Distribution

CE Buchwald, #6
VC Campbell, #6
PL Dee, #6
HJ Elias, BTP
WL Jones, #6
IC Kunz, #6
LC Maier, #6
WL Male, BTP
AN Reagan, #6
SS Sadowsky, #6
LE Swedlund, #6

October 13, 1955

Subject:

Emission Versus Cathode Temperature

Object:

To measure the increase in emission as the cathode temperature is increased from 500 to 1100°C.

Conclusion:

The slope of the emission versus cathode temperature curves did not become less as the temperature was increased. A space charge limiting effect was expected.

If emission versus heater voltage is plotted a slight space charge limiting effect can be shown.

An average emission versus cathode temperature curve and an average emission versus average heater voltage curve is shown in Fig. 6 and 7 respectively.

Procedure:

Five 17" 70° LVES tubes on life test for 285 hours were used for the measurements. The tubes have 2 mil pt-pt 10% rh thermocouples spot welded to the cathode just below the coating and these leads are brought out of the tube by spot welding to stem leads made of the same material. A Leeds and Northrup potentiometer model # 8657-C was used for the temperature measurements and a minimum of 5 minutes was allowed for the cathode temperature and emission to reach equilibrium.

The emission build-up at the end of 30 sec. was greater than 450ua for all tubes.

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Mechanical Engineering Unit
CATHODE RAY TUBE SUB-DEPARTMENT

ATD:jfe

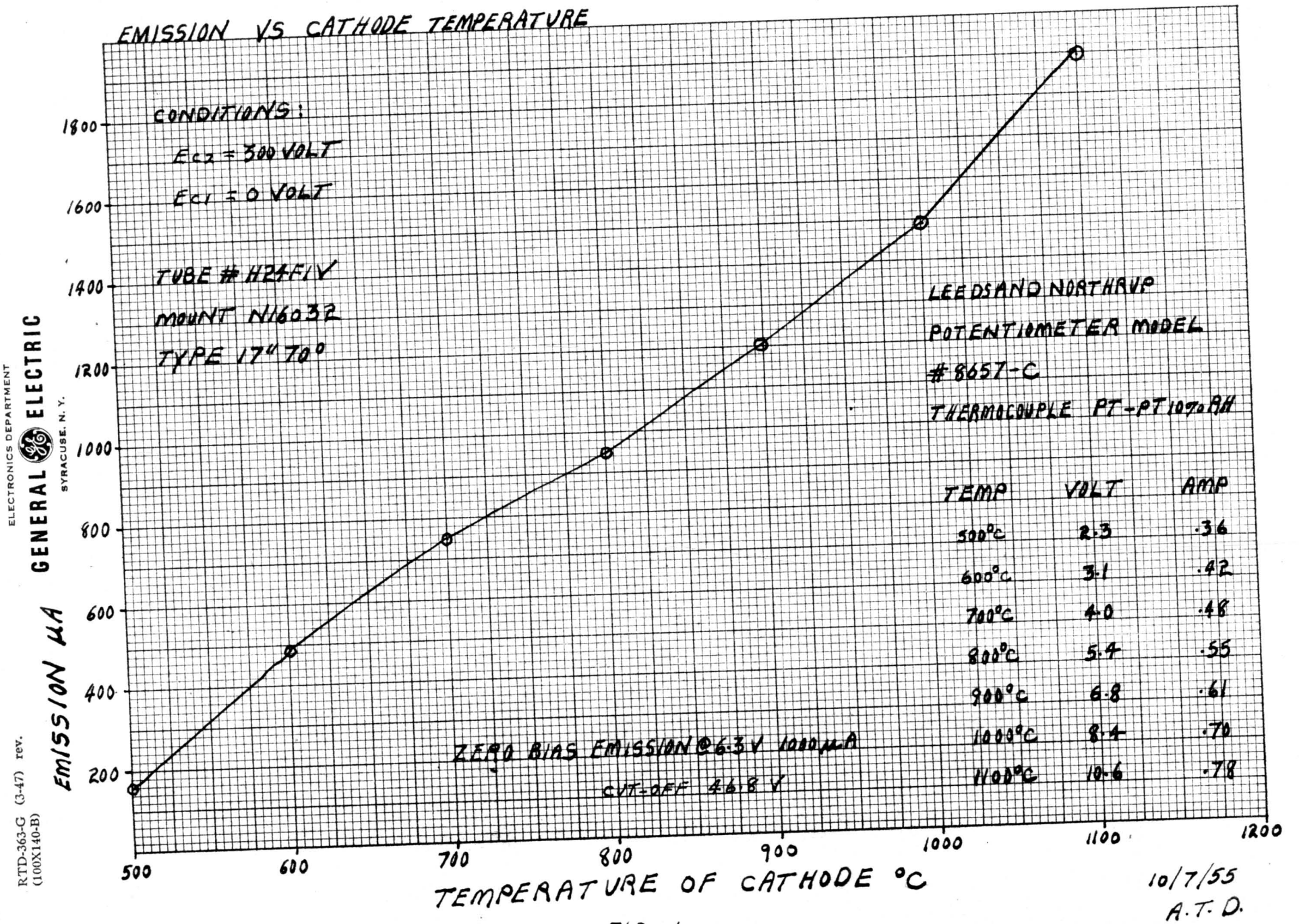

EMISSION VS CATHODE TEMPERATURE
CONDITIONS:
Ec2 = 300 VOLT
Ec1 = 0 VOLT
TUBE # H24F1V
MOUNT N16032
TYPE 17" 70°
LEEDS AND NORTHRUP
POTENTIOMETER MODEL
#8657-C
THERMOCOUPLE PT-PT10%RH
TEMP VOLT AMP
500°C 2.3 .36
600°C 3.1 .42
700°C 4.0 .48
800°C 5.4 .55
900°C 6.8 .61
1000°C 8.4 .70
1100°C 10.6 .78
ZERO BIAS EMISSION @ 6.3 V 1000 μA
CUT-OFF 46.8 V
EMISSION μA
1800
1600
1400
1200
1000
800
600
400
200
500
600
700
800
900
1000
1100
1200
TEMPERATURE OF CATHODE °C
10/7/55
A.T.D.
ELECTRONICS DEPARTMENT
GENERAL ELECTRIC
SYRACUSE, N. Y.
RTD-363-G (3-47) rev.
(100X140-B)

FIG. 1

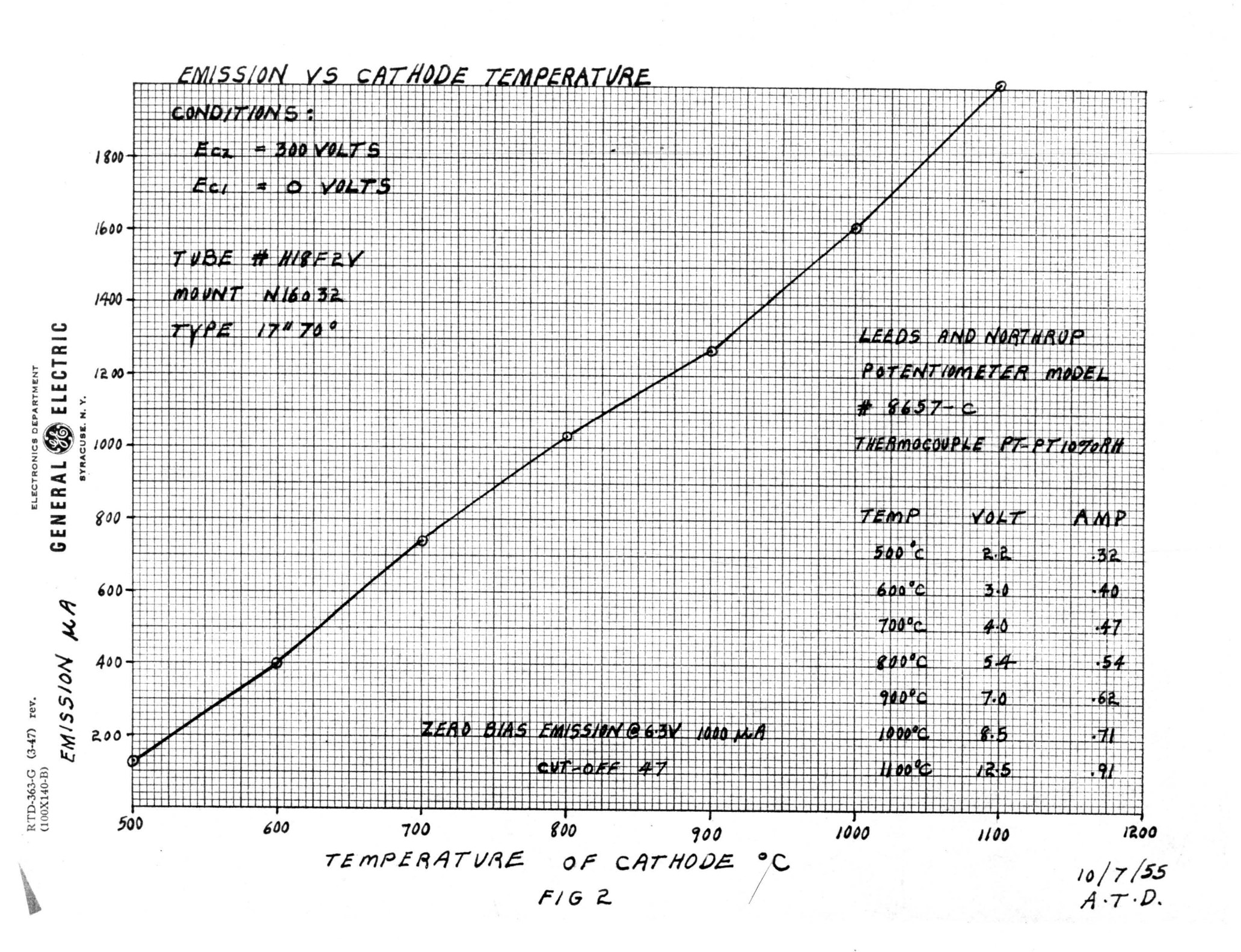
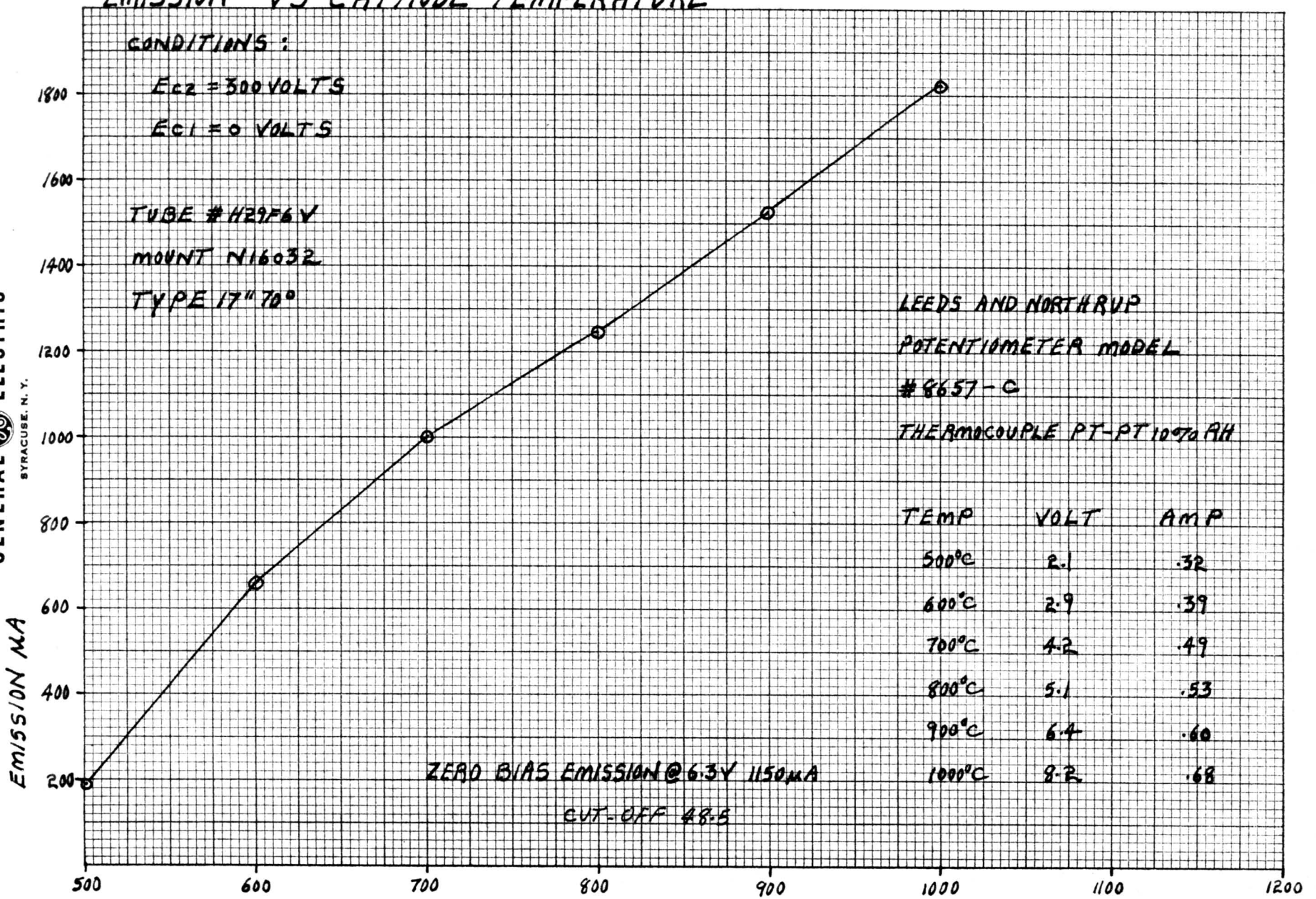

EMISSION VS CATHODE TEMPERATURE
CONDITIONS:
Ec2 = 300 VOLTS
Ec1 = 0 VOLTS
TUBE # H18F2V
MOUNT N16032
TYPE 17" 70°
LEADS AND NORTHROP
POTENTIOMETER MODEL
8657-C
THERMOCOUPLE PT-PT1070RH
TEMP VOLT AMP
500°C 2.2 .32
600°C 3.0 .40
700°C 4.0 .47
800°C 5.4 .54
900°C 7.0 .62
1000°C 8.5 .71
1100°C 12.5 .91
ZERO BIAS EMISSION @ 6.3V 1000 μA
CUT-OFF 47
EMISSION μA
1800
1600
1400
1200
1000
800
600
400
200
500
600
700
800
900
1000
1100
1200
TEMPERATURE OF CATHODE °C
ELECTRONICS DEPARTMENT
GENERAL ELECTRIC
SYRACUSE, N.Y.
RTD-363-G (3-47) rev.
(100X140-B)
10/7/55
A·T·D.

FIG 2

EMISSION VS CATHODE TEMPERATURE



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(100X140-B)

FIG 3

10/7/55
A.T.D.

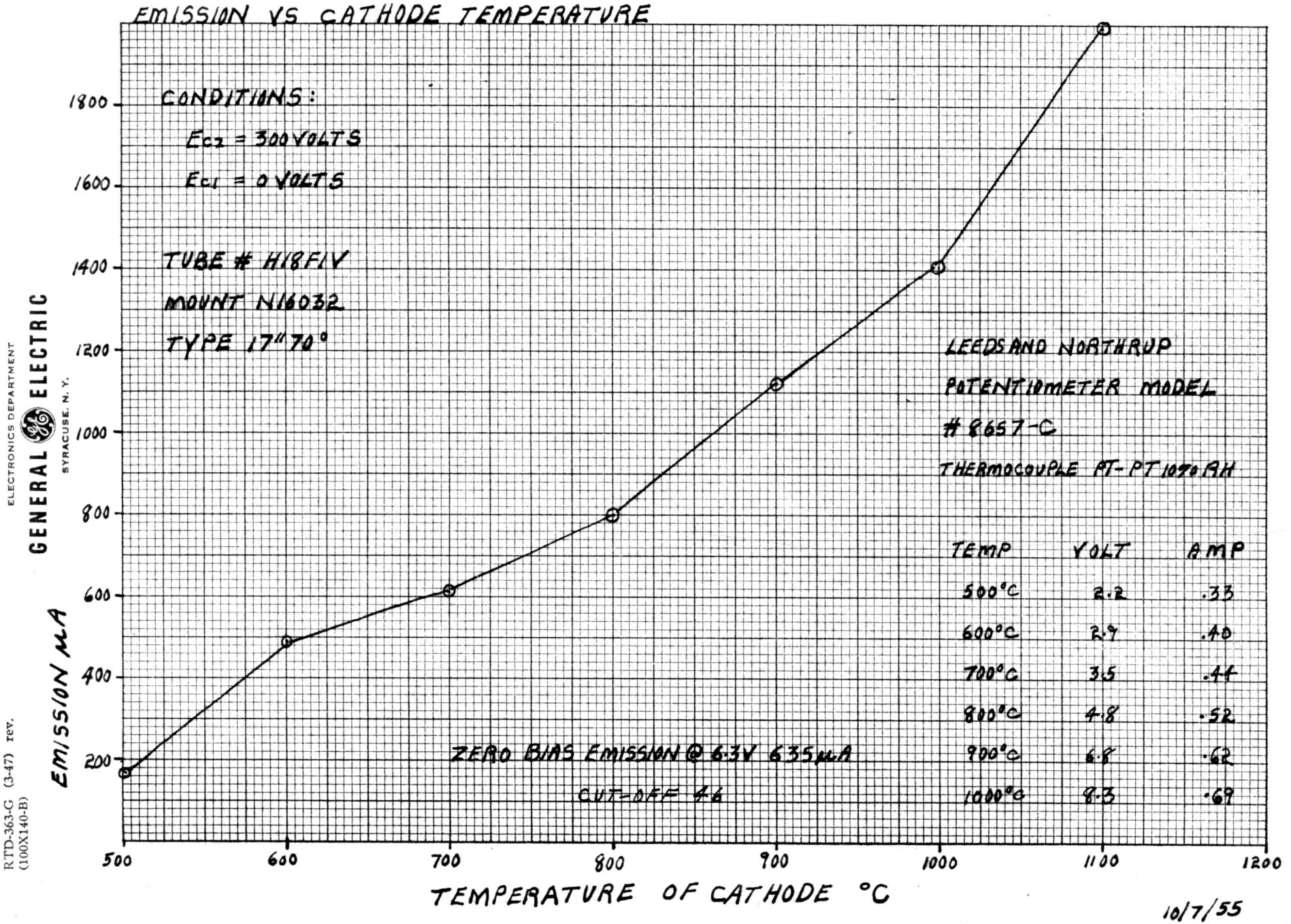
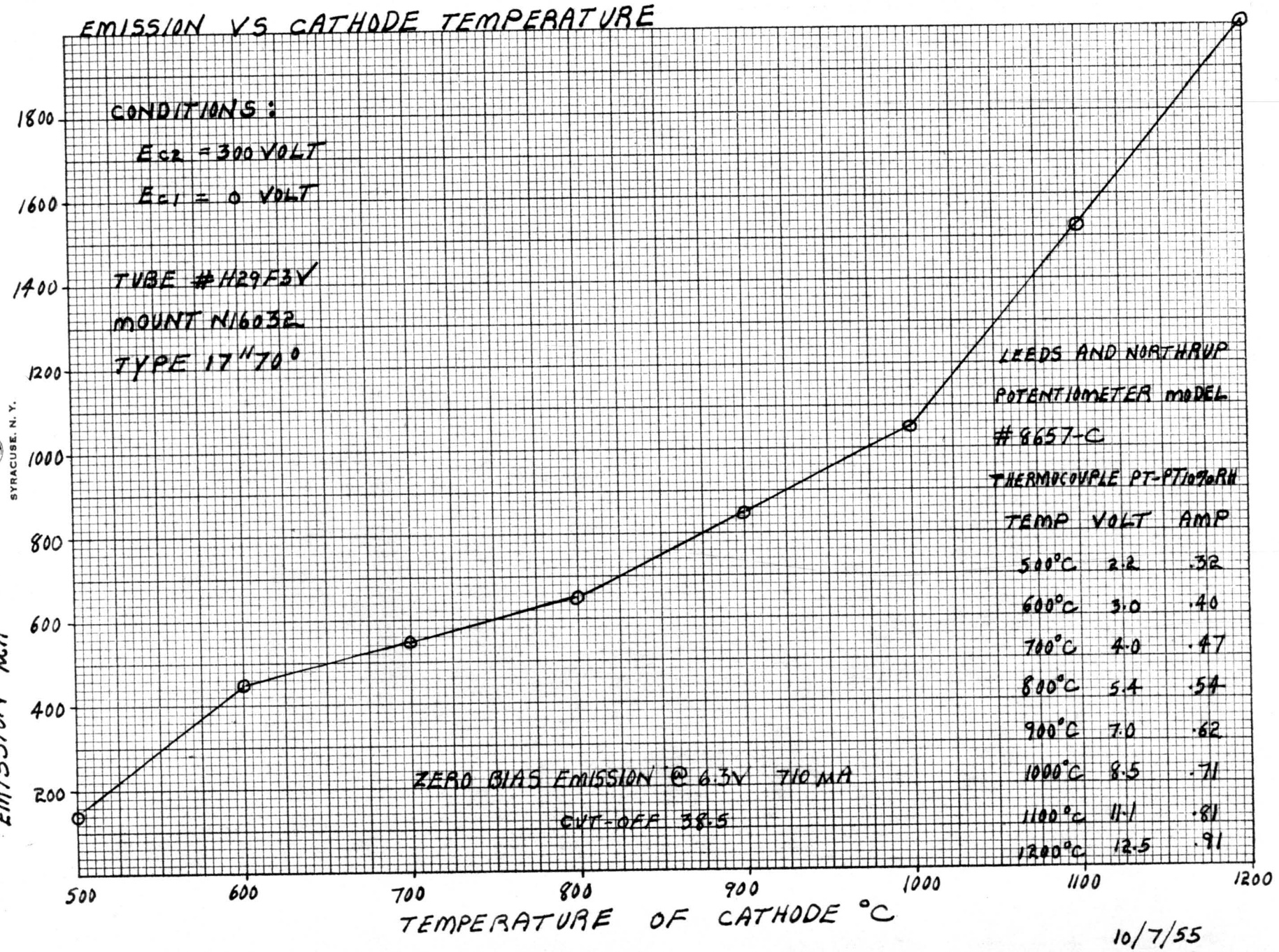


FIG 4

10/7/55
A.T.D.



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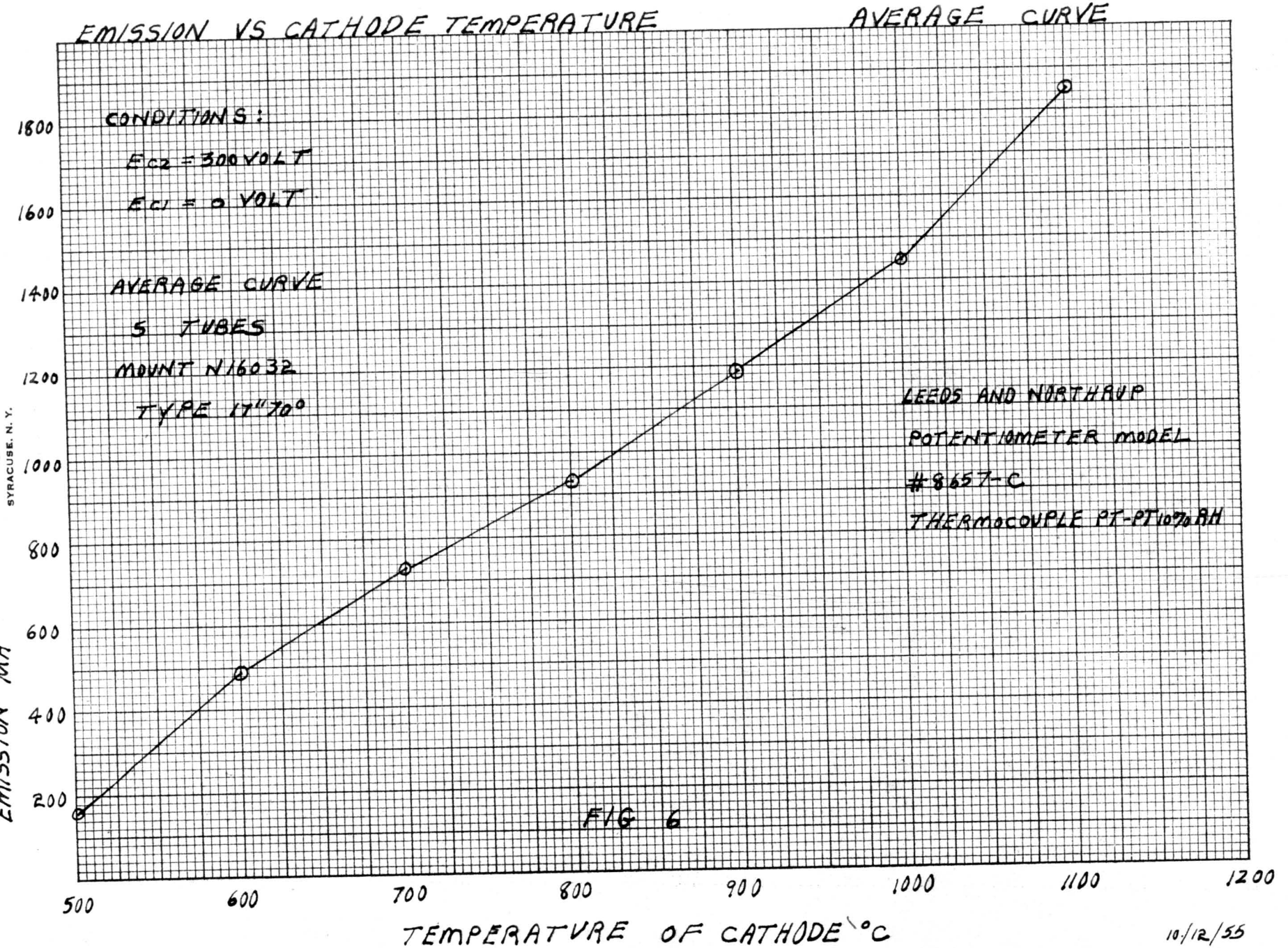
RTD-363-G (3-47) rev.
(100X140-B)

FIG 5

10/7/55
A.T.D.



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RTD-363-G (3-47) rev.
(100X140-B)

10/12/55
A.T.D.

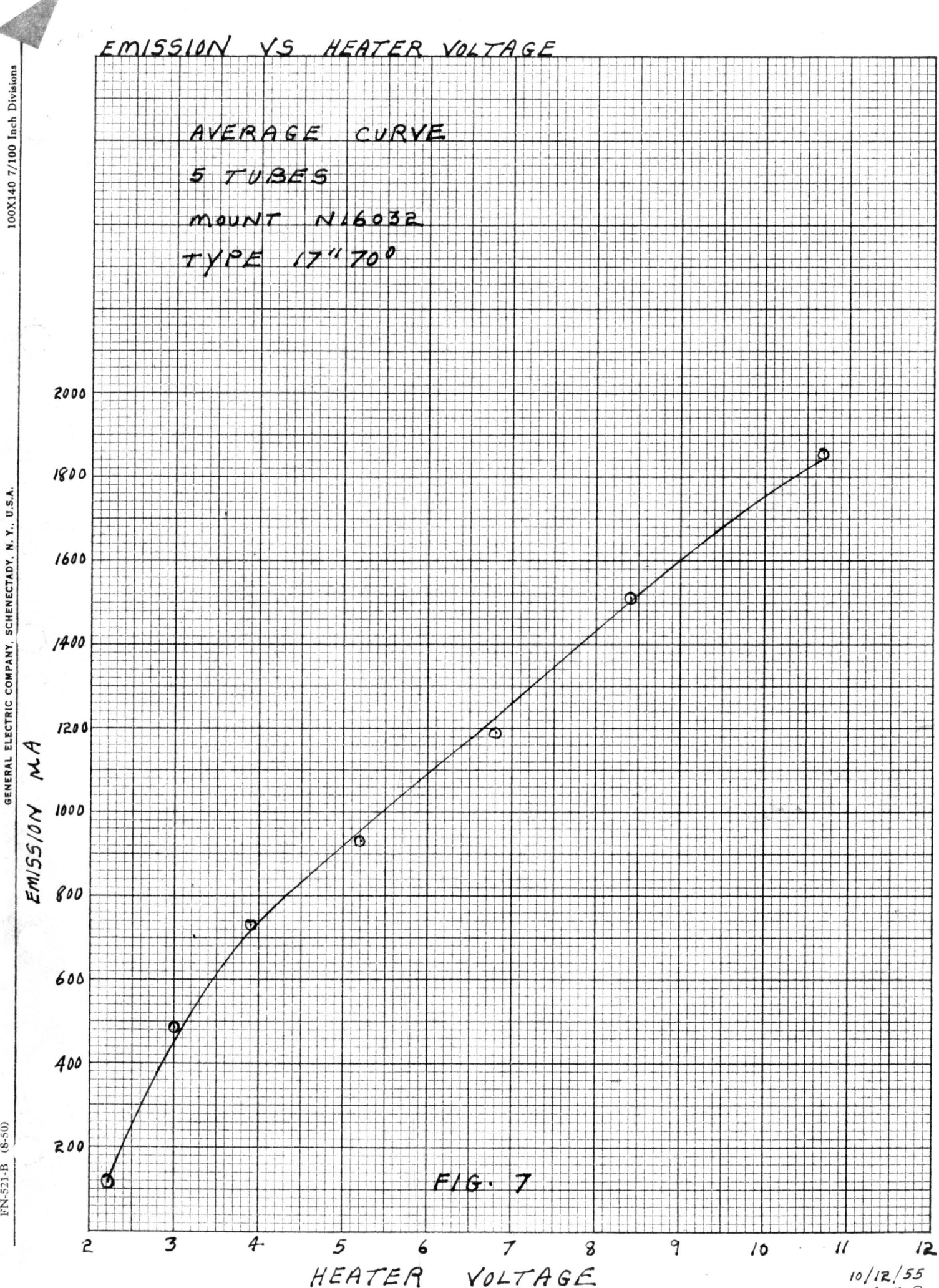

FIG. 7

Distribution

CE Buchwald, #6
~~VC Campbell, #6~~
PL Dee, #6
HJ Elias, BTP
WL Jones, #6
LC Kunz, #6
LC Maier, #6
WL Male, BTP
AN Reagan, #6
SS Sadowsky, #6
LE Swedlund, #6

Electronics Park
Syracuse, New York
October 24, 1955

Subject: Emission Versus Cathode Temperature

Please substitute the attached two graphs for Figs. 6 and 7 in the report Emission Versus Cathode Temperature by A. T. Devlin dated October 13, 1955.

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Monochrome Electrical and
Mechanical Engineering Unit
CATHODE RAY TUBE SUB-DEPARTMENT

ATD:jfe
attach.

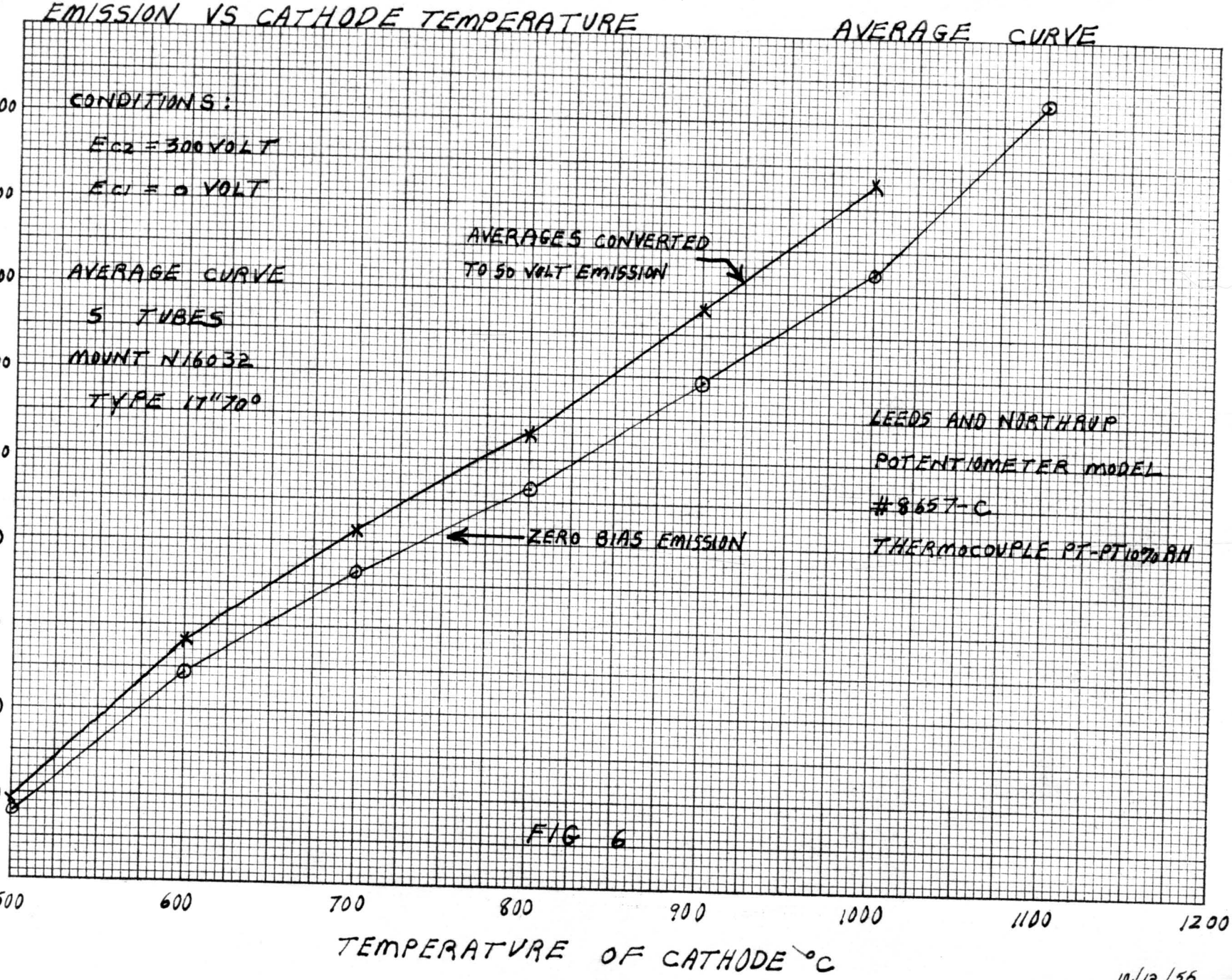

FIG 6

ELECTRONICS DEPARTMENT
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(100X140-B)

10/12/55
A.T.D.

ELECTRONICS DEPARTMENT
GENERAL ELECTRIC
SYRACUSE, N. Y.

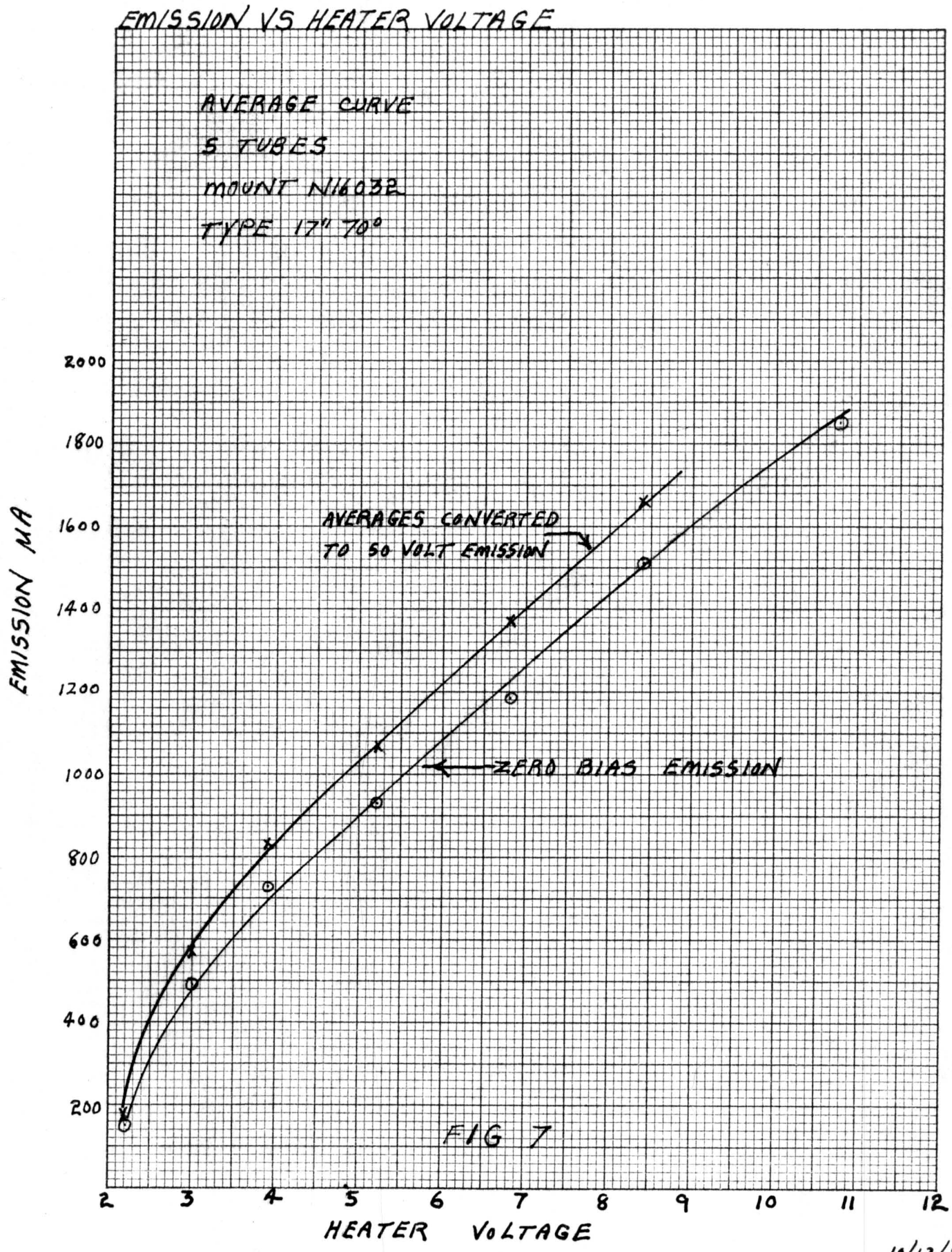

FIG 7

10/12/55
A.T.D.

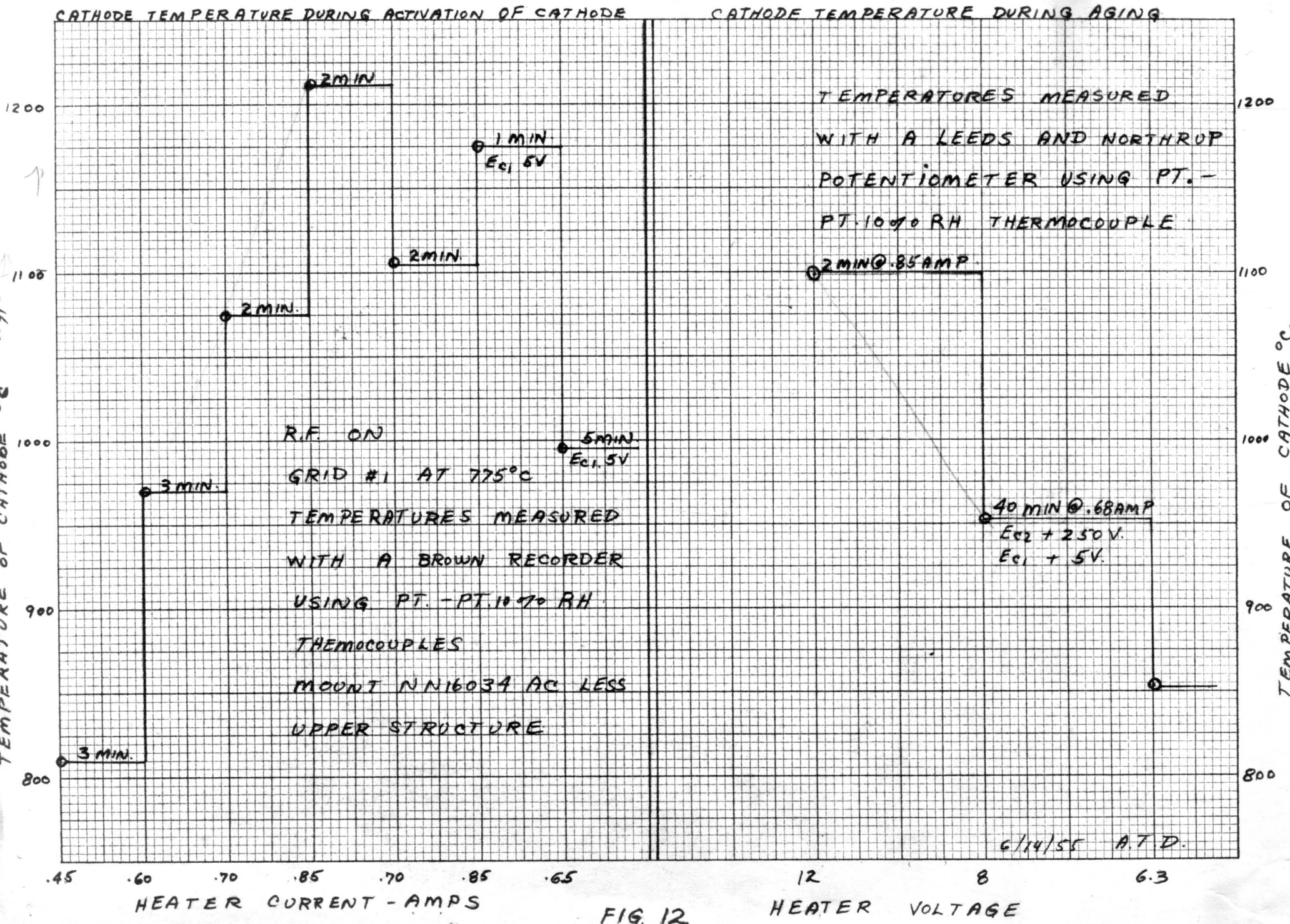
CATHODE TEMPERATURE DURING ACTIVATION OF CATHODE
CATHODE TEMPERATURE DURING AGING
TEMPERATURE OF CATHODE °C
1200
1100
1000
900
800
2 MIN
1 MIN
Ec1 5V
2 MIN
2 MIN
3 MIN
5 MIN
Ec1 5V
3 MIN
R.F. ON
GRID #1 AT 775°C
TEMPERATURES MEASURED
WITH A BROWN RECORDER
USING PT. - PT. 10% RH
THEMOCOUPLES
MOUNT NN16034 AC LESS
UPPER STRUCTURE
TEMPERATORES MEASURED
WITH A LEEDS AND NORTHRUP
POTENTIOMETER USING PT. -
PT. 10% RH THERMOCOUPLE
2 MIN @ .85 AMP
40 MIN @ .68 AMP
Ec2 + 250 V.
Ec1 + 5V.
6/14/55 A.T.D.
.45
.60
.70
.85
.70
.85
.65
12
8
6.3
HEATER CURRENT - AMPS
HEATER VOLTAGE

FIG. 12