US ARMY ELECTRONICS RESEARCH & DEVELOPMENT ACTIVITY

429020

METEOROLOGICAL DATA REPORT

ARGGEE NE 3 129

BY

MARJORIE McLARDIE HOIDAL

ERDA-80

WHITE SANDS MISSILE RANGE
NEW MEXICO

METEOROLOGICAL DATA RPEORT

AEROBEE NE 3.129

By

Marjorie McLardie Hoidale

AERDA-80

October ~~1~~963

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METEOROLOGICAL SUPPORT DIVISION
ENVIRONMENTAL SCIENCES DEPARTMENT
U. S. ARMY ELECTRONICS RESEARCH AND DEVELOPMENT ACTIVITY
WHITE SANDS MISSILE RANGE
NEW MEXICO

ABSTRACT

Meteorological data gathered for the launching of Aerobee NE 3.129 are presented for the U. S. Naval Research Laboratory and for ballistic studies. The data appear, along with calculated ballistic data, in Appendixes A, B, C and D.

CONTENTS

INTRODUCTION

Aerobee NE 3.129 was launched by Naval Ordnance Missile Test Facility personnel, White Sands Missile Range, New Mexico, at 0730 hours MST, 28 June 1963.

Meteorological data used in conjunction with theoretical calculations to predict rocket impact were collected by the Meteorological Support Division, U. S. Army Electronics Research and Development Activity, White Sands Missile Range, New Mexico.

DISCUSSION

Wind data for the first 2,000 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 2,000 to approximately 75,000 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 the equal-area method.

Data appearing in Appendix D are based on the E. L. Walter [2] theory. The "Predicted Impact" includes, where applicable, an adjustment of impact based on the experience of the impact predictor and the forecast of firing time wind conditions.

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

[2]. Walter, E. L., "Six-Variable Ballistic Model for a Rocket," Missile Meteorology Division, U. S. Army Signal Missile Support Agency, White Sands Missile Range, New Mexico, June 1962.

APPENDIX A

CALCULATED ROCKET PERFORMANCE VALUES

AND

TABLE OF BALLISTIC FACTORS

AEROBEE NE 3.129

TABLES — PAGE

APPENDIX A

TABLE A-I

CALCULATED ROCKET PERFORMANCE VALUES

AEROBEE NE 3.129

PAYLOAD 241.85 POUNDS

UNIT WIND EFFECT	5.055 Miles/Mile Per Hour
TOWER TILT EFFECT	20.09 Miles/Degree
BURNOUT:	
Velocity	6,050 Feet/Second
Altitude	131,350 Feet MSL
Time	52.8 Seconds
PEAK:	
Altitude	134 Miles MSL
Time	241 Seconds
TOTAL TIME OF FLIGHT	502 Seconds
CORIOLIS EFFECT (West)	6.63 Miles

APPENDIX A

TABLE A-II

TABLE OF BALLISTIC FACTORS

AEROBEE NE 3.129

HEIGHT INTERVAL FEET	BALLISITC FACTOR	HEIGHT INTERVAL FEET	BALLISTIC FACTOR
143 - 200	.138	5,000 - 10,000	.063
200 - 300	.158	10,000 - 15,000	.032
300 - 400	.090	15,000 - 20,000	.022
400 - 600	.102	20,000 - 25,000	.019
600 - 800	.064	25,000 - 30,000	.013
800 - 1,000	.046	30,000 - 35,000	.011
1,000 - 1,200	.032	35,000 - 40,000	.010
1,200 - 1,400	.024	40,000 - 45,000	.006
1,400 - 1,600	.020	45,000 - 50,000	.005
1,600 - 1,800	.015	50,000 - 60,000	.012
1,800 - 2,000	.015	60,000 - 70,000	.006
2,000 - 3,000	.040	70,000 - 80,000	.006
3,000 - 4,000	.024	80,000 - 90,000	.005
4,000 - 5,000	.023	90,000 - 100,000	.005

APPENDIX B

ANEMOMETER RECORDINGS OF WIND SPEED AND DIRECTION

AND

PILOT-BALLOON-MEASURED WIND DATA FROM 143 TO 10,000 FEET

AEROBEE NE 3.129

TABLES | PAGE

APPENDIX B

TABLE B-I

ANEMOMETER RECORDINGS OF WIND SPEED AND DIRECTION

AEROBEE NE 3.129

TIME (MINUTES)	WIND SPEED (MPH)	DIRECTION (DEGREES)
T - 15	5.5	117
T - 10	7.0	105
T - 5	6.0	110
T - Time	6.5	100
T + 5	5.5	100
T + 10	5.5	112
T + 15	5.5	112

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

APPENDIX B

TABLE B-II

PILOT-BALLOON-MEASURED WIND DATA

AEROBEE NE 3.129

MEAN WIND COMPONENTS FOR BALLISTIC ZONES IN MILES PER HOUR

DOUBLE-THEODOLITE METHOD

RELEASE NR	1		2		3		4	
RELEASE TIME (MST)	0330		0400		0435		0500	
LAYERS IN FEET	N-S	E-W	N-S	E-W	N-S	E-W	N-S	E-W
143 - 200	9.5S	1.5E	7.0S	11.5E	0	4.0E	3.0S	7.0E
200 - 300	10.0	2.5	7.5	9.5	1.5S	12.5	4.5	8.0
300 - 400	9.5	4.5	11.0	14.0	5.0	14.5	9.0	6.5
400 - 600	9.0	4.0	10.5	10.0	7.0	13.0	9.5	7.5
600 - 800	10.5	4.0	12.5	11.0	9.0	12.5	10.0	8.0
800 - 1,000	11.5	3.5	14.0	11.0	13.5	13.0	11.0	8.0
1,000 - 1,200	15.0	5.0	18.0	9.0	16.0	12.5	15.0	11.0
1,200 - 1,400	20.0	8.5	20.0	7.5	17.5	9.5	19.5	10.0
1,400 - 1,600	22.0	7.5	18.0	7.0	15.0	7.0	17.5	9.0
1,600 - 1,800	25.0	8.0	20.0	7.0	18.0	10.5	18.0	8.0
1,800 - 2,000	20.5	6.5	20.0	10.0	16.5	7.0	17.0	7.0

TABLE B-II (Cont)

PILOT-BALLOON-MEASURED WIND DATA

AEROBEE NE 3.129

MEAN WIND COMPONENTS FOR BALLISTIC ZONES IN MILES PER HOUR

DOUBLE-THEODOLITE METHOD

RELEASE NR	5		6		7		8	
RELEASE TIME (MST)	0525		0600		0625		0645	
LAYERS IN FEET	N-S	E-W	N-S	E-W	N-S	E-W	N-S	E-W
145 - 200	4.0S	1.5E	2.5S	3.5E	3.5S	6.0E	2.0S	6.5E
200 - 300	3.5	1.5W	2.0	1.0	4.0	3.5	3.5	9.0
300 - 400	4.0	3.0	2.0	1.0W	4.5	3.0	4.0	7.5
400 - 600	4.5	3.5	3.0	3.0	3.5	4.5	4.0	9.0
600 - 800	3.0	2.0	5.5	0	6.5	8.0	6.5	9.0
800 - 1,000	4.5	1.0E	7.5	4.5E	10.0	8.0	11.0	3.5
1,000 - 1,200	8.0	7.0	11.0	4.5	10.5	5.0	9.0	2.0
1,200 - 1,400	12.5	8.0	12.0	3.0	10.5	2.0	9.5	1.5
1,400 - 1,600	19.0	8.0	14.0	1.0	11.0	1.0W	10.0	2.0W
1,600 - 1,800	17.0	5.0	16.5	2.5	12.0	0	12.0	1.5
1,800 - 2,000	16.5	5.0	17.0	2.5	12.0	0	10.0	0.5

TABLE B-II (Cont)

RELEASE NR	9		10		11		12		13	
RELEASE TIME (MST)	0700		0710		0718		0723		0732	
LAYERS IN FEET	N-S	E-W	N-S	E-W	N-S	E-W	N-S	E-W	N-S	E-W
143 - 200	3.0S	8.0E	2.5S	2.0E	3.5S	5.0E	4.0S	5.5E	5.5S	2.5E
200 - 300	4.0	5.0	4.5	5.0	3.5	3.5	3.5	5.0	4.0	5.0
300 - 400	5.0	4.5	5.0	5.0	4.0	5.0	4.0	4.0	4.0	7.0
400 - 600	7.0	8.0	5.0	8.0	6.0	8.0	4.0	5.5	6.0	8.0
600 - 800	9.0	6.5	8.0	8.5	8.0	9.0	7.5	8.0	8.5	7.0
800 - 1,000	8.5	3.0	9.5	5.0	8.5	5.0	9.5	6.5	9.5	5.0
1,000 - 1,200	9.0	1.0	9.0	2.0	8.5	1.5	9.5	1.5	7.5	1.0
1,200 - 1,400	7.0	2.0W	7.5	0.5	8.0	1.0	7.5	0	7.0	1.0W
1,400 - 1,600	8.5	1.0	8.0	1.0W	8.0	0.5W	8.5	1.0W	9.0	1.0
1,600 - 1,800	10.0	1.0	10.0	0	10.5	0	9.0	0.5	9.0	0.5E
1,800 - 2,000	10.5	2.0E	8.5	2.0E	8.5	1.0E	10.0	1.0	10.0	1.5

APPENDIX B

TABLE B-III

PILOT-BALLOON-MEASURED WIND DATA

AEROBEE NE 3.129

MEAN WIND COMPONENTS FOR BALLISTIC ZONES IN MILES PER HOUR

SINGLE-THEODOLITE METHOD

RELEASE NR	1		2	
RELEASE TIME (MST)	0535		0635	
LAYERS IN FEET	N-S	E-W	N-S	E-W
2,000 - 2,310	10.0S	5.0E	8.0S	5.0E
2,310 - 3,450	10.0	4.0	6.0	1.0
3,450 - 4,560	13.0	6.0	8.0	6.5
4,560 - 5,670	9.0	5.0	6.0	3.0
5,670 - 6,750	8.0	4.0	7.5	7.0
6,750 - 7,830	0	5.0	5.0	7.0
7,830 - 8,910	0	5.0	5.0	9.0
8,910 - 10,000	2.0S	8.0	0	7.0

APPENDIX C

TABLES OF UPPER AIR DATA

AEROBEE NE 3.129

TABLES PAGE

APPENDIX C

TABLE C-I

UPPER AIR DATA

AEROBEE NE 3.129

MEAN WIND COMPONENTS FOR BALLISTIC ZONES IN KNOTS

RAWINSONDE METHOD

RELEASE NR	1	
RELEASE TIME (MST)	0600	
LAYERS IN FEET	N-S	E-W
2,000 - 3,000	11.5S	2.5E
3,000 - 4,000	10.0	4.0
4,000 - 5,000	11.0	6.5
5,000 - 10,000	2.5N	9.5

APPENDIX C

TABLE C-II

UPPER AIR DATA

AEROBEE NE 3.129

MEAN WIND COMPONENTS FOR BALLISTIC ZONES IN KNOTS

RELEASE NR	1		2		3	
RELEASE TIME (MST)	0030		0330		0730	
LAYERS IN FEET	N-S	E-W	N-S	E-W	N-S	E-W
2,000 - 5,000	8.5S	7.5E	11.5S	5.5E	8.5S	4.5E
5,000 - 10,000	2.0	7.5	1.5N	8.5	0	10.5
10,000 - 15,000	10.5N	5.5	10.5	5.5	8.0N	11.5
15,000 - 20,000	0	11.0	1.5S	9.5	3.5S	12.5
20,000 - 25,000	3.5S	4.5	4.0	2.5W	4.0N	0.5W
25,000 - 30,000	3.5N	10.5W	5.0N	9.5	11.5	2.5
30,000 - 35,000	16.5	11.5	20.5	10.0	19.0	3.0
35,000 - 40,000	12.0	10.5	14.5	8.5	13.5	6.5
40,000 - 45,000	4.5	13.0	7.5	13.0	6.0	10.0
45,000 - 50,000	3.5	10.5	0	10.0	2.0S	2.0
50,000 - 60,000	2.0S	4.0E	10.5N	3.5E	7.0N	12.0E
60,000 - 70,000	4.0N	22.5	0	26.0	1.5S	19.5
70,000 - 80,000	0	22.0	2.0S	23.0	1.0	23.0
80,000 - 90,000	2.0S	23.0	6.5N	24.0	BALLOON	
90,000 - 100,000	0	23.0	5.5	31.5	BURST	

APPENDIX C

TABLE C III

UPPER AIR DATA

STATION ALTITUDE 3989FEET MSL
DATE 28 JUN 1963, 0030 HRS MST
ASCENSION NO. 482

WHITE SANDS SITE

STM SITE COORDINATES
E 480,580 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
3989	878.3	24.5	8.9	37	1023.1	673	0	0	1.000277
5000	848.2	26.5	10.0	35	980.8	676	54	5	1.000270
6000	819.3	24.2	8.2	36	955.2	673	108	9	1.000259
7000	791.2	21.9	6.4	36	930.0	670	139	12	1.000249
8000	763.8	19.6	4.5	37	905.4	668	133	12	1.000239
9000	737.2	18.6	3.4	36	876.8	666	135	9	1.000230
10000	711.4	16.4	1.9	38	853.0	664	137	6	1.000222
11000	686.3	13.8	0.4	40	830.5	661	125	6	1.000214
12000	661.9	11.2	-1.3	42	808.4	658	98	8	1.000206
13000	638.1	8.6	-3.0	44	786.8	655	79	9	1.000199
14000	615.0	6.0	-4.8	46	765.6	651	58	9	1.000191
15000	592.4	3.3	-6.4	49	744.9	648	42	10	1.000185
16000	570.5	0.5	-8.0	53	724.8	645	32	12	1.000178
17000	549.2	-2.3	-9.7	57	705.1	641	26	14	1.000172
18000	528.5	-4.9	-12.4	56	685.3	638	25	14	1.000165
19000	508.4	-6.8	-18.9	38	664.3	636	31	12	1.000158
20000	488.9	-8.7	-28.0	20	643.8	633	48	10	1.000147
21000	470.0	-10.1	-36.0	10	622.3	632	86	9	1.000140
22000	451.8	-11.4	-37.0	10	601.2	630	110	12	1.000135
23000	434.1	-14.1	-39.2	10	583.7	627	123	12	1.000131
24000	417.0	-16.8	-41.3	10	566.6	623	131	12	1.000127
25000	400.4	-19.5	-43.5	10	550.0	620	133	10	1.000123
26000	384.2	-21.6	-45.2	10	532.2	618	133	7	1.000119
27000	368.6	-23.7	-46.8	10	514.8	615	171	2	1.000115
28000	353.6	-25.8	-48.5	10	497.9	612	267	3	1.000111
29000	339.0	-28.1	-39.5	33	481.8	610	294	5	1.000109
30000	324.9	-30.4	-36.0	59	466.1	607	297	6	1.000106
31000	311.2	-32.1	-42.1	37	449.8	605	293	9	1.000101
32000	298.1	-33.8			433.8	602	297	11	1.000097
33000	285.4	-36.0			419.3	600	304	15	1.000093
34000	273.1	-38.3			405.2	597	313	17	1.000090
35000	261.3	-40.5			391.3	594	319	19	1.000087
36000	249.8	-42.6			377.6	591	323	21	1.000084

APPENDIX C

TABLE C-III (Cont'd)

UPPER [illegible] DATA

STATION ALTITUDE 3982 FEET MSL
DATE 28 [illegible] 1963, 0030 HRS MST
ASCENSION NO. 462

WHITE SANDS SITE

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
37000	238.2	-44.8			364.3	568	329	22	1.000081
38000	225.1	-47.0			351.4	565	334	21	1.000078
39000	217.9	-49.2			338.9	563	336	19	1.000075
40000	208.0	-51.4			326.7	560	333	16	1.000073
41000	198.4	-53.6			314.9	557	326	15	1.000070
42000	189.2	-55.9			303.5	[illegible]	317	16	1.000068
43000	180.4	-58.2			292.3	[illegible]	309	17	1.000065
44000	171.8	-60.5			281.5	54[illegible]	307	18	1.000063
45000	163.6	-62.0			270.0	5[illegible]	306	16	1.000060
46000	155.8	-63.5			258.8	5[illegible]	298	15	1.000058
47000	148.2	-65.0			248.1	5[illegible]	292	14	1.000055
48000	141.0	-66.5			237.7	560	288	12	1.000053
49000	134.1	-68.0			227.7	55[illegible]	283	12	1.000051
50000	127.5	-69.5			218.1	556	280	12	1.000049
51000	121.1	-71.1			208.8	55[illegible]	279	10	1.000046
52000	115.1	-72.6			199.9	55[illegible]	283	7	1.000045
53000	109.2	-74.2			191.3	549	296	4	1.000043
54000	103.7	-74.2			181.6	54[illegible]	12	3	1.000040
55000	98.4	-73.5			171.6	550	70	2	1.000038
56000	93.5	-72.9			161.1	554	71	1	1.000036
57000	88.9	-66.6			151.3	557	39	2	1.000034
58000	84.5	-66.2			142.3	560	22	4	1.000032
59000	80.4	-64.2			134.0	563	31	7	1.000030
60000	76.5	-63.5			127.1	564	44	12	1.000028
61000	72.8	-62.7			120.[illegible]	565	56	15	1.000027
62000	69.4	-62.0			114.[illegible]	566	65	16	1.000025
63000	66.0	-61.3			108.[illegible]	567	70	16	1.000024
64000	62.9	-60.6			103.[illegible]	568	74	16	1.000023
65000	59.9	-59.9			97.9	569	76	15	1.000022
66000	57.1	-59.2			93.0	570	77	18	1.000021
67000	54.4	-58.5			88.3	571	78	21	1.000020
68000	51.9	-57.9			83.9	571	80	24	1.000019
69000	49.4	-57.9			79.[illegible]	572	83	25	1.000018

APPENDIX C

TABLE C-III (U)

UPPER AIR DATA

STATION ALTITUDE 3989FEET MSL
DATE 28 JUN 1963, 0030 HRS MST
ASCENSION NO. 482

WHITE SANDS SITE

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
70000	47.1	-56.3			75.7	573	89	26	1.000017
71000	44.9	-55.7			72.0	574	90	25	1.000016
72000	42.9	-55.0			68.4	575	87	24	1.000015
73000	40.9	-54.3			65.1	576	82	21	1.000014
74000	39.0	-53.6			61.9	577	85	21	1.000014
75000	37.2	-52.9			58.8	578	92	22	1.000013
76000	35.5	-52.7			56.1	578	98	22	1.000012
77000	33.9	-52.5			53.5	578	97	21	1.000012
78000	32.3	-52.4			51.0	579	89	18	1.000011
79000	30.8	-52.3			48.6	579	88	20	1.000011
80000	29.4	-52.2			46.4	579	91	22	1.000010
81000	28.1	-52.0			44.2	579	94	24	1.000010
82000	26.8	-51.9			42.2	579	96	26	1.000009
83000	25.6	-51.4			40.2	580	95	26	1.000009
84000	24.4	-50.2			38.2	581	95	26	1.000008
85000	23.3	-49.1			36.3	583	98	27	1.000008
86000	22.3	-48.0			34.5	584	102	28	1.000008
87000	21.3	-46.8			32.8	586	105	26	1.000007
88000	20.3	-45.7			31.1	587	108	24	1.000007
89000	19.4	-44.6			29.6	589	105	22	1.000007
90000	18.6	-43.5			28.2	590	100	21	1.000006
91000	17.8	-42.7			26.8	591	95	22	1.000006
92000	17.0	-42.7			25.7	591	90	24	1.000006
93000	16.2	-42.7			24.5	591	90	25	1.000005
94000	15.5	-42.6			23.5	591	91	25	1.000005
95000	14.8	-42.6			22.4	591	92	25	1.000005
96000	14.2	-42.6			21.5	591	91	25	1.000005
97000	13.6	-42.6			20.5	591	89	24	1.000005
98000	13.0	-42.6			19.6	591	87	25	1.000004
99000	12.4	-42.6			18.8	591	87	27	1.000004
100000	11.9	-42.6			17.9	591	90	27	1.000004
101000	11.4	-42.5			17.2	591	89	26	1.000004
102000	10.9	-42.5			16.4	591	86	25	1.000004

APPENDIX C

TABLE C I[illegible]
(UPPER AIR DATA)

STATION ALTITUDE [illegible] FEET MSL
DATE 28 [illegible] 1963, [illegible] HRS MST
ASCENSION NO. 482

WHITE SANDS SITE

WSTM SITE COORDINATES
E 488,580 FEET
N 1[illegible]5,045 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
103000	10.4	-42.5			15.7	591	82	24	1.000003
104000	9.9	-42.4			15.0	592	76	24	1.000003
105000	9.5	-41.5			14.3	593	72	26	1.000003
106000	9.1	-40.7			13.6	594	70	30	1.000003
107000	8.7	-39.8			13.0	595	74	34	1.000003
108000	8.3	-38.9			12.4	596	75	38	1.000003
109000	8.0	-38.0			11.8	597	76	43	1.000003
110000	7.6	-37.0			11.2	598	80	46	1.000003
111000	7.3	-36.1			10.7	599	85	49	1.000002
112000	7.0	-35.2			10.2	601			1.000002
113000	6.7	-34.4			9.8	602			1.000002
114000	6.4	-33.5			9.3	603			1.000002
115000	6.1	-32.6			8.9	604			1.000002

APPENDIX C

TABLE C-IV
UPPER AIR DATA

STATION ALTITUDE 3989FEET MSL
DATE 28 JUN 1963, 0330 HRS MST
ASCENSION NO. 483

WHITE SANDS SITE

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	878.6	21.4	9.7	47	1033.9	670	0	0	1.000283
5000	848.3	24.3	11.1	43	987.7	674	69	7	1.000277
5500	833.7	23.3	10.0	43	974.4	672	102	10	1.000270
6000	819.2	22.2	8.8	42	961.3	671	136	14	1.000263
6500	805.0	21.2	7.6	41	948.3	670	154	15	1.000257
7000	790.9	20.1	6.5	41	935.4	668	151	14	1.000251
7500	777.1	19.0	5.3	40	922.6	667	146	13	1.000245
8000	763.4	18.4	3.8	38	908.8	666	139	12	1.000238
8500	749.9	18.3	1.5	32	893.5	666	131	12	1.000229
9000	736.7	18.0	-0.7	28	879.1	665	124	11	1.000222
9500	723.7	16.7	-1.1	29	867.2	664	119	12	1.000219
10000	710.9	15.5	-1.7	31	855.6	663	115	12	1.000215
10500	698.2	14.3	-2.2	32	844.0	661	112	12	1.000212
11000	685.7	13.0	-2.8	33	832.6	660	108	12	1.000209
11500	673.4	11.7	-3.4	35	821.3	658	103	10	1.000205
12000	661.2	10.5	-4.0	36	810.1	657	96	9	1.000202
12500	649.2	9.2	-4.7	37	799.0	655	79	7	1.000199
13000	637.3	7.8	-4.9	40	788.3	654	56	6	1.000196
13500	625.7	6.5	-5.2	43	777.6	652	35	6	1.000193
14000	614.2	5.1	-5.6	46	767.1	650	14	6	1.000191
14500	602.8	3.7	-6.0	49	756.7	649	11	8	1.000188
15000	591.6	2.3	-6.5	52	746.4	647	11	9	1.000185
15500	580.5	0.9	-7.1	55	736.3	645	16	10	1.000182
16000	569.6	-0.5	-7.7	58	726.2	644	21	12	1.000179
16500	558.9	-1.9	-8.4	61	716.3	642	26	13	1.000176
17000	548.3	-3.3	-9.1	64	706.4	640	30	14	1.000173
17500	537.8	-4.7	-9.9	67	696.7	639	34	15	1.000170
18000	527.5	-6.2	-10.7	70	687.1	637	38	15	1.000167
18500	517.3	-7.6	-11.6	74	677.5	635	42	13	1.000165
19000	507.3	-7.4	-21.5	31	664.5	635	53	12	1.000154
19500	497.5	-7.3	-30.1	14	651.8	635	63	10	1.000148
20000	487.9	-7.5	-31.1	13	639.7	635	82	10	1.000145
20500	478.4	-8.4	-31.5	14	629.4	634	98	11	1.000143

IV

APPENDIX C

TABLE C-IV (Cont)

UPPER AIR DATA

STATION ALTITUDE 3989FEET MSL
DATE 28 JUN 1963, 0330 HRS MST
ASCENSION NO. 483

WHITE SANDS SITE

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
21000	469.1	-9.6	-31.7	15	619.9	632	105	12	1.000140
21500	459.9	-10.8	-32.0	16	610.5	631	109	12	1.000138
22000	450.9	-11.9	-32.4	17	601.3	629	111	13	1.000136
22500	442.0	-13.1	-32.8	18	592.1	628	112	12	1.000134
23000	433.3	-14.3	-33.2	19	583.1	627	113	11	1.000132
23500	424.7	-15.5	-33.7	20	574.1	625	114	10	1.000130
24000	416.2	-16.7	-34.2	21	565.3	624	116	10	1.000128
24500	407.8	-17.9	-34.8	22	556.6	622	120	9	1.000126
25000	399.6	-19.1	-35.4	23	548.0	621	124	8	1.000124
25500	391.5	-20.4	-36.0	24	539.5	619	128	7	1.000122
26000	383.5	-21.6	-36.6	25	531.1	618	133	5	1.000120
26500	375.7	-22.8	-37.3	26	522.8	616	144	3	1.000118
27000	368.0	-24.1	-38.0	27	514.6	615	170	1	1.000116
27500	360.4	-25.3	-38.7	28	506.5	613	240	2	1.000114
28000	352.8	-26.5	-38.1	33	498.3	612	287	2	1.000112
28500	345.5	-27.7	-37.2	40	490.2	610	285	3	1.000111
29000	338.2	-28.9	-36.6	48	482.3	609	282	4	1.000109
29500	331.1	-30.0	-36.3	55	474.4	607	277	4	1.000107
30000	324.1	-31.2	-36.2	63	466.6	606	279	5	1.000106
30500	317.2	-32.2	-38.9	52	458.6	604	289	6	1.000104
31000	310.5	-33.1	-43.8	34	450.5	603	299	7	1.000101
31500	303.8	-34.0	-51.7	15	442.5	602	308	9	1.000099
32000	297.3	-34.5			434.1	601	315	12	1.000097
32500	290.9	-35.0			425.6	601	320	15	1.000095
33000	284.6	-36.0			418.2	600	323	17	1.000093
33500	278.4	-37.1			411.1	598	326	19	1.000092
34000	272.4	-38.3			404.0	597	328	20	1.000090
34500	266.4	-39.4			397.0	595	331	22	1.000088
35000	260.6	-40.5			390.2	594	332	23	1.000087
35500	254.8	-41.6			383.4	592	334	23	1.000085
36000	249.1	-42.7			376.7	591	336	24	1.000084
36500	243.6	-43.9			370.2	590	337	25	1.000082
37000	238.1	-45.0			363.7	588	338	26	1.000081

TABLE C-IV (Cont)

UPPER AIR DATA

STATION ALTITUDE 3989FEET MSL
DATE 28 JUN 1963, 0330 HRS MST
ASCENSION NO. 483

WHITE SANDS SITE

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
37500	232.8	-46.2			357.3	587	339	26	1.000080
38000	227.5	-47.3			351.0	585	341	25	1.000078
38500	222.3	-48.5			344.8	584	343	25	1.000077
39000	217.2	-49.6			338.6	582	343	23	1.000075
39500	212.3	-50.8			332.6	581	343	21	1.000074
40000	207.4	-52.0			326.6	579	341	20	1.000073
40500	202.5	-53.2			320.8	578	339	18	1.000071
41000	197.8	-54.4			315.0	576	337	17	1.000070
41500	193.1	-55.5			309.2	574	334	17	1.000069
42000	188.6	-56.7			303.6	573	330	16	1.000068
42500	184.1	-57.9			298.0	571	323	16	1.000066
43000	179.7	-59.1			292.5	570	318	16	1.000065
43500	175.4	-60.3			287.1	568	313	15	1.000064
44000	171.2	-61.5			281.7	567	309	15	1.000063
44500	167.0	-62.3			276.0	565	302	16	1.000061
45000	163.0	-63.0			270.2	564	296	16	1.000060
45500	159.0	-63.8			264.6	563	293	17	1.000059
46000	155.1	-64.5			259.0	562	293	16	1.000058
46500	151.3	-65.2			253.5	562	293	16	1.000056
47000	147.6	-65.9			248.1	561	293	16	1.000055
47500	143.9	-66.7			242.8	560	293	16	1.000054
48000	140.4	-67.4			237.7	559	289	15	1.000053
48500	136.9	-68.1			232.6	558	285	14	1.000052
49000	133.4	-68.9			227.6	557	281	13	1.000051
49500	130.1	-69.6			222.7	556	280	13	1.000050
50000	126.8	-70.3			217.9	555	279	13	1.000049
50500	123.6	-71.1			213.2	553	280	12	1.000047
51000	120.5	-71.8			208.5	552	282	11	1.000046
51500	117.4	-72.6			204.0	551	283	9	1.000045
52000	114.4	-73.3			199.5	550	283	8	1.000044
52500	111.5	-74.1			195.2	549	283	8	1.000043
53000	108.6	-74.9			190.9	548	283	7	1.000042
53500	105.8	-74.6			185.7	549	293	5	1.000041

APPENDIX C

TABLE C-IV (Cont)

UPPER AIR DATA

STATION ALTITUDE 3989FEET MSL
DATE 28 JUN 1963, 0330 HRS MST
ASCENSION NO. 483

WHITE SANDS SITE

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
54000	103.1	-73.0			179.4	551	304	6	1.000040
54500	100.5	-71.3			173.5	553	315	6	1.000039
55000	97.9	-69.7			167.8	555	326	6	1.000037
55500	95.5	-68.1			162.3	558	336	6	1.000036
56000	93.1	-66.6			157.1	560	349	8	1.000035
56500	90.8	-65.6			152.5	561	3	10	1.000034
57000	88.6	-65.3			148.5	561	18	12	1.000033
57500	86.4	-65.0			144.7	562	27	12	1.000032
58000	84.3	-64.7			140.9	562	36	12	1.000031
58500	82.2	-64.4			137.3	563	45	12	1.000031
59000	80.2	-64.1			133.7	563	55	13	1.000030
59500	78.3	-63.8			130.3	563	63	13	1.000029
60000	76.4	-63.5			126.9	564	70	13	1.000028
60500	74.5	-63.2			123.6	564	77	13	1.000028
61000	72.7	-62.9			120.5	565	82	15	1.000027
61500	70.9	-62.6			117.4	565	85	16	1.000026
62000	69.2	-62.3			114.4	565	88	18	1.000025
62500	67.5	-62.0			111.4	566	88	19	1.000025
63000	65.9	-61.8			108.6	566	89	19	1.000024
63500	64.3	-61.5			105.8	567	87	20	1.000024
64000	62.7	-61.2			103.1	567	84	20	1.000023
64500	61.2	-60.9			100.5	567	82	21	1.000022
65000	59.8	-60.6			98.0	568	80	22	1.000022
65500	58.3	-60.3			95.5	568	79	23	1.000021
66000	56.9	-60.0			93.1	569	80	23	1.000021
66500	55.6	-59.7			90.7	569	82	23	1.000020
67000	54.2	-59.4			88.4	569	85	24	1.000020
67500	52.9	-59.1			86.2	570	88	25	1.000019
68000	51.7	-58.8			84.0	570	88	24	1.000019
68500	50.5	-58.5			81.9	570	88	22	1.000018
69000	49.3	-58.2			79.8	571	92	23	1.000018
69500	48.1	-57.9			77.8	571	96	24	1.000017
70000	46.9	-57.6			75.9	572	98	23	1.000017

APPENDIX C

TABLE C- 4 (Cont)

UPPER AIR DATA

STATION ALTITUDE 3989FEET MSL
DATE 28 JUN 1963, 0330 HRS MST
ASCENSION NO. 483

WHITE SANDS SITE

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
70500	45.8	-57.4			74.0	572	100	22	1.000016
71000	44.7	-57.1			72.2	572	104	22	1.000016
71500	43.7	-56.8			70.4	573	108	21	1.000016
72000	42.7	-56.5			68.6	573	103	20	1.000015
72500	41.7	-56.2			66.9	574	97	19	1.000015
73000	40.7	-55.8			65.2	574	92	19	1.000014
73500	39.7	-55.1			63.4	575	88	19	1.000014
74000	38.8	-54.4			61.7	576	85	20	1.000014
74500	37.9	-53.7			60.1	577	81	21	1.000013
75000	37.0	-53.0			58.5	578	80	22	1.000013
75500	36.1	-52.3			57.0	579	84	22	1.000013
76000	35.3	-51.6			55.5	580	87	23	1.000012
76500	34.5	-50.9			54.1	580	88	24	1.000012
77000	33.7	-50.4			52.7	581	90	25	1.000012
77500	32.9	-50.3			51.5	581	93	25	1.000011
78000	32.2	-50.2			50.3	581	97	25	1.000011
78500	31.4	-50.0			49.1	582	99	24	1.000011
79000	30.7	-49.9			47.9	582	99	23	1.000011
79500	30.0	-49.7			46.8	582	101	22	1.000010
80000	29.3	-49.6			45.7	582	104	21	1.000010
80500	28.7	-49.4			44.6	582	107	21	1.000010
81000	28.0	-49.3			43.6	583	109	20	1.000010
81500	27.4	-49.1			42.6	583	110	18	1.000009
82000	26.7	-49.0			41.6	583	108	18	1.000009
82500	26.1	-48.8			40.6	583	105	19	1.000009
83000	25.5	-48.7			39.6	583	101	19	1.000009
83500	25.0	-48.5			38.7	584	96	19	1.000009
84000	24.4	-48.4			37.8	584	91	20	1.000008
84500	23.8	-48.3			36.9	584	89	21	1.000008
85000	23.3	-48.1			36.1	584	86	22	1.000008
85500	22.8	-48.0			35.2	584	84	22	1.000008
86000	22.3	-47.8			34.4	584	81	21	1.000008
86500	21.8	-47.7			33.6	585	78	20	1.000007

APPENDIX C

TABLE C-IV (Cont)
UPPER AIR DATA

STATION ALTITUDE 3989FEET MSL.
DATE 28 JUN 1963, 0330 HRS MST
ASCENSION NO. 483

WHITE SANDS SITE

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
87000	21.3	-47.5			32.8	585	74	20	1.000007
87500	20.8	-47.4			32.1	585	69	20	1.000007
88000	20.3	-47.2			31.3	585	66	21	1.000007
88500	19.9	-47.1			30.6	585	65	23	1.000007
89000	19.4	-47.0			29.9	586	64	24	1.000007
89500	19.0	-46.8			29.2	586	65	25	1.000006
90000	18.5	-46.7			28.5	586	67	26	1.000006
90500	18.1	-46.5			27.9	586	69	27	1.000006
91000	17.7	-46.4			27.2	586	73	29	1.000006
91500	17.3	-46.2			26.6	587	77	30	1.000006
92000	16.9	-46.1			26.0	587	80	30	1.000006
92500	16.5	-46.0			25.4	587	83	29	1.000006
93000	16.2	-45.8			24.8	587	86	28	1.000006
93500	15.8	-45.7			24.2	587	85	28	1.000005
94000	15.5	-45.5			23.7	587	85	27	1.000005
94500	15.1	-45.4			23.1	588	85	26	1.000005
95000	14.8	-45.2			22.6	588	86	25	1.000005
95500	14.4	-45.1			22.1	588	86	25	1.000005
96000	14.1	-45.0			21.6	588	85	25	1.000005
96500	13.8	-44.8			21.1	588	83	26	1.000005
97000	13.5	-44.6			20.6	589	81	27	1.000005
97500	13.2	-44.5			20.1	589	83	28	1.000004
98000	12.9	-44.3			19.6	589	84	28	1.000004
98500	12.6	-44.2			19.2	589	84	28	1.000004
99000	12.3	-44.0			18.7	589	84	28	1.000004
99500	12.1	-43.8			18.3	590	83	27	1.000004
100000	11.8	-43.7			17.9	590	82	27	1.000004
100500	11.5	-43.5			17.5	590	81	26	1.000004
101000	11.3	-43.4			17.1	590	80	26	1.000004
101500	11.0	-43.2			16.7	590	79	27	1.000004
102000	10.8	-42.8			16.3	591	78	29	1.000004
102500	10.5	-42.4			15.9	591	78	31	1.000004
103000	10.3	-42.0			15.5	592	78	3	1.000003

APPENDIX C

TABLE C-IV (Cont)

UPPER AIR DATA

STATION ALTITUDE 3989FEET MSL
DATE 28 JUN 1963, 0330 HRS MST
ASCENSION NO. 483

WHITE SANDS SITE

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
103500	10.1	-41.6			15.2	593	78	35	1.000003
104000	9.9	-41.2			14.8	593	79	36	1.000003
104500	9.6	-40.7			14.5	594	80	38	1.000003
105000	9.4	-40.3			14.1	594	80	40	1.000003
105500	9.2	-39.9			13.8	595	82	42	1.000003
106000	9.0	-39.5			13.5	595	83	43	1.000003
106500	8.8	-39.1			13.1	596	85	45	1.000003
107000	8.6	-38.7			12.8	596	88	45	1.000003
107500	8.4	-38.3			12.5	597	90	46	1.000003
108000	8.3	-37.9			12.2	597	91	47	1.000003
108500	8.1	-37.5			12.0	598	93	47	1.000003
109000	7.9	-37.1			11.7	598	94	47	1.000003
109500	7.7	-36.6			11.4	599	96	46	1.000003
110000	7.6	-36.2			11.1	599	99	45	1.000002
110500	7.4	-35.8			10.9	600	101	43	1.000002
111000	7.3	-35.4			10.6	600	103	42	1.000002
111500	7.1	-35.0			10.4	601	104	40	1.000002
112000	6.9	-34.6			10.1	601	105	38	1.000002
112500	6.8	-34.2			9.9	602	105	36	1.000002
113000	6.7	-33.8			9.7	602	107	35	1.000002
113500	6.5	-33.4			9.5	603	108	33	1.000002
114000	6.4	-33.0			9.2	603	109	32	1.000002
114500	6.2	-32.6			9.0	604	109	31	1.000002
115000	6.1	-32.2			8.8	604	108	32	1.000002
115500	6.0	-31.8			8.6	605	107	33	1.000002
116000	5.9	-31.4			8.4	605	105	34	1.000002
116500	5.7	-31.0			8.2	606			1.000002
117000	5.6	-30.6			8.1	606			1.000002
117500	5.5	-30.2			7.9	607			1.000002
118000	5.4	-29.8			7.7	607			1.000002
118500	5.3	-29.5			7.5	608			1.000002
119000	5.2	-29.1			7.4	608			1.000002
119500	5.0	-28.7			7.2	609			1.000002

APPENDIX C

TABLE C-V

UPPER AIR DATA

STATION ALTITUDE 3989FEET MSL
DATE 28 JUN 1963, 0730 HRS MST
ASCENSION NO. 485

WHITE SANDS SITE

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	880.4	26.6	12.4	41	1017.1	676	150	4	1.000287
5000	850.0	23.3	11.8	48	992.9	673	157	6	1.000280
5500	835.3	22.5	11.3	49	978.5	672	160	7	1.000276
6000	820.8	21.6	10.9	50	964.4	671	164	8	1.000272
6500	806.6	20.8	10.1	50	950.5	670	164	9	1.000266
7000	792.5	19.9	8.1	46	937.3	668	158	9	1.000256
7500	778.6	19.1	5.9	42	924.2	667	152	10	1.000247
8000	764.9	18.2	3.7	38	911.1	666	147	10	1.000239
8500	751.4	17.3	1.4	34	898.2	665	142	10	1.000230
9000	738.1	17.3	-0.2	30	882.7	665	136	10	1.000224
9500	725.1	17.2	-1.9	27	867.6	664	132	11	1.000217
10000	712.2	16.0	-2.4	28	855.9	663	128	12	1.000214
10500	699.5	14.7	-3.0	29	844.3	662	121	12	1.000211
11000	687.0	13.5	-3.5	30	832.9	660	114	11	1.000207
11500	674.7	12.2	-4.0	32	821.6	659	103	11	1.000204
12000	662.5	10.9	-4.3	34	810.6	657	92	10	1.000201
12500	650.5	9.6	-4.7	36	799.7	656	76	10	1.000199
13000	638.7	8.2	-5.2	38	788.9	654	60	9	1.000196
13500	627.0	6.9	-5.7	40	778.2	652	50	9	1.000193
14000	615.5	5.5	-6.3	42	767.7	651	40	10	1.000190
14500	604.1	4.2	-6.9	44	757.2	649	38	10	1.000187
15000	592.9	2.8	-7.6	46	746.9	648	37	11	1.000184
15500	581.8	1.4	-8.2	49	736.7	646	42	12	1.000181
16000	570.9	0.1	-9.0	51	726.6	644	46	13	1.000178
16500	560.2	-1.3	-9.7	53	716.6	643	51	14	1.000175
17000	549.6	-2.7	-10.6	55	706.7	641	55	16	1.000172
17500	539.1	-4.1	-11.4	57	696.9	639	62	16	1.000169
18000	528.8	-5.5	-12.3	59	687.2	638	68	17	1.000166
18500	518.6	-6.9	-13.2	61	677.6	636	74	16	1.000163
19000	508.6	-6.6	-21.4	30	664.1	636	80	16	1.000154
19500	498.8	-6.5			651.4	636	87	15	1.000147
20000	489.1	-7.1			640.5	635	94	14	1.000144
20500	479.7	-7.8			629.8	634	98	14	1.000141

APPENDIX C

TABLE C-V (Cont)

UPPER AIR DATA

STATION ALTITUDE 3989FEET MSL
DATE 28 JUN 1963, 0730 HRS MST
ASCENSION NO. 485

WHITE SANDS SITE

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
21000	470.4	-8.5			619.2	633	102	14	1.000138
21500	461.2	-9.7			610.0	632	105	14	1.000136
22000	452.2	-11.0			600.9	630	107	13	1.000134
22500	443.3	-12.2			592.0	629	111	13	1.000132
23000	434.5	-13.5			583.1	627	114	13	1.000130
23500	425.9	-14.8			574.4	626	122	10	1.000128
24000	417.4	-16.1			565.8	624	130	8	1.000126
24500	409.1	-17.4			557.2	623	133	6	1.000124
25000	400.8	-18.7			548.8	621	139	4	1.000122
25500	392.7	-20.0			540.5	620	217	3	1.000120
26000	384.7	-21.4			532.4	618	295	2	1.000119
26500	376.9	-22.7			524.3	616	307	4	1.000117
27000	369.1	-24.1			516.4	614	319	5	1.000115
27500	361.5	-25.5			508.5	613	327	4	1.000113
28000	354.0	-26.8			500.6	611	337	4	1.000111
28500	346.6	-27.8			492.1	610	3	3	1.000110
29000	339.3	-28.8			483.8	609	25	3	1.000108
29500	332.2	-29.8			475.7	607	18	3	1.000106
30000	325.1	-30.9			467.6	606	10	4	1.000104
30500	318.3	-30.9			457.7	606	359	6	1.000102
31000	311.5	-31.2			448.7	606	347	8	1.000100
31500	304.9	-31.9			440.3	605	343	11	1.000098
32000	298.4	-32.9			432.7	604	338	15	1.000096
32500	292.0	-34.0			425.4	602	338	15	1.000095
33000	285.7	-35.1			418.3	601	338	16	1.000093
33500	279.6	-36.3			411.2	599	339	17	1.000092
34000	273.5	-37.4			404.2	598	340	18	1.000090
34500	267.5	-38.5			397.3	596	343	18	1.000088
35000	261.7	-39.7			390.5	595	348	18	1.000087
35500	255.9	-40.8			383.8	593	349	19	1.000085
36000	250.2	-42.0			377.2	592	349	20	1.000084
36500	244.7	-43.2			370.7	591	350	20	1.000083
37000	239.2	-44.3			364.3	589	352	20	1.000081

APPENDIX C

TABLE C-V (Cont)

UPPER AIR DATA

STATION ALTITUDE 3989FEET MSL
DATE 28 JUN 1963, 0730 HRS MST
ASCENSION NO. 485

WHITE SANDS SITE

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
37500	233.8	-45.5			357.9	587	353	19	1.000080
38000	228.6	-46.7			351.7	586	353	19	1.000078
38500	223.4	-47.9			345.5	584	353	18	1.000077
39000	218.3	-49.1			339.4	583	355	17	1.000076
39500	213.3	-50.3			333.4	581	356	16	1.000074
40000	208.3	-51.4			327.3	580	354	15	1.000073
40500	203.5	-52.5			321.3	578	350	14	1.000072
41000	198.8	-53.6			315.4	577	345	14	1.000070
41500	194.1	-54.7			309.6	576	339	13	1.000069
42000	189.6	-55.8			303.9	574	333	13	1.000068
42500	185.1	-56.9			298.3	573	325	15	1.000066
43000	180.7	-58.1			292.8	571	318	17	1.000065
43500	176.4	-59.2			287.3	570	314	16	1.000064
44000	172.2	-60.1			281.5	568	312	16	1.000063
44500	168.0	-60.8			275.7	567	310	16	1.000061
45000	164.0	-61.5			269.9	566	308	16	1.000060
45500	160.0	-62.2			264.3	566	305	15	1.000059
46000	156.1	-62.9			258.7	565	302	13	1.000058
46500	152.3	-63.7			253.3	564	299	12	1.000056
47000	148.6	-64.4			248.0	563	298	11	1.000055
47500	144.9	-65.0			242.6	562	297	10	1.000054
48000	141.4	-65.7			237.4	561	295	9	1.000053
48500	137.9	-66.3			232.2	560	293	8	1.000052
49000	134.5	-66.9			227.2	559	302	6	1.000051
49500	131.1	-67.6			222.2	558	321	4	1.000049
50000	127.9	-68.2			217.4	557	337	1	1.000048
50500	124.7	-68.8			212.6	557	263	2	1.000047
51000	121.5	-69.5			207.9	556	190	3	1.000046
51500	118.5	-69.9			203.1	555	154	3	1.000045
52000	115.5	-70.1			198.2	555	150	3	1.000044
52500	112.6	-70.3			193.4	555	151	3	1.000043
53000	109.8	-70.5			188.7	554	182	4	1.000042
53500	107.0	-70.7			184.1	554	214	4	1.000041

APPENDIX C

TABLE C- V (Cont)

UPPER AIR DATA

STATION ALTITUDE 3989FEET MSL
DATE 28 JUN 1963, 0730 HRS MST
ASCENSION NO. 485

WHITE SANDS SITE

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
54000	104.3	-70.5			179.3	554	257	4	1.000040
54500	101.7	-69.5			174.0	556	303	4	1.000039
55000	99.1	-68.9			169.1	556	344	5	1.000038
55500	96.6	-69.0			164.9	556	23	5	1.000037
56000	94.2	-69.1			160.9	556	37	8	1.000036
56500	91.9	-69.2			156.9	556	48	11	1.000035
57000	89.6	-68.6			152.5	557	54	12	1.000034
57500	87.3	-68.0			148.3	558	59	12	1.000033
58000	85.2	-67.4			144.2	559	63	13	1.000032
58500	83.0	-66.8			140.2	559	67	11	1.000031
59000	81.0	-66.2			136.3	560	70	10	1.000030
59500	79.0	-65.6			132.6	561	75	10	1.000030
60000	77.1	-65.0			129.0	562	82	11	1.000029
60500	75.2	-64.4			125.5	563	88	13	1.000028
61000	73.3	-63.8			122.1	563	91	15	1.000027
61500	71.5	-63.2			118.8	564	93	17	1.000026
62000	69.8	-62.7			115.5	565	94	19	1.000026
62500	68.1	-62.1			112.4	566	92	23	1.000025
63000	66.5	-61.5			109.4	566	90	26	1.000024
63500	64.9	-60.9			106.5	567	90	27	1.000024
64000	63.3	-60.4			103.7	568	90	27	1.000023
64500	61.8	-59.8			100.9	569	91	27	1.000022
65000	60.3	-59.2			98.2	570	91	26	1.000022
65500	58.9	-58.6			95.6	570	91	25	1.000021
66000	57.5	-58.1			93.1	571	91	23	1.000021
66500	56.1	-57.5			90.7	572	92	21	1.000020
67000	54.8	-56.9			88.3	573	92	20	1.000020
67500	53.5	-56.4			86.0	573	92	18	1.000019
68000	52.2	-55.8			83.7	574	92	17	1.000019
68500	51.0	-55.2			81.6	575	95	16	1.000018
69000	49.8	-54.7			79.4	576	99	15	1.000018
69500	48.7	-54.1			77.4	576	101	15	1.000017
70000	47.5	-53.6			75.4	577	101	15	1.000017

APPENDIX C

TABLE C-V (Cont)

UPPER AIR DATA

STATION ALTITUDE 3989FEET MSL
DATE 28 JUN 1963, 0730 HRS MST
ASCENSION NO. 485

WHITE SANDS SITE

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

GEOMETRIC ALTITUDE MSL FEET	PRESSURE MILLIBARS	TEMPERATURE AIR DEGREES CENTIGRADE	TEMPERATURE DEWPOINT	RELATIVE HUMIDITY PERCENT	DENSITY GM/CUBIC METER	SPEED OF SOUND KNOTS	WIND DATA DIRECTION DEGREES(TN)	WIND DATA SPEED KNOTS	INDEX OF REFRACTION
70500	46.4	-53.2			73.5	577	102	15	1.000016
71000	45.3	-53.1			71.8	578	100	16	1.000016
71500	44.3	-53.0			70.0	578	98	17	1.000016
72000	43.2	-52.8			68.4	578	96	18	1.000015
72500	42.2	-52.7			66.8	578	94	19	1.000015
73000	41.3	-52.6			65.2	578	93	20	1.000015
73500	40.3	-52.4			63.6	578	91	22	1.000014
74000	39.4	-52.3			62.1	579	91	22	1.000014
74500	38.5	-52.2			60.7	579	90	23	1.000014
75000	37.6	-52.1			59.2	579	90	24	1.000013
75500	36.7	-51.9			57.8	579	92	24	1.000013
76000	35.9	-51.8			56.4	579	95	23	1.000013
76500	35.0	-51.7			55.1	579	97	23	1.000012
77000	34.2	-51.5			53.8	580	97	23	1.000012
77500	33.4	-51.1			52.5	580	97	23	1.000012
78000	32.7	-50.5			51.1	581	97	23	1.000011
78500	31.9	-49.8			49.8	582	97	23	1.000011
79000	31.2	-49.2			48.5	583	97	23	1.000011
79500	30.5	-48.6			47.3	583	97	23	1.000011
80000	29.8	-48.0			46.1	584	96	22	1.000010
80500	29.1	-47.4			44.9	585	94	22	1.000010
81000	28.5	-46.8			43.8	586	92	22	1.000010
81500	27.8	-46.5			42.8	586	90	22	1.000010
82000	27.2	-46.7			41.8	586	89	22	1.000009
82500	26.6	-46.9			40.9	586	88	22	1.000009
83000	26.0	-47.1			40.0	585	87	23	1.000009
83500	25.4	-47.3			39.2	585	87	23	1.000009
84000	24.8	-47.6			38.3	585	87	24	1.000009
84500	24.3	-47.8			37.5	585	87	25	1.000008
85000	23.7	-48.0			36.7	584	87	25	1.000008
85500	23.2	-48.2			35.9	584	85	26	1.000008
86000	22.6	-48.4			35.1	584	83	26	1.000008
86500	22.1	-48.6			34.3	583	81	26	1.000008

TABLE C-V (Cont)

UPPER AIR DATA

STATION ALTITUDE 3989FEET MSL
DATE 28 JUN 1963, 0730 HRS MST
ASCENSION NO. 485

WHITE SANDS SITE

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
87000	21.6	-48.4			33.5	584			1.000007
87500	21.1	-47.9			32.7	584			1.000007
88000	20.7	-47.5			31.9	585			1.000007
88500	20.2	-47.1			31.1	585			1.000007
89000	19.7	-46.6			30.4	586			1.000007
89500	19.3	-46.2			29.6	587			1.000007

APPENDIX D

IMPACT PREDICTION DATA

APPENDIX D

TABLE D-I

IMPACT PREDICTION DATA

MISSILE: AEROBEE NE 3.129 DATE: 28 JUNE 1963

RELEASE TIME (MST)		DISPLACEMENT OF IMPACT DUE TO WIND IN MILES				THEORETICAL IMPACT IN MILES	
RAWIN-SONDE	PIBAL	143 TO 2,000 FT	2,000 TO 10,000 FT	10,000 TO 100,000 FT	TOTAL	N-S OF LAUNCHER	E-W OF LAUNCHER
R_1 0030		39.5S	5.2S	3.8N	40.9S		
R 0030	P 0330	12.8E	6.5E	3.2E	22.5E		
R_1 0030		38.2S	5.2S	3.8N	39.6S		
R 0030	P 0400	37.0E	6.5E	3.2E	46.7E	13.5	28.6
R_1 0030		17.4S	5.2S	3.8N	18.8S		
R 0030	P 0435	30.7E	6.5E	3.2E	40.4E	34.3	22.3
R_1 0030		29.3S	5.2S	3.8N	30.7S		
R 0030	P 0500	27.4E	6.5E	3.2E	37.1E	22.4	19.0
R_1 0330		19.3S	5.4S	5.6N	19.1S		
R 0330	P 0525	0.7E	6.0E	2.7E	9.4E	34.0	8.7W
	P_1 0535	17.2S	6.1S	5.6N	17.7S		
R 0330	P 0600	4.6E	3.6E	2.7E	10.9E	35.4	7.2
R_2 0600		19.2S	4.7S	5.6N	18.3S		
R 0330	P 0625	16.6E	5.5E	2.7E	24.8E	34.8	6.7E
	P_1 0635	17.9S	4.6S	5.6N	16.9S		
R 0330	P 0645	23.7E	3.3E	2.7E	29.7E	36.2	11.6
	P_1 0635	20.4S	4.6S	5.6N	19.4S		
R 0330	P 0700	18.6E	3.3E	2.7E	24.6E	33.7	6..
	P_1 0635	19.5S	4.6S	5.6N	18.5S		
R 0330	P 0710	15.9E	3.3E	2.7E	21.9E	34.6	3.8
	P_1 0635	18.6S	4.6S	5.6N	17.6S		
R 0330	P 0718	17.4E	3.3E	2.7E	23.4E	35.5	5.3
	P_1 0635	18.6S	4.6S	5.6N	17.6S		
R 0330	P 0725	17.0E	3.3E	2.7E	23.0E	35.5	4.9
*R_1 0730		21.2S	4.3S	5.3N	20.2S		
*R 0730	*P 0732	15.9E	6.1E	6.5E	28.5E	32.9	10.4

P = Double Theodolite Winds (143-2,000 Ft)

P_1 = Single Theodolite Winds (2,000-10,000 Ft)

R = Rawinsonde Winds (Above 10,000 Ft)

R_1 = Rawinsonde Winds (2,000-10,000 Ft)

R_2 = Rawin Winds (2,000-10,000 Ft)

* Post-Shoot Data

APPENDIX D

TABLE D-I (Cont)

IMPACT PREDICTION DATA

AEROBEE NE 3.129

JACK SETTINGS

West leg 21 inches East leg 27 inches

LAUNCHER SETTING

Tilt 87.3 degrees Azimuth 347.80 degrees

COMPONENTS OF TILT

2.64 degrees north 0.57 degrees West

NO WIND IMPACT

53.1 miles north of Navy Blockhouse 18.1 miles West of Navy Blockhouse

PREDICTED IMPACT

40 miles north of Navy Blockhouse 0 miles E-W of Navy Blockhouse

PREDICTED BOOSTER IMPACT

Azimuth 005 Degrees Distance 1000 feet

Recommendation Fire

With 99 % confidence of impacting on range, based upon:

wind correction 24 miles

one hour wind variability 3 miles

Date/Time 28 June 1963, 0730 hours MST

* SOTIM Actual Impact (From Launcher) 33.6 Miles North 9.6 Miles East

Actual Booster Impact (From Launcher) N/A

* Sonic Observation of Trajectory and Impact of Missiles

U. S. ARMY ELECTRONICS RESEARCH AND DEVELOPMENT ACTIVITY
WHITE SANDS MISSILE RANGE
NEW MEXICO

WILLIAM C. SKINNER
COLONEL, SIGNAL CORPS
COMMANDING

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Director
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HEADQUARTERS
U. S. ARMY ELECTRONICS RESEARCH AND DEVELOPMENT ACTIVITY
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NEW MEXICO

October 1963

1. Data Report ERDA-80 has been prepared under the supervision of the Meteorological Support Division and is published for the information and guidance of all concerned.

2. Suggestions or criticisms relative to the form, contents, purpose, or use of this publication should be referred to the Commanding Officer, U. S. Army Electronics Research and Development Activity, ATTN: SELWS-M, White Sands Missile Range, New Mexico.

FOR THE COMMANDER:

L. W. ALBRO
Major, AGC
Adjutant

AD ACCESSION NR

Army Electronics Research and Development Activity, Meteorological Support Division, White Sands Missile Range, New Mexico

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