NWC TP 5923
Part 2

Diurnal Temperatures in Dump-Stored Missiles

Part 2. Experimental Data

by

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for
Ordnance Systems Department

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FOREWORD

This report contains data related to the dump storage of ordnance; it includes a wide variety of dump-storage diurnal data from the desert environment, along with weather data for the same times. It is anticipated that these data will be used to calibrate computer models of the temperature response of items being stored in the outdoor environment.

This continuing effort has been sponsored by the Naval Air Systems Command under the Guided Missile Propulsion Technology Block Program (AirTask A32-320G/008B/WF31-330-000). Mr. Lee N. Gilbert is the NWC technology administrator for this program.

This report is being published in two parts; this part (Part 2) contains experimental data, along with weather data taken in conjunction with the analytical program that was reported in Part 1. The report, which was prepared by a consultant to the Naval Weapons Center, has been reviewed for technical accuracy by Howard C. Schafer and Crill Maples.

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(U) Temperature data were gathered in a desert environment for a wide variety of dump-stored ordnance; weather data for the same times also were recorded. Some of these data were used to evaluate four simple analytical approaches for predicting specific temperature-time values, and the results of this work were presented in Part 1 of this report. This part, Part 2, contains the experimental data on the Shrike and Sidewinder missiles plus some additional data taken at the same time on a variety of other ordnance. It is anticipated that the data may prove useful in the calibration of computer models on the temperature response of items being stored in the outdoor environment.

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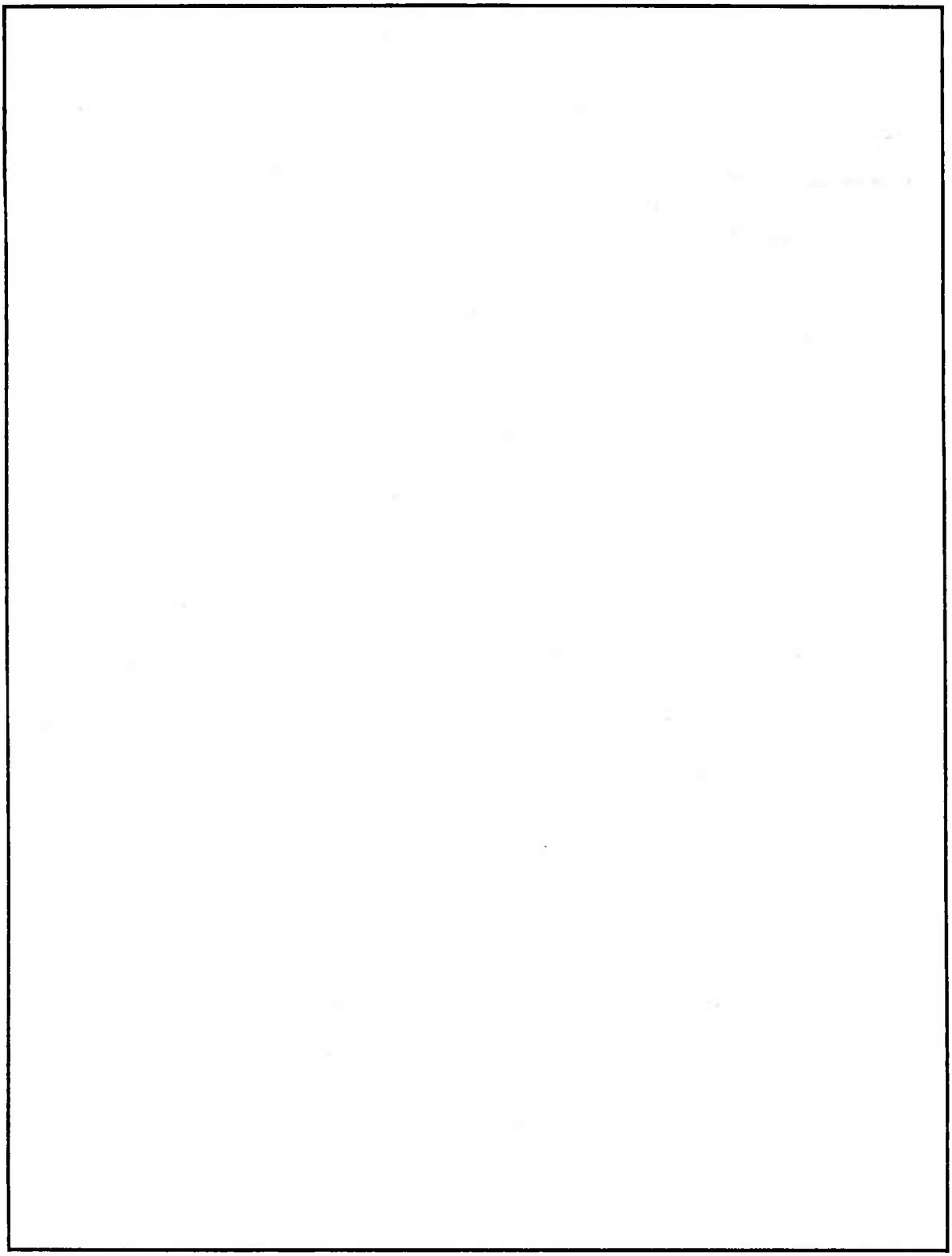

CONTENTS

INTRODUCTION

In the early 1970s, a project was undertaken in which three simple, analytical approaches for predicting specific temperature-time values were compared with experimentally obtained diurnal data. This involved not only the development of thermal analysis techniques and their application to the prediction of temperatures attained by dump-stored missiles, but also the gathering of thermal data for comparison with the calculations. This effort was reported in Part 1 of this report.

When the planned field tests were conducted for this project (at the Salt Wells facility of the Naval Weapons Center (NWC), which is located in the Mojave Desert of California), thermocouples were mounted on the specified missiles and shipping containers at the locations specified for the project and also at several additional locations on these missiles and containers, as well as a wide variety of additional ordnance. The additional thermocouples were mounted because this seemed a good opportunity to get extra data for future reference and for other applications. The measured thermal data are presented in this report, along with additional diurnal temperature data, for one day, from additional ordnance.

The specific objective of this part of the report is to document diurnal temperature data on some outdoor-stored (dump-stored) ordnance items for days during which weather data are available at the same location for the same time. Included also are data taken with the thermal standard device, which has been used extensively for gathering thermal data. (The thermal standard was developed by the authors for this purpose; listed in the bibliography are a number of reports describing the method. Part 1 of this report also contains a brief discussion.) Much data have been published over the years that involve temperatures of dump-stored ordnance, but not much that includes the specific daily (diurnal) temperature versus time results from thermocouples located in missiles and other types of military ordnance. Furthermore, only a small fraction of the published diurnal data includes synoptic weather data for the same locations. The primary use envisioned by the authors for the data published in this report is the calibration of computer models designed to calculate the temperature of dump-stored ordnance.

During the summer of 1974, the field tests were conducted, as planned, at NWC. The thermocouples were mounted on the missiles and shipping containers at the locations specified by the analysts and also at several additional locations on the missiles and shipping containers, as well as on a wide variety of other ordnance. The additional thermocouples were mounted because this seemed a good opportunity to get data for applications not necessarily related to the needs of these analysts. Also, very little diurnal data had been published, and this seemed to be a good method of getting additional data at little or no cost. These extra data are presented in this report, along with additional diurnal temperature data from China Lake taken at locations less than 200 feet from the primary site. Hourly diurnal data are given, some in tabular form and some in graphical form.

FIELD TEMPERATURE MEASUREMENTS

Temperature measurements for comparison with predictions were obtained on an AGM-45A-3 Shrike missile and an AIM-9II-2 Sidewinder missile. Both missiles had operational guidance and control sections but inert warheads and rocket motors. Both missiles had a fresh coat of standard paint. Desert sand was used to simulate rocket motors, and a cast plastic was used to simulate warhead explosive, which was used in the Sidewinder. Both missiles were extensively instrumented with copper-constantan thermocouples. Details on the locations were provided in Part 1 of this report; they are summarized in Appendixes A through D of this volume. The missiles were tested in an all-up configuration, although wings and fins were not installed on the Shrike.

Tests were performed with the missiles both in and out of the shipping containers. The same two missiles were used for all the tests, which were made at different times of the summer. The Shrike containers consisted of a Mk 399 Mod 0, light navy gray, steel, single-store container and a three-missile container with a white acrylic top and gray aluminum bottom. The Sidewinder container was white acrylic and accommodated four missiles. During the tests with multistore containers, additional dummy stores were used to fill the container. The containers were also instrumented with thermocouples.

In addition to the ordnance temperatures, various environmental conditions were monitored for use in the predictions. Ambient air temperature was measured in a Stevenson shelter located about 100 feet from the missiles (Channel 9 on the data logger); wind speed and direction were measured at the test site and at the missile level; solar radiation as measured by a pyrheliometer was obtained from the Range Instrumentation Support Division (located about 5 miles northwest of the test site); and relative humidity was monitored at the test site. The area was desert sand on the surface, and no special changes were made by way of surface conditioning or preparation.

Data were measured continuously throughout the summer of 1974 from early June to the middle of September. Also, the thermal standard data (five thermocouples: top, east side, west side, bottom, and center of the sphere) were monitored during the entire time. All the data were recorded on Honeywell Model 16 recorders.

The dates selected for analysis and the corresponding test configurations are listed in Table 1. These dates were chosen because these were cloudless days with relatively low winds and were deemed to be easier for analysis than other days. Also, the days chosen were similar in weather to the two or three preceding days and at least one following day. This ensured that no weather front passed by and caused a 1-day "glitch" in the long-term data. The recorded environmental conditions for these dates are listed in Table 2.

TABLE 1. Test Dates Selected for Analysis

Date	Test configuration
12 June 1974	Shrike out of container
28 June 1974	Shrike in single-store container
29 August 1974	Sidewinder out of container
11 September 1974	Shrike and Sidewinder in containers

TABLE 2. Weather Data for the Four Dates Used in the Analyses.
a. 12 June 1974.

Time	Wind, mph	Wind direction	Relative humidity, %	Air temperature, °F	Solar radiation, langleys
0000	1	variable	28	81	---
0100	2	variable	28	81	---
0200	2	variable	28	74	---
0300	1	variable	30	71	---
0400	1	variable	34	67	---
0500	1	variable	38	67	---
0600	1	variable	44	65	0.6
0700	1	variable	42	72	7.4
0800	2	variable	34	80	22.0
0900	2	variable	30	86	37.2
1000	3	variable	26	94	51.0
1100	3	variable	22	100	63.2
1200	3	variable	20	104	72.0
1300	4	variable	15	106	79.0
1400	4	variable	14	110	78.2
1500	5	variable	14	108	70.8
1600	4	variable	12	110	62.6
1700	3	variable	12	109	49.8
1800	5	variable	12	105	35.4
1900	5	SW	14	100	19.8
2000	4	SW	17	95	7.2
2100	4	SW	20	90	0.4
2200	4	SW	20	86	---
2300	4	SW	25	83	---

TABLE 2. (Contd.)
b. 28 June 1974.

Time	Wind, mph	Wind direction	Relative humidity, %	Air temperature, °F	Solar radiation, langleys
0000	2	SW	20	80	---
0100	1	SW	20	77	---
0200	2	variable	21	75	---
0300	1	SW	22	70	---
0400	1	SW	26	67	---
0500	1	SW	33	59	---
0600	1	SW	40	58	0.4
0700	1	SW	34	66	8.2
0800	2	SW	30	70	22.2
0900	2	variable	26	80	37.8
1000	2	variable	22	84	52.2
1100	3	variable	19	90	63.4
1200	3	variable	15	96	72.6
1300	4	variable	14	101	78.8
1400	3	variable	13	108	78.8
1500	4	variable	12	107	72.6
1600	3	variable	11	104	63.6
1700	4	variable	10	102	51.6
1800	3	SW	10	98	37.2
1900	2	variable	11	94	21.2
2000	2	variable	13	90	7.2
2100	3	variable	14	86	0.4
2200	3	SW	20	84	---
2300	3	SW	22	83	---

TABLE 2. (Contd.)
c. 29 August 1974.

Time	Wind, mph	Wind direction	Relative humidity, %	Temperature, °F	Solar radiation, langleys
0000	3	S	26	78	---
0100	2	S	26	77	---
0200	1	S	27	74	---
0300	1	S	28	72	---
0400	1	SW	30	70	---
0500	0	SW	32	69	---
0600	1	SW	33	65	---
0700	0	SW	37	66	0.8
0800	1	NW	35	72	9.0
0900	2	NW	32	78	26.0
1000	1	variable	29	82	41.4
1100	2	variable	26	88	54.8
1200	2	variable	22	94	65.6
1300	3	variable	18	97	70.6
1400	3	variable	17	100	70.6
1500	3	variable	12	100	65.4
1600	4	SW	11	100	56.0
1700	2	SW	10	98	43.8
1800	2	SW	10	96	28.8
1900	2	SW	10	86	12.6
2000	3	S	13	80	1.0
2100	1	SW	15	76	---
2200	1	SW	20	76	---
2300	1	variable	24	70	---

TABLE 2. (Contd.)
d. 11 September 1974.

Time	Wind, mph	Wind direction	Relative humidity, %	Temperature, °F	Solar radiation, langleys
0000	3	SW	21	78	---
0100	3	SW	24	75	---
0200	3	SW	24	7S	---
0300	2	variable	24	74	---
0400	2	variable	28	68	---
0500	2	E	30	64	---
0600	1	variable	32	63	---
0700	0	variable	32	64	0.2
0800	0	SW	30	70	7.8
0900	1	variable	29	79	21.8
1000	1	variable	25	8S	37.2
1100	2	variable	22	92	S1.0
1200	2	variable	20	9S	61.2
1300	3	variable	19	97	6S.8
1400	3	variable	18	100	65.4
1500	4	variable	16	102	60.4
1600	4	variable	16	102	S0.4
1700	7	S	16	98	38.4
1800	4	SW	18	94	22.6
1900	4	SW	21	87	8.4
2000	4	SW	24	82	0.2
2100	4	SW	26	82	---
2200	3	SW	26	80	---
2300	2	SW	28	79	---

Notes: Solar radiation is logged by weather facility using standard time.
All times are daylight saving time.
The correction for solar radiation time has been made.

SALT WELLS DIURNAL FIELD DATA

Some of the temperature data obtained from the Shrike and Sidewinder missiles and from the thermal standard during the 4 days listed in Table 1 are presented graphically in Appendixes A through D, along with identification of the data channels and thermocouple

locations. These data are presented without discussion, inasmuch as they are just the recorded results. All the results are not given graphically, but a wide diversity of size, thermal mass, color, etc., is provided.

As noted previously, additional data were gathered on a wide variety of other ordnance, including rockets, bombs, aircraft canopies, and ammunition. Table 3 gives hourly temperatures, in degrees Fahrenheit, obtained for more than 140 channels of data from thermocouples located on these ordnance items. (The left-hand column of the table gives the data channel, and the numbers across the top indicate the time of day.) The data given were taken on 12 June 1974. This day was chosen for the presentation of data in part because weather data have already been given (Table 2) and in part because 7 days in a row had similar temperature-versus-time-of-day values, so the comparative data would not be "abnormal." All of the temperatures recorded were taken within 150 feet of the weather data sensing and recording locations, except for the solar radiation. The channels and types of ordnance are identified in Table 4.

The data in the appendixes, plus those in Tables 3 and 4, should provide a sufficient amount of data that an analyst could probably match, or at least come close to, his particular problem.

These data, besides being useful in themselves for analysts, also illustrate the fact that one cannot expect to obtain 100% accurate comparisons between field and laboratory data. For example, Channels 40 through 44 and 74 through 79 of Table 3 provide data from two "identical" thermal standards. Comparing the results from these two thermal standards, one can see that, even when two nearly identical objects are instrumented and placed side by side outdoors, the temperatures vary by a few degrees. In just the brief period shown here, the maximum temperatures differ by as much as 14°F. The authors conclude from this that measured temperature differences of 5 or 6 degrees are not of significance when objects are stored in outdoor situations. This is true under controlled conditions. When uncontrolled variables are considered (such as paint aging, surface scratches, random directions relative to north, oxidation, thermocouple attachment method, cloud cover, local wind effects, etc.), one would be unsure of his ability to predict the temperature difference between an object and the ambient air to within 15 or 20°F.

TABLE 3. Temperature Data, in Degrees Fahrenheit, for a 24-Hour Period, 12 June 1974.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	82	78	74	71	69	67	69	91	109	120	125	126	124	124	123	121	123	120	116	110	101	95	89	87
2	80	76	73	70	67	66	66	75	90	104	116	126	131	135	135	136	139	136	129	118	105	97	90	87
3	82	77	74	70	68	66	66	72	85	99	112	123	130	134	136	136	138	137	130	122	109	99	92	88
4	76	72	69	65	63	62	66	84	101	116	129	138	141	147	138	139	147	132	122	108	95	89	84	82
5	86	84	80	78	75	73	72	74	79	85	92	96	101	104	106	107	108	107	106	104	101	97	95	91
6	93	91	88	85	82	79	77	76	76	79	82	86	89	95	98	101	104	104	105	105	104	103	101	98
7	86	83	80	78	75	73	72	73	78	84	90	95	100	104	107	109	110	109	107	105	101	98	95	92
8	76	72	70	67	65	63	62	70	80	89	98	106	113	118	119	120	121	115	109	100	93	88	83	82
9	83	78	75	72	70	70	70	78	85	90	95	100	104	107	109	110	112	108	107	103	98	94	88	88
10																								
11																								
12																								
13																								
14	84	79	76	73	70	68	67	73	86	99	109	118	124	127	130	130	131	130	121	115	107	101	94	91
15	88	84	80	77	73	71	70	71	78	88	97	107	113	117	121	124	127	129	123	118	110	104	98	94
16																								
17	80	77	73	70	68	66	66	75	89	104	117	125	129	130	133	137	142	138	122	116	104	97	91	86
18	95	93	90	87	85	82	79	78	77	79	82	86	90	94	98	101	104	107	109	109	107	104	101	98
19	92	89	86	84	81	78	76	75	77	82	88	95	101	107	112	115	116	117	115	113	108	104	100	96
20	81	76	73	69	68	66	69	85	101	113	125	131	135	139	139	141	138	132	122	116	105	98	90	87
21	85	81	77	73	70	68	79	77	90	102	113	120	124	126	127	129	131	129	123	119	110	103	97	91
22																								
23																								
24																								
25	106	104	102	100	98	96	94	92	92	92	94	96	98	101	104	107	108	111	112	113	113	113	111	110
26	97	94	91	89	87	85	83	85	92	99	106	110	114	118	119	120	121	121	119	117	113	109	106	102
27	90	86	83	81	78	77	77	85	99	111	120	126	131	134	135	134	134	131	125	118	109	104	99	95
28	78	74	71	69	68	66	68	92	117	134	146	154	157	165	153	151	154	139	125	109	97	92	86	84
29	75	71	68	65	63	62	65	95	124	143	154	162	161	167	151	147	147	129	116	104	93	88	83	81
30	76	71	68	65	63	62	63	93	117	135	147	155	157	167	156	153	154	138	124	107	94	88	83	82
31	101	97	94	90	87	83	81	80	82	86	91	97	103	108	114	118	121	125	126	126	123	118	113	109
32																								
33																								
34																								
35	88	85	81	78	75	73	72	85	99	110	119	126	131	136	137	137	139	135	129	121	110	104	99	95
36	82	75	74	70	69	68	68	72	81	88	96	104	108	116	119	122	124	125	119	111	99	94	87	87
37	88	85	81	78	74	72	70	69	72	78	85	92	99	105	110	112	114	116	116	113	110	104	99	95
38	77	73	70	67	65	63	64	72	84	96	106	115	120	125	123	121	121	116	110	103	95	90	85	83
39	80	76	73	70	68	67	70	80	92	100	106	111	113	116	113	113	113	112	108	104	98	93	88	86
40	88	84	81	77	74	72	71	75	85	94	102	109	115	119	122	123	125	126	123	118	110	103	97	92
41	84	79	78	72	73	71	73	86	104	118	130	139	144	150	144	141	143	133	122	112	101	96	90	88
42	84	80	76	73	70	69	72	100	114	125	127	129	126	127	121	121	123	119	114	107	100	95	99	88
43	88	79	79	73	74	72	73	83	95	104	108	116	118	124	123	123	127	122	118	110	101	96	91	89
44	84	80	76	73	71	69	70	78	89	101	110	121	130	137	139	141	148	135	125	112	102	95	91	88
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64																								
65	84	78	76	72	71	69	72	86	102	116	126	136	141	145	144	142	142	136	125	116	105	98	91	88
66	84	78	76	73	71	70	76	102	118	129	133	138	135	137	128	126	126	123	116	110	103	97	90	88
67	105	87	91	70	85	74	84	91	118	115	122	126	125	138	140	135	136	140	138	127	116	110	103	103
68	88	83	80	77	74	72	70	75	87	100	110	118	125	130	133	134	133	135	129	122	114	105	97	93
69	85	78	78	73	73	71	72	80	92	102	112	122	129	141	147	150	156	149	137	123	105	98	90	89
70	77	71	71	68	68	66	68	83	101	117	131	142	147	151	147	142	137	125	112	99	92	87	81	81
71																								

Note: Left column lists the data channel number. Remaining column headings list the time of day.

TABLE 3. (Contd.)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
72																								
73																								
74	88	77	80	72	74	73	76	88	104	117	127	137	140	146	141	139	140	132	121	112	101	96	89	88
75	87	79	79	73	73	72	75	87	103	113	121	131	134	137	126	123	127	120	113	108	101	96	91	88
76	88	79	80	73	74	73	76	84	95	100	103	110	109	118	118	119	119	122	116	113	104	98	88	91
77	88	78	80	73	74	73	76	84	94	101	109	114	116	123	124	126	132	131	124	116	102	97	90	88
78	79	77	74	72	71	70	69	72	76	81	86	92	95	98	99	99	98	97	94	89	84	79	77	75
79																								
80																								
81	78	74	71	68	66	65	68	78	88	98	104	109	112	117	118	119	120	118	113	105	96	91	86	83
82	78	73	70	67	65	63	68	80	91	100	107	111	113	117	117	117	117	115	110	103	95	90	85	82
83	80	76	73	70	67	65	65	71	81	91	99	106	111	115	118	119	120	119	116	110	101	95	89	85
84	80	76	73	70	67	65	65	71	81	91	99	106	111	115	118	120	121	121	117	111	101	95	89	85
85	80	76	73	70	67	65	66	72	82	92	99	106	110	115	118	119	120	120	116	110	101	95	89	85
86	80	76	73	70	68	65	66	73	82	92	100	107	111	115	118	118	119	119	116	110	101	95	89	85
87	79	76	73	70	67	65	65	72	82	92	100	106	110	114	117	118	119	119	115	109	100	94	88	85
88	80	77	73	70	68	65	65	71	81	91	99	106	110	115	117	118	120	120	116	111	102	95	90	85
89	82	78	75	71	69	67	66	71	80	88	97	104	109	114	117	118	119	120	116	112	103	97	91	87
90	79	75	72	69	67	65	65	72	82	92	100	107	111	115	117	118	119	118	115	109	100	94	88	85
91	78	73	71	68	66	63	78	98	111	119	123	123	120	121	119	118	118	115	110	104	96	90	86	83
92	78	74	71	68	66	65	72	88	101	110	114	117	117	120	118	118	118	116	112	105	97	92	87	83
93	78	73	71	68	66	64	66	76	86	95	103	110	114	121	127	134	139	138	130	112	96	91	86	83
94	78	74	71	68	66	65	66	74	85	94	102	108	113	120	124	128	131	131	124	111	97	92	86	83
95	80	75	73	69	67	65	67	76	87	96	103	110	113	116	116	115	115	113	109	104	98	93	88	85
96	79	76	73	70	67	65	65	70	78	87	96	104	111	116	120	121	123	120	115	108	98	93	88	85
97	82	79	75	72	70	68	67	72	79	87	95	101	107	113	116	118	121	120	117	111	101	96	91	87
98	82	79	75	72	70	68	69	76	85	92	99	105	109	113	113	114	116	114	111	108	101	96	91	87
99	88	84	81	77	74	71	70	70	73	80	86	93	99	104	109	112	114	116	115	113	110	104	99	95
100	87	83	80	76	73	70	68	69	73	79	86	94	100	105	110	113	114	116	115	113	109	104	98	94
101	88	84	81	77	74	71	69	68	70	76	83	90	98	104	110	113	116	118	118	116	111	105	99	95
102	88	84	81	77	74	71	69	69	72	77	84	91	98	104	109	113	116	118	118	116	111	105	99	95
103	90	86	82	79	75	73	70	69	70	75	81	88	95	101	107	111	114	116	117	116	113	107	102	97
104	90	86	82	78	75	72	70	69	70	75	82	88	95	102	107	111	114	116	117	116	113	107	102	97
105	75	71	68	65	61	60	63	77	90	103	113	119	123	129	126	124	124	117	110	102	93	88	83	80
106	82	78	75	72	69	67	67	73	83	92	101	107	113	118	121	122	124	123	119	113	104	98	92	88
107	82	78	74	71	69	66	67	74	84	94	102	109	114	117	119	119	120	119	116	112	103	96	91	87
108	85	82	78	75	72	70	68	70	77	85	93	100	107	112	116	118	120	121	119	116	108	102	96	92
109	76	72	70	66	63	61	62	71	79	91	101	110	117	124	124	125	126	120	113	105	95	89	85	82
110	76	72	70	66	63	61	67	80	92	103	111	117	120	123	119	117	115	110	106	101	94	89	84	82
111	80	76	72	70	68	66	72	85	96	104	110	113	114	116	114	113	112	110	106	102	97	92	88	85
112	84	81	78	74	72	70	71	78	87	96	103	109	113	116	118	119	122	118	114	109	101	96	92	89
113	80	76	73	70	68	66	66	70	77	84	92	100	108	116	121	125	130	127	121	111	98	92	88	85
114	88	85	81	78	74	72	70	69	70	75	81	88	96	104	110	116	119	121	121	119	113	106	101	95
115	86	82	79	75	73	70	68	69	74	81	88	96	103	109	113	116	117	117	116	113	108	103	98	93
116	88	85	82	78	75	72	70	71	76	83	90	96	102	107	110	113	114	115	114	113	109	105	100	95
117	91	87	83	80	77	74	72	71	74	80	87	94	100	106	110	114	116	118	118	116	112	107	102	97
118	91	87	83	80	77	73	71	70	72	77	83	90	97	104	109	113	115	117	118	116	113	108	103	98
119																								
120																								
121																								
122																								
123																								
124																								
125	85	81	79	76	74	73	73	78	83	88	93	98	103	108	108	111	119	114	110	103	96	95	88	87
126	90	86	86	81	81	79	76	75	78	79	83	90	93	101	103	104	106	111	109	107	102	102	95	94
127	84	81	78	75	85	82	83	76	83	85	88	96	101	95	95	98	101	102	103	100	97	98	95	92
128	85	80	78	74	73	71	71	78	90	101	112	122	129	136	137	136	138	138	129	118	106	101	92	89
129	89	85	82	79	77	74	73	77	86	96	107	116	123	129	131	132	135	135	128	119	108	104	98	93
130	86	82	80	76	73	72	70	75	86	97	109	119	127	134	137	138	140	141	132	123	110	104	96	91
131	78	76	73	69	70	70	67	70	80	88	95	104	107	114	113	113	114	112	114	99	88	83	80	77
132	78	86	65	81	68	80	70	78	81	94	113	117	137	123	123	137	150	128	124	111	95	89	99	81
133	84	80	78	73	72	70	70	78	90	101	113	124	132	140	140	140	145	140	131	119	105	100	92	88
134	86	82	79	76	73	71	70	75	85	96	107	118	127	133	137	137	141	140	131	121	107	102	95	90
135	92	86	85	80	77	76	72	76	88	95	108	118	123	134	139	139	139	148	136	131	118	111	97	98
136	88	84	81	78	75	73	72	78	87	98	109	119	128	134	137	138	143	142	134	123	110	104	97	92
137	84	80	78	74	72	70	70	76	88	100	112	121	129	135	137	137	136	129	126	117	104	97	90	86
138	87	80	82	74	75	73	70	75	87	98	107	119	124	136	138	136	137	142	131	123	110	106	93	92
139	90	84	85	78	78	77	74	78	90	100	108	120	124	135	138	136	138	146	136	124	111	106	95	94
140	92	88	85	82	80	78	76	80	87	96	105	113	121	126	128	131	135	137	131	124	113	108	101	96
141	83	83	77	78	73	68	73	79	85	101	111	119	132	133	134	136	145	136	133	117	103	199	98	86
142	91	85	81	78	77	76	72	76	87	96	108	118	124	133	136	137	139	143	133	126	114	108	97	95

Note: Left column lists the data channel number. Remaining column headings list the time of day.

TABLE 3. (Contd.)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
143	83	80	77	73	71	70	69	75	87	99	112	123	134	142	145	145	150	143	130	119	105	100	92	88
144	84	81	78	74	72	70	70	78	88	100	113	124	135	142	144	144	148	144	131	120	106	101	93	88
145	87	82	80	75	73	71	69	74	87	101	116	131	141	150	153	151	151	152	141	131	116	108	97	93
146	88	82	80	75	73	71	69	74	88	102	118	133	143	152	157	155	155	156	145	134	118	110	98	93
147	85	82	78	75	72	69	68	76	92	109	126	139	150	155	159	158	160	157	146	133	116	106	97	91
148	85	82	78	75	72	70	69	75	87	102	118	132	143	150	152	150	152	150	141	128	113	106	97	91
149	86	82	78	75	72	70	69	75	88	104	120	134	145	152	155	154	156	153	144	131	116	107	98	92
150	85	81	78	74	72	69	69	76	93	109	126	139	149	155	158	157	160	157	146	132	115	106	97	91
151	83	79	76	73	70	68	68	78	92	108	123	135	145	150	151	150	152	150	139	126	110	103	95	88
152	84	80	77	73	71	68	69	79	95	113	131	145	155	163	165	163	167	163	150	133	113	104	95	89
153	84	80	77	73	71	68	69	79	95	113	131	145	155	163	165	163	167	163	150	133	113	104	95	89
154	84	80	77	73	71	68	69	79	95	113	131	145	155	163	164	163	167	163	150	133	113	104	95	89
155	84	80	77	73	71	68	69	79	95	113	131	145	155	163	165	163	167	163	150	133	113	104	95	89
156	84	80	77	73	71	68	69	79	95	113	131	145	155	163	164	163	167	163	150	133	113	104	95	89
157	84	80	77	73	71	68	69	79	95	113	131	145	155	163	164	163	167	163	150	133	113	104	95	89
158	84	80	77	73	71	68	69	79	95	113	131	145	155	163	164	163	167	163	150	133	113	104	95	89
159	84	80	77	73	71	68	69	79	95	113	131	145	155	163	164	163	167	163	150	133	113	104	95	89
160	85	82	79	76	73	71	70	70	75	83	92	103	112	117	118	117	118	117	112	107	100	97	92	88
161	86	83	80	77	73	71	70	70	75	82	92	103	113	121	123	119	121	121	113	108	101	98	93	88
162	80	78	76	72	70	69	69	74	89	101	109	115	124	119	113	109	118	110	107	102	96	95	88	85
163	83	78	78	72	71	70	66	68	80	93	113	132	134	132	117	112	116	118	110	110	100	97	87	87
164	80	78	74	72	70	68	69	77	89	101	110	116	120	121	122	119	120	116	110	104	96	94	88	85
165	82	79	76	73	70	68	69	80	95	108	116	122	124	126	121	122	124	122	116	109	99	95	89	85
166	83	79	76	73	70	68	73	88	94	100	107	111	114	120	119	125	130	128	120	114	101	96	90	85
167	83	79	76	73	70	68	72	82	93	101	110	114	116	122	119	126	135	132	123	115	100	96	90	85
168	83	79	76	73	70	68	69	78	91	101	110	113	116	118	117	120	125	123	116	110	100	96	90	86
169	85	81	78	75	73	70	70	73	79	85	93	101	107	112	118	123	128	129	124	115	101	97	92	87
170	85	82	78	75	72	70	70	78	89	99	106	111	116	116	117	118	121	117	110	105	98	96	92	87
171	84	83	76	76	71	68	70	79	88	98	106	110	117	115	115	109	123	117	110	104	97	95	92	86
172	84	78	78	72	73	71	70	85	107	115	120	126	127	132	130	125	133	131	122	115	101	98	88	86
173	81	78	75	72	70	69	68	85	102	114	119	125	128	129	127	125	132	129	121	114	98	95	88	85
174	81	78	73	73	69	68	68	85	102	114	119	125	129	129	125	125	132	128	119	113	97	93	88	84
175	84	81	77	74	71	69	70	73	78	85	92	99	108	113	121	127	135	133	127	116	100	96	91	86
176	78	74	72	68	68	67	70	82	96	103	110	116	118	123	122	122	134	121	114	104	95	92	85	83
177	97	95	92	89	86	83	82	81	83	86	90	93	96	98	100	102	107	110	112	110	108	108	105	101
178	95	92	88	86	83	80	78	79	82	86	90	95	98	101	104	106	112	114	114	112	108	107	104	100
179																								
180	98	95	92	87	85	82	78	77	78	81	87	94	101	109	113	118	123	129	129	127	121	117	109	103
181	91	90	85	85	81	78	78	78	78	82	86	89	95	96	99	103	105	104	106	104	102	99	98	95
182	88	85	83	81	78	76	75	76	78	83	88	93	98	101	105	107	107	108	107	104	100	97	94	91
183	92	89	86	83	81	78	78	83	92	101	111	120	125	129	129	128	128	125	121	116	109	104	99	96
184	95	92	88	86	83	80	78	80	84	91	99	107	116	121	125	128	130	130	126	122	115	108	104	100
185	92	90	86	84	81	78	78	83	91	101	110	117	123	124	125	124	125	123	119	116	109	104	100	96
186	95	92	89	85	83	80	78	79	82	88	95	104	111	118	123	127	130	132	130	126	116	110	104	100
187																								
188																								
189	105	103	100	98	95	93	91	89	87	87	88	89	93	97	101	105	109	112	114	115	114	113	111	108
190	88	85	82	80	78	75	75	87	101	115	125	134	137	139	134	129	126	121	110	105	101	96	93	90
191																								
192	73	68	65	61	60	59	66	80	91	101	108	112	113	119	118	117	114	110	104	97	90	84	81	78
193	76	72	69	66	63	62	65	75	86	96	104	109	113	117	117	118	118	115	110	103	95	89	84	81
194	78	73	70	67	65	63	66	76	86	95	103	109	112	116	118	118	118	116	111	104	96	90	85	82
195	77	73	70	67	85	63	65	75	85	95	103	108	112	116	117	118	117	116	111	104	96	90	85	82
196	78	74	71	68	65	63	65	73	84	93	101	107	111	115	117	117	117	116	112	106	98	92	87	83
197	78	74	71	68	65	63	65	73	84	94	101	108	111	115	116	117	117	116	111	106	97	91	86	83
198	76	72	69	66	63	61	65	76	88	97	105	111	114	118	118	119	118	116	110	102	94	88	84	81
199	78	73	70	67	65	63	66	75	86	95	103	108	112	117	119	121	122	120	114	105	96	90	85	82

Note: Left column lists the data channel number. Remaining column headings list the time of day.

TABLE 4. Identification of Data Channels for Data Given in Table 3.

THERMOCOUPLE CHANNEL LOCATIONS FOR JUNE 12, 1974

	1	2	3	4
1	2.75" ROCKET CONTAINER (LOADED)	DARK GRAY	0.8	TOP SKIN, BTM RD EAST
2				TOP SKIN, TOP RD WEST
3				CNTR GRAIN, TOP RD WEST
4				TOP OUTSIDE SKIN, CONT
5	ZUNI POD (LOADED)	WHITE	0.29	ZUNI SKIN, TOP, EAST
6				ZUNI GRAIN, TOP, EAST
7				ZUNI SKIN, TOP, WEST
8				POD SURFACE TOP
9	STEVENSEN SHELTER			AMBIENT AIR
10				
11				
12				
13				
14	20 MM AMMO IN CONTAINER	OLIVE DRAB	0.7	TOP ROW CENTER
15				MIDDLE ROW CENTER
16				
17	30 CAL AMMO IN SMALL CONTAINER	OLIVE DRAB	0.7	TOP ROW CENTER
18	30 CAL AMMO IN LARGE CONTAINER	BARE WOOD	0.4	MIDDLE ROW CENTER
19				TOP ROW CENTER
20	50 CAL AMMO IN CONTAINER	OLIVE DRAD	0.7	TOP ROW CENTER
21				MIDDLE ROW CENTER
22				
23				
24				
25	ASROC MOTOR IN CONTAINER	DARK GRAY	0.8	1" INTO CRUCIFORM TOP
26				SHELL GRAIN TOP
27				TOP INSIDE SKIN OF MOTOR
28				AIR INSIDE CONTAINER
29				CONTAINER SKIN, TOP
30	SPARROW MOTOR IN CONTAINER	DARK GRAY	0.8	CONTAINER SKIN, TOP
31				MOTOR GRAIN, CENTER
32				
33				
34				
35	SPARROW MOTOR IN CONTAINER	DARK GRAY	0.8	MOTOR SKIN, TOP
36	ALLUP SPARROW	WHITE	0.29	OUTBOARD, 34" FROM MOTOR HEA
37				CNTR OF MOOTOR STAR, 34" BACK
38				MOTOR SKIN TOP, 34" BACK
39				INBOARD, 34" BACK
40	36" THERMAL STANDARD	310 SS	0.6	CENTER OF SPHERE
41				TOP
42				EAST 22 DEG UP
43				BOTTOM 20 DEG WEST
44				WEST 22 DEG UP
45				
46				
47				
48				
49				
50				
51				
52				
53				
54				
55				
56				
57				
58				
59				
60				
61				
62				
63				
64				
65	18" THERMAL STANDARD	310 SS	0.6	TOP
66				EAST
67				BOTTOM
68				WEST
69				CENTER
70	SAND SURFACE		0.6	
71				

Note: Data channel is listed in first column; Column 2 is surface paint color or material; Column 3 is a best estimate of surface absorptivity

TABLE 4. (Contd.)

THERMOCOUPLE CHANNEL LOCATIONS FOR JUNE 12, 1974

	1	2	3	4
72				
73				
74	60" THERMAL STANDARD	310 SS	0.6	TOP
75				EAST
76				BOTTOM
77				WEST
78				CENTER
79				
80				
81	SHRIKE COMPUTER SECTION	WHITE	0.29	BOTTOM OUTSIDE SKIN
82		WHITE	0.29	EAST OUTSIDE SKIN
83		WHITE	0.29	TOP SKIN, CNTR MODULE
84		WHITE	0.29	WEST, CENTER MODULE
85		WHITE	0.29	BOTTOM, CNTR MODULE
86		WHITE	0.29	EAST, CNTR MODULE
87		WHITE	0.29	BTTM EAST MOD BOLT
88		WHITE	0.29	CN TR AIR 4TH MODULE
89		WHITE	0.29	AFT CNTR, ALUM SURF
90		WHITE	0.29	FWD CNTR, ALUM SURF
91		WHITE	0.29	EAST ANT FUSE SURF
92		WHITE	0.29	" " " CENTER
93		OLIVE DRAB	0.7	WEST ANT FUSE SURF
94		OLIVE DRAB	0.7	" " " CENTER
95	SHRIKE WARHEAD SECTION	WHITE	0.29	OUTSIDE SKIN, EAST UP 45 DEG
96		WHITE	0.29	" " WEST UP 45 DEG
97		WHITE	0.29	" " " DOWN 45 DEG
98		WHITE	0.29	" " " EAST DOWN 45 DEG
99		WHITE	0.29	1-7/8 FROM CNTR EAST UP 45 DEG
100		WHITE	0.29	" " " " WEST UP 45 DEG
101		WHITE	0.29	" " " " WEST DWN 45 DEG
102		WHITE	0.29	" " " " EAST DWN 45 DEG
103		WHITE	0.29	INSIDE CENTER
104		WHITE	0.29	INSIDE CENTER
105	SHRIKE CONTROL SECTION	WHITE	0.29	TOP SKIN, OUTSIDE
106		WHITE	0.29	CENTER, PLASTIC SURFACE
107		WHITE	0.29	CENTR, STEEL BULKHEAD
108		WHITE	0.29	TOP SURF, GAS GEN, STEEL
109	SHRIKE MOTOR SECTION	WHITE	0.29	TOP SKIN, SLIGHT WEST
110		WHITE	0.29	TOP SKIN, SLIGHT EAST
111		WHITE	0.29	OUTSIDE SKIN, EAST
112		WHITE	0.29	OUTSIDE SKIN, BOTTOM
113		WHITE	0.29	OUTSIDE SKIN, WEST
114		WHITE	0.29	1-7/8" FROM CNTR, WEST
115		WHITE	0.29	" " " " " TOP
116		WHITE	0.29	" " " " ", EAST
117		WHITE	0.29	" " " " ", BOTTOM
118		WHITE	0.29	INSIDE CENTER
119				
120				
121				
122				
123				
124				
125	ZUNI ON A-4 AIRCRAFT			SKIN UNDER CENTER
126				SKIN FORWARD
127				SKIN CENTER
128	SHRIKE ON A-4 AIRCRAFT			TOP CENTER
129				INSIDE
130	2.75" CLUSTER ON AD AIRCRAFT			INSIDE
131				INSIDE
132				CENTER SURFACE
133				CENTER UNDER SURFACE
134				MISSILE HEAD SURFACE
135	BOMBS ON AD AIRCRAFT			MK 81 BOMB INSIDE
136				MK 81 CENTER SURFACE
137	SIDEWINDER ON AD AIRCRAFT	WHITE	0.29	SIDEWINDER
138				SIDEWINDER
139				SIDEWINDER
140	500 LB BOMB ON AD AIRCRAFT			SKIN
141				INSIDE
142	100 LB BOMB ON AD AIRCRAFT			SKIN

Note: Data channel is listed in first column; Column 2 is surface paint color or material; Column 3 is a best estimate of surface absorptivity.

TABLE 4. (Contd.)

	1	2	3	4
143				INSIDE
144				
145	A4 AIRCRAFT CLOSED CANOPY			RAEPEC, GRAIN BOTTOM CNTR
146				" , GRAIN NEAR CENTER
147				" , GRAIN NEAR TOP
148				" , SKIN NEAR BOTTOM
149				" , SKIN CENTER
150				" , SKIN TOP
151				INST. CONSOLE WEST SIDE
152				INST. CONSOLE EAST SIDE
153				GAGES EAST SIDE
154				GAGES WEST SIDE
155				INST. TOP WEST SIDE
156				INST. BOTTOM
157	A4 AIRCRAFT OPEN CANOPY			SAME AS 145
158				SAME AS 146
159				SAME AS 147
160				SAME AS 148
161				SAME AS 149
162				SAME AS 150
163				SAME AS 151
164				SAME AS 152
165				SAME AS 153
166				SAME AS 154
167				SAME AS 155
168				SAME AS 156
169				
170				
171				
172				
173				
174				
175				
176				
177				
178				
179				
180				
181				
182				
183	BOMB-250 POUND	OLIVE DRAB	0.7	TOP SKIN WEST ROUND
184		OLIVE DRAB	0.7	CENTER, WEST ROUND
185				
186				
187				
188				
189				
190				
191				
192	SHRIKE GUIDANCE SECTION	WHITE	0.29	RADOME TOP SKIN
193		WHITE	0.29	RF TOP SKIN
194		WHITE	0.29	RF CENTER OF ANTEN.
195		WHITE	0.29	" " ON ALUM. ROD
196		WHITE	0.29	" " IN AIR
197		WHITE	0.29	AFT CNTR ANTEN SECT
198	SHRIKE COMPUTER SECTION	WHITE	0.29	TOP OUTSIDE SKIN
199		WHITE	0.29	WEST OUTSIDE SKIN
200				

Note: Data channel is listed in first column; Column 2 is surface paint color or material; Column 3 is a best estimate of surface absorptivity

Appendix A

THERMAL DATA, 12 JUNE 1974 TESTS

This appendix contains graphs showing temperature versus time of day for the Shrike missile, as measured during the 12 June 1974 tests (Figures A-1 through A-7). For purposes of comparison with measurements taken with the thermal standard device, a graph of thermal standard data taken on the same date (Figure A-8) is included. The data channels depicted in the graphs are identified in Table A-1. (The locations of all of the data channels and copper-constantan thermocouples (TCs) used in these tests were illustrated in Appendix A, Part 1, NWC TP 5923.) The missile was an all-up Shrike, model AGM-45A-3. Its nose was pointed north. It had an inert plastic, cast warhead. The motor was filled with dry desert sand. It had no fins.

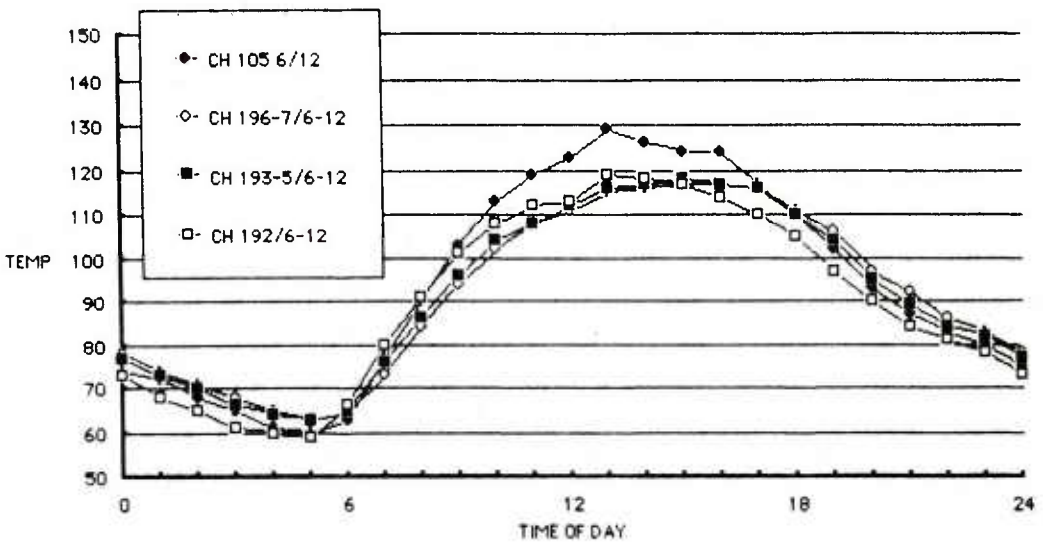

FIGURE A-1. All-Up Shrike, Channels 105, 196-197, 193-195, and 192.

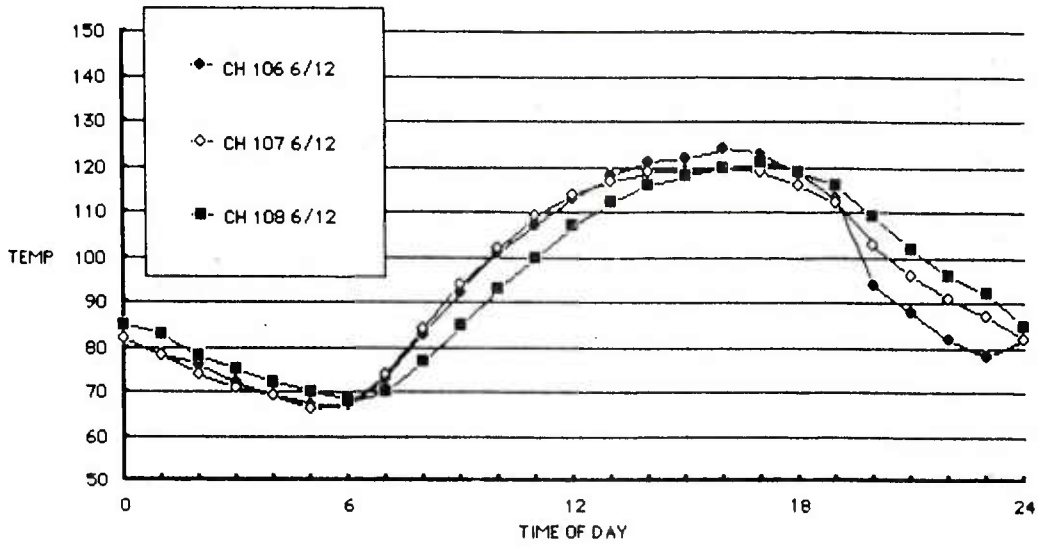

FIGURE A-2. All-Up Shrike, Channels 106, 107, and 108.

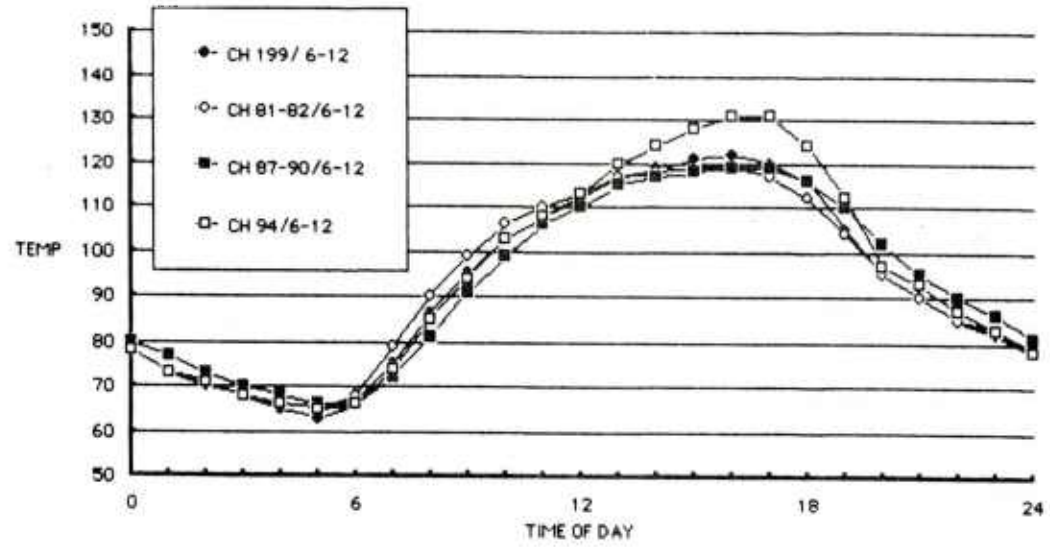

FIGURE A-3. All-Up Shrike, Channels 199, 81-82, 87-90, and 94.

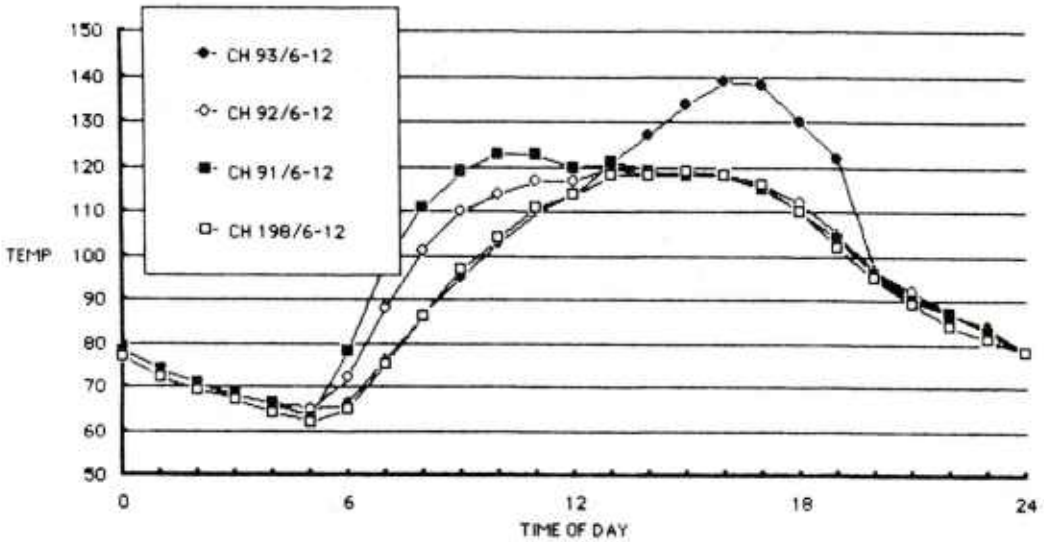

FIGURE A-4. All-Up Shrike, Channels 93, 92, 91, and 198.

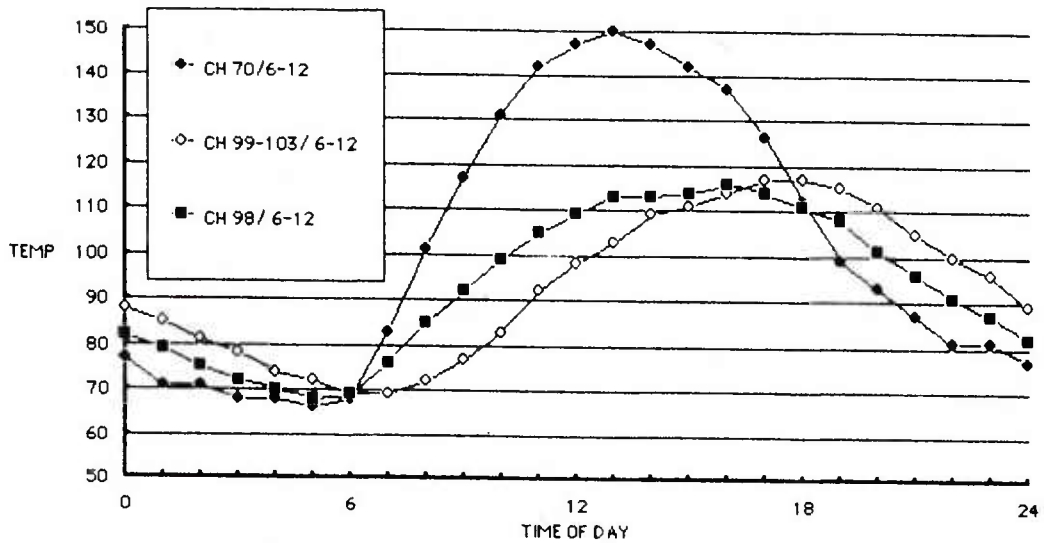

FIGURE A-5. All-Up Shrike, Channels 70, 99-103, and 98.

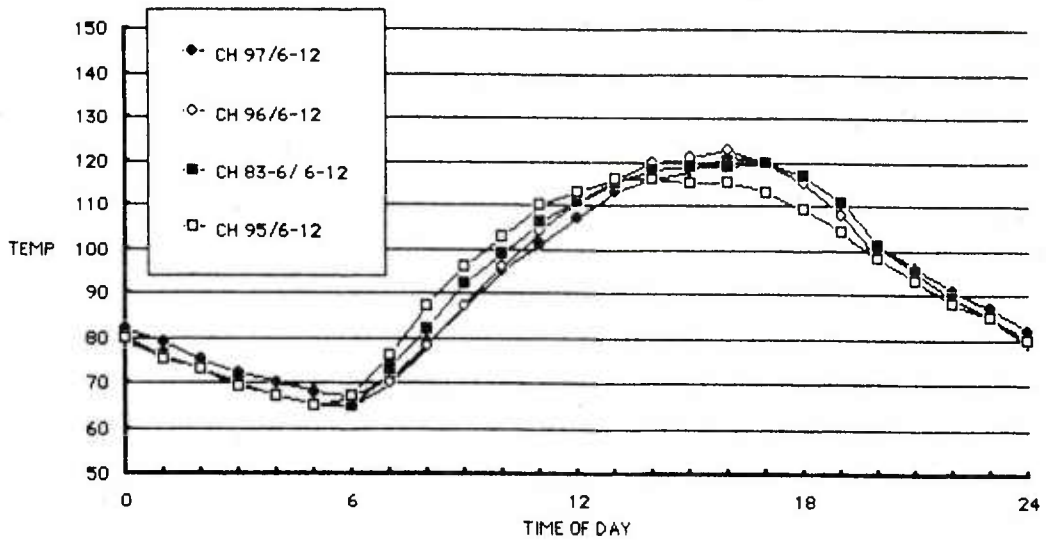

FIGURE A-6. All-Up Shrike, Channels 97, 96, 83-86, and 95.

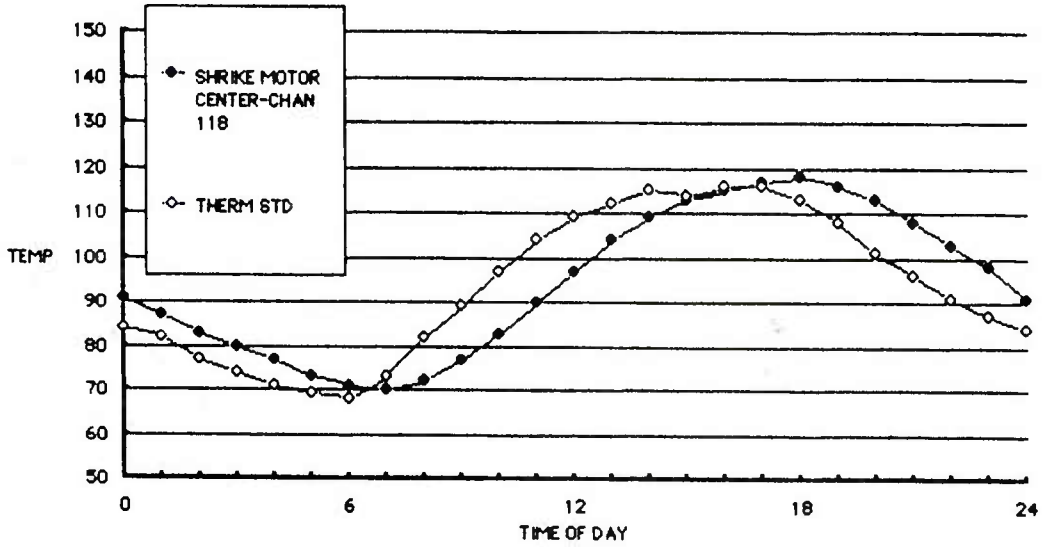

FIGURE A-7. Shrike Computer/Control Section, Channel 118.

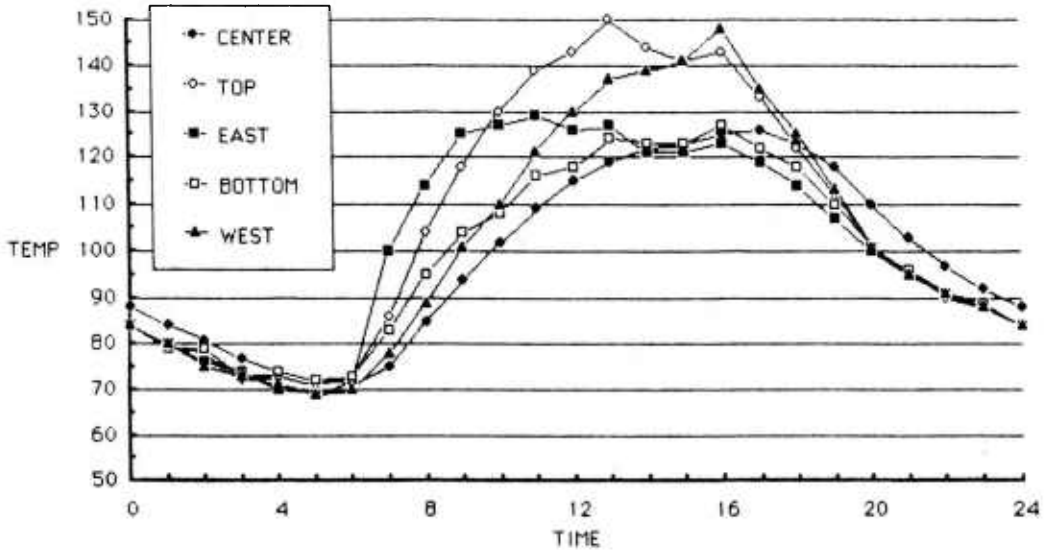

FIGURE A-8. Thermal Standard, 12 June 1974.

TABLE A-1. Data Channels, 12 June 1974 Tests.

Data channel	TC	Missile section	Location
65		Thermal standard	
66		Thermal standard	
67		Thermal standard	
68		Thermal standard	
69		Thermal standard	
70		Sand surface	
81	9	Guidance computer	Bottom, outside skin
82	10	Guidance computer	East side, outside skin
83	11	Guidance computer	Top skin, center module
84	12	Guidance computer	West skin, center module
85	13	Guidance computer	Bottom skin, center module

TABLE A-1. (Contd.)

Data channel	TC	Missile section	Location
86	14	Guidance computer	East skin, center module
87	15	Guidance computer	Bottom east, module bolt
88	16	Guidance computer	Center air, fourth module from aft
89	17	Guidance computer	Aft center on thin aluminum surface
90	18	Guidance computer	Forward surface, aluminum surface
91	19	Guidance computer	East antenna fuze, outside surface
92	20	Guidance computer	East antenna fuze, center
93	21	Guidance computer	West antenna fuze, outside surface
94	22	Guidance computer	West antenna fuze, center
95	23	Warhead	Outside skin, 10:30 o'clock east
96	24	Warhead	Outside skin, 1:30 o'clock west
97	25	Warhead	Outside skin, 4:30 o'clock west
98	26	Warhead	Outside skin, 7:30 o'clock east
99	27	Warhead	Inside, 1 7/8 inch from center, 10:30 east
100	28	Warhead	Inside, 1 7/8 inch from center, 1:30 west
101	29	Warhead	Inside, 1 7/8 inch from center, 4:30 west
102	30	Warhead	Inside, 1 7/8 inch from center, 7:30 east
103	31	Warhead	Inside, center
105	33	Control	Top outside skin, aluminum
106	34	Control	Center of section, nonmetal
107	35	Control	Bulkhead, steel
108	36	Control	Top outside surface of gas generator, steel
110	38	Motor	Top outside skin, slightly east
111	39	Motor	Outside skin, east side
112	30	Motor	Outside skin, bottom
113	41	Motor	Outside skin, west side
118	46	Motor	Inside center
192	1	Guidance	Top outside skin (nonmetal)
193	2	Guidance	Top outside skin, aluminum
194	3	Guidance	Center surface antenna, nonmetal
195		Guidance	Inside center antenna RF on aluminum rod
196	5	Guidance	Inside center antenna RF (air)
197	6	Guidance	Aft center RF antenna on aluminum surface
198	7	Guidance computer	Top outside skin
199	8	Guidance computer	West side, outside skin

Appendix B

THERMAL DATA, 28 JUNE 1974 TESTS

This appendix contains graphs showing temperature versus time of day for the Shrike missile in a container, as measured during the 28 June 1974 tests (Figures B-1 through B-9). The locations of the data channels depicted in the graphs have already been identified. (The locations of all of the data channels and copper-constantan thermocouples (TCs) used in these tests were illustrated in Appendix B, Part 1, NWC TP 5923.) The missile was an all-up Shrike, model AGM-45A-3, in a single-store container, Mk 399. The nose was pointed north in the container. The container was freshly painted a light navy gray, and it was made of 16-gage steel.

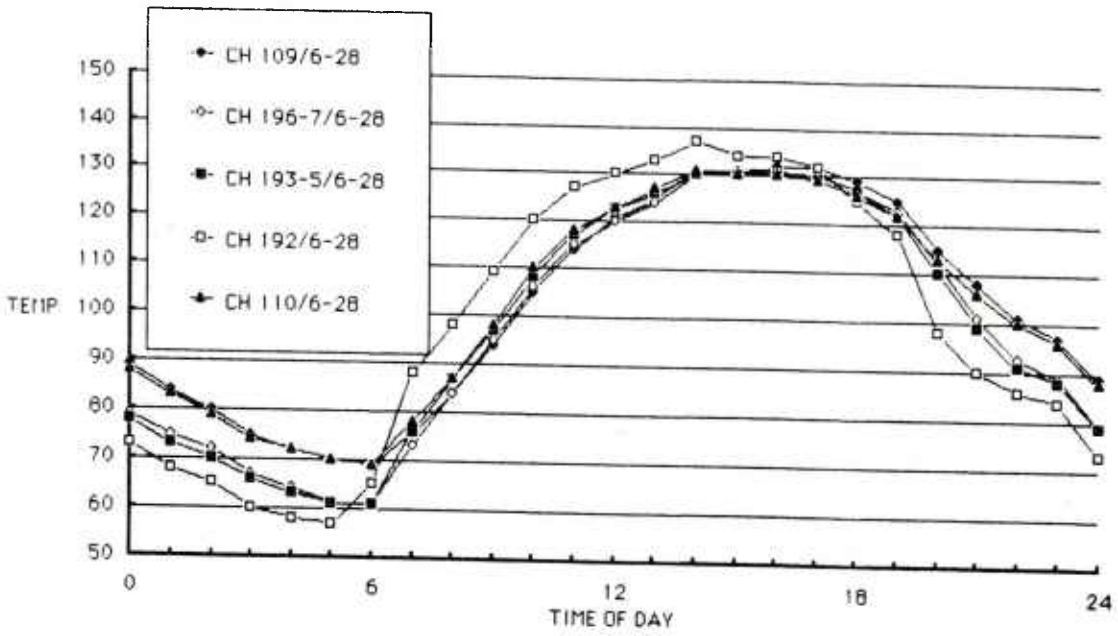

FIGURE B-1. Shrike in Single-Store Container, Channels 109, 196-197, 193-195, 192, and 110.

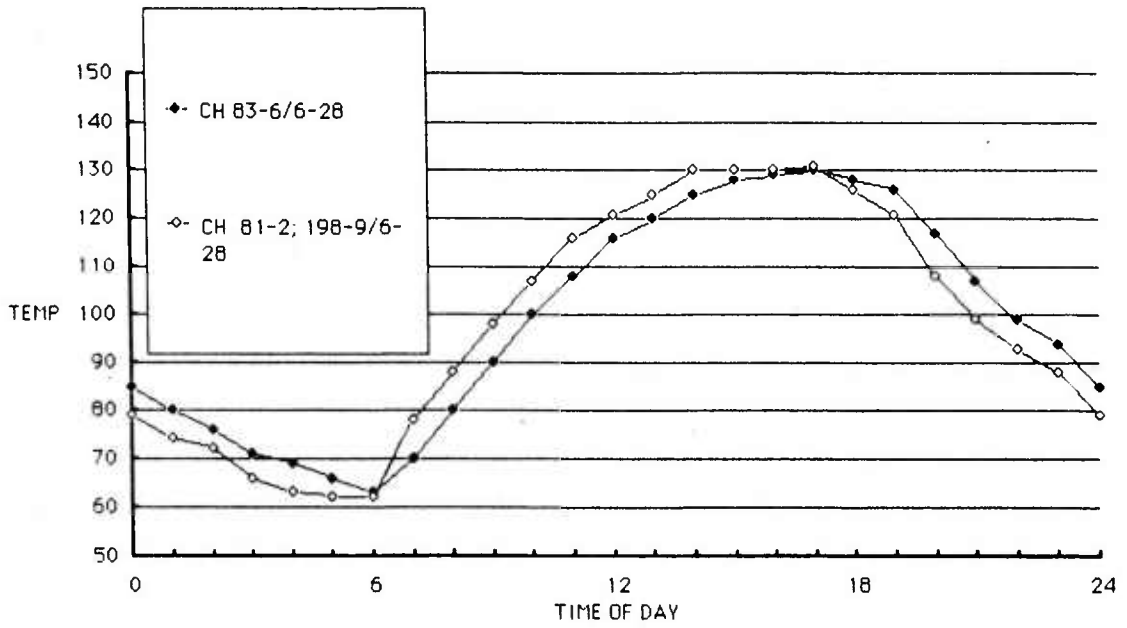

FIGURE B-2. Shrike in Single-Store Container, Channels 83-86 and 81-82.

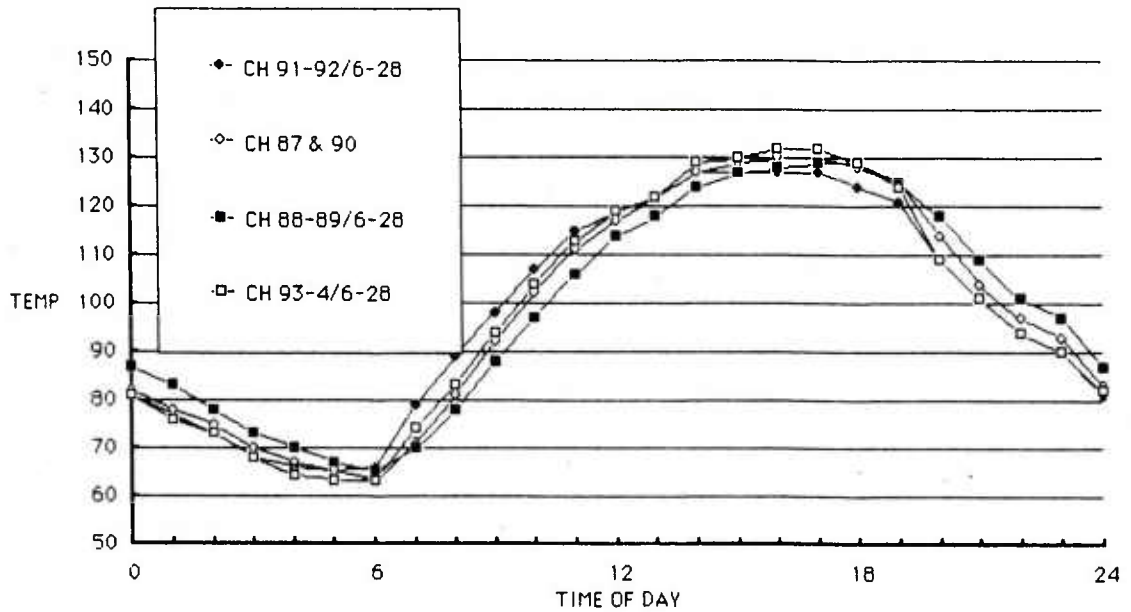

FIGURE B-3. Shrike in Single-Store Container, Channels 91-92, 87 and 90, 88-89, and 93-94.

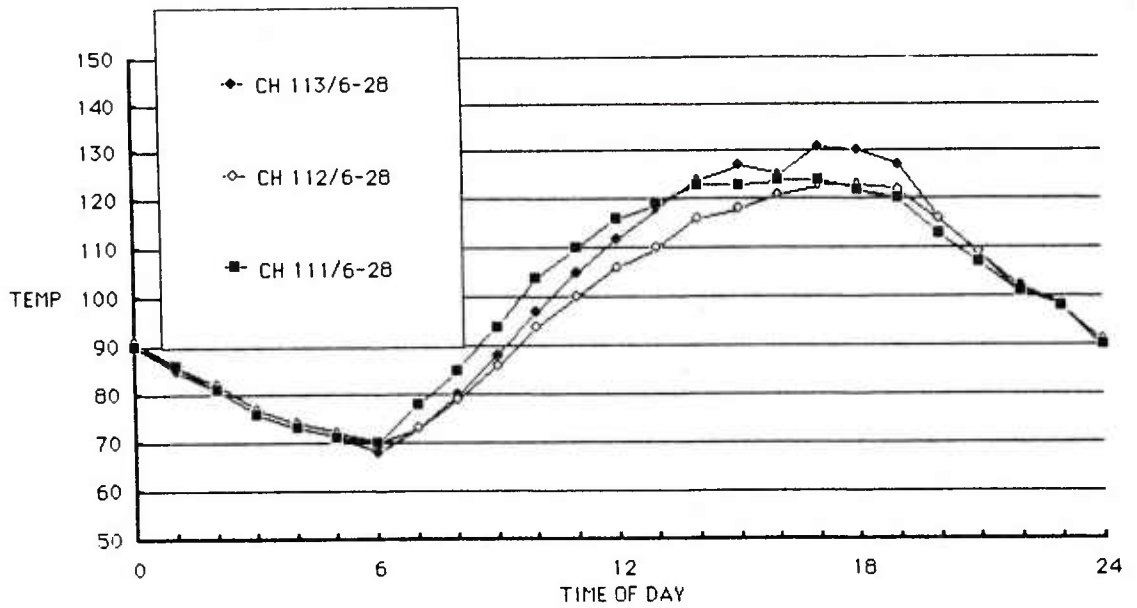

FIGURE B-4. Shrike in Single-Store Container, Channels 113, 112, and 111.

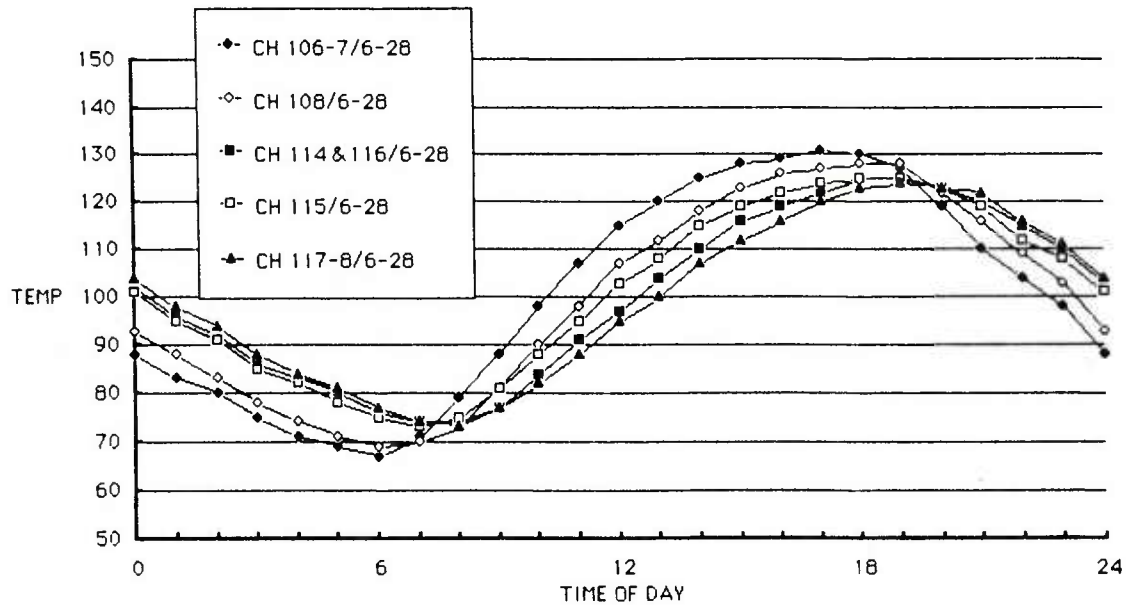

FIGURE B-5. Shrike in Single-Store Container, Channels 106 and 107, 108, 114 and 116, 115, and 117-118.

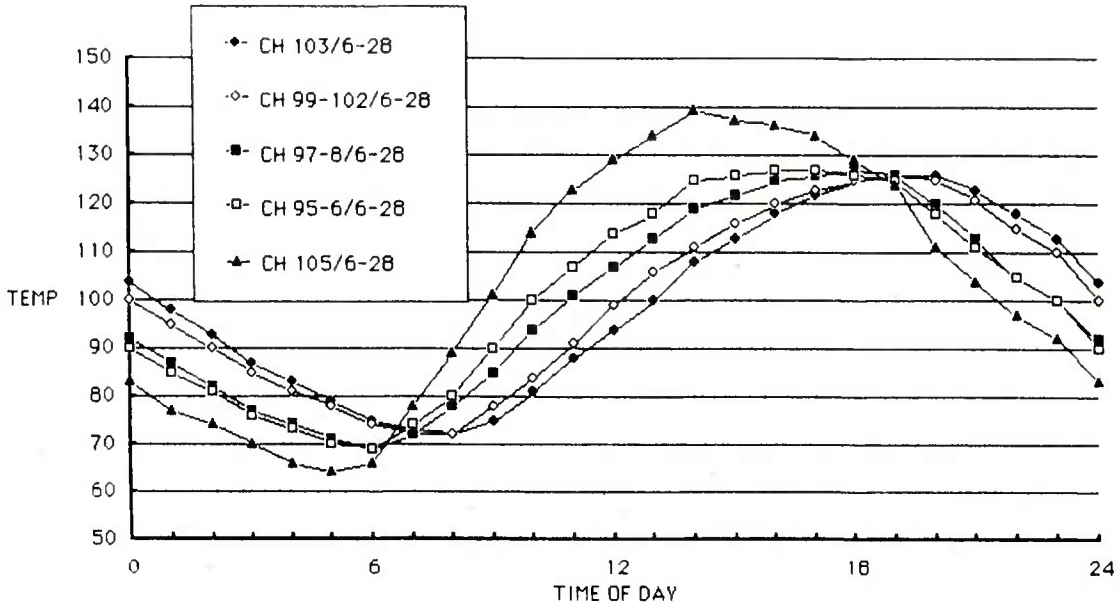

FIGURE B-6. Shrike in Single-Store Container, Channels 103, 99-102, 97-98, 95-96, and 105.

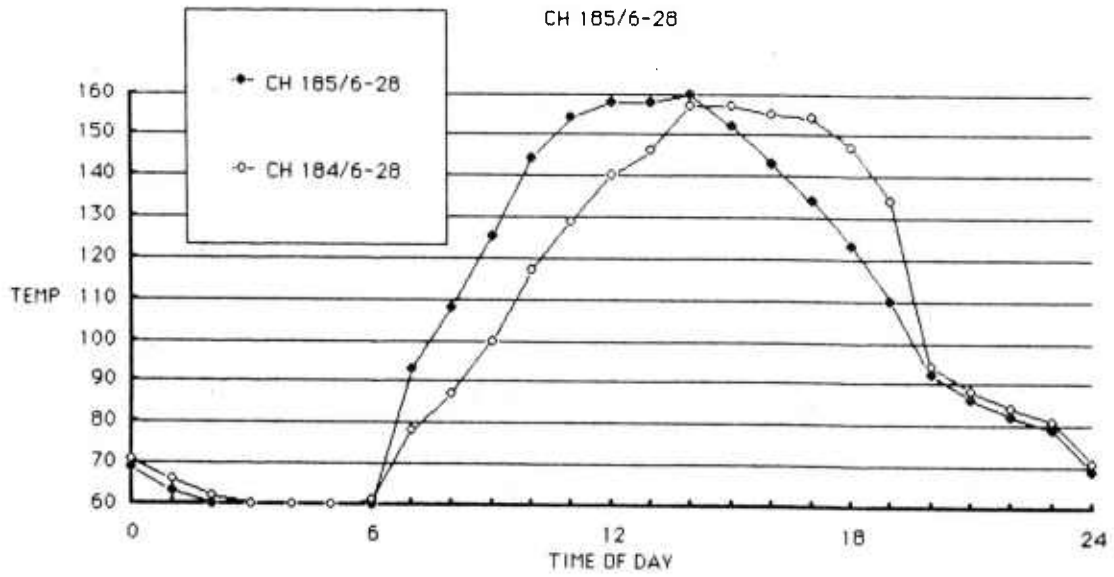

FIGURE B-7. Shrike in Single-Store Container, Channels 185 and 184.

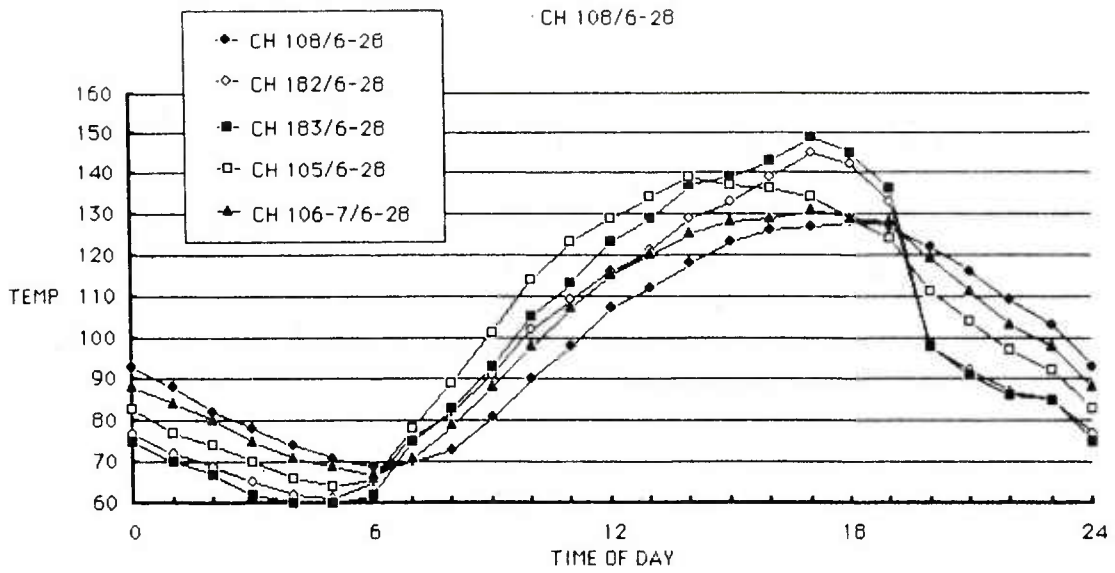

FIGURE B-8. Shrike in Single-Store Container; Channels 108, 182, 183, 105, and 106 and 107.

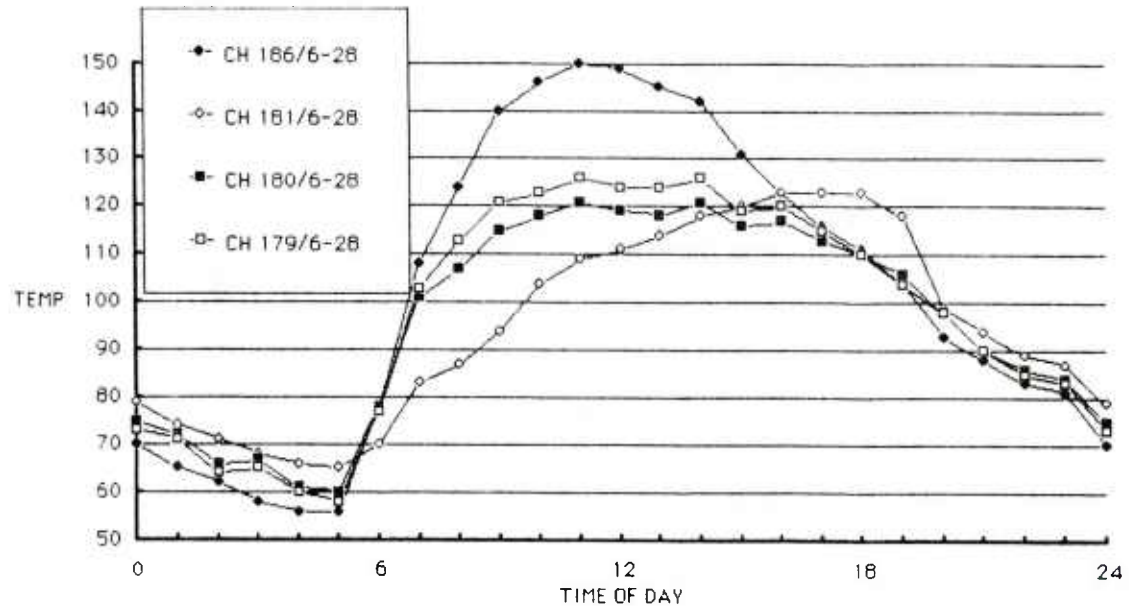

FIGURE B-9. Shrike in Single-Store Container, Channels 186, 181, 180, and 179.

Appendix C

THERMAL DATA, 29 AUGUST 1974 TESTS

This appendix contains graphs showing temperature versus time of day for the Sidewinder missile, as measured during the 29 August 1974 tests (Figures C-1 through C-7). Figures C-8 and C-9 show data taken with the thermal standard device on the same day for purposes of comparison. The data channels depicted in the graphs are identified in Table C-1. (The locations of all of the data channels and copper-constantan thermocouples (TCs) used in these tests were illustrated in Appendix C, Part 1, NWC TP 5923.) The missile was an all-up Sidewinder AIM-9H-2, complete with fins. The nose was pointed north. It was freshly painted epoxy white or, in some cases, olive (identified in the figure captions.)

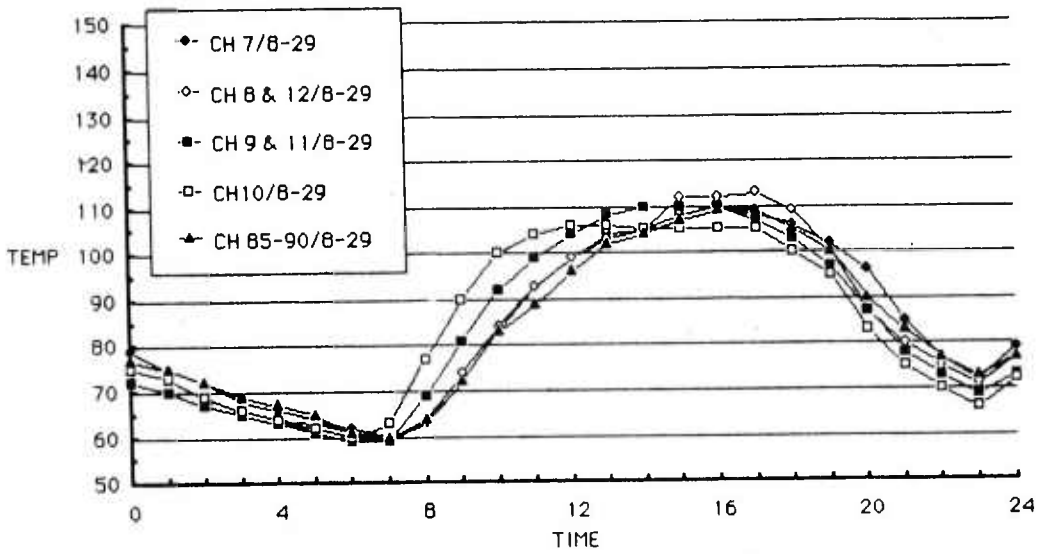

FIGURE C-1. All-up Sidewinder, Channels 7, 8, and 12; 9 and 11; 10, and 85-90.

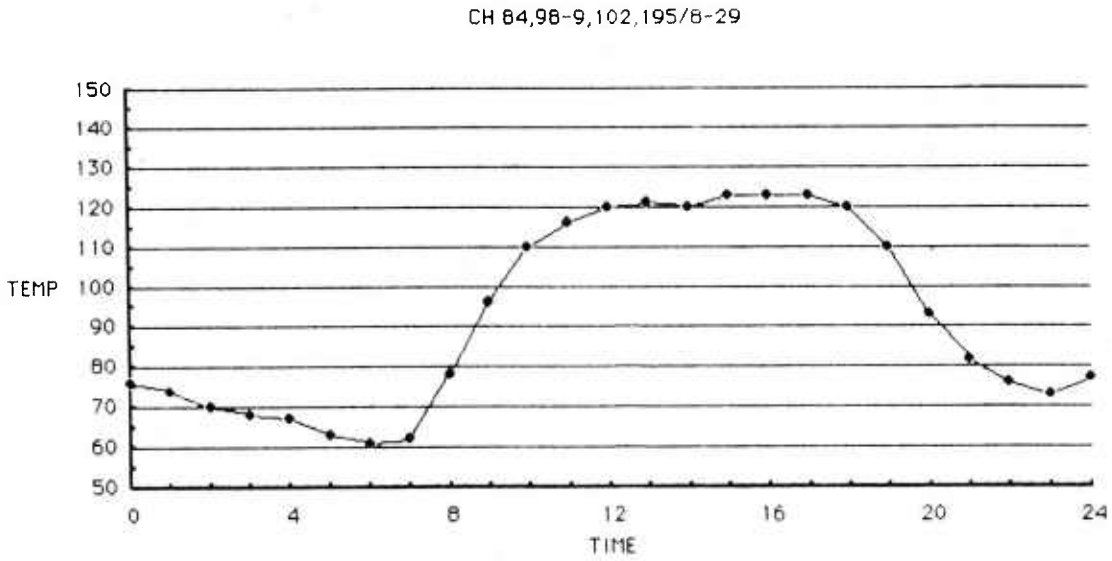

FIGURE C-2. Sidewinder Control Section, Channels 84, 98-99, 102, and 195.

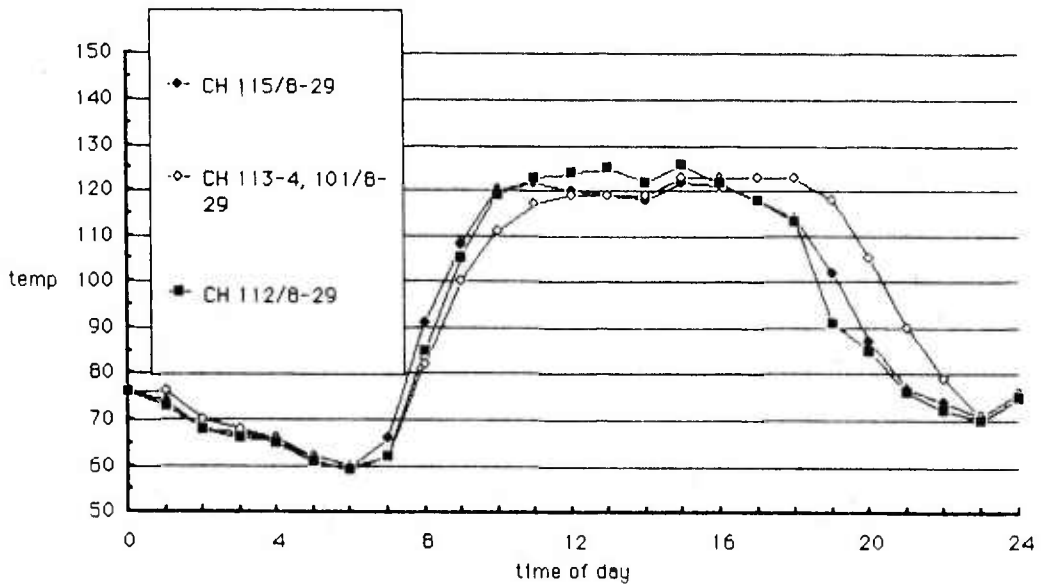

FIGURE C-3. Sidewinder Control Section (Olive), Channels 115, 113-114, and 112.

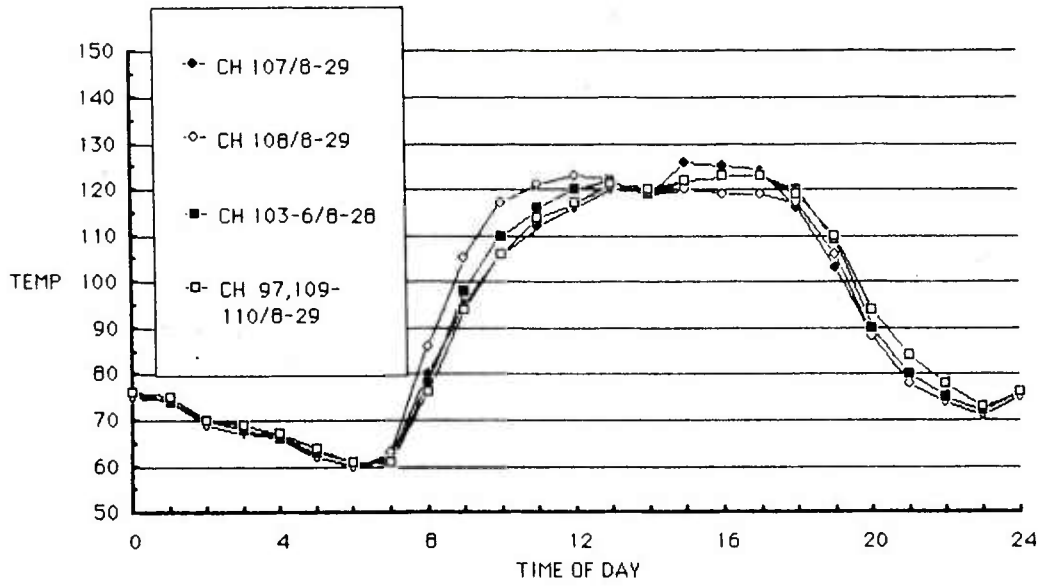

FIGURE C-4. Sidewinder Control Section (Olive), Channels 107, 108, 103-106, and 97 plus 109-110.

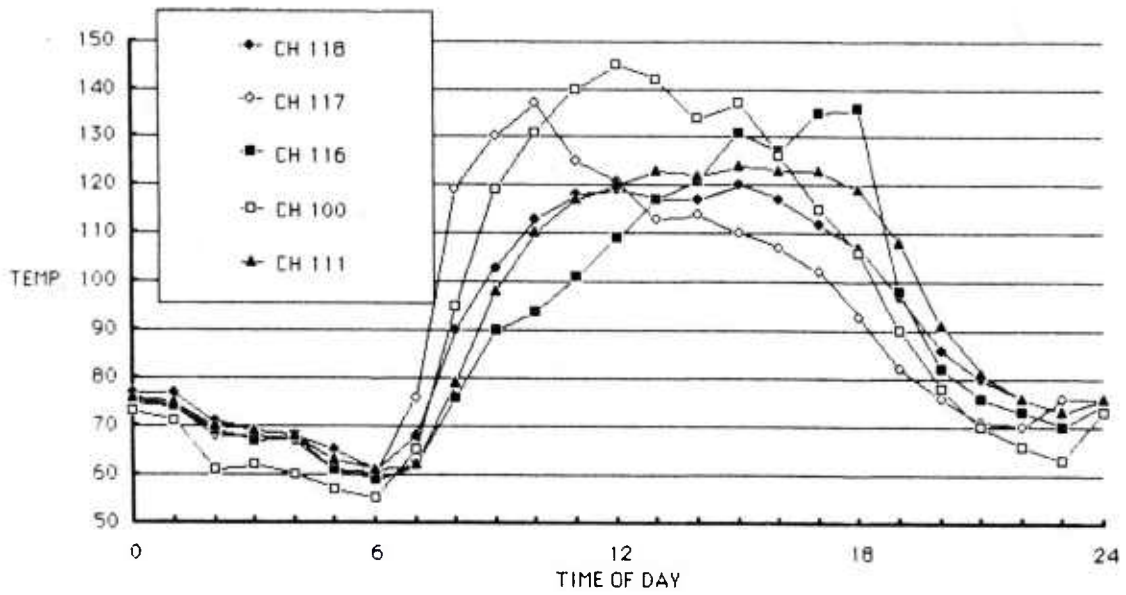

FIGURE C-5. All-Up Sidewinder, Channels 118, 117, 116, 100, and 111.

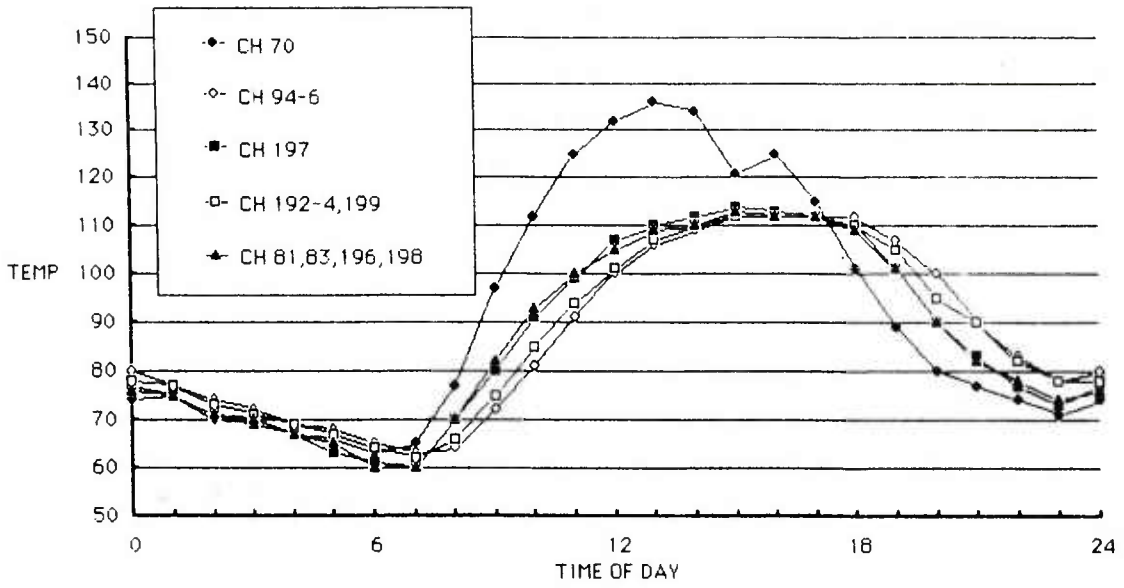

FIGURE C-6. All-Up Sidewinder, Channels 70, 94-96, 197, 192-194, and 81, 83, and 86.

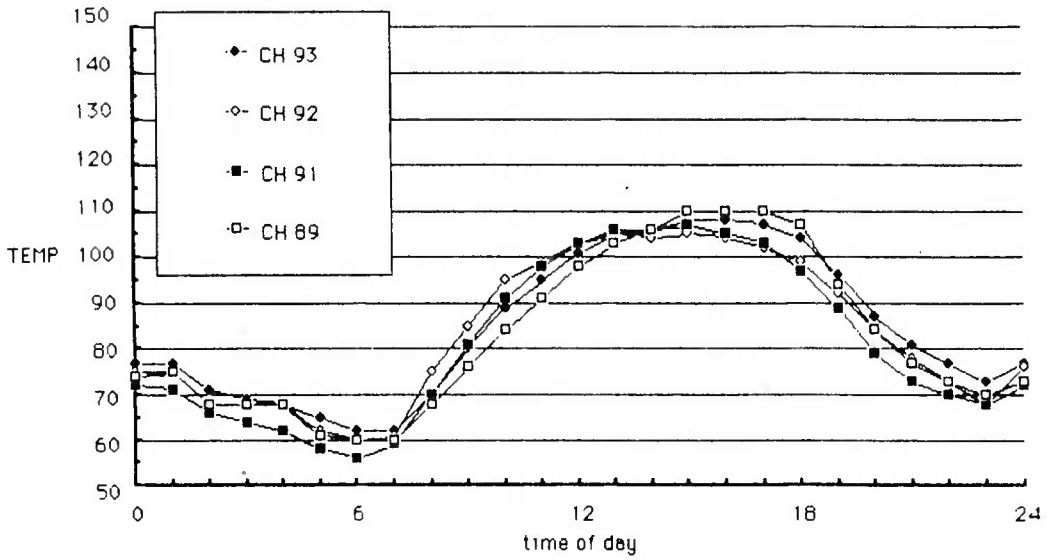

FIGURE C-7. Sidewinder Motor, Channels 93, 92, 91, and 89.

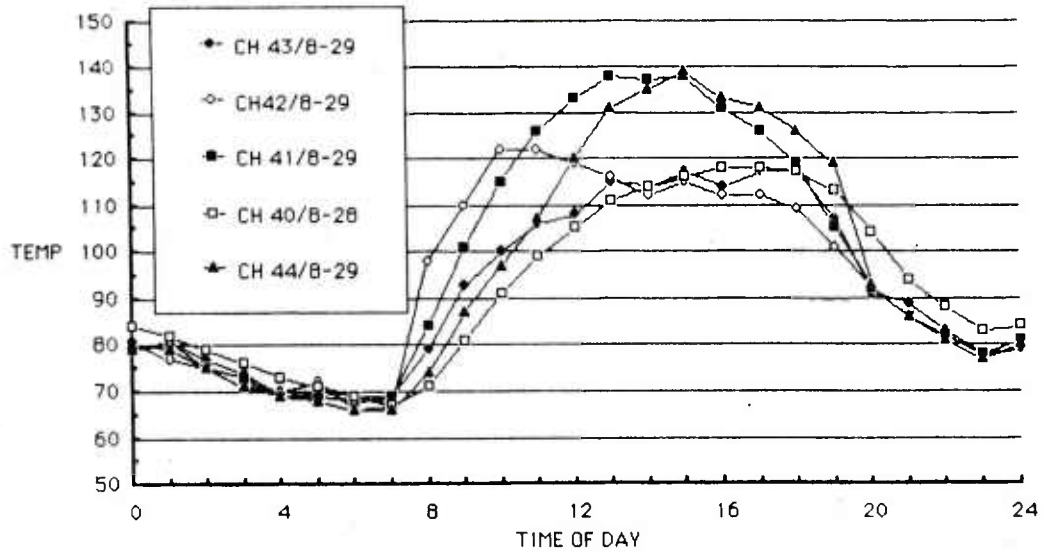

FIGURE C-8. Thermal Standard (36 inch) Data for 29 August 1974; Channels 43, 42, 41, 40, and 44.

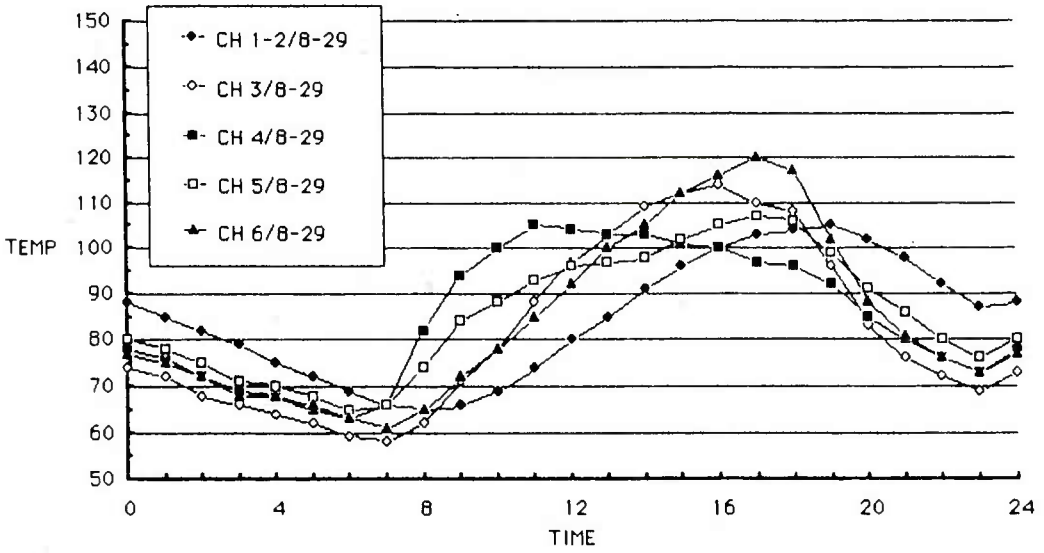

FIGURE C-9. Thermal Standard for 29 August 1974; Channels 1, 3, 4, 6, and 6.

TABLE C-1. Data Channels, 29 August 1974 Tests.

Data channel	TC	Missile section	Location
1		Thermal standard	
2		Thermal standard	
3		Thermal standard	
4		Thermal standard	
5		Thermal standard	
6		Thermal standard	
7		All-up Sidewinder	
8		All-up Sidewinder	
9		All-up Sidewinder	
10		All-up Sidewinder	
11		All-up Sidewinder	
12		All-up Sidewinder	
40		Thermal standard	
41		Thermal standard	
42		Thermal standard	
43		Thermal standard	
44		Thermal standard	
70		Sand	
81	33	Warhead	Top outside surface, case
83	35	Warhead	East outside surface, case
84	5	Control	West side control module
85	40	Motor	Inside motor, 1 1/4 inches from bottom
86	41	Motor	Center
87	42	Motor	Inside motor, 1 1/4 inches from top
88	43	Motor	Inside motor, 1 1/4 inches from east side
89	48	Motor	West outside surface
90	44	Motor	Inside motor, 1 1/4 inches from west side
91	45	Motor	Top surface
92	46	Motor	East outside surface
93	47	Motor	Bottom outside surface
94	37	Warhead	Center of tube in air
95	38	Warhead	East inside surface of grain
96	39	Warhead	West inside surface of grain
97	1	Control	Aluminum surface center aft of seeker section
98	2	Control	Center of control molules
99	3	Control	East side control modules

TABLE C-1. (Contd.)

Data channel	TC	Missile section	Location
100	23	Target detecting device	Top outside surface, nonmetal
102	6	Control	Bottom control modules
103	10	Control	Bottom actuator
104	8	Control	Top actuator
105	9	Control	West actuator
106	7	Control	Side of east actuator
107	12	Control	West side actuator arm at 1:00
108	11	Control	East side actuator arm at 10:00
109	13	Control	Center
110	14	Control	Center surface gas generator
111	15	Control	Under nut
112	16	Control	Top outside surface
113	17	Control	West outside surface
114	18	Control	Bottom outside surface
115	19	Control	East outside surface
116	20	Target detecting device	West outside surface (nonmetal)
117	21	Target detecting device	East Outside surface (nonmetal)
118	22	Target detecting device	Bottom outside surface (nonmetal)
192	25	Warhead	Top surface of grain
193	26	Warhead	West surface of grain
194	27	Warhead	East surface of grain
195	4	Control	Top control colule
196	30	Warhead	Top inside surface of case

Appendix D

THERMAL DATA, 11 SEPTEMBER 1974 TESTS

This appendix contains graphs showing temperature versus time of day for the Sidewinder and Shrike missiles in multistore containers, as measured during the 11 September 1974 tests (Figures D-1 through D-6). Thermal standard data for the same date are given in Figures D-7 and D-8. The data channels depicted in the graphs are identified in Table D-1.

The Sidewinder AIM-9H-2 missile was located in the west side storage location of a multistore container, and three other missiles filled the other storage locations in the container to simulate a full container. The missile was pointed north. The multistore container is all-white acrylic material. Data of Figures D-1 through D-3 are of this missile.

The Shrike AGM-45A-3, nose pointed north, was located on the west side of the multistore container. Two other Shrike missiles were placed east of the measured missile in order to simulate a true multistore condition. The multistore container was made of white acrylic on top and of gray aluminum on the bottom. Data of Figures D-4 through D-6 are of this missile.

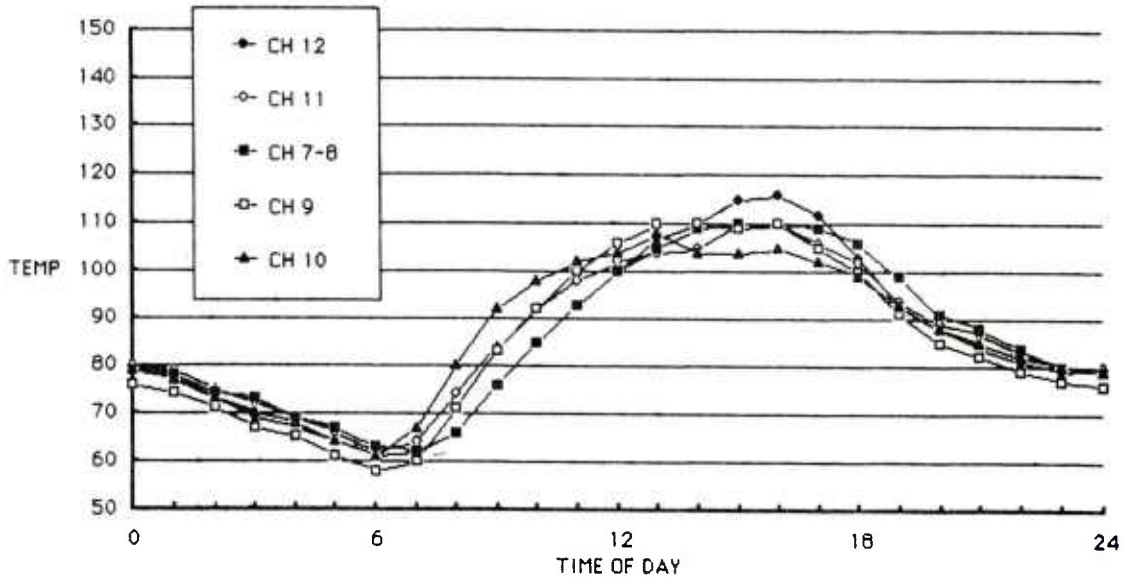

FIGURE D-1. Sidewinder in Container; Channels 12, 11, 7-8, 9, and 10.

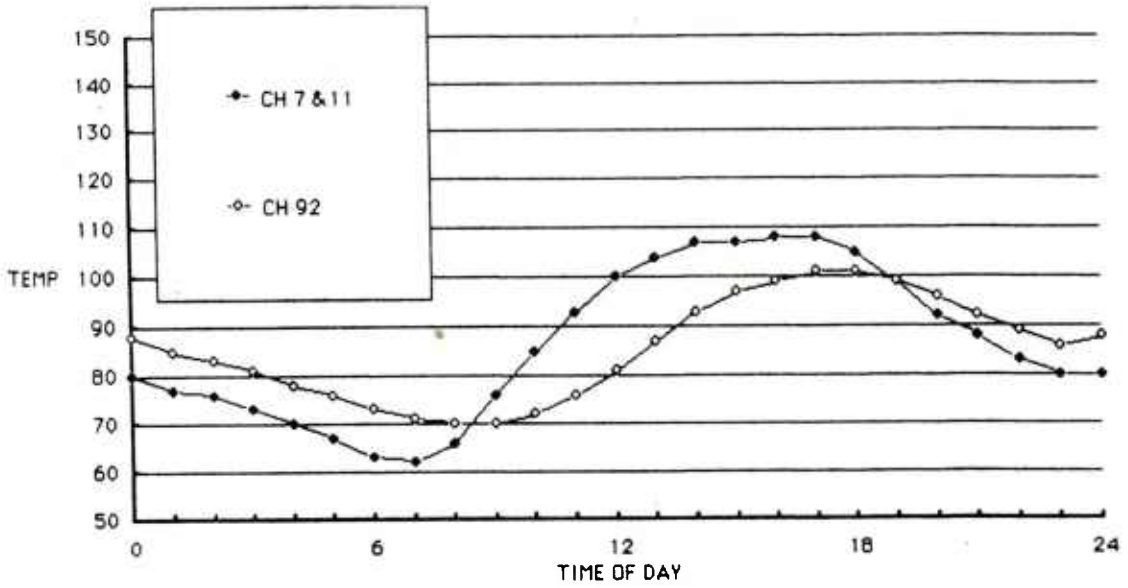

FIGURE D-2. Sidewinder in Containers; Channels 7 and 11 and 92.

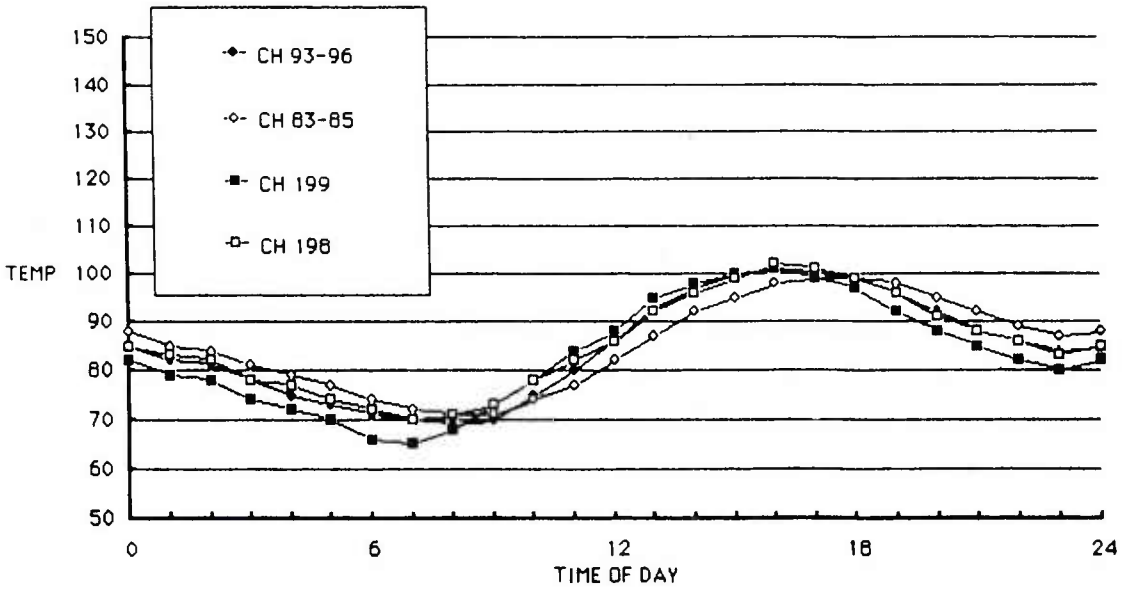

FIGURE D-3. Sidewinder in Container; Channels 93-96, 92, 83-85, 199, and 198.

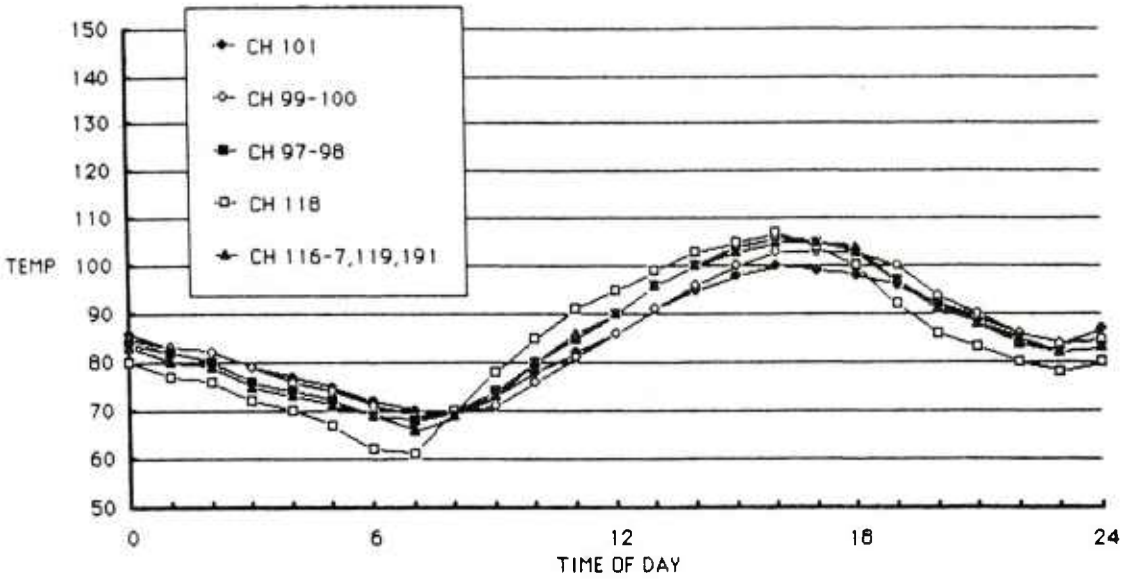

FIGURE D-4. Shrike in Container; Channels 101, 99-100, 97-98, 118, and 116-117, 119, and 191.

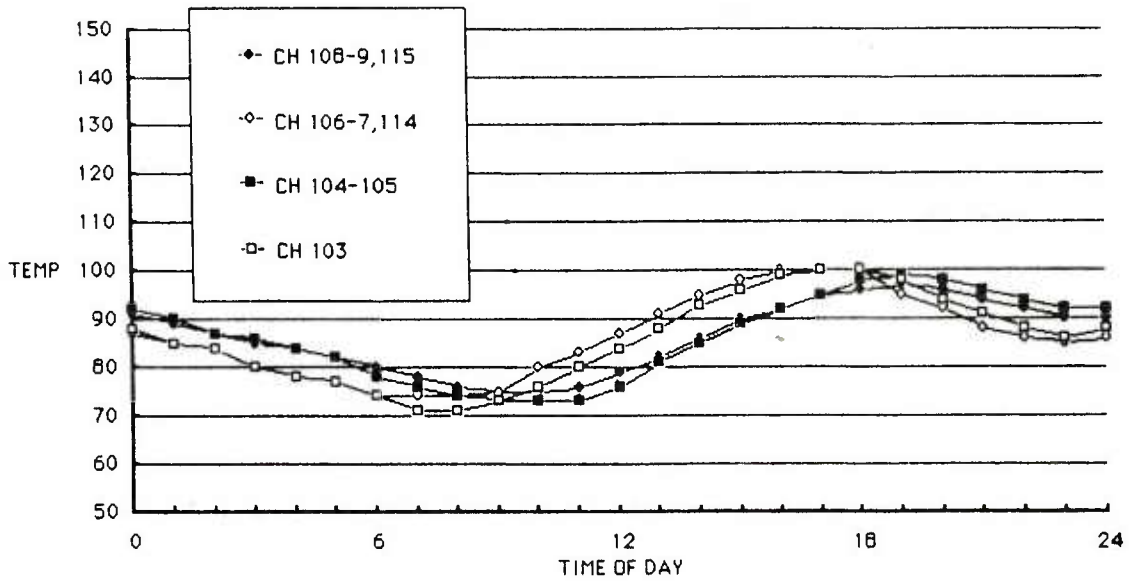

FIGURE D-5. Shrike in Container; Channels 108-109 and 115, 106-107 and 114, 104-105, and 103.

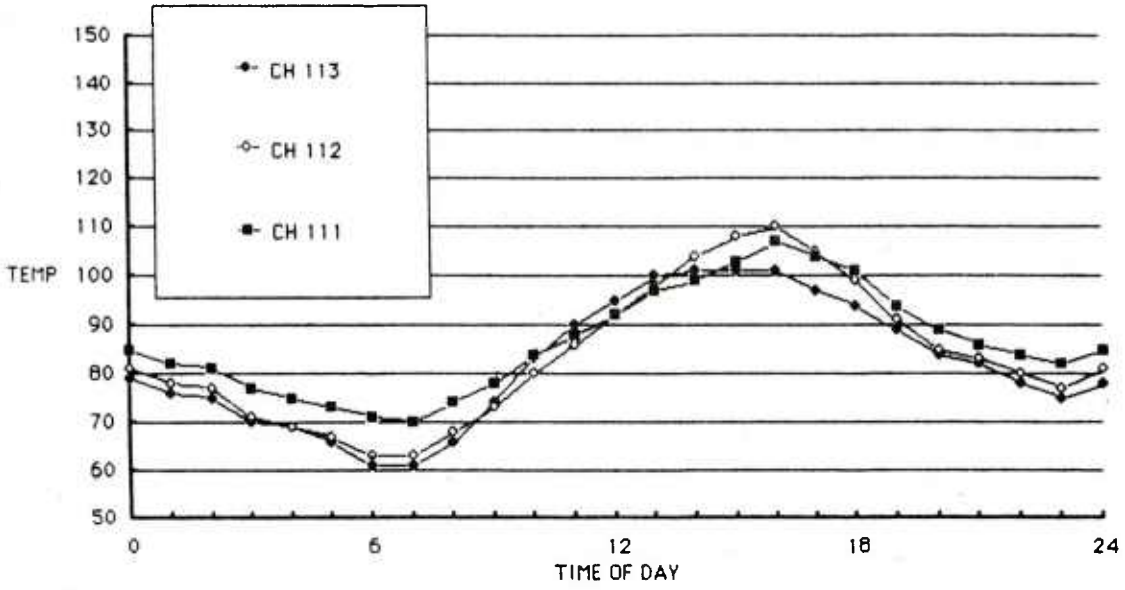

FIGURE D-6. Shrike in Container; Channels 113, 112, and 111

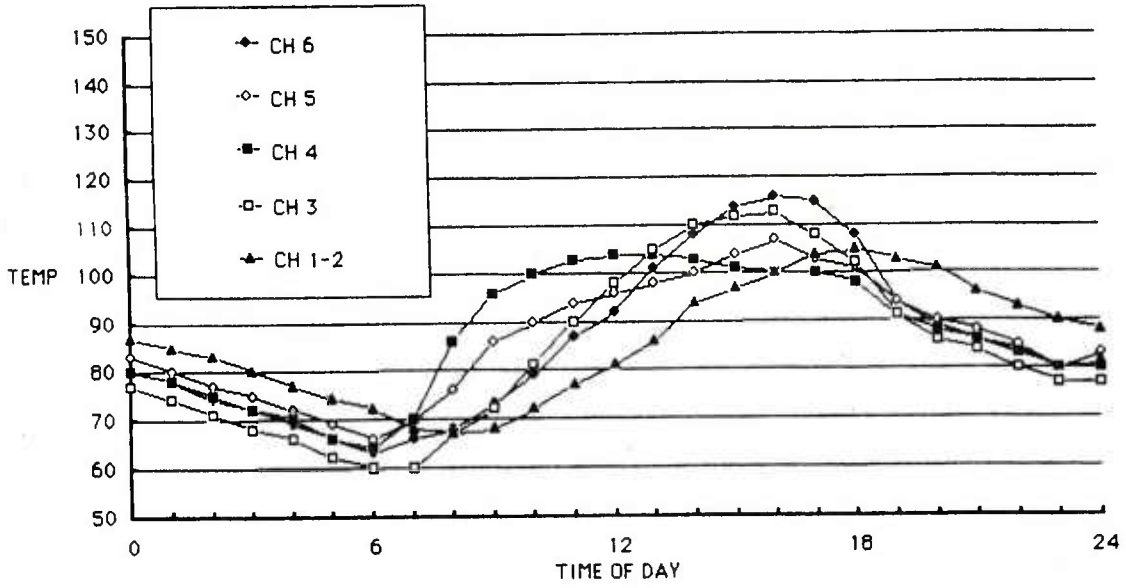

FIGURE D-7. Thermal Standard, Channels 6, 5, 4, 3, and 1-2.

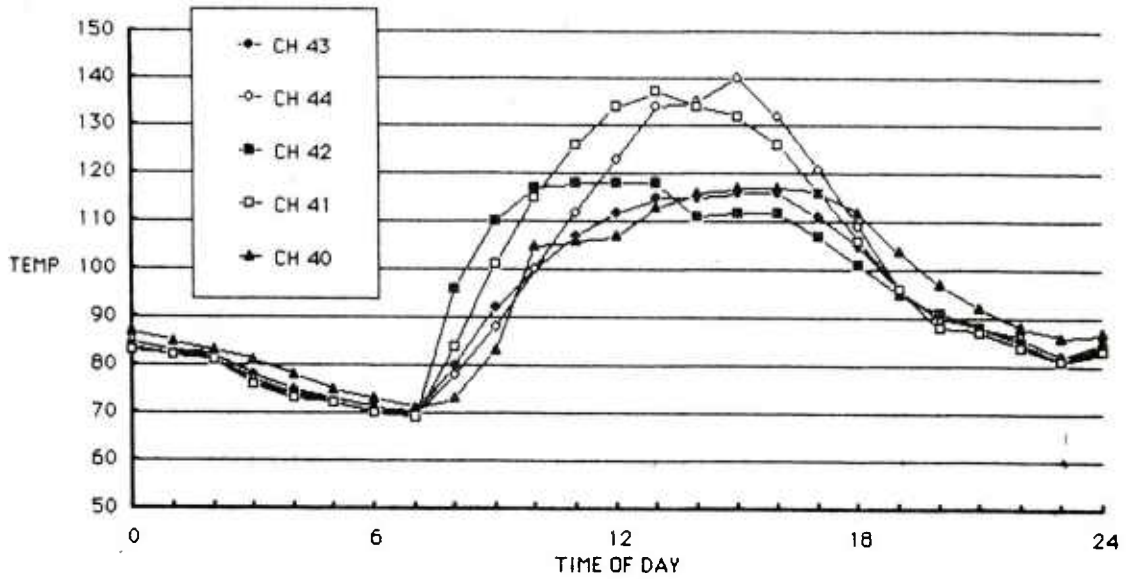

FIGURE D-8. Thermal Standard (60-inch), Channels 43, 44, 42, 41, and 40.

TABLE D-1. Data Channels, 11 September 1974 Tests of Shrike.

Data channel	TC	Missile section	Location
1		Thermal standard	
2		Thermal standard	
3		Thermal standard	
4		Thermal standard	
5		Thermal standard	
6		Thermal standard	
7		Sidewinder	
8		Sidewinder	
9		Sidewinder	
10		Sidewinder	
11		Sidewinder	
12		Sidewinder	

TABLE D-1. (Contd.)

Data channel	TC	Missile section	Location
40		Thermal standard	
41		Thermal standard	
42		Thermal standard	
43		Thermal standard	
44		Thermal standard	
70		Sand surface	
83	30	Sidewinder warhead	Top inside surface of case
84	31 32	Sidewinder warhead	West outside surface, grain Bottom surface, grain
85	33 34 35 36	Sidewinder warhead	Top outside surface, grain East inside surface, grain East outside surface, grain Bottom inside surface, grain
92	41 42 43	Sidewinder motor	Center Inside motor, 1 1/4 inches from top Inside motor, 1 1/4 inches from east side
93	47	Sidewinder motor	Bottom outside surface
94	45	Sidewinder motor	Top surface
95	46	Sidewinder motor	East outside surface
96	48 44	Sidewinder motor	Eest outside surface Inside motor, 1 1/4 inches fromwest side
97	7 8 9	Shrike guidance computer	Outside skin: top west side bottom)
98	21 22	Shrike guidance computer	West antenna fuze: outside surface center
99	18 19 20	Shrike guidance computer	Forward center, aluminum surface East antenna fuze, outside surface East antenna fuze, center
100	11 12 13 14 15 16 17	Shrike guidance computer	Center module skin: top west bottom east Bottom east module bolt Center air, fourth module from aft Aft center on aluminum
101	33	Shrike control	Top outside skin, aluminum

TABLE D-1. (Contd.)

Data channel	TC	Missile section	Location
103	24 25 26 27	Shrike warhead	Outside skin: 1:30 west Outside skin, 4:30 west Outside skin, 7:30 east Inside, 1 7/8 inches from center: 10:30 east
104	28 29 30 31	Shrike warhead	Inside, 1 7/8 inches from center: 1:30 west 4:30 west 7:30 west Inside center
105	32	Shrike warhead	Inside center
106	38 39	Shrike motor	Top outside skin, slightly east Outside skin, east side
107	41	Shrike motor	Outside skin, west side
108	43 44 45	Shrike motor	Inside, 1 7/8 inches fromcenter: top east bottom
109	46	Shrike motor	Inside center
111		Shrike container	Bottom
112		Shrike container	West side
113		Shrike container	Top
114	40	Shrike motor	Outside skin, bottom
115	42	Shrike motor	Inside, 1 7/8 inchs from center, west
116	4, 5	Strike guidance	Inside center antenna RF (aluminum rod, air)
117	3	Strike guidance	Center surface antenna (nonmetal)
118	1	Strike guidance	Top outside skin (nonmetal)
119	6	Strike guidance	Aft center RF antenna on aluminum surface
191	2	Strike guidance	Top outside skin, aluminum
198	22	Sidewinder TDD	Bottom outside surface (nonmetal)
199	23 20 21	Sidewinder TDD	Top outside surface (nonmetal) West outside surface (nometal) East outside surface (nonmetal)

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