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DEFENSE SATELLITE COMMUNICATIONS SYSTEM
TRAVELING WAVE TUBE AMPLIFIER
LIFE TEST REPORT

VOLUME II: LOW LEVEL TWTA

Prepared by:

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TORRANCE, CALIFORNIA 90509

1 FEB. 1978

FINAL REPORT

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Capt W. F. Nemeck, SAMSO/SKD, was the Project Officer for Space Communications Systems.

This report has been reviewed by the Information Office (OI) and is releasable to the National Technical Information Service (NTIS). At NTIS, it will be available to the general public, including foreign nations.

This technical report has been reviewed and is approved for publication.

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Traveling Wave Tube Amplifier (TWTA)
DSCS II, X-Band TWTA

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Data accumulated over a six (6) year life test period on DSCS II flight equivalent TWTA's is presented. Evaluation of the data is to determine trends and long term performance characteristics of traveling tube amplifiers.

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LIFE TEST REPORT
LOW LEVEL TRAVELING-WAVE TUBE AMPLIFIERS
MODEL 1200H

1.0 PURPOSE

The purpose of this test was to operate six low level developmental traveling-wave tube amplifiers (TWTA) for the stated period of time at operating conditions specified in the Statement of Work, Program 777. The data obtained in this test is to be used as a basis for determining the long term operating performance of each TWTA.

2.0 TEST OBJECTIVE

The test objective was to operate each TWTA at nominal ambient operating condition and environment to determine that each would maintain specified operating characteristics for the period of the life test as stated in the Program 777 Statement of Work For Traveling Wave Tube Amplifier Life Testing Continuation.

3.0 TEST ARTICLE

3.1 The list of the units under test is shown in Table I.

TABLE I
LIST OF TEST UNITS

HAC/EDD No.	TRW No.	Serial Numbers
B200300-121	C31054 1-1	12-1, 12-2, 12-3
B200300-122	C31054 1-2	22-1, 22-2, 22-3

3.2 Figure 1 (b) shows the Low Level Traveling-Wave Tube. Figure 2 shows the Life Test Rack. The Low Level TWTA's are mounted in the lower row of the left and center bays. The right bay contains the blower, power supplies, controls and elapsed time and current monitor meters.

4.0 SUMMARY OF TEST RESULTS

Summaries of the Life Test Data are shown in tabulations and graphs inserted at appropriate places in the discussion. This data was abstracted from the reduced recorded data attached as Appendix D.

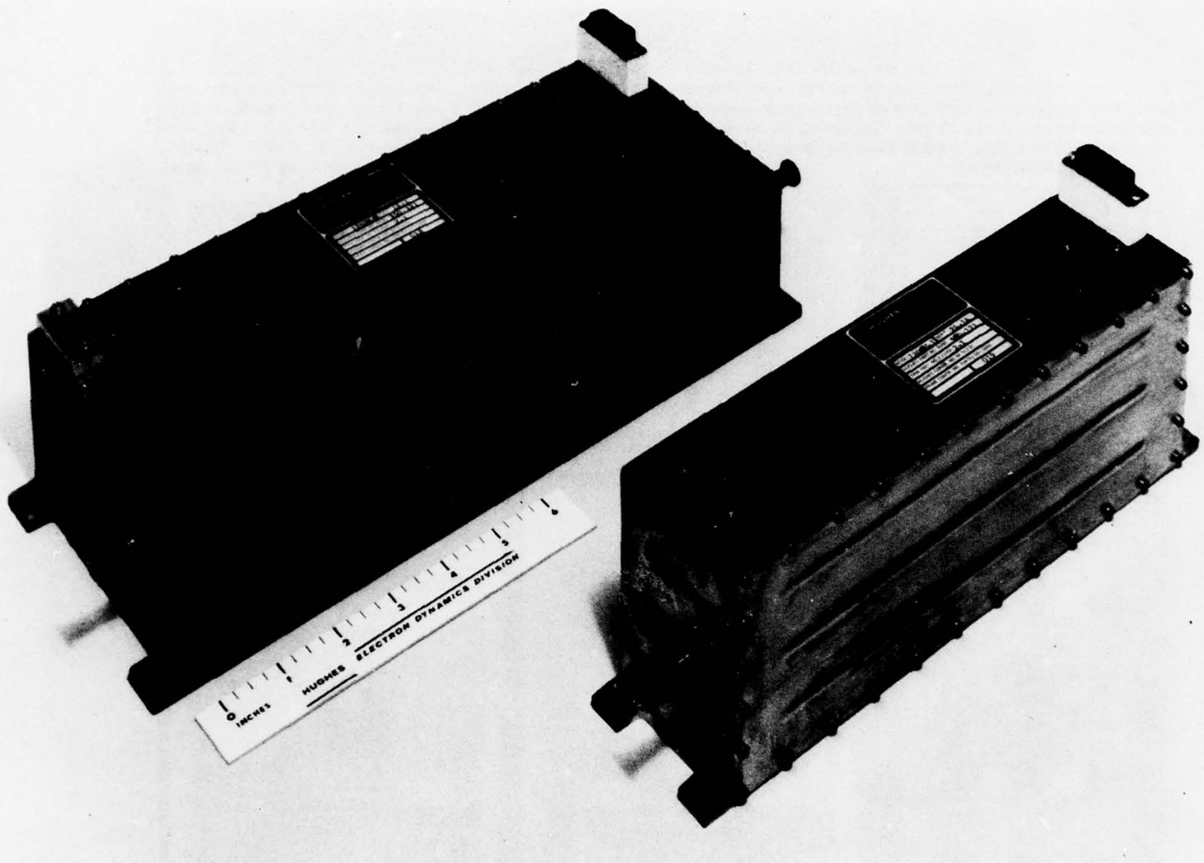
A total Life Test operating time of 295,142 hours for the six TWTA's was recorded.

One Low Level TWTA, Model 1200H, S/N 22-2, failed after 6784 high voltage hours of operation. The mode of failure was loss of emission from the tube cathode caused by a reaction that produced a sintered and fused coating. The source of the reactants was not clear, but a leak not detectable by helium-mass spectrographic detection methods or a virtual leak condition in the tube are most likely. See Appendix A, Malfunction Report 2355, for details of this failure.

5.0 TEST FACILITY AND PROCEDURE

5.1 Test Facility

The test facility consisted of a three-bay rack assembly. Two bays contained twelve TWTAs which included the six Low Level units in two rows mounted on water cooled plates to maintain a temperature of 90°C at the base plates. One bay contained the power supply, switches and indicators to provide the specified operating conditions and elapsed time meters. Test equipment used to make the periodic tests is listed in Table II.



1 (a) 1 (b)

Figure 1 (a) High Level and (b) Low Level Traveling-Wave Tube Amplifier.

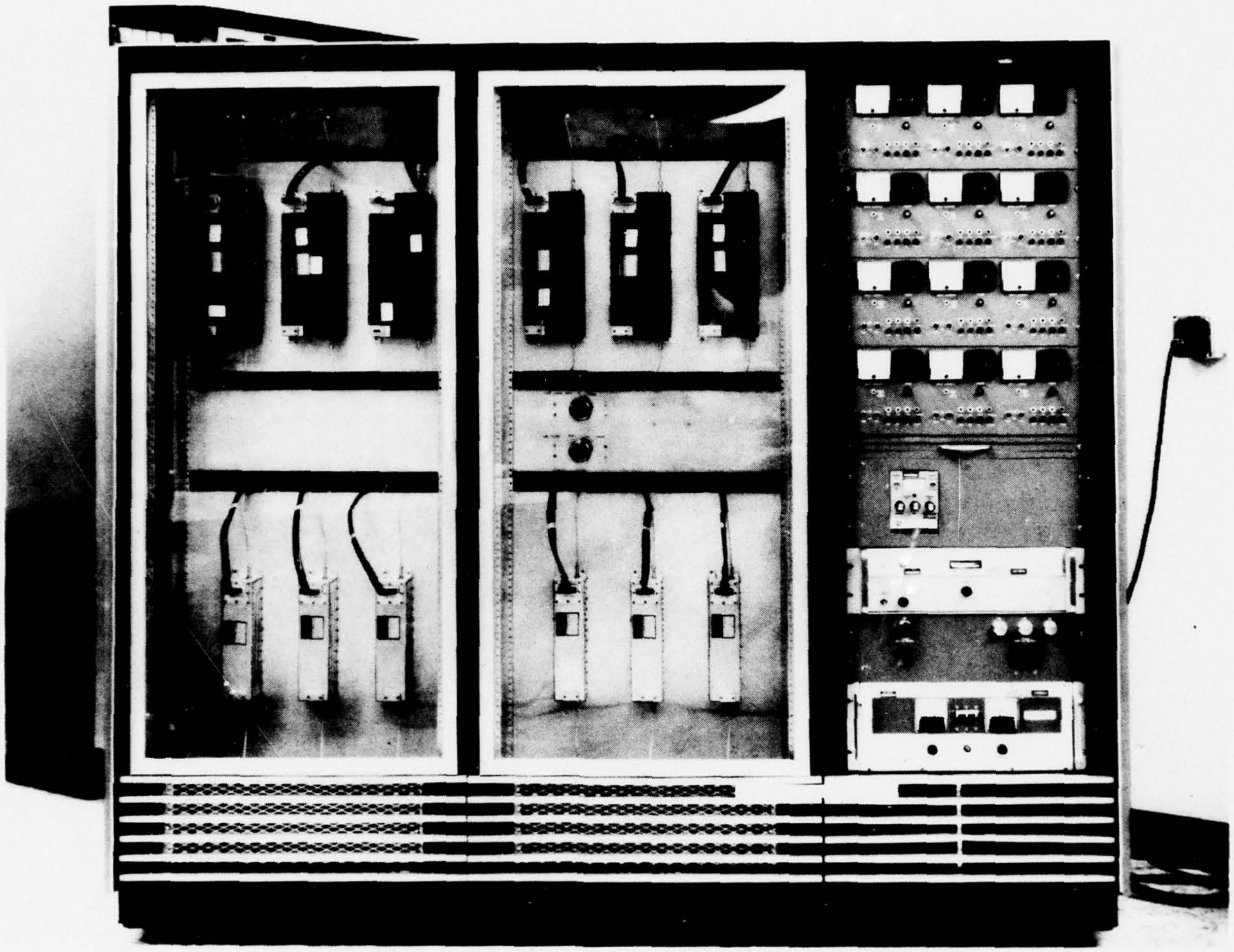


Figure 2 Life Test Rack.

TABLE II

LIST OF TEST EQUIPMENT

	Test Equipment	Manufacturer	Model No.
1.	Sweep Oscillator	H-P	RF Unit H01-8694B Series 8690
2.	X-Y Recorder	H-P	7035B
3.	Frequency Meter	H-P	537A
4.	20 dB Directional Coupler	Narda	3045C-20
5.	Crystal Detector	Alfred	1001
6.	PIN Modulator	H-P	8734A
7.	Invertor and Leveler Amplifier	HAC	401-8401A
8.	10 dB Attenuator	Narda	774-10
9.	Dual Directional Coupler	Narda	3024
10.	Crystal	H-P	423A
11.	Ratio Meter	H-P	416B
12.	Short (female)	Narda	
13.	Power Meter	H-P	432A
14.	Thermistor Mount	H-P	478A
15.	6 dB Attenuator	Weinschel	530A
16.	Low Pass Filter 8 GHz	Microlab	LA-80N
17.	High Power Load	Narda	376NM
18.	10 dB Directional Coupler	Narda	3034B-10
19.	20 dB Directional Coupler	Narda	4016-20
20.	Variable Attenuator	PRD	C1110
21.	10 dB Directional Coupler (Ku Band)	H-P	P752C
22.	Low Level Waveguide	H-P	P910A
23.	Coaxial Hybrid Coupler	Narda	3034
24.	Load	Weinschel	535-MN
25.	Signal Generator	PRD	1207
26.	20 dB Attenuator	Narda	777C-20
27.	DC Power Supply	Lamda	LK343FM
28.	Control Box	HAC	304083
29.	Digital Voltmeter	Fairchild	7000-OPT-1
30.	Oscilloscope	Tektronix	531A
31.	Current Probe	Tektronix	P6042
32.	Dual X-Y Recorder	H-P	136A

5.2 Test Procedure

Periodic testing was performed according to 777 TWTA Life Test Plan and Procedure LTPB200300-400 for Low Level TWTAs. See Appendix B. Block diagrams of the test configurations are shown in Appendix B, Life Test Plan and Procedure.

Weekly tests were performed until July 1973. After that date, monthly performance measurements were made of the listed parameters. At that time, regular measurements of Insertion Loss, Attenuator Input and Output Impedances, and Cathode Activity were initiated.

Four regularly spaced Bench Tests were made. These were performed according to the requirements of the Low Level Acceptance Test Procedures attached as Appendix C. This data is listed on a separate sheet and is inserted as the first page of data for each individual amplifier in Appendix D.

Additionally, a final Bench Functional Test was performed in accordance with the Life Test Plan and Procedure at the end of the extended life test period. Results of this testing is included in Appendix D.

6.0 DISCUSSION OF TEST RESULTS

6.1 Life Test Data

Appendix D contains the reduced test data recorded periodically during the Life Test. It is the most current, accurate data available, recorded in accordance with the latest issues of the specifications and test plans. The data is organized by numerically serialized unit. Following these data sheets for each unit, each parameter is plotted against a time scale so that trends or anomalies can be observed and compared against other parameters. The first page of each set of data sheets contains periodic tests made per Acceptance Test Procedure ATPB200300-400. See Appendix C for this procedure.

The remaining pages of data were recorded using Life Test Procedures LTPB200300-400 for Low Level TWTAs. See Appendix B for this procedure.

6.2 Data Presentation

Figure 3 presents a summary of the Life Test Data listing the maximum and minimum values recorded during the complete test.

Figure 4 presents data showing the initial value as a reference point and the percent change from the maximum and minimum values tabulated in Figure 3.

Figure 5 is a subjective tabulation of trends which is an attempt to show the general trend of the data over the extended Life Test period and a general description of the form the data takes during the period of the test. It also shows the change from start to finish, whether the values showed an increase or a decrease; and, in some instances, a value within which the data varied.

Figure 6 is a graphic presentation of the Cathode Activity data for the Low Level TWTAs. This graph shows the trend of decreasing cathode activity. Serial Number 22-3 exhibited sharply decreasing cathode activity for the first 25,000 hours after which the trend leveled off. After 45,000 hours, it again dropped sharply. It is still within the specified limits. No significant change of other measured parameters of this TWT has occurred.

Figures 7 through 18 are condensed data plots of selected parameters. Data points at approximately equal intervals of time are plotted and overall trends for these parameters are shown.

Serial Number 22-1 has shown a steady rise in Helix current telemetry voltage. This characteristic is not evident in any of the remaining TWTAs, nor is any effect visible in other measured parameters.

The orginal data presents the remaining parameters in a manner which clearly shows the life trend of their characteristics. See Appendix D.

HUGHES **ELECTRON DYNAMICS DIVISION**
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CUSTOMER TEST DATA SHEET

TEST NAME LOW LEVEL TWTA LIFE TEST DATA SUMMARY

SPEC NO. LTPB200300-400

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o			TOTAL ACCUMULATED HOURS	58873	58151	56824	59498	6784	55012
TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	-121 SN12-1	-121 SN12-2	-121 SN12-3	-122 SN22-1	-122 SN22-2	-122 SN22-3
INPUT CURRENT TELEMETRY VOLTAGE			V	2.409 2.050	2.709 2.22	2.793 2.289	2.564 2.079	2.095 2.020	2.494 2.099
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.580 3.001	3.534 3.005	3.464 3.410	3.350 3.280	3.251 3.167	3.54 3.48
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.105 3.090	3.003 2.688	3.194 2.946	3.953 3.807	3.784 3.640	3.074 2.936
HELIX CURRENT TELEMETRY VOLTAGE			V	1.160 0.890	2.094 1.593	1.470 1.170	1.853 1.145	3.436 2.167	1.220 0.783
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.67 2.63	2.949 2.900	3.910 3.154	2.832 2.790	2.698 2.539	3.041 3.017
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	27.95 27.00	28.40 27.25	27.88 27.24	28.30 27.40	27.85 27.15	28.60 27.60
Gss FREQ. f_o (PARA. 4.3.1)	35	39.5	db	37.1 34.6#	38.60 36.59	39.6# 38.00	37.06 35.65	36.93 34.29#	39.21 38.48
I_L INSERTION LOSS			db	>100 98.0	>100 98.0	>100 97.0	>100 95.0	>100	>100
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS	23.90 22.19	19.90 18.91	22.07 21.24	28.00 18.18	- -	21.54 20.96
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS	24.48 23.60	21.01 19.28	23.16 22.32	24.0 17.18	- -	22.61 22.10
T_K CATHODE ACTIVITY	6.0	--	SEC	11.8 8.0	12.5 10.0	13.2 7.6	14.7 9.4	11.3 9.8	13.5 6.0
SIGNIFICANT EVENT NOTES			NOTE 1					NOTE 2	

SIGNIFICANT EVENT NOTES

1. Recorded Values a. Top number in box is the maximum value measured.
   b. Bottom number in box is the minimum value measured.
   c. # - Measured value did not meet specification limit.
2. Failed after 6784 hours operation. Reference Malfunction Report and Analysis Report 2355.

gur S ry Low el Te Data

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CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______
MODEL NO. B200300-121 / B200300-122 SERIAL NO. ______
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC NO.: LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o

TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	SN12-1 Initial Value	SN12-1 Percent Change	SN12-2 Initial Value	SN12-2 Percent Change	SN12-3 Initial Value	SN12-3 Percent Change	SN22-1 Initial Value	SN22-1 Percent Change	SN22-2 Initial Value	SN22-2 Percent Change	SN22-3 Initial Value	SN22-3 Percent Change
INPUT CURRENT TELEMETRY VOLTAGE			V	2.084	+15.59 - 1.63	2.280	+18.81 - 2.63	2.316	+20.59 - 1.16	2.085	+22.97 - 0.28	2.026	+3.4 -0.3	2.106	+18.42 - 0.33
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.560	+ 0.56 -15.70	3.498	+ 1.03 -14.09	3.439	+ 0.72 - 0.84	3.313	+ 1.11 - 0.99	3.208	+1.34 -1.26	3.509	+ 0.38 - 0.82
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.104	+ 0.03 - 0.45	2.913	+ 3.09 - 7.72	3.188	+ 0.18 - 7.59	3.953	+ 0.0 - 3.69	3.769	+0.397 -3.42	3.058	+ 0.52 - 3.99
HELIX CURRENT TELEMETRY VOLTAGE			V	1.042	+11.32 -14.58	1.819	+15.12 -12.42	1.365	+ 7.69 -14.28	1.178	+57.30 - 2.80	2.239	+54.08 -2.82	0.805	+51.55 - 2.73
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.652	+0.678 -0.829	2.918	+ 1.06 - 0.62	3.167	+23.46 - 0.41	2.828	+ 0.14 - 1.34	2.692	+0.22 -5.68	3.040	+ 0.03 - 0.75
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	27.00	+3.51 -0.0	27.35	+ 2.81 - 0.36	27.40	+ 1.75 - 0.58	27.70	+ 2.16 - 1.08	27.50	+1.27 -1.27	27.75	+ 3.06 - 0.54
Gss FREQ. f_o (PARA. 4.3.1)	35	39.5	db	35.38	+4.86 -2.20	37.03	+ 4.24 - 1.18	38.86	+ 1.90 - 2.21	35.93	+ 3.14 - 0.78	36.68	+0.68 -6.52	38.85	+ 0.92 - 0.95
I_L INSERTION LOSS Note 2			db	98.00	-	96.00	-	>100	-	>100	-	-	-	>100	-
R_{AIN} ATTENUATOR RESISTANCE, INPUT Note 2			OHMS	22.58	+5.84 -1.73	18.9	+ 5.29 - 0.0	21.24	+ 3.90 - 0.0	20.87	+34.16 -12.89	-	-	20.96	+ 2.76 - 0.0
R_{AO} ATTENUATOR RESISTANCE, OUTPUT Note 2			OHMS	23.60	+3.73 -0.0	20.15	+ 4.26 - 4.51	22.32	+ 3.76 - 0.0	17.21	+39.45 - 0.17	-	-	22.19	+ 1.89 - 0.40
T_K CATHODE ACTIVITY	6.0	--	SEC	9.8	+16.95 -18.36	11.4	+ 9.65 -12.28	12.1	+ 9.09 -37.19	10.1	+45.54 - 6.93	10.5	+7.6 -6.7	13.1	+ 3.05 -54.19
SIGNIFICANT EVENT NOTES					NOTE 1		NOTE 1		NOTE 1		NOTE 1		NOTE 1		NOTE 1

SIGNIFICANT EVENT NOTES

1. Percent changes are derived from the differences between the Initial Value (Final acceptance value) and the Maximum and Minimum Value from Figure 3.
2. Initial Parameter Measurements recorded on 8/31/72

Figure 4 Summary of Low Level TWTA Life Test Parameter changes.

777 TRAVELING-WAVE TUBE AMPLIFIER

LIFE TEST DATA TREND ANALYSIS

MODEL 1200H

LIFE TEST UNIT	MEASURED PARAMETER TRENDS										
	TELEMETRY VOLTAGES					SATURATED POWER OUTPUT Po (SAT)	SMALL SIGNAL GAIN Gss	INSERTION LOSS I_L	ATTENUATOR RESISTANCE		CATHODE ACTIVITY T_K
	INPUT CURRENT	CATHODE CURRENT	HEATER VOLTAGE	HELIX CURRENT	CATHODE VOLTAGE				INPUT RAIN-OHMS	OUTPUT RAO-OHMS	
Model 1200H LOW LEVEL TWTA											
S/N 12-1	K∼	↓	K	K	K	↓	↓0.5 dB	K	↑	↑	↓
S/N 12-2	K∼	↓	↓	K∼	↑	↓	↑1 dB	K	↑	↑	K∼
S/N 12-3	K∼	K	↓	K∼	↑	K	K∼	K	↑	↑	↓
S/N 22-1	K∼	↓	↓	↑	K∼	K	↓1 dB	K	↑ INT	↑ INT	↓
S/N 22-2	K	K	K	Δ↑	K	K∼	↓∼ 1.0 dB	-	-	-	↓
S/N 22-3	K∼	↓	↓	K∼	K	↓	K∼	K	↑	↑	Δ↓

SYMBOL DEFINITIONS

K - *Relatively constant over entire time period*
OS - Readings were out of specification limit for the majority of readings
↑ - Readings increased slightly from start to end
↓ - Readings decreased slightly from start to end
∼ - *Readings varied slightly from start to end*
K∼ - Indicates slight variation around a fairly constant value
Δ - Readings changed a large amount in the direction indicated
INT - *Intermittent*

Figure 5 Subjective Analysis of Life Test Data.

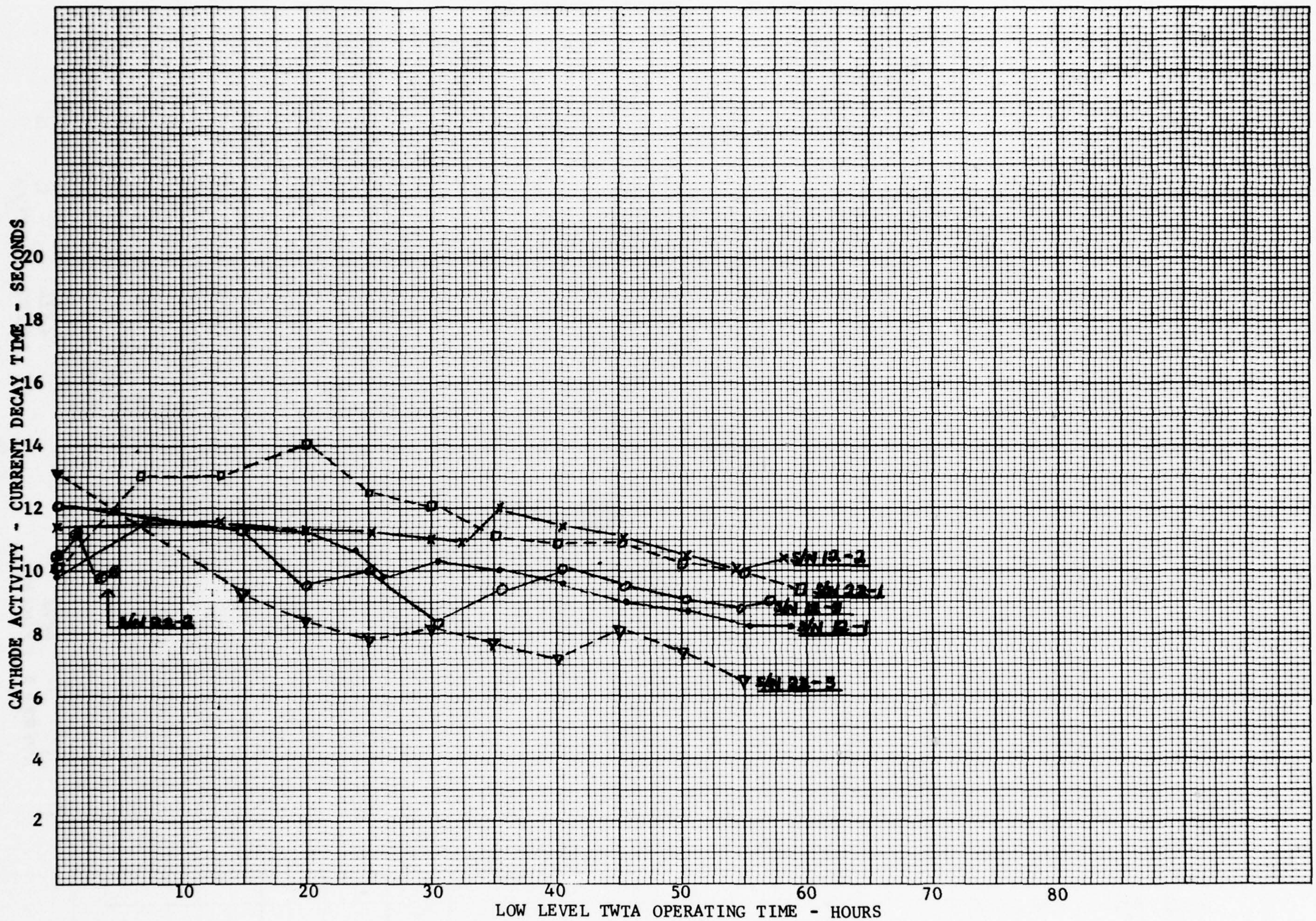


Figure 6 Cathode Activity as a Function of Operating Time.

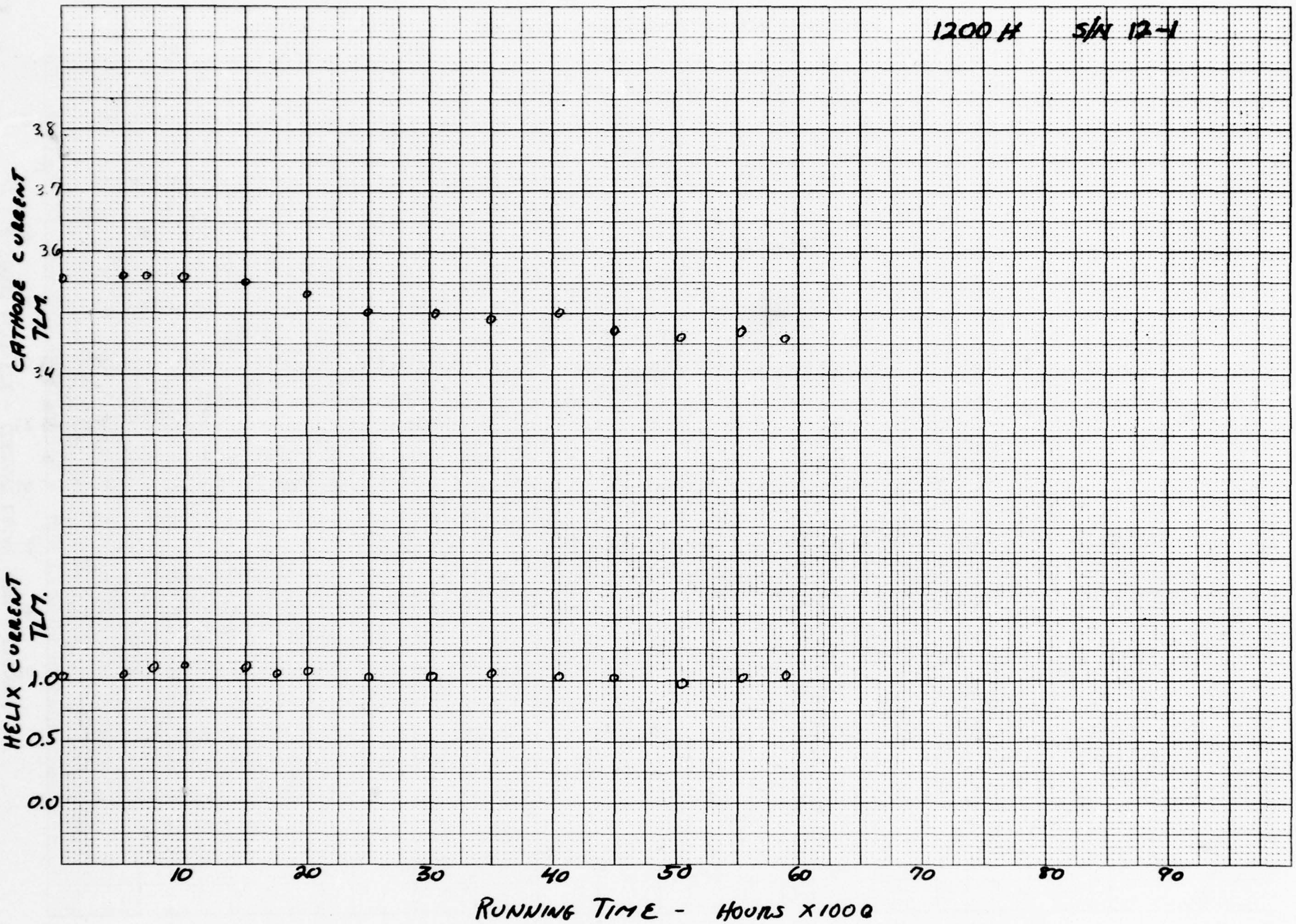


Figure 7 Telemetry data. S/N 12-1.

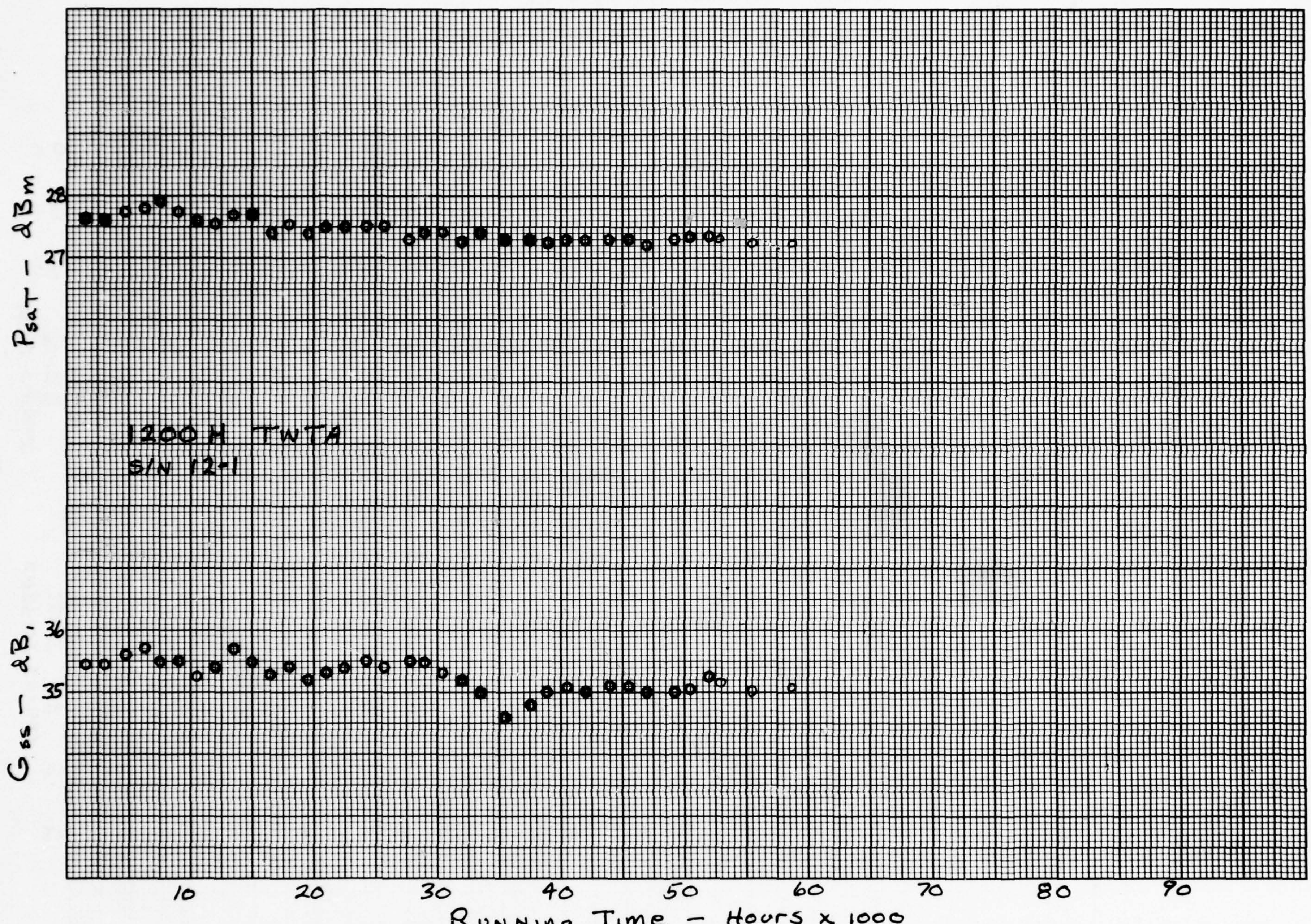


Figure 8 Saturated power and small signal data. S/N 12-1.

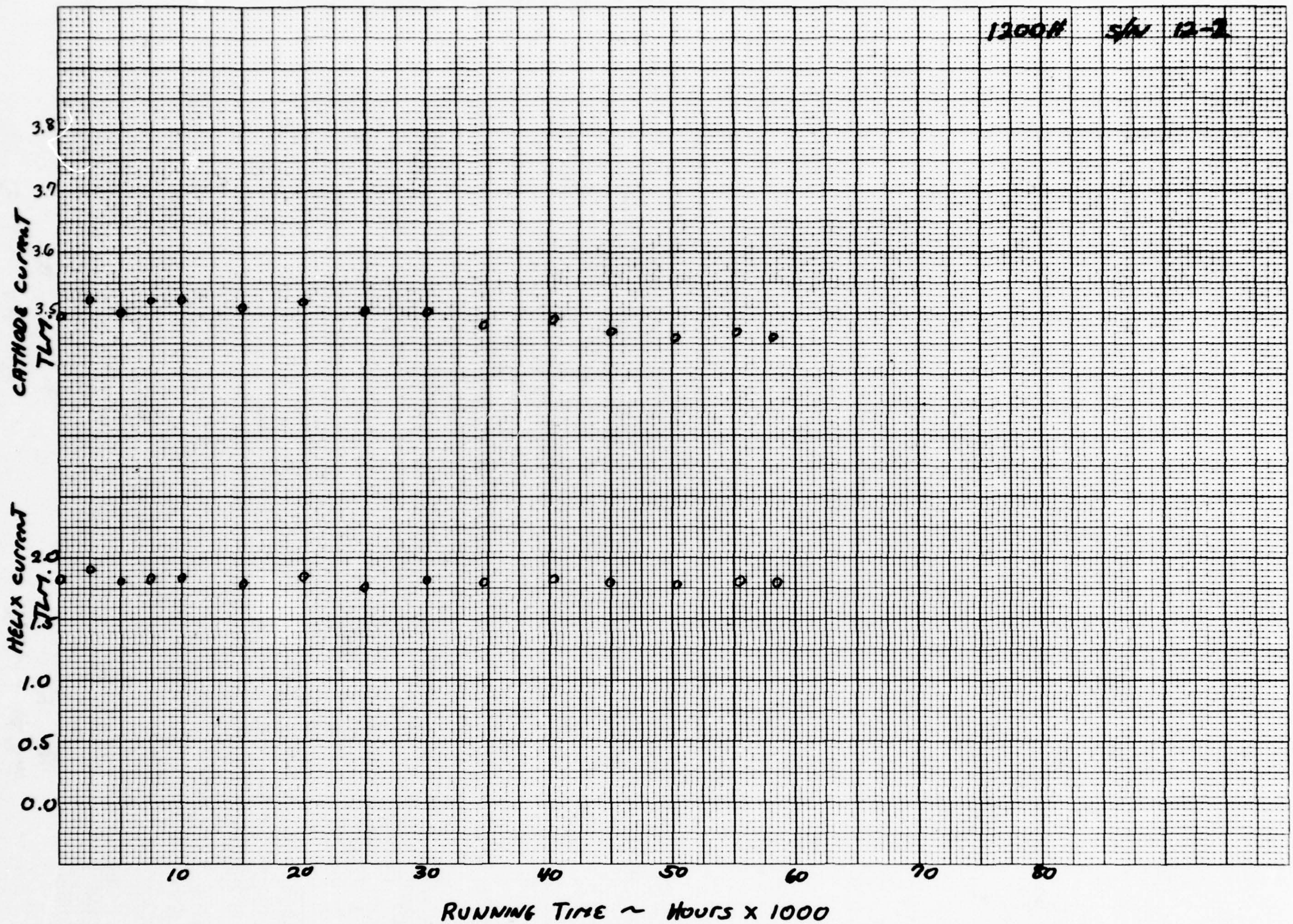


Figure 9 Telemetry data. S/N 12-2.

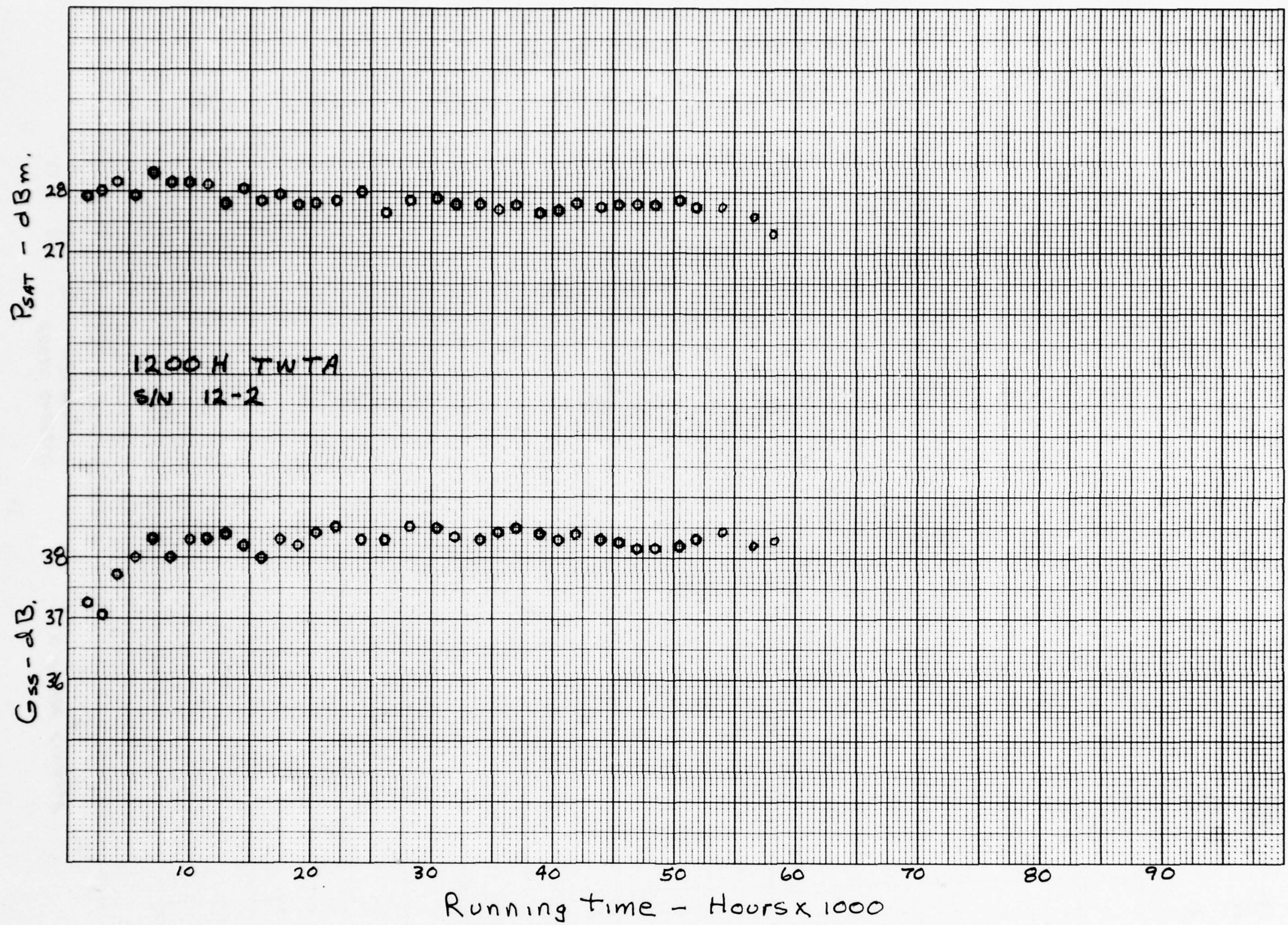


Figure 10 Saturated power and small signal gain. S/N 12-2

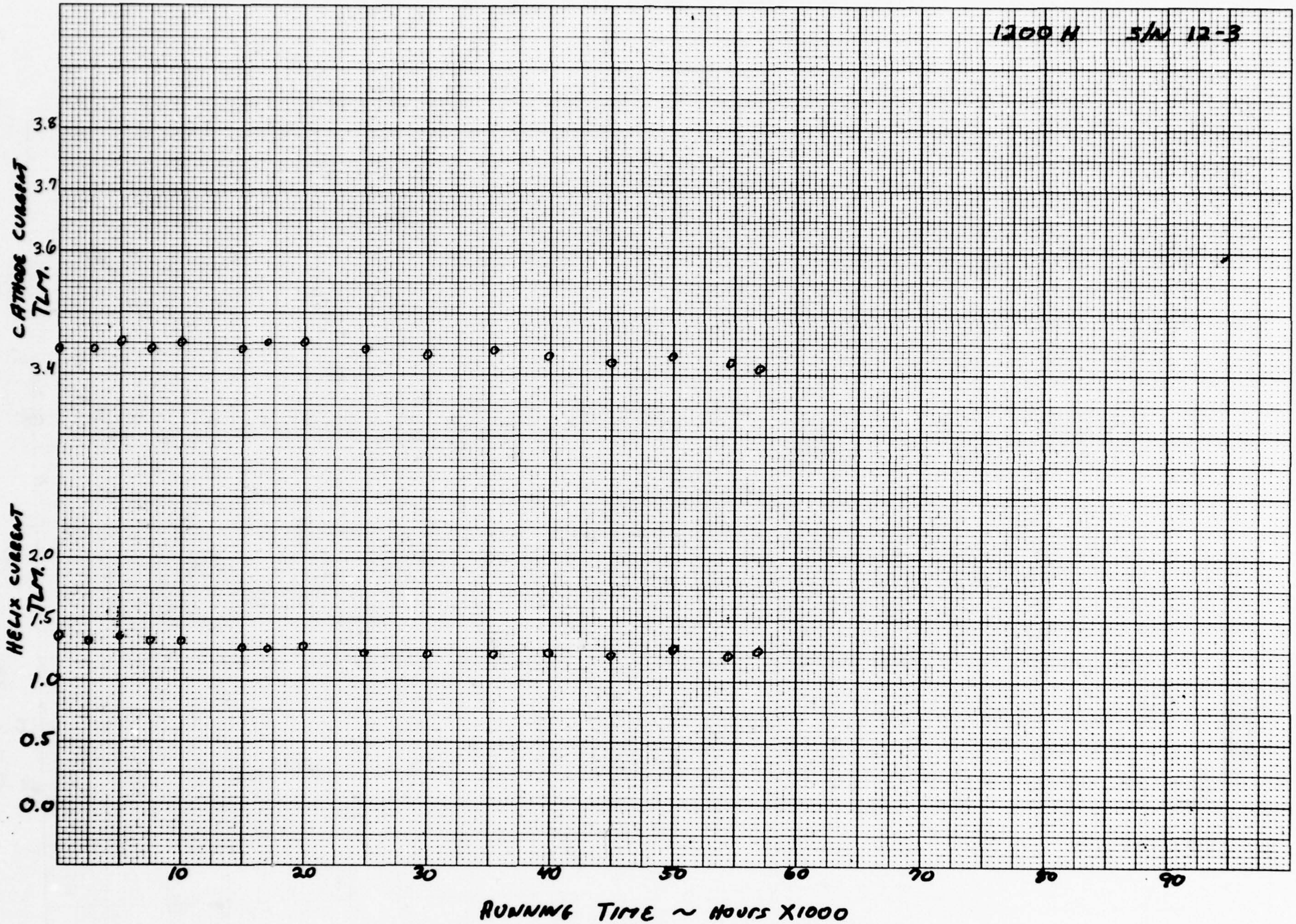


Figure 11 Telemetry data. S/N 12-3.

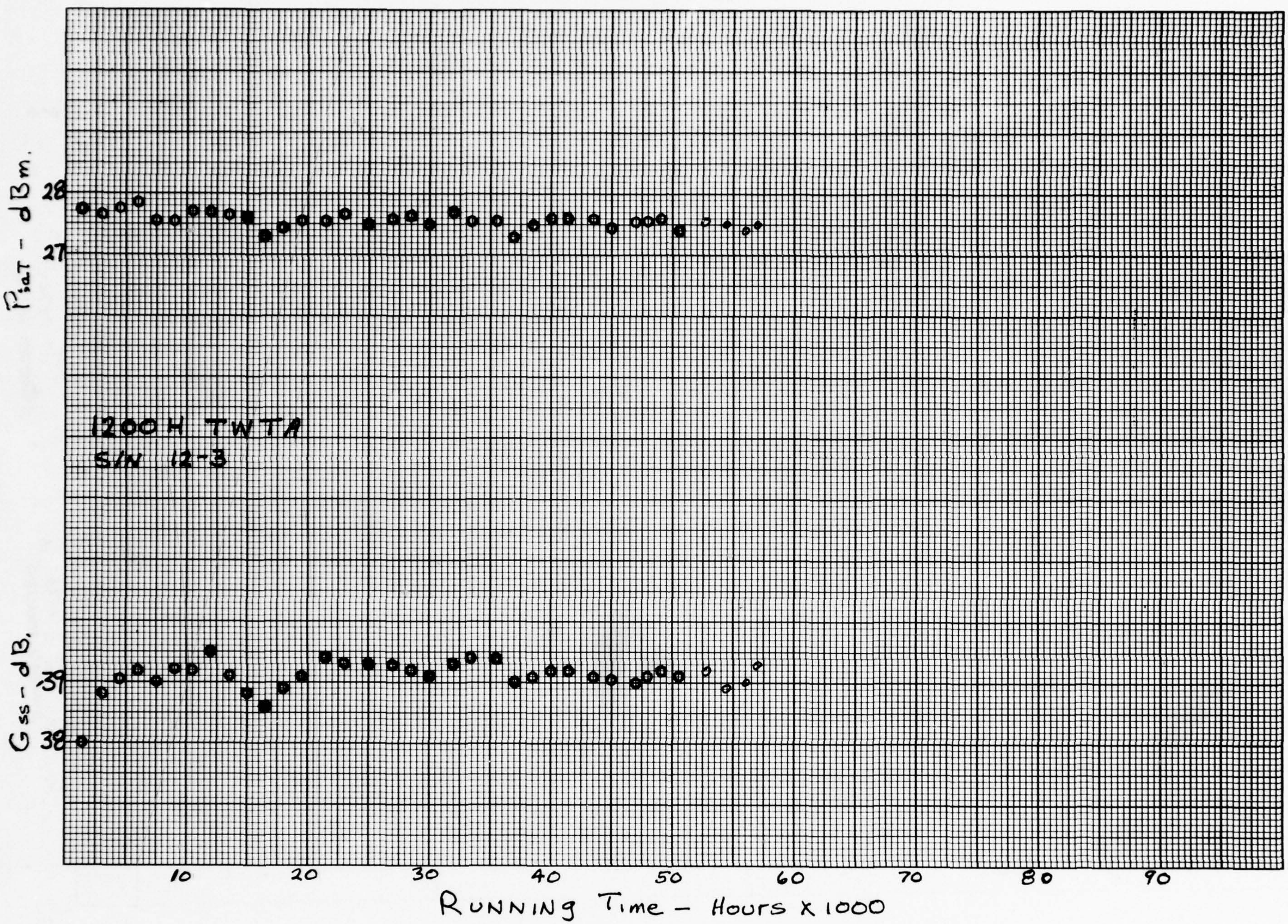


Figure 12 Saturated power and small signal gain. S/N 12-3.

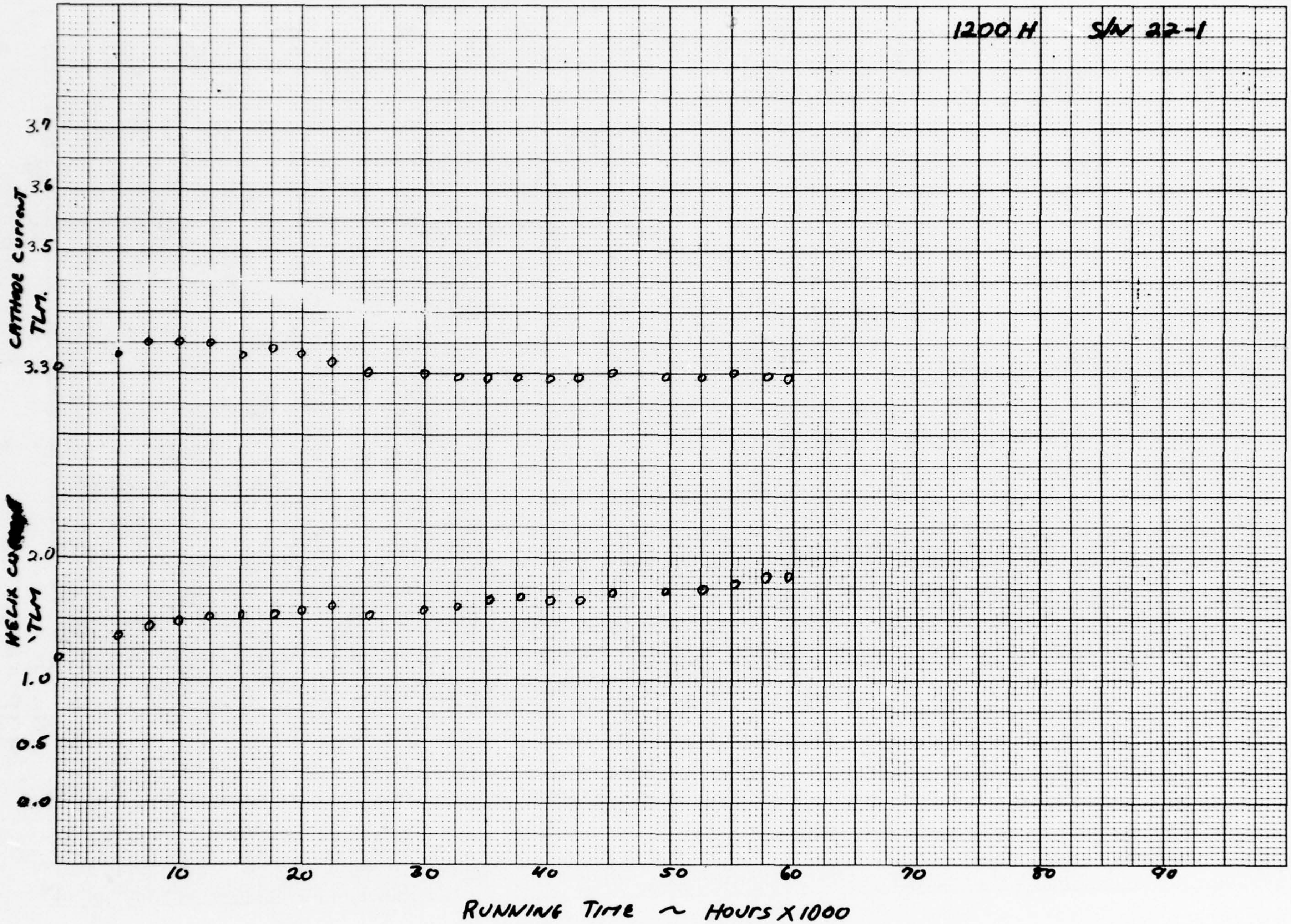


Figure 13. Telemetry data S/N

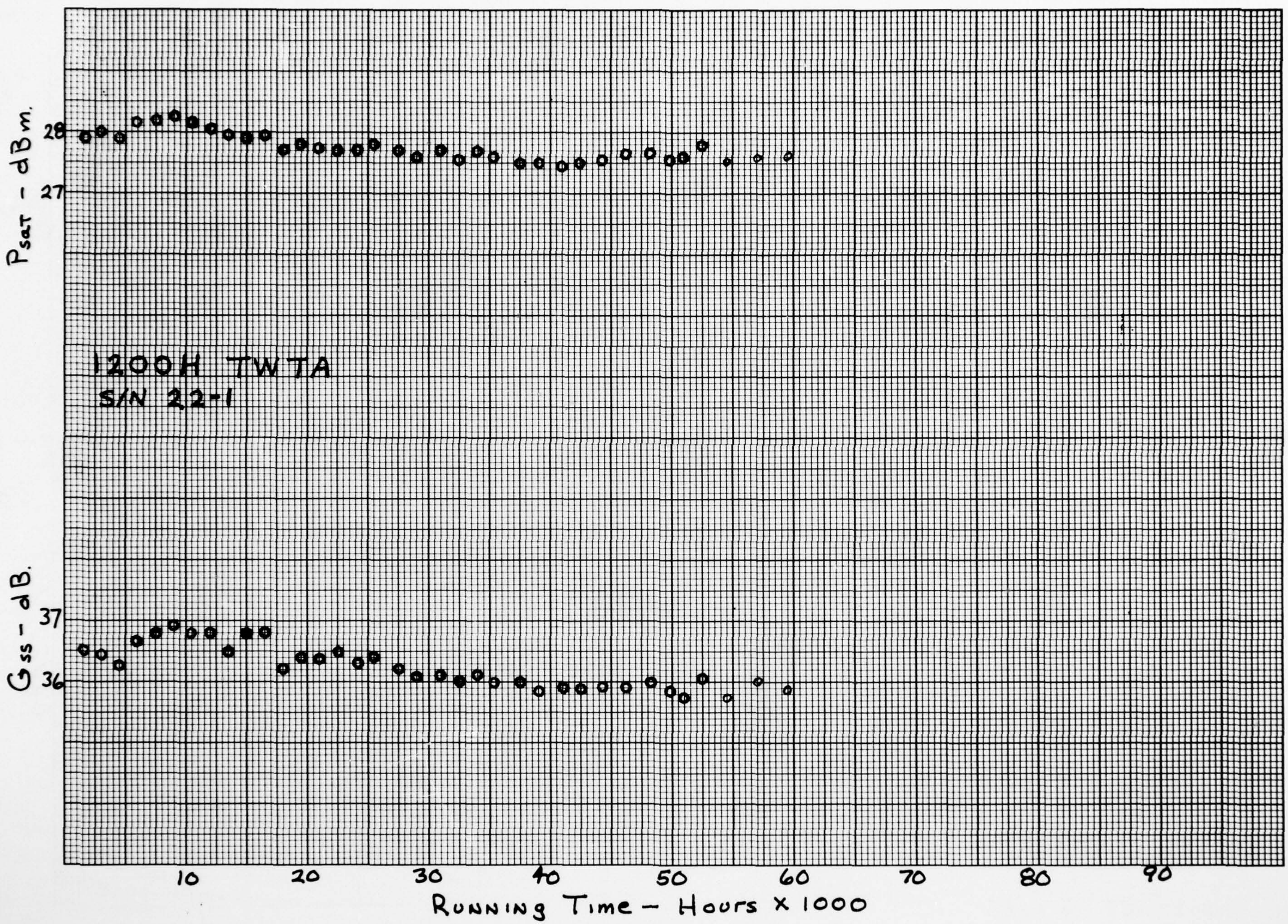


Figure 14 Saturated power and small signal gain. S/N 22-1.

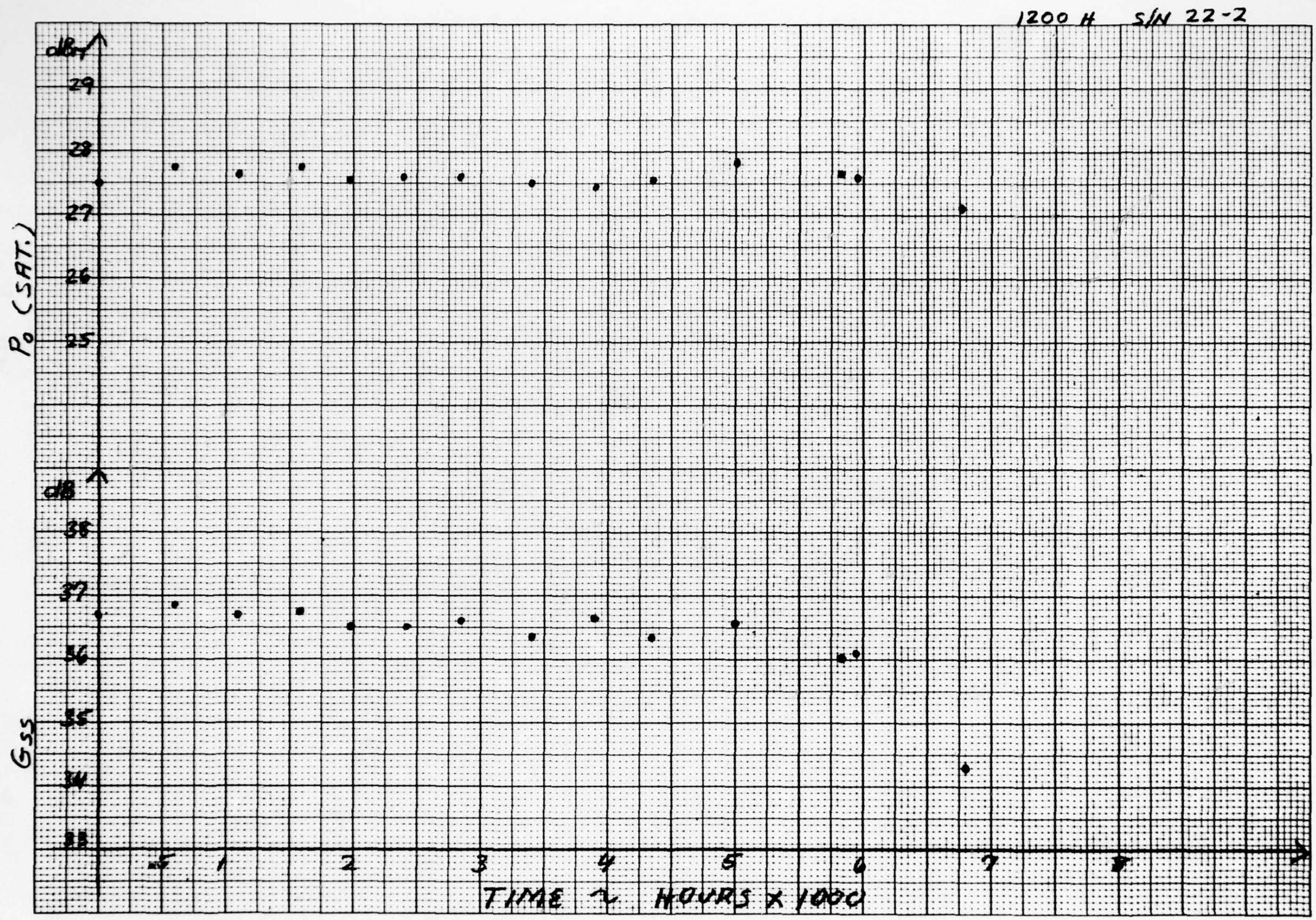


Figure 15 Telemetry data. S/N 22-2.

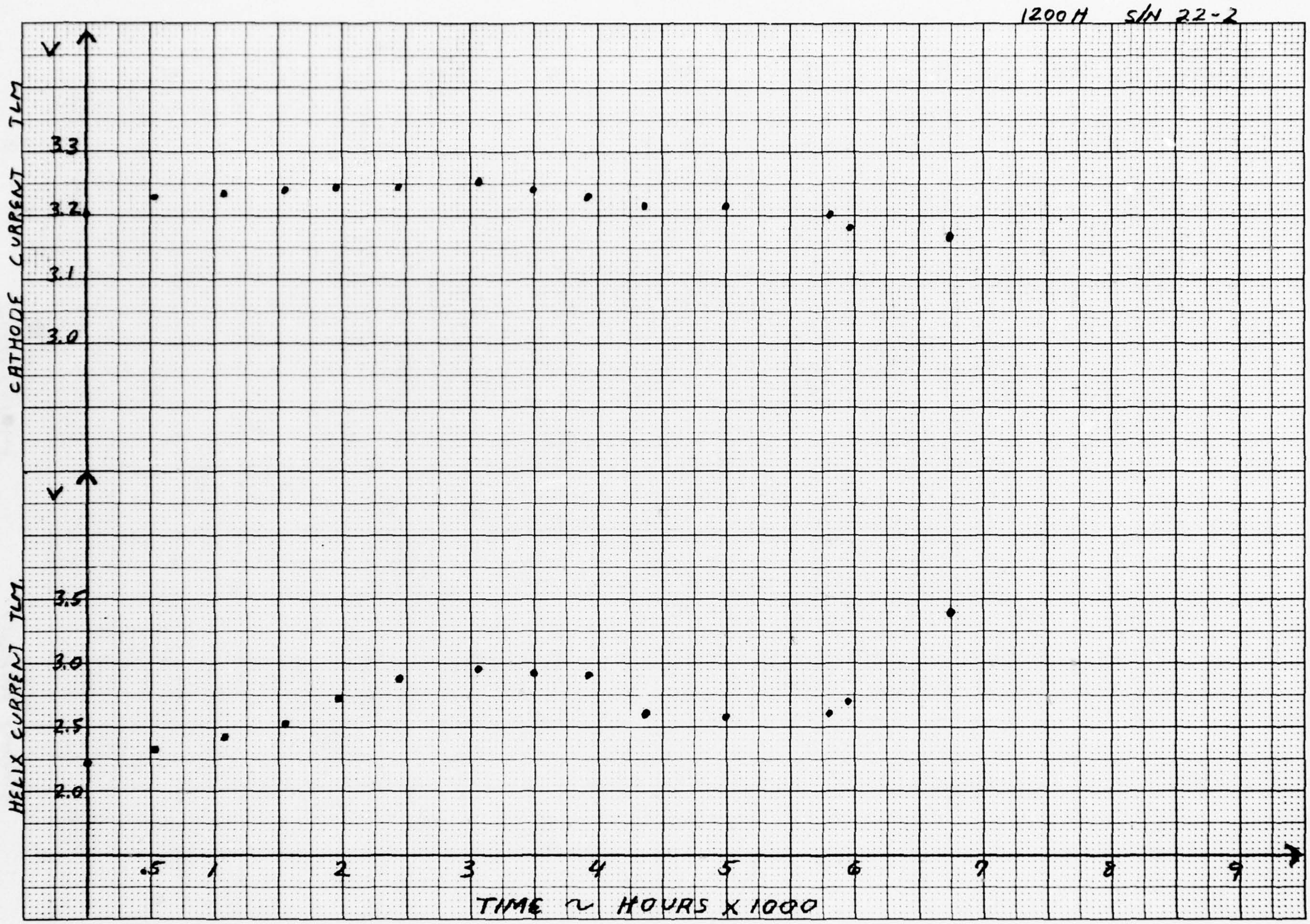


Figure 16 Saturated power and small signal gain. S/N 22-2.

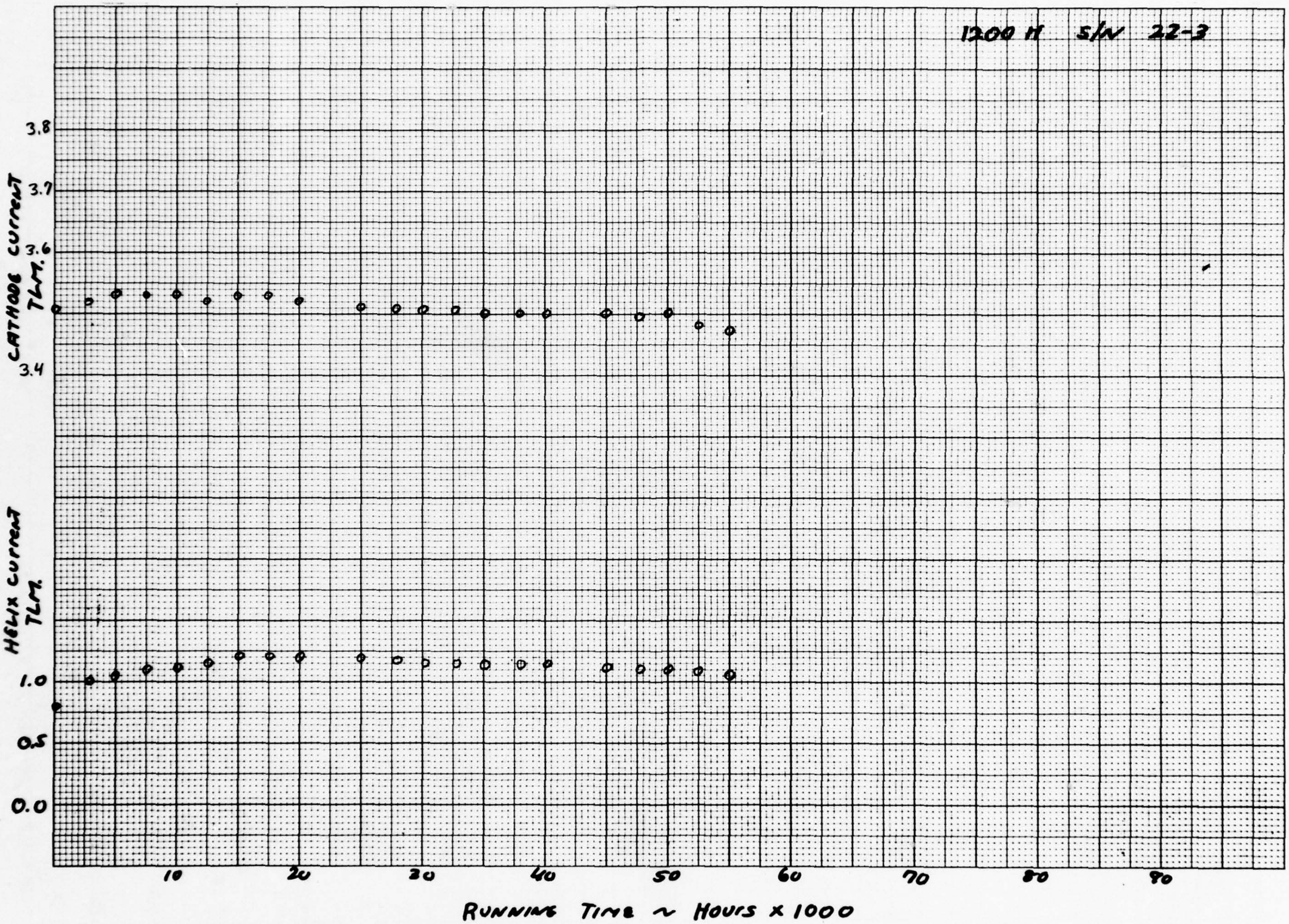


Figure 17 Telemetry data. S/N 22-3.

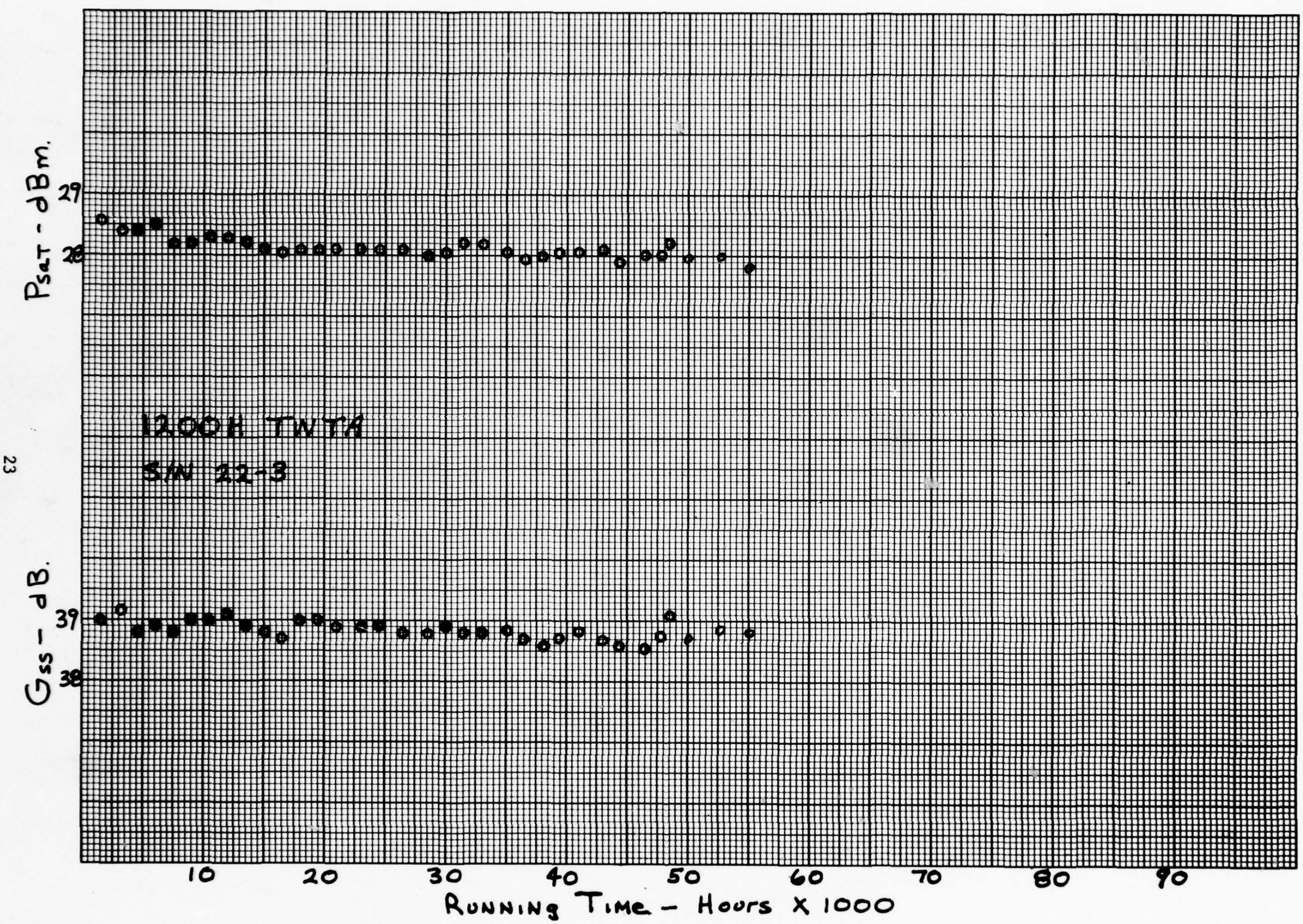


Figure 18 Saturated power and small signal gain. S/N 22-3.

6.3 Discussion of Data

Figures 3, 4 and 5 are summaries of the data of Appendix D. They show the maximum and minimum values of each parameter for each serialized unit percent change from initial value and note significant events and trends.

The most significant event was the failure of Low Level TWTA B200300-122 Serial Number 22-2 after 6784 high voltage hours of operation. This failure is analyzed in Appendix A, Malfunction Report 2355.

The Low Level TWTA failure was cathode coating sintering and fusing. The cause of this failure was most likely a reaction of components from a non-detected leak or virtual leak condition in the traveling-wave tube.

Low Level TWTAs had three instances of Small Signal Gain drifting out of specification limits, S/N 12-3 drifted high, and S/N 22-2 and S/N 12-1 drifted low.

This drift of the Small Signal Gain did not appear to affect the operation or to be indicative of any malfunction.

Helix Current Telemetry Voltage data indicates some large variations in this parameter. This data is plotted graphically in Figures 7, 9, 11, 13, 15 and 17 at approximately equal points along a linear time scale. Serial Number 22-2 changed during its life before failure. Malfunction Report 2355, Page 2 (Appendix A) shows an approximate inverse relationship between Helix Current and RF Power Output. No correlation was made between this effect and the TWTA failure. Of the other TWTAs, on S/N 22-1 showed a continual rise in Helix current telemetry data. This data has had no apparent effect to date.

Figure 5 shows attenuator resistance increasing with time. Unlike the High Level TWTA's, there was no accompanying consistent increase in small signal gain, and no obserable decrease in insertion loss. While the increase in attenuator resistance may still be related to the as yet undetectable reduction in insertion loss, (measurements at approximately 100 dB become relative in magnitude) no defenite assertion can be made at this time. A possible increase in beam size may signify a connection between increased attenuator resistance and increased helix current, as in S/N 22-1. This relationship has not been verified. The apparent intermittence may be an effect on the measurement technique as it requires a careful pin to barrel measurement.

Three tubes, S/N 12-1, 12-3 and 22-1 exhibited phase shifts that were out of spec. As there is no indication of malfunction, this was not investigated.

7.0 CONCLUSIONS

The preceding data shows no conclusive correlation between observed parameters which could indicate incipient failures.

Serial Number 22-1 has shown the most change, and as such, will be watched closely in the future.

The only consistent trends appear to be decreases in cathode activity, and increases in attenuator resistance. This is no obvious connection between the two.

The current frequency of test measurements is appropriate. Reference Life Test Plan LTP B200300-400 Section 3.4.2.1. Yearly Bench Functional tests allow complete evaluation of all parameters at sufficient intervals. Monthly RF tests permit timely observation of any approaching failure.

It is not recommended to insert new measurements, or revise measurement techniques at this time. Continuation of the life test process will allow direct correlation of future data to the data base now available.

APPENDIX A

777 MODEL 1200H LOW LEVEL TWTA

SERIAL NUMBER 22-2

MALFUNCTION REPORT 2355

HUGHES AIRCRAFT COMPANY
ELECTRON DYNAMICS DIVISION
3100 WEST LOMITA BOULEVARD
TORRANCE, CALIFORNIA 90509

FEBRUARY 1972

LIFE TEST FAILURE

1200H

S/N 22-2

MALFUNCTION REPORT 2355

FAILURE REPORT 1200H, SERIAL NUMBER 22-2

1.0 INTRODUCTION

This failure report describes a malfunction of a 1200H Traveling-wave Tube Amplifier serial number 22-2, which occurred during life test after 6784 high voltage operating hours.

2.0 BACKGROUND INFORMATION

Unit was being subjected to life test in accordance with Hughes Aircraft Company's document LTP B200300-400. The test was operating continuously at a baseplate temperature of $90^{\circ}F \pm 15^{\circ}F$ in a laboratory environment. Weekly the unit was turned off, transferred to a test station and the following data recorded:

1. All Telemetry
   - (a) Input Current
   - (b) Cathode Current
   - (c) Heater Voltage
   - (d) Helix Current
   - (e) Cathode Voltage
2. Saturated RF power out versus frequency
3. Small signal gain versus frequency

   Raw data is included in Appendix A.

3.0 DESCRIPTION OF TROUBLE

Unit performance was normal for first seven months of life test. Five additional units are on life test and trends are monitored. First indication of trouble was a trend of decreasing cathode current telemetry voltage accompanied by a trend of decreasing RF power output at all frequencies over the band. It should be noted that the shape of the swept RF saturated power output curves did not change, only the level of output was dropping over the band. These first indications were followed within approximately seven weeks by a sharp upward trend in helix current telemetry voltage and an ever increasing rate of RF power and cathode current voltage telemetry

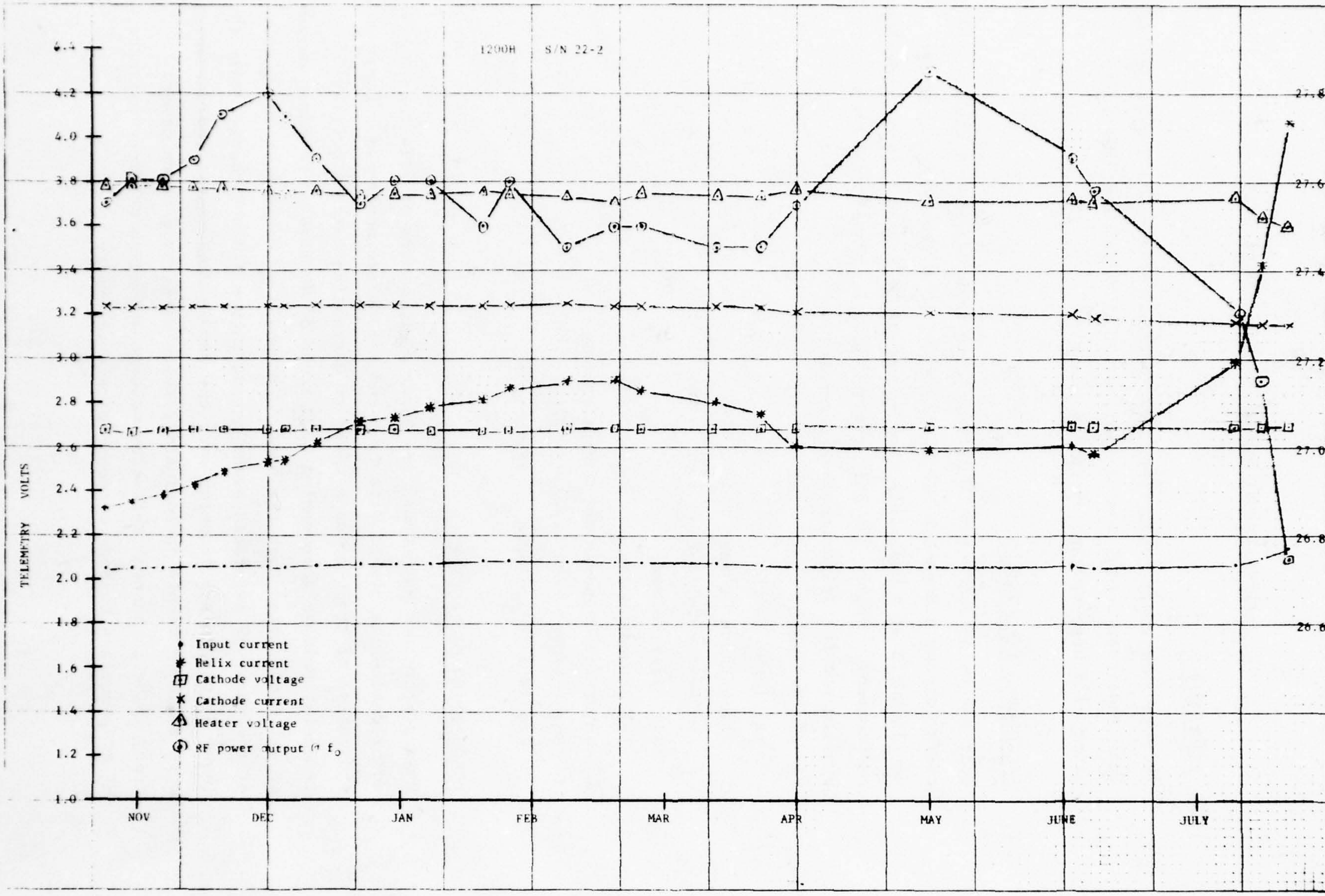

1200H S/N 22-2
TELEMETRY VOLTS
SATURATED POWER OUTPUT @ f_o (dbm)
4.4
4.2
4.0
3.8
3.6
3.4
3.2
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
27.8
27.6
27.4
27.2
27.0
26.8
26.6
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUNE
JULY
Input current
Helix current
Cathode voltage
Cathode current
Heater voltage
RF power output @ f_o

FIGURE 1

decreases (see Figure 1). Unit dropped below 27 dbm power output specifications after 6784 high voltage operating hours. Appendix B contains sample saturated power output sweep curves from beginning of the life test and every two months until power dropped below required 27 dbm which constituted a "failure" as defined in the test plan.

4.0 VERIFICATION AND ANALYSIS

Preliminary investigations isolated the problem to the traveling-wave tube (263H, S/N 42A).

The traveling-wave tube was disconnected electrically from the power supply by cutting the tube leads. The power supply was connected to a load simulating the traveling-wave tube and all voltages and currents provided by the power supply were checked against those of the final power supply ATP. All voltages and currents were the same as at the time of integration of the power supply and traveling-wave tube. Traveling-wave tube heater current was normally .250 A. An attempt to reactivate the cathode by operating the tube for 48 hours at a heater current of .280 A was not successful and resulted in a more rapid degradation of cathode performance. It was then decided to begin detail teardown analysis of the traveling-wave tube.

4.1 Traveling-wave Tube Disassembly and Preliminary Analysis

After determining and verifying the degraded cathode performance, the traveling-wave tube was systematically disassembled in an effort to determine the nature and cause of failure. Since the problem was manifested in the area of cathode performance, particular attention was given to checking for vacuum leaks, providing the least vigorous change in cathode environment and carefully obtaining the cathode assembly in tact for closer examination and analysis. The following operations were conducted in disassembling the traveling-wave tube.

4.1.1 Removal of Gun Cover, Potting, Exposure of Tubulation

Leak checking requires exposing the tubulation for application of leak check tube. The gun cover and surrounding potting were removed exposing the tubulation.

4.1.2 Drilling of Tubulation, Attachment of Leak Check Tube and Leak Check

The exposed tubulation having been cleaned, a hole was drilled into it at the planned point of attachment of the leak check tubing. The vacuum was broken in a dry nitrogen atmosphere in order to minimize the possibility of any room ambient air with water vapor entering the traveling-wave tube and effecting the cathode coating condition. The leak check tube was then soldered on and a leak check was performed with a Veeco helium mass spectrometer leak detector. In the case of this and suceeding leak checks, the traveling-wave tube was then back filled with dry N_2 and the leak check tube pinched off resealing the traveling-wave tube for the next operation. The leak check was negative. Helium bagging of the entire traveling-wave tube showed no indication of a leak.

4.1.3 Removal of Packaging and Potting From Other Ceramic Seal Areas

The package parts and potting were removed to expose the gun bottle, the collector and isolator assembly, and the R.F. windows. These areas were thoroughly sandblasted clean and successive leak checks were performed in an effort to isolate any leaks which might have appeared. No leaks were detected.

4.1.4 Removal of Magnet Cover and Baseplate

The magnet cover and R.F. connector support yokes were next removed. The collector heat sink assembly was then heated to a sufficiently high temperature to flow the solder and removal of the traveling-wave tube (collector) was accomplished. Another leak check was then performed. Again the results were negative.

4.1.5 Photographs and X-Ray Photos

At this point, the traveling-wave tube was X-ray photographed in two 90^{o} planes in an effort to uncover any internal abnormalities visible in this type of photo. Figure 6(a) and 6(b) show the X-ray photos. Figures 2, 3, 4, and 5 show the traveling-wave tube in various stages of disassembly.

4.1.6 Opening of Vacuum Envelope and Removal of Cathode

Refer to Figure 7 for the order of disassembly. The tubulation flange was cut circumferentially and removed. The getter was removed and put aside. Next, the heater leg was cut where it attached to the heater ring cross bar. This series of operations freed the cathode/support assembly of constraints from the back side.

Next, a circumferential cut was made through the anode support flange. At this point, the "back" portion of the gun bottle was removed, containing the cathode and support assembly, exposing the front face of the cathode and revealing the expanded and poorly adherent condition of the coating.

At this point, it was noted that the condition of the coating was distinctly abnormal while no abnormalities were evident in other adjacent parts of the traveling-wave tube and no detectable leaks were indicated in a rather extensive series of leak checks.

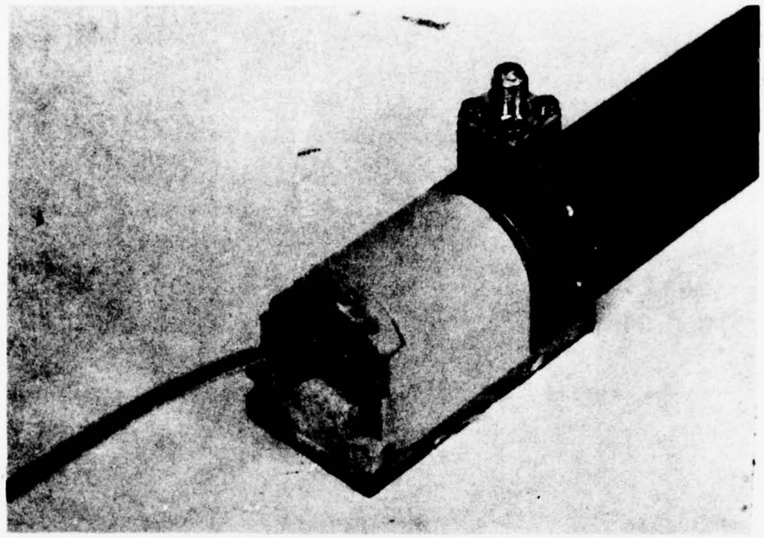


FIGURE 2. LEAK CHECK TUBE SOLDERED IN PLACE ON TUBULATION.

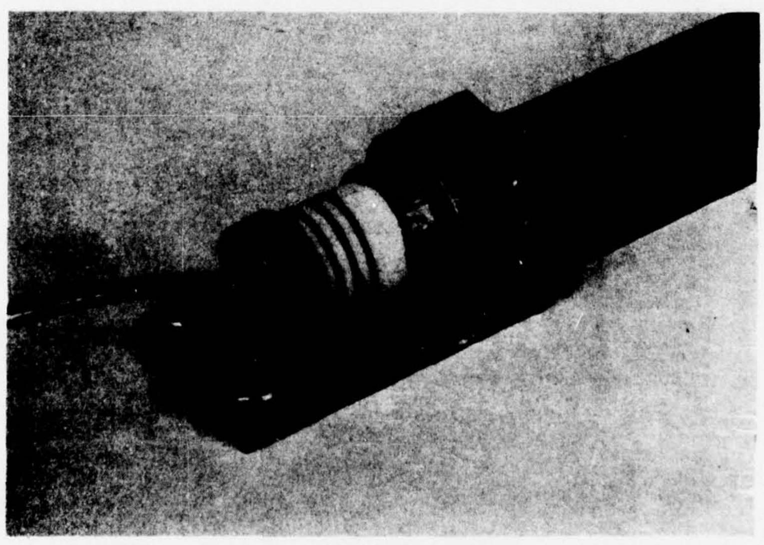


FIGURE 3. GUN CERAMICS AND R.F. INPUT WINDOW EXPOSED AND CLEANED

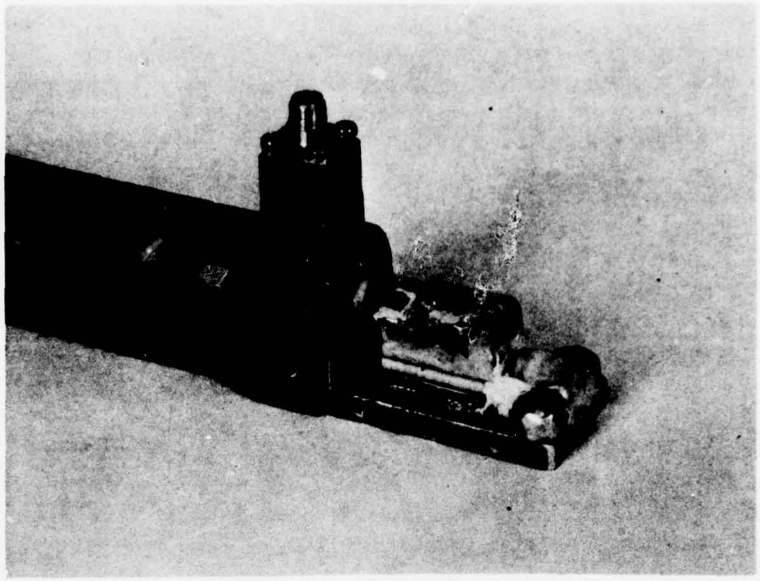
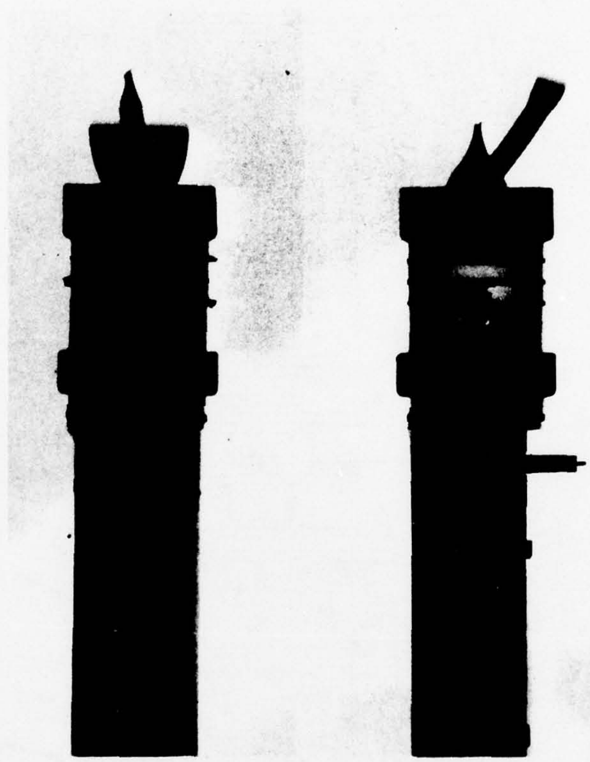


FIGURE 4. COLLECTOR/HEAT SINK AND COLLECTOR ISOLATOR EXPOSED.

FIGURE 5. PACKAGE AND HEAT SINK REMOVED.



TWO VIEWS OF TWT GUN AREA - 90° ROTATION

FIGURES 6(a) and 6(b). X-RAY PHOTOS OF TWT WITH MAGNET STACK

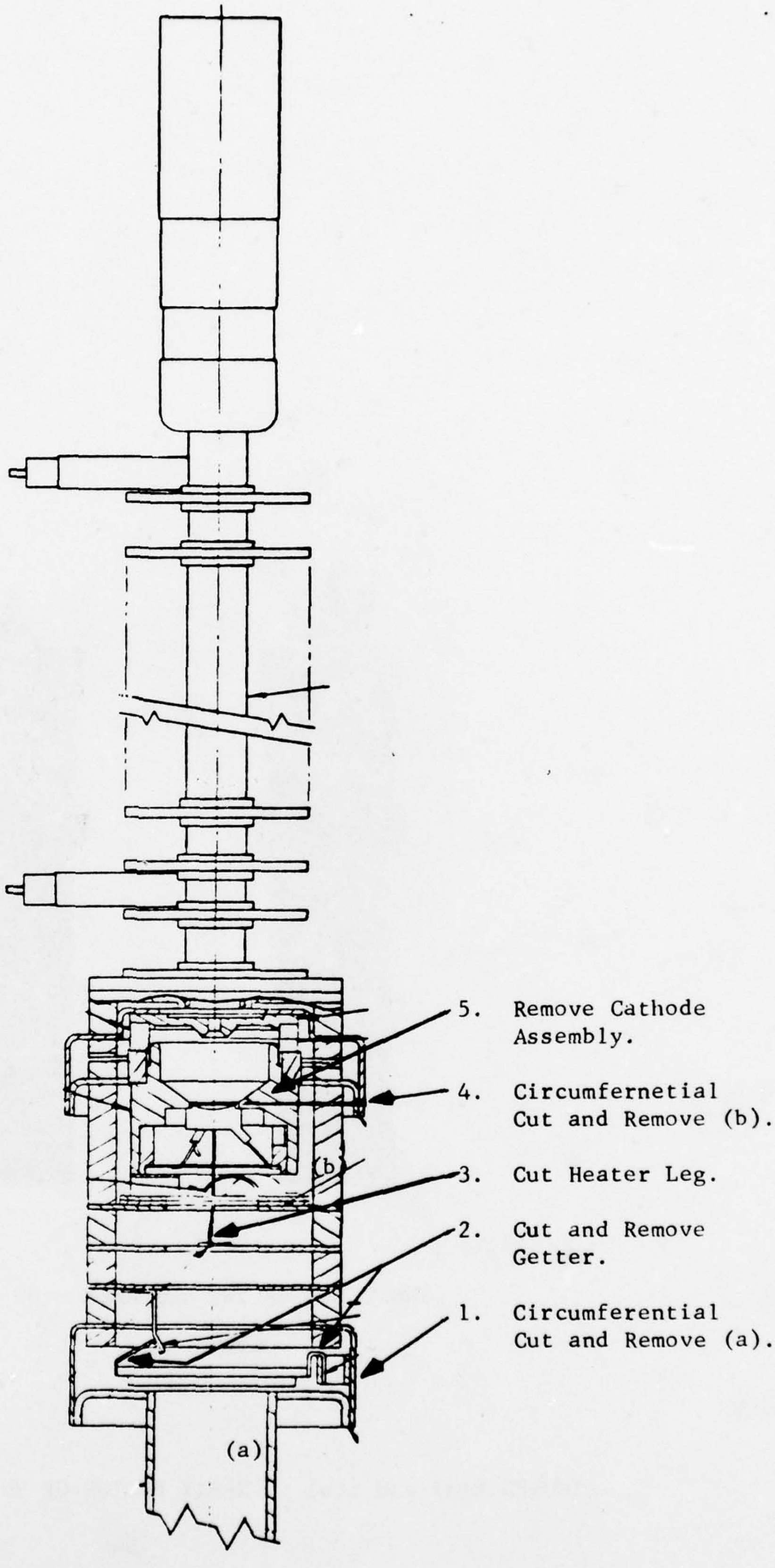


FIGURE 7. OPENING OF VACUUM ENVELOPE AND REMOVAL OF CATHODE ASSEMBLY

4.2 Material Analysis

4.2.1 Method and Analysis Data

The disassembly of the tube exposed the coating on the cathode for examination. Macroscopic examination of the ceramic support rings and the focus electrode, Figure 8, did not disclose any foreign material, discoloration, or unusual conditions. Examination of the cathode coating indicated it had grown to an extent that it was in contact with the focus electrode and had buckled and cracked in one area, Figure 9.

To provide a standard for comparison, the cathode from 263H, S/N 51 tube was analyzed along with the S/N 42A cathode. The S/N 51 tube had exhibited satisfactory cathode characteristics, and the cathode had been coated close to the same time as the S/N 42A. Prior to opening the tube, it was subjected to the same cathode over-temperature cycle that had been used in the attempt to reactivate the S/N 42A tube.

The coating on the S/N 51 cathode did not exhibit any indication of growth, Figure 10. The texture of the coating surface appeared similar and normal for both cathodes. Some small copper chips were observed on the surface of the coating from S/N 42A; apparently drawn into the tube when a hole was drilled in the copper pinch-off to let the tube down to nitrogen.

A sharp pointed stainless steel probe was used to check the adherence of the cathode coating and to remove sufficient coating to check the concentricity of the cathode to the focus electrode of the S/N 42A. The coating was found to be extremely brittle indicating a sintered condition, Figure 11.

After the cathodes were removed from the focus electrodes, they were examined microscopically. A comparison of the coatings, Figures 12, 13, and 14, did not reveal any significant difference except for the crack in the S/N 42A. The extent of the growth of the coating on the S/N 42A cathode is shown in Figure 15.

To check the adherence of the coating on S/N 51, a scratch test using the same pointed probe was performed. The coating exhibited a typical good adherent, nonbrittle, pasty type coating, Figure 16.

After microscopic examination, a small sample of the coating was removed from the cathode surface, Figure 17, for X-ray diffraction and emission spectrographic analysis. The samples of the coating were contained in cellulose nitrate for handling during analysis. The X-ray diffraction and spectrographic analysis data are listed in Table I and II respectively. During the sample collection period, the coating on the S/N 42A cathode curled up and lifted from the nickle surface of the cathode, Figure 18. The absorption of moisture most probably caused this, but the rigity of the coating indicates the high degree of sintering that had occurred to the coating.

An electron beam microprobe analysis of the coating surface was attempted; however, the poorly adhearing coating on the S/N 42A cathode dislodged and was lost during the preparation to install it in the analyzer. Barium and strontium were indicated in small remnants of the coating but a more quantitative analysis was not feasible.

To permit examination and comparison analysis of the nickel substrates, the oxide coating was removed from the S/N 51 cathode. The coating still had the typical pasty consistancy, and it was difficult to remove indicating good adherance. Electron beam microprobe analysis was performed on the surface of the nickel to which the coating had been applied on both the S/N 42A and S/N 51 cathodes. A manual spectral scan for all elements from atomic number 12 and up for a level in excess of 0.1% was run on both samples. The only difference between the two surfaces was indicated by an unidentified line at 4.75^{o}A on the S/N 42A cathode with the amount present being very minor. The closest correlation would be a K-alpha line of chlorine but a variation in valence state would be required. Analysis for specific elements are shown in Table III.

Microscopic examination of the metal surfaces under the coatings, Figure 19, did not reveal any significant difference in the characteristics of the nickel surface. Samples of the nickel base from each cathode were analyzed by emission spectrographic analysis. The data are reported in Table IV.

4.2.2 <u>Discussion</u>

The growth condition observed in the coating on the cathode from S/N 42A is a condition which has been observed in the past but the incidents have been very rare. Because of the extreme rarity of the condition very little information existed on the growth cause. It had always been postulated to be caused by a leak. Consequently, it was determined that the only way to obtain a meaningful analysis would be to perform the analyses on both a "good" or standard cathode and the failed cathode. Any difference would then be examined as the possible cause of the growth and sintering.

Some mechanisms have been postulated to explain the growth. A normal cathode should experience a slight shrinkage during and after activation. If the coat were a solid, continuous crystal, shrinkage may occur. Of course, this is not the case since the coating is very porous. Consequently, little if any dimensional change would be observed on the scale of a mil or more.

At the time of activation, the very small crystals of barium-strontium oxide grow at an extremely rapid rate so that crystals of 200^{o}A or even 2000^{0}A size grow to 10^{-3} cm in size in a matter of a minute or so. This rapid growth occurs at temperatures higher than 800^{o}C. A homogeneous solid solution of (Ba-SrO) is formed in 30 minutes at 800^{o}C. Only at 1,000^{o}C is a single X-ray line of the mixed crystal obtained. Up to this temperature lines of BaO, SrO and the mixed crystal are obtained. During normal cathode life, the coating would remain at a fixed dimension. This is confirmed by Eisenstein [JAPL 17, 434-442 (1946)].

The lattice parameters change drastically and rapidly at activation. The following tabulation displays the values:

Before Activation		After Activation	
$BaCO_3$	$SrCO_3$	BaO	SRO
Rhombohedral	Rhombohedral	Cubic	Cubic
a = 5.29 Å	a = 5.13 Å	a=b-c-5.5 Å	a=b-c=5.10 Å
b = 8.88 Å	b = 8.42 Å		
c = 6.41 Å	c = 6.10 Å		
Density = ~ 4.42	= 3.70	= 5.72	= 4.7

Coefficient Expansion	
Nickel	$= 13.5 \times 10^{-6}$
BaO (After Activation)	$= 17.8 \times 10^{-6}$
SrO (After Activation	$= 32 \times 10^{-6}$
(BaSr)O Mixed Crystal (After Activation)	$= 26.6 \times 10^{-6}$

The particular problem of explaining the anomalous coating growth must include such mechanisms as:

1. Carbonate reformation by absorption of CO_2 from air (not very likely at the temperature involved and pressure experienced by the tube).

2. Oxide formation from the barium metal generated. This may be feasible in a leaky tube or in one in which a virtual oxygen leak is present due to contaminant. Air leakage over a long period of time would:
   (a) Decrease emission slowly from the cathode by oxidation of the "free" barium.

   (b) Force an expansion in the coating due to the "new" compounds with high expansion or bulky crystal.

3. Coating expansion due to formation of anomalous "new" compounds with high expansion or bulky crystal.

If one assumes a two dimensional expansion, the coating expanded about 2%, i.e., volume of coat initially (.090" diameter x 1.5 mil thick).

$$.0000094 \text{ in}^3$$

volume of coat after (.092" diameter x 1.5 mil thick)

$$.0000096 \text{ in}^3$$

If one postulates that the expansion was three dimensional, then the volume increase is:

Initially .0000094 in^3 (.090" diameter x .0015" thick)
Final .0000164 in^3 (.092" diameter x .0025" thick)
or a gain of 175%

Such a large increase in volume would require the formation of very bulky molecules such as hydrates or compounds more bulky than $BaZrO_3$.

During operation at 600^{o}C, the "normal" coating will expand 1.7 mils while the nickel will expand 0.7 mils. Of course, upon cooling, the coating will contract. At 800^{o}C, the coating would expand 2.3 mils which would then contact the focus electrode. If, at that temperature, the coating were "set" by having a new phase formed, the contraction upon cooling may not necessarily return the coat to its original size. Then on opening the tube, the coating would seem to be larger than originally made.

Assuming that the coating expanded to touch the focus electrode, the confinement force would be sufficient to cause rupture of the weak mechanical bond at the points of most intense force application, i.e., at the edges. Once the edge coated-substrate bond had been broken, the emission would drop quickly to some fraction of the original amount. Examination of the cathode shortly after opening showed about 25% of the surface appeared to be "lifted" from the substrate around the outer edge.

One mechanism of degradation assumes that the coat retains electrical but not thermal contact with the base. This could be achieved by rupture of the substrate bond but retention of coating particle to particle contact. Then 25% of the coating would be reduced in temperature by perhaps 50%, essentially reducing the total emission by 10 to 15%.

Now, if one assumes that both thermal and electrical contact is broken in 30% of the total area, the total emission of the cathode could drop by 30 to 50%. This reduction implies that the 25% "lifted" area and 20 to 25% of the remaining periphery of the coat is inactive.

The drop in cathode emission could have the following pattern:

1. Slow Decrease of Emission
   Oxidation (by a leak) drops the emission slowly and causes the coat to expand abnormally, contacting the focus electrode.

2. <u>"Rapid" Drop in Emission</u>

Once the coat has contacted the focus electrode, the bond to the substrate is broken in several weak locations. Thermal contact is lost on 10 to 25% of the coat, resulting in some drop of total emission, perhaps less than 10%.

3. <u>Abrupt Decrease in Emission</u>

The coating continues to "grow" due perhaps to a more rapid evolution of Ba from the remaining thermally contacted (now "overheated") area, followed by subsequent oxidation. There may, then, be a point where more coating breaks free of the substrate, not complete, but partially, and a large unassessable drop in emission would occur. At this point, the "normal" mode of "curing a sick cathode" by increasing the heater output would simply lead to more BaO production and a resultant decrease in emission.

A review of cathode literature from other organizations indicated two known causes for growth have been identified in the carbonate type cathode coating. Both causes are associated with a sintering and fusion of the oxide coating. The sintering and fusion decreases porosity and causes varing degrees of poor coating adherence to the base metal - related to brittleness - because a greater cohesion for itself occurs than adhesion to the base metal. The level of emission is reduced in a sintered oxide coating because of decreased porosity and an increase in the size of the crystallite lattice. The conductivity of such a fused coating is decreased as the effect of the electron pore gas type of electron transfer is diminished. The increased bulk electrical resistance lowers the level of emission by causing a decrease in the cathode to anode voltage.

The two mechanisms involve the formation of low melting phases. The first is the formation of a $2BaCO_3:1BaO$ eutectic composition with a melting point of 1027°C. This eutectic can be formed during the thermochemical decomposition of the carbonates to oxides. The de-composition is a two step process defined by the following equation:

$$3BaCO_3 \rightleftharpoons 2BaCO_3:1BaO + CO_2\uparrow \rightleftharpoons 3BaO + 2CO_2\uparrow$$

If a nonequlibrium state caused by rapid heating or poor pumping condition occurs during the decomposition, the partial pressure of carbon dioxide can accelerate a melt situation caused by the formation of an excess of the $2BaCO_3:1BaO$ eutecic phase in the first step - resulting in large crystallite growth and fusion effects.

The second mechanism is the formation of $Ba(OH)_2$ with a melting point of 395°C or of $Ba(OH)_2 \cdot Sr(OH)_2$ eutecic composition with a melting point of 360°C. When the cathode coating is in the oxide form, it is vulnerable to the poisoning action of gases and water vapor that will tend to change it back to the hydroxide or carbonate as follows:

$$BaO+H_2O \longrightarrow Ba(OH)_2$$

The formation of the low melting compounds can induce excessive sintering and fusion of the coating.

The macroscopic examination of the S/N 42A cathode coating revealed that the coating was in intimate contact with the focus electrode. The crack in the buldged region along the edge indicates that growth continued after contact was made with the electrode and it forced the coating to buckle away from the nickel substrate. The coating exhibited the characteristics of a high degree of sintering or fusion.

The detection by X-ray diffraction analysis of $Ba(OH)_2$ in the S/N 42A coating but not in the S/N 51 coating indicates this low melting phase could have contributed to the sintering and fusion of the coating. Upon exposure of BaO to water vapor and carbon dioxide in the air, the following reactions can be expected to occur:

$$BaO + CO_2 \rightarrow BaCO_3$$

Since BaO was not detected in the S/N 42A cathode coating and the $Ba(OH)_2$ would be expected to convert to a carbonate on exposure to air, the formation of $Ba(OH)_2$ and $Sr(OH)_2$ in the coating prior to opening the tube to air is suggested. These compounds form a eutectic which would induce sintering and fusion. The normal reactions associated with the exposure to air could be inhibited because of the higher density of the fused coating. The detection of BaO and $BaCO_3$ but not $Ba(OH)_2$ in the S/N 51 coating is in agreement with the direct conversion of the oxide to the carbonate on exposure to air.

The emission spectrographic analysis of the coatings are semiquantitative and the sensitivity limits on the S/N 42A sample is significantly less than the S/N 51 because the sample size was much smaller. Also, the percentages reported are based on the combined weight of the coating and a cellulose nitrate carrier used to contain the samples. The high copper in the S/N 42A is attributed to the copper chips from the drilling of the pinch-off that were observed on the coating surface. The absence of barium in the analysis is ascribed to its low melting point. Barium also possesses an inherent low sensitivity of detection and high vapor pressure that results in it boiling off very early in the emission burn. The high silicon indicated in both coatings is most likely related to contamination pick-up during the analysis process. All other elements found in the S/N 42A coating are normal trace elements and the other trace elements indicated in the S/N 51 coating are associated with the increased sensitivity for detection related to the larger sample size. The significance of the data is that no elemental contamination was found in the S/N 42A coating that could be associated with the poor emission or sintered condition of the coating.

The microprobe and spectrographic analysis of the nickel base alloy did not reveal any abnormal conditions.

4.2.3 Conclusion

The loss of emission from the cathode of the S/N 42A tube was caused by a reaction that produced a sintered and fused coating. The source of the reactants is not clear but a leak not detectable by helium-mass spectrographic detection methods or a virtual leak condition in the tube are most likely. The growth of the coating to the extent of contact with the focus electrode caused cooling of the coating to further reduce emission.

Likewise, the buckled, non-adherent, coating would experience a drop in temperature and further reduce emission.

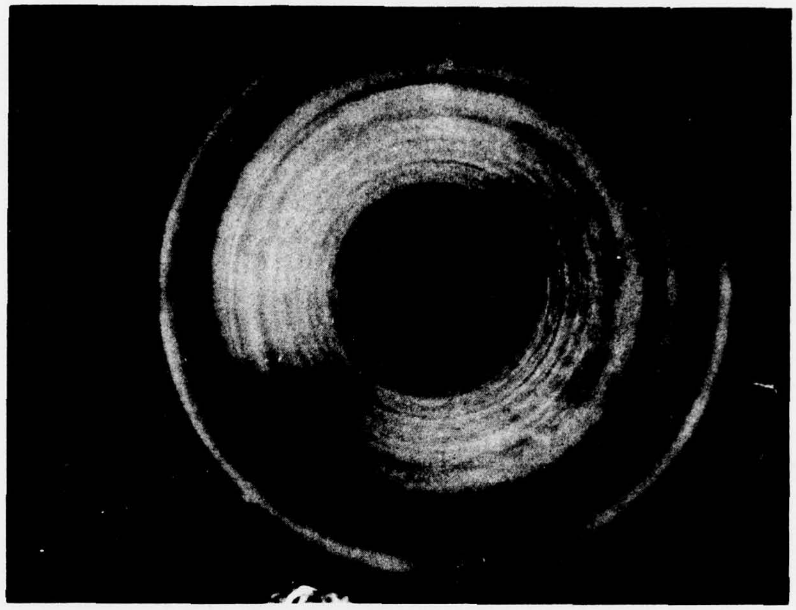


FIGURE 8. VIEW OF CATHODE (CENTER) FOCUS ELECTRODE, AND CERAMIC SUPPORT RINGS OF THE GUN ASSEMBLY AFTER REMOVAL FROM THE TUBE. MAG. 5X

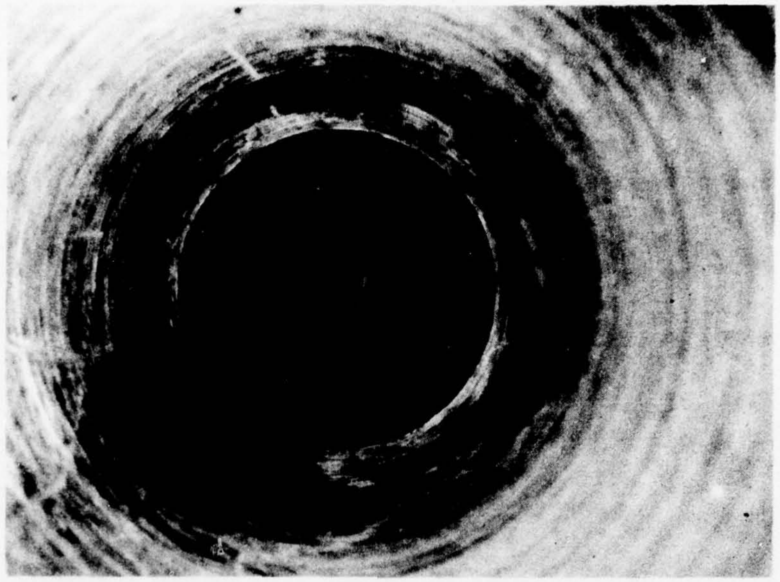


FIGURE 9. VIEW OF CATHODE COATING IN CONTACT WITH THE FOCUS ELECTRODE WITH CRACK IN A BULGED REGION ON THE RIGHT SIDE. MAG. 15X

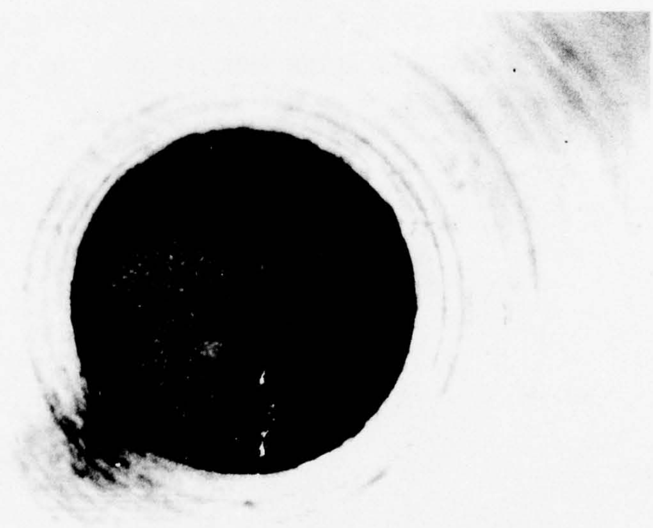


FIGURE 10. VIEW OF CATHODE COATING FROM S/N 51. NOTE: COATING IS NOT TOUCHING FOCUS ELECTRODE BUT HAS A TEXTURE SIMILAR TO FIGURE 9 COATING. MAG. 15X

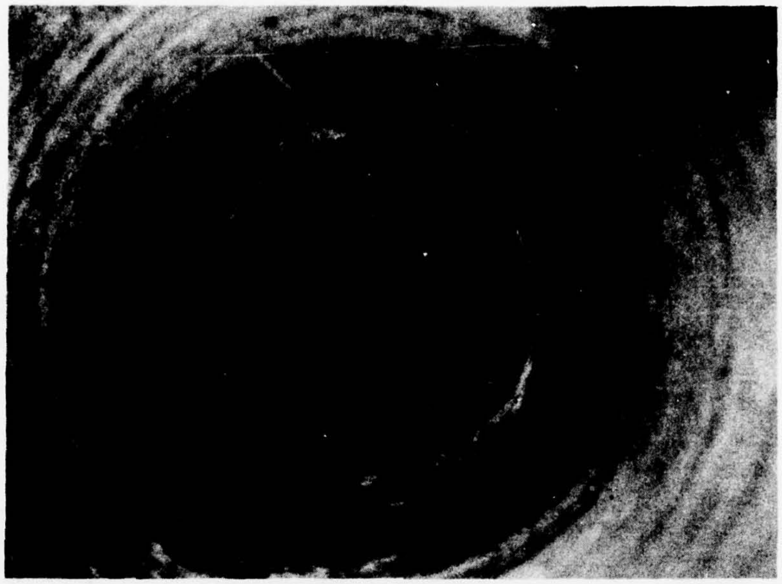
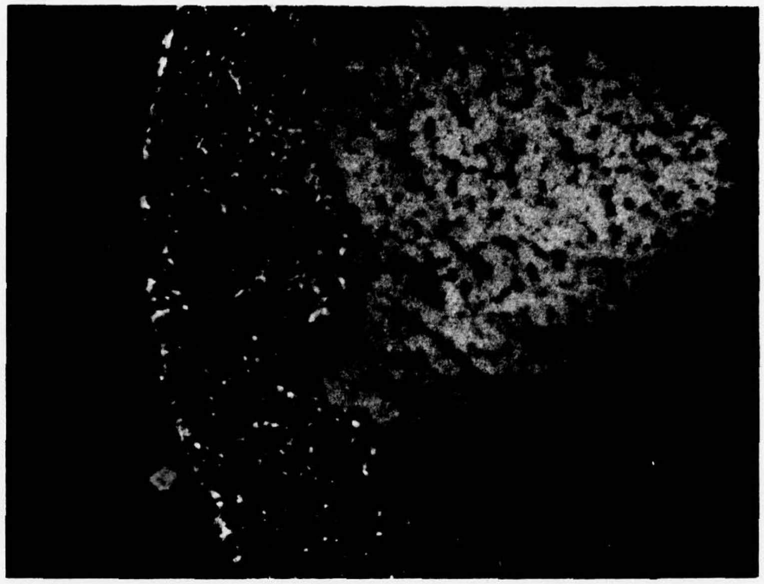


FIGURE 11. FRACTURED COATING AT THREE POINTS PROBED WITH STAINLESS STEEL POINT INDICATING THE FUSED AND BRITTLE CONDITION OF THE COATING. MAG. 15X

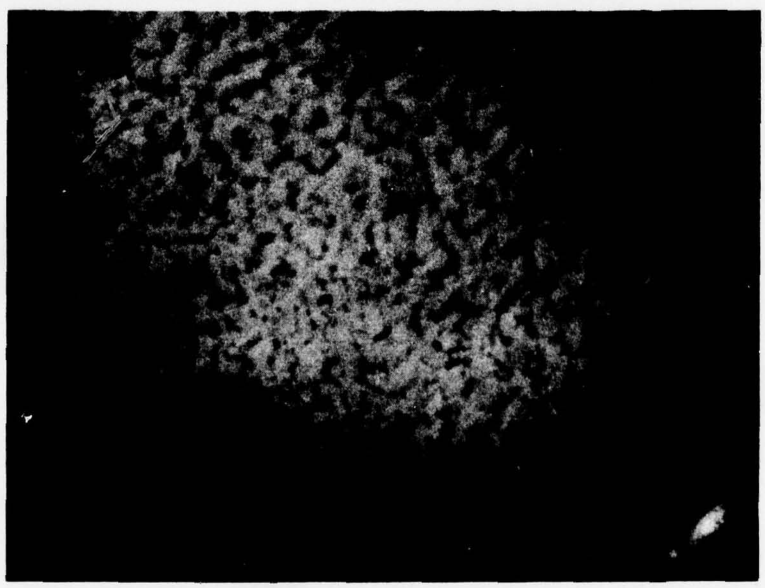
(A)

(B)

FIGURE 12. CATHODES (A) S/N 42A; (B) S/N 51 AFTER REMOVAL FROM FOCUS ELECTRODE IN THE GUN ASSEMBLY. THE COATING ON THE REGION OF EXPOSED NICKEL AT THE EDGE IN (A) FLAKED OFF DURING THE REMOVAL OF THE CATHODE FROM THE FOCUS ELECTRODE. MAG. 50X

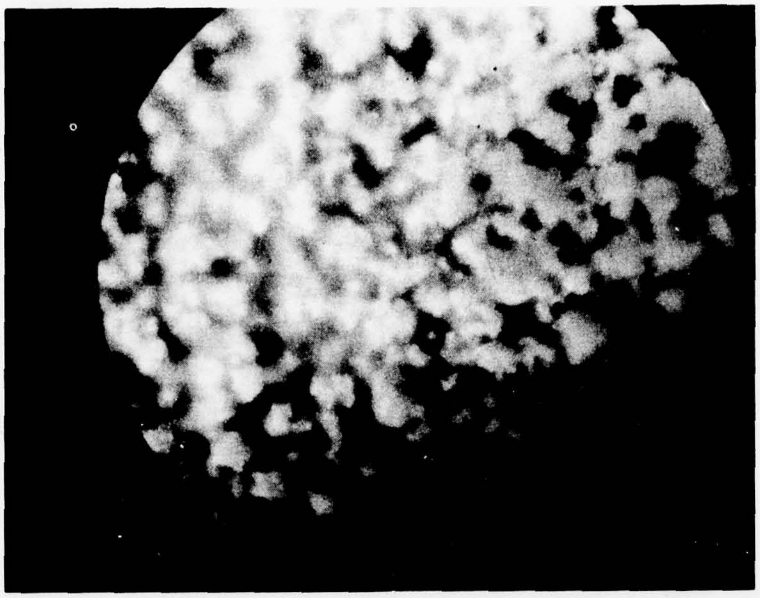


(A)

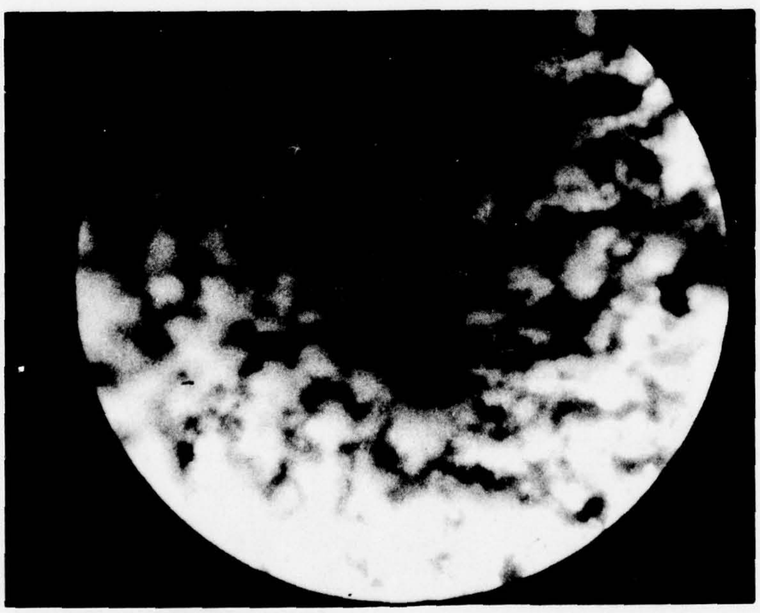


(B)

FIGURE 13. (SAME AS FIGURE 12 EXCEPT AT HIGHER MAGNIFICATION.) MAX. 100X



(A)



(B)

FIGURE 14, (SAME AS FIGURE 13 EXCEPT HIGHER MAGNIFICATION.) MAG. 200X.

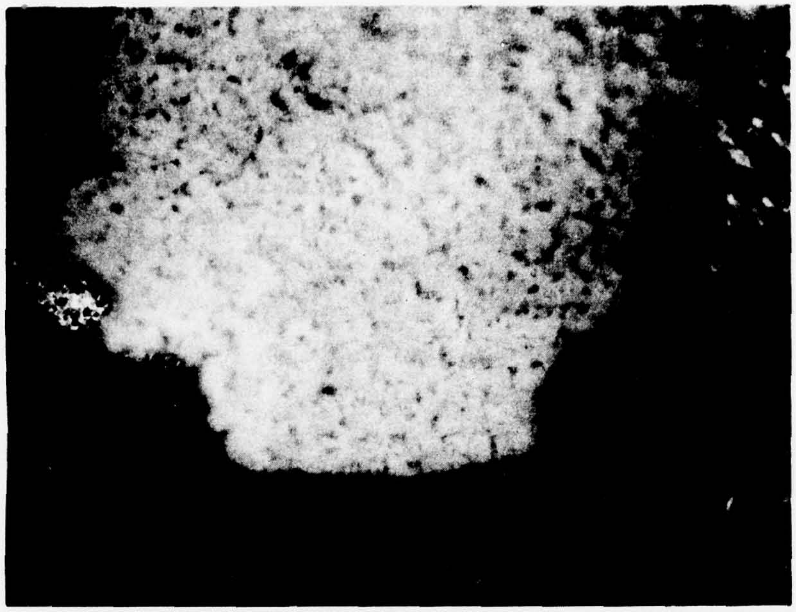


FIGURE 15. AREA OF COATING AT THE EDGE OF S/N 42A CATHODE THAT DID NOT FLAKE OFF DURING THE REMOVAL FROM THE FOCUS ELECTRODE AND ILLUSTRATING THE DEGREE OF GROWTH IN THE COATING BEYOND THE NICKEL SUBSTRATE. MAG. 100X

SCRATCH IN COATING

FIGURE 16. SURFACE OF S/N 51 CATHODE AFTER SCRATCH TEST. NOTE GOOD ADHERANCE AND ABSENCE OF CRACKING OR FLAKING. MAG. 50X

(A)

(B)

FIGURE 17. CATHODES (A) S/N 42A AND (B) S/N 51 AFTER SAMPLE HAD BEEN TAKEN FOR X-RAY DIFFRACTION AND SPECTROGRAPHIC ANALYSIS. NOTE: COATING ON (A) HAS CURLED UP FROM THE NICKEL SUBSTRATE AND HAS FRACTURED EDGES INDICATING A HIGHLY SINTERED AND BRITTLE CONDITION. COATING (B) ILLUSTRATES PASTY, GOOD ADHERANCE CONDITION. MAG. 50X

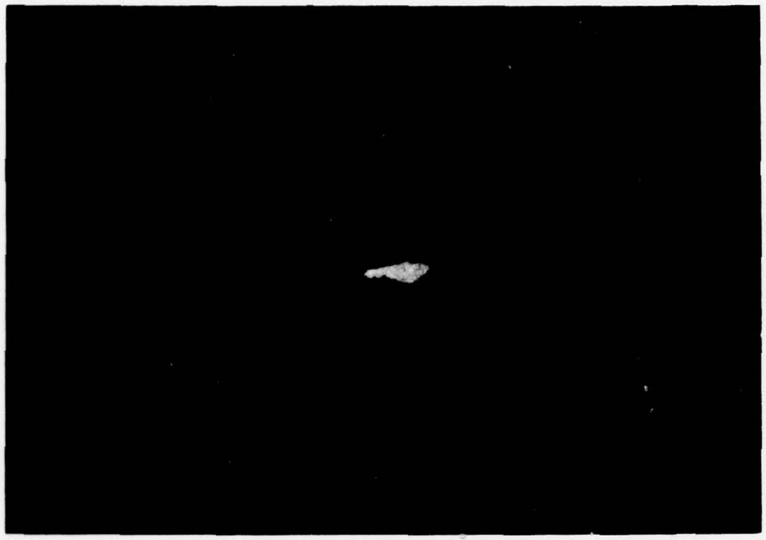
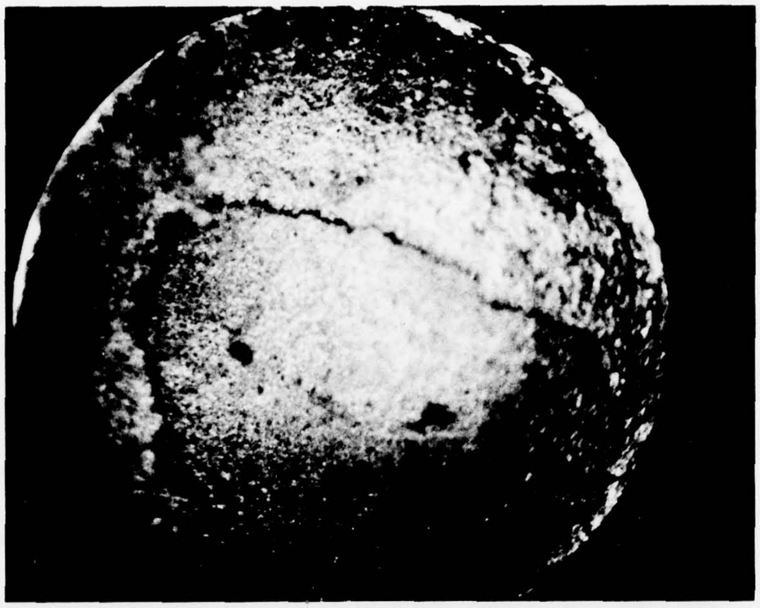
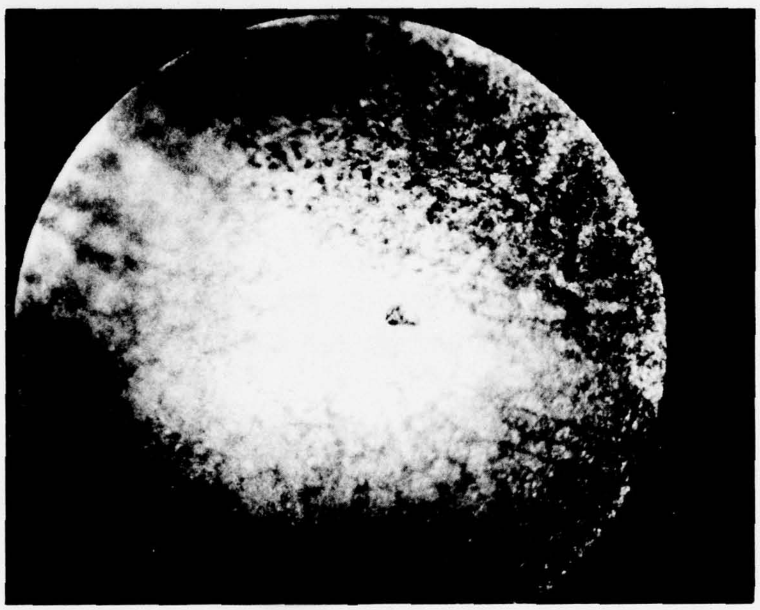


FIGURE 18. VIEW OF CATHODE, S/N 42A, ILLUSTRATING THE EXTENT THAT THE SINTERED COATING HAD LIFTER FROM THE NICKEL BASE OF THE CATHODE DURING THE SAMPLING PROCESS.



(A)



(B)

FIGURE 19. CATHODES (A), S/N 42A AND (B), S/N 51, AFTER OXIDE COATING HAD BEEN REMOVED. DISCOLORED REGION ON (A) IS FROM THE VAPOR DEPOSITED ALUMINUM APPLIED TO THE SURFACE FOR CONDUCTIVITY REQUIRED FOR MICROPROBE ANALYSIS JUST PRIOR TO LOSS OF THE COATING. SCRATCH MARKS ON (B) ARE FROM SCRAPING OFF THE ADHERENT OXIDE COATING. MAG. 50X.

TABLE I

X-RAY DIFFRACTION ANALYSIS

OF

CATHODE OXIDE COATINGS

COMPOUNDS DETECTED	S/N 42A COATING	S/N 51 COATING
Ba CO_3	X	X
Sr CO_3	X	X
Sr $(OH)_2$	X	X
Ba $(OH)_2$	X	ND*
Ba O	ND*	X

* ND - NOT DETECTED

TABLE II

EMISSION SPECTROGRAPHIC ANALYSIS

OF

CATHODE OXIDE COATINGS

ELEMENTS	PERCENT IN S/N 42A COATING*	PERCENT IN S/N 51 COATING*
Si	23.0	20.0
Fe	0.7	NO
Eu	5.3	0.037
Al	NO	27.0
Ca	6.4	0.92
Mg	4.0	0.69
Mn	NO	0.17
Sn	NO	2.2
Ag	NO	0.27
Sr	12.0	0.23

* WEIGHT PERCENT IS BASED ON OXIDE PLUS CELLULOSE NITRATE BINDER. BECAUSE OF THE SMALL SAMPLE SIZE, THE S/N 42A DATA HAS ONLY A 50% LIMIT OF DETECTION SENSITIVITY COMPARED TO 5% FOR S/N 51.

TABLE III

ELECTRON BEAM MICROPROBE ANALYSIS
OF
NICKEL SURFACE UNDER CATHODE OXIDE COATING

ELEMENT	PERCENT FOR S/N 42A CATHODE	PERCENT FOR S/N 51 CATHODE
Tungsten	1.3	0.7
Zirconium	0.1	0.1
Silicon	0.2	0.3
Copper	0.0	0.0

TABLE IV

EMISSION SPECTROGRAPHIC ANALYSIS

OF

NICKEL ALLOY BASE OF CATHODES

ELEMENT	PERCENT IN S/N 42A	PERCENT IN S/N 51
W	2.8	2.3
Zr	0.11	0.075
Mn	0.031	0.018
Fe	0.062	0.035
Mg	0.012	0.0058
Si	0.040	0.022
Al	0.023	0.012
Cu	0.0074	0.0056
Co	0.051	0.047
Ni	Balance	Balance
Others	Nil	Nil

APPENDIX A-1

WEEKLY RAW DATA

HUGHES | ELECTRON DYNAMICS DIVISION
3100 W. LOMITA BLVD. TORRANCE, CALIFORNIA 90509

DATA SHEET NO. 8200300-4 BY:
MODEL 8200300-121 / 8200300-122 SERIAL NO. 22-2

CUSTOMER TEST DATA SHEET

PAGE 1 OF 2

Test Name: LOW LEVEL LIFE TEST PLAN & PROCEDURE — Spec No. LTP8200300-400

Test conditions
Nominal input voltage, P_o(sat); freq f_o — CAT

Test conditions
Nominal input voltage

PRE-FINAL ATP DATA	O	LIMITS MIN	LIMITS MAX	UNITS									11.8	
TOTAL ACCUMULATED HOURS					92.5	260.5	428.5	593.5	732.7	923.2	1089.0	1253.9	1491.4	1588.2	1758.0
					week of 10/2/70	week of 10/9/70	week of 10/16/70	week of 10/23/70	week of 10/29/70	week of 11/6/70	week of 11/13/70	week of 11/20/70	week of 11/30/70	week of 12/4/70	week of 12/11/70
Input current telemetry voltage	2.020			V	2.031	2.033	2.035	2.041	2.047	2.048	2.053	2.054	2.055	2.056	2.066
Cathode current telemetry voltage	3.200			V	3.202	3.214	3.225	3.234	3.235	3.233	3.238	3.239	3.240	3.239	3.244
Heater voltage telemetry voltage	3.768			V	3.767	3.784	3.768	3.773	3.783	3.779	3.769	3.763	3.752	3.749	3.760
Helix current telemetry voltage	2.167			V	2.296	2.241	2.289	2.337	2.355	2.377	2.436	2.490	2.53	2.541	2.617
Cathode voltage telemetry voltage	2.698			V	2.539	2.678	2.684	2.681	2.677	2.676	2.679	2.679	2.683	2.683	2.675
P_o (sat) Freq. f_o (Para 4.3.3)	27.75	27	--	dbm	27.35	27.40	27.65	27.55	27.60	27.60	27.65	27.75	27.80	27.75	27.65
Gss Freq. f_o (Para 4.3.1)	36.48	35	39	db	~~36.60~~ 36.60	36.93	36.88	36.88	36.83	36.70	36.70	36.86	36.90	36.75	36.65
Tested By:															

				11.0			9.8				10.0			
TOTAL ACCUMULATED HRS	1992.1	2179.7	2399.6	2687.4	2829.5		3426	3665	3924	4177	4357	5068	5838	5947
	week of 12/21/70	week of 12/29/70	week of 1/7/71	week of 1/19/71	week of 1/25/71	week of 2/8/71	week of 2/19/71	week of 2/25/71	week of 3/12/71	week of 3/24/71	week of 3/31/71	week of 4/30/71	week of 6/2/71	week of 6/7/71
Input current telemetry voltage	2.070	2.075	2.077	2.082	2.082	2.080	2.080	2.080	2.075	2.072	2.063	2.059	2.051	2.049
Cathode current telemetry voltage	3.246	3.251	3.247	3.243	3.249	3.251	3.240	3.239	3.230	3.226	3.217	3.214	3.203	3.186
Heater voltage telemetry voltage	3.742	3.750	3.749	3.759	3.748	3.728	3.708	3.749	3.738	3.726	3.761	3.717	3.722	3.713
Helix current telemetry voltage	2.718	2.736	2.785	2.821	2.872	2.906	2.906	2.856	2.802	2.755	2.606	2.587	2.612	2.571
Cathode voltage telemetry voltage	2.681	2.678	2.677	2.671	2.676	2.682	2.691	2.681	2.682	2.686	2.680	2.692	2.695	2.698
P_o (sat) Freq f_o (Para 4.3.3)	27.55	27.60	27.60	27.50	27.60	27.45	27.50	27.50	27.45	27.48	27.55	27.85	27.65	27.58
Gss Freq f_o (Para 4.3.1)	36.50	36.55	36.50	36.40	36.60	36.40	36.36	36.70	36.65	36.13	36.36	36.60	36.05	36.10
Tested By:										RRB	WPM	WPM	RB	WPM

HUGHES ELECTRON DYNAMICS DIVISION
3100 W LOMITA BLVD TORRANCE, CALIFORNIA 90509

DATA SHEET [illegible]B200300-... REV.
MODEL B200300-121 / B200300-122 SERIAL NO. 22-2

CUSTOMER TEST DATA SHEET

PAGE 2 OF 2

Test Name	Spec No.
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400

Test conditions
Nominal input voltage, P_o(sat); freq f_o

Test conditions
Nominal input voltage

TOTAL ACCUMULATED HOURS				6784										
	LIMITS MIN	MAX	UNITS	week of 7/15/71	week of / /	week of / /	week of / /	week of / /	week of / /	week of / /	week of / /	week of / /	week of / /	week of / /
Input current telemetry voltage			v	2.095										
Cathode current telemetry voltage			v	3.167										
Heater voltage telemetry voltage			v	3.640										
Helix current telemetry voltage			v	3.436										
Cathode voltage telemetry voltage			v	2.697										
P_o (sat) Freq. f_o (Para 4.3.3)	27	--	dbm	27.15										
Gss Freq. f_o (Para 4.3.1)	35	39	db	34.29										
Tested By:				WPM										

TOTAL ACCUMULATED HRS														
	week of / /	week of / /	week of / /	week of / /	week of / /	week of / /	week of / /	week of / /	week of / /	week of / /	week of / /	week of / /	week of / /	week of / /
Input current telemetry voltage														
Cathode current telemetry voltage														
Heater voltage telemetry voltage														
Helix current telemetry voltage														
Cathode voltage telemetry voltage														
P_o (sat) Freq f_o (Para 4.3.3)														
Gss Freq f_o (Para 4.3.1)														
Tested By:														

APPENDIX B-1

SWEPT SATURATED POWER CURVES

HUGHES

HUGHES AIRCRAFT COMPANY

Para. 4.3.3 Satur d Power Output

ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

Data Sheet No. DSB2003 400

Rev.

Model B200300-121/122

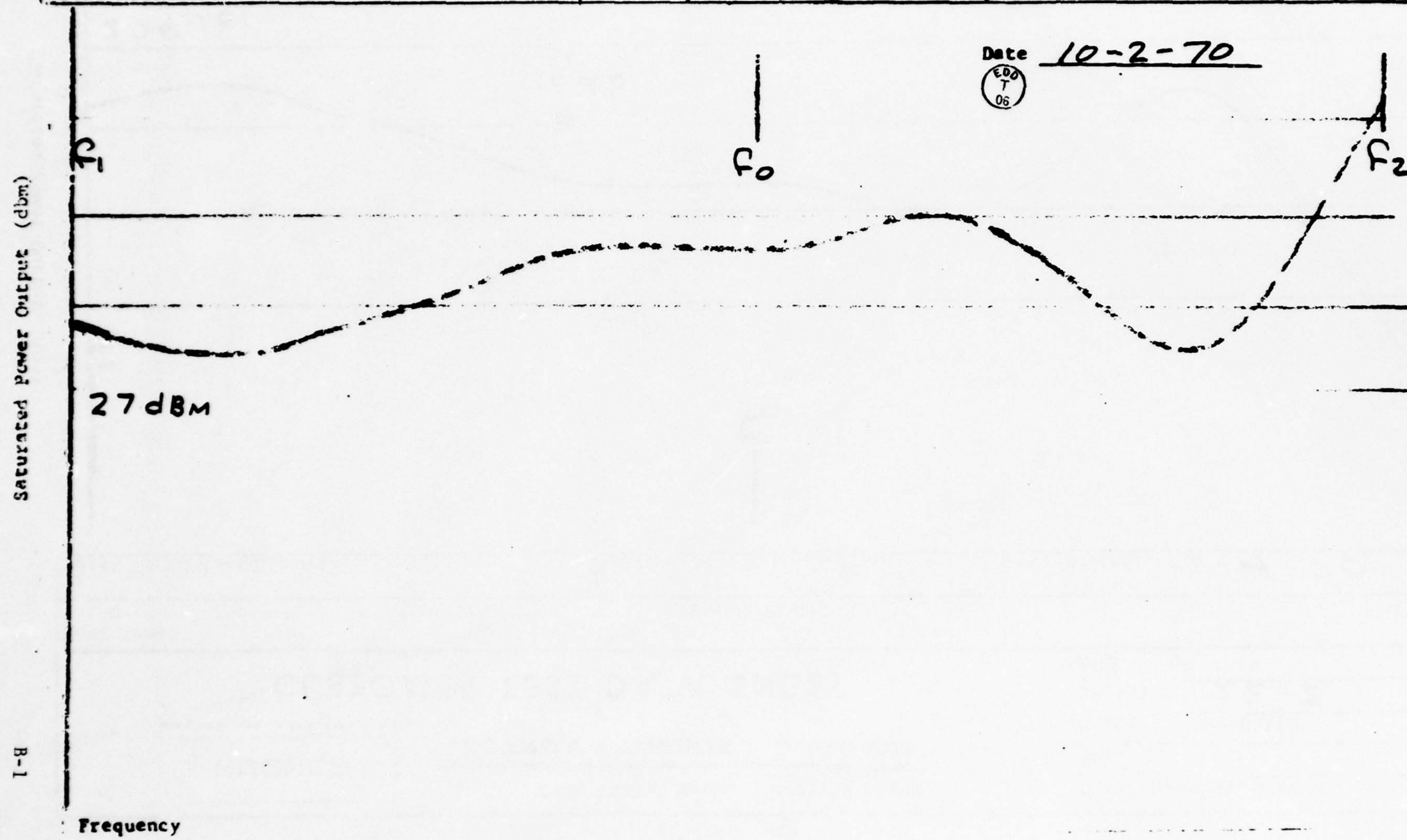
Serial No. 22-2

PAGE OF

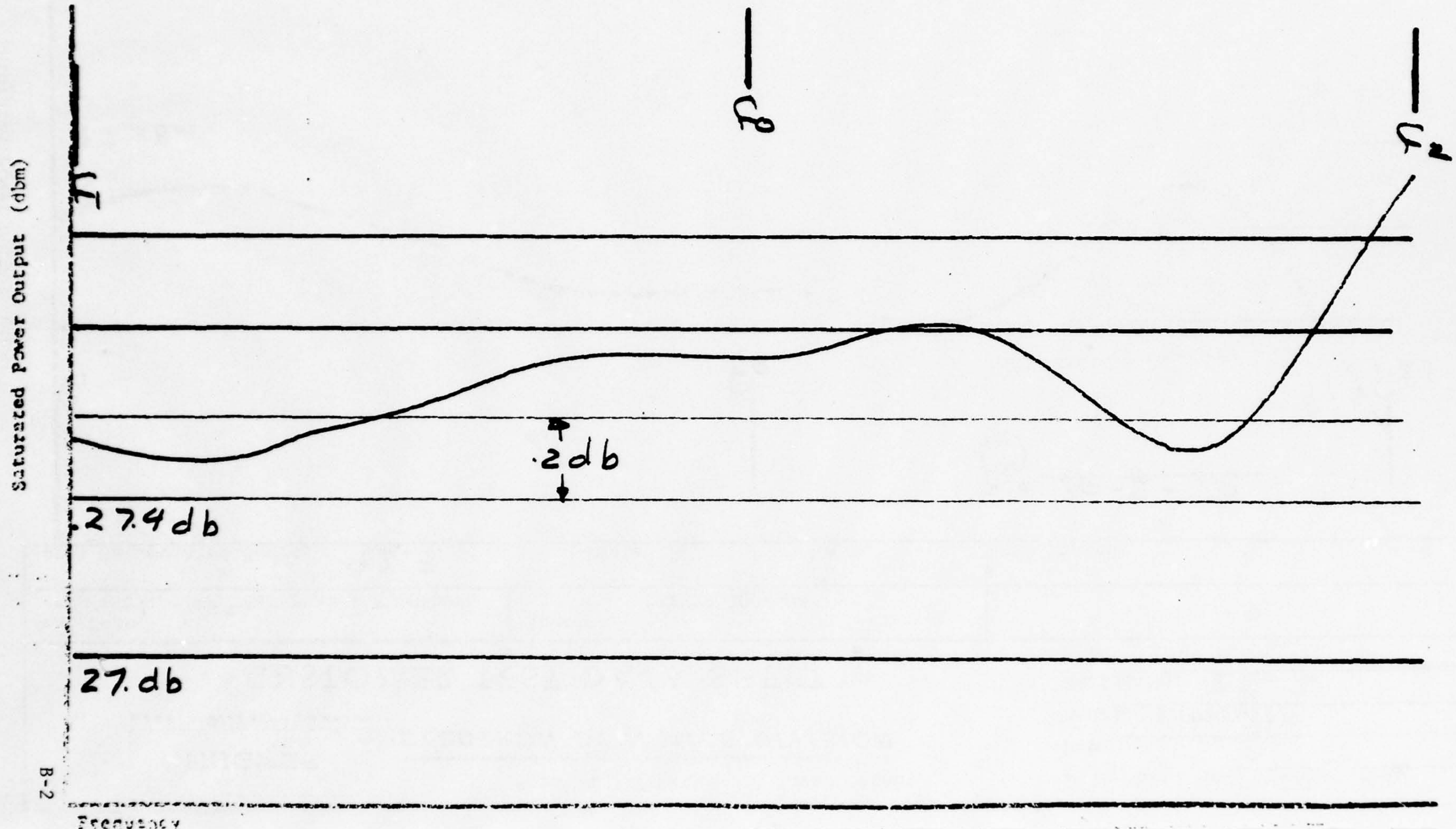
Test Name LOW LEVEL LIFE TEST PLAN & PROCEDURE	Spec No. LTPB200300-400	
Total Accumulated Hours: 92.5	Tested By:	Date Tested:

Date 10-2-70

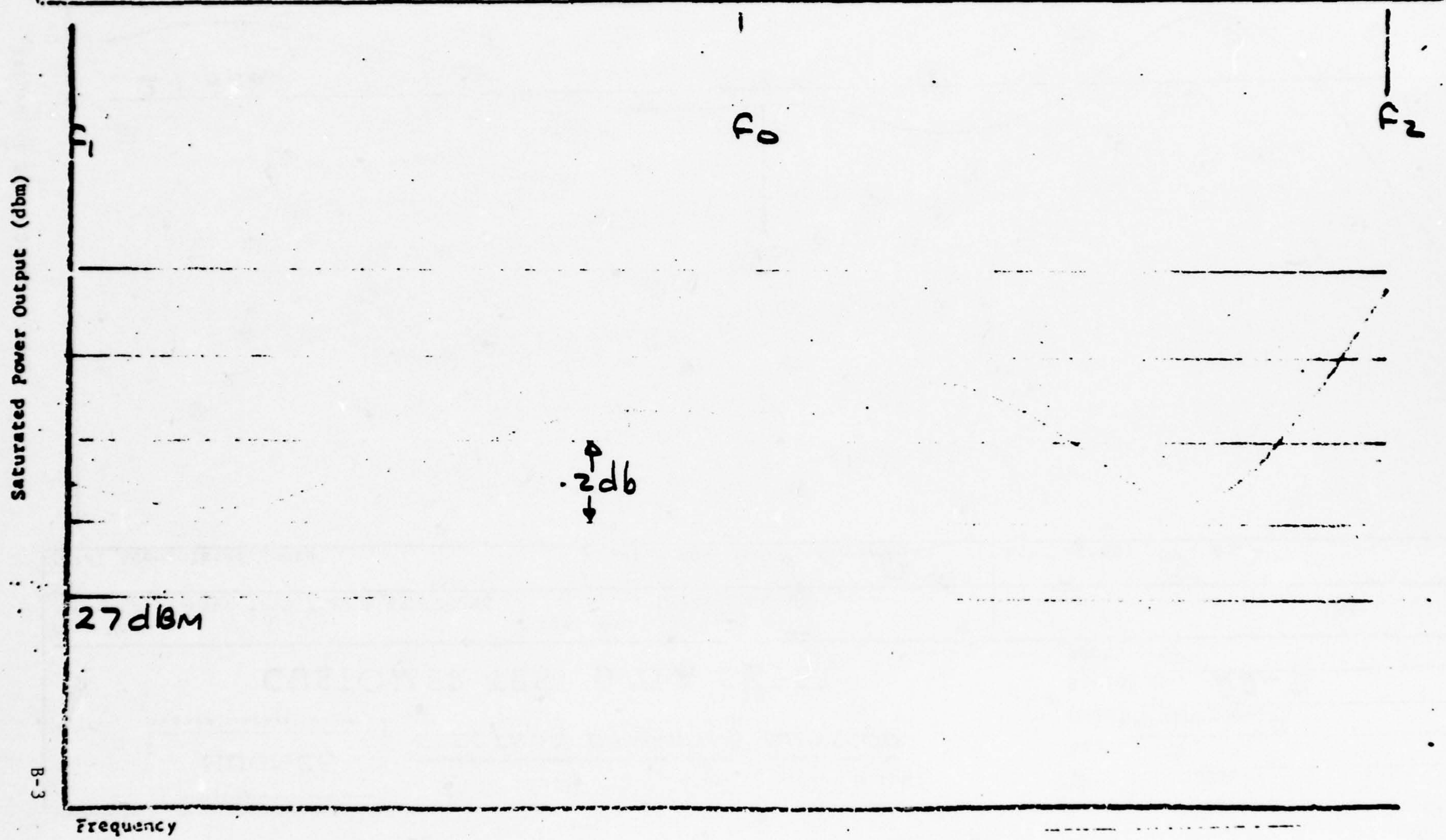
EDO T 06



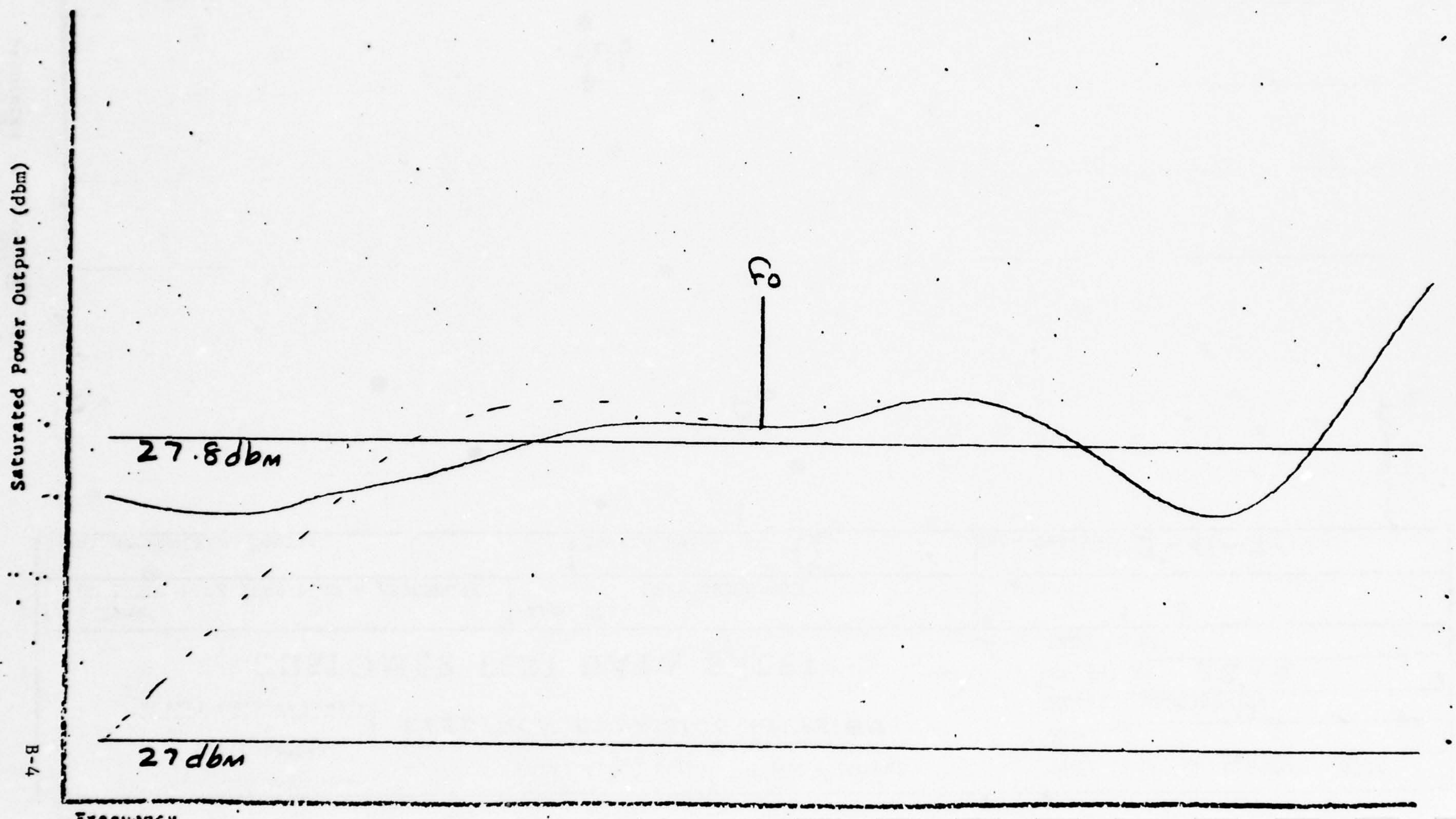
HUGHES HUGHES AIRCRAFT COMPANY	Para. 4.3.3 Satur d Power Output ELECTRON DYNAMICS DIVISION CUSTOMER TEST DATA SHEET	Data Sheet No. DSB200: 400 Rev. Model B200300-121/122 Serial No. 22-2 PAGE OF
Test Name LOW LEVEL LIFE TEST PLAN & PROCEDURE	Spec No. LTPB200300-400	
Total Accumulated Hours:	Tested By:	Date Tested: 12-4-70



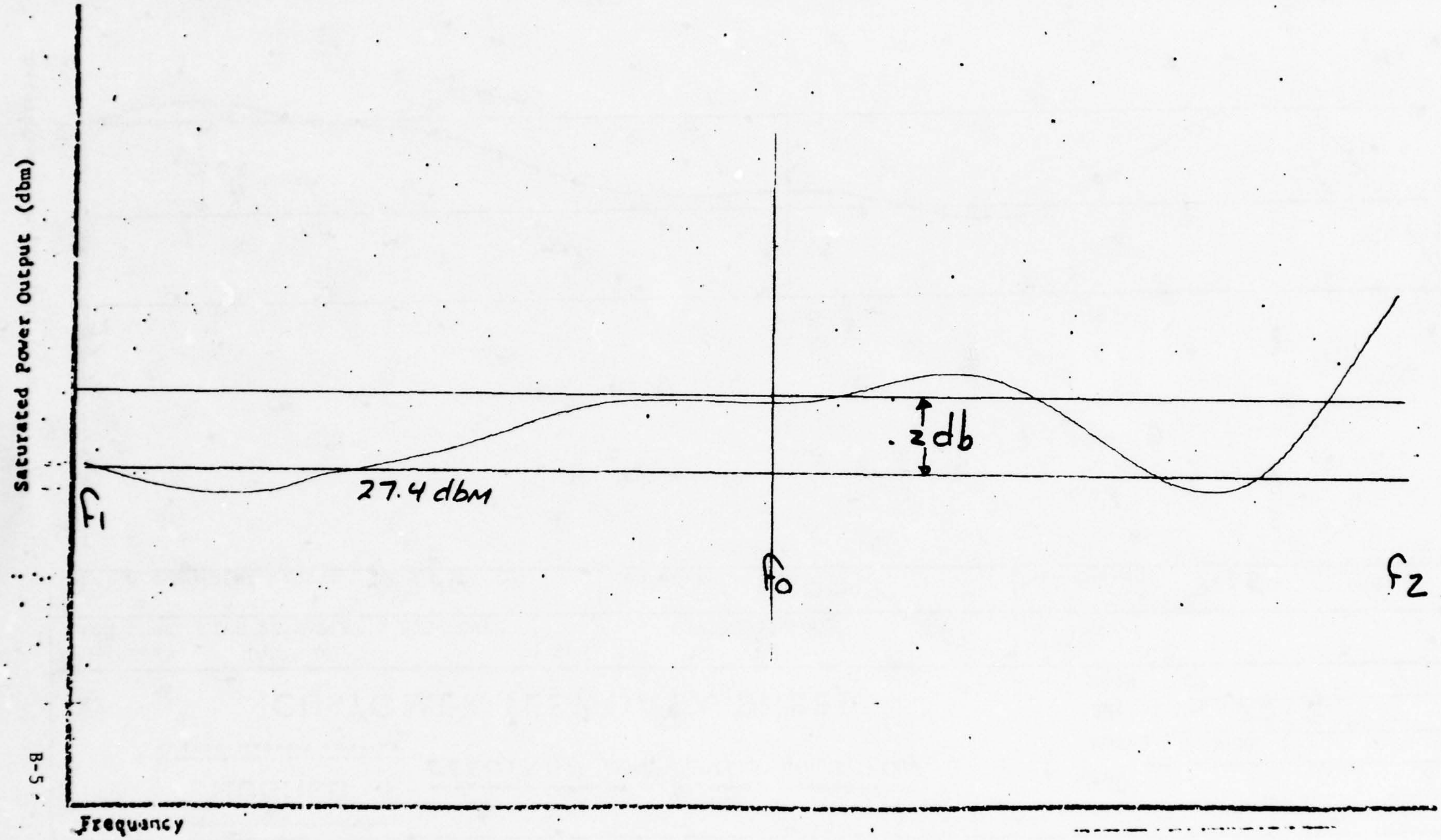
HUGHES HUGHES AIRCRAFT COMPANY	Para. 4.3.3 Satur. d Power Output ELECTRON DYNAMICS DIVISION CUSTOMER TEST DATA SHEET	Data Sheet No. DSB2003 400 Rev. Model B200300-121 122 Serial No. 22-2 PAGE OF
Test Name LOW LEVEL LIFE TEST PLAN & PROCEDURE	Spec No. LTPB200300-400	
Total Accumulated Hours:	Tested By:	Date Tested: 2-8-71



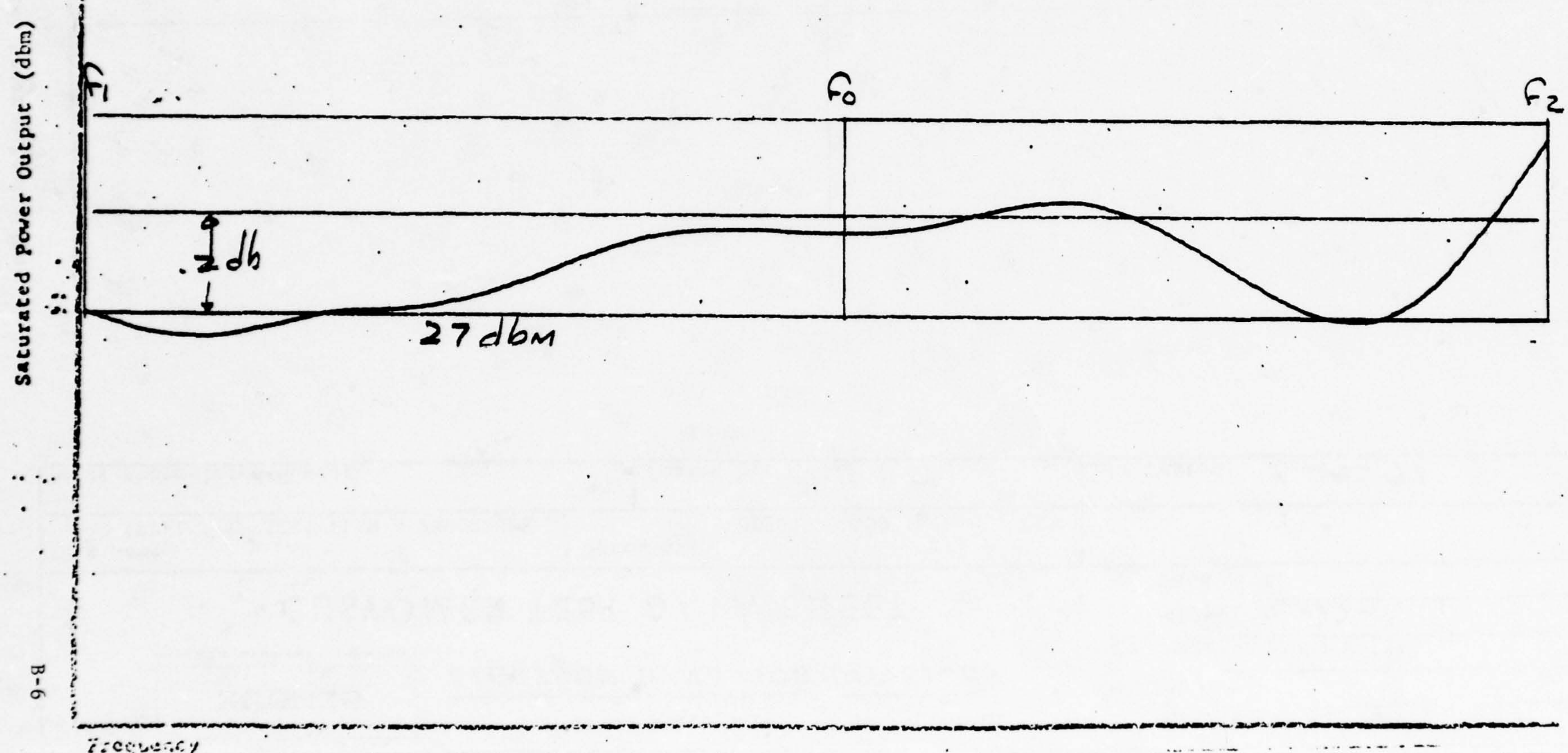
HUGHES HUGHES AIRCRAFT COMPANY	Para. 4.3.3 Satur. d Power Output ELECTRON DYNAMICS DIVISION CUSTOMER TEST DATA SHEET	Data Sheet No. DSB200[illegible] 400 Rev. Model B200300-122 [2] Serial No. 22-2 PAGE OF
Test Name LOW LEVEL LIFE TEST PLAN & PROCEDURE	Spec No. LTPB200300-400	
Total Accumulated Hours:	Tested By: W.P. Nowlan	Date Tested: 4-30-71



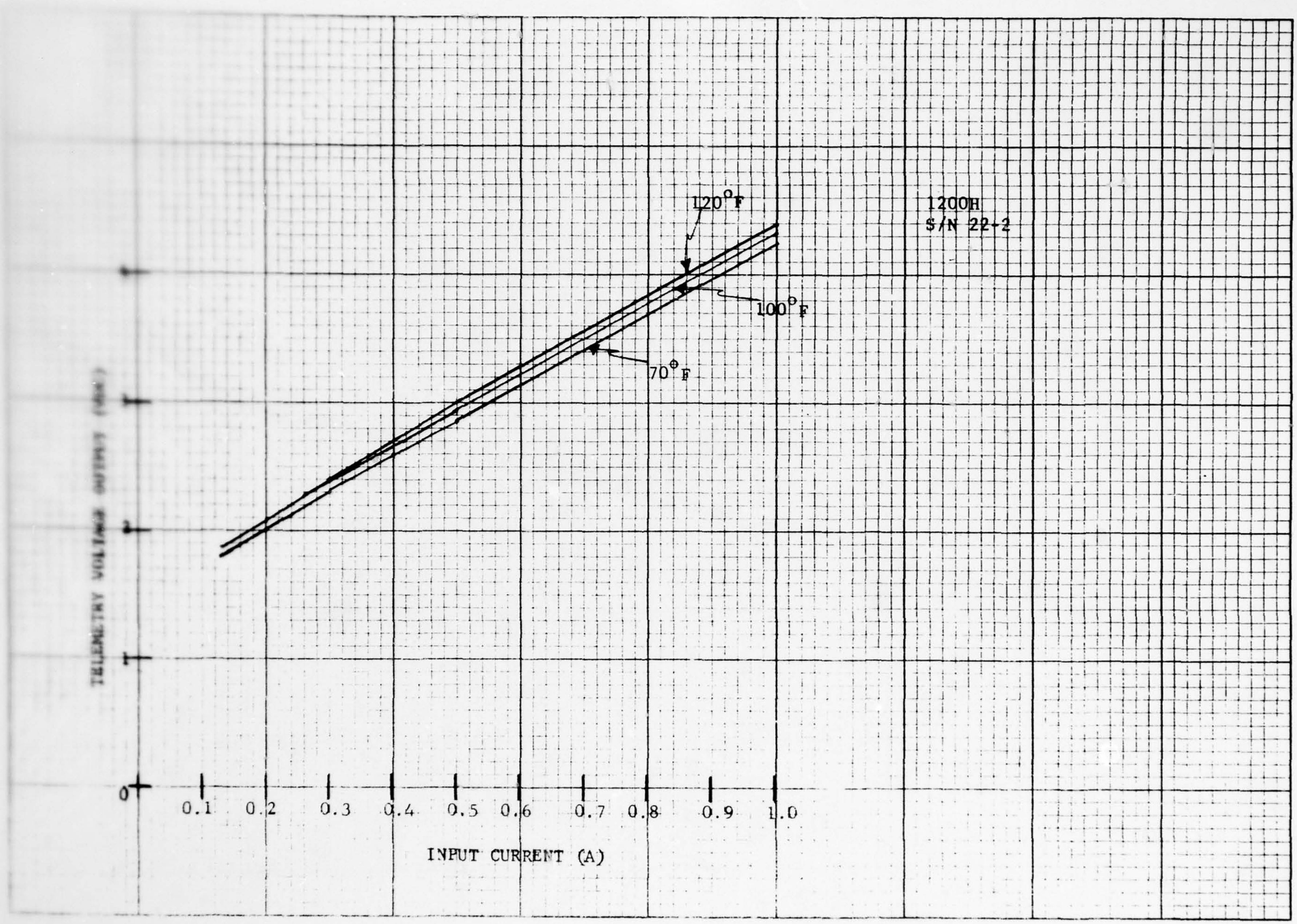
HUGHES HUGHES AIRCRAFT COMPANY	Para. 4.3.3 Satur. d Power Output ELECTRON DYNAMICS DIVISION CUSTOMER TEST DATA SHEET	Data Sheet No. DSB200: 400 Rev. Model B200300-122 Serial No. 22-2 PAGE OF
Test Name LOW LEVEL LIFE TEST PLAN & PROCEDURE	Spec No. LTPB200300-400	
Total Accumulated Hours:	Tested By: W P M	Date Tested: 6-7-71

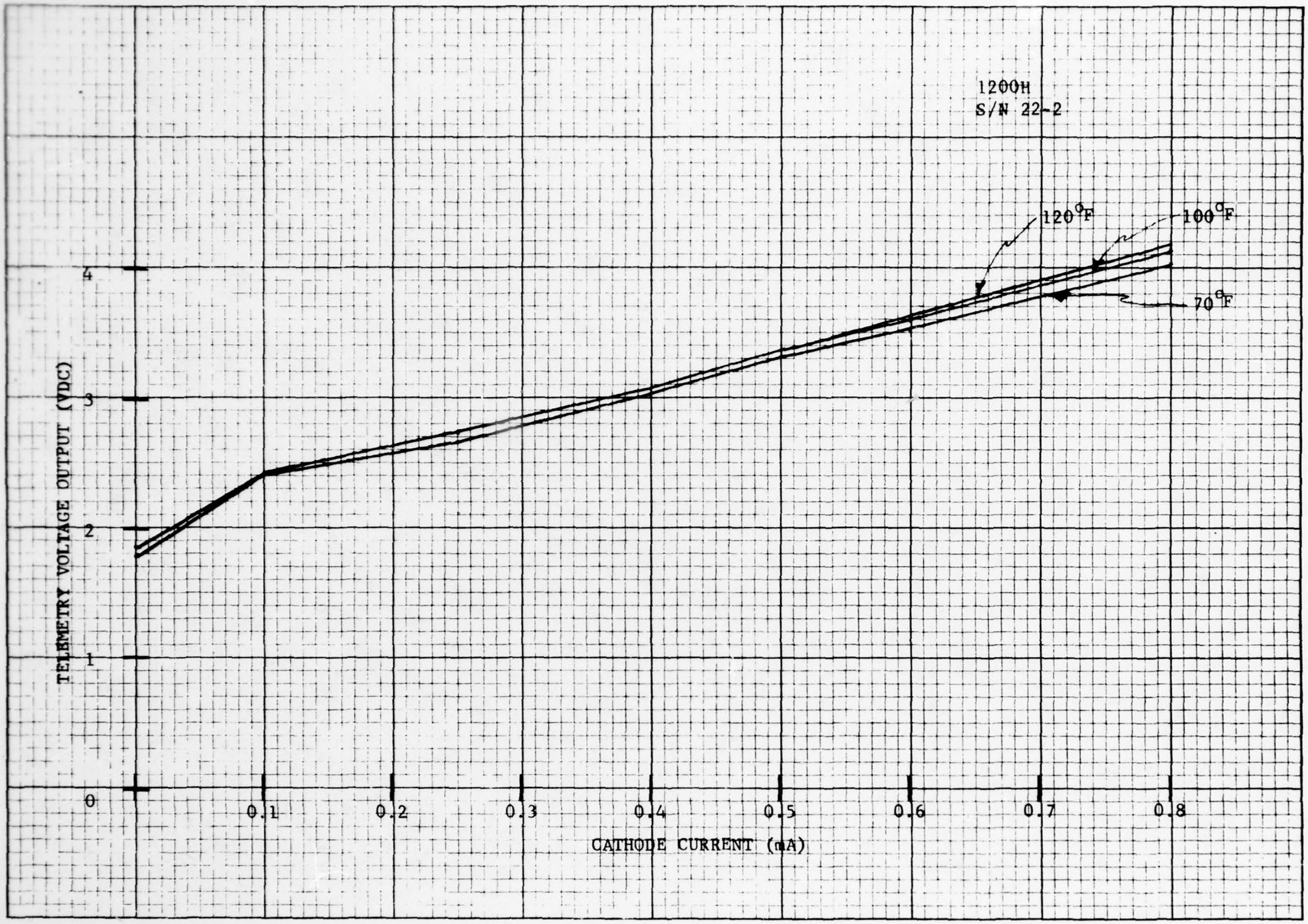


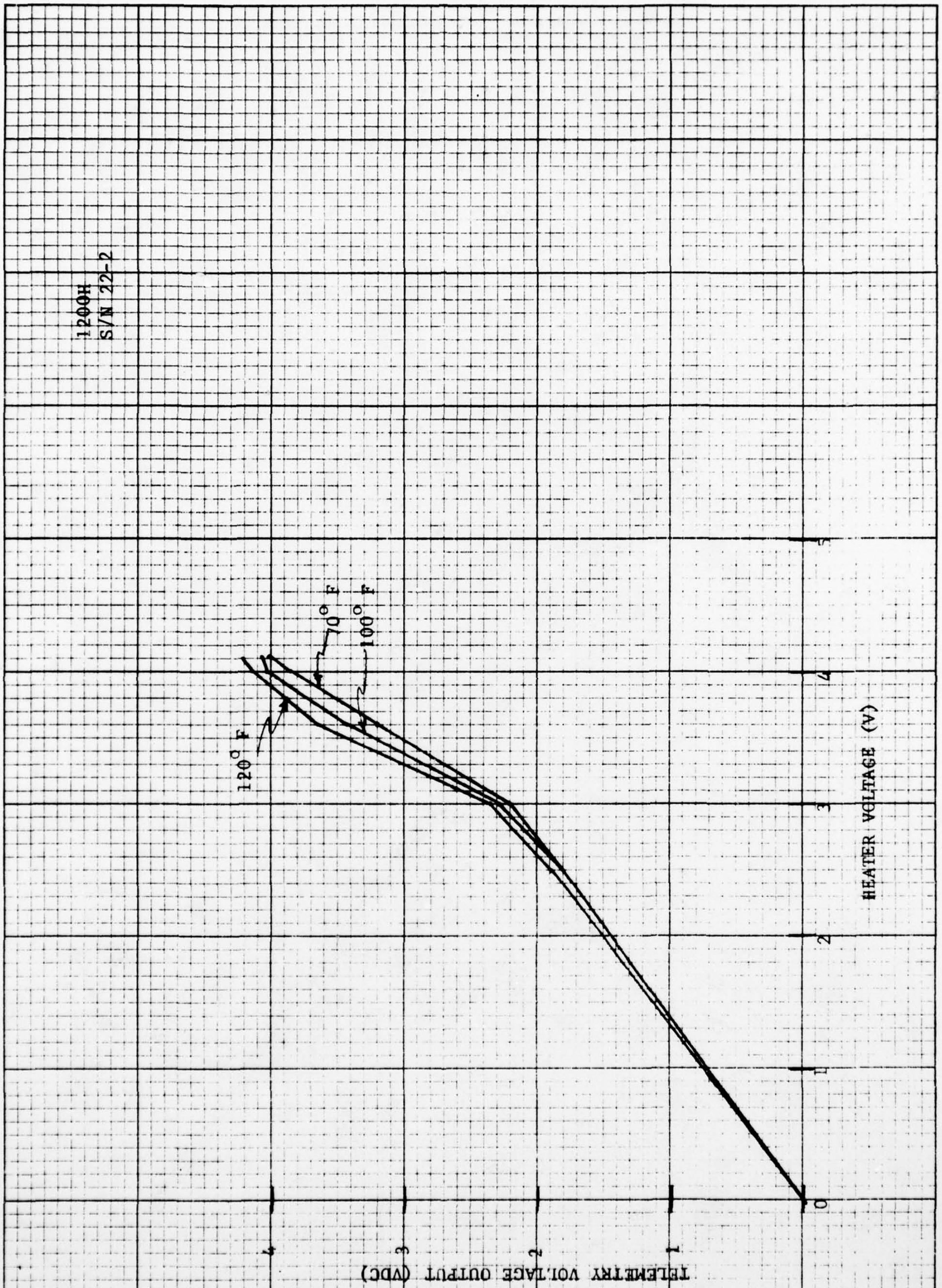
HUGHES HUGHES AIRCRAFT COMPANY	Para. 4.3.3 Satur. d Power Output ELECTRON DYNAMICS DIVISION CUSTOMER TEST DATA SHEET	Data Sheet No. DSB2003 400 Rev. Model B200300-122 Serial No. 22-2 PAGE OF
Test Name LOW LEVEL LIFE TEST PLAN & PROCEDURE	Spec No. LTPB200300-400	
Total Accumulated Hours: 6784	Tested By: W.P.M	Date Tested: 7-15-71

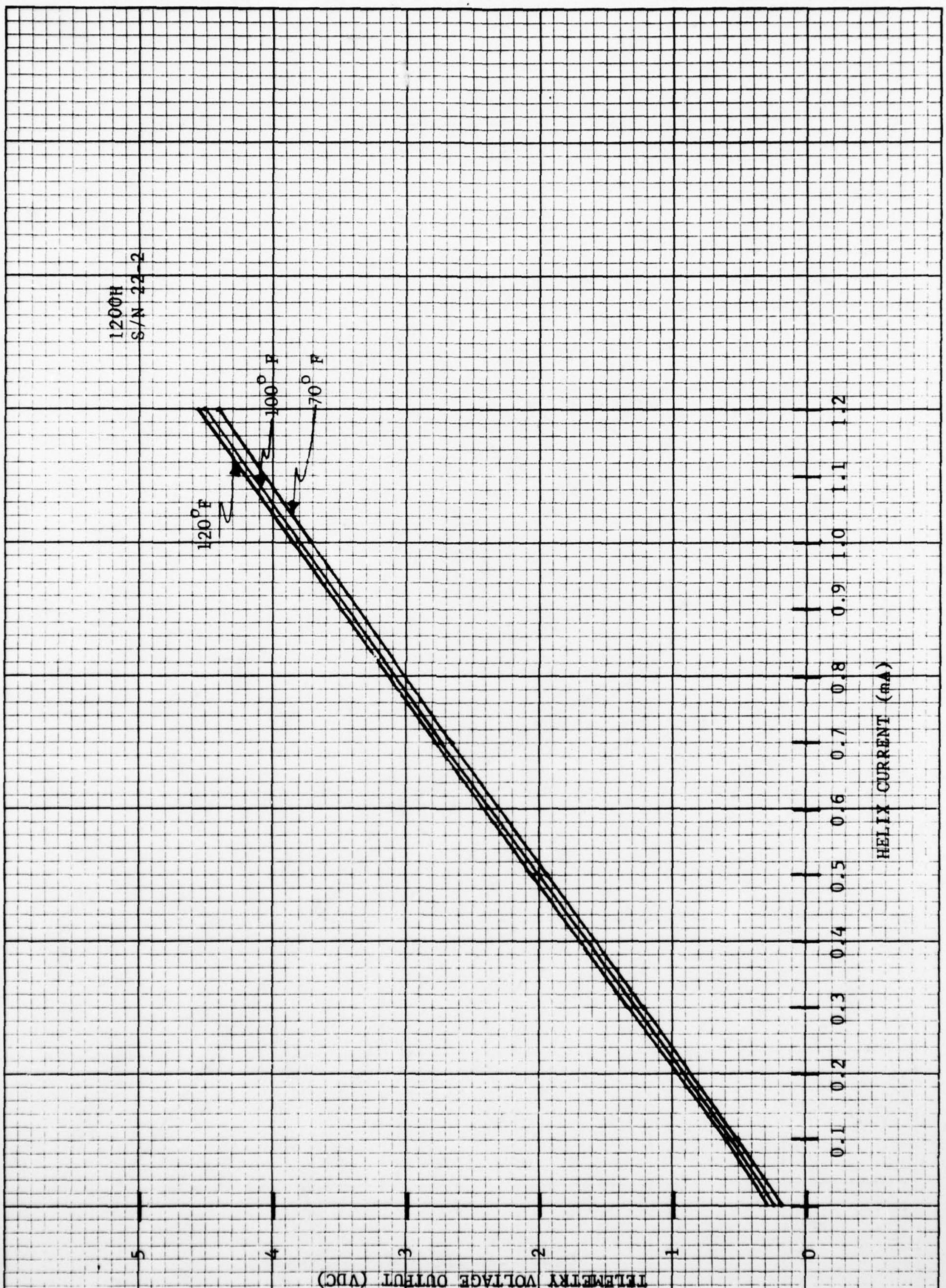


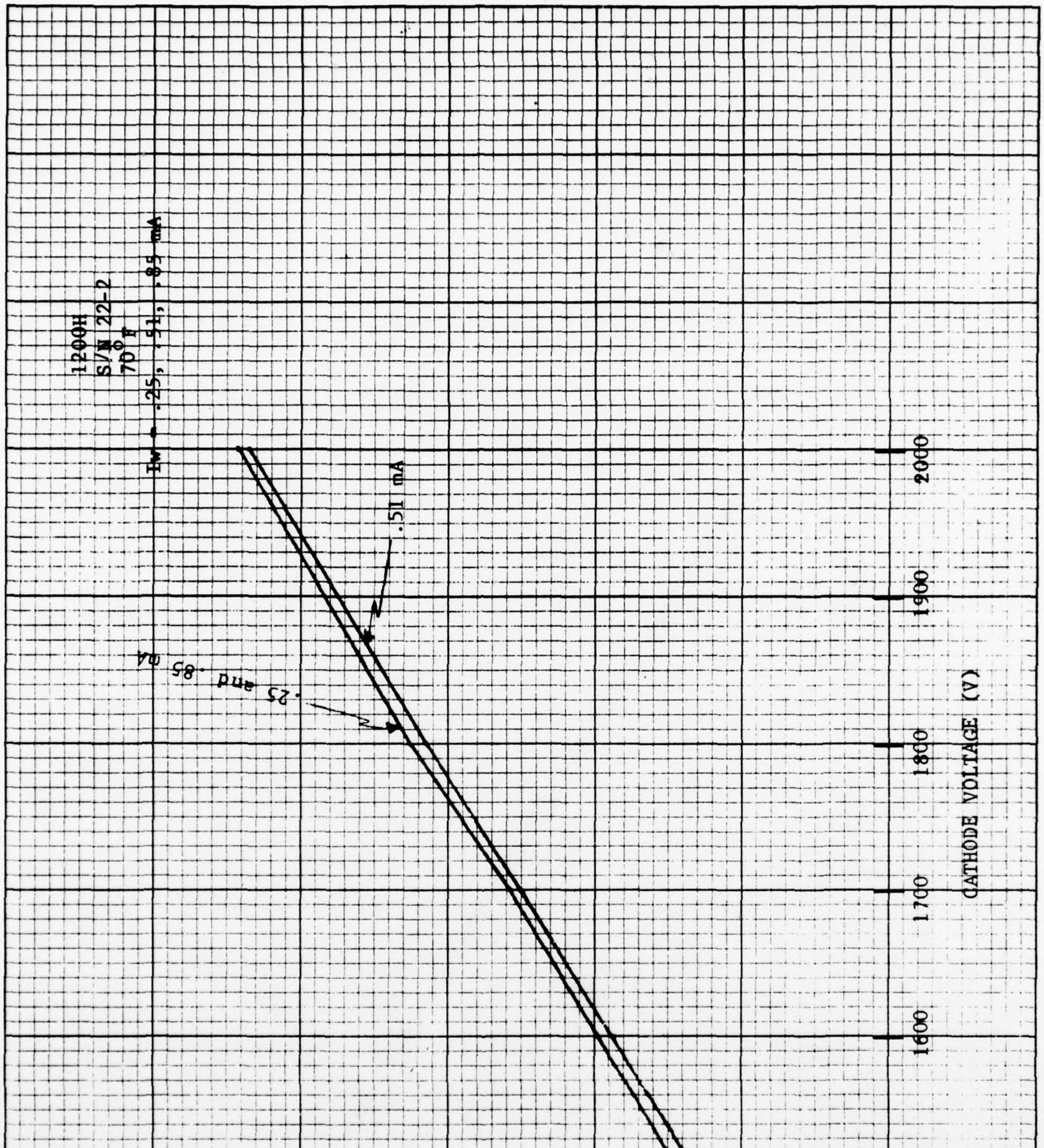
APPENDIX C-1
TELEMETRY CALIBRATION CURVES

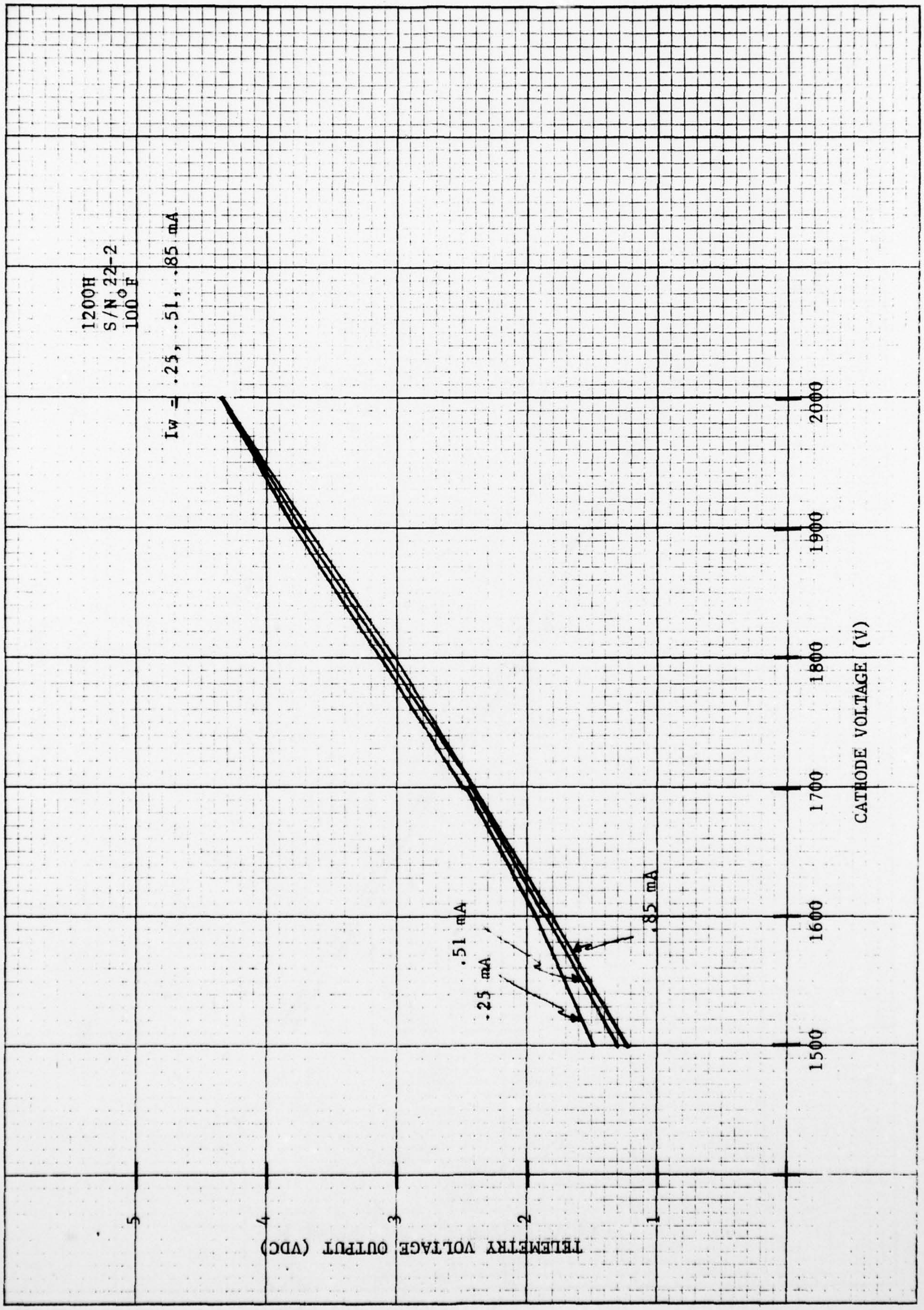

120°F
100°F
70°F
1200H
S/N 22-2
0
1
2
3
4
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
INPUT CURRENT (A)
TELEMETRY VOLTAGE OUTPUT

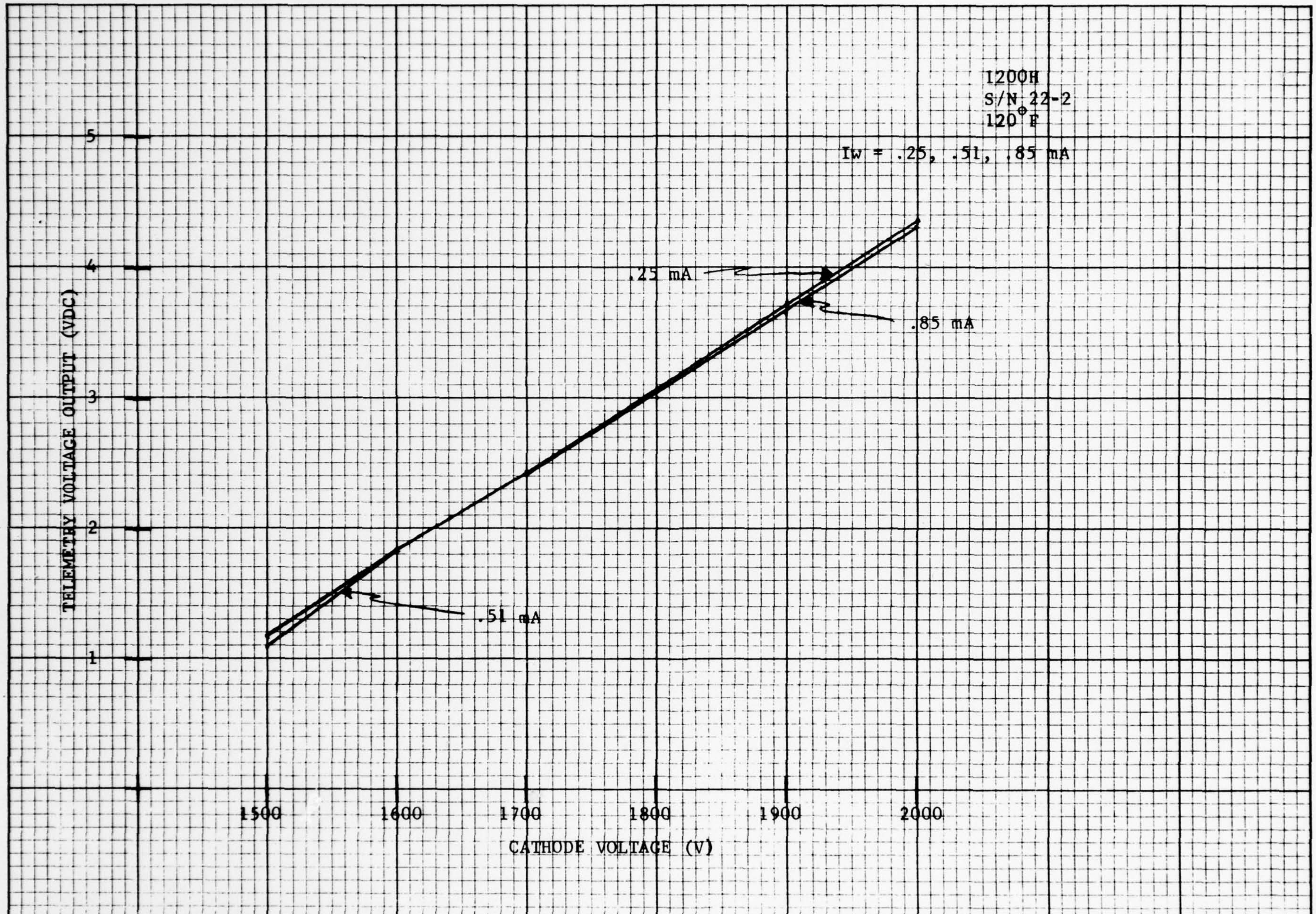

1200H
S/N 22-2
120°F
100°F
70°F
TELEMETRY VOLTAGE OUTPUT (VDC)
0
1
2
3
4
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
CATHODE CURRENT (mA)


1200H
S/N 22-2
120° F
70° F
100° F
TELEMETRY VOLTAGE OUTPUT (VDC)
HEATER VOLTAGE (V)
0
1
2
3
4
5
1
2
3
4


1200H
S/N 22-2
120°F
100°F
70°F
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2
HELIX CURRENT (mA)
0 1 2 3 4 5
TELEMETRY VOLTAGE OUTPUT (VDC)


1200H
S/N 22-2
70° F
Iw = .25, .51, .85 mA
.51 mA
.25 and .85 mA
1500
1600
1700
1800
1900
2000
CATHODE VOLTAGE (V)
1
2
3
4
5
TELEMETRY VOLTAGE OUTPUT (VDC)


1200H
S/N 22-2
100°F
Iw = .25, .51, .85 mA
.51 mA
.25 mA
.85 mA
1500
1600
1700
1800
1900
2000
CATHODE VOLTAGE (V)
1
2
3
4
5
TELEMETRY VOLTAGE OUTPUT (VDC)


1200H
S/N 22-2
120°F
Iw = .25, .51, .85 mA
.25 mA
.85 mA
.51 mA
TELEMETRY VOLTAGE OUTPUT (VDC)
1
2
3
4
5
1500
1600
1700
1800
1900
2000
CATHODE VOLTAGE (V)

APPENDIX B

777 MODEL 1200H LOW LEVEL TWTA

LIFE TEST PLAN AND PROCEDURE

LTPB200300-400

REVISIONS			APPROVED			
DATE	LTR	DESCRIPTION	QA	ENG	MFG	REL
3/26/4	A	Completely Revised: Per E.C.N. A8378 & A 14894 Was: See Historic File Is: Pages 2 Through 37		JWH		G.C.L.

RELEASED PRINT ENG DOC CONTROL CTR — REV: A — REL DATE: 3-27-4 — REL BY: JK

END USE B200300-12X	HUGHES ELECTRON DYNAMICS DIVISION 3100 W LOMITA BLVD TORRANCE CALIFORNIA 90509
PREP BY G W Schaffer	
QA	
ENG	777 LOW LEVEL TWTA LIFE TEST PLAN AND PROCEDURE
MFG	
REL GCL 2-3-74	SIZE A — CODE IDENT NO. 73293 — LTP B200300-400
DATE OF ISSUE 4-16-71	
	REV A — SHEET 1 OF 37

EDD-1047A-1272

LIFE TEST PLAN FOR

777 TRAVELING-WAVE TUBE AMPLIFIERS

1.0 SCOPE

1.1 General

This life test plan establishes the requirements for the life test of the Traveling-wave Tube Amplifiers.

2.0 APPLICABLE DOCUMENTS

2.1 The following documents, of the latest issue in effect, unless otherwise specified, form a part of this test plan to the extent specified herein:

Specification

TRW

777-778	Statement of Work, Low Level Traveling-wave Tube Amplifier, Project 777.
EC-EQ4-663	Detailed Specification, Low Level Traveling-wave Tube Amplifier (LL TWTA) for Project 777.
PAR 700-45-D-2	Subcontractor Product Integrity Requirements, Project 777.
777-S1-2831 70-2376-RV-616	Life Test Negotiations (amends 777-778).
777-G31-80A	Statement of Work, Traveling-wave Tube Amplifier Life Test Extension, Program 777, 3 July 1973

HUGHES/EDD

B200300-121	TWTA Assembly, Model 1200H-1
B200300-122	TWTA Assembly, Model 1200H-2
B200429-100	Life Test Assembly
ATPB200300-400	Acceptance Test Procedure TWTA, Low Level

3.0 REQUIREMENTS

3.1 Purpose

The life test described herein is for the purpose of determining the conformance of the TWTA to life test requirements in accordance with 777-778.

3.2 Items Tested

The life tests described herein are to be conducted on six low level TWTA's, three each of two frequency bands. The assigned identification for the units are:

Description	Part No.	S/N	Frequency Band
LL Life Test Unit	B200300-121	12-1	K
LL Life Test Unit	B200300-121	12-2	K
LL Life Test Unit	B200300-121	12-3	K
LL Life Test Unit	B200300-122	22-1	L
LL Life Test Unit	B200300-122	22-2	L
LL Life Test Unit	B200300-122	22-3	L

3.3 Test Equipment

3.3.1 Life Test Set

The TWTA life test shall consist of special test equipment and commercial equipment as defined in Hughes/EDD Drawing B200429, Life Test Assembly.

3.4 General Requirements

3.4.1 Test Environment

The test environment will be nominal operating laboratory conditions.

3.4.1.1 Room Temperature

The TWTA shall be exposed to an ambient room temperature of 75 $\pm$ 5°F.

3.4.1.2 Cold Plate Temperature

The TWTA cold plate temperature shall be maintained at 90 $\pm$ 15°F. Preconvection, forced air, or water cooling will be used to maintain the cold plate temperature.

3.4.1.3 Relative Humidity

The relative humidity will be 90% or less.

3.4.1.4 Barometric Pressure

The barometric pressure will be the prevailing laboratory pressure.

3.4.2 Performance

During the life test, the functional operation and performance of the TWTA will be recorded. If the value of any measured parameter is not within tolerance, a test discrepancy shall be recorded and an appropriate failure classification and resulting failure action shall be determined in accordance with 3.6. The test discrepancy shall be recorded on the form shown in Figure 7.

3.4.2.1 Monthly Performance Measurements

Once every month the TWTA's will be subjected to the following performance tests and shall meet the appropriate requirements of EC-EQ4-663 (see paragraphs 4.2 and 4.3).

a. All telemetry parameters
b. Small signal gain
c. RF power output at saturation
d. TWT attenuator insertion loss
e. TWT attenuator input and output dc resistance

3.4.2.2 Bench Functional Tests

Each TWTA will be tested per paragraph 4.0 of the Acceptance Test Procedure TWTA, Low Level, ATP B200300-400. Each TWTA will undergo bench functional test at 20,000 ± 500 hours and at termination of its extended life test. (See paragraph 4.4)

3.4.2.3 Cathode Activity Tests

Cathode activity tests shall be run the first month of high voltage operation, at the end of each three month interval, and the last month of the life test. The measurements shall be made in July and October 1973 and January, April and July 1974.

3.4.3 Assembly Calibration

3.4.3.1 Life Test Set

All critical measurement equipment shall have been calibrated. The Hughes/EDD system of calibration for test and measurement equipment complies with the requirements of MIL-C-45662A.

3.5 Completion of Life Test

The extended life test for each TWTA will be terminated 31 July 1974.

3.6 Failures

3.6.1 Test Discrepancies

At any time during the life testing of the TWTA's that a discrepancy is noted, the test shall be stopped on that unit and the responsible Reliability Project Engineer is to be notified. At this time additional testing may be performed to ascertain the nature of the discrepancy and establish the necessary actions to be taken.

3.6.2 Failure Definition

Failure is defined as the inability of the TWTA to meet the performance requirements of tests specified in paragraph 3.4.2.

3.6.3 Failure Action

In the event of the TWTA malfunction, that unit will be removed from the life test station and a malfunction notification will be submitted by TWX to TRW within 48 hours of the occurrence. Life testing will be continued on the remaining units. Failure analysis will be performed to determine the cause of the failure; however, permission to perform the tear-down which would be required for failure analysis will be obtained from TRW. A failure analysis report will be issued within seven days after the failure cause has been determined. Repair action, disposition and additional testing of the failed TWTA are not within the scope of this life test.

3.7 Test Records

Test results of the life testing of the TWTA shall be recorded and maintained consistent with the requirements specified herein.

3.7.1 Test Log

The test data resulting from the life tests shall be recorded on reproducible copies of test data sheets. All entries made during the life test must be in ink. Deletions and/or corrections to the data sheets shall be made by ruling out the appropriate portions of the test data and inserting the corrections. Ruled out data must remain legible and be signed and dated by the person making the correction. Completed data sheets shall be signed by the Reliability Project Engineer.

3.7.2 Variation

Any variation from these procedure shall be recorded in detail on the variations page of the test log. The form shown in Figure 8 shall be used as the variations page.

3.7.3 Test Reports

Summary status reports shall be submitted quarterly as part of quarterly life test review. A final life test report will be submitted to TRW within 45 days after completion of the life test.

3.7.4 Data Review

Quarterly review meetings will be held between TRW and HAC to discuss life test status, performance and data trends.

3.8 Plug Savers

Plug savers shall be used on the RF connectors and power connector at all times during life testing of the TWTA, except where critical test measurements are affected. (Does not apply to cathode activity connectors.)

3.9 Frequency Designations

The frequencies of test, relative to band limits, are designated as follows:

3.9.1 K-band (-1)

f_3	Low End Useful Band	7127 MHz
f_1	Low End Operating Band	7250 MHz
f_0	Center Operating Band	7350 MHz
f_2	High End Operating Band	7450 MHz
f_4	High End Useful Band	7500 MHz

3.9.2 L-Band (-2)

f_3	Low End Useful Band	7305 MHz
f_1	Low End Operating Band	7490 MHz
f_0	Center Operating Band	7620 MHz
f_2	High End Operating Band	7750 MHz
f_4	High End Useful Band	7860 MHz

AD-A053 740 HUGHES AIRCRAFT CO TORRANCE CALIF ELECTRON DYNAMICS DIV F/G 9/1
DEFENSE SATELLITE COMMUNICATIONS SYSTEM TRAVELING WAVE TUBE AMP--ETC(U)
FEB 78 M L KAHN F04701-74-C-0542

UNCLASSIFIED NL

2 OF 5
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A053740

4.0 TEST PROCEDURE

4.1 Test Setup for Extended Life Test

The test setup shall be maintaine
completion of the first phase of

4.1.1 Connect the TWTA as outli
shown in B200429-800.

4.1.2 Apply input voltage (28 ±
start switch.

4.1.3 Apply nominal RF input dr

4.1.4 Apply the command signal
on and RF output power sh
outputs.

4.1.5 Remove the command signal

4.1.6 Remove the power meter, t
D.V.M. Connect the TWTA

4.1.7 Repeat steps 4.1.1 throug
on the test console.

4.2 Telemetry Measurements - Monthly

Once every month, measure the tel
below; and record the data on the

Telemetry Output

Heater Voltage Telemetry Voltage
Cathode Current telemetry Voltage
Cathode Voltage Telemetry Voltage
Helix Current Telemetry Voltage
Input Current Telemetry Voltage

* Per Calibration Curves from 11

In addition to recording the tele
test, input voltage and the elaps

4.3 RF Measurements - Monthly

Once every month, perform the fol
recording the test results, the d
time for each unit must also be r
in Figure 5 shall be used for dat

4.3.1 Small Signal Gain

4.3.1.1 Connect the TWTA as outlined in Figures 1 and 2. Set the sweep oscillator to f_o. Insert a 10 dB attenuator in the RF input leg.

4.3.1.2 Apply nominal input voltage and command signal to the TWTA. Adjust the RF input drive level to produce a power output at least 10 dB below saturation. Using the input and output power calculate the gain at f_o. Gain shall be in the range of 35 dB to 39.5 dB. Record.

4.3.1.3 Vary the frequency over the band f_3 to f_4 and adjust the gain of the X-Y recorder to obtain a scale which will contain the small signal gain versus frequency curve. Plot calibration lines at .2 dB intervals.

4.3.1.4 Plot small signal gain versus frequency over the band of f_3 to f_4 indicating the f_1, f_2, f_3 and f_4 points.

4.3.1.5 Repeat paragraph 4.3.1.1 through 4.3.1.4 at an input voltage of 23 ± .5 Vdc and 33 ± .5 Vdc. Attach graphs to data sheet.

4.3.2 Saturated Power Output

4.3.2.1 Connect the TWTA as outlined in Figures 1 and 2. Apply nominal DC input voltage (28 ± 0.5 Vdc) and command signal (5 ± 0.25 Vdc) to the TWTA.

4.3.2.2 Set the sweep oscillator at f_o and adjust the RF input power level for saturated power out.

4.3.2.3 Record telemetry voltages.

4.3.2.4 Vary frequency over the band f_1 to f_2. Adjust the gain of X-Y recorder to obtain a scale which will contain the saturated power output versus frequency.

4.3.2.5 Plot calibration lines on the graph paper at 0.2 dB intervals beginning at 27 dBm. indicating the f_1 and f_2 points.

4.3.2.6 Plot saturated power output versus frequency over the band. The minimum power output at saturation shall be 27 dBm over the range of f_1 to f_2. Attach graph to data sheet. Check.

4.3.3 TWT Attenuator Insertion Loss

4.3.3.1 Connect the TWTA as outlined in Figure 3A.

4.3.3.2 Adjust the two waveguide attenuators each to 1 dB.

4.3.3.3 Set the generator to f_o and adjust the RF input power level until the Network Analyzer Reference Channel Level Meter is approximately mid-scale. Zero the amplitude meter using the test channel gain and amplitude zero controls.

4.3.3.4 Adjust the two waveguide attenuators each to their maximum setting.

4.3.3.5 Replace the unit under test (out) by a direct shorting coupler.

4.3.3.6 Adjust the waveguide attenuators until the network Analyzer Amplitude Meter reading is zero. Note: Do not readjust any other controls.

4.3.3.7 Subtract 2 dB from the sum of the two waveguide attenuators and record the difference.

4.3.4 <u>TWT Attenuator DC Resistance</u>

4.3.4.1 Connect the resistance bridge (Equipment List Item 26) leads together after warm-up and read the shorted lead resistance. Record this value.

4.3.4.2 Connect the resistance bridge leads between the TWTA input RF connector center pin and case. Measure the resistance and record R_{Ai} minus the lead resistance recorded in 4.3.4.1.

4.3.4.3 Connect the Resistance Bridge leads between the TWTA output RF connector center pin and case. Measure the resistance and record R_{Ao} minus the lead resistance recorded in 4.3.4.1.

4.4 <u>Bench Functional Tests</u>

Test each TWTA per paragraph 4.0 of the Acceptance Test Procedure, ATP B200300-400. Bench tests shall be performed after 20,000 ± 500 extended hours of operation and upon completion of life test.

4.5 <u>Cathode Activity Tests</u> - Three month intervals

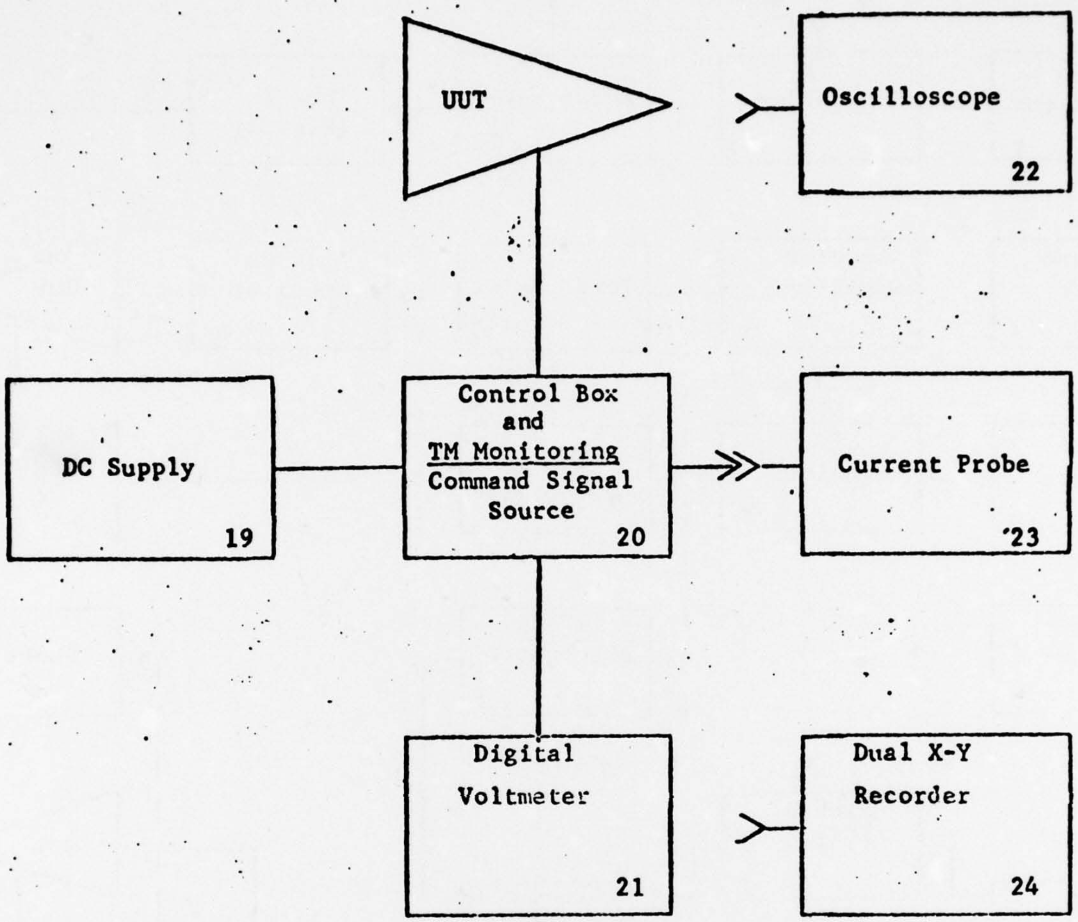
Cathode activity tests shall be run at the time indicated in paragraph 3.4.2.3. In addition to recording the test results, the date of the test and the elapsed time for each unit must be recorded. The data sheets shown in Figure 6 shall be used for recording this data.

4.5.1 Cathode Activity

4.5.1.1 Connect the TWTA as outlined in Figure 1. Apply nominal voltage (28 ± 0.5 Vdc) and the command signal (5 ± 0.25 Vdc). Allow at least three minutes for stabilization.

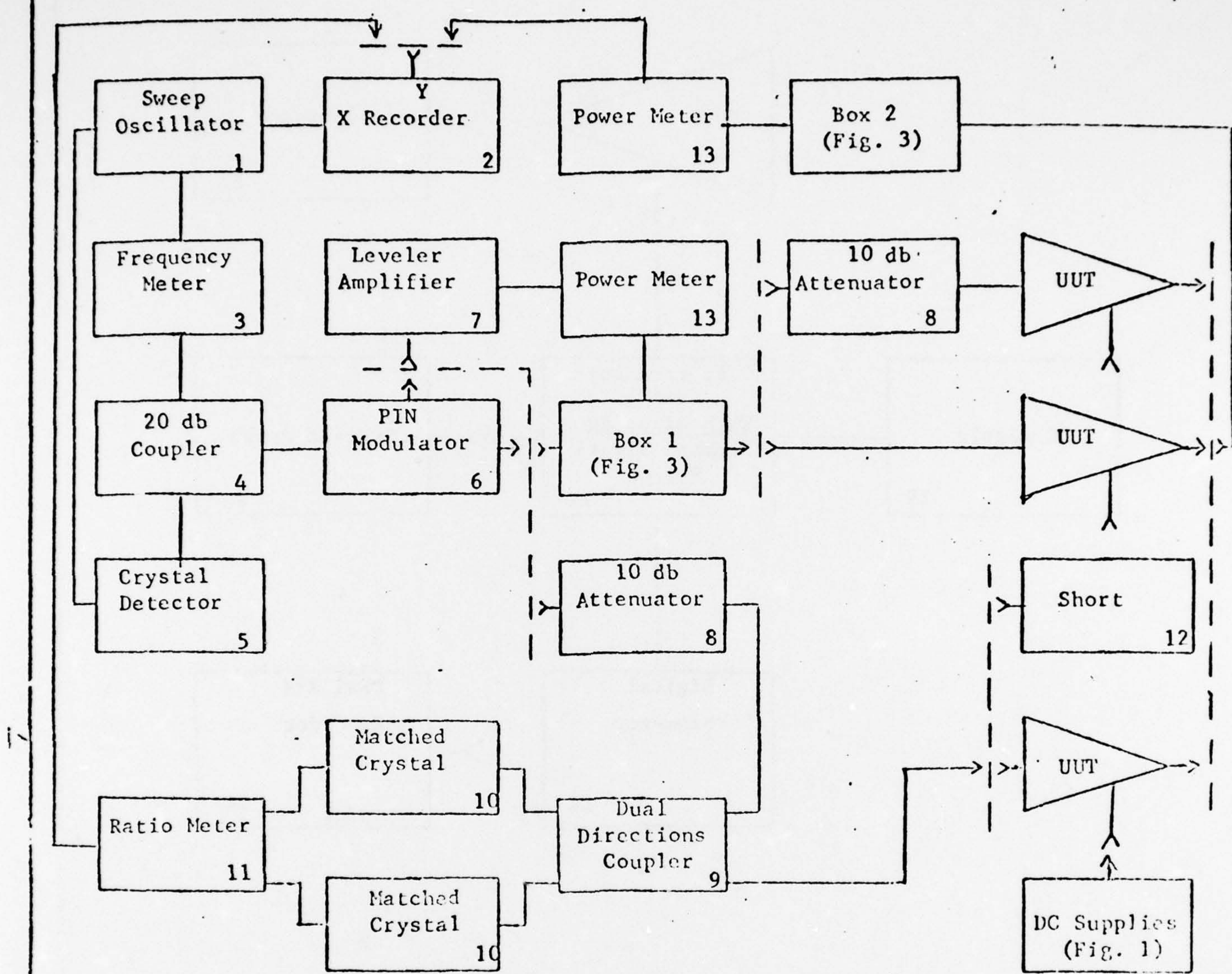
4.5.1.2 Remove heater voltage. Plot cathode and helix current versus time using the telemetry outputs.

4.5.1.3 Using the graph of cathode current versus time, draw two lines, one tangent to the operating point, the other tangent to the slope. The point of intersection of these two lines shall be greater than six (6) seconds. (See Figure 5). Check. Attach curve to data sheets.



SUPPLY AND CONTROL BLOCK

FIGURE 1



POWER OUTPUT AND GAIN BLOCK

FIGURE 2

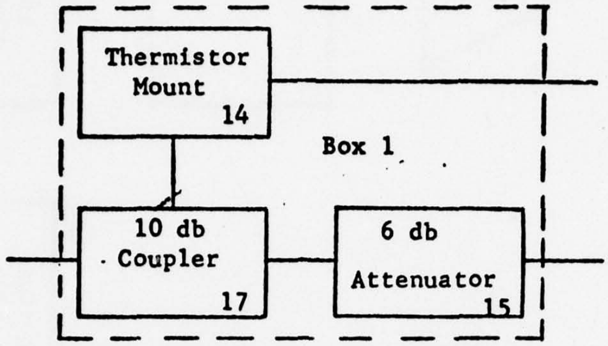
RF TEST MEASUREMENTS BLOCK DIAGRAMS

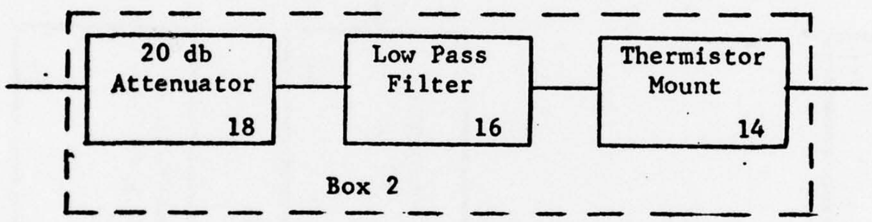
LIST OF EQUIPMENT

Equipment	Make (or Equiv.)	Model (or Equiv.)
1. Sweep Oscillator	H-P	RF Unit H01-8694B Series 8690
2. X-Y Recorder	H-P	7035B
3. Frequency Meter	H-P	537A
4. 20 db Directional Coupler	Narda	3045C-20
5. Crystal Detector	Alfred	1001
6. PIN Modulator	H-P	8734A
7. Invertor and Leveler Amplifier	HAC	
8. 10 db Attenuator	Narda	774-10
9. Dual Directional Coupler	Narda	3024
10. Crystal	Alfred	1001 Opti
11. Ratio Meter	H-P	416B
12. Short (female)	Narda	
13. Power Meter	H-P	432A
14. Thermistor Mount	H-P	478A
15. 6 db Attenuator	Narda	757C-6
16. Low Pass Filter	Microlab	1A-80N
17. 10 db Directional Coupler	Narda	3034B-10
18. 20 db Attenuator	Narda	777C-20
19. DC Power Supply	Lamda	LK343FM
20. Control Box	HAC	
21. Digital Voltmeter	Fairchild	7000-OPT-1
22. Oscilloscope	Tektronix	531A
23. Current Probe	Tektronix	P6042
24. Dual X-Y Recorder	H-P	136A

LIST OF EQUIPMENT (CONTINUED)

Equipment	Make (or Equiv.)	Model (or Equiv.)
25. Resistance Bridge	Fluke	853A
26. Microwave Amplifier	H-P	493A
27. RF Generator	Polarad	1207
28. Converter	H-P	8411
29. Network Analyzer	H-P	8410A
30. Network Analyzer Plug-in Unit	H-P	8413A
31. Adapter, Waveguide to Coax	H-P	281A
32. Waveguide Attenuator	H-P	H382A
33. 30 dB attenuator	Narda	777C-30
34. Cable Set	HAC/EDD	0-1-2-3-4 RG 214/U

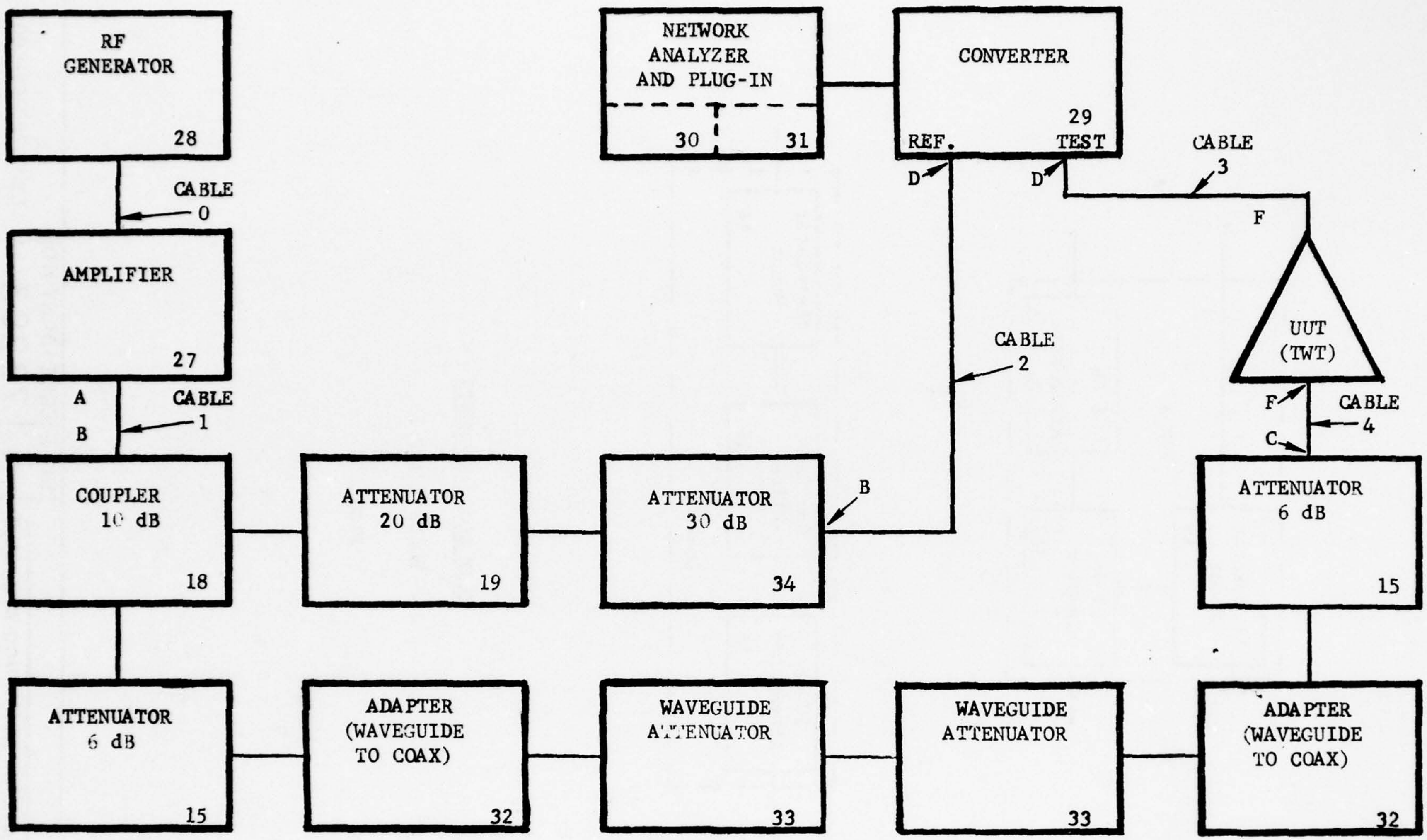




TEST BLOCK SEGMENTS

BOXES 1 AND 2

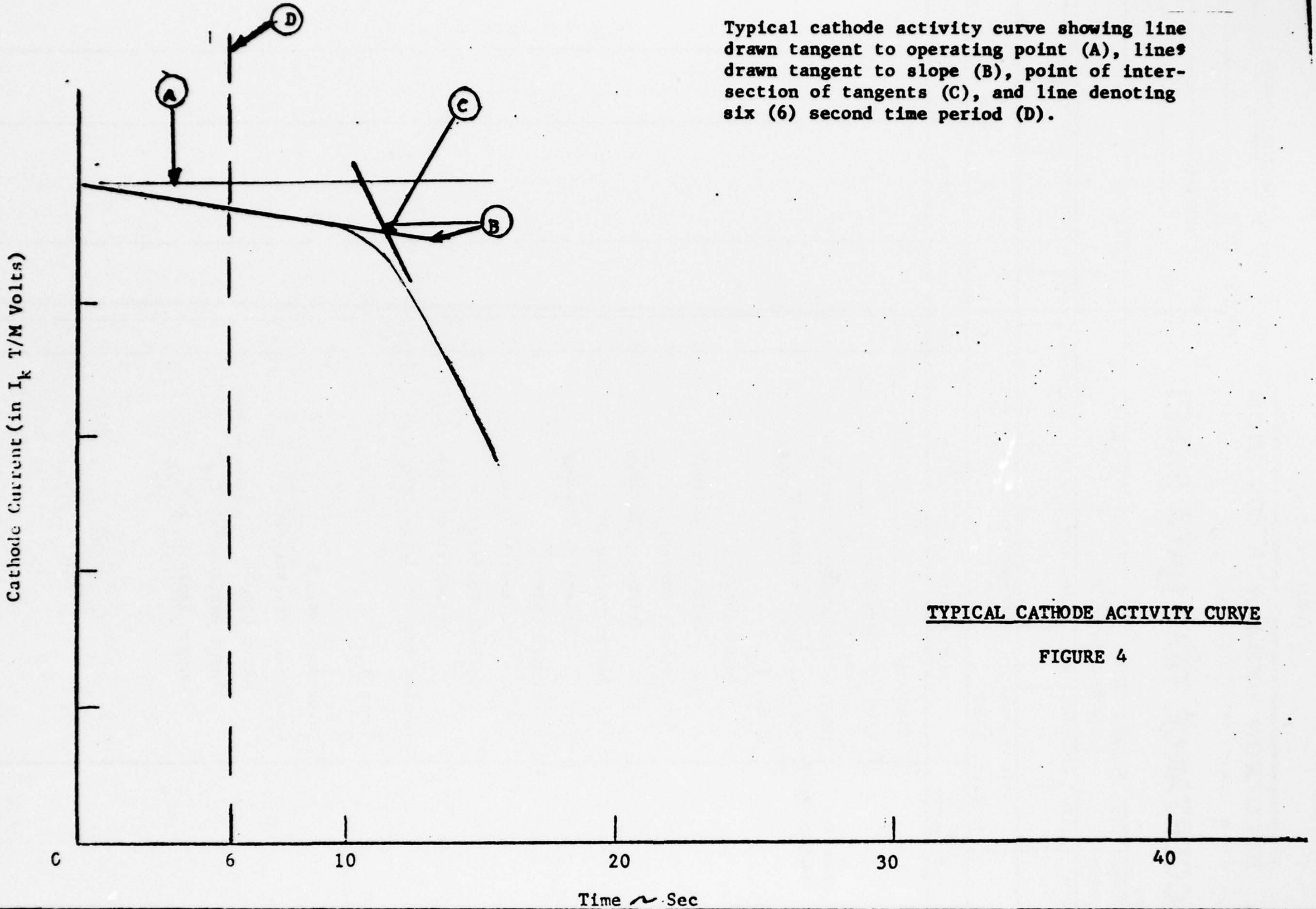
FIGURE 3



NOTES:
1. Cable set: Equipment List Item 35
2. Labeled end of cable to be connected as shown.

INSERTION LOSS TEST BLOCK DIAGRAM

FIGURE 3A



Typical cathode activity curve showing line drawn tangent to operating point (A), lines drawn tangent to slope (B), point of intersection of tangents (C), and line denoting six (6) second time period (D).

TYPICAL CATHODE ACTIVITY CURVE

FIGURE 4

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ELECTRON DYNAMICS DIVISION
3100 W. LOMITA BLVD. TORRANCE, CALIFORNIA 90509

DATA SHEET NO. DSB200300-400
PRODUCT TWTA
MODEL B200300-121 ~~B200300-122~~
PART NO.

ACCEPTANCE TEST DATA SHEET

CODE IDENT. 73293

TEST NAME	SPEC. No.	TEST POS. NO.	SERIAL NO.
Low Level Life Test Plan and Procedure	LTP B200300-400		

REV.	AUTHORITY	DATE	APPROVAL	REV.	AUTHORITY	DATE	APPROVAL	REV.	AUTHORITY	DATE	APPROVAL
A											

QUALITY	DATE OF ISSUE	EFFECTIVITY	PAGE OF
J. J. Haupt	29 Sept. 1970		

ITEM	SPEC. PAR. NO.	TEST DESIGNATION	TEST CONDITION / DESCRIPTION	R/C	MIN.	DATA	MAX.	UNITS
			Model No. ________					
			Band of Operation ________					
1	4.2 & 4.3	Monthly Measurements	Measure following parameters:					
			Nominal input voltage $P_{o(sat)}$					
			Freq. f_o					
			Input Current					
			Telemetry Voltage					
			Cathode Current					
			Telemetry Voltage					
			Heater Voltage					
			Telemetry Voltage					
			Helix Current					
			Telemetry Voltage					
			Cathode Voltage					
			Telemetry Voltage					
			Nominal input voltage Freq f_o					
			$P_{o(sat)}$					
			G_{ss}					
			Insertion Loss, IL					
			Attenuator Resistance					
			Meter Leads, R_M ________					
			Input Resistance. R_{Ai}					
			Output Resistance R_{AO}					

EDD-1045-273

HUGHES
HUGHES AIRCRAFT COMPANY

ELECTRON DYNAMICS DIVISION
3100 W. LOMITA BLVD. TORRANCE, CALIFORNIA 90509

DATA SHEET NO. ____
PRODUCT ____
MODEL ____
PART NO. ____

ACCEPTANCE TEST DATA SHEET

CODE IDENT. 73293

TEST NAME	SPEC. No.	TEST POS. NO.	SERIAL NO.

REV.	AUTHORITY	DATE	APPROVAL	REV.	AUTHORITY	DATE	APPROVAL	REV.	AUTHORITY	DATE	APPROVAL
A											

QUALITY	DATE OF ISSUE	EFFECTIVITY
		PAGE OF

ITEM	SPEC. PAR. NO.	TEST DESIGNATION	TEST CONDITION / DESCRIPTION	R/C	MIN.	DATA	MAX.	UNITS
			Data covering life test duration recorded on attached pages. Calculate and record the total accumulated life test hours at the time each measurement is made. Plot $P_{o(sat)}$ versus freq. and G_{ss} versus freq. as specified in procedure.					

EDD-1048-273

FIGURE 5
(SHEET 3 OF 16)

HUGHES **ELECTRON DYNAMICS DIVISION**
3100 W. LOMITA BLVD. TORRANCE, CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. A
MODEL NO. B200300-121 / B200300-122 SERIAL NO.
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o

TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	MAX	UNITS	TOTAL ACCUMULATED HOURS											
				/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /
INPUT CURRENT TELEMETRY VOLTAGE			V												
CATHODE CURRENT TELEMETRY VOLTAGE			V												
HEATER VOLTAGE TELEMETRY VOLTAGE			V												
HELIX CURRENT TELEMETRY VOLTAGE			V												
CATHODE VOLTAGE TELEMETRY VOLTAGE			V												
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm												
Gm FREQ. f_o (PARA. 4.3.1)	35	39.5	db												
I_L INSERTION LOSS			db												
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS												
T_K CATHODE ACTIVITY	6.0	--	SEC												
TEST EQUIPMENT CALIBRATION DATE															
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

FIGURE 5
(SHEET 4 OF 16)

HUGHES **ELECTRON DYNAMICS DIVISION**
3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. [illegible] REV. A
MODEL NO. [illegible]-121 / [illegible]-122 SERIAL NO.
PAGE OF

TEST NAME	SPEC. NO.	
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTP3200300-400	

INPUT CURRENT TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o

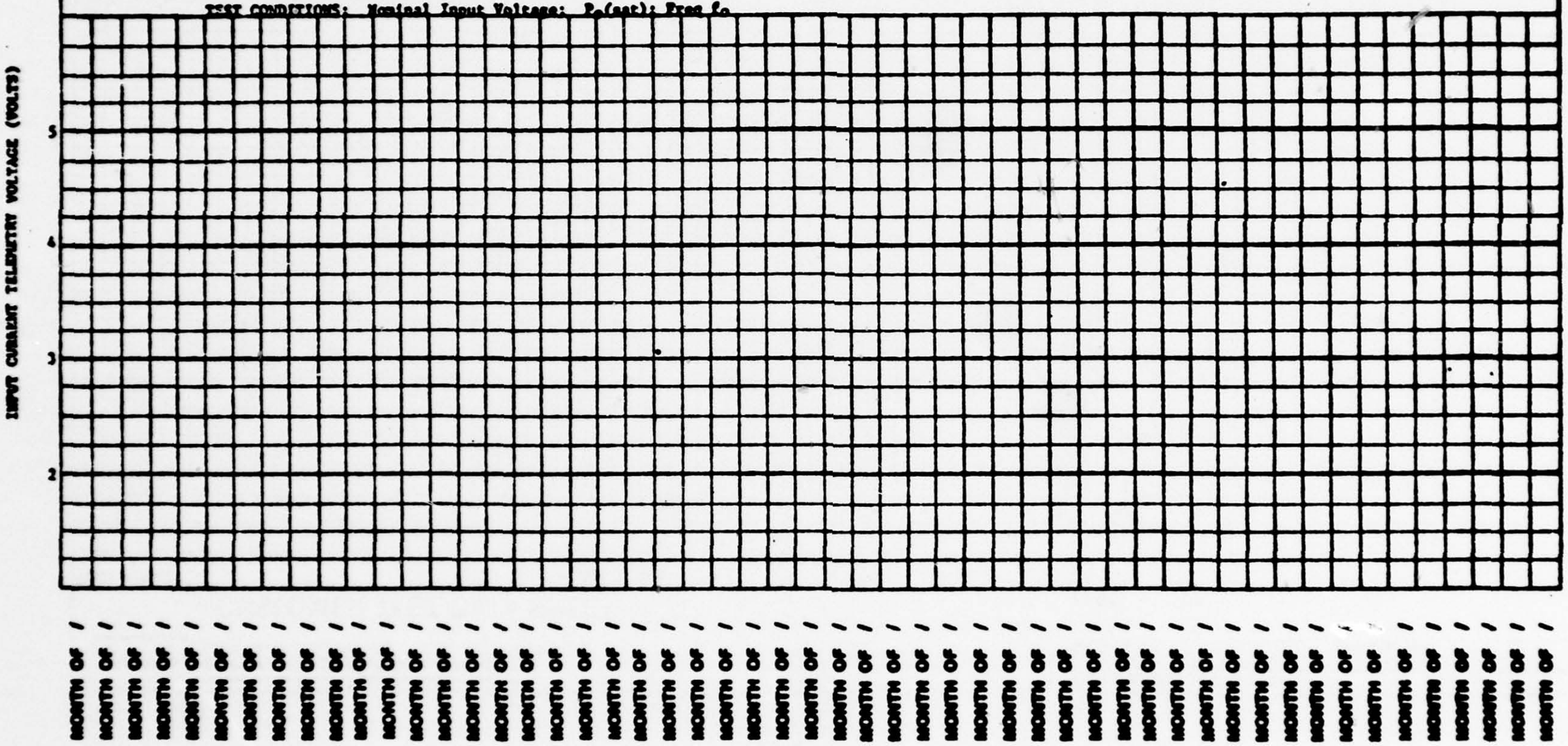


FIGURE 5
(SHEET 5 OF 16)

HUGHES *ELECTRON DYNAMICS DIVISION*
3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

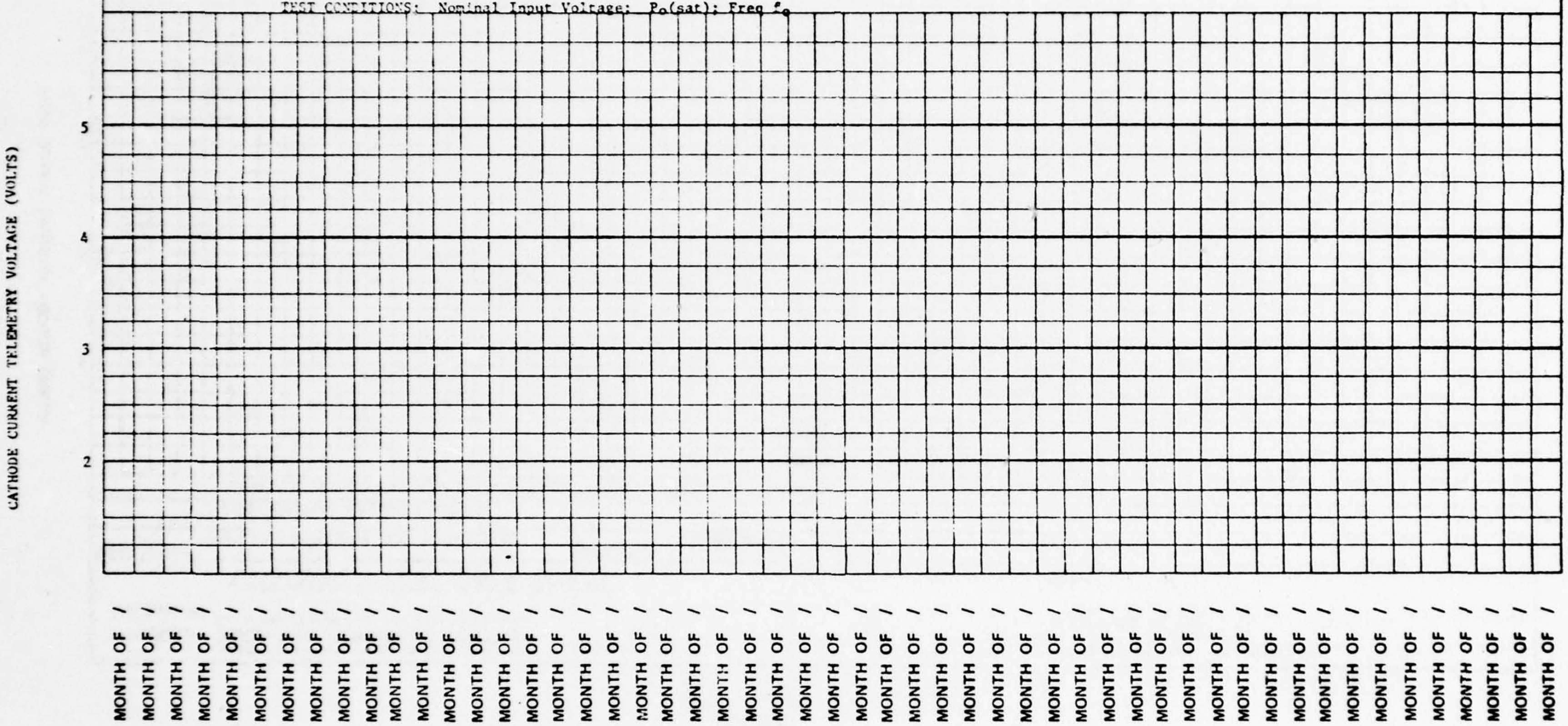
CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. A
MODEL NO. B200300-121 B200300-122 SERIAL NO.
PAGE OF

TEST NAME	SPEC. NO.	
LOW LEVEL LIFE PLAN & PROCEDURE	LTPB200300-400	

CATHODE CURRENT TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage: P_o(sat); Freq f_o



/FIGURE 5
(SHEET 6 OF 16)

HUGHES *ELECTRON DYNAMICS DIVISION*
3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

DATA SHEET NO. DSB200300-400 REV. A

MODEL NO. B200300-121 B200300-122 SERIAL NO.

CUSTOMER TEST DATA SHEET

PAGE OF

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC. NO. LTPB 200300-400

HEATER VOLTAGE TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o

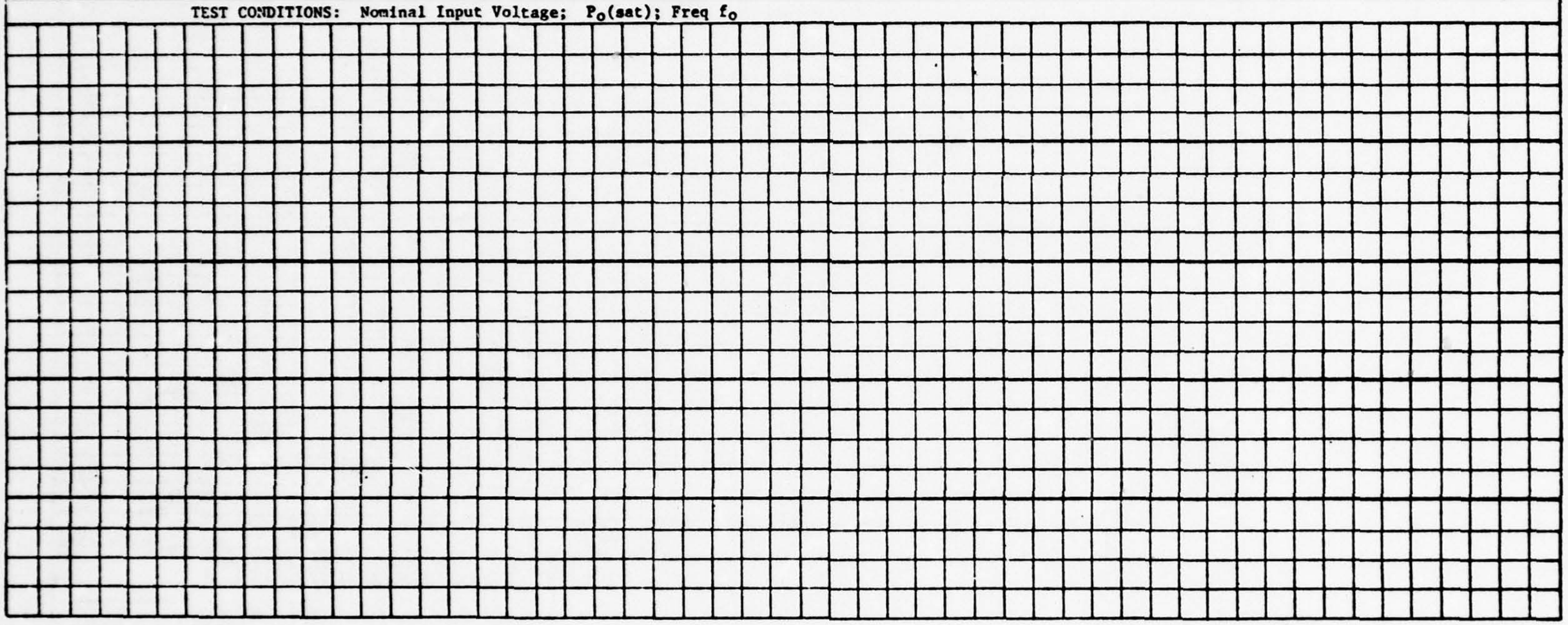


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FIGURE 5
(SHEET 7 OF 16)

HUGHES *ELECTRON DYNAMICS DIVISION*
W. LOMITA BLVD TORRANCE CALIFORNIA 90509

DATA SHEET NO. DSB200300-400 REV. A

MODEL NO. B200300-121 / B200300-122 SERIAL NO.

CUSTOMER TEST DATA SHEET

PAGE OF

TEST NAME LOW LEVEL LIFE PLAN & PROCEDURE

SPEC. NO. LTPB200300-400

HELIX CURRENT TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o

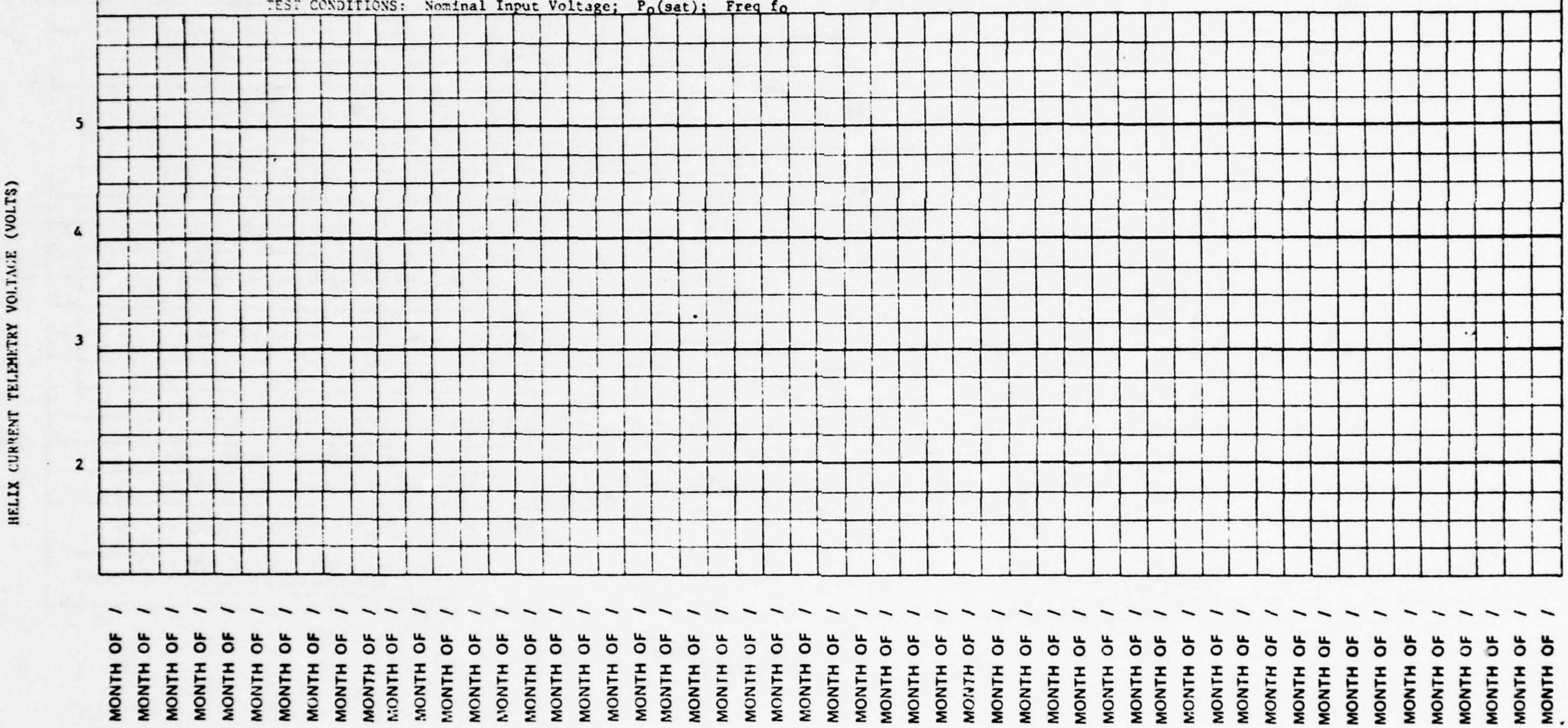


FIGURE 5
(SHEET 8 OF 16)

HUGHES ELECTRON DYNAMICS DIVISION
3100 W LOMITA BLVD TORRANCE CALIFORNIA 90509

DATA SHEET NO. DSB200300-400 REV. A
MODEL NO. B200300-121 B200300-122 SERIAL NO.

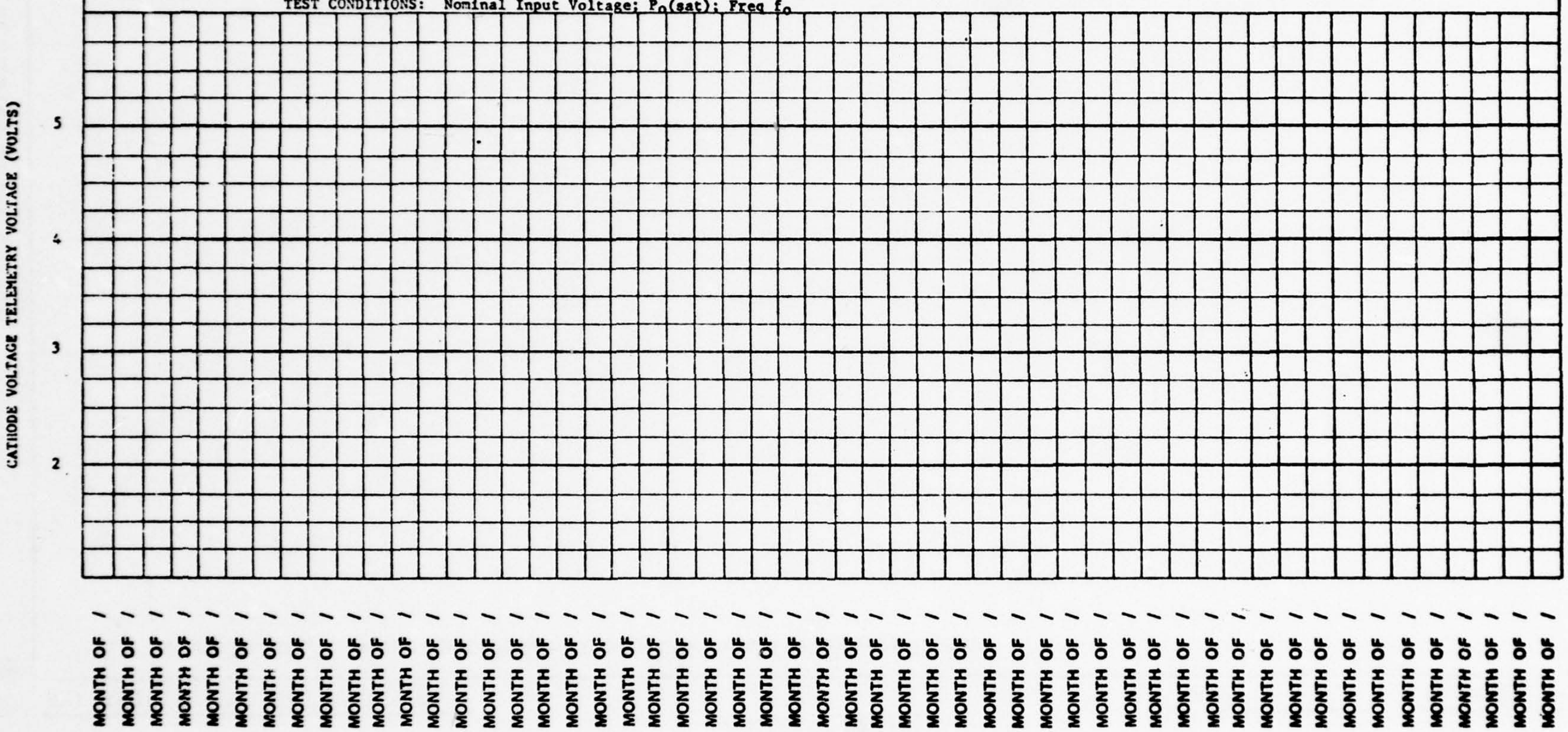
CUSTOMER TEST DATA SHEET

PAGE OF

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC. NO. LTPB200300-400

CATHODE VOLTAGE TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



TEST CONDUCTOR

RELIABILITY PROJECT ENGINEER

FIGURE 5
MONTHLY MEASUREMENTS
(SHEET 9 OF 16)

PART NO.

DATE

S/N

ELAPSE TIME

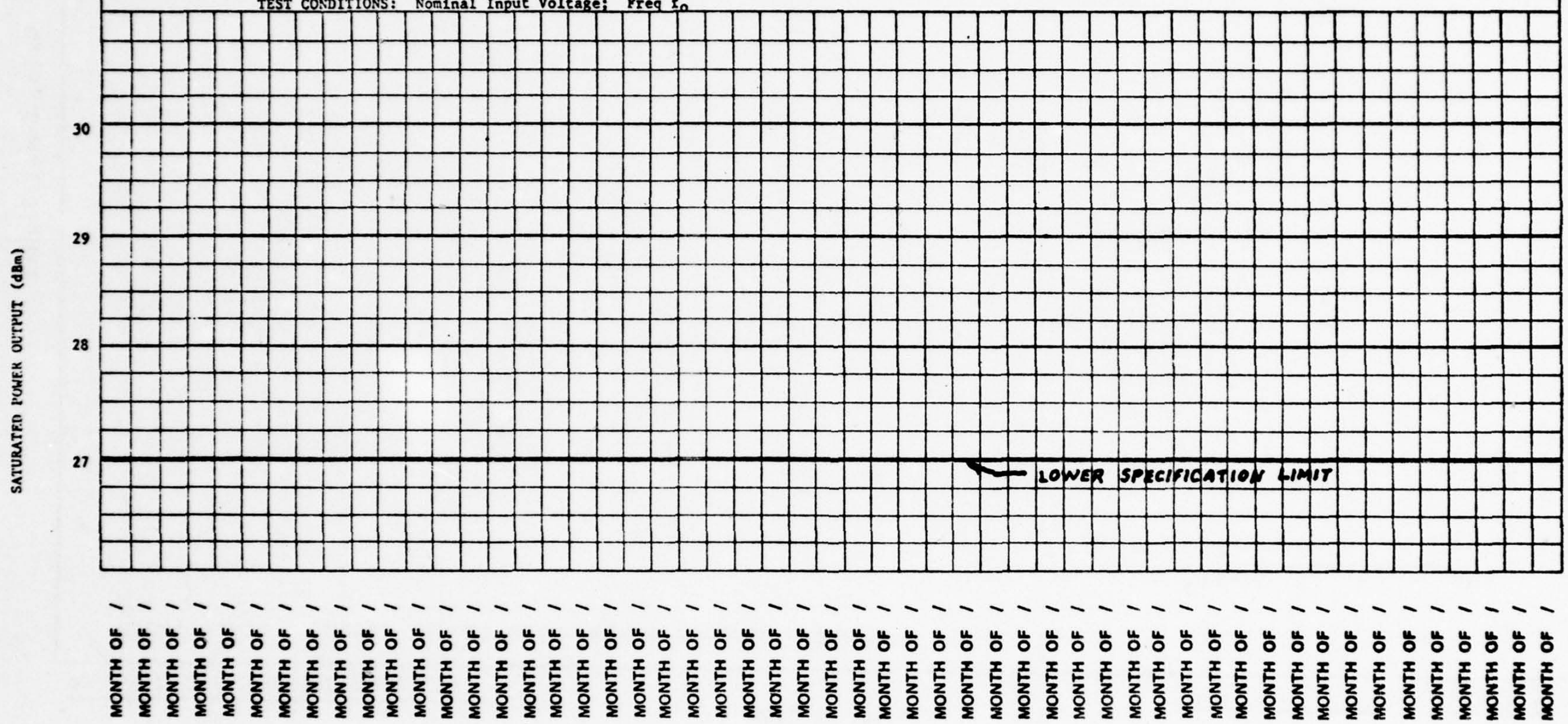
Para. 4.3.3 Saturated Power Output Versus Frequency Curve

Saturated Power Output

Frequency

FIGURE 5
(SHEET 10 OF 16)

HUGHES ***ELECTRON DYNAMICS DIVISION*** 3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509	DATA SHEET NO. DSB200300-400 REV. A
	MODEL NO. B200300-121 B200300-122 SERIAL NO.
CUSTOMER TEST DATA SHEET	PAGE OF
TEST NAME LOW LEVEL LIFE PLAN & PROCEDURE	SPEC. NO. LTPB200300-400
SATURATED POWER OUTPUT	
TEST CONDITIONS: Nominal Input Voltage; Freq f_o	



TEST CONDUCTOR ____________

RELIABILITY PROJECT ENGINEER ____________

FIGURE 5
MONTHLY MEASUREMENTS
(SHEET 11 OF 16)

PART NO. ____________ S/N ____________

DATE ____________ ELAPSE TIME ____________

Para. 4.3.1 **Small Signal Gain Versus Frequency Curve**

$P_{i(rf)}$ ____________ dbm

Gain, Small Signal

Frequency

FIGURE 5
(SHEET 12 OF 16)

HUGHES ***ELECTRON DYNAMICS DIVISION***
3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 **REV.** A
MODEL NO. B200300-121 B200300-122 **SERIAL NO.**
PAGE **OF**

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE	**SPEC. NO.** LTPB200300-400

SMALL SIGNAL GAIN

TEST CONDITIONS: Nominal Input Voltage; Freq f_o

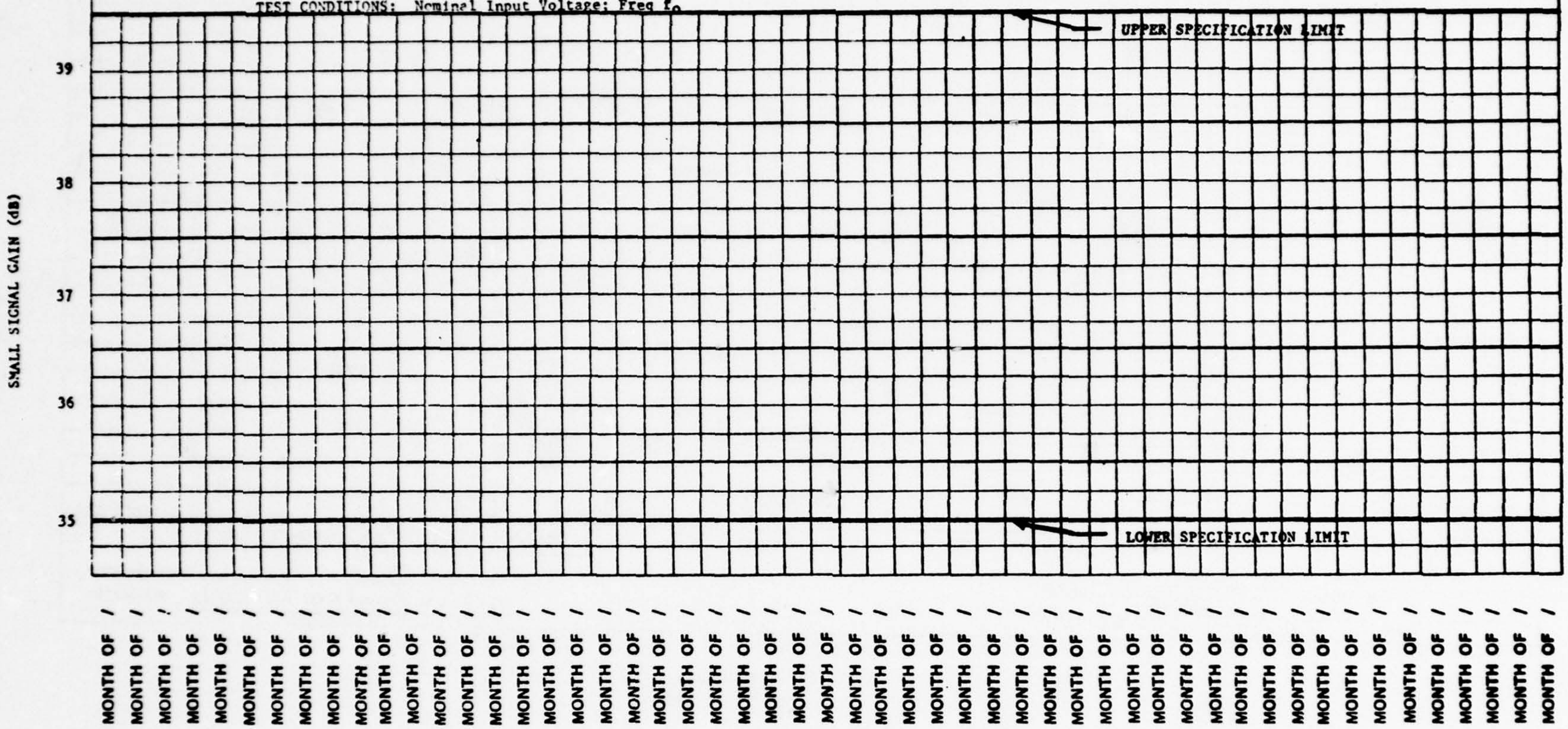


FIGURE 5
(SHEET 13 OF 16)

HUGHES ***ELECTRON DYNAMICS DIVISION***
3100 W LOMITA BLVD TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB 200300-400 REV. A
MODEL NO. B200300-121 B200300-122 SERIAL NO. ______
PAGE ____ OF ____

TEST NAME	SPEC. NO.	
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400	

INSERTION LOSS

TEST CONDITIONS: Nominal Input Voltage; Freq f_o

INSERTION LOSS (dB)

MONTH OF / MONTH OF /

FIGURE 5
(SHEET 14 OF 16)

HUGHES *ELECTRON DYNAMICS DIVISION*

3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. A

MODEL NO. B200300-121 B200300-122 SERIAL NO.

PAGE OF

TEST NAME	SPEC. NO.	
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400	
ATTENUATOR INPUT RESISTANCE		
TEST CONDITIONS: per para. 4.3.4.		

ATTENUATOR D.C. RESISTANCE - INPUT (OHMS)

MONTH OF / MONTH OF /

FIGURE 5
(SHEET 15 OF 16)

HUGHES ***ELECTRON DYNAMICS DIVISION***
3100 W LOMITA BLVD TORRANCE CALIFORNIA 90509

DATA SHEET NO. DSB200300-400 REV. A
MODEL NO. B200300-121 B200300-122 SERIAL NO. ______

CUSTOMER TEST DATA SHEET

PAGE OF

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC. NO. LTPB200300-400

ATTENUATOR OUTPUT RESISTANCE

TEST CONDITIONS: per para. 4.3.4

ATTENUATOR D.C. RESISTANCE - OUTPUT (OHMS)

MONTH OF /
MONTH OF /
MONTH OF /
MONTH OF /
MONTH OF /
MONTH OF /
MONTH OF /
MONTH OF /
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FIGURE 5
(SHEET 16 OF 16)

HUGHES ELECTRON DYNAMICS DIVISION
3100 W LOMITA BLVD TORRANCE CALIFORNIA 90509

DATA SHEET NO. DSB200300-400 REV. A

MODEL NO. B200300-121 B200300-122 SERIAL NO.

CUSTOMER TEST DATA SHEET

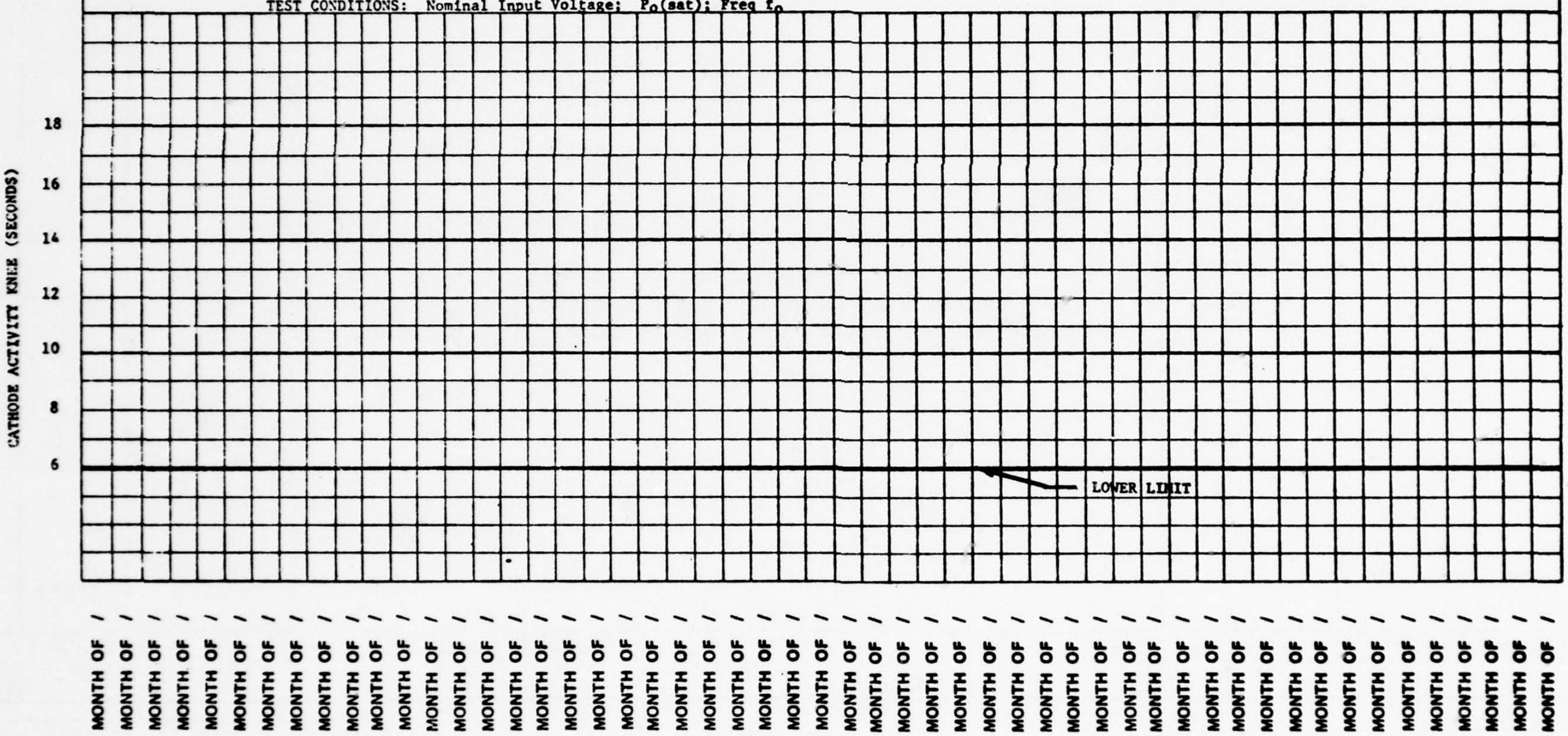
PAGE OF

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE

SPEC. NO. LTPB200300-400

CATHODE ACTIVITY

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



TEST CONDUCTOR ______ | PART NO. ______ | S/N ______

RELIABILITY PROJECT ENGINEER ______ | DATE ______ | ELAPSE TIME ______

FIGURE 6
CATHODE ACTIVITY TEST
(SHEET 1 OF 2)

TEM	SPEC PAR. NO.	TEST DESCRIPTION	R/C	LIMITS MIN	LIMITS MAX	MEASUREMENT	UN
1	4.4.1	<u>Cathode Activity</u> Nominal operating voltage Apply command signal t_k = 3 min minimum Turn $E_c = 0$ Plot I_k and I_w versus time Point of intersection of tangent to operating point and tangent to slope on graph of cathode current versus time to be greater than six (6) seconds. Indicate point of intersection on graph. Attach graph to data sheets	C	--	--		--

TEST CONDUCTOR	**FIGURE 7**	PART NO.	S/N
RELIABILITY PROJECT ENGINEER	**CATHODE ACTIVITY TEST** (SHEET 2 OF 2)	DATE	ELAPSE TIME

Para. 4.4.1 Cathode Activity Test

Cathode Current (mA)

Time (sec)

FIGURE 7

777 LIFE TEST DISCREPANCY REPORT

PART NO. ____________ DATE ____________ ELAPSE TIME ____________

SERIAL NO. ____________

____

TEST CONDUCTOR

ITEM	DESCRIPTION OF NONCONFORMANCE
	DISPOSITION AND REWORK INSTRUCTIONS

RELIABILITY PROJECT ENGINEER DATE	CUSTOMER REPRESENTATIVE DATE

FIGURE 8

	PART NO.	SERIAL NO.

ATE	PARAGRAPH NO.	VARIATION	INITIALS

APPENDIX C

777 MODEL 1200H LOW LEVEL TWTA

ACCEPTANCE TEST PROCEDURE

ATPB200300-400

REVISIONS

DATE	LTR	EFFECT	DESCRIPTION	QC	R&D	MFG	REL
11/28/70	K	ALL	Incorporated ECN B13476. Data Sheets revised to Rev. D	12/4/70	12/5/70		
1/25/71	L	All except 13-1, 22-1, 22-2, 12-1 1/25/71	Incorporated ECNS B13521 and B13596. Data sheets unaffected. Number of pages increased from 48 to 49.	2/4/71	2/5/71		

APPROVED

RELEASED PRINT ENG DOC CONTROL CTR | L | 2/5/71 | REV LTR / REL DATE / REL BY

Sheet	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Rev.	L	C	C	F	H	G	L	G	H	K	C	E	C	G	C	E	E	E	C	H	G	C	F	J	L	L
Sheet	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49			
Rev.	C	C	C	C	C	E	E	E	C	C	C	C	C	C	C	E	E	C	C	C	C	C	L			

NEXT ASSY. B200300-10X. B200300-11X. B200300-12X

END USE

PREP BY

QC

R&D 12/5/70

MFG

REL

DATE OF ISSUE 25 January 1971.

HUGHES ELECTRON DYNAMICS DIVISION

ACCEPTANCE TEST PROCEDURE
TRAVELING WAVE TUBE AMPLIFIER, LOW LEVEL

SIZE A | CODE IDENT NO 73293 | ATPB200300-400

REV L | SHEET 1 OF 49

EDD-1047 A /EDD/8-67 REV.

1.0 INTRODUCTION

1.1 Scope

The purpose of this document is to delineate the individual acceptance tests to be performed on each traveling wave tube amplifier (TWTA) to demonstrate compliance with TRW specification EC-EQ4-663.

Acceptance tests shall be conducted at Hughes Aircraft Company or other test facilities as specifically approved by TRW. Prior to the start of acceptance test the cognizant representative of EDD Quality Assurance department, the cognizant TRW representative and the cognizant Government representative shall be notified and may be present.

1.2 Test Requirements

Engineering models shall be tested in accordance with Part I of this document. Flight and life models shall be tested in accordance with Part II of this document.

2.0 SPECIFICATIONS

2.1 Applicable Specifications

The following specifications form a part of this document to the extent specified herein.

TRW Systems Group

EC-EQ4-663B	Detail Specification for Low Level Traveling Wave Tube Amplifier
EV2-23B	Environmental Specification for Electrical and Mechanical Equipment for Project 777

Drawings, HAC-EDD

B200300-500	Installation and Control Drawing Low Level Traveling Wave Tube Amplifier
B200300-10X B200300-11X B200300-12X	Low Level Traveling Wave Tube Amplifier Assembly

HAC-EDD Documents

CMP-777	Configuration Management Plan

3.0 GENERAL

3.1 Failures

Any failure experienced during acceptance test (except a test equipment failure) shall require a malfunction report. Form EDD 1146. Performance degradation during, or as a result of, tests or environmental exposures will not necessarily constitute a failure. However, any performance degradation beyond the limits specified herein will constitute a failure.

3.2 Customer Test Data Sheets

The results of acceptance tests shall be recorded on customer test data sheets which are controlled by this procedure and revisions hereto.

All entries made during acceptance testing must be in ink. Deletions and/or corrections to the data sheets shall be made by ruling out the appropriate portions of the test data and inserting the corrections. Ruled-out data must remain legible and be signed and dated by the person making the correction.

Completed data sheets shall be signed or stamped by the cognizant EDD Quality Assurance representative.

3.2.1 Preparation of Data

One copy of the following data will be submitted with each delivered TWTA and shall become part of the TWTA Log Book.

A. TWTA Acceptance Test Data (Customer Test Data Sheets)

B. TWT Acceptance Test Data (Customer Test Data Sheets)

C. Power Supply Acceptance Test Data (Customer Test Data Sheets) including telemetry calibration curves

D. Operating Time Log

E. Malfunction Reports

F. "As Delivered Parts List" per CMP-777

3.3 Calibration

The Hughes EDD system of calibration for test and measurement equipment complies with the requirements of MIL-C-45662A.

3.4 Part Numbering and Frequency Designation

TWTA part numbers are as follows:

Engr. Models	Life and Qual. Models	Flight Models
B200300-101	-121	-121
B200300-102	-122	-122

The operating frequency range shall be designated by the last numeral (1 for "K" band and 2 for "L" band) of the part dash number. Frequencies of test, relative to band limits, are designated as follows:

f_3	Low End Useful Band
f_1	Low End Operating Band
f_o	Center Operating Band
f_2	High End Operating Band
f_4	High End Useful Band

3.5 Standard Test Conditions

Ambient test conditions for conducting TWTA performance tests prior to or after environmental exposures shall be as indicated below unless otherwise specified.

A. Temperature, $50^{o}F$ to $95^{o}F$
B. Relative Humidity, 90% RH or less
C. Barometric Pressure, Prevailing Laboratory Pressure

3.6 Environmental Test Tolerances

A.	Vibration Amplitude (grms)	± 10%
B.	Vibration Frequency	± 2%
C.	Random Vibration RMS g level	± 10%
	Power Spectral Density (using filters with a 50 cps bandwidth or less)	± 3 db
D.	Pressure-Altitude	± 5% ≦ 200,000 ft.
	-Vacuum	Equal to lr less than the specified value
E.	Temperature	± $5^{o}F$
F.	Test Time Duration	± 10%

3.6.1 Vacuum Measurements

Vacuum measurements shall be made using an instrument which is conductively connected to the same vacuum environment as the test unit.

3.7 **Test Sequence**

The order of test paragraphs as listed does not represent the required sequence of tests. Functional and environmental tests may be performed in any sequence. To facilitate testing, steps from one Functional Test paragraph may be performed in conjunction with steps fron any other Functional Test paragraph at the option of Hughes EDD.

3.8 **Vibration Fixture**

The test fixture shall be designed to support the TWTA at its normal mounting points. Transmissibility between test item mounting points shall not exceed a factor of ± 3 db between 5 and 500 Hz; between 500 and 2000 Hz a factor of ± 6 db is allowed provided the total cumulative bandwidth which exceeds ±3db does not exceed 300 Hz. Cross-talk shall not exceed the input by greater than 3 db. A fixture evaluation will be performed in accordance with Paragraph 3.8.1.

3.8.1 **Fixture Evaluation**

The transmissibility and cross-talk of the test fixture shall be determined by sweeping a sinusoidal signal through the frequency range of 5 to 2000 Hz at a rate of 2 octaves/minute. The test amplitude shall be one g peak in each of the three (3) mutually perpendicular areas. The low-frequency input shall be limited to 0.5 inches double amplitude. This evaluation shall be performed once and results shall be on file at Hughes EDD.

3.9 **Rejection and Retest**

If a failure, malfunction, or out-of-tolerance performance degradation occurs during or after a test, as appropriate, the tests shall be discontinued, the deficiency (including any defect) corrected, and the pertinent test procedure repeated until completed successfully. If the corrective action substantially affects the significance of results of previously completed tests, such tests shall also be repeated.

3.10 **Plug Savers**

Plug savers shall be used on the RF connectors and power connector at all times during handling of the TWTA, except where critical test measurements are affected. (Does Not Apply To Cathode Activity Connectors).

3.11 **Burn-In**

Prior to the start of acceptance test each TWTA shall have accumulated 1500 hours burn-in* Burn-in shall be performed at a

3.11 Burn-In (Cont'd)

constant elevated temperature of 125 $\pm$ 15^{O}F with nominal voltages applied.

Engineering, life test, and first three flight models (one -121 and two -122) shall have accumulated burn-in time in accordance with the following schedule:

Engr. Models

Traveling Wave Tube	-	500 hrs
Power Supply	-	168 hrs

Life Test

Traveling Wave Tube (TWT)	-	500 hrs
Power Supply	-	168 hrs
Traveling Wave Tube Amplifier (TWTA)		No Requirement

First Three Flight Models

Traveling Wave Tube (TWT)	-	500 hrs
Power Supply	-	168 hrs
*Traveling Wave Tube Amplifier (TWTA)	-	100 hrs

*Note All operating time during Qualification and/or acceptance testing shall apply toward the TWTA Burn-In time requirements.

3.12 Preparation for Delivery

Units shall be packaged, packed and mailed for shipment as specified herein.

3.12.1 Connectors

Plug savers shall be employed to protect all connectors until the unit is delivered to TRW and is delivered "In Place" with the equipment.

3.12.2 Mounting Pads

The machined surfaces and mounting holes shall be protected.

3.12.3 Unit Packaging

The unit shall be bagged and sealed in a polyethylene bag. Th thickness of the polyethylene bag shall be at least 0.003 inches.

3.12.4 Cushion Material

The unit shall be cushioned by using polystyrene foam or equivalent material.

3.12.5 Marking

The shipping container shall be durably and legibly marked to provide the following information.

A. Item Name
B. Manufacturer
C. Manufacturer's Serial Number
D. TRW Purchase Order Number
E. Date of Manufacture
F. "Project 777 Spacecraft Material - Handle With Care"
G. Part Number

3.11 Burn-In (Con'd)

3.12.6 Documentation

One copy of test data in accordance with Paragraph 3.2.1 shall be shipped with each unit.

ACCEPTANCE TEST - PART I (ENGINEERING MODEL)

4.0 FUNCTIONAL TEST

The cathode activity test of Paragraph 4.1 shall be performed during the Final Functional Tests of Paragraph 11.0.

Nominal DC input voltage as referenced herein is defined as 28 $\pm$ .5 Vdc.

The command signal is defined as 5 $\pm$ 0.25 Vdc. The absence of a command signal is defined as 0 $\pm$ .25 Vdc.

4.1 Cathode Activity

Step 1: Connect the TWTA as outlined in Figure 1. Apply nominal voltage and the command signal. Allow at least three minutes for stabilization.

Step 2: Remove heater voltage. Plot cathode and helix current versus time using the telemetry outputs.

Step 3: Using the graph of cathode current versus time, draw two lines, one tangent to the slope of the portion prior to the knee and one tangent to the slope of the portion after the knee. The point of intersection of these two lines shall be greater than six (6) seconds. (See Figure 18). Check. Attach curve to data sheets.

4.2 Command Signal

Step 1: Connect the TWTA as outlined in Figures 1 and 2. Adjust input voltage to 23 $\pm$ .5 Vdc. Apply nominal RF input drive.

Step 2: Apply command signal. The unit shall turn on and RF power shall be present. Check

Step 3: Remove command signal. Unit shall turn off. Readjust input voltage to 33$\pm$ .5 Vdc and apply command signal. The unit shall turn on and RF power output shall be present. Check.

Step 4: Remove command signal. Unit shall turn off.

4.3 Inrush Current Characteristics

Step 1: Connect the TWTA as outlined in Figures 1 and 2. Install a 0.1 to 0.2 ohm resistor in the TWTA positive (+) input and adjust the input voltage to 33 ± .5 Vdc.

Step 2: Apply the command signal. Monitor the inrush current with an oscilloscope and photograph inrush current waveform.

Step 3: The inrush current characteristics shall conform to the following criteria; calculate from the photograph of Step 2:

(a) The time integral of current in excess of the steady-state current (I_{ss}) shall not exceed 0.0037 ampere-seconds in any 3 milliseconds time period Record.

(b) Current shall not exceed I_{ss} + 1.8 amps at any time. Record.

(c) The current shall remain within ± 3% of I_{ss} any time after 150 seconds from turn on. Check.

Step 4: Repeat Step 2 as required to determine the inrush characteristics.

4.4 Input and Output Reflection Coefficient

Connect the TWTA as outlined in Figures 1 and 2 except connect the dual directional coupler to a short instead of the TWTA RF input.

Step 1: Set the sweep oscillator to the f_o frequency position (verify with a frequency meter).

Step 2: Place the match graph on X-Y plotter and set the ratio meter range switch to 100%.

Step 3: Adjust the reference control to obtain a reading of 100 on the percent reflection scale. Adjust the X-Y plotter gain to the 100% line on the match graph and mark the f_o point.

Step 4: Disconnect the reflected input to the ratio meter and adjust the zero percent line on the graph.

Step 5: Reconnect the reflected input to the ratio meter and readjust the reference of Step 3, if necessary.

4.4 Input and Output Reflection Coefficient (Cont'd)

Step 6: Sweep the frequency from f_3 to f_4 and plot the curve.

Step 7: Verify that the f_o point falls on the 100% line of the match graph as outlined in Steps 1 through 3. Repeat Steps 1 through 5, if necessary.

Step 8: Remove the short and connect the TWTA RF output to the dual directional coupler, apply nominal input voltage and the command signal. With range switch set to 30% and using a new match graph data sheet, plot the curve of the RF output reflection over the frequency range of f_3 to f_4 and indicate f_1 and f_2 points.

Step 9: From the data obtained in Step 8, record the maximum TWTA output reflection in the range of f_1 to f_2. Output reflection shall be a maximum of 11%. (1.25:1) Convert reflection coefficient to VSWR and record.

Step 10: Turn off command signal and repeat Step 8. This gives a plot of the cold output reflection coefficient of the TWTA. Record the maximum cold output reflection in the range of f_1 to f_2. Cold output reflection shall be a maximum of 11%. (1.25:1) Convert reflection coefficient to VSWR and record.

Step 11: Repeat Steps 1 through 7 on a new match graph.

Step 12: With the command signal off, repeat Steps 8 and 9 in the input end of the TWTA connecting the dual directional coupler to the TWTA RF input. Cold input reflection coefficient shall be a maximum of 11%. (1.25:1) Convert reflection coefficient to VSWR and record.

Step 13: Apply command signal and repeat Step 12; hot input reflection coefficient shall be a maximum of 11%. (1.25:1) Convert reflection coefficient to VSWR and record.

Step 14: Attach graphs to data sheets.

4.5 Saturated Power Output

Connect the TWTA as outlined in Figures 1 and 2. Apply nominal DC input voltage and command signal to the TWTA.

Step 1: Set the sweep oscillator at f_o and adjust the RF input power level for saturated power out.

Step 2: Record Telemetry Voltages.

4.5 Saturated Power Output (Cont'd)

Step 3: Vary frequency over the band f_1 to f_2. Adjust the gain of X-Y recorder to obtain a scale which will contain the saturated power output versus frequency.

Step 4: Plot calibration lines on the graph paper at 0.2 db intervals beginning at 27 dbm, indicating the f_1 and f_2 points.

Step 5: Plot saturated power output versus frequency over the band. The minimum power output at saturation shall be 27 dbm over the range of f_1 to f_2. Attach graph to data sheet. Check.

4.6 Saturated Power Output and Input Power Versus Input Voltage

Step 1: Repeat Paragraph 4.5, (except Step 2) with the input voltage adjusted to 23 ± .5 Vdc. Record DC input current.

Step 2: Calculate the DC input power and record. The DC input power shall not exceed 6.3 watts.

Step 3: Repeat Step 1 except adjust the input voltage to 33 ± .5 Vdc.

Step 4: Calculate the DC input power and record. The DC input power shall not exceed 6.4 watts.

Step 5: Attach graphs to data sheets.

4.7 Small Signal Gain

Step 1: Connect the TWTA as outlined in Figures 1 and 2. Set the sweep oscillator to f_o. Insert a 10 db attenuator in the RF input leg.

Step 2: Apply nominal input voltage and command signal to the TWTA. Adjust the RF input drive level to produce a power output at least 10 db below saturation. Using the input and output power calculate the gain at f_o. Gain shall be in the range of 35 db to 39.5 db. Record.

Step 3: Vary the frequency over the band of f_3 to f_4 and adjust the gain of the X-Y recorder to obtain a scale which will contain the small signal gain versus frequency curve. Plot calibration lines at 0.2 db intervals.

Step 4: Plot small signal gain versus frequency over the band of f_3 to f_4, indicating the f_1, f_2, f_3 and f_4 points.

Step 5: Repeat Steps 1 through 4 at an input voltage of 23 ± .5 Vdc and 33 ± .5 Vdc. Attach graphs to data sheet.

4.7.1 Gain Slope

Step 1: From the graphs of Paragraph 4.7 calculate the gain slope over the band of f_1 to f_2. Gain slope for each graph shall not exceed 0.015 db/MHz. Record worst case gain slope.

Step 2: From the graphs of Paragraph 4.7 calculate the gain slope over the band of f_1 to f_3 and f_2 to f_4. Gain slope for each graph shall not exceed 0.030 db/MHz. Record worst case gain slope.

4.7.2 Gain Flatness

Step 1: From the graphs of Paragraph 4.7 calculate the gain variation over the range of f_1 to f_2. The gain variation for each graph shall not exceed ±0.2 db. (See Figure A). Record worst case gain variation.

Step 2: From the graphs of Paragraph 4.7, calculate the gain variation over the range of f_1 to f_3 and f_2 to f_4. Gain variation for each graph shall not exceed the limits of Figure A. Check.

4.8 Noise Figure

Step 1: Connect the TWTA as outlinedin Figures 1 and 4. Apply nominal input voltage and the command signal to the TWTA.

Step 2: Set sweep oscillator to f_o. Adjust noise generator current to 175 ma.

Step 3: Calibrate noise figure indicator for noise source used.

Step 4: Depress button marked "Auto" and read noise figure. Noise figure shall not exceed 25 db. Record.

4.9 Intermodulation Distortion

Step 1: Connect the TWTA as outlined in Figures 1 and 5. Apply nominal input voltage and the command signal. Adjust signal generator #1 to f_o.

Step 2: Adjust waveguide attenuator #1 to 3 db. Using the spectrum analyzer, saturate the TWTA using coax. attenuator #1. Do not disturb coax. attenuator #1 setting.

Step 3: Adjust waveguide attenuator #1 to 23 db. Insert signal generator #2 and adjust coax. attenuator #2 such that both signal levels are equal on the spectrum analyzer.

Step 4: Adjust frequency separation for 2 MHz. Check for equal signal levels. Adjust coax. attenuator #2 if necessary.

4.9 Intermodulation Distortion (Con'd)

Step 5: Re-adjust input waveguide attenuator #1 to obtain 2 signal saturation and re-adjust coax. attenuator #2 for equal levels.

Step 6: Set waveguide attenuator #2 to 3 db. Adjust frequency of signal generator #3 1 MHz above f_o.

Step 7: Adjust output level of signal generator #3 (injected signal) until its level is equal to that of the 2 carriers.

Step 8: Check saturation of the 2 carrier signal level as follows:

a) Increase drive to the TWTA by adjusting waveguide attenuator #1 in 1 db steps.

b) Adjust waveguide attenuator #2 to match levels. Note direction of waveguide attenuator #2 reading.

c) If the reading of waveguide attenuator #2 decreases, the TWTA is not saturated.

If the reading of waveguide attenuator #2 increases, the TWTA is over saturated.

d) Saturation occurs when waveguide attenuator #2 does not change for a given increase in input drive by waveguide attenuator #1.

e) It may be necessary to plot several points to determine saturation.

Step 9: Increase attenuation of waveguide attenuator #2 setting by 6 db. Note this setting.

Step 10: Adjust waveguide attenuator #1 until the 2 carrier power output level is equal to the injected level.

Step 11: Increase IF gain of spectrum analyzer until the third order IM products are at a convenient readable level.

Step 12: Adjust waveguide attenuator #2 until the injected signal level is the same as the third IM level. Note waveguide attenuator #2 reading.

Step 13: Subtract reading in Step 9 from reading in Step 12. This level shall be a minimum of 28 db, record.

4.10 <u>Time Delay Distortion (Test equipment per Figure 6)</u>

Step 1: Check the test set up for proper operation as follows:

(a) Connect RF input and output arms together.

(b) Adjust test oscillator frequency to 1.388 MHz ± 10 KHz.

(c) Observe on an oscilloscope with adequate bandwidth the wave form of Channel "B" of Vector Voltmeter. Adjust bias battery if necessary for undistorted sine wave.

(d) Set signal generator to f_o. Adjust Channel "A" and Channel "B" (on Vector Voltmeter) amplitude levels so that the two signals are within 10 db of each other.

(e) Check to make sure signal level is great enough to cause the Vector Voltmeter to phase lock.

Step 2: Adjust vertical channel of recorder for 2 nanoseconds per inch and adjust horizontal channel of recorder for a sweep range of f_3 to f_4.

Step 3: Reconnect the input and output RF arms to the TWTA (Ref. Fig.6) Apply nominal input voltage and command signal.

Step 4: Adjust input level such that the RF output power level is in the linear region below saturation and Vector Voltmeter is phase locked.

Step 5: Sweep the TWTA from f_3 to f_4 and record change in time delay on the graph paper.

Step 6: The time delay over the range of f_1 to f_2 shall be a maximum of 0.10 ns/MHz at any 10 MHz interval over the linear portion of the curve and 0.01 ns/MHz^2 over the parabolic portion. Check. Attach graph to data sheets.

4.11 Phase Shift

Step 1: Connect the TWTA as outlined in Figures 1 and 7. Apply nominal voltage and command signal to the TWTA.

Step 2: Adjust signal generator to f_o.

Step 3: Adjust RF input for an RF output power of 23 dbm.

Step 4: Adjust network analyzer to 0^o phase shift.

Step 5: Adjust X-Y recorder X axis for sweep width and Y axis for a convenient scale.

Step 6: Plot graph from +23 dbm output power ot +14 dbm output power by increasing input attenuation. The change of phase of the output signal as a function of the input drive level shall be less than 2.0 deg/db from +23 dbm to +21.75 dbm output power less than 1.5 deg/db from +21.75 dbm to +17 dbm output power and less than 1.0 deg/db from +17 dbm to +14 dbm output power. Record. Attach graphs to data sheets.

4.12 Stability (Mismatch)

Step 1: Connect the TWTA as outlined in Figures 1 and 8. Apply nominal operating voltages. Set power meter to the lowest range. Set spectrum analyzer to a convient range.

Step 2: With the load connected to the TWTA output and the short and line stretcher to the input, vary the line stretcher. There shall be no power output indicated other than inherent noise.

Step 3: Repeat Step 2 with the short removed from the line stretcher.

Step 4: Repeat Steps 2 and 3 with the load, line stretcher and short connected as in Figure 8. There shall be no power output indicated other than inherent noise. Check.

4.13 Spurious Output (Coherent Components)

Step 1: Connect the TWTA as outlined in Figures 1 and 9. Apply nominal voltage and command signal to the TWTA.

Step 2: With Box 2 (Ref Figure 3) connected to the TWTA output, adjust the signal generator to f_o and adjust the RF input drive to produce an RF output power of 23 dbm.

Step 3: Remove command signal. Disconnect Box 2 and connect the RF harmonic measuring arm; apply command signal.

4.13 **Spurious Output (Conherent Components)** (Cont'd)

Step 4: Note the harmonic output power. The harmonic output power shall be a minimum of 13 db below the fundamental output power noted in Step 2. Record.

4.13.1 Incoherent Components

Step 1: Connect the TWTA as outlined in Figures 1 and 10. Apply nominal voltage and command signal to the TWTA.

Step 2: Set sweep oscillator to f_o and adjust RF input drive level to produce an RF output power of 23 dbm.

Step 3: Turn off TWTA and remove Box 2, connect per Figure 10.

Step 4: Turn on TWTA and set spectrum analyzer input power for 0 dbm.

Step 5: Set spectrum analyzer vertical display to log, IF bandwidth to 10 KHz, spectrum width to 1 MHz and input attenuator to 10 db.

Step 6: Using IF attenuator set input to spectrum analyzer to the 0 db graticule.

Step 7: Tune spectrum analyzer through the frequency range of 7.25 GHz to 8.4 GHz. There shall be no non-harmonic component appearing above the -60 db graticule. Check.

4.13.2 Spurious Output (AM)

Step 1: To calibrate equipment for AM measurement, set up equipment as shown in Figure 11.

Step 2: Set signal generator frequency to f_o and adjust input to spectrum analyzer to 0 dbm.

Step 3: Set spectrum analyzer IF bandwidth to 1 KHz, spectrum width to 100 KHz/cm.

Step 4: Set signal generator to external amplitude modulation.

Step 5: Set audio oscillator frequency to approximately 100 KHz and adjust modulation signal until level of side bands is 30 db below the carrier level.

4.13.2 Spurious Output (AM) (Cont'd)

Step 6: Increase audio-oscillator attenuation by 10 db. Side band levels should drop 10 db on spectrum analyzer. Insert 10 db more attenuation. Side band level should now be 50 db below carrier level.

Step 7: Disconnect spectrum analyzer and connect H.P. 310A wave analyzer.

Step 8: Tune wave analyzer to modulation signal (approximately 100 KHz.) Set mode switch to normal; bandwidth at 1000 Hz; peak wave analyzer to maximum meter reading. Note this reading (which is the maximum allowable for determining compliance).

Step 9: Disconnect modulation input to signal generator. Turn modulation switch to CW.

Step 10: Conduct spurious search of signal generator from 100Hz to 1.0 MHz. Note level and frequency of any spurious detected.

Step 11: Set up equipment and connect TWTA as shown in Figure 12. Apply nominal input voltage and the command signal.

Step 12: Saturate the TWTA at f_o. Adjust input to wave analyzer to 0 dbm.

Step 13: Using H.P. 302A wave analyzer, conduct spurious search of TWTA output from 100Hz to 20 KHz (mode switch to normal).

Step 14: Switch to H.P. 310A wave analyzer and conduct spurious search from 20 KHz to 1.0 MHz. There shall be no spurious signal which exceeds the level noted in Step 8, discounting any spurious noted in Step 10. Check.

4.13.3 Spurious Output (PM)

Step 1: To calibrate equipment for PM measurement, set up equipment as shown in Figure 13.

Step 2: Set signal generator frequency to f_o and adjust input to spectrum analyzer to 0 dbm.

Step 3: Set spectrum analyzer IF bandwidth and spectrum width for convenient display.

Step 4: Set signal generator to external FM modulation. Set test oscillator to approximately 100 KHz and adjust modulation signal until side band level is 26 db below carrier level.

Step 5: Increase test oscillator attenuation by 10 db. Side band level should drop 10 db on spectrum analyzer. Insert 10 db more attenuation. Side band level should now be 46 db below carrier level. Set side band level to 52 db below carrier level, this equals a separation of 10 milliradians.

Step 6: Disconnect spectrum analyzer and connect signal generator to H.P. 310A through discriminator.

Step 7: With mode switch to normal and bandwidth set to 1.0 KHz, tune wave analyzer to modulation frequency (approximately 100 KHz) and peak frequency to maximum meter reading. Peak discriminator frequency for maximum meter reading. Note this reading (which is the maximum allowable for determining compliance).

Step 8: Disconnect modulation input to signal generator. Turn modulation switch to CW.

Step 9: Using H.P. 302A wave analyzer, conduct a spurious search of the signal generator spectrum from 100 Hz to 20 KHz. Note level and frequency of any spurious detected.

Step 10: Using H.P. 310A wave analyzer, conduct a spurious search of the signal generator spectrum from 20 KHz to 1.0 MHz. Note level and frequency of any spurious detected.

Step 11: Set up equipment and connect the TWTA as shown in Figure 14. Apply nominal voltage and the command signal.

4.13.3 Spurious Output (PM) (Cont'd)

Step 12: Saturate TWTA at f_o and adjust input to wave analyzer to 0 dbm.

Step 13: Reapply 100 KHz modulation to signal generator. Peak discriminator-detector and wave analyzer frequency for maximum meter reading. Disconnect modulation. Turn modulation switch to CW.

Step 14: Using H.P. 302A conduct spurious search of TWTA output from 100 Hz to 20 KHz. Note level and frequency of any spurious signal. There shall be none which exceeds the level noted in Step 7. Discount spurious signals noted in Step 9. Check.

Step 15: Using H.P. 310A conduct spurious search of TWTA output from 20 KHz to 1.0 MHz. Note level and frequency of any spurious signal. There shall be none which exceeds the level noted in Step 10. Check.

Step 16: Deleted

5.0 VIBRATION TEST

During this test the TWTA shall be operating; DC input currents and RF output shall be monitored. Vibration shall be applied in each of three orthogonal axes.

5.1 Test Levels

Random Spectrum	20 - 300 cps;	Increase at 3 db/oct to 0.25 g^2/cps
	300 - 1200 cps;	Constant 0.25 g^2/cps
	1200 - 2000 cps;	Decrease at 6 db/oct
		(Overall Level = 19.5 grms)

Test Duration -- 3 minutes/axis

5.2 Procedure

A bare fixture random equalization will be performed prior to mounting the TWTA. An on-line scanner output plot from the automatic analyzer/equalizer will be made during each axis of test and attached to the data sheets. This plot will be used to verify conformance with the vibration criteria. The filter bandwidth of the analyzer/equalizer will be 50 Hz or less. Applying the random spectrum in seperate parts by breaking up the specified spectrum into narrow bands is not acceptable.

Prior to performance of any vibration test the vibration fixture shall have been evaluated in accordance with Paragraph 3.8.

Step 1: The TWTA shall be attached to the vibration fixture at its normal mounting points. The vibration fixture shall then be mounted to the shaker head so that vibration is perpendicular to the TWTA mounting base (ref. Figure 16). The control accelerometer shall be mounted on the vibration fixture as close as possible to the TWTA point(s) of attachment.

Step 2: Connect the TWTA as outlined in Figure 15. Apply nominal input voltage and apply the command signal to the TWTA.

5.2 Procedure (Cont'd)

Step 3: Adjust the signal generator to f_o and adjust the RF input power to produce saturated output power. Record the RF output power and the telemetry voltages.

Step 4: Record DC input current; calculate DC input power.

Step 5: Vibrate the TWTA at the levels and for the time duration specified in Paragraph 5.1. During vibration the RF power output and DC input current shall be monitored for any abnormalities.

Step 6: Repeat Step 5 with the TWTA operating, except change the TWTA axis of vibration to the major horizontal axis (ref. Figure 16).

Step 7: Repeat Step 5 with the TWTA operating, except change the TWTA axis of vibration to the minor horizontal axis (ref. Figure 16).

Step 8: Repeat Steps 3 and 4.

Step 9: Remove the TWTA from the vibration fixture and inspect for any evidence of mechanical damage.

6.0 THERMAL VACUUM TEST

Unless otherwise specified, RF data taken at the start of and during thermal vacuum testing will be used as a reference only. Delta changes will be used to determine compliance to specification limits.

Prior to the start of testing the signal generator and power meters shall have been in operation a minimum of 24 hours.

Notes

1. Temperature stabilization is defined as the thermal base plate remaining within the specified temperature ± 5°F for 30 minutes.

2. Changes from one temperature condition to another shall be accomplished at a rate not to exceed 10°F/minute.

3. The change in small signal gain shall not exceed 0.15 db/15°F.

4. The following method shall be used to determine compliance to specification limits. Results shall be recorded on the data sheets.

   A. Determine the maximum delta decrease in RF power output that may occur from the reference data recorded in Step 2. Subtract this value from the RF power output determined during the pre-environmental functional test. The corrected RF power output shall be a minimum of 27 dbm.

   B. Determine the maximum delta changes in small signal gain that may occur from the reference data recorded in Step 2. These values shall be added or subtracted as applicable to the gain values determined furing the pre-environmental functional test. The corrected gain shall meet the requirements of Paragraph 4.7.

   C. X-Y plots of power output, gain flatness and gain slope perfomred at temperature extremes shall be compared to the reference data of Step 2. Any delta change shall not exceed the applicable specified limits.

Step 1: Attach the TWTA to a thermal base plate and install in the vacuum chamber. Connect the TWTA as outlined in Figure 16.

Step 2: Apply nominal input voltage and command signal. Perform the following tests at ambient temperature and pressure:

(a) Paragraph 4.3, Inrush Characteristics

(b) Paragraph 4.6, Saturated Power Output and Input Power Versus Input Voltage

(c) Paragraph 4.5, Saturated Power Output and Gain (Note 4)

(d) Paragraph 4.7, Small Signal Gain and Gain Flatness (Note 4)

6.0 Thermal Vacuum Test (Cont'd)

Step 3: With the TWTA operating at f_o and at small signal (input drive 10db below that required for saturation) lower the chamber pressure to 1×10^{-5} mmHg or less. During evacuation the RF power output and DC input current shall be monitored for any abnormalities. Temperature of the thermal base plate may be 50 ± 15°F during this period.

Step 4: When evacuation of the chamber is completed and the thermal base plate stabilized at +50°F, record the small signal gain at f_o. (Note 3)

Step 5: Increase the thermal base plate temperature to + 65°F and stabilize. After stabilization record the small signal gain at f_o (Note 3).

Step 6: Increase the thermal plate to +80°F and stabilize. After stabilization record the small signal gain at f_o (Note 3).

Step 7: Repeat Step 6 at 15° intervals to + 125°F (Note 3).

Step 8: With the TWTA still operating, increase the thermal base plate temperature to +130°F and maintain for six (6) hours. During this period, after approximately four (4) hours repeat the tests of Step 2.

Step 9: Lower the thermal base plate temperature to +50°F (stabilization not required) at +50°F remove the command signal.

Step 10: With the command signal still removed lower the thermal base plate to - 10°F (stabilization not required). At -10°F apply the command signal and simulataniously raise the temperature to + 50°F. The TWTA shall turn on normally.

Step 11: With the TWTA operating, maintain +50°F for six (6) hours. During this period, after approximately four (4) hours repeat the tests of Step 2.

Step 12: With the TWTA operating, increase the thermal base plate temperature to + 130°F. During the temperature increase, at 105°F (stabilization not required), remove command signal and then reapply, TWTA shall turn on normally. With the TWTA operating, maintain +130°F for six (6) hours. During this period, after approximately four (4) hours repeat the tests of Step 2, except items (a) and (b); Item (d) shall be performed at nominal input voltage.

Step 13: Repeat the sequence of Steps 9 through 12 twice, except test of items (a) and (b); Item (d) shall be performed at nominal input voltage.

6.0 Thermal Vacuum Test (Cont'd)

Step 14: Repeat the sequence of Steps 9 through 11 once, except test of items (a) and (b); Item (d) shall be performed at nominal input voltage.

Step 15: Return the TWTA to room anbient conditions.

7.0 FINAL FUNCTIONAL TEST

Repeat Paragraphs 4.1 through 4.13.

7.1 Final Mechanical and Visual Inspection

Mechanical and visual inspection shall be performed to determine compliance to B200300-500.

ACCEPTANCE TEST - PART II (LIFE, & FLIGHT MODELS)

8.0 BURN-IN (FLIGHT MODELS EXCEPT FIRST THREE)

Burn-in shall be in accordance with Paragraph 3.11 and functional tests performed as follows:

Functional Test Sequence	Test Paragraph (Note 1)
Start of burn-in	8.1
At 250 hours	8.1
At 750 hours	8.1,4.1
At 1250 hours	8.1
At 1500 hours	4.2 through 4.13

Note 1: Tests indicated shall be performed at about ±10% of the time interval specified.

8.1 Functional Tests (Burn-In)

The following parameters shall be recorded at the specified time interval. Data shall be reviewed for any abnormalities.

a. Input current
b. Telemetry voltages
c. Saturated power output at 7.5 GHz ± 100 MHz

9.0 VIBRATION TEST

During the test the TWTA shall be operating; DC input currents and RF output shall be monitored. Vibration shall be applied in each of three orthogonal axes.

9.1 Test Levels

Random Spectrum

20-300 Hz; increase at 3 db/octave to 0.0625 g^2/Hz

300-1200 Hz; constant 0.0625 g^2/Hz

1200-2000 Hz; decrease at 6 db/octave (overall level = 9.8g RMS)

Test Duration -1 minute/axis

9.0 VIBRATION TEST (Cont'd)

9.2 Procedure

Test procedure per paragraph 5.2, except change steps as follows:

Step 3: delete in its entirety and replace with the following:

Adjust the signal generator to f_o and adjust the RF input power to produce a power output at least 10db below saturation, record the small signal gain. Readjust the RF input power to produce saturated power output, record power output and telemetry voltages.

Step 7: delete in its entirety and replace with the following:

Repeat step 5 except with the TWTA operating at small signal and change the TWTA axis of vibration to the minor horizontal axis (ref. Figure 17).

10 0 THERMAL VACUUM TEST

Unless otherwise specified, RF data taken during thermal vacuum testing will be used as a reference only. Delta changes will be used to determine compliance to specification limits.

Prior to the start of testing the signal generator and power meters shall have been in operation a minimum of 24 hours.

Notes

1. Temperature stabilization is defined as the thermal base plate remaining within the specified temperature ± 5°F for 30 minutes.
2. Changes from one temperature condition to another shall be accomplished at a rate not to exceed 10°F/minute.
3. The change in small signal gain shall not exceed 0.15 db/15°F.
4. The following method shall be used to determine compliance to specification limits. Results shall be recorded on the data sheets.

   A. Determine the maximum delta decrease in RF power that may occur from the data recorded in Step 2. Subtract this value from the RF power output determined during the pre-environmental functional test. The corrected RF power output shall be a minimum of 27 dbm.

   B. Determine the maximum delta changes in small signal gain that may occur from the data recorded in Step 2. These values shall be added or subtracted as applicable to the gain values determined during the pre-environmental functional test. The corrected gain shall meet the requirements of Paragraph 4.7.

   C. X-Y plots of power output, gain flatness and gain slope shall be compared to the data of Step 2. Any delta change shall not exceed the applicable specified limits.

Step 1: Attach the TWTA to a thermal base plate and install in the vacuum chamber. Connect the TWTA as outlined in Figure 16.

Step 2: Apply nominal input voltage and command signal. Perform the tests of paragraphs 4.5, 4.6 and 4.7 at ambient temperature and pressure.

10.0 THERMAL VACUUM TEST (Cont'd)

Step 3: With the TWTA non-operating, evacuate chamber to 1×10^{-5} mm Hg or less and adjust base plate temperature to $+50^{\circ}F$.
After stabilization has been reached, turn TWTA on and maintain for six (6) hours minimum. During this period perform the following tests:

a. Paragraph 4.3 Inrush Characteristics
b. Paragraph 4.5 Saturated Power Output (Note 4)
c. Paragraph 4.6 Saturated Power Output and Input Power versus Input Voltage.
d. Paragraph 4.7 Small Signal Gain, Gain Slope and Gain Flatness (Note 4)

Record the small signal gain at f_o at nominal input voltage.

Step 4: Deleted

Step 5: Increase the thermal base plate temperature to $+90^{\circ}F$ and stabilize. After stabilization record the small signal gain at f_o with nominal input voltage applied. (Note 3)

From the data of Step 3, calculate change in gain as follows:

$$\frac{|GT_1 - GT_o|}{40} \times 15 = db/15^{\circ}F \text{ and } T_o \quad \text{where} \quad T_1 = 50^{\circ}F \text{ and } T_o = 90^{\circ}F$$

Step 6: With the TWTA still operating, increase the thermal base plate temperature to $+130^{\circ}F$ and maintain for a minimum of six (6) hours. During this period, after stabilization repeat the tests of Step 3 and the following paragraphs:

Para 4.9	Intermodulation Distortion
Para 4.13.1	Spurious Output (Incoherent Components)
Para 4.13.2	Spurious Output (AM)
Para 4.13.3	Spurious Output (PM)

Record the small signal gain at f_o at nominal input voltage (Note 3)

From the data of Step 5, calculate change in gain as follows:

$$\frac{|GT_2 - GT_o|}{40} \times 15 = db/15^{\circ}F \quad \text{where } T_2 = 130^{\circ}F \text{ and } T_o = 90^{\circ}F$$

Step 7: With the TWTA still operating, lower the thermal base plate temperature to $+40^{\circ}F$. After stabilization perform the following tests:
a. Paragraph 4.3 Inrush Characteristics
b. Paragraph 4.5 Saturated Power Output, Steps 1 and 2 only
c. With the TWTA operating at f_o, input voltage adjusted to 23 ± .5 Vdc, and RF input power adjusted for saturated output power, record the DC input current and calculate the DC input power. Repeat above at input voltage of 33 ± .5 Vdc.
d. Paragraph 4.7 Small Signal Gain, Gain Slope and Gain Flatness.

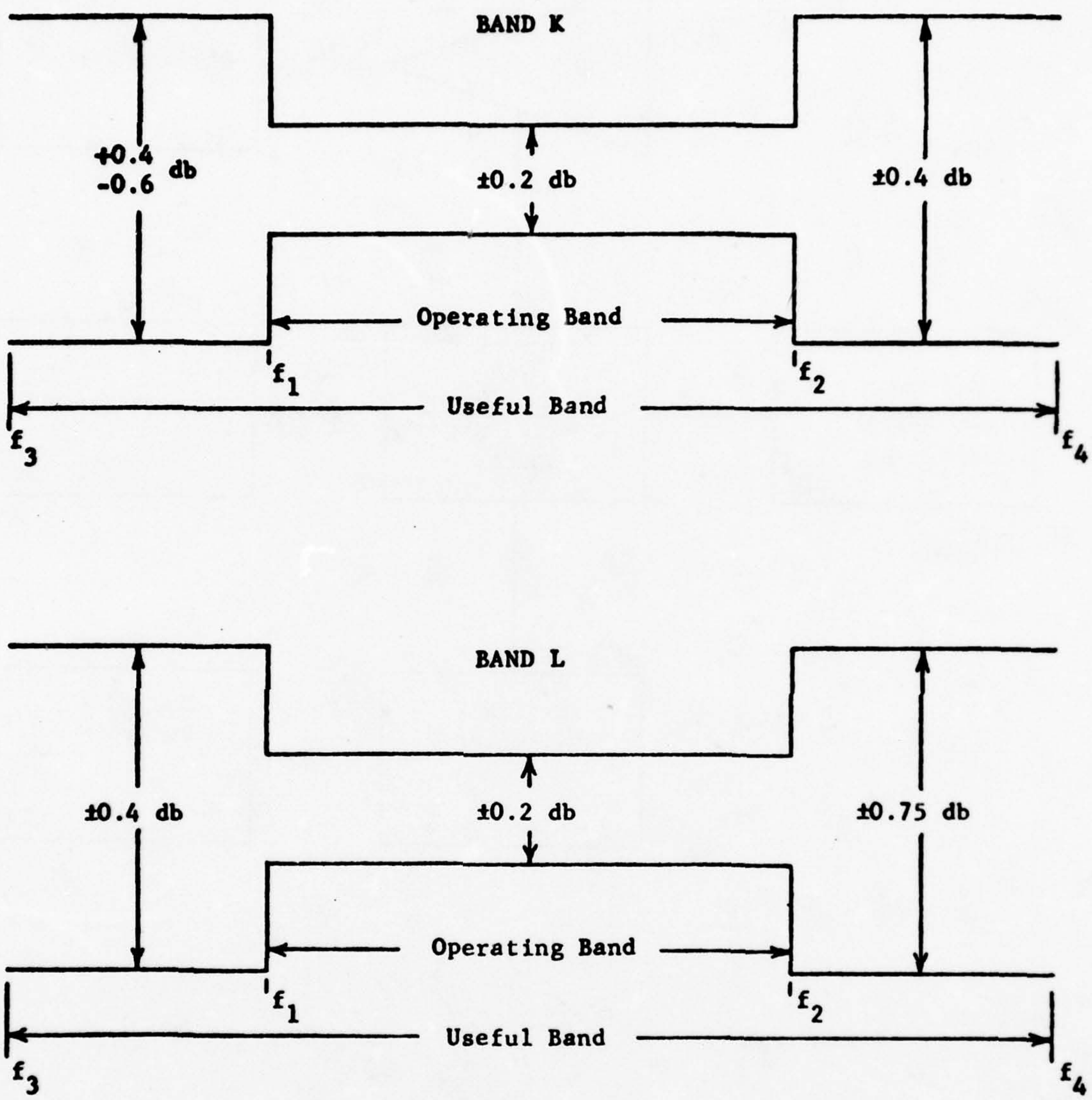
Tests under Step 7 are for engineering data only and specified limits do not apply.

11.0 FINAL FUNCTIONAL TEST

Perform Paragraphs 4.1 through 4.13.

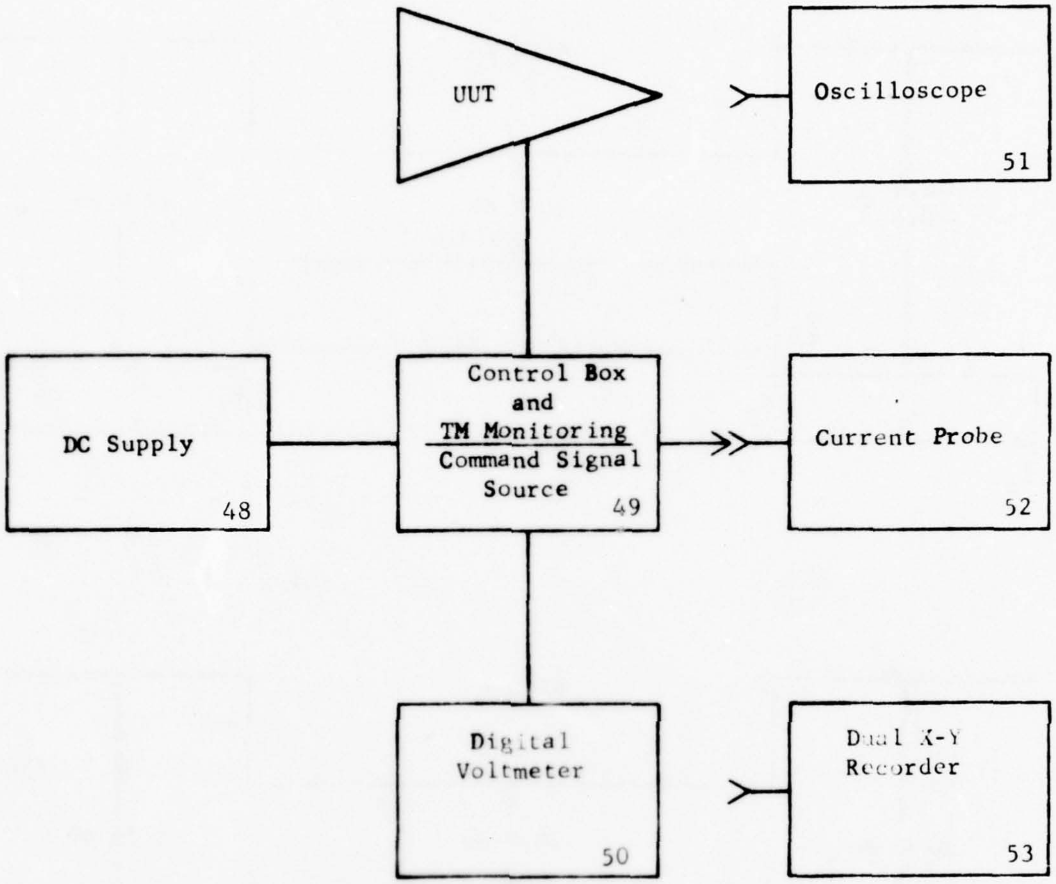
11.1 Final Mechanical and Visual Inspection

Mechanical and visual inspection shall be performed to determine compliance to B200300-500.



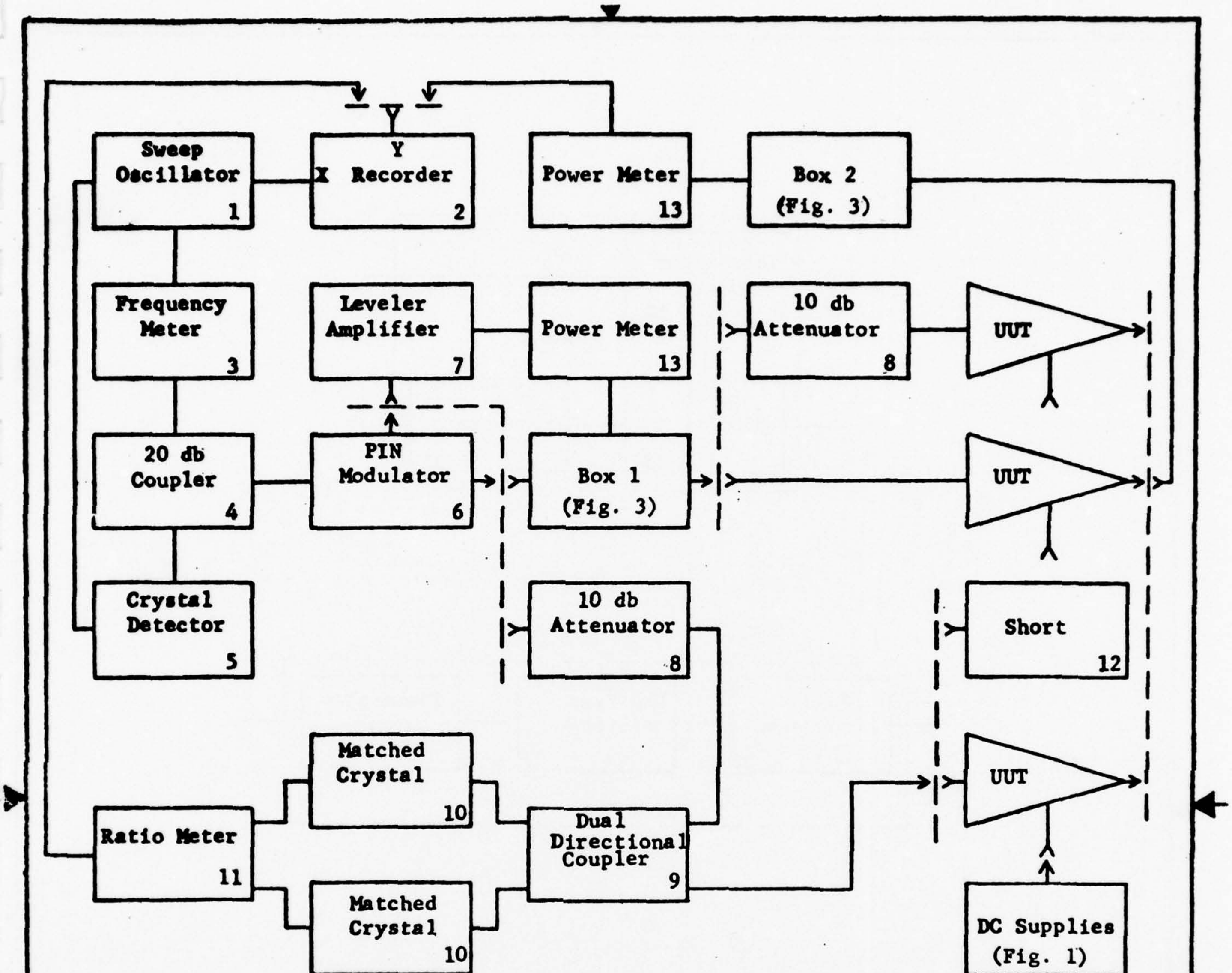
GAIN FLATNESS

FIGURE A



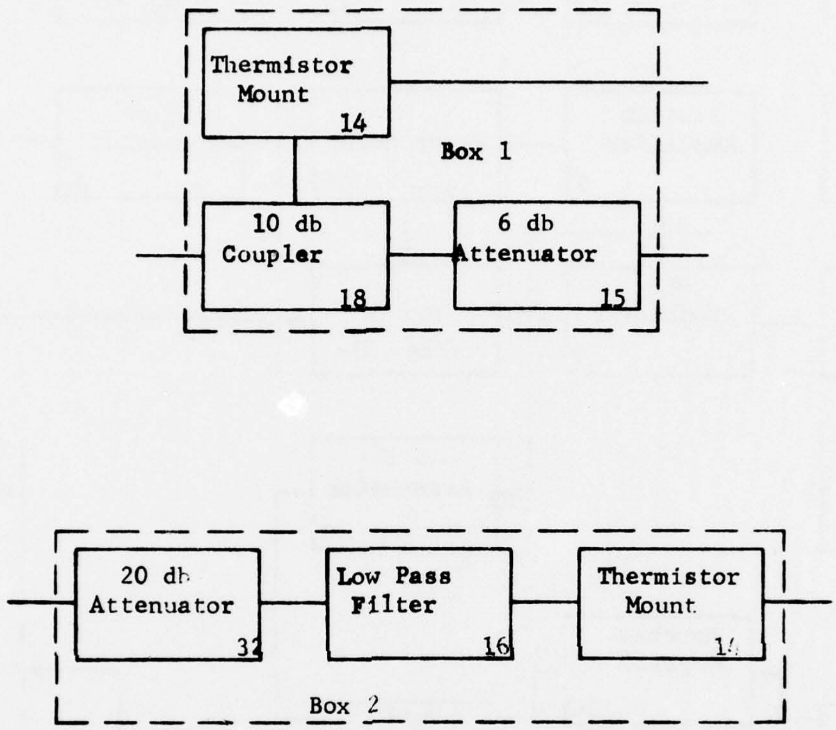
SUPPLY AND CONTROL BLOCK

FIGURE 1



REFLECTION COEFFICIENT, POWER OUTPUT AND GAIN BLOCK

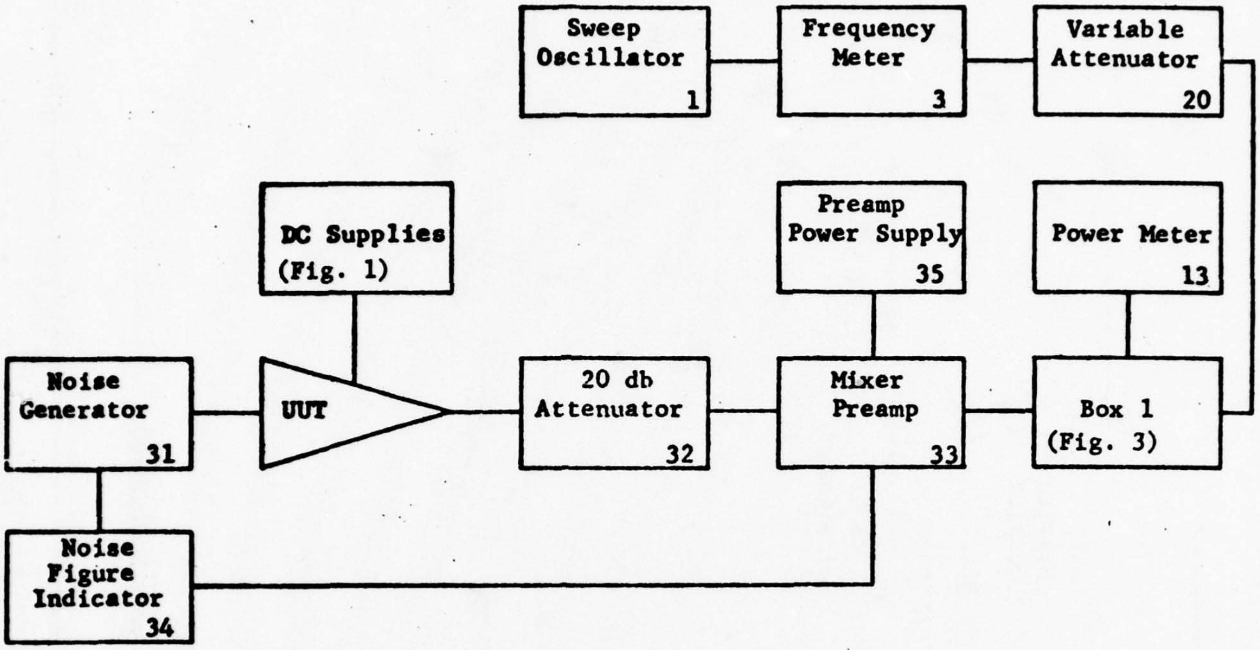
FIGURE 2



TEST BLOCK SEGMENTS

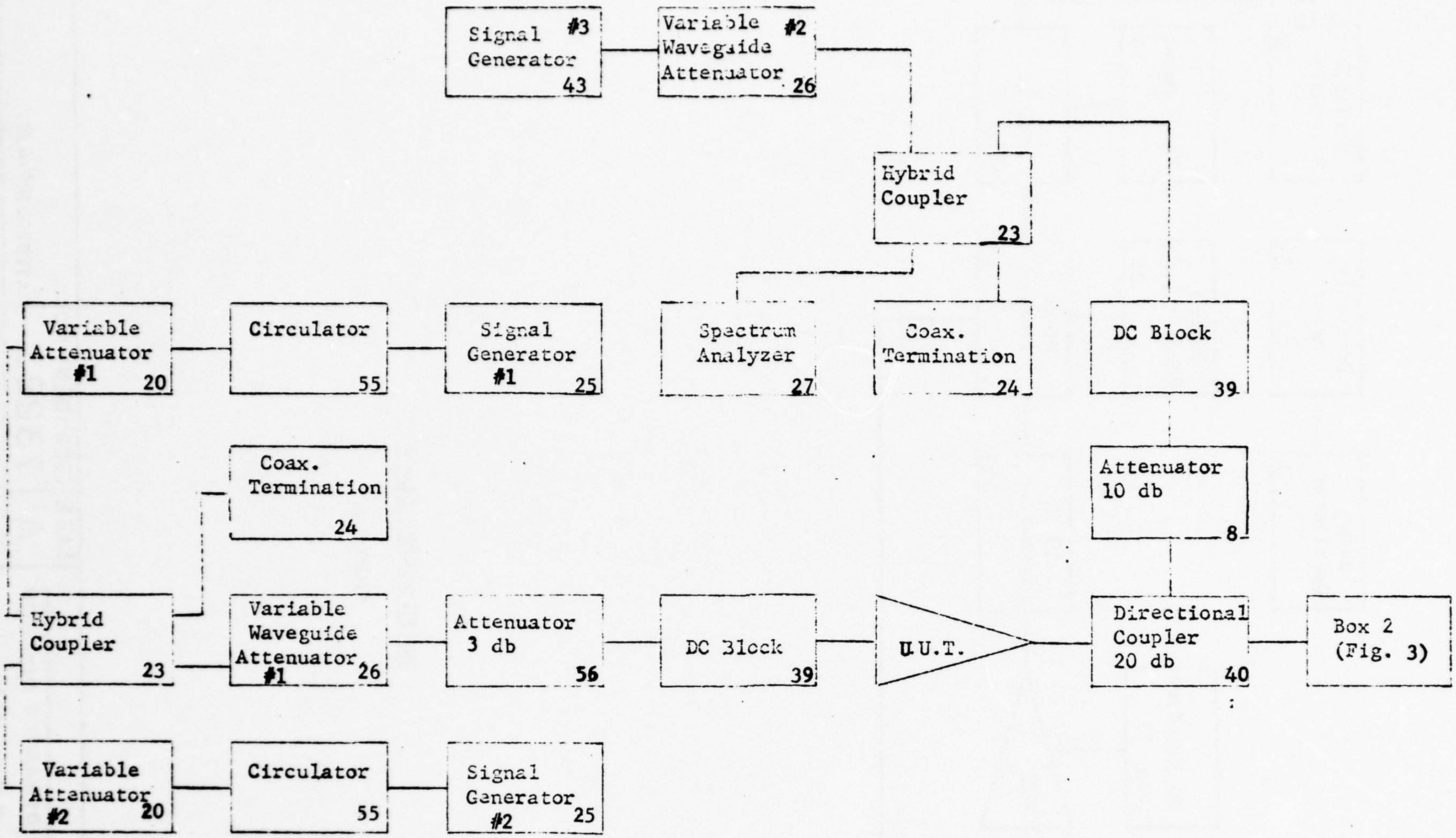
BOXES 1 AND 2

FIGURE 3



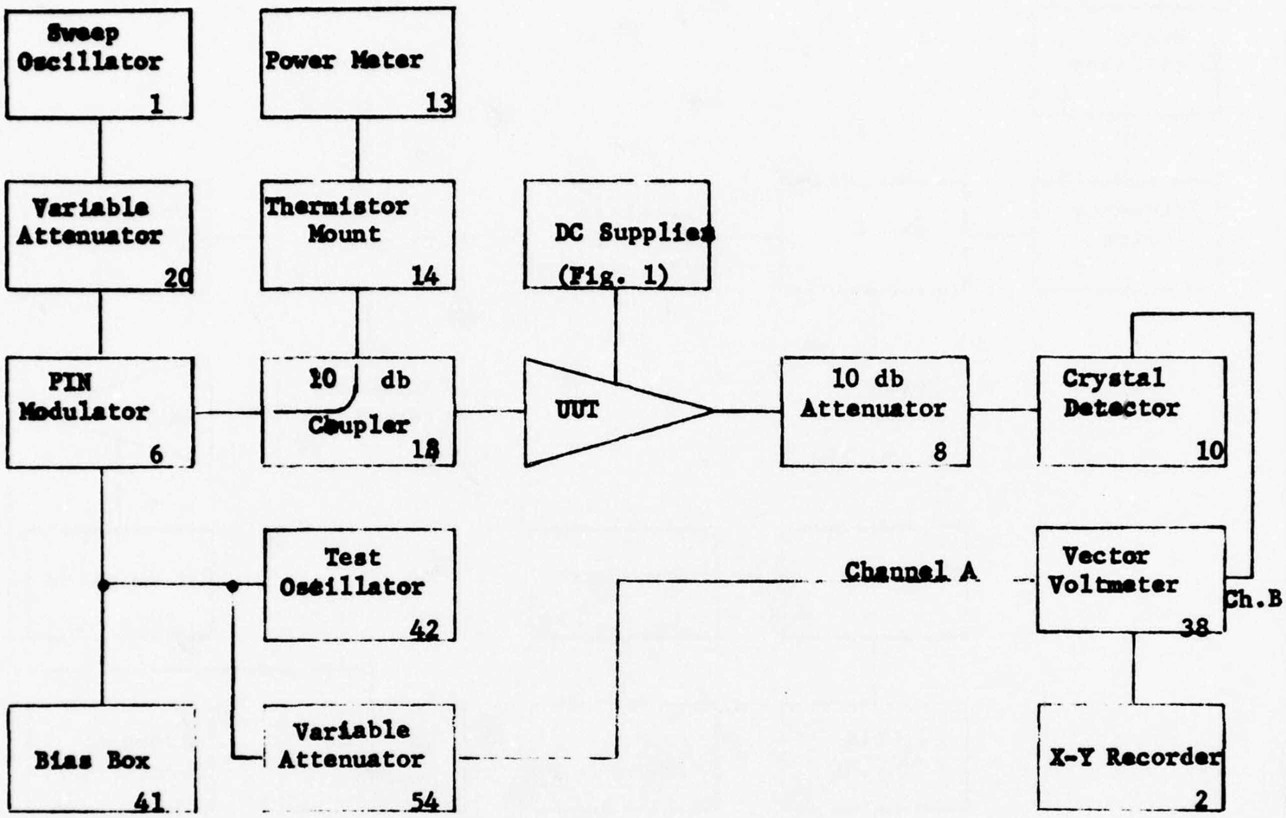
NOISE FIGURE BLOCK

FIGURE 4



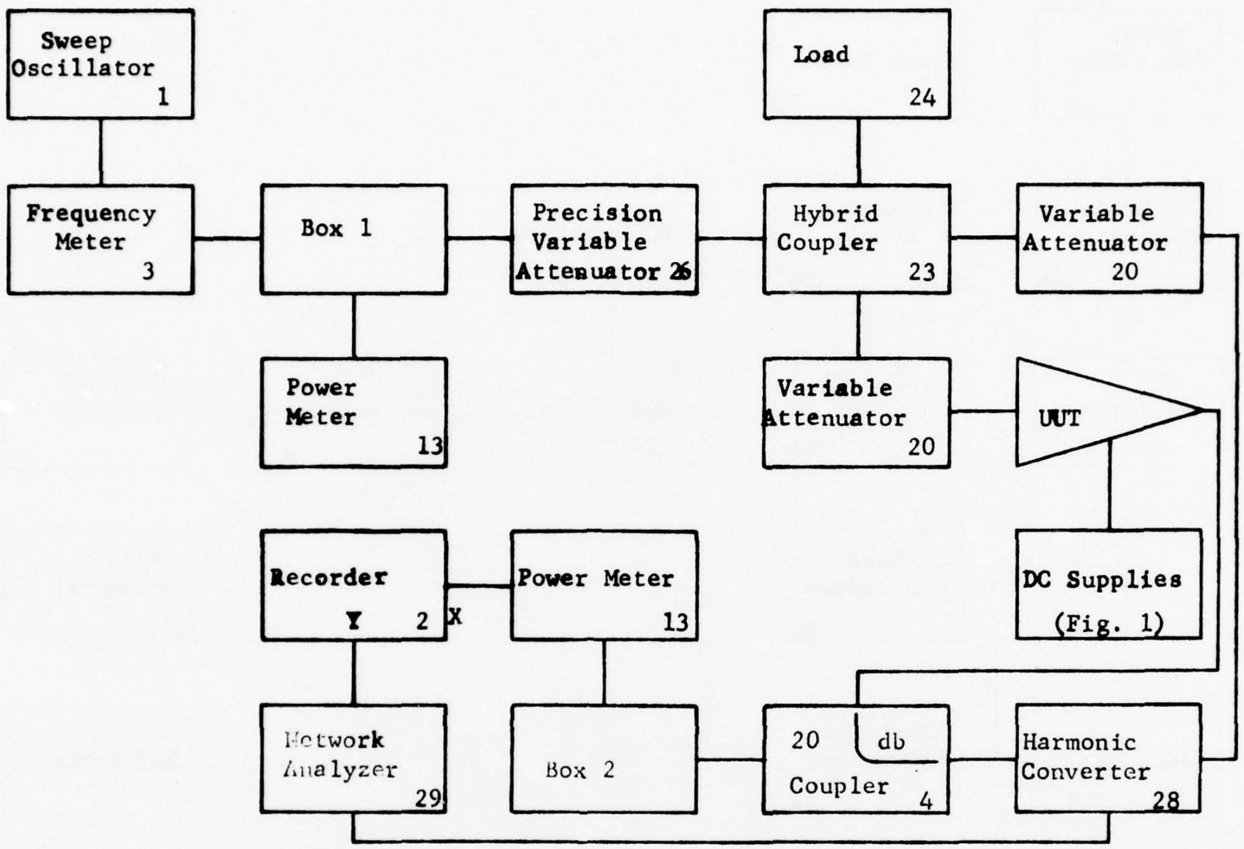
INTERMODULATION DISTORTION BLOCK DIAGRAM

FIGURE 5



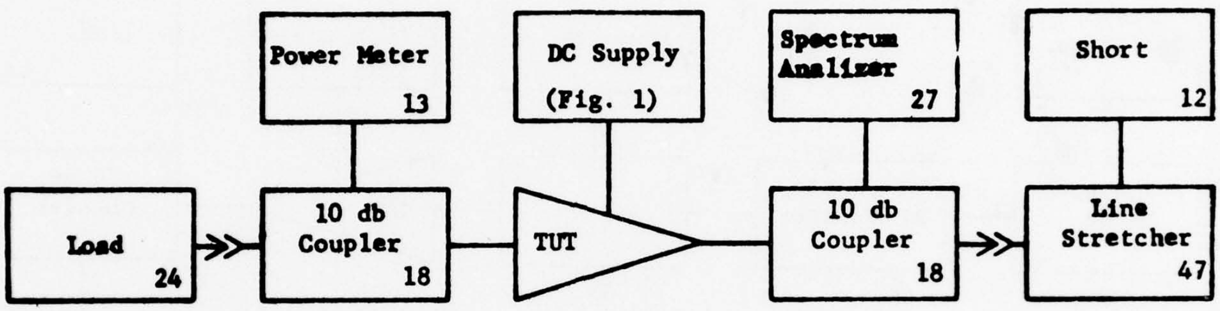
TIME DELAY DISTORTION BLOCK

FIGURE 6



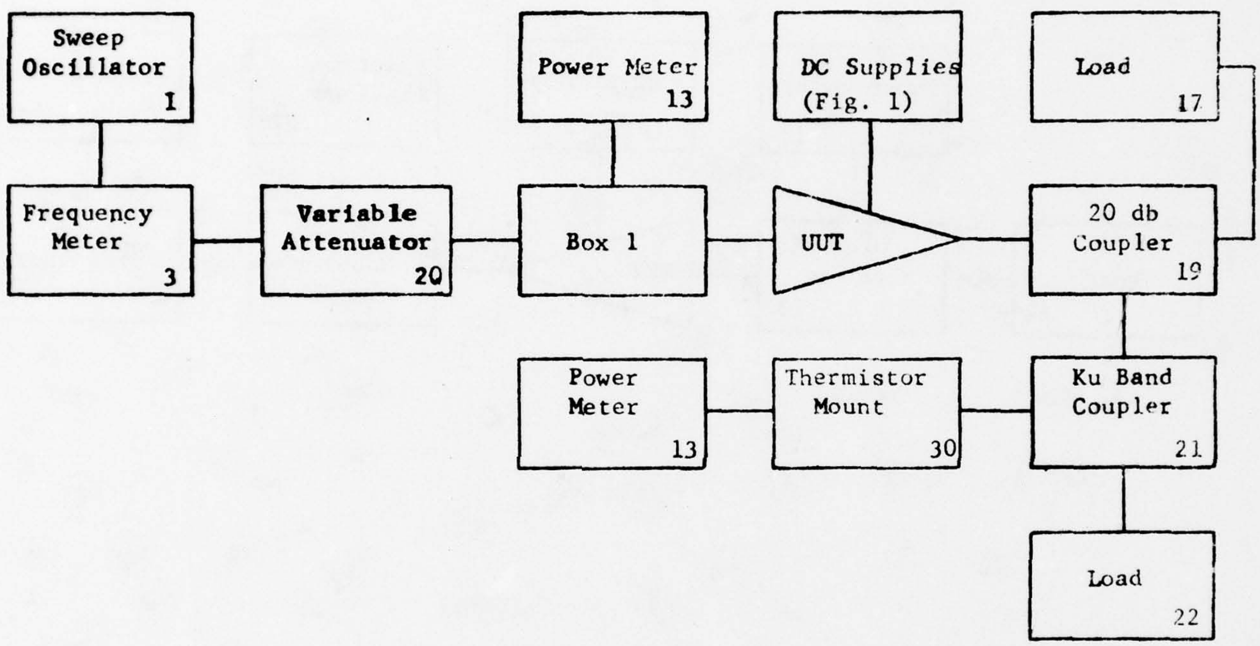
AM TO PM CONVERSION BLOCK

FIGURE 7



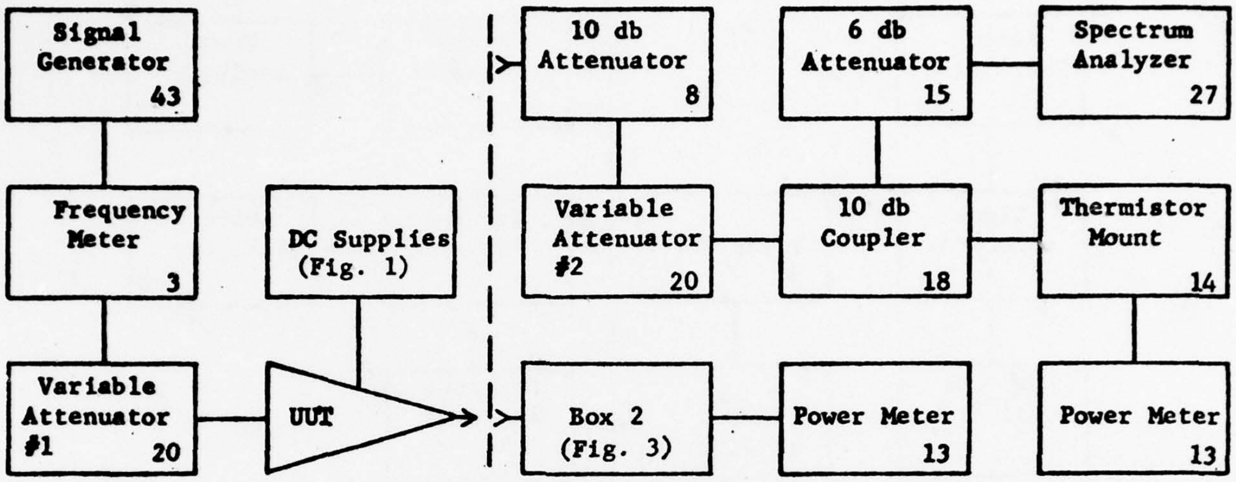
STABILITY BLOCK

FIGURE 8



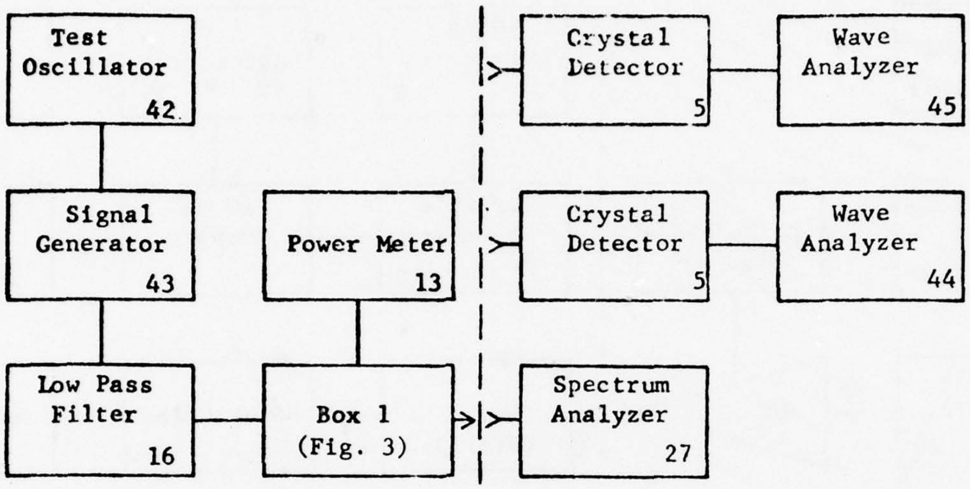
HARMONIC POWER BLOCK

FIGURE 9



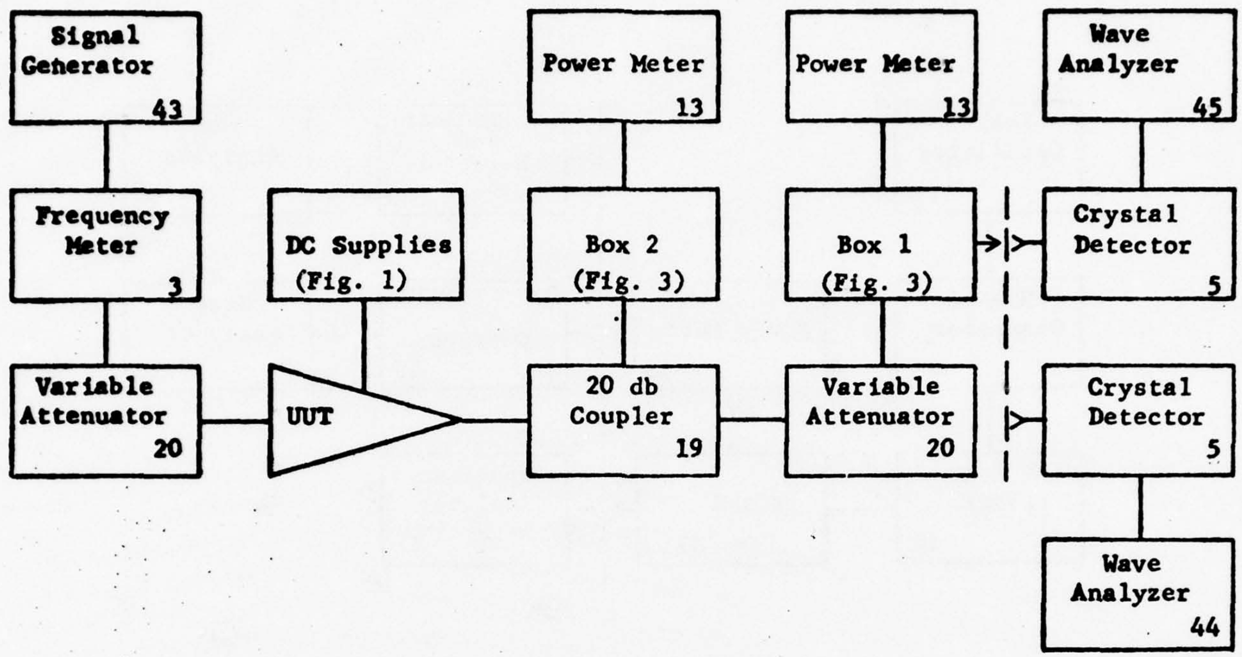
SPURIOUS OUTPUT
INCOHERENT COMPONENTS BLOCK

FIGURE 10



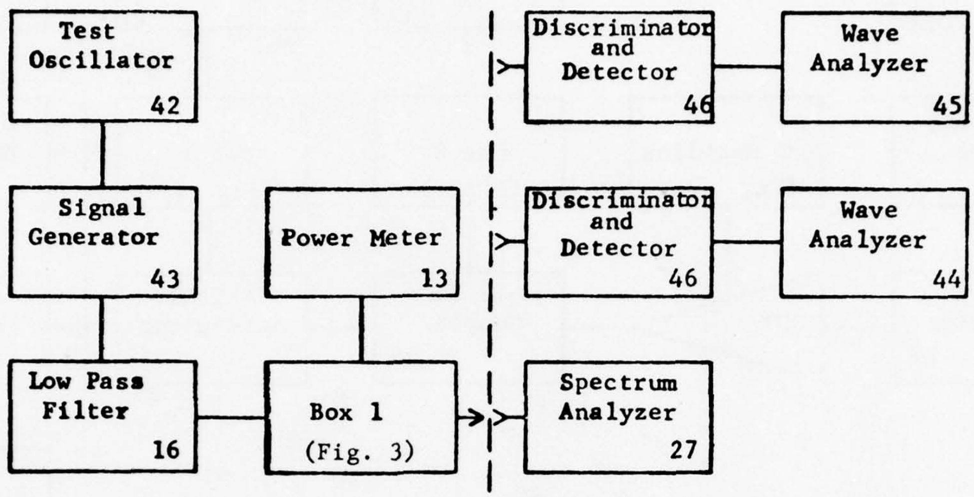
AM SPURIOUS OUTPUT
CALIBRATION BLOCK

FIGURE 11



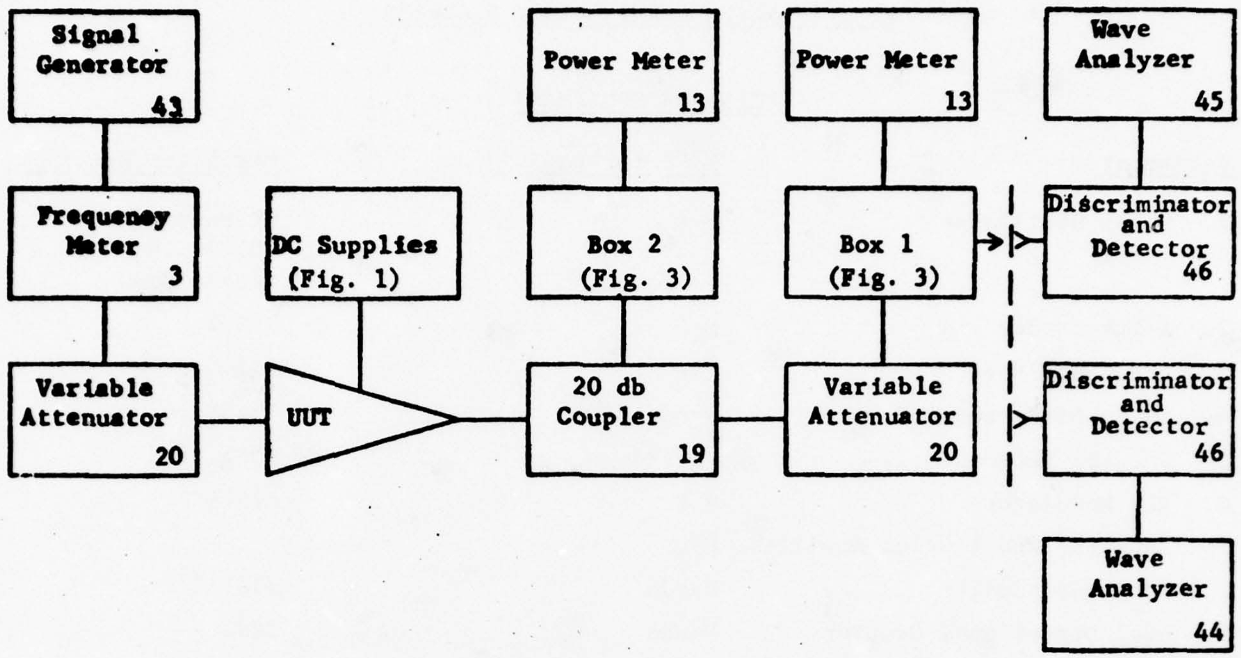
AM SPURIOUS OUTPUT
MEASUREMENT BLOCK

FIGURE 12



PM SPURIOUS OUTPUT
CALIBRATION BLOCK

FIGURE 13



PM SPURIOUS OUTPUT
MEASUREMENT BLOCK

FIGURE 14

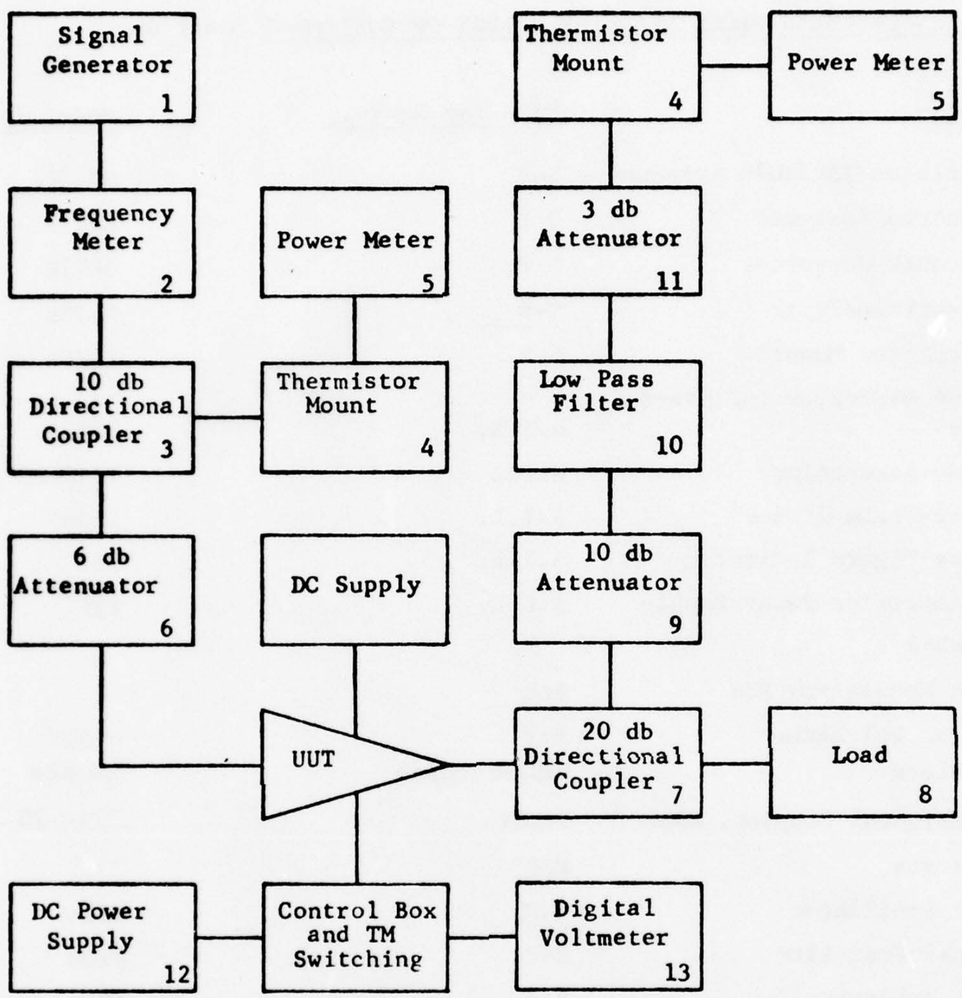
RF TEST MEASUREMENTS BLOCK DIAGRAMS

LIST OF EQUIPMENT

Equipment	Make (or Equiv.)	Model (or Equiv.)
1. Sweep Oscillator	H-P	RF Unit H01-8694B Series 8690
2. X-Y Recorder	H-P	7035B
3. Frequency Meter	H-P	537A
4. 20 db Directional Coupler	Narda	3045C-20
5 Crystal Detector	Alfred	1001
6. PIN Modulator	H-P	8734A
7. Invertor and Leveler Amplifier	HAC	
8. 10 db Attenuator	Narda	774-10
9. Dual Directional Coupler	Narda	3024
10. Crystal	Alfred	1001 Opti
11. Ratio Meter	H-P	416B
12. Short (female)	Narda	
13. Power Meter	H-P	432A
14. Thermistor Mount	H-P	478A
15. 6 db Attenuator	Narda	757C-6
16. Low Pass Filter	Microlab	LA-80N
17. High Power Load	Narda	376NM
18. 10 db Directional Coupler	Narda	3034B-10
19. 20 db Directional Coupler	Narda	4016-20
20. Variable Attenuator	PRD	C1110
21. 10 db Directional Coupler (Ku Band)	H-P	P752C
22. Low Level Waveguide	H-P	P910A
23. Coaxial Hybrid Coupler	Narda	3034
24. Load	Weinschel	535-MN
25. Signal Generator	PRD	1207

RF TEST MEASUREMENTS BLOCK DIAGRAMS - LIST OF EQUIPMENT (Cont'd)

Equipment	Make (or Equiv.)	Model (or Equiv.)
26. Precision Variable Attenuator	H-P	H382A
27. Spectrum Analyzer	H-P	8551B
28. Harmonic Converter	H-P	8411A
29. Network Analyzer	H-P	8410A
30. Thermistor Mount	H-P	P486A
31. Noise Generator (w/internal load)	A.I.L.	07051
32. 20 db Attenuator	Narda	777C-20
33. Mixer-Preamplifier	A.I.L.	13507
34. Noise Figure Indicator	A.I.L.	75
35. Preamplifier Power Supply	A.I.L.	136
36. Deleted		
37. 1 db Modulation Box	HAC	
38. Vector Voltmeter	H-P	8405A
39. DC Block	FXR/Microlab	HR-52N
40. Directional Coupler, 20db	Narda	3044-20
41. Bias Box	HAC	
42. Test Oscillator	H-P	651A
43. Signal Generator	H-P	618B
44. Wave Analyzer	H-P	302A
45. Wave Analyzer	H-P	310A
46. Discriminator/Detector		
47. Line Stretcher	General Radio	
48. DC Power Supply	Lamda	LK343FM
49. Control Box	HAC	
50. Digital Voltmeter	Fairchild	7000-OPT-1
51. Oscilloscope	Tektronix	531A
52. Current Probe	Tektronix	P6042
53. Dual X-Y Recorder	H-P	136A
54. Variable Attenuator	H-P	355D
55. Circulator	E & M Laboratory	X12T20
56. 3 db Attenuator	Narda	777C-3



RF MEASUREMENTS BLOCK DIAGRAM

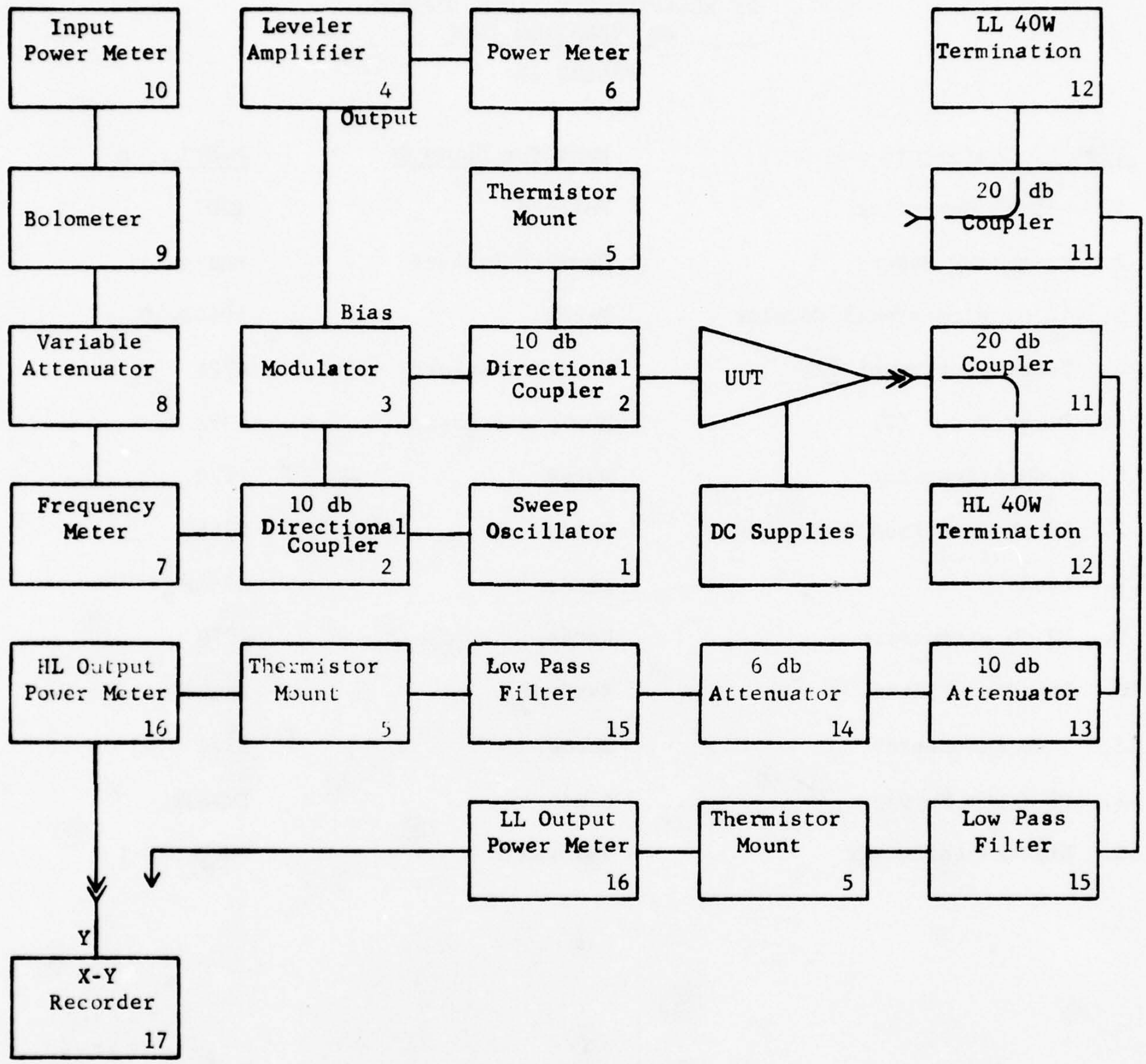
FOR VIBRATION TEST

FIGURE 15

RF MEASUREMENTS BLOCK DIAGRAM
FOR VIBRATION TEST

FIGURE 15

List of Equipment	Make (or Equiv.)	Model
1. Signal Generator	Polarad	1207
2. Frequency Meter	Hewlett-Packard	H532A
3. 10 db Directional Coupler	Narda	3044B-10
4. Thermistor Mount (2)	Hewlett-Packard	478A
5. Power Meter (2)	Hewlett-Packard	432A
6. 6 db Attenuator	Narda	777C
7. 20 db Directional Coupler	Narda	22580
8. Load	Narda	376NM
9. 10 db Attenuator	Narda	777C
10. Low Pass Filter	Narda	LA-80N
11. 3 db Attenuator	Narda	7776
12. DC Power Supply	Lamda	LK343A
13. Digital Voltmeter	Fairchild	7000-OPT-1



RF MEASUREMENTS BLOCK DIAGRAM
FOR THERMAL VACUUM TEST

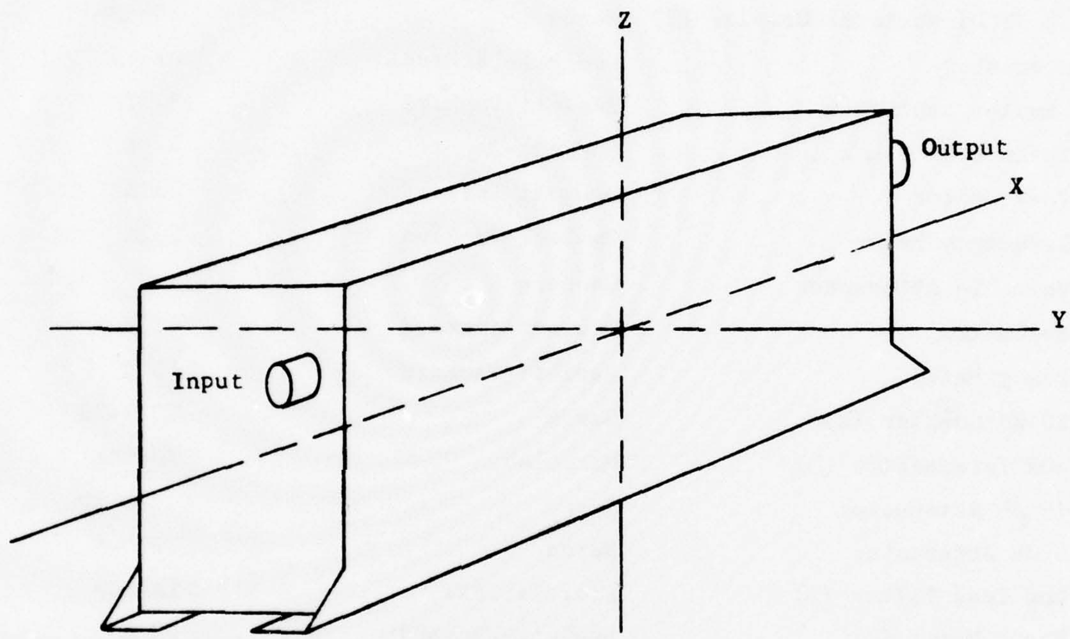
FIGURE 16

RF MEASUREMENTS BLOCK DIAGRAM FOR THERMAL VACUUM TEST

FIGURE 16

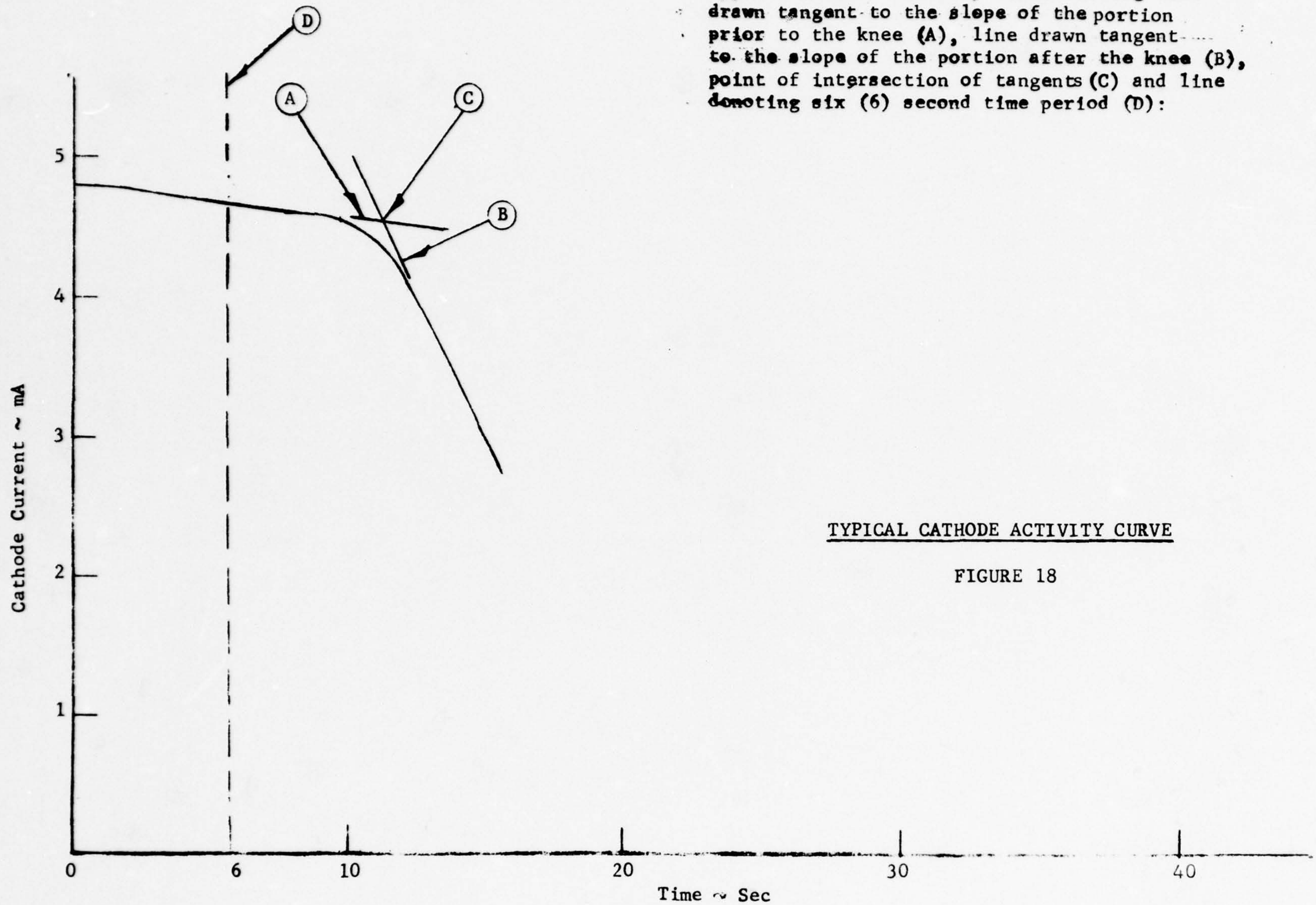
List of Equipment	Make (or Equiv.)	Model
1. Sweep Oscillator	Hewlett-Packard	8690B
2. 10 db Directional Coupler (2)	Narda	3044B-10
3. Modulator	Hewlett-Packard	8734A
4. Leveler Amplifier	Hewlett-Packard	8401A
5. Thermistor Mount (3)	Hewlett-Packard	478A
6. Power Meter	Hewlett-Packard	431B
7. Frequency Meter	Hewlett-Packard	532A
8. Variable Attenuator	Sanders	1
9. Bolometer	Hewlett-Packard	477B
10. Power Meter	Hewlett-Packard	430C
11. 20 db Coupler (2)	Narda	3045-20
12. 40W Termination (2)	Microlab	TD-5NM
13. 10 db Attenuator	Narda	777C-10
14. 6 db Attenuator	Narda	777C-6
15. Low Pass Filter (2)	Microlab/FXR	LA-80N
16. Power Meter (2)	Hewlett-Packard	432A
17. X-Y Recorder	Hewlett-Packard	7035B

X Axis = Major Horizontal
Y Axis = Minor Horizontal
Z Axis = Vertical



VIBRATION AXES DEFINITION

FIGURE 17



Typical cathode activity curve showing line drawn tangent to the slope of the portion prior to the knee (A), line drawn tangent to the slope of the portion after the knee (B), point of intersection of tangents (C) and line denoting six (6) second time period (D):

TYPICAL CATHODE ACTIVITY CURVE

FIGURE 18

APPENDIX D

777 MODEL 1200H LOW LEVEL TWTA

LIFE TEST REDUCED DATA

HUGHES **ELECTRON DYNAMICS DIVISION**

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ____
MODEL NO. B200300-121 SERIAL NO. 12-1
PAGE OF

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400 | ACCEPTANCE TEST DATA

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT), FREQ. f_o

TEST CONDITIONS NOMINAL INPUT VOLTAGE

	LIMITS		UNITS	PRE-FINAL	FINAL	6,996	13,339	20,007	31,672	58,873					
TOTAL ACCUMULATED HOURS	MIN	MAX		10/12/70	10/20/70	8/30/71	6/1/72	3/22/73	8/14/74	11/1/77	/ /	/ /	/ /	/ /	/ /
INPUT CURRENT TELEMETRY VOLTAGE			V	2.079	2.084	2.083	2.080	2.082	2.074	2.053					
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.556	3.556	3.563	3.549	3.536	3.495	3.481					
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.105	3.104	3.100	3.097	3.096	3.095	3.094					
HELIX CURRENT TELEMETRY VOLTAGE			V	1.041	1.042	1.135	1.119	1.086	1.063	1.039					
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.655	2.652	2.65	2.656	2.65	2.652	2.66[illegible]					
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	27.20	27.00	27.55	27.45	27.15	27.00	27.25					
Gm FREQ. f_o (PARA. 4.3.1)	35	39.5	db	35.48	35.36	35.63	35.70	35.30	35.15	35.10					
I_L INSERTION LOSS			db												
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS												
T_K CATHODE ACTIVITY	6.0	--	SEC		9.8	11.5	11.5	11.3	10.0	8.3					
TEST EQUIPMENT CALIBRATION DATE															
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

TWT has 686 hours prior to start of life test.

BENCH FUNCTIONAL TEST DATA

LOW LEVEL LIFE TEST PLAN AND PROCEDURE

SPEC: LTPB 200300-400

SERIAL NO. 12-1

SPEC. PARA #	TEST DESIGNATION	SPEC LIMITS		DATA			
		MINIMUM	MAXIMUM	0	2000	5887.3	HOURS
4.1	CATHODE ACTIVITY, SECONDS	6.0		9.8	11.3	8.3	
.2	COMMAND SIGNAL			✓	✓	✓	
.3	INRUSH CURRENT						
a)	TIME INTEGRAL > Iss, t=3msec, AMP-SEC		.0037	0.0019	0.0018	0.0018	
b)	Imax, AMPS		1.8	0.67	0.62	0.65	
c)	I WITHIN ±3% Iss AT 150 SECONDS			✓	✓	✓	
4.4	INPUT AND OUTPUT REFLECTION, VSWR						
a)	OUTPUT (HOT)		1.25:1	1.16	1.10	1.02	
b)	OUTPUT (COLD)		1.25:1	1.16	1.08	1.02	
c)	INPUT (COLD)		1.25:1	1.11	1.15	1.13	
d)	INPUT (HOT)		1.25:1	1.11	1.15	1.13	
5	SATURATED POWER OUTPUT						
a)	TELEMETRY VOLTAGES						
	1) INPUT CURRENT TLM V			2.084	2.082	2.053	
	2) CATHODE CURRENT TLM V			3.560	3.536	3.461	
	3) HEATER VOLTAGE TLM V			3.104	3.096	3.094	
	4) HELIX CURRENT TLM V			1.042	1.086	1.039	
	5) CATHODE VOLTAGE TLM V			2.652	2.650	2.666	
b)	P_o (SAT.), dBm	27		27.0	27.15	27.25	
6	SATURATED POWER OUTPUT AND INPUT POWER VS. INPUT VOLTAGE						
a)	Vin = 23 ±.5V DC						
	1) P_o (SAT.), dBm	27		27.0	27.15	27.25	
	2) Iin, AMPS			.263	.263	0.265	
	3) Pin (DC), WATTS			6.049	6.049	5.888	
b)	Vin = 33 ±.5V DC						
	1) P_o (SAT.), dBm	27		27.0	27.15	27.25	
	2) Iin, AMPS			.185	.184	0.181	
	3) Pin (DC), WATTS			6.105	6.072	5.473	

S/N_______________

SPEC PARA #	TEST DESIGNATION	SPEC LIMITS MINIMUM	SPEC LIMITS MAXIMUM	DATA 0	DATA 20007	DATA 58873 HOURS
4.7	SMALL SIGNAL GAIN					
a)	Gss AT P_o 10dB BELOW P_o (SAT.) , dB	35	39.5	35.38	35.3	35.1
b)	STEPS 4 AND 5 (SEE ATP)			✓	✓	✓
4.7.1	GAIN SLOPE , dB/Mhz					
a)	Vin = 23 ± .5V DC					
	1) ΔGss f_1 to f_2		0.015	0.0014	0.001	0.003
	2) ΔGss f_1 to f_3		0.030	0.0014	0.001	0.0017
	3) ΔGss f_2 to f_4		0.030	0.0007	0.001	0.0009
b)	Vin = 28 ± .5V DC					
	1) ΔGss f_1 to f_2		0.015	0.0014	0.001	0.003
	2) ΔGss f_1 to f_3		0.030	0.0014	0.001	0.0017
	3) ΔGss f_2 to f_4		0.030	0.0007	0.001	0.0009
c)	Vin = 33 ± .5V DC					
	1) ΔGss f_1 to f_2		0.015	0.0014	0.001	0.003
	2) ΔGss f_1 to f_3		0.030	0.0014	0.001	0.0017
	3) ΔGss f_2 to f_4		0.030	0.0007	0.001	0.0009
4.7.2	GAIN FLATNESS					
a)	Vin = 23 ± .5V DC					
	1) GAIN VARIATION f_1 to f_2 , dB		±0.2	±0.07	±0.1	±0.13
b)	Vin = 28 ± .5V DC					
	1) GAIN VARIATION f_1 to f_2 , dB		±0.2	±0.07	±0.1	±0.13
c)	Vin = 33 ± .5V DC					
	1) GAIN VARIATION f_1 to f_2 , dB		±0.2	±0.07	±0.1	±0.13
4.8	NOISE FIGURE					
a)	N.F. , dB		25	21.7	21.3	21.8
4.9	INTERMODULATION DISTORTION					
a)	I.M. DISTORTION , dB	28		28.7	28.9	29.3
4.10	TIME DELAY DISTORTION					
a)	T.D. f_1 to f_2 ANY 10MHZ LINEAR INTERVAL , ns/Mhz		0.10	0.091	0.01	0.01
b)	T.D. f_1 to f_2 PARABOLIC PORTION OF CURVE , ns/Mhz^2		0.01	0.005	0.001	0.001

SPEC PARA #	TEST DESIGNATION	SPEC LIMITS MINIMUM	SPEC LIMITS MAXIMUM	DATA 0	DATA 20007	DATA 58873 HOURS
4.11	PHASE SHIFT, FREQ. f_o, $+14dBm \leq P_o \leq +23dBm$, °/dB					
a)	$+21.75dBm \leq P_o \leq +23dBm$		2.0	1.0	1.1	0.733
b)	$+17dBm \leq P_o \leq +21.75dBm$		1.5	0.8	0.79	1.60
c)	$+14dBm \leq P_o \leq +17dBm$		1.0	0.75	0.8	0.82
4.12	STABILITY (MISMATCH) NO P_o FROM INPUT AND OUTPUT OTHER THAN INHERENT NOISE			✓	✓	✓
4.13	SPURIOUS OUTPUT COHERENT COMPONENTS					
a)	P_o (HARMONIC), dB	13		18.5	14.0	18.3
4.13.1	SPURIOUS OUTPUT INCOHERENT COMPONENTS					
a)	P_o (NON-HARMONIC)	60dB BELOW FUNDAMENTAL		✓	✓	✓
4.13.2	SPURIOUS OUTPUT (AM)			✓	✓	✓
4.13.3	SPURIOUS OUTPUT (PM)			✓	✓	✓

HUGHES ELECTRON DYNAMICS DIVISION
3100 W. LOMITA BLVD. TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DS8200300-400 REV. ____
MODEL NO. 8200300-121 / 8200300-122 SERIAL NO. 12-1
PAGE ____ OF ____

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE — SPEC NO. LTP8200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o

TEST CONDITIONS NOMINAL INPUT VOLTAGE	PRE-FINAL A.T.P. DATA 0	LIMITS MIN	LIMITS MAX	UNITS	0	89.6	262.5	423.8	662.6	757.1	924.2	1161.9	1352.0	1566.0	1854.9	1998.0
TOTAL ACCUMULATED HOURS					week of 10/30/70	week of 11/6/70	week of 11/13/70	week of 11/20/70	week of 11/30/70	week of 12/4/70	week of 12/11/70	week of 12/21/70	week of 12/29/70	week of 1/7/71	week of 1/19/71	week of 1/25/71
INPUT CURRENT TELEMETRY VOLTAGE	2.079			V	2.090	2.088	2.087	2.081	2.080	2.076	2.079	2.075	2.077	2.080	2.088	2.087
CATHODE CURRENT TELEMETRY VOLTAGE	3.556			V	3.566	3.566	3.569	3.568	3.565	3.563	3.566	3.556	3.564	3.565	3.563	3.564
HEATER VOLTAGE TELEMETRY VOLTAGE	3.105			V	3.102	3.102	3.102	3.103	3.102	3.103	3.103	3.101	3.101	3.101	3.099	3.099
HELIX CURRENT TELEMETRY VOLTAGE	1.041			V	1.045	1.067	1.045	1.055	1.051	1.067	1.072	1.064	1.066	1.074	1.038	1.099
CATHODE VOLTAGE TELEMETRY VOLTAGE	2.655			V	2.644	2.645	2.645	2.648	2.649	2.652	2.651	2.656	2.649	2.648	2.639	2.642
P_o (SAT) FREQ. f_o (PARA 4.2.2)	27.55	27	—	dbm	27.55	27.64	27.60	27.60	27.65	27.60	27.70	27.70	27.70	27.65	27.50	27.55
Gss FREQ. f_o (PARA 4.2.1)	35.48	35	39.5	db	35.42	35.35	35.80	35.35	35.43	35.35	35.45	35.55	35.50	35.45	35.40	35.30
L_i INSERTION LOSS				db												
R_{AIN} ATTENUATOR RESISTANCE, INPUT				OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT				OHMS												
T_K CATHODE ACTIVITY		6.0	—	SEC												
TEST EQUIPMENT CALIBRATION DATE						11/5/70								1/8/71		
SIGNIFICANT EVENT NOTES																
TESTED BY																

SIGNIFICANT EVENT NOTES

S/N____________________

SPEC PARA #	TEST DESIGNATION	SPEC LIMITS MINIMUM	SPEC LIMITS MAXIMUM	DATA 0 HOURS	DATA 20007 HOURS	DATA 58873 HOURS
4.11	PHASE SHIFT, FREQ. f_o, +14dBm < P_o < +23dBm , °/dB					
a)	+21.75dBm < P_o < +23dBm		2.0	1.0	1.1	0.733
b)	+17dBm < P_o < +21.75dBm		1.5	0.8	0.79	1.60
c)	+14dBm < P_o < +17dBm		1.0	0.75	0.8	0.82
4.12	STABILITY (MISMATCH) NO P_o FROM INPUT AND OUTPUT OTHER THAN INHERENT NOISE			✓	✓	✓
4.13	SPURIOUS OUTPUT COHERENT COMPONENTS					
a)	P_o (HARMONIC) , dB	13		18.5	14.0	18.3
4.13.1	SPURIOUS OUTPUT INCOHERENT COMPONENTS					
a)	P_o (NON-HARMONIC)	60dB BELOW FUNDAMENTAL		✓	✓	✓
4.13.2	SPURIOUS OUTPUT (AM)			✓	✓	✓
4.13.3	SPURIOUS OUTPUT (PM)			✓	✓	✓

HUGHES *ELECTRON DYNAMICS DIVISION*
3100 W. LOMITA BLVD. TORRANCE, CALIFORNIA 90505

DATA SHEET NO. DSB200300-400 REV. ____
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-1
PAGE ____ OF ____

CUSTOMER TEST DATA SHEET

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o

TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	2329.1	2589	2728	3064	3338	3576.7	3805	4196	4743	5076	5484	5680
TOTAL ACCUMULATED HOURS				week of 2/8/71	week of 2/19/71	week of 2/25/71	week of 3/11/71	week of 3/22/71	week of 4/2/71	week of 4/12/71	week of 4/30/71	week of 5/23/71	week of 6/7/71	week of 6/24/71	week of 7/2/71
INPUT CURRENT TELEMETRY VOLTAGE			V	2.081	2.085	2.086	2.079	2.084	2.086	2.081	2.079	2.084	2.079	2.069	2.081
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.561	3.572	3.568	3.566	3.563	3.566	3.566	3.547	3.561	3.560	3.563	3.579
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.102	3.100	3.100	3.098	3.100	3.102	3.098	3.100	3.104	3.101	3.099	3.101
HELIX CURRENT TELEMETRY VOLTAGE			V	1.134	1.101	1.118	1.123	1.086	1 081	1.073	1.007	1.001	1.050	1.047	1.053
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.653	2.653	2.649	2.649	2.651	2.648	2.647	2.650	2.651	2.653	2.651	2.650
P_o (SAT) FREQ. f_o (PARA 4.3.2)	27	—	dbm	27.90	27.55	27.60	27.60	27.67	27.52	27.56	27.80	27.75	27.95	27.70	27.70
Gm FREQ. f_o (PARA. 4.3.1)	35	39.5	db	35.60	35.40	35.44	35.20	35.67	35.22	35.44	35.90	35.60	35.60	35.64	35.60
L_I INSERTION LOSS			db												
R_{AI} ATTENUATOR RESISTANCE, INPUT			OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS												
T_K CATHODE ACTIVITY	6.0	—	SEC												
TEST EQUIPMENT CALIBRATION DATE									3/31/71		4/28/71				
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES **ELECTRON DYNAMICS DIVISION**
3100 W LOMITA BLVD TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ____
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-1
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE   SPEC NO. LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT): FREQ. f_o

TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	5898	6131	6281	6425	6564	6738	6905	7038	7229	7371	7537	7706
TOTAL ACCUMULATED HOURS				week of 7 /14/71	week of 7 /24/71	week of 7 /30/71	week of 8 / 6/71	week of 8/12/71	week of 8/19/71	week of 8 /26/71	week of 9 / 1/71	week of 9 /10/71	week of 9 /16/71	week of 9 /23/71	week of 9 /30/71
INPUT CURRENT TELEMETRY VOLTAGE			V	2.077	2.078	2.099	2.086	2.086	2.107	2.091	2.088	2.096	2.087	2.088	2.084
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.558	3.555	3.580	3.566	3.571	3.575	3.568	3.569	3.568	3.572	3.563	3.561
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.100	3.099	3.099	3.099	3.100	3.097	3.099	3.100	3.098	3.098	3.099	3.100
HELIX CURRENT TELEMETRY VOLTAGE			V	1.088	1.087	1.122	1.140	1.120	1.104	1.125	1.133	1.115	1.115	1.113	1.100
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.662	2.661	2.646	2.660	2.655	2.642	2.654	2.654	2.647	2.645	2.657	2.659
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	—	dbm	27.75	27.75	27.80	27.85	27.90	27.90	27.90	27.85	27.70	27.70	27.90	27.82
Gss FREQ. f_o (PARA. 4.3.1)	35	39.5	db	35.59	35.69	35.71	35.59	35.60	35.49	35.60	35.65	35.40	35.50	35.48	35.50
L_i INSERTION LOSS			db												
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS												
T_K CATHODE ACTIVITY	6.0	—	SEC												
TEST EQUIPMENT CALIBRATION DATE					7/21/71										
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES ELECTRON DYNAMICS DIVISION

3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ____

MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-1

PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o

TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	7868	8034	8203	8349	8541	8708	8900	9017	9184	9399	9565	9635
TOTAL ACCUMULATED HOURS				week of 10/7/71	week of 10/14/71	week of 10/21/71	week of 10/27/71	week of 11/4/71	week of 11/11/71	week of 11/19/71	week of 11/24/71	week of 12/1/71	week of 12/10/71	week of 12/17/71	week of 12/22/71
INPUT CURRENT TELEMETRY VOLTAGE			V	2.101	2.090	2.098	2.091	2.087	2.084	2.079	2.093	2.093	2.089	2.089	2.091
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.567	3.569	3.566	3.565	3.569	3.554	3.560	3.566	3.558	3.561	3.563	3.559
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.097	3.100	3.091	3.101	3.097	3.098	3.091	3.099	3.098	3.091	3.099	3.093
HELIX CURRENT TELEMETRY VOLTAGE			V	1.105	1.130	1.131	1.130	1.105	1.126	1.117	1.125	1.102	1.118	1.134	1.100
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.646	2.650	2.647	2.655	2.655	2.659	2.655	2.649	2.645	2.651	2.652	2.651
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	—	dbm	27.90	27.80	27.80	27.75	27.70	27.75	27.80	27.75	27.75	27.85	27.70	27.70
Gss FREQ. f_o (PARA. 4.3.1)	35	39.5	db	35.50	35.68	35.60	35.60	35.60	35.50	35.45	35.50	35.70	35.50	35.70	35.50
L_s INSERTION LOSS			db												
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS												
T_K CATHODE ACTIVITY	6.0	—	SEC												
TEST EQUIPMENT CALIBRATION DATE								11/2/71							
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES **ELECTRON DYNAMICS DIVISION**
3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-1
PAGE ___ OF ___

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o (SAT); FREQ. f_o

TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	9827	9996	10160	10354	10499	10691	10834	11002	11163	11354	11501	11697
TOTAL ACCUMULATED HOURS				week of 12/30/71	week of 1/[illegible]/72	week of 1/13/72	week of 1/22/72	week of 1/27/72	week of 2/4/72	week of 2/10/72	week of 2/17/72	week of 2/24/72	week of 3/3/72	week of 3/9/72	week of 3/17/72
INPUT CURRENT TELEMETRY VOLTAGE			V	2.090	2.089	2.094	2.090	2.090	2.090	2.080	2.080	2.080	2.080	2.070	2.080
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.563	3.561	3.559	3.560	3.560	3.560	3.550	3.560	3.550	3.550	3.540	3.550
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.099	3.100	3.098	3.100	3.100	3.100	3.100	3.100	3.100	3.100	3.100	3.100
HELIX CURRENT TELEMETRY VOLTAGE			V	1.120	1.130	1.098	1.100	1.080	1.100	1.110	1.100	1.110	1.100	1.070	1.120
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.650	2.649	2.646	2.650	2.640	2.640	2.650	2.650	2.650	2.650	2.660	2.650
P_o (SAT) FREQ. f_o (PARA 4.2.2)	27	--	dbm	27.70	27.70	27.65	27.65	27.60	27.60	27.65	27.65	27.55	27.55	27.50	27.50
G_{ss} FREQ. f_o (PARA 4.2.1)	35	39.5	db	35.60	35.60	35.50	35.40	35.25	35.30	35.30	35.30	35.50	35.40	35.40	35.40
L_i INSERTION LOSS			db												
R_{AI} ATTENUATOR RESISTANCE, INPUT			OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS												
T_K CATHODE ACTIVITY	6.0	--	SEC												
TEST EQUIPMENT CALIBRATION DATE								1/26/72							
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES **ELECTRON DYNAMICS DIVISION**
3100 W. LOMITA BLVD. TORRANCE, CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-1
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o

TEST CONDITIONS / NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	11832	12000	12122	12360	12507	12702	12865	13007	13198	13528	13693	13863
TOTAL ACCUMULATED HOURS				week of 3/23/72	week of 3/30/72	week of 4/7/72	week of 4/21/72	week of 4/27/72	week of 5/5/72	week of 5/12/72	week of 5/18/72	week of 5/26/72	week of 6/9/72	week of 6/16/72	week of 6/23/72
INPUT CURRENT TELEMETRY VOLTAGE			V	2.10	2.08	2.08	2.09	2.10	2.10	2.09	2.10	2.09	2.08	2.09	2.09
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.56	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.52	3.55	3.53
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10
HELIX CURRENT TELEMETRY VOLTAGE			V	1.10	1.12	1.12	1.12	1.07	1.12	1.12	1.11	1.12	1.12	1.08	1.11
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.64	2.66	2.66	2.66	2.64	2.65	2.65	2.64	2.65	2.66	2.65	2.65
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	—	dbm	27.50	27.55	27.70	27.70	27.65	27.65	27.70	27.70	27.70	27.70	27.70	27.70
Gss FREQ. f_o (PARA. 4.3.1)	35	39.5	db	35.35	35.40	35.50	35.50	35.50	35.60	35.60	35.70	35.60	35.70	35.70	35.60
L_L INSERTION LOSS			db												
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS												
T_K CATHODE ACTIVITY	6.0	—	SEC												
TEST EQUIPMENT CALIBRATION DATE							4/19/72								
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES **ELECTRON DYNAMICS DIVISION**
3100 W. LOMITA BLVD TORRANCE, CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-1
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o

TEST CONDITIONS
NOMINAL INPUT VOLTAGE

	LIMITS MIN	LIMITS MAX	UNITS	14025	14195	14361	14530	14694	14861	15030	15193	15367	15439	15518	15691
TOTAL ACCUMULATED HOURS				week of 6/30/72	week of 7/7/72	week of 7/14/72	week of 7/21/72	week of 7/28/72	week of 8/4/72	week of 8/11/72	week of 8/18/72	week of 8/28/72	week of 8/31/72	week of 9/8/72	week of 9/15/72
INPUT CURRENT TELEMETRY VOLTAGE			V	2.08	2.09	2.09	2.09	2.08	2.10	2.09	2.08	2.09	2.08	2.08	2.09
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.54	3.55	3.53	3.54	3.54
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10
HELIX CURRENT TELEMETRY VOLTAGE			V	1.13	1.12	1.10	1.11	1.10	1.09	1.10	1.11	1.11	1.10	1.10	1.10
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.65	2.66	2.65	2.65	2.65	2.64	2.65	2.66	2.65	2.66	2.65	2.66
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	—	dbm	27.70	27.70	27.70	27.70	27.50	27.70	27.70	27.70	27.70	27.50	27.65	27.70
Gs FREQ. f_o (PARA 4.3.1)	35	39.5	db	35.60	35.50	35.50	35.50	36.80	35.50	35.50	35.60	35.50	35.30	35.50	35.50
L_s INSERTION LOSS			db										98.0		
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS										22.58		
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS										23.60		
T_K CATHODE ACTIVITY	6.0	—	SEC												
TEST EQUIPMENT CALIBRATION DATE														9/7/72	
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES ELECTRON DYNAMICS DIVISION
3100 W. LOMITA BLVD TORRANCE, CALIFORNIA 90505

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-1
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC NO.: LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o

TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	15854	16021	16185	16350	16513	16683	16847	17009	17177	17289	17496	17664
TOTAL ACCUMULATED HOURS				week of 9/22/72	week of 9/29/72	week of 10/6/72	week of 10/13/72	week of 10/20/72	week of 10/27/72	week of 11/3/72	week of 11/10/72	week of 11/17/72	week of 11/22/72	week of 12/1/72	week of 12/8/72
INPUT CURRENT TELEMETRY VOLTAGE			V	2.09	2.08	2.08	2.07	2.10	2.08	2.08	2.08	2.10	2,08	2.08	2.08
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.54	3.54	3.54	3.53	3.55	3.54	3.54	3.54	3.55	3.54	3.53	3.54
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.09	3.09	3.10	3.10	3.10
HELIX CURRENT TELEMETRY VOLTAGE			V	1.10	1.10	1.10	1.10	1.09	1.10	1.10	1.08	1.08	1.09	1.06	1.09
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.66	2.65	2.66	2.67	2.64	2.65	2.64	2.64	2.64	2.65	2.65	2.65
P_o (SAT) FREQ. f_o (PARA 4.3.2)	27	—	dbm	27.70	27.30	27.60	27.55	27.40	27.40	27.45	27.45	27.45	27.50	27.30	27.40
Gm FREQ. f_o (PARA. 4.3.1)	35	39.5	db	35.50	35.30	35.50	35.40	35.30	35.30	35.30	35.40	35.20	35.30	35.20	35.30
L_t INSERTION LOSS			db	>100			>100			>100			>100		
R_{AHI} ATTENUATOR RESISTANCE, INPUT			OHMS	22.60			22.62			22.64			22.68		
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS	23.61			23.63			23.65			23.78		
T_K CATHODE ACTIVITY	6.0	—	SEC												
TEST EQUIPMENT CALIBRATION DATE					9/29/72										
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES *ELECTRON DYNAMICS DIVISION*
3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

DATA SHEET NO. DSB200300-400 REV. ______
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-1
PAGE ___ OF ___

CUSTOMER TEST DATA SHEET

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE SPEC NO. LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o

TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	17826 week of 12/15/72	1804[illegible] week of 12/29/72	18210 week of 1/5/73	18374 week of 1/12/73	18540 week of 1/19/73	18775 week of 1/29/73	18870 week of 2/2/73	19034 week of 2/9/73	19200 week of 2/16/73	19365 week of 2/23/73	19533 week of 3/2/73	19701 week of 3/9/73
INPUT CURRENT TELEMETRY VOLTAGE			V	2.09	2.10	2.09	2.09	2.09	2.09	2.08	2.10	2.09	2.10	2.08	2.08
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.54	3.55	3.53	3.53	3.53	3.53	3.53	3.55	3.53	3.54	3.53	3.53
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.10	3.10	3.09	3.10	3.10	3.10	3.10	3.10	3.10	3.09	3.10	3.10
HELIX CURRENT TELEMETRY VOLTAGE			V	1.08	1.09	1.08	1.09	1.07	1.08	1.07	1.07	1.07	1.05	1.08	1.08
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.65	2.64	2.65	2.64	2.65	2.65	2.65	2.64	2.64	2.64	2.65	2.65
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	—	dbm	27.40	27.55	27.55	27.60	27.40	27.40	27.40	27.45	27.45	27.35	27.40	27.40
G_{ss} FREQ. f_o (PARA. 4.3.1)	35	39.5	db	35.30	35.40	35.40	35.40	37.10	35.30	35.20	35.30	35.30	35.30	35.20	35.20
L_i INSERTION LOSS			db	>100		>100			>100			>100			
R_{AI} ATTENUATOR RESISTANCE, INPUT			OHMS	22.68		22.68			22.71			22.73			
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS	23.70		23.70			23.73			23.75			
T_K CATHODE ACTIVITY	6.0	—	SEC	11.8											
TEST EQUIPMENT CALIBRATION DATE							1/12/73								
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

AD-A053 740 HUGHES AIRCRAFT CO TORRANCE CALIF ELECTRON DYNAMICS DIV F/G 9/1
DEFENSE SATELLITE COMMUNICATIONS SYSTEM TRAVELING WAVE TUBE AMP--ETC(U)
FEB 78 M L KAHN F04701-74-C-0542

UNCLASSIFIED NL

3 OF 5
AD
A053740

HUGHES ELECTRON DYNAMICS DIVISION
3100 W. LOMITA BLVD TORRANCE, CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.
MODEL NO. B200300-121 B200300-122 SERIAL NO. 12-1
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT): FREQ. f_o

TEST CONDITIONS
NOMINAL INPUT VOLTAGE

TOTAL ACCUMULATED HOURS	LIMITS MIN	LIMITS MAX	UNITS	19869	20024	20171	20359	20526	20694	20837	21003	21171	21339	21505	.1672
				week of 3/16/73	week of 3/23/73	week of 3/29/73	week of 4/6/73	week of 4/13/73	week of 4/20/73	week of 4/27/73	week of 5/4/73	week of 5/11/73	week of 5/18/73	week of 5/25/73	week of 6/1/73
INPUT CURRENT TELEMETRY VOLTAGE			V	2.08	2.09	2.08	2.09	2.10	2.09	2.09	2.11	2.10	2.09	2.09	2.08
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.53	3.53	3.53	3.52	3.54	3.54	3.53	3.54	3.54	3.53	3.53	3.53
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.10	3.10	3.10	3.09	3.10	3.10	3.09	3.10	3.10	3.09	3.10	3.10
HELIX CURRENT TELEMETRY VOLTAGE			V	1.06	1.07	1.02	1.06	1.07	1.06	1.06	1.06	1.06	1.07	1.07	1.08
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.65	2.65	2.65	2.65	2.64	2.64	2.64	2.64	2.64	2.65	2.64	2.65
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	—	dbm	27.35	27.45	27.45	27.35	27.50	27.50	27.50	27.50	27.40	27.40	27.30	27.50
Gss FREQ. f_o (PARA. 4.3.1)	35	39.5	db	35.10	35.30	35.30	35.20	35.40	35.40	35.30	35.30	35.20	35.00	35.30	35.30
L_I INSERTION LOSS			db			>100						>100			
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS			22.75						22.80			
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS			23.79						23.80			
T_K CATHODE ACTIVITY	6.0	—	SEC			11.3						11.5			
TEST EQUIPMENT CALIBRATION DATE							4/4/73								
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES ELECTRON DYNAMICS DIVISION
3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-1
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT): FREQ. f_o			TOTAL ACCUMULATED HOURS	21841	22007	22150	22290	222457	22623	22936	23633	24367			
TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	week of 6/9/73	week of 6/16/73	week of 6/22/73	week of 6/27/73	week of 7/6/73	week of 7/13/73	week of 7/26/73	week of 8/28/73	week of 9/28/73	week of / /	week of / /	week of / /
INPUT CURRENT TELEMETRY VOLTAGE			V	2.09	2.07	2.38	2.09	2.09	2.07	2.08	2.06	2.07			
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.53	3.52	3.53	3.53	3.52	3.52	3.53	3.52	3.52			
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.10	3.10	3.09	3.10	3.10	3.10	3.10	3.10	3.09			
HELIX CURRENT TELEMETRY VOLTAGE			V	1.07	1.08	1.07	1.06	1.06	1.06	1.06	1.06	1.03			
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.64	2.66	2.65	2.64	2.65	2.65	2.65	2.65	2.65			
P_o (SAT) FREQ. f_o (PARA 4.3.2)	27	—	dbm	27.55	27.50	27.50	27.35	27.50	27.50	27.50	27.50	27.50			
Gss FREQ. f_o (PARA. 4.3.1)	35	39.5	db	35.30	35.30	35.50	35.30	35.40	35.30	35.40	35.50	35.50			
I_L INSERTION LOSS			db			>100				>100	>100	>100			
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS			22.96				22.83	23.87	23.90			
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS			23.95				23.92	23.91	23.86			
T_K CATHODE ACTIVITY	6.0	—	SEC							11.70	11.20	10.70			
TEST EQUIPMENT CALIBRATION DATE											8/10/73				
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES **ELECTRON DYNAMICS DIVISION**

... BLVD TORRANCE CALIFORNIA ...

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ____

MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-1

PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o (SAT), FREQ. f_o / TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	23,633	24,367	25,056	25,726	26,350	27,144	27,772	28,531	29,139	29,834	30,560	31,216	31692
TOTAL ACCUMULATED HOURS				8/27/73	9/28/73	10/28/73	11/30/73	12/28/73	1/31/74	2/28/74	4/1/74	4/29/74	5/28/74	6/27/74	7/26/74	
INPUT CURRENT TELEMETRY VOLTAGE			V	2.06	2.07	2.07	2.08	2.08	2.10	2.10	2.09	2.10	2.07	2.07	2.08	
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.52	3.52	3.50	3.50	3.51	3.50	3.50	3.51	3.50	3.49	3.50	3.49	
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.10	3.09	3.10	3.09	3.09	3.09	3.09	3.09	3.09	3.09	3.09	3.09	
HELIX CURRENT TELEMETRY VOLTAGE			V	1.06	1.03	1.02	1.03	1.07	1.16	1.21	1.06	1.05	1.03	1.05	1.05	
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.65	2.65	2.65	2.65	2.64	2.63	2.64	2.64	2.64	2.65	2.65	2.65	
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	27.50	27.50	27.50	27.50	27.40	27.40	27.30	27.4	27.40	27.40	27.40	27.30	
Gss FREQ. f_o (PARA. 4.3.1)	35	39.5	db	35.50	35.50	35.40	35.40	35.50	35.50	35.50	35.5	35.50	35.40	35.30	35.30	
I_L INSERTION LOSS			db	>100	>100	>100	>100	>100	≥100	≥100	≥100	>100	>100	>100	>100	
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS	23.87	23.90	22.89	22.95	22.94	22.98	22.98	22.98	23.00	23.04	23.07	23.07	
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS	23.91	23.86	23.97	23.88	23.94	23.95	24.00	24.03	24.03	24.06	24.07	24.09	
T_K CATHODE ACTIVITY	6.0	--	SEC	11.2	10.7	*	*	9.8	9.5	8.1	9.8	10.9	10.3	10.3	9.8	10.0
TEST EQUIPMENT CALIBRATION DATE				8/10/73	8/10/73	8/10/73	8/10/73	11/28/73	11/28/73	11/28/73	3/27/74	3/27/74	3/27/74	3/27/74	3/27/74	
SIGNIFICANT EVENT NOTES																
TESTED BY																

SIGNIFICANT EVENT NOTES

*RECORDER OUT FOR REPAIR.

HUGHES **ELECTRON DYNAMICS DIVISION**
3100 W. LOMITA BLVD TORRANCE, CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.
MODEL NO. B200300-121 SERIAL NO. 12-1
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE — SPEC NO. LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o

TEST CONDITIONS / NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS												
TOTAL ACCUMULATED HOURS				32,002 ~~8-30-4~~	32,907	33,497	34,206	34,804	35,579	36,247	36,881	37,646	38,405	39,045	39,778
				8/30/74	9/30/74	11/2/74	12/3/74	12/18/74	1/29/75	2/26/75	3/28/75	4/28/75	5/31/75	7/1/75	8/1/75
INPUT CURRENT TELEMETRY VOLTAGE			V	2.065	2.073	2.087	2.07	2.06	2.08	2.07	2.08	2.06	2.08	2.06	2.07
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.491	3.495	3.497	3.49	3.49	3.50	3.49	3.50	3.49	3.49	3.48	3.49
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.095	3.095	3.09	3.09	3.09	3.09	3.09	3.09	3.09	3.09	3.09	3.09
HELIX CURRENT TELEMETRY VOLTAGE			V	1.079 ~~3.477~~	1.080	1.05	1.07	1.05	1.04	1.04	1.04	1.04	1.03	1.00	1.04
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.65	2.651	2.64	2.65	2.65	2.64	2.64	2.64	2.64	2.64	2.66	2.64
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	27.25	27.30	27.4	27.4	27.3	27.3	27.25	27.1	27.3	27.25	27.25	27.25
Gss FREQ. f_o (PARA. 4.3.1)	35	39.5	db	35.2	35.1	35.0	35.0	35.0	34.6*	34.8*	34.8*	34.8*	34.8*	35.00	35.0
I_L INSERTION LOSS			db	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS	23.09	23.09	23.10	23.12	23.13	23.12	23.16	23.18	23.17	23.18	22.19	23.20
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS	24.10	24.10	24.10	24.16	24.16	24.16	24.17	24.19	24.22	24.22	24.22	24.24
T_K CATHODE ACTIVITY	6.0	--	SEC	9.0	9.8	10.0	9.4	9.5	10.0	9.0	9.4	9.4	9.3	9.3	9.1
TEST EQUIPMENT CALIBRATION DATE				7-24-4	7-24-4	7-24-4	11-21-4	11-21-4	11-21-4	1-31-5	1-31-5	1-31-5	4-1-5	4-1-5	7-30-5
SIGNIFICANT EVENT NOTES															
TESTED BY				W.P.N	WPN	WPN	W.P.N	W.P.N	WPN	W.P.N	W.P.N	W.P.N	W.P.N	W.P.N	W.P.N

SIGNIFICANT EVENT NOTES
* OUT OF SPECIFICATION LIMIT

HUGHES *ELECTRON DYNAMICS DIVISION*
3100 W. LOMITA BLVD TORRANCE, CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ____
MODEL NO. B200300-121 B200300-122 SERIAL NO. 12-1
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o	LIMITS MIN	LIMITS MAX	UNITS	40,569	41,315	41,977	42,745	43,701	44,081	44,828	45,681	46,184	47,042	47,684	49,244
TEST CONDITIONS NOMINAL INPUT VOLTAGE				9 13 15	10 14 15	11 11 15	12 13 15	1/14/6	1 30 16	3 11 16	4 16 16	4 28 16	6 12 16	6 29 16	9 18 16
INPUT CURRENT TELEMETRY VOLTAGE			V	2.09	2.14	2.07	2.08	2.06	2.06	2.07	2.06	2.07	~~2.12~~ 2.06	2.06	2.06
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.50	3.49	3.48	3.49	3.46	3.48	3.47	3.46	3.49	3.48	3.49	3.49
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.09	3.09	3.09	3.09	3.09	3.09	3.10	3.09	3.09	3.10	3.09	3.09
HELIX CURRENT TELEMETRY VOLTAGE			V	~~2.63~~ 1.02	1.04	1.01	1.03	1.03	1.03	1.02	1.00	1.01	1.02	1.01	1.02
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.63	2.63	2.65	2.64	2.66	2.66	2.64	2.64	2.64	2.65	2.64	2.64
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	27.3	27.3	27.3	27.3	27.3	27.3	27.3	27.3	27.30	27.20	27.30	27.30
G_m FREQ. f_o (PARA. 4.3.1)	35	39.5	db	35.1	35.1	35.0	35.1	35.1	35.1	35.05	35.1	35.0	35.0	35.05	35.0
I_L INSERTION LOSS			db	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS	23.22	23.23	23.24	23.26	23.26	23.26	23.26	23.29	23.30	23.32	23.33	23.34
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS	24.24	24.27	24.26	24.27	24.30	24.30	24.32	24.31	24.33	24.35	24.28	24.35
T_K CATHODE ACTIVITY	6.0	--	SEC	9.6	9.8	9.2	10.6	9.0	9.6	9.6	9.0	9.40	9.0	9.3	8.5
TEST EQUIPMENT CALIBRATION DATE				7-30-5	7-30-5	10-29-5	10-29-5	10-29-5	10-29-5	2-3-6	2-3-6	2-3-6	5-7-6	5-12-6	8-31-6
SIGNIFICANT EVENT NOTES															
TESTED BY				W.P.N	W.P.N	W.P.N	W.P.N	W.P.N	W.P.N	MSK	MSK	MSK	W.P.N	MSK	MSK

SIGNIFICANT EVENT NOTES

HUGHES ELECTRON DYNAMICS DIVISION
3100 W. LOMITA BLVD. TORRANCE, CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. A
MODEL NO. B200300-121 B200300-122 SERIAL NO. 12-1
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC NO.: LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o

TEST CONDITIONS
NOMINAL INPUT VOLTAGE

	LIMITS MIN	LIMITS MAX	UNITS												
TOTAL ACCUMULATED HOURS				50,114	50,465	51,213	51919	52650	53435	53,840	54,744	55,401	55903.7	56617.3	57359
				10 14 76	10 29 76	11 12 76	12 27 76	2 12 77	3 19 77	3 29 77	5 16 77	6 7 77	6 28 77	7 29 77	8 29 77
INPUT CURRENT TELEMETRY VOLTAGE			V	2.066	2.388	2.408	2.409	2.085	2.052	2.064	2.061	2.060	2.051	2.123	2.052
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.001	3.462	3.482	3.475 ~~2.112~~	3.491	3.471	3.481	3.426	3.473	3.465	3.468	3.459
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.096	3.097	3.097	3.095	3.094	3.096	3.096	3.095	3.096	3.095	3.094	3.094
HELIX CURRENT TELEMETRY VOLTAGE			V	2.641	.993	1.040	1.033	1.019	1.049	1.022	1.035	1.015	1.009	1.013	1.026
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	.8908	2.663	2.652	2.657	2.632	2.663	2.646	2.650	2.652	2.665	2.659	2.668
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	27.3	27.35	27.30	27.35	27.3	27.4	27.20	27.25	27.25	27.30	27.20	27.1
Gss FREQ. f_o (PARA. 4.3.1)	35	39.5	db	35.02	35.05	35.05	35.25	35.15	35.15	35.05	35.10	35.0	35.05	34.8*	34.8*
I_L INSERTION LOSS			db	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS	23.37	23.36	23.36	23.39	23.35	23.45	23.40	23.42	23.44	23.45	23.45	23.46
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS	24.42	24.40	24.4	24.43	24.40	24.43	24.43	24.44	24.45	24.47	24.46	24.48
T_K CATHODE ACTIVITY	6.0	--	SEC	9.2	8.7	9.0	9.2	8.2*	8.7	8.5	8.5	8.2	8.9	8.3	8.0
TEST EQUIPMENT CALIBRATION DATE				7-23-76	8-31-6	10-19-6	8-31-6	12-21-6	1-5-77	1-19-77	4-25-7	4-25-7	5-2-77	7-27-77	5-28-77
SIGNIFICANT EVENT NOTES				—				—	—				—		
TESTED BY				DJ	MSK	MSK	DRJ	DRJ.	D.R.J.	MSK	MSK	MSK	DRJ	DRJ	MKB

SIGNIFICANT EVENT NOTES
*OUT OF SPEC.

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CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200360-400 REV. A
MODEL NO. B200360-121 / B200360-122 SERIAL NO. 12-1
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TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC NO. LTPB200360-400

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o	LIMITS MIN	LIMITS MAX	UNITS												
TOTAL ACCUMULATED HOURS				58,087	58873										
TEST CONDITIONS NOMINAL INPUT VOLTAGE				9/29/77	11/2/77	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /
INPUT CURRENT TELEMETRY VOLTAGE			V	2.05	2.05										
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.47	3.46										
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.09	3.09										
HELIX CURRENT TELEMETRY VOLTAGE			V	1.03	1.04										
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.66	2.66										
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	27.15	27.25										
Gs FREQ. f_o (PARA. 4.3.1)	35	39.5	db	35.10	35.1										
I_L INSERTION LOSS			db	>100											
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS	23.46											
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS	24.48											
T_K CATHODE ACTIVITY	6.0	--	SEC	8.5	8.2										
TEST EQUIPMENT CALIBRATION DATE				7-27-77											
SIGNIFICANT EVENT NOTES					END OF CONTRACT										
TESTED BY				MSK											

SIGNIFICANT EVENT NOTES

HUGHES ELECTRON DYNAMICS DIVISION
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DATA SHEET NO. DSB200300-400 REV.
MODEL NO. B200300-121 B200300-122 SERIAL NO. 12-1

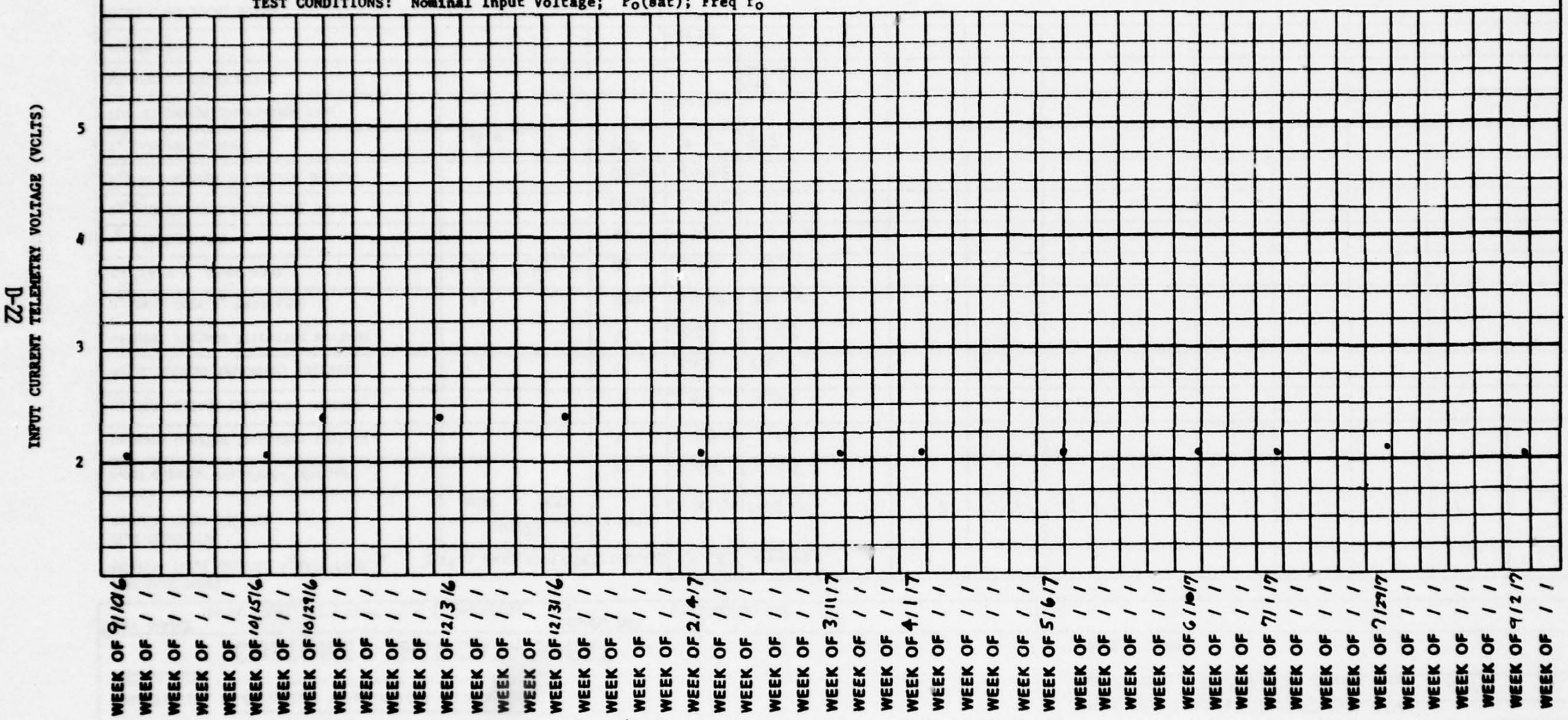
CUSTOMER TEST DATA SHEET

PAGE OF

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE SPEC. NO. LTPB200300-400

INPUT CURRENT TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



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3100 W LOMITA BLVD TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ____
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-1
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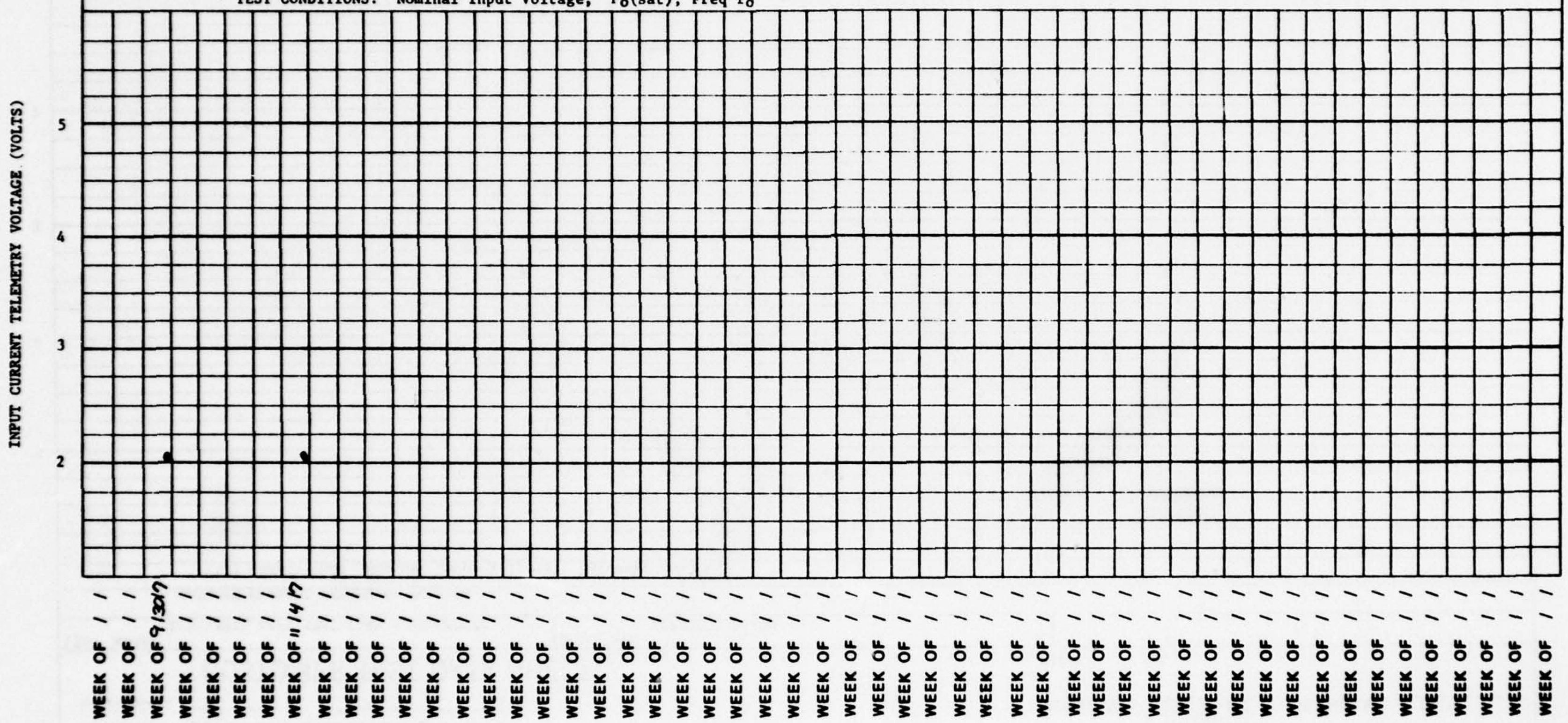
TEST NAME	SPEC. NO.
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400

INPUT CURRENT TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



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3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

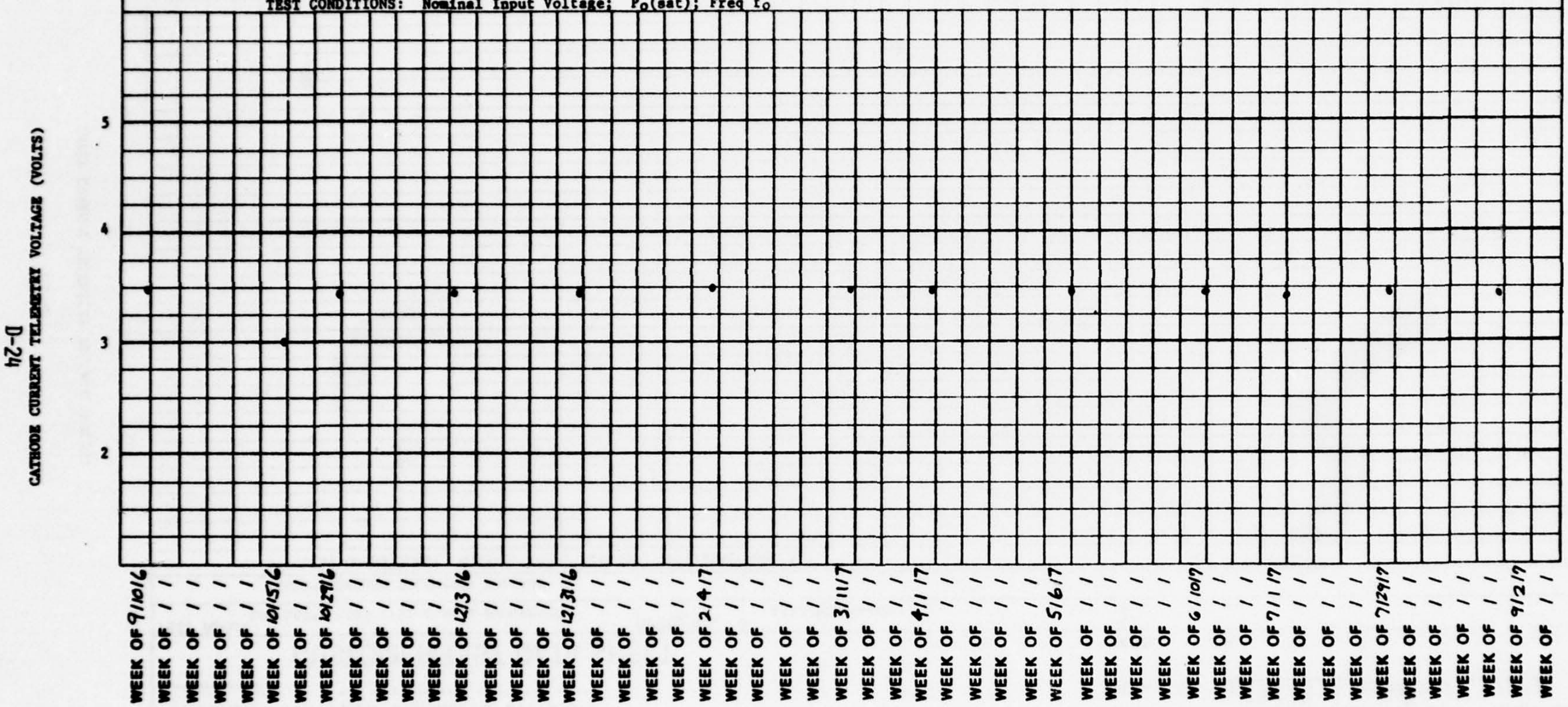
CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.
MODEL NO. B 200300-121 B200300-122 SERIAL NO. 12-1
PAGE OF

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC. NO. LTPB200300-400

CATHODE CURRENT TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; $P_o(sat)$; Freq f_o



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3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

DATA SHEET NO. DSB200300-400 REV. ____
MODEL NO. B 200300-121 / B200300-122 SERIAL NO. 12-1
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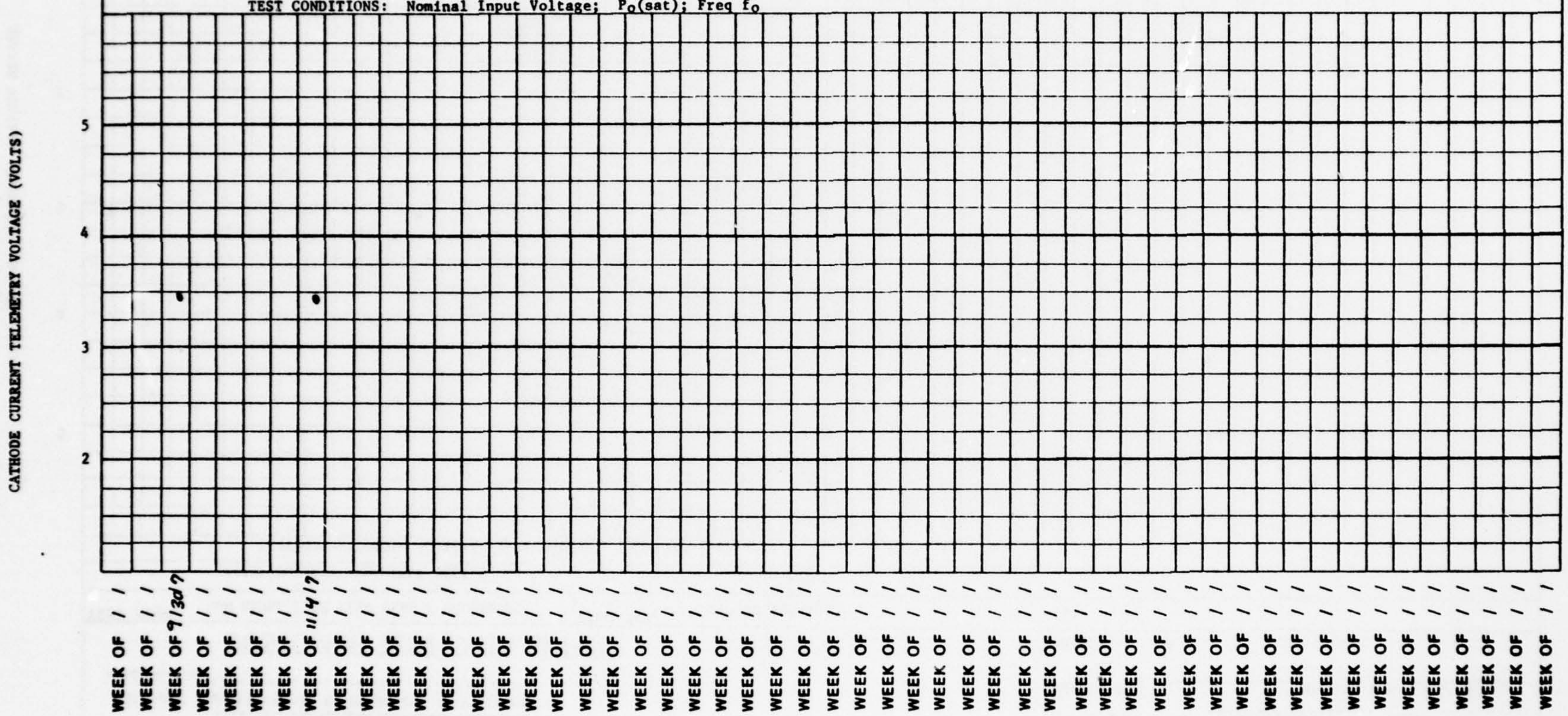
CUSTOMER TEST DATA SHEET

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC. NO. LTPB200300-400

CATHODE CURRENT TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



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3100 W. LOMITA BLVD. TORRANCE, CALIFORNIA 90509

DATA SHEET NO. DSB200300-400 REV. ______
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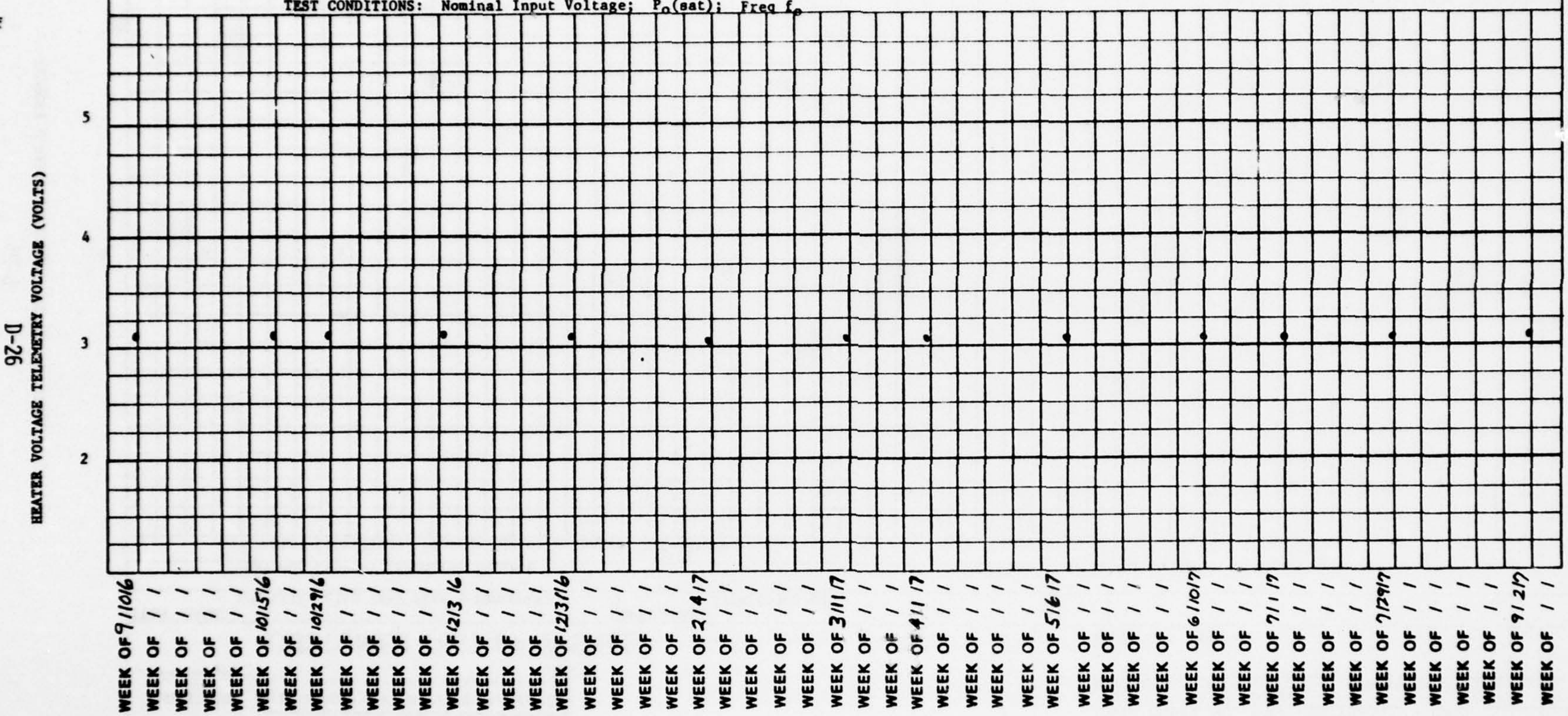
CUSTOMER TEST DATA SHEET

TEST NAME	LOW LEVEL LIFE TEST PLAN & PROCEDURE	SPEC. NO.	LTPB200300-400

HEATER VOLTAGE TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



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3100 W LOMITA BLVD TORRANCE CALIFORNIA 90509

DATA SHEET NO. DSB200300-400 REV. ____
MODEL NO. ____ SERIAL NO. 12-1
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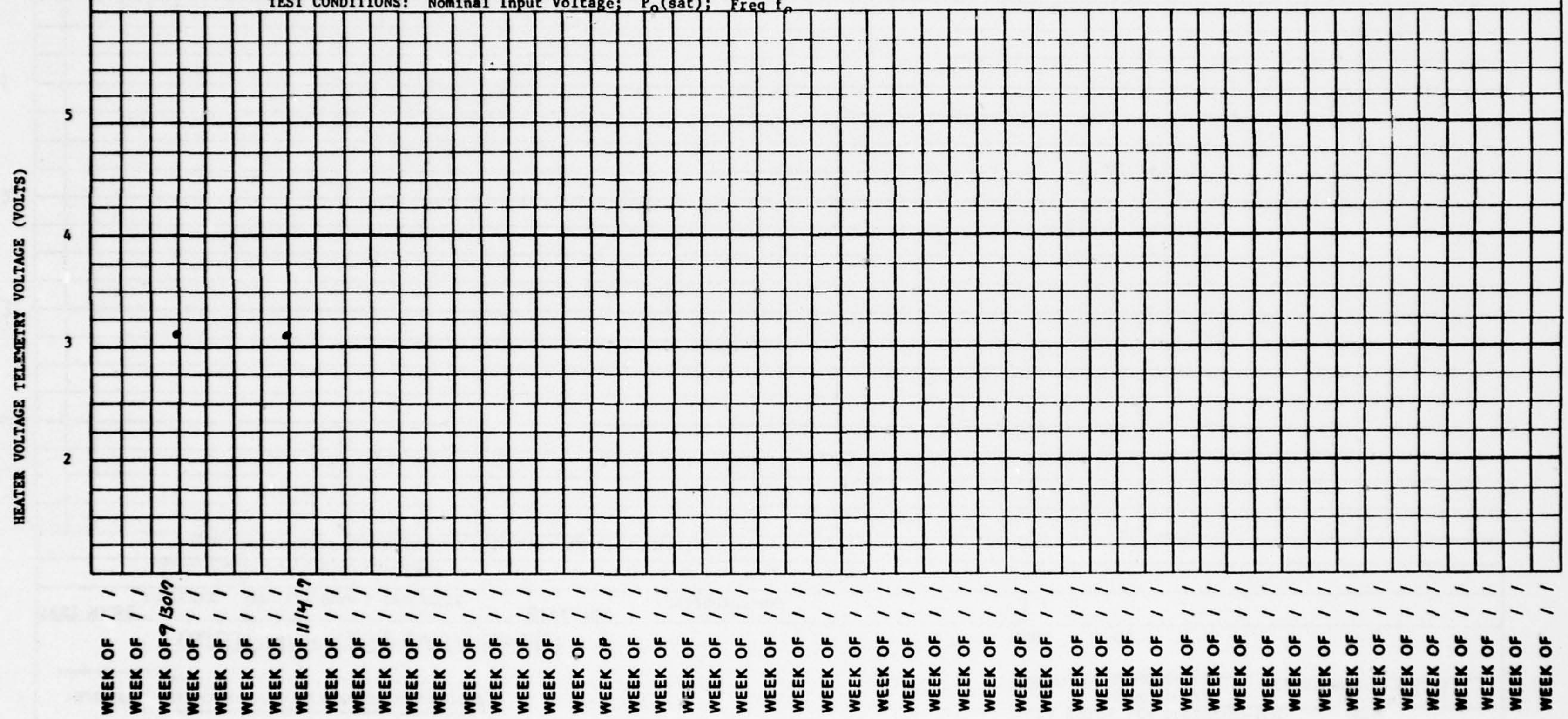
CUSTOMER TEST DATA SHEET

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE

SPEC. NO. LTPB200300-400

HEATER VOLTAGE TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



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DATA SHEET NO. DSB200300-400 REV.

MODEL NO. B200300-121 ~~B200300-122~~ SERIAL NO. 12-1

CUSTOMER TEST DATA SHEET

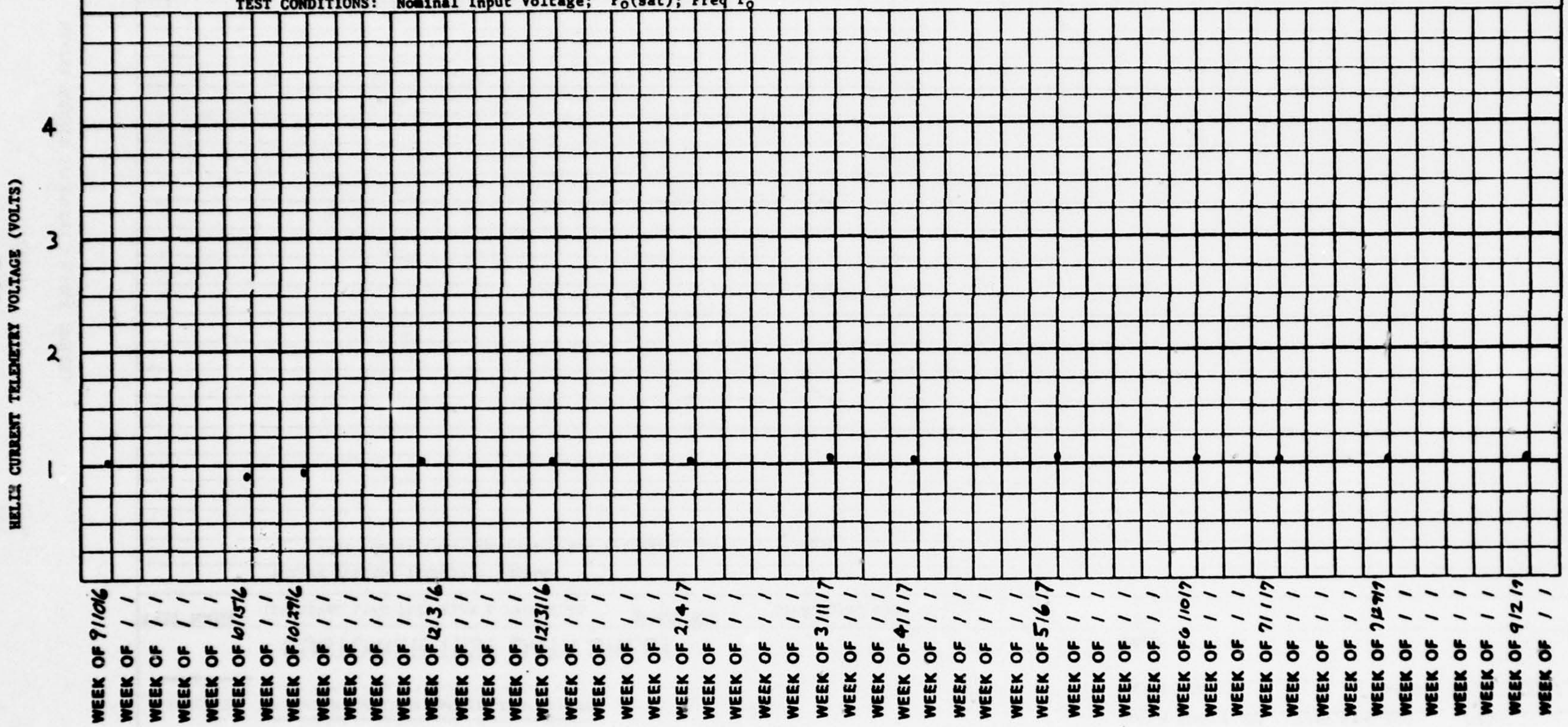
PAGE OF

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE

SPEC. NO. LTPB200300-400

HELIX CURRENT TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; $P_o(sat)$; Freq f_o



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3100 W LOMITA BLVD TORRANCE CALIFORNIA 90509

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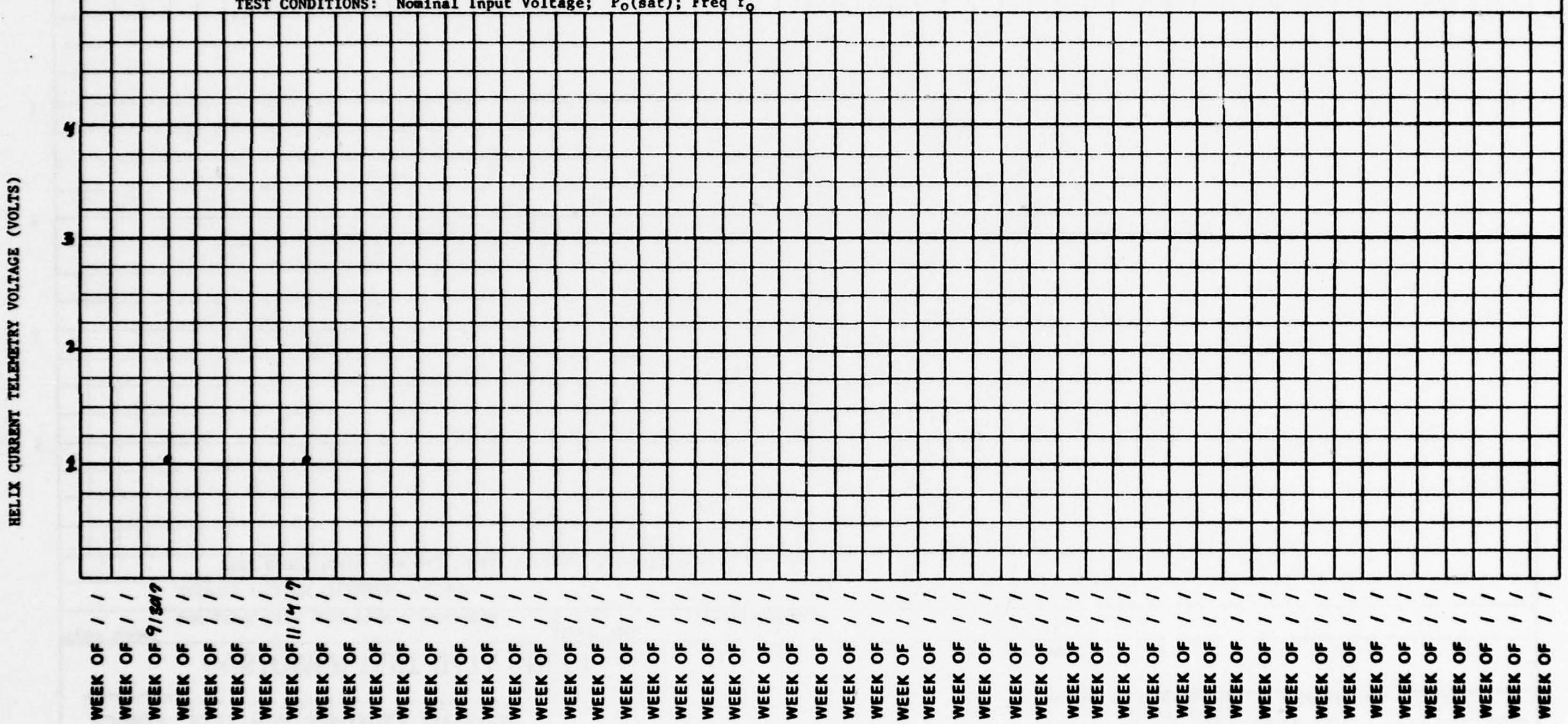
DATA SHEET NO. DSB200300-400 REV. ____
MODEL NO. B200300-121 ~~B200300-122~~ SERIAL NO. 12-1
PAGE OF

TEST NAME	SPEC. NO.	
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400	

HELIX CURRENT TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_O(sat); Freq f_o



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CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.

MODEL NO. B200300-121 B200300-122 SERIAL NO. 12-1

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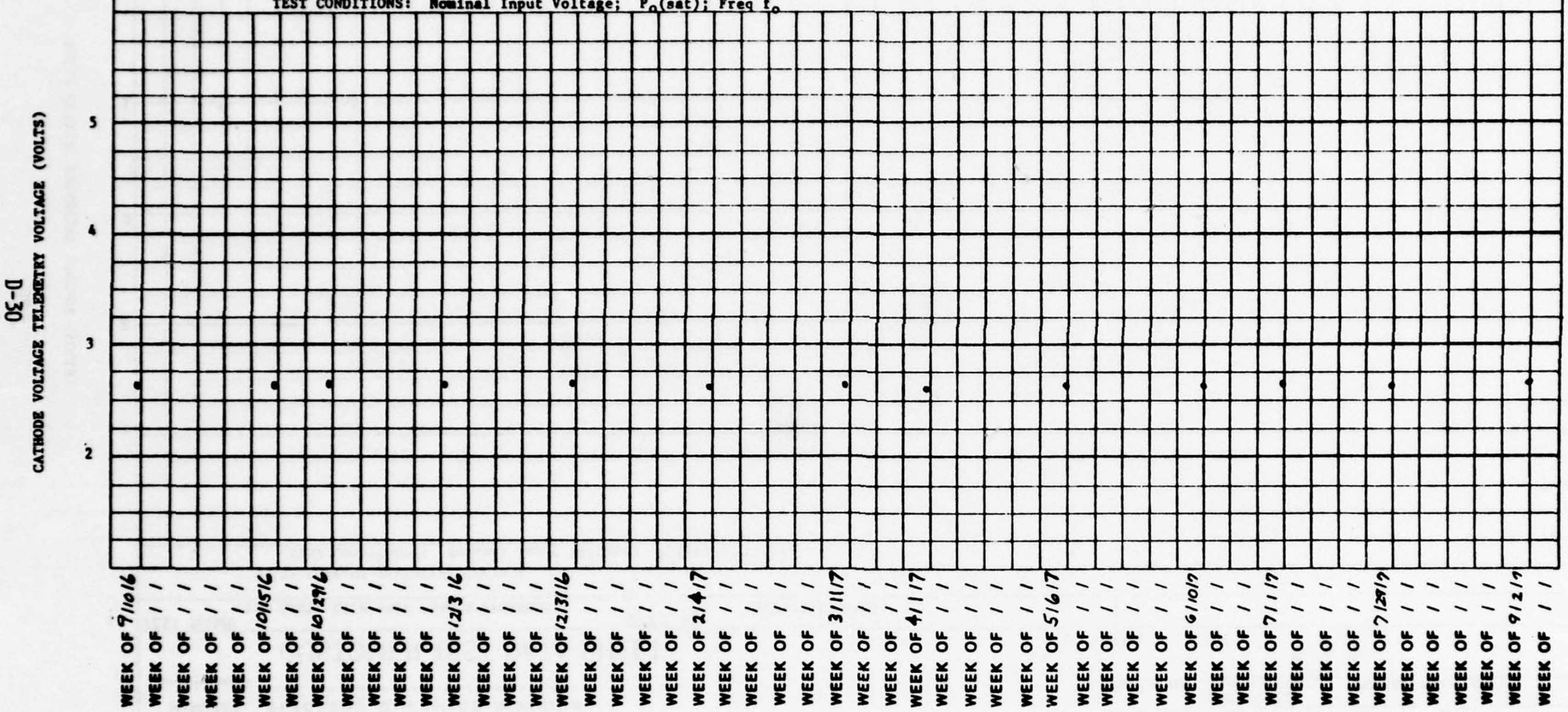
TEST NAME	SPEC. NO.
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400

CATHODE VOLTAGE TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



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CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.
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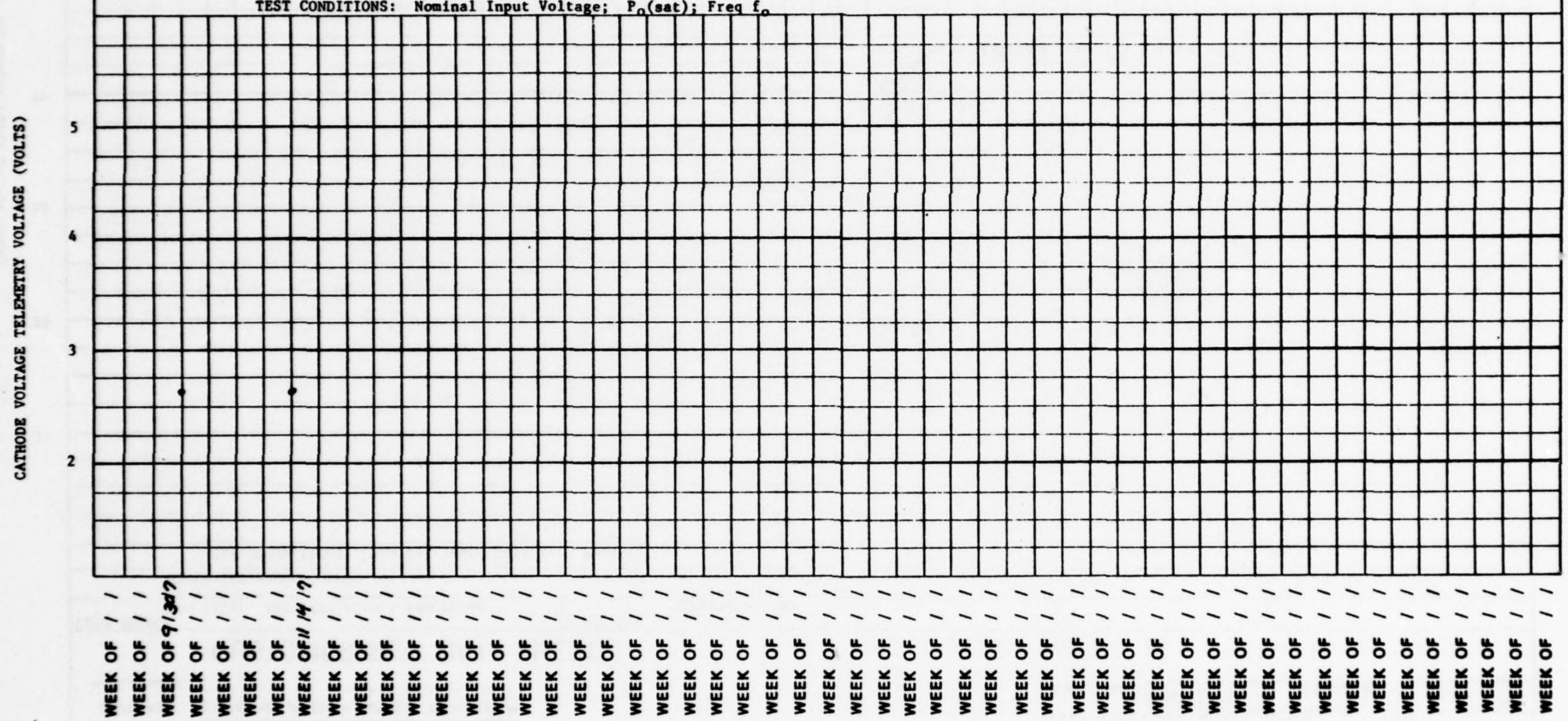
TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC. NO. LTPB200300-400

CATHODE VOLTAGE TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



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3100 W. LOMITA BLVD TORRANCE CALIFORNIA

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ____

MODEL NO. B200300-121 B200300-122 SERIAL NO. 12-1

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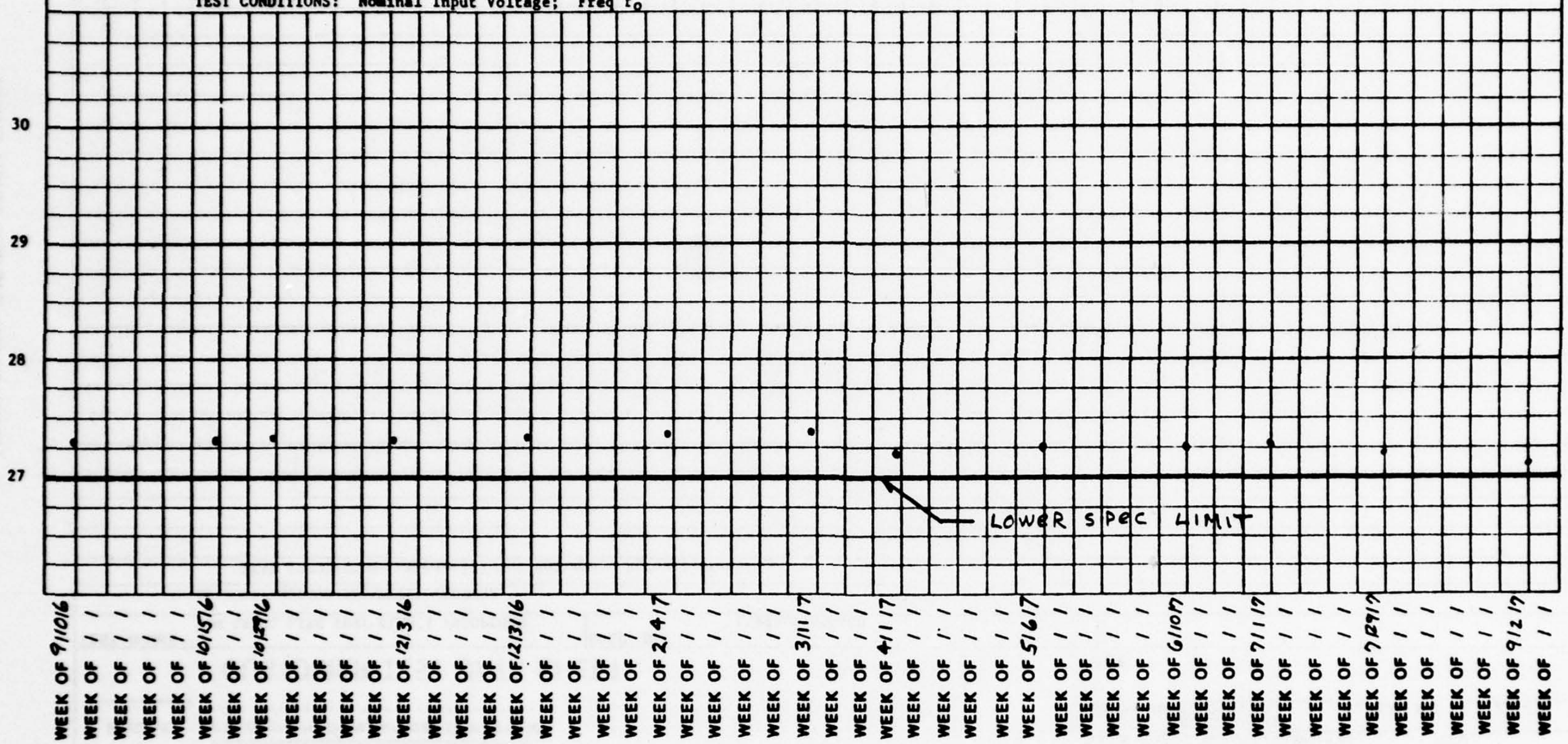
TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE

SPEC. NO. LTPB200300-400

SATURATED POWER OUTPUT

TEST CONDITIONS: Nominal Input Voltage; Freq f_o



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3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ____
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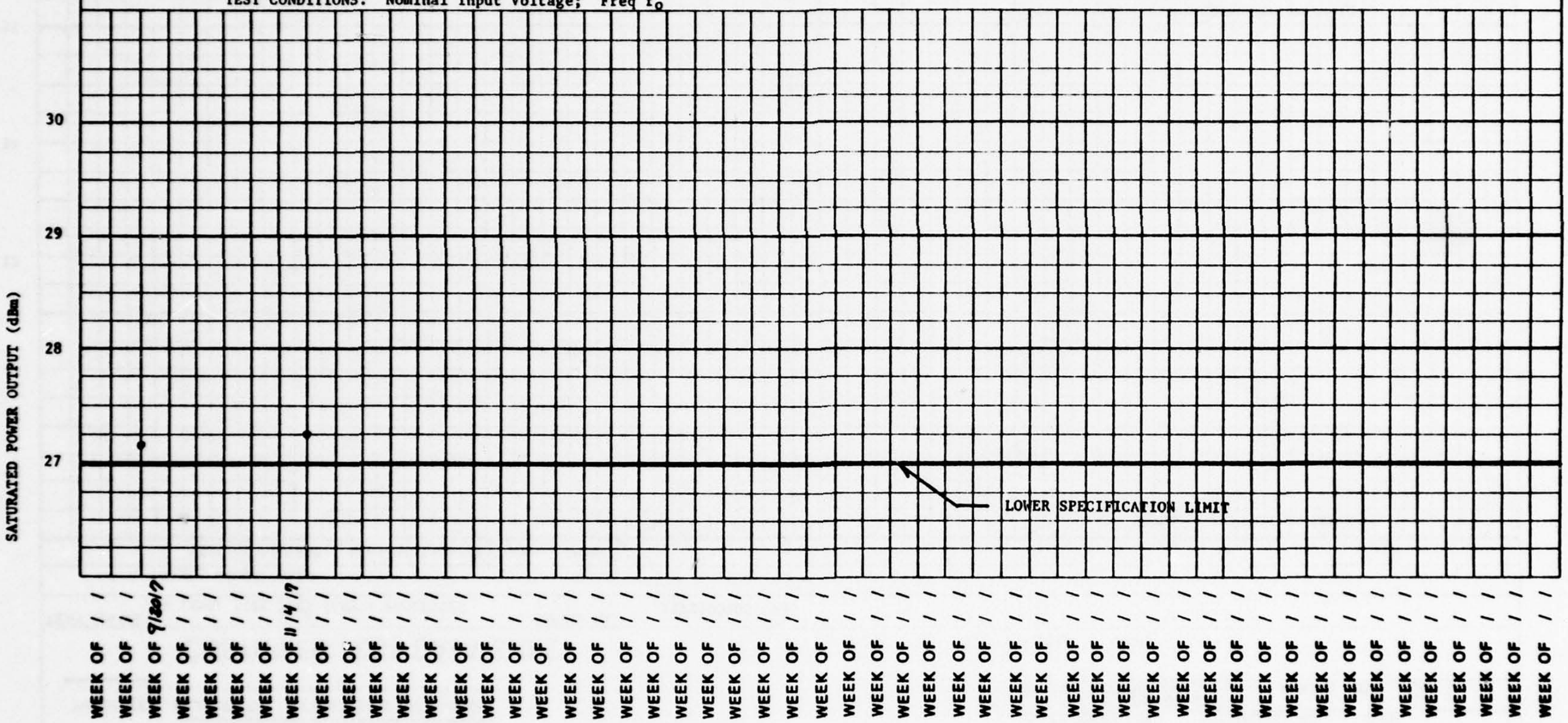
TEST NAME	SPEC. NO.	
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400	

SATURATED POWER OUTPUT

TEST CONDITIONS: Nominal Input Voltage; Freq f_o



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CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-1
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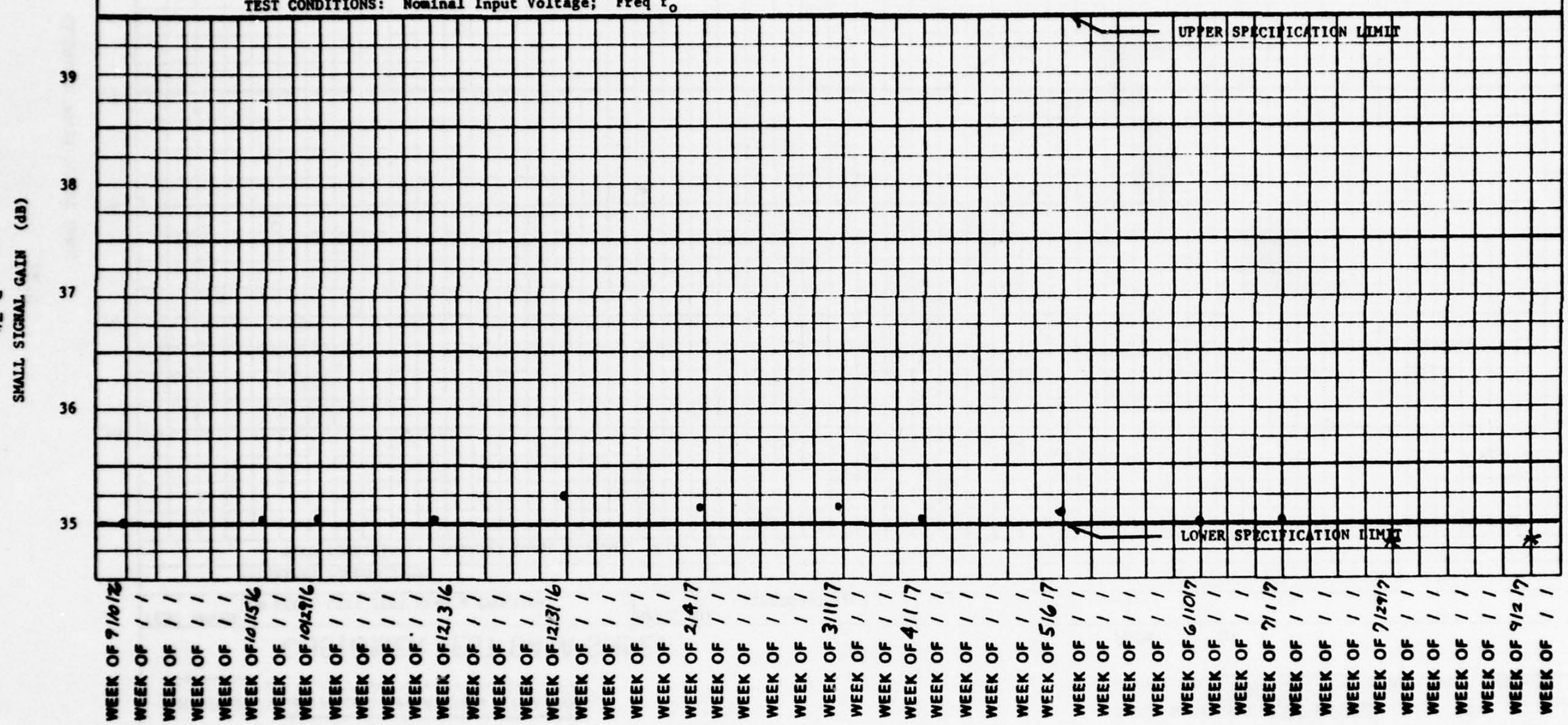
TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC. NO. LTPB200300-400

SMALL SIGNAL GAIN

TEST CONDITIONS: Nominal Input Voltage; Freq f_o



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CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.

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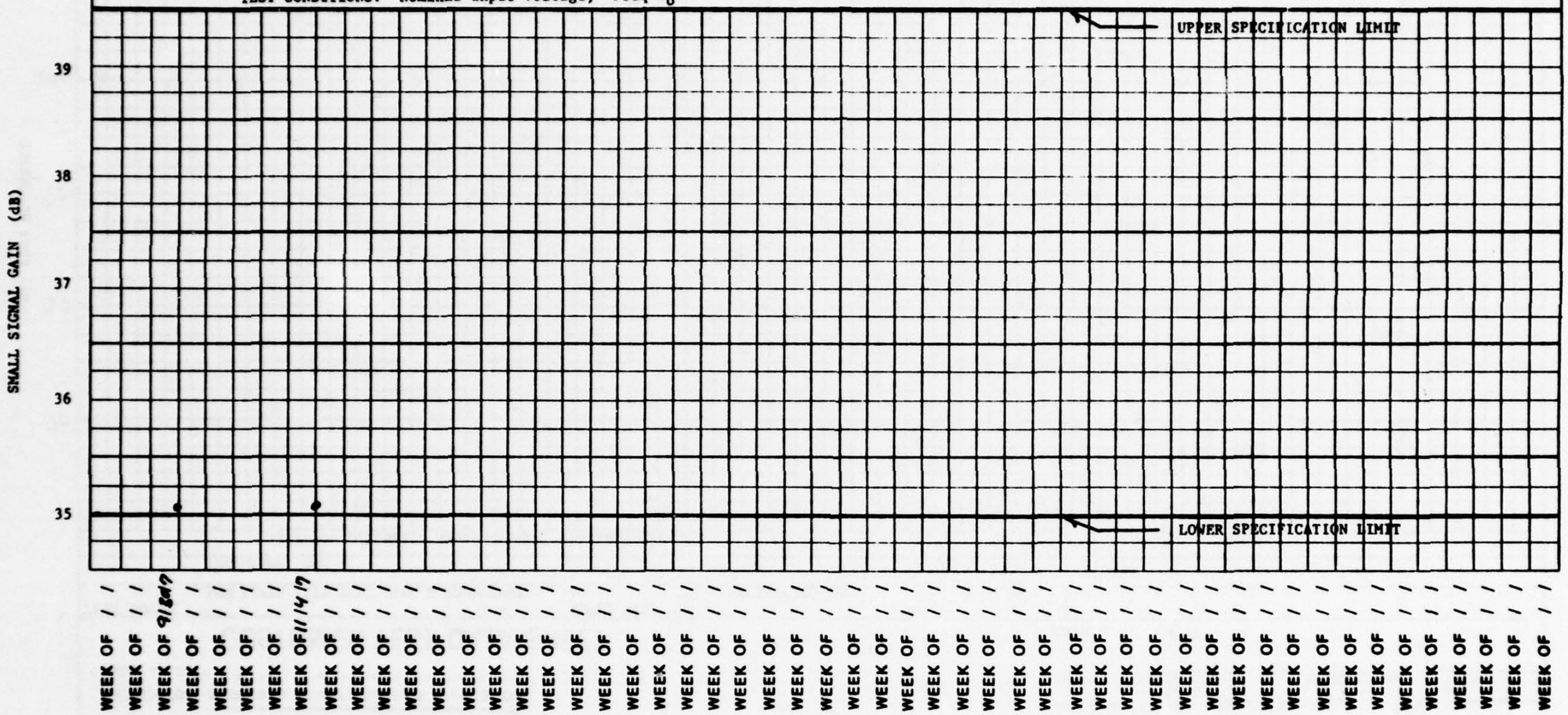
TEST NAME	SPEC. NO.
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400

SMALL SIGNAL GAIN

TEST CONDITIONS: Nominal Input Voltage; Freq f_o



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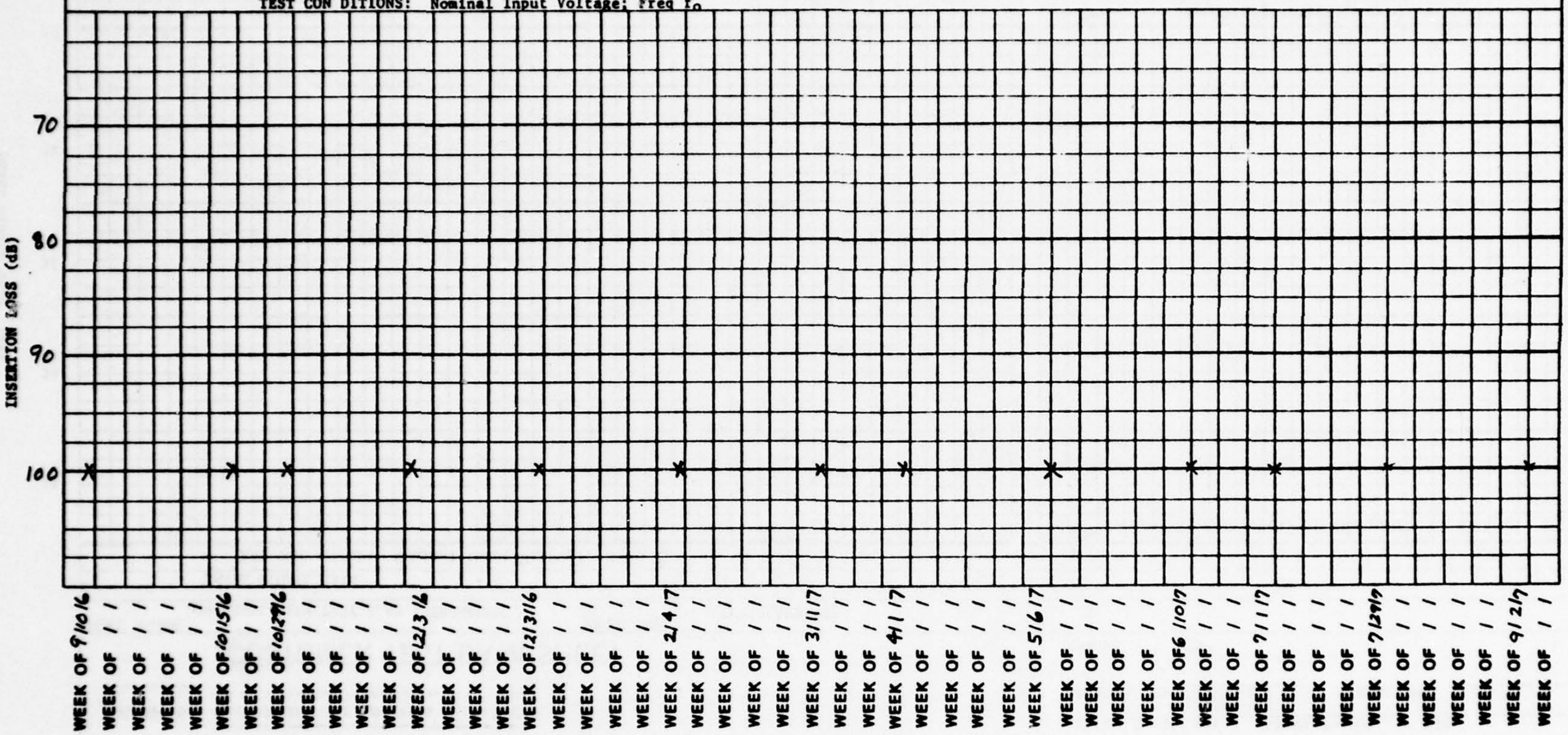
3100 W. LOMITA BLVD. TORRANCE, CALIFORNIA

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ____
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-1
PAGE ____ OF ____

TEST NAME	SPEC. NO.	
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400	
INSERTION LOSS		
TEST CON DITIONS: Nominal Input Voltage; Freq f_o		



x = > 100 dB Loss

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ELECTRON DYNAMICS DIVISION
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CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-1
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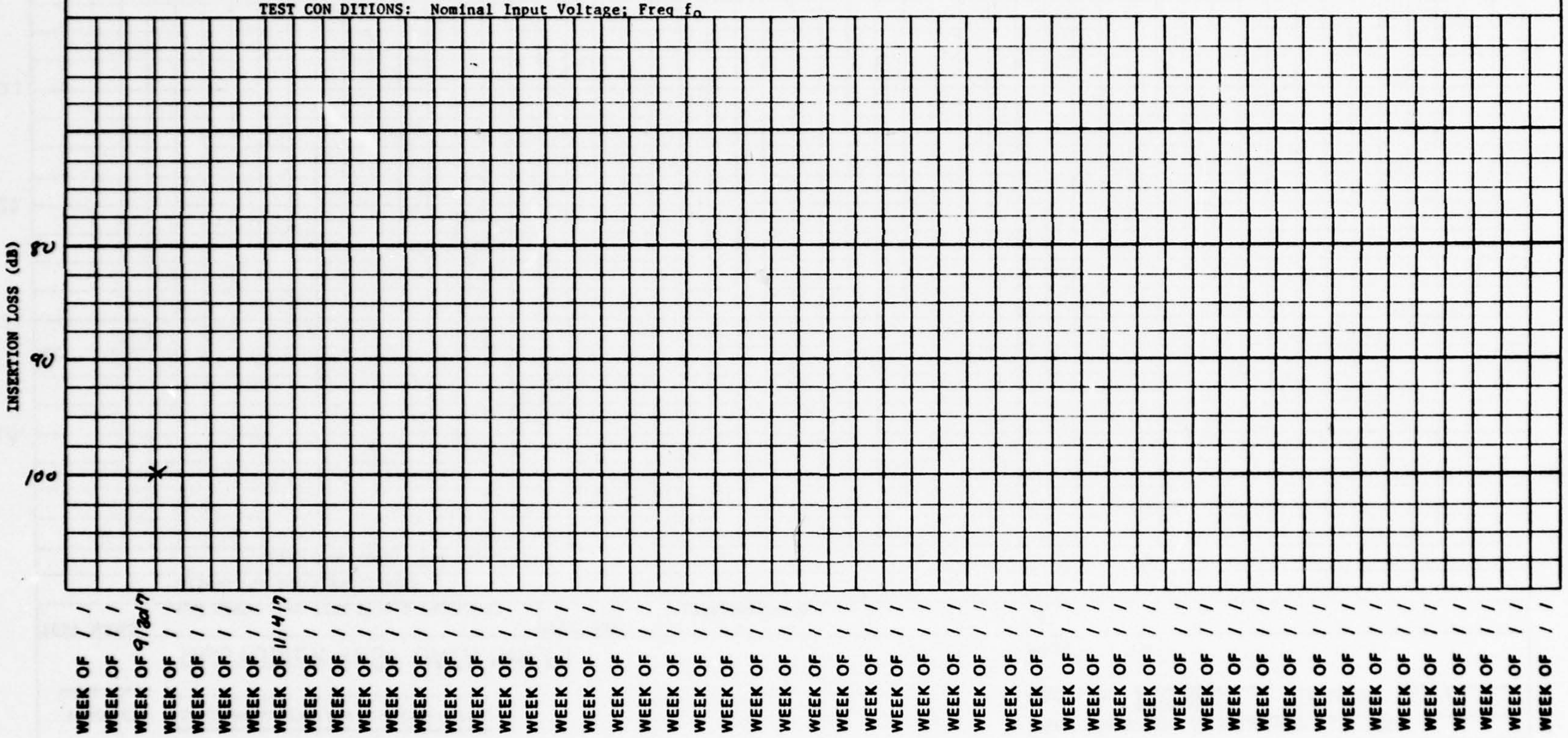
TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC. NO.: LTPB200300-400

INSERTION LOSS

TEST CON DITIONS: Nominal Input Voltage; Freq f_0



X = >100dB LOSS

HUGHES **ELECTRON DYNAMICS DIVISION**
3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.
MODEL NO. B200300-121 B200300-122 SERIAL NO. 12-1
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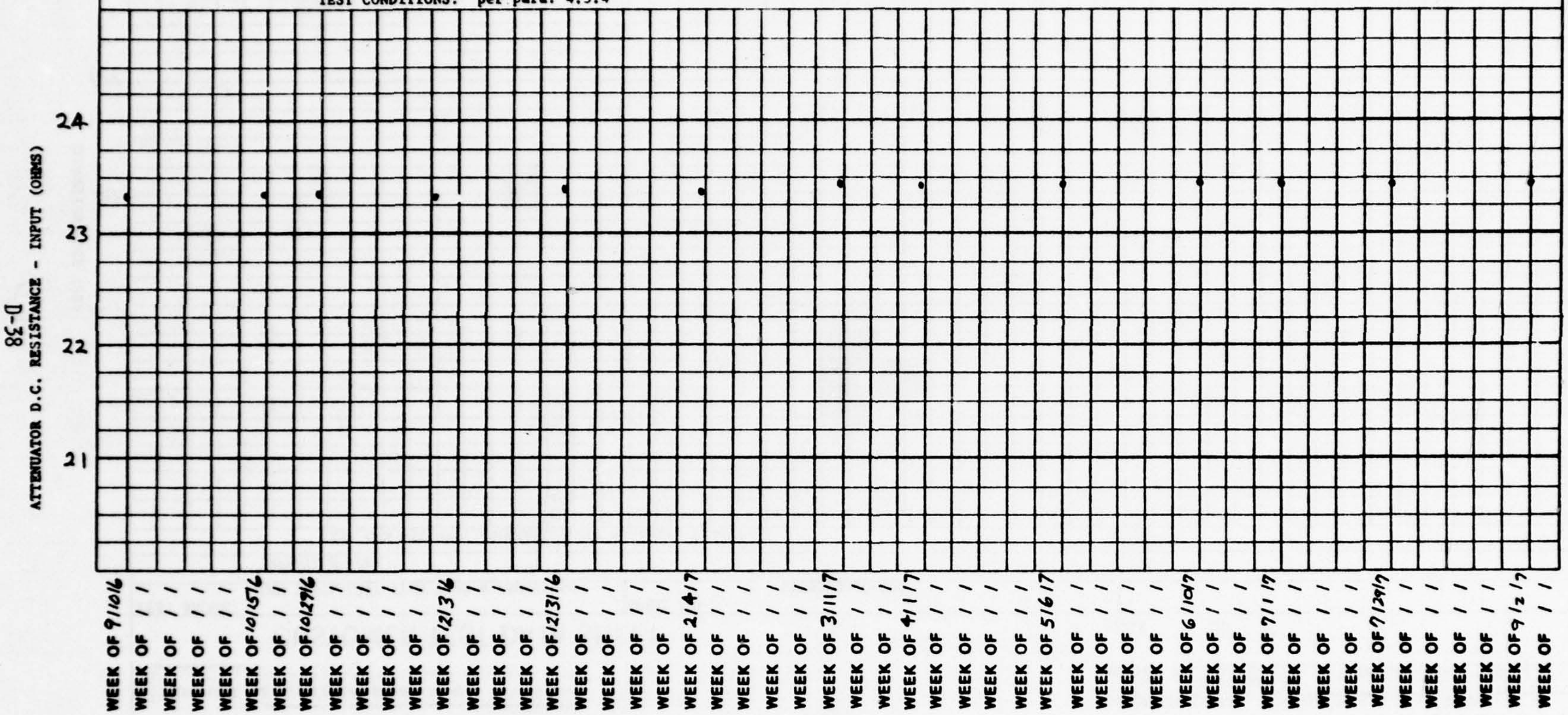
TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC. NO. LTPB200300-400

ATTENUATOR INPUT RESISTANCE

TEST CONDITIONS: per para. 4.3.4



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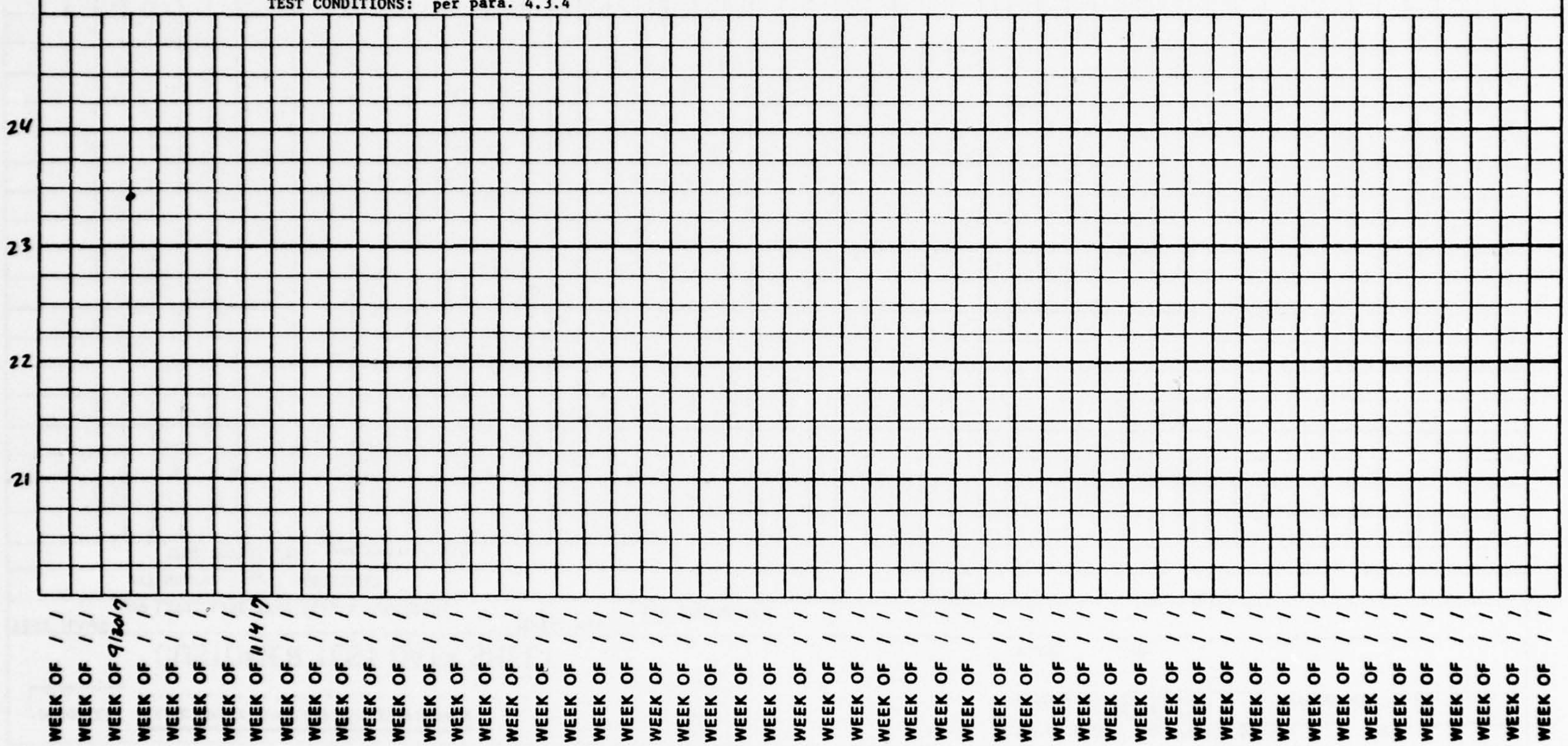
HUGHES ELECTRON DYNAMICS DIVISION
3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-1
PAGE ___ OF ___

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE	SPEC. NO. LTPB200300-400
ATTENUATOR INPUT RESISTANCE	
TEST CONDITIONS: per para. 4.3.4	



ATTENUATOR D.C. RESISTANCE - INPUT (OHMS)

HUGHES **ELECTRON DYNAMICS DIVISION**

3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90505

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.

MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-1

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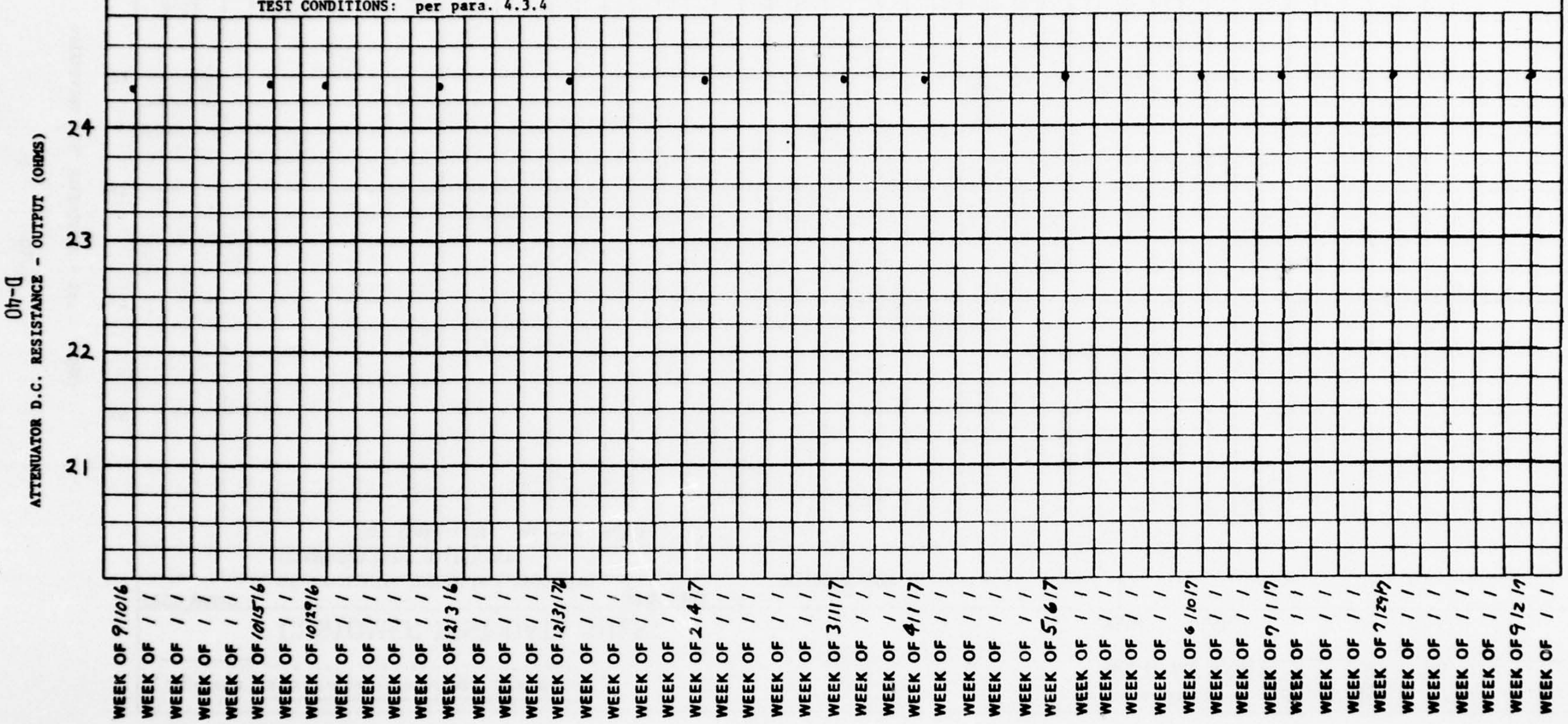
TEST NAME	SPEC. NO.
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400
ATTENUATOR OUTPUT RESISTANCE	
TEST CONDITIONS: per para. 4.3.4	



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CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ____

MODEL NO. B200300-121 B200300-122 SERIAL NO. 12-1

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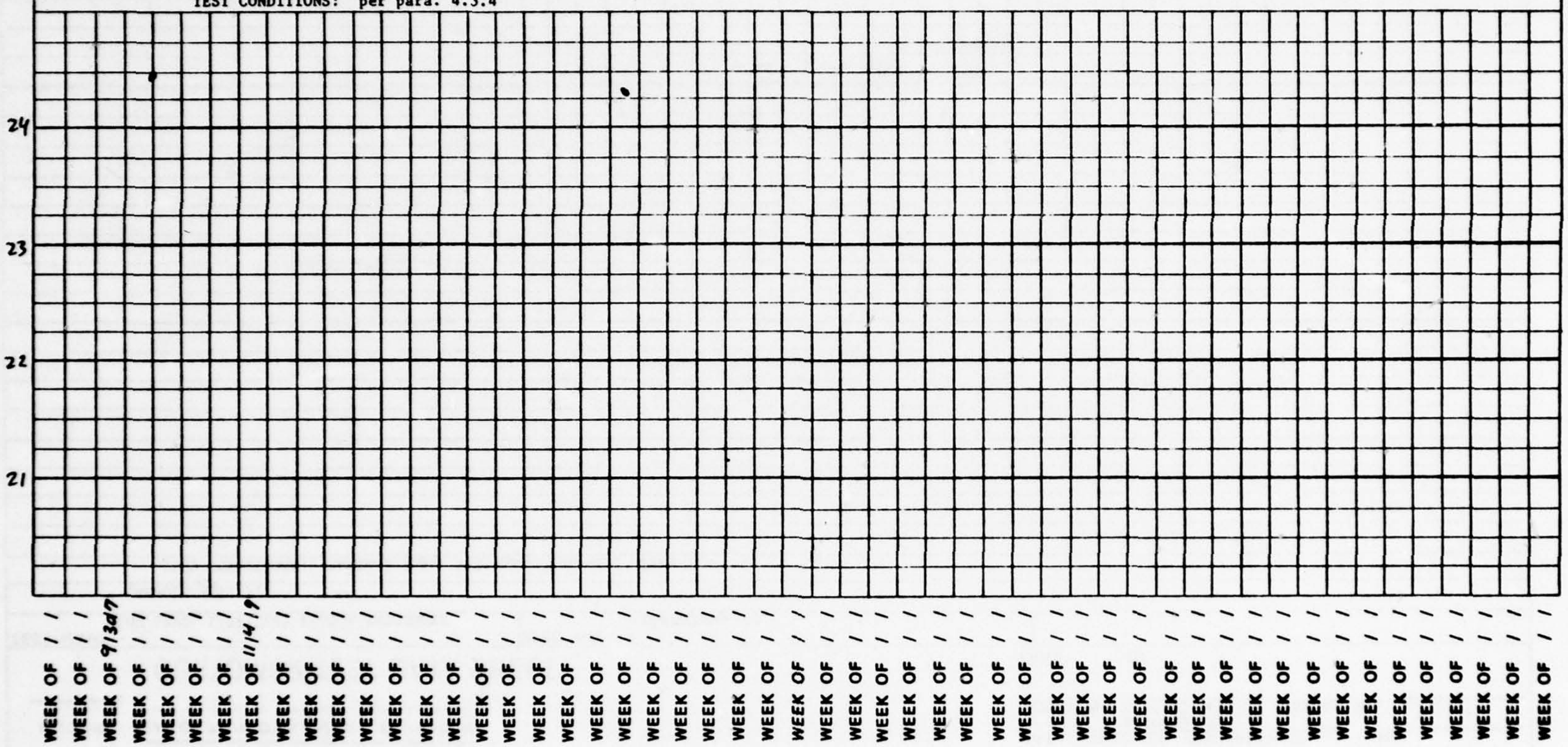
TEST NAME	SPEC. NO.	
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400	

ATTENUATOR OUTPUT RESISTANCE

TEST CONDITIONS: per para. 4.3.4



ATTENUATOR D.C. RESISTANCE - OUTPUT (OHMS)

HUGHES ELECTRON DYNAMICS DIVISION

3100 W. LOMITA BLVD. TORRANCE, CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.

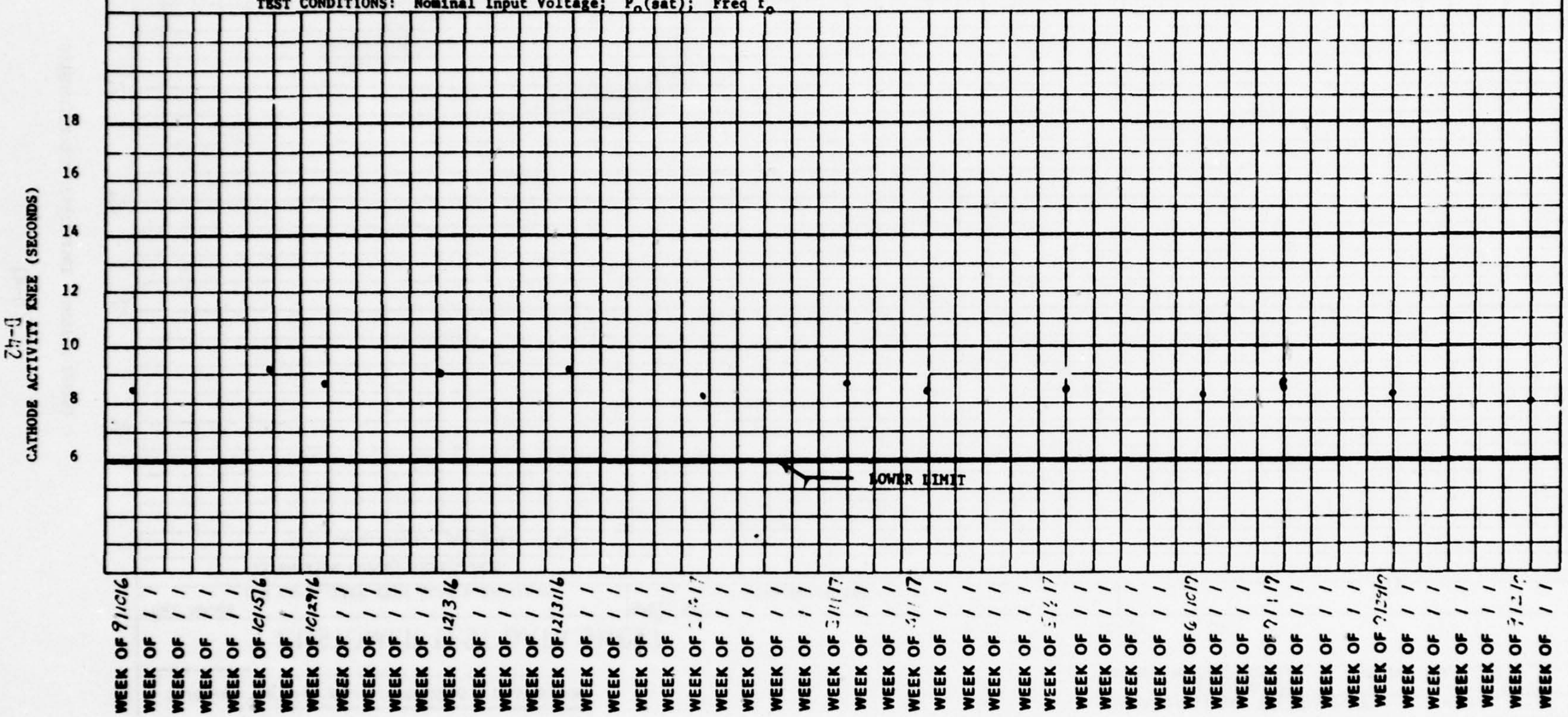
MODEL NO. B200300-121 B200300-122 SERIAL NO. 12-1

PAGE OF

TEST NAME	SPEC. NO.
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400

CATHODE ACTIVITY

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



HUGHES ***ELECTRON DYNAMICS DIVISION***

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______

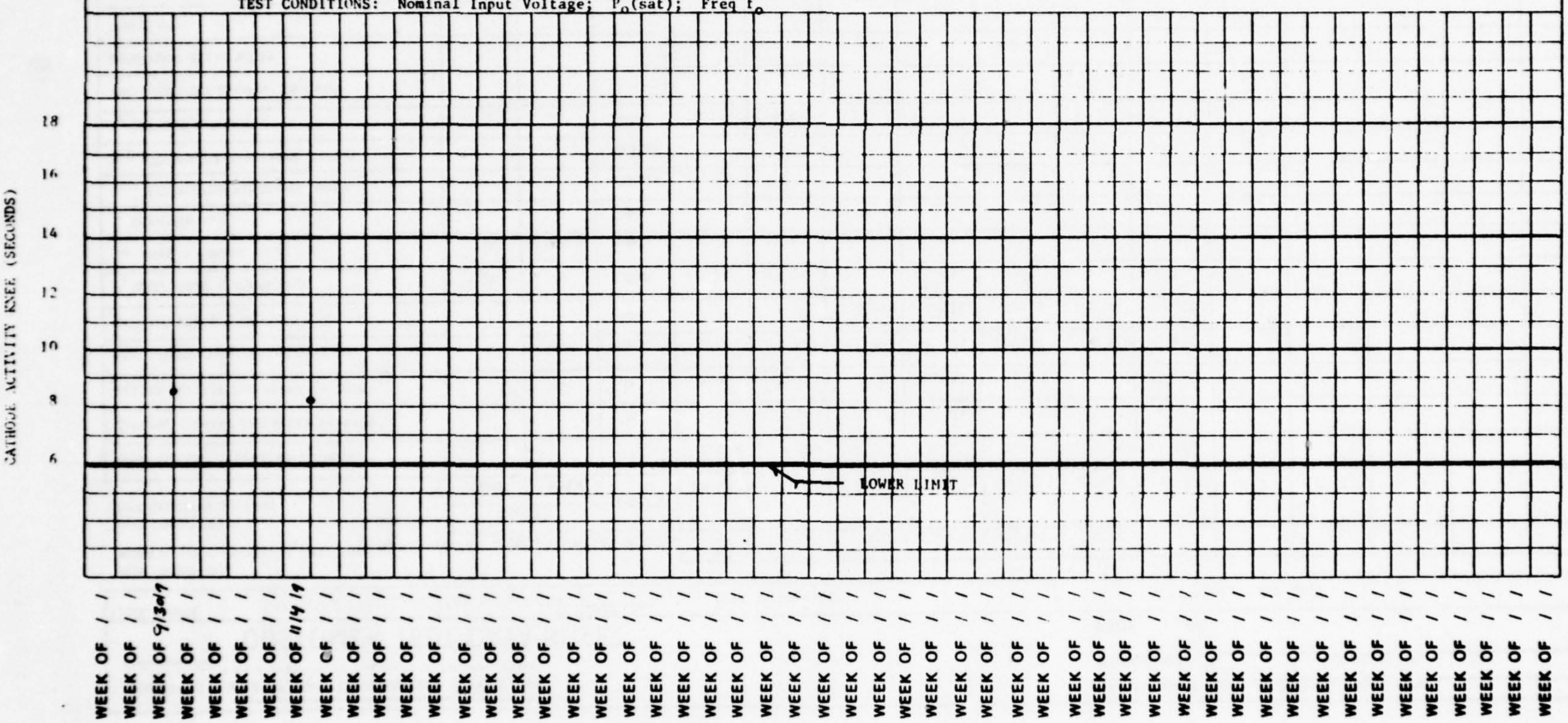
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-1

PAGE ____ OF ____

TEST NAME	SPEC. NO.
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400

CATHODE ACTIVITY

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



HUGHES *ELECTRON DYNAMICS DIVISION*
3100 W. LOMITA BLVD. TORRANCE, CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.
MODEL NO. B200300-121 SERIAL NO. 12-2
PAGE OF

TEST NAME	LOW LEVEL LIFE TEST PLAN & PROCEDURE	SPEC NO.	LTPB200300-400	ACCEPTANCE TEST DATA

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o	TOTAL ACCUMULATED HOURS			PRE-FINAL	FINAL	6,660	13,370	19,977	30,866	58,151					
TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS		UNITS												
	MIN	MAX		11/10/70	11/16/70	9/21/71	7/7/72	4/21/73	3/14/74	11/1/77	/ /	/ /	/ /	/ /	/ /
INPUT CURRENT TELEMETRY VOLTAGE			V	2.274	2.280	2.27	2.27	2.27	2.267	2.238					
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.486	3.498	3.529	3.516	3.511	3.495	3.466					
HEATER VOLTAGE TELEMETRY VOLTAGE			V	2.904	2.913	2.904	2.832	2.843	2.771	2.688					
HELIX CURRENT TELEMETRY VOLTAGE			V	1.763	1.819	1.784	1.793	1.826	1.819	1.800					
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.917	2.918	2.918	2.922	2.916	2.921	2.949					
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	27.25	27.35	27.75	27.55	27.45	27.35	27.30					
Gss FREQ. f_o (PARA. 4.3.1)	35	39.5	db	36.59	37.03	37.66	38.40	38.50	38.45	38.30					
I_L INSERTION LOSS			db												
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS												
T_K CATHODE ACTIVITY	6.0	--	SEC		11.4	12.5	12.5	11.5	12.0	10.4					
TEST EQUIPMENT CALIBRATION DATE															
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

TWT has 713.5 hours prior to start of life test.

BENCH FUNCTIONAL TEST DATA

LOW LEVEL LIFE TEST PLAN AND PROCEDURE

SPEC: LTPB 200300-400

SERIAL NO. 12-2

PAGE 1 of 3

SPEC. PARA #	TEST DESIGNATION	SPEC LIMITS		DATA			
		MINIMUM	MAXIMUM	0	19977	58151	HOURS
4.1	CATHODE ACTIVITY, SECONDS	6.0		11.4	11.5	10.4	
.2	COMMAND SIGNAL			✓	✓	✓	
4.3	INRUSH CURRENT						
a)	TIME INTEGRAL >1ss, t=3msec, AMP-SEC		.0037	0.0035	0.0028	0.0022	
b)	Imax, AMPS		1.8	1.16	0.8	0.88	
c)	I WITHIN ±3% Iss AT 150 SECONDS			✓	✓	✓	
4.4	INPUT AND OUTPUT REFLECTION, VSWR						
a)	OUTPUT (HOT)		1.25:1	1.10	1.06	1.11	
b)	OUTPUT (COLD)		1.25:1	1.10	1.06	1.11	
c)	INPUT (COLD)		1.25:1	1.18	1.24	1.11	
d)	INPUT (HOT)		1.25:1	1.18	1.24	1.11	
.5	SATURATED POWER OUTPUT						
a)	TELEMETRY VOLTAGES						
	1) INPUT CURRENT TLM V			2.290	2.27	2.238	
	2) CATHODE CURRENT TLM V			3.498	3.511	3.466	
	3) HEATER VOLTAGE TLM V			2.913	2.843	2.688	
	4) HELIX CURRENT TLM V			1.819	1.826	1.800	
	5) CATHODE VOLTAGE TLM V			2.918	2.916	2.949	
b)	P_o (SAT.), dBm	27		27.35	27.45	27.30	
4.6	SATURATED POWER OUTPUT AND INPUT POWER VS. INPUT VOLTAGE						
a)	Vin = 23 ±.5V DC						
	1) P_o (SAT.), dBm	27		27.35	27.45	27.30	
	2) Iin, AMPS			.277	.280	0.279	
	3) Pin (DC), WATTS			6.371	6.44	6.371	
b)	Vin = 33 ±.5V DC						
	1) P_o (SAT.), dBm	27		27.35	27.45	27.30	
	2) Iin, AMPS			.196	.197	0.195	
	3) Pin (DC), WATTS			6.468	6.501	6.435	

S/N_______________

SPEC PARA #	TEST DESIGNATION	SPEC LIMITS MINIMUM	SPEC LIMITS MAXIMUM	DATA 0	DATA 19779	DATA 58151	HOURS
4.7	SMALL SIGNAL GAIN						
a)	Gss AT P_o 10dB BELOW P_o (SAT.), dB	35	39.5	37.03	38.5	38.30	
b)	STEPS 4 AND 5 (SEE ATP)			✓	✓	✓	
4.7.1	GAIN SLOPE, dB/Mhz						
a)	Vin = 23 ±.5V DC						
	1) ∆Gss f_1 to f_2		0.015	0.0032	0.003	0.003	
	2) ∆Gss f_1 to f_3		0.030	0.002	0.002	0.003	
	3) ∆Gss f_2 to f_4		0.030	0.0001	0.001	0.003	
b)	Vin = 28 ±.5V DC						
	1) ∆Gss f_1 to f_2		0.015	0.0032	0.003	0.003	
	2) ∆Gss f_1 to f_3		0.030	0.002	0.002	0.003	
	3) ∆Gss f_2 to f_4		0.030	0.001	0.001	0.003	
c)	Vin = 33 ±.5V DC						
	1) ∆Gss f_1 to f_2		0.015	0.0032	0.003	0.003	
	2) ∆Gss f_1 to f_3		0.030	0.002	0.002	0.003	
	3) ∆Gss f_2 to f_4		0.030	0.001	0.001	0.003	
4.7.2	GAIN FLATNESS						
a)	Vin = 23 ±.5V DC 1) GAIN VARIATION f_1 to f_2, dB		±0.2	±0.1	±0.15	±0.13	
b)	Vin = 28 ±.5V DC 1) GAIN VARIATION f_1 to f_2, dB		±0.2	±0.1	±0.15	±0.13	
c)	Vin = 33 ±.5V DC 1) GAIN VARIATION f_1 to f_2, dB		±0.2	±0.1	±0.15	±0.13	
4.8	NOISE FIGURE						
a)	N.F., dB		25	21.5	22.0	21.50	
4.9	INTERMODULATION DISTORTION						
a)	I.M. DISTORTION, dB	28		30.0	31.0	29.70	
4.10	TIME DELAY DISTORTION						
a)	T.D. f_1 to f_2 ANY 10MHZ LINEAR INTERVAL, ns/Mhz		0.10	0.06	0.01	0.01	
b)	T.D. f_1 to f_2 PARABOLIC PORTION OF CURVE, ns/Mhz^2		0.01	0.003	0.001	0.001	

SPEC PARA #	TEST DESIGNATION	SPEC LIMITS		DATA			
		MINIMUM	MAXIMUM	0	19999	58151	HOURS
.11	PHASE SHIFT, FREQ. f_o, +14dBm < P_o < +23dBm , °/dB						
a)	+21.75dBm < P_o < +23dBm		2.0	0.8	0.9	0.61	
b)	+17dBm < P_o < +21.75dBm		1.5	0.66	0.70	1.20	
c)	+14dBm < P_o < +17dBm		1.0	0.70	0.70	0.71	
4.12	STABILITY (MISMATCH) NO P_o FROM INPUT AND OUTPUT OTHER THAN INHERENT NOISE			✓	✓	✓	
13	SPURIOUS OUTPUT COHERENT COMPONENTS						
a)	P_o (HARMONIC) , dB	13		20.0	20.0	>23.0	
.13.1	SPURIOUS OUTPUT INCOHERENT COMPONENTS						
a)	P_o (NON-HARMONIC)	60dB BELOW FUNDAMENTAL		✓	✓	✓	
.13.2	SPURIOUS OUTPUT (AM)			✓	✓	✓	
4.13.3	SPURIOUS OUTPUT (PM)			✓	✓	✓	

HUGHES ELECTRON DYNAMICS DIVISION
3100 W. LOMITA BLVD. TORRANCE, CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-2
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o				TOTAL ACCUMULATED HOURS	48.3	284.7	475.3	689.3	970.8	1115.0	1445.9	1713	1852	2187	2461.5	2699.9
TEST CONDITIONS NOMINAL INPUT VOLTAGE PRE-FINAL A.T.P. DATA	0	LIMITS MIN	MAX	UNITS	week of 12/11/70	week of 12/21/70	week of 12/29/70	week of 1/7/71	week of 1/19/71	week of 1/25/71	week of 2/8/71	week of 2/19/71	week of 2/25/71	week of 3/11/71	week of 3/22/71	week of 4/2/71
INPUT CURRENT TELEMETRY VOLTAGE	2.274			V	2.301	2.311	2.308	2.301	2.287	2.291	2.283	2.276	2.277	2.270	2.277	2.291
CATHODE CURRENT TELEMETRY VOLTAGE	3.486			V	3.503	3.504	3.506	3.509	3.511	3.509	3.511	3.516	3.513	3.516	3.522	3.525
HEATER VOLTAGE TELEMETRY VOLTAGE	2.904			V	2.941	2.869	2.890	2.935	3.003	2.931	2.916	2.918	2.939	2.910	2.897	2.938
HELIX CURRENT TELEMETRY VOLTAGE	1.763			V	1.963	2.094	2.040	1.983	1.868	1.883	1.852	1.863	1.880	1.872	1.909	1.947
CATHODE VOLTAGE TELEMETRY VOLTAGE	2.917			V	2.906	2.914	2.909	2.904	2.904	2.906	2.910	2.911	2.907	2.919	2.911	2.903
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27.80	27	—	dbm	27.90	27.80	27.90	27.90	27.90	28.00	27.90	27.90	27.90	27.90	28.12	28.00
Gm FREQ. f_o (PARA. 4.3.1)	35.59	35	39.5	db	36.70	36.75	37.15	37.30	37.30	37.20	37.24	37.66	37.20	37.51	37.49	37.07
L_L INSERTION LOSS				db												
R_{AI} ATTENUATOR RESISTANCE, INPUT				OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT				OHMS												
T_K CATHODE ACTIVITY		6.0	—	SEC												
TEST EQUIPMENT CALIBRATION DATE								1/8-71								3/31/71
SIGNIFICANT EVENT NOTES																
TESTED BY																

SIGNIFICANT EVENT NOTES

HUGHES **ELECTRON DYNAMICS DIVISION**
3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ____
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-2
PAGE ___ OF ___

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC NO. LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o

TEST CONDITIONS
NOMINAL INPUT VOLTAGE

	LIMITS MIN	LIMITS MAX	UNITS	3360	3905	4237	4645	4841	5077	5293	5441	5586	5726	5980	6068
TOTAL ACCUMULATED HOURS				week of 4/30/71	week of 5/23/71	week of 6/7/71	week of 6/24/71	week of 7/2/71	week of 7/14/71	week of 7/24/71	week of 7/30/71	week of 8/6/71	week of 8/12/71	week of 8/19/71	week of 8/26/71
INPUT CURRENT TELEMETRY VOLTAGE			V	2.279	2.283	2.267	2.259	2.271	2.263	2.260	2.282	2.267	2.265	2.280	2.262
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.521	3.524	3.509	3.510	3.491	3.501	3.500	3.509	3.505	3.514	3.524	3.515
HEATER VOLTAGE TELEMETRY VOLTAGE			V	2.965	2.963	2.900	2.930	2.901	2.913	2.858	2.920	2.865	2.914	2.932	2.891
HELIX CURRENT TELEMETRY VOLTAGE			V	1.879	1.881	1.843	1.846	1.861	1.814	1.801	1.863	1.825	1.770	1.810	1.744
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.908	2.508	2.919	2.913	2.909	2.917	2.927	2.908	2.921	2.916	2.904	2.918
P_o (SAT) FREQ. f_o (PARA 4.3.2)	27	—	dBm	28.25	28.15	28.30	28.20	28.20	28.10	28.20	27.92	28.15	28.10	28.25	28.30
Gss FREQ. f_o (PARA 4.3.1)	35	39.5	dB	37.60	37.69	37.60	37.80	37.60	37.60	37.60	37.00	37.90	37.99	38.19	38.00
L_I INSERTION LOSS			dB												
R_{AI} ATTENUATOR RESISTANCE, INPUT			OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS												
T_K CATHODE ACTIVITY	6.0	—	SEC												
TEST EQUIPMENT CALIBRATION DATE				4/28/71						7/21/71					
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES *ELECTRON DYNAMICS DIVISION*
3100 W. LOMITA BLVD. TORRANCE, CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-2
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE SPEC NO. LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o

TEST CONDITIONS
NOMINAL INPUT VOLTAGE

	LIMITS MIN	LIMITS MAX	UNITS	6206	6402	6546	6705	6875	7037	7204	7373	7519	7710	7879	8071
TOTAL ACCUMULATED HOURS				week of 9/1/71	week of 9/10/71	week of 9/16/71	week of 9/23/71	week of 9/30/71	week of 10/7/71	week of 10/14/71	week of 10/21/71	week of 10/27/71	week of 11/4/71	week of 11/11/71	week of 11/19/71
INPUT CURRENT TELEMETRY VOLTAGE			V	2.267	2.271	2.256		2.273	2.268	2.277	2.290	2.278	2.280	2.269	2.271
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.520	3.525	3.524		3.527	3.520	3.521	3.534	3.524	3.521	3.521	3.517
HEATER VOLTAGE TELEMETRY VOLTAGE			V	2.916	2.906	2.903		2.947	2.941	2.920	2.912	2.899	2.931	2.897	2.880
HELIX CURRENT TELEMETRY VOLTAGE			V	1.756	1.765	1.798		1.797	1.800	1.836	1.887	1.830	1.800	1.808	1.800
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.915	2.906	2.912		2.912	2.910	2.913	2.908	2.916	2.910	2.917	2.910
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	28.25	28.10	28.10		28.25	28.30	28.35	28.28	28.30	28.30	28.40	28.30
Gm FREQ. f_o (PARA. 4.3.1)	35	39.5	db	38.18	37.86	37.90		38.26	38.30	38.28	38.30	38.20	38.15	38.15	38.10
L_L INSERTION LOSS			db												
R_{AI} ATTENUATOR RESISTANCE, INPUT			OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS												
T_K CATHODE ACTIVITY	6.0	--	SEC												
TEST EQUIPMENT CALIBRATION DATE													11/2/71		
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES ELECTRON DYNAMICS DIVISION
3100 W. LOMITA BLVD. TORRANCE, CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.
MODEL NO. B200300-121 B200300-122 SERIAL NO. 12-2
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC NO.: LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o

TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	8187	8355	8568	8736	8805	8997	9166	9330	9524	9669	9861	10005
TOTAL ACCUMULATED HOURS				week of 11/24/71	week of 12/1/71	week of 12/10/71	week of 12/17/71	week of 12/22/71	week of 12/30/71	week of 1/6/72	week of 1/13/72	week of 1/22/72	week of 1/27/72	week of 2/4/72	week of 2/10/72
INPUT CURRENT TELEMETRY VOLTAGE			V	2.274	2.280	2.279	2.271	2.280	2.273	2.271	2.28	2.28	2.28	2.28	2.26
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.523	3.528	3.526	3.521	3.525	3.527	3.519	3.53	3.52	3.53	3.53	3.52
HEATER VOLTAGE TELEMETRY VOLTAGE			V	2.874	2.913	2.881	2.891	2.890	2.911	2.891	2.92	2.89	2.90	2.90	2.93
HELIX CURRENT TELEMETRY VOLTAGE			V	1.813	1.851	1.830	1.827	1.829	1.803	1.830	1.86	1.84	1.85	1.85	1.83
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.916	2.909	2.910	2.910	2.900	2.911	2.910	2.91	2.91	2.91	2.91	2.91
P_o (SAT) FREQ. f_o (PARA 4.3.2)	27	—	dbm	28.20	28.20	28.15	28.20	28.15	28.15	28.15	28.00	28.15	28.00	28.10	28.15
Gs FREQ. f_o (PARA. 4.3.1)	35	39.5	db	38.00	38.10	38.00	38.10	38.00	38.00	38.00	38.05	38.00	38.20	38.15	38.30
L_i INSERTION LOSS			db												
R_{AI} ATTENUATOR RESISTANCE, INPUT			OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS												
T_K CATHODE ACTIVITY	6.0	—	SEC												
TEST EQUIPMENT CALIBRATION DATE													1/26/72		
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES *ELECTRON DYNAMICS DIVISION*
3100 W. LOMITA BLVD TORRANCE, CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-2
PAGE ___ OF ___

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o

TEST CONDITIONS
NOMINAL INPUT VOLTAGE

	LIMITS MIN	LIMITS MAX	UNITS	10173	10333	10523	10674	10869	11005	11172	11294	11532	11679	11874	12038
TOTAL ACCUMULATED HOURS				week of 2/17/72	week of 2/24/72	week of 3/3/72	week of 3/9/72	week of 3/17/72	week of 3/23/72	week of 3/30/72	week of 4/7/72	week of 4/21/72	week of 4/27/72	week of 5/5/72	week of 5/12/72
INPUT CURRENT TELEMETRY VOLTAGE			V	2.28	2.26	2.27	2.27	2.27	2.27	2.26	2.26	2.26	2.29	2.26	2.27
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.53	3.52	3.52	3.51	3.52	3.52	3.52	3.52	3.52	3.53	3.52	3.52
HEATER VOLTAGE TELEMETRY VOLTAGE			V	2.91	2.90	2.91	2.90	2.91	2.90	2.[illegible]1	2.80	2.84	2.88	2.81	2.89
HELIX CURRENT TELEMETRY VOLTAGE			V	1.85	1.79	1.80	1.80	1.80	1.80	1.80	1.79	1.80	1.89	1.77	1.80
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.91	2.92	2.91	2.92	2.92	2.91	2.91	2.93	2.91	2.91	2.91	2.91
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	—	dbm	28.10	28.20	28.20	27.90	27.90	27.90	27.95	28.10	28.10	28.00	28.00	27.90
Gss FREQ. f_o (PARA. 4.3.1)	35	39.5	db	38.30	38.30	38.30	38.20	38.20	38.00	38.10	38.30	38.20	38.40	38.30	38.30
I_L INSERTION LOSS			db												
R_{AHI} ATTENUATOR RESISTANCE, INPUT			OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS												
T_K CATHODE ACTIVITY	6.0	—	SEC												
TEST EQUIPMENT CALIBRATION DATE												4/19/72			
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES **ELECTRON DYNAMICS DIVISION**
3100 W. LOMITA BLVD. TORRANCE, CALIFORNIA

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-2
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o

TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	12184 week of 5/18/72	12374 week of 5/26/72	12519 week of 6/1/72	12710 week of 6/9/72	12873 week of 6/16/72	13043 week of 6/23/72	13204 week of 6/30/72	week of 7/7/72	13537 week of 7/14/72	13706 week of 7/21/72	13872 week of 7/28/72	14038 week of 8/4/72
INPUT CURRENT TELEMETRY VOLTAGE			V	2.26	2.26	2.26	2.27	2.28	2.27	2.26		2.27	2.27	2.26	2.27
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.52	3.53	3.52	3.51	3.52	3.51	3.51		3.51	3.51	3.51	3.52
HEATER VOLTAGE TELEMETRY VOLTAGE			V	2.88	2.87	2.87	2.87	2.89	2.88	2.85		2.85	2.86	2.85	2.86
HELIX CURRENT TELEMETRY VOLTAGE			V	1.81	1.83	1.76	1.79	1.81	1.77	1.80		1.78	1.80	1.78	1.82
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.91	2.91	2.92	2.92	2.91	2.91	2.92		2.92	2.92	2.92	2.92
P_o (SAT) FREQ. f_o (PARA 4.1.3)	27	—	dBm	28.00	28.00	27.95	27.95	28.00	27.80	28.00		28.00	28.05	27.85	28.00
Gss FREQ. f_o (PARA 4.1.1)	35	39.5	dB	38.30	38.40	38.40	38.40	38.40	38.40	38.30		38.40	38.40	38.10	38.20
L_i INSERTION LOSS			dB												
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS												
T_K CATHODE ACTIVITY	6.0	—	SEC												
TEST EQUIPMENT CALIBRATION DATE															
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES *ELECTRON DYNAMICS DIVISION*
3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-2
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE SPEC NO. LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o

TEST CONDITIONS
NOMINAL INPUT VOLTAGE

	LIMITS MIN	LIMITS MAX	UNITS	14206	14370	14544	14616	14694	14867	15030	15197	15361	15526	15689	15859
TOTAL ACCUMULATED HOURS				week of 8/11/72	week of 8/18/72	week of 8/28/72	week of 8/31/72	week of 9/8/72	week of 9/15/72	week of 9/22/72	week of 9/29/72	week of 10/6/72	week of 10/13/72	week of 10/20/72	week of 10/27/72
INPUT CURRENT TELEMETRY VOLTAGE			V	2.26	2.26	2.26	2.26	2.27	2.26	2.27	2.27	2.28	2.26	2.28	2.28
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.52	3.51	3.52	3.51	3.52	3.51	3.51	3.52	3.52	3.50	3.51	3.52
HEATER VOLTAGE TELEMETRY VOLTAGE			V	2.85	2.81	2.85	2.81	2.85	2.85	2.80	[illegible].84	2.87	2.78	2.79	2.84
HELIX CURRENT TELEMETRY VOLTAGE			V	1.80	1.78	1.78	1.74	1.80	1.78	1.78	1.80	1.87	1.79	1.85	1.83
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.92	2.93	2.93	2.93	2.92	2.93	2.92	2.92	2.91	2.93	2.92	2.92
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	28.05	28.05	28.05	28.00	28.00	28.00	28.10	27.85	27.90	27.85	27.90	27.85
G_{ss} FREQ. f_o (PARA. 4.3.1)	35	39.5	db	38.20	38.30	38.20	38.30	38.30	38.30	38.30	38.05	38.20	38.10	38.10	37.90
I_L INSERTION LOSS			db				96.00			>100			>100		
R_{AI} ATTENUATOR RESISTANCE, INPUT			OHMS				18.91			18.93			18.96		
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS				20.15			20.05m			20.05		
T_K CATHODE ACTIVITY	6.0	--	SEC												
TEST EQUIPMENT CALIBRATION DATE								9/9/72			9/29/72				
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES ELECTRON DYNAMICS DIVISION
3100 W. LOMITA BLVD. TORRANCE, CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ____
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-2
PAGE ____ OF ____

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE — SPEC NO. LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o (SAT); FREQ. f_o

TEST CONDITIONS
NOMINAL INPUT VOLTAGE

	LIMITS MIN	LIMITS MAX	UNITS	16021	16184	16352	16463	16678	16846	17007	17150	17225	17389	17555	17721
TOTAL ACCUMULATED HOURS				week of 11/3/72	week of 11/10/72	week of 11/17/72	week of 11/22/72	week of 12/1/72	week of 12/8/72	week of 12/15/72	week of 12/21/72	week of 12/29/72	week of 1/5/73	week of 1/12/73	week of 1/19/73
INPUT CURRENT TELEMETRY VOLTAGE			V	2.26	2.25	2.29	2.27	2.28	2.27	2.28	2.27	2.27	2.27	2.27	2.28
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.52	3.52	3.53	3.52	3.53	3.52	3.53	3.53	3.52	3.52	3.52	3.52
HEATER VOLTAGE TELEMETRY VOLTAGE			V	2.87	2.88	2.83	2.87	2.84	2.86	2.86	2.86	2.82	2.86	2.84	2.87
HELIX CURRENT TELEMETRY VOLTAGE			V	1.85	1.87	1.90	1.82	1.81	1.83	1.83	1.83	1.80	1.83	1.80	1.85
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.92	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.92	2.91
P_o (SAT) FREQ. f_o (PARA 4.3.2)	27	—	dBm	27.85	27.80	27.80	27.85	27.70	27.85	27.90	27.80	27.90	27.90	27.95	27.80
G_o FREQ. f_o (PARA 4.3.1)	35	39.5	dB	38.00	38.00	38.20	38.10	38.00	38.10	38.10	38.10	38.10	38.10	38.30	38.20
f_o INSERTION LOSS			dB	100			>100			>100			>100		
R_{IN} ATTENUATOR RESISTANCE, INPUT			OHMS	18.98			19.00			19.02			19.03		
R_{OUT} ATTENUATOR RESISTANCE, OUTPUT			OHMS	20.06			20.10			20.14			20.13		
T_K CATHODE ACTIVITY	6.0	—	SEC							11.6					
TEST EQUIPMENT CALIBRATION DATE														1/2/73	
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES **ELECTRON DYNAMICS DIVISION**
3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ____
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-2
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o (SAT); FREQ. f_o

TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	17956	18050	18216	18381	18547	18717	18885	19053	19215	19363	19551	19716
TOTAL ACCUMULATED HOURS				week of 1 /29/73	week of 2 /2 /73	week of 2 / 9/73	week of 2/16/73	week of 2 /23/ 73	week of 3 / 2/73	week of 3/ 9/73	week of 3/16/73	week of 3 /23/73	week of 3 /29/73	week of 4/ 6/73	week of 4 /13/73
INPUT CURRENT TELEMETRY VOLTAGE			V	2.27	2.27	2.28	2.27	2.29	2.27	2.27	2.28	2.27	2.27	2.27	2.28
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.52	3.51	3.52	3.52	3.53	3.51	3.51	3.52	3.52	3.52	3.52	3.52
HEATER VOLTAGE TELEMETRY VOLTAGE			V	2.86	2.84	2.89	2.86	2.82	2.85	2.82	2.84	2.85	2.84	2.84	2.84
HELIX CURRENT TELEMETRY VOLTAGE			V	1.83	1.82	1.87	1.83	1.95	1.83	1.82	1.86	1.85	1.86	1.86	1.88
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.91	2.92	2.91	2.91	2.91	2.91	2.92	2.91	2.91	2.91	2.91	2.91
P_o (SAT) FREQ. f_o (PARA 4.2.3)	27	--	dbm	27.80	27.80	27.70	27.70	27.70	27.70	27.75	27.80	27.75	27.80	27.75	27.90
Gss FREQ. f_o (PARA. 4.2.1)	35	39.5	db	38.30	38.20	38.10	38.10	38.10	38.10	38.30	38.20	38.00	38.10	38.10	38.20
L_L INSERTION LOSS			db	>100			·100						·100		
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS	19.06			19.07						19.11		
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS	20.26			20.19						20.22		
T_K CATHODE ACTIVITY	6.0	--	SEC												
TEST EQUIPMENT CALIBRATION DATE														4/4/73	
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES *ELECTRON DYNAMICS DIVISION*
3100 W LOMITA BLVD TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-2
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o

TEST CONDITIONS
NOMINAL INPUT VOLTAGE

	LIMITS MIN	LIMITS MAX	UNITS	19886	20024	20192	20360	20529	20694	20865	21035	21200	21340	21481	21647
TOTAL ACCUMULATED HOURS				week of 4/20/73	week of 4/27/73	week of 5/4/73	week of 5/11/73	week of 5/18/73	week of 5/25/73	week of 6/1/73	week of 6/9/73	week of 6/16/73	week of 6/22/73	week of 6/29/73	week of 7/6/73
INPUT CURRENT TELEMETRY VOLTAGE			V	2.28	2.28	2.29	2.29	2.28	2.28	2.27	2.28	2.27	2.[illegible]8	2.27	2.27
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.52	3.52	3.52	3.52	3.52	3.52	3.52	3.52	3.51	3.52	3.51	3.51
HEATER VOLTAGE TELEMETRY VOLTAGE			V	2.84	2.82	2.82	2.82	2.84	2.83	2.82	2.84	2.81	2.82	2.83	2.81
HELIX CURRENT TELEMETRY VOLTAGE			V	1.87	1.85	1.91	1.90	1.84	1.89	1.84	1.88	1.81	1.81	1.80	1.82
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.91	2.92	2.91	2.91	2.91	2.91	2.92	2.91	2.92	2.92	2.92	2.92
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	—	dbm	27.90	27.75	27.80	27.80	27.80	27.70	27.90	27.80	27.90	27.90	27.75	28.00
Gm FREQ. f_o (PARA. 4.3.1)	35	39.5	db	38.30	38.00	38.40	38.40	38.40	38.30	38.40	38.50	38.40	38.40	38.50	38.30
L_I INSERTION LOSS			db				>100 v						>100		
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS				19.15						19.19		
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS				20.28						20.29		
T_K CATHODE ACTIVITY	6.0	—	SEC				11.5								
TEST EQUIPMENT CALIBRATION DATE															
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES *ELECTRON DYNAMICS DIVISION*

3100 W. LOMITA BLVD TORRANCE, CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______

MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-2

PAGE 1 OF

TEST NAME	LOW LEVEL LIFE TEST PLAN & PROCEDURE	SPEC NO.	LTPB200300-400

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o			TOTAL ACCUMULATED HOURS	21815	22130										
TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	week of 7/13/73	7/26/73	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /
INPUT CURRENT TELEMETRY VOLTAGE			V	2.25	2.28										
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.51	3.52										
HEATER VOLTAGE TELEMETRY VOLTAGE			V	2.82	2.84										
HELIX CURRENT TELEMETRY VOLTAGE			V	1.82	1.82										
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.92	2.91										
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	27.95	27.85										
Gss FREQ. f_o (PARA. 4.3.1)	35	39.5	db	38.50	38.50										
L_i INSERTION LOSS			db												
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS												
T_E CATHODE ACTIVITY	6.0	--	SEC												
TEST EQUIPMENT CALIBRATION DATE															
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES *ELECTRON DYNAMICS DIVISION*
3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-2
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o			TOTAL ACCUMULATED HOURS	22,826	23,561	24,249	24,919	25,545	26,231	26,966	27,726	28,334	29.025	29,755	30,412
TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	8/28/73	9/28/73	10/26/73	11/30/73	12/28/73	1/31/74	2/28/74	4/1/74	4/29/74	5/28/74	6/27/74	7/26/74
INPUT CURRENT TELEMETRY VOLTAGE			V	2.26	2.27	2.26	2.26	2.27	2.27	2.28	2.27	2.29	2.26	2.26	2.27
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.50	3.51	3.49	3.50	3.51	3.51	3.51	3.50	3.51	3.50	3.49	3.50
HEATER VOLTAGE TELEMETRY VOLTAGE			V	2.82	2.83	2.81	2.81	2.83	2.87	2.85	2.79	2.81	2.76	2.81	2.85
HELIX CURRENT TELEMETRY VOLTAGE			V	1.79	1.81	1.73	1.75	1.84	1.84	1.87	1.85	1.95	1.83	1.80	1.83
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.92	2.92	2.93	2.93	2.91	2.91	2.91	2.91	2.91	2.92	2.92	2.91
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	27.85	27.90	28.00	27.90	27.65	27.65	27.80	27.85	27.85	27.90	27.90	27.90
Gss FREQ. f_o (PARA 4.3.1)	35	39.5	db	38.50	38.50	38.30	38.60	38.50	38.30	38.60	38.50	38.50	38.50	38.50	38.50
I_L INSERTION LOSS			db	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS	19.22	19.25	19.27	19.29	19.27	19.30	19.32	19.36	19.35	19.38	19.37	19.39
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS	20.34	20.37	19.28	19.38	20.38	20.33	20.43	20.43	20.45	20.48	20.48	20.50
T_K CATHODE ACTIVITY	6.0	--	SEC	11.70	11.70	*		11.30	11.30	11.60	11.00	12.00	10.90	11.00	10.90
TEST EQUIPMENT CALIBRATION DATE				8/10/73	8/10/73	8/10/73	8/10/73	11/28/73	11/28/73	11/28/73	3/27/74	3/27/74	3/27/74	3/27/74	3/27/74
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

*RECORDER OUT FOR REPAIRS.

HUGHES **ELECTRON DYNAMICS DIVISION**
3100 W. LOMITA BLVD TORRANCE, CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-2
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o

TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	31197	31,903	32,671	33,383	33,997	34788	35,440	36,138	36,903	37,663	38,330	39,037
TOTAL ACCUMULATED HOURS				8/30/74	9/30/74	11/1/74	12/2/4	12/28/4	1/30/5	2/26/5	3/28/5	4/28/5	5/31/5	7/2/75	8/1/5
INPUT CURRENT TELEMETRY VOLTAGE			V	2.254	2.256	2.27	2.22	2.25	2.26	2.26	2.27	2.26	2.27	2.25	2.27
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.482	3.488	3.497	3.48	3.48	3.48	3.49	3.49	3.49	3.49	3.47	3.49
HEATER VOLTAGE TELEMETRY VOLTAGE			V	2.790	~~2.928~~ 2.779	2.80	2.81	2.80	2.87	2.82	2.85	2.79	2.79	2.84	2.84
HELIX CURRENT TELEMETRY VOLTAGE			V	1.782	1.782	1.83	1.83	1.79	1.80	1.80	1.81	1.81	1.83	1.78	1.85
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.924	2.928	2.915	2.93	2.92	2.91	2.91	2.91	2.92	2.91	2.92	2.91
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	27.75	27.80	27.7	27.7	27.80	27.8	27.7	27.75	27.8	27.7	27.5	27.65
Gss FREQ. f_o (PARA. 4.3.1)	35	39.5	db	38.4	38.35	38.4	38.3	38.3	38.35	38.4	38.4	38.5	38.4	38.2	38.4
I_L INSERTION LOSS			db	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS	19.40	19.43	19.45	19.47	19.48	19.47	19.50	19.53	19.54	19.55	19.55	19.56
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS	20.54	20.54	20.58	20.61	20.60	20.61	20.62	20.65	20.68	20.69	20.66	20.71
T_K CATHODE ACTIVITY	6.0	--	SEC	10.9	11.5	10.9	11.0	11.3	10.7	12.0	11.3	12.0	11.1	10.5	10.8
TEST EQUIPMENT CALIBRATION DATE				7-24-74	7-24-4	7-24-4	11-21-4	11-21-4	11-21-4	1-31-5	1-31-5	1-31-5	4-1-75	4-1-75	7-30-5
SIGNIFICANT EVENT NOTES															
TESTED BY				W.P.N	W.P.N	W.P.N	W.P.N	W.P.N	W.P.N	W.P.N	W.P.N	W.P.N	W.P.N	W.P.N	W.P.N

SIGNIFICANT EVENT NOTES

HUGHES — ELECTRON DYNAMICS DIVISION

3100 W. LOMITA BLVD TORRANCE, CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ____

MODEL NO. B200300-121 B200300-122 SERIAL NO. 12-2

PAGE __ OF __

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o	LIMITS MIN	LIMITS MAX	UNITS												
TOTAL ACCUMULATED HOURS				39,827	40,573	41,235	42,005	42,961	43,340	44,087	44,923	45,427	46,285	46,925	48,487
TEST CONDITIONS NOMINAL INPUT VOLTAGE				9 13 15	10 14 15	11 11 15	12 13 15	1 14 16	1 30 16	3 1 16	4 16 16	4 28 16	6 12 16	6 29 16	9 18 16
INPUT CURRENT TELEMETRY VOLTAGE			V	2.28	2.27	2.25	2.27	2.26	2.26	2.27	2.28	2.26	2.26	2.26	2.25
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.49	3.49	3.48	3.49	3.48	3.48	3.47	3.47	3.47	3.47	3.47	3.47
HEATER VOLTAGE TELEMETRY VOLTAGE			V	2.80	2.80	2.75	2.85	2.81	2.76	2.86	2.87	2.77	2.80	2.84	2.80
HELIX CURRENT TELEMETRY VOLTAGE			V	1.88	1.83	1.77	1.83	1.81	1.80	1.85	1.80	1.80	1.79	1.80	1.80
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.91	2.91	2.92	2.91	2.92	2.92	2.90	2.93	2.92	2.92	2.91	2.92
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	27.6	27.7	27.8	27.8	27.8	27.8	27.75	27.80	27.80	27.80	27.80	27.80
Gm FREQ. f_o (PARA. 4.3.1)	35	39.5	db	38.3	38.3	38.4	38.4	38.3	38.3	38.3	38.2	38.25	38.15	38.15	38.15
I_L INSERTION LOSS			db	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS	19.6	19.55	19.6	19.63	19.67	19.67	19.66	19.66	19.68	19.71	19.64	19.73
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS	20.2	20.19	20.73	20.76	20.78	20.78	20.82	20.79	20.83	20.85	20.76	20.85
T_K CATHODE ACTIVITY	6.0	--	SEC	10.7	11.4	10.5	11.5	11.5	11.4	11.5	10.8	11.0	11.1	11.0	10.5
TEST EQUIPMENT CALIBRATION DATE				7-30-5	7-30-5	10-29-5	10-29-5	10-29-5	10-29-5	2-3-6	2-3-6	2-3-6	5-7-6	5-12-6	8-31-6
SIGNIFICANT EVENT NOTES															
TESTED BY				W.P.N	W.P.N	W.P.N	W.P.N	W.P.N	W.P.N	MSK	MSK	MSK	W.P.N	MSK	MSK

SIGNIFICANT EVENT NOTES

HUGHES **ELECTRON DYNAMICS DIVISION**
3100 W. LOMITA BLVD. TORRANCE, CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. A
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-2
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO.: LTPB200300-400

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o			TOTAL ACCUMULATED HOURS	49,332	49,707	50,451	51157	51989	52724	53,159	54,023	54,672	55181.7	55893	56630
TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	MAX	UNITS	10/13/76	10/29/76	11/12/76	12/29/76	2/21/77	3/10/77	3/29/77	5/16/77	6/17/77	6/29/77	7/29/77	8/29/77
INPUT CURRENT TELEMETRY VOLTAGE			V	2.253	2.715	2.709	2.709	2.272	2.255	2.257	2.254	2.258	2.258	2.252	2.253
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.005	3.480	3.465	3.477	3.490	3.473	3.470	3.467	3.465	3.473	3.471	3.463
HEATER VOLTAGE TELEMETRY VOLTAGE			V	2.804	2.735	2.736	2.750	2.770	2.706	2.825	2.801	2.816	2.716	2.691	2.711
HELIX CURRENT TELEMETRY VOLTAGE			V	2.915	1.789	1.778	1.776	1.878	1.805	1.798	1.801	1.813	1.798	1.805	1.803
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	1.593	2.935	2.943	2.933	2.912	2.934	2.917	2.919	2.917	2.932	2.934	2.937
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	27.7	27.85	27.85	27.85	27.75	27.9	27.65	27.75	27.75	27.75	27.75	27.6
Gss FREQ. f_o (PARA. 4.3.1)	35	39.5	db	38.3	38.10	38.20	38.3	38.3	38.45	38.40	38.40	38.40	38.40	38.40	38.2
I_L INSERTION LOSS			db	>100	>100	>100	99	>100	>100	>100	>100	>100	>100	>100	>100
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS	19.75	19.75	19.75	19.77	19.75	19.79	19.82	19.83	19.82	19.86	19.87	19.88
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS	20.90	20.89	20.88	20.92	20.9	20.9	20.95	20.95	20.95	21.00	20.95	20.98
T_K CATHODE ACTIVITY	6.0	--	SEC	11.3	10.6	10.4	11.0	10.5	10.7	10.5	10.4	10.0	10.8	10.2	10.5
TEST EQUIPMENT CALIBRATION DATE				7-23-6	8-31-6	10-19-6	8-31-6	12-31-77	1-5-77	1-19-77	4-25-7	4-25-7	5-2-77	7-21-77	5-22-77
SIGNIFICANT EVENT NOTES				—			—								
TESTED BY				DJ	msk	msk	DRJ	D.R.J.	D.R.J.	msk	msk	msk	DRJ	DRJ	

SIGNIFICANT EVENT NOTES

HUGHES **ELECTRON DYNAMICS DIVISION**
3100 W. LOMITA BLVD TORRANCE CALIFORNIA

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. A
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-2
PAGE OF

TEST NAME	LOW LEVEL LIFE TEST PLAN & PROCEDURE	SPEC NO.	LTPB200300 400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o

TEST CONDITIONS
NOMINAL INPUT VOLTAGE

	LIMITS MIN	LIMITS MAX	UNITS												
TOTAL ACCUMULATED HOURS				57,365	58151										
				9/29/77	11/2/77	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /
INPUT CURRENT TELEMETRY VOLTAGE			V	2.24	2.238										
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.46	3.466										
HEATER VOLTAGE TELEMETRY VOLTAGE			V	2.70	2.688										
HELIX CURRENT TELEMETRY VOLTAGE			V	1.79	1.80										
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.94	2.949										
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	27.7	27.98										
Gm FREQ. f_o (PARA. 4.3.1)	35	39.5	db	38.15	38.3										
I_L INSERTION LOSS			db	>100											
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS	19.9											
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS	21.01											
T_K CATHODE ACTIVITY	6.0	--	SEC	10.5	10.4										
TEST EQUIPMENT CALIBRATION DATE				2-27-7											
SIGNIFICANT EVENT NOTES					*										
TESTED BY				MSK											

SIGNIFICANT EVENT NOTES *END OF CONTRACT

HUGHES **ELECTRON DYNAMICS DIVISION**

DATA SHEET NO. DSB200300-400 REV.

MODEL NO. B200300-121 B200300-122 SERIAL NO. 12-2

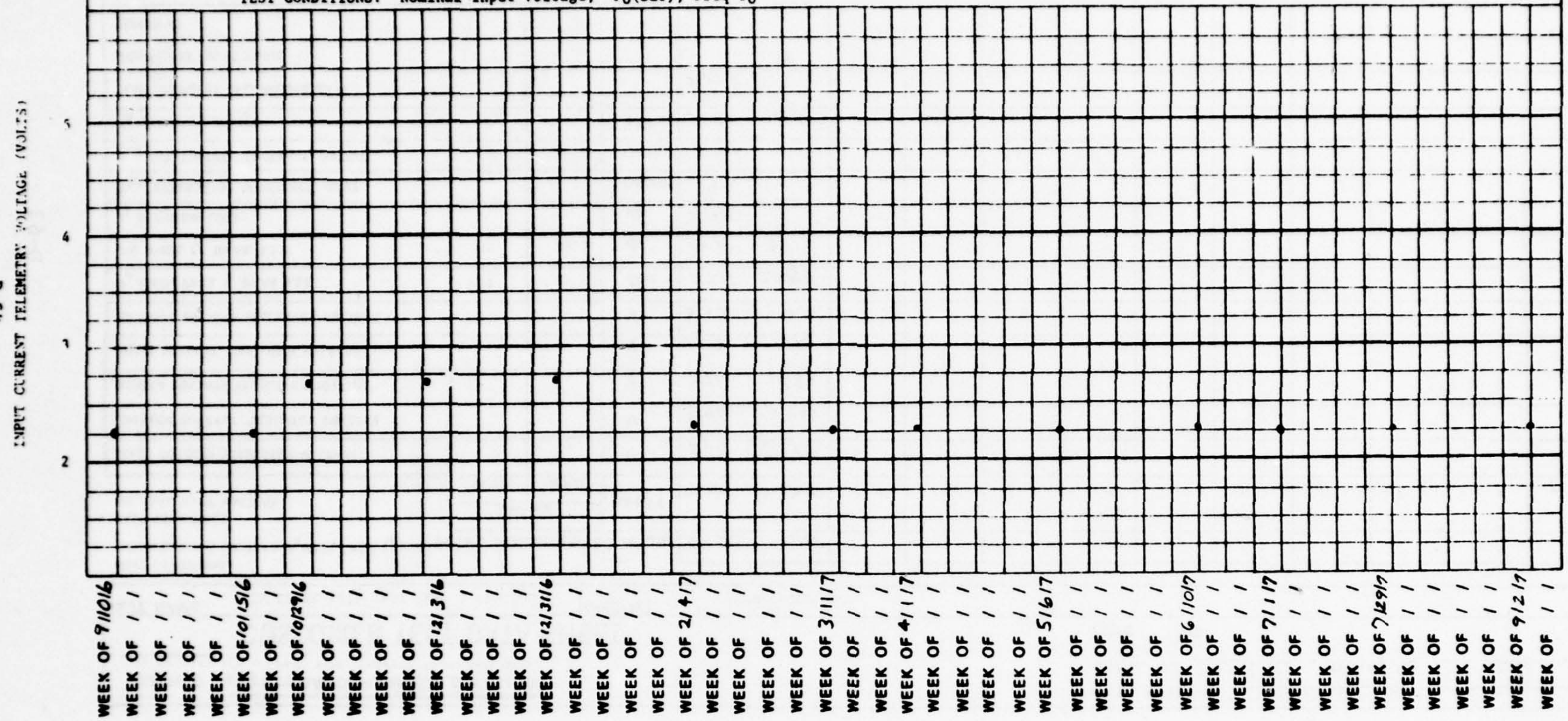
CUSTOMER TEST DATA SHEET

PAGE OF

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE	SPEC. NO. LTPB200300-400

INPUT CURRENT TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



HUGHES **ELECTRON DYNAMICS DIVISION**

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______

MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-2

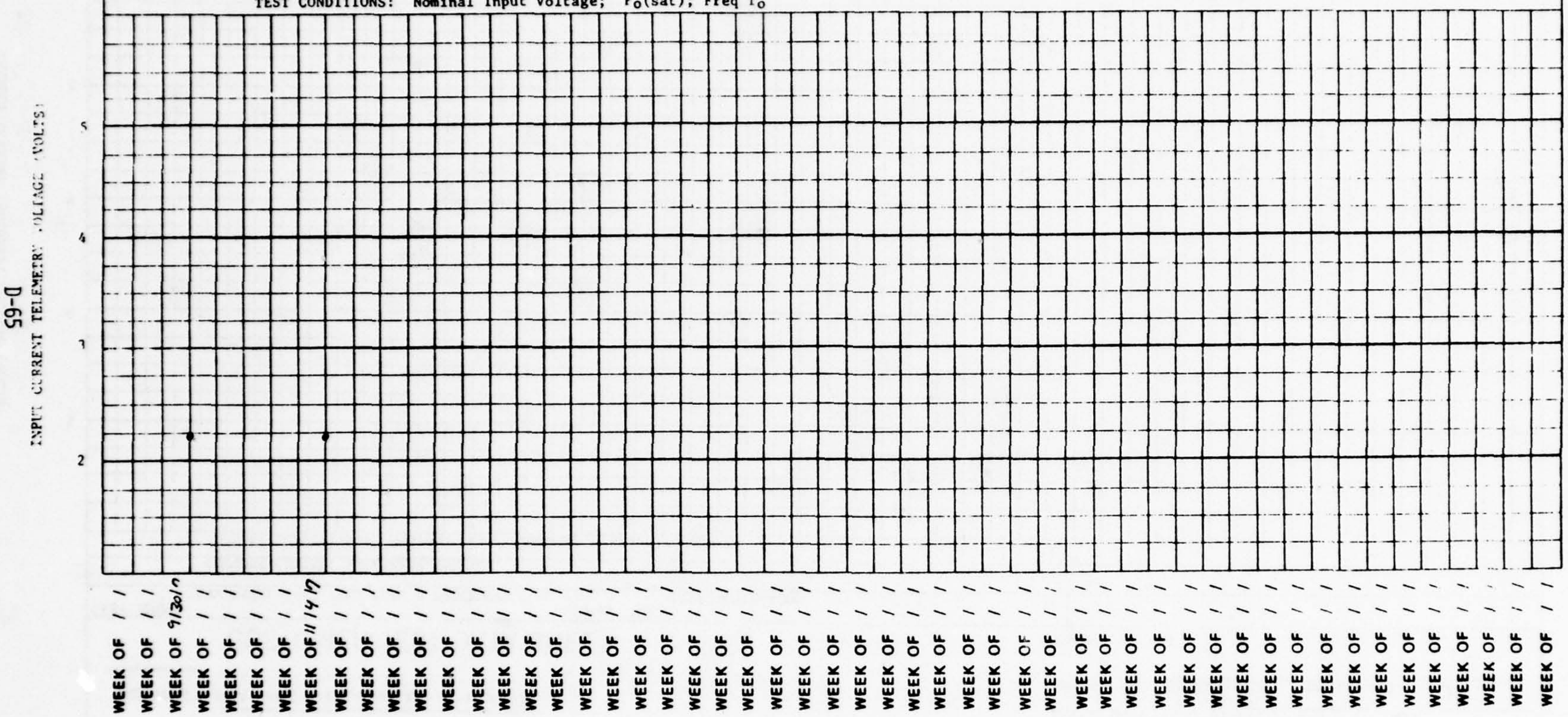
PAGE ____ OF ____

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE

SPEC. NO. LTPB200300-400

INPUT CURRENT TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; $P_o(sat)$; Freq f_o



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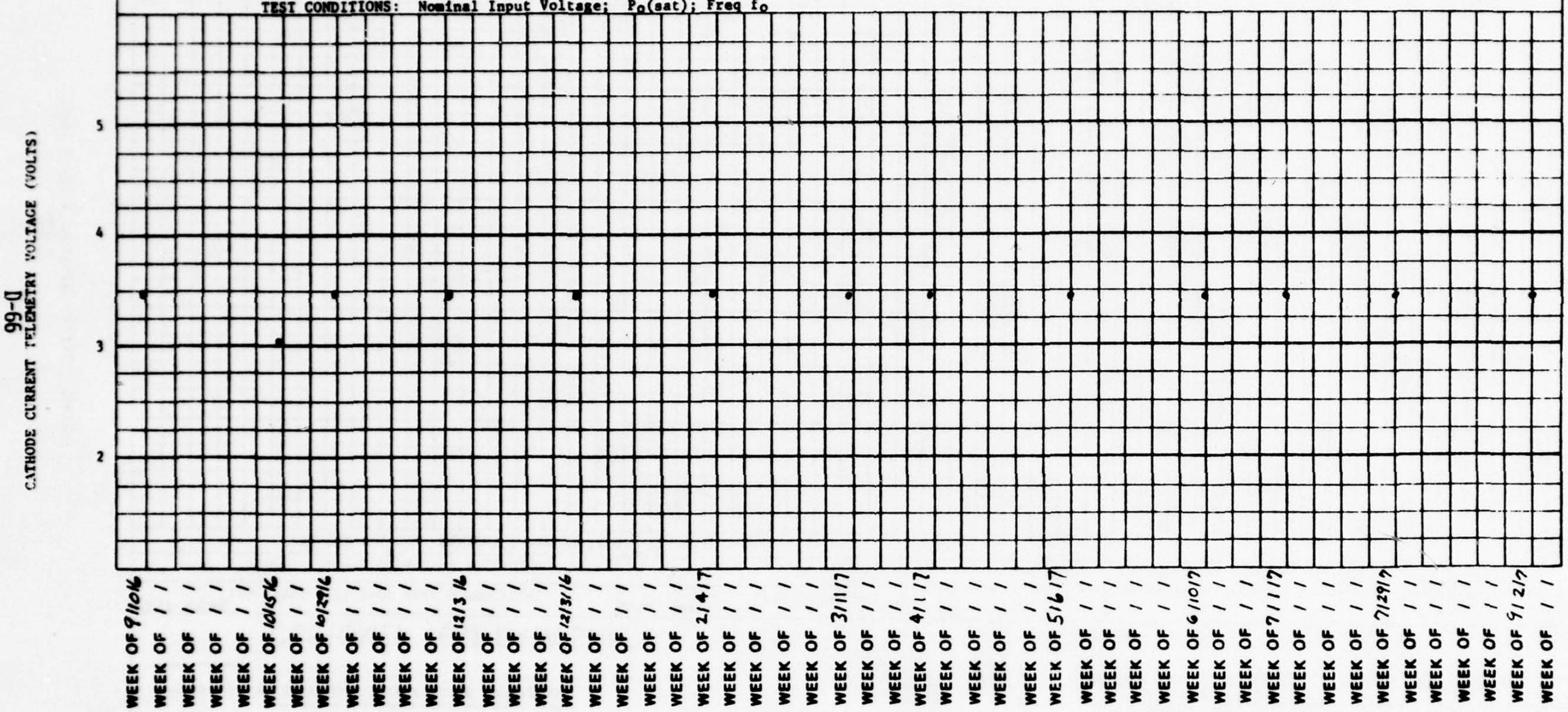
CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.
MODEL NO. B 200300-121 / B200300-122 SERIAL NO. 12-2
PAGE OF

TEST NAME	SPEC. NO.	
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400	

CATHODE CURRENT TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



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HUGHES ***ELECTRON DYNAMICS DIVISION***

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______

MODEL NO. B 200300-121 / B200300-122 SERIAL NO. 12-2

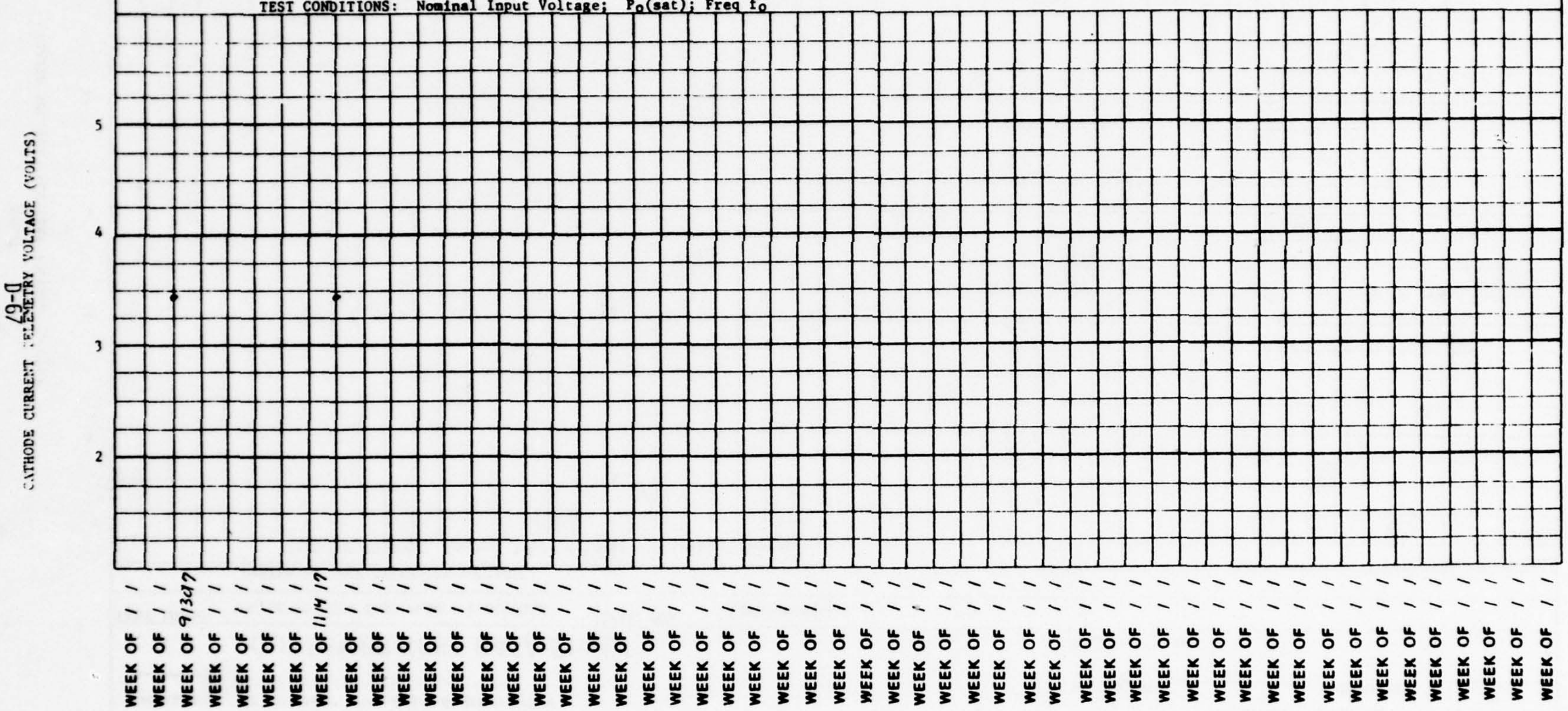
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE

SPEC. NO. LTPB200300-400

CATHODE CURRENT TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



HUGHES ***ELECTRON DYNAMICS DIVISION***

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______

MODEL NO. ______ SERIAL NO. 12-2

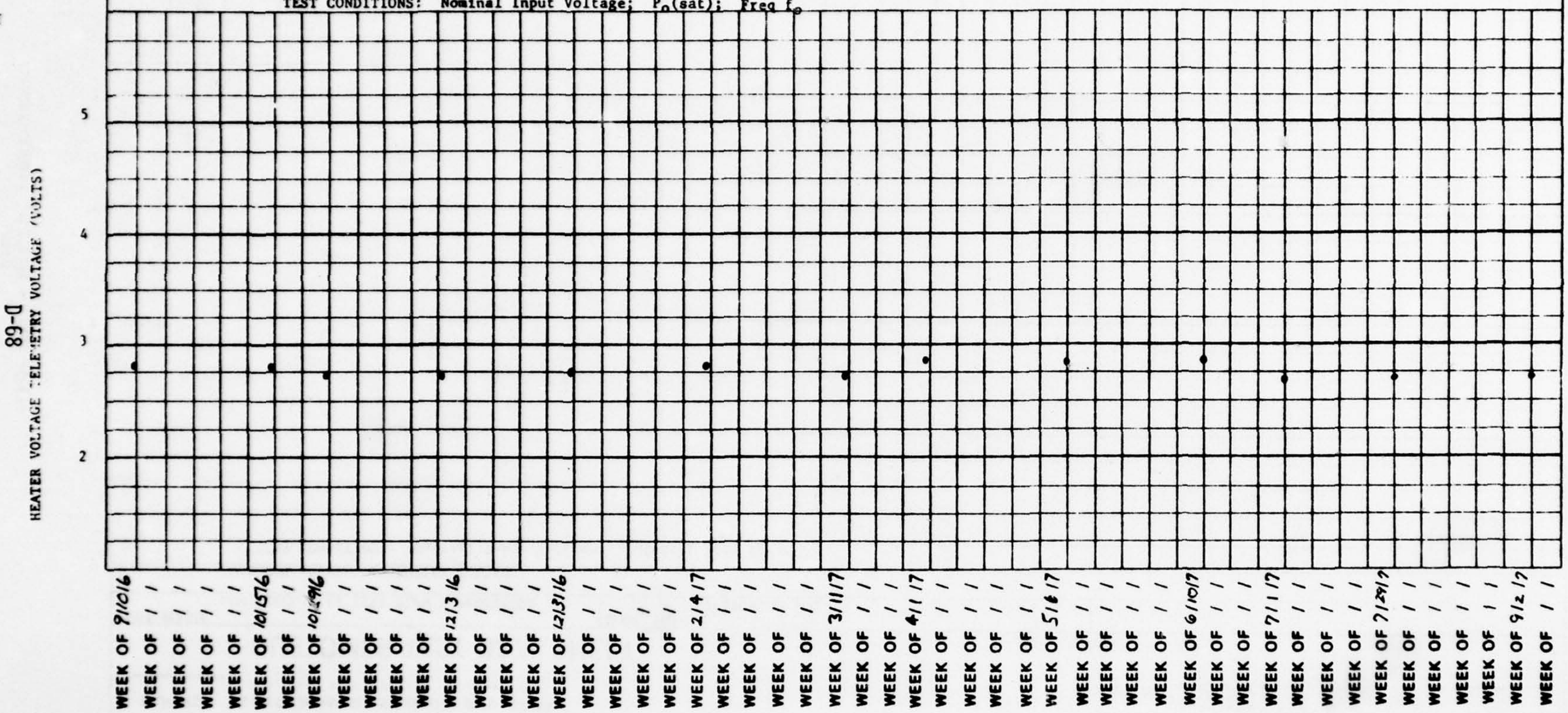
PAGE ___ OF ___

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE

SPEC. NO. LTPB200300-400

HEATER VOLTAGE TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



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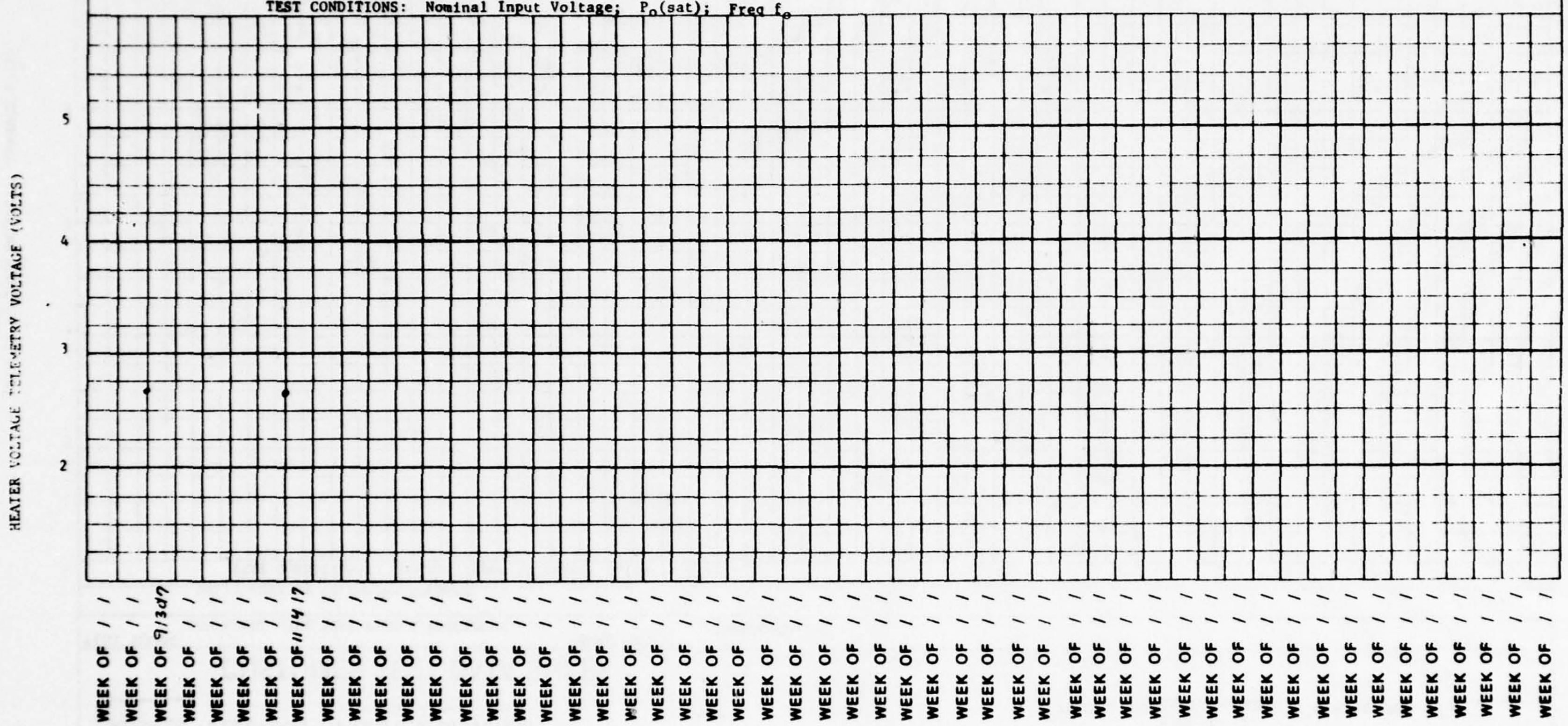
CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ____
MODEL NO. ________ SERIAL NO. 12-2
PAGE OF

TEST NAME	SPEC. NO.	
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400	

HEATER VOLTAGE TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



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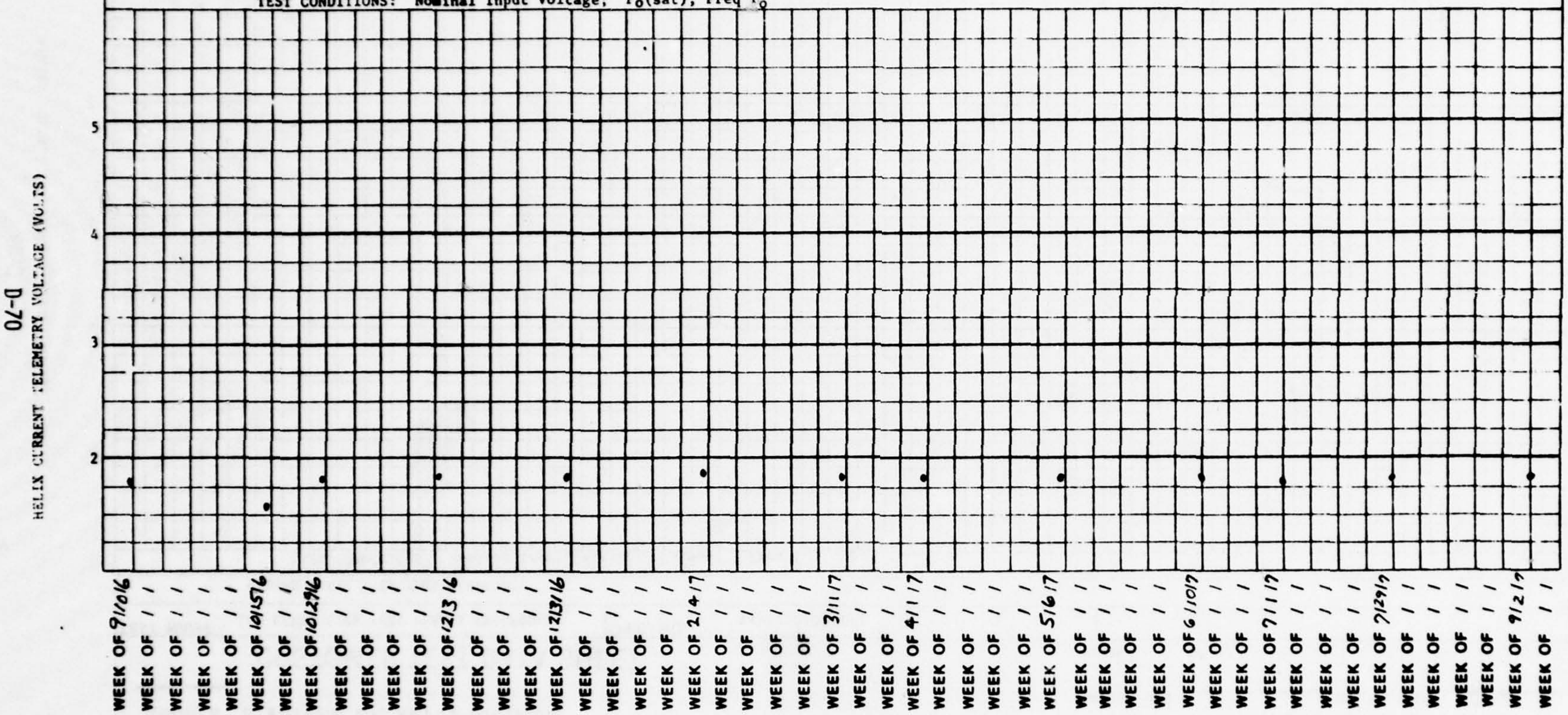
CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______
MODEL NO. B200300-121 ~~B200300-122~~ SERIAL NO. 12-2
PAGE OF

TEST NAME	SPEC. NO.	
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400	

HELIX CURRENT TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



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CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.

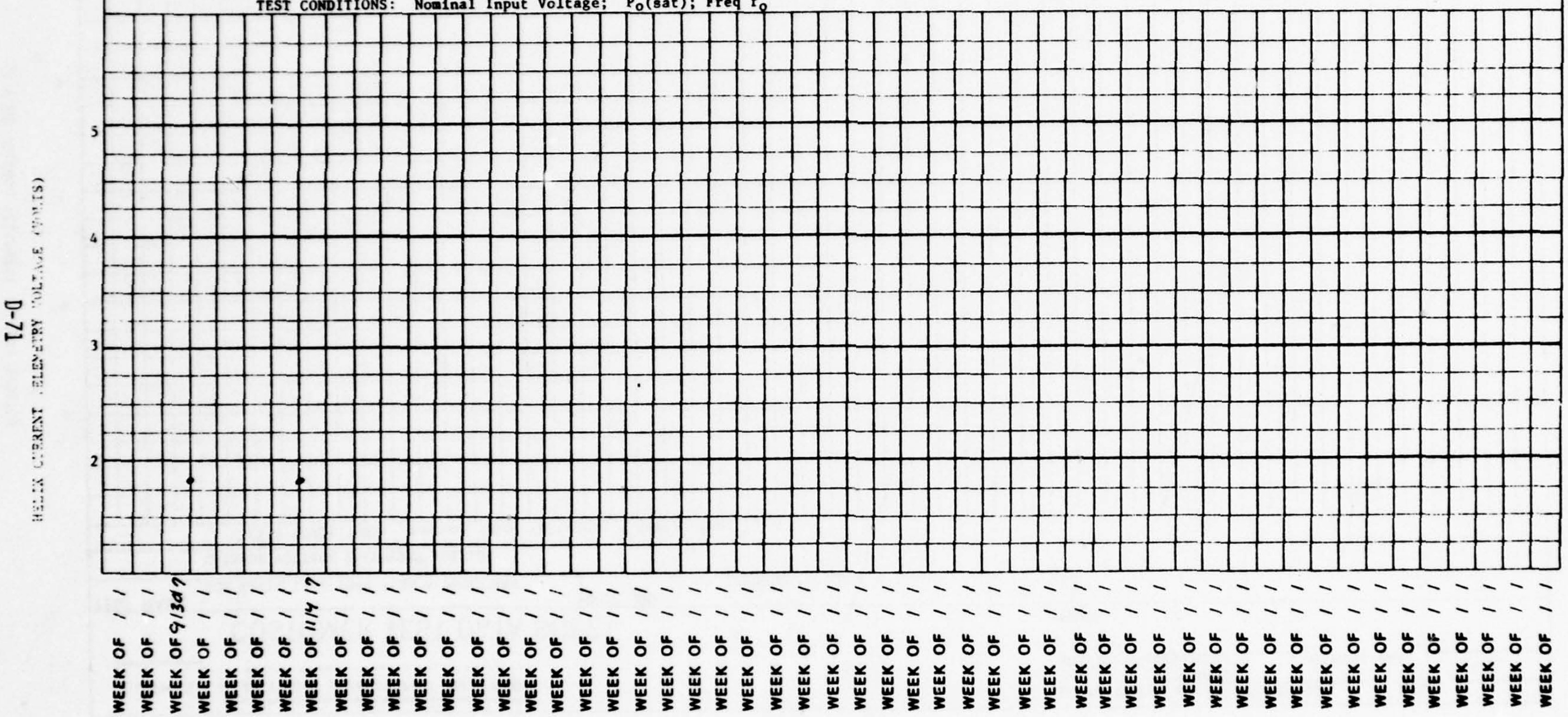
MODEL NO. B200300-121 ~~B200300-122~~ SERIAL NO. 12-2

PAGE OF

TEST NAME	SPEC. NO.	
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400	

HELIX CURRENT TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



HUGHES **ELECTRON DYNAMICS DIVISION**

3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______

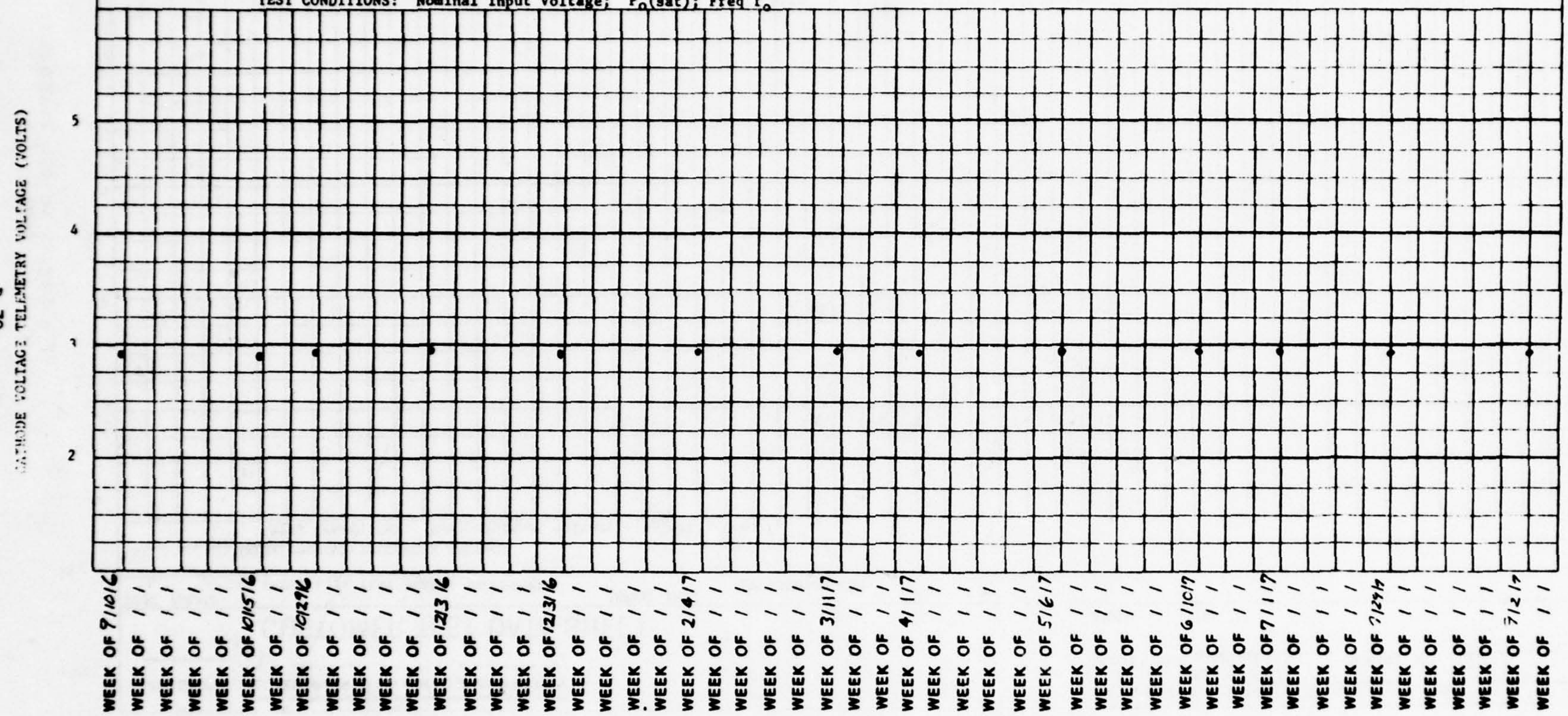
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-2

PAGE ____ OF ____

TEST NAME	SPEC. NO.	
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400	

CATHODE VOLTAGE TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



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CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.

MODEL NO. B200300-121 B200300-122 SERIAL NO. 12-2

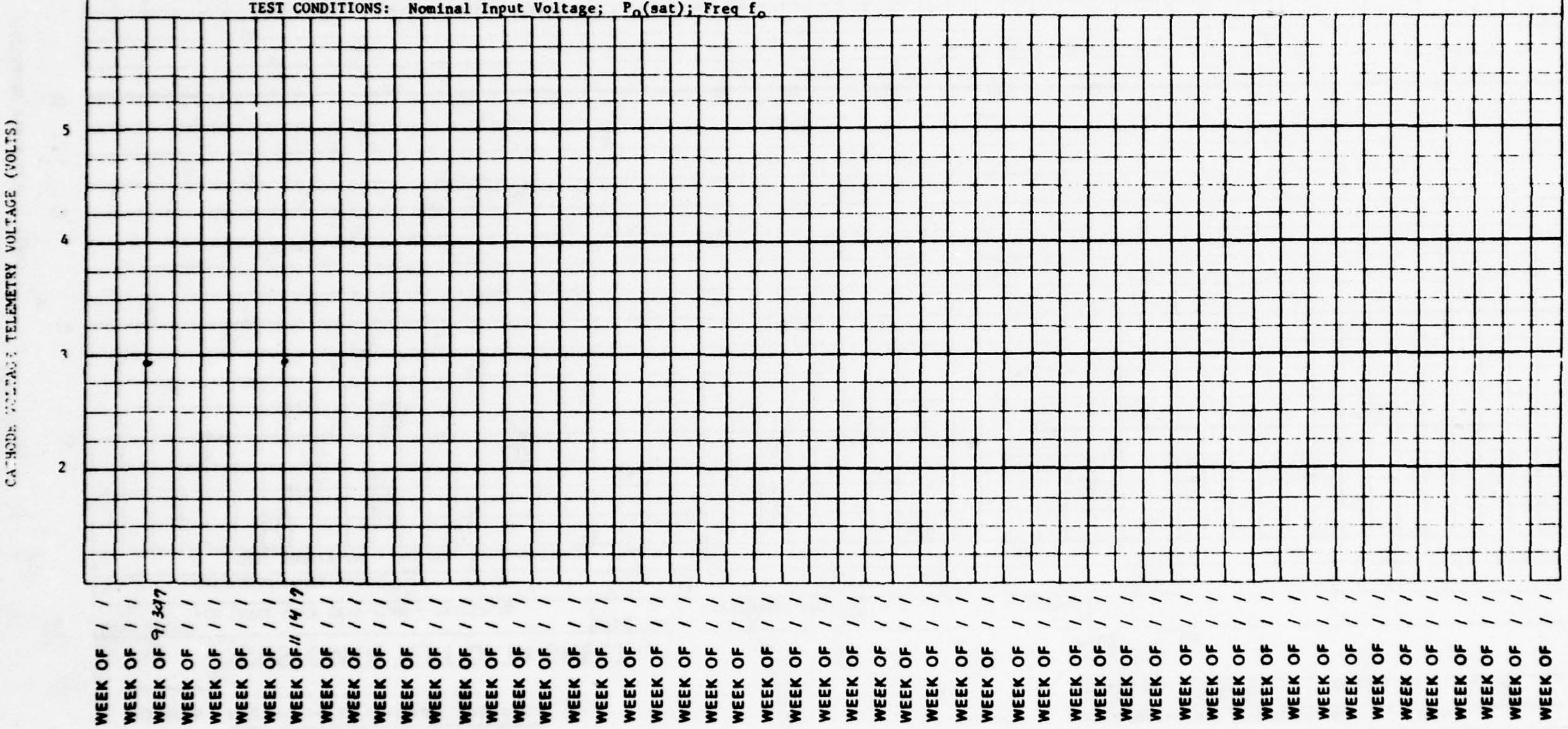
PAGE OF

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE

SPEC. NO. LTPB200300-400

CATHODE VOLTAGE TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



HUGHES ***ELECTRON DYNAMICS DIVISION***

DATA SHEET NO. DSB200300-400 REV. ______

MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-2

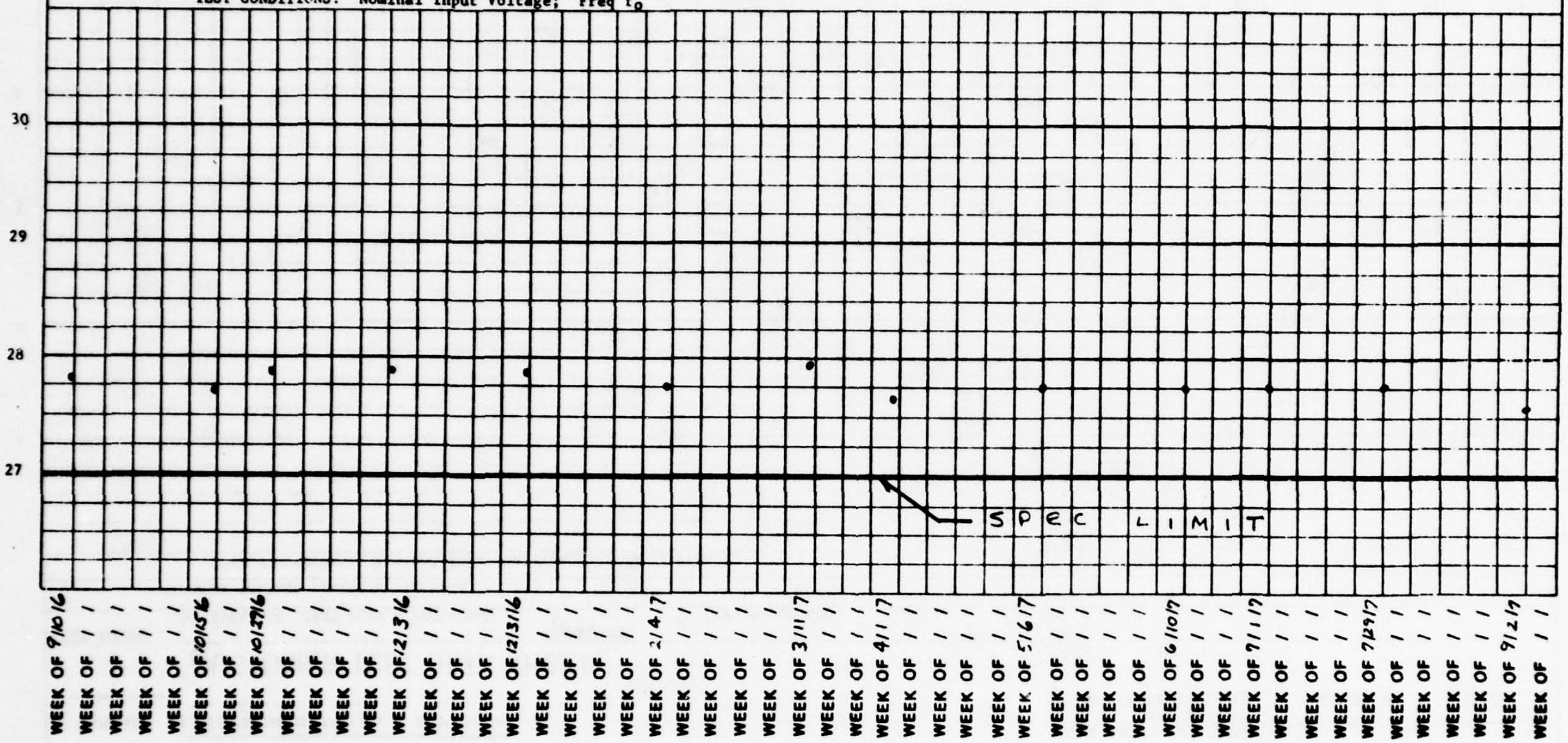
CUSTOMER TEST DATA SHEET

PAGE OF

TEST NAME	SPEC. NO.
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400

SATURATED POWER OUTPUT

TEST CONDITIONS: Nominal Input Voltage; Freq f_o



HUGHES ***ELECTRON DYNAMICS DIVISION***

DATA SHEET NO. DSB200300-400 REV. ______

MODEL NO. B200300-121 / B200300-122 SERIAL NO 12-2

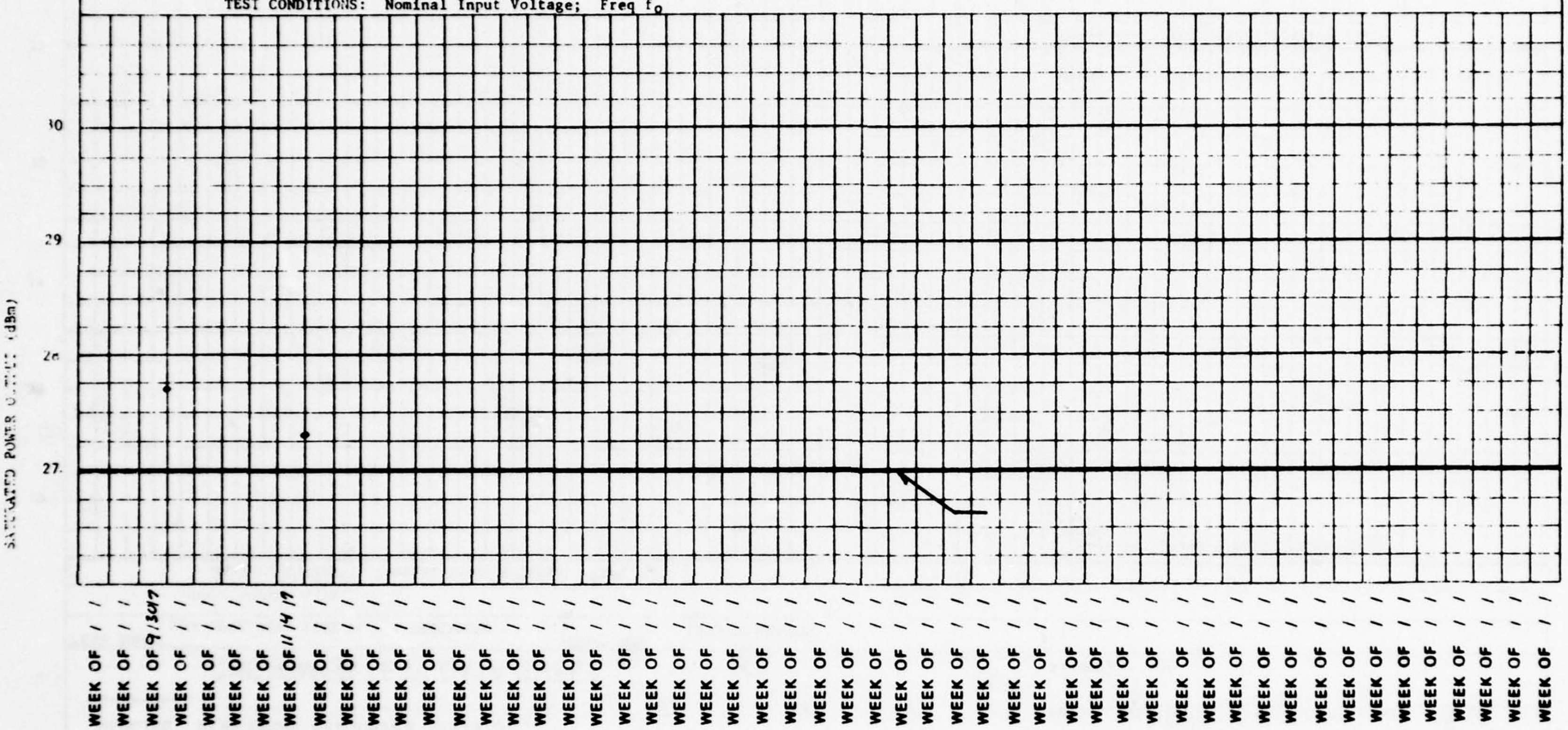
CUSTOMER TEST DATA SHEET

PAGE OF

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC. NO. LTPB200300-400

SATURATED POWER OUTPUT

TEST CONDITIONS: Nominal Input Voltage; Freq f_o



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CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ____
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-2
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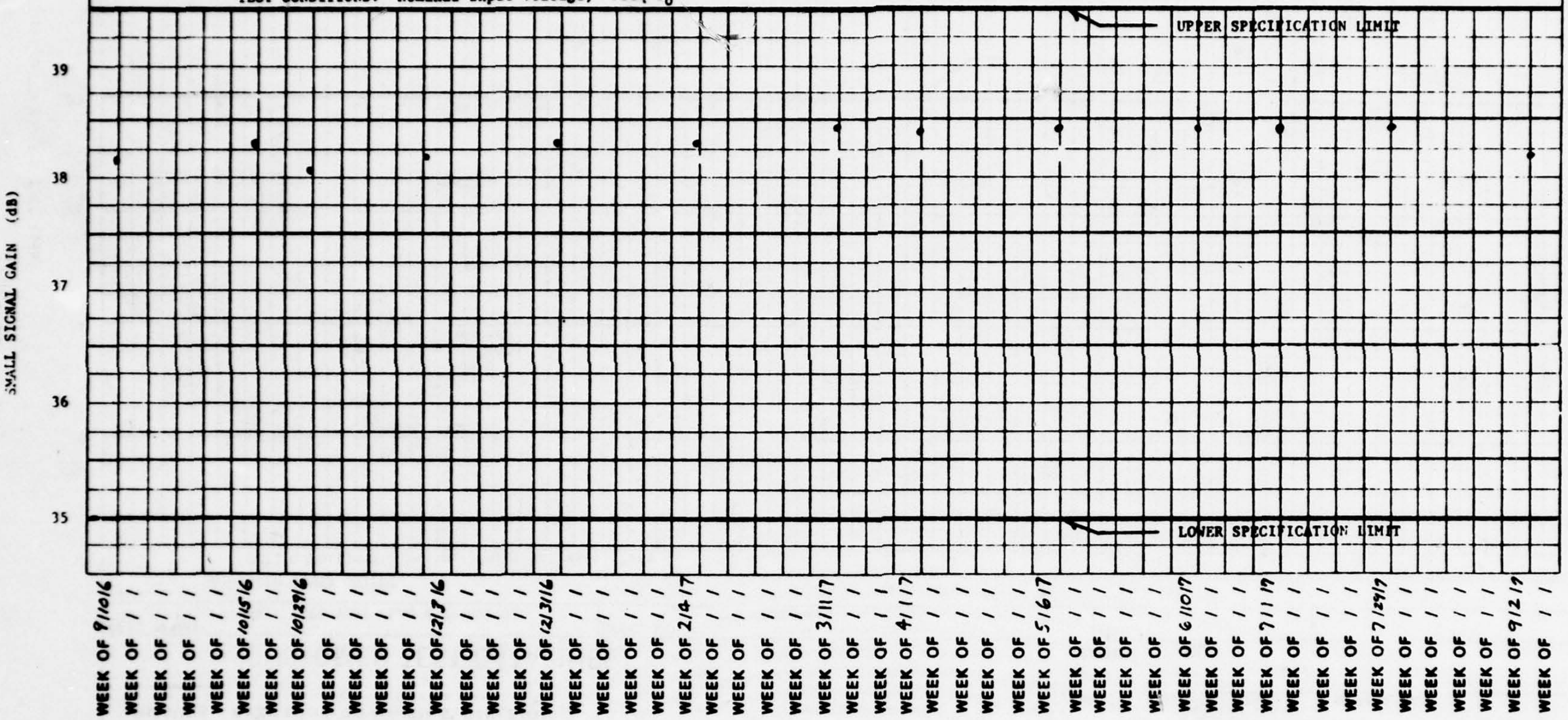
TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC. NO. LTPB200300-400

SMALL SIGNAL GAIN

TEST CONDITIONS: Nominal Input Voltage; Freq f_o



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CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ____

MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-2

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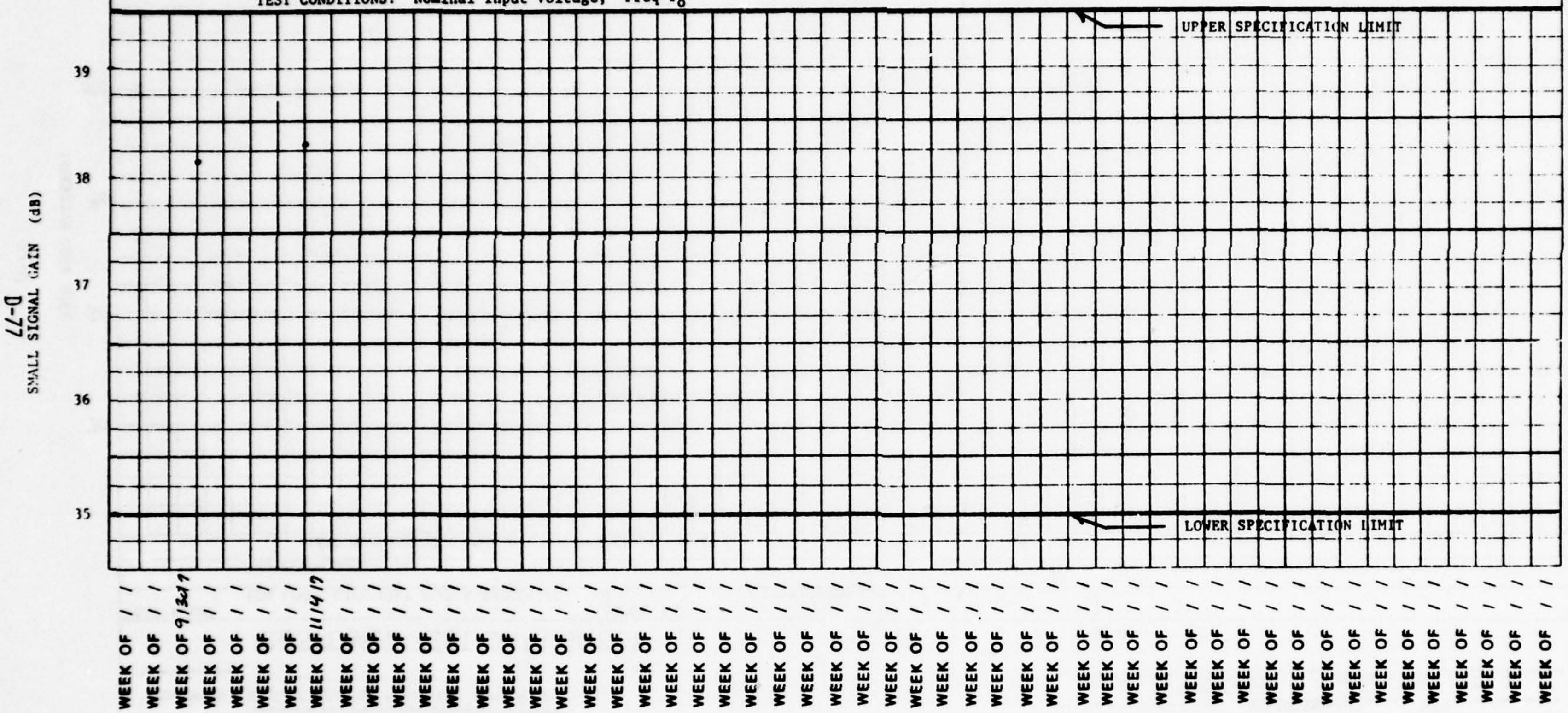
TEST NAME	SPEC. NO.
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400

SMALL SIGNAL GAIN

TEST CONDITIONS: Nominal Input Voltage; Freq f_o



HUGHES *ELECTRON DYNAMICS DIVISION*

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______

MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-2.

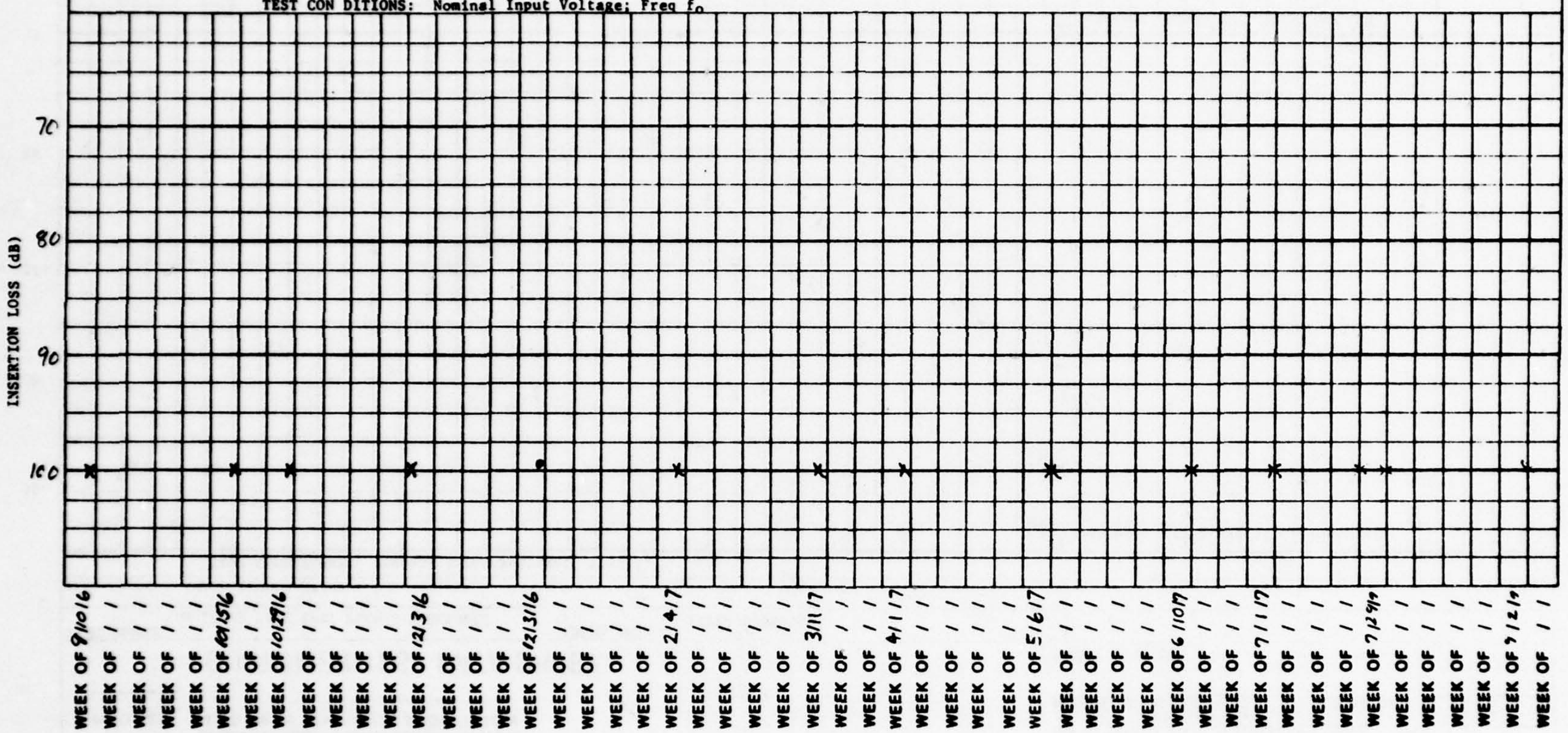
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE

SPEC. NO. LTPB200300-400

INSERTION LOSS

TEST CON DITIONS: Nominal Input Voltage; Freq f_o



x > 100 dB Loss

HUGHES ***ELECTRON DYNAMICS DIVISION***

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______

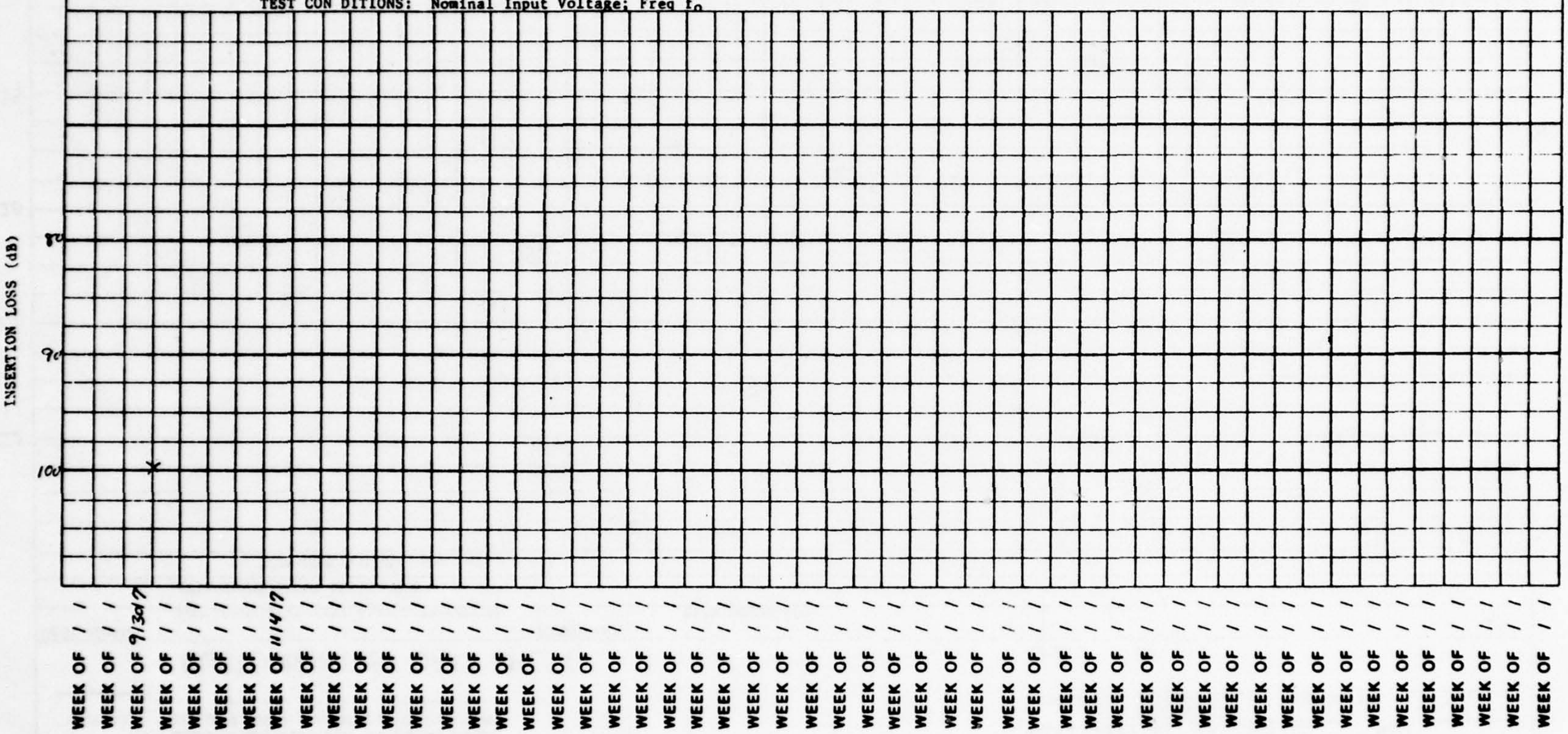
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-2

PAGE ___ OF ___

TEST NAME	SPEC. NO.	
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400	

INSERTION LOSS

TEST CON DITIONS: Nominal Input Voltage; Freq f_o



x = > 100 dB Loss

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2020 W. LOMITA BLVD. TORRANCE, CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______

MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-2

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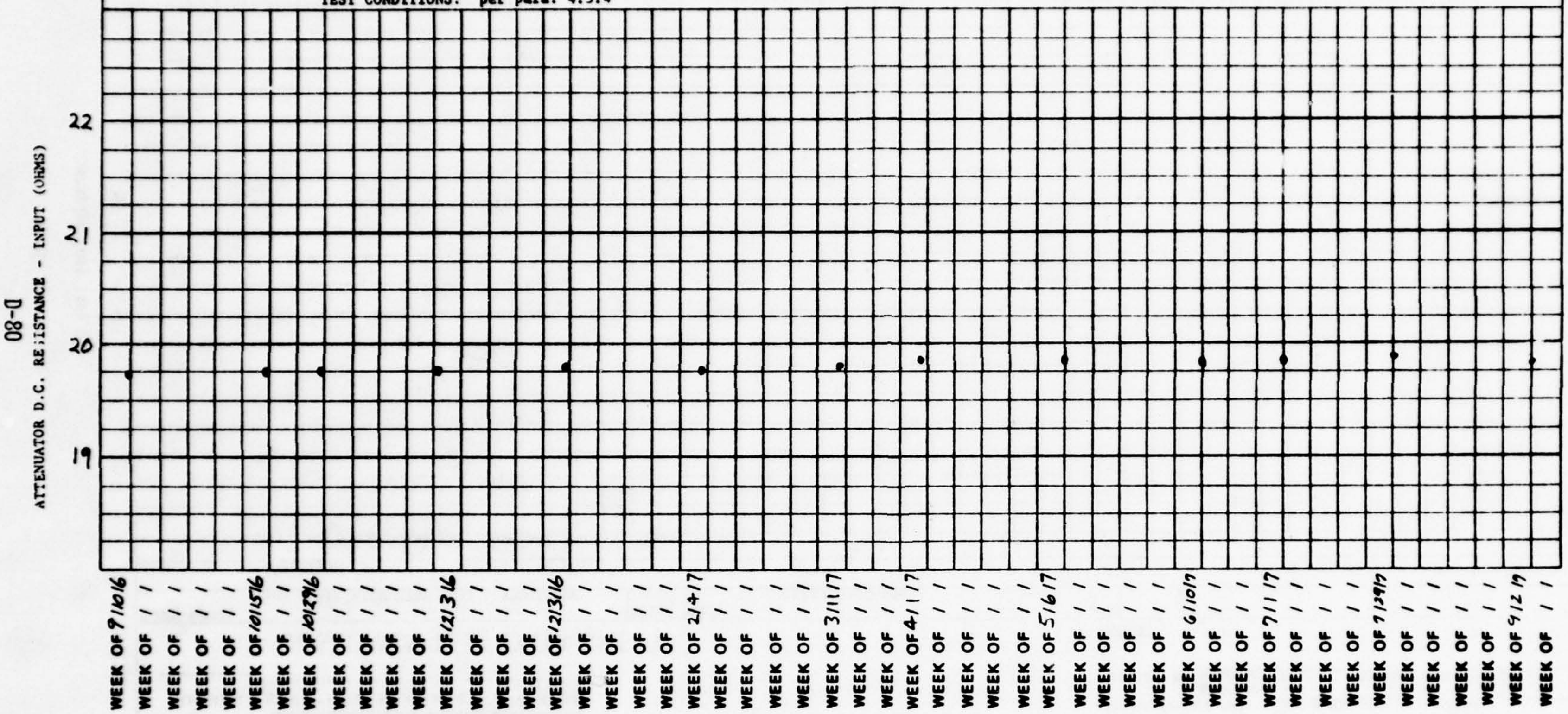
TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE	SPEC. NO. LTPB200300-400
ATTENUATOR INPUT RESISTANCE	
TEST CONDITIONS: per para. 4.3.4	



HUGHES **ELECTRON DYNAMICS DIVISION**

DATA SHEET NO. DSB200300-400 REV. ______

MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-2

CUSTOMER TEST DATA SHEET

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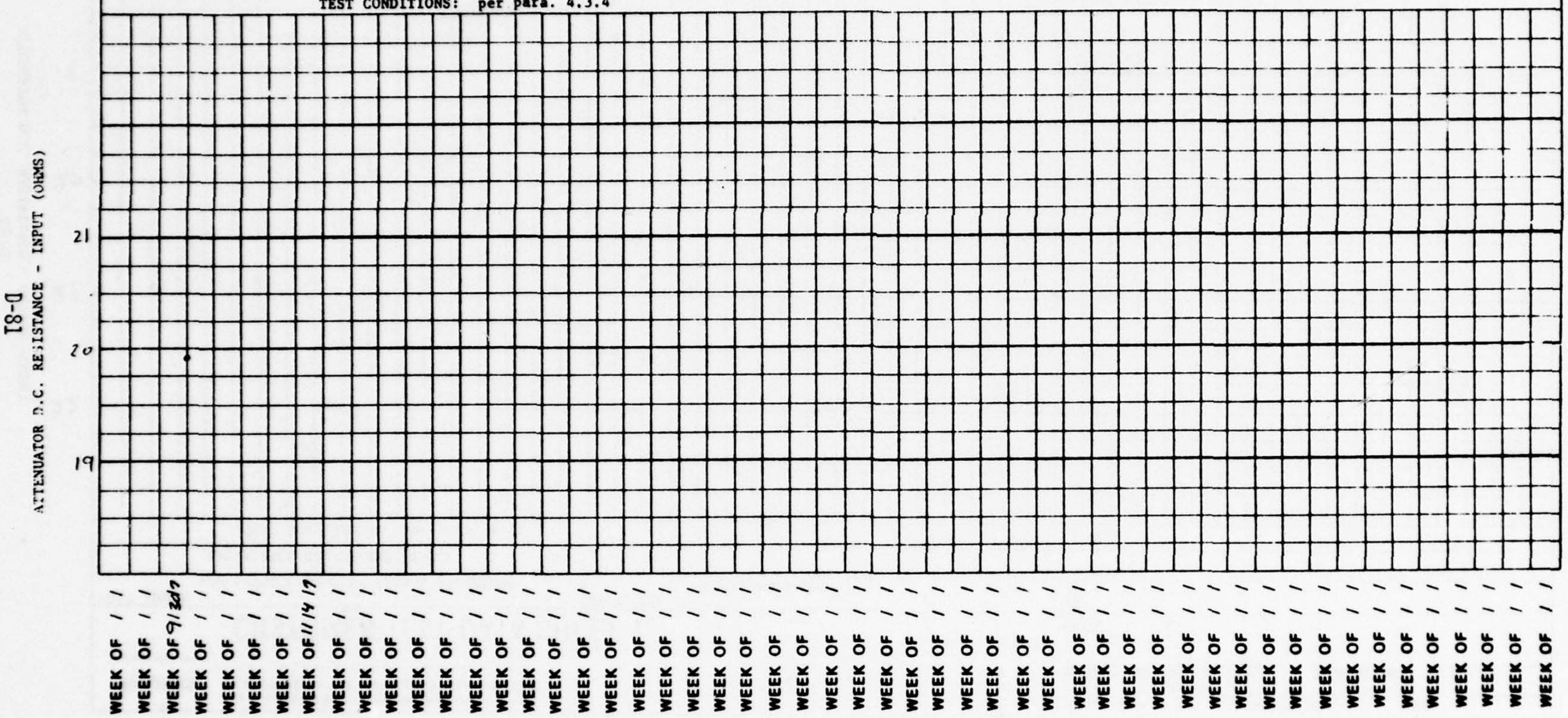
TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE

SPEC. NO. LTPB200300-400

ATTENUATOR INPUT RESISTANCE

TEST CONDITIONS: per para. 4.3.4



HUGHES ***ELECTRON DYNAMICS DIVISION***

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______

MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-2

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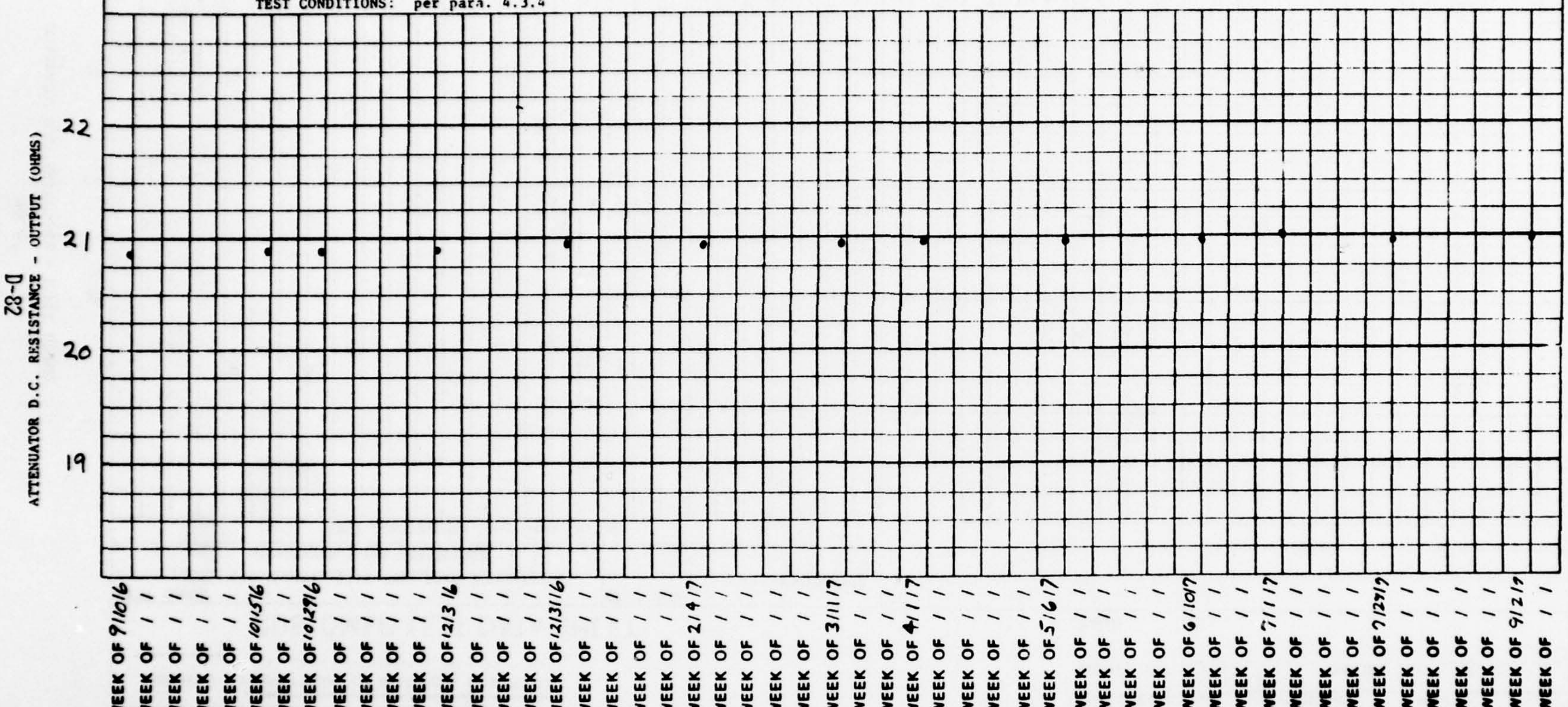
TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE

SPEC. NO. LTPB200300-400

ATTENUATOR OUTPUT RESISTANCE

TEST CONDITIONS: per para. 4.3.4



HUGHES *ELECTRON DYNAMICS DIVISION*

DATA SHEET NO. DSB200300-400 REV. ______

MODEL NO. B200300-121 B200300-122 SERIAL NO. 12-2

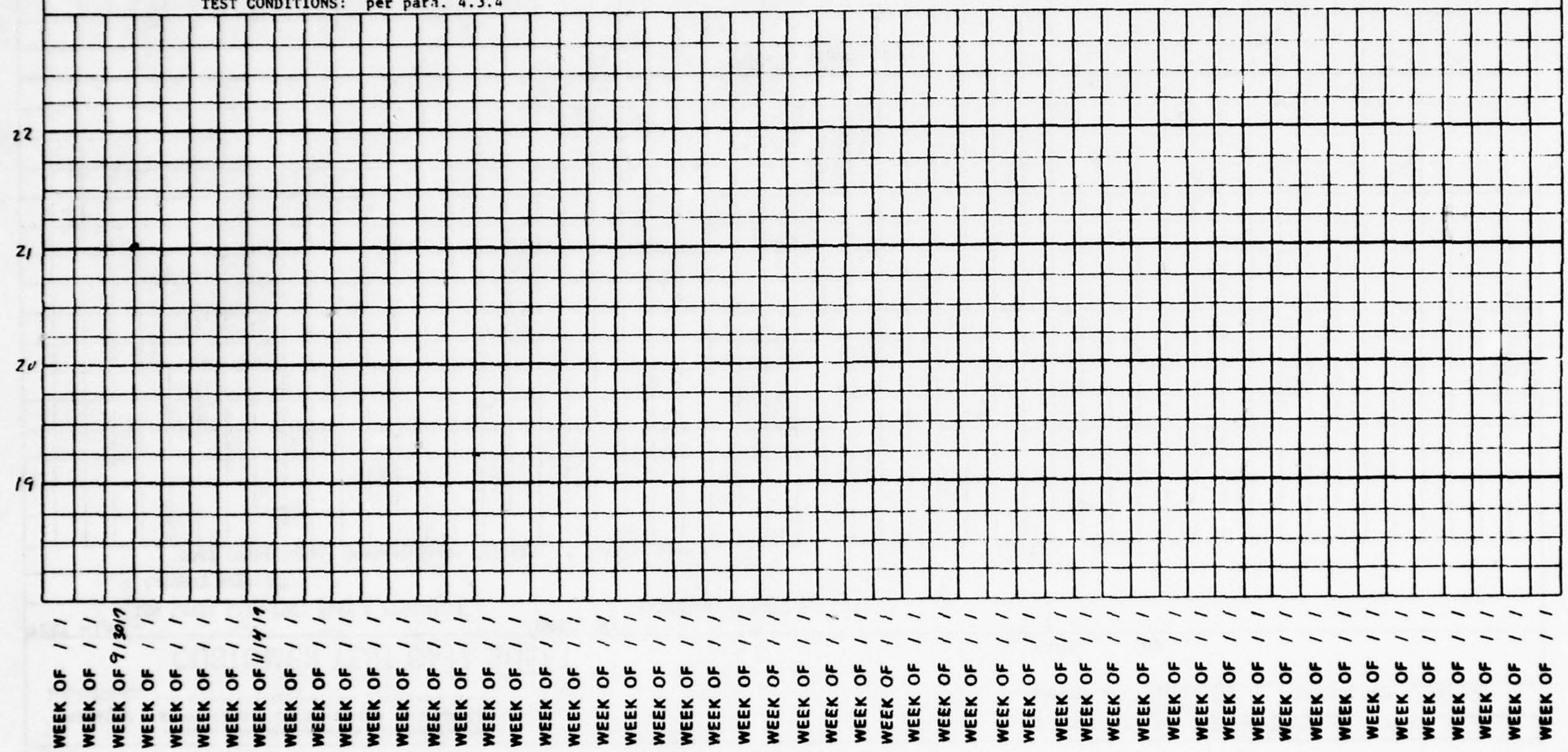
CUSTOMER TEST DATA SHEET

PAGE OF

TEST NAME	SPEC. NO.
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400

ATTENUATOR OUTPUT RESISTANCE

TEST CONDITIONS: per para. 4.3.4



ATTENUATOR D.C. RESISTANCE - OUTPUT (OHMS)

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3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90505

DATA SHEET NO. DSB200300-400 REV. ______

MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-2

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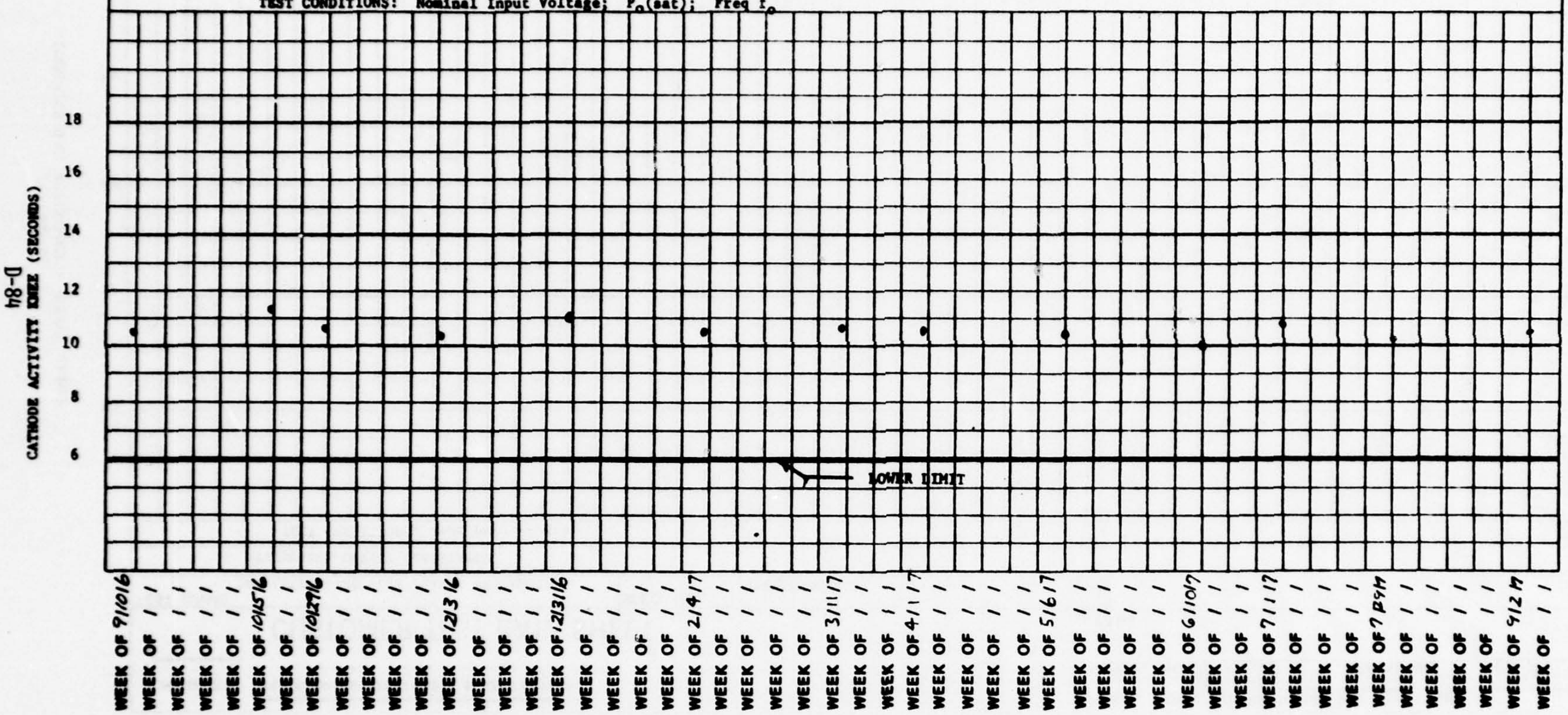
TEST NAME	SPEC. NO.	
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400	

CATHODE ACTIVITY

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



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3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______

MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-2

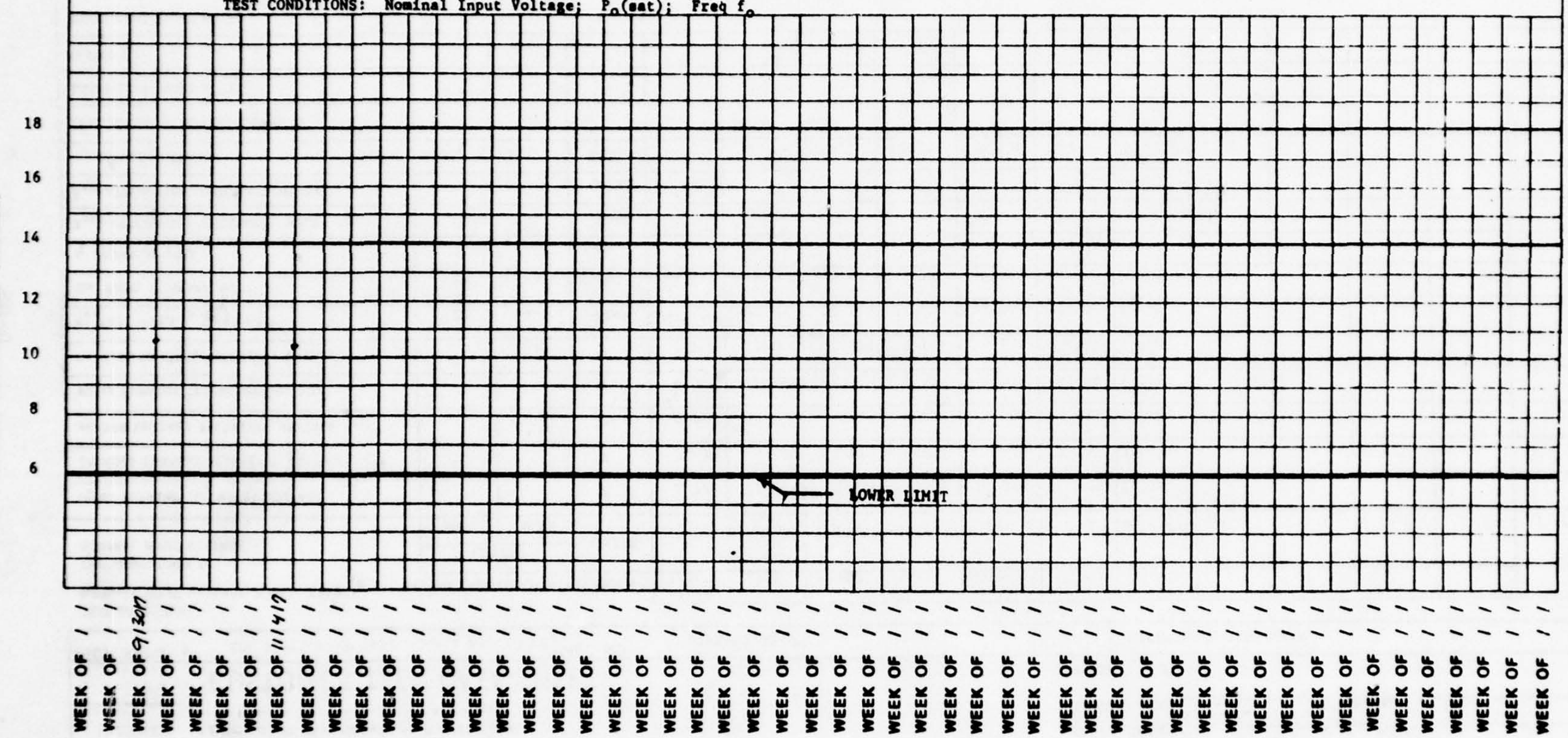
PAGE ___ OF ___

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE

SPEC. NO. LTPB200300-400

CATHODE ACTIVITY

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



HUGHES ELECTRON DYNAMICS DIVISION

3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______

MODEL NO. B200300-121 SERIAL NO. 12-3

PAGE OF

TEST NAME	LOW LEVEL LIFE TEST PLAN & PROCEDURE	SPEC NO.	LTPB200300-400	ACCEPTANCE TEST DATA

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT), FREQ. f_o	TOTAL ACCUMULATED HOURS			PRE-FINAL	FINAL	6.692	13.264	20.010	29.569	56.824					
TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS		UNITS												
	MIN	MAX		1/8/71	1/15/71	11/15/71	8/28/72	6/21/73	8/14/74	11/1/77	/ /	/ /	/ /	/ /	/ /
INPUT CURRENT TELEMETRY VOLTAGE			V	2.326	2.316	2.331	2.335	2.324	2.325	2.298					
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.438	3.439	3.456	3.454	3.443	3.436	3.411					
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.194	3.188	3.020	3.004	3.001	2.985	2.946					
HELIX CURRENT TELEMETRY VOLTAGE			V	1.343	1.365	1.365	1.310	1.270	1.244	1.201					
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	3.159	3.167	3.176	3.164	3.170	3.166	3.910					
P_o (SAT) FREQ. f_o (PARA 4.1.1)	27	--	dbm	27.35	27.40	27.50	27.45	27.50	27.50	27.50					
Gs FREQ. f_o (PARA. 4.1.1)	35	39.5	db	38.55	38.86	39.00	39.20	39.20	39.20	39.30					
I_L INSERTION LOSS			db												
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS												
T_K CATHODE ACTIVITY	6.0	--	SEC		12.1	13.2	12.7	9.5	10.1	9.0					
TEST EQUIPMENT CALIBRATION DATE															
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

TWT has 1328 hours prior to start of life test.

BENCH FUNCTIONAL TEST DATA

FINAL TEST

LOW LEVEL LIFE TEST PLAN AND PROCEDURE

SPEC: LTPB 200300-400

SERIAL NO. 12-3

11-4-77

SPEC. PARA #	TEST DESIGNATION	SPEC LIMITS MINIMUM	SPEC LIMITS MAXIMUM	DATA	COMMENTS (UNITS)
4.1	CATHODE ACTIVITY	6.0		9.0	SECONDS
.2	COMMAND SIGNAL				
4.3	INRUSH CURRENT				
a)	TIME INTEGRAL > Iss, t=3msec		.0037	0.0019	AMP-SEC
b)	Imax		1.8	0.64	AMPS
c)	I WITHIN ±3% Iss AT 150 SECONDS				
4.4	INPUT AND OUTPUT REFLECTION				
a)	OUTPUT (HOT)		1.25:1	1.13:1	VSWR
b)	OUTPUT (COLD)		1.25:1	1.13:1	
c)	INPUT (COLD)		1.25:1	1.06:1	
d)	INPUT (HOT)		1.25:1	1.06:1	
4.5	SATURATED POWER OUTPUT				
a)	TELEMETRY VOLTAGES				VOLTS
	1) INPUT CURRENT TLM V			2.298	
	2) CATHODE CURRENT TLM V			3.411	
	3) HEATER VOLTAGE TLM V			2.946	
	4) HELIX CURRENT TLM V			1.201	
	5) CATHODE VOLTAGE TLM V			3.910	
b)	P_o (SAT.)	27		27.50	dBm
4.6	SATURATED POWER OUTPUT AND INPUT POWER VS. INPUT VOLTAGE				
a)	Vin = 23 ±.5V DC				
	1) P_o (SAT.)	27		27.50	dBm
	2) Iin			0.254	AMPS
	3) Pin (DC)			5.84	WATTS
b)	Vin = 33 ±.5V DC				
	1) P_o (SAT.)	27		27.50	dBm
	2) Iin			0.180	AMPS
	3) Pin (DC)			5.94	WATTS

S/N________________

SPEC PARA #	TEST DESIGNATION	SPEC LIMITS MINIMUM	SPEC LIMITS MAXIMUM	DATA 0	DATA 20010	DATA 56824 HOURS
4.7	SMALL SIGNAL GAIN					
a)	Gss AT P_o 10dB BELOW P_o (SAT.), dB	35	39.5	38.86	39.2	39.30
b)	STEPS 4 AND 5 (SEE ATP)			✓	✓	✓
4.7.1	GAIN SLOPE, dB/Mhz					
a)	Vin = 23 ±.5V DC					
	1) ∠Gss f_1 to f_2		0.015	0.0085	0.001	0.006
	2) ∠Gss f_1 to f_3		0.030	0.001	0.001	0.004
	3) ∠Gss f_2 to f_4		0.030	0.001	0.001	0.0016
b)	Vin = 28 ±.5V DC					
	1) ∠Gss f_1 to f_2		0.015	0.0085	0.001	0.006
	2) ∠Gss f_1 to f_3		0.030	0.001	0.001	0.004
	3) ∠Gss f_2 to f_4		0.030	0.001	0.001	0.0016
c)	Vin = 33 ±.5V DC					
	1) ∠Gss f_1 to f_2		0.015	0.0085	0.001	0.006
	2) ∠Gss f_1 to f_3		0.030	0.001	0.001	0.004
	3) ∠Gss f_2 to f_4		0.030	0.001	0.001	0.0016
4.7.2	GAIN FLATNESS					
a)	Vin = 23 ±.5V DC 1) GAIN VARIATION f_1 to f_2, dB		±0.2	±0.19	±0.12	±0.18
b)	Vin = 28 ±.5V DC 1) GAIN VARIATION f_1 to f_2, dB		±0.2	±0.19	±0.12	±0.18
c)	Vin = 33 ±.5V DC 1) GAIN VARIATION f_1 to f_2, dB		±0.2	±0.19	±0.12	±0.18
4.8	NOISE FIGURE					
a)	N.F., dB		25	20.3	22.0	21.0
4.9	INTERMODULATION DISTORTION					
a)	I.M. DISTORTION, dB	28		28.8	29.0	29.0
4.10	TIME DELAY DISTORTION					
a)	T.D. f_1 to f_2 ANY 10MHZ LINEAR INTERVAL, ns/Mhz		0.10	0.0083	0.01	0.01
b)	T.D. f_1 to f_2 PARABOLIC PORTION OF CURVE, ns/Mhz^2		0.01	0.0013	0.001	0.001

S/N________________________

SPEC RA #	TEST DESIGNATION	SPEC LIMITS MINIMUM	SPEC LIMITS MAXIMUM	DATA 0	DATA 20010	DATA 56824 HOURS
4.11	PHASE SHIFT, FREQ. f_o, +14dBm ≤ P_o ≤ +23dBm , °/dB					
a)	+21.75dBm ≤ P_o ≤ +23dBm		2.0	1.2	1.0	0.83
b)	+17dBm P_o +21.75dBm		1.5	1.2	.84	2.0
c)	+14dBm P_o +17dBm		1.0	0.7	.77	0.99
4.12	STABILITY (MISMATCH) NO P_o FROM INPUT AND OUTPUT OTHER THAN INHERENT NOISE			✓	✓	✓
4.13	SPURIOUS OUTPUT COHERENT COMPONENTS					
a)	P_o (HARMONIC) , dB	13		19.0	20.0	>23
4.13.1	SPURIOUS OUTPUT INCOHERENT COMPONENTS					
a)	P_o (NON-HARMONIC)	60dB BELOW FUNDAMENTAL		✓	✓	✓
4.13.2	SPURIOUS OUTPUT (AM)			✓	✓	✓
4.13.3	SPURIOUS OUTPUT (PM)			✓	✓	✓

HUGHES *ELECTRON DYNAMICS DIVISION*

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______

MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-3

PAGE ___ OF ___

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT), FREQ. f_o			TOTAL ACCUMULATED HOURS	0	167.7	433	572	906	1180.1	1418.6	1647	2076	2624	2956	3364
TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	week of 2/1/71	week of 2/8/71	week of 2/19/71	week of 2/25/71	week of 3/11/71	week of 3/22/71	week of 4/2/71	week of 4/12/71	week of 4/30/71	week of 5/23/71	week of 6/7/71	week of 6/24/71
INPUT CURRENT TELEMETRY VOLTAGE			V	2.316	2.324	2.337	2.337	2.325	2.327	2.338	2.332	2.332	2.337	2.324	2.336
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.439	3.435	3.445	3.444	3.442	3.438	3.439	3.445	3.443	3.440	3.438	3.446
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.180	3.146	3.138	3.134	3.126	3.124	3.115	3.104	3.128	3.126	3.104	3.096
HELIX CURRENT TELEMETRY VOLTAGE			V	1.365	1.399	1.403	1.413	1.386	1.376	1.368	1.389	1.333	1.326	1.317	1.329
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	3.167	3.159	3.154	3.155	3.165	3.158	3.154	3.159	3.155	3.155	3.164	3.160
P_o (SAT) FREQ. f_o (PARA 4.1.3)	27	--	dbm	27.40	27.30	27.35	27.25	27.35	27.47	27.27	27.24	27.75	27.65	27.65	27.60
Gss FREQ. f_o (PARA. 4.1.1)	35	39.5	db	38.86	38.64	38.56	38.60	38.74	38.39	38.00	38.60	38.90	38.99	38.80	38.89
L_L INSERTION LOSS			db												
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS												
T_K CATHODE ACTIVITY	6.0	--	SEC												
TEST EQUIPMENT CALIBRATION DATE										3/31/71		4/28/71			
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES *ELECTRON DYNAMICS DIVISION*

... TORRANCE, CALIFORNIA ...

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______

MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-3

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TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE — SPEC NO. LTPB200300-400

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o	LIMITS MIN	LIMITS MAX	UNITS	3560	3796	4031	4172	4305	4445	4619	4786	4925	5121	5264	5431
TEST CONDITIONS NOMINAL INPUT VOLTAGE				week of 7/2/71	week of 7/14/71	week of 7/25/71	week of 7/31/71	week of 8/6/71	week of 8/12/71	week of 8/19/71	week of 8/26/71	week of 9/1/71	week of 9/10/71	week of 9/16/71	week of 9/23/71
INPUT CURRENT TELEMETRY VOLTAGE			V	2.331	2.339	2.331	2.335	2.326	2.349	2.333	2.330	2.339	2.341	2.341	2.333
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.440	3.448	3.455	3.458	3.449	3.463	3.453	3.458	3.457	3.454	3.454	3.453
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.106	3.072	3.077	3.053	3.033	3.024	3.034	3.031	3.043	3.031	3.028	3.047
HELIX CURRENT TELEMETRY VOLTAGE			V	1.340	1.346	1.364	1.399	1.381	1.470	1.333	1.381	1.375	1.367	1.360	1.350
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	3.161	3.164	3.161	3.163	3.171	3.160	3.160	3.164	3.160	3.161	3.162	3.162
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	27.60	27.65	27.70	27.65	27.55	27.75	27.75	27.88	27.70	27.60	27.55	27.75
Gss FREQ. f_o (PARA. 4.3.1)	35	39.5	db	38.94	39.09	39.09	38.59	39.04	39.06	39.06	39.01	39.00	39.01	39.00	39.02
I_L INSERTION LOSS			db												
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS												
T_K CATHODE ACTIVITY	6.0	--	SEC												
TEST EQUIPMENT CALIBRATION DATE						7/21/71									
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES **ELECTRON DYNAMICS DIVISION**

3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-3
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TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE — SPEC NO. LTPB200300-400

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT), FREQ. f_o	LIMITS		UNITS												
TOTAL ACCUMULATED HOURS				5598	5762	592[illegible]	6095	6240	6430	6600	6786	6902	7069	7282	7450
TEST CONDITIONS NOMINAL INPUT VOLTAGE	MIN	MAX		week of 9/30/71	week of 10/7/71	week of 10/14/71	week of 10/21/71	week of 10/27/71	week of 11/4/71	week of 11/11/71	week of 11/19/71	week of 11/24/71	week of 12/1/71	week of 12/10/71	week of 12/17/71
INPUT CURRENT TELEMETRY VOLTAGE			V	2.341	2.328	2.339	2.339	2.339	2.340	2.334	2.331	2.337	2.335	2.337	2.331
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.451	3.45[illegible]	3.459	3.455	3.459	3.455	3.453	3.455	3.457	3.455	3.455	3.454
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.038	3.017	3.026	.3.017	3.025	3.020	3.033	3.028	3.043	3.047	3.041	3.053
HELIX CURRENT TELEMETRY VOLTAGE			V	1.345	1.371	1.376	1.390	1.366	1.371	1.340	1.355	1.337	1.334	1.361	1.325
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	3.161	3.174	3.162	3.164	3.164	3.162	3.165	3.161	3.160	3.160	3.163	3.162
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	27.80	27.80	27.85	27.80	27.80	27.80	27.55	27.55	27.65	27.65	27.65	27.55
Gs FREQ. f_o (PARA. 4.3.1)	35	39.5	db	39.00	38.90	39.20	39.00	38.90	39.00	39.10	39.00	39.00	38.90	39.00	39.00
L_i INSERTION LOSS			db												
R_{AHI} ATTENUATOR RESISTANCE, INPUT			OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS												
T_K CATHODE ACTIVITY	6.0	--	SEC												
TEST EQUIPMENT CALIBRATION DATE									11/2/71						
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES ELECTRON DYNAMICS DIVISION

TORRANCE, CALIFORNIA

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.

MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-3

PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o			TOTAL ACCUMULATED HOURS	7519	7712	7880	8044	8236	8382	8574	8718	8885	9046	9235	9386
TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	week of 12/22/71	week of 12/30/71	week of 1/6/72	week of 1/13/72	week of 1/22/72	week of 1/27/72	week of 2/4/72	week of 2/10/72	week of 2/17/72	week of 2/24/72	week of 3/3/72	week of 3/9/72
INPUT CURRENT TELEMETRY VOLTAGE			V	2.330	2.337	2.335	2.34	2.33	2.33	2.33	2.33	2.33	2.33	2.33	2.33
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.444	3.464	3.455	3.46	3.45	3.46	3.46	3.46	3.46	3.45	3.46	3.46
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.055	3.041	3.050	3.05	3.05	3.06	3.05	3.09	3.07	3.06	3.05	3.06
HELIX CURRENT TELEMETRY VOLTAGE			V	1.335	1.346	1.333	1.35	1.34	1.33	1.34	1.32	1.33	1.30	1.32	1.33
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	3.173	3.164	3.170	3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.16
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	27.55	27.60	27.65	27.60	27.60	27.45	27.45	27.45	27.40	27.55	27.55	27.40
Gss FREQ. f_o (PARA. 4.3.1)	35	39.5	db	39.00	39.00	39.00	38.95	39.00	39.00	39.00	39.10	39.00	39.20	39.00	39.20
I_L INSERTION LOSS			db												
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS												
T_K CATHODE ACTIVITY	6.0	--	SEC												
TEST EQUIPMENT CALIBRATION DATE									1/26/72						
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______

MODEL NO. B200300-121 B200300-122 SERIAL NO. 12-3

PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE — SPEC NO. LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT), FREQ. f_o

TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	9581	9718	988[illegible]	10006	10246	10392	10584	10747	10894	11086	11230	11822
TOTAL ACCUMULATED HOURS				week of 3/17/72	week of 3/23/72	week of 3/30/72	week of 4/7/72	week of 4/21/72	week of 4/27/72	week of 5/5/72	week of 5/12/72	week of 5/18/72	week of 5/26/72	week of 6/1/72	week of 6/9/72
INPUT CURRENT TELEMETRY VOLTAGE			V	2.33	2.31	2.33	2.32	2.33	2.33	2.33	2.32	2.33	2.32	2.33	2.33
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.46	3.45	3.46	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.46	3.45
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.06	3.06	3.07	3.03	3.06	3.05	3.05	3.06	3.05	3.05	3.03	3.03
HELIX CURRENT TELEMETRY VOLTAGE			V	1.30	1.26	1.33	1.32	1.33	1.31	1.32	1.30	1.31	1.30	1.32	1.38
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	3.16	3.16	3.16	3.17	3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.17
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	27.40	27.50	27.40	27.55	27.60	27.70	27.70	27.60	27.60	27.70	27.70	27.65
G_{SS} FREQ. f_o (PARA 4.3.1)	35	39.5	db	39.10	38.80	38.80	39.00	39.00	39.30	39.20	39.00	39.10	39.30	39.30	39.30
L_1 INSERTION LOSS			db												
R_{AI} ATTENUATOR RESISTANCE, INPUT			OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS												
T_K CATHODE ACTIVITY	6.0	--	SEC												
TEST EQUIPMENT CALIBRATION DATE								4/19/72							
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______
MODEL NO. B200300-121 B200300-122 SERIAL NO. 12-3
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o

TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	11584	11754	11915	12086	12254	12423	12589	12755	12923	13087	13261	13326
TOTAL ACCUMULATED HOURS				week of 6/16/72	week of 6/23/72	week of 6/30/72	week of 7/7/72	week of 7/14/72	week of 7/21/72	week of 7/28/72	week of 8/4/72	week of 8/11/72	week of 8/18/72	week of / /	week of 8/31/72
INPUT CURRENT TELEMETRY VOLTAGE			V	2.32	2.32	2.33	2.32	2.33	2.32	2.32	2.32	2.32	2.33		2.33
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.44	2.44	3.46	3.45	3.44	3.44	3.44	3.43	3.44	3.45		3.45
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.03	3.03	3.00	3.01	3.03	3.03	3.03	3.01	3.03	3.01		2.99
HELIX CURRENT TELEMETRY VOLTAGE			V	1.31	1.30	1.34	1.31	1.30	1.30	1.29	1.31	1.30	1.30		1.30
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	3.17	3.16	3.17	3.16	3.17	3.16	3.17	3.17	3.17	3.17		3.17
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	27.70	27.70	27.70	27.75	27.70	27.70	27.50	27.70	27.70	27.70		27.60
Gm FREQ. f_o (PARA. 4.3.1)	35	39.5	db	39.30	39.20	39.50	39.60*	39.10	39.30	38.80	39.00	39.10	39.10		39.00
I_L INSERTION LOSS			db												>100
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS												21.24
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS												22.32
T_K CATHODE ACTIVITY	6.0	--	SEC												12.70
TEST EQUIPMENT CALIBRATION DATE															
SIGNIFICANT EVENT NOTES							NOTE 1								
TESTED BY															

SIGNIFICANT EVENT NOTES
1 [illegible]

HUGHES *ELECTRON DYNAMICS DIVISION*
3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

DATA SHEET NO. DSB200300-400 REV. ______
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-3
PAGE OF

CUSTOMER TEST DATA SHEET

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT): FREQ. f_o

TEST CONDITIONS
NOMINAL INPUT VOLTAGE

	LIMITS MIN	LIMITS MAX	UNITS	13403	13576	13739	13906	14070	14234	14398	14567	14729	14892	15062	15171
TOTAL ACCUMULATED HOURS				week of 9/8/72	week of 9/15/72	week of 9/22/72	week of 9/29/72	week of 10/6/72	week of 10/13/72	week of 10/20/72	week of 10/27/72	week of 11/3/72	week of 11/10/72	week of 11/17/72	week of 11/22/72
INPUT CURRENT TELEMETRY VOLTAGE			V	2.33	2.33	2.32	2.32	2.33	2.33	2.34	2.33	2.33	2.33	2.33	2.33
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.45	3.45	3.44	3.44	3.44	3.44	3.45	3.44	3.44	3.44	3.44	3.44
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.00	2.99	3.00	3.01	2.99	2.98	2.98	2.99	2.99	2.99	2.99	2.98
HELIX CURRENT TELEMETRY VOLTAGE			V	1.29	1.31	1.30	1.30	1.27	1.29	1.31	1.30	1.27	1.28	1.27	1.28
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	3.17	3.17	3.18	3.17	3.17	3.16	3.16	3.16	3.17	3.16	3.16	3.16
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	27.70	27.65	27.70	27.35	27.50	27.50	27.60	27.60	27.60	27.65	27.60	27.50
Gss FREQ. f_o (PARA 4.3.1)	35	39.5	db	39.10	39.10	39.10	38.90	39.00	38.90	38.70	38.90	38.80	38.90	38.80	38.90
L_L INSERTION LOSS			db			>100			>100			>100			>100
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS			21.28			21.31			21.34			21.38
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS			22.35			22.39			22.41			22.47
T_K CATHODE ACTIVITY	6.0	--	SEC												
TEST EQUIPMENT CALIBRATION DATE				9/7/72			9/29/72								
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES ELECTRON DYNAMICS DIVISION
3100 W. LOMITA BLVD. TORRANCE, CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-3
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o
TEST CONDITIONS
NOMINAL INPUT VOLTAGE

TOTAL ACCUMULATED HOURS	LIMITS MIN	LIMITS MAX	UNITS	15386	15554	15715	15860	15933	16097	16264	16431	16665	16760	16927	17092
				week of 12/1/72	week of 12/8/72	week of 12/15/72	week of 12/21/72	week of 12/29/72	week of 1/5/73	week of 1/12/73	week of 1/19/73	week of 1/29/73	week of 2/2/73	week of 2/9/73	week of 2/16/73
INPUT CURRENT TELEMETRY VOLTAGE			V	2.33	2.33	2.33	2.33	2.32	2.33	2.33	2.33	2.33	2.33	2.33	2.33
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.45	3.44	3.44	3.44	3.43	3.44	3.46	3.44	3.44	3.45	3.45	3.45
HEATER VOLTAGE TELEMETRY VOLTAGE			V	2.97	2.98	2.98	3.00	2.99	2.99	2.98	3.00	2.99	3.00	3.00	2.99
HELIX CURRENT TELEMETRY VOLTAGE			V	1.29	1.28	1.28	1.28	1.25	1.28	1.31	1.27	1.25	1.29	1.23	1.25
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	3.17	3.17	3.16	3.17	3.17	3.17	3.17	3.16	3.16	3.17	3.16	3.17
P_o (SAT) FREQ. f_o (PARA 4.3.2)	27	--	dbm	27.50	27.50	27.50	27.50	27.50	27.50	27.50	27.30	27.30	27.40	27.50	27.50
Go FREQ. f_o (PARA 4.3.1)	35	39.5	db	38.80	38.80	38.80	38.80	38.80	38.80	38.80	38.60	38.80	38.90	39.00	38.90
L_i INSERTION LOSS			db			>100			>100			>100			>100
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS			21.36			21.37			21.39			21.40
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS			22.44			22.46			22.46			22.49
T_K CATHODE ACTIVITY	6.0	--	SEC			11.4									
TEST EQUIPMENT CALIBRATION DATE										1/12/73					
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES ELECTRON DYNAMICS DIVISION
3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-3
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC NO. LTPB200300-400

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o	LIMITS MIN	LIMITS MAX	UNITS	17258	17426	17593	17763	17924	18071	18259	18425	18594	18738	18905	19073
TEST CONDITIONS NOMINAL INPUT VOLTAGE (TOTAL ACCUMULATED HOURS above)				week of 2/23/73	week of 3/2/73	week of 3/9/73	week of 3/16/73	week of 3/23/73	week of 3/29/73	week of 4/6/73	week of 4/13/73	week of 4/20/73	week of 4/27/73	week of 5/4/73	week of 5/11/73
INPUT CURRENT TELEMETRY VOLTAGE			V	2.34	2.33	2.33	2.33	2.34	2.33	2.33	2.34	2.34	2.34	2.34	2.34
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.45	3.44	3.44	3.44	3.45	3.45	3.45	3.46	3.46	3.45	3.45	3.45
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.04	3.02	3.01	3.01	3.00	3.01	3.00	3.00	3.01	3.01	3.00	3.00
HELIX CURRENT TELEMETRY VOLTAGE			V	1.27	1.26	1.27	1.26	1.33	1.31	1.31	1.29	1.30	1.28	1.29	1.29
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	3.16	3.16	3.17	3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.16
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dBm	27.35	27.50	27.50	27.50	27.35	27.45	27.50	27.60	27.60	27.50	27.50	27.55
Gm FREQ. f_o (PARA. 4.3.1)	35	39.5	db	38.70	38.70	39.00	38.90	38.90	38.90	39.00	39.00	39.30	39.00	39.20	39.20
I_L INSERTION LOSS			db						>100						>100
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS						21.44						21.49
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS						22.53						22.57
T_K CATHODE ACTIVITY	6.0	--	SEC												
TEST EQUIPMENT CALIBRATION DATE										4/7/73					
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES *ELECTRON DYNAMICS DIVISION*

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-3
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT) FREQ. f_o

TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	19242	19407	19578	19747	19913	20049	20187	20354	20522	20837		
TOTAL ACCUMULATED HOURS				week of 5/18/73	week of 5/25/73	week of 6/1/73	week of 6/9/73	week of 6/16/73	week of 6/22/73	week of 6/29/73	week of 7/6/73	week of 7/13/73	week of 7/26/73	/ /	/ /
INPUT CURRENT TELEMETRY VOLTAGE			V	2.34	2.34	2.33	2.34	2.32	2.33	2.33	2.33	2.33	2.34		
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.44	3.45	3.45	3.46	3.44	3.45	3.44	3.45	3.45	3.45		
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.01	3.00	3.01	·3.00	3.00	3.00	3.01	2.98	2.99	2.99		
HELIX CURRENT TELEMETRY VOLTAGE			V	1.27	1.27	1.27	1.28	1.28	1.28	1.26	1.28	1.27	1.28		
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	3.17	3.16	3.16	3.16	3.17	3.16	3.17	3.17	3.17	3.16		
P_o (SAT) FREQ. f_o (PARA 4.1.3)	27	--	dbm	27.50	27.40	27.55	27.50	27.50	27.50	27.35	27.50	27.50	27.50		
Gm FREQ. f_o (PARA. 4.1.1)	35	39.5	db	39.30	39.10	39.10	39.20	39.20	39.10	39.00	39.30	39.20	39.30		
I_L INSERTION LOSS			db						>100						
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS						21.51						
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS						22.60						
T_K CATHODE ACTIVITY	6.0	--	SEC						9.5						
TEST EQUIPMENT CALIBRATION DATE															
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES **ELECTRON DYNAMICS DIVISION**

3100 W. LOMITA BLVD TORRANCE CALIFORNIA

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ____
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-3
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC NO.: LTPB200300-400

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o	TOTAL ACCUMULATED HOURS			21,532	22,268	22,956	23,625	24,251	25,027	25,672	26,432	27,040	27,729	28,458	29,115
TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	8 /28/73	9 /28/73	10 /27/73	11 /30/73	12/28/73	1/31/74	2 /28/74	4 / 1/74	4/29/74	5/28/74	6/28/74	7 /27/74
INPUT CURRENT TELEMETRY VOLTAGE			V	2.32	2.32	2.32	2.34	2.34	2.32	2.32	2.32	2.33	2.31	2.32	2.32
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.44	3.43	3.43	3.44	3.44	3.44	3.43	3.43	3.44	3.46	3.44	3.43
HEATER VOLTAGE TELEMETRY VOLTAGE			V	2.99	3.01	3.00	·2.99	3.00	3.00	3.00	3.02	3.03	3.02	2.99	2.99
HELIX CURRENT TELEMETRY VOLTAGE			V	1.25	1.22	1.22	1.23	1.25	1.24	1.23	1.21	1.23	1.21	1.24	1.23
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	3.17	3.16	3.17	3.16	3.16	3.16	3.17	3.17	3.16	3.17	3.17	3.17
P_o (SAT) FREQ. f_o (PARA 4.3.2)	27	—	dbm	27.55	27.55	27.65	27.65	27.55	27.50	27.60	27.5	27.60	27.60	27.65	27.55
G_{ss} FREQ. f_o (PARA 4.3.1)	35	39.5	db	39.40	39.40	39.30	39.30	39.30	39.30	39.30	39.30	39.30	39.20	39.20	39.10
L_s INSERTION LOSS			db	>100	>100	>100	>100	>100	>100	>100	97	>100	>100	>100	>100
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS	21.53	21.57	21.56	21.60	21.58	21.61	21.62	21.68	21.64	21.65	21.65	21.70
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS	22.62	22.66	22.67	22.68	22.68	22.67	22.71	22.77	22.70	22.74	22.74	22.78
T_K CATHODE ACTIVITY	6.0	—	SEC	10.40	8.80	*		10.10	10.0	9.8	9.0	11.00	9.00	10.00	9.3
TEST EQUIPMENT CALIBRATION DATE				8/10/73	8/10/73	8/10/73	8/10/73	11/28/73	11/28/73	11/28/73	3/27/74	3/27/74	3/27/74	3/27/74	3/27/74
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

*RECORDER OUT FOR REPAIR.

HUGHES **ELECTRON DYNAMICS DIVISION**
3100 W. LOMITA BLVD. TORRANCE, CALIFORNIA 90509

DATA SHEET NO. DSB200300-400 REV.
MODEL NO. B200300-121 B200300-122 SERIAL NO. 12-3
PAGE OF

CUSTOMER TEST DATA SHEET

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o — TOTAL ACCUMULATED HOURS	LIMITS MIN	LIMITS MAX	UNITS	29900	30,607	31375	32,086	32,701	33,491	34143	34843	35,606	36,366	37,032	37,736
TEST CONDITIONS NOMINAL INPUT VOLTAGE				8/20/74	9/30/74	11/11/74	12/2 14	12/28 14	1/30 15	2/26 15	3/28 15	4/29 15	5/31 15	7/2 /75	8 11 15
INPUT CURRENT TELEMETRY VOLTAGE			V	2.316	2.316	2.33	2.34	2.32	2.32	2.32	2.32	2.32	2.31	2.30	2.31
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.434	3.428	3.437	3.45	3.44	3.45	3.44	3.44	3.44	3.42	3.43	3.42
HEATER VOLTAGE TELEMETRY VOLTAGE			V	2.986	2.997	2.98	2.99	2.97	3.01	3.00	3.02	3.03	3.04	3.03	3.03
HELIX CURRENT TELEMETRY VOLTAGE			V	1.237	1.223	1.23	1.24	1.26	1.24	1.29	1.22	1.23	1.20	1.21	1.21
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	3.174	3.170	3.164	3.153	3.17	3.16	3.16	3.16	3.16	3.16	3.17	3.16
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	27.5	27.5	27.5	27.7	27.6	27.55	27.6	27.6	27.55	27.50	27.30	27.45
Gm FREQ. f_o (PARA. 4.3.1)	35	39.5	db	39.1	39.1	39.3	39.3	39.3	39.4	39.4	39.2	39.4	39.1	39.0	39.00
I_L INSERTION LOSS			db	7100	7100	7100	7100	7100	7100	7100	98	7100	7100	7100	7100
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS	21.69	21.70	21.72	21.73	21.75	21.75	21.77	21.78	21.80	21.81	21.80	21.81
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS	22.76	22.79	22.80	22.83	22.83	22.86	22.86	22.86	22.90	22.96	22.89	22.92
T_K CATHODE ACTIVITY	6.0	--	SEC	9.7	8.3	9.6	11.0	9.5	9.5	10.4	9.2	9.4	8.5	8.5	9.0
TEST EQUIPMENT CALIBRATION DATE				7-24-4	7-24-4	7-24-4	11-21-4	11-21-4	11-21-4	1-31-5	1-31-5	1-31-5	4-1-5	4-1-5	7-30-5
SIGNIFICANT EVENT NOTES															
TESTED BY				W.P.N	WPN	WPN	W.P.N	W.P.N	WPN	W.P.N	W.P.N	W.P.N	WPN	W.P.N	W.P.N

SIGNIFICANT EVENT NOTES

HUGHES **ELECTRON DYNAMICS DIVISION**
3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ____
MODEL NO. B200300-121 SERIAL NO. 12-3
PAGE ____ OF ____

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o	LIMITS MIN	LIMITS MAX	UNITS												
TOTAL ACCUMULATED HOURS				38,526	39,271	39,908	40,677	41,635	42,012	42,773	43,608	44,112	44,968	45,608	47,171
TEST CONDITIONS NOMINAL INPUT VOLTAGE				9/13/5	10/14/5	11/11/5	12/13/5	1/14/6	1/30/6	3/12/6	4/16/6	4/28/6	6/12/6	6/27/6	9/18/6
INPUT CURRENT TELEMETRY VOLTAGE			V	2.32	2.32	2.32	2.32	2.32	2.31	2.31	2.31	2.31	2.30	2.31	2.30
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.43	3.43	3.43	3.44	3.44	3.44	3.43	3.42	3.43	3.42	3.43	3.42
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.00	2.98	2.98	3.00	3.01	3.01	3.04	3.03	3.03	3.03	3.03	3.01
HELIX CURRENT TELEMETRY VOLTAGE			V	1.21	1.22	1.22	1.23	1.22	1.22	1.21	1.25	1.21	1.20	1.19	1.18
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	3.17	3.16	3.17	3.16	3.16	3.17	3.16	3.16	3.17	3.16	3.16	3.17
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	27.5	27.45	27.6	27.6	27.6	27.6	27.55	27.6	27.50	27.45	27.50	27.55
Gm FREQ. f_o (PARA. 4.3.1)	35	39.5	db	39.1	39.1	39.2	39.2	39.2	39.2	39.1	39.1	39.0	39.05	39.00	39.0
I_L INSERTION LOSS			db	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS	21.84	21.81	21.85	21.87	21.86	21.87	21.89	21.90	21.90	21.92	21.86	21.95
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS	22.92	22.94	22.95	22.95	22.95	22.95	22.99	23.0	23.0	23.04	22.94	23.05
T_K CATHODE ACTIVITY	6.0	--	SEC	9.1	10.0	9.2	10.0	10.0	9.2	10.0	9.2	9.4	9.3	9.5	9.2
TEST EQUIPMENT CALIBRATION DATE				7-30-5	7-30-5	10-29-5	10-29-5	10-29-5	10-29-5	2-3-6	2-3-6	2-3-6	5-7-6	5-12-6	8-31-6
SIGNIFICANT EVENT NOTES															
TESTED BY				W.P.N	WPN	W.P.N	W.P.N	W.P.N	W.P.N	M.S.K.	MSK	MSK	W.P.N	MSK	MSK

SIGNIFICANT EVENT NOTES

HUGHES **ELECTRON DYNAMICS DIVISION**
3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. A
MODEL NO. B200300-121 B200300-122 SERIAL NO. 12-3
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC NO. LTPB200300-400

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o	LIMITS MIN	MAX	UNITS												
TOTAL ACCUMULATED HOURS				48,013	48,389	49,132	49825.3	~~50564.3~~ 50564.3	51,398	51,831	52697	53352	53854.6	54,568	55302
TEST CONDITIONS NOMINAL INPUT VOLTAGE				10/13/6	10/29/6	11/29/76	12/20/76	2/2/77	3/10/77	3/29/77	5/6/17	6/17/7	6/28/7	7/29/77	8/29/77
INPUT CURRENT TELEMETRY VOLTAGE			V	2.313	2.757	2.772	2.793	2.321	2.309	2.306	2.314	2.310	2.322	2.313	2.289
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.423	3.420	3.434	3.436	3.421	3.422	3.437	3.430	3.433	3.426	3.420	3.408
HEATER VOLTAGE TELEMETRY VOLTAGE			V	2.990	2.988	2.991	3.002	2.984	2.981	3.028	3.029	3.020	3.002	2.972	2.986
HELIX CURRENT TELEMETRY VOLTAGE			V	1.205 ~~3.168~~	1.192	1.214	1.258	1.190	1.216	1.211	1.187	1.197	1.205	1.200	1.187
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	3.168 ~~1.205~~	3.180	3.168	3.157	3.166	3.176	3.166	3.162	3.166	3.164	3.183	3.198
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	27.53	27.55	27.60	27.60	27.4	27.6	27.55	27.55	27.55	27.6	27.5	27.6
Gss FREQ. f_o (PARA. 4.3.1)	35	39.5	db	39.1	39.10	39.20	39.30	39.1	39.1	39.20	39.0	39.15	39.15	38.90	39.1
I_L INSERTION LOSS			db	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS	21.95	21.95	22.0	22.03	22.0	21.98	22.0	22.03	22.04	22.02	22.02	22.06
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS	23.10	23.06	23.07	23.05	23.05	23.05	23.10	23.11	23.12	23.12	23.10	23.16
T_K CATHODE ACTIVITY	6.0	--	SEC	8.9	8.6	9.2	7.8 *	9.1	9.0	9.2	8.5	9.0	9.3	8.8	7.8
TEST EQUIPMENT CALIBRATION DATE				7-23-6	8-31-6	10-19-6	8-31-6	12-31-6	1-5-77	1-19-77	4-25-7	4-25-7	5-2-77 ~~6-28-7~~	5-2-77	5-22-77
SIGNIFICANT EVENT NOTES				—			—	—	—				—		
TESTED BY				DJ	msk	msk	DJ	D.J.	D.R.J.	msk	msk	msk	DRJ	msk	MKB

SIGNIFICANT EVENT NOTES

HUGHES **ELECTRON DYNAMICS DIVISION**
3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. A
MODEL NO. B200300-121 B200300-122 SERIAL NO. 12-3
PAGE OF

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE SPEC NO. LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o

TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	MAX	UNITS												
TOTAL ACCUMULATED HOURS				56038	56824										
				9/29/77	11/4/17	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /
INPUT CURRENT TELEMETRY VOLTAGE			V	2.31	2.298										
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.41	3.411										
HEATER VOLTAGE TELEMETRY VOLTAGE			V	2.97	2.946										
HELIX CURRENT TELEMETRY VOLTAGE			V	1.17	1.201										
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	3.18	3.91**										
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	27.4	27.5										
G_{ss} FREQ. f_o (PARA 4.3.1)	35	39.5	db	37.0	39.3										
I_L INSERTION LOSS			db	>100											
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS	22.07											
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS	23.16											
T_K CATHODE ACTIVITY	6.0	--	SEC	7.6	9.0										
TEST EQUIPMENT CALIBRATION DATE				7-27-7											
SIGNIFICANT EVENT NOTES					*										
TESTED BY				MSK											

SIGNIFICANT EVENT NOTES * END OF CONTRACT

** This valve in error. Should be 3.19. Apparent transposition of digits. Subsequent monthly readings of 3.188 and 3.190 verifies error.

HUGHES ***ELECTRON DYNAMICS DIVISION***

DATA SHEET NO. DSB200300-400 REV.

MODEL NO. B200300-121 B200300-122 SERIAL NO. 12-3

CUSTOMER TEST DATA SHEET

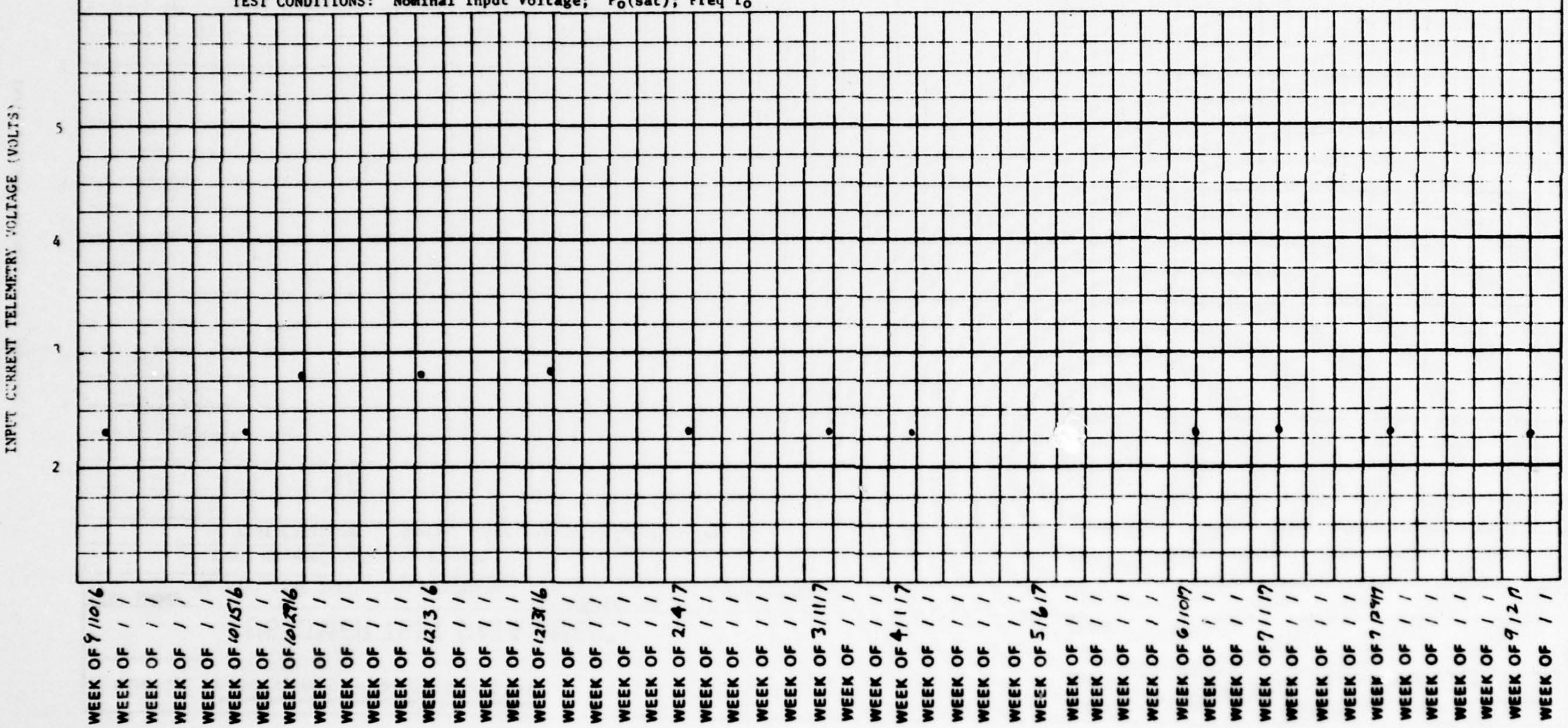
PAGE OF

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE

SPEC. NO. LTPB200300-400

INPUT CURRENT TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



HUGHES ***ELECTRON DYNAMICS DIVISION***

DATA SHEET NO. DSB200300-400 REV. ______

MODEL NO. B200300-121 B200300-122 SERIAL NO. 12-3

CUSTOMER TEST DATA SHEET

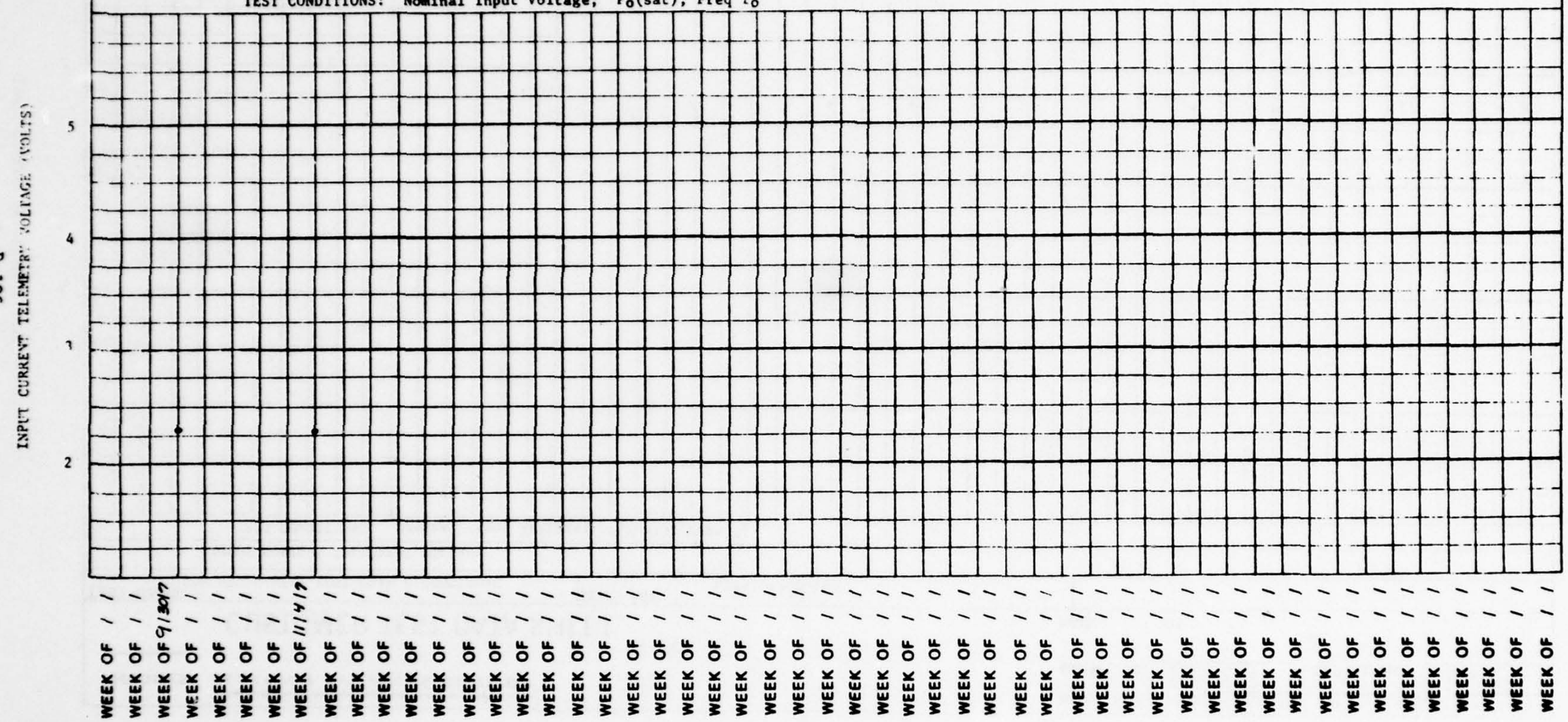
PAGE OF

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE

SPEC. NO. LTPB200300-400

INPUT CURRENT TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



HUGHES ELECTRON DYNAMICS DIVISION

DATA SHEET NO. DSB200300-400 REV.

MODEL NO. B 200300-121 / B200300-122 SERIAL NO. 12-3

CUSTOMER TEST DATA SHEET

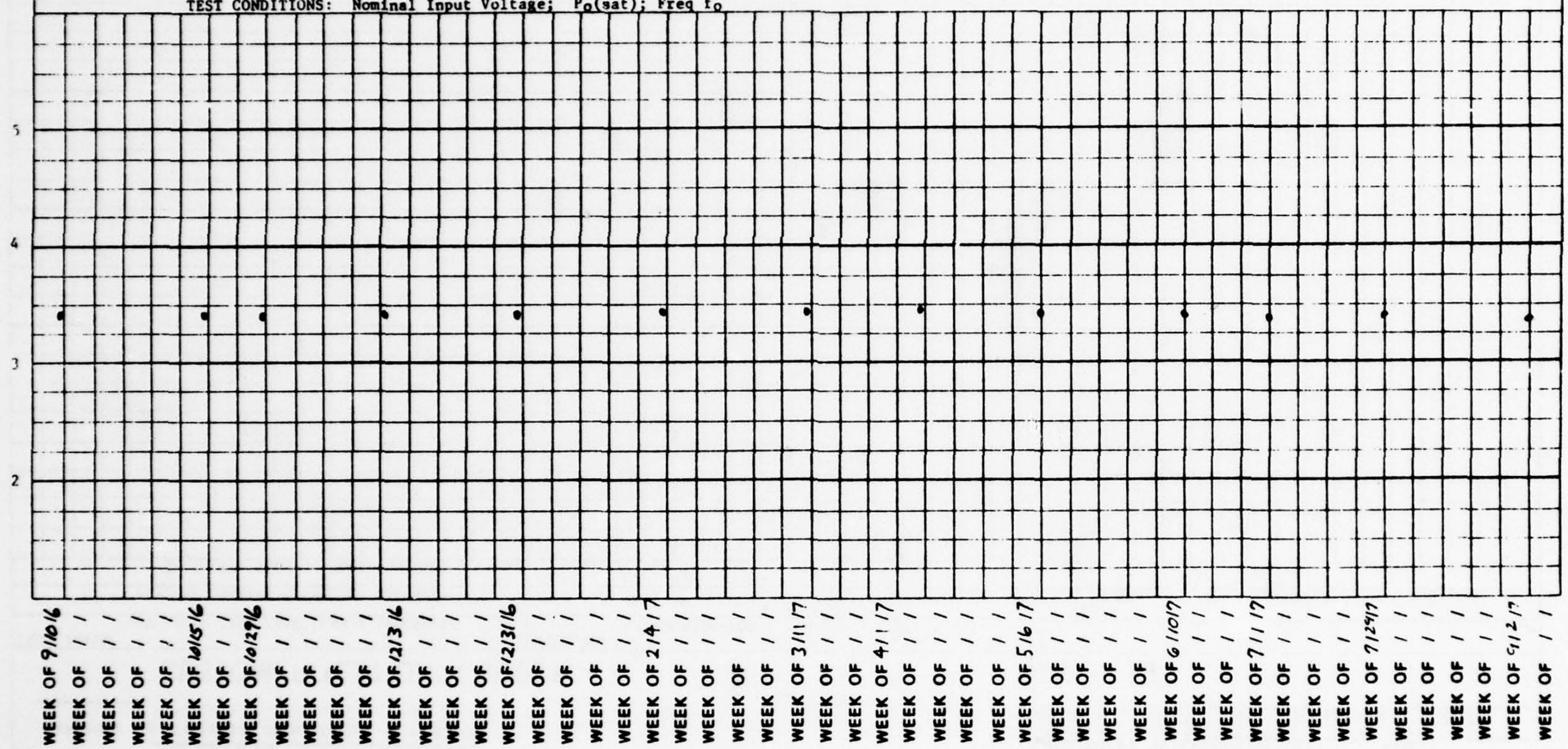
PAGE OF

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE

SPEC. NO. LTPB200300-400

CATHODE CURRENT TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; $P_o(sat)$; Freq f_o



CATHODE CURRENT TELEMETRY VOLTAGE (VOLTS)

HUGHES **ELECTRON DYNAMICS DIVISION**

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______

MODEL NO. B 200300-121 / B200300-122 SERIAL NO. 12-3

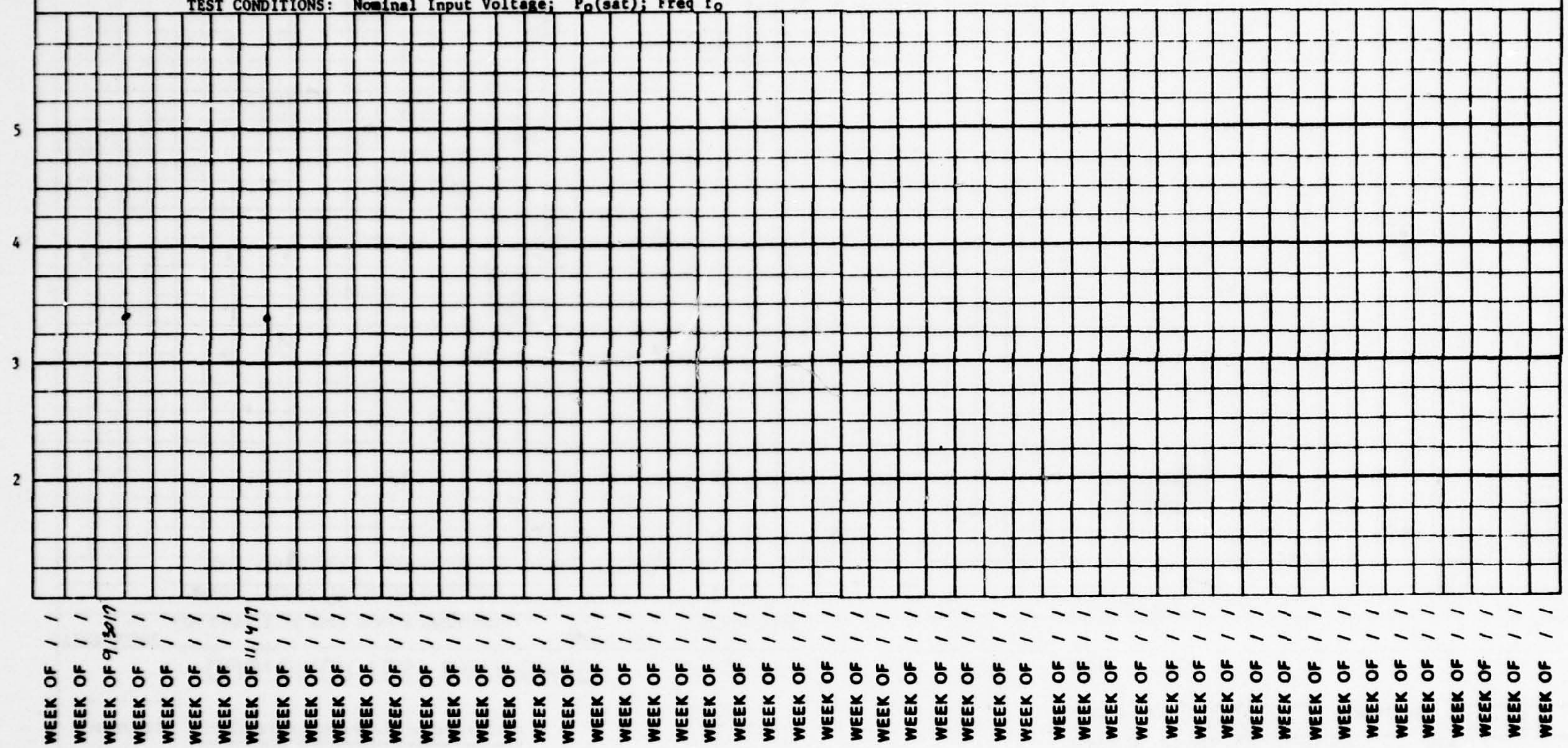
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE

SPEC. NO. LTPB200300-400

CATHODE CURRENT TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



HUGHES ***ELECTRON DYNAMICS DIVISION***

DATA SHEET NO. DSB200300-400 REV. ____

MODEL NO. ____ SERIAL NO. 12-3

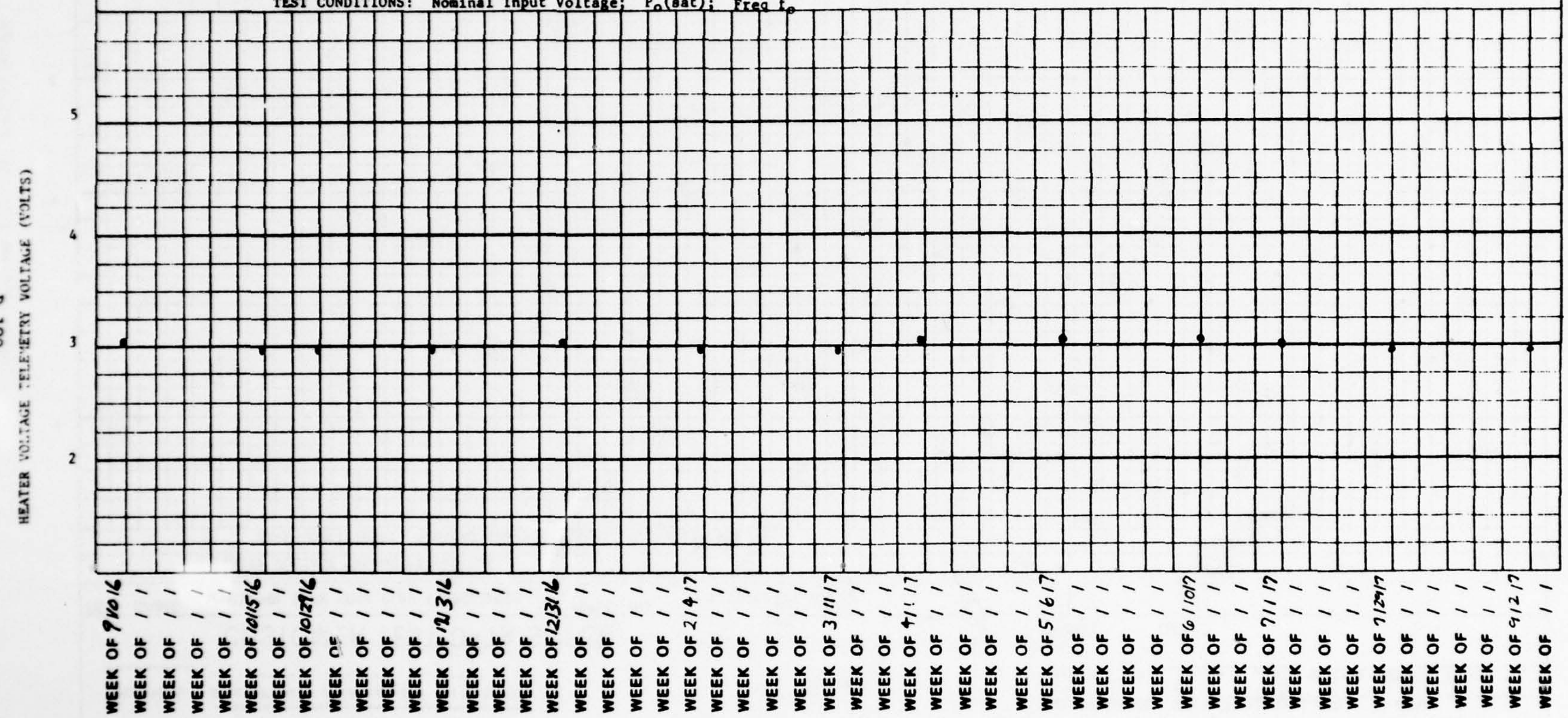
CUSTOMER TEST DATA SHEET

PAGE ____ OF ____

TEST NAME	SPEC. NO.
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400

HEATER VOLTAGE TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



HUGHES *ELECTRON DYNAMICS DIVISION*

DATA SHEET NO. DSB200300-400 REV. ______

MODEL NO. ______ SERIAL NO. 12-3

CUSTOMER TEST DATA SHEET

PAGE ___ OF ___

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE

SPEC. NO. LTPB200300-400

HEATER VOLTAGE TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o

WEEK OF / /

AD-A053 740 HUGHES AIRCRAFT CO TORRANCE CALIF ELECTRON DYNAMICS DIV F/G 9/1
DEFENSE SATELLITE COMMUNICATIONS SYSTEM TRAVELING WAVE TUBE AMP--ETC(U)
FEB 78 M L KAHN F04701-74-C-0542

UNCLASSIFIED NL

4 OF 5
AD
A053740

HUGHES **ELECTRON DYNAMICS DIVISION**

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.

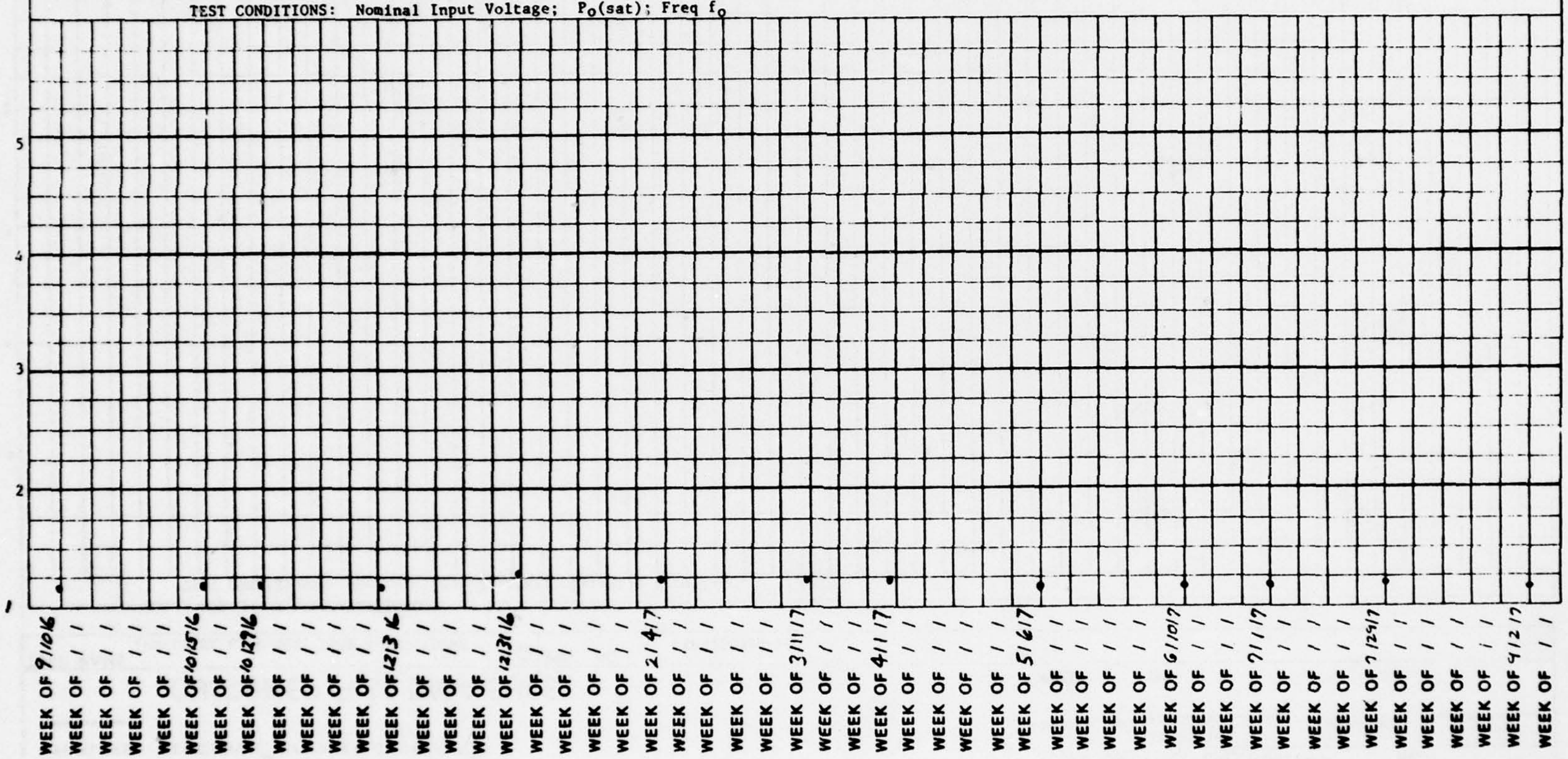
MODEL NO. B200300-121 ~~B200300~~-122 SERIAL NO. 12-3

PAGE OF

TEST NAME	SPEC. NO.
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400

HELIX CURRENT TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; $P_o(sat)$; Freq f_o



HUGHES *ELECTRON DYNAMICS DIVISION*

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______

MODEL NO. B200300-121 ~~B200300-122~~ SERIAL NO. 12-3

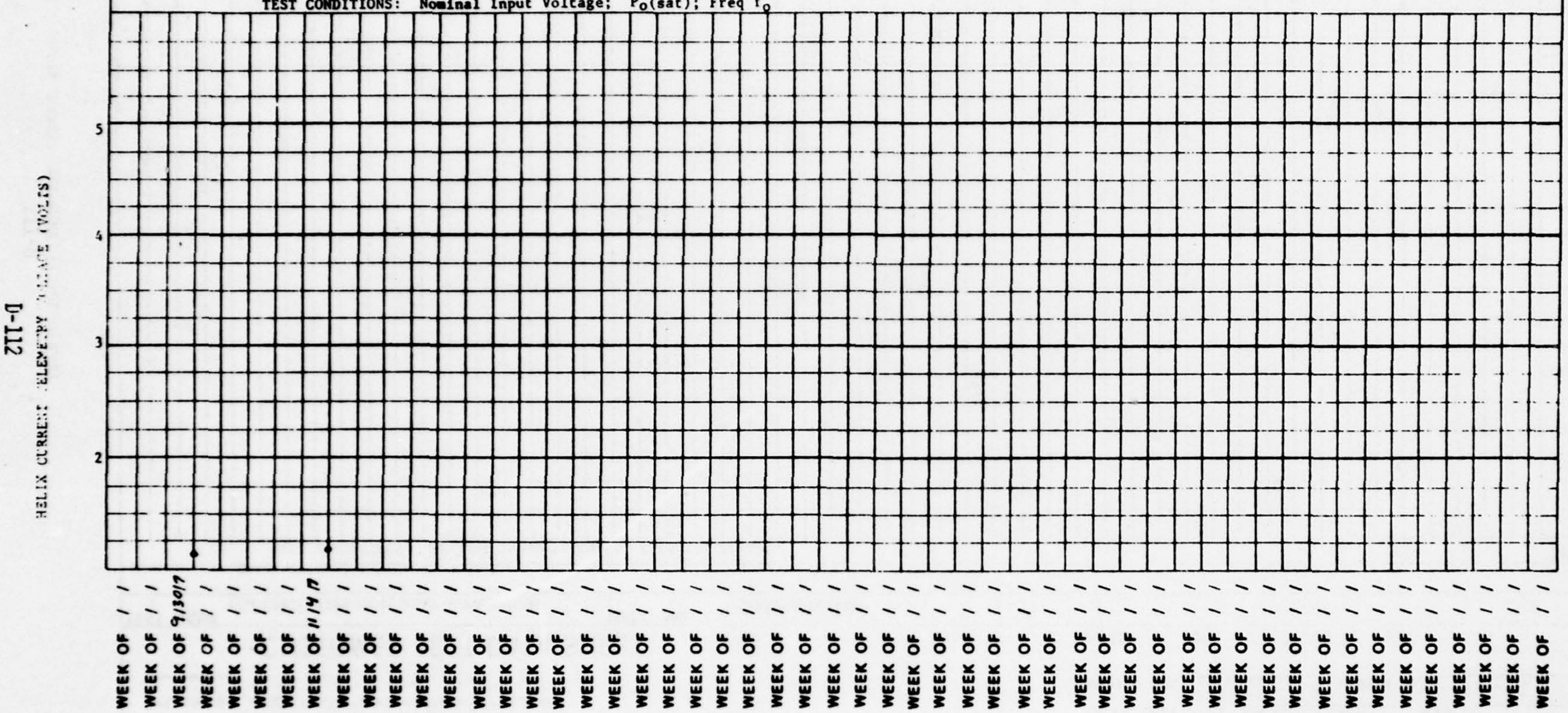
PAGE ___ OF ___

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE

SPEC. NO. LTPB200300-400

HELIX CURRENT TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; $P_o(sat)$; Freq f_o



HUGHES *ELECTRON DYNAMICS DIVISION*

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______

MODEL NO. B200300-121 B200300-122 SERIAL NO. 12-3

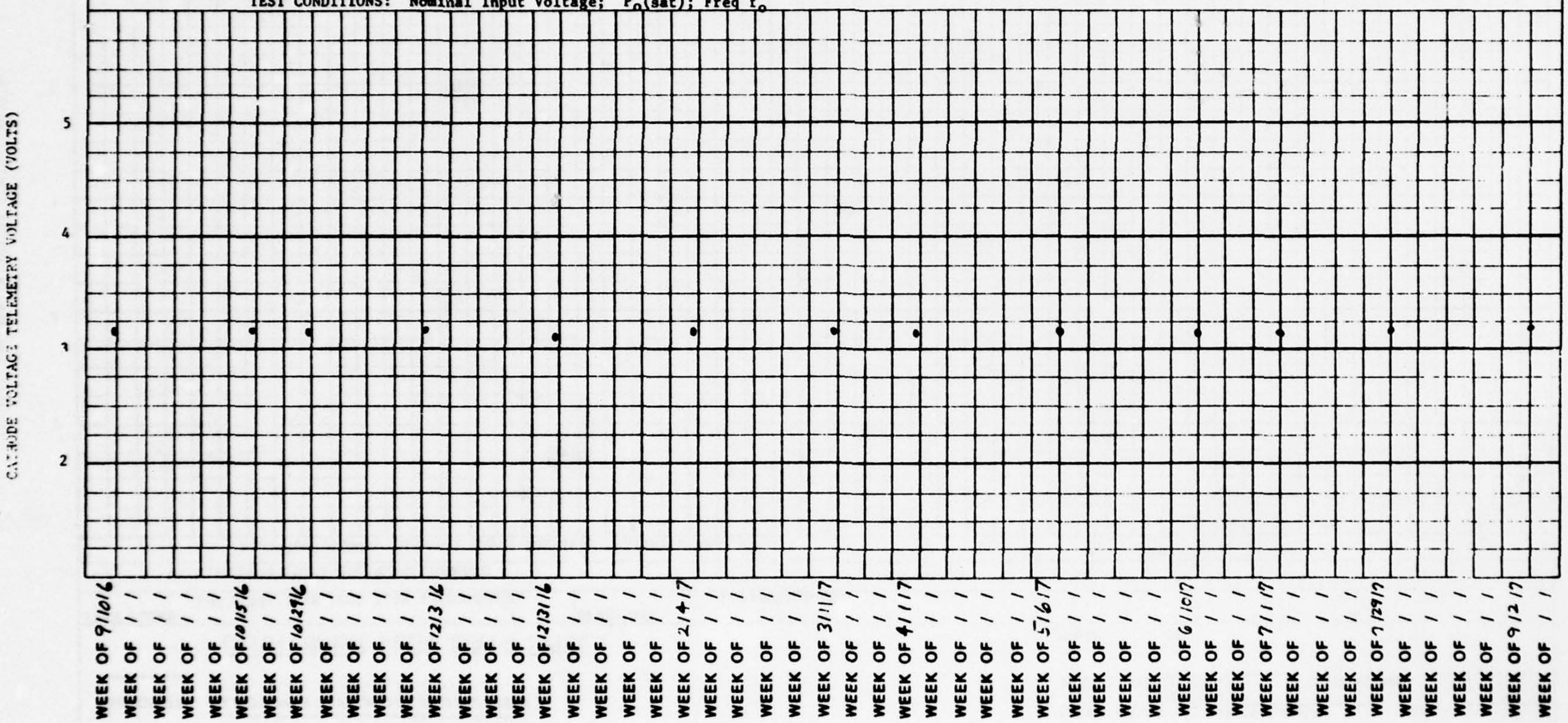
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE

SPEC. NO. LTPB200300-400

CATHODE VOLTAGE TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



HUGHES ***ELECTRON DYNAMICS DIVISION***

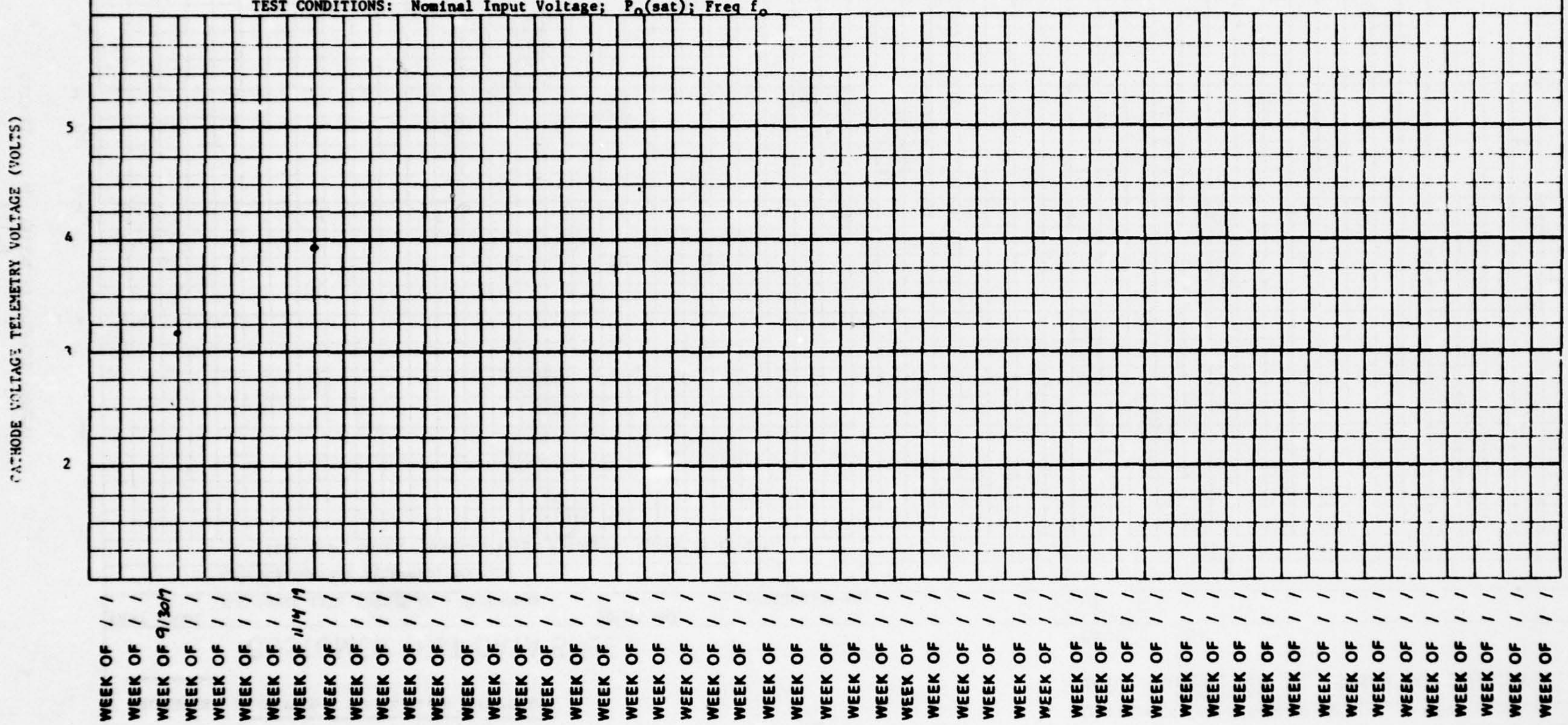
CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ____
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-3
PAGE ____ OF ____

TEST NAME	SPEC. NO.
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400

CATHODE VOLTAGE TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



HUGHES ***ELECTRON DYNAMICS DIVISION***

DATA SHEET NO. DSB200300-400 REV.

MODEL NO. B200300-121 B200300-122 SERIAL NO. 12-3

CUSTOMER TEST DATA SHEET

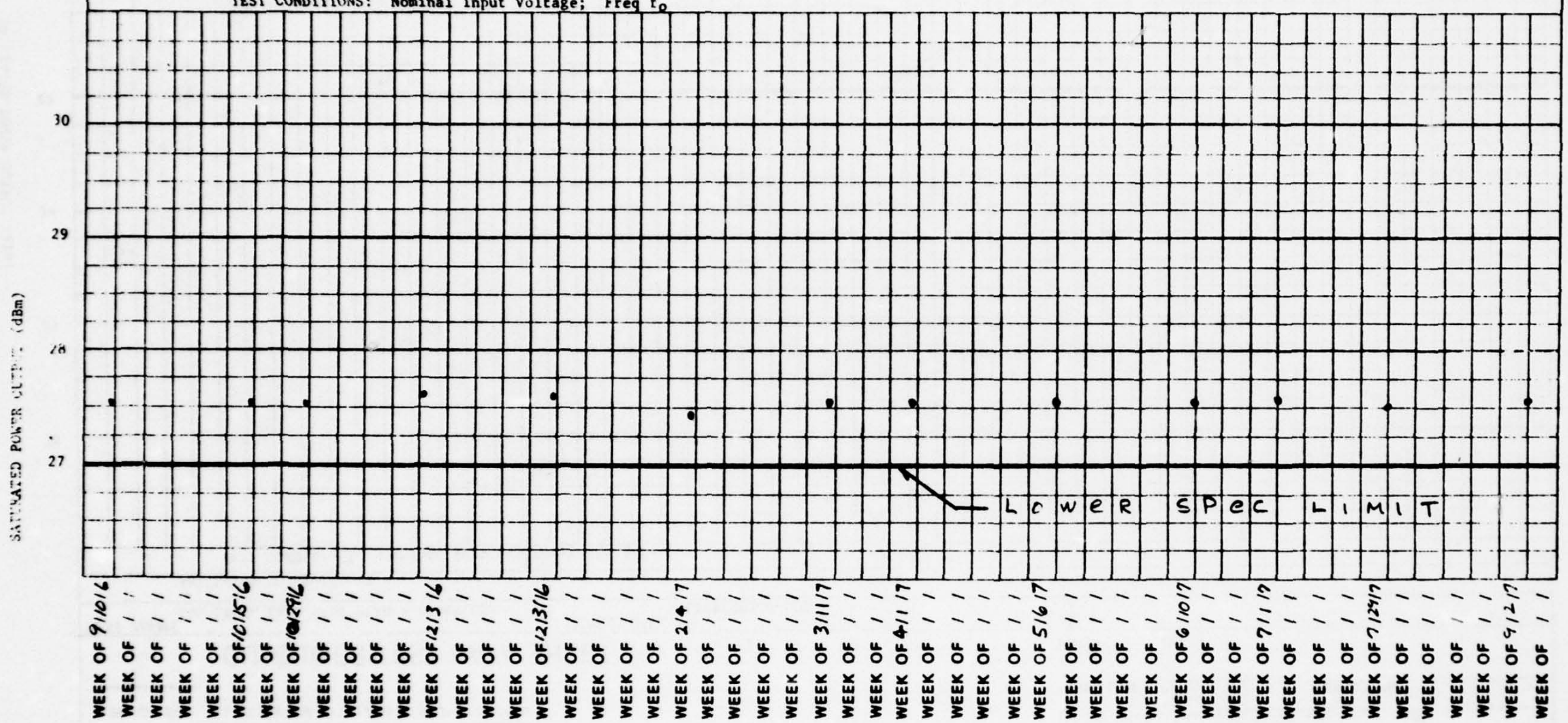
PAGE OF

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE

SPEC. NO. LTPB200300-400

SATURATED POWER OUTPUT

TEST CONDITIONS: Nominal Input Voltage; Freq f_o



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HUGHES **ELECTRON DYNAMICS DIVISION**

DATA SHEET NO. DSB200300-400 REV. ______
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12·3

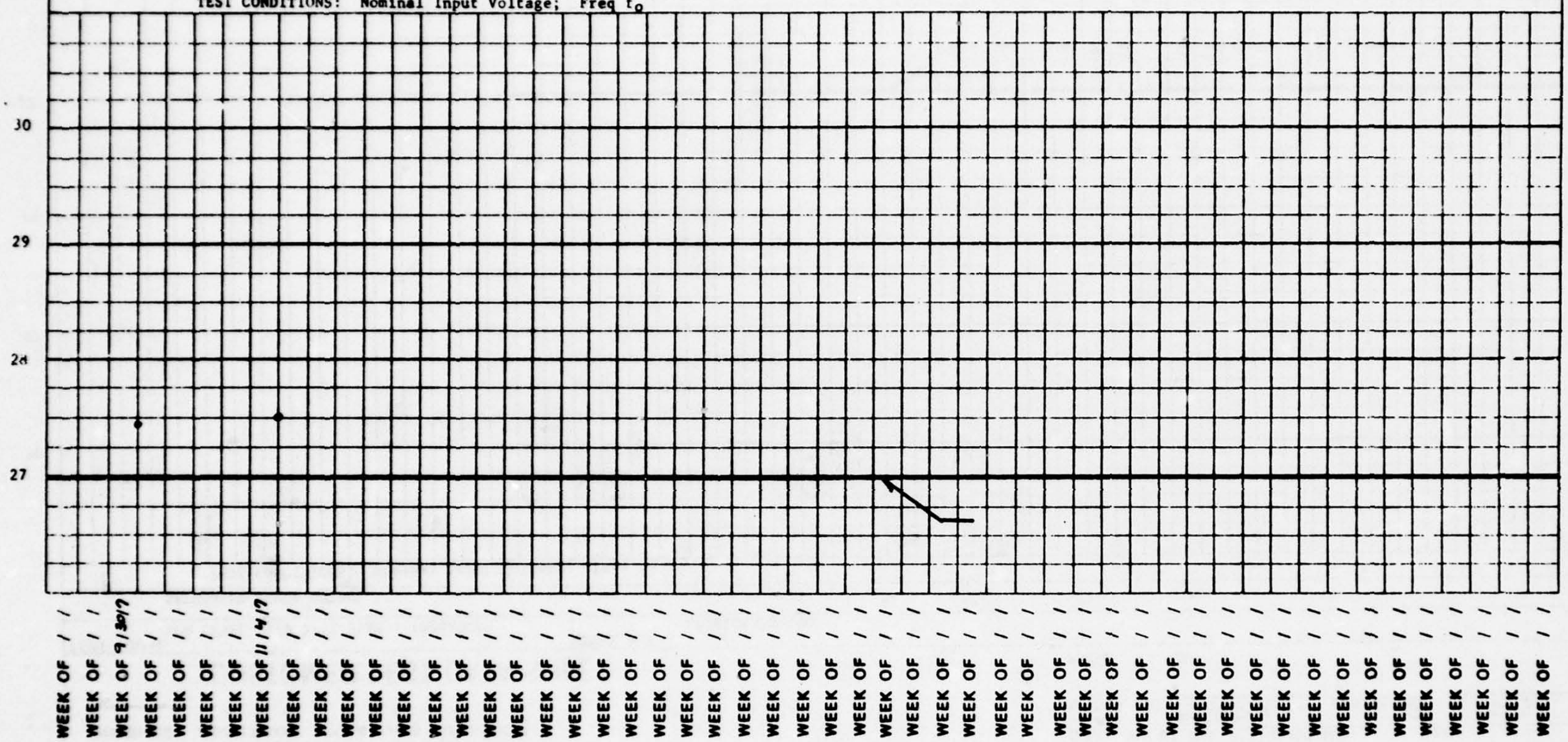
CUSTOMER TEST DATA SHEET

PAGE OF

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE SPEC. NO. LTPB200300-400

SATURATED POWER OUTPUT

TEST CONDITIONS: Nominal Input Voltage; Freq f_o



HUGHES ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.

MODEL NO. B200300-121 B200300-122 SERIAL NO. 12-3

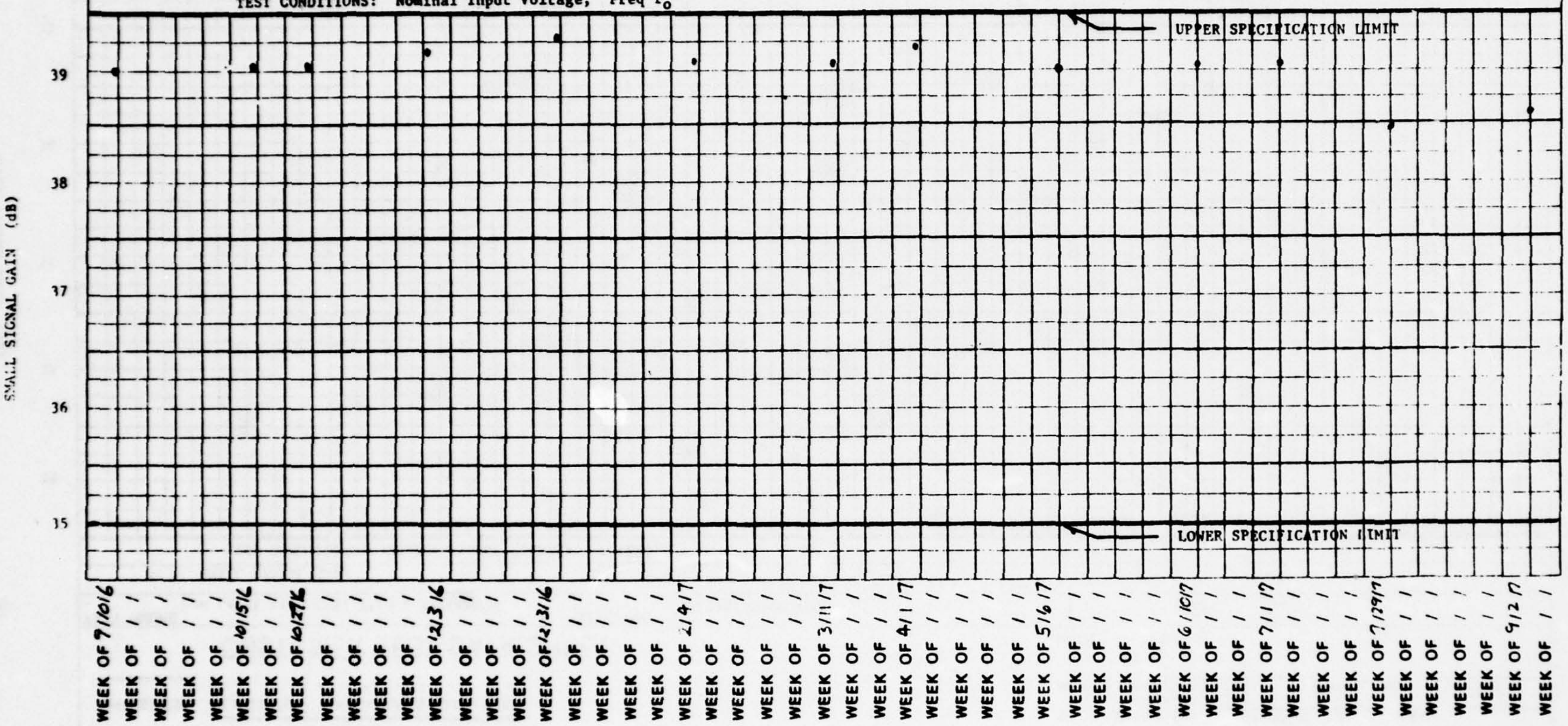
PAGE OF

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE

SPEC. NO. LTPB200300-400

SMALL SIGNAL GAIN

TEST CONDITIONS: Nominal Input Voltage; Freq f_o



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HUGHES ***ELECTRON DYNAMICS DIVISION***

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______

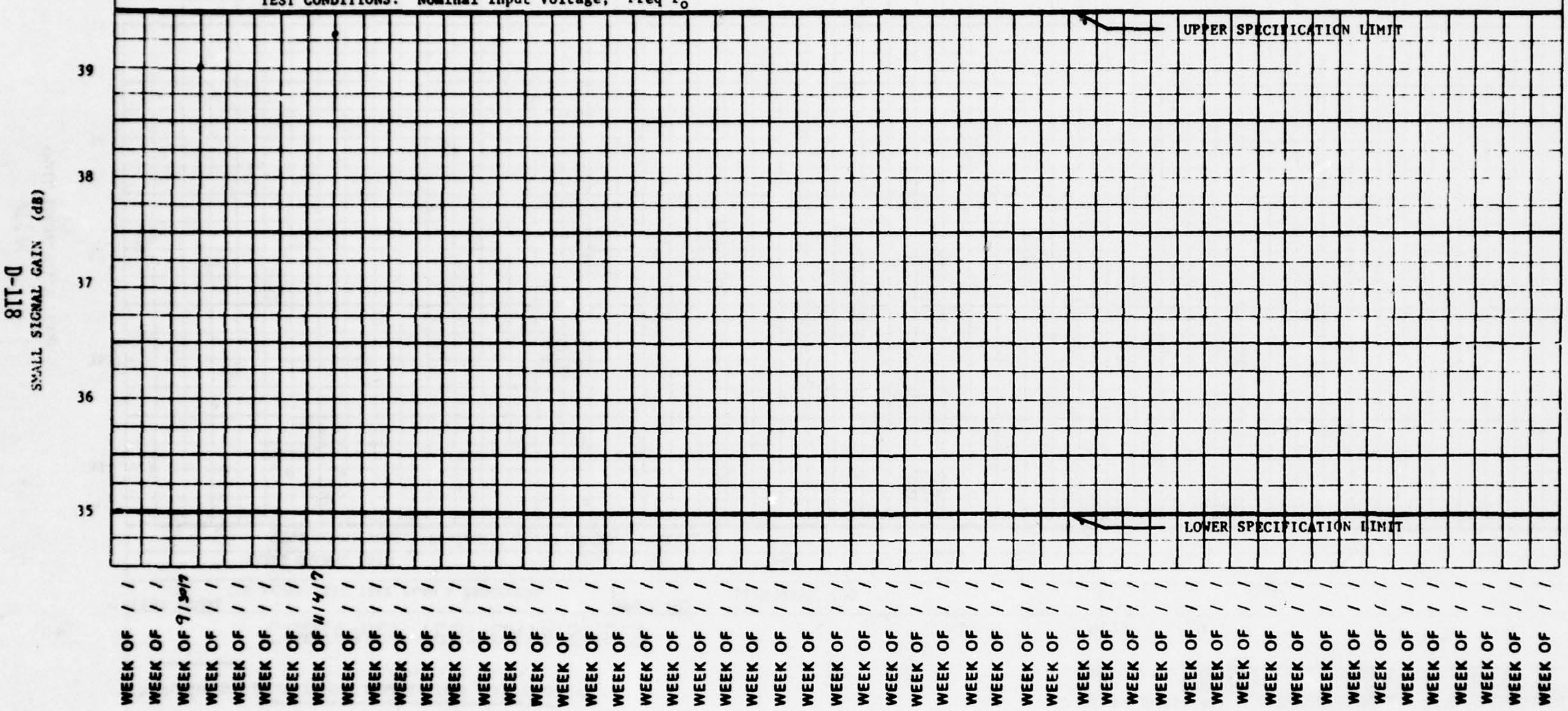
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-3

PAGE ____ OF ____

TEST NAME	SPEC. NO.
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400

SMALL SIGNAL GAIN

TEST CONDITIONS: Nominal Input Voltage; Freq f_o



HUGHES ELECTRON DYNAMICS DIVISION

DATA SHEET NO. DSB200300-400 REV.

MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-3

CUSTOMER TEST DATA SHEET

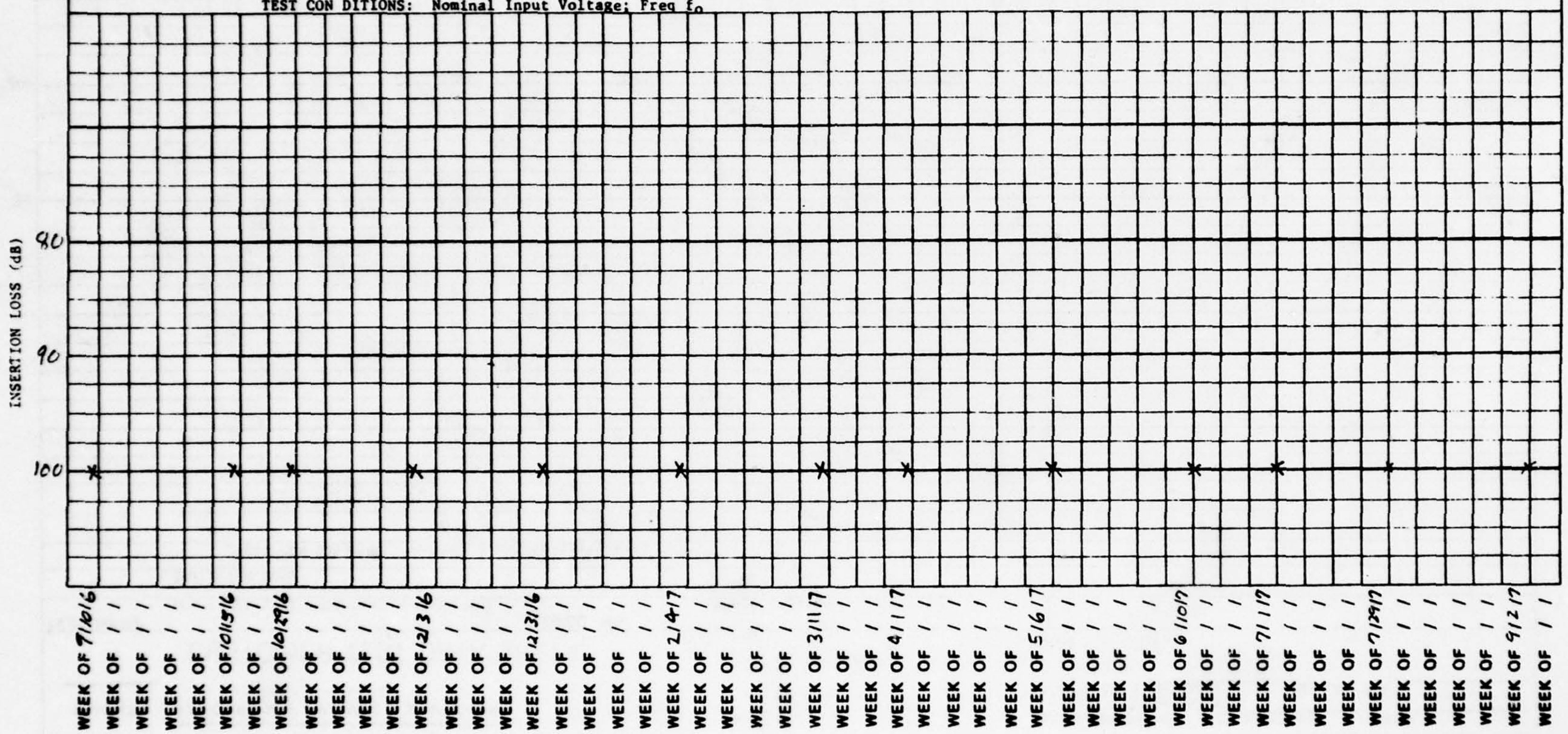
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE

SPEC. NO.: LTPB200300-400

INSERTION LOSS

TEST CON DITIONS: Nominal Input Voltage; Freq f_o



X > 100 dB loss

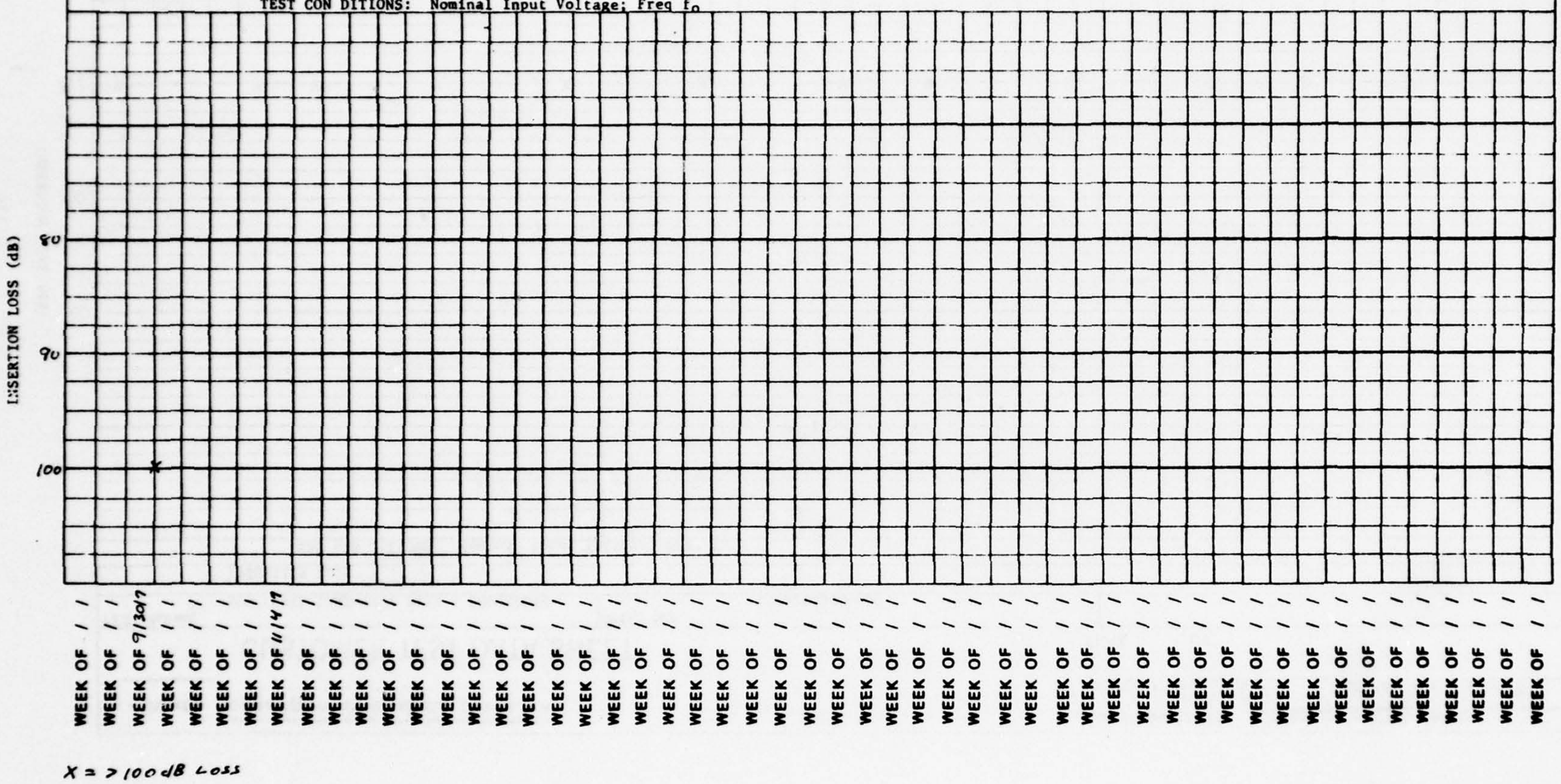
HUGHES *ELECTRON DYNAMICS DIVISION*	DATA SHEET NO. DSB200300-400 REV.
	MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-3
CUSTOMER TEST DATA SHEET	PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE

SPEC. NO.: LTPB200300-400

INSERTION LOSS

TEST CON DITIONS: Nominal Input Voltage; Freq f_o



HUGHES **ELECTRON DYNAMICS DIVISION**

3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ____

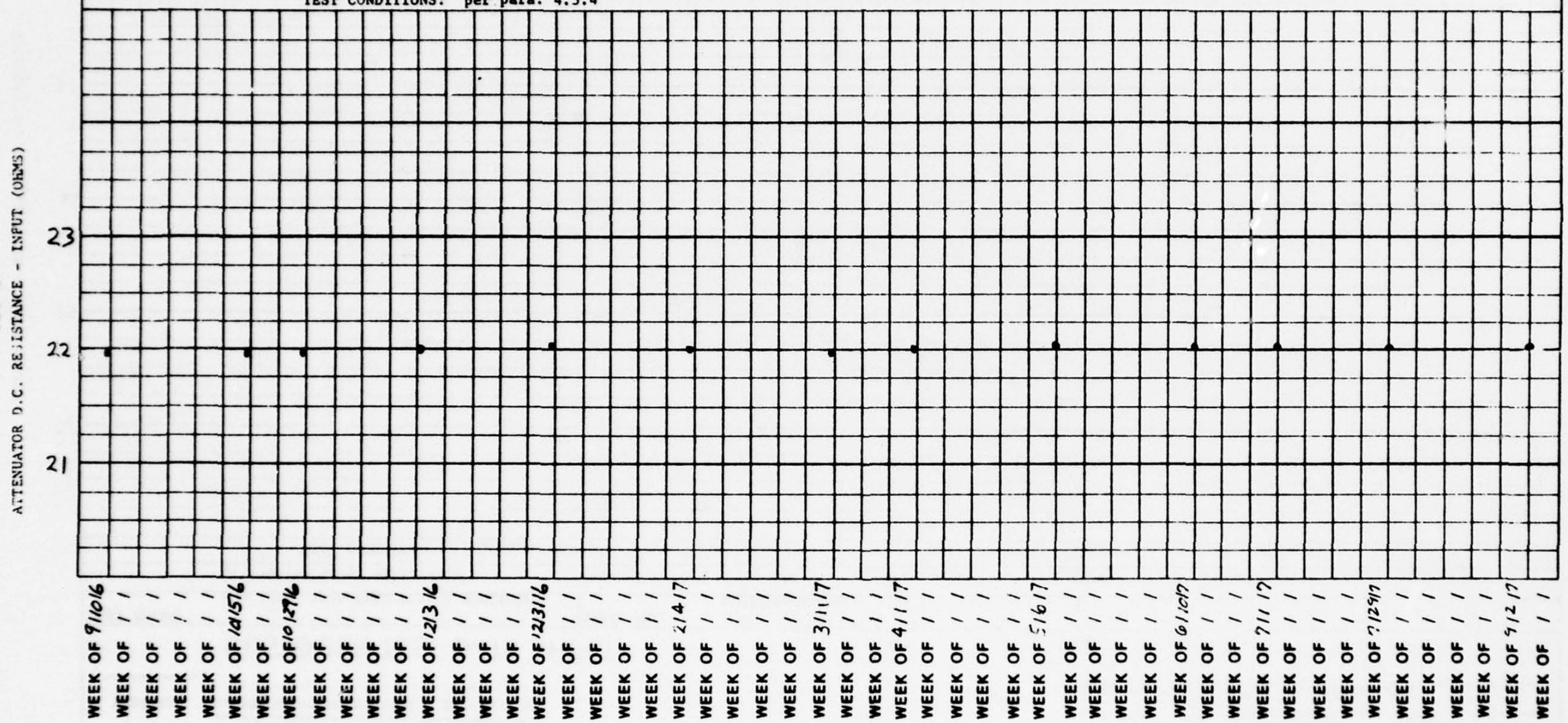
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-3

PAGE ____ OF ____

TEST NAME	SPEC. NO.
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400

ATTENUATOR INPUT RESISTANCE

TEST CONDITIONS: per para. 4.3.4



HUGHES **ELECTRON DYNAMICS DIVISION**

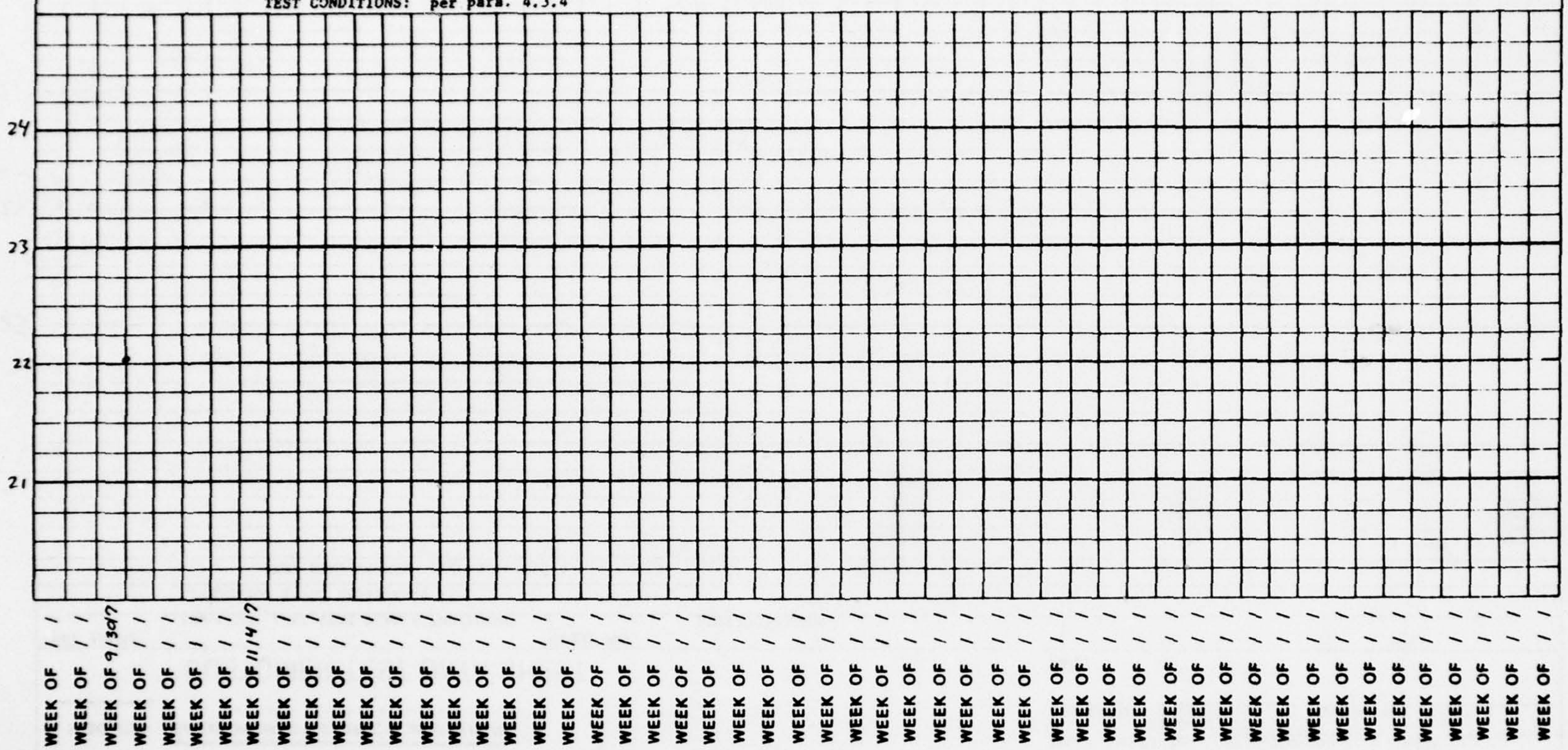
CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______

MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-3

PAGE ___ OF ___

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE	SPEC. NO. LTPB200300-400
ATTENUATOR INPUT RESISTANCE	
TEST CONDITIONS: per para. 4.3.4	



HUGHES **ELECTRON DYNAMICS DIVISION**

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ____

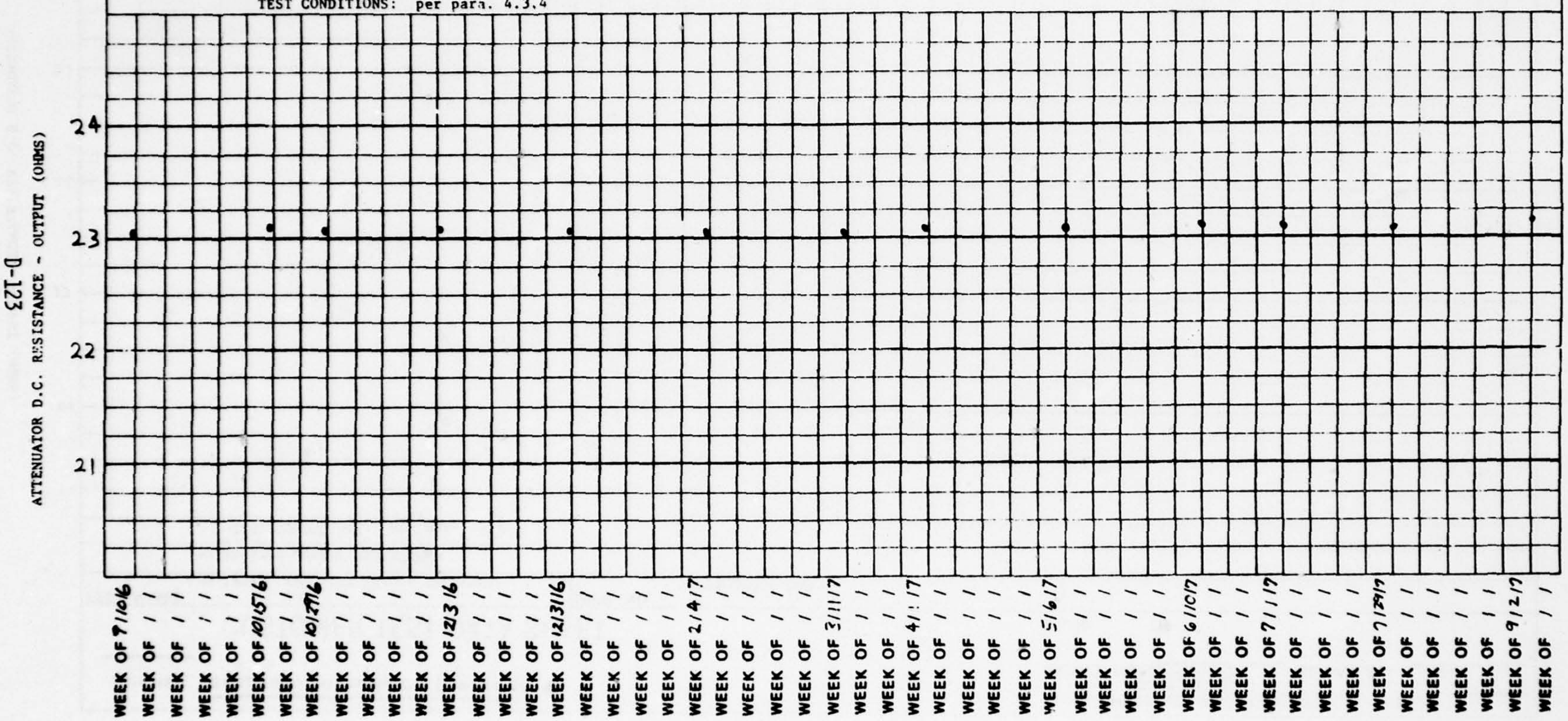
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-3

PAGE OF

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE	SPEC. NO. LIPB200300-400	

ATTENUATOR OUTPUT RESISTANCE

TEST CONDITIONS: per para. 4.3.4



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HUGHES ***ELECTRON DYNAMICS DIVISION***

CUSTOMER TEST DATA SHEET

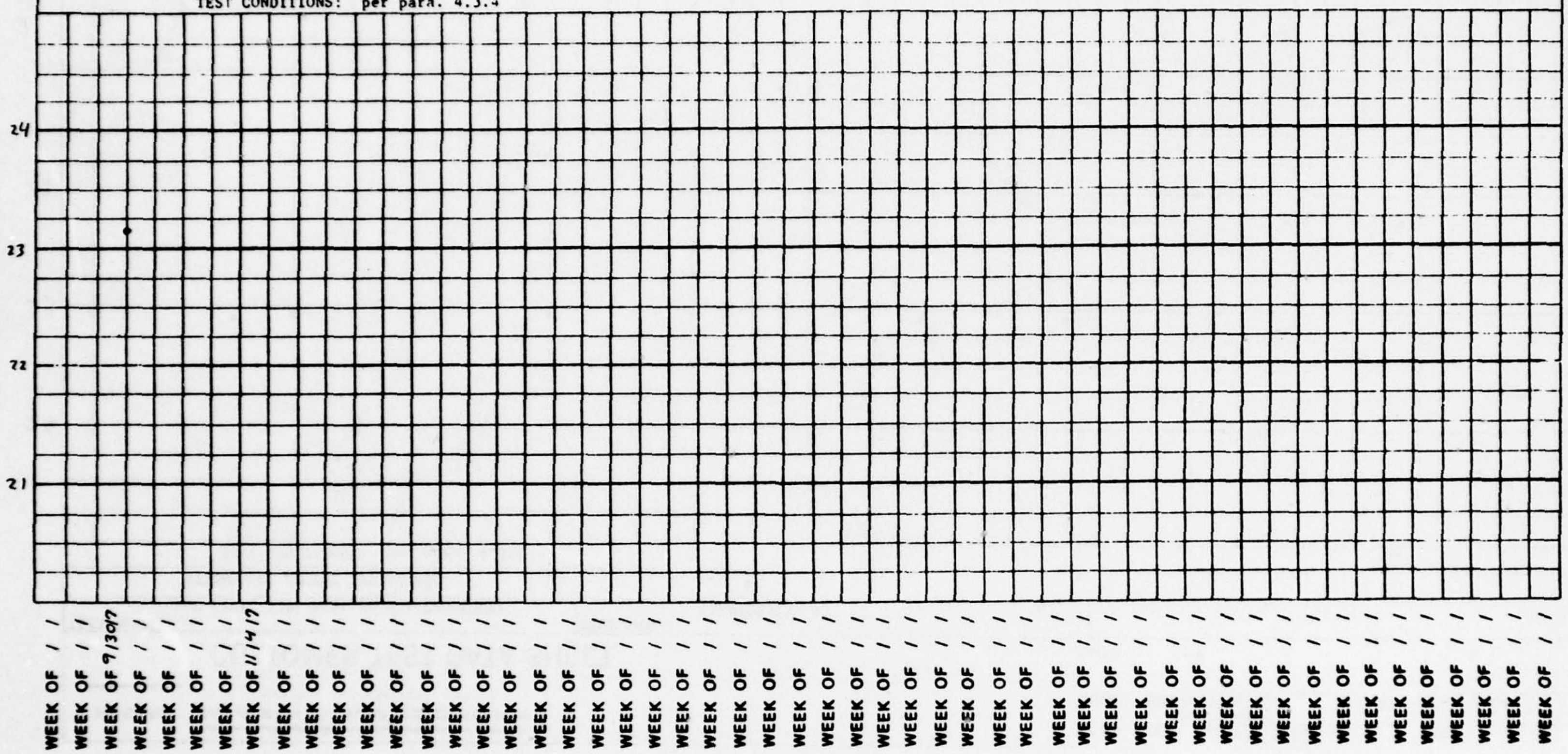
DATA SHEET NO. DSB200300-400 REV. ______
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-3
PAGE ___ OF ___

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC. NO. LTPB200300-400

ATTENUATOR OUTPUT RESISTANCE

TEST CONDITIONS: per para. 4.3.4

ATTENUATOR D.C. RESISTANCE - OUTPUT (OHMS)



HUGHES *ELECTRON DYNAMICS DIVISION*

3100 W. LOMITA BLVD TORRANCE CALIFORNIA

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.

MODEL NO. B200300-121 B200300-122 SERIAL NO. 12-3

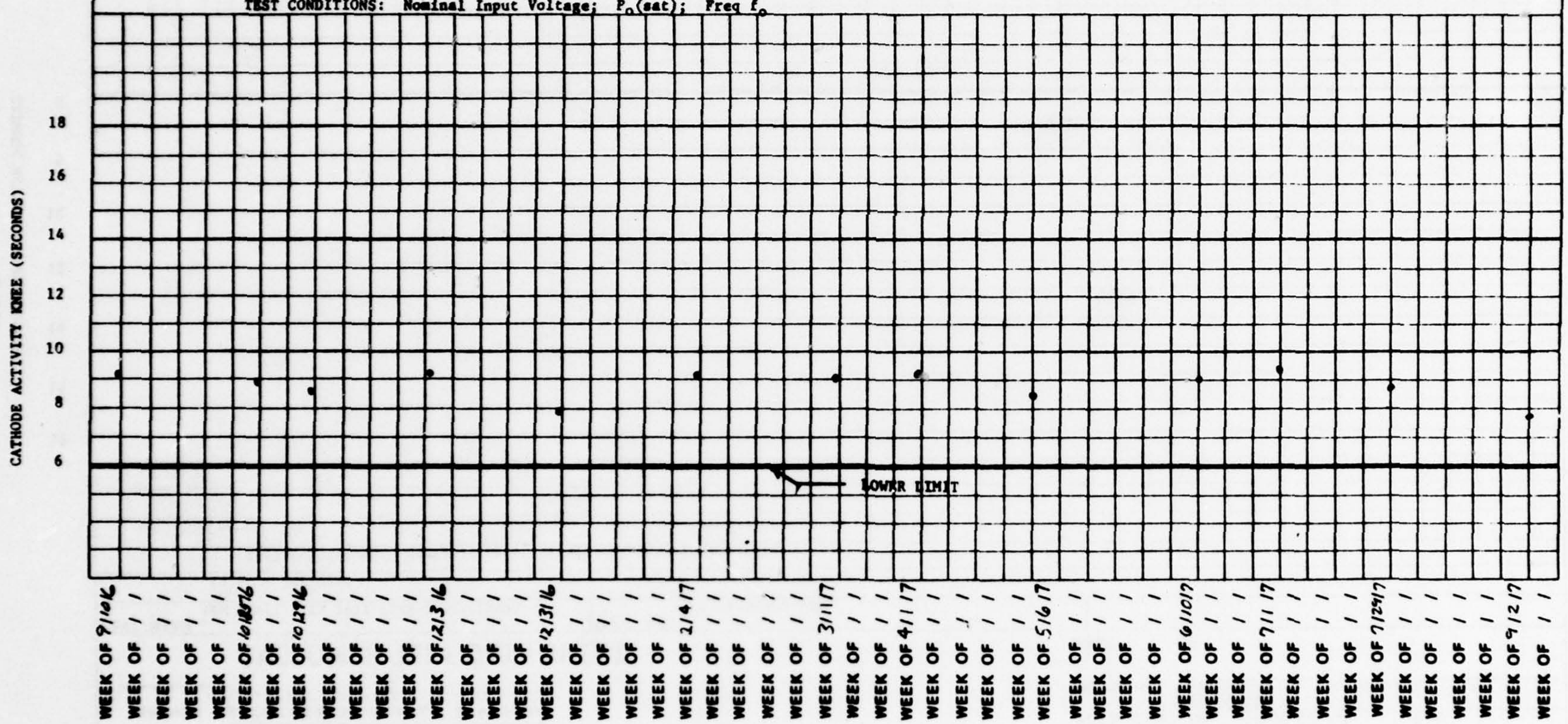
PAGE OF

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE

SPEC. NO. LTPB200300-400

CATHODE ACTIVITY

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



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HUGHES *ELECTRON DYNAMICS DIVISION*

3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______

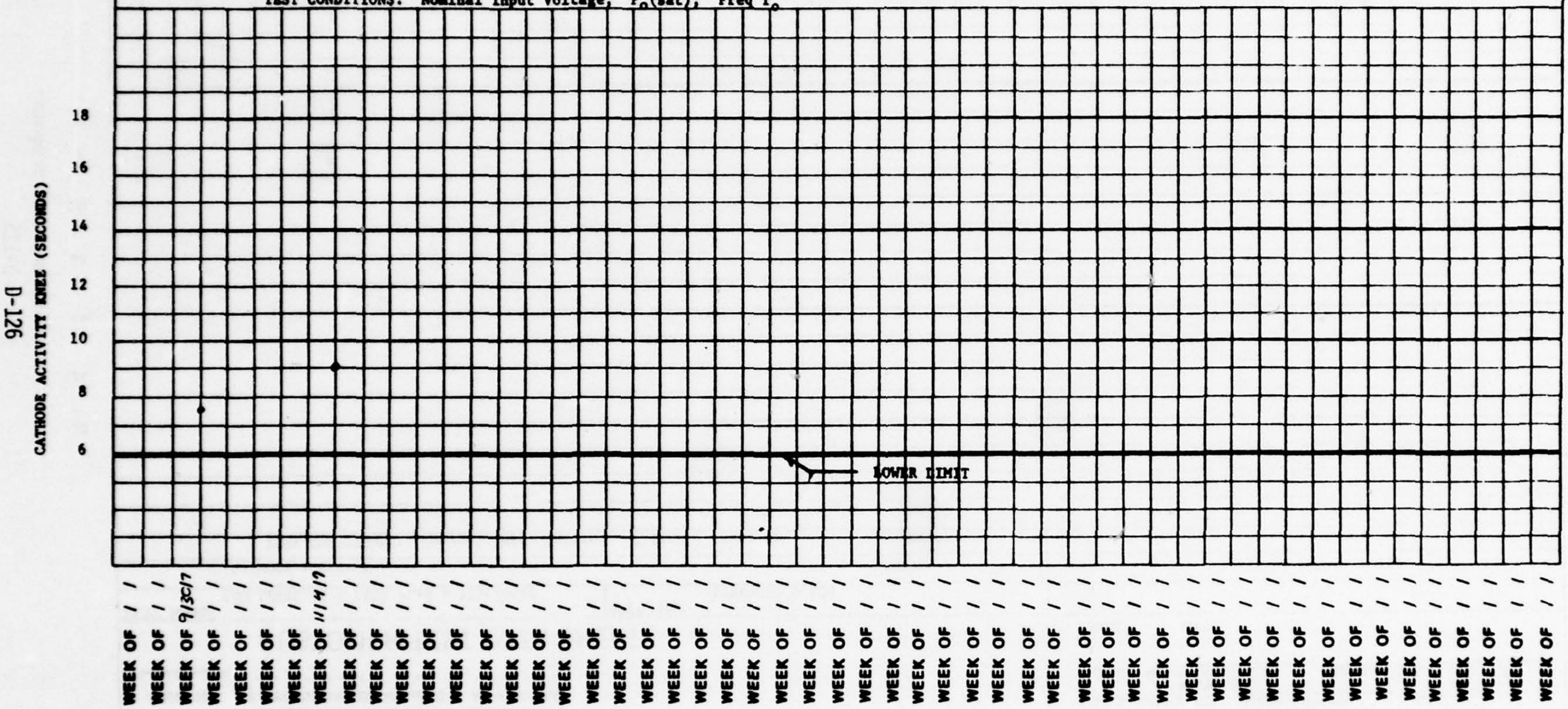
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 12-3

PAGE ____ OF ____

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE	SPEC. NO. LTPB200300-400

CATHODE ACTIVITY

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



HUGHES — **ELECTRON DYNAMICS DIVISION**
3100 W. LOMITA BLVD TORRANCE, CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.
MODEL NO. B200300-122 SERIAL NO. 22-1
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE — SPEC NO. LTPB200300-400 — ACCEPTANCE TEST DATA

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o	LIMITS MIN	LIMITS MAX	TOTAL ACCUMULATED HOURS / UNITS	PRE-FINAL	FINAL	6,824	13,246	20,000	32,264	59,498					
TEST CONDITIONS NOMINAL INPUT VOLTAGE				7/13/70	7/21/70	7/12/71	4/21/72	2/13/73	8/17/74	11/1/77	/ /	/ /	/ /	/ /	/ /
INPUT CURRENT TELEMETRY VOLTAGE			V	2.082	2.085	2.113	2.118	2.120	2.100	2.120					
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.303	3.313	3.349	3.346	3.329	3.288	3.289					
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.952	3.953	3.898	3.887	3.877	3.884	3.807					
HELIX CURRENT TELEMETRY VOLTAGE			V	1.163	1.178	1.433	1.522	1.559	1.378	1.853					
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.832	2.828	2.816	2.809	2.809	2.813	2.823					
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	27.75	27.70	28.05	27.90	27.65	27.4	27.60					
Gss FREQ. f_o (PARA. 4.3.1)	35	39.5	db	36.29	35.93	37.01	36.90	36.20	36.10	35.85					
I_L INSERTION LOSS			db												
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS												
T_K CATHODE ACTIVITY	6.0	--	SEC		10.1	13.0	13.0	14.0	11.4	9.4					
TEST EQUIPMENT CALIBRATION DATE															
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

TWT has 710.5 hours prior to start of life test.

BENCH FUNCTIONAL TEST DATA

LOW LEVEL LIFE TEST PLAN AND PROCEDURE

SPEC: LTPB 200300-400

SERIAL NO. 22-1

PAGE 1 of 3

SPEC. PARA #	TEST DESIGNATION	SPEC LIMITS MINIMUM	SPEC LIMITS MAXIMUM	DATA 0	DATA 20,000	DATA 59498	HOU
4.1	CATHODE ACTIVITY, SECONDS	6.0		10.1	14.0	9.4	
4.2	COMMAND SIGNAL			✓	✓	✓	
4.3	INRUSH CURRENT						
a)	TIME INTEGRAL > Iss, t=3msec, AMP-SEC		.0037	0.0025	0.0030	0.0021	
b)	Imax, AMPS		1.8	0.90	1.0	1.0	
c)	I WITHIN ±3% Iss AT 150 SECONDS			✓	✓	✓	
4.4	INPUT AND OUTPUT REFLECTION, VSWR						
a)	OUTPUT (HOT)		1.25:1	1.13	1.17	1.15	
b)	OUTPUT (COLD)		1.25:1	1.11	1.15	1.15	
c)	INPUT (COLD)		1.25:1	1.04	1.06	1.25	
d)	INPUT (HOT)		1.25:1	1.04	1.06	1.25	
4.5	SATURATED POWER OUTPUT						
a)	TELEMETRY VOLTAGES						
	1) INPUT CURRENT TLM V			2.085	2.120	2.120	
	2) CATHODE CURRENT TLM V			3.313	3.329	3.289	
	3) HEATER VOLTAGE TLM V			3.953	3.899	3.807	
	4) HELIX CURRENT TLM V			1.178	1.559	1.853	
	5) CATHODE VOLTAGE TLM V			2.828	2.809	2.823	
b)	P_o (SAT.), dBm	27		✓	27.65	27.60	
4.6	SATURATED POWER OUTPUT AND INPUT POWER VS. INPUT VOLTAGE						
a)	Vin = 23 ±.5V DC						
	1) P_o (SAT.), dBm	27		✓	27.65	27.60	
	2) Iin, AMPS			.252	.257	0.259	
	3) Pin (DC), WATTS			5.796	5.911	5.957	
b)	Vin = 33 ±.5V DC						
	1) P_o (SAT.), dBm	27		✓	27.65	27.60	
	2) Iin, AMPS			.178	.181	0.183	
	3) Pin (DC), WATTS			5.894	5.993	6.039	

SPEC PARA #	TEST DESIGNATION	SPEC LIMITS MINIMUM	SPEC LIMITS MAXIMUM	DATA 0	DATA 20,000	DATA 59428 HOUR
4.7	SMALL SIGNAL GAIN					
a)	Gss AT P_o 10dB BELOW P_o (SAT.), dB	35	39.5	35.93	36.2	35.85
b)	STEPS 4 AND 5 (SEE ATP)			✓	✓	✓
4.7.1	GAIN SLOPE, dB/Mhz					
a)	Vin = 23 ±.5V DC					
	1) ΔGss f_1 to f_2		0.015	0.009	0.004	0.006
	2) ΔGss f_1 to f_3		0.030	0.020	0.014	0.014
	3) ΔGss f_2 to f_4		0.030	0.004	0.002	0.003
b)	Vin = 28 ±.5V DC					
	1) ΔGss f_1 to f_2		0.015	0.009	0.004	0.006
	2) ΔGss f_1 to f_3		0.030	0.020	0.014	0.014
	3) ΔGss f_2 to f_4		0.030	0.004	0.002	0.003
c)	Vin = 33 ±.5V DC					
	1) ΔGss f_1 to f_2		0.015	0.009	0.004	0.006
	2) ΔGss f_1 to f_3		0.030	0.020	0.014	0.014
	3) ΔGss f_2 to f_4		0.030	0.004	0.002	0.003
4.7.2	GAIN FLATNESS					
a)	Vin = 23 ±.5V DC 1) GAIN VARIATION f_1 to f_2, dB		±0.2	±0.14	±0.15	±0.17
b)	Vin = 28 ±.5V DC 1) GAIN VARIATION f_1 to f_2, dB		±0.2	±0.14	±0.15	±0.17
c)	Vin = 33 ±.5V DC 1) GAIN VARIATION f_1 to f_2, dB		±0.2	±0.14	±0.15	±0.17
4.8	NOISE FIGURE					
a)	N.F., dB		25	21.5	21.0	22.5
4.9	INTERMODULATION DISTORTION					
a)	I.M. DISTORTION, dB	28		28.5	28.3	28.0
4.10	TIME DELAY DISTORTION					
a)	T.D. f_1 to f_2 ANY 10MHZ LINEAR INTERVAL, ns/Mhz		0.10	0.095	0.01	0.01
b)	T.D. f_1 to f_2 PARABOLIC PORTION OF CURVE, ns/Mhz^2		0.01	0.0036	0.001	0.001

S/N ______________

SPEC PARA #	TEST DESIGNATION	SPEC LIMITS MINIMUM	SPEC LIMITS MAXIMUM	DATA 0	DATA 20000	DATA 59498 HOURS
4.11	PHASE SHIFT, FREQ. f_o, +14dBm < P_o < +23dBm , °/dB					
a)	+21.75dBm < P_o < +23dBm		2.0	0.90	1.0	1.07
b)	+17dBm < P_o < +21.75dBm		1.5	0.75	0.83	2.24
c)	+14dBm < P_o < +17dBm		1.0	0.80	0.70	1.29
4.12	STABILITY (MISMATCH) NO P_o FROM INPUT AND OUTPUT OTHER THAN INHERENT NOISE			✓	✓	✓
4.13	SPURIOUS OUTPUT COHERENT COMPONENTS					
a)	P_o (HARMONIC) , dB	13		17.2	17.0	18.0
4.13.1	SPURIOUS OUTPUT INCOHERENT COMPONENTS					
a)	P_o (NON-HARMONIC)	60dB BELOW FUNDAMENTAL		✓	✓	✓
4.13.2	SPURIOUS OUTPUT (AM)			✓	✓	✓
4.13.3	SPURIOUS OUTPUT (PM)			✓	✓	✓

HUGHES ELECTRON DYNAMICS DIVISION

3100 W. LOMITA BLVD. TORRANCE CALIFORNIA

DATA SHEET NO. DSB200300-400 REV. ______

MODEL NO. B200300-121 SERIAL NO. 22-1

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CUSTOMER TEST DATA SHEET

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE

SPEC NO. LTPB200300-400

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT), FREQ. f_o		TOTAL ACCUMULATED HOURS			210.5	378.5	546.0	710.8	849.8	1038.3	1204.7	1368.4	1605.3	1700.2	1868.0	2104.4
TEST CONDITIONS NOMINAL INPUT VOLTAGE PRE-FINAL ATP DATA	0	LIMITS MIN	LIMITS MAX	UNITS	week of 10/2/70	week of 10/9/70	week of 10/16/70	week of 10/23/70	week of 10/29/70	week of 11/6/70	week of 11/13/70	week of 11/20/70	week of 11/30/70	week of 12/4/70	week of 12/11/70	week of 12/21/70
INPUT CURRENT TELEMETRY VOLTAGE	2.082			V	2.082	2.089	2.081	2.087	2.090	2.085	2.084	2.083	2.080	2.085	2.079	2.085
CATHODE CURRENT TELEMETRY VOLTAGE	3.303			V	3.319	3.321	3.317	3.318	3.315	3.317	3.319	3.315	3.315	3.313	3.313	3.315
HEATER VOLTAGE TELEMETRY VOLTAGE	3.952			V	3.924	3.938	3.923	3.931	3.945	3.948	3.943	3.939	3.926	3.924	3.947	3.929
HELIX CURRENT TELEMETRY VOLTAGE	1.163			V	1.192	1.210	1.178	1.213	1.187	1.186	1.190	1.182	1.209	1.214	1.145	1.214
CATHODE VOLTAGE TELEMETRY VOLTAGE	2.832			V	2.822	2.812	2.822	2.814	2.809	2.808	2.812	2.813	2.819	2.815	2.810	2.812
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27.90	27	--	dbm	27.50	27.65	27.85	27.75	27.65	27.80	27.80	28.00	27.90	28.00	27.90	27.88
Gs FREQ. f_o (PARA 4.3.1)	36.29	35	39.5	db	36.13	36.53	36.68	36.38	36.48	36.35	36.38	36.45	36.50	36.55	36.30	36.55
L_i INSERTION LOSS				db												
R_{AIN} ATTENUATOR RESISTANCE, INPUT				OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT				OHMS												
T_K CATHODE ACTIVITY		6.0	--	SEC												
TEST EQUIPMENT CALIBRATION DATE										11/5/70						
SIGNIFICANT EVENT NOTES																
TESTED BY																

SIGNIFICANT EVENT NOTES

HUGHES **ELECTRON DYNAMICS DIVISION**
3100 W. LOMITA BLVD TORRANCE, CALIFORNIA

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-1
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TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o	TOTAL ACCUMULATED HOURS			2290.4	2509.9	2798.8	2939.0	3275.6	3537	3675	4035	4288.7	4468	5179	5949
TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	week of 12/29/70	week of 1/7/71	week of 1/19/71	week of 1/25/71	week of 2/8/71	week of 2/19/71	week of 2/25/71	week of 3/12/71	week of 3/22/71	week of 3/31/71	week of 4/30/71	week of 6/2/71
INPUT CURRENT TELEMETRY VOLTAGE			V	2.086	2.087	2.092	2.096	2.095	2.101	2.097	2.094	2.089	2.099	2.100	2.108
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.318	3.316	3.313	3.316	3.319	3.315	3.320	3.303	3.305	3.324	3.336	3.344
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.934	3.933	3.947	·3.928	3.919	3.907	3.920	3.909	3.927	3.928	3.901	3.894
HELIX CURRENT TELEMETRY VOLTAGE			V	1.233	1.225	1.220	1.271	1.277	1.286	1.318	1.248	1.229	1.341	1.348	1.433
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.809	2.810	2.803	2.807	2.812	2.820	2.814	2.820	2.815	2.810	2.819	2.820
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	—	dbm	28.00	28.00	28.05	28.00	27.90	27.90	27.90	27.80	27.93	27.90	28.20	28.15
Go FREQ. f_o (PARA. 4.3.1)	35	39.5	db	36.50	36.40	36.30	36.45	36.44	36.56	36.40	36.55	36.13	36.26	36.60	36.65
L_I INSERTION LOSS			db												
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS												
T_K CATHODE ACTIVITY	6.0	—	SEC												
TEST EQUIPMENT CALIBRATION DATE					1/8/71								3/31/71	4/28/71	
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.

MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-1

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TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE SPEC NO. LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT), FREQ. f_o

TEST CONDITIONS
NOMINAL INPUT VOLTAGE

	LIMITS MIN	LIMITS MAX	UNITS	6058	6442	6638	6868	7126	7253	7383	7540	7730	7878	8159	8213
TOTAL ACCUMULATED HOURS				week of 6/7/71	week of 6/23/71	week of 7/1/71	week of 7/13/71	week of 7/25/71	week of 7/30/71	week of 8/5/71	week of 8/12/71	week of 8/20/71	week of 8/26/71	week of 9/7/71	week of 9/10/71
INPUT CURRENT TELEMETRY VOLTAGE			V	2.112	2.117	2.110	2.109	2.107	2.115	2.106	2.113	2.109	2.104	2.113	2.119
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.343	3.336	3.345	3.347	3.343	3.350	3.347	3.349	3.346	3.341	3.346	3.343
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.892	3.893	3.891	3.892	3.878	3.906	3.891	3.896	3.892	3.892	3.866	3.903
HELIX CURRENT TELEMETRY VOLTAGE			V	1.490	1.444	1.471	1.430	1.411	1.427	1.400	1.438	1.42·	1.418	1.474	1.354
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.820	2.817	2.819	2.817	2.823	2.810	2.815	2.815	2.817	2.816	2.827	2.805
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	28.30	28.15	28.20	28.18	28.15	28.10	28.15	28.20	28.25	28.25	28.25	28.30
Gss FREQ. f_o (PARA 4.3.1)	35	39.5	db	36.70	36.64	36.69	36.64	36.71	36.05	36.70	36.80	36.90	36.70	36.70	36.60
I_L INSERTION LOSS			db												
R_{AI} ATTENUATOR RESISTANCE, INPUT			OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS												
T_K CATHODE ACTIVITY	6.0	--	SEC												
TEST EQUIPMENT CALIBRATION DATE								7/21/71							
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES **ELECTRON DYNAMICS DIVISION**
3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ____
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-1
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TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE — SPEC NO. LTPB200300-400

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o			TOTAL ACCUMULATED HOURS	8356	8524	8685	8851	9014	9186	9327	9523	9686	9880	9996	10164
TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	MAX	UNITS	week of 9/16/71	week of 9/23/71	week of 9/30/71	week of 10/7/71	week of 10/14/71	week of 10/21/71	week of 10/27/71	week of 11/4/71	week of 11/11/71	week of 11/19/71	week of 11/24/71	week of 12/1/71
INPUT CURRENT TELEMETRY VOLTAGE			V	2.120	2.118	2.109	2.110	2.113	2.114	2.191	2.113	2.190	2.189	2.115	2.123
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.345	3.347	3.344	3.341	3.350	3.347	3.347	3.341	3.341	3.343	3.347	3.345
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.906	3.894	3.861	3.861	3.900	3.895	3.906	3.861	3.877	3.876	3.887	3.917
HELIX CURRENT TELEMETRY VOLTAGE			V	1.390	1.453	1.463	1.433	1.468	1.457	1.428	1.468	1.463	1.460	1.486	1.401
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.804	2.815	2.829	2.809	2.815	2.813	2.809	2.801	2.800	2.799	2.815	2.799
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	28.10	28.25	28.30	28.30	28.25	28.30	28.20	28.20	28.15	28.20	28.05	28.05
Gss FREQ. f_o (PARA. 4.3.1)	35	39.5	db	36.60	36.80	37.06	36.75	36.91	36.80	36.70	36.75	36.70	36.70	36.60	36.95
I_L INSERTION LOSS			db												
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS												
T_K CATHODE ACTIVITY	6.0	--	SEC												
TEST EQUIPMENT CALIBRATION DATE											11/2/71				
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES *ELECTRON DYNAMICS DIVISION*

3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______

MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-1

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TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE — SPEC NO. LTPB200300-400

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT), FREQ. f_o	TOTAL ACCUMULATED HOURS			10379	10548	10614	10804	10976	11142	11331	11494	11573	11717	11884	12046
TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	week of 12/10/71	week of 12/17/71	week of 12/22/71	week of 12/30/71	week of 1/6/72	week of 1/13/72	week of 1/22/72	week of 1/28/72	week of 2/4/72	week of 2/10/72	week of 2/17/72	week of 2/24/72
INPUT CURRENT TELEMETRY VOLTAGE			V	2.119	2.119	2.120	2.191	2.120	2.19	2.20	2.12	2.20	2.11	2.18	2.12
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.341	3.348	3.341	3.346	3.350	3.35	3.34	3.35	3.35	3.35	3.35	3.35
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.891	3.893	3.889	3.901	3.893	3.89	3.88	3.89	3.88	3.90	3.89	3.90
HELIX CURRENT TELEMETRY VOLTAGE			V	1.439	1.490	1.500	1.43	1.500	1.50	1.50	1.52	1.51	1.49	1.50	1.50
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.803	2.811	2.817	2.807	2.810	2.81	2.80	2.81	2.81	2.81	2.81	2.81
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	28.15	28.15	28.15	28.15	28.15	28.20	28.25	28.10	28.15	28.10	28.05	28.05
Gm FREQ. f_o (PARA. 4.3.1)	35	39.5	db	36.70	36.80	36.80	36.70	36.60	36.60	36.60	36.80	36.60	36.85	36.85	36.80
L_L INSERTION LOSS			db												
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS												
T_K CATHODE ACTIVITY	6.0	—	SEC												
TEST EQUIPMENT CALIBRATION DATE											1/26/72				
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES **ELECTRON DYNAMICS DIVISION**
3100 W. LOMITA BLVD. TORRANCE, CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-1
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TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o

TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	12236	12382	12580	12717	12882	13005	13237	13384	13576	13742	13887	14077
TOTAL ACCUMULATED HOURS				week of 3/3/72	week of 3/9/72	week of 3/17/72	week of 3/23/72	week of 3/30/72	week of 4/7/72	week of 4/21/72	week of 4/27/72	week of 5/5/72	week of 5/12/72	week of 5/18/72	week of 5/26/72
INPUT CURRENT TELEMETRY VOLTAGE			V	2.12	2.12	2.12	2.11	2.12	2.12		2.12	2.12	2.12	2.12	2.12
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.35	3.35	3.35	3.35	3.35	3.34		3.35	3.35	3.35	3.35	3.34
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.89	3.89	3.89	3.88	3.89	3.87		3.89	3.87	3.88	3.87	3.88
HELIX CURRENT TELEMETRY VOLTAGE			V	1.50	1.49	1.51	1.51	1.49	1.49		1.52	1.50	1.56	1.52	1.55
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.81	2.81	2.81	2.81	2.81	2.81		2.81	2.81	2.81	2.81	2.81
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	28.05	27.85	27.85	27.70	27.70	27.80		27.95	27.95	27.95	27.95	27.95
Gss FREQ. f_o (PARA. 4.3.1)	35	39.5	db	36.80	36.70	36.70	36.60	36.60	36.50		36.40	36.50	36.90	36.90	36.90
L_L INSERTION LOSS			db												
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS												
T_K CATHODE ACTIVITY	6.0	--	SEC												
TEST EQUIPMENT CALIBRATION DATE										4/19/72					
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.

MODEL NO. B200300-121 B200300-122 SERIAL NO. 22-1

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TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o	TOTAL ACCUMULATED HOURS			14222	14409	14579	14748	14912	15082	15247	15419	15585	15753	15919	16083
TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS		UNITS	week of 6/1/72	week of 6/9/72	week of 6/16/72	week of 6/23/72	week of 6/30/72	week of 7/7/72	week of 7/14/72	week of 7/21/72	week of 7/28/72	week of 8/4/72	week of 8/11/72	week of 8/18/72
	MIN	MAX													
INPUT CURRENT TELEMETRY VOLTAGE			V	2.12	2.12	2.12	2.12	2.10	2.12	2.12	2.16	2.13	2.12	2.13	2.12
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.34	3.34	3.34	3.33	3.33	3.33	3.34	3.33	3.33	3.34	3.33	3.34
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.88	3.89	3.88	3.88	3.89	3.88	3.89	3.88	3.88	3.88	3.88	3.86
HELIX CURRENT TELEMETRY VOLTAGE			V	1.54	1.50	1.54	1.50	1.55	1.53	1.50	1.51	1.50	1.54	1.51	1.58
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.81	2.81	2.81	2.80	2.82	2.81	2.81	2.80	2.80	2.81	2.81	2.82
P_o (SAT) FREQ. f_o (PARA 4.1.3)	27	--	dbm	28.00	28.05	27.95	28.00	27.95	27.90	27.90	27.90	28.00	27.90	27.95	27.80
Gss FREQ. f_o (PARA 4.3.1)	35	39.5	db	36.80	36.80	36.90	36.90	36.70	36.80	36.90	37.00	36.80	36.80	36.90	36.70
I_L INSERTION LOSS			db												
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS												
T_K CATHODE ACTIVITY	6.0	--	SEC												
TEST EQUIPMENT CALIBRATION DATE															
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES **ELECTRON DYNAMICS DIVISION**
3100 W. LOMITA BLVD. TORRANCE, CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.
MODEL NO. B200300-121 B200300-122 SERIAL NO. 22-1
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE SPEC NO. LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o

TEST CONDITIONS / NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	16257	16330	16402	16574	16737	16902	17070	17234	17400	17564	17730	17897
TOTAL ACCUMULATED HOURS				week of 8/28/72	week of 8/31/72	week of 9/8/72	week of 9/15/72	week of 9/22/72	week of 9/29/72	week of 10/6/72	week of 10/13/72	week of 10/20/72	week of 10/27/72	week of 11/3/72	week of 11/10/72
INPUT CURRENT TELEMETRY VOLTAGE			V	2.12	2.12	2.12	2.12	2.12	2.13	2.12	2.14	2.12	2.13	2.12	2.11
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.33	3.33	3.34	3.34	3.34	3.34	3.34	3.33	3.33	3.34	3.33	3.33
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.88	3.86	3.87	3.89	3.86	3.906	3.88	3.84	3.88	3.91	3.88	3.88
HELIX CURRENT TELEMETRY VOLTAGE			V	1.51	1.53	1.57	1.54	1.53	1.53	1.55	1.56	1.54	1.53	1.53	1.56
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.81	2.81	2.82	2.81	2.81	2.80	2.81	2.82	2.81	2.79	2.80	2.81
P_o (SAT) FREQ. f_o (PARA 4.1.3)	27	--	dbm	27.90	27.80	27.85	27.95	27.90	27.70	27.80	27.80	27.70	27.70	27.70	27.70
Gss FREQ. f_o (PARA. 4.1.1)	35	39.5	db	36.90	36.60	36.70	36.80	36.70	36.40	36.40	36.40	36.50	36.30	36.40	36.40
L_L INSERTION LOSS			db		>100			>100			>100			>100	
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS		20.87			21.08			19.35			28.00	
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS		17.21			17.22			17.25			17.18	
T_K CATHODE ACTIVITY	6.0	--	SEC												
TEST EQUIPMENT CALIBRATION DATE						9/8/72			9/29/72						
SIGNIFICANT EVENT NOTES											1.			1.	
TESTED BY															

SIGNIFICANT EVENT NOTES

1. Rain is intermittant.

HUGHES **ELECTRON DYNAMICS DIVISION**

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______

MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-1

PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE

SPEC NO. LTPB200300-400

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT), FREQ. f_o			TOTAL ACCUMULATED HOURS	18065	18174	18390	18553	18718	18643	18940	19103	19267	19437	19671	19763
TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	week of 11/17/72	week of 11/22/72	week of 12/1/73	week of 12/8/72	week of 12/15/72	week of 12/21/72	week of 12/29/72	week of 1/5/73	week of 1/12/73	week of 1/19/73	week of 1/29/73	week of 2/2/73
INPUT CURRENT TELEMETRY VOLTAGE			V	2.12	2.12	2.12	2.13	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.88	3.88	3.86	3.92	3.88	3.89	3.87	3.87	3.88	3.87	3.87	3.89
HELIX CURRENT TELEMETRY VOLTAGE			V	1.55	1.53	1.57	1.73	1.57	1.61	1.57	1.60	1.53	1.57	1.53	1.57
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.81	2.81	2.81	2.80	2.81	2.81	2.81	2.81	2.81	2.81	2.81	2.80
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	27.70	27.70	27.70	27.80	27.80	27.70	27.85	27.80	27.80	27.80	27.80	27.65
Gss FREQ. f_o (PARA 4.3.1)	35	39.5	db	36.20	36.30	36.30	36.40	36.40	36.40	36.40	36.40	36.30	36.40	36.30	36.20
L_i INSERTION LOSS			db					> 100			> 100			> 100	
R_{AII} ATTENUATOR RESISTANCE, INPUT			OHMS					22.15			23.82			23.56	
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS					17.28			17.28			17.29	
T_K CATHODE ACTIVITY	6.0	—	SEC					14.7							
TEST EQUIPMENT CALIBRATION DATE												1/12/73			
SIGNIFICANT EVENT NOTES								1.			1.			1.	
TESTED BY															

SIGNIFICANT EVENT NOTES

1. Rain is intermittant

HUGHES **ELECTRON DYNAMICS DIVISION**

3100 W. LOMITA BLVD TORRANCE, CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______

MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-1

PAGE OF

TEST NAME	LOW LEVEL LIFE TEST PLAN & PROCEDURE	SPEC NO.	LTPB200300-400

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o	LIMITS MIN	LIMITS MAX	UNITS	20024 week of 3/2/73	20194 week of 3/9/73	20358 week of 3/16/73	20523 week of 3/23/73	20668 week of 3/29/73	20858 week of 4/6/73	21023 week of 4/13/73	21191 week of 4/20/73	21333 week of 4/27/73	21500 week of 5/4/73	21666 week of 5/11/73	21831 week of 5/18/73
TEST CONDITIONS NOMINAL INPUT VOLTAGE				TOTAL ACCUMULATED HOURS											
INPUT CURRENT TELEMETRY VOLTAGE			V	2.13	2.12	2.13	2.13	2.13	2.12	2.12	2.12	2.12	2.12	2.12	2.13
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.33	3.33	3.33	3.33	3.33	3.33	3.32	3.33	3.32	3.32	3.33	3.32
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.89	3.87	3.88	3.88	3.89	3.88	3.87	3.88	3.89	3.88	3.87	3.93
HELIX CURRENT TELEMETRY VOLTAGE			V	1.57	1.58	1.56	1.56	1.56	1.58	1.59	1.58	1.58	1.57	1.58	1.53
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.80	2.81	2.80	2.80	2.80	2.81	2.81	2.81	2.81	2.81	2.81	2.79
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	27.60	27.65	27.65	27.65	27.70	27.70	27.75	27.75	27.70	27.65	27.70	27.70
Gss FREQ. f_o (PARA. 4.3.1)	35	39.5	db	36.10	36.20	36.20	36.20	36.20	36.10	36.40	36.50	36.30	36.30	36.40	36.20
I_L INSERTION LOSS			db					>100						>100	
R_{AI} ATTENUATOR RESISTANCE, INPUT			OHMS					23.97						25.10	
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS					17.33						17.38	
T_K CATHODE ACTIVITY	6.0	--	SEC												
TEST EQUIPMENT CALIBRATION DATE									4/4/73						
SIGNIFICANT EVENT NOTES								1.						1.	
TESTED BY															

SIGNIFICANT EVENT NOTES

1. Rain is intermittant.

HUGHES *ELECTRON DYNAMICS DIVISION*

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______
MODEL NO. B200300-121 SERIAL NO. 22-1
PAGE ___ OF ___

TEST NAME	LOW LEVEL LIFE TEST PLAN & PROCEDURE	SPEC NO.	LTPB200300-400

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT) FREQ. f_o			TOTAL ACCUMULATED HOURS	22001	22164	22338	22503		22790	22955	23123	23436			
TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	week of 5/25/73	week of 6/1/73	week of 6/9/73	week of 6/16/73	week of 6/22/73	week of 6/29/73	week of 7/6/73	week of 7/13/73	week of 7/26/73	/ /	/ /	/ /
INPUT CURRENT TELEMETRY VOLTAGE			V	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12			
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.33	3.32	3.32	3.32	3.32	3.31	3.31	3.31	3.31			
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.88	3.87	3.88	3.87	3.88	3.88	3.87	3.88	3.88			
HELIX CURRENT TELEMETRY VOLTAGE			V	1.56	1.60	1.57	1.60	1.60	1.55	1.56	1.56	1.55			
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.81	2.81	2.81	2.81	2.81	2.81	2.81	2.81	2.81			
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	27.55	27.60	27.60	27.70	27.70	27.65	27.65	27.65	27.70			
Gm FREQ. f_o (PARA. 4.3.1)	35	39.5	db	36.10	36.15	36.30	36.50	36.30	36.40	36.40	36.40	36.40			
I_L INSERTION LOSS			db					>100							
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS					--							
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS					17.37							
T_K CATHODE ACTIVITY	6.0	--	SEC					9.5							
TEST EQUIPMENT CALIBRATION DATE															
SIGNIFICANT EVENT NOTES								1.							
TESTED BY															

SIGNIFICANT EVENT NOTES

1. Rain is intermittant.

HUGHES ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ____
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-1
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o

TEST CONDITIONS
NOMINAL INPUT VOLTAGE

TOTAL ACCUMULATED HOURS	LIMITS MIN	LIMITS MAX	UNITS	24,139	24,874	25,562	26,237	26,862	27,637	28,285	29,049	29,656	30,366	31,086	31,742
				8 /28/73	9 /28 /73	10 /26/73	11 /30/73	12/28/73	1 /31/74	2 /28/ 74	4 / 1/74	4/29/74	5/29/74	6/26/74	7/26/74
INPUT CURRENT TELEMETRY VOLTAGE			V	2.12	2.11	2.12	2.12	2.11	2.11	2.11	2.12	2.10	2.11	2.12	2.12
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.31	3.30	3.30	3.29	3.30	3.30	3.30	3.30	3.29	3.30	3.30	3.30
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.88	3.88	3.87	3.88	3.88	3.88	3.88	3.87	3.88	3.87	3.87	3.88
HELIX CURRENT TELEMETRY VOLTAGE			V	1.55	1.50	1.51	1.55	1.51	1.53	1.51	1.60	1.40	1.58	1.57	1.61
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.81	2.81	2.81	2.81	2.81	2.81	2.81	2.81	2.81	2.81	2.81	2.80
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	27.7	27.7	27.8	27.7	27.7	27.70	27.70	27.60	27.70	27.70	27.70	27.60
Gm FREQ. f_o (PARA. 4.3.1)	35	39.5	db	36.3	36.4	36.4	36.5	36.2	36.20	36.10	36.10	36.10	36.30	36.10	36.10
I_L INSERTION LOSS			db	>100	>100	>100	>100	>100	>100	> 100	>100	>100	>100	>100	>100
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS	23.75	20.76	19.72	20.51	20.60	22.45**	22.60**	22.53**	22.64**	22.00**	21.88	21.71
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS	17.42	17.42	17.48	17.52	17.52	17.55	17.56	17.58	17.58	17.61	17.61	17.63
T_K CATHODE ACTIVITY	6.0	--	SEC	13.3	12.5	*		12.5	13.1	12.8	12.5	12.9	12.0	12.0	11.8
TEST EQUIPMENT CALIBRATION DATE				8/10/73	8/10/73	8/10/73	8/10/73	11/28/73	11/28/73	11/28/73	3/27/74	3/27/74	3/27/74	3/27/74	3/27/74
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

*RECORDER OUT FOR REPAIR.

**INTERMITTENT.

HUGHES ELECTRON DYNAMICS DIVISION
3100 W. LOMITA BLVD. TORRANCE, CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. USB200300-400 REV. ______
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-1
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o	LIMITS MIN	LIMITS MAX	TOTAL ACCUMULATED HOURS	32521	33,246	34,013	34,747	35,345	36,136	36809	37,490	38,276	39,021	39,686	40,393
TEST CONDITIONS NOMINAL INPUT VOLTAGE			UNITS	8/29/74	9/30/74	11/1/74	12/3/4	12/28/4	1/30/5	2/27/5	3/28/5	4/30/5	5/31/5	7/2/75	8/1/5
INPUT CURRENT TELEMETRY VOLTAGE			V	2.12	2.12	2.11	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.294	3.297	3.29	3.29	3.29	3.29	3.29	3.29	3.29	3.29	3.29	3.29
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.868	3.868	3.87	3.86	3.86	3.88	3.88	3.87	3.88	3.87	3.86	3.85
HELIX CURRENT TELEMETRY VOLTAGE			V	1.598	1.642	1.45	1.66	1.65	1.66	1.66	1.67	1.66	1.66	1.68	1.66
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.808	2.808	2.81	2.81	2.81	2.80	2.80	2.80	2.80	2.80	2.81	2.80
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	27.55	27.55	27.7	27.7	27.6	27.6	27.6	27.5	27.55	27.50	27.5	27.4
Gm FREQ. f_o (PARA. 4.3.1)	35	39.5	db	36.0	35.95	36.1	36.0	36.0	36.0	35.9	36.0	36.0	35.85	36.0	35.9
I_L INSERTION LOSS			db	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS	21.59	21.61	20.26	20.32	20.25	18.18	18.20	18.28	18.31	18.37	18.35	18.55
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS	17.64	17.64	17.66	17.75	17.71	~~18.78~~ 17.72	17.76	17.75	17.79	17.81	17.77	17.80
T_K CATHODE ACTIVITY	6.0	--	SEC	11.3	11.4	11.5	11.0	11.3	11.0	10.9	10.6	11.0	11.3	10.6	10.8
TEST EQUIPMENT CALIBRATION DATE				7-24-4	7-24-4	7-24-4	11-21-4	11-21-4	11-21-4	1/31/5	1-31-5	1-31-5	4-1-75	4-1-5	7-30-5
SIGNIFICANT EVENT NOTES															
TESTED BY				W.P.N	W.P.N	WPN	WPN	W.P.N	W.P.N	W.P.N	W.P.N	W.P.N	W.P.N	W.P.N	W.P.N

SIGNIFICANT EVENT NOTES

HUGHES — ELECTRON DYNAMICS DIVISION
3100 W LOMITA BLVD TORRANCE, CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ____
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-1
PAGE ___ OF ___

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE — SPEC NO. LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o

TEST CONDITIONS / NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	41,186	41,928	42,594	43365	44,317	~~44,9~~ 44,699	45,441	46,296	46,797	47,653	48,290	49,842
TOTAL ACCUMULATED HOURS (date)				9 13 15	10 14 15	11 11 15	12 13 15	1/14/6	1 30 16	3 1 16	4 16 16	4 28 16	6 12 16	6 29 16	9 18 16
INPUT CURRENT TELEMETRY VOLTAGE			V	2.12	2.13	2.13	2.13	2.11	2.12	2.12	2.11	2.12	2.12	2.11	2.12
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.29	3.29	3.29	3.29	3.29	3.29	3.30	3.28	3.30	3.29	3.29	3.29
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.86	3.87	3.87	3.87	3.87	3.86	3.87	3.88	3.86	3.85	3.85	3.85
HELIX CURRENT TELEMETRY VOLTAGE			V	1.68	1.69	1.64	1.70	1.64	1.70	1.71	1.63	1.69	1.71	1.70	1.71
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.81	2.80	2.80	2.80	2.80	2.81	2.80	2.80	2.81	2.81	2.81	2.81
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	27.45	27.5	27.5	27.6	27.55	27.60	27.60	27.65	27.60	27.45	27.65	27.55
Gss FREQ. f_o (PARA. 4.3.1)	35	39.5	db	35.9	36.0	35.9	35.9	35.9	36.0	36.0	35.9	36.0	35.9	36.0	35.85
I_L INSERTION LOSS			db	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS	18.50	18.49	18.5	INTER MITTENT *	*	23 *	20.9	*23	23.72*	22.75*	19.74	24*
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS	17.82	17.84	17.83	17.83	17.83	17.83	17.90	17.78	17.92	17.96	17.83	17.94
T_K CATHODE ACTIVITY	6.0	--	SEC	10.9	10.4	10.8	10.7	10.6	10.4	10.9	10.6	10.4	10.2	10.6	10.0
TEST EQUIPMENT CALIBRATION DATE				7-30-5	7-30-5	10-29-5	10-29-5	10-29-5	10-29-5	2-3-6	2-3-6	2-3-6	5-7-6	5-12-6	8-31-6
SIGNIFICANT EVENT NOTES															
TESTED BY				W.P.N	W.P.N	W.P.N	W.P.N	W.P.N	W.P.N	m.S.K	mSK	mSK	W.P.N	mSK	mSK

SIGNIFICANT EVENT NOTES * INTERMITTENT

HUGHES ELECTRON DYNAMICS DIVISION
3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. A
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-1
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC NO. LTPB200300-400

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o	LIMITS MIN	LIMITS MAX	UNITS												
TOTAL ACCUMULATED HOURS				50,882	51,066	51,815	52,519	53233	54067.9	54,505	55,369	56,027	56528.9	57,242	57988
TEST CONDITIONS NOMINAL INPUT VOLTAGE				10/2/76	10/29/76	11/29/76	12/30/76	2/21/77	3/19/77	3/29/77	5/16/77	6/7/77	6/10/77	7/29/77	8/29/77
INPUT CURRENT TELEMETRY VOLTAGE			V	2.125	2.561	2.562	2.564	2.126	2.135 ~~2.567~~	2.131	2.131	2.122	2.134	2.132	2.126
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.298	3.290	3.297	3.292	3.295	3.295	3.301	3.301	3.284	3.298	3.293	3.291
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.862	3.837	3.858	3.856	3.859	3.849 ~~3.853~~	3.870	3.857	3.841	3.852	3.824	3.817
HELIX CURRENT TELEMETRY VOLTAGE			V	1.765	1.746	1.770	1.744 ~~1.629~~	1.751	1.789	1.776	1.795	1.759	1.794	1.808	1.830
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.806	2.815	2.805	2.804	2.803	2.806	2.800	2.803	2.812	2.805	2.812	2.823
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	27.55	27.60	27.55	27.8	27.7	27.8	27.50	27.55	27.50	27.70	27.60	27.60
Gss FREQ. f_o (PARA. 4.3.1)	35	39.5	db	35.85	35.75	35.90	36.05 ~~34.15~~	35.9	36.15	35.75	35.70	35.65	36.15	36.0	36.0
I_L INSERTION LOSS			db	>100	>100	95	>100	>100	>100	>100	>100	>100	>100	>100	>100
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS	19.66	19.66	*24.4	*27.0	*24.0	*21.25	*25.55	21.52	19.22	22.24	24.73	23.57
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS	17.56	*24.0	17.8	18.0	18.0	17.96	17.96	18.0	18.04	18.07	18.06	18.10
T_K CATHODE ACTIVITY	6.0	--	SEC	10.3	10.3	10.5	10.7	9.4*	10.3	10.2	9.9	9.4	10.0	10.0	9.5
TEST EQUIPMENT CALIBRATION DATE				8-31-6	8-31-6	10-19-6	8-31-6	12-31-6	1-5-77	1-19-77	4-25-7	4-25-7	5-2-77	5-2-77	5-22-77
SIGNIFICANT EVENT NOTES															
TESTED BY				MSK	MSK	MSK	DRJ	D.R.J.	D.R.J.	MSK	MSK	MSK	DRJ	MSK	MKB

SIGNIFICANT EVENT NOTES

* INTERMITTENT

USE RESISTOR FOR TLM INPUT CURRENT VOLTAGES

HUGHES **ELECTRON DYNAMICS DIVISION**
3100 W. LOMITA BLVD. TORRANCE, CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. A
MODEL NO. B200300-121 B200300-122 SERIAL NO. 22-1
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC NO.: LTPB200300-400

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o			TOTAL ACCUMULATED HOURS	58687	59498										
TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	9/29/77	7/11/77	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /
INPUT CURRENT TELEMETRY VOLTAGE			V	2.124	2.120										
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.290	3.289										
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.827	3.807										
HELIX CURRENT TELEMETRY VOLTAGE			V	1.796	1.853										
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.820	2.823										
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	27.62	27.60										
Gm FREQ. f_o (PARA. 4.3.1)	35	39.5	db	35.85	35.85										
I_L INSERTION LOSS			db	>100											
R_{AHI} ATTENUATOR RESISTANCE, INPUT			OHMS	21.72											
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS	18.06											
T_K CATHODE ACTIVITY	6.0	--	SEC	10	9.4										
TEST EQUIPMENT CALIBRATION DATE				8-31-77											
SIGNIFICANT EVENT NOTES					*										
TESTED BY				[illegible]											

SIGNIFICANT EVENT NOTES * END OF CONTRACT MEASUREMENTS

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3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.

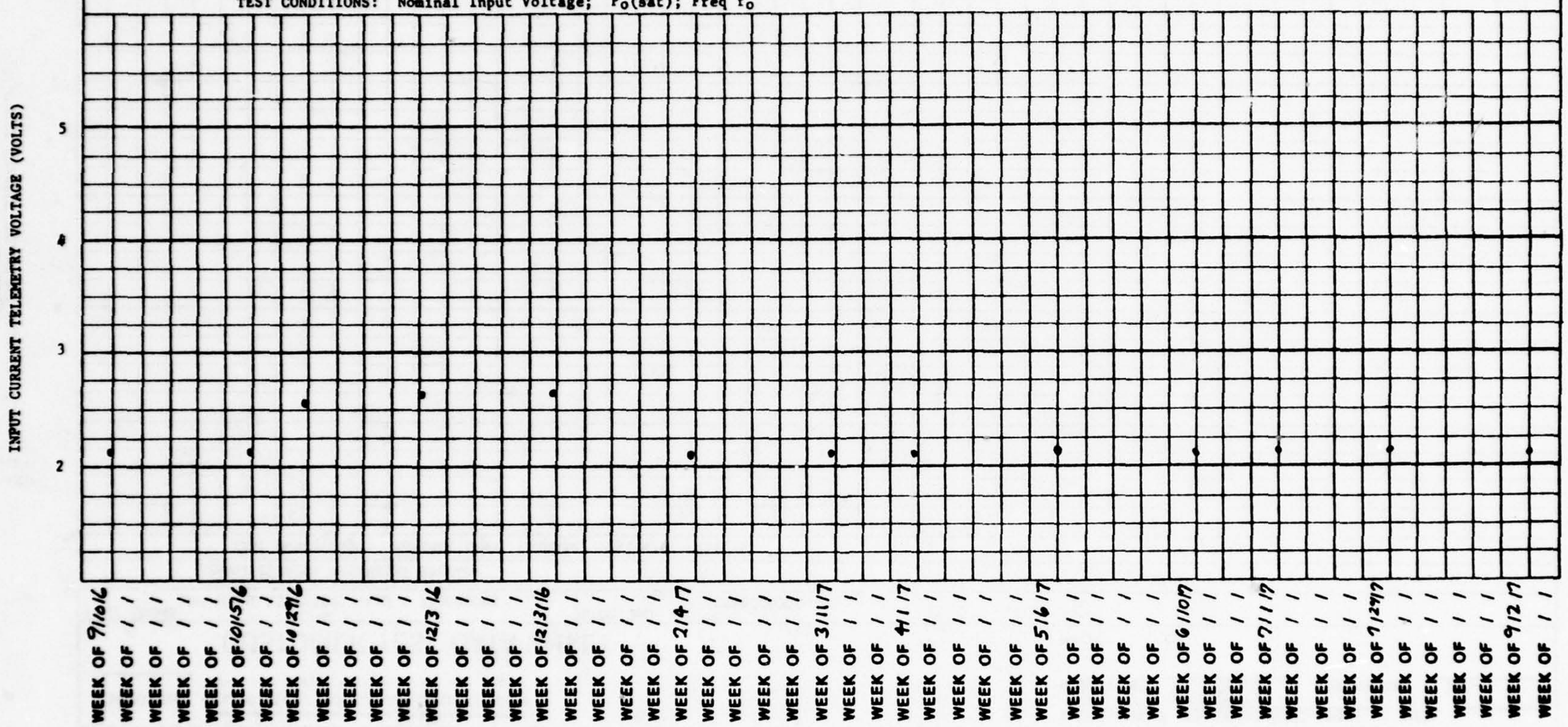
MODEL NO. B200300-121 B200300-122 SERIAL NO. 22-1

PAGE OF

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE	SPEC. NO. LTPB200300-400

INPUT CURRENT TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; $P_o(sat)$; Freq f_o



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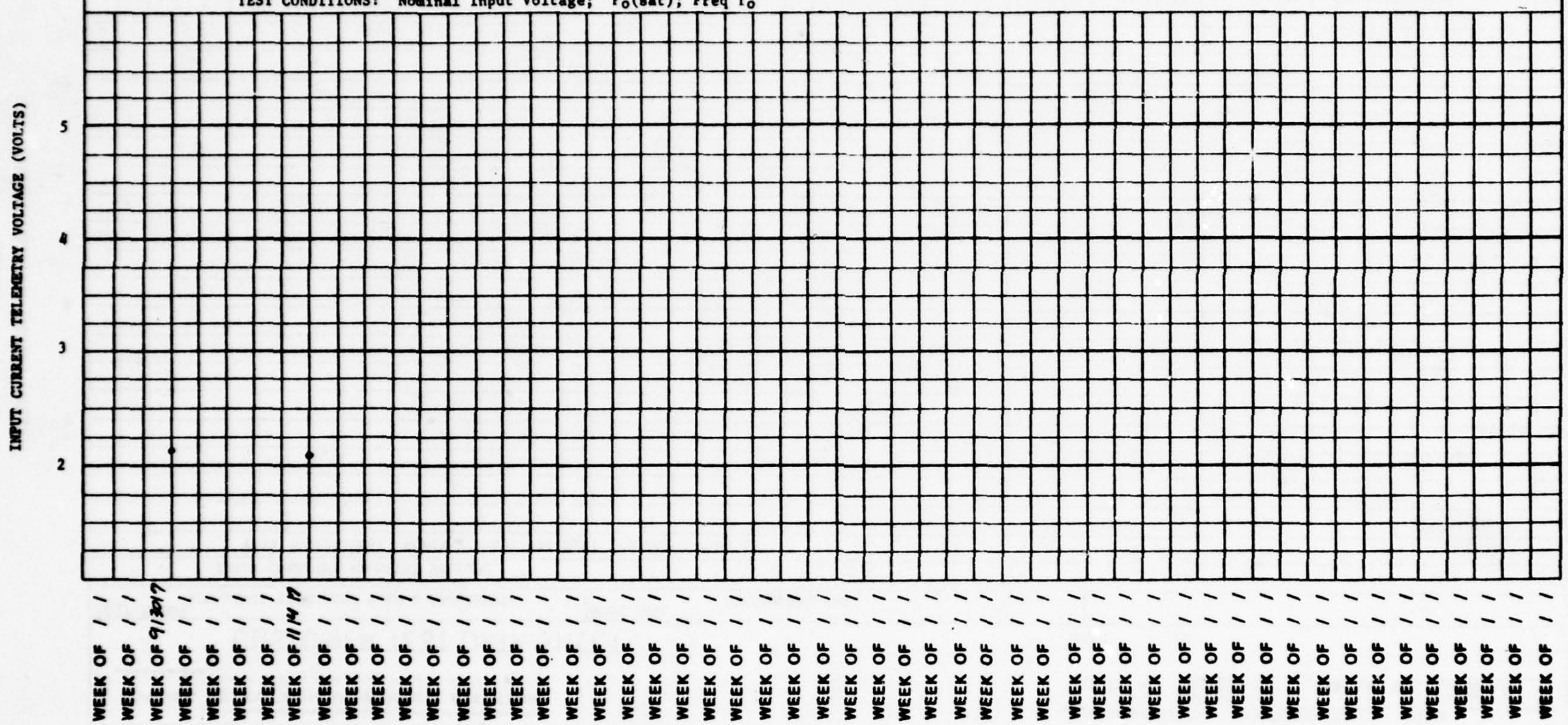
CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-1
PAGE ___ OF ___

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC. NO. LTPB200300-400

INPUT CURRENT TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



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3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90505

DATA SHEET NO. DSB200300-400 REV.

MODEL NO. B 200300-121 / B200300-122 SERIAL NO. 22-1

CUSTOMER TEST DATA SHEET

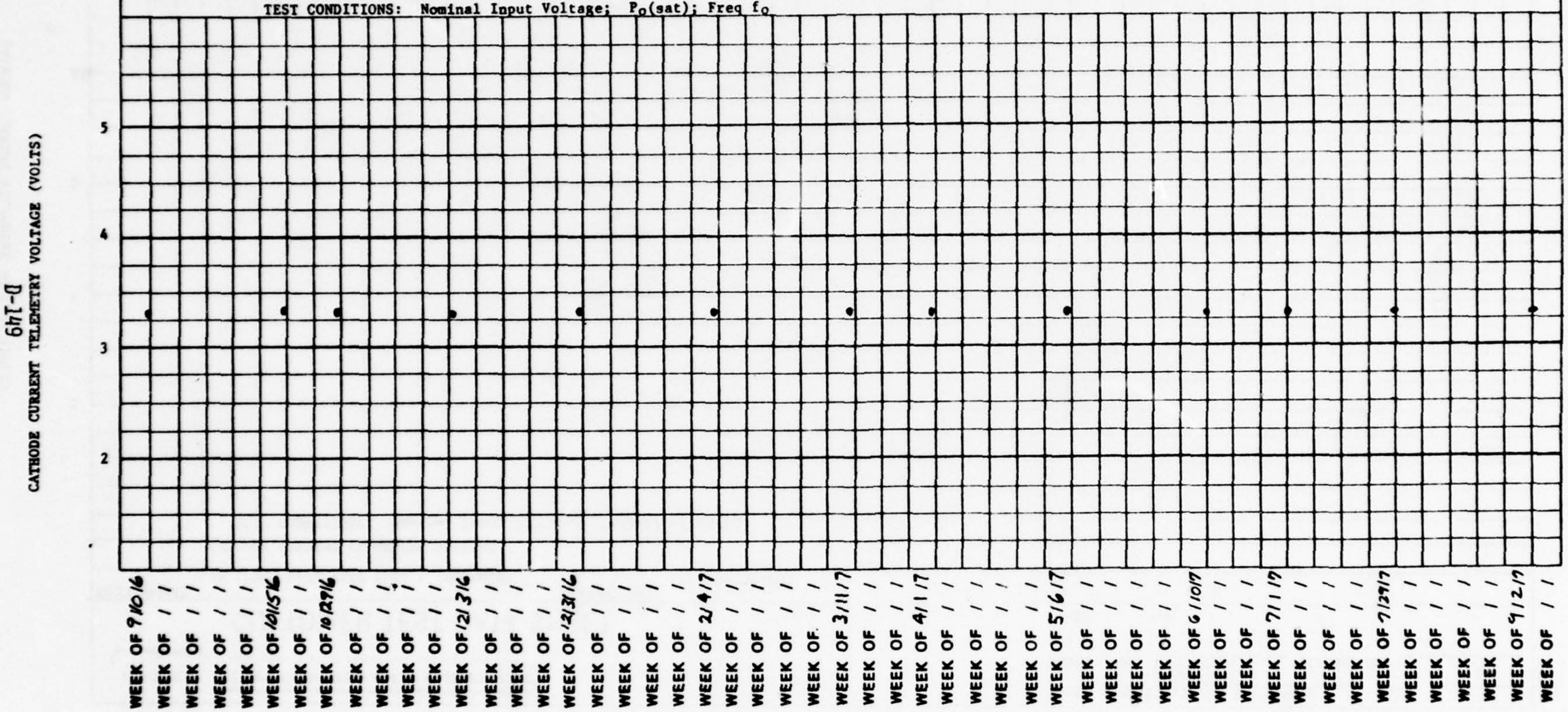
PAGE OF

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE

SPEC. NO. LTPB200300-400

CATHODE CURRENT TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



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CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______

MODEL NO. B 200300-121 / B200300-122 SERIAL NO. 22-1

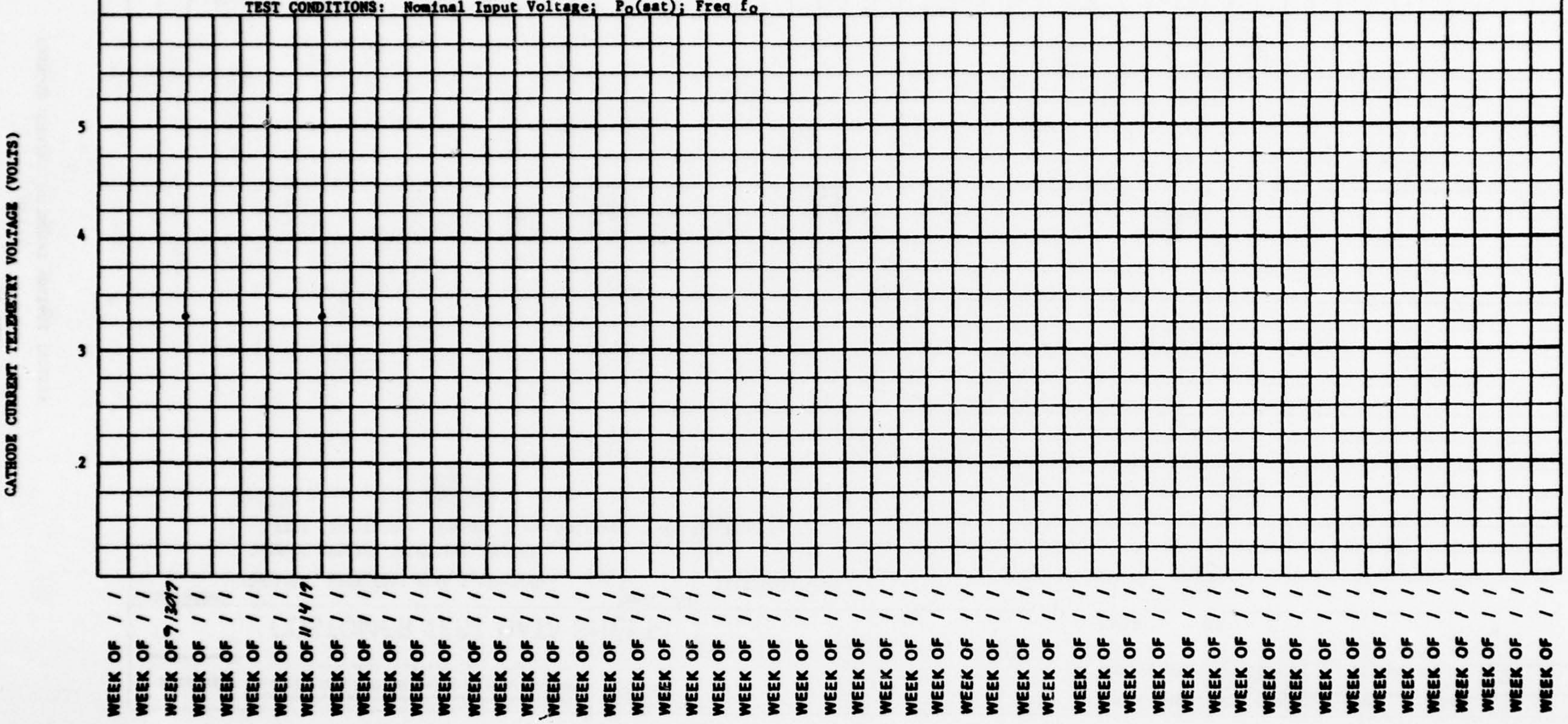
PAGE OF

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE

SPEC. NO. LTPB200300-400

CATHODE CURRENT TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



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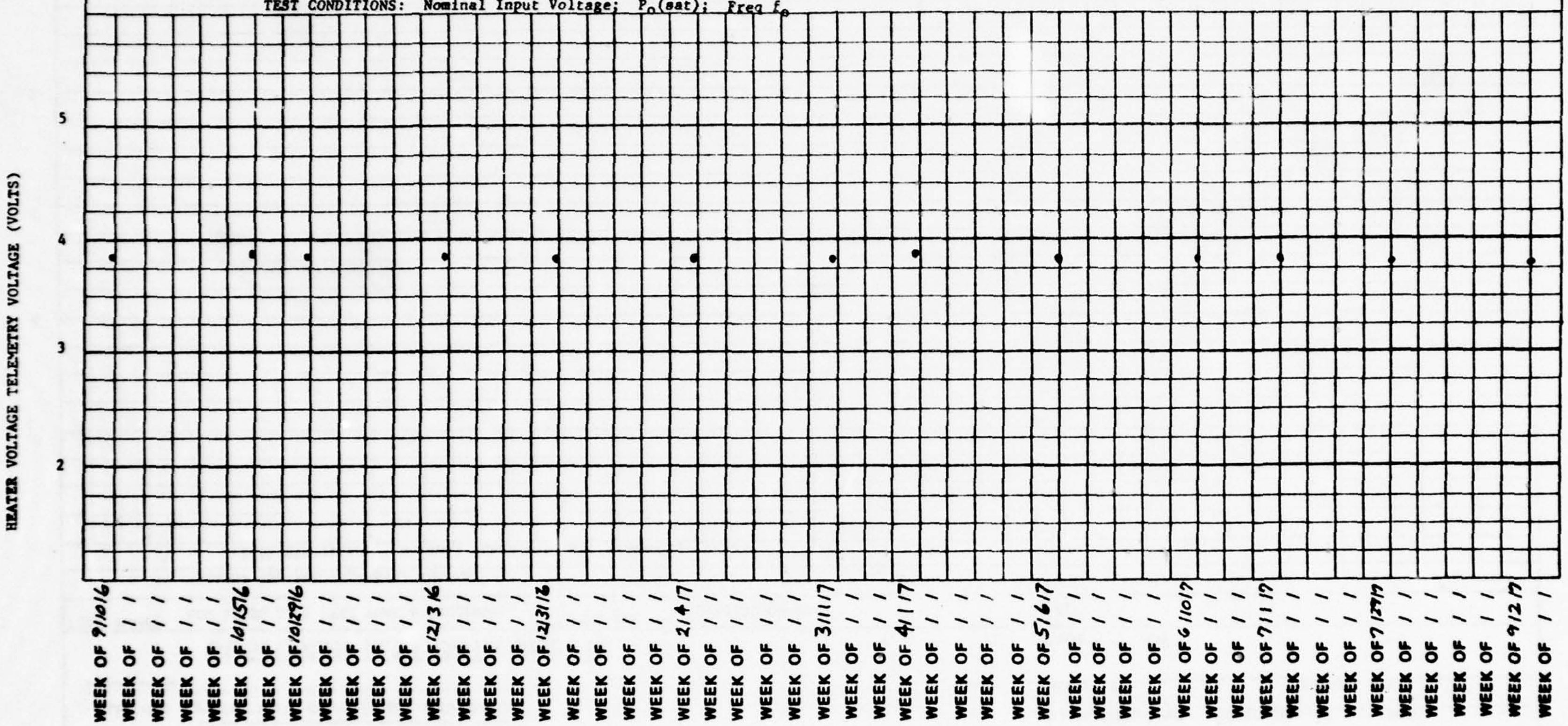
CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______
MODEL NO. ______ SERIAL NO. 22-1
PAGE ___ OF ___

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE	SPEC. NO. LTPB200300-400

HEATER VOLTAGE TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



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CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.

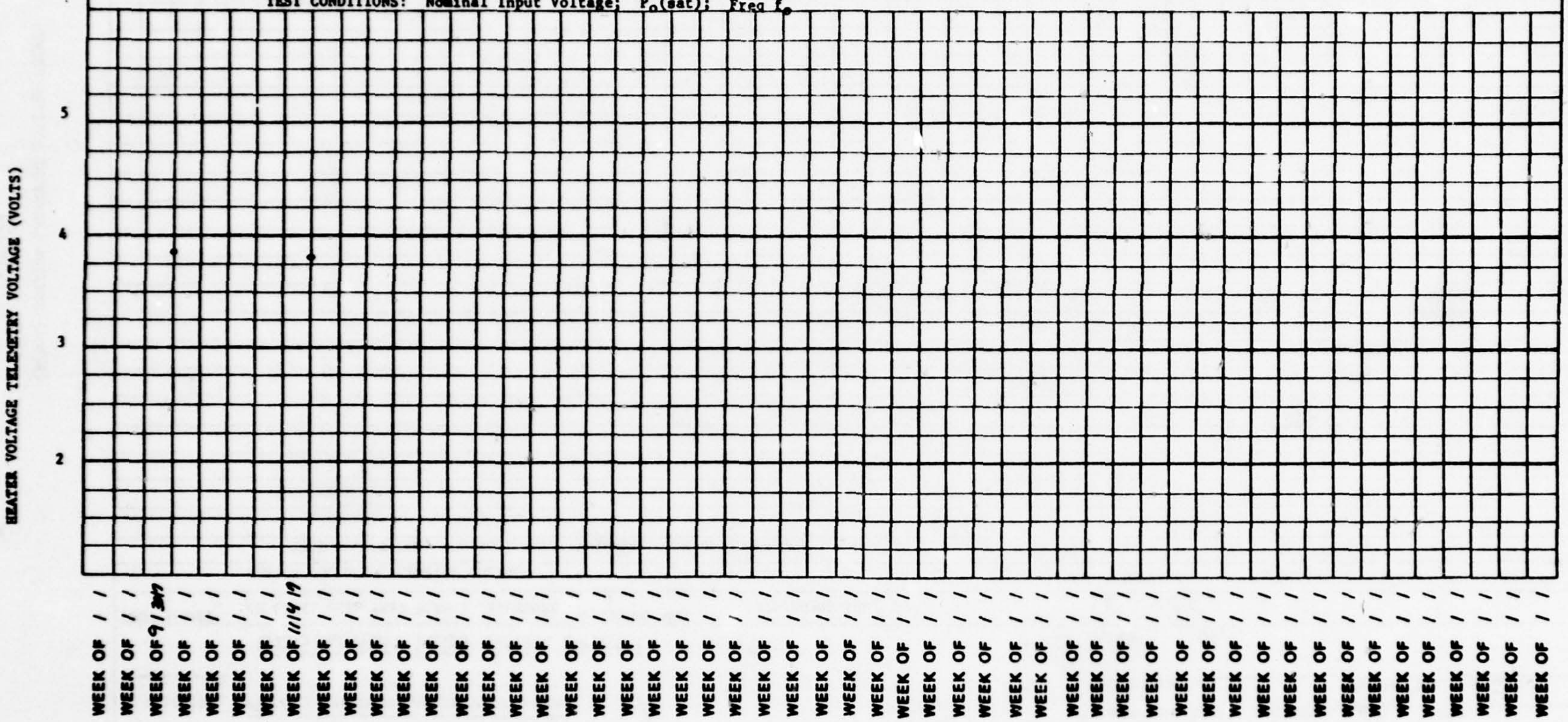
MODEL NO. SERIAL NO. 22-1

PAGE OF

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE SPEC. NO. LTPB200300-400

HEATER VOLTAGE TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



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CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.

MODEL NO. B200300-121 B200300-122 SERIAL NO. 22-1

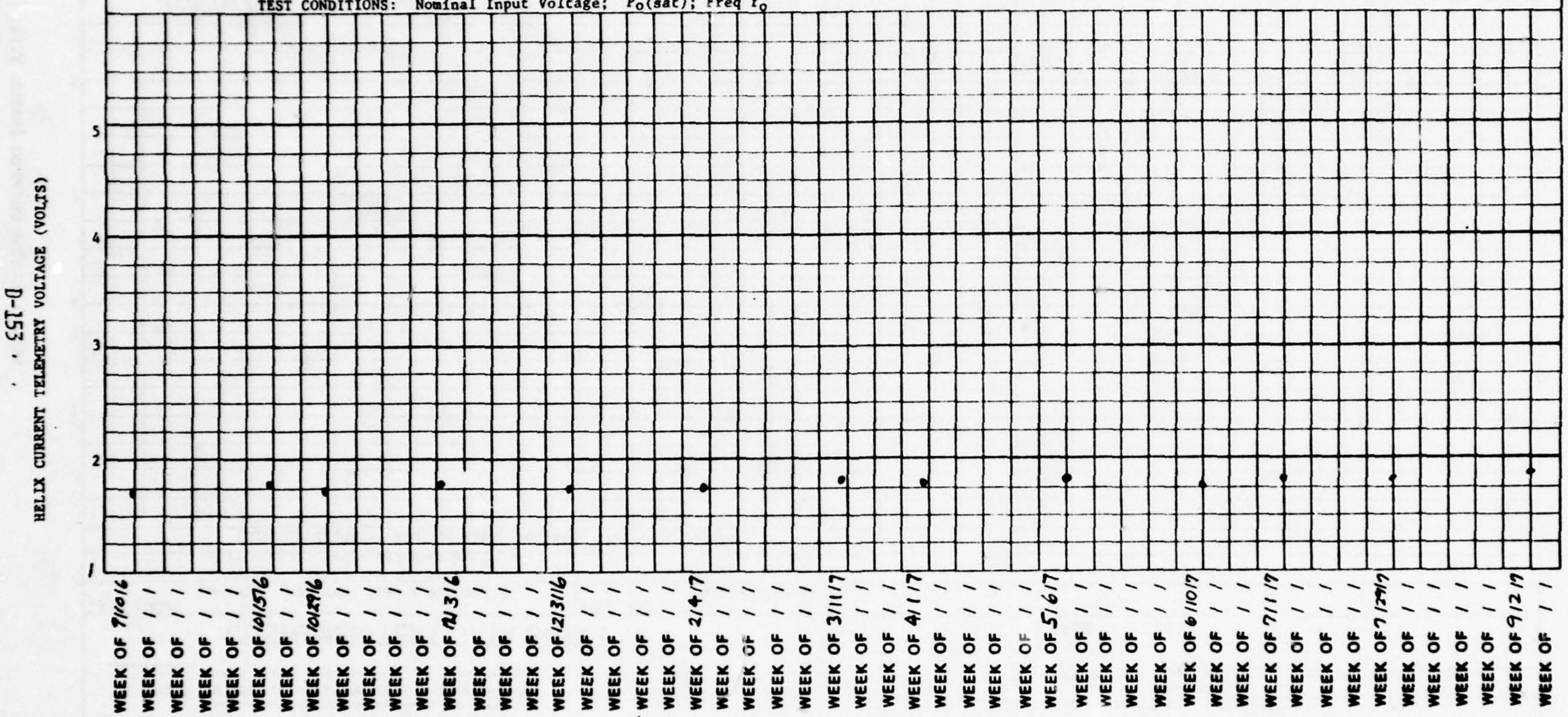
PAGE OF

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE

SPEC. NO. LTPB200300-400

HELIX CURRENT TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; $P_o(sat)$; Freq f_o



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CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.

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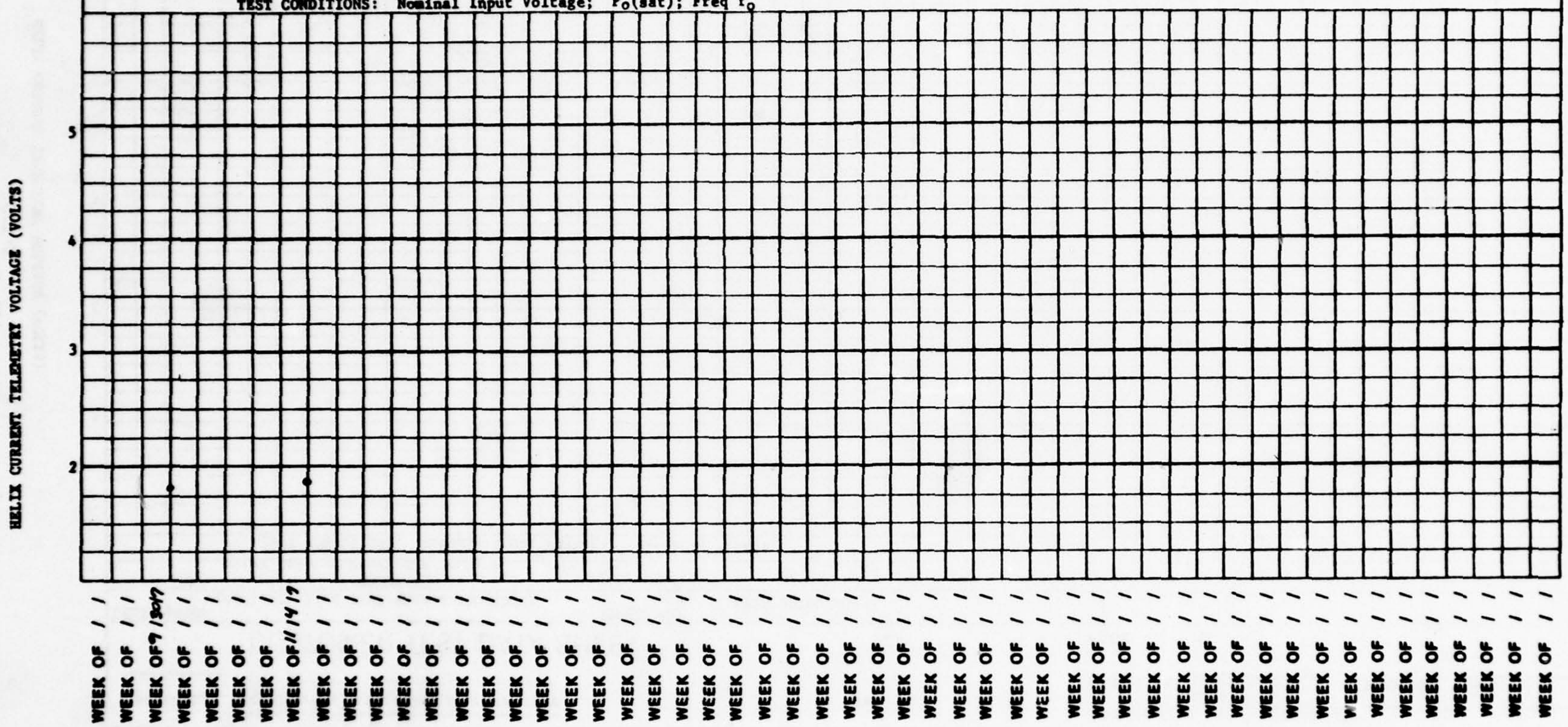
PAGE OF

TEST NAME	SPEC. NO.	
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400	

HELIX CURRENT TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



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3100 W LOMITA BLVD TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______

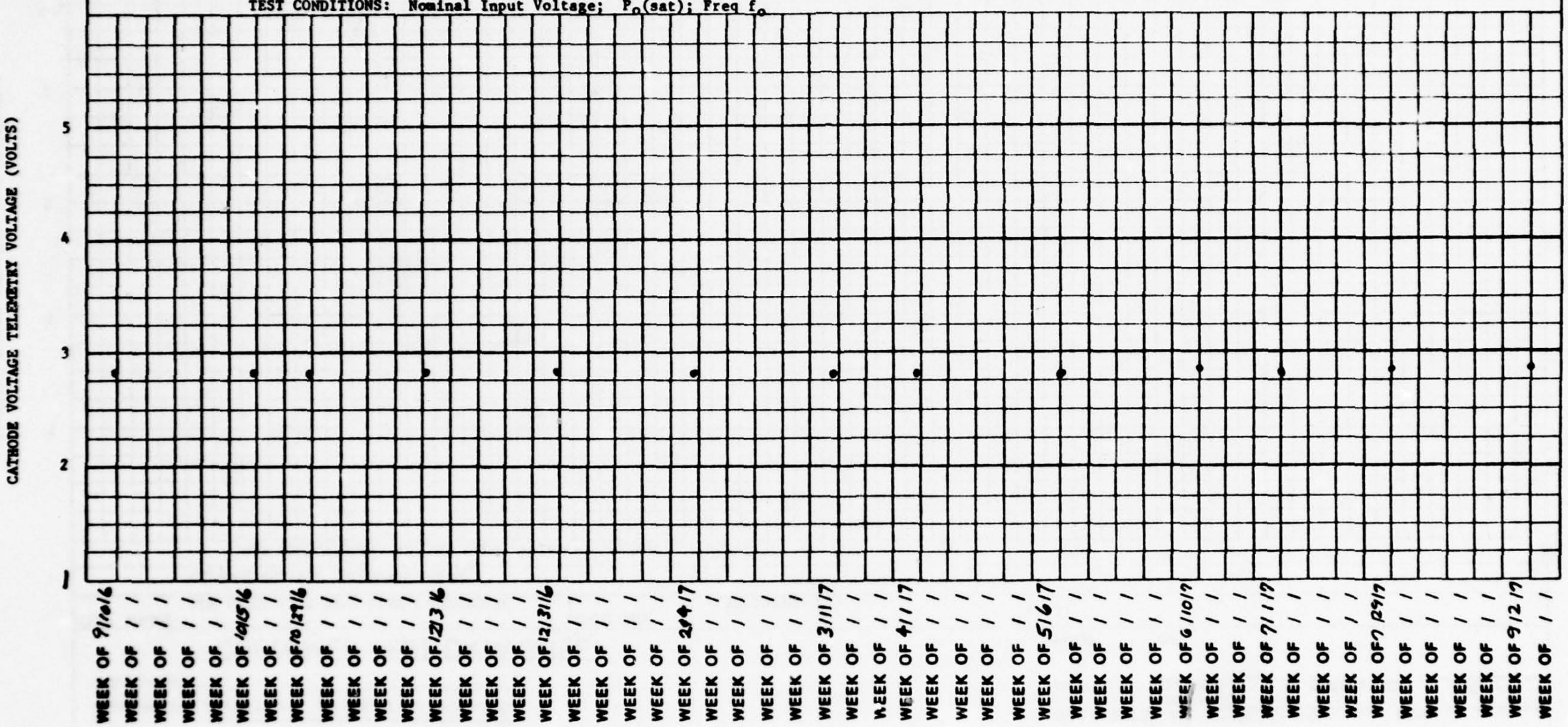
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-1

PAGE ____ OF ____

TEST NAME	SPEC. NO.
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400

CATHODE VOLTAGE TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



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3100 W LOMITA BLVD TORRANCE CALIFORNIA 90509

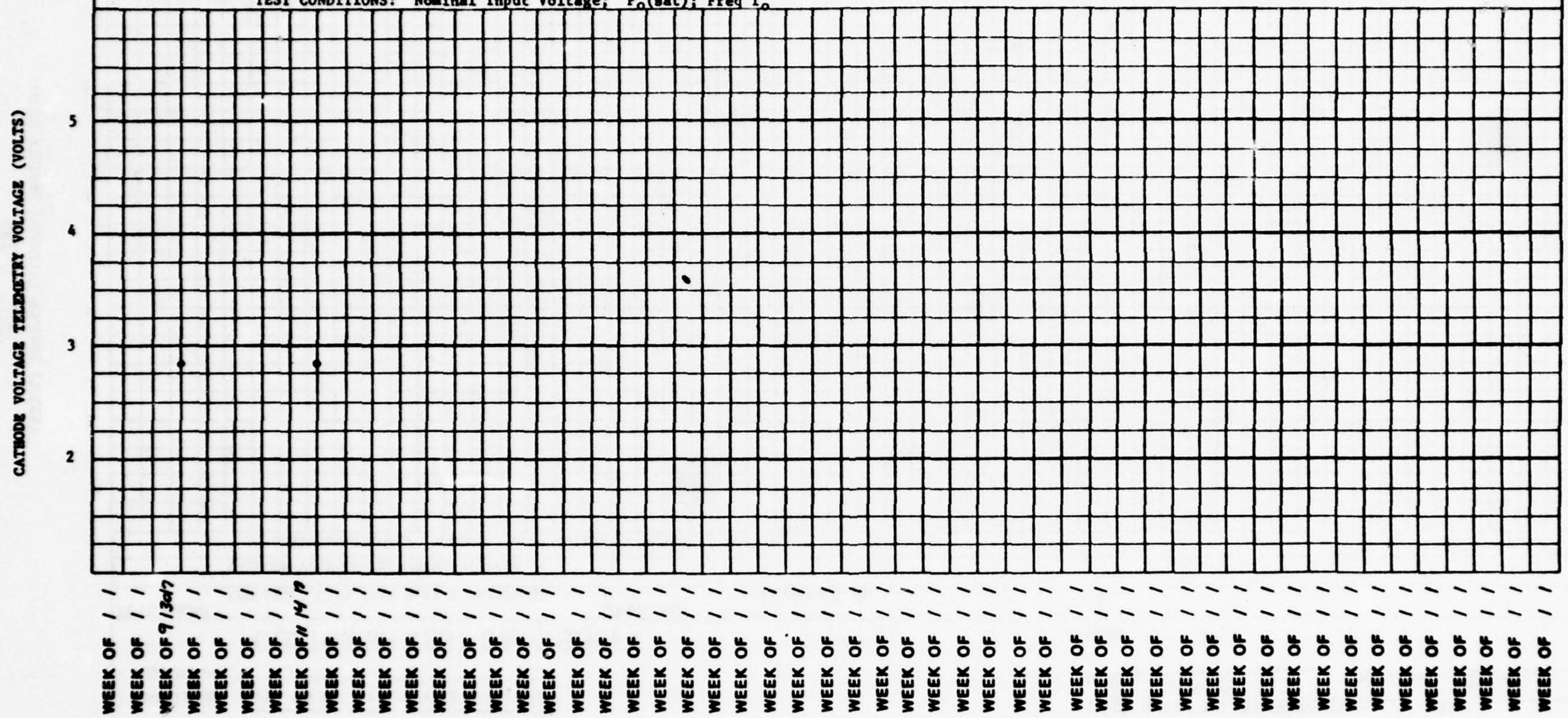
CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ____
MODEL NO. B200300-121 B200300-122 SERIAL NO. 22-1
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC. NO. LTPB200300-400

CATHODE VOLTAGE TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



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DATA SHEET NO. DSB200300-400 REV. ____

MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-1

CUSTOMER TEST DATA SHEET

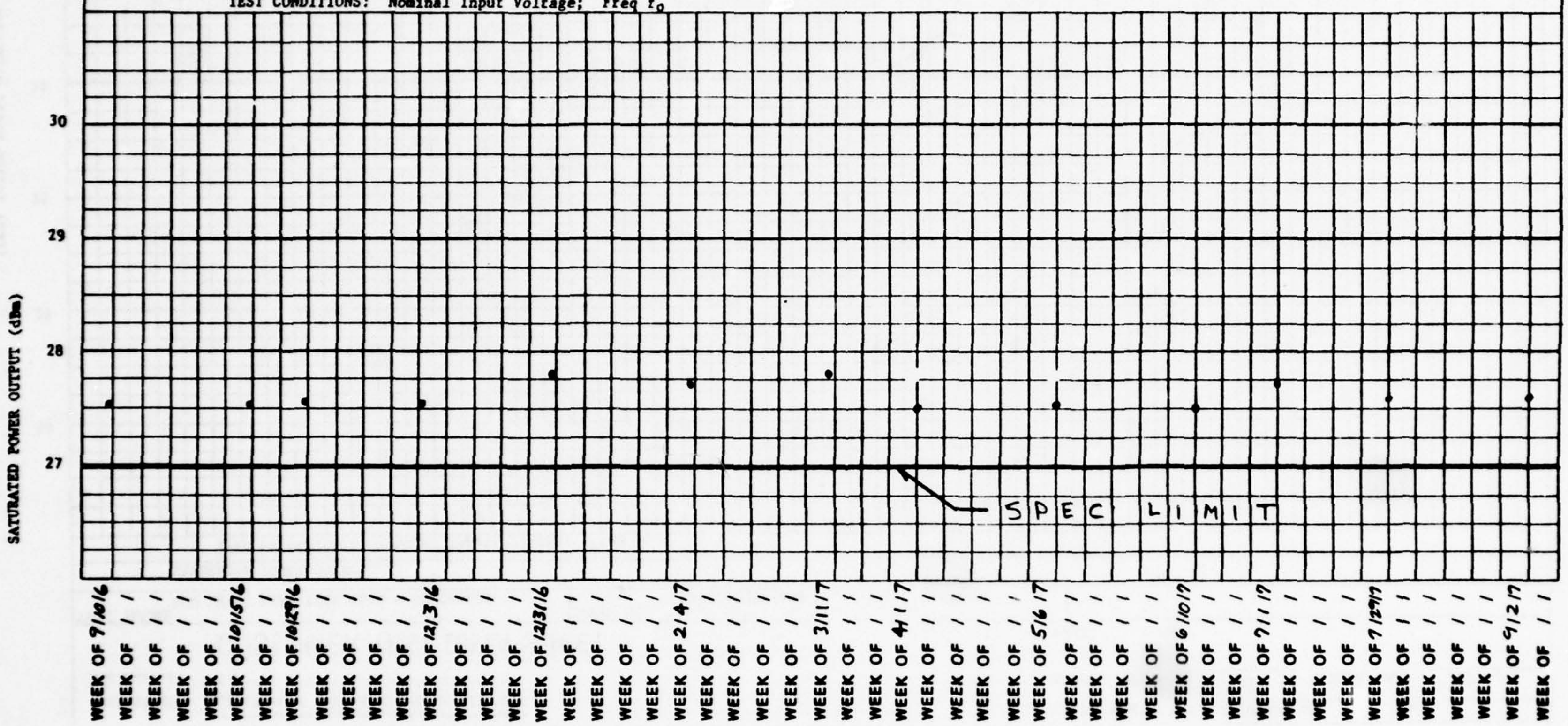
PAGE ____ OF ____

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE

SPEC. NO. LTPB200300-400

SATURATED POWER OUTPUT

TEST CONDITIONS: Nominal Input Voltage; Freq f_o



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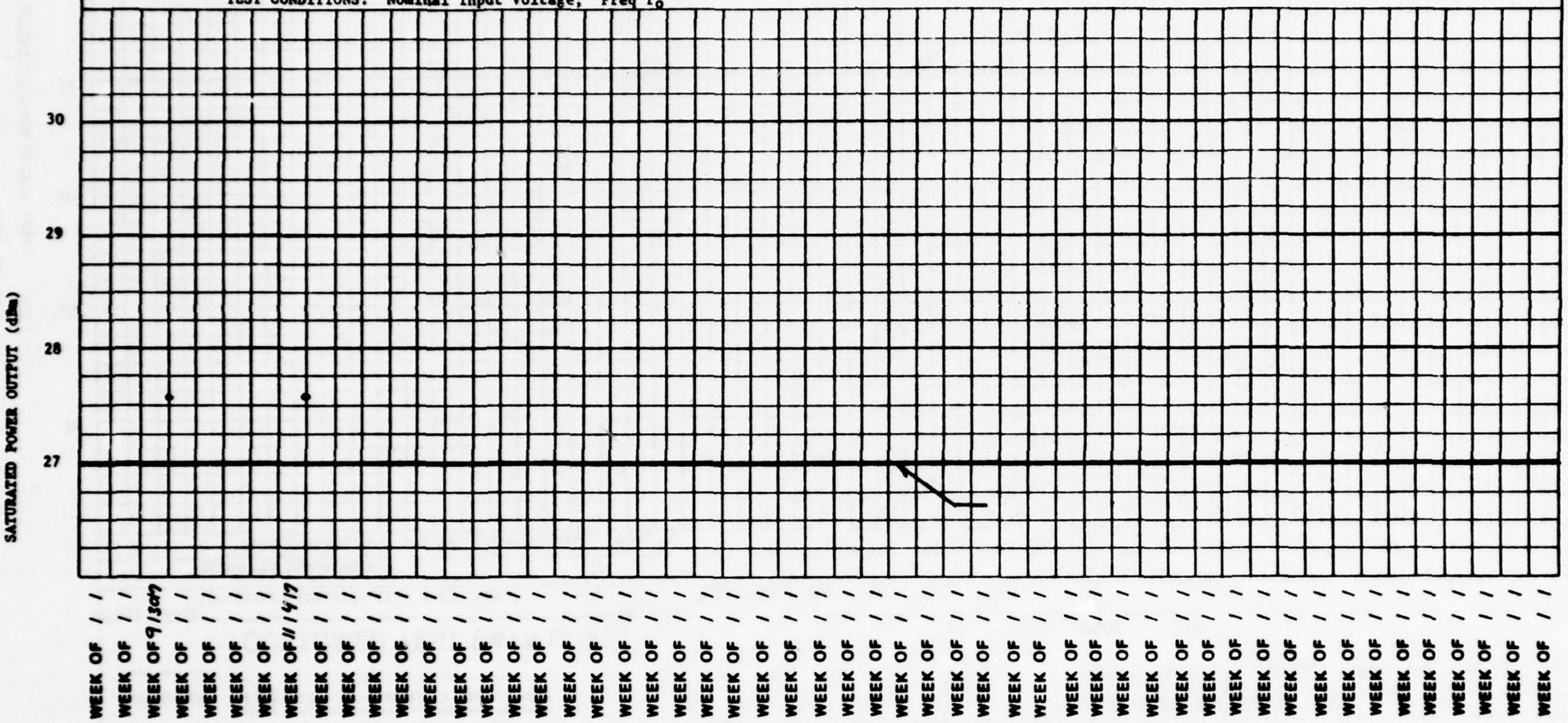
CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ____
MODEL NO. B200300-121 B200300-122 SERIAL NO. 22-1
PAGE OF

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC. NO. LTPB200300-400

SATURATED POWER OUTPUT

TEST CONDITIONS: Nominal Input Voltage; Freq f_o



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DATA SHEET NO. DSB200300-400 REV. ____

MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-1

CUSTOMER TEST DATA SHEET

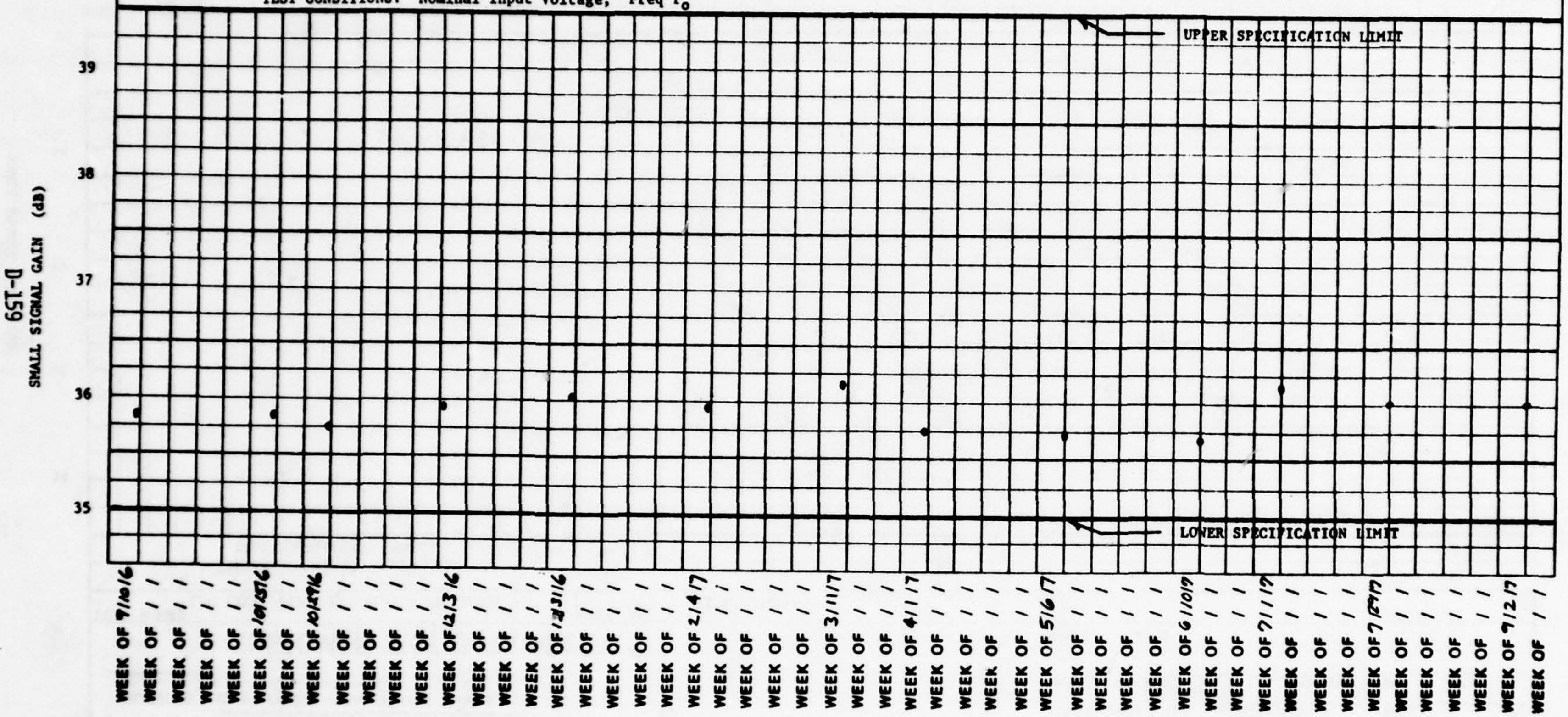
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE

SPEC. NO. LTPB200300-400

SMALL SIGNAL GAIN

TEST CONDITIONS: Nominal Input Voltage; Freq f_o



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CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.

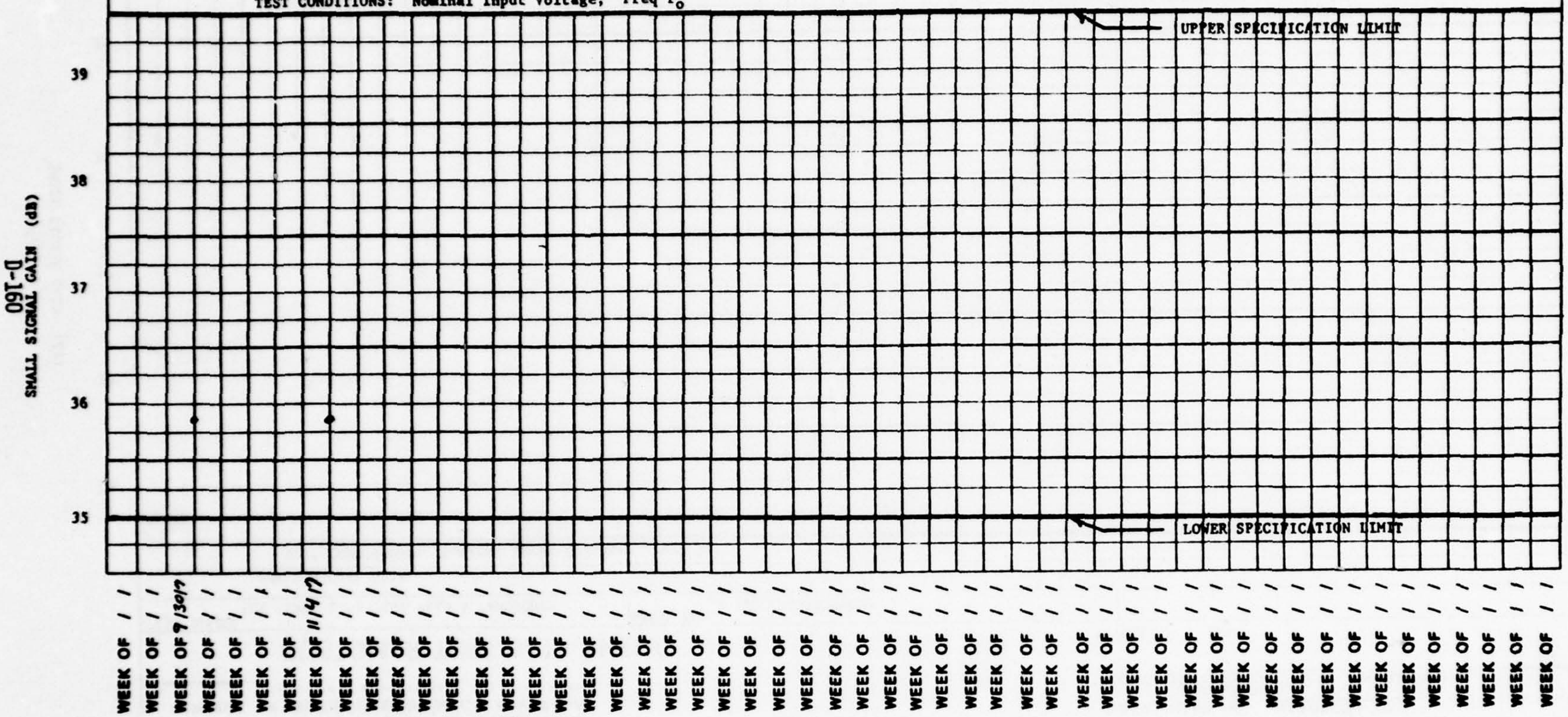
MODEL NO. B200300-121 B200300-122 SERIAL NO. 22-1

PAGE OF

TEST NAME	SPEC. NO.	
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400	

SMALL SIGNAL GAIN

TEST CONDITIONS: Nominal Input Voltage; Freq f_o



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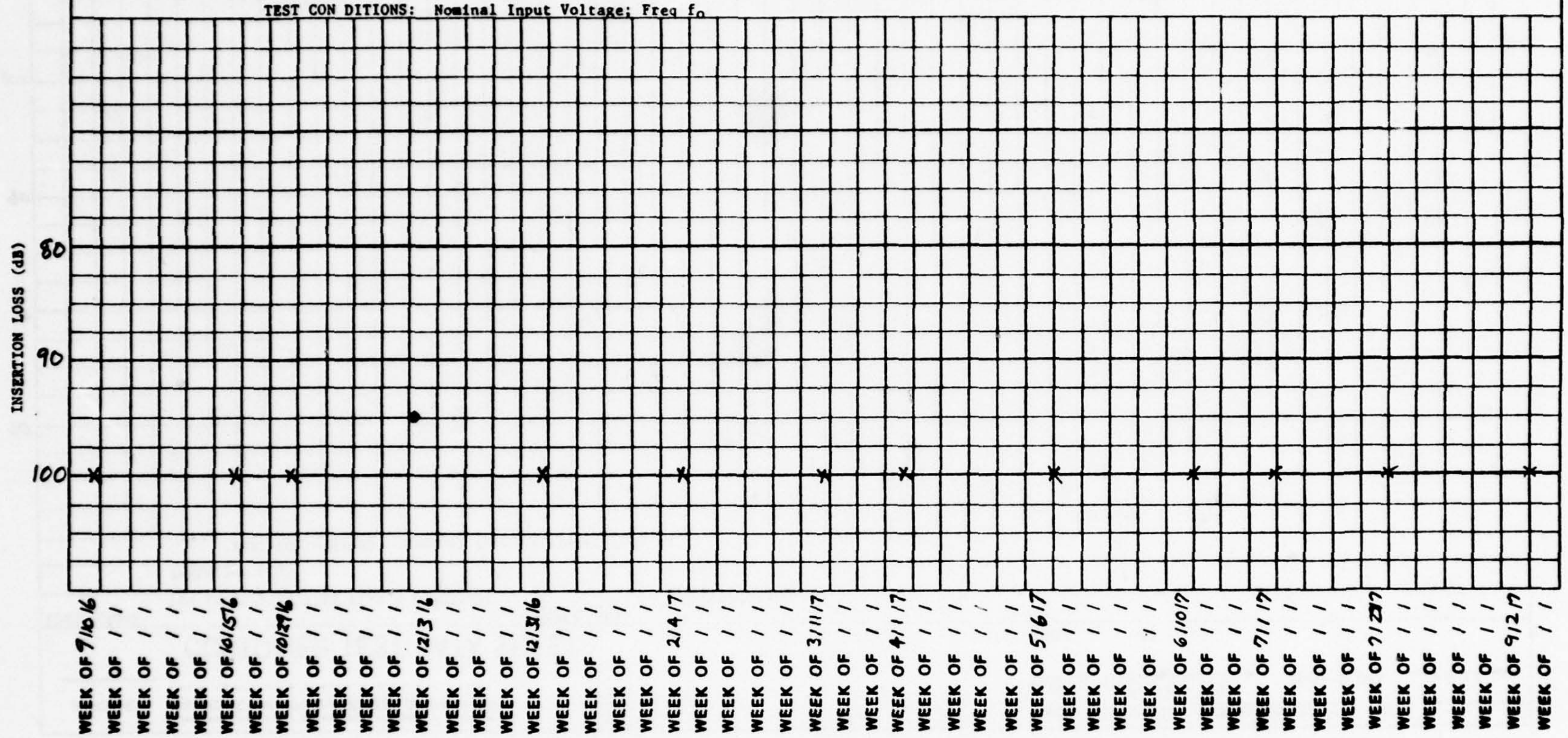
CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ____
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-1
PAGE OF

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE	SPEC. NO. LTPB200300-400	

INSERTION LOSS

TEST CON DITIONS: Nominal Input Voltage; Freq f_o



X > 100 dB loss

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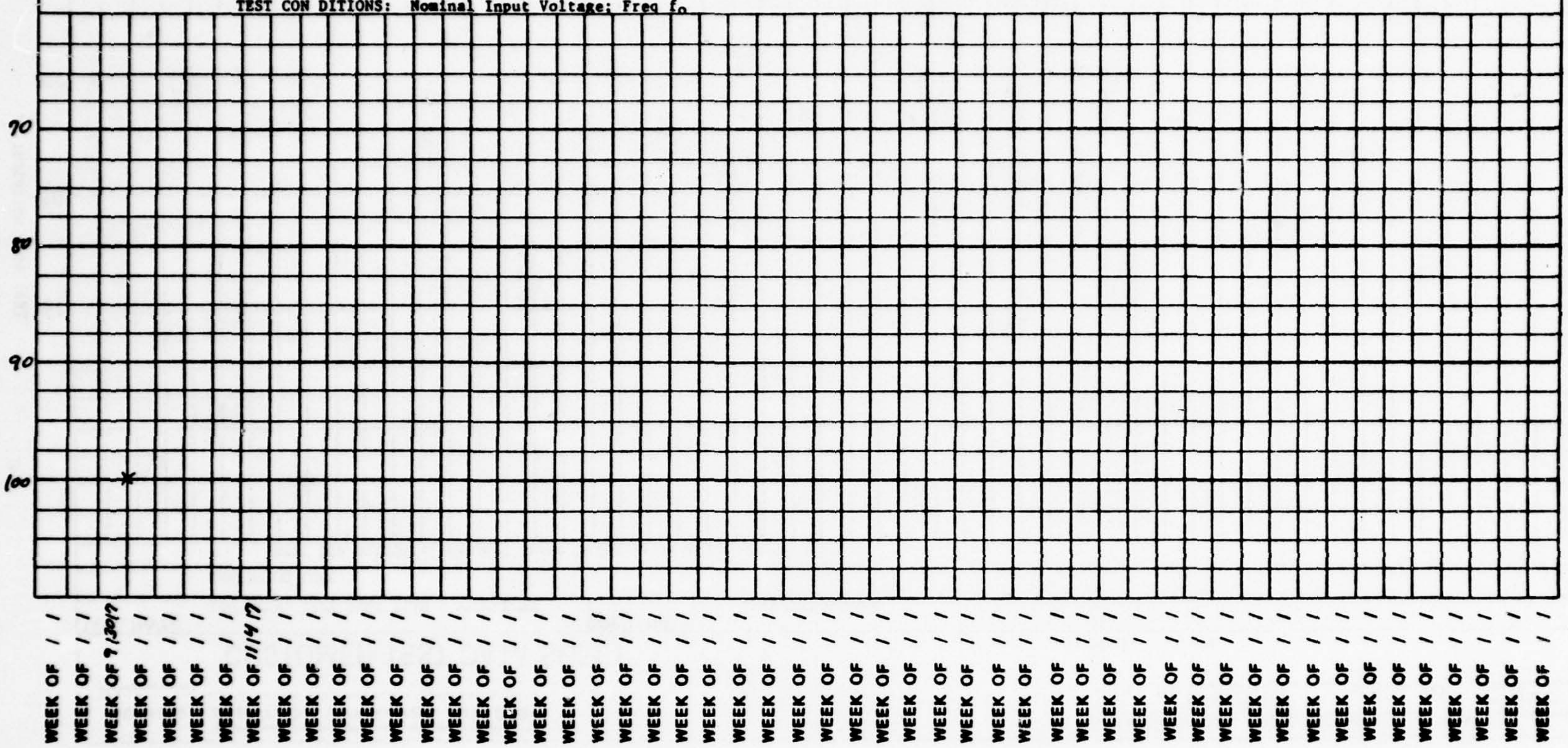
CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-1
PAGE OF

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC. NO. LTPB200300-400

INSERTION LOSS

TEST CON DITIONS: Nominal Input Voltage; Freq f_o



X = > 100 dB LOSS

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CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.

MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-1

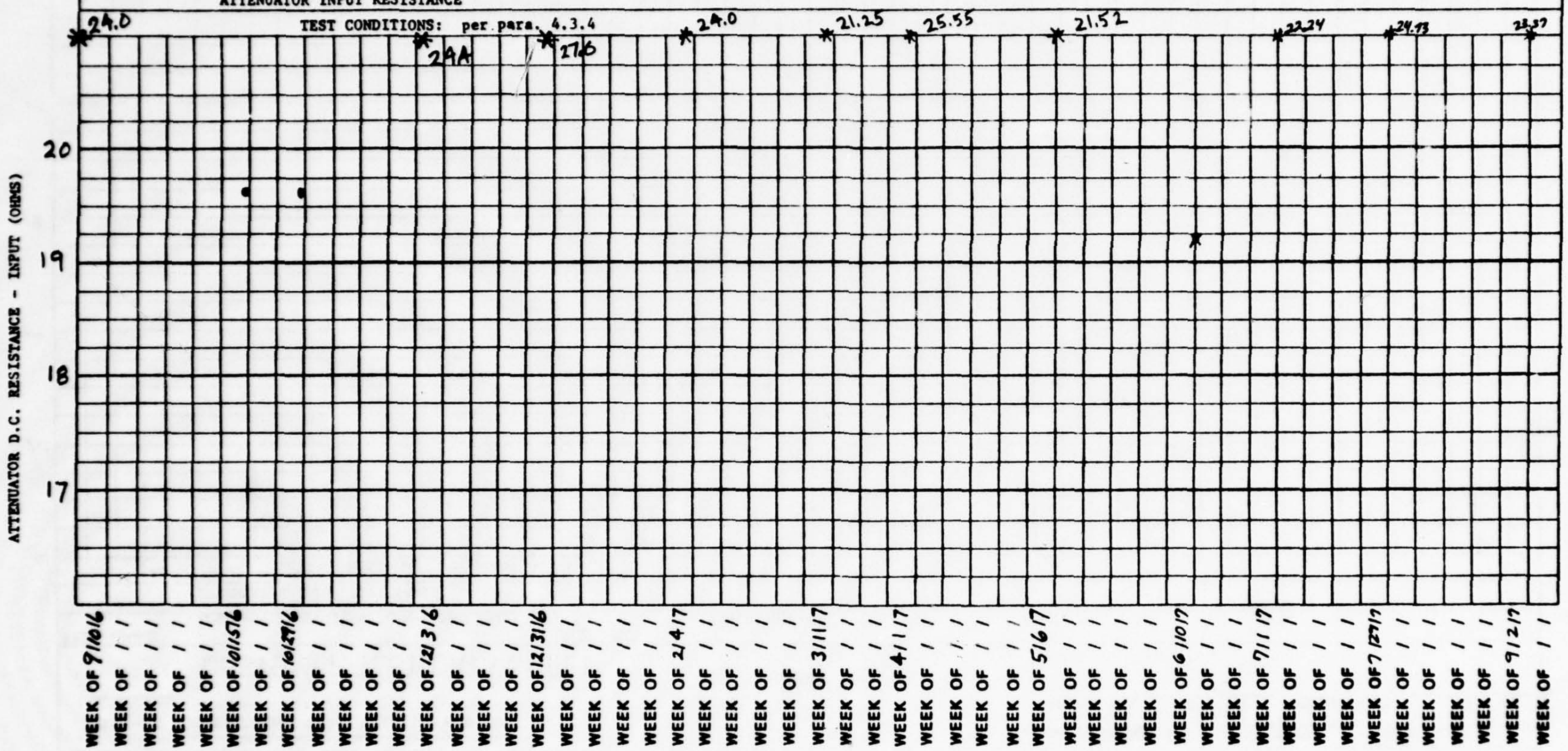
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE

SPEC. NO. LTPB200300-400

ATTENUATOR INPUT RESISTANCE

TEST CONDITIONS: per para. 4.3.4



* INTERMITTENT

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DATA SHEET NO. DSB200300-400 REV. ____
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-1

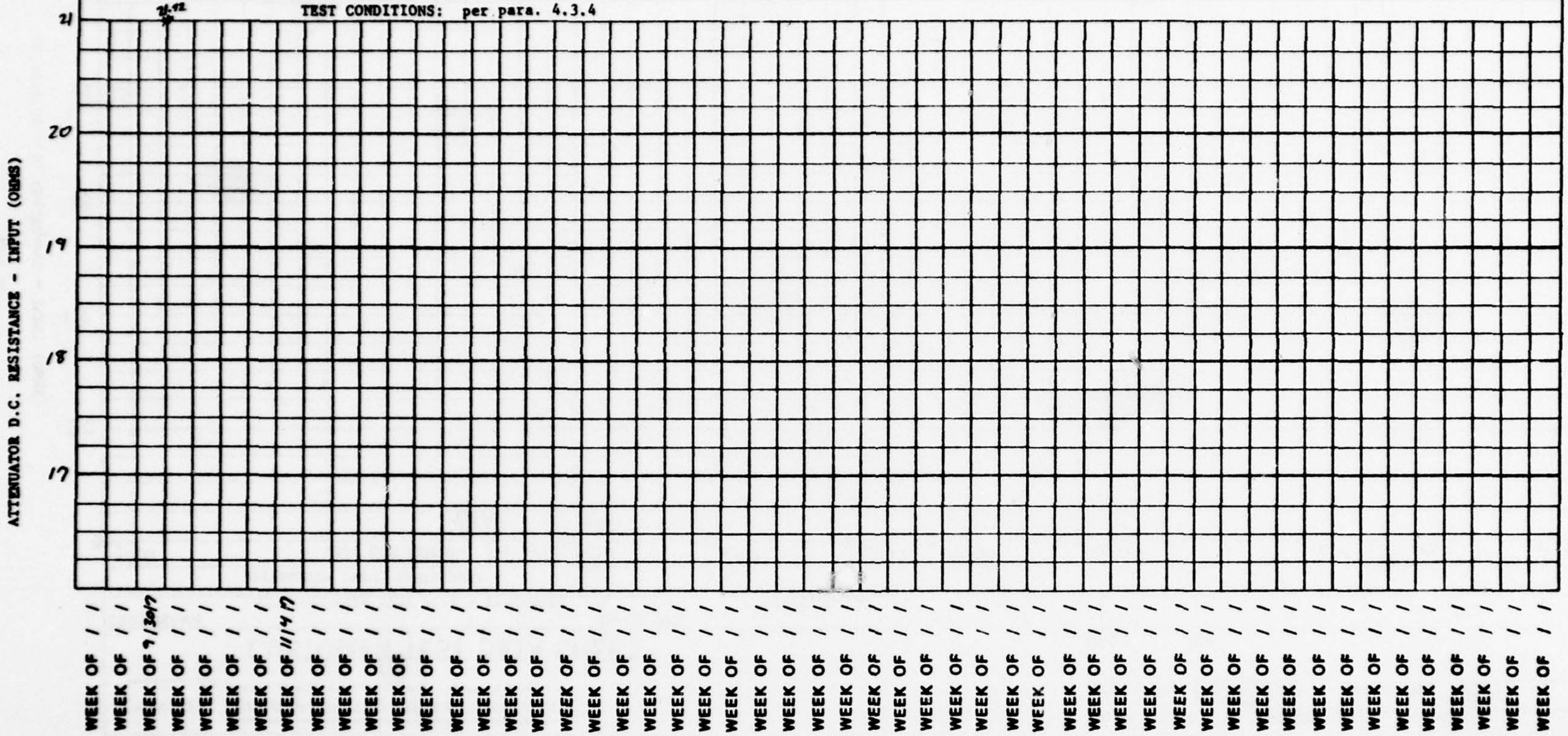
CUSTOMER TEST DATA SHEET

PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC. NO. LTPB200300-400

ATTENUATOR INPUT RESISTANCE

TEST CONDITIONS: per para. 4.3.4



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CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______

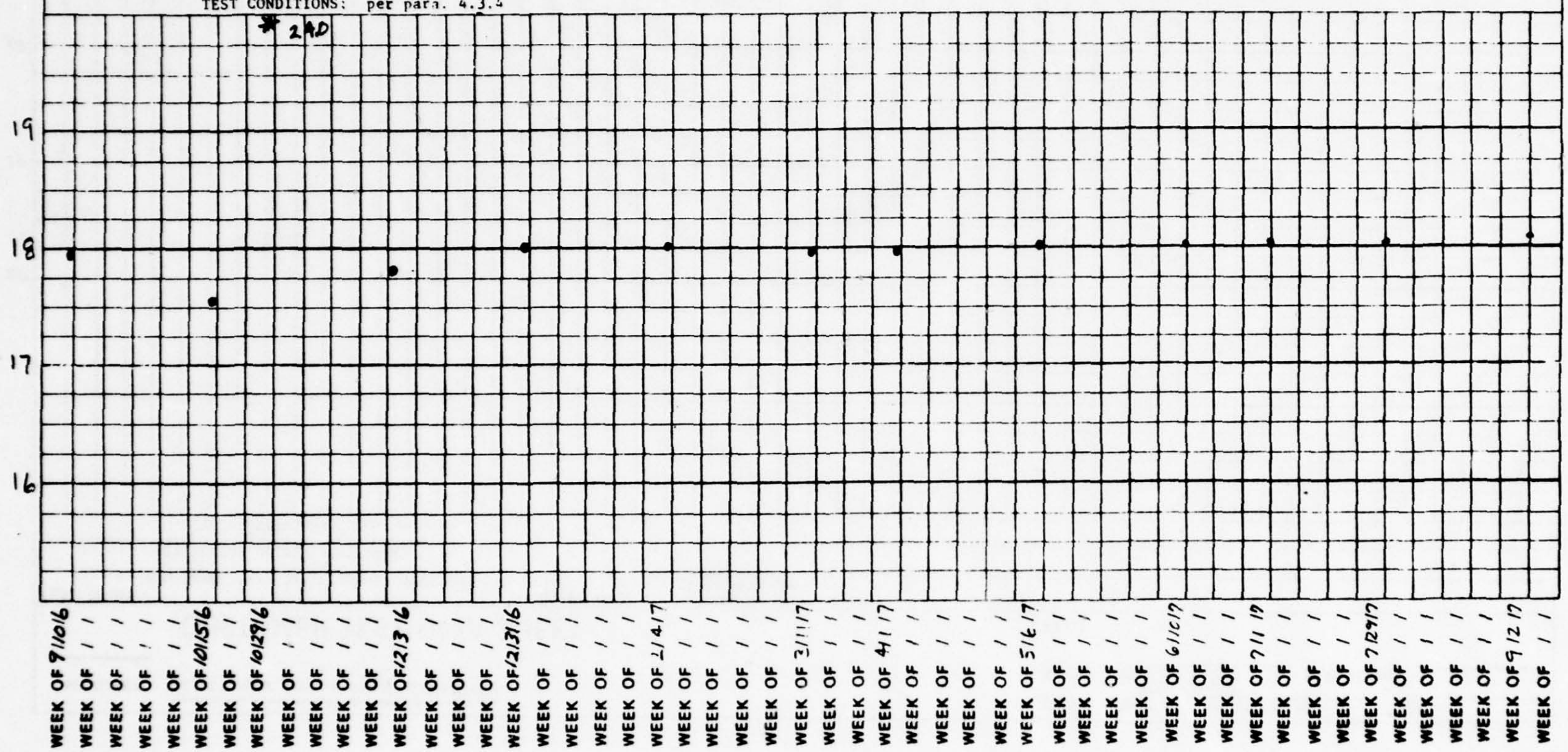
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-1

PAGE ____ OF ____

TEST NAME	SPEC. NO.
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LIPB200300-400

ATTENUATOR OUTPUT RESISTANCE

TEST CONDITIONS: per para. 4.3.4



*INTERMITTENT

HUGHES ***ELECTRON DYNAMICS DIVISION***

DATA SHEET NO. DSB200300-400 REV. ______

MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-1

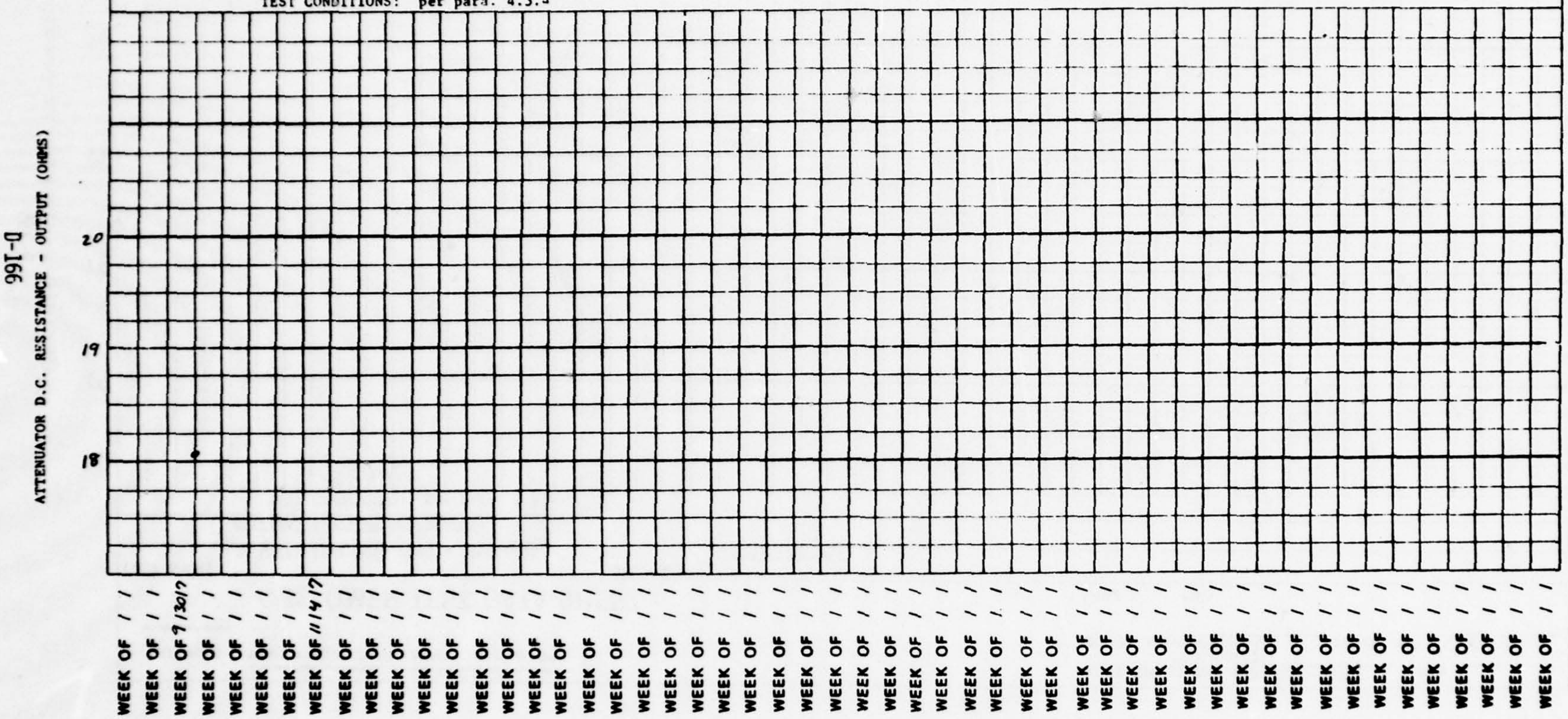
CUSTOMER TEST DATA SHEET

PAGE OF

TEST NAME	SPEC. NO.	
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400	

ATTENUATOR OUTPUT RESISTANCE

TEST CONDITIONS: per para. 4.3.4



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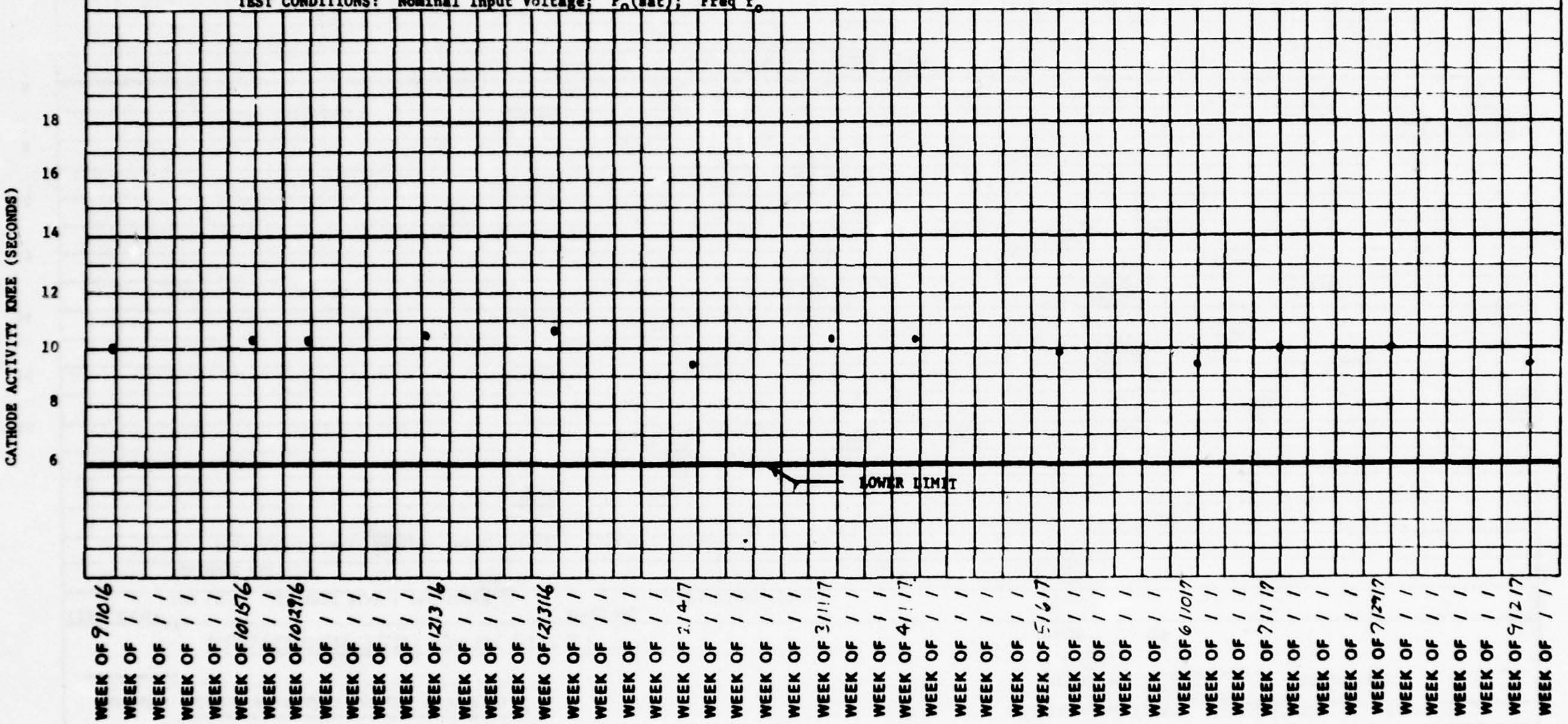
CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.
MODEL NO. B200300-121 B200300-122 SERIAL NO. 22-1
PAGE OF

TEST NAME	SPEC. NO.	
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400	

CATHODE ACTIVITY

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



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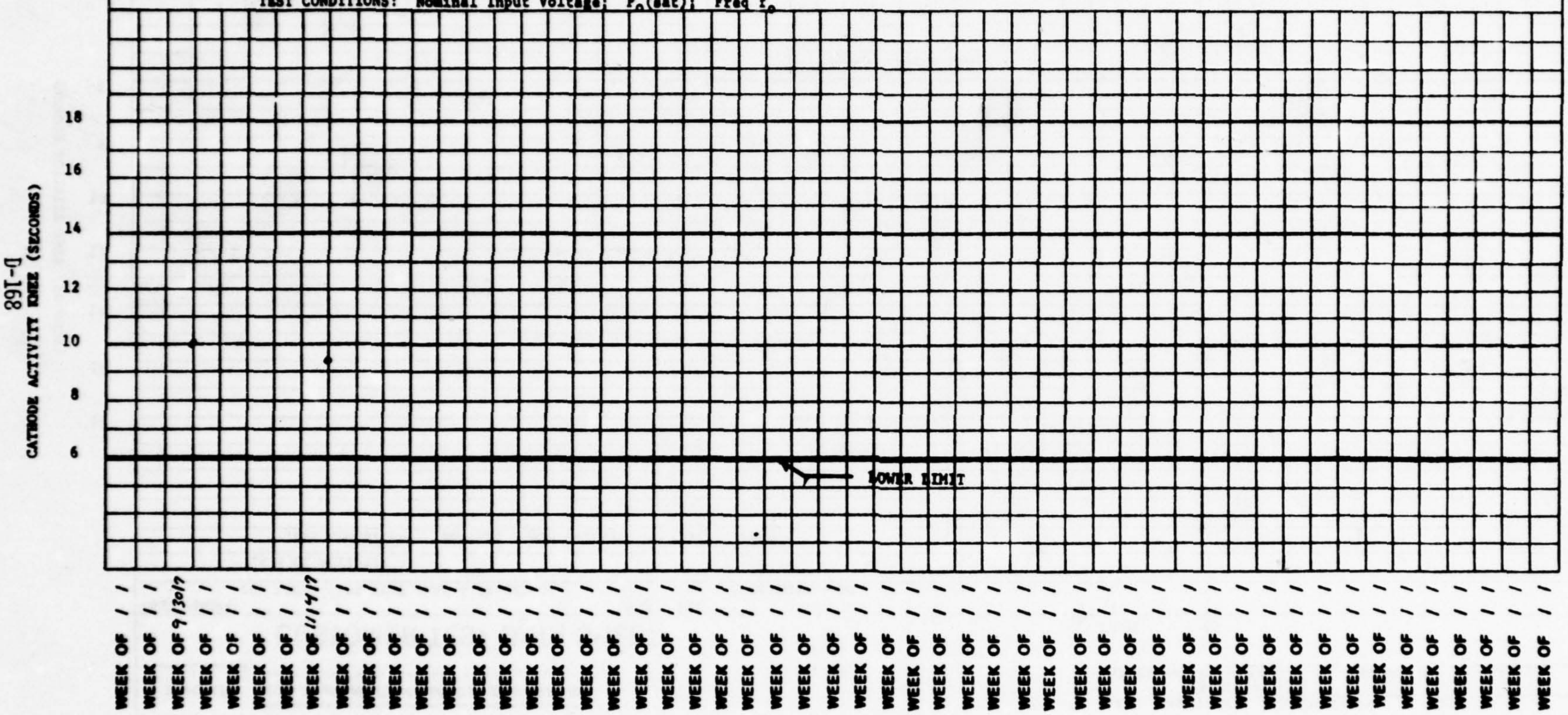
CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-1
PAGE ___ OF ___

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC. NO. LTPB200300-400

CATHODE ACTIVITY

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



HUGHES **ELECTRON DYNAMICS DIVISION**
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CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______
MODEL NO. B200300-122 SERIAL NO. 22-2
PAGE OF

TEST NAME	SPEC NO.	
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400	ACCEPTANCE TEST DATA

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT), FREQ. f_o

TEST CONDITIONS
NOMINAL INPUT VOLTAGE

TOTAL ACCUMULATED HOURS	LIMITS MIN	LIMITS MAX	UNITS	PRE-FINAL	FINAL										
				8/ 8/70	8 /13/70	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /
INPUT CURRENT TELEMETRY VOLTAGE			V	2.020	2.026										
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.200	3.208										
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.768	3.769										
HELIX CURRENT TELEMETRY VOLTAGE			V	2.167	2.230										
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.693	2.692										
P_o (SAT) FREQ. f_o (PARA 4.3.2)	27	--	dbm	27.4	27.5										
Gm FREQ. f_o (PARA. 4.3.1)	35	39.5	db	36.48	36.68										
L_L INSERTION LOSS			db												
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS												
T_K CATHODE ACTIVITY	6.0	—	SEC		10.5										
TEST EQUIPMENT CALIBRATION DATE															
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

TWT has 699 hours prior to start of life test.

BENCH FUNCTIONAL TEST DATA

LOW LEVEL LIFE TEST PLAN AND PROCEDURE

SPEC: LTPB 200300-400

SERIAL NO. 22-2

SPEC. PARA #	TEST DESIGNATION	SPEC LIMITS MINIMUM	SPEC LIMITS MAXIMUM	DATA 0			HOURS
4.1	CATHODE ACTIVITY, SECONDS	6.0		10.5			
4.2	COMMAND SIGNAL			✓			
4.3	INRUSH CURRENT			✓			
a)	TIME INTEGRAL > Iss, t=3msec, AMP-SEC		.0037	0.0019			
b)	Imax, AMPS		1.8	0.75			
c)	I WITHIN ±3% Iss AT 150 SECONDS			✓			
4.4	INPUT AND OUTPUT REFLECTION, VSWR						
a)	OUTPUT (HOT)		1.25:1	1.08:1			
b)	OUTPUT (COLD)		1.25:1	1.08:1			
c)	INPUT (COLD)		1.25:1	1.03:1			
d)	INPUT (HOT)		1.25:1	1.03:1			
4.5	SATURATED POWER OUTPUT						
a)	TELEMETRY VOLTAGES						
	1) INPUT CURRENT TLM V			2.026			
	2) CATHODE CURRENT TLM V			3.208			
	3) HEATER VOLTAGE TLM V			3.769			
	4) HELIX CURRENT TLM V			2.230			
	5) CATHODE VOLTAGE TLM V			2.692			
b)	P_o (SAT.), dBm	27		✓			
4.6	SATURATED POWER OUTPUT AND INPUT POWER VS. INPUT VOLTAGE						
a)	Vin = 23 ±.5V DC						
	1) P_o (SAT.), dBm	27		✓			
	2) Iin, AMPS			.263			
	3) Pin (DC), WATTS			6.049			
b)	Vin = 33 ±.5V DC						
	1) P_o (SAT.), dBm	27		✓			
	2) Iin, AMPS			1.85			
	3) Pin (DC), WATTS			6.105			

D-169A

S/N 22-2

SPEC PARA #	TEST DESIGNATION	SPEC LIMITS MINIMUM	MAXIMUM	DATA 0		HOUR
4.7	SMALL SIGNAL GAIN					
a)	Gss AT P_o 10dB BELOW P_o (SAT.), dB	35	39.5	36.68		
b)	STEPS 4 AND 5 (SEE ATP)			✓		
4.7.1	GAIN SLOPE, dB/Mhz					
a)	Vin = 23 ±.5V DC					
	1) ΔGss f_1 to f_2		0.015	0.0093		
	2) ΔGss f_1 to f_3		0.030	0.0155		
	3) ΔGss f_2 to f_4		0.030	0.0279		
b)	Vin = 28 ±.5V DC					
	1) ΔGss f_1 to f_2		0.015	0.0093		
	2) ΔGss f_1 to f_3		0.030	0.0155		
	3) ΔGss f_2 to f_4		0.030	0.0279		
c)	Vin = 33 ±.5V DC					
	1) ΔGss f_1 to f_2		0.015	0.0093		
	2) ΔGss f_1 to f_3		0.030	0.0155		
	3) ΔGss f_2 to f_4		0.030	0.0279		
4.7.2	GAIN FLATNESS					
a)	Vin = 23 ±.5V DC					
	1) GAIN VARIATION f_1 to f_2, dB		±0.2	±0.19		
b)	Vin = 28 ±.5V DC					
	1) GAIN VARIATION f_1 to f_2, dB		±0.2	±0.19		
c)	Vin = 33 ±.5V DC					
	1) GAIN VARIATION f_1 to f_2, dB		±0.2	±0.19		
4.8	NOISE FIGURE					
a)	N.F., dB		25	21.3		
4.9	INTERMODULATION DISTORTION					
a)	I.M. DISTORTION, dB	28		29.0		
4.10	TIME DELAY DISTORTION					
a)	T.D. f_1 to f_2 ANY 10MHZ LINEAR INTERVAL, ns/Mhz		0.10	0.040		
b)	T.D. f_1 to f_2 PARABOLIC PORTION OF CURVE, ns/Mhz^2		0.01	0.001		

S/N 22-2

SPEC PARA #	TEST DESIGNATION	SPEC LIMITS MINIMUM	SPEC LIMITS MAXIMUM	DATA 0			HOURS
4.11	PHASE SHIFT, FREQ. f_0, +14dBm < P_0 < +23dBm , $^\circ$/dB						
a)	+21.75dBm < P_0 < +23dBm		2.0	0.72			
b)	+17dBm < P_0 < +21.75dBm		1.5	0.88			
c)	+14dBm < P_0 < +17dBm		1.0	0.70			
4.12	STABILITY (MISMATCH) NO P_0 FROM INPUT AND OUTPUT OTHER THAN INHERENT NOISE			✓			
4.13	SPURIOUS OUTPUT COHERENT COMPONENTS			✓			
a)	P_0 (HARMONIC) , dB	13		22.0			
4.13.1	SPURIOUS OUTPUT INCOHERENT COMPONENTS			✓			
a)	P_0 (NON-HARMONIC)	60dB BELOW FUNDAMENTAL		✓			
4.13.2	SPURIOUS OUTPUT (AM)			✓			
4.13.3	SPURIOUS OUTPUT (PM)			✓			

HUGHES **ELECTRON DYNAMICS DIVISION**
3100 W. LOMITA BLVD. TORRANCE, CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ____
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-2
PAGE ____ OF ____

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o

TEST CONDITIONS
NOMINAL INPUT VOLTAGE

	PRE-FINAL A.T.P. DATA	LIMITS MIN	LIMITS MAX	UNITS	92.5	260.5	428.5	593.5	732.7	923.2	1089.0	1253.9	1491.4	1588.2	1758.0	1992.9
TOTAL ACCUMULATED HOURS	0				week of 10/2/70	week of 10/9/70	week of 10/16/70	week of 10/23/70	week of 10/29/70	week of 11/6/70	week of 11/13/70	week of 11/20/70	week of 11/30/70	week of 12/4/70	week of 12/11/70	week of 12/21/70
INPUT CURRENT TELEMETRY VOLTAGE	2.020			V	2.031	2.033	2.035	2.041	2.047	2.048	2.053	2.054	2.055	2.056	2.066	2.070
CATHODE CURRENT TELEMETRY VOLTAGE	3.200			V	3.202	3.214	3.225	3.234	3.235	3.233	3.238	3.239	3.240	3.239	3.244	3.246
HEATER VOLTAGE TELEMETRY VOLTAGE	3.768			V	3.767	3.784	3.768	3.773	3.783	3.779	3.769	3.763	3.752	3.749	3.760	3.742
HELIX CURRENT TELEMETRY VOLTAGE	2.167			V	2.296	2.241	2.289	2.337	2.355	2.377	2.436	2.490	2.530	2.541	2.617	2.718
CATHODE VOLTAGE TELEMETRY VOLTAGE	2.693			V	2.539	2.678	2.684	2.681	2.677	2.676	2.679	2.679	2.683	2.683	2.675	2.681
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27.75	27	--	dbm	27.35	27.40	27.65	27.55	27.60	27.60	27.65	27.75	27.80	27.75	27.65	27.55
Gss FREQ. f_o (PARA. 4.3.1)	36.48	35	39.5	db	36.60	36.93	36.88	36.88	36.83	36.70	36.70	36.86	36.90	36.75	36.65	36.50
I_L INSERTION LOSS				db												
R_{AIN} ATTENUATOR RESISTANCE, INPUT				OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT				OHMS												
T_K CATHODE ACTIVITY		6.0	--	SEC										11.3		
TEST EQUIPMENT CALIBRATION DATE										11/5/70						
SIGNIFICANT EVENT NOTES																
TESTED BY																

SIGNIFICANT EVENT NOTES

HUGHES *ELECTRON DYNAMICS DIVISION*

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.

MODEL NO. B200300-121 B200300-122 SERIAL NO. 22-2

PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o			TOTAL ACCUMULATED HOURS	2179.7	2399.6	2687.4	2829.5		3426	3565	3924	4177	4357	5068	5838
TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	MAX	UNITS	week of 12/29/70	week of 1/7/71	week of 1/19/71	week of 1/25/71	week of 2/8/71	week of 2/19/71	week of 2/25/71	week of 3/12/71	week of 3/22/71	week of 3/31/71	week of 4/30/71	week of 6/2/71
INPUT CURRENT TELEMETRY VOLTAGE			V	2.075	2.077	2.082	2.082	2.080	2.080	2.080	2.075	2.072	2.063	2.059	2.051
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.251	3.247	3.243	3.249	3.251	3.240	3.239	3.230	3.226	3.217	3.214	3.203
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.750	3.749	3.759	3.748	3.728	3.708	3.749	3.738	3.726	3.761	3.717	3.722
HELIX CURRENT TELEMETRY VOLTAGE			V	2.736	2.785	2.821	2.872	2.906	2.906	2.856	2.802	2.755	2.606	2.587	2.612
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.678	2.677	2.671	2.676	2.682	2.691	2.681	2.682	2.686	2.680	2.692	2.695
P_o (SAT) FREQ. f_o (PARA 4.1.3)	27	--	dbm	27.60	27.60	27.50	27.60	27.45	27.50	27.50	27.45	27.48	27.55	27.85	27.65
Gm FREQ. f_o (PARA. 4.3.1)	35	39.5	db	36.55	36.50	36.40	36.60	36.40	36.36	36.70	36.65	36.13	36.36	36.60	36.05
I_L INSERTION LOSS			db												
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS												
T_K CATHODE ACTIVITY	6.0	--	SEC			11.0			9.8				10.0		
TEST EQUIPMENT CALIBRATION DATE					1/8/71								3/31/71	4/28/71	
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

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3100 W. LOMITA BLVD. TORRANCE, CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______
MODEL NO. B200300-121 B200300-122 SERIAL NO. 22-2
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o			TOTAL ACCUMULATED HOURS	5947	6784										
TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	week of 6/7/71	week of 7/15/71	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /
INPUT CURRENT TELEMETRY VOLTAGE			V	2.049	2.095										
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.186	3.167										
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.713	3.640										
HELIX CURRENT TELEMETRY VOLTAGE			V	2.571	3.436										
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	2.698	2.697										
P_o (SAT) FREQ. f_o (PARA 4.1.3)	27	—	dbm	27.58	27.15										
Gss FREQ. f_o (PARA 4.1.1)	35	39.5	db	36.10	34.29*										
I_L INSERTION LOSS			db												
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS												
T_K CATHODE ACTIVITY	6.0	—	SEC												
TEST EQUIPMENT CALIBRATION DATE															
SIGNIFICANT EVENT NOTES					NOTE 1										
TESTED BY															

SIGNIFICANT EVENT NOTES
1. Gss out of specification - Low. Unit Failed

HUGHES ***ELECTRON DYNAMICS DIVISION***

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ____

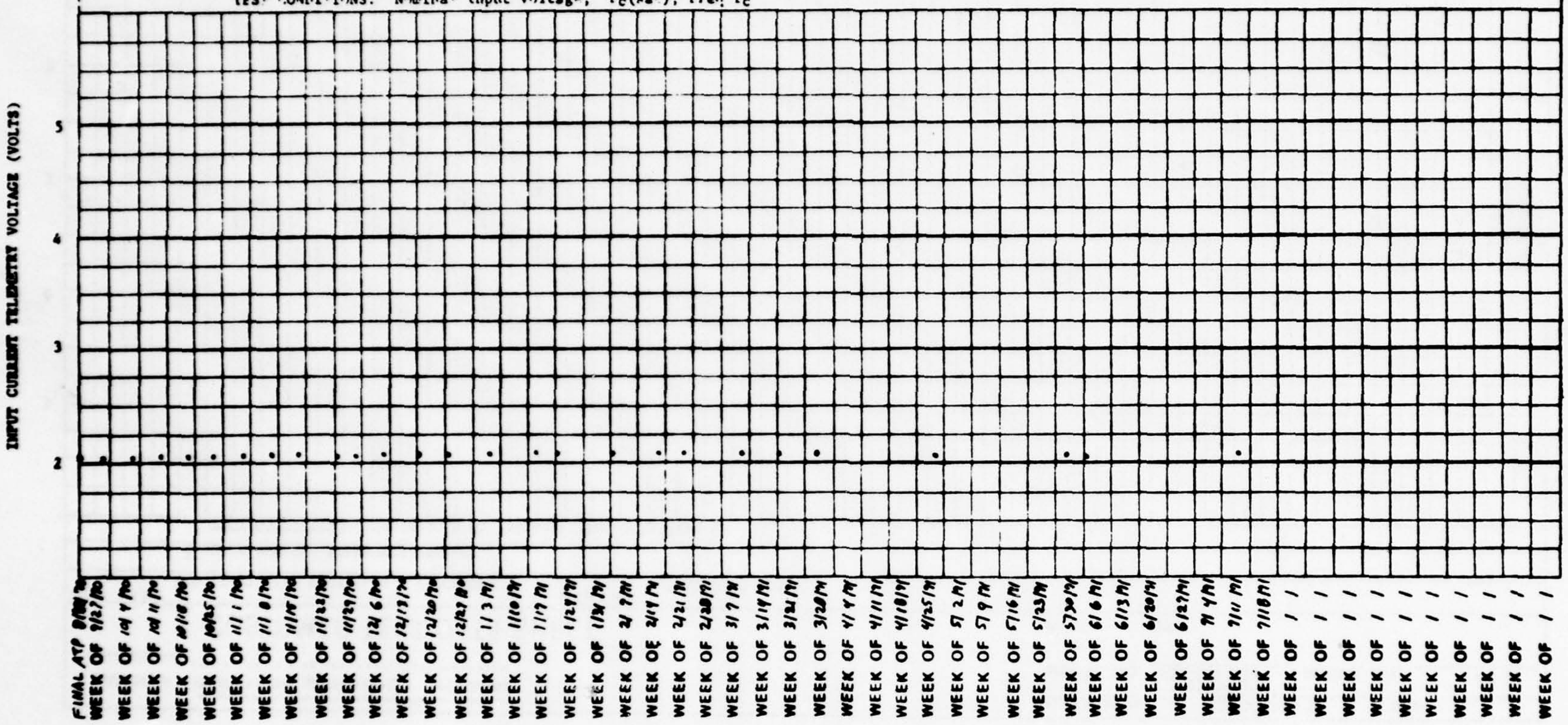
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-2

PAGE ____ OF ____

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE	SPEC. NO. LTPB200300-400

INPUT CURRENT TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_c(sat); Freq f_c



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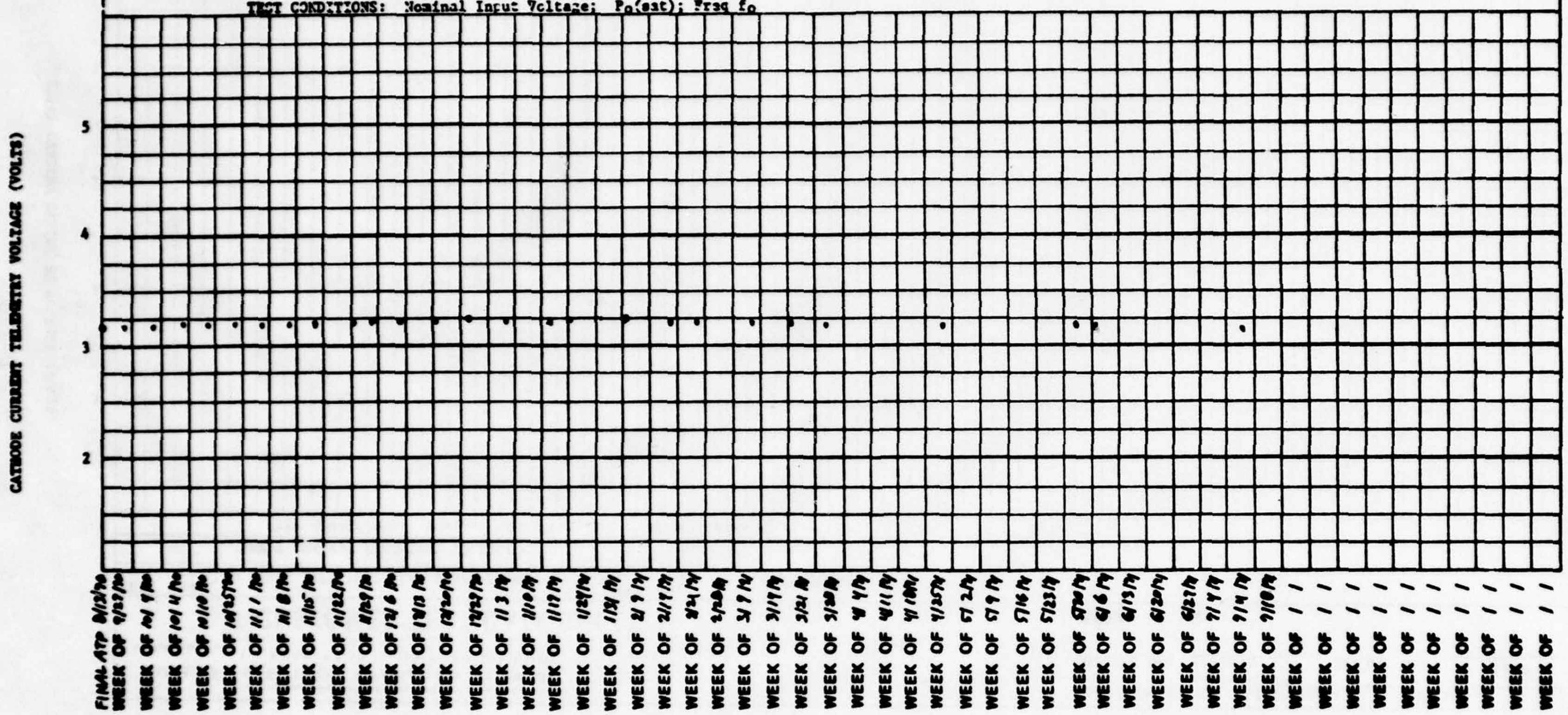
CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ____
MODEL NO. B 200300-121 / B200300-122 SERIAL NO. 22-2
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC. NO. LTPB200300-400

CATHODE CURRENT TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



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CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ____

MODEL NO. ____ SERIAL NO. 22-2

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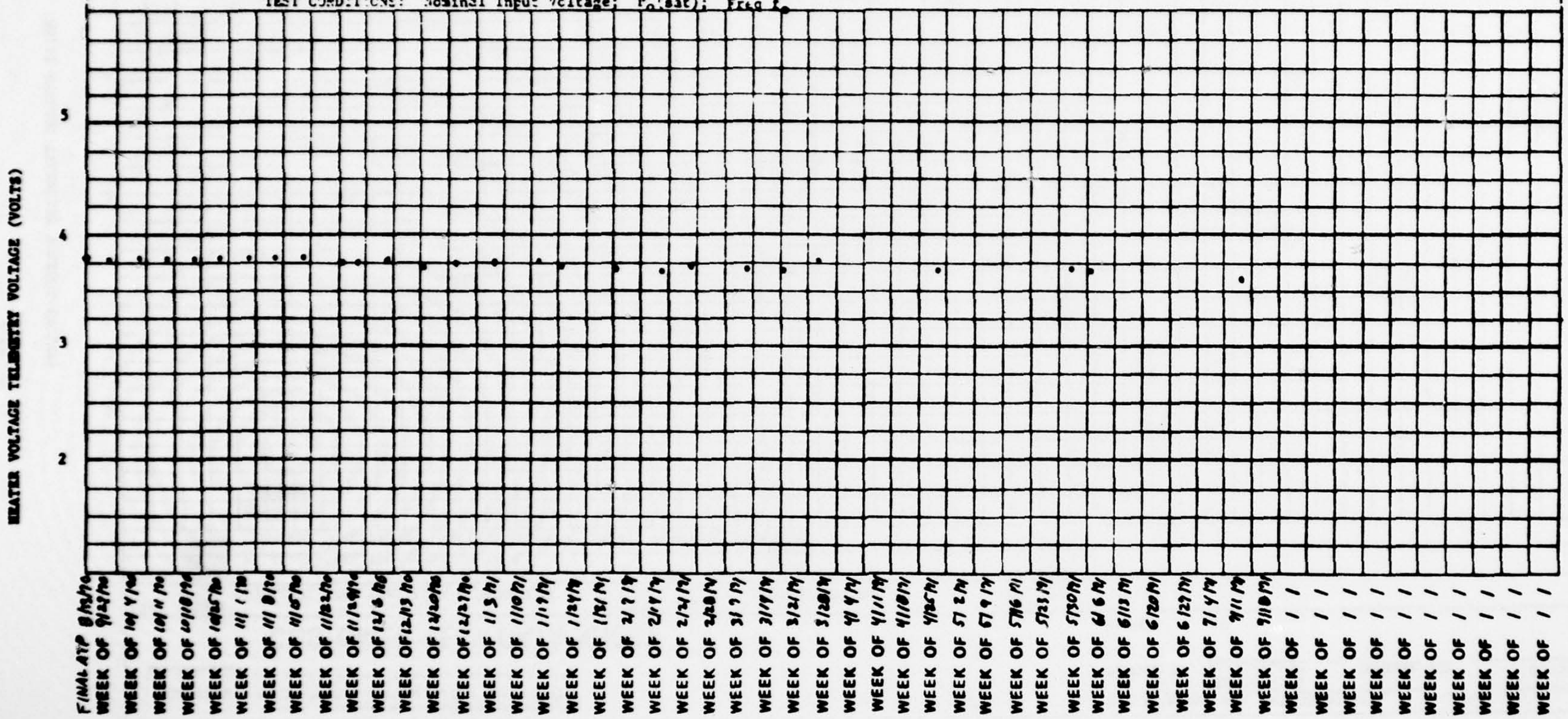
TEST NAME	SPEC. NO.
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400

HEATER VOLTAGE TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



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CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-2
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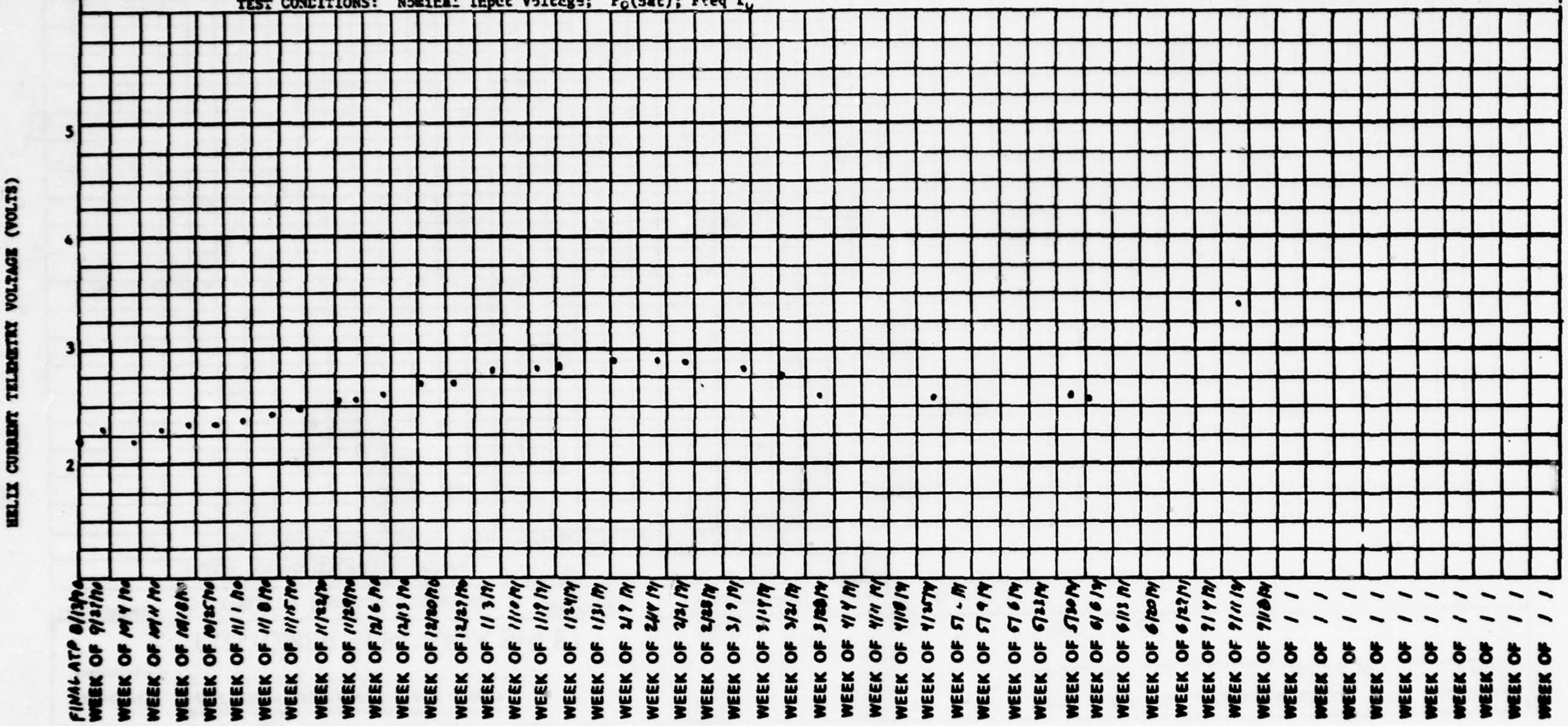
TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC. NO. LTPB200300-400

HELIX CURRENT TELEMETRY VOLTAGE
TEST CONDITIONS: Nominal Input Voltage; P_O(sat); Freq f_u



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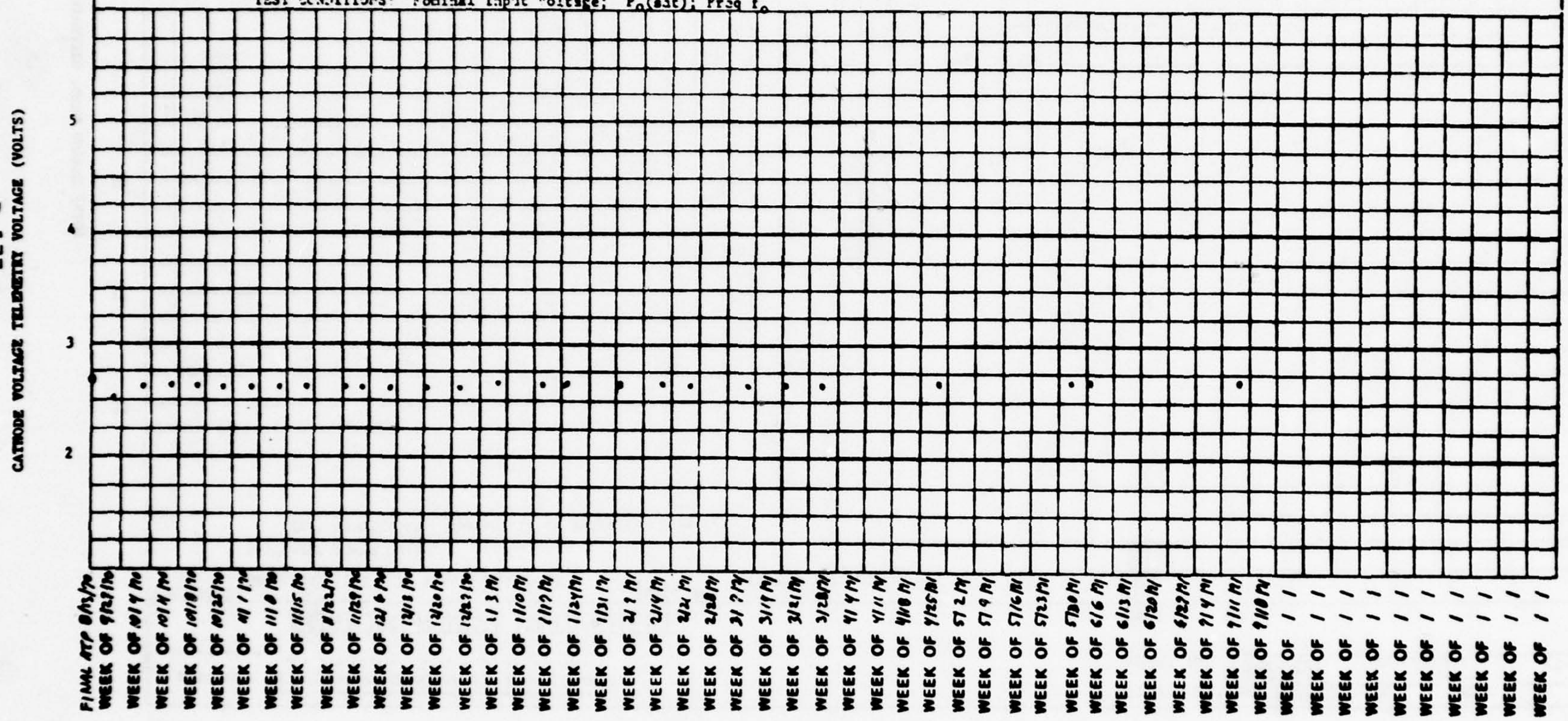
CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______

MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-2

PAGE ____ OF ____

TEST NAME	SPEC. NO.	
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400	
CATHODE VOLTAGE TELEMETRY VOLTAGE		
TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o		



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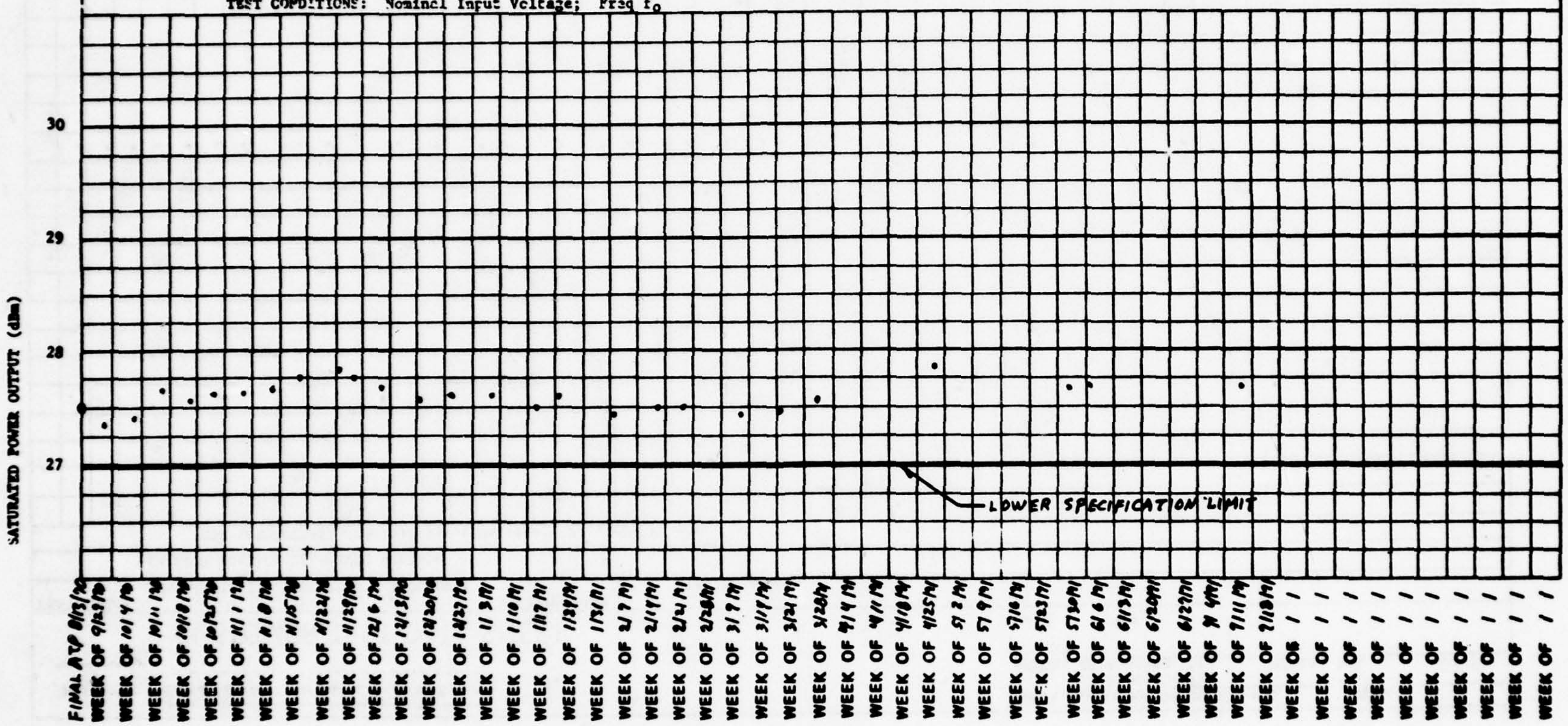
CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-2
PAGE OF

TEST NAME	SPEC. NO.	
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400	

SATURATED POWER OUTPUT

TEST CONDITIONS: Nominal Input Voltage; Freq f_o



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CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.

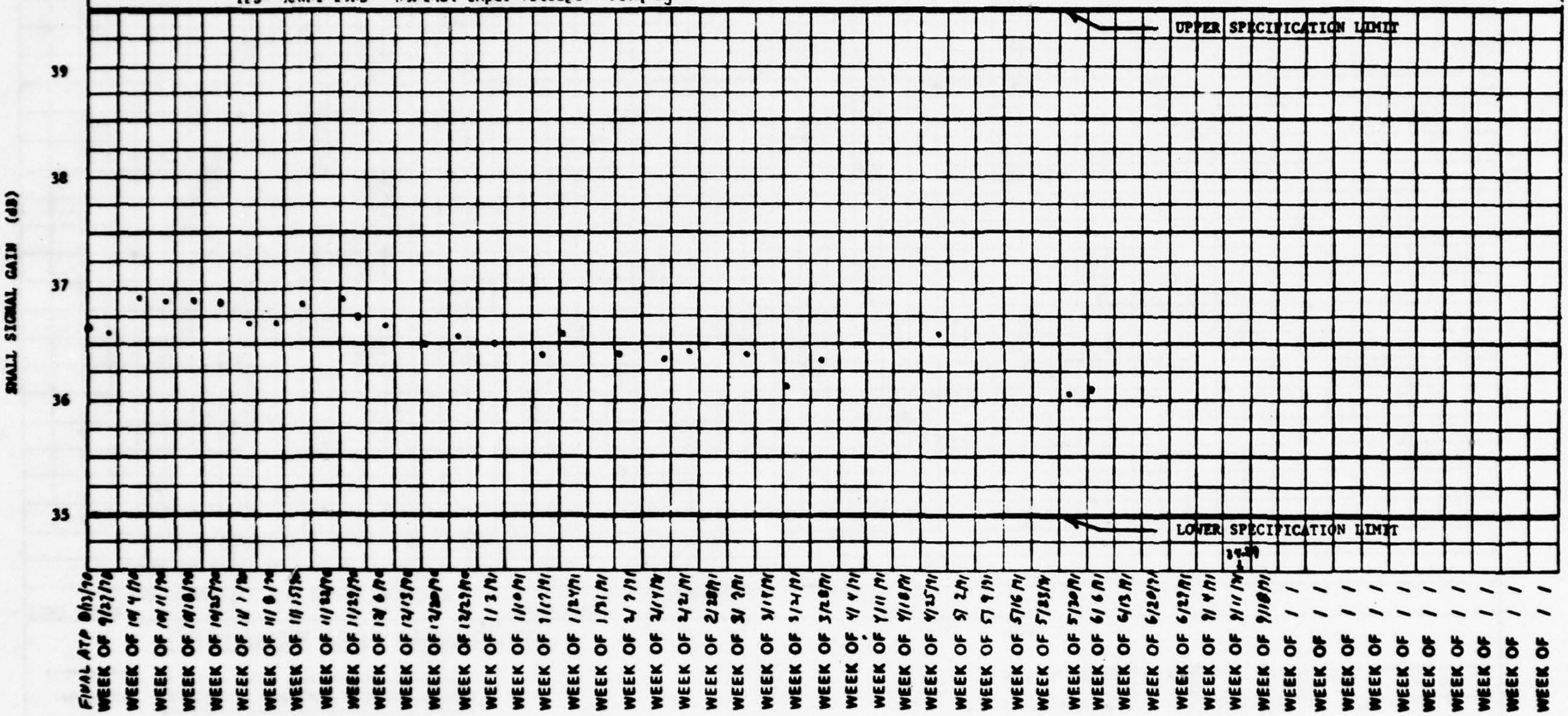
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 88-2

PAGE OF

TEST NAME	SPEC. NO.	
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400	

SMALL SIGNAL GAIN

TEST CONDITIONS: Nominal Input Voltage: Freq f_0



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CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.
MODEL NO. B200300-121 B200300-122 SERIAL NO. 22-2
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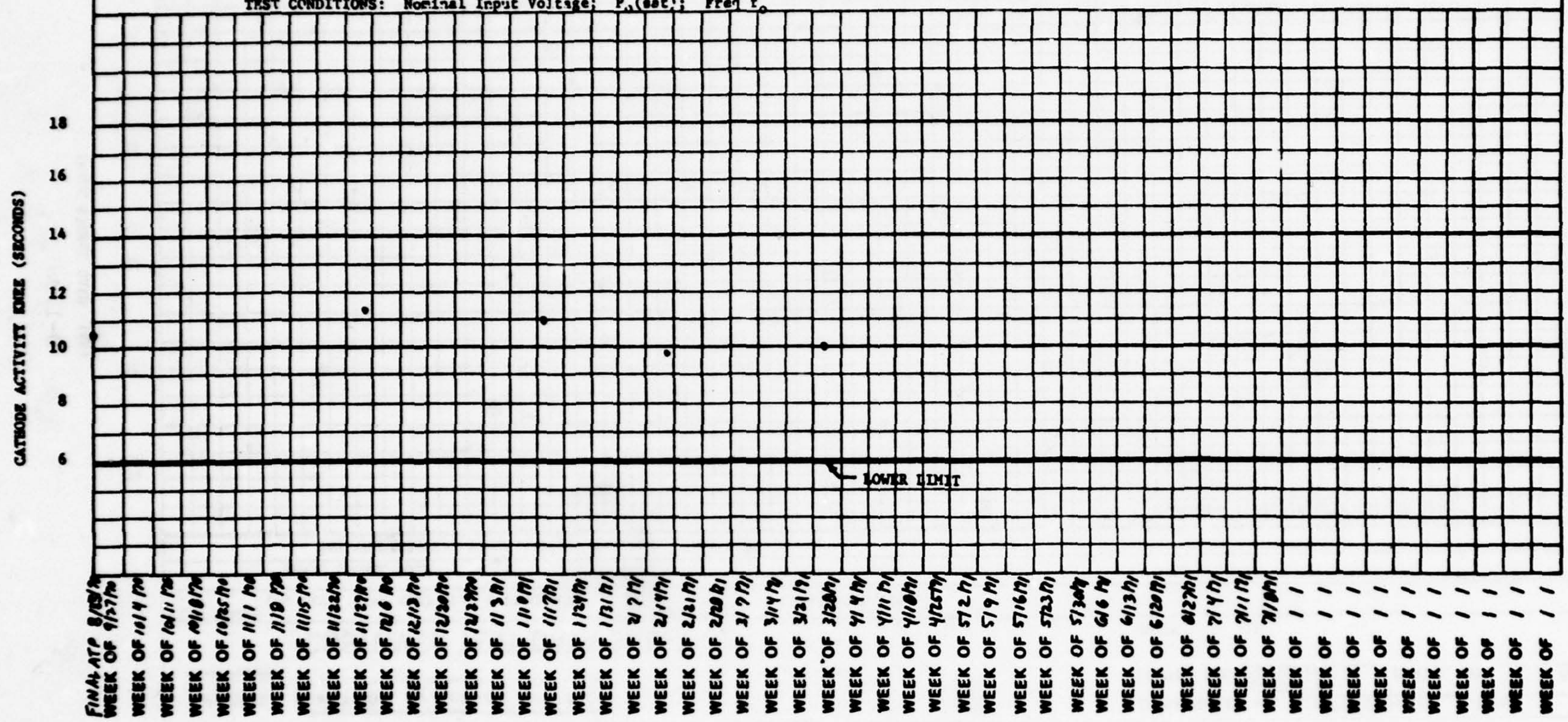
TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC. NO. LTPB200300-400

CATHODE ACTIVITY

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



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CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.

MODEL NO. [illegible] SERIAL NO. 22-3

PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400 | ACCEPTANCE TEST DATA

TEST CONDITIONS: NOMINAL INPUT VOLTAGE, P_o (SAT), FREQ. f_o

TEST CONDITIONS: NOMINAL INPUT VOLTAGE

	LIMITS MIN	LIMITS MAX	UNITS												
TOTAL ACCUMULATED HOURS				PRE- [illegible]	[illegible]	6,739	13,217	20,037	29,073	33,012					
				2/3/71	2/18/71	12/13/71	9/25/72	7/18/73	8/17/74	11/1/77	/ /	/ /	/ /	/ /	/ /
INPUT CURRENT TELEMETRY VOLTAGE			V	2.099	2.106	2.141	2.144	2.143	2.141	2.100					
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.504	3.509	3.5[illegible]	3.523	3.520	3.505	3.473					
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.068	3.058	3.009	2.984	2.966	2.963	2.939					
HELIX CURRENT TELEMETRY VOLTAGE			V	0.783	0.805	1.087	1.130	1.182	1.156	1.054					
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	3.036	3.040	3.031	3.029	3.032	3.027	3.037					
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dBm	28.05	27.75	28.50	28.10	27.90	27.80	27.60					
G_m FREQ. f_o (PARA. 4.3.1)	35	39.5	db	38.80	38.85	39.00	38.90	39.00	38.80	38.80					
I_L INSERTION LOSS			db												
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS												
T_X CATHODE ACTIVITY	6.0	--	SEC		13.1	13.5	9.8	8.4	8.2	6.5					
TEST EQUIPMENT CALIBRATION DATE															
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

TWT ha 1293 hours prior to start of life test.

BENCH FUNCTIONAL TEST DATA

LOW LEVEL LIFE TEST PLAN AND PROCEDURE

SPEC: LTPB 200300-400

SERIAL NO. 22-3

PAGE 1 of 3

SPEC. PARA #	TEST DESIGNATION	SPEC LIMITS MINIMUM	SPEC LIMITS MAXIMUM	DATA 0	DATA 20,057	DATA 55012	HOURS
4.1	CATHODE ACTIVITY, SECONDS	6.0		13.1	8.4	6.5	
4.2	COMMAND SIGNAL			✓	✓	✓	
4.3	INRUSH CURRENT						
a)	TIME INTEGRAL > Iss, t=3msec, AMP-SEC		.0037	.0032	.0029	0.0021	
b)	Imax, AMPS		1.8	0.80	0.80	0.83	
c)	I WITHIN ±3% Iss AT 150 SECONDS			✓	✓	✓	
4.4	INPUT AND OUTPUT REFLECTION, VSWR						
a)	OUTPUT (HOT)		1.25:1	1.13:1	1.09:1	1.20	
b)	OUTPUT (COLD)		1.25:1	1.13:1	1.09:1	1.20	
c)	INPUT (COLD)		1.25:1	1.08:1	1.05:1	1.13	
d)	INPUT (HOT)		1.25:1	1.08:1	1.05:1	1.13	
4.5	SATURATED POWER OUTPUT						
a)	TELEMETRY VOLTAGES						
	1) INPUT CURRENT TLM V			2.106	2.143	2.10	
	2) CATHODE CURRENT TLM V			3.509	3.520	3.475	
	3) HEATER VOLTAGE TLM V			3.058	2.966	2.989	
	4) HELIX CURRENT TLM V			0.805	1.182	1.054	
	5) CATHODE VOLTAGE TLM V			3.040	3.032	3.037	
b)	P_o (SAT.), dBm	27		28.00	27.90	27.80	
4.6	SATURATED POWER OUTPUT AND INPUT POWER VS. INPUT VOLTAGE						
a)	Vin 23 ±.5V DC						
	1) P_o (SAT.), dBm	27		28.00	27.90	27.85	
	2) Iin, AMPS			.255	.264	0.259	
	3) Pin (DC), WATTS			5.865	6.072	5.959	
b)	Vin = 33 ±.5V DC						
	1) P_o (SAT.), dBm	27		28.00	27.90	27.80	
	2) Iin, AMPS			.179	.186	0.183	
	3) Pin (DC), WATTS			5.907	6.138	6.039	

S/N 22-3

SPEC PARA #	TEST DESIGNATION	SPEC LIMITS MINIMUM	SPEC LIMITS MAXIMUM	DATA 0	DATA 20,057	DATA 55012 HOURS
4.7	SMALL SIGNAL GAIN					
a)	Gss AT P_o 10dB BELOW P_o (SAT.) , dB	35	39.5	38.85	39.00	39.80
b)	STEPS 4 AND 5 (SEE ATP)			✓	✓	✓
4.7.1	GAIN SLOPE , dB/Mhz					
a)	Vin = 23 ±.5V DC					
	1) ΔGss f_1 to f_2		0.015	.005	.006	0.004
	2) ΔGss f_1 to f_3		0.030	.006	.005	0.004
	3) ΔGss f_2 to f_4		0.030	.001	.001	0.0017
b)	Vin = 28 ±.5V DC					
	1) ΔGss f_1 to f_2		0.015	.005	.005	0.004
	2) ΔGss f_1 to f_3		0.030	.005	.005	0.004
	3) ΔGss f_2 to f_4		0.030	.001	.001	0.0017
c)	Vin = 33 ±.5V DC					
	1) ΔGss f_1 to f_2		0.015	.005	.005	0.004
	2) ΔGss f_1 to f_3		0.030	.005	.005	0.004
	3) ΔGss f_2 to f_4		0.030	.001	.001	0.0017
4.7.2	GAIN FLATNESS					
a)	Vin = 23 ±.5V DC					
	1) GAIN VARIATION f_1 to f_2 , dB		±0.2	±0.07	±0.01	±0.08
b)	Vin = 28 ±.5V DC					
	1) GAIN VARIATION f_1 to f_2 , dB		±0.2	±0.07	±0.01	±0.08
c)	Vin = 33 ±.5V DC					
	1) GAIN VARIATION f_1 to f_2 , dB		±0.2	±0.07	±0.01	±0.08
4.8	NOISE FIGURE					
a)	N.F. , dB		25	21.0	21.0	21.50
4.9	INTERMODULATION DISTORTION					
a)	I.M. DISTORTION , dB	28		29.2	28.0	29.50
4.10	TIME DELAY DISTORTION					
a)	T.D. f_1 to f_2 ANY 10MHZ LINEAR INTERVAL , ns/Mhz		0.10	0.036	0.01	0.01
b)	T.D. f_1 to f_2 PARABOLIC PORTION OF CURVE , ns/Mhz^2		0.01	0.001	0.001	0.001

S/N 22-3

SPEC PARA #	TEST DESIGNATION	SPEC LIMITS MINIMUM	SPEC LIMITS MAXIMUM	DATA 0	DATA 20,057	DATA 55012 HOURS
4.11	PHASE SHIFT, FREQ. f_o, +14dBm < P_o < +23dBm , °/dB					
a)	+21.75dBm < P_o < +23dBm		2.0	1.0°	0.72	0.67
b)	+17dBm < P_o < +21.75dBm		1.5	0.7°	0.064	1.32
c)	+14dBm < P_o < +17dBm		1.0	07°	.66	0.81
4.12	STABILITY (MISMATCH) NO P_o FROM INPUT AND OUTPUT OTHER THAN INHERENT NOISE			✓	✓	✓
4.13	SPURIOUS OUTPUT COHERENT COMPONENTS					
a)	P_o (HARMONIC) , dB	13		18.0	18.6	22.0
4.13.1	SPURIOUS OUTPUT INCOHERENT COMPONENTS					
a)	P_o (NON-HARMONIC)	60dB BELOW FUNDAMENTAL		✓	✓	✓
4.13.2	SPURIOUS OUTPUT (AM)			✓	✓	✓
4.13.3	SPURIOUS OUTPUT (PM)			✓	✓	✓

HUGHES **ELECTRON DYNAMICS DIVISION**
3100 W. LOMITA BLVD. TORRANCE, CALIFORNIA

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.
MODEL NO. B200300-121 B200300-122 SERIAL NO. 22-3
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC NO.: LTPB200300-400

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o	TOTAL ACCUMULATED HOURS			0	330	583.2	762	1474	2244	2352	3198	3428	3553	3684	3841
TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	MAX	UNITS	week of 2/26/71	week of 3/12/71	week of 3/22/71	week of 3/31/71	week of 4/30/71	week of 6/2/71	week of 6/7/71	week of 7/15/71	week of 7/25/71	week of 7/30/71	week of 8/5/71	week of 8/12/71
INPUT CURRENT TELEMETRY VOLTAGE			V	2.099	2.121	2.106	2.114	2.118	2.122	2.117	2.121	2.125	2.132	2.190	2.135
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.504	3.522	3.522	3.524	3.515	3.523	3.516	3.522	3.524	3.529	3.521	3.535
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.068	3.061	3.074	3.060	3.039	3.059	3.034	3.008	3.027	3.027	3.000	3.018
HELIX CURRENT TELEMETRY VOLTAGE			V	.783	.860	.855	.900	.953	1.003	.994	1.006	1.024	1.034	.992	1.029
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	3.036	3.036	3.034	3.033	3.036	3.029	3.035	3.039	3.032	3.034	3.040	3.030
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	—	dbm	28.00	28.25	28.13	28.35	28.55	28.45	28.40	28.50	28.35	28.40	28.45	28.50
Gss FREQ. f_o (PARA. 4.3.1)	35	39.5	db	38.80	38.85	38.68	38.90	39.00	38.50	38.50	39.14	39.01	38.48	39.19	39.21
I_L INSERTION LOSS			db												
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS												
T_K CATHODE ACTIVITY	6.0	—	SEC												
TEST EQUIPMENT CALIBRATION DATE							3/31/71	4/28/71					7/28/71		
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES ELECTRON DYNAMICS DIVISION

3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.

MODEL NO. B200300-121 B200300-122 SERIAL NO. 22-3

PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o

TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	4031 week of 8/20/71	4180 week of 8/26/71	4461 week of 9/7/71	4515 week of 9/10/71	4658 week of 9/16/71	4826 week of 9/23/71	4994 week of 9/30/71	5160 week of 10/7/71	5323 week of 10/14/71	5495 week of 10/21/71	5637 week of 10/27/71	5830 week of 11/4/71
INPUT CURRENT TELEMETRY VOLTAGE			V	2.136	2.136	2.132	2.140	2.145	2.132	2.128	2.131	2.139	2.139	2.140	2.131
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.536	3.534	3.527	3.536	3.534	3.533	3.532	3.531	3.537	3.531	3.534	3.528
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.025	3.023	2.992	3.044	3.031	3.021	3.023	3.033	3.029	3.012	3.018	3.023
HELIX CURRENT TELEMETRY VOLTAGE			V	1.047	1.021	1.045	1.013	1.017	1.053	1.062	1.000	1.066	1.052	1.071	1.010
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	3.030	3.030	3.039	3.025	3.031	3.032	3.030	3.017	3.021	3.033	3.033	3.019
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	28.50	28.50	28.50	28.40	28.35	28.50	28.50	28.55	28.60	28.60	28.55	28.55
G_{ss} FREQ. f_o (PARA 4.3.1)	35	39.5	db	39.02	38.96	39.00	38.81	38.90	39.00	38.96	39.20	39.11	39.00	39.11	39.01
L_I INSERTION LOSS			db												
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS												
T_K CATHODE ACTIVITY	6.0	--	SEC												
TEST EQUIPMENT CALIBRATION DATE															11/2/71
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES **ELECTRON DYNAMICS DIVISION**

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-3
PAGE 3 OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o

TEST CONDITIONS / NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	5996	6190	6305	6474	6689	6854	6919	7109	7279	7446	7636	7800
TOTAL ACCUMULATED HOURS				week of 11/11/71	week of 11/19/71	week of 11/24/71	week of 12/1/71	week of 12/10/71	week of 12/17/71	week of 12/22/71	week of 12/30/71	week of 1/6/72	week of 1/13/72	week of 1/22/72	week of 1/28/72
INPUT CURRENT TELEMETRY VOLTAGE			V	2.142	2.137	2.139	2.146	2.139	2.145	2.140	2.145	2.140	2.144	2.14	2.14
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.537	3.531	3.533	3.535	3.531	3.536	3.540	3.539	3.540	3.530	3.54	3.54
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.014	3.016	3.012	3.020	3.017	3.018	3.017	3.019	3.019	3.000	3.01	3.01
HELIX CURRENT TELEMETRY VOLTAGE			V	1.049	1.019	1.074	1.060	1.060	1.110	1.059	1.082	1.062	1.100	1.07	1.12
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	3.029	3.021	3.030	3.025	3.021	3.027	3.027	3.026	3.026	3.029	3.03	3.03
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	28.50	28.40	28.45	28.45	28.45	28.30	28.35	28.30	28.30	28.20	28.25	28.25
Gss FREQ. f_o (PARA 4.3.1)	35	39.5	db	38.90	38.80	39.00	39.00	38.80	38.80	38.70	38.80	38.70	38.80	38.80	39.00
I_L INSERTION LOSS			db												
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS												
T_K CATHODE ACTIVITY	6.0	--	SEC												
TEST EQUIPMENT CALIBRATION DATE															1/26/72
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES **ELECTRON DYNAMICS DIVISION**

3100 W. LOMITA BLVD TORRANCE CALIFORNIA

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______

MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-3

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TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE — SPEC NO. LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT), FREQ. f_o

TEST CONDITIONS
NOMINAL INPUT VOLTAGE

TOTAL ACCUMULATED HOURS	LIMITS MIN	LIMITS MAX	UNITS	7974	8119	8285	8448	8637	8784	8981	9121	9284	9406	9645	9794
				week of 2/4/72	week of 2/10/72	week of 2/17/72	week of 2/24/72	week of 3/3/72	week of 3/9/72	week of 3/17/72	week of 3/23/72	week of 3/30/72	week of 4/7/72	week of 4/21/72	week of 4/27/72
INPUT CURRENT TELEMETRY VOLTAGE			V	2.14	2.15	2.15	2.14	2.14	2.14	2.14	2.13	2.14	2.13	2.14	2.15
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.54	3.54	3.54	3.54	3.54	3.54	3.54	3.53	3.54	3.52	3.53	3.54
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.01	3.01	3.01	3.00	3.01	3.00	3.00	2.99	3.00	2.97	2.99	3.00
HELIX CURRENT TELEMETRY VOLTAGE			V	1.10	1.12	1.11	1.10	1.11	1.10	1.10	1.11	1.10	1.11	1.11	1.12
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	3.029	3.03	3.04	3.03	3.03	3.03	3.03	3.03	3.03	3.04	3.03	3.03
P_o (SAT) FREQ. f_o (PARA 4.1.3)	27	--	dbm	28.30	28.30	28.20	28.30	28.30	28.20	28.20	28.05	28.10	28.20	28.20	28.30
G_{ss} FREQ. f_o (PARA 4.1.1)	35	39.5	db	39.00	38.95	39.00	39.20	39.10	38.95	39.00	38.90	38.90	39.00	39.00	39.00
I_L INSERTION LOSS			db												
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS												
T_K CATHODE ACTIVITY	6.0	--	SEC												
TEST EQUIPMENT CALIBRATION DATE														4/19/72	
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES **ELECTRON DYNAMICS DIVISION**
3100 W. LOMITA BLVD TORRANCE, CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-3
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TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o

TEST CONDITIONS / NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	9985	10152	10295	10487	10632	10819	10989	11158	11321	11491	11657	11828
TOTAL ACCUMULATED HOURS				week of 5/5/72	week of 5/12/72	week of 5/18/72	week of 5/26/72	week of 6/1/72	week of 6/9/72	week of 6/16/72	week of 6/23/72	week of 6/30/72	week of 7/7/72	week of 7/14/72	week of 7/21/72
INPUT CURRENT TELEMETRY VOLTAGE			V	2.13	2.14	2.13	2.14	2.13	2.14	2.14	2.14	2.14	2.14	2.15	2.14
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.53	3.53	3.53	3.53	3.53	3.53	3.53	3.53	3.52	3.53	3.53	3.53
HEATER VOLTAGE TELEMETRY VOLTAGE			V	2.99	2.99	2.99	2.98	2.98	3.00	2.98	2.99	2.98	2.99	2.99	2.98
HELIX CURRENT TELEMETRY VOLTAGE			V	1.11	1.14	1.10	1.13	1.12	1.07	1.13	1.13	1.12	1.11	1.08	1.08
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	28.25	28.30	28.30	28.30	28.30	28.30	28.30	28.30	28.30	28.30	28.30	28.30
Gss FREQ. f_o (PARA. 4.3.1)	35	39.5	db	39.00	39.10	39.00	39.00	39.00	39.00	39.00	39.00	39.10	39.10	39.10	39.10
I_L INSERTION LOSS			db												
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS												
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS												
T_K CATHODE ACTIVITY	6.0	—	SEC												
TEST EQUIPMENT CALIBRATION DATE															
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ____
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-3
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TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC NO. LTPB200300-400

TEST CONDITIONS: NOMINAL INPUT VOLTAGE, P_o(SAT), FREQ. f_o
TEST CONDITIONS: NOMINAL INPUT VOLTAGE

	LIMITS MIN	LIMITS MAX	UNITS	11828	11993	12161	12327	12491	12665	12737	12811	12983	13146	13307	13475
TOTAL ACCUMULATED HOURS				week of 7/21/72	week of 7/28/72	week of 8/4/72	week of 8/11/72	week of 8/18/72	week of 8/28/72	week of 8/31/72	week of 9/7/72	week of 9/15/72	week of 9/22/72	week of 9/29/72	week of 10/6/72
INPUT CURRENT TELEMETRY VOLTAGE			V	2.14	2.14	2.14	2.14	2.14	2.14	2.14	2.14	2.15	2.14	2.14	2.14
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.53	3.52	3.52	3.52	3.52	3.52	3.52	3.53	3.53	3.53	3.53	3.53
HEATER VOLTAGE TELEMETRY VOLTAGE			V	2.98	2.98	2.98	2.98	2.97	2.98	2.97	2.98	2.99	2.97	2.97	2.99
HELIX CURRENT TELEMETRY VOLTAGE			V	1.08	1.12	1.13	1.11	1.14	1.13	1.12	1.14	1.15	1.13	1.14	1.12
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.00	3.03	3.03
P_o (SAT) FREQ. f_o (PARA 4.1.3)	27	--	dbm	28.30	28.30	28.30	28.30	28.30	28.30	28.35	28.25	28.30	28.25	28.10	28.20
Gm FREQ. f_o (PARA. 4.1.1)	35	39.5	db	39.10	39.10	39.10	39.00	38.90	39.00	38.90	39.00	38.90	39.00	38.75	38.90
I_L INSERTION LOSS			db							>100			>100		
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS							20.96			20.98		
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS							22.19			22.10		
T_K CATHODE ACTIVITY	6.0	--	SEC										9.8		
TEST EQUIPMENT CALIBRATION DATE											9/7/72			9/29/72	
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES *ELECTRON DYNAMICS DIVISION*
3100 W. LOMITA BLVD. TORRANCE, CALIFORNIA 90509

DATA SHEET NO. DSB200300-400 REV. ____
MODEL NO. B200300-121 B200300-122 SERIAL NO. 22-3
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CUSTOMER TEST DATA SHEET

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC NO.: LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o

TEST CONDITIONS / NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	13638	13805	13970	14134	14301	14469	14577	14794	14958	15121	15196	15343
TOTAL ACCUMULATED HOURS				week of 10/13/72	week of 10/20/72	week of 10/27/72	week of 11/3/72	week of 11/10/72	week of 11/17/72	week of 11/22/72	week of 12/1/72	week of 12/8/72	week of 12/15/72	week of 12/21/72	week of 12/29/72
INPUT CURRENT TELEMETRY VOLTAGE			V	2.14	2.14	2.15	2.14	2.15	2.15	2.14	2.15	2.15	2.14	2.15	2.15
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.53	3.53	3.53	3.53	3.53	3.53	3.53	3.53	3.53	3.53	3.53	3.52
HEATER VOLTAGE TELEMETRY VOLTAGE			V	2.98	2.99	2.97	2.97	2.98	2.98	2.98	2.97	2.98	2.98	2.98	2.97
HELIX CURRENT TELEMETRY VOLTAGE			V	1.20	1.13	1.21	1.17	1.22	1.21	1.22	1.21	1.20	1.21	1.21	1.18
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	3.02	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	—	dbm	28.20	28.10	28.10	28.10	28.10	28.10	28.10	28.00	28.10	28.10	28.10	28.15
G_{ss} FREQ. f_o (PARA. 4.3.1)	35	39.5	db	38.90	38.80	38.80	38.90	38.70	38.70	38.70	38.70	38.80	38.70	38.80	38.80
I_L INSERTION LOSS			db	>100			>100			>100			>100		
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS	20.98			21.00			21.06			21.05		
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS	22.10			22.14			22.20			22.19		
T_K CATHODE ACTIVITY	6.0	—	SEC										9.3		
TEST EQUIPMENT CALIBRATION DATE															
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.

MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-3

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TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE — SPEC NO. LTPB200300-400

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o (SAT) FREQ. f_o	TOTAL ACCUMULATED HOURS			15505	15669	15839	16072	16167	16335	16498	16665	16829	17000	17165	17331
TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	week of 1/5/73	week of 1/12/73	week of 1/19/73	week of 1/29/73	week of 2/2/73	week of 2/9/73	week of 2/16/73	week of 2/23/73	week of 3/2/73	week of 3/9/73	week of 3/16/73	week of 3/23/73
INPUT CURRENT TELEMETRY VOLTAGE			V	2.15	2.16	2.15	2.15	2.16	2.15	2.15	2.16	2.16	2.15	2.16	2.16
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.53	3.53	3.53	3.53	3.53	3.53	3.53	3.53	3.53	3.53	3.53	3.53
HEATER VOLTAGE TELEMETRY VOLTAGE			V	2.98	2.99	2.98	2.98	2.98	2.98	2.98	2.98	2.99	2.97	2.98	2.99
HELIX CURRENT TELEMETRY VOLTAGE			V	1.21	1.20	1.19	1.21	1.20	1.20	1.20	1.20	1.20	1.20	1.19	1.20
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.02	3.03	3.03	3.02
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	28.15	28.20	28.15	28.20	28.05	28.05	28.05	28.05	28.00	28.15	28.10	28.05
Gss FREQ. f_o (PARA. 4.3.1)	35	39.5	db	38.80	38.80	38.70	38.70	38.70	38.70	38.70	38.70	38.50	38.70	38.70	38.70
L_i INSERTION LOSS			db	>100			>100			>100					
R_{AHI} ATTENUATOR RESISTANCE, INPUT			OHMS	21.05			21.08			21.10					
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS	22.19			22.22			22.24					
T_K CATHODE ACTIVITY	6.0	--	SEC	8.8			9.0			8.9					
TEST EQUIPMENT CALIBRATION DATE					1/12/73										
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES ELECTRON DYNAMICS DIVISION
3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.
MODEL NO. B200300-121 SERIAL NO. 22-3
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TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC NO. LTPB200300-400

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o	LIMITS MIN	LIMITS MAX	UNITS	17476	17666	17834	18001	18143	18312	18479	18644	18814	18978	19151	19315
TOTAL ACCUMULATED HOURS / TEST CONDITIONS NOMINAL INPUT VOLTAGE				week of 3/29/73	week of 4/6/73	week of 4/13/73	week of 4/20/73	week of 4/27/73	week of 5/4/73	week of 5/11/73	week of 5/18/73	week of 5/25/73	week of 6/1/73	week of 6/9/73	week of 6/16/73
INPUT CURRENT TELEMETRY VOLTAGE			V	2.16	2.15	2.15	2.16	2.16	2.15	2.11	2.16	2.15	2.16	2.15	2.15
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.53	3.53	3.53	3.53	3.53	3.53	3.51	3.52	3.53	3.52	3.53	3.52
HEATER VOLTAGE TELEMETRY VOLTAGE			V	2.98	2.98	2.98	.2.99	2.98	2.98	3.00	2.98	2.98	2.98	2.98	2.96
HELIX CURRENT TELEMETRY VOLTAGE			V	1.19	1.20	1.20	1.21	1.21	1.19	1.19	1.17	1.18	1.18	1.20	1.21
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	3.03	3.03	3.02	3.02	3.02	3.03	3.03	3.02	3.03	3.02	3.02	3.03
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	28.05	28.00	28.10	28.10	28.05	28.10	28.10	28.10	28.10	28.10	28.05	28.10
Gss FREQ. f_o (PARA. 4.3.1)	35	39.5	db	38.70	38.60	38.90	39.00	38.90	38.90	39.00	38.90	38.80	39.00	38.90	39.10
I_L INSERTION LOSS			db	>100						>100					
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS	21.13						21.26					
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS	22.27						22.30					
T_K CATHODE ACTIVITY	6.0	--	SEC	8.5						8.2					
TEST EQUIPMENT CALIBRATION DATE					4/4/73										
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES **ELECTRON DYNAMICS DIVISION**
3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-3
PAGE OF

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE **SPEC NO.** LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o

TEST CONDITIONS
NOMINAL INPUT VOLTAGE

	LIMITS															
TOTAL ACCUMULATED HOURS				19459	19603	19769	19938	20244								
	MIN	MAX	UNITS	week of 6/22/73	week of 6/29/73	week of 7/6/73	week of 7/13/73	week of 7/20/73	/ /	/ /	/ /	/ /	/ /	/ /	/ /
INPUT CURRENT TELEMETRY VOLTAGE			V	2.15	2.15	2.15	2.15	2.15							
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.53	3.52	3.52	3.52	3.53							
HEATER VOLTAGE TELEMETRY VOLTAGE			V	2.98	2.98	2.97	2.97	2.98							
HELIX CURRENT TELEMETRY VOLTAGE			V	1.20	1.19	1.19	1.19	1.18							
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	3.03	3.03	3.03	3.03	3.03							
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	28.10	28.05	28.10	28.05	28.10							
G_{ss} FREQ. f_o (PARA. 4.3.1)	35	39.5	db	39.00	39.10	39.00	39.00	39.00							
L_L INSERTION LOSS			db	>100											
R_{AI} ATTENUATOR RESISTANCE, INPUT			OHMS	21.18											
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS	22.32											
T_K CATHODE ACTIVITY	6.0	--	SEC	8.3											
TEST EQUIPMENT CALIBRATION DATE															
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

HUGHES ELECTRON DYNAMICS DIVISION

3100 W. LOMITA BLVD TORRANCE, CALIFORNIA 90509

DATA SHEET NO. DSB200300-400 REV.

MODEL NO. B200300-121 B200300-122 SERIAL NO. 22-3

CUSTOMER TEST DATA SHEET

PAGE OF

TEST NAME	LOW LEVEL LIFE TEST PLAN & PROCEDURE	SPEC NO.	LTPB200300-400

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o			TOTAL ACCUMULATED HOURS	20,947	21,680	22,368	23,043	23,669	24,444	25,092	25,856	26,463	27,173	27,895	28,550
TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS	8/28/73	9/28/73	10/26/73	11/30/73	12/28/73	1/31/74	2/28/74	4/1/74	4/29/74	5/29/74	6/27/74	7/26/74
INPUT CURRENT TELEMETRY VOLTAGE			V	2.15	2.15	2.12	2.15	2.15	2.15	2.15	2.15	2.14	2.14	2.15	2.14
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.53	3.52	3.52	3.51	3.52	3.51	3.51	3.51	3.51	3.51	3.51	3.51
HEATER VOLTAGE TELEMETRY VOLTAGE			V	2.99	2.99	3.00	3.00	2.98	2.97	2.97	2.97	2.97	2.97	2.98	2.98
HELIX CURRENT TELEMETRY VOLTAGE			V	1.19	1.10	1.15	1.16	1.18	1.18	1.18	1.20	1.18	1.17	1.17	1.16
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	3.03	3.02	3.02	3.03	3.02	3.03	3.02	3.02	3.03	3.03	3.02	3.02
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	28.10	28.10	28.15	28.10	28.10	28.1	28.1	28.1	28.10	28.10	28.10	28.00
Gss FREQ. f_o (PARA. 4.3.1)	35	39.5	db	38.9	39.0	38.9	38.9	38.9	38.9	38.9	38.8	38.80	38.90	38.90	38.80
I_L INSERTION LOSS			db	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS	21.20	21.24	21.24	21.25	21.24	21.26	21.25	21.27	21.30	21.30	21.30	21.31
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS	22.36	22.39	22.38	22.40	22.37	22.40	22.41	22.41	22.43	22.43	22.43	22.45
T_K CATHODE ACTIVITY	6.0	--	SEC	8.3	8.3	*		8.3	8.0	7.8	8.0	8.5	8.0	7.8	7.8
TEST EQUIPMENT CALIBRATION DATE				8/10/73	8/10/73	8/10/73	8/10/73	11/28/73	11/28/73	11/28/73	3/27/74	3/27/74	3/27/74	3/27/74	3/27/74
SIGNIFICANT EVENT NOTES															
TESTED BY															

SIGNIFICANT EVENT NOTES

*RECORDER OUT FOR REPAIR.

HUGHES **ELECTRON DYNAMICS DIVISION**
3100 W. LOMITA BLVD TORRANCE, CALIFORNIA

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______
MODEL NO. B200300-121 SERIAL NO. 22-3
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC NO. LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o

TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS												
TOTAL ACCUMULATED HOURS				~~29239~~ 29329	30053	30,819	31551	32,149	32,940	33,613	34,228	35,014	35,758	36,424	37,133
				8/29/74	9/30/74	11/1/74	12/3/74	12/28/74	1/30/5	2/27/75	3/28/5	4/30/5	5/31/5	7/2/75	8/1/75
INPUT CURRENT TELEMETRY VOLTAGE			V	2.139	2.144	2.144	2.13	2.14	2.14	2.14	2.14	2.14	2.14	2.13	2.14
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.503	3.509	3.507	3.50	3.50	3.51	3.51	3.50	3.50	3.50	3.49	3.50
HEATER VOLTAGE TELEMETRY VOLTAGE			V	2.962	2.975	2.972	2.96	2.96	2.99	2.98	2.98	2.97	2.97	2.97	2.97
HELIX CURRENT TELEMETRY VOLTAGE			V	1.164	1.158	1.167	1.16	1.16	1.16	1.17	1.14	1.15	1.16	1.14	1.15
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	3.029	3.025	3.025	3.03	3.03	3.02	3.02	3.02	3.02	3.02	3.03	3.03
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	28.05	28.05	28.15	28.20	28.10	28.20	28.1	28.05	28.05	28.10	27.95	27.60
Gm FREQ. f_o (PARA. 4.3.1)	35	39.5	db	38.9	38.9	38.8	38.8	38.8	38.8	38.7	38.8	38.85	38.80	38.70	38.60
I_L INSERTION LOSS			db	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100	7100
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS	21.34	21.34	21.35	21.35	21.37	21.36	21.38	21.38	21.38	21.39	21.40	21.39
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS	22.47	22.46	22.48	22.50	22.51	22.51	22.52	22.52	22.52	22.52	22.55	22.52
T_K CATHODE ACTIVITY	6.0	--	SEC	8.4	8.1	8.0	7.5	8.1	8.0	7.8	7.8	7.7	8.1	7.5	7.5
TEST EQUIPMENT CALIBRATION DATE				7-24-4	7-24-4	7-24-4	11-21-4	11-21-4	11-21-4	1-31-5	1-31-5	1-31-5	4-1-5	4-1-5	7-30-5
SIGNIFICANT EVENT NOTES															
TESTED BY				W.P.N	W.P.N	W.P.N	W.P.N	W.P.N	W.P.N	W.P.N	W.P.N	W.P.N	W.P.N	W.P.N	W.P.N

SIGNIFICANT EVENT NOTES

HUGHES **ELECTRON DYNAMICS DIVISION**
3100 W. LOMITA BLVD TORRANCE, CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ____
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-3
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o	LIMITS MIN	LIMITS MAX	UNITS												
TOTAL ACCUMULATED HOURS				37,927	38,669	39,336	40,106	41,057	41,439	42,183	43,036	43,539	44,395	45,030	46,577
TEST CONDITIONS NOMINAL INPUT VOLTAGE				9/13/5	10/4/5	11/11/5	12/13/5	1/14/6	1/30/6	3/1/6	4/16/6	4/28/6	6/2/6	6/29/6	9/18/6
INPUT CURRENT TELEMETRY VOLTAGE			V	2.14	2.14	2.14	2.14	2.14	2.13	2.14	2.13	2.13	2.13	2.13	2.126
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.50	3.50	3.49	3.50	3.50	3.50	3.49	3.48	3.48	3.49	3.50	3.49
HEATER VOLTAGE TELEMETRY VOLTAGE			V	2.97	2.98	2.95	2.97	2.97	2.95	2.99	2.99	2.96	2.97	2.95	2.96
HELIX CURRENT TELEMETRY VOLTAGE			V	1.15	1.15	1.14	1.15	1.14	1.13	1.13	1.12	1.12	1.12	1.12	1.11
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	3.02	3.02	3.02	3.02	3.02	3.03	3.02	3.02	3.03	3.02	3.03	3.03
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	28.0	27.9	28.05	28.05	28.05	28.1	28.1	28.1	28.05	27.9	28.00	28.0
Gm FREQ. f_o (PARA. 4.3.1)	35	39.5	db	38.6	38.6	38.7	38.8	38.8	38.8	38.8	38.7	38.70	38.60	38.80	38.55
I_L INSERTION LOSS			db	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS	21.41	21.40	21.40	21.41	21.40	21.42	21.43	21.43	21.44	21.44	21.40	21.44
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS	22.56	22.55	22.55	22.57	22.56	22.56	22.58	22.57	22.59	22.60	22.53	22.60
T_K CATHODE ACTIVITY	6.0	--	SEC	7.6	8.0	7.9	7.2	7.8	7.7	7.9	7.9	7.9	7.2	8.0	7.3
TEST EQUIPMENT CALIBRATION DATE				7-30-5	7-30-5	10-29-5	10-29-5	10-29-5	10-29-5	2-3-6	2-3-6	2-3-6	5-7-6	5-12-6	8-31-6
SIGNIFICANT EVENT NOTES															
TESTED BY				W.P.N	W.P.N	W.P.N	W.P.N	W.P.N	W.P.N	MSK	MSK	MSK	W.P.N	MSK	MSK

SIGNIFICANT EVENT NOTES

HUGHES ELECTRON DYNAMICS DIVISION
3100 W. LOMITA BLVD. TORRANCE, CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. A
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-3
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC NO.: LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o

TEST CONDITIONS
NOMINAL INPUT VOLTAGE

	LIMITS MIN	LIMITS MAX	UNITS												
TOTAL ACCUMULATED HOURS				46,577	46,953	47,702	48406	49051.5	49580.3	50,018	50,882	51,540	52041.9	52,253	53498
				↓?. 10/15/76	10/29/76	11/29/76	12/30/76	2/2/77	3/9/77	3/29/77	5/6/77	6/7/77	6/28/77	7/29/77	8/29/77
INPUT CURRENT TELEMETRY VOLTAGE			V	.970?.	2.490	2.494	2.487	2.13	2.12 DRS. ~~2.493~~	2.131	2.124	2.125	2.137	2.117	2.119
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.03	3.491	3.495	3.495	3.490	3.493	3.500	3.494	3.487	3.496	3.486	3.481
HEATER VOLTAGE TELEMETRY VOLTAGE			V	3.00	2.953	2.972	2.957	2.965	2.986	2.983	2.969	2.953	2.969	2.936	2.938
HELIX CURRENT TELEMETRY VOLTAGE			V	3.01	1.105	1.119	1.105	1.091	1.084	1.103	1.091	1.092	1.083	1.080	1.055
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	.980	3.032	3.025	3.028	3.023	3.020	3.021	3.023	3.029	3.025	3.037	3.041
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	28.05	28.0	28.0	28.2	28.05	28.05	27.95	27.95	27.95	28.10	28.0	28.15
G_{ss} FREQ. f_o (PARA. 4.3.1)	35	39.5	db	38.52	38.55	38.75	39.1	38.85	38.80	38.7	38.60	38.65	38.80	38.65	38.60
I_L INSERTION LOSS			db	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS	21.5	21.5	21.48	21.50	21.50	21.52	21.50	21.50	21.52	21.54	21.54	21.43
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS	22.61	22.61	22.62	22.64	22.62	22.64	22.65	22.64	22.65	22.69	22.67	22.65
T_K CATHODE ACTIVITY	6.0	--	SEC	7.5	7.4	7.2	7.7	6.9	6.9	7.4	6.7	6.5	7.3	6.7	6.25
TEST EQUIPMENT CALIBRATION DATE				7-23-6	8-31-6	10-19-6	8-31-6	12-31-76	1-5-77	1-19-77	4-25-7	4-25-7	5-2-77	5-2-77	5-2-77
SIGNIFICANT EVENT NOTES				—	—	—	—	—	—				—		
TESTED BY				D.J.	msk	msk	DRS	DRS.	D.R.S.	msk	msk	msk	DRJ.	msk	

SIGNIFICANT EVENT NOTES

HUGHES **ELECTRON DYNAMICS DIVISION**
3100 W. LOMITA BLVD TORRANCE, CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. A
MODEL NO. B200300-131 B200300-121 SERIAL NO.
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC NO. LTPB200300-400

TEST CONDITIONS
NOMINAL INPUT VOLTAGE, P_o(SAT); FREQ. f_o

TEST CONDITIONS NOMINAL INPUT VOLTAGE	LIMITS MIN	LIMITS MAX	UNITS												
TOTAL ACCUMULATED HOURS				54226	55012										
				9/29/77	11/11/77	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /
INPUT CURRENT TELEMETRY VOLTAGE			V	2.102	2.10										
CATHODE CURRENT TELEMETRY VOLTAGE			V	3.479	3.475										
HEATER VOLTAGE TELEMETRY VOLTAGE			V	2.94	2.939										
HELIX CURRENT TELEMETRY VOLTAGE			V	1.060	1.054										
CATHODE VOLTAGE TELEMETRY VOLTAGE			V	3.038	3.037										
P_o (SAT) FREQ. f_o (PARA 4.3.3)	27	--	dbm	28.07	27.8										
Gss FREQ. f_o (PARA. 4.3.1)	35	39.5	db	38.59	38.80										
I_L INSERTION LOSS			db	>100											
R_{AIN} ATTENUATOR RESISTANCE, INPUT			OHMS	21.52											
R_{AO} ATTENUATOR RESISTANCE, OUTPUT			OHMS	22.66											
T_K CATHODE ACTIVITY	6.0	--	SEC	6.0	6.5										
TEST EQUIPMENT CALIBRATION DATE				8-31-77											
SIGNIFICANT EVENT NOTES															
TESTED BY				HSI											

SIGNIFICANT EVENT NOTES

HUGHES **ELECTRON DYNAMICS DIVISION**
3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

DATA SHEET NO. DSB200300-400 REV. ____
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-3

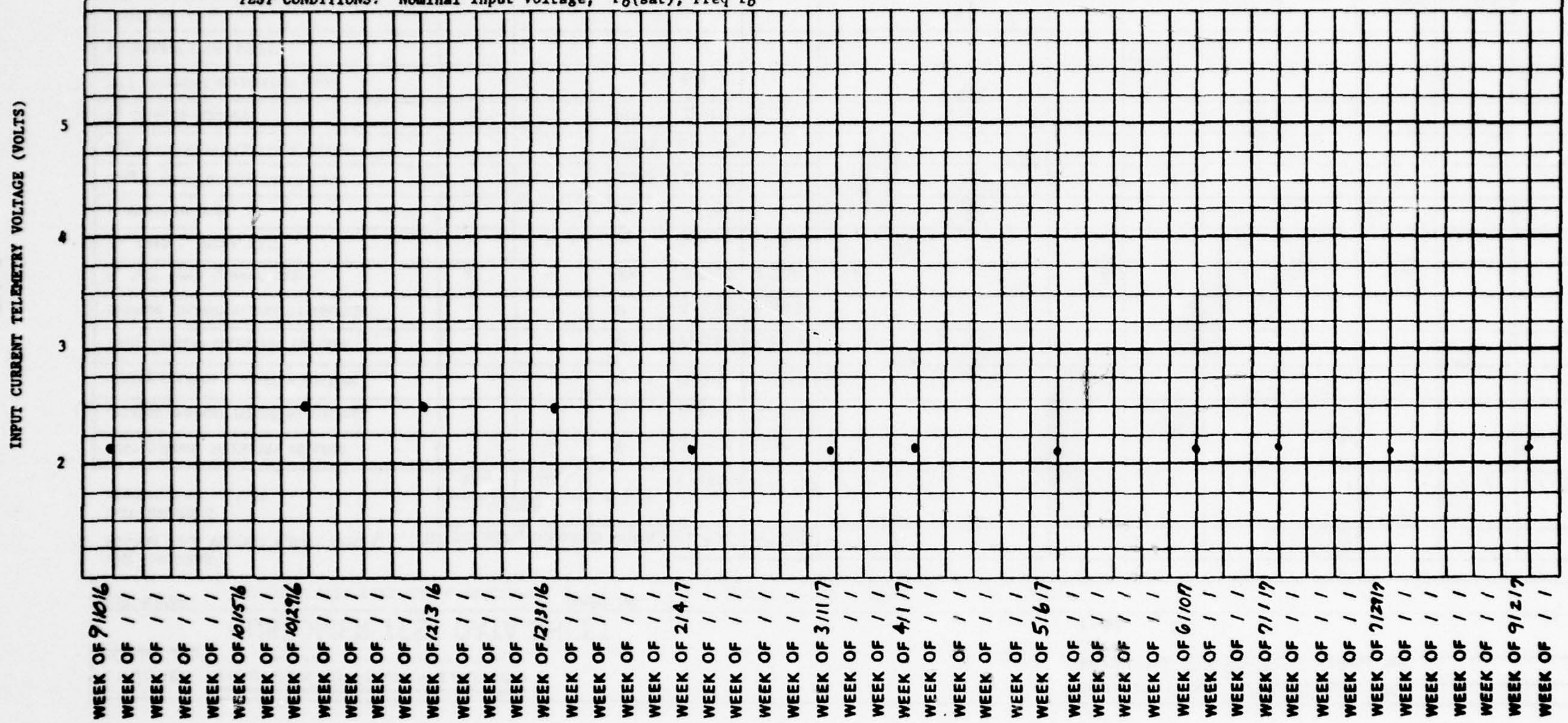
CUSTOMER TEST DATA SHEET

PAGE ____ OF ____

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE | SPEC. NO. LTPB200300-400

INPUT CURRENT TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



HUGHES *ELECTRON DYNAMICS DIVISION*
3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90505

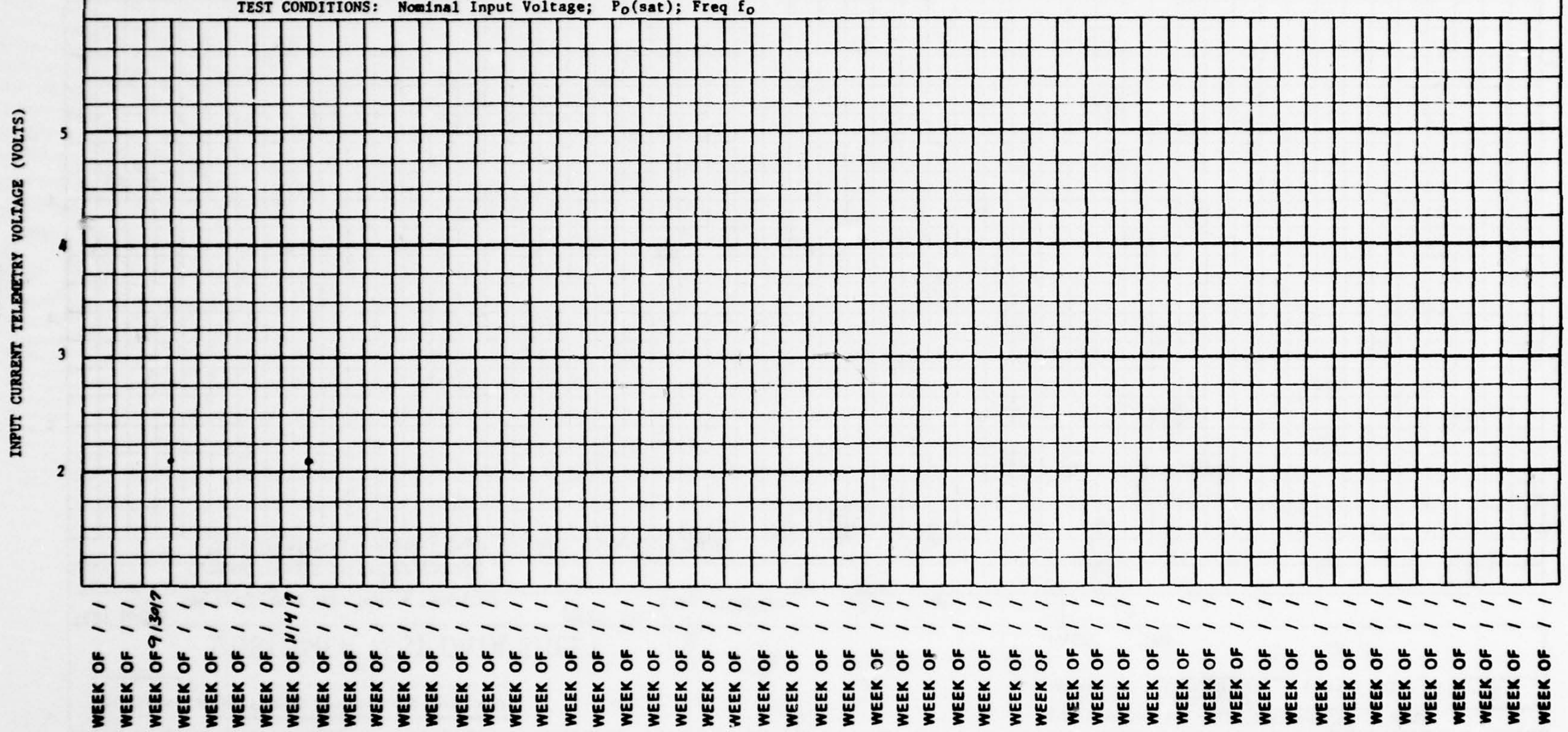
CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-3
PAGE OF

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE	SPEC. NO. LTPB200300-400

INPUT CURRENT TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; $P_o(sat)$; Freq f_o



HUGHES ***ELECTRON DYNAMICS DIVISION***

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.

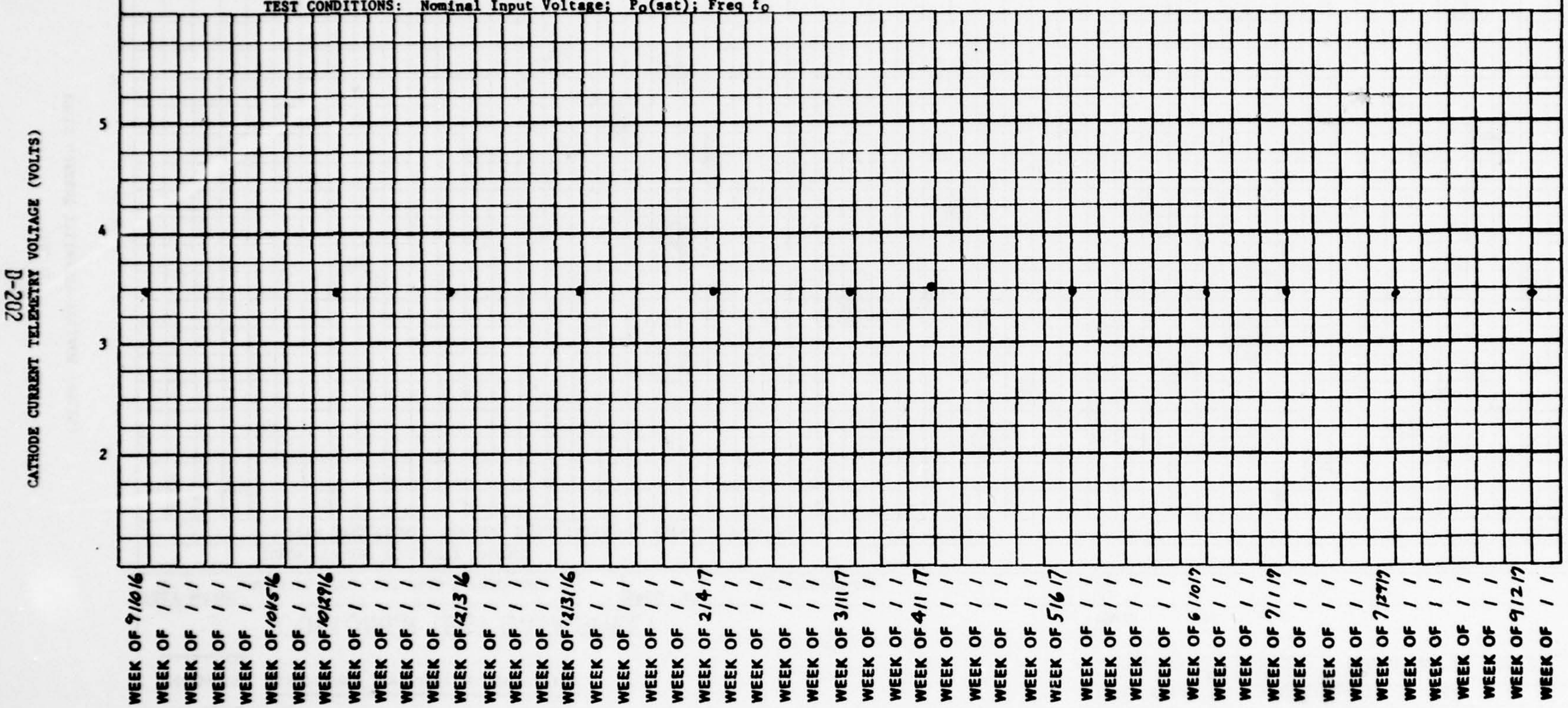
MODEL NO. B 200300-121 / B200300-122 SERIAL NO. 22-3

PAGE OF

TEST NAME	SPEC. NO.
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400

CATHODE CURRENT TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



HUGHES ***ELECTRON DYNAMICS DIVISION***
3100 W. LOMITA BLVD TORRANCE CALIFORNIA

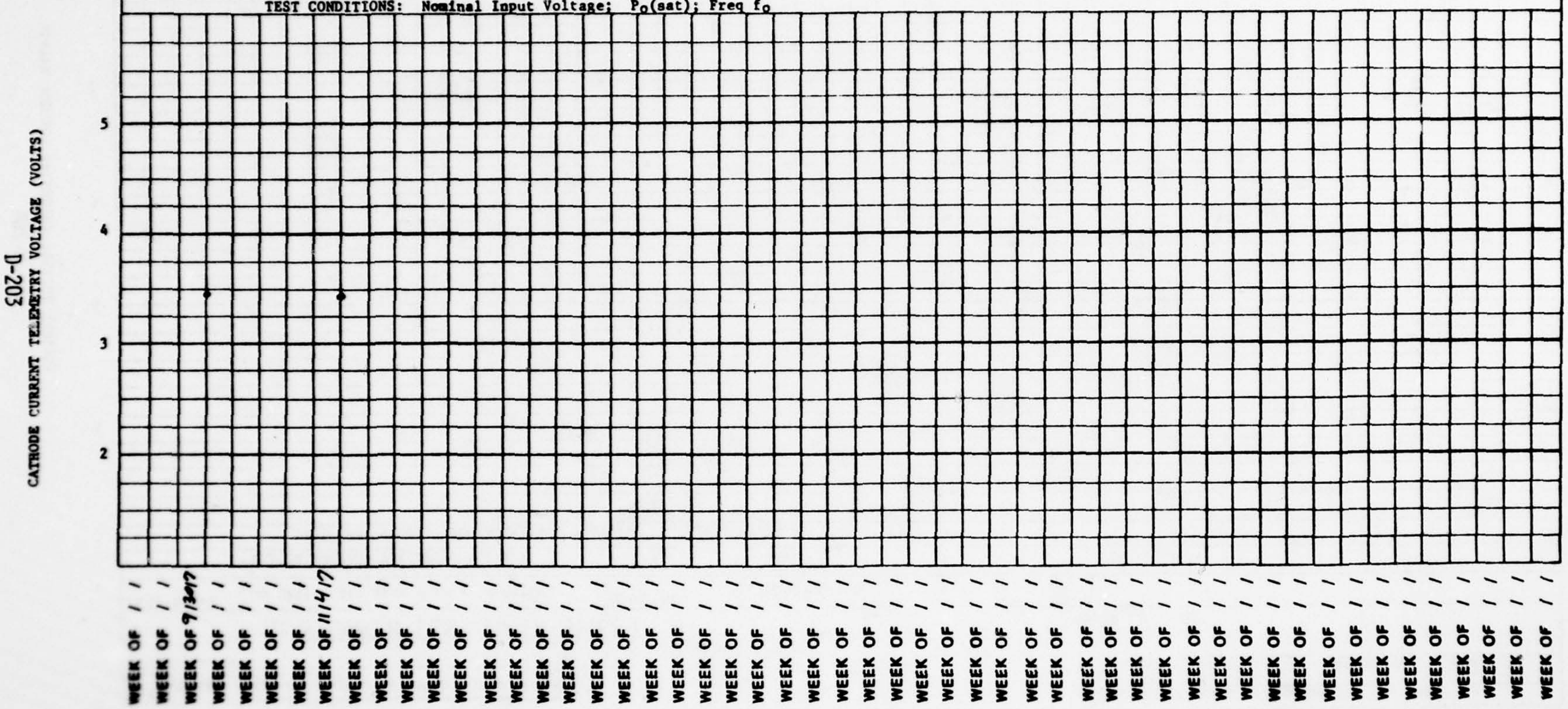
CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______
MODEL NO. B 200300-121 / B200300-122 SERIAL NO. 22-3
PAGE OF

TEST NAME	SPEC. NO.	
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400	

CATHODE CURRENT TELEMETRY VOLTAGE

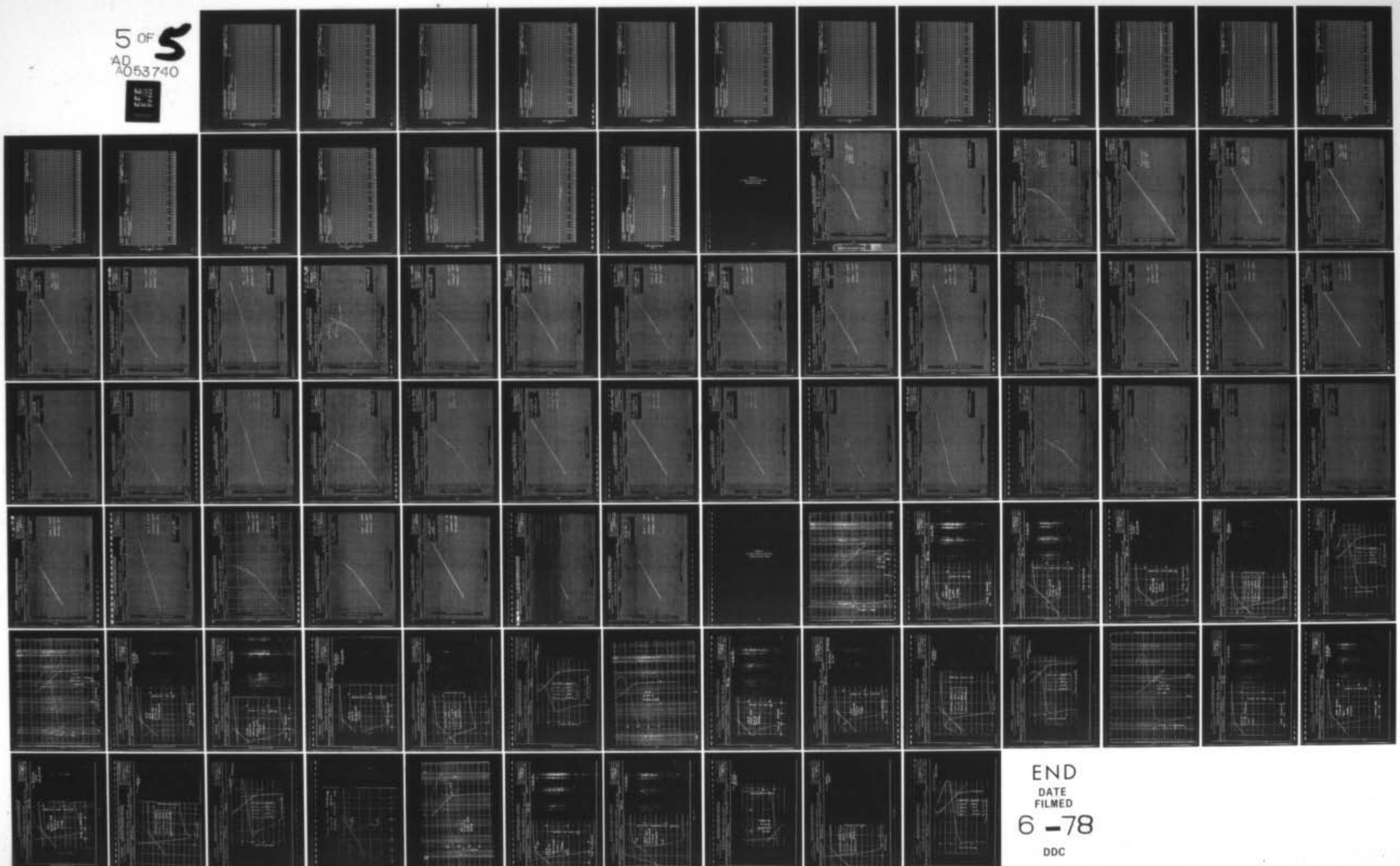
TEST CONDITIONS: Nominal Input Voltage; $P_o(sat)$; Freq f_o



AD-A053 740 HUGHES AIRCRAFT CO TORRANCE CALIF ELECTRON DYNAMICS DIV F/G 9/1
DEFENSE SATELLITE COMMUNICATIONS SYSTEM TRAVELING WAVE TUBE AMP--ETC(U)
FEB 78 M L KAHN F04701-74-C-0542

UNCLASSIFIED NL

5 OF 5
AD
A053740



END
DATE
FILMED
6-78
DDC

HUGHES *ELECTRON DYNAMICS DIVISION*
3100 W LOMITA BLVD TORRANCE CALIFORNIA

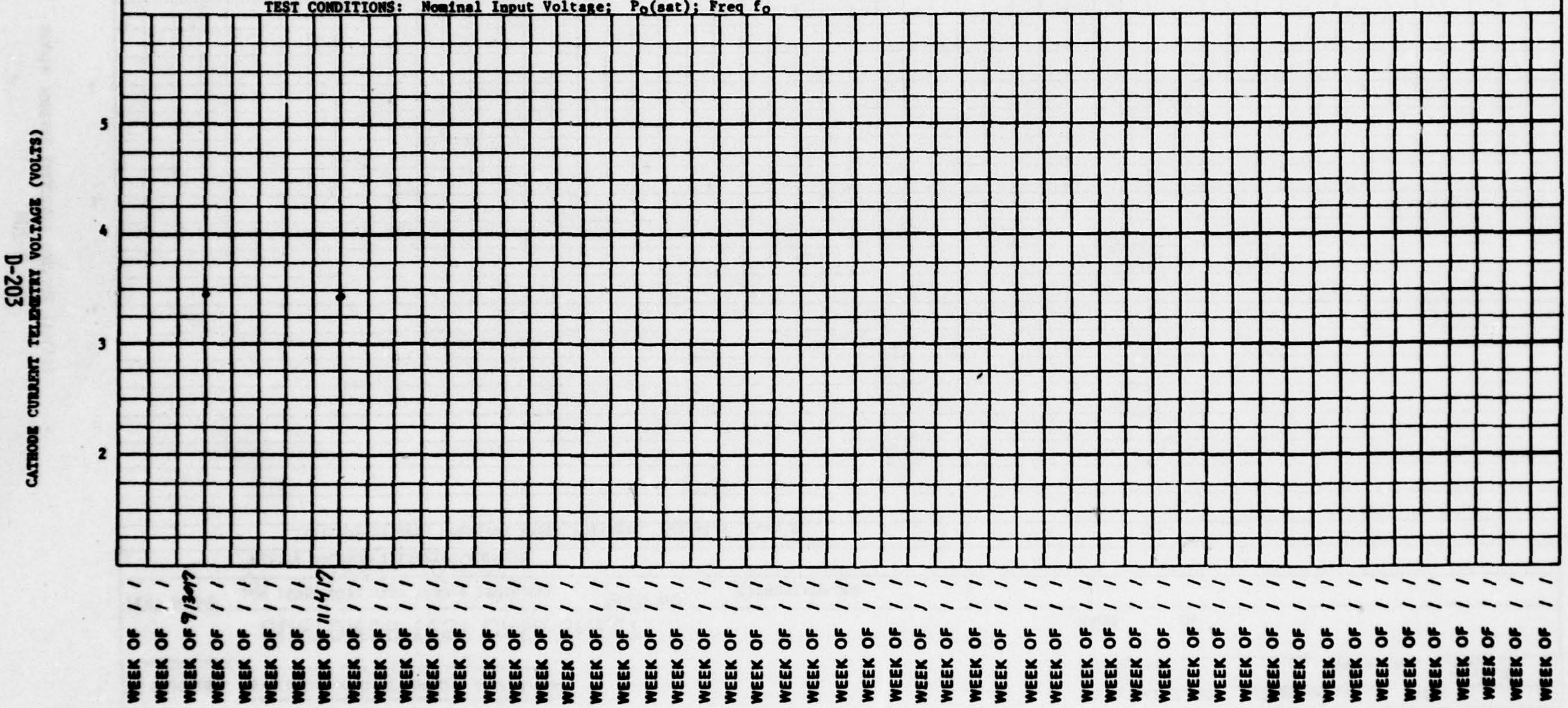
CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ____
MODEL NO. B 200300-121 B200300-122 SERIAL NO. 22-3
PAGE OF

TEST NAME	SPEC. NO.	
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400	

CATHODE CURRENT TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



HUGHES ELECTRON DYNAMICS DIVISION
3100 W. LOMITA BLVD TORRANCE CALIFORNIA

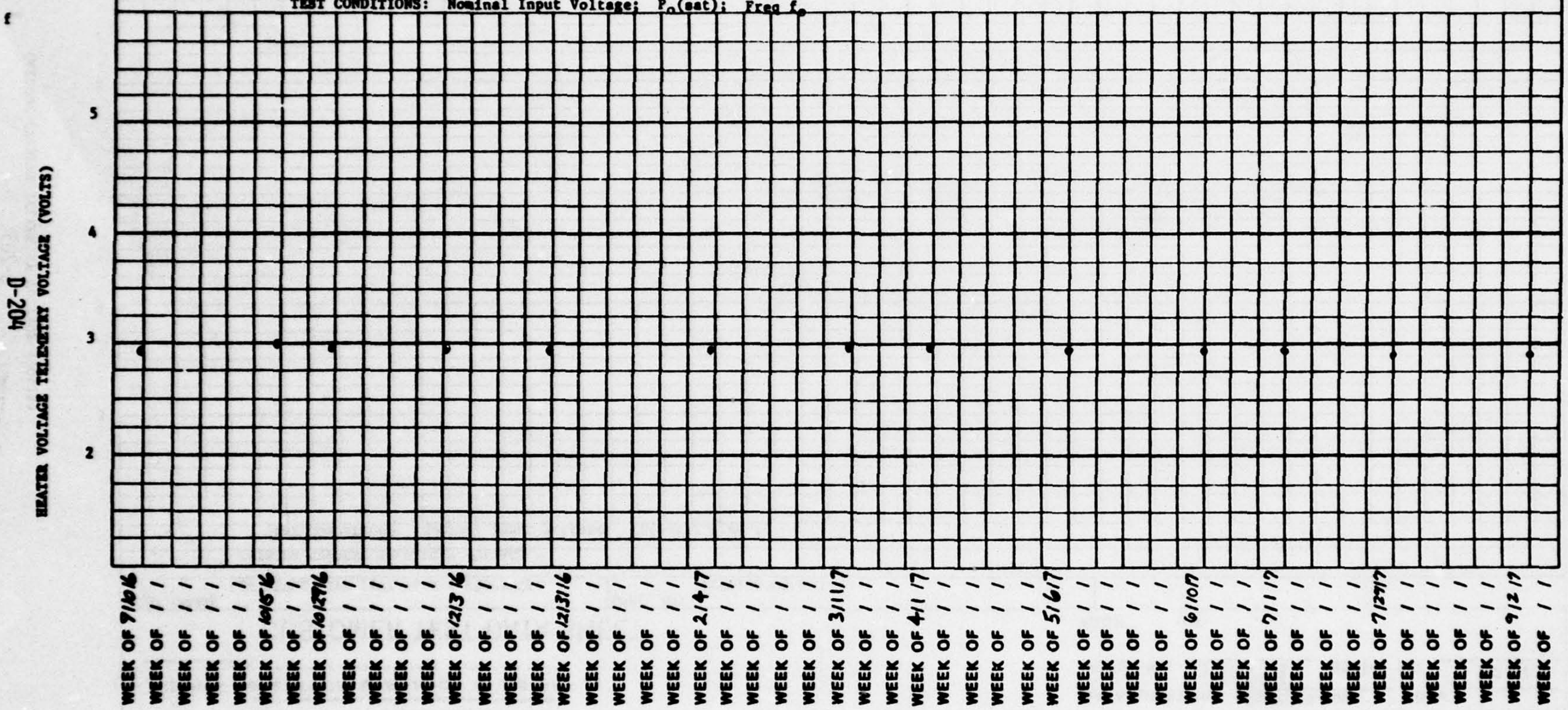
DATA SHEET NO. DSB200300-400 REV. ____
MODEL NO. ____ SERIAL NO. 22-3
PAGE ____ OF ____

CUSTOMER TEST DATA SHEET

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC. NO. LTPB200300-400

HEATER VOLTAGE TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



HUGHES **ELECTRON DYNAMICS DIVISION**
3100 W LOMITA BLVD TORRANCE CALIFORNIA 90509

DATA SHEET NO. DSB200300-400 REV. ______
MODEL NO. ______ SERIAL NO. 22-3
PAGE ___ OF ___

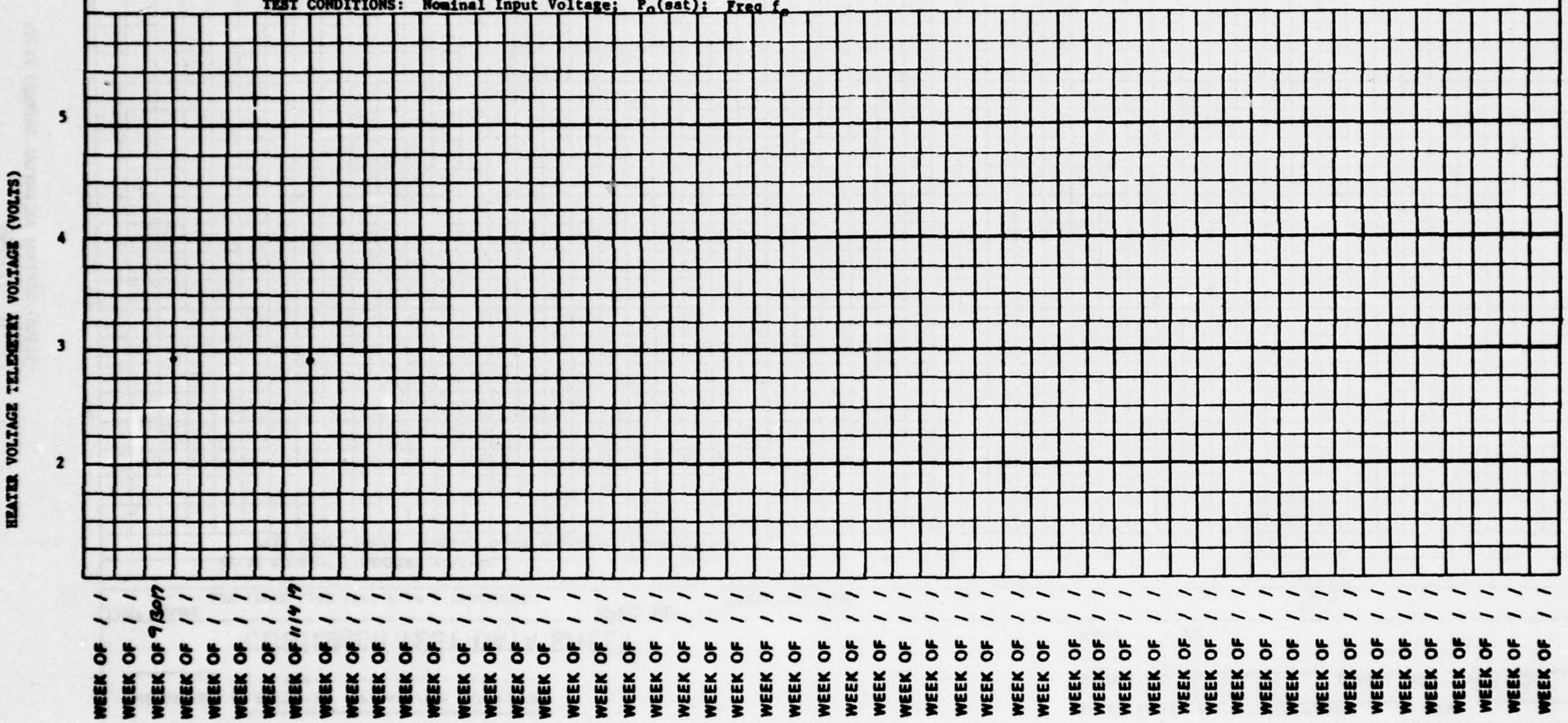
CUSTOMER TEST DATA SHEET

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE

SPEC. NO. LTPB200300-400

HEATER VOLTAGE TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



HUGHES *ELECTRON DYNAMICS DIVISION*
3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

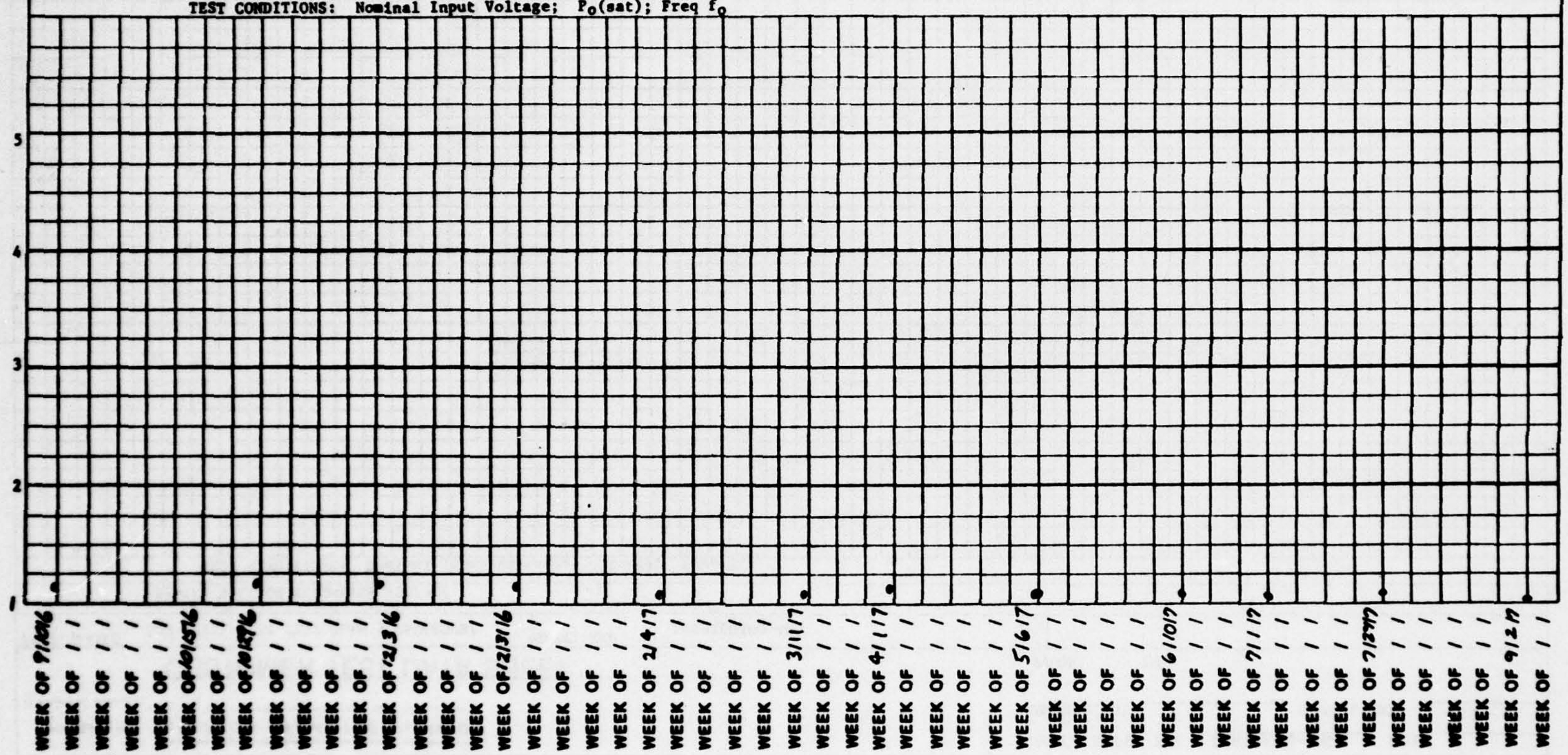
CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.
MODEL NO. B200300-121 B200300-122 SERIAL NO. 22-3
PAGE OF

TEST NAME	SPEC. NO.	
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400	

HELIX CURRENT TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



HUGHES ***ELECTRON DYNAMICS DIVISION***
3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

DATA SHEET NO. DSB200300-400 REV. ____
MODEL NO. B200300-121 ~~B200300-122~~ SERIAL NO. 22-3

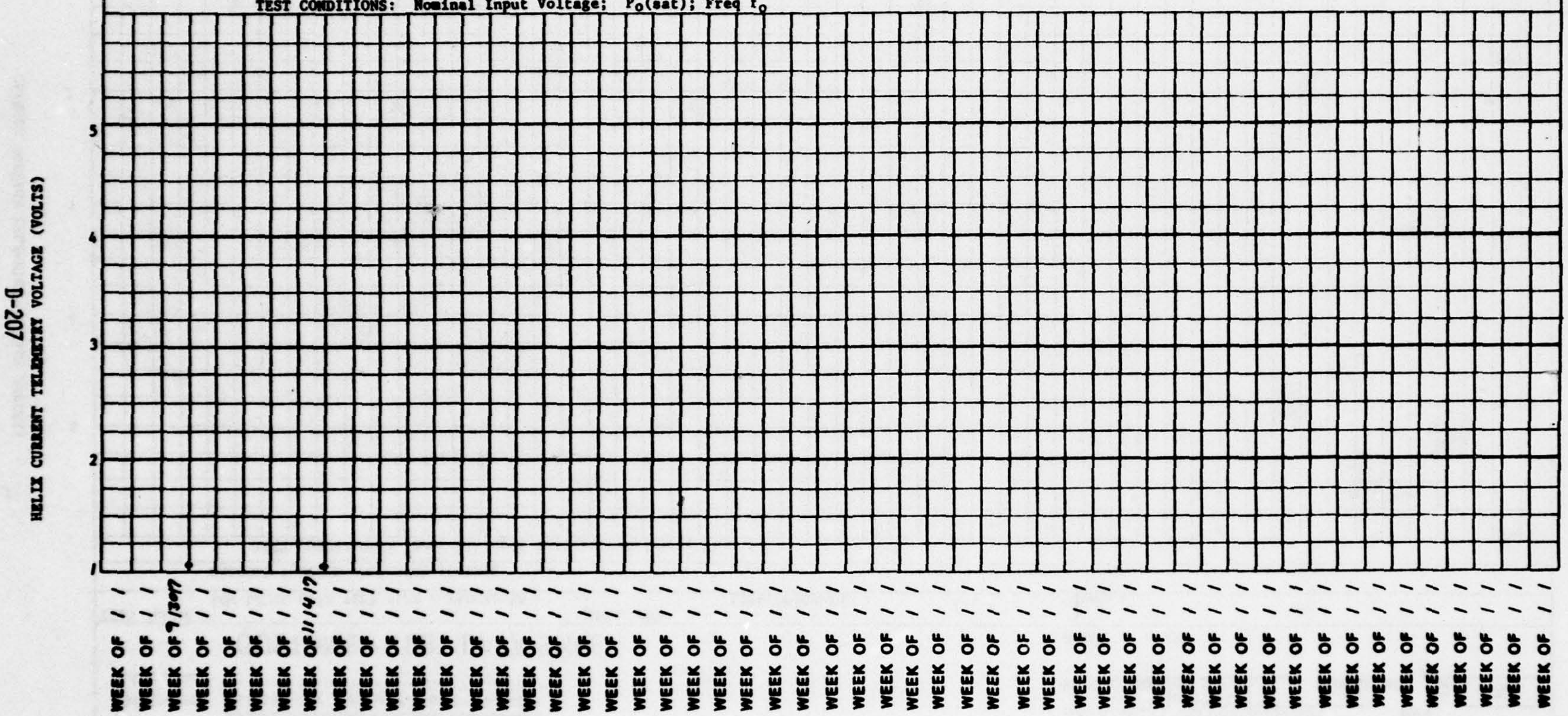
CUSTOMER TEST DATA SHEET

PAGE ____ OF ____

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE	SPEC. NO. LTPB200300-400

HELIX CURRENT TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; $P_o(sat)$; Freq f_o



HUGHES *ELECTRON DYNAMICS DIVISION*
3100 W LOMITA BLVD TORRANCE CALIFORNIA 90509

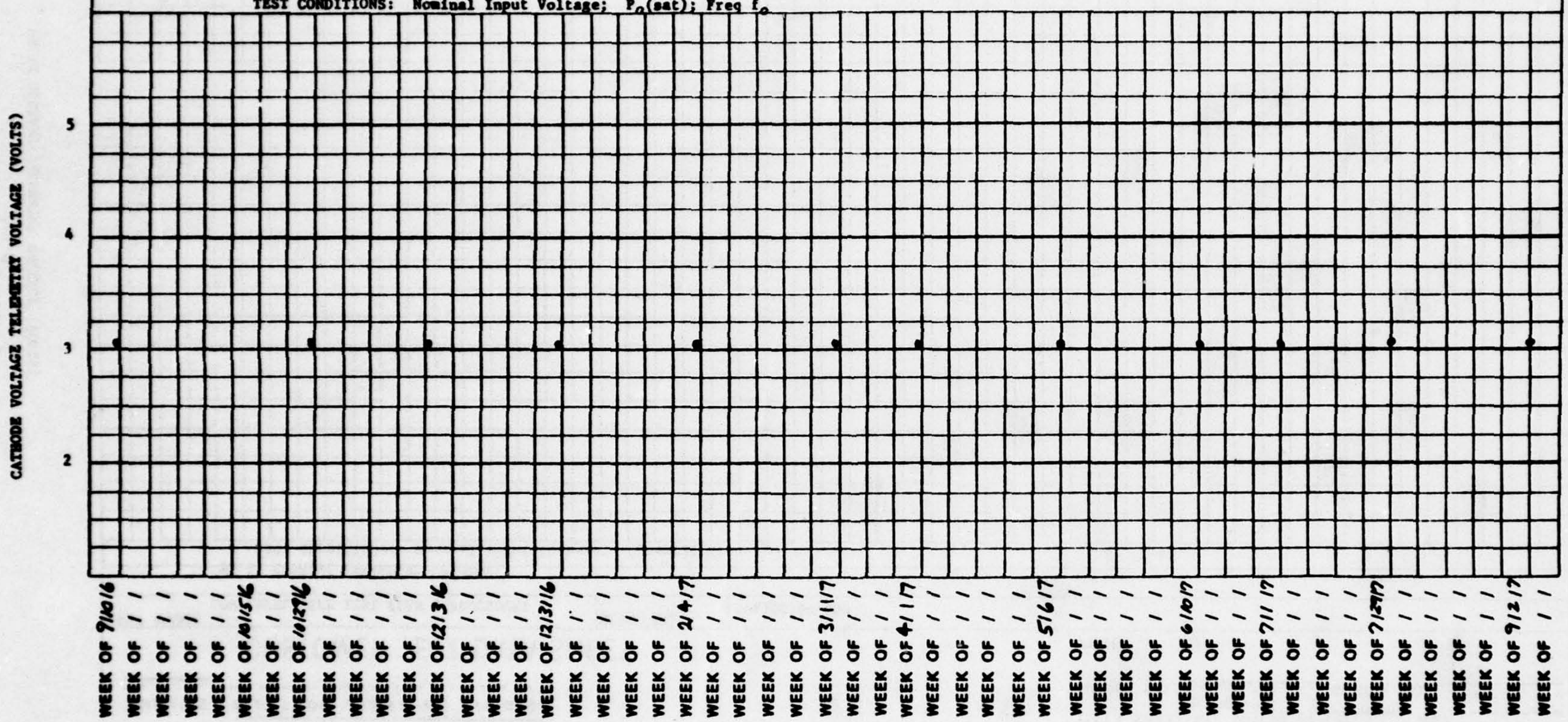
CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.
MODEL NO. B200300-121 B200300-122 SERIAL NO. 22-3
PAGE OF

TEST NAME	SPEC. NO.
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400

CATHODE VOLTAGE TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



HUGHES **ELECTRON DYNAMICS DIVISION**
3100 W LOMITA BLVD TORRANCE CALIFORNIA 90509

DATA SHEET NO. DSB200300-400 REV.
MODEL NO. B200300-121 B200300-122 SERIAL NO. 22-3

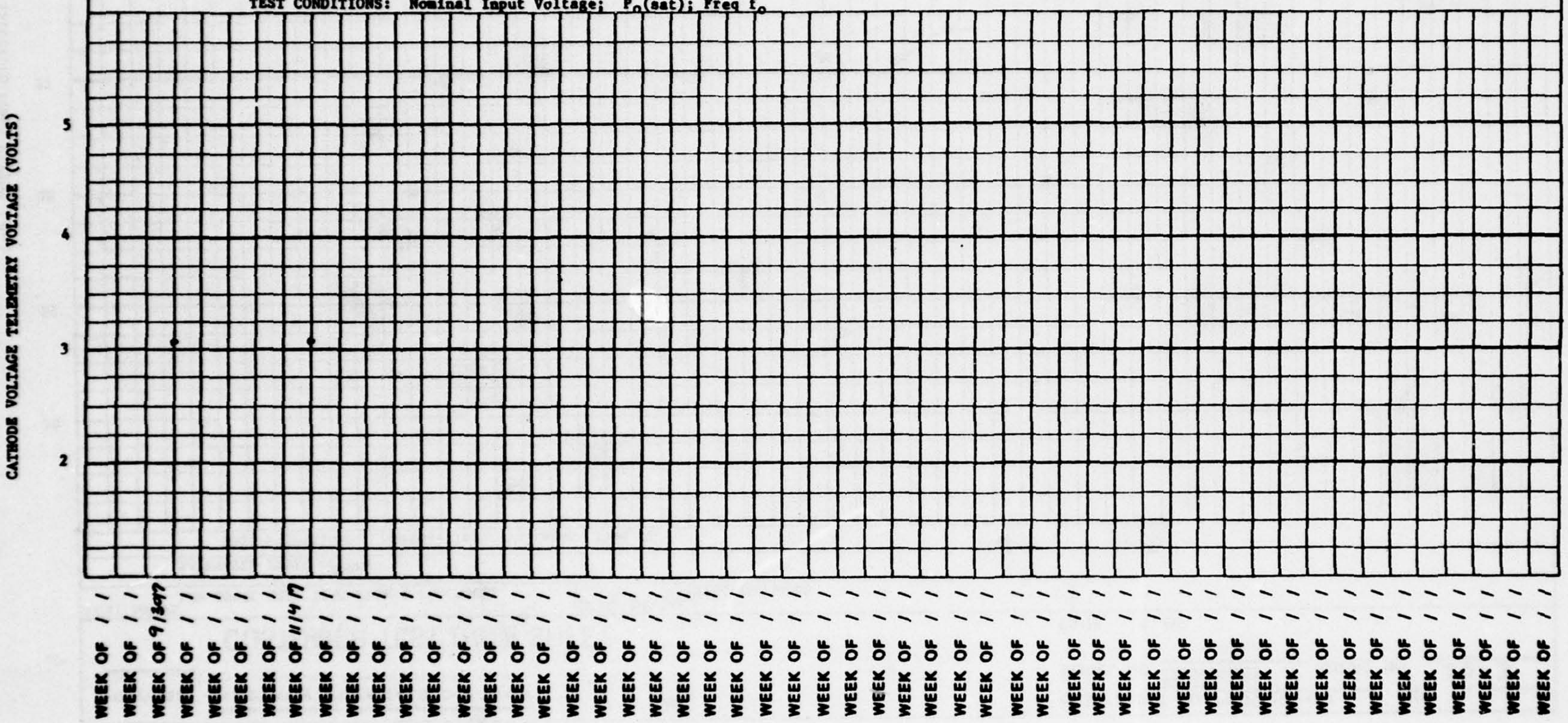
CUSTOMER TEST DATA SHEET

PAGE OF

TEST NAME	SPEC. NO.
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400

CATHODE VOLTAGE TELEMETRY VOLTAGE

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



HUGHES ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.

MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-3

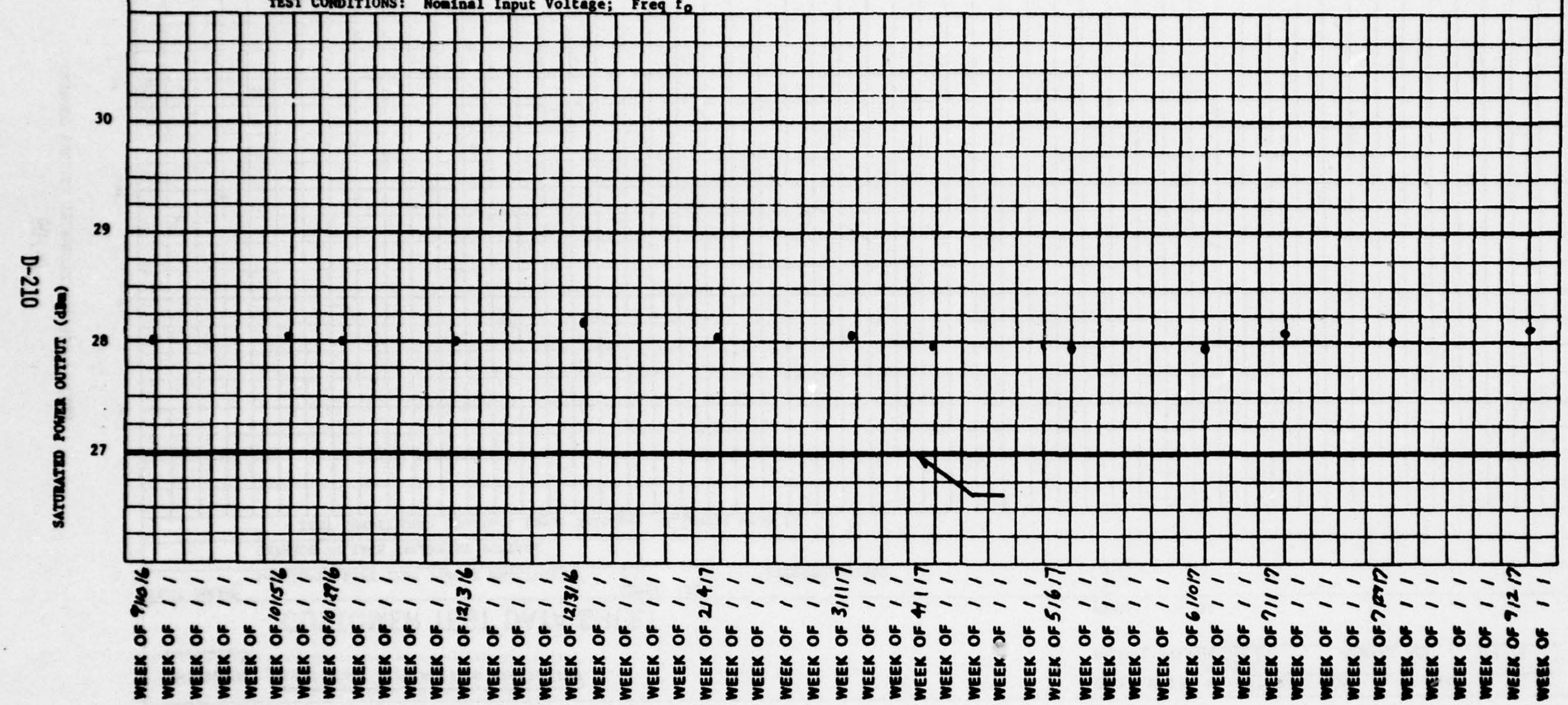
PAGE OF

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE

SPEC. NO. LTPB200300-400

SATURATED POWER OUTPUT

TEST CONDITIONS: Nominal Input Voltage; Freq f_o



HUGHES ***ELECTRON DYNAMICS DIVISION***
3100 W. LOMITA BLVD. TORRANCE, CALIFORNIA 90509

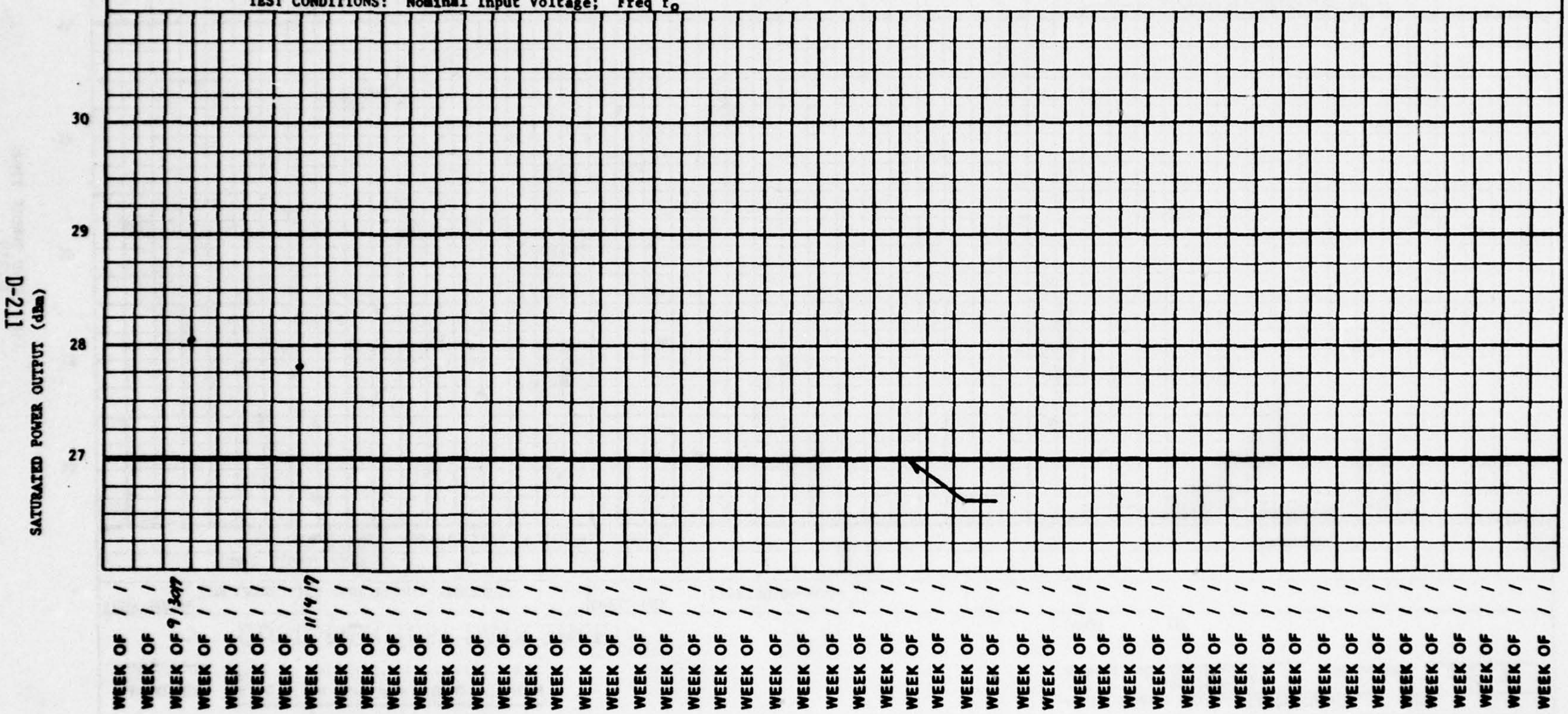
CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-3
PAGE OF

TEST NAME	SPEC. NO.	
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400	

SATURATED POWER OUTPUT

TEST CONDITIONS: Nominal Input Voltage; Freq f_o



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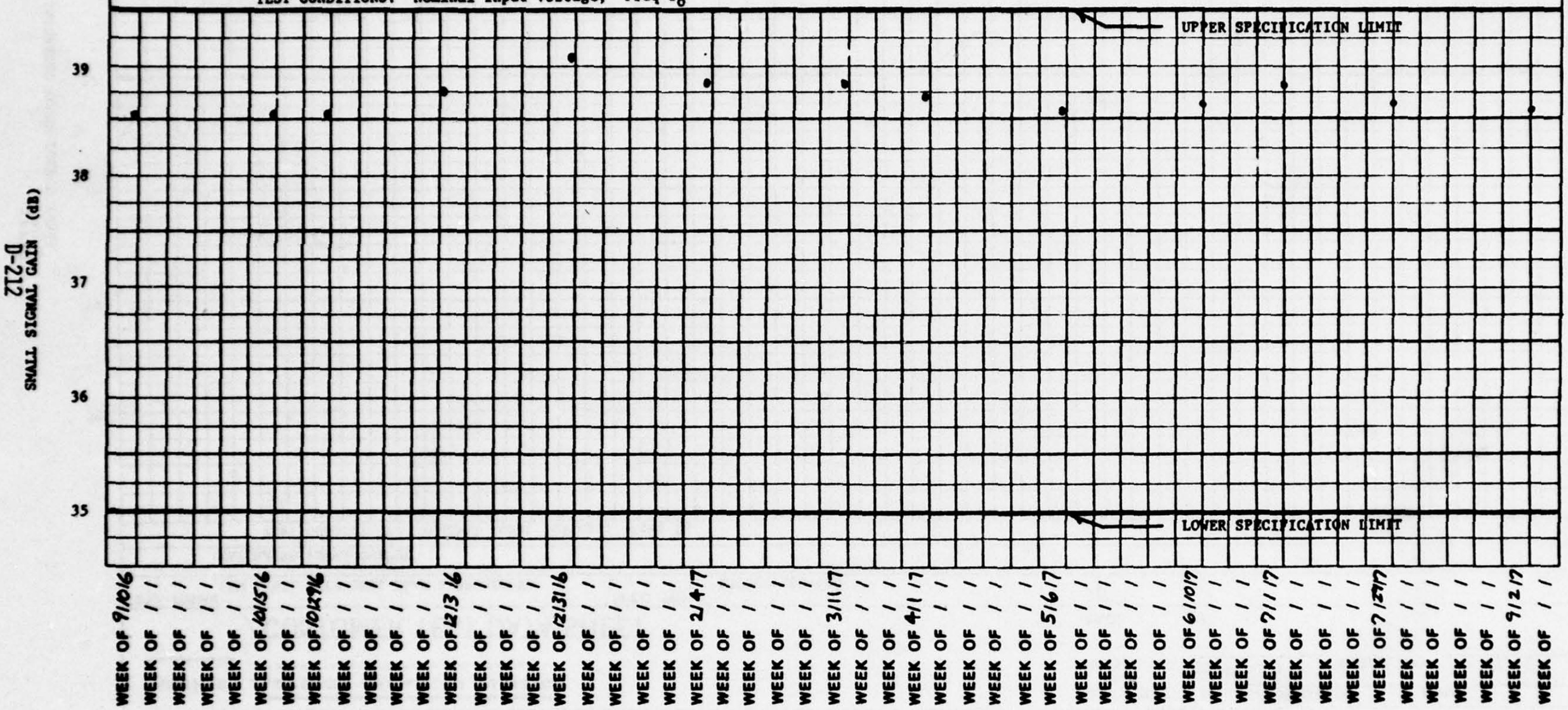
CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.
MODEL NO. B200300-121 B200300-122 SERIAL NO. 22-3
PAGE OF

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC. NO. LTPB200300-400

SMALL SIGNAL GAIN

TEST CONDITIONS: Nominal Input Voltage; Freq f_o



56

HUGHES ELECTRON DYNAMICS DIVISION
3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

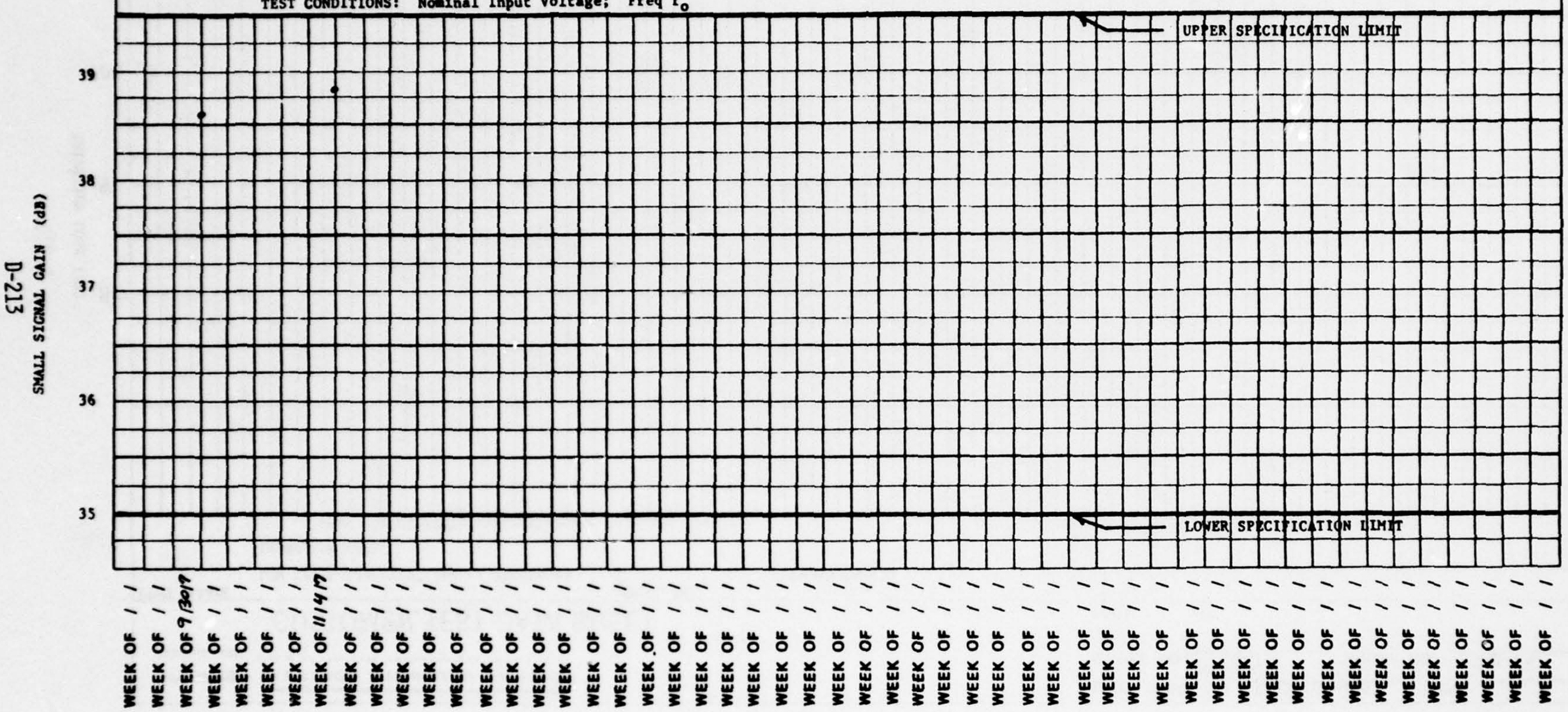
CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ____
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-3
PAGE OF

TEST NAME	SPEC. NO.	
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400	

SMALL SIGNAL GAIN

TEST CONDITIONS: Nominal Input Voltage; Freq f_o



HUGHES **ELECTRON DYNAMICS DIVISION**
3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

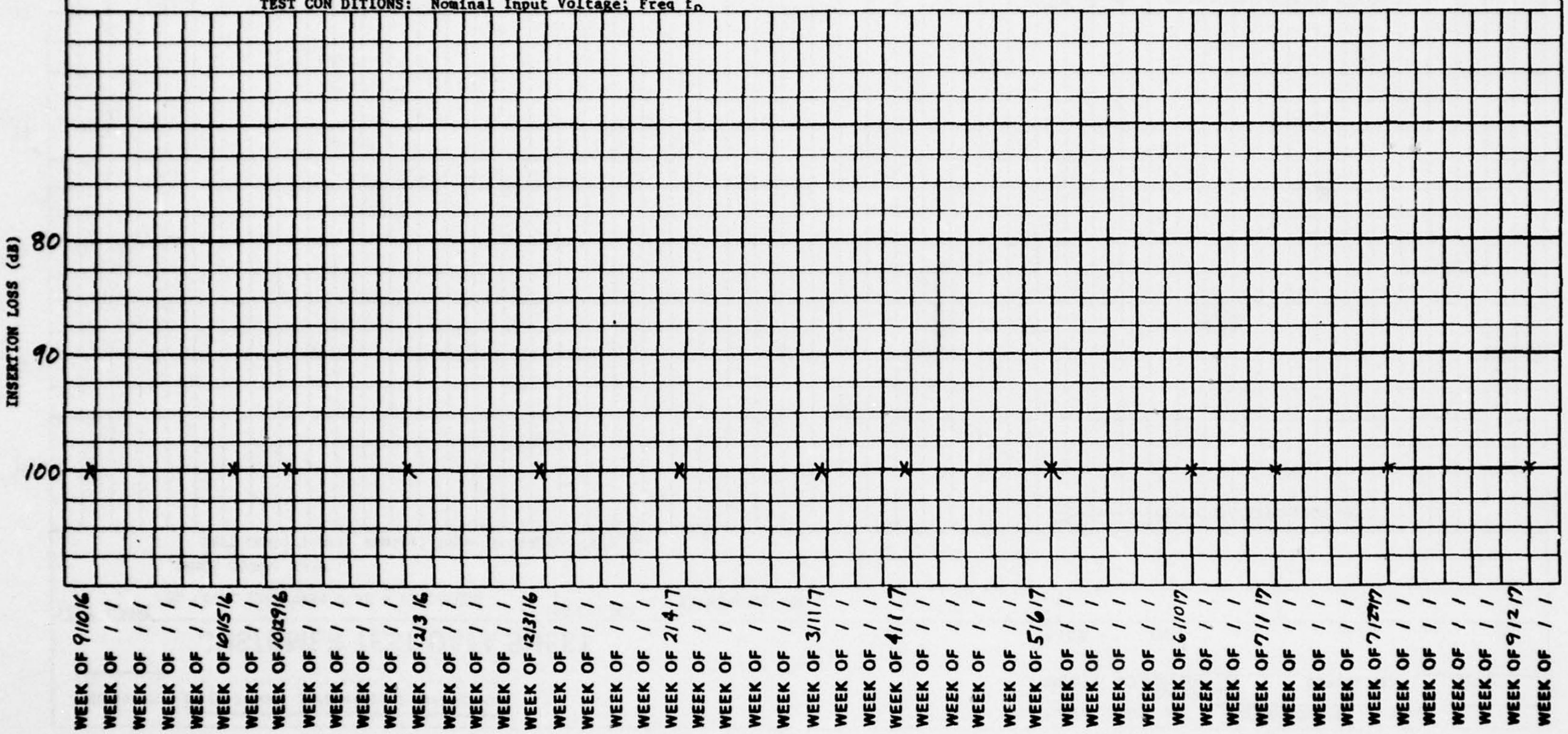
CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______

MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-3

PAGE ___ OF ___

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE	SPEC. NO. LTPB200300-400
INSERTION LOSS	
TEST CON DITIONS: Nominal Input Voltage; Freq f_o	



x >100 dB loss

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3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.

MODEL NO. B200300-121 B200300-122 SERIAL NO. 22-3

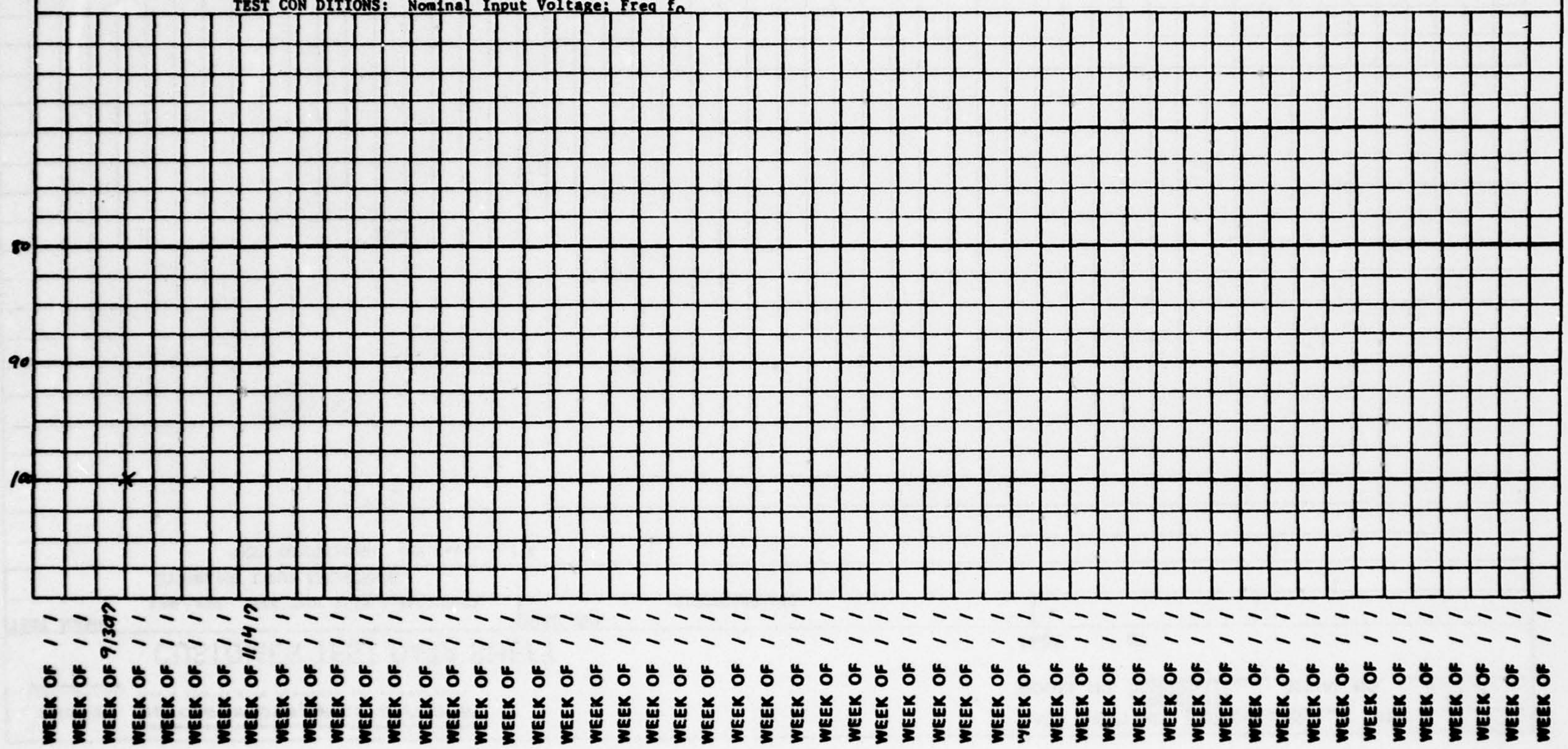
PAGE OF

TEST NAME SPEC. NO.

LOW LEVEL LIFE TEST PLAN & PROCEDURE LTPB200300-400

INSERTION LOSS

TEST CON DITIONS: Nominal Input Voltage; Freq f_o



X = >100 dB Loss

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3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

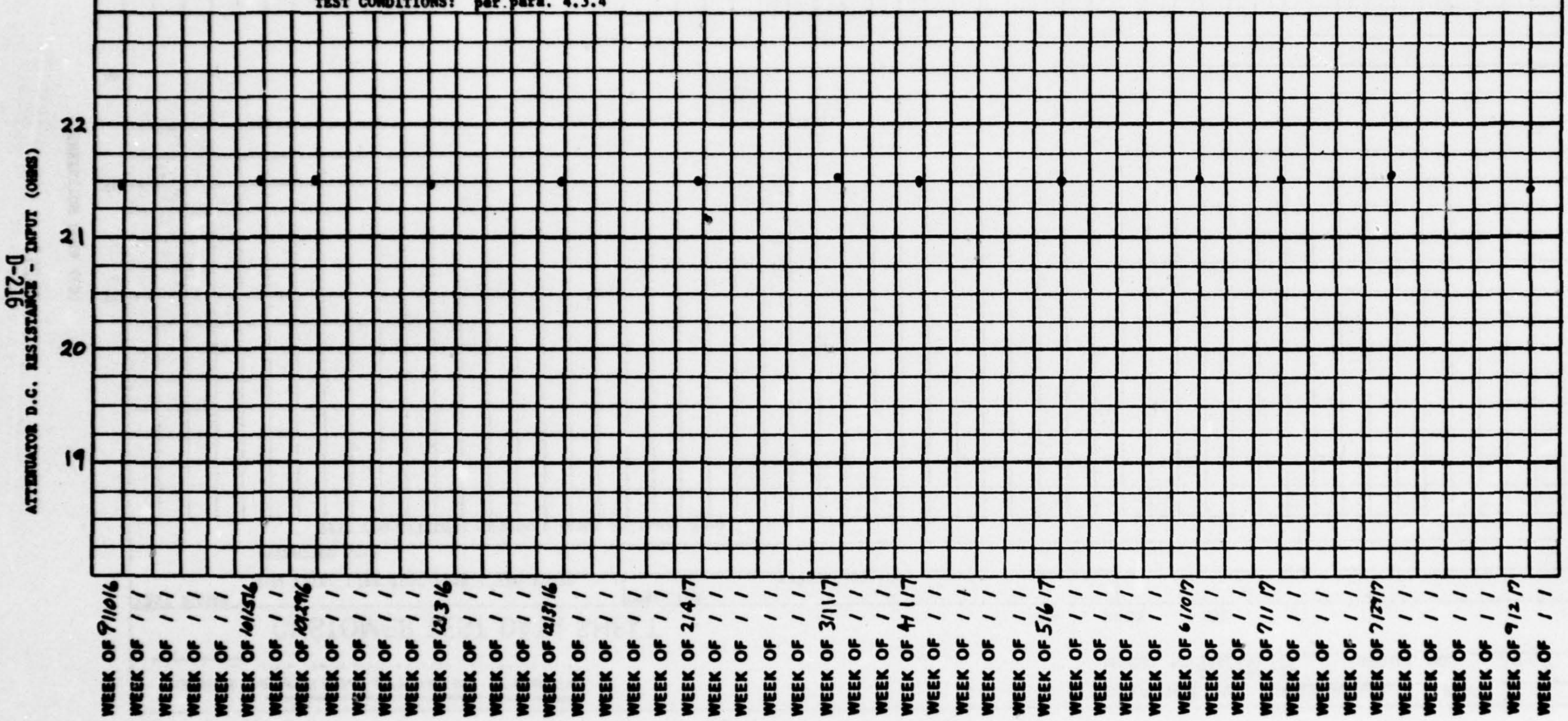
CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-3
PAGE OF

TEST NAME	SPEC. NO.
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400

ATTENUATOR INPUT RESISTANCE

TEST CONDITIONS: per para. 4.3.4



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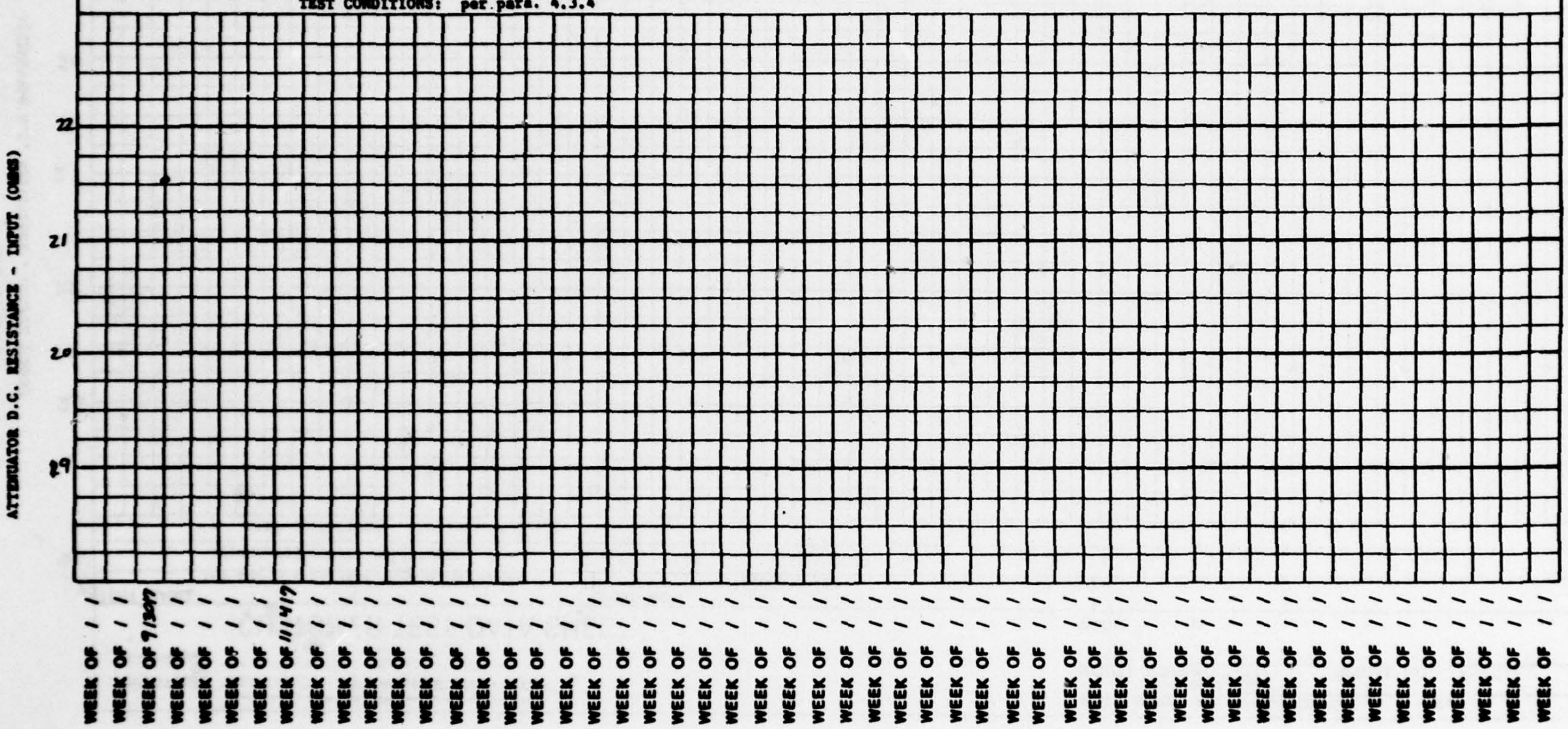
CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ____
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-3
PAGE ____ OF ____

TEST NAME	SPEC. NO.	
LOW LEVEL LIFE TEST PLAN & PROCEDURE	LTPB200300-400	

ATTENUATOR INPUT RESISTANCE

TEST CONDITIONS: per para. 4.3.4



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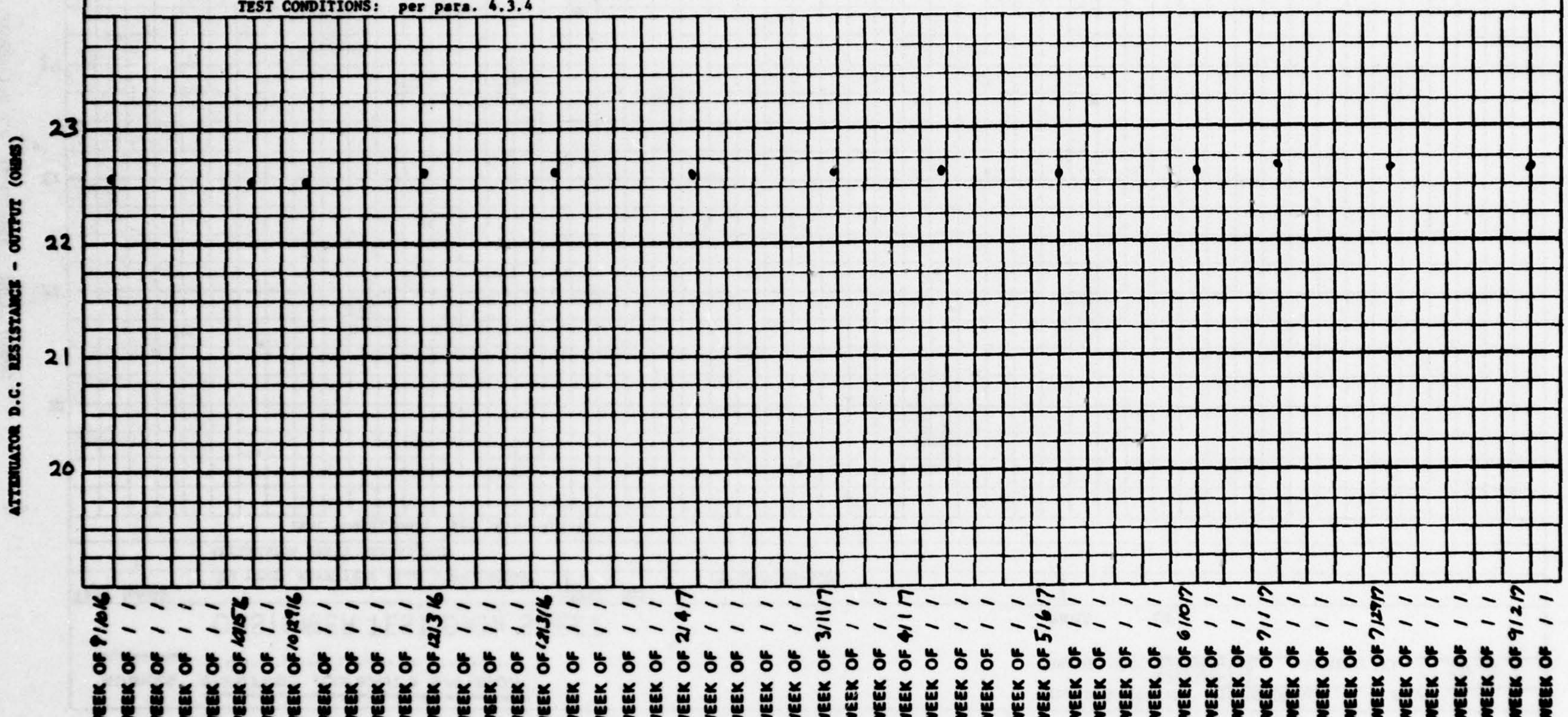
CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-3
PAGE OF

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC. NO. LTPB200300-400

ATTENUATOR OUTPUT RESISTANCE

TEST CONDITIONS: per para. 4.3.4



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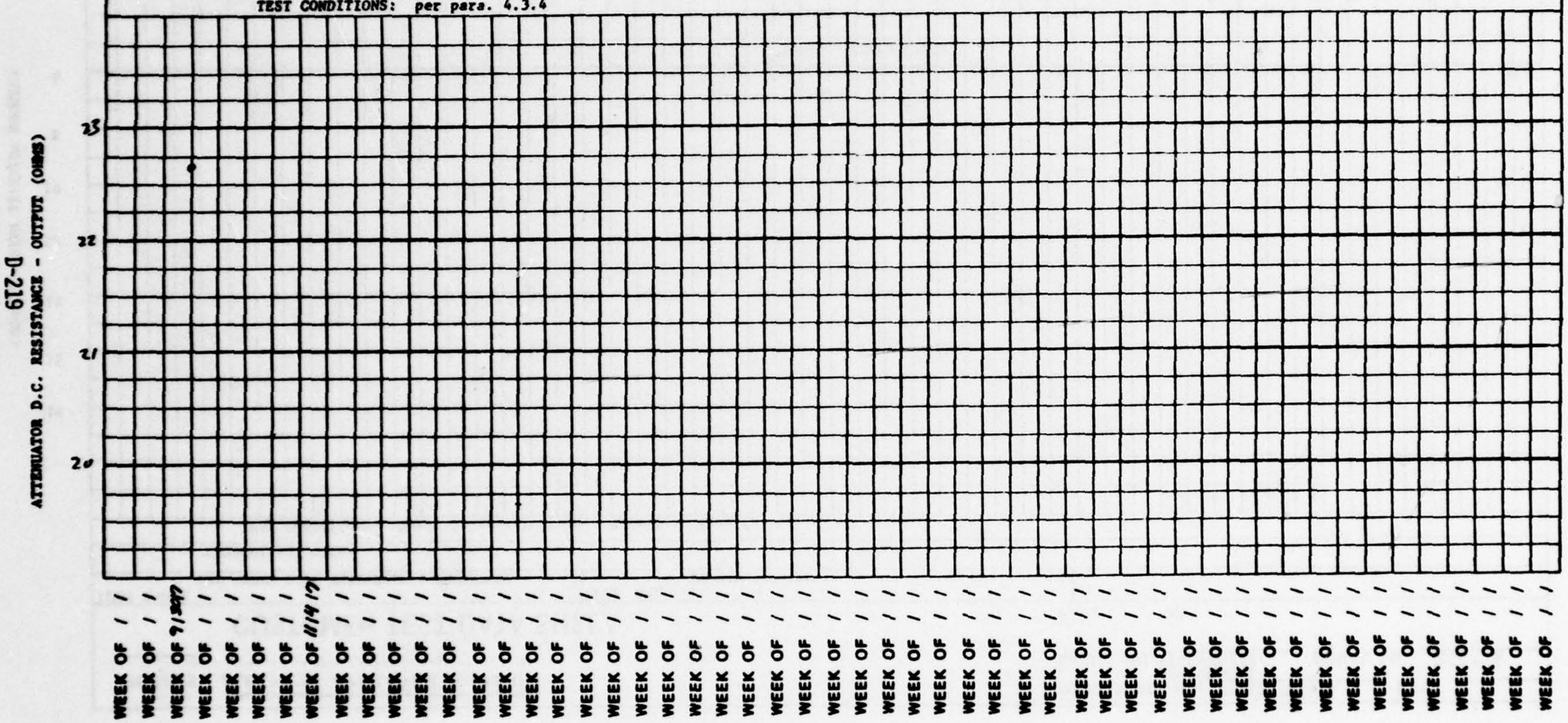
CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______
MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-3
PAGE ___ OF ___

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE
SPEC. NO. LTPB200300-400

ATTENUATOR OUTPUT RESISTANCE

TEST CONDITIONS: per para. 4.3.4



HUGHES ELECTRON DYNAMICS DIVISION
3100 W. LOMITA BLVD TORRANCE CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV.

MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-3

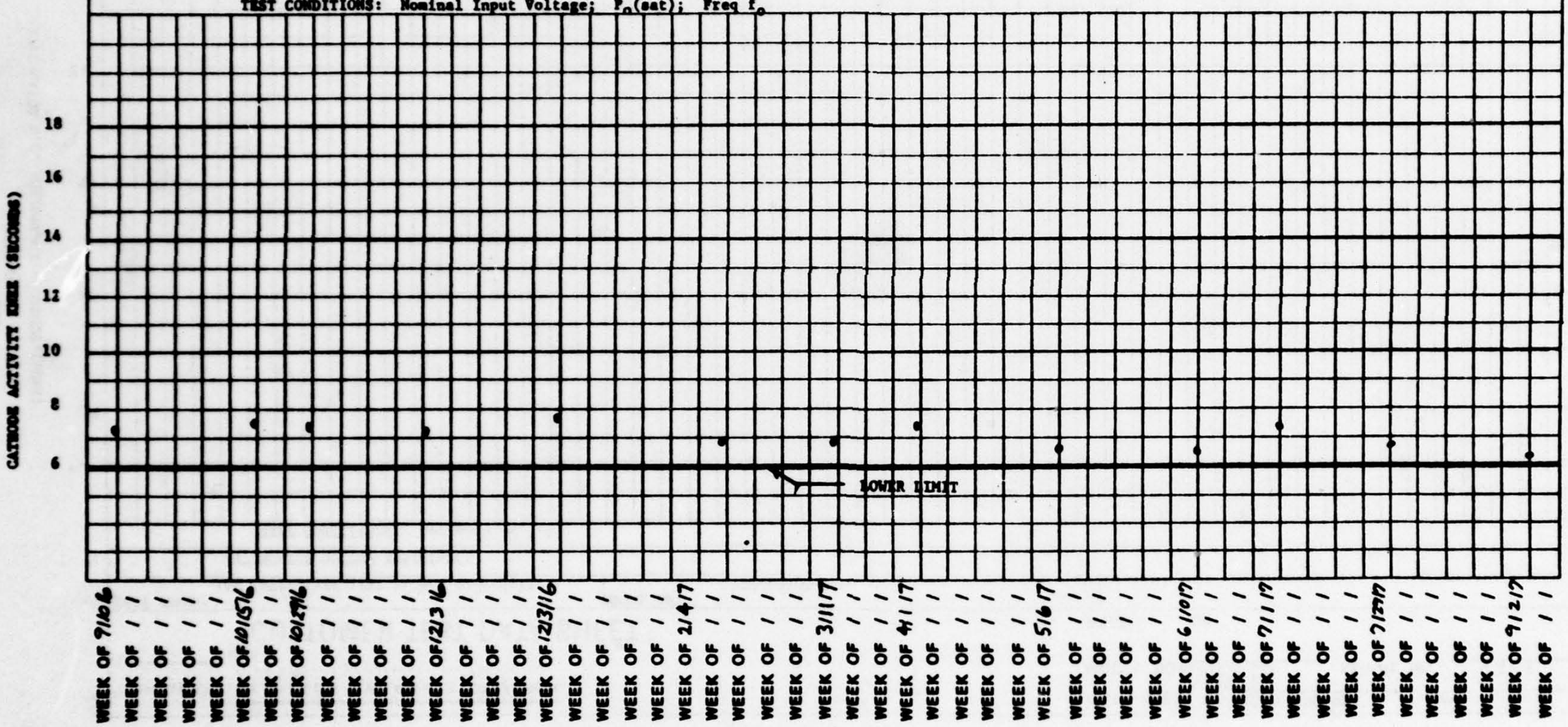
PAGE OF

TEST NAME: LOW LEVEL LIFE TEST PLAN & PROCEDURE

SPEC. NO. LTPB200300-400

CATHODE ACTIVITY

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



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3100 W. LOMITA BLVD. TORRANCE, CALIFORNIA 90509

CUSTOMER TEST DATA SHEET

DATA SHEET NO. DSB200300-400 REV. ______

MODEL NO. B200300-121 / B200300-122 SERIAL NO. 22-3

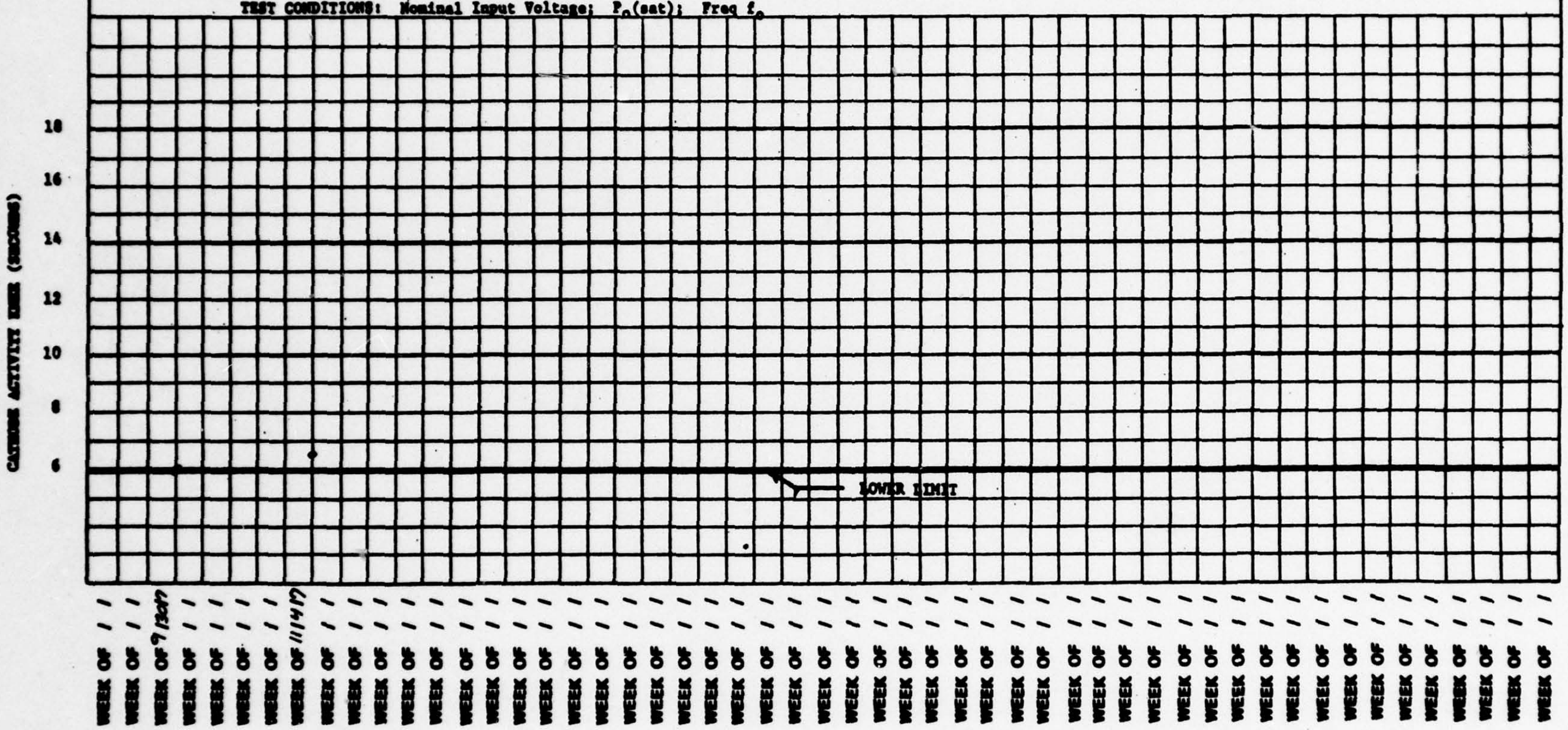
PAGE OF

TEST NAME LOW LEVEL LIFE TEST PLAN & PROCEDURE

SPEC. NO. LTPB200300-400

CATHODE ACTIVITY

TEST CONDITIONS: Nominal Input Voltage; P_o(sat); Freq f_o



APPENDIX E

777 MODEL 1200H LOW LEVEL TWTA

CALIBRATION CURVES

HUGHES
HUGHES AIRCRAFT COMPANY

Par 5.5.1.1 Inp Current Telemetry

ELECTRON DYNAMICS DIVISION

TRW S/N 12-1

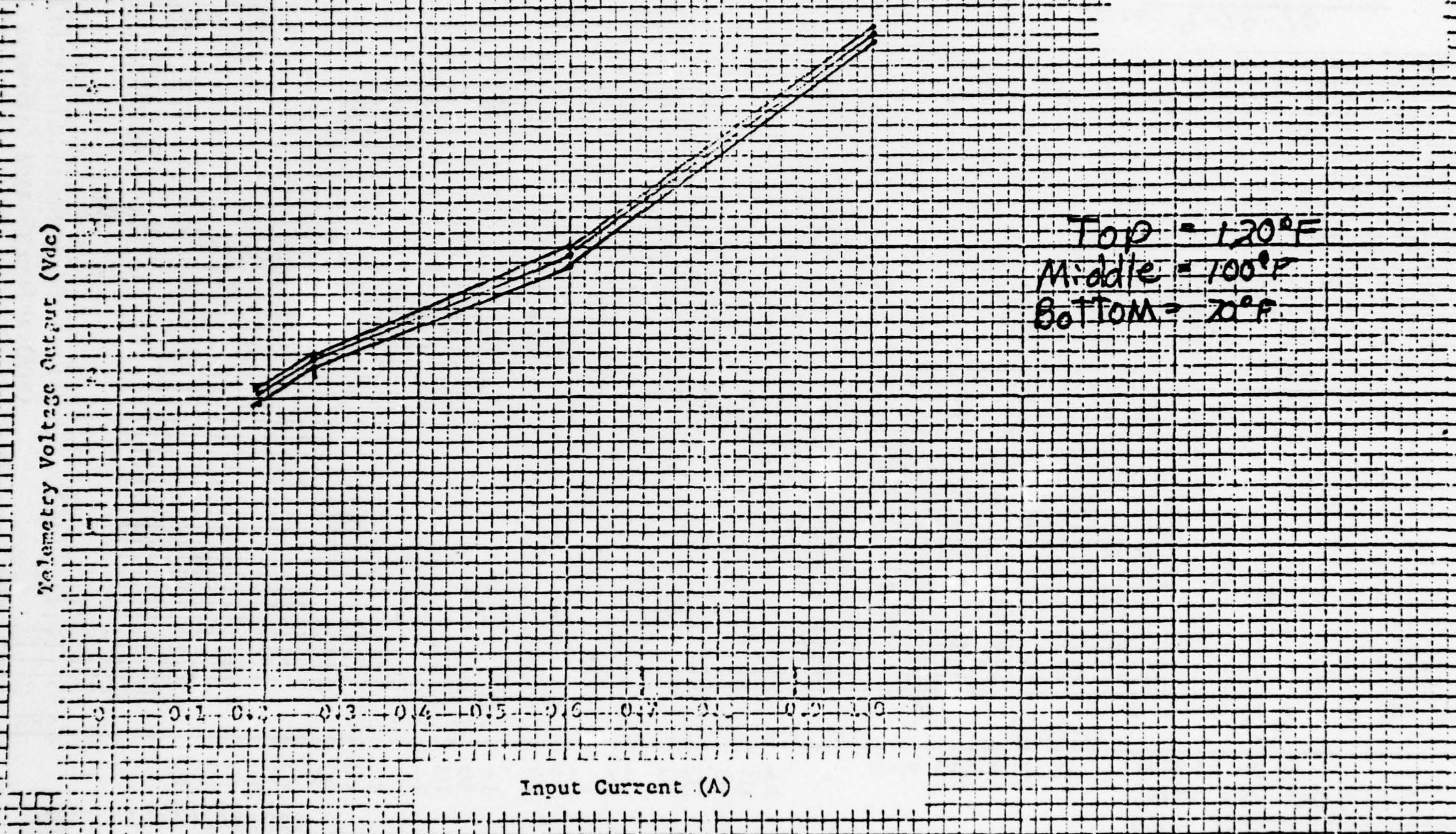
CUSTOMER TEST DATA SHEET

Code Ident 73293

Data Sheet No.
Rev. C
Model H200302-120
Serial No. 006 12-1
Page 28 of 35

Test Name	Spec. No.	Test Pos. No.	Quality
Test Procedure	TPB200302-400	#1	J. J. Haupt 9-30-70

Date 9-28-70



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Par 5.3.[illegible] Cathode Current [illegible]

HUGHES
HUGHES AIRCRAFT COMPANY

ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

Code Ident 73293

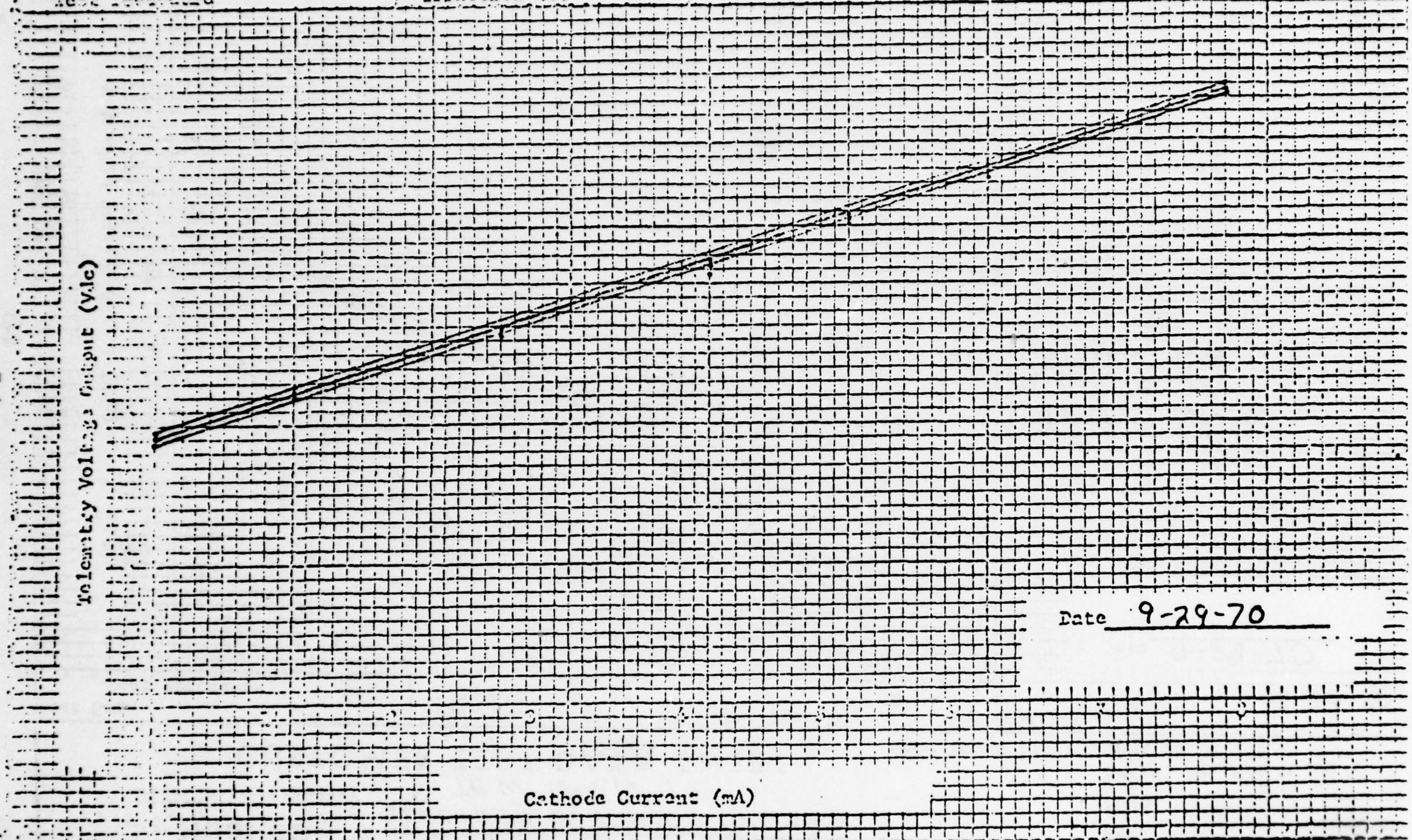
Rev. C

Model [illegible]

Serial No. 00612-1

Page 29 of 35

Test Name	Spec. No.	Test Pos. No.	Quality
Test Procedure	[illegible]200302-400	#1	J. J. [illegible] 9-30-70



Date 9-29-70

Par 5.3.1.5 Heater ...

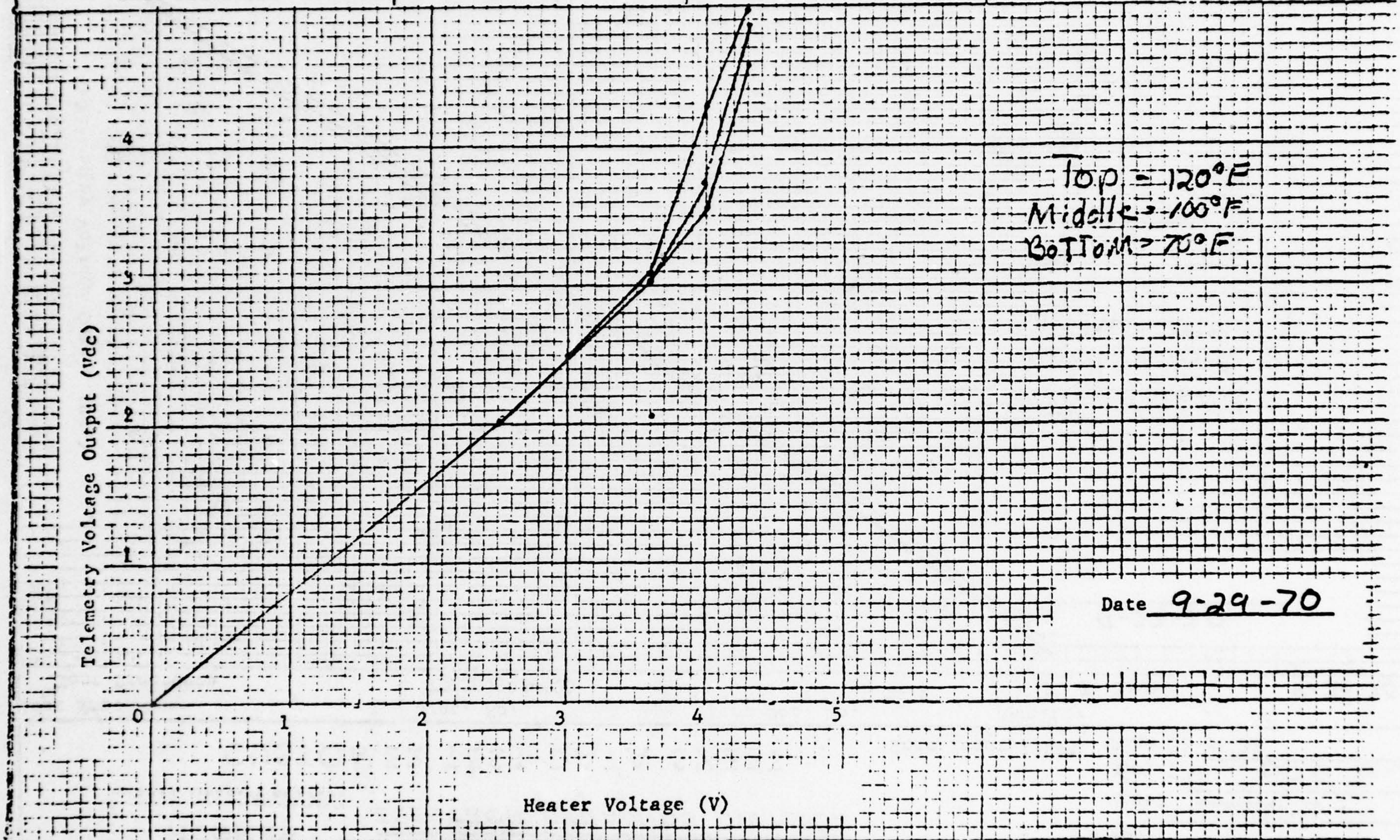
HUGHES
HUGHES AIRCRAFT COMPANY

ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

Rev. C
Model B200302-120 / R200302-110
Serial No. 006 12-1
Code Ident 73293 Page 30 of 35

Test Name	Spec. No.	Test Pos. No.	Quality
Test Procedure	TPB200302-400	#1	J. J. Haupt 9-30-70



Date 9-29-70

HUGHES

HUGHES AIRCRAFT COMPANY

Par 5.3.1.4 He Current Telemetry

ELECTRON DYNAMICS DIVISION

Data Sheet N 3 B2C0302-

Rev. C

Model D2C0302-110

Serial No. 006 12-1

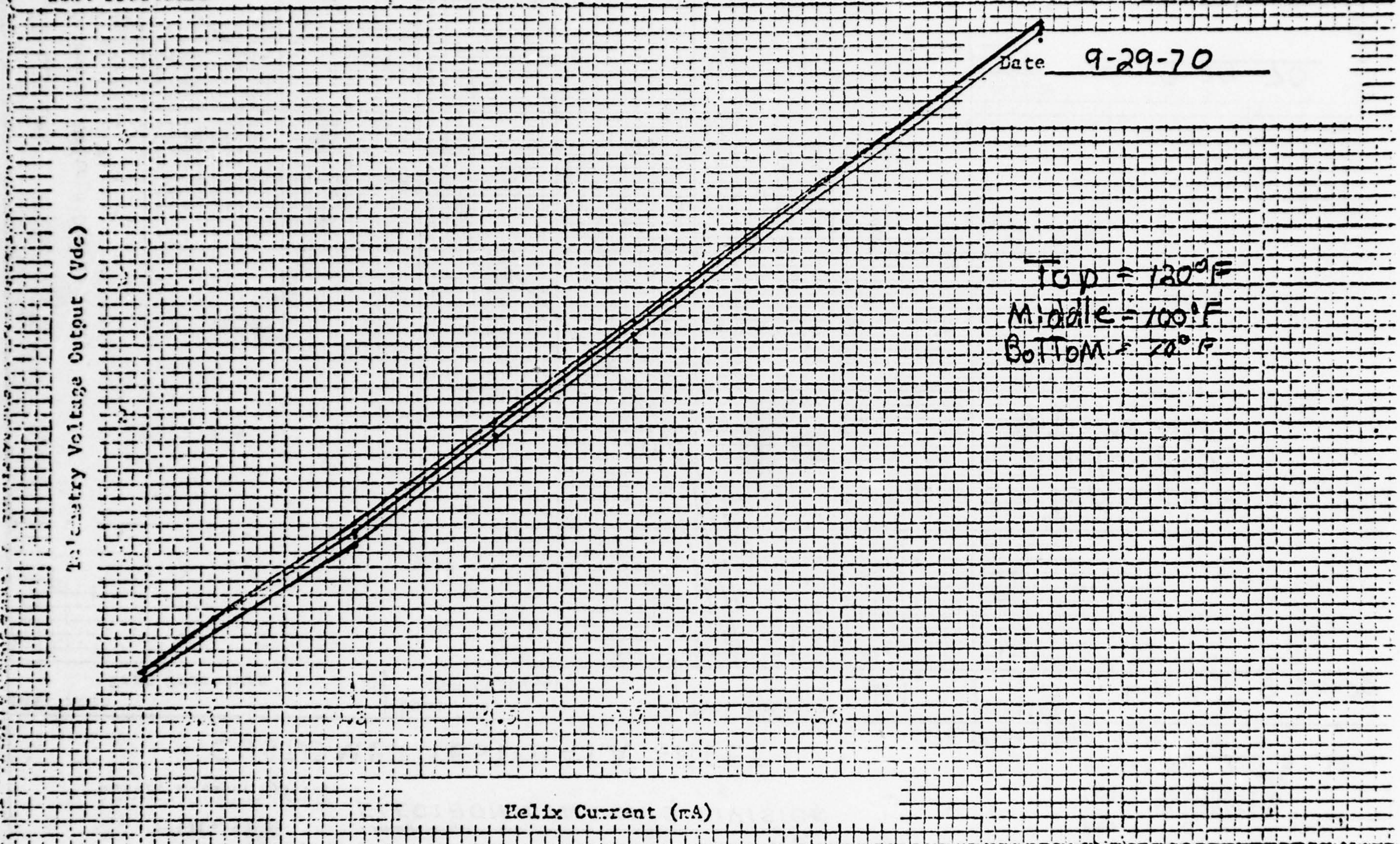
Page 31 of 35

CUSTOMER TEST DATA SHEET

Code Ident 73293

Test Name	Spec. No.	Test Pos. No.	Quality
Test Procedure	TP2C0302-400	#1	J. J. Haupt 9-30-70

Date 9-29-70



HUGHES AIRCRAFT COMPANY

ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

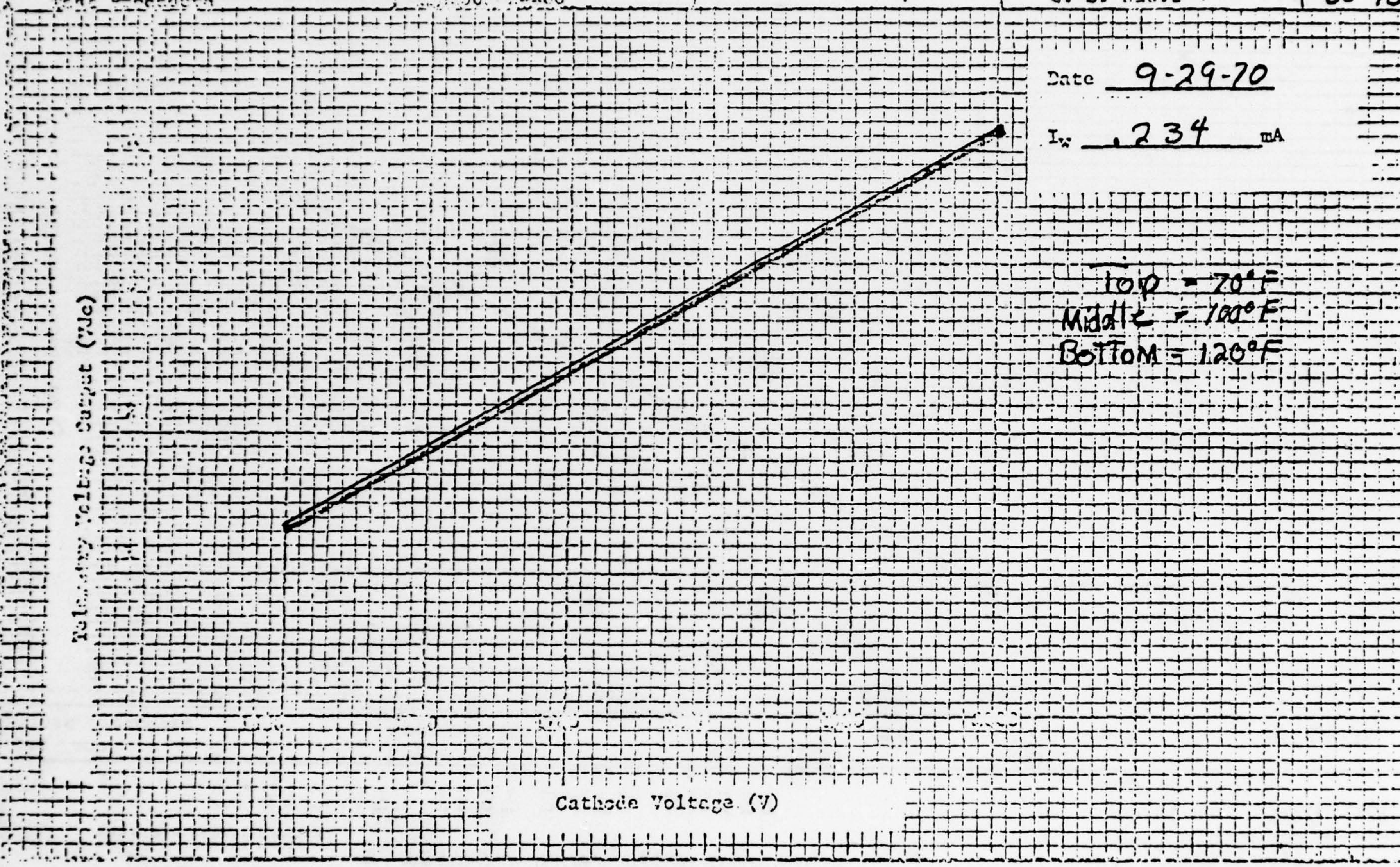
Code Ident 73293

Rev. C
Model [illegible]
Serial No. 006 12-1
Page 32 of 35

Test Name	Spec. No.	Test Pos. No.	Quality	
Test Procedure	TP200002-400	#1	J. J. Faust	9-30-70

Date 9-29-70

I_w .234 mA



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Par 5.3.1.5 Cathode Voltage Telemetry

ELECTRON DYNAMICS DIVISION

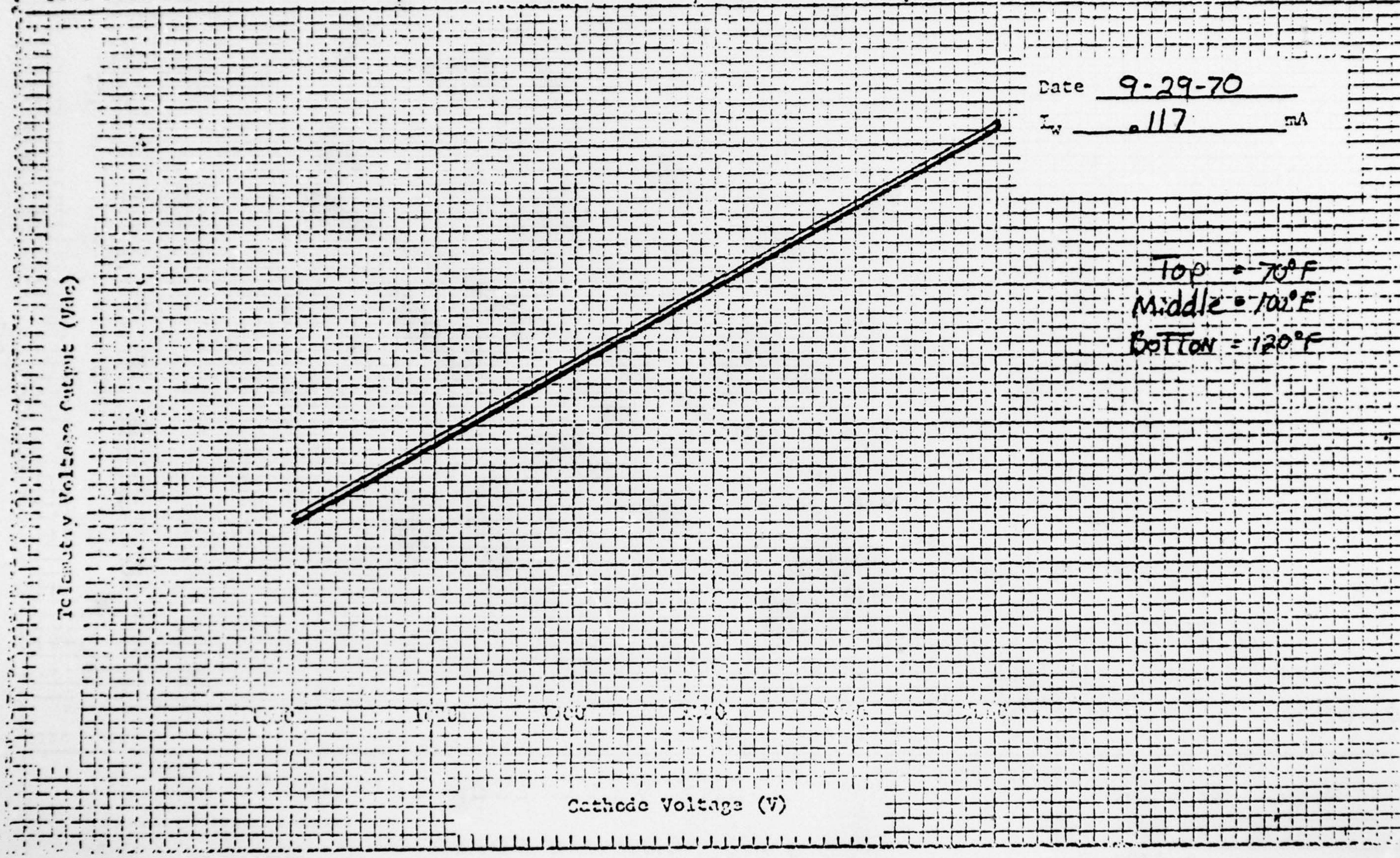
CUSTOMER TEST DATA SHEET

Data Sheet No. B200302-40
Rev. C
Model B200302-120 / B200302-110
Serial No. 006 12-1
Page 33 of 35

Test Name	Spec. No.	Test Pos. No.	Quality
Test Procedure	TP3200302-400	#1	J. J. Haupt 9-30-70

Date 9-29-70
I_w .117 mA

Top = 70°F
Middle = 102°F
Botton = 120°F



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Par 5.3.1.5 Cathode Stage Telemetry

ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

Code Ident 73293

Data Sheet No. [illegible]

Rev. C

Model B200302-120 / B200302-110

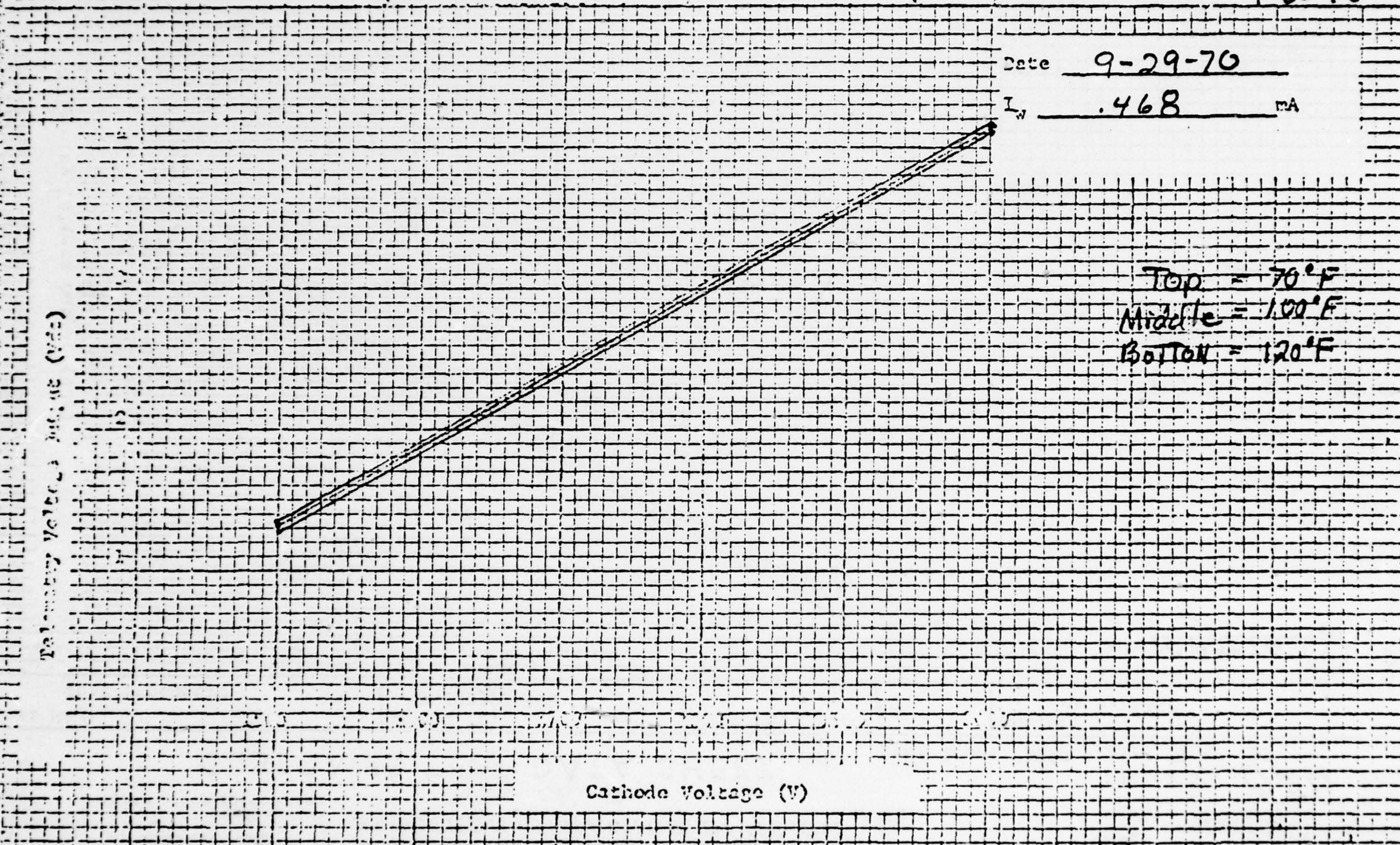
Serial No. 006 12-1

Page 34 of 35

Test Name	Spec. No.	Test Pos. No.	Quality
Test Procedure	TPB200302-400	#1	J. J. Haupt 9-30-70

Date 9-29-70

I_w .468 mA



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HUGHES AIRCRAFT COMPANY

ELECTRON DYNAMICS DIVISION

TRU S/N 12-2

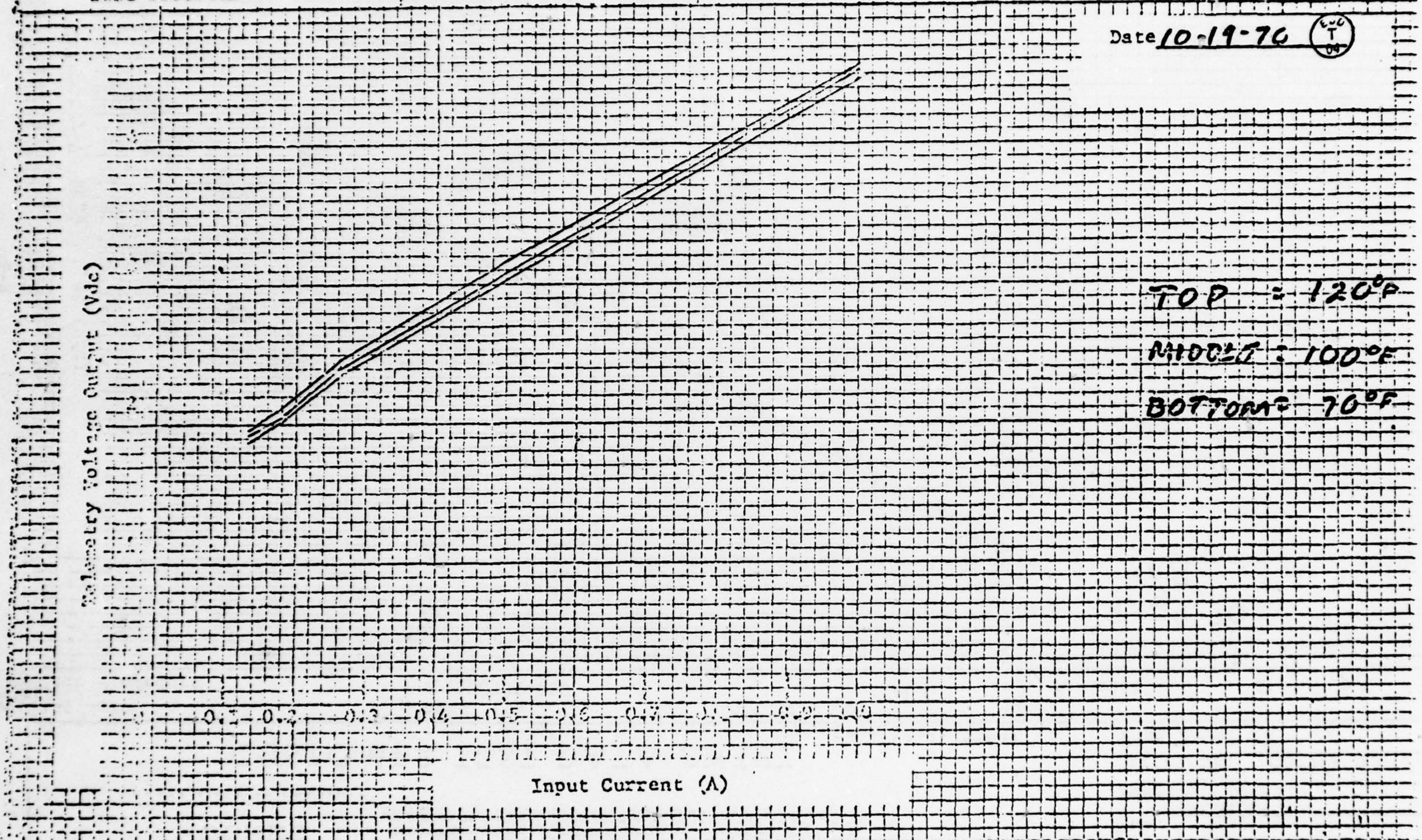
CUSTOMER TEST DATA SHEET

Code Ident 73293

Data Sheet No. [illegible]
Rev. C
Model H200302-120
Serial No. 020 12-2
Page 28 of 35

Test Name	Spec. No.	Test Pos. No.	Quality
Test Procedure	TPB200302-400	1	J. J. Knupt

Date 10-19-76



HUGHES
HUGHES AIRCRAFT COMPANY

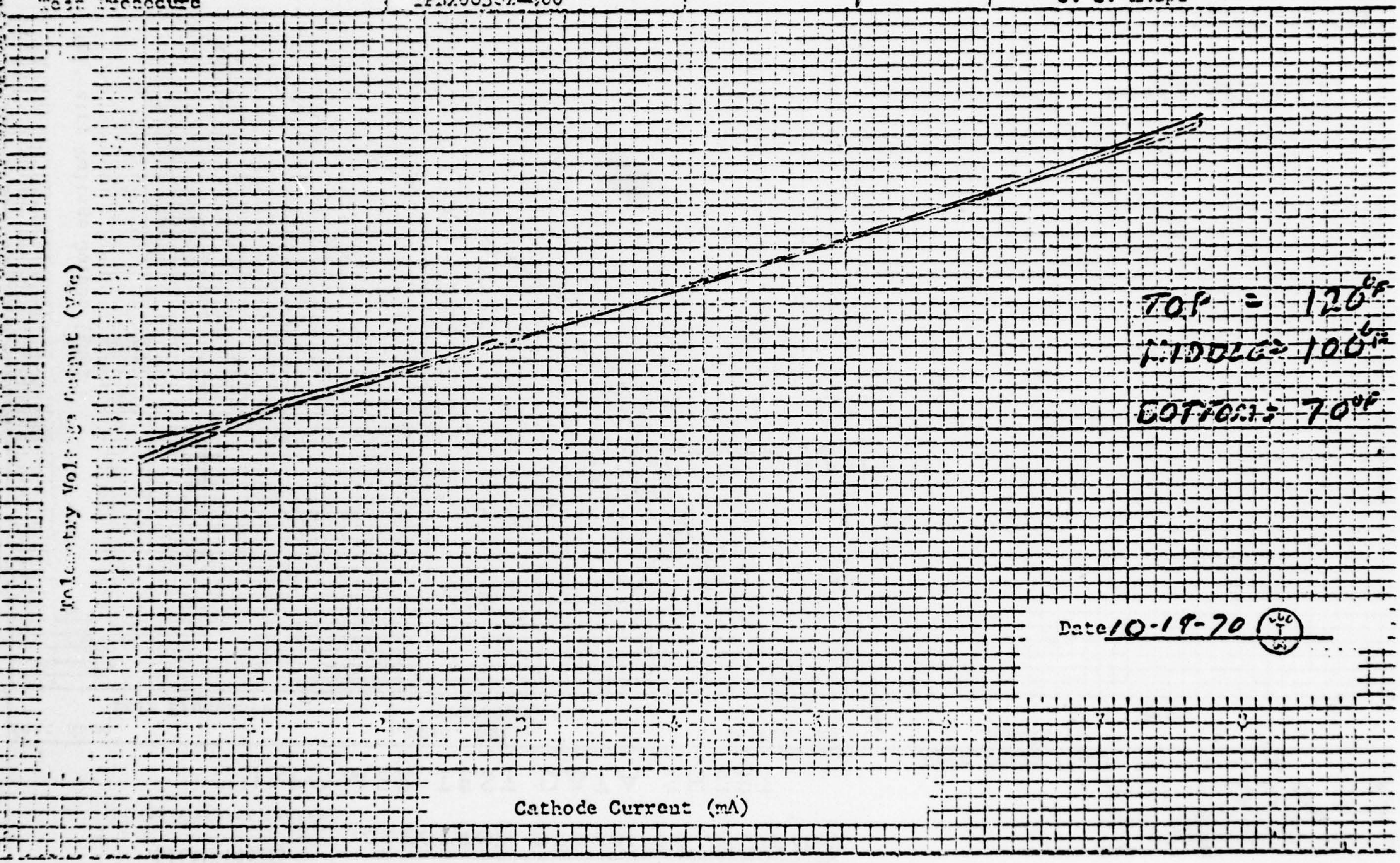
ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

Codo Ident 73293

Rev. C
Model [illegible]
Serial No. 020 12-2
Page 29 of 35

Test Name	Spec. No.	Test Pos. No.	Quality
Test Procedure	TPD200302-400	1	J. J. Haupt



HUGHES

HUGHES AIRCRAFT COMPANY

Par 5.3.1.3 Heater V   tage Telemetry

ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

Data Sheet No. 3 B200302-

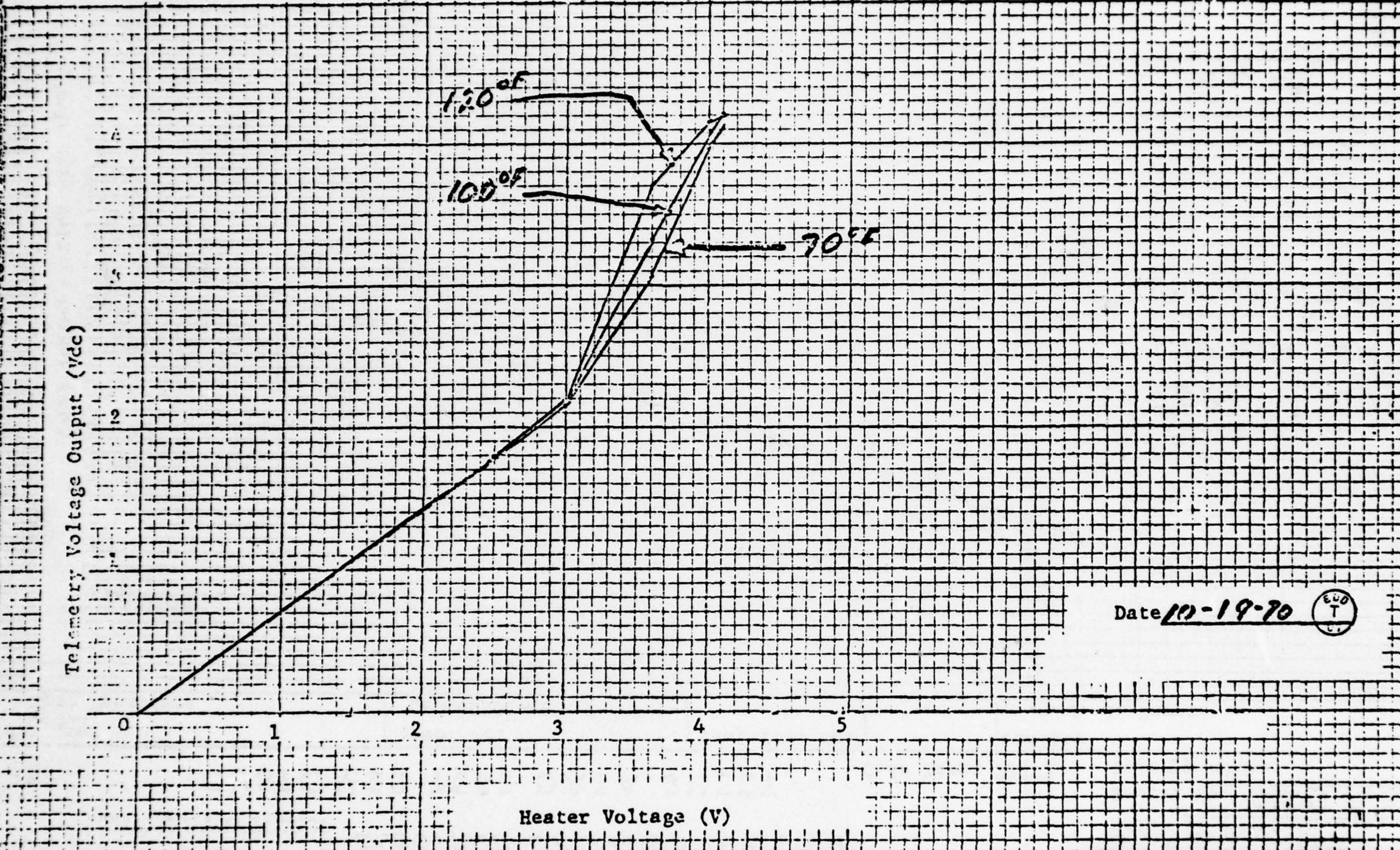
Rev. C

Model B200302-120 B200302-110

Serial No. 020 12-2

Code Ident 73293 Page 30 of 35

Test Name	Spec. No.	Test Pos. No.	Quality
Test Procedure	TPB200302-400	1	J. J. Haupt



HUGHES
HUGHES AIRCRAFT COMPANY

Par 5.3.1.4 Ea. Current Telemetry

ELECTRON DYNAMICS DIVISION

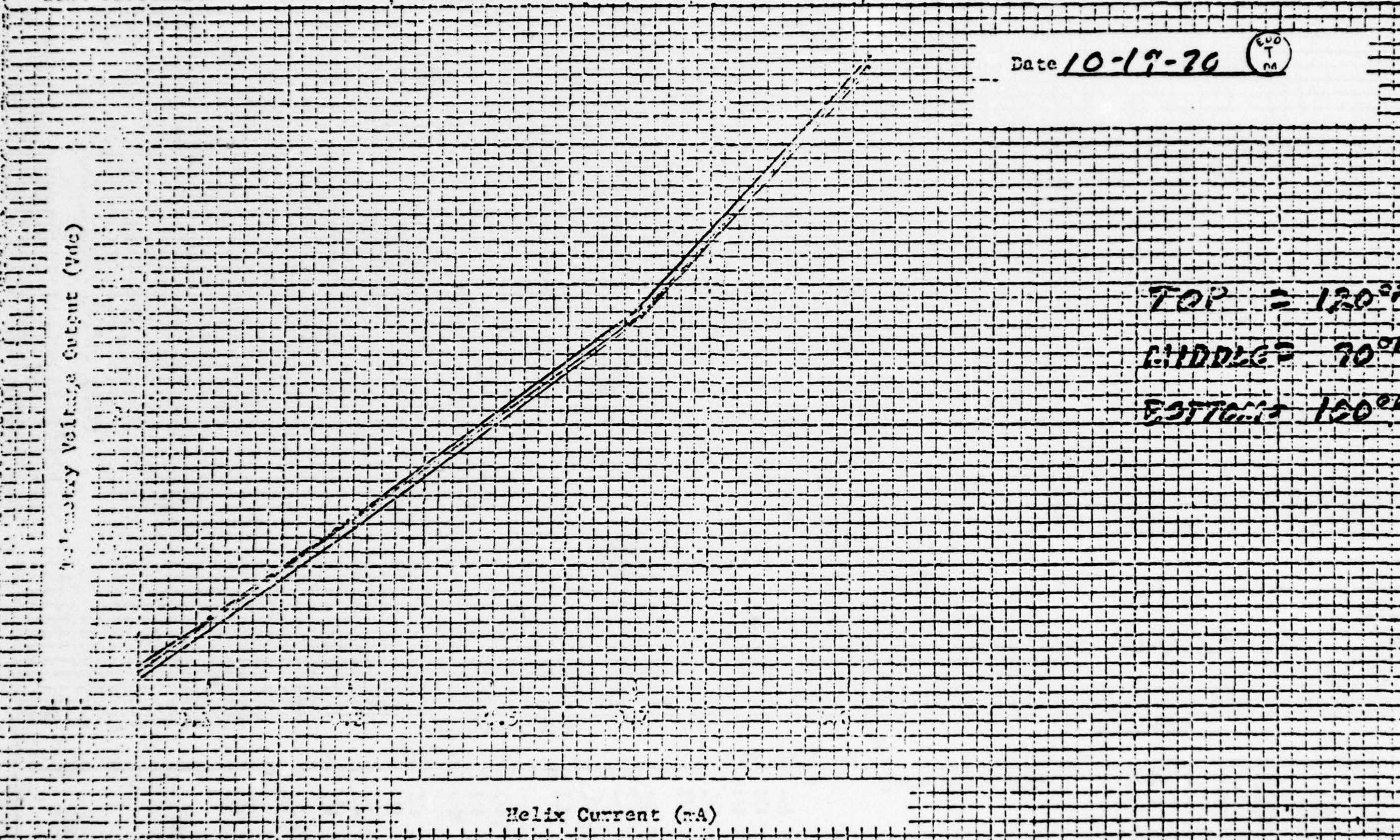
CUSTOMER TEST DATA SHEET

Code Ident 73293

Data Sheet No. 3 B2C0302-
Rev. C
Model B2C0302-110
Serial No. 020 12-2
Page 31 of 35

Test Name	Spec. No.	Test Proc. No.	Quality
Test Procedure	TPB2C0302-400	1	J. J. Haupt

Date 10-17-76



HUGHES AIRCRAFT COMPANY

ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

Code Ident 73293

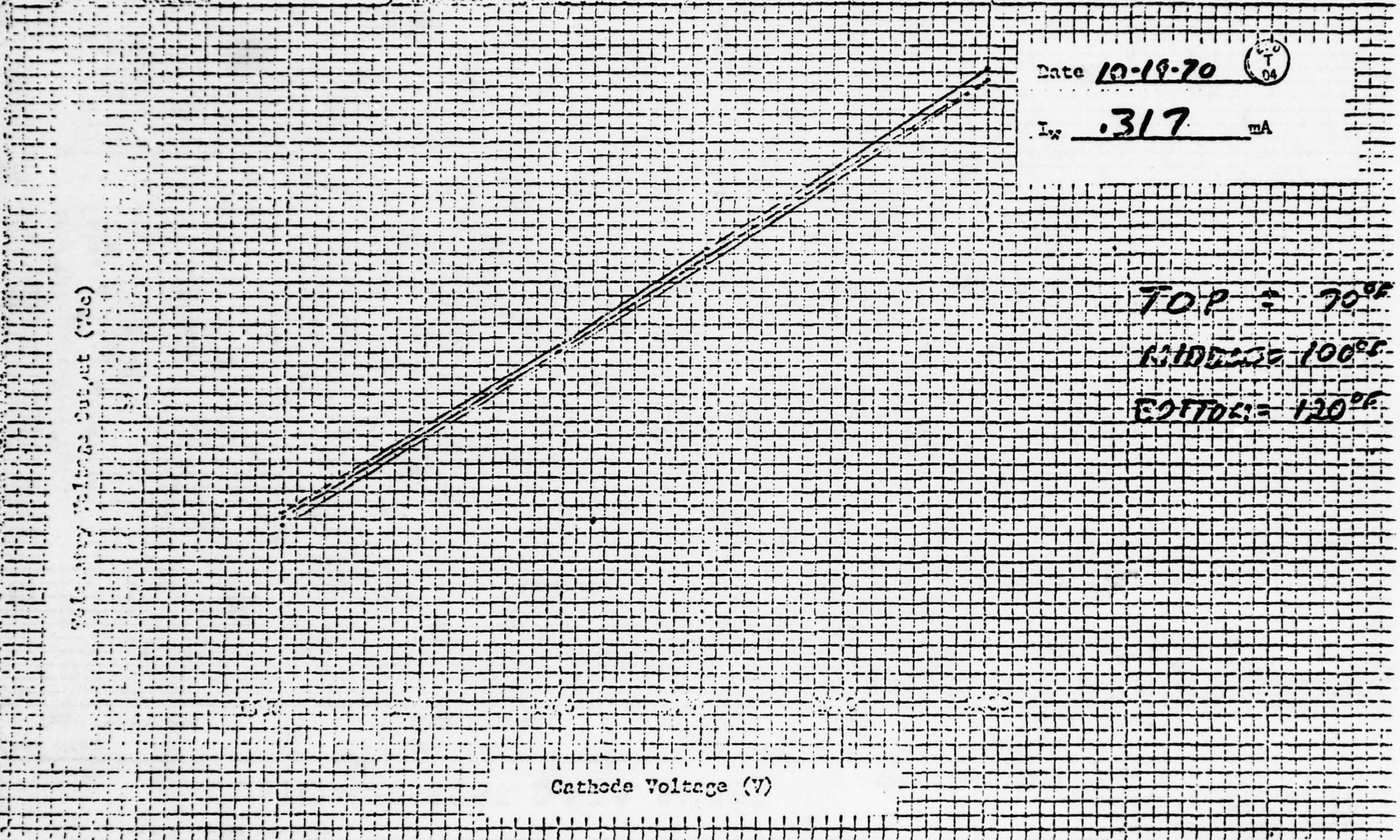
Rev. C

Model [illegible]

Serial No. 020 12-2

Page 32 of 35

Test Name	Spec. No.	Test Pos. No.	Quality
Test Procedure	TP[illegible]-400	1	J. J. Haupt



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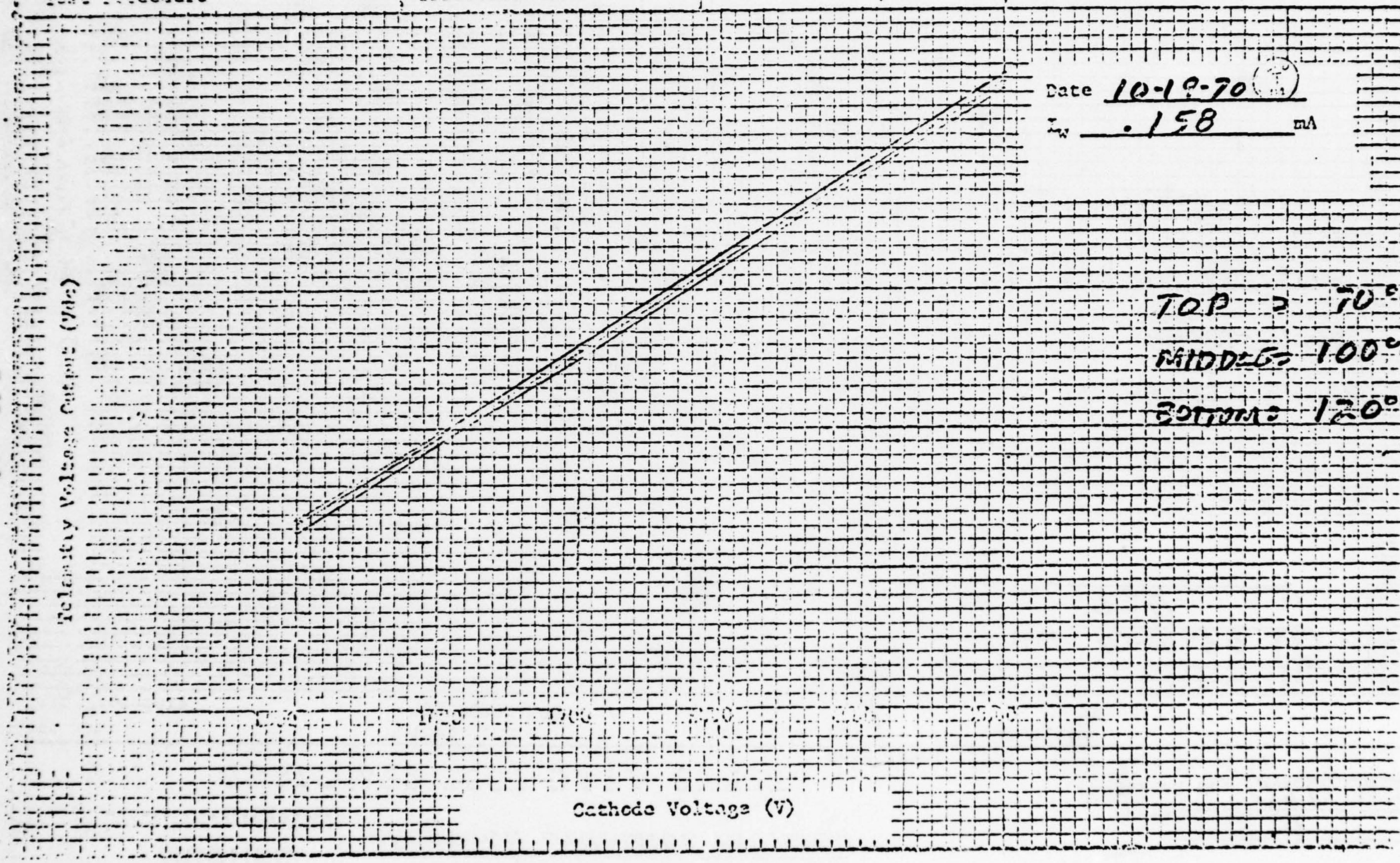
Par 5.3.1.5 Cathode V. .age Telemetry

ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

Data Sheet No. B200...
Rev. C
Model B200302-12J / B200302-110
Serial No. 020 12.2
Page 33 of 35

Test Name	Spec. No.	Test Pos. No.	Quality
Test Procedure	TP3200302-400	1	J. J. Haupt



HUGHES
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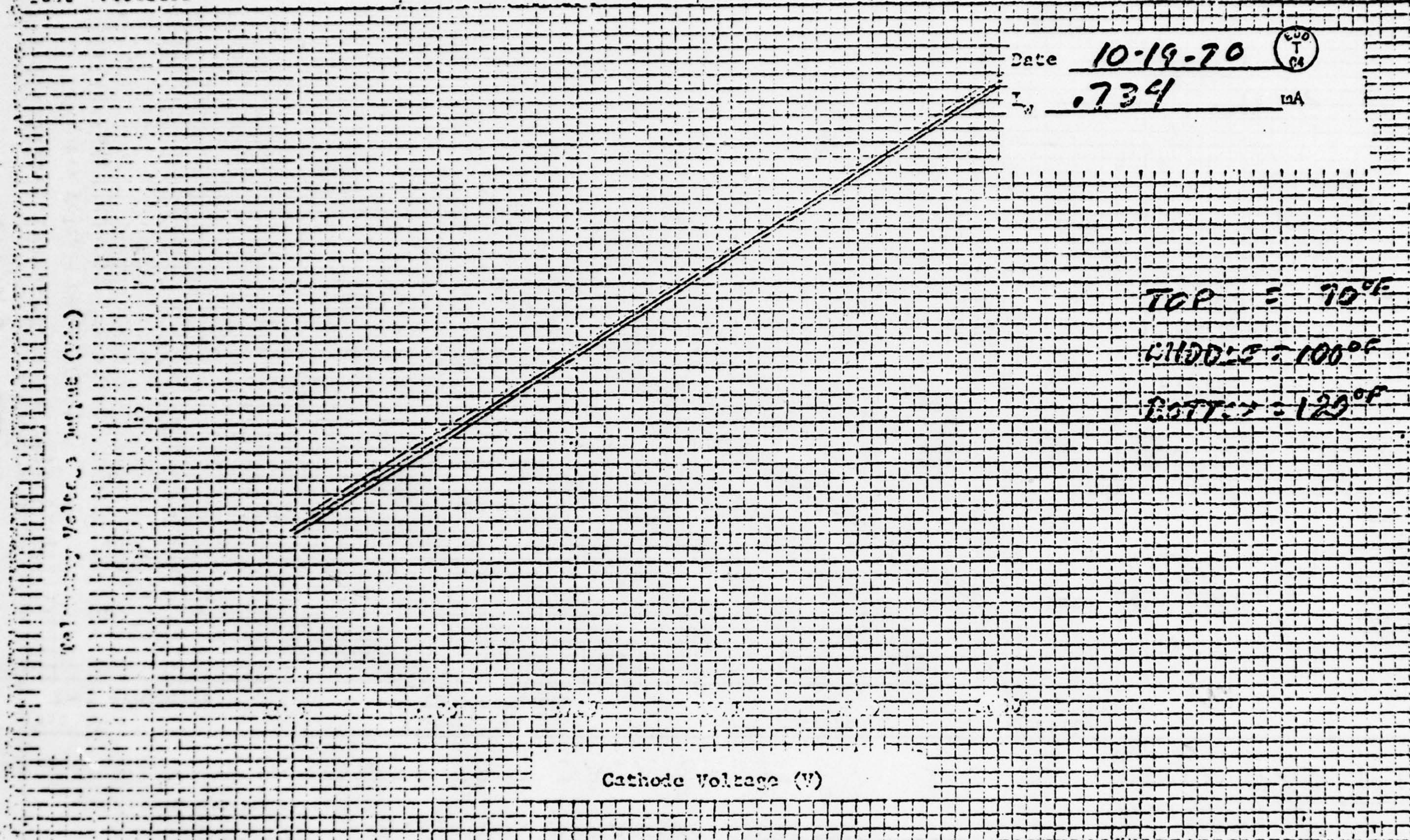
ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

Code Ident 73293

Rev. B200302-123
Model B200302-110
Serial No. 020 12-2
Page 34 of 35

Test Name / Test Procedure	Spec. No. TPB200302-400	Test Pos. No. 1	Quality J. J. Haupt



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ELECTRON DYNAMICS DIVISION

TRW S/N 12-3

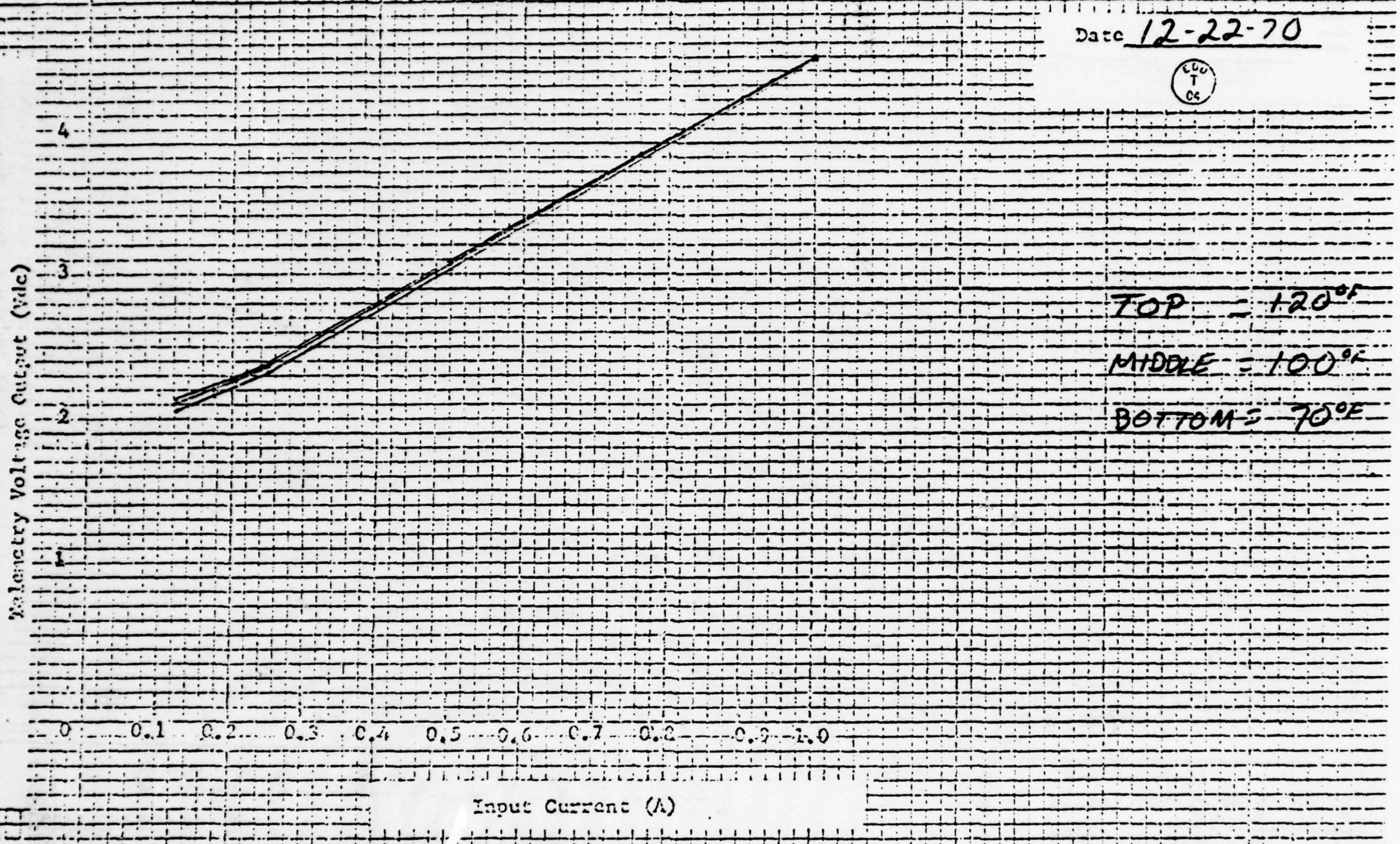
CUSTOMER TEST DATA SHEET

Code Ident 73293

Rev. —
Model B200302-120
Serial No. 023 12-3
Page 30 of 37

Test Name	Spec. No.	Test Pos. No.	Quality
Test Procedure	TPB200302-400	1	J. J. Knupt

Date 12-22-70



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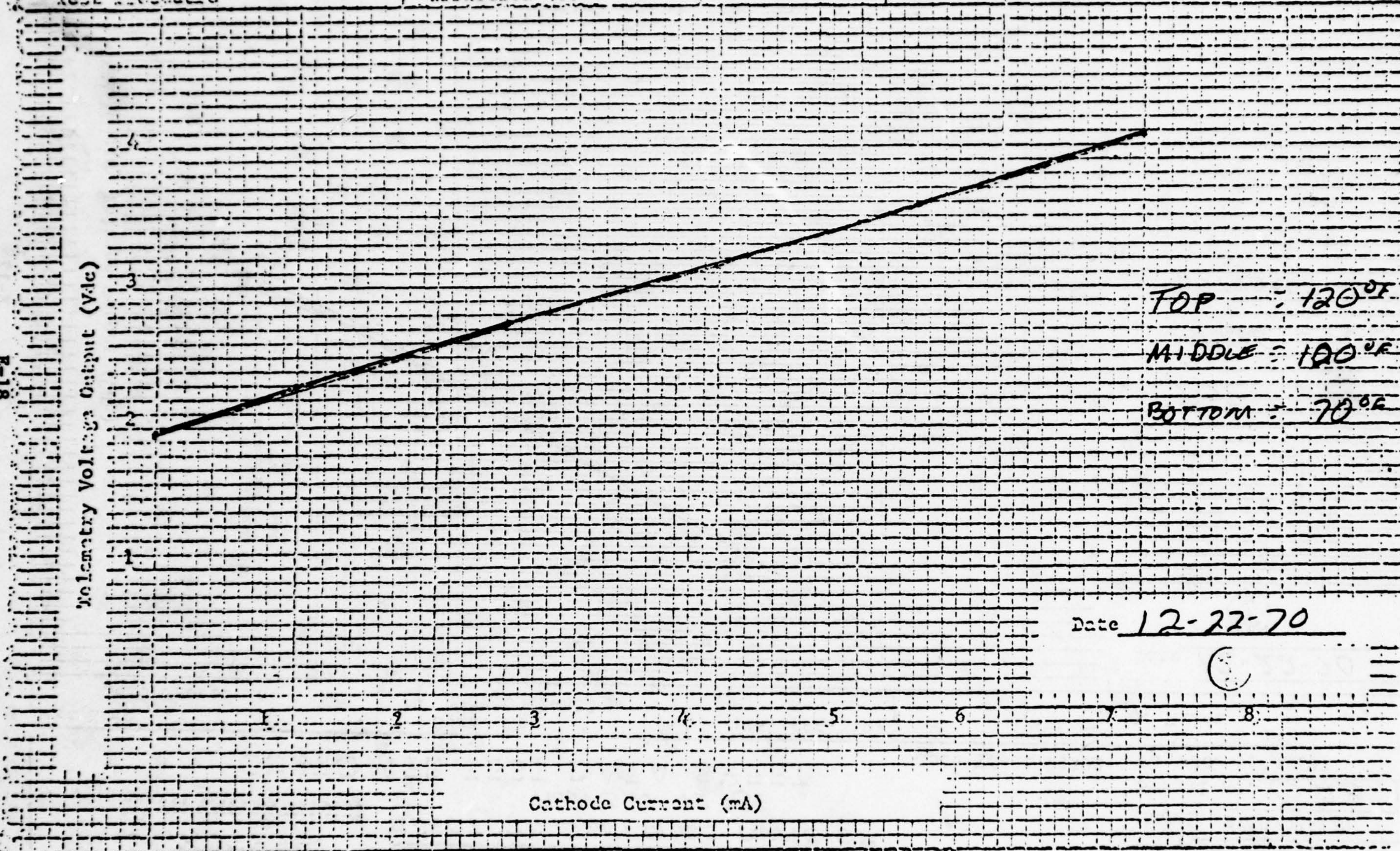
ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

Code Ident 73293

Rev. D
Model B200302-120
Serial No. 023 12-3
Page 31 of 37

Test Name	Spec. No.	Test Pos. No.	Quality
Test Procedure	TP200302-400	/	J. J. Haupt



Date 12-22-70

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Par 5.3.1.3 Heater Vo... ...

ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

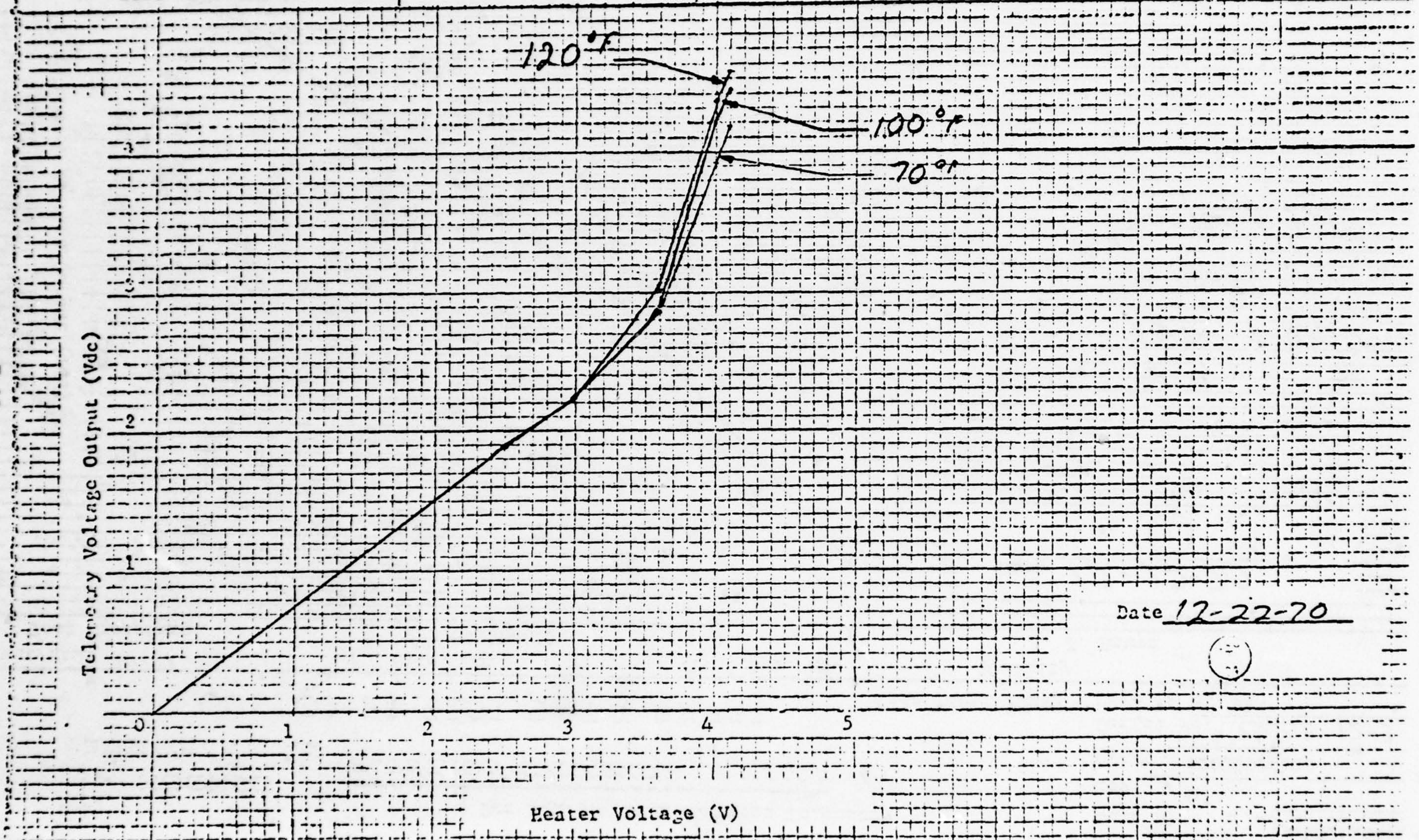
Rev. D

Model 570[illegible]-120

Serial No. 023 12-3

Code Ident 73293 Page 32 of 37

Test Name	Spec. No.	Test Pos. No.	Quality
Test Procedure	TPB200302-400	1	J. J. Haupt



Date 12-22-70

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Par 5.3.1.4 Helix Current Telemetry

ELECTRON DYNAMICS DIVISION

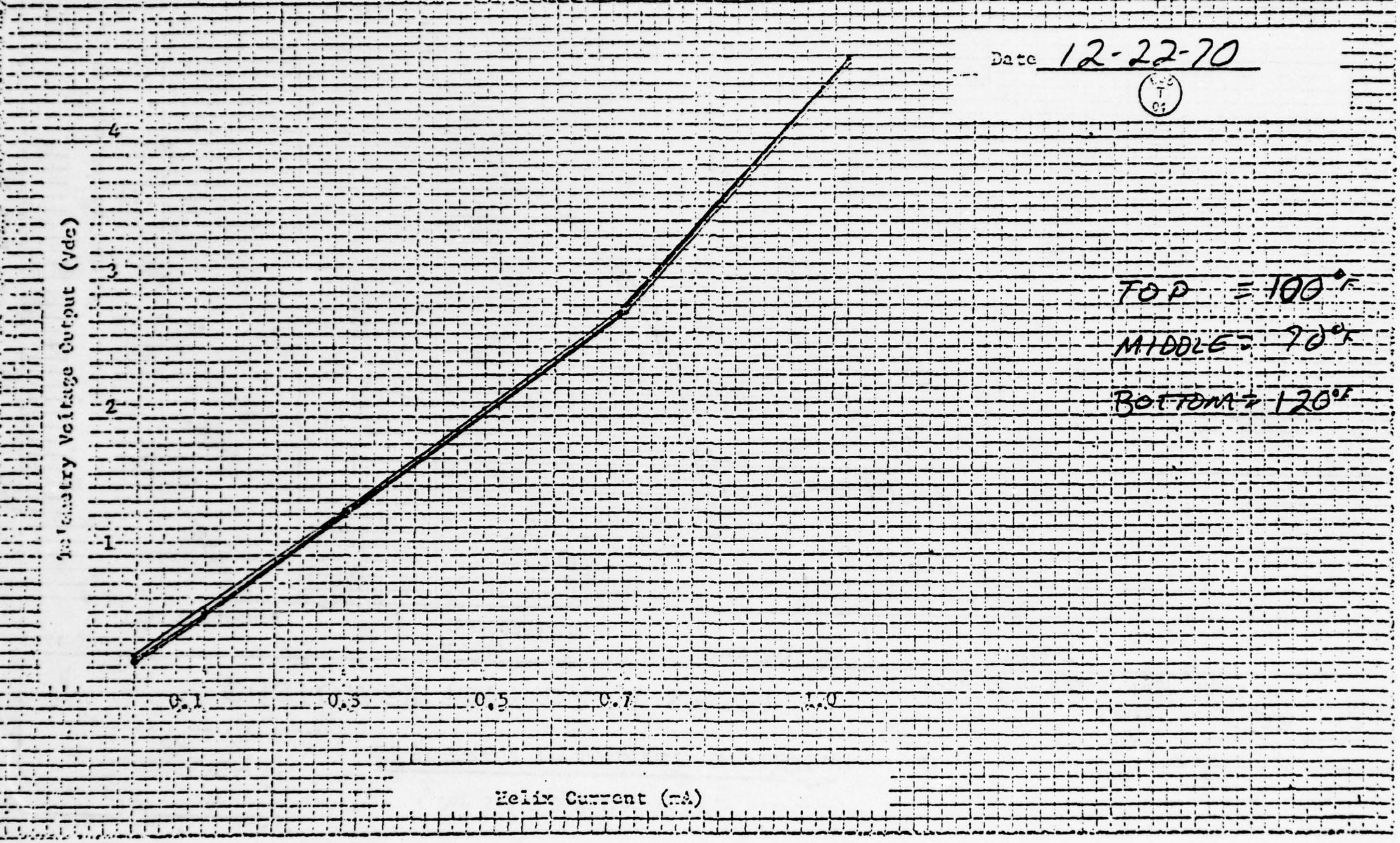
CUSTOMER TEST DATA SHEET

Code Ident 73293

Data Sheet [illegible]
Rev. D
Model B200302-120
Serial No. 023 12-3
Page 33 of 37

Test Name	Spec. No.	Test Pos. No.	Quality
Test Procedure	TP200302-400	1	J. J. Haupt

Date 12-22-70



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ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

Code Ident 73293

Rev. D

Model B200302-120

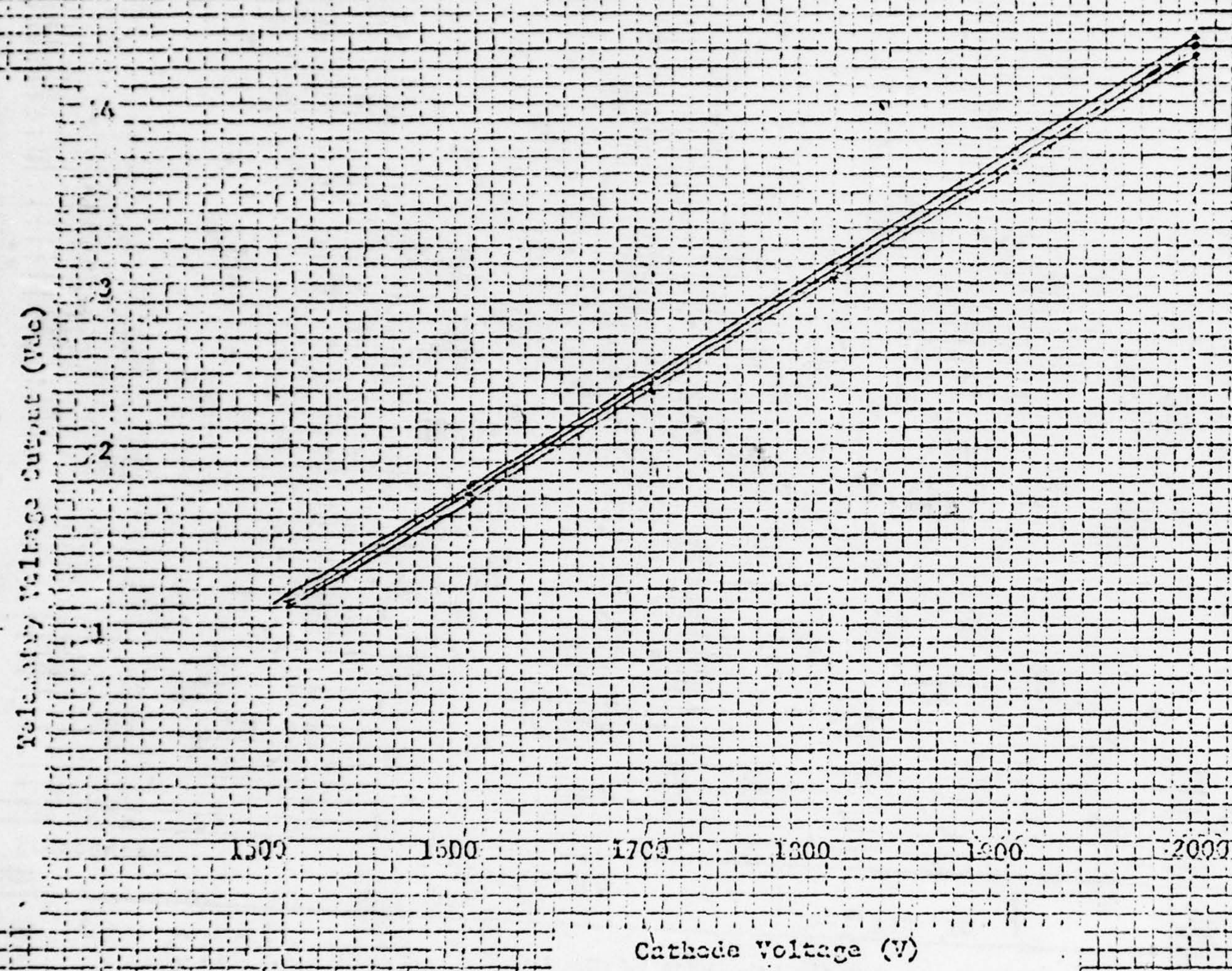
Serial No. 023 12-3

Page 34 of 37

Test Name	Spec. No.	Test Pos. No.	Quality
Test Procedure	[illegible]200302-400	1	J. J. Haupt

Date 12-22-70

I_w .31 mA



TOP = 70°F

MIDDLE = 100°F

BOTTOM = 120°F

Par 5.3.1.5 Cathode Voltage Telemetry

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ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

Rev. D

Model B200302-120

Serial No. 023 12-3

Page 35 of 37

Test Name	Spec. No.	Test Pos. No.	Quality
Test Procedure	TPB200302-400	1	J. J. Haupt

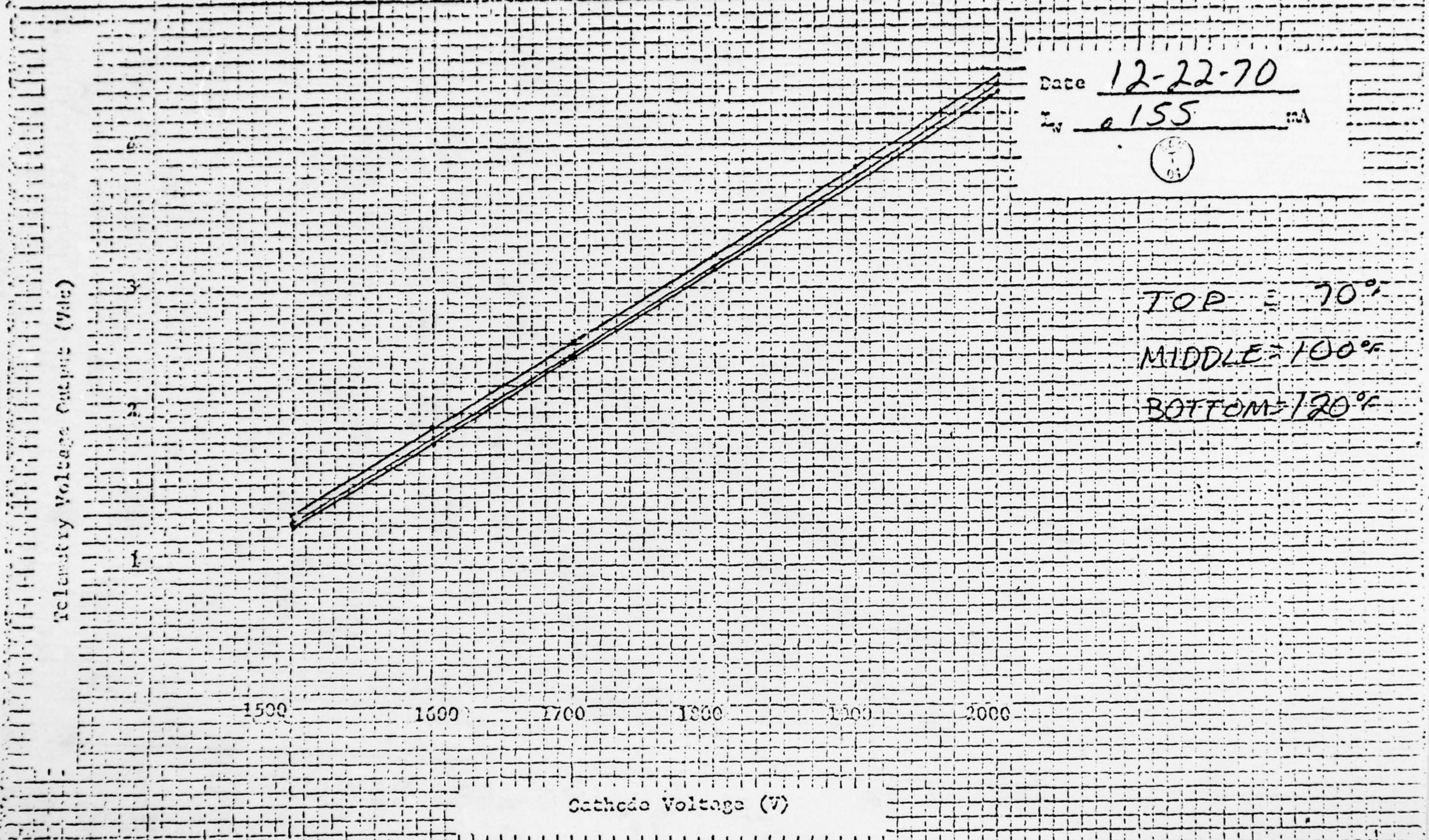
Date 12-22-70

I_W .155 mA

TOP = 70%

MIDDLE = 100%

BOTTOM = 120%



Par 5.3.1.5 Cathode Voltage Telemetry

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ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

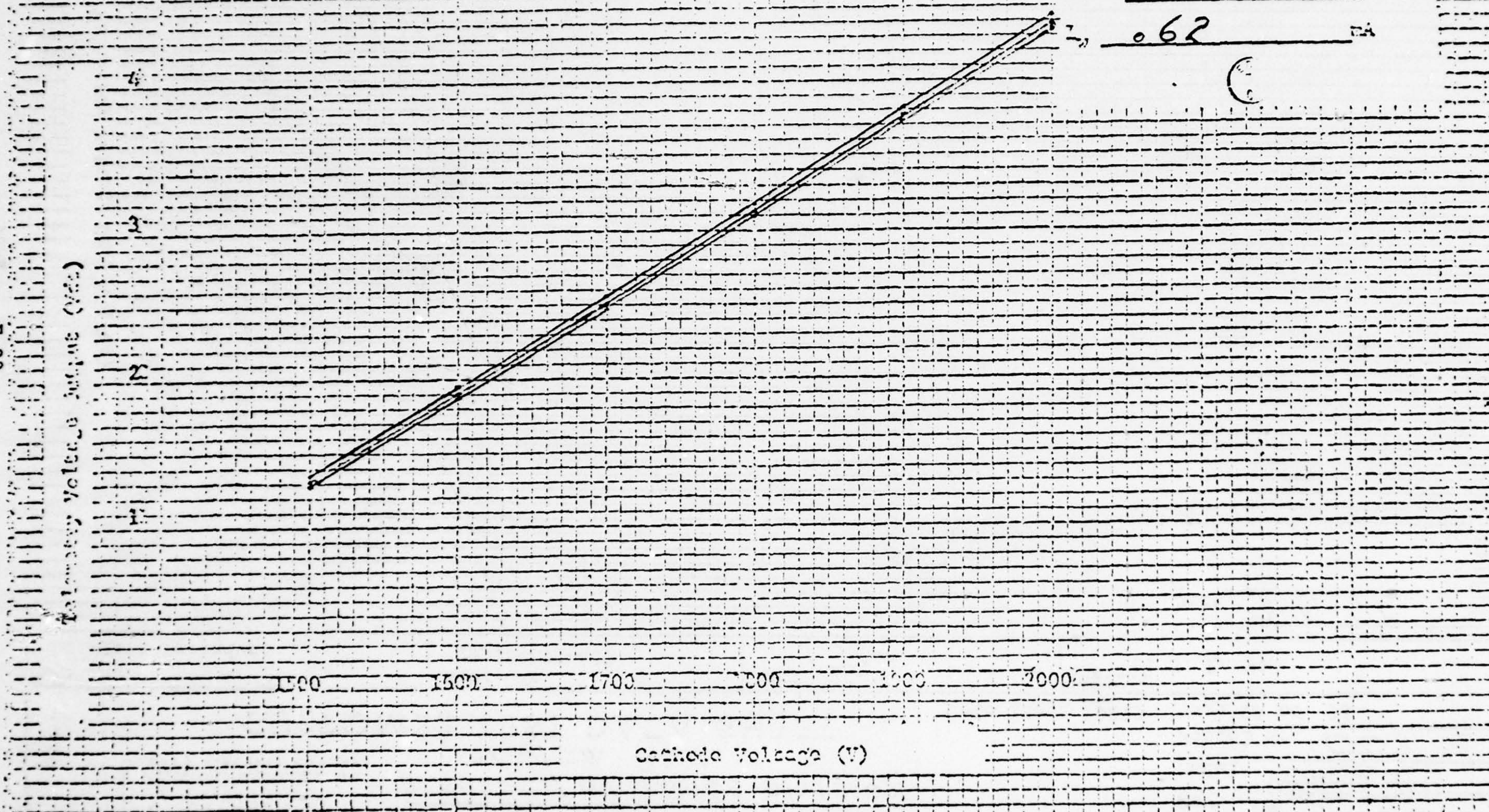
Rev. D
Model [illegible]
Serial No. 023 12-3

Code Ident 73293

Test Name / Test Procedure	Spec. No. TPB200302-400	Test Pos. No. 1	Quality J. J. Haupt

Date 12-22-70

I_o .62 mA



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Par 3.3.1.1 Input (ent Telemetry

ELECTRON DYNAMICS DIVISION

TRW s/n 22-1

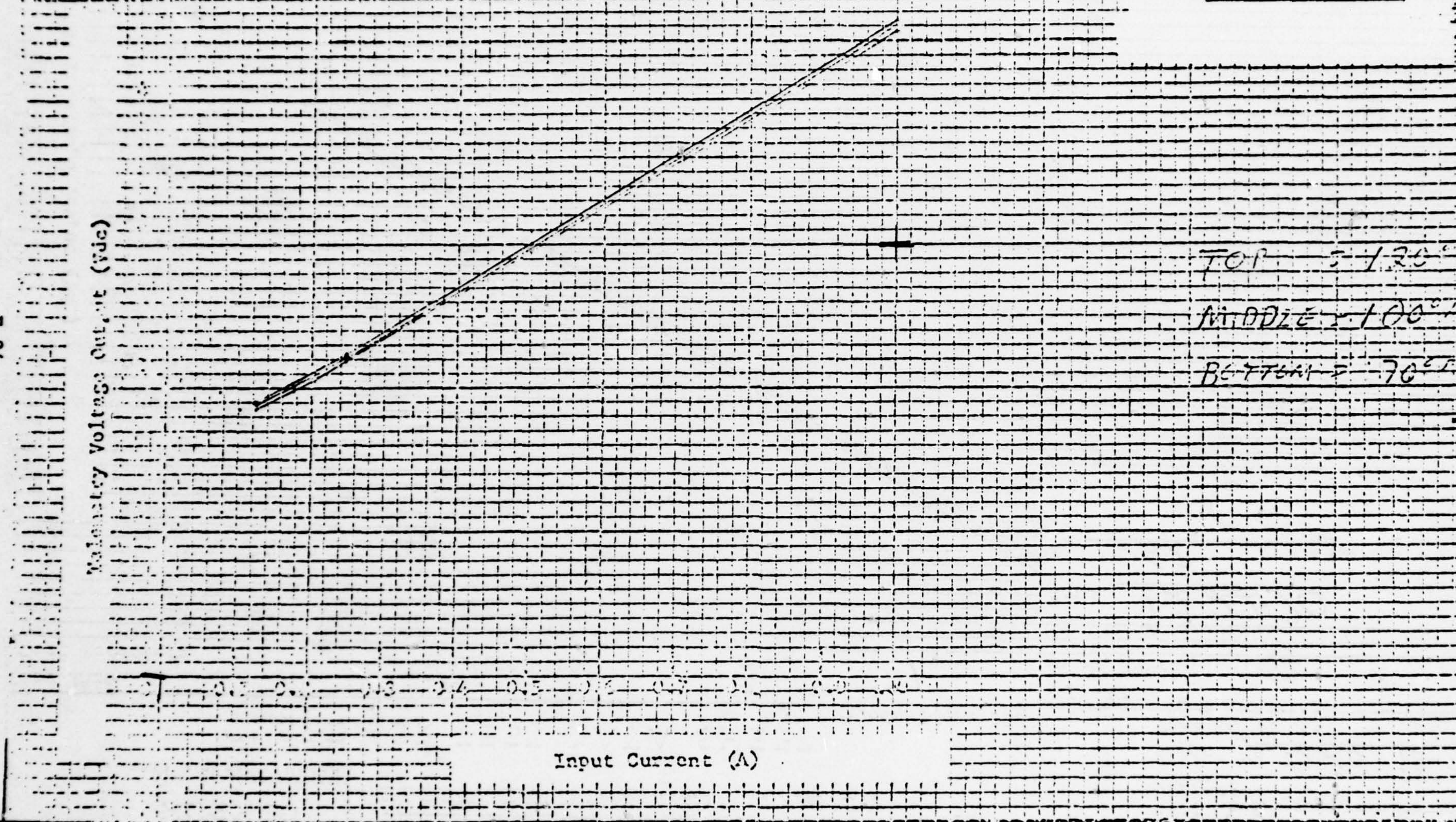
CUSTOMER TEST DATA SHEET

Code Ident 73293

Rev. C
Model H200302-120
Serial No. 003 22-1
Page 28 of 35

Test Name	Spec. No.	Test Pos. No.	Quality
Test Procedure	TPB200302-400	1360	J. J. Knupt

Date 7-6-70



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Par 5.3.1.2 Catho Current Telemetry

ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

Code Ident 73293

Data Sheet No.

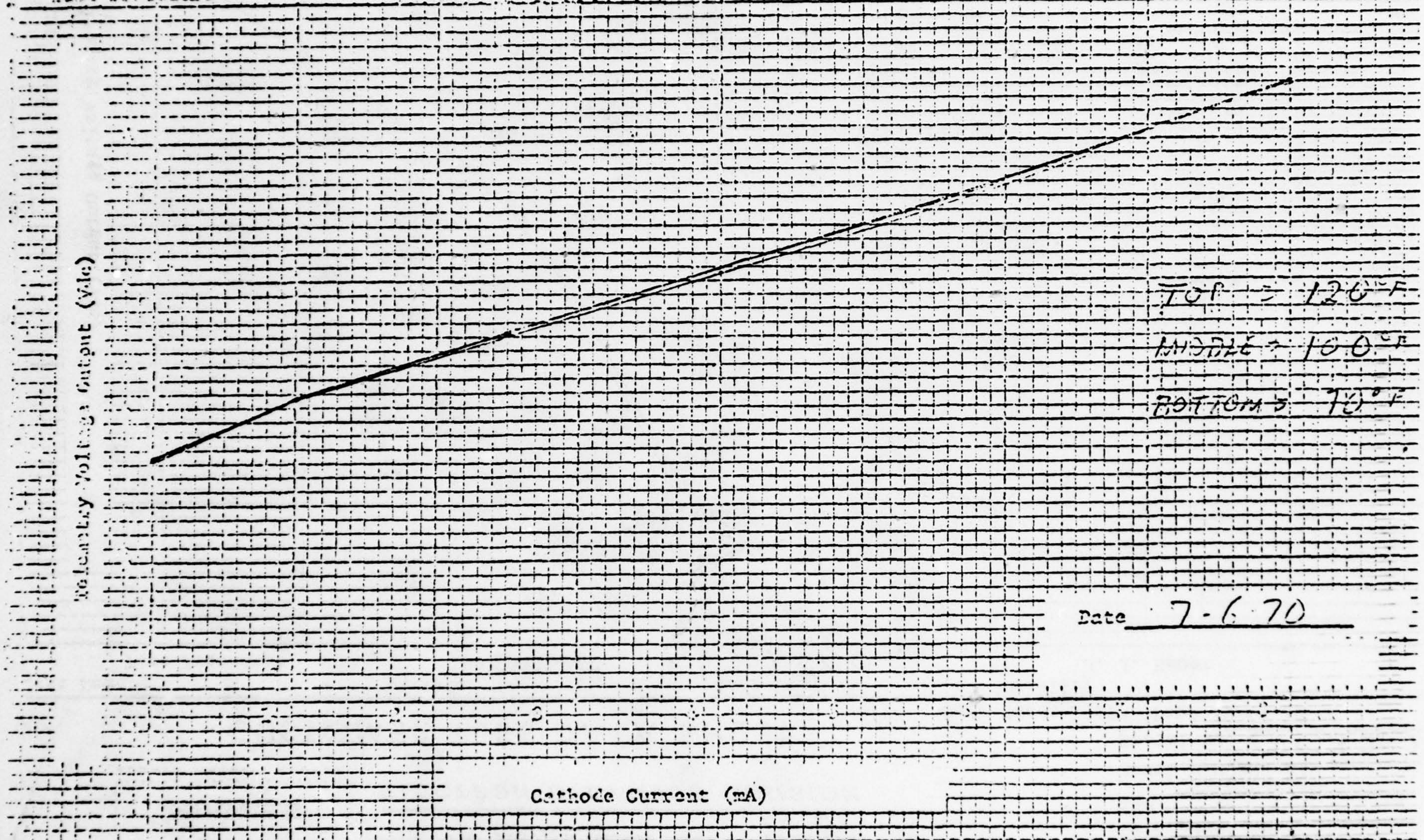
Rev. C

Model [illegible]

Serial No. 003 22-1

Page 29 of 35

Test Name	Spec. No.	Test Pos. No.	Quality
Test Procedure	TPD200302-400	1360	J. J. Haupt



Date 7-6-70

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Par 5.3.1.3 Heater Volt e Telemetry

ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

Data Sheet No.

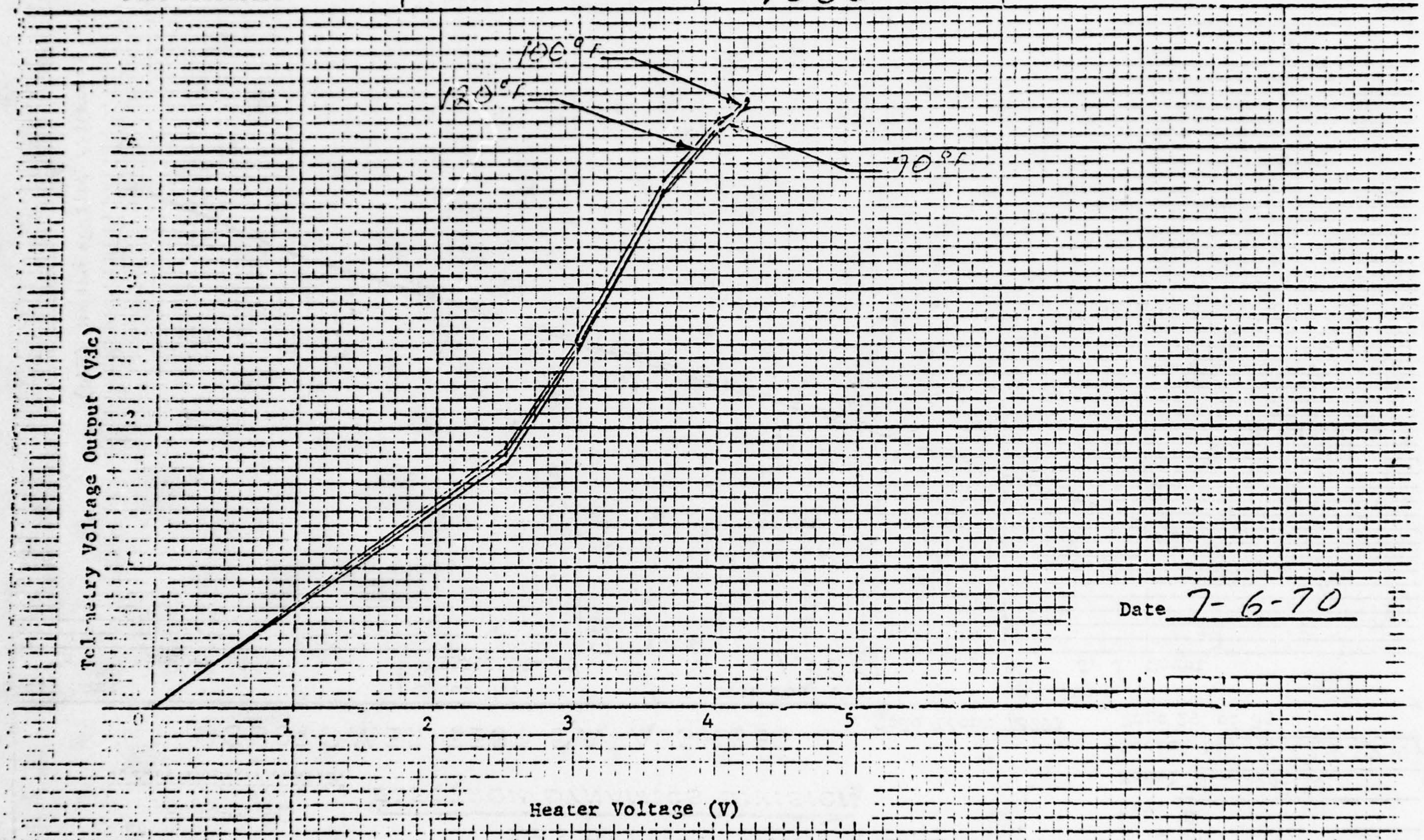
Rev. C

Model B200302-120 B200302-110

Serial No. 00322-1

Code Ident 73293 Page 30 of 35

Test Name	Spec. No.	Test Pos. No.	Quality
Test Procedure	TPB200302-400	1360	J. J. Haupt



Date 7-6-70

Par 5.3.1.4 Helix Current Telemetry

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ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

Code Ident 73293

Data Sheet No. B200302-C

Rev. B200302-12

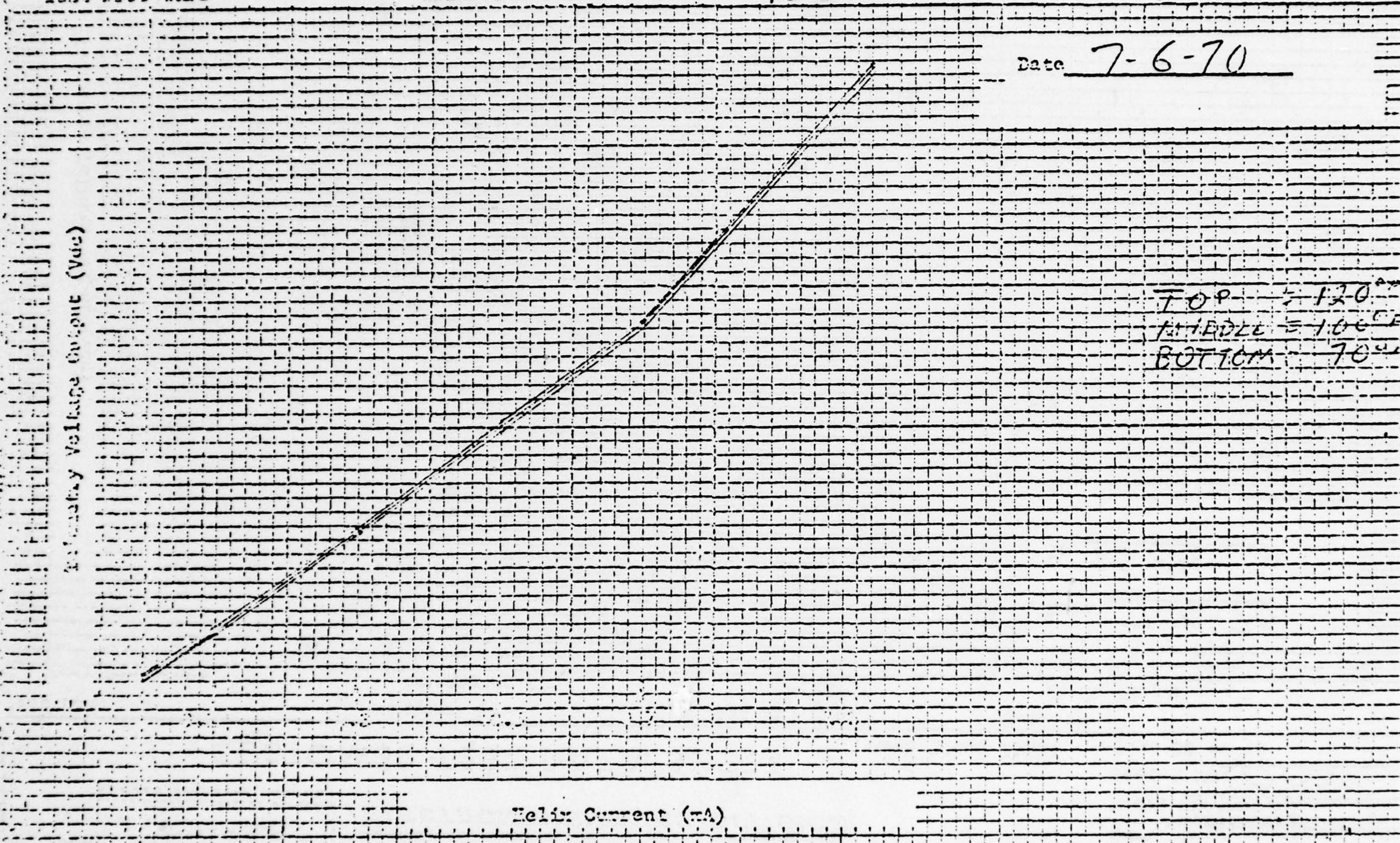
Model B200302-110

Serial No. 00322-1

Page 31 of 35

Test Name	Spec. No.	Test Pos. No.	Quality
Test Procedure	TPB200302-400	1360	J. J. Haupt

Date 7-6-70



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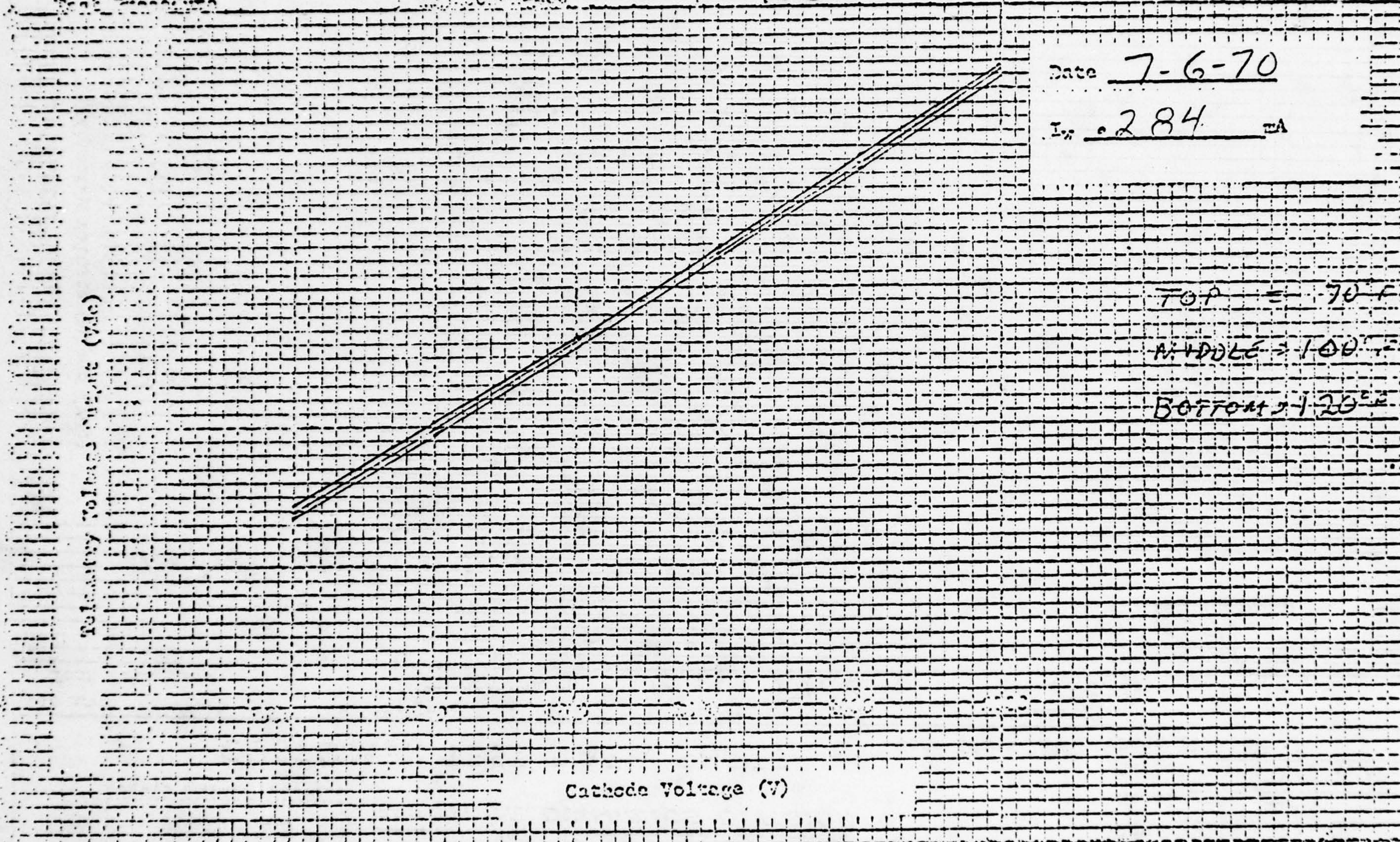
ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

Code Ident 73293

Rev. C
Model [illegible]
Serial No. 003
Page 32 of 35

Test Name	Spec. No.	Test Pos. No.	Quality
Test Procedure	TP3320202-A00	1360	J. J. Faust



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Par 3.3.1.5 Cathode Vo ge Telemetry

ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

Data Sheet No: 200302-

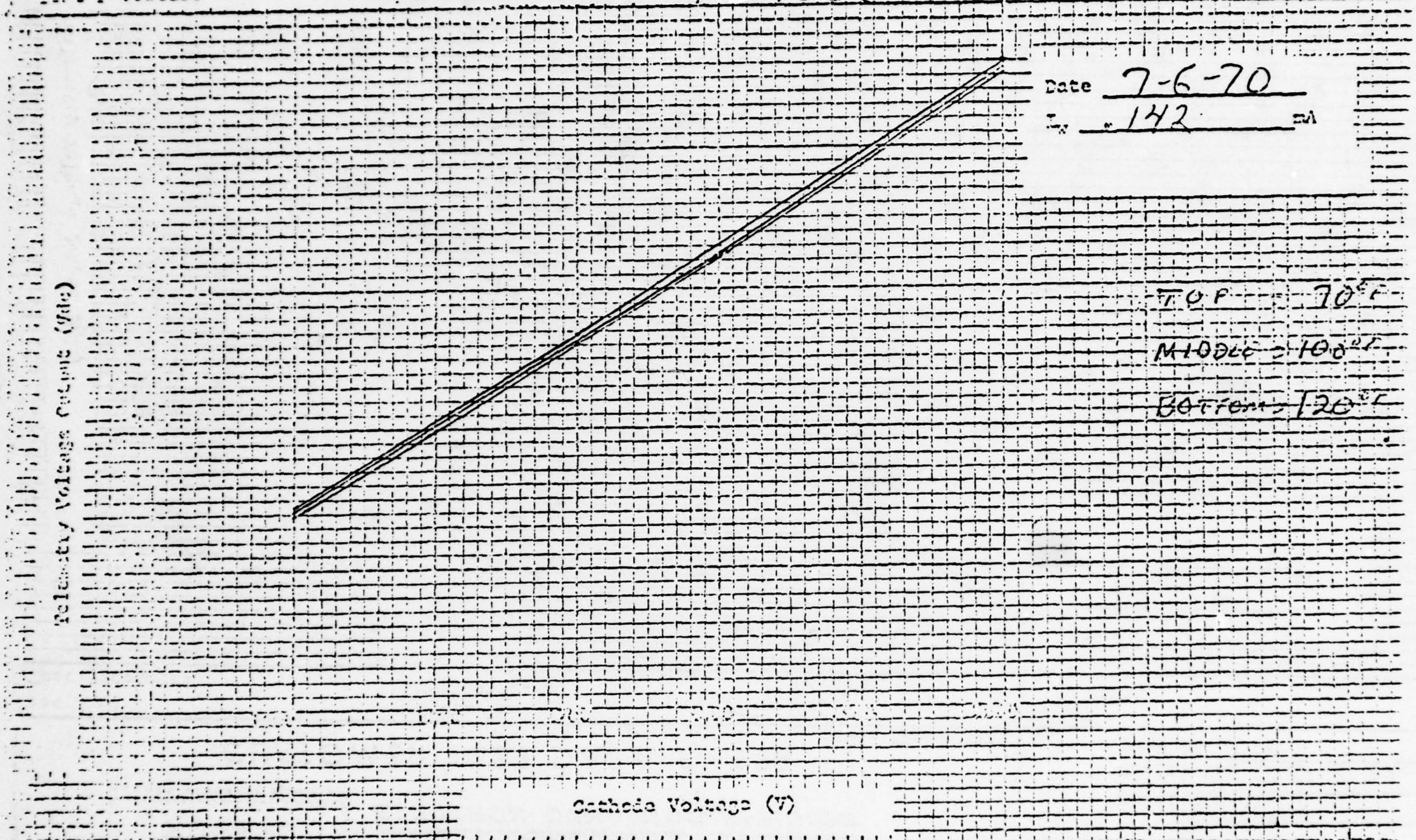
Rev. C

Model B200302-120 B200302-110

Serial No. 00322-1

Page 33 of 35

Test Name	Spec. No.	Test Pos. No.	Quality
Test Procedure	TPB200302-400	1360	J. J. Haupt



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Par 5.3.1.5 Cathode Voltage Telemetry

ELECTRON DYNAMICS DIVISION

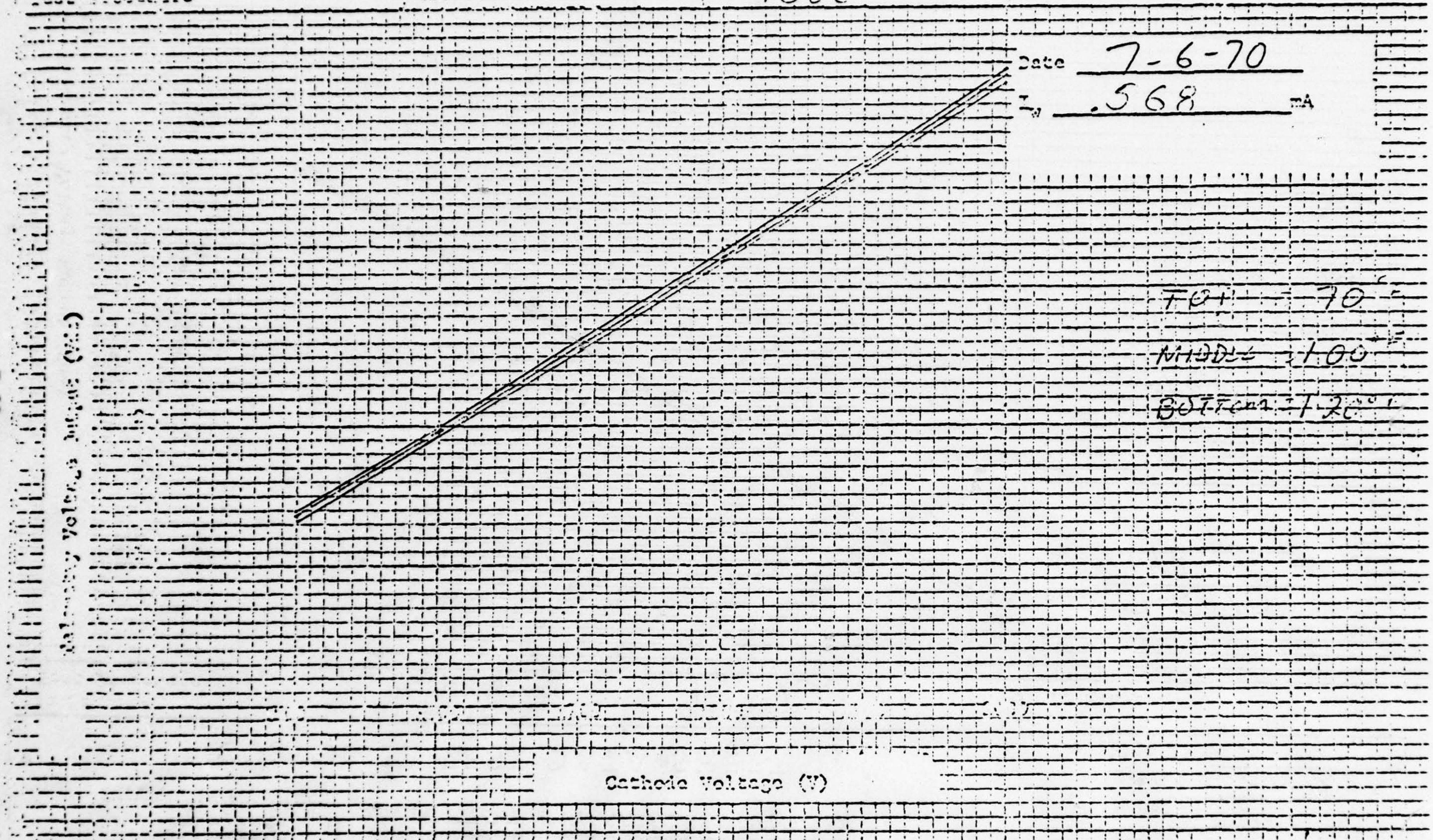
CUSTOMER TEST DATA SHEET

Code Ident 73293

Rev. C
Model B200302-120 / B200302-110
Serial No. 00322-1

Test Name	Spec. No.	Test Proc. No.	Quality
Test Procedure	TPB200302-400	1360	J. J. Haupt

Date 7-6-70
I_w .568 mA



HUGHES

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Par 5.3.1.1 Input (rent Telemetry

ELECTRON DYNAMICS DIVISION

7/.. ... 71 -2

CUSTOMER TEST DATA SHEET

Code Ident 73293

Data Sheet No.

Rev. C

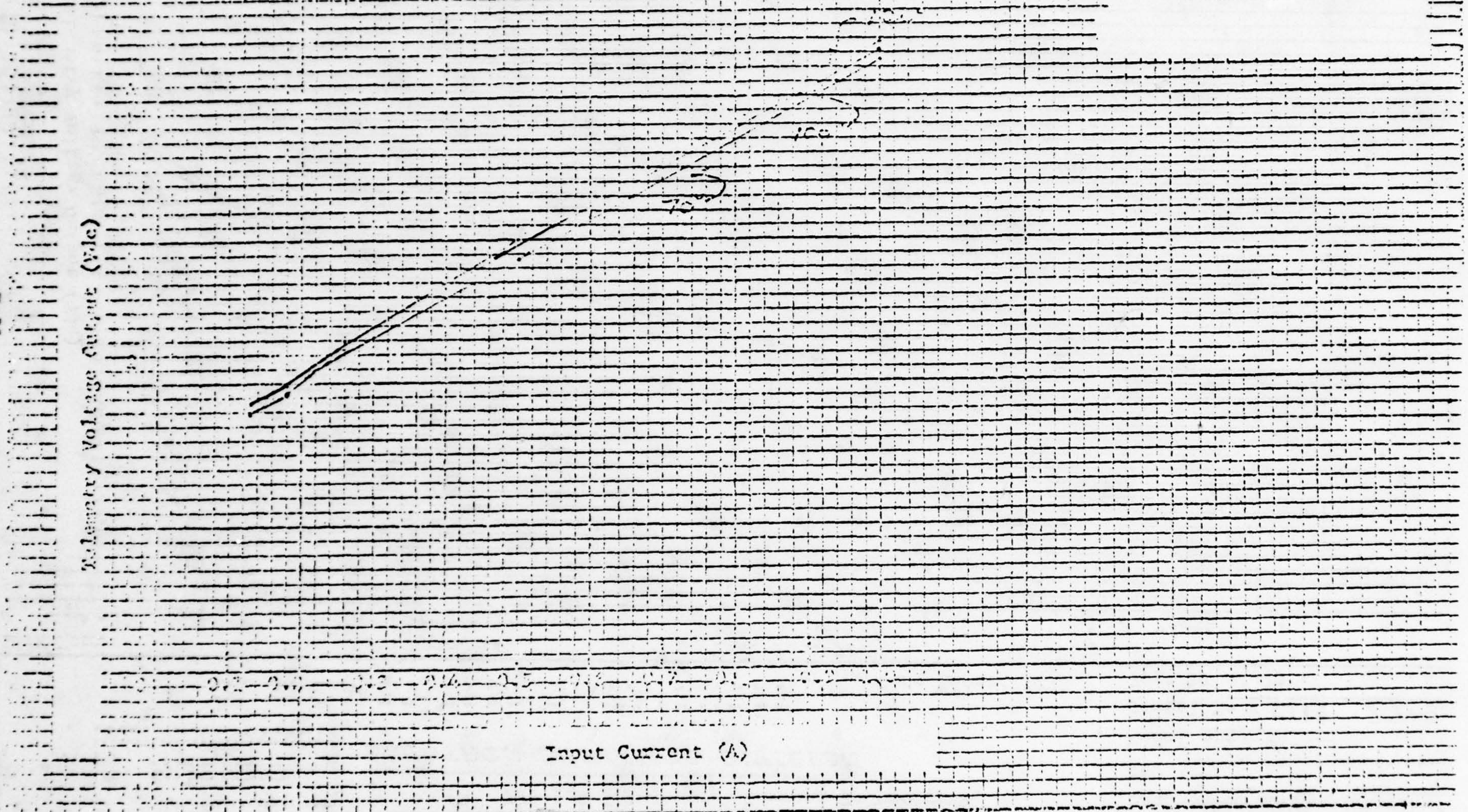
Model 4200302-1?0

Serial No. (3// 22-2

Page 28 of 35

Test Name	Spec. No.	Test Pos. No.	Quality
Test Procedure	TPD200302-400		J. J. Haupt

Date 22 JUN 70



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Par 5.3.1.2 Cathe Current Telemetry

ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

Code Ident 73293

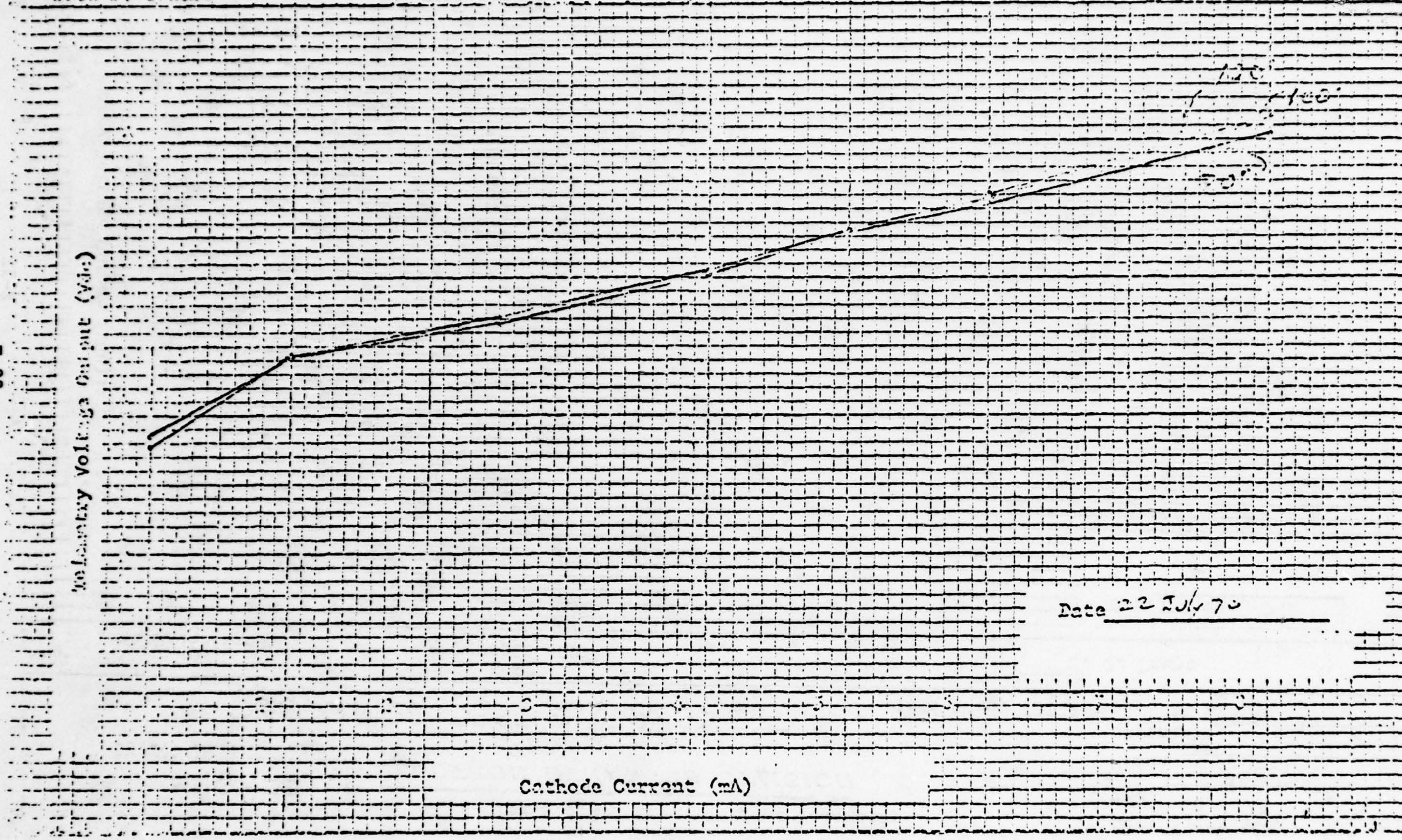
Data Sheet No. 22

Rev. C

Model

Serial No. 011 22-2

Test Name	Spec. No.	Test Pos. No.	Quality
Test Procedure	TPD200302-400		J. J. Houpt



Date 22 July 70

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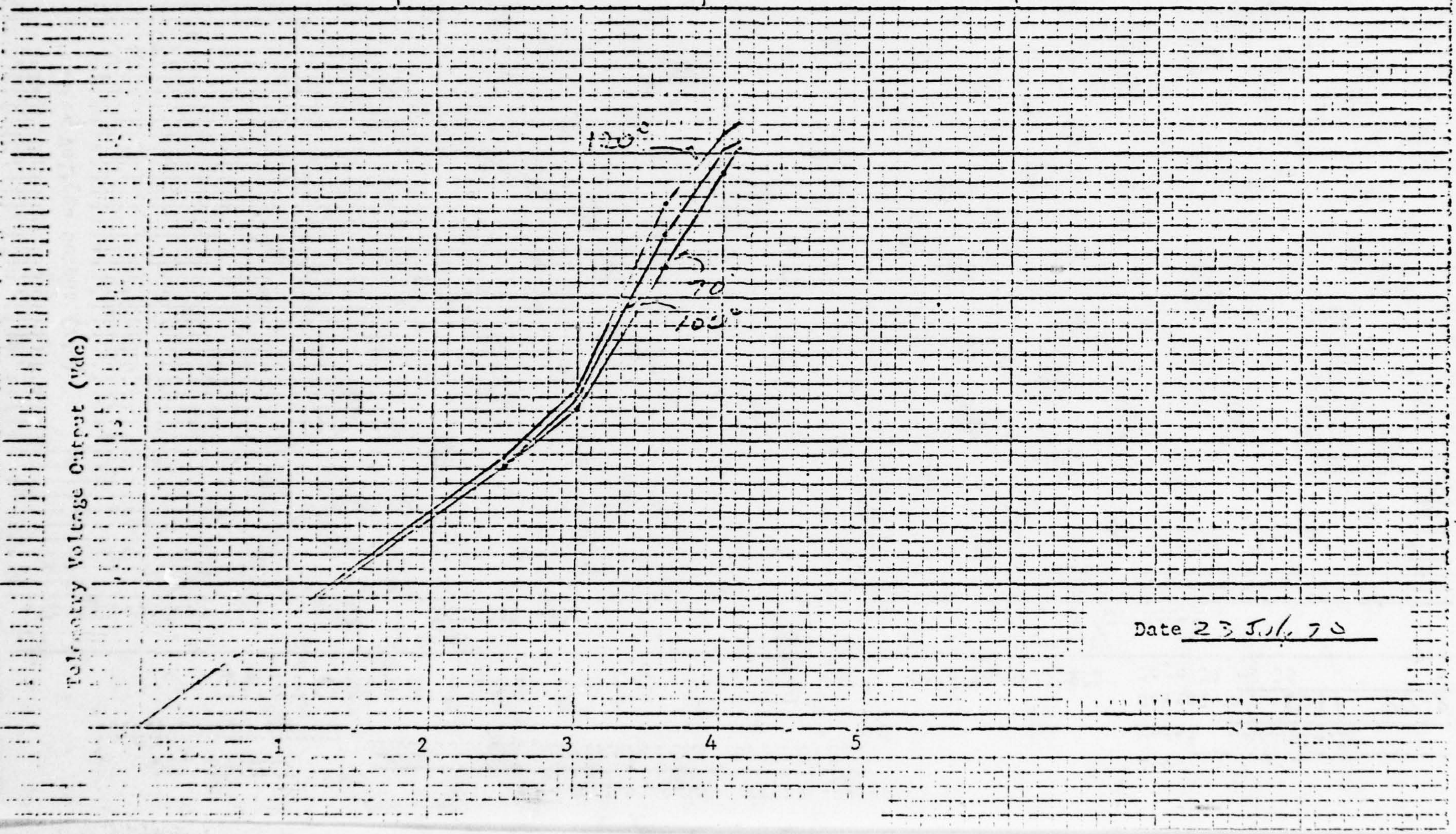
Par 5.3.1.3 Heater Volt : Telemetry

ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

Data Sheet No. DS 200302-490
Rev. C
Model B200302-120 / B200302-110
Serial No. 011 22-2
Code Ident 73293 Page 30 of 35

est Name	Spec. No.	Test Pos. No.	Quality
Test Procedure	TPB200302-400		J. J. Haupt



Date 23 Jul 70

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ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

Rev. C

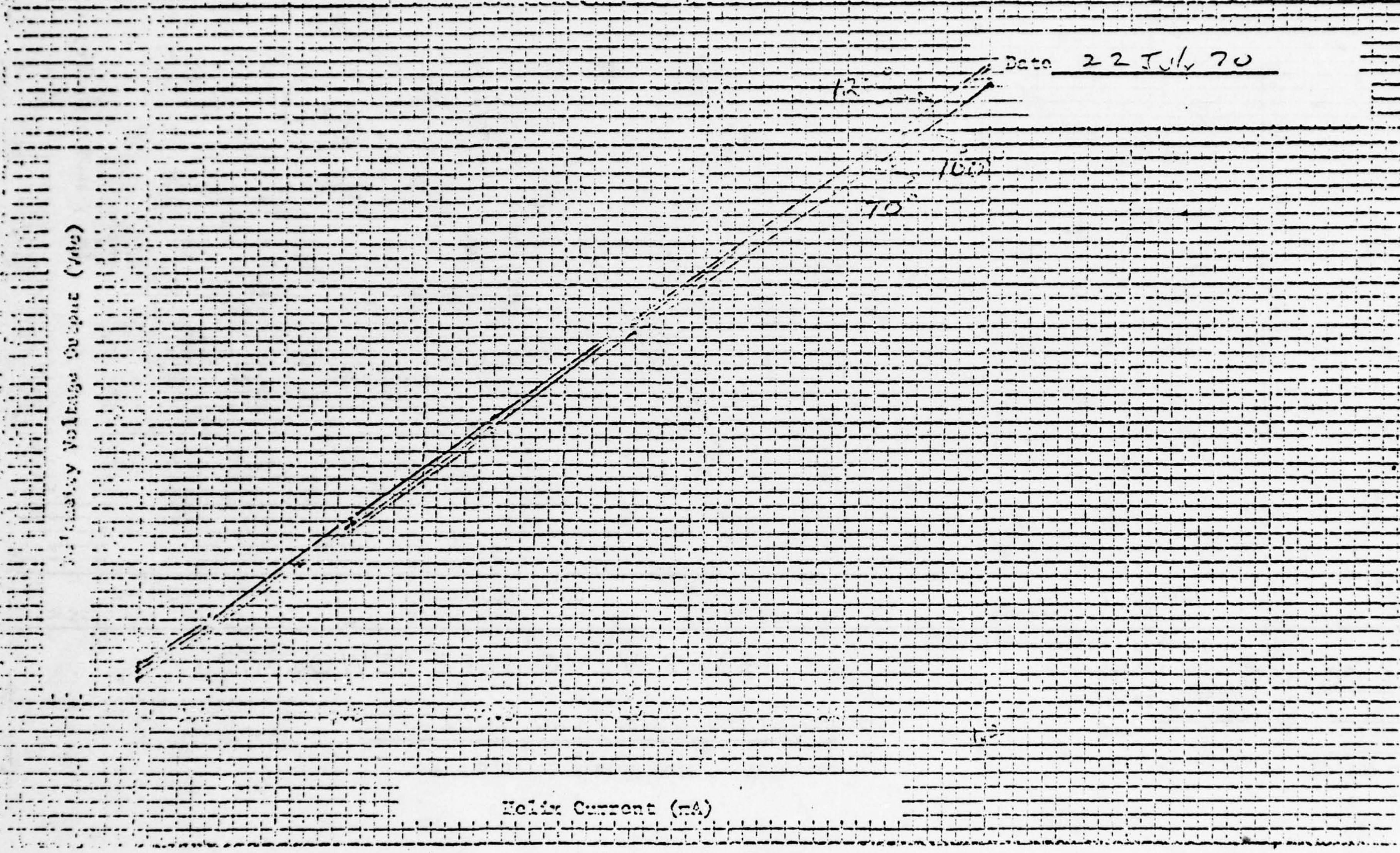
Model [illegible]

Serial No. CU 22-2

Code Ident 73293

Test Name	Spec. No.	Test Pos. No.	Quality
Test Procedure	[illegible]-400		J. J. Haupt

Date 22 July 70



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Par 5.3.1.5 Cathode Voltage Telemetry

ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

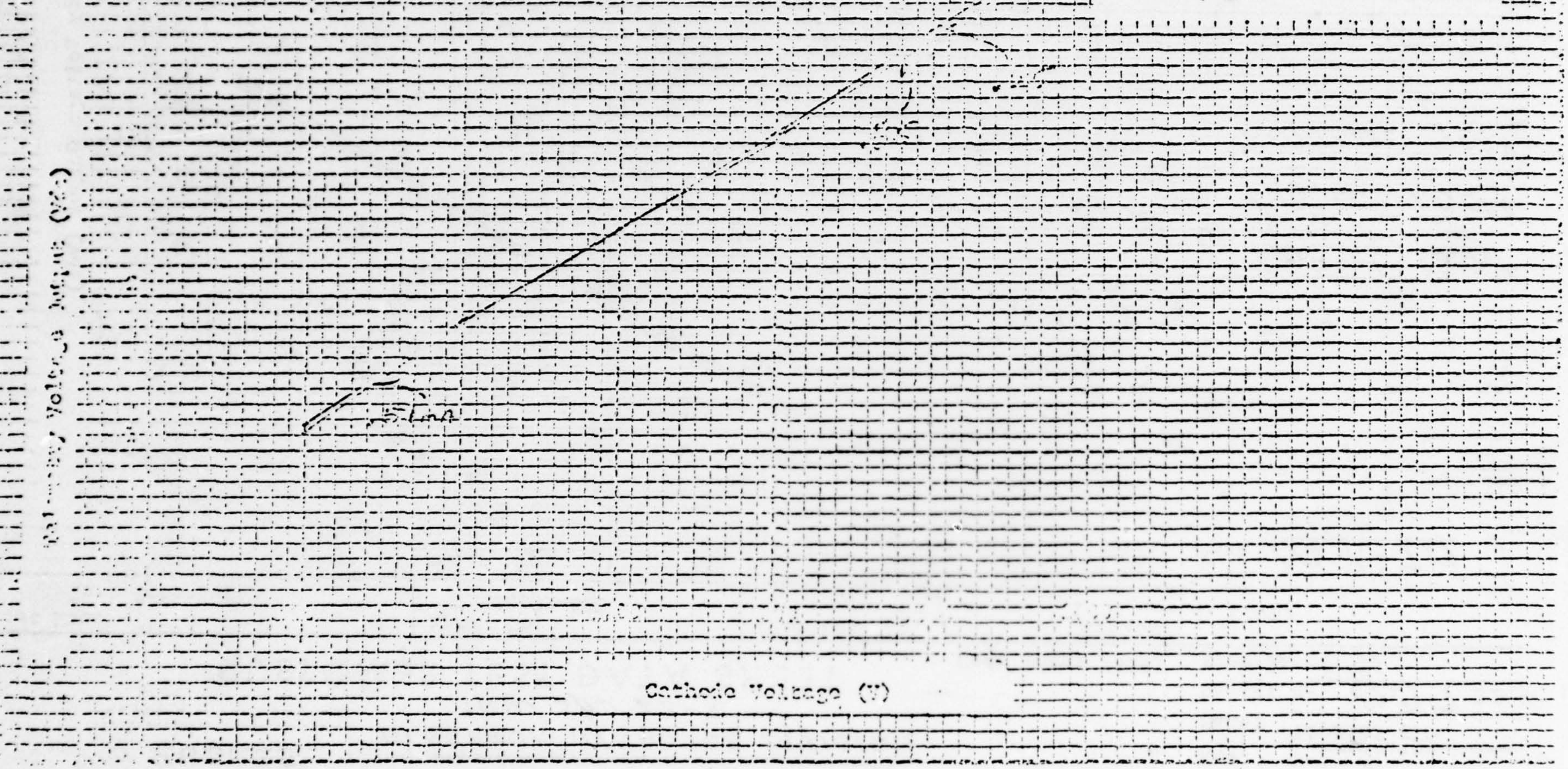
Code Ident 73293

Rev. C
Model B200302-120
B200302-110
Serial No. 011 22-2

Test Name	Spec. No.	Test Pos. No.	Quality
Test Procedure	TPB200302-400		J. J. Haupt

Date 22 Jul 70

I_k .51, .25, .85 mA
120°



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Par 5.3.1.5 Cathode V___age Telemetry

ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

Code Ident 73293

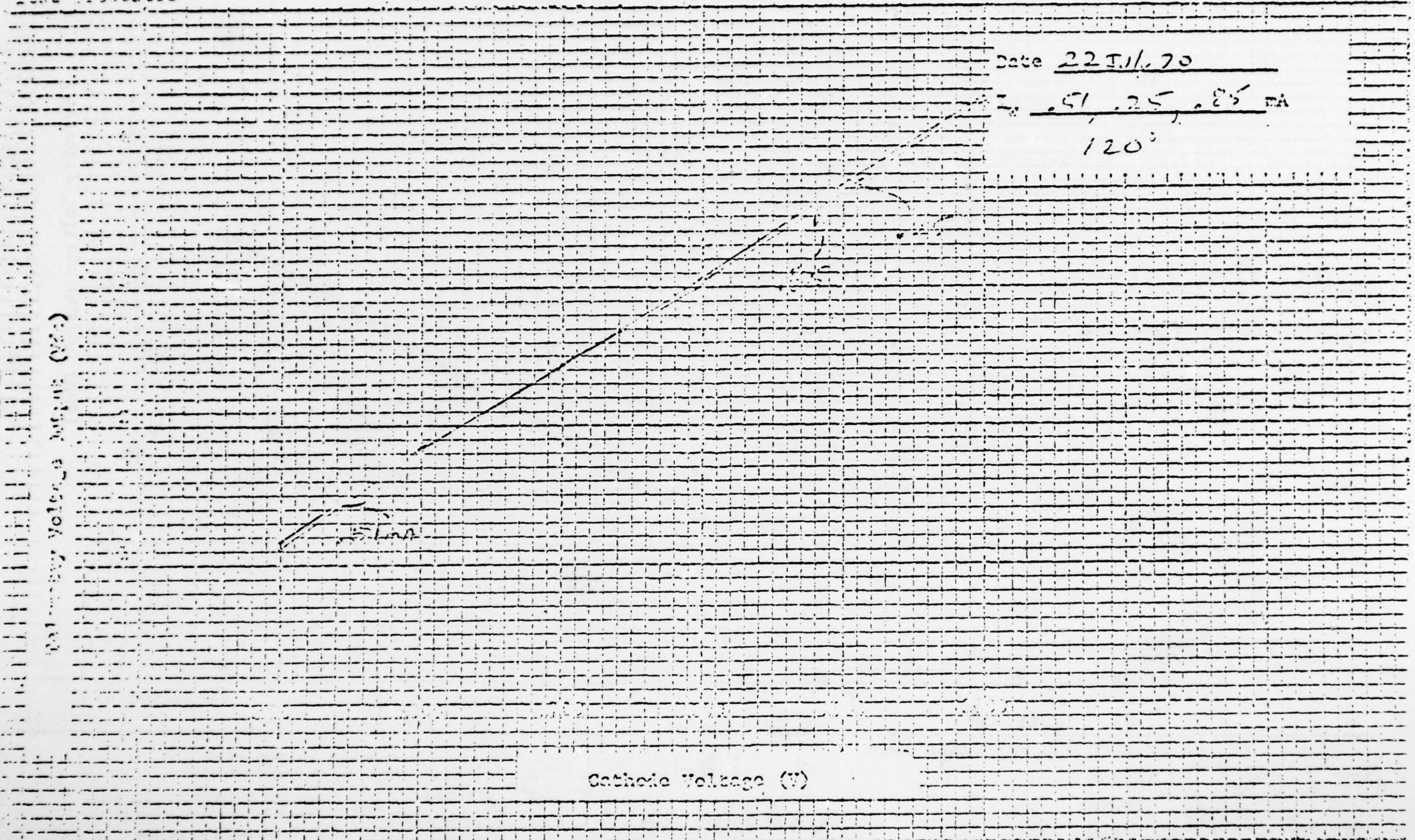
Rev. C

Model B200302-120 / B200302-110

Serial No. 011 22-2

Page 34 of 35

Test Name	Spec. No.	Test Pos. No.	Quality
Test Procedure	TPB200302-400		J. J. Haupt



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ELECTRON DYNAMICS DIVISION

TRW S/N 22-3

CUSTOMER TEST DATA SHEET

Code Ident 73293

Rev. G

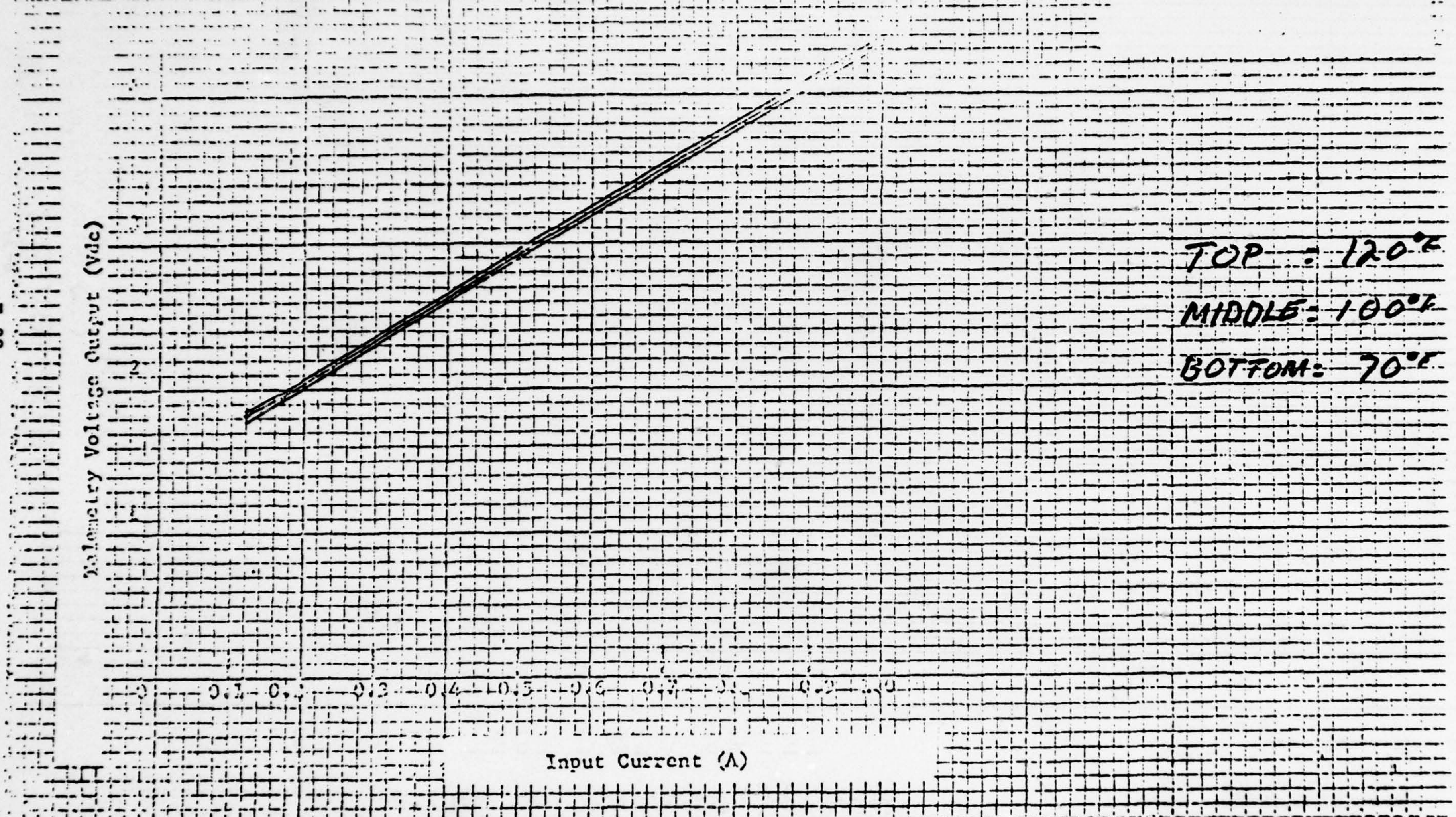
Model 1200302-120

Serial No. 007 22-3

Page 28 of 35

Test Name	Spec. No.	Test Pos. No.	Quality
Test Procedure	TPB200302-400	1	J. J. Haupt

Date 10-6-70



[redacted] Pa[redacted] 3. [redacted] Ca[redacted] C[redacted]nt [redacted] ma[redacted] Da[redacted] She[redacted]

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ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

Code Ident 73293

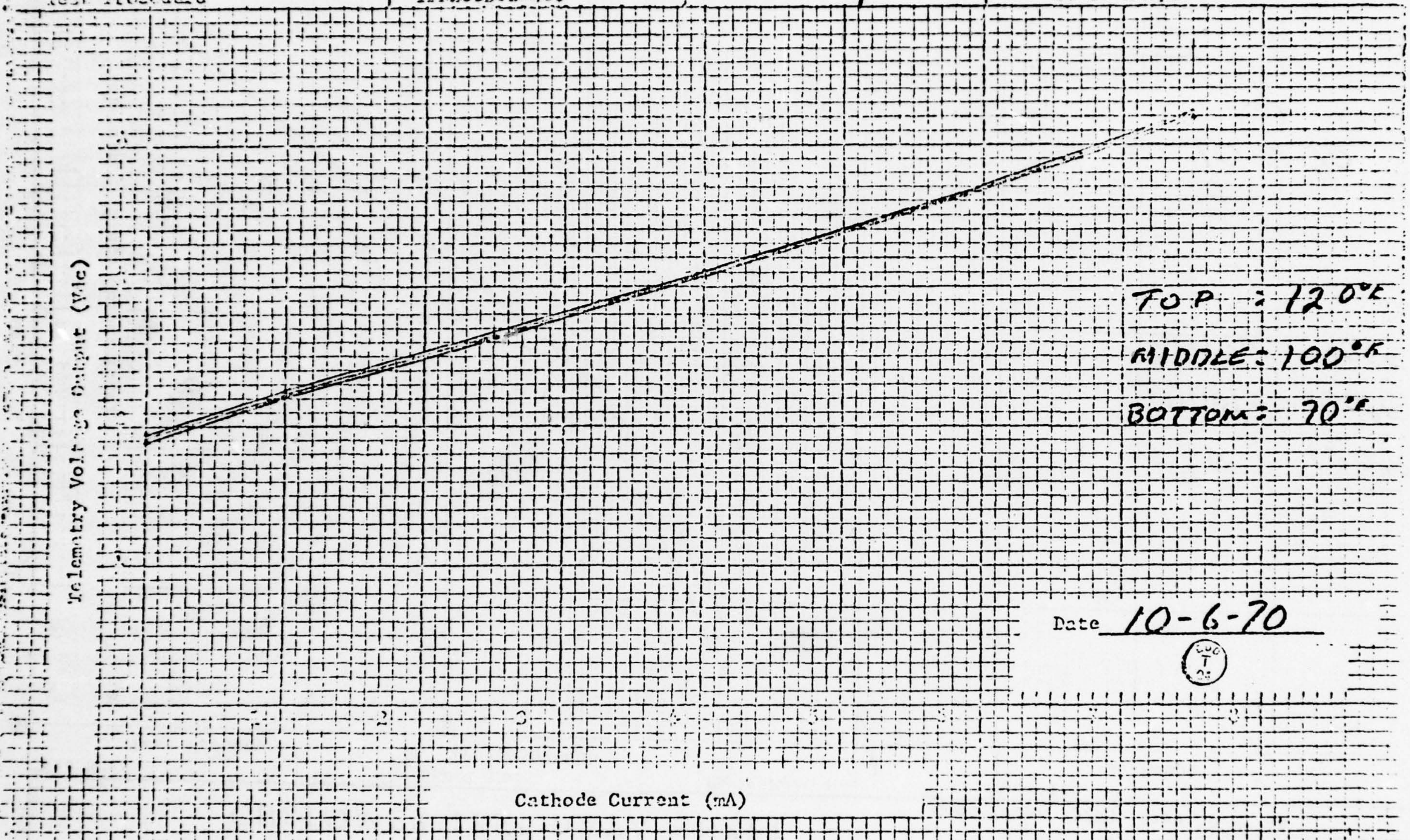
Rev. C

Model

Serial No. 007

Page 29 of 35

Test Name	Spec. No.	Test Pos. No.	Quality
Test Procedure	TPS200302-400	1	J. J. Haupt



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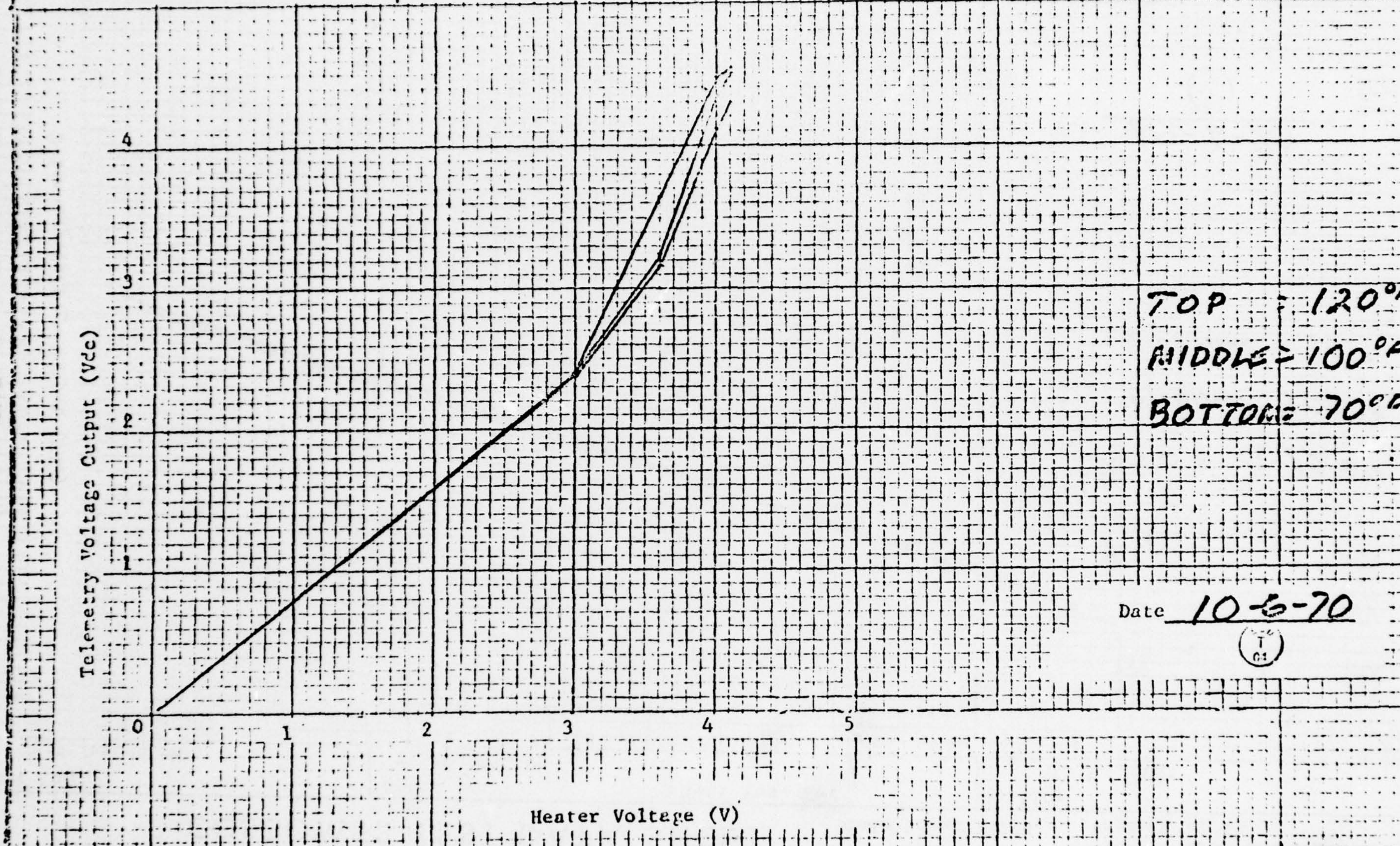
ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

Rev. C
Model B200302-120 / B200302-110
Serial No. 007 22-3
Code Ident 73293 Page 30 of 35

Test Name	Spec. No.	Test Pos. No.	Quality
Test Procedure	TPB200302-400	1	J. J. Haupt



Date 10-6-70

Per 3.3.1.4 Req. Current Telemetry

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ELECTRON DYNAMICS DIVISION

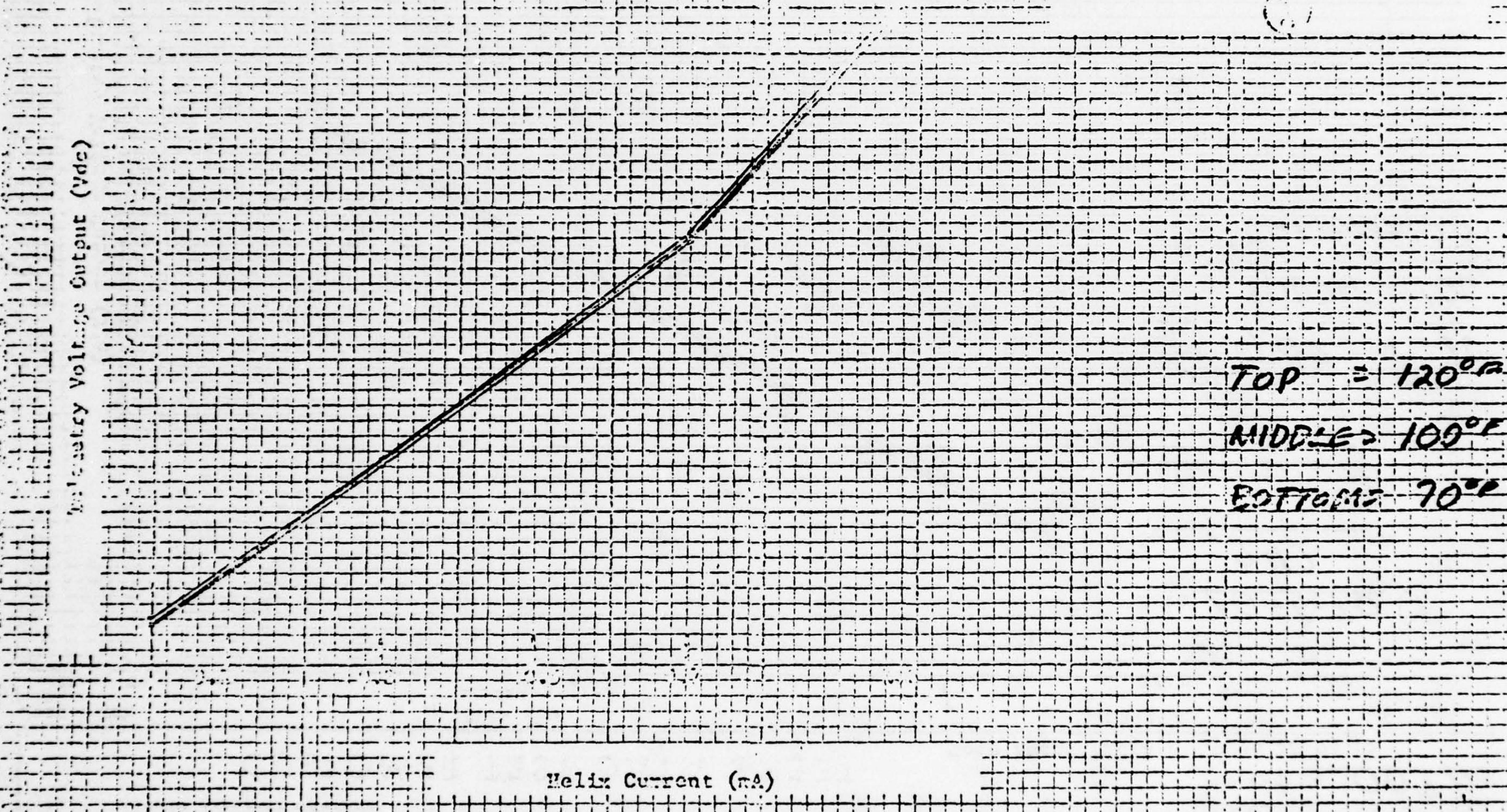
CUSTOMER TEST DATA SHEET

Code Ident 73293

Data Sheet No. E200302-
Rev. C
Model D200302-110
Serial No. 00722-3
Page 31 of 35

Test Name	Spec. No.	Test Proc. No.	Quality
Test Procedure	E200302-400	1	J. J. Knupt

Date 10-6-70



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ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

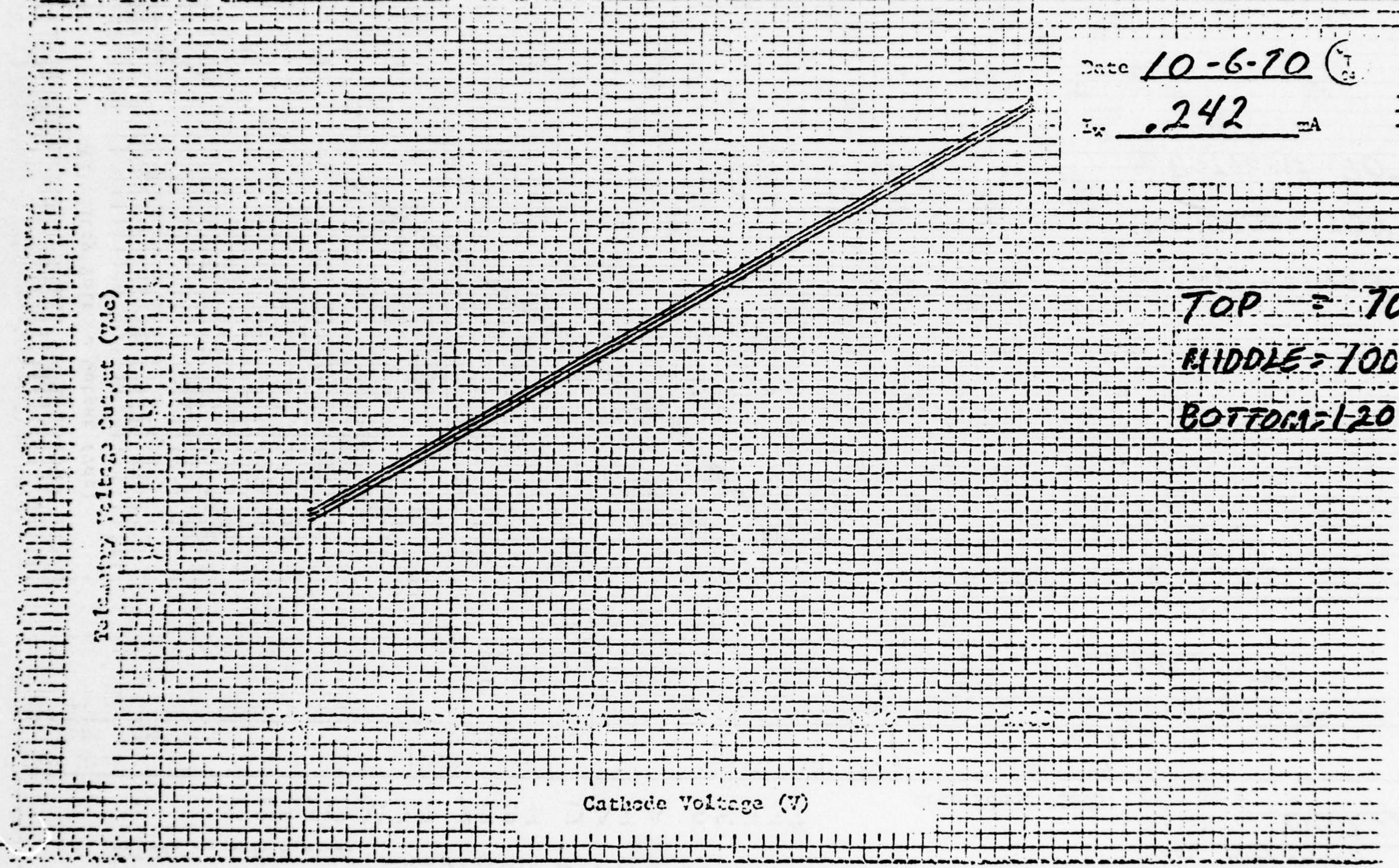
Code Ident 73293

Rev. C
Model [illegible]
Serial No. 007 22-3
Page 32 of 35

Test Name	Spec. No.	Test Pos. No.	Quality
Test Procedure	[illegible]-400	1	J. J. Faust

Date 10-6-70

I_w .242 mA



Par 5.3.1.5 Cathode Vo...age Telemetry

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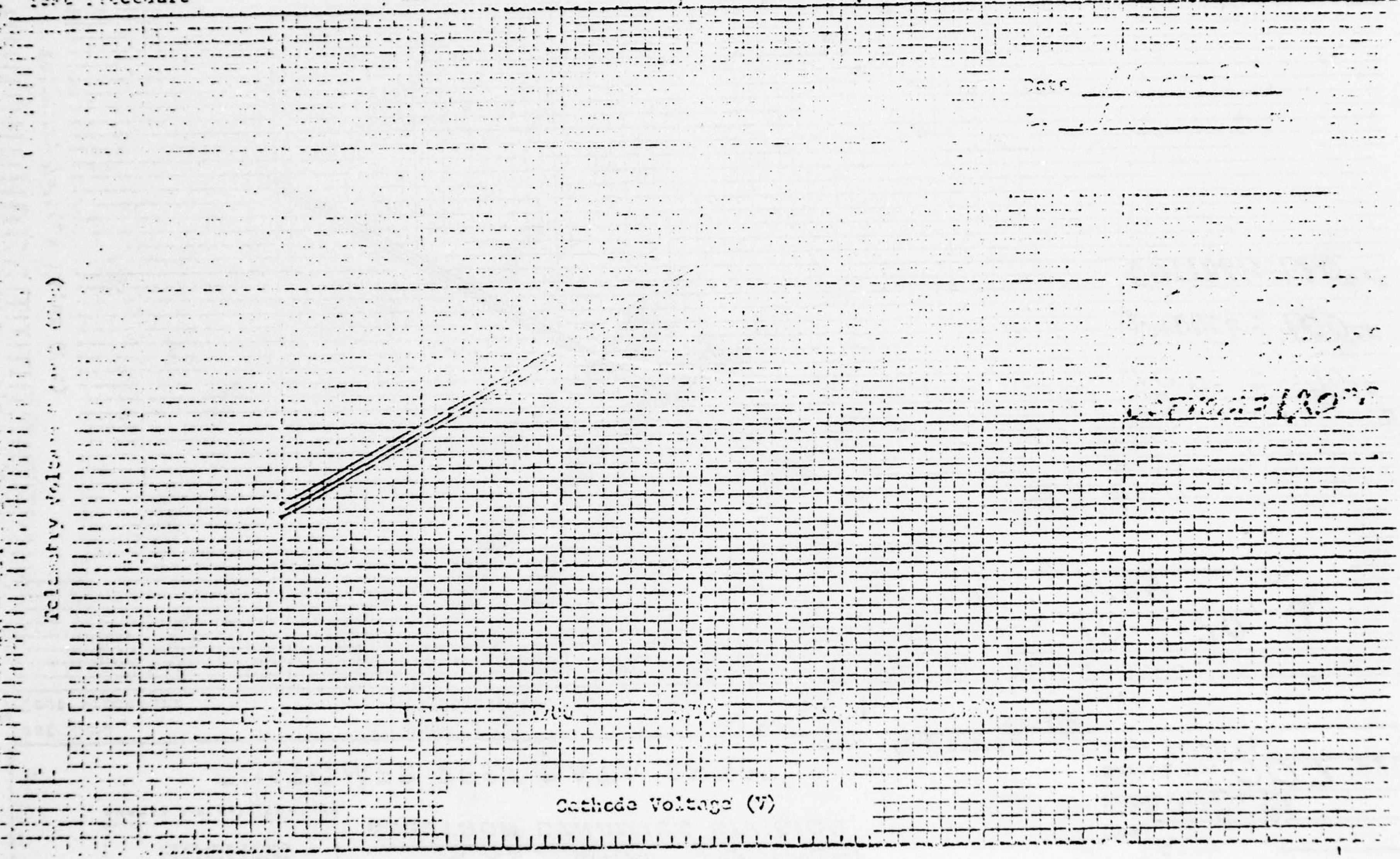
ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

Rev. C
Model E200302-120 / E200302-110
Serial No. 007 22.2

Test Name	Spec. No.	Test Pos. No.	Quality
Test Procedure	TP3200302-400	1	J. J. Haupt

Date



Par 5.3.1.5 Cathode Stage Telemetry

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ELECTRON DYNAMICS DIVISION

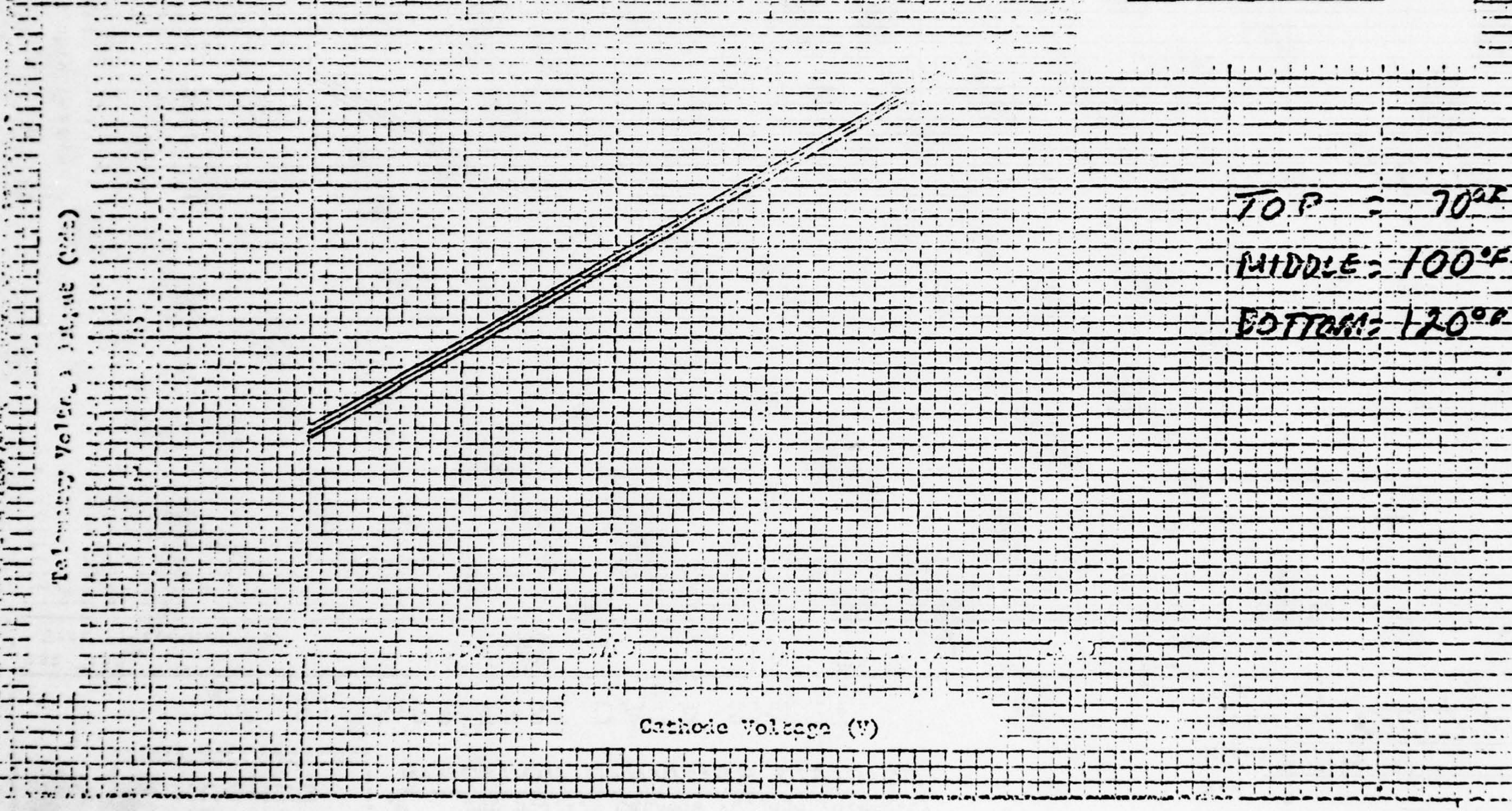
CUSTOMER TEST DATA SHEET

Rev. C
Model B200302-120 / B200302-110
Serial No. 007 22-3

Code Ident 73293

Test Name	Spec. No.	Test Pos. No.	Quality
Test Procedure	TPB200302-400		J. J. Haupt

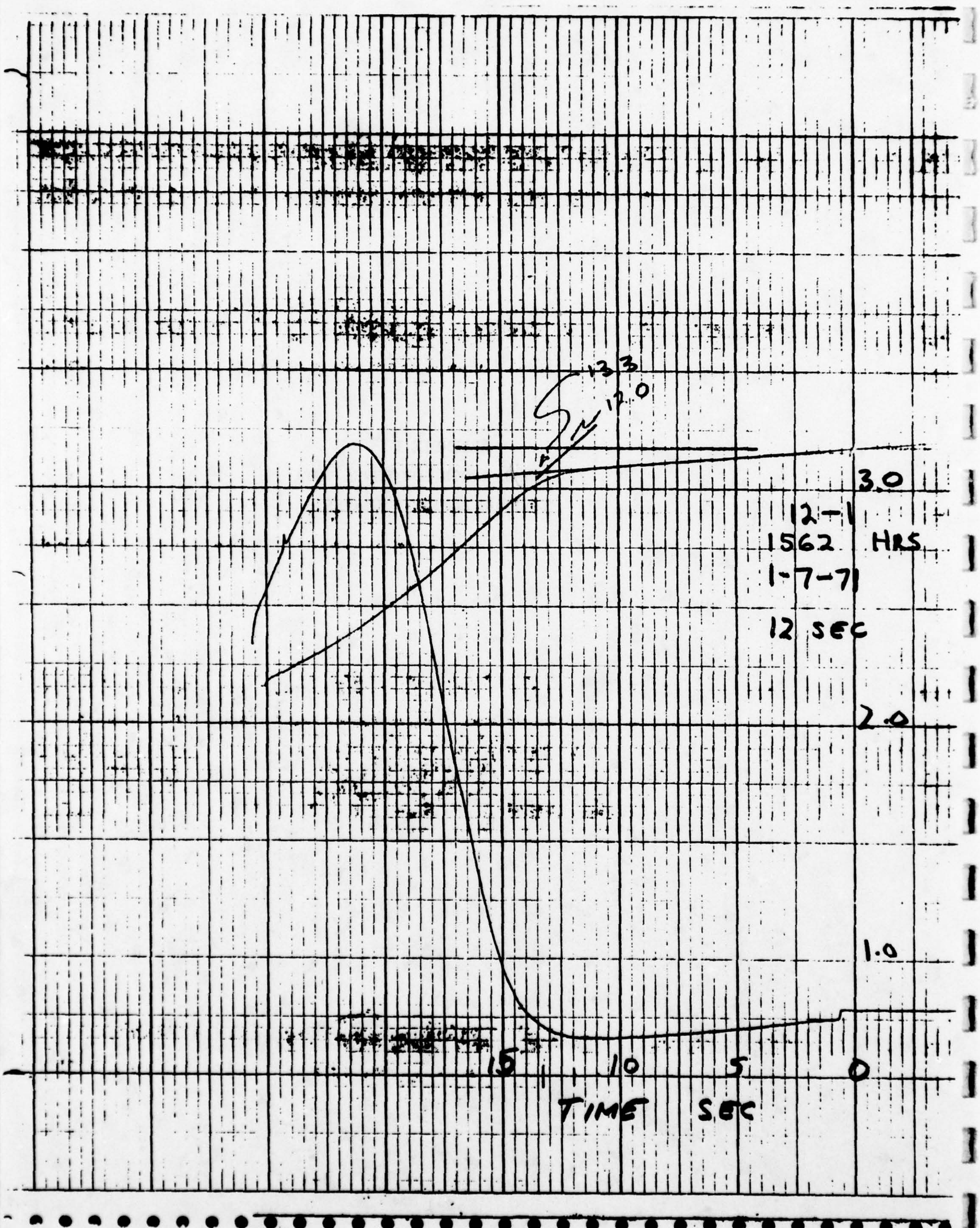
Date 10-6-70
I. .404 mA



APPENDIX F

777 MODEL 1200H LOW LEVEL TWTA

CATHODE ACTIVITY CURVES



13.3
12.0
3.0
12-1
1562 HRS
1-7-71
12 SEC
2.0
1.0
15
10
5
0
TIME SEC

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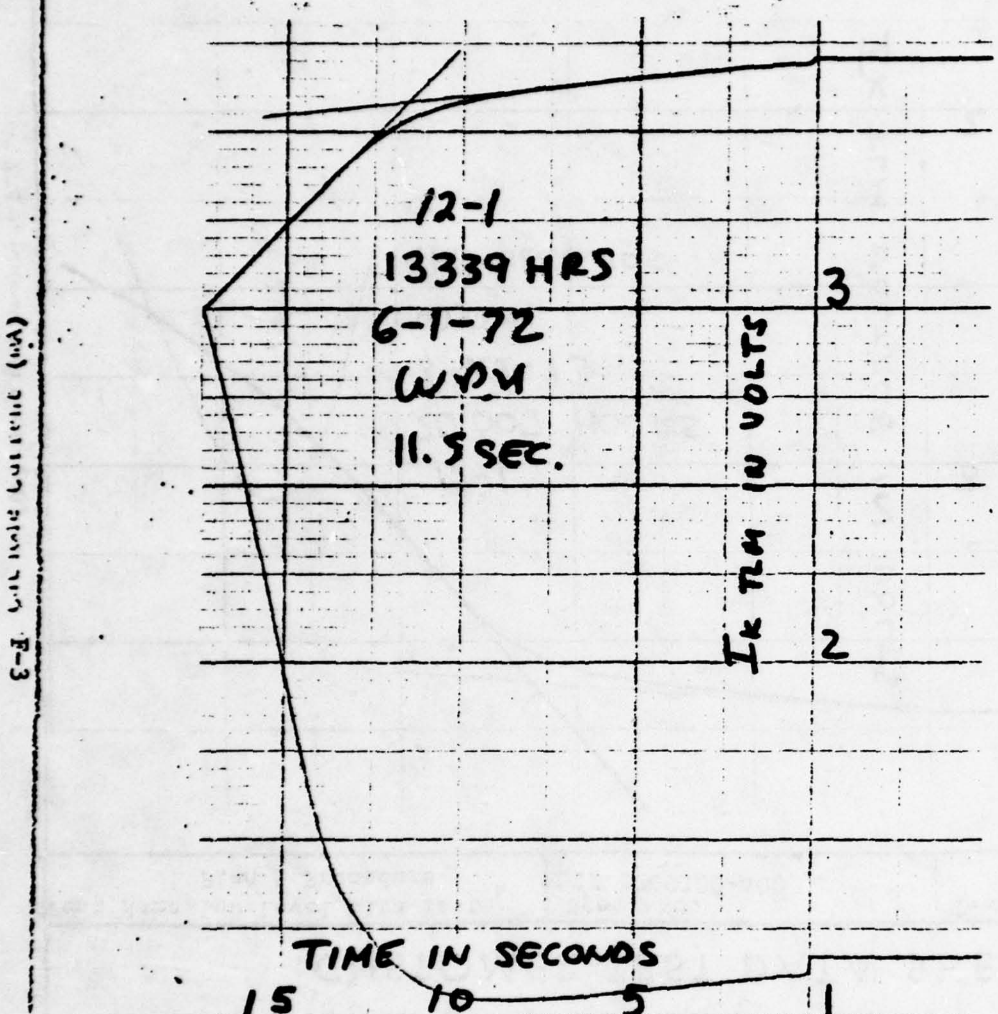
CUSTOMER TEST DATA SHEET

Code Ident 73293

Rev.
Model B200300-121 B200300-122
Serial No. 12-1
Page 3 of 38

Test Name	Spec. No.	Test Pos. No.	Quality
Low Level Life Test Plan & Procedure	LTP B200300-400	QU-46	

Date 6-1-72



HUGHES
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ELECTRON DYNAMICS DIVISION

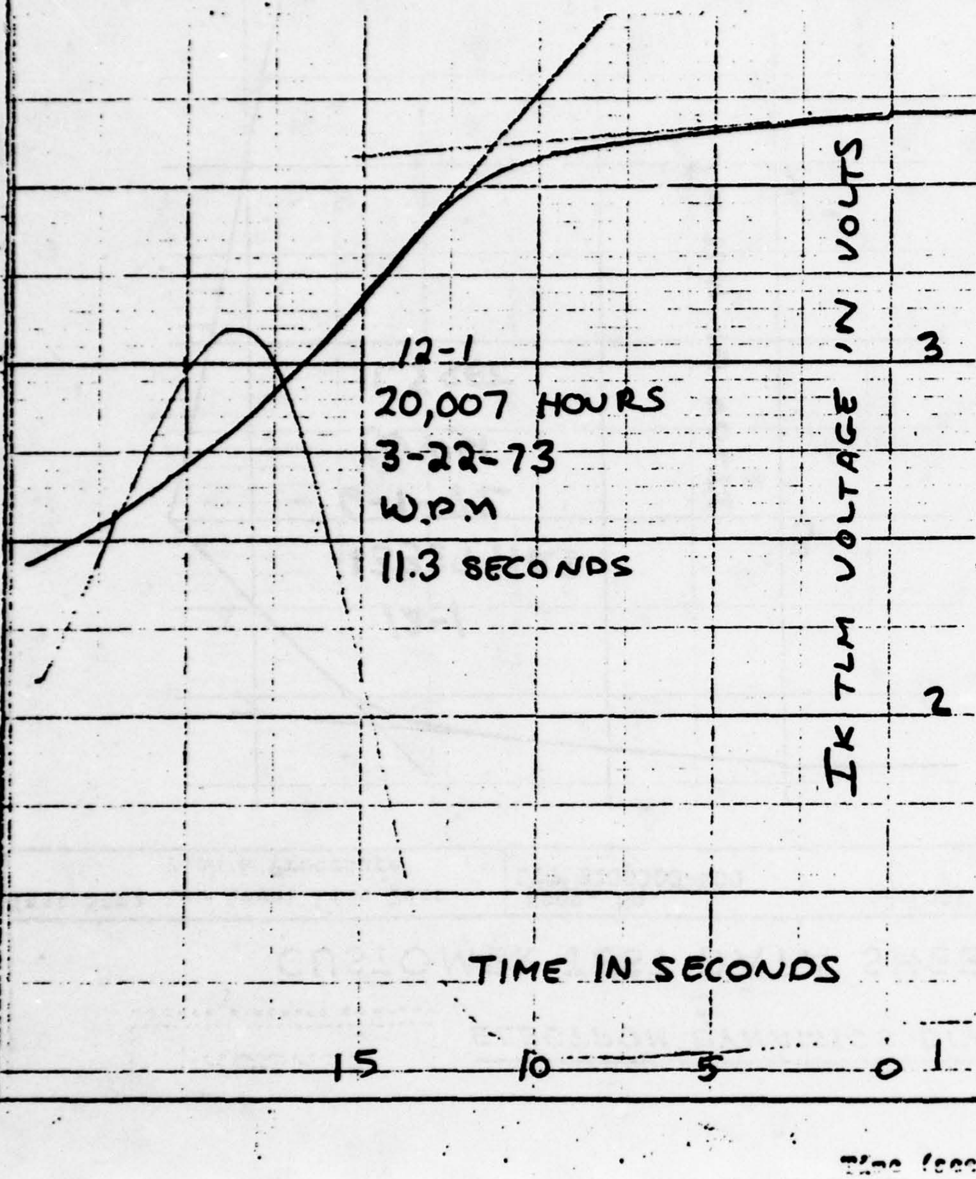
CUSTOMER TEST DATA SHEET

Code Ident 73293

Rev.
Model B200300-121 B200300-122
Serial No. 12-1

Test Name	Spec. No.	Test Pos. No.	Quality
Low Level Life Test Plan & Procedure	LTP B200300-400	QU-46	

Date 3-22-73



HUGHES
HUGHES AIRCRAFT COMPANY

ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

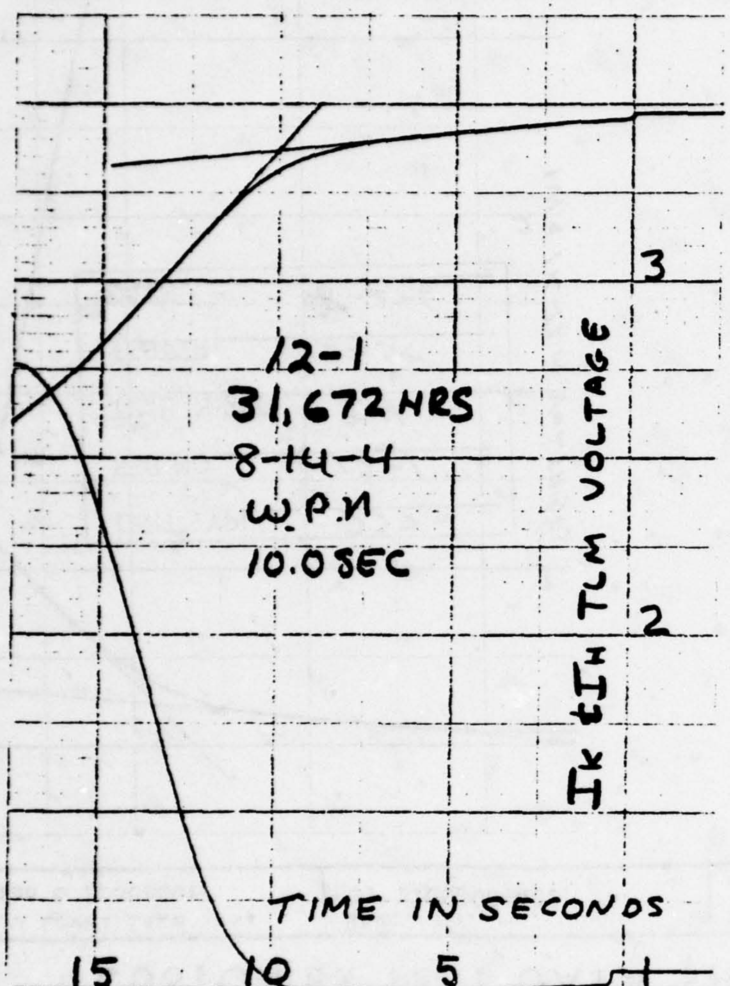
Code Ident 73293

Rev.
Model B200300-121 B200300-122
Serial No. 12-1
Page 2 of 38

Test Name	Spec. No.	Test Pos. No.	Quality
Low Level Life Test Plan & Procedure	LTP B200300-400	QU-46	

Date 8-14-4
W.P.M
31,672 HRS

Cathode Current (μA)



HUGHES
HUGHES AIRCRAFT COMPANY

ELECTRON DYNAMICS DIVISION

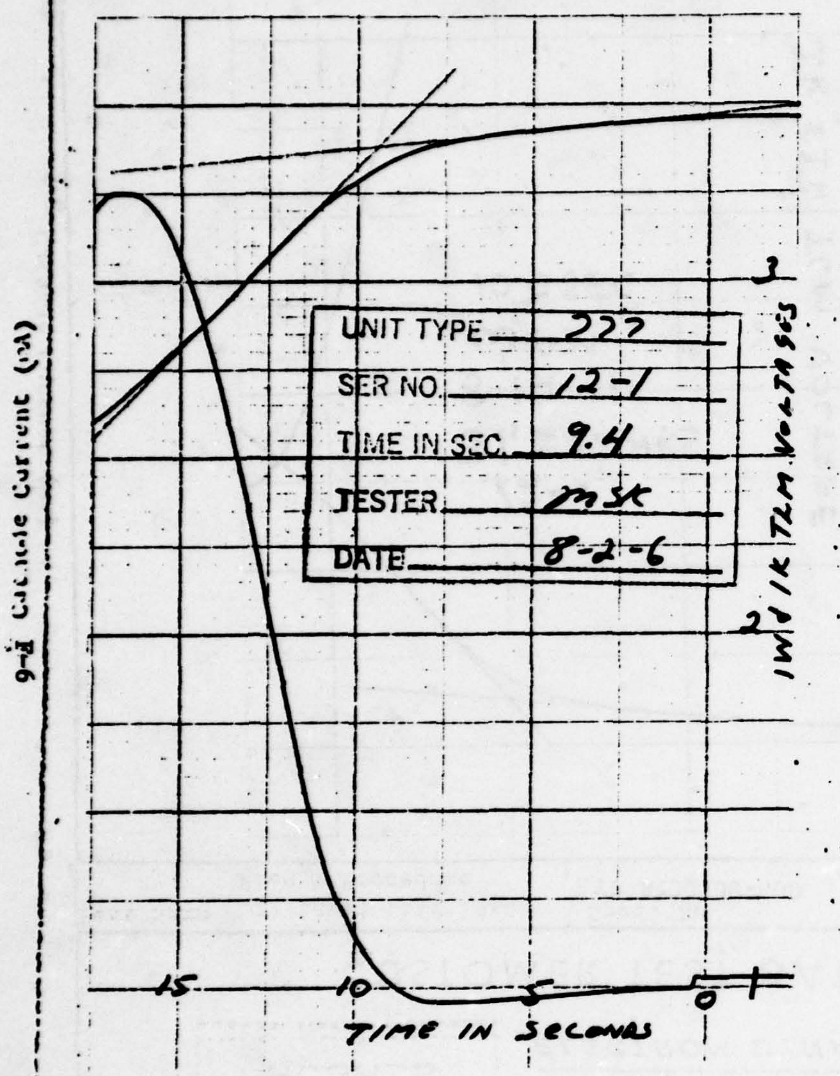
CUSTOMER TEST DATA SHEET

Code Ident 73293

Rev.
Model B200300-121 / B200300-122
Serial No. 12-1
Page 4 of 38

Test Name Low Level Life Test Plan & Procedure	Spec. No. LTP B200300-400	Test Pos. No.	Quality

Date 8-2-6
48,497



Time (sec)

Data Sheet No. ________

HUGHES
HUGHES AIRCRAFT COMPANY

ELECTRON DYNAMICS DIVISION

Rev. ________
Model B200300-121 B200300-122
Serial No. 12-1
Page 2 of 38

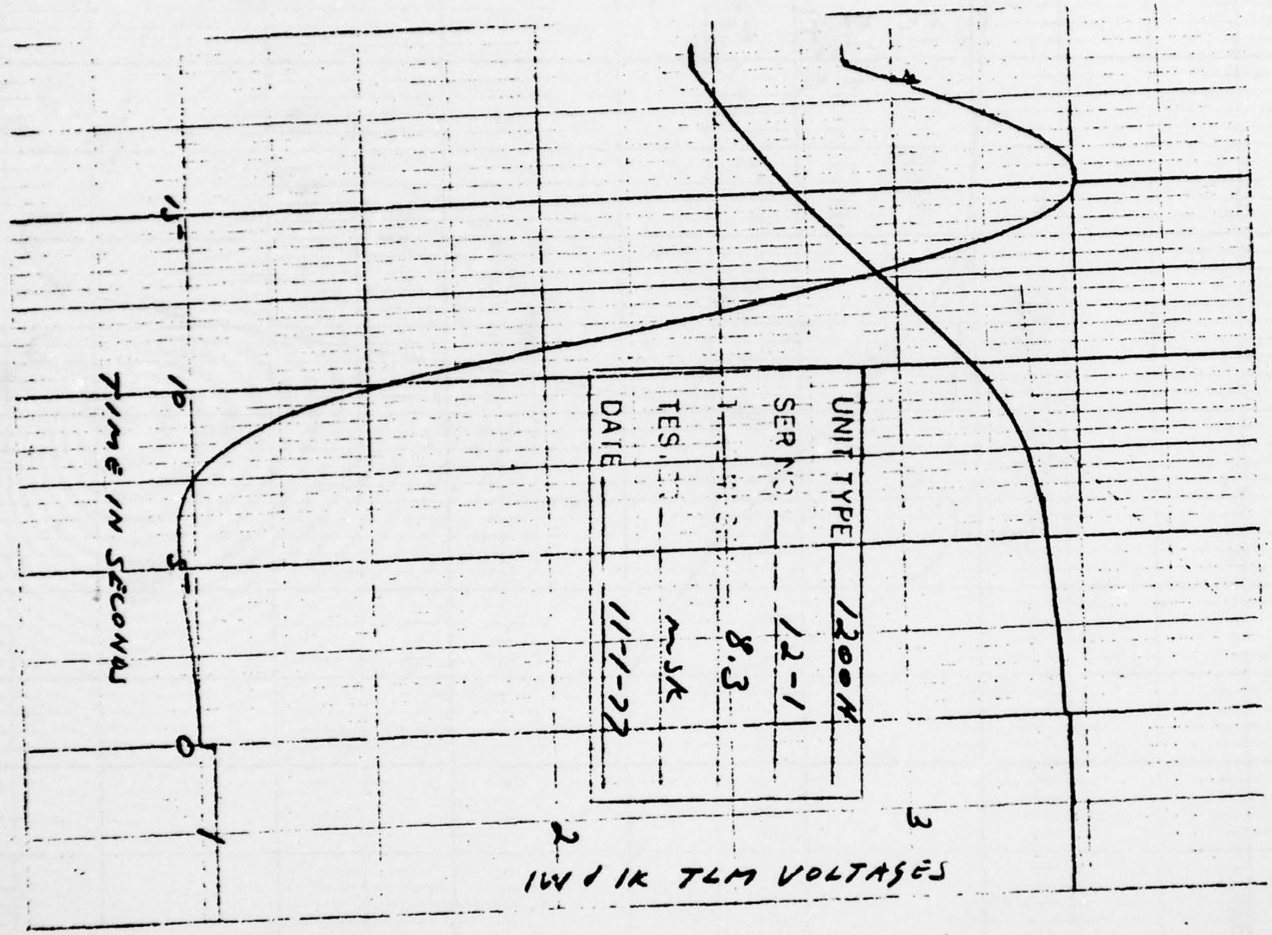
CUSTOMER TEST DATA SHEET

Code Ident 73293

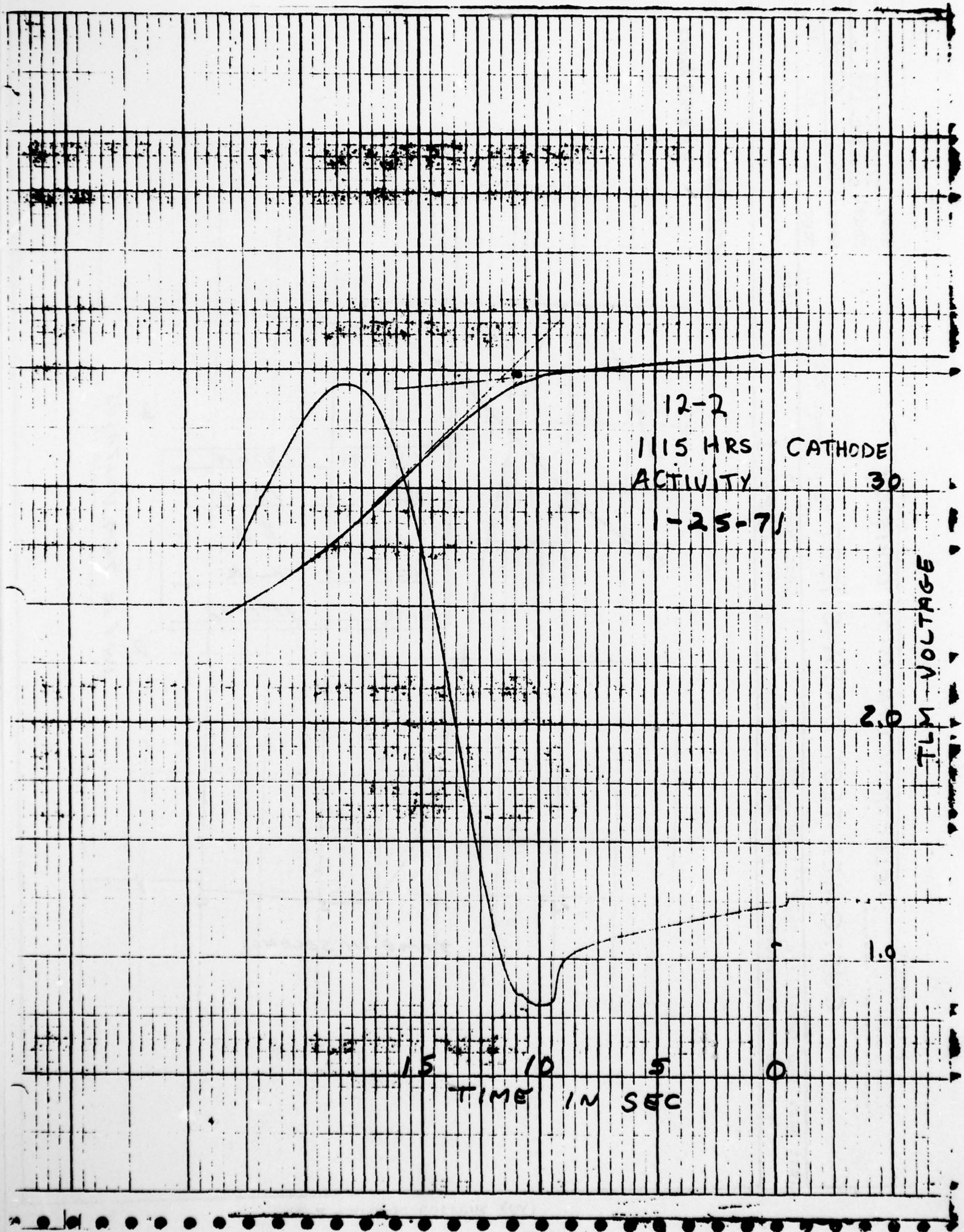
Test Name	Spec. No.	Test Pos. No.	Quality
Low Level Life Test Plan & Procedure	LTP B200300-400	198053	

Date 11-1-77

58873 hours



Cathode Current (mA)


12-2
1115 HRS CATHODE ACTIVITY
1-25-71
30
2.0
1.0
TLM VOLTAGE
15
10
5
0
TIME IN SEC

HUGHES
HUGHES AIRCRAFT COMPANY

Par 4.5 Cathode Activity 13,200 Hour Test

ELECTRON DYNAMICS DIVISION

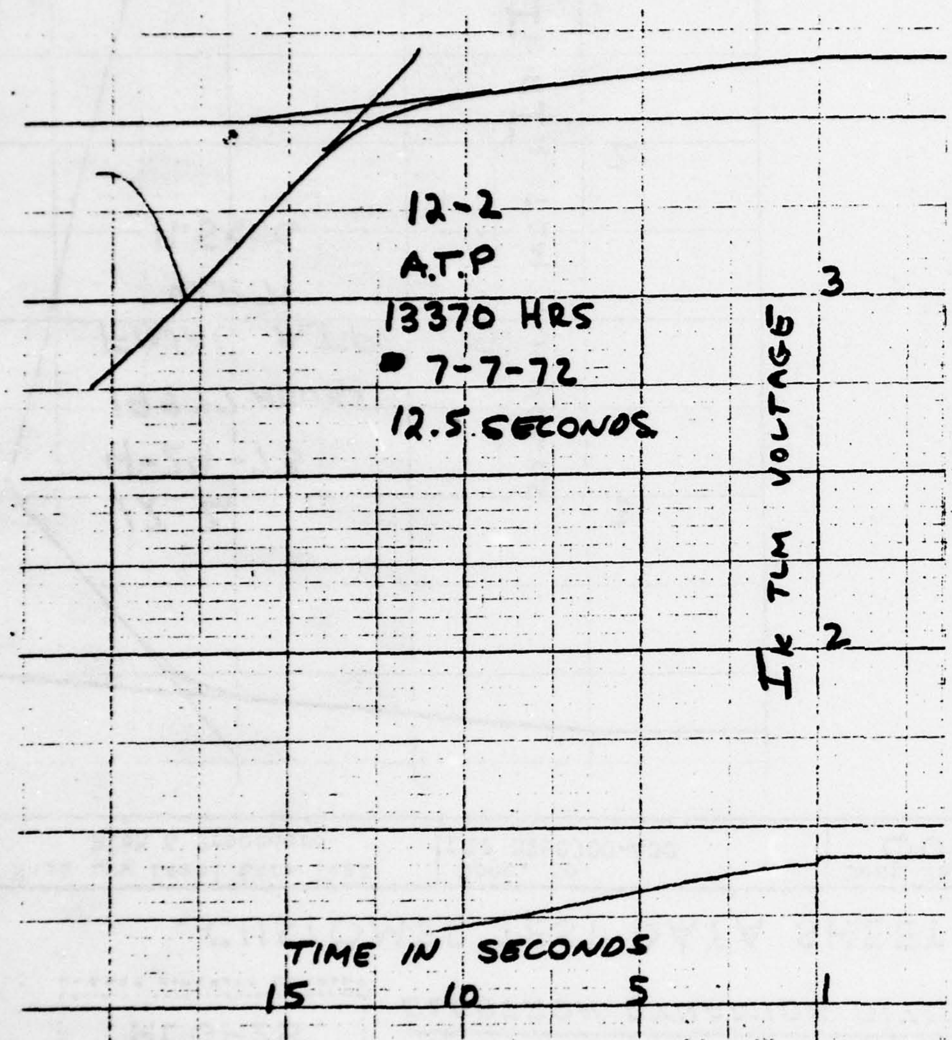
CUSTOMER TEST DATA SHEET

Code Ident 73293

Data Sheet No. DS B200300-4
Rev.
Model B200300-121 B200300-122
Serial No. 12-2
Page 3 of 38

Test Name	Spec. No.	Test Pos. No.	Quality
Low Level Life Test Plan & Procedure	LTP B200300-400	QU-46	

Date 7-7-72
WPM



F-9 Cathode Current (mA)

HUGHES.
HUGHES AIRCRAFT COMPANY

Par 4.5 Cathode Activity Final Test

ELECTRON DYNAMICS DIVISION

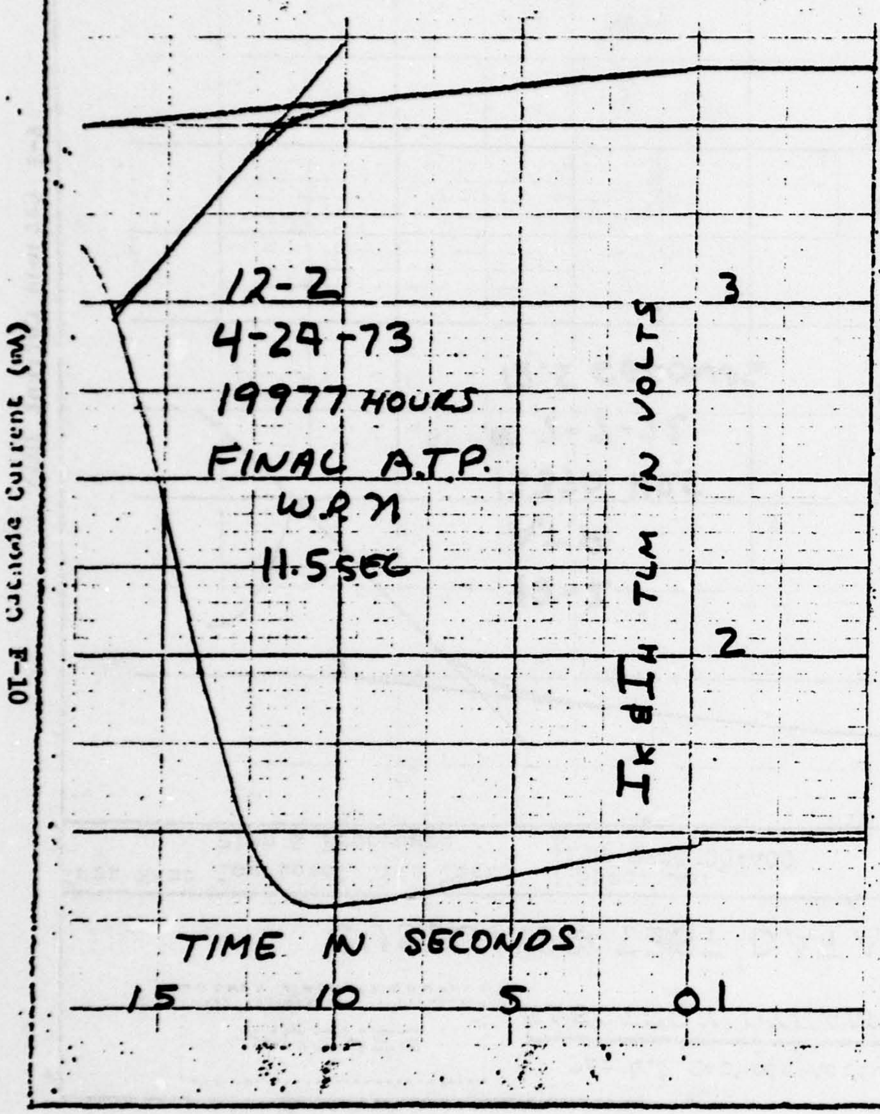
CUSTOMER TEST DATA SHEET

Code Ident 73293

Data Sheet No. DS B200300-
Rev.
Model B200300-121 B200300-122
Serial No. 12-2
Page 4 of 38

Test Name	Spec. No.	Test Pos. No.	Quality
Low Level Life Test Plan & Procedure.	LTP B200300-400	QU-46	

Date 4-24-73



HUGHES
HUGHES AIRCRAFT COMPANY

Par 4.5 Cathode Activity 6600 Hour Test

ELECTRON DYNAMICS DIVISION

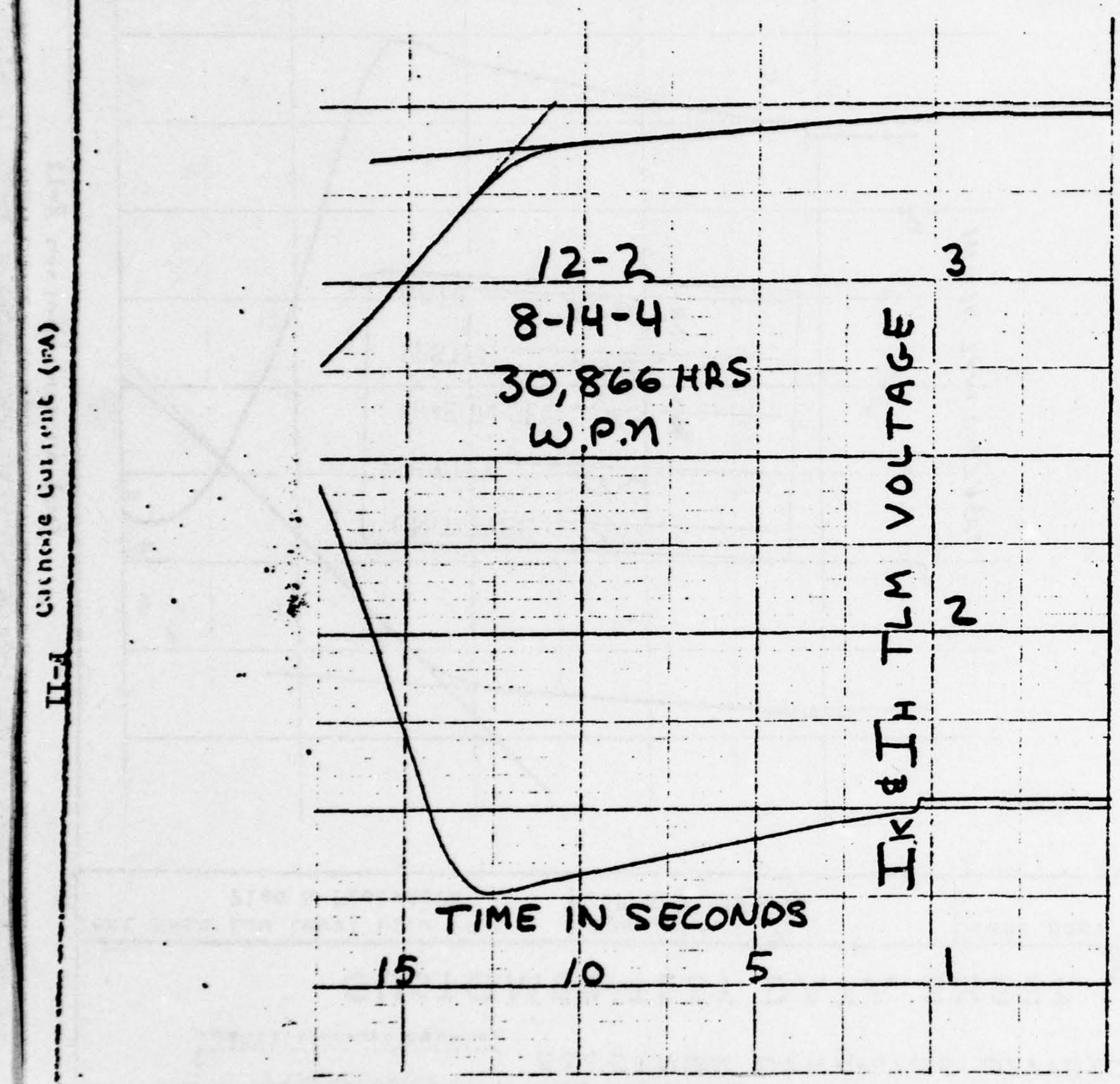
CUSTOMER TEST DATA SHEET

Code Ident 73293

Data Sheet No. DS B200300-400
Rev.
Model B200300-121 B200300-122
Serial No. 12-2
Page 2 of 38

Test Name	Spec. No.	Test Pos. No.	Quality
Low Level Life Test Plan & Procedure	LTP B200300-400	QU-46	

Date 8-14-4
W.P.M
30,866 HRS



HUGHES
HUGHES AIRCRAFT COMPANY

ELECTRON DYNAMICS DIVISION

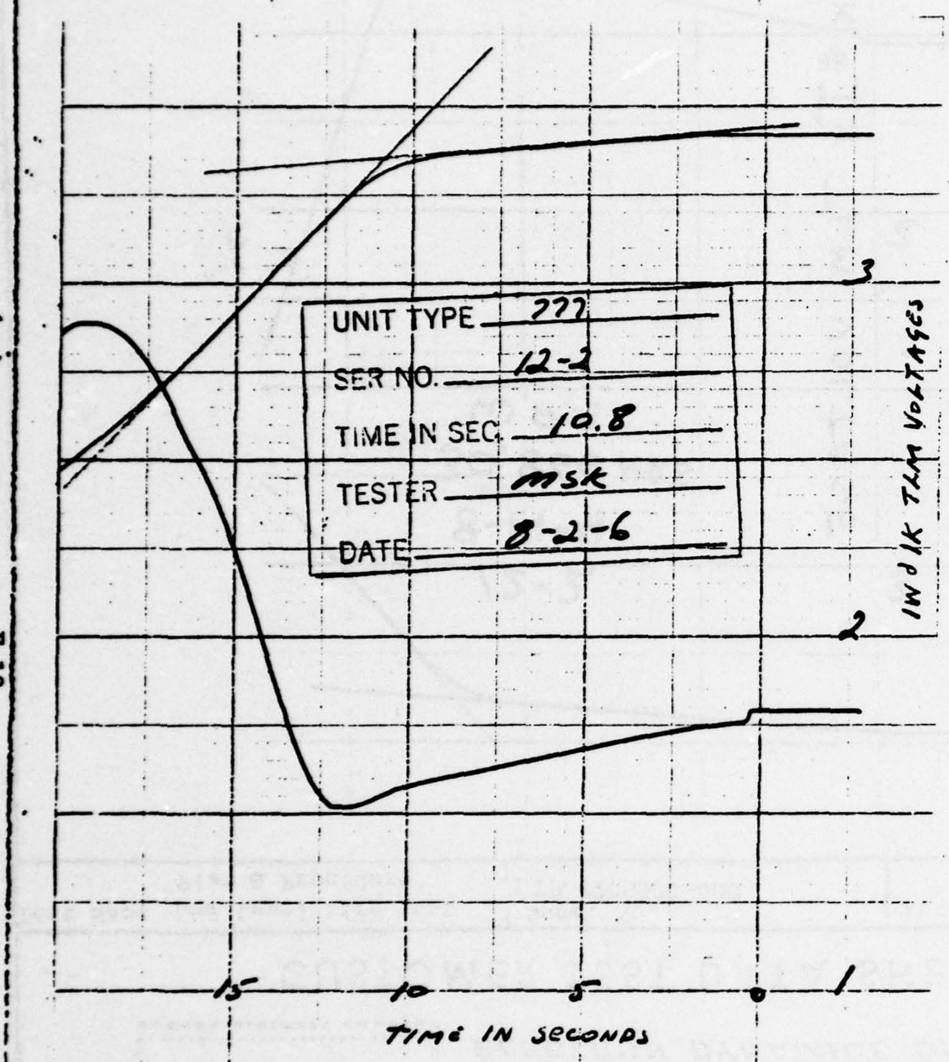
CUSTOMER TEST DATA SHEET

Code Ident 73293

Rev.
Model B200300-121 / B200300-122
Serial No. 12-2
Page 4 of 38

Test Name Low Level Life Test Plan & Procedure	Spec. No. LTP B200300-400	Test Pos. No.	Quality

Date 8-2-6
47,735



Time (sec)

HUGHES HUGHES AIRCRAFT COMPANY	Par 4.5 Cathode Activity 6600 Hour Test *ELECTRON DYNAMICS DIVISION*	Data Sheet No. DS B200300-4 Rev. Model B200300-121 B200300-122 Serial No. 12-2 Page 2 of 38

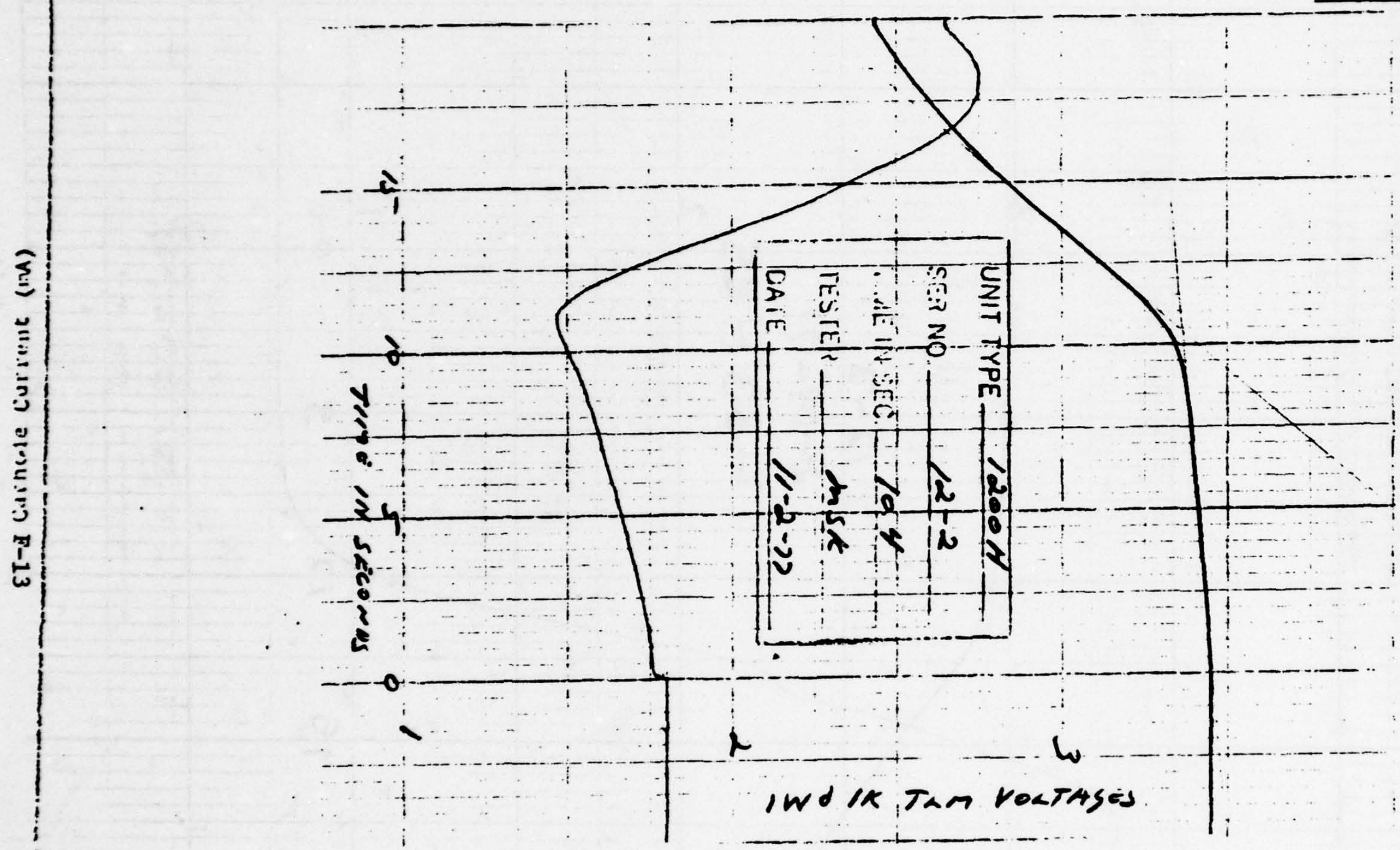
CUSTOMER TEST DATA SHEET

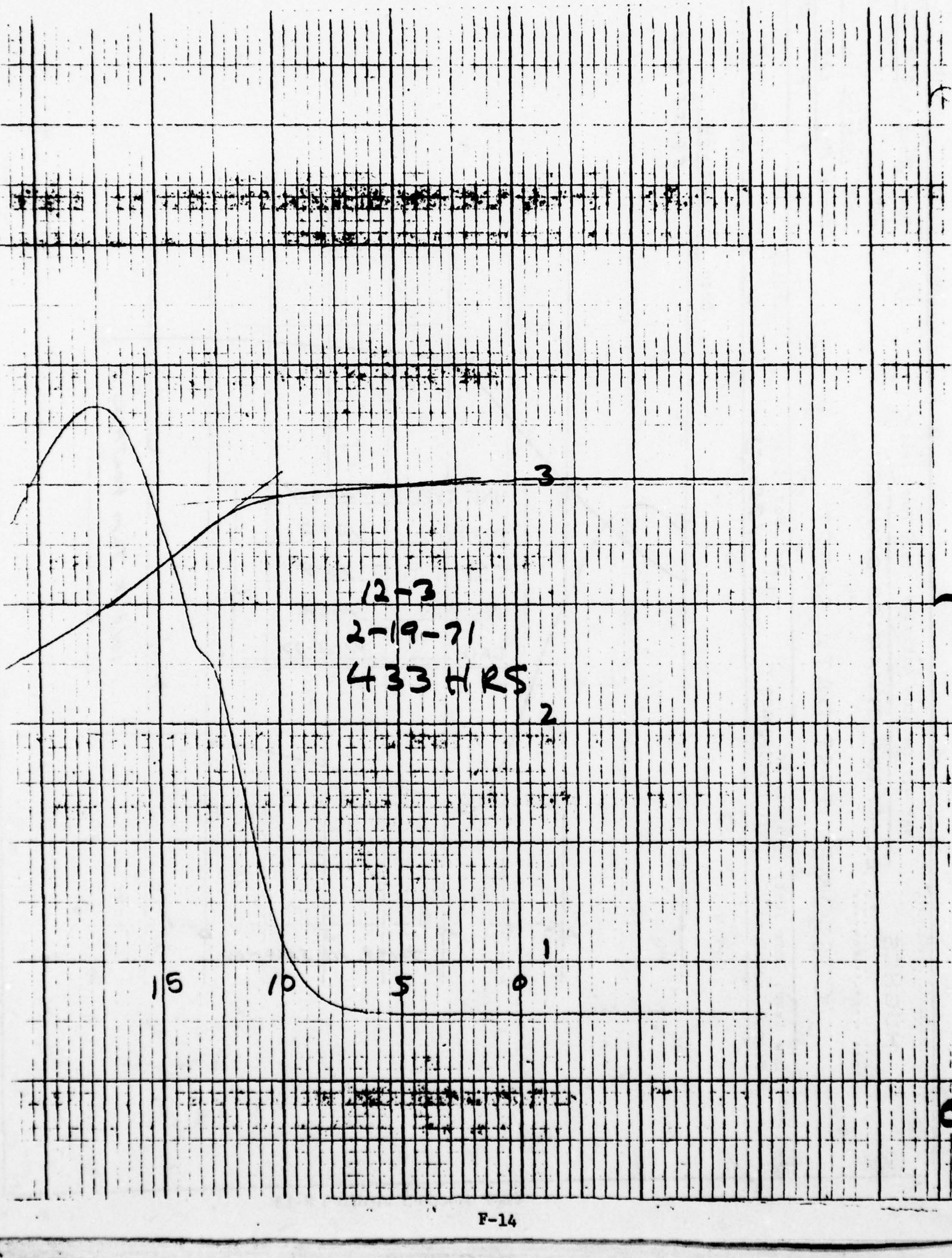
Code Ident 73293

Test Name	Spec. No.	Test Pos. No.	Quality
Low Level Life Test Plan & Procedure	LTP B200300-400	19805-3	

Date 11-2-77

58151 hours




3
12-3
2-19-71
433 HRS
2
1
15
10
5
0

HUGHES
HUGHES AIRCRAFT COMPANY

ELECTRON DYNAMICS DIVISION

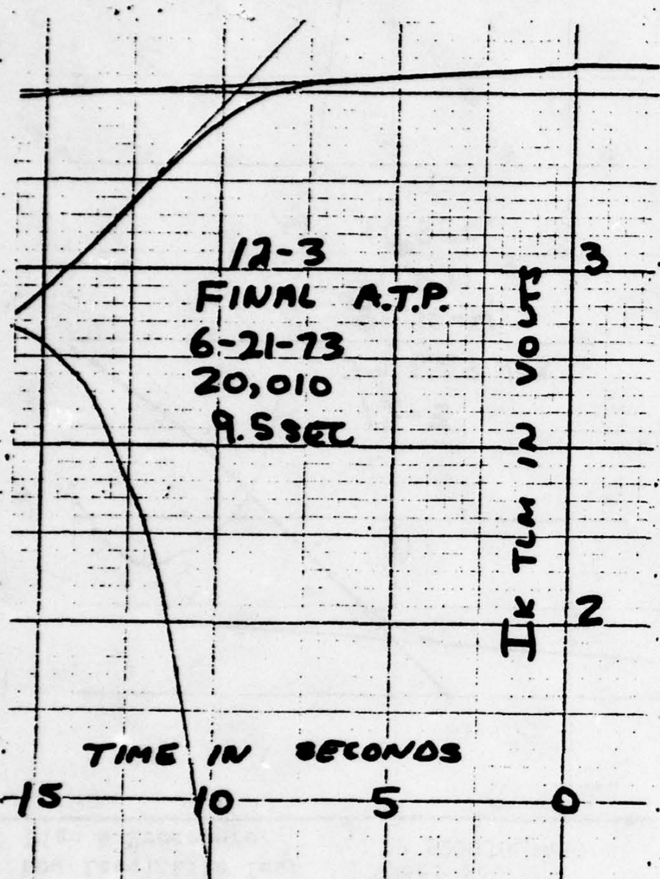
CUSTOMER TEST DATA SHEET

Code Ident 73293

Rev.
Model B200300-121 B200300-122
Serial No. 12-3
Page 4 of 38

Test Name	Spec. No.	Test Pos. No.	Quality
Low Level Life Test Plan & Procedure	LTP B200300-400	QU-46	

Date 6-21-73



HUGHES
HUGHES AIRCRAFT COMPANY

ELECTRON DYNAMICS DIVISION

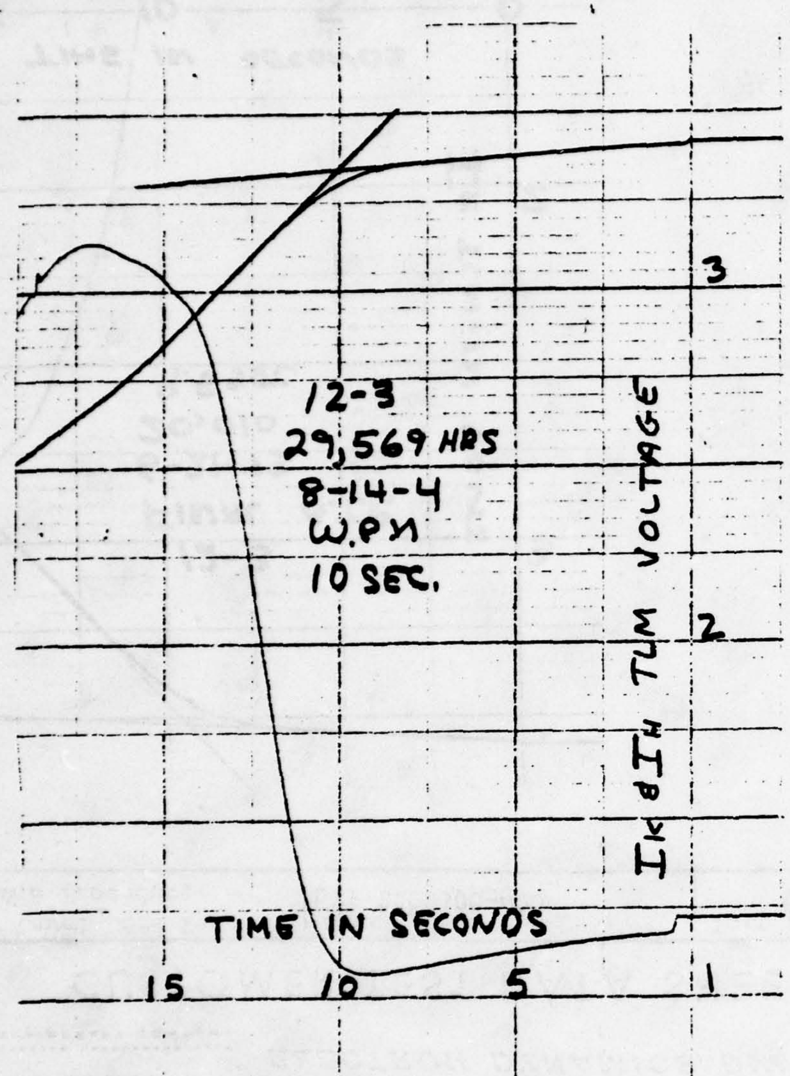
CUSTOMER TEST DATA SHEET

Code Ident 73293

Rev.
Model B200300-121 B200300-122
Serial No. 12-3
Page 2 of 38

Test Name	Spec. No.	Test Pos. No.	Quality
Low Level Life Test Plan & Procedure	LTP B200300-400	QU-46	

Date 8-14-4 29,569 HRS
W.P.M



F-16 Cathode Current (mA)

Time (sec)

HUGHES
HUGHES AIRCRAFT COMPANY

ELECTRON DYNAMICS DIVISION

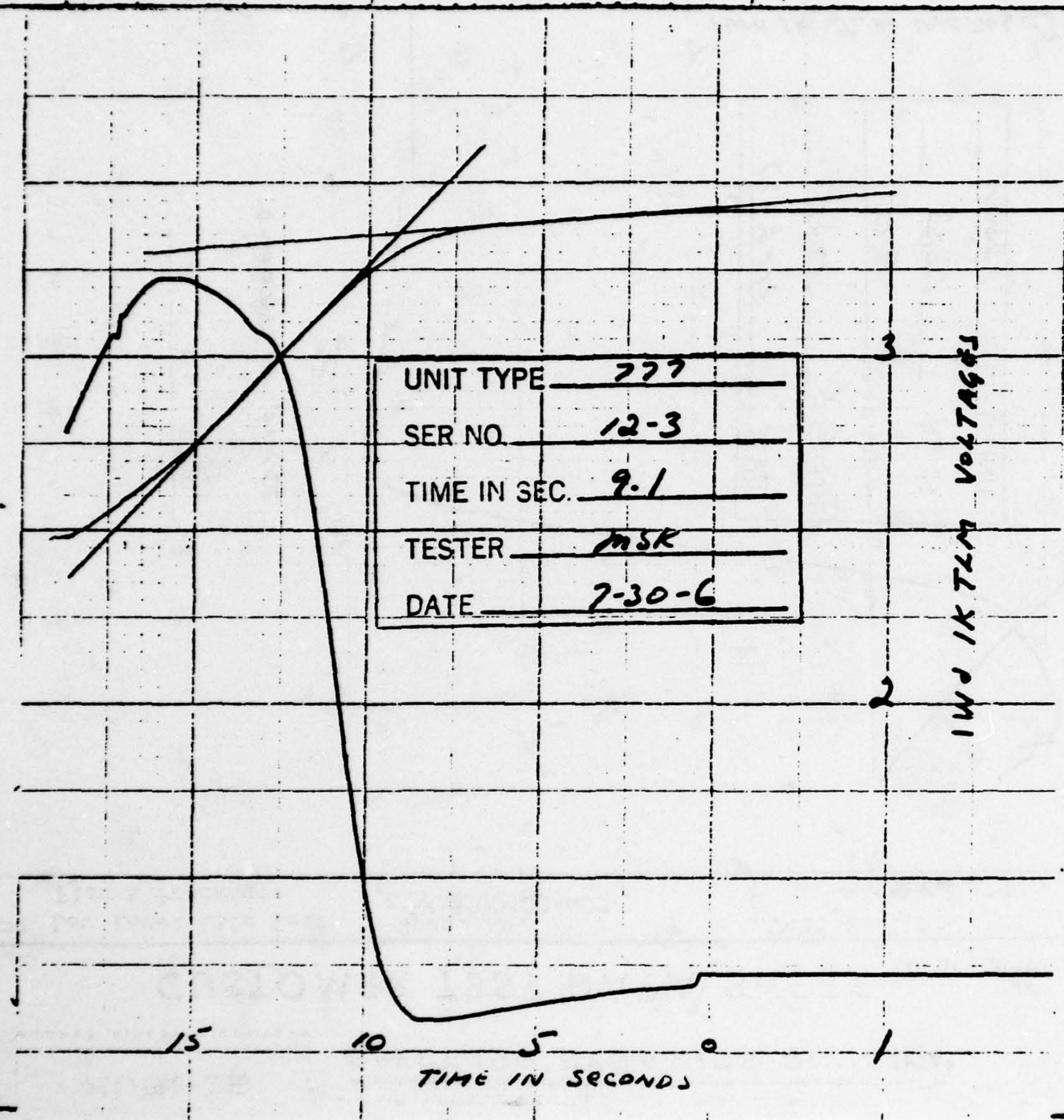
CUSTOMER TEST DATA SHEET

Code Ident 73293

Rev. B200300-121
Model B200300-122
Serial No. 12-3
Page 4 of 28

Test Name	Spec. No.	Test Pos. No.	Quality
Low Level Life Test Plan & Procedure	LTP B200300-400		

Date 7-30-6
46,348 Hrs



HUGHES
HUGHES AIRCRAFT COMPANY

ELECTRON DYNAMICS DIVISION

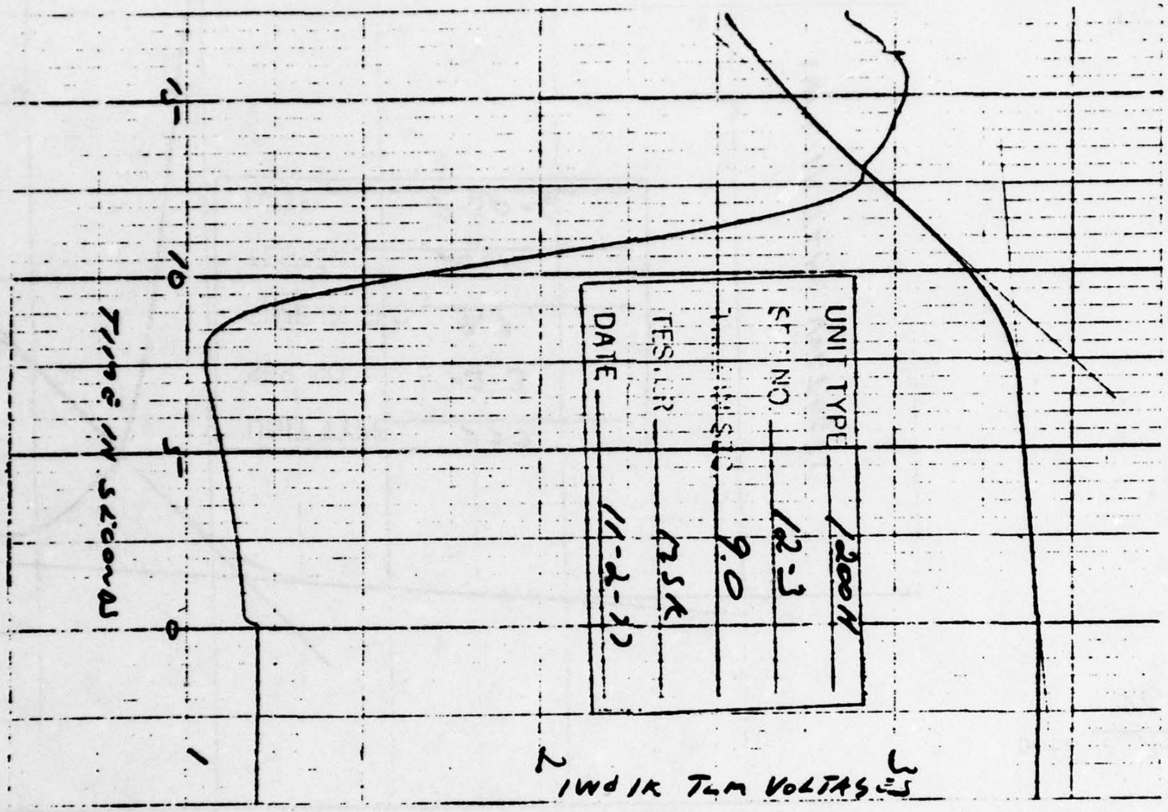
CUSTOMER TEST DATA SHEET

Code Ident 73293

Data Sheet No. [illegible]
Rev.
Model B200300-121 B200300-122
Serial No. 12-3
Page 2 of 38

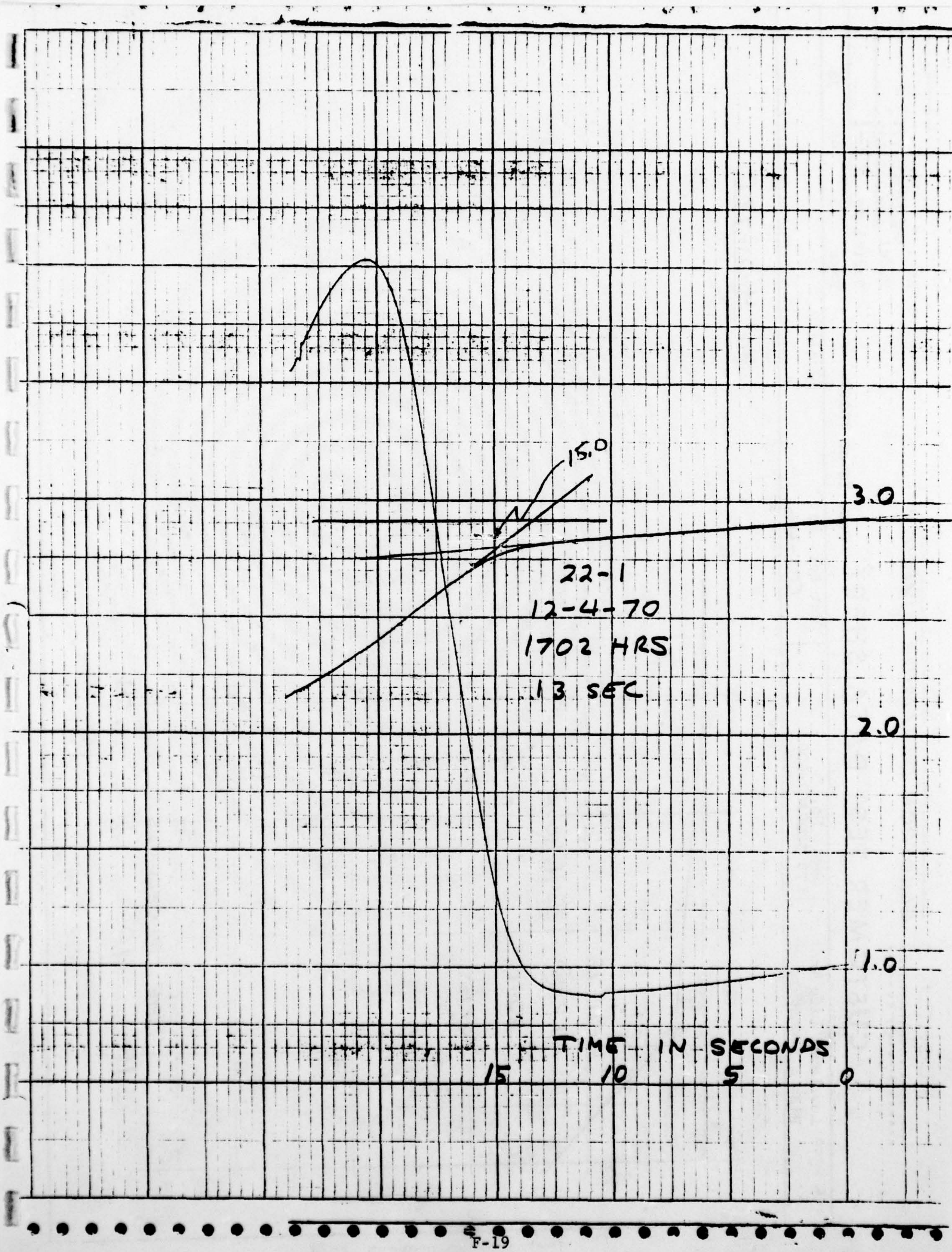
Test Name	Spec. No.	Test Pos. No.	Quality
Low Level Life Test Plan & Procedure	LTP B200300-400	19805-3	

Date 11-2-77
56824 hours



Cathode Current (mA)

Time (sec)


15.0
3.0
22-1
12-4-70
1702 HRS
13 SEC
2.0
1.0
TIME IN SECONDS
15
10
5
0

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HUGHES AIRCRAFT COMPANY

ELECTRON DYNAMICS DIVISION

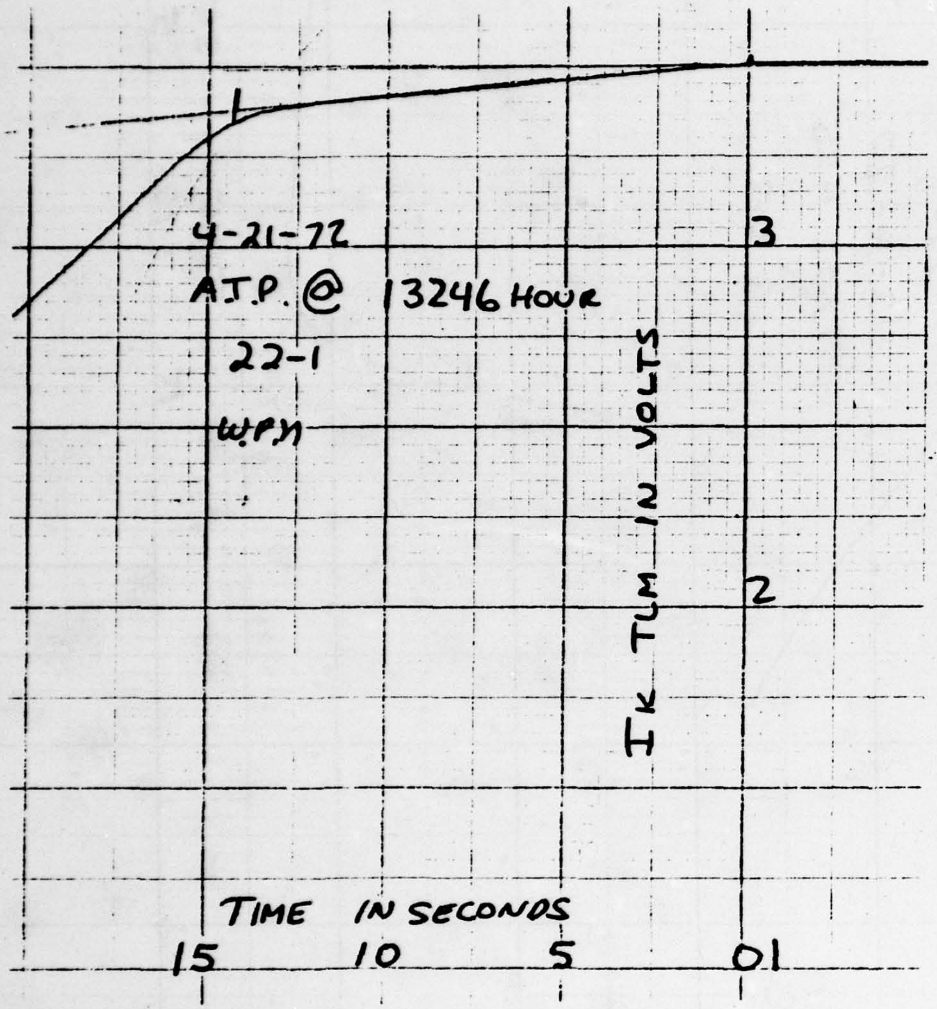
CUSTOMER TEST DATA SHEET

Code Ident 73293

Rev.
Model B200300-121 B200300-122
Serial No. 22-1
Page 3 of 38

Test Name	Spec. No.	Test Pos. No.	Quality
Low Level Life Test Plan & Procedure	LTP B200300-400	QU-46	

Date 4-21-72



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ELECTRON DYNAMICS DIVISION

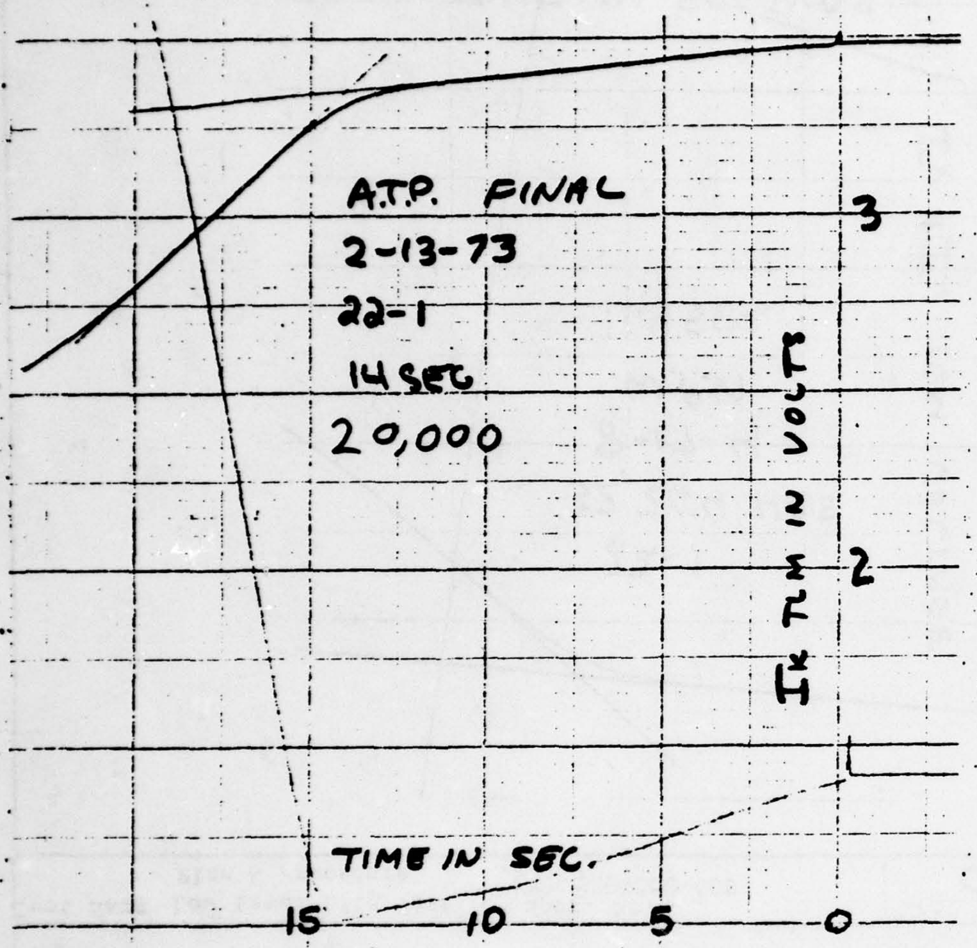
CUSTOMER TEST DATA SHEET

Code Ident 73293

Rev.
Model B200300-121 B200300-122
Serial No. 22-1
Page 4 of 38

Test Name Low Level Life Test Plan & Procedure	Spec. No. LTP B200300-400	Test Pos. No. QU-46	Quality

Date 2-13-73
W.P.M



0000 Hour Test

ELECTRON DYNAMICS DIVISION

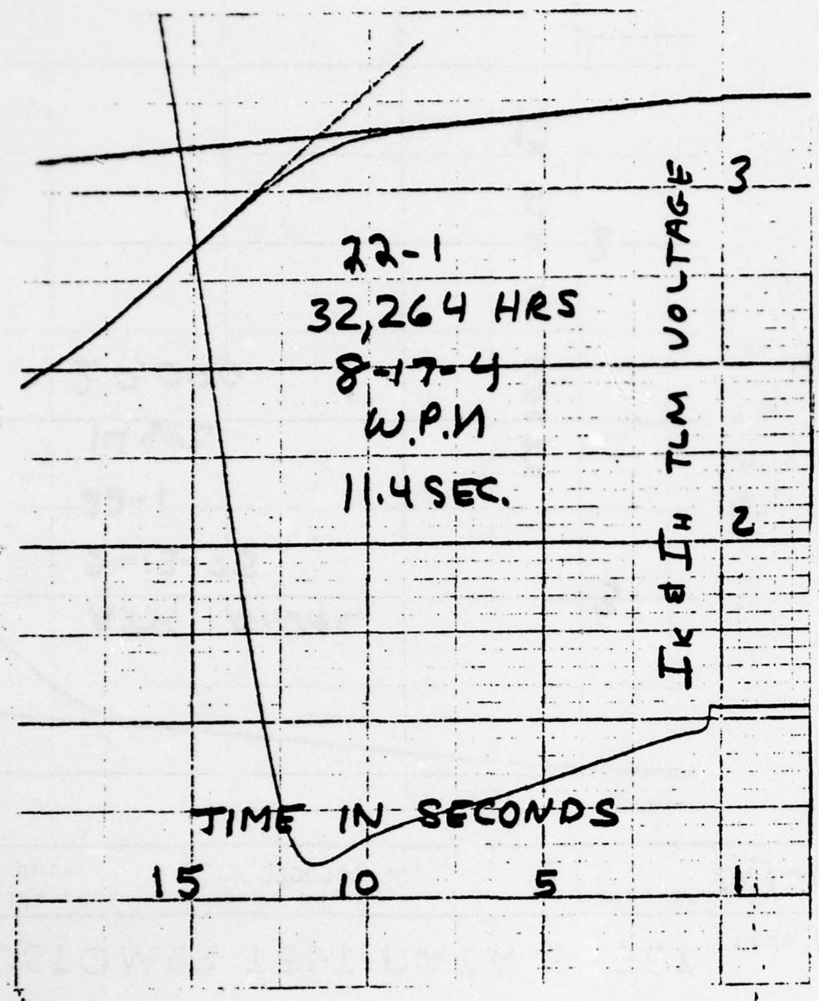
CUSTOMER TEST DATA SHEET

Code Ident 73293

Rev.
Model E200300-121 E200300-122
Serial No. 22-1
Page 2 of 38

Low Level Life Test Plan & Procedure	Spec. No. LTP E200300-400	Test Pos. No. QU-46	Quality

Date 8-17-4
W.P.N
32,264 HR



Cathode Current (mA)

Time (sec)

HUGHES
HUGHES AIRCRAFT COMPANY

Par 4.5 Cathode Activity Final Test

ELECTRON DYNAMICS DIVISION

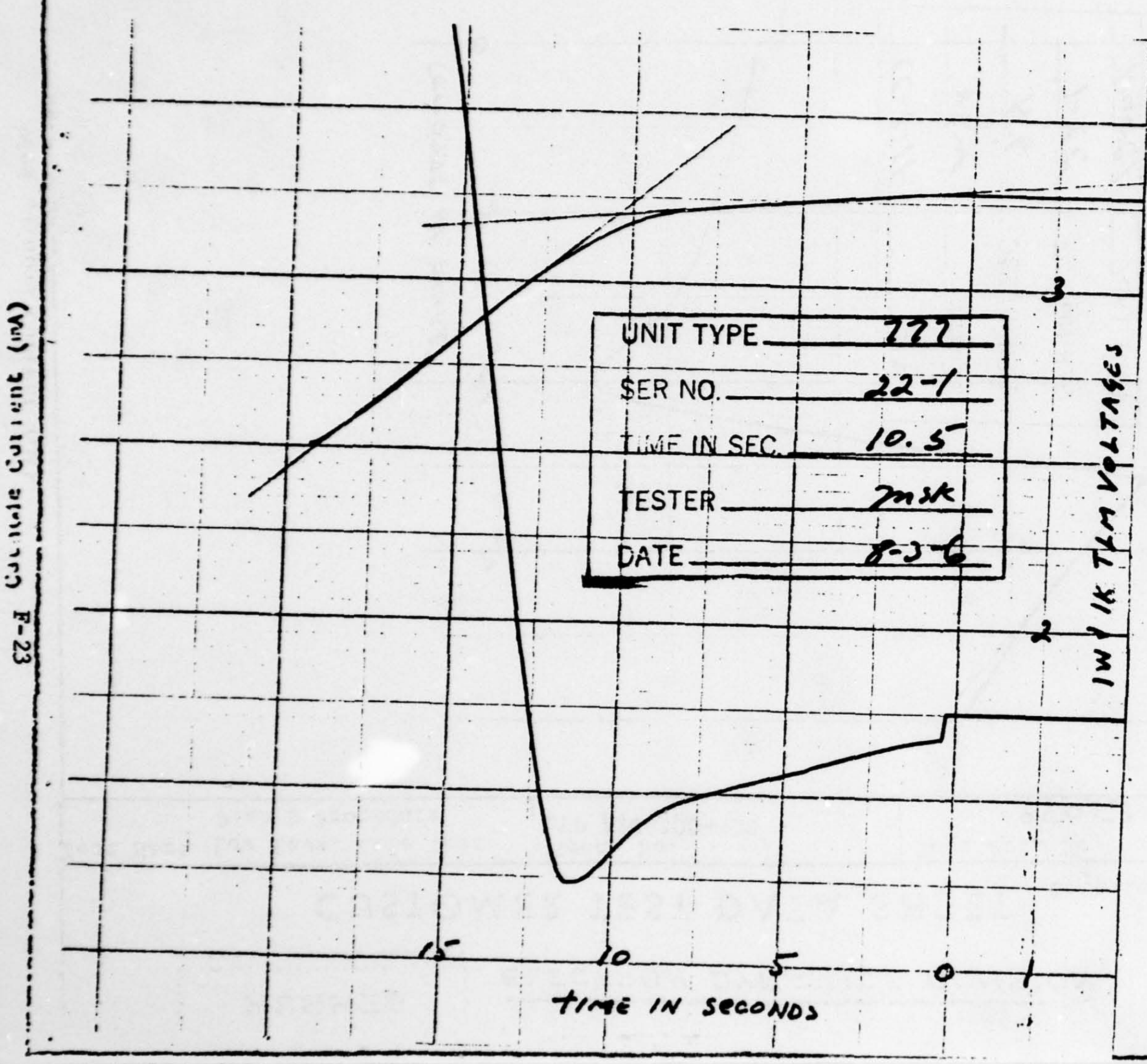
CUSTOMER TEST DATA SHEET

Code Ident 73293

Data Sheet No. DS B200300-40
Rev.
Model B200300-121 / B200300-122
Serial No. 22-1
Page 4 of 38

Test Name	Spec. No.	Test Pos. No.	Quality
Low Level Life Test Plan & Procedure.	LTP B200300-400		

Date 8-3-6
49,121



Data Sheet No.

HUGHES
HUGHES AIRCRAFT COMPANY

ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

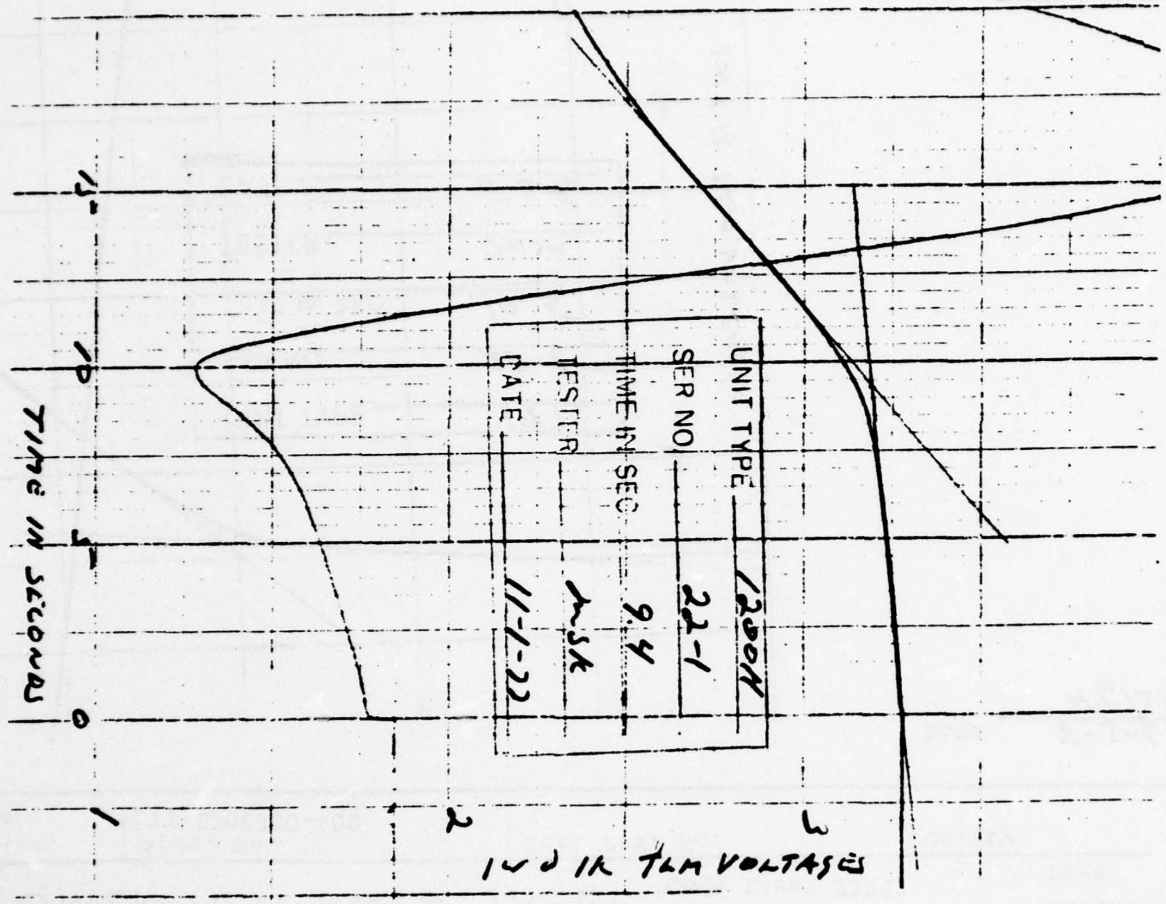
Code Ident 73293

Rev.
Model B200300-121 / B200300-122
Serial No. 22-1
Page 2 of 33

Test Name	Spec. No.	Test Pos. No.	Quality
Low Level Life Test Plan & Procedure	LTP B200300-400	198053	

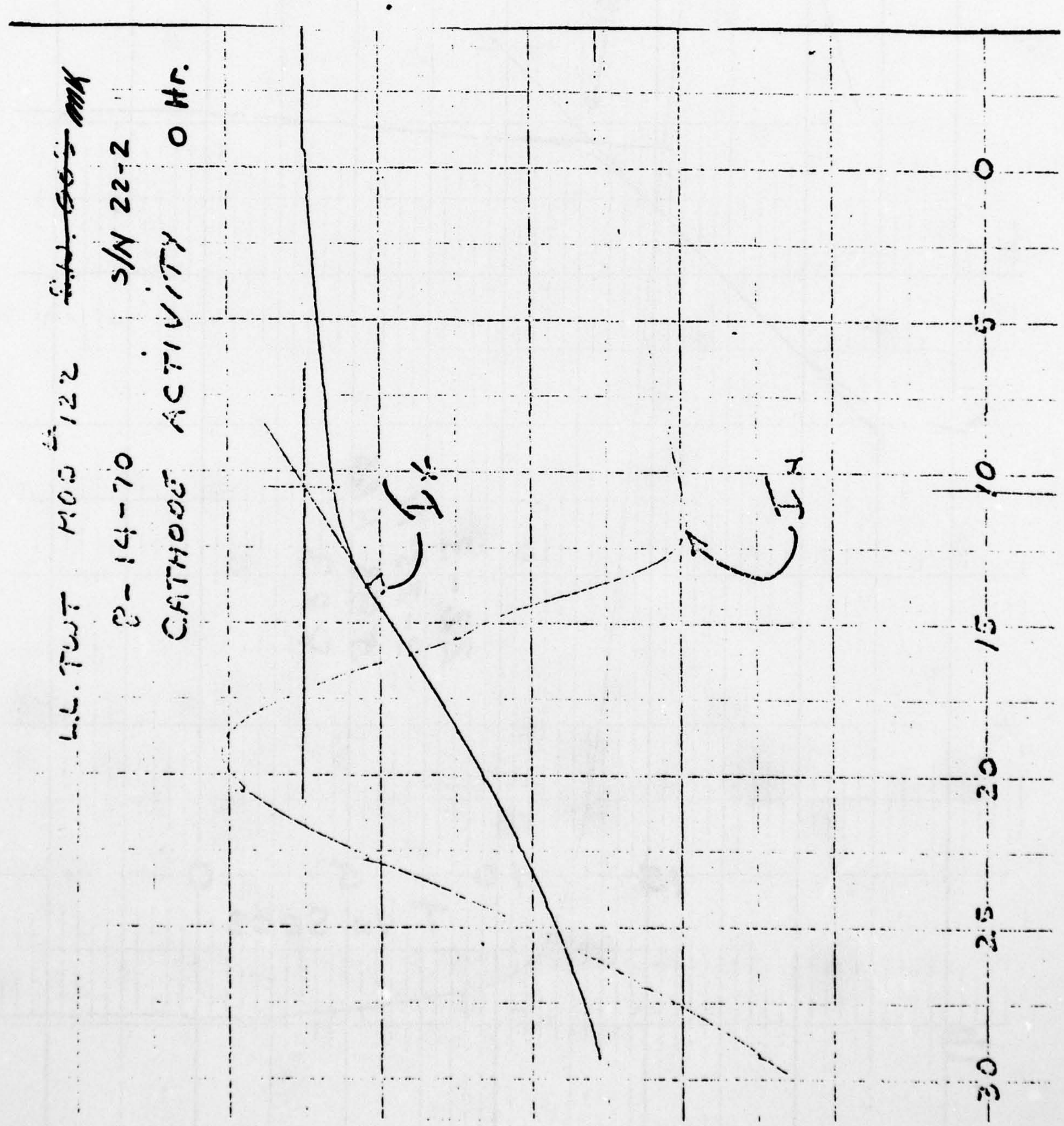
Date 11-1-72

59498 hours

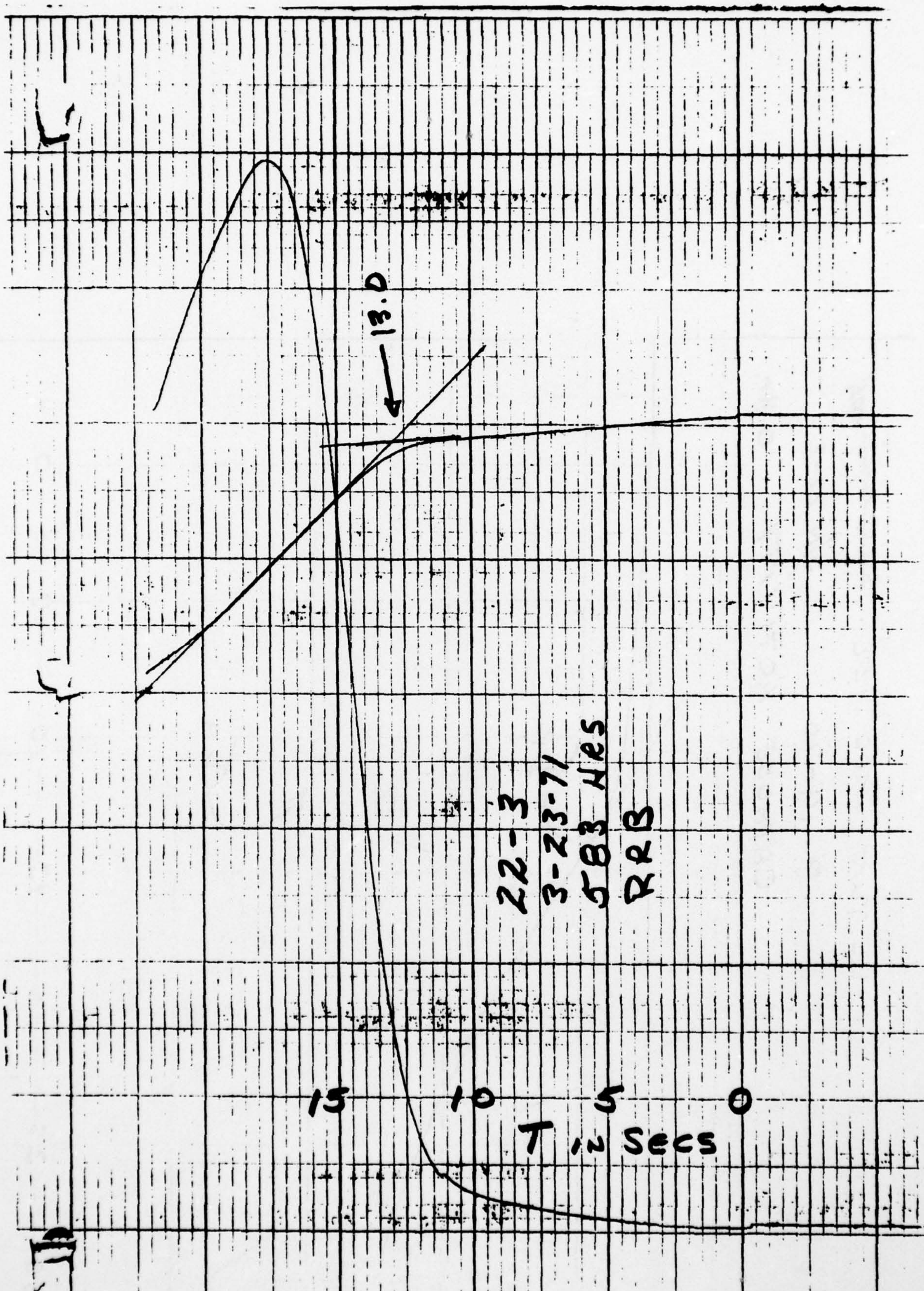


Time (sec)

Cathode Current (mA)



L.L. TWT MOD 122
8-14-70 S/N 22-2
CATHODE ACTIVITY 0 Hr.
0
5
10
15
20
25
30


13.0
22-3
3-23-71
RRB
15
10
5
0
T in Secs

)HUGHES
HUGHES AIRCRAFT COMPANY

ELECTRON DYNAMICS DIVISION

Rev.
Model B200300-121 B200300-122
Serial No. 22-3

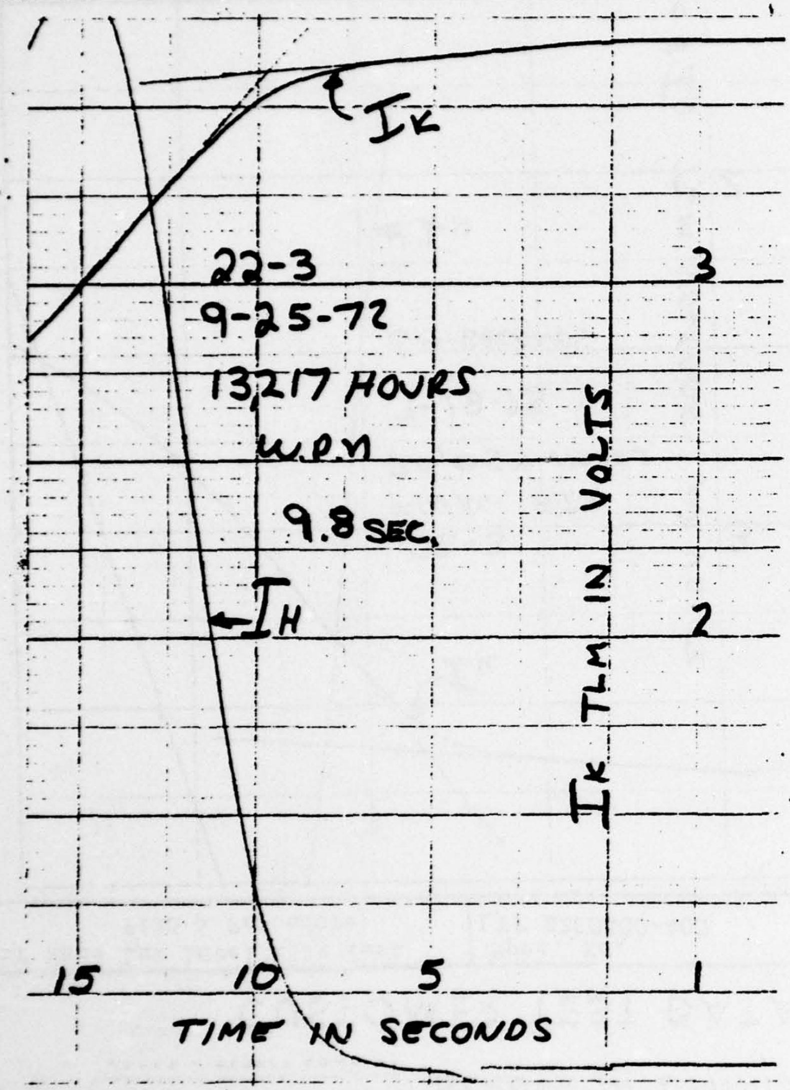
CUSTOMER TEST DATA SHEET

Code Ident 73293

Test Name	Spec. No.	Test Pos. No.	Quality
Low Level Life Test Plan & Procedure	LTP B200300-400	QU-46	

Date 9-25-72

Cathode Current (μA)



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HUGHES AIRCRAFT COMPANY

ELECTRON DYNAMICS DIVISION

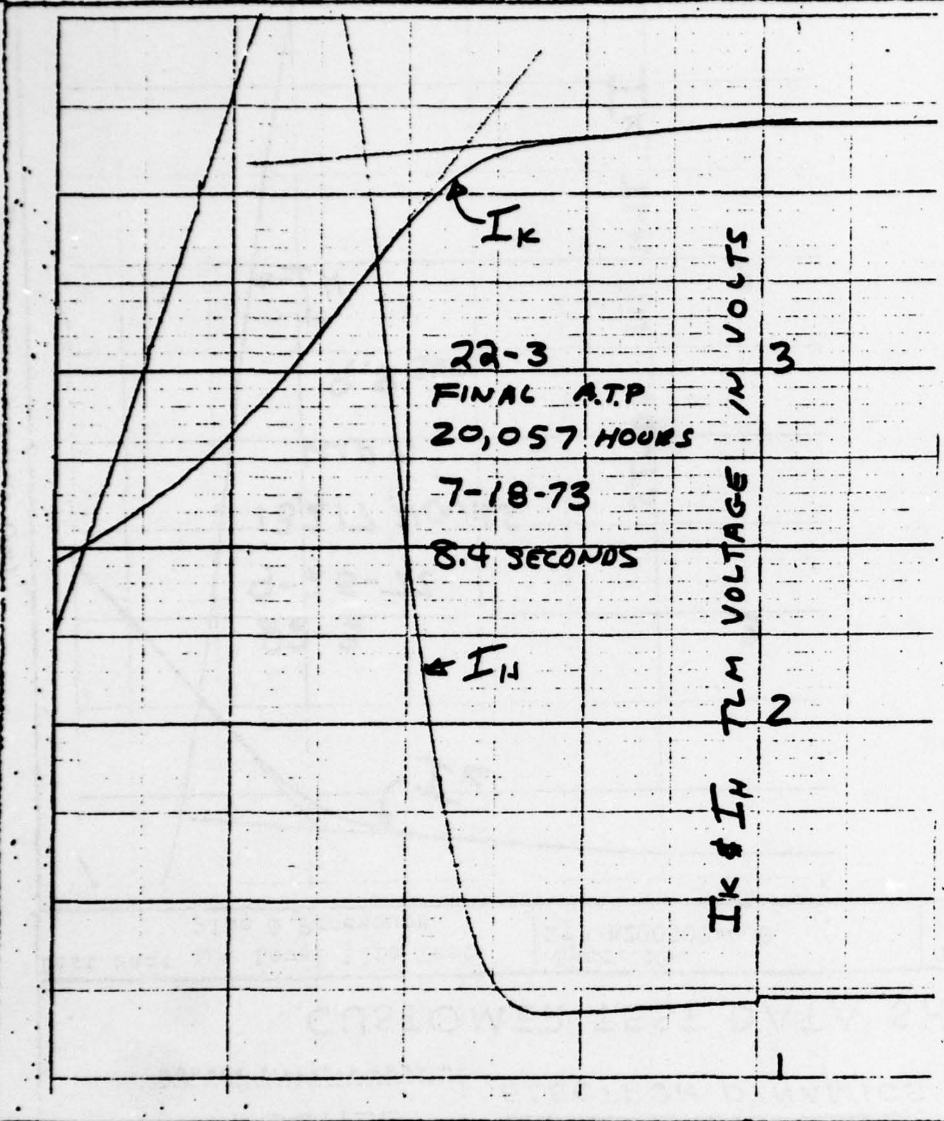
CUSTOMER TEST DATA SHEET

Code Ident 73293

Rev.
Model B200300-121 B200300-122
Serial No. 22-3

Test Name	Spec. No.	Test Pos. No.	Quality
Low Level Life Test Plan & Procedure	LTP B200300-400	QU-46	

Date 7-18-73



HUGHES
HUGHES AIRCRAFT COMPANY

ELECTRON DYNAMICS DIVISION

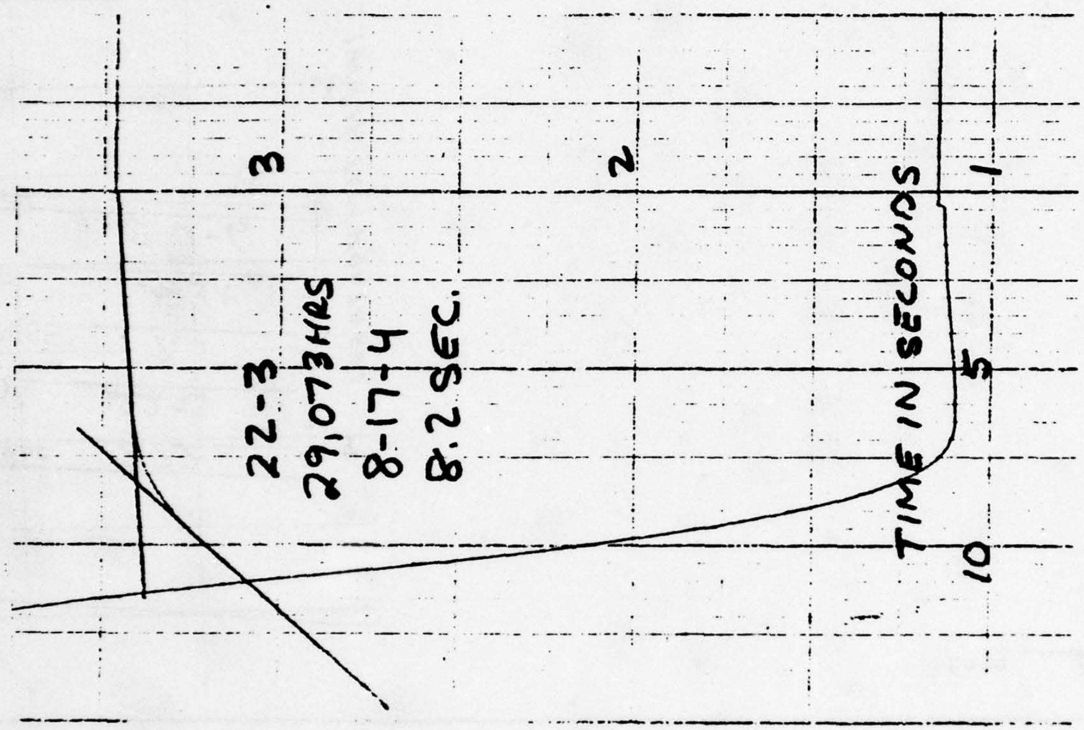
CUSTOMER TEST DATA SHEET

Code Ident 73293

Rev.
Model B200300-121 B200300-122
Serial No. 22-3
Page 2 of 38

Test Name	Spec. No.	Test Pos. No.	Quality
Low Level Life Test Plan & Procedure	LTP B200300-400		

Date 8-17-4
29,073



Cathode Current (mA)

HUGHES
HUGHES AIRCRAFT COMPANY

ELECTRON DYNAMICS DIVISION

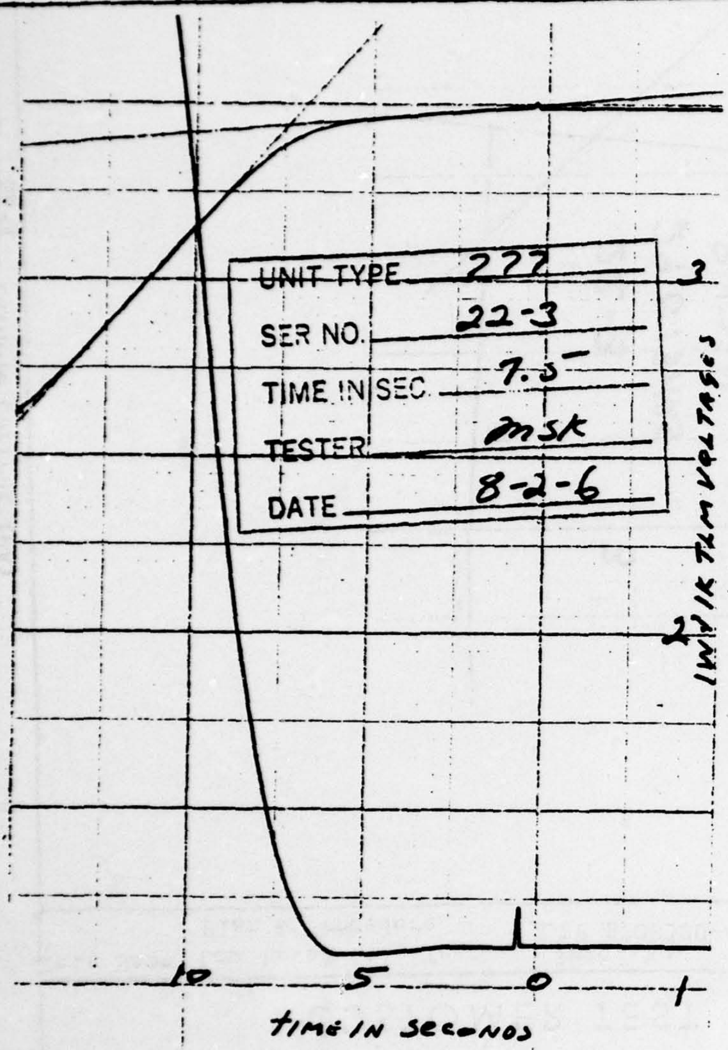
CUSTOMER TEST DATA SHEET

Code Ident 73293

Rev.
Model B200300-121
B200300-122
Serial No. 22-3
Page 4 of 38

Test Name Low Level Life Test Plan & Procedure	Spec. No. LTP B200300-400	Test Pos. No.	Quality

Date 8-2-6
45,845



HUGHES
HUGHES AIRCRAFT COMPANY

ELECTRON DYNAMICS DIVISION

CUSTOMER TEST DATA SHEET

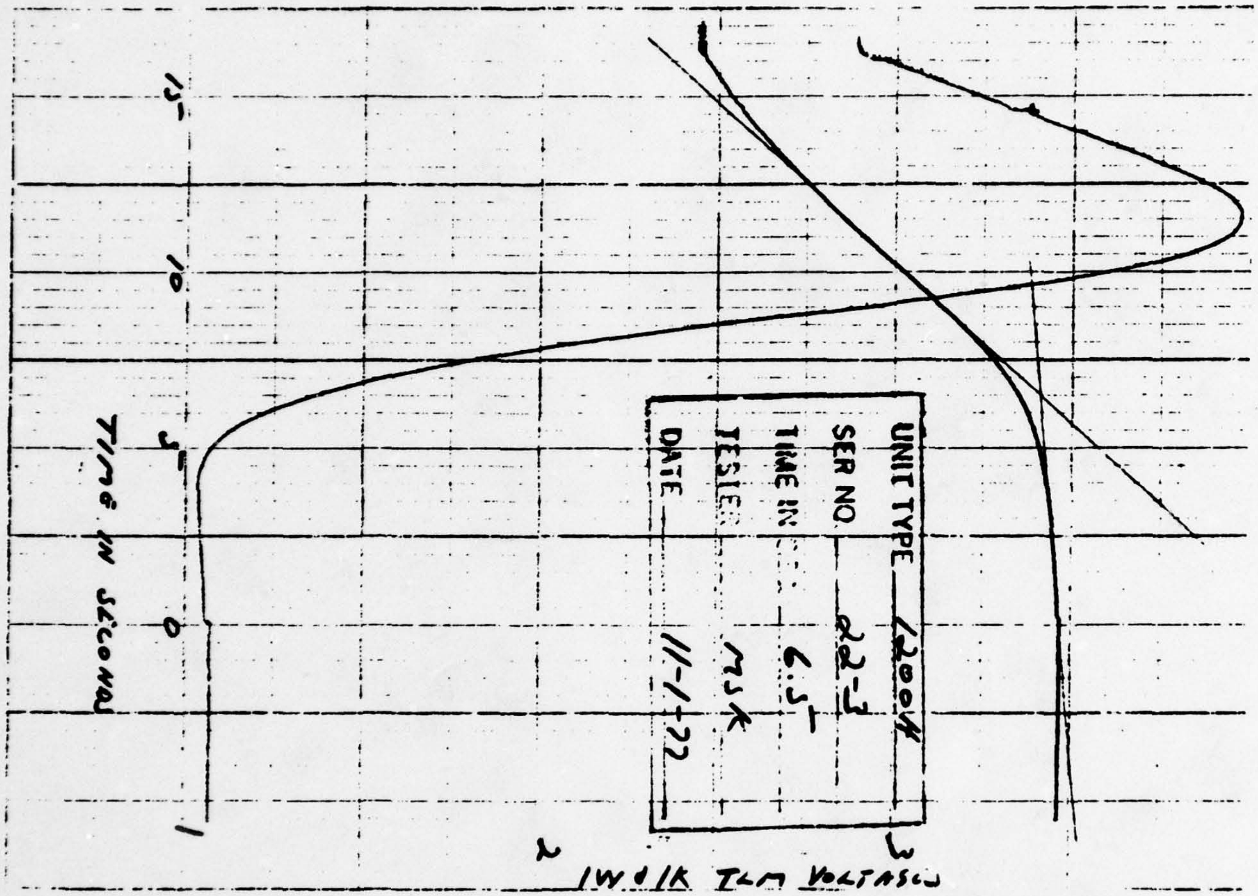
Code Ident 73293

Data Sheet No.
Rev.
Model B200300-121 B200300-122
Serial No.
Page 2 of 38

Test Name	Spec. No.	Test Pos. No.	Quality
Low Level Life Test Plan & Procedure	LTP B200300-400		

Date

55012 hours



Cathode Current (mA)

Time (sec)