[redacted]

1647

# UNCLASSIFIED

SANDIA SYSTEMATIC DECLASSIFICATION REVIEW

| | |
|---|---|
| 1st Review Date: 7/14/98<br>Authority: ☐ADC ☒ADD<br>Name: W Lane | Determination (Circle Numbers):<br>1. Classification Retained<br>2. Classification Changed to: U<br>3. Contains No DOE Classified Information<br>4. Coordinate With:<br>5. Contains UCNI? no<br>6. Comments: |
| 2nd Review Date: 7/23/98<br>Authority: ADD<br>Name: R Cranes | 6 for Approval |

JUN 1 8 1964

File No: XW-56X2, 3-2
T-10354
Test Completed: 5-1-64

RECEIVED
JUN 19 1964
CENTRAL TECH FILE

CENTRAL TECHNICAL FILE
TRANSMITTAL SLIP
FILE NO. 56/Minuteman 3-2

To: F. J. Maloney - 8124

Attn: J. Neuberger

From: J. E. Bear - 7331-1

Re: Radiant Heat Test of a Mk 11A Flare Component Section (U)

| PROGRAM | CATEGORY | ORG. | DATE |
|---|---|---|---|
| 0 5 6 5 6 | 0 2 4 3 | 8 1 0 | 6 4 4 4 |

## Summary of Results

This test was conducted to determine the temperature effects on a Mk 11A flare section components when subjected to a time-temperature profile.

The external skin was programmed to a time-temperature profile with a maximum temperature of 370°F occurring at 1690 seconds with the power being shut down at 1700 seconds.

The internal components attained temperature of approximately 125°F at 1700 seconds.

No visible damage occurred to the flare section or components during the test.

## Object of Test

The object of this test was to determine the effects of elevated temperatures on the components mounted within a Mk 11A Flare Component Section.

## Authorization for Test

This test was requested in an Environmental Test Order from F. J. Maloney, 8124, to E. White, 7331-1, Attn: B. Johnson, 7323-2, dated April 27, 1964. Mr. John Neuberger, 8124-3, was the consultant.

SANDIA SYSTEMATIC DECLASSIFICATION REVIEW
DOWNGRADING OR DECLASSIFICATION STAMP

| | |
|---|---|
| CLASSIFICATION CHANGED TO: U | AUTHORITY: R.R. Cranes |
| Emelda Selph 7/28/98<br>PERSON CHANGING MARKING & DATE | RECORD ID: 98SN2996 |
| W Lane 7/30/98<br>PERSON VERIFYING MARKING & DATE | DATED: 7/23/98 |

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Setup for Test

Figures 1, 2, and 3 are photographs showing the heater array used in the test, the instrumented Mk 11A Flare Component Section, and the mounting method used for the flare section in the heater array.

The 31-inch in diameter heater array consisted of three phases connected in series with each phase containing eighty-eight 17-inch, 3.2 KW, General Electric quartz lamps.

Figure 2 shows the flare section ready for the test. The 3/4-inch plywood covers were insulated with micro-quartz and Refrasil cloth to prevent the wood from burning.

The following test equipment was used:

1 - Channel Research Incorporated Ignitron Power Controller
1 - Heater Array consisting of 264 - 17-inch, 3.2 KW General Electric quartz lamps
3 - Honeywell Recorders, Serial No. S9136370011, S118996, Serial No. 59142738002, S-121000, Serial No. 59136370013, S-118994

The components mounted in the flare section were instrumented at SCLL using saturated GG-24-CCT chromel-alumel thermocouple wire. The thermocouples were located on the components as is shown in Table I.

The control and monitor thermocouples were installed on the external skin using unsaturated GG-24-CCT chromel-alumel thermocouple wire and were located as shown in Table I.

Procedure

The heater array was mounted on a stand as shown in Figure 3.

No calibration on the heater array was performed other than a power check since this was a time-temperature program on the power controller.

The control and monitor thermocouples were installed at the desired locations by drilling two No. 75 drill holes 3/16 inch apart. Each wire of the dual 24-gage thermocouple cable was placed in a hole and the aluminum was peened around the wire.

The flare section was then mounted inside the heater array (see Figure 3), the thermocouples were connected and the test was run . SC-4452B(M) does not apply to radiant heat tests.

Results

No visible damage was sustained by the flare section or its components during the test run. Figure 4 shows the flare section after the test run, and as can be seen in this photograph the plywood covers and external skin were undamaged.

Figure 5 is a graph showing the time-temperature profile for this test run as well as the control and monitor thermocouple.

Both of the monitor thermocouples were recording lower temperatures than the control thermocouple as their placement on the external section was such that their location was near to or opposite a gap in the heater array phases.

Figures 6 through 25 are the time vs temperature graphs for the thermocouples mounted on the components in the flare section.

JMStomp, Jr.:7323-2:mw

Approved by E. White
E. White - 7331-1

Enc: Figures 1 - 25
Table I

Copy to:
E. H. Copeland, 7331
Central Technical File, 8232-2
Central Technical File, 3428-1

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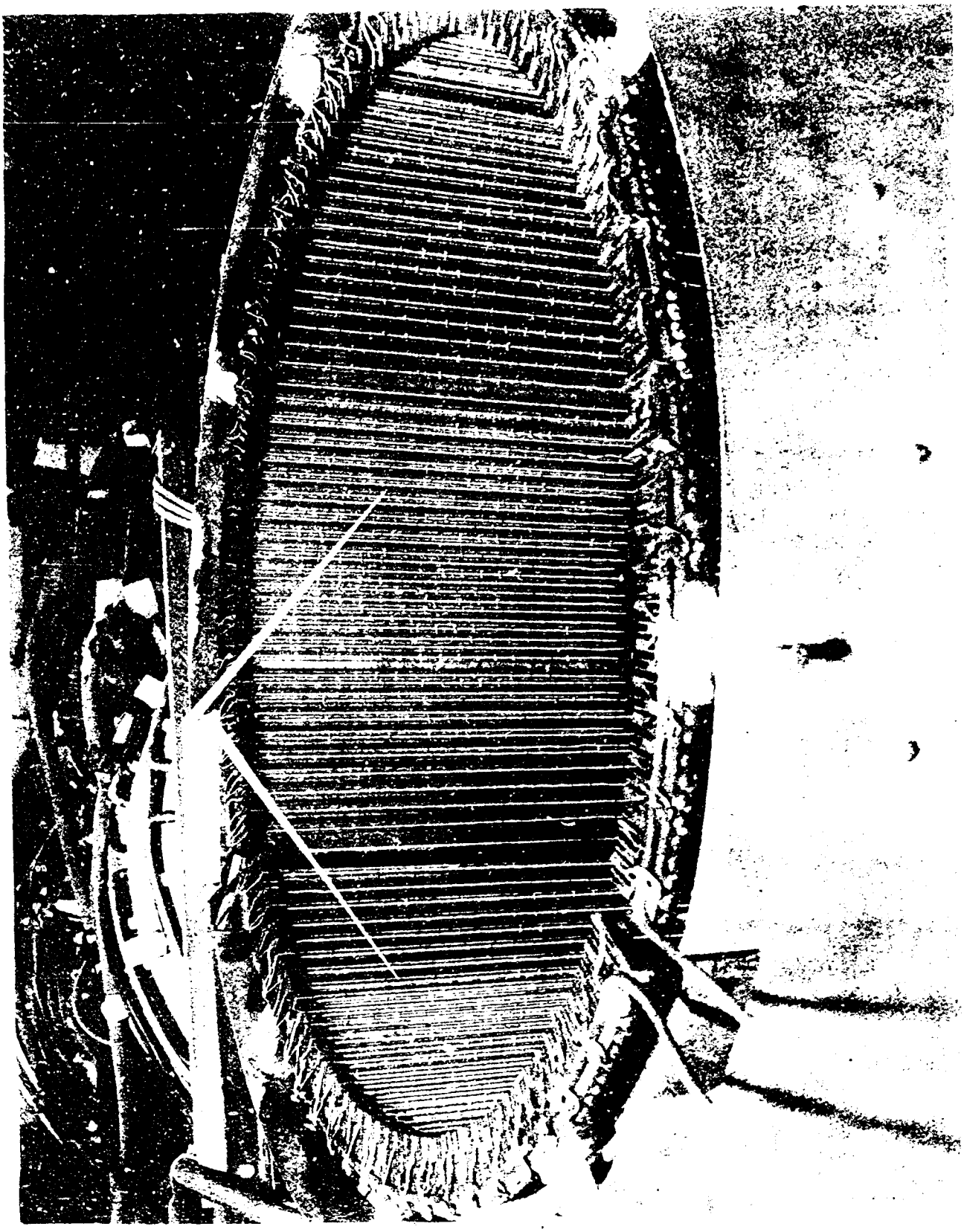

D# 64-2442

[redacted]

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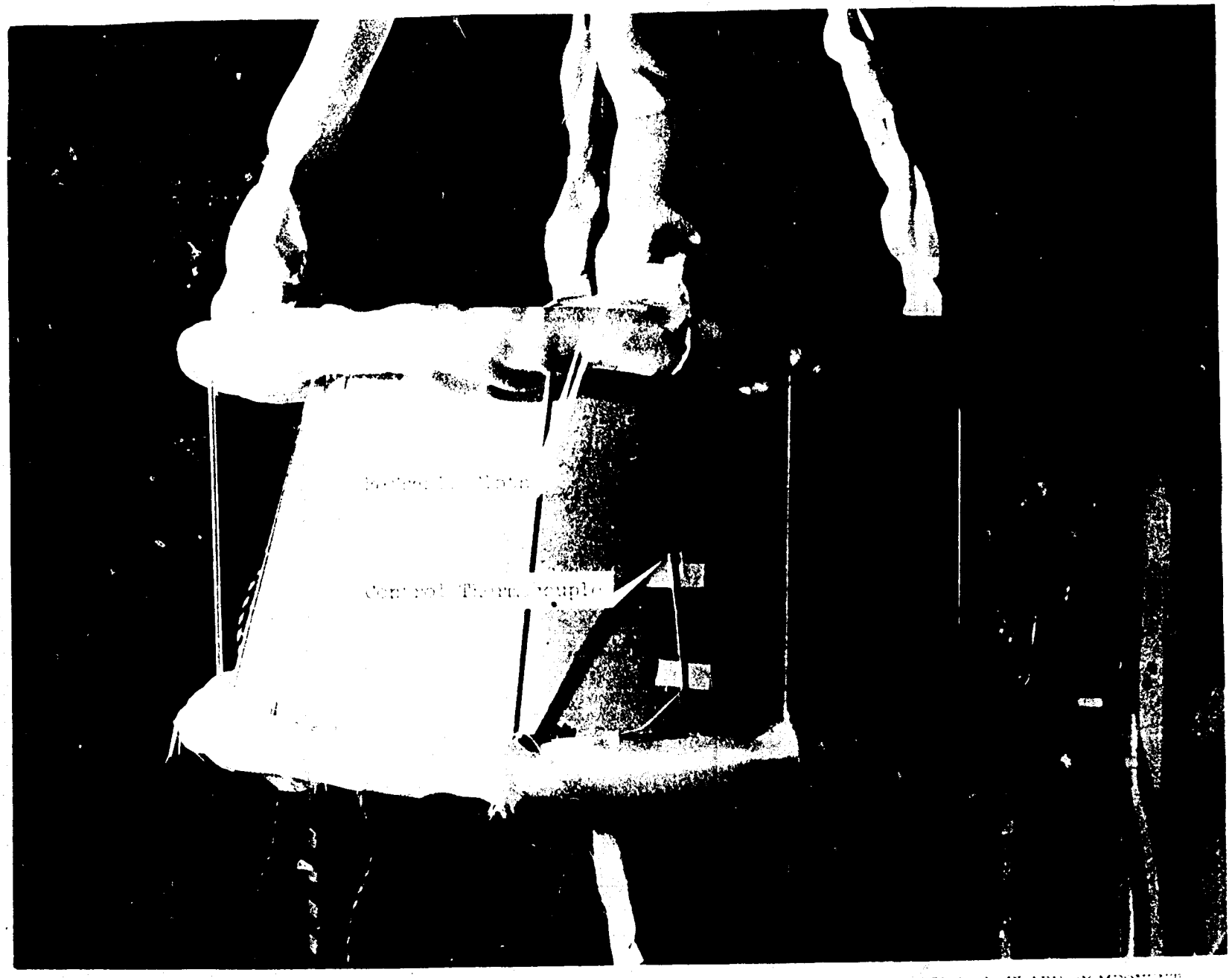


FIGURE [illegible]. INSTRUMENTED MK 11A FLARE SECTION FOR THE RADIANT HEAT TEST OF A MK [illegible] FLARE COMPONENT SECTION.

D# 64-2443

[redacted]

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UNCLASSIFIED [redacted]

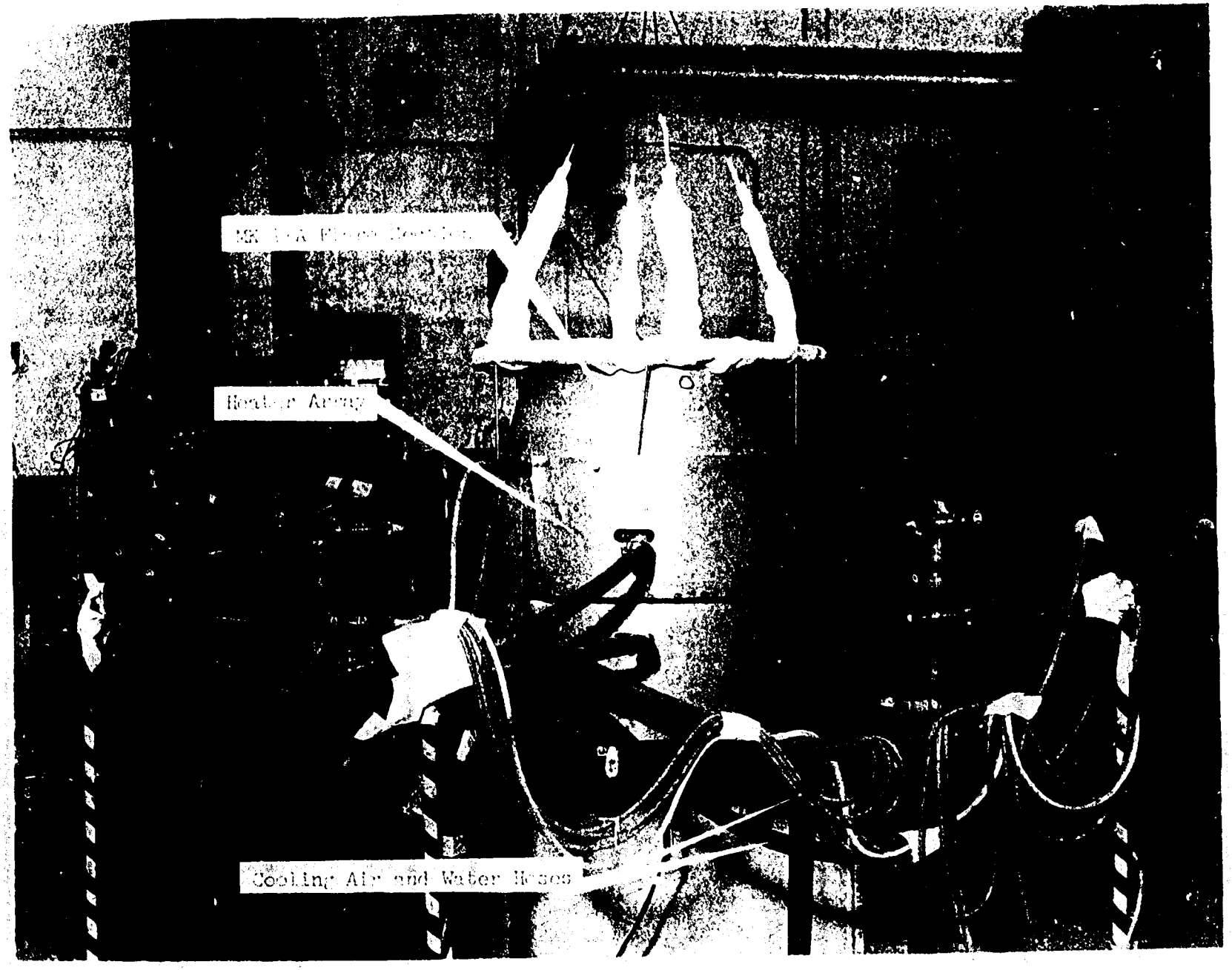


FIGURE [illegible]. [illegible] USED FOR THE RADIANT HEAT [illegible] A [illegible] FLARE [illegible].

D#64-2441

[redacted]

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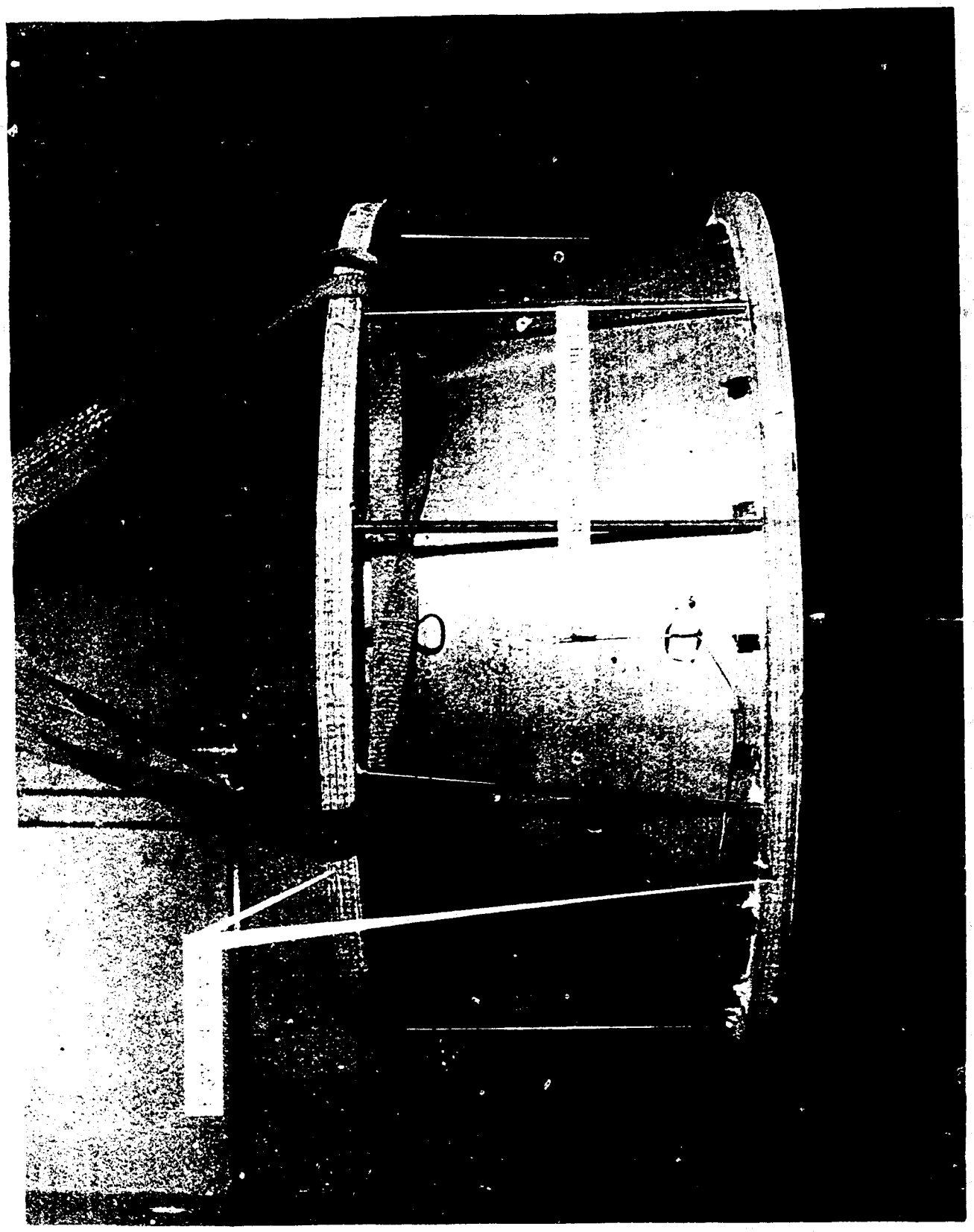

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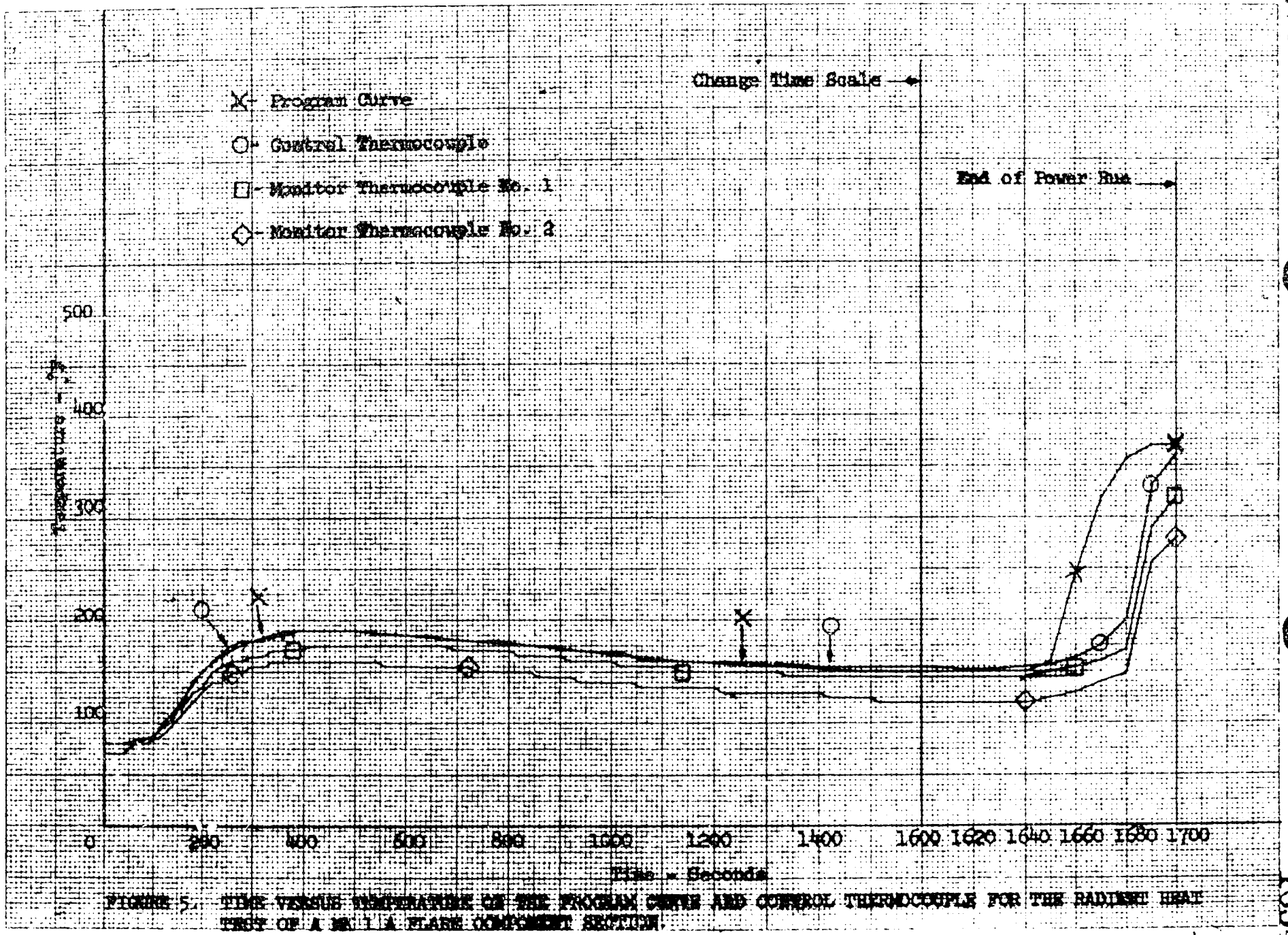


FIGURE 5. TIME VERSUS TEMPERATURE OF THE PROGRAM CURVE AND CONTROL THERMOCOUPLE FOR THE RADIANT HEAT TEST OF A MK 11A FLARE COMPONENT SECTION.

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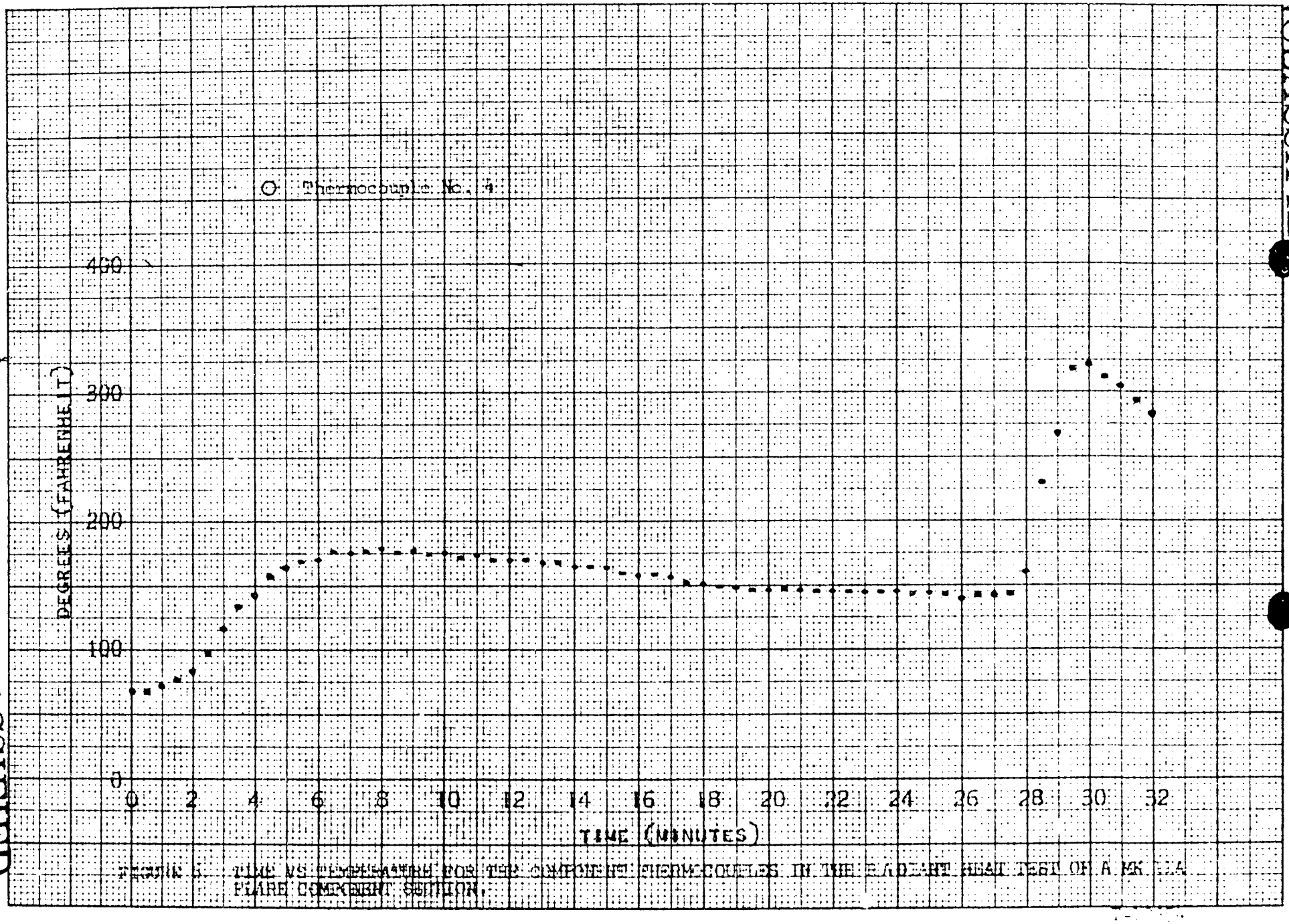


FIGURE 3. TIME VS TEMPERATURE FOR THE COMPONENT THERMOCOUPLES IN THE RADIANT HEAT TEST OF A MK 11A FLARE COMPONENT SECTION.

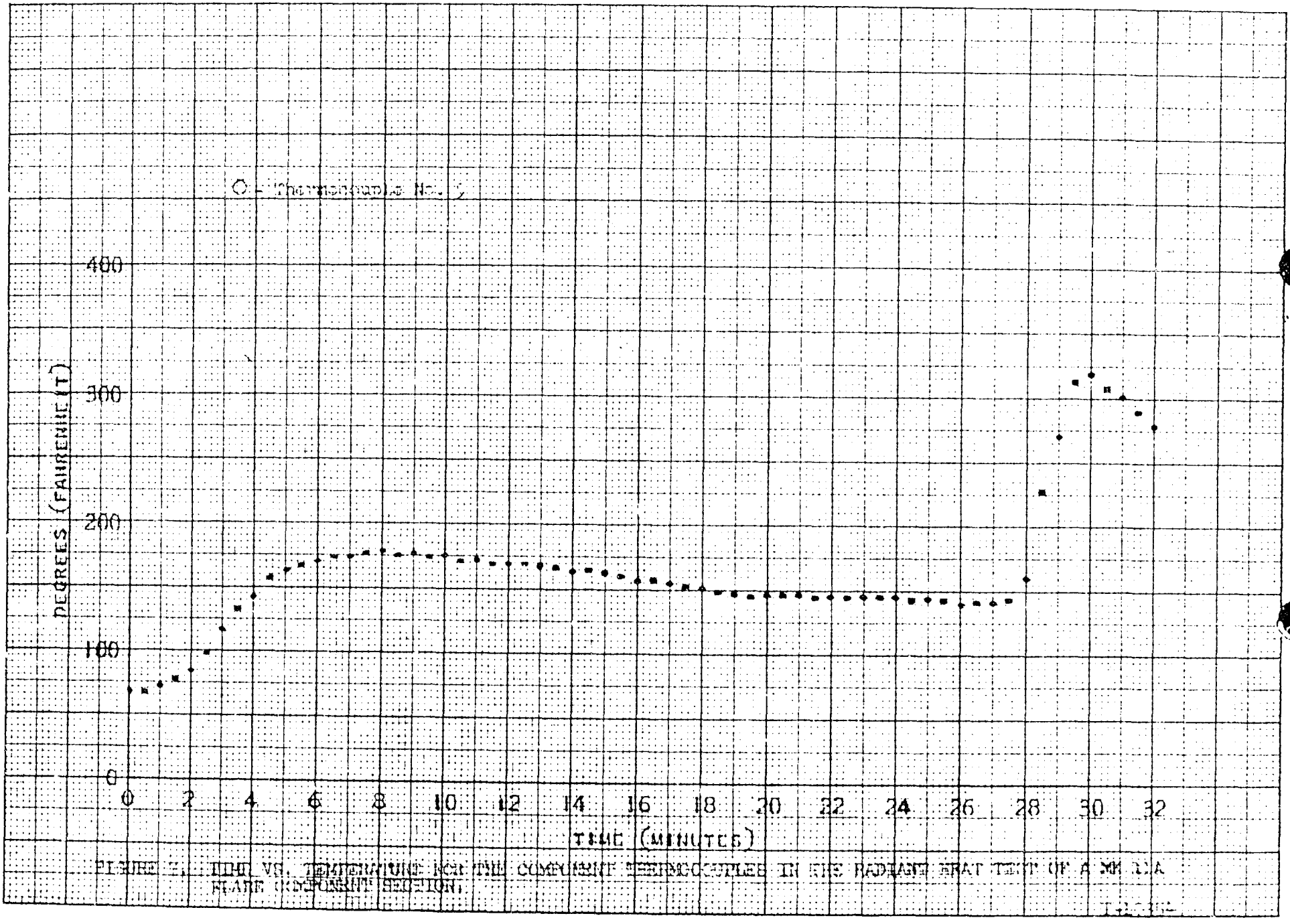


FIGURE 7. TIME VS. TEMPERATURE FOR THE COMPONENT THERMOCOUPLES IN THE RADIANT HEAT TEST OF A MK 11A FLARE COMPONENT SECTION.

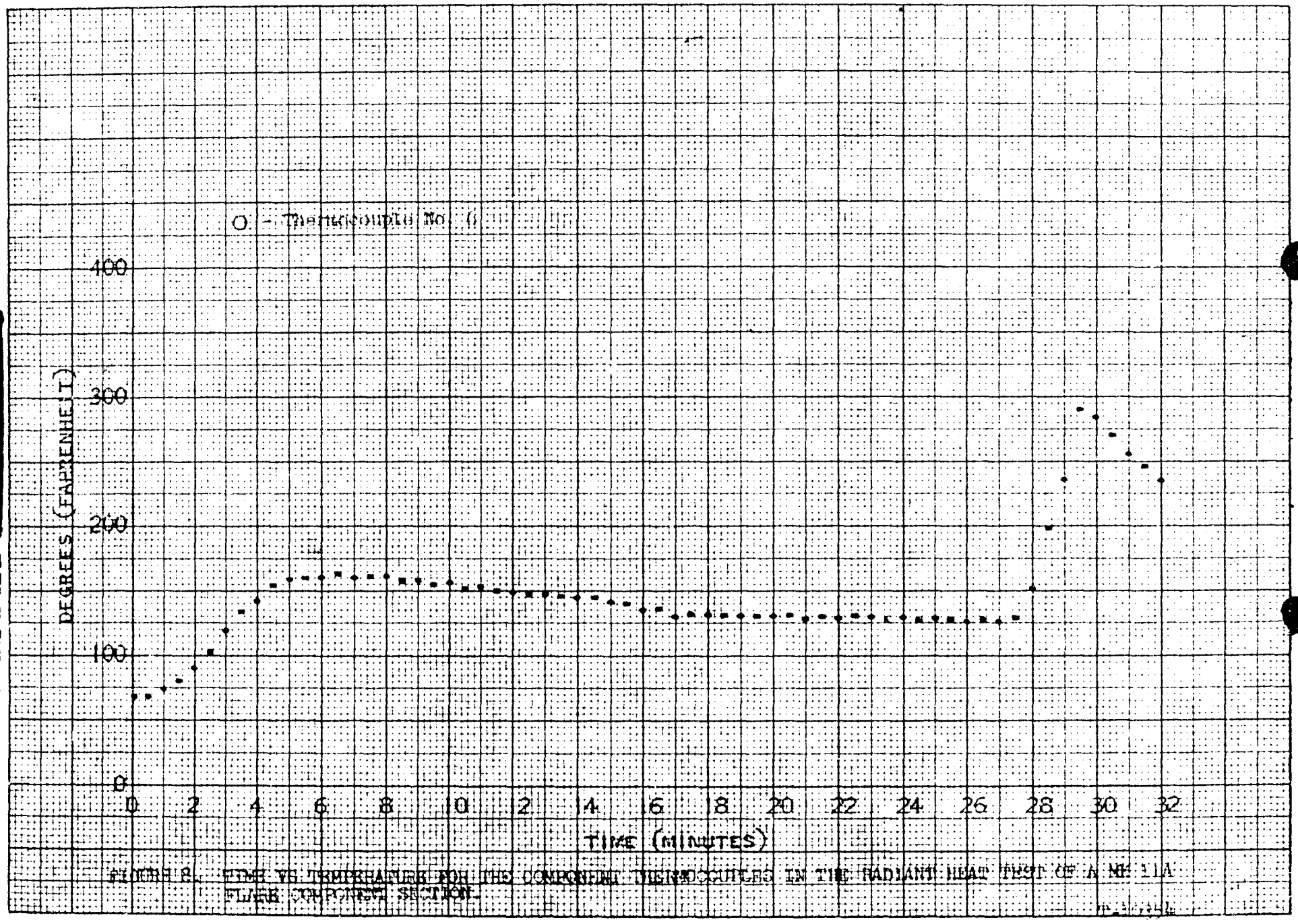


FIGURE 8. TIME VS TEMPERATURE FOR THE COMPONENT THERMOCOUPLES IN THE RADIANT HEAT TEST OF A MK 11A FLARE COMPONENT SECTION.

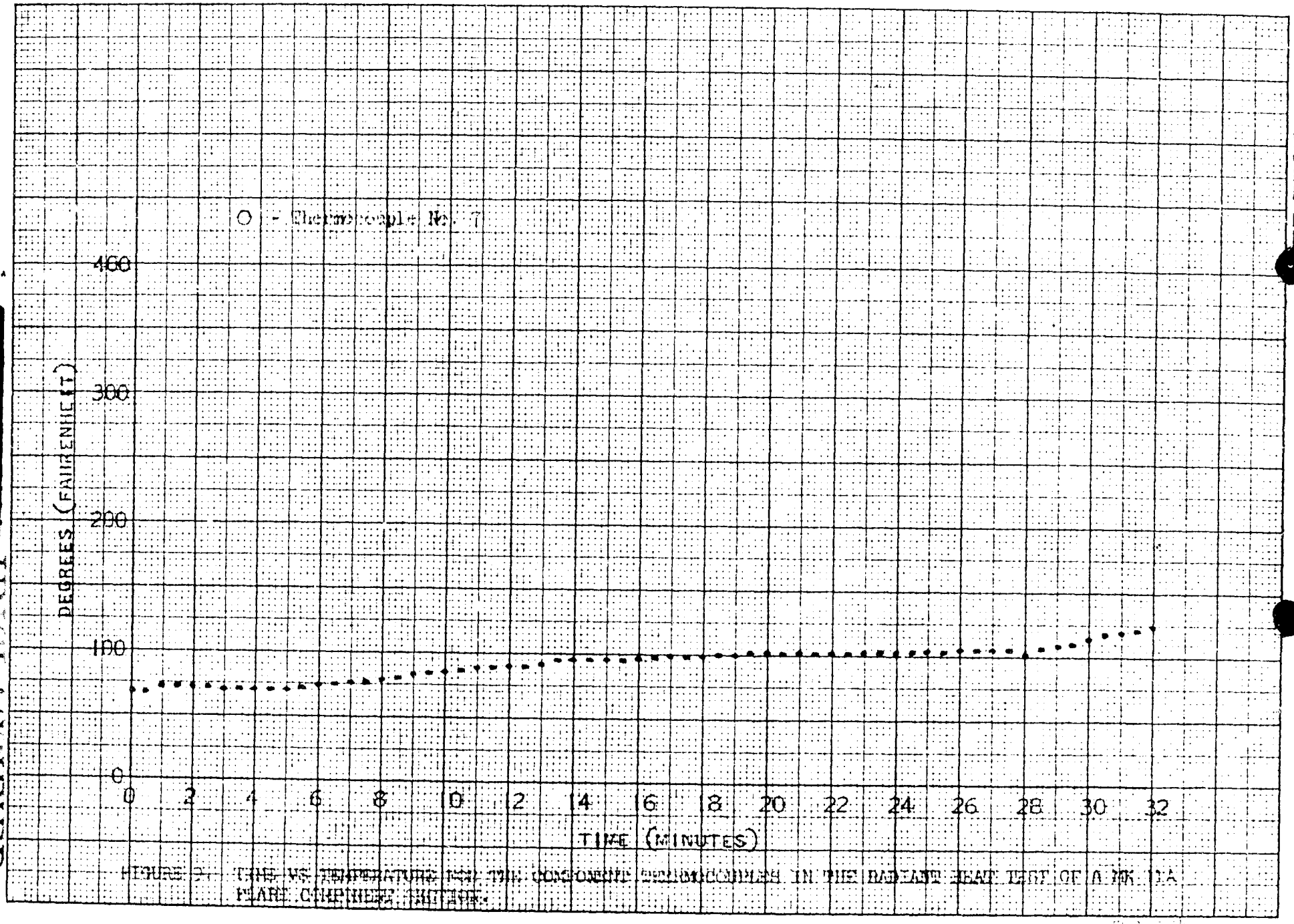


FIGURE 9. TIME VS TEMPERATURE FOR THE COMPONENT THERMOCOUPLES IN THE RADIANT HEAT TEST OF A MK 11A FLARE COMPONENT SECTION.

K+E 10 X 10 TO THE ½ INCH 359-11



[redacted]

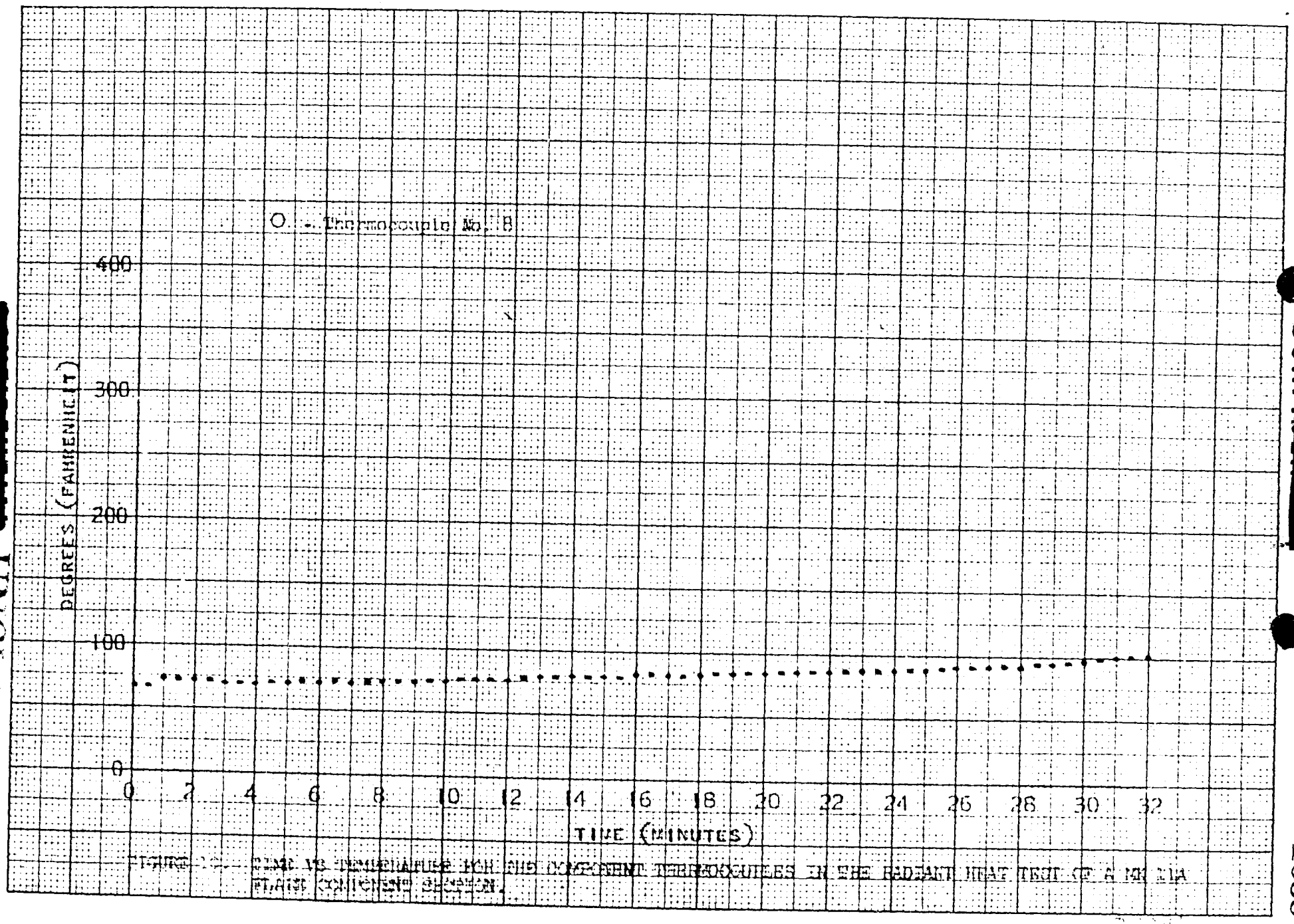


FIGURE 10 - TIME VS TEMPERATURE FOR THE COMPONENT THERMOCOUPLES IN THE RADIANT HEAT TEST OF A MK 11A FLAME COMPONENT SECTION.

[redacted]

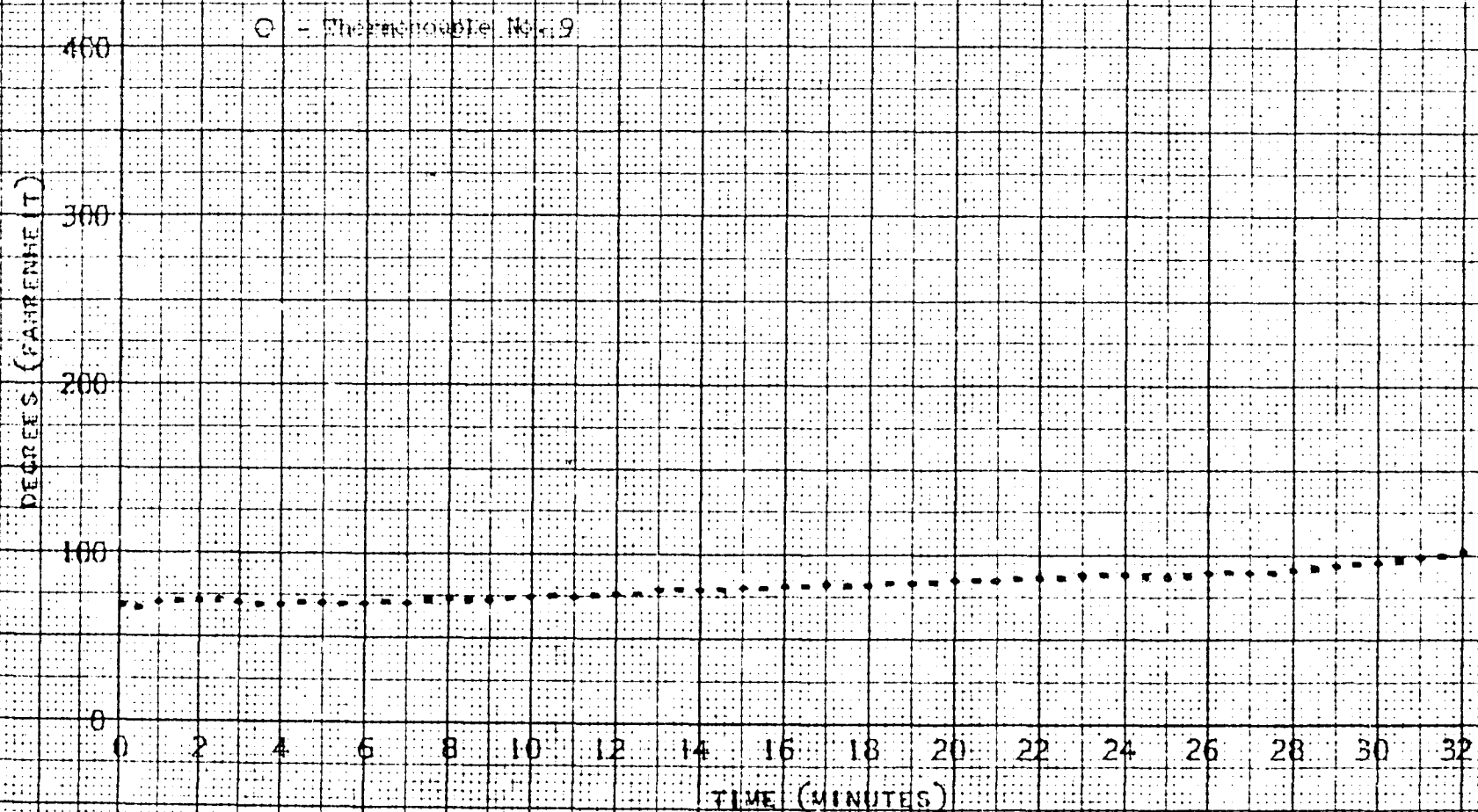


FIGURE [illegible]. TIME VS TEMPERATURE FOR THE COMPONENT THERMOCOUPLES IN THE RADIANT HEAT TEST OF A HE [illegible] A FLAME COMPONENT SECTION.

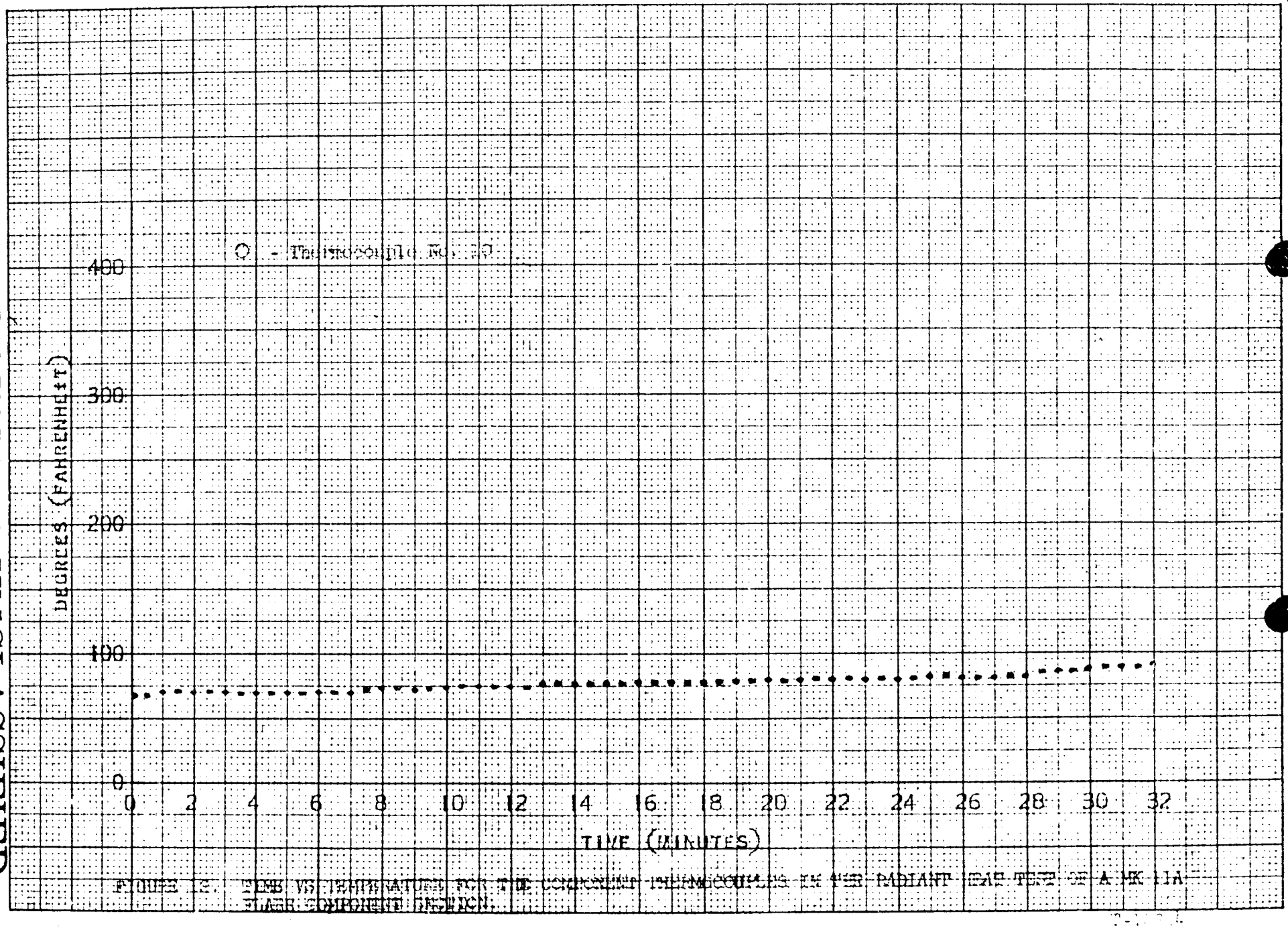


FIGURE 12. TIME VS TEMPERATURE FOR THE COMPONENT THERMOCOUPLES IN THE RADIANT HEAT TEST OF A MK 11A FLARE COMPONENT SECTION.

[redacted]

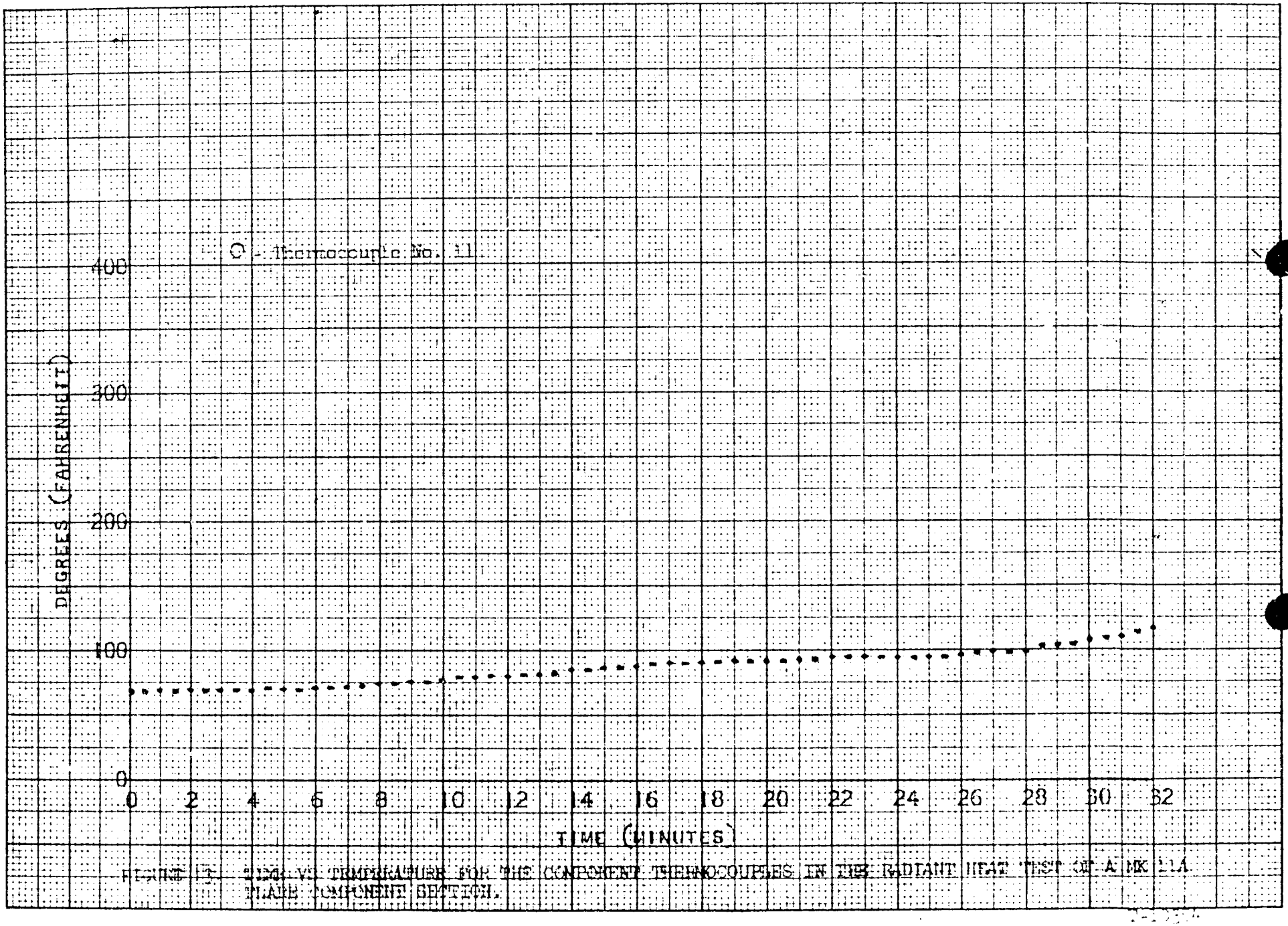


FIGURE 13. SIDE VI TEMPERATURE FOR THE COMPONENT THERMOCOUPLES IN THE RADIANT HEAT TEST OF A MK 11A FLARE COMPONENT SECTION.

[redacted]

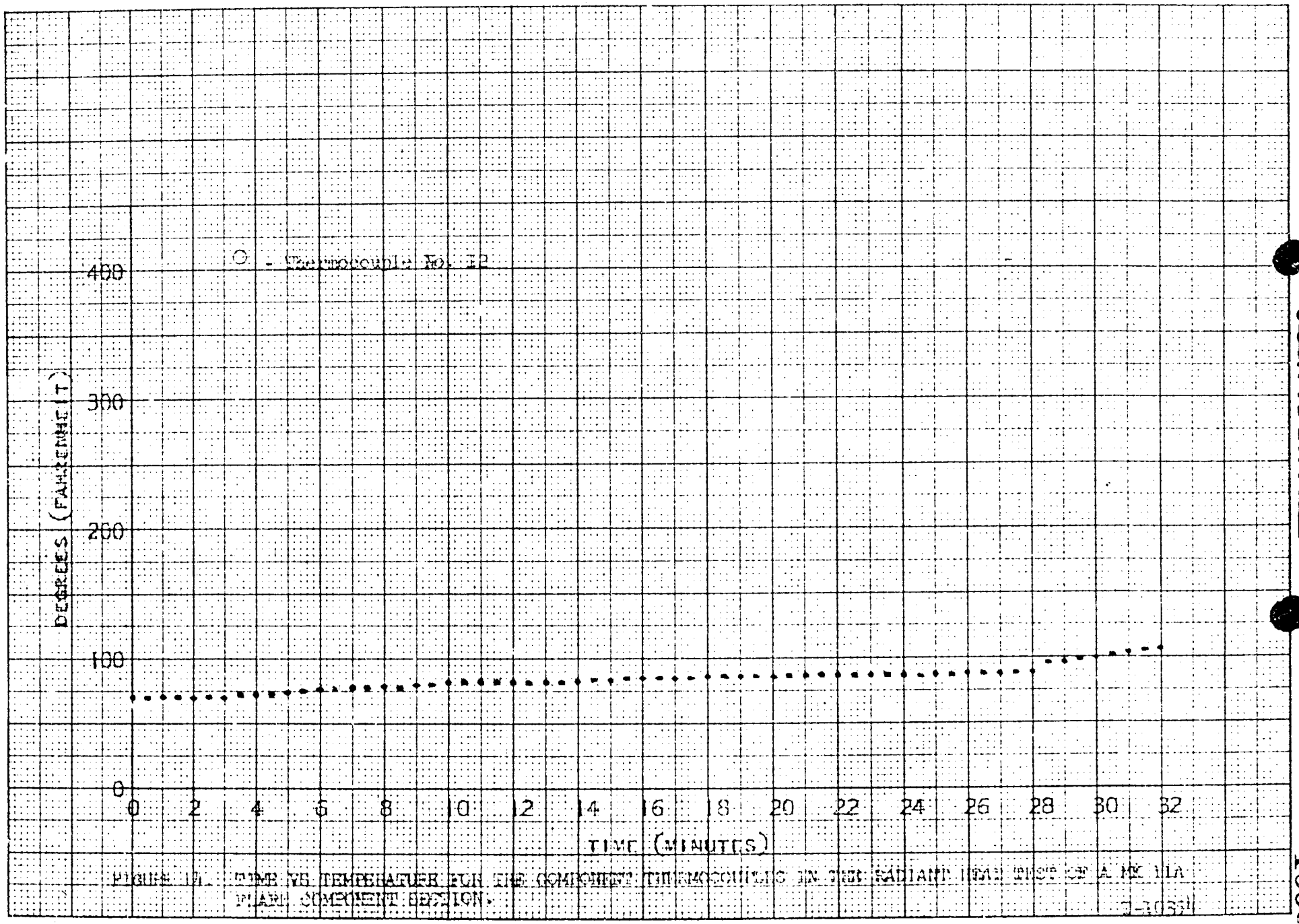


FIGURE 14. TIME VS TEMPERATURE FOR THE COMPONENT THERMOCOUPLES IN THE RADIANT HEAT TEST OF A MK 11A FLARE COMPONENT SECTION.

K&E 10 X 10 TO THE 1/2 INCH 359-11
KEUFFEL & ESSER CO.

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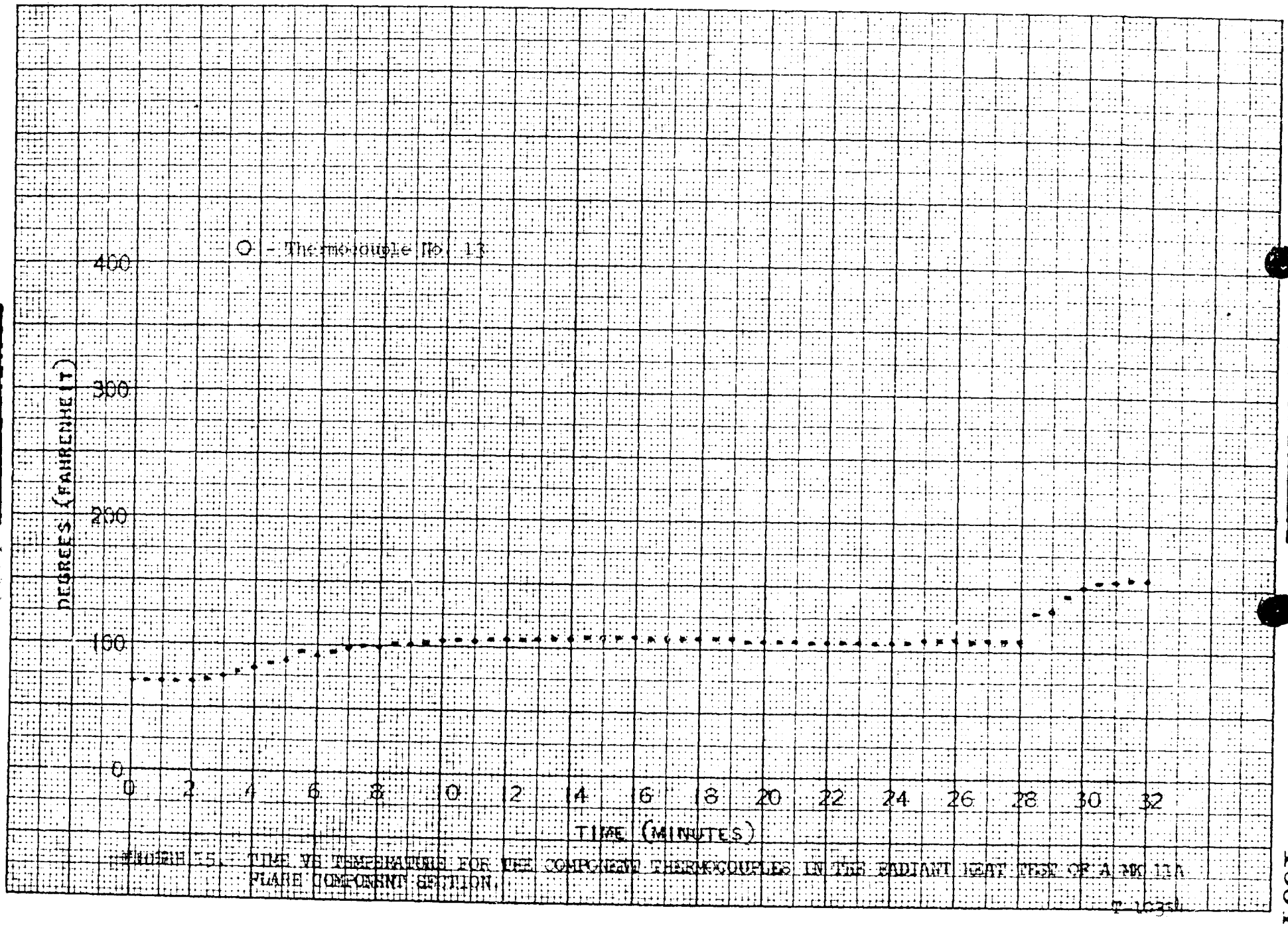


FIGURE 55. TIME VS TEMPERATURE FOR THE COMPONENT THERMOCOUPLES IN THE RADIANT HEAT TEST OF A MK 11A FLARE COMPONENT SECTION.

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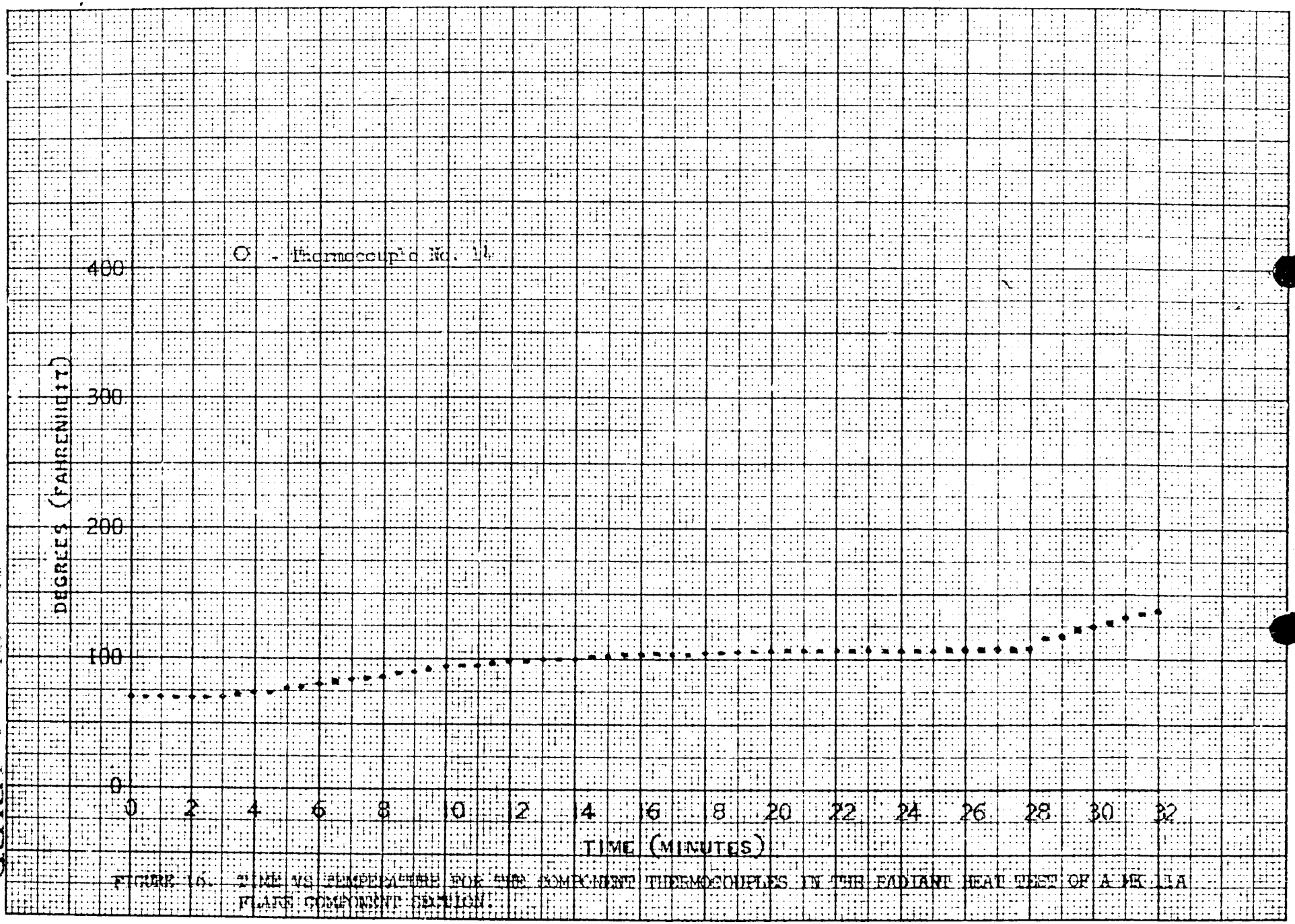


FIGURE 16. TIME VS TEMPERATURE FOR THE COMPONENT THERMOCOUPLES IN THE RADIANT HEAT TEST OF A MK 11A FLARE COMPONENT SECTION.

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10 X 10 TO THE INCH 359 11
KEUFFEL & ESSER CO

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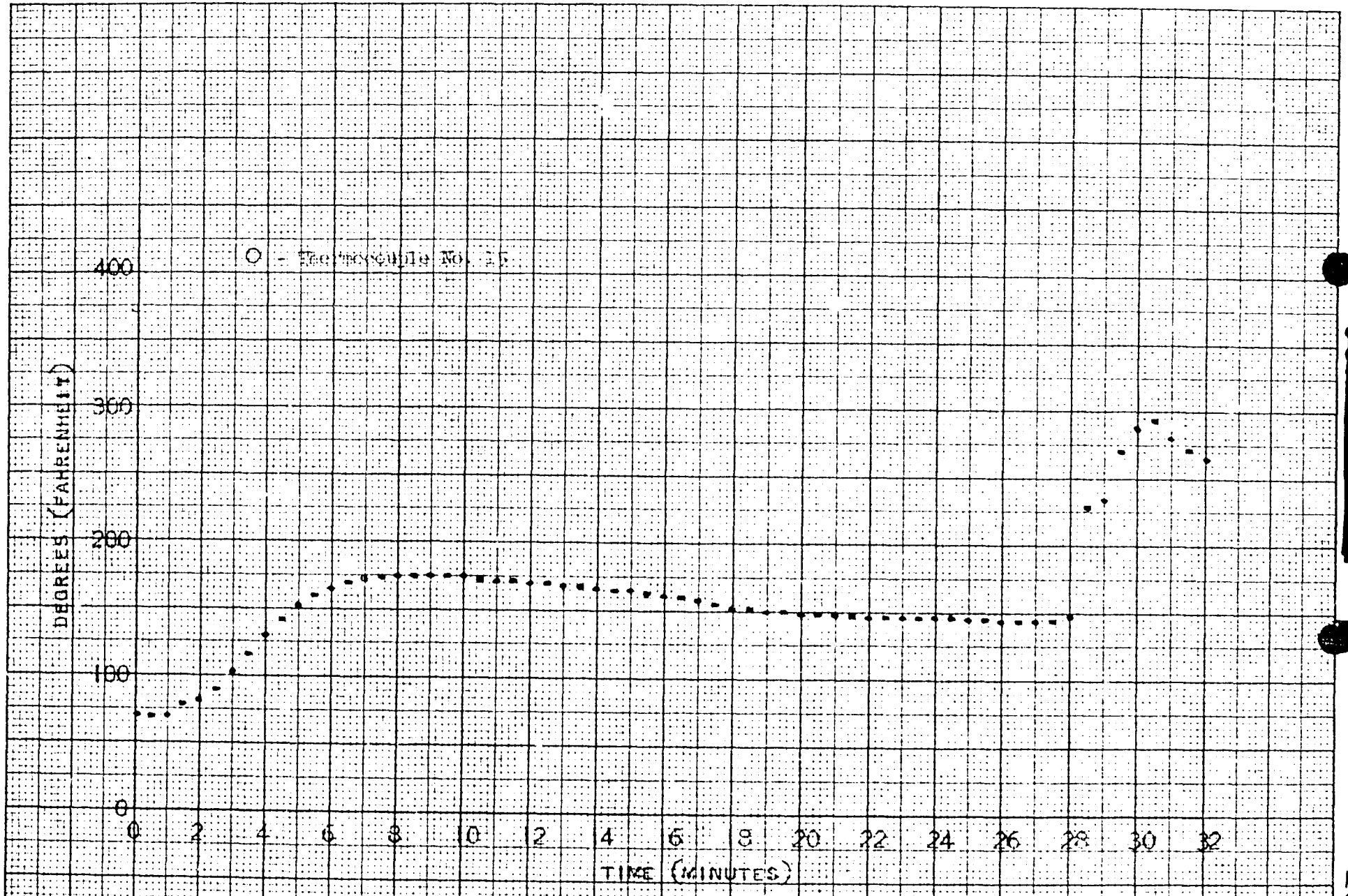


FIGURE 17. TIME VS TEMPERATURE FOR THE COMPONENT THERMOCOUPLES IN THE RADIANT HEAT TEST OF A MK 118 FLARE COMPONENT SECTION.

[redacted]

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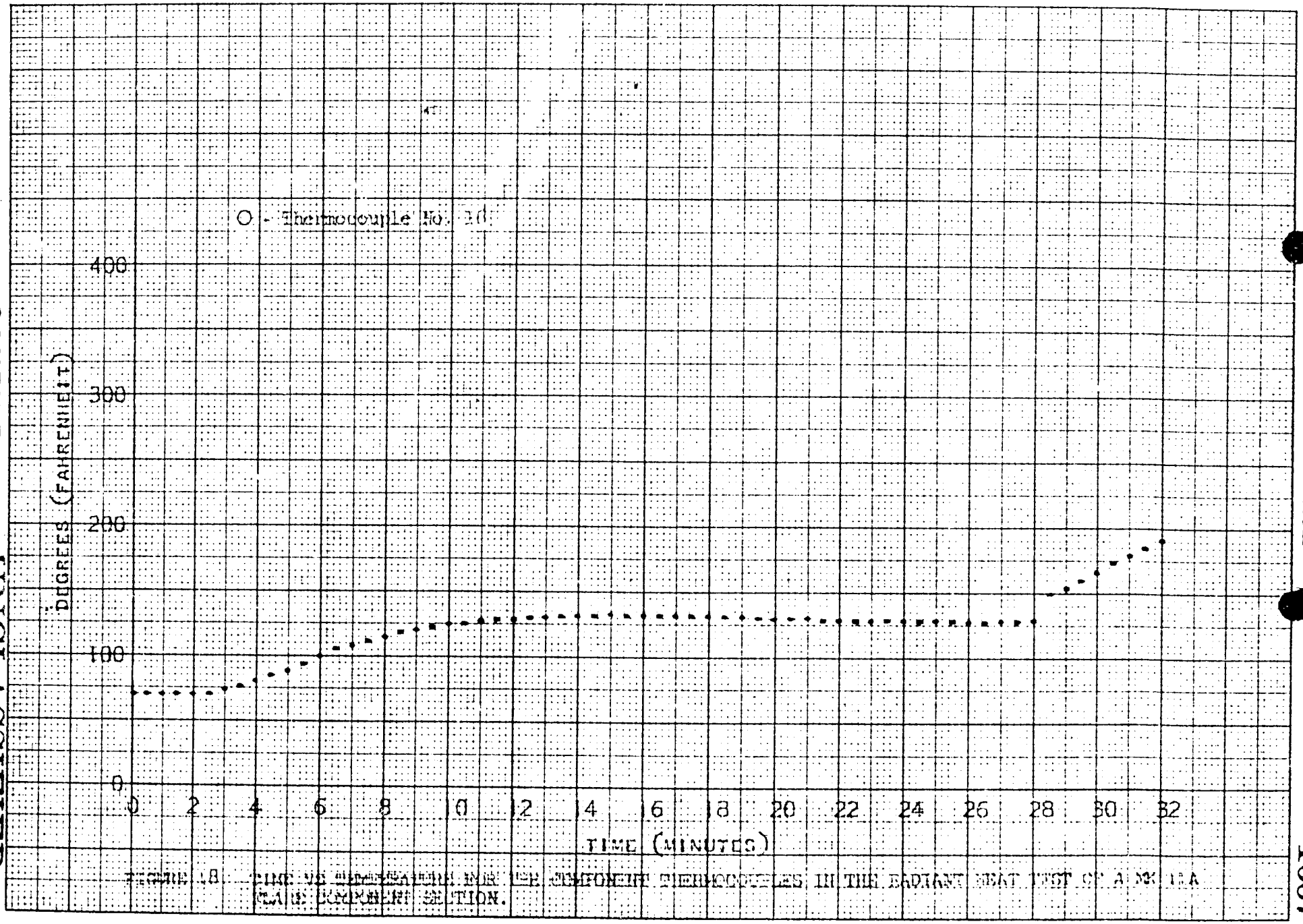


FIGURE 18 TIME VS TEMPERATURE FOR THE COMPONENT THERMOCOUPLES IN THE RADIANT HEAT TEST OF A MK 11A FLARE COMPONENT SECTION.

K&E 10 X 10 TO THE ½ INCH 359 11



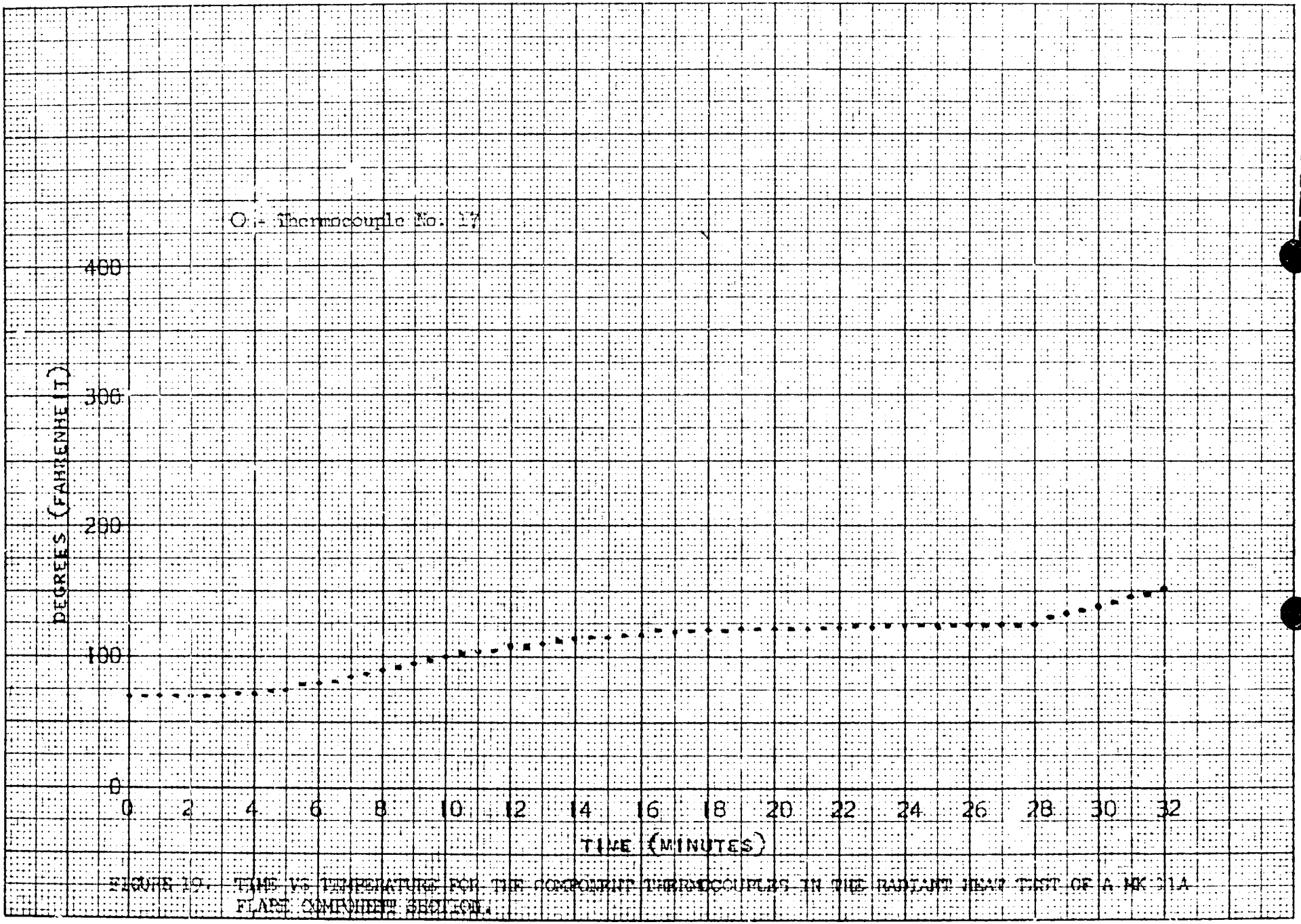


FIGURE 19. TIME VS TEMPERATURE FOR THE COMPONENT THERMOCOUPLES IN THE RADIANT HEAT TEST OF A MK 31A FLARE COMPONENT SECTION.

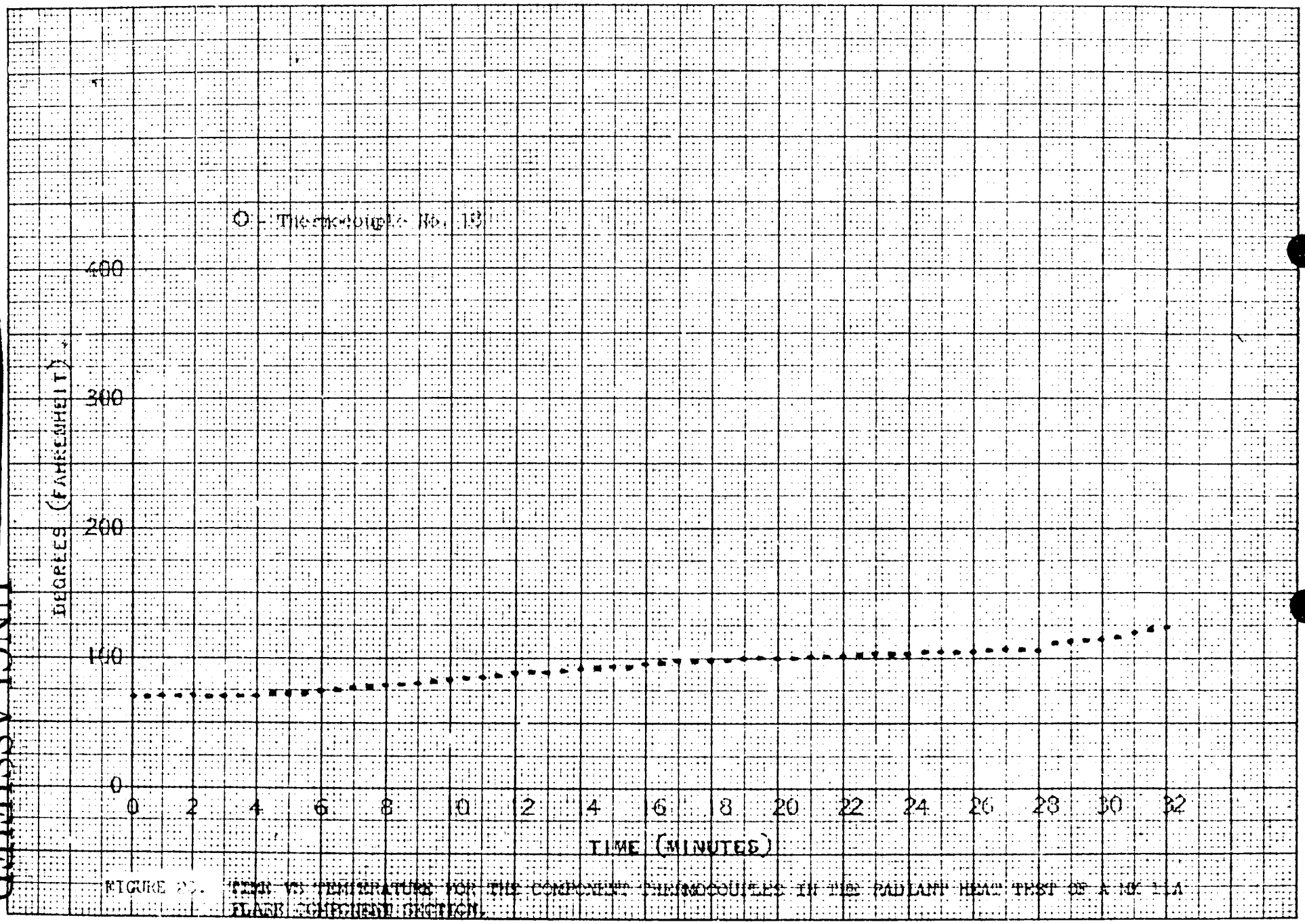


FIGURE 22. TIME VS TEMPERATURE FOR THE CONCRETE THERMOCOUPLES IN THE RADIANT HEAT TEST OF A 10 LA FLASH COMPONENT SECTION.

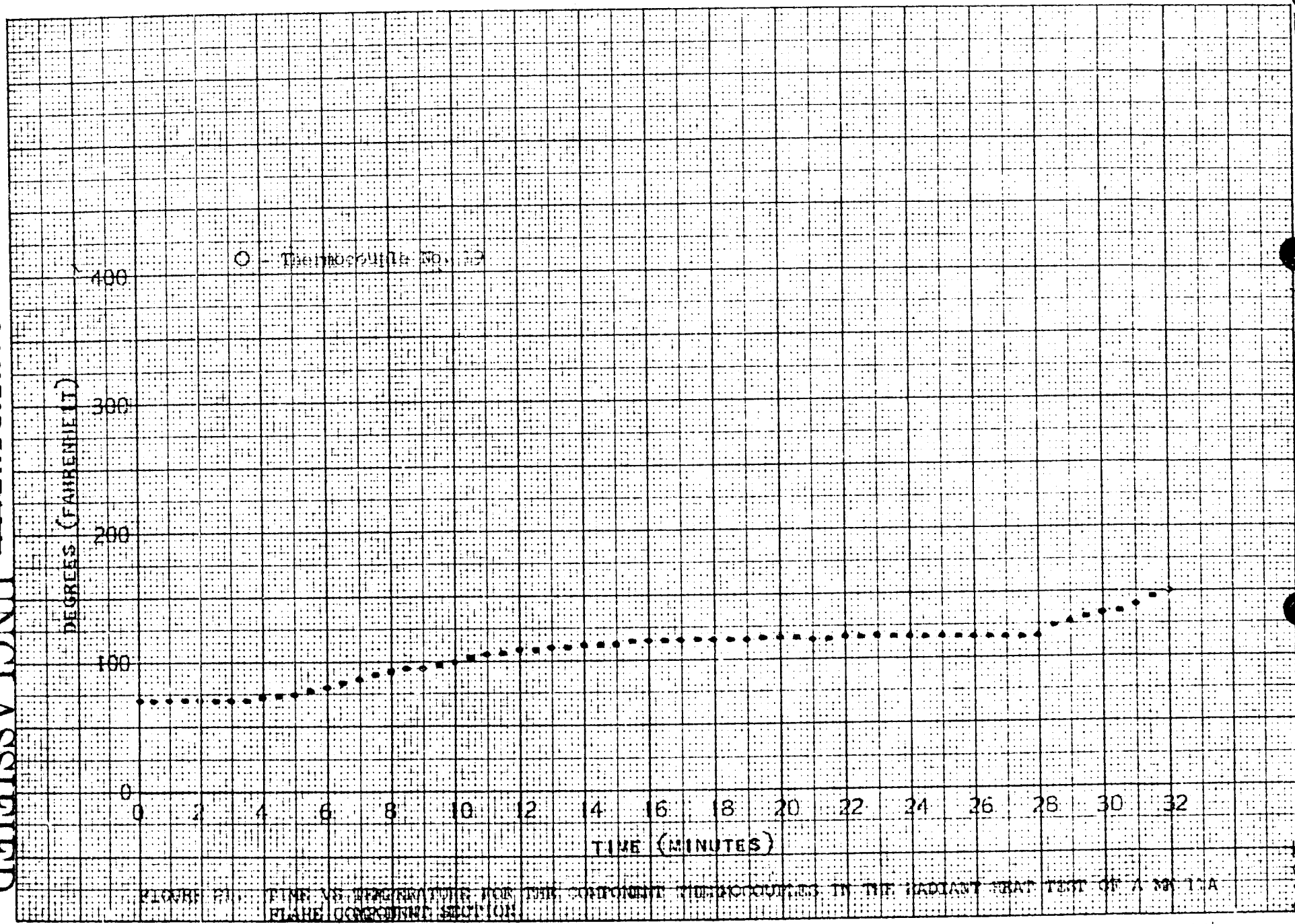


FIGURE 21. TIME VS TEMPERATURE FOR THE COMPONENT THERMOCOUPLES IN THE RADIANT HEAT TEST OF A MK 12A FLARE COMPONENT SECTION.

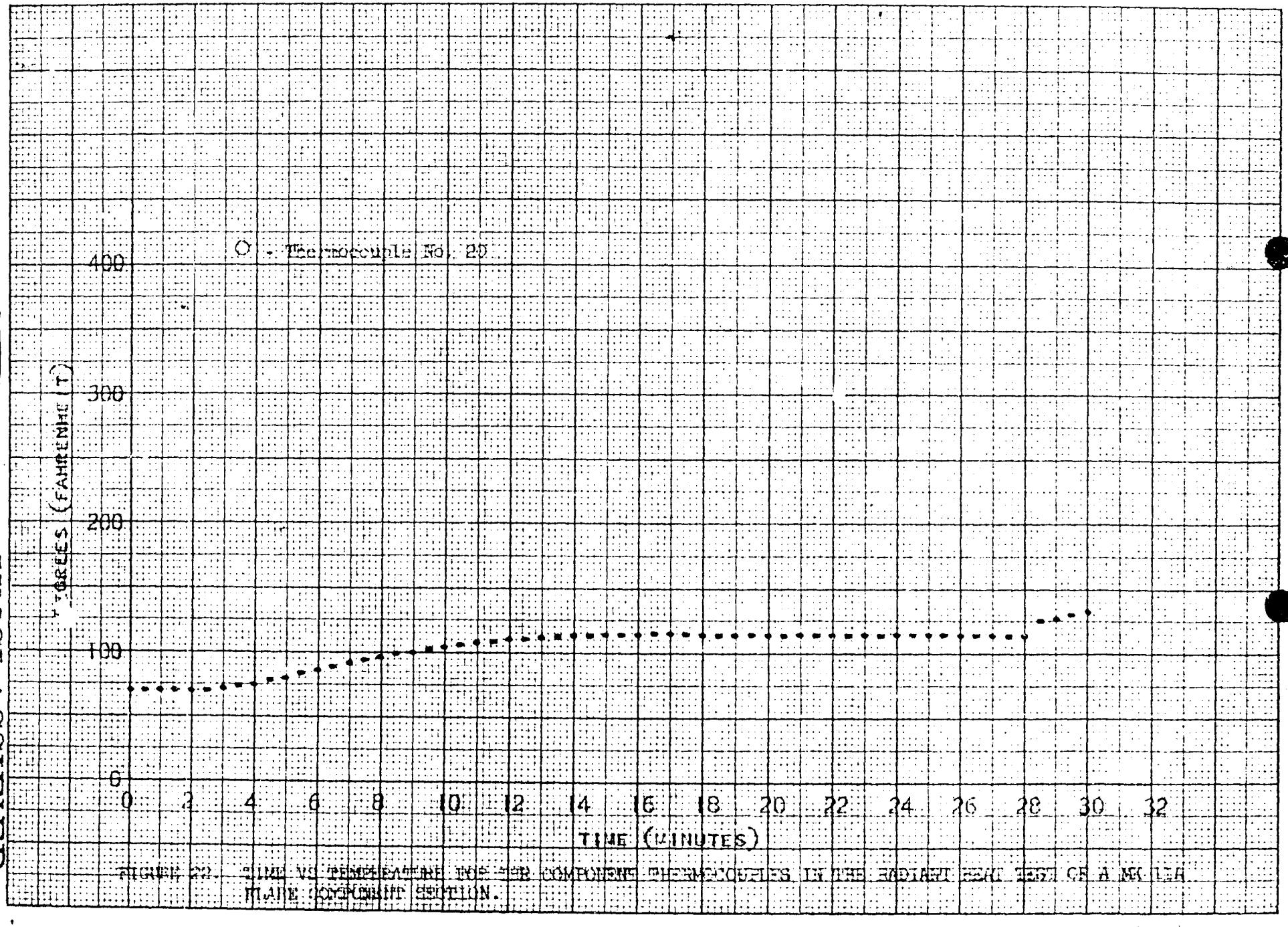


FIGURE 22. TIME VS TEMPERATURE FOR THE COMPONENT THERMOCOUPLES IN THE RADIANT HEAT TEST OF A MK 11A FLARE COMPONENT SECTION.

K&E 10 X 10 TO THE 1/2 INCH



[redacted]

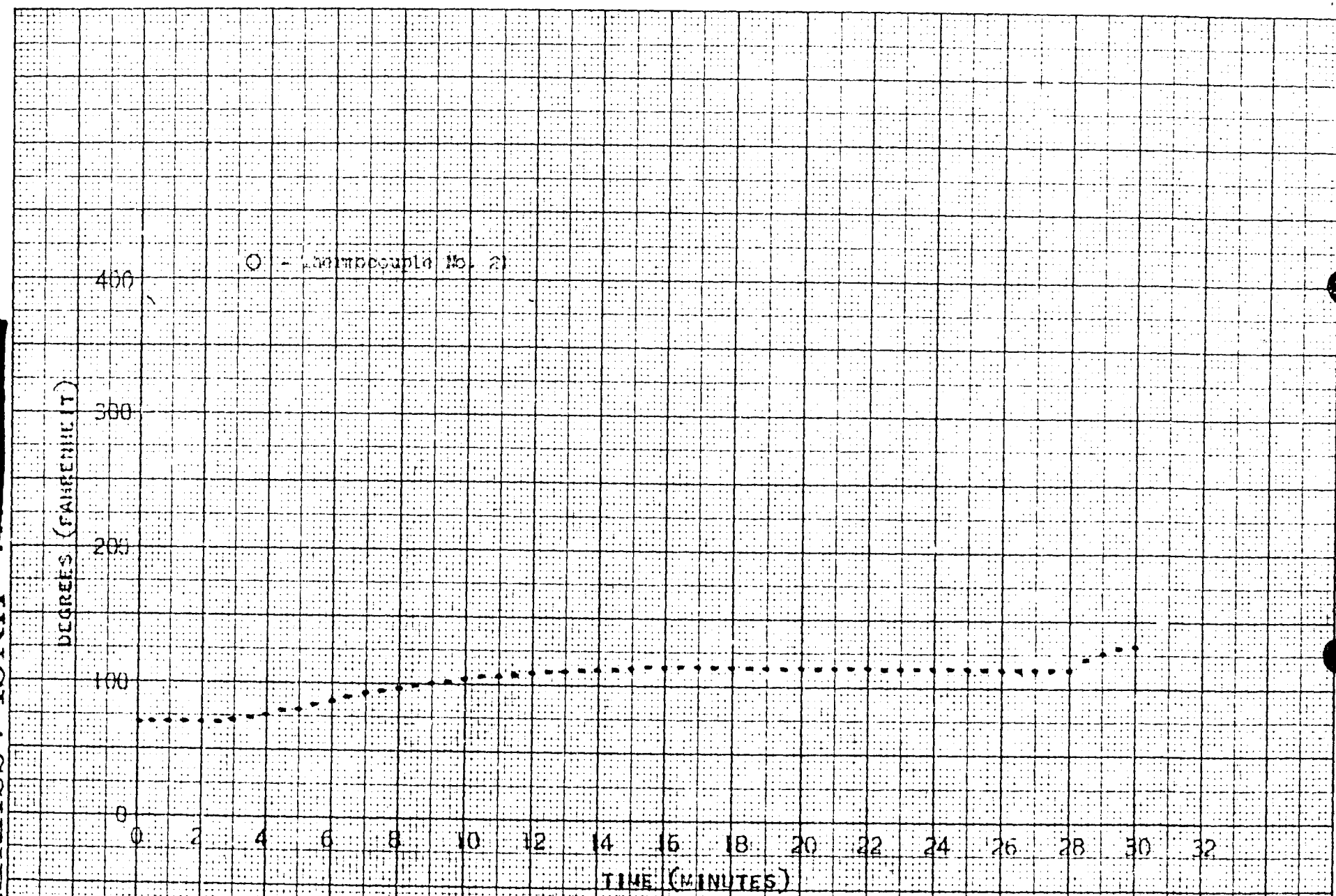


FIGURE 35. TIME VS TEMPERATURE FOR THE COMPONENT THERMOCOUPLES IN THE RADIANT HEAT TEST OF A MK 101A FLARE COMPONENT IGNITION.

[redacted]

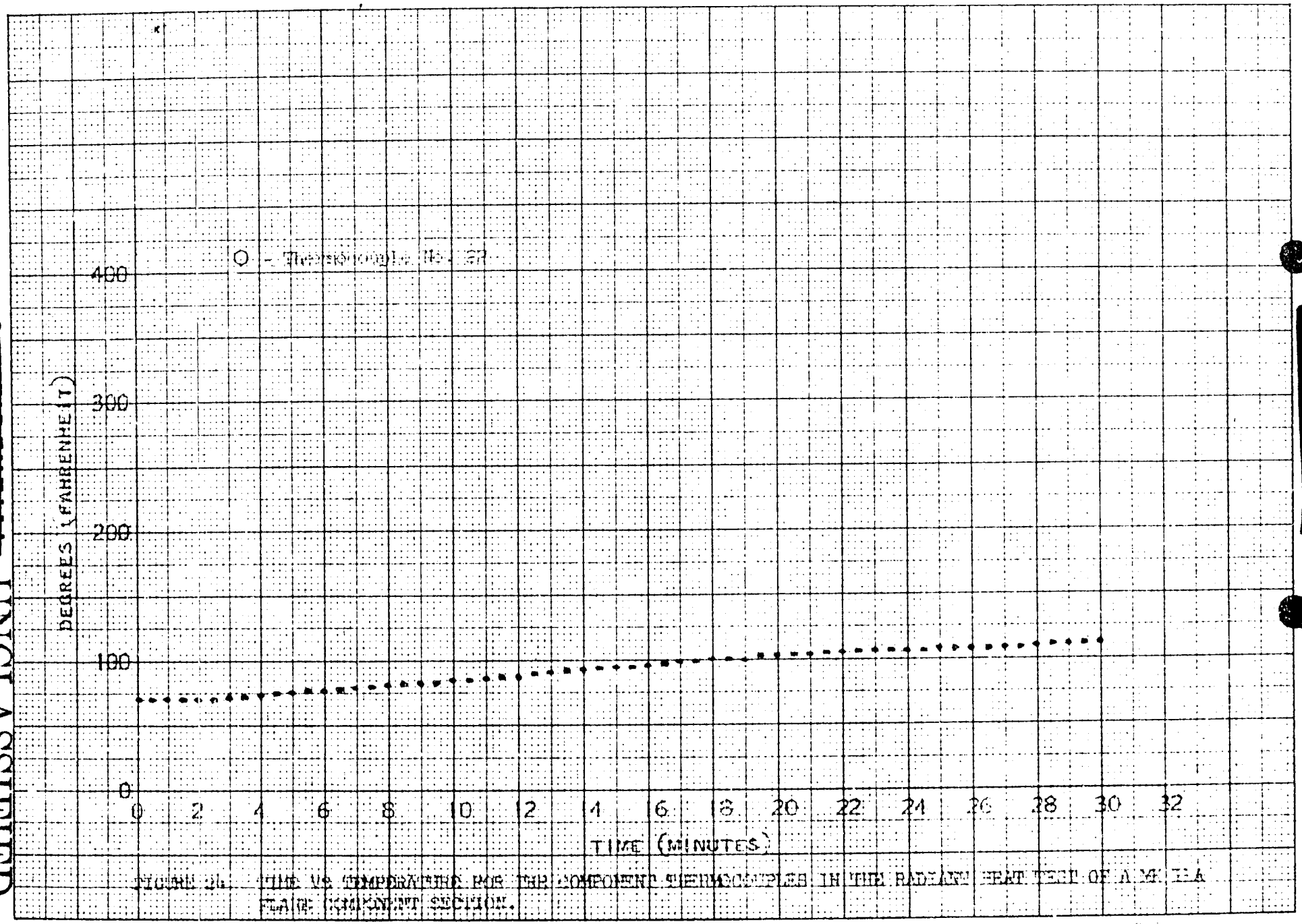


FIGURE 24. TIME VS TEMPERATURE FOR THE COMPONENT THERMOCOUPLES IN THE RADIANT HEAT TEST OF A [illegible] FLAME COMPONENT SECTION.

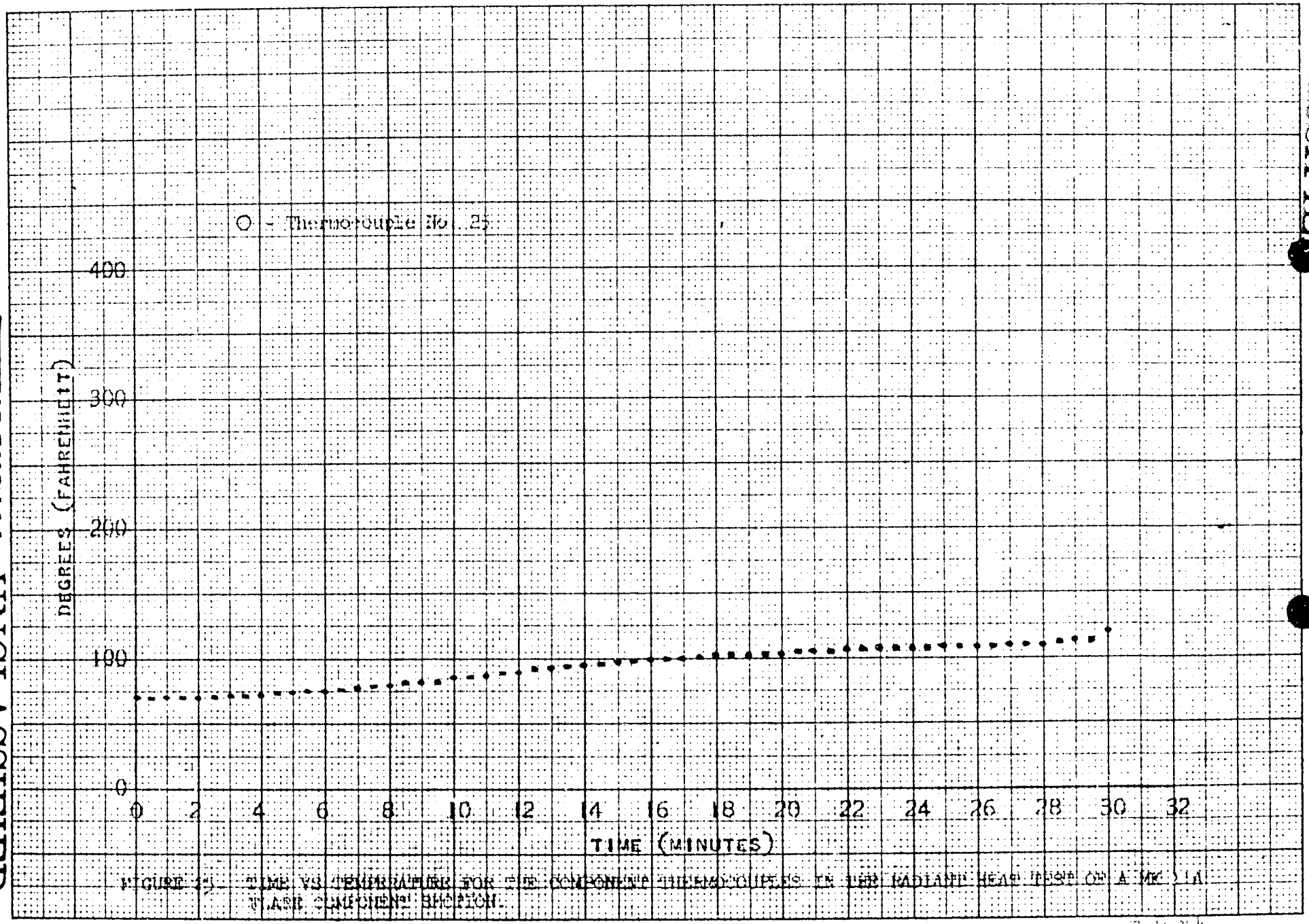


FIGURE 25 - TIME VS TEMPERATURE FOR THE COMPONENT THERMOCOUPLES IN THE RADIANT HEAT TEST OF A MK 11A FLARE COMPONENT SECTION.

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T-10354

TABLE I

Thermocouple Locations on the Mk 11A Flare Component Section in the Radiant Heat Test of a Mk 11A Flare Component Section

| Thermocouple No. | Location |
|---|---|
| 1 | Control, drilled and peened at the 0° location on the external skin of the flare section and midway between the end covers |
| 2. | Monitor No. 1, drilled and peened at 120° CCW from the control TC |
| 3. | Monitor No. 2, drilled and peened at 240° CCW from the control TC |
| 4 | Internal skin at 0° |
| 5 | Internal skin at 90° |
| 6 | Internal skin at 180° |
| 7 | Large inside face of the MC1793 |
| 8 | Zipper at 0° |
| 9 | Zipper at 170° |
| 10 | Bar on inside cover |
| 11 | Explosive valve |
| 12 | Inside 21.662 inch diameter plywood cover |
| 13 | Inside air mounted in center of flare section |
| 14 | Top surface of MC1793 |
| 15 | Forward flange at 0° |
| 16 | MC1793 |

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R-10354

TABLE I (Cont'd)

| Thermocoupled No. | Location |
|---|---|
| 17 | MC1564 |
| 18 | MC1508 |
| 19 | MC1410 |
| 20 | Cable on flange near MC1867 |
| 21 | Plastic housing of MC1867 |
| 22 | MC1867 |
| 23 | MC1564 |

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