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AUGUST 1966
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METEOROLOGICAL DATA REPORT

AEROBEE NASA 4.159 GG
(15 July 1966)

BY

MARJORIE MCLARDIE HOIDALE

ATMOSPHERIC SCIENCES LABORATORY
WHITE SANDS MISSILE RANGE, NEW MEXICO

ECOM
UNITED STATES ARMY ELECTRONICS COMMAND

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DA Task IV650212A127-02

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ABSTRACT

Meteorological data gathered for the launching of Aerobee NASA 4.159 GG are presented for the National Aeronautics and Space Administration and for ballistic studies. The data appear, along with calculated ballistic data, in tabular form.

CONTENTS

INTRODUCTION

Aerobee NASA 4.159 GG was launched by Naval Ordnance Missile Test Facility personnel, White Sands Missile Range (WSMR), New Mexico, at 2231 hours MST, 15 July 1966.

Meteorological data used in conjunction with theoretical calculations to predict rocket impact were collected by the Meteorological Support Division, Atmospheric Sciences Laboratory, White Sands Missile Range, New Mexico. The Ballistic Meteorologists for this firing were Marjorie M. Hoidale and Ivan I. Layton.

DISCUSSION

Wind data for the first 4,000 feet above the surface were obtained from a Double-Theodolite Wind Velocity Computer System (1). Balloons released at the launch site were observed and tracked from a 2,000-foot baseline. Continuous angular data were transmitted from two electrically instrumented theodolites to a computer where the data were reduced to obtain a velocity-vs-height relationship. The computer output drives two recorders which trace north-south and east-west components on a specially designed wind velocity computer ballistic chart. It is possible to read directly from the chart both the mean wind component values and the mean ballistic wind components in the various ballistic layers.

Temperature, pressure and humidity data, along with upper wind data from 4,000 to approximately 100,000 feet above the surface, were obtained from standard rawinsonde operations.

Mean wind component values in each ballistic zone were determined from vertical cross sections by equal-area method.

Data appearing in Tables IX, X and XI, are based on the L. D. Duncan (2) theory. The "Predicted Impact" includes, when applicable, an adjustment of impact based on the experience of the Ballistic Meteorologists and the forecast of firing time wind conditions.

REFERENCES

1. "Double-Theodolite Wind Velocity Computer", UNCLASSIFIED, U. S. Army Signal Research and Development Laboratory, Fort Monmouth, New Jersey, July 1959.

2. Duncan, L. D. and R. J. Ensey, November 1964: "Six Degree of Freedom Digital Simulation Model for Unguided Fin-Stabilized Rockets". ERDA-196, Environmental Sciences Directorate, United States Army Electronics Research and Development Activity, White Sands Missile Range, New Mexico.

PAYLOAD	Includes Nosecone Weight	341.5	Pounds
*UNIT WIND EFFECT	Cross	3.21	Miles/MPH
	Range	3.78	Miles/MPH
TOWER TILT EFFECT		16.99	Miles/Degree
BURNOUT	Velocity	5,262	Feet/Second
	Altitude	120,120	Feet MSL
	Time	51.8	Seconds
PEAK	Altitude	105.5	Miles MSL
	Time	217.0	Seconds
TOTAL FLIGHT TIME		406.2	Seconds
CORIOLIS EFFECT	West	4.75	Miles

TABLE I. THEORETICAL ROCKET PERFORMANCE VALUES
AEROBEE NASA 4.159 GG

* An empirical correction (85 percent of the total) has been made to the cross-unit wind effect. This correction was determined from statistical studies.

LAYERS IN FEET ABOVE GROUND	BALLISTIC FACTOR
143- 250	.185
250- 400	.115
400- 600	.100
600- 800	.062
800-1200	.053
1200-1600	.031
1600-2000	.025
2000-2500	.029
2500-3000	.023

LAYERS IN FEET ABOVE GROUND	BALLISTIC FACTOR
3000- 3500	.019
3500- 4000	.016
4000- 5000	.031
5000-10000	.096
10000-15000	.056
15000-20000	.033
20000-25000	.023
25000-30000	.017
30000-35000	.014

LAYERS IN FEET ABOVE GROUND	BALLISTIC FACTOR
35000- 40000	.009
40000- 45000	.006
45000- 50000	.012
50000- 60000	.010
60000- 70000	.009
70000- 80000	.007
80000- 90000	.008
90000-100000	.010

TABLE II. BALLISTIC FACTORS
AEROBEE NASA 4.159 GG

TIME IN MINUTES	ANEMOMETER-MEASURED WIND	
	Speed (Knots)	Direction (Degrees)
T - 15	15.0	148
T - 10	14.5	150
T - 5	14.0	150
T - Time	11.0	150
T + 5	14.0	154
T + 10	13.5	153
T + 15	13.5	152

TABLE III. ANEMOMETER-MEASURED WIND SPEED AND DIRECTION AEROBEE NASA 4.159 GG

NOTE: Wind speeds and directions are 5-minute averages centered at indicated times.

LAYERS IN FEET ABOVE GROUND	MEAN WIND COMPONENTS IN MILES PER HOUR											
	1 1825 MST		2 1842 MST		3 1912 MST		4 1932 MST		5 1952 MST		6 2012 MST	
	N-S	E-W	N-S	E-W	N-S	E-W	N-S	E-W	N-S	E-W	N-S	E-W
143- 250	10.0S	14.0E	6.0S	17.0E	7.0S	11.0E	7.0S	12.0E	6.0S	9.0E	8.0S	11.0E
250- 400	11.0	16.0	2.0	19.0	5.0	17.0	5.0	14.0	7.0	16.0	7.0	19.0
400- 600	5.0	19.0	6.0	16.0	8.0	21.0	5.0	16.0	7.0	19.0	11.0	21.0
600- 800	6.0	18.0	8.0	15.0	3.0	20.0	10.0	19.0	10.0	21.0	11.0	21.0
800-1200	6.0	19.0	7.0	16.0	10.0	19.0	14.0	20.0	12.0	22.0	14.0	26.0
1200-1600	12.0	20.0	8.0	22.0	10.0	22.0	11.0	21.0	12.0	22.0	13.0	22.0
1600-2000	9.0	19.0	5.0	15.0	10.0	20.0	10.0	22.0	12.0	22.0	12.0	25.0
2000-2500	8.0	21.0	7.0	16.0	7.0	19.0	11.0	21.0	10.0	22.0	8.0	21.0
2500-3000	10.0	22.0	10.0	18.0	14.0	22.0	11.0	21.0	10.0	21.0	10.0	22.0
3000-3500	8.0	21.0	15.0	29.0	9.0	10.0	10.0	21.0	9.0	20.0	6.0	20.0
3500-4000	10.0	19.0	22.0	37.0	8.0	24.0	8.0	19.0	6.5	20.0	6.0	22.0

TABLE IV. PILOT-BALLOON-MEASURED WIND DATA
(DOUBLE-THEODOLITE METHOD)
AEROBEE NASA 4.159 GG

LAYERS IN FEET ABOVE GROUND	MEAN WIND COMPONENTS IN MILES PER HOUR											
	7 2027 MST		8 2038 MST		9 2050 MST		10 2102 MST		11 2107 MST		12 2118 MST	
	N-S	E-W	N-S	E-W	N-S	E-W	N-S	E-W	N-S	E-W	N-S	E-W
143- 250	9.0S	10.0E	8.0S	11.0E	9.0S	10.0E	10.0S	11.0E	10.0S	10.0E	10.0S	11.0E
250- 400	10.0	20.0	6.0	18.0	7.0	16.0	6.0	15.0	8.0	16.0	10.0	18.0
400- 600	8.0	24.0	10.0	24.0	10.0	24.0	6.0	20.0	12.0	21.0	12.0	24.0
600- 800	14.0	26.0	15.0	26.0	15.0	23.0	15.0	21.0	15.0	26.0	16.0	26.0
800-1200	14.0	24.0	14.0	25.0	12.0	24.0	10.0	22.0	10.0	26.0	16.0	28.0
1200-1600	10.0	24.0	10.0	26.0	13.0	24.0	10.0	21.0	12.0	28.0	14.0	28.0
1600-2000	10.0	24.0	7.0	22.0	11.0	25.0	12.0	26.0	10.0	26.0	11.0	26.0
2000-2500	10.0	25.0	10.0	23.0	10.0	23.0	7.0	20.0	11.0	24.0	10.0	24.0
2500-3000	10.0	22.0	8.0	20.0	8.0	21.0	6.0	21.0	12.0	22.0	9.0	21.0
3000-3500	8.0	18.0	8.0	19.0	10.0	20.0	5.0	20.0	8.0	20.0	11.0	20.0
3500-4000	10.0	19.0	12.0	16.0	11.0	18.0	6.0	18.0	10.0	20.0	10.0	18.0

TABLE IV. PILOT-BALLOON-MEASURED WIND DATA (Cont)
(DOUBLE-THEODOLITE METHOD)
AEROBEE NASA 4.159 GG

LAYERS IN FEET ABOVE GROUND	MEAN WIND COMPONENTS IN MILES PER HOUR													
	13 2130 MST		14 2140 MST		15 2156 MST		16 2207 MST		17 2218 MST		18 2225 MST		19 2235 MST	
	N-S	E-W	N-S	E-W	N-S	E-W	N-S	E-W	N-S	E-W	N-S	E-W	N-S	E-W
143- 250	10.0S	13.0E	11.0S	10.0E	14.0S	11.0E	10.0S	12.0E	8.0S	8.0E	12.0S	13.0E	11.0S	9.0E
250- 400	11.0	17.0	11.0	18.0	15.0	18.0	12.0	19.0	10.0	17.0	15.0	19.0	11.0	18.0
400- 600	11.0	21.0	14.0	23.0	16.0	23.0	16.0	21.0	13.0	23.0	19.0	25.0	14.0	21.0
600- 800	16.0	26.0	18.0	26.0	21.0	26.0	20.0	26.0	18.0	27.0	19.0	28.0	14.0	26.0
800-1200	17.0	28.0	14.0	29.0	17.0	30.0	19.0	29.0	20.0	29.0	19.0	29.0	19.0	26.0
1200-1600	15.0	28.0	15.0	34.0	16.0	24.0	13.0	28.0	11.0	29.0	13.0	29.0	20.0	25.0
1600-2000	11.0	25.0	12.0	27.0	14.0	28.0	14.0	28.0	14.0	29.0	13.0	28.0	16.0	24.0
2000-2500	9.0	25.0	11.0	25.0	14.0	25.0	11.0	26.0	11.0	28.0	11.0	25.0	12.0	26.0
2500-3000	9.0	21.0	10.0	20.0	8.0	24.0	8.0	24.0	11.0	19.0	10.0	22.0	9.0	18.0
3000-3500	9.0	18.0	10.0	21.0	7.0	20.0	8.0	21.0	8.0	22.0	M	M	11.0	17.0
3500-4000	9.0	15.0	10.0	15.0	8.0	14.0	M*	M	8.0	20.0	M	M	10.0	19.0

TABLE IV. PILOT-BALLOON-MEASURED WIND DATA (Cont)
(DOUBLE-THEODOLITE METHOD)
AEROBEE NASA 4.159 GG

*M = Missing Data

LAYERS IN FEET ABOVE GROUND	MEAN WIND COMPONENTS IN KNOTS			
	1 2020 MST		2 2140 MST	
	N-S	E-W	N-S	E-W
4000- 5000	6.0S	16.0E	4.0S	10.5E
5000-10000	2.0N	12.0	4.5N	12.0
10000-15000	0.0	17.0	3.0	17.5
15000 20000	2.5N	14.0	3.0S	17.5

TABLE V. UPPER AIR DATA (4,000-20,000 FT)
AEROBEE NASA 4.159 GG

LAYERS IN FEET ABOVE GROUND	MEAN WIND COMPONENTS IN KNOTS					
	1 1615 MST		2* 1810 MST		3 2232 MST	
	N-S	E-W	N-S	E-W	N-S	E-W
4000- 5000	4.5S	12.0E	5.0S	14.0E	5.5S	15.0E
5000- 10000	0.0	15.0	2.5N	15.0	4.0N	11.5
10000- 15000	2.0N	12.0	0.0	15.0	3.0	17.5
15000- 20000	1.5	9.0	2.5N	13.0	7.0S	19.0
20000- 25000	13.0S	7.5	12.0S	4.5E	11.0	13.0
25000- 30000	18.5	3.5W	18.0	0.0	11.5	4.0
30000- 35000	17.5	3.0E	17.5	3.0E	17.0	0.0
35000- 40000	13.0	0.0	15.0	2.5	16.5	3.0E
40000- 45000	14.0	0.0	16.0	2.5E	20.5	3.5
45000- 50000	15.0	2.5W	11.5	4.0W	16.0	2.5
50000- 60000	0.0	12.0E	7.0	12.0E	4.5	12.0
60000- 70000	0.0	19.0	3.5N	20.5	3.5N	19.5
70000- 80000	0.0	13.0	5.5	32.5	0.0	36.0
80000- 90000	6.0S	33.5	0.0	34.0	0.0	33.0
90000-100000	0.0	13.0	12.0N	33.0	BALLOON	BURST

TABLE VI. UPPER AIR DATA (4,000-100,000 FT)
AEROBEE NASA 4.159 GG

* Rawin, telecompute data not available.

STATION ALTITUDE 3989.0 FEET MSL
15 JULY 66 1615 HRS MST
ASCENSION NO. 533

UPPER AIR DATA
3919606
WHITE SANDS SITE
TABLE VII

WSTM SITE COORDINATES
E 488,580 FEET
N 185,045 FEET

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES	TEMPERATURE DEWPOINT CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
3989.0	878.5	35.4	13.1	26.0	985.6	686.2	100.0	14.8	1.000279
4000.0	878.2	35.4	13.0	26.0	985.4	686.1	100.0	14.8	1.000279
4500.0	863.3	33.5	11.7	26.4	975.1	683.9	101.6	15.1	1.000272
5000.0	848.8	31.6	10.3	26.8	964.9	681.7	103.2	15.5	1.000266
5500.0	834.4	29.7	8.9	27.1	954.9	679.4	104.8	15.8	1.000260
6000.0	820.3	27.9	7.5	27.5	944.9	677.2	106.6	15.7	1.000254
6500.0	806.5	26.0	6.1	27.9	935.1	675.0	108.8	14.4	1.000248
7000.0	792.6	24.5	5.6	29.6	923.9	673.2	110.1	14.4	1.000245
7500.0	778.8	23.0	5.5	31.9	912.1	671.6	110.7	14.7	1.000242
8000.0	765.2	21.6	5.3	34.3	900.5	670.0	110.6	15.1	1.000239
8500.0	751.9	20.2	5.0	36.6	889.1	668.4	110.4	14.9	1.000236
9000.0	738.8	18.8	4.6	38.9	877.8	666.8	110.3	14.3	1.000233
9500.0	725.8	17.4	4.5	42.4	866.6	665.1	107.2	13.6	1.000231
10000.0	712.9	15.9	4.5	46.7	855.6	663.5	103.6	12.9	1.000229
10500.0	700.3	14.4	4.4	51.0	844.7	661.8	97.4	13.2	1.000227
11000.0	687.8	12.9	4.2	55.3	834.0	660.0	90.2	13.7	1.000224
11500.0	675.5	11.5	3.8	59.0	823.0	658.5	80.5	14.5	1.000221
12000.0	663.3	10.3	3.4	62.3	811.8	657.0	72.5	14.9	1.000218
12500.0	651.2	9.2	1.8	59.7	800.3	655.7	65.7	15.1	1.000211
13000.0	639.4	8.5	-1.1	50.7	788.3	654.5	62.7	14.4	1.000203
13500.0	627.7	7.7	-4.5	41.7	776.5	653.4	61.4	13.6	1.000194
14000.0	616.2	7.0	-8.3	32.8	764.9	652.4	66.0	12.6	1.000186
14500.0	604.9	6.2	-11.5	26.9	753.4	651.3	72.7	12.1	1.000180
15000.0	593.7	5.2	-12.4	26.8	742.0	650.1	82.8	12.6	1.000177
15500.0	582.7	4.3	-13.3	26.6	730.7	649.0	89.8	12.8	1.000174
16000.0	571.8	3.3	-14.2	26.4	719.7	647.9	94.1	12.8	1.000170
16500.0	561.2	2.4	-15.1	26.3	708.8	646.7	96.2	12.9	1.000167
17000.0	550.8	1.4	-16.0	26.1	698.1	645.6	97.1	13.1	1.000164
17500.0	540.5	0.5	-16.9	25.9	687.5	644.4	95.7	13.1	1.000161
18000.0	530.1	-0.6	-18.0	25.5	676.9	643.2	93.1	12.9	1.000158

STATION ALTITUDE 3989.0 FEET MSL
15 JULY 66 1615 HRS MST
ASCENSION NO. 533

UPPER AIR DATA
3919606
WHITE SANDS SITE
TABLE VII (Cont)

WSTM SITE COORDINATES
E 488,580 FEET
N 185,045 FEET

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES CENTIGRADE	TEMPERATURE DEWPOINT CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
18500.0	520.0	-1.6	-19.1	25.1	666.6	642.0	91.0	12.4	1.000155
19000.0	510.1	-2.6	-20.2	24.7	656.4	640.7	89.2	11.8	1.000153
19500.0	500.3	-3.7	-21.2	24.3	646.3	639.5	85.3	11.4	1.000150
20000.0	490.7	-4.7	-22.3	23.9	636.4	638.2	81.4	10.9	1.000147
20500.0	481.4	-5.7	-23.4	23.5	626.7	637.0	78.9	9.7	1.000145
21000.0	472.2	-6.8	-24.5	23.1	617.1	635.7	76.9	8.8	1.000142
21500.0	463.1	-7.8	-25.5	22.7	607.7	634.5	76.1	9.0	1.000140
22000.0	454.3	-8.8	-26.6	22.3	598.5	633.2	78.3	9.1	1.000137
22500.0	445.5	-9.9	-27.6	22.2	589.4	631.9	84.0	9.1	1.000135
23000.0	436.8	-11.2	-28.2	23.2	580.6	630.4	89.8	9.0	1.000133
23500.0	428.2	-12.4	-28.9	24.1	571.9	628.9	95.7	8.9	1.000131
24000.0	419.8	-13.6	-29.5	25.0	563.3	627.4	110.5	8.6	1.000128
24500.0	411.4	-14.5	-30.3	25.0	554.0	626.3	127.4	8.2	1.000126
25000.0	403.2	-15.5	-31.1	25.0	544.9	625.2	141.6	8.7	1.000124
25500.0	395.1	-16.4	-31.9	25.0	535.9	624.1	154.1	9.6	1.000122
26000.0	387.2	-17.3	-32.7	25.0	527.0	623.0	160.5	11.9	1.000120
26500.0	379.5	-18.2	-33.5	25.0	518.3	621.9	163.7	14.0	1.000118
27000.0	371.9	-19.1	-34.3	25.0	509.8	620.7	161.7	15.6	1.000116
27500.0	364.3	-19.4	-34.8	24.3	500.1	620.4	162.2	17.1	1.000113
28000.0	357.0	-19.6	-35.4	23.5	490.5	620.1	165.0	18.5	1.000111
28500.0	349.7	-20.2	-36.1	23.1	481.6	619.4	167.6	18.7	1.000109
29000.0	342.4	-21.6	-37.1	23.3	474.1	617.7	169.9	18.1	1.000107
29500.0	335.3	-22.9	-38.2	23.5	466.7	616.1	175.0	17.6	1.000105
30000.0	328.4	-24.2	-39.3	23.7	459.5	614.4	181.7	17.1	1.000104
30500.0	321.6	-25.6	-40.3	24.0	452.4	612.8	184.0	16.6	1.000102
31000.0	314.9	-26.9	-41.4	24.2	445.4	611.1	184.7	16.1	1.000100
31500.0	308.4	-28.2	-42.5	24.4	438.6	609.4	186.3	17.1	1.000099
32000.0	302.0	-29.6	-43.6	24.6	431.9	607.8	187.9	18.3	1.000097
32500.0	295.7	-30.9	-44.7	24.9	425.2	606.1	187.5	18.8	1.000095
33000.0	289.5	-32.2	-45.7	25.1	418.5	604.5	187.1	19.3	1.000094

STATION ALTITUDE 3989.0 FEET MSL
15 JULY 66 1615 HRS MST
ASCENSION NO. 533

UPPER AIR DATA
3919606
WHITE SANDS SITE
TABLE VII (Cont)

WSTM SITE COORDINATES
E 488,580 FEET
N 185,045 FEET

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES CENTIGRADE	TEMPERATURE DEWPOINT CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
33500.0	283.3	-33.4	-46.7	25.3	411.6	602.9	187.0	19.9	1.000092
34000.0	277.2	-34.6	-47.7	25.5	404.8	601.4	184.8	19.7	1.000091
34500.0	271.2	-35.9	-48.7	25.7	398.2	599.8	180.3	18.8	1.000089
35000.0	265.4	-37.1	-49.7	25.9	391.6	598.3	175.5	18.6	1.000088
35500.0	259.6	-38.3	-52.3	21.7**	385.1	596.7	170.6	18.8	1.000086
36000.0	253.9	-39.6	-56.8	14.4**	378.7	595.1	166.7	18.7	1.000085
36500.0	248.3	-40.8	-63.2	7.1**	372.3	593.5	163.0	18.7	1.000083
37000.0	242.9	-42.0	0.	-0. **	366.1	592.0	161.2	18.2	1.000082
37500.0	237.2	-43.2	0.	-0. **	359.4	590.5	160.4	17.6	1.000080
38000.0	231.8	-44.3	0.	-0. **	352.9	589.0	161.4	17.1	1.000079
38500.0	226.4	-45.5	0.	-0. **	346.5	587.5	163.3	16.7	1.000077
39000.0	221.2	-46.6	0.	-0. **	340.2	586.1	167.1	16.2	1.000076
39500.0	216.1	-47.8	0.	-0. **	334.0	584.6	171.7	15.7	1.000074
40000.0	211.1	-48.9	0.	-0. **	328.0	583.1	175.4	15.5	1.000073
40500.0	206.2	-50.1	0.	-0. **	322.0	581.6	178.7	15.6	1.000072
41000.0	201.4	-51.2	0.	-0. **	316.2	580.1	181.7	15.4	1.000070
41500.0	196.8	-52.4	0.	-0. **	310.5	578.6	184.2	14.7	1.000069
42000.0	192.2	-53.5	0.	-0. **	304.9	577.1	185.9	14.0	1.000068
42500.0	187.8	-54.6	0.	-0. **	299.5	575.6	184.0	13.5	1.000067
43000.0	183.5	-55.8	0.	-0. **	294.1	574.1	182.2	13.0	1.000065
43500.0	179.2	-56.9	0.	-0. **	288.8	572.5	181.1	13.4	1.000064
44000.0	175.1	-58.1	0.	-0. **	283.7	571.0	179.9	13.7	1.000063
44500.0	171.0	-59.2	0.	-0. **	278.6	569.5	179.0	14.1	1.000062
45000.0	167.1	-60.4	0.	-0. **	273.6	568.0	178.1	14.4	1.000061
45500.0	163.1	-61.4	0.	-0. **	268.3	566.6	177.8	14.6	1.000060
46000.0	159.1	-62.4	0.	-0. **	262.9	565.3	178.2	14.8	1.000059
46500.0	155.2	-63.3	0.	-0. **	257.7	564.0	178.7	14.8	1.000057
47000.0	151.4	-64.3	0.	-0. **	252.5	562.7	179.5	14.5	1.000056
47500.0	147.7	-65.2	0.	-0. **	247.5	561.4	180.9	14.3	1.000055
48000.0	144.1	-66.2	0.	-0. **	242.6	560.1	185.4	14.4	1.000054

** AT LEAST ONE ASSUMED RELATIVE HUMIDITY VALUE WAS USED IN THE INTERPOLATION.

STATION ALTITUDE 3989.0 FEET MSL
15 JULY 66 1615 HRS MST
ASCENSION NO. 533

UPPER AIR DATA
3919606
WHITE SANDS SITE
TABLE VII (Cont)

WSTM SITE COORDINATES
E 488,580 FEET
N 185,045 FEET

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES CENTIGRADE	TEMPERATURE DEWPOINT CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
48500.0	140.5	-67.2	0.	-0. **	237.7	558.8	189.8	14.6	1.000053
49000.0	137.0	-68.1	0.	-0. **	232.8	557.6	192.6	14.8	1.000052
49500.0	133.6	-69.0	0.	-0. **	227.9	556.4	195.3	15.0	1.000051
50000.0	130.2	-69.8	0.	-0. **	223.1	555.2	197.9	15.3	1.000050
50500.0	126.9	-70.7	0.	-0. **	218.5	554.0	200.4	15.6	1.000049
51000.0	123.7	-71.6	0.	-0. **	213.9	552.8	198.9	15.5	1.000048
51500.0	120.6	-72.5	0.	-0. **	209.4	551.6	196.6	15.3	1.000047
52000.0	117.6	-73.3	0.	-0. **	205.0	550.4	192.9	14.9	1.000046
52500.0	114.6	-73.3	0.	-0. **	199.8	550.4	188.3	14.5	1.000044
53000.0	111.6	-73.1	0.	-0. **	194.5	550.7	182.0	14.0	1.000043
53500.0	108.8	-72.9	0.	-0. **	189.3	551.0	172.8	13.3	1.000042
54000.0	106.0	-72.7	0.	-0. **	184.3	551.3	163.6	12.6	1.000041
54500.0	103.3	-72.5	0.	-0. **	179.4	551.6	155.0	12.5	1.000040
55000.0	100.7	-72.3	0.	-0. **	174.6	551.9	146.4	12.4	1.000039
55500.0	98.2	-71.6	0.	-0. **	169.7	552.8	141.3	12.3	1.000038
56000.0	95.7	-70.7	0.	-0. **	164.8	554.0	138.7	12.3	1.000037
56500.0	93.4	-69.9	0.	-0. **	160.0	555.1	136.2	12.1	1.000036
57000.0	91.0	-69.1	0.	-0. **	155.4	556.3	134.7	11.5	1.000035
57500.0	88.8	-68.2	0.	-0. **	150.9	557.4	133.1	10.9	1.000034
58000.0	86.6	-67.4	0.	-0. **	146.6	558.6	128.9	11.1	1.000033
58500.0	84.4	-66.5	0.	-0. **	142.4	559.7	123.8	11.5	1.000032
59000.0	82.3	-65.7	0.	-0. **	138.3	560.9	117.7	12.4	1.000031
59500.0	80.3	-64.8	0.	-0. **	134.3	562.0	109.6	14.1	1.000030
60000.0	78.3	-64.0	0.	-0. **	130.4	563.1	101.6	15.8	1.000029
60500.0	76.4	-63.2	0.	-0. **	126.7	564.3	102.4	16.7	1.000028
61000.0	74.5	-62.3	0.	-0. **	123.1	565.4	103.8	17.5	1.000027
61500.0	72.7	-62.2	0.	-0. **	120.0	565.6	105.9	17.7	1.000027
62000.0	70.9	-62.3	0.	-0. **	117.1	565.4	108.5	17.2	1.000026
62500.0	69.2	-62.4	0.	-0. **	114.4	565.2	111.2	16.6	1.000025
63000.0	67.5	-62.5	0.	-0. **	111.7	565.1	114.2	15.4	1.000025

** AT LEAST ONE ASSUMED RELATIVE HUMIDITY VALUE WAS USED IN THE INTERPOLATION.

STATION ALTITUDE 3989.0 FEET MSL
15 JULY 66 1615 HRS MST
ASCENSION NO. 533

UPPER AIR DATA
3919606
WHITE SANDS SITE
TABLE VII (Cont)

WSTM SITE COORDINATES
E 488,580 FEET
N 185,045 FEET

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES	TEMPERATURE DEWPOINT CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
63500.0	65.9	-62.7	0.	-0. **	109.0	564.9	117.2	14.2	1.000024
64000.0	64.3	-62.8	0.	-0. **	106.4	564.8	109.4	13.9	1.000024
64500.0	62.7	-62.2	0.	-0. **	103.6	565.6	98.9	13.8	1.000023
65000.0	61.2	-61.4	0.	-0. **	100.8	566.6	91.3	14.0	1.000022
65500.0	59.8	-60.7	0.	-0. **	98.0	567.6	86.7	14.5	1.000022
66000.0	58.3	-59.9	0.	-0. **	95.3	568.6	82.8	15.2	1.000021
66500.0	56.9	-59.1	0.	-0. **	92.7	569.6	82.1	16.3	1.000021
67000.0	55.6	-58.4	0.	-0. **	90.2	570.6	81.4	17.4	1.000020
67500.0	54.3	-57.6	0.	-0. **	87.7	571.6	80.8	17.9	1.000020
68000.0	53.0	-56.9	0.	-0. **	85.3	572.6	80.1	18.4	1.000019
68500.0	51.7	-56.1	0.	-0. **	83.0	573.6	77.6	19.3	1.000018
69000.0	50.5	-56.0	0.	-0. **	81.0	573.8	73.7	20.3	1.000018
69500.0	49.3	-56.5	0.	-0. **	79.3	573.1	70.7	21.2	1.000018
70000.0	48.1	-57.1	0.	-0. **	77.6	572.3	70.1	21.6	1.000017
70500.0	47.0	-57.7	0.	-0. **	76.0	571.5	69.5	21.9	1.000017
71000.0	45.9	-57.5	0.	-0. **	74.1	571.8	73.8	22.6	1.000016
71500.0	44.8	-57.3	0.	-0. **	72.3	572.0	78.7	23.2	1.000016
72000.0	43.7	-57.2	0.	-0. **	70.5	572.3	83.1	23.9	1.000016
72500.0	42.7	-57.0	0.	-0. **	68.8	572.5	87.1	24.7	1.000015
73000.0	41.7	-56.8	0.	-0. **	67.1	572.7	90.0	25.6	1.000015
73500.0	40.7	-56.6	0.	-0. **	65.5	573.0	88.7	27.2	1.000015
74000.0	39.7	-56.1	0.	-0. **	63.8	573.6	87.4	28.9	1.000014
74500.0	38.8	-54.7	0.	-0. **	61.9	575.5	87.5	31.0	1.000014
75000.0	37.9	-53.3	0.	-0. **	60.1	577.3	87.8	33.2	1.000013
75500.0	37.0	-51.9	0.	-0. **	58.3	579.2	87.3	34.9	1.000013
76000.0	36.2	-50.5	0.	-0. **	56.6	581.0	85.9	35.8	1.000013
76500.0	35.3	-50.3	0.	-0. **	55.3	581.3	84.6	36.8	1.000012
77000.0	34.5	-50.3	0.	-0. **	54.0	581.3	86.5	36.2	1.000012
77500.0	33.7	-50.4	0.	-0. **	52.8	581.2	88.5	35.7	1.000012
78000.0	33.0	-50.4	0.	-0. **	51.6	581.1	89.2	34.9	1.000011

** AT LEAST ONE ASSUMED RELATIVE HUMIDITY VALUE WAS USED IN THE INTERPOLATION.

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STATION ALTITUDE 3989.0 FEET MSL
15 JULY 66 1615 HRS MST
ASCENSION NO. 533

UPPER AIR DATA
3919606
WHITE SANDS SITE
TABLE VII (Cont)

WSTM SITE COORDINATES
E 488,580 FEET
N 185,045 FEET

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES	TEMPERATURE DEWPOINT CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
78500.0	32.2	-50.5	0.	-0. **	50.4	581.0	87.7	33.8	1.000011
79000.0	31.5	-50.6	0.	-0. **	49.3	580.9	86.2	32.7	1.000011
79500.0	30.8	-50.6	0.	-0. **	48.2	580.8	86.1	32.3	1.000011
80000.0	30.0	-50.7	0.	-0. **	47.1	580.7	87.1	32.5	1.000010
80500.0	29.4	-50.8	0.	-0. **	46.0	580.7	88.1	32.8	1.000010
81000.0	28.7	-50.8	0.	-0. **	45.0	580.6	87.9	33.3	1.000010
81500.0	28.0	-50.9	0.	-0. **	43.9	580.5	87.5	33.9	1.000010
82000.0	27.4	-51.0	0.	-0. **	42.9	580.4	87.0	34.5	1.000010
82500.0	26.8	-51.0	0.	-0. **	42.0	580.3	87.7	34.5	1.000009
83000.0	26.1	-51.1	0.	-0. **	41.0	580.2	88.4	34.5	1.000009
83500.0	25.5	-50.7	0.	-0. **	40.0	580.7	89.1	34.7	1.000009
84000.0	25.0	-50.3	0.	-0. **	39.0	581.3	89.7	35.3	1.000009
84500.0	24.4	-49.8	0.	-0. **	38.0	581.9	90.2	36.0	1.000008
85000.0	23.8	-49.3	0.	-0. **	37.1	582.5	91.1	36.4	1.000008
85500.0	23.3	-48.9	0.	-0. **	36.2	583.2	92.4	36.5	1.000008
86000.0	22.8	-48.2	0.	-0. **	35.2	584.0	93.7	36.6	1.000008
86500.0	22.3	-47.2	0.	-0. **	34.3	585.2	94.4	36.8	1.000008
87000.0	21.8	-46.3	0.	-0. **	33.4	586.5	94.8	37.3	1.000007
87500.0	21.3	-45.4	0.	-0. **	32.5	587.7	95.2	37.7	1.000007
88000.0	20.8	-44.4	0.	-0. **	31.7	588.9	94.9	37.1	1.000007
88500.0	20.3	-43.5	0.	-0. **	30.8	590.1	94.5	36.2	1.000007
89000.0	19.9	-42.6	0.	-0. **	30.0	591.3	94.0	35.2	1.000007
89500.0	19.4	-41.8	0.	-0. **	29.3	592.2	93.1	33.9	1.000007
90000.0	19.0	-41.8	0.	-0. **	28.6	592.2	92.1	32.6	1.000006
90500.0	18.6	-41.9	0.	-0. **	28.0	592.2	91.1	31.3	1.000006
91000.0	18.2	-41.9	0.	-0. **	27.4	592.1	91.6	29.7	1.000006
91500.0	17.8	-41.9	0.	-0. **	26.8	592.1	92.1	28.1	1.000006
92000.0	17.4	-41.9	0.	-0. **	26.2	592.1	92.6	26.5	1.000006
92500.0	17.0	-42.0	0.	-0. **	25.6	592.0	92.9	25.4	1.000006
93000.0	16.6	-42.0	0.	-0. **	25.1	592.0	93.2	24.3	1.000006

** AT LEAST ONE ASSUMED RELATIVE HUMIDITY VALUE WAS USED IN THE INTERPOLATION.

STATION ALTITUDE 3989.0 FEET MSL
15 JULY 66 1615 HRS MST
ASCENSION NO. 533

UPPER AIR DATA
3919606
WHITE SANDS SITE
TABLE VII (Cont)

WSTM SITE COORDINATES
E 488,580 FEET
N 185,045 FEET

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES CENTIGRADE	TEMPERATURE DEWPOINT DEGREES CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
93500.0	16.3	-41.8	0.	-0. **	24.5	592.2	90.9	24.5	1.000005
94000.0	15.9	-41.6	0.	-0. **	23.9	592.5	77.3	30.0	1.000005
94500.0	15.6	-41.4	0.	-0. **	23.4	592.8	63.7	35.6	1.000005
95000.0	15.2	-41.1	0.	-0. **	22.8	593.1	65.5	34.2	1.000005
95500.0	14.9	-40.9	0.	-0. **	22.3	593.4	77.2	28.3	1.000005
96000.0	14.6	-40.6	0.	-0. **	21.8	593.7	83.0	25.9	1.000005
96500.0	14.2	-40.4	0.	-0. **	21.3	594.0	83.6	26.8	1.000005
97000.0	13.9	-40.2	0.	-0. **	20.8	594.3	97.6	26.0	1.000005
97500.0	13.6	-39.9	0.	-0. **	20.3	594.7	121.2	24.0	1.000005
98000.0	13.3	-39.7	0.	-0. **	19.9	595.0			1.000004
98500.0	13.0	-39.4	0.	-0. **	19.4	595.3			1.000004
99000.0	12.7	-39.2	0.	-0. **	19.0	595.6			1.000004

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** AT LEAST ONE ASSUMED RELATIVE HUMIDITY VALUE WAS USED IN THE INTERPOLATION.

STATION ALTITUDE 3989.0 FEET MSL
15 JULY 66 2232 HRS MST
ASCENSION NO. 537

UPPER AIR DATA
3919607
WHITE SANDS SITE
TABLE VIII

WSTM SITE COORDINATES
E 488,580 FEET
N 185,045 FEET

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES	TEMPERATURE DEWPOINT CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
3989.0	880.6	26.5	12.3	41.0	1017.7	676.1	180.0	1.9	1.000287
4000.0	880.3	26.5	12.3	41.0	1017.3	676.1	179.7	2.0	1.000287
4500.0	865.2	26.9	12.6	41.0	998.3	676.6	167.4	6.2	1.000284
5000.0	850.5	27.3	13.0	41.0	979.8	677.2	155.1	10.3	1.000281
5500.0	836.0	27.3	13.0	41.0	962.9	677.2	142.8	14.5	1.000277
6000.0	821.6	26.6	12.5	41.3	948.7	676.4	130.5	18.7	1.000272
6500.0	807.4	25.3	11.6	42.3	936.7	674.8	118.3	22.8	1.000267
7000.0	793.3	23.9	10.8	43.3	924.7	673.2	116.9	21.5	1.000261
7500.0	779.5	22.6	9.9	44.2	913.0	671.6	115.5	20.0	1.000256
8000.0	766.0	21.2	9.0	45.2	901.4	670.0	114.2	17.8	1.000251
8500.0	752.7	19.9	8.1	46.2	890.0	668.4	112.7	15.5	1.000246
9000.0	739.6	18.6	7.2	47.2	878.8	666.8	110.9	13.1	1.000241
9500.0	726.7	17.2	6.2	48.2	867.7	665.2	105.0	11.3	1.000236
10000.0	714.0	16.0	5.4	49.2	856.4	663.6	97.6	9.8	1.000231
10500.0	701.3	15.1	4.9	50.6	843.9	662.6	85.7	9.6	1.000228
11000.0	688.9	14.2	4.5	51.9	831.5	661.5	73.9	9.7	1.000224
11500.0	676.5	12.6	4.5	57.5	820.8	659.8	62.6	10.9	1.000222
12000.0	664.3	11.1	4.4	63.4	810.5	658.0	54.5	12.4	1.000220
12500.0	652.3	9.5	4.2	69.3	800.3	656.2	49.2	14.0	1.000217
13000.0	640.5	8.1	3.8	74.3	789.7	654.5	47.9	15.4	1.000214
13500.0	628.8	7.0	3.4	77.8	778.3	653.3	47.8	16.7	1.000211
14000.0	617.3	5.9	3.0	81.3	767.1	652.0	54.0	16.8	1.000208
14500.0	605.9	5.0	-1.1	65.0	756.4	650.5	60.4	16.9	1.000196
15000.0	594.7	4.1	-6.1	47.3	745.6	649.1	67.7	16.9	1.000185
15500.0	583.7	3.3	-9.0	40.1	734.1	648.1	76.2	16.8	1.000179
16000.0	572.9	2.5	-9.5	40.8	722.6	647.1	86.2	16.6	1.000176
16500.0	562.1	1.4	-10.6	40.6	712.0	645.8	92.0	16.8	1.000172
17000.0	551.5	0.2	-11.8	40.1	701.8	644.3	96.0	17.2	1.000169
17500.0	541.2	-1.0	-13.1	39.6	691.8	642.8	97.8	17.7	1.000166
18000.0	531.0	-2.3	-14.4	39.1	682.0	641.3	98.3	18.2	1.000162

STATION ALTITUDE 3989.0 FEET MSL
15 JULY 66 2232 HRS MST
ASCENSION NO. 537

UPPER AIR DATA
3919607
WHITE SANDS SITE
TABLE VIII (Cont)

WSTM SITE COORDINATES
E 488,580 FEET
N 185,045 FEET

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES CENTIGRADE	TEMPERATURE DEWPOINT CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
18500.0	520.8	-3.0	-15.3	38.4	670.8	640.4	97.9	18.6	1.000159
19000.0	510.8	-3.7	-16.1	37.6	659.6	639.6	98.1	18.9	1.000156
19500.0	501.0	-4.3	-16.9	36.8	648.5	638.8	99.3	19.6	1.000153
20000.0	491.4	-5.0	-17.8	36.0	637.6	638.0	103.0	21.0	1.000150
20500.0	481.9	-5.6	-18.6	35.2	626.9	637.3	106.4	21.7	1.000147
21000.0	472.7	-6.2	-19.5	34.4	616.4	636.5	109.8	21.9	1.000144
21500.0	463.6	-6.9	-20.3	33.6	606.0	635.7	113.4	21.1	1.000142
22000.0	454.7	-7.5	-21.2	32.8	595.9	634.9	117.0	20.1	1.000139
22500.0	446.0	-8.2	-22.0	32.0	585.9	634.1	121.1	18.2	1.000136
23000.0	437.4	-8.8	-22.9	31.2	576.0	633.3	125.3	16.2	1.000134
23500.0	428.8	-10.0	-23.9	31.3	567.3	631.9	126.6	14.7	1.000131
24000.0	420.3	-11.4	-24.9	31.8	559.0	630.2	127.5	13.3	1.000129
24500.0	412.0	-12.7	-26.0	32.2	550.9	628.6	129.9	12.7	1.000127
25000.0	403.9	-14.1	-27.1	32.6	542.9	626.9	132.5	12.3	1.000125
25500.0	395.9	-15.5	-28.2	33.1	535.0	625.2	136.9	13.3	1.000123
26000.0	388.0	-16.9	-29.3	33.5	527.2	623.5	141.9	15.0	1.000121
26500.0	380.4	-18.2	-30.4	34.0	519.6	621.8	143.2	17.5	1.000119
27000.0	372.7	-18.6	-30.7	33.7	509.8	621.4	143.0	19.9	1.000116
27500.0	365.2	-18.8	-31.1	33.4	500.1	621.1	139.5	21.0	1.000114
28000.0	357.8	-19.1	-31.4	33.1	490.5	620.7	135.4	20.6	1.000112
28500.0	350.5	-19.9	-32.3	32.7	482.1	619.7	130.8	18.9	1.000110
29000.0	343.4	-20.9	-33.3	32.2	474.2	618.5	130.4	16.9	1.000108
29500.0	336.4	-22.0	-34.4	32.1	466.6	617.1	136.1	14.8	1.000106
30000.0	329.5	-23.3	-35.4	32.4	459.3	615.6	147.4	12.8	1.000104
30500.0	322.7	-24.5	-36.4	32.7	452.1	614.0	163.6	11.8	1.000102
31000.0	316.1	-25.8	-37.5	32.9	445.1	612.5	177.9	11.1	1.000101
31500.0	309.5	-27.3	-38.8	33.0	438.4	610.6	187.9	11.1	1.000099
32000.0	302.9	-28.9	-40.2	33.0	431.9	608.7	196.6	11.0	1.000097
32500.0	296.5	-30.4	-41.6	33.0	425.6	606.7	193.3	10.6	1.000096
33000.0	290.3	-32.0	-43.1	33.0	419.3	604.7	190.0	10.1	1.000094

STATION ALTITUDE 3989.0 FEET MSL
15 JULY 66 2232 HRS MST
ASCENSION NO. 537

UPPER AIR DATA
3919607
WHITE SANDS SITE
TABLE VIII (Cont)

WSTM SITE COORDINATES
E 488,580 FEET
N 185,045 FEET

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES	TEMPERATURE DEWPOINT CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
33500.0	284.1	-33.6	-44.5	33.0	413.2	602.7	178.3	10.5	1.000093
34000.0	278.0	-34.7	-45.2	34.1	406.2	601.3	165.2	11.0	1.000091
34500.0	272.0	-35.8	-45.8	35.4	399.2	600.0	161.9	13.1	1.000090
35000.0	266.1	-36.8	-46.4	36.7	392.2	598.7	160.2	15.4	1.000088
35500.0	260.4	-37.8	-47.0	38.0	385.4	597.4	166.9	16.9	1.000086
36000.0	254.7	-38.8	-47.8	38.7	378.6	596.1	173.1	18.4	1.000085
36500.0	249.1	-39.6	-48.8	37.4	371.7	595.0	178.1	19.7	1.000083
37000.0	243.6	-40.5	-49.9	36.2	364.8	593.9	181.5	19.6	1.000082
37500.0	238.3	-41.6	-55.6	20.7**	358.5	592.6	183.9	18.9	1.000080
38000.0	233.0	-42.7	-70.2	3.3**	352.2	591.1	182.2	17.5	1.000078
38500.0	227.7	-43.9	0.	-0. **	346.1	589.5	180.5	16.0	1.000077
39000.0	222.5	-45.2	0.	-0. **	340.1	587.9	178.8	14.7	1.000076
39500.0	217.4	-46.5	0.	-0. **	334.1	586.3	173.5	13.3	1.000074
40000.0	212.4	-47.7	0.	-0. **	328.3	584.6	167.8	12.1	1.000073
40500.0	207.6	-49.0	0.	-0. **	322.6	583.0	164.1	12.8	1.000072
41000.0	202.8	-50.3	0.	-0. **	317.1	581.3	161.7	13.5	1.000071
41500.0	198.2	-51.5	0.	-0. **	311.6	579.7	162.4	14.2	1.000069
42000.0	193.7	-52.8	0.	-0. **	306.2	578.0	164.8	15.7	1.000068
42500.0	189.2	-54.1	0.	-0. **	300.9	576.4	169.2	18.2	1.000067
43000.0	184.9	-55.3	0.	-0. **	295.6	574.7	172.2	19.9	1.000066
43500.0	180.4	-56.4	0.	-0. **	290.0	573.3	174.4	21.3	1.000065
44000.0	176.1	-57.5	0.	-0. **	284.4	571.8	174.9	22.3	1.000063
44500.0	171.8	-58.6	0.	-0. **	279.0	570.4	175.9	22.8	1.000062
45000.0	167.7	-59.7	0.	-0. **	273.7	568.9	177.4	22.6	1.000061
45500.0	163.6	-60.8	0.	-0. **	268.5	567.4	178.5	21.9	1.000060
46000.0	159.7	-61.9	0.	-0. **	263.4	565.9	179.2	20.8	1.000059
46500.0	155.8	-63.0	0.	-0. **	258.4	564.4	180.0	20.3	1.000058
47000.0	152.1	-64.1	0.	-0. **	253.5	563.0	180.9	19.9	1.000056
47500.0	148.4	-65.2	0.	-0. **	248.7	561.5	179.4	19.1	1.000055
48000.0	144.8	-66.3	0.	-0. **	244.0	560.0	177.2	18.2	1.000054

** AT LEAST ONE ASSUMED RELATIVE HUMIDITY VALUE WAS USED IN THE INTERPOLATION.

STATION ALTITUDE 3989.0 FEET MSL
15 JULY 66 2232 HRS MST
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UPPER AIR DATA
3919607
WHITE SANDS SITE
TABLE VIII (Cont)

WSTM SITE COORDINATES
E 488,580 FEET
N 185,045 FEET

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES	TEMPERATURE DEWPOINT CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
48500.0	141.2	-67.1	0.	-0. **	238.9	558.9	174.0	18.0	1.000053
49000.0	137.7	-67.8	0.	-0. **	233.6	557.9	170.5	18.2	1.000052
49500.0	134.2	-68.5	0.	-0. **	228.5	557.0	167.1	17.7	1.000051
50000.0	130.8	-69.2	0.	-0. **	223.5	556.0	163.6	17.1	1.000050
50500.0	127.5	-69.9	0.	-0. **	218.6	555.1	160.7	16.7	1.000049
51000.0	124.3	-70.6	0.	-0. **	213.9	554.1	157.7	16.5	1.000048
51500.0	121.2	-71.3	0.	-0. **	209.2	553.2	158.0	16.1	1.000047
52000.0	118.1	-72.0	0.	-0. **	204.7	552.2	158.3	15.7	1.000046
52500.0	115.1	-72.7	0.	-0. **	200.2	551.2	161.5	16.6	1.000045
53000.0	112.2	-73.4	0.	-0. **	195.8	550.3	164.7	17.5	1.000044
53500.0	109.4	-73.3	0.	-0. **	190.8	550.5	165.7	17.7	1.000042
54000.0	106.6	-70.4	0.	-0. **	183.3	554.4	166.7	17.8	1.000041
54500.0	103.9	-70.6	0.	-0. **	178.8	554.2	166.7	16.6	1.000040
55000.0	101.3	-70.7	0.	-0. **	174.4	554.0	166.5	15.3	1.000039
55500.0	98.8	-70.9	0.	-0. **	170.1	553.8	162.5	13.9	1.000038
56000.0	96.3	-71.0	0.	-0. **	165.9	553.6	157.8	12.4	1.000037
56500.0	93.8	-71.1	0.	-0. **	161.8	553.4	146.3	9.6	1.000036
57000.0	91.5	-71.3	0.	-0. **	157.8	553.2	133.2	7.2	1.000035
57500.0	89.1	-71.4	0.	-0. **	154.0	553.0	110.8	7.7	1.000034
58000.0	86.9	-70.9	0.	-0. **	149.7	553.8	91.0	8.6	1.000033
58500.0	84.8	-69.6	0.	-0. **	145.1	555.5	81.3	10.4	1.000032
59000.0	82.7	-68.4	0.	-0. **	140.7	557.2	76.1	12.1	1.000031
59500.0	80.6	-67.1	0.	-0. **	136.3	558.9	83.7	13.6	1.000030
60000.0	78.6	-65.9	0.	-0. **	132.2	560.6	90.7	14.9	1.000029
60500.0	76.7	-64.6	0.	-0. **	128.1	562.3	96.3	15.7	1.000029
61000.0	74.8	-63.4	0.	-0. **	124.2	563.9	98.7	16.4	1.000028
61500.0	72.9	-62.2	0.	-0. **	120.4	565.6	94.3	17.0	1.000027
62000.0	71.2	-61.9	0.	-0. **	117.4	565.9	90.0	17.3	1.000026
62500.0	69.5	-61.7	0.	-0. **	114.5	566.2	86.2	17.2	1.000025
63000.0	67.8	-61.4	0.	-0. **	111.7	566.6	82.0	17.3	1.000025

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STATION ALTITUDE 3989.0 FEET MSL
15 JULY 66 2232 HRS MST
ASCENSION NO. 537

UPPER AIR DATA
3919607
WHITE SANDS SITE
TABLE VIII (Cont)

WSTM SITE COORDINATES
E 488,580 FEET
N 185,045 FEET

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES CENTIGRADE	TEMPERATURE DEWPOINT DEGREES CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
63500.0	66.2	-61.2	0.	-0. **	108.9	566.9	76.5	18.4	1.000024
64000.0	64.7	-60.9	0.	-0. **	106.2	567.2	72.2	19.4	1.000024
64500.0	63.1	-60.7	0.	-0. **	103.5	567.6	73.6	19.9	1.000023
65000.0	61.6	-60.4	0.	-0. **	100.9	567.9	75.0	20.3	1.000022
65500.0	60.2	-60.2	0.	-0. **	98.4	568.2	79.0	20.4	1.000022
66000.0	58.7	-59.9	0.	-0. **	96.0	568.6	82.9	20.5	1.000021
66500.0	57.3	-59.7	0.	-0. **	93.6	568.9	84.4	20.2	1.000021
67000.0	56.0	-59.4	0.	-0. **	91.2	569.3	85.5	20.0	1.000020
67500.0	54.6	-59.2	0.	-0. **	89.0	569.6	87.0	20.0	1.000020
68000.0	53.3	-58.9	0.	-0. **	86.8	569.9	88.6	20.3	1.000019
68500.0	52.1	-58.7	0.	-0. **	84.6	570.3	88.8	20.7	1.000019
69000.0	50.8	-58.4	0.	-0. **	82.5	570.6	87.7	21.3	1.000018
69500.0	49.6	-58.2	0.	-0. **	80.4	570.9	88.4	21.6	1.000018
70000.0	48.4	-57.9	0.	-0. **	78.4	571.3	92.3	21.4	1.000017
70500.0	47.3	-57.7	0.	-0. **	76.5	571.6	95.2	21.1	1.000017
71000.0	46.2	-57.4	0.	-0. **	74.6	571.9	94.1	20.4	1.000017
71500.0	45.1	-57.2	0.	-0. **	72.7	572.3	92.7	19.9	1.000016
72000.0	44.0	-56.9	0.	-0. **	70.9	572.6	88.9	19.9	1.000016
72500.0	43.0	-56.6	0.	-0. **	69.1	572.9	84.9	20.2	1.000015
73000.0	41.9	-56.4	0.	-0. **	67.4	573.3	78.4	22.1	1.000015
73500.0	40.9	-56.1	0.	-0. **	65.7	573.6	73.0	24.0	1.000015
74000.0	40.0	-55.9	0.	-0. **	64.1	573.9	75.5	25.2	1.000014
74500.0	39.0	-55.6	0.	-0. **	62.5	574.3	78.0	26.6	1.000014
75000.0	38.1	-55.4	0.	-0. **	60.9	574.6	81.6	28.5	1.000014
75500.0	37.2	-55.1	0.	-0. **	59.4	574.9	85.0	30.4	1.000013
76000.0	36.3	-54.9	0.	-0. **	57.9	575.3	87.6	31.0	1.000013
76500.0	35.4	-54.6	0.	-0. **	56.5	575.6	89.9	31.7	1.000013
77000.0	34.6	-54.4	0.	-0. **	55.1	575.9	89.6	33.4	1.000012
77500.0	33.8	-54.1	0.	-0. **	53.7	576.3	89.4	35.0	1.000012
78000.0	33.0	-53.7	0.	-0. **	52.4	576.8	90.0	35.4	1.000012

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STATION ALTITUDE 3989.0 FEET MSL
15 JULY 66 2232 HRS MST
ASCENSION NO. 537

UPPER AIR DATA
3919607
WHITE SANDS SITE
TABLE VIII (Cont)

WSTM SITE COORDINATES
E 488,580 FEET
N 185,045 FEET

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES CENTIGRADE	TEMPERATURE DEWPOINT DEGREES CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
78500.0	32.3	-53.4	0.	-0. **	51.1	577.3	90.5	35.7	1.000011
79000.0	31.5	-53.0	0.	-0. **	49.9	577.8	93.5	37.2	1.000011
79500.0	30.8	-52.6	0.	-0. **	48.7	578.2	96.6	38.7	1.000011
80000.0	30.1	-52.2	0.	-0. **	47.5	578.7	97.8	38.4	1.000011
80500.0	29.4	-51.9	0.	-0. **	46.3	579.2	98.8	37.8	1.000010
81000.0	28.7	-51.5	0.	-0. **	45.2	579.7	99.2	38.1	1.000010
81500.0	28.1	-51.1	0.	-0. **	44.1	580.2	99.4	38.7	1.000010
82000.0	27.5	-50.8	0.	-0. **	43.0	580.7	99.2	38.4	1.000010
82500.0	26.8	-50.4	0.	-0. **	42.0	581.1	98.9	37.9	1.000009
83000.0	26.2	-50.0	0.	-0. **	40.9	581.6	99.4	37.5	1.000009
83500.0	25.6	-49.7	0.	-0. **	39.9	582.1	100.4	37.3	1.000009
84000.0	25.0	-49.3	0.	-0. **	39.0	582.6	100.3	36.4	1.000009
84500.0	24.5	-48.9	0.	-0. **	38.0	583.1	98.8	34.7	1.000008
85000.0	23.9	-48.6	0.	-0. **	37.1	583.5	97.3	33.9	1.000008
85500.0	23.4	-48.2	0.	-0. **	36.2	584.0	95.7	34.3	1.000008
86000.0	22.8	-47.8	0.	-0. **	35.3	584.5	93.6	34.7	1.000008
86500.0	22.3	-47.4	0.	-0. **	34.4	585.0	90.4	34.9	1.000008
87000.0	21.8	-47.1	0.	-0. **	33.6	585.5	87.8	35.0	1.000007
87500.0	21.3	-46.7	0.	-0. **	32.8	585.9	87.1	34.9	1.000007
88000.0	20.8	-46.3	0.	-0. **	32.0	586.4	86.5	34.4	1.000007
88500.0	20.3	-46.0	0.	-0. **	31.2	586.9	85.8	32.0	1.000007
89000.0	19.9	-45.6	0.	-0. **	30.4	587.4	85.1	29.6	1.000007
89500.0	19.4	-45.2	0.	-0. **	29.7	587.8	82.5	28.2	1.000007
90000.0	19.0	-44.9	0.	-0. **	29.0	588.3	80.0	26.7	1.000006
90500.0	18.6	-44.5	0.	-0. **	28.3	588.8	79.6	26.1	1.000006
91000.0	18.1	-44.1	0.	-0. **	27.6	589.3	79.2	25.6	1.000006
91500.0	17.7	-44.0	0.	-0. **	27.0	589.4	76.6	26.0	1.000006
92000.0	17.3	-44.0	0.	-0. **	26.4	589.4	73.7	26.6	1.000006
92500.0	16.9	-44.0	0.	-0. **	25.8	589.4	73.5	28.4	1.000006
93000.0	16.6	-44.0	0.	-0. **	25.2	589.4	74.1	30.6	1.000006

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STATION ALTITUDE 3989.0 FEET MSL
15 JULY 66 2232 HRS MST
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UPPER AIR DATA
3919607
WHITE SANDS SITE
TABLE VIII (Cont)

WSTM SITE COORDINATES
E 488,580 FEET
N 185,045 FEET

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES	TEMPERATURE DEWPOINT CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
93500.0	16.2	-44.0	0.	-0. **	24.6	589.4	74.7	32.9	1.000005
94000.0	15.8	-43.5	0.	-0. **	24.0	590.1	75.4	35.3	1.000005
94500.0	15.5	-42.4	0.	-0. **	23.4	591.4			1.000005
95000.0	15.2	-41.3	0.	-0. **	22.8	592.8			1.000005
95500.0	14.8	-40.3	0.	-0. **	22.2	594.2			1.000005

** AT LEAST ONE ASSUMED RELATIVE HUMIDITY VALUE WAS USED IN THE INTERPOLATION.

RELEASE TIME (MST)			IMPACT DISPLACEMENT IN MILES DUE TO WIND								THEORETICAL IMPACT IN MILES FROM LAUNCHER	
			143-4000 FT		4000-20000 FT		20000-100000 FT		TOTAL			
RAWINSONDE		PIBAL	N-S	E-W	N-S	E-W	N-S	E-W	N-S	E-W	N-S	E-W
R_1 1615	R 1615	P 1825	20.4S	37.1E	0.1N	10.3E	5.6S	3.4E	25.9S	50.8E	62.6N	7.5W
R_1 1615	R 1615	P 1842	14.9S	36.2E	0.1N	10.3E	5.6S	3.4E	20.4S	49.9E	68.1N	8.4W
R_2 1810	R 1615	P 1912	17.0S	35.4E	0.7N	11.6E	5.6S	3.4E	21.9S	50.4E	66.6N	7.9W
R_2 1810	R 1615	P 1932	19.1S	33.1E	0.7N	11.6E	5.6S	3.4E	24.0S	48.1E	64.5N	10.2W
R_2 1810	R 1615	P 1952	19.9S	34.2E	0.7N	11.6E	5.6S	3.4E	24.8S	49.2E	63.7N	9.1W
R_2 1810	R_3 1810	P 2012	22.6S	38.1E	0.7N	11.6E	4.7S	4.7E	26.6S	54.4E	61.9N	3.9W
R_2 1810	R_3 1810	P 2027	23.8S	39.3E	0.7N	11.6E	4.7S	4.7E	27.8S	55.6E	60.7N	2.7W
R_2 1810	R_3 1810	P 2038	22.2S	39.2E	0.7N	11.6E	4.7S	4.7E	26.2S	55.5E	62.3N	2.8W
R_2 2020	R_3 1810	P 2050	24.2S	37.9E	0.4N	11.3E	4.7S	4.7E	28.5S	53.9E	60.0N	4.4W
R_2 2020	R_3 1810	P 2102	20.9S	35.8E	0.4N	11.3E	4.7S	4.7E	25.2S	51.8E	63.3N	6.5W
R_2 2020	R_3 1810	P 2107	24.9S	38.8E	0.4N	11.3E	4.7S	4.7E	29.2S	54.8E	59.3N	3.5W
R_2 2020	R_3 1810	P 2118	27.7S	40.4E	0.4N	11.3E	4.7S	4.7E	32.0S	56.4E	56.5N	1.9W
R_2 2020	R_3 1810	P 2130	27.8S	40.1E	0.4N	11.3E	4.7S	4.7E	32.1S	56.1E	56.4N	2.2W
R_2 2020	R_3 1810	P 2140	28.7S	41.0E	0.4N	11.3E	4.7S	4.7E	33.0S	57.0E	55.5N	1.3W
R_2 2020	R_3 1810	P 2156	36.7S	41.3E	0.4N	11.3E	4.7S	4.7E	41.0S	57.3E	47.5N	1.0W
R_2 2140	R_3 1810	P 2207	32.1S	42.2E	1.7N	11.2E	4.7S	4.7E	35.1S	58.1E	53.4N	0.2W
R_2 2140	R_3 1810	P 2218	27.7S	39.8E	1.7N	11.2E	4.7S	4.7E	30.7S	55.7E	57.8N	2.6W
R_2 2140	R_3 1810	P 2225	35.4S	43.3E	1.7N	11.2E	4.7S	4.7E	38.4S	59.2E	50.1N	0.9E
*R_1 2232	*R 2232	*P 2235	30.6S	37.3E	0.6N	11.7E	4.5S	5.8E	34.5S	54.8E	54.0N	3.5W

* = Post-Shoot Data
P = Double Theodolite Winds (143-4,000 FT)
R = Rawinsonde Winds (Above 20,000 FT)
R_1 = Rawinsonde Winds (4,000-20,000 FT)
R_2 = Rawin Winds (4,000-20,000 FT)
R_3 = Rawin Winds (Above 20,000 FT)

TABLE IX. IMPACT PREDICTION DATA
AEROBEE NASA 4.159 GG

TIME: 2231 MST
DATE: 15 JULY 1966

JACK SETTINGS FOR LAUNCHER 21E	West leg	22	inches
	East leg	41	inches
LAUNCHER SETTING	Tilt	6.09	degrees
	Azimuth	328.86	degrees
TILT COMPONENTS	North	5.21	degrees
	West	3.15	degrees
NO WIND IMPACT FROM LAUNCHER	North	88.5	miles
	West	58.3	miles

PREDICTED IMPACT FROM LAUNCHER	North	58.0	miles
	West	3.0	miles
PREDICTED BOOSTER IMPACT FROM LAUNCHER	Azimuth	330	degrees
	Distance	1,700	feet

RECOMMENDATION - Fire, with 85% confidence of impacting on range, based upon:
wind correction of 68.0 miles
1-hr wind variability of 9.0 miles

15 July 1966/2221 MST

TABLE X. ACTUAL AND PREDICTED LAUNCH DATA
AEROBEE NASA 4.159 GG

RADAR IMPACT FROM LAUNCHER	North	51.0	miles
	West	10.6	miles
ACTUAL BOOSTER IMPACT FROM LAUNCHER	Azimuth	N/A	degrees
	Distance	N/A	feet

TABLE XI. IMPACT DATA
AEROBEE NASA 4.159 GG

UNCLASSIFIED
Security Classification

DOCUMENT CONTROL DATA - R&D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)
U. S. Army Electronics Command
Fort Monmouth, New Jersey

2a. REPORT SECURITY CLASSIFICATION
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2b. GROUP

3. REPORT TITLE
METEOROLOGICAL DATA REPORT, AEROBEE NASA 4.159 GG

4. DESCRIPTIVE NOTES (Type of report and inclusive dates)

5. AUTHOR(S) (Last name, first name, initial)
Hoidale, Marjorie McLardie

6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
August 1966	25	2

8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)
b. PROJECT NO.	DR-56
c. DA Task IV650212A127-02	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)
d.	

10. AVAILABILITY/LIMITATION NOTICES
Distribution of this document is unlimited.

11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY
	U. S. Army Electronics Command Atmospheric Sciences Laboratory White Sands Missile Range, New Mexico

13. ABSTRACT

Meteorological data gathered for the launching of Aerobee NASA 4.159 GG are presented for the National Aeronautics and Space Administration and for ballistic studies. The data appear, along with calculated ballistic data, in tabular form.

DD FORM 1 JAN 64 1473

UNCLASSIFIED
Security Classification

14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
1. Ballistics 2. Meteorology 3. Wind						

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