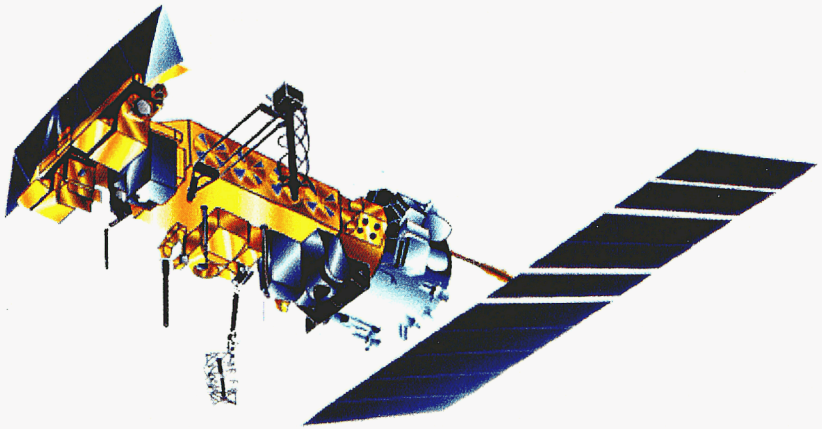
12/4/00
Dick Brooks

NOAA-L
ON-ORBIT VERIFICATION PRESENTATION



POLAR OPERATIONAL ENVIRONMENTAL SATELLITES PROJECT

December 4, 2000

NOAA-L ON-ORBIT VERIFICATION RESULTS

PRESENTATION TO NOAA
DECEMBER 4, 2000

NASA/GSFC

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HOV Services
Imaging Contractor
12200 Kiln Court
Beltsville, MD 20704-1387
January 26, 2009

AGENDA - MORNING

• 8:30	OV Summary	• D. Coolidge
• 8:45	Systems	• D. Coolidge
• 9:00	Ascent	• L. Anderson
• 9:15	Deployment	• J. Stivaletti
• 9:30	Power	• P.R.K. Chetty
• 9:45	Attitude Determination and Control	• J. Blue
• 10:10	Communications	• P. Acosta
• 10:30	Command and Control, Data Handling	• Y. Tiwary
• 10:50	Flight Software	• E. Jay
• 11:10	Thermal	• J. Hunter

AGENDA - AFTERNOON

• 1:00	AMSU-A	• S. Krimchansky
• 1:30	AMSU-B	• H. Goldberg
• 2:00	AVHRR	• S. Pszcolka
• 2:30	HIRS	• C. Richardson
• 3:00	DCS, SARP	• J. Mentall
• 3:15	SARR - SEDL	• J. Christo
• 3:30	SBUV	• J. Mentall
• 4:00	SEM	• J. Cardone and F. Hanser
• 4:20	Summary	• D. Coolidge

NOAA-L ON-ORBIT VERIFICATION (OV) DEFINITION

- NOAA-L OV is on-orbit activation and evaluation of the satellite.
  - 45 day duration
  - Joint operation between NASA and NOAA
  - NASA Health and Safety responsibility for the first 10 days
  - Formalized by Memorandum of Understanding between NASA and NOAA

- Objectives
  - Determine whether NOAA-L meets specifications
  - Characterize the performance of NOAA-L

PLANNING FOR NOAA-L OV

- Essentially follows NOAA-K baseline
- Developed Test Plan
  - Philosophy and overview
- Developed Test Description Document (160 tests)
  - Individual tests by spacecraft subsystem and instrument
- Developed Analysis Plan
  - How to interpret the test results
- Developed SOCC Command Procedures
  - For those tests requiring commanding
- Defined software to evaluate tests
  - PACS, CEMSCS, COTS, unique software developed at GSFC
- Provided Flight Time Table
  - Orbit-by-orbit sequence of events

PRE-LAUNCH PREPARATIONS

- Conducted End-to-end Spacecraft Testing (3 tests)
  - SOCC to NOAA-L
- Validated data base
  - Telemetry and command
- Tested Non-NOAA Networks
  - DSN, AFSCN, and McMurdo
- Conducted a comprehensive simulation program
  - Nominal and contingency operations
- Prepared the GSFC Data Lab
  - Generated software to support SBUV
  - PACS workstation, direct link to CEMSCS
- Planned SOCC staffing

NOAA-L OV SUMMARY

- NOAA-L launched on September 21, 2000
- OV conducted by GSFC at the SOCC, CDA and at GSFC
  - GSFC provided 24 hour a day spacecraft health and safety monitoring to augment NOAA's staff
  - NASA contractors participated in critical NOAA-L events at Suitland
    - LMSSC supported the first week
    - Science instrument contractors supported activation
- Established trending baseline
- More than 275 scheduled OV tests were executed
- Handover from GSFC to NOAA occurred:
  - Health and Safety Responsibility September 29, 2000
  - Operational Mode November 7, 2000

NOAA-L ACTIVATION OCCURRED AS SCHEDULED

- 9/21 Spacecraft Bus
- 9/21 AVHRR Visible Channels
- 9/22 AMSU-B
- 9/24 Search and Rescue Repeater (SARR)
- 9/25 Search and Rescue Processor (SARP)
- 9/26 AMSU-A1
- 9/26 AMSU-A2
- 9/26 Data Collection System (DCS)
- 10/10 HIRS Cooler Door, 10/11 HIRS Detectors
- 10/11 SEM, 10/11 MEPED High Voltage, 10/12 TED High Voltage
- 10/11 AVHRR Cooler Door, AVHRR IR Detectors

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- 10/11 SEM, 10/11 MEPED High Voltage, 10/12 TED High Voltage
- 10/11 AVHRR Cooler Door, AVHRR IR Detectors

9/27 SBUV

NOAA-L OV IMPLEMENTATION

- Daily SOCC life during OV
  - GSFC shift work managed by Mission Operations Manager
  - Team effort involving NOAA, GSFC, and contractors
  - Each position monitored respective area, plotted data, snapped pages, updated logs
- Flight Time Table defined Operations Plan
  - Identified revolutions and acquisition times for all real-time OV tests
  - Pre-launch FTT was used unchanged throughout the activation period
- Regular TOAR process used for all spacecraft anomalies
  - Each anomaly will be discussed today
- Daily GSFC life during OV
  - Data Analysis Lab at GSFC processed science data from CEMSCS
  - SOCC workstation used for observation of real-time passes

OV SOFTWARE UTILIZED

- Science Data Extraction
  - Extracts Instrument 1B data and formats for COTS statistical packages
  - Generated program for SBUV
  - Used for most of the Instrument Data Analysis
- Polaris Image Processing System
  - Based on GOES GLAS, registers images to world vectors shorelines
  - Used for NOAA-L AVHRR alignment tests
  - Used for channel-to-channel and instrument-to-instrument registration
- Attitude Determination System
  - Developed using Mat Lab Tool
  - Used for determining definitive attitude and instrument mounting misalignment

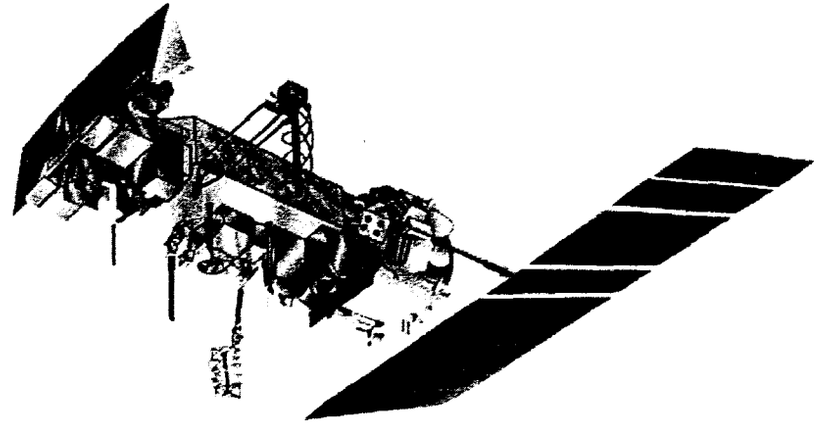
New ?

TODAY'S PRESENTATION

- Address only NOAA-L
  - Not Operations
  - Not the Ground System
  - Not NOAA-M
- Each subsystem and instrument presenter will discuss
  - Specification Compliance
  - OV Test Results
  - All TOARs or Anomalies
- Detailed written report will be completed in February 2001
  - In-depth test results

SYSTEMS

NOAA-16
OV Presentation



D. Coolidge

POES Systems Manager

Mission Objectives

- Collect and disseminate worldwide meteorological and environmental data. To accomplish this objective NOAA-L flight instruments will:
  - Provide day and night information on (AVHRR):
    - -- Cloud cover distribution and cloud type
    - -- Cloud top temperature
    - -- Moisture patterns and Ice/Snow melt
  - Provide vertical temperature and moisture profiles of atmosphere (HIRS, AMSU)
  - Collect environmental data from (DCS):
    - -- Stationary platforms in remote locations
    - -- Free floating platforms on buoys, balloons, migratory animals
  - Measure proton, electron, and particulate density to provide solar storm warnings (SEM)
  - Provide Search and Rescue capabilities (SARR, SARP)
  - Measure global ozone distribution and solar UV radiation (SBUV)

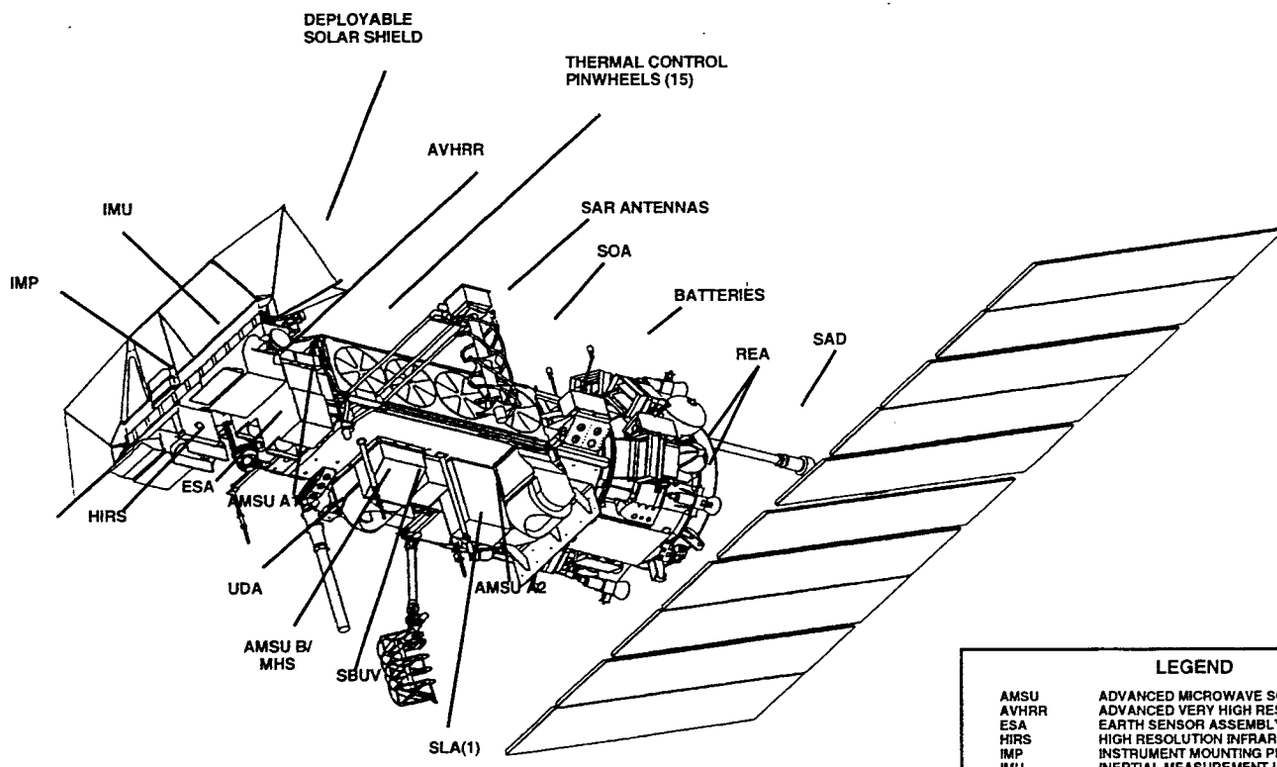
NOAA-L
Instrument Payload

AVHRR/3	Advanced Very High Resolution Radiometer
HIRS/3	High Resolution Infrared Sounder
AMSU-A	Advanced Microwave Sounding Unit - A
AMSU-B	Advanced Microwave Sounding Unit - B
SEM/3	Space Environmental Monitor
SBUV/2	Solar Backscattered Ultraviolet Radiometer
SARR	Search and Rescue Repeater
SARP/2	Search and Rescue Processor
DCS/2	Data Collection System

Changes Since NOAA-K

- S-Band antennas redesigned
- AMSU-B RF shielding problem corrected
- SBUV instrument added to NOAA-L (PM Orbit)
- Spectrolab solar cell interconnect replaces LMSS in house process
- Battery heater size increased
- Harness routing and blanket designs modified for deployments
- Solar array pyro rewire to provide redundancy

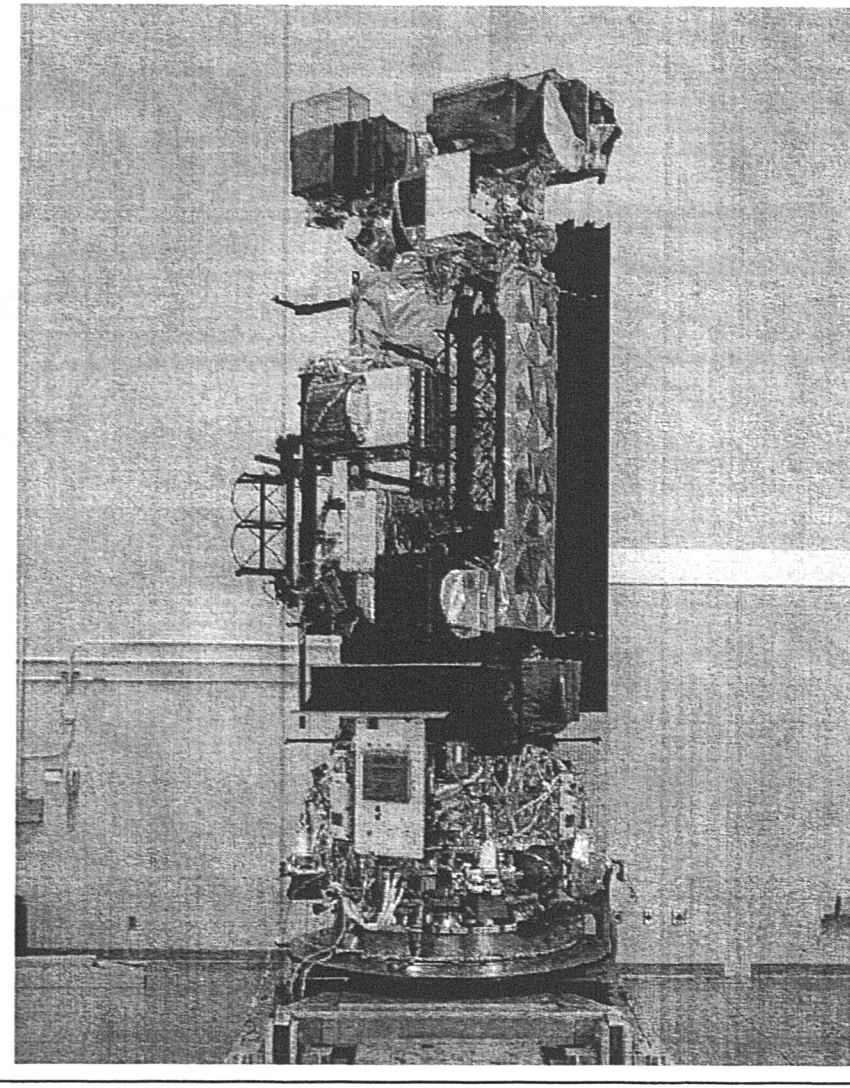
NOAA-L Spacecraft Configuration



LEGEND

AMSU	ADVANCED MICROWAVE SOUNDING UNIT
AVHRR	ADVANCED VERY HIGH RESOLUTION RADIOMETER
ESA	EARTH SENSOR ASSEMBLY
HIRS	HIGH RESOLUTION INFRARED SOUNDER
IMP	INSTRUMENT MOUNTING PLATFORM
IMU	INERTIAL MEASUREMENT UNIT
MHS	MICROWAVE HUMIDITY SOUNDER
REA	REACTION ENGINE ASSEMBLY
SAD	SOLAR ARRAY DRIVE
SAR	SEARCH AND RESCUE
SBUV	SOLAR BACKSCATTER ULTRAVIOLET SOUNDING SPECTRAL RADIOMETER
SOA	S-BAND OMNI ANTENNA
SLA	SEARCH AND RESCUE TRANSMITTING ANTENNA (L BAND)
UDA	ULTRA HIGH FREQUENCY DATA COLLECTION SYSTEM ANTENNA
VRA	VERY HIGH FREQUENCY REALTIME ANTENNA

NOAA-L at Vandenberg AFB



NOAA-16 (L) LAUNCH

EARLY ASSESSMENT:

AN EXCELLENT MISSION

ASCENT

- **Launched:** 9/21/2000
- **Titan II Performance:** Nominal
- **AKM Performance:** Nominal
- **Orbit:**

Inclination	98.783 (98.7442)
Apogee	472.0 nmi
Perigee	470.0 nmi
Nodal Crossing	13:58:40
Nodal Drift	14:30 @4.75 yrs.

- **TDRSS Coverage:** First Time Support
  Provided Ascent and Orbit data through WR Rev. #1

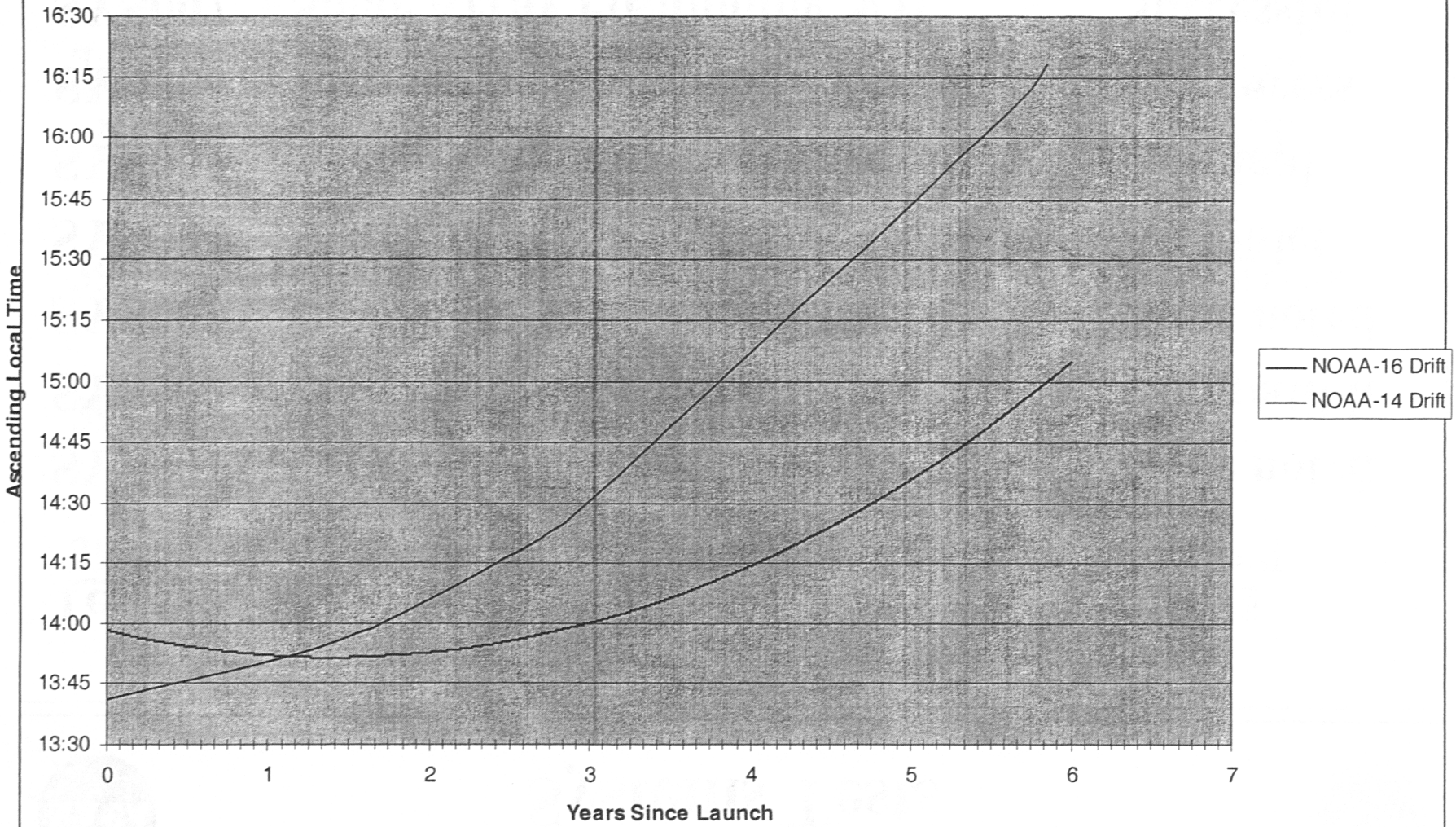
First Orbit Assessment

- Ascent to Orbit Mode Handover at L + 34 minutes
- All axes stable and solar array on the sun
- All deployments nominal
- No subsystem anomalies noted
- On-board computers and software performance nominal
- Occasional thruster firings (93) due to AKM "chuffing"
- Stored command table had errors

Leo Phase Completion

- Twenty-four hour FOT coverage for 10 days
- Lockheed systems engineering coverage for 5 days
- Spacecraft subsystems activated and evaluated
- Power system fine tuned for orbit and loads
- No performance anomalies documented
- New SADPOS module for backup array positioning was successfully tested
- NOAA ground system exhibited two significant anomalies
- Satellite handed over to NOAA for health and safety responsibility at 2:30 p.m. on September 29

Satellite Drift: NOAA-14 vs NOAA-16



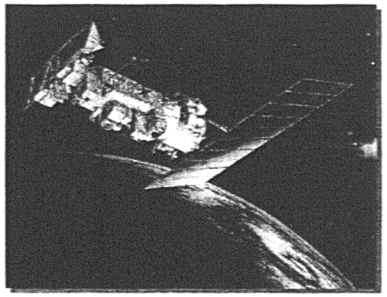
Systems Tests

Test No.	Subject	Status
SYS001	On-Orbit EMI Interference	None noted
SYS002	On-Orbit Self-compatibility	Compatible
SYS003	Day/Night Transition Effects	None noted
SYS004	Instrument Microphonic Coupling	All Quiet
SYS005	Ascent Guidance Software	Nominal
SYS006	Instrument Mounting Misalign	In Process
SYS007	Solar Array Positioning S/W (SADPOS)	Successful

Anomalies

TOAR NO.	SUBJECT	MISSION IMPACT
390	Hydrazine engine over-performance	Orbit Error
391	TIP Side 1 Calibration Voltages	None
392	VHF Realtime Transmitter #2 (VTX-2)	Potential

Can not generate APT at this time



ASCENT

Andy

L. H. Anderson

OV TEAM: R. Abrams, D. Blejer, R. McNally/QSS

NOAA-L OV PRESENTATION

TEST NUMBER:	SYS005
TEST NAME:	ASCENT GUIDANCE SOFTWARE (AGS)
TEST OBJECTIVE:	EVALUATE AGS PERFORMANCE

AGS PERFORMANCE EVALUATION OVERVIEW

I. BOOST PHASE SUMMARY:
- AGS PERFORMED ALL MODES SUCCESSFULLY
- ORBIT ACHIEVED WITHIN ONE SIGMA

II. SPECIFICATION COMPLIANCE:
- AGS FUNCTIONS - PRELAUNCH THROUGH HANDOVER

III. SUPPLEMENTAL DATA:
- BOOST PHASE EVENTS
- ORBIT COMPARISON WITH PREVIOUS MISSIONS
- PREDICTED SUN ANGLE
- PREDICTED NODAL DRIFT

IV. BOOST PHASE ITEMS OF SPECIAL INTEREST:
- SEPARATION
- AKM PERFORMANCE
- VELOCITY TRIM BURN
- FUEL USAGE

NOAA-L OV PRESENTATION

AGS FUNCTIONS	COMPLIANCE YES	COMPLIANCE NO
PRELAUNCH AZIMUTH ALIGNMENT	X	
ALTERNATE ALIGNMENT MODE (AAA)	X	
LIFTOFF	X	
BOOST PHASE:		
NAVIGATION (TITAN II PHASE)	X	
SEPARATION	X	
GUIDANCE AND CONTROL	X	
AKM	X	
VELOCITY TRIM BURN	X	
DEPLOYMENTS	X	
HANDOVER	X	

ORBITAL PARAMETERS AT INJECTION

SPACECRAFT: NOAA-16
LAUNCH DATE: September 21, 2000
LIFTOFF TIME: 10:22:02Z
LAUNCH WINDOW: 10:22:00 TO 10:32:00

PARAMETERS	NOMINAL	ACTUAL
TIME OF INJECTION	10:38:20.1Z	10:38:24.8Z
APOGEE (NMI)	470.0	472.4
PERIGEE (NMI)	470.0	470.2
INCLINATION (DEG)	98.7441	98.7868
PERIOD (MIN)	102.14	102.19
ECCENTRICITY	0.0000	0.0003
RA OF ASC NODE MOTION (+) (DEG/DAY)	0.9782	0.9764
EQUATOR-CROSSING TIME (DESCENDING)	14:00:00 LOCAL	13:58:19 LOCAL
ORBIT PLANE DRIFT (INITIAL RATE) (DEG/DAY)		-.0018

COMPARISON OF NOAA ORBITS ACHIEVED

SATELLITE	APOGEE(A) (NMI)	PERIGEE(P) (NMI)	Δ(A-P) (NMI)	ΔINCLINATION* (DEG)
NOAA-8	453.5	445.8	7.7	+0.05
NOAA-9	473.2	468.0	5.2	+0.06
NOAA-10	451.8	448.7	3.1	+0.04
NOAA-11	474.2	469.6	4.6	+0.04
NOAA-12	453.6	450.1	3.5	+0.03
NOAA-13	472.4	470.5	1.9	+0.04
NOAA-14	472.4	468.6	3.4	+0.02
NOAA-15	452.8	446.7	6.0	+0.01
NOAA-16	472.4	470.2	2.2	+0.04

*ACTUAL – NOMINAL

NOAA-16 SEQUENCE OF ASCENT FLIGHT EVENTS
SEPTEMBER 21, 2000

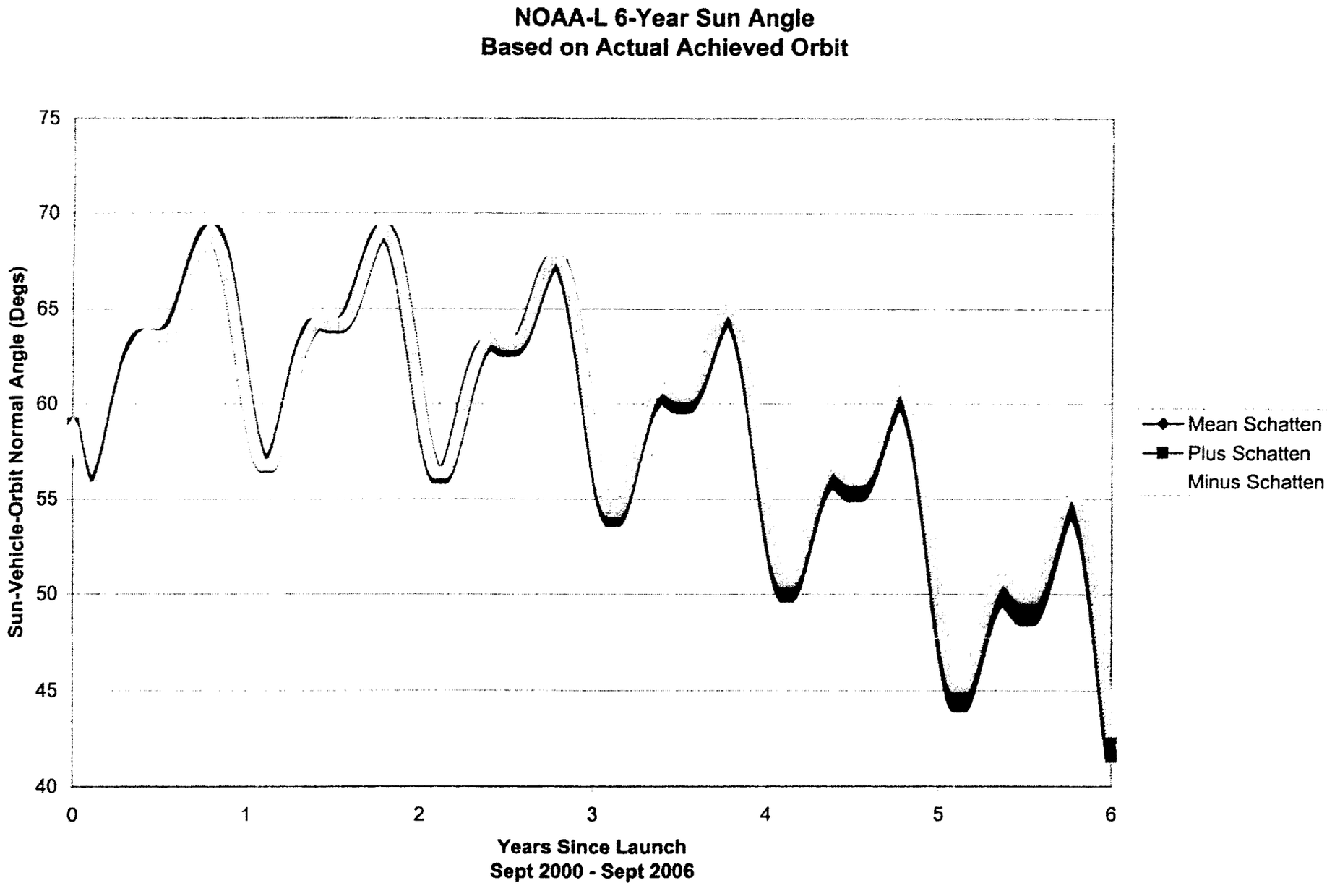
EVENT	NOMINAL*	ACTUAL	
		SPACECRAFT	VEHICLE
LIFTOFF	10:22:00Z	10:22:02Z	10:22:04.324
	TIME AFTER LIFTOFF (SEC)		
STAGE I SHUT-DOWN	148.5	149.0	149.3
STAGE I /STAGE II SEPARATION	149.5		149.6
JETTISON FAIRING	218.0		218.1
STAGE II SHUT-DOWN	326.9	333.5	333.2
STAGE II / PAYLOAD SEPARATION	395.0	396.5	397.3
END SEPARATION BURN	399.0	400.5	
START PITCH	660.0	662.0	
STOP PITCH	760.0	762.0	
AKM IGNITION	904.0	901.5	
AKM BURNOUT	955.0	952.5	
BEGIN $\Delta V(N_2H_4)$	960.0	958.0	
END ΔV (N_2H_4)	982.5	979.0	
N2H4 ISOLATION	983.0	980.0	

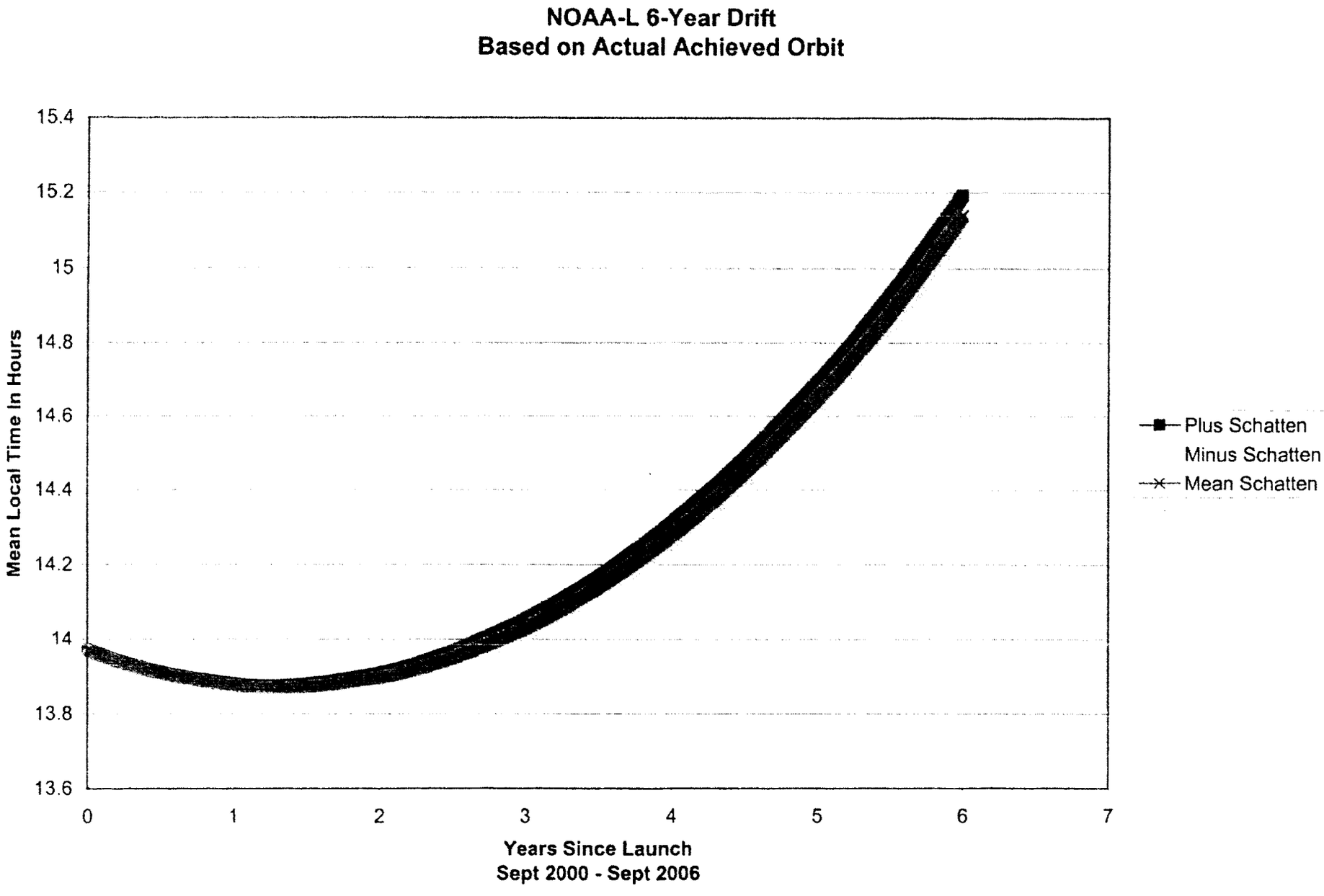
*BASED ON LMA Report No. MCR-0005-0231, dated June 2000
AND BOEING MISSION CONSTANTS ATN K,L,M 470 n. mi. RETARGETED; REV B
**Z DENOTES GREENWICH MEAN TIME (GMT).

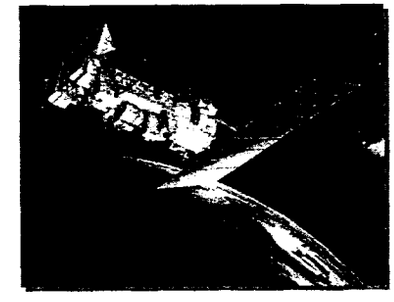
NOAA-16 SEQUENCE OF ASCENT FLIGHT EVENTS (CONTINUED)

EVENT	NOMINAL	ACTUAL
	TIME AFTER LIFTOFF (SEC)	
YAW START	986.0	983.5
YAW STOP	1031.0	1028.5
ROLL START	1035.0	1032.5
ROLL STOP	1045.0	1042.5
N_2H_4 BLOW DOWN START	1100.0	1097.5
N_2H_4 BLOW DOWN STOP	1240.0	1237.5
ARRAY DEPLOYMENT 1	1240.0	1237.5
ARRAY DEPLOYMENT 2	1243.0	1240.5
BOOM DEPLOYMENT	1333.0	1330.5
SRA DEPLOYMENT	1568.0	1565.5
UDA DEPLOYMENT	1648.0	1645.5
VRA PIN PULLER	1818.0	1815.5
SUNSHADE DEPLOYMENT	1818.5	1816.0
N2 FOR PITCH/YAW	1875.0	1872.5
START GUIDANCE	1890.0	1887.5
STOP GUIDANCE	1989.0	1986.5
HANDOVER	2040.0	2037.5*

*ESTIMATED FROM MISSION CONSTANTS AND LAST ESTABLISHED PREVIOUS EVENT


NOAA-L 6-Year Sun Angle
Based on Actual Achieved Orbit
Sun-Vehicle-Orbit Normal Angle (Degs)
75
70
65
60
55
50
45
40
0
1
2
3
4
5
6
Years Since Launch
Sept 2000 - Sept 2006
Mean Schatten
Plus Schatten
Minus Schatten


NOAA-L 6-Year Drift
Based on Actual Achieved Orbit
Mean Local Time In Hours
15.4
15.2
15
14.8
14.6
14.4
14.2
14
13.8
13.6
0
1
2
3
4
5
6
7
Years Since Launch
Sept 2000 - Sept 2006
Plus Schatten
Minus Schatten
Mean Schatten



MECHANISM DEPLOYMENTS

OV RESULTS

Joe

J. Stivaletti

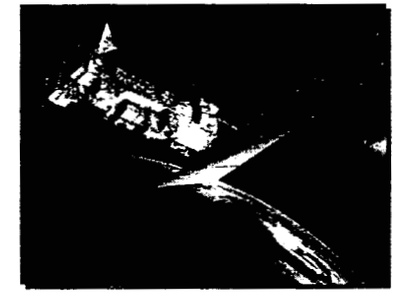
NOAA-16 Deployables (Sheet 1 of 2)

Deployable	Deployed Angle (deg)	Start	Duration	Status
Solar Array Hinge 1	180.00	1240.0s	32.0s	Deployed
Solar Array Hinge 2	180.00	1240.0s	31.0s	Deployed
Solar Array Hinge 3	180.00	1240.0s	23.0s	Deployed
Solar Array Hinge 4	180.00	1240.0s	25.0s	Deployed
Solar Array Hinge 5	42.00	1240.0s	15.0s	Deployed
Solar Array Hinge 6	42.00	1240.0s	15.0s	Deployed
Solar Array Hinge 7	180.00	1240.0s	23.0s	Deployed
Solar Array Hinge 8	180.00	1240.0s	27.0s	Deployed
Solar Array Hinge 9	180.00	1240.0s	32.0s	Deployed
Solar Array Hinge 10	180.00	1240.0s	40.0s	Deployed
S/A Boom Hinge	180.00	1333.0s	47.0s	Deployed
S/A CANT Hinge	22.00	1485.0s	16.0s	Deployed

NOAA-16 Deployables (Sheet 2 of 2)

Deployable	Deployed Angle (deg)	Start	Duration	Status
SRA phase 1	90.00	1568.0s	32.0s	Deployed
SRA phase 2	90.00		26.0s	Deployed
UDA	90.00	1648.0s	38.0s	Deployed
VRA phase 1	76.00	1698.0s	26.0s	Deployed
VRA phase 2	166.00	1818.0s	23.0s	Deployed
-Y Sunshade	131.00	1818.5s	48.0s	Deployed
+Y Sunshade	116.00	1818.5s	31.0s	Deployed

All mechanisms deployed successfully and confirmed by telemetry and operational data



ELECTRICAL POWER SUBSYSTEM (EPS)

OV RESULTS

T. Spitzer and P.R.K. Chetty

EPS OV Test Overview

- **The EPS has been fully on-orbit verified and is ready for operational phase of the mission.**

Test Number	Test Title/Description	Real-time/Off-line	Successful?
EPS001	Quick Look – Ascent Handover EPS Health and Safety of Spacecraft	Real-time	Yes
EPS002	Solar Array Performance	Off-line	Yes
EPS003	Quick Look –EPS Health and Safety with Spacecraft Under Load Condition of All Instruments On	Off-line	Yes
EPS004	Battery Maintenance	Off-line	Yes
EPS005	PMS Performance	Off-line	Yes

EPS KEY SPECIFICATION COMPLIANCE

Key Specifications *	Measured	Comments
Load Demand = 738.6W (Orbital ave at 80° sun angle) = 820.5W (Orbital ave at 0° sun angle)	Approx. 600W	Complied; Load consumption is less than specified load demand.
+28.0 V Regulation +0.56V, -0.30V (measured at the PSE main bus filter output)	+0.03V, -0.16V	Complied
+10VA Bus Regulation +0.50V, -0.45V including ripple, noise, and repetitive transients	-0.09V	Complied
+10VB Bus Regulation +0.50V, -0.45V including ripple, noise, and repetitive transients	+0.03V	Complied
+10VC Common Bus Regulation +0.50V, -0.45V including ripple, noise, and repetitive transients	+0.10	Complied

* Key specifications which can be measured through telemetry

OV TESTS - EPS001

EPS001 - Power System Quick Look After Ascent Handover

Purpose: Verify EPS health and safety by running power plots and snapping CRT pages.

Results: EPS is performing nominally and safely (see checklist).

EPS Ascent Handover Telemetry Checklist (Sheet 1 of 2)

	PARAMETER	EXPECTED	OBSERVED (on 265/10:54:55)
1.	Battery 1 Pack A Temperature	-1 to +28 °C	21.35 °C
2.	Battery 1 Pack B Temperature	-1 to +28 °C	22.00 °C
3.	Battery 2 Pack A Temperature	-1 to +28 °C	20.48 °C
4.	Battery 2 Pack B Temperature	-1 to +28 °C	22.22 °C
5.	Battery 3 Pack A Temperature	-1 to +28 °C	21.57 °C
6.	Battery 3 Pack B Temperature	-1 to +28 °C	21.57 °C
7.	Main Bus Voltage	+28.0 +0.56/-0.30 V	27.94V
8.	SA Current	0 to 60 A	34.56A
9.	Controls Power Converter-C Bus Voltage	+10.0 +0.5/-0.45 V	10.10V
10.	Main Bus Current	3 to 25 A	8.31A
11.	Total Regulated Current	3 to 25 A	5.81A
12.	Battery 1 Discharge Current	-2 to -12 A	OK
13.	Battery 2 Discharge Current	-2 to -12 A	OK
14.	Battery 3 Discharge Current	-2 to -12 A	OK
15.	Battery 1 Voltage	22.0 to 25.0 V	23.49V
16.	Battery 2 Voltage	22.0 to 25.0 V	23.49V
17.	Battery 3 Voltage	22.0 to 25.0 V	23.46V
18.	Battery 1 Charge Rate	10 A	10A
19.	Battery 2 Charge Rate	10 A	10A
20.	Battery 3 Charge Rate	10 A	10A

EPS Ascent Handover Telemetry Checklist (Sheet 2 of 2)

	PARAMETER	EXPECTED	OBSERVED (on 265/10:54:55)
21.	Battery 1 Voltage Limit	4	4
22.	Battery 2 Voltage Limit	4	4
23.	Battery 3 Voltage Limit	4	4
24.	Battery 1 Voltage/Temperature (VT) Shift	0	0
25.	Battery 2 VT Shift	0	0
26.	Battery 3 VT Shift	0	0
27.	PSE Phase Control Status	Prime	Yes
28.	PSE Mode Control Status	Prime	Yes
29.	PSE Boost Channel Status – Orbital Night	4.2 to 5.0 V	Yes
30.	PSE Boost Channel Status – Orbital Day	0.41 to 0.49 V	Yes
31.	PSE Command Interface Select Status	Prime	Yes
32.	Battery 1 Charge Connect Status	Connected	Yes
33.	Battery 2 Charge Connect Status	Connected	Yes
34.	Battery 3 Charge Connect Status	Connected	Yes
35.	Battery 1 Discharge Connect Status	Connected	Yes
36.	Battery 2 Discharge Connect Status	Connected	Yes
37.	Battery 3 Discharge Connect Status	Connected	Yes

Observation

Solar Array mounted shunt heat sink temperature peaked to 82 ^{o}C. As, such high temperature was not seen before on previous NOAA spacecraft, solar array was offset in two steps to -55 degrees. The shunt temperature peak has stabilized around 45 degrees.

OV TESTS - EPS002

EPS002 - Solar Array Performance

Purpose: Verify solar array performance, first by computing the solar array capability using the measured telemetry data and then comparing it with the predicted value.

Results:

- Power System is performing nominally.
- Predicted solar array capability per P&C Handbook is >66 amps.
- When the power subsystem is in shunt mode, the solar array capability is equal to 210 times the solar cell load current -1 or -2. Namely,

  $$210 \times 0.3188 = 66.948 \text{ amps.}$$
- Considering the errors introduced in the process of instrumentation and telemetry processing, ground computations, etc., the measured (telemetry) solar array capability is within expected nominal solar array performance values.

OV TESTS - EPS003

EPS003 - Quick Look - EPS Health and Safety with Spacecraft Under Load Condition of All Instruments On

Purpose: Verify health and safety of the EPS by running power plots, and snapping CRT pages.

Results: EPS is performing nominally and all parameters are within expected ranges, but for some of the observations made below:

- Battery pack 2A temperature is about one degree hotter than all other packs and is varying between about 6°C to 7°C (sometimes reaching 8°C). Also it is important to note that it is not under heater control. I think per spec it should be under heater control at this temperature.

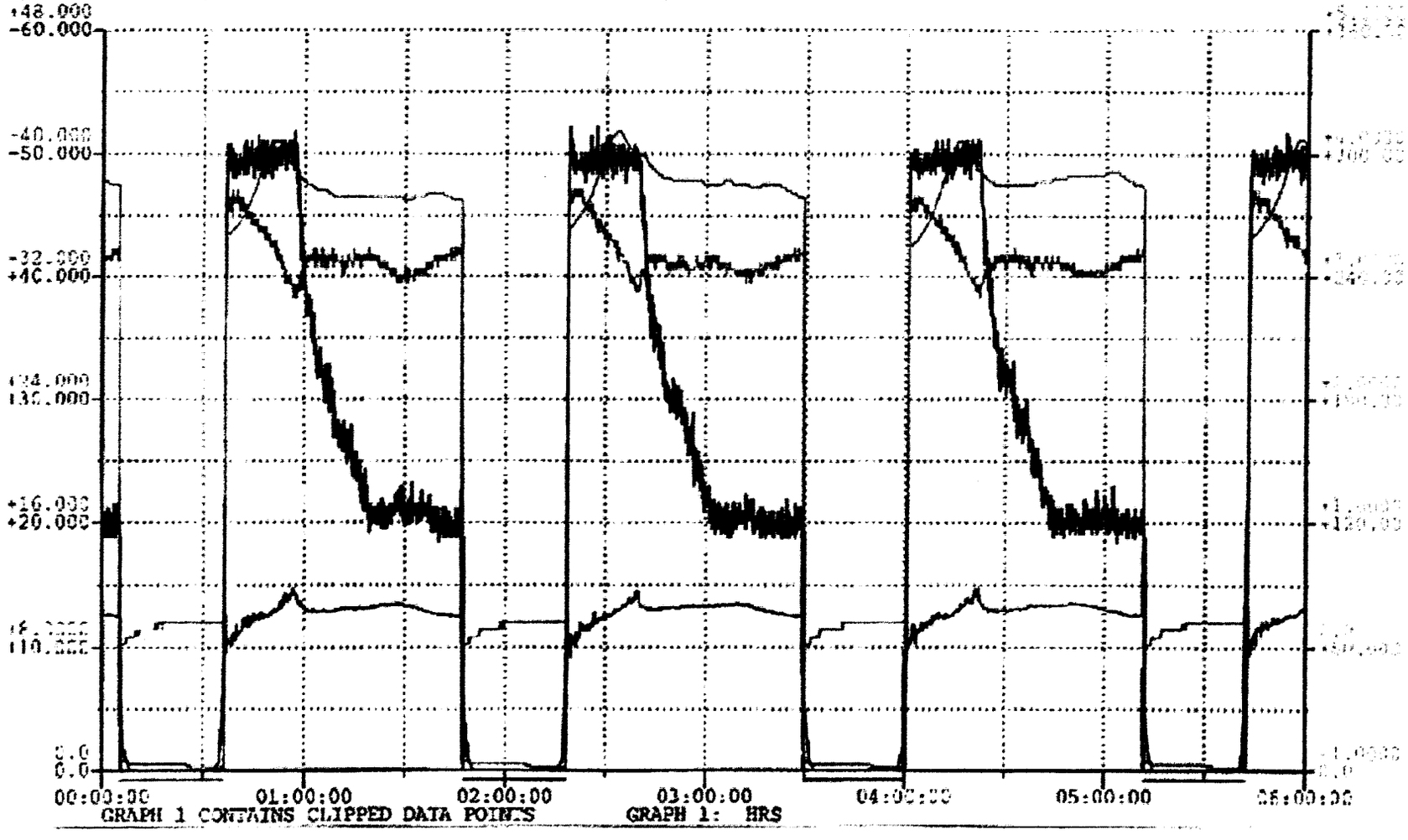
- Any additional thermal energy either created internally or received externally will result in higher battery pack operating temperature as heater is fully off and battery is under passive thermal control.

The current battery pack operating temperature is acceptable, although not preferable, we need to keep a close watch on battery pack 2A temperature.

PLOT NAME: NRT_OPSSHISPLOT_PLOT:N16PPLT1
TITLE: N16PLR1
DESCRIPTION: NOAA-16 POWER PLOT #1
SETUP FILENAME: NRT_OPSSHISPLOT_SETUP:N16PLR1
START/STOP TIME: 00/285/00:00:00.0 - 00/285/06:00:00.0

SCID: 16
PLOT CREATION DATE: 285/22:45:52
PLOT PRINT DATE: 285/23:06:02
SAMPLING PERIOD: 000/00:00:08.00

Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
MSOLARR1	FA256	AMP	EU		TIME		HRS		—	1											
MSHUNT1	FA488	VOL	EU		TIME		HRS		—	1											
MASHUNTV	FA499	VOL	EU		TIME		HRS		—	1											
[illegible]	[illegible]	[illegible]	[illegible]		[illegible]		[illegible]		—	1											



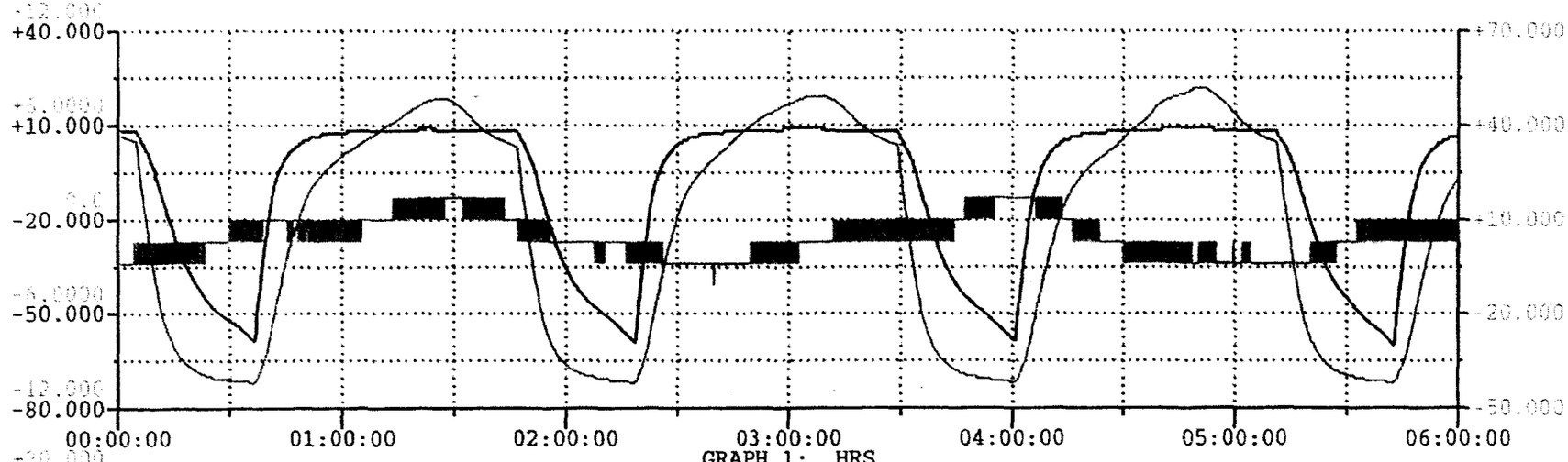
EPS3-10

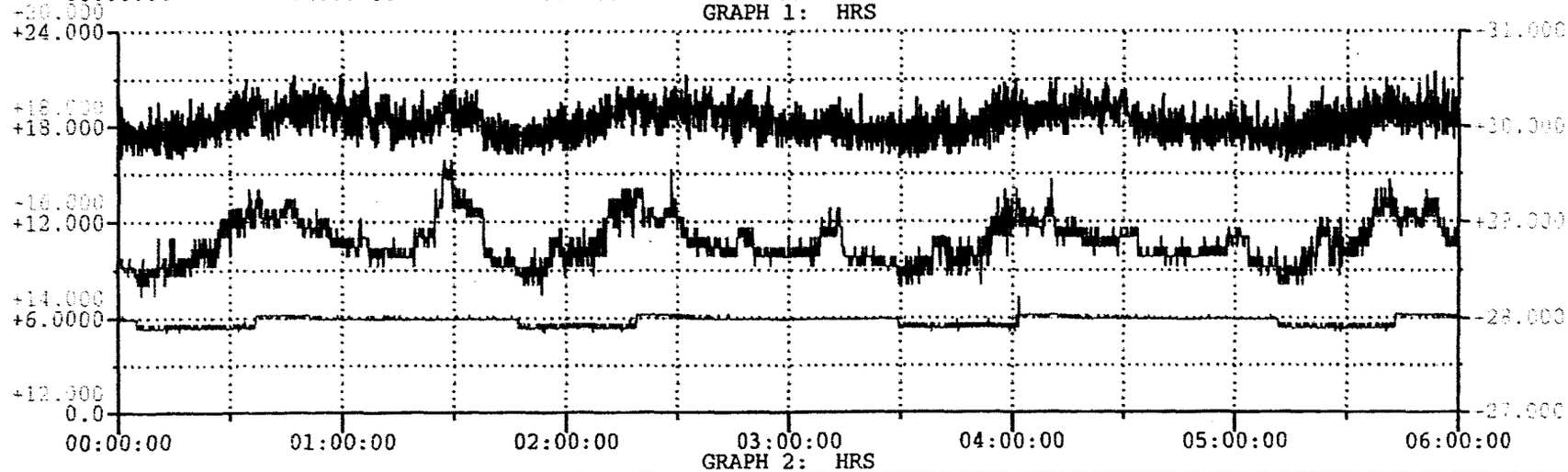
PLOT NAME: NRT_OPS$HISPLOT_PLOT:N16PPLT2
TITLE: N16PLR2
DESCRIPTION: NOAA-16 POWER PLOT #2
SETUP FILENAME: NRT_OPS$HISPLOT_SETUP:N16PLR2
START/STOP TIME: 00/285/00:00:00.0 - 00/285/06:00:00.0

SCID: 16
PLOT CREATION DATE: 285/22:47:14
PLOT PRINT DATE: 285/23:08:33
SAMPLING PERIOD: 000/00:00:08.00

Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
CSALT1	FSAT1	DEG	EU		TIME		HRS		—	1
CSALT1	FSAT0	DEG	EU		TIME		HRS		—	1
SLSADE22	FC047	DEG	EU		TIME		HRS		—	1
NPSEBUSI	FA296	AMP	EU		TIME		HRS		—	2

Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
NPSEBUSV	FA153	VOL	EU		TIME		HRS		—	2
NPSEMAIN	FA270	AMP	EU		TIME		HRS		—	2



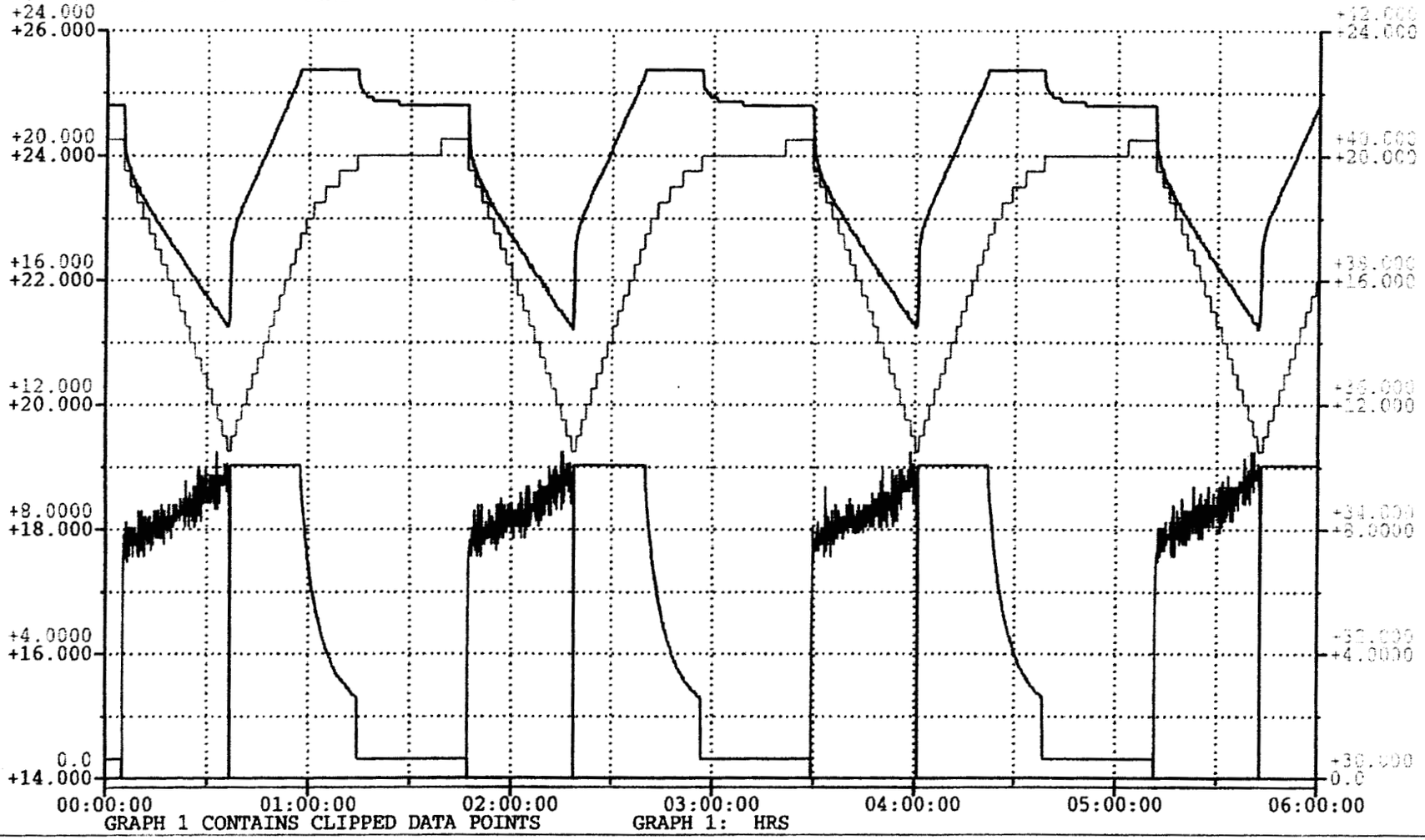


EPS 3-11

PLOT NAME: NRT_OPS$HISPLOT_PLOT:N16PPLT3
TITLE: N16PLR3
DESCRIPTION: NOAA-16 POWER PLOT #3
SETUP FILENAME: NRT_OPS$HISPLOT_SETUP:N16PLR3
START/STOP TIME: 00/285/00:00:00.0 - 00/285/06:00:00.0

SCID: 16
PLOT CREATION DATE: 285/22:48:39
PLOT PRINT DATE: 285/23:11:03
SAMPLING PERIOD: 000/00:00:08.00

Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
NBAT1V	FA480	VOL	EU		TIME		HRS		—	1											
NBAT1DCH	FA332	AMP	EU		TIME		HRS		—	1											
NBAT1CHI	FA300	AMP	EU		TIME		HRS		—	1											
[illegible]	[illegible]	[illegible]	[illegible]		TIME		HRS		—	1											

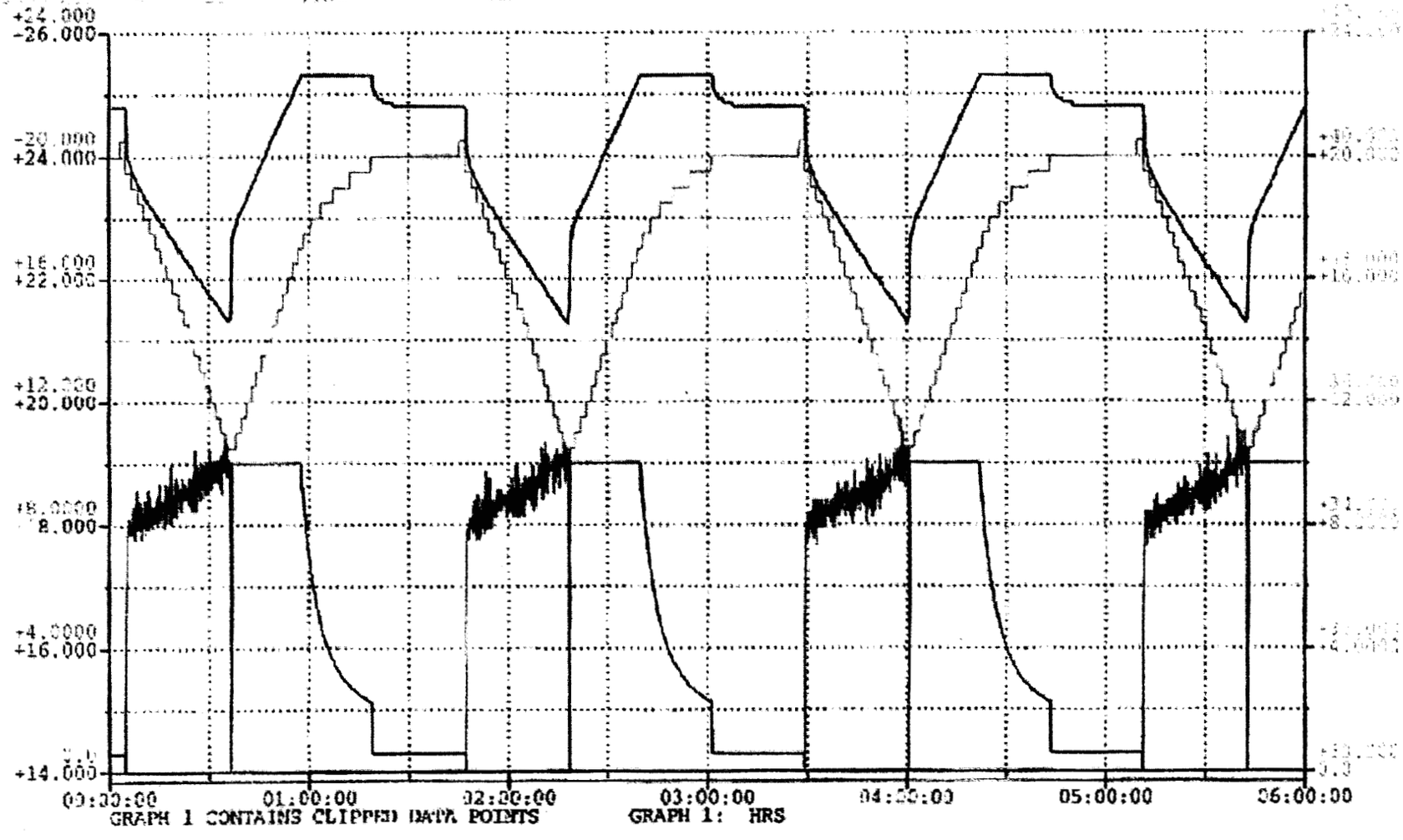


EPS3-12

PLOT NAME: NRT_OPS$HISPLOT_PLOT:N16PPLT4
TITLE: N16PLR4
DESCRIPTION: NOAA-16 POWER PLOT 4
SETUP FILENAME: NRT_OPS$HISPLOT_SETUP:N16PLR4
START/STOP TIME: 00/285/00:00:00.0 - 00/285/06:00:00.0

SCID: 16
PLOT CREATION DATE: 285/22:50:06
PLOT PRINT DATE: 285/23:13:18
SAMPLING PERIOD: 000/00:00:00.00

Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
NBATZV	PA488	VOL	EU		TIME		HRS		—	1											
[illegible]	[illegible]	[illegible]	[illegible]		[illegible]		[illegible]		—	[illegible]											
NBATRCHI	PA316	AMP	[illegible]		TIME		HRS		—	1											
[illegible]	[illegible]	[illegible]	[illegible]		[illegible]		[illegible]		—												

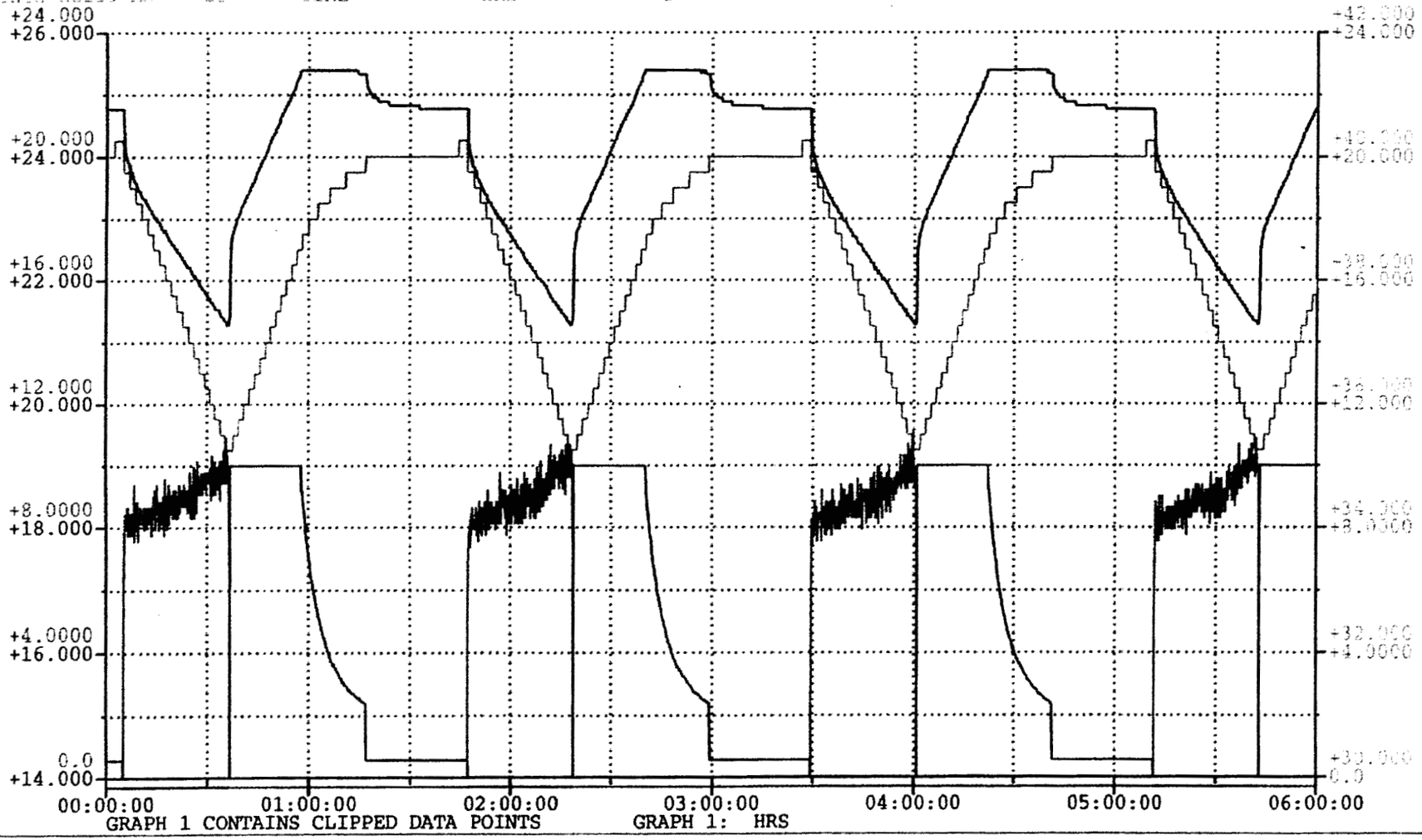


EPS3-13

PLOT NAME: NRT_OPS$HISPLOT_PLOT:N16PPLT5
TITLE: N16PLR5
DESCRIPTION: NOAA-16 POWER PLOT 5
SETUP FILENAME: NRT_OPS$HISPLOT_SETUP:N16PLR5
START/STOP TIME: 00/285/00:00:00.0 - 00/285/06:00:00.0

SCID: 16
PLOT CREATION DATE: 285/22:51:31
PLOT PRINT DATE: 285/23:15:42
SAMPLING PERIOD: 000/00:00:08.00

Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
NBAT3V	FA472	VOL	EU		TIME		HRS		—	1											
NBAT3DCH	FA284	AMP	EU		TIME		HRS		—	1											
NBAT3CHI	FA276	AMP	EU		TIME		HRS		—	1											
BB3CSNOW	HC110	AH	EU		TIME		HRS		—	1											

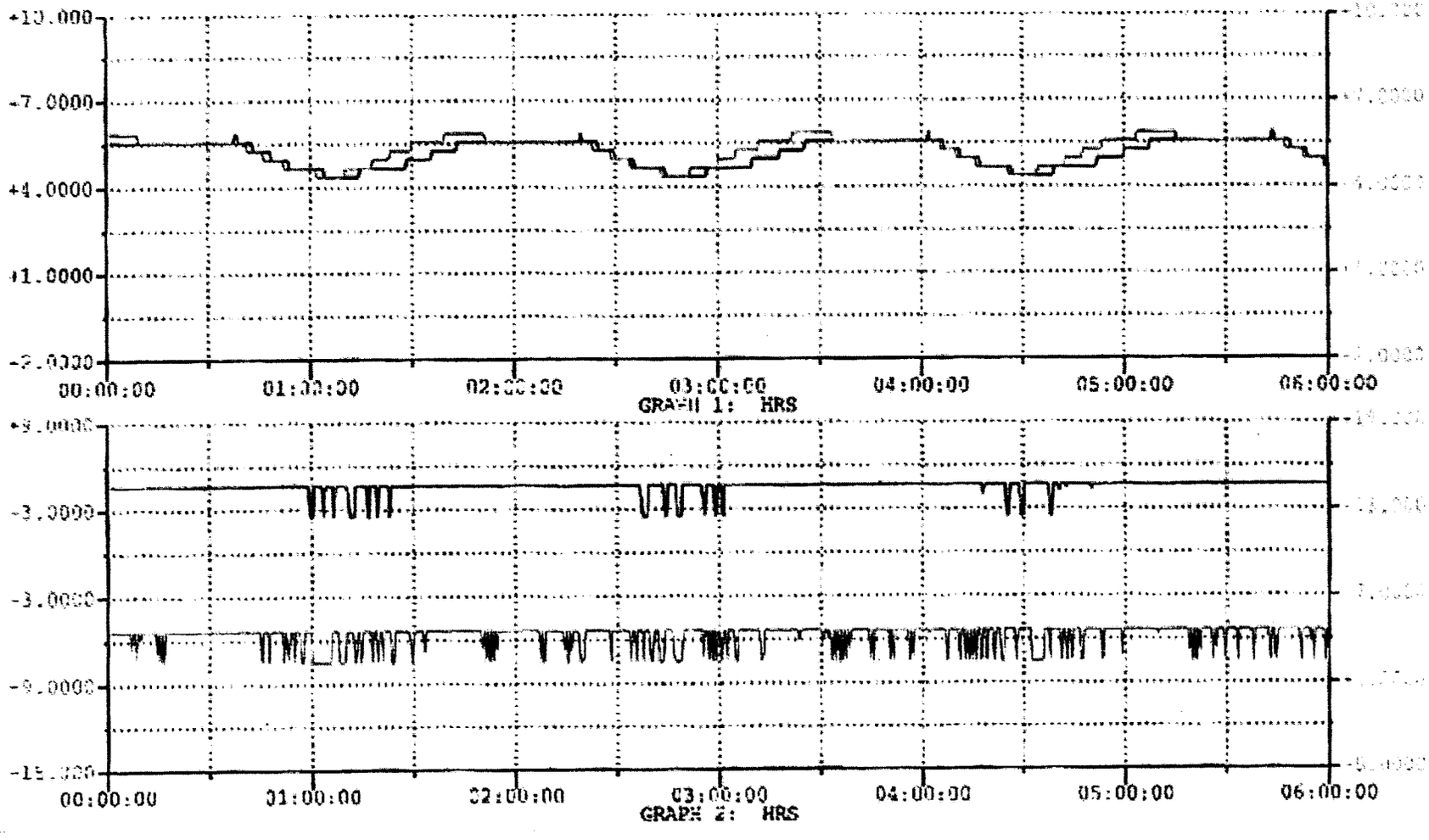


EPS3-14

PLOT NAME: NRT_OPS$HISPLOT_PLOT:N16PPLT6
TITLE: N16PLR6
DESCRIPTION: NOAA-16 POWER PLOT #6
SETUP FILENAME: NRT_OPS$HISPLOT_SETUP:N16PLR6
START/STOP TIME: 00/285/00:00:00.0 - 00/285/06:00:00.0

SCID: 16
PLOT CREATION DATE: 285/22:52:56
PLOT PRINT DATE: 285/23:17:59
SAMPLING PERIOD: 000/00:00:32.00

Y-DATA	CHAN	UNITS	TYPE	VS X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS X_DATA	CHAN	UNITS	TYPE	SYM	GPH
NHATIAT	FAC26	DEG	EU	TIME		HRS		—	1										
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]		—	[illegible]										
NTCELH	FA261	VOLT	EU	TIME		HRS		—	2										
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]		—	[illegible]										

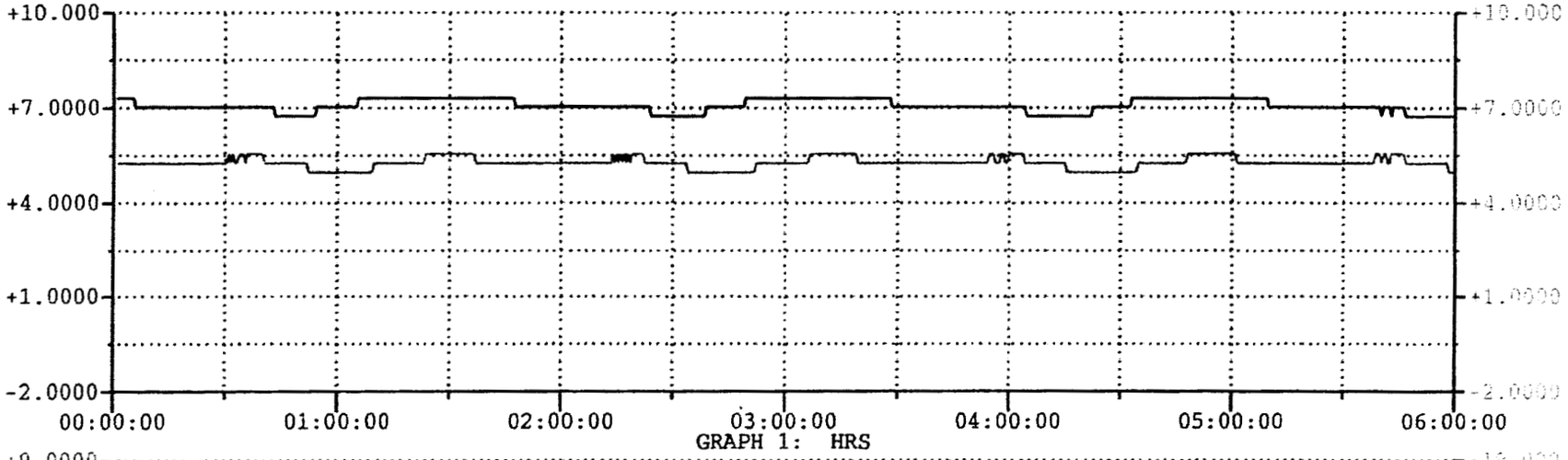


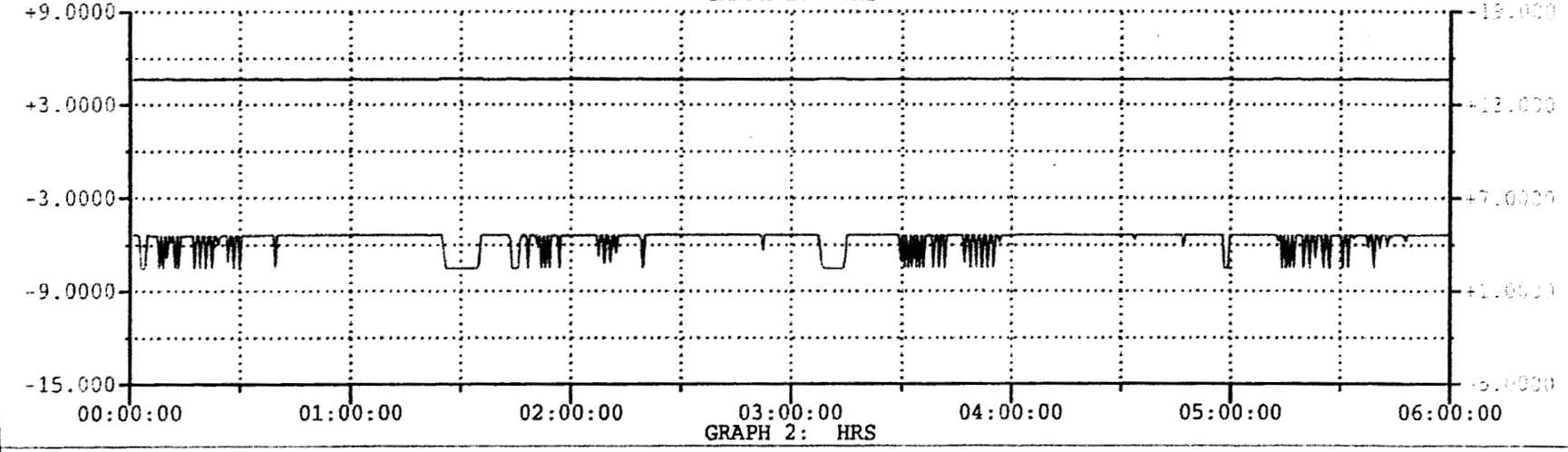
EPS 3-15

PLOT NAME: NRT_OPS$HISPLOT_PLOT:N16PPLT7
TITLE: N16PLR7
DESCRIPTION: NOAA-16 POWER PLOT #7
SETUP FILENAME: NRT_OPS$HISPLOT_SETUP:N16PLR7
START/STOP TIME: 00/285/00:00:00.0 - 00/285/06:00:00.0

SCID: 16
PLOT CREATION DATE: 285/22:54:13
PLOT PRINT DATE: 285/23:19:00
SAMPLING PERIOD: 000/00:00:32.00

Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
NBAT2AT	FA042	DEG	EU		TIME		HRS		—	1											
NBAT2BT	FA050	DEG	EU		TIME		HRS		—	1											
NTCE3H	FA233	VOL	EU		TIME		HRS		—	2											
NTCE4P	FA061	VOL	EU		TIME		HRS		—	2											



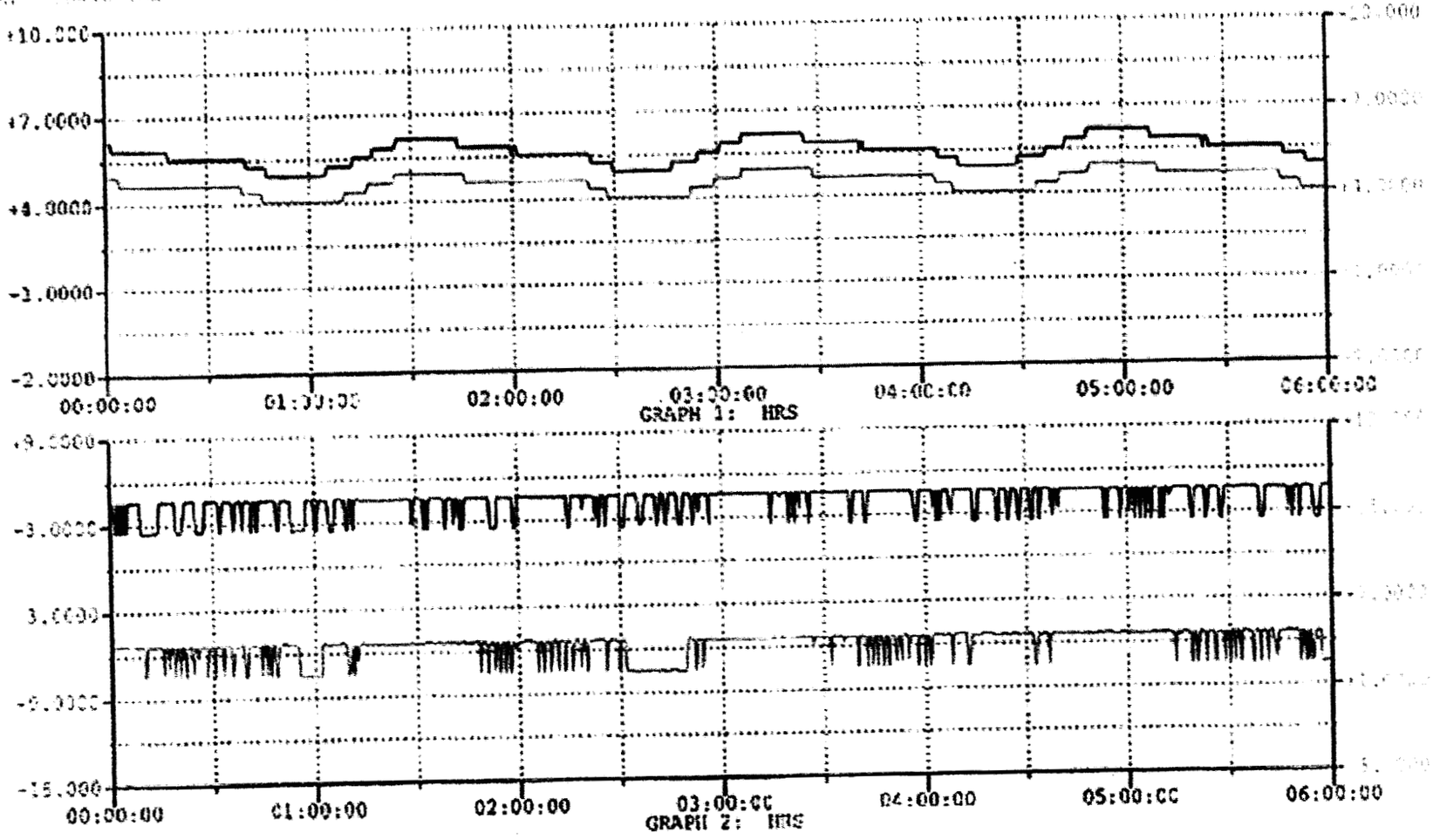


EPS 3-1

PLOT NAME: NRT_OPS$HISPLOT_PLOT:N16PLT8
TITLE: N16PLR8
DESCRIPTION: NOAA 16 POWER PLOT #8
SETUP FILENAME: NRT_OPS$HISPLOT_SETUP:N16PLR8
START/STOP TIME: 00/285/00:00:00.0 - 00/285/06:00:00.0

SCID: 16
PLOT CREATION DATE: 285/22:55:35
PLOT PRINT DATE: 285/23:20:06
SAMPLING PERIOD: 000/00:00:32.00

Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
NBAT3AT	FA066	DEG	EU		TIME		HRS		—	1											
NBAT3AR	FA074	DEG	EU		TIME		HRS		—	1											
NPCBSH	FA432	VOL	EU		TIME		HRS		—	2											
NPCBAR	FA448	VOL	EU		TIME		HRS		—	2											



EPS3-17

OV TESTS - EPS004

EPS004 - Battery Maintenance

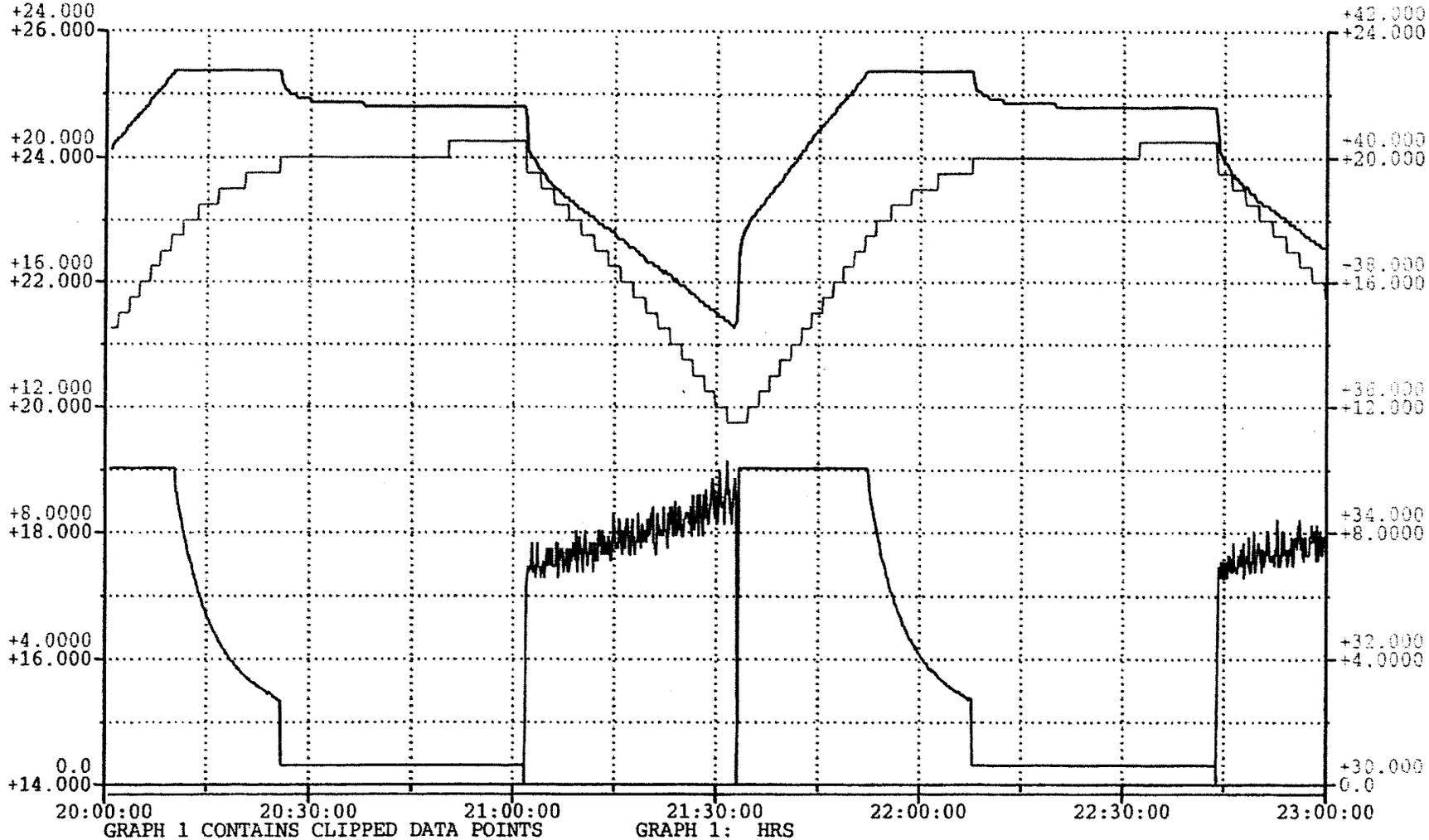
Purpose: Verify battery health and performance by making sure that the power management software (PMS) control has been enabled and set properly.

Results: The PMS control has been enabled and set properly. The charging of batteries changed from charge (10 A or 7.5 A) mode to trickle charge (0.5 A) mode when the batteries attained the pre-selected C/D ratio.

PLOT NAME: NRT_OPS$HISPLOT_PLOT:16PL3
TITLE: N16PLR3
DESCRIPTION: NOAA-16 POWER PLOT #3
SETUP FILENAME: NRT_OPS$HISPLOT_SETUP:N16PLR3
START/STOP TIME: 00/321/20:00:00.0 - 00/321/23:00:00.0

SCID: 16
PLOT CREATION DATE: 322/14:25:46
PLOT PRINT DATE: 322/14:29:44
SAMPLING PERIOD: 000/00:00:08.00

Y-DATA	CHAN	UNITS	TYPE	VS X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS X_DATA	CHAN	UNITS	TYPE	SYM	GPH
NBAT1V	FA480	VOL	EU	TIME		HRS		—	1										
NBAT1DCH	FA332	AMP	EU	TIME		HRS		—	1										
NBAT1CHI	FA300	AMP	EU	TIME		HRS		—	1										
BB1CSNOW	HC109	AH	EU	TIME		HRS		—	1										



GRAPH 1 CONTAINS CLIPPED DATA POINTS GRAPH 1: HRS

OV TESTS - EPS005 (Sheet 1 of 2)

EPS005 - PMS Performance

Purpose: Verify PMS operational performance via routine operations.

Results:

Description	Status	Comments
Bat/BCA-1 Over-Temperature Level-2+ Commanding	Enabled	Not triggered
Bat/BCA-2 Over-Temperature Level-2+ Commanding	Enabled	Not triggered
Bat/BCA-3 Over-Temperature Level-2+ Commanding	Enabled	Not triggered
Bat-1 C/D Ratio VT Commanding	Enabled	Functioning properly regularly
Bat-2 C/D Ratio VT Commanding	Enabled	Functioning properly regularly
Bat-3 C/D Ratio VT Commanding	Enabled	Functioning properly regularly
Bat-1 State of Charge below Minimum - Safe State commanding*	Enabled	Not triggered
Bat-2 State of Charge below Minimum - Safe State commanding *	Enabled	Not triggered
Bat-3 State of Charge below Minimum - Safe State commanding*	Enabled	Not triggered

* for this function FIPSS should be enabled and it has been enabled.

OV TESTS - EPS005 (Sheet 2 of 2)

EPS005 - PMS Performance

Results (continued):

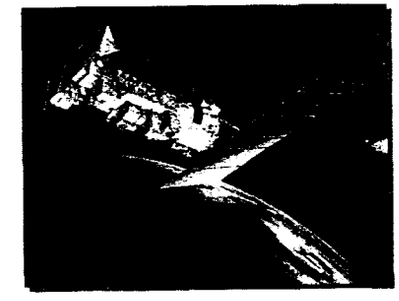
Description	Status	Comments
Bat-1 Voltage below Minimum - Safe State commanding*	Enabled	Not triggered
Bat-2 Voltage below Minimum - Safe State commanding*	Enabled	Not triggered
Bat-3 Voltage below Minimum - Safe State commanding*	Enabled	Not triggered
Sun Loss - Safe State Commanding*	Not Enabled	***Should have been enabled. See "Concerns, Anomalies,....."***
Short Circuit Detection & Correction (SHORTDC) - Safe State Commanding	Enabled	Not triggered
Main Bus Voltage Monitor (MBVMON) - BVR RESET Commanding	Enabled	Not triggered
PSE Mode Controller Monitor (MCNMON) - Switch to the Backup Mode Controller	Enabled	Not triggered
SADBIAS - automatically increases the solar array offset when the bus voltage remains continuously higher than 28.75V**	Enabled	Not triggered

* for this function FIPSS should be enabled and it has been enabled.

** and returns back to default offset at sunrise.

CONCERNS, ANOMALIES, AND OPERATIONAL IMPACTS

- Battery pack operating temperatures
  - *The current battery pack operating temperature is acceptable, although not preferable, we need to keep a close watch on battery pack 2A temperature.*
  - Maybe we lost a blanket due to bad Velcro.
- Sun-loss commanding of power survival safe state
  - The EPS is now configured for operational mode except for "sun-loss commanding of power survival safe state."
  - To preclude a possibility of losing all spacecraft power when the spacecraft goes through three blind orbits, *the "sun-loss commanding" should be enabled with or without a software patch before declaring NOAA-16 operational, although uploading the software patch is preferable.* The software patch algorithm can be configured to prevent spacecraft entering inadvertently into safe state during spacecraft-moon-eclipse.



ADACS OV RESULTS

J. Blue

Overview of ADACS Events from First Contact to NOAA Handover

- At first contact (Rev 0) Attitude Determination and Control System (ADACS) was in yaw gyrocompass (YGC) mode
- Auto Thruster Momentum Unload S/W thruster Firing Completed by Rev 2
- Rev 3 Arrays Slewed to -30 deg (Pitch attitude transient approx 0.6 deg)
- Rev 6 Reset RYC to primary and re-enabled RYC switching
- Rev 6 Inhibited thruster firing
- Rev 15 Command ESA Algorithm to "Primary"
- Rev 43 Disabled Auto Thruster Unload and ADACS to Nominal Mode
- Rev 47 Started SADPOS test
- Rev 49 Successfully completed SADPOS test. SADCS mode commanded and set Array offset to -55 deg (.5 deg pitch transient)
- Rev 50 SADPOS observed to be in control. Array offset=0 deg
- Rev 51 Commanded SADCS control and array offset =-55 deg (.5 deg pitch transient)
- Rev 73 Slew Solar Arrays from -55 to -45 deg (0.6 deg pitch transient)
- Rev 104 Stopping AMSU-B scan motor induced 0.04 deg roll transient
- Rev 116 Slew Solar Arrays from -45 to -35 deg (.6 deg pitch transient)
- Rev 117 Loaded Ephemeris to non-control CPU
- Rev 118 Load/Start new ephemeris in Control CPU
- No ADACS Out-of-Limit Parameters/Flags
- ADACS performance - Nominal

- NOAA-L / NOAA-16 REAL-TIME OPS TURNED OVER TO NOAA

ADACS Status At First Contact

- ADACS in YGC Mode
- Initial Reaction Wheel Speeds (RPM)

RWAX	+1840/-1080
RWAY	+1235/-1725
RWAZ	–540/-150

- Magnetic Momentum Unload Coils
  RYC in Backup, PTC in Primary
- 93 Total Thruster Firings (completed by Rev 2)
  -Yaw=14, +Yaw=36 / -Roll=43, +Roll=0
- Attitude and Rate Errors Well Behaved

Handover Tests and Results

Test Number	Title	Objective
ADC001	Handover	Document initial attitudes and rates at time S/C attitude control was handed over from Ascent Guidance System (AGS) to on-orbit ADACS
ADC002	Rate Nulling Mode	Determine ADACS performance in damping the handoff rates
ADC003	Search Mode	If any quadrant of the ESA is off the Earth, evaluate ADACS performance in acquiring Earth-lock
At first contact the ADACS was in YGC Mode		

OV Test ADC004

ADC004 – Yaw Gyrocompass Mode (YGC)

Objective:

Evaluate the performance of the ADACS in YGC Mode

Requirement:

In the YGC Mode, yaw axis control is achieved by "gyrocompassing," using a linear combination of the sensed rotation rates about the roll and yaw axes as the control reference. Roll and pitch axis control shall be to null the ESA outputs as in the Nominal mode.

Results:

Roll and pitch attitude control was observed to be within +/- 0.15 degrees at first contact. Within several orbits, steady state of +/_0.05 achieved.

Sun/Moon intrusions resulted in roll/pitch error transients on the order of 0.1 degrees. The resultant roll rate transients caused "indicated" yaw errors of up to several degrees.

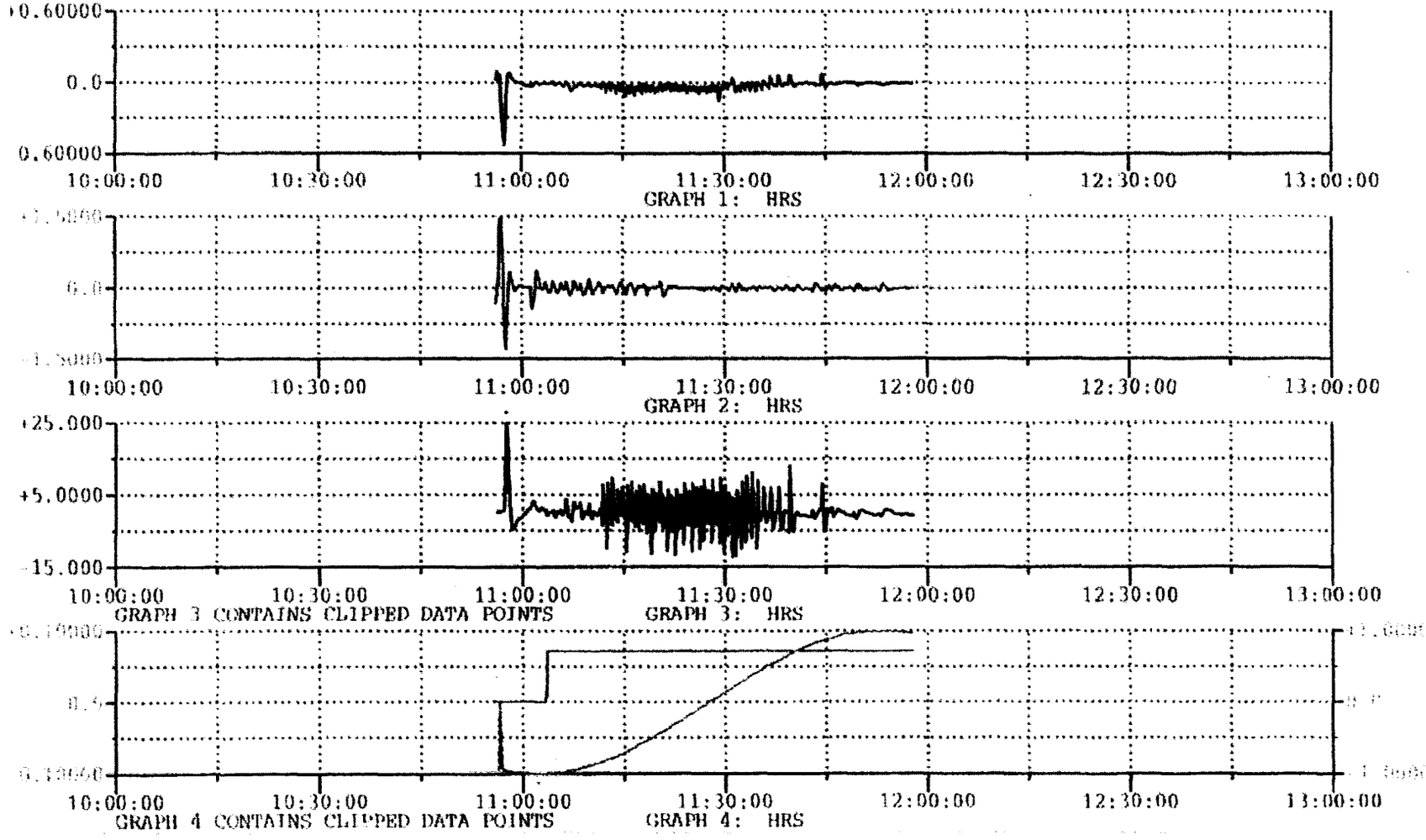
"Actual" yaw attitude transient errors derived by integrating the yaw rate gyro outputs show that the yaw errors were on the order of 0.7 degrees.

Steady-state yaw pointing, as per yaw update values were <0.3 degrees.

PLOT NAME: NRT OPS$HISPLOT_PLOT:0000RYP
TITLE: NOAA-16 ATTITUDE ERRORS
DESCRIPTION: AMSU-B BACK TO SCN MODE
SETUP FILENAME: NRT_OPS$HISPLOT_SETUP:00JBRYP
START/STOP TIME: 00/265/10:00:00.0 - 00/265/13:00:00.0

SCID: 16
PLOT CREATION DATE: 321/21:08:15
PLOT PRINT DATE: 321/21:09:44
SAMPLING PERIOD: 000/00:00:08.00

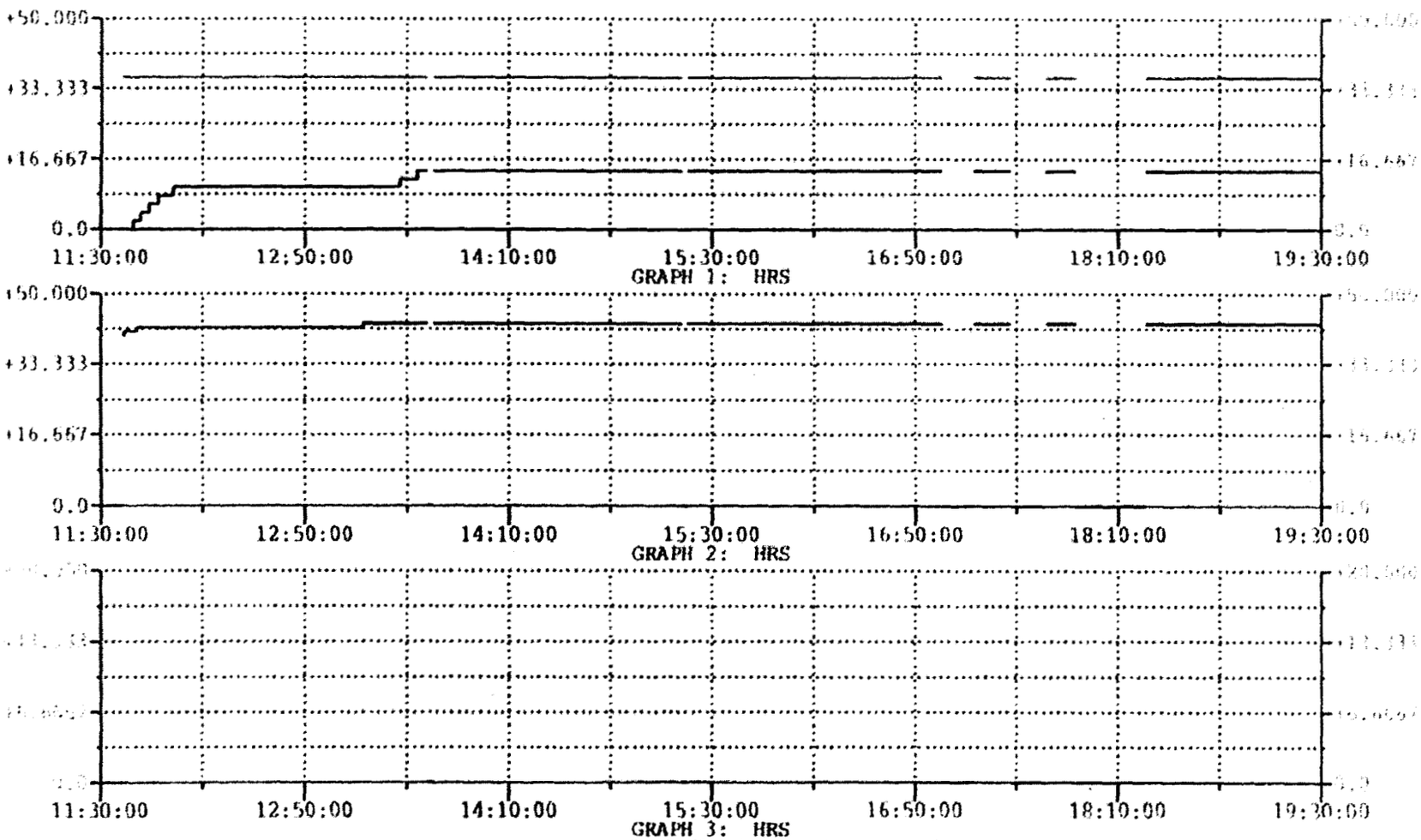
Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
BROLLERR	FC006	DEG	EU		TIME		HRS		—	1	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]		[illegible]		—	4
BPITCHERR	FC009	DEG	EU		TIME		HRS		—	2											
BYAWERR	FC003	DEG	EU		TIME		HRS		—	3											
BYAWCMD	FC024	DEG	EU		TIME		HRS		—	4											



PLOT NAME: NRT_OPS$HISPLOT_PLOT:000THR8
TITLE: NOAA 16 XYZ THRUSTER COUNTS
DESCRIPTION: YAW, ROLL, AND PITCH THRUSTER FIRE COUNTS AT HANDOVER
SETUP FILENAME: NRT_OPS$HISPLOT_SETUP:LLC_THR
START/STOP TIME: 00/265/11:30:00.0 - 00/265/19:30:00.0

SCID: 16
PLOT CREATION DATE: 322/20:16:18
PLOT PRINT DATE: 322/20:22:16
SAMPLING PERIOD: 000/00:00:08.00

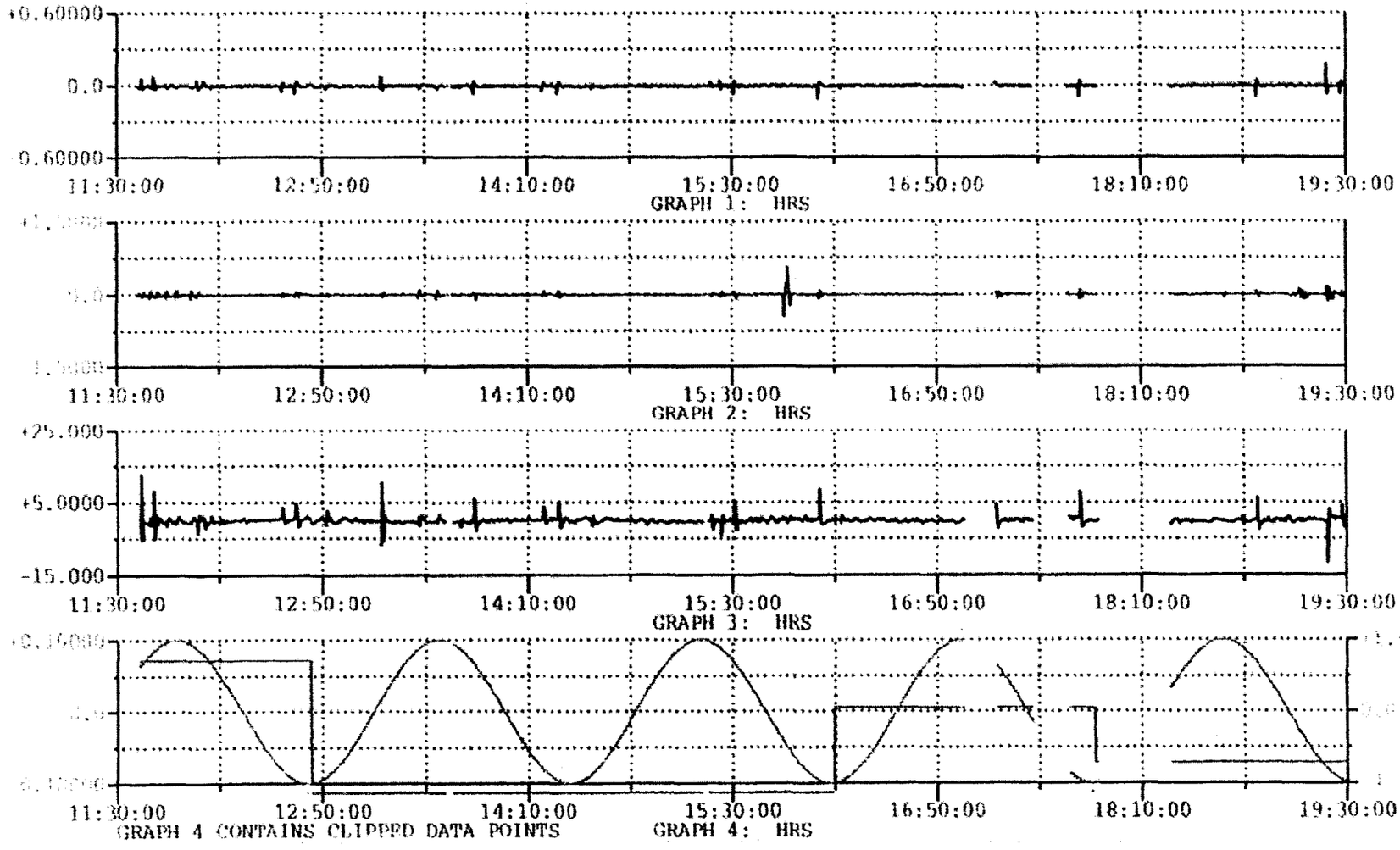
Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
BXNEGTHR	HC043	HEX	EU		TIME		HRS		—	1
BXPOSTHR	HC042	HEX	EU		TIME		HRS		—	1
BYNEGTHR	HC044	HEX	EU		TIME		HRS		—	2
BYPOSTHR	HC041	HEX	EU		TIME		HRS		—	2



PLOT FILENAME: NRT OPS$HISPLOT_PLOT:0000RY3
TITLE: NOAA-16 ATTITUDE ERRORS
DESCRIPTION: AMSU-B BACK TO SCN MODE
SETUP FILENAME: NRT OPS$HISPLOT_SETUP:00JBRYP
START/STOP TIME: 00/265/11:30:00.0 - 00/265/19:30:00.0

SCID: 16
PLOT CREATION DATE: 322/19:26:32
PLOT PRINT DATE: 322/20:09:00
SAMPLING PERIOD: 000/00:00:08.00

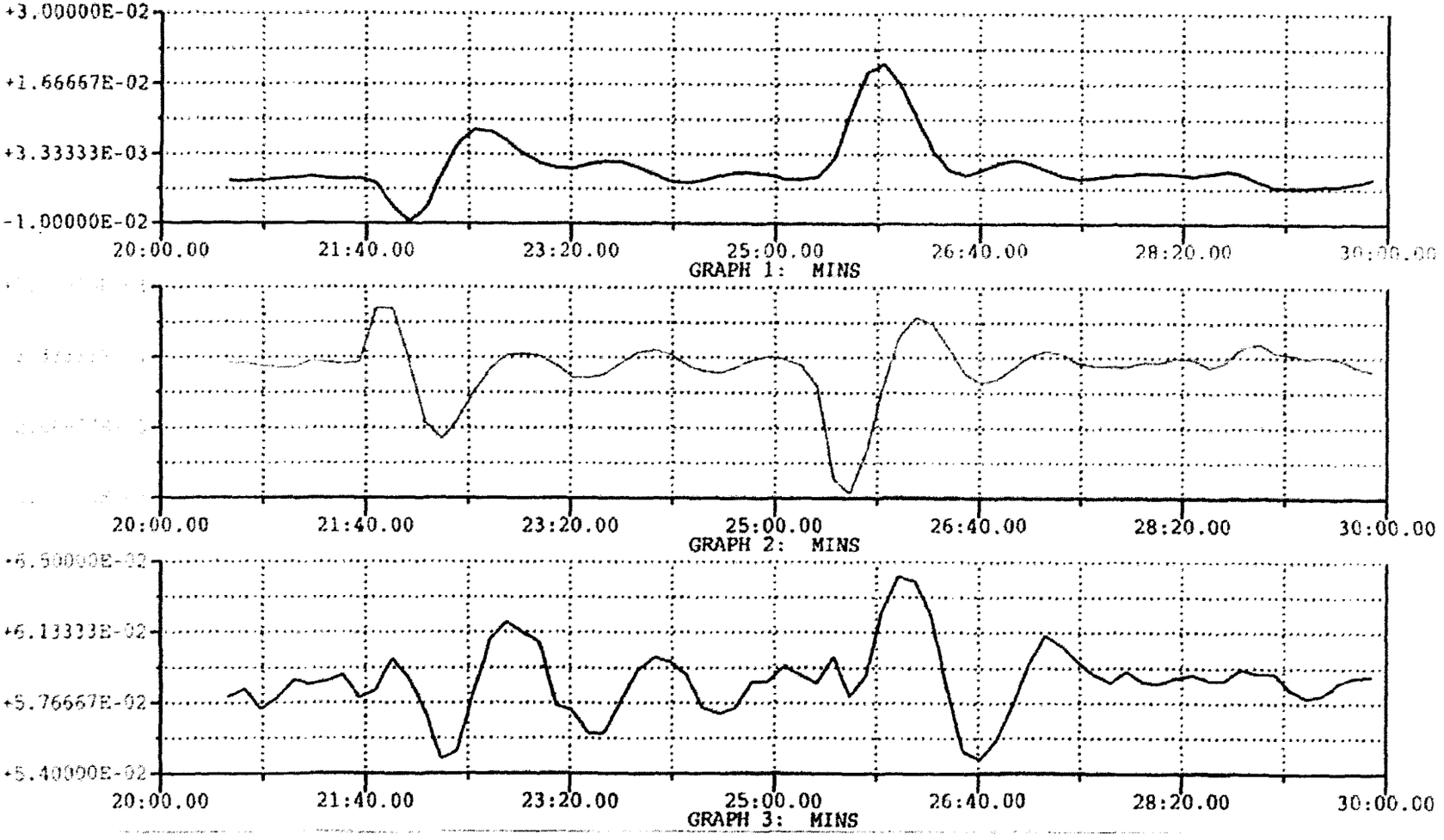
Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
BROLLERR	FC006	DEG	EU		TIME		HRS		—	1
[illegible]	[illegible]	[illegible]	[illegible]		[illegible]		[illegible]		[illegible]	[illegible]
BYAWERR	FC003	DEG	EU		TIME		HRS		—	3
[illegible]	[illegible]	[illegible]	[illegible]		[illegible]		[illegible]		[illegible]	[illegible]



PLOT NAME: NRT_OPS$HISPLOT_PLOT:JB2
TITLE: JB2
DESCRIPTION:
SETUP FILENAME: NRT_OPS$HISPLOT_SETUP:JB2
START/STOP TIME: 00/265/15:20:00.0 - 00/265/15:30:00.0

SCID: 16
PLOT CREATION DATE: 269/21:10:41
PLOT PRINT DATE: 269/21:31:05
SAMPLING PERIOD: [illegible]

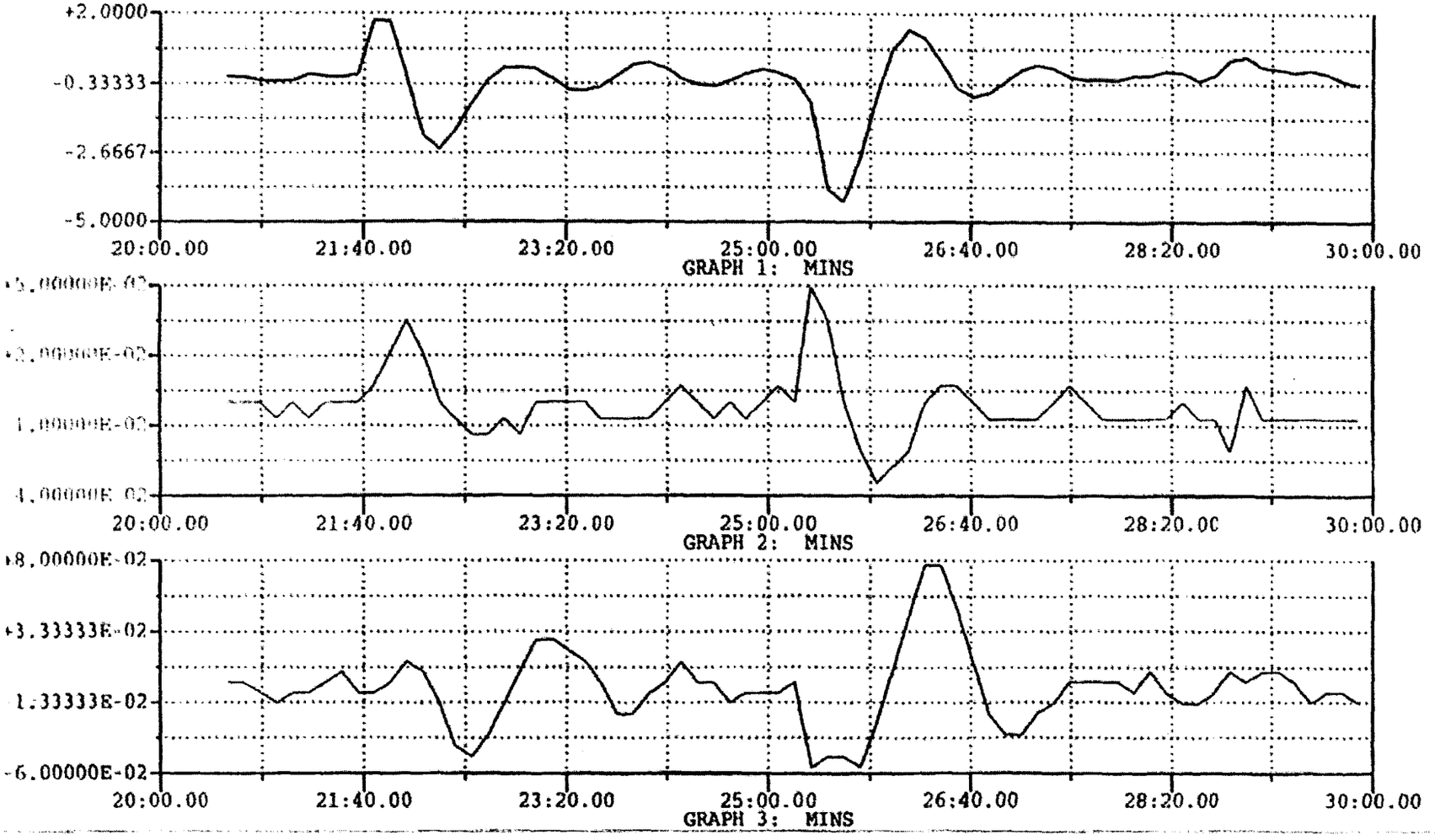
Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
BXBGYFLT	FC002	D/S	EU		TIME		MINS		—	1											
[illegible]	[illegible]	[illegible]	[illegible]		[illegible]		MINS		—	2											
BZBGYFLT	FC008	D/S	EU		TIME		MINS		—	3											



PLOT NAME: NRT_OPS$HISPLOT_PLOT:JB1
TITLE: JB1
DESCRIPTION:
SETUP FILENAME: NRT_OPS$HISPLOT_SETUP:JB1
START/STOP TIME: 00/265/15:20:00.0 - 00/265/15:30:00.0

SCID: 16
PLOT CREATION DATE: 269/21:10:26
PLOT PRINT DATE: 269/21:30:23
SAMPLING PERIOD: 000/00:00:08.00

Y-DATA	CHAN	UNITS	TYPE	VS X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS X_DATA	CHAN	UNITS	TYPE	SYM	GPH
BYAWERR	FC003	DEG	EU	TIME		MINS		—	1										
[illegible]	[illegible]	DEG	EU	TIME		MINS		—	2										
[illegible]	[illegible]	DEG	EU	TIME		MINS		—	3										



OV Tests ADC005 and ADC007

ADC005 – Nominal Mode

ADC007 – Attitude Control in Nominal Mode

Objective:

Evaluate the performance of the ADACS in the Nominal Control Mode

Requirement:

Roll, pitch, and yaw angles to be controlled in Nominal Mode to within +/- 0.2

Rate Limits:	Roll rate:	+/- 0.015 deg/sec
	Pitch & yaw rate:	+/- 0.035 deg/sec

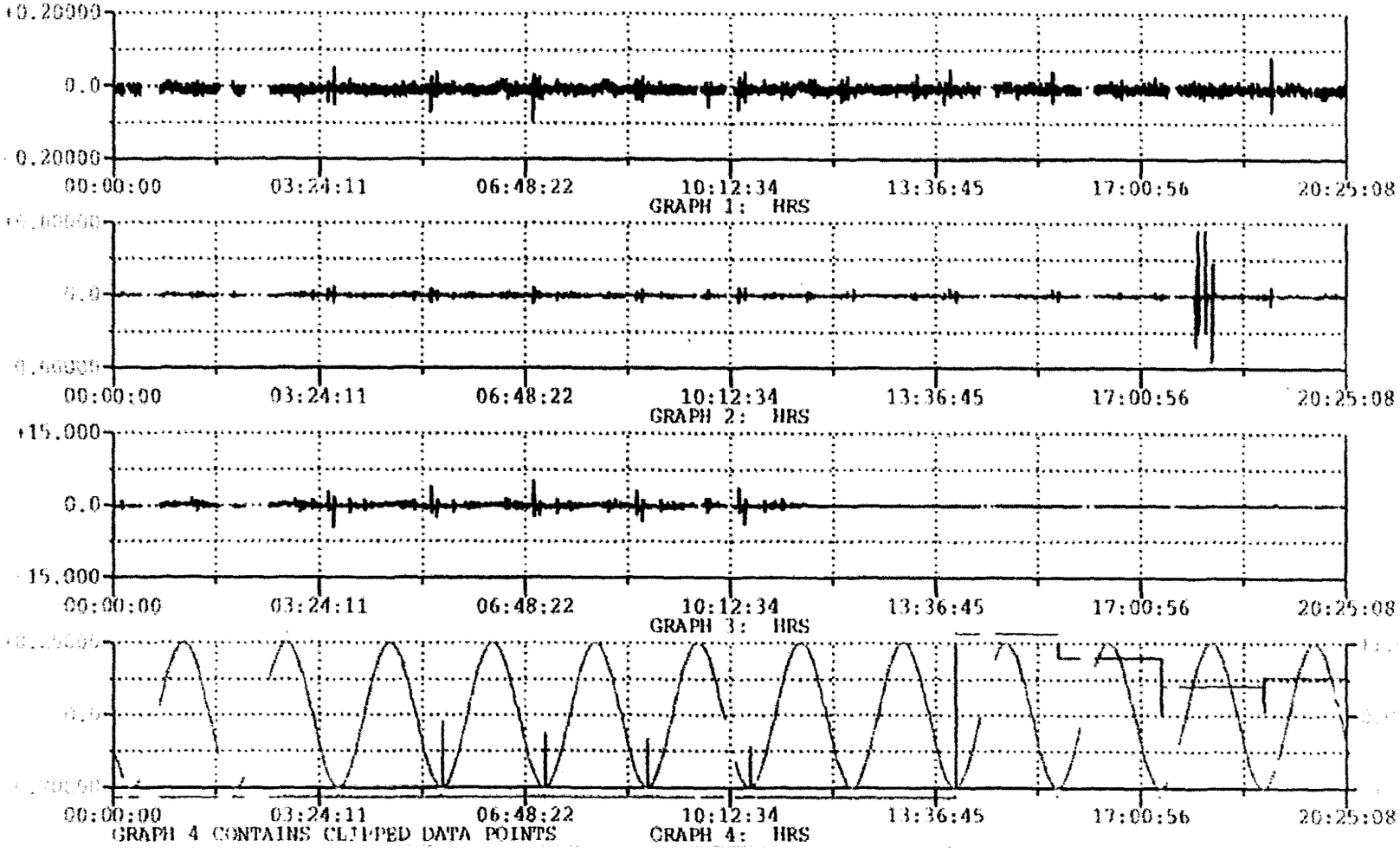
Results:

Performance in Nominal Mode is per design, with no anomalies

PLOT NAME: NRT_OPS$HISPLOT_PLOT:000RYPNM
TITLE: NOAA-16 ATTITUDE ERRORS
DESCRIPTION: AMSU-B BACK TO SCN MODE
SETUP FILENAME: NRT_OPS$HISPLOT_SETUP:00JBRYP
START/STOP TIME: 00/268/00:00:00.0 - 00/269/00:00:00.0

SCID: 16
PLOT CREATION DATE: 322/20:49:29
PLOT PRINT DATE: 322/21:11:51
SAMPLING PERIOD: 000/00:00:08.00

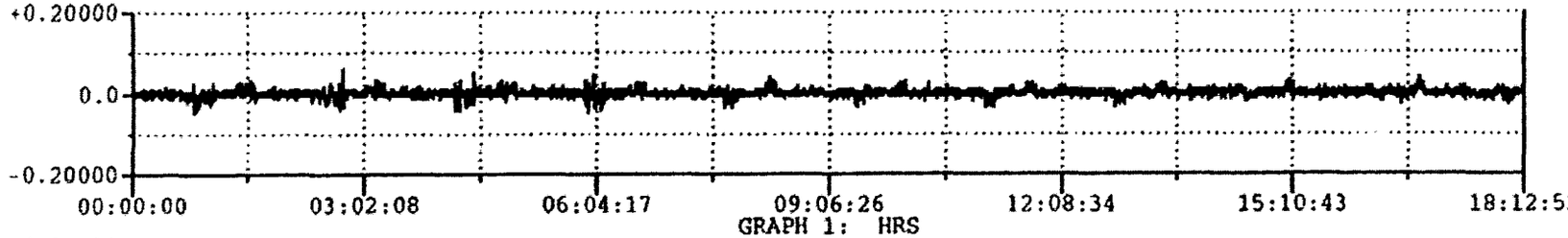
Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
BROLLERR	FC006	DEG	EU		TIME		HRS		—	1	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]		[illegible]		—	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]		TIME		HRS		—	2											
BYAWERR	FC003	DEG	EU		TIME		HRS		—	3											
[illegible]	[illegible]	[illegible]	[illegible]		TIME		HRS		—	4											



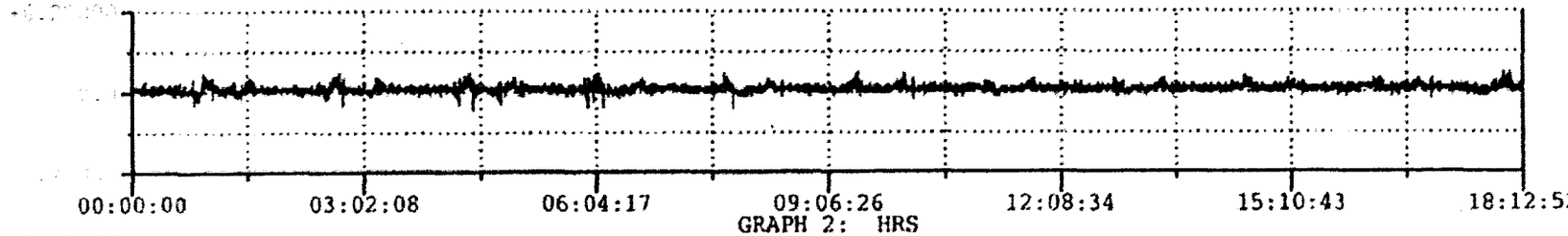
PLOT NAME: NRT_OPS$HISPLOT_PLOT:0000RYP
TITLE: NOAA-16 ATTITUDE ERRORS
DESCRIPTION: AMSU-B BACK TO SCN MODE
SETUP FILENAME: NRT_OPS$HISPLOT_SETUP:00JBRYP
START/STOP TIME: 00/309/00:00:00.0 - 00/310/00:00:00.0

SCID: 16
PLOT CREATION DATE: 327/10:32:24
PLOT PRINT DATE: 327/10:38:42
SAMPLING PERIOD: 000/00:00:08.00

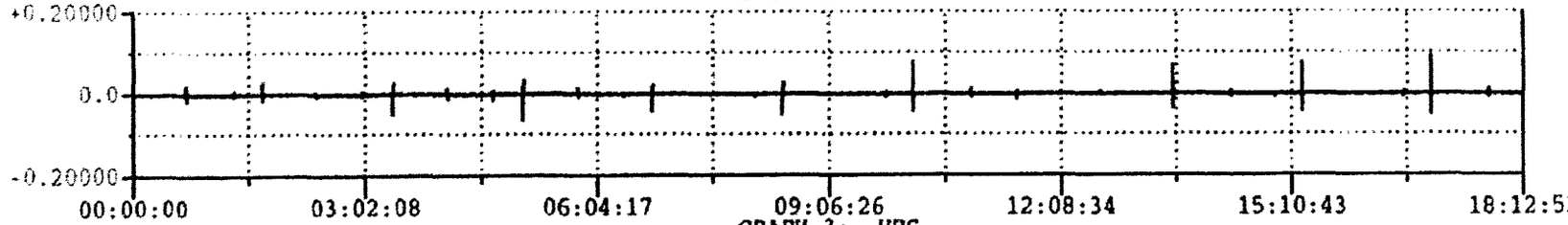
Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
BROLLERR	FC006	DEG	EU		TIME		HRS		—	1	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]		[illegible]		—	4
[illegible]	[illegible]	DEG	EU		TIME		HRS		—	2											
BYAWERR	FC003	DEG	EU		TIME		HRS		—	3											
[illegible]	[illegible]	[illegible]	[illegible]		[illegible]		[illegible]		—	4											



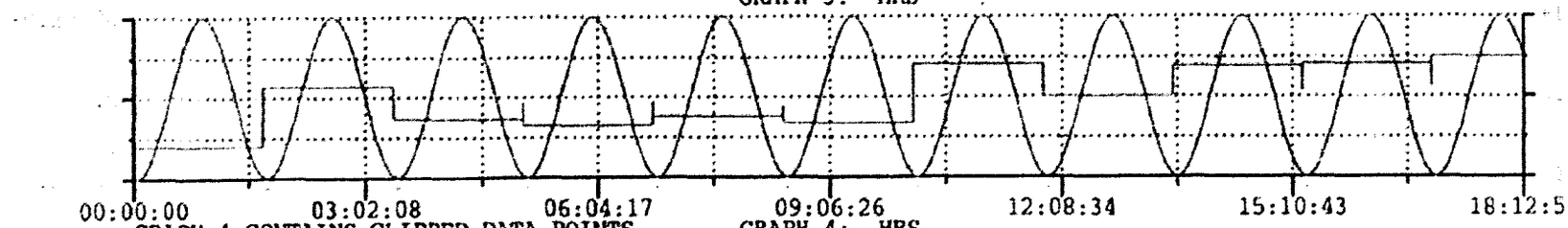
GRAPH 1: HRS



GRAPH 2: HRS



GRAPH 3: HRS



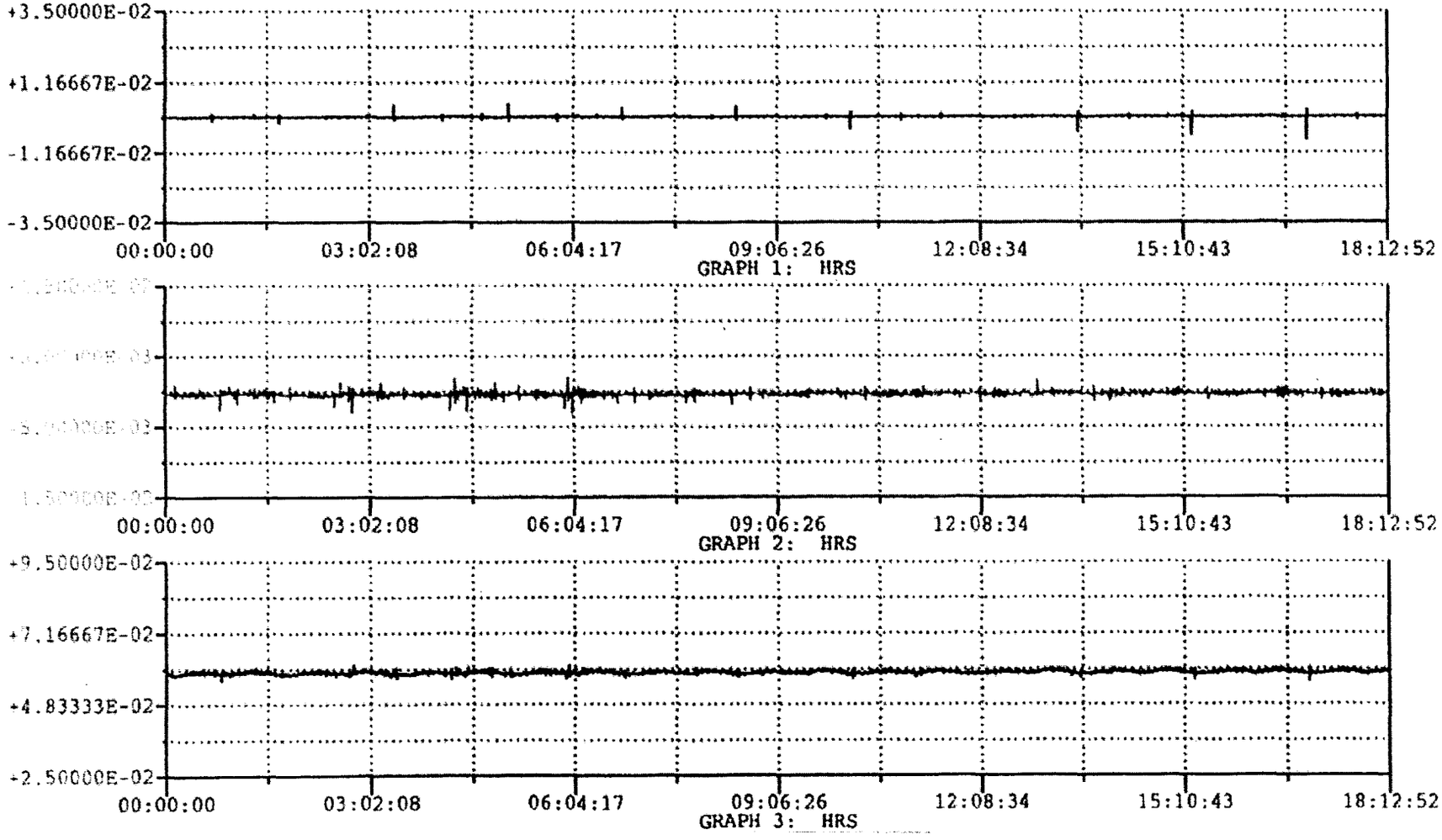
GRAPH 4 CONTAINS CLIPPED DATA POINTS

GRAPH 4: HRS

PLOT NAME: NRT_OPS$HISPLOT_PLOT:000BRT
TITLE: LLC_BRT
DESCRIPTION: FILT GYRO DATA
SETUP FILENAME: NRT_OPS$HISPLOT_SETUP:LLC_BRT
START/STOP TIME: 00/309/00:00:00.0 - 00/309/18:12:52.0

SCID: 16
PLOT CREATION DATE: 327/13:25:24
PLOT PRINT DATE: 327/13:29:40
SAMPLING PERIOD: 000/00:00:16.00

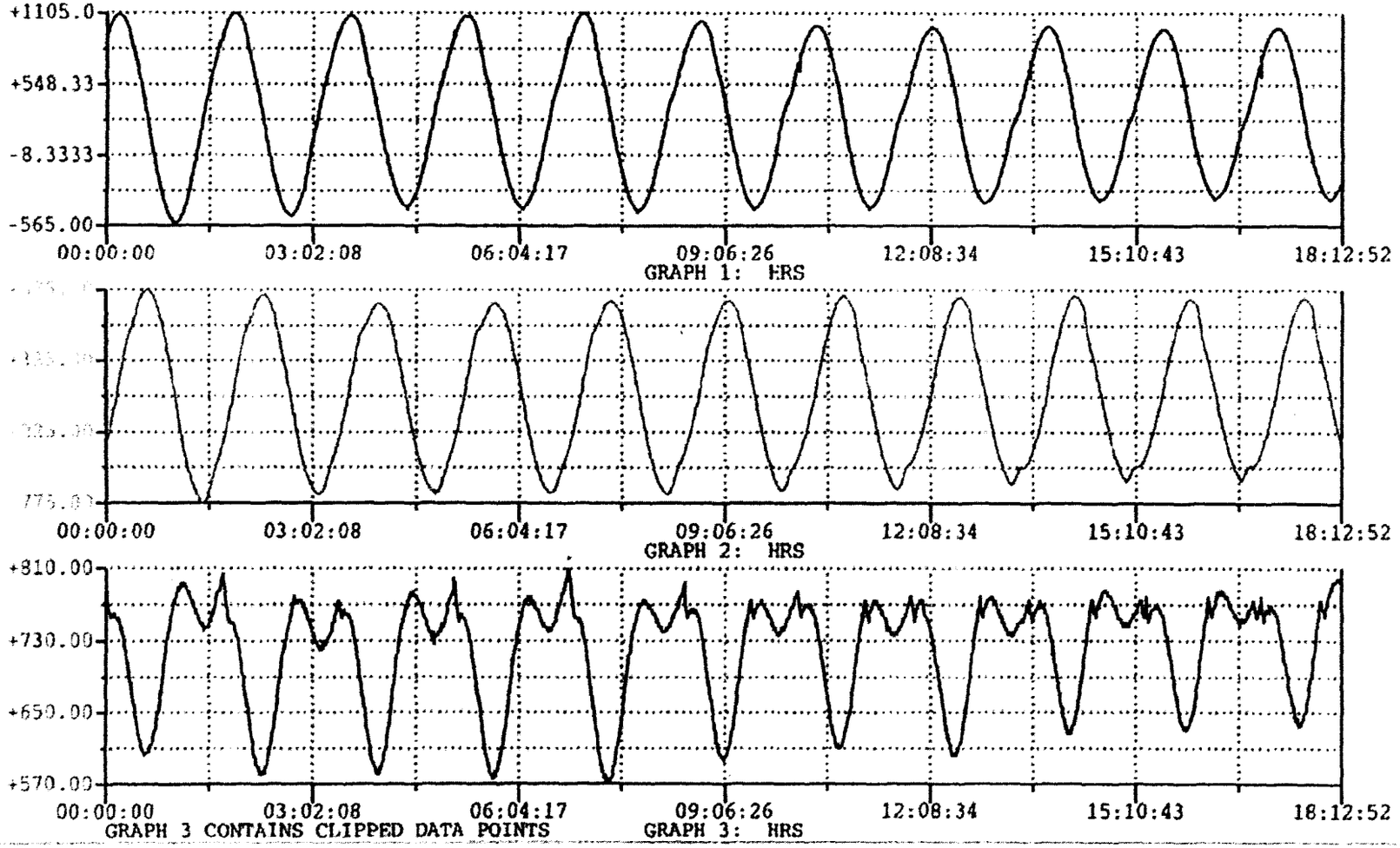
Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
BXBGYFLT	FC002	D/S	EU		TIME		HRS		—	1											
BYBGYFLT	FC003	D/S	EU		TIME		HRS		—	2											
BZBGYFLT	FC008	D/S	EU		TIME		HRS		—	3											



PLOT NAME: NRT_OPS$HISPLOT_PLOT:000RWA
TITLE: NOAA 16 WHEEL SPEEDS
DESCRIPTION: WHEEL SPEEDS AT HANDOVER
SETUP FILENAME: NRT_OPS$HISPLOT_SETUP:LLC_RWA1
START/STOP TIME: 00/309/00:00:00.0 - 00/309/18:12:52.0

SCID: 16
PLOT CREATION DATE: 327/12:52:57
PLOT PRINT DATE: 327/13:03:53
SAMPLING PERIOD: 000/00:00:32.00

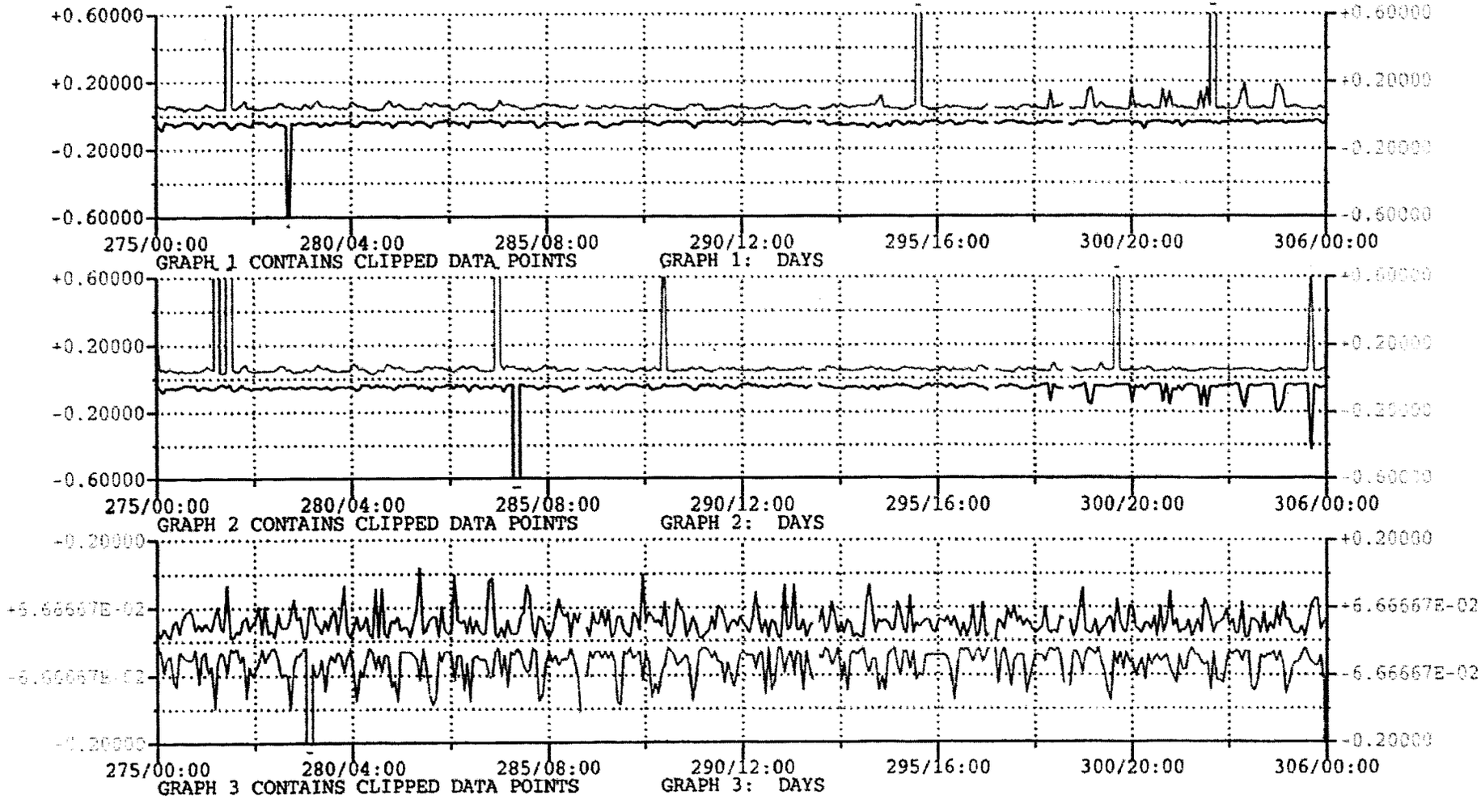
Y-DATA	CHAN	UNITS	TYPE	VS X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS X_DATA	CHAN	UNITS	TYPE	SYM	GPH
BRWAX	IC076	RPM	EU	TIME		HRS		—	1										
BRWAY	IC077B	RPM	EU	TIME		HRS		—	2										
BRWAZ	IC078	RPM	EU	TIME		HRS		—	3										



PLOT NAME: NRT_OPS$TRENDPLOT_PLOT:0000ADAC
TITLE: TREND PLOT ATTITUDE ERRORS
DESCRIPTION: ATTITUDE ERRORS
SETUP FILENAME: NRT_OPS$TRENDPLOT_SETUP:0000ADAC
START/STOP TIME: 00/275/00:00:00.0 - 00/306/00:00:00.0

SCID: 16
PLOT CREATION DATE: 333/18:25:08
PLOT PRINT DATE: 333/18:25:59
SAMPLING PERIOD: 000/01:03:20.00
MIN AVAILABILITY %: 50.00%

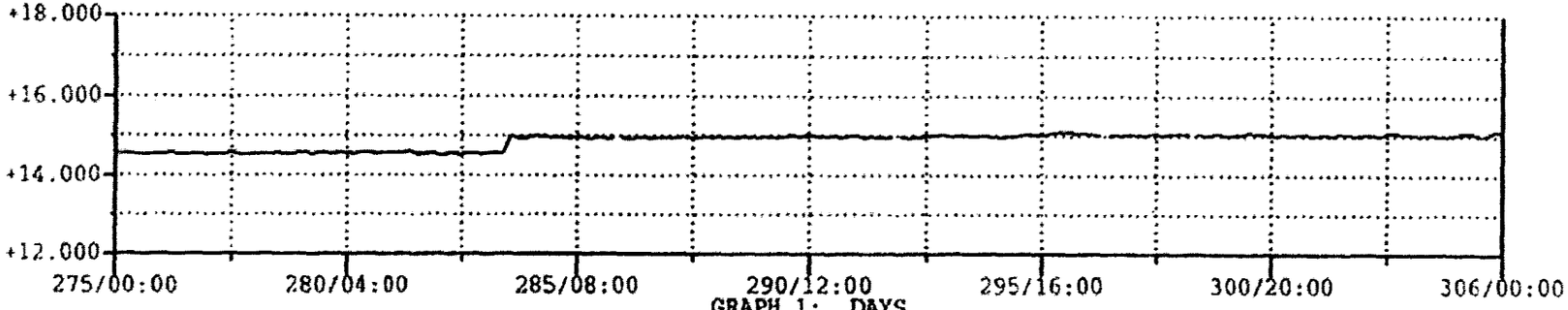
Y-DATA	CHAN	UNITS	TYPE	VS X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS X_DATA	CHAN	UNITS	TYPE	SYM	GPH
BROLLERR	FC006	DEG	MIN	TIME		DAYS		—	1	BYAWERR	FC003	DEG	MIN	TIME		DAYS		—	3
BROLLERR	FC006	DEG	MAX	TIME		DAYS		—	1	BYAWERR	FC003	DEG	MAX	TIME		DAYS		—	3
BPTCHERR	FC009	DEG	MIN	TIME		DAYS		—	2										
BPTCHERR	FC009	DEG	MAX	TIME		DAYS		—	2										



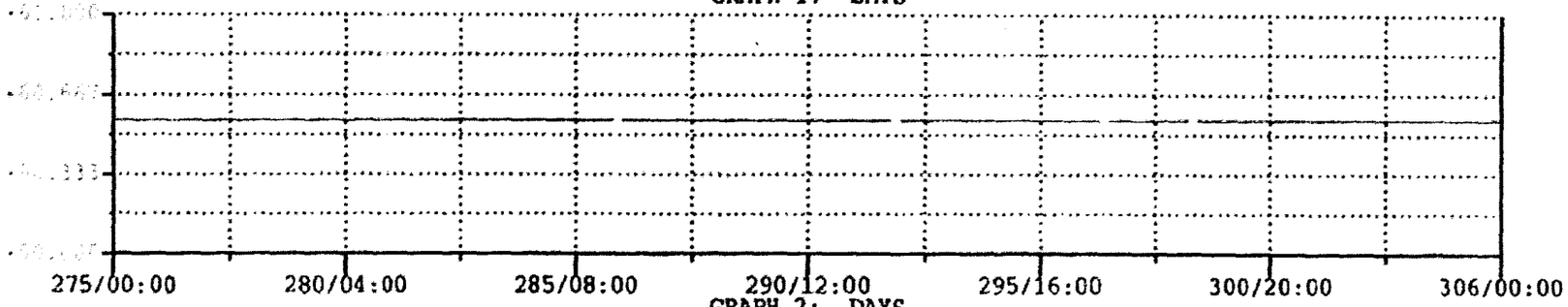
PLOT NAME: NRT_OPS$TRENDPLOT_PLOT:00IMU01
TITLE: ADPLKIMU
DESCRIPTION: ANY TELEMETRY
SETUP FILENAME: NRT_OPS$TRENDPLOT_SETUP:ADPLKIMU
START/STOP TIME: 00/275/00:00:00.0 - 00/306/00:00:00.0

SCID: 16
PLOT CREATION DATE: 308/15:10:01
PLOT PRINT DATE: 308/15:19:03
SAMPLING PERIOD: 000/00:00:08.00
MIN AVAILABILITY %: 50.00%

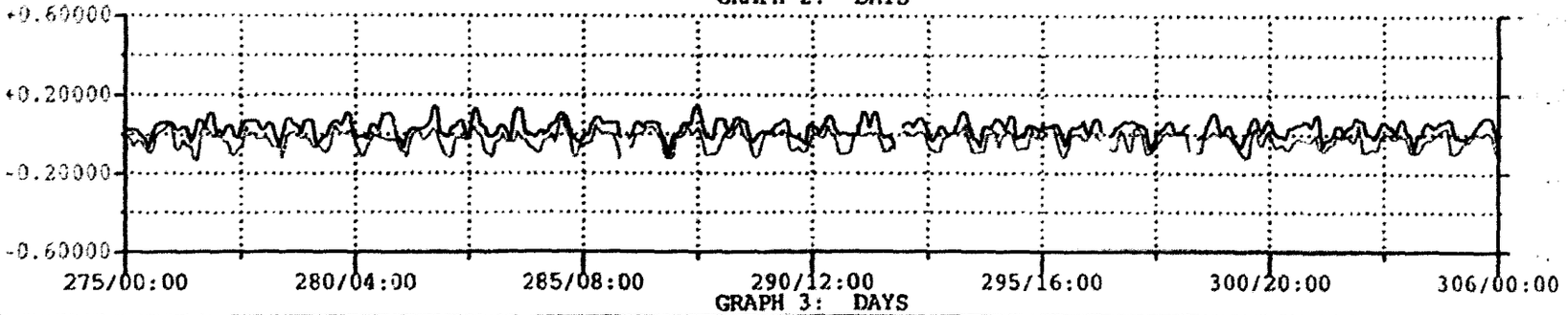
Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
NIMUTCA	FA043	VOL	MEAN		TIME		DAYS		—	1											
[illegible]	[illegible]	DEG	MEAN		TIME		DAYS		—	2											
BYAWUPD	FC023	DEG	MAX		TIME		DAYS		—	3											
[illegible]	[illegible]	[illegible]	[illegible]		[illegible]		[illegible]		—	[illegible]											



GRAPH 1: DAYS



GRAPH 2: DAYS

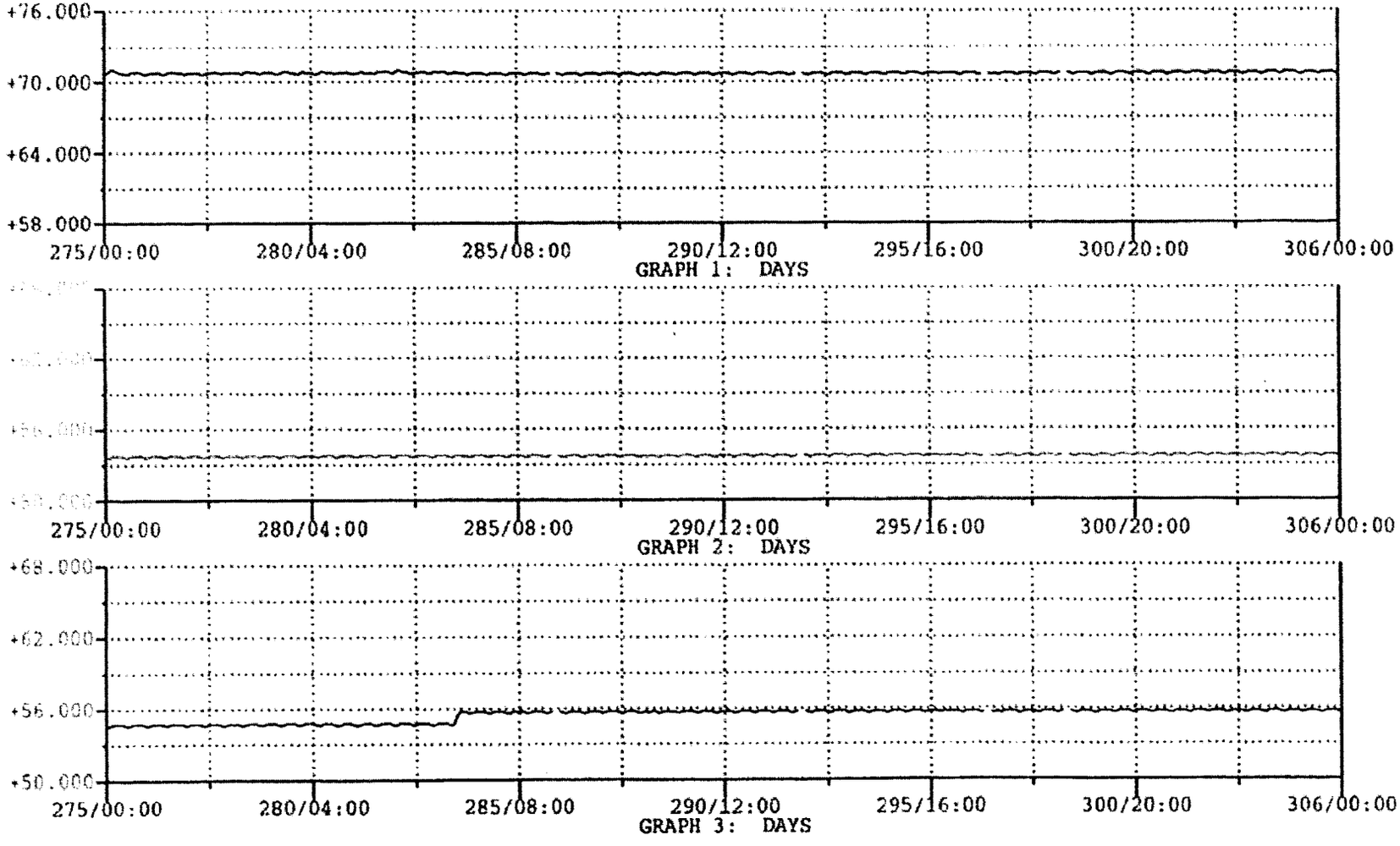


GRAPH 3: DAYS

PLOT NAME: NRT_OPS$TRENDPLOT_PLOT:00IMU02
TITLE: GYRO DATA FOR TESTING
DESCRIPTION: (CPU-B)
SETUP FILENAME: NRT_OPS$TRENDPLOT_SETUP:ADPLKI
START/STOP TIME: 00/275/00:00:00.0 - 00/306/00:00:00.0

SCID: 16
PLOT CREATION DATE: 308/15:31:27
PLOT PRINT DATE: 308/15:34:18
SAMPLING PERIOD: 000/00:00:08.00
MIN AVAILABILITY %: 50.00%

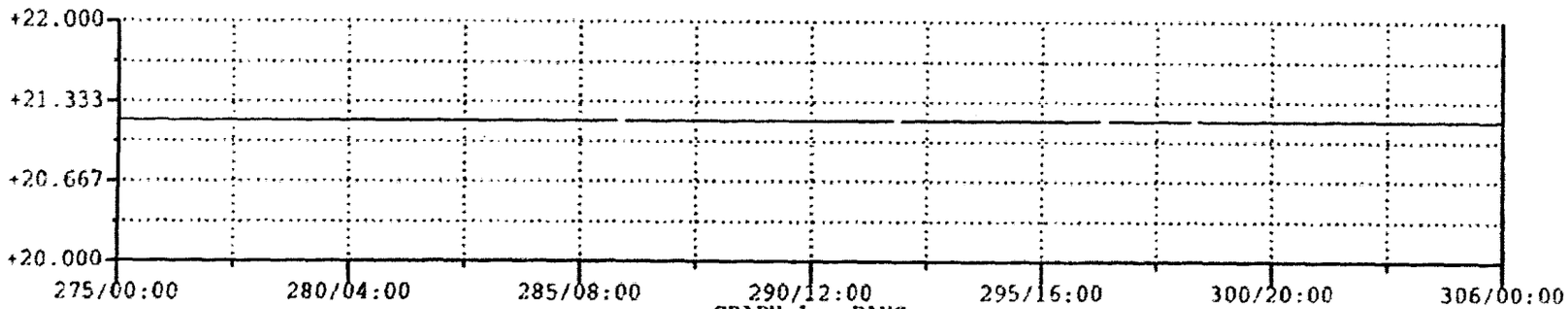
Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
NGY1MTRI	FA113	MA	MEAN		TIME		DAYS		—	1											
NGY2MTRI	FA350	MA	MEAN		TIME		DAYS		—	2											
NGY3MTRI	FA450	MA	MEAN		TIME		DAYS		—	3											



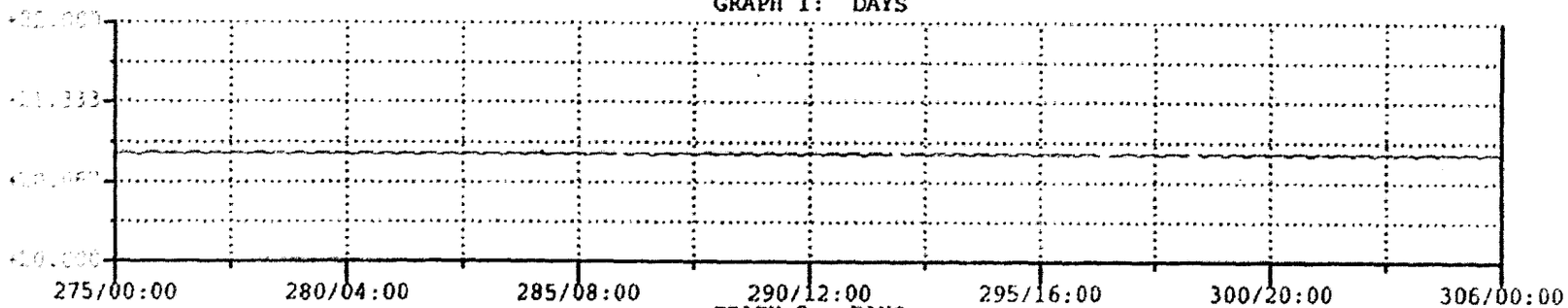
PLOT NAME: NRT_OPSSTRENDPLOT_PLOT:00IMU03
TITLE: ADPLKV
DESCRIPTION: IMU SPIN MOTOR PHASE VOLTAGE
SETUP FILENAME: NRT_OPSSTRENDPLOT_SETUP:ADPLKV
START/STOP TIME: 00/275/00:00:00.0 - 00/306/00:00:00.0

SCID: 16
PLOT CREATION DATE: 308/15:17:26
PLOT PRINT DATE: 308/15:26:46
SAMPLING PERIOD: 000/00:00:08.00
MIN AVAILABILITY %: 50.00%

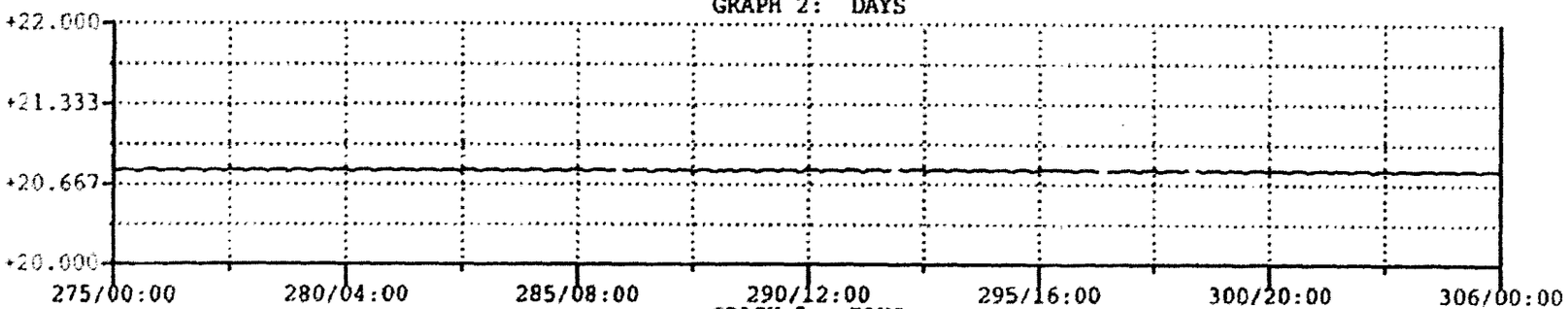
Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
NIMUSMA	FA487	VOL	MEAN		TIME		DAYS		—	1											
NIMUSMB	FA477	VOL	MEAN		TIME		DAYS		—	2											
NIMUSMC	FA257	VOL	MEAN		TIME		DAYS		—	3											



GRAPH 1: DAYS



GRAPH 2: DAYS

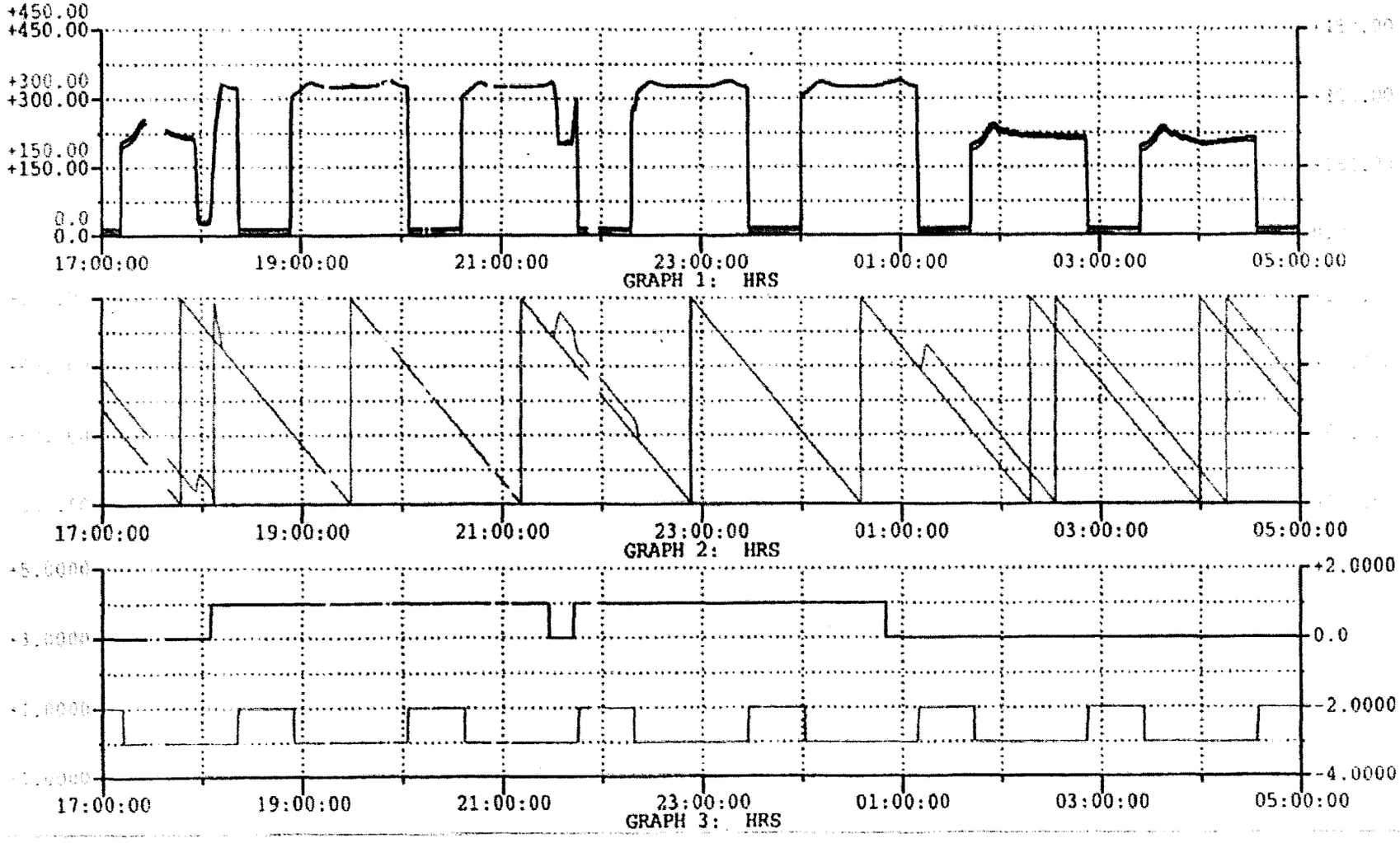


GRAPH 3: DAYS

PLOT NAME: NRT_OPS$HISPLOT_PLOT:SAD268
TITLE: LLC_SAD
DESCRIPTION:
SETUP FILENAME: NRT_OPS$HISPLOT_SETUP:LLC_SAD
START/STOP TIME: 00/268/17:00:00.0 - 00/269/05:00:00.0

SCID: 16
PLOT CREATION DATE: 322/21:17:35
PLOT PRINT DATE: 326/19:59:15
SAMPLING PERIOD: 000/00:00:32.00

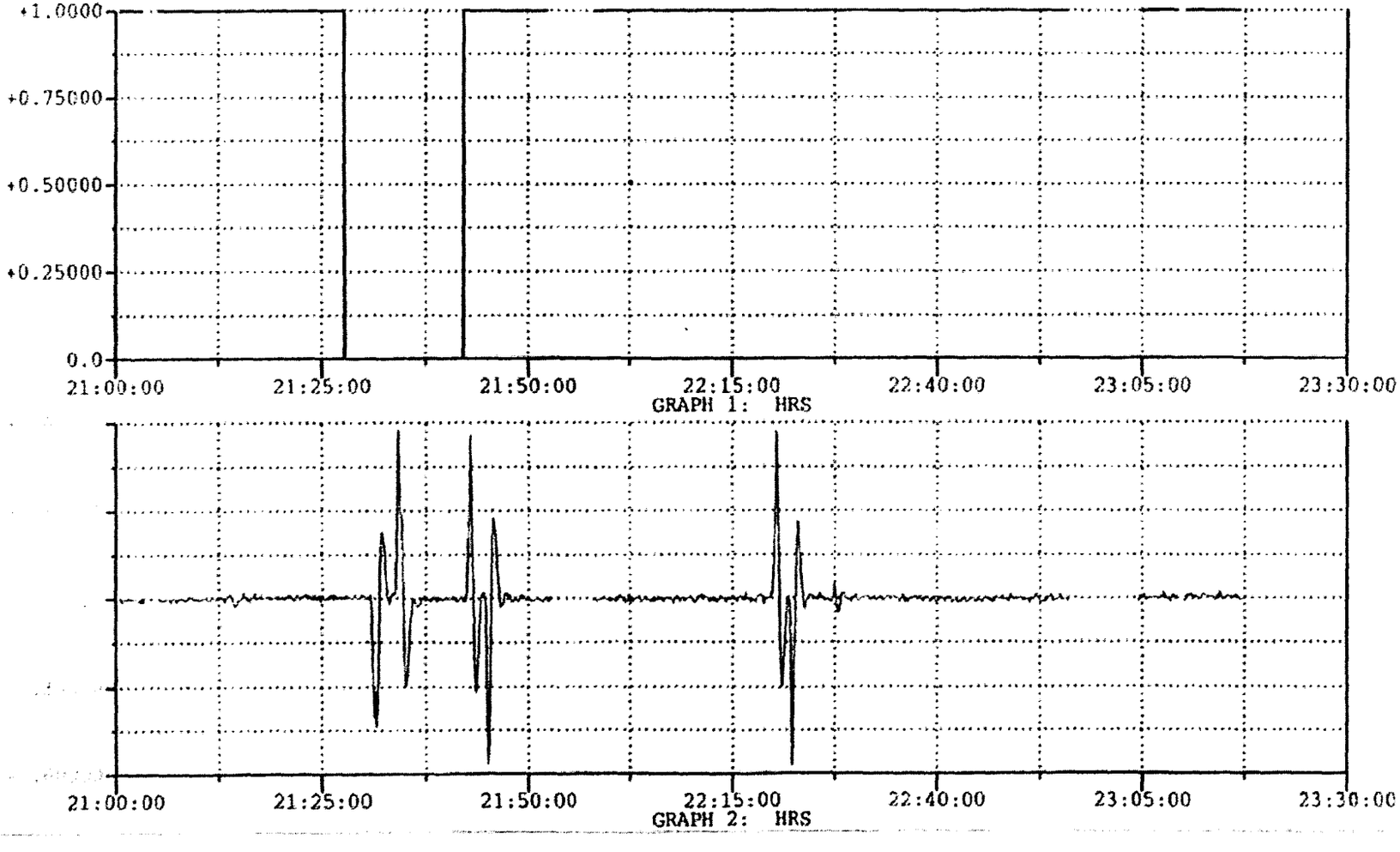
Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
NSADSCI	FA268	MA	EU		TIME		HRS		—	1	[illegible]	[illegible]	[illegible]	EU		TIME		HRS		—	[illegible]
CSCLI1	ISAT0	MA	[illegible]		TIME		HRS		—	1	BFECLIBS	C0258		RAW		TIME		HRS		—	[illegible]
CSCLI2	ISAT0	MA	EU		TIME		HRS		—	1	BSADCONT	C105	TXT	RAW		TIME		HRS		—	3
[illegible]	[illegible]	[illegible]	[illegible]		TIME		HRS		—	[illegible]											



PLOT NAME: NRT_OPS$HISPLOT_PLOT:JBLUE001
TITLE: ADACS924
DESCRIPTION: BSADCONT & BPTCHERR
SETUP FILENAME: NRT_OPS$HISPLOT_SETUP:JBLUE001
START/STOP TIME: 00/268/21:00:00.0 - 00/268/23:30:00.0

SCID: 16
PLOT CREATION DATE: 269/00:49:39
PLOT PRINT DATE: 269/00:50:43
SAMPLING PERIOD: 000/00:00:08.00

Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
BSADCONT	C105	TXT	RAW		TIME		HRS		—	1											



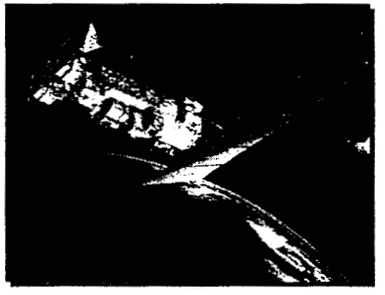
OV Test ADC006

ADC006 - Attitude Determination

Results: The POLARIS off-line attitude determination task to determine what misalignments exist between the AVHRR instrument and the S/C is in process.

Summary

- ADACS performance is nominal.
- Recommend investigations into improving ESA algorithms used during Sun and Moon intrusions, i.e., 3 and 2 Quad operations.
- Recommend investigations into YGC control law gains to minimize yaw transients during roll axis rate transients.



COMMUNICATION SUBSYSTEM

Peter Acosta and Adel Hassan

SUMMARY

TEST NUMBER	SUBJECT	STATUS
COM001	COMM CHECKLIST	OK
COM002	SATELLITE EIRP AND ANTENNA PATTERN	OK, based on data available
COM003	DOWNLINK FREQUENCIES	OK
COM004 and 005	GRD RECEIVER THRESHOLD	OK
COM006	MODULATION INDEX	OK
COM007	BER	OK

RF Communication Subsystem Readiness

- THE RF COMMUNICATION SUBSYSTEM TRANSMITTER POWER LEVELS ARE NOMINAL
- EIRP LEVELS ARE NOMINAL
- DOWNLINK FREQUENCIES ARE NOMINAL
- GRD RECEIVER THRESHOLD IS EXCELLENT
- MODULATION INDEX AND BER ALL MEET THE REQUIREMENTS

Specification Compliance

STXs TRANSMITTER POWER	COMPLY
EIRPS (VTX-2)	COMPLY
DOWNLINK FREQUENCIES	COMPLY
MOD INDEX	COMPLY
GRD SENSITIVITY	COMPLY
BER	COMPLY

OV TESTS - COM001

COM001 - COMM CHECKLIST

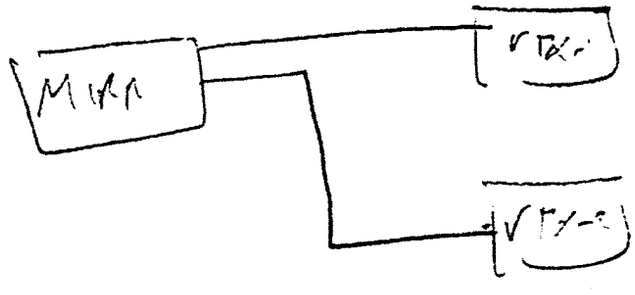
RESULTS: ALL RF TELEMETRY POINTS ARE WITHIN THE SPECIFICATION LIMITS.

PAGENAME: COMM SC: 16A TCS: TCS3 WS: S56 UTC: 268/16:11:44

TLM SRC TIPMODE MFRM 40 TIPTIME 268/15:39:44.5

NSTX1PWR	306	STX1	POWER	-0.02	WAT	^QXS	NSTXRFSW	307	RFS1	S-B SWPOS	4.60	STA
NSTX1TMP	012	STX1	TEMP	-18.36	DEG	^^XS	NVTXRFSW	339	RFS2	VTX SWPOS	4.56	STA
NSTX1STA	315	STX1	ON/OFF	0.64	STA		NBTXRFSW	347	RFS3	BTX SWPOS	4.58	STA
NSTX2PWR	323	STX2	POWER	0.01	WAT	^QXS						
NSTX2TMP	020	STX2	TEMP	-19.84	DEG	^^XS	NGRD1AGC	355	GRD1	AGC LEVEL	-127.[illegible]	DBM
NSTX2STA	331	STX2	ON/OFF	1.36	STA		NGRD2AGC	363	GRD2	AGC LEVEL	4752.71	DBM
NSTX3PWR	338	STX3	POWER	9.09	WAT	^QXS	NGRD1TMP	071	GRD1	RCVR TMP	8.36	DEG
NSTX3TMP	028	STX3	TEMP	22.16	DEG	^^XS	NGRD2TMP	169	GRD2	RCVR TMP	9.55	DEG
NSTX3STA	346	STX3	ON/OFF	5.10	STA		NGRD1PCV	010	GRD1	PWR CNV	3.5	TLM 1^XS
NVTX1PWR	354	VTX1	POWER	*****	WAT	^QXS	NGRD2PCV	052	GRD2	PWR CNV	3.5	TLM 1^XS
NVTX1TMP	036	VTX1	TEMP	-44.61	DEG	^^XS						
NVTX1STA	259	VTX1	ON/OFF	0.00	STA		XSUSTX1	005	STX1	STATUS	000F	HEX
NVTX2PWR	275	VTX2	POWER	6.18	WAT	^^XS	XSUSTX2	006	STX2	STATUS	000F	HEX
NVTX2TMP	044	VTX2	TEMP	17.88	DEG	^^XS	XSUSTX3	007	STX3	STATUS	000E	HEX
NVTX2STA	283	VTX2	ON/OFF	4.00	STA							
							NSTX4PWR	130	STX4	POWER	7.70	WAT ^QXS
NBTX1STA	291	BTX1	ON/OFF	0.00	STA		NSTX4TMP	011	STX4	TEMP	26.11	DEG ^^XS
NBTX2STA	299	BTX2	ON/OFF	4.00	STA		NSTX4STA	286	STX4	ON/OFF	5.10	STA

MIRP ch. 12 APT-1
44 APT-2



Low is ok
High is not ok
Coming from the
Same Source

SARP
DCS'

PAGENAME: COMMSTAT SC: 16A TCS: TCS3 WS: S56 UTC: 268/16:[illegible]

CDA_SITE SCID 16 TIPMODE MF_COUNT 40 TIPTIME 268/15:39:44.5

* **********STATUS**********

DGRD1LCK	256	GRD	1	CARRIER LOCK	NO	XSUSTX1	STX	1	STATUS	000F	HEX
DGRD1DMD	283	GRD	1	DEMOD STATUS	OFF	XSUSTX2	STX	2	STATUS	000F	HEX
DGRD1DAT	312	GRD	1	DATA PRESENCE	NO	XSUSTX3	STX	3	STATUS	000E	HEX
DGRD2LCK	260	GRD	2	CARRIER LOCK	NO	XSUSTX4	STX	4	STATUS	000C	HEX
DGRD2DMD	284	GRD	2	DEMOD STATUS	OFF						
DGRD2DAT	313	GRD	2	DATA PRESENCE	YES						
						XSUSTX1M	STX	1	INTERFACE	OFF	OFF
						XSUSTX2M	STX	2	INTERFACE	OFF	OFF
						XSUSTX3M	STX	3	INTERFACE	HRPT	ON
						XSUSTX4M	STX	4	INTERFACE	TIP	ON
						NVTX1STA	VTX	1	STATUS	0.00	STA
						NVTX2STA	VTX	2	STATUS	4.00	STA
						NBTX1STA	BTX	1	STATUS	0.00	STA
						NBTX2STA	BTX	2	STATUS	4.00	STA

PAGENAME: COMM SC: 16A TCS: TCS3 WS: S56 UTC: 268/17:44:34

TLM SRC TIPMODE MFRM 283 TIPTIME 000/00:00:00.0

N[illegible]X1PWR	306	STX1	POWER	-0.02	WAT	^^XS	NSTXRFSW	307	RFS1	S-B	SWPOS	4.58	STA
NSTX1TMP	012	STX1	TEMP	-18.36	DEG	^^XS	NVTXRFSW	339	RFS2	VTX	SWPOS	4.58	STA
NSTX1STA	315	STX1	ON/OFF	0.00	STA		NBTXRFSW	347	RFS3	BTX	SWPOS	4.62	STA
NSTX2PWR	323	STX2	POWER	0.01	WAT	^^XS							
NSTX2TMP	020	STX2	TEMP	-19.84	DEG	^^XS	NGRD1AGC	355	GRD1	AGC	LEVEL	1203.72	DBM
NSTX2STA	331	STX2	ON/OFF	0.00	STA		NGRD2AGC	363	GRD2	AGC	LEVEL	-128.28	DBM
NSTX3PWR	338	STX3	POWER	9.09	WAT	^QXS	NGRD1TMP	071	GRD1	RCVR	TMP	9.55	DEG
NSTX3TMP	028	STX3	TEMP	22.16	DEG	^QXS	NGRD2TMP	169	GRD2	RCVR	TMP	-3.80	DEG
NSTX3STA	346	STX3	ON/OFF	5.10	STA		NGRD1PCV	010	GRD1	PWR	CNV	3.5	TLM H^XS
NVTX1PWR	354	VTX1	POWER	*****	WAT	^QXS	NGRD2PCV	052	GRD2	PWR	CNV	3.5	TLM 1QXS
NVTX1TMP	036	VTX1	TEMP	-44.61	DEG	^^XS							
NVTX1STA	259	VTX1	ON/OFF	0.00	STA		XSUSTX1	005	STX1	STATUS	000F	HEX	
NVTX2PWR	275	VTX2	POWER	6.18	WAT	^QXS	XSUSTX2	006	STX2	STATUS	004F	HEX	
NVTX2TMP	044	VTX2	TEMP	18.43	DEG	^^XS	XSUSTX3	007	STX3	STATUS	000E	HEX	
NVTX2STA	283	VTX2	ON/OFF	4.00	STA								
							NSTX4PWR	130	STX4	POWER	7.70	WA[illegible]	
NBTX1STA	291	BTX1	ON/OFF	0.00	STA		NSTX4TMP	011	STX4	TEMP	26.11	DEG	^QXS
NBTX2STA	299	BTX2	ON/OFF	4.00	STA		NSTX4STA	286	STX4	ON/OFF	5.10	STA	

PAGENAME: COMMSTAT SC: 16A TCS: TCS3 WS: S56 UTC: 268/17:45:15

CDA_SITE SCID 16 TIPMODE MF_COUNT 283 TIPTIME 000/00:00:00.0

**********STATUS**********

DGRD1LCK	256	GRD	1	CARRIER LOCK	NO	XSUSTX1	STX	1	STATUS	000F HEX
DGRD1DMD	283	GRD	1	DEMOD STATUS	OFF	XSUSTX2	STX	2	STATUS	004F HEX
DGRD1DAT	312	GRD	1	DATA PRESENCE	NO	XSUSTX3	STX	3	STATUS	000E HEX
DGRD2LCK	260	GRD	2	CARRIER LOCK	NO	XSUSTX4	STX	4	STATUS	000C HEX
DGRD2DMD	284	GRD	2	DEMOD STATUS	OFF					
DGRD2DAT	313	GRD	2	DATA PRESENCE	NO					
						XSUSTX1M	STX	1	INTERFACE	OFF OFF
						XSUSTX2M	STX	2	INTERFACE	DTR2 OFF
						XSUSTX3M	STX	3	INTERFACE	HRPT ON
						XSUSTX4M	STX	4	INTERFACE	TIP ON
						NVTX1STA	VTX	1	STATUS	0.00 STA
						NVTX2STA	VTX	2	STATUS	4.00 STA
						NBTX1STA	BTX	1	STATUS	0.00 STA
						NBTX2STA	BTX	2	STATUS	4.00 STA

PAGENAME: COMM SC: 16A TCS: TCS3 WS: S56 UTC: 268/17:56:00

TLM SRC TIPMODE ORB MFRM 189 TIPTIME 268/17:55:59.4

NSTX1PWR	306	STX1	POWER	-0.02	WAT	^^X^	NSTXRFSW	307	RFS1	S-B	SWPOS	4.58	STA
NSTX1TMP	012	STX1	TEMP	-18.36	DEG	^^X^	NVTXRFSW	339	RFS2	VTX	SWPOS	4.58	STA
NSTX1STA	315	STX1	ON/OFF	0.00	STA		NBTXRFSW	347	RFS3	BTX	SWPOS	4.58	STA
NSTX2PWR	323	STX2	POWER	8.19	WAT	^^X^							
NSTX2TMP	020	STX2	TEMP	15.67	DEG	^^X^	NGRD1AGC	355	GRD1	AGC	LEVEL	-49.69	DBM
NSTX2STA	331	STX2	ON/OFF	5.10	STA		NGRD2AGC	363	GRD2	AGC	LEVEL	-45.37	DBM
NSTX3PWR	338	STX3	POWER	9.09	WAT	^^X^	NGRD1TMP	071	GRD1	RCVR	TMP	8.36	DEG
NSTX3TMP	028	STX3	TEMP	21.58	DEG	^^X^	NGRD2TMP	169	GRD2	RCVR	TMP	8.36	DEG
NSTX3STA	346	STX3	ON/OFF	5.10	STA		NGRD1PCV	010	GRD1	PWR	CNV	3.5	TLM
NVTX1PWR	354	VTX1	POWER	*****	WAT	^^X^	NGRD2PCV	052	GRD2	PWR	CNV	3.5	TLM
NVTX1TMP	036	VTX1	TEMP	-44.61	DEG	^^X^							
NVTX1STA	259	VTX1	ON/OFF	0.00	STA		XSUSTX1	005	STX1	STATUS		000F	HEX
NVTX2PWR	275	VTX2	POWER	6.18	WAT	^^X^	XSUSTX2	006	STX2	STATUS		002F	HEX
NVTX2TMP	044	VTX2	TEMP	21.70	DEG	^^X^	XSUSTX3	007	STX3	STATUS		000E	HEX
NVTX2STA	283	VTX2	ON/OFF	4.00	STA								
							NSTX4PWR	130	STX4	POWER		7.70	WAT
NBTX1STA	291	BTX1	ON/OFF	0.00	STA		NSTX4TMP	011	STX4	TEMP		25.58	DEG
NBTX2STA	299	BTX2	ON/OFF	4.00	STA		NSTX4STA	286	STX4	ON/OFF		5.10	STA

PAGENAME: COMMSTAT SC: 16A TCS: TCS3 WS: S56 UTC: 268/17:56:[illegible]

CDA_SITE WAL SCID 16 TIPMODE ORBIT MF_COUNT 23 TIPTIME 268/17:56:14[illegible]

**********STATUS**********

DGRD1LCK	256	GRD	1	CARRIER LOCK	LOCK	XSUSTX1	STX	1	STATUS	000F	HEX
DGRD1DMD	283	GRD	1	DEMOD STATUS	ON	XSUSTX2	STX	2	STATUS	002F	HEX
DGRD1DAT	312	GRD	1	DATA PRESENCE	YES	XSUSTX3	STX	3	STATUS	000E	HEX
DGRD2LCK	260	GRD	2	CARRIER LOCK	LOCK	XSUSTX4	STX	4	STATUS	000C	HEX
DGRD2DMD	284	GRD	2	DEMOD STATUS	ON						
DGRD2DAT	313	GRD	2	DATA PRESENCE	YES						
						XSUSTX1M	STX	1	INTERFACE	OFF	OFF
						XSUSTX2M	STX	2	INTERFACE	DTR1	ON
						XSUSTX3M	STX	3	INTERFACE	HRPT	ON
						XSUSTX4M	STX	4	INTERFACE	TIP	ON
						NVTX1STA	VTX	1	STATUS	0.00	STA
						NVTX2STA	VTX	2	STATUS	4.00	STA
						NBTX1STA	BTX	1	STATUS	0.00	STA
						NBTX2STA	BTX	2	STATUS	4.00	STA

PAGENAME: COMM SC: 16A TCS: TCS3 WS: S56 UTC: 268/17:56:50

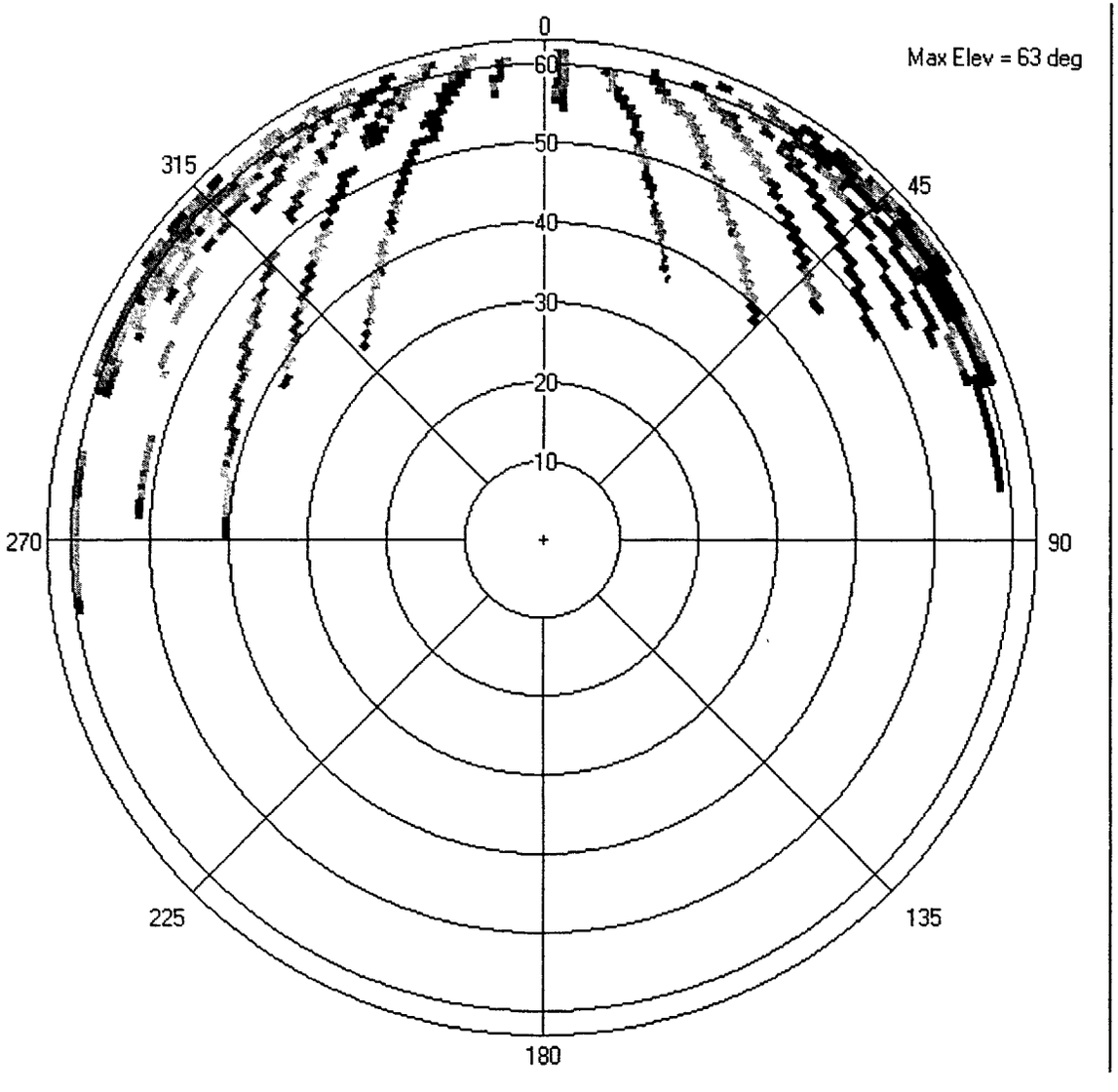
TLM SRC TIPMODE ORB MFRM 66 TIPTIME 268/17:56:51.1

NSTX1PWR	306	STX1	POWER	-0.02	WAT	^^X^	NSTXRFSW	307	RFS1	S-B	SWPOS	4.58	STA
NSTX1TMP	012	STX1	TEMP	-18.36	DEG	^^X^	NVTXRFSW	339	RFS2	VTX	SWPOS	4.62	STA
NSTX1STA	315	STX1	ON/OFF	0.00	STA		NBTXRFSW	347	RFS3	BTX	SWPOS	4.58	STA
NSTX2PWR	323	STX2	POWER	8.19	WAT	^^X^							
NSTX2TMP	020	STX2	TEMP	16.38	DEG	^^X^	NGRD1AGC	355	GRD1	AGC	LEVEL	-49.69	DBM
NSTX2STA	331	STX2	ON/OFF	5.10	STA		NGRD2AGC	363	GRD2	AGC	LEVEL	-45.37	DBM
NSTX3PWR	338	STX3	POWER	9.09	WAT	^^X^	NGRD1TMP	071	GRD1	RCVR	TMP	8.36	DEG
NSTX3TMP	028	STX3	TEMP	21.58	DEG	^^X^	NGRD2TMP	169	GRD2	RCVR	TMP	8.36	DEG
NSTX3STA	346	STX3	ON/OFF	5.10	STA		NGRD1PCV	010	GRD1	PWR	CNV	3.5	TLM 1^X^
NVTX1PWR	354	VTX1	POWER	*****	WAT	^^X^	NGRD2PCV	052	GRD2	PWR	CNV	3.5	TLM 1^X^
NVTX1TMP	036	VTX1	TEMP	-44.61	DEG	^^X^							
NVTX1STA	259	VTX1	ON/OFF	0.00	STA		XSUSTX1	005	STX1	STATUS	000F	HEX	
NVTX2PWR	275	VTX2	POWER	6.18	WAT	^^X^	XSUSTX2	006	STX2	STATUS	002F	HEX	
NVTX2TMP	044	VTX2	TEMP	21.70	DEG	^^X^	XSUSTX3	007	STX3	STATUS	000E	HEX	
NVTX2STA	283	VTX2	ON/OFF	4.00	STA								
							NSTX4PWR	130	STX4	POWER	7.70	WAT	^^X^
NBTX1STA	291	BTX1	ON/OFF	0.00	STA		NSTX4TMP	011	STX4	TEMP	25.58	DEG	^^X^
NBTX2STA	299	BTX2	ON/OFF	4.00	STA		NSTX4STA	286	STX4	ON/OFF	5.10	STA	

OV TESTS - COM002

COM002 - SATELLITE EIRP AND ANTENNA PATTERN

RESULTS: BASED ON THE DATA COLLECTED, THE ANTENNA PATTERNS FOR STX-2 AND STX-3 LOOKS NOMINAL.



EIRP Desired

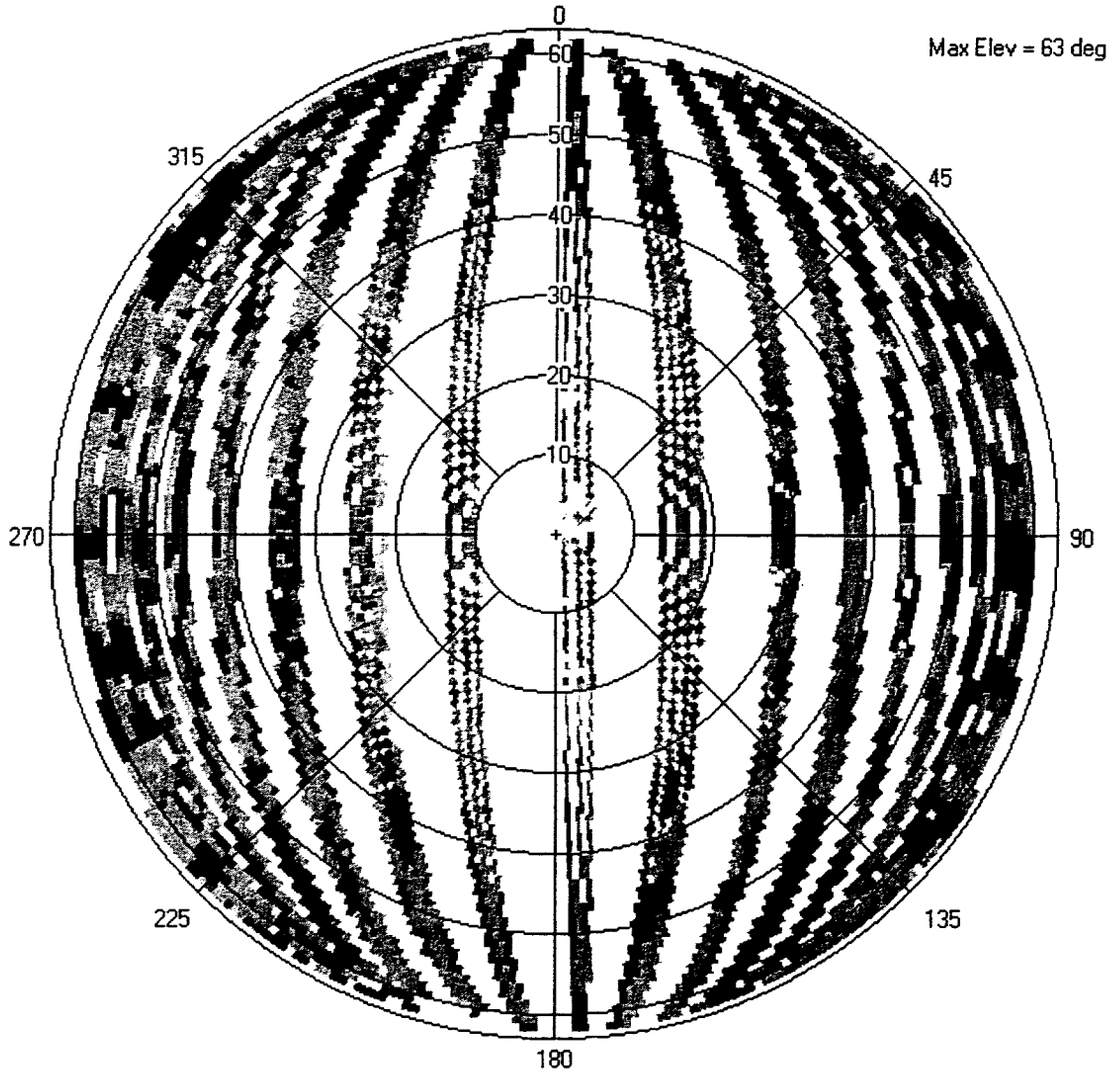
Satellite: NOAA-16
Orientation: Satellite Angle
Orbit Type: Ascending
Ground Station: Wallops Island VA
Satellite Antenna: SBA-2
Interference: None
Satellite Antenna: SBA-2

Legend (dBm)

- > 42.0
- 40.0 - < 42.0
- 38.0 - < 40.0
- 36.0 - < 38.0
- 34.0 - < 36.0
- 32.0 - < 34.0
- 30.0 - < 32.0
- 28.0 - < 30.0
- 26.0 - < 28.0
- 24.0 - < 26.0
- 22.0 - < 24.0
- < 22.0
- ?

? = Unknown

Orbit Range
min = 160
max = 598



EIRP Desired

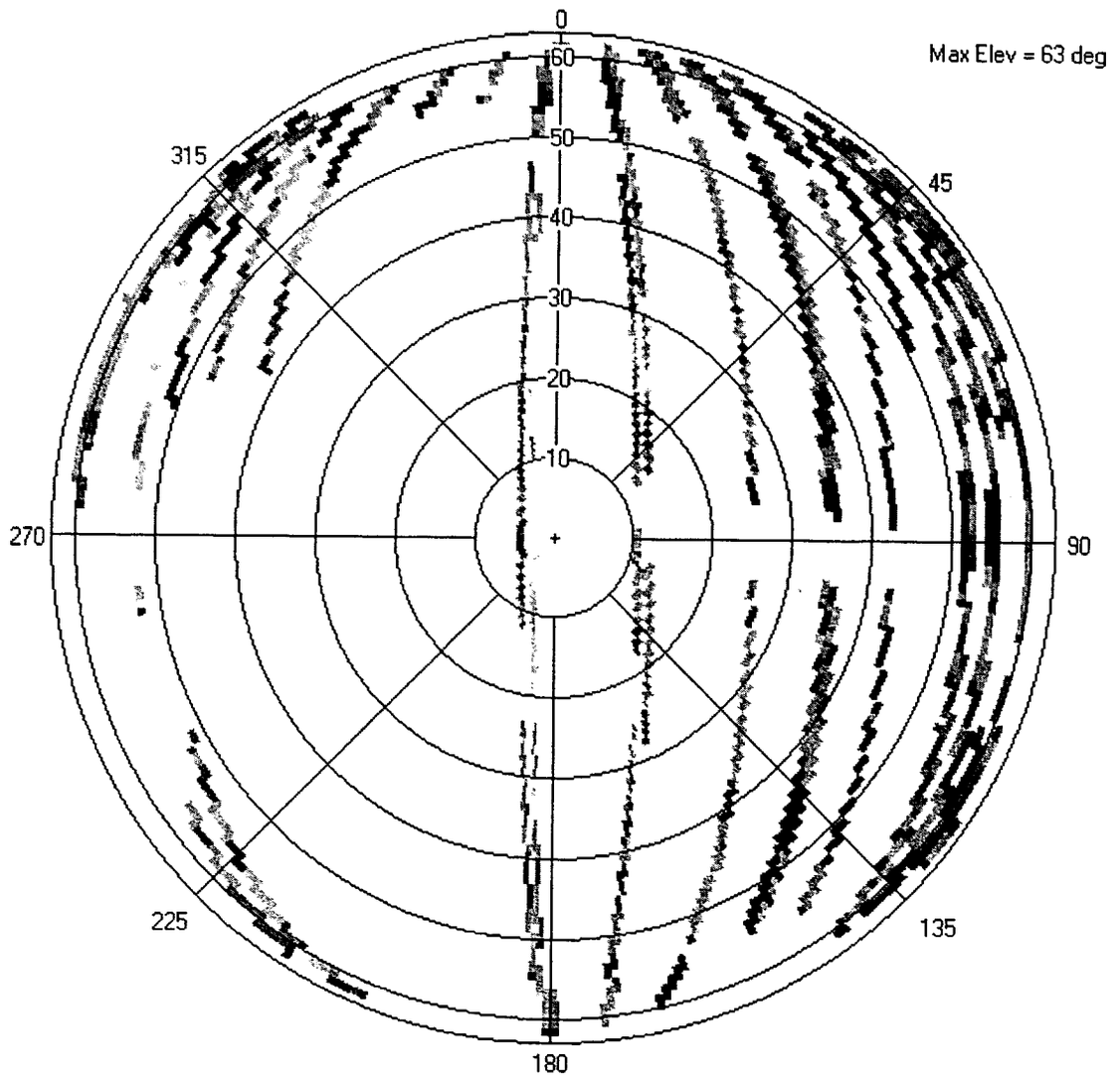
Satellite: NOAA-16
Orientation: Satellite Angle
Orbit Type: Ascending
Ground Station: Wallops Island VA
Satellite Antenna: SBA-3
Interference: None
Satellite Antenna: SBA-3

Legend (dBm)

- > 42.0
- 40.0 - < 42.0
- 38.0 - < 40.0
- 36.0 - < 38.0
- 34.0 - < 36.0
- 32.0 - < 34.0
- 30.0 - < 32.0
- 28.0 - < 30.0
- 26.0 - < 28.0
- 24.0 - < 26.0
- 22.0 - < 24.0
- < 22.0
- ?

? = Unknown

Orbit Range
min = 160
max = 682



EIRP Desired

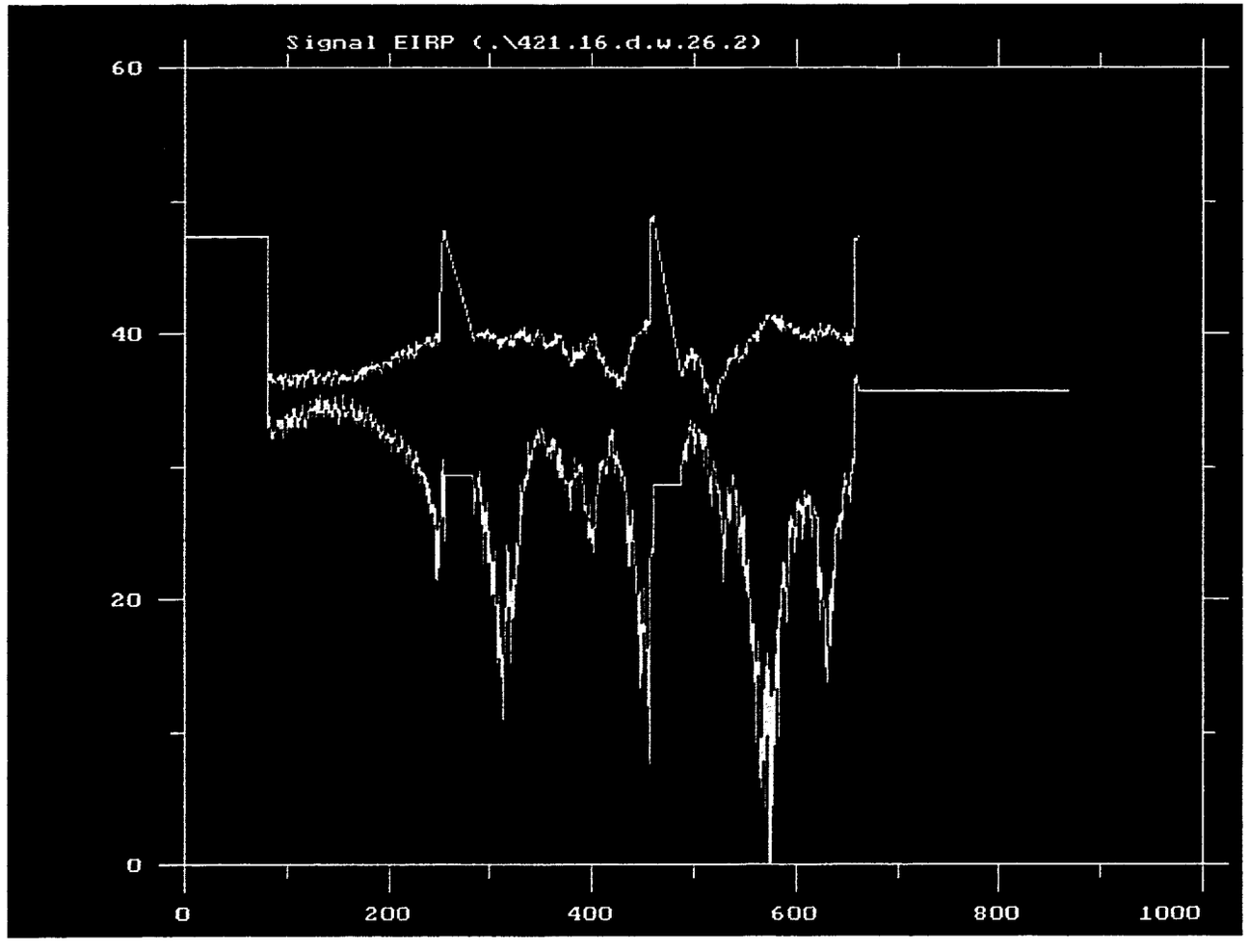
Satellite: NOAA-16
Orientation: Satellite Angle
Orbit Type: Descending
Ground Station: Wallops Island VA
Satellite Antenna: SBA-2
Interference: None
Satellite Antenna: SBA-2

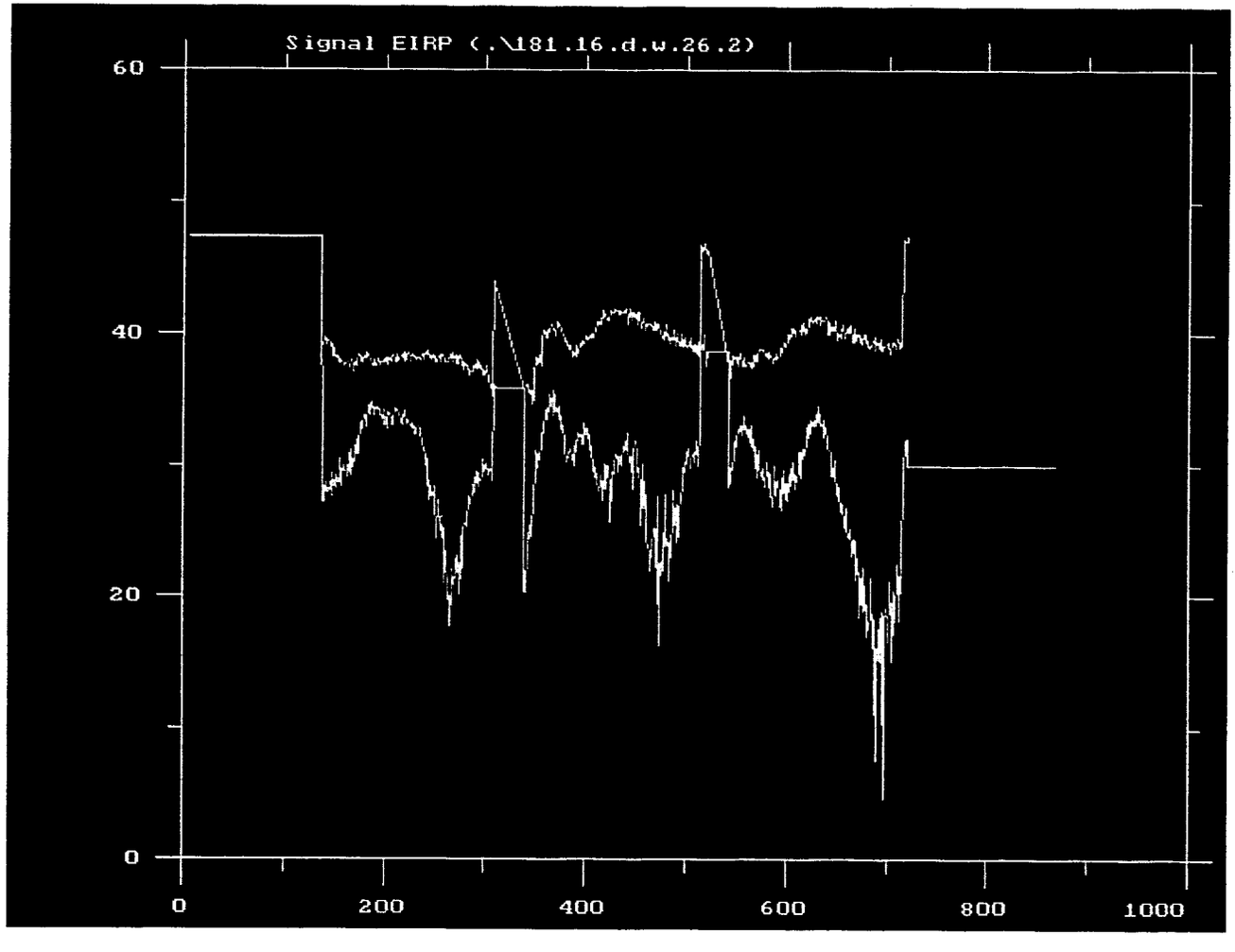
Legend (dBm)

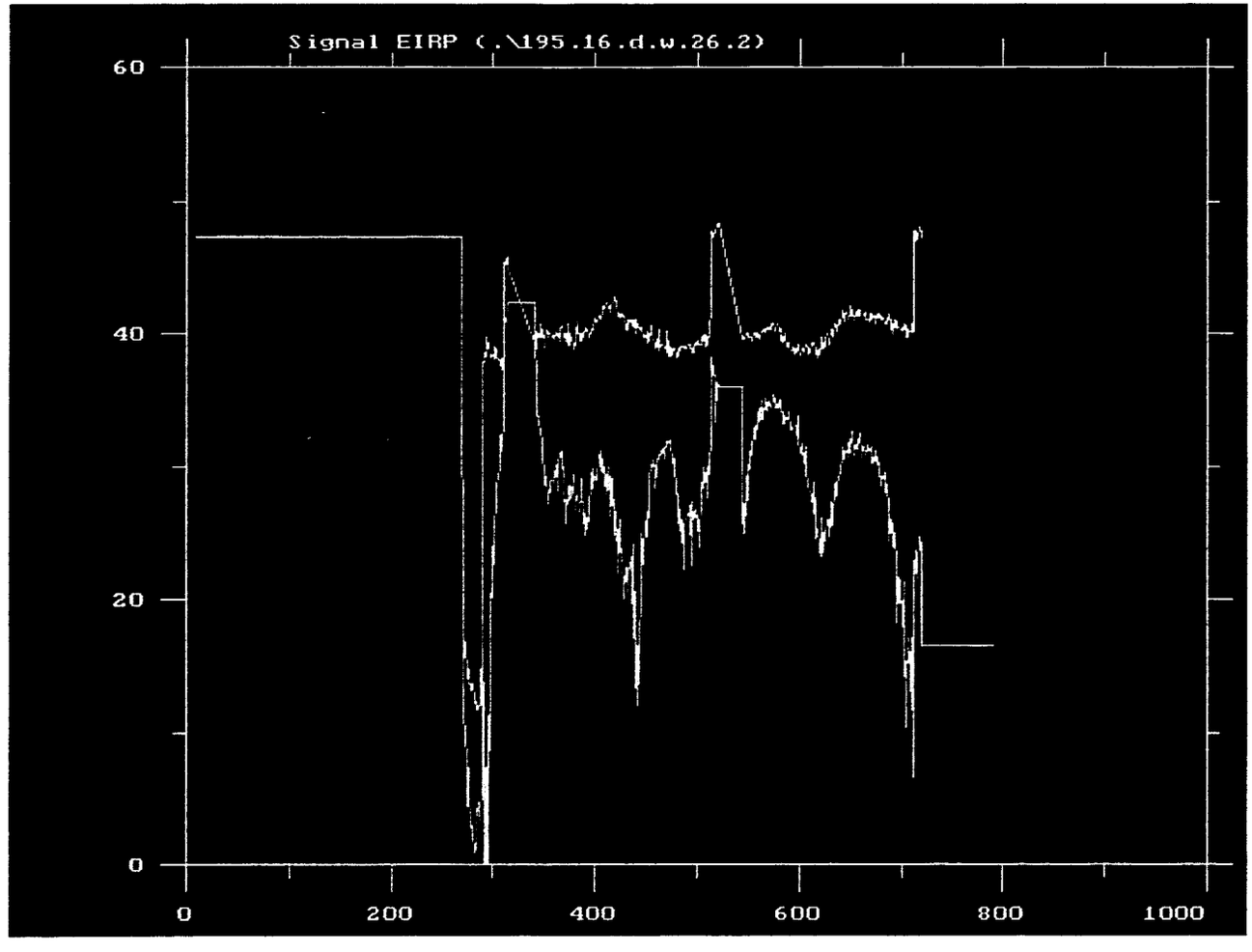
- > 42.0
- 40.0 - < 42.0
- 38.0 - < 40.0
- 36.0 - < 38.0
- 34.0 - < 36.0
- 32.0 - < 34.0
- 30.0 - < 32.0
- 28.0 - < 30.0
- 26.0 - < 28.0
- 24.0 - < 26.0
- 22.0 - < 24.0
- < 22.0
- ?

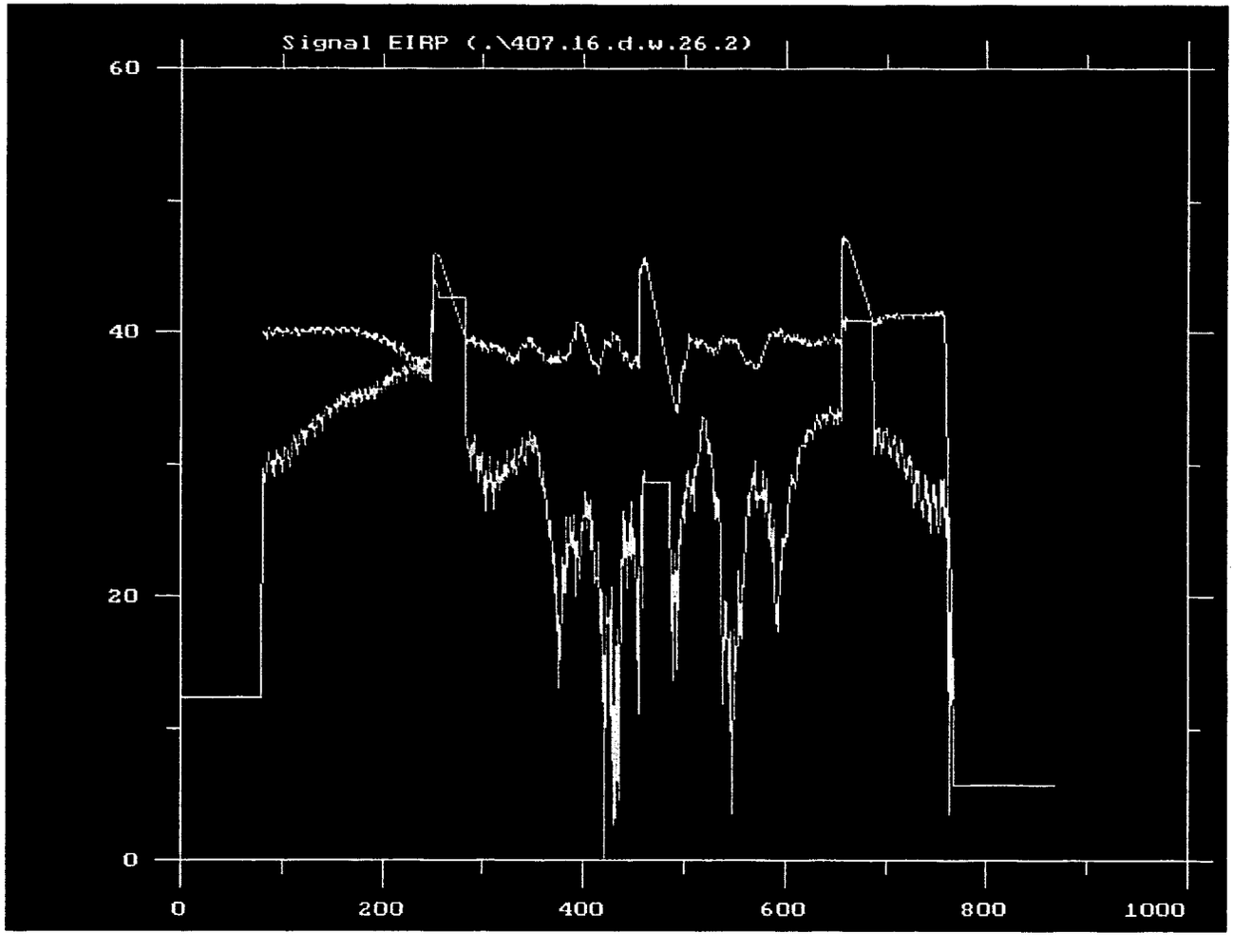
? = Unknown

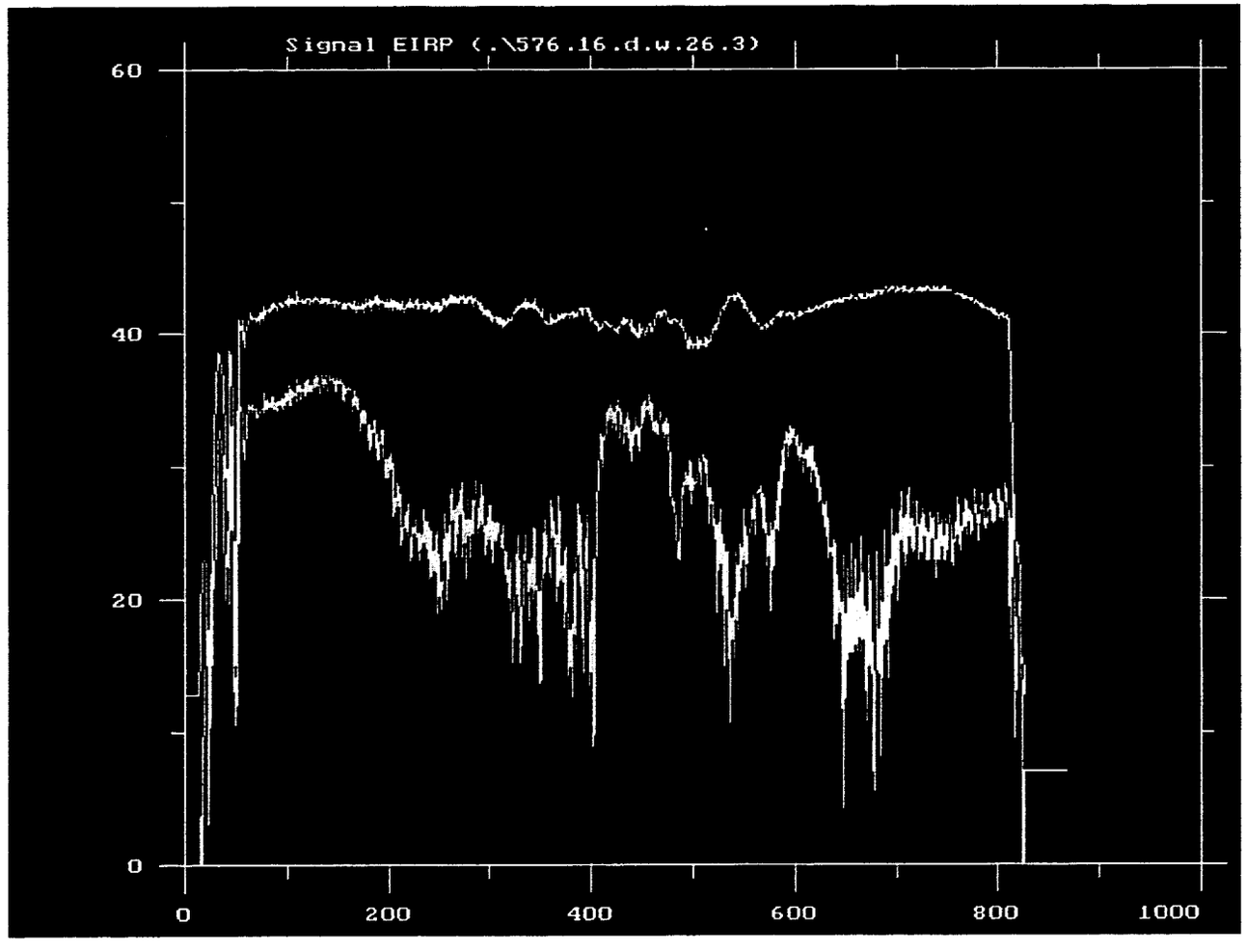
Orbit Range
min = 167
max = 605

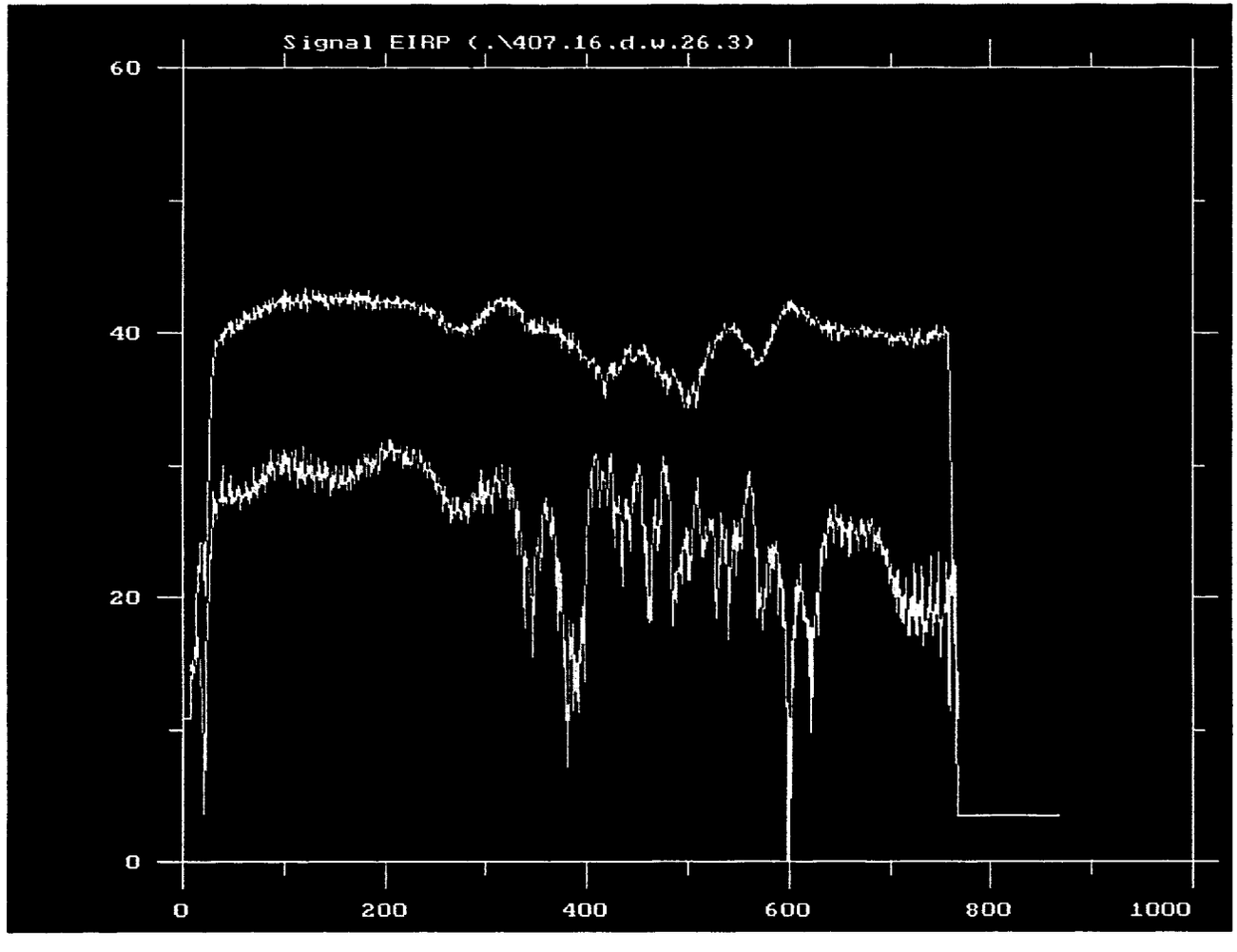

Signal EIRP (.\421.16.d.w.26.2)
60
40
20
0
0
200
400
600
800
1000

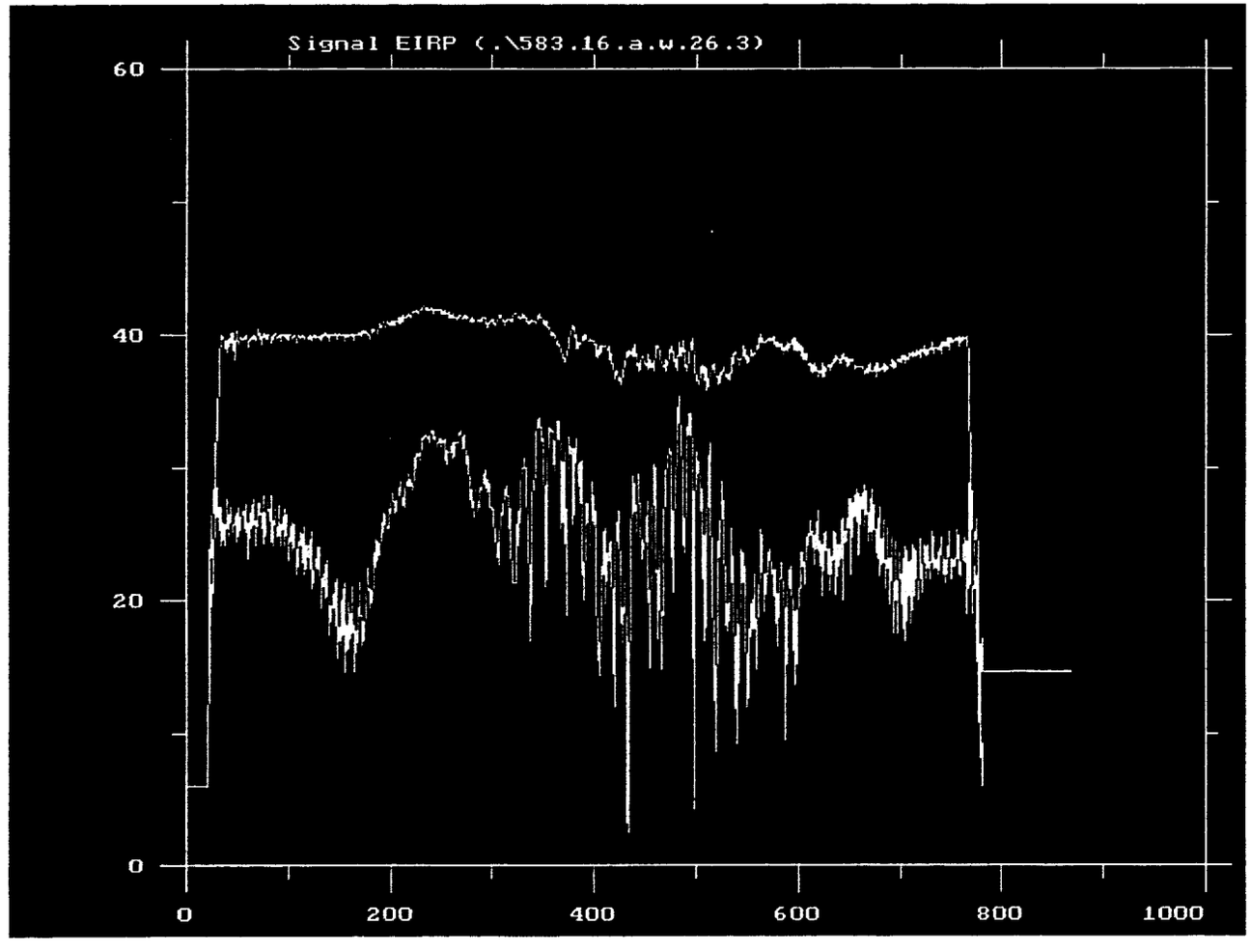

Signal EIRP (.\181.16.d.w.26.2)
60
40
20
0
0
200
400
600
800
1000


Signal EIRP (.\195.16.d.w.26.2)
60
40
20
0
0
200
400
600
800
1000


Signal EIRP (.\407.16.d.w.26.2)
60
40
20
0
0
200
400
600
800
1000


Signal EIRP (.\576.16.d.w.26.3)
60
40
20
0
0
200
400
600
800
1000


Signal EIRP (.\407.16.d.w.26.3)
60
40
20
0
0
200
400
600
800
1000


Signal EIRP (.\583.16.a.w.26.3)
60
40
20
0
0
200
400
600
800
1000

OV TESTS - COM003

COM003 - DOWNLINK FREQUENCIES

RESULTS: BASED UPON THE IF FREQUENCIES, AND THE RF POWER SPECTRUM ANALYSIS FOR DIFFERENT DOWNLINKS, THE DOWNLINK FREQUENCIES LOOK NOMINAL.

OV TESTS - COM004 AND COM005

COM 004 AND 005: GRD SENSITIVITY

RESULTS:

CDA OUTPUT POWER (WATTS)	AGC LEVEL (dBm)
36	-87.3, -85.28
28	-95.6, -87.3
-10 dB below 36	-93, -93
-20 dB	-103, -103
-30 dB	-110, -109
-40 dB	-114, -115
-50 dB	-124, -120
-55 dB	-127, -127

OV TESTS - COM006

COM006 - MODULATION INDEX LINK

RESULTS:

LINK	CARRIER SUPPRESSION	MOD INDEX
STX-1	TBD	TBD
STX-2	8.1 dB	1.18 Rad
STX-3	8.1 dB	1.18 Rad
STX-4	TBD	1.18 Rad

OV TESTS - COM007

COM007 - BER PERFORMANCE

RESULTS:

LINK	RSL	C/No	DATA RATE	Eb/No	Eb/No	SPEC.#
STX-1	TBD					10.5 dB
STX-2	-90	76	2.66 Mbps	12 dB	12 dB	10.5 dB
STX-3	-85	81	2.66 Mbps	17 dB	17 dB	10.5 dB
STX-4	TBD					10.5 dB

CONCERNS, ANOMALIES, AND OPERATIONAL IMPACTS

APT PROBLEM

DAY 265: SPACECRAFT LAUNCHED, VTX-2 ON.
MEAN ANALOG RF SWITCH READING (NVTXRFSW) FLUCTUATED BETWEEN 4.5941 AND 4.5865 VOLT.

DAY 270: THE RF SWITCH READING DROPPED TO 4.571 VOLT.

DAY 274: VTX-2 MEAN TEMPERTURE (NVTX2TMP) SPIKES UP FROM 26 TO 28 DEGREES.

DAY 293: VTX-2 WAS TURNED OFF.

DAY 314: VTX-2 TURNED BACK ON. TEMPERATURE INCREASED BY 2.5 DEGREES.

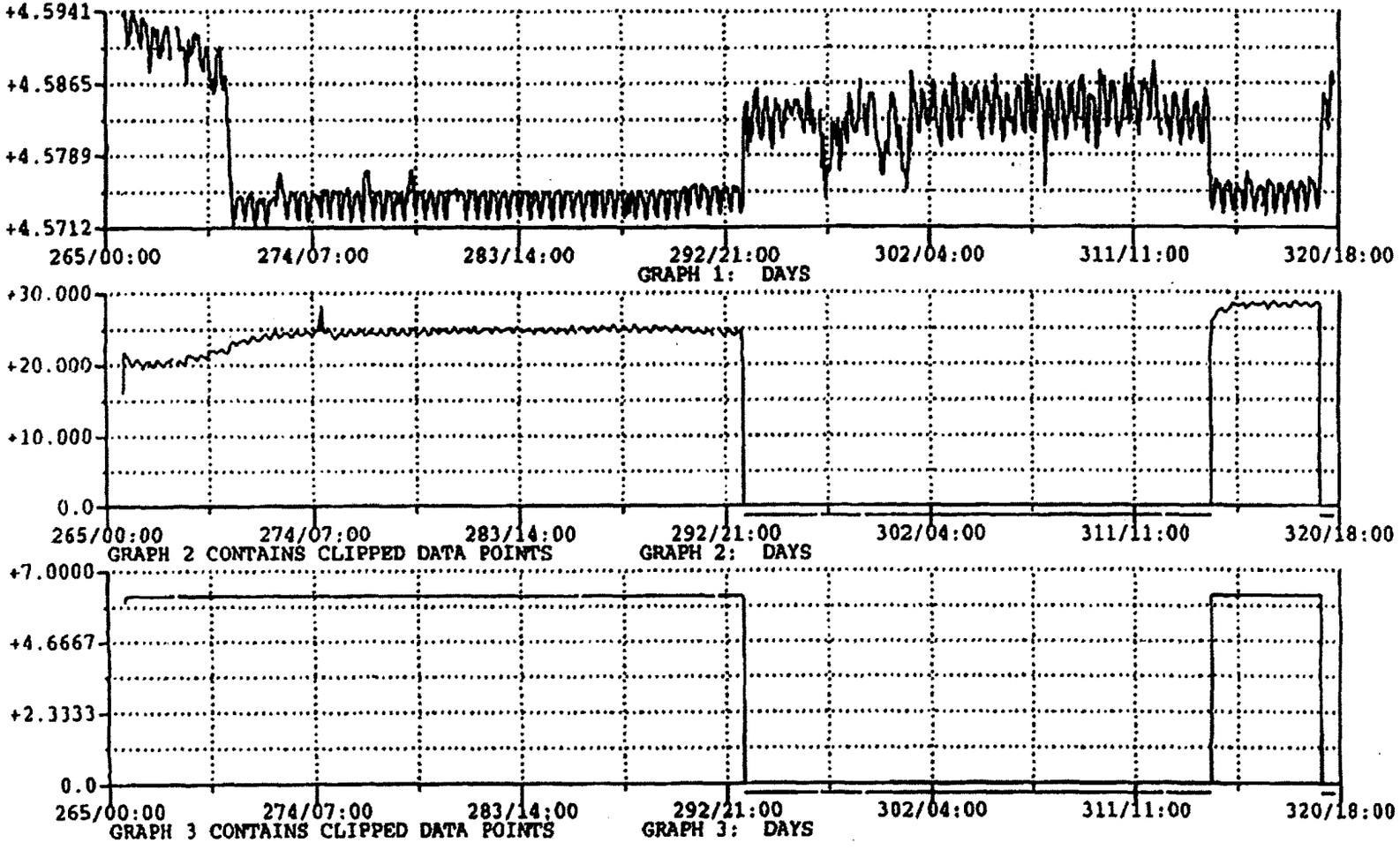
DAY 318: COMPLAINTS RECEIVED FROM USER COMMUNITY ABOUT POOR QUALITY OF APT DATA.

PROBLEM STILL UNDER INVESTIGATION.

PLOT NAME: NRT_OPS$TRENDPLOT_PLOT:0MRH
TITLE: MDW
DESCRIPTION: TEMP TP SETUP FILE FOR VARIOUS STUFF...REUSE!
SETUP FILENAME: NRT_OPS$TRENDPLOT_SETUP:MDW
START/STOP TIME: 00/265/00:00:00.0 - 00/320/18:00:00.0

SCID: 16
PLOT CREATION DATE: 320/20:55:58
PLOT PRINT DATE: 320/20:57:45
SAMPLING PERIOD: 000/01:00:00.00
MIN AVAILABILITY %: 50.00%

Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
NVTXRFSW	FA339	STA	MEAN		TIME		DAYS		—	1											
NVTX2TMP	FA044	DEG	MEAN		TIME		DAYS		—	2											
NVTX2PWR	FA275	WAT	MEAN		TIME		DAYS		—	3											



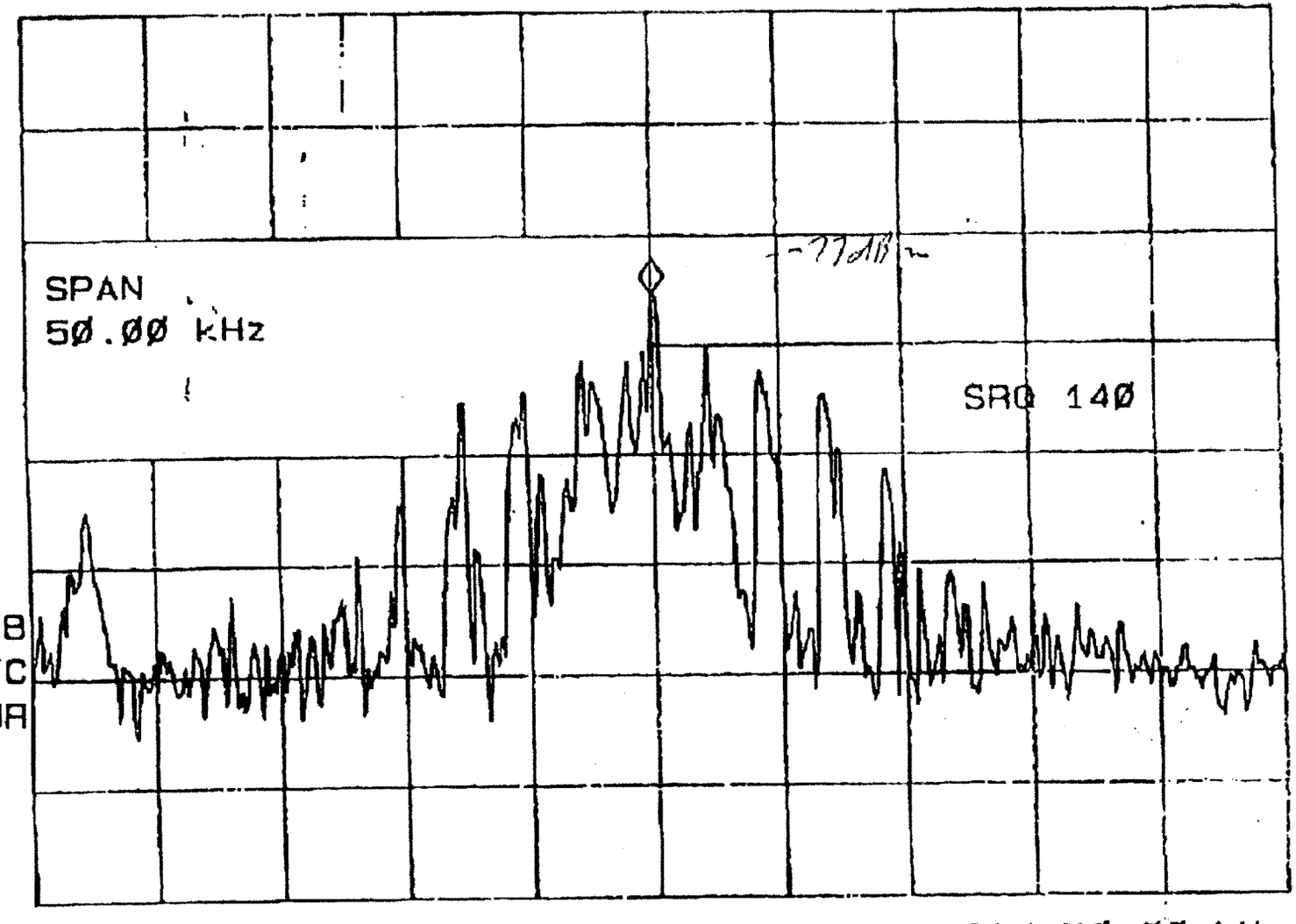
NIL UTX2 SumB

19: Ø7: 17 NOV 15, 2ØØØ

MKR 137.6255Ø MHz
-77.64 dBm

REF -65.Ø dBm
AT 1Ø dB

PEAK
LOG
5
dB/



WA SB
SC FC
CORR

SPAN

SPAN
ZOOM

FULL
SPAN

ZERO
SPAN

LAST
SPAN

PEAK
ZOOM

CENTER 137.6255Ø MHz
#RES BW 1.Ø kHz
#VBW 3Ø Hz
SPAN 5Ø.ØØ kHz
SWP 5.ØØ sec

PAGE.03

NOV 15 2000 11:58

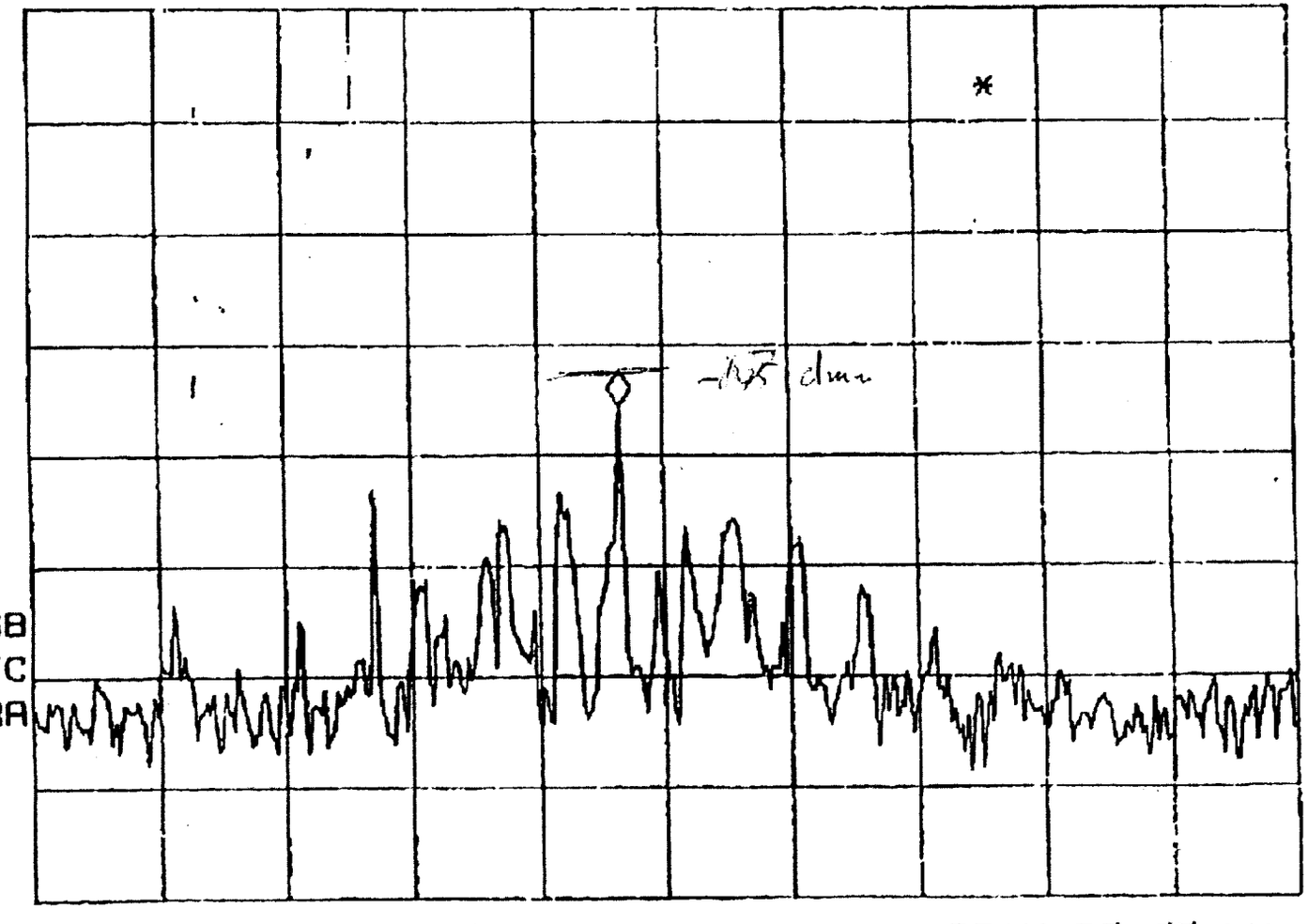
NIC VTX2 Sum H
NIC UTX2 Sum A

19: 16: 33 NOV 15, 2000

MKR 137.61738 MHz
-87.80 dBm

REF -70.0 dBm AT 10 dB

PEAK
LOG
5
dB/



VA SB
SC FC
CORR

MARKER
→ CF

MARKER
Δ

NEXT
PEAK

NEXT PK
RIGHT

NEXT PK
LEFT

More
1 of 2

CENTER 137.61913 MHz
#RES BW 1.0 kHz
#VBW 30 Hz
SPAN 50.00 kHz
SWP 5.00 sec

PAGE.02
NOV 16 2000 11:58

14

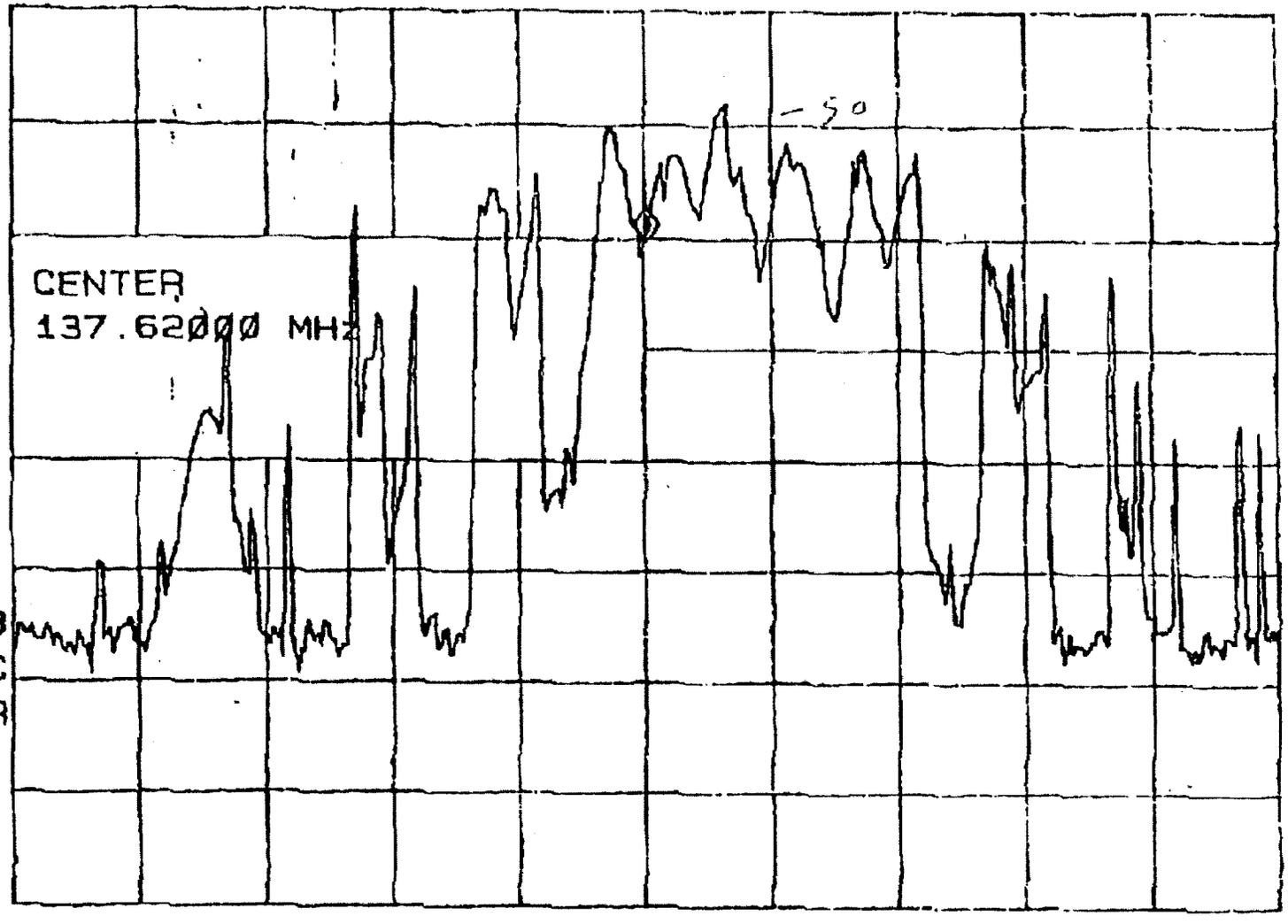
N14 UTX2 SumB
N14 UTY2 SumB

20: 29: 03 NOV 15. 2000

MKR 137.62000 MHz
-60.39 dBm

REF -40.0 dBm AT 10 dB

PEAK
LOG
10
dB/



SA VB
SC FC
CORR

CENTER
FREQ

START
FREQ

STOP
FREQ

CF STEP
AUTO MAN

FREQ
OFFSET

Band
Lock

CENTER 137.62000 MHz
RES BW 1.0 kHz #VBW 30 Hz SPAN 50.00 kHz
SWP 5.00 sec

PAGE.05

NOV 15 2000 11:59

N14 VTx 2 SumA

N14 VTx 2 SumA

20: 25: 52 NOV 15, 2000

MKR 137.62000 MHz
-66.57 dBm

REF -40.0 dBm AT 10 dB

PEAK
LOG
10
dB/

CENTER
137.62000 MHz

SPG 140

VA SB
SC FC
CORR

CENTER
FREQ

START
FREQ

STOP
FREQ

CF STEP
AUTO MAN

FREQ
OFFSET

Band
Lock

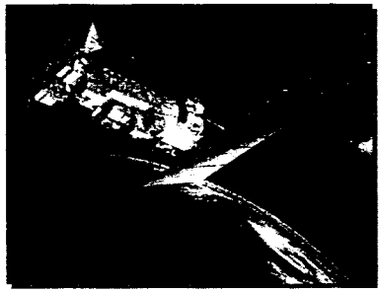
CENTER 137.62000 MHz
RES BW 1.0 kHz

#VBW 30 Hz

SPAN 50.00 kHz
SWP 5.00 sec

PAGE.04

NOV 15 2000 11:59



COMMAND AND CONTROL SUBSYSTEM

OV RESULTS

Y. Tiwary

C&CS Summary

Test Number	Test Description	Command Requirements	Status
CCS001	C&CS Status and Configuration Checklist Verification	In-line, No Commanding	Success
CCS002	Encrypted Commanding	Commands	Success
CCS003	Clock Update	Commands	Success

C&CS Team: Mark Ahdoot, Anita Wellen, and Yogesh Tiwary

Command and Control Subsystem is ready for operational use of NOAA-16.

MAJOR FUNCTIONS OF C&CS	DEMONSTRATED BY
Accept and execute real-time commands	EVENTS page when commands are sent
Generate timing and control signals	Successful operation of various on board components on time and changing modes of operation of on board components – Instrument Subsystem
Guidance and attitude control computation	ADACS Subsystem

OV Test CCS001 (Sheet 1 of 4)

TEST NUMBER:	CCS001
TEST NAME:	C&CS Status and Configuration Checklist Verification
OBJECTIVE:	Verify correct status and configuration of the CCS after ascent handover
DESCRIPTION:	Verify that key C&CS parameters are within expected values by using a pre-defined checklist.
RESULTS:	All key C&CS parameters are within expected values i.e. agreement with the checklist. Some telemetry points were either flagging out of limits or were different from the expected value for following reasons: • The spacecraft was launched in a different configuration than documented. • The nomenclature used for telemetry list was different from that in the PACS database.

CONCERNS, ANOMALIES, AND OPERATIONAL IMPACTS: NONE.

OV Test CCS001 (Sheet 2 of 4)

	MISMATCH – OV TEST ERROR	EXPECTED	OBSERVED
1.	CPU SELECTED FOR CONTROL	CPU1	CPU2[2]
2.	RXO BACKUP OVEN TEMPERATURE	75° C ± 1	76.30° C[3]
3.	SCU +28V switched power	ON	OFF[2]
4.	Clock select status	CLOCK 1	CLOCK 2[2]
5.	SCU +10V switched power	ON	OFF[2]
6.	RXO Mode	PRIMARY	BACKUP[2]

OV Test CCS001 (Sheet 3 of 4)

	MISMATCH – S/C CONFIGURATION	EXPECTED	OBSERVED
1.	EED BUS K10 RELAY	SAFE	ARMED[1]
2.	EED BUS A STATUS	OFF	ON[1]
3.	RXO COMMAND MODE	PRIMARY	BACKUP[2]
4.	EED BUS K9 RELAY	SAFE	ARMED[1]
5.	CXU SIDE SELECT	ONE	TWO[2]

OV Test CCS001 (Sheet 4 of 4)

NOTES:

1. Handover software did not disarm the EED bus or turn OFF the SCU; therefore, this was performed by the ground command. For the next mission, either the handover software needs to be modified or commands must be added to the Flight Time Table or to the Stored Command Table.

2. The value in the EXPECTED column is incorrect in the test plan. The value in the OBSERVED column is correct.

3. The limits need to be widened.

C&CS Ascent Handover Telemetry Checklist (Sheet 1 of 5)

	PARAMETER	EXPECTED	OBSERVED
1.	CPU2 power	ON	ON
2.	CPU1 status	OK	OK
3.	CPU2 restart command UP2	INACTIVE	INACTIVE
4.	Select clock 2 command UP2	INACTIVE	INACTIVE
5.	EED bus K10 relay	SAFE	ARMED
6.	CPU2 status	OK	OK
7.	Select CPU1 command UP1	INACTIVE	INACTIVE
8.	CIU I/O bus crossed state	NOT CROSSED	NOT CROSSED
9.	EED bus A status	OFF	ON
10.	Select backup RXO on UP1	SELECTED	SELECTED
11.	Select primary RXO on UP1	SELECTED	SELECTED
12.	CPU selected for control	CPU1	CPU2
13.	Select CPU1 command UP2	INACTIVE	INACTIVE
14.	RXO command mode	PRIMARY	BACKUP
15.	Select backup RXO on UP2	NOT SELECTED	NOT SELECTED
16.	Select primary RXO on UP2	NOT SELECTED	NOT SELECTED
17.	CPU1 on command UP2	INACTIVE	INACTIVE
18.	Clock select status	CLOCK 1	CLOCK 2
19.	CPU1 off command UP2	INACTIVE	INACTIVE
20.	Select CPU2 command UP2	INACTIVE	INACTIVE

C&CS Ascent Handover Telemetry Checklist (Sheet 2 of 5)

	PARAMETER	EXPECTED	OBSERVED
21.	Select bus A UP2	INACTIVE	INACTIVE
22.	Select CPU2 command UP1	INACTIVE	INACTIVE
23.	SCU +28V switched power	ON	OFF
24.	CPU2 on command UP1	INACTIVE	INACTIVE
25.	Select CLK1 command UP1	INACTIVE	INACTIVE
26.	Select bus B UP1	INACTIVE	INACTIVE
27.	TCC1 MSB	ONE	ONE
28.	SCU +10V switched power	ON	OFF
29.	CPU2 off command UP1	INACTIVE	INACTIVE
30.	Select CLK1 command UP2	INACTIVE	INACTIVE
31.	Bus select status	BBUS	BBUS
32.	Select bus B UP2	INACTIVE	INACTIVE
33.	Select bus A UP1	INACTIVE	INACTIVE
34.	CIU mode	ORBIT	ORBIT
35.	CPU1 power	ON	ON
36.	TCC2 MSB	ONE	ONE
37.	CPU1 restart command UP1	INACTIVE	INACTIVE
38.	Select CLK2 command UP1	INACTIVE	INACTIVE
39.	RXO mode	PRIMARY	BACKUP
40.	EED bus K9 relay	SAFE	ARMED

C&CS Ascent Handover Telemetry Checklist (Sheet 3 of 5)

	PARAMETER	EXPECTED	OBSERVED
41.	CXU side select	ONE	TWO
42.	CPU1 last block in error 0	ZERO	ZERO
43.	CXU bus select	TWO	TWO
44.	CPU1 last block in error 1	ZERO	ZERO
45.	CPU1 last block in error 2	ZERO	ZERO
46.	CPU1 error MSH	OK	OK
47.	CPU1 error LSH	OK	OK
48.	CPU2 last block in error 0	ZERO	ZERO
49.	CPU2 last block in error 1	ZERO	ZERO
50.	CPU2 last block in error 2	ZERO	ZERO
51.	CPU2 error MSH	OK	OK
52.	CPU2 error LSH	OK	OK
53.	CPU2 memory mode	NORMAL	NORMAL
54.	CPU1 select memory normal UP1	DISABLED	DISABLED
55.	CPU1 select memory swap UP1	DISABLED	DISABLED
56.	CPU1 commanded memory mode	NORMAL	NORMAL
57.	CPU2 select memory normal UP2	DISABLED	DISABLED
58.	CPU2 select memory swap UP2	DISABLED	DISABLED
59.	CPU2 commanded memory mode	NORMAL	NORMAL
60.	CPU1 memory mode	NORMAL	NORMAL

C&CS Ascent Handover Telemetry Checklist (Sheet 4 of 5)

	PARAMETER	EXPECTED	OBSERVED
61.	DAU side select UP1	SIDE 1	SIDE 1
62.	CIU UP1 status	BYPASS	BYPASS
63.	SCU titan separation 1 flag	RECEIVED	RECEIVED
64.	CIU UP2 s/w discrete enabled	ENABLED	ENABLED
65.	CIU UP1 s/w discrete enable	ENABLED	ENABLED
66.	DAU side select UP2	SIDE 1	SIDE 1
67.	CIU UP2 status	BYPASS	BYPASS
68.	SCU titan separation 2 flag	RECEIVED	RECEIVED
69.	DAU1 +5 volts	5.1 V	5.1 V
70.	DAU1 temperature	11 TO 17 C	N/A
71.	DAU2 +5 volts	5.1 V	5.1 V
72.	DAU2 temperature	11 TO 17 C	N/A
73.	CIU D/A converter reference voltage B	10.24 V ± 0.8	10.19 V
74.	CIU D/A converter A output	0 TO 5.1 V	0.01 V
75.	CIU D/A converter B output	0 TO 5.1 V	1.18 V
76.	CIU D/A converter reference voltage A	10.24 V ± 0.8	10.3 V
77.	CPC mode telemetry	A B	A B
78.	RXO primary oven temperature	75° C ± 1	75.31° C
79.	RXO backup oven temperature	75° C ± 1	76.30° C
80.	RXO mode	PRIMARY	BACKUP

C&CS Ascent Handover Telemetry Checklist (Sheet 5 of 5)

	PARAMETER	EXPECTED	OBSERVED
81.	BCPUMODE – Mode of CPU connected to B Bus	CONTROL	CONTROL
82.	BCPUTEST – MEMCHK and ITEST failure indicator	0000	0000
83.	BSKPMCHK – Skip MEMCHK	NO	NO
84.	BOKFORCE – Forced MEOK	NO	NO
85.	BBUSWINH – Bus switching inhibit flag	NO	NO
86.	BVETOINH – Veto inhibit flag	NO	NO
87.	BIQSAVCA – IQ save area	0000	0000
88.	BCARPCNT – CARP error entry count	0000	0000
89.	BCARPADD – Level 16 error address	0000	0000
90.	BBUF149 – Buffer 149 image	FEFF	FEFF
91.	BCPUERR – Level 16 error flag	0000	0000

OV Test CCS002

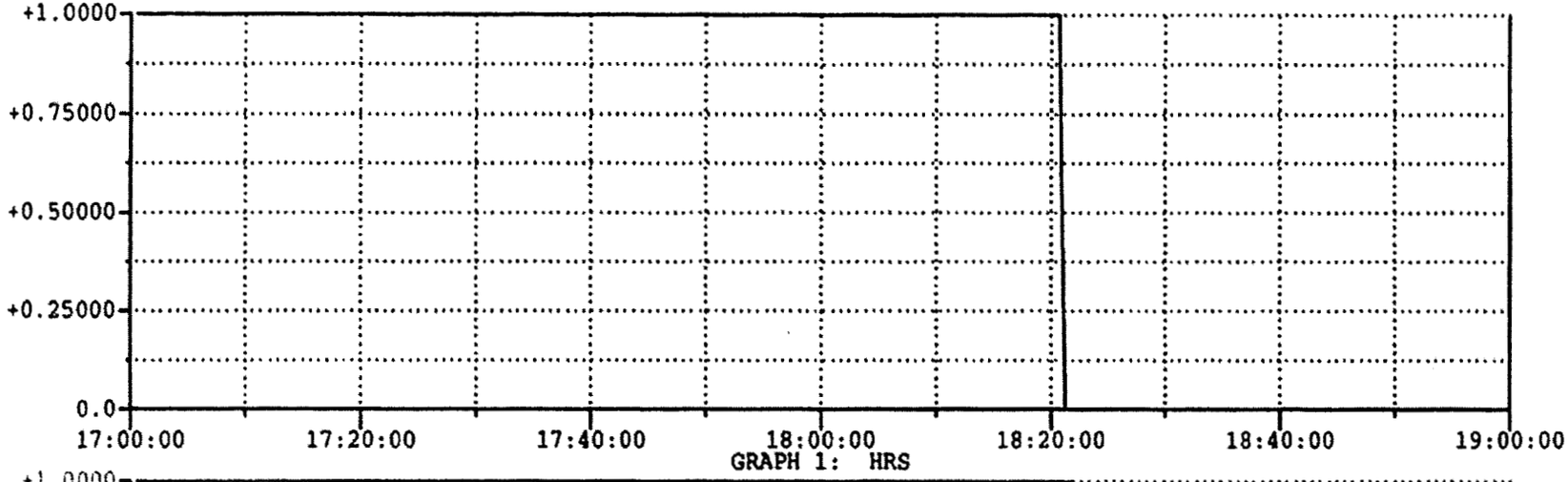
TEST NUMBER:	CCS002
TEST NAME:	Encrypted Commanding
OBJECTIVE:	Verify the operation of the spacecraft in both clear and encrypted mode.
DESCRIPTION:	Send various commands to the spacecraft while the uplink processor is accepting commands from the decrypt path.
RESULTS:	Configure the spacecraft to receive commands from the decrypt path. Resume encrypted mode commanding.

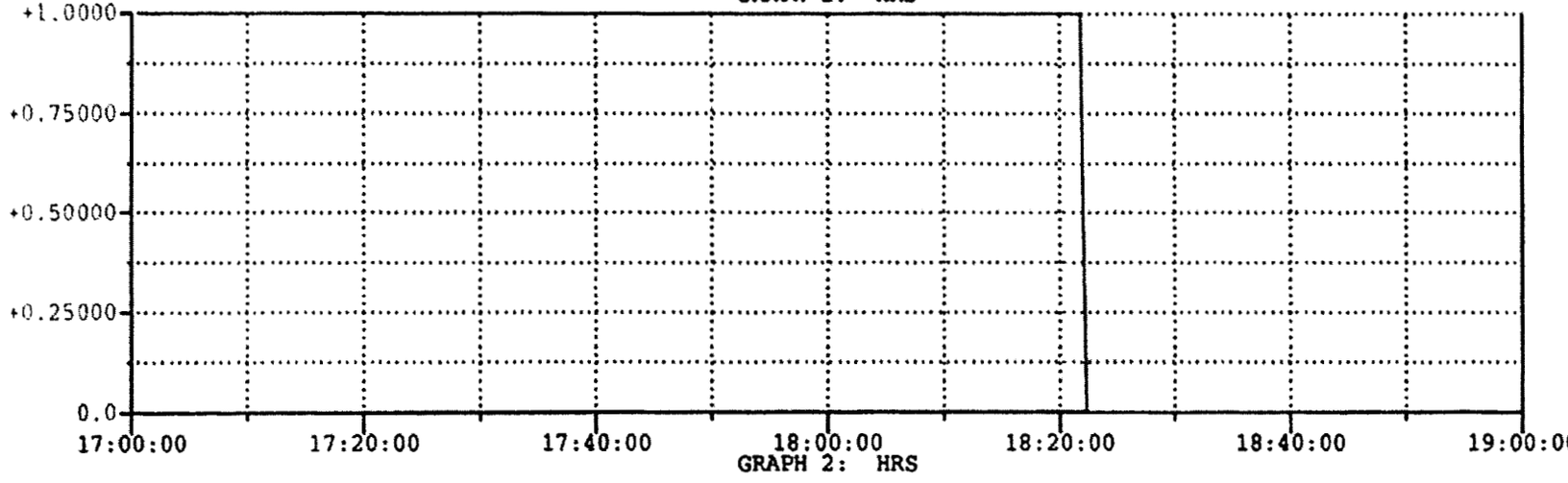
CONCERNS, ANOMALIES, AND OPERATIONAL IMPACTS: NONE.

PLOT NAME: NRT_OPS$HISPLOT_PLOT:YT16DAU
TITLE: NOAA-16 ENCRYPTED MODE
DESCRIPTION: ENCRYPTED MODE STATUS
SETUP FILENAME: NRT_OPS$HISPLOT_SETUP:YT16DAU
START/STOP TIME: 00/266/17:00:00.0 - 00/266/19:00:00.0

SCID: 16
PLOT CREATION DATE: 322/16:45:15
PLOT PRINT DATE: 322/17:03:30
SAMPLING PERIOD: 000/00:00:30.00

Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
DCIUUP1N	D318		RAW		TIME		HRS		—	1											
DCIUUP2N	D348		RAW		TIME		HRS		—	2											





OV Test CCS003 (Sheet 1 of 2)

TEST NUMBER:	CCS003
TEST NAME:	Clock Update
OBJECTIVE:	Verify the accuracy of the TIP clock update software patch.
DESCRIPTION:	Update the TIP clock by an integral number of seconds and verify the result in the telemetry.
RESULTS:	Observe that the TIP clock has been updated by the exact time requested.

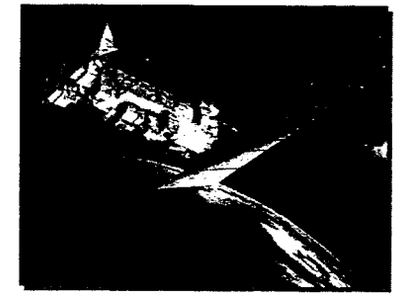
CONCERNS, ANOMALIES, AND OPERATIONAL IMPACTS: NONE.

OV Test CCS003 (Sheet 2 of 2)

TIP TIME	MF #	MFW 006	MFW 007	MFW 008	MFW 009	MFW 010	MFW 011	MFW 012
266/16:48:25.1	316	8	21	FF	0	32	11	3
266/16:48:25.2	317	8	21	C0	81	0	0	F
266/16:48:25.3	318	8	21	45	82	0	0	6F
266/16:48:25.4	319	8	21	5E	0	0	16	EC
266/16:48:25.5	0	8	21	85	2B	9B	3D	9C
266/16:48:25.6	1	8	21	41	0	EF	48	F5
266/16:48:25.7	2	8	21	FE	2	0	8F	F5
.....								
266/16:48:27.9	24	8	21	0	74	0	0	1
266/16:48:28.0	25	8	21	86	0	0	12	1
266/16:48:28.1	26	8	21	FF	47	0	11	1
266/16:48:28.2	27	8	21	FF	E8	0	0	9D
266/16:48:28.3	28	8	21	FF	2B	D	0	3
266/16:48:28.4	29	8	21	C0	F0	51	16	F
266/16:48:28.5	30	88	6	45	D3	0	A6	6F
266/16:48:28.6	31	0	0	5E	0	ED	48	EC
266/16:48:28.7	32	60	0	6	E8	B1	8F	D5
266/16:45:48.8	33	C9	2A	41	7F	70	11	F5
266/16:45:48.9	34	C9	2A	FE	4A	7B	0	F5
.....								
266/16:48:57.4	319	C9	2A	5E	0	0	16	EC
266/16:49:00.5	0	C9	2A	85	2B	9B	C6	54
266/16:49:00.6	1	C9	2A	41	0	EF	47	F5
266/16:49:00.7	2	C9	2A	FE	2	0	8F	F5

C&CS Conclusion

There were no anomalies noted with Command and Control Subsystem



DATA HANDLING SUBSYSTEM

OV RESULTS

Y. Tiwary

DHS Summary

Test Number	Test Description	Command Requirements	Status
DHS001	DHS Status and Configuration Checklist Verification	In-line, No Commanding	Success
DHS002	MIRP Operation with AVHRR	Off-line	Success

DHS Team: Mark Ahdoot, Anita Wellen, and Yogesh Tiwary

Data Handling Subsystem is ready for operational use of NOAA-16.

OV Test DHS001

TEST NUMBER:	DHS001
TEST NAME:	DHS Status and Configuration Checklist Verification
OBJECTIVE:	Verify correct status and configuration of the DHS after ascent handover
DESCRIPTION:	Verify that the DHS status and configuration (including TIP calibration voltages, 10 V bus monitor, and temperature and pressure of tape recorders) are within expected values by using a pre-defined checklist.
SUCCESS CRITERIA:	All key DHS parameters are within expected values (agreement with checklist) and the tape recorders show no evidence of leakage.
RESULTS:	All key DHS parameters are within expected values i.e. in agreement with the checklist. There were several telemetry points that were flagging out of limits because of the unique characteristics of the boxes. The SOCC telemetry database was customized to accommodate these boxes for NOAA-16.
NOTE:	Correspondence between the observed and expected telemetry value depends on the relevant unit being turned on and in use. These telemetry points were sampled shortly after handover.

DHS Ascent Handover Telemetry Checklist (Sheet 1 of 3)

	PARAMETER	EXPECTED	OBSERVED
1.	TIP 1 Selected	ON	ON
2.	TIP 2 Selected	OFF	OFF
3.	Digital Tape Recorder (DTR) 1 Status	0001	0001
4.	DTR 2 Status	0001	0001
5.	DTR 3 Status	0001	00BD
6.	DTR 4 Status	0001	0001
7.	DTR 5 Status	000D	000D
8.	MIRP Status	ON	ON
9.	AIP 1 Selected	ON	ON
10.	AIP 2 Selected	OFF	OFF
11.	TIP Logic Side 1 +10V	10.00	9.92 V
12.	TIP Quality Side 1 +10V	10.00	9.92 V
13.	TIP Logic Side 1 –10V	–10.00	–10.00 V
14.	TIP Side 1 +5.2V	5.20	5.16 V
15.	TIP Logic Side 2 +10V	0.00	0.00
16.	TIP Quality Side 2 +10V	0.00	0.00
17.	TIP Logic Side 2 –10V	–20.00	–20.00
18.	TIP Logic Side 2 +5.2V	0.00	0.00
19.	DTR 1 Transport Temperature	20±20°C	18.3° C
20.	DTR 1 Pressure	15 – 20 psia	0.00

DHS Ascent Handover Telemetry Checklist (Sheet 2 of 3)

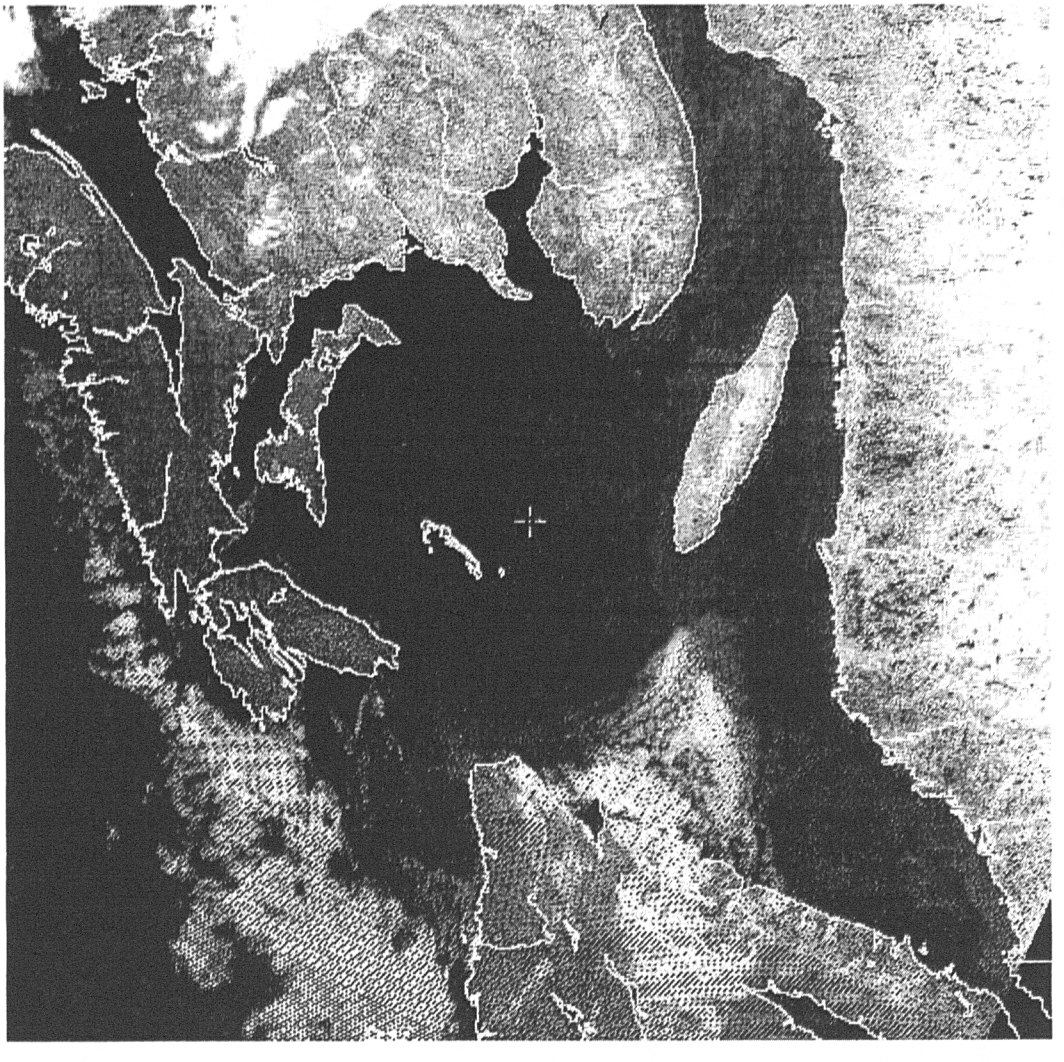
	PARAMETER	EXPECTED	OBSERVED
21.	DTR 1 Electronics Temperature	20±20°C	19.3° C
22.	DTR 1 Head Playback Voltage	0 – 7.5	0.3
23.	DTR 1 Servo Error	0 – 38	0.00
24.	DTR 1 Current	400±100 mA	
		600±100 mA	-6.0
25.	DTR 2 Transport Temperature	20±20°C	17.9° C
26.	DTR 2 Pressure	15 – 20 psia	0.0
27.	DTR 2 Electronics Temperature	20±20°C	18.6° C
28.	DTR 2 Head Playback Voltage	0 – 7.5	0.3
29.	DTR 2 Servo Error	0 – 38	0.0
30.	DTR 2 Current	400±100 mA	
		600±100 mA	41.3
31.	DTR 3 Transport Temperature	20±20°C	19.7° C
32.	DTR 3 Pressure	15 – 20 psia	0.0
33.	DTR 3 Electronics Temperature	20±20°C	31.0° C
34.	DTR 3 Head Playback Voltage	0 – 7.5	0.3
35.	DTR 3 Servo Error	0 – 38	0.4
36.	DTR 3 Current	400±100 mA	
		600±100 mA	326.1
37.	DTR 4 Transport Temperature	20±20°C	19.7° C
38.	DTR 4 Pressure	15 – 20 psia	0.0
39.	DTR 4 Electronics Temperature	20±20°C	20.7° C
40.	DTR 4 Head Playback Voltage	0 – 7.5	0.3

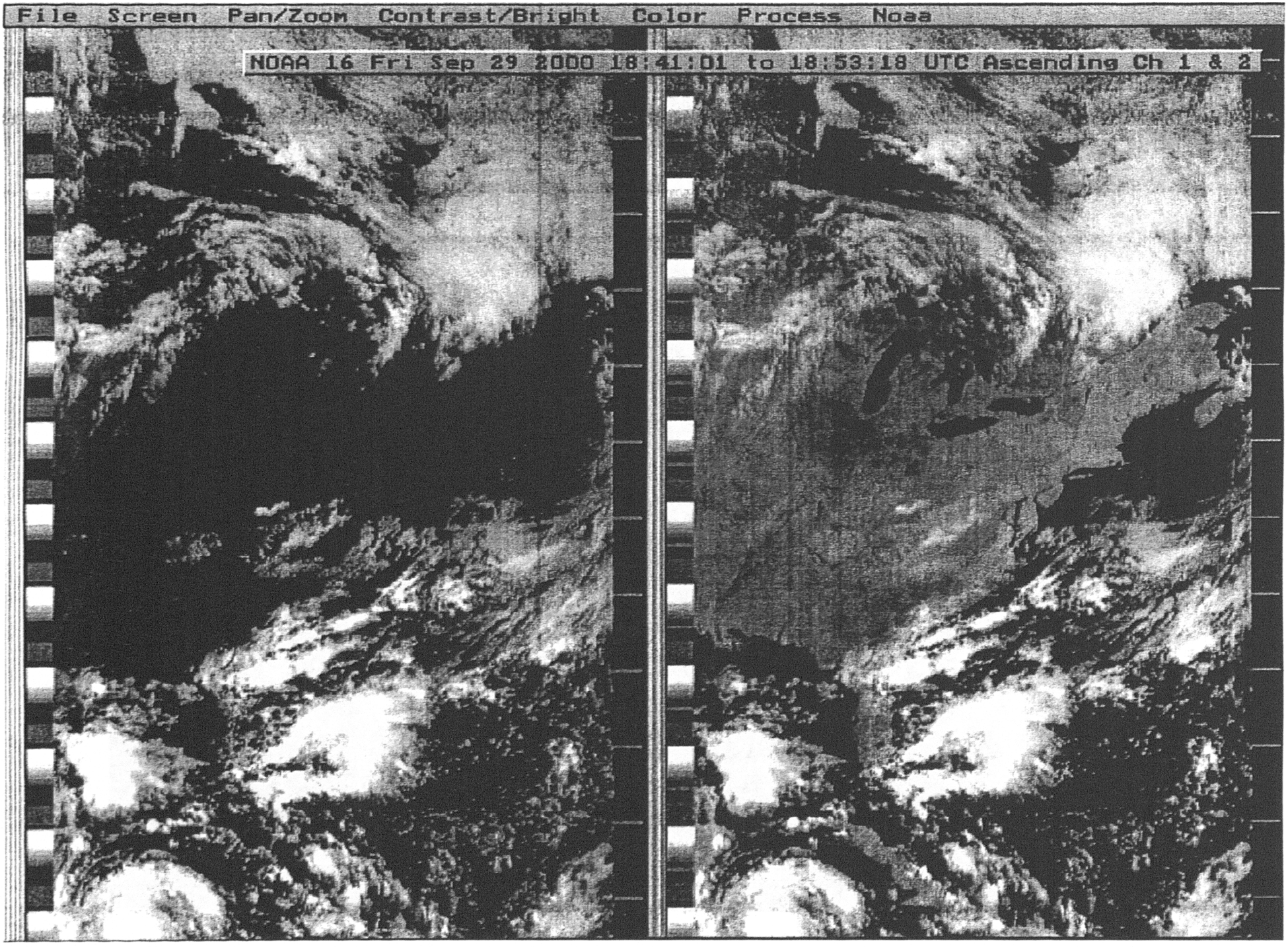
DHS Ascent Handover Telemetry Checklist (Sheet 3 of 3)

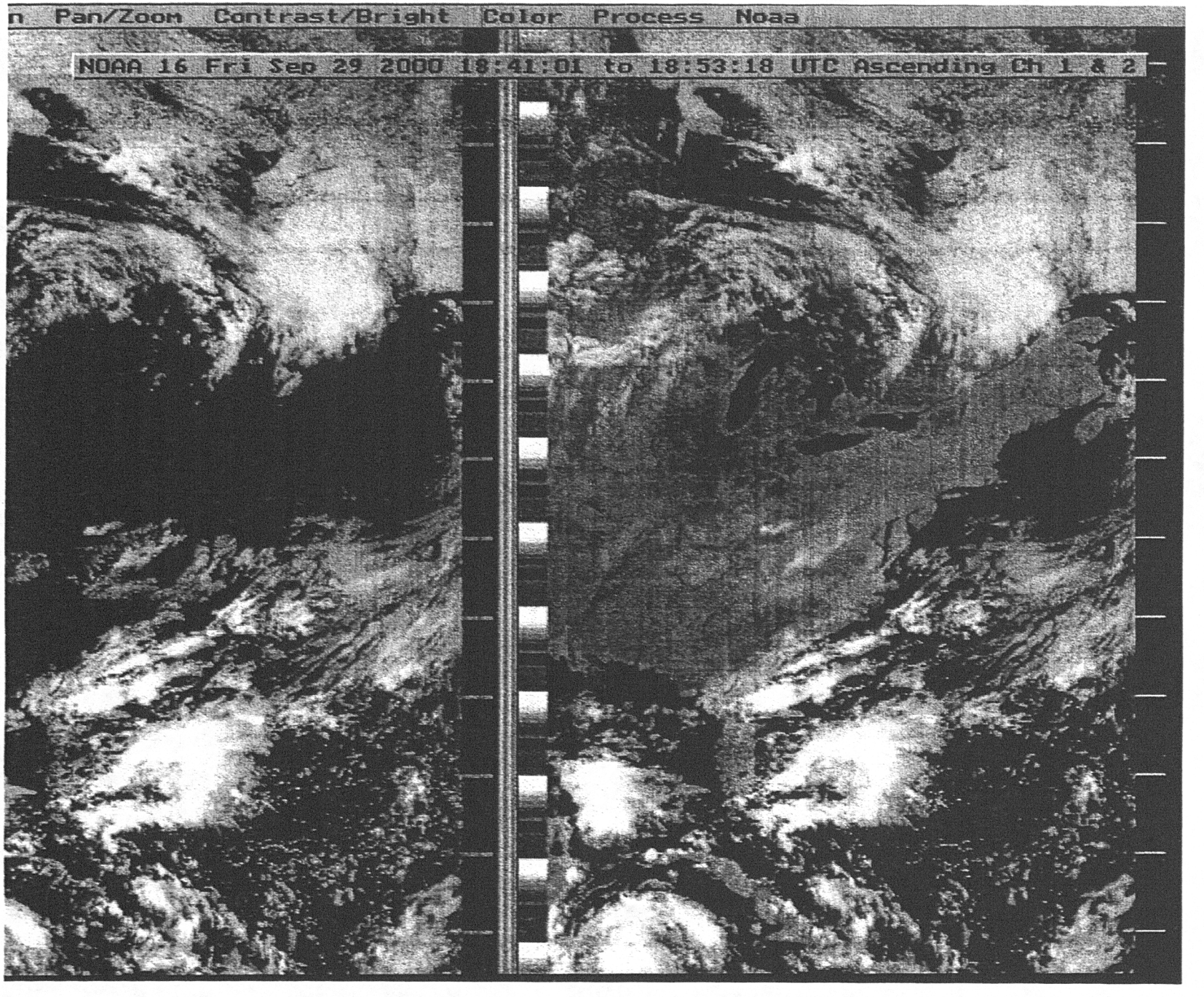
	PARAMETER	EXPECTED	OBSERVED
41.	DTR 4 Servo Error	0 – 38	0.0
42.	DTR 4 Current	400±100 mA	
		600±100 mA	26.0
43.	DTR 5 Transport Temperature	20±20°C	23.5° C
44.	DTR 5 Pressure	15 – 20 psia	15.9
45.	DTR 5 Electronics Temperature	20±20°C	37.6° C
46.	DTR 5 Head Playback Voltage	0 – 7.5	0.3
47.	DTR 5 Servo Error	0 – 38	0.5
48.	DTR 5 Current	400±100 mA	
		600±100 mA	353.8
49.	Cross Strap Unit (XSU) +10 V Side 1	10.00	10.0 V
50.	XSU +10 V Side 2	0.00	0.0
51.	XSU Phase Lock Loop (PLL) 1 Error Side 1	5.0±1.0	4.68 V
52.	XSU PLL 1 Error Side 2	5.0±1.0	0.0
53.	XSU PLL 2 Error Side 1	5.0±1.0	4.52 V
54.	XSU PLL 2 Error Side 2	5.0±1.0	0.0
55.	XSU +5.2V Ordered	5.20	5.16
56.	MIRP +10V Converter	10.00	10.0
57.	MIRP –10V Converter	–10.00	-10.08
58.	MIRP +5.2V Converter	5.20	5.20
59.	AIP +10V Side 1	10.00	10.02
60.	AIP +10V Side 2	0.00	0.0

OV Test DHS002

TEST NUMBER:	DHS002
TEST NAME:	MIRP Operation with AVHRR
OBJECTIVE:	Verify the operation of the MIRP by examining the AVHRR imagery as well as the derived low resolution APT imagery.
DESCRIPTION:	The AVHRR HRPT and APT imagery is formatted by the MIRP. The MIRP function is verified by the proper production of the two imagery types. This is verified subjectively first by examination of the HRPT imagery on the Telonics workstation at the NOAA SOCC. The hard copy available at this station is examined for line-to-line registration, noise, signal dropouts, streaking, and other possible MIRP induced anomalies. Next, the APT imagery is examined for the same area coverage for like phenomena. Ideally, if the MIRP is working properly, there are no anomalies in either the high or low resolution imagery. If anomalous behavior is exhibited in one but not the other, then an investigation as to the cause is necessary.
SUCCESS CRITERIA:	Both high and low resolution imagery should be blemish free or exhibit the same anomaly if a common processing error is the cause.
RESULTS:	Although samples of HRPT imagery and APT imagery are included, this requires analyzing imagery over a common area.




File Screen Pan/Zoom Contrast/Bright Color Process Noaa
NOAA 16 Fri Sep 29 2000 18:41:01 to 18:53:18 UTC Ascending Ch 1 & 2


n Pan/Zoom Contrast/Bright Color Process Noaa
NOAA 16 Fri Sep 29 2000 18:41:01 to 18:53:18 UTC Ascending Ch 1 & 2

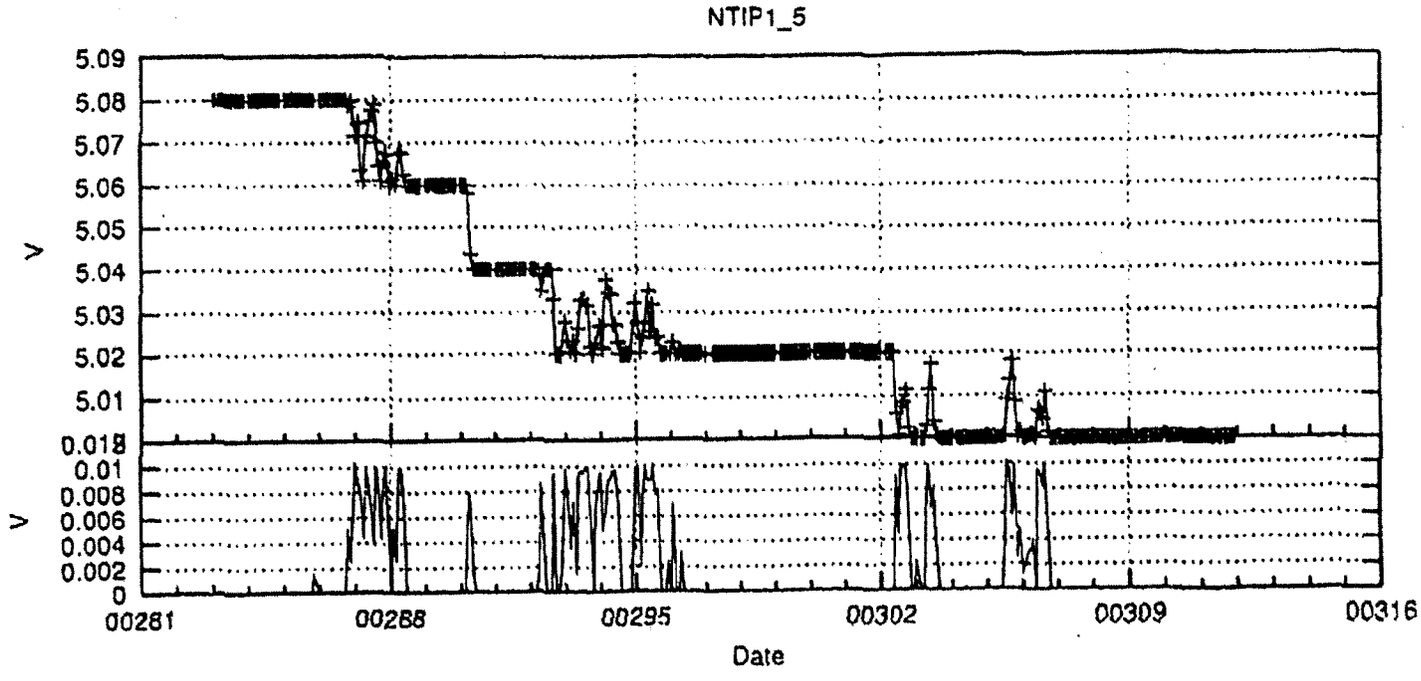
DHS Conclusions

OBSERVATIONS:

- The TIP Calibration Voltages of TIP side one have started to degrade. **No other telemetry is affected.**
- The limits on these telemetry points have been changed.
- A/D converter is working correctly.
- The TIP is a redundant unit therefore TIP may be switched to use side two.

PROBABLE CAUSE:

- A failing component, most likely the Zener diode, in the voltage divider network.
- This anomaly is under investigation.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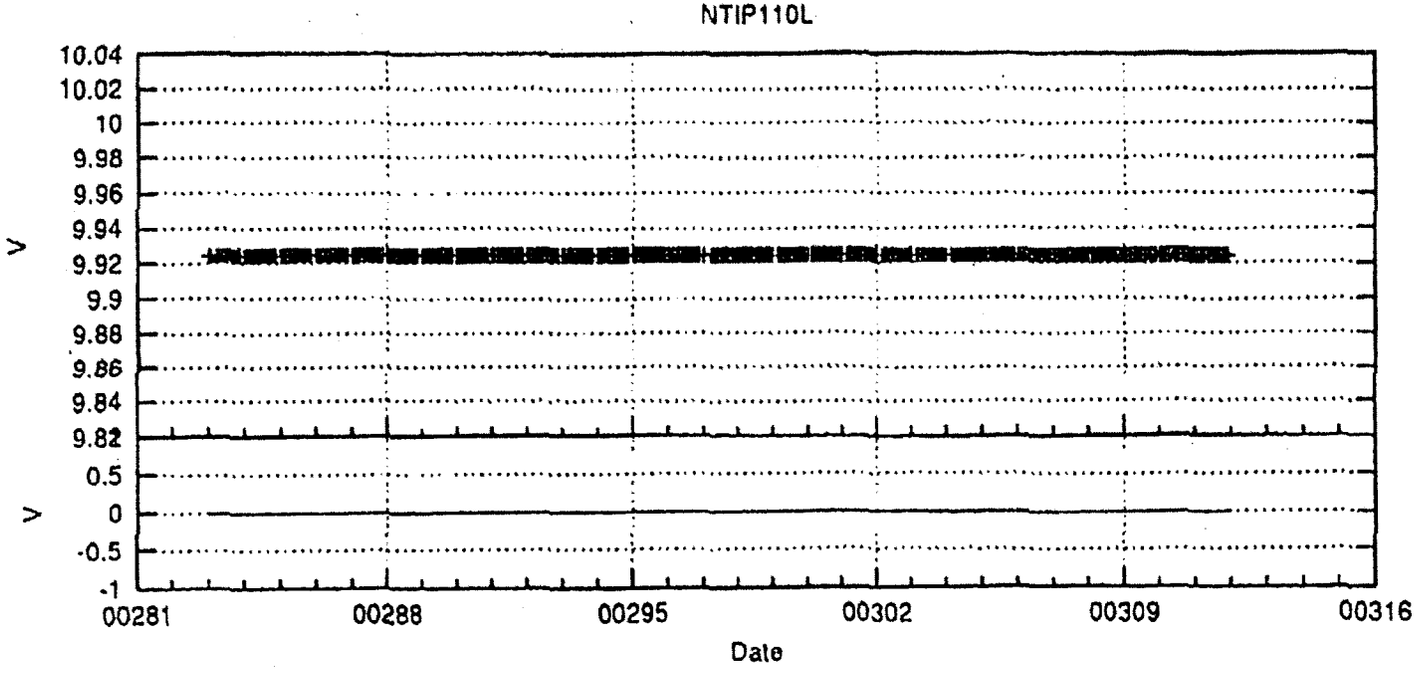
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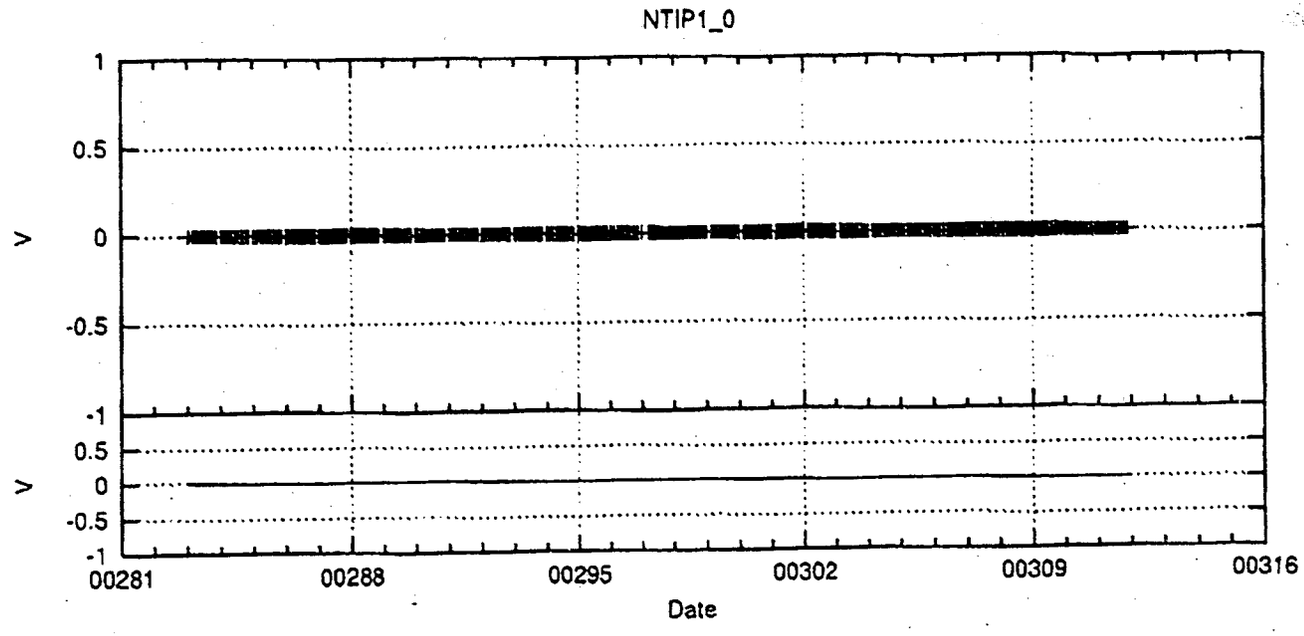
Acronym	Definition
AVHRR	Advanced Very High Resolution Radiometer
C&CS	Command and Control
CIU	Controls Interface Unit
CPU	Central Processing Unit (SCP-234 is on board processor)
CV	Command Verification
DAU	Decryption Authentication Unit
DHS	Data Handling Subsystem
GAC	Global Area Coverage
GRD	GSTDN Receiver Demodulator
LAC	Local Area Coverage
MIRP	Manipulated Information Rate Processor
RXO	Redundant Crystal Oscillator
TIP	TIROS Information Processor
TOAR	TIROS Orbital Anomaly Report
VCC	Vehicle/Variable Command Count

BACKGROUND MATERIAL

Y. Tiwary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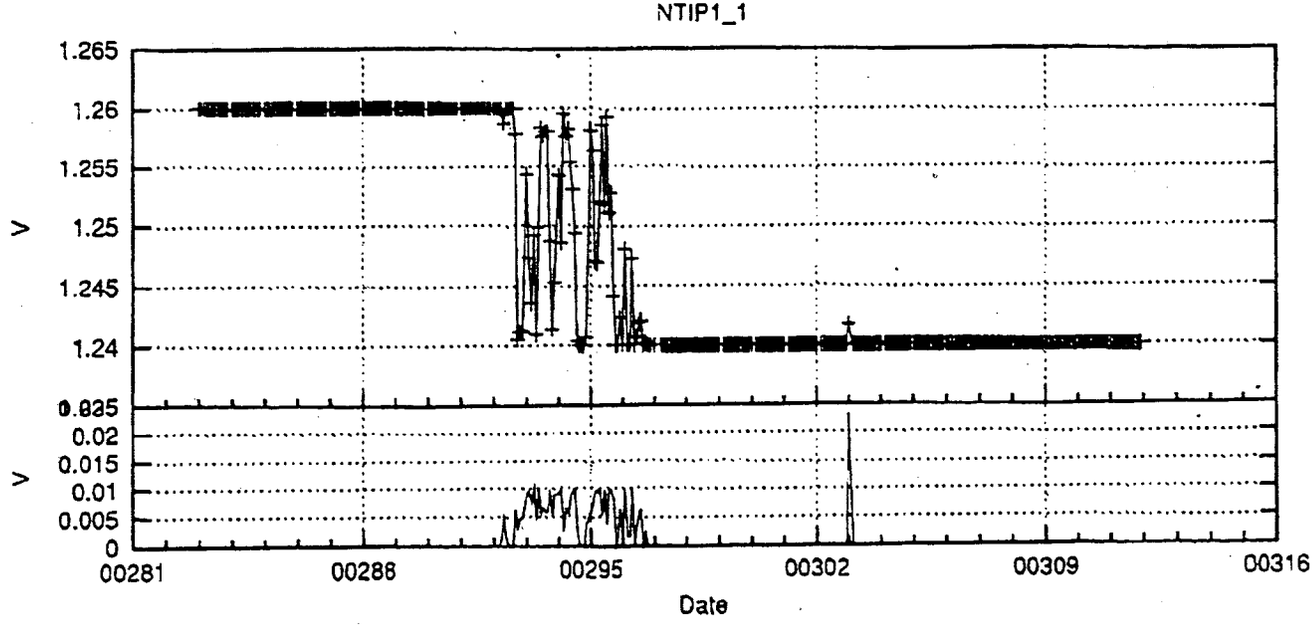
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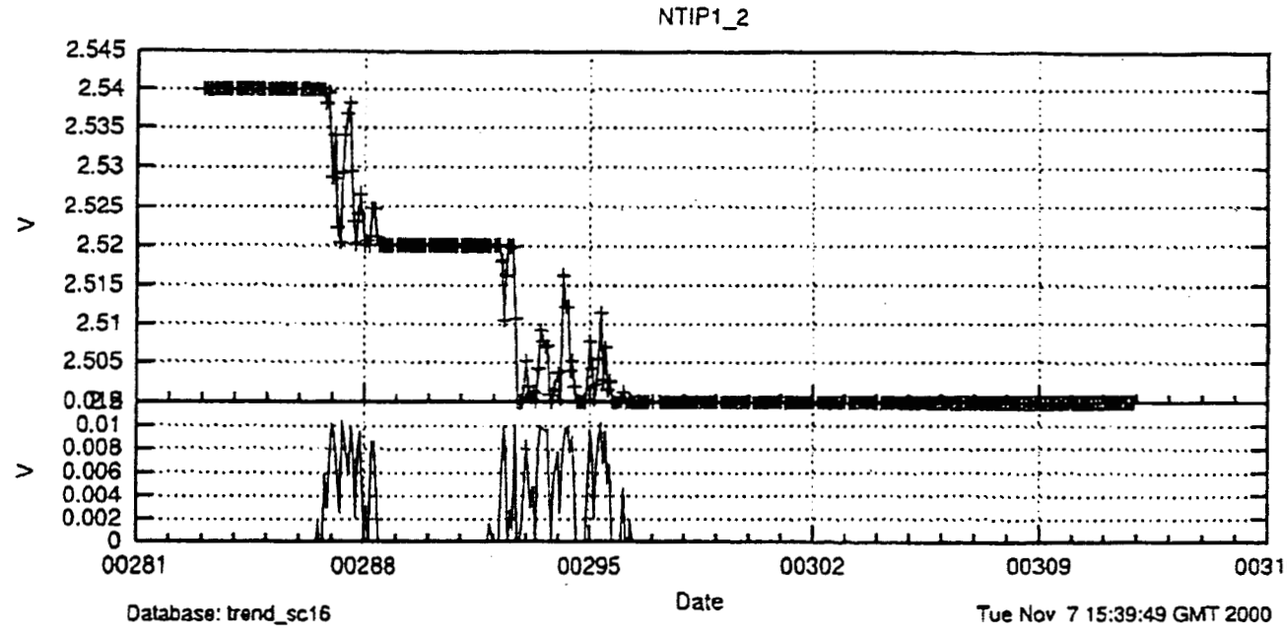
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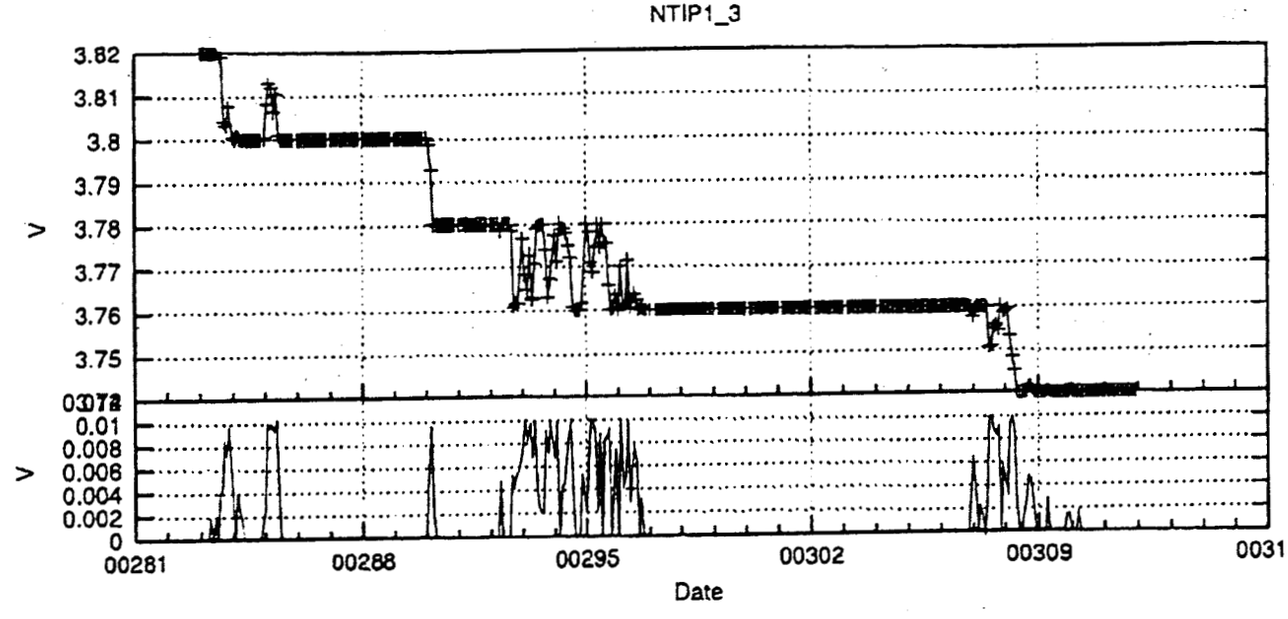
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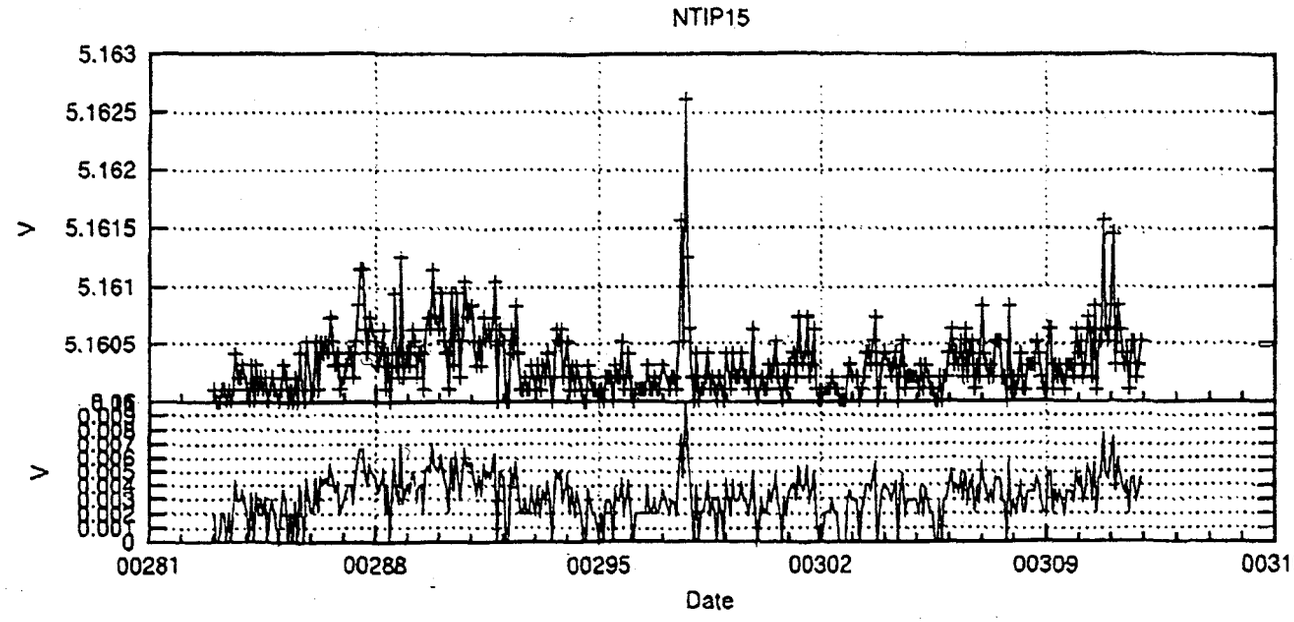
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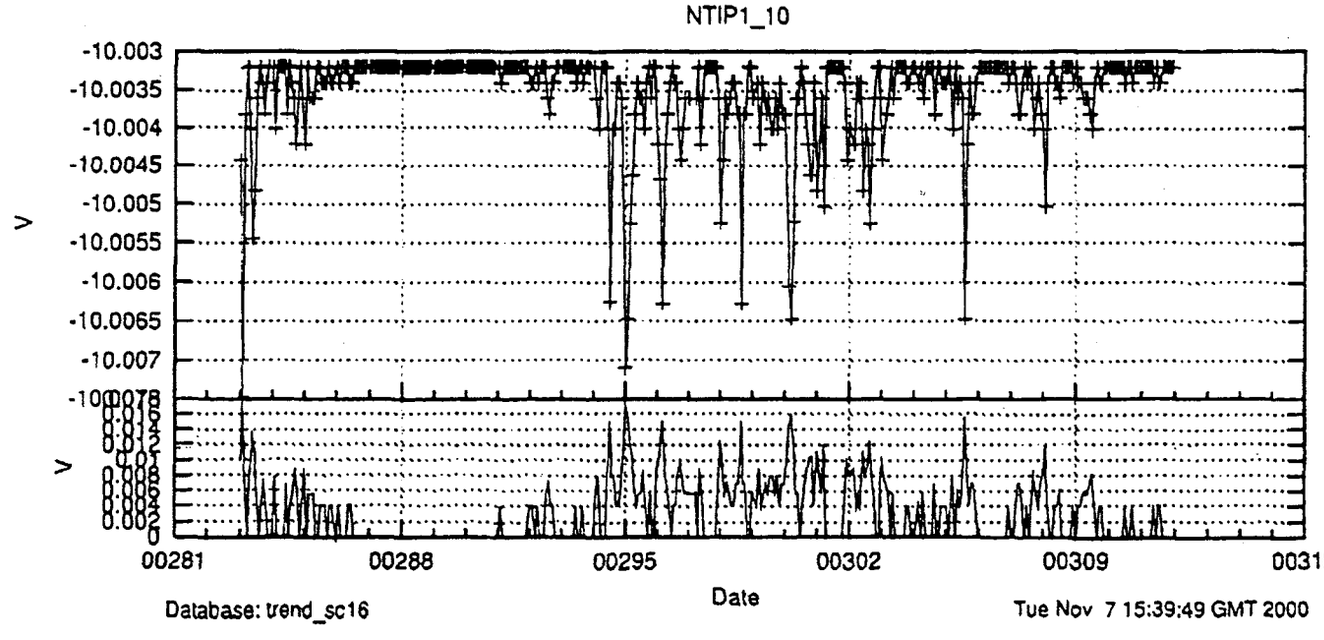
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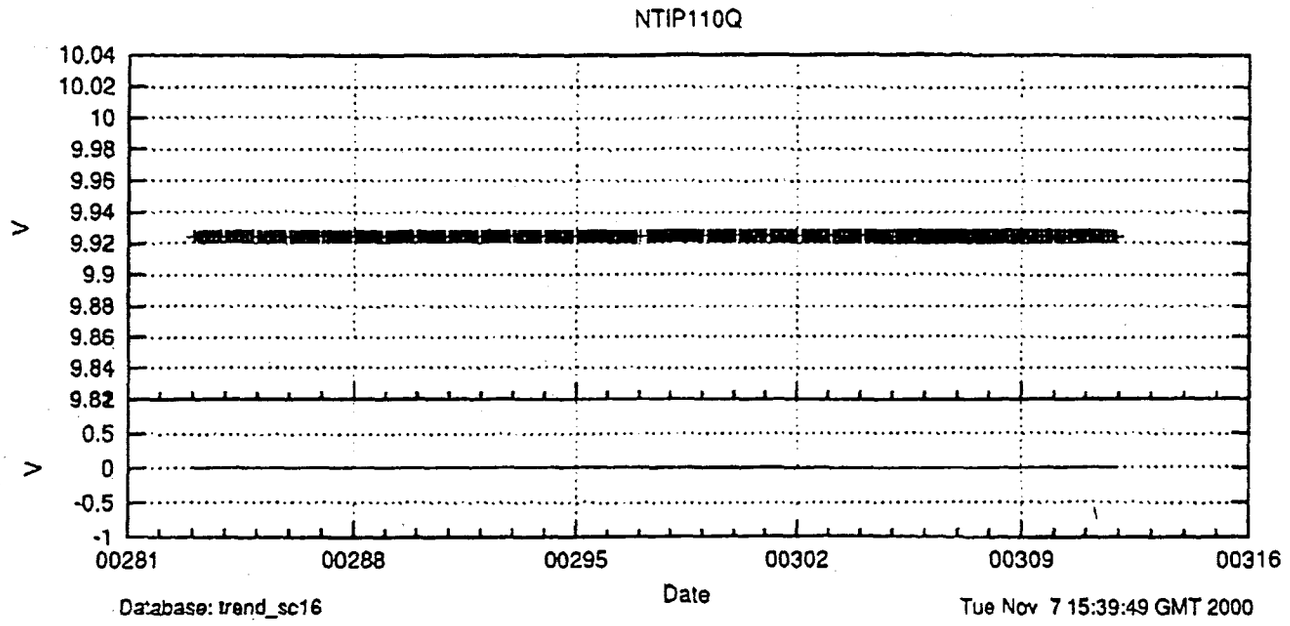
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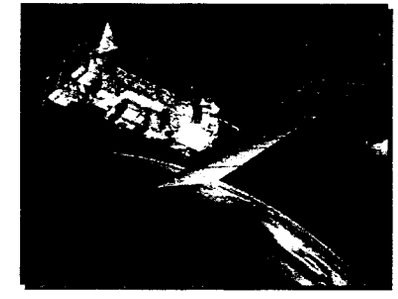


FLIGHT SOFTWARE

E. Jay

FSW Team: R. Abrams, D. Blejer, R. McNally/QSS

NOAA-L LAUNCH CONFIGURATION

- Two 64K SCP-234 Flight Computers
- NOAA-L Flight Load Package Revision A in both CPUs, including
  - Ascent Guidance Software, Revision C
  - AGS Mission Constants for 470 nmi Orbit
  - AGS IMU Calibration Constants for IMU Unit 305
  - CPU1 and CPU2 Mission Constants
- Ephemeris for September 21, 2000
- NOAA-L Post Handover Stored Command Table

SUMMARY OF NOAA-L FLIGHT SOFTWARE CHANGES SINCE NOAA-K BASELINE (Sheet 1 of 4)

NEW FLIGHT SOFTWARE MODULE

- A new flight software module, SADPOS, was added to provide solar array positioning in the event of a failure of the non-redundant solar array drive (SAD) resolver. SADPOS uses redundant solar cell illumination sensors and redundant solar array position sensors to sense array illumination and to select the proper SAD speed command; it does not use the resolver.

- SADPOS is always on, monitoring the illumination sensors and determining the array speed. When SADPOS is enabled, it autonomously takes control of the SAD if during a daylight period there is darkness on the array illumination sensors for more than eight consecutive minutes or if SADCS detects a persistent slew closing error.

- The heritage SADCS software module, which normally controls the SAD, was modified as a result of adding SADPOS to (1) support ground control of the SAD, (2) invoke SADPOS control when the slew closing test fails, and (3) issue SADPOS commands instead of its own when SADPOS is in control of the array.

SUMMARY OF NOAA-L FLIGHT SOFTWARE CHANGES SINCE NOAA-K BASELINE (Sheet 2 of 4)

NEW FLIGHT SOFTWARE MODULE (Continued)

- SADPOS operates in one of four modes:
  - Nominal Mode — SADCS in control of SAD, SADPOS enabled as backup
  - SADCS Primary — SADCS in control of SAD, SADPOS disabled (mode at launch)
  - SADPOS Primary — SADPOS in control of SAD
  - Ground Primary — Ground in control of SAD, SADCS and SADPOS disabled

- One new command/data word combination was added to control all SADPOS functions, and one new telemetry word was added to provide all available information about SADPOS.

- OV Test SYS007 was used to test SADPOS post-launch operation. A complete discussion of OV Test SYS007 and its results was presented in the Systems section.

SUMMARY OF NOAA-L FLIGHT SOFTWARE CHANGES SINCE NOAA-K BASELINE (Sheet 3 of 4)

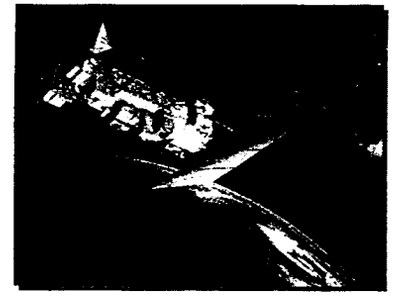
CHANGES TO HERITAGE FLIGHT SOFTWARE MODULES

- The long-standing TIP clock update error was corrected.
- Autonomous switching of the Power Supply Electronics (PSE) interface in the event of a persistent inability to command the PSE was added to redundancy management.
- Attitude determination software was modified to bypass yaw updates when in forced (ground initiated) yaw gyro compassing mode, in order to eliminate the error introduced into yaw rates when the sun sensor is shaded by the offset solar array.
- Redundancy management software was modified to provide level 2 management in the backup CPU as well as in the control CPU.
- Reduced gyro software was modified to set additional variables to normal attitude control values when the ground forces an exit from reduced gyro.
- Roll wheel speed limit for triggering pitch coil switch was changed from 1000 rpm to 1350 rpm.
- The macro storage area was moved from the AGS area so it can now be initialized prior to launch.

SUMMARY OF NOAA-L FLIGHT SOFTWARE CHANGES SINCE NOAA-K BASELINE (Sheet 4 of 4)

CHANGES TO HERITAGE FLIGHT SOFTWARE MODULES (Continued)

- The macro ID of the currently executing macro has been included in macro telemetry in response to a request from SOCC.
- Encryption and bypass timers were increased from 7 hours 20 minutes to 9 hours to allow SOCC more time to enter commands to prevent timer expiration in three-orbit blind situations.
- Software was changed to preserve the current command mode (encrypted or clear) in the event of a CPU restart, instead of defaulting to clear (uplink demodulator is not cross-strapped in clear command mode, only in encrypted); normal on-orbit operations are in encrypted mode.
- Attitude control constants for magnetic unloading compensation were modified to increase pointing accuracy during magnetic unloading, as a result of analysis done during NOAA-K OV.
- New ESA side switch commands were provided to eliminate the need to use two commands to switch ESA sides.



THERMAL CONTROL SUBSYSTEM

J. Hunter

OV Team: H. Farjadi and L. Lindrose/QSS

TCS OV TEST SUMMARY

Test Number	Description of Test	Operational Impacts
THR001	TCS status at ascent handover (t= + 34 minutes)	None
THR002	Review propulsion subsystem soakback effects	None
THR003	Assessment of TCS one month after launch	None
THR004	Temperature rate of change for instruments	None
THR005	Verify temperature control of hydrazine & RCE	None
THR006	TCS response to thermal load changes	None

THR001 - TCS STATUS AT ASCENT HANDOVER (Sheet 1 of 2)

- Summary
  - Real-time monitoring of handover data at the WR (No data at SOCC)
  - Data successfully obtained
  - TCS ready for operational use
- Specification Compliance
  - Check expected state of all thermal components (Compliant)
  - Were all temperatures within expected range? (Compliant)

THR001 - TCS STATUS AT ASCENT HANDOVER (Sheet 2 of 2)

- Characterization

  - Verify that all TCEs are enabled at time of handover (all were)
  - Verify that RCE A and B heaters are enabled and that RCE C and D heaters are disabled (verified correct)
  - All flight temperatures were within expected range

- Concerns, Anomalies, and Operational Impacts

  - Some temperature predicts at time of handover were in error (Predicted temperature ranges were not wide enough)
  - REA Inlet temperatures were outside their boost operational limits but well below the decomposition temperature of hydrazine (boost yellow and red limits should be increased)

THR002 - PROPULSION SUBSYSTEM SOAKBACK EFFECT (Sheet 1 of 2)

- Characterization
  - Verify that all TCEs are enabled at time of handover (all were)
  - Verify that RCE A and B heaters are enabled and that RCE C and D heaters are disabled (verified correct)
  - All flight temperatures were within expected range
- Concerns, Anomalies, and Operational Impacts
  - Some temperature predicts at time of handover were in error (Predicted temperature ranges were not wide enough)
  - REA Inlet temperatures were outside their boost operational limits but well below the decomposition temperature of hydrazine (boost yellow and red limits should be increased)

THR002 - PROPULSION SUBSYSTEM SOAKBACK EFFECT (Sheet 2 of 2)

- Summary
  - Offline history plots and reports of all the Propulsion System temperatures plus all RSS mounted component temperatures were obtained between Ascent Handover+1.0 hr
  - TCS is ready for operational use

- Specification Compliance
  - Determine if maximum soakback temperatures of RSS mounted equipment remains within specification limits (non compliant)

- Characterization
  - (See following table)

- Concerns, Anomalies, and Operational Impacts
  - REA Inlet temperatures and REA Loop temperatures exceeded their operational flight limits
    No operational impact.

THR002 - SUMMARY OF MAXIMUM TEMPERATURES (Sheet 1 of 2)

DURING THE BOOST PHASE

Sensor Location	Note	Flt. Temp. Limit (°C) Ref: P&C Hdbk	Peak Soakback Temp. (C°)	Time of Peak (00/265/hr:min)
Battery Pack 1A	•	32.0	22.0	10:22
Battery Pack 1B	•	32.0	21.4	10:22
Battery Pack 2A	•	32.0	23.1	10:22
Battery Pack 2B	*	32.0	23.1	10:22
Battery Pack 3A	•	32.0	22.6	10:22
Battery Pack 3B	*	32.0	22.4	10:22
PSE Heat Sink	•	45.0	23.8	10:34
BCA-1 Heat Sink	•	60.0	22.1	11:06
BCA-2 Heat Sink	*	60.0	22.5	11:06
BCA-3 Heat Sink	•	60.0	23.6	11:06
SAD Motor	•	40.0	16.7	11:54
ADE 1 Baseplate	•	40.0	16.7	10:22
ADE 2 Baseplate	•	40.0	16.2	10:22
BRU 1	•	45.0	13.5	10:22
BRU 2	•	45.0	14.0	10:22
BRU 3	•	45.0	14.0	10:22
REA 1 Inlet		66.0	84.4	11:06
REA 2 Inlet		66.0	86.9	11:06
REA 3 Inlet		66.0	84.4	11:06
REA 4 Inlet		66.0	84.4	11:25
REA 1 Loop		66.0	46.6	11:21
REA 2 Loop		66.0	43.3	11:11
REA 3 Loop		66.0	26.9	111:16

THR002 - SUMMARY OF MAXIMUM TEMPERATURES (Sheet 2 of 2)

DURING THE BOOST PHASE (Continued)

RCE CDCC		30.0	30.9	11:54
N2H4 –Y Tank		40.0	16.4	10:22
N2H4 –Y Line		66.0	21.0	11:54
N2H4 –Y Iso Valve		49.0	25.0	11:35
N2H4 + Y Tank		40.0	16.0	10:22
N2H4 + Y Line		66.0	19.7	11:54
N2H4 +Y Iso Valve		49.0	25.0	10:47
NEA 5 Valve		66.0	33.6	11:54
NEA 6 Valve		66.0	32.2	11:54
NEA 7 Valve		66.0	30.9	11:54
NEA 8 Valve		66.0	29.6	11:54
NEA 9 Valve		66.0	50.3	11:35
NEA 10 Valve		66.0	47.8	11:35
NEA 11 Valve		66.0	40.3	11:54
NEA 12 Valve		66.0	47.8	11:54
N2 Pressure Reg.		55.0	18.0	10:22
N2 Latch Valve		66.0	29.6	11:54
N2 +Y Tank		52.0	17.5	11:54
N2 –Y tank		52.0	27.9	11:35
RSS		60.0	49.0	11:40

THR003 - Assessment of TCS Launch + 1 Month

- Summary
  - Offline history & trend reports of temperatures one month after launch (Ref.00/312:20:00:00 to 00/313:16:00:00); t= 47th day. Successfully obtained.
  - TCS is ready for operational use

- Specification Compliance
  - Check all S/C temperatures one month after launch against flight specifications and predicts.
    (All temperatures were compliant to specification but some temperatures exceeded their predicted limits)
    - Hydrazine +Y line peak temperature reaches 42 °C (Red limit = 35°C)
    - IMP –Y minimum temperature reaches 9°C(Yellow & Red limits are 10 & 5°C)
    - Some heater duty cycles are close to their limit value (see following table)

- Real Concerns, Anomalies, and Operational Impacts (None)

THR003 - Summary of Louver Duty Cycles After One Month

TCE1H	TCE2H	TCE3H #	TCE4H	TCE5H	TCE6H	TCE8H	TCE9H	TCE10H	TCE10L
Battery 1A	Battery 1B	Battery 2A	Battery 2B	Battery 3A	Battery 3B	Long Strut	ESA Hous.	ESM 3+ZC	
6.2%	20.3%	1%	11.5%	20.3%	18.1%	16.0%	34.0%	1.0%	73.0%
TCE11H	TCE11L	TCE12H	TCE12L	TCE13H	TCE13L	TCE14H	TCE14L	TCE15H	TCE15L
ESM 3-ZC		ESM 3-Z		ESM 4+ZC		ESM 4-ZC		ESM 4-Z	
0.5%	73.0%	1.0%	51.0%	1.0%	56.0%	0.5%	47.0%	2.0%	82.0%

TCE16H	TCE16L	TCE17H	TCE17L	TCE18H	TCE18L	TCE19H	TCE19L	TCE20H	TCE20L #
ESM 5+ZC		ESM 5-ZC		ESM 5-Z		ESM 6+ZC		ESM 6-ZC	
0.5%	84.0%	1.0%	0.0%	2.0%	87.0%	0.5%	56.0%	1.8%	97.0%
TCE21H	TCE21L	TCE24H	TCE24L	TCE25H	TCE25L	TCE26H	TCE27H	TCE28H	TCE29H
ESM 6-Z		AVHRR BPLT		HIRS BPLT		IMU RAD.	ADE	SAD	SEM2TED
1.0%	55.7%	0.0%	29.2%	29.2%	0.0%	60.2%	7.1%	11.5%	1.0%

TCE31H	TCE32H	TCE33H	TCE34H	TCE34L #	TCE35H	TCE35L #	TCE36H	TCE36L	TCE37H
MEPED	IMP+X	IMP-X	ESM 4+Z		ESM 3+Z		ESM 5+Z		ESM 6+Z
1.0%	24.8%	42.5%	0.0%	100.0%	0.0%	100.0%	1.8%	42.5%	1.0%

Note: Duty cycles of the following TCEs are at or close to their limit value.
Corresponding temperatures are given.

TCE	Corresponding Mnemonic	Yellow Limits (°C)	Flight Temperatures (°C)
TCE3H	NBAT2AT	-5 to 15	6.2 to 7.0
TCE20L	NSTX3TMP	-20 TO 35	22.5 TO 27.0
TCE34L	NSARTXBT	-20 TO 55	13.0 TO 17.5
TCE35L	NSARPTCA	4 TO 25	10.0 TO 12.0

THR004 - Temperature Rates of Change for Instruments (Sheet 1 of 2)

- Summary
  - Offline history reports at instrument "turn on" times plus during times of day/night and night/day transition were used: Day 265 until Day 285
  - Estimate of maximum rate of temperature change was computed
  - TCS is ready for operational use

- Specification Compliance
  - Determine if the maximum rate of instrument temperature change stayed within limits

    AVHRR (Non-Compliant)
  - Thermal gradients within the instruments were not computed. No gradient specifications were given

- Characterization
  - (See following table)

- Real Concerns, Anomalies, and Operational Impacts (None)

THR004 - Temperature Rates of Change for Instruments (Sheet 2 of 2)

INSTRUMENT	MNEMONIC	TURN ON TRANSIENT (°C/HR)	ECLIPSE TRANSIENTS (°C/HR)	
			Day to Night	Night to Day
AVHRR (VISUAL CH)	NAVHELET	0.71	1.75	2.62
AVHRR (IR CH)	NAVHELET	0.27	3.21	2.62
AMSU-B	NAMBMDET	1.33	2.27	3.81
SARR	NSARBLOT	0.40	0.67	1.33
SARP	NSRPRUT	1.37	1.08	1.62
AMSU-A1	NAM1RF2	5.44	~0.0	~0.0
DCS	NDCSPCT	3.63	0.66	0.66
AMSU-A2	NAM2RFT	1.06	2.72	2.72
SBUV	NSBUGMTT	0.33	0.68	0.68
SEM	NSEMTEDT	0.25	2.88	5.00
HIRS	NHIRELET	0.25	2.00	3.30

Maximum allowable, nominal rate of temperature change:

DCS < 3ºC/hr SEM < ?ºC/hr AVHRR < 2ºC/hr HIRS < 5ºC/hr AMSU-A1 & A2 < 5ºC/hr SBUV < ?ºC/hr
SARR < 2.5ºC/hr SARP < 3ºC/hr

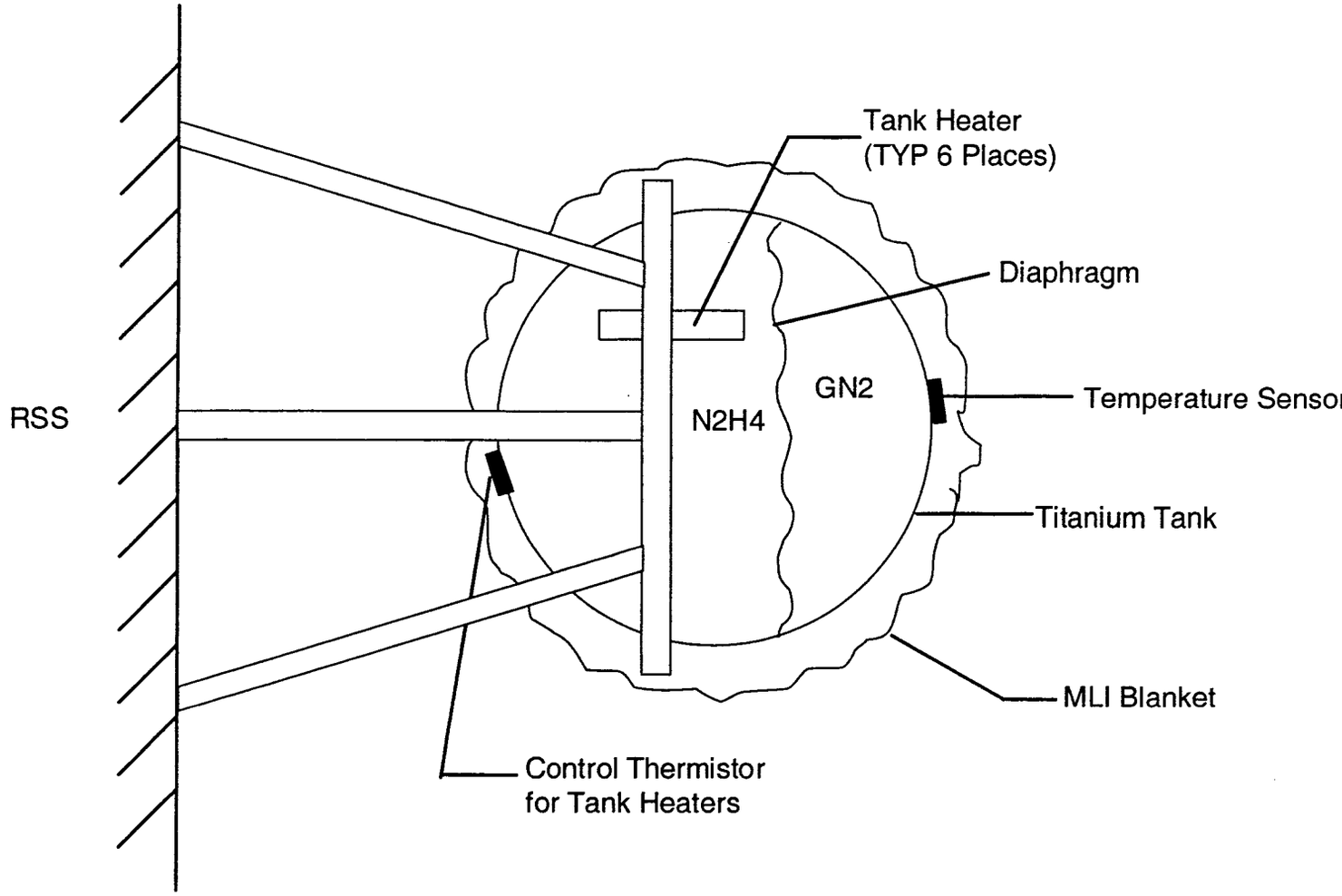
THR005 - Verify Temperature Control of Hydrazine and GN_2 Systems

- Summary
  - Offline history plots of all N_2H_4 and GN_2 component temperatures were generated (00/305:00:00:00 to 00/305:06:00:00)
  - TCS is ready for operational use
- Specification Compliance
  - Review the TCS's ability to keep the two propulsion systems within operational limits (Compliant)
- Real Concerns, Anomalies, and Operational Impacts (None)

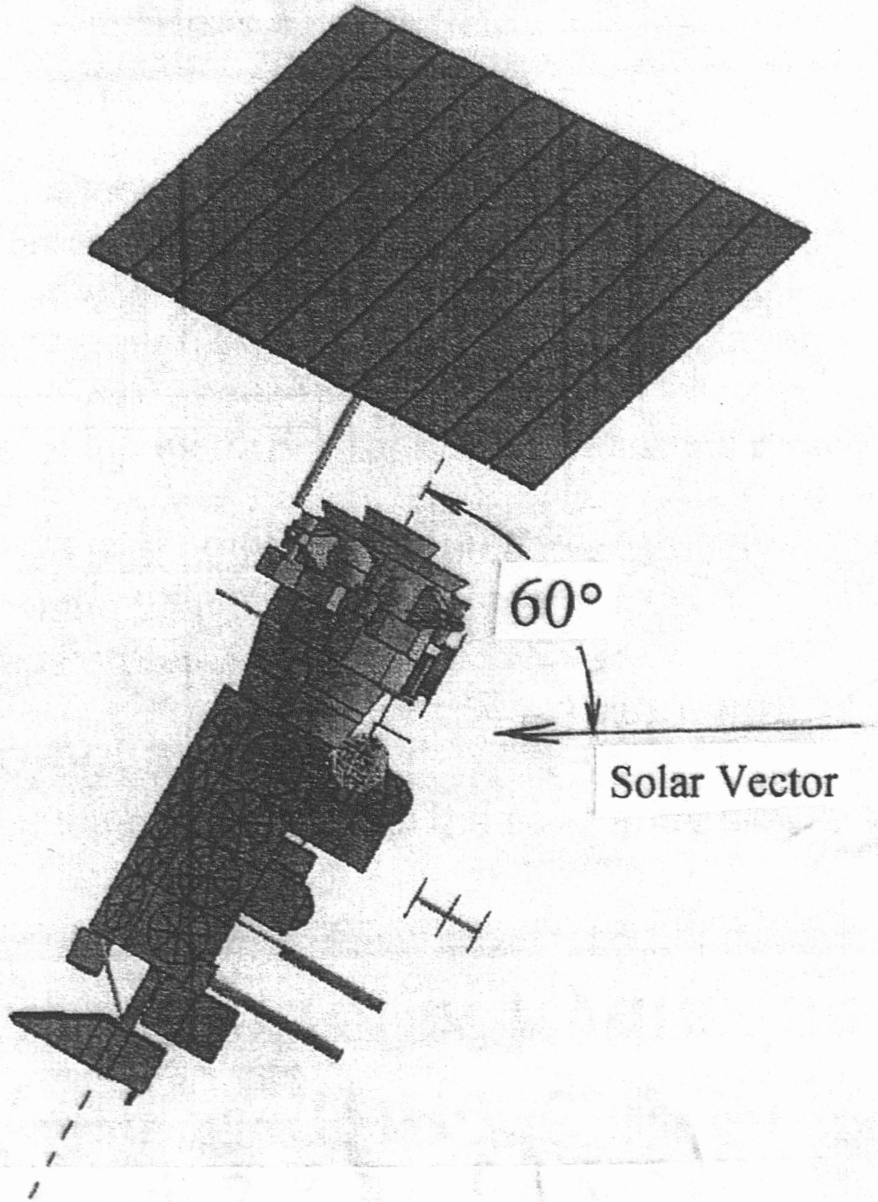
THR006 TCS Response to Thermal Load Changes

- Summary
  - Offline history plots of the instruments' temperatures during the SADPOS Test to determine if the solar array movement influences the instruments thermally. Successfully obtained (Ref 00/268/10:00:00.0 to 00/269/10:00.0)
  - Geometry plot of S/C showing relative position of the solar array, instruments and solar vector
  - Offline history plots of the hydrazine tank temperatures showing influence of the AKM burn
    Successfully obtained (Ref 00/265/11:00:00.0 to 00/266/11:00:00.0)
  - Sketch showing how the heat soak back from the AKM burn influences the hydrazine tank temperatures
- Specification Compliance
  - Checked instrument temperatures while the solar array slew angle was changing
    (Solar array position had no influence on the instrument temperatures)
  - Checked hydrazine tank temperatures during the AKM soakback period
    (Both hydrazine tanks dropped to 0°C during this period)
- Real Concerns, Anomalies and Operational Impacts (None)

THR006
Thermal Control of Hydrazine Tank



THR006
Sun Impingement Angle on NOAA-16

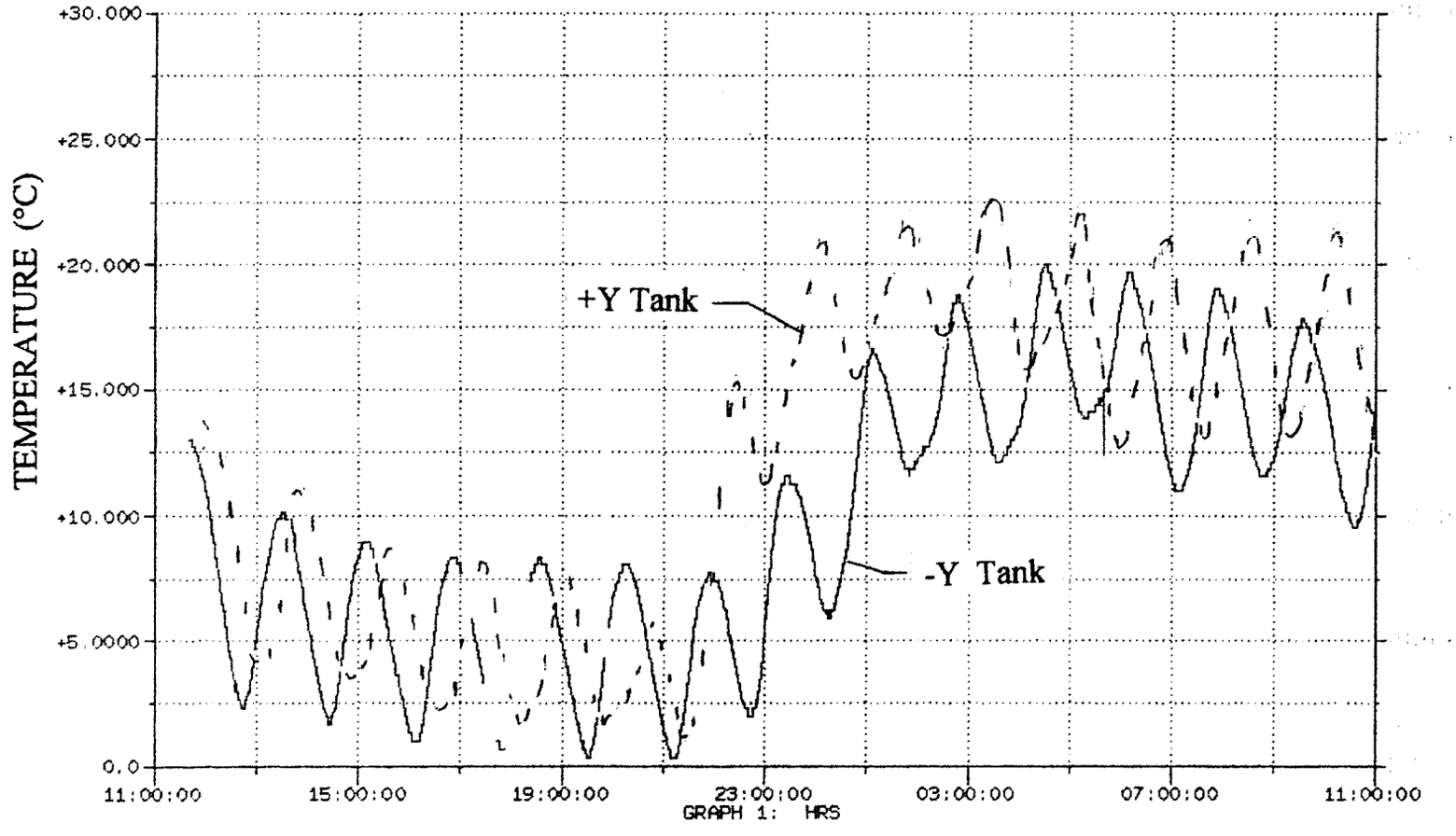


THR006
AKM Burn Influence on Hydrazine Tank Temperatures

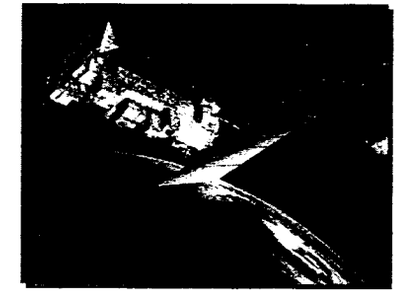
PLOT NAME: NRT_OPS$HISPLOT_PLOT:33HYZ
TITLE: HYZ TANK
DESCRIPTION: HYZ TANK TEMPERATURES
SETUP FILENAME: NRT_OPS$HISPLOT_SETUP:22HYZ
START/STOP TIME: 00/265/11:00:00.0 - 00/266/11:00:00.0

SCID: 16
PLOT CREATION DATE: 285/20:24:14
PLOT PRINT DATE: 285/20:34:45
SAMPLING PERIOD: 000/00:00:10.00

Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
NHYZ1T	FA203	DEG	EU		TIME		HRS			1											
NHYZ2T																					



see 12/4/00 update



AMSU-A OV RESULTS

S. Krimchansky

OV Team: M. Garhart and L. Penn / QSS

Summary (Sheet 1 of 2)

Total number of tests = 16 (10 Offline/6 real-time)

- 14 successful
- 0 unsuccessful
- 2 incomplete
  AM1008/2008 - Determination of Optimal Space View
- 0 deleted

Summary (Sheet 2 of 2)

- All computed NEdT's within specifications.
- Questions exist concerning optimal space view determination.
- Scanner operation within specification, but standard deviations at some positions are higher than NOAA-K.
- All other examined functions comply with specifications.
- Cross-track bias noted in channels 1 and 2.

OV TESTS

AM1001/2001 - Power Off/Monitor Analog Telemetry

- Purpose: Ensure the instrument is within permissible temperature limits before initiating power-on commands.
- Results: All parameters within permissible limits.

AM1002/2002 - Power On/ Monitor Telemetry

- Purpose: Perform partial instrument activation, command verification and telemetry monitoring.
- Results: All parameters within permissible limits.

OV TEST

AM1003/2003 - Noise Measurement - All Channels

- Purpose: Measure the noise floor and radiometric bias of the instrument.

- Results: No systematic noise was observed. Normal scan NEdT's are well within specification.

AM1003/2003
NEdT Comparison
Normal Scan Warm View Data
D284/0135 - D285/0124

Channel	NEdT	Spec
1	0.14	0.30
2	0.18	0.30
3	0.29	0.40
4	0.25	0.25
5	0.25	0.25
6	0.24	0.25
7	0.24	0.25
8	0.26	0.25
9	0.25	0.25
10	0.27	0.40
11	0.28	0.40
12	0.35	0.60
13	0.44	0.80
14	0.65	1.20
15	0.25	0.50

AM1003/2003
NEdT Comparison
Normal Scan Space View Data
D284/0135 - D285/0124

Channel	NEdT	Spec
1	0.07	0.30
2	0.10	0.30
3	0.11	0.40
4	0.07	0.25
5	0.08	0.25
6	0.07	0.25
7	0.08	0.25
8	0.07	0.25
9	0.08	0.25
10	0.10	0.40
11	0.11	0.40
12	0.17	0.60
13	0.24	0.80
14	0.39	1.20
15	0.11	0.50

OV TEST

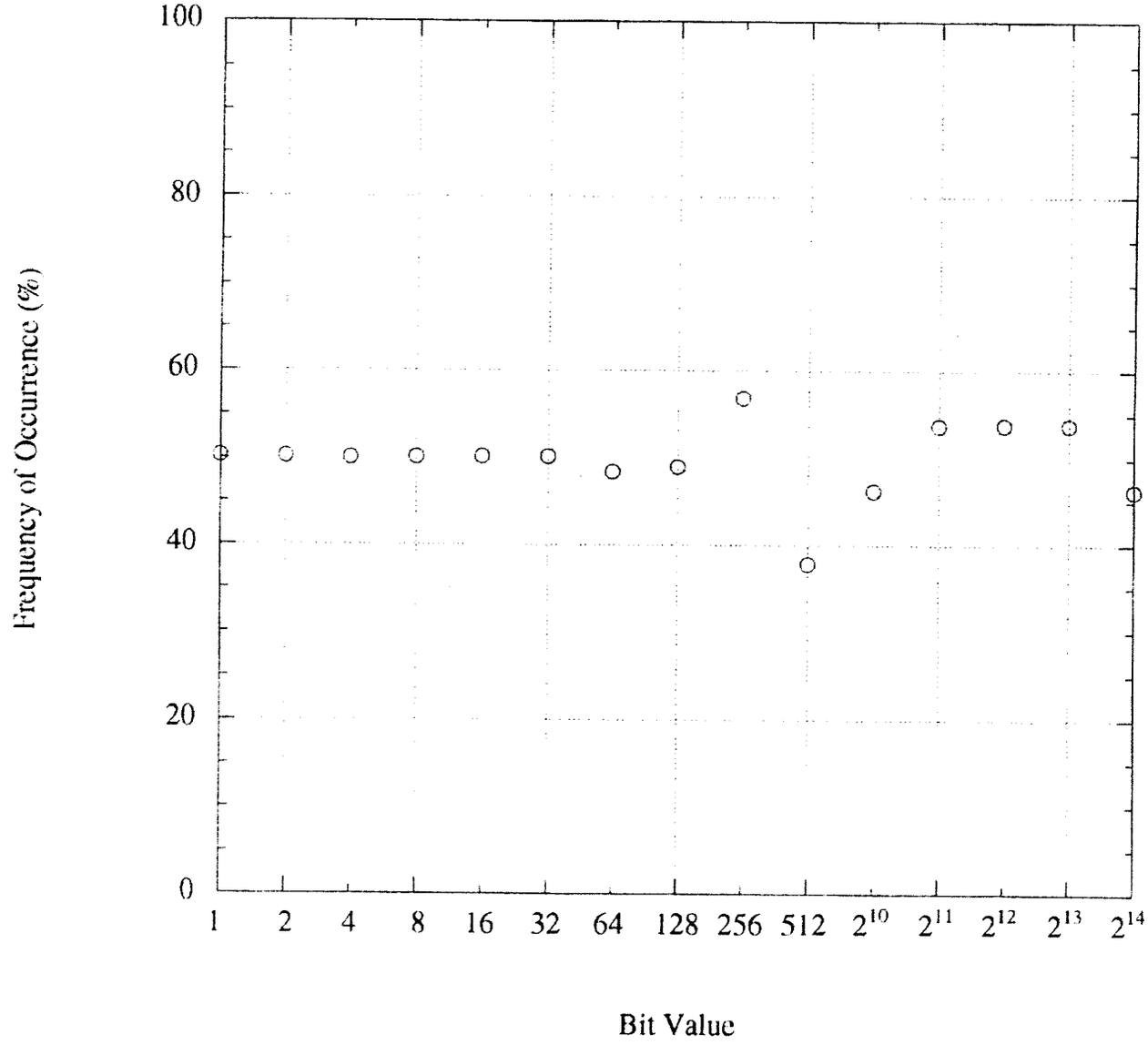
AM1004/2004 - A/D Converter Evaluation

- Purpose: Verify that the performance of the A/D converter is nominal.

- Results: First nine bits occur approximately 50% of the time as expected. The frequency of occurrence of the 10th bit (512) appears to be slightly lower than 50%.

AM1004

Figure 2: AMSU-A1 A/D Converter Bit Data



OV TESTS

AM1005/2005 - AMSU Space/Warm View Interference Test

- Purpose: Look for extraneous noise in the space and warm view data.

- Results: A normal orbital variation is seen to occur, however, no South Pole interference is observed. The South Pole interference noted in NOAA-K two years ago seems to have diminished significantly.

AM1006/2006 - Instrument Trending

- Purpose: Monitor key instrument performance parameters over time to determine stability and reliability.

- Results: All trended telemetry appears nominal.

OV TEST

AM1007/2007 - Scanner Accuracy and Stability

- Purpose: Determine if the antenna positioner is moving the antenna to the correct positions in a repeatable manner.

- Results: All positions are within specified limits. However, large standard deviations are noted in a number of scanner positions, primarily with telescope A1-2.
  This was not observed with NOAA-K.

AM1007/2007
Scanner Accuracy and Stability

Standard Deviation of Position

Position	NOAA-L	NOAA-K
0-2-2	1.85	0.27
11-2-2	2.41	0.59
13-2-2	2.84	0.56
14-2-2	2.66	0.50
15-2-2	2.30	0.46
16-2-2	3.15	0.51
17-2-2	3.54	0.86
18-2-2	3.42	0.04
19-2-2	3.14	0.80
29-1-2	5.77	0.32
29-2-2	3.89	0.48
30-1-2	3.53	0.00
30-2-2	2.94	0.33

Position X-Y-Z, where
X = Scene number
Y = Telescope
Z = Look

OV TEST

AM1008/2008 - Determination of Optimal Space View Calibration Position

- Purpose: Determine the optimal space view position.

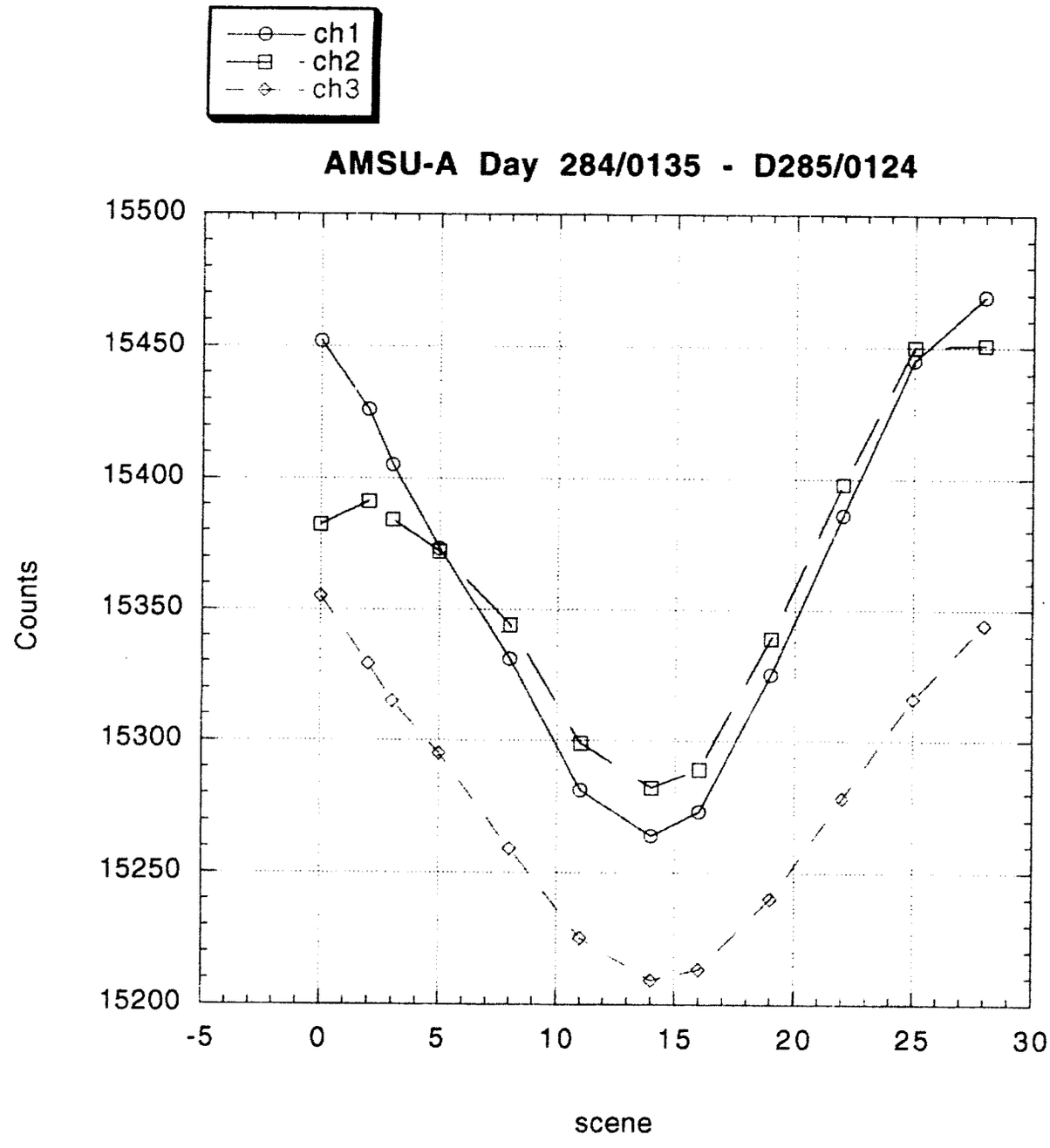
- Results: This test remains incomplete.
  Determination to be made based on lowest mean counts for each space view position, summed over all channels.
  Data used was that collected as normal scanning space data immediately after parked space looks. Data appears to be contaminated by variations in the RF shelf (instrument) temperatures resulting from prior cooling in the parked position. Since space counts are proportional to RF Shelf temperature, test as conducted does not appear satisfactory.

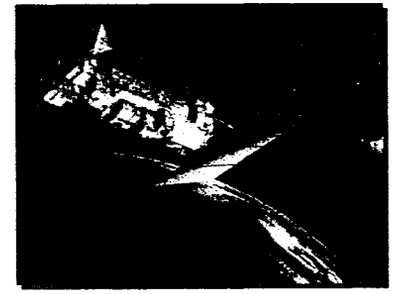
  It is recommended that the test be redone, with normal scanning data collected from the 4 space view positions, without prior parked episodes.

AMSU-A Cross-Track Bias

Analysis: An analysis of one day's worth of AMSU-A data reveals a cross-track bias favoring scenes 15-30, the left side of the viewed field. This bias is especially noteworthy for channel 2.

This test was performed in response to word from NESDIS that a similar problem had been noted on NOAA-K.


ch1
ch2
ch3
AMSU-A Day 284/0135 - D285/0124
15500
15450
15400
15350
15300
15250
15200
Counts
-5
0
5
10
15
20
25
30
scene



AMSU-B OV RESULTS

H. Goldberg

OV Team: M. Garhart and L. Penn/QSS

AMSU-B SUMMARY

- Number of tests = 15 (6 on- and 9 off-line)
- 14 successful, 1 deleted (AMB015 Earth View Bias: no measurable bias detected)
- Instrument complies with specification requirements and is considered operational
- Performance characteristics are consistent with pre-flight test results

OV Test

AMB001 - Power Off/Monitor Telemetry

- Purpose: Verify instrument is within temperature limits before activation
- Instrument is monitored using analog temperature values from 3 local oscillators
- Instrument cooled at a rate of –5 K/hour immediately after launch
- Two hours after launch, temperature had lowered to 278 K and survival heaters were turned on
- Cooling rate slowed and stabilized at 270 K

OV Test

AMB002 - Power On/Monitor Telemetry

- Purpose: Perform initial instrument turn-on
- After power-on, the instrument reference temperature (Ch. 18/19/20 Mixer temp.) increased at a rate of 2.6 K/hr., stabilized at 283 K after 48 hr., and further increased to 284-285 K over the next few days
- This temp. is about 8° cooler than that of NOAA-15 and is believed to be due to the differing orbits
- This lower temperature resulted in multiple red and yellow low readings
- Subsequently, limit adjustments were performed for 22 analog and digital temperature values to correct the situation
- Space and target views were not affected

OV Test

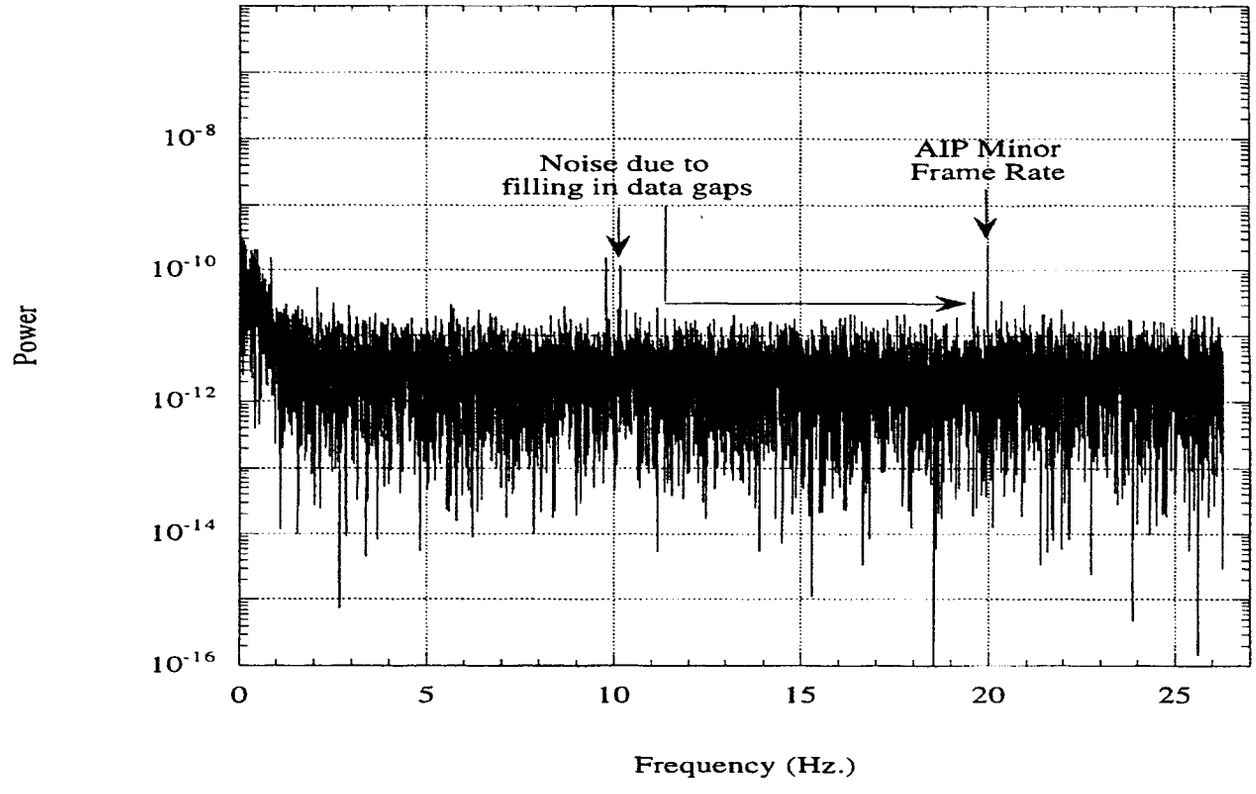
AMB003 - Noise Measurement

- Purpose: Measure the noise floor
- NEdTs for all channels are within specs.
- Low-level FFT noise present at 10 & 20 Hz. in Ch. 20 parked space data (Fig. 1)
- UK Met believes the noise may be due to the AIP 10 Hz. minor frame rate
- UK Met determined that noise is < 0.1 K and therefore of no concern
- No FFT noise detected in normal scan data

OV Figure 1

AMB003

Figure 1: AMSU-B Channel 20 Parked Space View 3 FFT D272/0730-0738



OV Test

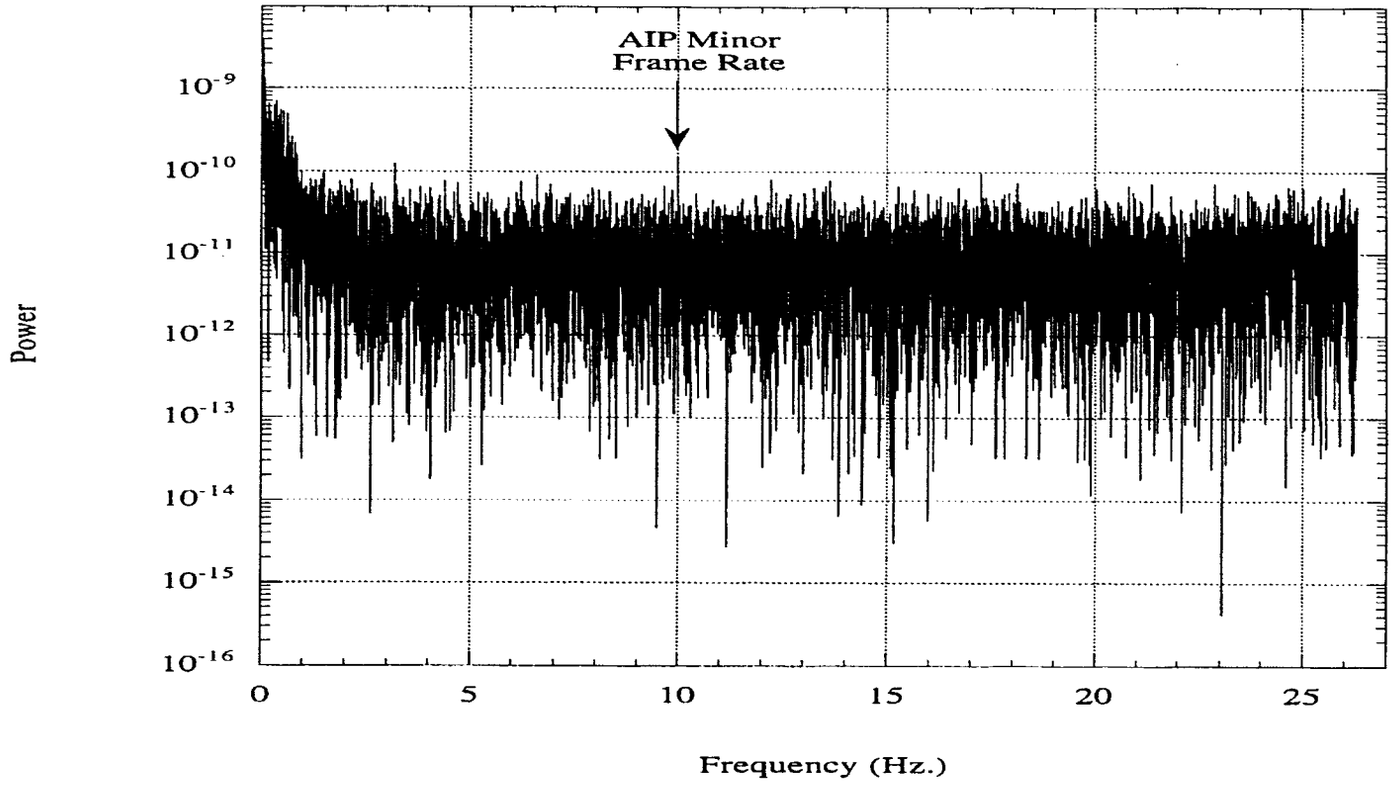
AMB004 - Parked/Radiometric Sensitivity

- Purpose: Measure the radiometric noise
- NEdTs for all channels are within specs.
- FFT noise seen in parked warm data similar to that present in parked space data (Fig. 2)
- FFT noise at 1/8 Hz. in normal scan warm view data for Ch. 16, 19, & 20 (Fig. 3)
- Normal scan FFT noise is currently under investigation by UK Met
- A much larger spike was observed on NOAA-15

OV Figure 2

AMB004

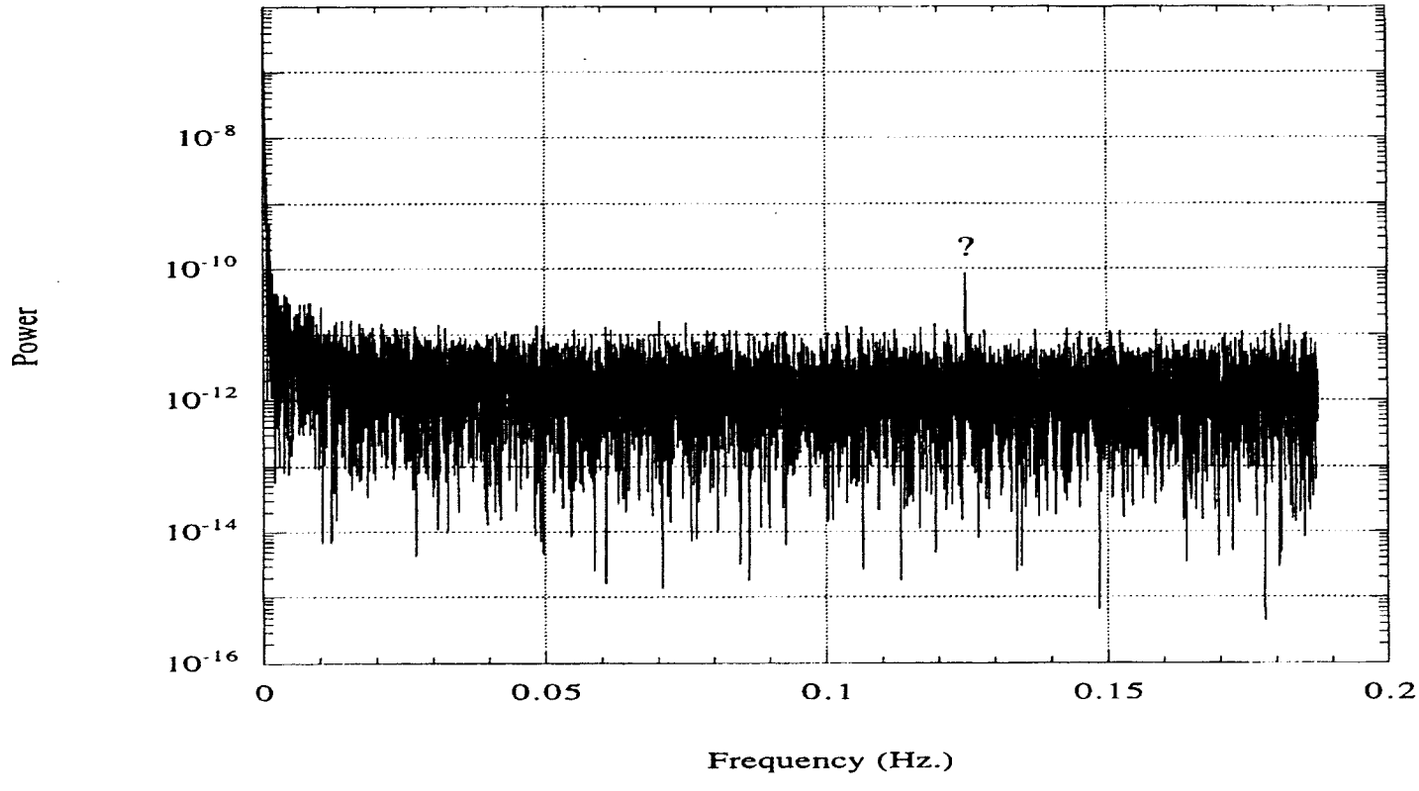
Figure 2: AMSU-B Channel 18 Parked Warm View FFT D272/1921-1929



OV Figure 3

AMB004

Figure 3: AMSU-B Channel 16 Normal Scan Warm View FFT D283/1346-284/1340



OV Tests

AMB005 - Scan Normal/Radiometric Calibration

- Purpose: Examine the on-orbit calibration of the channels
- Results: NESDIS calibration coefficients show slight change with time

AMB006 - Instrument Stability

- Purpose: Measure the absolute instrument stability
- Results: Calibration coefficients computed by OV Team from warm/space view data compare with in-flight (NESDIS) calibration

OV Tests

AMB007 - Science Data Soundness

- Purpose: Examine radiometric data as an indicator of instrument operation
- Results: Excellent agreement between NOAA-16 data and bias-corrected NOAA-15 data has been observed

AMB008 - Instrument Trending

- Purpose: Monitor instrument telemetry for long-term trends
- Results: All trended parameters are within specs

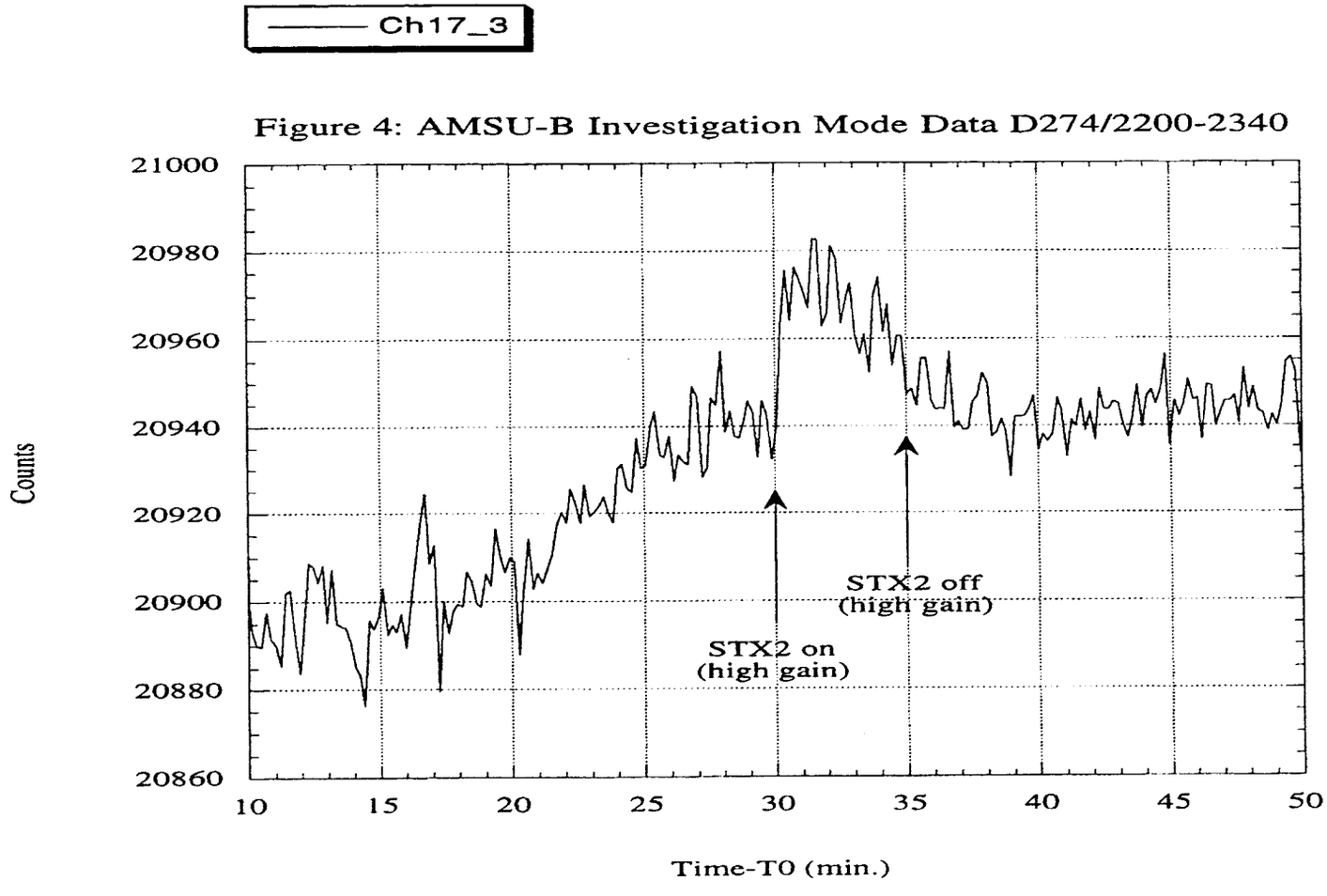
OV Test

AMB009 - Investigation Mode/Space View Evaluation

- Purpose: Select optimal space-view position and determine EMI induced space-view bias effects
- Space View 3 exhibited the lowest mean counts and was chosen as the operational space view
- STX-2 (high gain) introduces interference of approximately 1.2 K in space view (Fig. 4) and 0.4 K in target view
- No corrections are necessary

OV Figure 4

AMB009



OV Tests

AMB010 - A/D Converter Evaluation

- Purpose: Verify the performance of the A/D converter
- Results: No preferential bit setting seen.
  As expected, bits 0-8 occur 50% of the time.

AMB011 - AMSU 89 GHz. Cross Comparison

- Purpose: Verify the consistency of readings from AMSU-A1 (Ch. 15) with those from AMSU-B (Ch. 16)
- Results: AMSU-A1 and AMSU-B temperatures sampled at several locations agree to within 1 K

OV Tests

AMB012 - Channel Registration

- Purpose: Determine the relative alignments between the channels with respect to the World Vector Shoreline used by the POES Landmark Registration System (POLARIS)
- Results: Ch. 16 $\Delta Y = 0.82$ $\Delta X = 0.19$ (pixels)
  Ch. 17 $\Delta Y = 0.78$ $\Delta X = 0.11$ (pixels)

AMB013 - Detection of Land-Sea Boundary

- Purpose: Verify that the window channels return expected radiances across land-sea boundaries
- Results: Coastal areas were successfully identified by the POLARIS imaging system

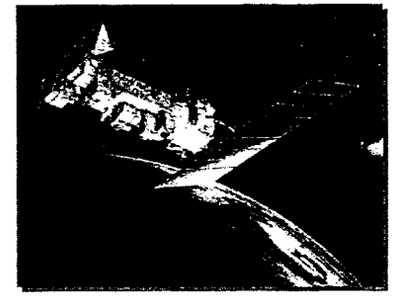
OV Tests

AMB014 - Scanner Accuracy and Stability

- Purpose: Assess operation of the antenna positioner
- Results: Scan mechanism is operating as expected

AMB015 - Earth-View Bias Characterization

- Purpose: Determine if S/C transmitters are introducing interference into any of the channels
- Results: Test was deleted as no measurable interference was detected in stage AMB009 & AMB002 from STX-3 or SARR



AVHRR OV RESULTS

S. Pszcolka

OV Team: M. Garhart and L. Penn/QSS

SUMMARY

- Number of tests = 21 (6 on-line and 15 off-line)
- 19 successful
- 2 incomplete (AVH018 and AVH021)
- Instrument is not ready for operational use due to errors in scan geometry parameters

OV TESTS (Sheet 1 of 11)

AVH001 - Monitor Analog Telemetry

- Purpose: Ensure the instrument is within permissible temperature limits before activation.
- Results: Instrument survived launch and all temperatures are within acceptable limits.

AVH002 - Cooler Outgassing

- Purpose: Outgas the detector cooler contaminants.
- Results: Radiator and patch heaters were activated. Instrument outgassing was successful.

OV TESTS (Sheet 2 of 11)

AVH003 - Channels 1, 2 and 3A Turn-On

- Purpose: Activate the visible channel (uncooled) detectors.
- Results: No anomalous telemetry was observed.
  Visible channel activation was successful.

AVH004 - Electronic Calibration

- Purpose: Verify the amplification stability.
- Results: Electronic ramp calibrations are linear.
  Visible channels have well defined voltage breakpoints.
  Slopes agree with pre-flight values.

OV TESTS (Sheet 3 of 11)

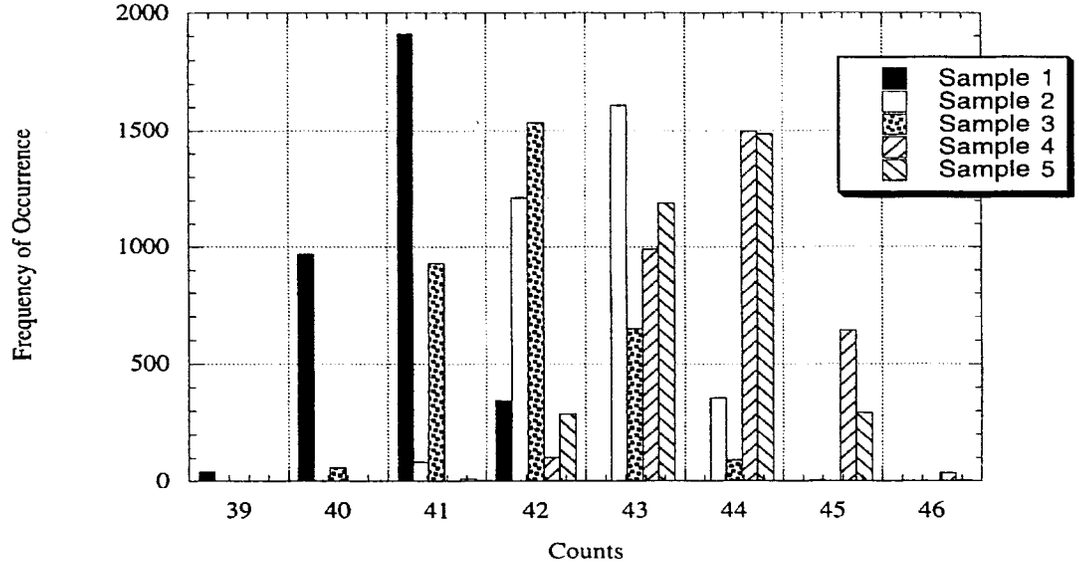
AVH005 - Space Clamp Noise and Stability

- Purpose: Measure the space clamp stability.

- Results: Standard deviation (SD) measurements for Channels 1, 2, 3B, 4 and 5 are lower than the A/D converter quanta. SD measurements for Channel 3A exceed the converter quanta due to sample positions 1, 2 and 3 (of 10) bias (see Figure 1).

AVH005

Figure 1: Histogram Of Sample 1, 2, 3 Bias for Channel 3A



OV TESTS (Sheet 4 of 11)

AVH006 - Imagery Evaluation - Channels 1, 2 and 3A
AVH012 - Imagery Evaluation - Channels 3B, 4 and 5

- Purpose: Examine the image quality.

- Results: No fixed pattern noise was detected.
  Three types of corrupted data are apparent at AOS and LOS:
  - Salt (bright) and pepper (dark) pixels
  - Missing scan lines
  - Corrupted scan lines.

OV TESTS (Sheet 5 of 11)

AVH007 - Signal to Noise (S/N) - Channels 1, 2 and 3A

- Purpose: Measure the S/N ratio of the visible channels.
- Results: Computed S/N ratios meet specifications.

AVH008 - Cooler Heater Off/Cooler Door Deploy/Detectors Cool Down

- Purpose: Configure IR detector for cooldown.
- Results: Heaters were turned off, Earth shield was successfully deployed, and IR detectors reached nominal operation temperatures. Patch power was stable at approx. 26 mW.

OV TESTS (Sheet 6 of 11)

AVH009 - Channels 3B, 4 and 5 Turn-On

- Purpose: Activate the IR channels.
- Results: IR channels were activated, operating temperatures and voltages are normal, and valid imagery is being produced.

AVH010 - NEdT/Dynamic Range - Channels 3B, 4 and 5

- Purpose: Verify NEdT compliance.
- Results: Computed NEdTs are within specifications.

OV TESTS (Sheet 7 of 11)

AVH011 - Instrument Stability - Channels 3B, 4 and 5

- Purpose: Measure instrument stability by monitoring calibration coefficients.
- Results: Computed calibration slopes compare with NESDIS reported slopes.

AVH013 - Scan Linearity, Synchronization, Delta and Jitter

- Purpose: Assess the scan motor operation.
- Results: Mean sync delta increased by 13 μsec during first few weeks and has stabilized.
  Jitter performance is within ± 5 μsec.

OV TESTS (Sheet 8 of 11)

AVH014 - Operational Calibration - Channels 3B, 4 and 5

- Purpose: Examine the on-orbit calibration of the IR channels.
- Results: NESDIS calibration coefficients show slight change with time.

AVH015 - Instrument Trending

- Purpose: Monitor instrument telemetry for long-term trends.
- Results: All trended telemetry values are normal.

OV TESTS (Sheet 9 of 11)

AVH016 - GAC to LAC/HRPT Compatibility

- Purpose: Verify the MIRP is pereforming the correct computations of GAC data.
- Results: Converted HRPT data is identical to GAC.

AVH017 - A/D Converter Evaluation

- Purpose: Verify that the A/D converter is generating reasonable output.
- Results: No preferential distribution of bits seen.
  Bits 0 - 2 occur 50% of the time.

OV TESTS (Sheet 10 of 11)

AVH018 - AVHRR Detection of Land-Sea Boundary

- Purpose: Verify that the detectors return reasonable radiances across land-sea boundaries.
- Results: POES Landmark Registration system (POLARIS) is unable to complete test due to scan geometry error.

AVH019 - AVHRR/3 and AVHRR/2 Comparisons

- Purpose: Verify that the NOAA-K temperatures are comparable to NOAA-L.
- Results: Temperature differences are within 2 K for Channels 4 and 5, and 4 K for Channel 3B.

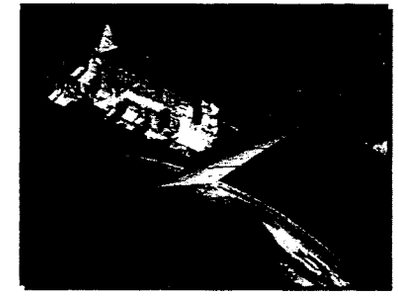
OV TESTS (Sheet 11 of 11)

AVH020 - Autonomous AVHRR Channel Switch

- Purpose: Ensure the 3A/3B channels change when the satellite crosses the terminator.
- Results: Circuitry properly switches from Channel 3A to 3B during the day-to-night transition.

AVH021 - Channel Registration

- Purpose: Determine the relative alignments between the channels.
- Results: POLARIS is unable to complete test due to scan geometry error.



HIRS OV RESULTS

Cathy
C. Richardson

OV Team: M. Garhart, L. Penn / QSS

Summary

Total number of tests = 18 (14 Offline/4 real-time)

- 16 successful
- 0 unsuccessful
- 2 not performed (HIR015 - HIRS 2/3 Comparison
  HIR018 - Channel Registration)
- 0 deleted

- All computed NEdN's within specifications
- All scanner and filter wheel operation nominal
- All other examined functions comply with specifications

OV TESTS - HIR001 AND 002

HIR001 - Monitor Analog telemetry

Purpose: Ensure the instrument is within permissible temperature limits before initiating further activation commands.

Results: All parameters within permissible limits.

HIR002 - Cooler Outgassing

Purpose: Outgas the detector cooler contaminants by applying power to the cooler heater for a period of 14 days. The cooler door remains open during this outgassing.

Results: Instrument outgassing was successful. Radiometer temperature stabilized at approximately 293 K.

OV TESTS - HIR003 AND 004

HIR003 - Cooler Heater Off/Cooler Door Deploy/ Detectors Cool Down

Purpose: Configure the detectors for cooldown

Results: Cooldown successful. Patch temperature maintained 100 K indicating radiant cooler is operating within specifications.

HIR004 - IR Detectors Cooldown Rate and Operational Configuration

Purpose: Monitor the IR detector's cooldown rate to determine radiator condition and configure the instrument for operational role.

Results: Cooldown and operational configuration successful. Patch temperature remained at 100 K and power consumption was nominal.

OV TESTS - HIR005 AND 006

HIR005 - Operational Evaluation - Normal Scanning

Purpose: Assess the operational performance of the HIRS instrument in the normal scanning mode, and obtain calibration measurements for specification compliance.

Results: Slopes appear to have been hard-wired and are invariable. Intercepts have been allowed to vary.

HIR006 - Noise Equivalent Change in Albedo Channel 20

Purpose: Measure the NEdN of channel 20.

Results: NEdN of 0.57 W/m2sr/cm for normal scanning and 0.29 for parked data, well within spec. of 1.77.

HIR005
Operational Evaluation

Channel	Day 289 Intercept	S.D.	Day 314 Intercept	S.D.
1	442.57	0.879	441.15	0.936
2	-13.20	0.883	-13.54	0.906
3	37.73	0.828	37.40	0.841
4	54.49	0.781	54.20	0.796
5	95.53	0.769	95.23	0.788
6	82.74	0.768	82.41	0.784
7	105.19	0.701	104.84	0.717
8	87.64	0.573	87.40	0.585
9	22.18	0.515	22.11	0.525
10	94.63	0.647	94.21	0.662
11	15.58	0.298	15.49	0.305
12	5.92	0.219	5.83	0.222
13	0.51	0.025	0.50	0.025
14	1.03	0.024	1.02	0.024
15	1.02	0.022	1.01	0.022
16	1.00	0.021	0.99	0.021
17	3.95	0.012	3.95	0.013
18	2.58	0.009	2.57	0.009
19	1.32	0.005	1.32	0.006

OV TESTS - HIR007 AND 008

HIR007 - Signal Amplitude - Visible Channel 20

Purpose: Determine subjectively the visible channel signal amplitude for a 100% albedo radiance target.

Results: Value is -615 counts, or 1773 counts above mean space view.

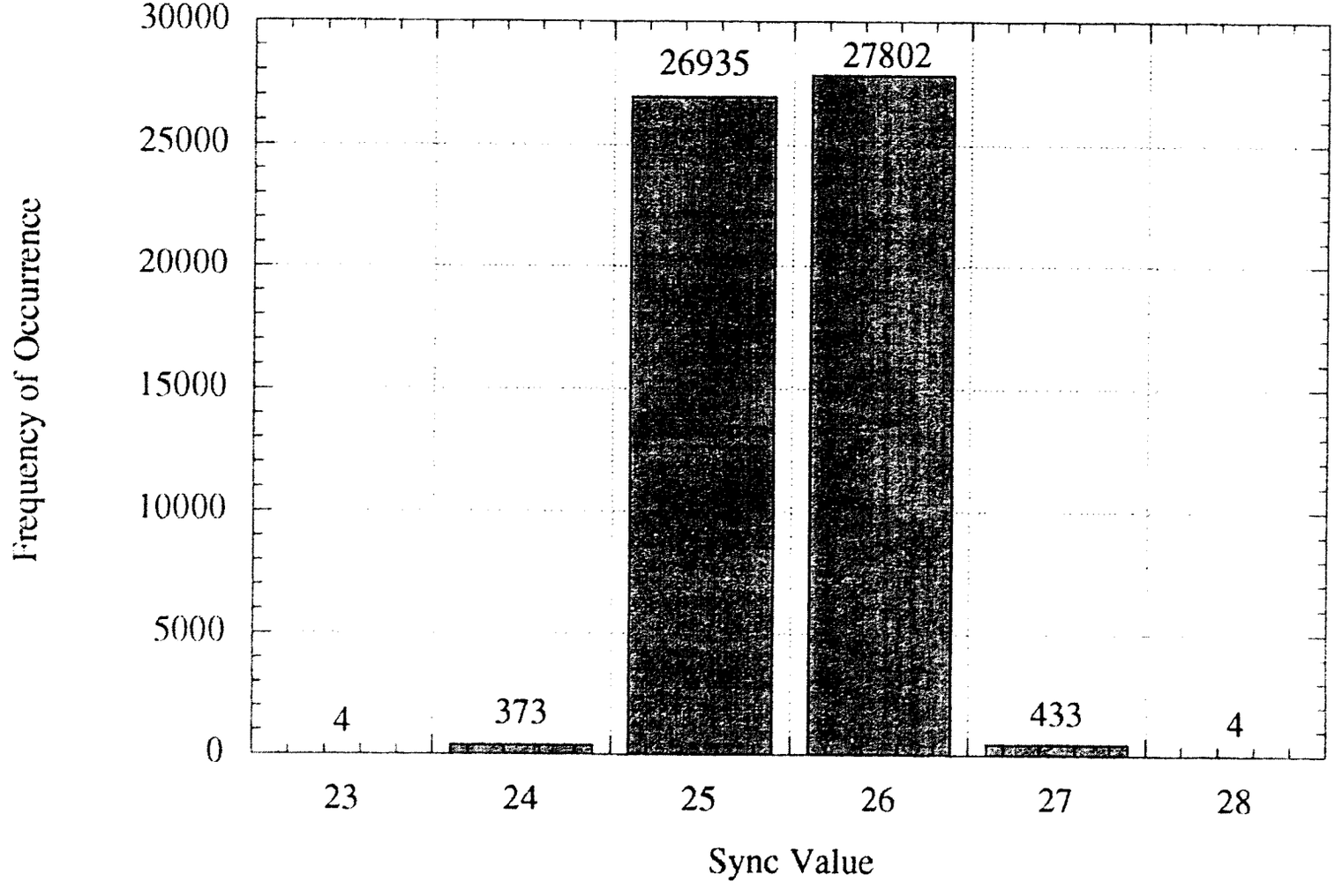
HIR008 - Filter Wheel Synchronization Evaluation

Purpose: Assess the filter wheel operation.

Results: Channel 1 period monitor is very consistent over 3 weeks of analysis.

HIR008

Figure 5: Filter Wheel Sync Histogram



OV TESTS - HIR009 AND 010

HIR009 - Electronic Calibration Sequence

Purpose: Check the linearity of the electronics processing chain

Results: All channels linear, slopes and intercepts for all channels are as expected.

HIR010 - Dark Current Radiometric Level

Purpose: Measure IR and visible detector electronic noise with negligible radiometric input, and thus establish the noise floor of the channels.

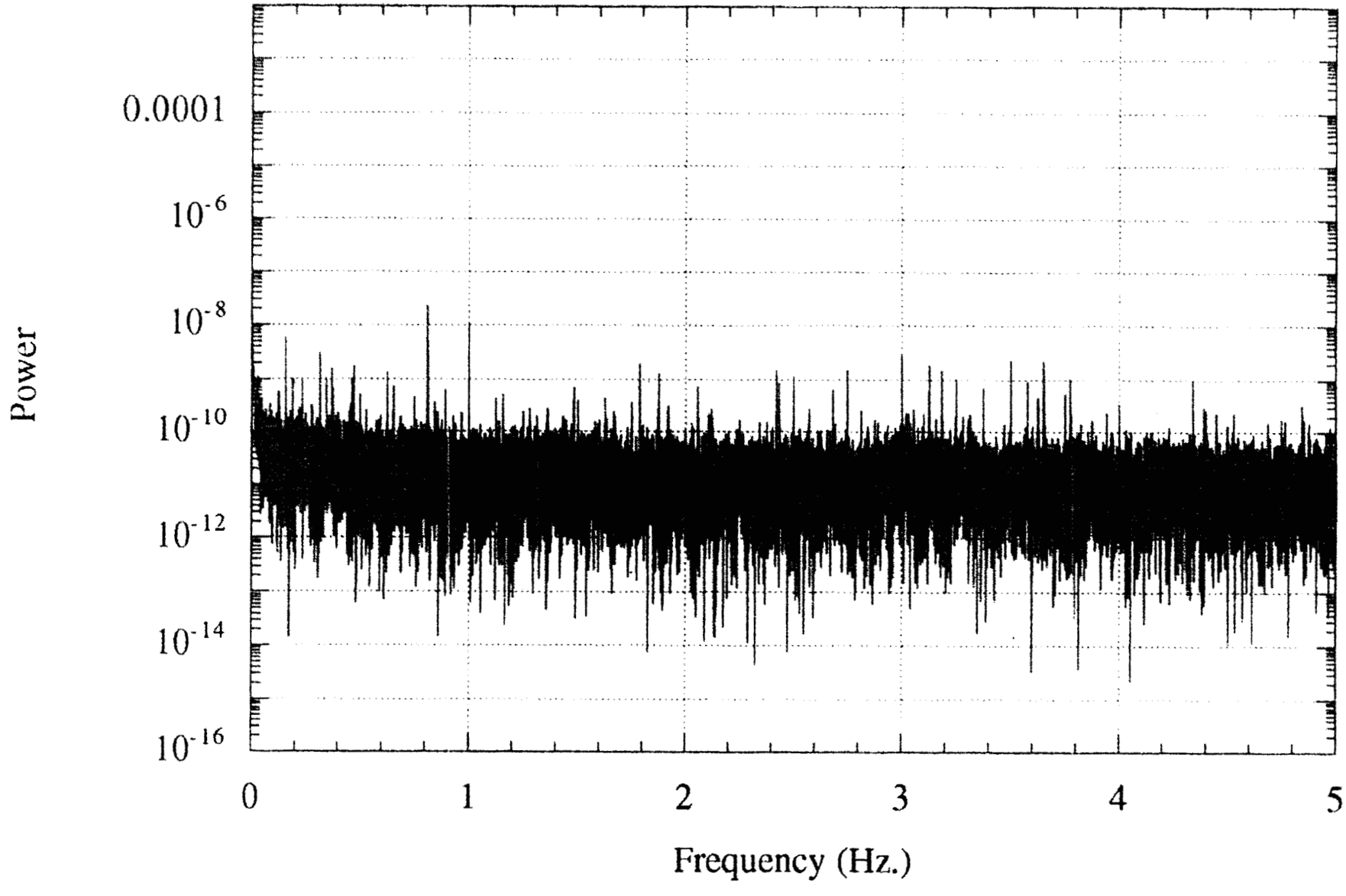
Results: NEdN's derived from parked space view data are within spec and ITT goal. A noise spike is apparent, especially in channels 1 -12, at a frequency of about 0.8 Hz.

HIR009
HIRS Electronic Calibration Statistics

Channel	Slope	Intcp	ITT sl	ITT int
1	302.5	-1377.2	302.2	-1396.8
2	97.6	-1449.8	97.5	-1457.1
3	97.6	-1451.4	97.5	-1455.3
4	97.6	-1450.0	97.5	-1456.7
5	97.6	-1451.1	97.5	-1457.1
6	97.6	-1451.2	97.5	-1455.6
7	97.6	-1451.6	97.5	-1455.8
8	38.1	-1473.9	38.1	-1476.1
9	38.1	-1473.2	38.1	-1475.1
10	97.6	-1448.8	97.5	-1456.1
11	97.6	-1448.9	97.5	-1456.5
12	97.6	-1449.0	97.5	-1456.2
13	177.6	-2379.0	177.4	-2383.7
14	177.6	-2379.5	177.4	-2384.1
15	177.6	-2379.5	177.4	-2383.8
16	177.6	-2379.2	177.4	-2383.7
17	52.3	1179.0	52.2	1177.9
18	52.3	1179.2	52.2	1177.9
19	52.6	1178.9	52.2	1177.7
20	-82.04	-2382.3	-81.97	-2384.8

HIR010

Figure 2: HIRS Channel 2 Parked Warm View FFT



OV TESTS - HIR011 AND 012

HIR011 - NEdN - IR Channels

Purpose: Measure the NEdN of the HIRS IR channels for specification compliance.

Results: NEdN's derived from warm target data are within spec and ITT goal.

HIR012 - Instrument Stability Measurement

Purpose: Measure the absolute instrument stability for channels 1 - 19

Results: IWT PRT values vary by 2.0 - 2.4 K over the course of each orbit. PRT's number 1,2 and 3 differ by less than 0.02 K. PRT number 4 differs from the others by 0.1 K. Computed slopes agree with reported a1 coefficients to within 1%.

HIR010/11
NEdN Comparison

Channel	NEdN(Warm)	NEdN(Space)		Spec	ITT Goal
1	0.55	0.48	3.00	0.75	
2	0.13	0.14	0.67	0.25	
3	0.11	0.003	0.50	0.25	
4	0.07	0.10	0.31	0.20	
5	0.05	0.07	0.21	0.20	
6	0.06	0.06	0.24	0.20	
7	0.03	0.04	0.20	0.20	
8	0.02	0.03	0.10	0.10	
9	0.02	0.03	0.15	0.15	
10	0.04	0.047	0.15	0.10	
11	0.03	0.03	0.20	0.20	
12	0.03	0.04	0.20	0.07	
13	0.001	0.002	0.006	0.002	
14	0.001	0.002	0.003	0.002	
15	0.001	0.0015	0.004	0.002	
16	0.001	0.002	0.004	0.002	
17	0.001	0.001	0.002	0.002	
18	0.001	0.0007	0.002	0.002	
19	0.0	0.0004	0.001	0.001	

HIR012
Calibration Coefficient Analysis

Channel	Slope	SD	Intercept	SD
1	-0.187	0.00028	441.54	1.105
2	-0.139	0.00020	-13.17	0.893
3	-0.107	0.00015	37.65	0.828
4	-0.076	0.00010	54.35	0.787
5	-0.056	0.00008	95.29	0.783
6	-0.057	0.00008	82.53	0.773
7	-0.035	0.00005	104.91	0.715
8	-0.027	0.00004	87.37	0.596
9	-0.043	0.00007	22.10	0.520
10	-0.040	0.00006	94.37	0.670
11	-0.028	0.00006	15.51	0.304
12	-0.033	0.00009	5.89	0.221
13	-0.0013	< 0.00001	0.50	0.025
14	-0.00091	< 0.00001	1.03	0.024
15	-0.00087	< 0.00001	1.01	0.023
16	-0.00082	< 0.00001	0.99	0.021
17	-0.0021	0.00001	3.92	0.021
18	-0.0012	0.00001	2.56	0.015
19	-0.00056	< 0.00001	1.31	0.008

OV TESTS - HIR013 AND 014

HIR013 - Instrument Trending

Purpose: Monitor the instrument operation over time for reliability and long-term behavior.

Results: Digital "A" data appears to be corrupted. Analog data appears nominal.

HIR014 - HIRS Detection of Land/Sea Boundary

Purpose: Verify that HIRS visible and IR window channels return expected radiances across land/sea boundaries.

Results: Recognizable coastal features are apparent in channels 17 - 20.

OV TESTS - HIR015 AND 016

HIR015 - HIRS/3 and HIRS/2 Comparison

Purpose: Verify that HIRS/3 radiances are compatible with the HIRS/2 values for NOAA-14.

Results: Test could not be performed due to suspected changes changes in the format for NOAA-14 1B data.

HIR016 - A/D Converter Evaluation

Purpose: Verify that the A/D converter is generating reasonable output.

Results: No indication of bit preference noted.

OV TESTS - HIR017 AND 018

HIR017 - Scanner Evaluation

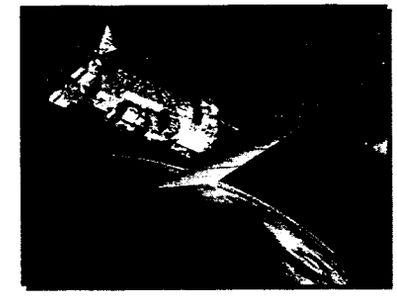
Purpose: Evaluate the scanner health by monitoring the positions of the scanner reported in elements 56 through 63 (the retrace from position 56 to position 0)

Results: No deviation in scanner position during retrace over a three week period.

HIR018 - Channel Registration

Purpose: Determine the relative alignment among the HIRS channels.

Results: Polaris system produced extremely inconsistent offset results.



DCS and SARP

Provided by French

Jim

J. Mentall

DCS AND SARP

Activation Procedure

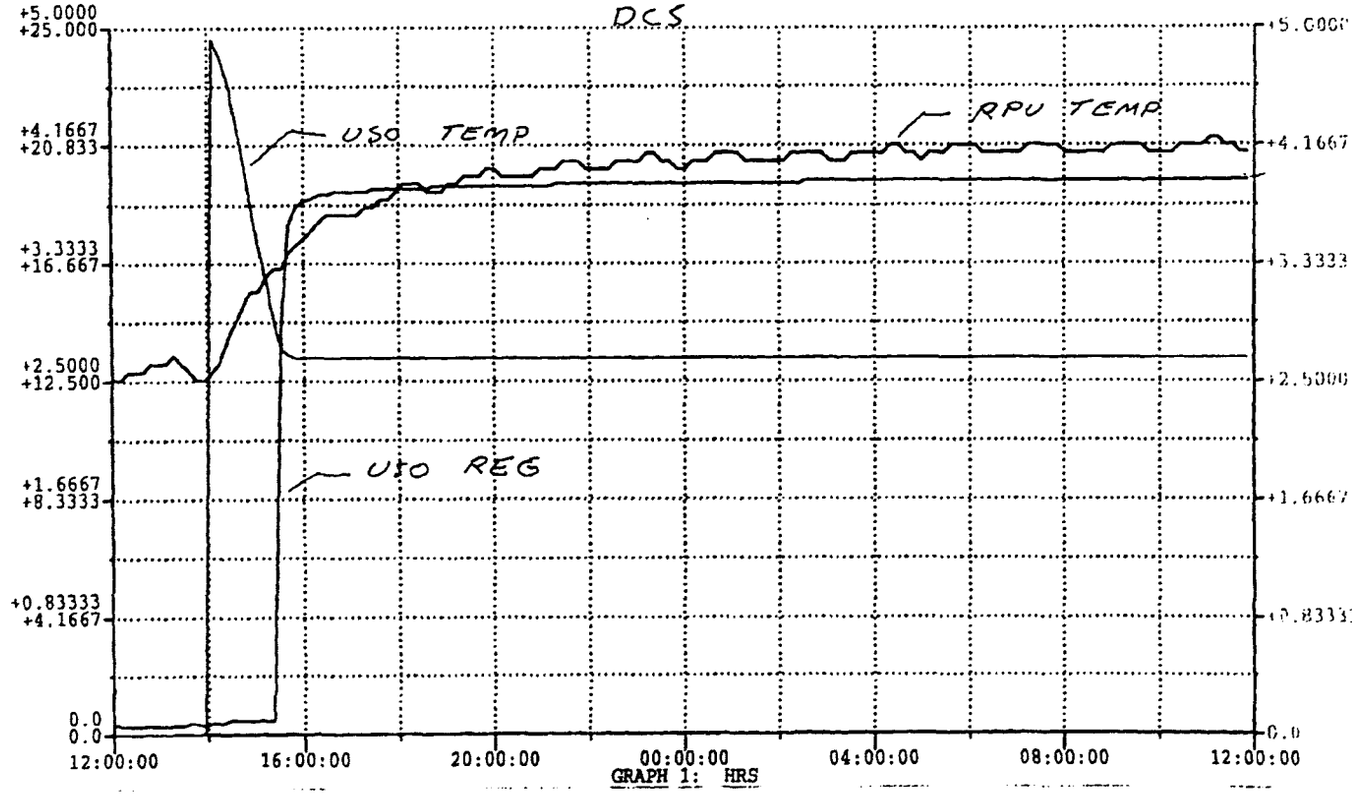
- Turn on power and one data recovery unit
- Monitor:
  - Temperatures
  - Ultra-stable Oscillator Oven regulation voltage
  - Ultra-stable Oscillator Temperature
- Turn on remaining data recovery units one/day

DCS AND SARP

PLOT NAME: NRT_OPS$HISPLOT_PLOT:DCSTEMP
TITLE: DCSTEMP
DESCRIPTION: DCS TURN ON
SETUP FILENAME: NRT_OPS$HISPLOT_SETUP:DCSTEMP
START/STOP TIME: 98/138/12:00:00.0 - 98/139/12:00:00.0

SCID: 15
PLOT CREATION DATE: 140/00:41:09
PLOT PRINT DATE: 140/00:49:11
SAMPLING PERIOD: 000/00:10:00.00

Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
NDCSRUT	FA175	DEG	EU		TIME		HRS		—	1
NDCSUS01	FA055	TLM	EU		TIME		HRS		—	1
NDCSUS1V	FA063	TLM	EU		TIME		HRS		—	1



DCS USO Temperature Regulation

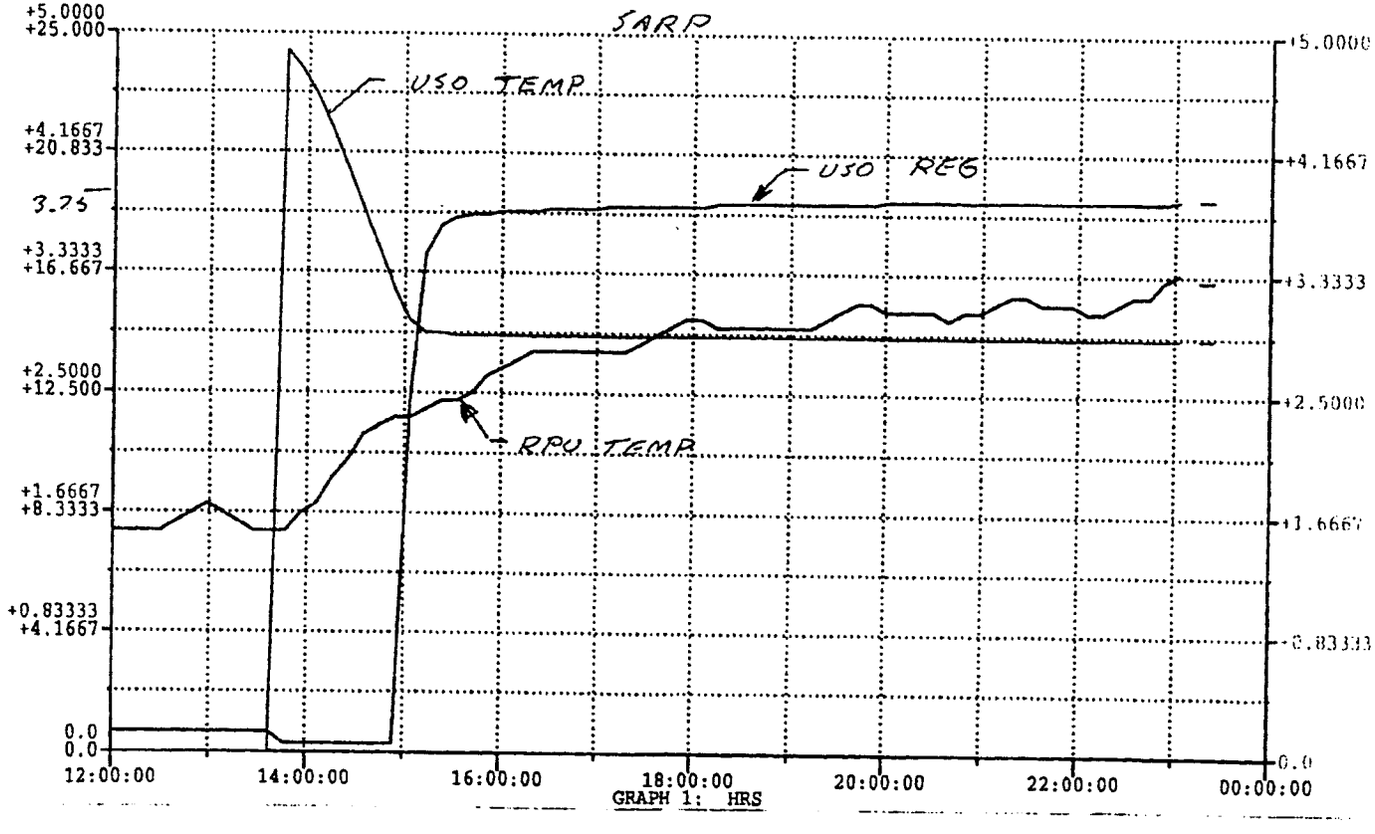
DCS AND SARP

PLOT NAME: NRT_OPS$HISPLOT_PLOT:SARPTEMP
TITLE: SARPTEMP
DESCRIPTION: SARP STARTUP TEMPS
SETUP FILENAME: NRT_OPS$HISPLOT_SETUP:SARPTEMP
START/STOP TIME: 98/139/12:00:00.0 - 98/140/00:00:00.0

SCID: 15
PLOT CREATION DATE: 140/00:40:51
PLOT PRINT DATE: 140/00:47:42
SAMPLING PERIOD: 000/00:10:00.00

Y-DATA	CHAN	UNITS	TYPE	VS X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS X_DATA	CHAN	UNITS	TYPE	SYM	GPH
NSRPRUT	FA384	DEG	EU	TIME		HRS		—	1										
NSRPUSOT	FA464	TLM	EU	TIME		HRS		—	1										
NSRPUSOV	FA434	TLM	EU	TIME		HRS		—	1										

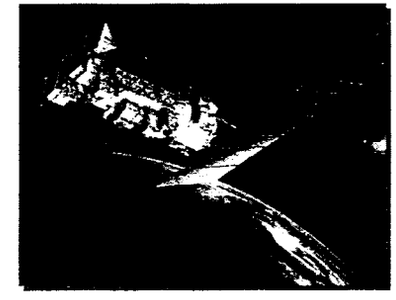
NOAA 15



SARP USO Temperature Regulation

DCS AND SARP

- Testing by CNES
  - Frequency of receiver
  - Location of beacon
  - Received signal level
  - Correctness of received messages
- Results of Testing
  - SARP and DCS are working correctly



SARSAT - SEDL OV RESULTS

J. Christo

SEARCH AND RESCUE MISSION OFFICE

OV Tests (Sheet 1 of 2)

- Tests Outlined in Cospas-Sarsat Document T.004
  - B.1 Total Received Signal Power
  - B.2 Spectral Occupancy of the Downlink
  - B.3 Spurious Output Levels
  - B.4 Received Signal Power of Test Signals in Each Repeater Band
  - B.5 Location Accuracy of Test Beacons
  - B.6 Bit Error Rate of Processed Data Stream on L-Band Downlink
  - B.7 AGC Dynamic Range
  - B.8 Modulation Indices of the Repeaters
  - B.9 Transition and Transmitter Frequencies
  - B.10 Channel Bandwidth and Amplitude Ripple
  - B.11 Intermodulation and Harmonic Levels
  - B.12 SARR Receive Antenna Patterns
  - B.13 SARP 406 MHz Receive Antenna Pattern
  - B.14 Background Noise Levels in Each Repeater Band

OV Tests (Sheet 2 of 2)

- Tests (continued)
  - B.15 SARP Calibration on SARSAT (USO Frequency and Tcal)
  - B.16 SARP Performance with Test Signals (Threshold Level, DRU, Sharing Ratio, Ration of Data Points Recovered, etc.)
- Original Test Responsibilities
  - NASA On orbit performance of the antennas
  - Canada On orbit performance tests on SARR
  - France On orbit performance tests on SARP
- New developments in Test responsibilities
  - Canada not performing several SARR tests
    - Tests B.7, B.9, B.10, B.11
  - SEDL is performing the tests
    - Tests B.7, B.11 performed on NOAA-16
    - Tests B.9, B.10 still in development - will be ready in 2Q01

OV Planning

- Summer 2000
  - Developed test schedule with Jim Mentall
  - Jim published spreadsheet of test dates and tests to be run
  - Planned 10 days of B side transmitter testing
- Fall 2000
  - SEDL began covering all passes on Sept 28
  - SEDL antenna cable failure delayed testing one week
  - B side testing did not occur
  - SEDL LEOLUT failure has left SEDL unable to process 406 data
    - Little data on spurs in 406 band.
    - Used data from MCC and Canada instead

SEDL Post Launch Testing Status

Dates	S/C Config	Tests Run	Status
9/28-10/8	TxA, RxA 121 AGC off, 243,406 AGC on	B.12 121 Ant Gain	Complete
10/8-10/20	243 AGC off 121,406 AGC on	B.12 243 Ant Gain	Complete
10/20-11/3	406 AGC off 121,243 AGC on	B.12 406 Ant Gain	Complete
11/3-11/23	All AGC's on TxB, RxA	B.7 AGC Dyn Rge B.11 Intermod	Never went tc B side
11/23-12/3	All AGC's on TxA, RxA	B.7 AGC Dyn Rge B.11 Intermod	In progress
2Q01	All AGC's on TxA, RxA	B.10 Chan BW, Ripple, B.9 Trans Freq	Planned

SEDL OV Tests
Preliminary Results (Sheet 1 of 2)

- 121.5 band
  - Antenna gain curves (B.12): curves are 3 dB below min spec
  - 47 kHz channel signal is strong
  - Intermod test (B.11): products observed 30 dB down at expected location
  - AGC curves (B.7): two passes taken so far 10 dB variation in linear region, smooth out at -110 dBm into SARR consistent with expected values; more data needed
- 243 band
  - Antenna gain curves (B.12): curves fall between the min and max spec levels
  - 94 kHz channel signal is strong
  - Intermod test (B.11): no intermod products observed
  - AGC curves (B.7): has linear region, level off at -110 dBm, 3 dB point is -123 dBm. 3 dB difference from S4

SEDL OV Tests
Preliminary Results (Sheet 2 of 2)

- 406 band
  - Antenna gain curves (B.12, B.13): falls between min and max spec levels
  - 170 kHz signal strong and clean
  - AGC curves (B.7): has linear region, levels off at -110 dBm. 3dB point is -120 dBm. Noise power density is -199 dBW/Hz agrees with expected from test plan
  - Intermod test (B.11): no intermods seen at expected locations during test

CTEC SARR Testing Preliminary Results (Sheet 1 of 2)

- Canada's CTEC performed 6 tests on SARP instrument
- Test B.1 Total received Signal Power
  - Data shows received signal strength is below spec by 2-7 dB
- Test B.2 Spectral Occupancy
  - Spectra is clean
  - SARSAT does not generate interference in adjacent bands
- Test B.3 Spurious Output levels
  - No out of band signals detected in LUT's frequency range
  - In band spurs are seen in 121.5 and 243 SAR bands
- Test B.4 Received Signal Power of Test Beacons
  - Noise floor in 121.5 and 243 bands significantly lower than predicted
  - Noise floor in 406 band 2 dB lower than predicted
  - Measurements in 121.5 band indicate beacon strength is low
  - Measurements in 243 and 406 bands indicate good beacon strength

CTEC SARR Testing Preliminary Results (Sheet 2 of 2)

- Test B.5 Location Accuracy of Test Beacons
  - Data shows that location accuracy of test beacons is as expected at CTEC
- Test B.8 Modulation Index
- Data shows individual Indices slightly below nominal and EIDP values
  - Composite also below nominal and EIDP
  - Data shown below
- Draft report received

	121 MHz	243 MHz	406 MHz	2.4 kb/s	Overall
Oct 2000	0.443	0.440	0.190	0.160	0.636
EIDP (S8)	0.464	0.470	0.210	0.210	0.689
Nominal	0.470	0.470	0.250	0.250	0.700

CNES SARP Preliminary Results

- CNES performed Tests B.15 (SARP calibration) and B.16 (SARP Performance Tests)
- Test B.15
  - calibration numbers judged a pass
- Test B.16
  - SARP threshold level is -135 dBM - a Pass
  - SARP DRU sharing judged acceptable
  - >99% of data points received from the test beacons, also a pass
- CNES sent a letter to NASA, NOAA stating SARP was operational

List of Spurious Signals Seen in the LUT Data

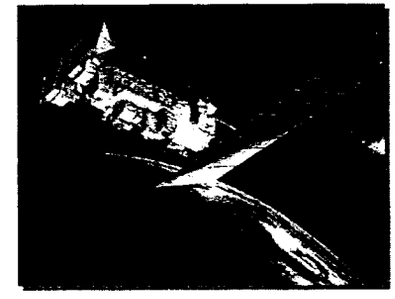
- 121.5 MHz band (14 passes)
  - 121.490 (strong, all passes, seen by all)
  - 121.5055 (most passes)
  - 121.4994 (one pass)
  - 121.4945 (Canada)
  - 121.4885 (Canada)
- 243 MHz band (14 passes)
  - 243.019 (strong, all passes, seen by all)
  - 243.065 (one pass)
- 406 MHz band (4 passes - MCC and Canada only)
  - 406.0337
  - 406.069

Comparison with S/C Level, Instrument Level EMI Test Results

- Instrument Level EMI Results
  - AVHRR (A301)
    - Small spurs seen at 121.485 MHz (+7) and 121.4854 MHz (+3)
    - No spurs seen that match on orbit 243, 406 spurs
  - HIRS (H301)
    - No spurs in any SAR band noted in EMI test report
  - AMSU
    - No EMI test data to compare
- S/C Level EMI Results
  - Small spur seen at 121.4989 MHz (1 dB out of spec)
  - Nothing seen at 243 MHz SAR band
  - Nothing seen at 406 MHz SAR band

Future SEDL OV Activities

- SEDL will resume testing in spring 2001 when development of the following two tests is complete
  - B. 9 Translation and Transmitter Frequencies
  - B.10 Channel Bandwidth and Amplitude Ripple
- Written report to be published



SBUV OV RESULTS

J. Mentall

OV Team: M. Garhart, L. Penn / QSS

SBUV

- Measures Ozone Profiles from 0 to 50 kms.
- Produces Daily Map of Global Total Ozone.
- Measures Solar Irradiance from 160 nm to 400 nm.

SBUV Test Summary

- Number of tests = 15 (12 on- and 3 off-line)
- 10 completed
- 5 incomplete pending execution of test commands

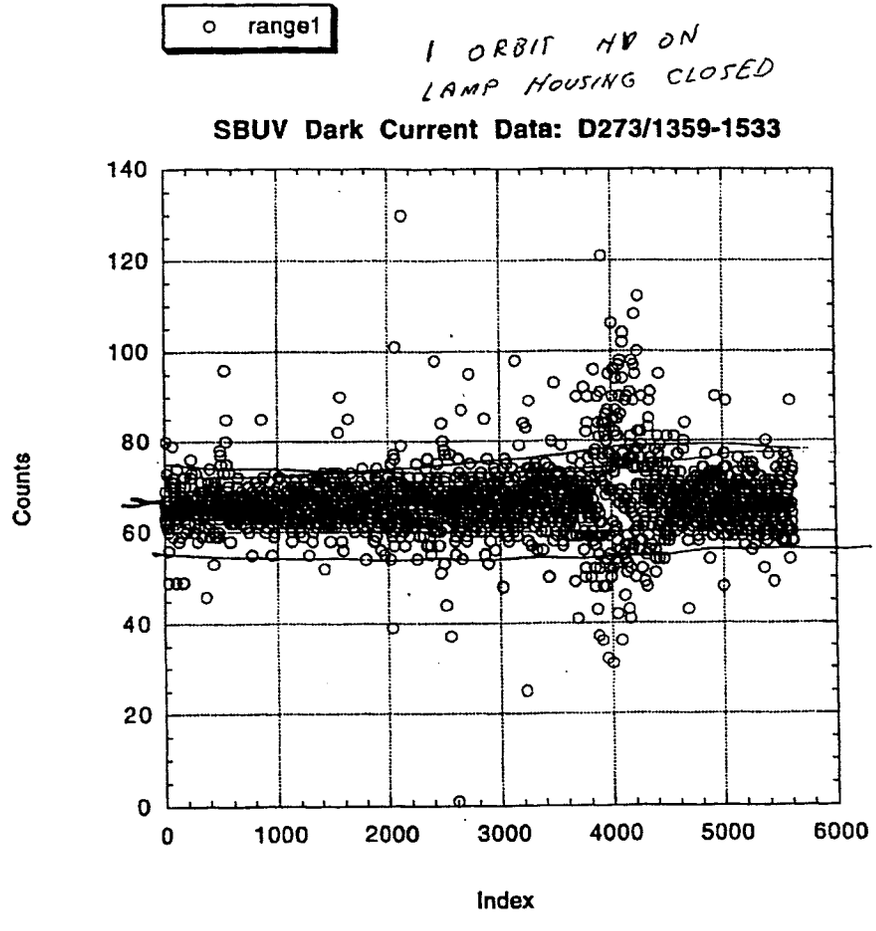
SBUV Tests

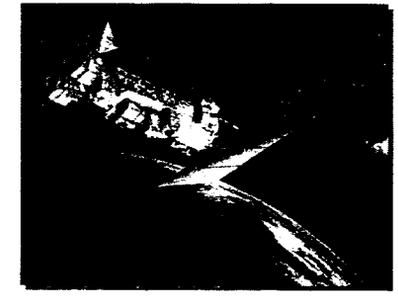
- Check electronics and telemetry
- Check performance of grating drive
- Check HV power supply and measure baseline noise level
- Do preliminary wavelength calibration
- Collect earth radiance data and check signal levels
- Do accurate wavelength calibration
- Measure diffuser reflectivity and degradation
- On-orbit Goniometric Measurements

SBUV Results

- Temperatures, voltages and currents all nominal
- Internal E-cal values in agreement with pre-launch values
- Neither sweep mode or discrete mode data had any position errors
- Wavelength calibration check – 253.72 emission line = 253.725
- Diffuser reflectivity measurements agreed with pre-flight values
- Baseline noise agreed with pre-launch values

SBUV


range1
1 ORBIT HV ON
LAMP HOUSING CLOSED
SBUV Dark Current Data: D273/1359-1533
Counts
Index
0
20
40
60
80
100
120
140
0
1000
2000
3000
4000
5000
6000



SEM OV RESULTS

J. Cardone / F. Hanser

SUMMARY

- **SEM is ready for operational use**
- **On-orbit Verification Tests**

Test Number	Test Title	Real-time/ Off-line	Success	Comments
SEM 001	SEM Temperature Verification	RT	Yes	
SEM 002	DPU Activation and TED Low Voltage	RT	Yes	
SEM 003	MEPED and IFC Activation	RT	Yes	
SEM 004	TED High Voltage and IFC Activation	RT	Yes	
SEM 005	TED High Voltage Step Contingency	RT	N/A	Contingency Only – Not Required
SEM 006	SEM Trended Data	Off-line	Yes	

SPECIFICATION COMPLIANCE

- On-orbit verification of specification compliance is limited

- Space Environment Center (SEC) processes particle flux and In-flight Calibration (IFC) data

- SEM performance appears within specification
  - IFC performance appears nominal
  - Noise and spurious response level, as estimated from IFC data, appears nominal

CHARACTERIZATION

- SEM 001 - SEM Temperature Verification
  - All valid temperatures in nominal range prior to activation
- SEM 002 - DPU Activation and TED Low Voltage
  - Instrument response and telemetry nominal
- SEM 003 - MEPED and IFC Activation
  - Instrument response and telemetry nominal
- SEM 004 - TED High Voltage and IFC Activation
  - Instrument response and telemetry nominal
- SEM 005 - TED High Voltage Contingency
  - Test is for contingency use only, and was not required
- SEM 006 - SEM Trended Data
  - All instrument voltages and temperatures performed nominally during OV period

CONCERNS, ANOMALIES, AND OPERATIONAL IMPACTS (Sheet 1 of 4)

- In-orbit data show high background counts from both the 0 degree and 30 degree high-energy ion ESAs in the TED.
  - These appear to be coming from ambient ions accelerated by the SC.
- Tests with the TED Sweep Voltage off for two orbits on NOAA-16 on Tuesday October 24 showed that the high background counts were eliminated.
  - The total energy flux counts rose during portions of the orbit.
  - Most of the counts are in the highest energy channels, as verified by the differential flux measurements.
- Data with the Sweep Supply ON show periods when the peak background flux switches between the 0 degree and 30 degree high energy ion ESAs, particularly over the Polar Caps.
  - The background correlation for high energy penetrating particles may not be applicable during periods when other background is present.
- There are also places in the orbit where the background counts show sharp peaks.
  - The sharp peaks seem to be associated with the S/C sunrise

CONCERNS, ANOMALIES, AND OPERATIONAL IMPACTS (Sheet 2 of 4)

- Current data from the TED on NOAA-15 show similar behavior, but on a much weaker scale.
  - However, shortly after launch in 5/98, the NOAA-15 TED high energy ion ESAs did show more elevated background counts than at present, but not as intense as the background counts from the NOAA-16 TED.
- These results are consistent with the high energy ion ESA background counts coming from ambient ions partially accelerated by the SC, and then being analyzed by the ESAs.
- During the background count period, and with the Sweep Supply +28V off, the ESA plates still have a low voltage, of the order of 0.1 V, from the control circuitry which is still powered.
  - This allows the high energy ion ESAs to analyze ions of a few eV or so.

CONCERNS, ANOMALIES, AND OPERATIONAL IMPACTS (Sheet 3 of 4)

- Normally the ESA CDEMs do not detect ions of less than 30 eV, but if the flux is very intense (greater than 10^{10}ions/sec at the ESA plate exit), then a very small fraction can scatter and reach the CDEM detectors.
- Accordingly, Panametrics concludes that what is likely being seen is the combined effect of:
  - (a) the SC charging to a few eV or so;
  - (b) the drift velocity of the ions in the magnetic and electric fields at 850 km;
  - (c) the SC velocity (which provides about 0.5 eV for H+, and about 2 eV for O+ ions).
- For a nominal electron/ion density of $10^4/cm^3$, the analyzed ion flux is about 10^{10}/sec at the ESA plate exit, and this intense flux should produce significant counts in the CDEM detectors.

CONCERNS, ANOMALIES, AND OPERATIONAL IMPACTS (Sheet 4 of 4)

- The elevated HE ion ESA background counts do not affect the normal TED data.
  - The HE ion ESA Total Flux and differential channels fluxes are not affected by the low energy ions which produce the high background counts
- The elevated background counts only affect the corrections required during periods of high energy particle events.
  - Background corrections for the HE ion ESAs must use the LE ion ESA background counts
  - Data from the November 9, 2000 solar proton event, and data from the South Atlantic Anomaly show that there is a stable relation between the LE and HE ion ESA background measurements
    - The 0 degree HE background is about 0.5 of the LE background
    - The 30 degree HE background is about equal to the LE background
  - This allows proper correction of the data for background

BACKGROUND MATERIAL

J. Cardone and F. Hanser

RIPTION: SEM DPU TEMPERATURE

P FILENAME: NRT_OPS$TRENDPLOT_SETUP:16SEMTRN1

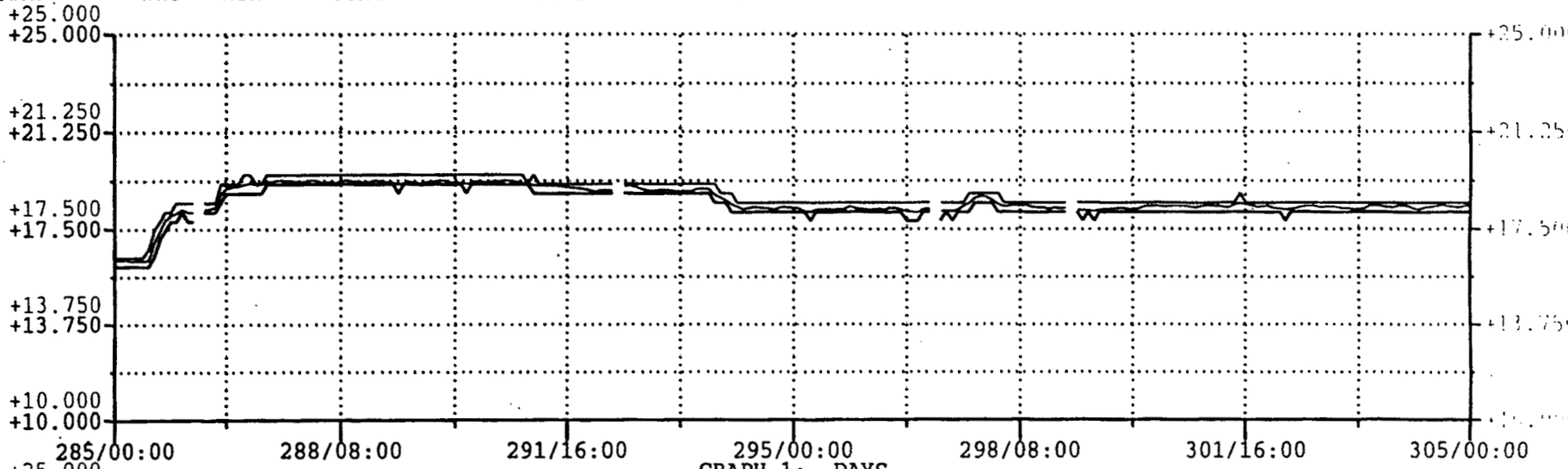
T/STOP TIME: 00/285/00:00:00.0 - 00/305/00:00:00.0

PLOT PRINT DATE: 306/20:19:25

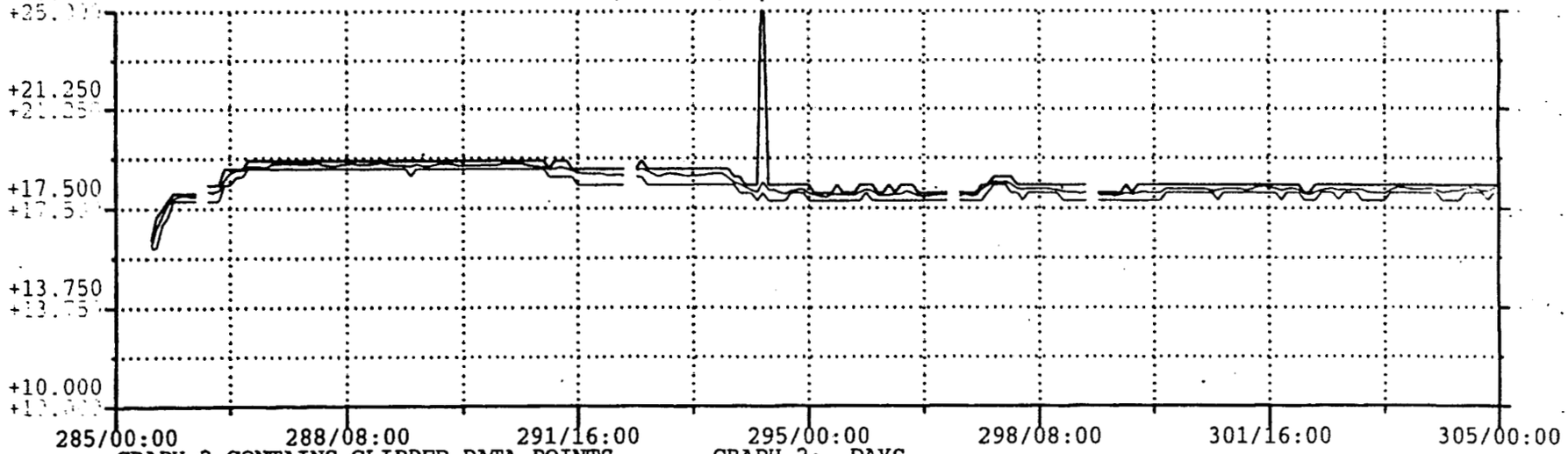
SAMPLING PERIOD: 000/00:00:08.00

MIN AVAILABILITY %: 50.00%

TA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
DPU	FA119	DEG	MIN		TIME		DAYS		—	1	[illegible]		[illegible]	[illegible]		[illegible]		[illegible]		—	
DPU	FA119	DEG	MEAN		TIME		DAYS		—	1	SDPUTEMP		DEG	MAX		TIME		DAYS		—	2
DPU	FA119	DEG	MAX		TIME		DAYS		—	1											
TEMP		DEG	MIN		TIME		DAYS		—	2											



GRAPH 1: DAYS



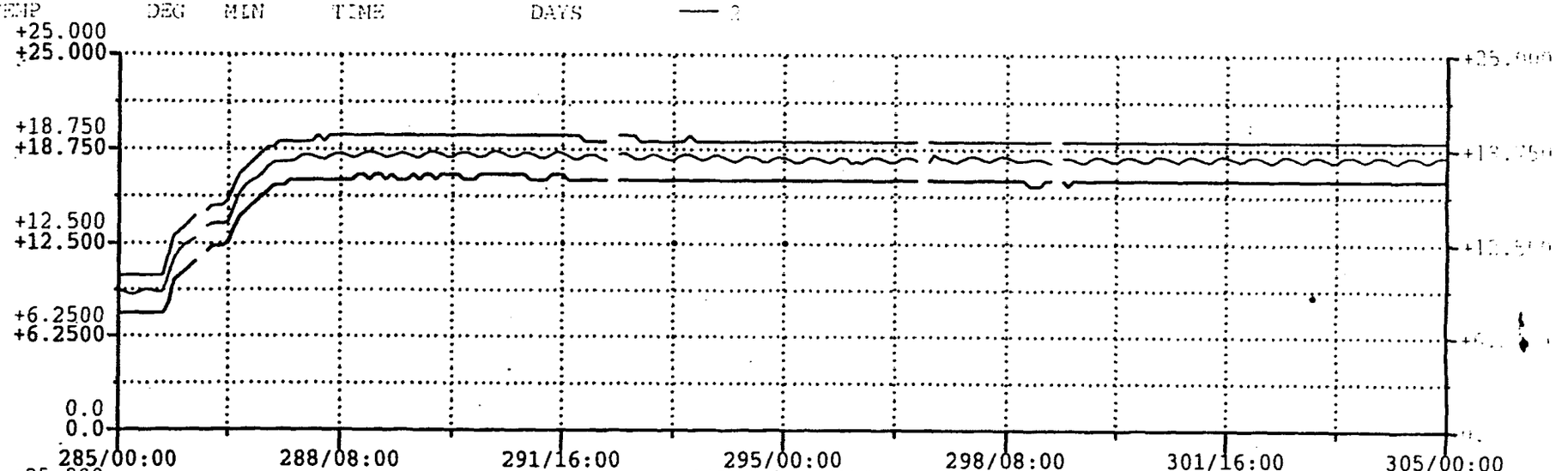
GRAPH 2 CONTAINS CLIPPED DATA POINTS

GRAPH 2: DAYS

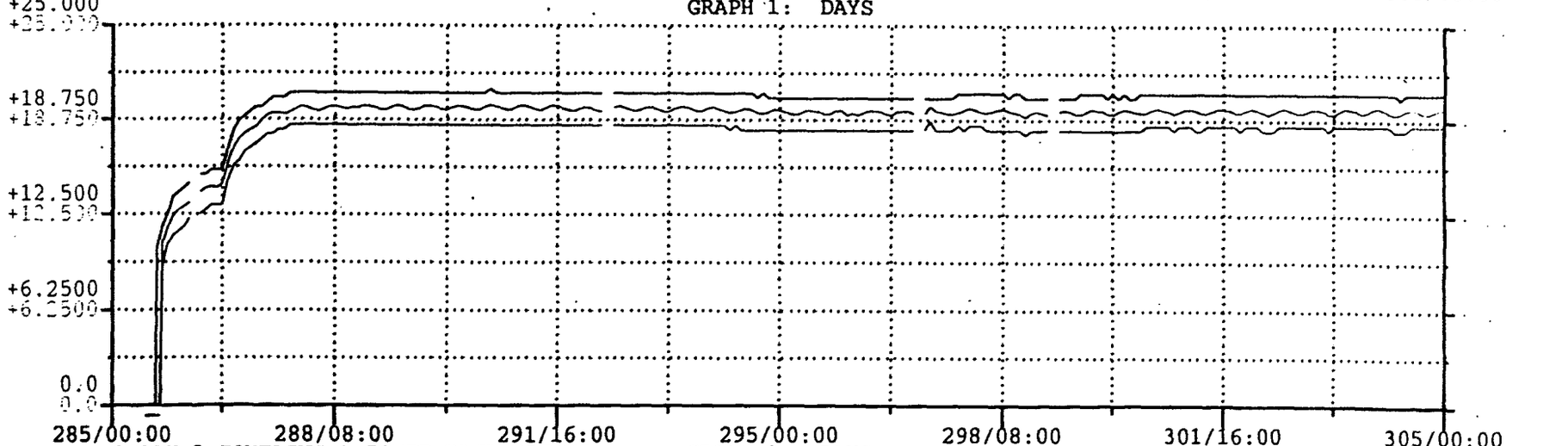
E: SEMTRN2
RIPTION: SEM TED TEMPERATURE
P FILENAME: NRT_OPS$TRENDPLOT_SETUP:16SEMTRN2
T/STOP TIME: 00/285/00:00:00.0 - 00/305/00:00:00.0

PLOT PRINT DATE: 306/20:19:56
SAMPLING PERIOD: 000/00:00:08.00
MIN AVAILABILITY %: 50.00%

TA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
TEDT	FA127	DEG	MIN		TIME		DAYS		—	1	STDTEMP		DEG	MEAN		TIME		DAYS		—	
TEDT	FA127	DEG	MEAN		TIME		DAYS		—	1	STDTEMP		DEG	MAX		TIME		DAYS		—	2
TEDT	FA127	DEG	MAX		TIME		DAYS		—	1											
EMP		DEG	MIN		TIME		DAYS		—	2											



GRAPH 1: DAYS



GRAPH 2 CONTAINS CLIPPED DATA POINTS

GRAPH 2: DAYS

.E: SEMTRN3

:RIPTION: SEM MEPED P TELESCOPE TEMPERATURE

JP FILENAME: NRT_OPS$TRENDPLOT_SETUP:16SEMTRN3

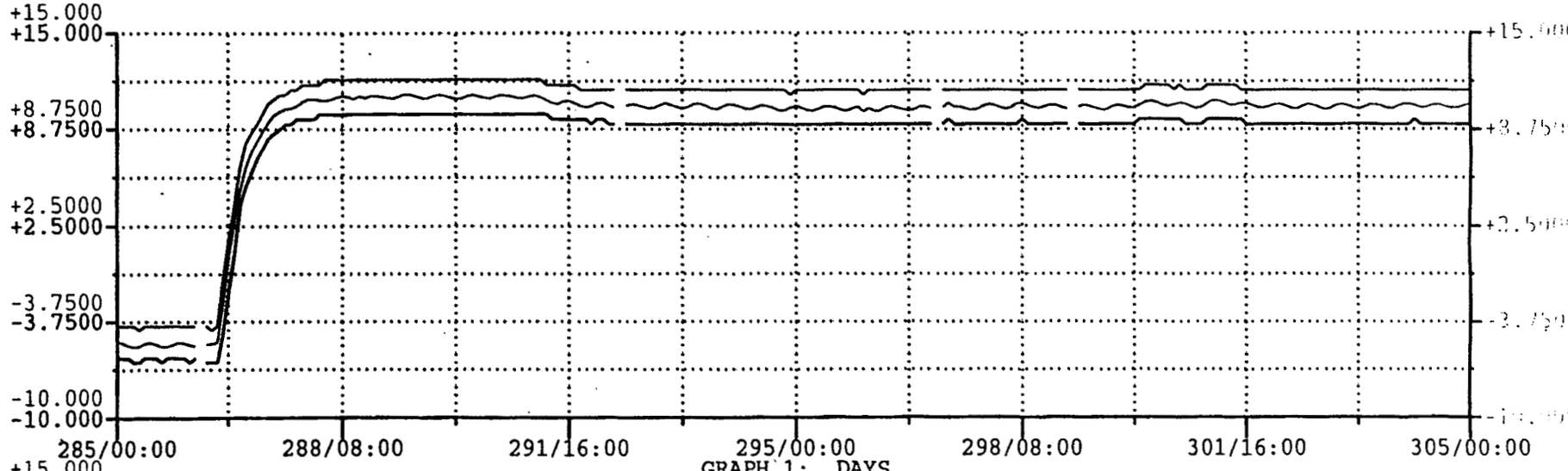
RT/STOP TIME: 00/285/00:00:00.0 - 00/305/00:00:00.0

PLOT PRINT DATE: 306/20:21:00

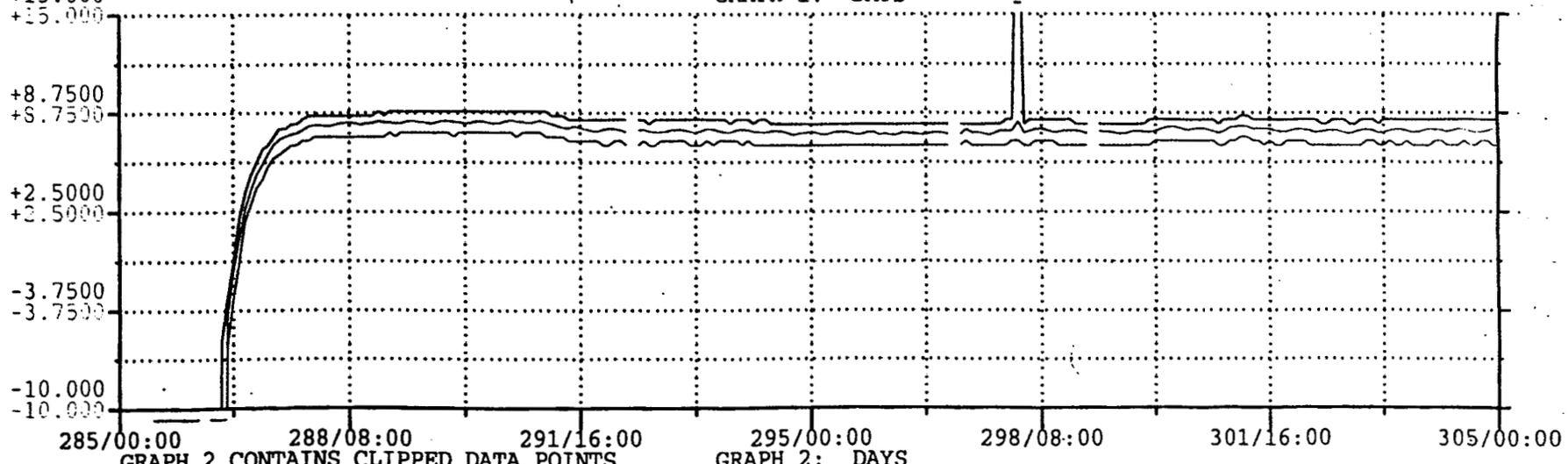
SAMPLING PERIOD: 000/00:00:08.00

MIN AVAILABILITY %: 50.00%

ATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
MPT	FA135	DEG	MIN		TIME		DAYS		—	1	SMEPPTEL		DEG	MEAN		TIME		DAYS		—	
MPT	FA135	DEG	MEAN		TIME		DAYS		—	1	SMEPPTEL		DEG	MAX		TIME		DAYS		—	2
MPT	FA135	DEG	MAX		TIME		DAYS		—	1											
PTEL		DEG	MIN		TIME		DAYS		—	2											



GRAPH 1: DAYS



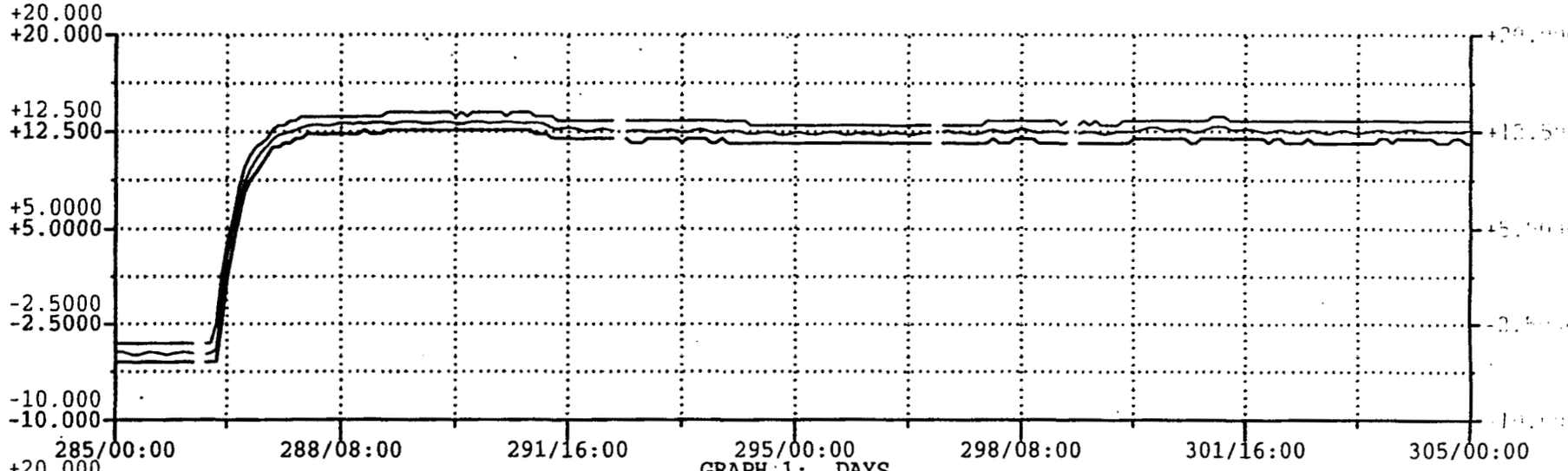
GRAPH 2 CONTAINS CLIPPED DATA POINTS

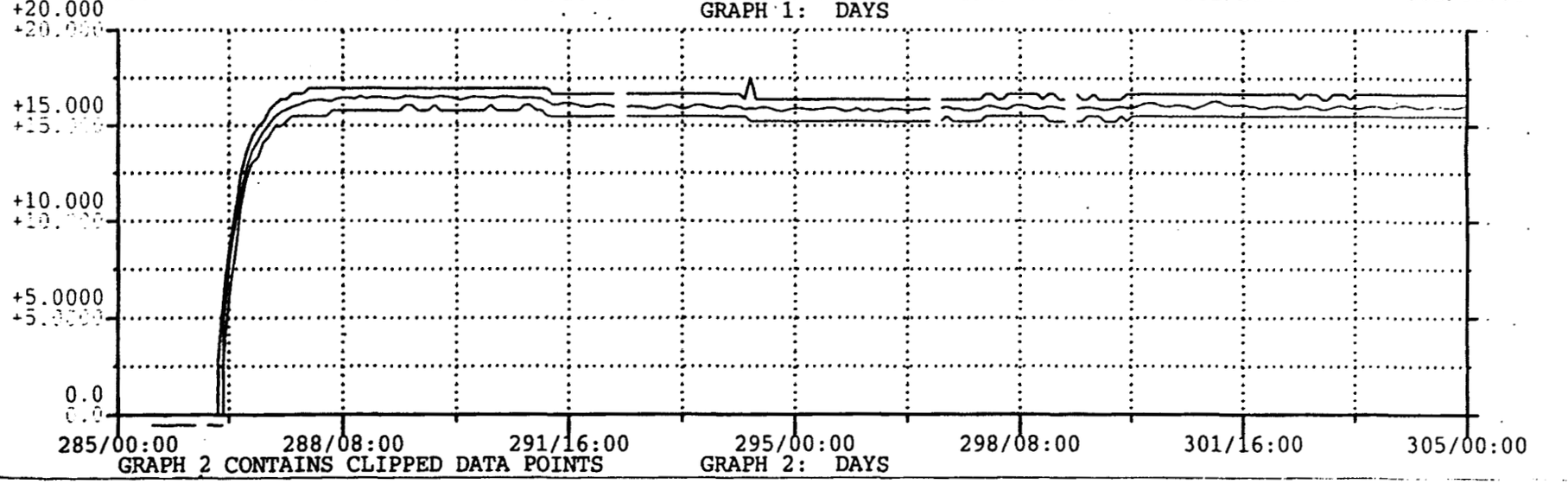
GRAPH 2: DAYS

:E: SEMTRN4
:RIPTION: SEM MEPED ELECTRONICS TEMPERATURE
JP FILENAME: NRT_OPS$TRENDPLOT_SETUP:16SEMTRN4
:T/STOP TIME: 00/285/00:00:00.0 - 00/305/00:00:00.0

PLOT PRINT DATE: 306/20:22:04
SAMPLING PERIOD: 000/00:00:08.00
MIN AVAILABILITY %: 50.00%

ATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
MEPE	FA143	DEG	MIN		TIME		DAYS		—	1	[illegible]		[illegible]	[illegible]		[illegible]		[illegible]		—	
MEPE	FA143	DEG	MEAN		TIME		DAYS		—	1	SMPELECT		DEG	MAX		TIME		DAYS		—	2
MEPE	FA143	DEG	MAX		TIME		DAYS		—	1											
ELECT		DEG	MIN		TIME		DAYS		—	[illegible]											

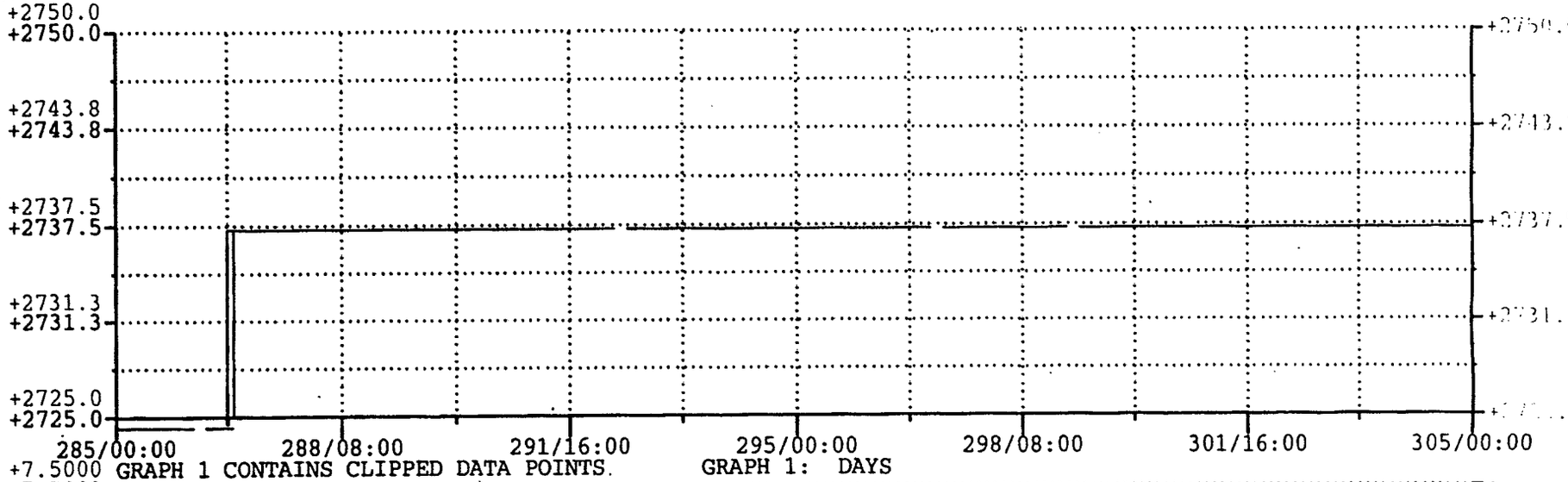




LE: SEMTRN5
CRIPTION: SEM TED E CDEM HV MONITOR VOLTAGE/E CDEM LEVEL
UP FILENAME: NRT_OPS$TRENDPLOT_SETUP:16SEMTRN5
RT/STOP TIME: 00/285/00:00:00.0 - 00/305/00:00:00.0

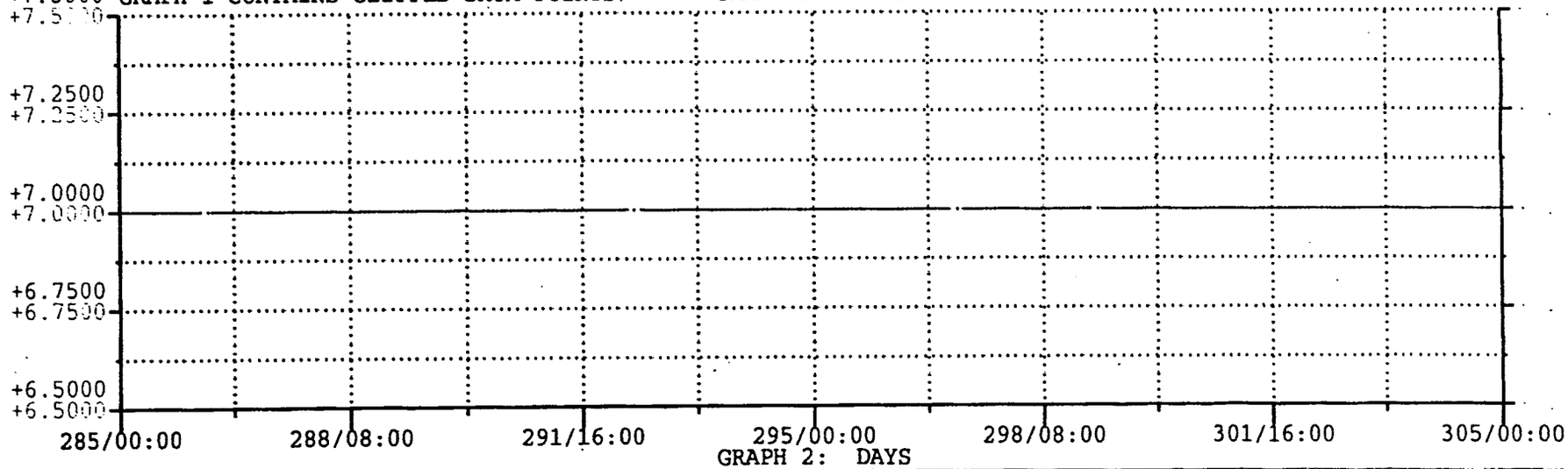
PLOT PRINT DATE: 306/20:23:09
SAMPLING PERIOD: 000/00:00:08.00
MIN AVAILABILITY %: 50.00%

ATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
MCHPS	FA230	VOL	MIN		TIME		DAYS		—	1	STDEHVPS		LVL	MEAN		TIME		DAYS		—	2
MCHPS	FA230	VOL	MEAN		TIME		DAYS		—	1	STDEHVPS		LVL	MAX		TIME		DAYS		—	2
MCHPS	FA230	VOL	MAX		TIME		DAYS		—	1											
EHVPS		LVL	MIN		TIME		DAYS		—	2											



GRAPH 1 CONTAINS CLIPPED DATA POINTS.

GRAPH 1: DAYS

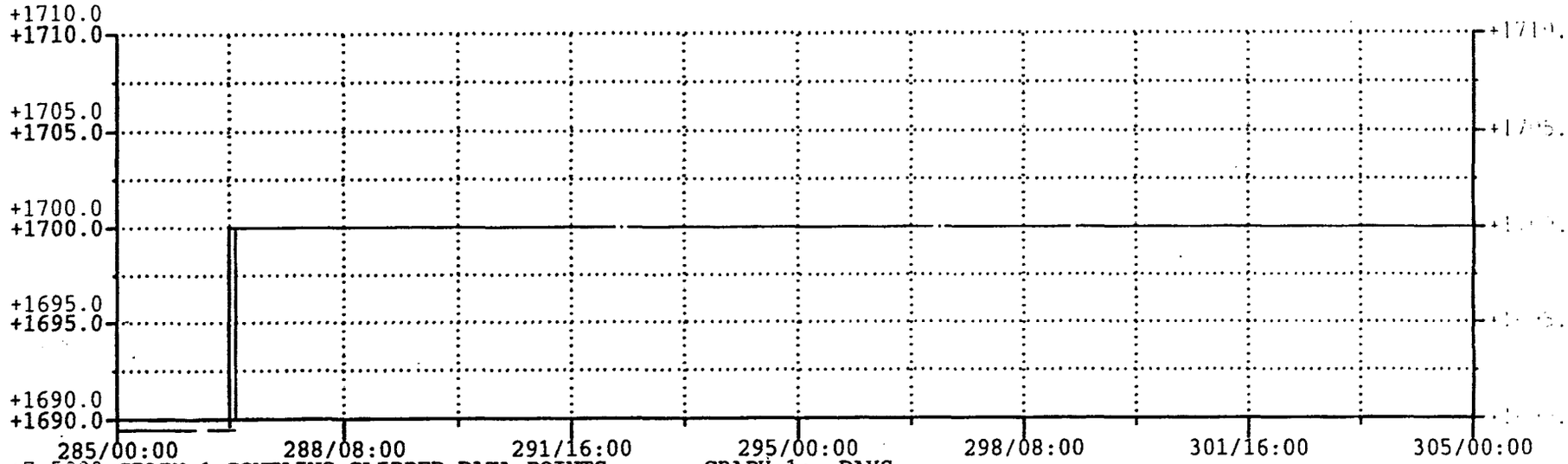


GRAPH 2: DAYS

'LE: SEMTRN6
:CRIPTION: SEM TED P CDEM HV MONITOR VOLTAGE/P CDEM LEVEL
'UP FILENAME: NRT_OPS$TRENDPLOT_SETUP:16SEMTRN6
.RT/STOP TIME: 00/285/00:00:00.0 - 00/305/00:00:00.0

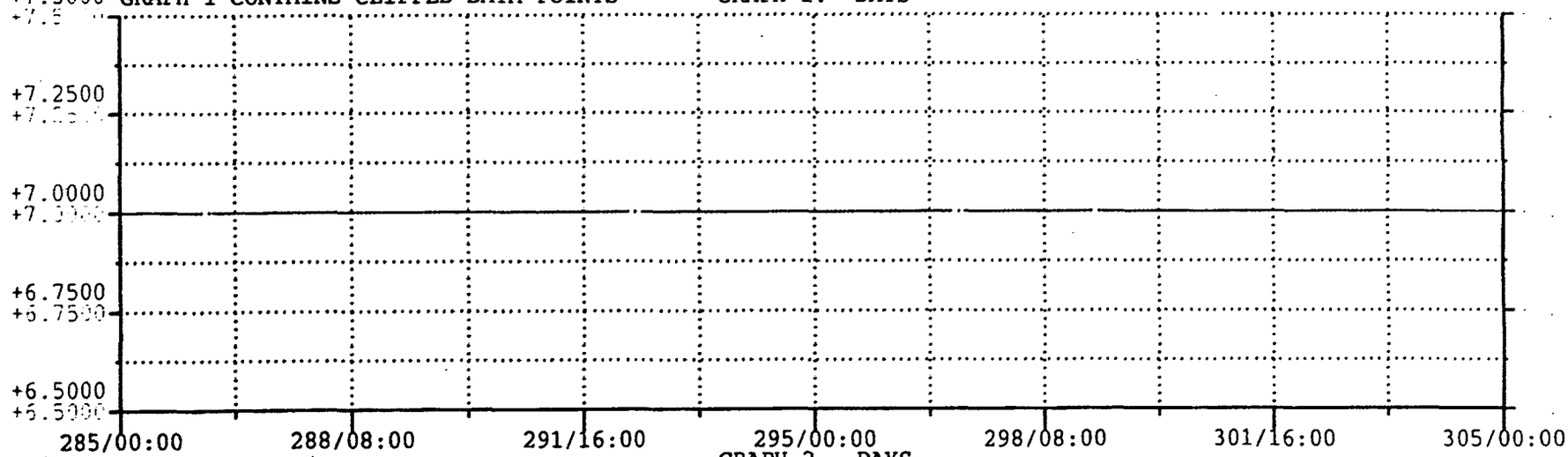
PLOT PRINT DATE: 306/20:24:14
SAMPLING PERIOD: 000/00:00:08.00
MIN AVAILABILITY %: 50.00%

DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
MCHPB	FA222	VOL	MIN		TIME		DAYS		—	1										—	
MCHPB	FA222	VOL	MEAN		TIME		DAYS		—	1	STDPHVPS		LVL	MAX		TIME		DAYS		—	2
MCHPB	FA222	VOL	MAX		TIME		DAYS		—	1											



GRAPH 1 CONTAINS CLIPPED DATA POINTS

GRAPH 1: DAYS



GRAPH 2: DAYS

LE: SEMTRN7

CRIPTION: SEM MEPED OMNI BIAS VOLTAGE

UP FILENAME: NRT_OPS$TRENDPLOT_SETUP:16SEMTRN7

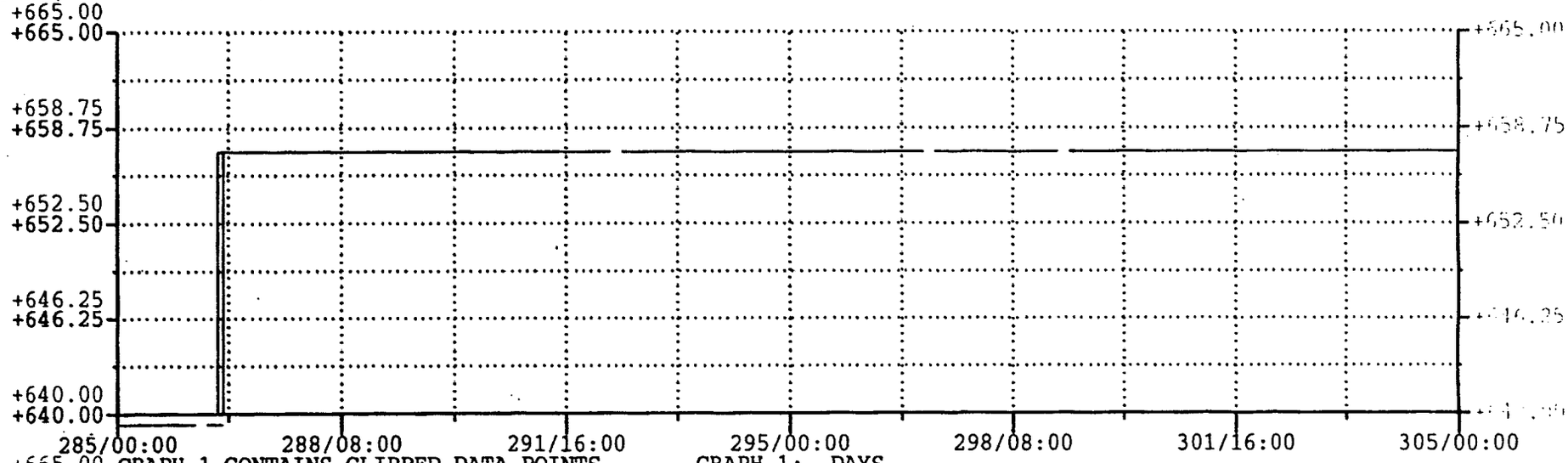
RT/STOP TIME: 00/285/00:00:00.0 - 00/305/00:00:00.0

PLOT PRINT DATE: 306/20:25:17

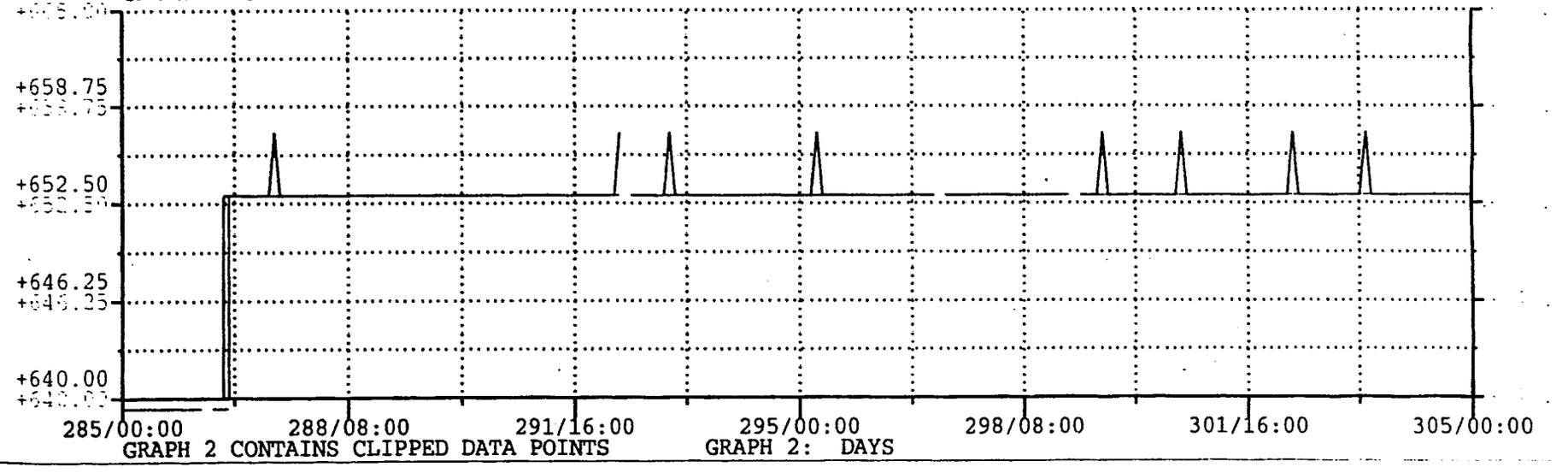
SAMPLING PERIOD: 000/00:00:08.00

MIN AVAILABILITY %: 50.00%

ATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
MMDV	FA214	VOL	MIN		TIME		DAYS		—	1	SMEPOMBV		VOL	MIN		TIME		DAYS		—	
MMDV	FA214	VOL	MEAN		TIME		DAYS		—	1	SMEPOMBV		VOL	MAX		TIME		DAYS		—	2
MMDV	FA214	VOL	MAX		TIME		DAYS		—	1											
POMBV		VOL	MIN		TIME		DAYS		—	2											



GRAPH 1 CONTAINS CLIPPED DATA POINTS. GRAPH 1: DAYS

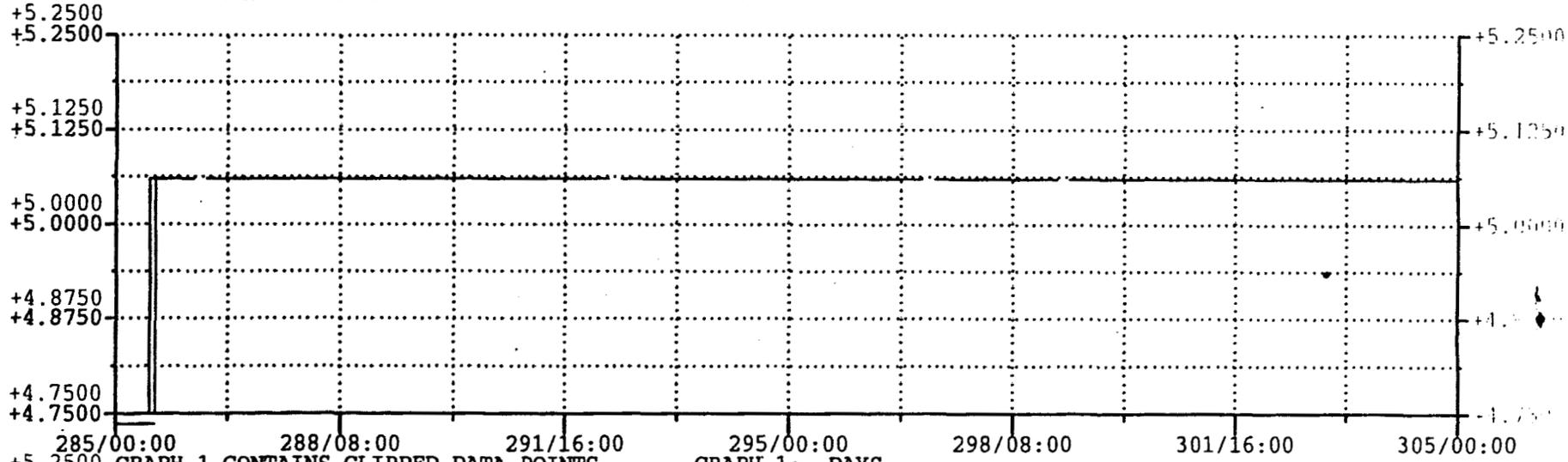


GRAPH 2 CONTAINS CLIPPED DATA POINTS GRAPH 2: DAYS

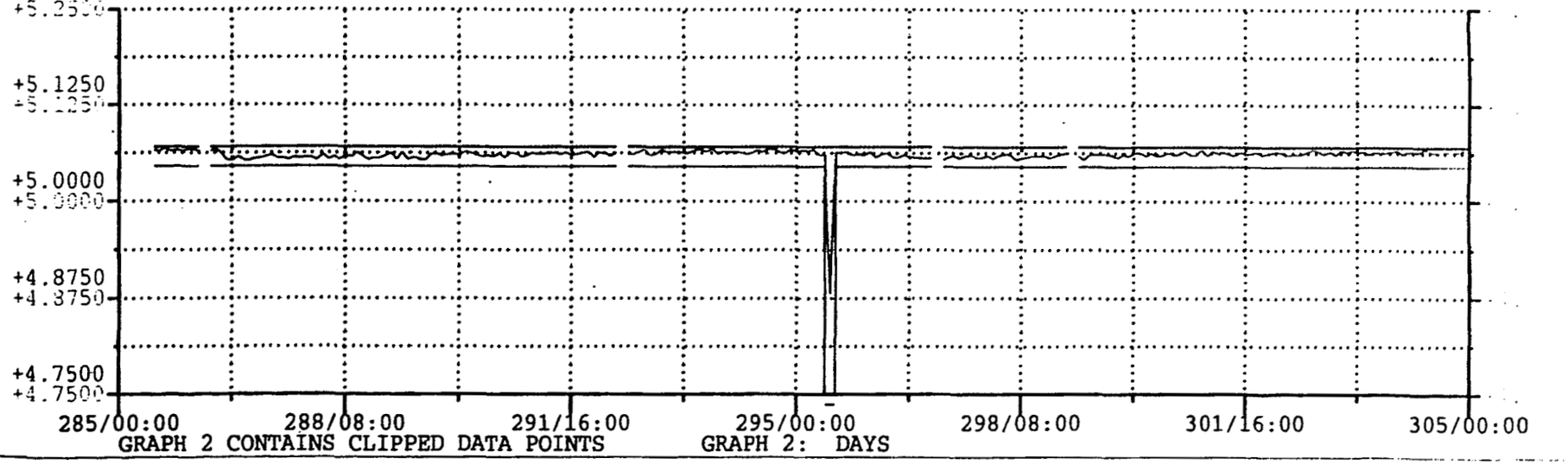
LE: SEMTRN8
CRIPTION: SEM DPU UPA +5 VOLTS
UP FILENAME: NRT_OPS$TRENDPLOT_SETUP:16SEMTRN8
RT/STOP TIME: 00/285/00:00:00.0 - 00/305/00:00:00.0

PLOT PRINT DATE: 306/20:26:21
SAMPLING PERIOD: 000/00:00:08.00
MIN AVAILABILITY %: 50.00%

ATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
MUPA5	FA294	VOL	MIN		TIME		DAYS		—	1	[illegible]		[illegible]	[illegible]		[illegible]		[illegible]		—	
MUPA5	FA294	VOL	MEAN		TIME		DAYS		—	1	SUPA5V		VOL	MAX		TIME		DAYS		—	2
MUPA5	FA294	VOL	MAX		TIME		DAYS		—	1											
A5V		VOL	MIN		TIME		DAYS		—	[illegible]											



GRAPH 1 CONTAINS CLIPPED DATA POINTS. GRAPH 1: DAYS

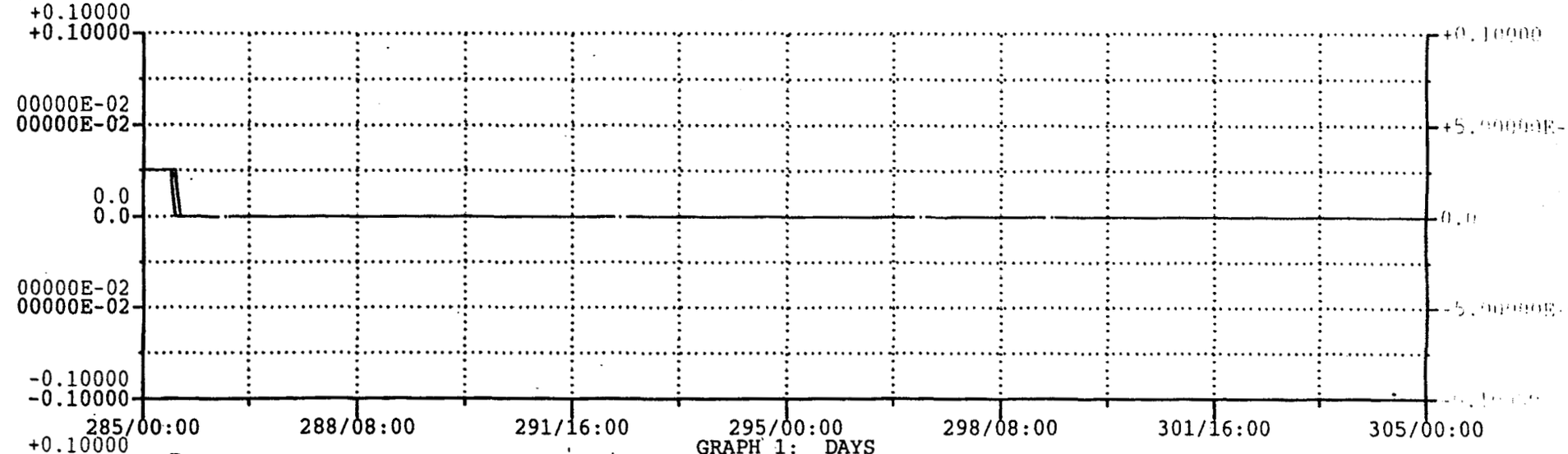


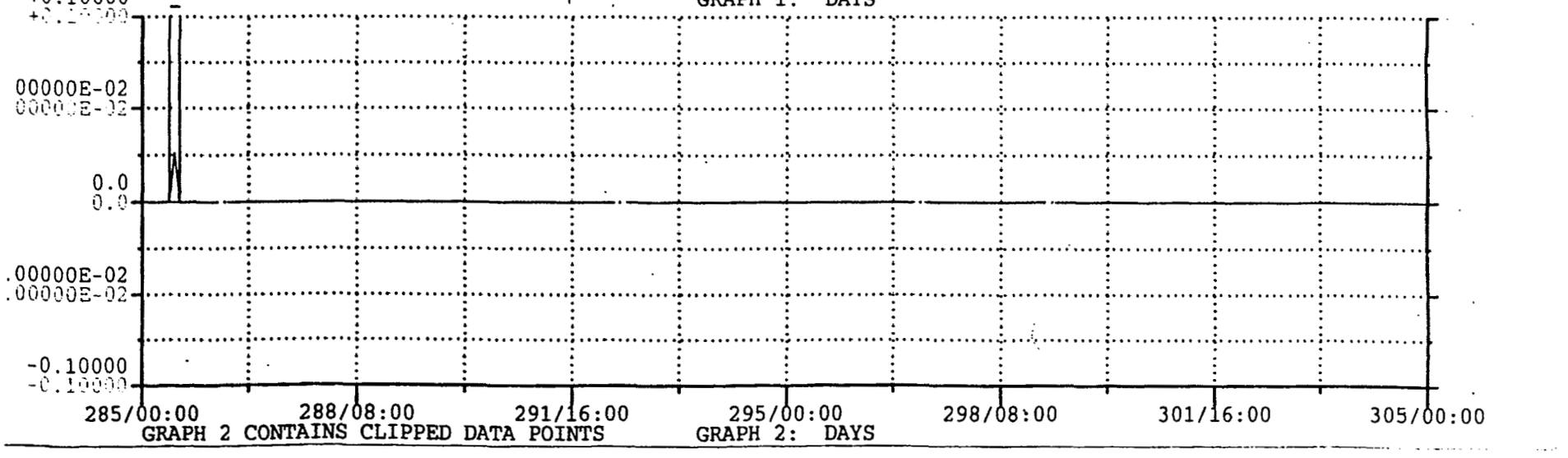
GRAPH 2 CONTAINS CLIPPED DATA POINTS GRAPH 2: DAYS

LE: SEMTRN9
CRIPTION: SEM DPU UPB +5 VOLTS
JP FILENAME: NRT_OPS$TRENDPLOT_SETUP:16SEMTRN9
RT/STOP TIME: 00/285/00:00:00.0 - 00/305/00:00:00.0

PLOT PRINT DATE: 306/20:27:25
SAMPLING PERIOD: 000/00:00:08.00
MIN AVAILABILITY %: 50.00%

ATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
MUPB5	FA492	VOL	MIN		TIME		DAYS		—	1	[illegible]		[illegible]	[illegible]		[illegible]		[illegible]		—	
MUPB5	FA492	VOL	MEAN		TIME		DAYS		—	1	SUPB5V		VOL	MAX		TIME		DAYS		—	2
MUPB5	FA492	VOL	MAX		TIME		DAYS		—	1											
B5V		VOL	MIN		TIME		DAYS		—	2											

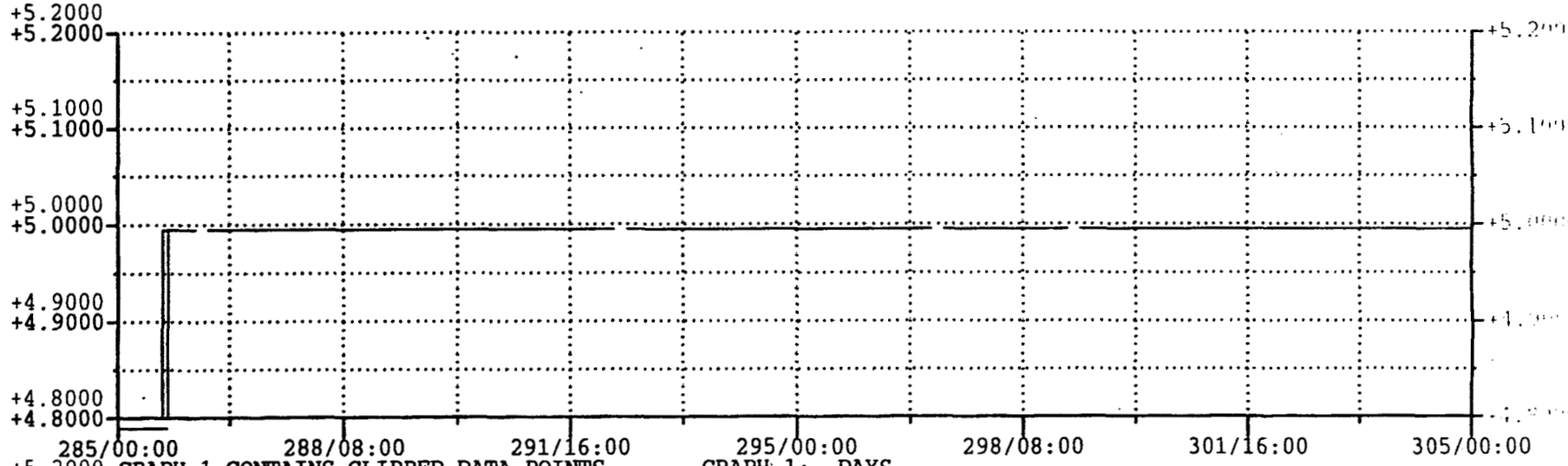




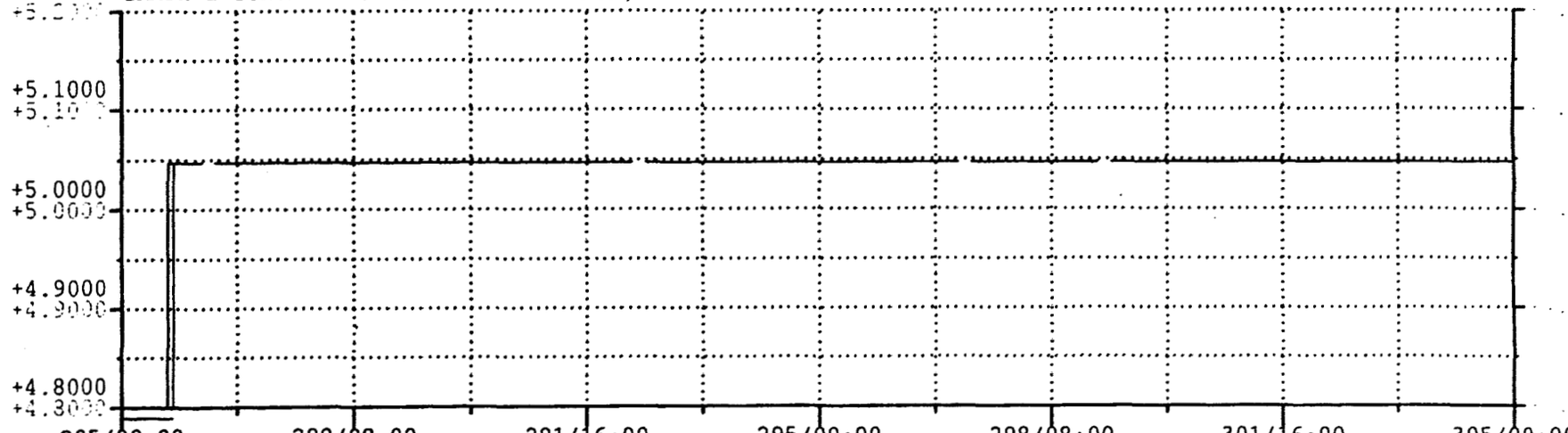
LE: SEMTRN10
CRIPTION: SEM TED +5 VOLTS
UP FILENAME: NRT_OPS$TRENDPLOT_SETUP:16SEMTRN10
RT/STOP TIME: 00/285/00:00:00.0 - 00/305/00:00:00.0

PLOT PRINT DATE: 306/20:28:29
SAMPLING PERIOD: 000/00:00:08.00
MIN AVAILABILITY %: 50.00%

ATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
MT5V	FA302	VOL	MIN		TIME		DAYS		—	1	[illegible]		[illegible]	MEAN		TIME		[illegible]		—	[illegible]
MT5V	FA302	VOL	MEAN		TIME		DAYS		—	1	STED5V		VOL	MAX		TIME		DAYS		—	2
MT5V	FA302	VOL	MAX		TIME		DAYS		—	1											
D5V		VOL	MIN		TIME		DAYS		—	[illegible]											



GRAPH 1 CONTAINS CLIPPED DATA POINTS GRAPH 1: DAYS

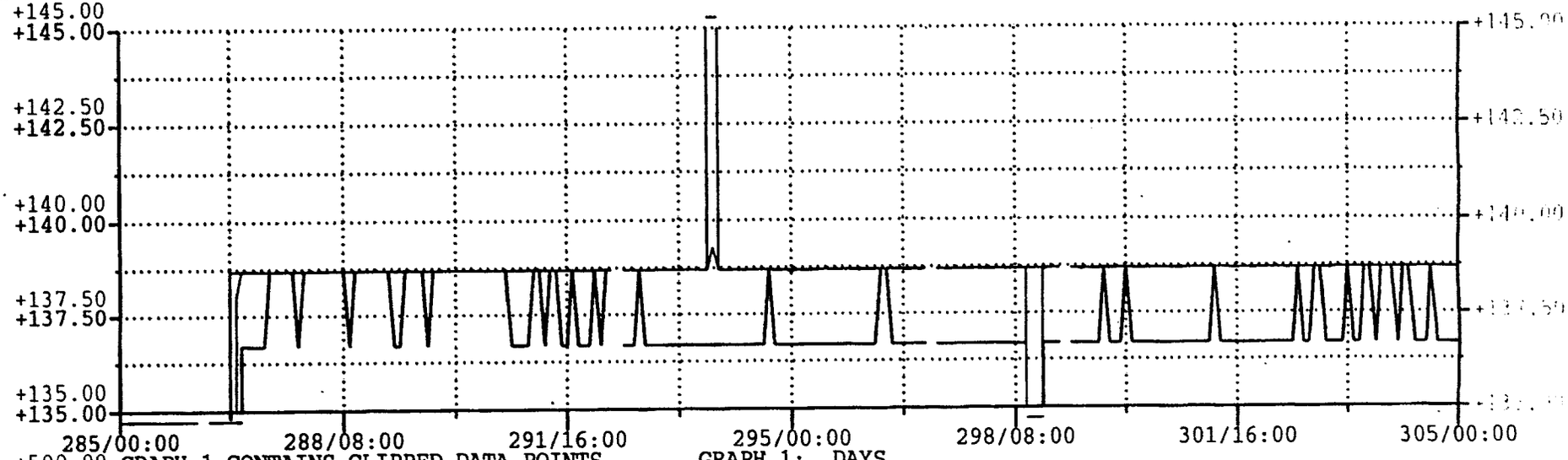


GRAPH 2 CONTAINS CLIPPED DATA POINTS GRAPH 2: DAYS

LE: SEMTRN11
CRIPTION: SEM TED SWEEP VOLTAGE
UP FILENAME: NRT_OPS$TRENDPLOT_SETUP:16SEMTRN11
RT/STOP TIME: 00/285/00:00:00.0 - 00/305/00:00:00.0

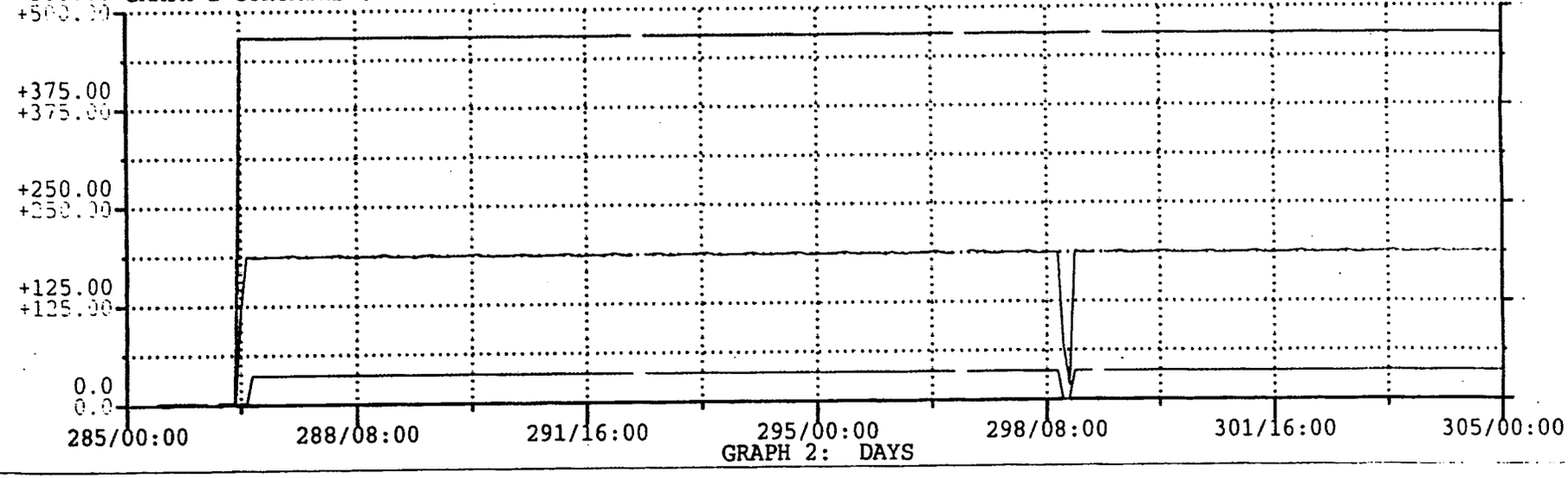
PLOT PRINT DATE: 306/20:29:33
SAMPLING PERIOD: 000/00:00:08.00
MIN AVAILABILITY %: 50.00%

ATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
MTSWP	FA310	VOL	MIN		TIME		DAYS		—	1	[illegible]		VOL	[illegible]		[illegible]		[illegible]		—	[illegible]
MTSWP	FA310	VOL	MEAN		TIME		DAYS		—	1	STEDSWP		VOL	MAX		TIME		DAYS		—	2
MTSWP	FA310	VOL	MAX		TIME		DAYS		—	1											
DSWP		VOL	MIN		TIME		DAYS		—	2											



GRAPH 1 CONTAINS CLIPPED DATA POINTS

GRAPH 1: DAYS

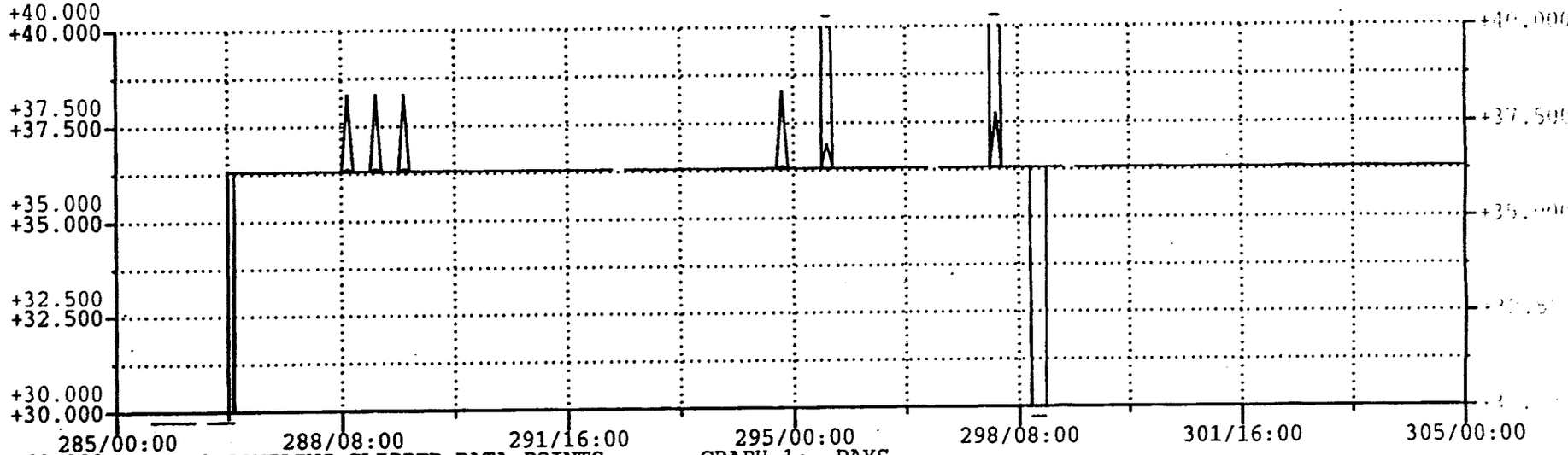


GRAPH 2: DAYS

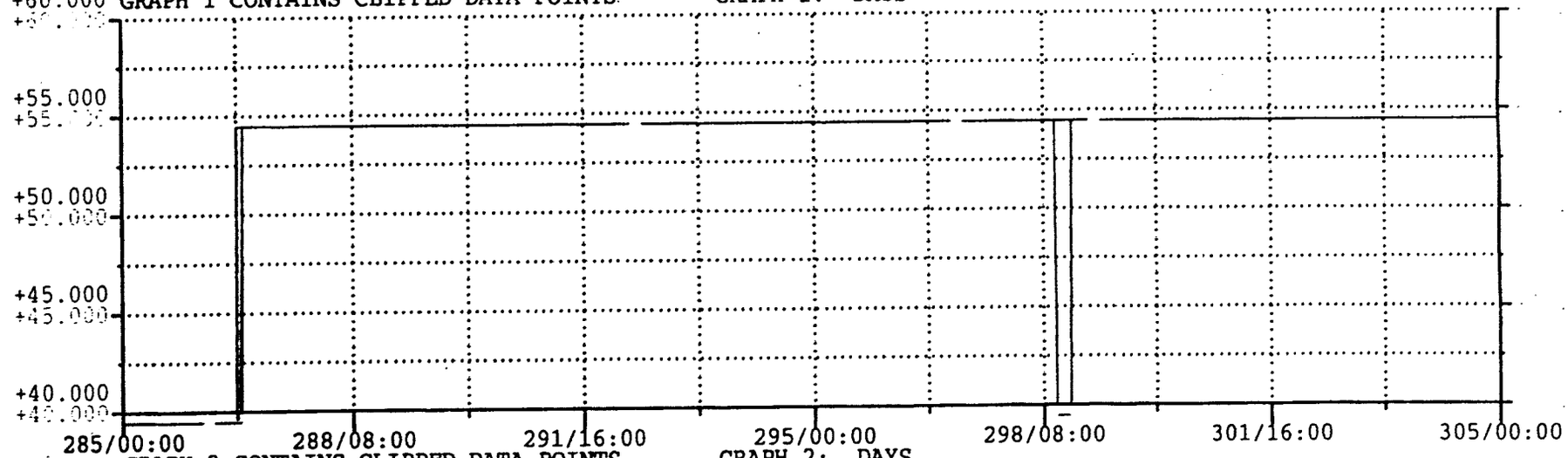
LE: SEMTRN12
CRIPTION: SEM TED SWEEP VOLTAGE 1/2
UP FILENAME: NRT_OPS$TRENDPLOT_SETUP:16SEMTRN12
RT/STOP TIME: 00/285/00:00:00.0 - 00/305/00:00:00.0

PLOT CREATION DATE: [illegible]
PLOT PRINT DATE: 306/20:30:37
SAMPLING PERIOD: 000/00:00:08.00
MIN AVAILABILITY %: 50.00%

ATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
DSWP1		VOL	MIN		TIME		DAYS		—	1	[illegible]		[illegible]	[illegible]		[illegible]		[illegible]		—	
DSWP1		VOL	MEAN		TIME		DAYS		—	1	STEDSWP2		VOL	MAX		TIME		DAYS		—	2
DSWP1		VOL	MAX		TIME		DAYS		—	1											
[illegible]		[illegible]	[illegible]		[illegible]		[illegible]		—												



GRAPH 1 CONTAINS CLIPPED DATA POINTS GRAPH 1: DAYS

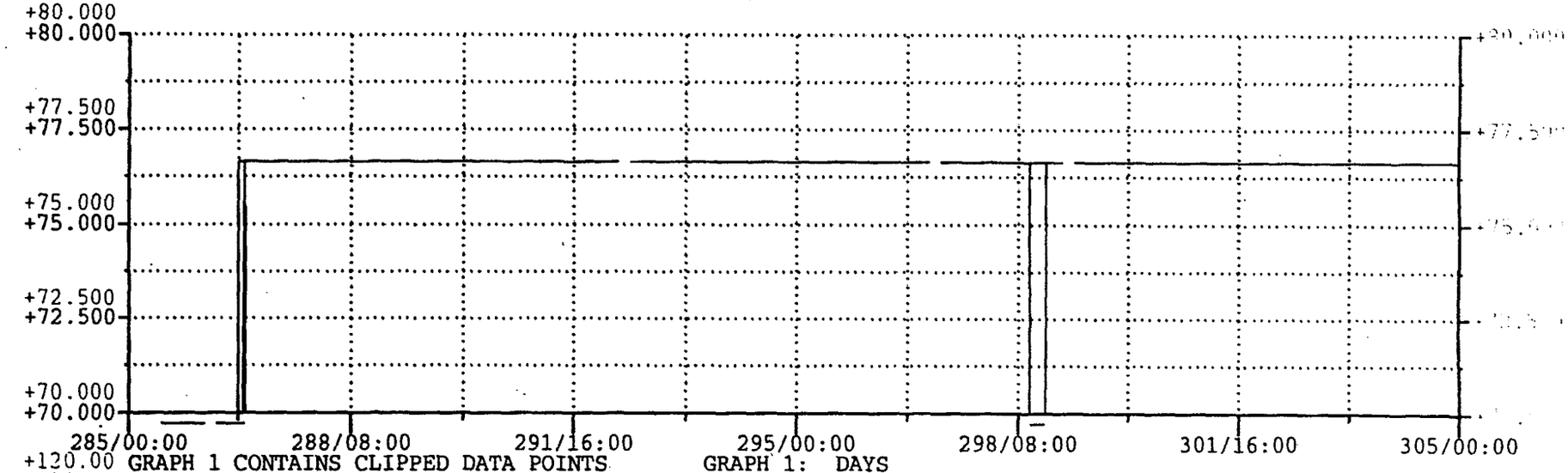


GRAPH 2 CONTAINS CLIPPED DATA POINTS GRAPH 2: DAYS

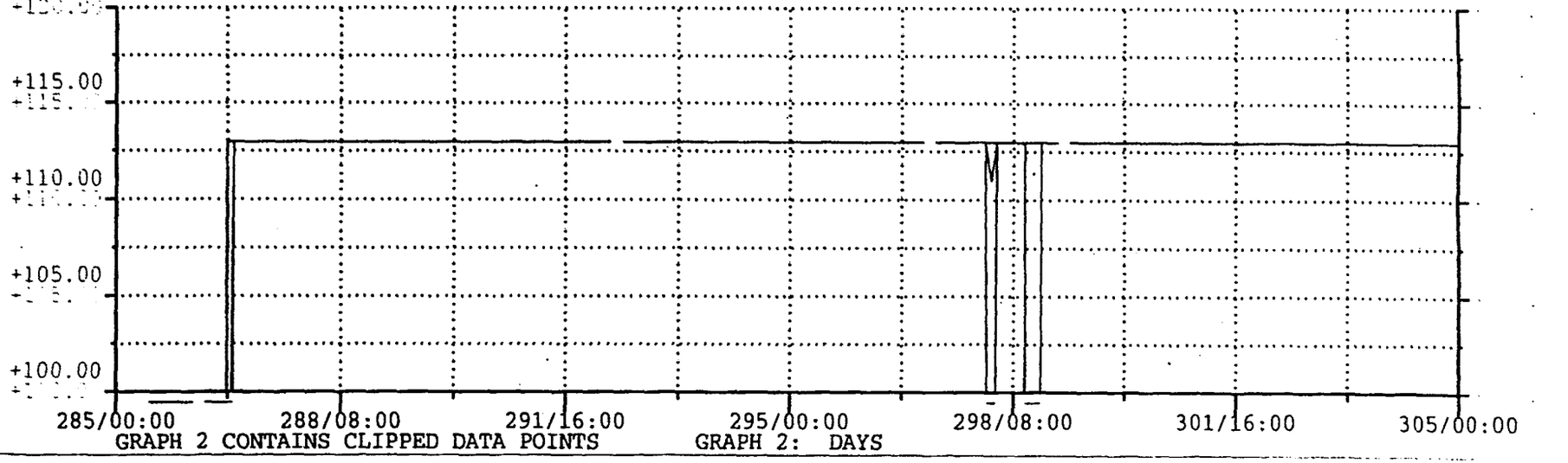
.E: SEMTRN13
:RIPTION: SEM TED SWEEP VOLTAGE 3/4
JP FILENAME: NRT_OPS$TRENDPLOT_SETUP:16SEMTRN13
RT/STOP TIME: 00/285/00:00:00.0 - 00/305/00:00:00.0

PLOT PRINT DATE: 306/20:31:41
SAMPLING PERIOD: 000/00:00:08.00
MIN AVAILABILITY %: 50.00%

ATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
DSWP3		VOL	MIN		TIME		DAYS		—	1	STEDSWP4		VOL	MIN		TIME		DAYS		—	
DSWP3		VOL	MEAN		TIME		DAYS		—	1	STEDSWP4		VOL	MAX		TIME		DAYS		—	2
DSWP3		VOL	MAX		TIME		DAYS		—	1											
DSWP4		VOL	MIN		TIME		DAYS		—	2											



GRAPH 1 CONTAINS CLIPPED DATA POINTS GRAPH 1: DAYS

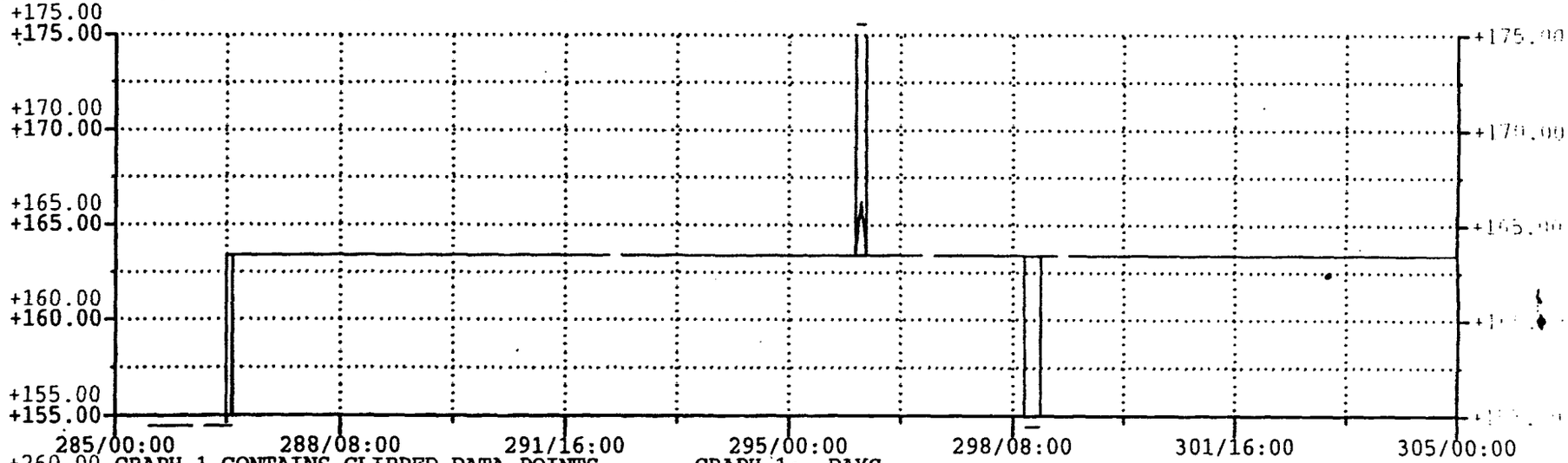


GRAPH 2 CONTAINS CLIPPED DATA POINTS GRAPH 2: DAYS

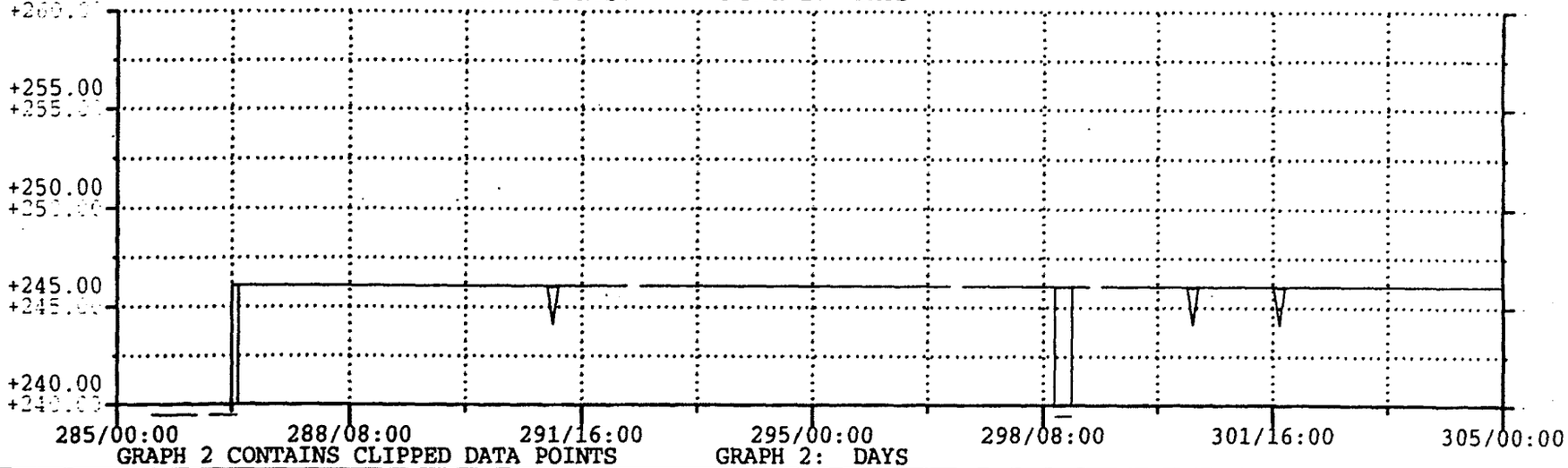
:E: SEMTRN14
:RIPTION: SEM TED SWEEP VOLTAGE 5/6
:P FILENAME: NRT_OPS$TRENDPLOT_SETUP:16SEMTRN14
:T/STOP TIME: 00/285/00:00:00.0 - 00/305/00:00:00.0

PLOT PRINT DATE: 306/20:32:45
SAMPLING PERIOD: 000/00:00:08.00
MIN AVAILABILITY %: 50.00%

:TA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
)SWP5		VOL	MIN		TIME		DAYS		—	1	[illegible]		[illegible]	[illegible]		[illegible]		[illegible]	[illegible]	—	
)SWP5		VOL	MEAN		TIME		DAYS		—	1	STEDSWP6		VOL	MAX		TIME		DAYS		—	2
)SWP5		VOL	MAX		TIME		DAYS		—	1											
)SWP6		VOL	MIN		TIME		DAYS		—	2											



GRAPH 1 CONTAINS CLIPPED DATA POINTS. GRAPH 1: DAYS

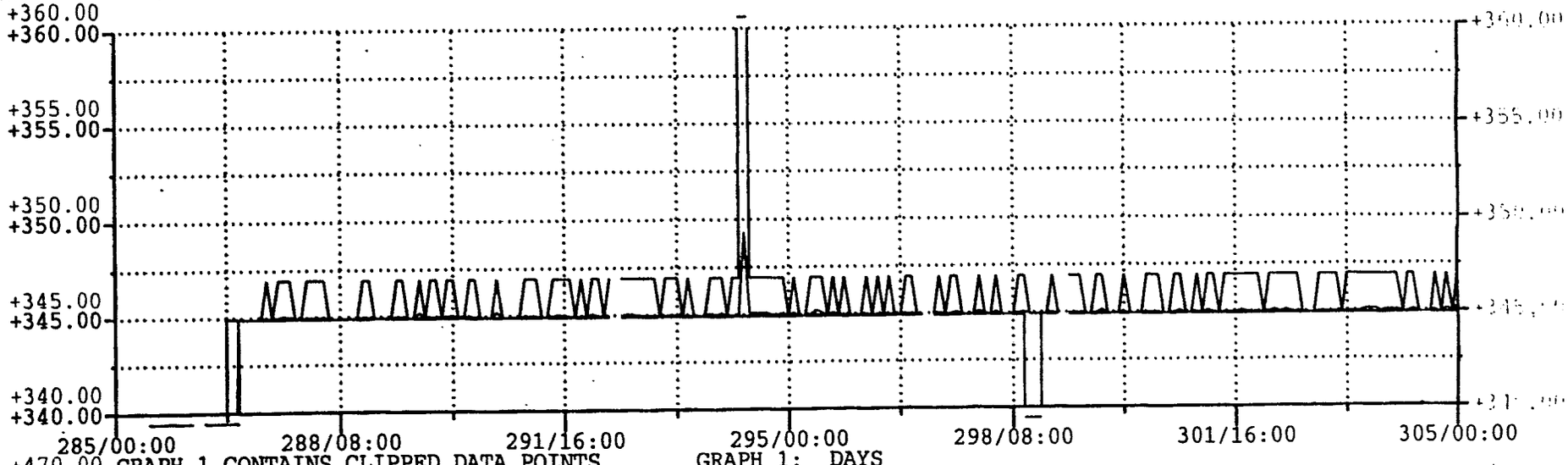


GRAPH 2 CONTAINS CLIPPED DATA POINTS GRAPH 2: DAYS

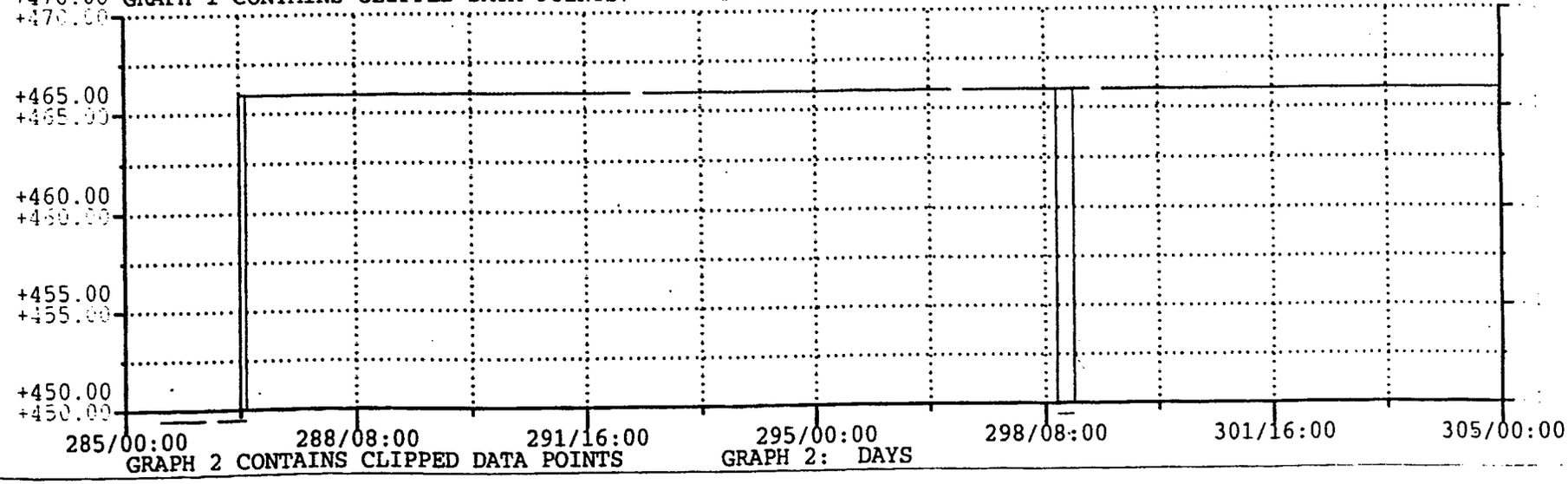
LE: SEMTRN15
CRIPTION: SEM TED SWEEP VOLTAGE 7/8
UP FILENAME: NRT_OPS$TRENDPLOT_SETUP:16SEMTRN15
RT/STOP TIME: 00/285/00:00:00.0 - 00/305/00:00:00.0

PLOT CREATION DATE: [illegible]
PLOT PRINT DATE: 306/20:33:49
SAMPLING PERIOD: 000/00:00:08.00
MIN AVAILABILITY %: 50.00%

ATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
DSWP7		VOL	MIN		TIME		DAYS		—	1	[illegible]		[illegible]	[illegible]		[illegible]		[illegible]	[illegible]	[illegible]	
DSWP7		VOL	MEAN		TIME		DAYS		—	1	STEDSWP8		VOL	MAX		TIME		DAYS		—	2
DSWP7		VOL	MAX		TIME		DAYS		—	1											
DSWP8		VOL	MIN		TIME		DAYS		—	2											



GRAPH 1 CONTAINS CLIPPED DATA POINTS. GRAPH 1: DAYS

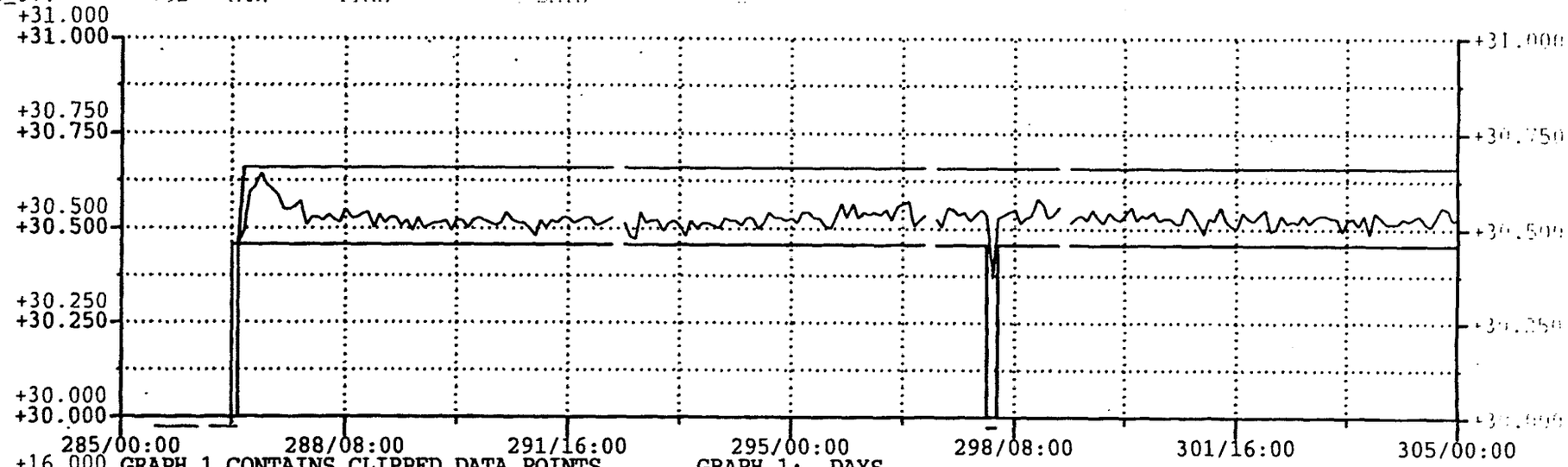


GRAPH 2 CONTAINS CLIPPED DATA POINTS GRAPH 2: DAYS

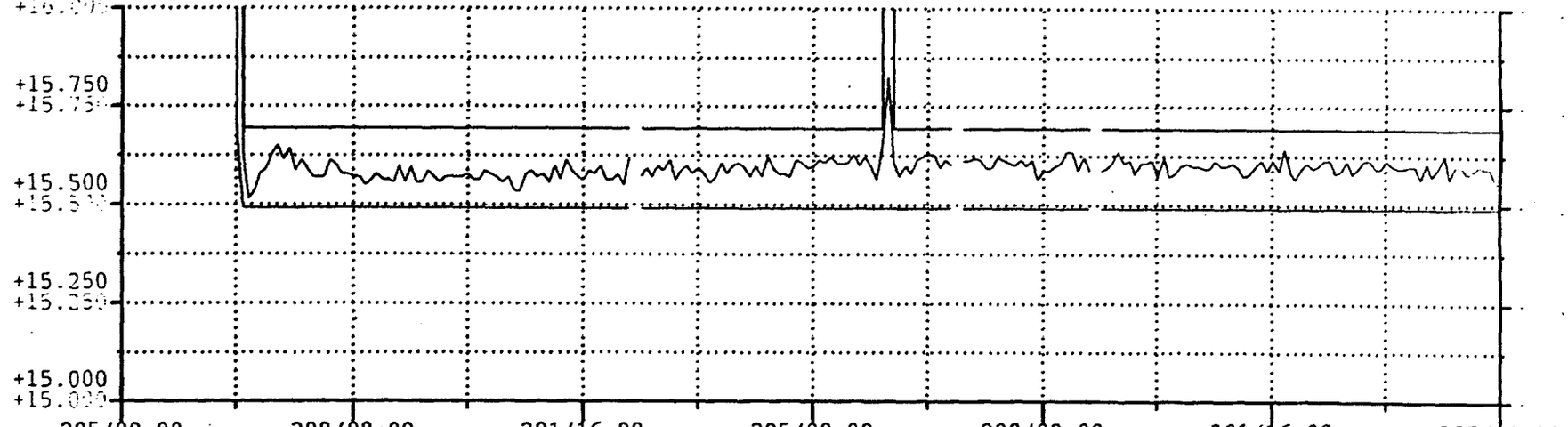
:E: SEMTRN16
:RIPTION: SEM TED +/-30 VOLTS
IP FILENAME: NRT_OPS$TRENDPLOT_SETUP:16SEMTRN16
:T/STOP TIME: 00/285/00:00:00.0 - 00/305/00:00:00.0

PLOT CREATION DATE: [illegible]
PLOT PRINT DATE: 306/20:34:54
SAMPLING PERIOD: 000/00:00:08.00
MIN AVAILABILITY %: 50.00%

ATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
)30V		VOL	MIN		TIME		DAYS		—	1	[illegible]		[illegible]	[illegible]		[illegible]		[illegible]		—	[illegible]
)30V		VOL	MEAN		TIME		DAYS		—	1	STED_30V		VOL	MAX		TIME		DAYS		—	2
)30V		VOL	MAX		TIME		DAYS		—	1											
)_30V		VOL	MIN		TIME		DAYS		—	[illegible]											



GRAPH 1 CONTAINS CLIPPED DATA POINTS GRAPH 1: DAYS

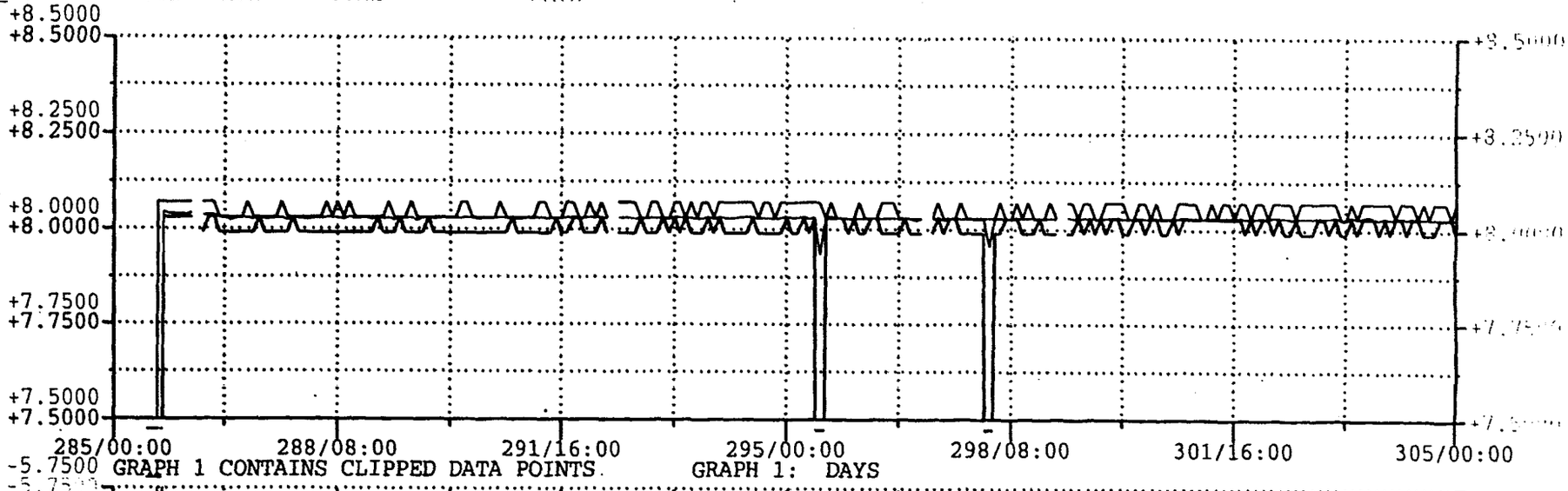


GRAPH 2 CONTAINS CLIPPED DATA POINTS GRAPH 2: DAYS

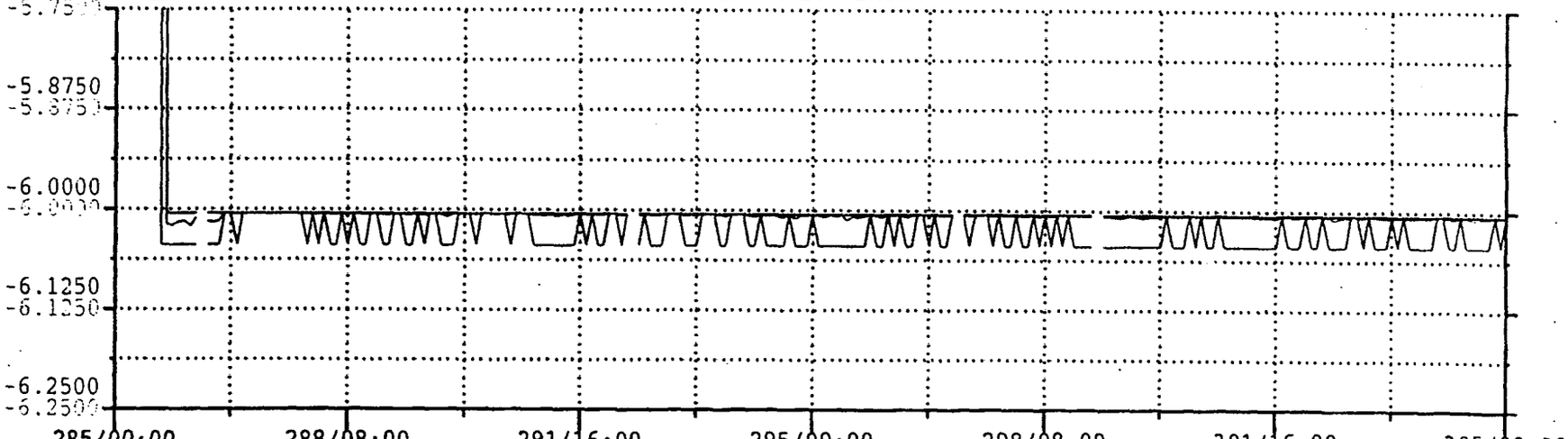
:E: SEMTRN17
:RIPTION: SEM TED +8/-6 VOLTS
JP FILENAME: NRT_OPS$TRENDPLOT_SETUP:16SEMTRN17
RT/STOP TIME: 00/285/00:00:00.0 ~ 00/305/00:00:00.0

PLOT CREATION DATE: [illegible]
PLOT PRINT DATE: 306/20:35:58
SAMPLING PERIOD: 000/00:00:08.00
MIN AVAILABILITY %: 50.00%

ATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
D8V		VOL	MIN		TIME		DAYS		—	1	[illegible]		[illegible]	[illegible]		[illegible]		[illegible]		—	[illegible]
D8V		VOL	MEAN		TIME		DAYS		—	1	STED_6V		VOL	MAX		TIME		DAYS		—	2
D8V		VOL	MAX		TIME		DAYS		—	1											
D_6V		VOL	MIN		TIME		DAYS		—	[illegible]											



-5.7500 GRAPH 1 CONTAINS CLIPPED DATA POINTS. GRAPH 1: DAYS

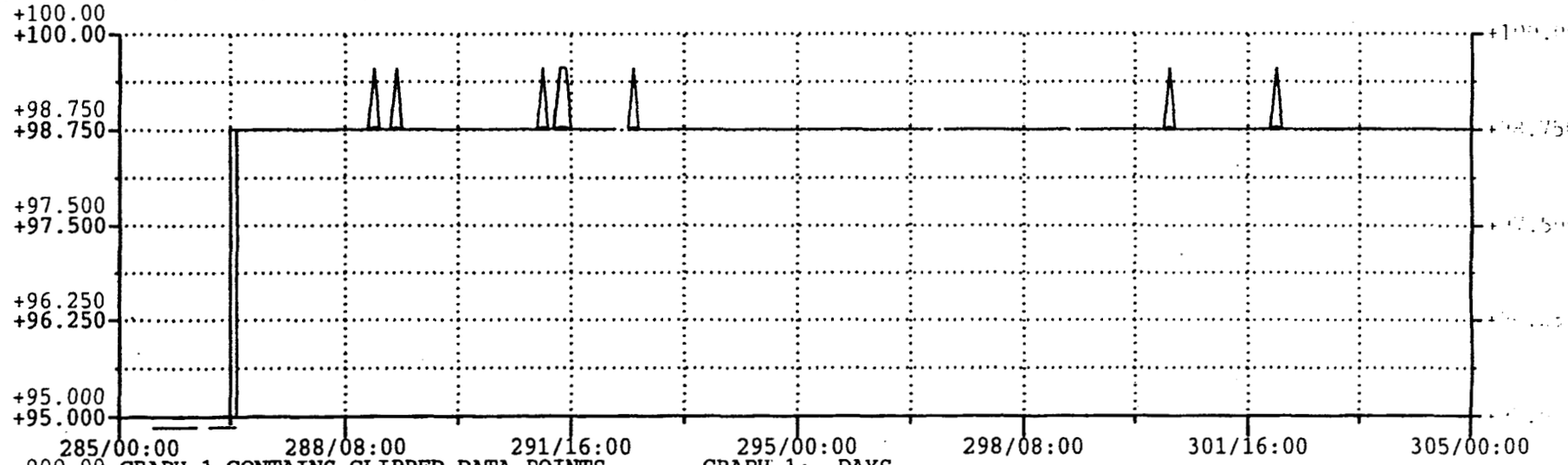


GRAPH 2 CONTAINS CLIPPED DATA POINTS GRAPH 2: DAYS

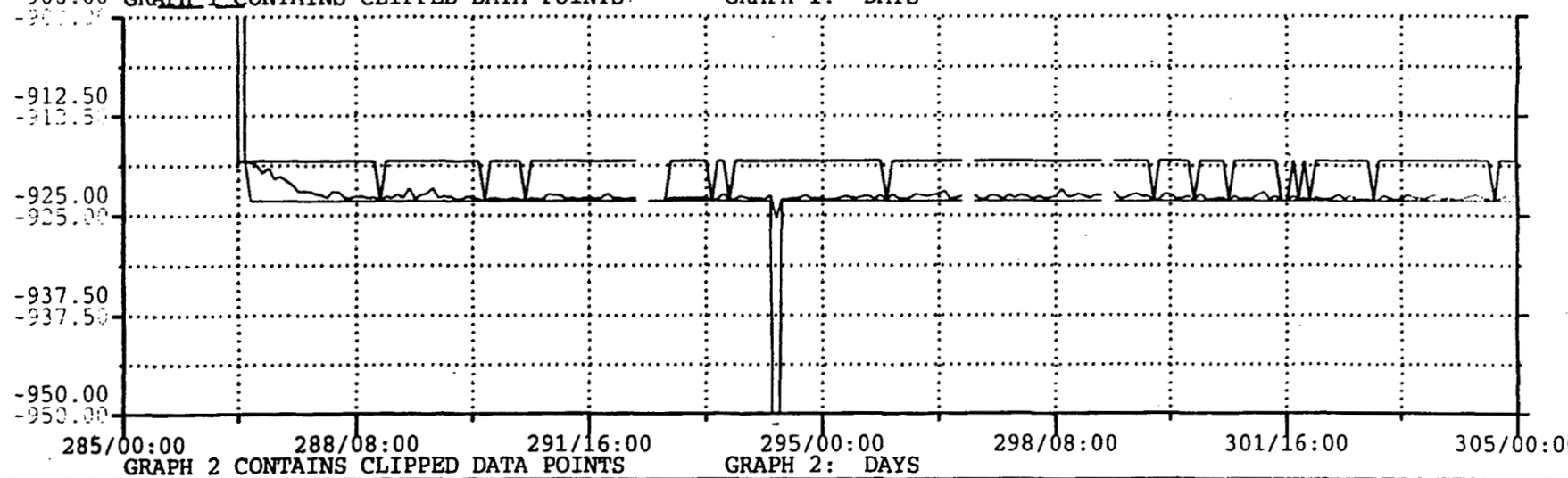
LE: SEMTRN18
CRIPTION: SEM TED +100/-1000 VOLTS
UP FILENAME: NRT_OPS$TRENDPLOT_SETUP:16SEMTRN18
RT/STOP TIME: 00/285/00:00:00.0 - 00/305/00:00:00.0

PLOT PRINT DATE: 306/20:37:02
SAMPLING PERIOD: 000/00:00:08.00
MIN AVAILABILITY %: 50.00%

ATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
D100V		VOL	MIN		TIME		DAYS		—	1										—	
D100V		VOL	MEAN		TIME		DAYS		—	1	STD_1000		VOL	MAX		TIME		DAYS		—	2
D100V		VOL	MAX		TIME		DAYS		—	1											



GRAPH 1 CONTAINS CLIPPED DATA POINTS GRAPH 1: DAYS

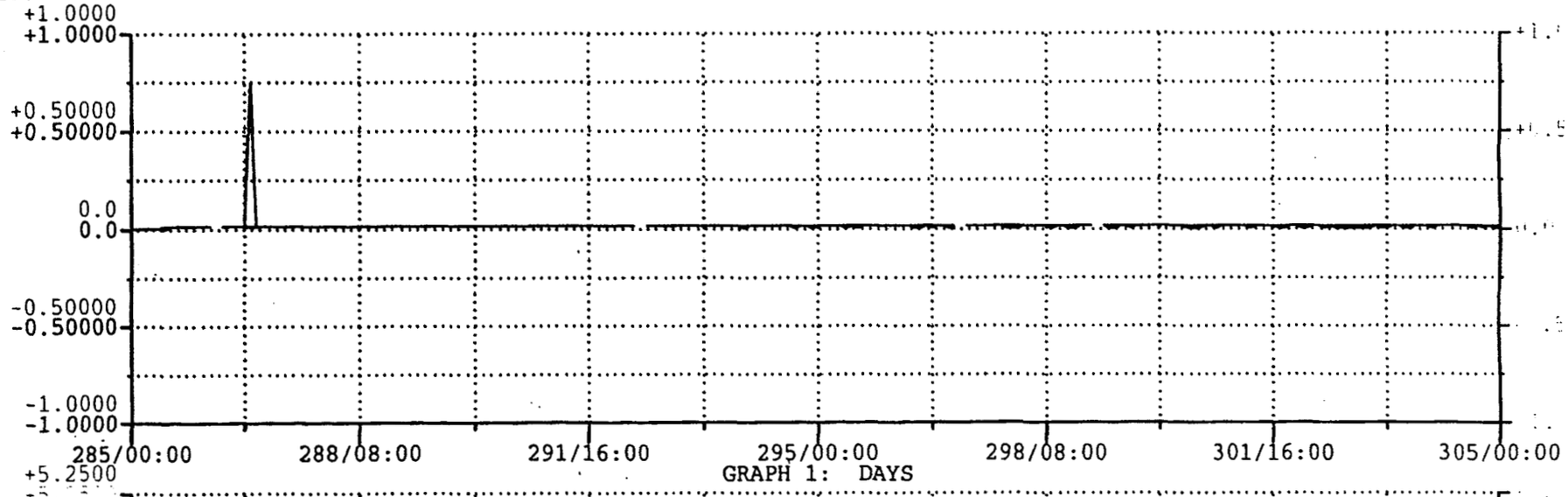


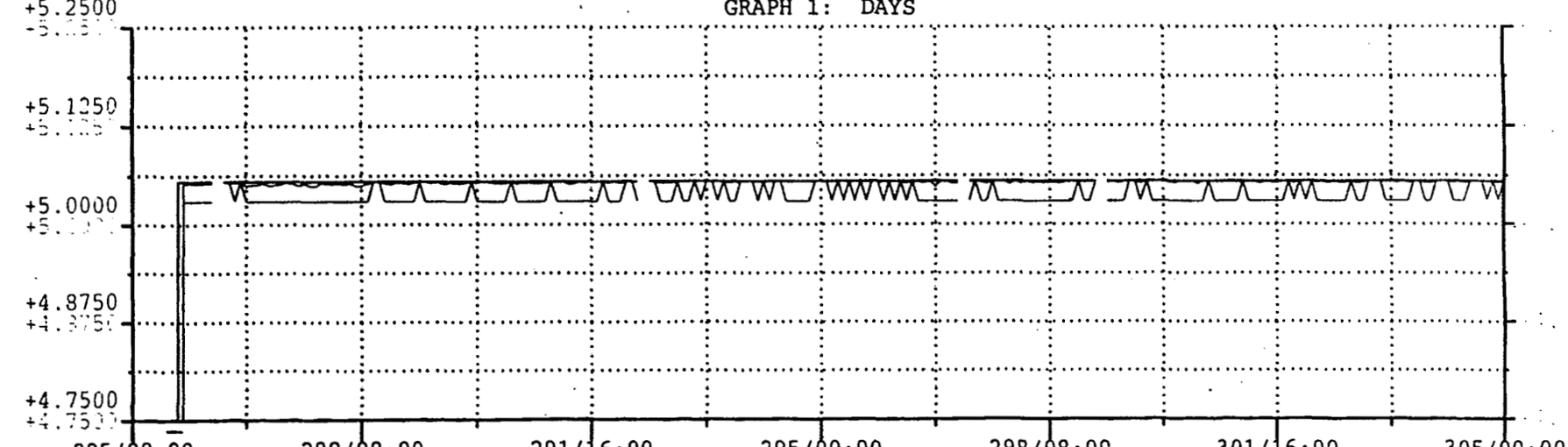
GRAPH 2 CONTAINS CLIPPED DATA POINTS GRAPH 2: DAYS

LE: SEMTRN19
CRIPTION: SEM TED IFC RAMP/+5V REFERENCE VOLTAGES
UP FILENAME: NRT_OPS$TRENDPLOT_SETUP:16SEMTRN19
RT/STOP TIME: 00/285/00:00:00.0 - 00/305/00:00:00.0

PLOT CREATION DATE: [illegible]
PLOT PRINT DATE: 306/20:38:05
SAMPLING PERIOD: 000/00:00:08.00
MIN AVAILABILITY %: 50.00%

ATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
DIFCV		VOL	MIN		TIME		DAYS		—	1	STDIFCRV		VOL	MEAN		TIME		DAYS		—	2
DIFCV		VOL	MEAN		TIME		DAYS		—	1	STDIFCRV		VOL	MAX		TIME		DAYS		—	2
DIFCV		VOL	MAX		TIME		DAYS		—	1											
IFCRV		VOL	MIN		TIME		DAYS		—	1											



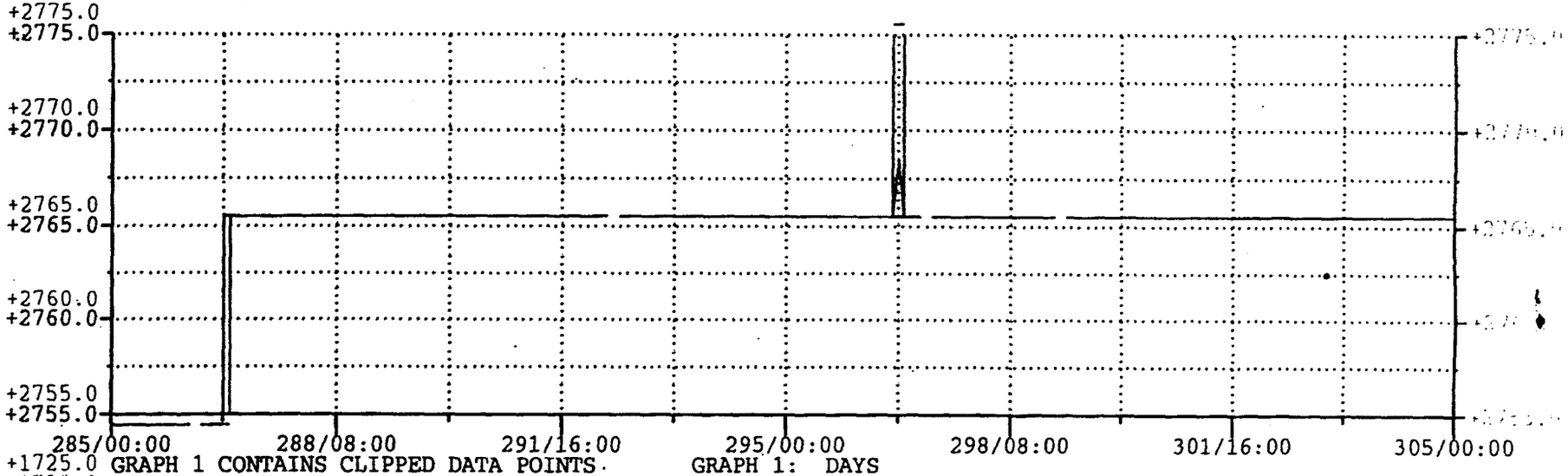


GRAPH 2 CONTAINS CLIPPED DATA POINTS GRAPH 2: DAYS

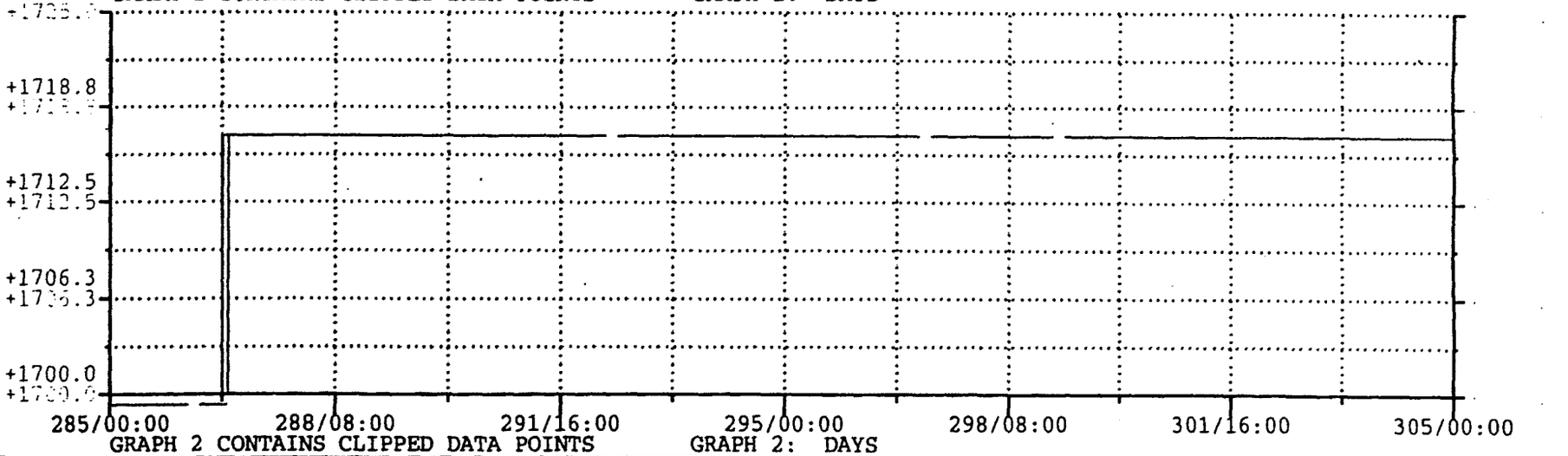
.E: SEMTRN20
:RIPTION: SEM TED E CDEM/P CDEM HIGH VOLTAGE
JP FILENAME: NRT_OPS$TRENDPLOT_SETUP:16SEMTRN20
RT/STOP TIME: 00/285/00:00:00.0 - 00/305/00:00:00.0

PLOT PRINT DATE: 306/20:39:09
SAMPLING PERIOD: 000/00:00:08.00
MIN AVAILABILITY %: 50.00%

ATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
ECDEM		VOL	MIN		TIME		DAYS		—	1	[illegible]		[illegible]	[illegible]		[illegible]		[illegible]	[illegible]	—	
ECDEM		VOL	MEAN		TIME		DAYS		—	1	STDPCDEM		VOL	MAX		TIME		DAYS		—	2
ECDEM		VOL	MAX		TIME		DAYS		—	1											
PCDEM		VOL	MIN		TIME		DAYS		—	[illegible]											



GRAPH 1 CONTAINS CLIPPED DATA POINTS GRAPH 1: DAYS

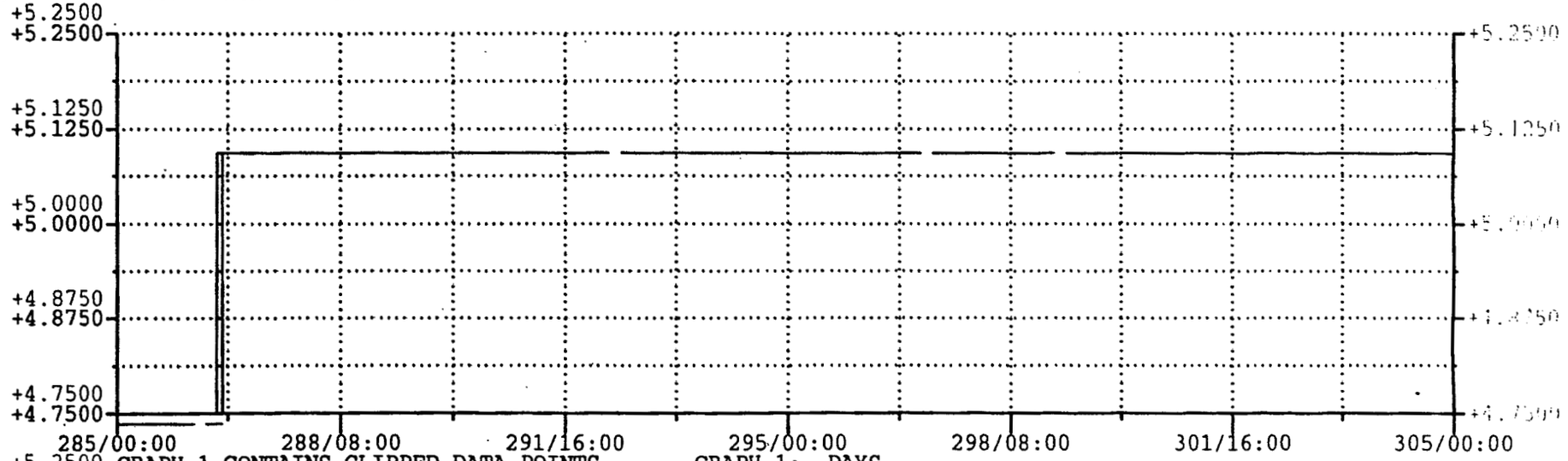


GRAPH 2 CONTAINS CLIPPED DATA POINTS GRAPH 2: DAYS

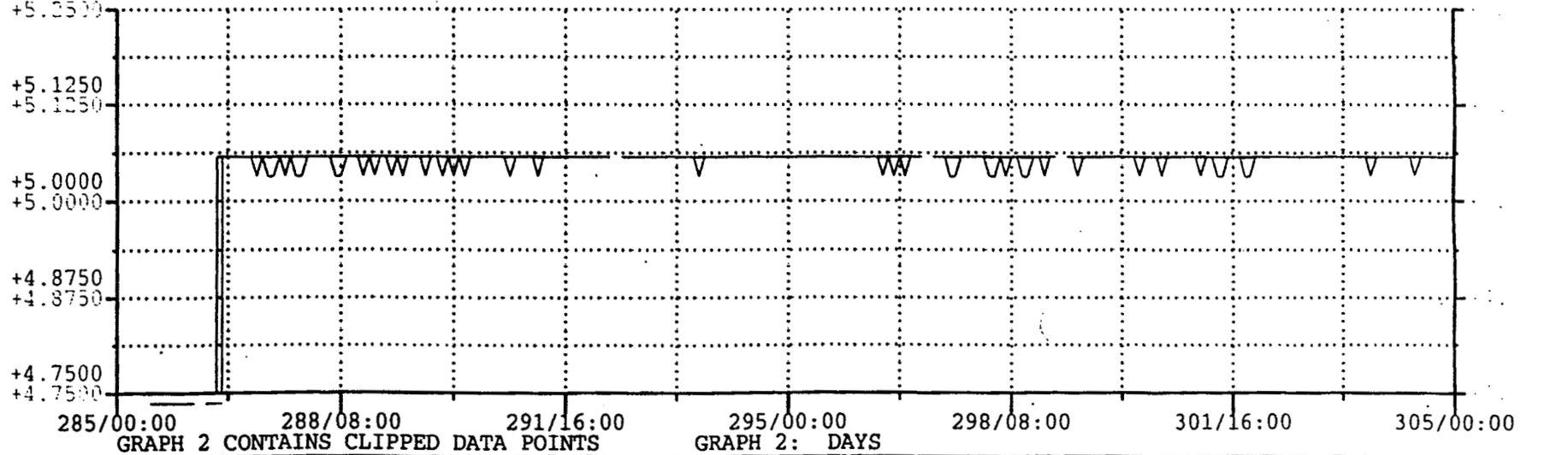
:E: SEMTRN21
:RIPTION: SEM MEPED +5 VOLTS
IP FILENAME: NRT_OPS$TRENDPLOT_SETUP:16SEMTRN21
:T/STOP TIME: 00/285/00:00:00.0 - 00/305/00:00:00.0

PLOT CREATION DATE: 306/20:12:15
PLOT PRINT DATE: 306/20:40:11
SAMPLING PERIOD: 000/00:00:08.00
MIN AVAILABILITY %: 50.00%

ATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
M5V	FA318	VOL	MIN		TIME		DAYS		—	1	[illegible]		[illegible]	[illegible]		[illegible]		[illegible]		—	
M5V	FA318	VOL	MEAN		TIME		DAYS		—	1	SMEP5V		VOL	MAX		TIME		DAYS		—	2
M5V	FA318	VOL	MAX		TIME		DAYS		—	1											
5V		VOL	MIN		TIME		DAYS		—	2											



+5.2500 GRAPH 1 CONTAINS CLIPPED DATA POINTS GRAPH 1: DAYS

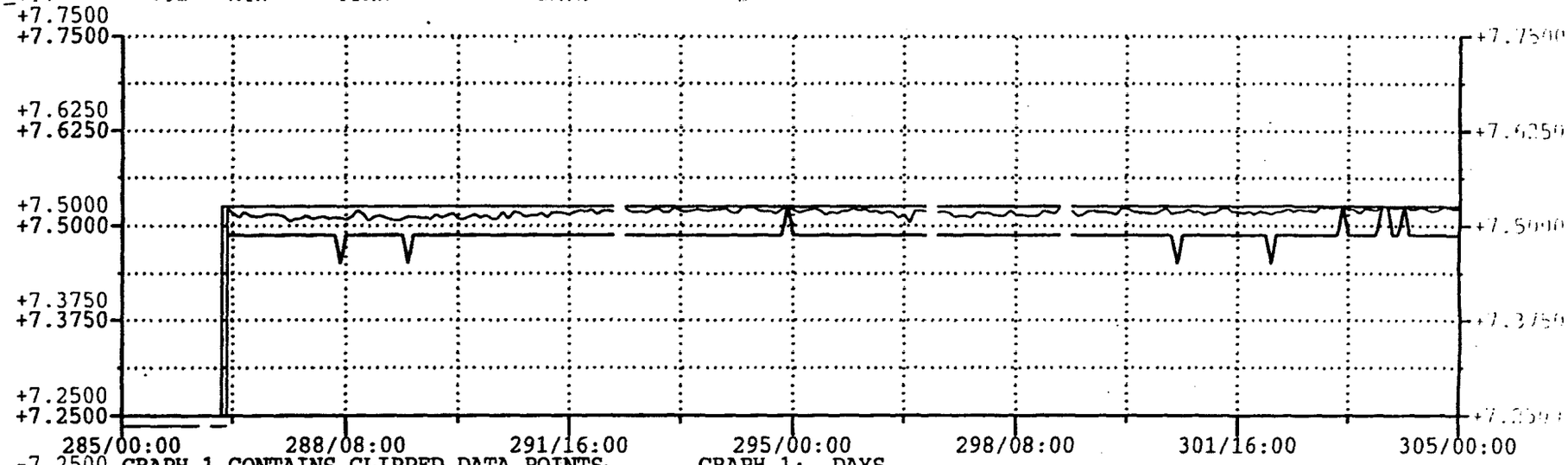


GRAPH 2 CONTAINS CLIPPED DATA POINTS GRAPH 2: DAYS

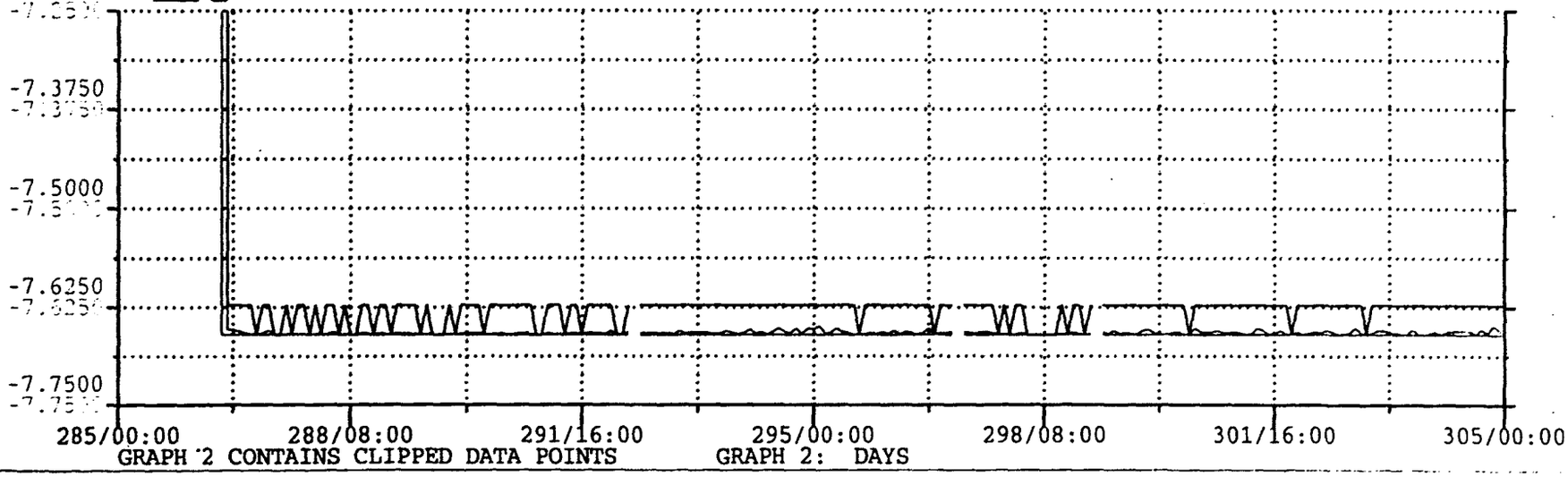
LE: SEMTRN22
CRIPTION: SEM MEPED +/-7.8 VOLTS
UP FILENAME: NRT_OPS$TRENDPLOT_SETUP:16SEMTRN22
RT/STOP TIME: 00/285/00:00:00.0 - 00/305/00:00:00.0

PLOT PRINT DATE: 306/20:41:16
SAMPLING PERIOD: 000/00:00:08.00
MIN AVAILABILITY %: 50.00%

ATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
P78V		VOL	MIN		TIME		DAYS		—	1	[illegible]		[illegible]	[illegible]		[illegible]		[illegible]		—	
P78V		VOL	MEAN		TIME		DAYS		—	1	SMEP_78V		VOL	MAX		TIME		DAYS		—	2
P78V		VOL	MAX		TIME		DAYS		—	1											
P_78V		VOL	MIN		TIME		DAYS		—	2											



GRAPH 1 CONTAINS CLIPPED DATA POINTS GRAPH 1: DAYS



GRAPH 2 CONTAINS CLIPPED DATA POINTS GRAPH 2: DAYS

E: SEMTRN23

RIPTION: SEM MEPED +/-6.2 VOLTS

P FILENAME: NRT_OPS$TRENDPLOT_SETUP:16SEMTRN23

T/STOP TIME: 00/285/00:00:00.0 - 00/305/00:00:00.0

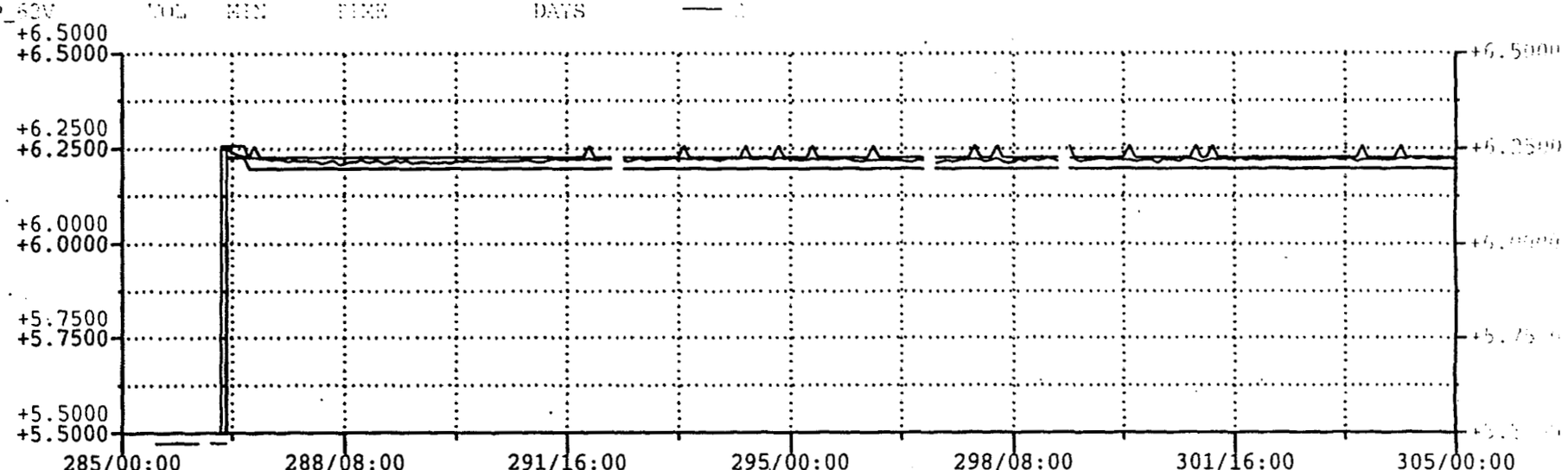
PLOT CREATION DATE: [illegible]

PLOT PRINT DATE: 306/20:42:21

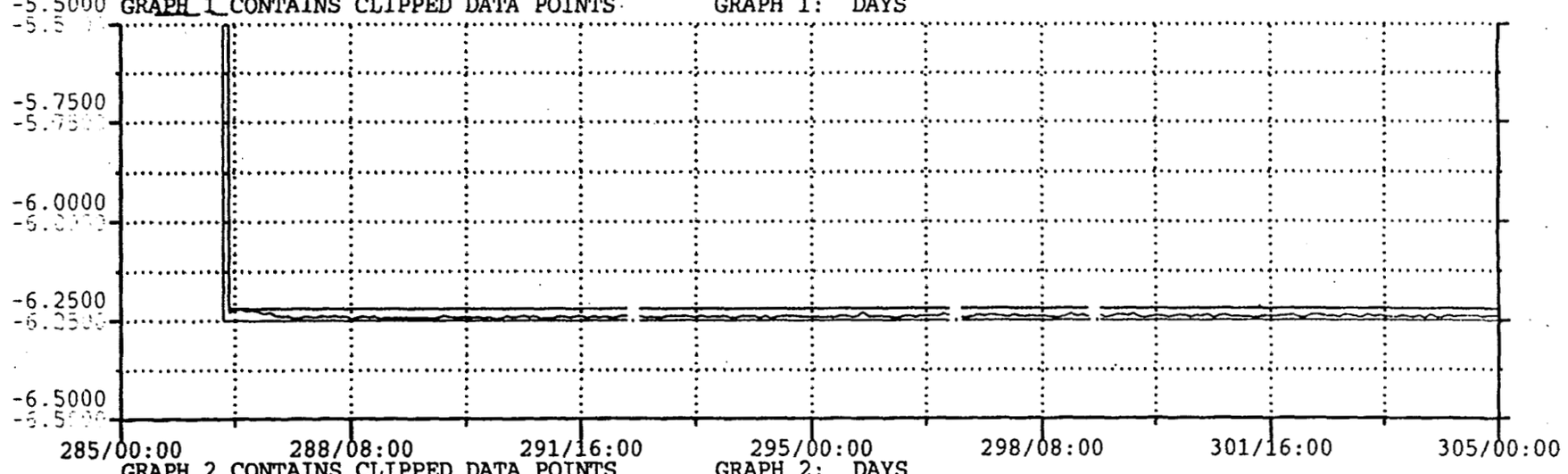
SAMPLING PERIOD: 000/00:00:08.00

MIN AVAILABILITY %: 50.00%

TA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
62V		VOL	MIN		TIME		DAYS		—	1	[illegible]		[illegible]	[illegible]		[illegible]				—	
62V		VOL	MEAN		TIME		DAYS		—	1	SMEP_62V		VOL	MAX		TIME		DAYS		—	2
62V		VOL	MAX		TIME		DAYS		—	1											
_62V		VOL	MIN		TIME		DAYS		—	[illegible]											



GRAPH 1 CONTAINS CLIPPED DATA POINTS GRAPH 1: DAYS



GRAPH 2 CONTAINS CLIPPED DATA POINTS GRAPH 2: DAYS

LE: SEMTRN24

CRIPTION: SEM MEPED P TELESCOPE/E TELESCOPE BIAS VOLTAGE

JP FILENAME: NRT_OPS$TRENDPLOT_SETUP:16SEMTRN24

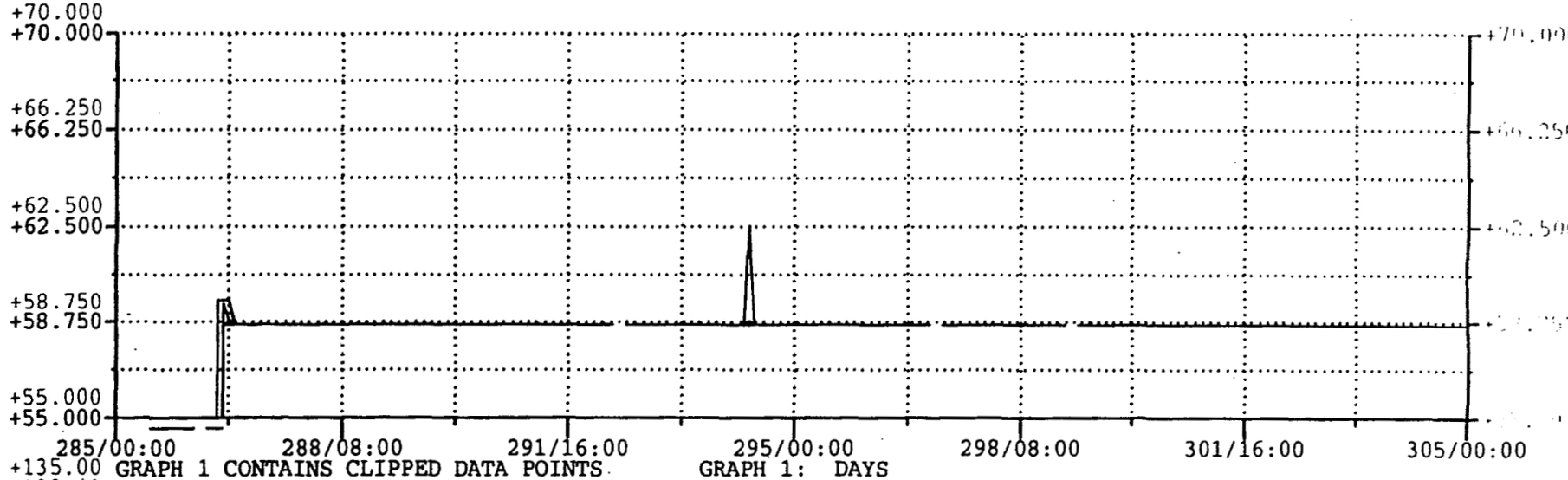
RT/STOP TIME: 00/285/00:00:00.0 - 00/305/00:00:00.0

PLOT PRINT DATE: 306/20:43:26

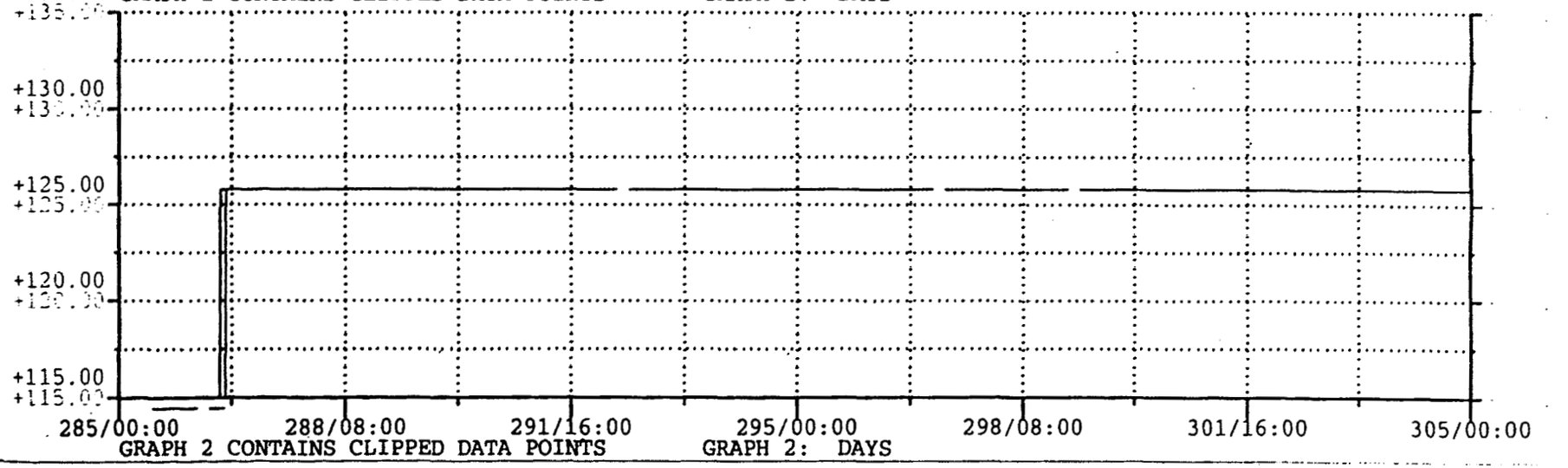
SAMPLING PERIOD: 000/00:00:08.00

MIN AVAILABILITY %: 50.00%

ATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
PTLBV		VOL	MIN		TIME		DAYS		—	1										—	
PTLBV		VOL	MEAN		TIME		DAYS		—	1	SMPETLBV		VOL	MAX		TIME		DAYS		—	2
PTLBV		VOL	MAX		TIME		DAYS		—	1											



GRAPH 1 CONTAINS CLIPPED DATA POINTS GRAPH 1: DAYS

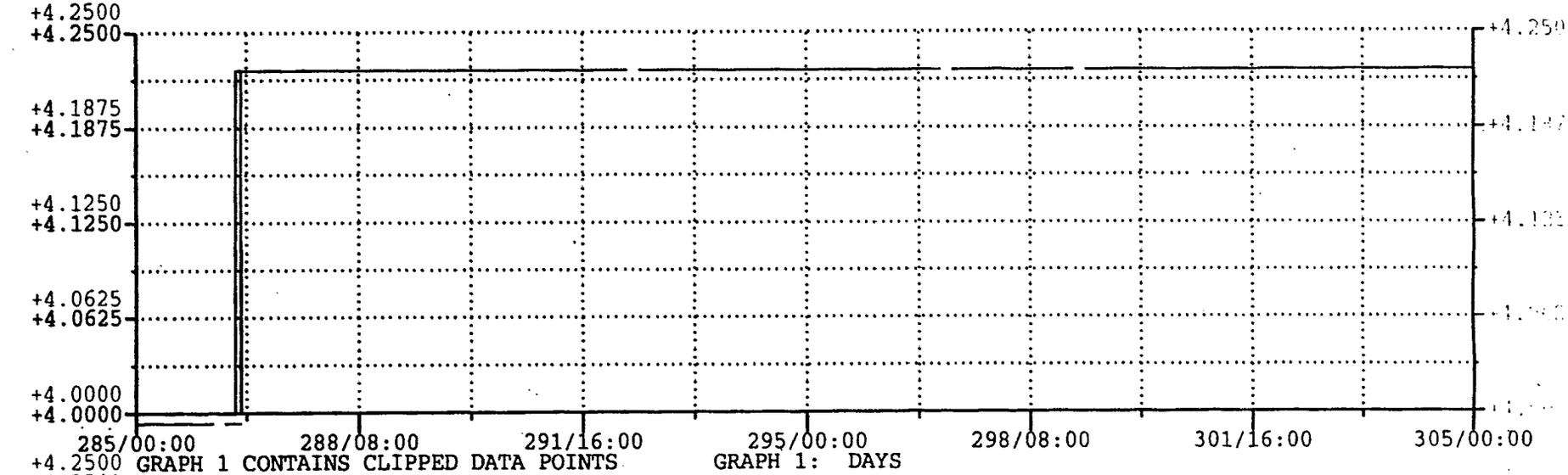


GRAPH 2 CONTAINS CLIPPED DATA POINTS GRAPH 2: DAYS

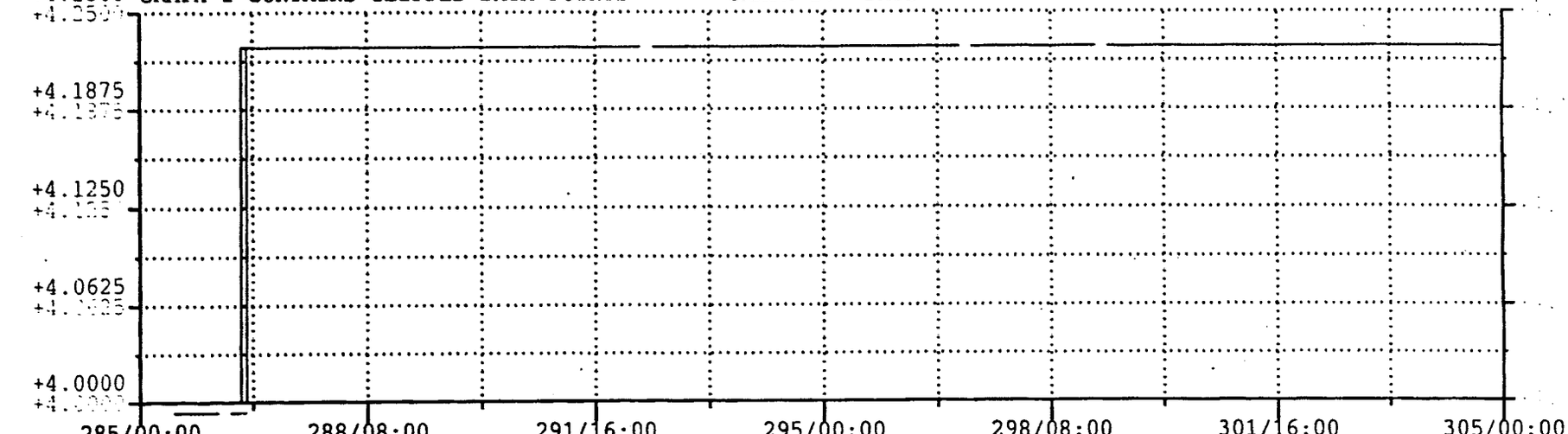
LE: SEMTRN25
CRIPTION: SEM MEPED 0/90 DEGREE REFERENCE VOLTAGE
JP FILENAME: NRT_OPS$TRENDPLOT_SETUP:16SEMTRN25
RT/STOP TIME: 00/285/00:00:00.0 - 00/305/00:00:00.0

PLOT PRINT DATE: 306/20:44:29
SAMPLING PERIOD: 000/00:00:08.00
MIN AVAILABILITY %: 50.00%

ATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
P0RFV		VOL	MIN		TIME		DAYS		—	1	[illegible]		[illegible]	[illegible]		[illegible]		[illegible]	[illegible]	—	
P0RFV		VOL	MEAN		TIME		DAYS		—	1	SMEP90RV		VOL	MAX		TIME		DAYS		—	2
P0RFV		VOL	MAX		TIME		DAYS		—	1											
P90RV		VOL	MIN		TIME		DAYS		—	2											



GRAPH 1 CONTAINS CLIPPED DATA POINTS GRAPH 1: DAYS



GRAPH 2 CONTAINS CLIPPED DATA POINTS GRAPH 2: DAYS

LE: SEMTRN26

CRIPTION: SEM MEPED IFC RAMP/REFERENCE VOLTAGE

JP FILENAME: NRT_OPS$TRENDPLOT_SETUP:16SEMTRN26

RT/STOP TIME: 00/285/00:00:00.0 - 00/305/00:00:00.0

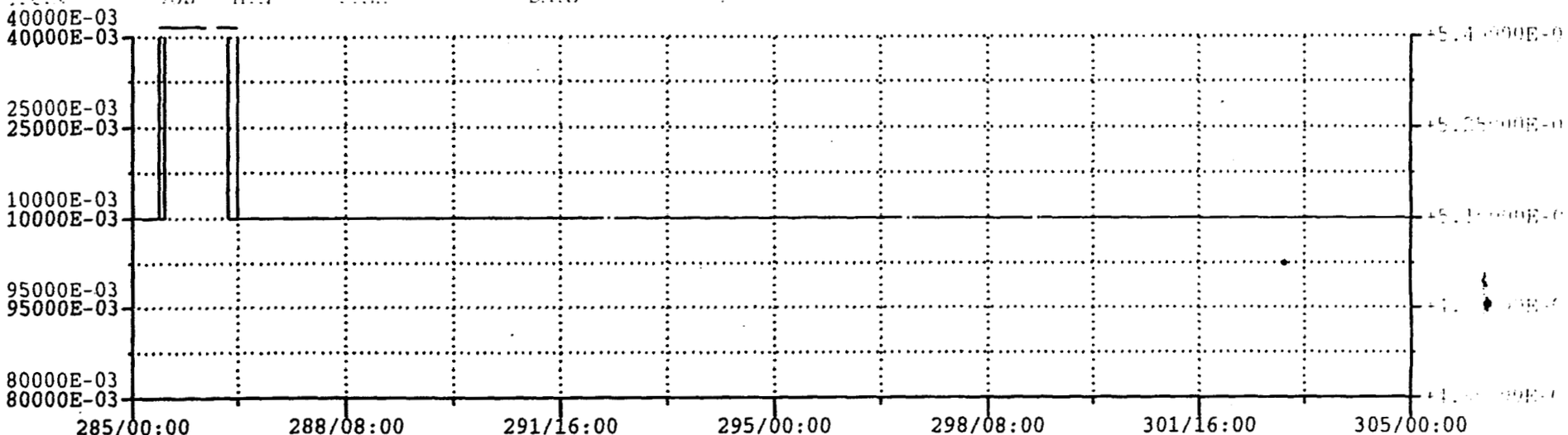
PLOT CREATION DATE: [illegible]

PLOT PRINT DATE: 306/20:45:34

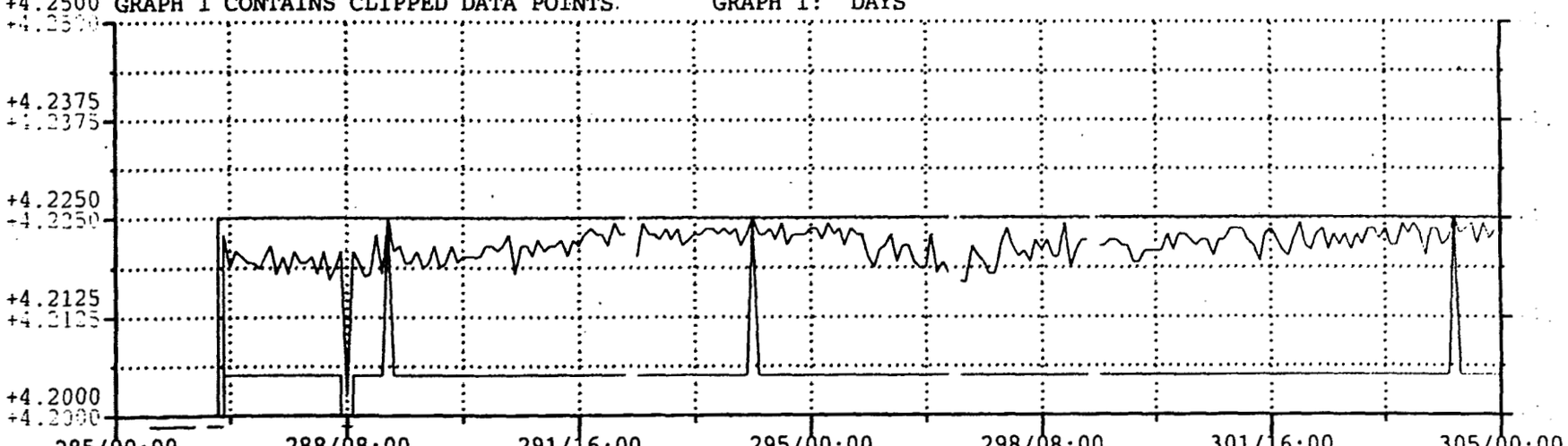
SAMPLING PERIOD: 000/00:00:08.00

MIN AVAILABILITY %: 50.00%

ATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
PIFCV		VOL	MIN		TIME		DAYS		—	1	[illegible]		[illegible]	[illegible]		[illegible]		[illegible]		—	[illegible]
PIFCV		VOL	MEAN		TIME		DAYS		—	1	SMPIFCRV		VOL	MAX		TIME		DAYS		—	2
PIFCV		VOL	MAX		TIME		DAYS		—	1											
[illegible]		VOL	MIN		TIME		DAYS		—	[illegible]											



GRAPH 1 CONTAINS CLIPPED DATA POINTS. GRAPH 1: DAYS



GRAPH 2 CONTAINS CLIPPED DATA POINTS GRAPH 2: DAYS

E: SEMTRN27

CRIPTION: SEM MEPED E TELESCOPE/OMNI TEMPERATURES

JP FILENAME: NRT_OPS$TRENDPLOT_SETUP:16SEMTRN27

RT/STOP TIME: 00/285/00:00:00.0 - 00/305/00:00:00.0

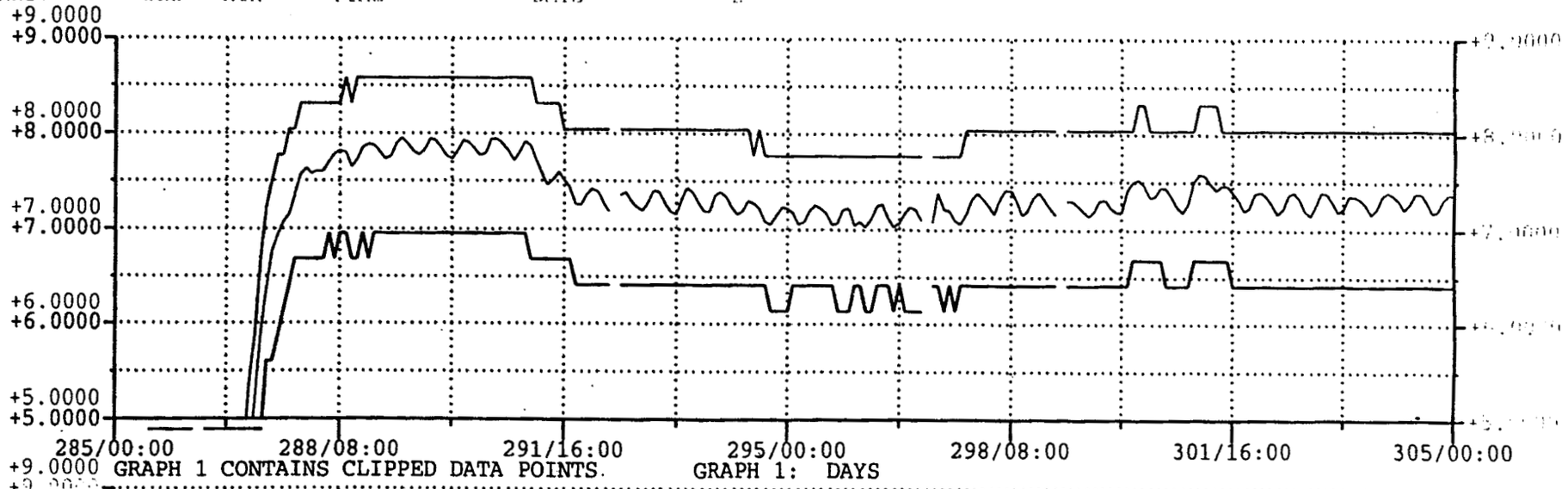
PLOT CREATION DATE: [illegible]

PLOT PRINT DATE: 306/20:46:37

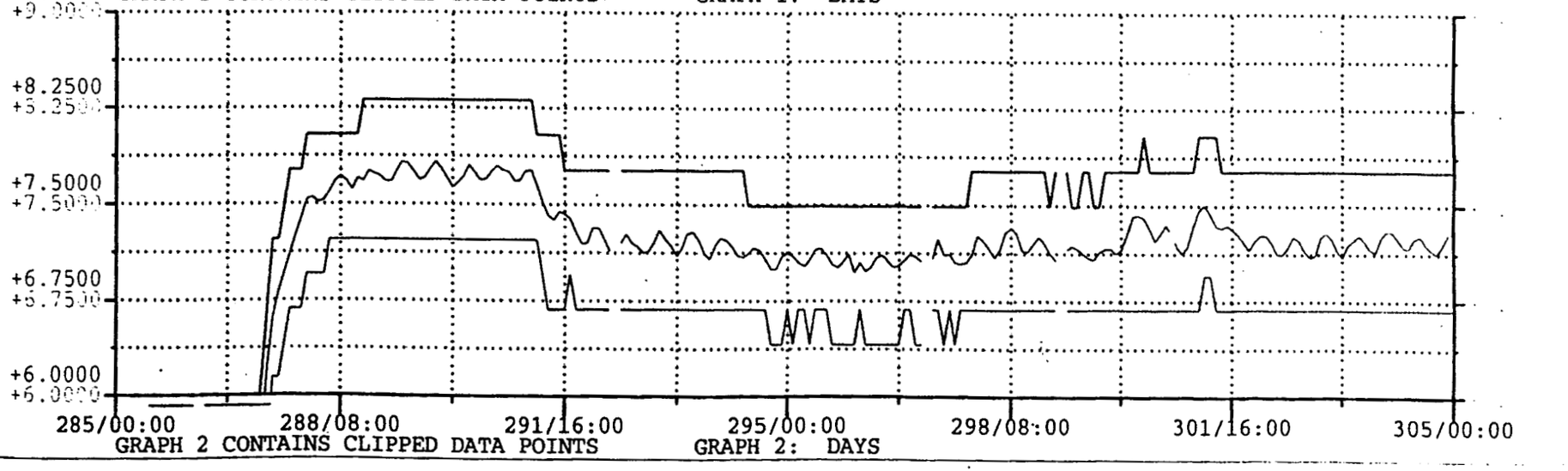
SAMPLING PERIOD: 000/00:00:08.00

MIN AVAILABILITY %: 50.00%

ATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
PETEL		DEG	MIN		TIME		DAYS		—	1	[illegible]		[illegible]	[illegible]		[illegible]		[illegible]	[illegible]	—	
PETEL		DEG	MEAN		TIME		DAYS		—	1	SMPOMNIT		DEG	MAX		TIME		DAYS		—	2
PETEL		DEG	MAX		TIME		DAYS		—	1											
OMNIT		DEG	MIN		TIME		DAYS		—	2											



GRAPH 1 CONTAINS CLIPPED DATA POINTS. GRAPH 1: DAYS

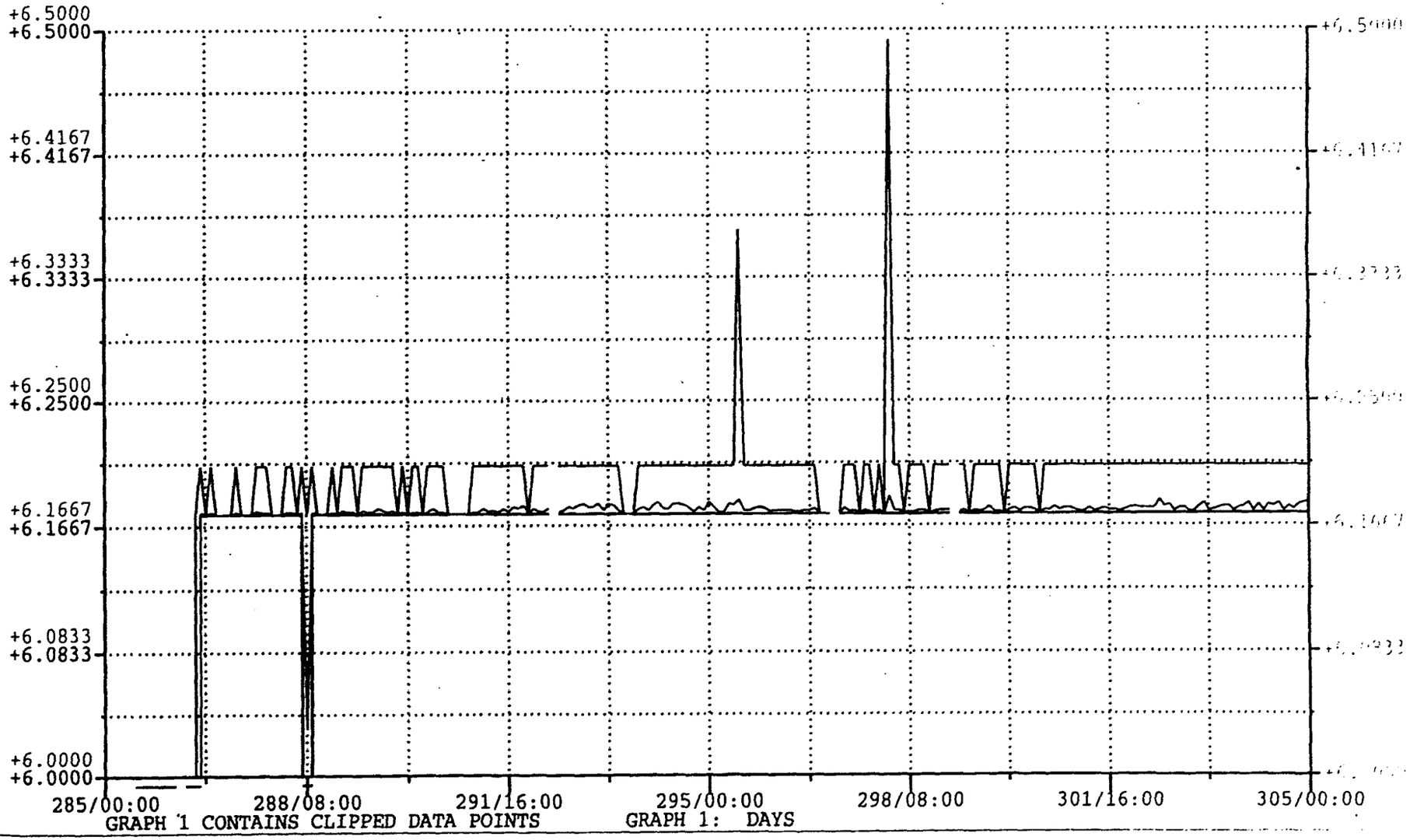


GRAPH 2 CONTAINS CLIPPED DATA POINTS GRAPH 2: DAYS

: NAME: NRT_OPS$TRENDPLOT_PLOT:2000285_0000_SC16_16SEMTRN28
.E: SEMTRN28
:RIPTION: SEM MEPED +6.5 VOLTS
JP FILENAME: NRT_OPS$TRENDPLOT_SETUP:16SEMTRN28
RT/STOP TIME: 00/285/00:00:00.0 - 00/305/00:00:00.0

PLOT CREATION DATE: 306/20:14:51
PLOT PRINT DATE: 306/20:47:42
SAMPLING PERIOD: 000/00:00:08.00
MIN AVAILABILITY %: 50.00%

ATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
P65V		VOL	MIN		TIME		DAYS		—	1											
P65V		VOL	MEAN		TIME		DAYS		—	1											
P65V		VOL	MAX		TIME		DAYS		—	1											

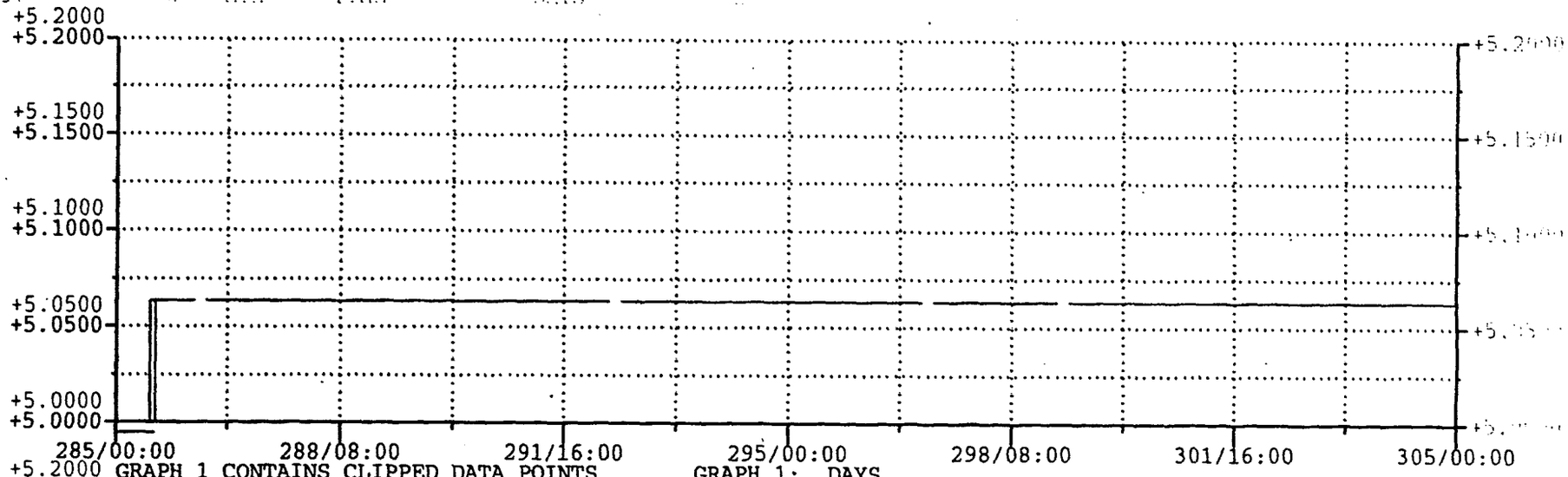


GRAPH 1 CONTAINS CLIPPED DATA POINTS GRAPH 1: DAYS

: NAME: NRT_OPS$TRENDPLOT_PLOT:2000285_0000_SC16_16SEMTRN29
.E: SEMTRN29
:RIPTION: SEM DPU +5 VOLTS
JP FILENAME: NRT_OPS$TRENDPLOT_SETUP:16SEMTRN29
RT/STOP TIME: 00/285/00:00:00.0 - 00/305/00:00:00.0

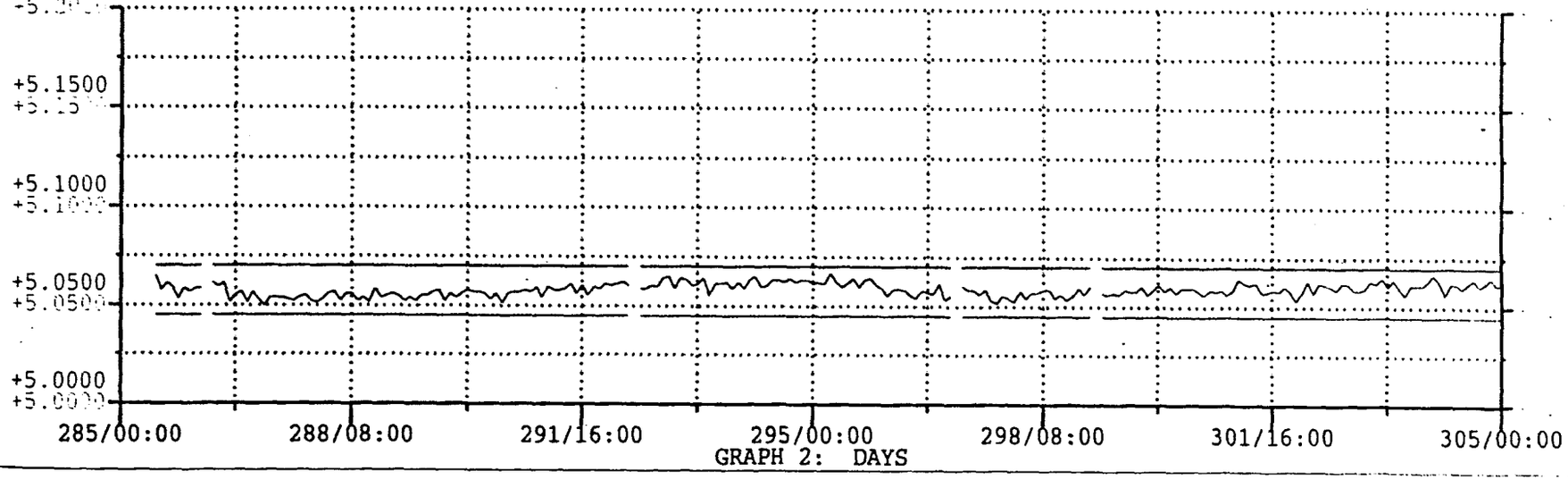
PLOT CREATION DATE: 306/20:15:13
PLOT PRINT DATE: 306/20:48:44
SAMPLING PERIOD: 000/00:00:08.00
MIN AVAILABILITY %: 50.00%

ATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
MDPU5	FA326	VOL	MIN		TIME		DAYS		—	1	[illegible]		[illegible]	[illegible]		[illegible]		[illegible]		—	
MDPU5	FA326	VOL	MEAN		TIME		DAYS		—	1	SDPU5V		VOL	MAX		TIME		DAYS		—	2
MDPU5	FA326	VOL	MAX		TIME		DAYS		—	1											
[illegible]		[illegible]	[illegible]		[illegible]		[illegible]		—	[illegible]											



GRAPH 1 CONTAINS CLIPPED DATA POINTS

GRAPH 1: DAYS

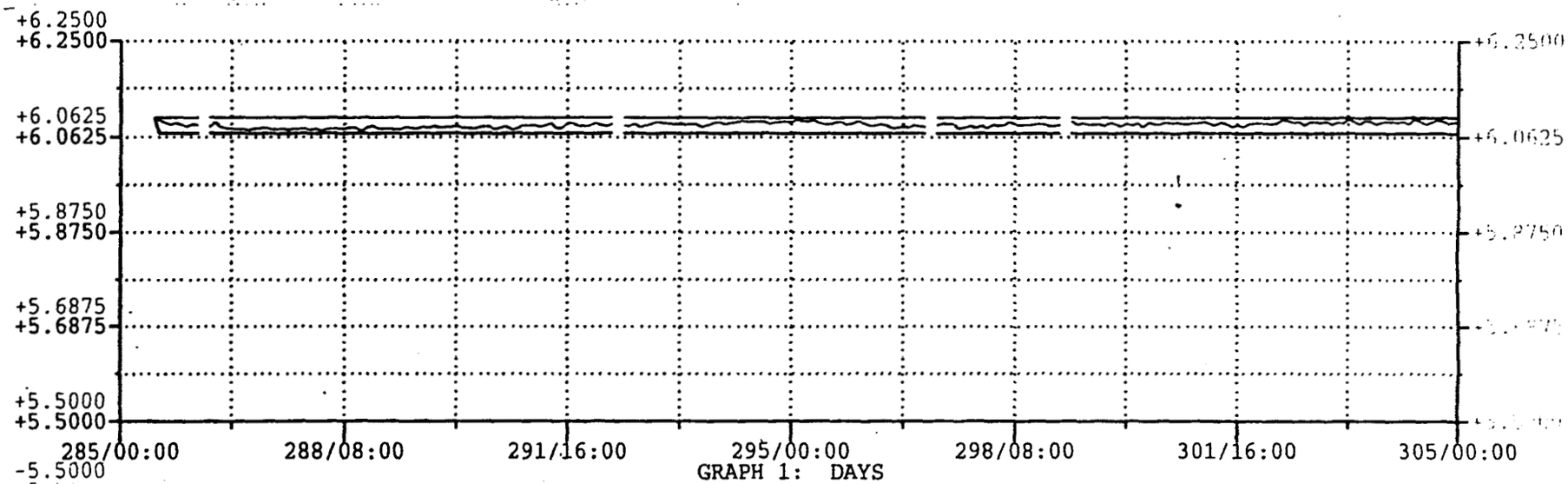


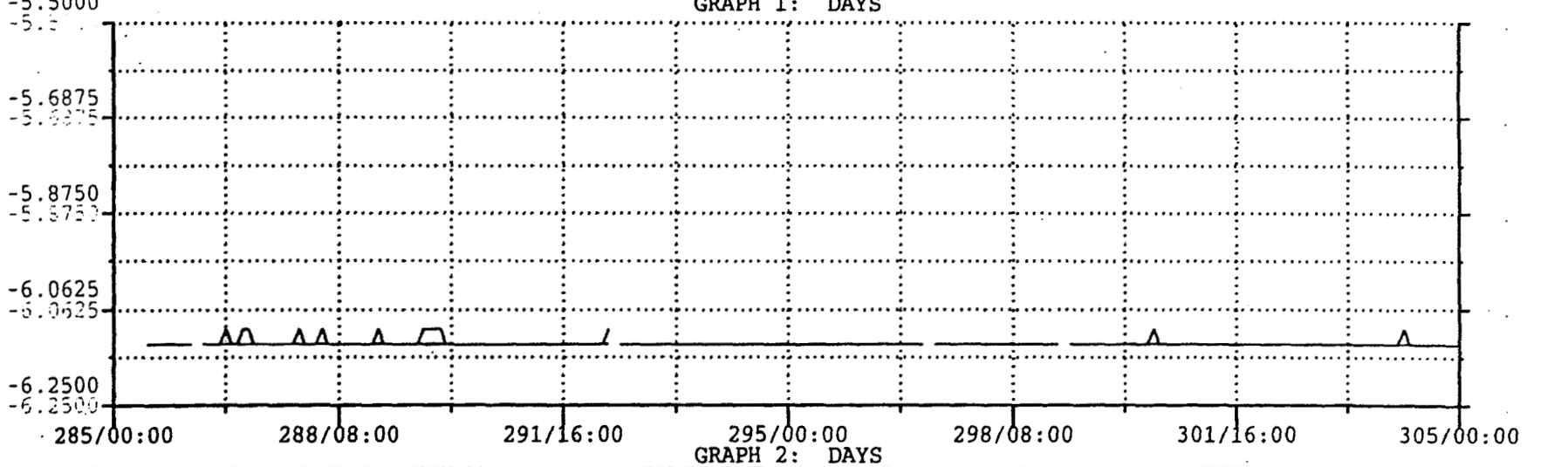
GRAPH 2: DAYS

T NAME: NRT_OPS$TRENDPLOT_PLOT:2000285_0000_SE10_10SEMTRN30
LE: SEMTRN30
CRIPTION: SEM DPU +/-6 VOLTS
UP FILENAME: NRT_OPS$TRENDPLOT_SETUP:16SEMTRN30
RT/STOP TIME: 00/285/00:00:00.0 - 00/305/00:00:00.0

PLOT CREATION DATE: 306/20:15:32
PLOT PRINT DATE: 306/20:49:48
SAMPLING PERIOD: 000/00:00:08.00
MIN AVAILABILITY %: 50.00%

ATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
U6V		VOL	MIN		TIME		DAYS		—	1										—	
U6V		VOL	MEAN		TIME		DAYS		—	1	SDPU_6V		VOL	MAX		TIME		DAYS		—	2
U6V		VOL	MAX		TIME		DAYS		—	1											
[illegible]		[illegible]	[illegible]		[illegible]		[illegible]		—	[illegible]											

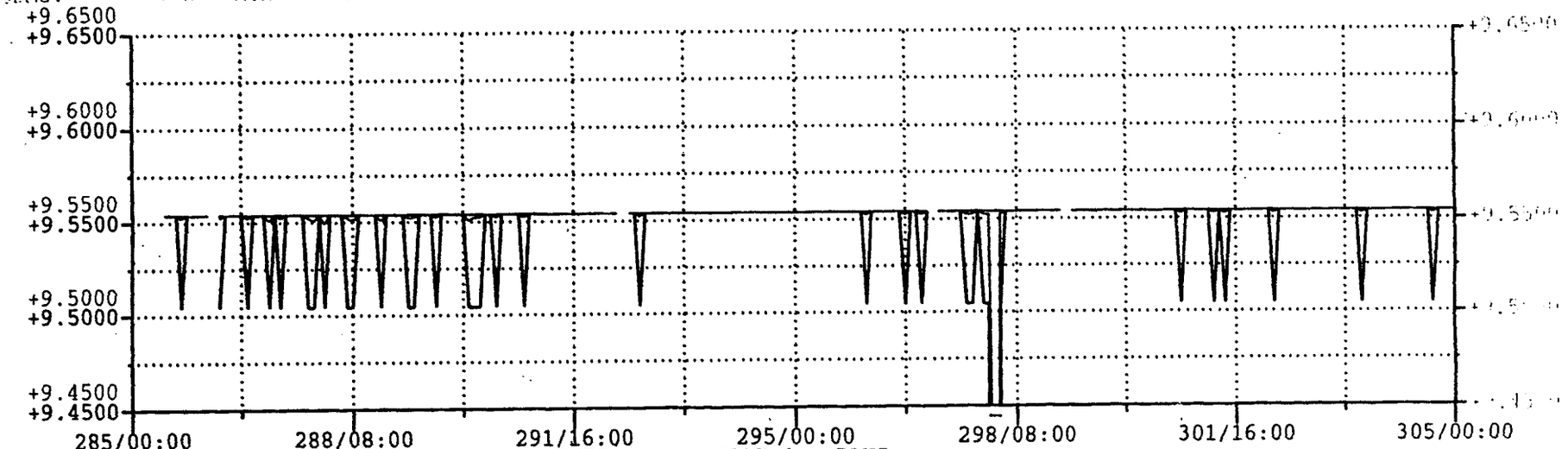




' NAME: NRT_OPS$TRENDPLOT_PLOT:2000285_0000_SC16_16SEMTRN31
:E: SEMTRN31
:RIPTION: SEM DPU +10V/D-A CONVERTER VOLTAGES
/P FILENAME: NRT_OPS$TRENDPLOT_SETUP:16SEMTRN31
RT/STOP TIME: 00/285/00:00:00.0 - 00/305/00:00:00.0

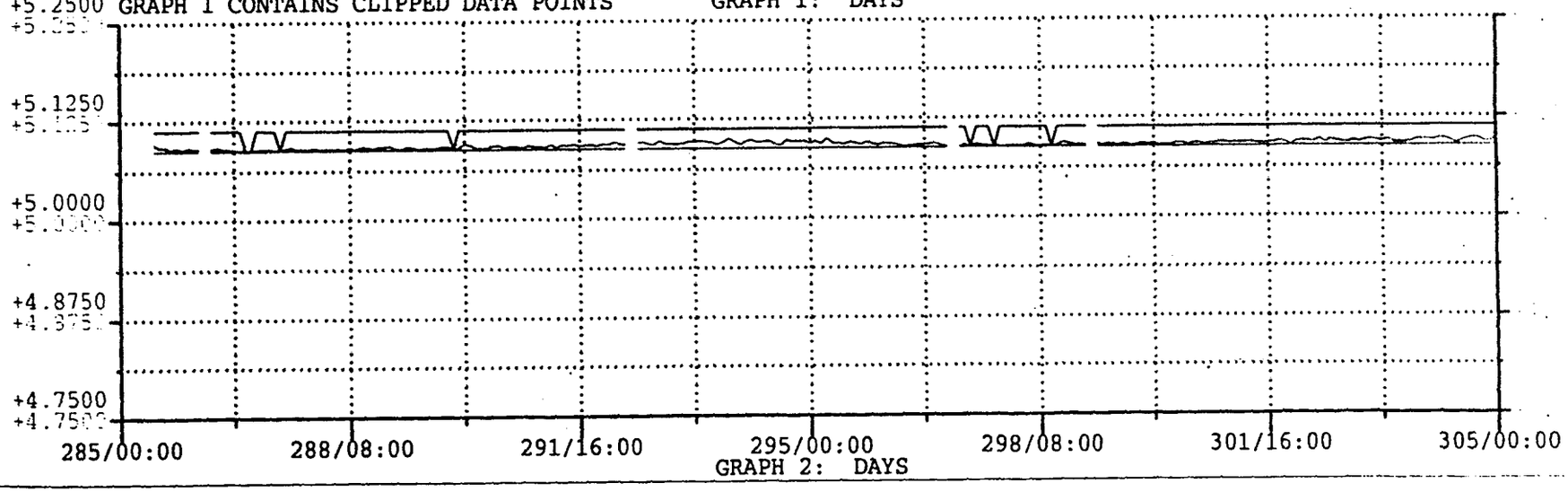
PLOT CREATION DATE: 306/20:15:57
PLOT PRINT DATE: 306/20:50:52
SAMPLING PERIOD: 000/00:00:08.00
MIN AVAILABILITY %: 50.00%

ATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH	Y-DATA	CHAN	UNITS	TYPE	VS	X_DATA	CHAN	UNITS	TYPE	SYM	GPH
J10V		VOL	MIN		TIME		DAYS		—	1	[illegible]		[illegible]	[illegible]		[illegible]		[illegible]		—	
J10V		VOL	MEAN		TIME		DAYS		—	1	SDPUDACV		VOL	MAX		TIME		DAYS		—	2
J10V		VOL	MAX		TIME		DAYS		—	1											
JDACV		VOL	MIN		TIME		DAYS		—	2											



+5.2500 GRAPH 1 CONTAINS CLIPPED DATA POINTS

GRAPH 1: DAYS



GRAPH 2: DAYS

SUMMARY

- NOAA-16 has been evaluated and characterized
- NOAA-16 OV written report will be complete February 2001
- NOAA-16 OV was a huge team effort
- Thank you to ALL