NASA Technical Memorandum

NASA TM-86486

ATMOSPHERIC ENVIRONMENT FOR SPACE SHUTTLE (STS-41G) LAUNCH

By D. L. Johnson, C. K. Hill, G. Jasper and G. W. Batts
Systems Dynamics Laboratory

November 1984

National Aeronautics and Space Administration

George C. Marshall Space Flight Center

MSFC - Form 3190 (Rev. May 1983)

TECHNICAL REPORT STANDARD TITLE PAGE

1. REPORT NO.	2. GOVERNMENT ACCESSION NO.	3. RECIPIENT'S CATALOG NO.
NASA TM-86486		

4. TITLE AND SUBTITLE	5. REPORT DATE
Atmospheric Environment for Space Shuttle (STS-41G) Launch	November 1984
	6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S)	8. PERFORMING ORGANIZATION REPORT #
D. L. Johnson, C. K. Hill, G. Jasper, and G. W. Batts*	
9. PERFORMING ORGANIZATION NAME AND ADDRESS	10. WORK UNIT NO.
George C. Marshall Space Flight Center Marshall Space Flight Center, Alabama 35812	11. CONTRACT OR GRANT NO.
	13. TYPE OF REPORT & PERIOD COVERED
12. SPONSORING AGENCY NAME AND ADDRESS	Technical Memorandum
National Aeronautics and Space Administration Washington, D.C. 20546	14. SPONSORING AGENCY CODE

15. SUPPLEMENTARY NOTES

Prepared by Systems Dynamics Laboratory, Science and Engineering

*Computer Sciences Corporation, Huntsville, Alabama

16. ABSTRACT

This report presents a summary of selected atmospheric conditions observed near Space Shuttle STS-41G launch time on October 5, 1984, at Kennedy Space Center Florida. Values of ambient pressure, temperature, moisture, ground winds, visual observations (cloud), and winds aloft are included. The sequence of pre-launch Jimsphere measured vertical wind profiles is given in this report. The final atmospheric tape, which consists of wind and thermodynamic parameters versus altitude, for STS-41G vehicle ascent has been constructed. The STS-41G ascent atmospheric data tape has been constructed by Marshall Space Flight Center's Atmospheric Sciences Division to provide an internally consistent data set for use in post flight performance assessments.

17. KEY WORDS	18. DISTRIBUTION STATEMENT
STS-41G Launch Atmospheric Summary Pressure Temperature Relative Humidity Winds, Winds Aloft, Clouds Space Shuttle	Dale L. Johnson Unclassified — Unlimited

19. SECURITY CLASSIF. (of this report)	20. SECURITY CLASSIF. (of this page)	21. NO. OF PAGES	22. PRICE
Unclassified	Unclassified	40	NTIS

MSFC - Form 3292 (May 1969)

For sale by National Technical Information Service, Springfield, Virginia 22151

ACKNOWLEDGMENTS

The authors wish to thank the personnel at NASA Kennedy Space Center, along with those at the Cape Canaveral Air Force Station and their Pan American World Airways contractors. for the acquisition and distribution of all related atmospheric data received at MSFC.

Thanks are due to James Arnold and David Keller of the Atmospheric Effects Branch, MSFC, for their help in extracting atmospheric data and satellite cloud photographs that are used in this report. Also, special thanks to Messrs. Bill Jeffries and Bobby Vayda of Computer Sciences Corporation for their assistance in processing all the upper air data used in producing the STS-41G final atmospheric data tapes. Finally, appreviation is expressed to Rhonda Blocker and Sherry Anderson of Boeing Computer Support Services for the GRA model and ESDB computer support, respectively.

TABLE OF CONTENTS

		Page
I.	INTRODUCTION	1
II.	SOURCES OF DATA	1
III.	GENERAL SYNOPTIC SITUATION AT LAUNCH TIME	1
IV.	SURFACE OBSERVATIONS AT LAUNCH TIME	2
V.	UPPER AIR MEASUREMENTS DURING LAUNCH	2
	A. Wind Speed	2
	B. Wind Direction	2
	C. Prelaunch/Launch Wind Profiles	3
	D. Thermodynamic Data	3
	E. SRB Upper Air and Surface Measurements	3
REFERENCES		35

LIST OF ILLUSTRATIONS

Figure	Title	Page
1.	Surface synoptic chart 57 min after launch of STS-41G	25
2.	500 mb map 57 min after launch of STS-41G	26
3.	GOES-5 visible imagery of cloud cover 3 min prior to launch of STS-41G (1100 UT, October 5, 1984). 500-mb contours and wind barbs are also included for 1200 UT.....	27
4.	Enlarged view of GOES-5 visible imagery of cloud cover taken 3 min prior to launch of STS-41G (1100 UT, October 5, 1984). Surface temperatures and wind barbs for 1100 UT are also included.....	28
5.	Scalar wind speed and direction at launch time of STS-41G	29
6.	STS-41G prelaunch/launch Jimspehre-measured wind speeds (FPS)	30
7.	STS-41G prelaunch/launch Jimspehre-measured wind directions (degrees).....	31
8.	STS-41G prelaunch/launch Jimsphere-measured in-plane component winds (FPS). Flight azimuth = 39 degrees	32
9.	STS-41G prelaunch/launch Jimsphere-measured out-of-plane component winds (FPS). Flight azimuth = 39 degrees.....	33
10.	STS-41G temperature profiles versus altitude for launch (ascent)	34

LIST OF TABLES

Table	Title	Page
1.	Selected Atmospheric Observations for the Flight Tests of the Space Shuttle Vehicles	4
2.	Systems Used to Measure Upper Air Wind Data for STS-41G Ascent	5
3.	Surface Observations at STS-41G Launch Time	6
4.	STS-41G Pre-Launch Through Launch KSC Pad 39A Atmospheric Measurements	7
5.	STS-41G Ascent Atmospheric Data Tape	8

TECHNICAL MEMORANDUM

ATMOSPHERIC ENVIRONMENT FOR SPACE SHUTTLE (STS-41G) LAUNCH

I. INTRODUCTION

This report presents an evaluation of the atmospheric environmental data taken during the launch of the Space Shuttle/STS-41G vehicle. This Space Shuttle vehicle was launched from Pad 39A at Kennedy Space Center (KSC), Florida, on a bearing of 39 deg east of north at 1103 UT (0703 EDT) on October 5, 1984.

This report presents a summary of the atmospheric environment at launch time (L+0) of the STS-41G, together with the sequence of prelaunch Jimsphere measured winds aloft profiles from L-12 hr through liftoff. The general atmospheric situation for the launch and flight area is described, and surface and upper level wind/thermodynamic observations near launch time are given. Since the ship Redstone was unavailable for STS-41G duty, the SRB descent/impact atmospheric data were not taken. However, one can use the STS-41G ascent data for SRB studies, as the best substitute.

Previous MSFC-related launch vehicle atmospheric environmental conditions have been published as Appendix A of individual MSFC Saturn Flight Evaluation Working Group reports [1]. Office memorandums have been issued for previous flights giving launch pad wind information. A report has also been published [2] which summarizes most launch atmospheric conditions observed for the past 155 MSFC/ABMA-related vehicle launches through SA-208 (Skylab 4). Reports summarizing ASTP, STS-1 through STS-41D launch conditions are presented in References 3 through 15, respectively. Table 1 gives the atmospheric L+0 launch conditions for all the Space Shuttle missions.

II. SOURCES OF DATA

Atmospheric observational data used in this report were taken from synoptic maps made by the National Weather Service, plus all available surface observations and measurements from around the launch area. Upper air observations were taken from balloon-released instruments sent aloft from Cape Canaveral Air Force Station (CCAFS). High-altitude winds and thermodynamic data were measured by the Super-Loki rocketsondes launched from the CCAFS. Table 2 presents a listing of systems used to obtain the upper level wind profiles used in compiling the final ascent atmospheric data tape. Data cutoff altitudes are also given in Table 2.

III. GENERAL SYNOPTIC SITUATION AT LAUNCH TIME

An area of high pressure, located in the Atlantic just off the Virginia coast, prevailed over the southeastern states just prior to STS-41G liftoff. This air mass brought warm and less humid conditions to the KSC area throughout the countdown period. Light to moderate northeast to easterly surface winds were the rule during

countdown. Figure 1 presents the surface map conditions approximately 57 minutes after launch. Figure 2 depicts the winds aloft conditions at the 500 mb pressure level approximately 57 minutes after launch. Westerly winds dominated the flow aloft over the KSC Florida area. Skies were mostly scattered to broken throughout the early morning of October 5, 1984. Figure 3 presents the GOES-5 visible picture taken at 1100 UT (3 minutes before liftoff). Figure 4 shows an up-close visible shot of the Florida peninsula as recorded by GOES-5, taken also at 1100 UT.

IV. SURFACE OBSERVATIONS AT LAUNCH TIME

Surface observations at launch time for selected KSC locations are given in Table 3. Included are pad 39A, shuttle runway, and CCAFS balloon release station observations. Neither precipitation nor lightning was observed at launch time.

Table 4 presents Pad 39A wind data along with other standard hourly atmospheric measurements and sky observations for the 6-hr period prior to launch of STS-41G. Values for wind speed and direction are given for the 84 m (275 ft) FSS reference level and 18 m (60 ft) pad light pole level.

V. UPPER AIR MEASUREMENTS DURING LAUNCH

The FPS-16 Jimsphere (1118 UT), MSS Rawinsonde (1106 UT), Super-Loki Rocketsonde (1403 UT), and Super-Loki Robin (1207 UT) systems were used to measure the upper level wind and thermodynamic parameters for STS-41G launch. At altitudes above the rocket-measured data, the Global Reference Atmosphere (GRA) [16] parameters for October KSC conditions were used. A tabulation of the STS-41G final atmospheric data for ascent is presented in Table 5 which lists the wind and thermodynamic parameters versus altitude. A brief summary of parameters is given in the following paragraphs.

A. Wind Speed

At launch time, wind speeds were 16.5 ft/sec (9.8 kn) at 60 ft and increased to a maximum of 78 ft/sec (46 kn) flowing from 303 deg. This maximum occurred at an altitude of 40,600 ft (12,375 m). The winds decreased above this level as shown in Figure 5. The overall maximum measured speed was 133 ft/sec (79 kn) at 247,000 ft (75,286 m) altitude.

B. Wind Direction

At launch time, the 60-ft wind direction was from the east northeast (73 deg) and shifted through east and south into a west northwesterly component above 32,000 ft (9754 m). Winds remained westerly through 66,000 ft (20,117 m) altitude. Winds above this level shifted into an easterly component, but oscillated enormously above 132,000 ft (40,234 m) as shown in Figure 5. Figure 5 shows the complete wind direction versus altitude profile, which indicates the wind direction became quite variable at altitudes with low wind speeds.

C. Prelaunch/Launch Wind Profiles

Prelaunch/launch wind profiles presented in Figures 6 through 9 were measured by the Jimsphere FPS-16 system. Data are shown for four measurement periods beginning at L-12 hr and extending through L+0.

The wind speed and direction profiles for the 12-hr period prior to and including L+0 are shown in Figures 6 and 7. The in-plane (head-tail wind) and out-of-plane (left-right crosswind) profiles are given on Figures 8 and 9. There were no calculated vehicle load exceedances produced by the wind data presented. The prelaunch atmospheric conditions are discussed in more detail in Section III.

D. Thermodynamic Data

The thermodynamic data taken at STS-41G launch time, consisting of atmospheric temperature, dew-point temperature, pressure, and density have been compiled as the STS-41G ascent atmospheric data and are presented in Table 4. The vertical structure of temperature and dew-point temperature for the STS-41G ascent are shown graphically versus altitude in Figure 10.

The atmospheric thermodynamic parameters of temperature, pressure, and density, measured during STS-41G launch below 102,000 ft (31,090 m) were all within 2 percent of their respective PRA-63 [17] annual values. All these parameters stayed within 20 percent of their respective PRA-63 values, at all levels of measurement.

E. SRB Upper Air and Surface Measurements

As has been mentioned in the introduction, since there was no ship available, an SRB descent atmospheric data tape has not been constructed. The tabular values for the ascent atmospheric tape as presented in Table 5 should be used for SRB descent/impact studies since it is the closest measured data source.

TABLE 1. SELECTED ATMOSPHERIC OBSERVATIONS FOR THE FLIGHT TESTS OF THE SPACE SHUTTLE VEHICLES

Vehicle Data					Surface Observations					Inflight Conditions Max. Wind Below 60,000 ft			Count Down and Launch Comments of Meteorological Significance
					Thermodynamic[a]			Wind[b]					
Seq. No.	Vehicle No.	Launch Date	Time (EST) Nearest Minute	Launch Pad	Press.,[c] N/cm^2	Temp. (°C)	Rel. Hum. (%)	Speed (ft/sec)	Dir. (deg)	Alt. (ft)	Speed (ft/sec)	Dir. (deg)	
1	STS-1 Columbia	4/12/81	0700	39A	10.234[d]	21	82	11.8 15.2	125 120	44,300	98	250	
2	STS-2 Columbia	11/12/81	1010	39A	10.166	23	61	27.0 27.0	345 355	36,300	158	286	
3	STS-3 Columbia	3/22/82	1100	39A	10.160	24	71	7.0[e] 8.0[e]	50[e] 145[e]	45,000	119	250	Wind directional change observed at Pad just prior to L+0. Onset of sea breeze.
4	STS-4 Columbia	6/27/82	1100[f]	39A	10.200	29	70	5.8[g] 4.9[g]	133[g] 141[g]	47,900	37	329	
5	STS-5 Columbia	11/11/82	0719	39A	10.227	22	68	22.0 35.0	90 90	40,600	146	336	
6	STS-6 Challenger	4/4/83	1330	39A	10.183	23	55	12.7 16.4	63 55	46,100	155	277	
7	STS-7 Challenger	6/18/83	0733[f]	39A	10.146	25	80	5.9[e] 10.3[e]	10[e] 350[e]	45,900	76	278	
8	STS-8 Challenger	8/30/83	0232[f]	39A	10.111	24	97	8.8 14.0	269 268	45,100	30	349	17 min countdown delay due to adverse weather conditions. Thunderstorms in area.
9	STS-9 (SL-1) Columbia	11/28/83	1100	39A	10.153	24	83	19.1 32.0	183 190	47,100	117	252	
10	STS-11 (41-B) Challenger	2/3/84	0800	39A	10.173	17	75	0.0 NA	0 NA	38,200	143	288	
11	STS-13 (41-C) Challenger	4/6/84	0858	39A	10.149	16	56	21.5 18.6	320 275	37,700	176	289	
12	STS-41D Discovery	8/30/84	0842[f]	39A	10.172	26	81	3.0 3.6	106 39	40,300	44	270	
13	STS-41G Challenger	10/5/84	0703[f]	39A	10.210	23	60	16.5 14.8	73 58	40,600	78	303	

a. Pad 39A thermodynamic measurements taken at approximately 1.2 m (4 ft) above natural grade at camera site No. 3.
b. 1 min average prior to L+0 of 60 ft PLP (listed first) and 275 ft FSS winds measured above natural grade.
c. Pressure measurement applicable to 21 ft above MSL unless otherwise indicated.
d. Pressure measurement applicable to 14 ft above MSL.
e. 10 sec average prior to L+0.
f. Eastern Daylight Time.
g. 30 sec average prior to L+0.

TABLE 2. SYSTEMS USED TO MEASURE UPPER AIR WIND DATA FOR STS-41G ASCENT

Type of Data	Date: October 5, 1984		Portion of Data Used			
	Release Time		Start		End	
	Time (UT) (hr/min)	Time After L+0 (min)	Altitude m (ft)	Time After L+0 (min)	Altitude m (ft)	Time After L+0 (min)
FPS-16 Jimsphere	11:18	15	6 (21)	15	17,069 (56,000)	74
MSS Rawinsonde	11:06	3	17,373 (57,000)	60	28,346 (93,000)	96
Super-Loki Rocketsonde (Datasonde)	14:03	180	40,843 (134,000)	180	28,651 (94,000)	193
Super-Loki Rocketsonde (Robin)	12:07	64	83,515 (274,000)	64	41,148 (135,000)	65

TABLE 3. SURFACE OBSERVATIONS AT STS-41G LAUNCH TIME

							Sky Cover			Wind	
Location[a]	Time After L+0 (min)	Pressure (MSL) N/cm^2 (psia)	Temperature °K (°F)	Dew Point °K (°F)	Relative Humidity (%)	Visibility km (miles)	Cloud Amount**	Cloud Type	Height of Base Meters (ft)	Speed ft/sec (kt)	Direction (deg)
NASA Space Shuttle Runway X68[e] Winds Measured at 10.4 m (34 ft)	0	10.217 (14.819)	292.9 (67.5)	288.7 (60.0)	76	16 (10)	5 3	Strato-cumulus Cirrus	1158 (3800) 10,058 (33,000)	3.4 (2.0)	20
CCAFS XMR[c] Surface Measurements	+5	10.213 (14.813)	291.5 (65.0)	287.6 (58.0)	78	13 (8)	5 3	Strato-cumulus Cirrus	1524 (5000) 10,363 (34000)	3.4 (2.0)	90
Pad 39A[d] Lightpole SE 18.3 m (60.0 ft)	0	10.210* (14.808*)	296.5 (74.0)	288.2 (59.0)	60	-	-	-	-	16.5[b] (9.8)	73[b]
Pad 39A FSS (Top SE) 83.8 m (275 ft)	0	-	-	-	-	-	-	-	-	14.8[b] (8.8)	58[b]

*Pad 39A Camera Site 3 barometric pressure instrument appeared to be reading too high. Therefore, the KSC Shuttle runway station pressure value interpolated to 10.210 N/cm^2 at 21 ft above MSL was used as the L+0 pad atmospheric pressure measurement. Sea level pressure was 10.217 N/cm^2.

**7/10 total sky cover reported at both X68 and XMR.

a. Altitudes of measurements are above natural grade, except where noted.

b. Approximately 1 min average prior to L+0.

c. Balloon release site.

d. Pad 39A thermodynamic measurements are taken at camera site No. 3, approximately 6.4 m (21 ft) above MSL.

e Official STS-41G sky observational site.

TABLE 4. STS-41G PRE-LAUNCH THROUGH LAUNCH KSC PAD 39A ATMOSPHERIC MEASUREMENTS[a]

Hourly Atmospheric Measurements								Sky Condition[b]			
5 October 1984 Time UT	Temp. (°F)	Dew Point (°F)	RH (%)	275' Level (SE)		60' Level (SE)		Clouds	Total Sky Cover	Vis. (mi)	Other Remarks
				WS Kt	WD°	WS Kt	WD°				
0500	73	51	53	10	100	11	108	Broken at 4500 ft	6/10	10	
0600	73	57	56	10	090	9	095	Broken at 4200 ft	7/10	10	
0700	73	59	61	6	077	7	094	Scattered at 4200 and 10,000 ft	4/10	10	
0800	74	58	57	11	071	12	076	Scattered at 3800 ft	5/10	10	
0900	74	55	52	9	106	9	117	Broken at 3800 ft	9/10	10	
1000	74	56	54	8	088	8	089	Broken at 3800 ft	8/10	10	
1100	74	59	60	10	048	10	066	Scattered at 3800 and 33,000 ft	5/10	10	
L+0[c] 1103	74	59	60	9	058	10	073	5/10 SC at 3800 ft 3/10 CI at 33,000 ft	7/10	10	

a. Hourly pad observations (obtained via MSFC/HOSC) averaged over 1 min, centered on the hour.

b. Sky observations taken at the Shuttle runway site X68.

c. L+0 PAD Wind and thermodynamic parameters obtained from HOSC strip charts. SE Anemometers used at 60 and 275 ft levels for L+0 wind conditions (approximately 1 min average prior to L+0). Pad 39A L+0 atmospheric pressure, at 21 ft (MSL), was 10.210 N/cm^2. Sea level pressure was 10.217 N/cm^2.

TABLE 5. STS-41G ASCENT ATMOSPHERIC DATA TAPE

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
000021	003	090	23.3	.1021+04	.1192+04	15.0
000100	016	070	23.1	.1018+04	.1190+04	15.0
000200	015	065	23.0	.1015+04	.1186+04	15.0
000300	014	066	22.8	.1011+04	.1183+04	14.9
000400	011	086	22.6	.1007+04	.1179+04	14.9
000500	013	086	22.4	.1004+04	.1176+04	14.9
000600	015	074	22.2	.1000+04	.1173+04	14.9
000700	019	090	22.0	.9969+03	.1169+04	14.9
000800	017	094	21.8	.9934+03	.1166+04	14.8
000900	014	091	21.6	.9899+03	.1162+04	14.8
001000	015	089	21.4	.9865+03	.1159+04	14.8
001100	018	080	21.1	.9830+03	.1156+04	14.6
001200	017	086	20.8	.9795+03	.1154+04	14.3
001300	019	090	20.5	.9761+03	.1151+04	14.1
001400	019	099	20.2	.9726+03	.1148+04	13.9
001500	017	102	19.9	.9692+03	.1145+04	13.7
001600	017	092	19.6	.9658+03	.1142+04	13.4
001700	020	090	19.3	.9624+03	.1140+04	13.2
001800	022	085	19.0	.9590+03	.1137+04	13.0
001900	021	093	18.7	.9556+03	.1134+04	12.7
002000	021	099	18.4	.9523+03	.1131+04	12.5
002100	018	095	18.2	.9489+03	.1128+04	12.4
002200	021	099	17.9	.9455+03	.1125+04	12.3
002300	021	091	17.7	.9422+03	.1122+04	12.2
002400	024	095	17.4	.9388+03	.1119+04	12.1
002500	025	103	17.2	.9355+03	.1116+04	12.0
002600	021	101	17.0	.9322+03	.1113+04	11.8
002700	022	094	16.7	.9289+03	.1110+04	11.7
002800	024	095	16.5	.9256+03	.1107+04	11.6
002900	022	099	16.2	.9223+03	.1104+04	11.5
003000	021	097	16.0	.9190+03	.1101+04	11.4
003100	021	093	15.7	.9157+03	.1098+04	11.4
003200	023	100	15.5	.9124+03	.1095+04	11.4
003300	021	100	15.2	.9092+03	.1092+04	11.4
003400	021	097	15.0	.9059+03	.1089+04	11.4
003500	023	098	14.7	.9027+03	.1086+04	11.4
003600	022	103	14.4	.8994+03	.1083+04	11.4
003700	020	101	14.2	.8962+03	.1080+04	11.4
003800	022	092	13.9	.8930+03	.1077+04	11.4
003900	024	098	13.7	.8898+03	.1075+04	11.4
004000	022	102	13.4	.8866+03	.1072+04	11.4
004100	020	099	13.1	.8834+03	.1069+04	11.3
004200	019	096	12.9	.8802+03	.1066+04	11.1
004300	021	104	12.6	.8770+03	.1064+04	11.0
004400	022	111	12.3	.8739+03	.1061+04	10.9
004500	018	116	11.9	.8707+03	.1058+04	10.8
004600	017	110	11.6	.8675+03	.1055+04	10.6
004700	020	109	11.3	.8644+03	.1053+04	10.5
004800	021	117	11.0	.8613+03	.1050+04	10.4
004900	020	120	10.7	.8581+03	.1047+04	10.2

TABLE 5. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
005000	020	114	10.4	.8550+03	.1045+04	10.1
005100	022	115	10.3	.8519+03	.1042+04	9.3
005200	020	116	10.2	.8488+03	.1038+04	8.6
005300	017	125	10.1	.8457+03	.1035+04	7.8
005400	018	120	10.0	.8426+03	.1032+04	7.0
005500	018	112	9.9	.8395+03	.1029+04	6.3
005600	018	119	9.7	.8365+03	.1026+04	5.5
005700	017	111	9.6	.8334+03	.1023+04	4.7
005800	016	091	9.5	.8304+03	.1020+04	3.9
005900	019	081	9.4	.8273+03	.1016+04	3.2
006000	021	086	9.3	.8243+03	.1013+04	2.4
006100	019	089	9.6	.8213+03	.1009+04	1.6
006200	018	084	9.9	.8184+03	.1004+04	.8
006300	020	085	10.3	.8154+03	.9995+03	-.1
006400	019	093	10.6	.8125+03	.9949+03	-.9
006500	016	095	10.9	.8095+03	.9903+03	-1.7
006600	017	089	11.2	.8066+03	.9857+03	-2.5
006700	018	094	11.5	.8037+03	.9812+03	-3.3
006800	017	102	11.9	.8007+03	.9767+03	-4.2
006900	015	098	12.2	.7978+03	.9722+03	-5.0
007000	016	096	12.5	.7950+03	.9677+03	-5.8
007100	016	101	12.3	.7921+03	.9649+03	-5.9
007200	013	112	12.1	.7892+03	.9622+03	-6.0
007300	011	098	11.8	.7863+03	.9594+03	-6.2
007400	012	096	11.6	.7835+03	.9567+03	-6.3
007500	009	102	11.4	.7806+03	.9539+03	-6.4
007600	007	090	11.2	.7778+03	.9512+03	-6.5
007700	009	096	11.0	.7750+03	.9485+03	-6.6
007800	008	115	10.7	.7721+03	.9458+03	-6.8
007900	005	114	10.5	.7693+03	.9431+03	-6.9
008000	007	106	10.3	.7665+03	.9404+03	-7.1
008100	009	120	10.1	.7637+03	.9375+03	-7.2
008200	005	132	10.0	.7609+03	.9347+03	-7.4
008300	004	111	9.8	.7581+03	.9318+03	-7.5
008400	007	128	9.6	.7554+03	.9290+03	-7.7
008500	006	154	9.5	.7526+03	.9262+03	-7.9
008600	003	133	9.3	.7498+03	.9234+03	-8.1
008700	006	134	9.1	.7471+03	.9205+03	-8.3
008800	007	158	8.9	.7444+03	.9177+03	-8.4
008900	004	178	8.6	.7416+03	.9150+03	-8.6
009000	005	156	8.6	.7389+03	.9122+03	-8.8
009100	007	157	8.6	.7362+03	.9088+03	-9.0
009200	006	136	8.6	.7335+03	.9054+03	-9.1
009300	012	111	8.6	.7308+03	.9021+03	-9.3
009400	012	112	8.6	.7281+03	.8988+03	-9.4
009500	007	109	8.6	.7255+03	.8955+03	-9.6
009600	008	094	8.7	.7228+03	.8921+03	-9.8
009700	011	105	8.7	.7201+03	.8888+03	-9.9
009800	009	117	8.7	.7176+03	.8856+03	-10.1
009900	006	115	8.7	.7149+03	.8823+03	-10.2

TABLE 5. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
010000	009	116	8.7	.7122+03	.8790+03	-10.4
010100	010	130	8.5	.7096+03	.8763+03	-10.4
010200	006	129	8.4	.7070+03	.8736+03	-10.4
010300	007	123	8.2	.7044+03	.8708+03	-10.5
010400	011	129	8.1	.7018+03	.8681+03	-10.5
010500	011	129	7.9	.6992+03	.8654+03	-10.5
010600	010	118	7.7	.6966+03	.8627+03	-10.5
010700	012	115	7.6	.6941+03	.8600+03	-10.5
010800	014	123	7.4	.6915+03	.8573+03	-10.6
010900	011	112	7.3	.6890+03	.8547+03	-10.6
011000	014	099	7.1	.6864+03	.8520+03	-10.6
011100	015	102	6.9	.6839+03	.8495+03	-10.8
011200	012	111	6.7	.6814+03	.8469+03	-11.0
011300	011	103	6.5	.6788+03	.8444+03	-11.1
011400	012	103	6.3	.6763+03	.8419+03	-11.3
011500	013	115	6.1	.6738+03	.8394+03	-11.5
011600	009	117	5.9	.6713+03	.8369+03	-11.7
011700	008	107	5.7	.6688+03	.8344+03	-11.9
011800	012	118	5.5	.6663+03	.8319+03	-12.0
011900	010	126	5.3	.6639+03	.8295+03	-12.2
012000	006	125	5.1	.6614+03	.8270+03	-12.4
012100	009	119	4.8	.6590+03	.8247+03	-12.6
012200	011	128	4.5	.6565+03	.8225+03	-12.8
012300	008	133	4.3	.6540+03	.8203+03	-13.0
012400	006	122	4.0	.6516+03	.8180+03	-13.2
012500	011	130	3.7	.6492+03	.8158+03	-13.4
012600	008	145	3.4	.6467+03	.8136+03	-13.6
012700	004	149	3.1	.6443+03	.8114+03	-13.8
012800	004	126	2.9	.6419+03	.8092+03	-14.0
012900	006	145	2.6	.6395+03	.8070+03	-14.2
013000	001	156	2.3	.6371+03	.8048+03	-14.4
013100	002	110	2.2	.6347+03	.8022+03	-14.6
013200	004	149	2.0	.6323+03	.7997+03	-14.8
013300	002	173	1.8	.6299+03	.7971+03	-15.0
013400	003	131	1.7	.6276+03	.7945+03	-15.2
013500	007	133	1.5	.6252+03	.7920+03	-15.4
013600	007	153	1.4	.6228+03	.7894+03	-15.7
013700	007	149	1.3	.6205+03	.7869+03	-15.9
013800	013	153	1.1	.6182+03	.7844+03	-16.1
013900	012	153	.9	.6158+03	.7819+03	-16.3
014000	013	162	.8	.6136+03	.7794+03	-16.5
014100	016	160	.7	.6112+03	.7766+03	-16.6
014200	015	163	.7	.6089+03	.7739+03	-16.7
014300	011	164	.6	.6066+03	.7712+03	-16.9
014400	014	149	.5	.6043+03	.7684+03	-17.0
014500	013	150	.5	.6020+03	.7657+03	-17.1
014600	010	150	.4	.5997+03	.7630+03	-17.2
014700	013	156	.3	.5975+03	.7604+03	-17.3
014800	013	170	.2	.5952+03	.7577+03	-17.5
014900	010	173	.2	.5930+03	.7550+03	-17.6

TABLE 5. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
015000	013	169	-.1	.5907+03	.7524+03	-17.7
015100	014	177	-.1	.5885+03	.7501+03	-17.9
015200	012	175	-.3	.5862+03	.7479+03	-18.0
015300	015	171	-.6	.5840+03	.7456+03	-18.2
015400	015	175	-.8	.5818+03	.7434+03	-18.3
015500	014	176	-1.0	.5796+03	.7412+03	-18.5
015600	013	175	-1.2	.5774+03	.7390+03	-18.7
015700	015	181	-1.4	.5752+03	.7368+03	-18.8
015800	015	180	-1.7	.5730+03	.7346+03	-19.0
015900	016	178	-1.9	.5708+03	.7324+03	-19.1
016000	012	182	-2.1	.5686+03	.7302+03	-19.3
016100	014	180	-2.3	.5665+03	.7281+03	-19.5
016200	014	185	-2.6	.5643+03	.7260+03	-19.7
016300	011	183	-2.8	.5621+03	.7239+03	-19.9
016400	014	180	-3.1	.5600+03	.7218+03	-20.1
016500	013	187	-3.3	.5578+03	.7197+03	-20.3
016600	011	181	-3.6	.5557+03	.7176+03	-20.5
016700	014	177	-3.8	.5536+03	.7155+03	-20.7
016800	012	186	-4.1	.5514+03	.7134+03	-20.9
016900	010	188	-4.3	.5493+03	.7114+03	-21.1
017000	012	189	-4.6	.5472+03	.7093+03	-21.3
017100	012	204	-4.8	.5451+03	.7072+03	-21.5
017200	010	218	-5.1	.5430+03	.7051+03	-21.7
017300	011	205	-5.3	.5409+03	.7031+03	-21.9
017400	012	210	-5.6	.5388+03	.7010+03	-22.1
017500	010	214	-5.8	.5367+03	.6990+03	-22.3
017600	012	204	-6.1	.5346+03	.6969+03	-22.6
017700	013	210	-6.3	.5325+03	.6949+03	-22.8
017800	011	229	-6.6	.5305+03	.6928+03	-23.0
017900	012	213	-6.8	.5284+03	.6908+03	-23.2
018000	012	218	-7.1	.5264+03	.6888+03	-23.4
018100	009	230	-7.3	.5243+03	.6867+03	-23.6
018200	011	220	-7.6	.5223+03	.6847+03	-23.8
018300	010	236	-7.8	.5202+03	.6827+03	-24.0
018400	008	236	-8.1	.5182+03	.6807+03	-24.2
018500	010	232	-8.3	.5162+03	.6787+03	-24.4
018600	008	254	-8.6	.5142+03	.6766+03	-24.6
018700	007	249	-8.8	.5122+03	.6746+03	-24.8
018800	009	263	-9.1	.5101+03	.6727+03	-25.0
018900	006	274	-9.3	.5082+03	.6707+03	-25.2
019000	005	248	-9.6	.5062+03	.6687+03	-25.4
019100	006	258	-9.8	.5042+03	.6665+03	-25.6
019200	005	274	-9.9	.5022+03	.6643+03	-25.7
019300	006	251	-10.1	.5002+03	.6621+03	-25.9
019400	007	258	-10.3	.4982+03	.6599+03	-26.1
019500	007	260	-10.4	.4963+03	.6578+03	-26.2
019600	009	240	-10.6	.4943+03	.6556+03	-26.4
019700	011	270	-10.8	.4924+03	.6535+03	-26.6
019800	010	281	-11.0	.4904+03	.6513+03	-26.8
019900	011	272	-11.1	.4885+03	.6492+03	-26.9

TABLE 5. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
020000	013	288	-11.3	.4866+03	.6470+03	-27.1
020100	011	298	-11.5	.4847+03	.6449+03	-27.3
020200	011	298	-11.7	.4827+03	.6428+03	-27.4
020300	014	302	-11.9	.4808+03	.6408+03	-27.6
020400	013	308	-12.1	.4789+03	.6387+03	-27.7
020500	015	308	-12.2	.4770+03	.6366+03	-27.9
020600	016	310	-12.4	.4751+03	.6346+03	-28.1
020700	013	321	-12.6	.4732+03	.6325+03	-28.2
020800	014	316	-12.8	.4714+03	.6305+03	-28.4
020900	018	317	-13.0	.4695+03	.6284+03	-28.5
021000	015	330	-13.2	.4676+03	.6264+03	-28.7
021100	014	324	-13.4	.4658+03	.6244+03	-28.8
021200	016	327	-13.7	.4639+03	.6225+03	-29.0
021300	014	333	-13.9	.4620+03	.6206+03	-29.1
021400	010	325	-14.1	.4602+03	.6186+03	-29.3
021500	010	322	-14.3	.4584+03	.6167+03	-29.4
021600	011	338	-14.6	.4565+03	.6148+03	-29.6
021700	009	346	-14.8	.4547+03	.6129+03	-29.7
021800	009	352	-15.0	.4528+03	.6110+03	-29.9
021900	013	358	-15.3	.4511+03	.6091+03	-30.0
022000	012	004	-15.5	.4493+03	.6072+03	-30.2
022100	013	347	-15.6	.4475+03	.6054+03	-30.4
022200	015	350	-16.0	.4457+03	.6035+03	-30.6
022300	013	348	-16.3	.4439+03	.6017+03	-30.8
022400	014	337	-16.6	.4421+03	.5999+03	-31.0
022500	016	342	-16.8	.4403+03	.5981+03	-31.2
022600	014	347	-17.1	.4385+03	.5963+03	-31.4
022700	015	336	-17.3	.4367+03	.5945+03	-31.6
022800	017	338	-17.6	.4350+03	.5927+03	-31.8
022900	015	340	-17.8	.4332+03	.5909+03	-32.0
023000	016	333	-18.1	.4315+03	.5891+03	-32.2
023100	018	335	-18.3	.4297+03	.5873+03	-32.4
023200	016	339	-18.6	.4280+03	.5855+03	-32.6
023300	018	332	-18.8	.4262+03	.5836+03	-32.8
023400	019	337	-19.1	.4245+03	.5818+03	-33.0
023500	017	335	-19.3	.4228+03	.5800+03	-33.1
023600	018	330	-19.5	.4210+03	.5782+03	-33.3
023700	018	331	-19.8	.4193+03	.5763+03	-33.5
023800	017	322	-20.0	.4176+03	.5745+03	-33.7
023900	018	327	-20.3	.4159+03	.5727+03	-33.9
024000	014	329	-20.5	.4142+03	.5710+03	-34.1
024100	017	322	-20.7	.4125+03	.5691+03	-34.3
024200	020	321	-20.9	.4108+03	.5672+03	-34.4
024300	019	317	-21.1	.4091+03	.5653+03	-34.6
024400	022	315	-21.3	.4074+03	.5634+03	-34.7
024500	022	319	-21.5	.4058+03	.5615+03	-34.9
024600	025	319	-21.7	.4041+03	.5597+03	-35.1
024700	028	318	-21.9	.4024+03	.5578+03	-35.2
024800	028	315	-22.1	.4006+03	.5560+03	-35.4
024900	032	315	-22.3	.3991+03	.5541+03	-35.5

TABLE 5. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
025000	030	320	-22.6	.3975+03	.5523+03	-35.7
025100	031	316	-22.7	.3958+03	.5505+03	-35.9
025200	035	319	-23.0	.3942+03	.5487+03	-36.0
025300	032	318	-23.2	.3926+03	.5470+03	-36.2
025400	035	314	-23.4	.3909+03	.5452+03	-36.4
025500	034	317	-23.6	.3893+03	.5434+03	-36.5
025600	034	314	-23.9	.3877+03	.5417+03	-36.7
025700	034	316	-24.1	.3861+03	.5399+03	-36.9
025800	032	316	-24.3	.3845+03	.5382+03	-37.1
025900	033	316	-24.6	.3829+03	.5365+03	-37.2
026000	032	316	-24.8	.3813+03	.5347+03	-37.4
026100	031	309	-25.0	.3797+03	.5329+03	-37.6
026200	031	313	-25.2	.3781+03	.5311+03	-37.8
026300	027	308	-25.4	.3765+03	.5293+03	-37.9
026400	026	309	-25.6	.3750+03	.5275+03	-38.1
026500	023	312	-25.7	.3734+03	.5257+03	-38.3
026600	025	307	-25.9	.3718+03	.5239+03	-38.5
026700	023	313	-26.1	.3703+03	.5221+03	-38.7
026800	021	311	-26.3	.3687+03	.5203+03	-38.8
026900	021	299	-26.5	.3672+03	.5186+03	-39.0
027000	018	304	-26.7	.3657+03	.5168+03	-39.2
027100	018	302	-26.9	.3641+03	.5151+03	-39.4
027200	021	301	-27.2	.3626+03	.5134+03	-39.6
027300	021	307	-27.4	.3611+03	.5117+03	-39.8
027400	022	304	-27.6	.3595+03	.5100+03	-40.0
027500	022	308	-27.8	.3580+03	.5084+03	-40.2
027600	021	301	-28.1	.3565+03	.5067+03	-40.4
027700	022	302	-28.3	.3550+03	.5050+03	-40.6
027800	019	296	-28.5	.3535+03	.5034+03	-40.8
027900	021	284	-28.8	.3520+03	.5017+03	-41.0
028000	021	283	-29.0	.3505+03	.5001+03	-41.2
028100	022	273	-29.3	.3491+03	.4985+03	-41.4
028200	022	277	-29.5	.3476+03	.4969+03	-41.6
028300	021	271	-29.8	.3461+03	.4954+03	-41.8
028400	023	271	-30.1	.3446+03	.4938+03	-42.0
028500	023	275	-30.3	.3431+03	.4923+03	-42.2
028600	023	270	-30.6	.3417+03	.4907+03	-42.5
028700	024	275	-30.9	.3402+03	.4892+03	-42.7
028800	023	271	-31.2	.3388+03	.4876+03	-42.9
028900	024	270	-31.4	.3373+03	.4861+03	-43.1
029000	024	275	-31.7	.3359+03	.4846+03	-43.3
029100	024	271	-32.0	.3345+03	.4830+03	-43.5
029200	024	274	-32.3	.3330+03	.4815+03	-43.7
029300	022	271	-32.5	.3316+03	.4800+03	-44.0
029400	024	273	-32.8	.3302+03	.4785+03	-44.2
029500	022	276	-33.1	.3287+03	.4770+03	-44.4
029600	022	272	-33.4	.3273+03	.4755+03	-44.6
029700	024	274	-33.7	.3259+03	.4740+03	-44.8
029800	022	272	-33.9	.3245+03	.4725+03	-45.1
029900	023	270	-34.2	.3231+03	.4710+03	-45.3

TABLE 5. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
030000	021	273	-34.6	.3217+03	.4696+03	-45.5
030100	023	271	-34.8	.3203+03	.4680+03	-45.7
030200	024	275	-35.0	.3189+03	.4665+03	-46.0
030300	023	271	-35.3	.3175+03	.4650+03	-46.2
030400	024	272	-35.5	.3161+03	.4635+03	-46.4
030500	022	273	-35.8	.3148+03	.4620+03	-46.6
030600	023	270	-36.1	.3134+03	.4604+03	-46.9
030700	023	276	-36.3	.3120+03	.4589+03	-47.1
030800	022	271	-36.6	.3107+03	.4575+03	-47.3
030900	024	275	-36.8	.3093+03	.4560+03	-47.6
031000	023	277	-37.1	.3080+03	.4545+03	-47.8
031100	025	277	-37.4	.3066+03	.4530+03	-47.9
031200	023	279	-37.7	.3053+03	.4516+03	-48.1
031300	024	275	-37.9	.3039+03	.4501+03	-48.2
031400	024	279	-38.2	.3026+03	.4486+03	-48.4
031500	021	275	-38.5	.3013+03	.4472+03	-48.5
031600	022	281	-38.8	.2999+03	.4458+03	-48.7
031700	023	274	-39.1	.2986+03	.4443+03	-48.8
031800	025	279	-39.3	.2973+03	.4429+03	-49.0
031900	025	275	-39.6	.2960+03	.4415+03	-49.1
032000	027	275	-39.9	.2947+03	.4401+03	-49.3
032100	026	277	-40.1	.2934+03	.4385+03	-49.2
032200	026	274	-40.4	.2921+03	.4370+03	-49.1
032300	027	277	-40.6	.2908+03	.4355+03	-49.0
032400	025	277	-40.8	.2895+03	.4340+03	-48.9
032500	028	279	-41.0	.2882+03	.4325+03	-48.8
032600	028	283	-41.3	.2869+03	.4310+03	-48.6
032700	028	284	-41.5	.2856+03	.4295+03	-48.5
032800	031	289	-41.7	.2843+03	.4280+03	-48.4
032900	031	288	-42.0	.2831+03	.4265+03	-48.3
033000	033	288	-42.2	.2818+03	.4250+03	-48.2
033100	033	288	-42.5	.2805+03	.4236+03	-48.1
033200	033	285	-42.7	.2793+03	.4222+03	-47.9
033300	034	289	-43.0	.2780+03	.4208+03	-47.8
033400	033	288	-43.3	.2768+03	.4194+03	-47.7
033500	034	288	-43.5	.2755+03	.4180+03	-47.6
033600	032	292	-43.8	.2743+03	.4166+03	-47.4
033700	030	291	-44.1	.2731+03	.4152+03	-47.3
033800	032	291	-44.4	.2718+03	.4138+03	-47.2
033900	030	297	-44.6	.2706+03	.4125+03	-47.0
034000	029	296	-44.9	.2694+03	.4111+03	-46.9
034100	032	296	-45.1	.2682+03	.4097+03	-47.2
034200	030	300	-45.4	.2669+03	.4082+03	-47.4
034300	031	295	-45.6	.2657+03	.4068+03	-47.7
034400	031	297	-45.9	.2645+03	.4054+03	-46.0
034500	030	300	-46.1	.2633+03	.4039+03	-48.2
034600	031	297	-46.3	.2621+03	.4025+03	-48.5
034700	033	295	-46.6	.2609+03	.4011+03	-48.8
034800	031	295	-46.8	.2597+03	.3997+03	-49.1
034900	033	293	-47.1	.2585+03	.3983+03	-49.3

TABLE 5. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
035000	030	294	-47.3	.2578+03	.3969+03	-49.6
035100	032	292	-47.5	.2562+03	.3955+03	-49.9
035200	034	295	-47.7	.2550+03	.3940+03	-50.1
035300	034	295	-47.9	.2538+03	.3925+03	-50.4
035400	032	295	-48.1	.2527+03	.3911+03	-50.6
035500	035	293	-48.3	.2515+03	.3896+03	-50.9
035600	034	300	-48.5	.2503+03	.3882+03	-51.2
035700	032	304	-48.7	.2492+03	.3867+03	-51.4
035800	033	302	-48.9	.2481+03	.3853+03	-51.7
035900	033	302	-49.1	.2469+03	.3839+03	-51.9
036000	033	299	-49.3	.2458+03	.3825+03	-52.2
036100	035	296	-49.5	.2446+03	.3811+03	-52.4
036200	033	302	-49.8	.2435+03	.3797+03	-52.7
036300	032	298	-50.0	.2424+03	.3784+03	-52.9
036400	035	299	-50.3	.2412+03	.3770+03	-53.2
036500	034	302	-50.5	.2401+03	.3757+03	-53.4
036600	039	302	-50.7	.2390+03	.3744+03	-53.6
036700	042	301	-51.0	.2379+03	.3730+03	-53.9
036800	043	298	-51.2	.2368+03	.3717+03	-54.1
036900	043	301	-51.5	.2357+03	.3704+03	-54.4
037000	047	297	-51.7	.2346+03	.3690+03	-54.6
037100	046	299	-51.9	.2335+03	.3677+03	-54.8
037200	048	298	-52.2	.2324+03	.3664+03	-55.1
037300	048	298	-52.4	.2313+03	.3651+03	-55.3
037400	047	297	-52.7	.2302+03	.3638+03	-55.6
037500	049	300	-52.9	.2292+03	.3625+03	-55.8
037600	048	299	-53.2	.2281+03	.3612+03	-56.1
037700	050	298	-53.4	.2270+03	.3599+03	-56.3
037800	049	300	-53.7	.2259+03	.3587+03	-56.6
037900	050	298	-53.9	.2249+03	.3574+03	-56.8
038000	051	299	-54.2	.2238+03	.3561+03	-57.1
038100	051	301	-54.3	.2228+03	.3545+03	-57.6
038200	051	301	-54.3	.2217+03	.3530+03	-58.0
038300	053	304	-54.4	.2207+03	.3514+03	-58.5
038400	053	307	-54.5	.2196+03	.3499+03	-59.0
038500	056	305	-54.5	.2186+03	.3483+03	-59.4
038600	062	307	-54.6	.2176+03	.3468+03	-59.9
038700	062	306	-54.7	.2165+03	.3453+03	-60.4
038800	065	304	-54.8	.2155+03	.3438+03	-60.9
038900	066	305	-54.8	.2145+03	.3423+03	-61.3
039000	068	305	-54.9	.2135+03	.3407+03	-61.8
039100	071	306	-55.0	.2125+03	.3392+03	-61.9
039200	070	305	-55.0	.2115+03	.3377+03	-62.2
039300	073	303	-55.1	.2105+03	.3362+03	-62.1
039400	074	304	-55.2	.2095+03	.3348+03	-62.2
039500	076	302	-55.2	.2085+03	.3333+03	-62.2
039600	077	301	-55.3	.2075+03	.3318+03	-62.3
039700	076	304	-55.4	.2065+03	.3303+03	-62.4
039800	076	305	-55.5	.2055+03	.3289+03	-62.5
039900	075	306	-55.5	.2045+03	.3274+03	-62.6

TABLE 5. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
040000	075	306	-55.6	.2036+03	.3260+03	-62.7
040100	076	306	-55.8	.2026+03	.3247+03	-62.7
040200	076	306	-56.0	.2016+03	.3234+03	-62.7
040300	077	304	-56.2	.2007+03	.3222+03	-62.7
040400	077	304	-56.4	.1997+03	.3209+03	-62.7
040500	077	304	-56.5	.1988+03	.3197+03	-62.7
040600	078	303	-56.7	.1976+03	.3184+03	-62.7
040700	076	305	-56.9	.1969+03	.3172+03	-62.7
040800	074	305	-57.1	.1959+03	.3160+03	-62.7
040900	075	306	-57.3	.1950+03	.3147+03	-62.7
041000	071	306	-57.5	.1941+03	.3135+03	-62.7
041100	073	307	-57.7	.1931+03	.3123+03	-9999.
041200	071	307	-57.9	.1922+03	.3111+03	-9999.
041300	071	307	-58.1	.1913+03	.3099+03	-9999.
041400	070	308	-58.3	.1904+03	.3087+03	-9999.
041500	070	308	-58.5	.1895+03	.3075+03	-9999.
041600	071	305	-58.7	.1885+03	.3063+03	-9999.
041700	072	303	-58.9	.1876+03	.3051+03	-9999.
041800	070	301	-59.1	.1867+03	.3039+03	-9999.
041900	072	302	-59.3	.1858+03	.3027+03	-9999.
042000	072	301	-59.5	.1849+03	.3016+03	-9999.
042100	070	301	-59.6	.1840+03	.3003+03	-9999.
042200	071	302	-59.8	.1832+03	.2991+03	-9999.
042300	070	303	-59.9	.1823+03	.2978+03	-9999.
042400	069	302	-60.1	.1814+03	.2966+03	-9999.
042500	071	299	-60.3	.1805+03	.2954+03	-9999.
042600	069	300	-60.4	.1796+03	.2941+03	-9999.
042700	072	299	-60.5	.1788+03	.2929+03	-9999.
042800	073	301	-60.7	.1779+03	.2917+03	-9999.
042900	072	304	-60.8	.1770+03	.2905+03	-9999.
043000	072	303	-61.0	.1762+03	.2893+03	-9999.
043100	074	304	-61.1	.1753+03	.2880+03	-9999.
043200	074	306	-61.2	.1745+03	.2868+03	-9999.
043300	073	308	-61.3	.1736+03	.2855+03	-9999.
043400	075	309	-61.4	.1728+03	.2843+03	-9999.
043500	073	310	-61.5	.1719+03	.2830+03	-9999.
043600	072	309	-61.7	.1711+03	.2818+03	-9999.
043700	071	314	-61.8	.1702+03	.2806+03	-9999.
043800	068	315	-61.9	.1694+03	.2793+03	-9999.
043900	064	314	-62.0	.1686+03	.2781+03	-9999.
044000	065	312	-62.1	.1678+03	.2769+03	-9999.
044100	066	315	-62.2	.1669+03	.2757+03	-9999.
044200	065	312	-62.3	.1661+03	.2745+03	-9999.
044300	067	312	-62.5	.1653+03	.2733+03	-9999.
044400	066	315	-62.6	.1645+03	.2721+03	-9999.
044500	066	313	-62.7	.1637+03	.2710+03	-9999.
044600	068	312	-62.8	.1629+03	.2698+03	-9999.
044700	068	314	-62.9	.1621+03	.2686+03	-9999.
044800	064	311	-63.1	.1613+03	.2674+03	-9999.
044900	065	308	-63.2	.1605+03	.2663+03	-9999.

TABLE 5. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
045000	062	309	-63.3	.1597+03	.2651+03	-9999.
045100	062	306	-63.4	.1589+03	.2640+03	-9999.
045200	063	308	-63.6	.1581+03	.2628+03	-9999.
045300	063	310	-63.7	.1574+03	.2617+03	-9999.
045400	060	308	-63.8	.1566+03	.2606+03	-9999.
045500	062	311	-63.9	.1558+03	.2595+03	-9999.
045600	062	312	-64.1	.1550+03	.2583+03	-9999.
045700	057	315	-64.2	.1543+03	.2572+03	-9999.
045800	054	317	-64.3	.1535+03	.2561+03	-9999.
045900	055	315	-64.5	.1528+03	.2550+03	-9999.
046000	050	316	-64.6	.1520+03	.2539+03	-9999.
046100	045	319	-64.8	.1512+03	.2529+03	-9999.
046200	042	312	-65.0	.1505+03	.2518+03	-9999.
046300	041	314	-65.1	.1497+03	.2508+03	-9999.
046400	038	312	-65.3	.1490+03	.2498+03	-9999.
046500	038	312	-65.5	.1483+03	.2487+03	-9999.
046600	037	308	-65.7	.1475+03	.2477+03	-9999.
046700	037	307	-65.9	.1466+03	.2467+03	-9999.
046800	036	310	-66.0	.1461+03	.2457+03	-9999.
046900	035	304	-66.2	.1453+03	.2447+03	-9999.
047000	036	301	-66.4	.1446+03	.2437+03	-9999.
047100	036	298	-66.7	.1439+03	.2428+03	-9999.
047200	035	298	-66.9	.1432+03	.2418+03	-9999.
047300	035	299	-67.2	.1425+03	.2409+03	-9999.
047400	037	295	-67.4	.1417+03	.2400+03	-9999.
047500	035	293	-67.7	.1410+03	.2391+03	-9999.
047600	037	286	-68.0	.1403+03	.2382+03	-9999.
047700	041	288	-68.2	.1396+03	.2373+03	-9999.
047800	043	286	-68.5	.1389+03	.2364+03	-9999.
047900	041	286	-68.7	.1382+03	.2356+03	-9999.
048000	043	282	-69.0	.1375+03	.2347+03	-9999.
048100	043	285	-69.1	.1366+03	.2336+03	-9999.
048200	044	279	-69.3	.1361+03	.2326+03	-9999.
048300	046	277	-69.4	.1354+03	.2316+03	-9999.
048400	052	274	-69.6	.1348+03	.2306+03	-9999.
048500	050	272	-69.8	.1341+03	.2296+03	-9999.
048600	053	271	-69.9	.1334+03	.2286+03	-9999.
048700	053	274	-70.0	.1327+03	.2276+03	-9999.
048800	055	275	-70.2	.1320+03	.2266+03	-9999.
048900	052	276	-70.3	.1314+03	.2257+03	-9999.
049000	051	279	-70.5	.1307+03	.2247+03	-9999.
049100	050	287	-70.5	.1300+03	.2235+03	-9999.
049200	055	284	-70.4	.1294+03	.2223+03	-9999.
049300	050	295	-70.4	.1287+03	.2212+03	-9999.
049400	046	296	-70.4	.1281+03	.2200+03	-9999.
049500	042	303	-70.4	.1274+03	.2189+03	-9999.
049600	041	305	-70.3	.1268+03	.2177+03	-9999.
049700	035	313	-70.3	.1261+03	.2166+03	-9999.
049800	033	318	-70.3	.1255+03	.2154+03	-9999.
049900	029	329	-70.2	.1248+03	.2143+03	-9999.

TABLE 5. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
050000	027	340	-70.2	.1242+03	.2132+03	-9999.
050100	022	341	-70.2	.1236+03	.2121+03	-9999.
050200	016	332	-70.3	.1229+03	.2111+03	-9999.
050300	010	344	-70.3	.1223+03	.2101+03	-9999.
050400	009	332	-70.4	.1217+03	.2090+03	-9999.
050500	009	336	-70.4	.1211+03	.2080+03	-9999.
050600	011	317	-70.4	.1205+03	.2070+03	-9999.
050700	014	313	-70.5	.1199+03	.2060+03	-9999.
050800	011	319	-70.5	.1192+03	.2050+03	-9999.
050900	018	288	-70.6	.1186+03	.2040+03	-9999.
051000	020	297	-70.6	.1180+03	.2030+03	-9999.
051100	016	308	-70.7	.1174+03	.2020+03	-9999.
051200	025	291	-70.7	.1168+03	.2010+03	-9999.
051300	028	292	-70.6	.1162+03	.2001+03	-9999.
051400	032	288	-70.8	.1156+03	.1991+03	-9999.
051500	028	306	-70.9	.1150+03	.1982+03	-9999.
051600	030	289	-71.0	.1145+03	.1972+03	-9999.
051700	024	296	-71.0	.1139+03	.1963+03	-9999.
051800	020	289	-71.1	.1133+03	.1953+03	-9999.
051900	020	281	-71.1	.1127+03	.1944+03	-9999.
052000	019	274	-71.2	.1121+03	.1934+03	-9999.
052100	027	267	-71.2	.1116+03	.1924+03	-9999.
052200	022	287	-71.2	.1110+03	.1914+03	-9999.
052300	029	292	-71.1	.1104+03	.1904+03	-9999.
052400	033	285	-71.1	.1099+03	.1894+03	-9999.
052500	033	282	-71.1	.1093+03	.1885+03	-9999.
052600	033	285	-71.1	.1087+03	.1875+03	-9999.
052700	023	268	-71.1	.1082+03	.1865+03	-9999.
052800	026	277	-71.0	.1076+03	.1855+03	-9999.
052900	028	293	-71.0	.1071+03	.1846+03	-9999.
053000	026	277	-71.0	.1065+03	.1836+03	-9999.
053100	025	280	-70.9	.1060+03	.1826+03	-9999.
053200	030	295	-70.8	.1055+03	.1816+03	-9999.
053300	035	293	-70.7	.1049+03	.1806+03	-9999.
053400	034	299	-70.6	.1044+03	.1795+03	-9999.
053500	032	301	-70.5	.1039+03	.1785+03	-9999.
053600	032	301	-70.4	.1033+03	.1775+03	-9999.
053700	031	297	-70.3	.1028+03	.1766+03	-9999.
053800	024	334	-70.2	.1023+03	.1756+03	-9999.
053900	033	304	-70.1	.1018+03	.1746+03	-9999.
054000	034	301	-70.0	.1012+03	.1736+03	-9999.
054100	033	312	-69.9	.1007+03	.1727+03	-9999.
054200	032	305	-69.8	.1002+03	.1717+03	-9999.
054300	035	309	-69.7	.9972+02	.1707+03	-9999.
054400	031	302	-69.6	.9921+02	.1698+03	-9999.
054500	027	305	-69.5	.9871+02	.1689+03	-9999.
054600	021	328	-69.4	.9821+02	.1679+03	-9999.
054700	020	303	-69.3	.9771+02	.1670+03	-9999.
054800	018	299	-69.2	.9721+02	.1661+03	-9999.
054900	014	296	-69.1	.9672+02	.1651+03	-9999.

TABLE 5. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
055000	017	282	-69.4	.9623+02	.1642+03	-9999.
055100	017	269	-69.5	.9574+02	.1634+03	-9999.
055200	013	269	-69.5	.9526+02	.1626+03	-9999.
055300	007	281	-69.1	.9478+02	.1618+03	-9999.
055400	009	280	-69.1	.9430+02	.1610+03	-9999.
055500	010	290	-69.1	.9382+02	.1602+03	-9999.
055600	015	282	-69.1	.9335+02	.1594+03	-9999.
055700	019	274	-69.1	.9288+02	.1586+03	-9999.
055800	018	266	-69.2	.9241+02	.1578+03	-9999.
055900	022	260	-69.2	.9194+02	.1570+03	-9999.
056000	018	264	-69.2	.9148+02	.1563+03	-9999.
057000	017	268	-68.8	.8696+02	.1482+03	-9999.
058000	016	250	-66.6	.8249+02	.1396+03	-9999.
059000	015	247	-66.6	.7865+02	.1328+03	-9999.
060000	014	277	-66.3	.7482+02	.1260+03	-9999.
061000	012	313	-64.5	.7119+02	.1189+03	-9999.
062000	006	323	-62.7	.6776+02	.1122+03	-9999.
063000	004	229	-62.2	.6452+02	.1065+03	-9999.
064000	009	224	-63.0	.6143+02	.1018+03	-9999.
5000	010	251	-63.4	.5849+02	.9714+02	-9999.
066000	010	283	-61.2	.5569+02	.9153+02	-9999.
067000	008	301	-59.8	.5305+02	.8662+02	-9999.
068000	007	328	-60.0	.5054+02	.8260+02	-9999.
069000	005	018	-60.4	.4815+02	.7884+02	-9999.
070000	007	059	-59.8	.4587+02	.7497+02	-9999.
071000	008	078	-59.2	.4371+02	.7117+02	-9999.
072000	007	088	-59.0	.4165+02	.6775+02	-9999.
073000	008	098	-57.8	.3970+02	.6422+02	-9999.
074000	013	107	-57.4	.3784+02	.6113+02	-9999.
075000	017	108	-57.4	.3607+02	.5824+02	-9999.
076000	020	101	-57.4	.3439+02	.5553+02	-9999.
077000	022	093	-56.5	.3279+02	.5273+02	-9999.
078000	027	089	-55.2	.3127+02	.4998+02	-9999.
079000	032	092	-55.4	.2982+02	.4771+02	-9999.
080000	033	097	-55.1	.2844+02	.4544+02	-9999.
081000	032	101	-54.3	.2713+02	.4319+02	-9999.
082000	029	104	-53.7	.2588+02	.4108+02	-9999.
083000	025	103	-53.7	.2470+02	.3921+02	-9999.
084000	024	098	-52.4	.2357+02	.3720+02	-9999.
085000	023	092	-51.7	.2249+02	.3538+02	-9999.
086000	023	087	-51.1	.2147+02	.3368+02	-9999.
087000	026	081	-51.1	.2050+02	.3202+02	-9999.
088000	031	081	-49.4	.1956+02	.3049+02	-9999.
089000	033	082	-49.1	.1869+02	.2906+02	-9999.
090000	034	084	-48.8	.1786+02	.2773+02	-9999.
091000	035	086	-48.5	.1706+02	.2646+02	-9999.
092000	039	092	-48.2	.1624+02	.2515+02	-9999.
093000	042	094	-48.0	.1546+02	.2392+02	-9999.
094000	047	095	-47.7	.1471+02	.2273+02	-9999.
095000	042	095	-47.6	.1400+02	.2162+02	-9999.

TABLE 5. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
096000	038	088	-47.6	.1333+02	.2057+02	-9999.
097000	033	090	-47.4	.1273+02	.1964+02	-9999.
098000	030	083	-47.1	.1216+02	.1874+02	-9999.
099000	027	075	-46.8	.1162+02	.1783+02	-9999.
100000	031	067	-45.0	.1111+02	.1696+02	-9999.
101000	021	062	-44.3	.1062+02	.1616+02	-9999.
102000	027	068	-44.2	.1015+02	.1545+02	-9999.
103000	035	077	-44.3	.9707+01	.1478+02	-9999.
104000	038	082	-44.4	.9280+01	.1414+02	-9999.
105000	037	090	-44.1	.8872+01	.1349+02	-9999.
106000	028	091	-42.9	.8484+01	.1284+02	-9999.
107000	021	077	-41.9	.8114+01	.1222+02	-9999.
108000	021	058	-41.3	.7761+01	.1166+02	-9999.
109000	027	059	-40.8	.7425+01	.1113+02	-9999.
110000	033	069	-40.2	.7104+01	.1062+02	-9999.
111000	040	080	-39.6	.6798+01	.1014+02	-9999.
112000	047	090	-39.0	.6505+01	.9676+01	-9999.
113000	050	104	-38.2	.6226+01	.9234+01	-9999.
114000	050	116	-37.4	.5960+01	.8806+01	-9999.
115000	048	126	-36.4	.5707+01	.8398+01	-9999.
116000	043	135	-35.5	.5465+01	.8010+01	-9999.
117000	038	142	-34.6	.5234+01	.7642+01	-9999.
118000	035	141	-33.7	.5013+01	.7293+01	-9999.
119000	033	139	-32.8	.4803+01	.6963+01	-9999.
120000	023	144	-32.0	.4603+01	.6649+01	-9999.
121000	015	144	-31.2	.4411+01	.6351+01	-9999.
122000	006	114	-31.0	.4228+01	.6082+01	-9999.
123000	006	011	-31.1	.4052+01	.5832+01	-9999.
124000	010	006	-31.2	.3884+01	.5592+01	-9999.
125000	008	043	-31.4	.3722+01	.5363+01	-9999.
126000	010	063	-31.2	.3567+01	.5136+01	-9999.
127000	013	064	-30.5	.3420+01	.4909+01	-9999.
128000	015	066	-29.8	.3278+01	.4693+01	-9999.
129000	015	097	-29.2	.3143+01	.4487+01	-9999.
130000	013	096	-28.5	.3012+01	.4317+01	-9999.
131000	011	112	-27.9	.2936+01	.4171+01	-9999.
132000	013	150	-27.3	.2866+01	.4053+01	-9999.
133000	016	166	-26.7	.2787+01	.3939+01	-9999.
134000	016	167	-27.2	.2715+01	.3845+01	-9999.
135000	023	183	-26.2	.2645+01	.3761+01	-9999.
136000	010	200	-25.3	.2577+01	.3627+01	-9999.
137000	016	238	-22.2	.2511+01	.3465+01	-9999.
138000	023	241	-25.1	.2446+01	.3449+01	-9999.
139000	015	233	-25.6	.2383+01	.3423+01	-9999.
140000	022	229	-27.5	.2322+01	.3382+01	-9999.
141000	025	245	-27.8	.2262+01	.3212+01	-9999.
142000	016	246	-32.2	.2166+01	.3134+01	-9999.
143000	015	249	-27.6	.2079+01	.2949+01	-9999.
144000	021	273	-28.1	.1995+01	.2769+01	-9999.
145000	027	259	-28.2	.1916+01	.2638+01	-9999.

TABLE 5. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
146000	038	227	-18.2	.1640+01	.2510+01	-9999.
147000	048	225	-18.2	.1768+01	.2415+01	-9999.
148000	040	254	-16.5	.1699+01	.2306+01	-9999.
149000	042	302	-19.4	.1632+01	.2241+01	-9999.
150000	045	331	-22.2	.1567+01	.2175+01	-9999.
151000	037	352	-18.8	.1505+01	.2061+01	-9999.
152000	028	024	-14.8	.1446+01	.1950+01	-9999.
153000	035	045	-15.4	.1390+01	.1879+01	-9999.
154000	048	042	-17.2	.1336+01	.1818+01	-9999.
155000	057	040	-13.8	.1284+01	.1725+01	-9999.
156000	050	045	-13.2	.1235+01	.1659+01	-9999.
157000	035	058	-14.2	.1187+01	.1596+01	-9999.
158000	021	082	-11.6	.1141+01	.1520+01	-9999.
159000	020	102	-11.2	.1097+01	.1459+01	-9999.
160000	021	137	-12.9	.1055+01	.1413+01	-9999.
161000	023	101	-16.9	.1015+01	.1379+01	-9999.
162000	020	088	-17.2	.9788+00	.1327+01	-9999.
163000	020	069	-15.4	.9368+00	.1266+01	-9999.
164000	023	056	-14.2	.9006+00	.1211+01	-9999.
165000	027	052	-17.4	.8656+00	.1179+01	-9999.
166000	027	050	-18.2	.8316+00	.1136+01	-9999.
167000	023	052	-13.8	.7992+00	.1074+01	-9999.
168000	016	054	-11.2	.7687+00	.1022+01	-9999.
169000	013	055	-12.7	.7392+00	.9866+00	-9999.
170000	016	048	-11.1	.7109+00	.9450+00	-9999.
171000	025	038	-10.2	.6837+00	.9058+00	-9999.
172000	032	042	-9.5	.6579+00	.8691+00	-9999.
173000	033	052	-14.7	.6327+00	.8528+00	-9999.
174000	032	069	-18.3	.6080+00	.8303+00	-9999.
175000	028	094	-13.9	.5843+00	.7851+00	-9999.
176000	023	111	-5.2	.5622+00	.7709+00	-9999.
177000	028	176	-1.5	.5413+00	.6942+00	-9999.
178000	042	206	-3.6	.5218+00	.6723+00	-9999.
179000	060	221	-7.5	.5020+00	.6583+00	-9999.
180000	076	230	-11.1	.4820+00	.6423+00	-9999.
181000	087	236	-13.6	.4644+00	.6238+00	-9999.
182000	091	240	-15.9	.4464+00	.6088+00	-9999.
183000	087	245	-17.0	.4291+00	.5837+00	-9999.
184000	081	250	-19.0	.4123+00	.5651+00	-9999.
185000	072	256	-21.2	.3961+00	.5454+00	-9999.
186000	064	262	-21.2	.3804+00	.5259+00	-9999.
187000	057	269	-22.2	.3653+00	.5070+00	-9999.
188000	054	272	-24.0	.3507+00	.4903+00	-9999.
189000	050	273	-26.2	.3366+00	.4747+00	-9999.
190000	050	271	-26.2	.3230+00	.4556+00	-9999.
191000	052	269	-26.2	.3100+00	.4372+00	-9999.
192000	054	263	-26.2	.2975+00	.4136+00	-9999.
193000	057	259	-25.8	.2855+00	.4022+00	-9999.
194000	060	257	-25.2	.2740+00	.3869+00	-9999.
195000	064	255	-25.3	.2630+00	.3697+00	-9999.

TABLE 5. (Continued)

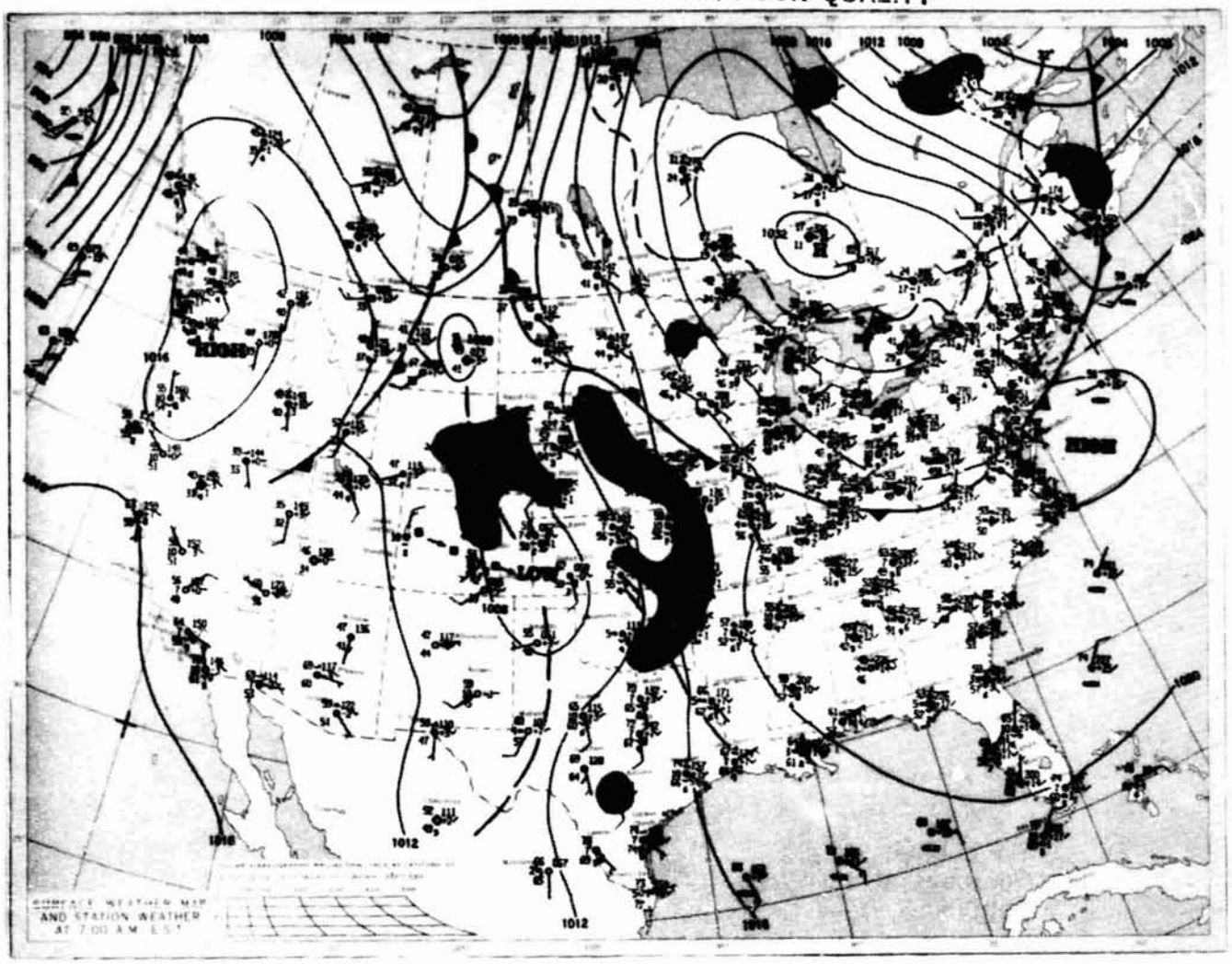
ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
196000	065	253	-28.2	.2523+00	.3587+00	-9999.
197000	065	253	-29.2	.2433+00	.3474+00	-9999.
198000	064	253	-30.2	.2336+00	.3349+00	-9999.
199000	060	254	-30.4	.2239+00	.3214+00	-9999.
200000	055	256	-31.2	.2147+00	.3091+00	-9999.
201000	050	259	-32.8	.2058+00	.2983+00	-9999.
202000	043	264	-35.7	.1972+00	.2893+00	-9999.
203000	038	270	-37.8	.1889+00	.2796+00	-9999.
204000	035	277	-39.9	.1809+00	.2702+00	-9999.
205000	033	285	-41.2	.1732+00	.2601+00	-9999.
206000	035	292	-44.0	.1657+00	.2519+00	-9999.
207000	037	296	-46.9	.1584+00	.2439+00	-9999.
208000	040	299	-49.2	.1514+00	.2355+00	-9999.
209000	043	299	-49.7	.1446+00	.2254+00	-9999.
210000	047	299	-50.2	.1382+00	.2159+00	-9999.
211000	050	298	-51.2	.1320+00	.2071+00	-9999.
212000	054	295	-52.2	.1260+00	.1987+00	-9999.
213000	057	292	-53.8	.1204+00	.1912+00	-9999.
214000	059	288	-55.2	.1149+00	.1836+00	-9999.
215000	059	282	-56.2	.1096+00	.1759+00	-9999.
216000	060	276	-56.3	.1046+00	.1681+00	-9999.
217000	062	268	-57.9	.9980-01	.1615+00	-9999.
218000	064	259	-59.2	.9510-01	.1548+00	-9999.
219000	067	250	-60.2	.9070-01	.1483+00	-9999.
220000	070	241	-61.2	.8650-01	.1421+00	-9999.
221000	077	234	-61.2	.8240-01	.1354+00	-9999.
222000	082	228	-61.2	.7860-01	.1292+00	-9999.
223000	089	224	-61.2	.7500-01	.1232+00	-9999.
224000	092	222	-61.2	.7150-01	.1175+00	-9999.
225000	096	221	-61.2	.6820-01	.1121+00	-9999.
226000	096	220	-61.6	.6490-01	.1069+00	-9999.
227000	096	221	-62.2	.6180-01	.1020+00	-9999.
228000	092	223	-63.6	.5870-01	.9760-01	-9999.
229000	089	227	-66.1	.5590-01	.9407-01	-9999.
230000	086	231	-69.2	.5320-01	.9087-01	-9999.
231000	081	237	-71.2	.5060-01	.8730-01	-9999.
232000	079	244	-73.7	.4820-01	.8420-01	-9999.
233000	076	253	-76.2	.4580-01	.8099-01	-9999.
234000	076	262	-77.8	.4350-01	.7756-01	-9999.
235000	077	271	-79.3	.4130-01	.7422-01	-9999.
236000	081	279	-80.2	.3910-01	.7058-01	-9999.
237000	086	287	-81.3	.3710-01	.6738-01	-9999.
238000	091	294	-83.2	.3520-01	.6454-01	-9999.
239000	097	300	-85.2	.3340-01	.6189-01	-9999.
240000	104	305	-86.9	.3160-01	.5911-01	-9999.
241000	111	309	-88.2	.2990-01	.5630-01	-9999.
242000	116	312	-89.2	.2830-01	.5358-01	-9999.
243000	121	316	-91.2	.2680-01	.5102-01	-9999.
244000	126	318	-91.8	.2540-01	.4858-01	-9999.
245000	130	321	-91.2	.2400-01	.4594-01	-9999.

TABLE 5. (Continued)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
246000	131	323	-90.3	.2270-01	.4324-01	-9999.
247000	133	325	-90.2	.2150-01	.4093-01	-9999.
248000	133	328	-90.2	.2030-01	.3864-01	-9999.
249000	131	329	-90.2	.1920-01	.3655-01	-9999.
250000	130	331	-90.2	.1820-01	.3465-01	-9999.
251000	128	333	-89.6	.1720-01	.3265-01	-9999.
252000	123	335	-89.2	.1630-01	.3086-01	-9999.
253000	119	337	-88.6	.1550-01	.2926-01	-9999.
254000	114	339	-87.2	.1460-01	.2734-01	-9999.
255000	108	341	-86.5	.1390-01	.2595-01	-9999.
256000	101	343	-86.0	.1310-01	.2439-01	-9999.
257000	092	345	-85.2	.1240-01	.2298-01	-9999.
258000	084	347	-84.0	.1180-01	.2173-01	-9999.
259000	076	350	-83.2	.1120-01	.2054-01	-9999.
260000	065	353	-81.9	.1060-01	.1931-01	-9999.
261000	055	358	-80.4	.1010-01	.1825-01	-9999.
262000	043	003	-80.2	.9600-02	.1733-01	-9999.
263000	033	012	-79.3	.9100-02	.1636-01	-9999.
264000	023	028	-78.8	.8600-02	.1542-01	-9999.
265000	016	061	-78.2	.8200-02	.1465-01	-9999.
266000	018	106	-78.2	.7800-02	.1393-01	-9999.
267000	028	132	-77.2	.7400-02	.1316-01	-9999.
268000	038	145	-77.2	.7000-02	.1244-01	-9999.
269000	052	153	-77.2	.6600-02	.1173-01	-9999.
270000	065	158	-76.2	.6300-02	.1114-01	-9999.
271000	079	162	-76.2	.6000-02	.1061-01	-9999.
272000	092	166	-74.6	.5700-02	.1000-01	-9999.
273000	106	169	-73.2	.5400-02	.9406-02	-9999.
274000	119	172	-72.6	.5100-02	.8858-02	-9999.
275000	112	173	-73.0	.4904-02	.8517-02	-9999.
276000	105	175	-73.4	.4715-02	.8189-02	-9999.
277000	098	177	-73.9	.4534-02	.7875-02	-9999.
278000	091	180	-74.3	.4360-02	.7572-02	-9999.
279000	085	182	-74.7	.4192-02	.7281-02	-9999.
280000	078	186	-75.1	.4031-02	.7001-02	-9999.
281000	072	189	-75.6	.3876-02	.6731-02	-9999.
282000	066	194	-76.0	.3727-02	.6472-02	-9999.
283000	061	199	-76.4	.3583-02	.6223-02	-9999.
284000	057	206	-76.9	.3445-02	.5984-02	-9999.
285000	053	213	-77.3	.3313-02	.5754-02	-9999.
286000	050	221	-77.7	.3186-02	.5533-02	-9999.
287000	049	230	-78.1	.3063-02	.5320-02	-9999.
288000	048	239	-78.6	.2945-02	.5115-02	-9999.
289000	049	248	-79..	.2832-02	.4919-02	-9999.
290000	050	254	-79.3	.2725-02	.4732-02	-9999.
291000	052	259	-79.5	.2077-02	.3735-02	-9999.
292000	104	265	-78.4	.1795-02	.3172-02	-9999.
293000	167	267	-74.9	.1536-02	.2688-02	-9999.
294000	231	268	-71.5	.1317-02	.2279-02	-9999.
295000	291	269	-72.1	.1128-02	.1932-02	-9999.

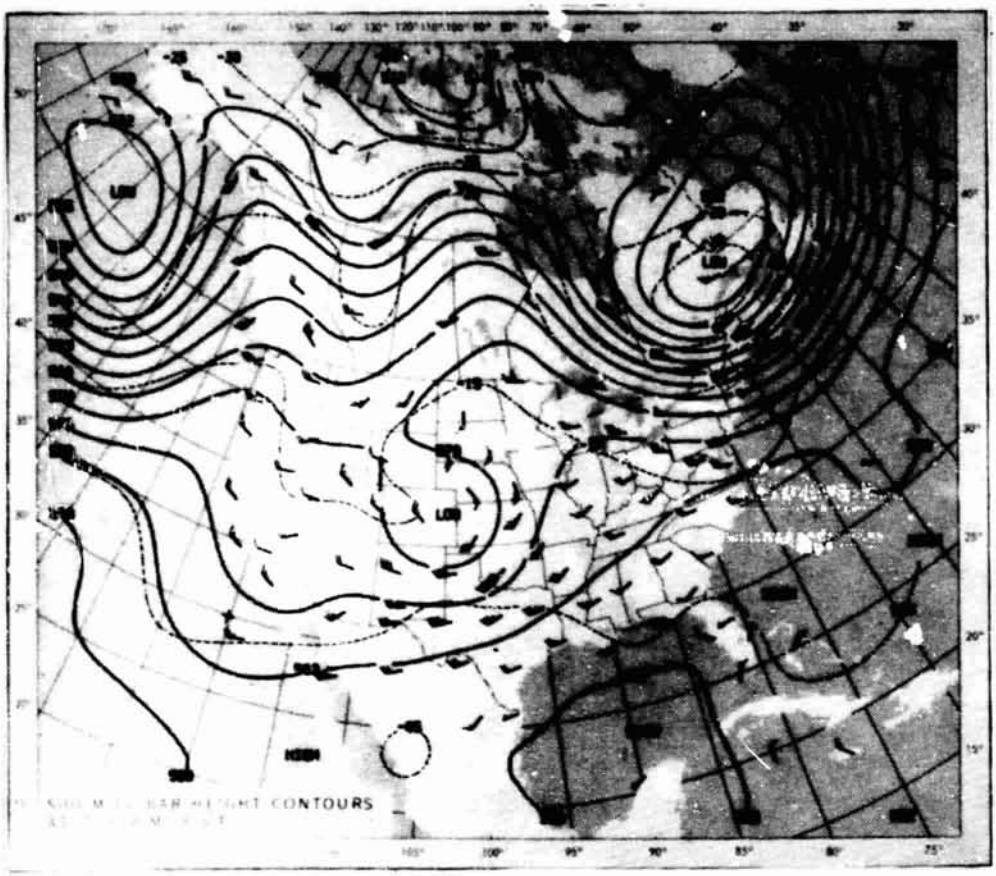
TABLE 5. (Concluded)

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
310000	338	269	-70.6	.9659-03	.1638-02	-9999.
313000	360	269	-69.1	.8279-03	.1390-02	-9999.
316000	369	269	-67.5	.7104-03	.1181-02	-9999.
319000	371	269	-66.0	.6095-03	.1003-02	-9999.
322000	363	269	-64.4	.5229-03	.8522-03	-9999.
325000	339	269	-62.8	.4486-03	.7240-03	-9999.
328000	295	269	-61.2	.3849-03	.6151-03	-9999.
331000	301	269	-59.8	.3298-03	.5200-03	-9999.
334000	301	269	-58.5	.2826-03	.4396-03	-9999.
337000	291	269	-54.1	.2422-03	.3716-03	-9999.
340000	267	269	-51.7	.2075-03	.3141-03	-9999.
343000	225	268	-49.3	.1777-03	.2655-03	-9999.
346000	195	269	-46.2	.1531-03	.2251-03	-9999.
349000	190	268	-42.5	.1327-03	.1914-03	-9999.
352000	178	268	-38.8	.1149-03	.1627-03	-9999.
355000	155	267	-35.0	.9955-04	.1383-03	-9999.
358000	119	264	-31.3	.8620-04	.1176-03	-9999.
361000	067	264	-27.5	.7469-04	.1001-03	-9999.
364000	062	261	-21.4	.6644-04	.8658-04	-9999.
367000	054	257	-15.3	.5906-04	.7485-04	-9999.
370000	042	248	-9.1	.5248-04	.6473-04	-9999.
373000	029	226	-3.0	.4660-04	.5599-04	-9999.
376000	026	172	3.2	.4136-04	.4842-04	-9999.
379000	022	129	10.3	.3712-04	.4222-04	-9999.
382000	023	132	18.5	.3369-04	.3714-04	-9999.
385000	024	135	27.0	.3068-04	.3276-04	-9999.
388000	026	137	35.7	.2802-04	.2899-04	-9999.
391000	028	139	44.6	.2566-04	.2572-04	-9999.
394000	029	141	53.8	.2357-04	.2290-04	-9999.
397000	032	143	63.0	.2170-04	.2044-04	-9999.
400000	034	145	72.5	.2004-04	.1830-04	-9999.



Surface Synoptic Map at 1200 UT October 5, 1984 — Isobaric, Frontal, and Precipitation Patterns are Shown in Standard Symbolic Form.

Figure 1. Surface synoptic chart 57 min after launch of STS-41G.



500 Millibar Height
Contours at 1200 UT
October 5, 1984.
Continuous Lines Indicate Height Contours in Feet Above Sea Level. Dashed Lines are Isotherms in Degrees Centigrade. Arrows Show Wind Direction and Speed at the 500 MB Level.

Figure 2. 500 mb map 57 min after launch of STS-41G.

CLOUD PHOTOGRAPH NOT AVAILABLE

Figure 3. GOES-5 visible imagery of cloud cover 3 min prior to launch of STS-41G (1100 UT, October 5, 1984). 500-mb contours and wind barbs are also included for 1200 UT.

CLOUD PHOTOGRAPH NOT AVAILABLE

Figure 4. Enlarged view of GOES-5 visible imagery of cloud cover taken 3 min prior to launch of STS-41G (1100 UT, October 5, 1984). Surface temperatures and wind barbs for 1100 UT are also included.

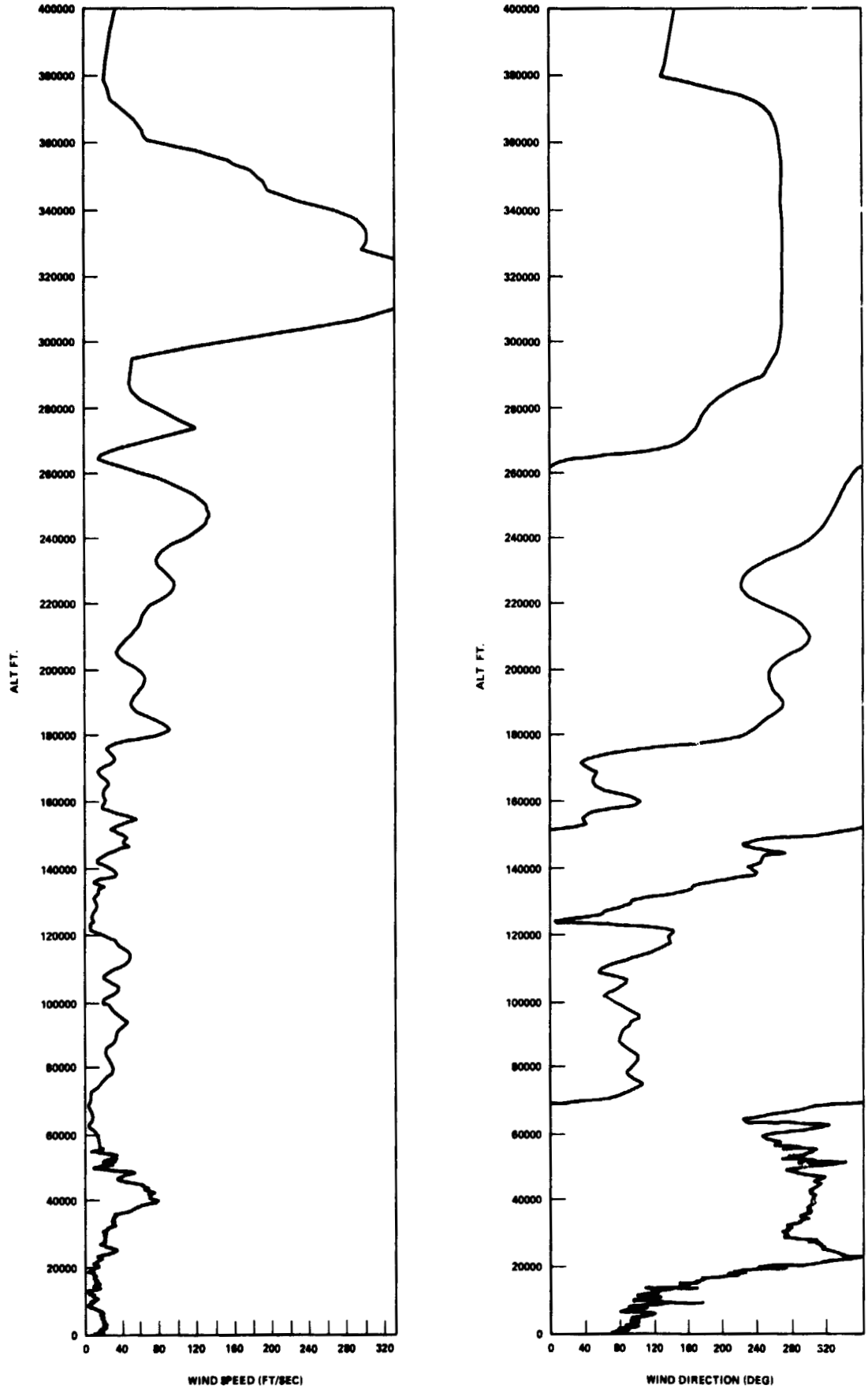


Figure 5. Scalar wind speed and direction at launch time of STS-41G.

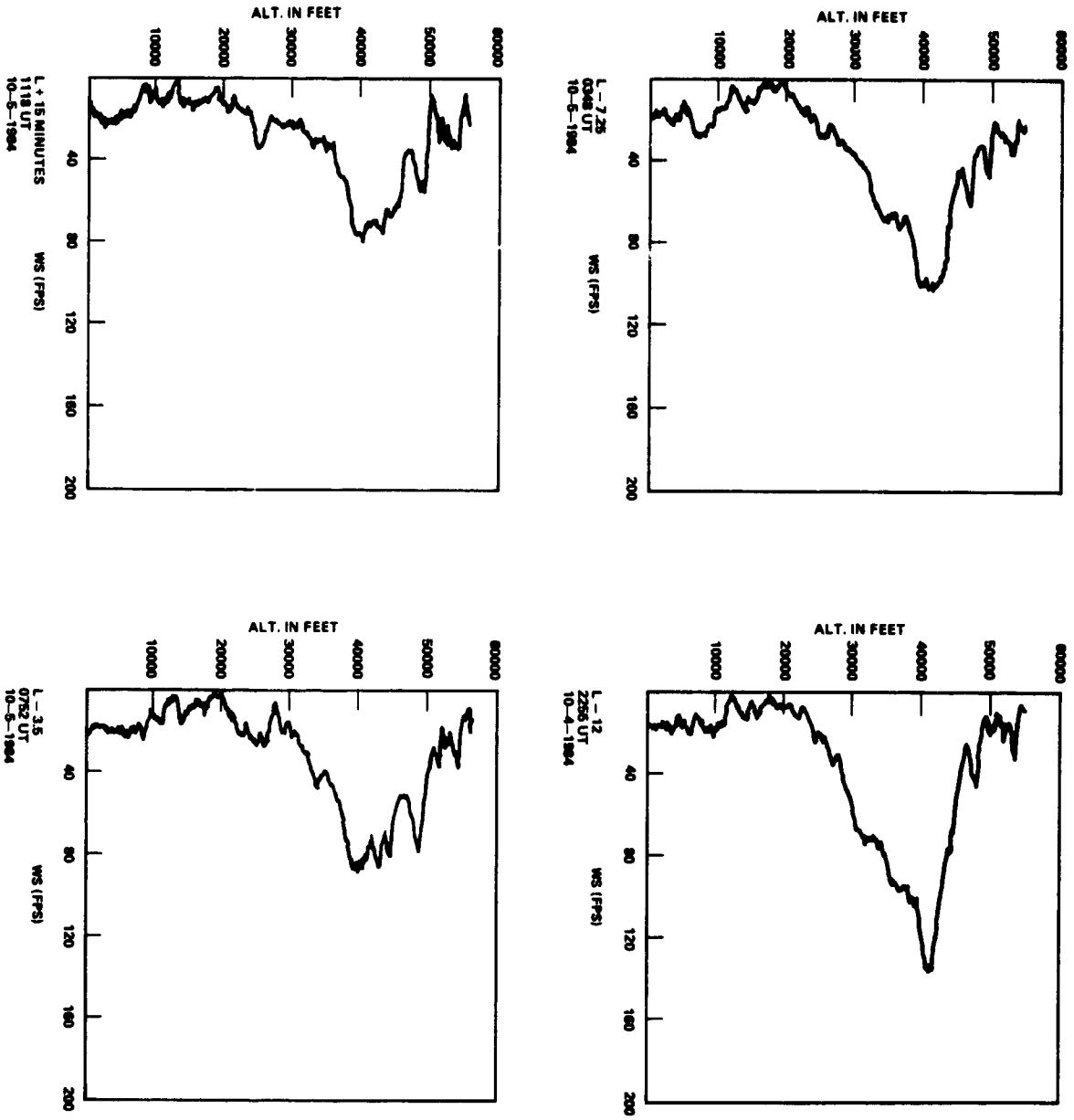


Figure 6. STS-41G prelaunch/launch Jimsphere-measured wind speeds (FPS).

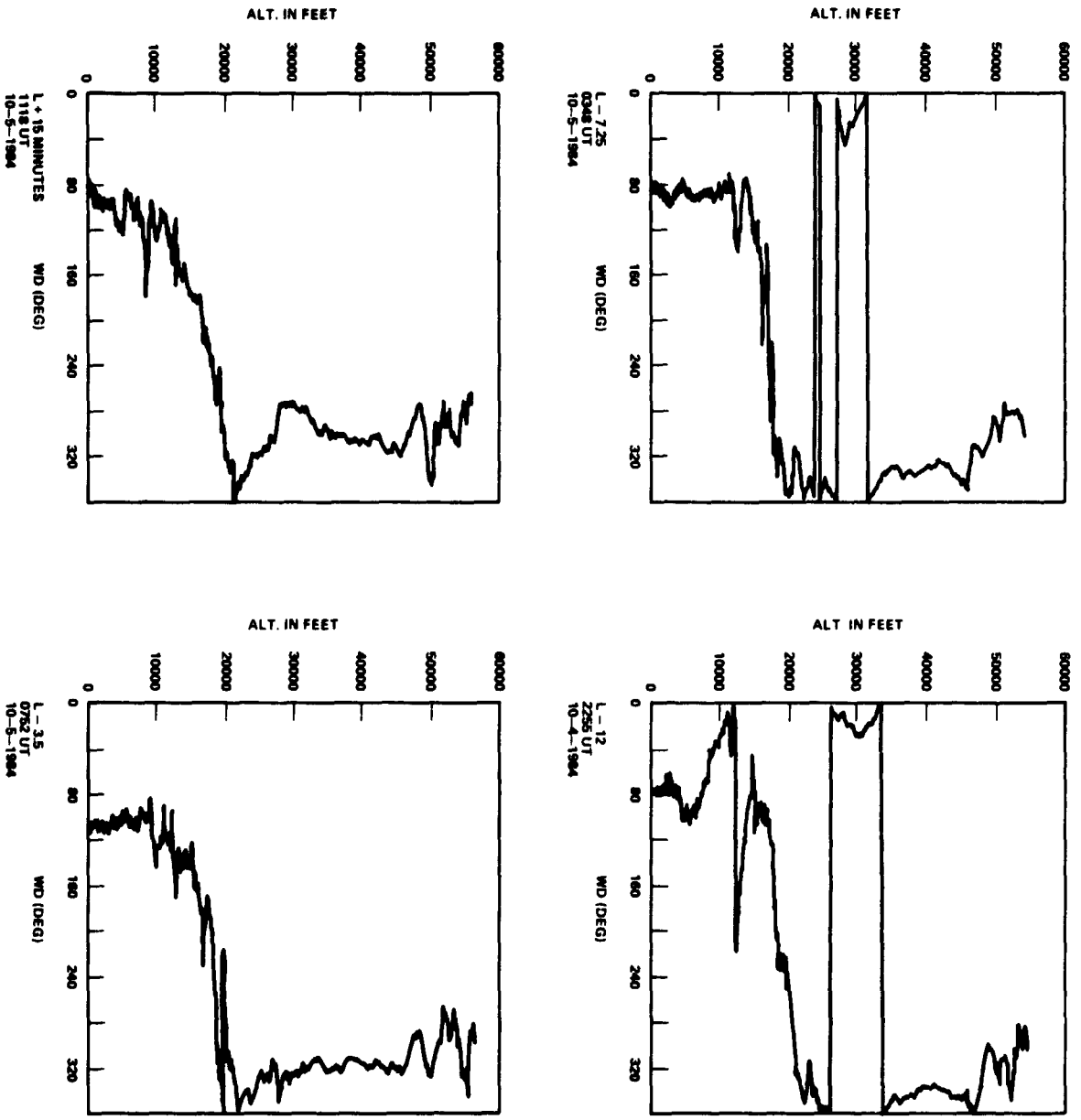


Figure 7. STS-41G prelaunch/launch Jimsphere-measured wind directions (degrees).

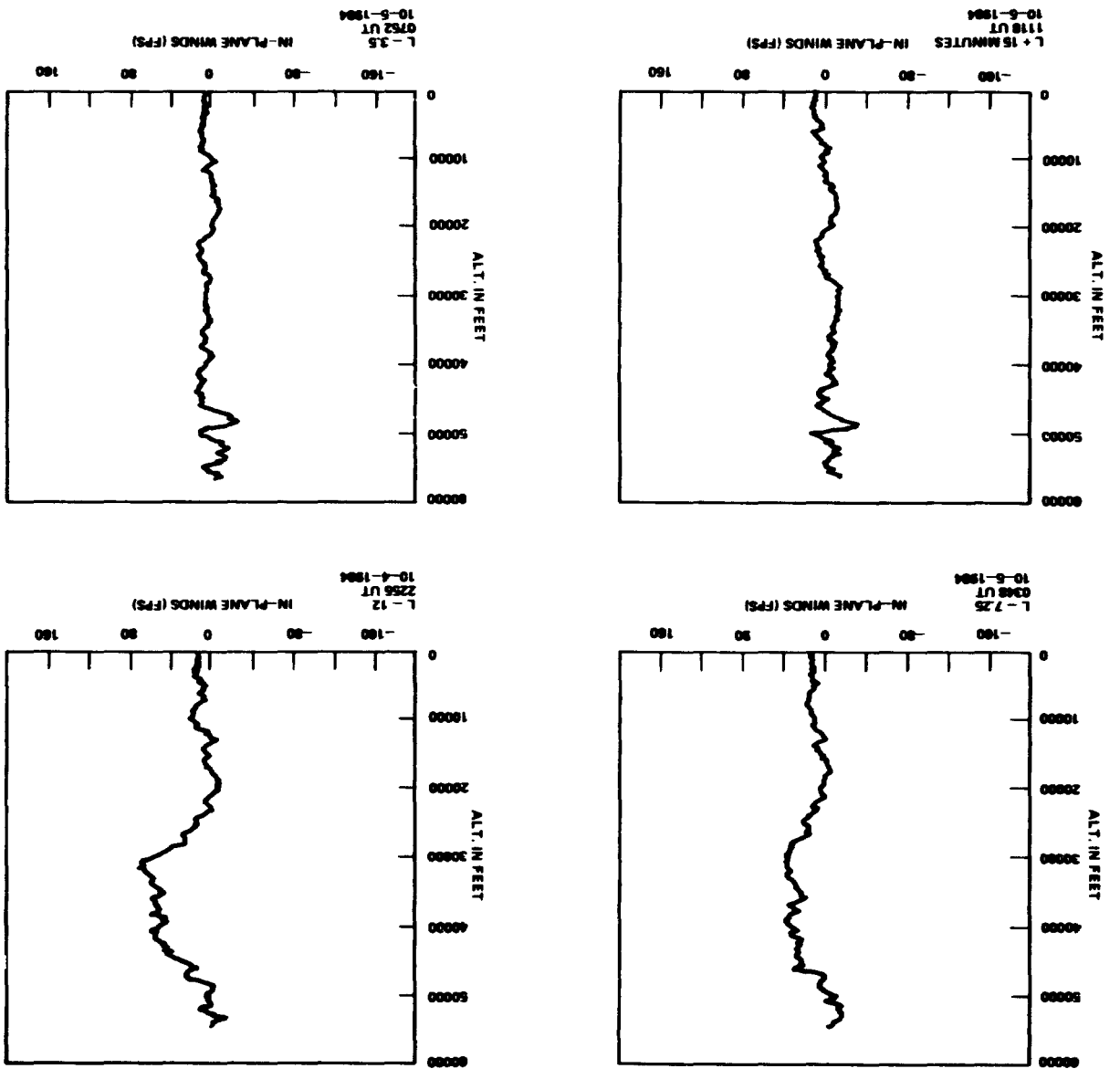


Figure 8. STS-41G prelaunch/launch Jimsphere-measured in-plane component winds (FPS). Flight azimuth = 39 degrees.

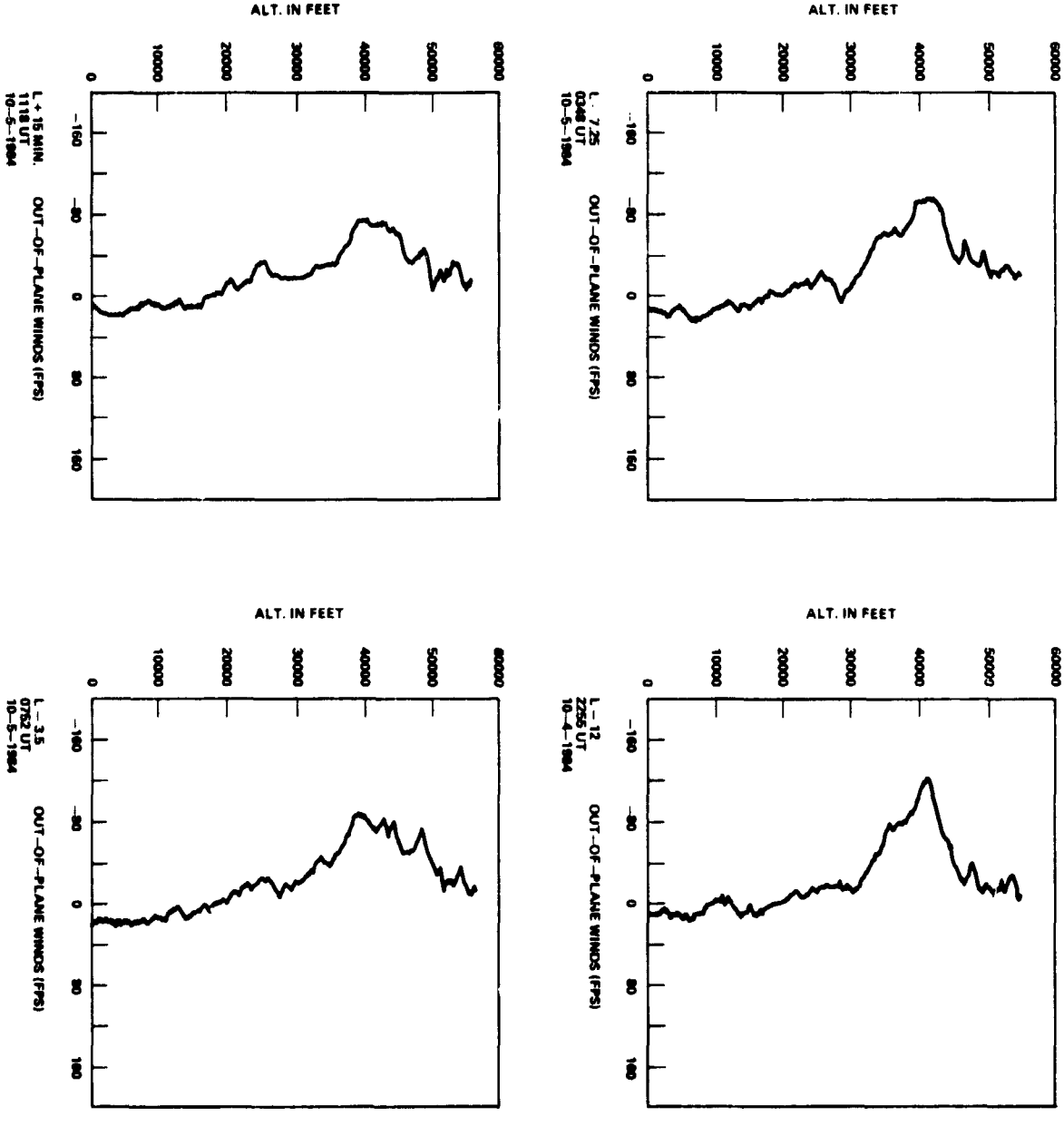


Figure 9. STS-41G prelaunch/launch Jimsphere-measured out-of-plane components winds (FPS). Flight azimuth = 39 degrees.

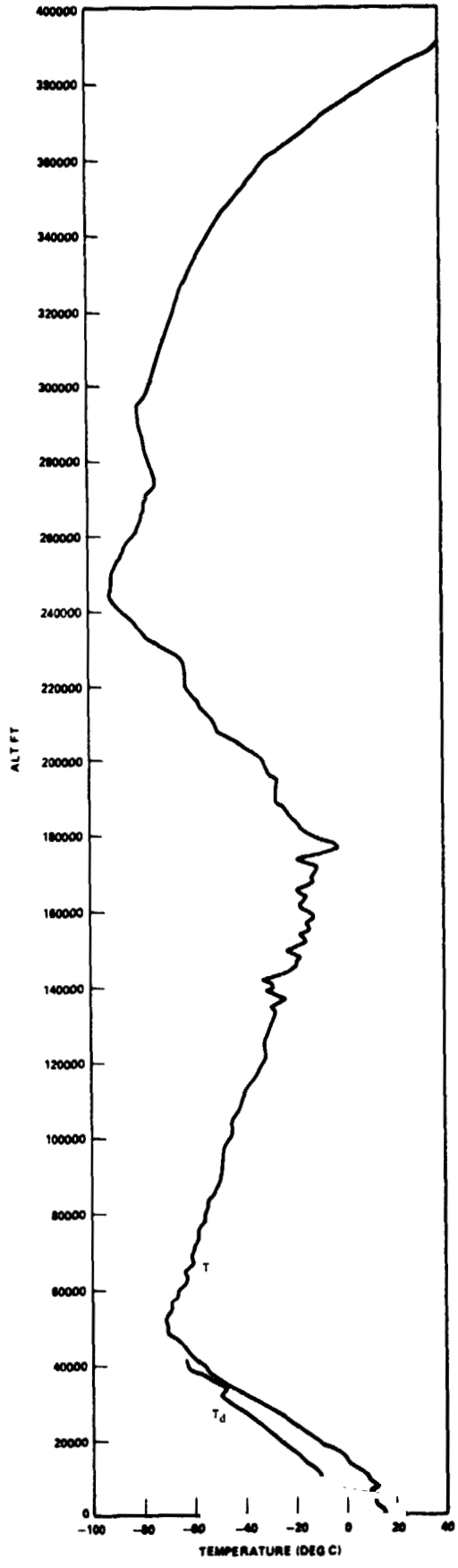


Figure 10. STS-41G temperature profiles versus altitude for launch (ascent).

REFERENCES

1. Saturn Flight Evaluation Working Group: Saturn Launch Vehicle Flight Evaluation Report — Appendix A — Atmosphere (a separate report is prepared for each Saturn vehicle launch operation). George C. Marshall Space Flight Center, Alabama.

2. Johnson, D. L.: Summary of Atmospheric Data Observations for 155 Flights of MSFC/ABMA Related Aerospace Vehicles. NASA TM X-64796, December 5, 1973.

3. Johnson, D. L.: Atmospheric Environment for ASTP (SA-210) Launch. NASA TM X-64990. February 1976.

4. Johnson, D. L., Jasper, G., and Brown, S. C.: Atmospheric Environment for Space Shuttle (STS-1) Launch. NASA TM 82436, July 1981.

5. Johnson, D. L. and Brown, S. C.: Atmospheric Environment for Space Shuttle (STS-2) Launch. NASA TM 82463, December 1981.

6. Johnson, D. L., Brown, S. C., and Batts, G. W.: Atmospheric Environment for Space Shuttle (STS-3) Launch. NASA TM 82480, April 1982.

7. Johnson, D. L., Hill, C. K., and Batts, G. W.: Atmospheric Environment for Space Shuttle (STS-4) Launch. NASA TM 82498, July 1982.

8. Jonnson, D. L., Hill, C. K., and Batts, G. W.: Atmospheric Environment for Space Shuttle (STS-5) Launch. NASA TM 82515, March 1983.

9. Johnson, D. L., Hill, C. K., and Batts, G. W.: Atmospheric Environment for Space Shuttle (STS-6) Launch. NASA TM 82529, May 1983.

10. Johnson, D. L., Hill, C. K., and Batts, G. W.: Atmospheric Environment for Space Shuttle (STS-7) Launch. NASA TM 82542, July 1983.

11. Johnson, D. L., Hill, C. K., Turner, R. E., and Batts, G. W.: Atmospheric Environment for Space Shuttle (STS-8) Launch. NASA TM 82560, October 1983.

12. Johnson, D. L., Hill, C. K., and Batts, G. W.: Atmospheric Environment for Space Shuttle (STS-9) Launch. NASA TM 82572, January 1984.

13. Johnson, D. L., Hill, C. K., and Batts, G. W.: Atmospheric Environment for Space Shuttle (STS-11) Launch. NASA TM 82580, March 1984.

14. Johnson, D. L., Hill, C. K., Jasper, G., and Batts, G. W.: Atmospheric Environment for Space Shuttle (STS-13) Launch. NASA TM 82588, May 1984.

15. Johnson, D. L., Hill, C. K., Jasper, G., and Batts, G. W.: Atmospheric Environment for Space Shuttle (STS-41D) Launch. NASA TM 86484, October 1984.

16. Justus, C. G., et al.: The NASA/MSFC Global Reference Atmosphere Model — Mod 3 (with Spherical Harmonic Wind Model). NASA CR-3256, March 1980.

17. Smith, O. E. and Weidner, D. K.: A Reference Atmosphere for Patrick AFB, Florida, Annual (1963 Revision). NASA TM X-53139, September 23, 1964.

APPROVAL

ATMOSPHERIC ENVIRONMENT FOR SPACE SHUTTLE (STS-41G) LAUNCH

By D. L. Johnson, C. K. Hill, G. Jasper, and G. W. Batts

The information in this report has been reviewed for technical content. Review of any information concerning Department of Defense or nuclear energy activities or programs has been made by the MSFC Security Classification Officer. This report, in its entirety, has been determined to be unclassified.

W. W. VAUGHAN
Acting-Chief, Atmospheric Effects Branch
and Chief, Atmospheric Sciences Division

G. F. McDONOUGH
Director, Systems Dynamics Laboratory

☆U.S. GOVERNMENT PRINTING OFFICE 1985—544-048/10082