	%	F	CP	%	F	CP	%	F	CP	%	F	CP	%	F	CP	%	
66-76	5	GOOD	1	71	61.2	20.8	33	28.4	9.7	12	10.3	3.5	116	11.6	3.0	116	11.6	3.0	116	11.6	3.0	341
			2	43	62.3	12.6	18	26.1	5.3	8	11.6	2.3	69	11.6	1.5	69	11.6	1.5	69	11.6	1.5	43
			3	25	58.1	7.3	13	30.2	3.8	5	11.6	1.5	43	11.6	1.5	43	11.6	1.5	43	11.6	1.5	25
	6	MARG	1	31	27.4	9.1	46	40.7	13.5	36	31.9	10.6	113	31.9	10.6	113	31.9	10.6	113	31.9	10.6	331
			2	12	26.7	3.5	17	37.8	5.0	16	35.6	4.7	45	35.6	4.7	45	35.6	4.7	45	35.6	4.7	16
			3	5	31.3	1.5	3	18.8	.9	16	50.0	2.3	16	50.0	2.3	16	50.0	2.3	16	50.0	2.3	5
	7	POOR	1	14	12.5	4.1	37	33.0	10.9	61	54.5	17.9	112	54.5	17.9	112	54.5	17.9	112	54.5	17.9	335
			2	10	16.9	2.9	19	32.2	5.6	30	50.8	8.8	59	50.8	8.8	59	50.8	8.8	59	50.8	8.8	29
			3	5	17.2	1.5	9	31.0	2.6	15	51.7	4.4	29	51.7	4.4	29	51.7	4.4	29	51.7	4.4	5
8	6	GOOD	1	127	75.6	38.5	26	15.5	7.9	15	8.9	4.5	168	8.9	4.5	168	8.9	4.5	168	8.9	4.5	330
			2	94	76.3	29.5	17	14.2	5.2	9	7.5	2.7	120	7.5	2.7	120	7.5	2.7	120	7.5	2.7	88
			3	66	75.0	20.0	15	17.0	4.5	7	8.0	2.1	88	8.0	2.1	88	8.0	2.1	88	8.0	2.1	12
	7	MARG	1	34	37.0	10.3	35	38.0	10.4	23	25.0	7.0	92	25.0	7.0	92	25.0	7.0	92	25.0	7.0	279
			2	17	48.6	5.2	12	34.3	3.6	6	17.1	1.8	35	17.1	1.8	35	17.1	1.8	35	17.1	1.8	12
			3	5	41.7	1.5	4	33.3	1.2	3	25.0	.9	12	25.0	.9	12	25.0	.9	12	25.0	.9	12
	8	POOR	1	13	18.6	3.9	29	41.4	8.8	28	40.0	8.5	70	40.0	8.5	70	40.0	8.5	70	40.0	8.5	212
			2	4	14.8	1.2	9	33.3	2.7	14	51.9	4.2	27	51.9	4.2	27	51.9	4.2	27	51.9	4.2	14
			3	2	14.3	.6	5	35.7	1.5	7	50.0	2.1	14	50.0	2.1	14	50.0	2.1	14	50.0	2.1	14
9	6	GOOD	1	123	69.9	36.1	42	23.9	12.3	11	6.3	3.2	176	6.3	3.2	176	6.3	3.2	176	6.3	3.2	341
			2	84	69.4	24.6	29	24.0	8.5	8	6.6	2.5	121	6.6	2.5	121	6.6	2.5	121	6.6	2.5	82
			3	57	69.5	16.7	20	24.4	9.9	5	6.1	1.5	82	6.1	1.5	82	6.1	1.5	82	6.1	1.5	23
	7	MARG	1	41	35.0	12.0	57	48.7	16.7	19	16.2	5.6	117	16.2	5.6	117	16.2	5.6	117	16.2	5.6	343
			2	23	42.6	5.7	24	44.4	7.0	7	13.0	2.1	54	13.0	2.1	54	13.0	2.1	54	13.0	2.1	23
			3	8	34.8	2.3	10	43.5	2.9	5	21.7	1.5	23	21.7	1.5	23	21.7	1.5	23	21.7	1.5	7
	8	POOR	1	7	14.6	2.1	21	43.8	6.2	20	41.7	5.8	48	41.7	5.8	48	41.7	5.8	48	41.7	5.8	141
			2	2	10.5	.6	10	52.6	2.9	7	36.8	2.1	19	36.8	2.1	19	36.8	2.1	19	36.8	2.1	7
			3				2	28.6	.6	5	71.4	1.5	7	71.4	1.5	7	71.4	1.5	7	71.4	1.5	7
9	GOOD	1	125	76.2	39.7	41	23.0	12.0	12	6.7	3.5	178	6.7	3.5	178	6.7	3.5	178	6.7	3.5	341	
		2	86	69.9	25.2	29	23.6	8.5	8	6.5	2.3	123	6.5	2.3	123	6.5	2.3	123	6.5	2.3	85	
		3	57	67.1	16.7	22	25.9	6.5	6	7.1	1.8	85	7.1	1.8	85	7.1	1.8	85	7.1	1.8	23	
10	MARG	1	47	40.9	13.6	53	46.1	15.5	15	13.0	4.4	115	13.0	4.4	115	13.0	4.4	115	13.0	4.4	337	
		2	22	44.0	6.5	21	42.0	6.2	7	14.0	2.1	50	14.0	2.1	50	14.0	2.1	50	14.0	2.1	21	
		3	9	42.9	2.6	9	42.9	2.6	3	14.3	.9	21	14.3	.9	21	14.3	.9	21	14.3	.9	21	
11	POOR	1	6	12.5	1.8	26	50.0	7.0	18	37.5	5.3	48	37.5	5.3	48	37.5	5.3	48	37.5	5.3	141	
		2	1	5.6	.3	5	27.8	1.5	12	66.7	3.5	18	66.7	3.5	18	66.7	3.5	18	66.7	3.5	18	
		3	1	18.3	.3	4	33.3	1.2	7	58.3	2.1	12	58.3	2.1	12	58.3	2.1	12	58.3	2.1	12	



TABLE 7 EDWARDS AFB TO MARSHALL SPACE FLIGHT CENTER  
EASTERN SEQUENT-MIDLAND, TX TO MSFC.

FASTERN YR WD 66-76 9	TYPE	DAYS	GOOD			MARGINAL			%	F	CP	%	F	CP	%	F	CP	%	TOTAL F	%	N
			F	CP	%	F	CP	%													
10	GOOD	1	116	67.4	34.0	39	22.7	11.4	17	9.9	5.0	172	50.4	341	115	33.5	2.3	96	28.2		
		2	74	64.3	21.7	29	25.2	8.2	12	10.4	3.2	115	33.5	2.3	73	21.4					
		3	49	67.1	14.4	16	21.9	4.7	8	11.0	0.9	73	21.4		7	0.9					
11	MARG	1	40	41.7	11.7	32	33.3	9.4	24	25.0	7.0	96	28.2		31	32.2	0.9	31	21.4		
		2	13	41.9	3.8	7	22.6	2.1	11	35.5	3.2	115	33.5	2.3	7	0.9					
		3	3	42.9	0.9	1	14.3	0.3	3	42.9	0.9	73	21.4		7	0.9					
11	POOR	1	12	16.4	3.5	27	37.0	7.9	34	46.6	10.0	143	43.3	330	83	2.1	1.2	73	21.4		
		2	4	12.9	1.2	12	38.7	3.2	15	48.4	4.4	143	43.3	330	49	1.2					
		3	2	15.4	0.6	5	39.5	1.5	6	46.2	1.8	143	43.3	330	15	1.0					
12	GOOD	1	86	60.1	26.1	42	29.4	12.7	15	10.5	4.5	112	33.9		29	29.9	9.8	112	33.9		
		2	51	61.4	15.5	25	30.1	7.0	7	8.4	2.1	83	24.9		45	3.9					
		3	29	59.2	8.8	16	32.7	4.8	4	8.2	1.2	49	14.7		15	1.8					
12	MARG	1	37	33.0	11.2	46	41.1	13.9	29	29.9	9.8	112	33.9		13	28.9	3.9	112	33.9		
		2	17	37.8	5.2	15	33.3	4.5	6	40.0	1.8	45	13.3		15	1.8					
		3	4	26.7	1.2	3	33.3	1.5	6	40.0	1.8	15	4.5		15	1.8					
12	POOR	1	20	26.7	6.1	26	34.7	7.9	29	38.7	8.8	75	22.7		6	21.4	1.8	75	22.7		
		2	8	28.6	2.4	14	50.0	4.2	6	21.4	1.8	28	8.3		6	2.1					
		3	1	16.7	0.3	4	66.7	1.2	1	16.7	0.3	6	1.7		6	1.7					
12	GOOD	1	66	56.4	19.4	35	29.9	10.3	16	13.7	4.7	117	34.3	342	65	2.3	1.5	117	34.3	342	
		2	35	53.8	13.3	22	33.8	6.2	8	12.3	2.3	65	19.3		35	1.5					
		3	17	48.8	5.0	13	37.1	3.6	5	14.3	1.5	35	10.3		35	1.5					
12	MARG	1	37	29.6	10.9	52	41.6	15.2	36	28.8	10.6	125	35.7		14	28.6	4.1	125	35.7		
		2	11	22.4	3.2	24	49.0	7.0	7	30.6	2.1	49	14.7		23	2.1					
		3	6	26.1	1.8	10	43.5	2.9	7	30.6	2.1	23	6.8		23	6.8					
12	POOR	1	12	12.2	3.5	39	39.8	11.4	47	48.0	13.8	98	28.7		20	44.4	5.9	98	28.7		
		2	5	11.1	1.0	20	44.4	5.9	20	44.4	5.9	45	13.8		45	13.8					
		3	1	5.3	0.3	8	42.1	2.3	10	52.6	2.8	19	2.8		19	2.8					

Section V

REFERENCES

1. Daily Weather Maps, Weekly Series, U. S. Department of Commerce, National Oceanic and Atmospheric Administration, Environmental Data Service, Silver Spring, MD.