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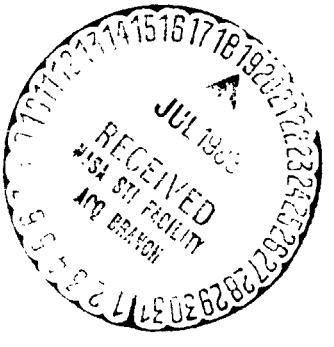
NASA TECHNICAL MEMORANDUM

NASA TM- 82495

ATMOSPHERIC OBSERVATIONS FOR STS-4 LANDING

By Robert E. Turner, James E. Arnold, and Wade Batts
Space Science Laboratory



July 1982

NASA

George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama

TECHNICAL REPORT STANDARD TITLE PAGE

1. REPORT NO.	2. GOVERNMENT ACCESSION NO.	3. RECIPIENT'S CATALOG NO.
NASA TM-82495		

4. TITLE AND SUBTITLE	5. REPORT DATE
Atmospheric Observations for STS-4 Landing	July 1982
	6. PERFORMING ORGANIZATION CODE

7. AUTHOR(S)	8. PERFORMING ORGANIZATION REPORT #
Robert E. Turner, James E. Arnold, and Wade Batts*	

9. PERFORMING ORGANIZATION NAME AND ADDRESS	10. WORK UNIT NO.
George C. Marshall Space Flight Center Marshall Space Flight Center, Alabama35812	989-13-22
	11. CONTRACT OR GRANT NO.
	13. TYPE OF REPORT & PERIOD COVERED
12. SPONSORING AGENCY NAME AND ADDRESS	Technical Memorandum
National Aeronautics and Space Administration Washington, D. C. 20546	14. SPONSORING AGENCY CODE

15. SUPPLEMENTARY NOTES

Prepared by Space Science Laboratory, Science and Engineering Directorate
*Computer Sciences Corporation.

16. ABSTRACT

A summary of synoptic weather conditions existing over the western United States is given for the time of Shuttle descent into Edwards Air Force Base, California. The techniques and methods used to furnish synoptic atmospheric data at the surface and aloft for flight verification of the STS-4 Orbiter during its descent into Edwards Air Force Base are specified. Examples of the upper-level data set are given.

17. KEY WORDS	18. DISTRIBUTION STATEMENT
synoptic atmospheric data satellite imagery rawinsonde techniques	Unclassified - Unlimited Robert E. Turner

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

MSFC - Form 3292 (May 1969)

For sale by National Technical Information Service, Springfield, Virginia 22161

ACKNOWLEDGMENTS

The authors thank Mr. John Hickey, Atsuko Computing International, for his assistance in processing the upper air data used in producing the Meteorological Data Tape.

The authors also thank Mr. Luke Gilchrist, University of Tennessee Space Institute, for supervising the taking of the observations by FWG Associates personnel, and other members of the Atmospheric Sciences Division, George C. Marshall Space Flight Center.

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I. INTRODUCTION

The successful launch and landing of STS-4 concluded the first phase of NASA's space vehicle/flight program. This report presents a summary of synoptic conditions and the atmospheric observations taken in support of the Sonic Boom Measurement Program and flight verification of the STS-4 Orbiter.

The Space Shuttle STS-4 was launched from Complex 39A at the Kennedy Space Center, Florida, into a nominal 150/150 n.mi. altitude circular orbit on June 27, 1982.

The deorbit maneuver was initiated during the 113th orbit, with subsequent landing on Rogers Lake bed at Edwards Air Force Base, California, on July 4, 1982. Runway 17 was the primary runway, 23 was the backup, and 04, the alternate.

This document is written under the requirement Level II PRCB, dated May 5, 1980, Request S-13705A, to furnish atmospheric data at the surface and aloft for flight verification of STS-4 Orbiter during its descent into Edwards Air Force Base, California.

II. GENERAL SYNOPTIC CONDITIONS AT LANDING TIME

Deorbit maneuvers for STS-4 were initiated on July 4, 1982, while passing over the western portion of the North Pacific Ocean. The Shuttle Orbiter then descended into the atmosphere, passing rapidly through the stratosphere and then the troposphere over southern California. It landed at 1610 GMT at Edwards Air Force Base. This section describes the general synoptic conditions during this period. These conditions were derived using both satellite imagery and conventional surface and upper-level rawinsonde measurements of temperature, winds, moisture, and pressure. Analysis of these data was performed by the Man Computer Interactive Data Access System (McIDAS) in the Space Science Laboratory of the Marshall Space Flight Center.

The overall synoptic pattern during the STS-4 landing was excellent and provided a setting for clear skies and optimal glide slope conditions. A weak Pacific front had moved through southern California and the surface Pacific ridge extended northeastward through the western states. These surface, as well as the 500 mb conditions, are shown in Figure 1. At upper levels the longwave trough centered over the west coast of the United States resulted in a general upper level flow from the southwest.

Figure 2 shows the visible satellite image over the western United States at 1615 GMT. State and geographical boundaries are superimposed. This figure shows that skies were cloudless over much of California including the Edwards Air Force Base area. The high cloudiness in eastern Nevada and the thin cirrus streaks across

southern California are associated with the Pacific front seen in Figure 1. The clouds over the coastal area of California are low stratoform clouds common to that region.

A more specific impression about atmospheric conditions over California at landing time can be obtained from Figure 3. This figure is a plot of the surface reporting stations at 1600 GMT on July 4, 1982. At that time Edwards was reporting a wind from the west at 20 kt. The sea level pressure was 1012.8 mb, the temperature was 72°F, and the dew-point was 45°F. Scattered high clouds, cirrus, are reported although they are not apparent in Figure 2.

Figure 4 shows the satellite image over the western United States at 1545 GMT with the 500 mb height analysis (approximately 5,000 m/18,000 ft) at 1200 GMT superimposed on the image. Wind barbs representing direction and speed (m/sec) at the upper level reporting stations are also shown. Edwards Air Force Base is located at the white square in southern California and is reporting a wind of 17 m/sec at the 500-mb pressure level.

The change of upper level conditions as a function of pressure (height) is shown in Figures 5 through 8. These figures display wind barbs and geopotential height analyses for 700 mb (approximately 3,000 m/10,000 ft), 500 mb (approximately 5,000 m/18,000 ft), 300 mb (approximately 9,000 m/30,000 ft), and 200 mb (approximately 12,000 m/40,000 ft), respectively, over the southwestern United States. Over southern California, the flow was from the southwest at all levels from 700 to 200 mb and reached a maximum wind speed of 29 m/sec at 250 mb. Along the central and northern California coastal region, the wind veered slightly with height, decreasing pressure, and became northwesterly at the 300 and 200 mb levels.

Figure 9 shows a full-resolution (1 km) visible picture of the Edwards area (small white square) at 1600 GMT on July 4. The thin cirrus reported by the surface stations in southern California is faintly visible in the picture. It is clear along the ground track to the west of Edwards. Some cloud activity is apparent over the Sierra Mountains while coastal stratus dominates the southwestern portion of the picture.

Figure 10 is a plot of the vertical distribution of winds (m/sec), temperature (solid line), and dew-point temperature (dashed line) at 1200 GMT on July 4 taken at Edwards Air Force Base. The diagram is a standard Skew-T diagram with temperatures in °C. The profile extends from the surface to 100 mb (17,000 m/55,000 ft). The wind speed increases slowly from 5 m/sec at the surface to 29 m/sec at 250 mb. The temperature structure is stable with the frontal surface near 800 mb. Two moist layers are present in the sounding. The first is between 700 and 550 mb where the relative humidity, with respect to water, is approximately 67 percent; the second layer is at 350 mb where the relative humidity is approximately 73 percent.

III. DISCUSSION OF BASIC DATA

A. Collection of the Data and the Data Acquisition System

Past experience gained on Apollo and Skylab programs has shown that it is necessary to have atmospheric data to verify the analytical techniques used for engineering analysis. For this reason, atmospheric data at the surface and aloft were obtained by using the Rawinsonde System. The Rawinsonde System was placed at

Wheeler Ridge, California. The set was positioned along the STS-4 reentry track. The requirements to collect atmospheric data approximately 2.5 hr before landing from this location have been met.

The Rawinsonde System is a transportable radio direction finder designed to track a balloon-borne radiosonde automatically. A radiosonde signal containing information about the atmosphere in the form of an amplitude or frequency modulation data signal is received, amplified, and detected by this system. The detected signal is passed to separate equipment in the system where it is recorded. By reference to calibration data for the radiosonde, this recorded information is converted to values of temperature, humidity, and pressure. Recordings of time versus progressive changes of the elevation and azimuth positions of the ascending balloon package, as determined by tracking of the signal from the radiosonde, are made so that they can later be converted to wind speed and direction.

The radiosonde consists of a transmitter, modulator, antenna, battery, and pressure, temperature, and humidity sensing elements. The radiosonde, parachute, and train weigh approximately 2 kg (4 lb) and can be carried to an altitude of approximately 30 km by a helium-filled balloon. The battery furnishes power to the modulator and transmitter. The transmitter operates in the 1660 to 1700 MHz band; its carrier is amplitude modulated by an audio-frequency pulse, the rate of which is determined by the pressure, temperature, and humidity sensing elements.

The Rawinsonde antenna automatically tracks the balloon-borne radiosonde by continuous homing on the radiosonde signal to horizontal distances of approximately 200 km and altitudes of up to 30 km. The equipment recorder records the elevation and azimuth angles of the position of the radiosonde versus time.

B. Methods of Processing

The procedure used to compute the soundings is described by Fuelberg [1] and Turner [2]. All raw data keypunched were checked for errors by calculating centered differences on the input data. Additional checks include centered differences on computed winds and checks on lapse rates of computed temperatures and dew points. Suspected errors were checked with the original recorder chart information and the appropriate corrections made.

The final data set consists of data computed at each pressure contact as well as data at 30-sec intervals. Thermodynamic quantities were computed at each pressure contact, while winds were computed from the available 30-sec interval angle data by means of centered finite differences. Winds were subsequently interpolated to each contact.

The following procedures were employed in the processing of these data which differ from those described by Fuelberg [1]:

1) Humidity values, including dew-point temperature, were computed only at temperatures above -40°C; at temperatures below -40°C, humidity values are missing and are indicated by a field of nines. Moisture values were computed if the relative humidity exceeded 1 percent. If the value was below 1 percent, it was set equal to 1 percent and used in the computation of other moisture variables.

2) Winds based on low elevation angles are denoted by asterisks. One asterisk denotes angles less than 10 deg but greater than 6 deg, while two asterisks

denote angles less than 6 deg. Caution must be exercised in the use of data at low elevation angles, since it is subject to rather large RMS errors.

3) Wind direction and speed were determined for contact levels by interpolating time values.

In processing the data, corrections were made for any errors made in recording the observational data.

IV. DISCUSSION OF UPPER AIR DATA

A. Accuracy Estimates

Estimates of the RMS errors in the wind and thermodynamic quantities of the STS-4 descent rawinsonde soundings are the same as those given by Fuelberg [1]. The error estimates for thermodynamic variables are presented in Table 1.

The RMS errors for wind speed and direction are difficult to describe since they are a function of tracking geometry and other factors. Maximum RMS errors for winds (speed and direction) computed at 30-sec intervals (based on the worst geometric tracking configuration) for 10 and 40 deg elevation angles are presented in Table 2. The accuracy of the wind data at pressure contacts is greater than that stated for the 30-sec winds because of the added smoothing and interpolation performed. In addition, the errors stated for the 30-sec winds were maxima for the stated conditions.

TABLE 1. ESTIMATES OF THE RMS ERRORS IN THERMODYNAMIC QUANTITIES

Parameter	Approximate RMS Error
Temperature	0.5°C
Pressure	1.3 mb from surface to 400 mb 1.1 mb between 400 and 100 mb 0.7 mb between 100 and 10 mb
Humidity	10 percent
Pressure Altitude	10 gpm at 500 mb 20 gpm at 300 mb 50 gpm at 50 mb

TABLE 2. ESTIMATES OF RMS ERRORS IN WIND DATA

	RMS Errors ($msec^{-1}$) in Speed		RMS Errors (deg) in Direction	
Pressure mb	10-deg Elevation	40-deg Elevation	10-deg Elevation	40-deg Elevation
700	2.5	0.5	9.5	1
500	4.5	0.8	13.4	1.8
300	7.8	1.0	18.0	2.5

B. Tabulated Data

An example of the contact data is given in Table 3, with the explanation of column headings in Table 4. The first line of data for the time 0.0 min is surface data. The three numbers in the upper right-hand corner are the number of pressure levels computed, the minimum pressure obtained (mb), and an identifier with the value 0 for 30-sec angle input and 1 for 1-min angle input.

The contact data and the 30-sec data are presented in Appendices A and B.

TABLE 3. EXAMPLE OF CONTACT DATA

STATION NO. 2
WHEELER RIDGE, CALIF

4 JULY 1982
1448 GMT

118 121. 0

TIME MIN	CNTCT	HEIGHT GPM	PRES MB	TEMP DG C	DEW PT DG C	DIR DG	SPEED M/SEC	U COMP M/SEC	V COMP M/SEC	POT T DG K	E POT T DG K	MX RTO GM/KG	RH PCT	RANGE KM	AZ DG
43.1	96.0	10923.2	243.0	-49.9	99.9	268.6	12.3	12.3	.3	334.6	999.9	99.9	999.9	28.[illegible]	92.
43.6	97.0	11050.9	230.0	-50.7	99.9	273.2	13.0	12.9	-.7	335.4	999.9	99.9	999.9	29.1	92.
44.1	98.0	11225.0	232.0	-51.3	99.9	277.2	12.8	12.7	-1.6	336.9	999.9	99.9	999.9	29.5	92.
44.7	99.0	11366.5	227.0	-51.8	99.9	277.9	13.8	13.7	-1.9	338.3	999.9	99.9	999.9	30.0	92.
45.2	100.0	11510.6	222.0	-52.6	99.9	277.4	16.7	16.5	-2.1	339.3	999.9	99.9	999.9	30.4	92.
45.7	101.0	11687.5	216.0	-53.0	99.9	279.8	18.0	17.7	-3.1	341.2	999.9	99.9	999.9	31.0	93.
46.2	102.0	11930.4	211.0	-53.4	99.9	285.7	17.8	17.1	-4.8	343.0	999.9	99.9	999.9	31.5	93.
46.7	103.0	11992.4	206.0	-54.5	99.9	292.8	18.2	16.8	-7.1	343.6	999.9	99.9	999.9	32.0	93
47.3	104.0	12149.4	201.0	-55.3	99.9	299.2	19.9	17.4	-9.7	344.7	999.9	99.9	999.9	32.[illegible]	93.
47.8	105.0	12310.8	196.0	-55.8	99.9	304.5	19.9	16.4	-11.3	346.4	999.9	99.9	999.9	33.[illegible]	94.
48.4	106.0	12441.2	192.0	-55.8	99.9	310.2	18.4	14.1	-11.9	348.4	999.9	99.9	999.9	33.6	95.
49.0	107.0	12609.3	187.0	-55.7	99.9	312.7	17.4	12.8	-11.8	351.3	999.9	99.9	999.9	34.2	95
49.6	108.0	12781.7	182.0	-56.2	99.9	317.2	15.5	10.6	-11.4	353.2	999.9	99.9	999.9	34.7	96.
50.1	109.0	12922.0	178.0	-56.0	99.9	320.4	13.5	8.6	-10.4	354.4	999.9	99.9	999.9	35.1	96.
50.7	110.0	13066.4	174.0	-58.1	99.9	315.8	11.8	8.2	-8.5	354.7	999.9	99.9	999.9	35.4	97.
51.3	111.0	13249.7	169.0	-58.9	99.9	306.2	11.4	9.2	-6.7	356.2	999.9	99.9	999.9	35.7	97
51.7	112.0	13399.6	165.0	-60.0	99.9	302.4	11.1	9.4	-6.0	356.0	999.9	99.9	999.9	36.0	97.
52.3	113.0	13552.0	161.0	-60.2	99.9	298.5	12.2	10.7	-5.8	359.1	999.9	99.9	999.9	36.3	98.
52.9	114.0	13749.9	156.0	-59.5	99.9	297.6	13.6	12.0	-6.3	363.5	999.9	99.9	999.9	36.8	98.
53.5	115.0	13912.1	152.0	-60.4	99.9	300.3	13.2	11.4	-6.6	364.7	999.9	99.9	999.9	37.2	98
54.1	116.0	14078.4	148.0	-60.4	99.9	296.2	14.2	12.7	-6.2	367.5	999.9	99.9	999.9	37.7	99.
54.6	117.0	14249.6	144.0	-59.1	99.9	290.2	13.1	12.3	-4.5	372.6	999.9	99.9	999.9	38.1	99
55.3	118.0	14426.5	140.0	-58.4	99.9	275.2	11.8	11.7	-1.1	376.8	999.9	99.9	999.9	38.6	99
55.6	119.0	14600.4	136.0	-59.7	99.9	265.1	12.2	12.2	1.1	377.8	999.9	99.9	999.9	39.0	99
56.4	120.0	14794.6	132.0	-60.7	99.9	999.9	99.9	99.9	99.9	379.1	999.9	99.9	999.9	999.9	999
56.9	121.0	14937.6	129.0	-60.9	99.9	999.9	99.9	99.9	99.9	381.2	999.9	99.9	999.9	999.9	999
57.5	122.0	15133.7	125.0	-60.2	99.9	999.9	99.9	99.9	99.9	386.0	999.9	99.9	999.9	999.9	999
58.1	123.0	15336.5	121.0	-60.4	99.9	999.9	99.9	99.9	99.9	389.3	999.9	99.9	999.9	999.9	999.

TABLE 4. EXPLANATION OF COLUMN HEADINGS OF TABULATED SOUNDING DATA FOR THE STS-4 ORBITER DURING ITS DESCENT AND LANDING

TIME (MIN)	Time after balloon release.
CNTCT	Contact number.
HEIGHT (GPM)	Height of corresponding pressure surface in geopotential meters.
PRES (MB)	Pressure in millibars.
TEMP (DG C)	Ambient temperature in °C. NOTE: An asterisk indicates that time from release and/or temperature were linearly interpolated.
DEW PT (DG C)	Dew-point temperature in °C.
DIR (DG)	Wind direction measured clockwise from true north and is the direction from which the wind is blowing.
SPEED (M/SEC)	Scalar wind speed in meters per second. NOTE: An asterisk indicates that wind quantities are based on an elevation angle that is between 10 and 6 deg. A double asterisk indicates that the elevation angle is less than 6 deg.
U COMP (M/SEC)	The E-W wind component, positive toward the east and negative toward the west.
V COMP (M/SEC)	The N-S wind component, positive toward the north and negative toward the south.
POT T (DG K)	Potential temperature in °K.
E POT T (DG K)	Equivalent potential temperature in °K.
MX RTO (GM/KG)	Mixing ratio in grams per kilogram.
RH (PCT)	Relative humidity in percent.
RANGE (KM)	Distance balloon is from release point along a radius vector.
AZ (DG)	Direction toward balloon measured clockwise from true north.

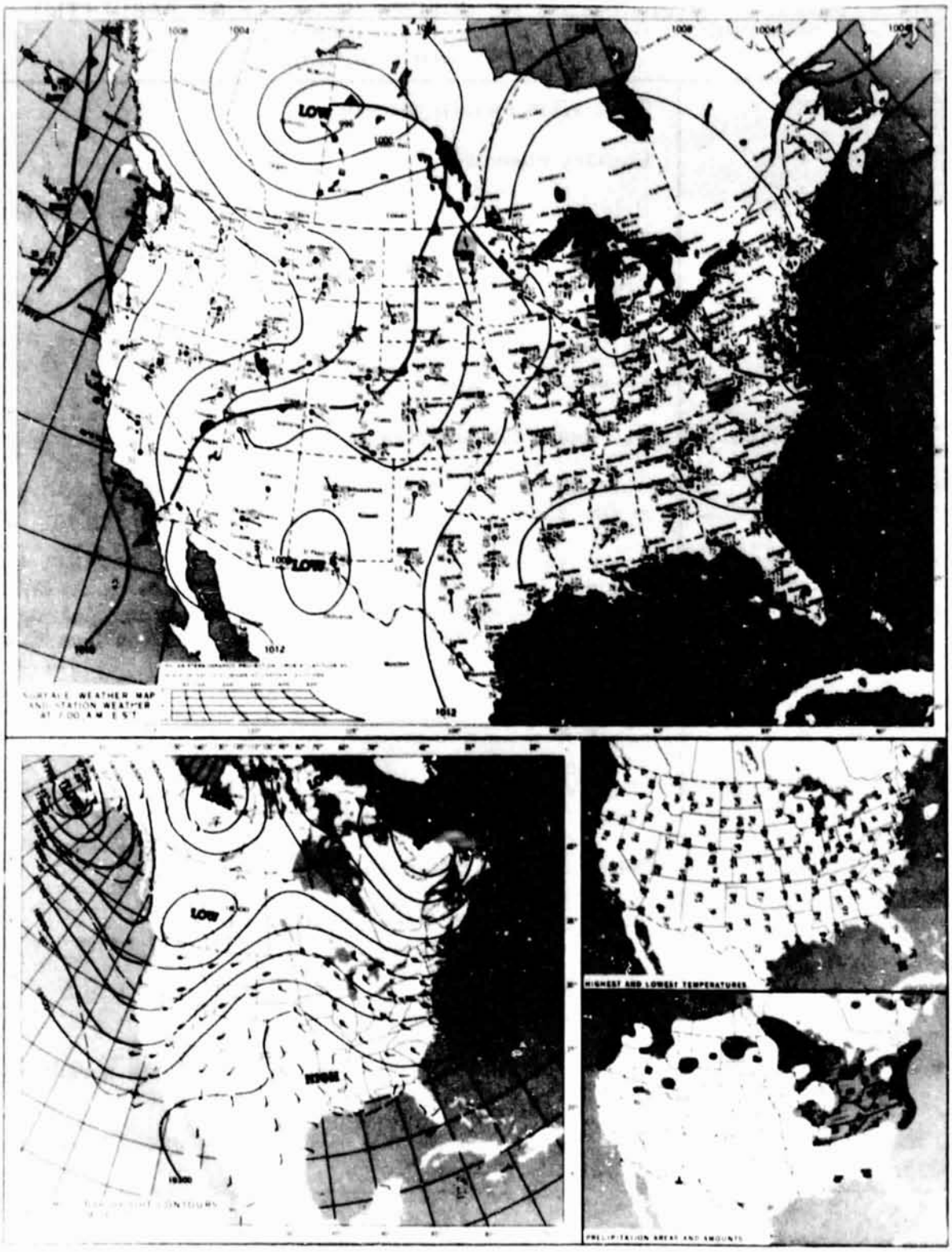

Figure 1. Large-scale analysis of weather conditions over North America and the U.S., including surface map, 500 mb (approximately 18,000 ft) height contours, high and low surface temperatures, and 24-hr precipitation map for 1200 GMT July 4, 1982.

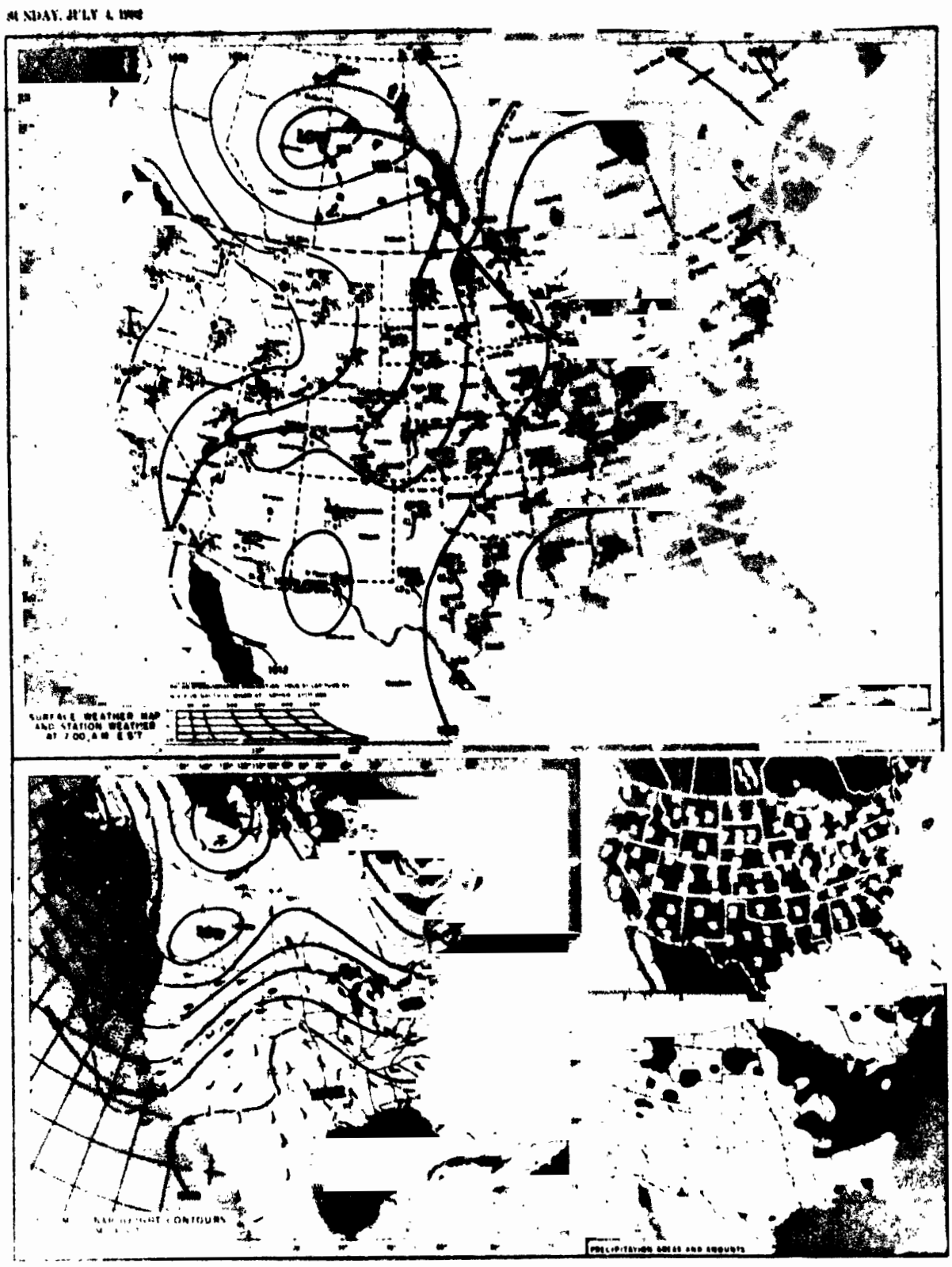

Figure 1. Large-scale analysis of weather conditions over North America and the U.S., including surface map, 500 mb (approximately 18,000 ft) height contours, high and low surface temperatures, and 24-hr precipitation map for 1200 GMT July 4, 1982.

Figure 2. GOES-W visible satellite image at 1615 GMT July 4, 1982. Edwards Air Force Base is located at the small white square in southern California.

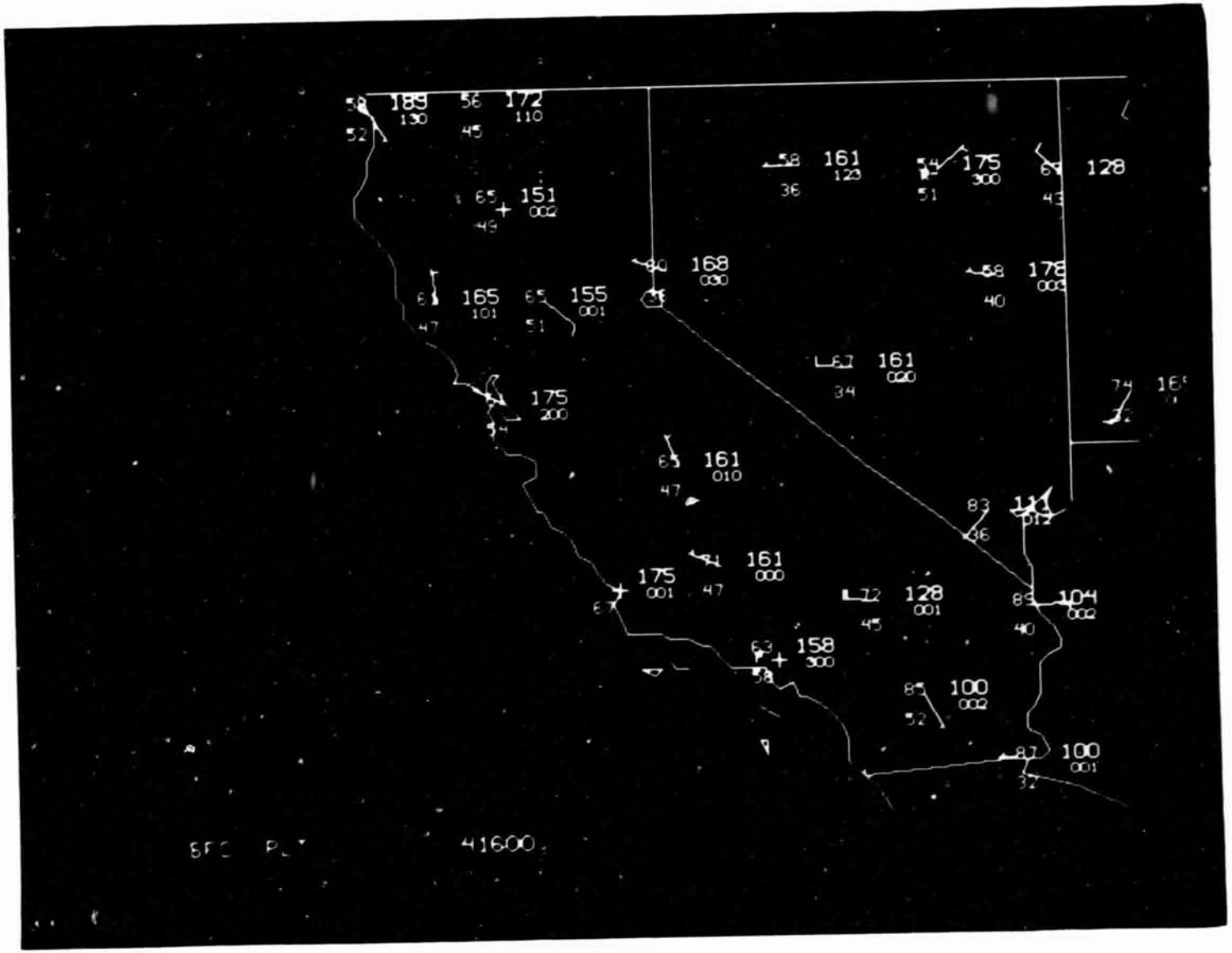

Figure 3. Synoptic data for California and Nevada at 1600 GMT on July 4, 1982. Wind flags, pressure (tens, units, and tenths of mb) - upper right; temperature (°F) - upper left; dew-point temperature (°F) - lower left; low, middle, and high cloud amounts (0 - none, 1 - scattered, 2 - broken, 3 - overcast) - lower right.

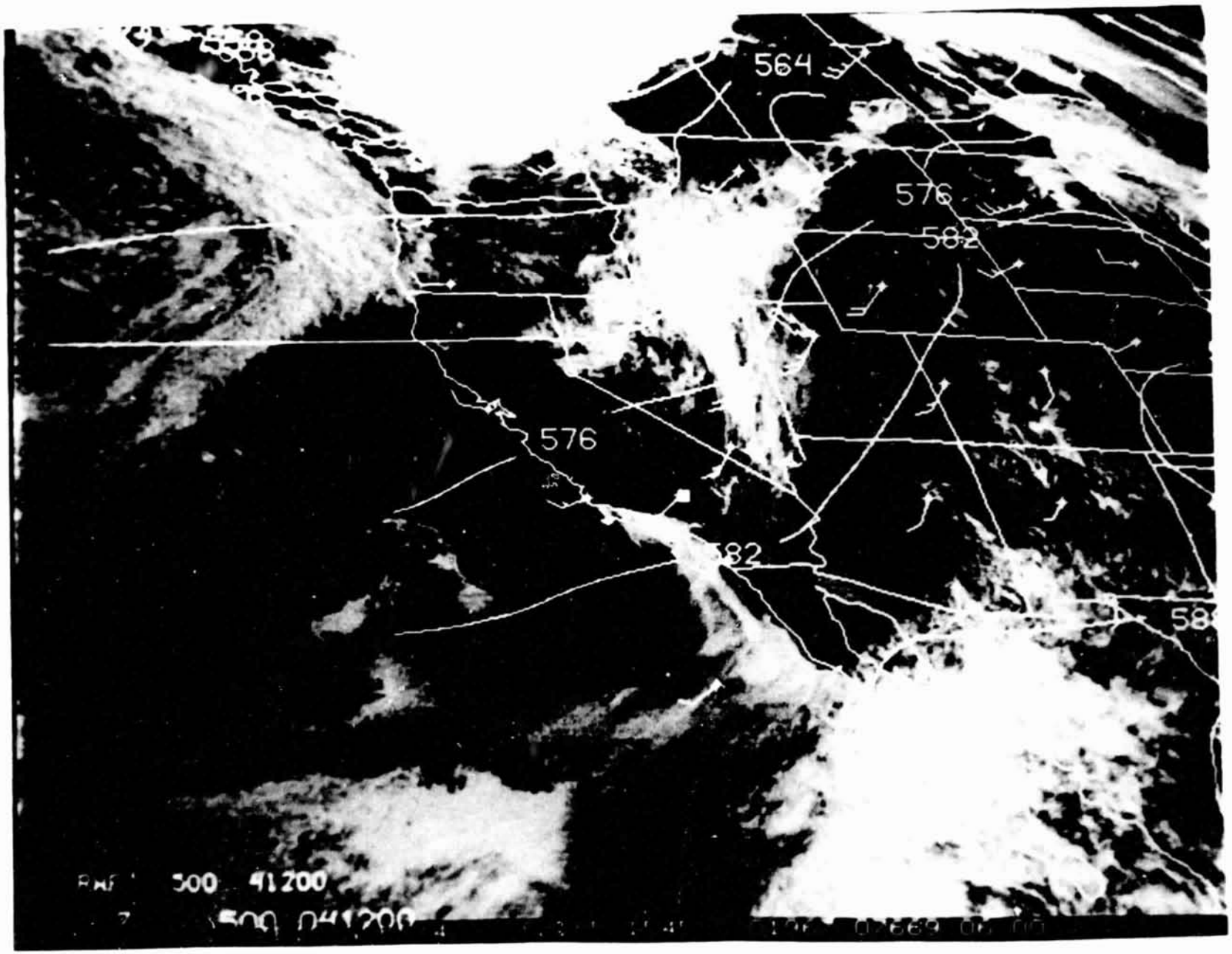

Figure 4. GOES-W satellite image at 1545 GMT on July 4, 1982, superimposed are wind barbs (m/sec) and a geopotential height analysis (m) for 500 mb (approximately 18,000 ft) from data at 1200 GMT on July 4, 1982.

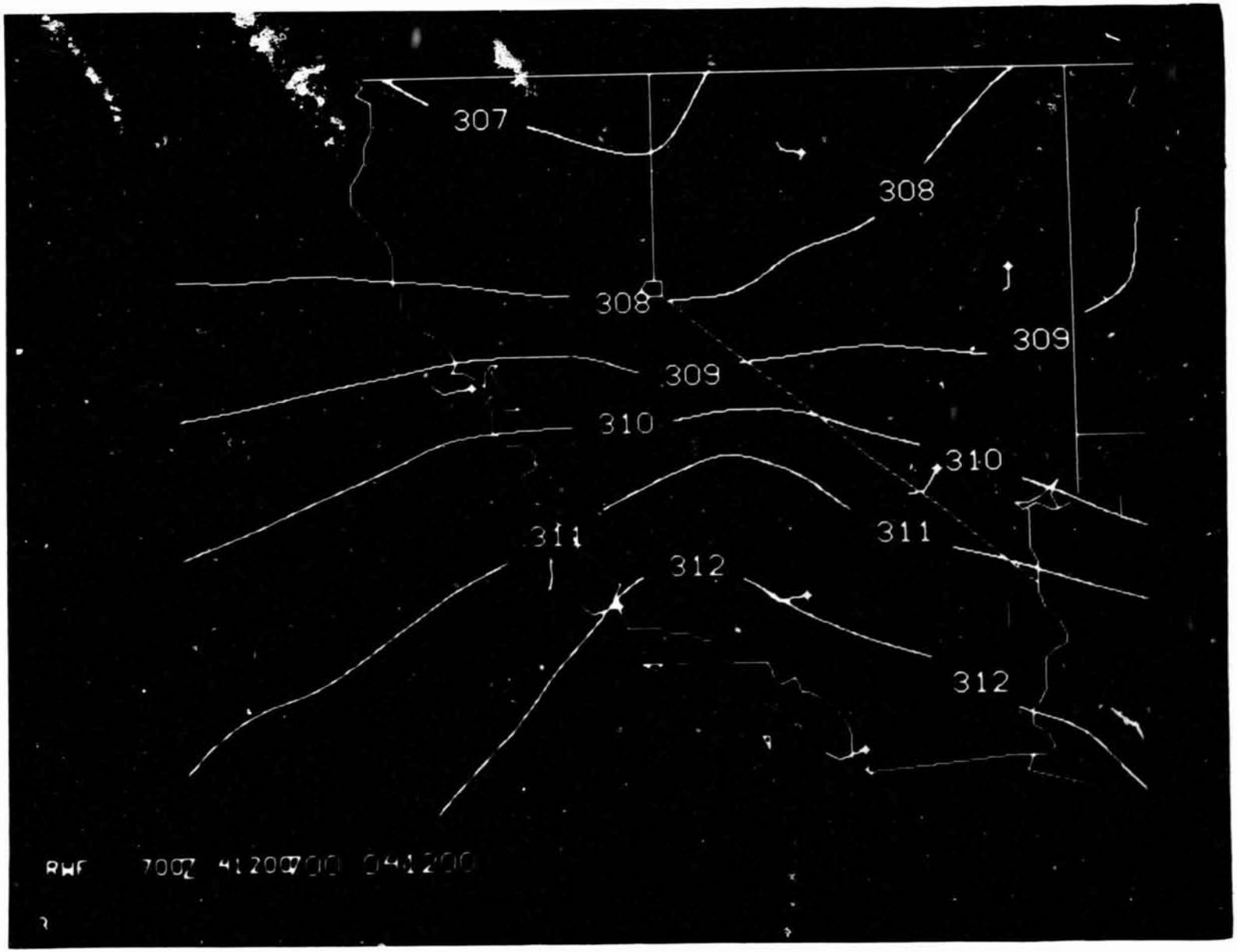

Figure 5. 700 mb (approximately 10,000 ft) winds (m/sec) and geopotential height analysis (m) from data at 1200 GMT July 4, 1982.

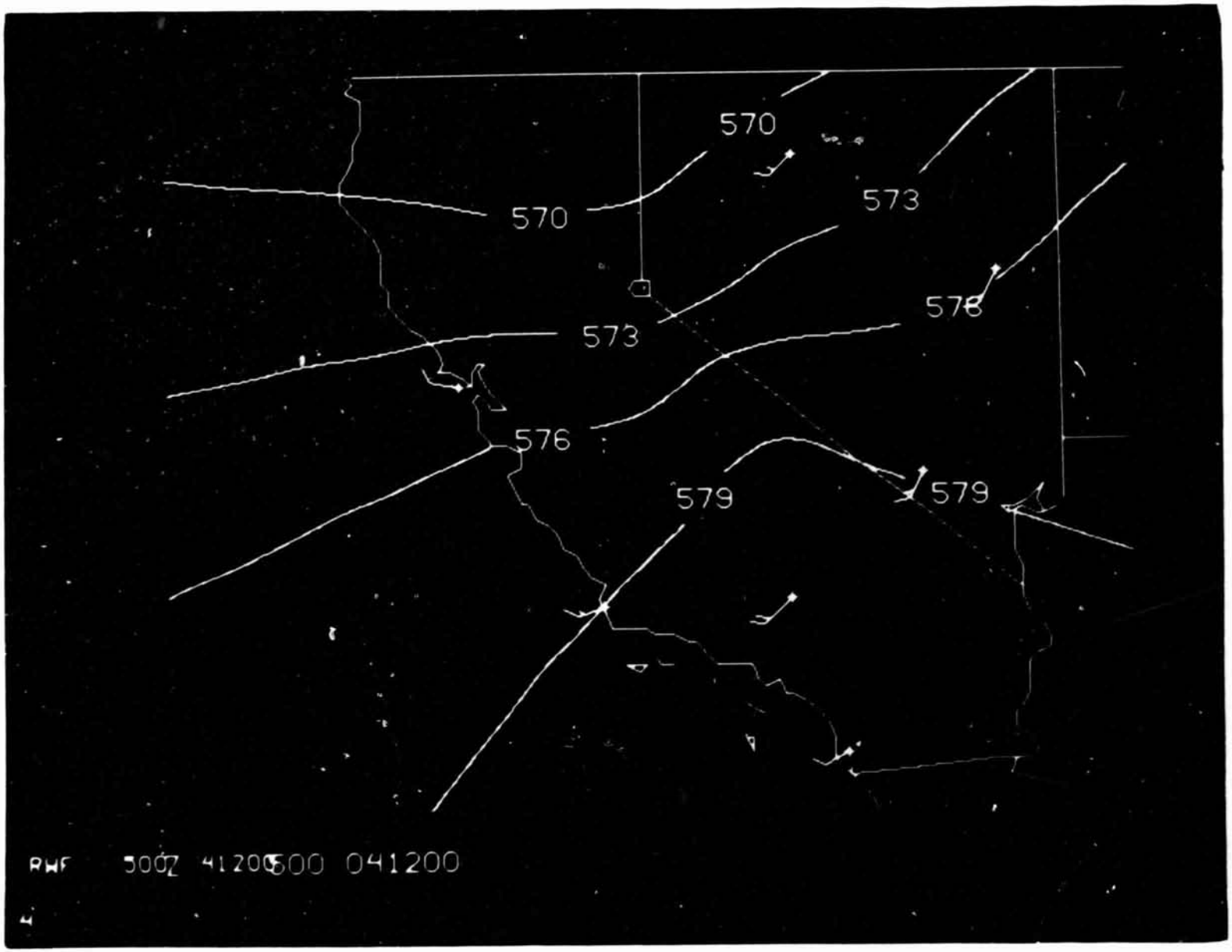

Figure 6. 500 mb (approximately 18,000 ft) winds (m/sec) and geopotential height analysis (m) from data at 1200 GMT July 4, 1982.

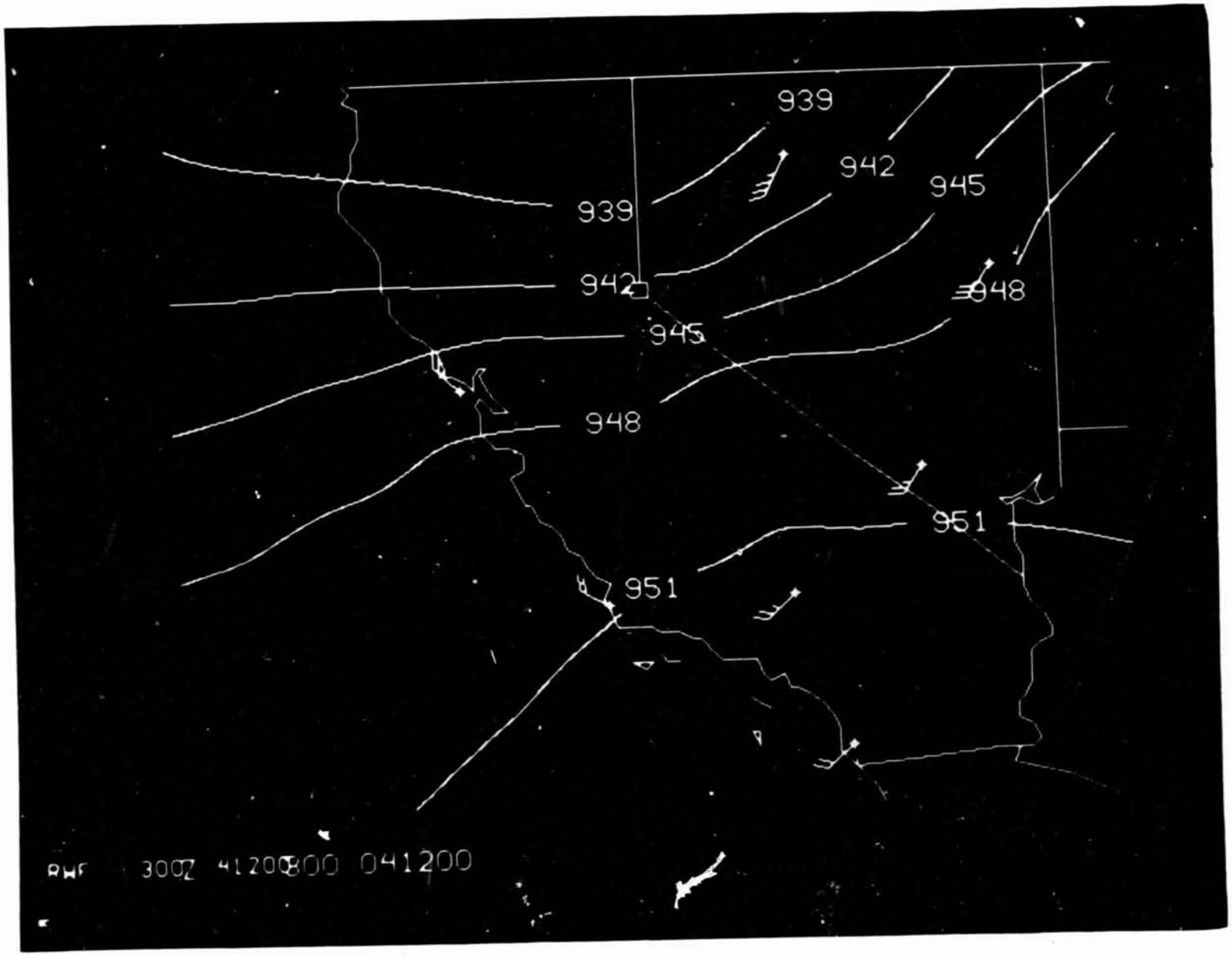

Figure 7. 300 mb (approximately 30,000 ft) winds (m/sec) and geopotential height analysis (m) from data at 1200 GMT July 4, 1982.

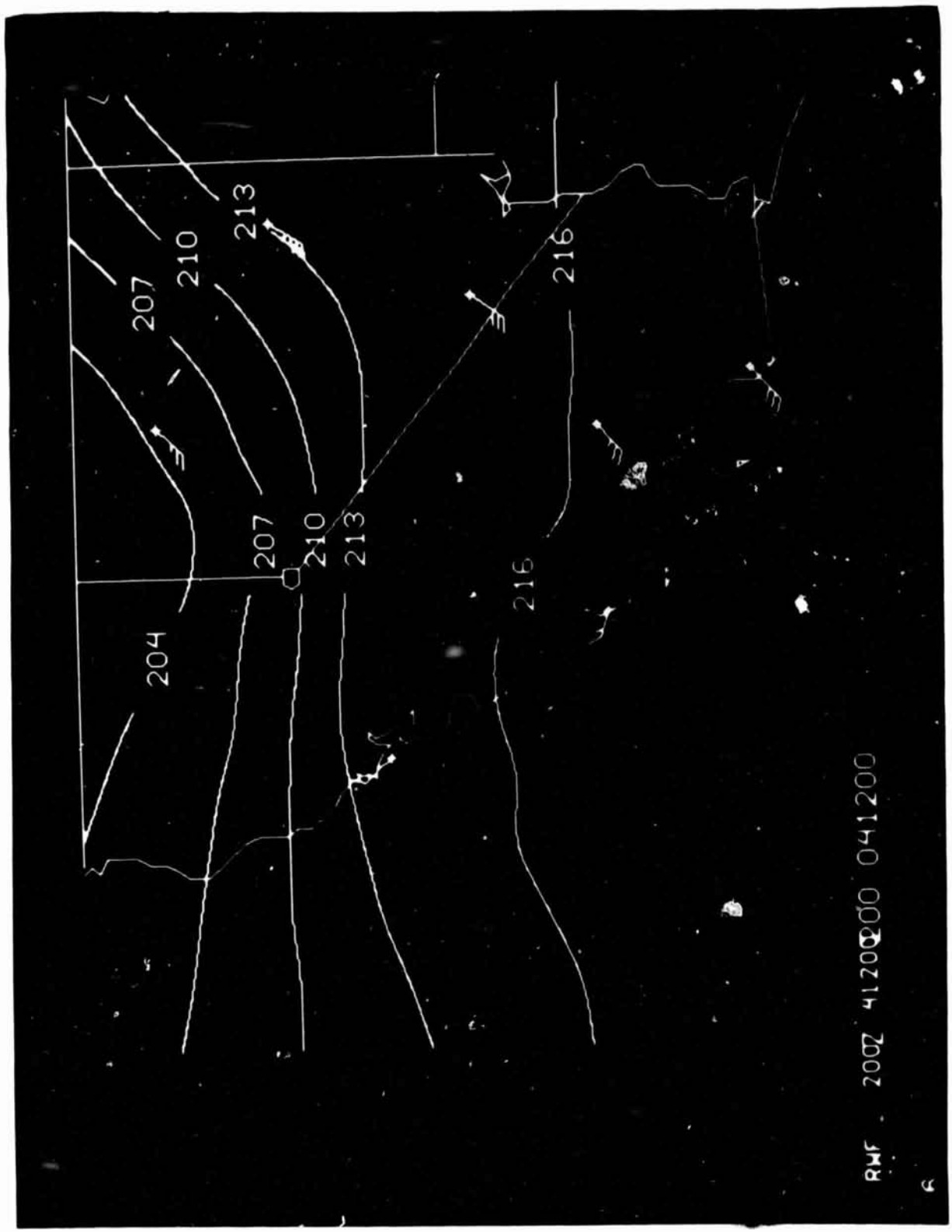

Figure 8. 200 mb (approximately 40,000 ft) winds (m/sec) and geopotential height analysis (m) from data at 1200 GMT July 4, 1982.

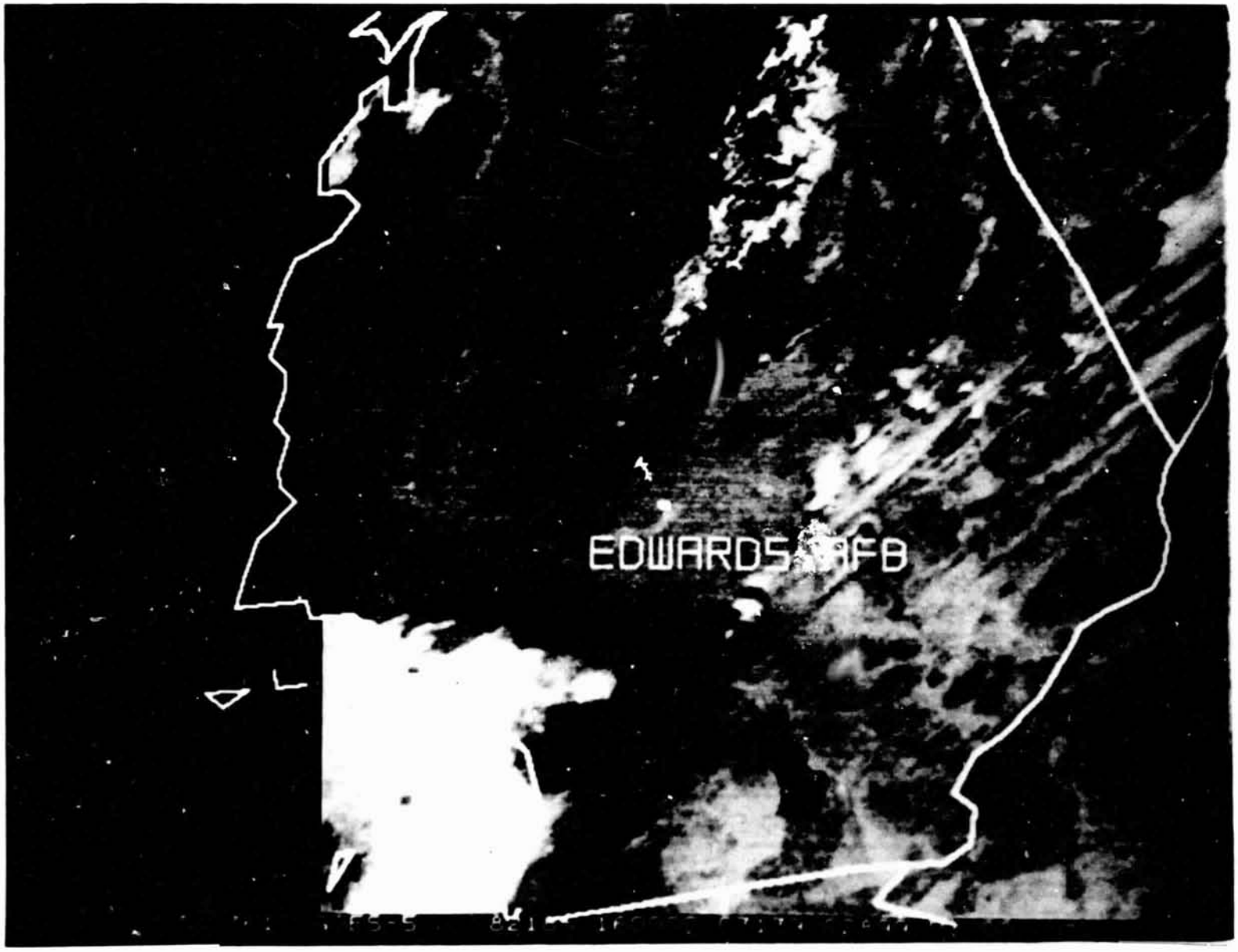

Figure 9. Visible GOES-W satellite image at 1600 GMT July 4, 1982, over southern California.

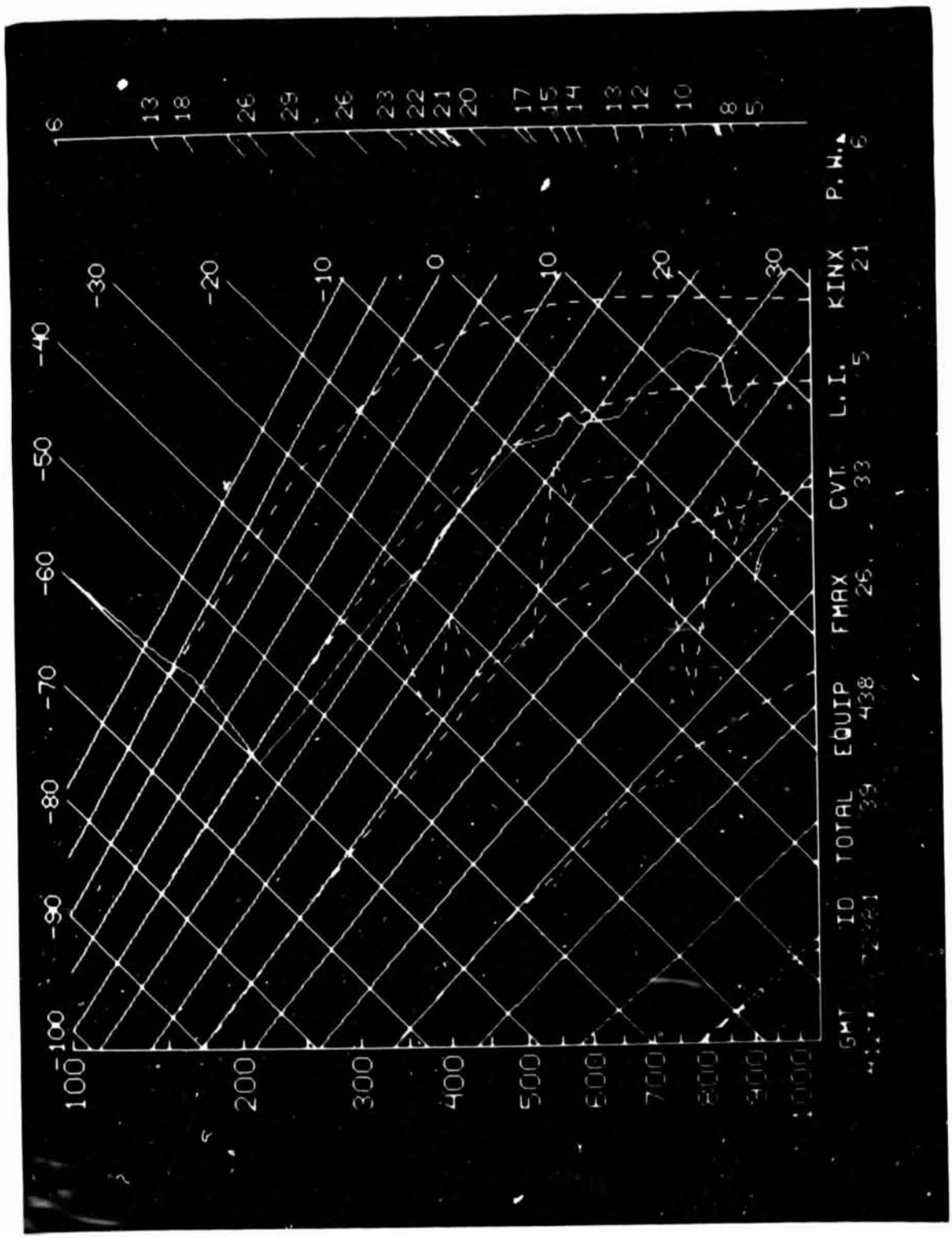

Figure 10. Vertical profiles of wind barbs (m/sec), temperature (solid line in °C), and dew-point temperature (dashed line in°C) from the surface to 100 mb (approximately 55,000 ft) at 1200 GMT July 4, 1982 for Edwards Air Force Base.

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APPENDIX A

CONTACT DATA

STATION NO. 2
WHEELER RIDGE, CALIF

4 JULY 1982
1440 GMT

118 121 0

TIME MIN	CNTCT	HEIGHT GPM	PRES MB	TEMP DG C	DEW PT DG C	DIR DG	SPEED M/SEC	U COMP M/SEC	V COMP M/SEC	POT T DG K	E POT T DG K	MX RTO GM/KG	RH PCT	RANGE KM	AZ DG
0.0	6.8	148.0	999.6	18.8	12.9	330.0	0.0	0.0	0.0	291.2	315.6	9.4	72.0	0.0	0.
.2	7.0	170.3	997.0	16.6	9.1	327.4	1.5	.8	-1.3	290.0	309.1	7.3	61.3	.0	145.
.6	8.0	264.0	986.0	16.4	8.4	323.1	1.6	1.0	-1.3	290.7	309.2	7.0	59.2	.0	1 5.
1.0	9.0	360.2	975.0	15.6	7.4	318.7	2.2	1.6	-1.4	290.3	308.4	6.6	58.2	.1	1 0.
1.4	10.0	456.4	964.0	14.8	7.3	308.0	2.6	2.0	-1.6	291.0	308.6	6.7	60.8	.1	1. .
1.8	11.0	544.7	954.0	14.8	6.2	310.0	2.5	1.9	-1.6	291.8	308.5	6.3	56.4	.2	133.
2.3	12.0	642.8	943.0	14.4	5.9	308.1	2.3	2.0	-1.2	292.4	308.9	6.2	56.5	.3	133.
2.7	13.0	741.9	932.0	13.8	6.0	283.1	2.5	2.4	-.6	292.8	309.7	6.3	59 2	.3	129.
3.2	14.0	841.9	921.0	12.8	5.7	272.5	3.1	3.1	-.1	292.8	309.6	6.3	61.9	.4	122.
3.6	15.0	933.6	911.0	12.1	5.7	271.3	3.5	3.5	-.1	293.0	309.9	6.3	64.9	.4	117.
4.0	16.0	1035.5	900.0	12.1	6.0	269.7	3.8	3.8	.0	294.0	311 6	6.6	66.4	.5	112.
4.4	17.0	1129.2	890.0	11.7	5.5	272.8	3.2	3.2	-.1	294.5	312.1	6.5	67.8	.6	109.
4.8	18.0	1223.8	880.0	11.5	5.4	285.0	2.1	2.0	-.5	295.3	312.6	6.4	65.8	.7	108.
5.3	19.0	1329.0	869.0	11.0	4.4	331.2	1.4	.7	-1.3	295.8	312.2	6.0	63.6	.7	109.
5.7	20.0	1425.5	859.0	10.2	3.6	352.7	2.8	.3	-2.8	296.0	311.7	5.8	63.2	.7	111.
6.1	21 0	1532.9	848.0	10.2	3.0	356.3	3.0	.2	-3.0	297.1	312.5	5.6	60.7	.8	115.
6.5	22.0	1631.6	838.0	10.1	1.4	1.8	4.4	-.1	-4.4	297.9	311.9	5.1	54.8	.8	120.
6.9	23.0	1731.5	828.0	9.7	3.3	1.8	5.8	-.2	-5.8	298.5	314.7	5.9	64.1	.9	128.
7.3	24.0	1832.5	818.0	9.5	5.7	352.4	4.5	.6	-4.4	299.4	318.7	7.1	77.2	1.0	134.
7.7	25.0	1934.0	808.0	9.7	4.9	325.0	3.9	2.2	-3.2	300.6	319.3	6.8	72.2	1.0	137.
8.2	26.0	2038.3	798.0	9.2	3.9	295.0	4.9	4.4	-2.1	301.1	318.7	6.3	69.4	1.2	135.
8.7	27.0	2132.3	789.0	8.4	3.7	291.4	5.8	5.4	-2.1	301.3	319.0	6.4	72.2	1.3	132.
9.1	28.0	2237.9	779.0	8.4	-2.4	287.5	6.0	5 8	-1.8	302.4	314.2	4.1	46.3	1.4	130.
9.6	29.0	2344.7	769.0	8.6	-7.4	275.8	6.3	6.3	-.6	303.8	312.2	2.9	31.4	1 6	127.
10.0	30.0	2452.0	759.0	8.1	-8.	272.4	6.5	6.5	-.3	304.3	312.3	2.7	30.4	1.7	124.
10.5	31.0	2562.1	749.0	7.6	-10.8	272.7	7.9	7.9	-.4	304.9	311.6	2.2	25.8	1 9	121.
10.9	32.0	2661.6	740.0	7.4	-13.9	272.7	9.5	9.5	-.4	305.8	311.2	1 5	20.3	2.1	118
11.3	33.0	2773.5	730.0	7.2	-6.0	271.4	10.7	10.7	-.3	306.8	316.6	2.3	30.3	2.3	115.
11.8	34.0	2886.9	720.0	6.3	-6.3	269.2	12.0	12.0	.2	307.0	315.5	2.0	34.1	2.7	112.
12.2	35.0	2989.9	711.0	5.6	-5.1	267.0	12.5	12.4	.7	307.6	315.5	2.7	33.6	2 9	110.
12.6	36.0	3094.0	702.0	5.1	-9.0	264.4	12.6	12.5	1.2	[illegible]	316.2	2.8	35.2	3.2	108.
13.1	37.0	3199.2	693.0	4.3	-8.4	261.3	12.4	12.2	1.9	[illegible]	316.9	2.9	39.2	3.5	105.
13.6	38.0	3317.3	683.0	3.8	-20.5	259.5	12.3	12.1	2.2	[illegible]	317.3	1.1	14.9	3.9	103.
14.2	39.0	3437.8	673.0	3.5	-20.9	259.9	12.6	12.4	2.2	309.8	313.2	1.1	14 5	4 3	100.
14.6	40 0	3546.1	664.0	3.0	-21.3	260.6	12.8	12.7	2.1	310.4	313.8	1.0	14.8	4.6	99.
15.1	41.0	3656.3	655.0	2.1	-21.9	261.2	12.7	12.5	1.9	310.7	313.9	1.0	14.8	5 0	98.
15.6	42.0	3767.8	646.0	1.3	-22.4	262.5	12.9	12.8	1.7	311.0	314.2	1.0	15.0	5.3	97.
16.0	43.0	3880.5	637.0	.7	-23.0	263.1	12.9	12.8	1.6	311.5	314.6	.9	15.0	5.6	96.
16.5	44.0	3994.7	628.0	.4	-10.5	262.4	12.9	12.8	1.7	312.4	326.8	2.7	43.9	6.0	95.
17.0	45.0	4123.2	618.0	-.9	-10.7	261.1	14.1	13.9	2.2	312.4	320.0	2.7	47.2	6.4	94.
17.5	46.0	4266.4	607.0	-1.9	-11.3	260.6	15.3	15.0	3.0	312.9	321.1	2.7	48.5	6.8	93.
17.9	47.0	4385.2	598.0	-2.5	-11.1	256.4	15.7	15.3	3.7	313.6	321.9	2.7	51.3	7.2	93.
18.4	48.0	4505.5	589.0	-3.1	-9.8	254.5	16.1	15.5	4.3	314.2	323.7	3.1	59.9	7.6	91.
18.9	49.0	4627.3	580.0	-4.2	-10.8	253.4	16.6	15.9	4.7	314.3	323.8	2.9	59.8	8.1	90.
19.4	50.0	4750.6	571.0	-4.9	-10.1	252.3	17.1	16.3	5.2	314.9	324.4	3.1	66.9	8.6	89.

* BY SPEED MEANS ELEVATION ANGLE BETWEEN 6 AND 10 DEG
* BY TEMP MEANS TEMPERATURE OR TIME HAVE BEEN INTERPOLATED
** BY SPEED MEANS ELEVATION ANGLE LESS THAN 6 DEG

STATION NO. 2
WHEELER RIDGE, CALIF

4 JULY 1982
1440 GMT

118 121. 0

TIME MIN	CNTCT	HEIGHT GPM	PRES MB	TEMP DG C	DEW PT DG C	DIR DG	SPEED M/SEC	U COMP M/SEC	V COMP M/SEC	POT T DG K	E POT T DG K	MX RTO GM/KG	RH PCT	RANGE KM	AZ DG
19.9	51.0	4875.3	562.0	-6.1	-10.6	251.1	17.5	16.6	5.7	314.9	324.2	3.8	70.5	9.1	86.
20.3	52.0	4987.5	554.0	-7.0	-10.7	250.2	17.4	16.4	5.9	315.1	324.5	3.1	75.1	9.5	88.
20.8	53.0	5100.9	546.0	-8.0	-12.6	249.8	16.9	15.9	5.8	315.2	323.4	2.7	69.7	10.0	87.
21.3	54.0	5230.8	537.0	-8.3	-29.2	250.8	16.2	15.2	5.3	316.4	318.5	.6	16.7	10.5	86
21.8	55.0	5346.4	529.0	-8.8	-20.7	253.3	15.5	14.8	4.5	317.2	321.7	1.4	37.2	10.9	85.
22.3	56.0	5479.2	520.0	-9.6	-18.4	256.3	15.1	14.6	3.6	317.7	323.2	1.7	48.8	11.4	85.
22.8	57.0	5598.8	512.0	-10.5	-19.9	258.3	15.1	14.8	3.1	318.1	323.1	1.5	45.9	11.9	85.
23.3	58.0	5719.9	504.0	-11.4	-19.5	259.1	16.3	16.0	3.1	318.5	323.7	1.6	50.6	12.3	84.
23.8	59.0	5842.7	496.0	-11.5	-21.3	259.2	18.3	18.0	3.4	319.8	324.4	1.4	44.0	12.8	84.
24.3	60.0	5983.8	487.0	-12.1	-22.7	258.8	19.1	18.7	3.7	320.8	324.9	1.3	40.7	13.4	84.
24.8	61.0	6109.6	479.0	-12.8	-25.3	258.0	18.3	17.9	3.8	321.4	324.8	1.0	34.1	13.9	84.
25.3	62.0	6221.7	472.0	-13.9	-27.8	258.7	17.7	17.4	3.5	321.4	324.1	.8	29.6	14.5	84.
25.8	63.0	6351.3	464.0	-15.0	-29.4	261.6	17.9	17.7	2.6	321.6	324.0	.7	27.9	15.0	83
26.3	64.0	6482.7	456.0	-15.6	-34.4	264.9	18.3	18.2	1.6	322.5	324.8	.4	17.9	15.5	83.
26.8	65.0	6616.2	448.0	-15.8	-35.6	266.4	18.3	18.3	1.1	323.8	325.2	.4	16.3	16.1	83.
27.3	66.0	6734.8	441.0	-16.2	-36.6	266.5	17.7	17.7	1.1	324.7	326.0	.4	15.3	16.6	84.
27.8	67.0	6872.6	433.0	-16.5	-36.9	266.5	15.9	15.8	1.0	326.1	327.4	.4	15.1	17.1	84
28.4	68.0	7012.5	425.0	-17.3	-37.6	267.4	13.1	13.1	.6	326.7	328.0	.3	15.1	17.7	84.
28.9	69.0	7136.8	418.0	-18.4	-38.5	269.2	12.3	12.3	.2	326.9	328.1	.3	15.2	18.0	84.
29.4	70.0	7280.7	410.0	-19.4	-39.1	271.7	11.8	11.8	-.4	327.5	328.6	.3	15.3	18.4	84
29.9	71.0	7408.4	403.0	-20.6	-40.0	274.9	11.3	11.3	-1.0	327.5	328.6	.3	15.5	18.7	84
30.4	72.0	7537.7	396.0	-22.1	-41.0	279.8	11.2	11.1	-1.9	327.3	328.2	.3	15.9	19.1	84.
31.0	73.0	7687.4	388.0	-23.3	-41.7	290.2	10.3	9.7	-3.6	327.6	328.5	.2	16.5	19.4	85.
31.6	74.0	7801.2	382.0	-24.6	-42.4	297.2	11.0	9.7	-5.0	327.3	328.2	.2	17.2	19.7	85.
32.1	75.0	7935.6	375.0	-25.7	-42.5	297.2	12.8	11.4	-5.8	327.6	328.5	.2	18.9	20.0	86
32.6	76.0	8091.7	367.0	-26.6	-42.6	298.7	13.3	11.6	-6.4	328.4	329.3	.2	20.2	20.4	86.
33.1	77.0	8230.3	360.0	-28.1	-42.8	301.6	12.4	10.6	-6.5	328.3	329.2	.2	22.7	20.7	87
33.7	78.0	8350.8	354.0	-29.0	-42.4	299.4	13.0	11.3	-6.4	328.6	329.5	.3	26.0	21.1	88
34.2	79.0	8493.3	347.0	-30.3	-42.4	295.4	14.0	12.6	-6.0	328.7	329.6	.3	29.5	21.4	88
34.8	80.0	8637.8	340.0	-31.7	-42.9	292.8	14.2	13.1	-5.5	328.8	329.7	.2	31.6	21.8	89
35.3	81.0	8784.7	333.0	-32.7	-43.3	292.3	13.4	12.4	-5.1	329.3	330.2	.2	33.5	22.3	89
35.9	82.0	8912.5	327.0	-33.8	-44.0	293.5	12.8	12.0	-4.5	329.5	330.4	.2	34.5	22.7	90
36.4	83.0	9063.8	320.0	-35.0	-45.1	288.3	13.1	12.4	-4.2	329.9	330.7	.2	34.6	23.1	90
36.9	84.0	9195.6	314.0	-36.0	-45.8	290.4	12.6	11.8	-4.4	330.4	331.1	.2	35.2	23.4	90
37.5	85.0	9329.3	308.0	-37.2	-46.7	290.2	14.5	13.6	-5.0	330.5	331.2	.2	36.1	23.9	91
38.0	86.0	9487.8	301.0	-38.4	-47.4	289.5	16.3	15.3	-5.4	330.9	331.6	.2	37.7	24.3	91
38.5	87.0	9626.0	295.0	-39.5	-47.9	289.7	15.8	14.9	-5.3	331.3	331.9	.2	39.9	24.9	91
39.0	88.0	9766.3	289.0	-40.6	99.9	287.8	15.8	15.0	-4.8	331.7	999.9	99.9	999.9	25.4	92
39.5	89.0	9908.9	283.0	-41.7	99.9	284.6	15.8	15.3	-4.0	332.1	999.9	99.9	999.9	25.7	92
40.0	90.0	10053.7	277.0	-43.0	99.9	280.5	16.1	15.8	-2.9	332.3	999.9	99.9	999.9	26.2	92
40.5	91.0	10201.0	271.0	-44.0	99.9	277.0	14.0	13.9	-1.9	332.9	999.9	99.9	999.9	26.7	92
41.1	92.0	10325.8	266.0	-45.0	99.9	275.3	13.5	13.4	-1.2	333.2	999.9	99.9	999.9	27.1	92.
41.6	93.0	10477.7	260.0	-46.6	99.9	272.8	14.7	14.7	-.7	333.8	999.9	99.9	999.9	27.5	92.
42.1	94.0	10632.3	254.0	-47.6	99.9	269.7	14.3	14.3	.1	333.7	999.9	99.9	999.9	28.0	92.
42.6	95.0	10789.7	248.0	-49.0	99.9	267.3	13.8	12.9	.6	334.0	999.9	99.9	999.9	28.4	92.

* BY SPEED MEANS ELEVATION ANGLE BETWEEN 6 AND 10 DEG
* BY TEMP MEANS TEMPERATURE OR TIME HAVE BEEN INTERPOLATED
** BY SPEED MEANS ELEVATION ANGLE LESS THAN 6 DEG

STATION NO. 2
WHEELER RIDGE, CALIF

4 JULY 1982
1440 GMT

118 121. 0

TIME MIN	CNTCT	HEIGHT GPM	PRES MB	TEMP DG C	DEW PT DG C	DIR DG	SPEED M/SEC	U COMP M/SEC	V COMP M/SEC	POT T DG K	E POT T DG K	MX RTO GM/KG	RH PCT	RANGE KM	AZ DG
43.1	96.0	10923.2	243.0	-49.9	99.9	268.6	12.3	12.3	.3	334.6	999.9	99.9	999.9	28.2	92
43.6	97.0	11058.9	238.0	-50.7	99.9	273.2	12.0	12.9	-.7	335.4	999.9	99.9	999.9	29.1	92
44.1	98.0	11225.0	232.0	-51.3	99.9	277.2	12.8	12.7	-1.6	336.9	999.9	99.9	999.9	29.5	92.
44.7	99.0	11366.5	227.0	-51.8	99.9	277.9	13.8	13.7	-1.9	338.3	999.9	99.9	999.9	30.0	92
45.2	100.0	11510.6	222.0	-52.6	99.9	277.4	16.7	16.5	-2.1	339.3	999.9	99.9	999.9	30.4	92
45.7	101.0	11687.5	216.0	-53.0	99.9	279.8	18.0	17.7	-3.1	341.2	999.9	99.9	999.9	31.0	93.
46.2	102.0	11838.4	211.0	-53.4	99.9	285.7	17.8	17.1	-4.8	343.0	999.9	99.9	999.9	31.5	93.
46.7	103.0	11992.4	206.0	-54.5	99.9	292.8	18.2	16.8	-7.1	343.6	999.9	99.9	999.9	32.0	93
47.3	104.0	12149.4	201.0	-55.3	99.9	299.2	19.9	17.4	-9.7	344.7	999.9	99.9	999.9	32.6	93.
47.8	105.0	12310.0	196.0	-55.8	99.9	304.5	19.9	16.4	-11.3	346.4	999.9	99.9	999.9	33.2	94.
48.4	106.0	12441.2	192.0	-55.8	99.9	310.2	18.4	14.1	-11.9	348.4	999.9	99.9	999.9	33.6	95.
49.0	107.0	12609.3	187.0	-55.7	99.9	312.7	17.4	12.8	-11.8	351.3	999.9	99.9	999.9	34.2	95
49.6	108.0	12781.7	182.0	-56.2	99.9	317.2	15.5	10.6	-11.4	353.2	999.9	99.9	999.9	34.7	96
50.1	109.0	12922.8	178.0	-56.8	99.9	320.4	13.5	8.6	-10.4	354.4	999.9	99.9	999.9	35.1	96.
50.7	110.0	13066.4	174.0	-58.1	99.9	315.8	11.8	8.2	-8.5	354.7	999.9	99.9	999.9	35.4	97.
51.3	111.0	13249.7	169.0	-58.9	99.9	306.2	11.4	9.2	-6.7	356.2	999.9	99.9	999.9	35.7	97
51.7	112.0	13399.6	165.0	-60.0	99.9	302.4	11.1	9.4	-6.0	356.8	999.9	99.9	999.9	36.0	97.
52.3	113.0	13552.8	161.0	-60.2	99.9	298.5	12.2	10.7	-5.8	359.1	999.9	99.9	999.9	36.3	98.
52.9	114.0	13749.9	156.0	-59.5	99.9	297.6	13.6	12.0	-6.3	363.5	999.9	99.9	999.9	36.8	98.
53.5	115.0	13912.1	152.0	-60.4	99.9	300.3	13.2	11.4	-6.6	364.7	999.9	99.9	999.9	37.2	98.
54.1	116.0	14078.4	148.0	-60.4	99.9	296.2	14.2	12.7	-6.2	367.5	999.9	99.9	999.9	37.7	99.
54.6	117.0	14249.6	144.0	-59.1	99.9	290.2	13.1	12.3	-4.5	372.6	999.9	99.9	999.9	38.1	99
55.3	118.0	14426.5	140.0	-58.4	99.9	275.2	11.8	11.7	-1.1	376.8	999.9	99.9	999.9	38.6	99.
55.8	119.0	14608.4	136.0	-59.7	99.9	265.1	12.2	12.2	1.1	377.8	999.9	99.9	999.9	39.0	99.
56.4	120.0	14794.6	132.0	-60.7	99.9	999.9	99.9	99.9	99.9	379.1	999.9	99.9	999.9	999.9	999
56.9	121.0	14937.6	129.0	-60.9	99.9	999.9	99.9	99.9	99.9	381.2	999.9	99.9	999.9	999.9	999
57.5	122.0	15133.7	125.0	-60.2	99.9	999.9	99.9	99.9	99.9	386.0	999.9	99.9	999.9	999.9	999
58.1	123.0	15336.5	121.0	-60.4	99.9	999.9	99.9	99.9	99.9	389.3	999.9	99.9	999.9	999.9	999.

STATION NO. 2
WHEELER RIDGE, CALIF

4 JULY 1982
1540 GMT

152 30. 0

TIME MIN	CNTCT	HEIGHT GPM	PRES MB	TEMP DG C	DEW PT DG C	DIR DG	SPEED M/SEC	U COMP M/SEC	V COMP M/SEC	POT T DG K	E POT T DG K	MX RTO GM/KG	RH PCT	RANGE KM	AZ DG
0.0	6.7	148.0	1000.1	15.7	8.7	300.0	1.5	1.3	-.8	288.9	307.4	7.1	63.0	0.0	0.
.1	7.0	174.4	997.0	16.9	7.5	272.9	1.6	1.6	-.1	290.4	307.7	6.6	53.8	.0	100.
.4	8.0	269.0	986.0	16.7	7.0	272.9	1.6	1.6	-.1	291.1	308.1	6.4	52.7	.0	100.
.8	9.0	355.9	976.0	16.3	6.5	275.1	1.8	1.8	-.2	291.5	308.2	6.3	52.2	.1	97.
1.3	10.0	461.0	964.0	15.3	6.2	278.3	2.3	2.2	-.3	291.5	308.0	6.2	54.5	.1	97.
1.7	11.0	549.4	954.0	14.9	6.4	280.0	2.8	2.7	-.5	292.0	308.9	6.4	56.8	.2	98.
2.0	12.0	638.6	944.0	14.5	6.4	280.8	3.1	3.1	-.6	292.5	309.6	6.4	58.2	.2	98.
2.4	13.0	728.5	934.0	13.7	5.9	284.9	3.6	3.5	-.9	292.5	309.3	6.3	59.1	.3	99.
2.8	14.0	820.4	923.0	13.3	5.2	279.4	3.5	3.4	-.6	293.1	309.4	6.0	57.9	.4	101.
3.2	15.0	928.1	913.0	12.9	5.2	270.3	3.4	3.4	-.0	293.7	310.1	6.1	59.3	.5	100.
3.6	16.0	1021.9	902.0	12.6	5.0	266.1	3.5	3.5	.2	294.3	310.7	6.1	60.1	.6	97.
4.0	17.0	1106.0	893.0	11.6	4.7	275.0	3.4	3.4	-.3	294.1	310.4	6.0	62.6	.7	96.
4.5	18.0	1209.7	882.0	11.0	4.2	277.3	2.7	2.7	-.3	294.6	310.5	5.9	62.6	.7	97.
4.9	19.0	1305.0	872.0	11.0	4.2	283.8	1.8	1.8	-.4	295.6	311.7	5.9	62.6	.8	97.
5.3	20.0	1401.2	862.0	10.5	3.6	313.1	1.2	.9	-.8	295.9	311.7	5.8	62.2	.6	97.
5.7	21.0	1498.5	852.0	10.3	3.4	349.1	1.7	.3	-1.6	296.7	312.5	5.8	62.3	.9	99.
6.1	22.0	1596.7	842.0	9.7	1.1	3.1	2.7	-.1	-2.7	297.2	310.8	4.9	54.9	.9	102.
6.5	23.0	1696.0	832.0	9.9	1.7	16.8	4.0	-1.2	-3.9	298.4	312.8	5.2	56.6	.9	107.
7.0	24.0	1796.7	822.0	9.9	4.7	1.4	4.1	-.1	-4.1	299.4	317.3	6.5	69.7	.9	117.
7.3	25.0	1898.6	812.0	9.9	4.3	339.8	4.0	1.4	-3.8	300.5	318.2	6.4	68.0	.9	119.
7.7	26.0	2001.5	802.0	9.0	3.3	316.5	4.4	3.0	-3.2	300.5	317.4	6.1	67.4	1.0	122.
8.2	27.0	2105.4	792.0	8.1	2.6	300.8	5.0	4.3	-2.5	300.7	316.9	5.9	68.2	1.2	123.
8.7	28.0	2210.4	782.0	7.4	3.0	293.3	5.7	5.2	-2.3	301.0	317.9	6.1	73.5	1.3	122.
9.1	29.0	2305.8	773.0	7.4	-2.9	284.5	6.5	6.3	-1.6	302.0	313.4	4.0	47.8	1.5	121.
9.5	30.0	2413.0	763.0	7.4	-8.3	274.9	7.7	7.7	-.7	303.1	311.0	2.7	31.8	1.6	118
9.9	31.0	2521.5	753.0	7.2	-15.3	273.7	8.5	8.4	-.6	304.1	308.8	1.5	18.2	1.8	116.
10.3	32.0	2628.3	744.0	7.0	-17.4	271.5	9.4	9.4	-.3	304.9	309.0	1.3	15.5	2.0	114.
10.7	33.0	2731.4	734.0	6.9	-14.3	269.1	10.3	10.3	.2	305.9	311.2	1.7	20.3	2.2	111
11.2	34.0	2844.0	724.0	6.5	-16.3	266.4	11.0	10.9	.7	306.7	311.3	1.5	17.7	2.5	108.
11.7	35.0	2946.5	715.0	6.3	-17.3	265.4	11.3	11.2	.9	307.6	311.9	1.4	16.5	2.8	106.
12.1	36.0	3061.9	705.0	6.1	-16.9	265.7	11.3	11.3	.9	308.7	313.2	1.4	17.2	3.1	104.
12.5	37.0	3167.0	696.0	5.6	-18.8	266.1	11.2	11.1	.8	309.2	313.2	1.2	15.2	3.4	102.
12.9	38.0	3273.2	687.0	4.9	-18.8	265.5	10.9	10.9	.8	309.6	313.6	1.3	15.9	3.6	101.
13.4	39.0	3380.5	678.0	3.9	-19.5	264.3	10.9	10.8	1.1	309.6	313.5	1.2	16.1	3.9	100.
13.8	40.0	3501.0	668.0	3.1	-20.3	263.6	10.9	10.8	1.2	310.0	313.6	1.1	15.9	4.2	99.
14.4	41.0	3610.6	659.0	2.2	-21.2	264.9	11.5	11.5	1.0	310.3	313.7	1.1	15.6	4.6	98.
14.7	42.0	3733.9	649.0	1.6	-22.0	266.1	12.2	12.1	.8	310.9	314.1	1.0	15.3	4.8	97.
15.1	43.0	3833.8	641.0	1.1	-9.3	267.0	12.8	12.8	.7	311.4	320.4	3.0	45.7	5.1	96.
15.5	44.0	3960.1	631.0	.3	-8.2	266.2	12.6	12.6	.8	311.9	321.8	3.3	52.8	5.4	96.
16.0	45.0	4075.2	622.0	-.8	-8.1	265.0	12.9	12.9	1.1	311.9	322.0	3.3	57.7	5.7	95.
16.4	46.0	4170.5	614.0	-1.6	-8.2	264.1	13.7	13.6	1.4	312.2	322.3	3.4	60.6	6.1	95.
16.9	47.0	4296.0	605.0	-2.6	-8.5	261.1	14.4	14.2	2.2	312.4	322.4	3.3	63.5	6.5	94.
17.4	48.0	4414.8	596.0	-3.5	-9.0	257.2	15.4	15.1	3.4	312.7	322.5	3.3	65.7	6.9	93.
17.8	49.0	4535.1	587.0	-4.0	-12.2	254.5	16.0	15.5	4.3	313.5	321.4	2.6	52.6	7.3	92.
18.3	50.0	4656.9	578.0	-4.6	-14.2	252.7	16.3	15.6	4.9	314.2	321.0	2.2	46.7	7.7	91.

* BY SPEED MEANS ELEVATION ANGLE BETWEEN 6 AND 10 DEG
* BY TEMP MEANS TEMPERATURE OR TIME HAVE BEEN INTERPOLATED
** BY SPEED MEANS ELEVATION ANGLE LESS THAN 6 DEG

STATION NO. 2
WHEELER RIDGE, CALIF

4 JULY 1982
1540 GMT

:52 30. 0

TIME MIN	CNTCT	HEIGHT GPM	PRES MB	TEMP DG C	DEW PT DG C	DIR DG	SPEED M/SEC	U COMP M/SEC	V COMP M/SEC	POT T DG K	E POT T DG K	MX RTO GM/KG	RH PCT	RANGE KM	AZ DG
18.7	51.0	4766.6	570.0	-5.0	-20.7	252.8	16.0	15.3	4.7	314.9	319.0	1.3	28.0	8.1	90.
19.2	52.0	4891.6	561.0	-5.2	-26.9	254.5	14.9	14.4	4.0	316.1	318.6	.7	16.2	8.6	89.
19.7	53.0	5004.2	553.0	-6.2	-19.5	257.7	14.0	13.7	3.0	316.2	320.9	1.5	34.0	9.0	88.
20.2	54.0	5132.3	544.0	-7.4	-18.3	261.5	14.2	14.0	2.1	316.3	321.5	1.7	41.1	9.4	88.
20.6	55.0	5247.6	536.0	-8.2	-18.8	264.0	14.9	14.9	1.6	316.7	321.9	1.6	42.0	9.7	88.
21.1	56.0	5364.2	528.0	-9.2	-19.5	265.6	16.0	16.0	1.2	316.9	321.8	1.5	42.7	10.2	88.
21.5	57.0	5497.0	519.0	-10.1	-20.8	265.6	15.2	15.2	1.2	317.4	321.9	1.4	40.9	10.6	88.
22.0	58.0	5616.7	511.0	-10.6	-20.7	264.4	13.4	13.3	1.3	318.1	322.7	1.4	43.1	11.0	88.
22.5	59.0	5738.1	503.0	-10.8	-25.2	264.4	15.1	15.0	1.5	319.4	322.6	1.0	29.2	11.4	88.
23.0	60.0	5861.3	495.0	-11.2	-27.4	265.3	17.4	17.4	1.4	320.3	323.0	.8	24.6	11.9	87.
23.4	61.0	5986.0	487.0	-12.5	-31.3	266.7	17.3	17.3	1.0	320.2	322.2	.6	19.0	12.3	87.
23.9	62.0	6112.4	479.0	-13.2	-33.6	269.4	16.6	16.6	.2	320.9	322.5	.5	16.0	12.8	87.
24.4	63.0	6240.8	471.0	-12.8	-34.1	272.2	16.6	16.6	-.6	322.9	324.5	.4	14.7	13.3	87.
24.9	64.0	6371.3	463.0	-13.2	-34.5	274.5	16.0	16.0	-1.3	324.0	325.6	.4	14.6	13.8	88.
25.4	65.0	6503.9	455.0	-13.8	-35.2	277.0	14.4	14.3	-1.8	324.9	326.4	.4	14.3	14.3	88.
25.9	66.0	6621.5	448.0	-14.9	-36.3	278.5	13.2	13.1	-2.0	325.0	326.3	.4	14.1	14.7	88.
26.4	67.0	6757.7	440.0	-15.7	-36.8	278.8	12.1	12.0	-1.8	325.6	326.9	.4	14.2	15.1	89.
26.9	68.0	6878.3	433.0	-16.9	-37.6	279.5	11.0	10.9	-1.8	325.5	326.8	.3	14.5	15.4	89.
27.4	69.0	7018.0	425.0	-18.2	-38.4	284.2	9.8	9.5	-2.4	325.7	326.9	.3	14.9	15.7	89.
28.0	70.0	7141.8	418.0	-19.2	-38.7	293.6	9.5	8.7	-3.8	325.9	327.0	.3	15.8	16.0	89.
28.5	71.0	7267.1	411.0	-20.5	-39.5	296.2	11.5	10.3	-5.1	325.9	326.9	.3	16.2	16.3	90.
29.0	72.0	7412.4	403.0	-21.4	-38.5	298.9	11.9	10.4	-5.8	326.5	327.7	.3	19.6	16.6	90.
29.5	73.0	7541.3	396.0	-22.5	-36.7	299.2	11.7	10.2	-5.7	326.7	328.2	.4	25.8	16.9	91.
30.0	74.0	7672.1	389.0	-23.4	-38.3	295.4	11.9	10.7	-5.1	327.2	328.5	.4	23.8	17.3	92.
30.5	75.0	7804.6	382.0	-24.7	-38.1	293.4	11.0	10.1	-4.4	327.1	328.5	.4	27.3	17.6	92.
31.1	76.0	7938.9	375.0	-25.9	-37.3	293.0	10.8	9.9	-4.2	327.3	328.8	.4	33.2	17.9	92.
31.6	77.0	8075.0	368.0	-27.2	-35.7	294.7	12.1	11.0	-5.1	327.3	329.1	.5	44.0	18.2	93.
32.1	78.0	8213.0	361.0	-28.5	-36.1	297.7	13.9	12.3	-6.5	327.4	329.1	.5	47.6	18.6	93.
32.6	79.0	8353.0	354.0	-29.9	-37.4	299.2	15.1	13.2	-7.4	327.4	329.0	.4	47.6	19.0	94.
33.1	80.0	8495.0	347.0	-31.0	-37.4	300.2	14.8	12.8	-7.4	327.7	329.3	.4	53.3	19.4	94.
33.6	81.0	8618.5	341.0	-32.1	-37.7	300.0	14.6	12.6	-7.3	327.9	329.5	.4	57.0	19.8	95.
34.1	82.0	8764.6	334.0	-33.4	-38.6	299.0	14.8	12.9	-7.1	328.1	329.5	.4	59.3	20.2	95.
34.6	83.0	8891.6	328.0	-34.3	-39.6	297.1	14.8	13.2	-6.8	328.5	329.8	.4	58.2	20.6	96
35.1	84.0	9020.6	322.0	-35.3	-40.9	294.0	14.8	13.6	-6.0	328.9	330.1	.3	56.1	21.0	96
35.7	85.0	9173.3	315.0	-36.6	-42.1	290.2	15.3	14.4	-5.3	329.2	330.2	.3	56.5	21.6	97.
36.2	86.0	9306.2	309.0	-37.8	-43.2	288.3	16.3	15.4	-5.1	329.3	330.3	.3	56.8	22.0	97.
36.6	87.0	9463.9	302.0	-38.8	-44.4	288.2	15.7	14.9	-4.9	330.1	331.0	.2	55.0	22.4	97.
37.1	88.0	9578.3	297.0	-39.7	-45.5	288.9	13.7	13.0	-4.5	330.4	331.2	.2	53.5	22.8	97.
37.6	89.0	9717.6	291.0	-40.7	99.9	287.7	13.2	12.6	-4.0	330.9	999.9	99.9	999.9	23.2	98.
38.1	90.0	9859.1	285.0	-41.9	99.9	285.0	12.8	12.4	-3.3	331.1	999.9	99.9	999.9	23.6	98.
38.6	91.0	10002.9	279.0	-43.0	99.9	281.3	12.3	12.1	-2.4	331.6	999.9	99.9	999.9	24.0	98.
39.1	92.0	10149.1	273.0	-44.1	99.9	277.4	11.9	11.8	-1.5	332.0	999.9	99.9	999.9	24.4	98.
39.7	93.0	10297.8	267.0	-45.3	99.9	273.8	12.7	12.7	-.8	332.5	999.9	99.9	999.9	24.8	98.
40.2	94.0	10449.1	261.0	-46.4	99.9	271.8	13.5	13.5	-.4	333.0	999.9	99.9	999.9	25.2	98.
40.7	95.0	10577.3	256.0	-47.5	99.9	270.4	14.0	14.0	-.1	333.1	999.9	99.9	999.9	25.6	98.

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* BY TEMP MEANS TEMPERATURE OR TIME HAVE BEEN INTERPOLATED
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STATION NO. 2
WHEELER RIDGE, CALIF

4 JULY 1982
1540 GMT

152 30. 0

TIME MIN	CNTCT	HEIGHT GPM	PRES MB	TEMP DG C	DEW PT DG C	DIR DG	SPEED M/SEC	U COMP M/SEC	V COMP M/SEC	POT T DG K	E POT T DG K	MX RTO GM/KG	RH PCT	RANGE KM	AZ DG
41.3	96.0	10733.7	250.0	-48.4	99.9	270.6	15.2	15.2	-.2	334.1	999.9	99.9	999.9	26.1	97.
41.8	97.0	10893.2	244.0	-49.6	99.9	272.3	14.6	14.6	-.6	334.6	999.9	99.9	999.9	26.6	97.
42.3	98.0	11028.5	239.0	-50.5	99.9	274.6	13.5	13.4	-1.1	335.3	999.9	99.9	999.9	27.0	97.
42.8	99.0	11166.3	234.0	-50.7	99.9	275.9	13.5	13.5	-1.4	337.1	999.9	99.9	999.9	27.4	97.
43.4	100.0	11335.5	228.0	-51.1	99.9	275.7	14.2	14.2	-1.4	338.9	999.9	99.9	999.9	27.9	97.
44.0	101.0	11479.5	223.0	-51.6	99.9	277.8	14.9	14.8	-2.0	340.4	999.9	99.9	999.9	28.4	97.
44.5	102.0	11626.4	218.0	-52.6	99.9	284.3	14.7	14.2	-3.6	340.9	999.9	99.9	999.9	28.9	97.
45.1	103.0	11775.8	213.0	-53.7	99.9	293.3	15.8	14.5	-6.2	341.5	999.9	99.9	999.9	29.4	98.
45.6	104.0	11928.3	208.0	-54.4	99.9	297.5	18.0	16.0	-8.3	342.8	999.9	99.9	999.9	29.9	98.
46.1	105.0	12083.9	203.0	-55.2	99.9	301.7	18.8	16.0	-9.9	343.9	999.9	99.9	999.9	30.4	98.
46.7	106.0	12242.9	198.0	-55.8	99.9	304.0	19.4	16.1	-10.9	345.4	999.9	99.9	999.9	31.0	99.
47.2	107.0	12405.9	193.0	-55.5	99.9	304.3	19.2	15.9	-10.8	348.4	999.9	99.9	999.9	31.5	99.
47.7	108.0	12573.3	188.0	-5[illegible]3	99.9	308.7	17.6	13.8	-11.0	351.3	999.9	99.9	999.9	32.1	100.
48.3	109.0	12710.1	184.0	-56.5	99.9	317.2	16.8	11.4	-12.4	351.6	999.9	99.9	999.9	32.6	100.
48.9	110.0	12884.7	179.0	-57.1	99.9	321.6	14.8	9.2	-11.6	353.3	999.9	99.9	999.9	33.0	101.
49.5	111.0	13027.5	175.0	-57.7	99.9	320.7	11.4	7.2	-8.8	354.8	999.9	99.9	999.9	33.4	101.
50.0	112.0	13210.2	170.0	-58.5	99.9	334.9	7.4	3.1	-6.7	356.3	999.9	99.9	999.9	33.6	102.
50.6	113.0	13359.5	166.0	-59.5	99.9	339.6	6.7	2.3	-6.3	357.0	999.9	99.9	999.9	33.7	102.
51.1	114.0	13550.9	161.0	-59.5	99.9	319.7	9.8	6.3	-7.5	360.2	999.9	99.9	999.9	33.8	102.
51.6	115.0	13708.4	157.0	-59.4	99.9	320.4	10.9	7.0	-8.4	363.1	999.9	99.9	999.9	34.1	103
52.2	116.0	13869.8	153.0	-59.7	99.9	322.0	11.6	7.1	-9.1	365.2	999.9	99.9	999.9	34.4	103.
52.7	117.0	14035.3	149.0	-60.2	99.9	310.5	13.6	10.3	-8.8	367.0	999.9	99.9	999.9	34.7	104.
53.3	118.0	14204.6	145.0	-61.3	99.9	299.3	17.3	15.1	-8.5	368.0	999.9	99.9	999.9	35.2	104.
53.9	119.0	14378.2	141.0	-61.1	99.9	300.1	20.3	17.5	-10.1	371.3	999.9	99.9	999.9	35.9	104.
54.5	120.0	14557.0	137.0	-60.9	99.9	294.9	21.3	19.3	-9.0	374.7	999.9	99.9	999.9	36.6	104.
55.2	121.0	14741.2	133.0	-60.9	99.9	263.6	20.2	20.0	2.2	377.9	999.9	99.9	999.9	37.5	104.
55.7	122.0	14882.9	130.0	-61.3	99.9	254.6	20.1	19.3	5.3	379.7	999.9	99.9	999.9	38.0	104.
56.3	123.0	15076.8	126.0	-61.3	99.9	265.9	18.6	18.5	1.3	383.1	999.9	99.9	999.9	38.7	103
56.9	124.0	15277.4	122.0	-60.6	99.9	271.9	15.3	15.3	-.5	388.0	999.9	99.9	999.9	39.3	103
57.5	125.0	15432.1	119.0	-61.3	99.9	267.8	11.3	11.3	.4	389.4	999.9	99.9	999.9	39.7	103
58.1	126.0	15644.6	115.0	-60.8	99.9	265.0	8.2	8.1	.7	394.3	999.9	99.9	999.9	40.1	103.
58.7	127.0	15809.2	112.0	-60.2	99.9	263.6	5.8	5.7	.6	398.2	999.9	99.9	999.9	40.3	103.
59.3	128.0	15978.8	109.0	-59.5	99.9	265.7	6.4	6.4	.5	402.7	999.9	99.9	999.9	40.5	103.
60.0	129.0	16212.7	105.0	-59.7	99.9	259.9	6.9	6.8	1.2	406.7	999.9	99.9	999.9	40.8	103.
60.6	130.0	16393.8	102.0	-60.1	99.9	253.7	5.6	5.4	1.6	409.4	999.9	99.9	999.9	41.0	102.
61.3	131.0	16580.5	99.0	-59.2	99.9	253.9	5.1	4.9	1.4	414.6	999.9	99.9	999.9	41.1	102.
62.0	132.0	16773.3	96.0	-59.4	99.9	255.8	6.3	6.1	1.5	417.9	999.9	99.9	999.9	41.3	102.
62.7	133.0	16972.5	93.0	-58.5	99.9	260.0	7.6	7.5	1.3	423.4	999.9	99.9	999.9	41.6	102.
63.4	134.0	17179.0	90.0	-57.8	99.9	254.0	7.4	7.1	2.0	428.0	999.9	99.9	999.9	41.9	102.
64.1	135.0	17393.0	87.0	-57.5	99.9	248.4	6.9	6.4	2.5	433.6	999.9	99.9	999.9	42.2	102.
64.8	136.0	17614.0	84.0	-58.0	99.9	257.9	6.4	6.2	1.3	435.2	999.9	99.9	999.9	42.4	101.
65.5	137.0	17842.1	81.0	-59.2	99.9	268.4	6.2	6.2	.2	439.1	999.9	99.9	999.9	42.7	101.
66.2	138.0	18079.0	78.0	-58.5	99.9	264.8	5.0	5.0	.5	445.3	999.9	99.9	999.9	42.9	101.
67.0	139.0	18325.8	75.0	-58.2	99.9	253.8	3.4	3.3	1.0	451.0	999.9	99.9	999.9	43.1	101.
67.8	140.0	18496.6	73.0	-56.8	99.9	279.1	2.2	2.1	-.3	457.3	999.9	99.9	999.9	43.2	101.

* BY SPEED MEANS ELEVATION ANGLE BETWEEN 6 AND [illegible]9 DEG
* BY TEMP MEANS TEMPERATURE OR TIME HAVE BEEN INTERPOLATED
** BY SPEED MEANS ELEVATION ANGLE LESS THAN 6 DEG

STATION NO. 2
WHEELER RIDGE, CALIF

4 JULY 1982
1540 GMT

152 30. 0

TIME MIN	CNTCT	HEIGHT GPM	PRES MB	TEMP DG C	DEW PT DG C	DIR DG	SPEED M/SEC	U COMP M/SEC	V COMP M/SEC	POT T DG K	E POT T DG K	MX RTO GM/KG	RH PCT	RANGE KM	AZ DG
68.6	141.0	18762.1	70.0	-57.5	99.9	318.0	2.1	1.4	-1.6	461.4	999.9	99.9	999.9	43.2	101
69.4	142.0	19039.0	67.0	-57.1	99.9	359.7	1.7	.0	-1.7	468.0	999.9	99.9	999.9	43.4	101.
70.2	143.0	19230.8	65.0	-57.0	99.9	21.0	1.7	-.6	-1.6	472.4	999.9	99.9	999.9	43.3	101.
71.0	144.0	19529.7	62.0	-57.5	99.9	353.6	2.2	.2	-2.2	477.7	999.9	99.9	999.9	43.4	101
71.8	145.0	19843.4	59.0	-57.0	99.9	36.1	3.0	-2.5	-1.7	485.7	999.9	99.9	999.9	43.4	102.
72.7	146.0	20061.8	57.0	-56.8	99.9	61.7	.7	-.6	-.3	490.9	999.9	99.9	999.9	43.2	102.
73.6	147.0	20405.2	54.0	-55.8	99.9	110.2	1.2	-1.1	.4	500.8	999.9	99.9	999.9	43.3	102.
74.6	148.0	20646.2	52.0	-54.5	99.9	86.3	3.0	-3.0	-.2	509.2	999.9	99.9	999.9	43.0	102.
75.5	149.0	21027.7	49.0	-53.4	99.9	90.7	6.9	-6.9	.1	520.6	999.9	99.9	999.9	42.9	102
76.5	150.0	21295.8	47.0	-53.6	99.9	89.3	10.9	-10.9	-.1	526.5	999.9	99.9	999.9	42.3	102.
77.6	151.0	21575.7	45.0	-53.3	99.9	90.7	9.2	-9.2	.1	533.8	999.9	99.9	999.9	41.6	102.
78.7	152.0	22020.7	42.0	-52.6	99.9	92.9	4.7	-4.7	.2	546.0	999.9	99.9	999.9	41.2	102.
79.8	153.0	22501.5	39.0	-50.7	99.9	64.9	6.7	-6.1	-2.8	562.7	999.9	99.9	999.9	40.9	102.
80.9	154.0	22843.3	37.0	-52.3	99.9	72.6	10.2	-9.7	-3.0	566.9	999.9	99.9	999.9	40.4	103.
82.2	155.0	23391.3	34.0	-51.4	99.9	85.9	9.9	-9.8	-.7	583.2	999.9	99.9	999.9	39.7	103
83.5	156.0	23786.4	32.0	-49.9	99.9	999.9	99.9	99.9	99.9	597.5	999.9	99.9	999.9	999.9	999
84.8	157.0	24210.4	30.0	-47.8	99.9	999.9	99.9	99.9	99.9	614.2	999.9	99.9	999.9	999.9	999

APPENDIX B

30-SECOND DATA

STATION NO. 2
WHEELER RIDGE, CALIF

4 JULY 1982
1440 GMT

TIME MIN	CNTCT	HEIGHT GPM	PRES MB	TEMP DG C	DEW PT DG C	DIR DG	SPEED M/SEC	R HUM PCT
0.0	6.8	148.0	999.6	18.0	12.9	330.0	0.0	72.0
.5	7.8	241.2	988.8	16.4	8.6	324.1	1.6	59.7
1.0	9.0	360.2	975.0	15.6	7.4	310.7	2.2	58.2
1.5	10.3	478.5	961.5	14.8	7.0	308.7	2.6	59.7
2.0	11.4	583.9	949.6	14.6	6.1	306.7	2.4	56.5
2.5	12.5	692.3	937.5	14.1	5.9	291.3	2.4	57.9
3.0	13.6	801.9	925.4	13.2	5.8	276.2	2.8	60.9
3.5	14.8	910.7	913.5	12.3	5.7	271.6	3.4	64.2
4.0	16.0	1035.5	900.0	12.1	6.0	269.7	3.8	66.4
4.5	17.3	1152.8	887.5	11.7	5.7	274.3	2.9	66.7
5.0	18.4	1265.8	875.6	11.3	5.0	299.1	1.7	64.9
5.5	19.5	1377.2	864.0	10.6	4.0	343.8	1.7	63.4
6.0	20.8	1506.0	850.8	10.2	3.1	355.6	2.8	61.3
6.5	22.0	1631.6	838.0	10.1	1.4	1.0	4.4	54.8
7.0	23.3	1756.7	825.5	9.6	3.9	359.7	4.9	67.4
7.5	24.5	1883.7	813.0	9.6	5.3	339.7	4.1	74.7
8.0	25.6	1996.9	802.0	9.4	4.3	305.2	4.3	70.5
8.5	26.6	2094.7	792.6	8.7	3.8	292.7	5.5	71.1
9.0	27.8	2211.5	781.5	8.4	-.9	288.5	6.0	52.8
9.5	28.8	2323.3	771.0	8.6	-6.4	278.1	6.2	34.4
10.0	30.0	2452.0	759.0	8.1	-8.2	272.4	6.5	30.4
10.5	31.0	2562.1	749.0	7.6	-10.8	272.7	7.9	25.8
11.0	32.3	2689.6	737.5	7.3	-11.9	272.4	9.8	24.8
11.5	33.4	2810.9	726.0	6.9	-6.9	270.5	11.2	36.6
12.0	34.5	2938.4	715.5	6.0	-8.7	268.1	12.2	33.9
12.5	35.8	3068.0	704.3	5.3	-9.0	265.1	12.5	34.8
13.0	36.8	3178.1	694.8	4.5	-8.5	261.9	12.4	38.4
13.5	37.8	3293.7	685.0	3.9	-18.1	259.9	12.3	19.8
14.0	38.7	3397.1	676.3	3.6	-20.7	259.8	12.5	14.8
14.5	39.6	3510.0	666.3	3.1	-21.2	260.4	12.8	14.8
15.0	40.8	3634.3	656.6	2.3	-21.8	261.1	12.7	14.8
15.5	41.8	3745.5	647.8	1.5	-22.3	262.2	12.8	14.9
16.0	43.0	3880.5	637.0	.7	-23.0	263.1	12.9	15.0
16.5	44.0	3994.7	628.0	.4	-10.5	262.4	12.9	43.9
17.0	45.0	4123.2	618.0	-.9	-10.7	261.1	14.1	47.2
17.5	46.0	4266.4	607.0	-1.9	-11.3	258.6	15.3	48.5
18.0	47.2	4409.3	596.2	-2.6	-10.9	256.0	15.8	53.0
18.5	48.2	4529.9	587.2	-3.3	-10.0	254.3	16.2	59.9
19.0	49.2	4651.9	578.2	-4.3	-10.7	253.2	16.7	61.2
19.5	50.2	4775.5	569.2	-5.2	-10.2	252.1	17.2	67.6
20.0	51.3	4903.4	560.0	-6.3	-10.6	250.9	17.5	71.6
20.5	52.4	5032.9	550.8	-7.4	-11.4	250.1	17.2	72.9
21.0	53.4	5152.5	542.4	-8.2	-19.2	250.2	16.6	48.5
21.5	54.4	5276.6	533.8	-8.5	-25.8	251.7	15.9	24.9
22.0	55.4	5399.5	525.4	-9.1	-19.8	254.4	15.3	41.9
22.5	56.4	5527.0	516.8	-10.8	-19.0	257.1	15.1	47.6
23.0	57.4	5647.2	508.8	-10.8	-19.7	258.6	15.6	47.7
23.5	58.4	5769.0	500.8	-11.4	-20.2	259.1	17.1	48.0
24.0	59.4	5898.0	492.4	-11.7	-21.8	259.0	18.6	42.7
24.5	60.4	6033.6	483.8	-12.3	-23.7	258.5	18.8	38.1

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STATION NO. 2
WHEELER RIDGE, CALIF

4 JULY 1982
1440 GMT

TIME MIN	CNTCT	HEIGHT GPM	PRES MB	TEMP DG C	DEW PT DG C	DIR DG	SPEED M/SEC	R HUM PCT
25.0	61.4	6154.4	476.2	-13.2	-26.3	258.3	18.1	32.3
25.5	62.4	6273.5	468.8	-14.3	-28.4	259.8	17.8	28.9
26.0	63.4	6483.8	460.8	-15.2	-31.4	262.9	18.1	23.9
26.5	64.4	6536.1	452.8	-15.7	-34.9	265.5	18.3	17.3
27.0	65 4	6663.7	445.2	-16.0	-36.0	266.5	18.1	15.9
27.5	66.4	6789.9	437.8	-16.4	-36.7	266.5	17.0	15.2
28.0	67.3	6919.2	430.3	-16.8	-37.1	266.8	14.9	15.1
28.5	68.2	7037.4	423.6	-17.6	-37.8	267.8	13.8	15.1
29.0	69.2	7165.5	416.4	-18.6	-38.6	269.7	12.2	15.2
29.5	70.2	7306.2	408.6	-19.6	-39.3	272.3	11.7	15.4
30.0	71.2	7434.3	401.6	-20.9	-40.2	275.9	11.3	15.6
30.5	72.2	7562.6	394.7	-22.3	-41.1	281.4	11.0	16.0
31.0	73.0	7687.4	388.0	-23.3	-41.7	290.2	10.3	16.5
31.5	73.8	7782.3	383.0	-24.4	-42.3	296.1	10.8	17.1
32.0	74.8	7900.7	376.4	-25.5	-42.5	297.2	12.4	18.5
32.5	75.8	8060.4	368.6	-26.4	-42.6	298.4	13.2	19.9
33.0	76 8	8202.6	361.4	-27.8	-42.7	301.0	12.6	22.2
33.5	77.7	8318.6	356.0	-28.7	-42.5	300.1	12.0	24.9
34.0	78.6	8436.3	349.8	-29.8	-42.4	296.9	13.5	28.1
34.5	79.5	8565.5	343.5	-31.0	-42.6	294.1	14.1	30.6
35.0	80.4	8696.6	337.2	-32.1	-43.1	292.6	13.9	32.4
35.5	81.3	8827.3	331.0	-33.1	-43.5	291.7	13.2	33.8
36.0	82.2	8942.7	325.6	-34.0	-44.2	290.2	12.9	34.5
36.5	83.2	9090.2	318.8	-35.2	-45.2	289.1	13.0	34.7
37.0	84.2	9217.9	313.0	-36.2	-45.9	290.3	12.9	35.4
37.5	85 0	9329.3	308.0	-37.2	-46.7	290.2	14.5	36.1
38.0	86.0	9487.0	301.0	-38.4	-47.4	289.5	16.3	37.7
38.5	87.0	9626.0	295.0	-39.5	-47.9	289.7	15.8	39.9
39.0	88.0	9766.3	289.0	-40.6	99.9	287.8	15.8	999.9
39.5	89.0	9900.9	283.0	-41.7	99.9	284.6	15.8	999.9
40.0	90.0	10053.7	277.0	-43.0	99.9	280.5	16.1	999.9
40.5	91 0	10201.0	271.0	-44.0	99.9	277.8	14.0	999.9
41.0	91.8	10305.0	266.0	-44.0	99.9	275.7	13.6	999.9
41.5	92.8	10447.3	261.2	-46.3	99.9	273.3	14.5	999.9
42.0	93.8	10601.4	255.2	-47.4	99.9	270.3	14.3	999.9
42.5	94.8	10750.2	249.2	-48.7	99.9	267.8	13.2	999.9
43.0	95.8	10896.5	244.0	-49.7	99.9	268.3	12.4	999.9
43.5	96.8	11031.7	239.0	-50.5	99.9	272.3	12.8	999.9
44.0	97.8	11191.8	233.2	-51.2	99.9	276.4	12.8	999.9
44.5	98.7	11319.3	228.7	-51.6	99.9	277.7	13.5	999.9
45.0	99.6	11453.8	224.0	-52.2	99.9	277.6	15.6	999.9
45.5	100.6	11616.8	218.4	-52.9	99.9	278.9	17.5	999.9
46.0	101.6	11778.8	213.0	-53.2	99.9	283.3	17.8	999.9
46.5	102.6	11930.8	208.0	-54.8	99.9	290.0	18.0	999.9
47.0	103.5	12070.9	203.5	-54.9	99.9	296.1	19.0	999.9
47.5	104.4	12213.7	199.0	-55.5	99.9	301.3	19.9	999.9
48.0	105.3	12353.7	194.7	-55.8	99.9	306.3	19.4	999.9
48.5	106.2	12469.3	191.2	-55.8	99.9	310.6	18.3	999.9
49.0	107.0	12609.3	187.0	-55.7	99.9	312.7	17.4	999.9
49.5	107.8	12753.0	182.8	-56.1	99.9	316.4	15.8	999.9

STATION NO. 2
WHEELER RIDGE, CALIF

4 JULY 1982
1440 GMT

TIME MIN	CNTCT	HEIGHT GPM	PRES MB	TEMP DG C	DEW PT DG C	DIR DG	SPEED M/SEC	R HUM PCT
50.0	108.8	12894.6	178.8	-56.7	99.9	319.7	13.9	999.9
50.5	109.7	13018.5	175.3	-57.7	99.9	317.5	12.4	999.9
51.0	110.5	13158.0	171.5	-58.5	99.9	311.1	11.5	999.9
51.5	111.5	13324.7	167.0	-59.5	99.9	304.3	11.2	999.9
52.0	112.5	13476.2	163.0	-60.1	99.9	300.3	11.7	999.9
52.5	113.3	13618.5	159.3	-60.0	99.9	298.2	12.7	999.9
53.0	114.2	13776.9	155.3	-59.6	99.9	298.0	13.5	999.9
53.5	115.0	13912.1	152.0	-60.4	99.9	300.3	13.2	999.9
54.0	115.8	14050.7	148.7	-60.4	99.9	296.8	14.0	999.9
54.5	116.8	14215.4	144.8	-59.4	99.9	291.5	13.3	999.9
55.0	117.6	14350.7	141.7	-58.7	99.9	282.1	12.2	999.9
55.5	118.4	14499.3	138.4	-58.9	99.9	271.1	11.9	999.9
56.0	119.3	14670.4	134.7	-60.0	99.9	999.9	99.9	999.9
56.5	120.2	14823.2	131.4	-60.8	99.9	999.9	99.9	999.9
57.0	121	14970.2	128.3	-60.8	99.9	999.9	99.9	999.9
57.5	122.0	15133.7	125.0	-60.2	99.9	999.9	99.9	999.9
58.0	122.8	15302.7	121.7	-60.3	99.9	999.9	99.9	999.9

STATION NO. 2
WHEELER RIDGE, CALIF

4 JULY 1982
1540 GMT

152 30.

TIME MIN	CNTCT	HEIGHT GPM	PRES MB	TEMP DG C	DEW PT DG C	DIR DG	SPEED M/SEC	R HUM PCT
0.0	6.7	148.0	1000.1	15.7	8.7	300.0	1.5	63.0
.5	8.3	290.7	983.5	16.6	6.9	273.5	1.7	52.6
1.0	9.4	397.9	971.2	15.9	6.4	276.6	2.0	53.1
1.5	10.5	505.2	959.0	15.1	6.3	279.2	2.5	55.6
2.0	12.0	638.6	944.0	14.5	6.4	280.8	3.1	58.2
2.5	13.3	753.5	931.3	13.6	5.7	283.6	3.5	58.8
3.0	14.5	874.2	918.0	13.1	5.2	274.9	3.4	58.6
3.5	15.8	996.5	904.8	12.7	5.1	267.1	3.4	59.9
4.0	17.0	1106.0	893.0	11.6	4.7	275.0	3.4	62.6
4.5	18.0	1209.7	882.0	11.9	4.2	277.3	2.7	62.6
5.0	19.3	1329.0	869.5	10.9	4.0	289.0	1.7	62.5
5.5	20.5	1449.8	857.0	10.4	3.5	333.8	1.4	62.3
6.0	21.8	1572.1	844.5	9.9	1.7	.8	2.4	56.8
6.5	23.0	1696.8	832.0	9.9	1.7	16.8	4.0	56.6
7.0	24.0	1796.7	822.0	9.9	4.7	1.4	4.1	69.7
7.5	25.5	1950.0	807.0	9.5	3.8	327.7	4.1	67.7
8.0	26.6	2063.9	796.0	8.5	2.9	306.6	4.7	67.9
8.5	27.6	2168.4	786.0	7.7	2.8	296.0	5.4	71.4
9.0	28.8	2281.9	775.3	7.4	-1.5	286.5	6.3	54.3
9.5	30.0	2413.0	763.0	7.4	-8.3	274.9	7.7	31.8
10.0	31.3	2546.2	750.8	7.2	-15.8	273.1	8.7	17.6
10.5	32.5	2675.9	739.0	6.9	-15.9	270.2	9.8	17.9
11.0	33.6	2798.9	728.0	6.6	-15.5	267.4	10.7	18.7
11.5	34.6	2905.5	718.6	6.4	-16.9	265.8	11.2	17.0
12.0	35.8	3033.0	707.5	6.2	-17.0	265.6	11.3	17.0
12.5	37.0	3167.0	696.0	5.6	-18.8	266.1	11.2	15.2
13.0	38.2	3294.6	685.2	4.7	-18.9	265.3	10.9	15.9
13.5	39.3	3410.6	675.5	3.7	-19.7	264.1	10.9	16.1
14.0	40.3	3537 5	665.0	2.8	-20.6	264.1	11.1	15.8
14.5	41.3	3651.7	655.7	2.0	-21.5	265.3	11.7	15.5
15.0	42.8	3808.8	643.0	1.2	-12.5	266.8	12.7	38.1
15.5	44.0	3960.1	631.0	.3	-8.2	266.2	12.6	52.8
16.0	45.0	4075.2	622.0	-.8	-8.1	265.0	12.9	57.7
16.5	46.2	4202.8	612.2	-1.8	-8.3	263.5	13.8	61.2
17.0	47.2	4319.7	603.2	-2.8	-8.6	260.3	14.6	63.9
17.5	48.3	4444.0	593.0	-3.6	-9.0	256.5	15.6	62.4
18.0	49.4	4563.8	583.4	-4.2	-13.0	253.7	16.1	50.3
18.5	50.5	4711.8	574.0	-4.8	-17.4	252.7	16.2	37.4
19.0	51.6	4841.6	564.6	-5.1	-24.4	253.8	15.4	20.9
19.5	52.6	4959.2	556.2	-5.8	-22.5	256.4	14.4	26.9
20.0	53.6	5081.1	547.6	-7.0	-18.8	260.0	14.1	38.3
20.5	54.8	5210.8	538.0	-8.0	-18.7	263.4	14.8	41.8
21.0	55.8	5340.9	529.6	-9.0	-19.4	265.3	15.8	42.6
21.5	57.0	5497.8	519.0	-10.1	-20.8	265.6	15.2	40.9
22.0	58.0	5616.7	511.8	-10.6	-20.7	264.4	13.4	43.1
22.5	59.0	5730.1	503.0	-10.8	-25.2	264.4	15.1	29.2
23.0	60.0	5861.3	495.0	-11.2	-27.4	265.3	17.4	24.6
23.5	61.2	6011.3	485.4	-12.6	-31.8	267.2	17.2	18.4
24.0	62.2	6138.8	477.4	-13.1	-33.7	270.8	16.6	15.8
24.5	63.2	6266.9	469.4	-12.9	-34.2	272.6	16.5	14.7

STATION NO. 2
WHEELER RIDGE, CALIF

4 JULY 1982
1540 GMT

152 30. 0

TIME MIN	CNTCT	HEIGHT GPM	PRES MB	TEMP DG C	DEW PT DG C	DIR DG	SPEED M/SEC	R HUM PCT
25.0	64.2	6397.9	461.4	-13.3	-34.7	275.0	15.7	14.5
25.5	65.2	6527.5	453.6	-14.0	-35.4	277.3	14.2	14.3
26.0	66.2	6648.7	446.4	-15.0	-36.4	278.6	13.0	14.1
26.5	67.2	6781.8	438.6	-16.0	-37.0	278.9	11.9	14.3
27.0	68.2	6906.3	431.4	-17.2	-37.8	280.3	10.8	14.6
27.5	69.2	7038.6	423.8	-18.3	-38.5	285.7	9.7	15.0
28.0	70.0	7141.8	418.0	-19.2	-38.7	293.6	9.5	15.8
28.5	71.0	7267.1	411.0	-20.5	-39.5	296.2	11.5	16.2
29.0	72.0	7412.4	403.0	-21.4	-38.5	298.9	11.9	19.6
29.5	73.0	7541.3	396.0	-22.5	-36.7	299.2	11.7	25.8
30.0	74.0	7672.1	389.0	-23.4	-38.3	295.4	11.9	23.8
30.5	75.0	7804.4	382.0	-24.7	-38.1	293.4	11.0	27.3
31.0	75.8	7916.5	376.2	-25.7	-37.4	293.1	10.8	32.2
31.5	76.8	8047.8	369.0	-27.0	-36.0	294.4	11.9	41.8
32.0	77.8	8185.4	362.4	-28.3	-36.1	297.1	13.6	46.9
32.5	78.8	8325.0	355.4	-29.6	-37.1	298.9	14.9	47.6
33.0	79.8	8466.6	348.4	-30.8	-37.4	300.0	14.8	52.1
33.5	80.8	8593.8	342.2	-31.9	-37.7	300.0	14.6	56.2
34.0	81.8	8735.3	335.4	-33.2	-38.1	299.2	14.7	58.8
34.5	82.8	8866.2	329.2	-34.2	-39.4	297.5	14 8	58.4
35.0	83.8	8994.8	323.2	-35.1	-40.6	294.6	14.8	56.5
35.5	84.7	9122.4	317.3	-36.2	-41.7	291.4	15.2	56.4
36.0	85.6	9253.1	311.4	-37.3	-42.7	289.0	15.9	56.7
36.5	86.6	9424.5	303.7	-38.5	-44.1	288.2	15.8	55.4
37.0	87.8	9555.4	298.0	-39.5	-45.3	288.8	14.1	53.8
37.5	88.8	9689.7	292.2	-40.5	99.9	288.0	13.3	999.9
38.0	89.8	9830.8	286.2	-41.7	99.9	285.6	12.9	999.9
38.5	90.8	9974.1	280.2	-42.8	99.9	282.0	12.4	999.9
39.0	91.8	10119.8	274.2	-43.9	99.9	278.2	11.9	999.9
39.5	92.7	10248.2	269.0	-44.9	99.9	274.9	12.4	999.9
40.0	93.6	10388.6	263.4	-45.9	99.9	272.5	13.2	999.9
40.5	94.6	10526.8	258.0	-47.1	99.9	270.9	13.8	999.9
41.0	95.5	10655.5	253.0	-48.0	99.9	270.5	14.6	999.9
41.5	96.4	10797.5	247.6	-48.9	99.9	271.3	15.0	999.9
42.0	97.4	10947.3	242.0	-50.0	99.9	273.2	14.2	999.9
42.5	98.4	11083.6	237.0	-50.6	99.9	275.1	13.5	999.9
43.0	99.3	11222.7	232.0	-50.8	99.9	275.8	13.8	999.9
43.5	100.2	11359.5	227.2	-51.2	99.9	276.1	14.3	999.9
44.0	101.0	11479.5	223.0	-51.6	99.9	277.8	14.9	999.9
44.5	102.0	11626.4	218.0	-52.6	99.9	284.3	14.7	999.9
45.0	102.8	11750.9	213.8	-53.6	99.9	291.9	15.6	999.9
45.5	103.8	11897.8	209.0	-54.3	99.9	296.7	17.6	999.9
46.0	104.8	12052.8	204.0	-55.0	99.9	300.9	18.6	999.9
46.5	105.7	12189.9	199.7	-55.6	99.9	303.2	19.2	999.9
47.0	106.6	12340.7	195.0	-55.6	99.9	304.1	19.3	999.9
47.5	107.6	12506.3	190.0	-55.4	99.9	306.8	18.2	999.9
48.0	108.5	12641.7	186.0	-55.9	99.9	312.9	17.2	999.9
48.5	109.3	12768.3	182.3	-56.7	99.9	318.6	16.2	999.9
49.0	110.2	12908.5	178.3	-57.2	99.9	321.5	14.2	999.9
49.5	111.0	13027.5	175.0	-57.7	99.9	320.7	11.4	999.9

STATION NO. 2
WHEELER RIDGE, CALIF

4 JULY 1982
1540 GMT

152 30. 0

TIME MIN	CNTCT	HEIGHT GPM	PRES MB	TEMP DG C	DEW PT DG C	DIR DG	SPEED M/SEC	R HUM PCT
50.0	112.0	13210.2	170.0	-58.5	99.9	334.9	7.4	999.9
50.5	112.8	13334.6	166.7	-59.4	99.9	338.8	6.8	999.9
51.0	113.8	13512.6	162.0	-59.5	99.9	322.6	9.1	999.9
51.5	114.8	13676.9	157.8	-59.4	99.9	320.3	10.7	999.9
52.0	115.7	13816.0	154.3	-59.6	99.9	321.5	11.3	999.9
52.5	116.6	13969.1	150.6	-60.0	99.9	314.7	12.7	999.9
53.0	117.5	14119.9	147.0	-60.8	99.9	304.3	15.4	999.9
53.5	118.3	14262.4	143.7	-61.2	99.9	299.6	18.3	999.9
54.0	119.2	14408.0	140.3	-61.1	99.9	299.2	20.4	999.9
54.5	120.0	14557.0	137.0	-60.9	99.9	294.9	21.3	999.9
55.0	120.7	14688.6	134.1	-60.9	99.9	272.8	19.8	999.9
55.5	121.6	14826.2	131.2	-61.2	99.9	258.2	20.0	999.9
56.0	122.5	14979.9	128.0	-61.3	99.9	260.0	19.2	999.9
56.5	123.3	15143.7	124.7	-61.1	99.9	267.6	17.4	999.9
57.0	124.2	15303.2	121.5	-61.7	99.9	271.4	14.6	999.9
57.5	125.0	15432.1	119.0	-61.3	99.9	267.8	11.3	999.9
58.0	125.8	15609.2	115.7	-60.9	99.9	265.6	8.7	999.9
58.5	126.7	15754.3	113.0	-60.4	99.9	264.2	6.6	999.9
59.0	127.5	15894.0	110.5	-59.9	99.9	264.7	6.1	999.9
59.5	128.3	16045.6	107.9	-59.6	99.9	263.9	6.5	999.9
60.0	129.0	16212.7	105.0	-59.7	99.9	259.9	6.9	999.9
60.5	129.8	16363.6	102.5	-60.0	99.9	254.9	5.8	999.9
61.0	130.6	16508.5	100.3	-59.6	99.9	253.8	5.3	999.9
61.5	131.3	16635.6	98.1	-59.2	99.9	254.5	5.5	999.9
62.0	132.0	16773.3	96.0	-59.4	99.9	255.8	6.3	999.9
62.5	132.7	16915.6	93.9	-58.7	99.9	258.9	7.2	999.9
63.0	133.4	17061.0	91.7	-58.2	99.9	257.4	7.5	999.9
63.5	134.1	17209.6	89.6	-57.8	99.9	253.3	7.3	999.9
64.0	134.9	17362.4	87.4	-57.5	99.9	249.2	7.0	999.9
64.5	135.6	17519.3	85.3	-58.3	99.9	253.7	6.6	999.9
65.0	136.3	17679.2	83.1	-58.9	99.9	260.9	6.3	999.9
65.5	137.0	17842.1	81.0	-59.2	99.9	268.4	6.2	999.9
66.0	137.7	18011.3	78.9	-58.7	99.9	266.0	5.4	999.9
66.5	138.4	18171.6	76.9	-58.4	99.9	261.6	4.4	999.9
67.0	139.0	18325.8	75.0	-58.2	99.9	253.8	3.4	999.9
67.5	139.6	18432.5	73.8	-57.3	99.9	266.7	2.6	999.9
68.0	140.3	18562.9	72.3	-57.0	99.9	288.3	2.1	999.9
68.5	140.9	18728.9	70.4	-57.4	99.9	313.3	2.1	999.9
69.0	141.5	18900.5	68.5	-57.3	99.9	336.0	1.8	999.9
69.5	142.1	19063.8	66.7	-57.1	99.9	2.3	1.7	999.9
70.0	142.8	19182.9	65.5	-57.0	99.9	15.7	1.7	999.9
70.5	143.4	19342.9	63.9	-57.2	99.9	9.0	1.9	999.9
71.0	144.0	19529.7	62.0	-57.5	99.9	353.6	2.2	999.9
71.5	144.6	19725.7	60.1	-57.2	99.9	37.9	2.4	999.9
72.0	145.2	19891.9	58.6	-56.9	99.9	56.4	2.5	999.9
72.5	145.8	20013.3	57.4	-56.9	99.9	58.5	1.2	999.9
73.0	146.3	20176.3	56.0	-56.5	99.9	84.9	.8	999.9
73.5	146.9	20367.1	54.3	-55.9	99.9	107.5	1.1	999.9
74.0	147.4	20501.6	53.2	-55.3	99.9	95.2	1.9	999.9
74.5	147.9	20622.1	52.2	-54.7	99.9	87.3	2.8	999.9

STATION NO. 2
WHEELER RIDGE, CALIF

4 JULY 1982
1540 GMT

TIME MIN	CNTCT	WEIGHT GPM	PRES MB	TEMP DG C	DEW PT DG C	DIR DG	SPEED M/SEC	R HUM PCT
75.0	148.4	20815.7	50.7	-54.0	99.9	89.1	4.7	999.9
75.5	149.0	21027.7	49.0	-53.4	99.9	90.7	6.9	999.9
76.0	149.3	21161.7	48.0	-53.5	99.9	88.8	8.9	999.9
76.5	150.0	21295.8	47.0	-53.6	99.9	89.3	10.9	999.9
77.0	150.5	21423.0	46.1	-53.4	99.9	89.9	10.1	999.9
77.5	150.9	21550.2	45.2	-53.3	99.9	90.9	9.4	999.9
78.0	151.4	21737.5	43.9	-53.0	99.9	91.2	7.6	999.9
78.5	151.8	21939.8	42.5	-52.8	99.9	92.2	5.6	999.9
79.0	152.3	22151.8	41.2	-52.1	99.9	83.3	5.1	999.9
79.5	152.7	22378.3	39.8	-51.2	99.9	70.6	6.0	999.9
80.0	153.2	22563.6	38.6	-51.0	99.5	66.8	7.3	999.9
80.5	153.6	22719.0	37.7	-51.7	99.6	70.5	8.9	999.9
81.0	154.1	22865.4	36.8	-52.3	99.6	73.6	10.1	999.9
81.5	154.5	23056.2	35.9	-51.9	99.5	78.7	10.8	999.9
82.0	154.8	23307.0	34.5	-51.9	99.5	83.8	9.9	999.9
82.5	155.2	23482.5	33.5	-51.1	99.5	999.9	9.9	999.9
83.0	155.6	23634.5	32.8	-50.5	99.5	999.9	99.9	999.9
83.5	156.0	23786.4	32.0	-49.9	99.5	999.9	99.9	999.9
84.0	156.4	23945.5	31.2	-49.1	99.5	999.9	99.9	999.9
84.5	156.8	24112.6	30.3	-48.3	99.5	999.9	99.9	999.9

APPROVAL

ATMOSPHERIC OBSERVATIONS FOR STS-4 LANDING

By Robert E. Turner, James E. Arnold, and Wade Batts

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

A. J. Dessler
Director, Space Science Laboratory

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