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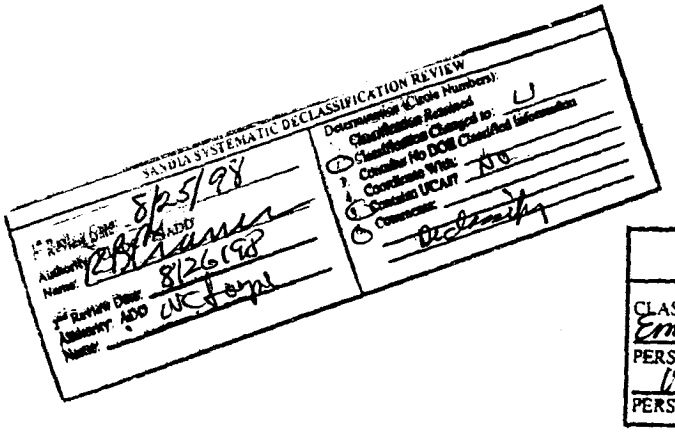
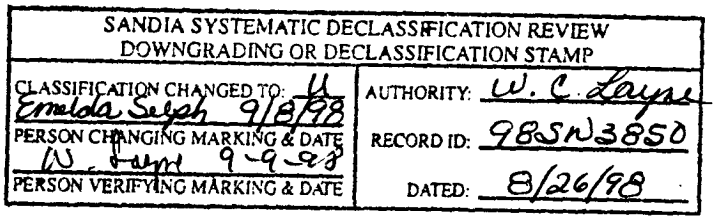
34 Cookoff Test, 3-2
Project No. ET-4498
Case No. 770.00
Completed 7-11-58

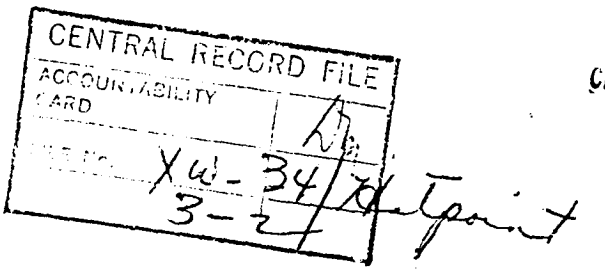




34 Weapon of Hotpoint
Cookoff Test

Summary of Results

Two cookoff tests using JP-4 for fuel, were performed in Coyote Canyon, Area Z. The first weapon exploded after 19.58 minutes while the second weapon separated with a more of an overpressure type of rupture after 33 minutes.



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Object of Test

The object of this test was to determine the effect of a simulated shipboard fire on the 34 weapon in the Hotpoint configuration. Division 1611 had the responsibility of instrumentation and interpretation of the instrumentation results. The consultants for this test were G. R. Norris, 1225 and R. M. Jorgensen, 1225.

Procedure and Results

The tests were performed in Area Z, Coyote Canyon and the instrumentation was setup in Building 9851 which is a concrete dugout. Building 9851 is shown in Figure 6. The weapon is shown prior to the test in Figure 7. The weapon was suspended on a cable between two poles and the instrumentation wires were brought out of the weapon in an insulated pipe. The object of the pipe was to permit pressure sealing of the weapon and to provide protection of the wires from the flames. The fuel pans for the test are also shown in Figure 7.

Figures 8 and 9 are pictures of the test site after the completion of the first test. The large metal squares shown are the remains of the fuel pans. The location of Building 9851 with respect to the test site is shown in Figure 9.

Both tests were performed in the morning in the hope of avoiding high winds. An Anemotherm Aneometer was used to monitor wind velocity. Both tests were radically affected by the wind and it is therefore recommended that fuel pans in the future tests have a larger fuel surface area and that the test be run as early in the morning as is possible. It is also recommended that the weapon be suspended and instrumentation connected the day before the test as was done on the second test of this series. It appeared that any wind in excess of 2 to 3 knots would have a definite effect on the results. A log of the first test is given in Table I to illustrate the wind velocities encountered.

The weapon was instrumented using 9 thermocouples and 5 monitor points. Results from the thermocouples are shown in Figure 1 for the first test and in Figure 3 for the second test.

The following points were monitored within the weapon:

(1) Fire pulse No. 1 (XT-2, #43), (2) Fire pulse No. 2 (XT-2, #60), (3) Low Voltage Battery No. 1 (XT-2, #36), (4) Low Voltage Battery No. 2 (XT-2, #35), and (5) High Voltage Battery.

The first 4 low voltage (28 V Max.) monitor points were recorded on Esterline-Angus Recording Voltmeters. There was no voltage output recorded during either of the tests.

Point No. 5 was monitored with the circuit shown in Figure 5. This circuit measured back resistance, forward resistance and voltage output of the MC-726 in an automatically switched sequence. Due to the length of cable involved between the circuit and the MC-726, the back resistance actually was a measurement of minimum resistance (i.e. the back resistance of the MC-726 was at least equal to the measured value). No high voltage was noted in either of the two tests. Plots of the back and forward resistance and the fuse block temperature are shown in Figures 2 and 4.

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Approved by: R. S. HOOPER - 1611-1

CTS:1611-1:ec

Enc: Table I
Figures 1 thru 9

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TABLE I

Log of Test No. 1

0630	2-3 KTS Wind Speed
0745	4-5 KTS
0805	3-3.5 KTS
0825	5-6 KTS
0850	5-6 KTS
0853	Fueling Started
0902	Gusts to 10 KTS Steady 6-7 KTS.
0905	4-5 KTS
0912	6-7 KTS
0920	5-6 KTS
0930	6-7 KTS
0940	$5\frac{1}{2}$-$6\frac{1}{2}$ KTS
0941	Fueling Completed
0943	Ignition System Started
1000	Ignition Completed
1000	Gusts to 14 KTS 9-10 KTS
1003	Fire
1005	10-11 KTS
1012	11-12 KTS
1016	10-11 KTS
1021	17-18 KTS
1023	Fire + 20 min.
1025	11-12 KTS
1028	Fire + 25 min.
1033	10-12 KTS Gust to 14
	Fire + 32 min. 45 sec.

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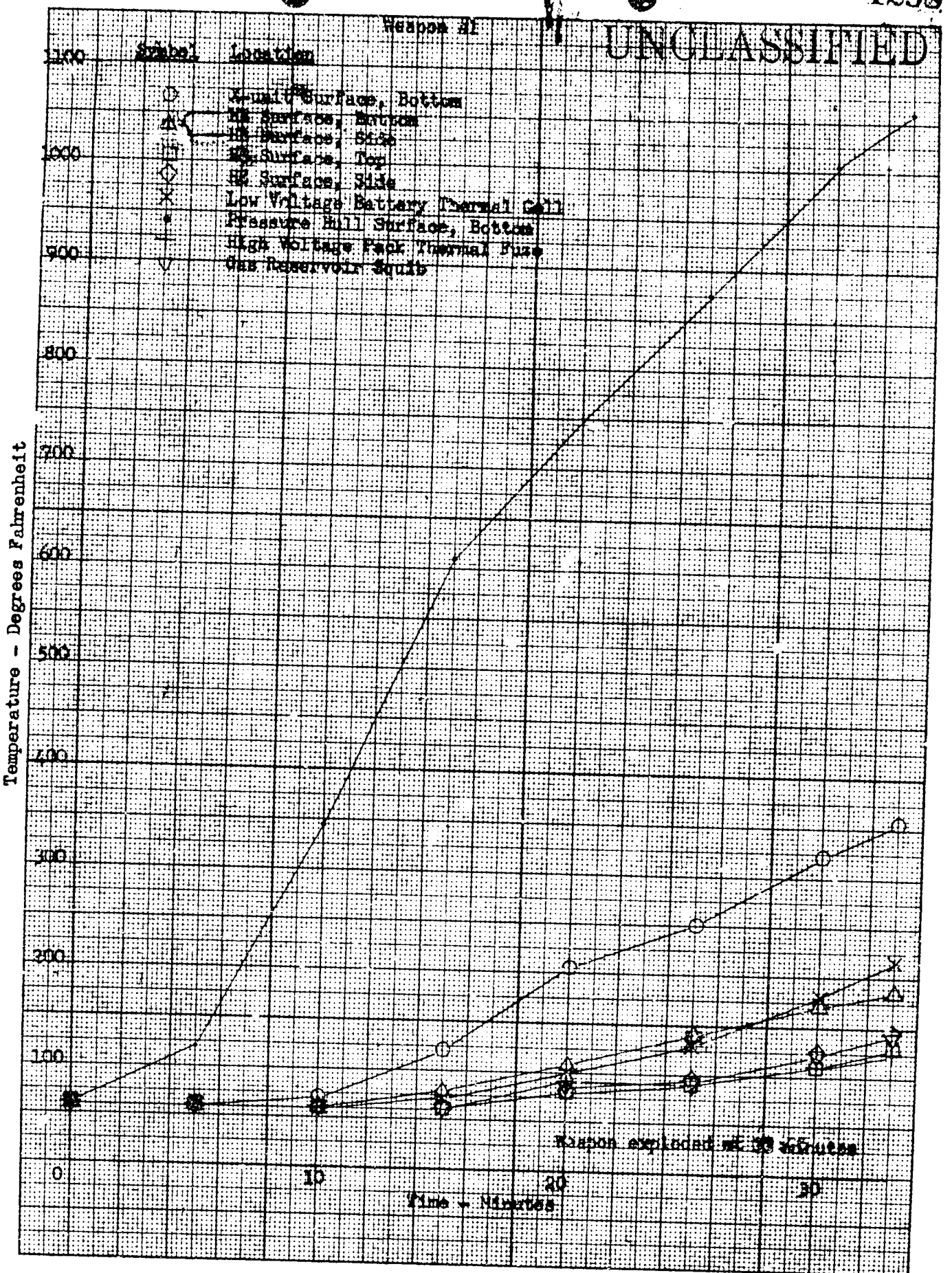
Figure 1. Temperatures vs Ti[redacted]



[redacted]

Figure 2. High Voltage Battery Pack Readings

[redacted] Weapon X

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Codes:

□ = Back Resistance in Ohms

X = Forward Resistance in Ohms

○ = High Voltage Pack Thermal Fuse Temperature in Degrees Fahrenheit

1 X 10^8

7 X 10^7

4 X 10^2

1 X 10^2

1 X 10^1

0 5 10 15 20 25 30

Time - Minutes

[redacted] Weapon exploded at 22 Minutes

ET - 4498

KEUFFEL & ESSER CO.
Semi-Logarithmic, 3 Cycles X 1v to the inch.
5th lines accented.

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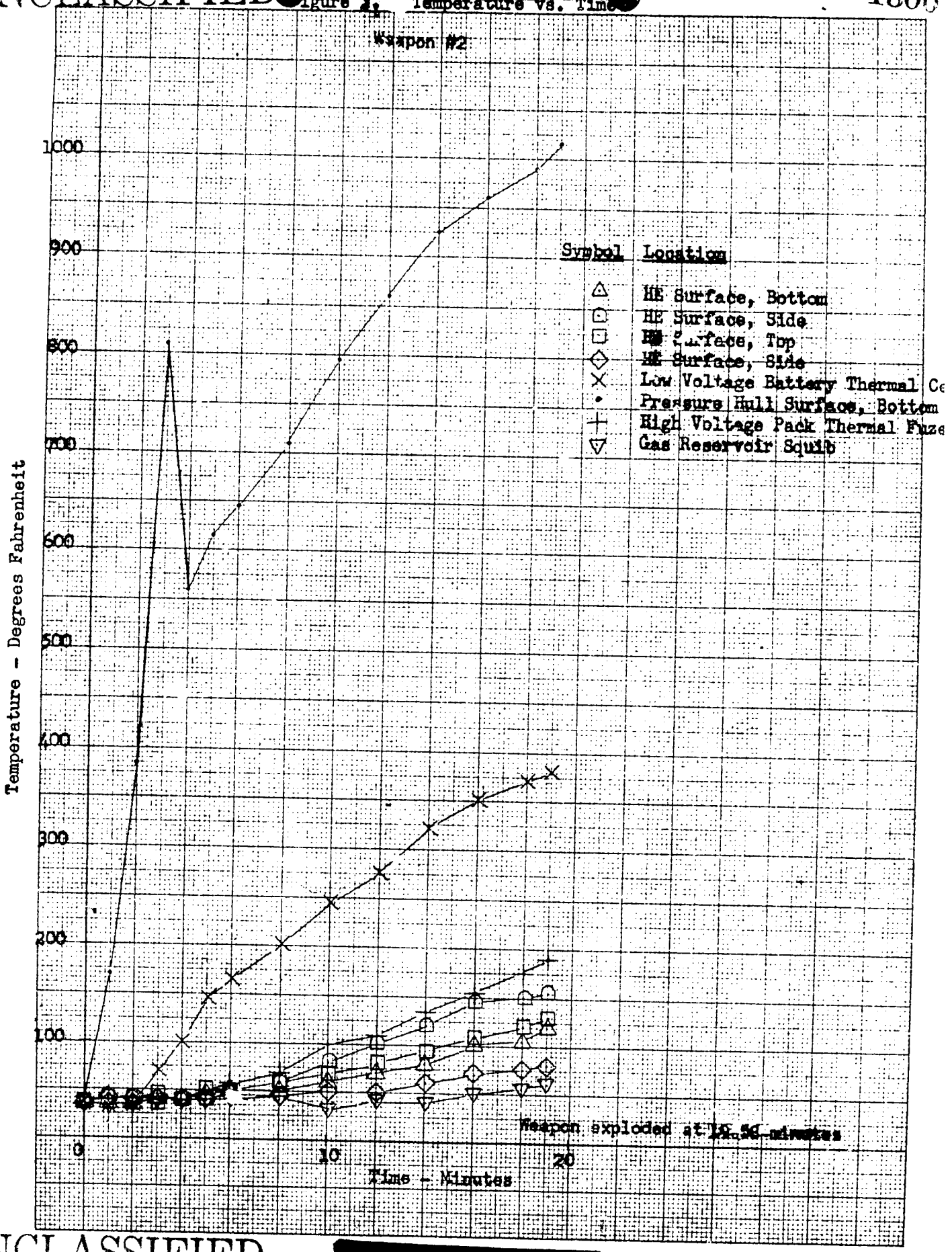
Figure [redacted] Temperature vs. Time



10 X 10 TO THE CM. 359-14
KEUFFEL & ESSER CO.

[redacted]

2.5 (Minimum Value)

Figure [redacted] HIGH VOLTAGE BATTERY PACK RESISTANCE

Weapon #2

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Codes:
- □ = Pack Resistance in Ohms
- × = Forward Resistance in Ohms
- ⊙ = High Voltage Pack Thermal Fuse Temp. (in Degrees Fahrenheit X 10)

1×10^{10}

1×10^{9}

1×10^{8}

1×10^{7}

1×10^{3}

1×10^{2}

[redacted] Exploded at 1968 minutes

0 5 10 15 20

Time - Minutes

KEUFFEL & ESSER CO. 215-91 Semi-Logarithmic, 3 Cycles X 10 to the inch. 5th lines accented. MADE IN U.S.A.

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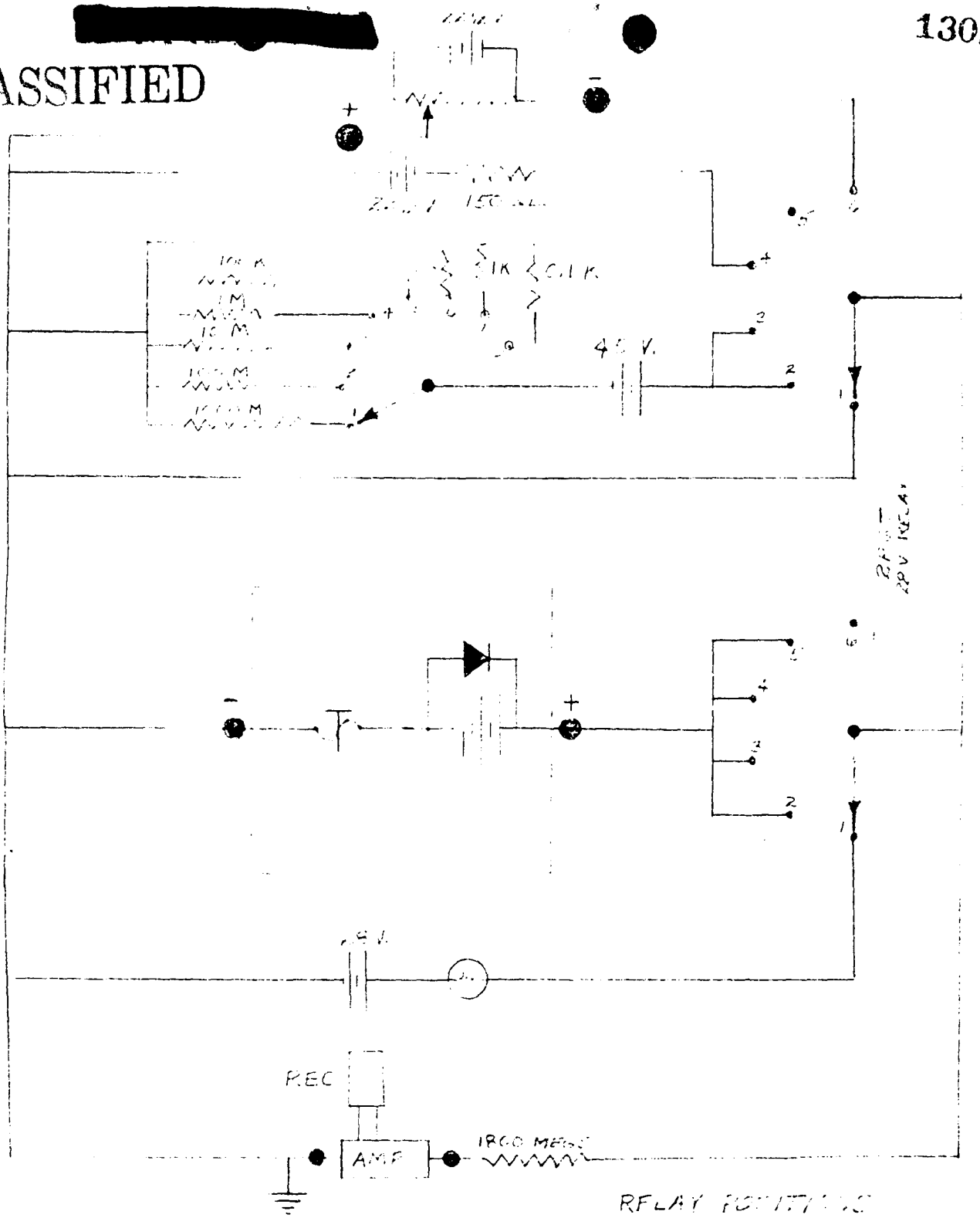

RELAY POSITIONS
1. BALANCE
2. BACK RESISTANCE
3. " "
4. FORWARD RESISTANCE
5. VOLTAGE OUTPUT
6. CALIBRATE - 20 V.

Figure 5
SCHEMATIC OF HIGH VOLTAGE BATTERY CIRCUIT TESTER

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FIGURE 6 - [illegible] IN AREA Z, COYOTE CANYON ET-4498

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[redacted]

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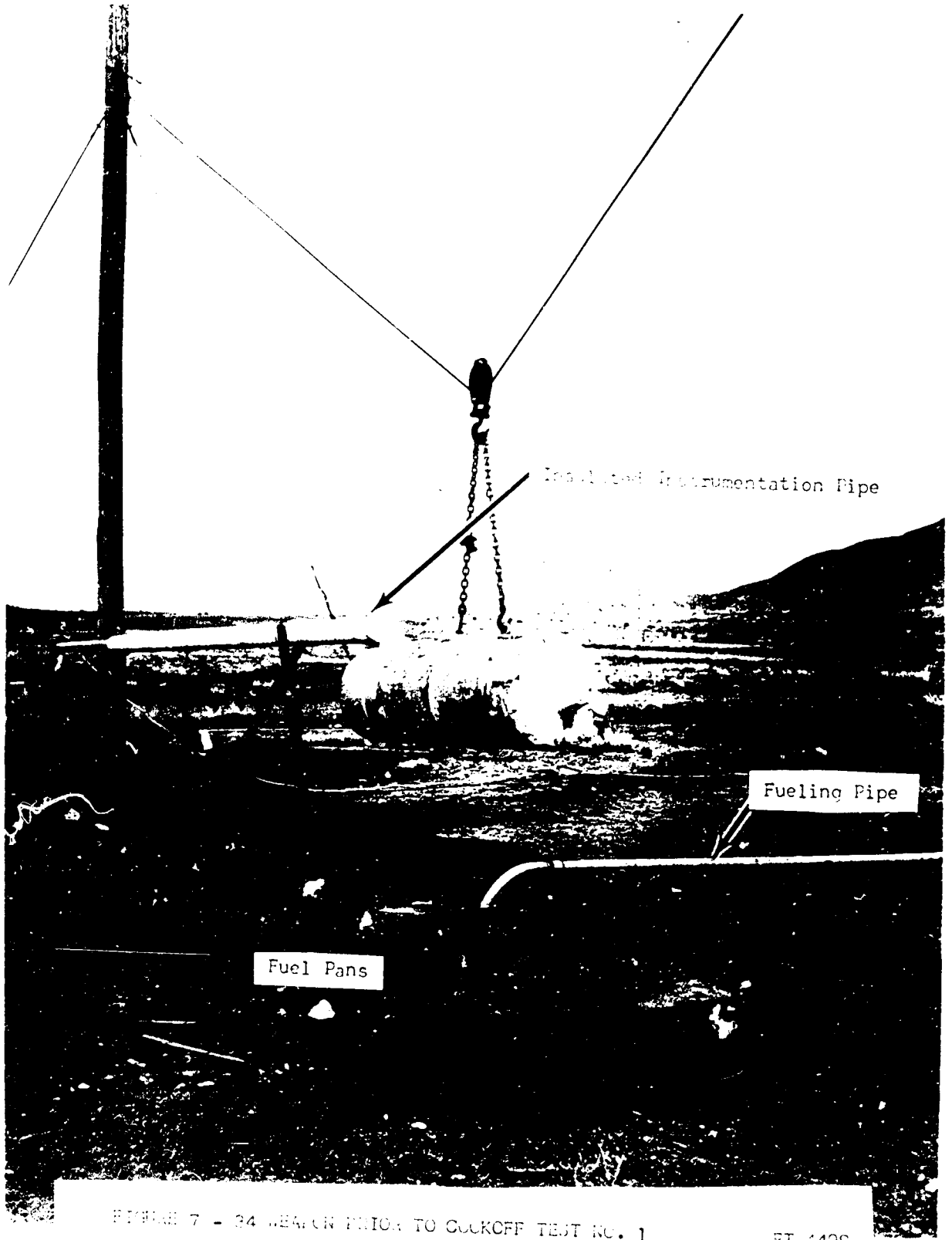

FIGURE 7 - 34 SECONDS PRIOR TO COOKOFF TEST NO. 1 ET-1498

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[redacted]

#1305

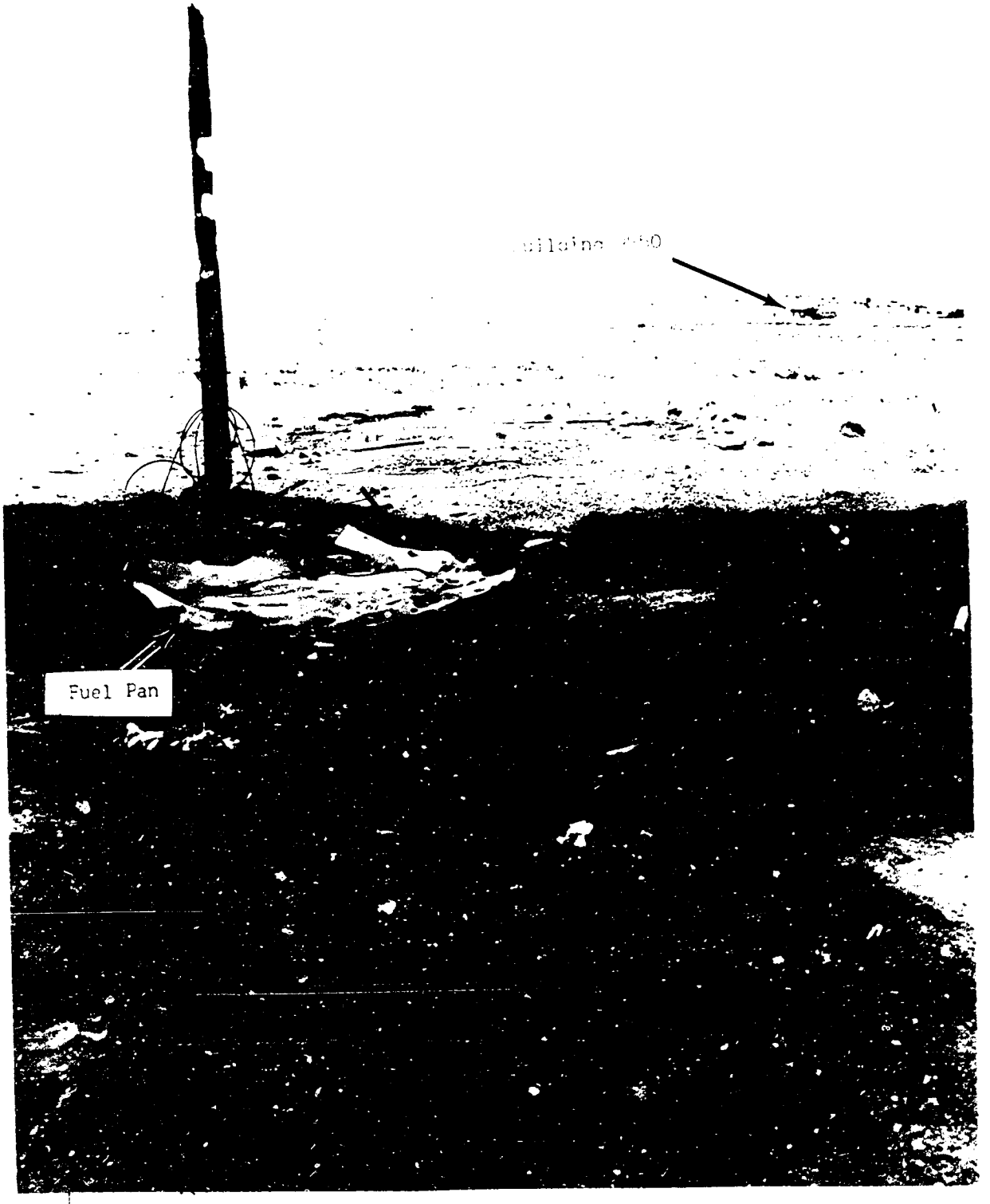

FIGURE 8 - TEST SITE AFTER COOKOFF TEST NO. 1

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