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ATMOSPHERIC ENVIRONMENT FOR SPACE SHUTTLE (STS-13) LAUNCH

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16. ABSTRACT

This report presents a summary of selected atmospheric conditions observed near Space Shuttle STS-13 launch time on April 6, 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 meteorological tape, which consists of wind and thermodynamic parameters versus altitude, for STS-13 vehicle ascent has been constructed. The STS-13 ascent meteorological data tape has been constructed by Marshall Space Flight Center in response to Shuttle task agreement No. 561-81-22-368 with Johnson Space Center.

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ATMOSPHERIC ENVIRONMENT FOR SPACE SHUTTLE (STS-13) LAUNCH

I. INTRODUCTION

This report presents an evaluation of the atmospheric environmental data taken during the launch of the Space Shuttle/STS-13 vehicle. This Space Shuttle vehicle was launched from Pad 39A at Kennedy Space Center (KSC), Florida, on a bearing of 91 deg east of north at 1358 UT (0858 EST) on April 6, 1984.

This report presents a summary of the atmospheric environment at launch time (L+0) of the STS-13, together with the sequence of prelaunch Jimsphere measured winds aloft profiles from L-14 hr through liftoff. The general weather 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-13 duty, the SRB descent/impact atmospheric data were not taken. However, one can use the STS-13 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-11 launch conditions are presented in References 3 through 13, respectively.

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 1 presents a listing of systems used to obtain the upper level wind profiles used in compiling the final ascent meteorological data tape. Data cutoff altitudes are also given in Table 1.

III. GENERAL SYNOPTIC SITUATION AT LAUNCH TIME

An area of weak high pressure, centered just south of Louisiana, prevailed over the southeast just prior to STS-13 liftoff. This new air mass brought cooler and dryer conditions to the KSC area throughout the countdown period. Moderate, west to northwesterly surface winds were the rule during the countdown period. Figure 1 presents the surface map conditions approximately 2 hours before STS-13 launch. Figure 2 depicts winds aloft conditions at the 500 mb pressure level approximately 2 hours before launch. Westerly winds dominated the flow aloft over the KSC Florida area.

Skies were mostly clear throughout the morning of April 6, 1984. Figure 3 presents the GOES-5 visible picture taken at 1400 UT (2 minutes after liftoff). Figure 4 shows an up-close visible shot of the Florida peninsula as recorded by GOES-5, taken at 1400 UT.

IV. SURFACE OBSERVATIONS AT LAUNCH TIME

Surface observations at launch time for selected KSC locations are given in Table 2. Included are pad 39A, shuttle runway, and CCAFS balloon release station observations. Neither precipitation nor lightning was observed at launch time.

Table 3 presents Pad 39A wind data along with other standard hourly meteorological measurements and sky observations for the 6-hr period prior to launch of STS-13. 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 (1413 UT), MSS Rawinsonde (1401 UT), and Super-Loki Robin (1658 UT) systems were used to measure the upper level wind and thermodynamic parameters for STS-13 launch. At altitudes above the rocket-measured data, the Global Reference Atmosphere (GRA) [14] parameters for April KSC conditions were used. A tabulation of the STS-13 final meteorological data for ascent is presented in Table 4 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 21.5 ft/sec (11.3 kn) at 60 ft and increased to a maximum of 176 ft/sec (104 kn) flowing from 289 deg. This maximum occurred at an altitude of 37,700 ft (11,491 m). The winds decreased above this level as shown in Figure 5. The overall maximum measured speed was at 37,700 ft (11,491 m) altitude.

B. Wind Direction

At launch time, the 60-ft wind direction was from the northwest (320 deg) and shifted into a westerly component above 12,600 ft (3840 m). Winds remained westerly through 67,000 ft (20,422 m) altitude. Winds above this level shifted into an easterly component, but came back to be a westerly wind above 123,000 ft (37,490 m). Wind directions oscillated enormously above 180,000 ft (54,864 m). Figure 5 shows the complete wind direction versus altitude profile. As shown in Figure 5, 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-13 hr and extending through L+0.

The wind speed and direction profilesfor the 13-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. The wind speeds and component speeds were greater than the April means but less than the 95 percent values within the 30,000 ft to 50,000 ft altitude layer, however, no ascent load exceedences were calculated. Unusually strong wind speeds exceeding the 99 percent values measured at L-27 hr and L-50 hr below 20,000 ft altitude produced some calculated load exceedences and some concern early in the prelaunch period. These particular wind speeds subsided as predicted and were not a problem after L-24 hr.

D. Thermodynamic Data

The thermodynamic data taken at STS-13 launch time, consisting of atmospheric temperature, dew-point temperature, pressure, and density have been compiled as the STS-13 ascent meteorological data and are presented in Table 4. The vertical structure of temperature for the STS-13 ascent is shown graphically versus altitude in Figure 10.

The atmospheric thermodynamic parameters of temperature, pressure, and density, measured during STS-13 launch below 163,000 ft (49,682 m) were all within 7 percent of their respective PRA-63 [15] annual values. All these parameters stayed within 13 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 meteorological data tape has not been constructed. The tabular values for the ascent meteorological tape as presented in Table 4 should be used for SRB descent/impact studies since it is the closest measured data source.

VI. ATMOSPHERIC SUMMARY CONDITIONS FOR STS LAUNCHES

Given in Table 5 are selected atmospheric L+0 launch conditions for all the Space Shuttle launches.

TABLE 1. SYSTEMS USED TO MEASURE UPPER AIR WIND DATA FOR STS-13 ASCENT

Type of Data	Date: April 6, 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	14:13	15	6 (21)	15	17,069 (56,000)	74
MSS Rawinsonde	14:01	3	17,373 (57,000)	60	29,870 (98,000)	101
Super-Loki Rocketsonde (Robin)	16:58	180	78,943 (259,000)	180	30,175 (99,000)	190

TABLE 2. SURFACE OBSERVATIONS AT STS-13 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	10.156 (14.730)	288.9 (60.3)	279.8 (44.0)	55	16 (10)	0	Clear	-	16.9 (10.0)	310
CCAFS XMR[c] Surface Measurements	+2	10.156 (14.730)	289.8 (62.0)	280.4 (45.0)	54	16 (10)	0	Clear	-	13.5 (8.0)	310
Pad 39A[d] Lightpole NW 18.3 m (60.0 ft)	0	10.156* (14.730*)	288.9 (60.4)	280.2 (44.7)	56	-	-	-	-	21.5[b] (12.7)	320[b]
Pad 39A FSS (Top NW) 83.8 m (275 ft)	0	-	-	-	-	-	-	-	-	18.6[b] (11.0)	275[b]

*Pad 29A Camera Site 3 barometric pressure instrument appeared to be reading too high. Therefore, the KSC Shuttle runway station pressure value interpolated to 10.149 N/cm^2 at 21 ft above MSL was used as the L+0 pad atmospheric pressure measurement.

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-13 sky observational site.

TABLE 3. STS-13 PRE-LAUNCH THROUGH LAUNCH KSC PAD 39A METEOROLOGICAL MEASUREMENTS[a]

Hourly Atmospheric Measurements								Sky Condition[b]			
6 April 1984 Time UT	Temp. (°F)	Dew Point (°F)	RH (%)	275' Level (NW)		60' Level (NW)		Clouds	Total Sky Cover	Vis. (mi)	Other Remarks
				WS Kt	WD°	WS Kt	WD°				
0700	53	47	79	12	253	9	299	Clear Skys	0/10	10	
0800	53	47	82	13	258	10	301	Scattered at 3000 ft	1/10	10	
0900	51	47	84	10	253	8	284	Clear Skys	0/10	10	
1000	51	45	80	10	249	7	281	Clear Skys	0/10	10	
1100	52	47	82	11	229	8	277	Scattered at 4000 ft	1/10	8	
1200	52	46	78	11	231	8	283	Clear Skys	0/10	8	
1300	56	44	66	9	255	11	301	Clear Skys	0/10	9	
L+0[c] 1358	60	45	56	11	275	13	320	Clear Skys	0/10	10	

a. Hourly pad observations (obtained via MSFC/HOSC) averaged over 2 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. NW 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 10.149 N/cm^2. Sea level pressure was 10.156 N/cm^2.

TABLE 4. STS-13 METEOROLOGICAL DATA TAPE ASCENT

STS NUMBER 13
LAUNCH DATE 84 4 6 1358.
METEOROLOGICAL DATA TAPE

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
000021	015	310	15.8	.1015+04	.1219+04	7.2
000100	020	305	15.6	.1012+04	.1217+04	7.1
000200	019	290	15.3	.1009+04	.1214+04	6.9
000300	025	280	15.0	.1005+04	.1211+04	6.7
000400	030	319	14.7	.1001+04	.1207+04	6.5
000500	020	308	14.4	.9978+03	.1204+04	6.4
000600	024	311	14.1	.9942+03	.1201+04	6.2
000700	024	320	13.9	.9906+03	.1198+04	6.0
000800	025	310	13.6	.9870+03	.1195+04	5.8
000900	027	314	13.3	.9834+03	.1192+04	5.7
001000	025	315	13.0	.9799+03	.1189+04	5.5
001100	027	311	12.8	.9763+03	.1186+04	5.2
001200	026	315	12.5	.9728+03	.1182+04	5.0
001300	025	317	12.3	.9692+03	.1179+04	4.7
001400	029	320	12.0	.9657+03	.1176+04	4.4
001500	032	323	11.8	.9622+03	.1173+04	4.2
001600	031	317	11.6	.9587+03	.1169+04	3.9
001700	032	321	11.3	.9553+03	.1166+04	3.6
001800	035	325	11.1	.9518+03	.1163+04	3.3
001900	034	318	10.8	.9483+03	.1160+04	3.1
002000	032	314	10.6	.9449+03	.1157+04	2.8
002100	033	312	10.3	.9415+03	.1153+04	2.6
002200	034	316	10.1	.9380+03	.1150+04	2.4
002300	036	317	9.8	.9346+03	.1147+04	2.2
002400	031	316	9.6	.9312+03	.1144+04	2.0
002500	031	310	9.3	.9277+03	.1141+04	1.8
002600	034	307	9.1	.9244+03	.1138+04	1.7
002700	035	306	8.8	.9210+03	.1135+04	1.5
002800	035	312	8.6	.9176+03	.1131+04	1.3
002900	033	313	8.3	.9142+03	.1128+04	1.1
003000	032	310	8.1	.9109+03	.1125+04	.9
003100	035	305	7.8	.9075+03	.1122+04	.7
003200	035	306	7.6	.9042+03	.1119+04	.6
003300	033	310	7.3	.9008+03	.1116+04	.4
003400	030	315	7.1	.8975+03	.1113+04	.2
003500	027	314	6.8	.8942+03	.1110+04	.1
003600	028	309	6.6	.8909+03	.1107+04	-.1
003700	031	306	6.3	.8876+03	.1103+04	-.3
003800	031	310	6.1	.8843+03	.1100+04	-.5
003900	030	310	5.8	.8811+03	.1097+04	-.6
004000	036	306	5.6	.8778+03	.1094+04	-.8
004100	038	304	5.6	.8745+03	.1091+04	-1.2
004200	039	305	5.5	.8713+03	.1087+04	-1.6
004300	034	309	5.4	.8681+03	.1083+04	-2.0
004400	033	308	5.4	.8648+03	.1079+04	-2.4
004500	035	306	5.3	.8616+03	.1075+04	-2.8
004600	034	307	5.3	.8584+03	.1072+04	-3.3
004700	032	312	5.3	.8552+03	.1068+04	-3.7
004800	035	308	5.2	.8521+03	.1064+04	-4.1
004900	038	307	5.1	.8489+03	.1061+04	-4.5

TABLE 4. (Continued)

STS NUMBER 13
LAUNCH DATE 84 4 6 1358.
METEOROLOGICAL DATA TAPE

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
005000	035	312	5.1	.8457+03	.1057+04	-4.9
005100	031	316	5.3	.8426+03	.1052+04	-6.1
005200	036	312	5.5	.8395+03	.1048+04	-7.3
005300	038	315	5.8	.8364+03	.1043+04	-8.5
005400	039	319	6.0	.8333+03	.1039+04	-9.7
005500	036	310	6.2	.8302+03	.1034+04	-10.9
005600	039	298	6.4	.8271+03	.1030+04	-12.2
005700	042	300	6.6	.8240+03	.1025+04	-13.4
005800	043	301	6.9	.8210+03	.1020+04	-14.6
005900	043	303	7.1	.8180+03	.1016+04	-15.8
006000	044	299	7.3	.8149+03	.1012+04	-17.0
006100	045	298	7.3	.8119+03	.1008+04	-17.0
006200	042	301	7.3	.8089+03	.1004+04	-17.0
006300	046	303	7.2	.8059+03	.1001+04	-17.0
006400	049	301	7.2	.8029+03	.9969+03	-17.0
006500	050	303	7.2	.8000+03	.9933+03	-17.0
006600	044	307	7.2	.7970+03	.9897+03	-17.1
006700	044	303	7.2	.7941+03	.9861+03	-17.1
006800	045	298	7.1	.7911+03	.9825+03	-17.1
006900	045	301	7.1	.7882+03	.9790+03	-17.1
007000	042	303	7.1	.7853+03	.9754+03	-17.1
007100	042	298	7.1	.7824+03	.9720+03	-17.2
007200	047	295	7.0	.7795+03	.9685+03	-17.2
007300	047	297	7.0	.7766+03	.9651+03	-17.2
007400	045	297	6.9	.7738+03	.9616+03	-17.2
007500	046	293	6.9	.7709+03	.9582+03	-17.3
007600	048	291	6.9	.7680+03	.9548+03	-17.3
007700	045	292	6.8	.7652+03	.9514+03	-17.3
007800	048	290	6.8	.7624+03	.9480+03	-17.4
007900	051	289	6.7	.7595+03	.9446+03	-17.4
008000	054	291	6.7	.7567+03	.9413+03	-17.5
008100	055	294	6.7	.7539+03	.9378+03	-17.5
008200	053	294	6.7	.7511+03	.9344+03	-17.6
008300	057	290	6.7	.7484+03	.9310+03	-17.6
008400	060	290	6.7	.7456+03	.9276+03	-17.7
008500	056	292	6.6	.7428+03	.9242+03	-17.8
008600	056	293	6.6	.7401+03	.9208+03	-17.8
008700	058	292	6.6	.7373+03	.9174+03	-17.9
008800	059	292	6.6	.7346+03	.9140+03	-17.9
008900	057	295	6.6	.7319+03	.9107+03	-18.0
009000	056	295	6.6	.7292+03	.9073+03	-18.1
009100	057	293	6.4	.7265+03	.9045+03	-18.2
009200	059	289	6.3	.7238+03	.9017+03	-18.3
009300	061	290	6.1	.7211+03	.8988+03	-18.4
009400	060	294	6.0	.7184+03	.8960+03	-18.4
009500	056	295	5.8	.7158+03	.8932+03	-18.5
009600	057	294	5.6	.7131+03	.8904+03	-18.6
009700	060	291	5.5	.7105+03	.8876+03	-18.7
009800	061	293	5.3	.7078+03	.8848+03	-18.8
009900	059	293	5.2	.7052+03	.8820+03	

TABLE 4. (Continued)

STS NUMBER 13
LAUNCH DATE 84 4 6 1358.
METEOROLOGICAL DATA TAPE

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
010000	059	289	5.0	.7026+03	.8793+03	-18.9
010100	062	289	4.8	.6999+03	.8766+03	-19.0
010200	065	285	4.6	.6973+03	.8740+03	-19.2
010300	062	287	4.4	.6947+03	.8714+03	-19.3
010400	060	287	4.2	.6921+03	.8687+03	-19.4
010500	062	284	4.0	.6895+03	.8661+03	-19.5
010600	065	282	3.8	.6870+03	.8635+03	-19.7
010700	063	284	3.6	.6844+03	.8609+03	-19.8
010800	061	285	3.4	.6818+03	.8583+03	-19.9
010900	063	283	3.2	.6793+03	.8557+03	-20.1
011000	064	282	3.0	.6768+03	.8532+03	-20.2
011100	063	283	2.8	.6742+03	.8507+03	-20.4
011200	061	287	2.5	.6717+03	.8482+03	-20.5
011300	058	286	2.3	.6691+03	.8457+03	-20.7
011400	062	282	2.1	.6666+03	.8432+03	-20.9
011500	063	283	1.9	.6641+03	.8408+03	-21.0
011600	062	284	1.6	.6616+03	.8383+03	-21.2
011700	061	287	1.4	.6591+03	.8358+03	-21.4
011800	061	283	1.2	.6566+03	.8334+03	-21.6
011900	063	283	.9	.6542+03	.8310+03	-21.7
012000	062	286	.7	.6517+03	.8285+03	-21.9
012100	061	288	.5	.6492+03	.8262+03	-22.1
012200	060	284	.2	.6468+03	.8238+03	-22.3
012300	064	283	.0	.6443+03	.8214+03	-22.5
012400	062	284	-.3	.6419+03	.8190+03	-22.7
012500	061	283	-.5	.6394+03	.8167+03	-22.8
012600	061	281	-.8	.6370+03	.8143+03	-23.0
012700	063	280	-1.0	.6346+03	.8120+03	-23.2
012800	063	283	-1.3	.6322+03	.8097+03	-23.4
012900	061	281	-1.5	.6298+03	.8073+03	-23.6
013000	063	279	-1.8	.6274+03	.8050+03	-23.8
013100	065	279	-2.0	.6250+03	.8027+03	-24.0
013200	063	282	-2.3	.6226+03	.8003+03	-24.2
013300	063	279	-2.5	.6202+03	.7980+03	-24.4
013400	065	278	-2.8	.6178+03	.7957+03	-24.6
013500	066	278	-3.0	.6154+03	.7934+03	-24.8
013600	063	280	-3.3	.6131+03	.7911+03	-25.1
013700	062	277	-3.5	.6107+03	.7888+03	-25.3
013800	066	277	-3.8	.6084+03	.7865+03	-25.5
013900	066	278	-4.0	.6061+03	.7842+03	-25.7
014000	063	278	-4.3	.6037+03	.7819+03	-25.9
014100	064	277	-4.5	.6014+03	.7796+03	-26.1
014200	066	277	-4.8	.5991+03	.7772+03	-26.3
014300	063	280	-5.0	.5968+03	.7749+03	-26.4
014400	061	277	-5.2	.5945+03	.7726+03	-26.6
014500	063	276	-5.4	.5922+03	.7703+03	-26.8
014600	063	276	-5.7	.5899+03	.7679+03	-27.0
014700	060	277	-5.9	.5876+03	.7656+03	-27.2
014800	061	274	-6.1	.5853+03	.7633+03	-27.3
014900	062	273	-6.4	.5830+03	.7610+03	-27.5

TABLE 4. (Continued)

STS NUMBER 13
LAUNCH DATE 84 4 6 1358.
METEOROLOGICAL DATA TAPE

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
015000	061	274	-6.6	.5808+03	.7588+03	-27.7
015100	059	274	-6.8	.5785+03	.7565+03	-27.9
015200	064	271	-7.1	.5763+03	.7542+03	-28.1
015300	065	273	-7.3	.5740+03	.7520+03	-28.2
015400	062	276	-7.6	.5718+03	.7497+03	-28.4
015500	060	277	-7.8	.5695+03	.7475+03	-28.6
015600	063	275	-8.0	.5673+03	.7452+03	-28.8
015700	062	277	-8.3	.5651+03	.7430+03	-29.0
015800	060	280	-8.5	.5629+03	.7408+03	-29.1
015900	062	277	-8.8	.5607+03	.7385+03	-29.3
016000	062	280	-9.0	.5585+03	.7363+03	-29.5
016100	060	279	-9.3	.5563+03	.7342+03	-29.7
016200	060	277	-9.5	.5541+03	.7320+03	-29.9
016300	061	274	-9.8	.5519+03	.7298+03	-30.1
016400	066	275	-10.0	.5498+03	.7277+03	-30.3
016500	063	276	-10.3	.5476+03	.7255+03	-30.4
016600	065	273	-10.6	.5455+03	.7234+03	-30.6
016700	067	272	-10.8	.5433+03	.7213+03	-30.8
016800	065	275	-11.1	.5412+03	.7191+03	-31.0
016900	067	273	-11.3	.5390+03	.7170+03	-31.2
017000	067	272	-11.6	.5369+03	.7149+03	-31.4
017100	066	276	-11.8	.5348+03	.7127+03	-31.6
017200	066	275	-12.1	.5326+03	.7105+03	-31.8
017300	067	274	-12.3	.5305+03	.7084+03	-32.0
017400	068	278	-12.6	.5284+03	.7062+03	-32.2
017500	062	278	-12.8	.5263+03	.7041+03	-32.3
017600	065	277	-13.0	.5242+03	.7019+03	-32.5
017700	065	277	-13.3	.5221+03	.6998+03	-32.7
017800	061	280	-13.5	.5201+03	.6976+03	-32.9
017900	062	276	-13.8	.5180+03	.6955+03	-33.1
018000	065	278	-14.0	.5159+03	.6934+03	-33.3
018100	063	278	-14.3	.5139+03	.6913+03	-33.5
018200	065	275	-14.5	.5118+03	.6892+03	-33.6
018300	067	277	-14.8	.5098+03	.6871+03	-33.8
018400	064	277	-15.0	.5077+03	.6851+03	-34.0
018500	067	275	-15.3	.5057+03	.6830+03	-34.1
018600	070	274	-15.6	.5036+03	.6810+03	-34.3
018700	067	276	-15.8	.5016+03	.6789+03	-34.5
018800	068	276	-16.1	.4996+03	.6769+03	-34.7
018900	070	274	-16.3	.4976+03	.6748+03	-34.8
019000	068	277	-16.6	.4956+03	.6728+03	-35.0
019100	067	276	-16.9	.4936+03	.6708+03	-35.2
019200	069	275	-17.1	.4916+03	.6688+03	-35.4
019300	067	277	-17.4	.4896+03	.6668+03	-35.6
019400	064	277	-17.7	.4876+03	.6648+03	-35.8
019500	065	276	-17.9	.4856+03	.6628+03	-36.0
019600	066	277	-18.2	.4837+03	.6608+03	-36.3
019700	063	276	-18.5	.4817+03	.6588+03	-36.5
019800	064	274	-18.8	.4798+03	.6568+03	-36.7
019900	066	275	-19.0	.4778+03	.6549+03	-36.9

TABLE 4. (Continued)

STS NUMBER 13
LAUNCH DATE 84 4 6 1358.
METEOROLOGICAL DATA TAPE

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
020000	062	276	-19.3	.4759+03	.6529+03	-37.1
020100	065	271	-19.5	.4739+03	.6508+03	-37.3
020200	067	269	-19.8	.4720+03	.6488+03	-37.5
020300	065	273	-20.0	.4700+03	.6467+03	-37.7
020400	066	271	-20.2	.4681+03	.6446+03	-37.9
020500	067	271	-20.4	.4662+03	.6426+03	-38.0
020600	068	274	-20.7	.4643+03	.6405+03	-38.2
020700	072	274	-20.9	.4624+03	.6385+03	-38.4
020800	073	277	-21.1	.4605+03	.6365+03	-38.6
020900	070	280	-21.4	.4586+03	.6344+03	-38.8
021000	075	280	-21.6	.4567+03	.6324+03	-39.0
021100	077	280	-21.8	.4548+03	.6303+03	-39.2
021200	077	282	-22.0	.4530+03	.6282+03	-39.3
021300	079	283	-22.2	.4511+03	.6260+03	-39.5
021400	082	281	-22.4	.4492+03	.6239+03	-39.6
021500	082	284	-22.5	.4474+03	.6218+03	-39.8
021600	082	286	-22.7	.4455+03	.6197+03	-40.0
021700	087	288	-22.9	.4437+03	.6176+03	-40.1
021800	085	289	-23.1	.4419+03	.6156+03	-40.3
021900	086	288	-23.3	.4400+03	.6135+03	-40.4
022000	085	289	-23.5	.4382+03	.6114+03	-40.6
022100	085	289	-23.8	.4364+03	.6095+03	-40.8
022200	087	287	-24.0	.4346+03	.6075+03	-40.9
022300	086	291	-24.3	.4328+03	.6056+03	-41.1
022400	086	288	-24.5	.4310+03	.6037+03	-41.2
022500	088	287	-24.8	.4292+03	.6018+03	-41.4
022600	085	290	-25.0	.4274+03	.5999+03	-41.6
022700	087	287	-25.3	.4256+03	.5980+03	-41.7
022800	087	286	-25.5	.4238+03	.5961+03	-41.9
022900	084	289	-25.8	.4221+03	.5942+03	-42.0
023000	087	287	-26.0	.4203+03	.5924+03	-42.2
023100	088	286	-26.2	.4185+03	.5904+03	-42.4
023200	086	287	-26.4	.4168+03	.5884+03	-42.5
023300	088	287	-26.7	.4150+03	.5865+03	-42.7
023400	092	286	-26.9	.4133+03	.5845+03	-42.8
023500	093	286	-27.1	.4115+03	.5826+03	-43.0
023600	096	287	-27.3	.4098+03	.5807+03	-43.2
023700	101	285	-27.5	.4081+03	.5788+03	-43.3
023800	102	285	-27.8	.4064+03	.5768+03	-43.5
023900	104	287	-28.0	.4047+03	.5749+03	-43.6
024000	106	286	-28.2	.4030+03	.5730+03	-43.8
024100	110	287	-28.3	.4013+03	.5709+03	-43.9
024200	112	287	-28.5	.3996+03	.5688+03	-44.1
024300	114	288	-28.6	.3979+03	.5667+03	-44.2
024400	118	289	-28.8	.3962+03	.5647+03	-44.4
024500	121	288	-28.9	.3945+03	.5626+03	-44.5
024600	123	288	-29.0	.3928+03	.5605+03	-44.7
024700	129	287	-29.2	.3912+03	.5585+03	-44.8
024800	132	287	-29.3	.3895+03	.5564+03	-45.0
024900	133	285	-29.5	.3879+03	.5544+03	-45.1

TABLE 4. (Continued)

STS NUMBER 13
LAUNCH DATE 84 4 6 1358.
METEOROLOGICAL DATA TAPE

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
025000	132	285	-29.6	.3862+03	.5524+03	-45.3
025100	134	284	-29.7	.3846+03	.5502+03	-45.4
025200	133	284	-29.8	.3829+03	.5481+03	-45.5
025300	136	284	-29.9	.3813+03	.5460+03	-45.6
025400	137	284	-30.0	.3797+03	.5439+03	-45.7
025500	138	283	-30.1	.3781+03	.5418+03	-45.8
025600	139	284	-30.2	.3765+03	.5398+03	-46.0
025700	138	285	-30.3	.3749+03	.5377+03	-46.1
025800	142	285	-30.4	.3733+03	.5356+03	-46.2
025900	144	285	-30.5	.3717+03	.5336+03	-46.3
026000	142	284	-30.6	.3701+03	.5315+03	-46.4
026100	143	285	-30.7	.3685+03	.5295+03	-46.5
026200	143	285	-30.9	.3669+03	.5275+03	-46.6
026300	143	285	-31.0	.3654+03	.5256+03	-46.7
026400	144	286	-31.1	.3638+03	.5236+03	-46.8
026500	141	285	-31.2	.3622+03	.5216+03	-46.8
026600	139	286	-31.4	.3607+03	.5197+03	-46.9
026700	142	284	-31.5	.3592+03	.5177+03	-47.0
026800	139	287	-31.6	.3576+03	.5158+03	-47.1
026900	140	285	-31.8	.3561+03	.5139+03	-47.2
027000	141	285	-31.9	.3546+03	.5120+03	-47.3
027100	139	286	-32.1	.3530+03	.5102+03	-47.4
027200	141	286	-32.3	.3515+03	.5084+03	-47.6
027300	137	286	-32.5	.3500+03	.5066+03	-47.7
027400	140	284	-32.7	.3485+03	.5049+03	-47.9
027500	136	285	-32.9	.3470+03	.5031+03	-48.0
027600	138	284	-33.1	.3455+03	.5014+03	-48.1
027700	137	284	-33.3	.3440+03	.4996+03	-48.3
027800	137	286	-33.5	.3425+03	.4979+03	-48.4
027900	139	286	-33.7	.3411+03	.4962+03	-48.6
028000	139	286	-33.9	.3396+03	.4944+03	-48.7
028100	140	289	-34.1	.3381+03	.4927+03	-48.9
028200	140	287	-34.3	.3367+03	.4910+03	-49.0
028300	140	287	-34.5	.3352+03	.4893+03	-49.2
028400	140	290	-34.7	.3337+03	.4876+03	-49.4
028500	141	288	-34.9	.3323+03	.4859+03	-49.5
028600	144	290	-35.2	.3309+03	.4843+03	-49.7
028700	144	292	-35.4	.3294+03	.4826+03	-49.9
028800	142	289	-35.6	.3280+03	.4809+03	-50.1
028900	141	288	-35.8	.3266+03	.4793+03	-50.2
029000	143	289	-36.0	.3252+03	.4776+03	-50.4
029100	140	287	-36.1	.3237+03	.4758+03	-50.6
029200	142	286	-36.3	.3223+03	.4740+03	-50.7
029300	142	287	-36.4	.3209+03	.4723+03	-50.9
029400	141	287	-36.6	.3195+03	.4705+03	-51.0
029500	140	287	-36.8	.3181+03	.4687+03	-51.2
029600	141	288	-36.9	.3167+03	.4670+03	-51.4
029700	139	286	-37.0	.3153+03	.4652+03	-51.5
029800	141	288	-37.2	.3139+03	.4635+03	-51.7
029900	139	287	-37.3	.3126+03	.4618+03	-51.8

TABLE 4. (Continued)

STS NUMBER 13
LAUNCH DATE 84 4 6 1358.
METEOROLOGICAL DATA TAPE

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
030000	142	287	-37.5	.3112+03	.4600+03	-52.0
030100	144	285	-37.7	.3098+03	.4583+03	-52.1
030200	144	285	-37.8	.3085+03	.4567+03	-52.2
030300	146	285	-38.0	.3071+03	.4550+03	-52.3
030400	145	288	-38.2	.3056+03	.4533+03	-52.4
030500	148	290	-38.3	.3044+03	.4516+03	-52.5
030600	149	288	-38.5	.3031+03	.4500+03	-52.6
030700	150	288	-38.7	.3017+03	.4483+03	-52.7
030800	156	291	-38.9	.3004+03	.4467+03	-52.8
030900	155	289	-39.0	.2991+03	.4450+03	-52.9
031000	155	287	-39.2	.2978+03	.4434+03	-53.0
031100	155	290	-39.3	.2965+03	.4417+03	-53.1
031200	153	287	-39.4	.2951+03	.4399+03	-53.3
031300	153	287	-39.6	.2938+03	.4382+03	-53.4
031400	153	290	-39.7	.2925+03	.4365+03	-53.6
031500	149	290	-39.8	.2912+03	.4348+03	-53.8
031600	150	288	-39.9	.2900+03	.4331+03	-53.9
031700	149	289	-40.0	.2887+03	.4314+03	-54.0
031800	151	288	-40.2	.2874+03	.4297+03	-54.2
031900	150	288	-40.3	.2861+03	.4280+03	-54.3
032000	152	288	-40.4	.2848+03	.4263+03	-54.5
032100	152	289	-40.5	.2836+03	.4246+03	-54.6
032200	153	287	-40.6	.2823+03	.4230+03	-54.6
032300	155	287	-40.8	.2811+03	.4213+03	-54.7
032400	154	286	-40.9	.2798+03	.4196+03	-54.7
032500	155	286	-41.0	.2786+03	.4180+03	-54.8
032600	155	286	-41.1	.2773+03	.4163+03	-54.9
032700	157	285	-41.2	.2761+03	.4147+03	-54.9
032800	157	286	-41.4	.2749+03	.4131+03	-55.0
032900	159	286	-41.5	.2736+03	.4114+03	-55.0
033000	162	285	-41.6	.2724+03	.4098+03	-55.1
033100	163	287	-41.8	.2712+03	.4083+03	-55.2
033200	165	287	-42.0	.2700+03	.4069+03	-55.3
033300	168	286	-42.2	.2688+03	.4054+03	-55.5
033400	171	287	-42.4	.2676+03	.4039+03	-55.6
033500	172	285	-42.6	.2664+03	.4025+03	-55.7
033600	171	285	-42.8	.2652+03	.4010+03	-55.8
033700	171	284	-43.0	.2640+03	.3996+03	-55.9
033800	171	284	-43.2	.2628+03	.3981+03	-56.1
033900	171	285	-43.4	.2616+03	.3967+03	-56.2
034000	173	284	-43.6	.2604+03	.3952+03	-56.3
034100	173	284	-43.8	.2593+03	.3938+03	-56.5
034200	172	284	-44.0	.2581+03	.3923+03	-56.7
034300	173	285	-44.2	.2569+03	.3909+03	-56.9
034400	172	284	-44.4	.2558+03	.3894+03	-57.1
034500	172	285	-44.5	.2546+03	.3880+03	-57.2
034600	174	284	-44.7	.2535+03	.3866+03	-57.4
034700	175	285	-44.9	.2523+03	.3851+03	-57.6
034800	174	285	-45.1	.2512+03	.3837+03	-57.8
034900	174	285	-45.3	.2500+03	.3823+03	-56.0

TABLE 4. (Continued)

STS NUMBER 13
LAUNCH DATE 84 4 6 1358.
METEOROLOGICAL DATA TAPE

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
035000	174	285	-45.5	.2489+03	.3809+03	-58.2
035100	174	286	-45.7	.2478+03	.3795+03	-58.3
035200	173	287	-45.9	.2466+03	.3781+03	-58.5
035300	172	285	-46.1	.2455+03	.3767+03	-58.6
035400	172	286	-46.3	.2444+03	.3753+03	-58.7
035500	169	287	-46.5	.2433+03	.3739+03	-58.8
035600	170	287	-46.7	.2422+03	.3726+03	-59.0
035700	170	287	-46.9	.2411+03	.3712+03	-59.1
035800	171	288	-47.1	.2400+03	.3698+03	-59.2
035900	172	288	-47.3	.2389+03	.3685+03	-59.4
036000	173	287	-47.5	.2378+03	.3671+03	-59.5
036100	172	288	-47.7	.2367+03	.3657+03	-59.6
036200	172	287	-47.9	.2356+03	.3644+03	-59.8
036300	173	287	-48.1	.2345+03	.3630+03	-59.9
036400	174	289	-48.3	.2334+03	.3617+03	-60.1
036500	174	288	-48.5	.2324+03	.3603+03	-60.3
036600	174	288	-48.7	.2313+03	.3590+03	-60.4
036700	174	288	-48.9	.2302+03	.3577+03	-60.5
036800	174	288	-49.1	.2292+03	.3563+03	-60.7
036900	173	288	-49.3	.2281+03	.3550+03	-60.8
037000	174	287	-49.5	.2271+03	.3537+03	-61.0
037100	175	288	-49.7	.2260+03	.3524+03	-61.2
037200	175	288	-50.0	.2250+03	.3512+03	-61.4
037300	174	287	-50.2	.2239+03	.3499+03	-61.6
037400	173	287	-50.5	.2229+03	.3487+03	-61.8
037500	174	288	-50.7	.2219+03	.3474+03	-62.0
037600	175	288	-50.9	.2208+03	.3462+03	-62.3
037700	176	289	-51.2	.2198+03	.3450+03	-62.5
037800	176	290	-51.4	.2188+03	.3437+03	-62.7
037900	175	290	-51.7	.2178+03	.3425+03	-62.9
038000	174	289	-51.9	.2168+03	.3413+03	-63.1
038100	174	289	-52.2	.2157+03	.3401+03	-63.4
038200	174	290	-52.4	.2147+03	.3389+03	-63.6
038300	175	290	-52.7	.2137+03	.3377+03	-63.9
038400	175	291	-53.0	.2127+03	.3366+03	-64.1
038500	175	291	-53.2	.2117+03	.3354+03	-64.4
038600	174	290	-53.5	.2107+03	.3342+03	-64.7
038700	174	291	-53.8	.2097+03	.3331+03	-64.9
038800	174	290	-54.1	.2087+03	.3319+03	-65.2
038900	173	290	-54.3	.2078+03	.3308+03	-65.4
039000	173	291	-54.6	.2068+03	.3296+03	-65.7
039100	173	290	-54.8	.2058+03	.3283+03	-65.8
039200	173	290	-55.0	.2048+03	.3270+03	-65.9
039300	172	290	-55.1	.2039+03	.3258+03	-66.0
039400	172	290	-55.3	.2029+03	.3245+03	-66.1
039500	171	289	-55.5	.2019+03	.3232+03	-66.2
039600	171	289	-55.7	.2010+03	.3219+03	-66.4
039700	171	289	-55.9	.2000+03	.3207+03	-66.5
039800	171	289	-56.0	.1991+03	.3194+03	-66.6
039900	171	289	-56.2	.1981+03	.3182+03	-66.7

TABLE 4. (Continued)

STS NUMBER 13
LAUNCH DATE 84 4 6 1358.
METEOROLOGICAL DATA TAPE

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
040000	170	288	-56.4	.1972+03	.3169+03	-66.8
040100	171	289	-56.7	.1962+03	.3158+03	-67.0
040200	172	290	-56.9	.1953+03	.3146+03	-67.2
040300	171	289	-57.2	.1944+03	.3135+03	-67.4
040400	171	289	-57.4	.1934+03	.3124+03	-67.6
040500	171	289	-57.7	.1925+03	.3112+03	-67.8
040600	172	289	-58.0	.1916+03	.3101+03	-68.1
040700	171	289	-58.2	.1906+03	.3090+03	-68.3
040800	171	290	-58.5	.1897+03	.3079+03	-68.5
040900	170	290	-58.7	.1888+03	.3068+03	-68.7
041000	170	290	-59.0	.1879+03	.3057+03	-68.9
041100	169	290	-59.1	.1870+03	.3043+03	-9999.
041200	168	290	-59.2	.1861+03	.3030+03	-9999.
041300	168	290	-59.3	.1852+03	.3017+03	-9999.
041400	168	289	-59.4	.1843+03	.3004+03	-9999.
041500	166	289	-59.5	.1834+03	.2991+03	-9999.
041600	166	288	-59.6	.1825+03	.2978+03	-9999.
041700	167	287	-59.7	.1816+03	.2965+03	-9999.
041800	168	287	-59.8	.1808+03	.2952+03	-9999.
041900	167	288	-59.9	.1799+03	.2939+03	-9999.
042000	167	290	-60.0	.1790+03	.2926+03	-9999.
042100	166	292	-60.0	.1782+03	.2912+03	-9999.
042200	163	292	-60.0	.1773+03	.2898+03	-9999.
042300	160	293	-60.0	.1764+03	.2884+03	-9999.
042400	157	293	-60.0	.1756+03	.2870+03	-9999.
042500	153	293	-60.0	.1747+03	.2856+03	-9999.
042600	150	294	-60.1	.1739+03	.2843+03	-9999.
042700	147	294	-60.1	.1730+03	.2829+03	-9999.
042800	143	295	-60.1	.1722+03	.2816+03	-9999.
042900	140	294	-60.1	.1714+03	.2802+03	-9999.
043000	137	294	-60.1	.1705+03	.2789+03	-9999.
043100	134	293	-60.2	.1697+03	.2776+03	-9999.
043200	132	293	-60.2	.1689+03	.2763+03	-9999.
043300	129	293	-60.3	.1681+03	.2751+03	-9999.
043400	126	290	-60.4	.1673+03	.2738+03	-9999.
043500	123	290	-60.4	.1664+03	.2726+03	-9999.
043600	120	289	-60.5	.1656+03	.2714+03	-9999.
043700	118	287	-60.6	.1648+03	.2701+03	-9999.
043800	120	284	-60.7	.1640+03	.2689+03	-9999.
043900	120	282	-60.7	.1632+03	.2677+03	-9999.
044000	118	283	-60.8	.1624+03	.2665+03	-9999.
044100	115	283	-60.9	.1616+03	.2653+03	-9999.
044200	114	280	-61.0	.1609+03	.2641+03	-9999.
044300	114	280	-61.0	.1601+03	.2629+03	-9999.
044400	113	279	-61.1	.1593+03	.2617+03	-9999.
044500	115	276	-61.2	.1585+03	.2606+03	-9999.
044600	115	274	-61.3	.1578+03	.2594+03	-9999.
044700	118	273	-61.4	.1570+03	.2582+03	-9999.
044800	122	272	-61.4	.1562+03	.2571+03	-9999.
044900	124	272	-61.5	.1555+03	.2559+03	-9999.

TABLE 4. (Continued)

STS NUMBER 13
LAUNCH DATE 84 4 6 1358.
METEOROLOGICAL DATA TAPE

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
045000	129	272	-61.6	.1547+03	.2548+03	-9999.
045100	132	273	-61.7	.1539+03	.2536+03	-9999.
045200	134	273	-61.7	.1532+03	.2524+03	-9999.
045300	136	271	-61.8	.1524+03	.2513+03	-9999.
045400	134	270	-61.8	.1517+03	.2501+03	-9999.
045500	132	269	-61.9	.1510+03	.2489+03	-9999.
045600	130	267	-62.0	.1502+03	.2478+03	-9999.
045700	131	266	-62.0	.1495+03	.2467+03	-9999.
045800	134	267	-62.1	.1488+03	.2455+03	-9999.
045900	135	268	-62.1	.1480+03	.2444+03	-9999.
046000	133	268	-62.2	.1473+03	.2433+03	-9999.
046100	134	267	-62.2	.1466+03	.2420+03	-9999.
046200	133	266	-62.1	.1459+03	.2408+03	-9999.
046300	133	266	-62.1	.1452+03	.2396+03	-9999.
046400	135	266	-62.0	.1445+03	.2384+03	-9999.
046500	137	267	-62.0	.1437+03	.2372+03	-9999.
046600	138	268	-62.0	.1430+03	.2360+03	-9999.
046700	138	270	-61.9	.1423+03	.2348+03	-9999.
046800	140	271	-61.9	.1417+03	.2336+03	-9999.
046900	139	271	-61.8	.1410+03	.2324+03	-9999.
047000	137	270	-61.8	.1403+03	.2312+03	-9999.
047100	140	268	-61.7	.1396+03	.2299+03	-9999.
047200	142	268	-61.5	.1389+03	.2287+03	-9999.
047300	143	270	-61.4	.1382+03	.2274+03	-9999.
047400	143	274	-61.3	.1376+03	.2262+03	-9999.
047500	146	274	-61.2	.1369+03	.2249+03	-9999.
047600	147	276	-61.0	.1362+03	.2237+03	-9999.
047700	146	276	-60.9	.1356+03	.2225+03	-9999.
047800	148	278	-60.8	.1349+03	.2213+03	-9999.
047900	152	278	-60.6	.1342+03	.2200+03	-9999.
048000	152	279	-60.5	.1336+03	.2188+03	-9999.
048100	151	278	-60.4	.1329+03	.2177+03	-9999.
048200	149	277	-60.4	.1323+03	.2166+03	-9999.
048300	150	276	-60.3	.1316+03	.2155+03	-9999.
048400	150	275	-60.2	.1310+03	.2143+03	-9999.
048500	149	276	-60.2	.1304+03	.2132+03	-9999.
048600	147	277	-60.1	.1297+03	.2121+03	-9999.
048700	145	277	-60.0	.1291+03	.2110+03	-9999.
048800	143	277	-59.9	.1285+03	.2099+03	-9999.
048900	140	281	-59.9	.1279+03	.2089+03	-9999.
049000	137	280	-59.8	.1273+03	.2078+03	-9999.
049100	133	281	-59.8	.1266+03	.2068+03	-9999.
049200	127	281	-59.8	.1260+03	.2058+03	-9999.
049300	122	281	-59.8	.1254+03	.2048+03	-9999.
049400	119	281	-59.8	.1248+03	.2038+03	-9999.
049500	116	280	-59.8	.1242+03	.2028+03	-9999.
049600	112	280	-59.8	.1236+03	.2018+03	-9999.
049700	109	279	-59.8	.1230+03	.2008+03	-9999.
049800	107	277	-59.8	.1224+03	.1999+03	-9999.
049900	106	277	-59.8	.1218+03	.1989+03	-9999.

TABLE 4. (Continued)

STS NUMBER 13
LAUNCH DATE 84 4 6 1358.
METEOROLOGICAL DATA TAPE

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
050000	106	277	-59.8	.1212+03	.1979+03	-9999.
050100	107	277	-59.8	.1206+03	.1970+03	-9999.
050200	108	274	-59.9	.1201+03	.1961+03	-9999.
050300	106	272	-59.9	.1195+03	.1952+03	-9999.
050400	106	271	-59.9	.1189+03	.1943+03	-9999.
050500	105	269	-59.9	.1183+03	.1933+03	-9999.
050600	104	267	-60.0	.1178+03	.1924+03	-9999.
050700	105	265	-60.0	.1172+03	.1915+03	-9999.
050800	105	263	-60.0	.1166+03	.1906+03	-9999.
050900	105	262	-60.1	.1161+03	.1897+03	-9999.
051000	105	262	-60.1	.1155+03	.1888+03	-9999.
051100	107	260	-60.1	.1149+03	.1879+03	-9999.
051200	108	258	-60.1	.1144+03	.1870+03	-9999.
051300	109	257	-60.1	.1138+03	.1861+03	-9999.
051400	111	255	-60.1	.1133+03	.1852+03	-9999.
051500	112	255	-60.1	.1127+03	.1843+03	-9999.
051600	113	256	-60.1	.1122+03	.1834+03	-9999.
051700	114	256	-60.1	.1116+03	.1825+03	-9999.
051800	118	255	-60.1	.1111+03	.1817+03	-9999.
051900	119	254	-60.1	.1106+03	.1808+03	-9999.
052000	119	254	-60.1	.1100+03	.1799+03	-9999.
052100	120	253	-60.2	.1095+03	.1791+03	-9999.
052200	119	254	-60.3	.1090+03	.1783+03	-9999.
052300	121	253	-60.4	.1084+03	.1775+03	-9999.
052400	119	255	-60.5	.1079+03	.1767+03	-9999.
052500	116	258	-60.5	.1074+03	.1759+03	-9999.
052600	114	259	-60.6	.1069+03	.1752+03	-9999.
052700	112	261	-60.7	.1063+03	.1744+03	-9999.
052800	109	264	-60.8	.1058+03	.1736+03	-9999.
052900	107	265	-60.9	.1053+03	.1728+03	-9999.
053000	105	265	-61.0	.1048+03	.1721+03	-9999.
053100	103	267	-61.1	.1043+03	.1713+03	-9999.
053200	101	268	-61.2	.1038+03	.1705+03	-9999.
053300	097	268	-61.2	.1033+03	.1698+03	-9999.
053400	094	271	-61.3	.1028+03	.1690+03	-9999.
053500	091	272	-61.4	.1023+03	.1682+03	-9999.
053600	087	273	-61.5	.1018+03	.1675+03	-9999.
053700	084	274	-61.6	.1013+03	.1667+03	-9999.
053800	082	272	-61.6	.1008+03	.1660+03	-9999.
053900	078	272	-61.7	.1003+03	.1652+03	-9999.
054000	075	271	-61.8	.9980+02	.1645+03	-9999.
054100	073	269	-61.9	.9931+02	.1637+03	-9999.
054200	068	274	-61.9	.9883+02	.1630+03	-9999.
054300	065	272	-62.0	.9834+02	.1622+03	-9999.
054400	064	266	-62.0	.9786+02	.1615+03	-9999.
054500	064	266	-62.1	.9739+02	.1607+03	-9999.
054600	065	265	-62.2	.9691+02	.1600+03	-9999.
054700	066	263	-62.2	.9644+02	.1593+03	-9999.
054800	068	263	-62.3	.9597+02	.1585+03	-9999.
054900	070	263	-62.3	.9550+02	.1578+03	-9999.

TABLE 4. (Continued)

STS NUMBER 13
LAUNCH DATE 84 4 6 1358.
METEOROLOGICAL DATA TAPE

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
055000	073	264	-62.4	.9503+02	.1571+03	-9999.
055100	075	263	-62.5	.9456+02	.1564+03	-9999.
055200	076	264	-62.5	.9410+02	.1557+03	-9999.
055300	076	267	-62.6	.9364+02	.1549+03	-9999.
055400	080	266	-62.7	.9318+02	.1542+03	-9999.
055500	082	266	-62.7	.9273+02	.1535+03	-9999.
055600	083	267	-62.8	.9227+02	.1528+03	-9999.
055700	086	267	-62.9	.9182+02	.1521+03	-9999.
055800	089	266	-63.0	.9137+02	.1514+03	-9999.
055900	089	269	-63.0	.9093+02	.1507+03	-9999.
056000	091	269	-63.1	.9048+02	.1501+03	-9999.
057000	086	265	-64.8	.8612+02	.1440+03	-9999.
058000	081	264	-67.5	.8192+02	.1388+03	-9999.
059000	069	264	-67.9	.7790+02	.1322+03	-9999.
060000	055	267	-67.6	.7408+02	.1256+03	-9999.
061000	043	272	-65.8	.7047+02	.1184+03	-9999.
062000	032	280	-62.5	.6706+02	.1109+03	-9999.
063000	022	294	-63.2	.6384+02	.1059+03	-9999.
064000	018	302	-63.4	.6078+02	.1009+03	-9999.
065000	014	301	-63.2	.5786+02	.9601+02	-9999.
066000	009	292	-63.0	.5508+02	.9131+02	-9999.
067000	008	258	-63.8	.5243+02	.8725+02	-9999.
068000	009	236	-64.4	.4991+02	.8329+02	-9999.
069000	011	236	-64.3	.4750+02	.7923+02	-9999.
070000	009	244	-63.3	.4522+02	.7507+02	-9999.
071000	003	247	-62.0	.4305+02	.7103+02	-9999.
072000	005	103	-60.5	.4101+02	.6718+02	-9999.
073000	012	109	-58.7	.3907+02	.6347+02	-9999.
074000	015	129	-58.6	.3723+02	.6045+02	-9999.
075000	013	130	-58.8	.3549+02	.5768+02	-9999.
076000	014	090	-56.6	.3383+02	.5442+02	-9999.
077000	022	081	-55.8	.3226+02	.5171+02	-9999.
078000	028	083	-56.1	.3076+02	.4937+02	-9999.
079000	032	088	-56.5	.2933+02	.4716+02	-9999.
080000	032	091	-55.8	.2797+02	.4483+02	-9999.
081000	032	094	-55.0	.2668+02	.4261+02	-9999.
082000	031	097	-54.0	.2545+02	.4046+02	-9999.
083000	029	103	-52.8	.2428+02	.3839+02	-9999.
084000	029	102	-51.3	.2317+02	.3638+02	-9999.
085000	032	097	-49.3	.2213+02	.3444+02	-9999.
086000	037	094	-49.2	.2113+02	.3287+02	-9999.
087000	042	092	-48.1	.2018+02	.3124+02	-9999.
088000	047	090	-46.2	.1928+02	.2959+02	-9999.
089000	051	088	-45.2	.1843+02	.2817+02	-9999.
090000	055	088	-44.1	.1762+02	.2680+02	-9999.
091000	059	088	-42.8	.1684+02	.2547+02	-9999.
092000	061	090	-41.6	.1611+02	.2424+02	-9999.
093000	062	092	-41.4	.1541+02	.2316+02	-9999.
094000	062	094	-41.7	.1474+02	.2219+02	-9999.
095000	061	096	-42.0	.1410+02	.2125+02	-9999.

TABLE 4. (Continued)

STS NUMBER 13
LAUNCH DATE 84 4 6 1358.
METEOROLOGICAL DATA TAPE

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
096000	059	097	-41.9	.1348+02	.2031+02	-9999.
097000	057	097	-41.5	.1290+02	.1940+02	-9999.
098000	055	096	-41.1	.1234+02	.1853+02	-9999.
099000	042	097	-41.1	.1175+02	.1764+02	-9999.
100000	038	100	-41.2	.1119+02	.1680+02	-9999.
101000	038	106	-44.9	.1065+02	.1626+02	-9999.
102000	042	056	-43.7	.1014+02	.1540+02	-9999.
103000	045	053	-40.2	.9660+01	.1444+02	-9999.
104000	038	048	-39.7	.9198+01	.1372+02	-9999.
105000	035	052	-42.1	.8758+01	.1320+02	-9999.
106000	030	063	-37.3	.8339+01	.1232+02	-9999.
107000	032	058	-36.2	.7986+01	.1174+02	-9999.
108000	032	055	-38.2	.7647+01	.1134+02	-9999.
109000	043	044	-39.4	.7318+01	.1091+02	-9999.
110000	047	047	-29.2	.7010+01	.1001+02	-9999.
111000	021	039	-31.8	.6722+01	.9700+01	-9999.
112000	032	049	-40.3	.6436+01	.9628+01	-9999.
113000	037	059	-35.8	.6160+01	.9041+01	-9999.
114000	015	070	-34.5	.5901+01	.8614+01	-9999.
115000	027	091	-37.9	.5651+01	.8369+01	-9999.
116000	037	100	-32.8	.5413+01	.7845+01	-9999.
117000	023	103	-28.2	.5189+01	.7379+01	-9999.
118000	020	039	-29.8	.4977+01	.7123+01	-9999.
119000	021	046	-32.8	.4770+01	.6914+01	-9999.
120000	030	058	-30.8	.4571+01	.6571+01	-9999.
121000	023	034	-31.2	.4382+01	.6308+01	-9999.
122000	018	072	-32.2	.4200+01	.6071+01	-9999.
123000	020	121	-30.3	.4026+01	.5776+01	-9999.
124000	008	188	-28.2	.3860+01	.5490+01	-9999.
125000	006	282	-22.7	.3704+01	.5152+01	-9999.
126000	016	311	-21.2	.3556+01	.4916+01	-9999.
127000	023	285	-23.2	.3414+01	.4757+01	-9999.
128000	025	265	-21.0	.3277+01	.4529+01	-9999.
129000	035	253	-19.3	.3148+01	.4319+01	-9999.
130000	040	260	-23.2	.3022+01	.4211+01	-9999.
131000	037	281	-23.9	.2901+01	.4055+01	-9999.
132000	035	295	-21.8	.2785+01	.3859+01	-9999.
133000	042	315	-21.2	.2673+01	.3696+01	-9999.
134000	050	322	-24.6	.2567+01	.3598+01	-9999.
135000	043	328	-31.7	.2462+01	.3551+01	-9999.
136000	021	337	-29.6	.2359+01	.3376+01	-9999.
137000	005	275	-24.7	.2263+01	.3173+01	-9999.
138000	016	228	-19.9	.2173+01	.2989+01	-9999.
139000	028	236	-18.2	.2087+01	.2852+01	-9999.
140000	037	251	-20.7	.2005+01	.2767+01	-9999.
141000	043	267	-21.2	.1925+01	.2661+01	-9999.
142000	040	287	-18.8	.1849+01	.2532+01	-9999.
143000	035	315	-16.2	.1777+01	.2408+01	-9999.
144000	032	337	-16.2	.1707+01	.2314+01	-9999.
145000	025	342	-16.2	.1641+01	.2224+01	-9999.

TABLE 4. (Continued)

STS NUMBER 13
LAUNCH DATE 84 4 6 1358.
METEOROLOGICAL DATA TAPE

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
146000	023	337	-18.2	.1576+01	.2153+01	-9999.
147000	020	330	-17.2	.1515+01	.2062+01	-9999.
148000	013	322	-18.9	.1455+01	.1993+01	-9999.
149000	010	282	-15.8	.1398+01	.1893+01	-9999.
150000	020	255	-10.1	.1344+01	.1780+01	-9999.
151000	035	256	-7.2	.1293+01	.1694+01	-9999.
152000	045	258	-6.2	.1244+01	.1624+01	-9999.
153000	045	253	-8.5	.1198+01	.1576+01	-9999.
154000	043	247	-12.2	.1152+01	.1537+01	-9999.
155000	043	249	-10.8	.1108+01	.1471+01	-9999.
156000	047	257	-8.7	.1066+01	.1404+01	-9999.
157000	045	269	-8.6	.1025+01	.1350+01	-9999.
158000	042	277	-10.8	.9865+00	.1310+01	-9999.
159000	033	282	-11.2	.9487+00	.1261+01	-9999.
160000	027	282	-10.5	.9125+00	.1210+01	-9999.
161000	025	280	-9.1	.8778+00	.1158+01	-9999.
162000	027	281	-6.4	.8447+00	.1103+01	-9999.
163000	030	286	-3.5	.8132+00	.1051+01	-9999.
164000	032	289	-1.2	.7831+00	.1003+01	-9999.
165000	033	290	-1.2	.7543+00	.9661+00	-9999.
166000	033	289	-1.2	.7266+00	.9306+00	-9999.
167000	032	288	-2.2	.6998+00	.8997+00	-9999.
168000	027	288	-5.3	.6738+00	.8762+00	-9999.
169000	021	287	-9.5	.6484+00	.8567+00	-9999.
170000	018	280	-11.2	.6237+00	.8293+00	-9999.
171000	018	272	-11.2	.5999+00	.7977+00	-9999.
172000	021	268	-11.2	.5770+00	.7672+00	-9999.
173000	025	272	-12.2	.5549+00	.7406+00	-9999.
174000	030	280	-13.2	.5336+00	.7150+00	-9999.
175000	037	288	-12.7	.5131+00	.6863+00	-9999.
176000	042	295	-10.9	.4935+00	.6556+00	-9999.
177000	045	300	-9.7	.4747+00	.6277+00	-9999.
178000	047	303	-10.8	.4567+00	.6063+00	-9999.
179000	045	303	-13.7	.4392+00	.5898+00	-9999.
180000	042	300	-16.8	.4222+00	.5737+00	-9999.
181000	037	294	-19.2	.4056+00	.5563+00	-9999.
182000	032	284	-19.2	.3897+00	.5345+00	-9999.
183000	025	271	-17.3	.3744+00	.5097+00	-9999.
184000	018	257	-13.0	.3599+00	.4820+00	-9999.
185000	013	237	-12.2	.3461+00	.4620+00	-9999.
186000	008	206	-13.4	.3328+00	.4463+00	-9999.
187000	006	161	-16.1	.3200+00	.4337+00	-9999.
188000	008	129	-17.2	.3076+00	.4186+00	-9999.
189000	010	120	-16.1	.2956+00	.4006+00	-9999.
190000	011	119	-14.2	.2841+00	.3822+00	-9999.
191000	013	125	-12.0	.2733+00	.3645+00	-9999.
192000	016	131	-10.2	.2629+00	.3482+00	-9999.
193000	020	136	-10.4	.2529+00	.3353+00	-9999.
194000	025	138	-14.5	.2432+00	.3275+00	-9999.
195000	032	138	-18.7	.2338+00	.3201+00	-9999.

TABLE 4. (Continued)

STS NUMBER 13
LAUNCH DATE 84 4 6 1358.
METEOROLOGICAL DATA TAPE

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
196000	037	138	-22.6	.7245+00	.3121+00	-9999.
197000	040	139	-24.2	.2160+00	.3022+00	-9999.
198000	040	142	-24.2	.2084+00	.2916+00	-9999.
199000	038	148	-25.2	.2000+00	.2809+00	-9999.
200000	035	158	-26.6	.1919+00	.2712+00	-9999.
201000	032	174	-29.7	.1841+00	.2635+00	-9999.
202000	030	199	-31.8	.1765+00	.2548+00	-9999.
203000	035	222	-34.9	.1692+00	.2474+00	-9999.
204000	043	239	-35.2	.1621+00	.2373+00	-9999.
205000	054	249	-36.2	.1553+00	.2283+00	-9999.
206000	062	254	-36.2	.1488+00	.2187+00	-9999.
207000	069	258	-37.2	.1425+00	.2103+00	-9999.
208000	074	261	-38.1	.1365+00	.2023+00	-9999.
209000	076	262	-39.7	.1307+00	.1950+00	-9999.
210000	074	263	-41.2	.1251+00	.1879+00	-9999.
211000	072	264	-43.2	.1197+00	.1813+00	-9999.
212000	067	265	-43.3	.1145+00	.1735+00	-9999.
213000	060	266	-44.8	.1095+00	.1670+00	-9999.
214000	052	267	-45.3	.1047+00	.1601+00	-9999.
215000	045	270	-46.2	.1001+00	.1536+00	-9999.
216000	038	274	-46.2	.9570-01	.1469+00	-9999.
217000	033	280	-46.9	.9150-01	.1409+00	-9999.
218000	028	289	-47.4	.8750-01	.1350+00	-9999.
219000	027	300	-48.2	.8360-01	.1294+00	-9999.
220000	027	313	-49.2	.7990-01	.1243+00	-9999.
221000	027	323	-50.8	.7640-01	.1197+00	-9999.
222000	028	331	-52.2	.7300-01	.1151+00	-9999.
223000	030	336	-53.0	.6970-01	.1103+00	-9999.
224000	030	340	-54.1	.6650-01	.1058+00	-9999.
225000	030	342	-53.2	.6350-01	.1006+00	-9999.
226000	027	344	-51.7	.6060-01	.9534-01	-9999.
227000	023	344	-50.3	.5800-01	.9066-01	-9999.
228000	020	342	-49.2	.5540-01	.8616-01	-9999.
229000	016	337	-49.1	.5300-01	.8242-01	-9999.
230000	013	325	-49.7	.5070-01	.7903-01	-9999.
231000	011	306	-51.2	.4840-01	.7595-01	-9999.
232000	011	282	-52.5	.4620-01	.7295-01	-9999.
233000	013	265	-54.2	.4410-01	.7018-01	-9999.
234000	016	255	-55.2	.4210-01	.6728-01	-9999.
235000	020	251	-57.2	.4020-01	.6484-01	-9999.
236000	023	250	-58.2	.3830-01	.6206-01	-9999.
237000	025	250	-59.3	.3650-01	.5947-01	-9999.
238000	027	250	-60.9	.3480-01	.5711-01	-9999.
239000	028	252	-62.4	.3320-01	.5488-01	-9999.
240000	030	253	-63.9	.3160-01	.5261-01	-9999.
241000	030	255	-65.4	.3010-01	.5048-01	-9999.
242000	028	257	-67.0	.2870-01	.4849-01	-9999.
243000	027	258	-68.5	.2730-01	.4647-01	-9999.
244000	025	259	-70.0	.2600-01	.4459-01	-9999.
245000	023	258	-71.5	.2470-01	.4268-01	-9999.

TABLE 4. (Continued)

STS NUMBER 13
LAUNCH DATE 84 4 6 1358.
METEOROLOGICAL DATA TAPE

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
246000	020	256	-72.2	.2350-01	.4073-01	-9999.
247000	016	251	-73.6	.2230-01	.3893-01	-9999.
248000	013	241	-75.1	.2120-01	.3729-01	-9999.
249000	010	223	-77.2	.2010-01	.3573-01	-9999.
250000	008	190	-79.2	.1910-01	.3430-01	-9999.
251000	011	160	-80.7	.1810-01	.3276-01	-9999.
252000	015	142	-82.2	.1720-01	.3138-01	-9999.
253000	021	134	-83.7	.1630-01	.2998-01	-9999.
254000	028	129	-84.3	.1550-01	.2858-01	-9999.
255000	035	126	-85.2	.1470-01	.2724-01	-9999.
256000	042	125	-86.2	.1390-01	.2589-01	-9999.
257000	048	123	-86.8	.1320-01	.2468-01	-9999.
258000	055	123	-88.2	.1250-01	.2354-01	-9999.
259000	062	122	-88.9	.1180-01	.2231-01	-9999.
260000	060	121	-87.9	.1134-01	.2143-01	-9999.
261000	057	121	-86.9	.1089-01	.2059-01	-9999.
262000	055	121	-85.9	.1046-01	.1977-01	-9999.
263000	052	121	-85.0	.1005-01	.1900-01	-9999.
264000	050	121	-84.0	.9653-02	.1825-01	-9999.
265000	048	121	-83.0	.9273-02	.1753-01	-9999.
266000	045	121	-82.0	.8908-02	.1684-01	-9999.
267000	043	121	-81.1	.8557-02	.1618-01	-9999.
268000	040	121	-80.1	.8220-02	.1554-01	-9999.
269000	038	121	-79.1	.7897-02	.1493-01	-9999.
270000	036	120	-78.1	.7586-02	.1434-01	-9999.
271000	033	120	-77.2	.7287-02	.1378-01	-9999.
272000	031	120	-76.2	.7000-02	.1323-01	-9999.
273000	028	120	-75.2	.6725-02	.1271-01	-9999.
274000	026	120	-74.2	.6460-02	.1221-01	-9999.
277000	032	131	-75.2	.5540-02	.9740-02	-9999.
280000	035	132	-76.2	.4760-02	.8400-02	-9999.
283000	031	121	-77.3	.4080-02	.7240-02	-9999.
286000	028	108	-78.5	.3500-02	.6240-02	-9999.
289000	027	094	-79.6	.3000-02	.5380-02	-9999.
292000	029	079	-80.8	.2570-02	.4640-02	-9999.
295000	031	066	-81.9	.2200-02	.4000-02	-9999.
298000	024	063	-82.9	.1830-02	.3330-02	-9999.
301000	014	052	-83.2	.1550-02	.2830-02	-9999.
304000	006	334	-83.6	.1310-02	.2400-02	-9999.
307000	022	279	-83.9	.1120-02	.2030-02	-9999.
310000	048	271	-84.3	.9460-03	.1730-02	-9999.
313000	066	269	-83.9	.8030-03	.1460-02	-9999.
316000	066	269	-82.6	.6830-03	.1230-02	-9999.
319000	064	269	-81.4	.5810-03	.1030-02	-9999.
322000	058	269	-80.1	.4940-03	.8710-03	-9999.
325000	048	268	-78.9	.4200-03	.7330-03	-9999.
328000	033	266	-77.6	.3580-03	.6180-03	-9999.
331000	035	267	-73.7	.3070-03	.5180-03	-9999.
334000	038	266	-69.7	.2630-03	.4350-03	-9999.
337000	042	265	-65.8	.2260-03	.3650-03	-9999.

TABLE 4. (Concluded)

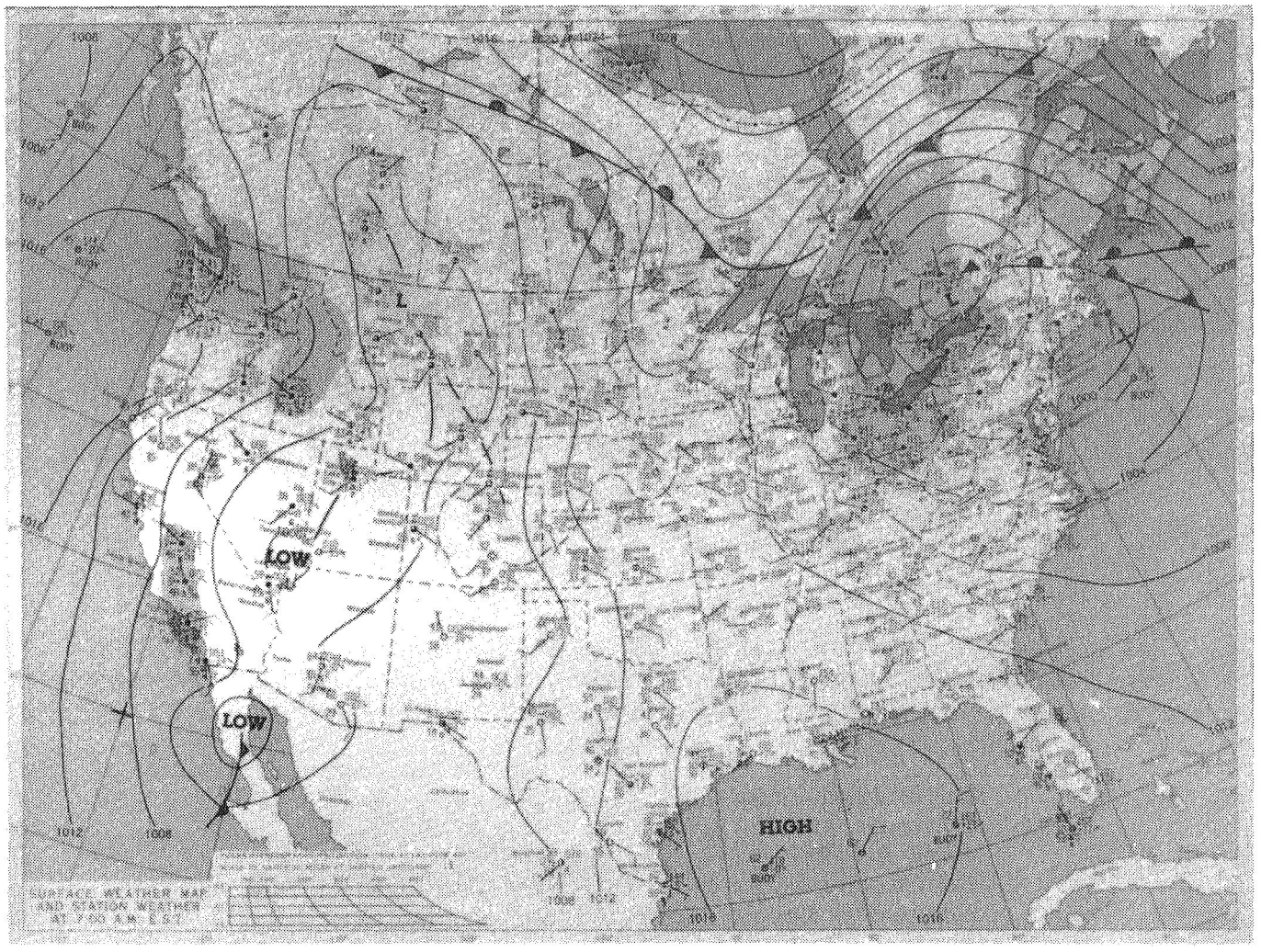
STS NUMBER 13
LAUNCH DATE 84 4 6 1358.
METEOROLOGICAL DATA TAPE

ALTITUDE (FT)	WIND SPEED (FT/SEC)	WIND DIRECTION (DEG)	TEMPERATURE (DEG C)	PRESSURE (MILLIBARS)	DENSITY (GRAM/M3)	DEW POINT (DEG C)
340000	045	263	-61.8	.1940-03	.3060-03	-9999.
343000	048	261	-57.8	.1660-03	.2570-03	-9999.
346000	049	264	-52.5	.1440-03	.2170-03	-9999.
349000	050	262	-45.7	.1270-03	.1850-03	-9999.
352000	049	258	-39.0	.1110-03	.1570-03	-9999.
355000	047	254	-32.3	.9770-04	.1340-03	-9999.
358000	043	247	-25.5	.8570-04	.1140-03	-9999.
361000	033	250	-18.7	.7520-04	.9700-04	-9999.
364000	034	244	-9.8	.6790-04	.8430-04	-9999.
367000	035	236	-.9	.6120-04	.7330-04	-9999.
370000	036	226	7.9	.5510-04	.6370-04	-9999.
373000	039	214	16.8	.4960-04	.5540-04	-9999.
376000	044	201	25.8	.4460-04	.4820-04	-9999.
379000	027	206	35.3	.4040-04	.4220-04	-9999.
382000	029	203	45.6	.3700-04	.3730-04	-9999.
385000	032	199	56.3	.3390-04	.3300-04	-9999.
388000	034	197	67.2	.3120-04	.2930-04	-9999.
391000	037	194	78.4	.2880-04	.2610-04	-9999.
394000	041	192	89.9	.2670-04	.2340-04	-9999.
397000	044	190	101.5	.2480-04	.2100-04	-9999.
400000	048	189	113.3	.2300-04	.1890-04	-9999.

TABLE 5. SELECTED ATMOSPHERIC OBSERVATIONS FOR THE FLIGHT TESTS OF THE SPACE SHUTTLE VEHICLES

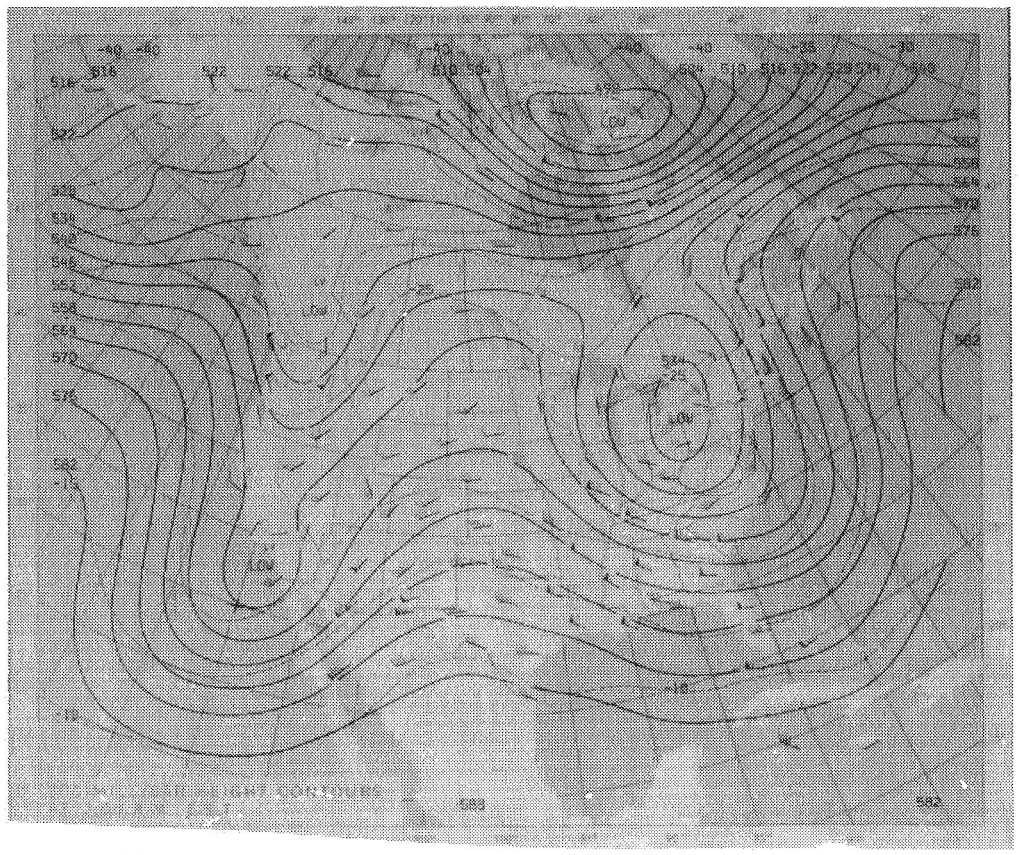
Vehicle Data					Surface Observations					Inflight Conditions Max. Wind Below 60,000 ft			Count Down and Launch Comments of Meteorological Significance
					Thermodynamic[a]			Wind[b]					
Seq. No.	Vehicle No.	Launch Date	Time (EST) Nearest Minute	Launch Pad	Press.[c] N/cm^2	Temp. (°C)	Rel. Hum. (%)	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.
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	

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.



Surface Synoptic Map at 1200 UT April 6, 1984 — Isobaric, Frontal, and Precipitation Patterns are Shown in Standard Symbolic Form.

Figure 1. Surface synoptic chart 1 hr 58 min prior to launch of STS-13.



500 Millibar Height
Contours at 1200 UT
April 6, 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 1 hr 58 min prior to launch of STS-13.

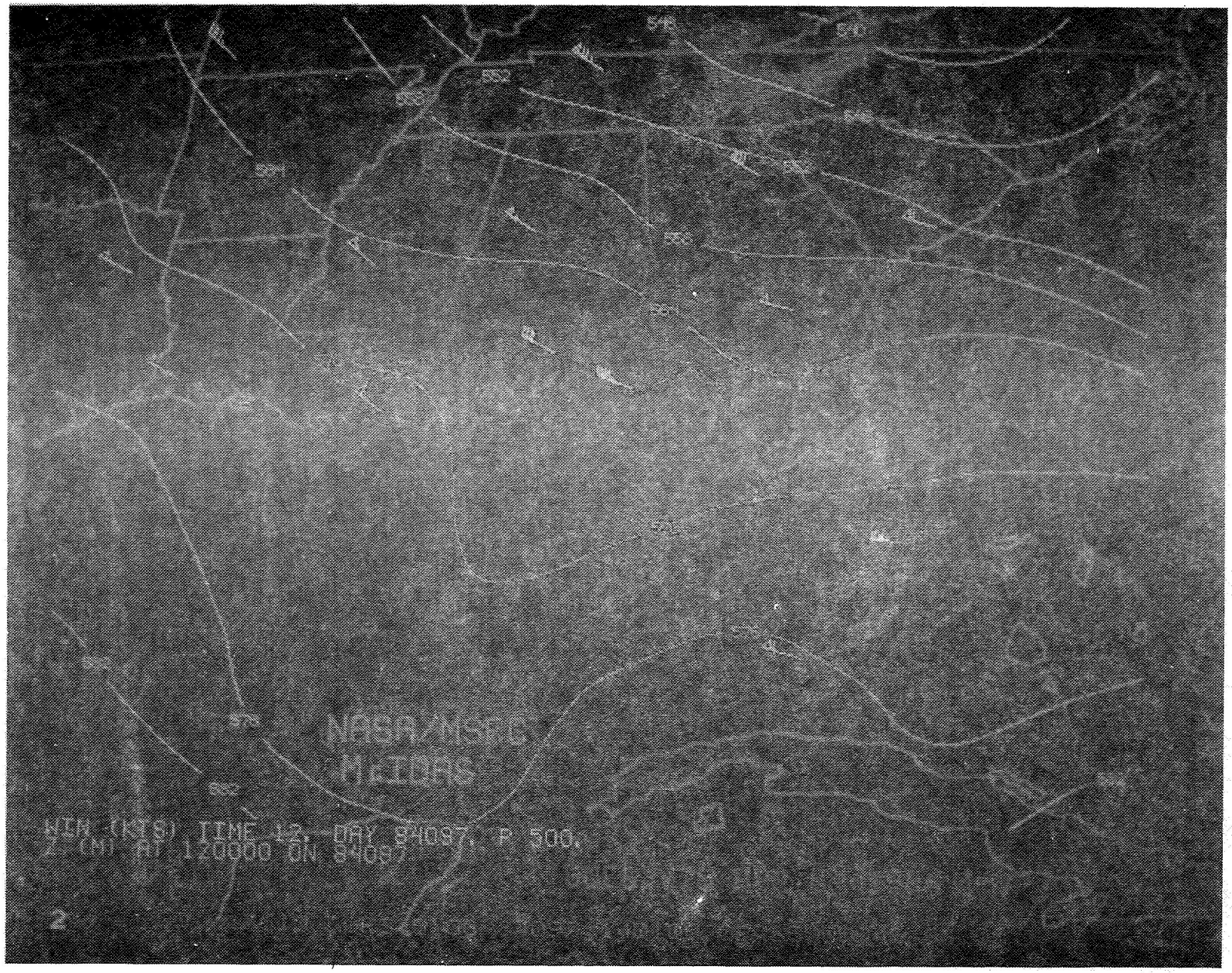


Figure 3. GOES-5 visible imagery of cloud cover 2 min after launch of STS-13 (1400 UT, April 6, 1984). 500-mb contours and wind barbs are also included for 1200 UT.

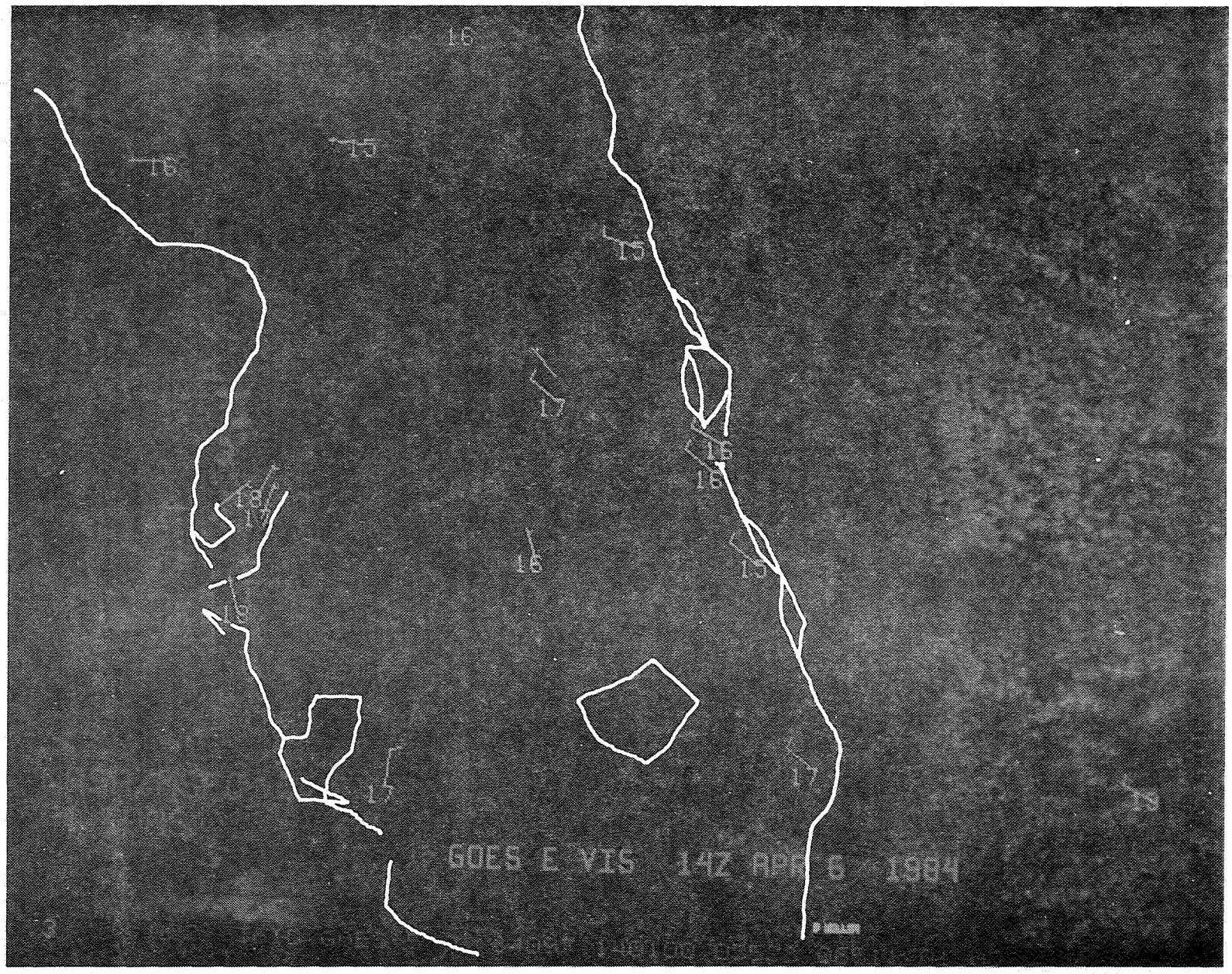


Figure 4. Enlarged view of GOES-5 visible imagery of cloud cover taken 2 min after launch of STS-13 (1400 UT, April 6, 1984). Surface temperatures and wind barbs for 1400 UT are also included.

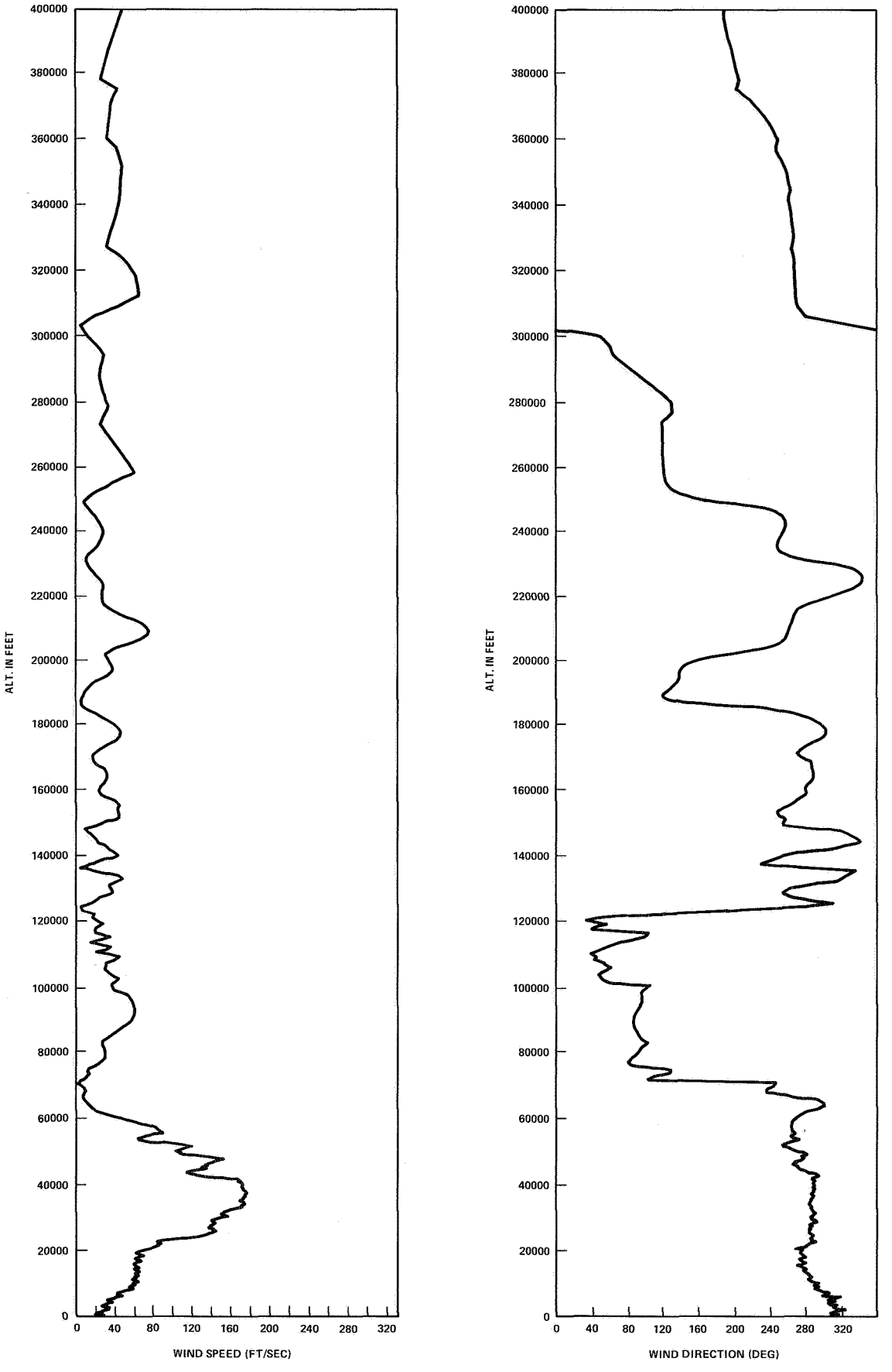


Figure 5. Scalar wind speed and direction at launch time of STS-13.

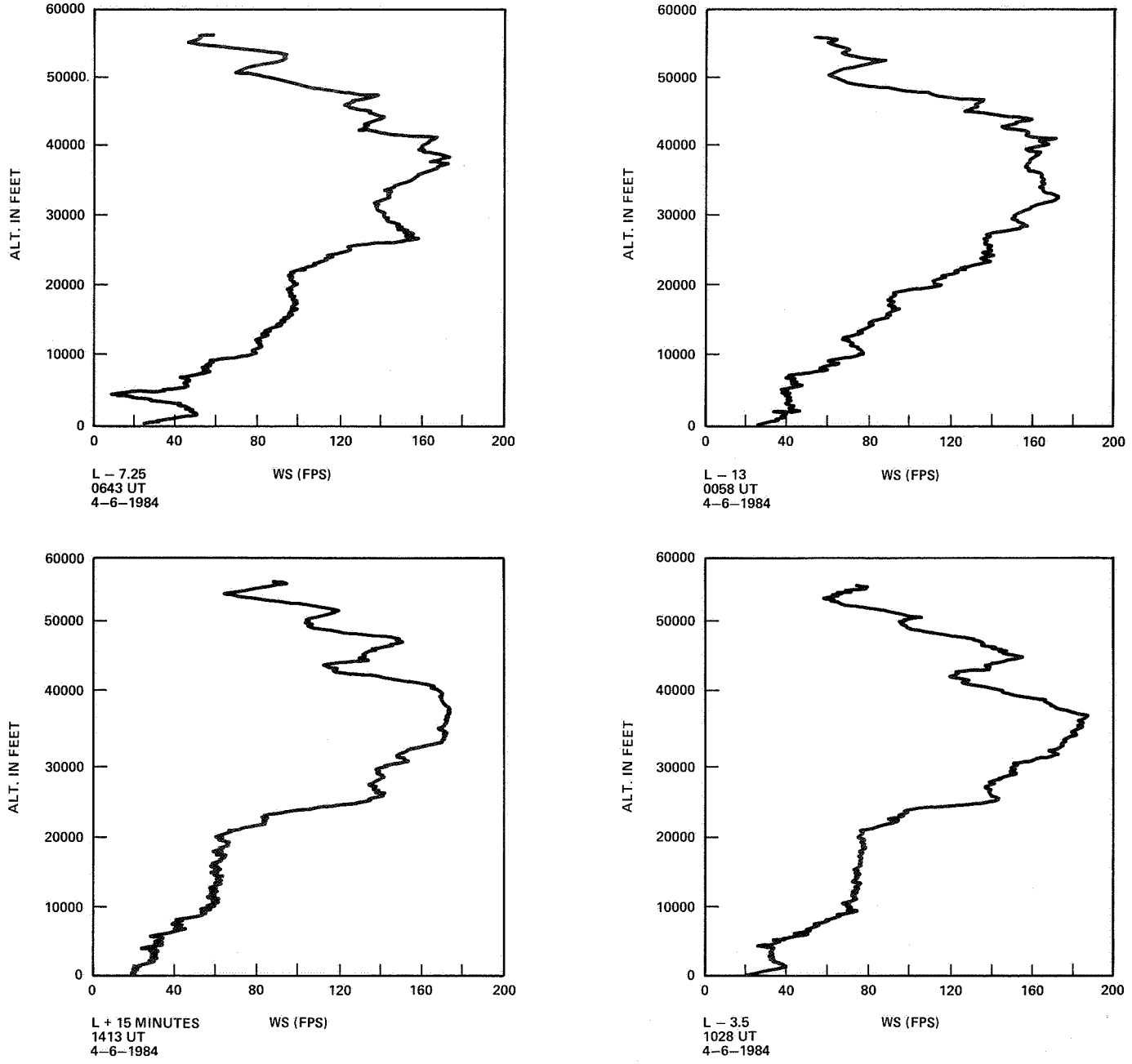


Figure 6. STS-13 prelaunch/launch Jimsphere-measured wind speeds (FPS).

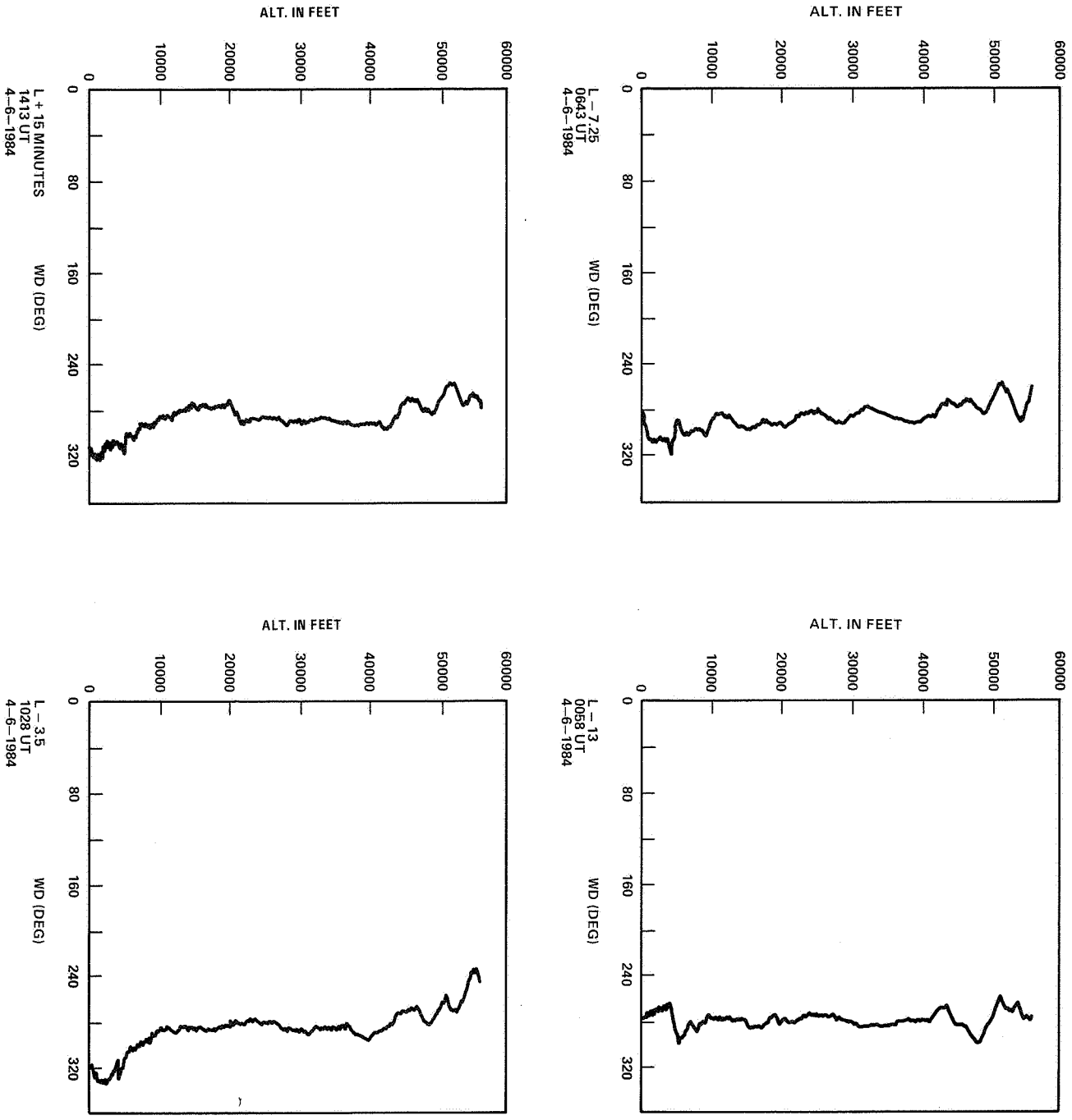


Figure 7. STS-13 prelaunch/launch Jimsphere-measured wind directions (degrees).

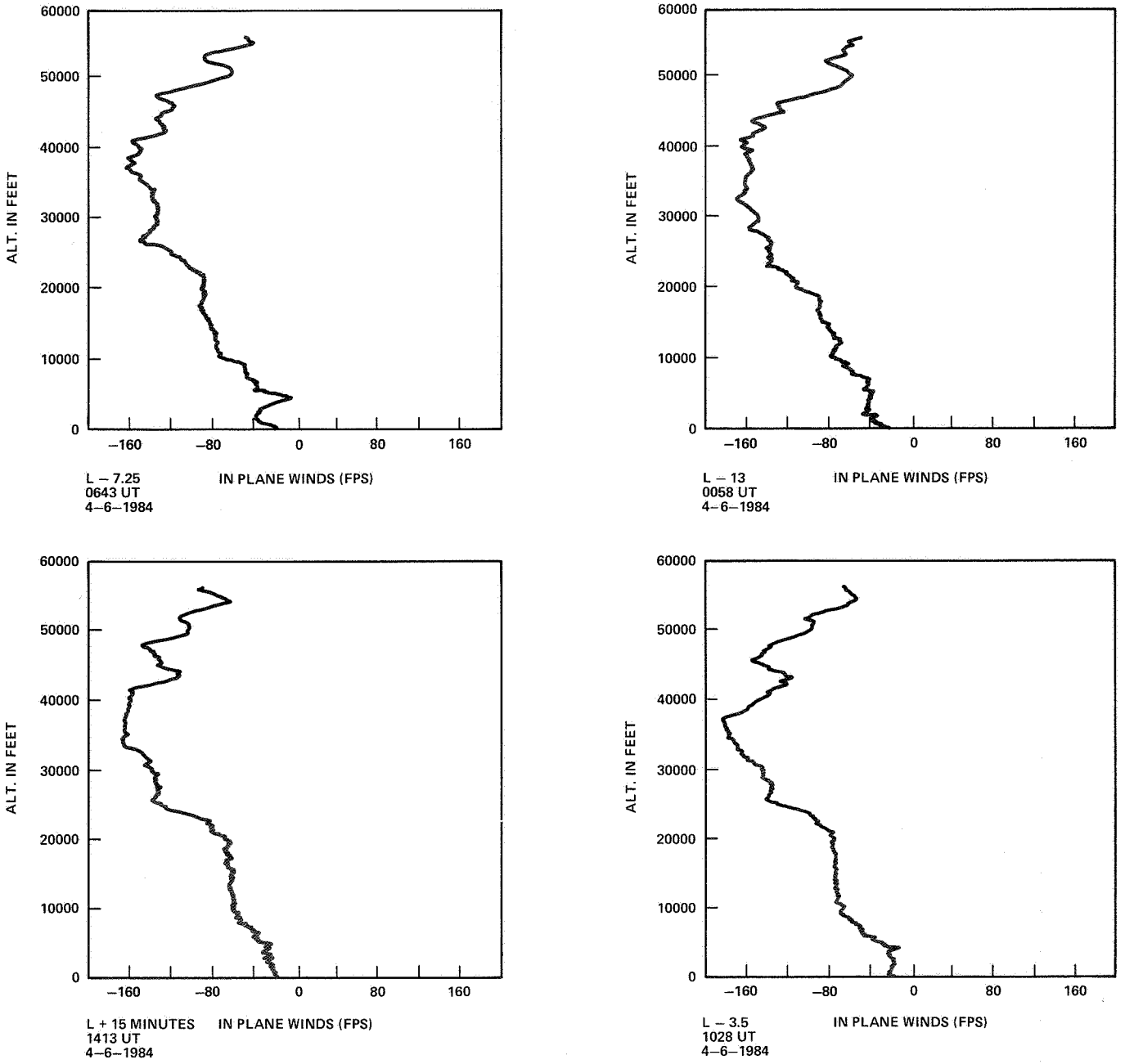


Figure 8. STS-13 prelaunch/launch Jimsphere-measured in-plane component winds (FPS). Flight azimuth = 91 degrees.

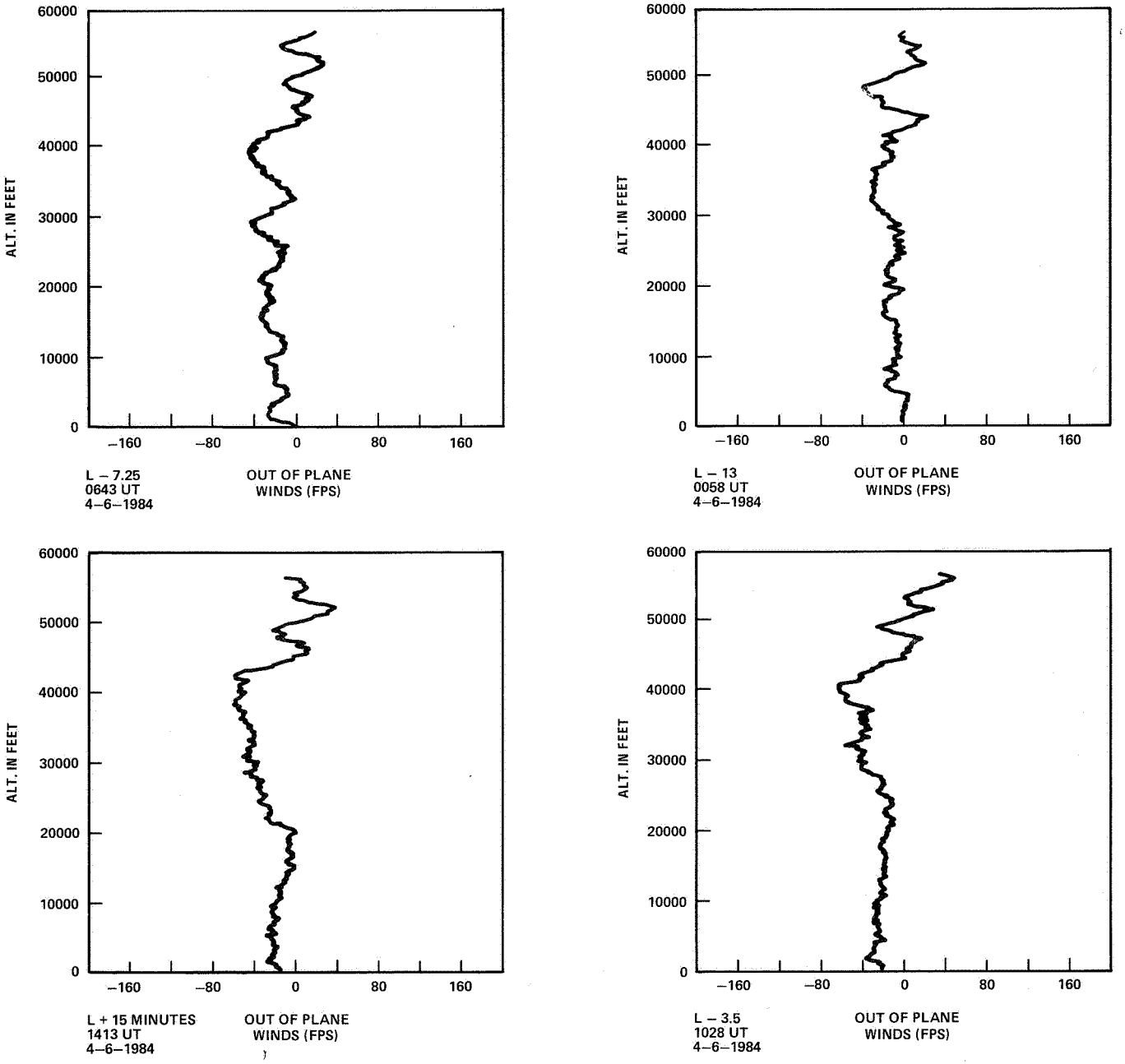


Figure 9. STS-13 prelaunch/launch Jimsphere-measured out-of-plane components winds (FPS). Flight azimuth = 91 degrees.

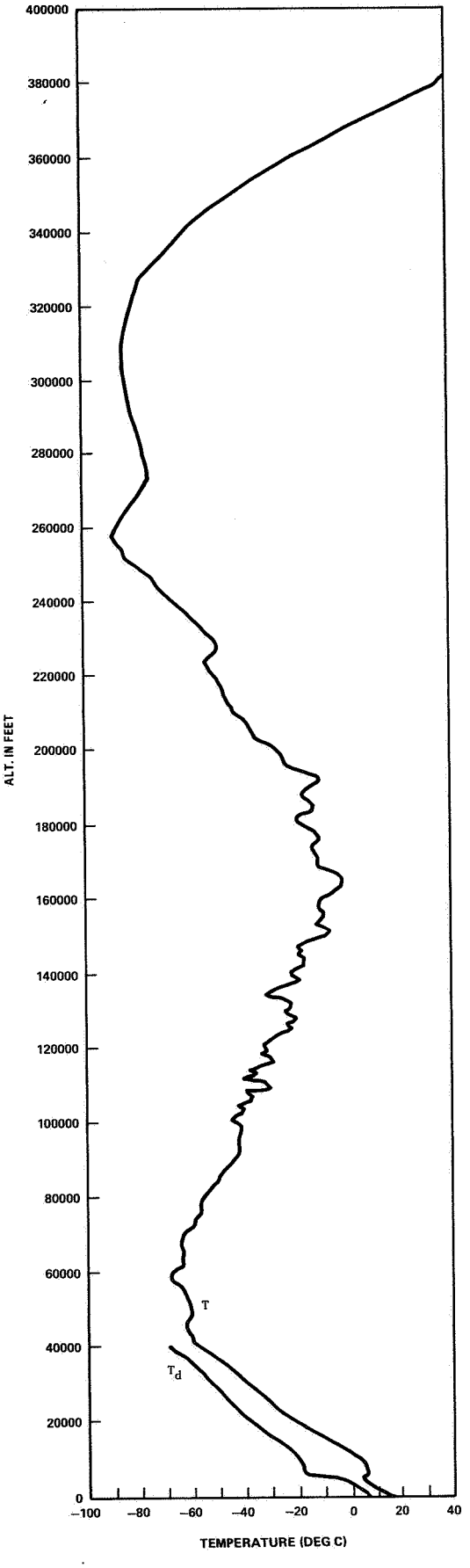


Figure 10. STS-13 temperature profiles versus altitude for launch (ascent).

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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.

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APPROVAL

ATMOSPHERIC ENVIRONMENT FOR SPACE SHUTTLE (STS-13) LAUNCH

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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.

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