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ATMOSPHERIC ENVIRONMENT FOR SPACE SHUTTLE (STS-11) LAUNCH

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| 16. ABSTRACT This report presents a summary of selected atmospheric conditions observed near Space Shuttle STS-11 launch time on February 3, 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 prelaunch Jimsphere measured vertical wind profiles is given in this report. Also presented are wind and thermodynamic parameters representative of surface and aloft conditions in the SRB descent/impact ocean area. Final meteorological tapes, which consist of wind and thermodynamic parameters versus altitude, for STS-11 vehicle ascent and SRB descent/impact have been constructed. The STS-11 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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TECHNICAL MEMORANDUM

ATMOSPHERIC ENVIRONMENT FOR SPACE SHUTTLE (STS-11) LAUNCH

I. INTRODUCTION

This report presents an evaluation of the atmospheric environmental data taken during the launch of the Space Shuttle/STS-11 vehicle. This Space Shuttle vehicle was launched from Pad 39A at Kennedy Space Center (KSC), Florida, on a bearing of 89 deg east of north at 1300 UT (0800 EST) on February 3, 1984.

This report presents a summary of the atmospheric environment at launch time (L+0) of the STS-11, 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. Surface and upper level wind/thermodynamic parameter estimates are also presented for the SRB descent/impact analyses.

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 and STS-1 through STS-9 launch conditions are presented in References 3 through 12, 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. The L-0 rawinsonde and Super-Loki rocket data were used in the upper level atmospheric regions for the construction of the final SRB impact/descent meteorological data tape. Data cutoff altitudes are also given in Table 1.

III. GENERAL SYNOPTIC SITUATION AT LAUNCH TIME

A cold front, extending out of a low pressure area over eastern Lake Superior and passing through central Tennessee, eastern Louisiana and into the Gulf of Mexico, was situated west of KSC prior to STS-11 launch. The influence of high pressure

over eastern Florida was starting to weaken as this front approached. Moderate temperatures and light surface wind conditions prevailed as launchtime grew closer. Figure 1 presents the surface map conditions 1 hr before STS-11 launch. Figure 2 presents the winds aloft conditions at the 500 mb pressure level 1 hr before launch. Moderate westerly winds prevailed aloft over KSC at this pressure level.

From 1735 UT on February 2, 1984, through launch, an area of instability that produced rainshowers extended just off and parallel to the eastern coast line of Florida over the Atlantic Ocean. Between 0049 and 0422 UT on February 3, 1984, rainshower activity occurred at KSC and was reported at Shuttle runway site X68. This left most inland KSC areas slightly cooler and with greater atmospheric moisture than most coastal sites. This was evidenced throughout the later countdown period from observations taken at KSC's AF Wind Tower system sites.

At launch time, the ground fog was starting to clear as visibility improved to 4 miles. The fog was relatively shallow as rooftop visibility was 10 miles. At launch time cloudiness amounting to 3/10 of the total sky cover was mainly located to the east and south of Pad 39A as shown in Figure 3. Figure 3 presents the GOES-5 infrared southeast U.S. cloud picture taken at launch time (1300 UT). The scattered cloud conditions at L-0 consisted of 2/10 cumulus at 2500 ft, 1/10 stratocumulus at 4500 ft, and <1/10 cirrus at 25,000 ft. Figure 4 shows an up-close visible shot of the central Florida peninsula as recorded by GOES-5, taken at 1300 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-11. Values for wind speed and direction are given for the 18 m (60 ft) pad light pole level. Wind values from the 295 ft level off AF Wind Tower No. 313 were substituted for the Pad 275 ft FSS level winds, due to the FSS wind instrumentation not operating.

V. UPPER AIR MEASUREMENTS DURING LAUNCH

The FPS-16 Jimsphere (1320 UT), MSS Rawinsonde (1305 UT), Super-Loki Rocketsonde (1500 UT), and Super-Loki Robin (1734 UT) systems were used to measure the upper level wind and thermodynamic parameters for STS-11 launch. At altitudes above the rocket-measured data, the Global Reference Atmosphere (GRA) [13] parameters for February KSC conditions were used. A tabulation of the STS-11 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 calm (0 ft/sec) at 60 ft and increased to a maximum of 143 ft/sec (85 kn) blowing from 288 deg. This maximum occurred at an altitude of 38,200 ft (11,643 m). The winds decreased above this level as shown in Figure 5. The overall maximum measured speed was 280 ft/sec (166 kn) at 234,000 ft (71,323 m) altitude.

B. Wind Direction

At launch time, the 60-ft wind direction was calm. Light low level winds were from the southeast and shifted through the south to a westerly component above 12,000 ft (3658 m). Winds remained in the winter westerly regime throughout most of the upper troposphere, the stratosphere and lower mesosphere to 250,000 ft (76,200 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 the L-13 hr, L-7.25 hr, L-3.5, and L+0 measurement periods.

The wind speed and direction profiles for the 13-hr period prior to and including L+0 are shown in Figures 6 and 7. The in-plane and out-of-plane profiles are given on Figures 8 and 9. Significant differences between the February mean values and the measured values in the 30,000 to 50,000 ft layer were found only in the L-3.5 hr data set. This is seen on Figure 9 at approximately 36,000 ft altitude where the peak left crosswind profile value increased from 25 ft per second at L-7.25 hr to 85 ft per second at L-3.5 hr due to a shift to a more northerly wind direction. However, at L-0 the left crosswind had decreased to approximately 45 ft per second. Although the value of 85 ft per second nearly equaled the February 95 percent value, there were no calculated vehicle load exceedances produced by the wind data presented in Figures 6 through 9. The prelaunch weather conditions are discussed in more detail in Section III.

D. Thermodynamic Data

The thermodynamic data taken at STS-11 launch time, consisting of atmospheric temperature, dew-point temperature, pressure, and density have been compiled as the STS-11 ascent meteorological data and are presented in Table 4. The associated thermodynamic data taken in support of the SRB descent have also been assembled as the STS-11 SRB descent/impact meteorological data and are presented in Table 5. The vertical structure of temperature for the STS-11 ascent and for the SRB descent is shown graphically versus altitude in Figure 10.

The atmospheric thermodynamic parameters of temperature, pressure, and density, measured during STS-11 launch below 130,000 ft (39,624 m) were all within 5 percent of their respective PRA-63 [14] annual values. All these parameters stayed within 18 percent of their respective PRA-63 values, at all levels of measurement.

E. SRB Upper Air and Surface Measurements

As has been mentioned in earlier paragraphs, an SRB descent meteorological data tape has also been constructed which consists of data taken from the Omegasonde-Rawinsonde system (1355 UT) aboard the USNS Redstone, which was stationed off the coast in the Atlantic Ocean. The CCAFS measured Super-Loki rocketsonde data and the GRA model data were used at altitude levels above the measured Omegasonde data. The tabular values for the SRB descent meteorological tape are presented in Table 5, with wind speed and direction profiles presented in Figure 11. Figure 10 gives the vertical temperature profile.

The surface-ship meteorological and oceanographic observations taken close to STS-11 SRB impact are presented in Table 6.

VI. ATMOSPHERIC SUMMARY CONDITIONS FOR STS LAUNCHES

Given in Table 7 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-11 ASCENT*

| Type of Data | Date: February 3, 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 | 13:20 | 20 | 6 (21) | 20 | 17,374 (57,000) | 79 |
| MSS Rawinsonde | 13:05 | 5 | 17,678 (58,000) | 23 | 29,870 (98,000) | 35 |
| Super-Loki Rocketsonde (Datasonde) | 15:00 | 120 | 61,265 (201,000) | 120 | 30,175 (99,000) | 137 |
| Super-Loki Rocketsonde (Robin) | 17:34 | 274 | 80,772 (265,000) | 274 | 61,570 (202,000) | 275 |
| Omegasonde-Rawinsonde* | 13:55 | 55 | 9 (28) | 55 | 29,870 (98,000) | 85 |

*The Omegasonde-Rawinsonde was released from the USNS Redstone to measure the upper atmosphere for SRB descent/impact analyses.

TABLE 2. SURFACE OBSERVATIONS AT STS-11 LAUNCH TIME

| 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) | Sky Cover | | | Wind | |
|--|----------------------|---|---------------------------|-------------------------|-----------------------|-----------------------------|-------------------|------------------------------|---------------------------------------|---------------------------|--------------------|
| | | | | | | | Cloud** Amount | Cloud Type | Height of Base Meters (ft) | Speed ft/sec (kt) | Direction (deg) |
| NASA Space Shuttle Runway X68e Winds Measured at 10.4 m (34 ft) | -5 | 10.180 (14.765) | 287.0 (57.0) | 285.4 (54.0) | 90 | 6 (4) | 2 | Cumulus | 762 (2,500) | 3.4 (2.0) | 010 |
| CCAFSC Surface Measurements | 0 | 10.180 (14.765) | 284.8 (53.0) | 284.3 (52.0) | 95 | 11 (7) | 1 | Strato- Cumulus Cirrus | 1,372 (4,500) 7,620 (25,000) | 0.0 (0.0) | 0 |
| Pad 39A ^d Lightpole SE 18.3 m (60.0 ft) | 0 | 10.173* (14.755)* | 287.6* (58.0) | 287.0* (57.0) | 97* | - | - | - | - | 0.0 ^b (0.0) | 0 ^b |
| Pad 39A FSS (Top-SE) 83.8 m (275 ft) | 0 | - | - | - | - | - | - | - | - | N/A N/A | N/A |

*Pad 39A Camera Site 3 barometric pressure and humidity instruments appeared to be reading too high. Therefore, the KSC Shuttle runway station pressure value interpolated to 10.173 N/cm² at 21 ft above MSL was used as the L+0 pad atmospheric pressure measurement. Temperature, dewpoint and relative humidity values selected as being representative of L+0 pad (coastal) conditions were 62°F, 54°F, and 75 percent, respectively. Inland conditions around KSC were considered too cool and moist.

**Three-tenths total sky cover at both X68 and CCAFS.

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-11 sky observational site.

N/A - Not Available.

TABLE 3. STS-11 PRE-LAUNCH THROUGH LAUNCH KSC PAD 39A METEOROLOGICAL MEASUREMENTS^a

| 3 February 1984 Time UT | Hourly Atmospheric Measurements | | | | | | Sky Condition ^b | | | | |
|----------------------------|---------------------------------|----------------------|------------------------|---------------------------------|-----|--------------------------------|----------------------------|--|-----------------------|--------------|---------------------------|
| | Temp. (°F) | Dew Point (°F) | RH ^c (%) | 275' Level (SE) ^d | | 50' Level (SE) ^e | | Clouds | Total Sky Cover | Vis. (mi) | Other Remarks |
| | | | | WS Kt | WD° | WS Kt | WD° | | | | |
| 0700 | 61 | 58 | 91 | 12 | 102 | 7 | 120 | Scattered at 7,500 ft | 3/10 | 10 | |
| 0800 | 58 | 56 | 93 | 12 | 116 | 8 | 100 | Scattered at 4,500 ft | 3/10 | 10 | |
| 0900 | 58 | 56 | 93 | 8 | 125 | 8 | 100 | Clear Skys | 0/10 | 10 | Patches of Ground Fog |
| 1000 | 59 | 58 | 95 | 5 | 135 | 4 | 120 | Clear Skys | 0/10 | 7 | Patches of Ground Fog |
| 1100 | 60 | 59 | 96 | 3 | 120 | 2 | 100 | Scattered at 9,000 ft | NA | 7 | Patches of Ground Fog |
| 1200 | 59 | 57 | 93 | 0 | 0 | 0 | 0 | Scattered at 2,500 ft Scattered at 4,500 ft Scattered at 25,000 ft | 2/10 | 2* | Ground Fog. TCU DSNT E |
| L+0 ^f 1300 | 62 | 54 | 75 | - | - | 0 | 0 | 2/10 CU at 2,500 ft 1/10 SC at 4,500 ft 0/10 CI at 25,000 ft | 3/10 | 4* | Ground Fog. TCU DSNT E |

a. Hourly observations obtained verbally from CCAFS.

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

c. Note: Relative humidity measurements very erratic and off scale throughout the countdown period. Table values given here through 1200 UT are too high.

d. Pad 39A 275 ft FSS wind instrumentation was taken down prior to L-6 hr, due to a range safety problem. The values presented in these columns are 5-min wind averages obtained from the 295 ft level of the AF Tower No. 313; located inland 3 miles west of Pad 39A.

e. 10 min mean about the hour from pad 39A instrumentation.

f. L+0 PAD Wind and thermodynamic parameters obtained from HOSC strip charts. L+0 thermodynamic parameters have been adjusted slightly here to approximate the correct lift-off atmospheric conditions. SE Anemometers used at 60 ft level for L+0 wind condition (approximately 1 min average prior to L+0). Pad 39A L+0 atmospheric pressure, at 21 ft (MSL), was 10.173 N/cm². Sea level pressure was 10.180 N/cm².

* Rooftop visibility = 10 miles.

TABLE 4. STS-11 FINAL ASCENT METEOROLOGICAL TAPE LISTING

| ALTITUDE (FT) | WIND SPEED (FT/SEC) | WIND DIRECTION (DEG) | TEMPERATURE (DEG C) | PRESSURE (MILLIBARS) | DENSITY (GRAM/MS) | DEW POINT (DEG C) |
|------------------|------------------------|-------------------------|------------------------|-------------------------|----------------------|----------------------|
| 000321 | 200 | 007 | 16.7 | .1017+04 | .1216+04 | 12.2 |
| 000330 | 203 | 144 | 16.8 | .1014+04 | .1212+04 | 12.5 |
| 000335 | 305 | 154 | 17.0 | .1011+04 | .1207+04 | 13.0 |
| 000336 | 007 | 150 | 17.2 | .1007+04 | .1202+04 | 13.4 |
| 000400 | 009 | 160 | 17.4 | .1004+04 | .1196+04 | 13.8 |
| 000500 | 009 | 163 | 17.5 | .1000+04 | .1191+04 | 14.3 |
| 000600 | 013 | 145 | 17.7 | .9966+03 | .1186+04 | 14.7 |
| 000700 | 018 | 156 | 17.9 | .9931+03 | .1181+04 | 15.1 |
| 000900 | 021 | 162 | 18.1 | .9896+03 | .1176+04 | 15.5 |
| 000500 | 020 | 158 | 18.2 | .9861+03 | .1171+04 | 16.0 |
| 001000 | 025 | 159 | 18.4 | .9826+03 | .1166+04 | 16.4 |
| 001100 | 028 | 163 | 18.2 | .9791+03 | .1162+04 | 16.3 |
| 001200 | 021 | 160 | 17.9 | .9756+03 | .1159+04 | 16.2 |
| 001300 | 024 | 158 | 17.7 | .9722+03 | .1156+04 | 16.2 |
| 001400 | 033 | 162 | 17.4 | .9687+03 | .1153+04 | 16.1 |
| 001500 | 033 | 165 | 17.2 | .9653+03 | .1150+04 | 16.0 |
| 001600 | 032 | 159 | 17.0 | .9619+03 | .1147+04 | 15.9 |
| 001700 | 034 | 156 | 16.7 | .9585+03 | .1144+04 | 15.8 |
| 001800 | 035 | 163 | 16.5 | .9551+03 | .1141+04 | 15.8 |
| 001900 | 034 | 163 | 16.2 | .9517+03 | .1138+04 | 15.7 |
| 002000 | 035 | 155 | 16.0 | .9483+03 | .1134+04 | 15.6 |
| 002100 | 037 | 158 | 15.7 | .9449+03 | .1132+04 | 15.3 |
| 002200 | 037 | 161 | 15.5 | .9415+03 | .1129+04 | 15.1 |
| 002300 | 035 | 160 | 15.2 | .9382+03 | .1126+04 | 14.8 |
| 002400 | 034 | 158 | 14.9 | .9348+03 | .1123+04 | 14.6 |
| 002500 | 037 | 157 | 14.7 | .9315+03 | .1120+04 | 14.3 |
| 002600 | 036 | 161 | 14.4 | .9281+03 | .1117+04 | 14.1 |
| 002700 | 033 | 163 | 14.1 | .9248+03 | .1114+04 | 13.8 |
| 002800 | 031 | 157 | 13.8 | .9215+03 | .1111+04 | 13.6 |
| 002900 | 032 | 162 | 13.6 | .9182+03 | .1109+04 | 13.3 |
| 003000 | 033 | 169 | 13.3 | .9149+03 | .1106+04 | 13.1 |
| 003100 | 029 | 168 | 13.1 | .9116+03 | .1102+04 | 12.9 |
| 003200 | 028 | 167 | 12.9 | .9083+03 | .1099+04 | 12.7 |
| 003300 | 029 | 164 | 12.8 | .9050+03 | .1096+04 | 12.5 |
| 003400 | 030 | 168 | 12.6 | .9018+03 | .1093+04 | 12.3 |
| 003500 | 028 | 174 | 12.4 | .8985+03 | .1090+04 | 12.1 |
| 003600 | 024 | 169 | 12.2 | .8953+03 | .1086+04 | 12.0 |
| 003700 | 024 | 161 | 12.0 | .8920+03 | .1083+04 | 11.8 |
| 003800 | 028 | 165 | 11.9 | .8888+03 | .1080+04 | 11.6 |
| 003900 | 028 | 172 | 11.7 | .8856+03 | .1077+04 | 11.4 |
| 004000 | 024 | 171 | 11.5 | .8824+03 | .1074+04 | 11.2 |
| 004100 | 024 | 165 | 11.3 | .8792+03 | .1071+04 | 11.0 |
| 004200 | 028 | 168 | 11.2 | .8760+03 | .1067+04 | 10.8 |
| 004300 | 027 | 173 | 11.0 | .8728+03 | .1064+04 | 10.7 |
| 004400 | 026 | 181 | 10.8 | .8697+03 | .1061+04 | 10.5 |
| 004500 | 027 | 177 | 10.7 | .8665+03 | .1058+04 | 10.3 |
| 004600 | 028 | 163 | 10.5 | .8634+03 | .1055+04 | 10.1 |
| 004700 | 029 | 193 | 10.3 | .8602+03 | .1051+04 | 9.9 |
| 004800 | 021 | 187 | 10.1 | .8571+03 | .1048+04 | 9.8 |
| 004900 | 030 | 184 | 10.0 | .8540+03 | .1045+04 | 9.6 |

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TABLE 4. (Continued)

| ALTIITUDE (FT) | WIND SPEED (FT/SEC) | WIND DIRECTION (DEG) | TEMPERATURE (DEG C) | PRESSURE (ML - IBARS) | DENSITY (GRAM/M3) | DEW POINT (DEG C) |
|-------------------|------------------------|-------------------------|------------------------|--------------------------|----------------------|----------------------|
| 005300 | 037 | 189 | 9.8 | .8509+03 | .1042+04 | 9.3 |
| 005300 | 032 | 173 | 9.6 | .8479+03 | .1039+04 | 9.2 |
| 005200 | 033 | 190 | 9.5 | .8447+03 | .1036+04 | 9.1 |
| 005300 | 035 | 191 | 9.3 | .8416+03 | .1033+04 | 8.9 |
| 005400 | 033 | 188 | 9.1 | .8385+03 | .1030+04 | 8.7 |
| 005500 | 034 | 193 | 9.0 | .8354+03 | .1026+04 | 8.6 |
| 005600 | 032 | 189 | 8.8 | .8324+03 | .1023+04 | 8.4 |
| 005700 | 033 | 186 | 8.6 | .8293+03 | .1020+04 | 8.2 |
| 005800 | 035 | 187 | 8.4 | .8263+03 | .1017+04 | 8.0 |
| 005900 | 035 | 188 | 8.3 | .8233+03 | .1014+04 | 7.9 |
| 006000 | 035 | 195 | 8.1 | .8203+03 | .1011+04 | 7.7 |
| 006100 | 034 | 194 | 8.0 | .8173+03 | .1008+04 | 6.7 |
| 006200 | 031 | 194 | 7.9 | .8142+03 | .1005+04 | 5.7 |
| 006300 | 030 | 192 | 7.9 | .8113+03 | .1002+04 | 4.8 |
| 006400 | 031 | 197 | 7.8 | .8083+03 | .9985+03 | 3.8 |
| 006500 | 031 | 205 | 7.7 | .8053+03 | .9954+03 | 2.8 |
| 006600 | 029 | 197 | 7.6 | .8023+03 | .9922+03 | 1.8 |
| 006700 | 031 | 194 | 7.5 | .7994+03 | .9891+03 | .8 |
| 006800 | 032 | 198 | 7.5 | .7964+03 | .9859+03 | -1.1 |
| 006900 | 027 | 199 | 7.4 | .7935+03 | .9828+03 | -1.1 |
| 007000 | 030 | 195 | 7.3 | .7906+03 | .9796+03 | -2.1 |
| 007100 | 030 | 201 | 7.2 | .7877+03 | .9767+03 | -3.3 |
| 007200 | 030 | 205 | 7.0 | .7848+03 | .9737+03 | -4.5 |
| 007300 | 026 | 205 | 6.9 | .7819+03 | .9708+03 | -5.6 |
| 007400 | 028 | 202 | 6.7 | .7790+03 | .9678+03 | -6.8 |
| 007500 | 025 | 217 | 6.6 | .7761+03 | .9649+03 | -8.0 |
| 007600 | 021 | 219 | 6.5 | .7732+03 | .9619+03 | -9.2 |
| 007700 | 022 | 216 | 6.3 | .7704+03 | .9590+03 | -10.4 |
| 007800 | 023 | 215 | 6.2 | .7675+03 | .9560+03 | -11.5 |
| 007900 | 022 | 229 | 6.0 | .7647+03 | .9531+03 | -12.7 |
| 008000 | 021 | 230 | 5.9 | .7618+03 | .9501+03 | -13.9 |
| 008100 | 017 | 227 | 5.7 | .7590+03 | .9473+03 | -13.4 |
| 008200 | 019 | 224 | 5.4 | .7562+03 | .9446+03 | -12.9 |
| 008300 | 018 | 226 | 5.2 | .7534+03 | .9418+03 | -12.3 |
| 008400 | 017 | 224 | 4.9 | .7506+03 | .9391+03 | -11.8 |
| 008500 | 019 | 215 | 4.7 | .7478+03 | .9363+03 | -11.3 |
| 008600 | 019 | 221 | 4.5 | .7450+03 | .9336+03 | -10.8 |
| 008700 | 016 | 227 | 4.2 | .7422+03 | .9308+03 | -10.3 |
| 008800 | 019 | 219 | 4.0 | .7394+03 | .9281+03 | -9.7 |
| 008900 | 020 | 218 | 3.7 | .7367+03 | .9254+03 | -9.2 |
| 009000 | 018 | 223 | 3.5 | .7339+03 | .9227+03 | -8.7 |
| 009100 | 018 | 212 | 3.3 | .7312+03 | .9199+03 | -8.6 |
| 009200 | 021 | 209 | 3.1 | .7284+03 | .9172+03 | -8.5 |
| 009300 | 020 | 216 | 2.8 | .7257+03 | .9145+03 | -8.4 |
| 009400 | 018 | 214 | 2.6 | .7230+03 | .9117+03 | -8.3 |
| 009500 | 019 | 219 | 2.4 | .7203+03 | .9090+03 | -8.3 |
| 009600 | 020 | 219 | 2.2 | .7176+03 | .9063+03 | -8.2 |
| 009700 | 020 | 225 | 2.0 | .7149+03 | .9036+03 | -8.1 |
| 009800 | 021 | 215 | 1.7 | .7122+03 | .9009+03 | -8.0 |
| 009900 | 024 | 213 | 1.5 | .7095+03 | .8983+03 | -7.9 |

TABLE 4. (Continued)

| ALTIUDE (FT) | WIND SPEED (FT/SEC) | WIND DIRECTION (DEG) | TEMPERATURE (DEG C) | PRESSURE (MILLIBARS) | DENSITY (GRAM/M ³) | DEW POINT (DEG C) |
|-----------------|------------------------|-------------------------|------------------------|-------------------------|-----------------------------------|----------------------|
| 01000 | 019 | 222 | 1.3 | 7068+03 | .8956+03 | -7.8 |
| 01010 | 023 | 217 | 1.2 | 7042+03 | .8927+03 | -8.2 |
| 01020 | 021 | 271 | 1.0 | 7015+03 | .8897+03 | -8.5 |
| 01030 | 020 | 232 | .9 | 6989+03 | .8868+03 | -8.9 |
| 01040 | 021 | 224 | .8 | 6962+03 | .8840+03 | -9.3 |
| 01050 | 021 | 227 | .7 | 6936+03 | .8811+03 | -9.6 |
| 01060 | 022 | 234 | .5 | 6910+03 | .8782+03 | -10.0 |
| 01070 | 021 | 232 | .4 | 6884+03 | .8753+03 | -10.4 |
| 01080 | 022 | 238 | .3 | 6858+03 | .8725+03 | -10.8 |
| 01090 | 023 | 246 | .1 | 6832+03 | .8696+03 | -11.1 |
| 01100 | 020 | 236 | .0 | 6806+03 | .8668+03 | -11.5 |
| 01110 | 020 | 233 | -.1 | 6780+03 | .8640+03 | -11.8 |
| 01120 | 019 | 236 | -.3 | 6754+03 | .8611+03 | -12.2 |
| 01130 | 019 | 223 | -.4 | 6729+03 | .8583+03 | -12.5 |
| 01140 | 020 | 209 | -.6 | 6703+03 | .8555+03 | -12.8 |
| 01150 | 017 | 216 | -.7 | 6676+03 | .8528+03 | -13.1 |
| 01160 | 019 | 229 | -.8 | 6652+03 | .8500+03 | -13.5 |
| 01170 | 016 | 234 | -1.0 | 6627+03 | .8472+03 | -13.8 |
| 01180 | 021 | 247 | -1.1 | 6602+03 | .8445+03 | -14.1 |
| 01190 | 020 | 252 | -1.3 | 6577+03 | .8417+03 | -14.5 |
| 01200 | 020 | 248 | -1.4 | 6552+03 | .8390+03 | -14.8 |
| 01210 | 025 | 256 | -1.5 | 6527+03 | .8363+03 | -15.1 |
| 01220 | 026 | 269 | -1.7 | 6502+03 | .8336+03 | -15.7 |
| 01230 | 027 | 267 | -1.8 | 6477+03 | .8309+03 | -16.7 |
| 01240 | 027 | 265 | -2.0 | 6452+03 | .8282+03 | -17.6 |
| 01250 | 030 | 269 | -2.1 | 6428+03 | .8255+03 | -18.5 |
| 01260 | 030 | 276 | -2.2 | 6403+03 | .8228+03 | -19.4 |
| 01270 | 031 | 274 | -2.4 | 6379+03 | .8201+03 | -20.4 |
| 01280 | 035 | 277 | -2.5 | 6354+03 | .8175+03 | -21.3 |
| 01290 | 038 | 281 | -2.7 | 6330+03 | .8148+03 | -22.2 |
| 01300 | 036 | 285 | -2.8 | 6306+03 | .8121+03 | -23.2 |
| 01310 | 036 | 282 | -3.0 | 6282+03 | .8096+03 | -24.1 |
| 01320 | 041 | 285 | -3.2 | 6258+03 | .8070+03 | -24.1 |
| 01330 | 043 | 283 | -3.4 | 6233+03 | .8045+03 | -24.1 |
| 01340 | 040 | 281 | -3.6 | 6209+03 | .8020+03 | -24.1 |
| 01350 | 041 | 280 | -3.7 | 6186+03 | .7994+03 | -24.0 |
| 01360 | 043 | 283 | -3.9 | 6162+03 | .7969+03 | -24.0 |
| 01370 | 044 | 283 | -4.1 | 6138+03 | .7944+03 | -24.0 |
| 01380 | 047 | 281 | -4.3 | 6115+03 | .7919+03 | -24.0 |
| 01390 | 049 | 285 | -4.5 | 6091+03 | .7894+03 | -24.0 |
| 01400 | 048 | 286 | -4.7 | 6068+03 | .7870+03 | -24.0 |
| 01410 | 049 | 281 | -4.9 | 6044+03 | .7844+03 | -24.2 |
| 01420 | 050 | 286 | -5.0 | 6021+03 | .7818+03 | -24.3 |
| 01430 | 051 | 286 | -5.2 | 5997+03 | .7793+03 | -24.5 |
| 01440 | 049 | 285 | -5.3 | 5974+03 | .7767+03 | -24.6 |
| 01450 | 052 | 285 | -5.5 | 5951+03 | .7742+03 | -24.8 |
| 01460 | 050 | 288 | -5.7 | 5928+03 | .7717+03 | -25.0 |
| 01470 | 047 | 284 | -5.8 | 5905+03 | .7691+03 | -25.1 |
| 01480 | 048 | 286 | -6.0 | 5882+03 | .7666+03 | -25.3 |
| 01490 | 047 | 287 | -6.1 | 5860+03 | .7641+03 | -25.4 |

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TABLE 4. (Continued)

| ALTITUDE (FT) | WIND SPEED (FT/SEC) | WIND DIRECTION (DEG) | TEMPERATURE (DEG C) | PRESSURE (MILLIBARS) | DENSITY (GRAM/M ³) | DEW POINT (DEG C) |
|------------------|------------------------|-------------------------|------------------------|-------------------------|-----------------------------------|----------------------|
| 015300 | 046 | 283 | -6.3 | .5837+03 | .7616+03 | -25.6 |
| 015100 | 046 | 282 | -6.5 | .5814+03 | .7592+03 | -25.7 |
| 015200 | 043 | 282 | -6.7 | .5792+03 | .7568+03 | -25.8 |
| 015300 | 044 | 279 | -6.9 | .5769+03 | .7545+03 | -25.9 |
| 015400 | 045 | 283 | -7.1 | .5747+03 | .7521+03 | -26.0 |
| 015500 | 043 | 280 | -7.3 | .5724+03 | .7497+03 | -26.1 |
| 015500 | 044 | 282 | -7.5 | .5702+03 | .7474+03 | -26.2 |
| 015700 | 043 | 284 | -7.7 | .5680+03 | .7450+03 | -26.3 |
| 015900 | 044 | 281 | -7.9 | .5658+03 | .7427+03 | -26.4 |
| 015900 | 046 | 282 | -8.1 | .5636+03 | .7404+03 | -26.5 |
| 016000 | 046 | 281 | -8.3 | .5614+03 | .7380+03 | -26.6 |
| 016100 | 048 | 281 | -8.5 | .5592+03 | .7357+03 | -26.8 |
| 016200 | 045 | 282 | -8.7 | .5570+03 | .7333+03 | -27.1 |
| 015300 | 046 | 280 | -8.9 | .5548+03 | .7310+03 | -27.3 |
| 016400 | 046 | 283 | -9.1 | .5526+03 | .7286+03 | -27.6 |
| 015500 | 045 | 283 | -9.2 | .5504+03 | .7263+03 | -27.8 |
| 016600 | 046 | 278 | -9.4 | .5483+03 | .7240+03 | -28.1 |
| 016700 | 048 | 281 | -9.6 | .5461+03 | .7217+03 | -28.3 |
| 015900 | 047 | 282 | -9.8 | .5440+03 | .7194+03 | -28.6 |
| 016900 | 052 | 278 | -10.0 | .5419+03 | .7171+03 | -28.8 |
| 017000 | 052 | 280 | -10.2 | .5397+03 | .7148+03 | -29.1 |
| 017100 | 052 | 275 | -10.4 | .5376+03 | .7125+03 | -29.3 |
| 017200 | 056 | 276 | -10.6 | .5355+03 | .7103+03 | -29.5 |
| 017300 | 054 | 276 | -10.8 | .5334+03 | .7080+03 | -29.6 |
| 017400 | 055 | 274 | -11.0 | .5312+03 | .7058+03 | -29.8 |
| 017500 | 056 | 276 | -11.2 | .5291+03 | .7036+03 | -30.0 |
| 017500 | 053 | 274 | -11.5 | .5271+03 | .7014+03 | -30.2 |
| 017700 | 054 | 274 | -11.7 | .5250+03 | .6992+03 | -30.4 |
| 017800 | 053 | 277 | -11.9 | .5229+03 | .6970+03 | -30.5 |
| 017900 | 052 | 274 | -12.1 | .5208+03 | .6948+03 | -30.7 |
| 018000 | 054 | 273 | -12.3 | .5188+03 | .6926+03 | -30.9 |
| 018100 | 051 | 274 | -12.4 | .5167+03 | .6902+03 | -31.1 |
| 018200 | 051 | 273 | -12.6 | .5147+03 | .6878+03 | -31.3 |
| 018300 | 053 | 275 | -12.7 | .5126+03 | .6855+03 | -31.5 |
| 019400 | 052 | 272 | -12.9 | .5106+03 | .6831+03 | -31.7 |
| 018500 | 053 | 270 | -13.0 | .5085+03 | .6808+03 | -31.9 |
| 018600 | 053 | 274 | -13.1 | .5065+03 | .6784+03 | -32.2 |
| 018700 | 052 | 273 | -13.3 | .5045+03 | .6761+03 | -32.4 |
| 018900 | 055 | 277 | -13.4 | .5025+03 | .6738+03 | -32.6 |
| 018900 | 055 | 280 | -13.6 | .5005+03 | .6715+03 | -32.8 |
| 019000 | 053 | 282 | -13.7 | .4985+03 | .6692+03 | -33.0 |
| 019100 | 055 | 281 | -13.9 | .4965+03 | .6670+03 | -33.1 |
| 019200 | 053 | 283 | -14.1 | .4945+03 | .6649+03 | -33.1 |
| 019300 | 052 | 282 | -14.3 | .4925+03 | .6628+03 | -33.4 |
| 019400 | 056 | 279 | -14.5 | .4906+03 | .6606+03 | -33.5 |
| 019500 | 056 | 281 | -14.7 | .4886+03 | .6585+03 | -33.6 |
| 019600 | 055 | 279 | -15.0 | .4866+03 | .6564+03 | -33.8 |
| 019700 | 057 | 278 | -15.2 | .4847+03 | .6543+03 | -33.9 |
| 019800 | 055 | 282 | -15.4 | .4828+03 | .6523+03 | -34.0 |
| 019900 | 053 | 280 | -15.6 | .4808+03 | .6502+03 | -34.2 |

TABLE 4. (Continued)

| ALTITUDE (FT) | WIND SPEED (FT/SEC) | WIND DIRECTION (DEG) | TEMPERATURE (DEG C) | PRESSURE (MILLIBARS) | DENSITY (GRAM/M3) | DEW POINT (DEG C) |
|------------------|------------------------|-------------------------|------------------------|-------------------------|----------------------|----------------------|
| 020300 | 055 | 280 | -15.8 | .8789+03 | .6481+03 | -34.3 |
| 020100 | 056 | 286 | -16.1 | .8770+03 | .6461+03 | -34.5 |
| 020200 | 055 | 288 | -16.3 | .8750+03 | .6449+03 | -34.7 |
| 020300 | 056 | 285 | -16.6 | .8731+03 | .6422+03 | -34.8 |
| 020400 | 059 | 288 | -16.8 | .8712+03 | .6407+03 | -35.0 |
| 020500 | 059 | 289 | -17.1 | .8693+03 | .6393+03 | -35.2 |
| 020600 | 059 | 297 | -17.4 | .8674+03 | .6364+03 | -35.4 |
| 020700 | 060 | 288 | -17.6 | .8655+03 | .6345+03 | -35.6 |
| 020800 | 060 | 291 | -17.9 | .8636+03 | .6326+03 | -35.7 |
| 020900 | 059 | 289 | -18.1 | .8618+03 | .6307+03 | -35.9 |
| 021000 | 060 | 287 | -18.4 | .8599+03 | .6288+03 | -36.1 |
| 021100 | 059 | 291 | -18.6 | .8580+03 | .6267+03 | -35.9 |
| 021200 | 057 | 290 | -18.8 | .8561+03 | .6247+03 | -35.8 |
| 021300 | 058 | 282 | -19.0 | .8543+03 | .6226+03 | -35.6 |
| 021400 | 058 | 288 | -19.2 | .8524+03 | .6206+03 | -35.5 |
| 021500 | 058 | 287 | -19.4 | .8506+03 | .6186+03 | -35.3 |
| 021600 | 057 | 285 | -19.7 | .8488+03 | .6166+03 | -35.1 |
| 021700 | 059 | 284 | -19.9 | .8469+03 | .6146+03 | -35.0 |
| 021800 | 060 | 283 | -20.1 | .8451+03 | .6125+03 | -34.8 |
| 021900 | 061 | 282 | -20.3 | .8433+03 | .6106+03 | -34.7 |
| 022000 | 063 | 283 | -20.5 | .8415+03 | .6086+03 | -34.5 |
| 022100 | 063 | 288 | -20.7 | .8397+03 | .6066+03 | -33.8 |
| 022200 | 064 | 284 | -21.0 | .8379+03 | .6047+03 | -33.2 |
| 022300 | 065 | 287 | -21.2 | .8361+03 | .6028+03 | -32.5 |
| 022400 | 062 | 287 | -21.5 | .8343+03 | .6008+03 | -31.9 |
| 022500 | 063 | 285 | -21.7 | .8325+03 | .5989+03 | -31.2 |
| 022600 | 064 | 284 | -21.9 | .8307+03 | .5970+03 | -30.5 |
| 022700 | 062 | 288 | -22.2 | .8289+03 | .5951+03 | -29.9 |
| 022800 | 063 | 294 | -22.4 | .8271+03 | .5932+03 | -29.2 |
| 022900 | 064 | 285 | -22.7 | .8254+03 | .5913+03 | -28.6 |
| 023000 | 063 | 285 | -22.9 | .8236+03 | .5894+03 | -27.9 |
| 023100 | 064 | 282 | -23.1 | .8219+03 | .5874+03 | -28.9 |
| 023200 | 065 | 283 | -23.3 | .8201+03 | .5855+03 | -29.9 |
| 023300 | 065 | 284 | -23.5 | .8184+03 | .5835+03 | -30.9 |
| 023400 | 067 | 282 | -23.7 | .8167+03 | .5816+03 | -31.9 |
| 023500 | 068 | 285 | -23.8 | .8149+03 | .5796+03 | -32.9 |
| 023600 | 070 | 206 | -24.0 | .8132+03 | .5777+03 | -34.0 |
| 023700 | 072 | 285 | -24.2 | .8115+03 | .5757+03 | -35.0 |
| 023800 | 071 | 287 | -24.4 | .8098+03 | .5738+03 | -36.0 |
| 023900 | 073 | 283 | -24.6 | .8081+03 | .5719+03 | -37.0 |
| 024000 | 073 | 285 | -24.8 | .8064+03 | .5699+03 | -38.0 |
| 024100 | 073 | 287 | -25.0 | .8047+03 | .5680+03 | -38.5 |
| 024200 | 072 | 285 | -25.2 | .8030+03 | .5661+03 | -39.1 |
| 024300 | 074 | 297 | -25.4 | .8013+03 | .5643+03 | -39.6 |
| 024400 | 072 | 287 | -25.6 | .7996+03 | .5624+03 | -40.2 |
| 024500 | 073 | 286 | -25.8 | .7980+03 | .5605+03 | -40.8 |
| 024600 | 073 | 286 | -26.1 | .7963+03 | .5586+03 | -41.3 |
| 024700 | 072 | 283 | -26.3 | .7946+03 | .5568+03 | -41.8 |
| 024800 | 076 | 283 | -26.5 | .7930+03 | .5549+03 | -42.4 |
| 024900 | 074 | 285 | -26.7 | .7913+03 | .5531+03 | -42.9 |

TABLE 4. (Continued)

| ALTIITUDE (FT) | WIND SPEED (FT/SEC) | WIND DIRECTION (DEG) | TEMPERATURE (DEG F) | PRESSURE (MILLIBARS) | DENSITY (GRAM/M3) | DEW POINT (DEG C) |
|-------------------|------------------------|-------------------------|------------------------|-------------------------|----------------------|----------------------|
| 025100 | 073 | 282 | -26.9 | 38.97+03 | 5513+03 | -43.5 |
| 025100 | 074 | 284 | -27.1 | 38.81+03 | 5494+03 | -43.6 |
| 025200 | 075 | 285 | -27.3 | 38.64+03 | 5476+03 | -43.8 |
| 025300 | 075 | 284 | -27.6 | 38.88+03 | 5458+03 | -43.9 |
| 025400 | 078 | 294 | -27.8 | 38.72+03 | 5440+03 | -44.0 |
| 025500 | 075 | 284 | -28.0 | 38.16+03 | 5421+03 | -44.1 |
| 025600 | 076 | 284 | -28.2 | 38.00+03 | 5403+03 | -44.3 |
| 025700 | 077 | 284 | -28.4 | 37.83+03 | 5386+03 | -44.4 |
| 025800 | 074 | 285 | -28.7 | 37.68+03 | 5368+03 | -44.5 |
| 025900 | 074 | 292 | -28.9 | 37.52+03 | 5350+03 | -44.7 |
| 026000 | 080 | 282 | -29.1 | 37.16+03 | 5332+03 | -44.8 |
| 026100 | 080 | 294 | -29.3 | 37.20+03 | 5315+03 | -45.0 |
| 026200 | 083 | 280 | -29.6 | 37.04+03 | 5298+03 | -45.2 |
| 026300 | 082 | 280 | -29.8 | 36.88+03 | 5281+03 | -45.4 |
| 026400 | 082 | 287 | -30.1 | 36.73+03 | 5263+03 | -45.6 |
| 026500 | 087 | 279 | -30.3 | 36.57+03 | 5246+03 | -45.8 |
| 026600 | 086 | 279 | -30.6 | 36.41+03 | 5230+03 | -46.1 |
| 026700 | 086 | 281 | -30.8 | 36.26+03 | 5213+03 | -46.3 |
| 026800 | 087 | 278 | -31.1 | 36.10+03 | 5196+03 | -46.5 |
| 026900 | 085 | 279 | -31.3 | 35.95+03 | 5179+03 | -46.7 |
| 027000 | 087 | 278 | -31.6 | 35.80+03 | 5162+03 | -46.9 |
| 027100 | 086 | 279 | -31.8 | 35.64+03 | 5145+03 | -47.1 |
| 027200 | 085 | 279 | -32.1 | 35.49+03 | 5128+03 | -47.3 |
| 027300 | 087 | 278 | -32.3 | 35.34+03 | 5111+03 | -47.5 |
| 027400 | 088 | 276 | -32.6 | 35.19+03 | 5094+03 | -47.7 |
| 027500 | 087 | 278 | -32.8 | 35.03+03 | 5078+03 | -47.9 |
| 027600 | 085 | 278 | -33.0 | 34.88+03 | 5061+03 | -48.1 |
| 027700 | 082 | 278 | -33.3 | 34.73+03 | 5044+03 | -48.3 |
| 027800 | 084 | 278 | -33.5 | 34.58+03 | 5027+03 | -48.5 |
| 027900 | 084 | 276 | -33.8 | 34.44+03 | 5011+03 | -48.7 |
| 028000 | 084 | 278 | -34.0 | 34.29+03 | 4994+03 | -48.9 |
| 028100 | 084 | 279 | -34.2 | 34.14+03 | 4976+03 | -49.1 |
| 028200 | 084 | 278 | -34.4 | 33.99+03 | 4958+03 | -49.3 |
| 028300 | 084 | 280 | -34.5 | 33.84+03 | 4941+03 | -49.4 |
| 028400 | 086 | 281 | -34.7 | 33.70+03 | 4923+03 | -49.6 |
| 028500 | 087 | 281 | -34.9 | 33.55+03 | 4905+03 | -49.8 |
| 028600 | 089 | 283 | -35.1 | 33.40+03 | 4888+03 | -50.0 |
| 028700 | 094 | 286 | -35.3 | 33.26+03 | 4870+03 | -50.2 |
| 028800 | 095 | 288 | -35.4 | 33.11+03 | 4853+03 | -50.3 |
| 028900 | 096 | 285 | -35.6 | 32.97+03 | 4835+03 | -50.5 |
| 029000 | 099 | 288 | -35.8 | 32.83+03 | 4818+03 | -50.7 |
| 029100 | 099 | 286 | -36.0 | 32.68+03 | 4802+03 | -50.8 |
| 029200 | 100 | 287 | -36.2 | 32.54+03 | 4786+03 | -50.8 |
| 029300 | 102 | 284 | -36.5 | 32.40+03 | 4770+03 | -50.9 |
| 029400 | 101 | 288 | -36.8 | 32.26+03 | 4754+03 | -50.9 |
| 029500 | 104 | 289 | -37.0 | 32.12+03 | 4738+03 | -51.0 |
| 029600 | 101 | 284 | -37.3 | 31.98+03 | 4723+03 | -51.1 |
| 029700 | 104 | 289 | -37.5 | 31.84+03 | 4707+03 | -51.1 |
| 029800 | 104 | 288 | -37.8 | 31.70+03 | 4691+03 | -51.2 |
| 029900 | 102 | 290 | -38.0 | 31.56+03 | 4676+03 | -51.2 |

TABLE 4. (Continued)

| ALTITUDE (FT) | WIND SPEED (FT/SEC) | WIND DIRECTION (DEG) | TEMPERATURE (DEG C) | PRESSURE (MILLIBARS) | DENSITY (GRAM/M ³) | DEW POINT (DEG C) |
|------------------|------------------------|-------------------------|------------------------|-------------------------|-----------------------------------|----------------------|
| 030700 | 104 | 290 | -38.3 | .3132+03 | .4660+03 | -51.3 |
| 030800 | 103 | 289 | -38.6 | .3128+03 | .4645+03 | -51.1 |
| 030900 | 106 | 291 | -38.8 | .3114+03 | .4629+03 | -50.9 |
| 031000 | 107 | 291 | -39.1 | .3100+03 | .4614+03 | -50.6 |
| 031100 | 108 | 289 | -39.3 | .3087+03 | .4599+03 | -50.4 |
| 031200 | 109 | 289 | -39.6 | .3073+03 | .4583+03 | -50.2 |
| 031300 | 107 | 289 | -39.9 | .3059+03 | .4568+03 | -50.0 |
| 031400 | 107 | 290 | -40.1 | .3046+03 | .4553+03 | -49.8 |
| 031500 | 109 | 288 | -40.4 | .3032+03 | .4538+03 | -49.5 |
| 031600 | 107 | 290 | -40.6 | .3019+03 | .4523+03 | -49.3 |
| 031700 | 110 | 288 | -40.9 | .3006+03 | .4508+03 | -49.1 |
| 031800 | 112 | 287 | -41.2 | .2992+03 | .4493+03 | -49.2 |
| 031900 | 110 | 287 | -41.5 | .2979+03 | .4479+03 | -49.2 |
| 032000 | 111 | 289 | -41.8 | .2965+03 | .4464+03 | -49.3 |
| 032100 | 111 | 286 | -42.1 | .2952+03 | .4450+03 | -49.4 |
| 032200 | 112 | 287 | -42.3 | .2939+03 | .4435+03 | -49.4 |
| 032300 | 111 | 287 | -42.6 | .2926+03 | .4421+03 | -49.5 |
| 032400 | 111 | 286 | -42.9 | .2912+03 | .4407+03 | -49.6 |
| 032500 | 116 | 286 | -43.2 | .2899+03 | .4393+03 | -49.7 |
| 032600 | 115 | 286 | -43.5 | .2886+03 | .4378+03 | -49.7 |
| 032700 | 114 | 285 | -43.8 | .2873+03 | .4364+03 | -49.8 |
| 032800 | 116 | 283 | -44.1 | .2860+03 | .4350+03 | -50.1 |
| 032900 | 117 | 285 | -44.3 | .2848+03 | .4335+03 | -50.4 |
| 033000 | 115 | 284 | -44.6 | .2835+03 | .4321+03 | -50.6 |
| 033100 | 115 | 284 | -44.9 | .2822+03 | .4306+03 | -50.9 |
| 033200 | 115 | 284 | -45.1 | .2809+03 | .4292+03 | -51.2 |
| 033300 | 117 | 284 | -45.4 | .2796+03 | .4277+03 | -51.5 |
| 033400 | 118 | 283 | -45.7 | .2784+03 | .4263+03 | -51.8 |
| 033500 | 120 | 285 | -46.0 | .2771+03 | .4249+03 | -52.0 |
| 033600 | 119 | 285 | -46.2 | .2758+03 | .4234+03 | -52.3 |
| 033700 | 124 | 282 | -46.5 | .2746+03 | .4220+03 | -52.6 |
| 033800 | 127 | 282 | -46.7 | .2733+03 | .4205+03 | -52.8 |
| 033900 | 127 | 283 | -46.9 | .2721+03 | .4190+03 | -53.0 |
| 034000 | 123 | 282 | -47.2 | .2708+03 | .4175+03 | -53.2 |
| 034100 | 124 | 282 | -47.4 | .2696+03 | .4160+03 | -53.4 |
| 034200 | 121 | 283 | -47.6 | .2684+03 | .4145+03 | -53.6 |
| 034300 | 122 | 283 | -47.8 | .2671+03 | .4130+03 | -53.8 |
| 034400 | 123 | 283 | -48.0 | .2659+03 | .4115+03 | -54.1 |
| 034500 | 123 | 286 | -48.3 | .2647+03 | .4100+03 | -54.3 |
| 034600 | 121 | 284 | -48.5 | .2635+03 | .4085+03 | -54.5 |
| 034700 | 123 | 286 | -48.7 | .2623+03 | .4070+03 | -54.7 |
| 034800 | 120 | 287 | -48.9 | .2610+03 | .4055+03 | -54.9 |
| 034900 | 121 | 287 | -49.1 | .2598+03 | .4040+03 | -55.1 |
| 035000 | 125 | 284 | -49.3 | .2586+03 | .4025+03 | -55.3 |
| 035100 | 122 | 285 | -49.5 | .2574+03 | .4011+03 | -55.5 |
| 035200 | 122 | 284 | -49.7 | .2563+03 | .3996+03 | -55.7 |
| 035300 | 124 | 283 | -50.0 | .2551+03 | .3981+03 | -56.0 |
| 035400 | 124 | 283 | -50.2 | .2539+03 | .3966+03 | -56.2 |
| 035500 | 122 | 284 | -50.4 | .2527+03 | .3952+03 | -56.4 |
| 035600 | 120 | 283 | -50.6 | .2515+03 | .3937+03 | -56.6 |

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TABLE 4. (Continued)

| ALTITUDE (FT) | WIND SPEED (FT/SEC) | WIND DIRECTION (DEG) | TEMPERATURE (DEG C) | PRESSURE (MILLIBARS) | DENSITY (GRAM/M ³) | DEW POINT (DEG C) |
|------------------|------------------------|-------------------------|------------------------|-------------------------|-----------------------------------|----------------------|
| 335700 | 124 | 282 | -50.8 | .2509+03 | .3221+03 | -56.8 |
| 335100 | 121 | 284 | -51.0 | .2492+03 | .3908+03 | -57.0 |
| 335200 | 123 | 283 | -51.3 | .2480+03 | .3894+03 | -57.2 |
| 335300 | 122 | 282 | -51.5 | .2469+03 | .3880+03 | -57.4 |
| 335400 | 125 | 286 | -51.7 | .2457+03 | .3866+03 | -57.6 |
| 335500 | 127 | 284 | -51.9 | .2446+03 | .3852+03 | -57.8 |
| 335600 | 124 | 288 | -52.2 | .2434+03 | .3838+03 | -58.0 |
| 335700 | 123 | 287 | -52.4 | .2423+03 | .3824+03 | -58.2 |
| 335800 | 126 | 282 | -52.6 | .2412+03 | .3810+03 | -58.4 |
| 335900 | 126 | 283 | -52.9 | .2401+03 | .3796+03 | -58.6 |
| 336000 | 126 | 285 | -53.1 | .2389+03 | .3782+03 | -58.8 |
| 336100 | 127 | 283 | -53.3 | .2378+03 | .3768+03 | -59.0 |
| 336200 | 127 | 285 | -53.5 | .2367+03 | .3753+03 | -59.2 |
| 336300 | 125 | 284 | -53.7 | .2356+03 | .3739+03 | -59.4 |
| 336400 | 124 | 284 | -53.9 | .2345+03 | .3724+03 | -59.6 |
| 336500 | 127 | 287 | -54.0 | .2333+03 | .3710+03 | -59.8 |
| 336600 | 125 | 287 | -54.2 | .2322+03 | .3696+03 | -60.0 |
| 336700 | 126 | 287 | -54.4 | .2312+03 | .3682+03 | -60.2 |
| 336800 | 125 | 287 | -54.6 | .2301+03 | .3667+03 | -60.4 |
| 336900 | 127 | 287 | -54.9 | .2290+03 | .3653+03 | -60.6 |
| 337000 | 124 | 288 | -55.0 | .2279+03 | .3639+03 | -60.8 |
| 337100 | 120 | 286 | -55.2 | .2268+03 | .3625+03 | -61.0 |
| 337200 | 132 | 288 | -55.4 | .2257+03 | .3611+03 | -61.1 |
| 337300 | 130 | 287 | -55.6 | .2247+03 | .3597+03 | -61.3 |
| 337400 | 138 | 287 | -55.8 | .2236+03 | .3583+03 | -61.5 |
| 337500 | 141 | 289 | -55.9 | .2225+03 | .3569+03 | -61.6 |
| 337600 | 138 | 287 | -56.1 | .2215+03 | .3555+03 | -61.8 |
| 337700 | 140 | 287 | -56.3 | .2204+03 | .3541+03 | -62.0 |
| 337800 | 139 | 285 | -56.5 | .2194+03 | .3528+03 | -62.2 |
| 337900 | 140 | 266 | -56.7 | .2183+03 | .3514+03 | -62.3 |
| 338000 | 141 | 288 | -56.9 | .2173+03 | .3500+03 | -62.5 |
| 338100 | 141 | 287 | -57.1 | .2162+03 | .3487+03 | -9999. |
| 338200 | 143 | 288 | -57.3 | .2152+03 | .3473+03 | -9999. |
| 338300 | 139 | 288 | -57.4 | .2142+03 | .3459+03 | -9999. |
| 338400 | 139 | 288 | -57.6 | .2132+03 | .3445+03 | -9999. |
| 338500 | 137 | 287 | -57.8 | .2121+03 | .3432+03 | -9999. |
| 338600 | 137 | 288 | -58.0 | .2111+03 | .3418+03 | -9999. |
| 338700 | 135 | 288 | -58.2 | .2101+03 | .3405+03 | -9999. |
| 338800 | 133 | 287 | -58.3 | .2091+03 | .3391+03 | -9999. |
| 338900 | 134 | 288 | -58.5 | .2081+03 | .3378+03 | -9999. |
| 339000 | 131 | 289 | -58.7 | .2071+03 | .3364+03 | -9999. |
| 339100 | 126 | 286 | -59.1 | .2061+03 | .3352+03 | -9999. |
| 339200 | 126 | 286 | -59.2 | .2051+03 | .3340+03 | -9999. |
| 339300 | 170 | 293 | -59.5 | .2041+03 | .3328+03 | -9999. |
| 339400 | 116 | 289 | -59.8 | .2031+03 | .3316+03 | -9999. |
| 339500 | 118 | 288 | -60.0 | .2021+03 | .3304+03 | -9999. |
| 339600 | 117 | 288 | -60.3 | .2012+03 | .3293+03 | -9999. |
| 339700 | 115 | 288 | -60.6 | .2002+03 | .3281+03 | -9999. |
| 339800 | 114 | 287 | -60.9 | .1992+03 | .3269+03 | -9999. |
| 339900 | 112 | 287 | -61.1 | .1982+03 | .3257+03 | -9999. |

TABLE 4. (Continued)

| ALTIJDE (FT) | WIND SPEED (FT/SEC) | WIND DIRECTION (DEG) | TEMPERATURE (DEG C) | PRESSURE (MILLIBARS) | DENSITY (GRAM/M3) | DEW POINT (DEG C) |
|-----------------|------------------------|-------------------------|------------------------|-------------------------|----------------------|----------------------|
| 040300 | 111 | 287 | -61.4 | .1973+03 | .3246+0. | -9999. |
| 040300 | 110 | 286 | -61.4 | .1963+03 | .3230+0. | -9999. |
| 040300 | 110 | 296 | -61.5 | .1954+03 | .3215+03 | -9999. |
| 040300 | 107 | 286 | -61.5 | .1944+03 | .3200+03 | -9999. |
| 040300 | 107 | 285 | -61.5 | .1935+03 | .3184+03 | -9999. |
| 040500 | 106 | 282 | -61.5 | .1925+03 | .3169+03 | -9999. |
| 040600 | 104 | 283 | -61.6 | .1916+03 | .3154+03 | -9999. |
| 040700 | 103 | 283 | -61.6 | .1906+03 | .3139+03 | -9999. |
| 040800 | 102 | 278 | -61.6 | .1897+03 | .3124+03 | -9999. |
| 040900 | 099 | 274 | -61.7 | .1888+03 | .3110+03 | -9999. |
| 041000 | 094 | 273 | -61.7 | .1878+03 | .3095+03 | -9999. |
| 041100 | 094 | 270 | -61.6 | .1869+03 | .3078+03 | -9999. |
| 041200 | 095 | 271 | -61.5 | .1860+03 | .3061+03 | -9999. |
| 041300 | 096 | 271 | -61.3 | .1851+03 | .3045+03 | -9999. |
| 041400 | 097 | 270 | -61.2 | .1842+03 | .3028+03 | -9999. |
| 041500 | 096 | 275 | -61.1 | .1833+03 | .3012+03 | -9999. |
| 041600 | 096 | 273 | -61.0 | .1824+03 | .2995+03 | -9999. |
| 041700 | 097 | 274 | -60.9 | .1815+03 | .2979+03 | -9999. |
| 041800 | 098 | 275 | -60.7 | .1807+03 | .2963+03 | -9999. |
| 041900 | 101 | 270 | -60.6 | .1798+03 | .2947+03 | -9999. |
| 042000 | 101 | 270 | -60.5 | .1789+03 | .2931+03 | -9999. |
| 042100 | 102 | 267 | -60.4 | .1780+03 | .2915+03 | -9999. |
| 042200 | 100 | 269 | -60.3 | .1772+03 | .2900+03 | -9999. |
| 042300 | 101 | 273 | -60.3 | .1763+03 | .2885+03 | -9999. |
| 042400 | 100 | 271 | -60.2 | .1755+03 | .2870+03 | -9999. |
| 042500 | 099 | 272 | -60.1 | .1746+03 | .2855+03 | -9999. |
| 042600 | 099 | 274 | -60.0 | .1738+03 | .2840+03 | -9999. |
| 042700 | 099 | 274 | -59.9 | .1729+03 | .2825+03 | -9999. |
| 042800 | 099 | 275 | -59.9 | .1721+03 | .2811+03 | -9999. |
| 042900 | 097 | 274 | -59.8 | .1712+03 | .2796+03 | -9999. |
| 043000 | 101 | 273 | -59.7 | .1704+03 | .2781+03 | -9999. |
| 043100 | 101 | 273 | -59.7 | .1696+03 | .2767+03 | -9999. |
| 043200 | 102 | 275 | -59.6 | .1688+03 | .2754+03 | -9999. |
| 043300 | 105 | 270 | -59.6 | .1680+03 | .2740+03 | -9999. |
| 043400 | 105 | 264 | -59.5 | .1671+03 | .2726+03 | -9999. |
| 043500 | 109 | 269 | -59.5 | .1663+03 | .2712+03 | -9999. |
| 043600 | 109 | 271 | -59.5 | .1655+03 | .2699+03 | -9999. |
| 043700 | 113 | 267 | -59.4 | .1647+03 | .2685+03 | -9999. |
| 043800 | 113 | 268 | -59.4 | .1639+03 | .2672+03 | -9999. |
| 043900 | 113 | 271 | -59.3 | .1631+03 | .2658+03 | -9999. |
| 044000 | 113 | 274 | -59.3 | .1624+03 | .2645+03 | -9999. |
| 044100 | 111 | 275 | -59.4 | .1616+03 | .2633+03 | -9999. |
| 044200 | 109 | 277 | -59.4 | .1608+03 | .2621+03 | -9999. |
| 044300 | 109 | 277 | -59.5 | .1600+03 | .2609+03 | -9999. |
| 044400 | 107 | 276 | -59.6 | .1592+03 | .2598+03 | -9999. |
| 044500 | 105 | 278 | -59.6 | .1585+03 | .2586+03 | -9999. |
| 044600 | 105 | 278 | -59.7 | .1577+03 | .2574+03 | -9999. |
| 044700 | 101 | 278 | -59.8 | .1569+03 | .2563+03 | -9999. |
| 044800 | 099 | 277 | -59.9 | .1562+03 | .2551+03 | -9999. |
| 044900 | 092 | 277 | -59.9 | .1554+03 | .2540+03 | -9999. |

TABLE 4. (Continued)

| ALTITUDE (FT) | WIND SPEED (FT/SEC) | WIND DIRECTION (DEG) | TEMPERATURE (DEG C) | PRESSURE (MILLIBARS) | DENSITY (GRAM/M ³) | DEW POINT (DEG C) |
|------------------|------------------------|-------------------------|------------------------|-------------------------|-----------------------------------|----------------------|
| 045100 | 090 | 275 | -60.0 | 1591.03 | 2528.03 | -9999. |
| 045100 | 089 | 274 | -60.0 | 1539.03 | 2516.03 | -9999. |
| 045200 | 088 | 275 | -60.1 | 1532.03 | 2505.03 | -9999. |
| 045300 | 088 | 273 | -60.1 | 1524.03 | 2493.03 | -9999. |
| 045400 | 085 | 274 | -60.2 | 1517.03 | 2491.03 | -9999. |
| 045500 | 081 | 275 | -60.2 | 1510.03 | 2470.03 | -9999. |
| 045600 | 079 | 273 | -60.2 | 1502.03 | 2458.03 | -9999. |
| 045700 | 080 | 270 | -60.3 | 1495.03 | 2447.03 | -9999. |
| 045800 | 083 | 269 | -60.3 | 1488.03 | 2435.03 | -9999. |
| 045900 | 082 | 269 | -60.4 | 1481.03 | 2424.03 | -9999. |
| 046000 | 083 | 269 | -60.4 | 1473.03 | 2413.03 | -9999. |
| 046100 | 084 | 270 | -60.5 | 1466.03 | 2402.03 | -9999. |
| 046200 | 082 | 272 | -60.6 | 1459.03 | 2391.03 | -9999. |
| 046300 | 081 | 271 | -60.6 | 1452.03 | 2380.03 | -9999. |
| 046400 | 081 | 272 | -60.7 | 1445.03 | 2370.03 | -9999. |
| 046500 | 081 | 271 | -60.8 | 1438.03 | 2359.03 | -9999. |
| 046600 | 079 | 271 | -60.9 | 1431.03 | 2348.03 | -9999. |
| 046700 | 077 | 270 | -61.0 | 1424.03 | 2338.03 | -9999. |
| 046800 | 076 | 268 | -61.0 | 1417.03 | 2327.03 | -9999. |
| 046900 | 074 | 268 | -61.1 | 1410.03 | 2317.03 | -9999. |
| 047000 | 073 | 268 | -61.2 | 1403.03 | 2307.03 | -9999. |
| 047100 | 075 | 267 | -61.4 | 1397.03 | 2297.03 | -9999. |
| 047200 | 077 | 267 | -61.5 | 1390.03 | 2288.03 | -9999. |
| 047300 | 077 | 264 | -61.7 | 1383.03 | 2278.03 | -9999. |
| 047400 | 077 | 263 | -61.8 | 1376.03 | 2268.03 | -9999. |
| 047500 | 077 | 263 | -62.0 | 1369.03 | 2259.03 | -9999. |
| 047600 | 078 | 262 | -62.2 | 1363.03 | 2250.03 | -9999. |
| 047700 | 079 | 263 | -62.3 | 1356.03 | 2241.03 | -9999. |
| 047800 | 080 | 262 | -62.5 | 1349.03 | 2231.03 | -9999. |
| 047900 | 082 | 261 | -62.6 | 1343.03 | 2222.03 | -9999. |
| 048000 | 081 | 262 | -62.8 | 1336.03 | 2213.03 | -9999. |
| 048100 | 082 | 262 | -62.9 | 1330.03 | 2204.03 | -9999. |
| 048200 | 084 | 259 | -63.1 | 1323.03 | 2194.03 | -9999. |
| 048300 | 084 | 260 | -63.2 | 1317.03 | 2185.03 | -9999. |
| 048400 | 082 | 262 | -63.4 | 1311.03 | 2176.03 | -9999. |
| 048500 | 083 | 262 | -63.5 | 1305.03 | 2166.03 | -9999. |
| 048600 | 082 | 265 | -63.6 | 1297.03 | 2157.03 | -9999. |
| 048700 | 082 | 261 | -63.8 | 1291.03 | 2148.03 | -9999. |
| 048800 | 081 | 264 | -63.9 | 1285.03 | 2139.03 | -9999. |
| 048900 | 078 | 264 | -64.1 | 1278.03 | 2130.03 | -9999. |
| 049000 | 080 | 264 | -64.2 | 1272.03 | 2121.03 | -9999. |
| 049100 | 080 | 264 | -64.3 | 1266.03 | 2111.03 | -9999. |
| 049200 | 079 | 264 | -64.5 | 1259.03 | 2102.03 | -9999. |
| 049300 | 078 | 267 | -64.6 | 1253.03 | 2093.03 | -9999. |
| 049400 | 078 | 268 | -64.7 | 1247.03 | 2084.03 | -9999. |
| 049500 | 078 | 270 | -64.8 | 1241.03 | 2075.03 | -9999. |
| 049600 | 077 | 272 | -65.0 | 1235.03 | 2066.03 | -9999. |
| 049700 | 075 | 275 | -65.1 | 1228.03 | 2057.03 | -9999. |
| 049800 | 073 | 273 | -65.2 | 1222.03 | 2048.03 | -9999. |
| 049900 | 073 | 272 | -65.4 | 1216.03 | 2039.03 | -9999. |

TABLE 4. (Continued)

| ALTIITUDE (FT) | WIND SPEED (FT/SEC) | WIND DIRECTION (DEG) | TEMPERATURE (DEG C) | PRESSURE (MILLIBARS) | DENSITY (GRAM/M3) | DEW POINT (DEG C) |
|-------------------|------------------------|-------------------------|------------------------|-------------------------|----------------------|----------------------|
| 350300 | 072 | 272 | -65.5 | -1210+03 | -2030+03 | -9999 |
| 350310 | 071 | 268 | -65.6 | -1204+03 | -2022+03 | -9999 |
| 350320 | 070 | 268 | -65.7 | -1198+03 | -2013+03 | -9999 |
| 350330 | 071 | 267 | -65.9 | -1192+03 | -2004+03 | -9999 |
| 350400 | 070 | 266 | -66.0 | -1186+03 | -1995+03 | -9999 |
| 350500 | 071 | 265 | -66.1 | -1180+03 | -1986+03 | -9999 |
| 350600 | 072 | 265 | -66.2 | -1175+03 | -1977+03 | -9999 |
| 350700 | 072 | 264 | -66.3 | -1169+03 | -1969+03 | -9999 |
| 350800 | 073 | 264 | -66.5 | -1163+03 | -1960+03 | -9999 |
| 350900 | 076 | 263 | -66.6 | -1157+03 | -1951+03 | -9999 |
| 351000 | 078 | 263 | -66.7 | -1151+03 | -1943+03 | -9999 |
| 351100 | 071 | 264 | -66.8 | -1146+03 | -1934+03 | -9999 |
| 351200 | 081 | 264 | -66.9 | -1140+03 | -1926+03 | -9999 |
| 351300 | 081 | 264 | -67.1 | -1134+03 | -1917+03 | -9999 |
| 351400 | 084 | 262 | -67.2 | -1128+03 | -1909+03 | -9999 |
| 351500 | 085 | 264 | -67.3 | -1123+03 | -1900+03 | -9999 |
| 351600 | 086 | 264 | -67.4 | -1117+03 | -1892+03 | -9999 |
| 351700 | 086 | 264 | -67.5 | -1112+03 | -1883+03 | -9999 |
| 351800 | 088 | 262 | -67.7 | -1106+03 | -1875+03 | -9999 |
| 351900 | 089 | 263 | -67.8 | -1101+03 | -1867+03 | -9999 |
| 352000 | 087 | 265 | -67.9 | -1095+03 | -1859+03 | -9999 |
| 352100 | 085 | 264 | -68.0 | -1089+03 | -1850+03 | -9999 |
| 352200 | 084 | 265 | -68.1 | -1084+03 | -1842+03 | -9999 |
| 352300 | 083 | 266 | -68.3 | -1079+03 | -1834+03 | -9999 |
| 352400 | 083 | 265 | -68.4 | -1073+03 | -1826+03 | -9999 |
| 352500 | 083 | 265 | -68.5 | -1068+03 | -1817+03 | -9999 |
| 352600 | 085 | 265 | -68.6 | -1062+03 | -1809+03 | -9999 |
| 352700 | 085 | 265 | -68.7 | -1057+03 | -1801+03 | -9999 |
| 352800 | 086 | 264 | -68.9 | -1052+03 | -1793+03 | -9999 |
| 352900 | 076 | 264 | -69.0 | -1046+03 | -1785+03 | -9999 |
| 353000 | 085 | 266 | -69.1 | -1041+03 | -1777+03 | -9999 |
| 353100 | 084 | 267 | -69.2 | -1036+03 | -1769+03 | -9999 |
| 353200 | 085 | 266 | -69.3 | -1030+03 | -1761+03 | -9999 |
| 353300 | 085 | 265 | -69.3 | -1025+03 | -1752+03 | -9999 |
| 353400 | 086 | 262 | -69.4 | -1020+03 | -1744+03 | -9999 |
| 353500 | 085 | 260 | -69.5 | -1015+03 | -1736+03 | -9999 |
| 353600 | 085 | 260 | -69.6 | -1010+03 | -1728+03 | -9999 |
| 353700 | 086 | 261 | -69.7 | -1005+03 | -1720+03 | -9999 |
| 353800 | 084 | 263 | -69.7 | -9996+02 | -1712+03 | -9999 |
| 353900 | 084 | 264 | -69.8 | -9945+02 | -1704+03 | -9999 |
| 354000 | 085 | 266 | -69.9 | -9895+02 | -1696+03 | -9999 |
| 354100 | 088 | 267 | -69.9 | -9845+02 | -1687+03 | -9999 |
| 354200 | 090 | 264 | -69.9 | -9795+02 | -1679+03 | -9999 |
| 354300 | 091 | 271 | -69.8 | -9745+02 | -1670+03 | -9999 |
| 354400 | 091 | 269 | -69.8 | -9696+02 | -1661+03 | -9999 |
| 354500 | 088 | 268 | -69.8 | -9647+02 | -1653+03 | -9999 |
| 354600 | 084 | 268 | -69.8 | -9598+02 | -1644+03 | -9999 |
| 354700 | 083 | 267 | -69.8 | -9549+02 | -1636+03 | -9999 |
| 354800 | 082 | 268 | -69.7 | -9501+02 | -1627+03 | -9999 |
| 354900 | 081 | 272 | -69.7 | -9453+02 | -1619+03 | -9999 |

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OF POOR QUALITY

TABLE 4. (Continued)

| ALTIITUDE (FT) | WIND SPEED (FT/SEC) | WIND DIRECTION (DEG) | TEMPERATURE (DEG C) | PRESSURE (MILLIBARS) | DENSITY (GRAM/M3) | DEW POINT (DEG C) |
|-------------------|------------------------|-------------------------|------------------------|-------------------------|----------------------|----------------------|
| 35500 | 079 | 273 | -69.7 | .9405+02 | .1610+03 | -9999. |
| 055100 | 076 | 274 | -69.7 | .9357+02 | .1602+03 | -9999. |
| 055200 | 074 | 274 | -69.6 | .9310+02 | .1594+03 | -9999. |
| 055300 | 071 | 271 | -69.6 | .9263+02 | .1585+03 | -9999. |
| 055400 | 071 | 269 | -69.5 | .9216+02 | .1577+03 | -9999. |
| 055500 | 072 | 267 | -69.5 | .9169+02 | .1568+03 | -9999. |
| 055600 | 073 | 265 | -69.5 | .9123+02 | .1560+03 | -9999. |
| 055700 | 074 | 263 | -69.4 | .9076+02 | .1552+03 | -9999. |
| 055800 | 075 | 263 | -69.4 | .9030+02 | .1544+03 | -9999. |
| 055900 | 078 | 261 | -69.3 | .8985+02 | .1536+03 | -9999. |
| 056000 | 079 | 262 | -69.3 | .8939+02 | .1528+03 | -9999. |
| 056100 | 079 | 265 | -69.3 | .8894+02 | .1520+03 | -9999. |
| 055200 | 081 | 264 | -69.3 | .8849+02 | .1512+03 | -9999. |
| 055300 | 083 | 265 | -69.3 | .8804+02 | .1505+03 | -9999. |
| 055400 | 081 | 267 | -69.3 | .8760+02 | .1497+03 | -9999. |
| 055500 | 076 | 268 | -69.3 | .8715+02 | .1490+03 | -9999. |
| 055600 | 072 | 269 | -69.4 | .8671+02 | .1482+03 | -9999. |
| 055700 | 067 | 270 | -69.4 | .8627+02 | .1475+03 | -9999. |
| 055800 | 065 | 271 | -69.4 | .8584+02 | .1467+03 | -9999. |
| 055900 | 062 | 273 | -69.4 | .8540+02 | .1460+03 | -9999. |
| 057000 | 058 | 271 | -69.4 | .8497+02 | .1453+03 | -9999. |
| 058000 | 055 | 274 | -68.3 | .8454+02 | .1446+03 | -9999. |
| 059000 | 046 | 272 | -66.9 | .8412+02 | .1439+03 | -9999. |
| 050000 | 034 | 268 | -64.0 | .8370+02 | .1432+03 | -9999. |
| 051000 | 023 | 264 | -61.7 | .8328+02 | .1425+03 | -9999. |
| 052000 | 019 | 252 | -62.7 | .8286+02 | .1418+03 | -9999. |
| 053000 | 017 | 234 | -62.8 | .8245+02 | .1411+03 | -9999. |
| 054000 | 016 | 214 | -61.9 | .8204+02 | .1404+03 | -9999. |
| 055000 | 015 | 220 | -62.4 | .8163+02 | .1397+03 | -9999. |
| 056000 | 013 | 235 | -62.0 | .8122+02 | .1390+03 | -9999. |
| 057000 | 010 | 261 | -61.3 | .8081+02 | .1383+03 | -9999. |
| 058000 | 007 | 310 | -60.5 | .8041+02 | .1376+03 | -9999. |
| 059000 | 010 | 037 | -59.1 | .8001+02 | .1369+03 | -9999. |
| 070000 | 017 | 759 | -58.6 | .7961+02 | .1362+03 | -9999. |
| 071000 | 018 | 064 | -59.1 | .7921+02 | .1355+03 | -9999. |
| 072000 | 015 | 075 | -58.4 | .7881+02 | .1348+03 | -9999. |
| 073000 | 014 | 080 | -58.8 | .7841+02 | .1341+03 | -9999. |
| 074000 | 012 | 075 | -58.6 | .7801+02 | .1334+03 | -9999. |
| 075000 | 011 | 062 | -57.2 | .7761+02 | .1327+03 | -9999. |
| 076000 | 010 | 053 | -55.9 | .7721+02 | .1320+03 | -9999. |
| 077000 | 008 | 051 | -55.4 | .7681+02 | .1313+03 | -9999. |
| 078000 | 004 | 050 | -54.7 | .7641+02 | .1306+03 | -9999. |
| 079000 | 002 | 023 | -53.6 | .7601+02 | .1299+03 | -9999. |
| 080000 | 005 | 004 | -53.1 | .7561+02 | .1292+03 | -9999. |
| 091000 | 006 | 006 | -53.0 | .7521+02 | .1285+03 | -9999. |
| 092000 | 005 | 021 | -53.0 | .7481+02 | .1278+03 | -9999. |
| 093000 | 006 | 034 | -53.7 | .7441+02 | .1271+03 | -9999. |
| 094000 | 006 | 032 | -54.0 | .7401+02 | .1264+03 | -9999. |
| 095000 | 007 | 007 | -54.3 | .7361+02 | .1257+03 | -9999. |
| 096000 | 009 | 004 | -55.0 | .7321+02 | .1250+03 | -9999. |

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TABLE 4. (Continued)

| ALTIJUD (FT) | WIND SPEED (FT/SEC) | WIND DIRECTION (DEG) | TEMPERATURE (DEG C) | PRESSURE (MILLIBARS) | DENSITY (GRAM/M3) | DEW POINT (DEG C) |
|-----------------|------------------------|-------------------------|------------------------|-------------------------|----------------------|----------------------|
| 097000 | 012 | 294 | -55.1 | .2004+02 | .3202+02 | -9999. |
| 098000 | 015 | 286 | -54.6 | .1911+02 | .3086+02 | -9999. |
| 099000 | 018 | 287 | -53.5 | .1824+02 | .2893+02 | -9999. |
| 100000 | 021 | 278 | -52.2 | .1740+02 | .2783+02 | -9999. |
| 101000 | 023 | 274 | -50.9 | .1661+02 | .2604+02 | -9999. |
| 102000 | 025 | 273 | -49.9 | .1586+02 | .2475+02 | -9999. |
| 103000 | 026 | 268 | -49.4 | .1515+02 | .2359+02 | -9999. |
| 104000 | 025 | 261 | -49.1 | .1447+02 | .2250+02 | -9999. |
| 105000 | 024 | 251 | -48.7 | .1382+02 | .2145+02 | -9999. |
| 106000 | 029 | 234 | -47.3 | .1323+02 | .2041+02 | -9999. |
| 107000 | 037 | 233 | -46.0 | .1267+02 | .1943+02 | -9999. |
| 108000 | 050 | 227 | -45.0 | .1213+02 | .1852+02 | -9999. |
| 109000 | 065 | 226 | -44.6 | .1161+02 | .1770+02 | -9999. |
| 110000 | 067 | 231 | -44.2 | .1112+02 | .1692+02 | -9999. |
| 111000 | 065 | 234 | -43.8 | .1064+02 | .1617+02 | -9999. |
| 112000 | 060 | 246 | -44.4 | .1019+02 | .1552+02 | -9999. |
| 113000 | 060 | 255 | -45.5 | .9740+01 | .1491+02 | -9999. |
| 114000 | 067 | 261 | -45.6 | .9309+01 | .1425+02 | -9999. |
| 115000 | 070 | 265 | -44.9 | .8899+01 | .1358+02 | -9999. |
| 116000 | 072 | 270 | -43.7 | .8508+01 | .1291+02 | -9999. |
| 117000 | 072 | 277 | -41.7 | .8136+01 | .1224+02 | -9999. |
| 118000 | 072 | 285 | -39.5 | .7784+01 | .1160+02 | -9999. |
| 119000 | 070 | 293 | -37.6 | .7451+01 | .1102+02 | -9999. |
| 120000 | 065 | 301 | -36.0 | .7133+01 | .1048+02 | -9999. |
| 121000 | 059 | 304 | -34.6 | .6831+01 | .9977+01 | -9999. |
| 122000 | 052 | 302 | -34.3 | .6543+01 | .952+01 | -9999. |
| 123000 | 045 | 294 | -34.8 | .6267+01 | .9162+01 | -9999. |
| 124000 | 042 | 283 | -35.5 | .6002+01 | .8800+01 | -9999. |
| 125000 | 040 | 274 | -36.2 | .5748+01 | .8452+01 | -9999. |
| 126000 | 042 | 268 | -36.8 | .5504+01 | .8113+01 | -9999. |
| 127000 | 038 | 268 | -36.9 | .5269+01 | .7771+01 | -9999. |
| 128000 | 033 | 271 | -36.9 | .5045+01 | .7438+01 | -9999. |
| 129000 | 028 | 263 | -36.9 | .4830+01 | .7121+01 | -9999. |
| 130000 | 027 | 246 | -35.7 | .4625+01 | .6785+01 | -9999. |
| 131000 | 035 | 233 | -1.9 | .4431+01 | .6399+01 | -9999. |
| 132000 | 043 | 233 | -28.1 | .4244+01 | .6040+01 | -9999. |
| 133000 | 048 | 231 | -25.5 | .4074+01 | .5732+01 | -9999. |
| 134000 | 050 | 232 | -23.8 | .3909+01 | .5461+01 | -9999. |
| 135000 | 052 | 232 | -22.5 | .3752+01 | .5214+01 | -9999. |
| 136000 | 055 | 241 | -22.4 | .3602+01 | .5003+01 | -9999. |
| 137000 | 064 | 251 | -21.3 | .3457+01 | .4783+01 | -9999. |
| 138000 | 076 | 257 | -19.0 | .3320+01 | .4551+01 | -9999. |
| 139000 | 084 | 267 | -16.8 | .3189+01 | .4318+01 | -9999. |
| 140000 | 087 | 260 | -14.6 | .3064+01 | .4129+01 | -9999. |
| 141000 | 089 | 257 | -12.6 | .2945+01 | .3938+01 | -9999. |
| 142000 | 089 | 252 | -10.6 | .2832+01 | .3758+01 | -9999. |
| 143000 | 092 | 248 | -9.7 | .2724+01 | .3589+01 | -9999. |
| 144000 | 097 | 246 | -7.7 | .2620+01 | .3439+01 | -9999. |
| 145000 | 101 | 248 | -7.8 | .2521+01 | .3309+01 | -9999. |
| 146000 | 106 | 252 | -8.1 | .2427+01 | .3188+01 | -9999. |

TABLE 4. (Continued)

| ALTITUDE (FT) | WIND SPEED (FT/SEC) | WIND DIRECTION (DEG) | TEMPERATURE (DEG C) | PRESSURE (MILLIBARS) | DENSITY (GRAM/M3) | DEW POINT (DEG C) |
|------------------|------------------------|-------------------------|------------------------|-------------------------|----------------------|----------------------|
| 137000 | 169 | 253 | -8.6 | .2333+01 | .2972+01 | -9999. |
| 138000 | 111 | 256 | -9.0 | .2245+01 | .2960+01 | -9999. |
| 139000 | 114 | 259 | -9.5 | .2159+01 | .2852+01 | -9999. |
| 140000 | 119 | 261 | -8.8 | .2077+01 | .2737+01 | -9999. |
| 141000 | 124 | 261 | -5.7 | .1998+01 | .2603+01 | -9999. |
| 142000 | 126 | 258 | -4 | .1924+01 | .2457+01 | -9999. |
| 143000 | 131 | 258 | 3.2 | .1853+01 | .2336+01 | -9999. |
| 144000 | 135 | 258 | 5.7 | .1786+01 | .2231+01 | -9999. |
| 145000 | 136 | 260 | 7.4 | .1722+01 | .2138+01 | -9999. |
| 146000 | 138 | 260 | 9.6 | .1660+01 | .2053+01 | -9999. |
| 147000 | 138 | 259 | 8.6 | .1601+01 | .1979+01 | -9999. |
| 148000 | 136 | 257 | 8.0 | .1544+01 | .1913+01 | -9999. |
| 149000 | 136 | 255 | 6.8 | .1487+01 | .1852+01 | -9999. |
| 150000 | 136 | 251 | 5.7 | .1435+01 | .1792+01 | -9999. |
| 151000 | 136 | 247 | 4.5 | .1383+01 | .1735+01 | -9999. |
| 152000 | 141 | 239 | 3.3 | .1333+01 | .1679+01 | -9999. |
| 153000 | 148 | 232 | 2.2 | .1284+01 | .1625+01 | -9999. |
| 154000 | 155 | 227 | 1.0 | .1237+01 | .1572+01 | -9999. |
| 155000 | 160 | 226 | -1 | .1192+01 | .1520+01 | -9999. |
| 156000 | 162 | 227 | -1.2 | .1148+01 | .1470+01 | -9999. |
| 157000 | 162 | 229 | -2.3 | .1105+01 | .1421+01 | -9999. |
| 158000 | 160 | 232 | -3.3 | .1064+01 | .1374+01 | -9999. |
| 159000 | 158 | 236 | -4.4 | .1025+01 | .1328+01 | -9999. |
| 150000 | 155 | 240 | -5.5 | .9862+00 | .1283+01 | -9999. |
| 161000 | 153 | 244 | -6.5 | .9491+00 | .1240+01 | -9999. |
| 162000 | 150 | 250 | -7.5 | .9133+00 | .1198+01 | -9999. |
| 163000 | 145 | 255 | -8.6 | .8788+00 | .1157+01 | -9999. |
| 164000 | 150 | 250 | -8.3 | .8454+00 | .1112+01 | -9999. |
| 165000 | 158 | 250 | -6.4 | .8135+00 | .1062+01 | -9999. |
| 166000 | 167 | 253 | -6.5 | .7829+00 | .1023+01 | -9999. |
| 167000 | 170 | 259 | -7.0 | .7534+00 | .9862+00 | -9999. |
| 168000 | 168 | 266 | -7.6 | .7250+00 | .9513+00 | -9999. |
| 169000 | 170 | 274 | -8.1 | .6976+00 | .9168+00 | -9999. |
| 170000 | 173 | 274 | -8.7 | .6712+00 | .8841+00 | -9999. |
| 171000 | 177 | 266 | -9.3 | .6457+00 | .8524+00 | -9999. |
| 172000 | 187 | 261 | -9.1 | .6212+00 | .8166+00 | -9999. |
| 173000 | 200 | 258 | -6.2 | .5978+00 | .7802+00 | -9999. |
| 174000 | 209 | 255 | -4.4 | .5754+00 | .7459+00 | -9999. |
| 175000 | 211 | 252 | -2.7 | .5540+00 | .7135+00 | -9999. |
| 176000 | 207 | 254 | -1.7 | .5335+00 | .6847+00 | -9999. |
| 177000 | 200 | 256 | -1.4 | .5138+00 | .6585+00 | -9999. |
| 178000 | 190 | 260 | -1.2 | .4948+00 | .6339+00 | -9999. |
| 179000 | 180 | 263 | -1.9 | .4746+00 | .6099+00 | -9999. |
| 180000 | 172 | 265 | -2.5 | .4531+00 | .5866+00 | -9999. |
| 181000 | 167 | 267 | -1.5 | .4322+00 | .5670+00 | -9999. |
| 182000 | 143 | 270 | -3.1 | .4258+00 | .5493+00 | -9999. |
| 183000 | 162 | 272 | -4.8 | .4099+00 | .5321+00 | -9999. |
| 184000 | 163 | 272 | -6.5 | .3946+00 | .5156+00 | -9999. |
| 185000 | 163 | 268 | -8.2 | .3797+00 | .4993+00 | -9999. |
| 186000 | 163 | 263 | -9.4 | .3653+00 | .4832+00 | -9999. |

TABLE 4. (Continued)

| ALTITUDE (FT) | WIND SPEED (FT/SEC) | WIND DIRECTION (DEG) | TEMPERATURE (DEG C) | PRESSURE (MILLIBARS) | DENSITY (GRAM/M3) | DEW POINT (DEG C) |
|------------------|------------------------|-------------------------|------------------------|-------------------------|----------------------|----------------------|
| 187300 | 158 | 257 | -11.5 | .3514+00 | .4678+00 | -9999. |
| 188000 | 155 | 252 | -13.1 | .3379+00 | .4527+00 | -9999. |
| 189000 | 157 | 249 | -14.7 | .3249+00 | .4380+00 | -9999. |
| 190000 | 158 | 248 | -16.3 | .3122+00 | .4234+00 | -9999. |
| 191000 | 160 | 248 | -18.0 | .3000+00 | .4095+00 | -9999. |
| 192000 | 163 | 251 | -19.4 | .2882+00 | .3957+00 | -9999. |
| 193000 | 167 | 253 | -21.1 | .2768+00 | .3825+00 | -9999. |
| 194000 | 168 | 253 | -22.7 | .2658+00 | .3697+00 | -9999. |
| 195000 | 172 | 252 | -24.4 | .2552+00 | .3574+00 | -9999. |
| 196000 | 172 | 250 | -26.1 | .2449+00 | .3453+00 | -9999. |
| 197000 | 172 | 246 | -26.8 | .2350+00 | .3324+00 | -9999. |
| 198000 | 179 | 241 | -26.6 | .2251+00 | .3183+00 | -9999. |
| 199000 | 190 | 237 | -26.2 | .2105+00 | .2969+00 | -9999. |
| 200000 | 206 | 236 | -26.1 | .1992+00 | .2809+00 | -9999. |
| 201000 | 229 | 234 | -26.8 | .1886+00 | .2667+00 | -9999. |
| 202000 | 260 | 234 | -31.3 | .1785+00 | .2571+00 | -9999. |
| 203000 | 263 | 236 | -30.8 | .1689+00 | .2428+00 | -9999. |
| 204000 | 266 | 239 | -31.1 | .1594+00 | .2301+00 | -9999. |
| 205000 | 268 | 243 | -31.2 | .1513+00 | .2179+00 | -9999. |
| 206000 | 270 | 246 | -34.1 | .1432+00 | .2066+00 | -9999. |
| 207000 | 271 | 250 | -36.9 | .1372+00 | .2023+00 | -9999. |
| 208000 | 273 | 254 | -39.1 | .1314+00 | .1956+00 | -9999. |
| 209000 | 275 | 257 | -40.7 | .1258+00 | .1885+00 | -9999. |
| 210000 | 276 | 260 | -41.2 | .1204+00 | .1808+00 | -9999. |
| 211000 | 276 | 263 | -41.4 | .1152+00 | .1732+00 | -9999. |
| 212000 | 276 | 266 | -42.2 | .1103+00 | .1664+00 | -9999. |
| 213000 | 275 | 268 | -43.8 | .1055+00 | .1602+00 | -9999. |
| 214000 | 273 | 270 | -45.3 | .1009+00 | .1543+00 | -9999. |
| 215000 | 271 | 272 | -46.5 | .9650-01 | .1483+00 | -9999. |
| 216000 | 268 | 272 | -48.3 | .9220-01 | .1424+00 | -9999. |
| 217000 | 263 | 272 | -49.2 | .8810-01 | .1370+00 | -9999. |
| 218000 | 260 | 272 | -50.2 | .8420-01 | .1315+00 | -9999. |
| 219000 | 256 | 271 | -51.9 | .8040-01 | .1266+00 | -9999. |
| 220000 | 255 | 271 | -54.7 | .7680-01 | .1225+00 | -9999. |
| 221000 | 255 | 270 | -58.5 | .7330-01 | .1189+00 | -9999. |
| 222000 | 255 | 269 | -62.1 | .7000-01 | .1156+00 | -9999. |
| 223000 | 256 | 269 | -65.9 | .6650-01 | .1118+00 | -9999. |
| 224000 | 260 | 269 | -69.9 | .6310-01 | .1082+00 | -9999. |
| 225000 | 261 | 269 | -73.0 | .5980-01 | .1041+00 | -9999. |
| 226000 | 265 | 270 | -74.6 | .5680-01 | .9964-01 | -9999. |
| 227000 | 268 | 271 | -74.2 | .5410-01 | .9473-01 | -9999. |
| 228000 | 270 | 272 | -72.7 | .5160-01 | .8967-01 | -9999. |
| 229000 | 271 | 272 | -72.2 | .4910-01 | .8510-01 | -9999. |
| 230000 | 275 | 273 | -70.1 | .4670-01 | .8013-01 | -9999. |
| 231000 | 275 | 274 | -69.1 | .4440-01 | .7542-01 | -9999. |
| 232000 | 276 | 275 | -65.6 | .4230-01 | .7099-01 | -9999. |
| 233000 | 278 | 275 | -63.0 | .4030-01 | .6680-01 | -9999. |
| 234000 | 280 | 276 | -60.2 | .3840-01 | .6282-01 | -9999. |
| 235000 | 280 | 276 | -59.2 | .3670-01 | .5974-01 | -9999. |
| 236000 | 280 | 276 | -58.2 | .3500-01 | .5671-01 | -9999. |

TABLE 4. (Continued)

| ALTITUDE (FT) | WIND SPEED (FT/SEC) | WIND DIRECTION (DEG) | TEMPERATURE (DEG C) | PRESSURE (MILLIBARS) | DENSITY (GRAM/M ³) | DEW POINT (DEG C) |
|------------------|------------------------|-------------------------|------------------------|-------------------------|-----------------------------------|----------------------|
| 237000 | 280 | 276 | -52.2 | .3340-01 | .537-01 | -9999. |
| 238000 | 278 | 276 | -57.2 | .3190-01 | .5195-01 | -9999. |
| 239000 | 276 | 275 | -57.2 | .3040-01 | .493-01 | -9999. |
| 240000 | 275 | 275 | -57.9 | .2900-01 | .4694-01 | -9999. |
| 241000 | 271 | 274 | -58.4 | .2770-01 | .4494-01 | -9999. |
| 242000 | 270 | 273 | -60.0 | .2640-01 | .4314-01 | -9999. |
| 243000 | 266 | 271 | -60.5 | .2510-01 | .4112-01 | -9999. |
| 244000 | 263 | 270 | -61.2 | .2400-01 | .3944-01 | -9999. |
| 245000 | 260 | 268 | -62.5 | .2280-01 | .3771-01 | -9999. |
| 246000 | 256 | 267 | -63.2 | .2180-01 | .3616-01 | -9999. |
| 247000 | 251 | 265 | -64.2 | .2070-01 | .3450-01 | -9999. |
| 248000 | 248 | 263 | -65.1 | .1980-01 | .3315-01 | -9999. |
| 249000 | 244 | 261 | -65.6 | .1880-01 | .3156-01 | -9999. |
| 250000 | 241 | 258 | -66.2 | .1790-01 | .3012-01 | -9999. |
| 251000 | 236 | 256 | -67.2 | .1710-01 | .2892-01 | -9999. |
| 252000 | 233 | 254 | -67.2 | .1620-01 | .2760-01 | -9999. |
| 253000 | 229 | 251 | -68.2 | .1550-01 | .2634-01 | -9999. |
| 254000 | 228 | 249 | -68.1 | .1470-01 | .2497-01 | -9999. |
| 255000 | 224 | 247 | -67.2 | .1400-01 | .2368-01 | -9999. |
| 256000 | 221 | 244 | -67.2 | .1330-01 | .2249-01 | -9999. |
| 257000 | 219 | 242 | -67.2 | .1270-01 | .2148-01 | -9999. |
| 258000 | 216 | 247 | -67.2 | .1210-01 | .2046-01 | -9999. |
| 259000 | 214 | 238 | -67.9 | .1150-01 | .1952-01 | -9999. |
| 260000 | 212 | 236 | -68.4 | .1090-01 | .1854-01 | -9999. |
| 261000 | 211 | 235 | -69.9 | .1040-01 | .1763-01 | -9999. |
| 262000 | 209 | 233 | -70.4 | .9900-02 | .1701-01 | -9999. |
| 263000 | 206 | 232 | -71.7 | .9400-02 | .1625-01 | -9999. |
| 264000 | 204 | 231 | -72.5 | .8900-02 | .1545-01 | -9999. |
| 265000 | 200 | 230 | -73.2 | .8500-02 | .1491-01 | -9999. |
| 266000 | 187 | 229 | -73.5 | .8136-02 | .1417-01 | -9999. |
| 267000 | 175 | 228 | -73.9 | .7788-02 | .1357-01 | -9999. |
| 268000 | 162 | 227 | -74.2 | .7455-02 | .1298-01 | -9999. |
| 269000 | 150 | 226 | -74.6 | .7135-02 | .1243-01 | -9999. |
| 270000 | 137 | 225 | -74.9 | .6830-02 | .1190-01 | -9999. |
| 271000 | 125 | 223 | -75.3 | .6538-02 | .1139-01 | -9999. |
| 272000 | 113 | 222 | -75.6 | .6258-02 | .1090-01 | -9999. |
| 273000 | 101 | 219 | -76.0 | .5990-02 | .1043-01 | -9999. |
| 274000 | 89 | 216 | -76.3 | .5734-02 | .9987-02 | -9999. |
| 275000 | 77 | 213 | -76.7 | .5488-02 | .9560-02 | -9999. |
| 276000 | 66 | 208 | -77.0 | .5253-02 | .9150-02 | -9999. |
| 277000 | 55 | 201 | -77.4 | .5028-02 | .8759-02 | -9999. |
| 278000 | 46 | 191 | -77.7 | .4813-02 | .8384-02 | -9999. |
| 279000 | 33 | 177 | -78.1 | .4607-02 | .8025-02 | -9999. |
| 280000 | 35 | 159 | -78.4 | .4410-02 | .7682-02 | -9999. |
| 283000 | 25 | 135 | -79.4 | .3770-02 | .6780-02 | -9999. |
| 285000 | 23 | 99 | -80.3 | .3270-02 | .5820-02 | -9999. |
| 289000 | 30 | 369 | -81.2 | .2750-02 | .5000-02 | -9999. |
| 292000 | 42 | 353 | -82.1 | .2350-02 | .4300-02 | -9999. |
| 295000 | 56 | 349 | -83.0 | .2010-02 | .3690-02 | -9999. |
| 298000 | 46 | 341 | -82.2 | .1620-02 | .2950-02 | -9999. |

TABLE 4. (Concluded)

| ALTIUDE (FT) | WIND SPEED (FT/SEC) | WIND DIRECTION (DEG) | TEMPERATURE (DEG C) | PRESSURE (MILLIBARS) | DENSITY (GRAM/CM ³) | DEW POINT (DEG C) |
|-----------------|------------------------|-------------------------|------------------------|-------------------------|------------------------------------|----------------------|
| 301200 | 033 | 036 | -81.1 | .1180-02 | .2490-02 | -9999. |
| 304000 | 021 | 022 | -79.9 | .1180-02 | .2110-02 | -9999. |
| 307000 | 012 | 335 | -78.7 | .1010-02 | .1780-02 | -9999. |
| 310000 | 021 | 281 | -77.5 | .8570-03 | .1510-02 | -9999. |
| 313000 | 030 | 269 | -76.1 | .7350-03 | .1280-02 | -9999. |
| 316000 | 028 | 269 | -74.3 | .6330-03 | .1090-02 | -9999. |
| 319000 | 025 | 268 | -72.4 | .5450-03 | .9280-03 | -9999. |
| 322000 | 020 | 267 | -70.6 | .4700-03 | .7890-03 | -9999. |
| 325000 | 013 | 263 | -68.8 | .4050-03 | .6720-03 | -9999. |
| 329000 | 003 | 233 | -66.9 | .3480-03 | .5720-03 | -9999. |
| 331000 | 002 | 234 | -64.0 | .3010-03 | .4860-03 | -9999. |
| 334000 | 003 | 220 | -61.1 | .2610-03 | .4140-03 | -9999. |
| 337000 | 004 | 206 | -58.1 | .2260-03 | .3520-03 | -9999. |
| 340000 | 005 | 194 | -55.2 | .1950-03 | .3000-03 | -9999. |
| 343000 | 007 | 185 | -52.2 | .1690-03 | .2550-03 | -9999. |
| 346000 | 004 | 166 | -48.2 | .1470-03 | .2180-03 | -9999. |
| 349000 | 008 | 146 | -43.2 | .1290-03 | .1860-03 | -9999. |
| 352000 | 012 | 135 | -38.1 | .1130-03 | .1600-03 | -9999. |
| 355000 | 019 | 129 | -33.1 | .9900-04 | .1370-03 | -9999. |
| 358000 | 027 | 126 | -28.0 | .8680-04 | .1170-03 | -9999. |
| 351000 | 033 | 117 | -22.9 | .7600-04 | .1000-03 | -9999. |
| 364000 | 036 | 112 | -15.7 | .6820-04 | .8700-04 | -9999. |
| 357000 | 040 | 116 | -8.5 | .6110-04 | .7570-04 | -9999. |
| 370000 | 045 | 122 | -1.2 | .5470-04 | .6580-04 | -9999. |
| 373000 | 050 | 127 | 6.0 | .4900-04 | .5720-04 | -9999. |
| 376000 | 057 | 133 | 13.3 | .4380-04 | .4970-04 | -9999. |
| 379000 | 047 | 118 | 21.3 | .3950-04 | .4350-04 | -9999. |
| 382000 | 046 | 122 | 30.3 | .3600-04 | .3830-04 | -9999. |
| 385000 | 046 | 126 | 39.7 | .3290-04 | .3390-04 | -9999. |
| 388000 | 047 | 130 | 49.2 | .3010-04 | .3000-04 | -9999. |
| 391000 | 047 | 134 | 59.1 | .2770-04 | .2670-04 | -9999. |
| 394000 | 049 | 138 | 69.1 | .2550-04 | .2380-04 | -9999. |
| 397000 | 050 | 142 | 79.4 | .2360-04 | .2130-04 | -9999. |
| 400000 | 052 | 146 | 89.8 | .2190-04 | .1910-04 | -9999. |

TABLE 5. STS-11 FINAL SRB DESCENT METEOROLOGICAL DATA TAPE

| ALTITUDE (FT) | WIND SPEED (FT/SEC) | WIND DIRECTION (DEG) | TEMPERATURE (DEG C) | PRESSURE (MILLIBARS) | DENSITY (GRAM/M3) | DEW POINT (DEG C) |
|------------------|------------------------|-------------------------|------------------------|-------------------------|----------------------|----------------------|
| 00000 | 045 | 161 | 21.9 | .1017+04 | .1197+04 | 14.4 |
| 00020 | 330 | 723 | 18.9 | .9843+03 | .1166+04 | 16.2 |
| 00040 | 373 | 705 | 15.6 | .9499+03 | .1138+04 | 15.3 |
| 00060 | 039 | 120 | 13.1 | .9164+03 | .1110+04 | 9.3 |
| 00080 | 042 | 133 | 12.1 | .8838+03 | .1075+04 | 5.8 |
| 00100 | 126 | 147 | 11.5 | .8523+03 | .1039+04 | 6.3 |
| 00120 | 015 | 174 | 8.6 | .8217+03 | .1011+04 | 6.9 |
| 00140 | 016 | 203 | 5.7 | .7920+03 | .9851+03 | 5.7 |
| 00160 | 317 | 246 | 4.6 | .7631+03 | .9537+03 | 2.4 |
| 00180 | 025 | 287 | 2.7 | .7351+03 | .9254+03 | .3 |
| 00200 | 029 | 292 | 1.4 | .7079+03 | .8965+03 | -6.4 |
| 00220 | 021 | 234 | .3 | .6816+03 | .8686+03 | -9.2 |
| 00240 | 014 | 281 | -2.0 | .6562+03 | .8414+03 | -8.1 |
| 00260 | 016 | 278 | -3.6 | .6315+03 | .8150+03 | -12.9 |
| 00280 | 027 | 280 | -5.1 | .6076+03 | .7887+03 | -14.5 |
| 00300 | 338 | 287 | -6.3 | .5845+03 | .7622+03 | -15.8 |
| 00320 | 044 | 272 | -7.0 | .5622+03 | .7354+03 | -21.6 |
| 00340 | 046 | 293 | -8.7 | .5407+03 | .7119+03 | -27.1 |
| 00360 | 051 | 297 | -11.3 | .5198+03 | .6912+03 | -29.2 |
| 00380 | 056 | 297 | -13.2 | .4995+03 | .6692+03 | -30.5 |
| 00400 | 358 | 288 | -15.2 | .4799+03 | .6479+03 | -32.3 |
| 00420 | 079 | 274 | -17.7 | .4609+03 | .6284+03 | -33.9 |
| 00440 | 058 | 261 | -20.3 | .4425+03 | .6095+03 | -36.0 |
| 00460 | 055 | 247 | -21.1 | .4247+03 | .5869+03 | -37.6 |
| 00480 | 052 | 252 | -23.8 | .4075+03 | .5692+03 | -39.6 |
| 00500 | 058 | 275 | -27.3 | .3908+03 | .5537+03 | -41.7 |
| 00520 | 068 | 279 | -29.4 | .3746+03 | .5393+03 | -41.7 |
| 00540 | 076 | 281 | -31.5 | .3589+03 | .5173+03 | -39.3 |
| 00560 | 089 | 289 | -33.2 | .3438+03 | .4990+03 | -39.5 |
| 00580 | 020 | 292 | -35.3 | .3292+03 | .4821+03 | -44.5 |
| 00600 | 097 | 295 | -38.2 | .3151+03 | .4671+03 | -48.6 |
| 00620 | 079 | 296 | -39.3 | .3014+03 | .4490+03 | -49.4 |
| 00640 | 100 | 275 | -41.1 | .2883+03 | .4329+03 | -50.3 |
| 00660 | 114 | 297 | -43.5 | .2757+03 | .4182+03 | -51.9 |
| 00680 | 175 | 303 | -47.1 | .2635+03 | .4060+03 | -54.9 |
| 00700 | 150 | 307 | -47.5 | .2516+03 | .3885+03 | -55.2 |
| 00720 | 166 | 306 | -51.3 | .2403+03 | .3733+03 | -58.5 |
| 00740 | 146 | 304 | -53.4 | .2293+03 | .3634+03 | -60.3 |
| 00760 | 115 | 294 | -55.3 | .2187+03 | .3497+03 | -62.0 |
| 00780 | 103 | 277 | -57.7 | .2085+03 | .3371+03 | -64.1 |
| 00800 | 107 | 292 | -60.3 | .1986+03 | .3251+03 | -69.9 |
| 00820 | 106 | 247 | -62.1 | .1891+03 | .3122+03 | -69.9 |
| 00840 | 099 | 289 | -60.1 | .1801+03 | .2946+03 | -69.9 |
| 00860 | 091 | 284 | -58.1 | .1716+03 | .2781+03 | -69.9 |
| 00880 | 085 | 280 | -57.8 | .1636+03 | .2646+03 | -69.9 |
| 00900 | 070 | 277 | -59.0 | .1559+03 | .2536+03 | -69.9 |
| 00920 | 080 | 271 | -60.2 | .1485+03 | .2470+03 | -69.9 |
| 00940 | 087 | 262 | -60.3 | .1415+03 | .2315+03 | -69.9 |
| 00960 | 096 | 275 | -61.5 | .1347+03 | .2218+03 | -69.9 |
| 00980 | 084 | 280 | -62.4 | .1283+03 | .2121+03 | -69.9 |

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TABLE 5. (Continued)

| ALTI-UDC (FT) | WIND SPED (FT/SEC) | WIND DIRECTION (DEG) | TEMPERATURE (DEG C) | PRESSURE (MILLIBARS) | DENSITY (GRAM/M3) | DEW POINT (DEG C) |
|------------------|-----------------------|-------------------------|------------------------|-------------------------|----------------------|----------------------|
| 050000 | 047 | 271 | -63.4 | .1221+03 | .2029+03 | -9999. |
| 051000 | 081 | 279 | -64.2 | .1162+03 | .1933+03 | -9999. |
| 052000 | 091 | 271 | -65.0 | .1106+03 | .1852+03 | -9999. |
| 053000 | 095 | 262 | -65.9 | .1053+03 | .1769+03 | -9999. |
| 054000 | 092 | 260 | -65.9 | .1001+03 | .1683+03 | -9999. |
| 055000 | 072 | 266 | -65.0 | .9527+02 | .1594+03 | -9999. |
| 056000 | 066 | 273 | -65.9 | .9064+02 | .1524+03 | -9999. |
| 057000 | 057 | 269 | -66.9 | .8622+02 | .1456+03 | -9999. |
| 058000 | 046 | 260 | -66.6 | .8201+02 | .1383+03 | -9999. |
| 059000 | 119 | 259 | -63.5 | .7804+02 | .1297+03 | -9999. |
| 060000 | 035 | 268 | -62.2 | .7430+02 | .1227+03 | -9999. |
| 061000 | 070 | 275 | -61.8 | .7075+02 | .1166+03 | -9999. |
| 062000 | 024 | 272 | -60.8 | .6738+02 | .1105+03 | -9999. |
| 063000 | 017 | 253 | -59.6 | .6419+02 | .1047+03 | -9999. |
| 064000 | 012 | 237 | -50.2 | .6115+02 | .1000+03 | -9999. |
| 065000 | 108 | 289 | -59.8 | .5826+02 | .9513+02 | -9999. |
| 066000 | 013 | 326 | -58.0 | .5552+02 | .8990+02 | -9999. |
| 067000 | 010 | 332 | -57.4 | .5292+02 | .8545+02 | -9999. |
| 068000 | 006 | 009 | -58.7 | .5044+02 | .8194+02 | -9999. |
| 069000 | 011 | 028 | -58.1 | .4807+02 | .7787+02 | -9999. |
| 070000 | 013 | 045 | -56.4 | .4563+02 | .7366+02 | -9999. |
| 071000 | 011 | 083 | -54.8 | .4371+02 | .6974+02 | -9999. |
| 072000 | 011 | 093 | -54.8 | .4169+02 | .6651+02 | -9999. |
| 073000 | 011 | 068 | -54.2 | .3977+02 | .6328+02 | -9999. |
| 074000 | 012 | 038 | -53.4 | .3794+02 | .6015+02 | -9999. |
| 075000 | 012 | 029 | -52.9 | .3620+02 | .5726+02 | -9999. |
| 076000 | 010 | 042 | -52.5 | .3455+02 | .5455+02 | -9999. |
| 077000 | 010 | 022 | -52.3 | .3297+02 | .5201+02 | -9999. |
| 078000 | 009 | 012 | -52.3 | .3146+02 | .4962+02 | -9999. |
| 079000 | 008 | 355 | -52.1 | .3003+02 | .4733+02 | -9999. |
| 080000 | 012 | 340 | -51.7 | .2866+02 | .4503+02 | -9999. |
| 081000 | 021 | 335 | -51.7 | .2736+02 | .4304+02 | -9999. |
| 082000 | 023 | 330 | -52.4 | .2611+02 | .4120+02 | -9999. |
| 083000 | 017 | 346 | -52.0 | .2492+02 | .3926+02 | -9999. |
| 084000 | 012 | 321 | -51.3 | .2379+02 | .3736+02 | -9999. |
| 085000 | 009 | 344 | -50.6 | .2271+02 | .3555+02 | -9999. |
| 086000 | 009 | 019 | -49.9 | .2168+02 | .3383+02 | -9999. |
| 087000 | 012 | 038 | -49.3 | .2071+02 | .3223+02 | -9999. |
| 088000 | 014 | 029 | -48.7 | .1978+02 | .3070+02 | -9999. |
| 089000 | 020 | 012 | -48.7 | .1889+02 | .2932+02 | -9999. |
| 090000 | 024 | 359 | -48.0 | .1804+02 | .2791+02 | -9999. |
| 091000 | 025 | 341 | -47.2 | .1744+02 | .2658+02 | -9999. |
| 092000 | 024 | 311 | -47.4 | .1697+02 | .2542+02 | -9999. |
| 093000 | 027 | 292 | -47.0 | .1574+02 | .2425+02 | -9999. |
| 094000 | 033 | 280 | -46.6 | .1501+02 | .2311+02 | -9999. |
| 095000 | 047 | 261 | -45.8 | .1437+02 | .2202+02 | -9999. |
| 096000 | 056 | 251 | -45.9 | .1366+02 | .2097+02 | -9999. |
| 097000 | 063 | 245 | -45.6 | .1303+02 | .1995+02 | -9999. |
| 098000 | 067 | 241 | -45.1 | .1240+02 | .1894+02 | -9999. |
| 099000 | 065 | 226 | -44.6 | .1181+02 | .1800+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) |
|------------------|------------------------|-------------------------|------------------------|-------------------------|----------------------|----------------------|
| 10200 | 067 | 231 | -43.2 | .1124+02 | .1711+02 | -9999. |
| 10100 | 065 | 238 | -43.8 | .1070+02 | .1626+02 | -9999. |
| 10200 | 069 | 246 | -44.4 | .1019+02 | .1552+02 | -9999. |
| 10300 | 060 | 255 | -45.5 | .9740+01 | .1491+02 | -9999. |
| 10400 | 067 | 261 | -45.6 | .9309+01 | .1425+02 | -9999. |
| 10500 | 070 | 265 | -44.9 | .8899+01 | .1358+02 | -9999. |
| 10600 | 072 | 270 | -43.7 | .8508+01 | .1291+02 | -9999. |
| 10700 | 072 | 277 | -41.7 | .8136+01 | .1224+02 | -9999. |
| 10800 | 072 | 285 | -39.5 | .7784+01 | .1160+02 | -9999. |
| 10900 | 070 | 293 | -37.6 | .7451+01 | .1102+02 | -9999. |
| 11000 | 065 | 301 | -36.0 | .7133+01 | .1048+02 | -9999. |
| 11100 | 059 | 304 | -34.6 | .6831+01 | .9977+01 | -9999. |
| 11200 | 052 | 302 | -34.3 | .6543+01 | .9542+01 | -9999. |
| 11300 | 045 | 294 | -34.8 | .6267+01 | .9162+01 | -9999. |
| 11400 | 042 | 283 | -35.5 | .6002+01 | .8800+01 | -9999. |
| 11500 | 040 | 274 | -36.2 | .5748+01 | .8452+01 | -9999. |
| 11600 | 042 | 268 | -36.8 | .5504+01 | .8113+01 | -9999. |
| 11700 | 038 | 268 | -36.9 | .5269+01 | .7771+01 | -9999. |
| 11800 | 033 | 271 | -36.9 | .5045+01 | .7438+01 | -9999. |
| 11900 | 028 | 263 | -36.9 | .4830+01 | .7121+01 | -9999. |
| 12000 | 027 | 246 | -35.7 | .4625+01 | .6785+01 | -9999. |
| 12100 | 035 | 233 | -21.9 | .4431+01 | .6399+01 | -9999. |
| 12200 | 043 | 233 | -28.1 | .4248+01 | .6040+01 | -9999. |
| 12300 | 048 | 233 | -25.5 | .4074+01 | .5732+01 | -9999. |
| 12400 | 050 | 232 | -23.8 | .3909+01 | .5461+01 | -9999. |
| 12500 | 052 | 232 | -22.5 | .3752+01 | .5214+01 | -9999. |
| 12600 | 055 | 241 | -22.4 | .3602+01 | .5003+01 | -9999. |
| 12700 | 064 | 252 | -21.3 | .3457+01 | .4783+01 | -9999. |
| 12800 | 076 | 257 | -19.0 | .3320+01 | .4551+01 | -9999. |
| 12900 | 084 | 260 | -16.8 | .3189+01 | .4334+01 | -9999. |
| 13000 | 087 | 260 | -14.6 | .3064+01 | .4129+01 | -9999. |
| 13100 | 089 | 257 | -12.6 | .2945+01 | .3938+01 | -9999. |
| 13200 | 089 | 252 | -10.6 | .2832+01 | .3758+01 | -9999. |
| 13300 | 092 | 248 | -8.7 | .2724+01 | .3589+01 | -9999. |
| 13400 | 097 | 246 | -7.7 | .2620+01 | .3439+01 | -9999. |
| 13500 | 101 | 248 | -7.8 | .2521+01 | .3309+01 | -9999. |
| 13600 | 106 | 252 | -8.1 | .2426+01 | .3188+01 | -9999. |
| 13700 | 109 | 253 | -8.6 | .2333+01 | .3072+01 | -9999. |
| 13800 | 111 | 256 | -9.0 | .2245+01 | .2960+01 | -9999. |
| 13900 | 114 | 259 | -9.5 | .2159+01 | .2852+01 | -9999. |
| 14000 | 119 | 261 | -8.8 | .2077+01 | .2737+01 | -9999. |
| 14100 | 124 | 261 | -5.7 | .1998+01 | .2603+01 | -9999. |
| 14200 | 128 | 258 | -4 | .1924+01 | .2457+01 | -9999. |
| 14300 | 131 | 258 | 3.2 | .1853+01 | .2336+01 | -9999. |
| 14400 | 135 | 258 | 5.7 | .1786+01 | .2231+01 | -9999. |
| 14500 | 136 | 260 | 7.4 | .1722+01 | .2138+01 | -9999. |
| 14600 | 138 | 260 | 8.6 | .1660+01 | .2053+01 | -9999. |
| 14700 | 138 | 259 | 8.6 | .1601+01 | .1979+01 | -9999. |
| 14800 | 136 | 257 | 8.0 | .1544+01 | .1913+01 | -9999. |
| 14900 | 136 | 255 | 6.8 | .1488+01 | .1852+01 | -9999. |

TABLE 5. (Continued)

| ALTITUDE (FT) | WIND SPEED (FT/S) | WIND DIRECTION (DEG) | TEMPERATURE (DEG F) | PRESSURE (MILLIBARS) | DENSITY (GRAM/M3) | DEW POINT (DEG C) |
|------------------|----------------------|-------------------------|------------------------|-------------------------|----------------------|----------------------|
| 15000 | 136 | 251 | 5.7 | .1435+01 | .1735+01 | -9999. |
| 15100 | 136 | 247 | 4.5 | .1383+01 | .1679+01 | -9999. |
| 15200 | 141 | 239 | 3.3 | .1333+01 | .1625+01 | -9999. |
| 15300 | 148 | 232 | 2.2 | .1284+01 | .1572+01 | -9999. |
| 15400 | 155 | 227 | 1.0 | .1237+01 | .1520+01 | -9999. |
| 15500 | 160 | 226 | -1.1 | .1192+01 | .1470+01 | -9999. |
| 15600 | 162 | 227 | -1.2 | .1148+01 | .1421+01 | -9999. |
| 15700 | 162 | 229 | -2.3 | .1105+01 | .1374+01 | -9999. |
| 15800 | 160 | 232 | -3.3 | .1064+01 | .1328+01 | -9999. |
| 15900 | 158 | 236 | -4.4 | .1025+01 | .1283+01 | -9999. |
| 16000 | 155 | 240 | -5.5 | .9862+00 | .1240+01 | -9999. |
| 16100 | 153 | 244 | -6.5 | .9491+00 | .1198+01 | -9999. |
| 16200 | 150 | 250 | -7.5 | .9133+00 | .1157+01 | -9999. |
| 16300 | 145 | 255 | -8.6 | .8788+00 | .1112+01 | -9999. |
| 16400 | 150 | 250 | -9.3 | .8454+00 | .1062+01 | -9999. |
| 16500 | 158 | 250 | -6.4 | .8135+00 | .1023+01 | -9999. |
| 16600 | 167 | 253 | -6.5 | .7829+00 | .9862+00 | -9999. |
| 16700 | 170 | 259 | -7.0 | .7534+00 | .9513+00 | -9999. |
| 16800 | 168 | 266 | -7.6 | .7250+00 | .9168+00 | -9999. |
| 16900 | 170 | 274 | -8.1 | .6976+00 | .8841+00 | -9999. |
| 17000 | 173 | 274 | -8.7 | .6712+00 | .8524+00 | -9999. |
| 17100 | 177 | 266 | -9.3 | .6457+00 | .8168+00 | -9999. |
| 17200 | 187 | 261 | -8.1 | .6212+00 | .7802+00 | -9999. |
| 17300 | 200 | 258 | -6.2 | .5978+00 | .7458+00 | -9999. |
| 17400 | 209 | 255 | -4.4 | .5754+00 | .7135+00 | -9999. |
| 17500 | 211 | 252 | -2.7 | .5540+00 | .6847+00 | -9999. |
| 17600 | 207 | 254 | -1.7 | .5335+00 | .6585+00 | -9999. |
| 17700 | 200 | 256 | -1.4 | .5138+00 | .6339+00 | -9999. |
| 17800 | 190 | 260 | -1.2 | .4948+00 | .6099+00 | -9999. |
| 17900 | 180 | 263 | -1.9 | .4766+00 | .5866+00 | -9999. |
| 18000 | 172 | 265 | -3.5 | .4591+00 | .5670+00 | -9999. |
| 18100 | 167 | 267 | -1.5 | .4422+00 | .5493+00 | -9999. |
| 18200 | 163 | 270 | -3.1 | .4258+00 | .5321+00 | -9999. |
| 18300 | 162 | 272 | -4.8 | .4099+00 | .5156+00 | -9999. |
| 18400 | 163 | 272 | -6.5 | .3946+00 | .4993+00 | -9999. |
| 18500 | 163 | 264 | -8.2 | .3797+00 | .4832+00 | -9999. |
| 18600 | 163 | 263 | -9.8 | .3653+00 | .4678+00 | -9999. |
| 18700 | 158 | 257 | -11.5 | .3514+00 | .4527+00 | -9999. |
| 18800 | 158 | 252 | -13.1 | .3379+00 | .4380+00 | -9999. |
| 18900 | 157 | 249 | -14.7 | .3249+00 | .4234+00 | -9999. |
| 19000 | 158 | 248 | -16.3 | .3122+00 | .4095+00 | -9999. |
| 19100 | 160 | 244 | -18.0 | .3000+00 | .3957+00 | -9999. |
| 19200 | 163 | 251 | -17.4 | .2882+00 | .3825+00 | -9999. |
| 19300 | 167 | 251 | -21.1 | .2768+00 | .3697+00 | -9999. |
| 19400 | 158 | 253 | -22.7 | .2658+00 | .3574+00 | -9999. |
| 19500 | 172 | 251 | -24.4 | .2552+00 | .3453+00 | -9999. |
| 19600 | 172 | 250 | -26.1 | .2449+00 | .3324+00 | -9999. |
| 19700 | 172 | 245 | -26.8 | .2350+00 | .3244+00 | -9999. |
| 19800 | 179 | 241 | -26.6 | .2224+00 | .3143+00 | -9999. |
| 19900 | 190 | 237 | -26.2 | .2105+00 | .2969+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) |
|------------------|------------------------|-------------------------|------------------------|-------------------------|----------------------|----------------------|
| 20000 | 206 | 236 | -26.1 | .1992+00 | .2809+00 | -9999. |
| 20100 | 229 | 234 | -25.8 | .1866+00 | .2667+00 | -9999. |
| 20200 | 263 | 234 | -31.3 | .1785+00 | .2571+00 | -9999. |
| 20300 | 263 | 236 | -30.8 | .1689+00 | .2428+00 | -9999. |
| 20400 | 266 | 239 | -31.1 | .1599+00 | .2301+00 | -9999. |
| 20500 | 268 | 243 | -31.2 | .1513+00 | .2179+00 | -9999. |
| 20600 | 270 | 245 | -34.1 | .1432+00 | .2086+00 | -9999. |
| 20700 | 271 | 257 | -36.9 | .1372+00 | .2023+00 | -9999. |
| 20800 | 273 | 254 | -39.1 | .1314+00 | .1956+00 | -9999. |
| 20900 | 275 | 257 | -40.7 | .1258+00 | .1885+00 | -9999. |
| 21000 | 276 | 260 | -41.2 | .1204+00 | .1808+00 | -9999. |
| 21100 | 276 | 263 | -41.4 | .1152+00 | .1732+00 | -9999. |
| 21200 | 276 | 265 | -42.2 | .1103+00 | .1658+00 | -9999. |
| 21300 | 275 | 268 | -43.8 | .1055+00 | .1602+00 | -9999. |
| 21400 | 273 | 270 | -45.3 | .1009+00 | .1543+00 | -9999. |
| 21500 | 271 | 272 | -46.5 | .9650-01 | .1483+00 | -9999. |
| 21600 | 268 | 272 | -48.3 | .9220-01 | .1429+00 | -9999. |
| 21700 | 263 | 272 | -49.2 | .8810-01 | .1370+00 | -9999. |
| 21800 | 260 | 272 | -50.2 | .8420-01 | .1315+00 | -9999. |
| 21900 | 256 | 271 | -51.9 | .8040-01 | .1266+00 | -9999. |
| 22000 | 255 | 271 | -54.7 | .7680-01 | .1223+00 | -9999. |
| 22100 | 255 | 270 | -58.5 | .7330-01 | .1189+00 | -9999. |
| 22200 | 255 | 262 | -62.1 | .7000-01 | .1156+00 | -9999. |
| 22300 | 256 | 269 | -65.9 | .6650-01 | .1118+00 | -9999. |
| 22400 | 260 | 269 | -69.9 | .6310-01 | .1082+00 | -9999. |
| 22500 | 261 | 269 | -73.0 | .5980-01 | .1041+00 | -9999. |
| 22600 | 265 | 270 | -74.6 | .5680-01 | .9968-01 | -9999. |
| 22700 | 268 | 271 | -74.2 | .5410-01 | .9473-01 | -9999. |
| 22800 | 270 | 272 | -72.7 | .5160-01 | .8967-01 | -9999. |
| 22900 | 271 | 272 | -72.2 | .4910-01 | .8510-01 | -9999. |
| 23000 | 275 | 273 | -70.1 | .4670-01 | .8013-01 | -9999. |
| 23100 | 275 | 274 | -68.1 | .4440-01 | .7542-01 | -9999. |
| 23200 | 276 | 275 | -65.6 | .4230-01 | .7099-01 | -9999. |
| 23300 | 278 | 275 | -63.0 | .4030-01 | .6680-01 | -9999. |
| 23400 | 280 | 276 | -60.2 | .3840-01 | .6282-01 | -9999. |
| 23500 | 280 | 276 | -59.2 | .3670-01 | .5974-01 | -9999. |
| 23600 | 283 | 276 | -58.2 | .3500-01 | .5671-01 | -9999. |
| 23700 | 280 | 276 | -57.2 | .3340-01 | .5387-01 | -9999. |
| 23800 | 278 | 276 | -57.2 | .3190-01 | .5145-01 | -9999. |
| 23900 | 276 | 275 | -57.2 | .3040-01 | .4903-01 | -9999. |
| 24000 | 275 | 275 | -57.9 | .2900-01 | .4694-01 | -9999. |
| 24100 | 271 | 274 | -58.4 | .2770-01 | .4494-01 | -9999. |
| 24200 | 270 | 273 | -60.0 | .2640-01 | .4314-01 | -9999. |
| 24300 | 266 | 271 | -63.5 | .2510-01 | .4112-01 | -9999. |
| 24400 | 263 | 270 | -61.2 | .2400-01 | .3944-01 | -9999. |
| 24500 | 260 | 267 | -62.5 | .2230-01 | .3771-01 | -9999. |
| 24600 | 256 | 267 | -63.2 | .2180-01 | .3616-01 | -9999. |
| 24700 | 251 | 265 | -64.2 | .2070-01 | .3450-01 | -9999. |
| 24800 | 248 | 263 | -65.1 | .1980-01 | .3315-01 | -9999. |
| 24900 | 244 | 261 | -65.6 | .1880-01 | .3156-01 | -9999. |

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TABLE 5. (Continued)

| ALTITUDE (FT) | WIND SPEED (FT/SEC) | WIND DIRECTION (DEG) | TEMPERATURE (DEG C) | PRESSURE (MILLIBARS) | DENSITY (GRAM/M3) | DEW POINT (DEG C) |
|------------------|------------------------|-------------------------|------------------------|-------------------------|----------------------|----------------------|
| 25000 | 241 | 254 | -66.2 | .1790-01 | .3012-01 | -9999. |
| 251000 | 236 | 254 | -67.2 | .1710-01 | .2892-01 | -9999. |
| 252000 | 233 | 254 | -67.2 | .1620-01 | .2740-01 | -9999. |
| 253000 | 229 | 251 | -67.2 | .1550-01 | .2639-01 | -9999. |
| 254000 | 228 | 249 | -68.1 | .1470-01 | .2497-01 | -9999. |
| 255000 | 224 | 224 | -67.2 | .1400-01 | .2368-01 | -9999. |
| 256000 | 221 | 244 | -67.2 | .1330-01 | .2249-01 | -9999. |
| 257000 | 219 | 242 | -67.2 | .1270-01 | .2148-01 | -9999. |
| 258000 | 216 | 240 | -67.2 | .1210-01 | .2046-01 | -9999. |
| 259000 | 214 | 239 | -67.9 | .1150-01 | .1952-01 | -9999. |
| 260000 | 212 | 236 | -68.4 | .1090-01 | .1854-01 | -9999. |
| 261000 | 211 | 235 | -69.9 | .1040-01 | .1793-01 | -9999. |
| 262000 | 209 | 233 | -70.4 | .9900-02 | .1701-01 | -9999. |
| 263000 | 206 | 232 | -71.7 | .9400-02 | .1625-01 | -9999. |
| 264000 | 204 | 231 | -72.5 | .8900-02 | .1545-01 | -9999. |
| 265000 | 200 | 230 | -73.2 | .8500-02 | .1481-01 | -9999. |
| 266000 | 187 | 229 | -73.5 | .8136-02 | .1417-01 | -9999. |
| 267000 | 175 | 228 | -73.9 | .7788-02 | .1357-01 | -9999. |
| 268000 | 162 | 227 | -74.2 | .7455-02 | .1298-01 | -9999. |
| 269000 | 150 | 226 | -74.6 | .7135-02 | .1243-01 | -9999. |
| 270000 | 137 | 225 | -74.9 | .6830-02 | .1190-01 | -9999. |
| 271000 | 125 | 223 | -75.3 | .6538-02 | .1139-01 | -9999. |
| 272000 | 113 | 222 | -75.6 | .6258-02 | .1090-01 | -9999. |
| 273000 | 101 | 219 | -76.0 | .5990-02 | .1043-01 | -9999. |
| 274000 | 089 | 216 | -76.3 | .5734-02 | .9987-02 | -9999. |
| 275000 | 077 | 213 | -76.7 | .5488-02 | .9560-02 | -9999. |
| 276000 | 066 | 208 | -77.0 | .5253-02 | .9150-02 | -9999. |
| 277000 | 055 | 201 | -77.4 | .5028-02 | .8759-02 | -9999. |
| 278000 | 046 | 191 | -77.7 | .4813-02 | .8394-02 | -9999. |
| 279000 | 039 | 177 | -78.1 | .4607-02 | .8025-02 | -9999. |
| 280000 | 035 | 158 | -78.4 | .4410-02 | .7682-02 | -9999. |
| 283000 | 025 | 135 | -79.4 | .3770-02 | .6780-02 | -9999. |
| 286000 | 023 | 099 | -80.3 | .3220-02 | .5820-02 | -9999. |
| 289000 | 030 | 069 | -81.2 | .2750-02 | .5000-02 | -9999. |
| 292000 | 042 | 053 | -82.1 | .2350-02 | .4300-02 | -9999. |
| 295000 | 056 | 044 | -83.0 | .2010-02 | .3690-02 | -9999. |
| 298000 | 046 | 041 | -82.2 | .1620-02 | .2950-02 | -9999. |
| 301000 | 033 | 036 | -81.1 | .1380-02 | .2490-02 | -9999. |
| 304000 | 071 | 022 | -79.9 | .1160-02 | .2110-02 | -9999. |
| 307000 | 012 | 335 | -78.7 | .1010-02 | .1780-02 | -9999. |
| 310000 | 021 | 281 | -77.5 | .9570-03 | .1510-02 | -9999. |
| 313000 | 030 | 269 | -76.1 | .7350-03 | .1280-02 | -9999. |
| 316000 | 028 | 269 | -74.3 | .6330-03 | .1090-02 | -9999. |
| 319000 | 025 | 264 | -72.4 | .5450-03 | .9280-03 | -9999. |
| 322000 | 020 | 267 | -70.6 | .4700-03 | .7890-03 | -9999. |
| 325000 | 013 | 263 | -68.6 | .4050-03 | .6720-03 | -9999. |
| 328000 | 003 | 233 | -66.9 | .3480-03 | .5720-03 | -9999. |
| 331000 | 004 | 234 | -64.0 | .3010-03 | .4860-03 | -9999. |
| 334000 | 003 | 220 | -61.1 | .2610-03 | .4140-03 | -9999. |
| 337000 | 004 | 216 | -58.1 | .2260-03 | .3520-03 | -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) |
|------------------|------------------------|-------------------------|------------------------|-------------------------|----------------------|----------------------|
| 340000 | 005 | 194 | -55.2 | .1950-03 | .3000-03 | -9999. |
| 343000 | 007 | 185 | -52.2 | .1690-03 | .2550-03 | -9999. |
| 346000 | 004 | 166 | -48.2 | .1470-03 | .2180-03 | -9999. |
| 349000 | 008 | 145 | -41.2 | .1290-03 | .1860-03 | -9999. |
| 352000 | 012 | 135 | -38.1 | .1130-03 | .1600-03 | -9999. |
| 355000 | 019 | 129 | -33.1 | .0900-04 | .1370-03 | -9999. |
| 358000 | 027 | 126 | -28.0 | .0680-04 | .1170-03 | -9999. |
| 361000 | 033 | 107 | -22.9 | .7600-04 | .1000-03 | -9999. |
| 364000 | 036 | 112 | -15.7 | .6820-04 | .0700-04 | -9999. |
| 367000 | 040 | 116 | -8.5 | .6110-04 | .7570-04 | -9999. |
| 370000 | 045 | 122 | -1.2 | .5470-04 | .6580-04 | -9999. |
| 373000 | 050 | 127 | 6.0 | .4900-04 | .5720-04 | -9999. |
| 376000 | 057 | 133 | 13.3 | .4380-04 | .4970-04 | -9999. |
| 379000 | 047 | 118 | 21.3 | .3950-04 | .4350-04 | -9999. |
| 382000 | 046 | 122 | 30.3 | .3600-04 | .3830-04 | -9999. |
| 385000 | 046 | 126 | 39.7 | .3290-04 | .3590-04 | -9999. |
| 388000 | 047 | 130 | 49.2 | .3010-04 | .3000-04 | -9999. |
| 391000 | 047 | 134 | 59.1 | .2770-04 | .2670-04 | -9999. |
| 394000 | 049 | 138 | 69.1 | .2550-04 | .2380-04 | -9999. |
| 397000 | 050 | 142 | 79.4 | .2360-04 | .2130-04 | -9999. |
| 400000 | 052 | 146 | 89.8 | .2190-04 | .1910-04 | -9999. |

TABLE 6. STS-11 SRB DESCENT-IMPACT SURFACE SHIP OBSERVATIONS

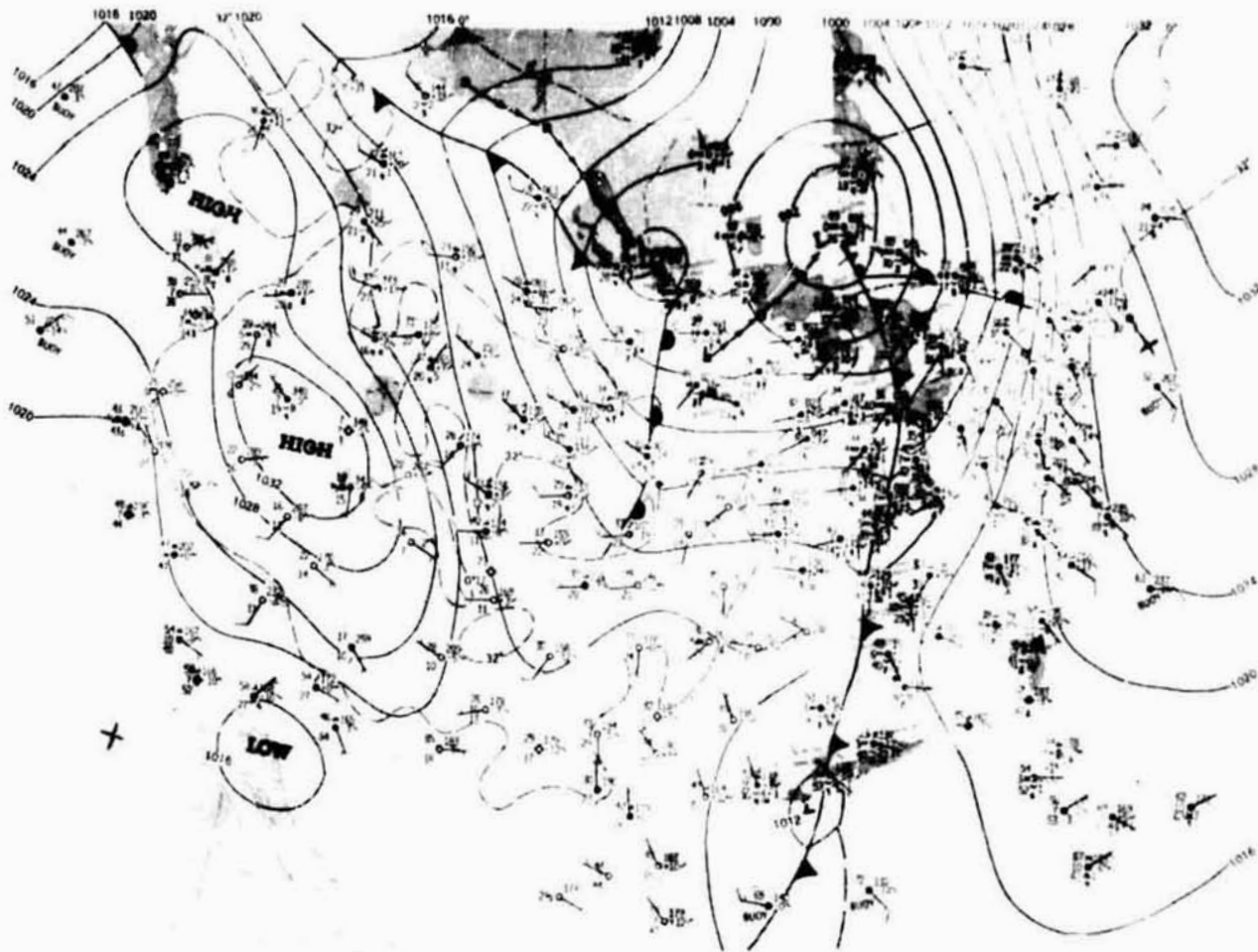
| | | | | | | | |
|-----------------------------|--|------------------------|--|---------------------------|-----------------------|-----------------------|--|
| Site: | U.S.N. Ship Redstone | | | | | | |
| Location: | 29° Latitude | | 78° Longitude | | | | |
| Date: | February 3, 1984 | | | | | | |
| Time: | 1306 UT | | | | | | |
| Surface Observation: | | | | | | | |
| | <u>Air Temp °F</u> | <u>Wet-Bulb °F</u> | <u>Dew Point °F</u> | <u>Pressure (MSL) mb</u> | <u>Wind Direction</u> | <u>Wind Speed Kt.</u> | |
| | 70.2 | 62.5 | 58.0 | 1018.0 | 100° | 27 | |
| Sky Observation: | | | | | | | |
| | <u>Clouds</u> | <u>Total Sky Cover</u> | <u>Total Opaque Sky</u> | <u>Visibility (miles)</u> | | | |
| | 1/10 Cumulus at 2000 ft. 4/10 Stratocumulus at 4000 ft. 1/10 Altocirrus at 10000 ft. | 6/10 | 6/10 | 8 | | | |
| Sea Observation: | | | | | | | |
| | <u>Sea Condition:</u> | <u>Wind Waves:</u> | <u>Swell Conditions:</u> | | | | |
| | Sea Moderate - Code 4 | <u>Freq. Sec.</u> | <u>Dir. from Which Swell is coming</u> | <u>Freq. Sec.</u> | <u>Ht. m.</u> | | |
| | 1/10 Breaking Waves | 4 | 40° | 4 | 2 | | |
| | 1/10 Foam | 2 | | | | | |
| | Surface Sea Water Temp. = 22.2°C (72°F) | | | | | | |

TABLE 7. SELECTED ATMOSPHERIC OBSERVATIONS FOR THE FLIGHT TESTS OF THE SPACE SHUTTLE VEHICLES

| Seq. No. | Vehicle Data | | | | Surface Observations | | | | Inflight Conditions Max. Wind Below 60,000 ft | | | Count Down and Launch Comments of Meteorological Significance | |
|----------|--------------------------|-------------|---------------------------|------------|----------------------------|------------|-------------------|---------------------------------------|--|----------------|------------|---|---|
| | Vehicle No. | Launch Date | Time (EST) Nearest Minute | Launch Pad | Thermodynamic ^a | | Wind ^b | | Alt. (ft) | Speed (ft/sec) | Dir. (deg) | | |
| | | | | | Press: N/cm ² | Temp. (°C) | Rel. Hum. (%) | 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 | Wind directional change observed at Pad just prior to L+0. Onset of sea breeze. |
| 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 | |
| 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 50 | 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-3 Challenger | 8/30/83 | 0232 ^f | 39A | 10.111 | 24 | 97 | 8.8 14.0 | 269 268 | 45,100 | 30 | 349 | |
| 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 (+1-B) Challenger | 2/3/84 | 0800 | 39A | 10.173 | 17 | 75 | 0.0 NA | 0 NA | 38,200 | 143 | 288 | |

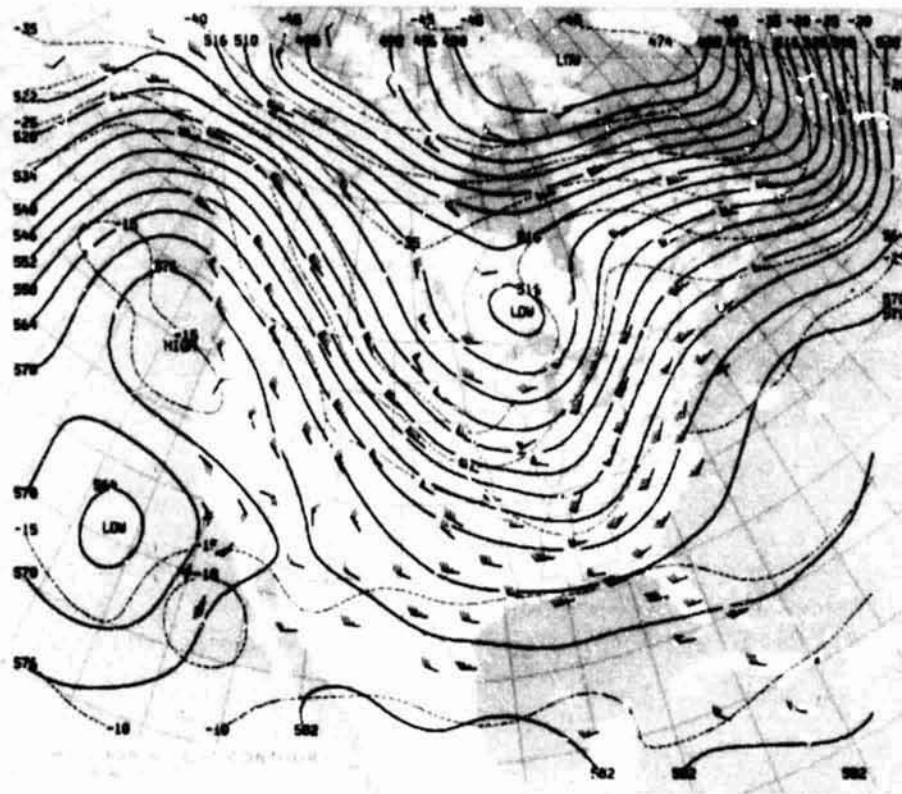
- a. Pad 39A thermodynamic measurements taken at approximately 1.2 m (4 ft) above natural grade at camera site No. 3.
 b. 1 min average prior to L+0 of 60 ft PLP (listed first) and 275 ft FSS winds measured above natural grade.
 c. Pressure measurement applicable to 21 ft above MSL unless otherwise indicated.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

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Surface Synoptic Map at 1200 UT February 3, 1984 - Isobaric, Frontal, and Precipitation Patterns are Shown in Standard Symbolic Form.

Figure 1. Surface synoptic chart 1 hr before launch of STS-11.



500 Millibar Height
Contours at 1200 UT
February 3, 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 prior to launch of STS-11.

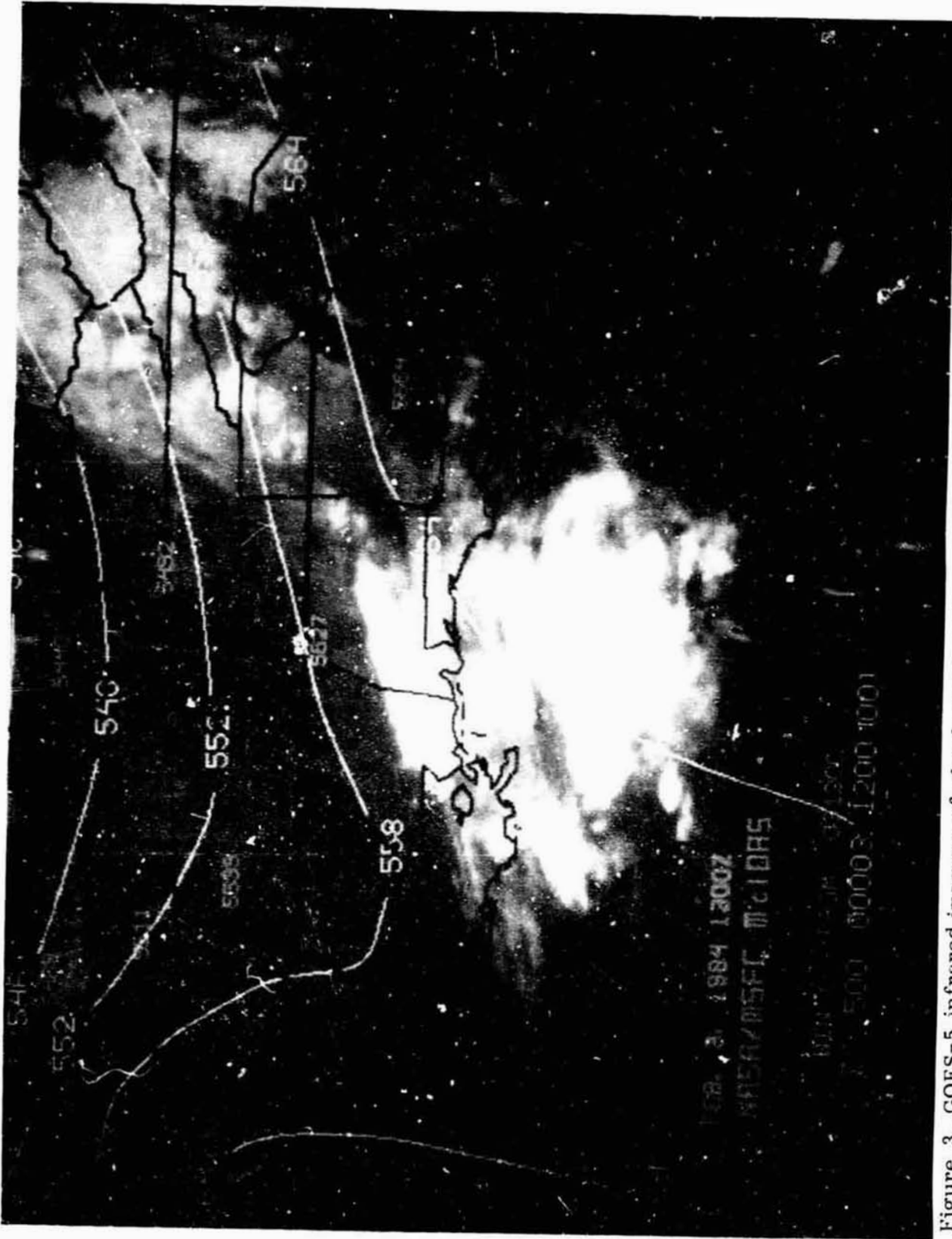


Figure 3. GOES-5 infrared imagery of cloud cover at launch of STS-11 (1300 UT, February 3, 1984).
500-mb contours and wind barbs are also included for 1200 UT.

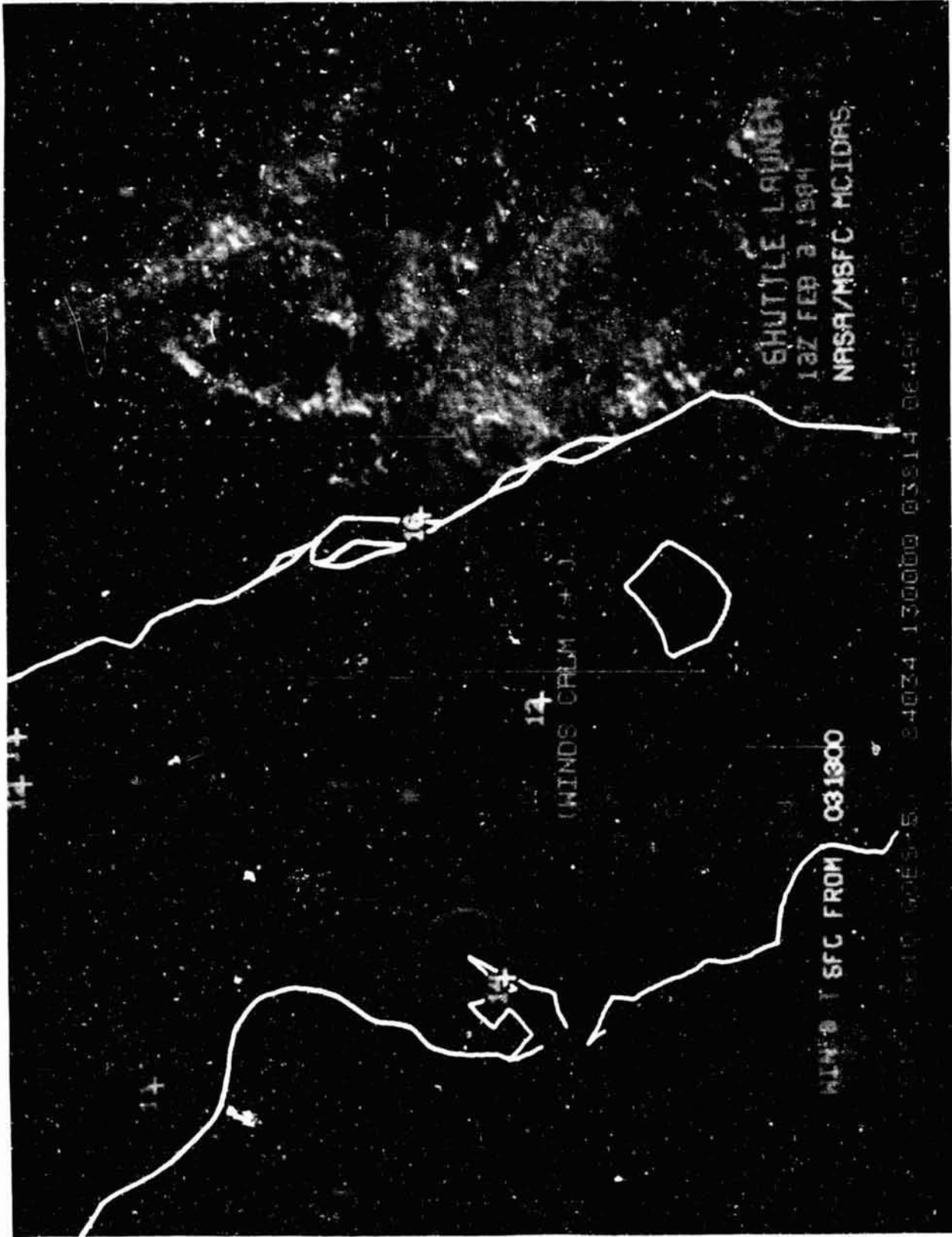


Figure 4. Enlarged view of GOES-5 visible imagery of cloud cover at launch of STS-11 (1300 UT, February 3, 1984). Surface temperatures and wind barbs for 1300 UT are also included.

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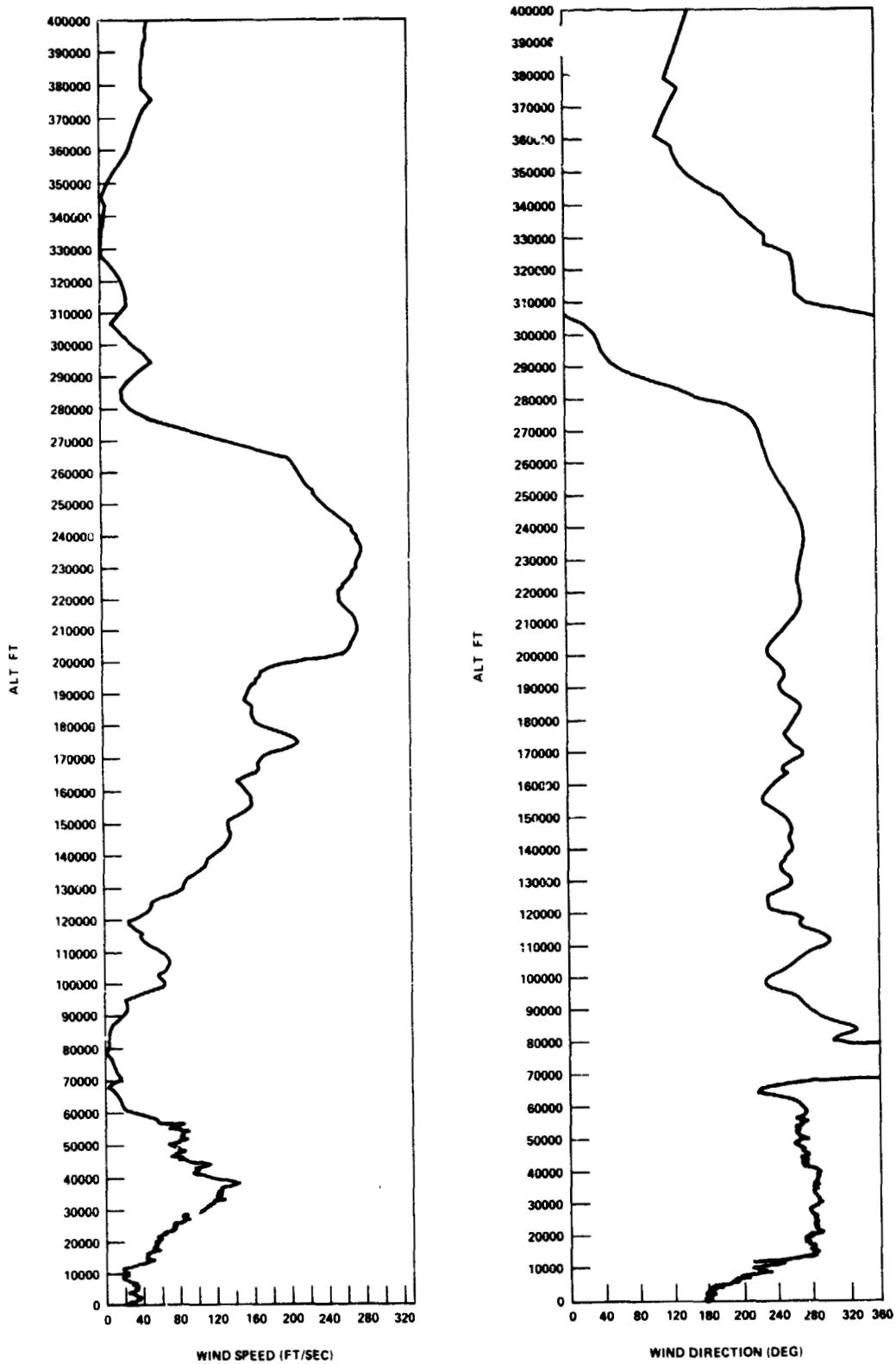


Figure 5. Scalar wind speed and direction at launch time of STS-11.

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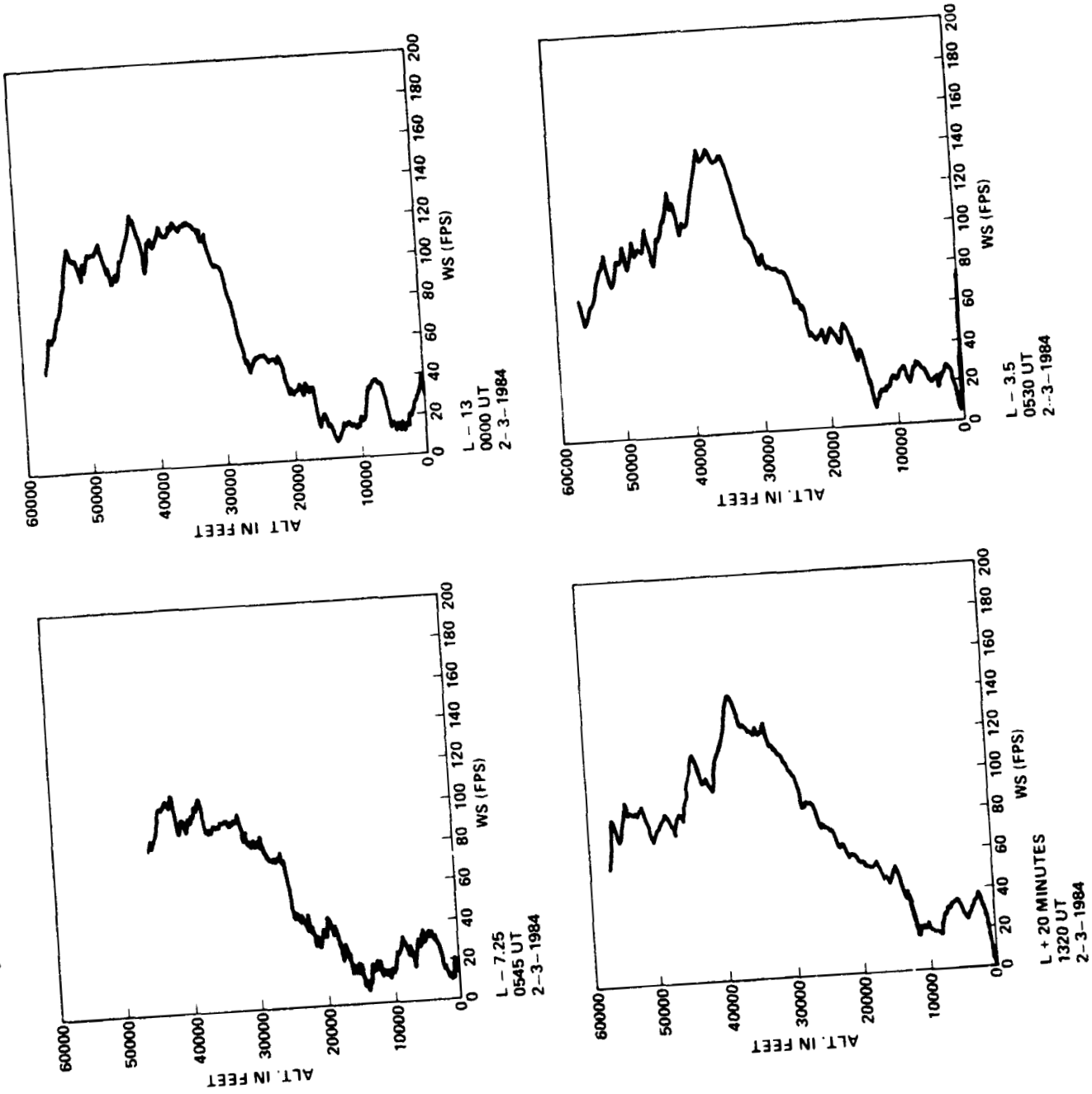


Figure 6. STS-11 prelaunch/launch Jimsphere-measured wind speeds (FPS).

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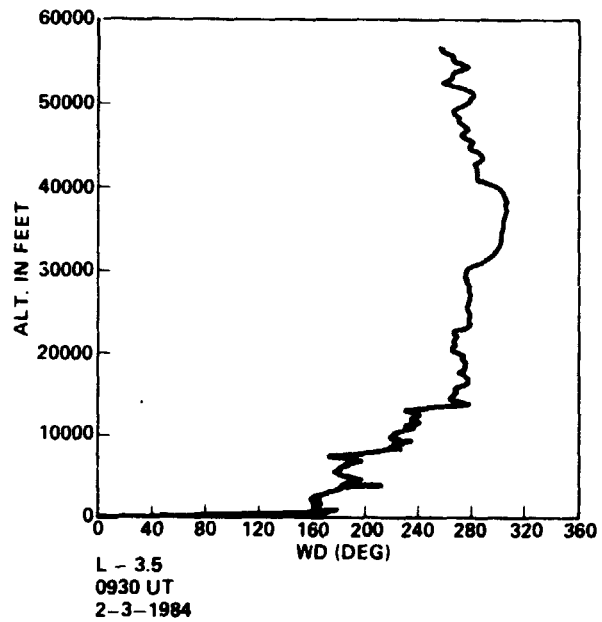
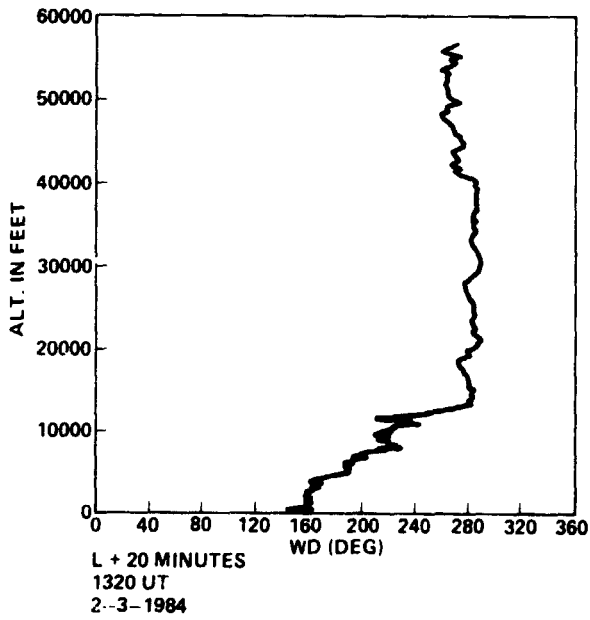
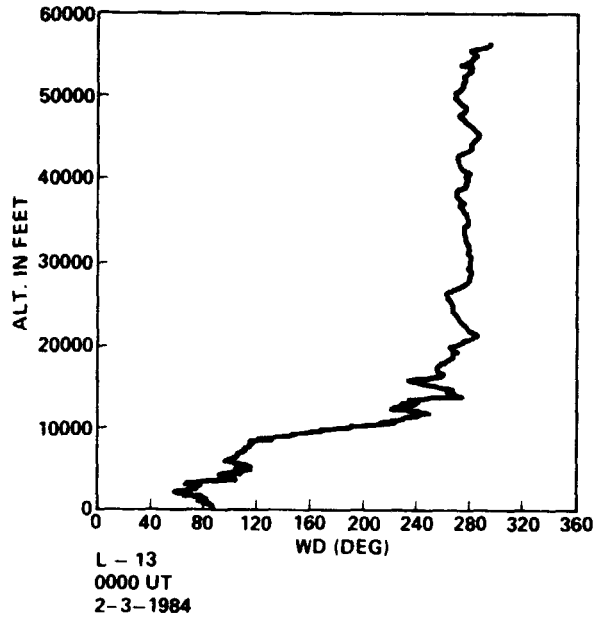
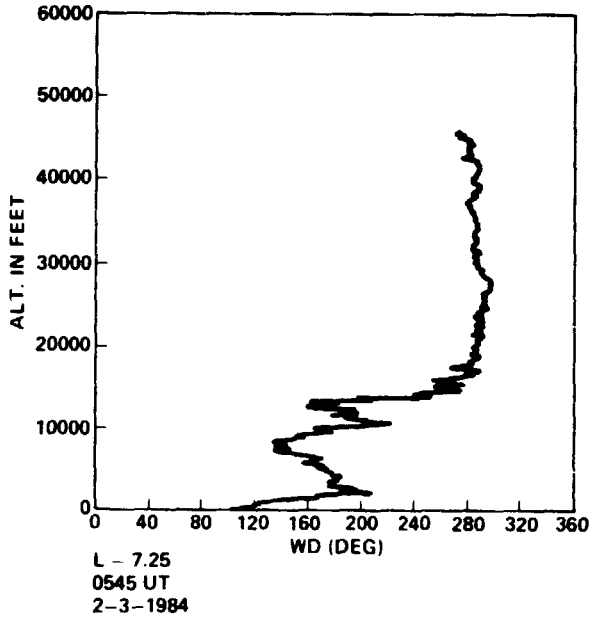


Figure 7. STS-11 prelaunch/launch Jimsphere-measured wind directions (degrees).

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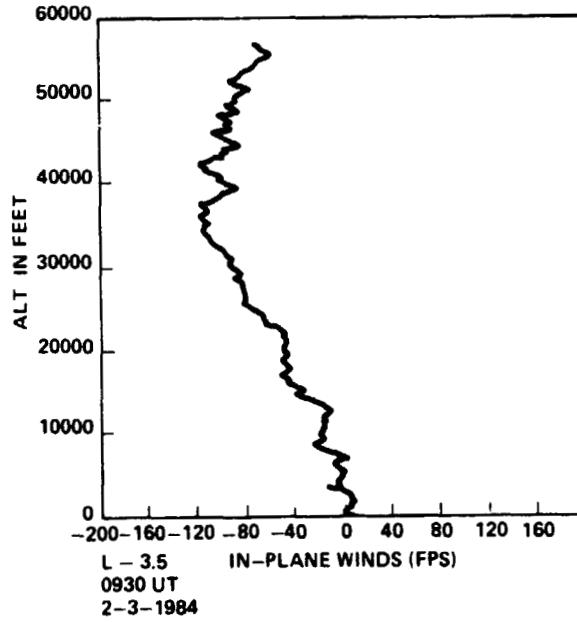
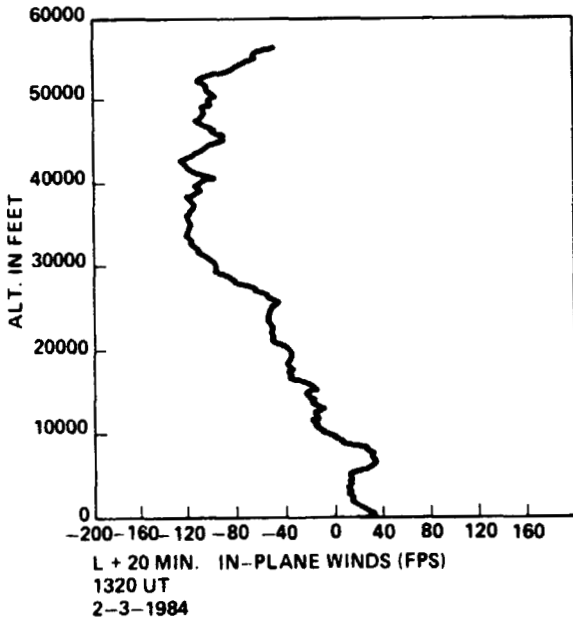
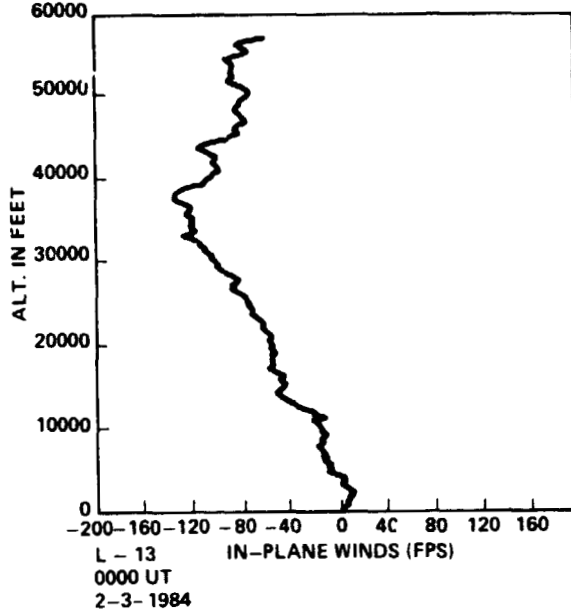
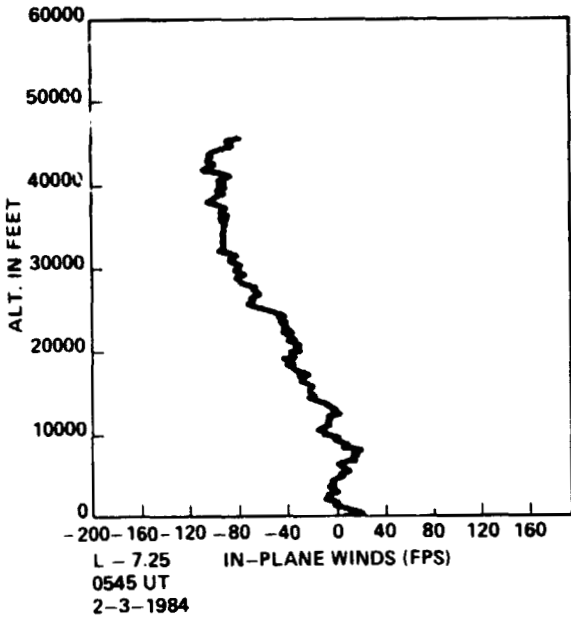
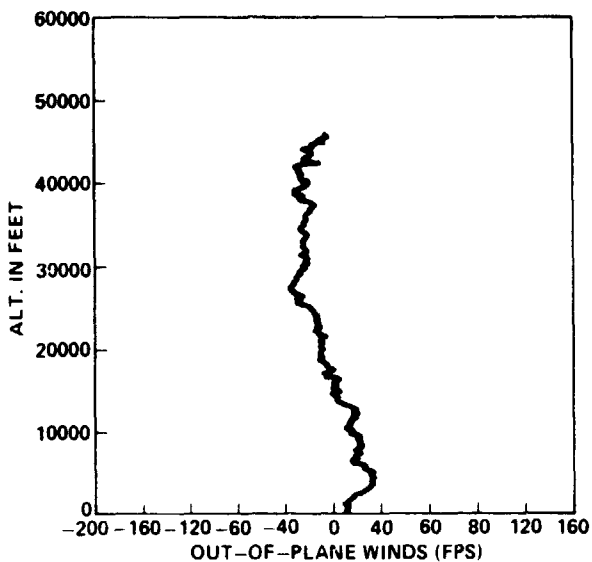
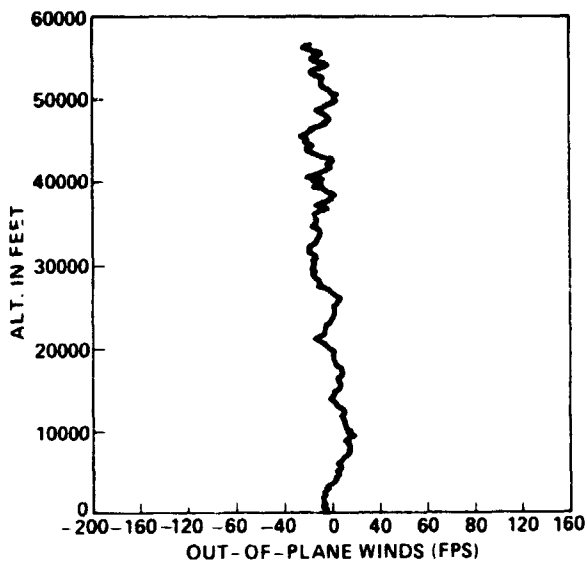


Figure 8. STS-11 prelaunch/launch Jimsphere-measured in-plane component winds (FPS).
Flight azimuth = 89 degrees.

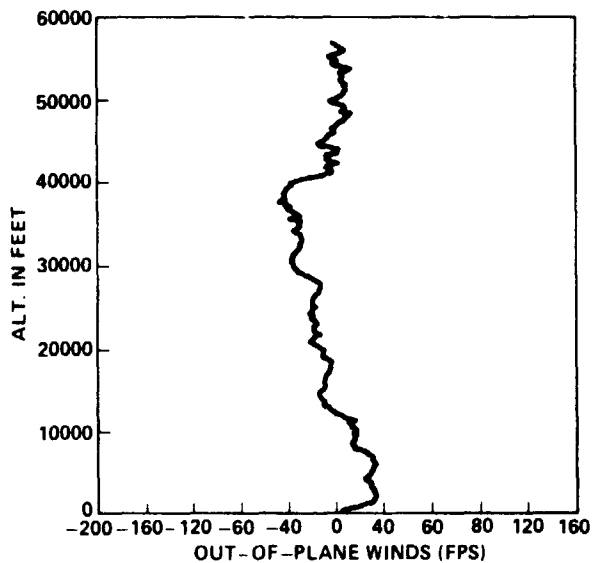
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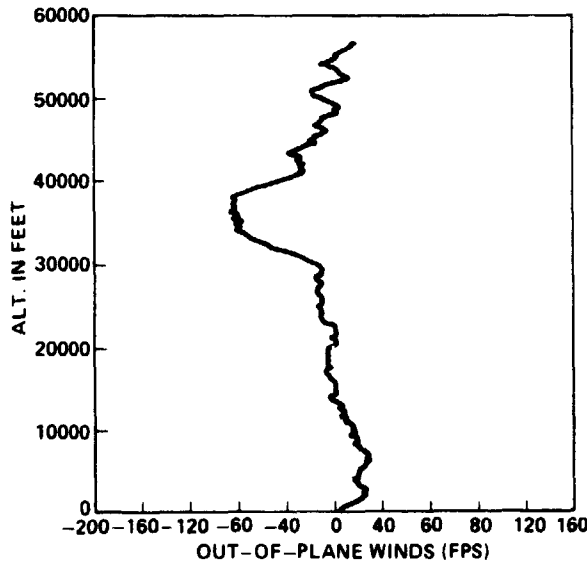
L - 7 25
0545 UT
2-3-1984



L - 13
0000 UT
2-3-1984



L + 20 MINUTES
1320 UT
2-3-1984



L - 3.5
0930 UT
2-3-1984

Figure 9. STS-11 prelaunch/launch Jimsphere-measured out-of-plane component winds (FPS).
Flight azimuth = 89 degrees.

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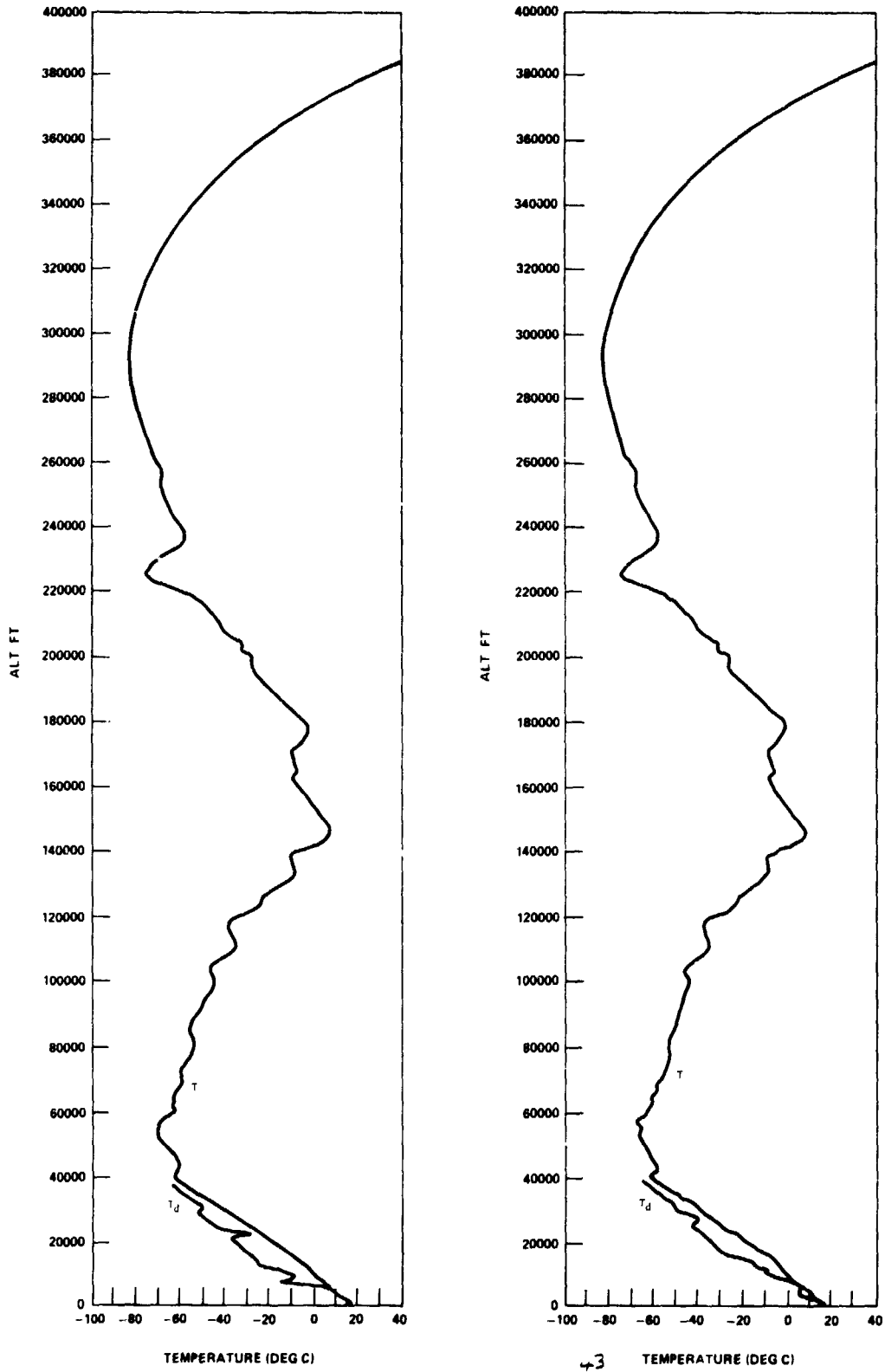


Figure 10. STS-11 temperature profiles versus altitude for launch (left) and SRB descent (right).

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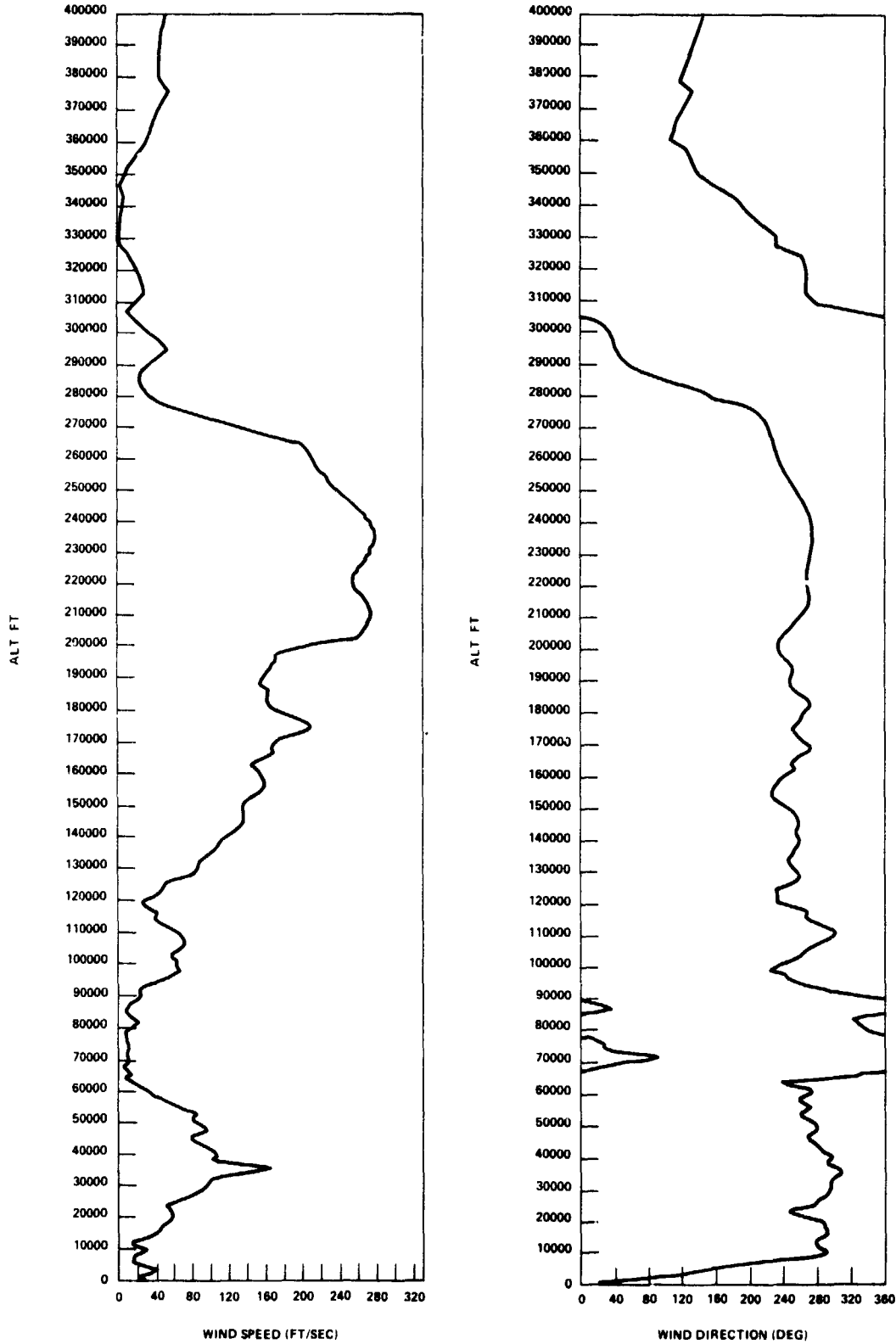


Figure 11. STS-11 scalar wind speed and direction for SRB descent.

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