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METEOROLOGICAL DATA REPORT

AEROBEE NASA 4.106 NP
(9 May 1966)

BY

MARJORIE McLARDIE HOIDALE

FACILITY FORM 802

(ACCESSION NUMBER)	N66 33391	(THRU)	
(PAGES)	33	(CODE)	
(NASA CR OR TMX OR AD NUMBER)	CR-46571	(CATEGORY)	20

NASA
SCI. & TECH. INFO.
FACILITY

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DA Task IV650212A127-02

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ABSTRACT

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Meteorological data gathered for the launching of Aerobee NASA 4.106 NP are presented for the National Aeronautics and Space Administration, the Jet Propulsion Laboratory, and for ballistic studies. The data appear, along with calculated ballistic data, in tabular form.

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INTRODUCTION

Aerobee NASA 4.106 NP was launched by Naval Ordnance Missile Test Facility personnel, White Sands Missile Range (WSMR), New Mexico, at 0820 hours MST, 9 May 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	308.0	Pounds
*UNIT WIND EFFECT	Cross	3.32	Miles/MPH
	Range	3.90	Miles/MPH
TOWER TILT EFFECT		17.52	Miles/Degree
BURNOUT	Velocity	5,380	Feet/Second
	Altitude	121,968	Feet MSL
	Time	51.8	Seconds
PEAK	Altitude	109.8	Miles MSL
	Time	222.0	Seconds
TOTAL FLIGHT TIME		524.0	Seconds
CORIOLIS EFFECT	West	5.0	Miles

TABLE I. THEORETICAL ROCKET PERFORMANCE VALUES
AEROBEE NASA 4.106 NP

* 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 4.106 NP

TIME IN MINUTES	ANEMOMETER-MEASURED WIND	
	Speed (Knots)	Direction (Degrees)
T - 15	1.0	200
T - 10	1.5	205
T - 5	2.5	230
T - Time	3.0	218
T + 5	2.0	213
T + 10	1.5	217
T + 15	1.5	219

TABLE III. ANEMOMETER-MEASURED WIND SPEED AND DIRECTION
AFROBEE NASA 4.106 NP

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 0455 MST		2 0530 MST		3 0600 MST		4 0625 MST		5 0640 MST		6 0700 MST		7 0715 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	8.0N	9.0E	5.5N	7.5E	4.5N	7.0E	9.0N	3.5E	6.5N	4.0E	5.0N	3.5E	1.5N	1.5E
250- 400	12.0	6.5	6.0	7.0	6.5	7.0	10.5	4.0	8.0	4.0	5.5	4.5	3.5	4.5
400- 600	15.0	2.5	8.5	6.0	5.5	6.5	5.5	7.0	5.5	4.0	6.0	5.5	0.5	4.0
600- 800	15.5	1.5	10.0	6.5	3.0	7.0	3.0	9.5	1.5	4.5	0.5	7.5	0.5S	5.5
800-1200	11.5	3.5	5.0	9.0	4.5S	6.5	7.5S	10.0	1.0S	6.5	3.5S	9.0	4.5	7.0
1200-1600	12.5	3.0	1.5	10.0	6.0	6.5	9.0	11.5	6.0	11.5	10.0	9.0	10.5	8.5
1600-2000	4.5	4.0W	3.5	8.5	6.0	4.5	7.5	6.5	8.0	8.5	8.0	10.0	8.5	5.5
2000-2500	6.5	7.5	6.5	5.5	2.0	4.0	2.5	4.5	4.5	4.0	5.0	8.5	5.0	5.0
2500-3000	3.5	14.0	2.5	6.0W	0.0	1.0	1.0	2.5	2.0	1.5	5.0	7.0W	3.5	0.0
3000-3500	2.5S	11.0	0.5	8.0	0.0	5.5W	6.5	0.0	2.5	2.0W	2.5	2.5E	3.5	1.5W
3500-4000	2.5	11.0	0.5	6.0	0.0	3.5	1.0	2.0W	2.5	5.5	3.0N	12.0	3.0	7.0

TABLE IV. PILOT-BALLOON-MEASURED WIND DATA (DOUBLE-THEODOLITE METHOD)
AEROBEE NASA 4.106 NP

LAYERS IN FEET ABOVE GROUND	MEAN WIND COMPONENTS IN MILES PER HOUR											
	8		9		10		11		12		13	
	0725 MST		0735 MST		0745 MST		0755 MST		0805 MST		0813 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	0.5S	3.5E	0.5N	0.5E	0.0	0.5E	0.5S	1.0E	0.5S	0.5E	1.0S	1.5W
250- 400	2.0N	6.0	0.5S	1.0	1.0N	1.0	0.5	1.0	0.5	0.5	1.5	1.5
400- 600	1.0	5.5	1.0	1.0	1.5S	0.0	3.0	0.5W	0.5N	0.5	3.0	1.5
600- 800	0.5	3.0	0.5	1.0	0.5N	1.0E	3.0	0.5E	0.5S	1.5	3.0	0.5
800-1200	3.0S	4.0	1.0N	1.0	4.5S	4.5	3.0	3.5	0.5	4.0	5.5	2.0E
1200-1600	11.0	7.0	3.5S	1.0	6.0	7.5	4.0	2.5	7.0	8.0	5.5	4.5
1600-2000	7.5	10.0	10.0	6.5	12.0	5.5	8.0	7.5	7.5	6.5	7.0	6.0
2000-2500	7.0	4.5	10.0	3.5	7.5	3.5	9.5	2.5	9.5	2.5	10.5	1.0
2500-3000	6.0	2.0	7.5	4.0	5.5	2.0	6.5	1.0W	7.0	0.5	9.5	1.5W
3000-3500	*M	M	5.0	2.0W	6.0	1.0	6.0	2.0	8.0	2.0W	9.0	2.5
3500-4000	M	M	1.0	3.0	2.5	2.0	5.0	1.5	7.0	8.0	9.0	1.0
											0.5S	0.5E
											2.5	4.5
											4.5	4.0
											7.0	3.0
											7.5	5.5
											8.0	5.5
											10.0	8.0
											10.5	8.5
											M	M
											M	M
											M	M

TABLE IV. PILOT-BALLOON-MEASURED WIND DATA - DOUBLE-THEODOLITE METHOD (Cont)
AEROBEE NASA 4.106 NP

* M = Missing data

LAYERS IN FEET ABOVE GROUND	MEAN WIND COMPONENTS IN KNOTS	
	1	
	0705 MST	
	N-S	E-W
4000- 5000	10.0S	8.5W
5000-10000	12.0	14.5
10000-15000	27.5	5.0
15000-20000	27.5	23.0

TABLE V. UPPER AIR DATA
(4,000-20,000 FT)
AEROBEE NASA 4.106 NP

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LAYERS IN FEET ABOVE GROUND	MEAN WIND COMPONENTS IN KNOTS					
	1		2*		3	
	0220 MST		0500 MST		0820 MST	
	N-S	E-W	N-S	E-W	N-S	E-W
4000- 5000	4.0S	10.5W	1.5S	10.0W	9.0S	7.5W
5000- 10000	9.5	5.5	8.5	14.5	15.5	13.0
10000- 15000	16.5	3.0	20.5	7.5	25.0	9.0
15000- 20000	13.0	11.0	12.5	21.5	23.5	20.0
20000- 25000	15.5	27.0	16.5	28.0	22.0	26.0
25000- 30000	18.5	32.0	19.5	34.0	15.5	27.0
30000- 35000	14.5	40.5	13.5	37.5	13.5	37.5
35000- 40000	16.5	45.0	9.0	50.0	9.0	50.0
40000- 45000	6.5	36.5	7.0	38.5	7.5	43.5
45000- 50000	0.0	38.0	0.0	37.0	5.0	29.5
50000- 60000	8.0N	21.0	8.5N	14.5	7.0N	19.0
60000- 70000	7.0	12.0	5.0	8.5	3.0	8.5
70000- 80000	6.0	5.0E	3.5S	9.5	11.0	6.5
80000- 90000	14.0S	2.5W	6.0	7.0	3.0S	5.0
90000-100000	4.5	5.5	3.0	4.0	3.0	5.0

TABLE VI. UPPER AIR DATA (4,000-100,000 FT)
AEROBEE NASA 4.106 NP

* Rawin, telecompute data not available.

UPPER AIR DATA

STATION ALTITUDE 3989.0 FEET MSL
 9 MAY 66 220 HRS MST
 ASCENSION NO. 321

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

3912908
 WHITE SANDS SITE
 TABLE VII

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)	SPEED KNOTS	INDEX OF REFRACTION
3989.0	873.0	24.3	3.1	25.0	1019.2	672.7	270.0	12.0	1.000260
4000.0	872.7	24.3	3.0	24.9	1018.9	672.6	270.0	12.1	1.000259
4500.0	857.6	23.9	1.3	22.6	1002.8	672.1	270.8	14.3	1.000252
5000.0	842.7	23.5	-0.5	20.2	987.0	671.6	271.6	16.5	1.000245
5500.0	828.1	23.1	-2.4	18.1	971.6	671.0	272.4	18.7	1.000239
6000.0	813.3	21.8	-2.5	19.5	958.3	669.5	273.2	20.9	1.000236
6500.0	798.7	20.5	-2.6	20.9	945.3	668.1	273.5	22.1	1.000233
7000.0	784.4	19.2	-2.8	22.2	932.4	666.6	271.8	19.2	1.000230
7500.0	770.3	18.0	-3.1	23.6	919.8	665.1	269.6	16.2	1.000227
8000.0	756.5	16.7	-3.4	25.0	907.4	663.7	266.2	13.1	1.000224
8500.0	743.0	15.4	-3.8	26.4	895.1	662.2	258.3	10.9	1.000220
9000.0	729.7	14.1	-4.2	27.8	883.1	660.7	245.9	9.5	1.000217
9500.0	716.6	12.8	-4.7	29.2	871.2	659.2	234.9	9.1	1.000214
10000.0	703.8	11.5	-5.2	30.6	859.5	657.7	224.6	9.2	1.000211
10500.0	691.2	10.2	-5.8	32.0	848.0	656.2	216.8	10.1	1.000208
11000.0	678.8	8.9	-6.4	33.4	836.7	654.6	208.9	10.8	1.000205
11500.0	666.6	7.6	-7.0	34.7	825.5	653.1	200.9	11.4	1.000201
12000.0	654.7	6.3	-7.6	36.1	814.6	651.6	194.0	11.7	1.000198
12500.0	643.0	5.0	-8.3	37.5	803.7	650.1	187.9	12.0	1.000195
13000.0	631.0	3.7	-8.3	41.4	792.7	648.5	184.5	12.2	1.000193
13500.0	619.1	2.3	-8.0	46.6	781.6	646.9	182.6	12.6	1.000191
14000.0	607.3	0.8	-8.0	51.9	770.6	645.2	185.3	13.7	1.000189
14500.0	595.8	-0.6	-8.0	57.1	759.9	643.6	187.5	15.1	1.000186
15000.0	584.5	-2.0	-8.3	62.3	749.4	641.9	189.4	16.7	1.000184
15500.0	573.4	-3.4	-8.6	67.5	739.1	640.2	191.7	18.1	1.000181
16000.0	562.5	-4.8	-9.0	72.7	728.9	638.5	193.9	19.3	1.000179
16500.0	551.9	-6.2	-9.5	78.0	718.9	636.8	194.2	19.1	1.000176
17000.0	541.4	-7.6	-10.0	83.2	709.0	635.1	194.1	18.9	1.000173
17500.0	531.1	-9.0	-10.7	88.4	699.3	633.4	191.9	17.9	1.000171
18000.0	520.8	-9.8	-11.6	87.1	687.7	632.5	189.2	16.7	1.000167

STATION ALTITUDE 3989.0 FEET MSL
 9 MAY 66 220 HRS MST
 ASCENSION NO. 321

UPPER AIR DATA
 3912908
 WHITE SANDS SITE
 TABLE VII (Cont)

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

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE		RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND		WIND DATA		INDEX OF REFRACTION
		AIR DEGREES	DEWPOINT CENTIGRADE			KNOTS	KNOTS	DIRECTION DEGREES(TN)	SPEED KNOTS	
18500.0	510.7	-10.4	-12.5	85.2	676.1	631.7	185.7	185.7	15.0	1.000163
19000.0	500.6	-11.6	-12.9	90.7	665.8	630.3	183.0	183.0	14.0	1.000161
19500.0	490.8	-12.8	-13.3	96.1	655.7	628.8	180.9	180.9	13.5	1.000158
20000.0	481.1	-13.7	-14.8	92.1	645.2	627.7	191.4	191.4	13.2	1.000155
20500.0	471.6	-14.1	-19.3	65.4	633.6	627.0	203.3	203.3	13.2	1.000149
21000.0	462.3	-14.5	-25.6	38.7	622.3	626.4	215.1	215.1	14.2	1.000143
21500.0	453.0	-15.5	-26.5	38.4	612.1	625.2	224.6	224.6	15.7	1.000140
22000.0	443.8	-16.4	-27.3	38.8	602.1	624.0	231.2	231.2	17.1	1.000138
22500.0	434.9	-17.4	-28.1	39.3	592.3	622.8	231.6	231.6	17.9	1.000135
23000.0	426.1	-18.4	-28.9	39.7	582.6	621.6	231.4	231.4	18.9	1.000133
23500.0	417.6	-19.4	-29.7	40.1	573.1	620.4	231.6	231.6	19.9	1.000131
24000.0	409.2	-20.4	-30.5	40.5	563.8	619.2	234.4	234.4	21.0	1.000128
24500.0	400.9	-21.4	-31.3	41.0	554.6	618.0	237.4	237.4	22.3	1.000126
25000.0	392.6	-22.7	-32.1	42.5	545.9	616.4	240.7	240.7	23.7	1.000124
25500.0	384.3	-24.0	-32.9	44.1	537.3	614.7	241.9	241.9	24.9	1.000122
26000.0	376.3	-25.4	-33.8	45.8	528.9	613.0	242.3	242.3	26.0	1.000120
26500.0	368.4	-26.7	-34.7	47.5	520.6	611.4	241.8	241.8	26.7	1.000118
27000.0	360.7	-28.0	-35.6	49.1	512.5	609.7	241.0	241.0	27.5	1.000116
27500.0	353.1	-29.4	-36.5	50.8	504.5	608.0	240.1	240.1	28.4	1.000114
28000.0	345.7	-30.7	-37.4	52.4	496.7	606.4	240.5	240.5	30.1	1.000112
28500.0	338.4	-32.1	-38.4	54.1	489.0	604.7	240.8	240.8	31.9	1.000110
29000.0	331.3	-33.4	-39.4	55.8	481.4	603.0	240.2	240.2	33.9	1.000109
29500.0	324.4	-34.7	-40.4	57.4	474.0	601.3	240.0	240.0	35.7	1.000107
30000.0	317.4	-36.1	-41.0	61.8	466.5	599.5	240.5	240.5	37.1	1.000105
30500.0	310.5	-37.6	-41.6	67.5	459.2	597.7	241.1	241.1	37.9	1.000103
31000.0	303.8	-39.0	-42.2	73.3	452.0	595.8	241.7	241.7	38.1	1.000102
31500.0	297.1	-39.7	-44.3	63.0	443.4	595.0	242.8	242.8	37.3	1.000100
32000.0	290.6	-40.7	-45.8	59.2	435.5	593.7	243.6	243.6	36.4	1.000098
32500.0	284.1	-42.1	-46.5	63.5	428.4	591.9	243.7	243.7	36.0	1.000096
33000.0	277.8	-43.4	-47.5	65.5	421.3	590.2	243.7	243.7	35.8	1.000094

STATION ALTITUDE 3989.0 FEET MSL
9 MAY 66 220 HRS MST
ASCENSION NO. 321

UPPER AIR DATA
3912908
WHITE SANDS SITE
TABLE VII (Cont)

WSTM SITE COORDINATES
E 488,580 FEET
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GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE		RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND		WIND DATA		INDEX OF REFRACTION
		AIR DEGREES	DEWPOINT CENTIGRADE			KNOTS	KNOTS	DIRECTION DEGREES(TN)	SPEED KNOTS	
33500.0	271.6	-44.5	-49.7	57.7	413.9	588.8		243.9	36.1	1.000093
34000.0	265.4	-45.6	-51.6	51.8**	406.4	587.4		244.5	38.2	1.000091
34500.0	259.2	-46.6	-53.0	48.7**	398.6	586.1		245.5	40.3	1.000089
35000.0	253.2	-47.6	-54.5	45.7**	391.0	584.8		246.8	42.1	1.000087
35500.0	247.3	-48.5	-55.9	42.7**	383.5	583.6		248.1	43.6	1.000086
36000.0	241.5	-49.5	-57.4	39.7**	376.2	582.3		249.3	43.6	1.000084
36500.0	235.8	-50.5	-59.0	36.7**	369.0	581.0		250.2	43.0	1.000082
37000.0	230.3	-51.5	-60.5	33.6**	362.0	579.7		250.6	42.2	1.000081
37500.0	224.9	-52.5	-62.1	30.6**	355.1	578.5		251.2	41.4	1.000079
38000.0	219.7	-53.4	-63.8	27.6**	348.4	577.2		251.8	40.6	1.000078
38500.0	214.6	-54.4	-65.5	24.6**	341.8	575.9		252.1	40.6	1.000076
39000.0	209.5	-55.4	-67.3	21.6**	335.3	574.6		252.6	40.8	1.000075
39500.0	204.7	-56.4	-69.2	18.5**	328.9	573.3		253.7	42.1	1.000073
40000.0	199.9	-57.4	-71.3	15.5**	322.7	572.0		254.1	43.7	1.000072
40500.0	195.2	-58.3	-73.6	12.5**	316.6	570.7		252.8	46.0	1.000071
41000.0	190.6	-59.3	-76.2	9.5**	310.6	569.4		252.0	48.3	1.000069
41500.0	186.2	-60.3	-79.4	6.5**	304.8	568.1		252.3	50.8	1.000068
42000.0	181.8	-61.3	-83.9	3.4**	299.0	566.8		253.0	52.7	1.000067
42500.0	177.6	-62.3	-95.7	0.4**	293.4	565.5		254.8	53.0	1.000065
43000.0	173.3	-62.4	0.	-0.	286.5	565.3		256.7	52.5	1.000064
43500.0	169.1	-62.4	0.	-0.	279.6	565.3		259.0	49.7	1.000062
44000.0	165.0	-62.4	0.	-0.	272.8	565.3		261.2	46.6	1.000061
44500.0	161.0	-62.4	0.	-0.	266.1	565.3		262.6	41.3	1.000059
45000.0	157.1	-63.1	0.	-0.	260.5	564.4		263.8	36.0	1.000058
45500.0	153.2	-64.4	0.	-0.	255.7	562.6		262.0	30.4	1.000057
46000.0	149.5	-65.7	0.	-0.	251.0	560.8		261.7	27.8	1.000056
46500.0	145.8	-66.2	0.	-0.	245.5	560.1		263.8	30.3	1.000055
47000.0	142.2	-65.1	0.	-0.	238.2	561.6		265.8	33.1	1.000053
47500.0	138.7	-64.0	0.	-0.	231.1	563.1		267.8	35.7	1.000051
48000.0	135.3	-63.6	0.	-0.	225.0	563.7		269.9	37.5	1.000050

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

STATION ALTITUDE 3989.0 FEET MSL
 9 MAY 66 220 HRS MST
 ASCENSION NO. 321

UPPER AIR DATA
 3912908
 WHITE SANDS SITE
 TABLE VII (Cont)

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

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE		RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND		WIND DATA		INDEX OF REFRACTION
		AIR DEGREES	DEWPOINT CENTIGRADE			KNOTS	KNOTS	DIRECTION DEGREES(TN)	SPEED KNOTS	
48500.0	132.0	-63.8	0.	-0. **	219.6	563.4		271.2	37.5	1.000049
49000.0	128.7	-64.0	0.	-0. **	214.4	563.2		271.1	34.9	1.000048
49500.0	125.6	-64.2	0.	-0. **	209.4	562.9		270.9	34.4	1.000047
50000.0	122.5	-64.4	0.	-0. **	204.4	562.6		270.5	35.9	1.000046
50500.0	119.5	-64.5	0.	-0. **	199.6	562.4		270.7	37.2	1.000044
51000.0	116.6	-64.7	0.	-0. **	194.9	562.1		271.4	38.2	1.000043
51500.0	113.7	-64.9	0.	-0. **	190.3	561.9		272.6	39.2	1.000042
52000.0	110.9	-65.1	0.	-0. **	185.8	561.6		274.1	40.0	1.000041
52500.0	108.2	-65.3	0.	-0. **	181.4	561.4		274.9	39.4	1.000040
53000.0	105.5	-65.5	0.	-0. **	177.1	561.1		275.4	38.6	1.000039
53500.0	103.0	-65.7	0.	-0. **	172.9	560.9		273.0	36.9	1.000039
54000.0	100.4	-65.9	0.	-0. **	168.8	560.6		270.9	35.4	1.000038
54500.0	98.0	-65.8	0.	-0. **	164.6	560.7		269.6	34.3	1.000037
55000.0	95.5	-65.6	0.	-0. **	160.4	560.9		269.3	32.8	1.000036
55500.0	93.2	-65.5	0.	-0. **	156.4	561.1		270.2	30.9	1.000035
56000.0	90.9	-65.3	0.	-0. **	152.4	561.3		273.6	31.0	1.000034
56500.0	88.7	-64.9	0.	-0. **	148.3	561.9		278.5	32.0	1.000033
57000.0	86.5	-62.9	0.	-0. **	143.3	564.6		284.0	32.5	1.000032
57500.0	84.4	-62.8	0.	-0. **	139.8	564.7		289.6	33.0	1.000031
58000.0	82.3	-63.3	0.	-0. **	136.7	564.0		297.9	29.9	1.000030
58500.0	80.3	-63.8	0.	-0. **	133.7	563.3		306.3	26.7	1.000030
59000.0	78.3	-64.4	0.	-0. **	130.7	562.6		311.9	22.3	1.000029
59500.0	76.4	-64.9	0.	-0. **	127.8	561.9		317.4	17.8	1.000028
60000.0	74.5	-65.4	0.	-0. **	125.0	561.2		320.1	13.4	1.000028
60500.0	72.7	-65.9	0.	-0. **	122.2	560.5		320.8	9.4	1.000027
61000.0	70.9	-66.4	0.	-0. **	119.5	559.8		294.9	10.9	1.000027
61500.0	69.2	-66.9	0.	-0. **	116.9	559.1		271.0	12.5	1.000026
62000.0	67.5	-66.8	0.	-0. **	114.0	559.3		275.6	14.8	1.000025
62500.0	65.8	-66.7	0.	-0. **	111.1	559.5		280.1	17.1	1.000025
63000.0	64.2	-66.5	0.	-0. **	108.2	559.8		281.2	19.6	1.000024

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

UPPER AIR DATA

STATION ALTITUDE 3989.0 FEET MSL
 9 MAY 66 220 HRS MST
 ASCENSION NO. 321

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

3912908
 WHITE SANDS SITE
 TABLE VII (Cont)

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)	SPEED KNOTS	INDEX OF REFRACTION
63500.0	62.6	-66.3	0.	-0. **	105.5	560.0	282.2	22.1	1.000023
64000.0	61.1	-66.1	0.	-0. **	102.8	560.3	285.9	22.7	1.000023
64500.0	59.6	-65.9	0.	-0. **	100.1	560.5	289.8	23.2	1.000022
65000.0	58.1	-65.7	0.	-0. **	97.6	560.8	291.9	21.5	1.000022
65500.0	56.7	-65.6	0.	-0. **	95.1	561.0	293.7	19.3	1.000021
66000.0	55.3	-65.4	0.	-0. **	92.7	561.3	296.0	17.7	1.000021
66500.0	53.9	-65.2	0.	-0. **	90.3	561.6	298.6	16.3	1.000020
67000.0	52.6	-64.7	0.	-0. **	87.9	562.2	304.2	15.0	1.000020
67500.0	51.4	-64.2	0.	-0. **	85.6	562.9	312.4	13.6	1.000019
68000.0	50.1	-63.7	0.	-0. **	83.4	563.6	316.6	12.8	1.000019
68500.0	48.9	-63.2	0.	-0. **	81.2	564.2	308.2	13.8	1.000018
69000.0	47.8	-62.7	0.	-0. **	79.1	564.9	299.8	14.8	1.000018
69500.0	46.6	-62.2	0.	-0. **	77.0	565.6	299.5	14.2	1.000017
70000.0	45.5	-61.7	0.	-0. **	75.0	566.2	300.3	13.5	1.000017
70500.0	44.4	-61.2	0.	-0. **	73.0	566.9	296.2	13.5	1.000016
71000.0	43.3	-60.7	0.	-0. **	71.1	567.5	287.5	14.3	1.000016
71500.0	42.3	-60.2	0.	-0. **	69.2	568.2	280.3	14.6	1.000015
72000.0	41.3	-59.7	0.	-0. **	67.4	568.9	282.8	11.7	1.000015
72500.0	40.3	-59.2	0.	-0. **	65.6	569.5	285.4	8.9	1.000015
73000.0	39.3	-58.7	0.	-0. **	63.9	570.2	280.3	8.5	1.000014
73500.0	38.4	-58.2	0.	-0. **	62.2	570.8	273.1	8.8	1.000014
74000.0	37.5	-57.7	0.	-0. **	60.6	571.5	275.9	8.1	1.000013
74500.0	36.6	-57.2	0.	-0. **	59.0	572.2	291.9	5.9	1.000013
75000.0	35.7	-56.7	0.	-0. **	57.5	572.8	303.0	4.4	1.000013
75500.0	34.8	-56.2	0.	-0. **	56.0	573.5	298.0	4.8	1.000012
76000.0	34.0	-55.7	0.	-0. **	54.5	574.1	297.5	5.0	1.000012
76500.0	33.2	-55.3	0.	-0. **	53.1	574.8	319.1	4.1	1.000012
77000.0	32.4	-54.8	0.	-0. **	51.7	575.4	338.2	3.2	1.000012
77500.0	31.6	-54.5	0.	-0. **	50.4	575.7	334.6	2.7	1.000011
78000.0	30.9	-54.6	0.	-0. **	49.3	575.6	331.0	2.2	1.000011

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

UPPER AIR DATA

STATION ALTITUDE 3989.0 FEET MSL
 9 MAY 66 220 HRS MST
 ASCENSION NO. 321

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

3912908
 WHITE SANDS SITE
 TABLE VII (Cont)

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE		RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND		WIND DATA		INDEX OF REFRACTION
		AIR DEGREES	DEWPOINT CENTIGRADE			KNOTS	KNOTS	DIRECTION DEGREES(TN)	SPEED KNOTS	
78500.0	30.2	-54.7	0.	-0.	48.1	575.5	312.7	312.7	2.9	1.000011
79000.0	29.5	-54.8	0.	-0.	47.0	575.4	294.4	294.4	3.5	1.000010
79500.0	28.8	-54.6	0.	-0.	45.9	575.6	289.2	289.2	3.9	1.000010
80000.0	28.1	-54.1	0.	-0.	44.7	576.3	285.7	285.7	4.3	1.000010
80500.0	27.5	-53.5	0.	-0.	43.6	577.0	264.3	264.3	5.0	1.000010
81000.0	26.9	-53.0	0.	-0.	42.5	577.7	236.6	236.6	5.9	1.000009
81500.0	26.3	-52.5	0.	-0.	41.4	578.5	220.2	220.2	6.9	1.000009
82000.0	25.7	-51.9	0.	-0.	40.4	579.2	212.1	212.1	8.0	1.000009
82500.0	25.1	-51.4	0.	-0.	39.4	579.9	210.2	210.2	9.2	1.000009
83000.0	24.5	-50.8	0.	-0.	38.4	580.6	216.9	216.9	10.6	1.000009
83500.0	23.9	-50.3	0.	-0.	37.4	581.3	224.6	224.6	11.6	1.000008
84000.0	23.4	-49.7	0.	-0.	36.5	582.0	234.8	234.8	11.4	1.000008
84500.0	22.9	-49.2	0.	-0.	35.6	582.7	244.6	244.6	11.0	1.000008
85000.0	22.3	-48.6	0.	-0.	34.7	583.4	249.5	249.5	9.2	1.000008
85500.0	21.8	-48.1	0.	-0.	33.8	584.1	254.3	254.3	7.3	1.000008
86000.0	21.3	-47.6	0.	-0.	32.9	584.8	229.4	229.4	5.8	1.000007
86500.0	20.8	-47.0	0.	-0.	32.1	585.5	195.6	195.6	4.4	1.000007
87000.0	20.4	-46.5	0.	-0.	31.3	586.3	170.1	170.1	3.4	1.000007
87500.0	19.9	-45.9	0.	-0.	30.5	587.0	168.9	168.9	3.8	1.000007
88000.0	19.4	-45.4	0.	-0.	29.7	587.7	167.8	167.8	4.2	1.000007
88500.0	19.0	-44.8	0.	-0.	29.0	588.4	174.9	174.9	5.6	1.000006
89000.0	18.6	-44.3	0.	-0.	28.3	589.1	185.9	185.9	7.3	1.000006
89500.0	18.2	-44.1	0.	-0.	27.6	589.3	196.9	196.9	9.1	1.000006
90000.0	17.8	-44.0	0.	-0.	27.0	589.4	207.7	207.7	10.7	1.000006
90500.0	17.4	-43.9	0.	-0.	26.4	589.6	218.5	218.5	12.2	1.000006
91000.0	17.0	-43.8	0.	-0.	25.8	589.7	224.4	224.4	13.1	1.000006
91500.0	16.6	-43.6	0.	-0.	25.2	589.9	223.9	223.9	12.9	1.000006
92000.0	16.2	-43.5	0.	-0.	24.6	590.0	223.4	223.4	12.8	1.000005
92500.0	15.9	-43.4	0.	-0.	24.1	590.2	226.6	226.6	11.9	1.000005
93000.0	15.5	-43.3	0.	-0.	23.5	590.3	230.9	230.9	10.8	1.000005

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

UPPER AIR DATA

STATION ALTITUDE 3989.0 FEET MSL
 9 MAY 66 220 HRS MST
 ASCENSION NO. 321

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

3912908
 WHITE SANDS SITE
 TABLE VII (Cont)

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE		RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND		WIND DATA		INDEX OF REFRACTION
		AIR DEGREES	DEWPOINT CENTIGRADE			KNOTS	KNOTS	DIRECTION DEGREES(TN)	SPEED KNOTS	
93500.0	15.2	-43.2	0.	-0. **	23.0	590.5		234.4	9.7	1.000005
94000.0	14.8	-43.1	0.	-0. **	22.5	590.6		232.8	9.1	1.000005
94500.0	14.5	-42.9	0.	-0. **	22.0	590.8		231.1	8.5	1.000005
95000.0	14.2	-42.8	0.	-0. **	21.5	590.9		230.6	8.3	1.000005
95500.0	13.9	-42.7	0.	-0. **	21.0	591.1		231.4	8.7	1.000005
96000.0	13.6	-42.6	0.	-0. **	20.5	591.2		232.3	9.0	1.000005
96500.0	13.3	-42.5	0.	-0. **	20.0	591.4		231.8	8.8	1.000004
97000.0	13.0	-42.4	0.	-0. **	19.6	591.5		231.0	8.5	1.000004
97500.0	12.7	-42.2	0.	-0. **	19.1	591.7		231.1	8.2	1.000004
98000.0	12.4	-42.1	0.	-0. **	18.7	591.8		236.6	7.7	1.000004
98500.0	12.1	-42.0	0.	-0. **	18.3	592.0		242.0	7.2	1.000004
99000.0	11.9	-41.9	0.	-0. **	17.9	592.1		246.5	6.8	1.000004
99500.0	11.6	-41.8	0.	-0. **	17.5	592.3		250.0	6.5	1.000004
100000.0	11.3	-41.7	0.	-0. **	17.1	592.4		253.5	6.2	1.000004
100500.0	11.1	-41.5	0.	-0. **	16.7	592.6		254.1	4.6	1.000004
101000.0	10.8	-41.2	0.	-0. **	16.3	593.0		254.1	2.8	1.000004
101500.0	10.6	-40.8	0.	-0. **	15.9	593.5		265.1	1.5	1.000004
102000.0	10.4	-40.4	0.	-0. **	15.5	594.1		331.7	2.7	1.000003
102500.0	10.2	-39.9	0.	-0. **	15.2	594.6		38.4	3.9	1.000003
103000.0	9.9	-39.5	0.	-0. **	14.8	595.2		43.2	8.0	1.000003
103500.0	9.7	-39.1	0.	-0. **	14.5	595.7		336.6	15.5	1.000003
104000.0	9.5	-38.7	0.	-0. **	14.1	596.3		269.9	23.0	1.000003
104500.0	9.3	-38.2	0.	-0. **	13.8	596.8				1.000003
105000.0	9.1	-37.8	0.	-0. **	13.5	597.4				1.000003
105500.0	8.9	-37.4	0.	-0. **	13.2	597.9				1.000003
106000.0	8.7	-36.9	0.	-0. **	12.8	598.4				1.000003

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

STATION ALTITUDE 3989.0 FEET MSL
9 MAY 66 820 HRS MST
ASCENSION NO. 324

UPPER AIR DATA
3912909
WHITE SANDS SITE
TABLE VIII

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

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE		RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND		WIND DIRECTION DEGREES(TN)	WIND DATA		INDEX OF REFRACTION
		AIR DEGREES	DEWPOINT CENTIGRADE			KNOTS	KNOTS		SPEED KNOTS	SPEED KNOTS	
3989.0	878.8	22.9	8.7	40.0	1029.3	671.6	671.6	190.0	2.9	2.9	1.000278
4000.0	878.5	22.8	8.5	39.8	1029.1	671.5	671.5	190.0	2.9	2.9	1.000277
4500.0	863.1	20.8	3.7	32.5	1019.6	668.7	668.7	191.9	3.8	3.8	1.000262
5000.0	848.0	19.4	3.2	34.1	1006.4	667.1	667.1	193.7	4.7	4.7	1.000258
5500.0	833.1	18.0	2.7	35.8	993.5	665.6	665.6	195.5	5.6	5.6	1.000254
6000.0	818.4	17.0	2.0	36.4	979.6	664.3	664.3	197.4	6.5	6.5	1.000250
6500.0	803.9	17.0	0.9	33.7	962.4	664.3	664.3	199.2	7.3	7.3	1.000244
7000.0	789.5	16.1	-0.0	33.3	948.3	663.1	663.1	204.9	8.1	8.1	1.000239
7500.0	775.2	14.8	-1.0	33.8	935.5	661.6	661.6	216.5	8.8	8.8	1.000234
8000.0	761.2	13.5	-2.0	34.3	922.9	660.1	660.1	224.4	9.9	9.9	1.000230
8500.0	747.5	12.2	-2.9	34.7	910.5	658.6	658.6	227.6	11.5	11.5	1.000226
9000.0	734.0	10.9	-3.9	35.2	898.2	657.0	657.0	230.2	12.9	12.9	1.000222
9500.0	720.7	9.6	-4.9	35.7	886.1	655.5	655.5	232.3	14.3	14.3	1.000218
10000.0	707.7	8.3	-5.8	36.2	874.2	653.9	653.9	232.0	16.3	16.3	1.000214
10500.0	695.0	7.0	-6.8	36.6	862.5	652.4	652.4	231.2	18.4	18.4	1.000210
11000.0	682.4	6.0	-9.6	31.8	850.3	651.1	651.1	227.8	19.8	19.8	1.000204
11500.0	669.8	5.8	-22.2	11.3	836.2	650.5	650.5	224.2	21.2	21.2	1.000191
12000.0	657.4	4.9	-21.2	13.1	823.2	649.5	649.5	219.4	21.6	21.6	1.000189
12500.0	645.2	4.1	-20.4	14.8	810.3	648.6	648.6	214.4	22.1	22.1	1.000186
13000.0	633.2	2.6	-13.6	29.1	799.0	647.0	647.0	209.0	22.8	22.8	1.000189
13500.0	621.4	1.1	-9.6	44.7	788.0	645.4	645.4	203.9	23.1	23.1	1.000190
14000.0	609.7	-0.3	-7.9	56.5	776.9	643.9	643.9	199.1	23.0	23.0	1.000190
14500.0	598.2	-1.3	-8.5	58.2	765.1	642.7	642.7	198.5	25.1	25.1	1.000187
15000.0	586.9	-2.3	-9.0	59.9	753.4	641.5	641.5	199.0	27.6	27.6	1.000184
15500.0	575.7	-3.4	-9.8	61.5	742.3	640.1	640.1	199.8	29.2	29.2	1.000181
16000.0	564.7	-4.8	-10.8	62.8	731.8	638.5	638.5	200.8	30.3	30.3	1.000177
16500.0	553.8	-6.1	-11.9	64.1	721.5	636.8	636.8	202.4	31.0	31.0	1.000174
17000.0	543.2	-7.5	-12.9	65.5	711.3	635.1	635.1	203.8	31.3	31.3	1.000171
17500.0	532.7	-8.9	-14.0	66.8	701.3	633.5	633.5	204.9	30.9	30.9	1.000168
18000.0	522.3	-10.1	-16.3	60.8	691.0	631.9	631.9	206.0	30.1	30.1	1.000163

STATION ALTITUDE 3989.0 FEET MSL
9 MAY 66 820 HRS MST
ASCENSION NO. 324

UPPER AIR DATA
3912909
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	DEWPOINT CENTIGRADE	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	SPEED KNOTS	INDEX OF REFRACTION
18500.0	512.1	-11.4	-19.0	53.4	680.9	630.3	207.3	28.8	1.000159
19000.0	502.1	-12.6	-21.9	46.1	670.8	628.8	207.9	28.0	1.000155
19500.0	492.2	-12.0	-34.2	13.9	656.4	629.3	207.9	27.7	1.000148
20000.0	482.5	-11.8	-33.6	14.6	643.0	629.6	208.9	27.5	1.000145
20500.0	473.0	-12.5	-28.9	24.2	631.9	628.8	210.9	27.5	1.000144
21000.0	463.6	-13.9	-27.1	31.9	622.7	627.2	213.3	27.8	1.000142
21500.0	454.4	-15.1	-29.4	28.7	613.3	625.6	216.0	28.4	1.000140
22000.0	445.4	-16.4	-31.7	25.5	604.1	624.1	218.9	29.1	1.000137
22500.0	436.4	-17.8	-32.4	27.0	595.2	622.4	222.2	29.8	1.000135
23000.0	427.6	-19.3	-31.7	32.9	586.7	620.5	224.4	30.8	1.000133
23500.0	419.0	-20.7	-30.5	41.2	577.9	618.8	225.4	32.2	1.000132
24000.0	410.4	-21.9	-29.1	52.4	568.9	617.4	226.4	33.3	1.000130
24500.0	402.0	-23.2	-30.0	54.2	560.1	615.8	227.2	34.2	1.000128
25000.0	393.7	-24.4	-33.1	44.9	551.3	614.2	227.8	35.0	1.000125
25500.0	385.6	-25.6	-36.5	35.7	542.6	612.7	228.3	35.7	1.000123
26000.0	377.5	-26.8	-38.2	33.7	533.8	611.2	229.0	35.5	1.000120
26500.0	369.5	-28.0	-39.8	31.7	525.1	609.7	229.3	35.6	1.000118
27000.0	361.8	-29.2	-41.5	29.8	516.6	608.2	229.0	36.1	1.000116
27500.0	354.2	-30.4	-43.2	27.8	508.2	606.7	229.3	36.1	1.000114
28000.0	346.7	-31.6	-44.9	25.8	500.0	605.2	230.0	35.9	1.000112
28500.0	339.4	-32.7	-47.1	22.6	491.8	603.8	232.1	35.6	1.000110
29000.0	331.9	-33.5	-50.6	16.4**	482.5	602.8	234.6	35.4	1.000108
29500.0	324.5	-34.6	-52.0	15.5**	474.0	601.4	237.5	34.7	1.000106
30000.0	317.3	-35.8	-53.5	14.6**	465.7	599.9	240.4	33.9	1.000104
30500.0	310.2	-36.9	-55.0	13.7**	457.5	598.5	242.5	33.0	1.000102
31000.0	303.3	-38.1	-56.5	12.8**	449.5	597.0	244.4	32.2	1.000100
31500.0	296.5	-39.2	-58.0	11.9**	441.6	595.5	245.3	32.2	1.000099
32000.0	289.9	-40.4	-59.6	11.0**	433.9	594.0	246.2	32.2	1.000097
32500.0	283.4	-41.6	-61.2	10.1**	426.3	592.6	247.2	32.4	1.000095
33000.0	277.1	-42.7	-62.8	9.2**	418.9	591.1	248.4	32.7	1.000093

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

STATION ALTITUDE 3989.0 FEET MSL
3 MAY 66 820 HRS MST
PRECENSION NO. 324

UPPER AIR DATA
3912909
WHITE SANDS SITE
TABLE VIII (Cont)

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

ALTIMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE		RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND		WIND DATA		INDEX OF REFRACTION
		AIR DEGREES	DEWPOINT CENTIGRADE			KNOTS	KNOTS	DIRECTION DEGREES(TN)	SPEED KNOTS	
33500.0	270.9	-43.9	-64.5	8.3**	411.6	589.6	250.1	250.1	32.9	1.000092
34000.0	264.8	-45.0	-66.3	7.4**	404.4	588.1	250.9	250.9	34.0	1.000090
34500.0	258.9	-46.2	-68.1	6.5**	397.4	586.6	249.6	249.6	37.4	1.000089
35000.0	253.1	-47.3	-70.1	5.6**	390.5	585.1	249.0	249.0	40.3	1.000087
35500.0	247.5	-48.5	-72.2	4.7**	383.8	583.6	250.3	250.3	41.9	1.000085
36000.0	241.9	-49.6	-74.4	3.8**	377.1	582.1	251.1	251.1	44.3	1.000084
36500.0	236.5	-50.8	-77.1	2.9**	370.6	580.6	250.4	250.4	48.6	1.000083
37000.0	231.2	-52.0	-80.2	2.0**	364.2	579.1	250.5	250.5	51.1	1.000081
37500.0	226.1	-53.1	-84.6	1.1**	358.0	577.6	252.6	252.6	48.3	1.000080
38000.0	221.0	-54.3	-94.8	0.2**	351.8	576.1	254.1	254.1	46.2	1.000078
38500.0	215.8	-55.3	0.	-0. **	345.1	574.8	253.8	253.8	46.9	1.000077
39000.0	210.7	-56.2	0.	-0. **	338.4	573.5	254.1	254.1	47.5	1.000075
39500.0	205.7	-57.2	0.	-0. **	331.9	572.2	256.5	256.5	47.9	1.000074
40000.0	200.8	-58.2	0.	-0. **	325.5	570.9	258.7	258.7	48.7	1.000072
40500.0	196.1	-59.1	0.	-0. **	319.2	569.6	260.1	260.1	50.9	1.000071
41000.0	191.4	-60.1	0.	-0. **	313.0	568.3	261.3	261.3	52.6	1.000070
41500.0	186.8	-59.6	0.	-0. **	304.8	569.0	261.7	261.7	52.7	1.000068
42000.0	182.3	-59.5	0.	-0. **	297.4	569.1	261.6	261.6	52.2	1.000066
42500.0	178.0	-59.7	0.	-0. **	290.5	568.9	261.0	261.0	51.0	1.000065
43000.0	173.7	-60.2	0.	-0. **	284.1	568.2	260.9	260.9	50.1	1.000063
43500.0	169.5	-60.9	0.	-0. **	278.2	567.3	261.1	261.1	49.4	1.000062
44000.0	165.4	-61.6	0.	-0. **	272.3	566.4	262.0	262.0	49.0	1.000061
44500.0	161.4	-62.3	0.	-0. **	266.6	565.4	263.1	263.1	48.6	1.000059
45000.0	157.5	-63.0	0.	-0. **	261.0	564.5	263.7	263.7	47.5	1.000058
45500.0	153.7	-63.6	0.	-0. **	255.5	563.7	263.7	263.7	45.7	1.000057
46000.0	149.9	-63.4	0.	-0. **	249.0	563.9	263.1	263.1	44.4	1.000055
46500.0	146.3	-63.3	0.	-0. **	242.8	564.1	261.8	261.8	43.5	1.000054
47000.0	142.7	-63.3	0.	-0. **	236.9	564.1	260.6	260.6	42.5	1.000053
47500.0	139.2	-63.3	0.	-0. **	231.1	564.1	259.7	259.7	41.3	1.000051
48000.0	135.8	-63.3	0.	-0. **	225.5	564.1	259.4	259.4	40.3	1.000050

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

STATION ALTITUDE 3989.0 FEET MSL
9 MAY 66 820 HRS MST
ASCENSION NO. 324

UPPER AIR DATA
3912909
WHITE SANDS SITE
TABLE VIII (Cont)

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

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE		RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND		WIND DATA		INDEX OF REFRACTION
		AIR DEGREES	DEWPOINT CENTIGRADE			KNOTS	KNOTS	DIRECTION DEGREES(TN)	SPEED KNOTS	
48500.0	132.5	-62.6	0.	-0. **	219.4	564.9		260.4	39.7	1.000049
49000.0	129.3	-61.8	0.	-0. **	213.2	566.1		261.5	39.0	1.000047
49500.0	126.2	-60.9	0.	-0. **	207.2	567.3		263.2	38.3	1.000046
50000.0	123.1	-60.0	0.	-0. **	201.3	568.4		264.8	37.4	1.000045
50500.0	120.2	-60.5	0.	-0. **	196.9	567.8		266.0	34.8	1.000044
51000.0	117.3	-61.1	0.	-0. **	192.7	567.0		267.1	32.2	1.000043
51500.0	114.4	-61.7	0.	-0. **	188.5	566.2		267.7	31.2	1.000042
52000.0	111.6	-62.3	0.	-0. **	184.4	565.5		268.3	30.3	1.000041
52500.0	108.9	-62.8	0.	-0. **	180.5	564.7		266.8	29.4	1.000040
53000.0	106.3	-63.4	0.	-0. **	176.6	563.9		264.6	28.7	1.000039
53500.0	103.7	-63.8	0.	-0. **	172.6	563.4		265.0	28.2	1.000038
54000.0	101.2	-63.1	0.	-0. **	167.8	564.4		268.2	28.1	1.000037
54500.0	98.7	-63.0	0.	-0. **	163.7	564.4		271.2	27.3	1.000036
55000.0	96.3	-63.7	0.	-0. **	160.2	563.5		273.2	24.5	1.000036
55500.0	93.9	-64.3	0.	-0. **	156.7	562.7		275.3	21.7	1.000035
56000.0	91.6	-65.0	0.	-0. **	153.3	561.8		281.0	20.1	1.000034
56500.0	89.3	-65.7	0.	-0. **	150.0	560.9		286.6	18.6	1.000033
57000.0	87.1	-66.3	0.	-0. **	146.8	560.0		285.2	18.3	1.000033
57500.0	85.0	-67.0	0.	-0. **	143.6	559.1		282.2	18.3	1.000032
58000.0	82.9	-67.6	0.	-0. **	140.5	558.2		281.2	19.1	1.000031
58500.0	80.8	-68.3	0.	-0. **	137.5	557.4		281.7	20.5	1.000031
59000.0	78.8	-68.9	0.	-0. **	134.5	556.5		283.1	21.4	1.000030
59500.0	76.9	-68.8	0.	-0. **	131.1	556.6		285.8	21.7	1.000029
60000.0	75.0	-68.2	0.	-0. **	127.5	557.5		289.5	21.8	1.000028
60500.0	73.1	-67.5	0.	-0. **	123.9	558.4		297.1	21.4	1.000028
61000.0	71.3	-66.9	0.	-0. **	120.5	559.3		304.7	21.0	1.000027
61500.0	69.6	-66.2	0.	-0. **	117.1	560.1		306.6	20.3	1.000026
62000.0	67.9	-65.5	0.	-0. **	113.9	561.0		308.5	19.5	1.000025
62500.0	66.2	-64.9	0.	-0. **	110.7	561.9		313.0	18.5	1.000025
63000.0	64.5	-64.2	0.	-0. **	107.7	562.8		318.3	17.5	1.000024

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

STATION ALTITUDE 3989.0 FEET MSL
 8 MAY 66 820 HRS MST
 OBSERVATION NO. 324

UPPER AIR DATA
 3912909
 WHITE SANDS SITE
 TABLE VIII (Cont)

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

BAROMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE		RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND		WIND DATA		INDEX OF REFRACTION
		AIR DEGREES	DEWPOINT CENTIGRADE			KNOTS	KNOTS	DIRECTION DEGREES(TN)	SPEED KNOTS	
63500.0	63.0	-63.6	0.	-0. **	104.7	563.7	319.2	319.2	16.4	1.000023
64000.0	61.4	-63.4	0.	-0. **	102.0	564.0	316.8	316.8	15.3	1.000023
64500.0	60.0	-63.1	0.	-0. **	99.5	564.3	315.8	315.8	14.2	1.000022
65000.0	58.5	-62.9	0.	-0. **	97.0	564.6	317.6	317.6	13.2	1.000022
65500.0	57.1	-62.7	0.	-0. **	94.5	564.9	318.6	318.6	12.3	1.000021
66000.0	55.7	-62.5	0.	-0. **	92.1	565.2	312.0	312.0	12.5	1.000021
66500.0	54.4	-62.2	0.	-0. **	89.8	565.5	305.5	305.5	12.7	1.000020
67000.0	53.1	-62.0	0.	-0. **	87.6	565.8	297.5	297.5	12.8	1.000019
67500.0	51.8	-61.8	0.	-0. **	85.4	566.1	289.2	289.2	12.8	1.000019
68000.0	50.5	-61.6	0.	-0. **	83.2	566.4	284.9	284.9	12.6	1.000019
68500.0	49.3	-61.3	0.	-0. **	81.1	566.7	284.2	284.2	12.2	1.000018
69000.0	48.1	-61.1	0.	-0. **	79.1	567.0	283.5	283.5	11.8	1.000018
69500.0	47.0	-60.9	0.	-0. **	77.1	567.3	277.0	277.0	11.0	1.000017
70000.0	45.8	-60.7	0.	-0. **	75.1	567.6	270.4	270.4	10.1	1.000017
70500.0	44.7	-60.4	0.	-0. **	73.2	567.9	266.8	266.8	9.5	1.000016
71000.0	43.6	-60.2	0.	-0. **	71.4	568.2	269.4	269.4	9.5	1.000016
71500.0	42.6	-60.0	0.	-0. **	69.6	568.5	272.1	272.1	9.5	1.000015
72000.0	41.6	-59.8	0.	-0. **	67.9	568.8	273.1	273.1	10.0	1.000015
72500.0	40.6	-59.5	0.	-0. **	66.2	569.1	273.3	273.3	10.9	1.000015
73000.0	39.6	-58.9	0.	-0. **	64.4	570.0	273.5	273.5	11.7	1.000014
73500.0	38.7	-57.6	0.	-0. **	62.5	571.7	277.0	277.0	11.3	1.000014
74000.0	37.8	-56.4	0.	-0. **	60.7	573.3	280.6	280.6	10.9	1.000014
74500.0	36.9	-55.1	0.	-0. **	58.9	574.9	280.7	280.7	10.2	1.000013
75000.0	36.0	-53.9	0.	-0. **	57.2	576.6	270.9	270.9	9.0	1.000013
75500.0	35.2	-52.6	0.	-0. **	55.5	578.2	261.1	261.1	7.8	1.000012
76000.0	34.3	-52.5	0.	-0. **	54.2	578.3	252.0	252.0	7.3	1.000012
76500.0	33.5	-52.7	0.	-0. **	53.0	578.1	243.4	243.4	7.3	1.000012
77000.0	32.8	-52.9	0.	-0. **	51.8	577.9	234.9	234.9	7.4	1.000012
77500.0	32.0	-53.1	0.	-0. **	50.7	577.6	232.5	232.5	8.4	1.000011
78000.0	31.3	-53.3	0.	-0. **	49.5	577.4	232.6	232.6	9.8	1.000011

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

STATION ALTITUDE 3985.0 FEET MSL
9 MAY 66 820 HRS MST
ASCENSION NO. 324

UPPER AIR DATA
3912909
WHITE SANDS SITE
TABLE VIII (Cont)

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

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE		RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND		WIND DATA		INDEX OF REFRACTION
		AIR DEGREES	DEWPOINT CENTIGRADE			KNOTS	KNOTS	DIRECTION DEGREES(TN)	SPEED KNOTS	
78500.0	30.5	-53.5	0.	-0. **	48.4	577.1		232.7	11.2	1.000011
79000.0	29.8	-53.2	0.	-0. **	47.3	577.5		233.6	12.3	1.000011
79500.0	29.1	-51.5	0.	-0. **	45.8	579.6		234.7	13.4	1.000010
80000.0	28.5	-49.9	0.	-0. **	44.4	581.8		235.8	14.5	1.000010
80500.0	27.8	-48.6	0.	-0. **	43.2	583.4		236.9	16.3	1.000010
81000.0	27.2	-48.4	0.	-0. **	42.2	583.7		237.9	18.1	1.000009
81500.0	26.6	-48.2	0.	-0. **	41.2	584.0		239.0	19.9	1.000009
82000.0	26.0	-48.0	0.	-0. **	40.2	584.3		239.3	20.6	1.000009
82500.0	25.4	-47.8	0.	-0. **	39.3	584.5		239.5	21.2	1.000009
83000.0	24.9	-47.6	0.	-0. **	38.4	584.8		239.7	21.8	1.000009
83500.0	24.3	-47.4	0.	-0. **	37.5	585.1		241.0	19.7	1.000008
84000.0	23.8	-47.2	0.	-0. **	36.6	585.3		242.3	17.3	1.000008
84500.0	23.2	-47.0	0.	-0. **	35.8	585.6		243.7	14.9	1.000008
85000.0	22.7	-46.7	0.	-0. **	34.9	585.9		248.1	12.1	1.000008
85500.0	22.2	-46.5	0.	-0. **	34.1	586.2		252.8	9.2	1.000008
86000.0	21.7	-46.3	0.	-0. **	33.3	586.4		257.6	6.4	1.000007
86500.0	21.2	-46.1	0.	-0. **	32.6	586.7		261.3	5.2	1.000007
87000.0	20.7	-45.9	0.	-0. **	31.8	587.0		265.0	4.1	1.000007
87500.0	20.3	-45.7	0.	-0. **	31.1	587.2		268.7	3.1	1.000007
88000.0	19.8	-45.5	0.	-0. **	30.3	587.5		262.7	3.5	1.000007
88500.0	19.4	-45.3	0.	-0. **	29.6	587.8		255.7	4.1	1.000007
89000.0	18.9	-45.1	0.	-0. **	28.9	588.1		248.7	4.7	1.000006
89500.0	18.5	-44.8	0.	-0. **	28.3	588.3		229.6	7.0	1.000006
90000.0	18.1	-44.6	0.	-0. **	27.6	588.6		209.0	9.5	1.000006
90500.0	17.7	-44.4	0.	-0. **	27.0	588.9		188.4	12.0	1.000006
91000.0	17.3	-44.2	0.	-0. **	26.3	589.2		193.2	10.7	1.000006
91500.0	16.9	-44.0	0.	-0. **	25.7	589.4		201.3	9.0	1.000006
92000.0	16.5	-43.8	0.	-0. **	25.1	589.7		209.5	7.3	1.000006
92500.0	16.2	-43.6	0.	-0. **	24.6	590.0		215.1	7.6	1.000005
93000.0	15.8	-43.4	0.	-0. **	24.0	590.2		220.4	8.2	1.000005

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

STATION ALTITUDE 3989.0 FEET MSL
 9 MAY 66 820 HRS MST
 ASCENSION NO. 324

UPPER AIR DATA
 3912909
 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	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	SPEED KNOTS	INDEX OF REFRACTION
93500.0	15.5	-43.2	-0. **	23.4	590.5	225.7	8.8	1.000005
94000.0	15.1	-43.0	-0. **	22.9	590.8	244.5	10.0	1.000005
94500.0	14.8	-42.7	-0. **	22.3	591.0	264.5	11.2	1.000005
95000.0	14.4	-42.5	-0. **	21.8	591.3	284.4	12.4	1.000005
95500.0	14.1	-42.3	-0. **	21.3	591.6	275.8	10.8	1.000005
96000.0	13.8	-42.1	-0. **	20.8	591.9	265.9	9.1	1.000005
96500.0	13.5	-41.9	-0. **	20.3	592.1	256.1	7.4	1.000005
97000.0	13.2	-41.7	-0. **	19.9	592.4	256.9	6.9	1.000004
97500.0	12.9	-41.5	-0. **	19.4	592.7	257.6	6.4	1.000004
98000.0	12.6	-41.3	-0. **	19.0	592.9	258.3	6.0	1.000004
98500.0	12.3	-41.1	-0. **	18.5	593.2	259.6	5.4	1.000004
99000.0	12.1	-40.8	-0. **	18.1	593.5	261.0	4.9	1.000004
99500.0	11.8	-40.6	-0. **	17.7	593.8	263.2	4.4	1.000004
100000.0	11.5	-40.3	-0. **	17.3	594.2	281.3	3.7	1.000004
100500.0	11.3	-39.9	-0. **	16.9	594.6	299.4	3.0	1.000004
101000.0	11.0	-39.6	-0. **	16.5	595.0	317.6	2.4	1.000004
101500.0	10.8	-39.3	-0. **	16.1	595.4	344.3	4.6	1.000004
102000.0	10.6	-39.0	-0. **	15.7	595.8	11.0	6.7	1.000004
102500.0	10.3	-38.7	-0. **	15.4	596.2	37.8	8.9	1.000003
103000.0	10.1	-38.4	-0. **	15.0	596.6	40.7	8.8	1.000003
103500.0	9.9	-38.1	-0. **	14.7	597.0	43.0	8.7	1.000003
104000.0	9.7	-37.8	-0. **	14.3	597.4	45.3	8.6	1.000003
104500.0	9.5	-37.5	-0. **	14.0	597.8			1.000003
105000.0	9.3	-37.2	-0. **	13.7	598.1			1.000003
105500.0	9.1	-36.9	-0. **	13.4	598.5			1.000003
106000.0	8.9	-36.6	-0. **	13.1	598.9			1.000003
106500.0	8.7	-36.3	-0. **	12.8	599.3			1.000003
107000.0	8.5	-35.9	-0. **	12.5	599.7			1.000003

** 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				20000- 100000 FT						TOTAL	
		N-S	E-W	N-S	E-W	N-S	E-W	N-S	E-W				
RAWINSONDE	PIBAL	N-S	E-W	N-S	E-W	N-S	E-W	N-S	E-W	N-S	E-W		
R ₁ 0220	R 0220	P 0455	25.9N	6.7E	10.7S	5.3W	4.6S	12.1W	10.6N	10.7W	87.9N	4.3E	
R ₁ 0220	R 0220	P 0530	15.0N	13.4E	10.7S	5.3W	4.6S	12.1W	0.3S	4.0W	77.0N	11.0E	
R ₂ 0500	R 0220	P 0600	6.6N	12.6E	10.8S	10.8W	4.6S	12.1W	8.8S	10.3W	68.5N	4.7E	
R ₂ 0500	R 0220	P 0625	9.6N	11.5E	10.8S	10.8W	4.6S	12.1W	5.8S	11.4W	71.5N	3.6E	
R ₂ 0500	R 0220	P 0640	8.2N	9.3E	10.8S	10.8W	4.6S	12.1W	7.2S	13.6W	70.1N	1.4E	
R ₂ 0500	R ₃ 0500	P 0700	5.0N	11.7E	10.8S	10.8W	4.5S	12.5W	10.3S	11.6W	67.0N	3.4E	
R ₂ 0500	R ₃ 0500	P 0715	1.4S	7.7E	10.8S	10.8W	4.5S	12.5W	16.7S	15.6W	60.6N	0.6W	
R ₂ 0500	R ₃ 0500	P 0725	3.4S	9.4E	10.8S	10.8W	4.5S	12.5W	18.7S	13.9W	58.6N	1.1E	
R ₂ 0705	R ₃ 0500	P 0735	3.8S	3.0E	17.5S	10.3W	4.5S	12.5W	25.8S	19.8W	51.5N	4.8W	
R ₂ 0705	R ₃ 0500	P 0745	5.1S	3.7E	17.5S	10.3W	4.5S	12.5W	27.1S	19.1W	50.2N	4.1W	
R ₂ 0705	R ₃ 0500	P 0755	6.9S	2.5E	17.5S	10.3W	4.5S	12.5W	28.9S	20.3W	48.4N	5.3W	
R ₂ 0705	R ₃ 0500	P 0805	4.9S	2.9E	17.5S	10.3W	4.5S	12.5W	26.9S	19.9W	50.4N	4.9W	
R ₂ 0705	R ₃ 0500	P 0813	9.2S	0.9W	17.5S	10.3W	4.5S	12.5W	31.2S	23.7W	46.1N	8.7W	
*R ₁ 0820	*R 0820	*P 0821	11.6S	6.5E	17.7S	10.1W	4.6S	11.7W	33.9S	15.3W	43.4N	0.3W	

TIME: 0820 MST
DATE: 9 May 1966

TABLE IX. IMPACT PREDICTION DATA
AEROBEE NASA 4.106 NP

* = Post-Shoot Data
P = Double Theodolite Winds (143-4,000 FT)
R = Rawinsonde Winds (Above 20,000 FT)
R₁ = Rawinsonde Winds (4,000-20,000 FT)
R₂ = Rawin Winds (4,000-20,000 FT)
R₃ = Rawin Winds (Above 20,000 FT)

JACK SETTINGS FOR LAUNCHER A	West leg	46	inches
	East leg	34	inches
LAUNCHER SETTING	Tilt	4.56	degrees
	Azimuth	014.6	degrees
TILT COMPONENTS	North	4.41	degrees
	East	1.14	degrees
NO WIND IMPACT FROM LAUNCHER	North	77.3	miles
	East	15.0	miles

PREDICTED IMPACT FROM LAUNCHER	North	47.0	miles
	West	8.0	miles
PREDICTED BOOSTER IMPACT FROM LAUNCHER	Azimuth	014	degrees
	Distance	1,775	feet

RECOMMENDATION - Fire, with 87%
confidence of impacting on
range, based upon:
wind correction of 34 miles
1-hr wind variability of 20 miles
9 May 1966/0818 MST

TABLE X. ACTUAL AND PREDICTED LAUNCH DATA
AEROBEE NASA 4.106 NP

SOTIM IMPACT FROM LAUNCHER	North	41.6	miles
	West	13.7	miles
ACTUAL BOOSTER IMPACT FROM LAUNCHER	Azimuth	N/A	degrees
	Distance	N/A	feet

*

TABLE XI. IMPACT DATA
AEROBEE NASA 4.106 NP

* Sonic observation of trajectory and impact of missiles

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1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Electronics Command Fort Monmouth, New Jersey		2a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED	
		2b. GROUP	
3. REPORT TITLE METEOROLOGICAL DATA REPORT, AEROBEE NASA 4.106 NP			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (Last name, first name, initial) Hoidale, Marjorie M.			
6. REPORT DATE May 1966		7a. TOTAL NO. OF PAGES 24	7b. NO. OF REFS 2
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S) DR-30	
b. PROJECT NO.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
c. DA Task IV650212A127-02			
d.			
10. AVAILABILITY/LIMITATION NOTICES Qualified requesters may obtain copies of this report from DDC.			
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 4.106 NP are presented for the National Aeronautics and Space Administration, the Jet Propulsion Laboratory, and for ballistic studies. The data appear, along with calculated ballistic data, in tabular form.			

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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