BVS 2414

DATE 9 December 1988

REV -

ORIGINATOR [signature]
T. W. Birdsall

F-14

OLS #15

ACCEPTANCE TEST REPORT
VOLUME I OF IV
SUMMARY AND SPECIFICATION REQUIREMENTS

(CDRL 066A2)

Contract F04701-83-C-0048

Prepared For

UNITED STATES AIR FORCE
Headquarters, Space Division
Los Angeles, California

Prepared By

WESTINGHOUSE ELECTRIC CORPORATION
Defense and Electronics Center
Baltimore, Maryland

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TABLE CONTENTS (continued)

1.0 INTRODUCTION

The OLS #15 Acceptance Test Report contains the technical data pertinent to the OLS #15 AVE system. This document is intended to present the Acceptance Test data in terms of the requirements of the Prime Item Development Specification (DMSS-OLS-300) and Interface Specification (IS-2298450).

Test results and data have been reviewed by Westinghouse Electric Corporation and USAF representatives. System performance data, test histories, data summaries and system analyses are included. In addition, a complete set of system log books are on file at the contractor's facility and are available for review. The Test History is in log books K40100-- and K40062--.

This Acceptance Test Report consists of 4 volumes as follows:

BVS 2414	OLS #15 Summary and Specification Requirements
BVS 2415	OLS #15 Acceptance Vibration Report
BVS 2416	OLS #15 Alignment & Synchronization Curves
BVS 2417	OLS #15 Weight & Center-of-Gravity

OLS #15

TLEVEL VS M1 TEMPERATURE RANGE

T DETECTOR S/N J-1

TL	M1 TEMP(°C)	
1111	-22.240°	to -16.952°
1110	-16.952°	-11.665°
1101	-11.665°	-6.377°
1100	-6.377°	-1.089°
1011	-1.089°	+4.198°
1010	+4.198°	+9.486°
1001	+9.486°	+14.773°
1000	+14.773°	+20.061°
0111	+20.061°	+25.349°
0110	+25.349°	+30.636°
0101	+30.636°	+35.924°
0100	+35.924°	+41.212°
0011	+41.212°	+46.499°
0010	+46.499°	+51.787°
0001	+51.787°	+57.074°
0000	+57.074°	+62.362°

TLEVEL command changes should be uplinked to the OLS as a function of M1 temperature to maximize T Channel output accuracy.

1.2 Specification Pass-Fail Summary

The following sections of this Qualification Test Report contain the test results as they pertain to the Development Specification requirements. Each Test Report paragraph heading is followed by the corresponding Segment Spec paragraph number in parentheses.

The table on the following page summarizes the OLS #15 pass-fail status vs. Development Spec. paragraph number.

1.3 Summary of OLS #15 Testing

Began System Test	2/19/88
Thermal Vacuum T-Channel Adjustment	4/23/88
SPS, PSU, SPU, OSU 3 axis vibration	5/10 & 11-88
SSS 3 axis vibration	5/12/88
Thermal Vacuum Acceptance Test	5/29/88
Completed Thermal Vacuum Acceptance Test	7/10/88
Retest per BVS 2418	11/3/88
Weight and C of G	11/10/88

1.4 Configuration and Serialized Assemblies

The configuration listing on the following pages includes the current configuration of the OLS #15 as of 10/05/88.

5D-3 CONFIGURATION IDENTIFICATION
SERIALIZED ASSEMBLIES (OLS 15)

DESCRIPTION	ASSEMBLY NO.	REV.	S/N
Key Drawing	536R500G04	M	
SSS Assembly	758R750G02	U	5010
OSC Assy	623R765G08	AG	5010
HRD Assy	623R754G05	AB	0009
PWR Bd	623R758G04	R	0009
Pre Amp Bd	623R506G04	U	0009
T-Chan	765R048G02	F	5003
T-Chan Bd	762R539G02	C	5003
Module	623R727G01	B	5019
Module	623R727G01	B	5020
VDGA/Lin Log	644R150G05	G	5010
Lin Log	644R127G05	P	5010
VDGA	644R152G04	P	5010
VDGA	644R153G04	N	5010
Enc. OPT	688R705H01	C	013
PMT	644R909G05	T	0010
EMR Bd	644R905G03	D	0010
Switch Bd	644R903G05	M	0011
Doubler Bd	644R907G02	F	0010
Regulator Bd	644R807G04	H	0010
Led Assy	536R916G01	D	0010
Pre Amp Bd	644R935G04	M	5011
Tube Assy	640R920G02	J	17
HRD Post Amp	644R220G05	L	5010
Post Amp Bd	644R228G05	AF	5010
EST/LMD	644R219G04	D	5010
EST/LMD Bd	758R142G03	E	0010
Heater Cont	633R053G13	J	5027
Elect Assy	633R052G04	Y	5027
Heat Cont	633R053G14	J	5028
Elect Assy	633R052G04	Y	5028
Heat Cont	633R053G15	J	5029
Elect Assy	633R052G04	Y	5029
Solenoid Mech	758R620G02	E	5003
Cable Assy	644R320G03	N	502

OLS 15 (Cont'd)

DESCRIPTION	ASSEMBLY NO.	REV.	S/N
Heater Cont	633R053G16	J	5030
Elect Assy	633R052G04	Y	5030
Rel Mech I	640R701G02	F	5010
Rel Mech II	640R753G02	H	5010
Rel Mech III	640R381G02	H	5010
T-Clamp	623R821G01	J	
T-Cal	623R920G01	B	
Aux Encd	640R846G05	L	5010
Bd Assy	640R825G05	F	5009
Bd Assy	640R844G05	K	5010
Wire Dia	758R619G02	E	
Wire Tab	318R708	C	
Wire Tab	315R386	C	
Wire Tab	318R709	(-)	
Motor Assy	623R894G01	B	
IMC/M3	623R858G02	D	5009
Cover, Cooler	640R320G01	(-)	
Cone Cooler	9RA5216H01	K	027
ENPA	682R215G06	N	5010
A1 Bd	682R167G04	H	5011
A2 Bd	682R110G06	V	5010
A3 Bd	682R112G04	T	5010
Aux Encd B/U	682R300G04	C	5010
A1 Bd	682R149G04	E	5011
A2 Bd	682R151G04	E	5010
BB1	KG43		
BB2	KG43		
BB3	KG43		
Ther. Blk. Kit	661R564G03	J	
GSSA/DOC	640R790G03	M	
GSSB	633R906G01	A	
PR1	688R461H01	E	052
PR2	688R461H01	E	053
PR3	688R461H01	E	054
PR4	688R461H01	E	055
Optical Relay	701R717H01	A	015

OLS 15 (Cont'd)

DESCRIPTION	ASSEMBLY NO.	REV.	S/N
Cable Assy	9RA5255H09	V	503
Cable Assy	9RA5255H02	V	501
Cable Assy	9RA5255H04	V	503
Cable Assy	9RA5255H11	V	503
Cable Assy	9RA5255H10	V	502
Cable Assy	9RA5255H12	V	502
Cable Assy	9RA5255H06	V	502
Cable Assy	9RA8118G01	G	
Coax Assy	644R327G01	C	
Coax Assy	644R327G02	C	
Coax Assy	644R327G03	C	
Coax Assy	644R328G01	D	
Coax Assy	644R328G02	D	
Coax Assy	644R328G03	D	
Coax Assy	644R328G04	D	
Coax Assy	644R328G05	D	
Coax Cable	644R328G06	D	
Coax Assy	644R329G01	D	
Coax Assy	644R329G02	D	
Coax Assy	644R329G03	D	
Coax Assy	644R329G04	D	
Coax Assy	644R329G05	D	
Coax Assy	644R329G06	D	
Coax Assy	644R329G07	D	
Coax Assy	644R329G08	D	
SPS	651R390G04	AF	5010
Buss Bar	640R714G01	N	5010
Buss Bar	640R714G02	N	5010
Matrix	651R342G04	AW	8619-0002
R/B	644R665G05	AF	5020
Matrix	644R081G03	N	053085/11
A1 Bd	640R618G03	G	5023
A2 Bd	640R518G03	R	5021
A3 Bd	640R520G03	R	5020
R/B	644R665G05	AF	5018
Matrix	644R081G03	N	05308/13

OLS 15 (Cont'd)

DESCRIPTION	ASSEMBLY NO.	REV.	S/N
A1 Bd	640R618G03	G	5018
A2 Bd	640R518G03	R	5020
A3 Bd	640R520G03	R	5018
CU 1	640R612G03	L	5019
CU1	640R612G03	L	5020
CU2	640R614G03	L	5019
CU2	640R614G03	L	5018
AU 1	640R608G04	F	5020
AU 1	640R608G04	F	5019
AU 2	640R610G04	F	5019
AU 2	640R610G04	F	5021
MC1X	640R560G03	P	5020
MC1X	640R560G03	P	5021
MC2X	640R662G02	B	5004
MC2X	640R662G02	B	5005
ROM	640R530G03	W	5018
ROM	640R530G03	W	5019
Core	644R910H03	K	016
Core	644R910H03	K	022
SDS2	640R442G03	U	5018
SDS2	640R442G03	U	5019
SDS3	640R444G03	P	5019
SDS3	640R444G03	P	5018
SDS4	640R446G03	U	5019
SDS4	640R446G03	U	5018
SDS5	640R498G04	T	5018
SDS5	640R498G04	T	5019
CLSD	640R458G04	AH	5019
CLSD	640R458G04	AH	5018
SDS1X	640R660G03	F	5004
SDS1X	640R660G03	F	5005
FC-1	640R450G03	AC	5018
FC-1	640R450G03	AC	5019
FC-2	640R454G04	AA	5020
FC-2	640R454G04	AA	5021
FC-3	640R456G03	AA	5019

OLS 15 (Cont'd)

DESCRIPTION	ASSEMBLY NO.	REV.	S/N
FC-3	640R456G03	AA	5018
SDF-1	640R474G04	AK	5018
SDF-1	640R474G04	AK	5019
SDF-2	640R476G04	AK	5018
SDF-2	640R476G04	AK	5019
SDF-3X	640R644G03	A	5007
SDF-3X	640R644G03	A	5006
SDF-4X	640R646G03	A	5004
SDF-4X	640R646G03	A	5005
SDF-5X	640R648G03	F	5019
SDF-5X	640R648G03	F	5018
SDS-6	640R650G03	A	5005
SDS-6	640R650G03	A	5004
SDS-7	640R546G03	R	5018
SDS-7	640R546G03	R	5019
4B	640R412G03	R	5019
4B	640R412G03	R	5018
7A	640R414G03	AD	5018
7A	640R414G03	AD	5019
7B	640R416G05	BB	5021
7B	640R416G05	BB	5020
1A	640R400G03	AL	5019
1A	640R400G03	AL	5021
1B	640R402G03	AF	5018
1B	640R402G03	AF	5019
FBC	640R448G04	P	5018
FBC	640R448G04	P	5019
RAM	640R626G03	D	5004
RAM	640R626G03	D	5005
2A	640R488G03	AA	5018
2A	640R488G03	AA	5019
2B	640R410G03	Y	5019
2B	640R410G03	Y	5018
3A	640R404G03	AA	5019

OLS 15 (Cont'd)

DESCRIPTION	ASSEMBLY NO.	REV.	S/N
3A	640R404G03	AA	5018
10X	640R572G03	K	5018
10X	640R572G03	K	5019
CLCL	640R406G05	AH	5020
CLCL	640R406G05	AH	5021
WF-1X	640R664G02	-	5019
WF-1X	640R664G02	-	5018
WF-2	640R432G03	AA	5019
WF-2	640R432G03	AA	5018
WF-3	640R622G03	G	5017
WF-3	640R622G03	G	5019
WF-4	640R436G04	M	5018
WF-4	640R436G04	M	5019
WF-5	640R438G03	AA	5019
WF-5	640R438G03	AA	5018
9A	640R654G02	A	5005
9A	640R654G02	A	5004
9BX	640R656G02	C	5005
9BX	640R656G02	C	5004
9CX	640R658G02	-	5005
9CX	640R658G02	-	5004
WF-6	640R568G03	J	5020
WF-6	640R568G03	J	5019
OSU	640R960G04	AF	5010
Matrix	522R783G02	G	0004
A1	640R522G04	V	5009
A2	640R524G03	R	5010
Bottom	644R047G04	V	0010
Top	644R046G03	V	5010
SPU	758R040G03	P	5010
Matrix	640R927G03	W	0001
Buss Bar	640R912G01	L	5009
SSP-8	640R638G03	E	5004
SSP-8	640R638G03	E	5005
RTD-1	640R508G04	AL	5018

OLS 15 (Cont'd)

DESCRIPTION	ASSEMBLY NO.	REV.	S/N
RTD-1	640R508G04	AL	5019
RTD-2	640R510G04	AV	5019
RTD-2	640R510G04	AV	5021
RTD-3	640R512G03	L	5018
RTD-3	640R512G03	L	5019
RTD-4	640R526G03	P	5018
RTD-4	640R526G03	P	5019
RTD-5	640R514G03	T	5018
RTD-5	640R514G03	T	5019
SSP-1X	640R636G02	C	5004
SSP-1X	640R636G02	C	5005
SSP-2	640R462G04	Y	5018
SSP-2	640R462G04	Y	5019
SSP-3	640R464G04	V	5019
SSP-3	640R464G04	V	5018
SSP-4	640R642G02	F	5002
SSP-4	640R642G02	F	5015
SSP-5	640R468G04	V	5018
SSP-5	640R468G04	V	5021
SSP-6	640R470G04	U	5018
SSP-6	640R470G04	U	5019
SSP-7	640R472G04	Y	5018
SSP-7	640R472G04	Y	5019
SSP-9	640R554G03	K	5019
SSP-9	640R554G03	K	5020
PSU	758R050G05	AH	5010
Matrix	758R569G01	C	8057/0001
RFI Plate	690R891G01	B	5008
Reg Assy	682R089G03	P	5007
Misc Bd	756R609G02	D	5001
T-Chan CG	688R483G04	K	5010
T-Left	688R485G04	J	5010
T-Right	688R487G04	J	5010
T-Chan 8U	688R489G04	H	5010

OLS 15 (Cont'd)

DESCRIPTION	ASSEMBLY NO.	REV.	S/N
T-Ana Fil	688R491G04	K	5018
T-Ana Fil	688R491G04	K	5019
L-Ana Fil	688R493G04	H	5019
L-Ana Fil	688R493G04	H	5018
PSU TRA BLK	640R998G05	K	5020
PSU TRA BLK	640R998G05	K	5019
DME	688R481G05	H	5021
DME	688R481G05	H	5020
IMC	644R864G04	G	5010
Relay-1	756R589G02	D	5010
+5V	644R078G04	R	5010
Relay-2	688R502G04	F	5010
+12VDA	688R499G04	F	5020
+12VDA	688R499G04	F	5019
Dual ENPA	640R616G02	J	5010
Relay-3	688R503G04	D	5010
-12V	644R069G04	R	5010
Relay-5	688R505G04	D	5010
Relay-4	688R504G04	D	5010
+12V Vm	688R500G04	D	5010
MC	688R495G04	G	5019
MC	688R495G04	G	5021
CPH	688R497G04	E	5010
Enable	682R381G04	E	5010
Driver	756R593G02	E	5003

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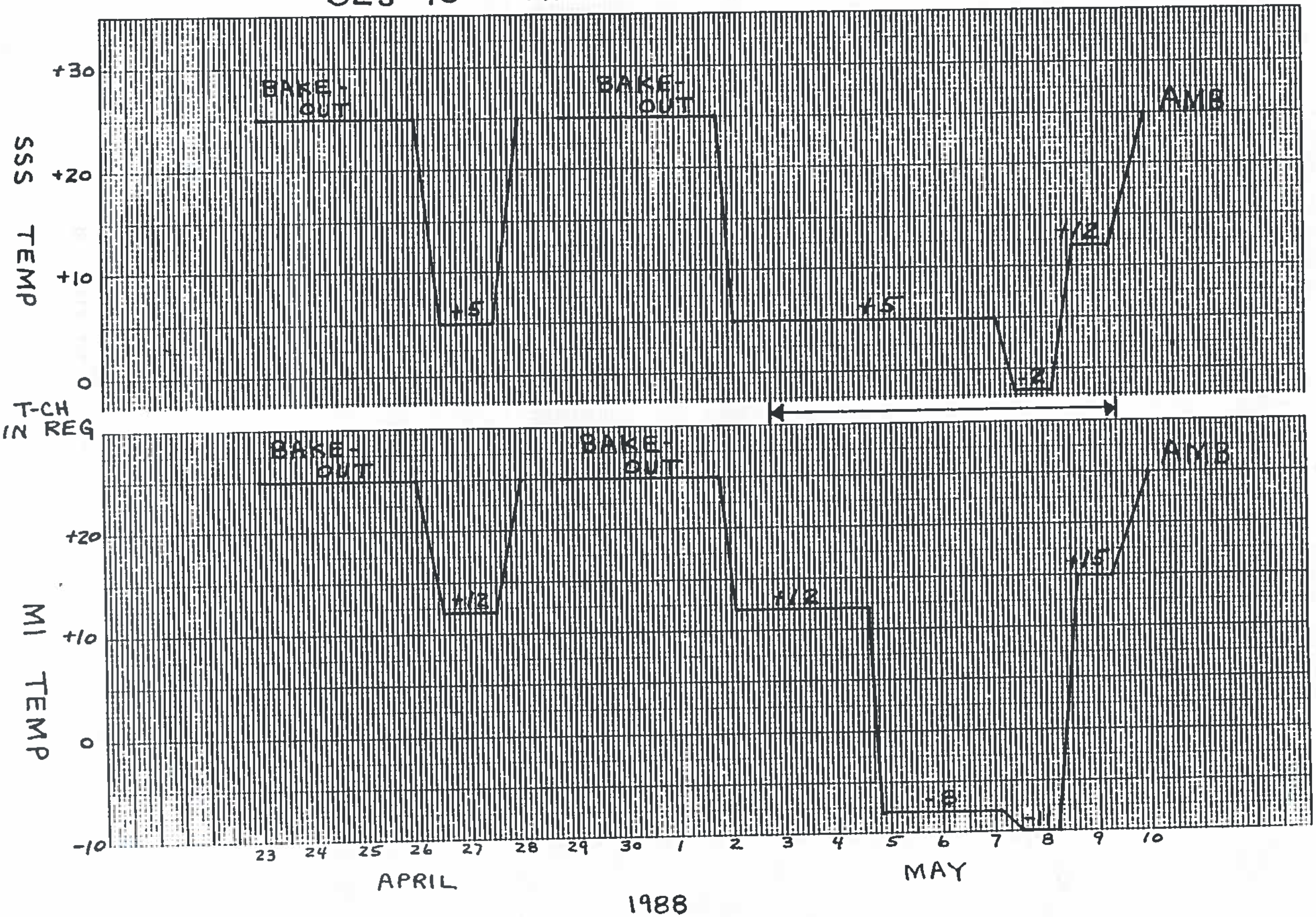
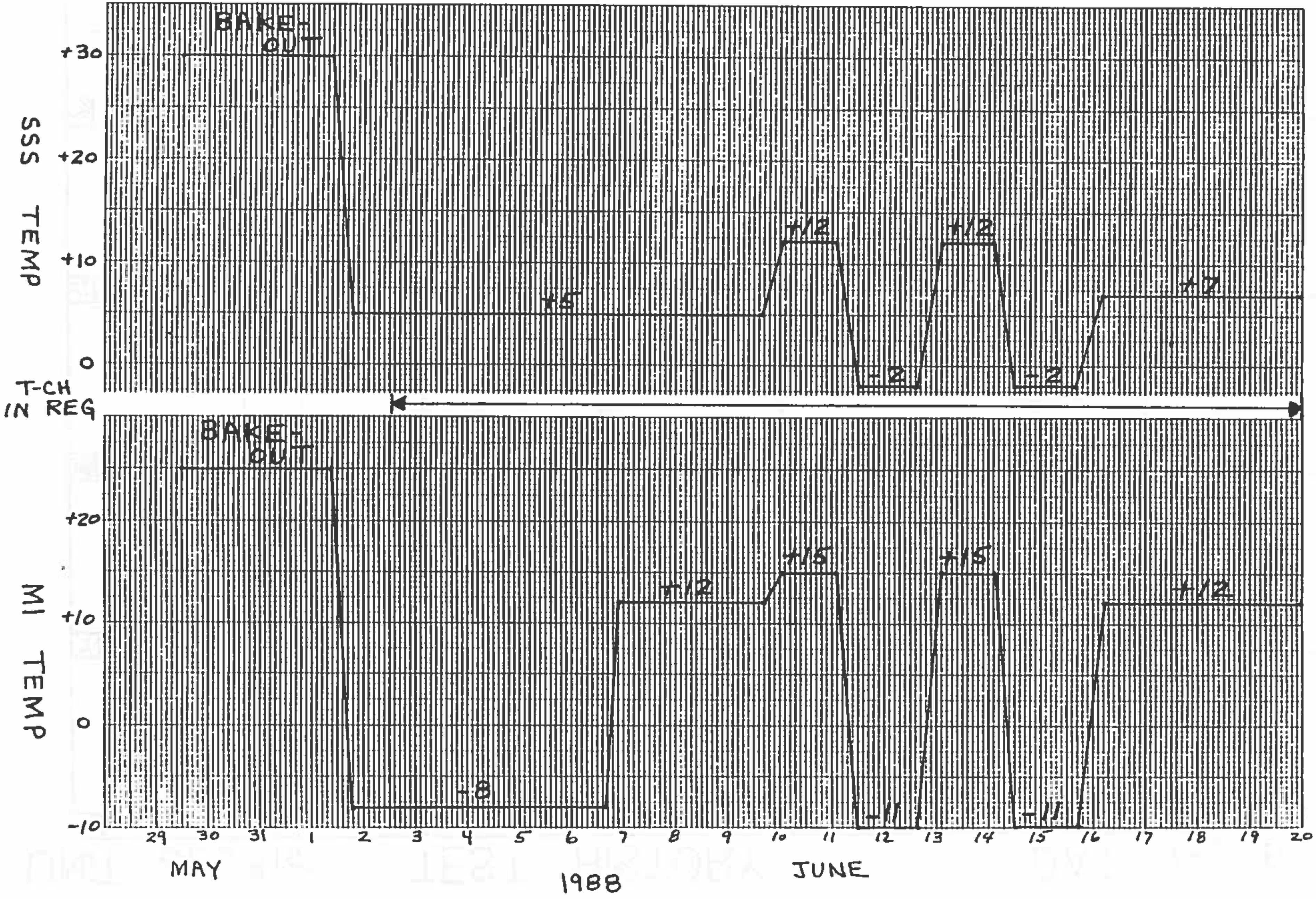
OLS #15 THERMAL VACUUM PROFILE



OLS #15 THERMAL VACUUM PROFILE



UNIT OLS #15 TEST HISTORY DATE FEB 88

	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19 Began System Test	20 No Testing
21 No. Testing	22 4x1x1 4x1x2 4x2x1 4x6x1	23 Funct Tests 4x7x1 9x1x1	24 9x1x2 9x1x3	25 T-Clamp Voltage EST OOS 4x3x1	26 9x1x6 9x1x4 9x1x5	27 No Testing
28 No Testing	29 Incoming #057 PR Test SDSBER					

UNIT OLS#15 **TEST HISTORY** DATE MAR 88

		1 4x4x1 MHC7PT	2 SDFIBER SDFNIBER MHC7PT 4x5x1	3 Funct Tests 4x4x1 MHC11PT 6x2x1 6x6x2 4x9x1	4 AHSF3PTI AHC11PT 4x4x1 MHC11PT 6x2x1 6x3x1 Funct Tests	5 No Testing
6 No Testing	7 APC11PT AHSFB11PT 6x2x4 6x3x2 6x3x3 6x3x5 MPA11PT 6x4x3A	8 6x8x2 6x5x1 6x10 4x10x1 6x6x1 6x6x3 6x11x1	9 6x11x2 Funct Tests 6x3x5 6x7x1 6x7x2 6x9	10 6x11x3 6x11x4 Funct Tests Config Tests	11 Config Tests 7x5 4x13 4x12 Funct Tests	12 No Testing
13 No Testing	14 Config Tests Funct Tests	15 Testing OLS#14 Tape Recorders	16 OLS#14 Tape Recorder Thermal Tests	17 OLS#14 Tape Recorder Thermal Tests	18 OLS #14 Tape Recorder Thermal Tests	19 No Testing
20 Config Tests	21 Config Tests	22 Funct Tests SIMFLT	23 Config Tests HRD spectral Response Test	24 Config Tests Funct Tests	25 Config Tests	26 Config Tests 7x8
27 Config Tests T-Cal & T-Clamp mirror check	28 6x8x2 System adjust & ambient verification completed	29 Moved System to TV chamber	30 T-Cal/Clamp EST Problem	31 SSS removed because of T-Clamp Thermistor short		

UNIT OLS #15 TEST HISTORY DATE APR 88

					1 No Tests	2 No Tests
3 No Tests	4 SSS installed in chamber Funct Tests	5 Funct Tests HOTTEST	6 Funct Tests 6x1x1 6x4x1 6x5x1 6x2x2 AHSF7PT MHA7PT 7x9 6x3x1 6x3x4 6x6x2	7 6x3x5 6x7x1 6x7x2 6x9 7x10 SDS anomally 6x6x2	8 SIMFLT	9 No Tests
10 No Tests	11 MPA7PT Funct Tests	12 SDS drop-out problem 9x1x1 Funct Tests	13 System moved to Blue Room because of MTF problem	14 SDS Problem MHC11PT AHSF7PT	15 MPA11PT 6x5x1 SDS Problem 4x4x1 6x5x1	16 No Tests
17 No Tests	18 HRO Shim installed AHC11PT MHC11PT 6x5x1	19 6x2x1 6x3x1 6x3x5 Adjusted HRO Gain & Freq MHC11PT 6x2x1 6x3x1 4x4x1 No Adj.	20 6x5x1 6x3x5 Moved system to TV chamber MHC11PT 6x5x1 6x2x2	21 6x3x1 6x3x5 AHSF7PT Funct Tests 9x1x1 6x7x1 6x7x2 MHC11PT	22 2A129 & 2A329 bds. reinstalled in SPS 7x10 7x3	23 Pumpdown 72 Hr Bake-out
24 72 Hr Bake-out	25 72 Hr Bake-out	26 Funct Tests T-Ch pot R19 will not adjust +5/+12@1230 7x7 4x13 6x2x2 6x3x1 MHC7PT 6x5x1 AHSF7PT	27 6x2x5 APC7PT MPA7PT 4x8x1 4x8x2 Began venting @1525	28 T/s T-Ch pot Adjust Problem 6x2x2 Adjusted PMT Edge Gain Pots 7x3 7x11 Pumpdown@1845	29 72 Hr Bake-out	30 72 Hr Bake-out

UNIT OLS #15 TEST HISTORY DATE MAY 88

1 72 Hr Bake-out	2 +5/Hz @ 0100 7x7 10x1 4x13 Funct Tests AHSF7PT MHC7PT 4x9x1 AHSFB9PT T-Ch in Reg @ 2015 T121T231RA	3 6x5x1 4x8x1 4x8x2 T121T231D ASV 210, 310 6x3x3 ATSF7PT MTC7PT 6x5x2	4 APC7PT MPA7PT 6x7x1 6x9 6x2x5 6x2x2 6x3x1 6x3x4 6x2x2 6x3x5 M1 to -8 4x8x3	5 T121T231A ASV 210Q 240 T123T229A Funct Tests 6x2x4 T125T227A ASU 270 AHSF7PT ATSF7PT T121T221A ASVCROSS	6 MHC7PT MTC7PT 6x5x2 6x5x1 ASV 210, 310 TDCRM3A DTIMOUNMBA Funct Tests	7 Funct Tests To Cold Soak @ 0130 9x1x3 -2/-11 @ 1100 T121T231B 6x10 SIMFLT
8 To Hot Soak @ 0300 9x1x6 +12/+15 @ 1300 T121T231B	9 SIMFLT 6x10 Warm-up @ 1030 7x8 chamber open @ 0830	10 System to Blue Room X-X axis vib of SPS	11 Y-Y & Z-Z axis vib of SPS 3 axis vib of PSU, SPU, OSU	12 3 axis vib of SSS	13 Quicktest STDVALTST 10x1	14 STDVALTST Quicktest AHSF3PTI AHSF7PT Funct Tests
15 MHA7PT MPA7PT 6x4x3A 6x6x2 6x2x4 10x1 6x2x4 6x2x1 6x3x1 APC7PT	16 AHSFB9PT 6x7x2 Funct Tests 6x2x1 7x5	17 Funct Tests 6x2x2 9x1x1 9x1x4	18 Funct Tests T/S. SDF/SDS switching phenomenon SDFIBER SOFNIBER	19 SOSBER T/S SDF/SDS switching phenomenon New thrust bearing installed	20 SDS/SDF Switching Investigation	21 No Tests
22 No Tests	23 Pre TV Inspection	24 System installed in TV Funct Tests AHSF7PT 6x2x2	25 6x3x1 6x2x5 MHA7PT 6x5x1 6x3x4 6x6x2 6x6x3 Funct Tests 6x7x1 6x6x1 6x3x5 6x9	26 Funct Tests SIMFLT	27 Funct Tests	28 7x10 Funct Tests
29 Funct Tests Pumpdown @ 12 oc	30 72 Hr Bake-out	31 72 Hr Bake-out				

UNIT OLS #15 TEST HISTORY DATE JUNE 88

			1 +5/-8@1900 7x7 Funct Tests	2 MHC11PT MPA11PT 6x5x1 6x2x5 Tch in Rez@1300 AHSF3PTI 6x6x2 6x2x3A TDCRM2G 6x2x2 6x3x1	3 TG=3 TL=12 6x2x3A TDCRM2G 6x2x4 6x7x3 T121T231G SIMFLT	4 ASV 210Q 6x7x1 6x9 T123T224A MTC11PT T125T227A 6x3x4 ASV270 T127T225A 6x3x5 ASV290 T129T223A
5 6x5x2 T131T221A ASV 210, 310 Funct Tests AHC11PT T121T221S ASVCROSS APC11PT T119T220A	6 AHSFB9PT ATC11PT 9x1x1 T121T221S TDCRM3A Funct Tests M1 to +12@1645 +5/+12@ 2200	7 Funct Tests 6x2x3A AHSF7PT APC7PT T121T231H 6x3x3 6x5x1 ASV 210, 290, 310 9x1x4 ATSF7PT T123T229B	8 MHC7PT MPA7PT MTC7PT 6x5x2 T125T227B ASV270 Funct Tests ASV 210	9 6x7x3 Funct Tests T119T220B TDCRM3B TDCRM3K TDCRM3A To Hot Soak #1 @1715	10 9x1x6 +12/+15@0100 T121T231B Funct Tests 6x2x2 SIMFLT	11 To Cold Soak #1 @ 0235 9x1x3 -2/-11@1225 Funct Tests
12 Funct Tests T121T231B 6x2x2 SIMFLT To Hot Soak #2 @1735 7x4B 9x1x2	13 +12/+15@0230 Funct Tests T121T231B SIMFLT	14 To Cold Soak #2 @0325 9x1x3 -2/-11@ 1200 SIMFLT	15 Funct Tests 6x2x2 T121T231B To Hot Limits @1930 9x1x6	16 +7/+12@ 0330 6x2x2 6x2x4 6x2x3A T121T231B 6x2x5 Funct Tests	17 Funct Tests 6x2x5 ASV 210 310 6x3x1 T123T224B MHC7PT 6x6x3 6x3x3 T125T227B 6x3x4 6x3x5	18 Funct Tests T119T231B MPA7PT MTC7PT 6x6x1 6x6x2 6x10 TDCRM3B DTMCVHL11A AHSF3PTI
19 AHC7PT AHSFB9PT 6x11x1 6x11x2 6x11x3 6x11x4 APC7PT Funct Tests ATS7PT	20 Funct Tests SIMFLT 6x3x5 9x1x1 9x1x4	21 To Cold Limits @0010 7x4A 9x1x5 +3/-8 @ 0700 6x2x3A T121T231B ASV 210 310 6x2x2 6x3x1 T123T229B T125T227B	22 6x2x4 6x2x5 T119T231B MHC7PT MPA7PT TDCRM3B 6x6x2 6x10 6x3x4 6x6x1 6x6x3 6x3x3 6x3x5 AHSF3PTI	23 AHC7PT AHSFB9PT 6x11x1 ATS7PT APC7PT 6x11x2	24 6x11x3 6x11x4 MTC7PT Funct Tests SIMFLT	25 Funct Tests
26 9x1x1 9x1x4 To +5/-8@1230 9x1x6 +5/-8@ 1730 Funct Tests	27 Funct Tests 6x2x2 6x2x4 6x2x5 6x10 To +3/-8@ 1530 +3/-8 @ 1915 Funct Tests	28 Funct Tests To +5/-8 @0855 9x1x6 +5/-8 @ 1600 6x10 6x2x3A	29 MHC7PT MPA7PT MTC7PT 6x3x1 T121T231C ASV 210, 310 6x6x2 6x6x1 6x6x3 6x3x3 T122T230C 6x3x5 6x3x4 T123T224C	30 T124T228C AHSFB9PT T125T227C AHC7PT T126T226C APC7PT Funct Tests		

UNIT OLS #15 TEST HISTORY DATE JULY 88

31					1 Funct Tests T12ST224C 6x11x1 6x11x4 T130T222C 9x1x1 9x1x4 T119T220C TDCRM3C DTMOUNLEV SIMFLT	2 ATS7PT Funct Tests
3 Funct Tests T121T231G To +12/-8 @ 0435 +12/-8 @ 0815 T121T231B PSU to +30° T121T231B To +12/+12 @ 1545 +12/+12 @ 2000 T121T231B	4 PSU to +20° T121T231B To +5/+12 @ 0255 +5/+12 @ 1000 T121T231H To +5/-8 @ 1230 +5/-8 @ 1939 Config Tests	5 Config. Tests	6 Config Tests	7 Config Tests Special T-ch MTF Test	8 Config Tests	9 Config Tests Venting Chamber @ 0800
10 Venting Chamber	11 Chamber open @ 0800 TCP Calib. Test	12 TCP T/S	13 MHC7PT TERDAT	14 TCP T/S	15 SIMFLT TCP T/S	16 No Testing
17 No Testing	18 Moved System to Blue Room	19 6x2x1 AHSF11PT 7x5	20 7x8 Config Tests	21 Config Tests	22 SSS mirrors were cleaned 6x2x1	23 No Testing
24 No Testing	25 All system Tests are complete	26	27	28	29	30

UNIT OLS #15 TEST HISTORY DATE AUG 88

	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	27
28	29	30	31			

No Testing

UNIT OLS #15 TEST HISTORY DATE SEPT 88

				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	27	28	29	30	

No Testing

UNIT OLS #15 TEST HISTORY DATE OCT 88

30	31					1
2	3	4	5	6	7	8
9	10	11	12	13	19	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29

No Testing

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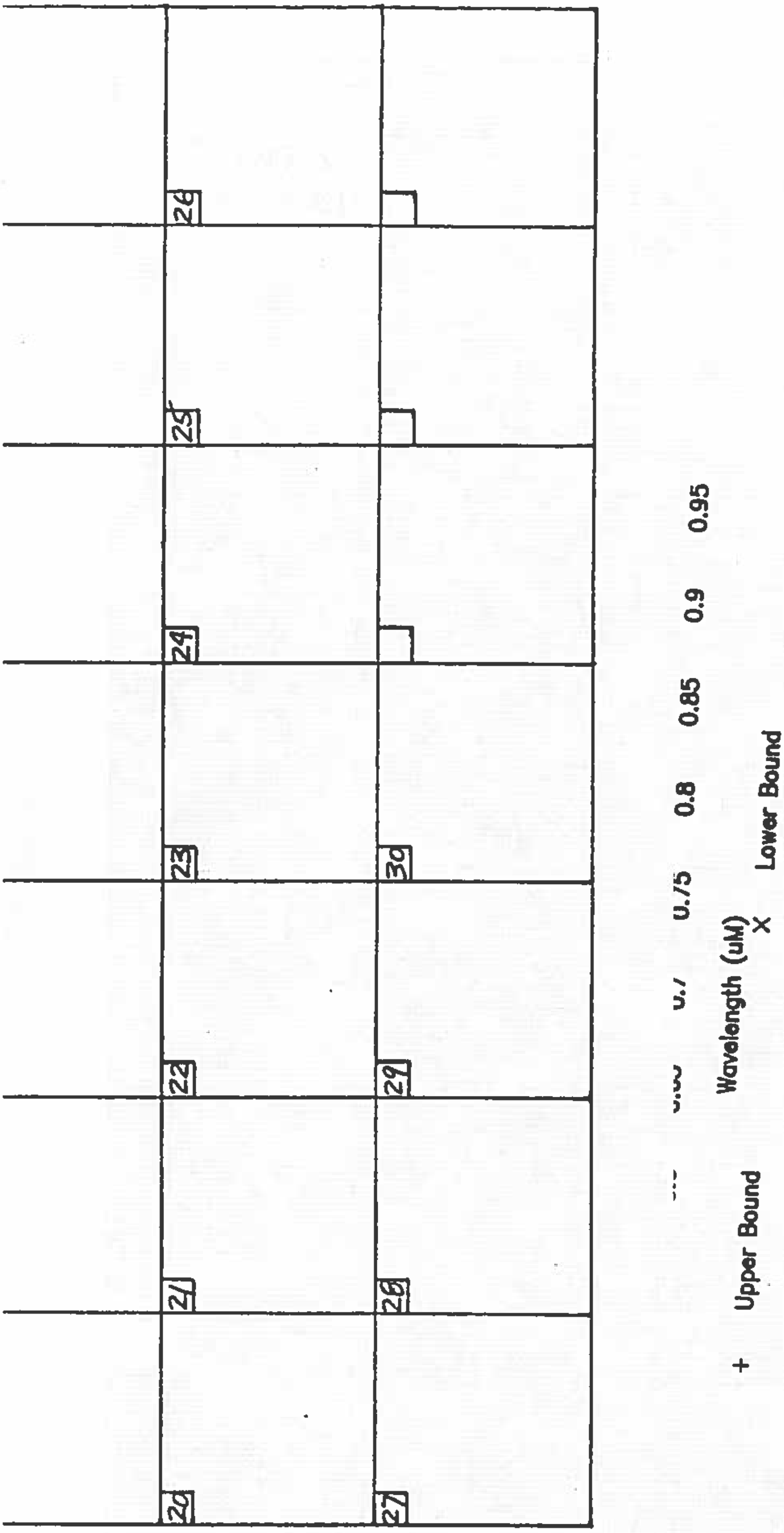

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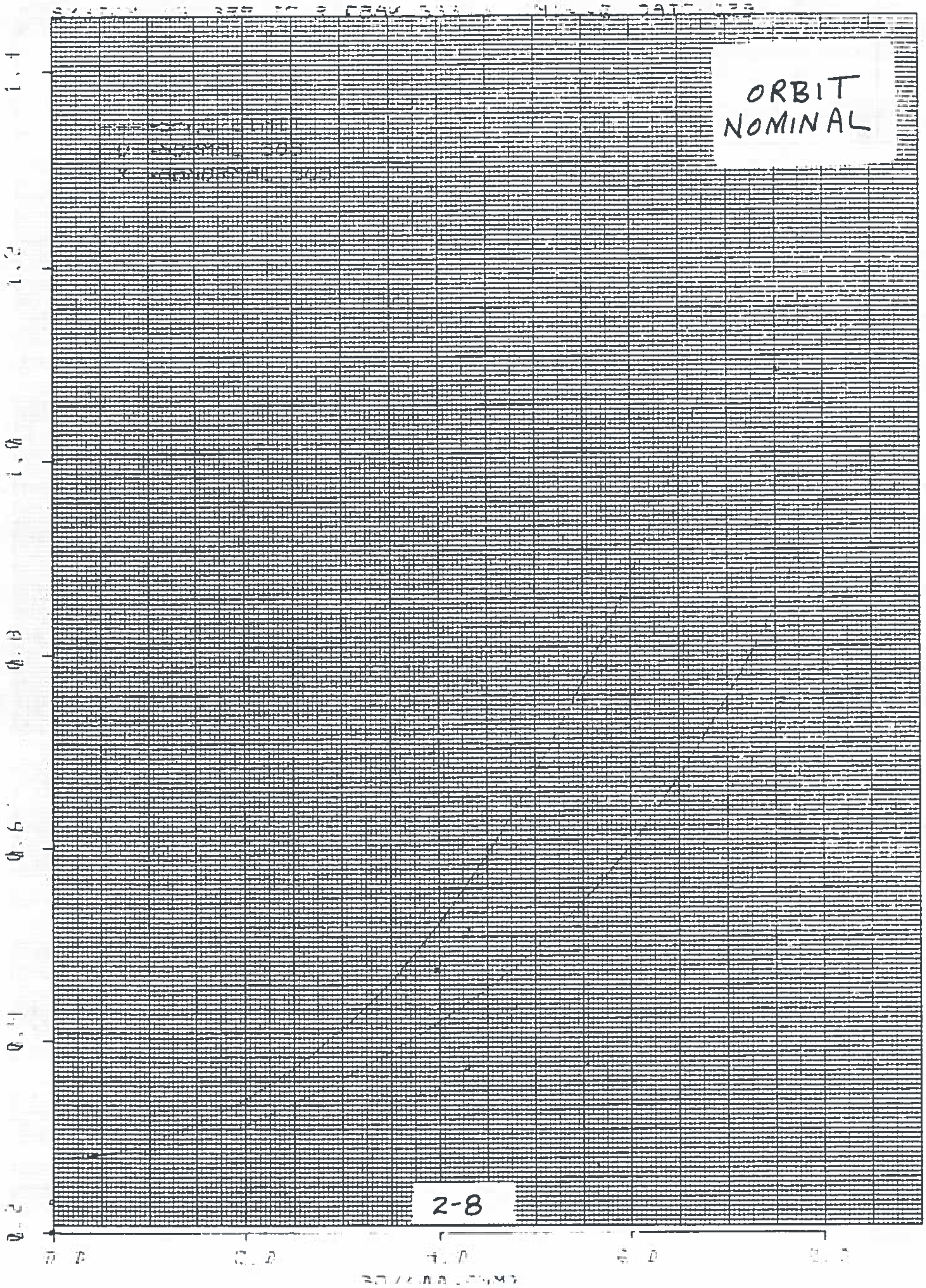

2-8

T, COMPLETE, SRP (NM)

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= -8DEGC DATE: 629

SEG	SUR. DIST. (NM)	TFP	TFB	TSP	TSB
LFT	-750.	0.767	0.756	1.747	1.748
MID	-750.	1.317	0.000	1.857	1.859
RGT	-750.	1.092	1.087	1.799	1.800
LFT	0.	0.000	0.000	0.000	0.000
MID	0.	0.000	0.000	0.000	0.000
RGT	0.	0.000	0.000	0.000	0.000
LFT	-431.	0.373	0.365	1.452	1.453
MID	-431.	0.625	0.000	1.482	1.484
RGT	-431.	0.513	0.510	1.462	1.464
LFT	-398.	0.349	0.341	1.392	1.394
MID	-398.	0.589	0.581	1.419	1.421
RGT	-398.	0.472	0.470	1.405	1.406
LFT	0.	0.000	0.000	0.000	0.000
MID	0.	0.000	0.000	0.000	0.000
RGT	0.	0.000	0.000	0.000	0.000
LFT	0.	0.230	0.226	0.959	0.960
MID	0.	0.231	0.226	0.957	0.958
RGT	0.	0.232	0.227	0.958	0.959
LFT	0.	0.000	0.000	0.000	0.000
MID	0.	0.000	0.000	0.000	0.000
RGT	0.	0.000	0.000	0.000	0.000
LFT	398.	0.452	0.451	1.400	1.402
MID	398.	0.566	0.560	1.415	1.417
RGT	398.	0.349	0.341	1.393	1.394
LFT	431.	0.498	0.496	1.463	1.465
MID	431.	0.601	0.000	1.477	1.478
RGT	431.	0.370	0.362	1.451	1.452
LFT	0.	0.000	0.000	0.000	0.000
MID	0.	0.000	0.000	0.000	0.000
RGT	0.	0.000	0.000	0.000	0.000
LFT	757.	1.088	1.083	1.795	1.796
MID	757.	1.571	0.000	1.958	1.958
RGT	757.	0.750	0.739	1.729	1.731

T, COMPLETE, SRP RATIO

SEG	SUR. DIST. (NM)	TFP	TFB	TSP	TSB
LFT	-750.	0.893	0.880	0.777	0.778
MID	-750.	0.000	0.000	0.826	0.827
RGT	-750.	0.827	0.823	0.800	0.801
LFT	0.	0.000	0.000	0.000	0.000
MID	0.	0.000	0.000	0.000	0.000
RGT	0.	0.000	0.000	0.000	0.000
LFT	-431.	0.845	0.826	0.907	0.908
MID	-431.	0.000	0.000	0.926	0.927
RGT	-431.	0.903	0.898	0.913	0.914
LFT	-398.	0.832	0.813	0.908	0.909
MID	-398.	0.896	0.885	0.925	0.926
RGT	-398.	0.902	0.898	0.916	0.917
LFT	0.	0.000	0.000	0.000	0.000
MID	0.	0.000	0.000	0.000	0.000
RGT	0.	0.000	0.000	0.000	0.000

LFT	0.	0.837	0.820	0.913	0.914
MID	0.	0.798	0.782	0.912	0.913
RGT	0.	0.843	0.826	0.912	0.913
LFT	0.	0.000	0.000	0.000	0.000
MID	0.	0.000	0.000	0.000	0.000
RGT	0.	0.000	0.000	0.000	0.000
LFT	398.	0.866	0.862	0.913	0.914
MID	398.	0.862	0.852	0.923	0.924
RGT	398.	0.832	0.813	0.908	0.909
LFT	431.	0.876	0.872	0.913	0.915
MID	431.	0.000	0.000	0.922	0.923
RGT	431.	0.838	0.819	0.906	0.907
LFT	0.	0.000	0.000	0.000	0.000
MID	0.	0.000	0.000	0.000	0.000
RGT	0.	0.000	0.000	0.000	0.000
LFT	757.	0.810	0.806	0.794	0.795
MID	757.	0.000	0.000	0.866	0.866
RGT	757.	0.860	0.848	0.765	0.766

TF, LEFT, PRIMARY

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= -8DEGC DATE: 629

SUR. DIST. (NM)	SRP ACTUAL (NM)	SRP RATIO
-750.	0.767	0.893
0.	0.000	0.000
-431.	0.373	0.845
-398.	0.349	0.832
0.	0.000	0.000
0.	0.230	0.837
0.	0.000	0.000
398.	0.452	0.866
431.	0.498	0.876
0.	0.000	0.000
757.	1.088	0.810

TF, LEFT, BACKUP

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= -8DEGC DATE: 629

SUR. DIST. (NM)	SRP ACTUAL (NM)	SRP RATIO
-750.	0.756	0.880
0.	0.000	0.000
-431.	0.365	0.826
-398.	0.341	0.813
0.	0.000	0.000
0.	0.226	0.820
0.	0.000	0.000
398.	0.451	0.862
431.	0.496	0.872
0.	0.000	0.000
757.	1.083	0.806

TF, RIGHT, PRIMARY

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= -8DEGC DATE: 629

SUR. DIST. (NM)	SRP ACTUAL (NM)	SRP RATIO
-750.	1.092	0.827
0.	0.000	0.000
-431.	0.513	0.903
-398.	0.472	0.902
0.	0.000	0.000
0.	0.232	0.843
0.	0.000	0.000
398.	0.349	0.832
431.	0.370	0.838
0.	0.000	0.000
757.	0.750	0.860

TF RIGHT, BACKUP

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= -8DEGC DATE: 629

SUR. DIST. (NM)	SRP ACTUAL (NM)	SRP RATIO
-750.	1.087	0.823
0.	0.000	0.000
-431.	0.510	0.898
-398.	0.470	0.898
0.	0.000	0.000
0.	0.227	0.826
0.	0.000	0.000
398.	0.341	0.813
431.	0.362	0.819
0.	0.000	0.000
757.	0.739	0.848

2.2 Geometric Resolution (Cont'd)

2.2.1 Fine Geometric Resolution, Infared (Cont'd.) (3.2.1.1.2.1)

2.2.1.2 Acceptance - Vibration

OLS #15 underwent Acceptance level SSS vibration per DMSS-OLS-300 with Cone Cooler S/N 027 on May 12, 1988. The pre-to-post vibration SRP performance shows no SRP changes attributable to vibration and is shown on the attached curves and tables.

ATTACHMENTS:	TF SRP	Curve Previbration	5-03-88
	TF SRP	Tables Previbration	5-03-88
	TF SRP	Curves Postvibration	6-6-88
	TF SRP	Tables Postvibration	6-6-88

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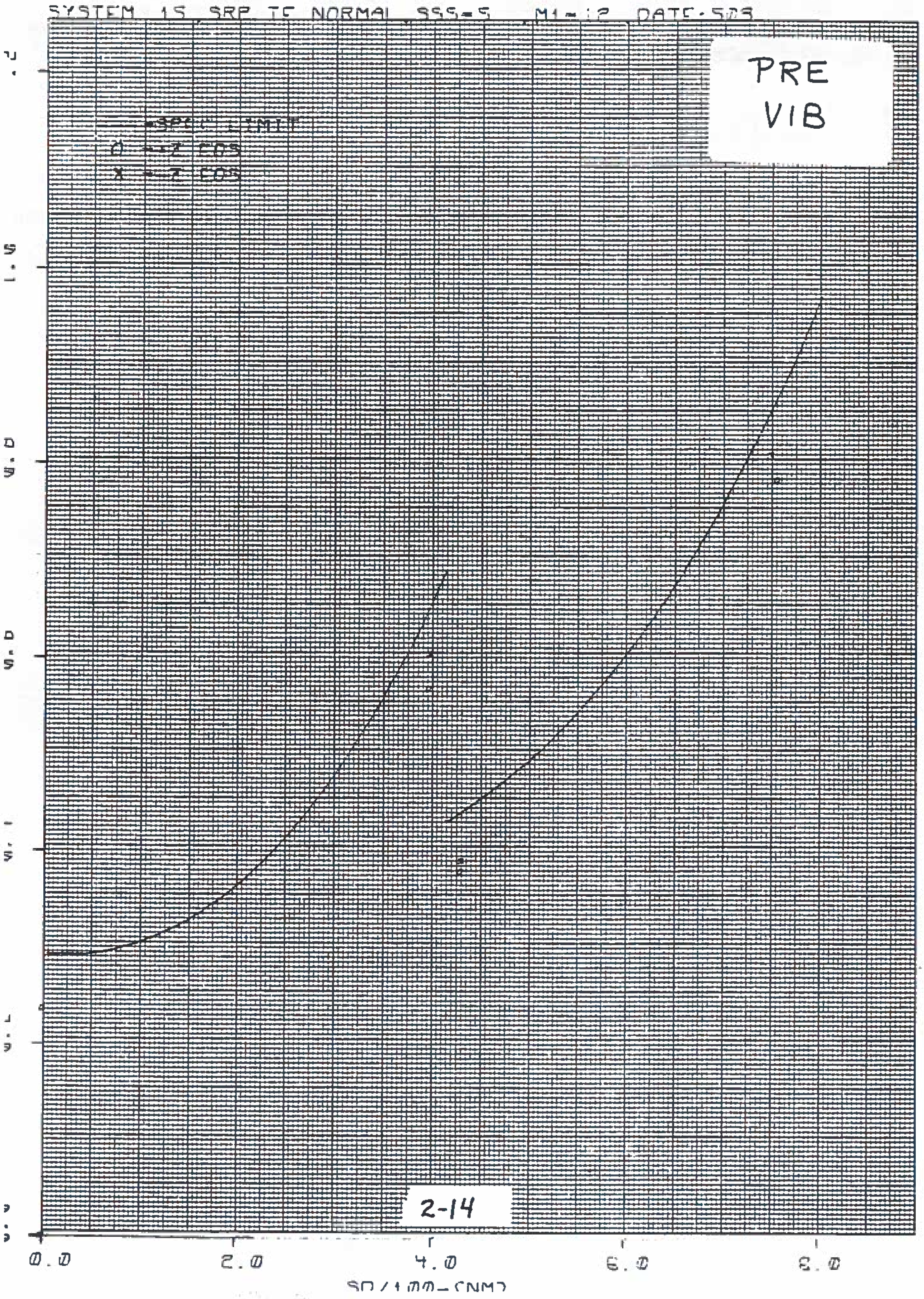

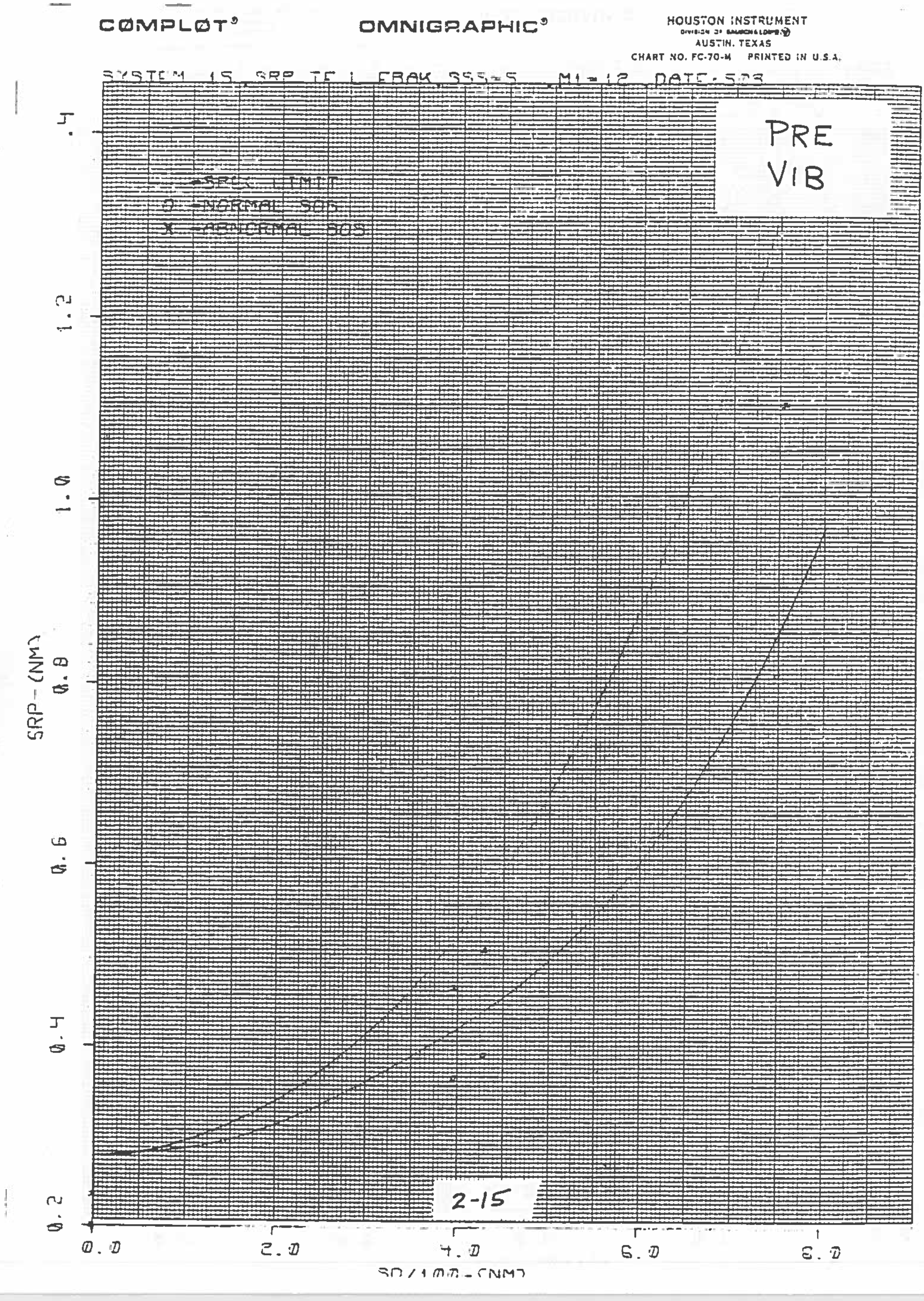
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SYSTEM 15 SRP TE L FRAK SSS=5 M1=12 DATE 5/23
SPEC LIMIT
O = NORMAL SOS
X = ABNORMAL SOS
PRE VIB
SRP-(NM)
0.2
0.4
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SO/100-(NM)
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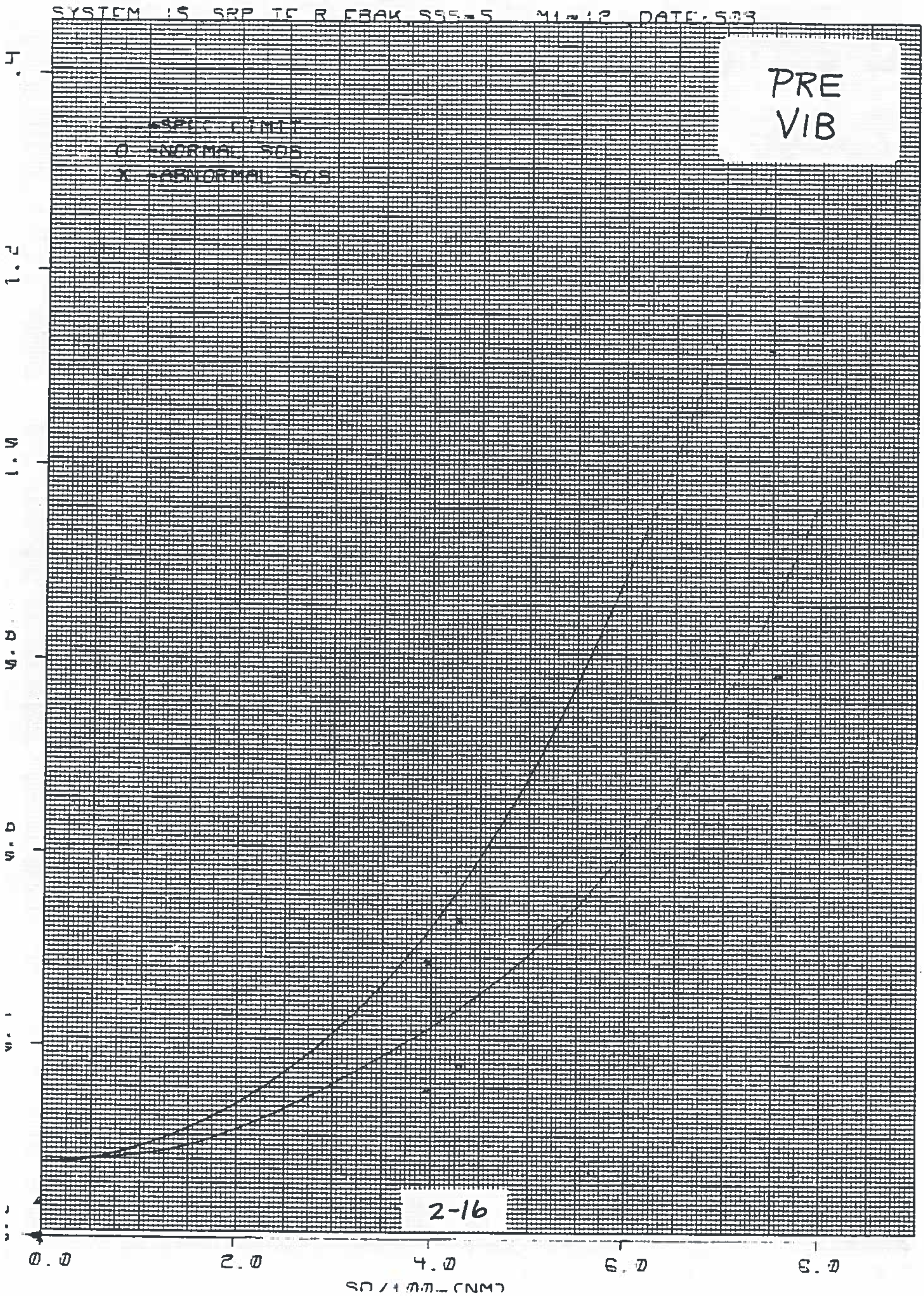

T, COMPLETE, SRP (NM)

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= 12DEGC DATE: 503

SEG	SUR. DIST. (NM)	TFP	TFB	TSP	TSB
LFT	-750.	0.809	0.805	1.751	1.751
MID	-750.	1.292	0.000	1.847	1.845
RGT	-750.	1.115	1.112	1.804	1.803
LFT	0.	0.000	0.000	0.000	0.000
MID	0.	0.000	0.000	0.000	0.000
RGT	0.	0.000	0.000	0.000	0.000
LFT	-431.	0.390	0.386	1.458	1.458
MID	-431.	0.643	0.000	1.489	1.489
RGT	-431.	0.529	0.528	1.467	1.467
LFT	-398.	0.365	0.360	1.401	1.402
MID	-398.	0.603	0.602	1.425	1.425
RGT	-398.	0.485	0.484	1.409	1.410
LFT	0.	0.000	0.000	0.000	0.000
MID	0.	0.000	0.000	0.000	0.000
RGT	0.	0.000	0.000	0.000	0.000
LFT	0.	0.234	0.231	0.960	0.961
MID	0.	0.235	0.232	0.960	0.961
RGT	0.	0.236	0.233	0.960	0.960
LFT	0.	0.000	0.000	0.000	0.000
MID	0.	0.000	0.000	0.000	0.000
RGT	0.	0.000	0.000	0.000	0.000
LFT	398.	0.465	0.463	1.403	1.404
MID	398.	0.567	0.566	1.415	1.415
RGT	398.	0.354	0.349	1.395	1.395
LFT	431.	0.506	0.504	1.462	1.463
MID	431.	0.605	0.000	1.478	1.478
RGT	431.	0.378	0.373	1.451	1.452
LFT	0.	0.000	0.000	0.000	0.000
MID	0.	0.000	0.000	0.000	0.000
RGT	0.	0.000	0.000	0.000	0.000
LFT	757.	1.106	1.102	1.799	1.798
MID	757.	1.578	0.000	1.960	1.956
RGT	757.	0.782	0.779	1.735	1.735

TF, RIGHT, PRIMARY

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= 12DEGC DATE: 503

SUR. DIST. (NM)	SRP ACTUAL (NM)	SRP RATIO
-750.	1.115	0.844
0.	0.000	0.000
-431.	0.529	0.931
-398.	0.485	0.929
0.	0.000	0.000
0.	0.236	0.858
0.	0.000	0.000
398.	0.354	0.845
431.	0.378	0.856
0.	0.000	0.000
757.	0.782	0.897

TF RIGHT, BACKUP

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= 12DEGC DATE: 503

SUR. DIST. (NM)	SRP ACTUAL (NM)	SRP RATIO
-750.	1.112	0.842
0.	0.000	0.000
-431.	0.528	0.929
-398.	0.484	0.926
0.	0.000	0.000
0.	0.233	0.847
0.	0.000	0.000
398.	0.349	0.833
431.	0.373	0.845
0.	0.000	0.000
757.	0.779	0.894

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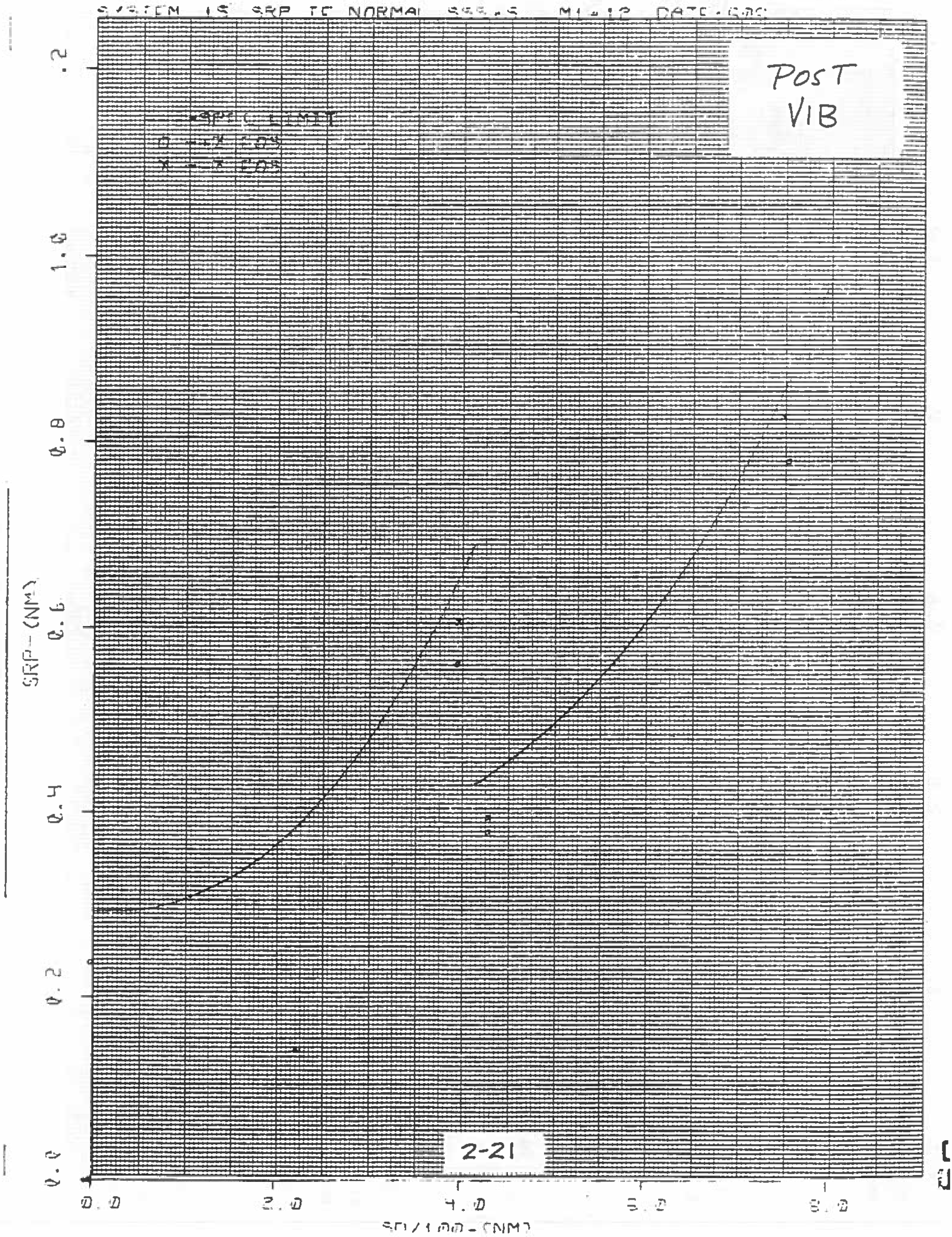

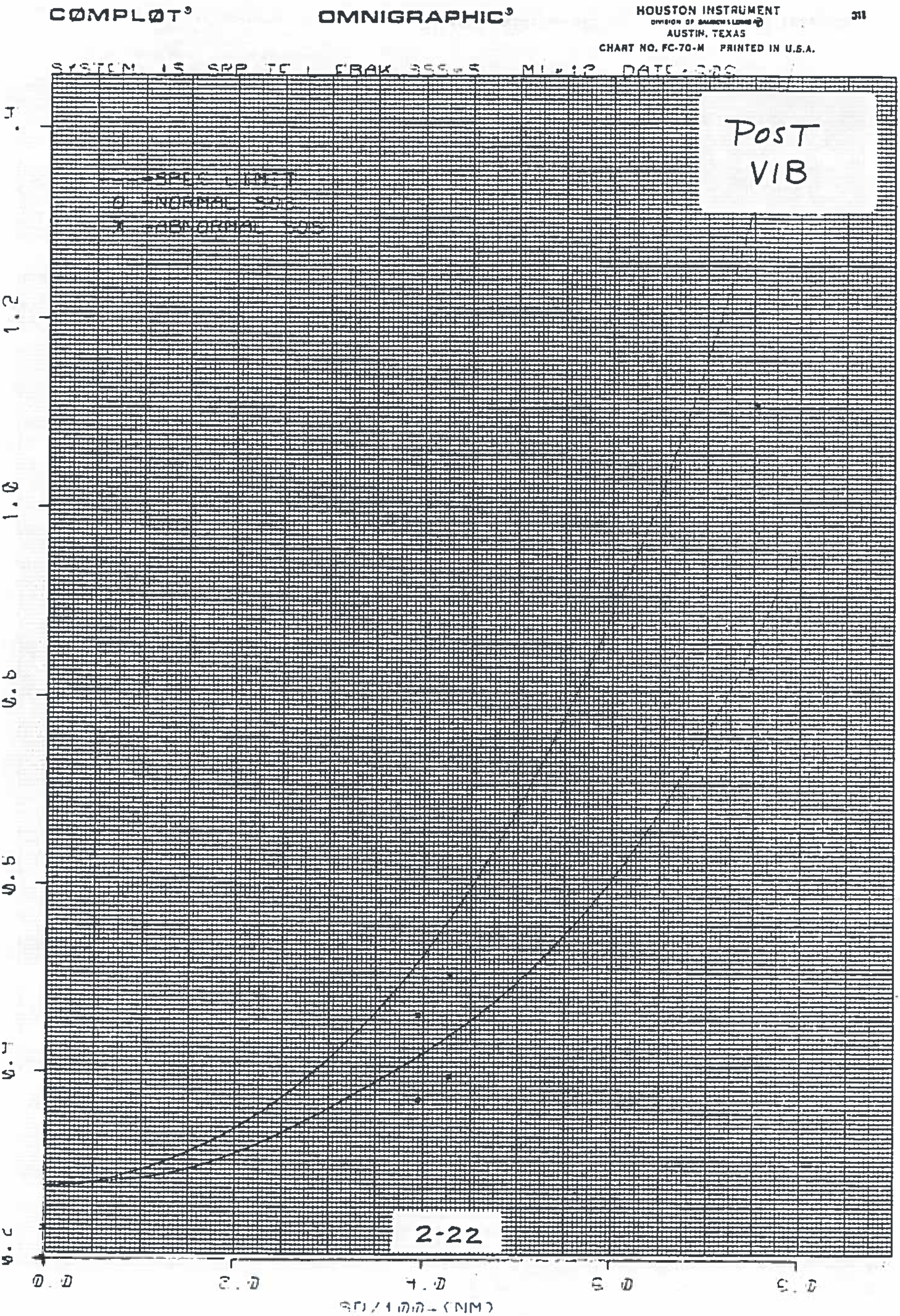
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POST VIB
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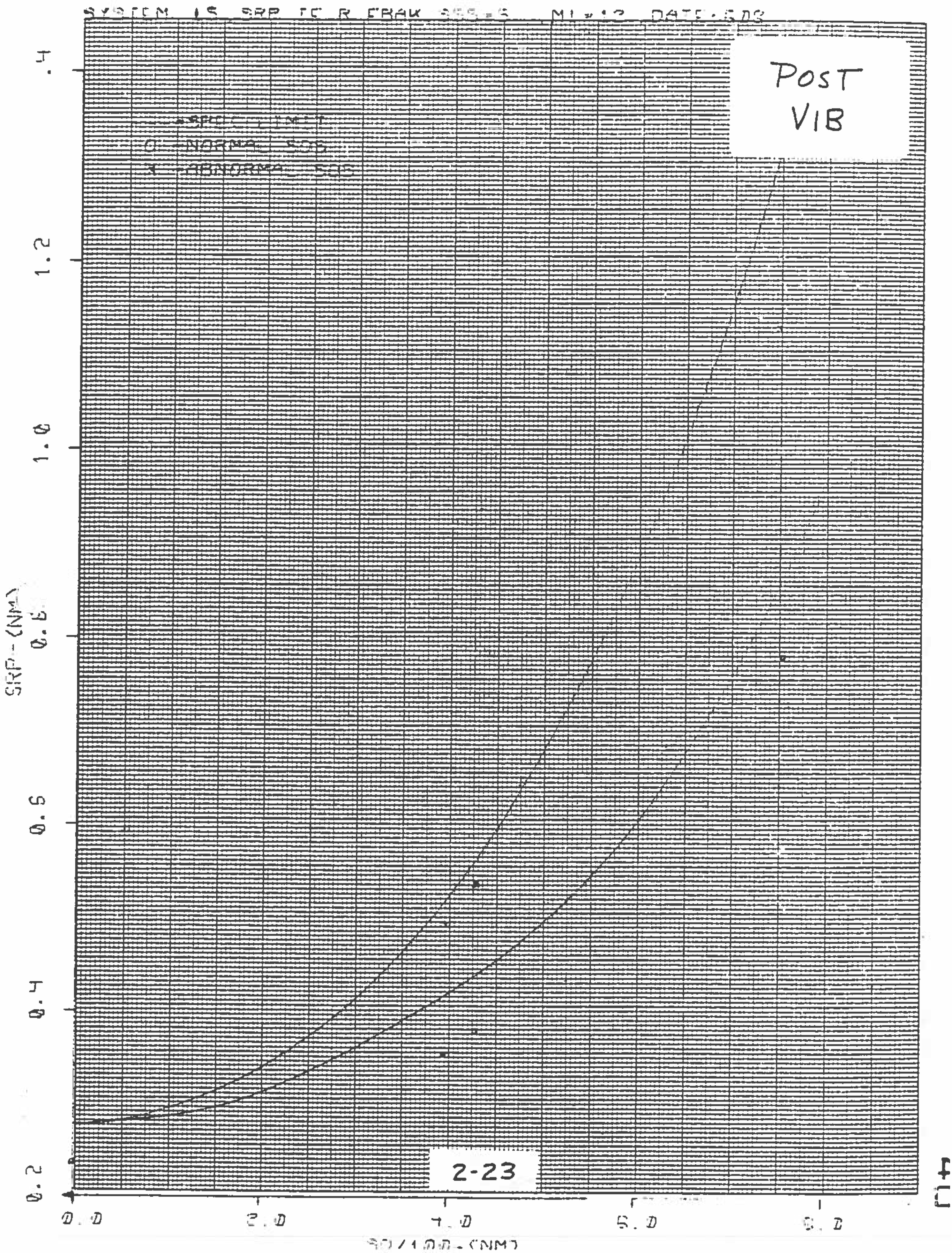

T, COMPLETE, SRP (NM)

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= 12DEGC DATE: 608

SEG	SUR. DIST. (NM)	TFP	TFB	TSP	TSB
LFT	-750.	0.827	0.829	1.751	1.755
MID	-750.	1.292	0.000	1.841	1.846
RGT	-750.	1.129	1.127	1.805	1.810
LFT	0.	0.000	0.000	0.000	0.000
MID	0.	0.000	0.000	0.000	0.000
RGT	0.	0.000	0.000	0.000	0.000
LFT	-431.	0.394	0.389	1.451	1.455
MID	-431.	0.645	0.000	1.485	1.489
RGT	-431.	0.536	0.535	1.466	1.470
LFT	-398.	0.370	0.365	1.396	1.399
MID	-398.	0.606	0.608	1.420	1.424
RGT	-398.	0.493	0.491	1.407	1.410
LFT	0.	0.000	0.000	0.000	0.000
MID	0.	0.000	0.000	0.000	0.000
RGT	0.	0.000	0.000	0.000	0.000
LFT	0.	0.232	0.230	0.958	0.961
MID	0.	0.236	0.234	0.958	0.961
RGT	0.	0.236	0.234	0.959	0.962
LFT	0.	0.000	0.000	0.000	0.000
MID	0.	0.000	0.000	0.000	0.000
RGT	0.	0.000	0.000	0.000	0.000
LFT	398.	0.461	0.457	1.399	1.403
MID	398.	0.560	0.562	1.411	1.414
RGT	398.	0.354	0.350	1.388	1.392
LFT	431.	0.501	0.499	1.456	1.460
MID	431.	0.591	0.000	1.471	1.475
RGT	431.	0.379	0.374	1.447	1.450
LFT	0.	0.000	0.000	0.000	0.000
MID	0.	0.000	0.000	0.000	0.000
RGT	0.	0.000	0.000	0.000	0.000
LFT	757.	1.108	1.106	1.793	1.798
MID	757.	1.567	0.000	1.948	1.954
RGT	757.	0.779	0.782	1.728	1.733

T, COMPLETE, SRP RATIO

SEG	SUR. DIST. (NM)	TFP	TFD	TSP	TSD
LFT	-750.	0.963	0.966	0.779	0.781
MID	-750.	0.000	0.000	0.818	0.821
RGT	-750.	0.855	0.853	0.803	0.807
LFT	0.	0.000	0.000	0.000	0.000
MID	0.	0.000	0.000	0.000	0.000
RGT	0.	0.000	0.000	0.000	0.000
LFT	-431.	0.893	0.880	0.906	0.906
MID	-431.	0.000	0.000	0.928	0.930
RGT	-431.	0.943	0.942	0.916	0.918
LFT	-398.	0.881	0.870	0.910	0.912
MID	-398.	0.922	0.926	0.926	0.928
RGT	-398.	0.943	0.939	0.917	0.919
LFT	0.	0.000	0.000	0.000	0.000
MID	0.	0.000	0.000	0.000	0.000
RGT	0.	0.000	0.000	0.000	0.000
LFT	0.	0.845	0.838	0.913	0.915
MID	0.	0.817	0.809	0.913	0.915
RGT	0.	0.858	0.850	0.914	0.916
LFT	0.	0.000	0.000	0.000	0.000
MID	0.	0.000	0.000	0.000	0.000
RGT	0.	0.000	0.000	0.000	0.000
LFT	398.	0.881	0.874	0.913	0.915
MID	398.	0.853	0.856	0.920	0.922
RGT	398.	0.843	0.835	0.905	0.908
LFT	431.	0.882	0.877	0.909	0.912
MID	431.	0.000	0.000	0.919	0.921
RGT	431.	0.857	0.847	0.903	0.906
LFT	0.	0.000	0.000	0.000	0.000
MID	0.	0.000	0.000	0.000	0.000
RGT	0.	0.000	0.000	0.000	0.000
LFT	757.	0.825	0.823	0.793	0.796
MID	757.	0.000	0.000	0.862	0.865
RGT	757.	0.893	0.897	0.765	0.767

TF, LEFT, PRIMARY

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= 12DEGC DATE: 608

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-750.	0.827	0.963
0.	0.000	0.000
-431.	0.394	0.893
-398.	0.370	0.881
0.	0.000	0.000
0.	0.232	0.845
0.	0.000	0.000
398.	0.461	0.881
431.	0.501	0.882
0.	0.000	0.000
757.	1.108	0.825

TF, LEFT, BACKUP

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= 12DEGC DATE: 608

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-750.	0.829	0.966
0.	0.000	0.000
-431.	0.389	0.880
-398.	0.365	0.870
0.	0.000	0.000
0.	0.230	0.838
0.	0.000	0.000
398.	0.457	0.874
431.	0.499	0.877
0.	0.000	0.000
757.	1.106	0.823

TF, RIGHT, PRIMARY

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= 12DEGC DATE: 608

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-750.	1.129	0.855
0.	0.000	0.000
-431.	0.536	0.943
-398.	0.493	0.943
0.	0.000	0.000
0.	0.236	0.858
0.	0.000	0.000
398.	0.354	0.843
431.	0.379	0.857
0.	0.000	0.000
757.	0.779	0.893

TF RIGHT, BACKUP

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= 12DEGC DATE: 608

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-750.	1.127	0.853
0.	0.000	0.000
-431.	0.535	0.942
-398.	0.491	0.939
0.	0.000	0.000
0.	0.234	0.850
0.	0.000	0.000
398.	0.350	0.835
431.	0.374	0.847
0.	0.000	0.000
757.	0.782	0.897

2.2 Geometric Resolution (Cont'd)

2.2.1 Fine Geometric Resolution, Infrared (Cont'd) (3.2.1.1.2.1)

2.2.1.3 Acceptance - Thermal Vacuum

The attached TF SRP curves and tables demonstrate in-spec performance at the thermal vacuum test limits. The Orbit Nominal SRP curves are contained in paragraph 2.2.1.1 and are not included here.

ATTACHMENTS:	TF SRP Curves Hot Limits	6-18-88
	TF SRP Tables Hot Limits	6-18-88
	TF SRP Curves Cold Limits	6-24-88
	TF SRP Tables Cold Limits	6-24-88

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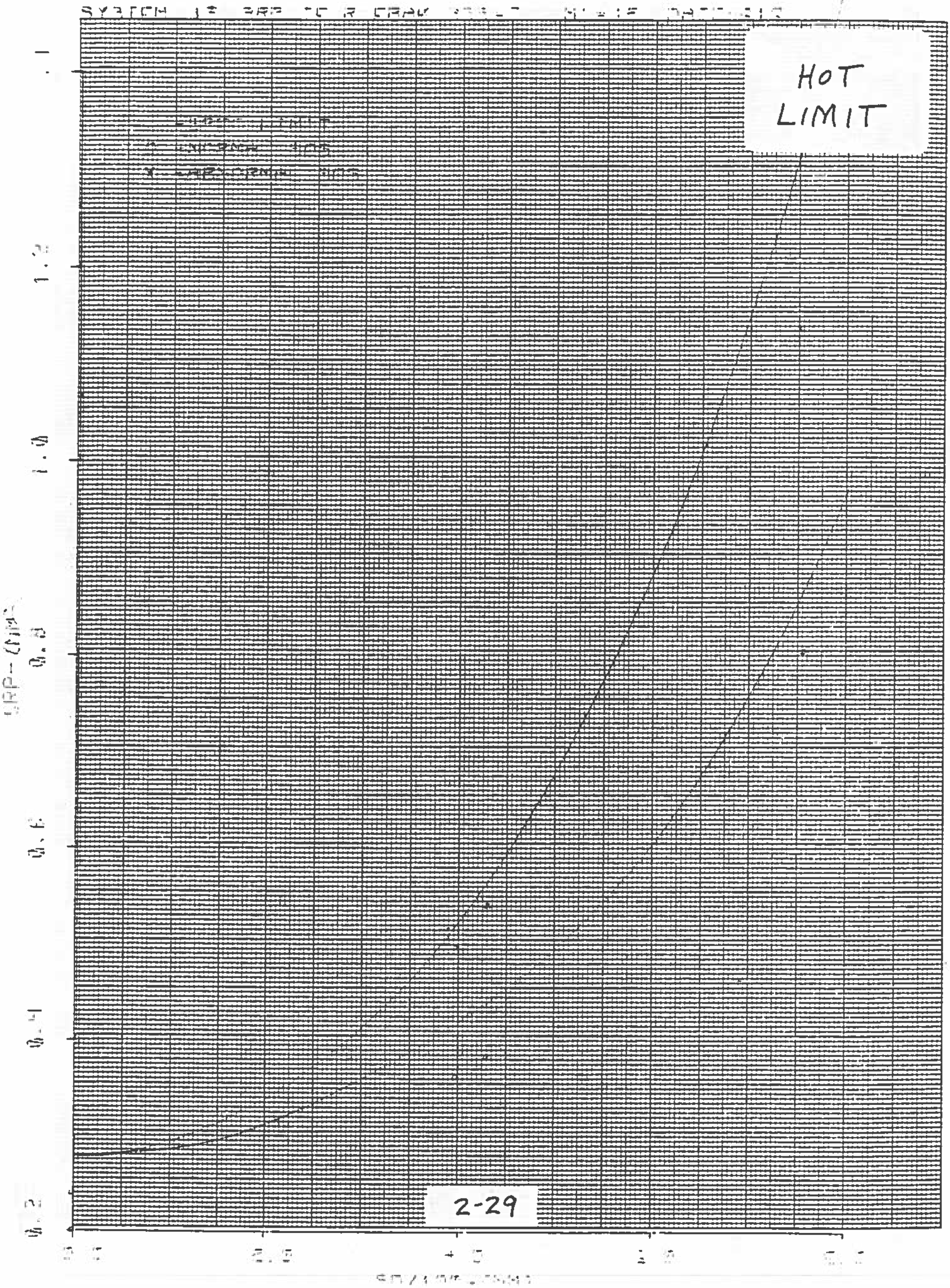

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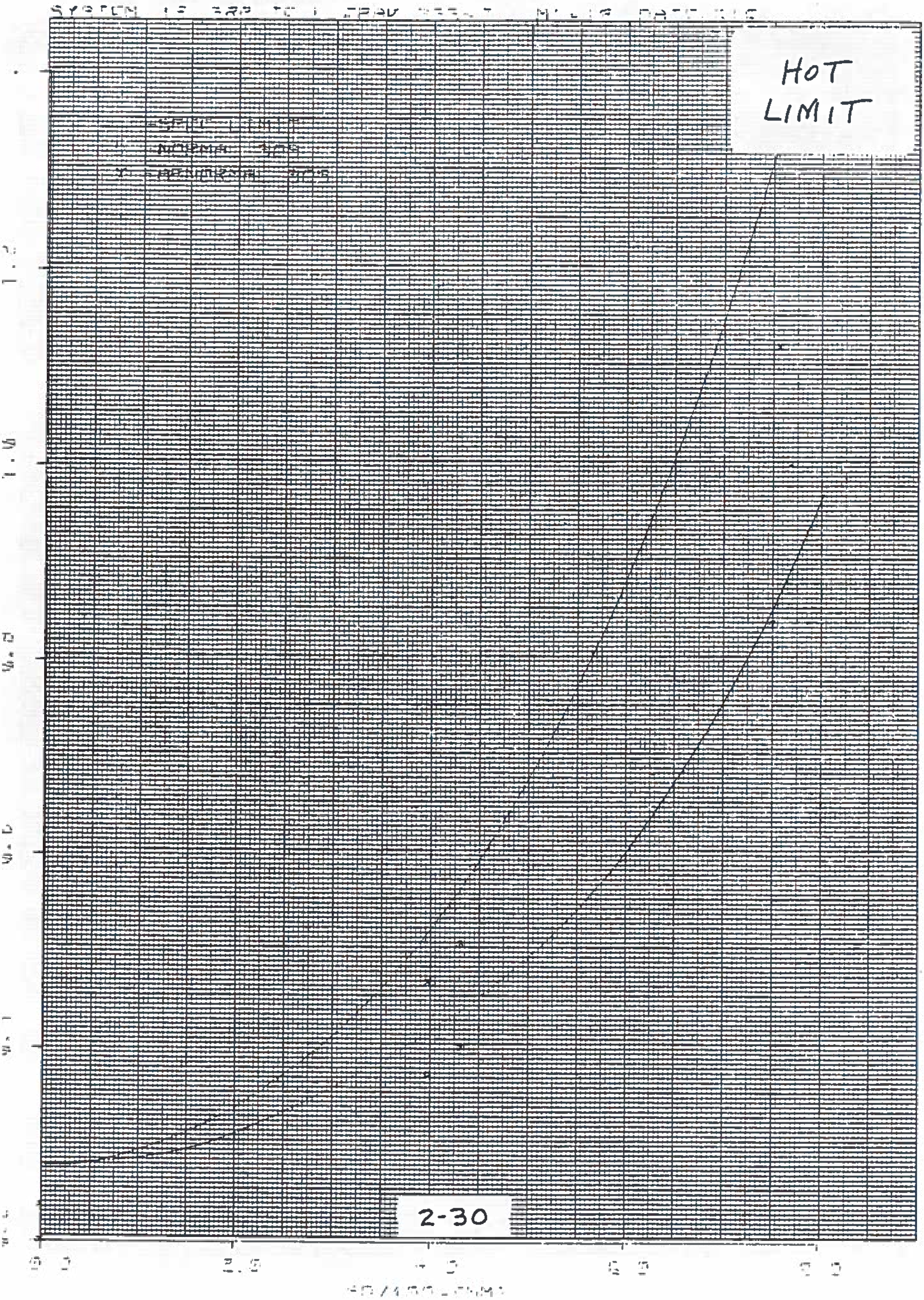

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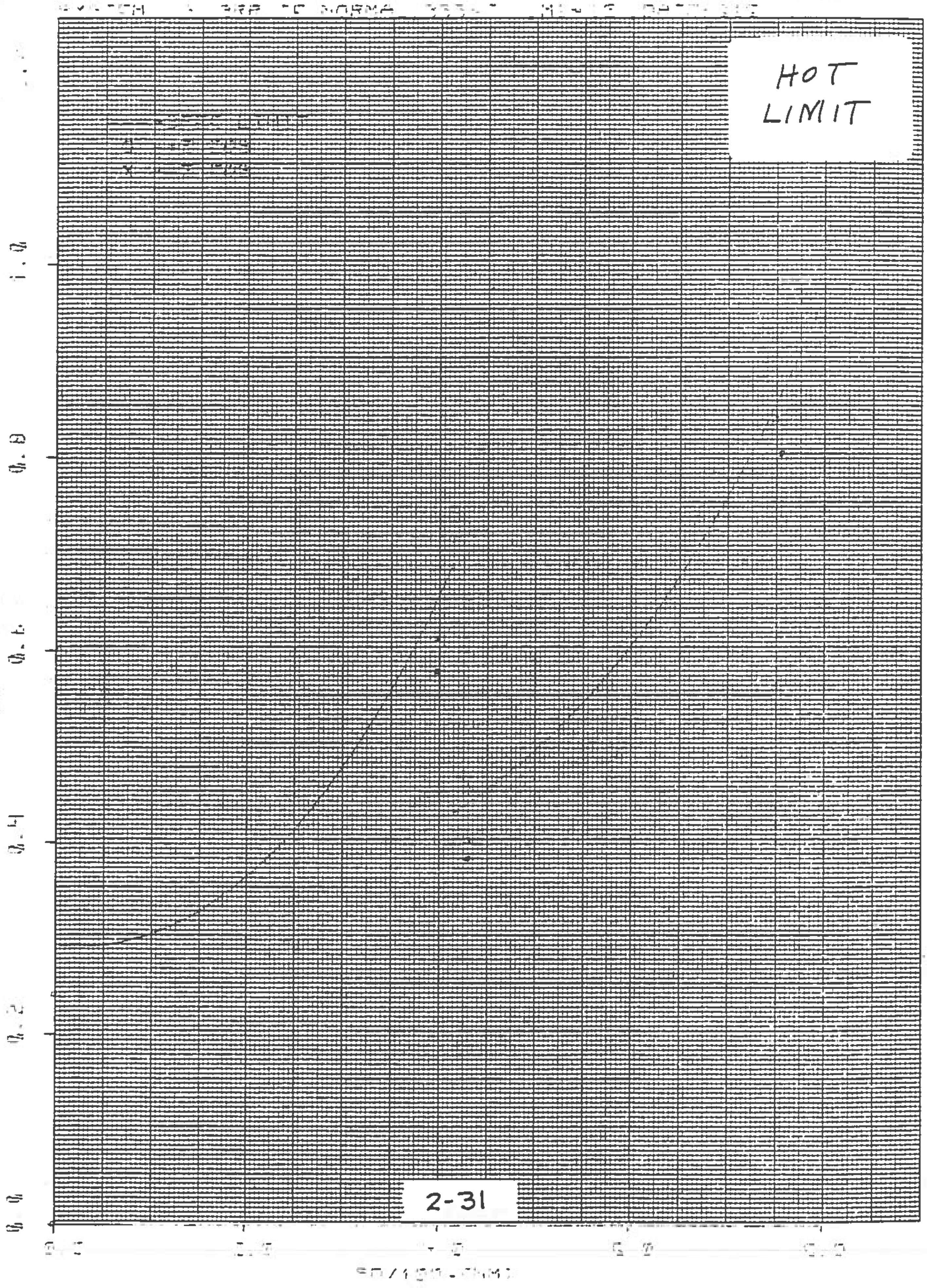


T, COMPLETE, SRP (NM)

FLT. NO. = 15 ENV. = 4 SSS= 7DEGC M1= 12DEGC DATE: 618

SEG	SUR. DIST. (NM)	TFP	TFB	TSP	TSB
LFT	-750.	0.839	0.832	1.754	1.766
MID	-750.	1.330	0.000	1.858	1.872
RGT	-750.	1.137	1.127	1.805	1.818
LFT	0.	0.000	0.000	0.000	0.000
MID	0.	0.000	0.000	0.000	0.000
RGT	0.	0.000	0.000	0.000	0.000
LFT	-431.	0.401	0.396	1.456	1.465
MID	-431.	0.645	0.000	1.487	1.496
RGT	-431.	0.539	0.532	1.470	1.479
LFT	-398.	0.374	0.369	1.398	1.407
MID	-398.	0.611	0.606	1.423	1.432
RGT	-398.	0.496	0.489	1.410	1.418
LFT	0.	0.000	0.000	0.000	0.000
MID	0.	0.000	0.000	0.000	0.000
RGT	0.	0.000	0.000	0.000	0.000
LFT	0.	0.237	0.234	0.961	0.967
MID	0.	0.241	0.238	0.961	0.967
RGT	0.	0.240	0.237	0.962	0.968
LFT	0.	0.000	0.000	0.000	0.000
MID	0.	0.000	0.000	0.000	0.000
RGT	0.	0.000	0.000	0.000	0.000
LFT	398.	0.469	0.462	1.403	1.412
MID	398.	0.577	0.572	1.415	1.424
RGT	398.	0.361	0.357	1.393	1.402
LFT	431.	0.509	0.501	1.458	1.468
MID	431.	0.608	0.000	1.476	1.485
RGT	431.	0.382	0.378	1.450	1.460
LFT	0.	0.000	0.000	0.000	0.000
MID	0.	0.000	0.000	0.000	0.000
RGT	0.	0.000	0.000	0.000	0.000
LFT	757.	1.122	1.112	1.798	1.811
MID	757.	1.593	0.000	1.962	1.978
RGT	757.	0.803	0.796	1.733	1.744

T, COMPLETE, SRP RATIO

SEG	SUR. DIST. (NM)	TFP	TFB	TSP	TSB
LFT	-750.	0.977	0.969	0.780	0.785
MID	-750.	0.000	0.000	0.826	0.833
RGT	-750.	0.861	0.853	0.803	0.808
LFT	0.	0.000	0.000	0.000	0.000
MID	0.	0.000	0.000	0.000	0.000
RGT	0.	0.000	0.000	0.000	0.000
LFT	-431.	0.908	0.897	0.909	0.915
MID	-431.	0.000	0.000	0.929	0.934
RGT	-431.	0.949	0.937	0.918	0.924
LFT	-398.	0.891	0.880	0.911	0.917
MID	-398.	0.929	0.922	0.928	0.934
RGT	-398.	0.948	0.935	0.919	0.925
LFT	0.	0.000	0.000	0.000	0.000
MID	0.	0.000	0.000	0.000	0.000
RGT	0.	0.000	0.000	0.000	0.000
LFT	0.	0.861	0.852	0.916	0.921
MID	0.	0.833	0.823	0.915	0.921
RGT	0.	0.871	0.862	0.916	0.922
LFT	0.	0.000	0.000	0.000	0.000
MID	0.	0.000	0.000	0.000	0.000
RGT	0.	0.000	0.000	0.000	0.000
LFT	398.	0.897	0.883	0.915	0.921
MID	398.	0.879	0.871	0.923	0.928
RGT	398.	0.860	0.850	0.908	0.914
LFT	431.	0.895	0.882	0.911	0.916
MID	431.	0.000	0.000	0.922	0.927
RGT	431.	0.865	0.855	0.906	0.911
LFT	0.	0.000	0.000	0.000	0.000
MID	0.	0.000	0.000	0.000	0.000
RGT	0.	0.000	0.000	0.000	0.000
LFT	757.	0.835	0.827	0.795	0.801
MID	757.	0.000	0.000	0.868	0.875
RGT	757.	0.921	0.913	0.767	0.772

TF, LEFT, PRIMARY

FLT. NO. = 15 ENV. = 4 SSS= 7DEGC M1= 12DEGC DATE: 618

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-750.	0.839	0.977
0.	0.000	0.000
-431.	0.401	0.908
-398.	0.374	0.891
0.	0.000	0.000
0.	0.237	0.861
0.	0.000	0.000
398.	0.469	0.897
431.	0.509	0.895
0.	0.000	0.000
757.	1.122	0.835

TF, LEFT, BACKUP

FLT. NO. = 15 ENV. = 4 SSS= 7DEGC M1= 12DEGC DATE: 618

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-750.	0.832	0.969
0.	0.000	0.000
-431.	0.396	0.897
-398.	0.369	0.880
0.	0.000	0.000
0.	0.234	0.852
0.	0.000	0.000
398.	0.462	0.883
431.	0.501	0.882
0.	0.000	0.000
757.	1.112	0.827

TF, RIGHT, PRIMARY

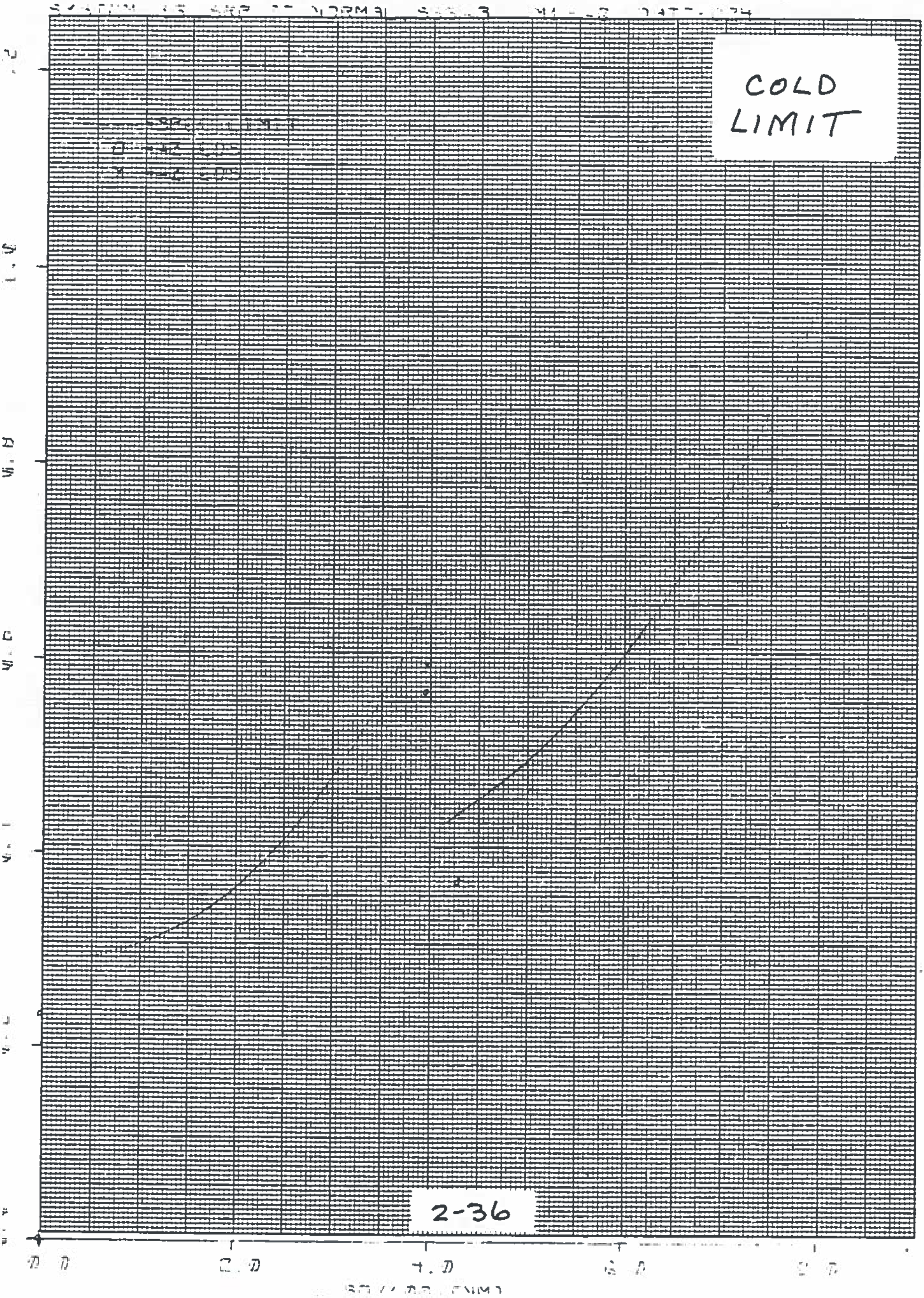
FLT. NO. = 15 ENV. = 4 SSS= 7DEGC M1= 12DEGC DATE: 618

SUR. DIST. (NM)	SRP ACTUAL (NM)	SRP RATIO
-750.	1.137	0.861
0.	0.000	0.000
-431.	0.539	0.949
-398.	0.496	0.948
0.	0.000	0.000
0.	0.240	0.871
0.	0.000	0.000
398.	0.361	0.860
431.	0.382	0.865
0.	0.000	0.000
757.	0.803	0.921

TF RIGHT, BACKUP

FLT. NO. = 15 ENV. = 4 SSS= 7DEGC M1= 12DEGC DATE: 618

SUR. DIST. (NM)	SRP ACTUAL (NM)	SRP RATIO
-750.	1.127	0.853
0.	0.000	0.000
-431.	0.532	0.937
-398.	0.489	0.935
0.	0.000	0.000
0.	0.237	0.862
0.	0.000	0.000
398.	0.357	0.850
431.	0.378	0.855
0.	0.000	0.000
757.	0.796	0.913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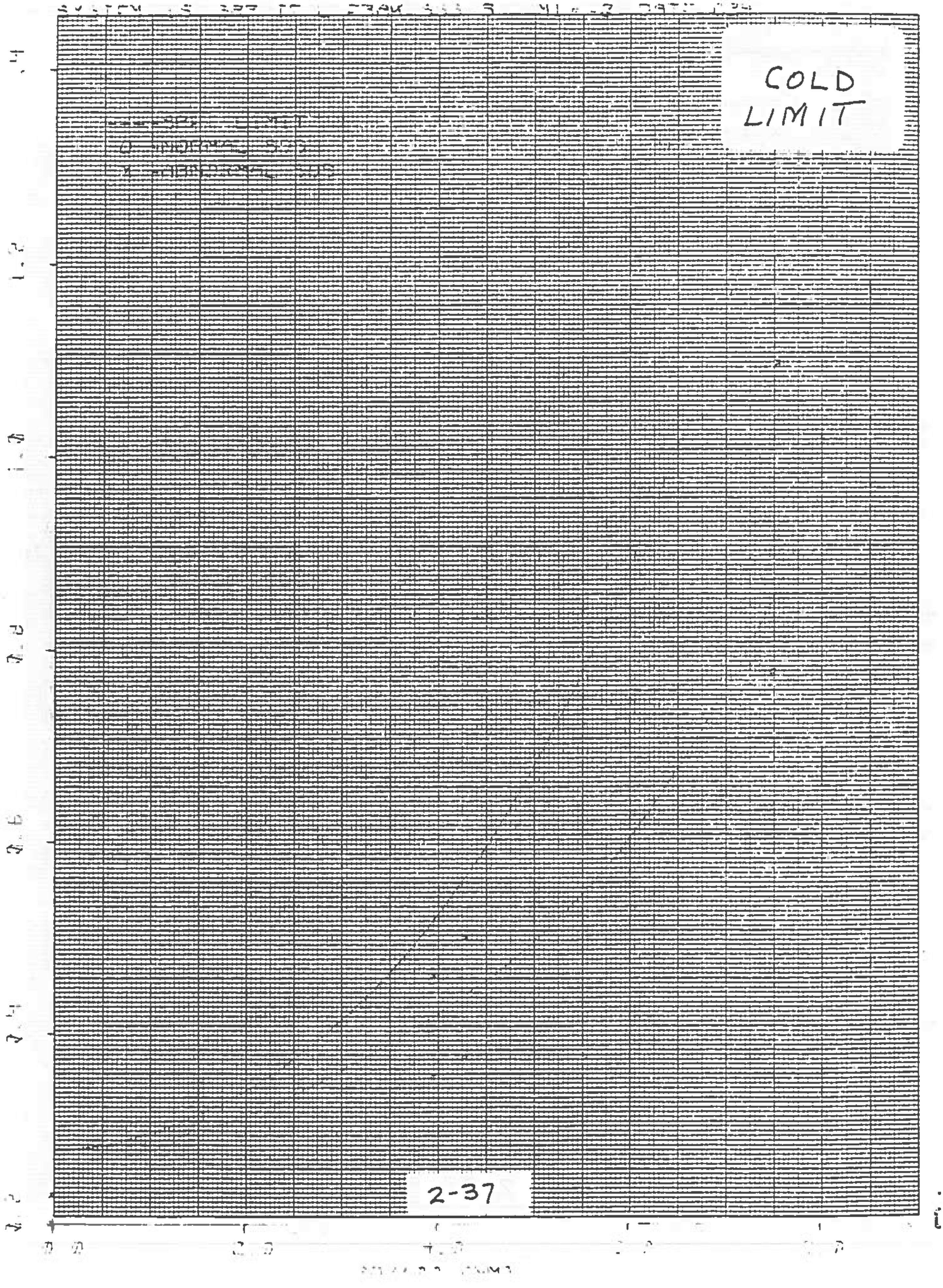

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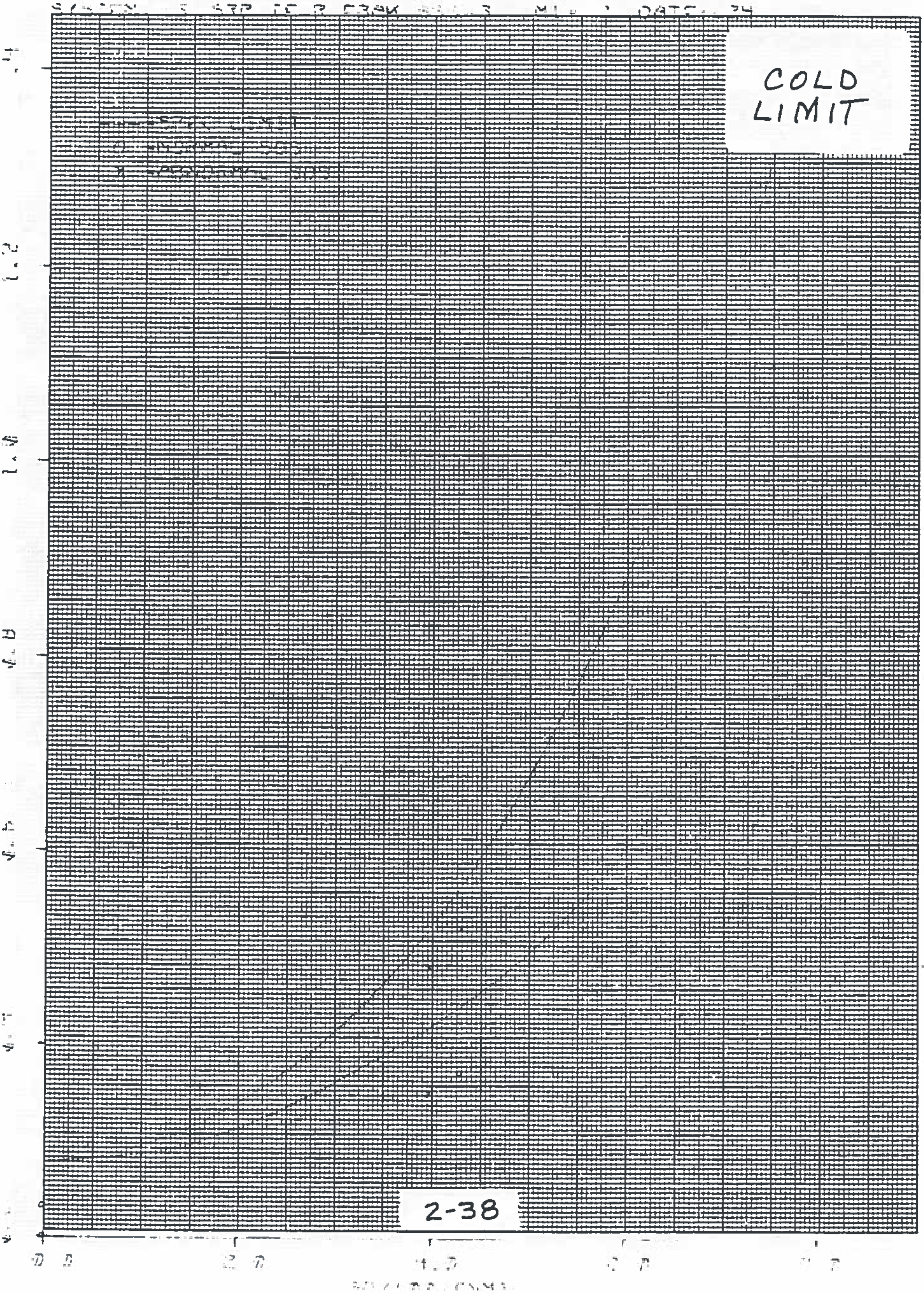

T, COMPLETE, SRP (NM)

FLT. NO. = 15 ENV. = 4 SSS= 3DEGC M1= -8DEGC DATE: 624

SEG	SUR. DIST. (NM)	TFP	TFB	TSP	TSB
LFT	-750.	0.775	0.769	1.736	1.748
MID	-750.	1.341	0.000	1.852	1.866
RGT	-750.	1.098	1.099	1.790	1.803
LFT	0.	0.000	0.000	0.000	0.000
MID	0.	0.000	0.000	0.000	0.000
RGT	0.	0.000	0.000	0.000	0.000
LFT	-431.	0.374	0.369	1.443	1.453
MID	-431.	0.630	0.000	1.473	1.483
RGT	-431.	0.519	0.518	1.457	1.467
LFT	-398.	0.353	0.349	1.385	1.394
MID	-398.	0.593	0.589	1.412	1.421
RGT	-398.	0.479	0.478	1.397	1.407
LFT	0.	0.000	0.000	0.000	0.000
MID	0.	0.000	0.000	0.000	0.000
RGT	0.	0.000	0.000	0.000	0.000
LFT	0.	0.230	0.227	0.951	0.958
MID	0.	0.232	0.229	0.951	0.957
RGT	0.	0.232	0.229	0.951	0.958
LFT	0.	0.000	0.000	0.000	0.000
MID	0.	0.000	0.000	0.000	0.000
RGT	0.	0.000	0.000	0.000	0.000
LFT	398.	0.460	0.459	1.393	1.402
MID	398.	0.566	0.562	1.406	1.415
RGT	398.	0.349	0.344	1.383	1.393
LFT	431.	0.499	0.498	1.452	1.462
MID	431.	0.599	0.000	1.465	1.475
RGT	431.	0.371	0.366	1.440	1.450
LFT	0.	0.000	0.000	0.000	0.000
MID	0.	0.000	0.000	0.000	0.000
RGT	0.	0.000	0.000	0.000	0.000
LFT	757.	1.096	1.097	1.786	1.799
MID	757.	1.576	0.000	1.943	1.962
RGT	757.	0.759	0.753	1.720	1.731

T, COMPLETE, SRP RATIO

SEG	SUR. DIST. (NM)	TFP	TFB	TSP	TSB
LFT	-750.	0.903	0.895	0.772	0.777
MID	-750.	0.000	0.000	0.823	0.830
RGT	-750.	0.831	0.832	0.796	0.802
LFT	0.	0.000	0.000	0.000	0.000
MID	0.	0.000	0.000	0.000	0.000
RGT	0.	0.000	0.000	0.000	0.000
LFT	-431.	0.847	0.837	0.901	0.907
MID	-431.	0.000	0.000	0.920	0.926
RGT	-431.	0.914	0.911	0.910	0.916
LFT	-398.	0.842	0.831	0.903	0.909
MID	-398.	0.902	0.896	0.920	0.926
RGT	-398.	0.916	0.914	0.911	0.917
LFT	0.	0.000	0.000	0.000	0.000
MID	0.	0.000	0.000	0.000	0.000
RGT	0.	0.000	0.000	0.000	0.000
LFT	0.	0.837	0.826	0.906	0.912
MID	0.	0.802	0.791	0.905	0.912
RGT	0.	0.843	0.832	0.906	0.912
LFT	0.	0.000	0.000	0.000	0.000
MID	0.	0.000	0.000	0.000	0.000
RGT	0.	0.000	0.000	0.000	0.000
LFT	398.	0.880	0.878	0.908	0.915
MID	398.	0.861	0.856	0.917	0.923
RGT	398.	0.832	0.820	0.902	0.908
LFT	431.	0.878	0.876	0.906	0.913
MID	431.	0.000	0.000	0.915	0.921
RGT	431.	0.839	0.828	0.899	0.905
LFT	0.	0.000	0.000	0.000	0.000
MID	0.	0.000	0.000	0.000	0.000
RGT	0.	0.000	0.000	0.000	0.000
LFT	757.	0.816	0.816	0.790	0.796
MID	757.	0.000	0.000	0.860	0.868
RGT	757.	0.871	0.863	0.761	0.766

TF, LEFT, PRIMARY

FLT. NO. = 15 ENV. = 4 SSS= 3DEGC M1= -8DEGC DATE: 624

SUR. DIST. (NM)	SRP ACTUAL (NM)	SRP RATIO
-750.	0.775	0.903
0.	0.000	0.000
-431.	0.374	0.847
-398.	0.353	0.842
0.	0.000	0.000
0.	0.230	0.837
0.	0.000	0.000
398.	0.460	0.880
431.	0.499	0.878
0.	0.000	0.000
757.	1.096	0.816

TF, LEFT, BACKUP

FLT. NO. = 15 ENV. = 4 SSS= 3DEGC M1= -8DEGC DATE: 624

SUR. DIST. (NM)	SRP ACTUAL (NM)	SRP RATIO
-750.	0.769	0.895
0.	0.000	0.000
-431.	0.369	0.837
-398.	0.349	0.831
0.	0.000	0.000
0.	0.227	0.826
0.	0.000	0.000
398.	0.459	0.878
431.	0.498	0.876
0.	0.000	0.000
757.	1.097	0.816

TF, RIGHT, PRIMARY

FLT. NO. = 15 ENV. = 4 SSS= 3DEGC M1= -8DEGC DATE: 624

SUR. DIST. (NM)	SRP ACTUAL (NM)	SRP RATIO
-750.	1.098	0.831
0.	0.000	0.000
-431.	0.519	0.914
-398.	0.479	0.916
0.	0.000	0.000
0.	0.232	0.843
0.	0.000	0.000
398.	0.349	0.832
431.	0.371	0.839
0.	0.000	0.000
757.	0.759	0.871

TF RIGHT, BACKUP

FLT. NO. = 15 ENV. = 4 SSS= 3DEGC M1= -8DEGC DATE: 624

SUR. DIST. (NM)	SRP ACTUAL (NM)	SRP RATIO
-750.	1.099	0.832
0.	0.000	0.000
-431.	0.518	0.911
-398.	0.478	0.914
0.	0.000	0.000
0.	0.229	0.832
0.	0.000	0.000
398.	0.344	0.820
431.	0.366	0.828
0.	0.000	0.000
757.	0.753	0.863

2.2 Geometric Resolution (Cont'd)

2.2.2 Fine Geometric Resolution - Daytime Visual (3.2.1.1.2.1)

2.2.2.1 Baseline (Orbit Nominal)

The LF SRP is within the development specification limits in both Primary and Redundant configurations.

ATTACHMENTS: LF SRP Curves Orbit Nominal 6-29-88

LF SRP Tables Orbit Nominal 6-29-88

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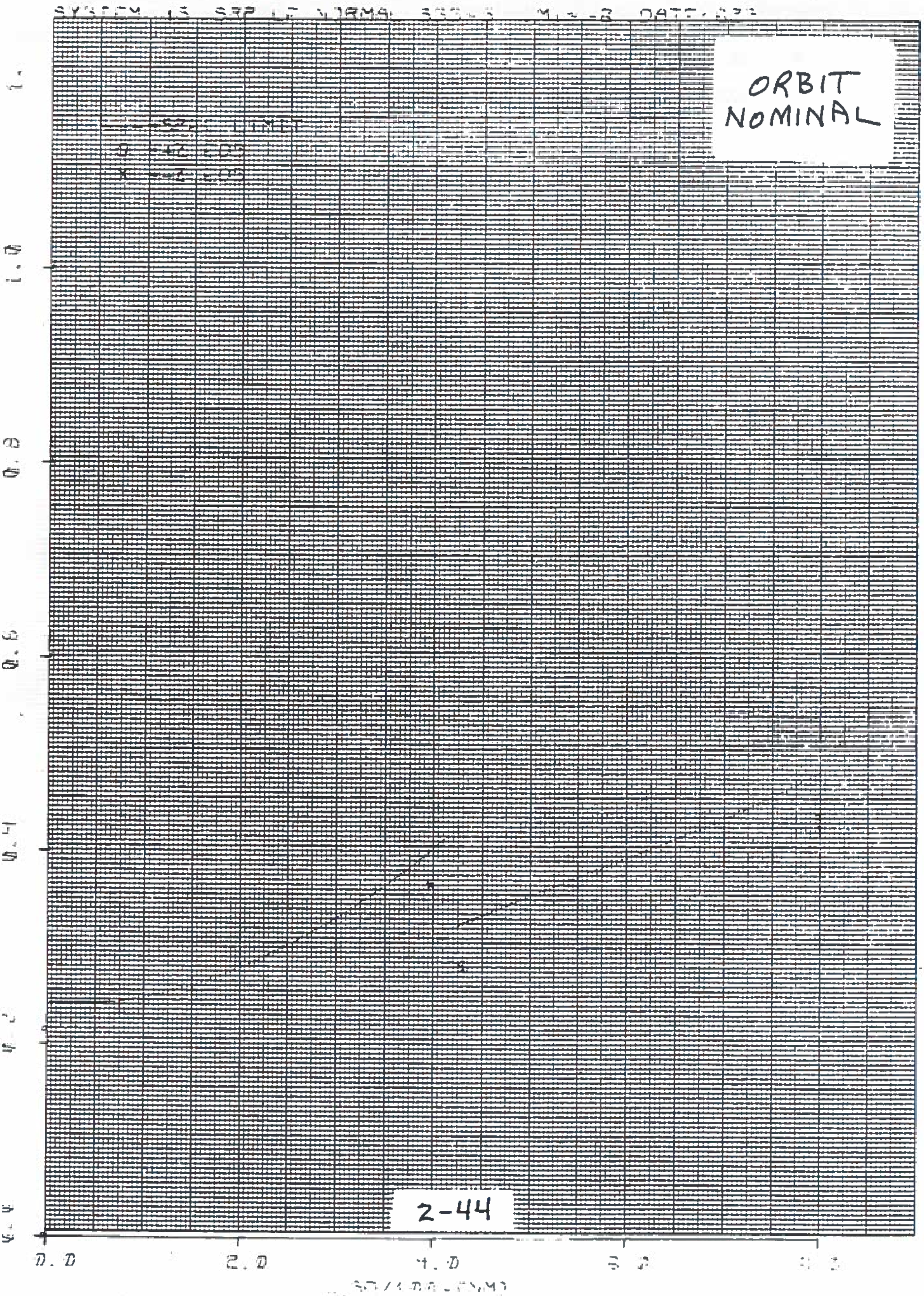

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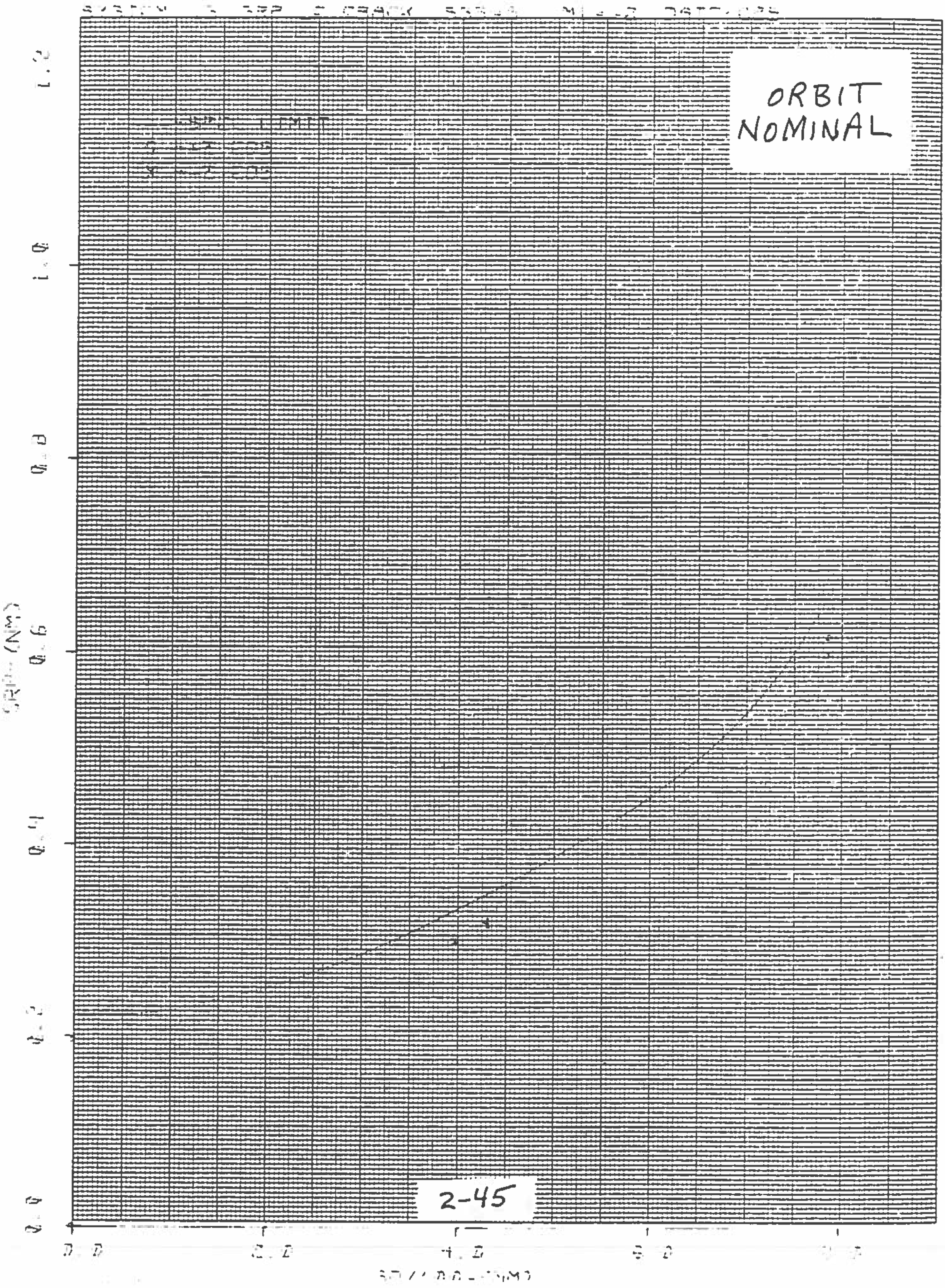
ORBIT
NOMINAL

LF, DAY, NORMAL, PRIMARY

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= -8DEGC DATE: 629

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-800.	0.425	0.881
0.	0.000	0.000
-431.	0.279	0.856
-398.	0.365	0.904
0.	0.000	0.000
0.	0.214	0.892
0.	0.000	0.000
398.	0.367	0.911
431.	0.284	0.871
0.	0.000	0.000
800.	0.436	0.904

LF, DAY, NORMAL, BACKUP

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= -8DEGC DATE: 629

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-800.	0.429	0.888
0.	0.000	0.000
-431.	0.281	0.860
-398.	0.368	0.911
0.	0.000	0.000
0.	0.215	0.898
0.	0.000	0.000
398.	0.370	0.917
431.	0.286	0.876
0.	0.000	0.000
800.	0.440	0.911

LF, DAY, FALLBACK, PRIMARY

FLT. NO. = 15   ENV. = 4   SSS= 5DEGC   M1= -8DEGC   DATE: 629

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-787.	0.597	0.899
0.	0.000	0.000
-431.	0.315	0.900
-398.	0.298	0.897
0.	0.000	0.000
0.	0.195	0.891
0.	0.000	0.000
398.	0.303	0.911
431.	0.320	0.915
0.	0.000	0.000
788.	0.616	0.925

LF, DAY, FALLBACK, BACKUP

FLT. NO. = 15   ENV. = 4   SSS= 5DEGC   M1= -8DEGC   DATE: 629

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-787.	0.600	0.903
0.	0.000	0.000
-431.	0.317	0.907
-398.	0.301	0.904
0.	0.000	0.000
0.	0.196	0.897
0.	0.000	0.000
398.	0.305	0.917
431.	0.322	0.921
0.	0.000	0.000
788.	0.618	0.929

2.2 Geometric Resolution (Cont'd)

2.2.2 Fine Geometric Resolution - Daytime Visual (Cont'd) (3.2.1.1.2.1)

2.2.2.2 Acceptance - Vibration

OLS #15 underwent Acceptance-level SSS vibration on May 12, 1988. The Pre-to-Post Vibration SRP performance is within Specification requirements and is shown on the attached curves and tables. No changes in SRP performance occurred as a result of vibration.

ATTACHMENTS:	LF SRP	Curves Pre-Vibration	5-2-88
	LF SRP	Tables Pre-Vibration	5-2-88
	LF SRP	Curves Post-Vibration	6-7-88
	LF SRP	Tables Post-Vibration	6-7-88

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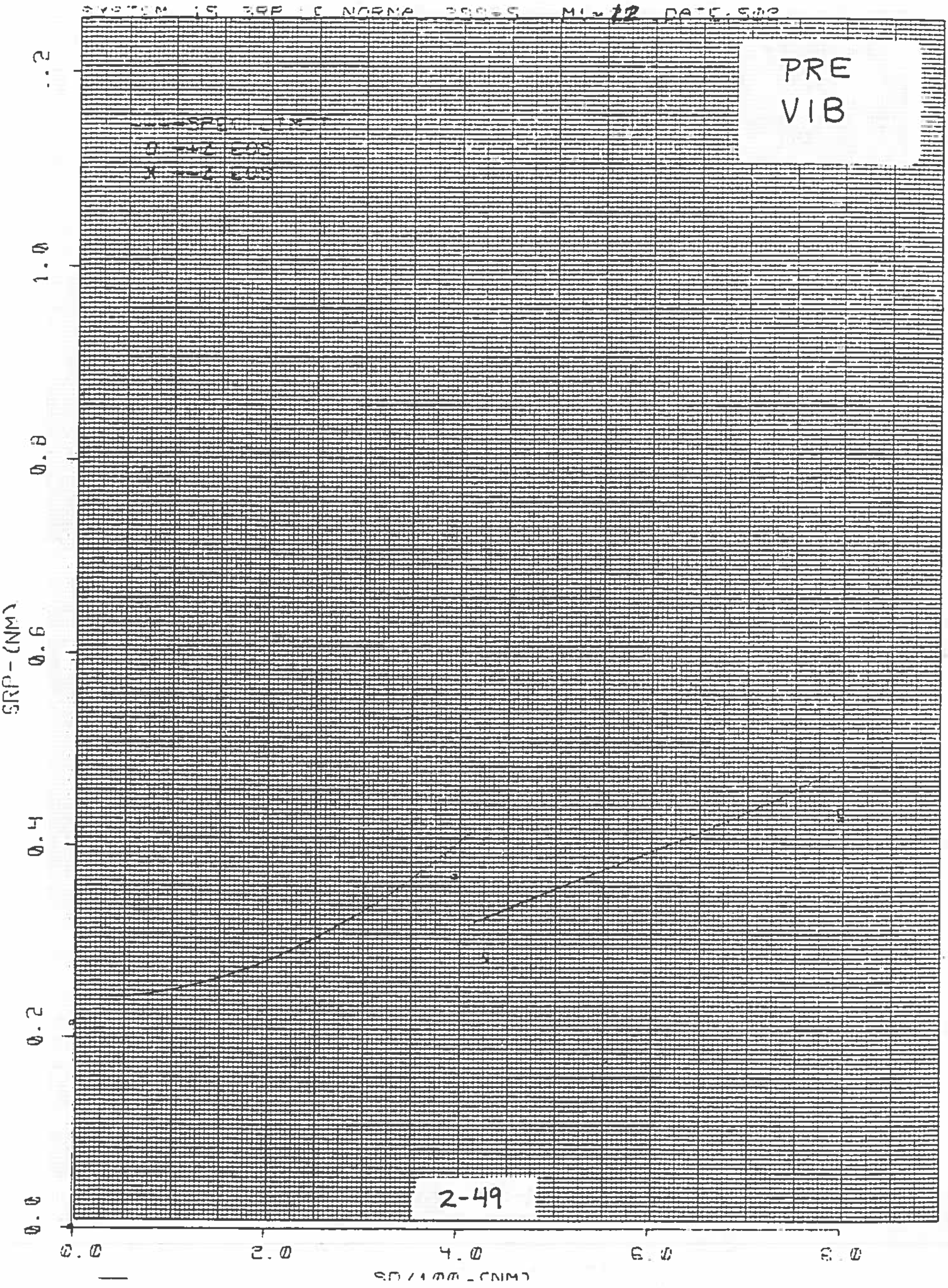

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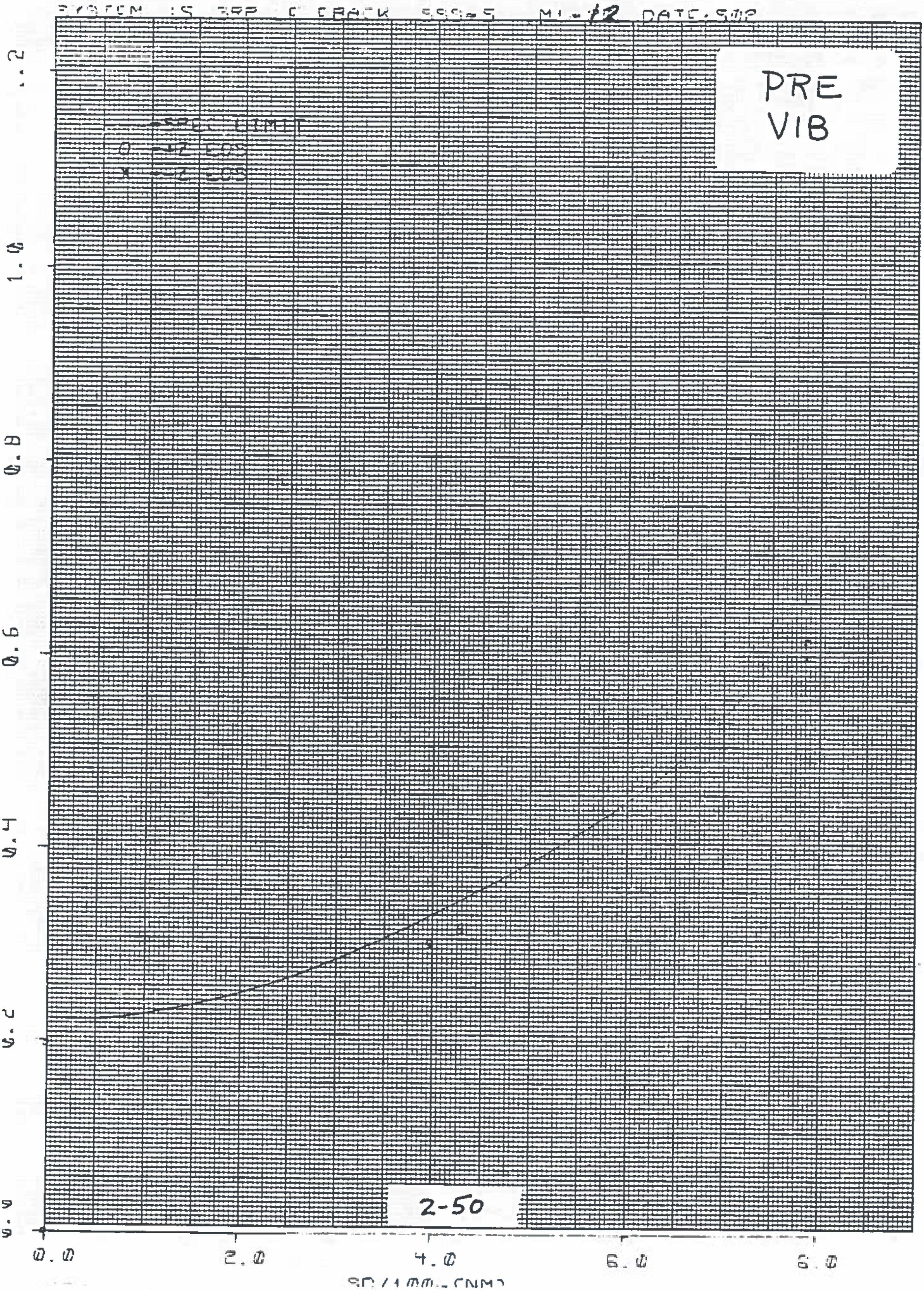
311



LF, DAY, NORMAL, PRIMARY

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= ~~20~~ 12DEGC DATE: 502

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-800.	0. 427	0. 885
0.	0. 000	0. 000
-431.	0. 281	0. 861
-398.	0. 368	0. 911
0.	0. 000	0. 000
0.	0. 214	0. 890
0.	0. 000	0. 000
398.	0. 368	0. 912
431.	0. 286	0. 875
0.	0. 000	0. 000
800.	0. 435	0. 902

LF, DAY, NORMAL, BACKUP

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= ~~20~~ 12DEGC DATE: 502

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-800.	0. 431	0. 893
0.	0. 000	0. 000
-431.	0. 283	0. 867
-398.	0. 371	0. 919
0.	0. 000	0. 000
0.	0. 215	0. 897
0.	0. 000	0. 000
398.	0. 371	0. 919
431.	0. 288	0. 882
0.	0. 000	0. 000
800.	0. 440	0. 910

LF, DAY, FALLBACK, PRIMARY

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= ~~20~~ 12 DEGC DATE: 502

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-787.	0.598	0.900
0.	0.000	0.000
-431.	0.315	0.901
-398.	0.300	0.902
0.	0.000	0.000
0.	0.195	0.892
0.	0.000	0.000
398.	0.304	0.914
431.	0.320	0.914
0.	0.000	0.000
788.	0.616	0.925

LF, DAY, FALLBACK, BACKUP

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= ~~20~~ 12 DEGC DATE: 502

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-787.	0.601	0.906
0.	0.000	0.000
-431.	0.317	0.908
-398.	0.302	0.909
0.	0.000	0.000
0.	0.197	0.898
0.	0.000	0.000
398.	0.306	0.920
431.	0.322	0.921
0.	0.000	0.000
788.	0.619	0.930

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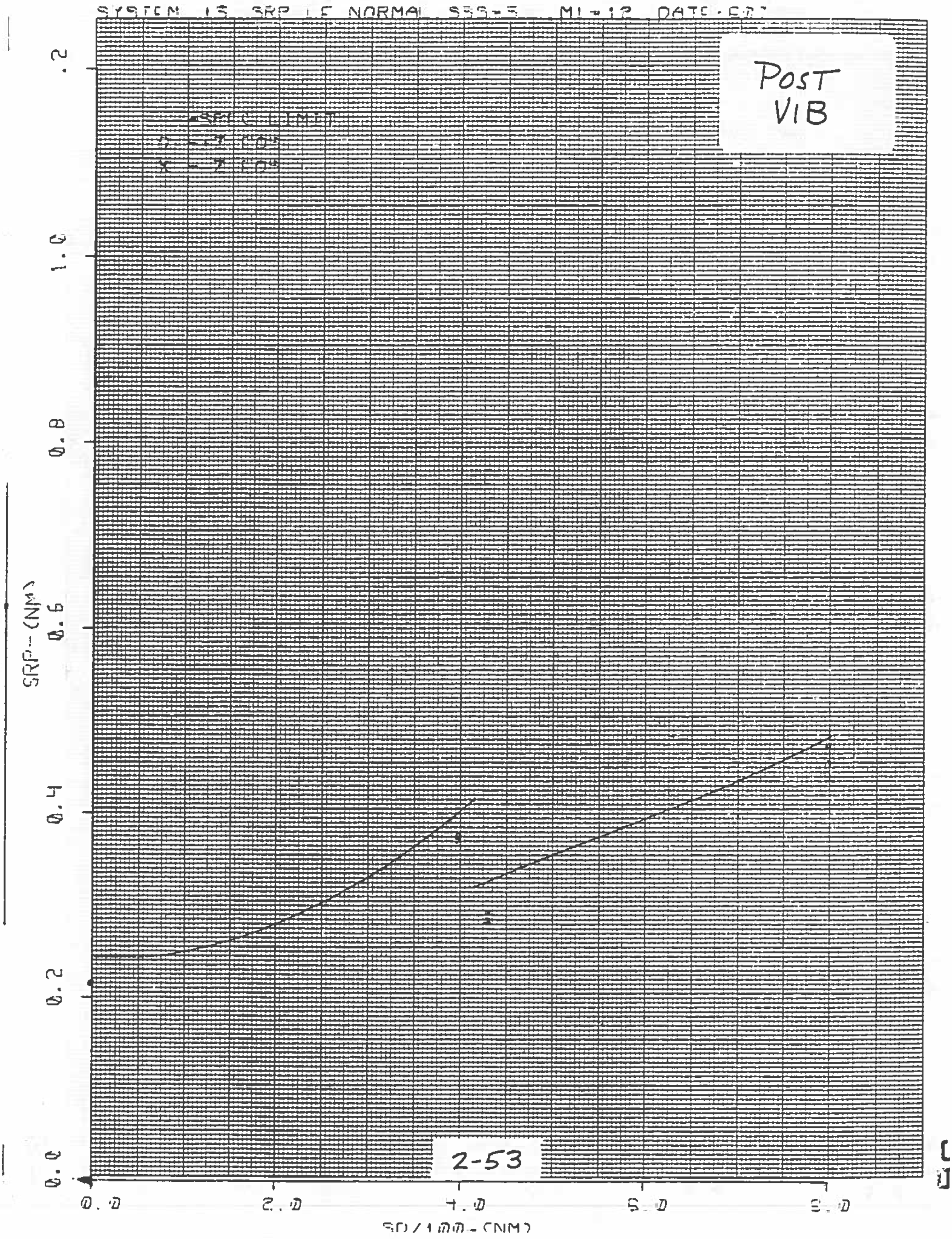

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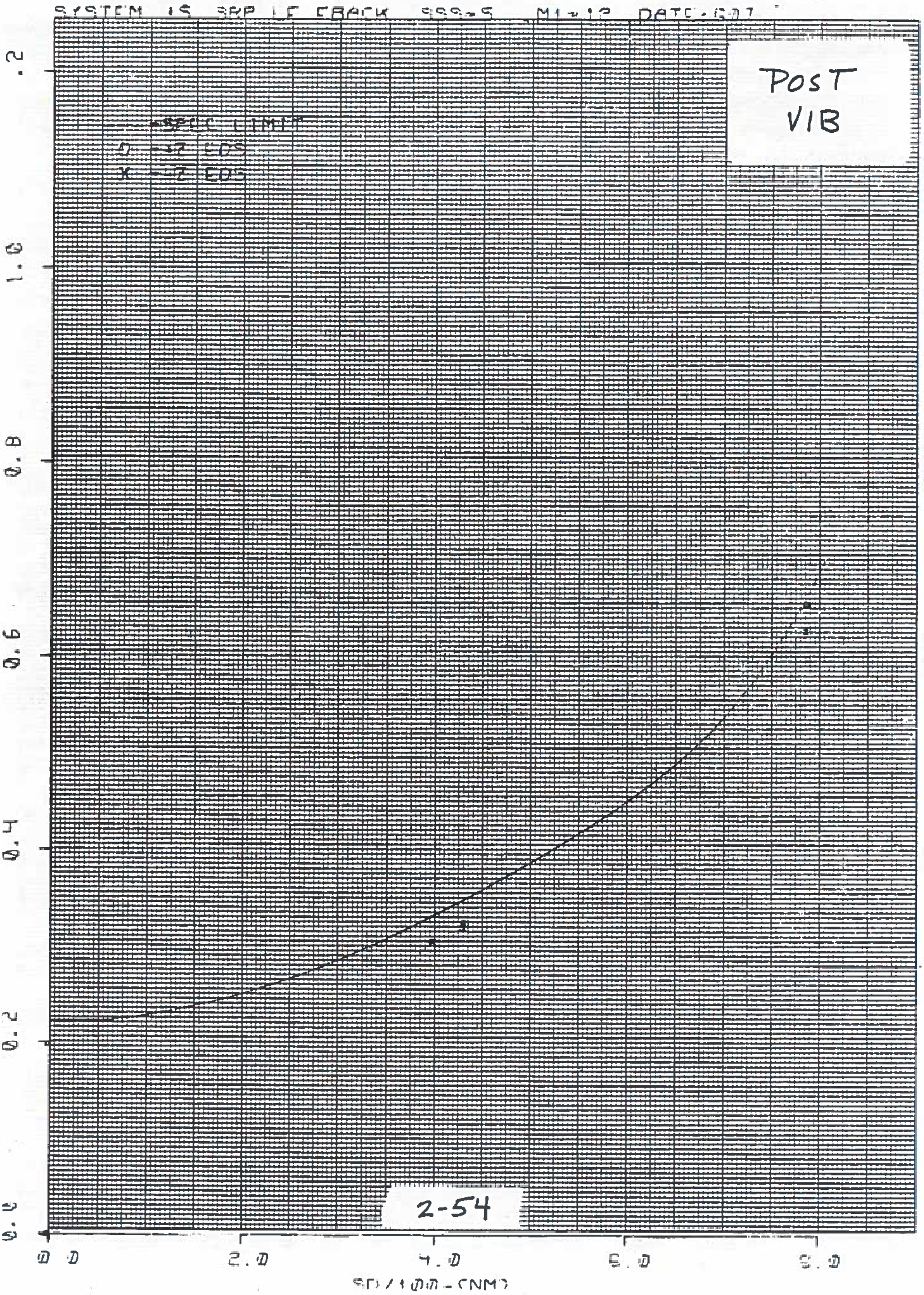

LF, DAY, NORMAL, PRIMARY

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= 12DEGC DATE: 607

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-800.	0.454	0.941
0.	0.000	0.000
-431.	0.282	0.866
-398.	0.369	0.915
0.	0.000	0.000
0.	0.215	0.894
0.	0.000	0.000
398.	0.375	0.929
431.	0.291	0.893
0.	0.000	0.000
800.	0.472	0.977

LF, DAY, NORMAL, BACKUP

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= 12DEGC DATE: 607

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-800.	0.457	0.947
0.	0.000	0.000
-431.	0.284	0.870
-398.	0.372	0.922
0.	0.000	0.000
0.	0.216	0.900
0.	0.000	0.000
398.	0.377	0.936
431.	0.293	0.898
0.	0.000	0.000
800.	0.475	0.983

LF, DAY, FALLBACK, PRIMARY

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= 12DEGC DATE: 607

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-787.	0.626	0.942
0.	0.000	0.000
-431.	0.318	0.911
-398.	0.304	0.915
0.	0.000	0.000
0.	0.197	0.900
0.	0.000	0.000
398.	0.304	0.916
431.	0.324	0.926
0.	0.000	0.000
788.	0.653	0.982

LF, DAY, FALLBACK, BACKUP

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= 12DEGC DATE: 607

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-787.	0.628	0.946
0.	0.000	0.000
-431.	0.321	0.917
-398.	0.306	0.921
0.	0.000	0.000
0.	0.198	0.905
0.	0.000	0.000
398.	0.307	0.922
431.	0.326	0.932
0.	0.000	0.000
788.	0.656	0.985

2.2 Geometric Resolution (Cont'd)

2.2.2 Fine Geometric Resolution - Daytime Visual (Cont'd) (3.2.1.1.2.1)

2.2.2.3 Acceptance - Thermal Vacuum

OLS #15 LF SRP is within the specification limits in both Primary and Redundant configurations. The Orbit Nominal curves are in paragraph 2.2.2.1 and are not included here.

ATTACHEMTS:	LF SRP Curve	Hot Limits	6-17-88
	LF SRP Tables	Hot Limits	6-17-88
	LF SRP Curves	Cold Limits	6-22-88
	LF SRP Tables	Cold Limits	6-22-88

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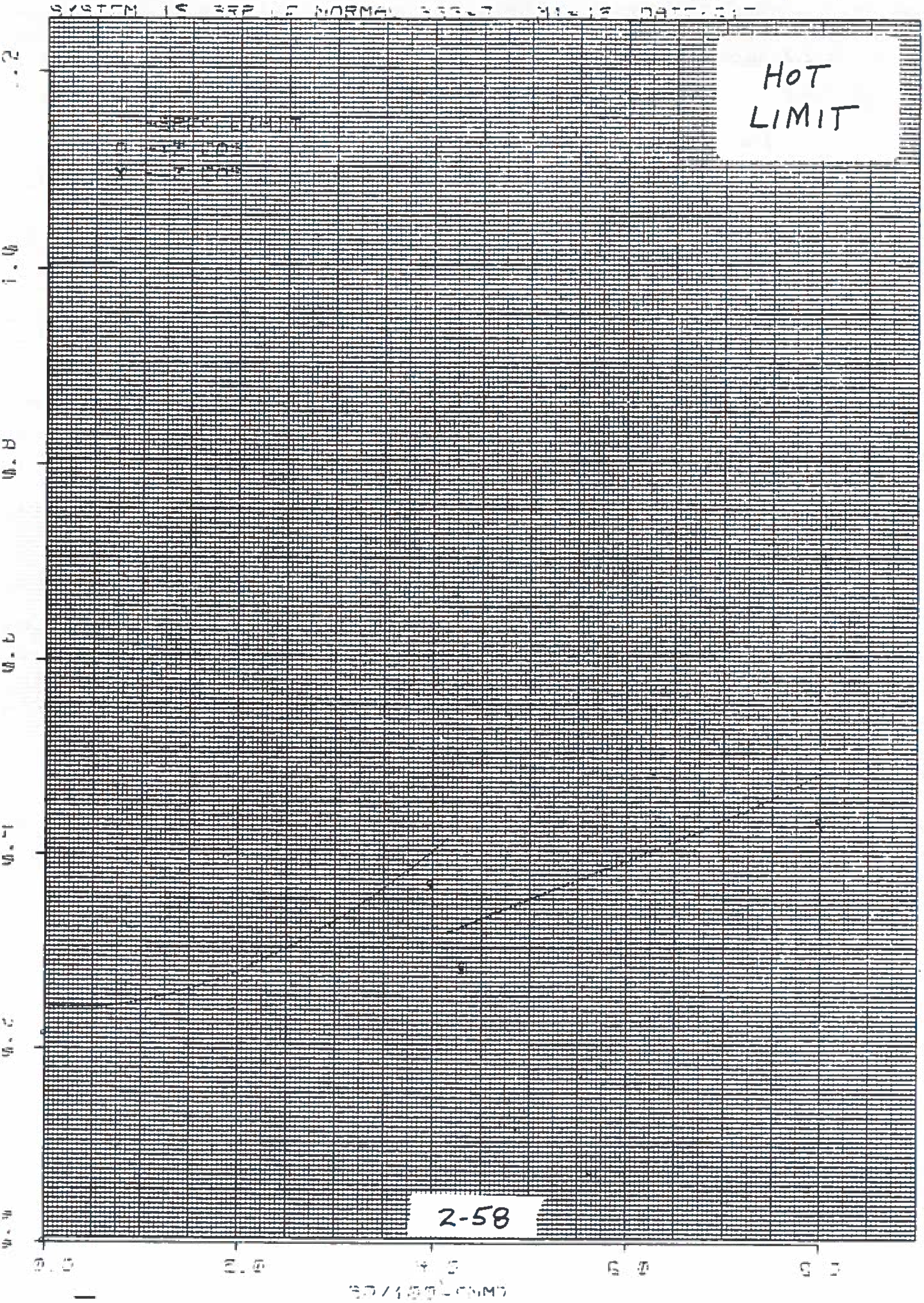

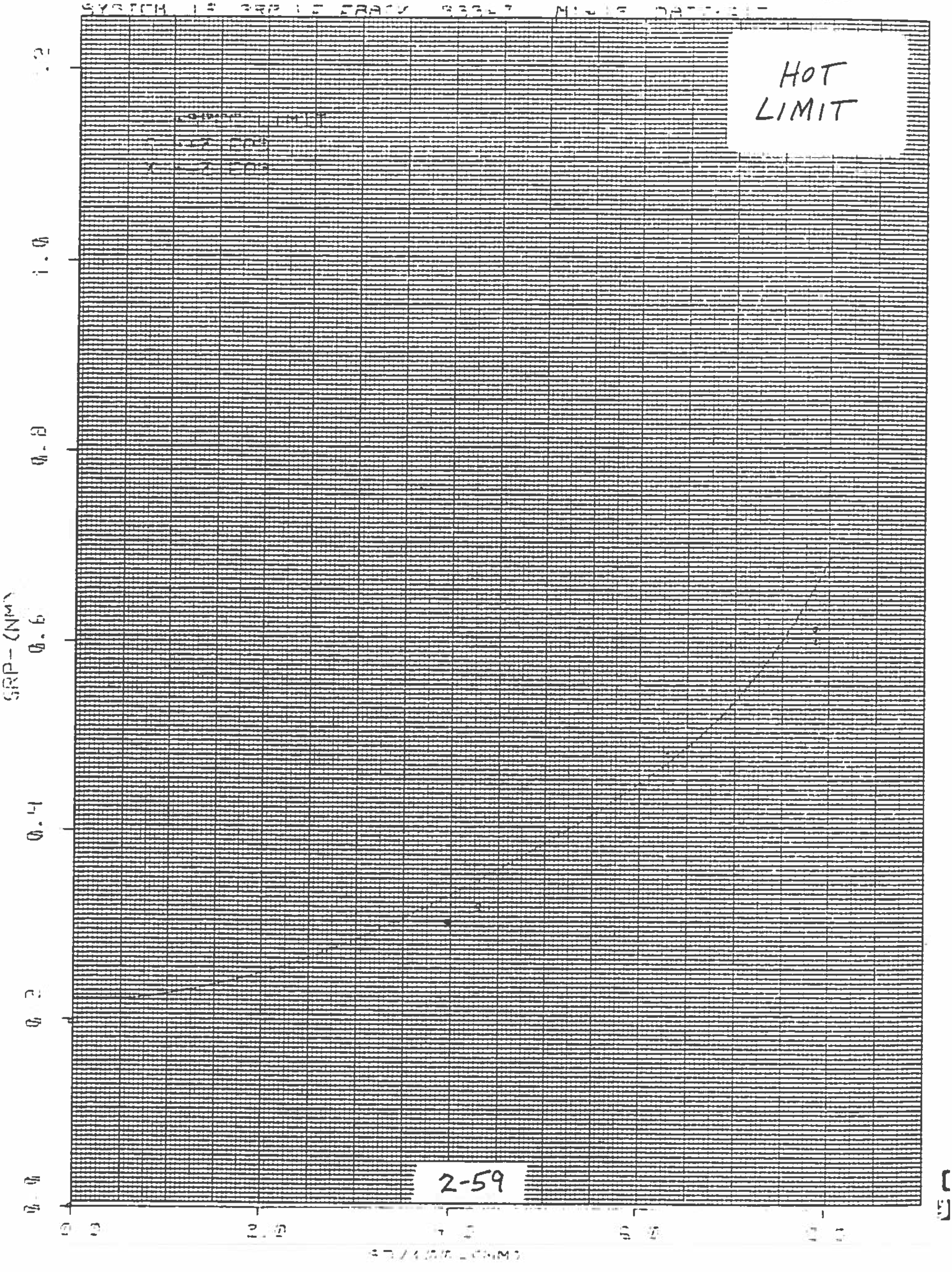
HOT
LIMIT
1.0
0.8
0.6
0.4
0.2
SRP-(NM)
2.0
6.0

LF, DAY, FALLBACK, PRIMARY

FLT. NO. = 15 ENV. = 4 SSS= 7DEGC M1= 12DEGC DATE: 617

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-787.	0.600	0.904
0.	0.000	0.000
-431.	0.317	0.907
-398.	0.301	0.904
0.	0.000	0.000
0.	0.196	0.897
0.	0.000	0.000
398.	0.303	0.912
431.	0.320	0.916
0.	0.000	0.000
788.	0.614	0.922

LF, DAY, FALLBACK, BACKUP

FLT. NO. = 15 ENV. = 4 SSS= 7DEGC M1= 12DEGC DATE: 617

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-787.	0.603	0.908
0.	0.000	0.000
-431.	0.319	0.913
-398.	0.303	0.910
0.	0.000	0.000
0.	0.198	0.902
0.	0.000	0.000
398.	0.305	0 919
431.	0.322	0.922
0.	0.000	0.000
788.	0.616	0.926

LF, DAY, NORMAL, PRIMARY

FLT. NO. = 15 ENV. = 4 SSS= 7DEGC M1= 12DEGC DATE: 617

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-800.	0. 427	0. 885
0.	0. 000	0. 000
-431.	0. 280	0. 857
-398.	0. 365	0. 905
0.	0. 000	0. 000
0.	0. 215	0. 895
0.	0. 000	0. 000
398.	0. 370	0. 917
431.	0. 286	0. 877
0.	0. 000	0. 000
800.	0. 434	0. 900

LF, DAY, NORMAL, BACKUP

FLT. NO. = 15 ENV. = 4 SSS= 7DEGC M1= 12DEGC DATE: 617

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-800.	0. 431	0. 892
0.	0. 000	0. 000
-431.	0. 281	0. 862
-398.	0. 368	0. 912
0.	0. 000	0. 000
0.	0. 216	0. 901
0.	0. 000	0. 000
398.	0. 373	0. 924
431.	0. 288	0. 882
0.	0. 000	0. 000
800.	0. 438	0. 908

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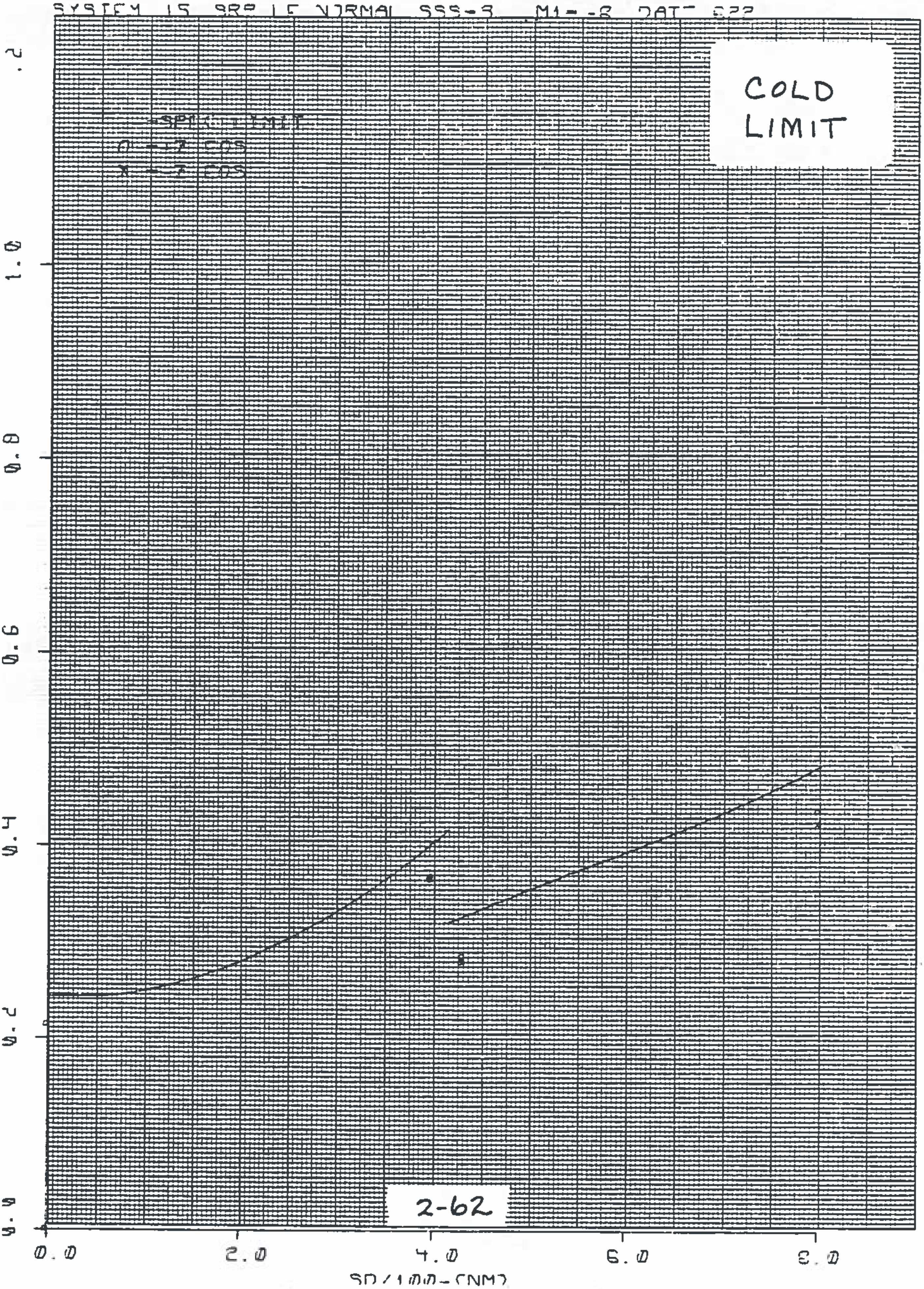

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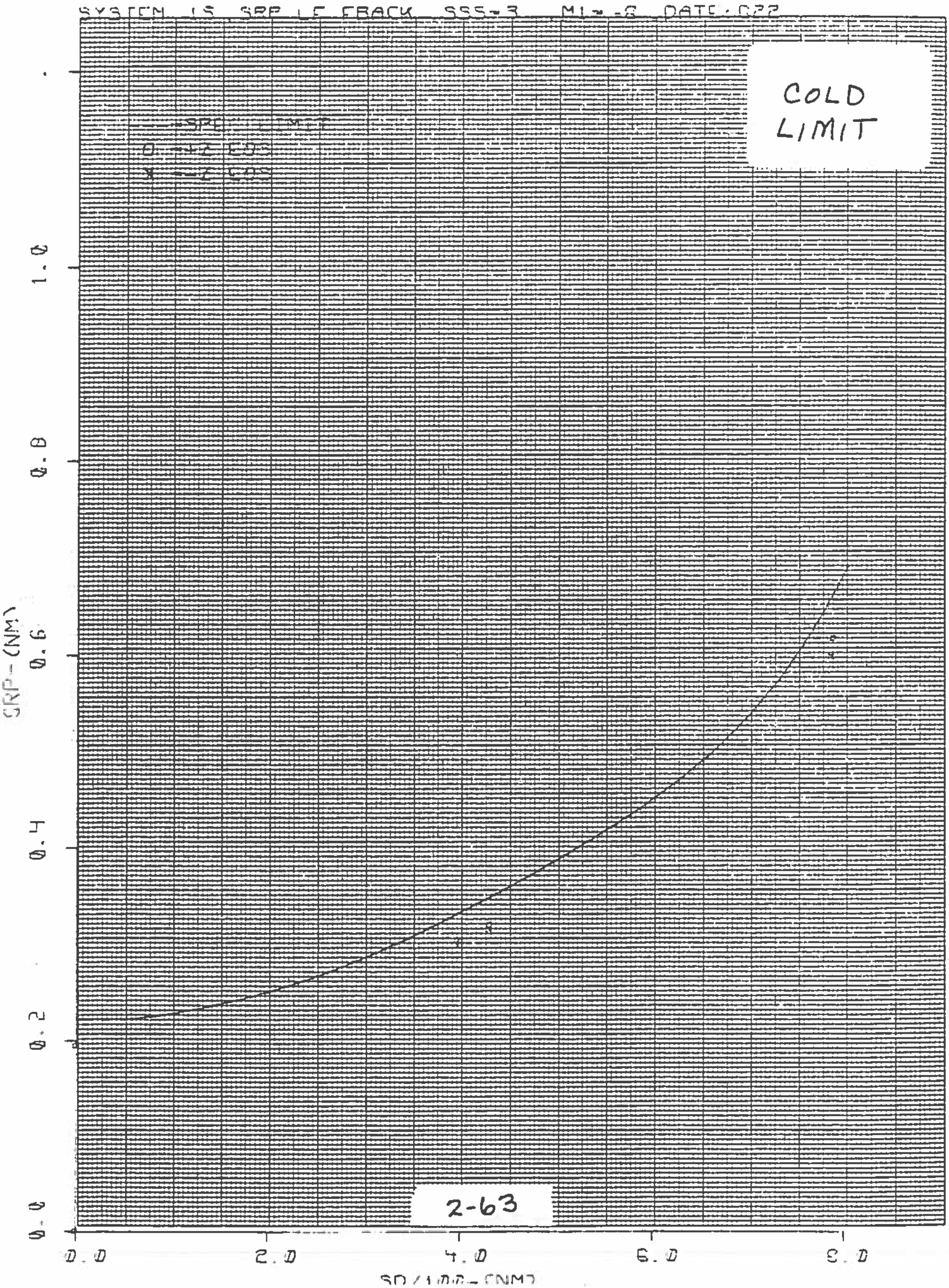

LF, DAY, NORMAL, PRIMARY

FLT. NO. = 15 ENV. = 4 SSS= 3DEGC M1= -8DEGC DATE: 622

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-800.	0.423	0.876
0.	0.000	0.000
-431.	0.279	0.854
-398.	0.365	0.903
0.	0.000	0.000
0.	0.213	0.889
0.	0.000	0.000
398.	0.367	0.909
431.	0.284	0.872
0.	0.000	0.000
800.	0.436	0.903

LF, DAY, NORMAL, BACKUP

FLT. NO. = 15 ENV. = 4 SSS= 3DEGC M1= -8DEGC DATE: 622

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-800.	0.427	0.886
0.	0.000	0.000
-431.	0.281	0.862
-398.	0.368	0.912
0.	0.000	0.000
0.	0.215	0.897
0.	0.000	0.000
398.	0.370	0.918
431.	0.287	0.881
0.	0.000	0.000
800.	0.441	0.913

LF, DAY, FALLBACK, PRIMARY

FLT. NO. = 15 ENV. = 4 SSS= 3DEGC M1= -8DEGC DATE: 622

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-787.	0.596	0.898
0.	0.000	0.000
-431.	0.314	0.898
-398.	0.298	0.897
0.	0.000	0.000
0.	0.194	0.885
0.	0.000	0.000
398.	0.303	0.912
431.	0.319	0.911
0.	0.000	0.000
788.	0.615	0.924

LF, DAY, FALLBACK, BACKUP

FLT. NO. = 15 ENV. = 4 SSS= 3DEGC M1= -8DEGC DATE: 622

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-787.	0.600	0.904
0.	0.000	0.000
-431.	0.317	0.908
-398.	0.301	0.905
0.	0.000	0.000
0.	0.196	0.894
0.	0.000	0.000
398.	0.306	0.920
431.	0.322	0.920
0.	0.000	0.000
788.	0.619	0.930

2.2 Geometric Resolution (Cont'd)

2.2.3 Smoothed Geometric Resolution - Infrared (3.2.1.1.2.2)

2.2.3.1 Baseline (Orbit Nominal)

The TS SRP is within spec for all measured scan angles.

ATTACHMENTS: TS SRP Curve Orbit Nominal 6-29-88

TS SRP Tables Orbit Nominal 6-29-88

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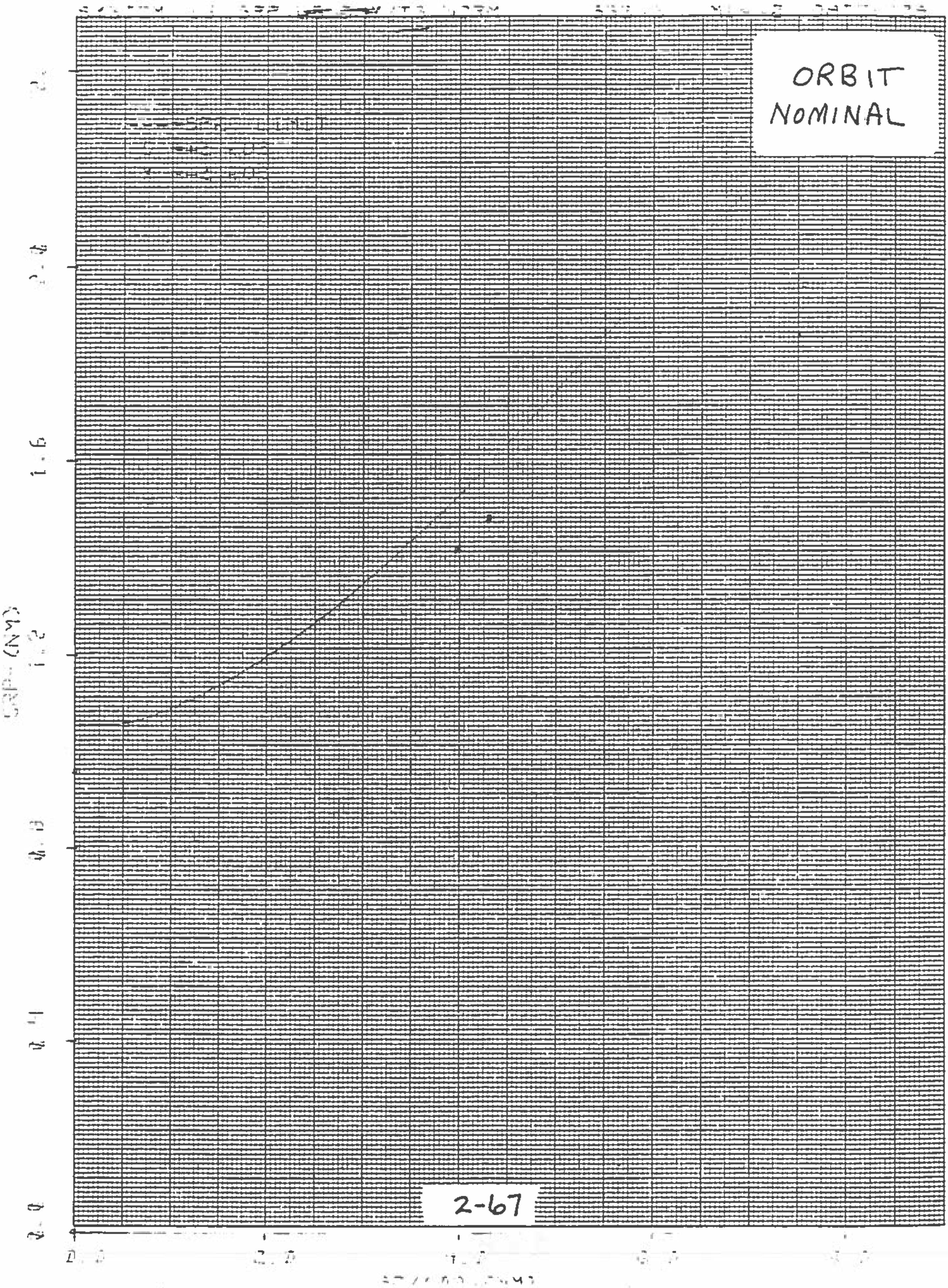


TS, MID, PRIMARY

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= -8DEGC DATE: 629

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-750.	1.857	0.826
0.	0.000	0.000
-431.	1.482	0.926
-398.	1.419	0.925
0.	0.000	0.000
0.	0.957	0.912
0.	0.000	0.000
398.	1.415	0.923
431.	1.477	0.922
0.	0.000	0.000
757.	1.958	0.866

TS, MID, BACKUP

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= -8DEGC DATE: 629

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-750.	1.859	0.827
0.	0.000	0.000
-431.	1.484	0.927
-398.	1.421	0.926
0.	0.000	0.000
0.	0.958	0.913
0.	0.000	0.000
398.	1.417	0.924
431.	1.478	0.923
0.	0.000	0.000
757.	1.958	0.866

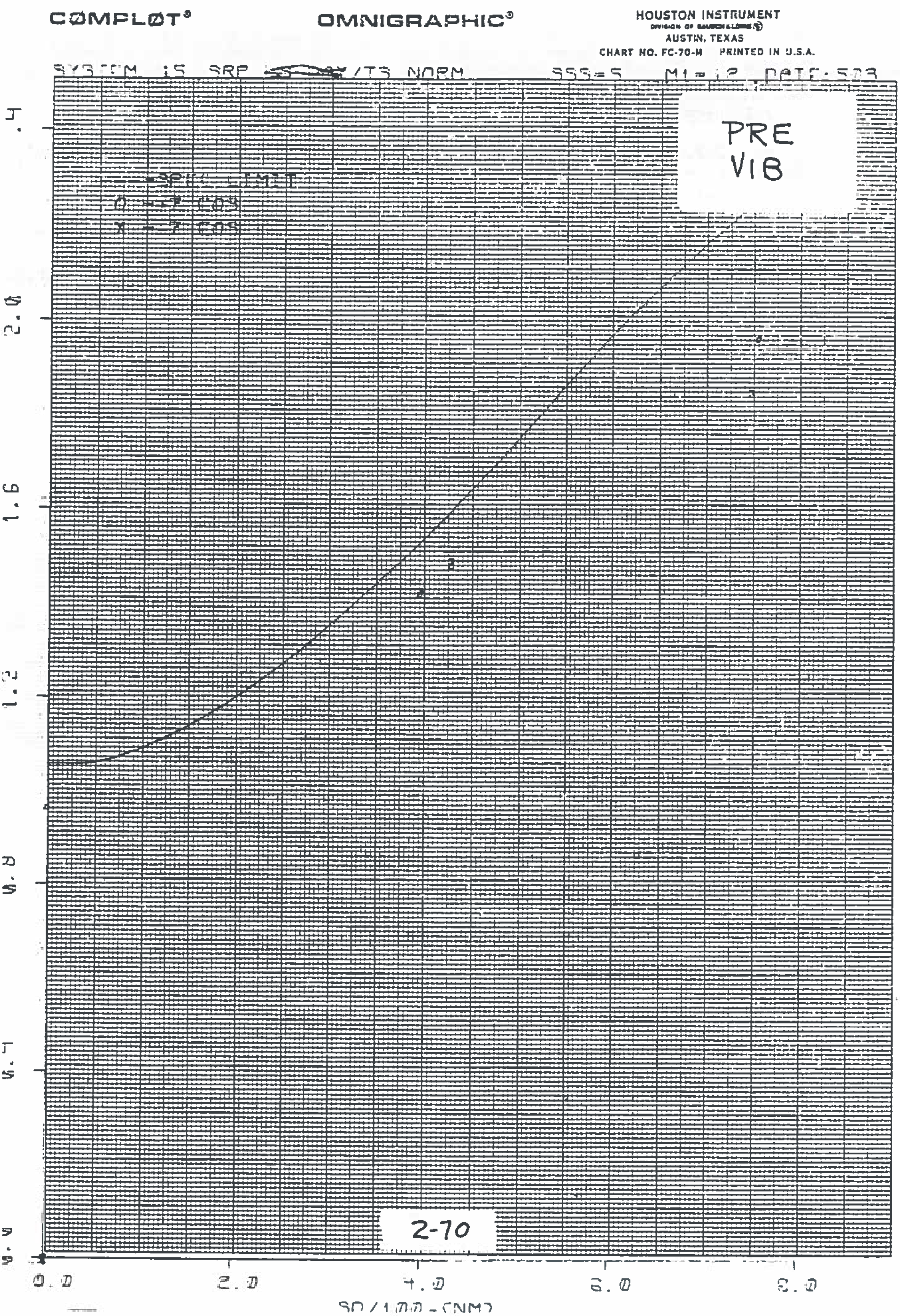
2.2 Geometric Resolution (Cont'd)

2.2.3 Smoothed Geometric Resolution - Infrared (Cont'd) (3.2.1.1.2.2)

2.2.3.2 Acceptance - Vibration

The TS SRP run in Thermal Vacuum before and after SSS Acceptance Vibration May 12, 1988, show no out-of-specification performance changes in SRP due to vibration.

ATTACHMENTS:	TS SRP Curve Pre-Vibration	5-03-88
	TS SRP Tables Pre-Vibration	5-03-88
	TS SRP Curve Post-Vibration	6-08-88
	TS SRP Tables Post-Vibration	6-08-88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PRE
VIB
2.0
1.6
1.2
0.8
0.0
2.0
4.0
6.0
8.0
2-70

TS, MID, PRIMARY

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= 12DEGC DATE: 503

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-750.	1.847	0.821
0.	0.000	0.000
-431.	1.489	0.930
-398.	1.425	0.929
0.	0.000	0.000
0.	0.960	0.914
0.	0.000	0.000
398.	1.415	0.923
431.	1.478	0.923
0.	0.000	0.000
757.	1.960	0.867

TS, MID, BACKUP

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= 12DEGC DATE: 503

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-750.	1.845	0.820
0.	0.000	0.000
-431.	1.489	0.930
-398.	1.425	0.929
0.	0.000	0.000
0.	0.961	0.915
0.	0.000	0.000
398.	1.415	0.923
431.	1.478	0.923
0.	0.000	0.000
757.	1.956	0.866

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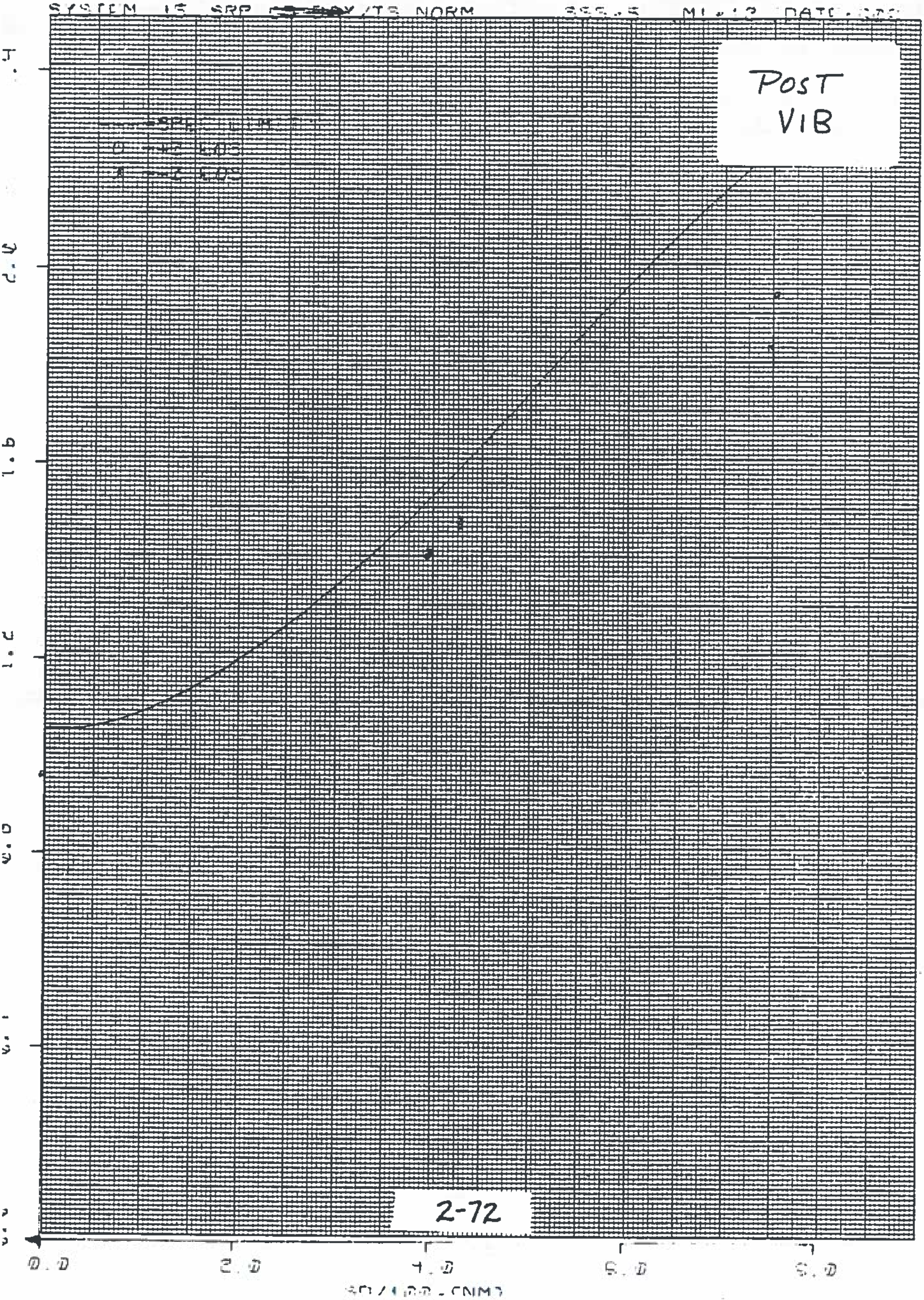

TS, MID, PRIMARY

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= 12DEGC DATE: 608

SUR. DIST. (NM)	SRP ACTUAL (NM)	SRP RATIO
-750.	1.841	0.818
0.	0.000	0.000
-431.	1.485	0.928
-398.	1.420	0.926
0.	0.000	0.000
0.	0.958	0.913
0.	0.000	0.000
398.	1.411	0.920
431.	1.471	0.919
0.	0.000	0.000
757.	1.948	0.862

TS, MID, BACKUP

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= 12DEGC DATE: 608

SUR. DIST. (NM)	SRP ACTUAL (NM)	SRP RATIO
-750.	1.846	0.821
0.	0.000	0.000
-431.	1.489	0.930
-398.	1.424	0.928
0.	0.000	0.000
0.	0.961	0.915
0.	0.000	0.000
398.	1.414	0.922
431.	1.475	0.921
0.	0.000	0.000
757.	1.956	0.865

2.2 Geometric Resolution (Cont'd)

2.2.3 Smoothed Geometric Resolution - Infrared (3.2.1.1.2.2)

2.2.3.3 Acceptance - Thermal Vacuum

The TS SRP is within spec for the extremes of hot and cold Thermal Vacuum limit testing.

ATTACHMENTS:	TS SRP Curve	Hot Limits	6-18-88
	TS SRP Tables	Hot Limits	6-18-88
	TS SRP Curve	Cold Limits	6-24-88
	TS SRP Tables	Cold Limits	6-24-88

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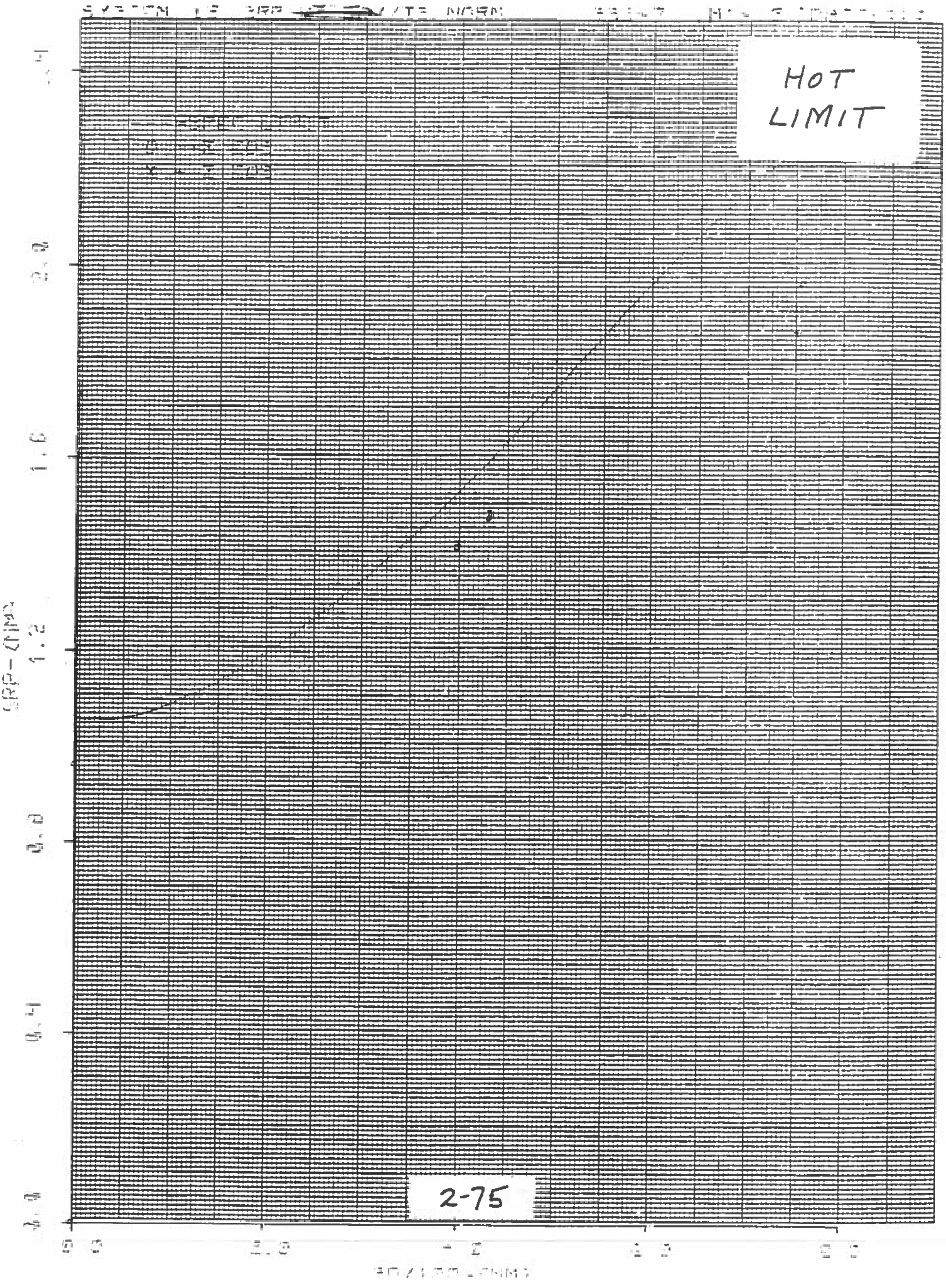

TS, MID, PRIMARY

FLT. NO. = 15 ENV. = 4 SSS= 7DEGC M1= 12DEGC DATE: 618

SUR. DIST. (NM)	SRP ACTUAL (NM)	SRP RATIO
-750.	1.858	0.826
0.	0.000	0.000
-431.	1.487	0.929
-398.	1.423	0.928
0.	0.000	0.000
0.	0.961	0.915
0.	0.000	0.000
398.	1.415	0.923
431.	1.476	0.922
0.	0.000	0.000
757.	1.962	0.868

TS, MID, BACKUP

FLT. NO. = 15 ENV. = 4 SSS= 7DEGC M1= 12DEGC DATE: 618

SUR. DIST. (NM)	SRP ACTUAL (NM)	SRP RATIO
-750.	1.872	0.833
0.	0.000	0.000
-431.	1.496	0.934
-398.	1.432	0.934
0.	0.000	0.000
0.	0.967	0.921
0.	0.000	0.000
398.	1.424	0.928
431.	1.485	0.927
0.	0.000	0.000
757.	1.978	0.875

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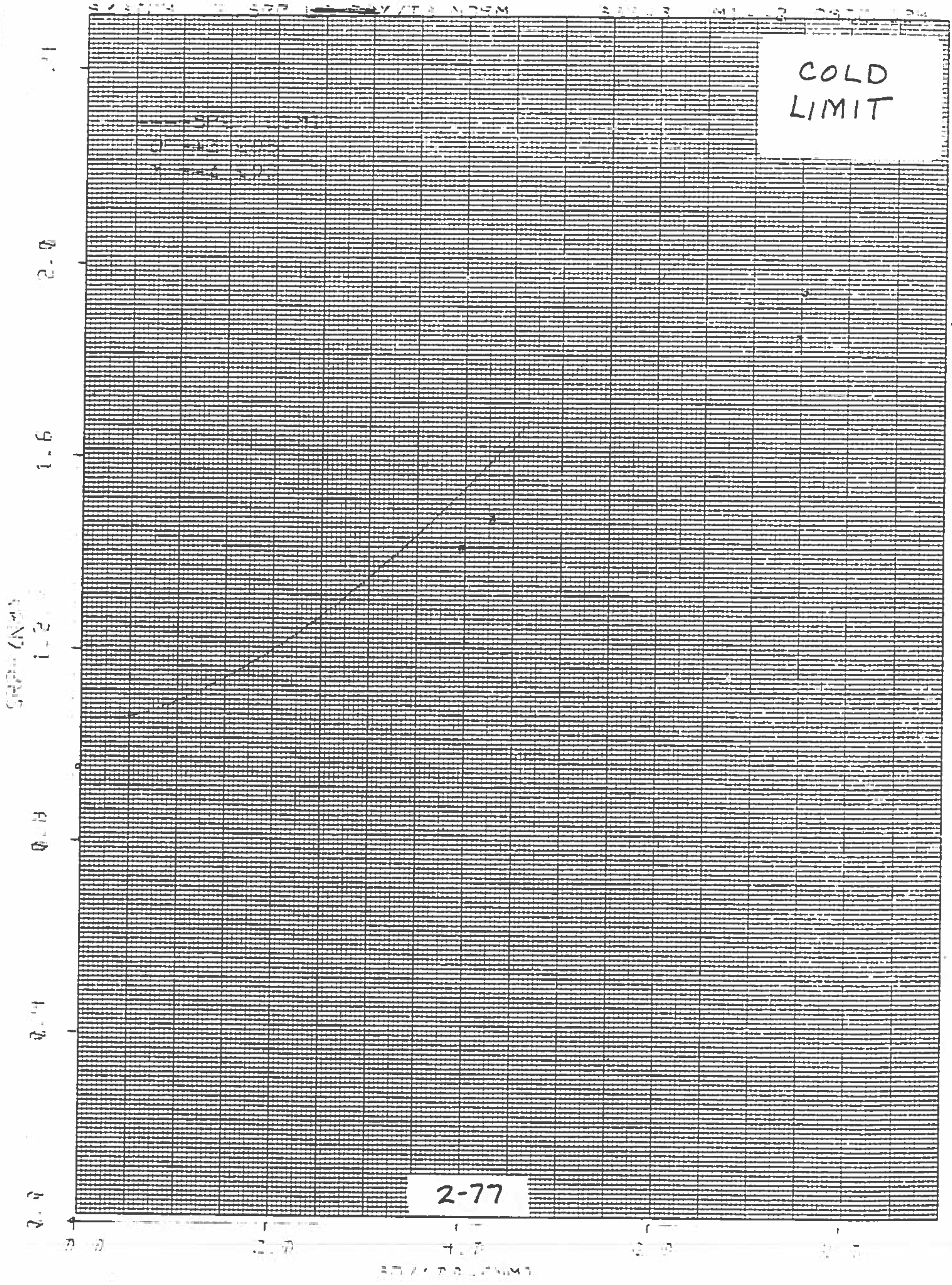

49

TS, MID, PRIMARY

FLT. NO. = 15 ENV. = 4 SSS= 3DEGC M1= -8DEGC DATE: 624

SUR. DIST. (NM)	SRP ACTUAL (NM)	SRP RATIO
-750.	1.852	0.823
0.	0.000	0.000
-431.	1.473	0.920
-398.	1.412	0.920
0.	0.000	0.000
0.	0.951	0.905
0.	0.000	0.000
398.	1.406	0.917
431.	1.465	0.915
0.	0.000	0.000
757.	1.943	0.860

TS, MID, BACKUP

FLT. NO. = 15 ENV. = 4 SSS= 3DEGC M1= -8DEGC DATE: 624

SUR. DIST. (NM)	SRP ACTUAL (NM)	SRP RATIO
-750.	1.866	0.830
0.	0.000	0.000
-431.	1.483	0.926
-398.	1.421	0.926
0.	0.000	0.000
0.	0.957	0.912
0.	0.000	0.000
398.	1.415	0.923
431.	1.475	0.921
0.	0.000	0.000
757.	1.962	0.868

2.2 Geometric Resolution (Cont'd)

2.2.4 Smoothed Geometric Resolution - Daytime Visual (3.2.1.1.2.2)

2.2.4.1 Baseline (Orbit Nominal)

The LS Day SRP is within spec limits at Orbit Nominal conditions.

ATTACHMENTS: LS Day SRP Curve - Orbit Nominal 6-29-88

LS Day SRP Tables - Orbit Nominal 6-29-88

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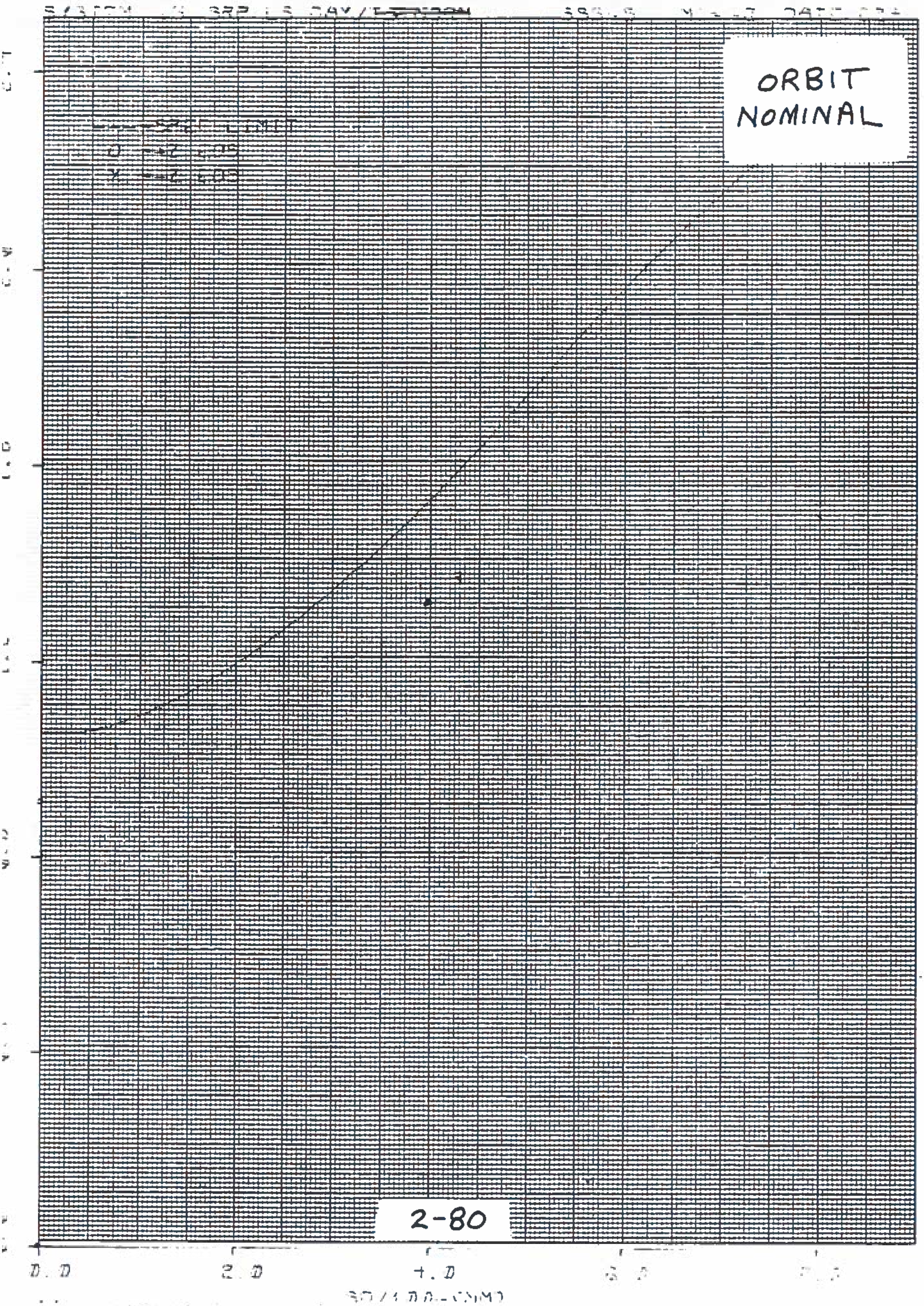

LS, DAY, NORMAL, PRIMARY

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= -8DEGC DATE: 629

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-800.	1.497	0.637
0.	0.000	0.000
-431.	1.366	0.853
-398.	1.324	0.863
0.	0.000	0.000
0.	0.912	0.868
0.	0.000	0.000
398.	1.321	0.862
431.	1.379	0.861
0.	0.000	0.000
800.	1.527	0.650

LS, DAY, NORMAL, BACKUP

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= -8DEGC DATE: 629

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-800.	1.496	0.637
0.	0.000	0.000
-431.	1.364	0.852
-398.	1.323	0.863
0.	0.000	0.000
0.	0.911	0.868
0.	0.000	0.000
398.	1.320	0.861
431.	1.377	0.860
0.	0.000	0.000
800.	1.525	0.649

2.2 Geometric Resolution (Cont'd)

2.2.4 Smoothed Geometric Resolution - Daytime Visual (Cont'd) (3.2.1.1.2.2)

2.2.4.2 Acceptance - Vibration

The OLS #15 SSS underwent vibrations on May 12, 1988. The LS Day SRP is within specification both before and after SSS Acceptance level vibration. No vibration-related changes in SRP were observed.

ATTACHMENTS:	LS Day SRP Curve	Pre-Vibrtion	5-02-88
	LS Day SRP Tables	Pre-Vibration	5-02-88
	LS Day SRP Curve	Post-Vibration	6-07-88
	LS Day SRP Table	Post-Vibration	6-07-88

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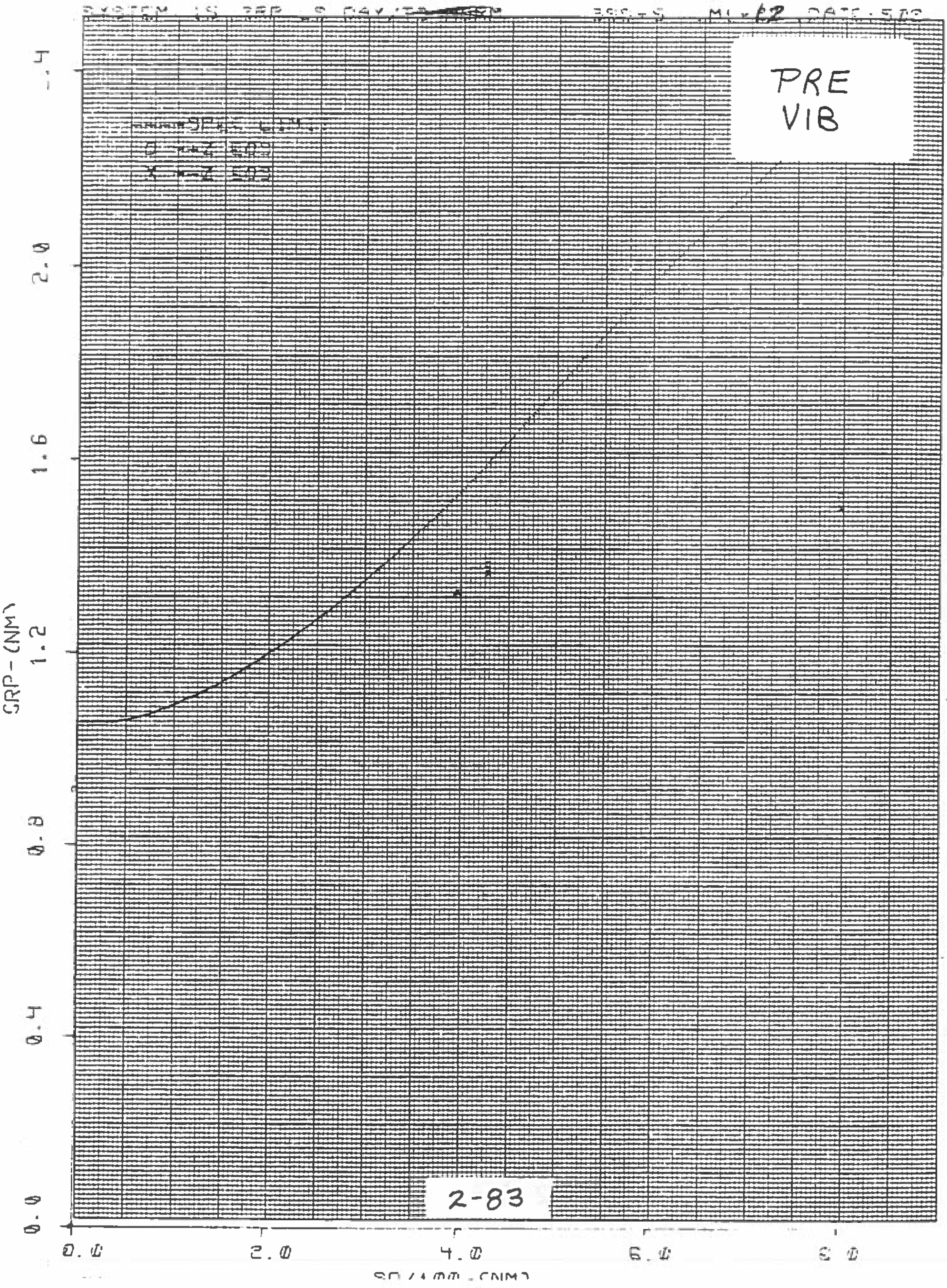


LS, DAY, NORMAL, PRIMARY

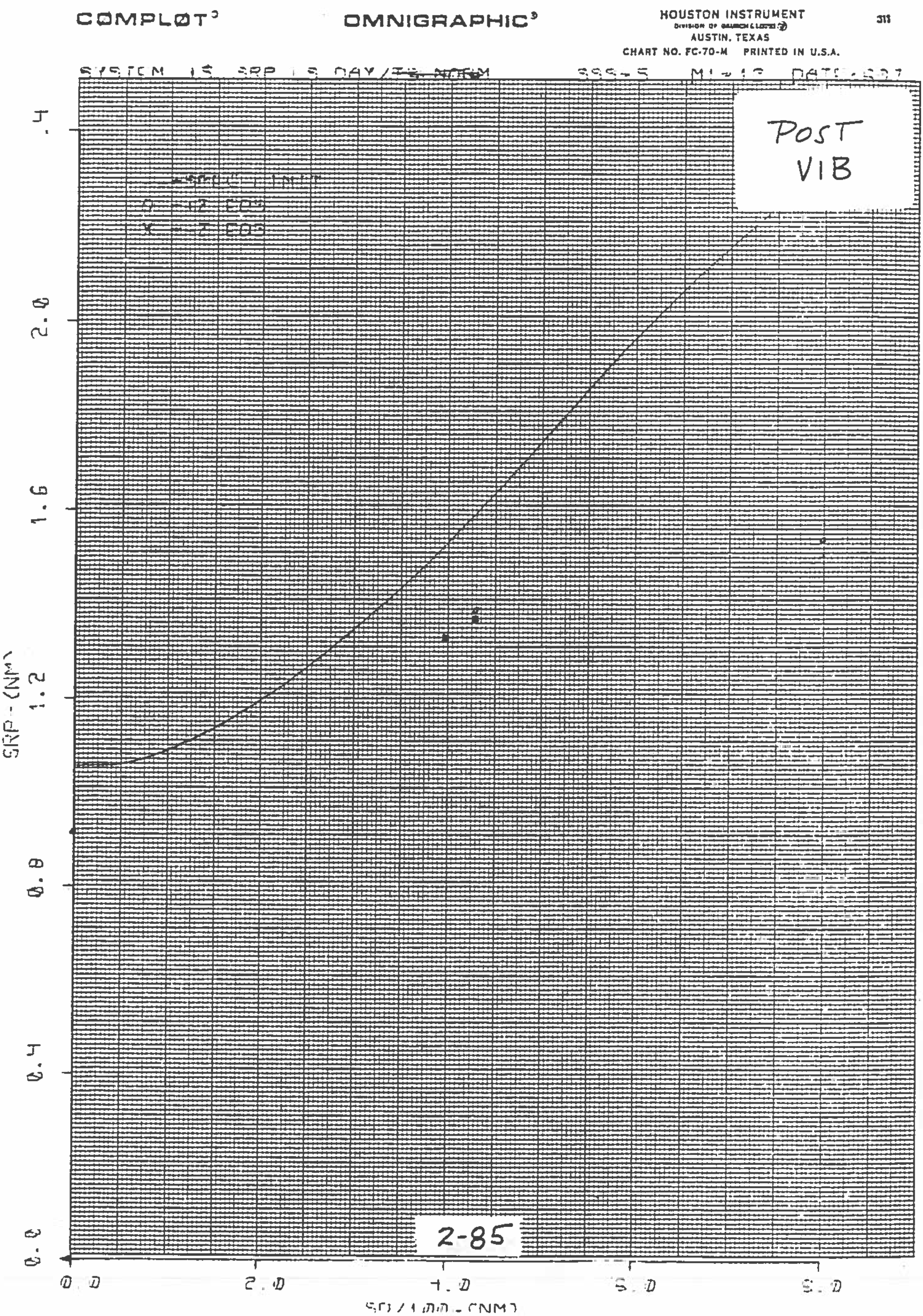
FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= ~~20~~12DEGC DATE: 502

SUR. DIST. (NM)	SRP ACTUAL (NM)	SRP RATIO
-800.	1.499	0.638
0.	0.000	0.000
-431.	1.365	0.853
-398.	1.326	0.864
0.	0.000	0.000
0.	0.913	0.870
0.	0.000	0.000
398.	1.321	0.862
431.	1.383	0.863
0.	0.000	0.000
800.	1.528	0.650

LS, DAY, NORMAL, BACKUP

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= ~~20~~12DEGC DATE: 502

SUR. DIST. (NM)	SRP ACTUAL (NM)	SRP RATIO
-800.	1.500	0.638
0.	0.000	0.000
-431.	1.366	0.853
-398.	1.327	0.865
0.	0.000	0.000
0.	0.914	0.870
0.	0.000	0.000
398.	1.322	0.862
431.	1.383	0.864
0.	0.000	0.000
800.	1.529	0.651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POST VIB
2.0
1.6
1.2
0.8
0.4
0.0
SRP - (NM)
2.0
4.0
6.0
8.0
2-85

LS, DAY, NORMAL, PRIMARY

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= 12DEGC DATE: 607

SUR. DIST. (NM)	SRP ACTUAL (NM)	SRP RATIO
-800.	1.505	0.641
0.	0.000	0.000
-431.	1.369	0.855
-398.	1.330	0.867
0.	0.000	0.000
0.	0.914	0.871
0.	0.000	0.000
398.	1.327	0.865
431.	1.387	0.866
0.	0.000	0.000
800.	1.537	0.654

LS, DAY, NORMAL, BACKUP

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= 12DEGC DATE: 607

SUR. DIST. (NM)	SRP ACTUAL (NM)	SRP RATIO
-800.	1.504	0.640
0.	0.000	0.000
-431.	1.367	0.854
-398.	1.329	0.866
0.	0.000	0.000
0.	0.914	0.870
0.	0.000	0.000
398.	1.326	0.865
431.	1.386	0.866
0.	0.000	0.000
800.	1.536	0.654

2.2 Geometric Resolution (Cont'd)

2.2.4 Smoothed Geometric Resolution - Daytime Visual (Cont'd) (3.2.1.1.2.2)

2.2.4.3 Acceptance - Thermal Vacuum

The LS Day SRP is well within specification allowance, over the entire range of Acceptance temperatures.

ATTACHMENTS:	LS Day SRP Curve	Hot Limits	6-17-88
	LS Day SRP Tables	Hot Limits	6-17-88
	LS Day SRP Curve	Cold Limits	6-22-88
	LS Day SRP Tables	Cold Limits	6-22-88

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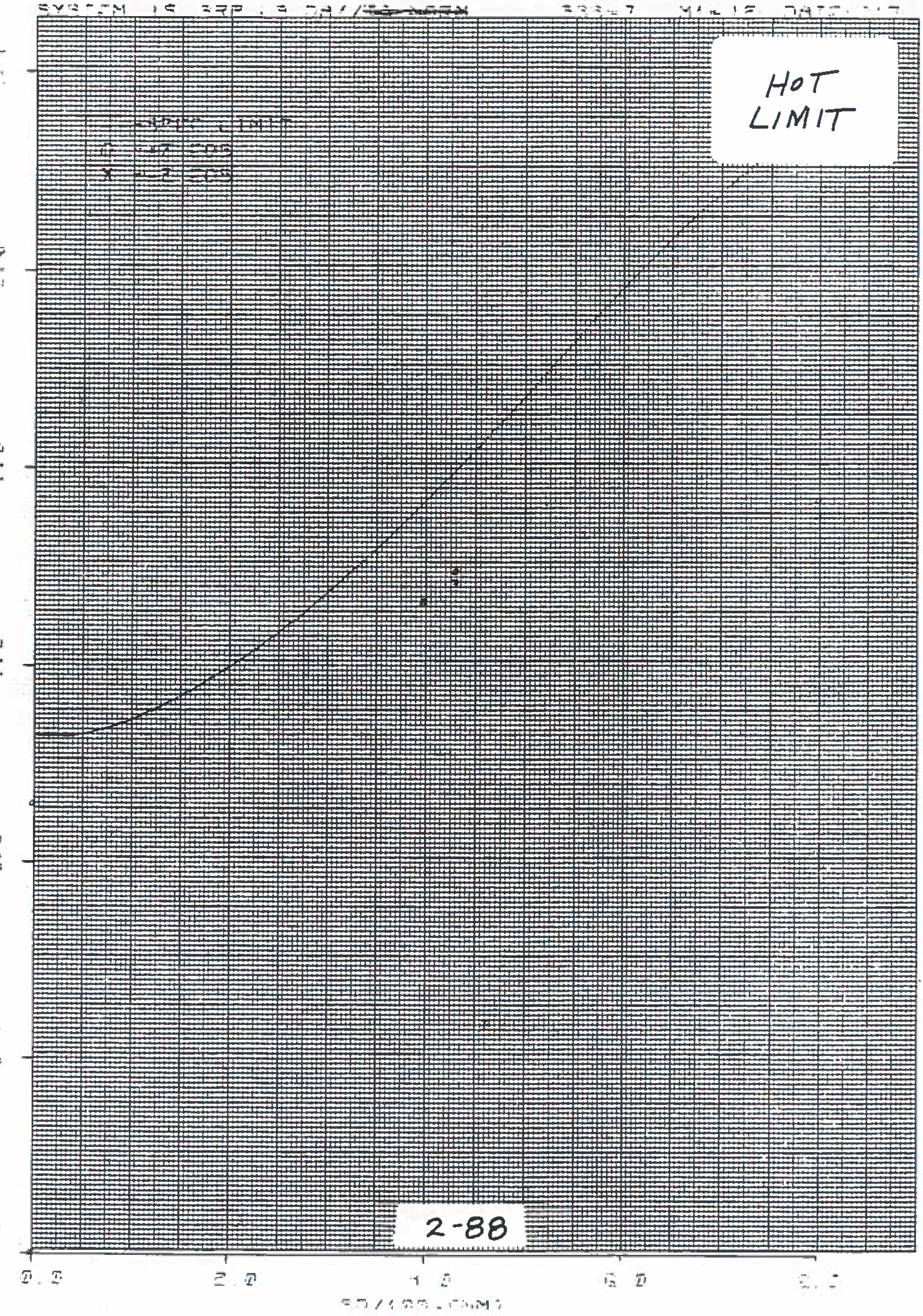

2-88

LS, DAY, NORMAL, PRIMARY

FLT. NO. = 15 ENV. = 4 SSS= 7DEGC M1= 12DEGC DATE: 617

SUR. DIST. (NM)	SRP ACTUAL (NM)	SRP RATIO
-800.	1.503	0.640
0.	0.000	0.000
-431.	1.368	0.854
-398.	1.330	0.867
0.	0.000	0.000
0.	0.916	0.872
0.	0.000	0.000
398.	1.326	0.865
431.	1.389	0.867
0.	0.000	0.000
800.	1.534	0.653

LS, DAY, NORMAL, BACKUP

FLT. NO. = 15 ENV. = 4 SSS= 7DEGC M1= 12DEGC DATE: 617

SUR. DIST. (NM)	SRP ACTUAL (NM)	SRP RATIO
-800.	1.497	0.637
0.	0.000	0.000
-431.	1.362	0.851
-398.	1.325	0.864
0.	0.000	0.000
0.	0.912	0.869
0.	0.000	0.000
398.	1.322	0.862
431.	1.384	0.864
0.	0.000	0.000
800.	1.529	0.650

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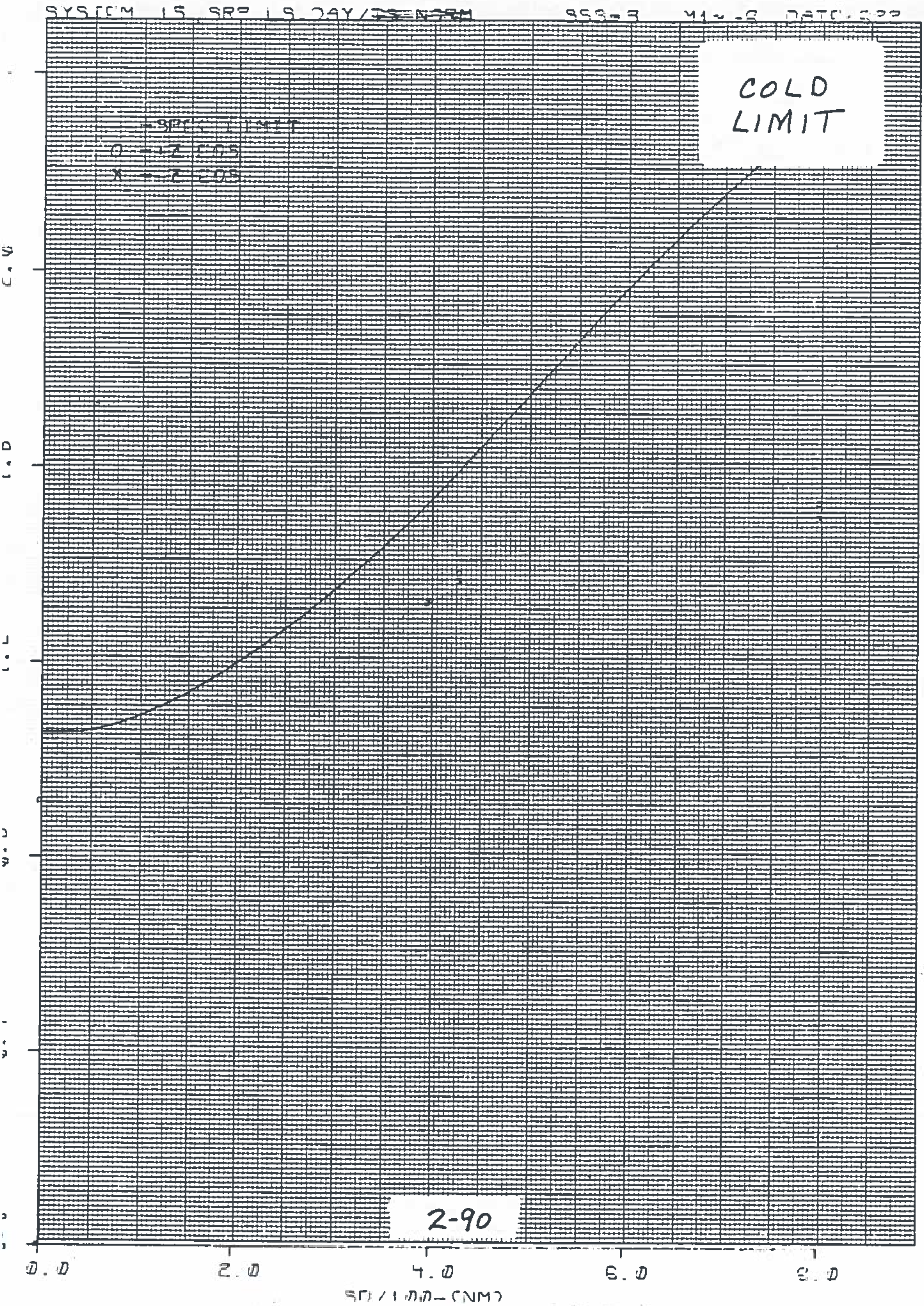

LS, DAY, NORMAL, PRIMARY

FLT. NO. = 15 ENV. = 4 SSS= 3DEGC M1= -8DEGC DATE: 622

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-800.	1.498	0.637
0.	0.000	0.000
-431.	1.366	0.853
-398.	1.326	0.864
0.	0.000	0.000
0.	0.914	0.870
0.	0.000	0.000
398.	1.323	0.863
431.	1.383	0.863
0.	0.000	0.000
800.	1.528	0.650

LS, DAY, NORMAL, BACKUP

FLT. NO. = 15 ENV. = 4 SSS= 3DEGC M1= -8DEGC DATE: 622

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-800.	1.494	0.636
0.	0.000	0.000
-431.	1.362	0.851
-398.	1.322	0.862
0.	0.000	0.000
0.	0.911	0.868
0.	0.000	0.000
398.	1.319	0.860
431.	1.379	0.861
0.	0.000	0.000
800.	1.524	0.648

2.2 Geometric Resolution (Cont'd)

2.2.5 Smoothed Geometric Resolution - Nighttime Visual (3.2.1.1.2.2)

LS Night SRP routinely is deliberately adjusted to be close to spec limit during system integration in order to optimize PMT signal-to-noise ratio, at the expense of SRP margin.

2.2.5.1 Baseline (Orbit Nominal)

The LS Night SRP is within spec for all measured scan angles

ATTACHMENTS:	LS Night SRP Curve - Orbit Nominal	6-29-88
	LS Night SRP Table - Orbit Nominal	6-29-88

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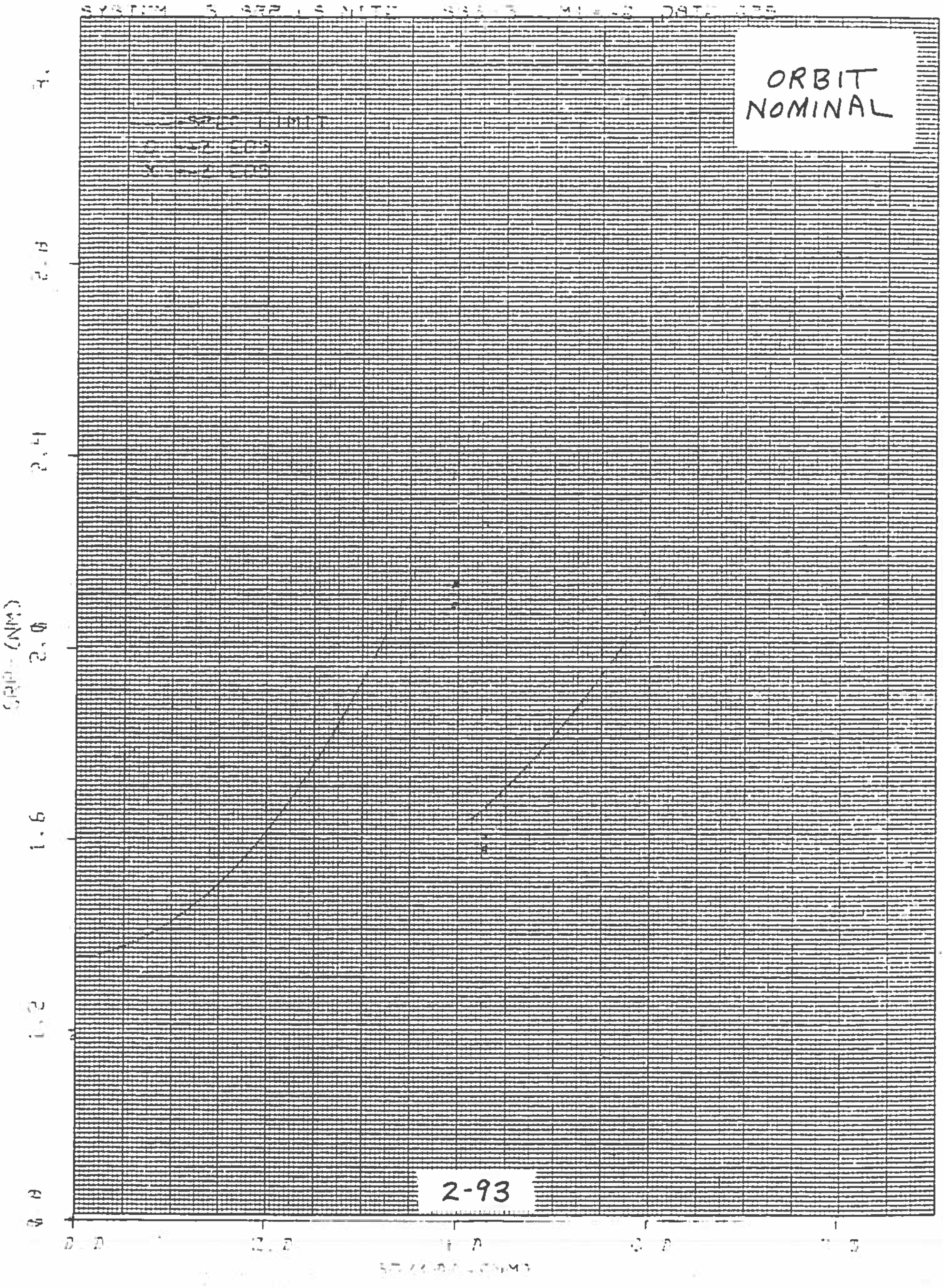

LS, NITE, NORMAL, PRIMARY

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= -8DEGC DATE: 629

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-799.	2.819	0.941
0.	0.000	0.000
-430.	1.607	0.962
-397.	2.132	0.895
0.	0.000	0.000
0.	1.182	0.876
0.	0.000	0.000
397.	2.089	0.877
430.	1.580	0.946
0.	0.000	0.000
801.	2.732	0.908

LS, NITE, NORMAL, BACKUP

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= -8DEGC DATE: 629

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-799.	2.845	0.950
0.	0.000	0.000
-430.	1.611	0.964
-397.	2.150	0.903
0.	0.000	0.000
0.	1.188	0.880
0.	0.000	0.000
397.	2.107	0.884
430.	1.584	0.948
0.	0.000	0.000
801.	2.758	0.917

2.2 Geometric Resolution (Cont'd)

2.2.5 Smoothed Geometric Resolution - Nighttime Visual (Cont'd) (3.1.2.2)

2.2.5.2 Acceptance - Vibration

The LS Night SRP is within specification before and after SSS vibration. No vibration-induced changes in SRP were observed.

ATTACHMENTS:	LS Night SRP Curve	Pre-Vibration	5-04-88
	LS Night SRP Tables	Pre-Vibration	5-04-88
	LS Night SRP Curve	Post-Vibration	6-06-88
	LS Night SRP Tables	Post-Vibration	6-06-88

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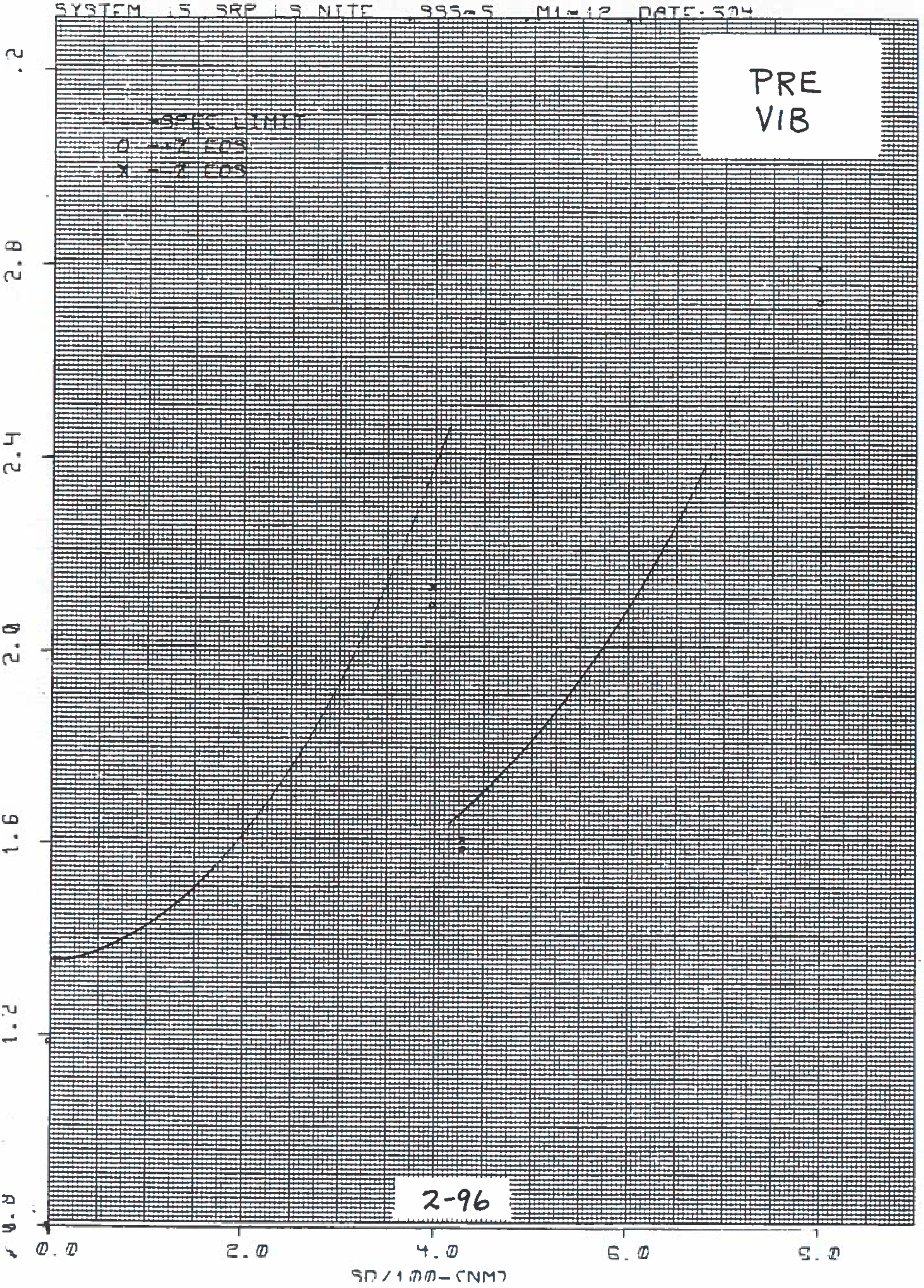

LS, NITE, NORMAL, PRIMARY

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= 12DEGC DATE: 504

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-799.	2.791	0.932
0.	0.000	0.000
-430.	1.608	0.962
-397.	2.131	0.895
0.	0.000	0.000
0.	1.184	0.877
0.	0.000	0.000
397.	2.094	0.879
430.	1.588	0.950
0.	0.000	0.000
801.	2.721	0.905

LS, NITE, NORMAL, BACKUP

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= 12DEGC DATE: 504

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-799.	2.820	0.942
0.	0.000	0.000
-430.	1.615	0.967
-397.	2.151	0.903
0.	0.000	0.000
0.	1.191	0.882
0.	0.000	0.000
397.	2.114	0.888
430.	1.595	0.955
0.	0.000	0.000
801.	2.750	0.914

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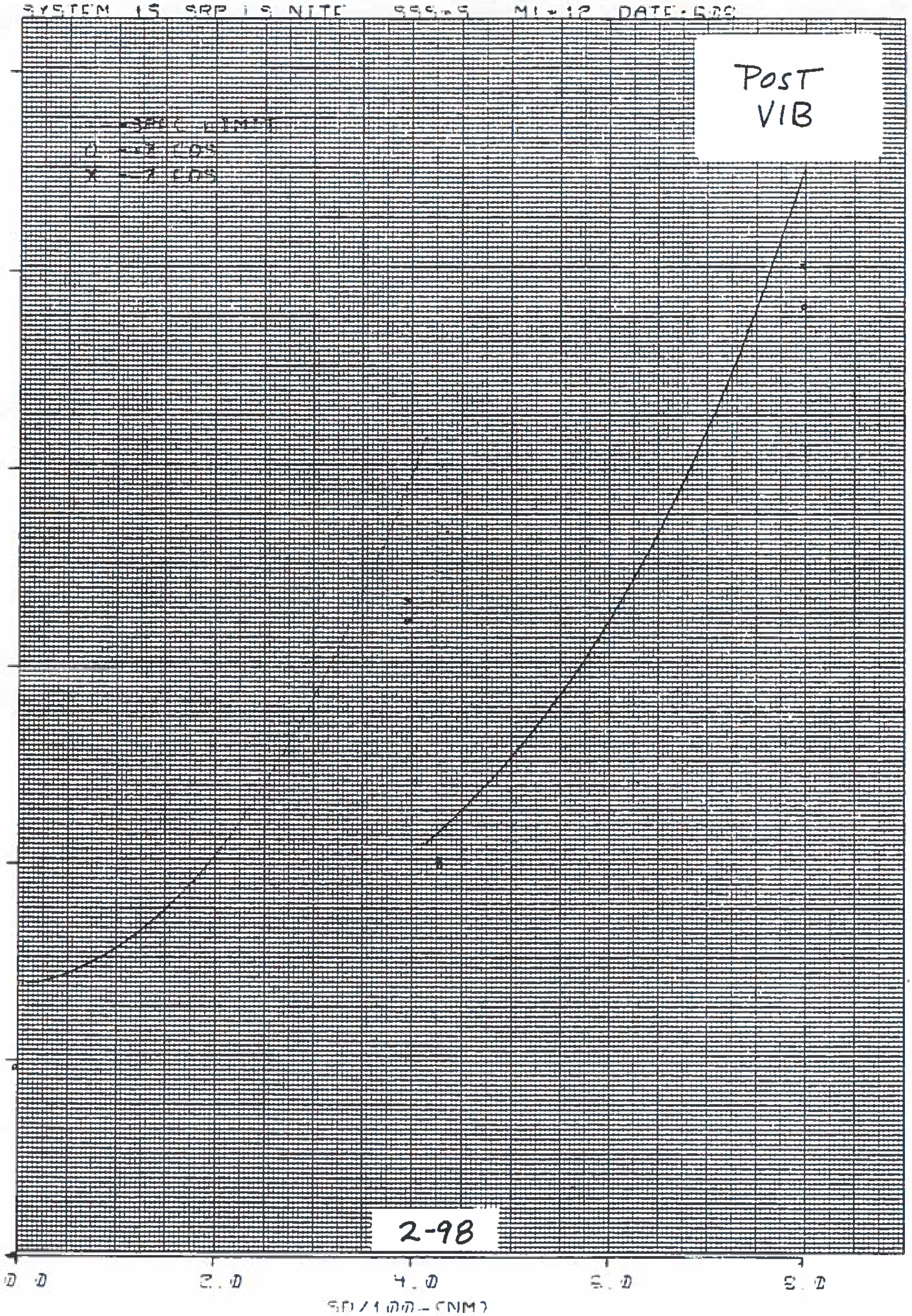

LS, NITE, NORMAL, PRIMARY

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= 12DEGC DATE: 608

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-799.	2.810	0.938
0.	0.000	0.000
-430.	1.607	0.962
-397.	2.133	0.895
0.	0.000	0.000
0.	1.183	0.876
0.	0.000	0.000
397.	2.092	0.878
430.	1.593	0.953
0.	0.000	0.000
801.	2.727	0.907

LS, NITE, NORMAL, BACKUP

FLT. NO. = 15 ENV. = 4 SSS= 5DEGC M1= 12DEGC DATE: 608

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-799.	2.838	0.948
0.	0.000	0.000
-430.	1.614	0.966
-397.	2.153	0.904
0.	0.000	0.000
0.	1.192	0.882
0.	0.000	0.000
397.	2.112	0.887
430.	1.600	0.958
0.	0.000	0.000
801.	2.755	0.916

2.2 Geometric Resolution (Cont'd)

2.2.5 Smoothed Geometric Resolution - Nighttime Visual (Cont'd) (3.1.2.2)

2.2.5.3 Acceptance - Thermal Vacuum

The LS Night SRP is within specification limits over the Acceptance temperature range. No temperature-related changes in SRP over the Acceptance temperature range were observed.

ATTACHMENTS:	LS Night SRP Curve	Hot Limits	6-18-88
	LS Night SRP Tables	Hot Limits	6-18-88
	LS Night SRP Curve	Cold Limits	6-22-88
	LS Night SRP Tables	Cold Limits	6-22-88

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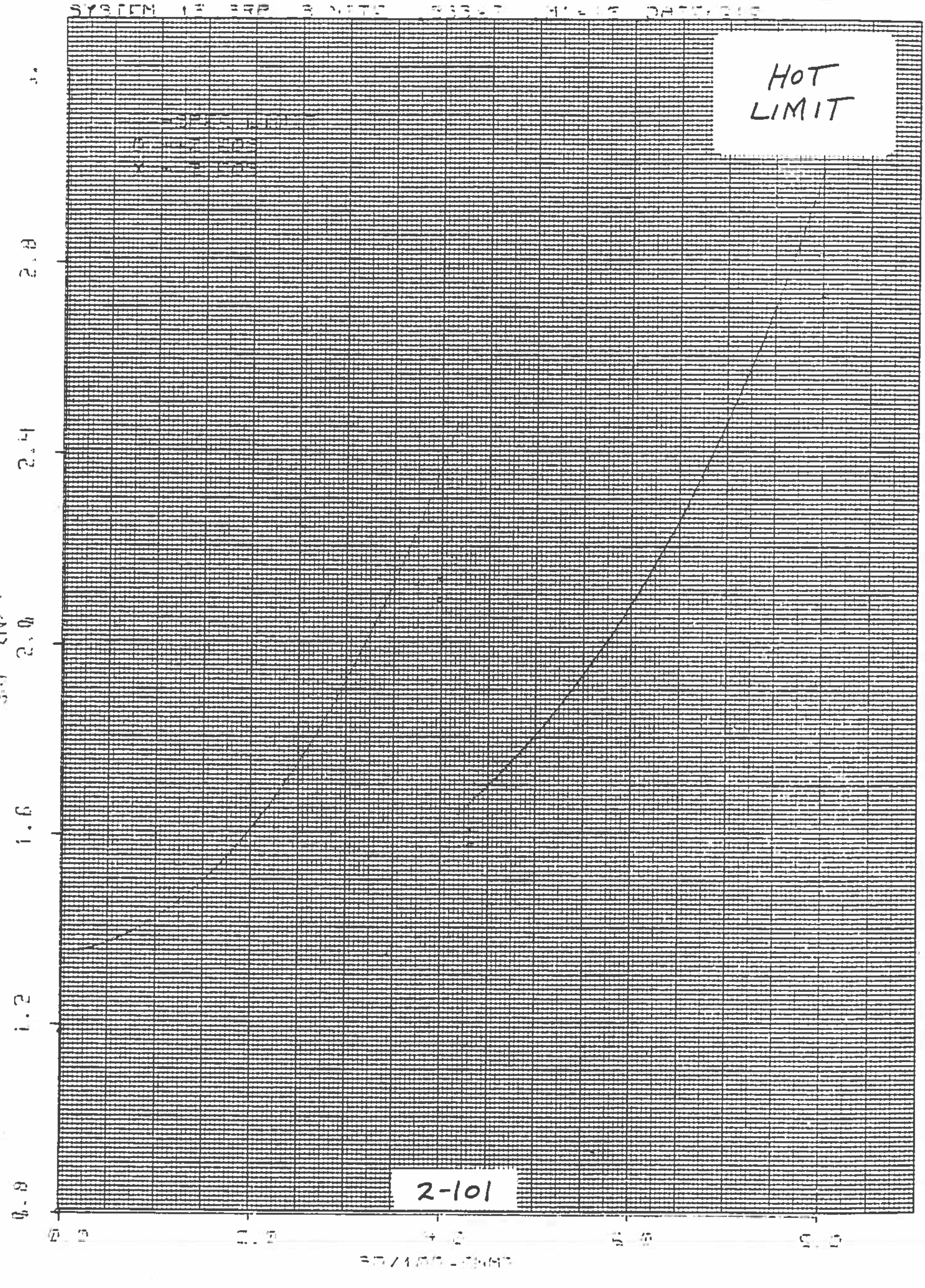

LS, NITE, NORMAL, PRIMARY

FLT. NO. = 15 ENV. = 4 SSS= 7DEGC M1= 12DEGC DATE: 618

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-799.	2.817	0.941
0.	0.000	0.000
-430.	1.611	0.964
-397.	2.134	0.896
0.	0.000	0.000
0.	1.184	0.877
0.	0.000	0.000
397.	2.093	0.879
430.	1.579	0.945
0.	0.000	0.000
801.	2.734	0.909

LS, NITE, NORMAL, BACKUP

FLT. NO. = 15 ENV. = 4 SSS= 7DEGC M1= 12DEGC DATE: 618

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-799.	2.843	0.949
0.	0.000	0.000
-430.	1.620	0.969
-397.	2.154	0.904
0.	0.000	0.000
0.	1.193	0.884
0.	0.000	0.000
397.	2.112	0.887
430.	1.587	0.949
0.	0.000	0.000
801.	2.759	0.917

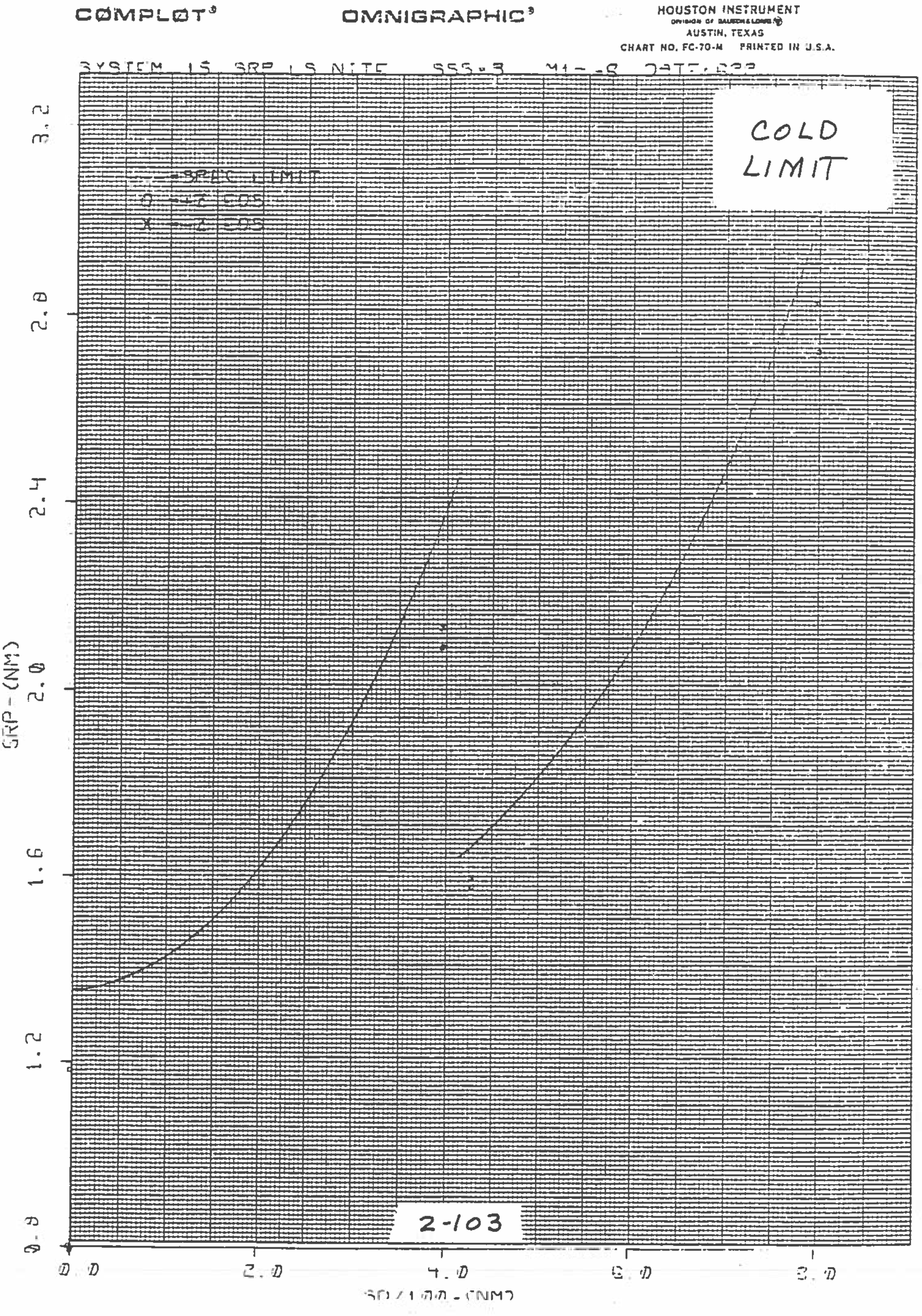
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CHART NO. FC-70-M PRINTED IN U.S.A.
COLD LIMIT
SPEC LIMIT
X -2 COS
SRP-(NM)
3.2
2.8
2.4
2.0
1.6
1.2
0.0
2.0
4.0
6.0
8.0

LS, NITE, NORMAL, PRIMARY

FLT. NO. = 15 ENV. = 4 SSS= 3DEGC M1= -8DEGC DATE: 622

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-799.	2.823	0.943
0.	0.000	0.000
-430.	1.597	0.956
-397.	2.132	0.895
0.	0.000	0.000
0.	1.180	0.874
0.	0.000	0.000
397.	2.090	0.877
430.	1.576	0.943
0.	0.000	0.000
801.	2.720	0.904

LS, NITE, NORMAL, BACKUP

FLT. NO. = 15 ENV. = 4 SSS= 3DEGC M1= -8DEGC DATE: 622

SUR. DIST. (NM)	SRP ACTUAL(NM)	SRP RATIO
-799.	2.837	0.947
0.	0.000	0.000
-430.	1.596	0.955
-397.	2.142	0.899
0.	0.000	0.000
0.	1.183	0.876
0.	0.000	0.000
397.	2.100	0.882
430.	1.575	0.942
0.	0.000	0.000
801.	2.734	0.909

2.2 Geometric Resolution (Cont'd)

2.2.6 Data Sampling (3.2.1.1.2.3)

The sampling frequency ratios for all modes of the 5D-3 OLS satisfy the specification requirements. The calculations are contained in the 5D-3 OLS System Summary Report. The results are summarized below. The worst-case sampling frequency ratio for each mode is given.

MODE	SAMPLING FREQ. RATIO (Spec: > 2.4)
LF Day - Normal	2.58
LF Day - Fallback	2.61
LS & TS Day - Normal	2.50
LS Night - Normal	2.66
TF - Normal	3.44
TF Fallback - Normal Side of scan	3.28
TF Fallback - Abnormal Side of Scan	3.28

2.3 Geometric Accuracy (3.2.1.1.3.1, 3.2.1.1.3.2, 3.2.1.1.3.3)

The alignment and synchronization of the SSS determine the Geometric Accuracy. Geometric accuracy is specified in 3 categories (Repeatability, Stability & Fixed Errors). Within these categories, accuracy is further specified for Along Track, Along Scan (Stored Data), Along Scan (Direct Data), and Along Scan (with digital delphi generation, i.e., the Encoder Simulator locked mode). The results of the OLS #15 Alignment and Syncronization tests for all modes are within specification.

There was an observed shift in alignment between the extremes of M1 temperature of -8°C and +12°C on the order of less than 0.1 milliradians for all channels. There was also an observed shift in synchronization in all modes in OLS #15 of approximately 0.1 milliradians between M1 temperature extremes of -8°C and +12°. Therefore, in the calcuation of the Repeatability error, the rms difference of the Hot and Cold data from the average of the Hot and Cold data was used. The Repeatability error was calculated as the rms difference of the measured alignment/synchronization (as a function of the variation of M1 temperature on orbit) from the hot-to-cold average synchronization/alignment. The total Repeatability contribution for synchronization is determined by rss'ing the wow-flutter error (as measured in test 6x11.ST) and the jitter error (which was negligible on OLS #15) with the repeatability shift between Hot and Cold Limits.

The Primary Alignment Reference Axes (REFPLN) are calculated in a computer program using HRD & T channel Alignment and Sync data from several Orbit Nominal tests. The data determine a best-fit alignment with respect to the Interface Mounting Axes. The REFPLN Alignment and REFPLN Synchronization curves are included here. The remainder of the Alignment and Synchronization data for the OLS #15 SSS are in BVS 2416, Vol. III of this Acceptance Test Report.

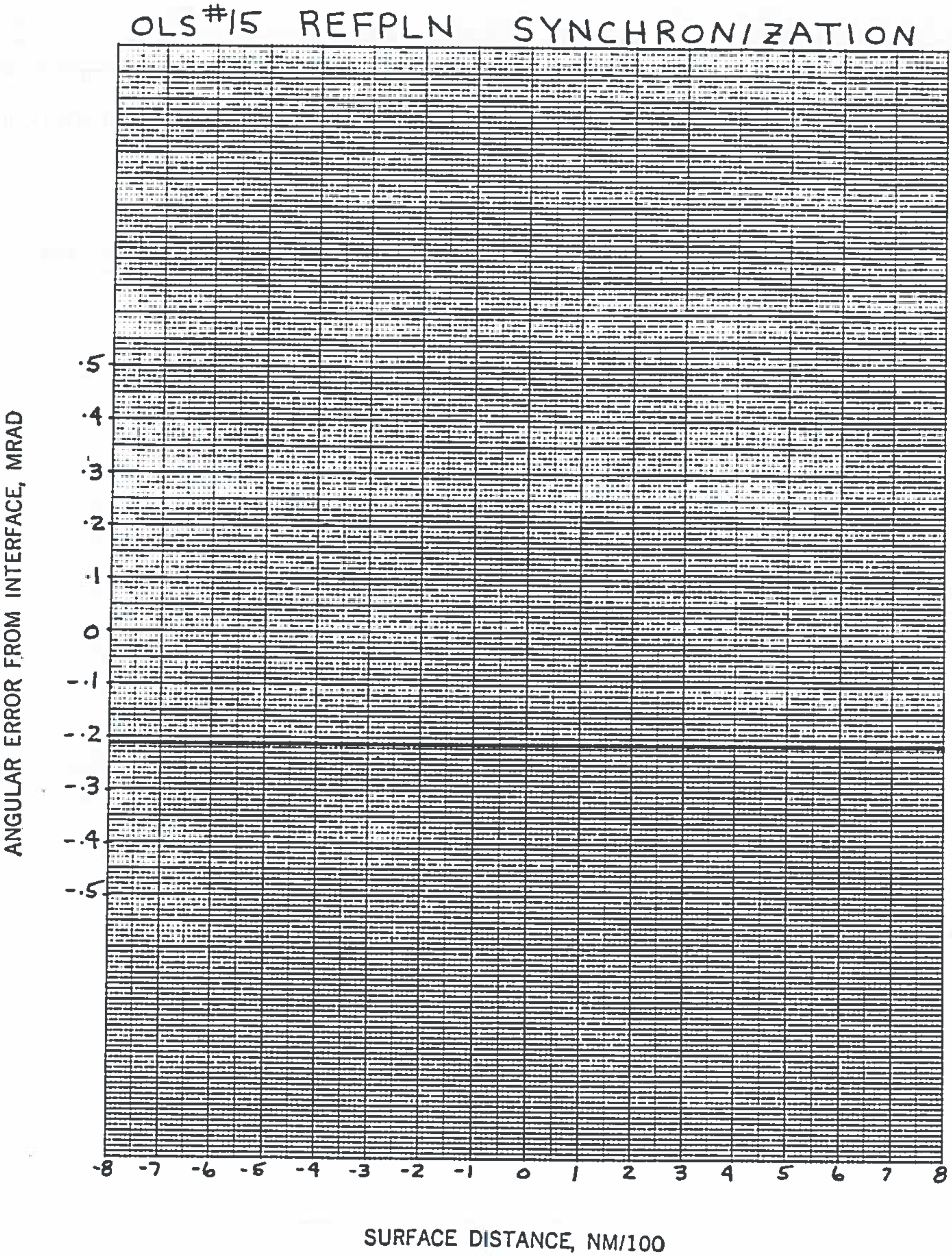
The 5D-3 System has a Fallback mode utilizing an encoder control track and Encoder Simulator. The spec limits and measured results are shown in Table 2.3-2.

ATTACHMENTS: OLS #15 REFPLN ALIGNMENT

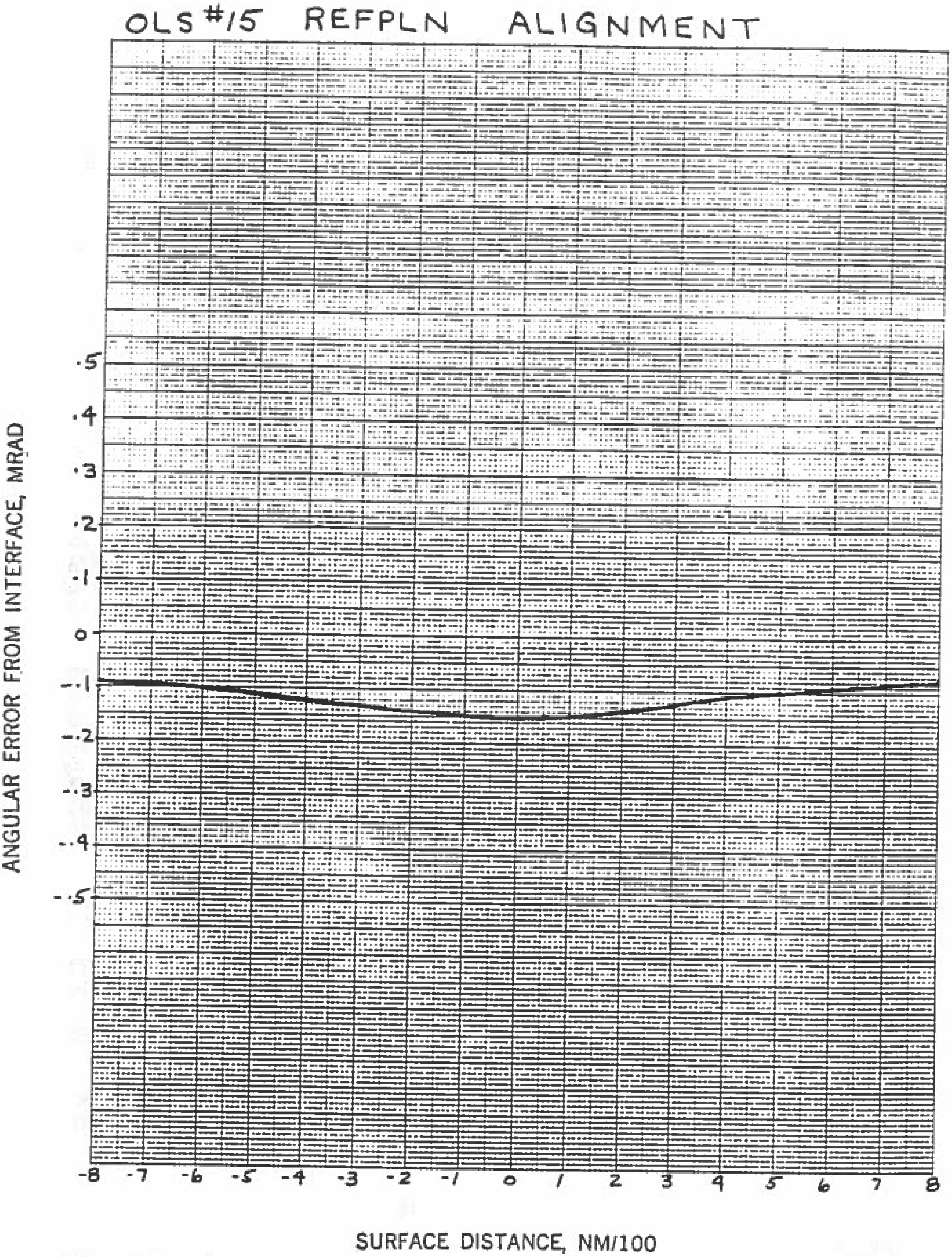
OLS #15 REFPLN SYNCHRONIZATION

OLS #15 ALIGN/SYNC vs SPEC, Table 2.3-1

OLS #15 Encoder Simulator Sync, Table 2.3-2



OLS #15 REFPLN SYNCHRONIZATION
ANGULAR ERROR FROM INTERFACE, MRAD
.5
.4
.3
.2
.1
0
-.1
-.2
-.3
-.4
-.5
-8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8
SURFACE DISTANCE, NM/100



OLS #15 REFPLN ALIGNMENT
ANGULAR ERROR FROM INTERFACE, MRAD
.5
.4
.3
.2
.1
0
-.1
-.2
-.3
-.4
-.5
-8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8
SURFACE DISTANCE, NM/100

Table 2.3-1

OLS #15 ALIGN/SYNC vs. SPEC
all numbers in milliradians

	HRD	T	PMT
FIXED - Delta between "REFPLN" & Optic Hot - Cold Average			
AT SPEC	0.45	0.70	0.60
Measured (worst-case)	0.27	0.32	0.40
AS STORED SPEC	0.80	0.80	1.90
Measured (worst-case)	0.33	0.34	0.90
AS DIRECT FINE SPEC	0.80	0.80	1.90
Measured (worst-case)	0.41	0.34	N/A
AS DIRECT SMOOTH SPEC	0.80	0.80	1.90
Measured (worst-case)	0.38	0.34	1.10
STABILITY - Delta Between Pre & Post - Vibration			
AT SPEC	0.50	0.55	0.55
Measured (worst-case)	0.10	0.10	0.17
AS STORED SPEC	0.20	0.25	0.25
Measured (worst-case)	0.12	0.19	0.12
AS DIRECT FINE SPEC	0.20	0.25	0.25
Measured (worst-case)	0.12*	0.19*	N/A
AS DIRECT SMOOTH SPEC	0.20	0.25	0.25
Measured (worst-case)	0.12*	0.12*	0.10
REPEATABILITY - Delta between TV Hot & Cold Limits			
AT SPEC	0.20	0.22	0.20
Measured (rms)	0.02	0.06	0.03
AS STORED SPEC	0.30	0.30	0.30
Measured (rms)	0.22	0.23	0.23
AS DIRECT FINE SPEC	0.50	0.50	0.50
Measured (rms)	0.20	0.21*	N/A
AS DIRECT SMOOTH SPEC	2.00	2.00	2.00
Measured (rms)	0.22	0.21*	0.20
TOTAL -			
AT SPEC	1.00	1.30	1.20
Calculated	0.37	0.44	0.57
AS STORED SPEC	1.16	1.19	2.29
Calculated	0.58	0.64	1.16
AS DIRECT FINE SPEC	1.34	1.36	2.46
Calculated	0.64	0.62	N/A
AS DIRECT SMOOTH SPEC	2.81	2.82	3.92
Calculated	0.63	0.58	1.32

N/A = not applicable   * = Inferred from AS Stored number.

Table 2.3-2

ALONG-SCAN GEOMETRIC ACCURACY WITH ENCODER SIMULATOR

	Stored	Direct Fine	Direct Smooth
Repeatability-Spec, mrad	1.0	1.1	2.2
Measured	0.23	0.21	0.22
Stability - Spec, mrad	0.50	0.50	0.50
Measured	0.16	0.16*	0.16*
Fixed - Spec, mrad	10.0	10.0	10.0
Measured	0.81	0.81*	0.81*
Total - Spec, mrad	11.1	11.2	12.3
Calculated	1.09	1.07	1.08

*Inferred from stored number

2.4 RADIOMETRIC ACCURACY

2.4.1 T Channel Radiometric Accuracy (3.2.1.1.4.1 a,b,c)

The overall one sigma accuracy of the OLS #15 T Channel dc response is 0.78°K compared to a 1.1°K spec and therefore OLS #15 does meet this specification requirement.

Table 2.4.1-1 presents the overall summary of performance, which is discussed more fully in sections 2.4.1.1, 2.4.1.2 and 2.4.1.3.

ATTACHMENTS:

Table 2.4.1-1	Overall Contributors	
Table 2.4.1-2	210° to 310°K Best Straight Line Calibrations	
Table 2.4.1-3	T DC Response Compilation of Test Runs	
Table 2.4.1-4	BSL Equation T Right, Run #10	
Table 2.4.1-5	BSL Equation T Mid, Run #10	
Table 2.4.1-6	BSL Equation T Left, Run #10	
Figure 2.4.1-1	T DC Response Plots, Run #1	Primary
Figure 2.4.1-2	T DC Response Plots, Run #2	Primary
Figure 2.4.1-3	T DC Response Plots, Run #3	Primary
Figure 2.4.1-4	T DC Response Plots, Run #8	Primary
Figure 2.4.1-5	T DC Response Plots, Run #9	Primary
Figure 2.4.1-6	T DC Response Plots, Run #10	Primary
Figure 2.4.1-7	T DC Response Plots, Run #1	Redundant
Figure 2.4.1-8	T DC Response Plots, Run #2	Redundant
Figure 2.4.1-9	T DC Response Plots, Run #3	Redundant
Figure 2.4.1-10	T DC Response Plots, Run #8	Redundant
Figure 2.4.1-11	T DC Response Plots, Run #9	Redundant
Figure 2.4.1-12	T DC Response Plots, Run #10	Redundant

TABLE 2.4.1-1

OLS #15

OVERALL CONTRIBUTORS TO T-CHANNEL RADIOMETRIC ACCURACY

SPECIFICATION PARA. 3.1.4.1	RMS DEVIATION (°K)	SPECIFICATION MAX ONE SIGMA ERROR (°K)
a) Repeatability (<1 day)	0.265	0.35
b) Stability (>1 day)	0.61	0.80
c) Fixed Deviations	0.40	0.60
TOTAL (RSS) ACCURACY	0.78	1.10

Discussion of T DC Response Test and Overview

The measurement of T DC Response is accomplished in the thermal vacuum chamber because the T detector must be cooled to its operating temperature of near 110°K. Two controlled blackbody targets variable in temperature over the dynamic range of 190°K to 310°K provide the absolute infrared radiance reference. The temperature of each target is measured by five thermocouples which have been calibrated against a precision platinum resistance temperature standard. The five thermocouples provide target temperature gradient information to indicate target stability as well as the capability to average the five for the reference target temperature. T Channel DC Response consists of comparing the average target temperature to the channel output voltage at the input to the A/D converters for several target temperatures.

Ten vacuum runs were made on OLS #15. The T DC Response data from vacuum runs (1 through 10) is compiled in Table 2.4.1-2 and -3, which show the equipment temperature environments and characteristics of each run. The column headed "Data Points" indicates how many target temperatures were in that run. The characteristics of the response itself are indicated in three columns each for T LFT, T MID and T RGT. The compared channel response to target temperature results in a difference for each data point. This difference is corrected for M1 Temperature so that all data for a given run reflect the same M1 temperature and the expected shaper circuit difference is subtracted. In this form the difference data for a given run should ideally be a linear function to target temperature. A linear least- squares fit to the corrected data is used to determine the equation of the best straight line (BSL). In Table 2.4.1-2 the slope error, the 210°K ordinate and the RMS data fit values for these different BSL's are listed in the columns headed Slope, Ordinate at 210°K, and RMS Dev,

In addition to the 10 vacuum runs completed on OLS #15, a preliminary run was started, then aborted due to a system test equipment failure in the mechanical adjustment of the left T-channel pot. Data was collected for right T-channel response, after breaking vac on 4/27/88, repositioning of the tool, and entering vacuum for a second time, new data was taken for the right T-channel and no significant changes were found. Normal testing proceeded after this tool adjustment.

In order to distinguish between gain and bias type effects caused by environment, the 310°K value that results when the 210°K BSL value is forced to zero difference is also calculated. Table 2.4.1-3 shows the pre-shaper % gain Difference from Nominal, the Bias Diff. from Nominal (at 190°K) where the pre-shaper Gain is forced to nominal, and the M1 temperature coefficient (K factor); in three columns each for TRGT, TMID, and TLEFT.

Tables 2.4.1-4, -5 and -6 show the STE computer processed T DC Response Data of the final "Orbit Nominal" Run (Run #10) for TRGT, TMID, and TLEFT respectively. The fourth line down in the body of the Best Straight Line Equation, "RMS Deviation", is the RMS error (for 210°K to 310°K) of the data points fitted to the best straight line. "FP" is T Fine Primary; "FB" is T Fine, Backup (Redundant); "SP" is T Smoothed, Primary; "SB" is T Smoothed, Backup (redundant). The SP and SB are not used for T Right Only or for T Left

Only in the Primary or Redundant normal modes; these are utilized only in the Fallback (slightly degraded) modes of operation. SP and SB are applicable to T Mid in normal Primary or Redundant modes.

Runs 2 and 3 together indicate the changes which accompany operation over the foreoptics cold-to-warm temperature range as indicated by M1 temperature.

Runs 6 and 7 together indicate the magnitude of the variation over the extremes of SSS temperature, (+11° to -3°C); when compared to the +3°C and +5°C SSS run pairs with the corresponding M1 temperatures, (Runs 3 and 2, respectively). However, changes between these runs are not only due to SSS temperature differences. The PSU, which contains the shaper networks was varied in temperature along with the SSS, from a low of -0.7°C to a high of +37.8°C.

Figures 2.4.1-1 through 2.4.1-12 inclusive show, for Runs No. 1 through No. 10, (respectively), the test data points for Targets 1 and 2 and the BSL plots for Right, Mid, and Left. (No BSL data plot was obtained for Runs 1 and 4 through 7).

The OLS #15 average M1 coefficient (coupling factor) measured for the final run (#10) was 0.175 °K at 210°K scene per 1°C temperature change of M1. The lower the M1 coefficient value, the better the performance. The T Clamp leakage was +0.126% T LEFT and +0.058% RIGHT.

The BSL differences (from Table 2.4.1-4,5 and 6) between Fine Primary and Fine Backup are 0.35K for T RIGHT, at the 310°K end. In the Smooth Primary and Backup modes, T RIGHT differs by 0.31°K (at 310°K).

The difference between T RIGHT and T LEFT segments calibration (from Tables 2.4.1.3-4 and 5) is 0.56°K worst-case, vs. a spec limit of 1.0°K.

TABLE 2.4.1-2

OLS #15

210° to 310°K BEST STRAIGHT LINE CALCULATIONS

DATE	RUN#	TG	TL	# of DATA POINTS	TEMPERATURE °C SSS	M1	PSU	T RIGHT SLOPE	ORD. @ 210°	RMS DEV	T MID SLOPE	ORD. @ 210°	RMS DEV	T LEFT SLOPE	ORD. @ 210°	RMS DEV	COMMENTS
TDCRM3A 05/06/88	1	4/4	13	6	5	-8	23.1	0.0039	0.29	0.13	0.0018	0.46	0.11	0.0078	0.10	0.19	TV Adjust
05/09/88																	Break Vac and Vibrate
TDCRM3A 06/09/88	2	4/4	12	14	5	-8	22.9	0.0128	-0.44	0.19	0.0086	-0.23	0.18	0.0154	-0.70	0.28	Optic Limit Cold
TDCRM3B 06/09/88	3	4/4	9	8	3	12	23.1	0.0020	0.10	0.12	-0.0037	0.43	0.10	0.0007	0.09	0.16	Optic Limit Hot
T121T231B 06/10/88	4	4/4	9	2	11	12	37.7	0.0045	-0.17	0.00	-0.0026	-0.46	0.00	0.0021	-1.02	0.00	Hot Soak #1
T121T231B 06/12/88	5	4/4	13	2	-3	-8	-0.7	0.0108	0.46	0.00	0.0076	0.67	0.00	0.0146	0.21	0.00	Cold Soak #1
T121T231B 06/13/88	6	4/4	9	2	11	12	37.8	0.0050	-0.85	0.00	-0.0017	-0.51	0.00	0.0037	-1.24	0.00	Hot Soak #2
T121T231B 06/15/88	7	4/4	12	2	-3	-8	-0.4	0.0172	-0.49	0.00	0.0147	-0.34	0.00	0.0201	-0.72	0.00	Cold Soak #2
TDCRM3B 06/18/88	8	4/4	9	6	5	12	32.7	0.0038	-0.26	0.14	-0.0011	-0.04	0.13	0.0049	-0.55	0.23	Hot Limit
TDCRM3B 06/22/88	9	4/4	12	7	3	-8	3.5	0.0159	-0.39	0.24	0.0136	-0.31	0.25	0.0196	-0.78	0.32	Cold Limit
TDCRM3C 07/01/88	10	4/4	12	18	5	-8	22.7	0.0143	-0.63	0.23	0.0124	-0.57	0.25	0.0188	-1.04	0.29	Orbit Nominal

TABLE 2.4.1-3

OLS #15

T DC RESPONSE COMPILATION OF TEST RUNS

DATE	RUN #	TG	TL	# OF DATA POINTS	TEMP °C SSS	M1	PSU	T RGT % GAIN DIFF. FROM NOM.	BIAS DIFF. FROM NOM.	K FACTOR	T MID % GAIN DIFF. FROM NOM.	BIAS DIFF. FROM NOM.	K FACTOR	T LFT % GAIN DIFF. FROM NOM.	BIAS DIFF. FROM NOM.	K FACTOR	COMMENTS
TDCRM3A 05/06/88	1	4/4	13	6	5	-8	23.1	0.87	0.95	0.166	0.71	1.10	0.178	1.26	0.89	0.176	TV Adjust Break Vac
05/09/88																	Vibrate
TDCRM3A 06/09/88	2	4/4	12	14	5	-8	22.9	1.48	0.17	0.169	1.06	0.25	0.170	1.61	-0.14	0.187	Optic Limit Cold
TDCRM3B 06/09/88	3	4/4	9	8	3	12	23.1	0.39	0.36	0.169	-0.14	0.56	0.170	0.19	0.23	0.187	Optic Limit Hot
T121T231B 06/10/88	4	4/4	9	2	11	12	37.7	-0.17	-1.40	0.169	-0.83	-1.23	0.170	-0.68	-1.97	0.187	Hot Soak #1
T121T231B 06/12/88	5	4/4	13	2	-3	-8	-0.7	2.06	1.63	0.169	1.78	1.81	0.170	2.37	1.42	0.187	Cold Soak #1
T)21T231B 06/13/88	6	4/4	9	2	11	12	37.8	-0.08	-1.32	0.169	-0.76	-1.26	0.170	-0.66	-2.28	0.187	Hot Soak #2
T121T231B 06/15/88	7	4/4	12	2	-3	-8	-0.4	2.08	0.21	0.169	1.86	0.34	0.170	2.30	-0.02	0.187	Cold Soak #2
TDCRM3B 06/18/88	8	4/4	9	6	5	12	32.7	0.31	-0.21	0.169	-0.20	-0.18	0.170	0.12	-0.74	0.187	Hot Limit
TDCRM3B 06/22/88	9	4/4	12	7	3	-8	3.5	1.99	0.46	0.169	1.72	0.43	0.170	2.16	-0.01	0.187	Cold Limit
TDCRM3C 07/01/88	10	4/4	12	18	5	-8	22.7	1.52	-0.10	0.169	1.30	-0.13	0.170	1.78	-0.57	0.187	Orbit Nominal

TABLE 2.4.1-4

OLS NUMBER 15

T RGT DATA OF 06/29/88

SSS AT 5C

M1 AT -8C

PSU TEMP = 22.7

M1 Coefficient = .169 K/C

T GAIN = 4

T LEVEL = 12

V2 (T Clamp V) = 2.11263

K9 (TL Step Size) = .925332

BEST STRAIGHT LINE EQUATION

	FP	FB	SP	SB
BSL SLOPE	0.0143	0.0131	0.0146	0.0131
BSL AT 190K(K)	-0.91	-1.13	-0.90	-1.08
BSL AT 210K(K)	-0.63	-0.86	-0.61	-0.82
BSL AT 310K(K)	0.80	0.45	0.85	0.50
RMS DEVIATION(K)	0.23	0.19	0.26	0.19
BSL AT 310K;				
190 AT OV(K)	1.10	0.80	1.15	0.84
% CHANGE FROM				
NOM GAIN	1.52	1.11	1.58	1.16
BIAS DIFF FROM				
NORMAL 190K(K)	-0.10	-0.67	-0.04	-0.57

TABLE 2.4.1-5

OLS NUMBER 15

T MID DATA OF 06/29/88

SSS AT 5C

M1 AT -8C

PSU TEMP = 22.7

M1 Coefficient = .170 K/C

T GAIN = 0

T LEVEL = 12

V2 (T Clamp V) = 2.11697

K9 (TL Step Size) = .925332

BEST STRAIGHT LINE EQUATION

	FP	FB	SP	SB
BSL SLOPE	0.0124	0.0130	0.0124	0.0131
BSL AT 190K(K)	-0.82	-0.97	-0.74	-0.91
BSL AT 210K(K)	-0.57	-0.71	-0.49	-0.64
BSL AT 310K(K)	0.68	0.59	0.75	0.67
RMS DEVIATION(K)	0.25	0.24	0.24	0.26
BSL AT 310K;				
190 AT OV(K)	0.94	0.90	0.99	0.96
% CHANGE FROM				
NOM GAIN	1.30	1.25	1.37	1.33
BIAS DIFF FROM				
NORMAL 190K(K)	-0.13	-0.36	0.02	-0.23

TABLE 2.4.1-6

OLS NUMBER 15

T LFT DATA OF 06/29/88

SSS AT 5C

M1 AT -8C

PSU TEMP = 22.6

M1 Coefficient = .187 K/C

T GAIN = 4

T LEVEL = 12

V2 (T Clamp V) = 2.11914

K9 (TL Step Size) = .925332

BEST STRAIGHT LINE EQUATION

	FP	FB	SP	SB
BSL SLOPE	0.0188	0.0204	0.0189	0.0204
BSL AT 190K(K)	-1.42	-1.45	-1.39	-1.41
BSL AT 210K(K)	-1.04	-1.04	-1.01	-1.00
BSL AT 310K(K)	0.83	1.00	0.88	1.04
RMS DEVIATION(K)	0.29	0.29	0.30	0.29
BSL AT 310K;				
190 AT OV(K)	1.29	1.47	1.33	1.50
% CHANGE FROM				
NOM GAIN	1.78	2.03	1.83	2.07
BIAS DIFF FROM				
NORMAL 190K(K)	-0.57	-0.43	-0.49	-0.34

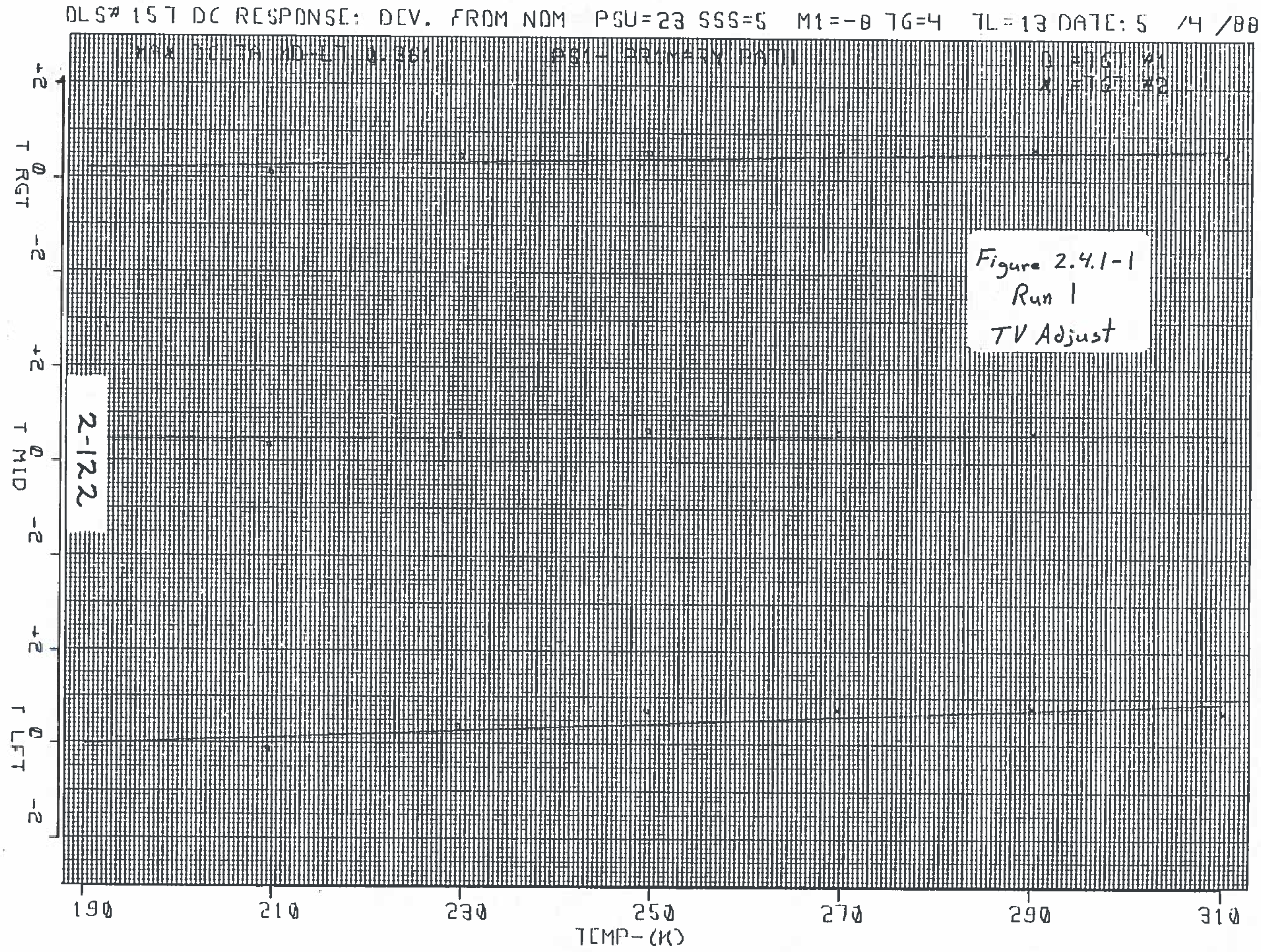


Figure 2.4.1-1
Run 1
TV Adjust

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311

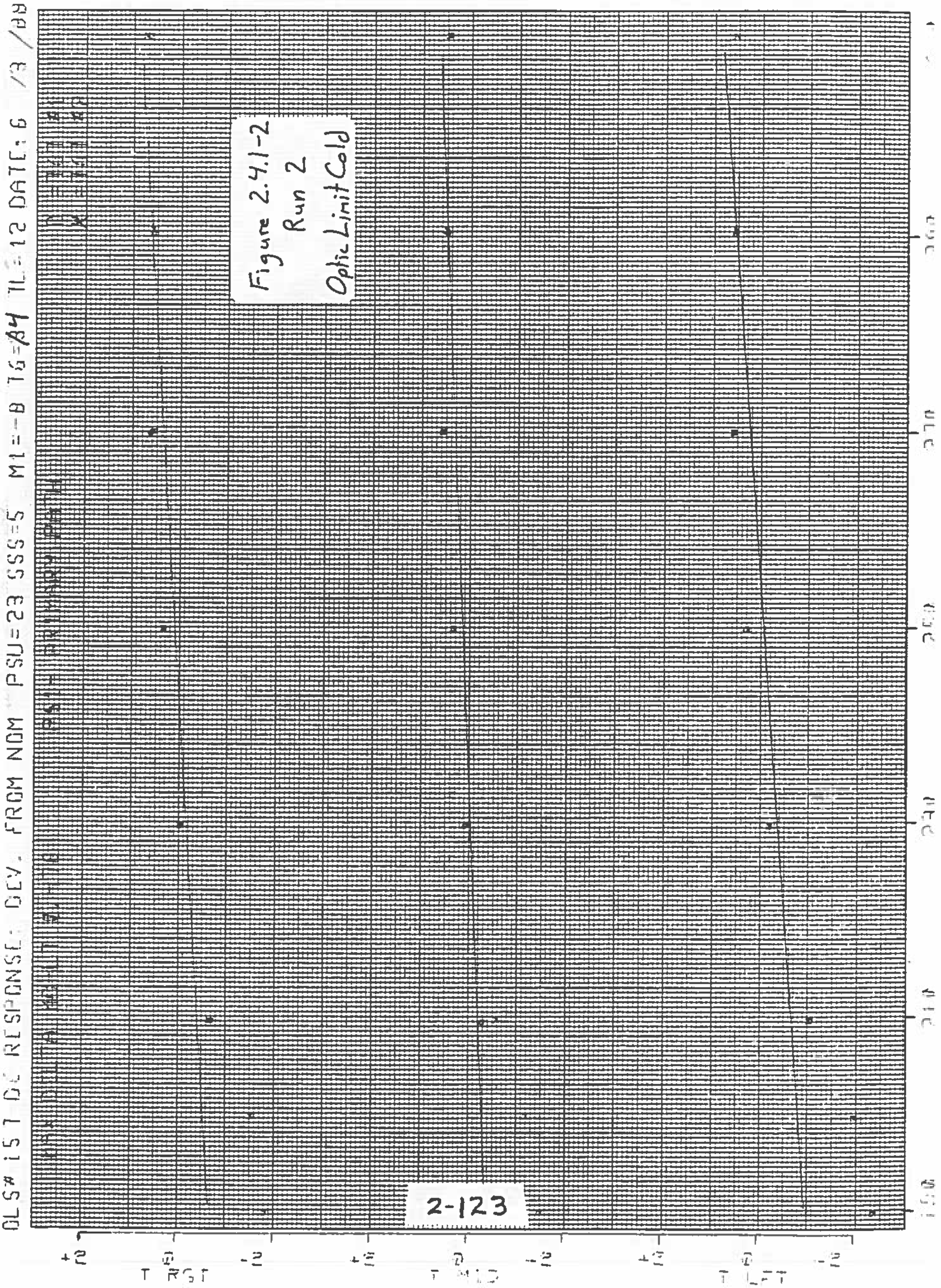
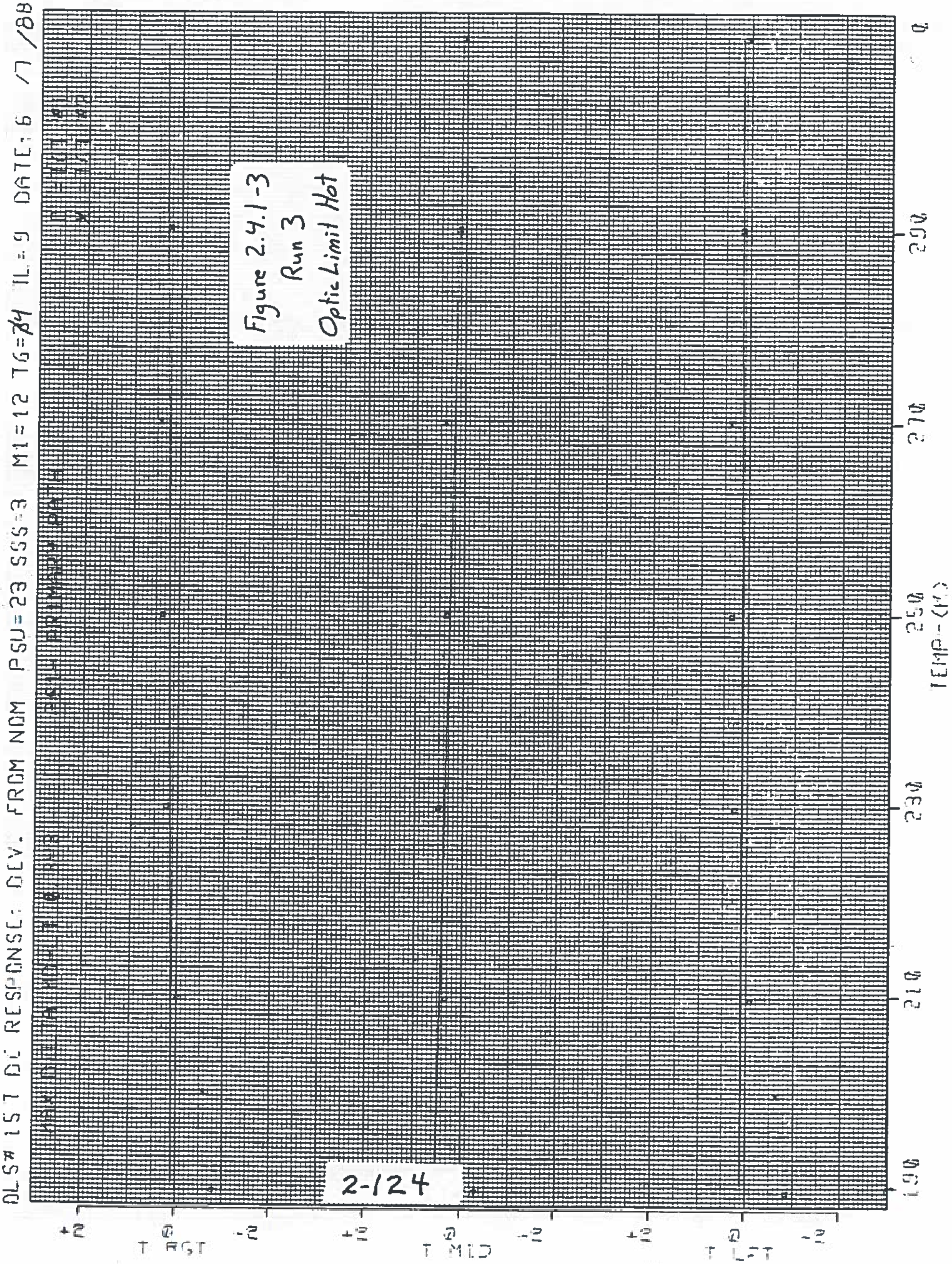


Figure 2.4.1-2
Run 2
Optic Limit Cold


OLS# 1ST DC RESPONSE: DEV. FROM NOM PSU=23 SSS=3 M1=12 TG=24 IL=9 DATE:6 /7 /88
Figure 2.4.1-3
Run 3
Optic Limit Hot
0
290
270
250
230
210
190
TEMP-(K)
+2
0
-2
T RGT
T MID
T LFT

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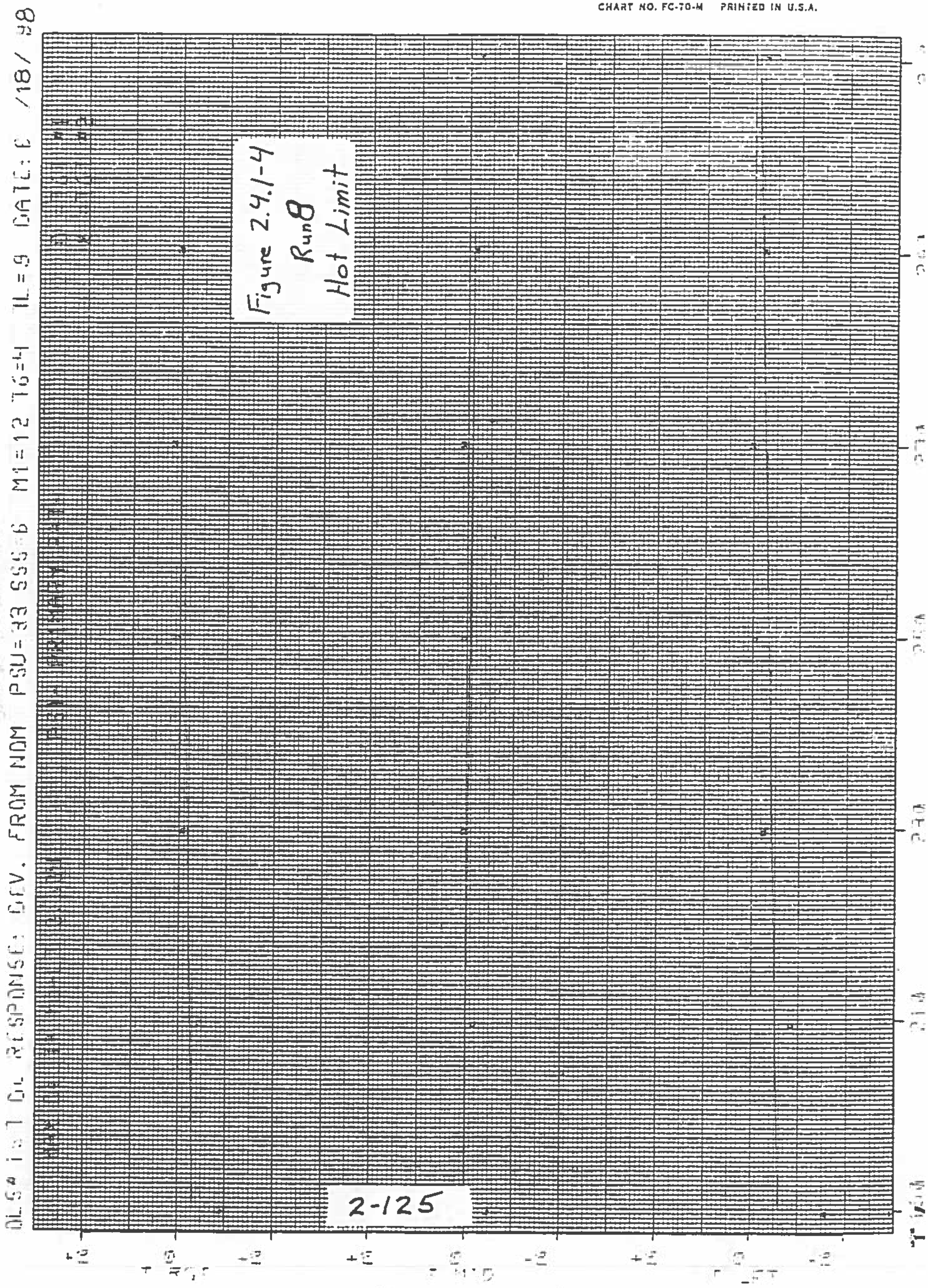

Figure 2.4.1-4 Run 8 Hot Limit

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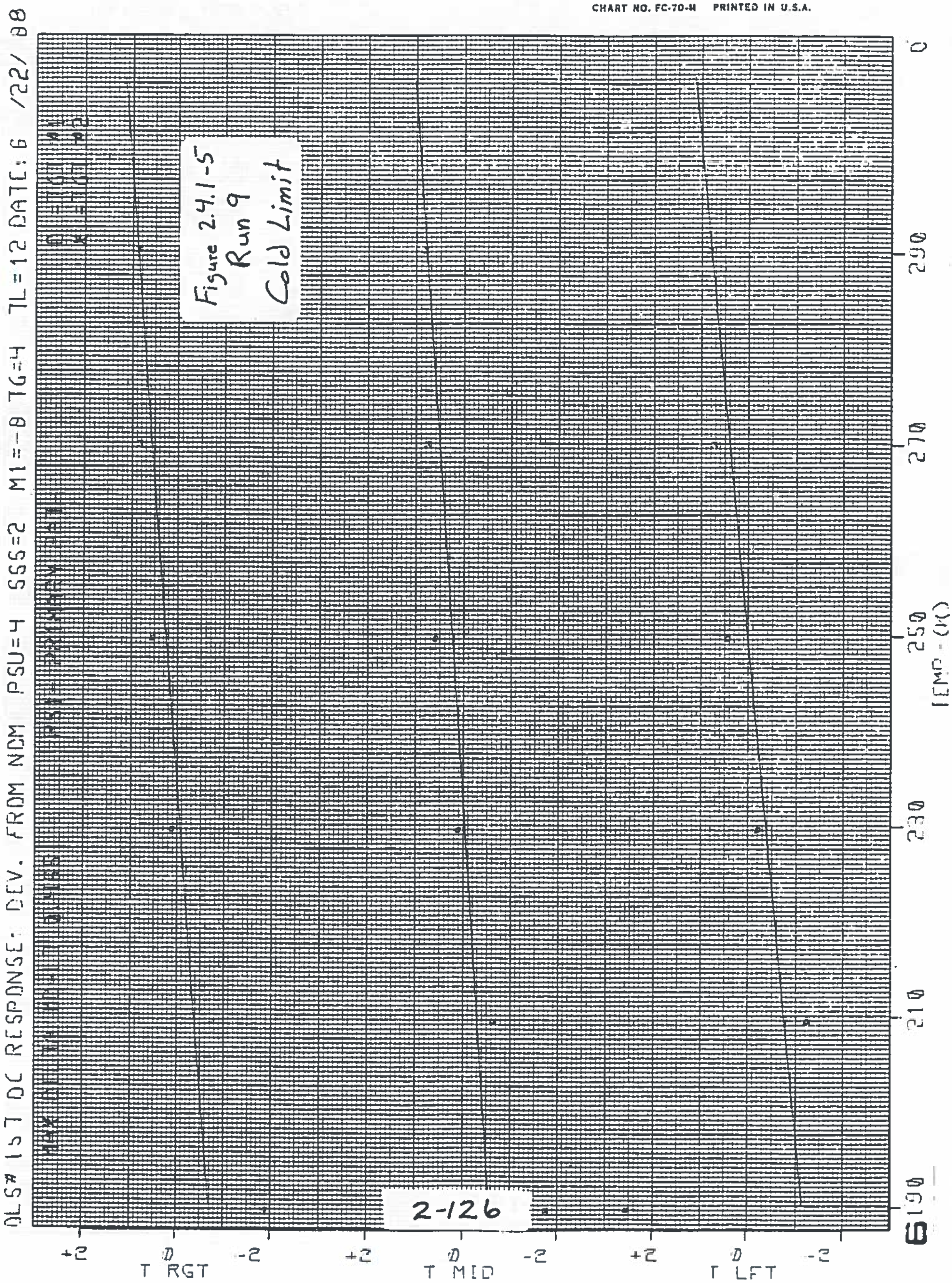

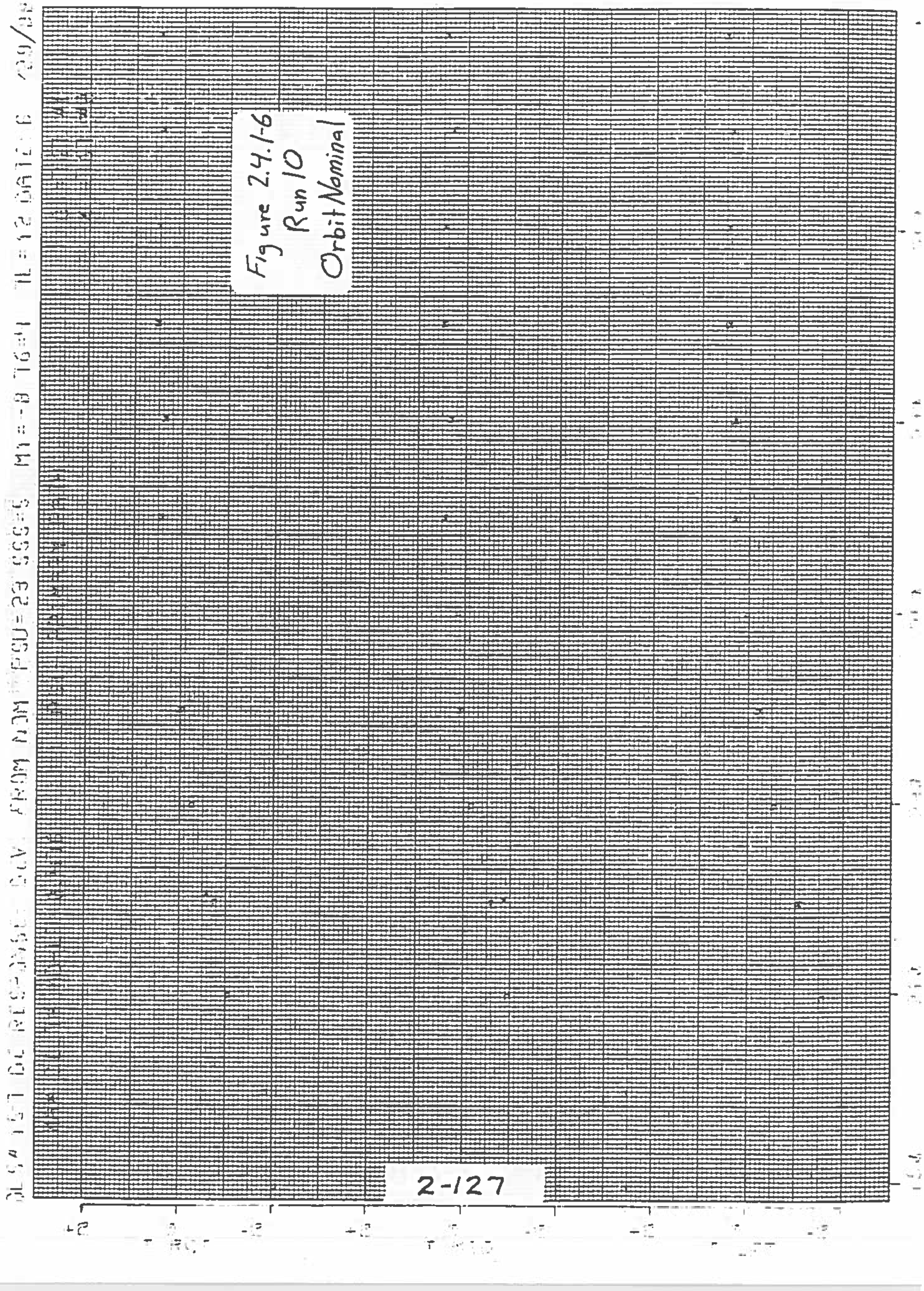
Figure 2.4.1-6
Run 10
Orbit Nominal

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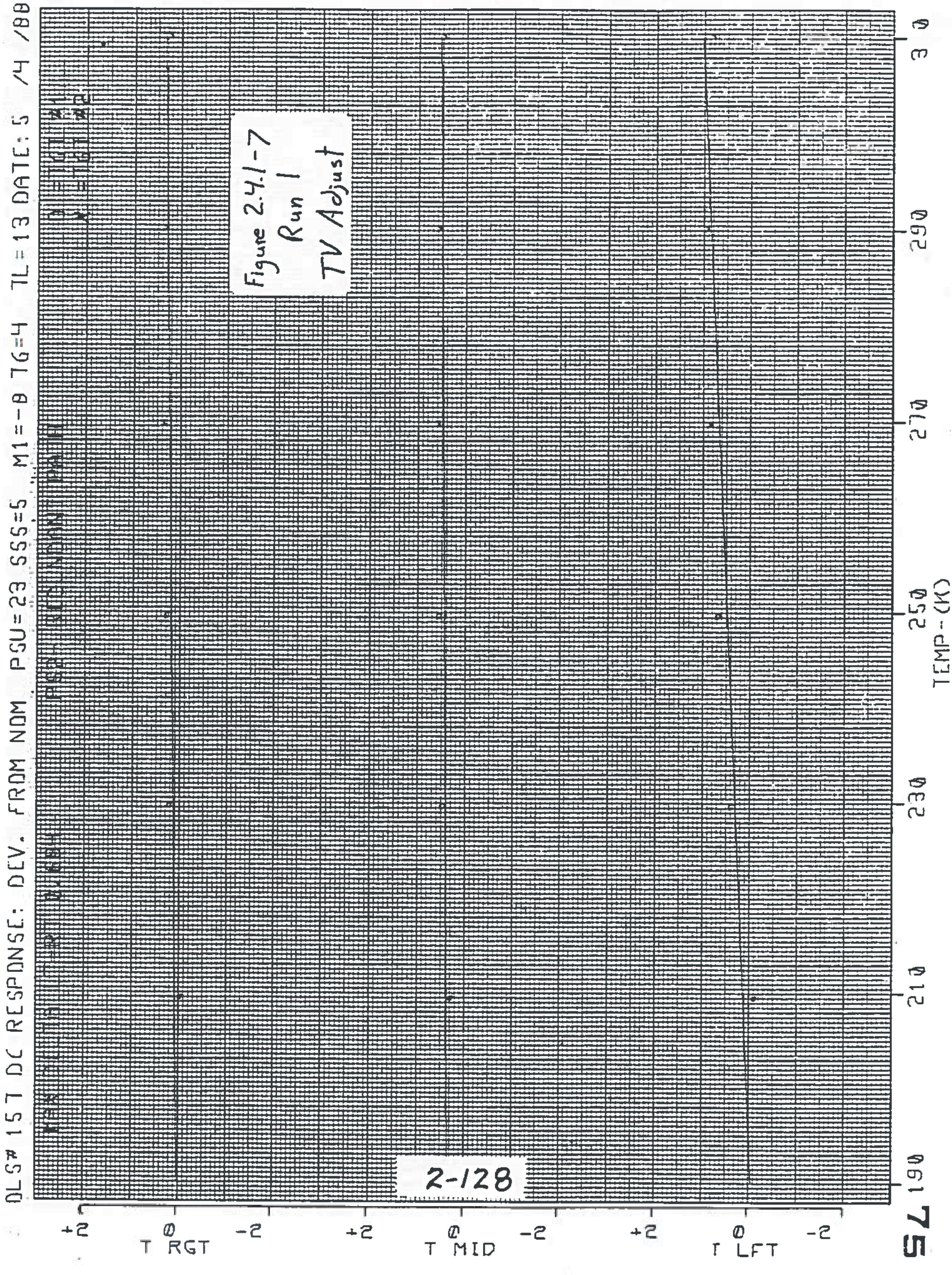

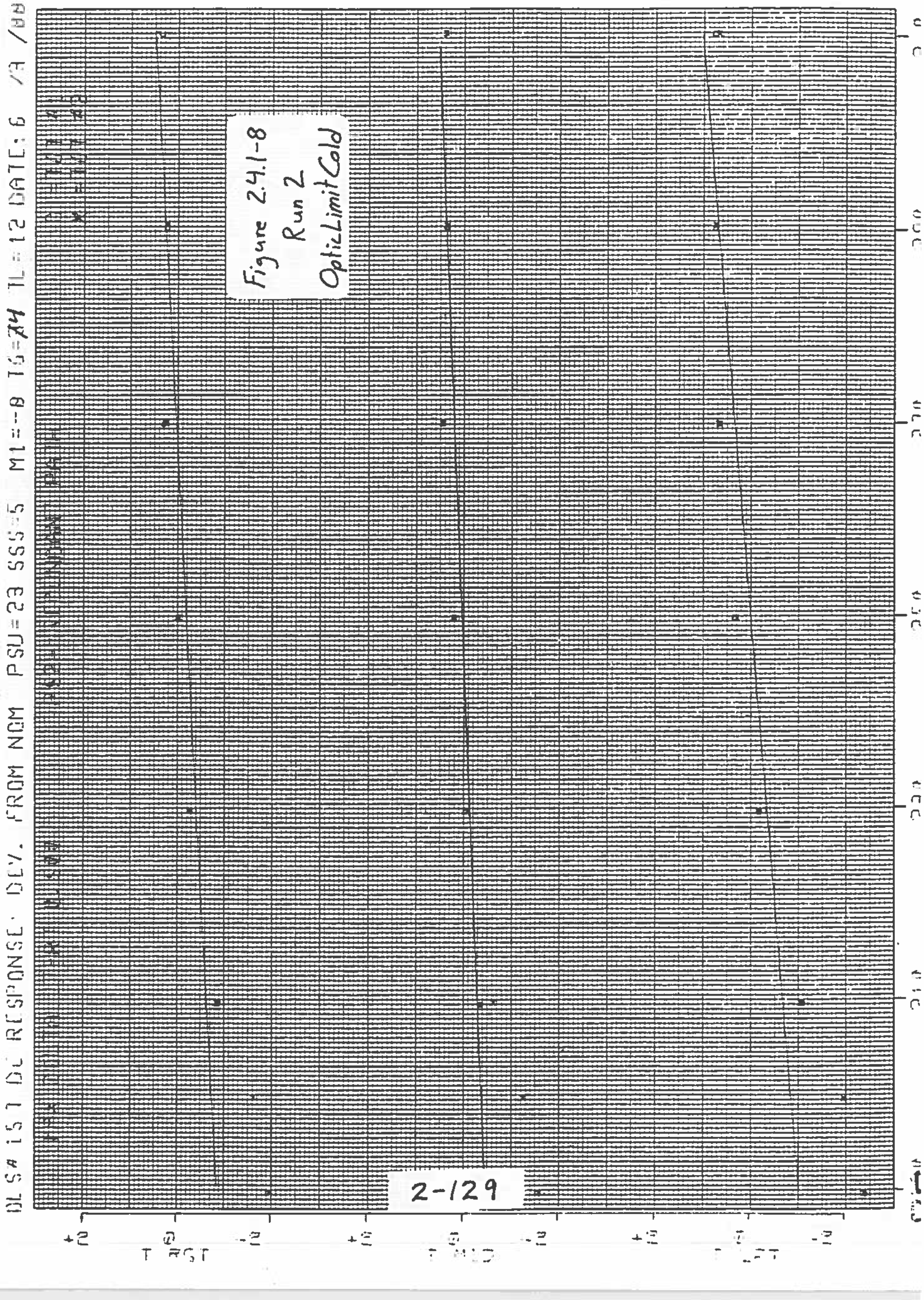
Figure 2.4.1-8
Run 2
OpticLimit Cold
+2
0
-2
T RGT
T MID
T LFT

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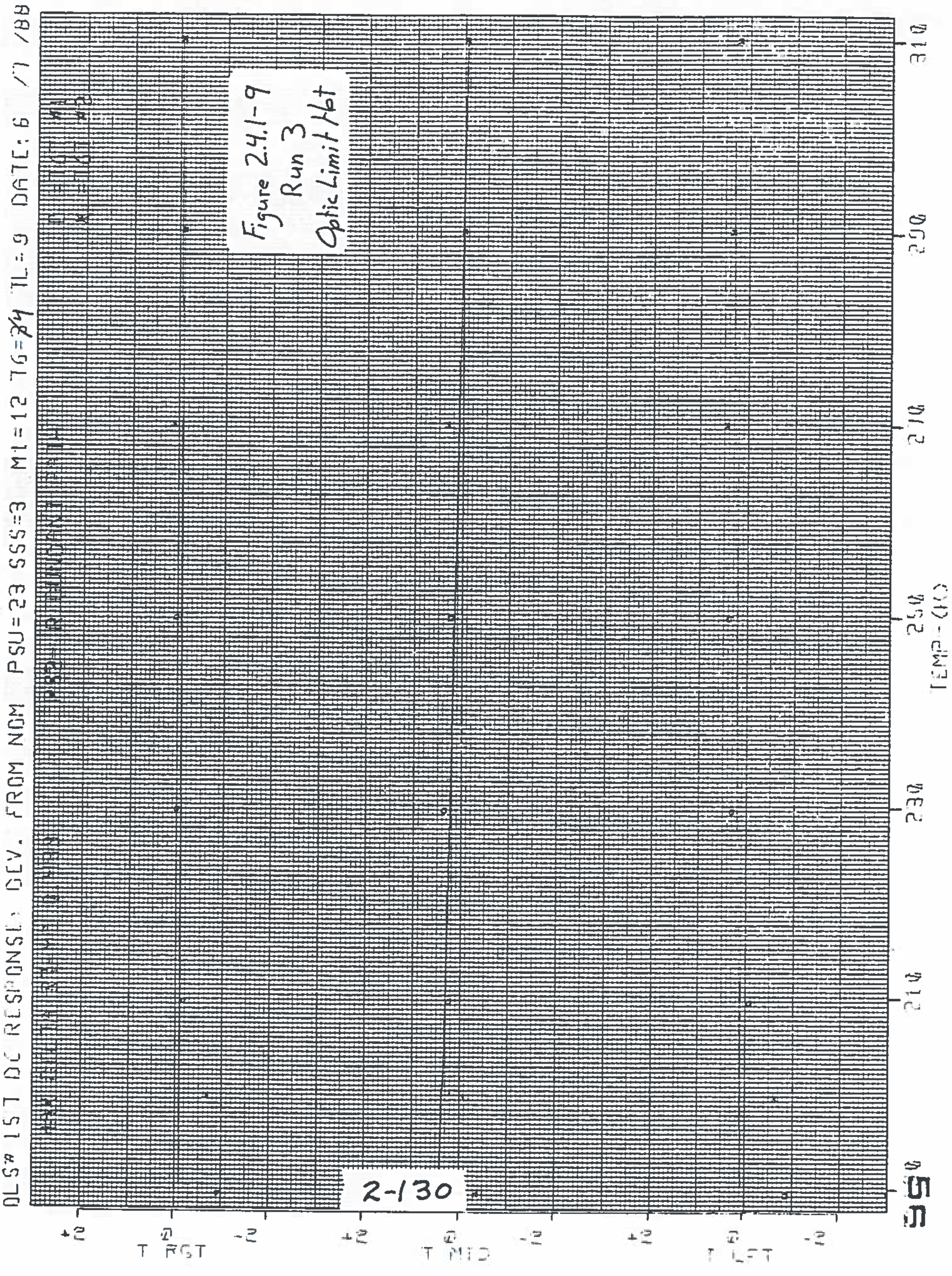

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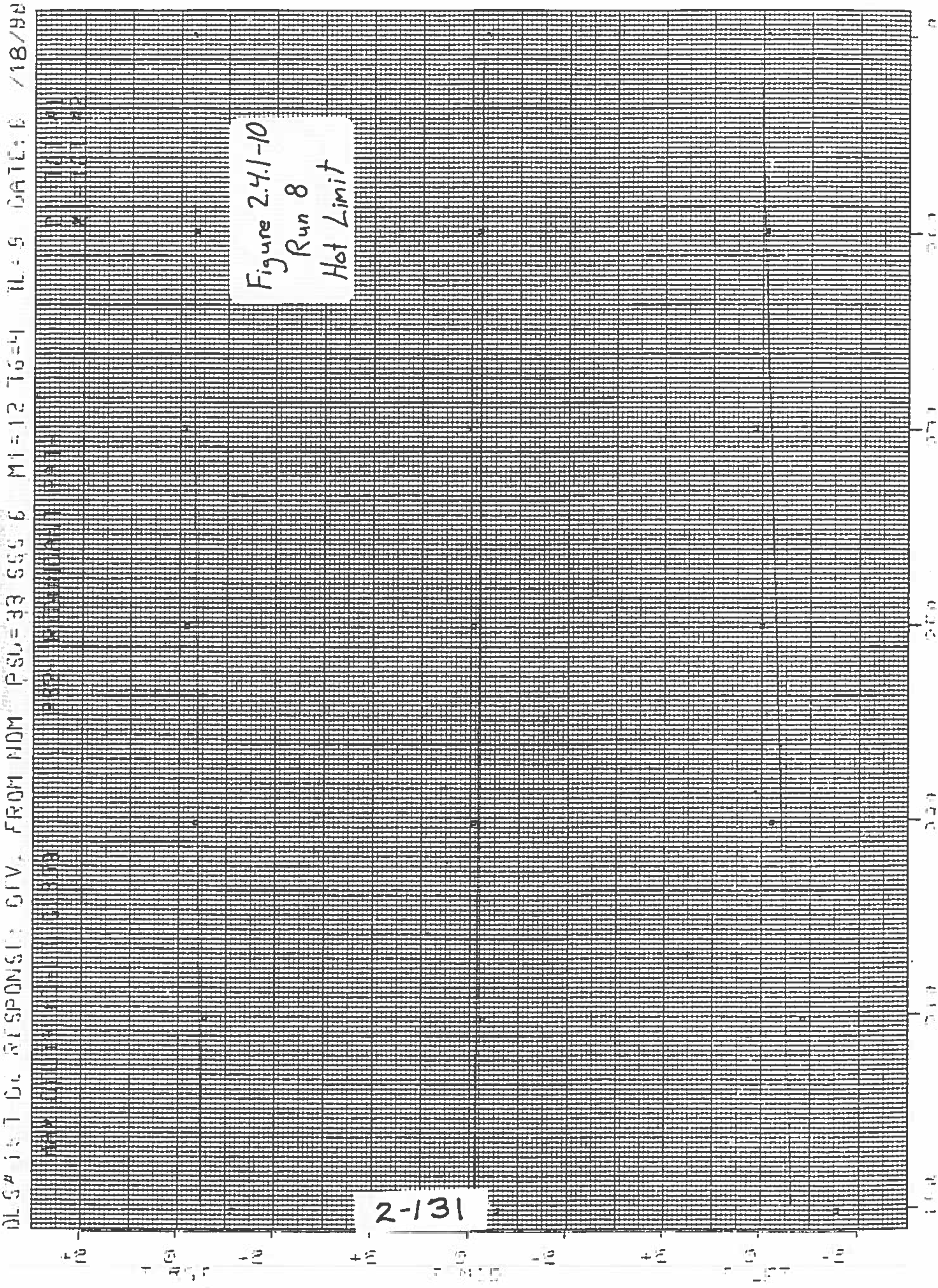

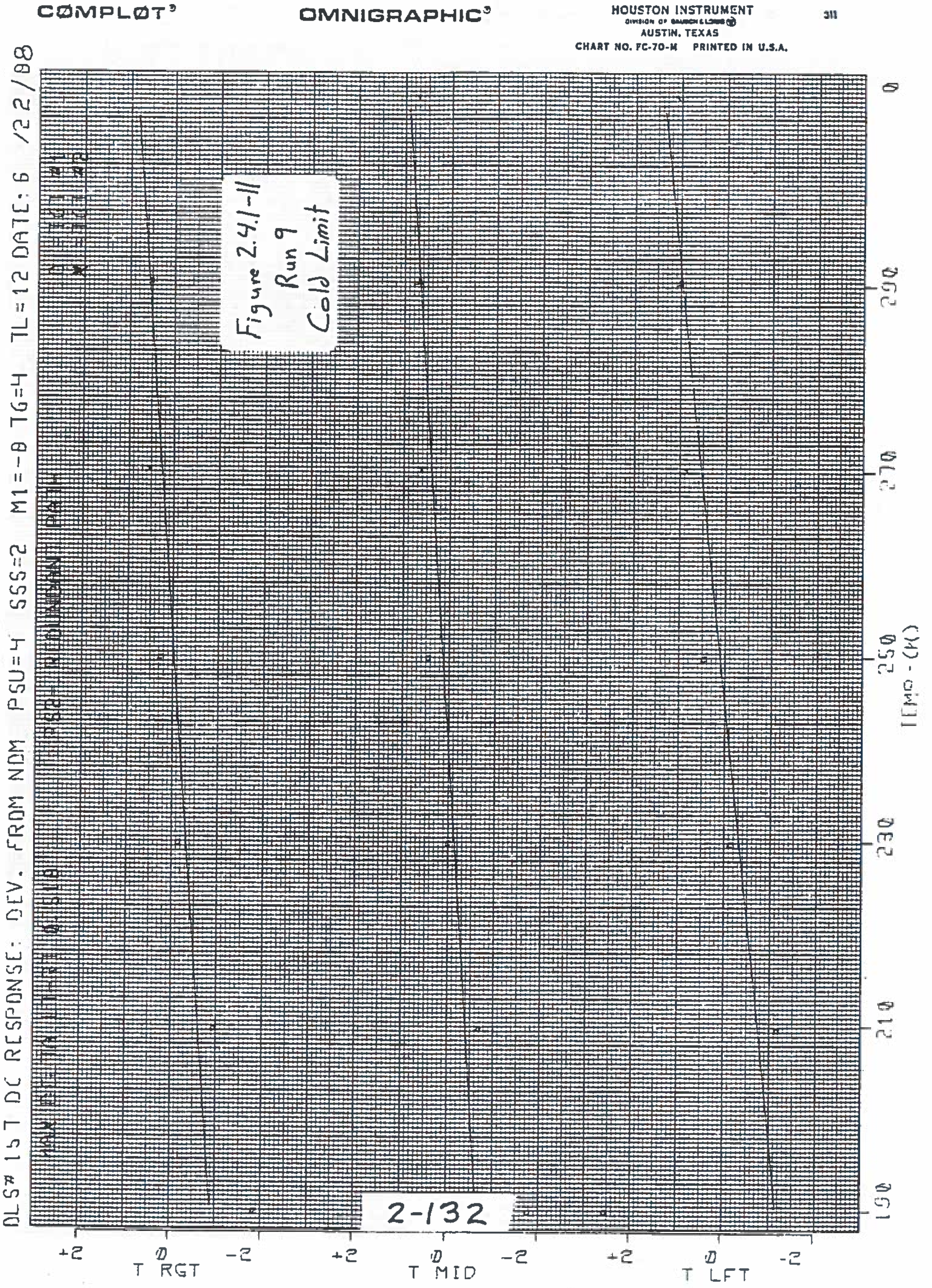
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AUSTIN, TEXAS
CHART NO. FC-70-M PRINTED IN U.S.A.
DLS# 15T DC RESPONSE: DEV. FROM NOM PSU=4 SSS=2 M1=-8 TG=4 TL=12 DATE: 6 /22/88
Figure 2.4.1-11
Run 9
Cold Limit
0
290
270
250
230
210
190
TEMP-(K)
+2 0 -2
T RGT
+2 0 -2
T MID
+2 0 -2
T LFT

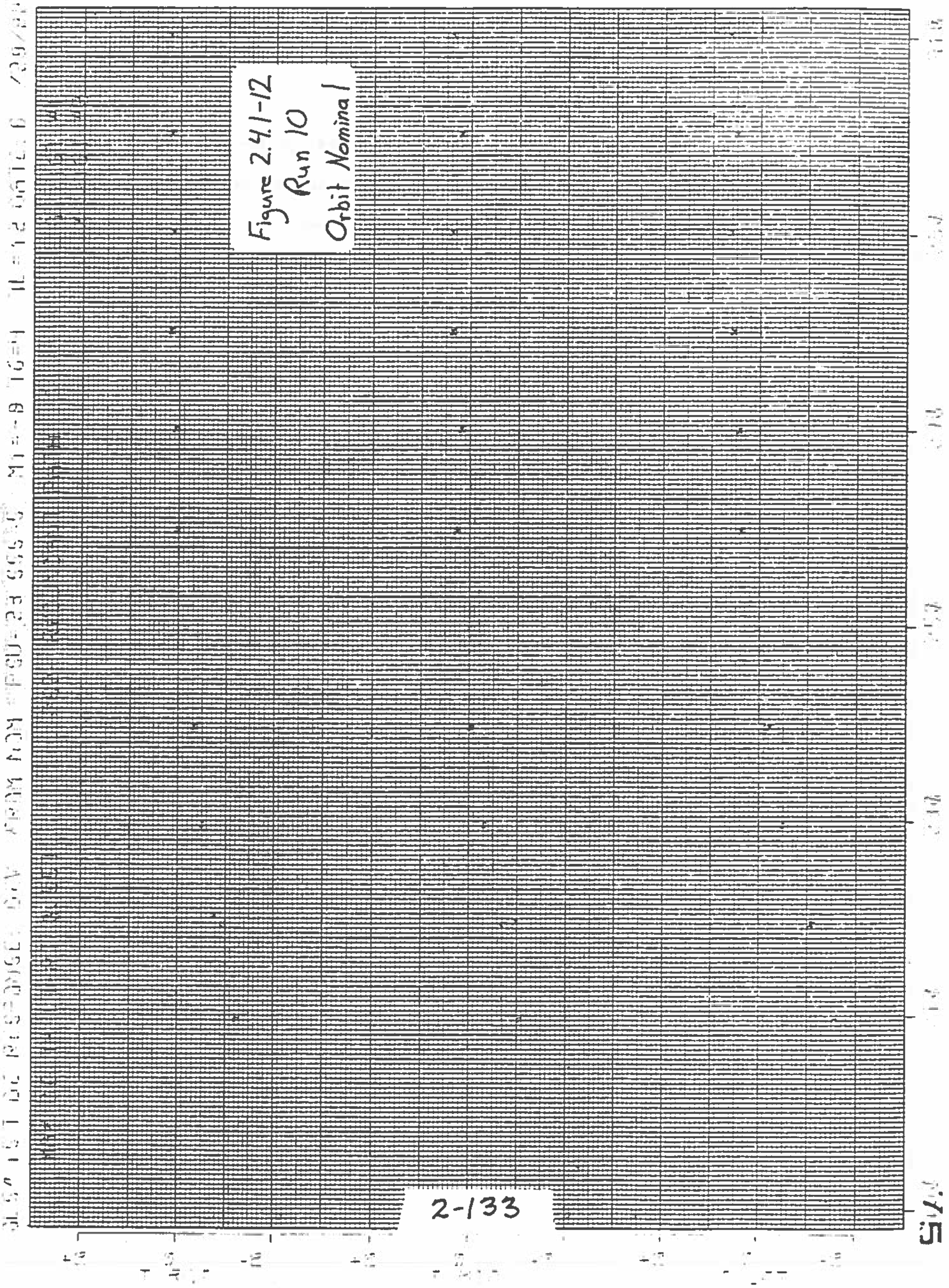


Figure 2.4.1-12
Run 10
Orbit Nominal 1

2.4 RADIOMETRIC ACCURACY

2.4.1 T Channel Radiometric Accuracy (Cont'd)

2.4.1.1 Repeatability (3.2.1.1.4.1a)

The 1 sigma Repeatability of T Channel DC Response is 0.265°K compared to a 0.35°K one sigma specification maximum and therefore OLS #15 does meet this specification requirement.

ATTACHMENTS

Table 2.4.1.1-1 Repeatability Contributors

Table 2.4.1.1-2 Gain and Bias Variations with Temperature Change

Table-2.4.1.1-3 Target Crosstalk, T Clmp Leakage Data

TABLE 2.4.1.1-1

OLS #15

REPEATABILITY CONTRIBUTORS SUMMARY

ERROR SOURCE	ONE SIGMA ERROR (K°)
1. Diurnal M1 Temperature Change (4°C)	
A. Quantization of T Level Command	0.17
B. Inability to Compensate Actual Effect Exactly	0.057*
2. Temperature Change PSU ± 4.5°C, SSS ± 1°C	
A. Effect due to Gain Change	0.059*
B. Effect due to Bias Change	0.130*
3. T Clamp Shaper Compensation	0.08
4. T Clamp Leakage	0.107*
TOTAL RSS REPEATABILITY ERROR (°K)	0.265
SPECIFICATION LIMIT, °K, ONE SIGMA	0.35 MAXIMUM

*FROM TEST DATA (REDUCED)

Discussion of Repeatability Calculations

1. Dinurnal M1 Temperature Change

A. The effects of M1 temperature (more properly the foreoptics temperature) are a Repeatability error source. The foreoptics thermal time constant is short enough to permit significant diurnal temperature variations. The ability to compensate for foreoptics temperature using the T Level command greatly reduces this error but does not eliminate it. Although calculations enabling ground compensation smaller than the quantization of the T Level command are possible, it is herein assumed that they will not generally be made. Therefore an error is ascribed due to the T Level quantization as follows:

0.294°K	RMS T Level Cmd. Quantization Error at 210°K (1.02° x $1/\sqrt{12}$)
x 0.564	RMS Temperature Linearity Effects over 210-310°K dynamic range
= 0.17°K	RMS error

B. The fact that foreoptics temperature effect cannot be accurately predicted by the single monitor of M1 temperature means that in times of sharp transition the ability to compensate is impaired. It has been assumed that this error may be represented by a 1°C lag in M1 temperature during the 1/3 of the orbit that sharp transistions occur. Therefore the inability to compensate the actual effect is ascribed the following error:

1°C	Lag in M1 Temperature
x $1/\sqrt{3}$	RMS Over total orbit
x 0.175	T Left, T Mid, T RGT average sensitivity coefficient of video at 210K to M1 temperature change for OLS #15 (K factor)
x 0.564	Temperature Linearity Effects over dynamic range.
= 0.057°K	RMS error

Discussion of Repeatability Calculations

Total T channel gain change with temperature may be broken down into two components as follows:

$$\text{Total Gain } \Delta = [(\text{PSU } \Delta T) \times P_G] + [\text{SSS } \Delta T) \times S_G]$$

where: P_G = PSU coefficient of gain, % per °C.
S_G = SSS coefficient of gain, % per °C.

Similarly for bias changes with temperature:

$$\text{Total Bias } \Delta = [(\text{PSU } \Delta T) \times P_B] + [(\text{SSS } \Delta T) \times S_B]$$

where: P_B = PSU coefficient of bias, °K per °C.
S_B = SSS coefficient of bias, °K per °C.

Data from two pairs of runs designated A and B, were used to solve these equations simultaneously:

$$\text{Gain } \Delta, \text{ Run A} = G_A = (T_{PA})(P_G) + (T_{SA})(S_G)$$
$$\text{Gain } \Delta, \text{ Run B} = G_B = (T_{PB})(P_G) + (T_{SB})(S_G)$$
$$\text{Bias } \Delta, \text{ Run A} = B_A = (T_{PA})(P_B) + (T_{SA})(G_B)$$
$$\text{Bias } \Delta, \text{ Run B} = B_B = (T_{PB})(P_B) + (T_{SB})(S_B)$$

where: G = Total Gain change over temperature
B = Total Bias change over temperature
T_P = PSU Temperature change
T_S = SSS Temperature change

Solved simultaneously for the temperature sensitivity factors, these equations can be reduced to the following:

$$S_G = \frac{(T_{PA})(G_B) - (T_{PB})(G_A)}{(T_{PA})(T_{SB}) - (T_{PB})(T_{SA})}$$

$$P_G = \frac{G_A - (T_{SA})(S_G)}{T_{PA}}$$

$$S_B = \frac{(T_{PA})(B_B) - (T_{PB})(B_A)}{(T_{PA})(T_{SB}) - (T_{PB})(T_{SA})}$$

$$P_B = \frac{B_A - (T_{SA})(S_B)}{T_{PA}}$$

2. SSS and PSU Temperature Change: Effect On Gain Change

The effects of SSS and PSU temperature change on gains were determined from parametric analysis of the four runs in Table 2.4.1.1-2. Solving simultaneous equations yielded sensitivity coefficients of gain change for both SSS and PSU temperature change. Temperature data from 5D-2 systems currently on-orbit indicates that the worst case SSS temperature variations are 1°C while worst case PSU temperature variations are 4.5°C. This is a change from the calculations used in previous systems. Previous calculations assumed a maximum temperature change of 1°C for both SSS and PSU. Using the worst-case factors yields:

S_G = -.033% Gain change per degree SSS change
x 1°C temperature change
x .31°K RMS over 210K to 310K range
x $1/\sqrt{3}$ for uniform temperature distribution
= -.006 deg/deg

P_G = -.046% Gain change per degree PSU change
x 4.5° temperature change
x .31°K RMS over 210K to 310K range
x $1/\sqrt{3}$ for uniform temperature distribution
= -.037 deg

RSS'ing these two contributors yields 0.059 deg total.

3. SSS and PSU Temperature Change, Effect On Bias Change

From Table 2.4.1.1-2:

S_B = -0.10 deg Bias change per degree SSS change
x 1° temperature change
x 0.564 RMS Temperature Linearization Effects, 210K to 310K
x $1/\sqrt{3}$ for uniform temperature distribution
= -.033 deg/deg

P_B = -.073 deg Bias change per degree PSU change
x 4.5° temperature change
x 0.564 RMS Temperature Linearization Effects, 210K to 310K
x $1/\sqrt{3}$ for uniform temperature distribution
= -.107 deg

RSS'ing these two contributors yields 0.130 deg/deg total.

4. T Clamp Shaper Compensation

The SSS temperature changes throughout each orbit are expected to a cause a one sigma error of 0.146°K at 210K due to the compensation for T clamp temperature variation from 228K to 253K. This times the 0.564 RMS Temperature Linearitation Effect over the dynamic range equals 0.08°K RMS error.

5. T Clamp Leakage

An ASV effect may be caused by some of the scene radiance being viewed at the time of T clamp during the overscan period getting into the reference T Clamp value. This can happen if the T detector sensitivity extends slightly beyond the boundaries of M4' during the clamp time. The test performed for leakage is to view one target at 210°K while the other target (which is at the T Clamp angle) is varied over the 210° to 310°K dynamic range. This data is presented in Table 2.4.1.1-3. The effect on the active scan first target is attributed to the T clamp optical leakage.

Using the OLS #15 T data from Table 2.4.1.1-3, the T clamp leakage contribution can be calculated as follows:

$$\text{T clamp leakage ratio (LR)} = 100\% \times \Delta T \times \frac{\frac{\partial P}{\Delta T}_{214}}{\Delta P}$$

$$= \Delta T \times .50552\%$$

This calculation is now performed to more decimal places in the MODE 4 data reduction of T121T221S. The ratio calculated is:

.126% T LEFT

.058% T RIGHT

The peak error from T clamp leakage (due to the 310° background) can be calculated as follows:

$$\text{peak error} = LR \times \Delta N \times \left(\frac{\partial P^{-1}}{\Delta T_{210}}\right)^{-1}$$

$$= \Delta T \times \frac{\Delta N}{\Delta P} \times \frac{\frac{\partial P}{\Delta T}_{214}}{\frac{\partial P}{\Delta T_{210}}}$$

$$= \Delta T \times 0.8156 \times 1.0788$$
$$= \Delta T \times 0.880$$

where:

ΔP = Difference in radiance between 210° and 310°K

$= 16.742\text{ E-4 w cm}^{-2}\text{ sr}^{-1}$ @ 310°K
$- 2.3468\text{E-4 w cm}^{-2}\text{ sr}^{-1}$ @ 210°K

$= 14.395\text{E-4 w cm}^{-2}\text{ sr}^{-1}$

and: ΔN = Difference in radiance between 240° and 310°K

$= 16.742\text{ E-4 w cm}^{-2}\text{ sr}^{-1}$ @ 310°K
$- 5.001\text{ E-4 w cm}^{-2}\text{ sr}^{-1}$ @ 240°K

$11.741\text{ E-4 w cm}^{-2}\text{ sr}^{-1}$

$\frac{\partial P}{\Delta T_{210}}$ = slope of radiance curve at 210°K = 6.7452 E-6

$\frac{\partial P}{\Delta T_{214}}$ = slope of radiance curve at 214°K = 7.277 E-6

ΔT = measured change in response to 210° target as the background is varied from 210° to 310°K.

RMS ERROR = PEAK ERROR
x 0.7605 for RMS distribution of leakage radiance over dynamic range.
x 0.564 RMS Temperature Linearization Effect

FROM MODE 4 Data reduction:

Calculated RMS leakage error = .107°K T LEFT
= .049°K T RIGHT

The worst-case contribution to repeatability error by T-clamp leakage is therefore 0.107°K RMS.

TABLE 2.4.1.1-2

OLS #15

GAIN AND BIAS VARIATIONS WITH TEMPERATURE CHANGE
(M1 TEMP CORRECTED TO +12°C or -8°C)

		SSS TEMP	PSU TEMP	T RGT % GAIN DELTA (%)	T RGT BIAS CHG. @ 190°K (°K)	T MID % GAIN DELTA (%)	T MID BIAS CHG. @ 190°K (°K)	T LFT % GAIN DELTA (%)	T LFT BIAS CHG. @ 190°K (°K)
M1 = -8°C (RUN A)		11.8	32.0	1.1	-1.67	0.77	-1.67	1.1	-2.48
		5.07	21.3	1.38	-0.76-	1.16	-0.8	1.52	-1.49
		6.73 (T_{SA})	10.7 (T_{PA})	-0.28 (G_A)	-0.91 (B_A)	-0.39 (G_A)	-0.87 (B_A)	-0.42 (G_A)	-0.99 (B_A)
M1 = +12°C (RUN B)		12.06	31.5	0.33	-1.22	-0.31	-1.11	-0.15	-2.0
		4.0	21.0	0.56	-0.3	0.05	-0.23	0.31	-0.89
		8.06 T_{SB}	10.5 T_{PB}	-0.23 G_B	-0.92 B_B	-0.36 G_B	-0.88 B_B	-0.46 G_B	-1.11 B_B
Calculated Sensitivity Factors		SSS:	S_G (%/°C)	0.0308		0.0156		*-0.0329	
			S_B (%/°C)		-0.0186		-0.0180		*-0.0951
		PSU:	P_G (%/°C)	-0.0455		*-0.0463		-0.0186	
			P_B (%/°C)		*-0.0734		-0.0700		-0.0327

* WORST CASE VALUES

TABLE 2.4.1.1-3

OLS #15

TARGET CROSSTALK, T CLAMP LEAKAGE DATA*

SSS = +5°

M1 = -8°

	T RIGHT	T MID	T CPL	T CPR	T LEFT	
T1 210° [T2 @ 310°] (TDCRM3A)	+0.12	+0.54	-0.05**	+0.07**	-0.23	06-06-88
Difference, ΔT	+0.06	-0.14	+0.25	+0.11	+0.15	
T1 210° [T2 @ 210°] (T121T221S)	+0.18	+0.40	+0.20	+0.18	-0.08	06-06-88
T2 210° [T1 @ 310°] (T131T221A)	+0.10	+0.26			-0.21	06-05-88
Difference, ΔT	+0.10	+0.07			+0.10	
T2 210° [T1 @ 210°] (T121T221S)	+0.20	+0.33			-0.11	06-06-88
From T121T221S Mode 4 Data Reduction:						
T clamp leakage ratio is			.126%	.058%		
Peak leakage error at 210°K is			.219°K	.101°K		
RMS leakage error at 210°K is			.107°K	.049°K		

*Data is FP Deviation in °K
**Clamp Leakage Data from 6/03/88 run of T121T231G.ST

2.4 Radiometric Accuracy

2.4.1 T Channel Radiometric Accuracy (Cont'd)

2.4.1.2 Stability (3.2.1.1.4.1b)

The T Channel Radiometric Accuracy (Stability) analysis in the OLS 5D-3 System Summary Report Paragraph 3.5.1.2, predicts 0.61°K 1 sigma error in stability compared to the 0.8°K maximum specification requirement. This calculation is applicable to all 5D-3 systems with 190-310°K total range.

ATTACHMENTS

Table 2.4.1.2-1 Stability Contributors Summary

Table 2.4.1.2-2 Change in BSL 201°, 310°K Points Between Runs

Table 2.4.1.2-3 Change in 210°, 310° Output Deviation From Nominal (°K) between Power Supply 1 and Power Supply 2

TABLE 2.4.1.2-1

STABILITY CONTRIBUTORS SUMMARY

			ONE SIGMA ERROR (°K)
1. Shaped Bias			
a) Open Loop Mirror Emissivity		0.1	
b) T Clamp Shaper Compensation	- Temperature	0.23	
	- Age	0.17	
RSS Total		0.30°K	
X RMS Temperature Linearization Effect		0.564	
= RMS Shaped Bias Errors			0.17°K
2. Bias			
a) Preshaper Gain	- Inner Stage Temperature	0.28	
	- Bias Current	0.24	
	- Amplifiers	0.22	
b) Post Shaper DC Drift		0.12	
RSS Total = RMS Bias Error			0.45°K
3. Gain			
Postshaper Gain Changes	- Amplifier		
over the 210-310K range, °K RMS Error			0.38
TOTAL RSS Stability Error (Total Dynamic Range)			0.61
Stability Error Specification (°K, 1 Sigma)			0.80 Maximum

Discussion of Stability Errors

The experimentally derived RMS change of the BSL(s) between runs was calculated to be 0.05°K, 0.04°k and 0.16°K for TRGT, TMID and TLEFT respectively. The two runs used were Run #4 and run #6. The results verify the analytical estimate of the stability over time intervals greater than one day. This data is tabulated in Table 2.4.1.2-2.

As an additional check of stability, the Fine-Primary outputs of the three segments as a deviation from nominal (°K) at 210° and 310° were compared using power supply 1 data of TDCRM3C.ST and power supply 2 data of 6X2X3A.ST. (Both from Run #10). This data is tabulated in Table 2.4.1.2-3. The deltas were calculated and RMS'd over the temperature range. The results are comparable to the "Change Between Runs" data.

TABLE 2.4.1.2-2

OLS #15

CHANGE IN BSL 210, 310K POINTS BETWEEN RUNS

SSS = +11°C, M1 = +12°C

	TG R/L	TL	T RGT 210	T RGT 310	T MID 210	T MID 310	T LFT 210	T LFT 310
T121T231B 6-10-88	4/4	9	-0.87	-0.42	-0.46	-0.72	-1.02	-0.81
T121T231B 6-13-88	4/4	9	-0.86	-0.35	-0.51	-0.69	-1.24	-0.87
Change Between Runs			0.01	0.07	0.06	0.03	0.22	0.06
RMS Change			0.05°K		0.04°K		0.16°K	

TABLE 2.4.1.2-3

OLS #15

T CHANNEL DC RESPONSE

DIFFERENCE BETWEEN POWER SUPPLIES 1 and 2

From Orbit Nominal (Run #10), SSS = +5°C, M1 = -8°C

	RIGHT		MID		LEFT	
	TGT-1 210°K	TGT-2 310°K	TGT-1 210°	TGT-2 310°	TGT-1 210°	TGT-2 310°
Power Supply 1 TDCRM3C.ST FP DEV [K] 07/01/88	-1.08	+0.50	-0.96	+0.43	-1.62	+0.47
Power Supply 2 6X2X3A.ST T121T231P 06/28/88	-1.07	+0.54	-0.95	+0.46	-1.57	+0.53
Change °K	0.01	0.04	0.01	0.03	0.05	0.06
RMS °K	0.03		0.02		0.06	

2.4 RADIOMETRIC ACCURACY

2.4.1 T Channel Radiometric Accuracy (Cont'd)

2.4.1.3 Fixed Deviations (3.2.1.1.4.1c)

The Fixed deviations for OLS #15 are 0.40°K, 1 sigma, compared to the 0.6°K specification maximum. The calibrateable portion of the fixed deviations is 0.33°K RMS compared to the 0.4°K RMS specification maximum. The Fixed deviation calibration for separate detector segments is 0.56°K (worst case) compared to the 1°K spec. maximum. The maximum along scan variation was 0.114°K RMS for TF (Right) and 0.118°K RMS for TS compared to the 0.2°K RMS specification maximum.

ATTACHMENTS

Table 2.4.1.3-1	Fixed Deviations Contributors
Table 2.4.1.3-2	T Shaper Error Tabulation
Table 2.4.1.3-3	Target Deviation from Mean of Both Targets
Table 2.4.1.3-4	BSL Calibration Equations
Table 2.4.1.3-5	Fixed Deviation Calibration Differences for Separate Segments
Table 2.4.1.3-6	Along Scan Variation (265° to 310°K) within a Segment
Table 2.4.1.3-7	Cone (Inner Stage) Patch Temp EST
Table 2.4.1.3-8	Cone Cooler Outer Stage Temp EST
Figure 2.4.1.3-1	502 Nominal Shaper Curve
Figure 2.4.1.3-2	Along Scan Variation, T Right, M1 = 12°C
Figure 2.4.1.3-3	Along Scan Variation, T Mid, M1 = 12°C
Figure 2.4.1.3-4	Along Scan Variation, T Left, M1 = 12°C
Figure 2.4.1.3-5	Along Scan Variation, T Right, M1 = -8°C
Figure 2.4.1.3-6	Along Scan Variation, T MID, M1 = -8°C
Figure 2.4.1.3-7	Along Scan Variation, T Left, M1 = -8°C
Figure 2.4.1.3-8	Along Scan Variation, T Auto M1 = 12°C
Figure 2.4.1.3-9	Along Scan Variation, T Auto M1 = -8°C

TABLE 2.4.1.3-1

OLS #15

FIXED DEVIATION CONTRIBUTORS

DEVIATION SOURCE	ONE SIGMA ERROR (°K)
1. Foreoptics Mirror Emissivity	0.10*
2. T Clamp Shaper Compensation	0.09
3. Transfer Function	
A. Non-Linearity	0.33* 0.4°K Spec Max
B. Shaper Components Variation	0.10
C. Detector Spectrum Variation (included in 3A)	-
4. Test Targets	
A. Temperature	0.10
B. Emissivity	0.10
C. Repeatability	0.02*
TOTAL (RSS) FIXED DEVIATION	0.40
FIXED DEV. SPECIFICATION LIMIT, °K ONE SIGMA	0.60 Maximum

* FROM TEST DATA ANALYSIS

	DATA	SPEC MAX
5. Fixed Deviation BSL Calibrations Match for Separate Segments (Worst Case)	0.56	1.°K
6. Along Scan Varations within a segment (265° to 310°K) Worst Case	0.11°K RMS	0.2°K RMS

Discussion of Fixed Deviation Tests and Calculations

1. Foreoptics Mirror Emissivity

The foreoptics mirror emissivity is a source of Fixed deviations as well as of Repeatability and Stability deviations. The correction in operation is made on M1 temperature only; whereas the entire foreoptics causes the offset phenomena. The ground calibration is made in the thermal vacuum chamber, where M1 is cooled radiatively via a cold tunnel, which fills the M1 view beyond the optical field of view of the system. Thus the foreoptics temperature distribution in the chamber differs somewhat from operation in space, especially in that M2 is colder in the chamber. It is not possible to determine accurately this effect based upon present knowledge. It is therefore assumed that it is equivalent to a 1°C difference in M1 temperature, or about 0.175°K at 210° using the actual OLS #15 M1 coefficient (K factor). The RMS Temperature Linearization Effect, 0.564, transforms this to a 0.10°K RMS contribution to fixed deviation.

2. T Clamp Shaper Compensation

The T Clamp shaper compensation contribution arises as follows. If the T Clamp emissivity were initially only 0.98 rather than the 0.995 used to calculate the compensation for T Clamp temperature, the error at 242°K would be 0.70°K. Although this error would be compensated for when the T channel adjustments were made, a change in T Clamp temperature to 256°K or 230°K would result in an error of 0.78°K, producing an uncompensated error of 0.08°K. Over the dynamic range this is equivalent to 0.09°K RMS.

3. Transfer Function

A. The departure of the T channel radiometric transfer function from a linear relationship is not an error as such because it it known and may be compensated for. However, this type of deviation is included within the constraints of the Fixed deviation portion of the T channel radiometric accuracy spec. The nominal T Channel non-linear transfer function (shaper) error is tabulated in Table 2.4.1.3-2 and plotted in Figure 2.4.1.3-1. The nominal shaper error is 0.13°K RMS. This calculation is made with the 5D-3 shaper, which is also used on OLS #15. The worst-case reduced test data (from Tables 2.4.1-4,5 & 6) RMS Deviations of the points from the BSL for OLS #15, are 0.26°K for T Right (Smooth Primary), 0.26°K for T MID (Smooth Backup) and 0.30°K for T Left (Smooth Primary). The analytic value, (0.13°K RMS) and the worst-case test value of 0.30°K are RSS'ed to become 0.33°K RMS for this Fixed deviation source versus the 0.4°K maximum spec allowance for the calibrateable portion of the Fixed deviations.

B. Departure of shaper components from design nominal values may cause additional peak errors of 0.25°K and are assigned a one sigma error of 0.1°K. These deviations would not be included in the measured deviation, because the data points are not close enough together to adequately detect them.

C. The T detector spectrum difference from unit to unit is included in the calibration data and is therefore included in 3A, the non-linearity of transfer function.

4. Test Targets

The deviation of the reference test target indicated blackbody temperature from absolute is the result of contributions from three Fixed deviation sources.

A. The measurement of the averaged target temperature using the 5 thermocouples immersed in the target baseplate is subject to the accuracy of the PQL/Block V Thermocouple Aquisition and Control System calibrated per procedure MCS0116801B. A review of the calibration procedure and the equipment used has led to ascribing 0.1°K RMS to these sources.

B. The actual effective blackbody temperature of the target also deviates from that measured because of differing emissivity from that assumed and because the "true" radient temperature differs from the measured temperature using the thermocouples. The effective emissivity is a combination of true emissivity (which is better than 0.996 according to Eppley) and reflectance of up to 0.004. An average emissivity of 0.998 is corrected for along with the thermocouple calibration. This source of deviation has been assigned 0.1°K RMS.

C. Actual measurements with OLS #15 system of the two Eppley IR Reference test targets over the 210° to 310°K range reveal small differences between the targets. These differences, as tabulated in Table 2.4.1.3-3, represent the target differences from the mean of both targets for T LFT and T RGT averaged from file TDCRM3C.ST (Run #10). The eleven differences when RMS'ed yield 0.02°K RMS deviation for this source.

Fixed Deviation Calibrations for Separate Segments

The calibrations are represented by the best straight line (BSL) equations for the separate segments. The BSL deviation expressions (from ideal), in y = mx + b form for the segments are tabulated in Table 2.4.1.3-4. In T Smooth the Right and Left detector segments are averaged and used across the entire scan line.

In order to determine the differences in calibrations for separate segments, (for comparison to the specification) the T Fine BSL deviation equations of Table 2.4.1.3-4 were evaluated at 210°K and 310°K. The 3 possible segment differences were then calculated. Also, the worst-case deviations between segments were taken from the Best Straight Line Plots (Figures 2.4.1-1 thru 2.4.1-12). These results are tabulated in Table 2.4.1.3-5. The calibration differences for separate segments are within the 1°K maximum spec throughout the dynamic range of 210 to 310K for OLS #15.

Along Scan Variation (265°K to 310°K) Within a Segment

The Along Scan Variation (ASV) in T DC Response is considered to be a Fixed deviation, since as a function of scan angle it does not vary as a function of time per se. Figures 2.4.1.3-2, 3, 4, 5, 6, 7, 8 and 9 show the deviations along-scan vs. surface distance (nmi/100) for T RGT, T MID, TLFT, and T AUTO. The vertical scale factor is 1.0°K per cm. Four figures are for M1 = -8°c and four are for M1 = +12°C. The computer printed number to the right of each curve is the computed RMS deviation is millidegrees K for the associated ASV plot. the RMS ASV values are only printed for the target temperatures above 265°K, i.e., the 270°, 290°, and 310°K plots.

The T DC response BSL calibrations are taken using test scan angles of -50° (-600nmi) for T LFT, +50° (+600nmi) for T RGT, and +0° (0 nmi) for T MID.

The OLS #15 has a slight amount of ASV, but is within spec. The worst case (max) ASV RMS value within a segment for OLS #15 was 0.11°K and is entered in Table 2.4.1.3-6 to compare with the specification limit.

TABLE 2.4.1.3-2

T SHAPER ERROR LIST

The 190 to 310°K T Shaper has 6 straight line segments of decreasing slope and 5 (inflections) diode break points.

T (°K)	ERROR (°K)	REMARKS
190	0	End point adjusted to be an Ideal Curve
195	-0.38	1st slope is parallel to Radiance (Smooth) Curve
201.5	0	
205	+0.26	1st diode cut-in
210	0	
215	-0.18	2nd slope is parallel to Radiance (Smooth) Curve
220.5	0	
224	+0.20	2nd diode cut-in
228.5	0	
235	-0.20	3rd slope is parallel to Radiance Curve
240.5	0	
245	+0.19	3rd diode cut-in
251.5	0	
257	-0.21	4th slope is parallel to Radiance Curve
263	0	
267	+0.165	4th diode cut-in
272	0	
279	-0.195	5th slope is parallel to Radiance Curve
284.5	0	
291	+0.16	5th diode cut-in
296	0	
303	-0.13	6th slope is parallel to Radiance Curve
310	+0.023	

The largest plus and minus errors in the 210K-310°K range are +0.20° and -0.21°K respectively.

The standard deviation = 0.13°K RMS over the 210° to 310°K dynamic range.

TABLE 2.4.1.3-3

OLS #15

TARGET DEVIATION FROM MEAN OF BOTH TARGETS

TARGET TEMP (°K)	DEVIATION (°K)
210	.01
220	.04
230	-.02
240	.00
250	.02
260	.03
270	-.01
280	.01
290	.02
300	-.04
310	.00

$$RMS = \sqrt{\frac{\Sigma(\text{Dev. }°K)^2}{11}} = 0.023°K$$

TABLE 2.4.1.3-4

OLS #15

BSL CALIBRATION EQUATIONS

(From Tables 2.4.1-4,5,6)

			EVALUATED @ 210°	EVALUATED @ 310°
T FINE (Primary)				
T-Right:	Error = 0.0143 (T-190) - 0.91	(°K)	-0.63	+0.80
T-Mid:	Error = 0.0124 (T-190) - 0.82	(°K)	-0.57	+0.68
T-Left:	Error = 0.0188 (T-190) - 1.42	(°K)	-1.04	+0.83
T FINE (Redundant)				
T-Right:	Error = 0.0146 (T-190) - 0.90	(°K)	-0.86	+0.45
T-Mid:	Error = 0.0130 (T-190) - 0.97	(°K)	-0.71	+0.59
T-Left:	Error = 0.0204 (T-190) - 1.45	(°K)	-1.04	+1.00
T SMOOTH (Primary - SP MID)	Error = 0.0124 (T-190) - 0.74	(°K)		
T SMOOTH (Redundant - SB MID)	Error = 0.0131 (T-190) - 0.91	(°K)		

TABLE 2.4.1.3-5

OLS #15

FIXED DEVIATION CALIBRATION DIFFERENCES FOR SEPARATE SEGMENTS

Calculated from Run #10 BSL's in Table 2.4.1.3-4:

	DIFFERENCE AT 210°K (°K)	DIFFERENCE AT 310K (°K)	SPECIFICATION (MAX)
PRIMARY			
T Mid to T Right	0.06	0.12	1°K
T Mid to T Left	0.47	0.15	1°K
T Right to T Left	0.41	0.03	1°K
REDUNDANT			
T Mid to T Right	0.15	0.14	1°K
T Mid to T Left	0.33	0.41	1°K
T Right to T Left	0.18	* 0.55	1°K

Worst Case Differences from Best Straight Line Plots (Figures 2.4.1-1 thru 2.4.1-12):

RUN #	PRIMARY PATH		REDUNDANT PATH		SPEC. MAX.
2	0.48°	MID-LFT	0.50°	LFT-RGT	1°K
3	0.34°	MID-LFT	* 0.44°	RGT-MID	1°K
8	* 0.50°	MID-LFT	0.39°	MID-LFT	1°K
9	0.47°	MID-LFT	0.52°	LFT-RGT	1°K
10	0.48°	MID-LFT	* 0.56°	LFT-RGT	1°K

*WORST-CASE DATA

TABLE 2.4.1.3-6

OLS #15

ALONG SCAN VARIATION (265°K TO 310°K) WITHIN A SEGMENT

(From ASV Graphs)

T-FINE	ONE SIGMA ERROR (°K RMS)	SPEC. LIMIT (°K RMS)
T-Left Segment	0.114	0.2
T-Mid (Sum) Segment	0.095	0.2
T-Right Segment	0.096	0.2
T-SMOOTH		
T-Sum	0.118	0.2

TABLE 2.4.1.3-7

CONE COOLER S/N 027

OLS-15

CONE (INNER STAGE) PATCH TEMP. EST

TEMPERATURE °K	PATCH EST, VOLTS
95	5.789
96	5.373
97	4.991
98	4.638
99	4.313
100	4.014
101	3.737
102	3.482
103	3.247
104	3.030
105	2.829
106	2.644
107	2.472
108	2.314
109	2.167
110	2.031
111	1.905
112	1.788
113	1.679
114	1.578
115	1.485
116	1.398
117	1.317
118	1.241
119	1.171
120	1.105
121	1.044
122	0.987
123	0.934
124	0.884
125	0.838

TABLE 2.4.1.3-8

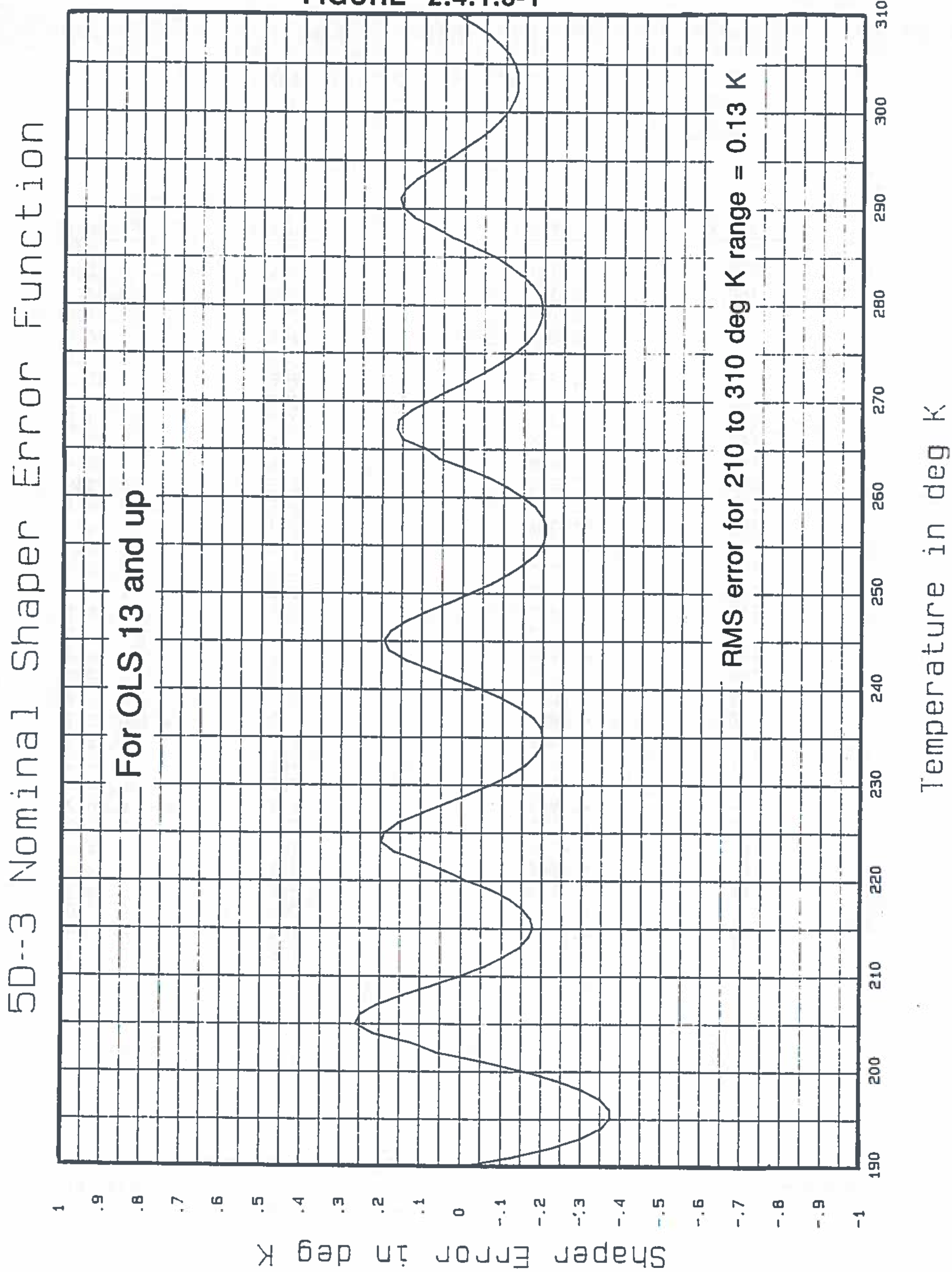
CONE COOLER OUTER STAGE TEMP EST

OLS #15

T CONE TEMP EST (EST #33)

T (DEG K)	EST VOLTS	T (DEG K)	EST VOLTS
158	4.8221	194	4.1282
159	4.8181	196	4.0328
160	4.8136	198	3.93
161	4.8088	200	3.8195
162	4.8035	202	3.7016
163	4.7978	204	3.5769
164	4.7915	206	3.4468
165	4.7848	208	3.3115
166	4.7775	210	3.1719
167	4.7695	212	3.0292
168	4.7609	214	2.8844
169	4.7515	216	2.7386
170	4.7414	218	2.5924
171	4.7306	220	2.4475
172	4.7188	222	2.305
173	4.7063	224	2.1659
174	4.6926	226	2.0302
175	4.678	228	1.8995
176	4.6622	230	1.7735
177	4.6454	235	1.4832
178	4.6273	240	1.2308
179	4.608	245	1.0159
180	4.5874	250	0.8359
181	4.5654	255	0.6873
182	4.5418	260	0.5650
183	4.517	265	0.4653
184	4.4904	270	0.3842
185	4.4622	275	0.3182
186	4.4323	280	0.2646
187	4.4008	285	0.2207
188	4.3673	290	0.1852
189	4.3322	295	0.1560
190	4.2951	300	0.1320
192	4.2156	305	0.1123

FIGURE 2.4.1.3-1



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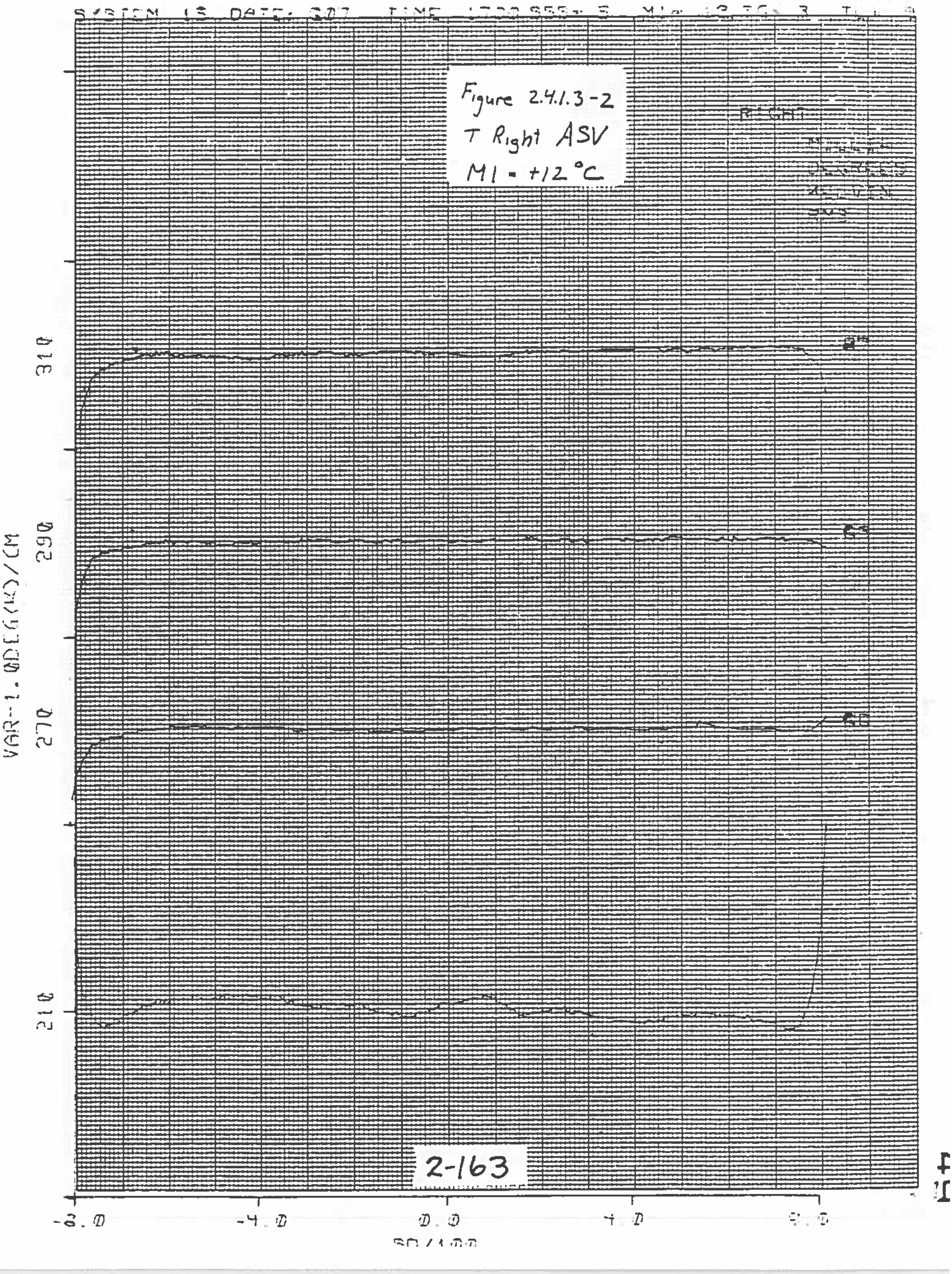

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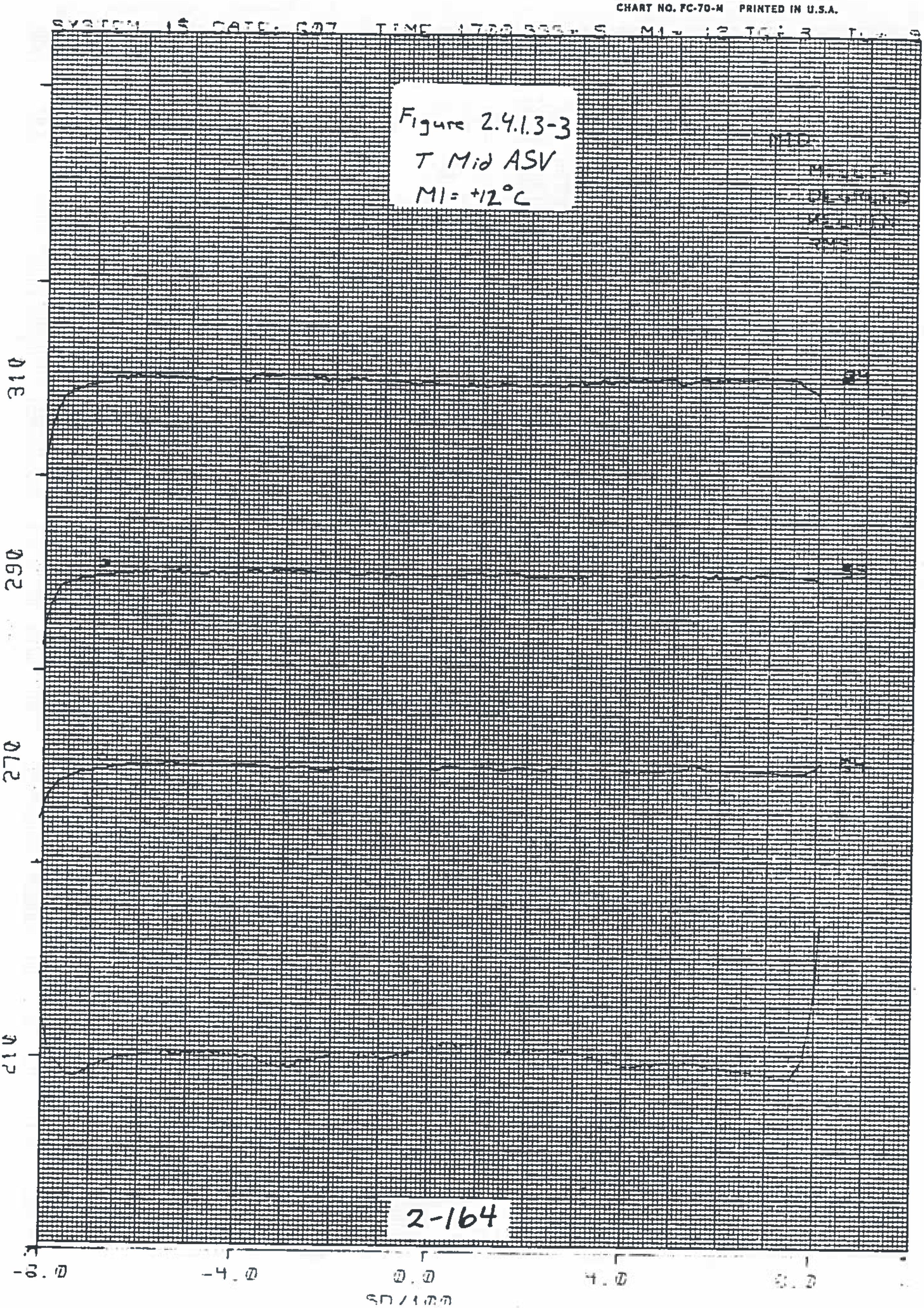

Figure 2.4.1.3-3
T Mid ASV
M1 = +12°C

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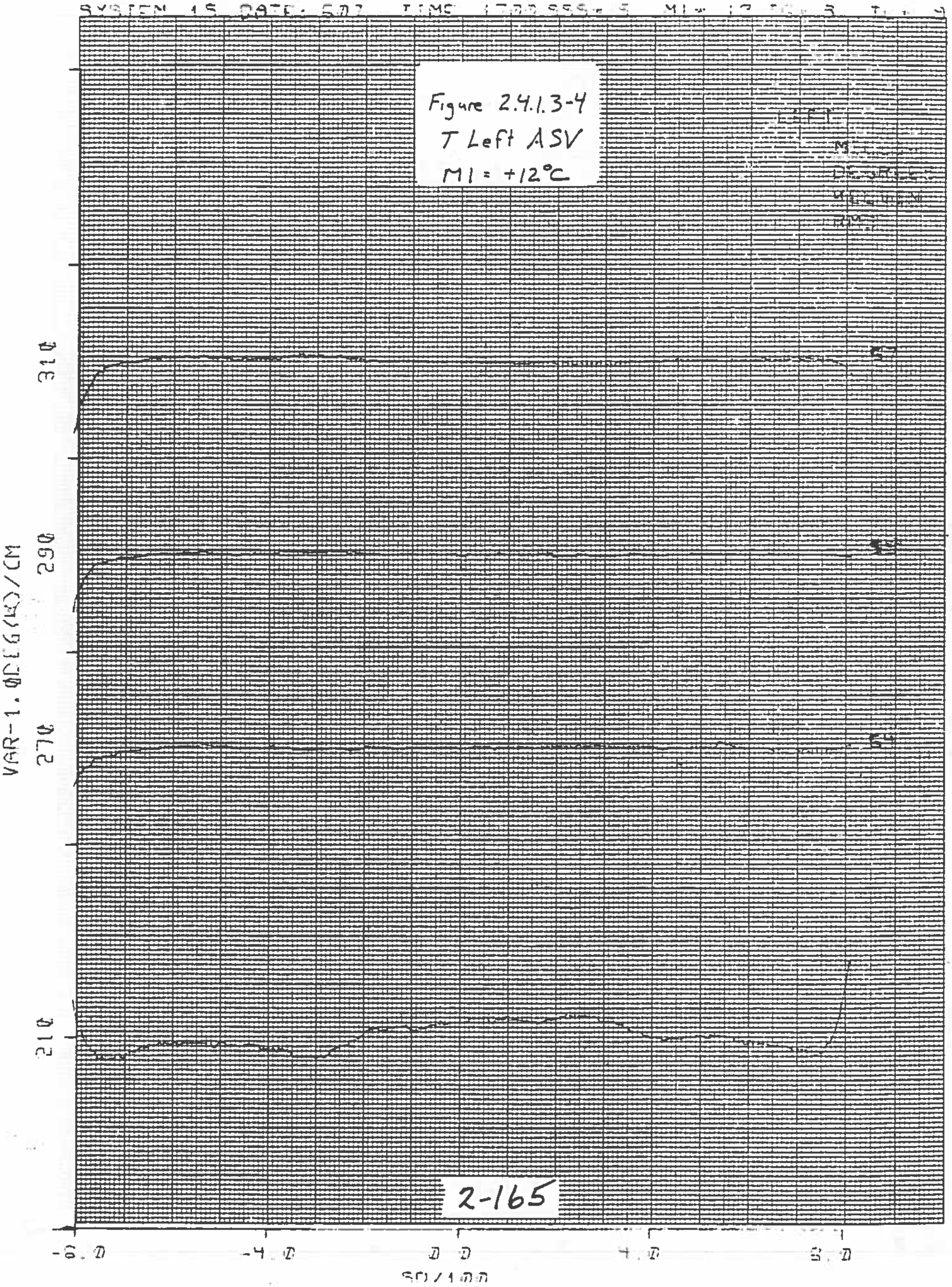

Figure 2.4.1.3-4
T Left ASV
M1 = +12°C

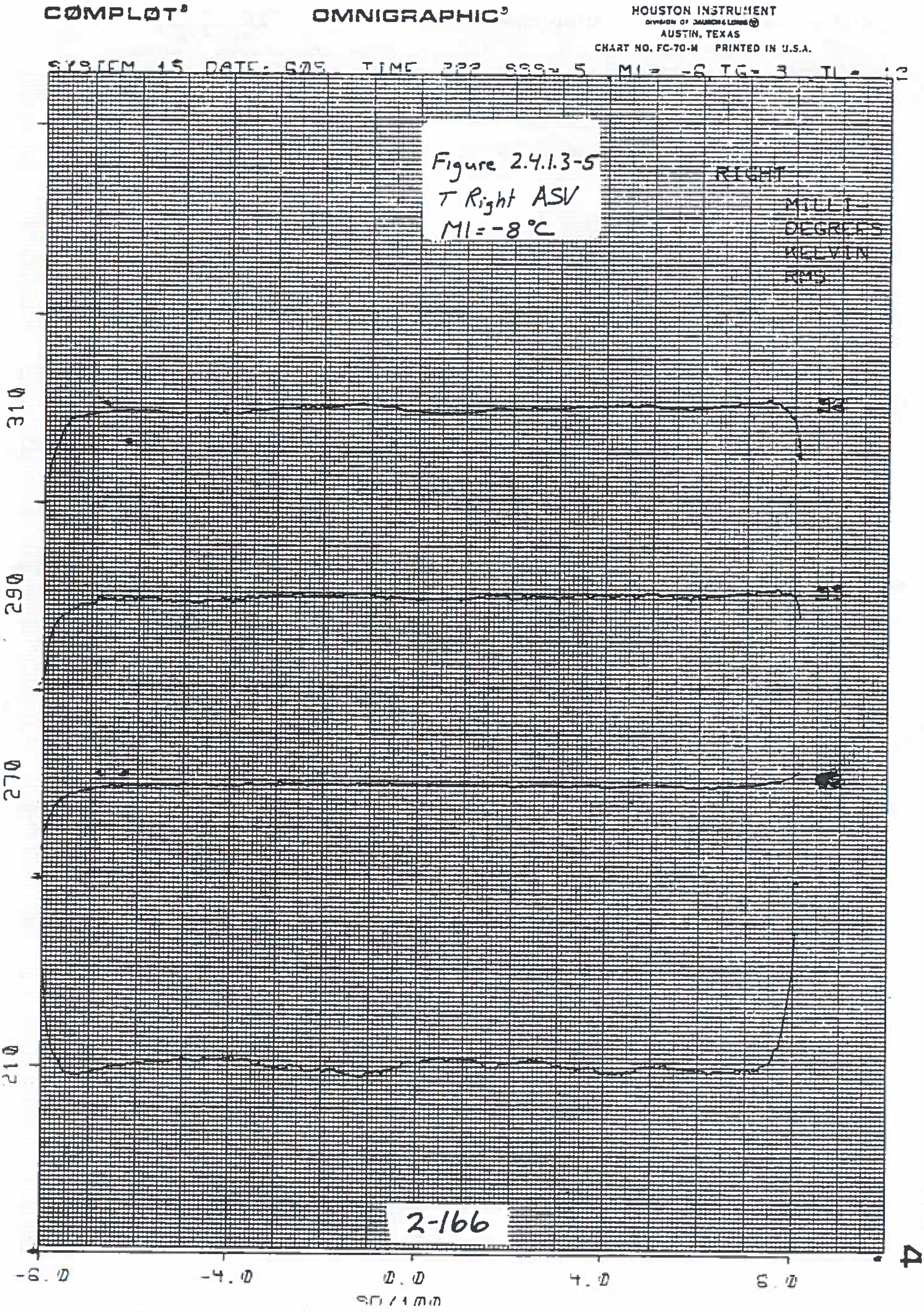

Figure 2.4.1.3-5
T Right ASV
M1=-8°C

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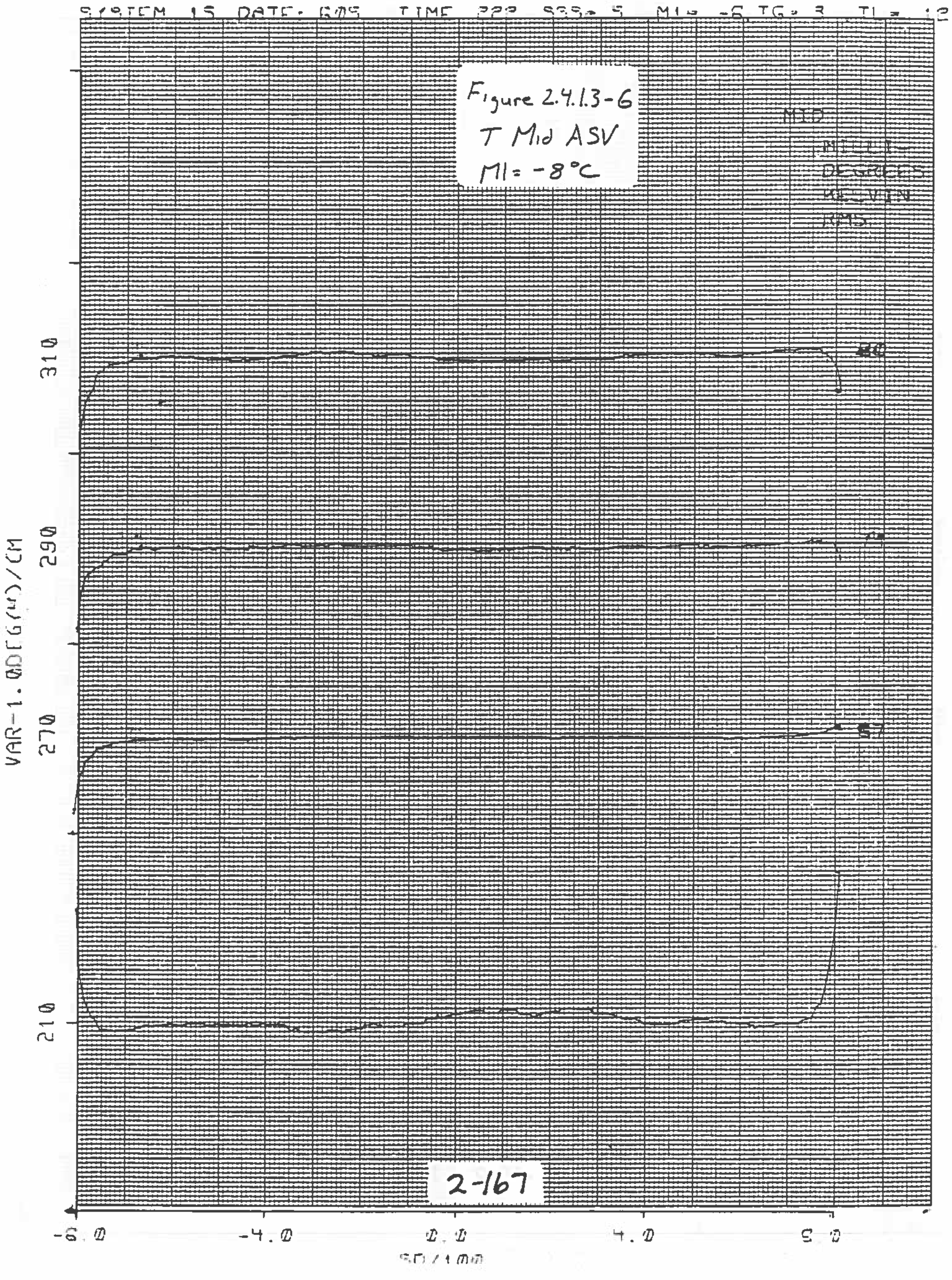

Figure 2.4.1.3-6
T Mid ASV
MI= -8°C

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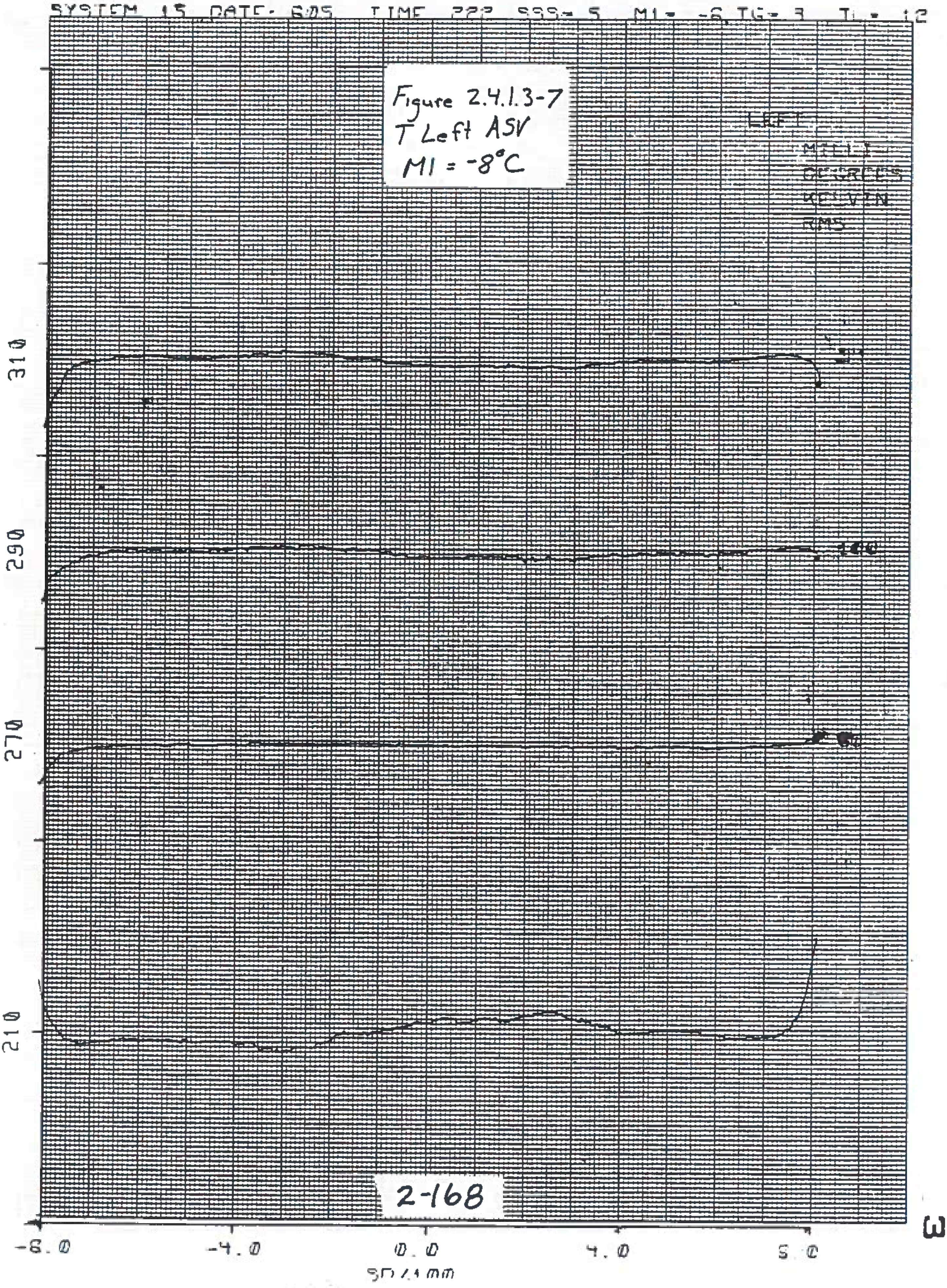

Figure 2.4.1.3-7
T Left ASV
M1 = -8°C

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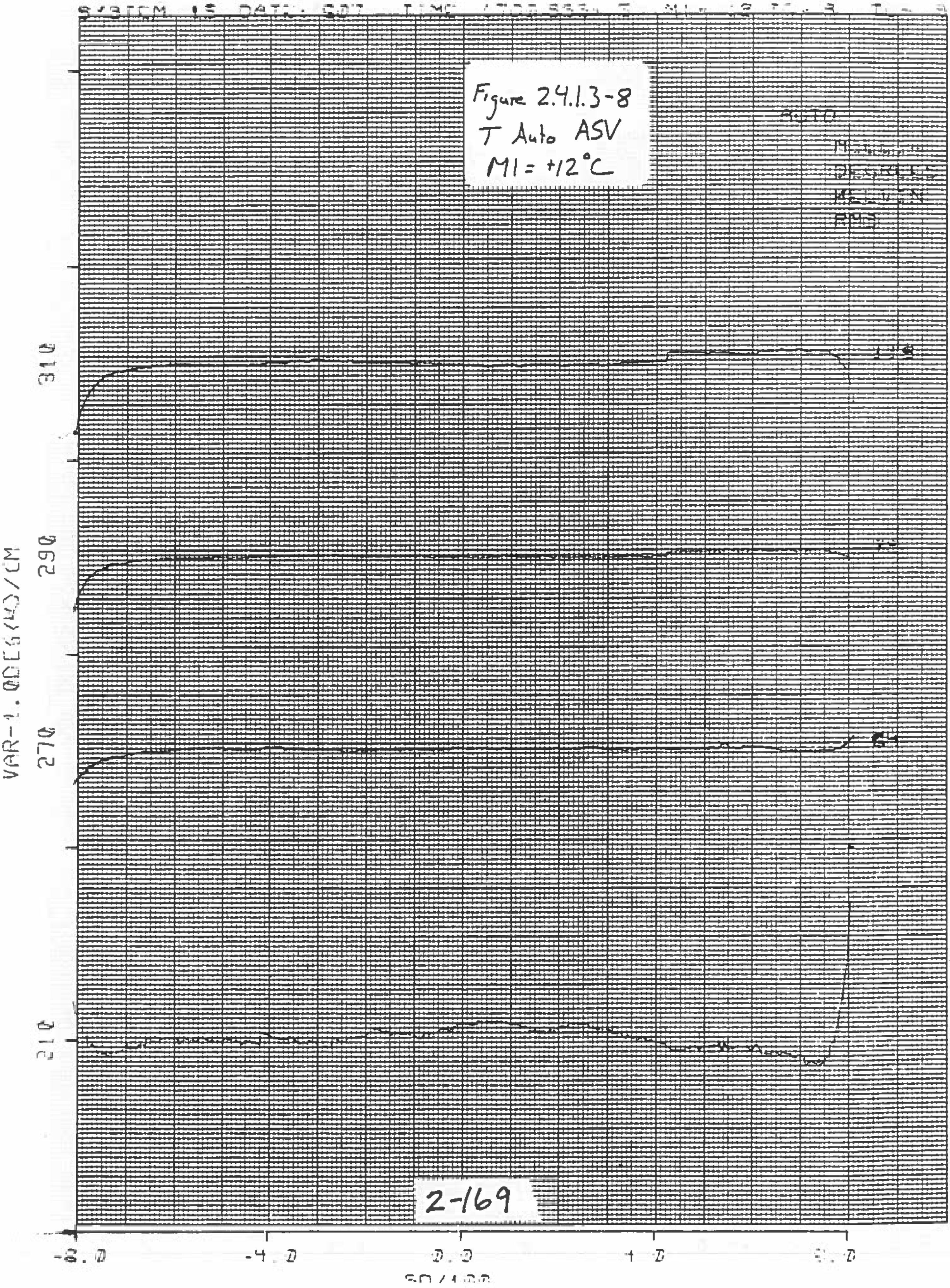

Figure 2.4.1.3-8
T Auto ASV
M1 = +12°C

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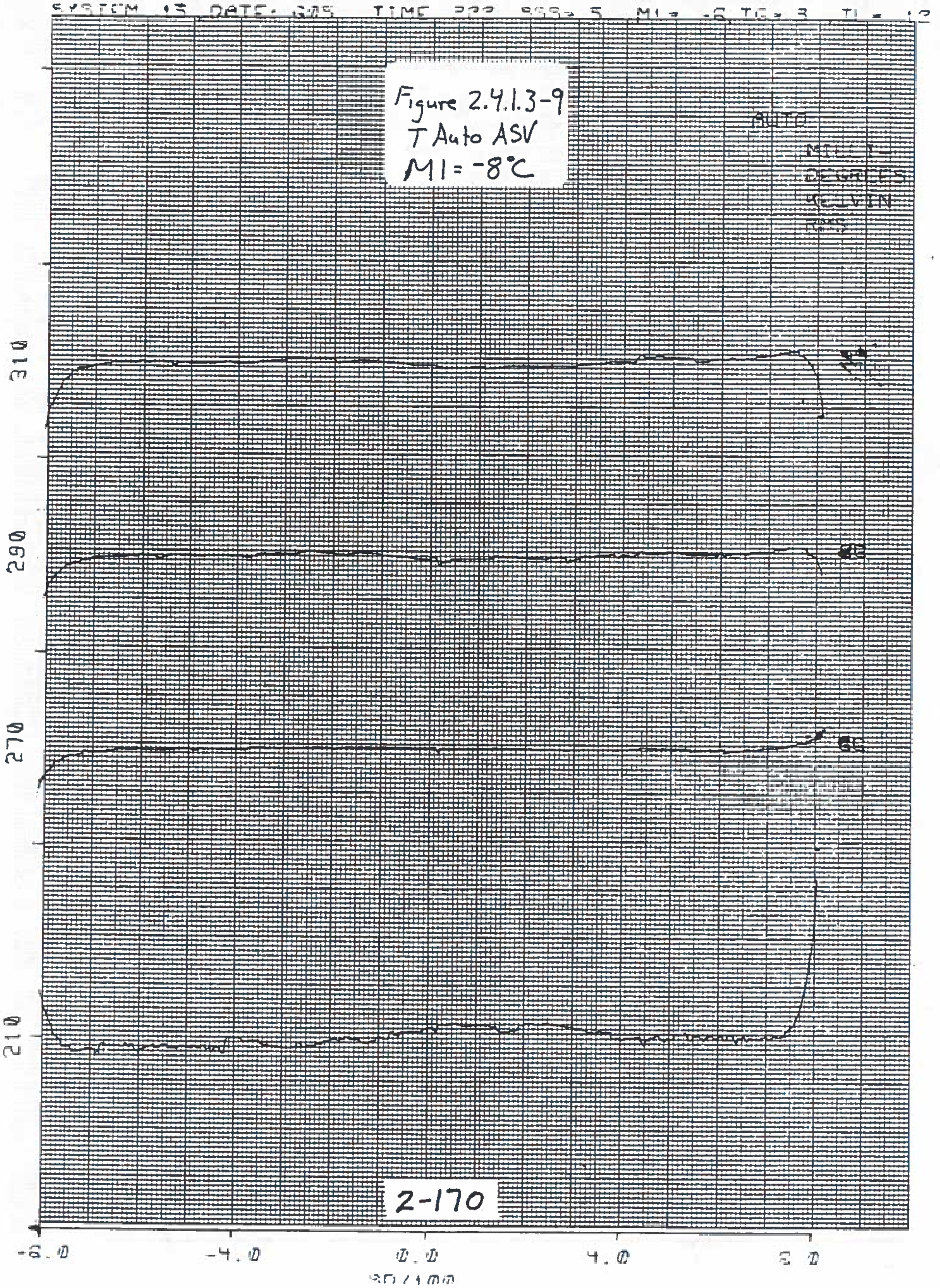


Figure 2.4.1.3-9
T Auto ASV
M1 = -8°C

2.4 Radiometeric Accuracy (Cont'd)

2.4.2 Daytime Radiometric Accuracy (3.2.1.1.4.2)

OLS #15 achieved the 7% absolute radiance requirement by setting the HRD channel gain as shown on the L channel DC Response plot, using the calibrated light source (VULS).

The analysis of the calibration accuracy and the L-Day channel stability show within-specification performance. The gain ratios (PMH/PML, PML/HRD, and PMH/HRD) were measured (using the VULS), nine times during Acceptance Test in test 6x2x1.ST, and vary less than 0.3% from the average of the ratios. The gain ratios measured in test 6x2x2.ST using a less accurate test method show greater variation.

The plot of L DC Response contains the calculated sensor switch points, S(x), and relative gains P(X), which are stored in the OLS Constants Memory page zero, locations 071 through 077. P(2) and S(2) represent the bypass of the PMT 1/9 mode, which is not usually implemented on orbit.

OLS #15 exhibited the lower optics transmission that has been observed on all 5D3 OLS units. The OLS #15 transmission was observed to drop 1.4 dB from room temperature to +5°C, and has resulted in P (0) being set at 7.50 dB rather than the normal setting of approximately 6 dB.

ATTACHMENT: OLS #15		L Channel DC Response Plot
	Table 2.4.2-1	OLS #15 DC Response Stability
	Table 2.4.2-2	OLS #15 PMT/HRD DC Response vs. SSS Temp.

OLS #15 L CHANNEL DC RESPONSE

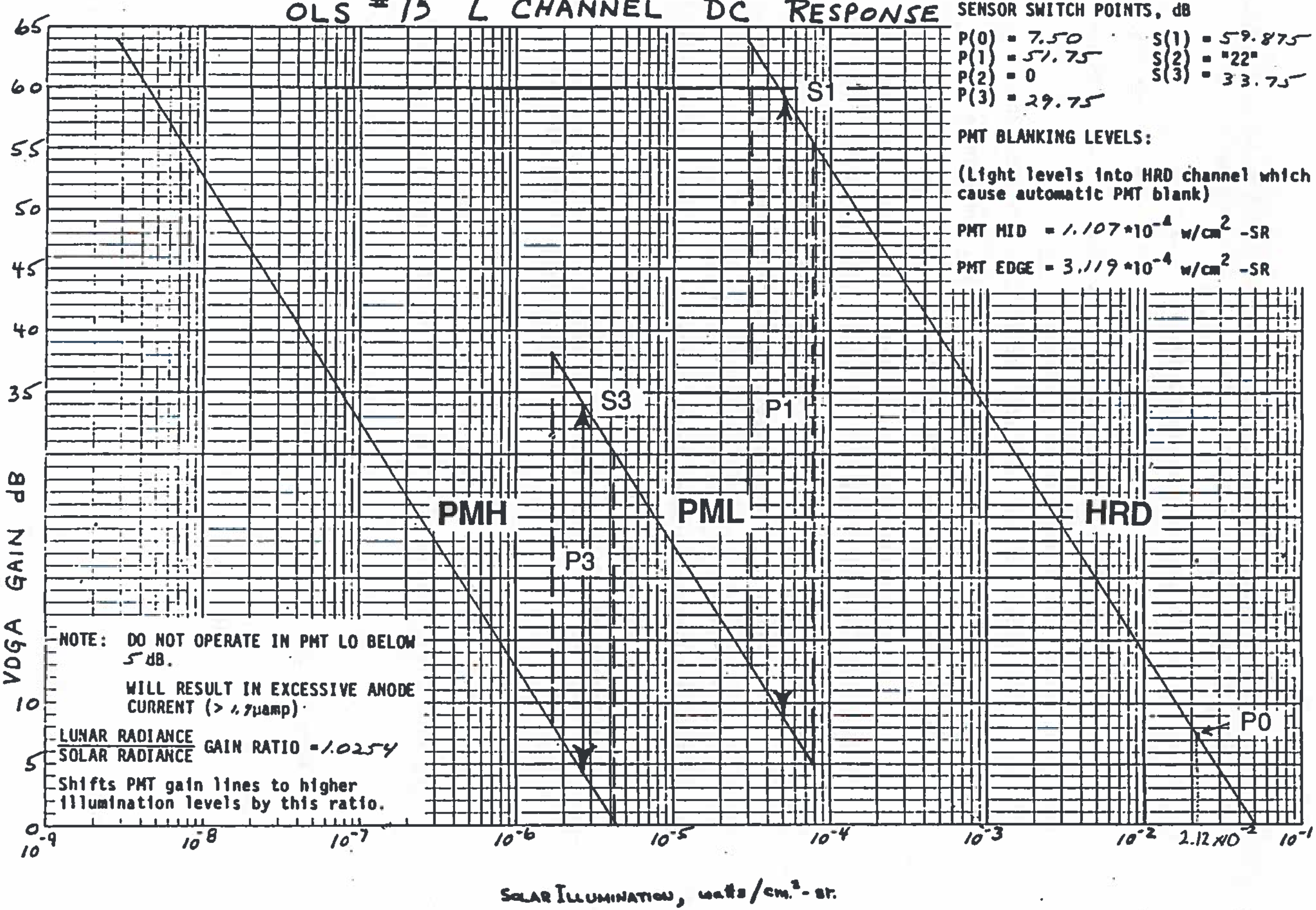


Table 2.4.2-1

OLS #15 L DC Response Stability

Stability vs. Time (6x2x1.ST data using VULS)

DATE	PMT HI / PMT LO dB	PMT LO / HRD dB	PMT HI / HRD dB
03/04/88	29.72	50.05	79.78
04/18/88	29.72	50.38	80.10
04/19/88	29.72	50.35	80.07
05/15/88	29.73	50.25	79.97
07/19/88	29.72	50.23	79.95
Average	29.72 dB	50.25 dB	79.97 dB
(Direct Multiple)	(30.62)	(325.5)	(9966)

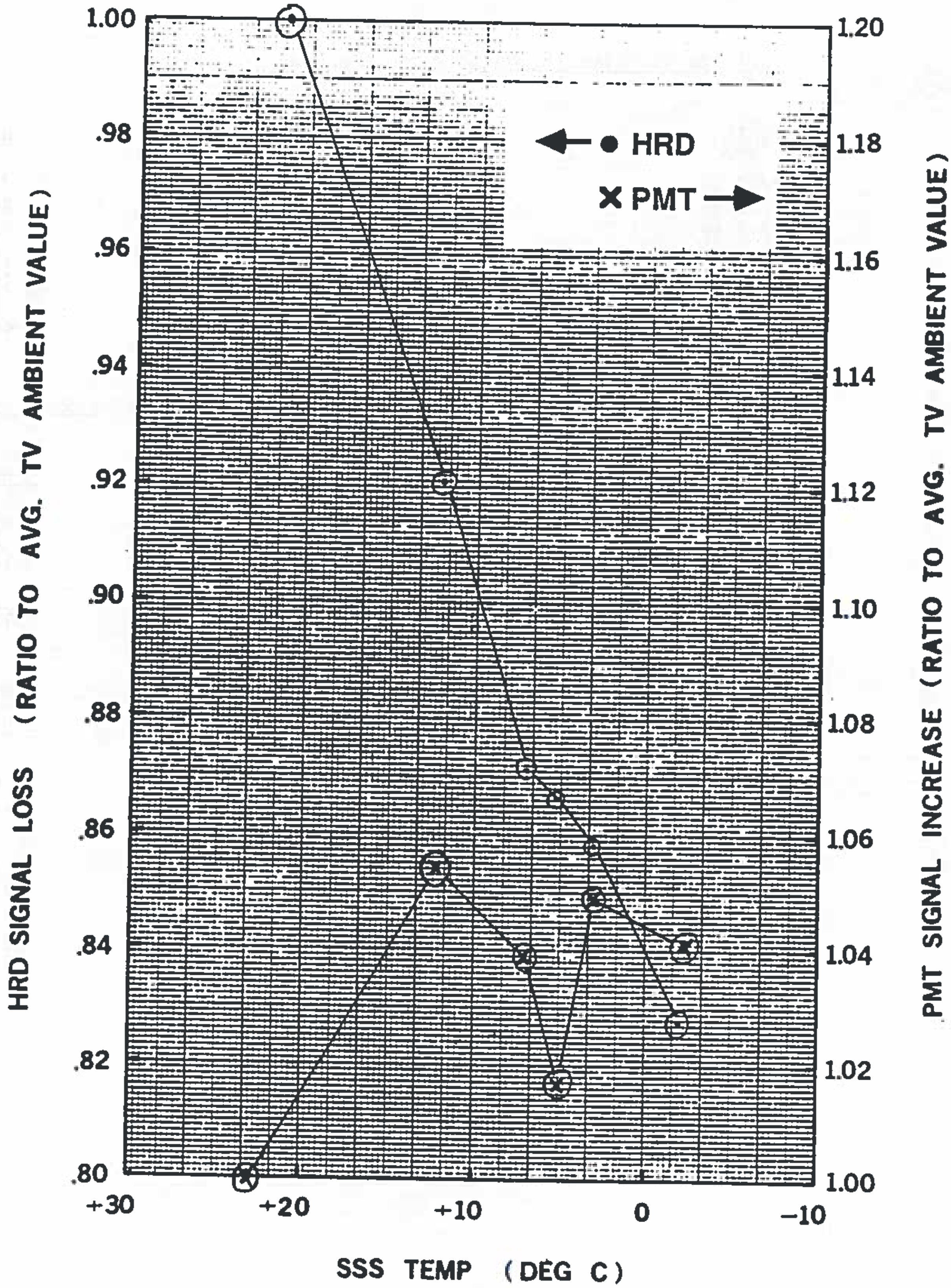
Stability vs. Temperature (6x2x2.ST data using half sphere source)

DATE	ENVIRONMENT	PMT HI / PMT LO dB	PMT LO / HRD dB	PMT HI / HRD dB
04/06/88	TV Amb	29.76	40.05	69.81
04/20/88	TV Amb	29.74	40.30	70.03
05/21/88	TV Amb	29.64	40.58	70.22
Average		29.71 dB	40.31 dB	70.02 dB

DATE	ENVIRONMENT	PMT HI / PMT LO dB	PMT LO / HRD dB	PMT HI / HRD dB
05/04/88	+5/+12	29.66	41.76	71.42
06/02/88	+5/-8	29.67	42.00	71.67
06/10/88	+12/+15	29.71	41.09	70.80
06/12/88	-2/-11	29.58	42.40	71.98
06/15/88	-2/-11	29.69	42.33	72.02
06/16/88	+7/+12	29.64	41.70	71.34
06/21/88	+3/-8	29.56	42.03	71.59
06/27/88	+5/-8	29.62	42.00	71.63
Average		29.64 dB	41.91 dB	71.56 dB

TABLE 2.4.2 - 2

PMT/HRD DC RESPONSE vs.
SSS TEMP



2.4 Radiometric Accuracy, (Cont'd)

2.4.3 Nighttime Radiometric Accuracy (3.2.1.1.4.3)

The PMT accuracy is required to degrade by no more than 60% from its initial accuracy at time of Acceptance testing to end of 3 year orbital life.

The 5D-3 OLS System Summary Report indicates PMT channel stability to be within 25.7% over the mission life so that the PMT meets this specification requirement. The above figures do not include corrections utilizing on-board LED calibration. The PMT CAL LED is extremely stable, and has an essentially constant output over the mission life.

The DC response curve of the OLS #15 PMT is shown in the L Channel DC Response curve in paragraph 2.4.2. The PMT signal increase with SSS temperature is shown in Figure 2.4.2-2.

ATTACHMENT: Table 2.4.3-1 PMT CAL Baseline data

(See para 2.4.2 attachment for L. Chan. DC Response curve)

TABLE 2.4.3-1

PMT CAL BASELINE DATA

The PMT Cal voltage EST is a monitor of PMT sensitivity and stability characteristics. In order to relate on-orbit measurement of PMT CAL to measurement during Acceptance Test, the following data are provided. PMT CAL Voltage (EST #40) and PMT BU (Back-up) CAL V (EST #41) are sampled 500 times in test 6x6x2.ST. The PMT Cal voltage EST output is tabulated below.

TABLE 2.4.3-1

PMT CAL BASELINE DATA

DATE	SSS TEMP	Output voltage (mV) PMT CAL V (EST #40)	Output voltage (mV) PMT BU CAL V (EST #41)
2-23-88	+25	2509	2487
3-03-88	+25	2454	2435
4-07-88	+25	2488	2470
5-04-88	+ 5	2390	2374
5-15-88	+25	2462	2443
5-22-88	+25	2479	2459
6-02-88	+ 5	2382	2362
6-18-88	+ 7	2378	2364
6-22-88	+ 3	2372	2453
6-29-88	+ 5	2378	2362
	AVERAGE	2429	2411
Max change from AVERAGE		3.29%	3.15%

2.4 RADIOMETRIC ACCURACY, (Cont'd)

2.4.4 Gain Control Accuracy (3.1.4.4)

Along-Scan Gain Control (ASGC) accuracy is within the specification limit of 4dB of the smooth monotonic curve drawn through the nominal values of Gain Value versus Scense Solar Elevation (GVVSSE), tabulated in para 3.2.1.1.1.4 of DMSS-OLS-300.

System Tests 5x6x3.ST and 5x6x6.ST exercise the ASGC function through various combinations of extremes of slope and bias adjustment and measure channel output for a wide range of values. These are automatically compared against stored test limits which ensure spec compliance.

An analysis using the ASGC software algorithm showing 3.25dB maximum error is summarized in the System Summary Report paragraph 3.5.4.

ATTACHMENTS: None.

2.4 RADIOMETRIC ACCURACY, (Cont'd)

2.4.5 Gain Control Adjustability (3.2.1.1.4.4 et al)

The OLS #15 Gain Control Adjustability is the same as for 5D-1 systems. The OLS 5D-3 System Summary Report paragraph 3.5.5 contains the analysis required to demonstrate conformance with the specifications, with additional information below.

TERMINATOR LOCATION (3.1.4.5.1)

The GNC Command (an uplink command) has a sub mode (GNC 10 Ø X) which allows the GVVSSE bias (terminator location) to be adjusted by X degrees, where X is a 6-bit 2's complement word with an LSB of 0.5°. This results in the required range of ± 15.5 degrees.

GAIN CHANGE RATE (3.1.4.5.2)

The GNC command submode (GNC 10 1 X) allows the GVVSSE slope to be varied by a factor of 1+X over ± 48% in 1.6% increments where X is a 6-bit 2's complement word with an LSB of 2^{-6}. This results in the required range of ± 48%.

MAXIMUM GAIN SETTING (3.2.1.1.4.5.3)

The maximum ASGC gain is commandable. An operational value is determined in Early Orbit Calibrations. The value is stored in the Operational Constants Memory location page Ø Address 104 (BCMAX). The ASGC function & performance are exercised in tests 5x6x3.ST & 5x6x6.ST

COMMANDABLE T-CHANNEL GAIN (3.2.1.1.4.5.4)

The T-Channel Commandable Gain is exercised in test 6x8x2.ST. The channel output is measured for the entire range of commandable gains. The T Channel Gain is required to have the capability of being varied by command to be between 128% and 135% of the established minimum gain value (0 dB).

The actual percentage of TGAIN change measured in test 6X8X2.ST for OLS #15 was 131.6% for T Right and 131.7% for T Left.

Each step of TGAIN is required to be between 1.0% and 3.0% above the preceeding lower gain value. Measured gain steps on OLS #15 ranged from 1.33% to 2.37%, within specification.

COMMANDABLE T CHANNEL LEVEL (3.2.1.1.4.5.5)

The T Channel Commandable Level is also exercised in test 6x8x2.ST. The specification requires that TLEVEL be variable over at least a 14° range in steps of 1.1°K or less. Measured results during testing were 14.93° range and step sizes between 0.962°K to 1.028°K worst-case; all within specification.

2.4 <u>RADIOMETRIC ACCURACY,</u> Cont'd

2.4.6 <u>A/D Conversions & Algorithms</u> (3.2.1.1.4.6.2 & 3.2.1.1.4.6.3)

DMSS-OLS-300 specifies that the Stored Smooth Algorithm accuracy with an ideal A/D shall be verified by analysis. OLS 5D-3 System Summary Report contains the analysis which shows that the LS % Full Scale Deviation does meet the specification. The results are summarized below. In summary:

Mode	% Full Scale Deviation	Analysis
LS	≤ ± 2.2%	-1.70%, +2.09%
TS	≤ ± 0.4%	± 0.39%

The Actual A/D Conversion Radiometric Accuracy was measured in system test 6x10.ST. The worst-case results from the OLS #15 Thermal Vacuum runs (Hot Limits, Cold Limit & Orbit Nominal) are summarized below:

A/D		BSL SLOPE (% DEV FROM IDEAL)	BSL OFFSET (% OF FULL SCALE)	RMS DEV FROM BSL (% OF FULL SCALE)
SDF-L	PRIM	+0.04	+0.06	0.05
	RED	+0.02	+0.16	0.04
SDF-T	PRIM	-0.02	+0.30	0.10
	RED	-0.02	+0.26	0.14
RTD-F	PRIM	+0.03	+0.00	0.06
	RED	+0.03	+0.16	0.05
SPEC		±1.0	±1.0	0.50
RTD-S	PRIM	-0.02	+0.06	0.05
	RED	+0.01	+0.18	0.06
SDS-L	PRIM	-0.02	+0.14	0.06
	RED	+0.01	+0.06	0.06
SDS-T	PRIM	+0.02	-0.16	0.09
	RED	+0.02	-0.18	0.08
SPEC		±0.5	±0.5	0.25

2.5 RADIOMETRIC RESOLUTION (3.2.1.1.5 et al.)

DMSS-OLS-300 apportions the Radiometric Resolution verification between Test and Analysis.

The Fine and Direct Smoothed Radiometric Resolution (para. 3.2.1.1.5.1), as well as the Stored Smoothed A/D Converter Error (para. 3.2.1.1.5.2), were measured in System Test 6x10.ST during the OLS #15 vacuum runs and are tabulated below:

A/D		PEAK DEV FROM BSL (% OF FULL SCALE)	SPEC
SDF-L	PRIM	0.09	±0.8%
	RED	0.09	
SDF-T	PRIM	0.20	±0.8%
	RED	0.32	
RTD-F	PRIM	0.28	±0.8%
	RED	0.10	
RTD-S	PRIM	0.11	±0.25%
	RED	0.11	
SDS-L	PRIM	0.11	±0.5%
	RED	0.11	
SDS-T	PRIM	0.20	±0.5%
	RED	0.19	

The Stored Smoothed Algorithms Resolution with Ideal A/D (para. 3.2.1.1.5.2.1) are verified by Analysis in OLS 5D-3 System Summary Report, and are summarized in Table 2.5.1.

TABLE 2.5-1

Stored Smoothed Algorithms

Resolution With Ideal A/D

ITEM		SPEC	ACTUAL
Accuracy			
LS Algorithm		<±2.2%	-1.70% +2.09%
TS Algorithm		<±0.4%	±0.39%
Resolution			
LS Algorithm		<1.6%	1.57%
TS Algorithm			
Population 1	Density	25%	25%
	Quantization	<0.8%	0.78%
Population 2	Density	75%	75%
	Quantization	<0.4%	0.39%
Population Distribtution		Uniform	Uniform
Quantization Capability		0.4%	0.4%

2.6 NOISE

2.6.1 T Channel Noise (3.2.1.1.6.1)

The T Channel noise equivalent temperature difference (NETD) is specified between 210K and 310K, although the T channel responsivity extends down to 190K.

The NETD is measured during T Channel DC response tests in the Thermal Vacuum Chamber.

The Channel views a stable blackbody target at 210K (worst-case noise). The channel output is sampled & the noise (std. deviation) of 500 samples is converted to NETD using the following formula:

NETD = [Avg Noise in Volts * 24 °/Volt] * 1.074 (the shaper slope correction)

The OLS #15 NETD is in-spec. The noise in the right segment is approximately 14% larger than in the left segment.

	TF	TS	TS Fallback
SPEC	2.2°K	0.90°K	1.3°K
Worst-Case Measured NETD	0.707°K	0.393°K	0.272°K
Worst-Case Average NETD	0.652°K	0.364°K	0.242°K

ATTACHMENT: Table 2.6.1-1 OLS #15 NETD

Table 2.6.1-1

DATE	SSS	MI	TG R/L	TL	FINE RGT	SMOOTH RGT	FINE MID	SMOOTH MID	FINE LFT	SMOOTH LFT
OLS #15 PRIMARY SIDE NETD					Noise (mV)					
6/03/88	+5	-8	3/3	12	23.39	12.85	15.24	8.63	21.82	10.62
6/07/88	+4	+12	3/3	9	24.07	13.39	16.99	9.48	20.62	10.30
6/10/88	+11	+12	4/4	9	24.16	14.04	15.76	9.03	20.89	11.20
6/12/88	-3	-8	4/4	13	24.91	13.50	16.45	9.38	22.33	11.80
6/13/88	+11	+12	4/4	9	24.95	14.13	14.96	8.51	22.36	11.54
6/15/88	-3	-8	4/4	12	*27.41	14.87	18.35	10.07	23.34	12.41
6/16/88	+6	+12	4/4	9	25.12	14.51	16.80	9.07	22.71	11.29
6/21/88	+2	-8	4/4	12	26.82	*15.25	17.91	10.47	22.82	12.14
6/29/88	+5	-8	4/4	12	26.89	14.46	18.07	9.91	22.33	11.45
AVERAGE					25.30	14.11	16.72	9.39	22.14	11.42
NETD					.607	.339	.401	.225	.531	.274
NETD Corr. for Shaper Slope**					.652	.364	.431	.242	.570	.294
OLS #15 REDUNDANT SIDE NETD										
06/02/88	+5	-8	3/3	12	23.10	12.70	15.48	9.02	20.97	10.70
06/07/88	+3	+12	3/3	9	23.23	13.55	16.12	9.78	20.54	10.35
06/16/88	+6	+12	4/4	9	25.33	14.60	16.31	9.20	22.72	11.25
06/21/88	+2	-8	4/4	12	26.79	15.00	17.60	*10.55	22.79	12.01
06/28/88	+5	-8	4/4	12	26.11	14.38	17.89	9.52	22.52	11.22
AVERAGE					24.91	14.05	16.68	9.61	21.91	11.11
NETD					.598	.337	.400	.231	.526	.267
NETD Corr. for Shaper Slope**					.642	.353	.419	.242	.551	.280

* Worst case measured

*Shaper slope correction factor = 1.074

2.6 NOISE (Cont'd)

2.6.2 L-Channel Noise (Day) (3.2.1.1.6.2)

The L Channel Noise is measured using the calibrated Variable Uniform Light Source (VULS) and half-sphere reference. Dark noise is measured in test 6x3x1.ST and shot noise is measured in 6x3x5.ST.

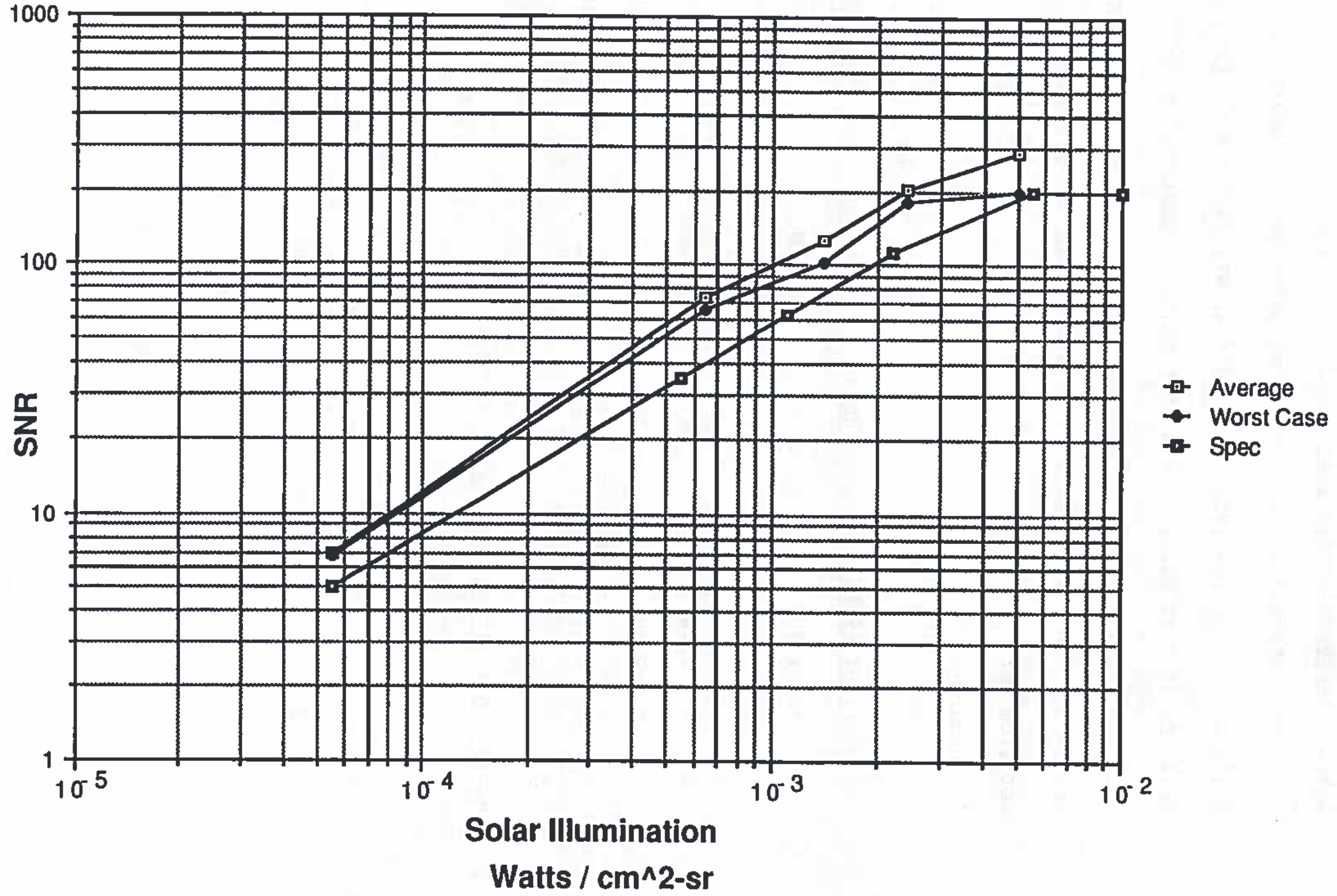
The OLS #15 HRD is in-spec for the entire range of illumination. Worst-case HRD SNR is better than spec by 36% at 5.5×10^{-5} watts/cm^2-sr.

In summary:

	SNR		
LIGHT LEVEL	SPEC	AVERAGE	WORST CASE MEASURED
5.5×10^{-5}	5	6.9	6.79
5.5×10^{-4}	34.8	61	54
1.1×10^{-3}	62.3	110	89
2.2×10^{-3}	112	180	160
5.0×10^{-3}	200	300	205

ATTACHMENT: OLS #15 HRD Channel SNR Graph

OLS 15 HRD Signal to Noise Ratio



2.6 NOISE (Cont'd)

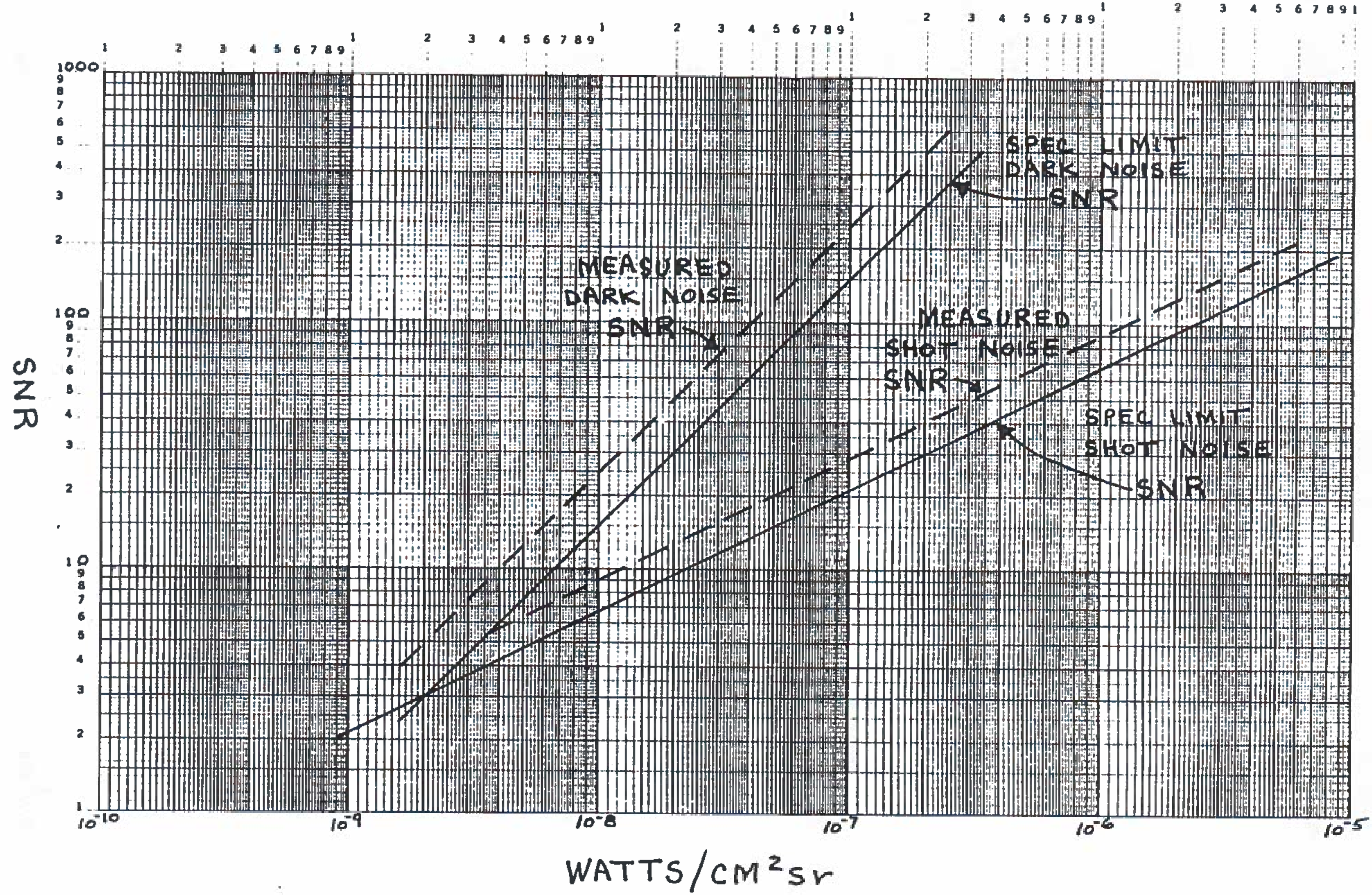
2.6.3 L Channel Noise (Night) 3.2.1.1.6.3)

The PMT dark noise is measured in all environments throughout the Acceptance Test in Tests 6x3x1.ST, 6x3x2.ST and 6x3x4.ST. The SNR is calculated from the measured noise (std. deviation of multiple voltage samples) vs. light level and compared against spec values.

The minimum OLS #15 PMT Shot Noise SNR is 8.0 at 8.0 x 10^{-9} watts/cm^2-Sr vs. a spec requirement of 6.0. The measured Dark Noise SNR is also better than spec requirement (19.5 vs. spec of 12).

ATTACHMENT: OLS #15 PMT channel SNR graph.

OLS #15 PMT CHANNEL SNR



2.6 NOISE (Cont'd)

2.6.4 Dark Current (3.2.1.1.6.4)

The Dark Current (the PMT noise with no signal input) is determined from the graph of PMT SNR in paragraph 2.6.3. The Dark Noise SNR is calculated from data gathered during PMT Smooth Noise measurements. These measurements are made in Test 6x3x1.ST during Thermal Vacuum testing. For the OLS #15, the average Dark Noise SNR at 8×10^{-9} watts/cm^2-SR is 20.8, or 28.8% of the noise corresponding to an SNR of 6. The minimum Dark Noise SNR at 8×10^{-9} watts/cm^2-SR is 19.5, or 30.8% of the noise corresponding to a SNR of 6. This is well within the spec requirement for the dark current to be 50% or less of the noise corresponding to an SNR of 6.00.

2.6 NOISE, (Cont'd)

2.6.5 Stability (3.2.1.1.6.5) (L - Channel (night))

The OLS 50-3 System Summary Report contains the analysis for this spec requirement.

The loss in sensitivity after 3 years on orbit of the PMT channel will be < 23%. This would require 2.27dB change in VDGA gain to compensate and over 6dB of VDGA gain is available.

ATTACHMENT: None.

2.6 NOISE (Cont'd)

2.6.6 Along-Track Noise Integration (3.2..1.1.6.6)

OLS 5D-3 System Summary Report contains the analysis which concludes that the OLS 5D-3 algorithm is consistently above 0.6 times the SNR resulting from perfect integration with 8 bit A/D for T Channel; and above $1/\sqrt{2}$ times the SNR resulting from perfect integration with 6-bit A/D for L channel. Therefore, the Along-Track Noise Integration is in-spec.

ATTACHMENT: None.

2.6 NOISE, (Cont'd)

2.6.7 Glare Suppression (3.2.1.1.6.7)

OLS 5D-3 System Summary Report contains the analysis which verifies that the OLS does provide effective protection against solar glare for sun angles between 75° and 95°.

ATTACHMENTS: None.

2.7 SURVIVABILITY (3.2.1.1.7)

The OLS 5D-3 System Summary Report contains calculations of survivability of optics & detectors with protective shutter/cover. All OLS 5D-1 since OLS #2, all 5D-2 & 5D-3 systems contain a Deployable Optics Cover which can survive the requirement of 50 minutes continuous exposure to solar radiation & thus meet the requirements of this spec paragraph. See BVS 2353 (Verification of Survivability Requirements) for further details.

ATTACHMENTS: None.

2.8 SCAN ANGLE (3.2.1.1.8)

Tests 6x7x1.ST and 6x7x3.ST (End of Scan Vignette for HRD & T channels respectively) measure the delphi number at which 1% vignetting of scene begins to occur. The measured delphis enable calculation of the altitude needed to obtain contiguous coverage at the equator. The contiguous coverage requirement is based on the average of +Z and -Z scan angles.

For OLS #15, the following results were obtained:

CHANNEL	DELPHI	SCAN ANGLE	CONTIGUOUS COVERAGE ABOVE:	
+Z HRD	+991.5	+55.99°	426.77 n. mi.	427.32 avg.
-Z HRD	-990.5	-55.93°	427.87 n. mi.	
+Z T	+984.5	+55.59°	434.44 n. mi.	430.10 avg.
-Z T	-992.5	-56.04°	425.75 n. mi.	

Thus, both the HRD channel and the T channel meet the requirements for contiguous coverage above 440 naut. mi, since both channels will provide contiguous coverage for all altitudes above 430.10 naut. mi.

ATTACHMENTS: None.

2.9 DATA COLLECTION RATE (3.2.1.1.9)

OLS #15 does scan the field of view at the prescribed 11.88 +/- .12 Hz rate. This parameter is measured in Scanner Functional tests 5x12x1.ST (Primary Side) and 5x12x2.ST (Redundant Side).

The test results are summarized below for all TV tests:

	Frequency, Hz	
Date	Primary	Redundant
5-04-88 Pre Vib	11.86	11.86
6-06-88 Post Vib	11.86	11.86
6-19-88 Hot Limit	11.84	11.84
6-24-88 Cold Limit	11.86	11.86
7-01-88 Orbit Nom.	11.86	11.86

ATTACHMENTS: None.

2.10 POWER (3.3.1 and 3.3.2)

Both +28V and +5V power is measured and monitored continuously throughout all of Qualification Testing.

The power required in the 8 Development-Spec-defined modes is tabulated below. The Development Spec Power Profile is measured in test 5x2x11.ST for modes 1 through 8 and 5x2x2.ST for mode 0.

OLS #15 5V power consumption is in spec for all modes in the primary and redundant configurations.

10V power consumption was not tested on OLS #15. The current System Test Equipment is not capable of monitoring 10V power. Analysis of the components using S/C supplied 10V power indicates that 5D-3 10V power consumption is in spec.

DMSS-OLS-300 limits 28V power consumed for SSS thermal control to 23 watts maximum. SSS heater power consumption was not measured on OLS #15. Analysis of the heater resistances and tolerances indicates that 5D-3 SSS heater power consumption is in spec.

OLS #15 28V power consumption is in spec for all modes in the primary and redundant configurations. Fallback (dual power) configuration power consumption is also in spec. See the attached table for further details.

ATTACHMENTS: OLS #15 Power Profile

OLS #15 POWER PROFILE

	SINGLE POWER						DUAL POWER**	
28V MODE/LIMIT	PRE VIB 3-02-88	POST VIB 5-14-88	TV HOT LIM 6-16-88	TV COLD LIM 6-24-88	TV +5/-8 6-26-88	28V	WORST CASE (CALCULATED)
0 88W	54.2	55	54	53	53	131W	90.2
1 105W	89.9	91	90	90	88	148W	126.2
2 116W	96.4	97	98	99	97	159W	134.2
3 125W	102.1	102	105	107	104	168W	142.2
4 157W	137.7	140	141	141	139	200W	176.2
5 167W	144.8	147	150	150	149	210W	185.2
6 198W	172.4	174	179	177	177	241W	214.2
7 207W	185.9	191	192	193	191	250W	228.2
8 218W	192.9	198	201	201	199	261W	236.2
5V MODE/LIMIT							
0 4.3W	3.07	3.13	3.43	2.75	3.05		
1 4.3W	3.37	3.57	4.39*	3.50	3.91		
2 4.3W	3.28	3.48	4.26	3.37	3.76		
3 4.3W	3.16	3.33	4.12	3.27	3.68		
4 4.3W	3.22	3.39	3.87	3.06	3.43		
5 4.3W	3.22	3.41	4.11	3.26	3.68		
6 4.3W	3.31	3.50	4.12	3.26	3.66		
7 4.3W	3.32	3.52	4.12	3.25	3.65		
8 4.3W	3.34	3.39	4.10	3.25	3.66		

*Out-of-spec reading
**Represents sum of (1) Worst-Case Reading (Single Power)
plus (2) Measured delta between (max dual power minus max single power)

2.11 MASS

2.11.1 Total Mass (3.4.1)

The weights of all OLS #15 components were measured for sell-off on 3 Aug 88 and 10 Nov 88. The tape recorder and encrypter serial numbers are those belonging to the system at OLS #15 sell-off and may change.

All Westinghouse furnished parts meet their center of gravity specification limits and their maximum specified weight allocation except system cables, however the total system weight does not exceed the max allowable weight. Typical encrypters exceed the spec limit in weight and center-of-gravity. The encrypters are GFE to WEC and their weight and C.G. are not controlled by WEC.

The total weight of the OLS #15 AVE is 293.04 pounds, (less BBX's, but including GSSA/DOC & Test Cable), vs. a spec limit of 298 pounds.

ATTACHMENT: OLS #15 Weight and Center-of-Gravity Tables

TABLE 1

WESTINGHOUSE FURNISHED PARTS SUPPLIED WITH OLS 15 SYSTEM

SUMMARY OF WEIGHT AND CENTER GRAVITY

UNIT	UNIT SER. NO.	$\bar{X}$			$\bar{Y}$			$\bar{Z}$			WEIGHT			
		SPEC	MPR	ACT	SPEC	MPR	ACT	SPEC	MPR	ACT	MAX* SPEC	MPR** W/O CONT	MPR ** W/O CONT	ACT
SSS	5010	1.8±.5	1.8±.5	1.79	6.2±.5	6.2±.5	6.11	0.7±.5	0.7±.6	0.63	59.0	54.92	56.02	55.29
SPS	5010	3.0±.5	3.0±.5	2.92	13.8±1.0	13.8±1.0	13.70	8.6±.8	8.6±.8	8.53	70.0	67.60	68.95	68.75
SPU	5010	3.0±.5	3.0±.5	2.97	6.6±.5	6.6±.5	6.74	6.0±.5	6.0±.5	5.91	18.0	17.00	17.34	17.13
PSU	5010	2.8±.5	2.8±.5	2.79	7.0±.6	7.0±.5	6.73	7.2±.5	7.2±.5	7.09	27.0	25.93	26.45	26.50
OSU	5010	1.2±.25	1.2±.25	1.30	4.0±.5	4.0±.5	4.34	3.0±.5	3.0±.5	2.71	4.0	3.47	3.53	3.49
GSSA/DOC	5010	4.2±.5	4.2±.5	4.32	+0.1±.3	+0.1±.3	0.35	2.4±.5	2.5±.5	2.66	9.0	7.83	7.99	7.83
PR1	052	3.45±.25	3.45±.25	3.36	6.36±.25	6.36±.25	6.34	4.23±.25	4.23±.25	4.28	22.75	21.14	21.57	21.13
PR2	053	3.45±.25	3.45±.25	3.30	6.36±.25	6.36±.25	6.52	4.23±.25	4.23±.25	4.29	22.75	21.14	21.56	21.09
PR3	054	3.45±.25	3.45±.25	3.43	6.36±.25	6.36±.25	6.26	4.23±.25	4.23±.25	4.28	22.75	21.14	21.56	21.15
PR4	055	3.45±.25	3.45±.25	3.24	6.36±.25	6.36±.25	6.36	4.23±.25	4.23±.25	4.15	22.75	21.14	21.56	21.05
CABLES	(1)	-	-	-	-	-	-	-	-	-	32.0	29.41	30.00	23.63
TEST CABLE	(2)	-	-	-	-	-	-	-	-	-	6.0	6.0	6.0	6.0
TOTAL WEIGHT											300	287.72	296.53	293.04

* DMSS-OLS-300, SCN 011, 20 NOV 1987

** 5D3 Mass Properties Report

(1) SERIAL NUMBERS ARE AS RECORDED ON DATA SHEET
(2) A MASS ALLOCATION OF 6 LBS. HAS BEEN ASSIGNED FOR TEST CABLE FROM THE TOTAL OLS MASS ALLOCATION.
TEST CABLE IS PROVIDED IS PROVIDED AND CONTROLLED BY THE SPACECRAFT INTEGRATOR.

TABLE 2

GOVERNMENT FURNISHED PARTS SUPPLIED WITH OLS 15 SYSTEM

SUMMARY OF WEIGHT AND CENTER GRAVITY

UNIT	UNIT SER. NO.	$\overline{X}$ SPEC	$\overline{X}$ MPR	$\overline{X}$ ACT	$\overline{Y}$ SPEC	$\overline{Y}$ MPR	$\overline{Y}$ ACT	$\overline{Z}$ SPEC	$\overline{Z}$ MPR	$\overline{Z}$ ACT	WEIGHT MAX* SPEC	WEIGHT MPR** W/O CONT	WEIGHT MPR ** W/O CONT	WEIGHT ACT
BB1	(3)	1.8±.1	1.8±.1	0	2.7±.1	2.7±.1	0	2.2±.1	2.2±.1	0	3.67	3.50	3.59	0
BB2		1.8±.1	1.8±.1	0	2.7±.1	2.7±.1	0	2.2±.1	2.2±.1	0	3.67	3.50	3.59	0
BB3		1.8±.1	1.8±.1	0	2.7±.1	2.7±.1	0	2.2±.1	2.2±.1	0	3.66	3.50	3.59	0
									TOTAL WEIGHT		11.00	10.50	10.77	0

* DMSS-OLS-300, SCN 011, 20 NOV 1987

** 5D3 Mass Properties Report

(3) Average Weight and C.G. as measured on 24 units can be used as a guide for these units.

Weight - 3.60 Lbs.

CG. X - 1.87 in.

Y - 2.77 in.

Z - 2.19 in.

2.11 MASS (Cont'd)

2.11.2 Component Mass (3.4.2, 3.4.3)

The mass of the individual components of the OLS #15 AVE are tabulated below.

Component	Spec	Measured
SSS	59.0	55.29
SPS	70.0	68.75
SPU	18.0	17.13
PSU	27.0	26.50
OSU	4.0	3.49
GSSA/DOC	9.00	7.83
PR1	22.75	21.13
PR2	22.75	21.09
PR3	22.75	21.15
PR4	22.75	21.05
BB1	3.59	3.60*
BB2	3.59	3.60*
BB3	3.59	3.60*
Cables	22.00	23.63

*Nominal Wt.

The cable figure does not include Special Sensor cables which are not supplied by WEC. The cables meet spec per ECP 029R1.

2.12 Cooler Transient Margin (3.2.2.5)

The T channel cone cooler transient cooldown cooling capacity margin is tested by the file 7x7.ST. An external power supply provides 1/2 Watt of heating to the outer stage of the cooler during a normal cooldown. On OLS #15, cone cooler S/N 027 successfully reached its operating set-point with 1/2 watt of external power applied, demonstrating the required margin.

ATTACHMENTS: None

2.13 DESIGN FEATURES

The following design features of the 5D-3 OLS are addressed in the analyses. The analyses are contained in the OLS 5D-3 System Summary Report. The requirements of the Design Features are met or exceeded in each category.

SUBJECT	SPEC. PARA.
DESIGN INTERFACES	(3.1.2)
RELIABILITY	(3.2.3)
WEAROUT/CONSUMPTION	(3.2.3.3)
STORAGE	(3.2.3.4)
CONTAMINATION CONTROL	(3.2.3.5)
CORROSION OF METAL PARTS	(3.2.3.6)
MAINTAINABILITY	(3.2.4)
INTERCHANGEABILITY	(3.3.5)

ATTACHMENTS: None.

2.14 Redundant and Fallback Subsystems (3.2.3.1 & 3.2.3.2)

Paragraph 3.2.3.1 of the development spec requires the OLS to incorporate the following redundant subsystems:

(1) Along-Scan Gain Control

(2) Main Bus Power Supplies

(3) Data Processors

(4) Memories

(5) I/O Interfaces

   a. Bus Controls

   b. I/O Controls

   c. S/C Interfaces

   d. WOW/Flutter Signals/Clock Drivers

   e. Drive Motor Controls

   f. Sensor Controls

   g. Gain Controls

   h. Encoder Processors

(6) Data Channels

   a. Smooth Video Filters

   b. Fine Video Filters

   c. T-Channel Post Amplifiers

   d. SDS Channel

   e. SDF Channel

   f. RTD Channel

   g. Special Sensor Processors

   h. Output Data Multiplexers

(7) Output Switching Unit Oscillator and Clock Circuits

(8) Digital Tape Recorders - (Three of Four Required)

(9) Output Data Channels - (Three of Four Required)

Paragraph 3.2.3.2 requires the OLS to incorporate the following fallback subsystems:

(1) IMC Shut-Off Mode.

(2) HRD - Detector Single Segment Select, with associated electronics.

(3) T-Detector Single Segment Select, with associated electronics.

(4) Digital Generation of Delphi Scanner Clock.

(5) PMT Shut-Off Mode

Redundant and fallback subsystems are verified by test during the normal test flow either by repetition of the relevant test on the alternate subsystem (in the case of a redundant subsystem) or by tests designed to verify the specific subsystem (in the case of a fallback subsystem). In each case, any out-of-specs or anomalies are reported as part of the relevant Qualification Test Report paragraph.

2.15 ENVIRONMENT

The following enviromental requirements are addressed in analyses and are contained in the OLS 5D-3 System Summary Report. The Thermal Vacuum (except CHA), Random Vibration, and shock requirements are verified by the sucessful completion of the approved Qualification Test Procedure.

The 5D-3 Environmental requirements of the Development Specification are met or exceeded by the OLS #15 AVE.

SUBJECT	SPEC. PARA
GROUND ENVIRONMENT	20.2.1
LAUNCH ENVIRONMENT	20.2.2
THERMAL VACUUM (CHA)	20.2.2.1
ACCELERATION	20.2.2.5
CHARGED PARTICLE ENVIRONMENT	20.2.2.6
LAUNCH PRESSURE PROFILE	20.2.2.8
ACCOUSTIC FIELD	20.2.2.9
TRANSPORATION & HANDLING ENVIRONMENT	20.2.3

ATTACHMENTS: None.

3.0 INTERFACE SPECIFICATION REQUIREMENTS

Electrical Interface parameters are measured in the OLS Detailed Electrical Test (T927989) and the OLS Special Sensor Detailed Electrical Test (T927992). These tests demonstrated conformance with all applicable Interface Specification requirements. The only Interface related system measurements that vary significantly from system to system are the SSS Alignment axes which are included here.

3.1 SSS ALIGNMENT AXES

The OLS #15 SSS Reference Plane axes are within the specification allowances. The results of system test and calculation are given below. The designations are those in Interface Spec IS-YD-810, para. 3.2.7ff.

SECONDARY REFERENCE AXES TO PRIMARY AXES

X_{R-p} = 0.785 mrad = 162 arc sec

Y_{R-p} = 0.233 mrad = 48 arc sec

Z_{R-p} = 0.722 mrad = 149 arc sec

SECONDARY REFERENCES AXES TO MOUNTING (INTERFACE) AXES

X_{R-M} = 0.543 mrad = 112 arc sec

Y_{R-M} = 0.138 mrad = 28 arc sec

Z_{R-M} = 0.514 mrad = 106 arc sec

These are within the specification limits of 600 arc seconds. The Mounting (Interface) Axes to Primary axes are also calculated, using the computer program REFPLN and are given below:

X_{M-p} = 0.262 mrad = 54 arc sec

Y_{M-p} = 0.150 mrad = 31 arc sec

Z_{M-p} = 0.213 mrad = 44 arc sec

These are within the specification limits of 120 arc seconds.