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HEXAGON PROGRAM

PRELIMINARY POST FLIGHT REPORT

FOR FLIGHT NO. 7

5 MARCH 1974

This document is prepared to support the Program HEXAGON analysis and reporting requirement established by the System Program Director.

This report represents the coordinated inputs from Program HEXAGON Technical Advisor Staff at Sunnyvale, California. The Technical Advisor Staff is composed of the Aerospace Program HEXAGON Sunnyvale Field Office and the Satellite Contractors who provided technical support during the mission. The data contained in this report were collected and analyzed during mission operations and were assembled in sections keyed to injection, each RV recovery and Solo as major mission segments.

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SECURITY

This HEXAGON Program Preliminary Post Flight Report for Flight No. 7 has been prepared covertly in accordance with the requirements set forth in the BYEMAN Industrial Facility Security Manual, which establishes procedures and assigns responsibilities for the preparation of security plans for all program operation. Personnel should refer all security problems not covered therein to one of the following:

The SAFSP Deputy Director has overall responsibility for Program security.

The 6595th ATW is responsible for all security procedures applicable to prelaunch and launch operations at VAFB.

Det No. 1, Hq, AFSCF is responsible for all security procedures applicable to the SCF and retrieval operations.

It is emphasized that security requirements take precedence overall other Program requirements.

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FOREWARD

This document presents preliminary evaluation results of vehicle and ground system performances during the seventh Program HEXAGON flight. The evaluation is based upon data gathered during operations at the Satellite Test Center (STC), Sunnyvale, California.

The report was prepared in sections, keyed to major segments, during mission operations and were assembled at the end of the operation.

Preliminary evaluation began as data were gathered at the STC during operations. The Aerospace Corporation and the Associate Contractors maintained close coordination during this period and the Contractors submitted formal inputs to The Aerospace Corporation ten calendar days after injection, after each RV recovery event and after completion of the SOLO phase and deboost. The Aerospace Corporation compiled the inputs for each section as they were received and published the report. Throughout the preparation of this report, editorial considerations were minimized in order to provide timely publication of technically useful information.

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FLIGHT SUMMARY

SV-7 was launched on the first countdown attempt on 10 November 1973. Liftoff occurred at 12:10 PST at the opening of the launch window. Ascent was nominal and the SV was injected into a near nominal orbit. The solar arrays were deployed and positioned on Rev 1 as planned. All Day One configuration and health testing was completed as scheduled. Panoramic camera mission operations started on Rev 5 and Stellar Terrain operations on Rev 14. Subsatellite No. 2 (+Y) was released on Rev 2.9 and subsatellite No. 1 (-Y) was released on Rev 13.5.

Normal panoramic camera photography continued throught the RV-1 segment without incident. Normal Stellar Terrain operations were achieved with only minor instrumentation problems. RV-1 was successfully air recovered on Rev 229, operations day 15. Quality of the acquired photography was rated as good.

Normal panoramic and stellar operations continued through the RV-2 segment with only minor ST instrumentation problems. A slight decrease in the thrust level of RCS-1 thruster No. 1 was detected, which did not degrade performance. OOAA and exposure changes were made based on segment one results and perigee was raised by two miles to avoid a resonance. RV-2 was aerially recovered on Rev 602, operations day 38. Overall photographic quality was rated as fair because of an increase in haze level and lower solar elevations.

The stellar terrain mission was successfuly completed with the aerial recovery of RV-5 on Rev 942, operations day 58. Successful tests of a special terrain film and the ST calibrate were completed. Quality of acquired photography ranged from good to excellent.

Panoramic camera photography continued without incident through the RV-3 segment, although a film tear was discovered during processing. Thrust level decay on REA No. 1 continued and decay was detected on REA No. 4, however, performance remained nominal. RV-3 was aerially recovered on

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Rev 1039, operations day 65. Overall photographic quality was rated as fair as a result of poor weather, snow cover and low solar elevations.

Mission photography continued through the RV-4 segment with the only incident being the improper commanding on Rev 1242 causing an early shutdown on the aft camera and requiring a VBE to remove subsequent operations. Operations were resumed after verifying panoramic camera health and modification of the software to prevent assembling operations that are too short. A payload message was missed on Rev 1436 KODI from the inability to command. The horizon sensors inhibited on Rev 1442 during gyrocompass to fly reverse maneuvers and a negative OA executed while the SV was unstable. ACS 2/RCS 2 transfer was successfully made and a second negative OA was performed to return the orbit trace to nominal. [redacted] solar photograph experiment were successfully accomplished. All on-board film was exposed and stored in RV-4. RV-4 was reentered and aerially recovered on Rev 1656, operations day 102. Quality of the acquired photography was rated as fair but better than RV-3. The improvement resulted from better weather and higher solar elevation. The achieved quality also demonstrated that extended life on orbit did not degrade system performance.

SV-7 Solo experiments will be reported at a later date in an annex to this report.

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PROGRAM HISTORY

MISSION	CONFIGURATION	DURATION	RECOVERIES	COMMENTS
1201 Launched 15 June 1971 Deboost 6 August 1971	FIRST HEXAGON MISSION Normal ACS/RCS config. Restricted rewind-Pan. Cam. Beta Angle -20° to $+10^{\circ}$ RV unbalance $<60\%$	Primary 31 days Solo 21 days	RV-1 5 Days 6/20/71 Water-Parachute damage RV-2 6 days 6/26/71 RV-3 14 days 7/10/71 Lost-Parachute failure RV-4 6 days 7/16/71 Restricted to 45% capacity	1. Thermal contamination High temperatures reduced batt. capacity-limited payload operations. 2. Main parachute damage RV's 1, 2, 3. 3. Camera ESD's - resumed operation each time 4. Degraded RCS thruster pulse shapes-Control OK
1202 Launched 20 January 1972 Deboost 28 February 1972	Beta angle $+18^{\circ}$ to $+30^{\circ}$ Subsatellite Rev 13 Parachutes modified Rewind limited to 35 ips	Primary 40 days Solo 0 days	RV-1 6 days 1/26/72 RV-2 13 days 2/8/72 RV-3 9 days 2/17/72 RV-4 11 days 2/28/72	1. Film path break Camera B RV 3 & 4 Monoscopic operation. 2. RCS thruster degradation SV tumbled 2 times. 3. Deboost used Lifeboat. 4. Thermal contamination verified.
1203 Launched 7 July 1972 Deboost 13 Sept. 1972	Laboratory quality hydrazine. Higher perigee, min maneuvers and OA's Redundant RCS tanks empty-filled from OAS when needed Beta angle $+34^{\circ}$ to $+26^{\circ}$ Subsatellite-Rev 13.	Primary 58 days Solo 11 days	RV-1 8 days 7/15/72 RV-2 14 days 7/29/72 RV-3 14 days 8/12/72 RV-4 21 days 9/2/72	1. Film edge folds - both cameras. 2. Film path disturbances at high rewinds. 3. High RCS thruster leaks, primary and redundant.

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PROGRAM HISTORY

MISSION	CONFIGURATION	DURATION	RECOVERIES	COMMENTS
1204 Launched 10 October 1972 Deboost 8 January 1973	10,000 color-Camera A RCS tanks 3 & 4 capped Beta angle +32° to +24° Minimum SV maneuvers Subsatellite - Rev 2 RACS control RCS 1 at L.O.	Primary 68 days Solo 22 days	RV-1 11 days 10/21/72 RV-2 16 days 11/5/72 RV-3 18 days 11/23/72 RV-4 24 days 12/17/72	1. Improper OB stow degraded early photography. 2. Yaw bias RACS Day 35 3. Yaw bias PACS Day 68 4. Pyro battery leaks RV-2 and RV-4
1205 Launched 9 March 1973 VASP Deboost 18 May 1973	First mapping mission 2000' color-Camera A RCS operated from OAS No subsatellites Beta angle +2° to -8°	Primary 61 days Mapping 43 days Solo 9 days	RV-1 12 days 3/22/73 RV-2 14 days 4/5/73 RV-3 14 days 4/19/73 RV-4 22 days 5/9/73 RV-5 43 days 4/21/73	1. Primary ACS pitch error 2. Redundant ACS yaw bias (degraded photography) 3. ST terrain thermal door (restricted ST operation) (No ST calibration) 4. SGLS 2 (Cubic) failure 5. ST quality excellent
1206 Launched 13 July 1973 VASP Deboost 12 October 1973	21,000' color-Camera B in 5 segments RCS 1 & 2 operate from OAS Propellant in RCS Tank 2 only. (Emergency use) Beta angle +2° to -8° 50 hour batteries in RV's Modified ST terrain therm. door	Primary 74 days Mapping 42 days Solo 17 days	RV-1 19 days 8/1/73 RV-2 12 days 8/13/73 RV-3 26 days 9/8/73 RV-4 17 days 9/25/73 RV-5 42 days 8/24/73	1. Primary ACS yaw bias on day 3-Transferred to RACS 2. Thrust level decay REA #4 & 8 - No effect. 3. ST calibration successful 4. VASP Deboost/impact successful.

Total S.I. 21 11 29 17 21 101

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SECTION 1

1.0 READINESS, LAUNCH AND ASCENT

1.1 Readiness Activity

SV-7 was shipped to VAFB on the 25th of October for a scheduled launch on 7 November 1973. Replacement of suspect portions of the Titan IIID booster flight control system required delaying the launch until 10 November.

1.2 SV-7 Operational Configuration

1.2.1 SV-7 Changes

1.2.1.1 Satellite Vehicle

Description	Comment
Primary and redundant REM Valves are soft seat	Block change for improved leakage resistance.
RCS tanks 3 and 4 are removed RCS isolation valves have over-pressure relief	Primary RCS will be operated from Tanks 1 and 2. RCS propellant will be transferred from OAS as required. RCS 2 (if used) will be operated directly from the OAS tank.
REM filters are 10 Micron	Replaced 25 Micron filter for reduced contamination.
PACS IRA has ceramic bearings RACS IRA has Ferrotic bearings	Hardware availability.
Separate IRA power commanding	To permit turning ACS electronics off while leaving gyros on.
Both PACS and RACS torquer power supplies are isolated from vehicle ground	Prevents Attitude Bias errors caused by internal shorts.
Both SGLS Transponders are CUBIC units	Block II configuration.
Subsatellite No. 2 (+Y) Subsatellite No. 1 (-Y)	To be released on Rev 2.9. To be released on Rev 13.5.

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Solar Array Positional Drive commanding circuitry modified	Primary and redundant control isolated to remove a potential failure condition.

1.2.1.2 Panoramic Camera Subsystem

Description	Comment
Interchangeable Filter	Capability to change filter type by command.

1.2.1.3 Main Reentry Vehicles

No change

1.2.1.4 Mapping Camera Subsystem

No change

1.2.1.5 Operational

	Description	Comment
a.	The on-orbit Beta range is constrained to remain within plus 2° and minus 8° during the mission.	
b.	A nominal 3 day orbit adjust cycle with dual adjusts as necessary to control Argument of Perigee between 120° and 150°.	
c.	The primary mission length is planned for 90 days followed by a 30 day SOLO period. Prior to RV-3 recovery the decision will be made to plan the remainder of the flight.	To support a primary mission of up to 120 days and also conduct readiness activity for SV-8.
d.	Orbit Parameters (Nominal)	
	(1) Inclination	96.899 degrees
	(2) Period	88:53.065 min/sec
	(3) Perigee Altitude	88.077 n. miles
	(4) Argument of Perigee	149.824 degrees

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e. Panoramic Camera restrictions

(1) No 30 degree scans at ±45 degree scan centers.

(2) Rewind fixed at 5 ips.

f. General

(1) Doppler beacon ON/OFF commanding to be managed by 'TDERBY.

(2) RV-5 not to be released until after RV-1 recovery.

(3) PACS and RACS gyros are both on at liftoff and will remain ON unless a failure or thermal considerations require a turnoff.

1.2.1.6 'TUNITY

SV-7 also used Mod 2 with only minor changes:

(1) An improved model for MPR inter op footage.

(2) Increased table size for command descriptor.

1.2.2 Documentation and Software

1.2.2.1 Documentation:

1) Test Operations Order (TOO) 72-12, with RCN #4 Basic, OCN 3
2) Test Operating Instructions (TOIs), dated 19 Oct 73
3) Flight Profile Addendum (FPA), dated 29 Jul 73
4) Field Test Force Profile FLT OIA, dated 2 Nov 73
5) Computer Utilization Schedule (CUS) FLT 7-1A
6) Test Group Operations Order #6 31 Oct 73
7) Test Group Operations Plan 2-73, 15 Feb 73
8) Orbital Requirements Document (ORD), dated 31 Aug 72
9) Orbital Support Plan (OSP), dated 15 Dec 69
10) DOX Requirements Letter, dated 9 Oct 73
11) System Test Objectives (STO), dated Oct 73, Rev B
12) Orbital Operations Policies (OOPS), dated 3 Oct 73
13) Contingency Plan, dated 15 Oct 73
14) Sequence Definition Specification (SDS), dated 6 Nov 73
15) Command Definition Specification (CDS), dated 24 Oct 73
16) Hardware/Software Limitations Specifications (HSLS), dated 24 Oct 73
17) MADCOMX, MS-IV, dated 11 Jun 71
18) MOD-IVA Command System Manual, (Revised), dated Dec 72

1.2.2.2 Software:

1) 'TUNITY

a) Auxiliary Master Tape AMTFL 703

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b) Auxiliary COMPOOL COMOCPWU
c) SAFARI Tape 705

2) System II

a) System Support Tape (SST) 13-1F
b) SST Corrector Tape CT 13-1F 7B
c) Data Base FLT 7 DBW
d) System COMPOOL COMSYSXB

3) Bird Buffer Master 13.1 BF

4) RTS Master Disk 13-1 RF, with Corrector Set 6630-1

1.2.3 Telemetry

All telemetry modes required for support of SV-7 were generated and validated prior to start of Dress Rehearsal.

1.2.4 Pad Load and Emergency Messages

1. The flight pad load was generated to support a planned launch date of 7 November and was used for the 10 November launch with a time offset to accommodate the revised launch window. The pad load was generated in two segments. Msg 100 was loaded on the pad and msg 110 was generated as though it were for a Rev 2 load (to prevent software table overflow) and also loaded on the pad. The pad load contents are summarized as:

a) Selected station contacts to Rev 19 and operational activities thru Rev. 4.
b) Rev 0
SV/BV Separation enable
Uncage SS System
ST System out of Ascent Mode
Inhibited SA deploy at INDI
c) Rev 1
ECS Telltales
SA Deploy (inhibited)
d) Rev 2
SA deploy
SUBSAT 2 separate
CV Test (inhibited)
e) Rev 3
SS Health Test (inhibited)

A set of emergency messages were generated for use as required.

2. Msg 098 SGLS2/PCM2 Emergency contacts - Rev 1 use

3. Msg 068 VBE to Solar Array Deploy - Rev 1 use

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4. Msg 990 Emergency PCON - Available throughout the mission. This message obtains PCM Side 2B, PCM Format B, telemetry and tape recorder readout through SGLS 2 in the event of negative acquisition due to malfunction of the primary transponder. PCM 1A telemetry, and/or ECS command system.

5. Msg 992 Recovery Emergency PCON - Available throughout the mission. This message is used in the event of no acquisition at POGO on a recovery pass. It will accomplish a complete switch to SGLS 2, PCM 2 to gain visibility of the vehicle.

6. Msg 084 MCS Rev 1 Emergency Contacts - Rev 1 use.

7. Msg 080 Emergency Orbit Adjust - Rev 1 use.

8. Msg 074 Emergency ACS Message - Rev 1 use.

9. Msg 096 Command Exercise - Early rev use.

1.2.5 Expendables (Liftoff Status)

OA Tank	3200 Pounds Propellant	
RCS Tanks 1 and 2	197 Pounds Propellant	
Panoramic Camera	Camera A*	Camera B**
Film on RV-1	1836 ft	1721 ft
Film on Supply	105,712 ft	104,211 ft
Pneumatics lbs.	16.9	17.1

* Includes 500' IR
** Includes 5000' Color

Mapping Camera	Terrain	Stellar
Film on RV	65 frames	81 frames
Film on Supply	3489 feet 2174 frames	2159 feet 2399 frames
Engineering allotment	90 frames	-
Special 3414 film	18 frames	-
ST Calibration	19 frames	

1.3 Launch and Ascent

1.3.1 Launch

The seventh HEXAGON vehicle was launched on the first countdown

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attempt on 10 November 1973. Liftoff occurred at 12:10 PST at the opening of the launch window (system time 72601.1).

1.3.2 Ascent

Ascent appeared nominal with all events verified as occurring normally.

1.3.3 Injection Accuracy

Rev 1 tracking showed that a nominal orbit had been achieved except perigee was 7.8 degrees North of the planned location. Table 1-1 shows the comparison between the actual and planned injection conditions and the Rev 0 orbit comparison.

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MATCH POINT AND INJECTION ACCURACY

ITEM	UNITS	PREDICTED	ACTUAL	(A-P)
Match Point Geod Lat.	Deg.	20.1148	20.1148	0
Radius	N.M.	3529.62	3529.800	.180
Velocity	Fps	25740.30	25737.78	-2.52
Gamma	Deg.	.1231	.1482	.0251
Long	Deg.	123.8099	123.8431	.0332
Rev 0 Orbit Comparisons				
Apogee	N.M.	154.060	154.400	.394
Perigee	N.M.	87.930	88.673	.743
Arg Per	Deg.	150.050	142.801	-7.249
Period	Min	88.910	88.883	-.027
Eccentricity	nd	.00943	.00937	-.00006
Inclination	Deg.	96.90	96.93	.03

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SECTION 2

2.0 ORBIT PHASE - REV 1 THROUGH RV-1 RECOVERY

2.1 Summary

The solar arrays were deployed at INDI, Rev 1, and positioned to the desired 0 degrees at Rev 1 POGO. Commanding and panoramic camera health tests were completed satisfactorily and mission photography started with Rev 5 command message. SUBSATELLITE No. 2 (+Y) was released on Rev. 2.9. Redundant subsystem testing continued with the Doppler Beacon antenna deployed and the beacon successfully activated on Rev. 12. SUBSATELLITE No. 1 (-Y) was successfully released on Rev 13.5. The ST Health Test on Rev. 7 was successful and mapping photography started on Rev. 14.

Normal panoramic and mapping photography continued during the segment with only minor ST instrumentation problems.

RV-1 was successfully re-entered and aerially recovered on Rev 229, operations day 15.

A summary of significant events and a statement of anomalies during this segment are presented in the following paragraphs.

2.1.1 Summary of Events

The sensor system was uncaged and the optical bars stowed shortly after BV/SV separation and the ST system was commanded out of the ascent mode. The solar arrays were deployed over Rev 1 INDI and were positioned to 0^{o} position at Rev 1 POGO after verification of satisfactory erection and deployment. The constant velocity was executed on Rev 2 and the SS health test executed on Rev. 3. SS subsystem mission photography started with the first command message loaded on Rev. 5. SUBSATELLITE No. 2 was released on Rev. 2.9 as planned. The ST Health Test was executed as an operational MOP on Rev 7 to verify subsystem health and simultaneously take operational photography. The pan camera SS Engineering Test was conducted over COOK Rev 8 and the SGLS 2/ PCM 2 test over KODI Rev. 9. An [redacted] test was conducted on Rev. 11

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to establish quiescent data prior to DBS turn-on. The doppler beacon antenna was successfully erected on Rev. 12 and the beacon turned on prior to the Rev. 12 GUAM contact. SUBSATELLITE No. 1 was released on Rev. 13.5 with the SV yaw maneuver executed for the desired release attitude. Mapping photography started on Rev 14. as scheduled. MCS/Lifeboat check executed on Rev. 18 and the back-up timer test on Rev. 25, completing the redundant subsystems testing. Improper commanding of the DBS by 'TDERBY was detected on Rev 19 and was corrected by a data base change to the Doppler circles. Erractic telemetry indication of the terrain camera platen press function was noted on Rev. 24 and continued intermittently during the segment. The indication was analyzed as a telemetry switch malfunction (as on SV-6) and ST operations continued. On Rev. 88 the +Y Stellar shutter switch indicated the shutter did not fully close after an operation, however, the redundant monitor showed proper operation. This problem had been seen in factory testing and was considered a monitor problem. Rapid cycling of battery No. 4 heater was noted starting on Rev. 186, however, battery temperatures remained acceptable. Orbit adjust and attitude control performance remained nominal during the segment with the RCS propellant consumption rate substantially less than on previous flights. Panoramic camera photography was conducted without incident throughout the segment. RV-1 was re-entered and aerially recovered on Rev. 229 after the planned recovery on Rev. 180 was aborted because of recovery area weather. RV maximum weight limits were relaxed to permit operating four additional days for acquisition of high priority operational photography and accomplishment of critical engineering MOP's desired for RV-1. RV-1 was loaded to 100.2 percent of capacity and balanced. No capsule or parachute damage was reported.

Overall quality of the acquired photography ranged from very good to fair with the majority rated as good. Engineering data from the MOP's verified the focus settings as valid, OOAA in-track smear on the aft camera and a slight over exposure on the aft camera. A slight resonance had been detected at Vx/h values corresponding to the current perigee altitude. Evaluation of

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the photography verified the resonance and recommended that perigee be raised by two miles to avoid the Vx/h range of resonance.

2.1.2 Problem Summary

a. Terrain Camera Platen Press Switch.

Statement - Intermittent platen press operation was noted on Rev. 24 telemetry. The erratic data continued randomly during the segment.

Solution - The failure paralleled the monitor function of SV-6 (same hardware) and is considered a telemetry monitor failure with no effect on operations.

b. +Y Stellar Shutter

Statement - The +Y stellar shutter "not closed" monitor indicated the shutter was not fully closed on the Rev 87 operation. The condition has repeated randomly during the segment. Redundant monitor shows proper action.

Solution - Analysis shows failure in the adjustment of the monitor switch and has no effect on the operation.

c. Battery Heater Cycling

Statement - Random cycling of Battery #4 heater was detected starting on Rev. 186.

Solution - Similar to the heater cycling noted on SV-6. Battery temperature remained within acceptable limits.

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2.2 COMMAND SUBSYSTEMS PERFORMANCE (Prepared by CSC)

2.2.1 Health

The health of the Command Systems remained excellent throughout Segment 1 (Revs 0 - 229). There were no equipment malfunctions. None of the Command Systems were subjected to out of specification temperatures or voltages. There were no power dropouts, relay driver overloads, or clock status errors experienced.

2.2.1.1 EXTENDED COMMAND SUBSYSTEM

2.2.1.1.1 Command Modes

The ECS responded properly in all modes into which it was commanded. There were a total of 392 messages loaded in the ECS for this segment. This resulted in 35,516 SPC's being stored for readout from the PMU's.

Of the 35,516 SPC's loaded, 18,915 were output from the PMU's for processing by the decoders. The remaining were erased out prior to time label matches. In loading the 35,516 SPC's there were no rejects.

2.2.1.1.2 ECS Clock Operation

The accuracy of the ECS clock was 2.28 parts in 10^7. This corresponds to an average frequency offset of .2335 HZ above the nominal frequency of 1.024×10^6 HZ. The frequency of the clock oscillators changed .0363 HZ in 229 revs. This results in a stability of 3.54 parts in 10^8 over 229 revs, or 6.28 parts in 10^{10} for an average six hour period. All of these values are well within system specifications. The clock plot is presented in Figure 2.2-1.

2.2.1.1.3 ECS Anomalies

There were no ECS anomalies experienced during this segment.

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2.2.1.2 MINIMAL COMMAND SUBSYSTEM

2.2.1.2.1 Command Modes

The MCS was commanded on to the Operate Mode at 18 Pogo and the memory was addressed and filled. The MCS remained in the Operate mode for three revs, and responded properly to all stored and real-time commands.

2.2.1.2.2 MCS Anomalies

There were no MCS anomalies.

2.2.1.3 REMOTE DECODER/BUD

2.2.1.3.1 Command Modes

The remote decoder was used for the recovery of RV-1 which ended this segment of the flight. The performance of both channels was verified from telemetry to be proper for all commands.

No commands were issued from the BUD during this segment.

2.2.1.3.2 Remote Decoder/BUD Anomalies

There were no remote decoder or back-up decoder anomalies.

2.2.1.4 SUMMARY

2.2.1.4.1 Expendables and Environmental Data

Total Command Readouts	PMU-A 9,889 PMU-B 9,026
ECS Clock Drift Rate	2.28 parts in 10^7
ECS Clock Stability	3.54 parts in 10^8 for a 229 rev period
Total Hours On	ECS 363 MCS 4.5 RD .5 BUD .05
Secure Words Expended at end of Segment 1	PMU-A 32 PMU-B 36
Environmental Data:	See Figures 2.2-1 through 2.2-7

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	(1)	(2)
VEH. TIME SPAN	3274.0 TO	1220667.0 SECS.

AVERAGE CLOCK ACCURACY =BIAS CHANGE/TIME CHANGE

=(1.2412- 0.9636)/(1220667.0- 3274.0)

= 2.28028E-07

= 2.28028 PARTS IN 10 TO THE -7TH

AVERAGE CLOCK FREQUENCY =(2.28028E-07*1,024,000.0)+1,024,000.0

= 1024000.23359 HZ

FREQUENCY 1 (F1) =(SLOPE AT 1)*1.024MHZ+1.024MHZ

=(2.04599E-07)*1.024MHZ+1.024MHZ

= 1024000.20951 HZ

FREQUENCY 2 (F2) =(SLOPE AT 2)*1.024MHZ+1.024MHZ

=(2.39996E-07)*1.024MHZ+1.024MHZ

= 1024000.24576 HZ

CLOCK STABILITY =(F2-F1)/AVERAGE CLOCK FREQ.

=(1024000.24576- 1024000.20951)/1.024E+06

= 3.54004E-08

= 3.54004 PARTS IN 10 TO THE -8TH
FOR THIS 229 REV. PERIOD

= 6.38103 PARTS IN 10 TO THE -10TH
FOR AN AVERAGE 6 HOUR PERIOD

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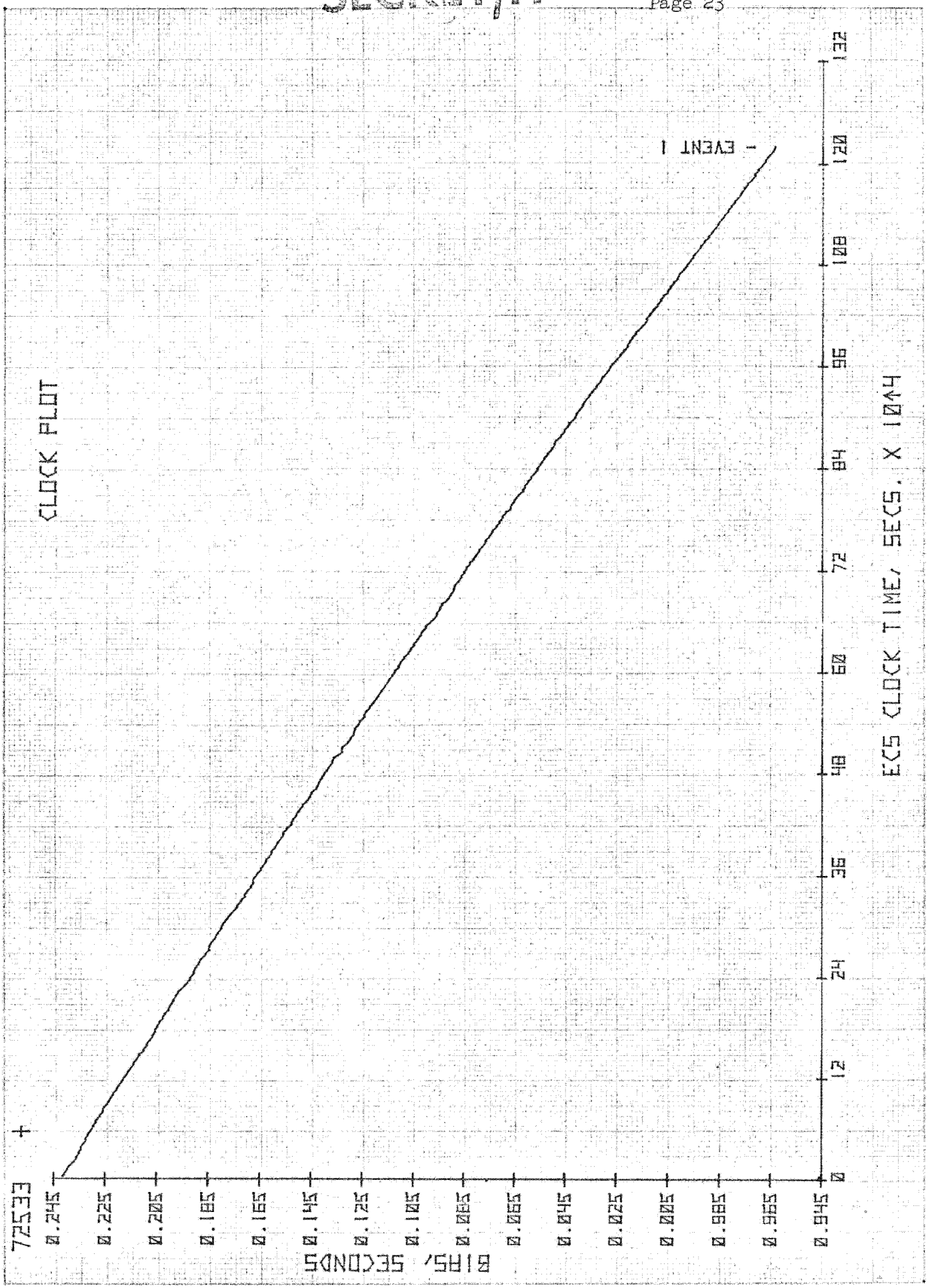


Figure 2.2-1

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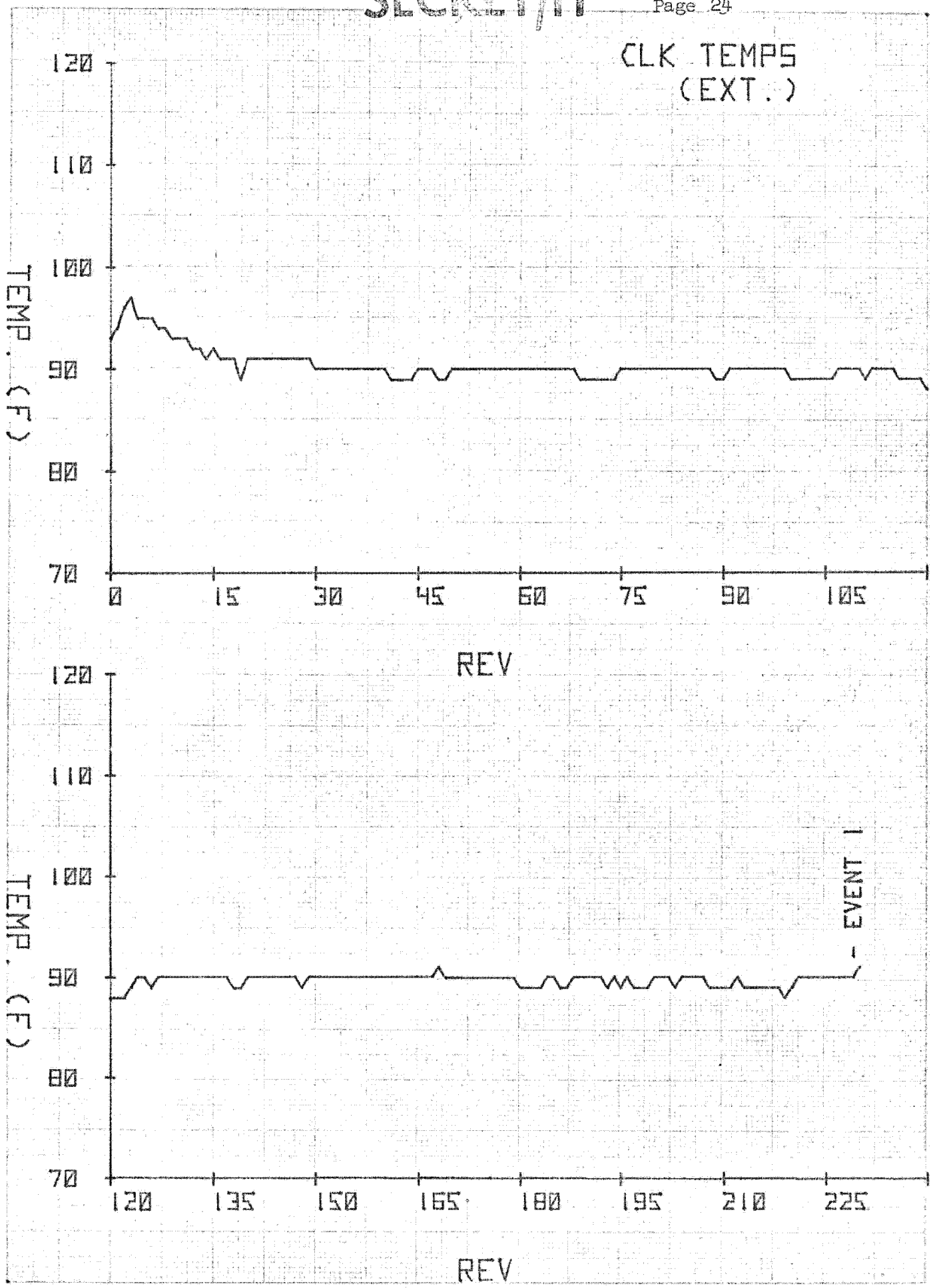


Figure 2.2-2

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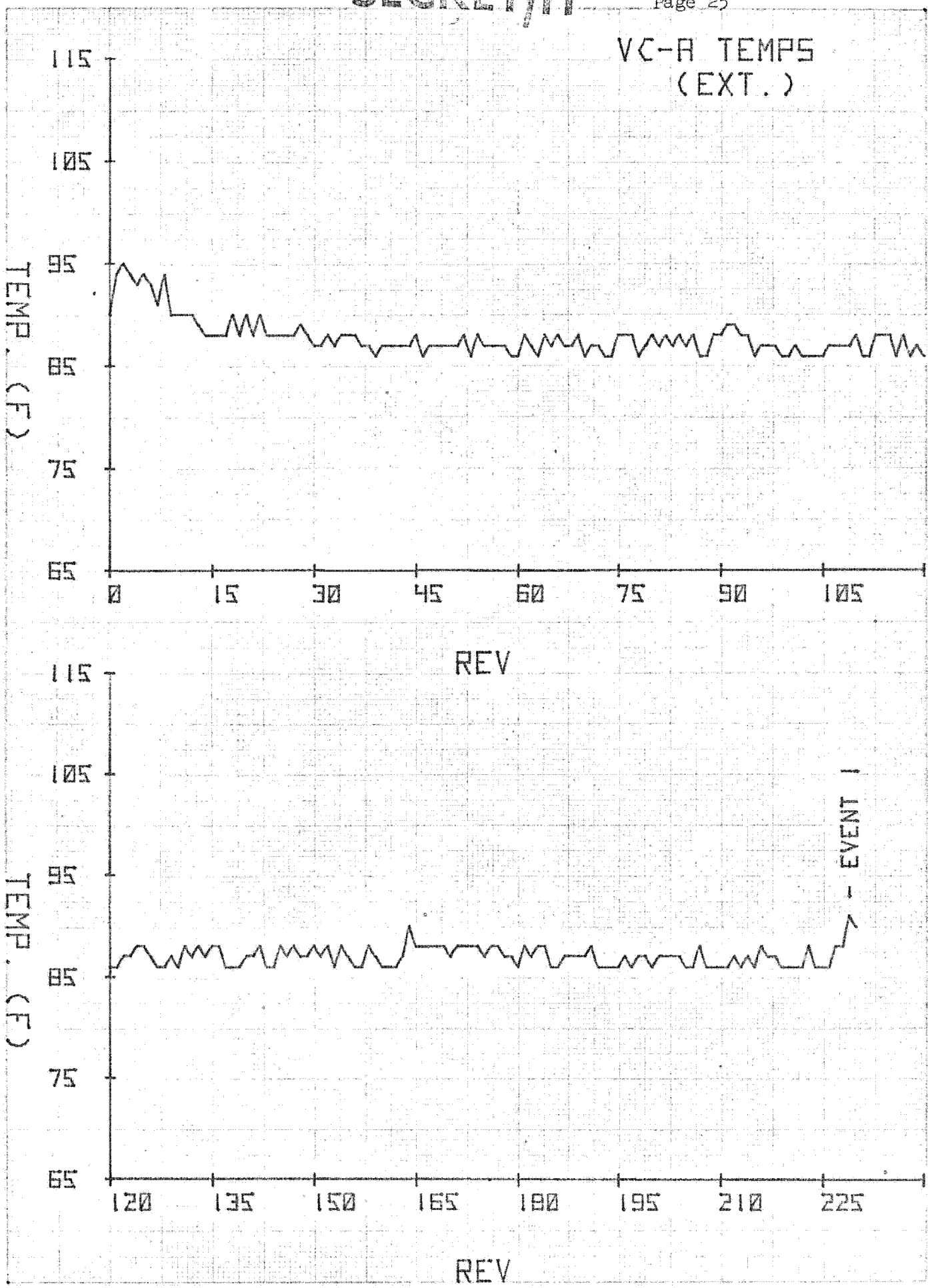


Figure 2.2-3

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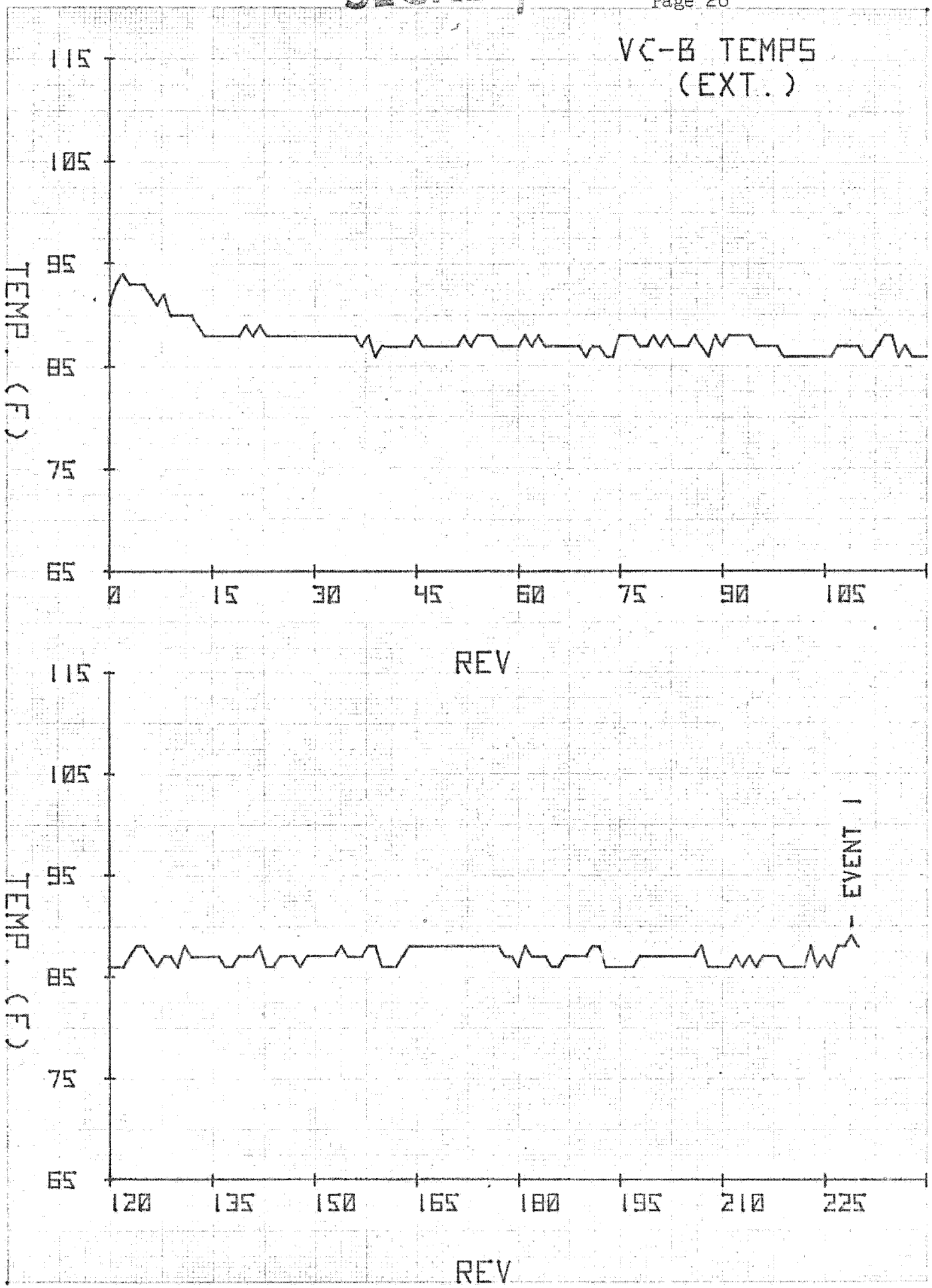


Figure 2.2-4

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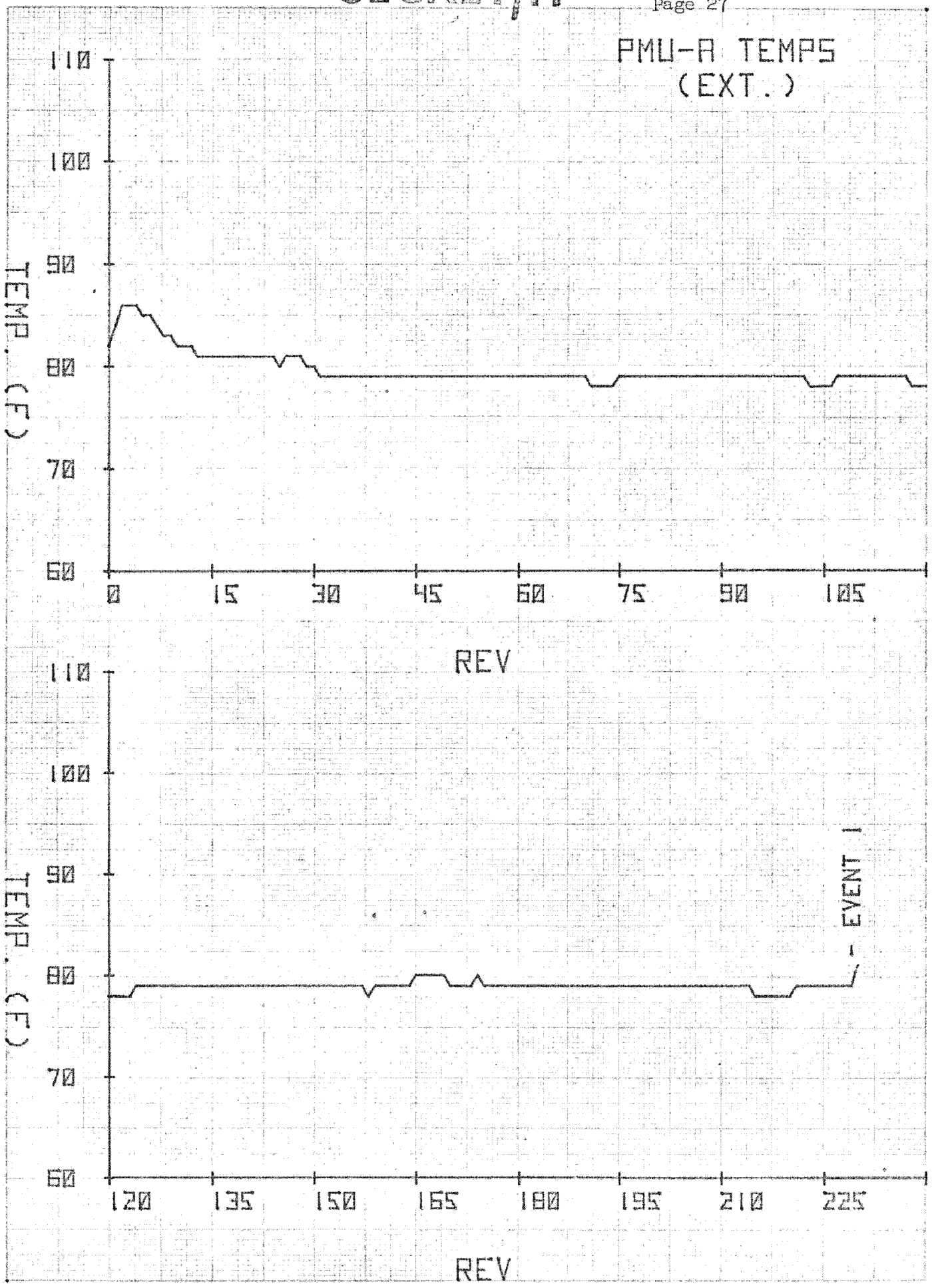


Figure 2.2-5

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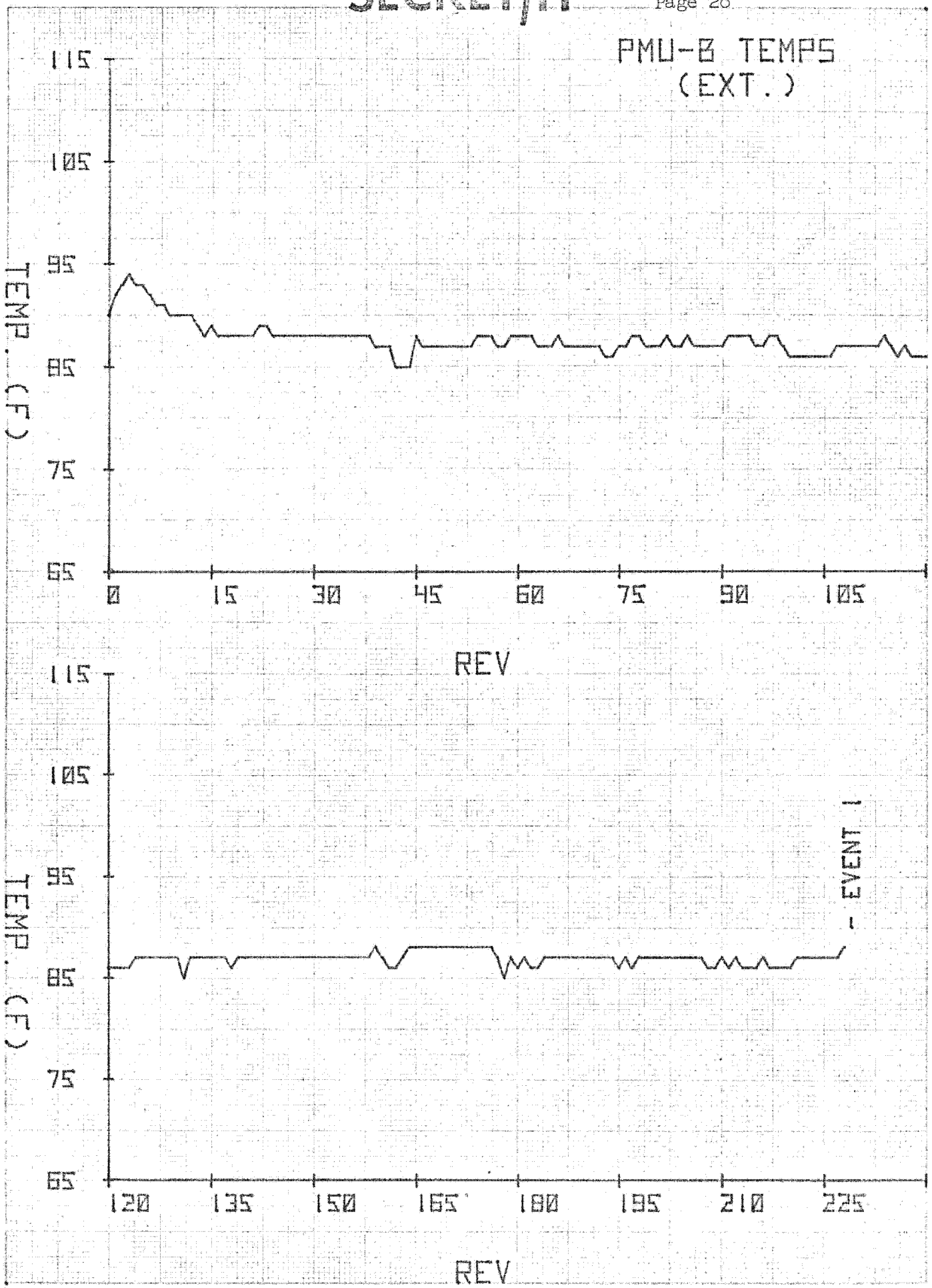


Figure 2.2-6

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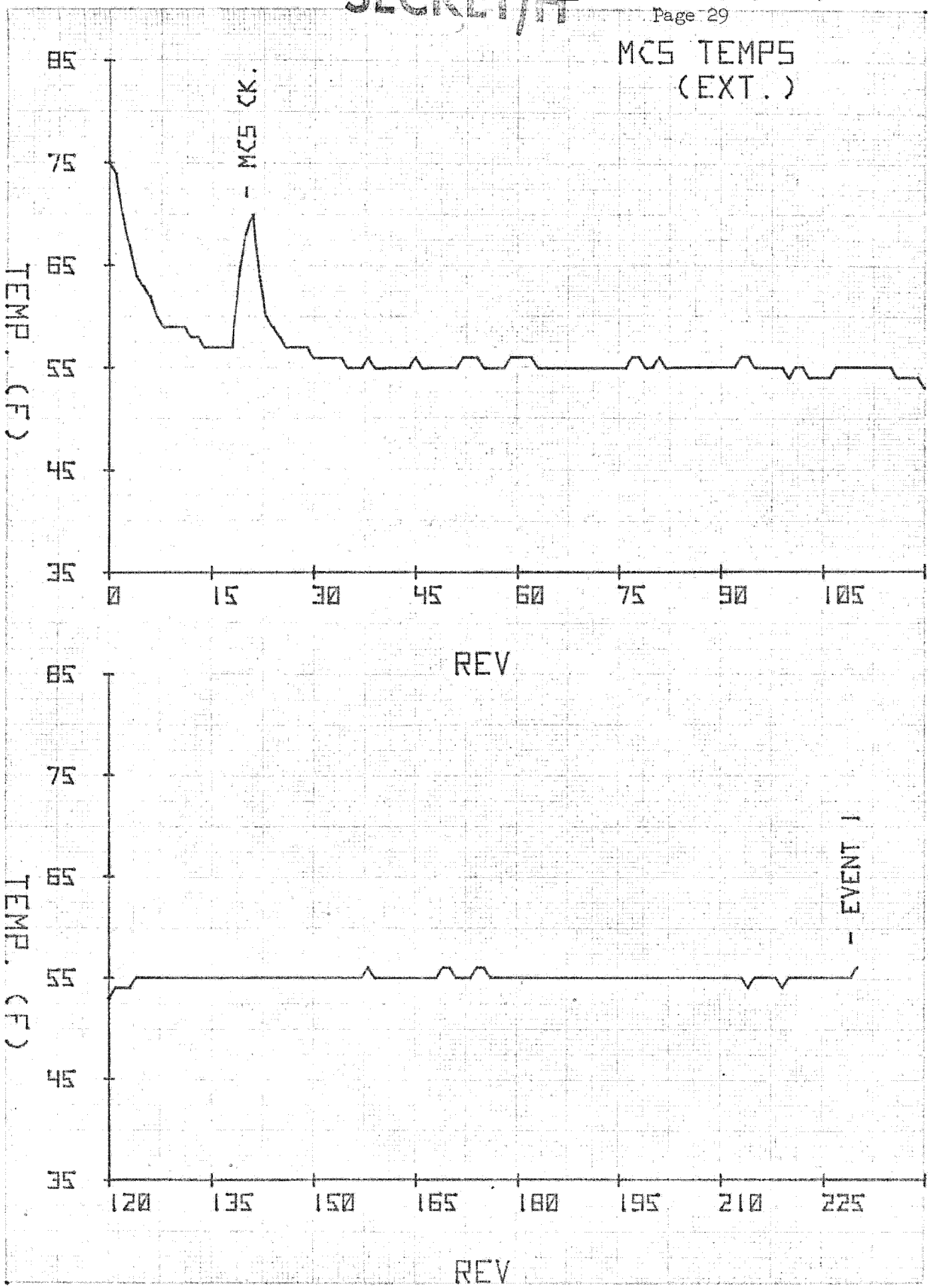


Figure 2.2-7

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2.3 SENSOR SYSTEM OPERATIONS THROUGH RV-1

2.3.1 MISSION OPERATIONS PERFORMANCE

The Sensor Subsystem was successfully uncaged and the optical bars were stowed just after BV/SV separation. The constant velocity and health check tests were performed on Revs. 2 and 3, respectively, indicating normal operation. Due to a loss of the telemetry during a portion of the health check on Rev. 3, the execution of the OOAA nominal settings could not be verified. These nominals were re-commanded on Rev. 5 and verified in effect for the operational photography which began on Rev. 5. The regular real-time engineering check functioned without incident at Rev. 8C.

All operations throughout RV-1 were achieved with no SS malfunctions or failures. This segment of the mission consisted of 116 sensor system operations, consuming 14,484 seconds of camera power ON time, 6.2 pounds of nitrogen gas, and a film usage of approximately 29,000 ft. on the forward camera and approximately 27,400 ft. on the aft camera. (This includes pre-launch footage on the take-up at lift-off.) The aft camera film included 5,010 ft. of SO-255 color material, utilized on mission operations 50 through 82. Consumption profiles through RV-1 are graphically depicted in Figure 1.

The sensor system configuration at lift-off was as follows:

	FORWARD-LOOKING CAMERA	AFT-LOOKING CAMERA
Filter Type	W-12	W-12
Focal Length	59.9917 in.	59.9680 in.
Focus Setting	137 Microns	33 Microns
Film Type	1414	1414/SO-255/FE-3916
Total Film Length	107,548 ft.	105,932 ft.
Supply Spool Number	2331	2470
Pneumatics Loaded	34.0 lbs.	

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The overall quality of the acquired photography ranged from very good to fair, with the majority rated as good. Engineering data from the thru-focus MOPS verified the validity of the nominal focal plane positions. The OOAA engineering tests indicated residual smear In-track on the aft camera, corrected by a 3 command step adjustment early in RV-2. Exposure analysis revealed the aft camera slightly overexposed, and exposure was reduced 2 slit steps early in RV-2. Evaluation of the photography confirmed that image quality could be improved if operations at peak resonance values of Vx/h could be avoided. This was accomplished by raising perigee altitude approximately 2 nautical miles effective Rev. 289.

2.3.2 ENGINEERING TESTS

The normal uncage/OB stow, constant velocity, and SS health check sequences were routinely executed on Revs. 0, 2, and 3 respectively. The regular night-time engineering was run in real-time at 8C. In addition to these checks, several engineering tests were performed during this segment of the mission, primarily through-focus photographic operations to aid PFA in determining flight plane of best focus.

Rev 0	SS uncage/OB stows, sequences 204, 205/213, 214
Rev 2	SS constant velocity, sequence 208
Rev 3	SS health check, sequence 175
Rev 8	SS engineering, sequence 209
Rev 15	Through focus MOP, test type 1
Rev 32	TUCSON, test type 7 and test type 9
Rev 47	Through focus MOP, test type 1
Rev 65	Through focus MOP, test type 1
Rev 80	Color through focus MOP, test type 8
Rev 81	Through focus and color smear slits, test types 1 and 3B
Rev 112	Color through focus MOP, test types 1 and 8
Rev 113	6C color target, test type 4
Rev 129	6C color target, test type 4
Rev 130	Color through focus MOP, test types 1 and 8
Rev 146	Smear vs. Scan, test type 10

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Rev 160	Smear slits, test type 3A
Rev 162	Through focus MOP, test type 1
Rev 173	Through focus MOP, test type 1
Rev 225	Through focus MOP, test type 1
Rev 225	Protective wrap.

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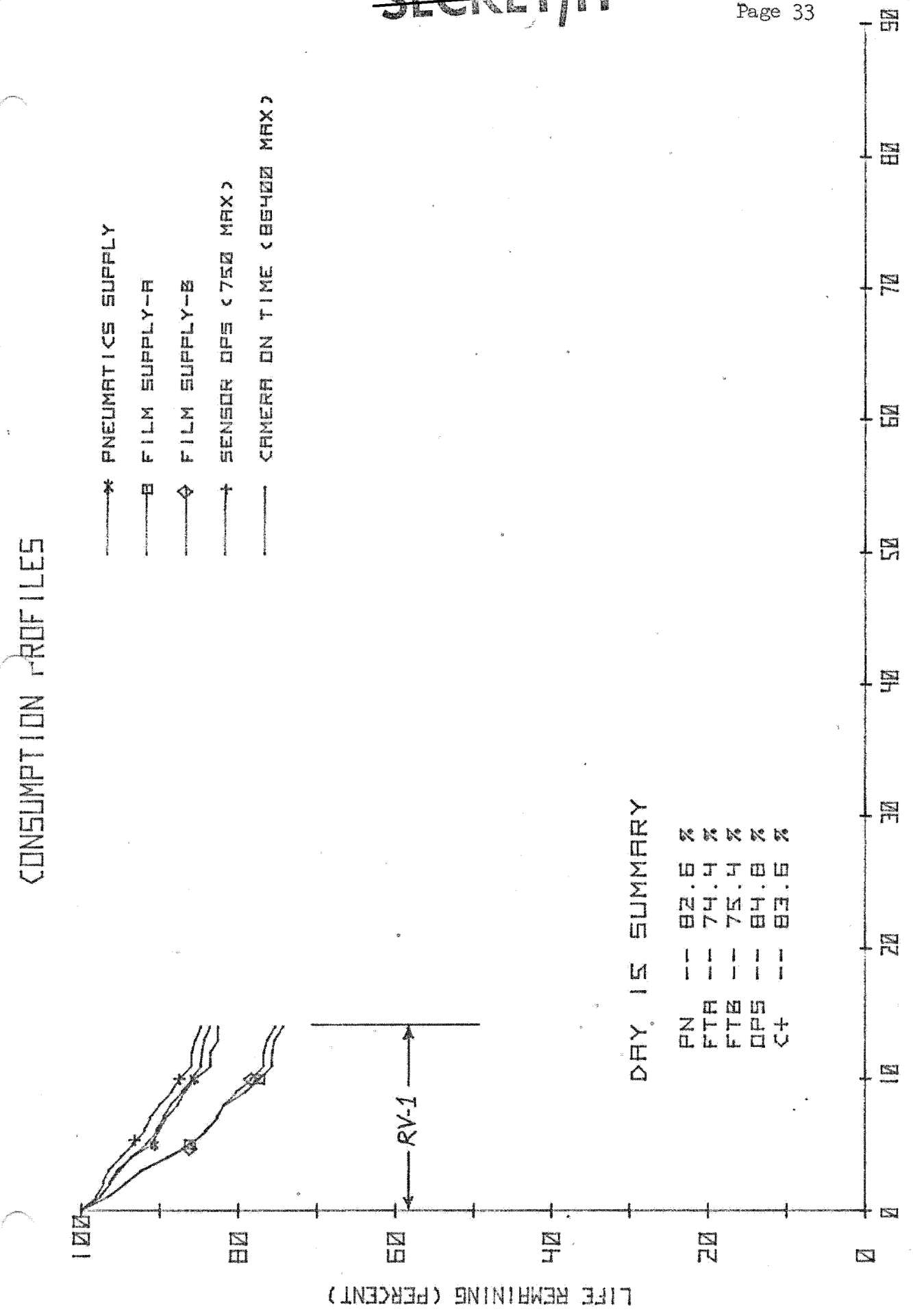


FIGURE 1

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2.4 RV 1 (S/N 32) Performance

This report presents an analysis of the RV 1 performance based on evaluation of recovery studies, command message, RV and SV telemetry, voice reports, and the recovery test report TWX. Tables 2.4-1 thru 2.4-3 list all relevant data. RV heater performance graphs are also included.

2.4.1 Summary

The RV payload was 100.22% of the maximum I.C.D. weight and unbalanced 1.3%. The PREP2 event took place on Rev 227 over POGO and separation occurred on Rev 229. Preparation, deorbit, and entry events, and drogue and main parachute deployment conditions were normal and executed as planned. Aerial recovery was accomplished on the first pass at 14,000 feet altitude, 20.7 nautical miles from the predicted impact point.

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TABLE 3.4-1

RV 1 RECOVERY DATA

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IDENTIFICATION DATA

SV 7 IRON NO 6630 RECOVERY REV 229

RV 1 RV S/N 32 RETRO MOTOR S/N Q-49 RECOVERY DATE 24 Nov 73

EVENT TIMES (IN SYSTEMS TIME - SECONDS)

EVENT	BASIC STUDY	UPDATED TEAPOT	TEAPOT EVAL	COMMAND MESSAGE	SV TLM	VOICE REPORTS	RV TLM MODE 51	DIFF NOTE 1
RV2 OUT T/S	REV/STA 227 P			72117.1	72118			-
RV1 IN T/S				72121.1	72122			-
DT START	81389.9	81388.3	81388.7	81390.0	81390.0			-
POGO TRAN	82530.6			82530.7	82512			18.7
PITCH START	82560.6			82560.8	82561			
PITCH STOP				82609.8	82610			-
PYRO ARM BATT				82730.8	82731			-
POGO FADE	82833.3			82833.4	82840			6.6
KODI TRAN	82967.0			82967.2	82995	82958		27.8
ORB PWR OFF				82970.0	82971			-
RV SEP (0)	82979.9	82980	82980.0	82980.0	82981	Confirm	NOTE 2	-
SPIN UP (+2.4)				N/A		Confirm	N/A	-
RETRO START	83105.3	83105.4	83105.4	N/A		83106	83105.7	-
DESPIN (+160.4)				N/A		83143	83140.7	-
PROP JETT (+175.4)				N/A		83157	83155.7	-
KODI FD (RV)	83306.4					83323	83313.7	7.3
RV ENTRY (400K	83278.2	83277.4	83277.83		RECOV TWX			
Δ 1-2 ACQ					83375	83375		
ION ENTR	83379	83377.8	83378.25		83400	83400		21.7
ION EXIT	83571.4	83569.7	83570.1		83570	83570		-
DROGUE DEPLOY	83617.0	83615.3	83615.70	TONE STOP	83627	83627	N/A	11.3
IMPACT (50K)	83634.9	83633.3	83633.70					
MAIN CHUTE DPL	83637.9	83636.3	83636.73		N/A	N/A	N/A	-
H/SHLD JETT	83641.9	83640.3	83640.73	TONE START	83641	83641	N/A	-
STEADY STATE	83652.9	83651.3	83651.73					
ETPD(RAINDROP)	83681.8	83680.3	83680.2					
RV @ 13.5K	84586.7	84585.3	84585.2	IN TRAIL	84600	84600	84611	14.8
WATER IMPACT	85137.6	85136.2	85136.1		N/A	N/A	N/A	N/A
HULA TRAN (RV)	N/A					N/A	N/A	N/A
HULA FADE (RV)	N/A					N/A	N/A	N/A
DT RUNOUT	84104.9	84103.3	84103.7		N/A	N/A	N/A	

*To nearest Minute.

NOTES: 1. DIFF = Actual - Predicted times, TLM differences of less than 1.0 sec are ignored. [ ] = PREDICTED TIME, [ ] = ACTUAL TIME.

2. Assume RV SEP Sequencing starts 0.4 seconds after RV SEP Command msg. time.

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TABLE 2.4-2

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RV 1 RECOVERY DATA

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RECOVERY DATA

	BASIC STUDY	UPDATED TEAPOT	TEAPOT EVALUATION	QUICK LOOK RPT	EPPD (TWX)	AERIAL RECOVERY
LATITUDE	30.998	31.088	31.057	30.75	30.75	30.75
LONGITUDE	164.72	164.70	164.71	164.867	164.733	164.867

RECOV. A/C DEPLOYMENT FORMATION No. 1, RECOVERING A/C No. 1

RECOV ALT 14000 ft, PASS No. 1, TIME 2330 Z

AIRSPEED 143 KTAS, 127 KIAS; TIME IN TOW 15 min.

RAINDROP ETPD 83681 sec 46000 ft; RATE/DESCENT, 15K 29.2 FPS, 10K 27.0 FPS

CONTACT LOCATION Right inline hook, No. 7 caught one load line.

PRESET TENSION LEVEL 3500 lb, PAYOUT Normal

MISS DISTANCE (TEAPOT EVAL VS AERIAL RECOV) (Uncorrected for Wind)

OVERSHOOT 18.42 nm, CROSS TRACK 9.42 nm EAST

RC CONDITION Normal

CHUTE/CONE CONDITION Pilot reported a possible small tear in top of cone.

CHUTE/CONE BEHAVIOR 30 degree oscillations in a rotating manner.

WIND DATA

ALT (K)	DIRECTION PRED	DIRECTION ACT	VELOCITY PRED	VELOCITY ACT	ALT (K)	DIRECTION PRED	DIRECTION ACT	VELOCITY PRED	VELOCITY ACT
SCF	170	90	15	20	25	140	200	15	10
2	160	--	15	--	30	160	240	15	15
4	160	--	15	--	35	180	290	15	15
6	180	180	15	15	40	160	340	15	10
8	200	--	10	--	45	140	360	10	10
10	180	180	10	20	50	100	30	10	10
15	150	190	15	10	55	--	--	--	--
20	120	190	15	5	60	--	--	--	--

RV BATTERY TIME HISTORY

TIME	ACT 82733	82734	735	736	737	738	739	740	742	745	747	750
MAIN	16.0	24.4		23.8								
PYRO #1	3.6	20.7	21.4	22.1		23.4	22.8	23.9	24.6	25.2		25.9
PYRO #2	11.3	21.8			23.1		24.1			24.6	25.5	
TIME	751	753	755	759	767	796	831				Post Sep.	
MAIN			24.5	25.2			25.1				23.3	
PYRO #1		26.5				27.0	27.2				26.7	
PYRO #2	26.2				26.7		26.9				27.1	

SV RATES BEFORE & AFTER SEP (SV TLM)

	TIME	PITCH RATE PGR °/sec	ROLL RATE RGR °/sec	YAW RATE YGR °/sec
	82979	+.1	+.02	+.02
SEP	82980	-.06	+.02	+.02
	82981	1.39	-.04	+.02

MISC DATA

Payload Temp before SEP,	Rn06 69	°F
Payload Temp, Max REENTRY,	TB02 70	°F
Chute Press before PREP 2,	P711 .74	PSI
Supply Press before PREP 2,	P113 .68	PSI
BETA ANGLE of Recovery Rev.	0.1	°

PITCH ANGLE

BASIC STUDY
Θ_{rvs} -126.56 °
$\Delta\Theta 1$ -1.93 °

Ω_y 1.42 °/sec
$\Delta\Theta 2$ .01 °
Θ_{sv} -34.62 °

PITCH (CMD MSG) -34.56 °
Θ_{sv} (PDWN-SV TLM) -34.0 °
Θ_{rvs} ON UPDATED TEAPOT -126.56 °

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TABLE 2.4-3

RV 1 RECOVERY DATA

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RV MASS PROPERTIES

	BASIC STUDY	UPDATED TEAPOT	TEAPOT EVALUATION	ACTUAL POST FLT
TU-A	231.2 lb	229 lb	229 lb	226.3 lb
TU-B	235.1 lb	232 lb	232 lb	231.7 lb
TOTAL	466.3 lb	461.0 lb	461 lb	458.0 lb
SEP WGT	1555.1 lb	1549.8 lb	1549.8 lb	UPDATED TEAPOT
RETRO WGT	1553.41 lb	1548.11 lb	1548.11 lb	% UNBAL 1.3
ENTRY WGT	1362.60 lb	1357.3 lb	1357.3 lb	% FULL 100.22
AIR RECOV WGT	1146.41 lb	1141.11 lb	1141.11 lb	(100% = 460 lb)

SV MASS PROPERTIES - AFTER SEP (FROM BASIC STUDY)

SV WEIGHT	19522.2 lb	PITCH INERTIA (Iy)	143094.91 SLUG-FT^2
CG FROM STA2220.2(X)	222.35 in	ROLL INERTIA (Ix)	5742.52 SLUG-FT^2
CG FROM LONG AXIS(Y)	.304 in	YAW INERTIA(Iz)	144319.84 SLUG-FT^2

'DORBEL EPHEMERIS

REV OF SEP 229	BASIC STUDY	UPDATED TEAPOT	TEAPOT EVALUATION
PREDICTED FROM REV	219	227	N/A
APOGEE	154.335 nm	154.093 nm	153.761 nm
PERIGEE	88.284 nm	88.221 nm	88.287 nm
ARG OF PERIGEE	122.845 °	122.932 °	122.915 °
INCLINATION	96.920 °	96.919 °	96.919 °
TRUE ANOMALY AT RETRO	355.21 °	355.16 °	355.18 °
HEATSHIELD JETT ALT	49567.95 FT	49566.39 FT	49540.69 FT

ENTRY PARAMETERS FROM TEAPOT EVALUATION RUN

	SEPARATION	RETRO	REENTRY	DROGUE DEPLOY
SYSTEMS TIME (sec)	82980	83105.4	83277.83	83615.7
ALTITUDE (FT)	555032.59	542039.85	400000	63517.45
LATITUDE (°N)	69.444	61.189	49.877	31.098
LONGITUDE (°W)	147.58	154.24	159.49	164.7
INERTIAL AZIMUTH (°)	201.10	194.49		
INERT FLT PATH ANGLE (°)	-.1371	-.0536		
INERT VELOCITY (FT/SEC)	25727.44	25738.05	25534.68	
LOCAL AZIMUTH (°)			192.94	191.09
LOCAL FLT PATH ANGLE (°)			-2.0753	-31.1911
LOCAL VELOCITY (FT/SEC)				1430.09
ANGLE OF ATTACK (°)			104.26	
MACH NUMBER				1.48
DYN PRESS (PSF)				195.015

CORE PINS SHEARED (FROM REBOUND TWX) A: YES ___ NO X , B: YES ___ NO X

BFE VECTOR, Parameters from a SYS Time near the ascending node of the Recovery Rev.

SYS TIME	81370.290 sec	DECLINATION (MDAC = GEOCENTRIC LAT)	-.0001 °
LONGITUDE	20.2142 ° E	INERTIAL GEOCENTRIC FLT PATH ANGLE	-.4400 °
ALTITUDE	134.3072 nm	INERTIAL GEOCENTRIC AZIMUTH	353.0810 °
		INERTIAL VELOCITY	25382.18 FT/SEC

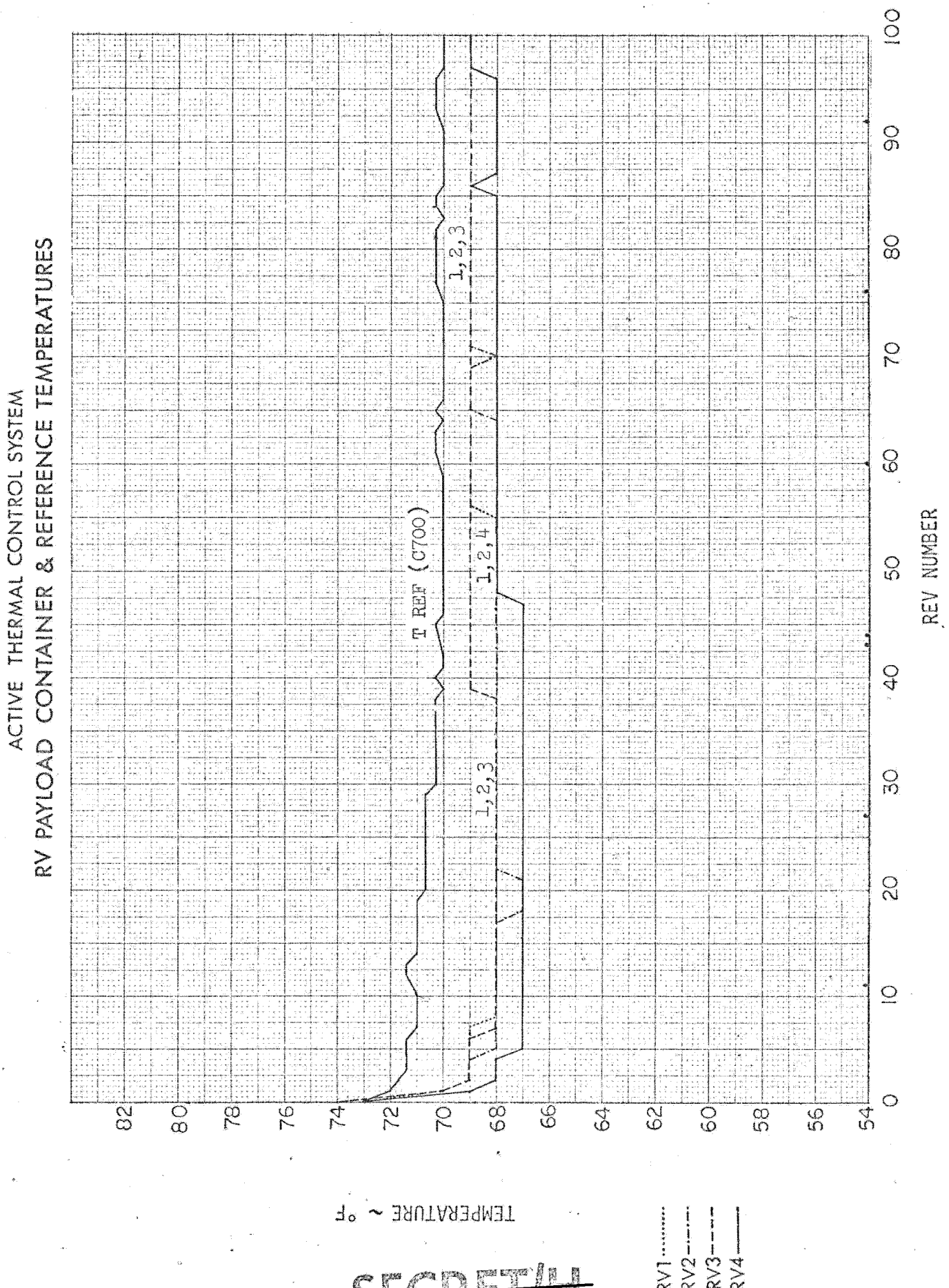
SV C_D A/M (DRAG VALUE AT ASCENDING NODE OF RECOVERY REV) .48582 FT^2/SLUG

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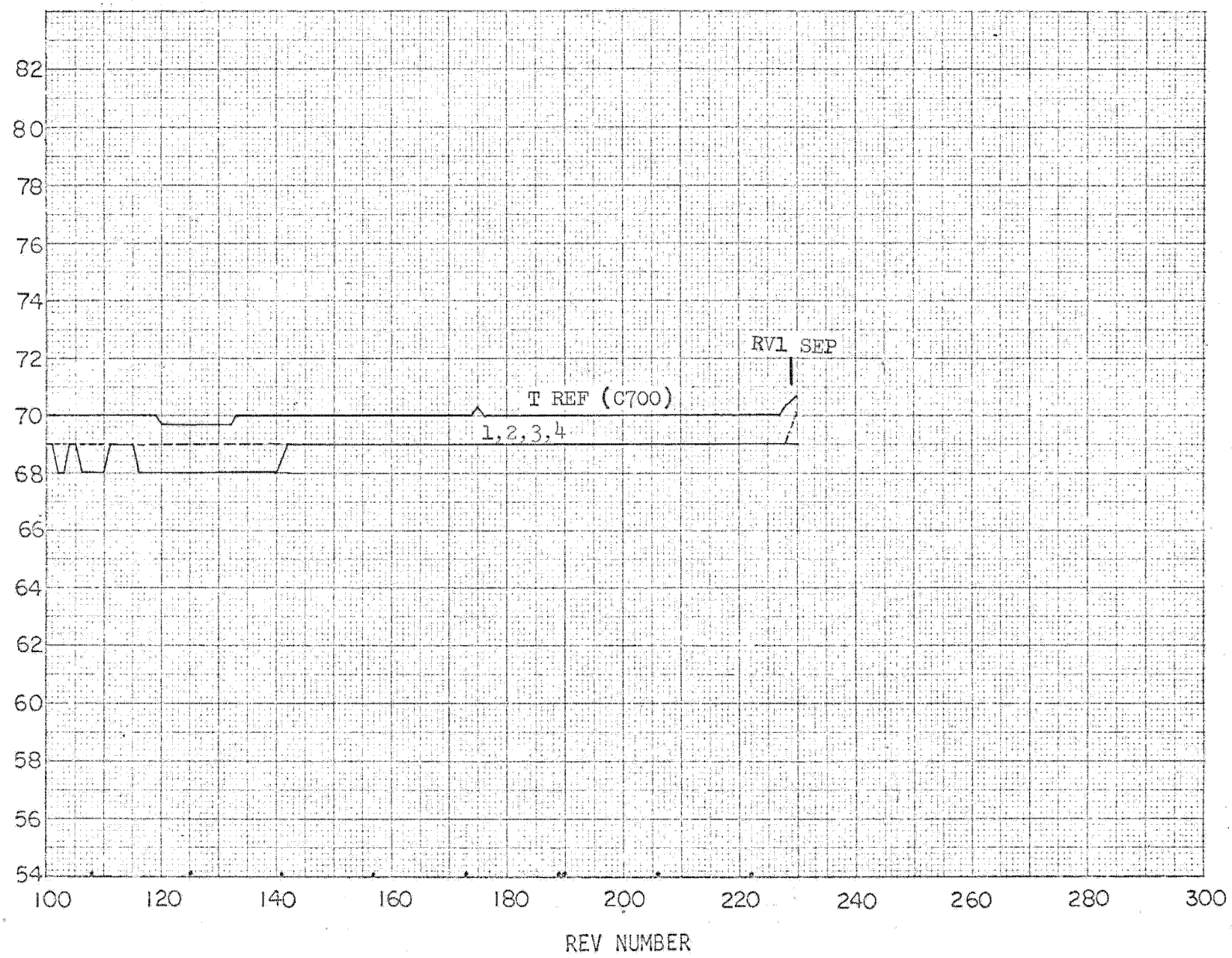
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ACTIVE THERMAL CONTROL SYSTEM

RV PAYLOAD CONTAINER & REFERENCE TEMPERATURES

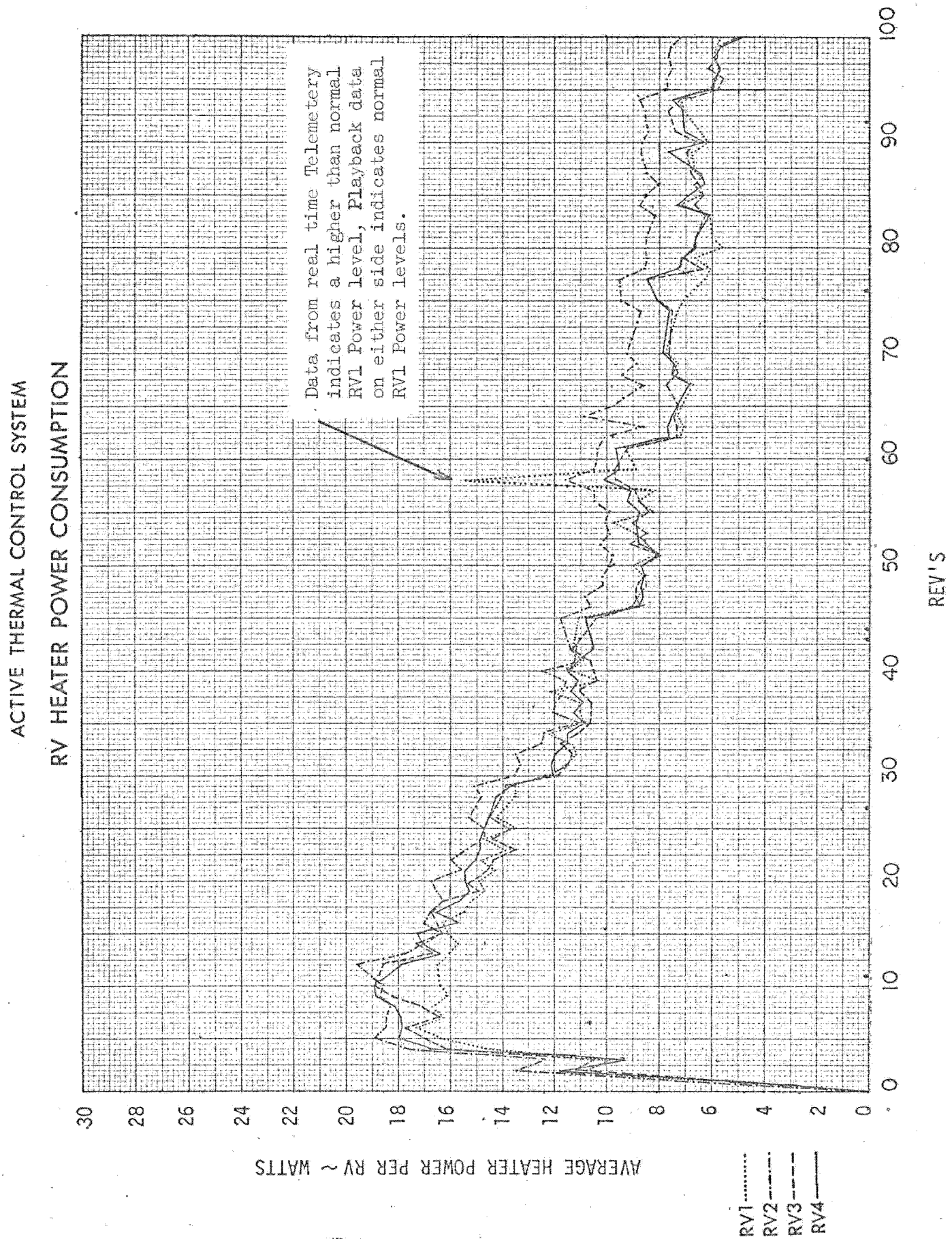


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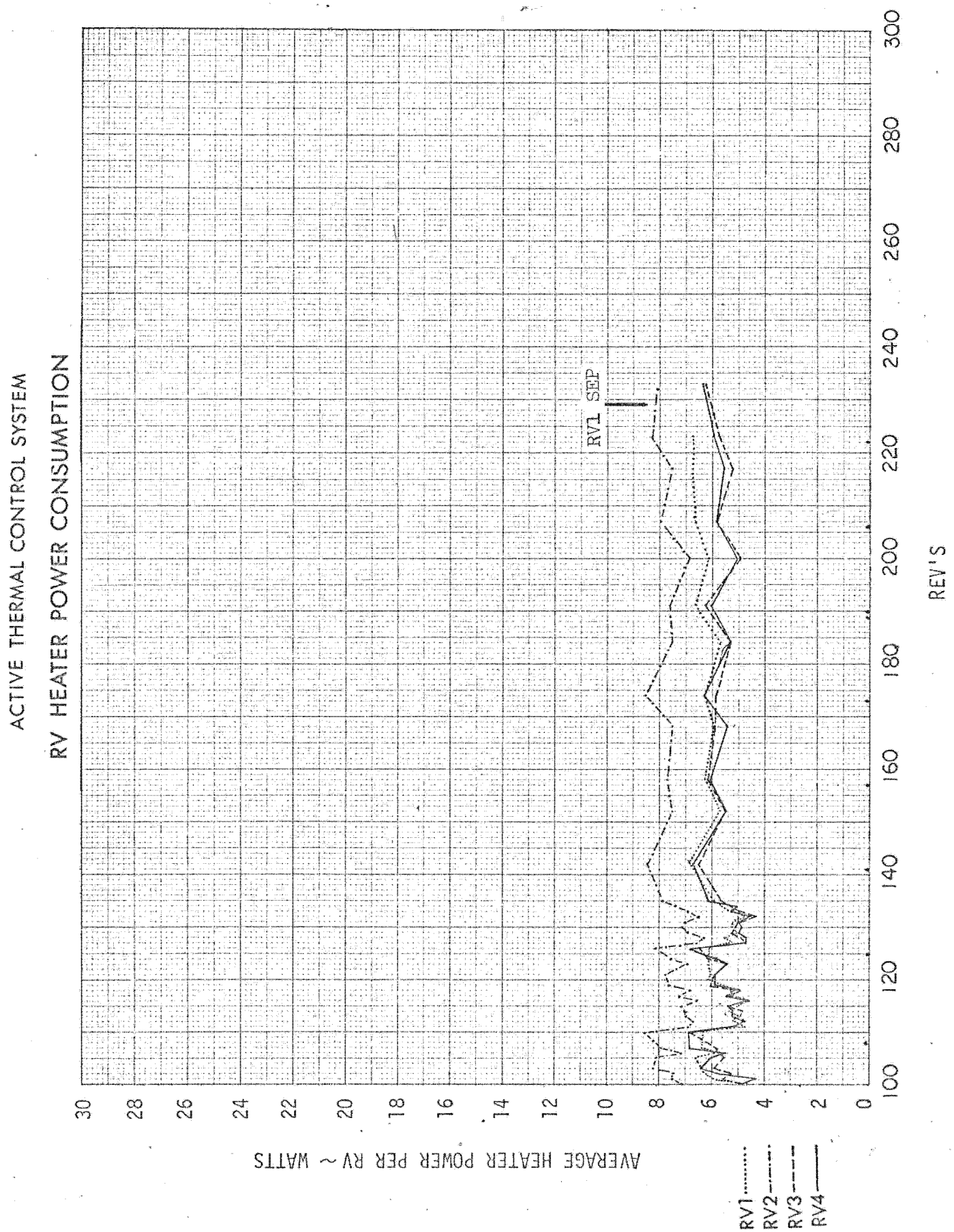


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2.5 SATELLITE CONTROL FACILITY PERFORMANCE

2.5.1 Orbit Determination and Prediction

2.5.1.1 Orbit Determination

Table 2.5-1 shows a summary of the orbital conditions computed from each tracking reduction from Rev 1 to RV-1 recovery on Rev 229. Significant events affecting the orbit included an orbit adjust every three days with dual positive/negative OA's to provide tighter control on orbit characteristics, including the location of Argument of Perigee as necessary. The events during the RV-1 segment were:

1. Positive orbit adjust on Rev 46.
2. Positive orbit adjust on Rev 94 followed by a negative orbit adjust on Rev 97.
3. Positive orbit adjust on Rev 143.
4. Positive orbit adjust on Rev 192.

2.5.1.2 Prediction Accuracy

Table 2.5-2 contains a summary of prediction accuracies over ten rev span from each tracking reduction epoch rev. Accuracies are determined by comparing the nodal crossing differences between the Best Fit Ephemeris and the tracking reduction ephemeris predictions. Prediction accuracies were within acceptable limits throughout the RV-1 segment.

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TRACKING F JCTION

SUMMARY

EPOCH REV	ECCENT.	PERIOD DECAY	INTEG. PERIOD	MAX ALTIT.	MIN. ALTIT.	ARG. PERIGEE	DRAG	STABLE/ TUMBLE	COMMENTS
000	.0092	.1960	88:53.1	154.59	86.96	149.8	-	214/ -	
001	.0094	.1957	88:52.7	156.05	87.12	142.5	.4222	227/65	
002	.0094	.1966	88:52.5	156.05	87.08	142.2	.4220	227/65	
003	.0094	.1974	88:52.4	156.03	87.03	141.9	.4220	226/65	
004	.0094	.1932	88:52.2	155.98	86.98	141.6	.4106	231/67	
006	.0093	.1877	88:51.9	155.75	87.06	141.2	.4001	238/70	
008	.0093	.1873	88:51.5	155.53	87.12	140.4	.4013	238/70	
012	.0092	.1886	88:50.6	155.19	87.01	139.6	.3963	237/69	
016	.0092	.2016	88:49.9	154.71	87.06	138.6	.4225	222/63	
019	.0092	.2045	88:49.3	154.54	86.88	137.8	.4176	220/63	
021	.0091	.1859	88.48.9	154.39	86.83	137.4	.3740	242/70	
024	.0091	.1821	88:48.5	154.08	86.98	136.4	.3743	247/72	
028	.0091	.1866	88:47.6	153.65	86.95	135.6	.3795	241/72	
032	.0090	.1863	88:46.9	153.29	86.96	134.6	.3769	242/70	
035	.0090	.2057	88:46.2	153.07	86.78	133.9	.4089	218/63	
037	.0089	.2085	88:45.7	152.88	86.72	133.4	.4103	216/63	
040	.0089	.1944	88:45.3	152.56	86.87	132.4	.3849	232/67	
045	.0088	.1946	88:44.3	152.11	86.76	131.4	.3783	232/67	
048	.0096	.1817	88:52.5	158.01	87.14	134.9	.3853	259/75	OA No. 1 Rev 46
051	.0096	.2072	88:51.7	157.73	87.00	134.2	.4313	228/66	
053	.0096	.2194	88:51.2	157.53	86.91	133.6	.4529	215/61	

SECRET

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TRACKING [illegible]UCTION

SUMMARY

EPOCH REV	ECCENT.	PERIOD DECAY	INTEG. PERIOD	MAX ALTIT.	MIN. ALTIT.	ARG. PERIGEE	DRAG	STABLE/ TUMBLE	COMMENTS
056	.0095	.2011	88:50.8	157.20	87.06	132.8	.4174	235/71	
061	.0095	.1896	88:49.8	156.75	86.99	131.7	.3877	250/73	
064	.0094	.1959	88:49.3	156.36	87.10	130.9	.4016	241/70	
067	.0094	.2069	88:48.5	156.06	86.97	130.1	.4174	228/66	
070	.0094	.2136	88:48.0	155.91	86.87	129.6	.4263	221/64	
073	.0093	.2064	88:47.3	155.39	87.04	128.5	.4149	228/67	
077	.0092	.2059	88:46.4	154.99	86.92	127.7	.4053	229/67	
081	.0091	.2099	88:45.7	154.44	87.03	126.8	.4129	224/65	
084	.0091	.2306	88:44.9	154.14	86.85	126.1	.4403	206/61	
086	.0091	.2291	88:44.4	153.85	86.83	125.6	.4392	205/61	
089	.0090	.2216	88:43.9	153.47	86.56	124.6	.4259	211/63	
093	.0089	.2126	88:42.9	152.99	86.89	123.8	.4025	220/64	OA No. 2 Rev 94
098	.0090	.1877	88:52.5	153.49	87.33	150.6	.4169	219.64	OA No. 3 Rev 97
100	.0090	.1772	88:52.0	153.41	87.17	150.1	.3879	233/67	
102	.0090	.1959	88:51.5	153.22	87.08	149.6	.4244	211/63	
104	.0090	.1912	88:51.3	152.99	87.19	149.0	.4170	216/64	
110	.0089	.2036	88:50.0	152.46	86.98	147.5	.4331	204/59	
113	.0088	.2024	88:49.4	152.00	87.07	146.7	.4452	199/58	
116	.0088	.2217	88:48.6	151.73	86.91	145.9	.4602	189/55	
118	.0088	.2257	88:48.1	151.53	86.82	145.3	.4677	184/54	
121	.0087	.2169	88:47.6	151.01	87.11	144.2	.4560	192/57	

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TRACKING : UCTION

SUMMARY

EPOCH REV	ECCENT.	PERIOD DECAY	INTEG. PERIOD	MAX ALTIT.	MIN. ALTIT.	ARG. PERIGEE	DRAG	STABLE/ TUMBLE	COMMENTS
126	.0086	.2179	88:46.5	150.52	86.96	143.1	.4495	192/57	
129	.0085	.2253	88:45.8	150.13	86.98	142.2	.4628	185/54	
132	.0085	.2351	88:45.0	149.89	86.77	141.3	.4719	178/52	
134	.0085	.2340	88:44.6	149.74	86.66	140.8	.4650	179/52	
137	.0084	.2198	88:44.1	149.35	86.79	139.9	.4390	190/55	
143	.0094	.1951	88:53.6	156.39	87.09	143.9	.4247	227/68	OA No. 4 Rev 143
146	.0094	.1961	88:53.2	156.18	87.15	143.6	.4271	226/68	
149	.0094	.2012	88:52.6	156.03	86.95	142.7	.4272	221/65	
154	.0093	.1951	88:51.6	155.48	87.05	141.2	.4164	228/67	
158	.0093	.1987	88:50.7	155.12	86.91	140.4	.4170	224/65	
162	.0092	.1972	88:50.1	154.70	86.96	139.5	.4128	226/68	
165	.0092	.2131	88:49.4	154.48	86.78	138.7	.4343	211/64	
167	.0092	.2068	88:48.9	154.29	86.72	138.2	.4216	215/63	
170	.0091	.2042	88:48.4	153.93	86.85	137.2	.4183	218/64	
174	.0090	.2160	88:47.4	153.43	86.78	136.3	.4363	207/59	
178	.0090	.2100	88:46.7	153.02	86.78	135.4	.4214	212/61	
181	.0089	.2592	88:45.8	152.66	86.62	134.6	.5106	172/50	
183	.0089	.2830	88:45.2	152.33	86.53	134.0	.5505	157/46	
186	.0088	.2732	88:44.5	151.83	86.64	133.0	.5322	163/47	
191	.0087	.2629	88:43.1	151.17	86.46	132.0	.4997	169/49	
195	.0100	.2409	88:53.0	160.04	86.72	131.2	.4935	202/58	OA No. 5 Rev 192

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Table 2.5-1

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SUMMARY

EPOCH REV	ECCENT.	PERIOD DECAY	INTEG. PERIOD	MAX ALTIT.	MIN. ALTIT.	ARG. PERIGEE	DRAG	STABLE/ TUMBLE	COMMENTS
197	.0100	.2394	88:52.4	159.82	86.58	130.8	.4853	202/58	
199	.0099	.2376	88:51.9	159.63	86.49	130.2	.4749	204/58	
202	.0098	.2228	88:51.5	159.21	86.69	129.3	.4489	218/59	
207	.0098	.2152	88:50.3	158.66	86.62	128.2	.4266	226/65	
210	.0097	.2217	88:49.7	158.22	86.69	127.5	.4391	218/59	
213	.0097	.2321	88:48.9	157.90	86.52	126.8	.4509	208/60	
216	.0096	.2312	88:48.2	157.51	86.49	126.0	.4450	208/60	
219	.0096	.2283	88:47.6	157.11	86.61	125.0	.4403	211/60	
223	.0095	.2290	88:46.6	156.61	86.50	124.3	.4340	210/61	
227	.0094	.2530	88:45.7	155.96	86.53	123.4	.4763	189/55	

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Table 2.5-1

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PREDICTION ACCURACY SUMMARY

(BFE - Tracking Reduction Predictions)

Tracking Reduction Epoch Rev	BFE ID NO.	5 Revs After Epoch	10 Revs After Epoch
REV 000	DAY 1	.189	.420
001	1	.614	1.376
002	1	.150	.546
003	1	.159	.615
004	1	.892	.398
006	1/2	- .030	- .124
008	1/2	.049	- .172
012	2	- .198	- .526
016	2	.169	.769
019	2	.330	1.072
021	2	.061	.052
024	2/3	- .090	- .311
028	3	.132	- .281
032	3	- .260	- .698
035	3	.124	.631
037	3	.384	.609
040	3/4	.129	.162
045	4	- .093	- .763
048	4	- .436	-1.406
051	4	- .066	.257
053	4	.442	1.612
056	4/5	.276	.594
061	5	- .245	- .869
064	5	- .173	- .647
067	5	- .012	- .012
070	5	.207	.562
073	5/6	.034	- .071
077	6	- .164	- .750
081	6	- .297	- .804
084	6	.070	.452
086	6	.198	.723
089	6/7	.176	1.215
093	7	.527	.876
098	7	- .160	- .585
100	7	- .328	- 1.357
102	7	.013	- .374
105	7/8	- .332	- 1.090
110	8	- .216	- .754
113	8	- .093	- .358
116	8	.087	.221
118	8	.359	.785
121	8/9	.127	.125
126	9	- .212	- .477
129	9	.003	.294
132	9	.318	1.181
134	9	.423	1.342
137	9/10	.182	.907
143	10	.533	1.208
146	10	.031	.137
149	10	.080	.238

Table 2.5-2

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PREDICTION ACCURACY SUMMARY

(BFE - Tracking Reduction Predictions)

Tracking Reduction Epoch Rev	BFE ID NO.	5 Revs After Epoch	10 Revs After Epoch	Tracking Reduction Epoch Rev	BFE ID NO.	5 Revs After Epoch	10 Revs After Epoch
151	10	.155	.354				
154	10/11	- .043	- .068				
158	11	.042	- .028				
162	11	- .129	- .423				
165	11	.143	.333				
167	11	- .001	- .131				
170	11/12	- .150	- .503				
174	12	.153	- .491				
178	12	- .728	- 2.889				
181	12	- .355	- .700				
183	12	.276	1.249				
186	12/13	.311	.605				
191	13	.588	1.815				
195	13	.252	1.048				
197	13	.349	1.322				
199	13	.466	1.446				
202	13/14	.271	.514				
207	14	- .313	- .988				
210	14	- .210	- .573				
213	14	- .009	.099				
216	14	.070	.232				
219	14/15	.013	- .438				
223	15	- .365	- 3.492				
227	15	- .054	- 3.435				
231	15	- .907	- 2.427				

Table 2.5-2

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2.5.1.3 B-Factor

Figure 2.5-1 shows a plot of B-factor for this segment of the mission. The B-factors shown are from the individual tracking reductions and from the BFE for comparison. Maneuvers are indicated as to the rev of occurrence.

The daily average K factor, i.e., the ground magnetometer readings from Alaska and Colorado as indicative of possible rediation damage to the stellar film, is also shown on this figure.

2.5.1.4 Orbit Adjust Summary

Table 2.5-3 reflects a summary of each orbit adjust during this segment. For each orbit adjust or set of orbit adjusts occurring on the same or adjacent revs, orbital conditions are provided which describe the orbit prior to the first orbit adjust. In addition, the predicted velocity change and orbit resulting from each orbit adjust or set of orbit adjusts is provided and compared with the actual orbit and velocity change obtained. The actual orbit and velocity change was determined from the Best Fit Ephemeris. All orbit adjusts were close to nominal.

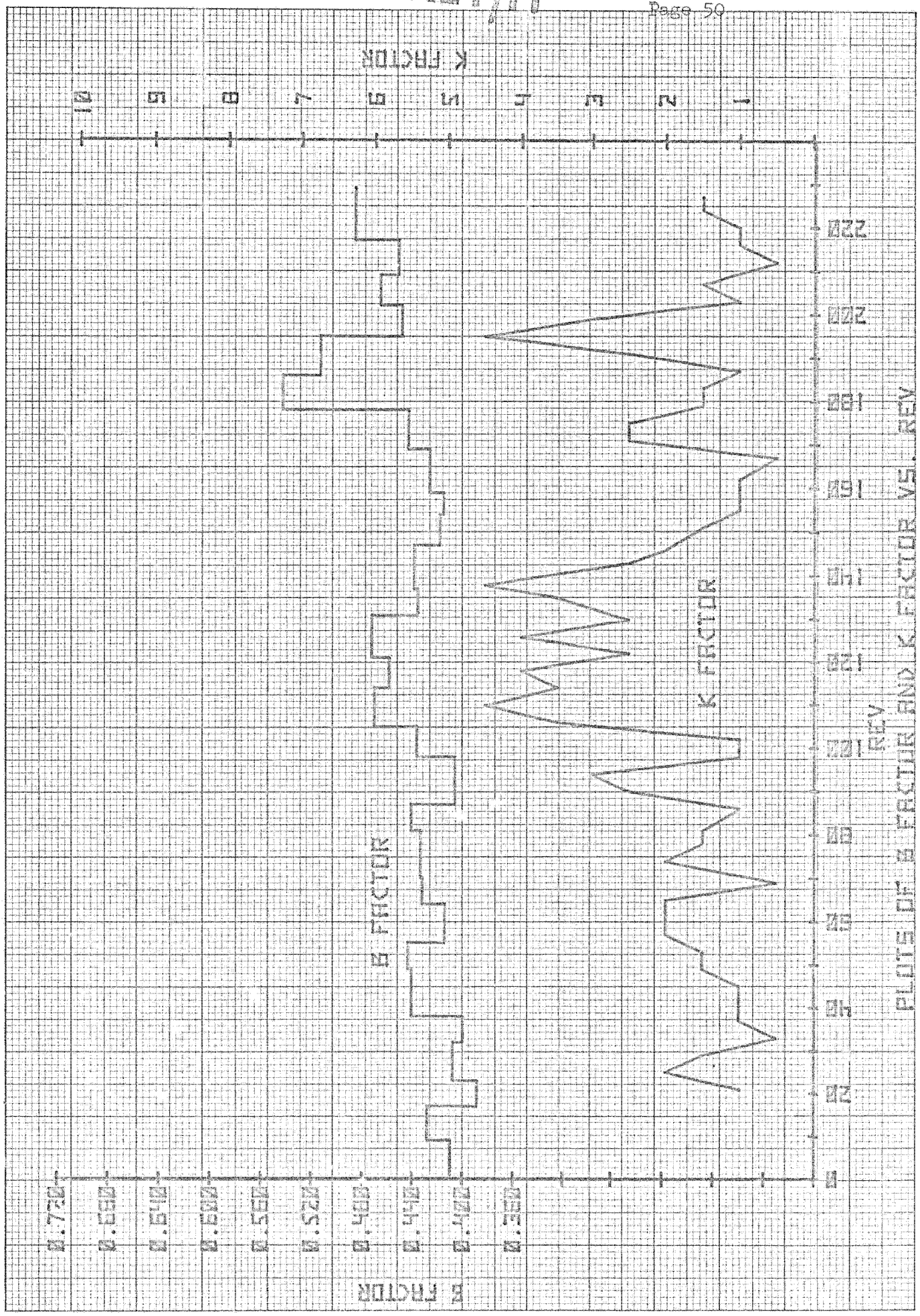
2.5.1.5 Best Fit Ephemeris

Table 2.5-4 shows the orbital conditions for each day of this segment of the mission.

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10 X 10 TO ½ INCH 46 1320
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.

Figure 2.5-1

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	Period Min:Sec. XX:XX.X	Perigee N.M. XX.XX	Apogee N.M. XXX.XX	Arg of Per. Deg. XXX.XXX	Burn Dur. Sec. XX.X	Delta Velocity XX.XX
OA No. 1 Rev. No. 46						
Orbit at Rev 45	88:44.2	88.71	150.23	131.215	-	-
Predicted 46	88:52.8	88.86	156.47	135.187	-	+ 13.71
Actual 46	88:52.8	88.85	156.51	135.181	40.2	+ 13.79
Delta (A-P)	-	- .01	+ .04	- .006	-	+ .08
OA No. 2 Rev. No. 94						
Orbit at Rev 93	88:42.8	88.76	151.39	123.747	-	-
Predicted					-	+ 35.30
Actual					103.6	+ 35.70
Delta (A-P)					-	+ .40
OA No. 3 Rev. No. 97						
Orbit at Rev -						
Predicted 97	88:52.4	88.36	152.05	150.675	-	- 19.16
Actual 97	88:52.6	88.44	152.00	150.992	57.6	- 19.30
Delta (A-P)	+ .6	+ .08	- .05	+ .317	-	+ .14
OA No. 4 Rev. No. 143						
Orbit at Rev 142	88:42.8	88.41	146.81	138.528	-	-
Predicted 143	88:53.6	88.50	154.79	143.932	-	+ 17.23
Actual 143	88:53.7	88.54	154.84	144.025	53.00	+ 17.49
Delta (A-P)	+ .1	+ .04	+ .05	+ .093	-	+ .26

Table 2.5-3

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OA No. 5	Rev. No. 192	Period Min:Sec. XX:XX.X	Perigee N.M. XX.XX	Apogee N.M. XXX.XX	Arg of Per. Deg. XXX.XXX	Burn Dur. Sec. XX.X	Delta Velocity XX.XX
Orbit at Rev	191	88:43.0	88.43	149.26	132.003	-	-
Predicted	192	88:53.4	88:46	158.70	131.704	-	+ 16.77
Actual	192	88:53.6	88.48	158.84	131.689	52.0	+ 17.05
Delta (A-P)		+ .2	+ .02	+ .14	- .015	-	+ .18
OA No. _____	Rev. No. _____						
Orbit at Rev							
Predicted							
Actual							
Delta (A-P)							
OA No. _____	Rev. No. _____						
Orbit at Rev							
Predicted							
Actual							
Delta (A-P)							
OA No. _____	Rev. No. _____						
Orbit at Rev							
Predicted							
Actual							
Delta (A-P)							

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BEST FIT EPHEMERIS

SUMMARY

DAY	EPOCH REV	ECCENT.	INCL.	INTEG. PERIOD	MAX. ALTITUDE	MIN. ALTITUDE	ARG. PERIGEE	DRAG	REV. SPAN
XX	XXX	.XXXX	XX.XX	XX:XX.X	XXX.XX	XX.XX	XXX.X	.XXXX	XXX - XXX
01	000	.0094	96.93	88:53.0	156.17	87.20	142.8	.4000 .4100	1 - 5 1 - 9
02	009	.0092	96.93	88:51.3	155.30	87.27	140.2	.4283 .3885 .3835	9 - 17 17 - 23 23 -
03	026	.0090	96.93	88:48.0	153.70	87.20	135.7	.4077 .3998 .3790	26 - 32 32 - 38 38 -
04	041	.0088	96.93	88:45.2	152.28	87.16	131.9	.4403 .4435 .3886	38 - 49 49 - 55 55 -
05	057	.0094	96.92	88:50.6	156.96	87.29	132.2	.4141 .4318 .4117	57 - 64 64 - 70 70 -
06	074	.0092	96.92	88:47.1	155.14	87.21	128.1	.4334 .4409 .4116	74 - 81 81 - 87 87 -
07	090	.0089	96.92	88:43.6	153.10	87.26	124.1	.4062 .4364 .4591	90 - 98 98 -105 105 -
08	106	.0088	96.92	88:50.8	152.46	87.53	148.1	.4699 .4588 .4585	106 - 114 114 - 121 121 -
09	123	.0086	96.92	88:47.1	150.77	87.14	143.4	.4722 .4355 .4226	123 - 131 131 - 137 137 -

Table 2.5-4

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BEST FIT EPHEMERIS

SUMMARY

DAY	EPOCH REV	ECCENT.	INCL.	INTEG. PERIOD	MAX. ALTITUDE	MIN. ALTITUDE	ARG. PERIGEE	DRAG.	REV. SPAN
XX	XXX	.XXXX	XX.XX	XX:XX.X	XXX.XX	XX.XX	XXX.X	.XXXX	XXX - XXX
10	139	.0084	96.92	88:43.6	149.03	86.90	139.2	.4388 .4184 .4217	139 - 147 147 - 154 154 -
11	154	.0093	96.92	88:51.6	155.42	87.10	141.2	.4153 .4265 .4299	154 - 159 159 - 169 169 -
12	171	.0090	96.92	88:48.2	153.67	87.01	136.8	.4433 .5428 .4897	171 - 178 178 - 186 186 -
13	186	.0088	96.92	88:44.5	151.78	86.77	132.9	.5133 .4487 .4260	186 - 195 195 - 202 202 -
14	203	.0098	96.92	88:51.3	159.08	86.79	128.9	.4654 .4511 .4357	203 - 209 209 - 217 217
15	219	.0096	96.92	88:47.7	157.10	86.65	125.1	.4858 .6871 .5863 .5617	219 - 229 229 - 229 229 - 234 234 -

Table 2.5-4

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2.5.2 Telemetry and Mode Processing

The telemetry modes for SV-7 were validated prior to the dress rehearsal. Mode problems and mode changes required because of hardware problems are discussed below.

2.5.2.1 SV-7 Telemetry Mode Problems

a. MCR 7-42

PROBLEM: A search block is required in Modes 130, 131, 140 and 141 to search for BV-EV times in Block 2 of the above modes. This requirement imposed by the need to closely monitor the Pan Camera System because of pre-flight problems.

SOLUTION: Add a Block 3 to search to Block 2 in each of the above modes.

OPS IMPACT: Reduction of P/B time for these modes.

COMMENT: Modes validated and sent to RTS.

b. MCR 7-43

PROBLEM: In Mode 124.2 Trigger 6 was being output every 11 seconds. The required output frequency for Trigger 6 is at Acq +11 and on any change thereafter.

SOLUTION: Mode 124.2 was corrected and regenerated so that Trigger 6 is output as required.

OPS IMPACT: Possible masking of data from analyst.

COMMENT: Modes 123 and 125 were also regenerated as they are common RAD with Mode 124.

c. MCR 7-44

PROBLEM: P403 is constantly failing its limits. These limits are pre-flight nominal values.

SOLUTION: Change the limits on P403 from 106-120 to 104-118 counts in Modes 122 and 144.

OPS IMPACT: SSC is not required to report unmeaningful "out-of-limits" conditions in the Rebound 850 msg.

COMMENT: P403 = Metering Capstan Summed Error.

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d. MCR 7-45

PROBLEM: P403 is constantly failing its limits because of a shift in the pre-flight nominal limits.

SOLUTION: Change the limits to 105-119.

OPS IMPACT: SSC is not required to report meaningless out-of-limits conditions on Rebound messages.

COMMENTS: P403 = Metering Capstan Summed Error. (See MCR 7-44).

e. MCR 7-46

PROBLEM: P457 and P458 open/close indications are being output incorrectly in Mode 122.

SOLUTION: Under investigation.

OPS IMPACT: Increased analysis time and effort to determine true status of this subsystem.

COMMENT: P457 = A Side Shutter
P458 = B Side Shutter

f. OTHER

1. Points P260 and P261 are not being displayed properly in Mode 11.

SOLUTION: No action.

OPS IMPACT: None. P260 and P261 are correctly displayed in Mode 13.

COMMENT: P260 = Pneumatics A Tank Temp.
P261 = Pneumatics B Tank Temp.

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2.5.3 Command Message Planning and Generation

The FPA was updated to reflect SV-7 requirements prior to the Dress Rehearsal and has been used throughout the segment. Changes to the FPA during the segment were made as necessary to support added or changed vehicle requirements. The majority of the required changes involved secondary flight objective engineering tests, such as Horizon Sensor Mapping, Lifeboat Attitude data, etc.

Planning for the BUSTC operation in the eventuality of a catastrophic STC failure, involved extending the SP (Station Pass) contacts duration to provide SV access until BUSTC operations could be started.

Command Generation support was excellent during the segment.

2.5.4 SCF Support

SCF support during the entire RV-1 segment was excellent. Minor RTS caused loss of several small segments of Tape Recorder data but caused no impact on mission operations.

Radiation level monitoring and reporting continued as on SV-6.

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SECTION 2.6
PROGRAM COMMAND SOFTWARE PERFORMANCE
(Prepared by HTC)

2.6.1 Command Message Summary

This section summarizes pertinent command message data from Mission 1207, IRON 6630. The command messages discussed cover the period from the padload to the RV1 recovery message (Rev 227 load).

One hundred seventy-eight command messages were received by the Technical Advisor (TA) Staff. One hundred forty-nine were accepted and twenty-nine were rejected. Eight of the rejected messages were subsequently altered and loaded into the vehicle. The remaining twenty-one were not required due to lack of payload operation or no change in payload selection. The reasons for rejection of the eight messages are summarized below:

Rev No. and Load Station	Reason for Rejection
18 POGO	No SCLOCK card was input into this MCS message.
55 BOSS	The message load card had been omitted. Having already clobbered the SACRED tape the message was properly altered and a new SACRED tape created.
91 HULA	Incorrect slit widths input for Rev 91 MOP.
158 GUAM	Due to obscura, a split pass occurred and the software did not assemble a PCM D select command as required.
174 GUAM	Same reason as described for 158 GUAM.
204 HULA	This message contained incorrect slit widths.
220 HULA	This message was altered to delete four incorrect slit width commands.
223 GUAM	This prep. message contained two commands with the same time tag.

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One hundred forty-five messages were loaded and thirty-three were not for the reasons stated below:

1. The twenty-nine rejected messages were not loaded.
2. One message was not loaded because it was decided that the original message was satisfactory (Rev 37 POGO).
3. One message was accepted but not loaded because of a change in message requirements (Rev 152 BOSS).
4. Two contingency VBE messages concerning RV1 recovery were not required.

A one rev load cycle was employed while the vehicle was over the area of interest. The add-on message generation and loading philosophy was in effect. This resulted in the generation of one hundred sixty-three add-on messages.

Summary

Total RV1 messages	-	178
Messages rejected	-	29
Total messages accepted	-	149
Messages not required	-	4
Total messages accepted and loaded	-	145

2.6.2 'TUNITY Software Problems

The flight 7 'TUNITY software problems itemized below pertain only to the period from launch through RV1. They have been grouped into the following categories to demonstrate their impact on the flight. The disposition of these software problems will be specified by the Configuration Control Board.

Category	No. of SPRs	Comments
Flight Critical	5 (6316,6318, 6323,6324, 6325)	Software corrections were made and incorporated during this flight period.
Non-Flight Critical (Requiring Work-Around)	6	Work-around procedures were developed and implemented.

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Category	No. of SPRs	Comments
Non-Flight Critical (Minor)	4	Work-around procedures were not required.
Product Improvement or New Requirements	9	To be considered during future development.
Documentation Error	1	MS-4 or MS-7 affected.

Itemized Software Problems

SPR MD2-6307 ('TRANFUN)

- Problem Description: If an MCS sequence is requested by an event generator while in the ECS mode and PMU is specified as A or B, 'TRANFUN will not output error message #21 and will attempt to assemble MCS commands into an ECS message resulting in 'TRANS errors. The problem would occur if an MCS sequence is subbed in 'TWORT and PMU was specified on the original MAC card input.

- Solution or Work-Around: Care must be taken when using the "SUB" card that the proper sequence is used in the proper mode.

- Operational Impact: None

- Comment: It is a software problem, the solution is known and it should be fixed at the first opportunity not involving a flight.

SPR MD2-6308 ('TCROSS)

- Problem Description: An ST Inhibit card was input on the rev 14 load with a latitude of 83.0°S as the start of the inhibit band. Maxlat for the rev as listed in the 'EET is 83.1°S. The input card was rejected as exceeding Maxlat.

- Solution or Work-Around: The compound time field on the card must be changed from latitude to a different compound time field such as rev and system time or rev, hemisphere and longitude.

- Operational Impact: None

- Comment: SOST is currently studying the possibility of changing the source of Maxlat in the 'TUNITY system to be the 'EET value. It should be noted that using Lat as a method of determining a unique time near Maxlat should be discouraged because its directive with respect to time is approaching zero.

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SPR MD2-6309 ('TFRTFIX)

- Problem Description: A bad "MODF" card was input to a 'TFRTFIX run to correct an erroneous frame count. Neither "CNT" nor "SVT" was specified on the data card. 'TFRTFIX gave no indication that a parameter was missing from the data card.

- Solution or Work-Around: The card must be completed and 'TFRTFIX rerun.

- Operational Impact: None

- Comment: It is a software problem in that more complete data card checking could be done. The solution is known and should be implemented prior to the support of SV-8.

SPR MD2-6310 ('TDERBY)

- Problem Description: With the current design of the doppler beacon circles, a combined event duration can exceed the maximum sequence duration limitation of 6553.4 seconds.

- Solution or Work-Around: The smaller SV-6 doppler beacon circles were substituted for those originally defined for SV-7. This eliminated the extended duration carried by overlapping circles and therefore the problem of exceeding the sequence duration limitation of 6553.4 seconds.

- Operational Impact: With the larger SV-7 beacon circles, beacon data is lost.

- Comment: This SPR should be considered as a product improvement item for a future software delivery. It should be noted that this limitation not only applies to 'TDERBY but all event generators.

SPR MD2-6311 ('TUMP)

- Problem Description: When a "MOP" card is input with the "RTM" option and it is combined with a selected operation, the "RTM" may or may not take effect. This causes the wrong sequence to be assembled for a real time MOP.

- Solution or Work-Around: An inhibit on the rev in the area of the "MOP" will solve this problem.

- Operational Impact: There was no operational impact because the conflicting logic in 'TRIAL moved the recorder commands out of the station.

- Comment: It is a software problem, the solution is known and it should be fixed prior to the support of SV-8.

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SPR MD2-6312 ('TUPM)

- Problem Description: 'TUPM aborts with a bounds violation when attempting to generate a block zero VBE message in conjunction with a normal SE add-on message.
- Solution or Work-Around: A single message will have to be generated and then altered just like the emergency abort message in order to achieve the desired affects.
- Operational Impact: None
- Comment: This SPR should be considered as a product improvement item for a future software delivery. 'TUPM could be redesigned to ignore two address memory commands in the same block providing the block was block zero.

SPR MD2-6313 ('TBAT)

- Problem Description: 'TBAT should have the capability to list the 'TAPTAB data without the necessity to use the "Full List" option.
- Solution or Work-Around: None
- Operational Impact: None
- Comment: This SPR should be considered as a product improvement item for a future software delivery.

SPR MD2-6314 ('TBALL)

- Problem Description: The 'SDAHA read of the 'TLITAB into core from disc is in error. If more than 18 ops existed on a single rev, the additional ops would not be considered for internal countdown.
- Solution or Work-Around: None
- Operational Impact: None because internal countdown is not a significant factor on winter missions and the chance of over 18 ops per rev is remote.
- Comment: It is a software problem, the solution is known and it should be fixed prior to the support of SV-8.

SPR MD2-6315 ('TORB)

- Problem Description: Beacon circles whose centers are above Maxlat are being ignored. There is logic in 'TORB to handle this situation for both beacon circles [redacted] This logic does not appear to be working properly.

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- Solution or Work-Around: The beacon circles have to be redefined so that no circle has a center above Maxlat.

- Operational Impact: There was some loss of beacon data until the work-around procedure was implemented.

- Comment: It is a software problem, the solution is known and it should be fixed prior to the support of SV-8.

SPR MD2-6316 ('TOREP) - FLIGHT CRITICAL -

- Problem Description: A request has been received to increase the accuracy of 'CFB output by MPR. At present 'TOREP outputs 9 digits to the right of the decimal point. Accuracy to be extended to 11 digits to the right of the decimal point.

- Solution or Work-Around: The problem was determined to be flight critical because 'CFB is not accurate enough for the users of the MPR data. A change was made to 'TOREP correcting this problem and was incorporated on the flight Aux Master.

- Operational Impact: 'CFB was not accurate enough for the user for the first few days of the flight. With the implementation of the new mod of 'TOREP the problem has been solved.

SPR MD2-6317 ('TOTEM)

- Problem Description: With the current logic in the subroutine goal, if we have the situation of exiting a circle (or polygon) and entering a polygon, the events will not be deconflicted. Overlapping sequence requests will be generated by 'TOTEM for the events. Since the deconflicting will then be left for 'TRIAL to perform, we will have extra off commands loaded in the opposite PMU unnecessarily.

- Solution or Work-Around: None

- Operational Impact: There is no operational impact because for SV-7 polygons and circles are not being processed at the same time.

- Comment: 'TUNITY is operating per design in this case. This SPR should be considered a product improvement item for a future software delivery.

SPR MD2-6318 ('TMOUND) - FLIGHT CRITICAL -

- Problem Description: In message 840, rev 91 HULA load, the SLW bias was incorrectly applied for operation number 1 on rev 91. The program now calculates ideal SLW, limits at max value (0.910), then looks for a bias. The bias is applied from the max limit rather than from ideal values which can be well over 0.910 at low sun angles.

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- Solution or Work-Around: The problem was determined to be flight critical because the SLW bias was not being applied properly thus causing underexposure. A change was made to 'TMOUND correcting this problem and was incorporated on the flight Aux Master.

- Operational Impact: The message had to be altered to insert the proper SLW commands. With the implementation of the new mod of 'TMOUND the problem has been solved.

SPR MD2-6319 ('TSTAGEN)

- Problem Description: 'TSTAGEN does not give any error information when a card to change MODE, SGLS or TPS at a cap O station is input. The results of this error are that none of the requested changes are made. An informational error message, output by 'TSTAGEN, saying that station status changes were input for an inactive station in the "SP" span, would suffice.

- Solution or Work-Around: None

- Operational Impact: None

- Comment: This SPR should be considered as a product improvement item for a future software delivery.

SPR MD2-6320 ('TDEFINE)

- Problem Description: 'TDEFINE should buffer all data card inputs to permit card format and/or compatability checks to be performed, before any data cards are permitted to update the data base. Also, 'TDEFINE should list the proposed updated sequence for user inspection before processing continues.

- Solution or Work-Around: None

- Operational Impact: None

- Comment: This SPR should be considered a product improvement item for a future software delivery.

SPR MD2-6321 ('TCOMP)

- Problem Description: 'TCOMP should list miscompares in a more readable format, therefore, by item name and/or table entry number. Also 'TCOMP should be able to compare data bases constructed with different compools, possibly flagging the new compool items added or deleted.

- Solution or Work-Around: None

- Operational Impact: None

- Comment: This SPR should be considered as a product improvement item for a future software delivery.

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SPR MD2-6322 ('TDCARD)

- Problem Description: 'TDCARD should buffer all data card inputs to permit card format and/or compatability checks to be performed, before any data cards are permitted to update the data base.

- Solution or Work-Around: None

- Operational Impact: None

- Comment: This SPR should be considered as a product improvement item for a future software delivery.

SPR MD2-6323 ('TSTAGEN) - FLIGHT CRITICAL -

- Problem Description: An SP message deck contained separate STA cards for a mode change and a SGLS change (in that order). Only the SGLS change occurred.

- Solution or Work-Around: The problem was determined to be flight critical because the message had to be regenerated and this problem was going to be a common occurrence. A change was made to 'TSTAGEN correcting this problem and was incorporated on the flight Aux Master.

- Operational Impact: The message had to be regenerated thus causing a delay in the message checking time. With the implementation of the new mod of 'TSTAGEN the problem has been solved.

SPR MD2-6324 ('TBALL) - FLIGHT CRITICAL -

- Problem Description: 'TBALL was modified to print OP scores for MOPs. OP 1 of rev 135 was a three part combine with a total score of around 3000. The first and last sub-op were automatics with the middle being a MOP. In message 380 the score for OP 1 was reported as 980 which was the score of the first automatic sub-op.

- Solution or Work-Around: The problem was determined to be flight critical because the customer uses the score of the operations to determine the efficiency of that operation. A change was made to 'TREPLAY correcting the problem and was incorporated on the flight Aux Master.

- Operational Impact: There was no operational impact, just confusion to the user. With the implementation of the new mod of 'TREPLAY the problem has been solved.

SPR MD2-6325 ('TSTAGEN) - FLIGHT CRITICAL -

- Problem Description: An SP message deck contained a mode switch for a broken pass. The pass (163 POGO) had two rises and two sets. The first part of the pass had a duration of 30 seconds and 'TSTAGEN did not assemble any commands for this part but did indicate a mode D. The second part of the pass had a duration of 291 seconds but 'TSTAGEN did not assemble the mode D command.

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- Solution or Work-Around: The problem was determined to be flight critical because of the failure of 'TSTAGEN to assemble the mode D command. A change was made to 'TSTAGEN correcting this problem and was incorporated on the flight Aux Master.

- Operational Impact: The message had to be altered to add the necessary mode D command thus causing a delay in checking the message. With the implementation of the new mod of 'TSTAGEN the problem has been solved.

SPR MD2-6326 ('TCOMTIM)

- Problem Description: 'TWORT did not sub a sequence 101 for a sequence 90 at 163 POGO. 163 POGO was a broken pass with two rises and two sets. 'TWORT processed the sub for the first rise/set at 163 POGO which was a 30 second pass and allowed the sequence 90 at the second rise/set causing a TR blink at the second POGO set.

- Solution or Work-Around: When this situation occurs then a different compound time field other than RISE, TRAN, FADE or SET must be used on the data card.

- Operational Impact: The message had to be altered to correct the tape recorder blink thus causing delay in the message checking time.

- Comment: This SPR is a duplicate of SPR MD2-6252 written against 'TCOMTIM. SWFTFD and the SOST are now in the process of studying this problem to see the extent of the change required for 'TCOMTIM.

SPR MD2-6237 ('TBALL)

- Problem Description: A problem has been discovered in the computations used to determine whether two ops will merge or nest when inputs are via MOP cards. The software will put a subsequent operations FT+ command within 0.2 sec of the computed stop. The computation of FTSTOP is not accurate enough to allow placing of FT+ so close to FTSTOP. If FT+ occurs before FTSTOP it can cause a catastrophic failure to the sensor system.

- Solution or Work-Around: The data base item 'COPSBD should be increased to prevent this problem from occurring. 'COPSBD is an uncertainty that is added to the FTSTOP calculation and by increasing the value of this item the problem will not occur.

- Operational Impact: There was no operational impact in that the feared condition of FT+ preceeding FT had not actually occurred. The case in question was too close for comfort. Once the item 'COPSBD was increased the problem was solved.

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SPR MD2-6328 ('TUNITY)

- Problem Description: 'TUNITY should have the capability to provide film allocation data on a score basis for SS and ST operations.
- Solution or Work-Around: None
- Operational Impact: None
- Comment: This SPR should be considered as a product improvement item for a future software delivery.

SPR MD2-6329 ('TOTEM/'TDERBY)

- Problem Description: Considerable time has been spent in modifying the beacon circles during the last flight and during the current flight. Numerous alters have been necessary. The following improvements should be considered:

    1. Incorporation of polygon logic in 'TORB allowing 'TDERBY to use a polygon.
    2. Expand the polygon capability of 'TOTEM and 'TORB to some 25 polygons and provide deconflicting logic between circles and polygons as well as between polygons.
    3. Additional information on overlapped events should be displayed.

- Solution or Work-Around: None
- Operational Impact: None
- Comment: This SPR should be considered as a product improvement item for a future software delivery.

SPR MD2-6330 ('TRIAL)

- Problem Description: Message 330 contained two commands (a TT/C- and a C-) executing at the same time and in the same PMU. This message contained two C- commands that time conflicted with commands from the previous message. 'TRIAL correctly moved the first C- to the next available time slot but incorrectly moved the second C- only .2 of a second to a slot already occupied by another command.
- Solution or Work-Around: None
- Operational Impact: This problem occurred in the recovery message for RV-1 causing the message to be altered to move, manually, the conflicting commands.
- Comment: SOST is currently working on the problem to determine the frequency that it may occur and how to fix it.

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SPR MD2-6331 ('TWORT)

- Problem Description: An MQ card was used to move the call time of sequence 220 (within MAC 11) 12 sec forward in time in a regeneration of message 340 for rev 227 cook. Instead, the sequence 220 was called 103 seconds earlier.

- Solution or Work-Around: To move a single sequence within a macro a sub card must be used. The MQ card is used to move the entire macro.

- Operational Impact: The message had to be regenerated using the above mentioned work-around.

- Comment: The MS-7 should be updated to explain the proper use of the MQ card.

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2.6.3 Hardware/Software Interface Changes

For IRON 6630, eight change requests were processed from launch day through the RV-1 recovery message (as shown in Table 2.6.3-1).

Four of these changes were implemented via requests SV7-192 through SV7-195 and have been incorporated in the flight data base and hardware/software interface documentation. Four of these changes were processed via requests SV7-196 through SV7-199 but were not implemented when the test message revealed the proposed changes would not be acceptable.

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Table 2.6.3-1 Summary of Hardware/Software Interface Changes

Request No.	Identification	Effectivity
SV7-192	Provides new MACRO 50 which contains the RV-5 pre-separate pitch down and remote decoder ON sequences (Seq. 38 and 82).	SV-7 and nominal data base
SV7-193	Provides new MACRO 51 which contains the RV-5 SV attitude after RV separation abort, post separation pitch-up, LB check, RV separate and yaw forward sequences (Seq. 276, 275, 70, 378, 249, 35 and 90).	SV-7 and nominal data base
SV7-194	Modifies sequence 275 by providing a specific PMU assignment for use in conjunction with MACRO 51.	SV-7 and nominal data base
SV7-195	Modifies sequence 276 by providing a specific PMU assignment for use in conjunction with MACRO 51.	SV-7 and nominal data base
SV7-196	This change was disapproved. It increased the focus command priority and resulted in focus commands occurring after FT-.	
SV7-197	Identical to the above.	
SV7-198	Identical to the above.	
SV7-199	Identical to the above.	

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2.7 SATELLITE VEHICLE AND AUXILIARY PAYLOAD PERFORMANCE
(Prepared by Satellite Basic Assembly Contractor)

2.7.1 EDAP Performance

2.7.1.1 Solar Arrays were deployed at Rev 0 INDI. Deployment and erection were nominal. (Reference Figures 2.7-1 and 2.7-2.) At Rev 1 POGO both arrays were positioned to 0°. Solar Array output during Rev 2 was determined to be 24.45 A/H. No full sun rev record was obtained for a pass without a K2 drop-out after rev #3. However, in the past the solar arrays have degraded until approximately rev 7. Extrapolating using past data indicates that the S/A is producing 23.90 A/H per rev.

The main battery/solar array power system performed in a satisfactory manner during Segment 1. The first day Charge Current Controller K-2 Relay Openings occurred on Revs 3, 4, 5 and 7.

The Main Battery Voltages at sun entrance and the predicted power usage per rev are depicted in Figures 2.7-3. The average main bus voltage, at sun entrance, during the segment was 27.7 volts. The average actual power consumption was 22.02 A/H per rev.

The Main Battery Discharge Load Sharing at sun entrance, is indicated in Figures 2.7-4. The batteries are sharing load as follows: #1 - 26%, #2 - 29%, #3 - 23%, #4 - 22%.

The Main Battery Temperatures as observed in real time, are shown in Figures 2.7-5.

2.7.1.2 Main Battery #4 Heater Cycling

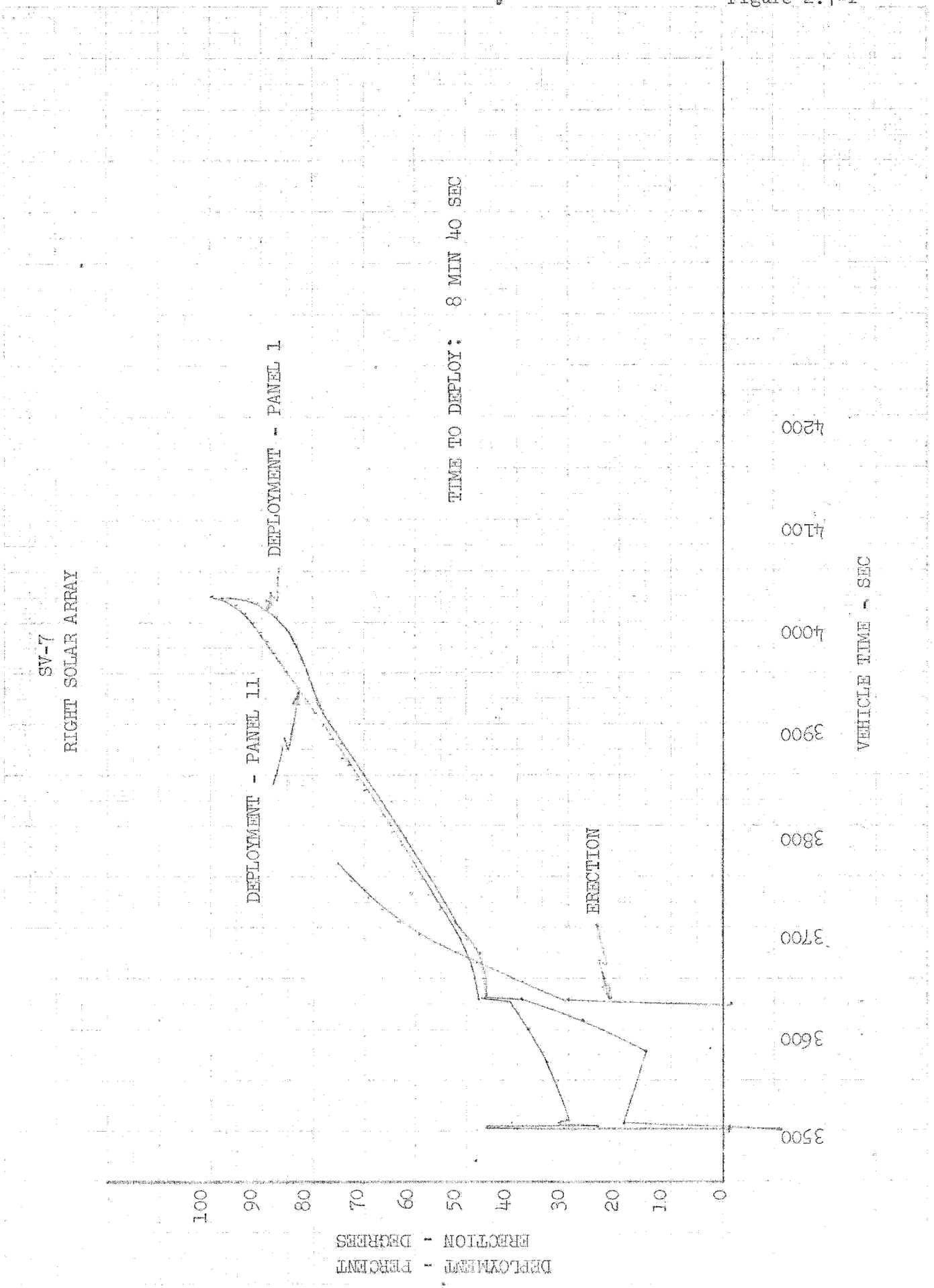
On Rev 186 the Main Battery #4 Heater began an abnormal cycling pattern. The varying abnormal cycling pattern continued until the end of the segment. This anomaly is similar to the anomalies which occurred on SV-6 on the battery #2 and 3 heaters. The #4 battery temp rose from 46° to 48°F. The primary batteries, which are in the same bay, also rose about 2°F in temp. This caused no difficulty.

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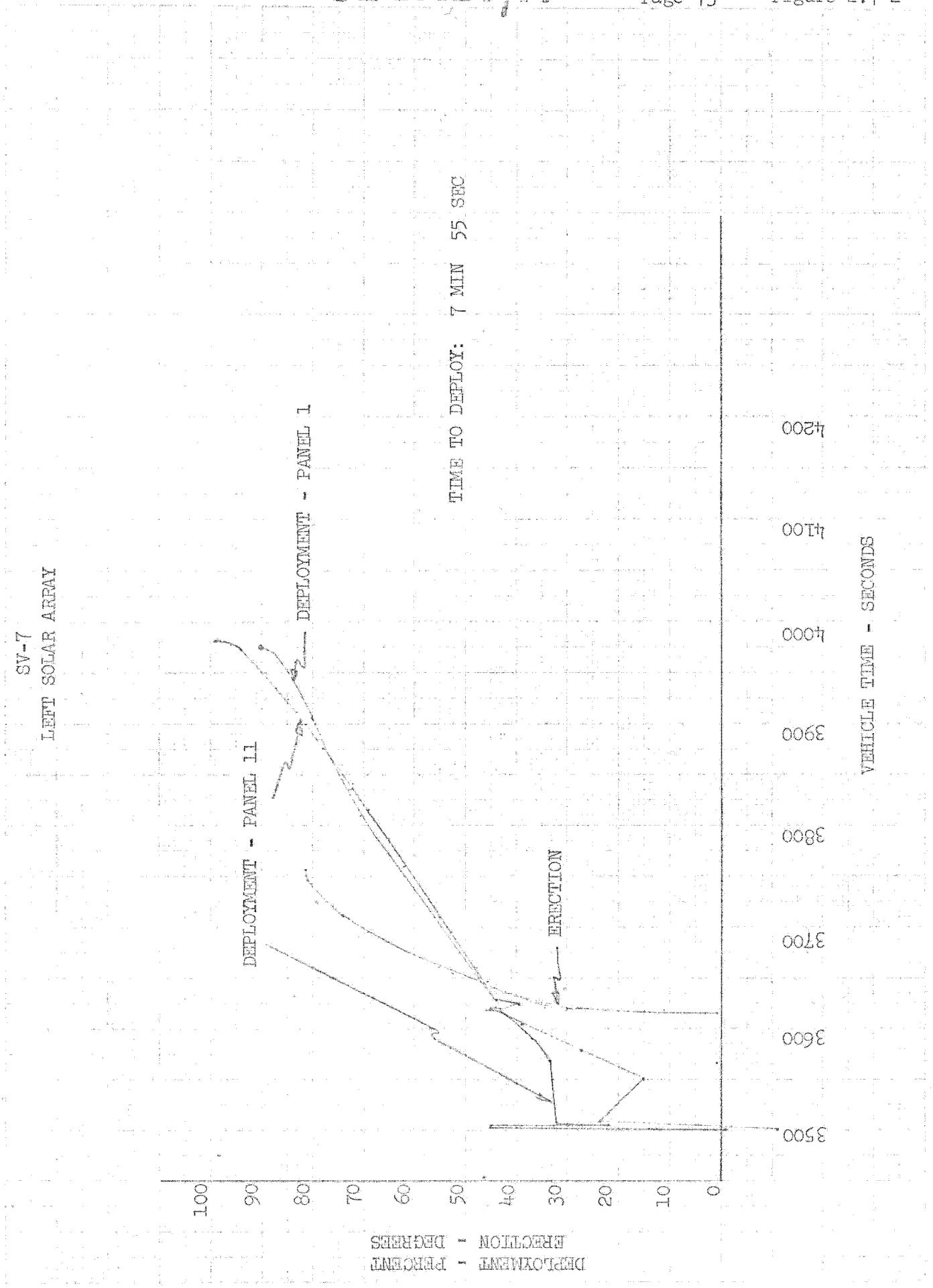
Figure 2.7-1



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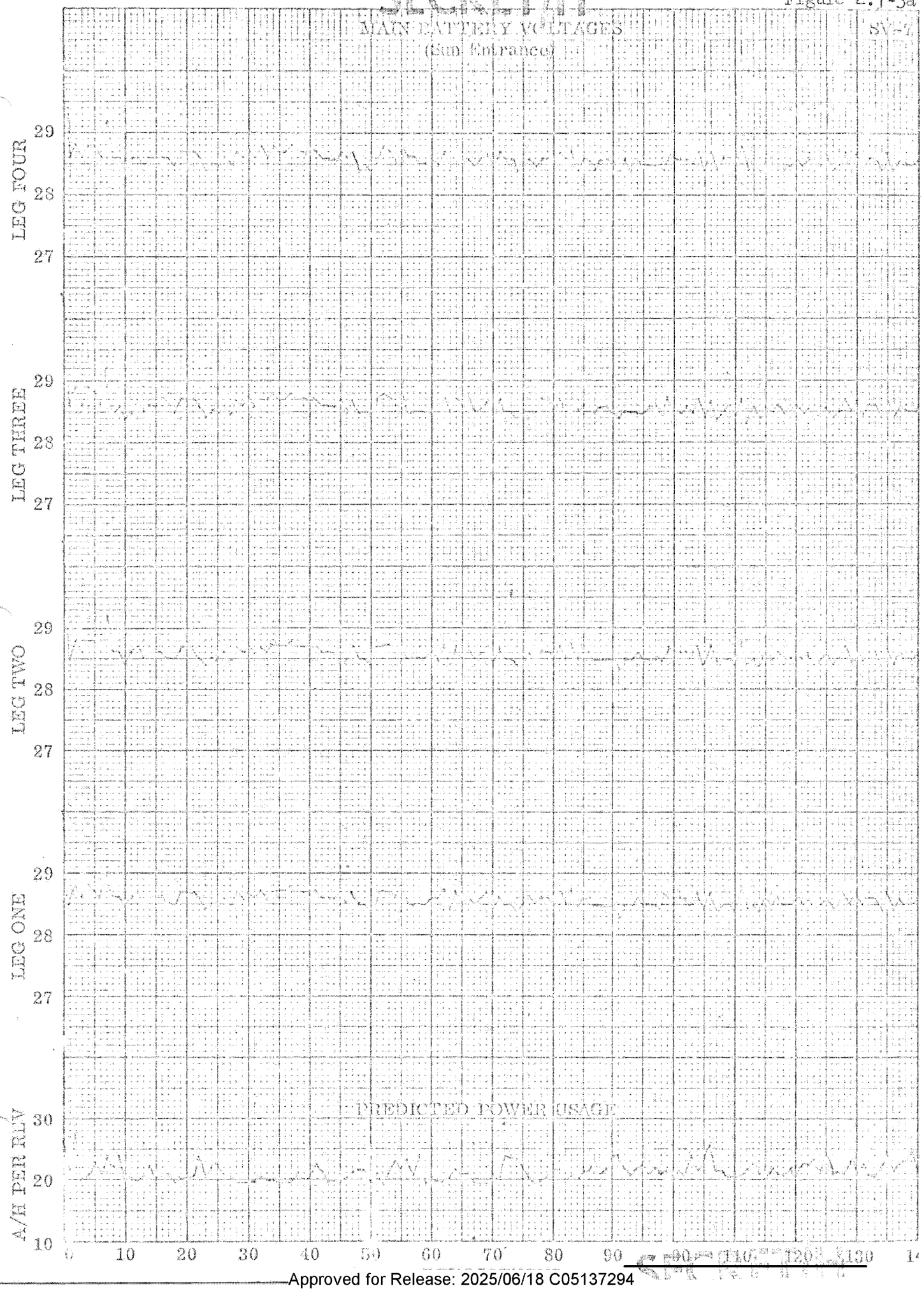
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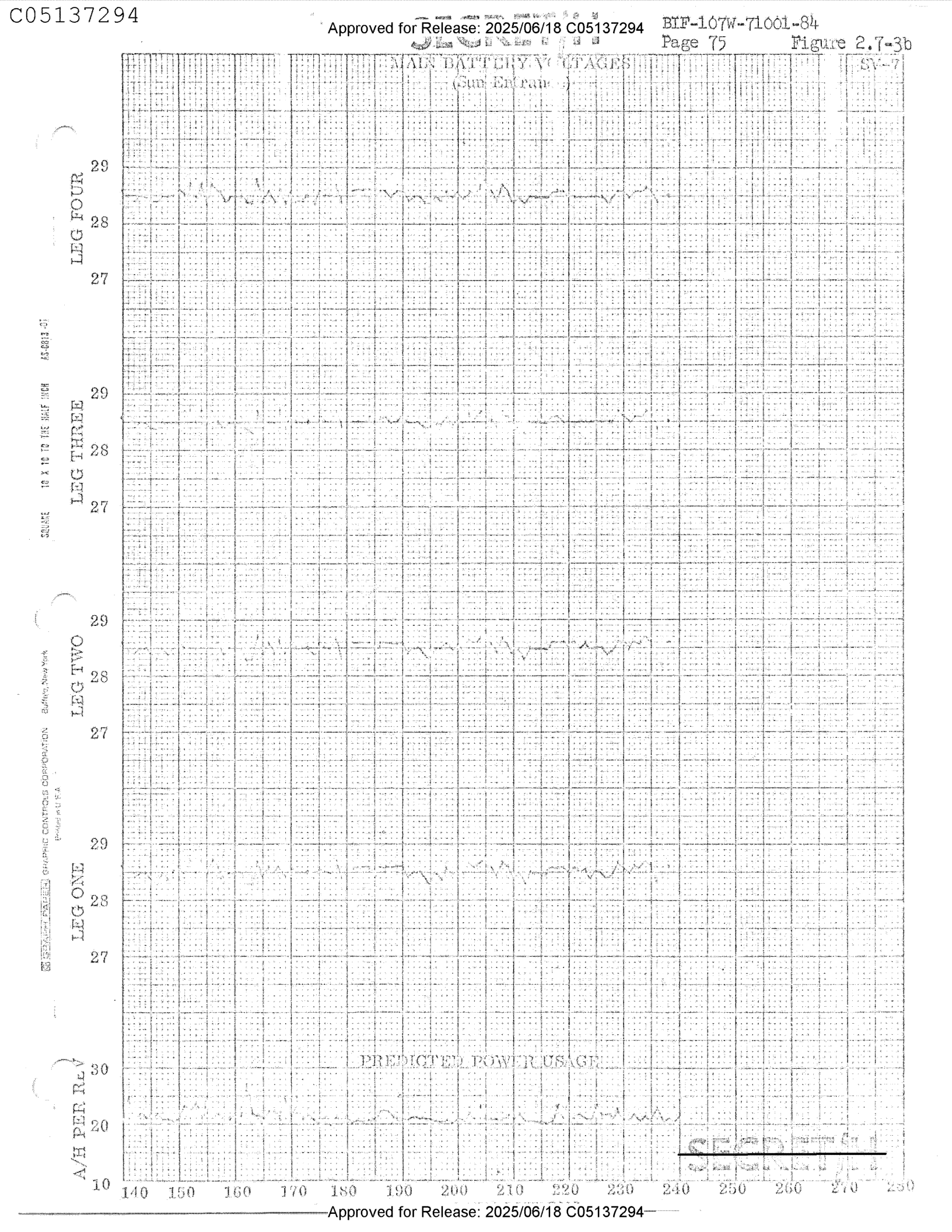
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Figure 2.7-3a



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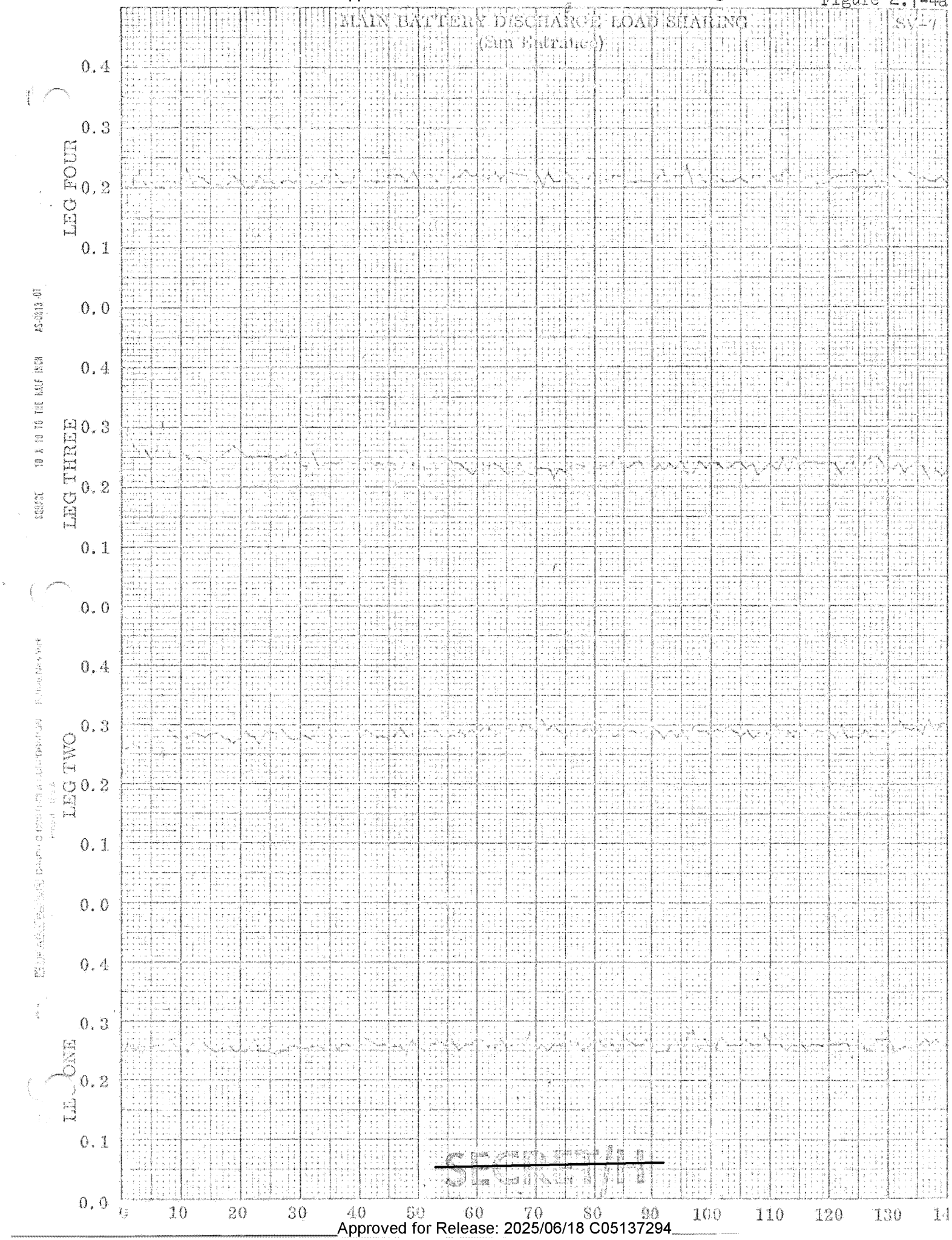


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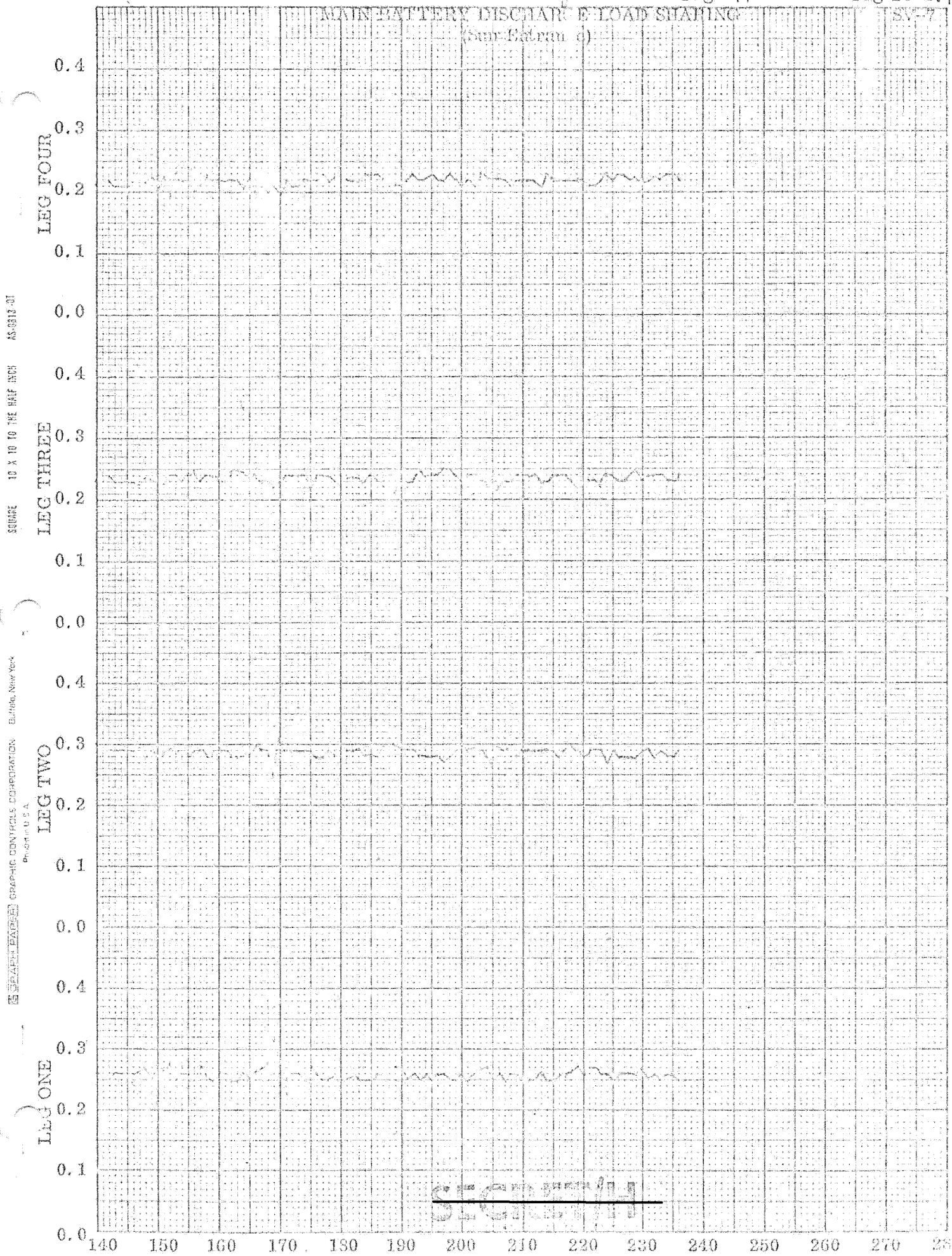
Figure 2.7-4a



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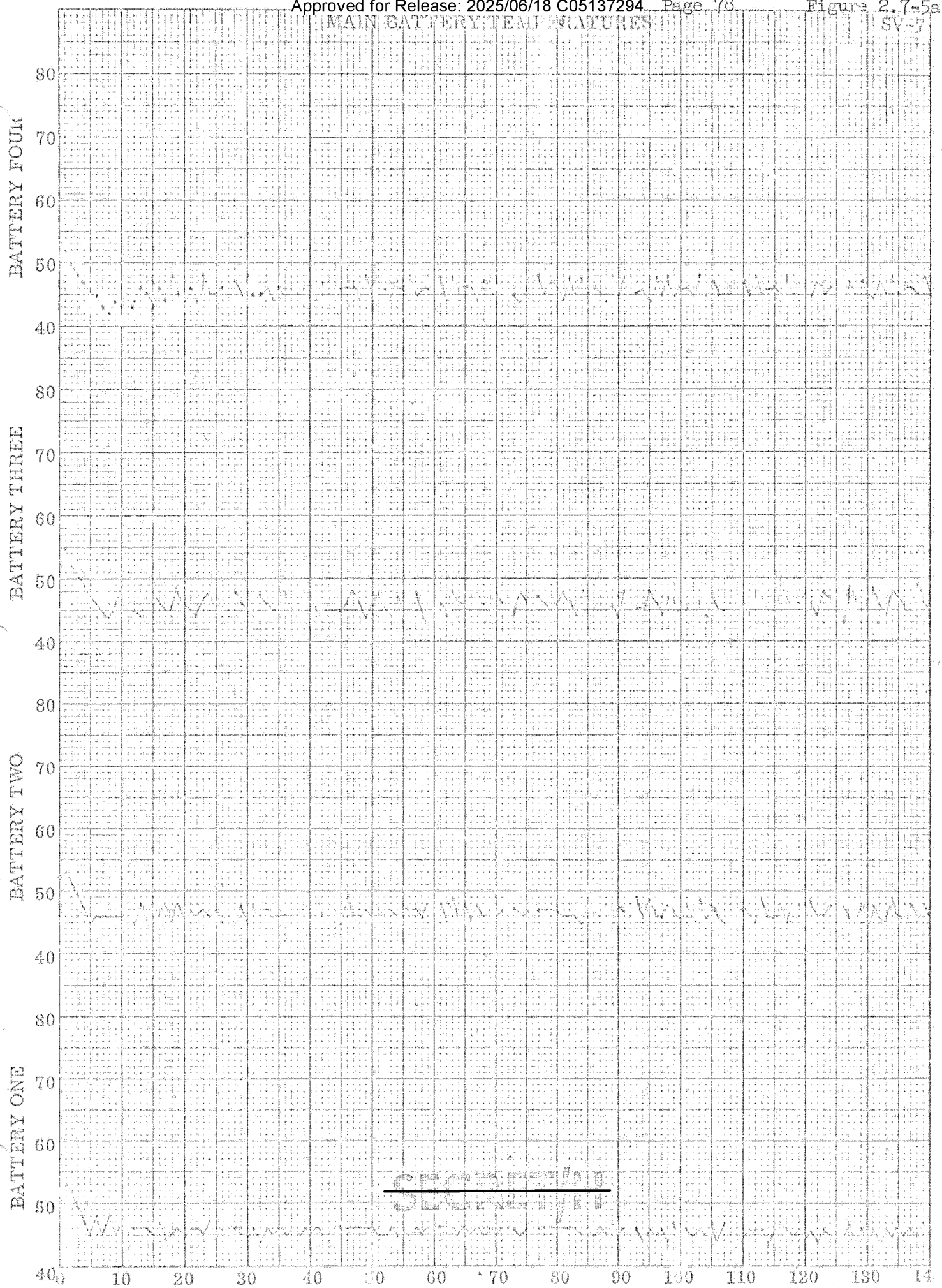


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MAIN BATTERY TEMPERATURES SV-7

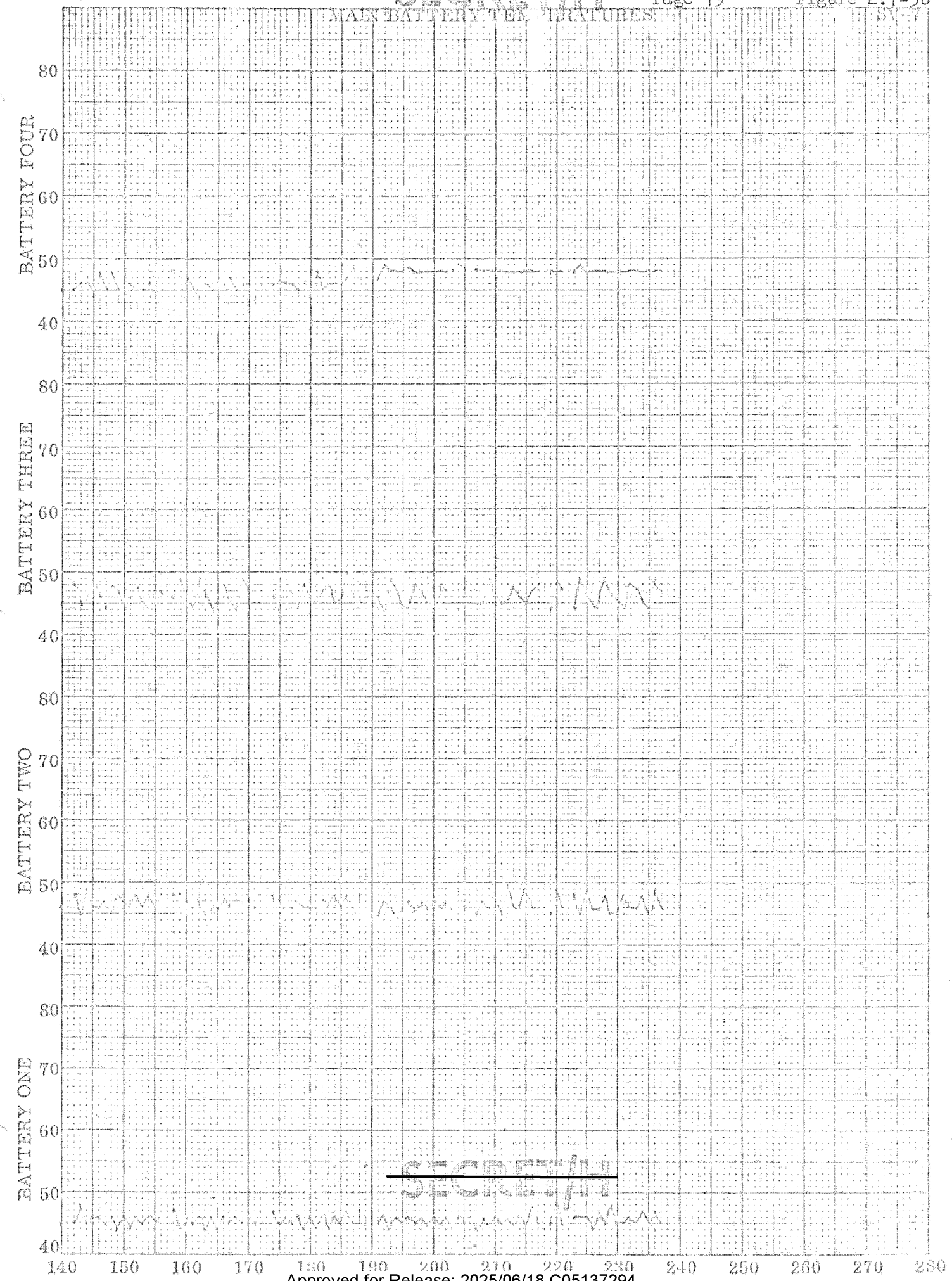


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Figure 2.7-5b



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2.7.2 T & T Performance

The SGLS, PCM Telemetry Systems and Tape Recorders have demonstrated satisfactory performance throughout the Segment 1. The primary systems have been utilized during this segment with the exception of redundant systems used for back up, health checks or evaluation. The redundant systems were employed in the following instances:

Ascent	-	Read-in Tape Recorder #2, Read-out to BOT on Rev 2 HULA
Rev 9	-	SGLS 2, PCM 2B Health Check
Rev 18	-	SGLS 2, PCM 2B MCS Test
Rev 18-21	-	Time Word Power Supply #2 - MCS Test
Rev 130C	-	SGLS 2 Evaluation
Rev 124-125	-	Read-in Tape Recorder #2 for Horizon Sensor Mapping; read-out to BOT on Rev 133 POGO.
Rev 140-141	-	Read in Tape Recorder #2 for Horizon Sensor Mapping; read-out to BOT on Rev 149 POGO.
Rev 162	-	Read-in Tape Recorder #2 for TCEA (Pri) test; read-out to BOT on Rev 166 GUAM.

The Back-up Timer was checked on Rev 25. The timer period was 543 seconds. The specification value is 540 seconds $\pm$ 54 seconds.

2.7.2.1 Data Dropouts

Data dropouts were experienced as listed below:

Rev	Station	Veh Side	Max El	Ant	Range at Max El	Elevation Angles of Loss	Duration of Loss
126	GUAM	R	67°	60'	158 NM	59°A to 46°D	37 sec
146	VTS	L	63°	60'	125 NM	41°D to 29°D	20 sec
154	VTS	R	60°	46'	151 NM	54°D to 45°D	16 sec

The conclusion is that 3 antenna pattern holes exist on high el passes which are peculiar to SV-7. However, it is believed that these holes are small.

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2.7.3 ACS/RCS Performance

The Primary Attitude Control System (ACS) and Reaction Control System (RCS) maintained nominal control throughout Segment 1. The redundant Attitude Control System was also "on" but provided no control. Comparative data showed good correlation between the primary and redundant ACS. Primary system roll and yaw gyro temperatures were approximately 179° and 173° respectively with the pitch gyro between 190° and 192°F. Gyro temperatures of the non-controlling redundant system were between 157° and 166°F.

The Reaction Control System performance was nominal throughout Segment 1. Thrust levels of the thrusters remained around 5# throughout this segment. RCS propellant consumption was 50.0 pounds which equates to an average of 3.5 pounds per day.

Full rev recordings were made on Rev 124/125 and Rev 140/141 for the purpose of mapping the Horizon Sensor signal. The Rev 124/125 recording was partially lost due to a signal dropout during playback at 126 GUAM.

2.7.4 Orbit Adjust System (OAS) Performance

The OAS functioned nominally for all burns throughout Segment 1. A total of 5 burns were accomplished with a total propellant usage for the OA's of 289.8 pounds.

An orbit adjust summary for Segment 1 appears in Table 2.7-1.

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TABLE 2.7-1

ORBIT ADJUST SUMMARY
SEGMENT 1 (REV 0-229)

OA NO/TYPE	1/POS	2/POS	3/NEG	4/POS	5/POS
OPS DAY	3	6	6	9	12
REV. NO	46	94	97	143	192
DELTA VEL. (PREDICT) -fps	13.7	35.3	-19.2	17.2	16.8
DELTA VEL. (TRACKING) - fps	13.8	35.7	-19.3	17.5	17.0
BURN DURATION - SEC.	40.2	103.6	57.6	53.0	52.0
PROPELLANT USED - LBS	39.5	100.0	53.8	49.0	47.6
AVG. OA TANK TEMP - ^{o}F	74	74.7	75.7	76.0	77.3
AVG. OA TANK PRESS - psia	261.5	252.0	236.0	231.0	226.5

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2.7.5 Lifeboat II (LBII) Performance

The LBII system (electronics) was activated on Rev 18 for the standard early rev health check. No activation of the regulator valve was made. Analysis of magnetometer data indicated that system performance was nominal.

The LBII propellant tank heaters were commanded on following orbit injection at vehicle time 579.0. The heaters were on under thermostat control until Rev 6 POGO at which time they were commanded off. They remained off throughout Segment 1. The tank temperature decreased from 171°F (Avg) on Rev 6 to 102.5°F (Avg) on Rev 229.

The electronics were activated on Rev 51 for a system calibration at ten (10) selected locations in the orbit. This provided data to be used as a baseline for subsequent calibration checks throughout the mission. A calibration check was performed (electronics activated) on Rev 197 near the ascending and descending nodes. During the recovery maneuver on Rev 229 the system electronics were activated to observe the magnetometer excursions.

A shift of 6 milligauss was observed on telemetry monitor D202 (Y, Z axis) during the Rev 51 calibration. The effect of this anomaly is to prevent accurate analysis of the Lifeboat P and R sensor errors. The magnitude of the anomaly is not great enough to prevent performance of the Lifeboat II system within specification limits. This anomaly has no effect on the use of the Lifeboat system as a reference for yaw bias determination.

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2.7.6 Doppler Beacon Performance

The Doppler Beacon System antenna was deployed and the system activated by stored commands on Rev 12 prior to the GUAM station contact. Evaluation of the vehicle telemetry data indicated that the antenna properly deployed and locked in position as verified by the correct and stable readings in S750, DBS Antenna Position monitor.

Throughout Segment 1, telemetry has verified nominal performance of the system's transmitters, heaters, oscillators and power supply components.

No anomalous conditions have been observed.

Utilization of the software program 'TDERBY was initiated following the Doppler Beacon activation on Rev 12 and throughout the remainder of Segment 1 operational period. Although the program performed satisfactorily during the segment, the beacon circles defined in the data base were in error during the early part of the mission. 'TDERBY generation was leaving the beacon OFF in the Southern Hemisphere until the data base was corrected on 13 November 1973.

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2.7.7 Thermal

2.7.7.1 Ascent

SV-7 was the first vehicle to fly an ascent trajectory without a dogleg. Because of this, peak ascent temperatures on the shroud and equipment section skins were higher than on previous vehicles. Peak ascent temperatures were well within design capability of the system.

The shroud temperature instrumentation on SV-7 added monitors on several Z-Rings where Block I instrumentation recorded only shroud skin temperatures. The measured ring-skin temperature differential was found to be significantly higher than predicted.

2.7.7.2 Orbit - Active Thermal Control

The Active Thermal Control System provided adequate control of film path temperatures. The RV control zones were within 1°F of the mid-section reference temperature and other film path gradients for which requirements exist were within 4°F.

2.7.7.3 Orbit - Mid-Section, Forward Section, APSA

The temperatures in the Mid-Section, Forward Section, and APSA were all within specified limits. The average temperatures in the Mid-Section and APSA were within 2°F of preflight predictions.

Mid-Section	Design	Predict	Segment 1
T_{Ref}	--	72	70
$\bar{T}_{TCA}$	49/91	72	70
$\bar{T}_{SU}$	47/93	74	72
Forward Section			
$\bar{T}_{FWD}$	47/93	74	71/78
APSA			
$\bar{T}_{Enc}$	32/69	50	52
$\bar{T}_{TU}$	30/45	52	50
$\bar{T}_{DBS}$	32/90	58	59

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2.7.7.4 Orbit - Aft Section

The external thermal design (paint pattern) of the Aft Section is identical to that of the two previous vehicles. The thermal performance of SV-7 has been very similar to that of SV-5 and SV-6, as was expected because these three vehicles have flown similar Beta angles. The temperatures of Equipment Section doors and major Aft Section equipments compare favorably with predictions, as well as SV-5 and SV-6 histories. The Primary ACS pitch gyro temperature is higher than the normal gyro operating level. However, this gyro ran hot during ground tests and the present temperature is acceptable.

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2.7.8 Subsatellite

2.7.8.1 Subsatellite No. 2 (+Y)

Subsatellite No. 2 (+Y) was separated from the Satellite Vehicle at vehicle time 13845.6 on Rev 2.9. The Satellite Vehicle was at normal (0,0,0) attitude and stable at separation.

2.7.8.2 Subsatellite No. 1 (-Y)

Subsatellite No. 1 (-Y) was separated from the Satellite Vehicle at 11.8°S latitude descending at system time 56447 on Rev 13.5. The Satellite Vehicle executed a yaw left maneuver of -23.50 degrees and was stable prior to separation. Return to normal fly forward attitude occurred immediately after separation.

2.7.9 [redacted]

[redacted] B-3 Systems operated nominally from Revs 1 thru 229.

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2.8 MAPPING CAMERA OPERATIONS THROUGH REV. 229.
(Prepared by Mapping Camera Contractor - NEC)

2.8.1 MISSION PERFORMANCE

The Mapping Camera Subsystem was successfully removed from the Ascent Mode (powered) shortly after BV/SV separation. On Rev 7, a 11 frame operational MOP was performed over the block to serve as the ST Health Check. Rev 8 COOK telemetry data indicated ST operation was normal.

On Rev 24 the terrain platen press telemetry monitor indicated erratic operation on three frames. This data discrepancy was diagnosed as a telemetry anomaly....other telementry indicates normal platen press function. This problem is believed to be identical to that observed with SV-6. Post flight film analysis of SV-6 mission indicated the terrain platen press did function normally throughout the flight.

On Rev 87 one of two redundant +Y stellar shutter "not closed" monitors indicated the shutter was not fully closed after each exposure. This problem was diagnosed as a critical adjustment of the telemetry microswitch. This anomaly occurred once during the Al chamber test at SBAC on this system. This anomaly also occurred on SV-6 during the solo activities. In both SV-6 and SV-7 to date, this condition is random. No corrective action was required.

47 mapping camera operations were executed through Rev. 229. Total in flight mapping camera frames taken was 881. Total footage transported into RV-5 included 1518 feet of terrain and 851 feet of stellar.

One operation over the BAR X C range in Arizona was taken on Rev 113.

2.9 RV-5 (Prepared by RV-5 Contractor - OPC)

The telemetry measurements indicated that the RV-5 system status (temperatures and discrete monitors) remained within specification limits during the first phase of the mission.

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SECTION 3

3.0 ORBIT PHASE - REV 230 THROUGH RV-2 RECOVERY

3.1 SUMMARY

Mission photography on the panoramic camera continued throughout the segment without incident. On Rev 427, telemetry showed the ST terrain capping shutter did not open but a redundant monitor showed normal operation. SBA subsystems performance remained nominal although a slightly lower thrust level on REA No. 1 was detected. RV-2 was successfully reentered and aerially recovered on the 602, operations day 38.

3.1.1 Summary of Events

Panoramic camera continued nominally with the 00AA bias adjustments and exposure reductions on the aft camera made as recommended by the PFA. Perigee was raised by 2 n. mi. in the Rev 289 OA to avoid a forward camera resonance.

The SGLS transmitter faulted during the 308 POGO pass and additional RTS's were brought up for protection of mission operations.

Battery No. 4 heater cycling continued randomly and Battery No. 3 cycling started on Rev 377. Both battery temperatures remained within a nominal range.

The terrain capping shutter data indicated the shutter did not open on Rev 427; however, the redundant monitor verified normal operations and ST photography continued.

REA No. 1 thrust level was measured as 10% lower than qualification level during the yaw maneuver on Rev 436. Thrust level was completely adequate to support the mission and normal operations were continued.

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The SGLS transmitter failed at GUAM Rev 515 and procedures were implemented to minimize the impact of future transmitter problems.

The Station Pass (SP) span was extended to provide SV access if the BUSTC operation were to be required and the compressed (70 minute) message generation timeline was implemented during this period.

RV-2 was successfully reentered and aerially recovered on Rev 602. The capsule was loaded 89.5 percent of capacity and balanced. No capsule or parachute damage was reported.

Overall quality of the acquired photography ranged from very good to poor with the majority rated as fair. An increase in overall haze level and lower scene contrast because of reduced solar elevations at high latitudes were considered the major contributors.

3.1.2 Problem Summary

None.

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3.2 COMMAND SUBSYSTEMS PERFORMANCE (Prepared by CSC)

3.2.1 Health

The health of the Command Systems remained excellent throughout Segment 2 (Revs 230 - 602). There were no equipment malfunctions. None of the Command Systems were subjected to out of specification temperatures or voltages. There were no power dropouts, relay driver overloads, or clock status errors experienced.

3.2.1.1 EXTENDED COMMAND SUBSYSTEM

3.2.1.1.1 Command Modes

The ECS responded properly in all modes into which it was commanded. There were a total of 211 messages loaded in the ECS for this segment. This resulted in 52,832 SPCs being stored for readout from the PMUs.

Of the 52,832 SPCs loaded, 24,053 were output from the PMUs for processing by the decoders. The remaining were erased out prior to time label matches. In loading the 52,832 SPCs there were no rejects.

3.2.1.1.2 ECS Clock Operation

The accuracy of the ECS clock was 2.72 parts in 10^7. This corresponds to an average frequency offset of .2781 HZ above the nominal frequency of 1.024×10^6 HZ. The frequency of the clock oscillators changed .0365 HZ in 372 revs. This results in a stability of 3.57 parts in 10^8 over 372 revs, or 3.89 parts in 10^{10} for an average six hour period. All of these values are well within system specifications. The clock plot is presented in Figure 3.2.1.

3.2.1.1.3 ECS Anomalies

There were no ECS anomalies experienced during this segment.

3.2.1.2 MINIMAL COMMAND SUBSYSTEM

3.2.1.2.1 Command Modes

The MCS was not commanded during this segment.

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3.2.1.2.2 MCS Anomalies

There were no MCS anomalies.

3.2.1.3 REMOTE DECODER/BUD

3.2.1.3.1 Command Modes

The remote decoder was used for the recovery of RV-2 which ended this segment of the flight. The performance of both channels was verified from telemetry to be proper for all commands.

No commands were issued from the BUD during this segment.

3.2.1.3.2 Remote Decoder/BUD Anomalies

There were no remote decoder or back-up decoder anomalies.

3.2.1.4 SUMMARY

3.2.1.4.1 Expendables and Environmental Data

Total Command Readouts PMU-A 12,237 PMU-B 11,816

ECS Clock Drift Rate 2.72 parts in 10^7

ECS Clock Stability 3.57 parts in 10^8 for a 372 rev period

Total Hours On ECS 888 MCS 4.5 RD 1.0 BUD .05

Secure Words Expended at end of Segment 2 PMU-A 60 PMU-B 76

Environmental Data: See Figures 3.2-1 through 3.2-7

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	(1)	(2)
VEH. TIME SPAN	1224906.2 TO	3207707.4 SECS.

AVERAGE CLOCK ACCURACY =BIAS CHANGE/TIME CHANGE

=(0.9620- 0.4236)/(3207707.4- 1224906.2)

= 2.71535E-07

= 2.71535 PARTS IN 10 TO THE 7TH

AVERAGE CLOCK FREQUENCY =(2.71535E-07*1,024,000.0)+1,024,000.0

= 1024000.27805 HZ

FREQUENCY 1 (F1) =(SLOPE AT 1)*1.024MHZ+1.024MHZ

=(2.50329E-07)*1.024MHZ+1.024MHZ

= 1024000.25623 HZ

FREQUENCY 2 (F2) =(SLOPE AT 2)*1.024MHZ+1.024MHZ

=(2.85912E-07)*1.024MHZ+1.024MHZ

= 1024000.29277 HZ

CLOCK STABILITY =(F2-F1)/AVERAGE CLOCK FREQ.

=(1024000.29277- 1024000.25623)/1.024E+06

= 3.56836E-08

= 3.56836 PARTS IN 10 TO THE 8TH
FOR THIS 372 REV. PERIOD

= 3.88726 PARTS IN 10 TO THE 10TH
FOR AN AVERAGE 6 HOUR PERIOD

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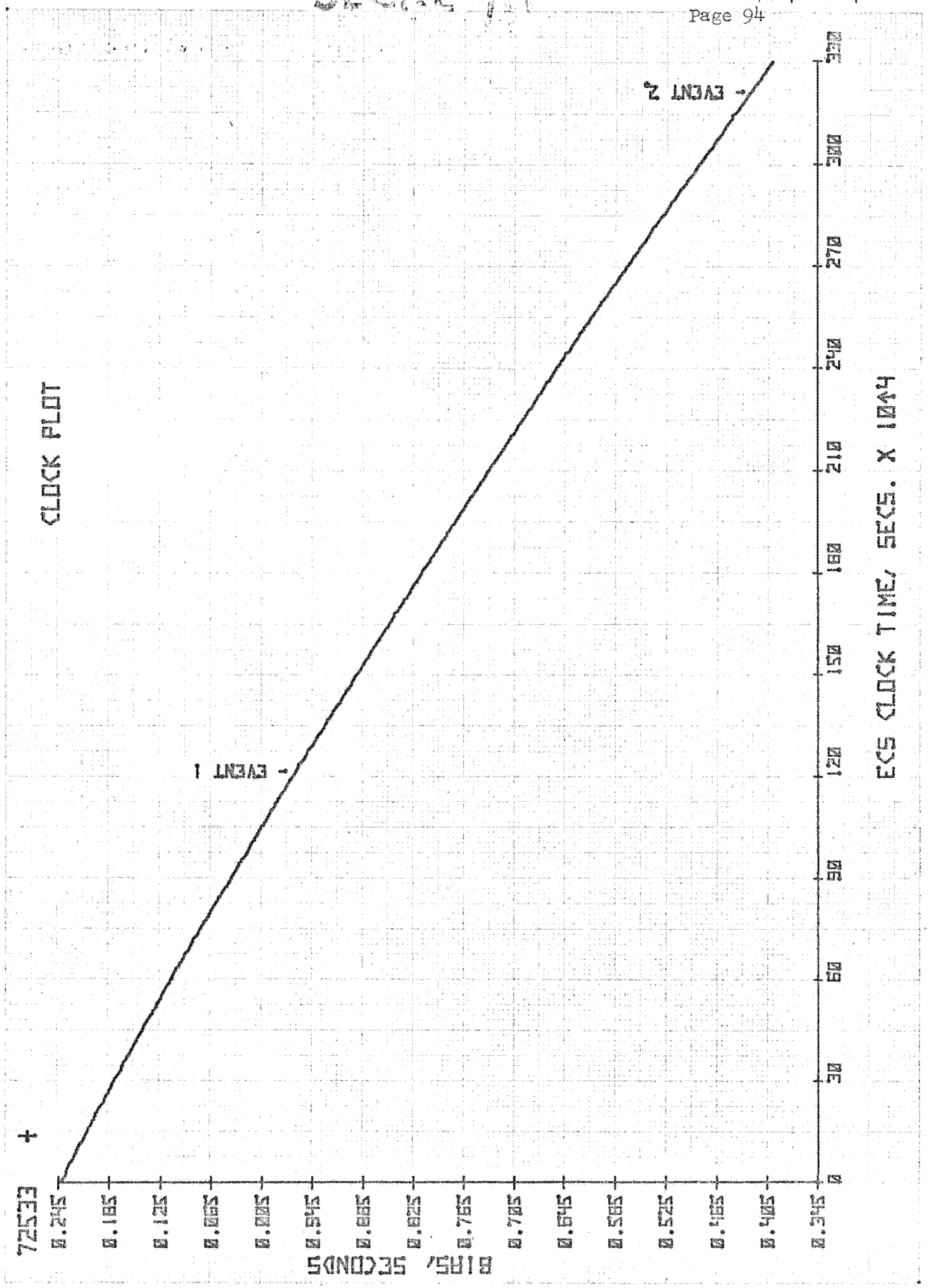


Figure 3.2-1

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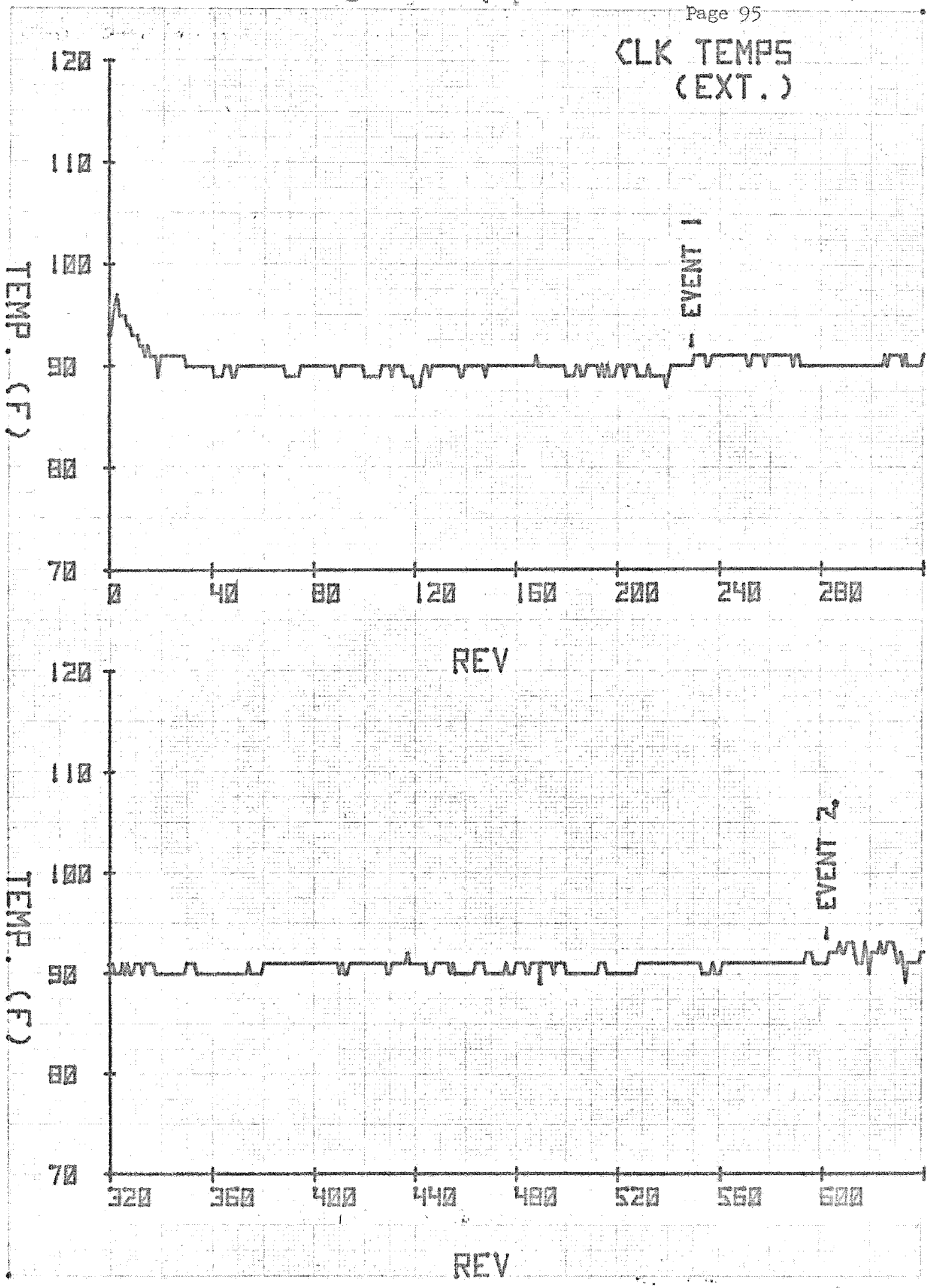


Figure 3.2-2

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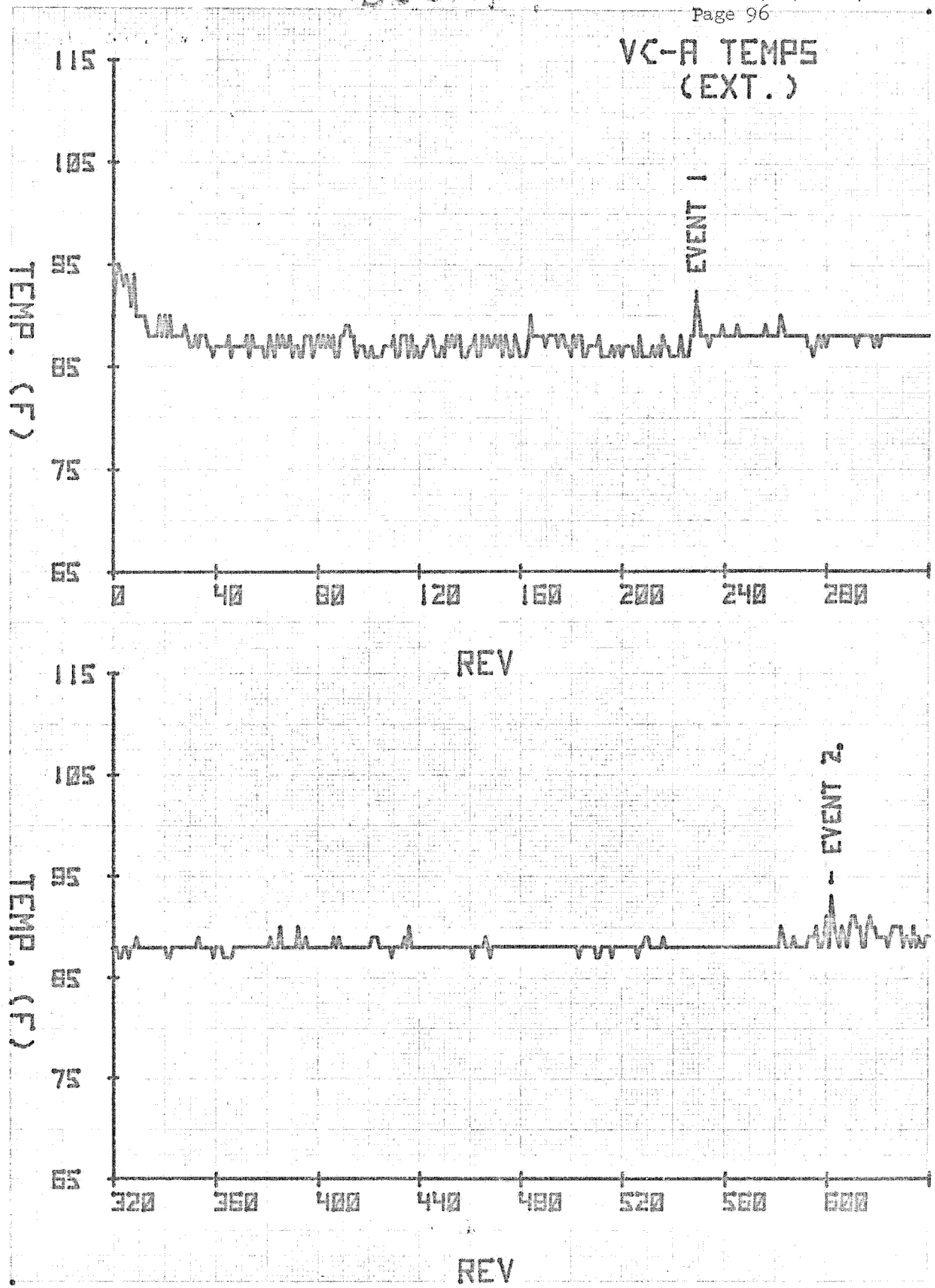


Figure 3.2-3

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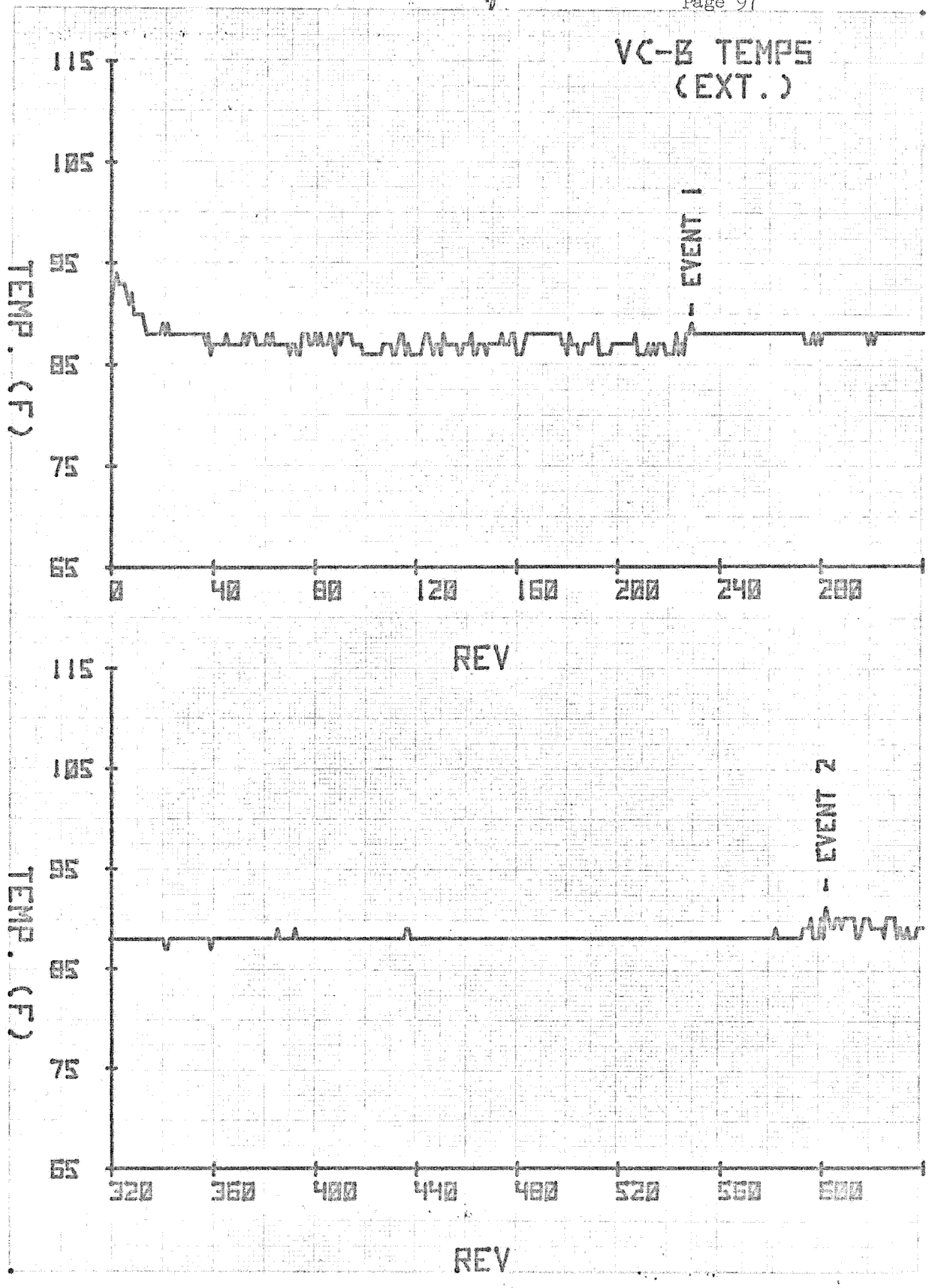


Figure 3.2-4

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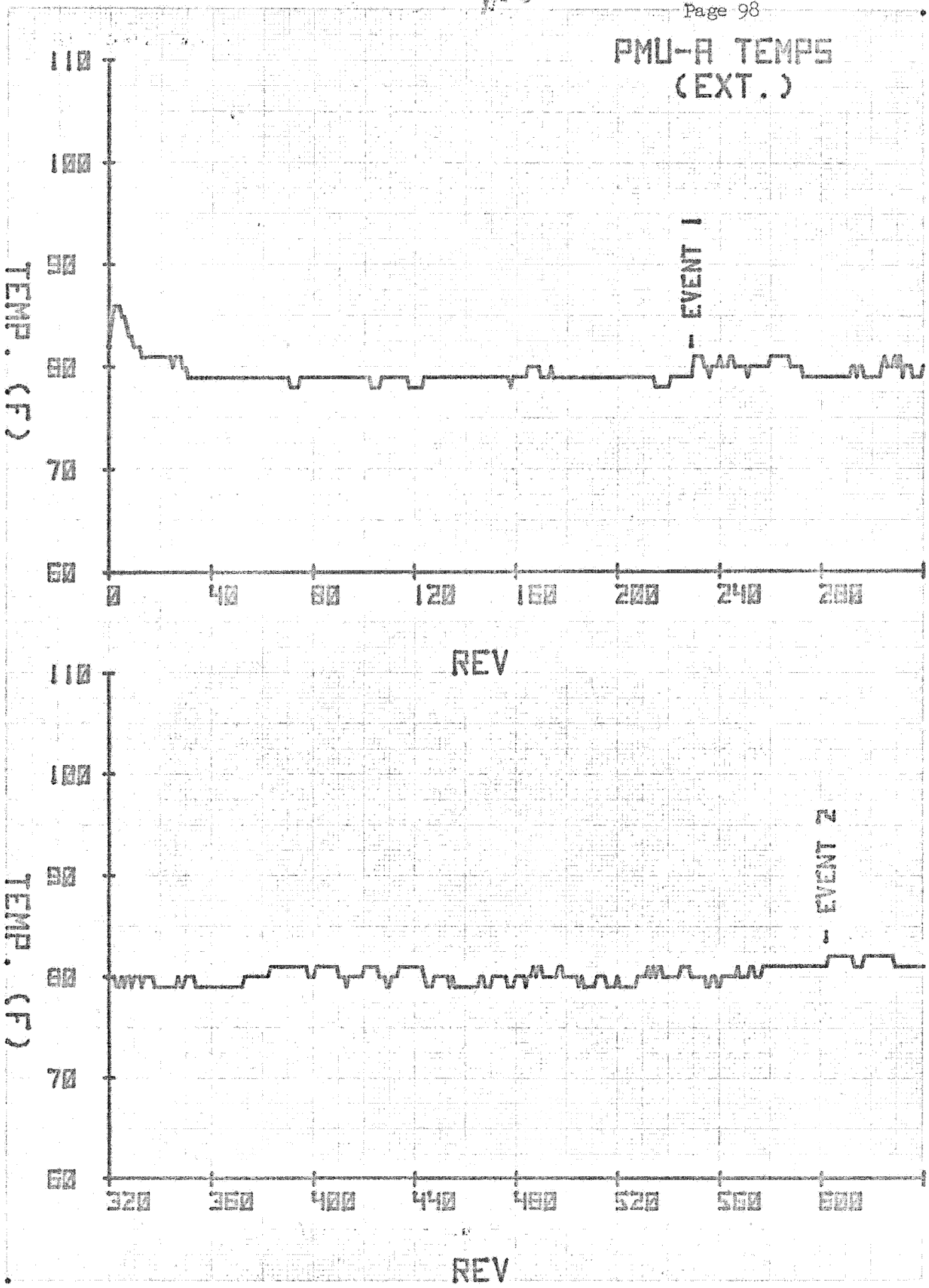
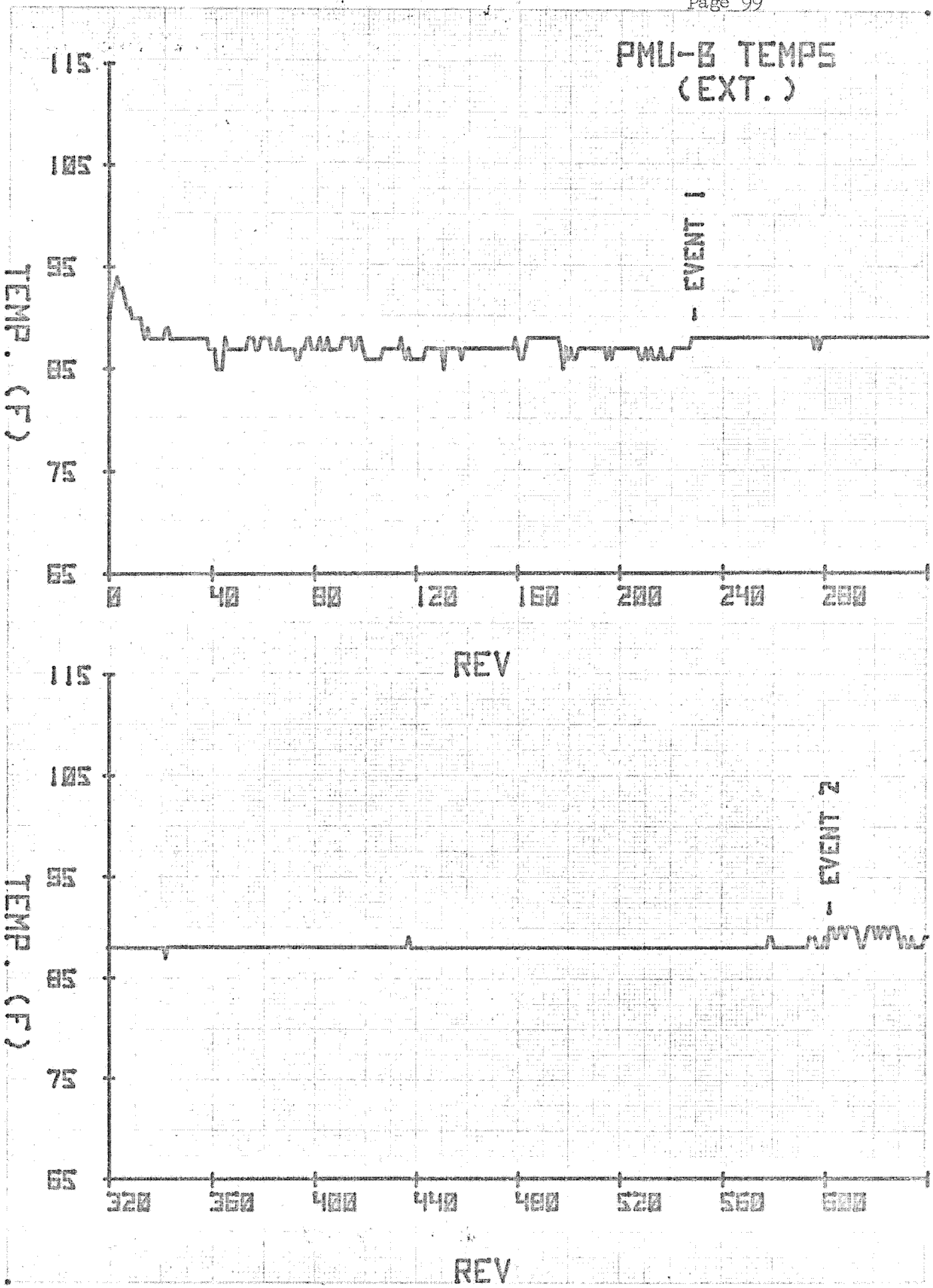


Figure 3.2-5

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Figure 3.2-6

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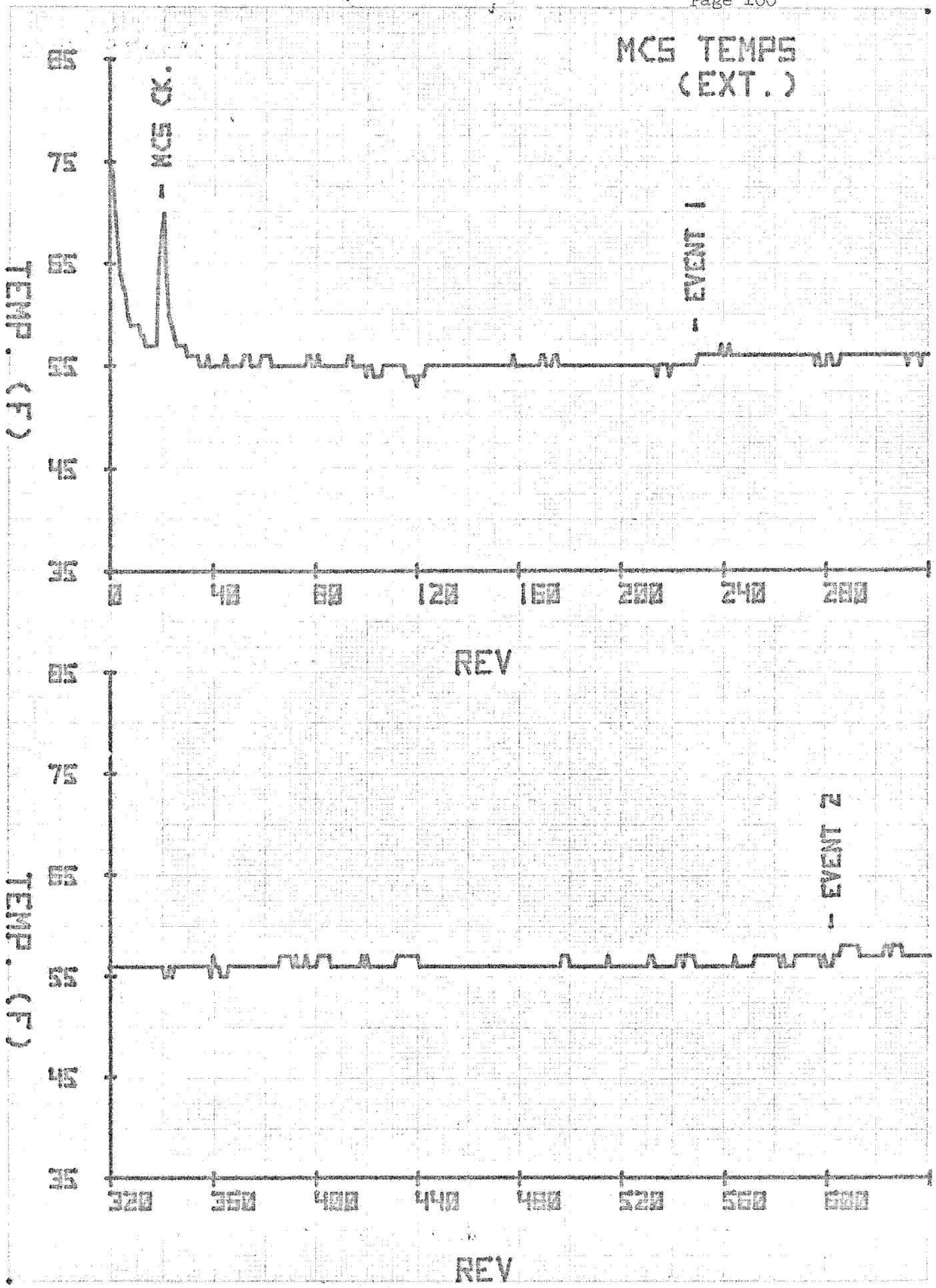


Figure 3.2-7

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3.3 Sensor System Operations Through RV-2

3.3.1 Mission Operations Performance

The Sensor Subsystem exhibited basically nominal characteristics throughout RV-2, with no anomalies or malfunctions experienced.

The Aft camera OOAA adjustment recommended by PFA after evaluation of RV-1 imagery was implemented on Rev 282, Op 132. The In-track nominal was changed minus 3 command steps to a new nominal of minus 2 command steps. PFA also recommended an Aft camera exposure reduction of 0.2 stops which was implemented for Rev 285, Op 136. To avoid forward camera MC resonance, PFA recommended raising perigee altitude by approximately two nautical miles. This change was made with OA #8 on Rev 289.

The RV-2 mission segment consisted of 133 sensor system operations, consuming 14,738 seconds of camera power on time, 5.9 pounds of nitrogen gas, and approximately 26,000 feet of film per camera. The consumption profiles through RV-2 are graphically depicted in Figure 1.

The overall quality of the acquired photography ranged from very good to poor, with the majority rated as fair. There was an overall decrease in image quality compared to RV-1 due primarily to an overall increase in haze levels. In addition, the lower solar elevation acquisitions in northern latitudes contributed to the general image quality reduction by lowering the overall scene contrasts.

3.3.2 Engineering Tests

Several engineering tests were performed during this segment of the mission, primarily in support of PFA smear evaluation:

Rev 339	Smear slits, test type 3A
Rev 355	Smear slits, test type 3A
Rev 371	Smear slits, test type 3A
Rev 405	Tucson/Tri-bars, test types 7/9
Rev 454	Lens MTF/Smear slits, test types 6/3
Rev 517	Smear vs Scan, test type 10

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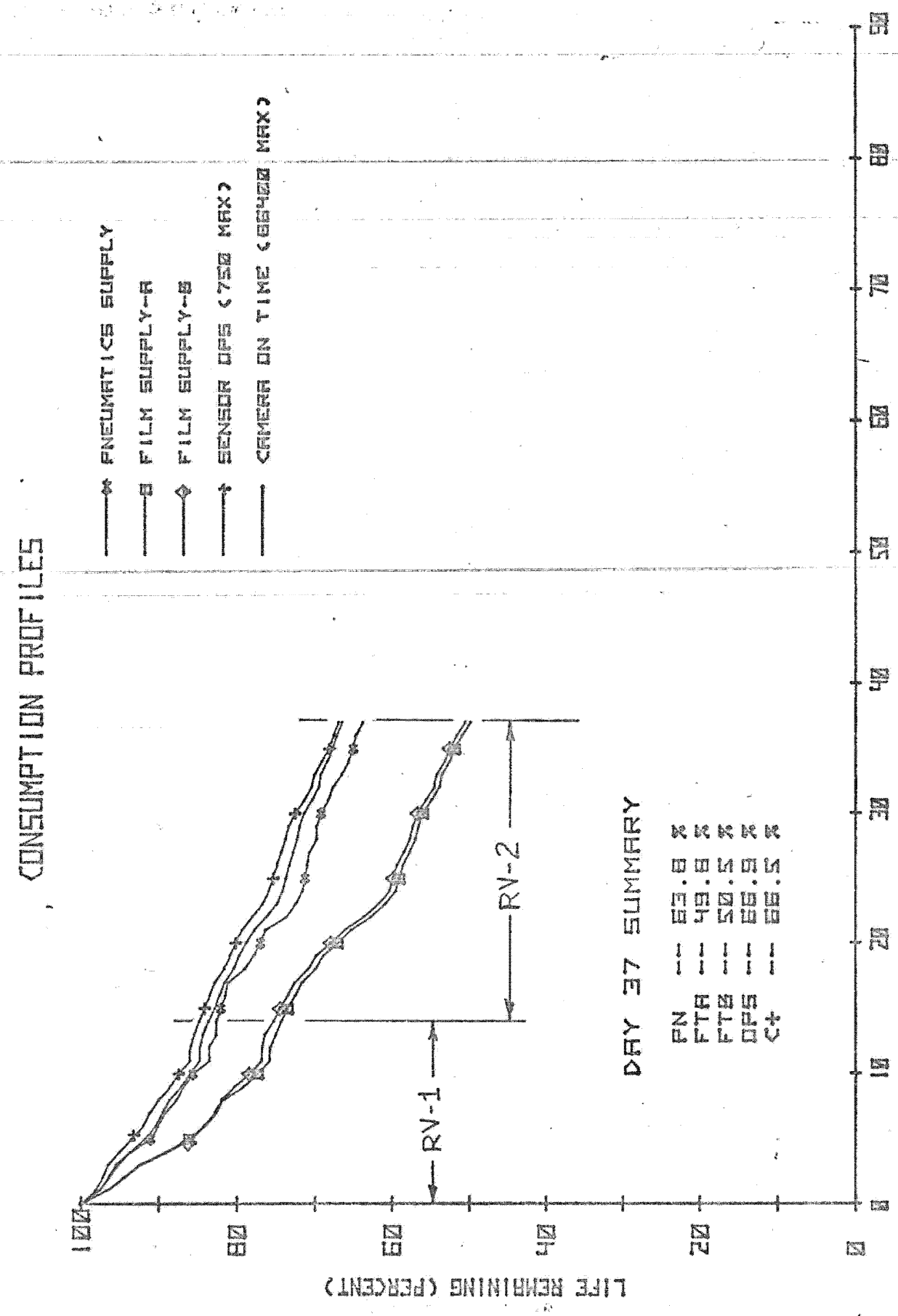


FIGURE-1

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3.4 RV 2 (S/N 31) Performance

This report presents an analysis of the RV 2 performance based on evaluation of recovery studies, command message, RV and SV telemetry, voice reports, and the recovery test report TWX. Tables 3.4-1 thru 3.4-3 list all relevant data. RV heater performance graphs are also included.

3.4.1 Summary

The RV payload was 89.52% of the maximum I.C.D. weight and unbalanced 0.0%. The PREP2 event took place on Rev 600 over POGO and separation occurred on Rev 602. Preparation, deorbit, and entry events, and drogue and main parachute deployment conditions were normal and executed as planned. Aerial recovery was accomplished on the 1st pass at 12,300 feet altitude, 20.0 nautical miles from the predicted impact point.

The recovery forces reported the parachute cone looked soft and fell several times at an altitude of 16,000 feet, but that it was erect and stable prior to recovery. The RV and chute were reported in normal condition.

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TABLE 3.4-1 ~~SECRET/H~~

RV 2 RECOVERY DATA

IDENTIFICATION DATA

SV 7	IRON NO 6630		RECOVERY REV 602
RV 2	RV S/N 31	RETRO MOTOR S/N 051	RECOVERY DATE 17 Dec 1973

EVENT TIMES (IN SYSTEMS TIME - SECONDS)

EVENT	BASIC STUDY	UPDATED TEAPOT	TEAPOT EVAL	COMMAND MESSAGE	SV TLM	VOICE REPORTS	RV TLM MODE 51	DIFF NOTE 1
RV 3 OUT T/S	REV/STA			72414.8	72416			1.2
RV 2 IN T/S	72418.8			72418.8	72420			1.2
DT START	81790.6	81791.2	81791.8	81790.6	81790.8			0
POGO TRAN	82835.9			82835.6	82823			-12.6
PITCH START	82865.9			82865.6	82866			0
PITCH STOP				82920.2	82921			0
PYRO ARM BATT				83035.6	83036			0
POGO FADE	83178.0			83177.6	83186			8.4
KODI TRAN	83282.1			83281.8	83383	83381		1.2
ORB PWR OFF				83369.2	83369.8			0
RV SEP (0)	83379.2	83379.2	83379.2	83379.2	83379.8	confirm	N/A NOTE 2	0
SPIN UP (+2.4)				83381.6		83381	83382.2	0
RETRO START	83504.6	83504.6	83504.6	83504.6		83505	83505.1	0
DESPIN (+160.4)				83539.6		83540	83540.5	0
PROP JETT (+175.4)				83554.6		83555	83556.0	1.4
KODI FD (RV)	83651.3					83662	83658.6	7.3
RV ENTRY (400K	83704.2	83704.7	83705.3		RECOV TWX			
△ 1-2 ACQ					83715	N/A		
ION ENTR	83793.8	83794.3	83794.9		83785	83801		-9.9
ION EXIT	83971.5	83972.2	83972.8		83980	83969		7.2
DROGUE DEPLOY	84016.3	84017.0	84017.6	TONE STOP	84028	84028	N/A	10.4
IMPACT (50K)	84035.6	84036.2	84036.8					
MAIN CHUTE DPL	84038.7	84039.6	84040.0		N/A	N/A	84043.6	3.6
H/SHLD JETT	84042.7	84043.6	84044.0	TONE START	84045	84045	N/A	1.0
STEADY STATE	84053.7	84054.6	84055.0					
ETPD(RAINDROP)	84089.2	84089.8	84089.4					
RV @ 13.5K	85026.3	85017.4	85017.0	IN TRAIL	N/A	N/A	N/A	N/A
WATER IMPACT	85596.8	85582.1	85581.8		N/A	N/A	N/A	N/A
HULA TRAN (RV)	N/A					N/A	N/A	N/A
HULA FADE (RV)	N/A					N/A	N/A	N/A
DT RUNOUT	84505.6	84506.2	84506.8		N/A	N/A	N/A	

*To nearest Minute.

NOTES: 1. DIFF = Actual - Predicted times, TLM differences of less than 1.0 sec are ignored. [ ] = PREDICTED TIME, [ ] = ACTUAL TIME.

2. Assume RV SEP Sequencing starts 0.4 seconds after RV SEP Command msg. time.

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RV 2 RECOVERY DATA

RECOVERY DATA

	BASIC STUDY	UPDATED TEAPOT	TEAPOT EVALUATION	QUICK LOOK RPT	EPPD (TWX)	AERIAL RECOVERY
LATITUDE	26.002	25.922	25.871	25.55	25.833	25.55
LONGITUDE	165.31	165.33	165.34	165.25	165.33	165.25

RECOV. A/C DEPLOYMENT FORMATION No. 1, RECOVERING A/C No. 1

RECOV ALT 12,300 ft, PASS No. 1, TIME 2338 Z

AIRSPEED 154 KTAS, 127 KIAS; TIME IN TOW 17 min.

RAINDROP ETPD 84089.2 sec 46000 ft; RATE/DESCENT, 15K 28.4 FPS, 10K 26.2 FPS

CONTACT LOCATION Left pole high with contact on left pole hook

PRESET TENSION LEVEL 3400 lb, PAYOUT N/A

MISS DISTANCE (TEAPOT EVAL VS AERIAL RECOV) (Uncorrected for Wind)

OVERSHOOT 19.26 nm, CROSS TRACK 5.4 nm EAST

RC CONDITION Normal

CHUTE/CONE CONDITION Normal

CHUTE/CONE BEHAVIOR Cone Looked Soft and Fell several times at 16000 ft, became erect and stable prior to recovery

WIND DATA

ALT (K)	DIRECTION PRED	DIRECTION ACT	VELOCITY PRED	VELOCITY ACT	ALT (K)	DIRECTION PRED	DIRECTION ACT	VELOCITY PRED	VELOCITY ACT
SCF	350	050	20	15	25	340	360	70	30
2	340	-	20	-	30	350	010	80	60
4	330	-	20	-	35	360	010	85	80
6	330	325	25	20	40	360	030	90	90
8	320	-	30	-	45	360	010	60	45
10	320	270	30	25	50	330	300	60	35
15	310	300	45	25	55				
20	330	340	65	25	60				

RV BATTERY TIME HISTORY

	ACT											
TIME	83038	039	041	042	044	045	048	054	055	057	059	073
MAIN	20.0	24.2								24.8		25.1
PYRO #1	6.7	22.4		23.9	24.8		25.3		25.9		26.5	26.6
PYRO #2	23.5	22.8	24.1	24.6		25.2		25.8			26.3	26.5
TIME	129	170	370	376	SEP	411						
MAIN		24.9	24.2		23.3	23.3						
PYRO #1	27.0	27.0	26.5		26.8	26.1						
PYRO #2		26.7		26.3	26.8	27.1						

SV RATES BEFORE & AFTER SEP (SV TLM)

	TIME	PITCH RATE PGR °/sec	ROLL RATE RGR °/sec	YAW RATE YGR °/sec
	83378.8	-0.06	0.01	0.02
SEP	83379.8	+1.37	-0.06	+0.02
	83380.8	+1.31	-0.06	+0.02

MISC DATA

Payload Temp before SEP, Rn06 70 °F

Payload Temp, Max REENTRY, TB02 72 °F

Chute Press before PREP 2, P711 0.77 PSI

Supply Press before PREP 2, P113 0.70 PSI

BETA ANGLE of Recovery Rev. 0.8 °

PITCH ANGLE

BASIC STUDY

Θ_{rvs} -126.53 °

$\Delta\Theta 1$ +2.14 °

Ω_y 1.37 °/sec

$\Delta\Theta 2$ .24 °

Θ_{sv} -38.43 °

PITCH (CMD MSG) -38.493 °

Θ_{sv} (PDWN-SV TLM) -37.7 °

Θ_{rvs} ON UPDATED TEAPOT -126.593°

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RV 2 RECOVERY DATA

RV MASS PROPERTIES

	BASIC STUDY	UPDATED TEAPOT	TEAPOT EVALUATION	ACTUAL POST FLT
TU-A	205.00 lb	205.9 lb	205.9 lb	203 lb
TU-B	205.00 lb	205.9 lb	205.9 lb	204 lb
TOTAL	410.00 lb	411.8 lb	411.8 lb	407 lb
SEP WGT	1492.64 lb	1494.44 lb	1494.44 lb	UPDATED TEAPOT
RETRO WGT	1490.95 lb	1492.75 lb	1492.75 lb	% UNBAL 0.0
ENTRY WGT	1300.14 lb	1301.94 lb	1301.94 lb	% FULL 89.52
AIR RECOV WGT	1089.13 lb	1090.93 lb	1090.93 lb	(100% = 460 lb)

SV MASS PROPERTIES - AFTER SEP (FROM BASIC STUDY)

SV WEIGHT	17336.5 lb	PITCH INERTIA (Iy)	121948.9 SLUG-FT^2
CG FROM STA 2060 (Xr)	263.04 in	ROLL INERTIA (Ix)	5513.89 SLUG-FT^2
CG FROM LONG AXIS (Y)	.343 in	YAW INERTIA (Iz)	123317.0 SLUG-FT^2

'DORBEL EPHEMERIS

REV OF SEP 602	BASIC STUDY	UPDATED TEAPOT	TEAPOT EVALUATION
PREDICTED FROM REV	592	600	N/A
APOGEE	148.109 nm	147.911 nm	147.764 nm
PERIGEE	90.148 nm	90.175 nm	90.309 nm
ARG OF PERIGEE	145.501 °	145.566 °	145.422 °
INCLINATION	96.898 °	96.897 °	96.899 °
TRUE ANOMALY AT RETRO	337.49 °	337.47 °	337.62 °
HEATSHIELD JETT ALT	49809.37 FT	49818.64 FT	49773.34 FT

ENTRY PARAMETERS FROM TEAPOT EVALUATION RUN

	SEPARATION	RETRO	REENTRY	DROGUE DEPLOY
SYSTEMS TIME (sec)	83379.2	83504.60	83705.25	84017.64
ALTITUDE (FT)	608477.21	587686.18	400000	64417.02
LATITUDE (°N)	64.653	56.325	43.098	25.914
LONGITUDE (°W)	151.46	156.33	161.18	165.33
INERTIAL AZIMUTH (°)	196.32	192.52		
INERT FLT PATH ANGLE (°)	-.2474	-.1827		
INERT VELOCITY (FT/SEC)	25666.87	25686.06	25522.83	
LOCAL AZIMUTH (°)			191.94	190.78
LOCAL FLT PATH ANGLE (°)			-2.3372	-31.1090
LOCAL VELOCITY (FT/SEC)				1430.54
ANGLE OF ATTACK (°)			102.19	
MACH NUMBER				1.48
DYN PRESS (PSF)				186.930

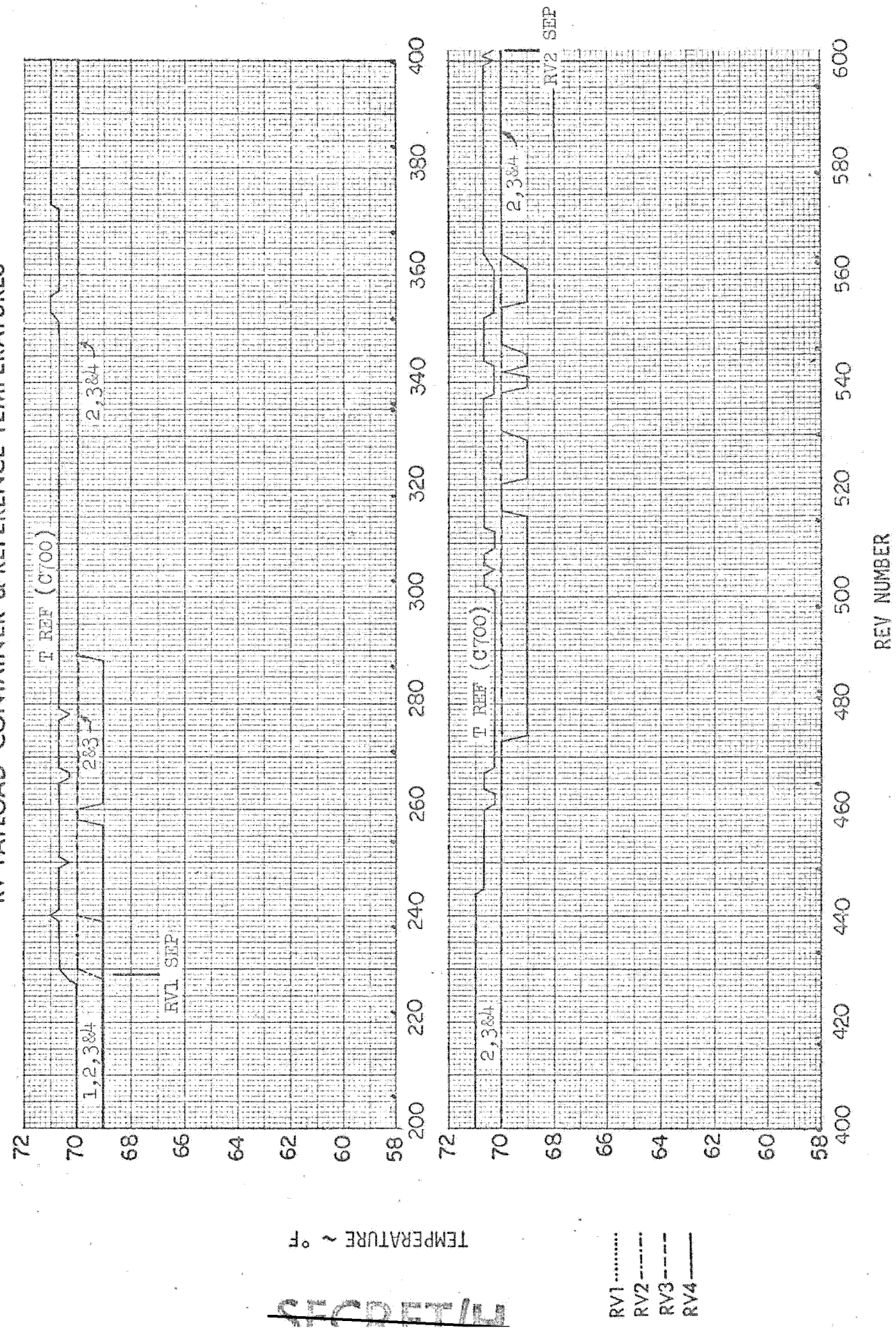
CORE PINS SHEARED (FROM REBOUND TWX) A: YES X NO ___, B: YES X NO ___.

BFE VECTOR, Parameters from a SYS Time near the ascending node of the Recovery Rev.

SYS TIME	81864.662 sec	DECLINATION (MDAC = GEOCENTRIC LAT)	.0002 °
LONGITUDE	20.7729E °	INERTIAL GEOCENTRIC FLT PATH ANGLE	-.2457 °
ALTITUDE	141.4209 nm	INERTIAL GEOCENTRIC AZIMUTH	353.1013 °
		INERTIAL VELOCITY	25336.78 FT/SEC
SV C_D A/M (DRAG VALUE AT ASCENDING NODE OF RECOVERY REV)			.585437 FT^2/SLUG

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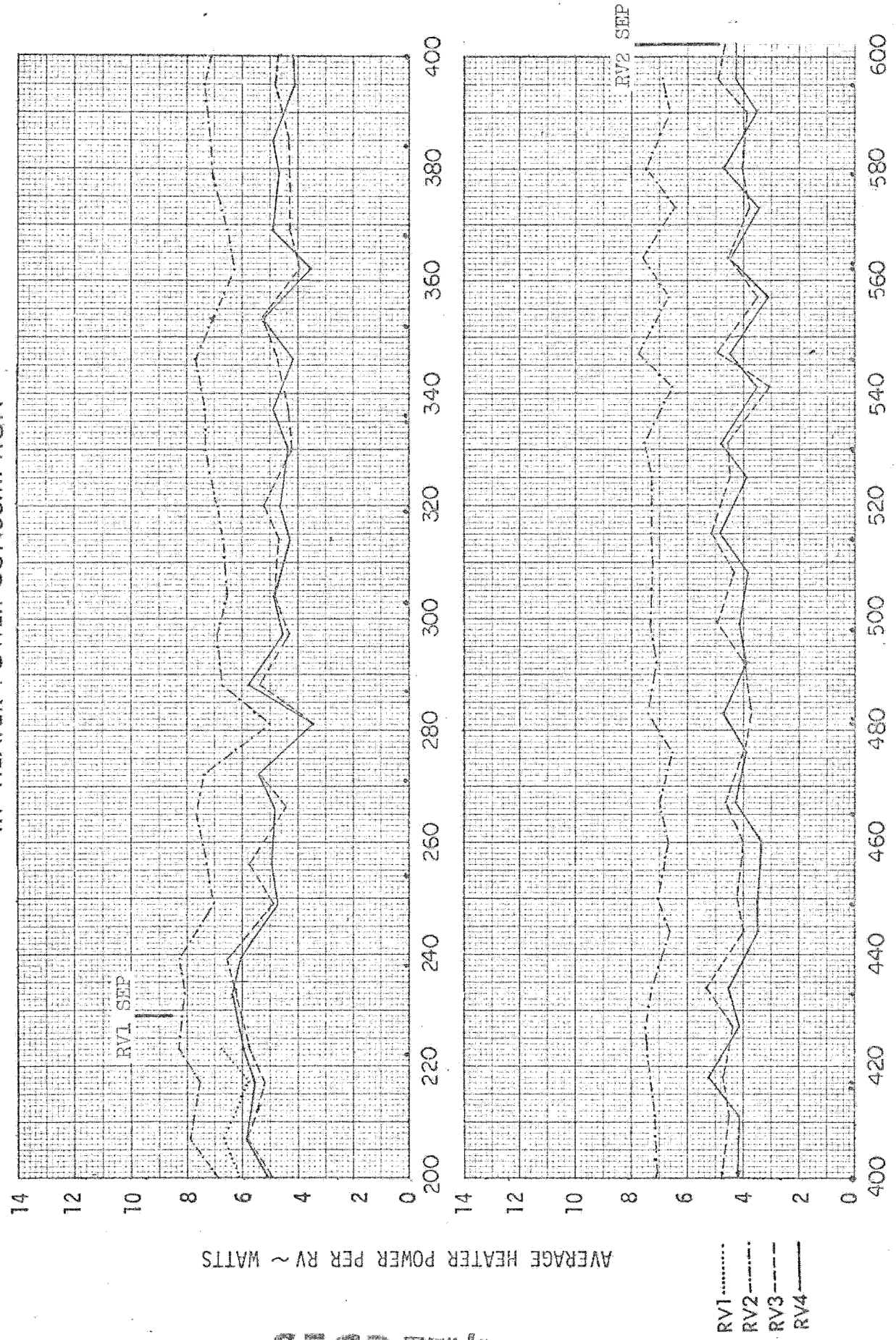
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SECRET/H

ACTIVE THERMAL CONTROL SYSTEM

RV HEATER POWER CONSUMPTION



SECRET/H

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3.5 SATELLITE CONTROL FACILITY PERFORMANCE

3.5.1 Orbit Determination and Prediction

3.5.1.1 Orbit Determination

Table 3.5.1 shows a summary of the orbital conditions computed from each tracking reduction from RV-1 recovery to RV-2 recovery on Rev 602. Significant events affecting the orbit included an orbit adjust every two days with the third orbit adjust a dual positive/negative to provide tighter control on orbit characteristics, including the location of Argument of Perigee. The events during the RV-2 segment were:

1. Positive orbit adjust on Rev 240 followed by a negative orbit adjust on Rev 242.
2. Positive orbit adjust on Rev 289.
3. Positive orbit adjust on Rev 338.
4. Positive orbit adjust on Rev 386.
5. Positive orbit adjust on Rev 435 followed by a negative orbit adjust on Rev 437.
6. Positive orbit adjust on Rev 484.
7. Positive orbit adjust on Rev 534.
8. Positive orbit adjust on Rev 581 followed by a negative orbit adjust on Rev 583.

3.5.1.2 Prediction Accuracy

Table 3.5.2 contains a summary of prediction accuracies over ten rev span from each tracking reduction epoch rev. Accuracies are determined by comparing the nodal crossing differences between the Best Fit Ephemeris and the tracking reduction ephemeris predictions. Prediction accuracies were within acceptable limits throughout the RV-2 segment.

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SUMMARY

EPOCH REV	ECCENT.	PERIOD DECAY	INTEG. PERIOD	MAX ALTIT.	MIN. ALTIT.	ARG. PERIGEE	DRAG	STABLE/ TUMBLE	COMMENTS
231	.0094	.2868	88:44.0	155.16	86.20	122.4	.5201	165/46	
233	.0093	.2863	88:43.5	154.69	86.23	122.0	.5175	165/46	
235	.0093	.3163	88:42.7	154.29	86.24	121.2	.5678	148/43	
238/239	.0092	.3192	88:41.4	153.44	86.15	120.4	.5615	146/42	OA #6 Rev 240
243	.0091	.2578	88:53.1	154.17	87.24	150.3	.5726	161/47	OA #7 Rev 242
246	.0091	.2672	88:52.2	153.65	87.20	149.4	.5879	155/45	
248	.0090	.2612	88:51.6	153.41	87.11	148.9	.5688	159/46	
251	.0090	.2430	88:51.0	152.97	87.23	147.9	.5309	171/49	
256	.0089	.2431	88:49.8	152.45	86.98	146.9	.5176	171/49	
259	.0088	.2416	88:49.1	151.98	87.03	146.0	.5132	172/49	
262	.0088	.2539	88:48.3	151.70	86.82	145.1	.5234	166/48	
264	.0088	.2499	88:47.7	151.49	86.72	144.6	.5142	167/48	
267	.0087	.2403	88:47.2	151.05	86.85	143.6	.4964	174/50	
272	.0086	.2406	88:45.9	150.48	86.67	142.5	.4859	173/50	
275	.0086	.2406	88:45.3	150.04	86.71	141.7	.4847	173/50	
278	.0085	.2584	88:44.4	149.73	86.50	140.8	.5082	162/46	
280	.0085	.2632	88:43.8	149.52	86.39	140.2	.5121	159/46	
283	.0084	.2513	88:43.3	149.06	86.51	139.3	.4904	167/48	
287	.0084	.2464	88:41.9	148.44	86.36	138.1	.4703	170/50	
288	.0084	.2464	88:41.9	148.44	86.36	138.1	.4703	170/50	OA #8 Rev 289
292	.0087	.1893	88:53.4	153.31	89.18	147.4	.4775	223/65	
295	.0087	.1987	88:52.7	153.15	88.98	146.5	.4880	216/60	
297	.0087	.1984	88:52.3	152.94	88.94	146.1	.4883	215/60	
300	.0086	.1935	88:51.8	152.61	89.07	144.9	.4779	221/64	
304	.0086	.1940	88:51.0	152.31	88.89	144.2	.4703	221/64	
308	.0085	.1870	88:50.3	151.91	88.91	143.2	.4638	223/64	
311	.0085	.2047	88:49.6	151.71	88.74	142.3	.4835	211/61	
313	.0085	.2029	88:49.2	151.54	88.66	141.9	.4772	211/61	
316	.0084	.1934	88:48.7	151.22	88.79	140.8	.4564	223/64	
320	.0084	.2013	88:47.8	150.80	88.68	140.0	.4677	215/63	
324	.0083	.1986	88:47.1	150.42	88.67	139.1	.4586	218/63	

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TABLE 3.5-1

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SUMMARY

EPOCH REV	ECCENT.	PERIOD DECAY	INTEG. PERIOD	MAX ALTIT.	MIN. ALTIT.	ARG. PERIGEE	DRAG	STABLE/ TUMBLE	COMMENTS
327	.0083	.2227	88:46.3	150.19	88.47	138.2	.5006	196/56	
328	.0083	.2309	88:46.1	150.13	88.41	137.9	.5139	190/55	
332	.0082	.2158	88:45.4	149.65	88.51	136.7	.4849	201/58	
337	.0082	.2186	88:44.2	149.17	88.30	135.7	.4796	199/58	OA #9 Rev 338
340	.0090	.2005	88:52.9	155.32	88.71	139.9	.4825	226/66	
343	.0090	.2123	88:52.2	154.98	88.67	139.1	.5078	213/61	
345	.0089	.2150	88:51.7	154.82	88.58	138.5	.5077	211/60	
348	.0089	.1984	88:51.3	154.48	88.76	137.6	.4719	229/65	
353	.0088	.1896	88:50.2	154.06	88.66	136.5	.4439	241/70	
356	.0088	.2011	88:49.7	153.69	88.73	135.6	.4708	227/65	
359	.0088	.2107	88:49.0	153.47	88.55	134.8	.4841	217/63	
361	.0087	.2090	88:48.5	153.37	88.44	134.3	.4747	218/62	
364	.0087	.2000	88:48.1	153.02	88.57	133.4	.4562	228/65	
369	.0086	.1918	88:47.1	152.57	88.47	132.4	.4299	239/70	
373	.0086	.1999	88:46.4	152.13	88.50	131.5	.4459	229/67	
376	.0086	.2338	88:45.6	151.86	88.31	130.6	.5039	198/57	
378	.0085	.2269	88:45.1	151.59	88.28	130.2	.4927	202/58	
381	.0085	.2291	88:44.5	151.19	88.39	129.2	.4978	200/58	
385	.0084	.2363	88:43.5	150.66	88.27	128.4	.5041	193/55	OA #10 Rev 386
389	.0092	.2208	88:51.7	156.67	88.59	132.2	.5139	216/61	
392	.0092	.2705	88:50.8	156.22	88.42	131.5	.6179	176/51	
394	.0091	.2764	88:50.2	155.90	88.36	131.0	.6254	172/50	
[illegible]	.0091	.2600	88:49.6	155.46	88.48	130.0	.5889	183/53	
[illegible]	.0090	.2429	88:48.4	154.88	88.32	128.9	.5380	196/56	
405	.0089	.2251	88:47.7	154.42	88.44	128.2	.4998	211/60	
408	.0089	.2356	88:46.9	154.14	88.26	127.4	.5129	201/58	
410	.0089	.2526	88:46.4	153.86	88.18	126.9	.5439	187/55	
413	.0088	.2433	88:45.8	153.43	88.30	126.0	.5243	194/57	
418	.0087	.2253	88:44.6	152.86	88.18	125.0	.4759	210/61	
419	.0087	.2250	88:40.0	152.43	88.26	124.2	.4744	210/61	
424	.0086	.2413	88:43.2	152.11	88.08	123.5	.4990	195/56	

TABLE 3.5-1

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SUMMARY

EPOCH REV	ECCENT.	PERIOD DECAY	INTEG. PERIOD	MAX ALTIT.	MIN. ALTIT.	ARG. PERIGEE	DRAG	STABLE/ TUMBLE	COMMENTS
426	.0086	.2391	88:42.7	151.91	87.99	123.0	.4883	196/57	
429	.0086	.2234	88:42.2	151.52	88.14	122.2	.4584	210/61	
434	.0085	.2163	88:41.1	150.91	88.06	121.1	.4355	217/62	OA #11 Rev 435
438	.0088	.1866	88:55.1	153.97	89.36	111.9	.4841	225/64	OA #12 Rev 437
441	.0088	.1926	88:54.5	153.85	89.15	149.1	.4878	220/64	
443	.0088	.1781	88:54.1	153.65	89.17	148.7	.4532	236/69	
446	.0087	.1706	88:53.7	153.37	89.30	147.7	.4357	248/72	
451	.0087	.1722	88:52.8	153.16	89.04	146.6	.4298	247/72	
454	.0086	.1685	88:52.4	152.80	89.15	145.9	.4216	253/73	
457	.0086	.1791	88:51.7	152.68	88.97	144.9	.4380	239/69	
459	.0086	.1777	88:51.3	152.53	88.91	144.5	.4341	240/69	
462	.0085	.1744	88:50.9	152.23	89.04	143.5	.4278	246/71	
467	.0085	.1796	88:49.9	151.95	88.81	142.6	.4306	240/69	
470	.0085	.1841	88:49.5	151.56	88.91	141.8	.4421	234/69	
473	.0085	.2114	88:48.7	151.34	88.71	140.9	.4986	203/55	
475	.0084	.2099	88:48.3	151.17	88.64	140.4	.4904	205/56	
478	.0084	.1977	88:47.8	150.86	88.76	139.4	.4634	219/63	
483	.0083	.1893	88:46.8	150.51	88.57	138.5	.4344	229/66	OA #13 Rev 484
486	.0087	.1855	88:49.7	153.08	88.74	137.7	.4376	242/70	
489	.0086	.1910	88:49.1	152.87	88.68	136.7	.4463	235/69	
491	.0086	.1924	88:48.6	152.72	88.62	136.2	.4456	234/66	
494	.0086	.1809	88:48.3	152.42	88.77	135.3	.4217	249/71	
499	.0085	.1814	88:47.3	152.00	88.68	134.2	.4162	249/71	
503	.0085	.1899	88:46.6	151.62	88.69	133.2	.4330	238/69	
505	.0085	.2003	88:46.1	151.48	88.53	132.7	.4496	226/65	
507	.0085	.2042	88:45.6	151.36	88.43	132.2	.4531	222/63	
510	.0084	.1917	88:45.2	151.04	88.50	131.3	.4275	236/67	
515	.0084	.1823	88:44.2	150.60	88.50	130.2	.4001	249/73	
519	.0083	.1870	88:43.6	150.15	88.57	129.3	.4097	242/71	
522	.0083	.2009	88:42.9	149.97	88.38	128.5	.4275	228/66	
524	.0082	.2002	88:42.4	149.73	88.37	128.1	.4276	227/66	

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SUMMARY

EPOCH REV	ECCENT.	PERIOD DECAY	INTEG. PERIOD	MAX ALTIT.	MIN. ALTIT.	ARG. PERIGEE	DRAG	STABLE/ TUMBLE	COMMENTS
527	.0082	.1922	88:41.9	149.43	88.50	127.0	.4115	236/67	
531	.0081	.1867	88:41.1	149.04	88.41	126.3	.3935	244/74	OA # 14 Rev 534
535	.0096	.1647	88:54.8	159.52	88.68	131.6	.3931	298/87	
538	.0096	.1765	88:54.2	159.38	88.51	130.8	.4116	280/82	
540	.0096	.1785	88:53.7	159.21	88.48	130.4	.4101	280/82	
543	.0095	.1684	88:53.4	158.94	88.63	129.4	.3947	293/85	
547	.0095	.1692	88:52.6	158.53	88.63	128.5	.3933	292/85	
551	.0094	.1665	88:52.0	158.20	88.69	127.7	.3863	296/87	
554	.0094	.1927	88:51.4	157.99	88.53	127.0	.4367	257/75	
556	.0094	.2029	88:50.8	157.77	88.48	126.5	.4593	243/67	
559	.0094	.1848	88:50.5	157.50	88.61	125.6	.4198	267/76	
564	.0093	.1924	88:49.5	157.01	88.52	124.7	.4297	256/75	
567	.0092	.1978	88:48.9	156.60	88.63	123.9	.4421	248/72	
570	.0092	.2067	88:48.2	156.35	88.47	123.2	.4542	237/69	
572	.0092	.2091	88:47.7	156.18	88.40	122.7	.4545	235/69	
575	.0091	.1917	88:47.4	155.85	88.56	121.9	.4191	256/70	
580	.0091	.1850	88:46.3	155.34	88.53	120.8	.3986	265/77	OA #15 Rev 581
584	.0085	.1646	88:51.9	151.35	89.14	150.3	.4145	247/72	OA #16 Rev 583
586	.0084	.1755	88:51.5	151.19	89.02	149.7	.4368	232/67	
589	.0084	.1723	88:50.9	151.00	88.93	149.0	.4222	238/69	
592	.0084	.1772	88:50.5	150.70	89.02	147.9	.4372	231/67	
596	.0083	.1828	88:49.6	150.45	88.81	147.2	.4422	225/65	
600	.0083	.1853	88:49.0	150.00	88.88	146.2	.4477	222/64	

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TABLE 3.5-1

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PREDICTION ACCURACY SUMMARY

(BFE - Tracking Reduction Predictions)

Tracking Reduction Epoch Rev	BFE ID NO.	5 Revs After Epoch	10 Revs After Epoch
231	15	-.907	-2.427
233	15/16	-.592	-1.305
236	15/16	.069	.775
239	16	.565	.985
243	16	-.121	.262
246	16	.347	.409
248	16	.366	.238
251	16/17	.049	.228
256	17	-.041	.021
259	17	.008	.144
262	17	.232	.923
264	17	.276	.924
267	17/18	.123	1.255
272	18	-.142	-.461
275	18	-.139	-.441
278	18	.172	.680
280	18	.350	1.243
283	18/19	.196	.814
288	19	.169	.373
292	19	-.058	-.178
295	19	.082	.237
297	19	.141	.351
300	19/20	-.015	.089
304	20	.029	.008
308	20	-.085	-.279

Tracking Reduction Epoch Rev	BFE ID NO.	5 Revs After Epoch	10 Revs After Epoch
311	20	.158	.397
313	20	.137	.278
316	20/21	-.169	-.401
320	21	.069	-.088
324	21	-.220	-.820
327	21	.078	.348
329	21	.398	-3.615
332	21/22	.025	.247
337	22	.165	.403
340	22	.005	.165
343	22	.222	1.069
345	22	.485	1.626
348	22/23	.307	.602
353	23	-.288	-.817
356	23	-.027	.085
359	23	.146	.956
361	23	.265	1.035
364	23	.232	-.152
369	24	-.152	-.960
373	24	-.410	-1.432
376	24	.044	.083
378	24	-.078	-1.268
381	24/25	-.026	-.177
385	25	.183	-.405
389	25	-.742	-2.268

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PREDICTION ACCURACY SUMMARY

(BFE - Tracking Reduction Predictions)

Tracking Reduction Epoch Rev	BFE ID NO.	5 Revs After Epoch	10 Revs After Epoch
392	25	.083	.891
394	25	.519	1.839
397	25/26	.352	1.570
402	26	.255	.664
405	26	-.187	-.616
408	26	-.214	-.147
410	26	.334	1.458
413	26/27	.429	1.321
418	27	-.053	-.129
421	27	-.067	-.035
424	27	.271	1.302
426	27	.402	-4.152
429	27/28	.247	.937
434	28	.217	.314
438	28	.058	.601
441	28	.391	1.359
443	28	.193	.612
446	28/29	.034	.130
451	29	-.010	-.095
454	29	-.128	-.408
457	29	.043	.085
459	29	.024	-.033
462	29/30	-.092	-.449
467	30	-.237	-.977
470	30	-.327	-.915
473	30	.194	.957
475	30	.351	1.203
478	30/31	.203	.755
483	31	.097	.348
486	31	.162	.443
489	31	.132	.585
491	31	.275	.844
494	31/32	.067	-.069
499	32	-.256	-.790
503	32	-.116	-.138
505	32	.117	.651
507	32	.345	1.199
510	32/33	.227	.576
515	33	-.164	-.555
519	33	-.088	-.235
522	33	.113	.478
524	33	.239	.738
527	33/34	.075	.708
531	34	.201	.854
535	34	-.129	-.344
538	34	.066	.276
540	34	.119	.340
543	34/35	-.027	-.141
547	35	.039	-.276
551	35	-.390	-1.242

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PREDICTION ACCURACY SUMMARY

(BFE - Tracking Reduction Predictions)

Tracking Reduction Epoch Rev	BFE ID NO.	5 Revs After Epoch	10 Revs After Epoch	Tracking Reduction Epoch Rev	BFE ID NO.	5 Revs After Epoch	10 Revs After Epoch
554	35	-.069	.041				
556	35	.387	1.152				
559	35/36	-.032	-.454				
564	36	-.214	-.542				
567	36	.024	.150				
570	36	.240	.876				
572	36	.476	1.367				
575	36/37	.152	.285				
580	37	-.118	-.918				
584	37	-.364	-1.029				
586	37	-.041	-.219				
589	37	-.214	-.830				
592	37/38	-.148	-.601				
596	38	-.160	-1.295				
600	38	-.372	-1.358				

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3.5.1.3 B-Factor

Figure 3.5-1 shows a plot of B-factor for this segment of the mission. The B-factors shown are from the individual tracking reductions and from the BFE for comparison. Maneuvers are indicated as to the rev of occurrence.

The daily average K factor, i.e., the ground magnetometer readings from Alaska and Colorado as indicative of possible radiation damage to the stellar film, is also shown on this figure.

3.5.1.4 Orbit Adjust Summary

Table 3.5-3 reflects a summary of each orbit adjust during this segment. For each orbit adjust or set of orbit adjusts occurring on the same or adjacent revs, orbital conditions are provided which describe the orbit prior to the first orbit adjust. In addition, the predicted velocity change and orbit resulting from each orbit adjust or set of orbit adjusts is provided and compared with the actual orbit and velocity change obtained. The actual orbit and velocity change was determined from the Best Fit Ephemeris. All orbit adjusts were close to nominal.

3.5.1.5 Best Fit Ephemeris

Table 3.5-4 shows the orbital conditions for each day of this segment of the mission.

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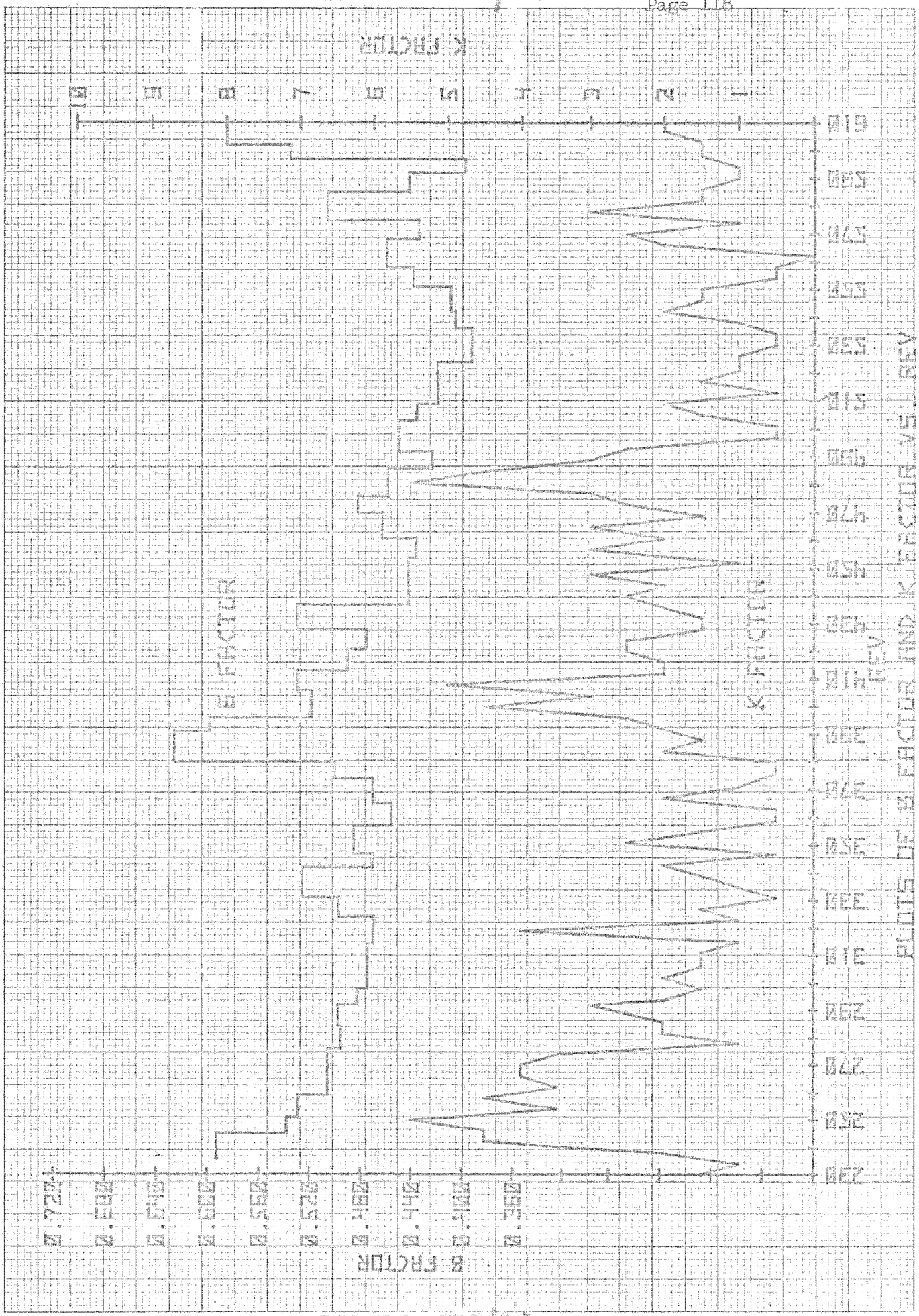


FIGURE 3.5-1

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OA No. 6 Rev. No. 240	Period Min:Sec. XX:XX.X	Perigee N.M. XX.XX	Apogee N.M. XXX.XX	Arg of Per. Deg. XXX.XXX	Burn Dur. Sec. XX.X	Delta Velocity XX.XX
Orbit at Rev 239	88:41.4	87.99	152.05	120.357	--	--
Predicted					--	+40.4
Actual					117.0	+41.0
Delta (A-P)					--	+ .6
OA No. 7 Rev. No. 242						
Orbit at Rev						
Predicted 243	88:53.2	88.37	152.81	150.074	--	-20.69
Actual 243	88:53.3	88.36	152.79	150.542	61.8	-21.06
Delta (A-P)	+.1	-.01	-.02	+.468	--	+ .37
OA No. 8 Rev. No. 289						
Orbit at Rev 288	88:41.8	88.13	146.40	137.937	--	--
Predicted 290	88:53.8	90.41	151.95	147.771	--	+19.28
Actual 290	88:53.9	90.46	151.80	147.831	57.8	+19.46
Delta (A-P)	+.1	+ .05	-.15	+.060	--	+ .18
OA No. 9 Rev. No. 338						
Orbit at Rev 337	88:44.1	90.26	147.09	135.438	--	--
Predicted 338	88:53.2	90.33	153.73	140.097	--	+14.53
Actual 338	88:53.2	90.34	153.76	140.125	44.2	+14.67
Delta (A-P)	0	+ .01	+ .03	+ .128	--	+ .14

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		Period Min:Sec. XX:XX.X	Perigee N.M. XX.XX	Apogee N.M. XXX.XX	Arg of Per. Deg. XXX.XXX	Burn Dur. Sec. XX.X	Delta Velocity XX.XX
OA No. 10	Rev. No. 386						
Orbit at Rev	385	88:43.3	90.26	148.78	128.320	-	-
Predicted	386	88:52.2	90.34	155.28	132.650	-	+14.21
Actual	386	88:52.2	90.37	155.26	132.710	43.6	+14.72
Delta (A-P)		0	+.03	-.02	+.060	-	+ .51
OA No. 11	Rev. No. 435						
Orbit at Rev	434	88:41.0	90.02	149.37	120.97	-	-
Predicted						-	+39.59
Actual						121.0	+40.32
Delta (A-P)						-	+0.73
OA No. 12	Rev. No. 437						
Orbit at Rev							
Predicted	437	88:55.2	90.53	152.48	149.92	-	-16.60
Actual	437	88:55.2	90.51	152.44	150.36	52.0	-16.81
Delta (A-P)		0	-.02	-.04	+.46	-	+ .21
OA No. 13	Rev. No. 484						
Orbit at Rev	483	88:46.7	90.39	148.47	138.451	-	-
Predicted	484	88:50.0	90.50	151.40	137.893	-	+ 5.27
Actual	484	88:50.0	90.52	151.40	137.891	17.2	+ 5.41
Delta (A-P)		0	+ .02	0	-.002	-	+ .13

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		Period Min:Sec. XX:XX.X	Perigee N.M. XX.XX	Apogee N.M. XXX.XX	Arg of Per. Deg. XXX.XXX	Burn Dur. Sec. XX.X	Delta Velocity XX.XX
OA No. 14	Rev. No. 534						
Orbit at Rev	533	88:40.8	90.61	147.10	125.636	-	-
Predicted	534	88:54.7	90.45	157.81	131.498	-	+22.42
Actual	534	88:54.8	90.50	157.89	131.555	70.4	+22.56
Delta (A-P)		+ .1	+ .05	+ .08	+ .057	-	+ .14
OA No. 15	Rev. No. 581						
Orbit at Rev	581	88:46.3	90.36	153.91	120.623	-	-
Predicted						-	+34.2
Actual						108.8	+34.3
Delta (A-P)						-	+ .1
OA No. 16	Rev. No. 583						
Orbit at Rev							
Predicted	583	88:52.1	90.29	149.90	150.218	-	-24.50
Actual	583	88:52.0	90.31	149.73	150.590	79.0	-24.57
Delta (A-P)		-.1	+ .02	- .17	+ .372	-	+ .07
OA No.	Rev. No.						
Orbit at Rev							
Predicted							
Actual							
Delta (A-P)							

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SECRET/II

BEST FIT EPHEMERIS

SUMMARY

DAY	EPOCH REV	ECCENT.	INCL.	INTEG. PERIOD	MAX. ALTITUDE	MIN. ALTITUDE	ARG. PERIGEE	DRAG	REV. SPAN
XX	XXX	.XXXX	XX.XX	XX:XX.X	XXX.XX	XX.XX	XXX.X	.XXXX	XXX - XXX
16	236	.0091	96.92	88:42.5	153.77	86.58	120.8	.5924 .5380 .5221	236 - 245 245 - 251 251 -
17	252	.0089	96.91	88:50.8	152.75	87.32	147.6	.5294 .5057 .4809	252 - 259 259 - 266 266 -
18	268	.0086	96.91	88:47.0	150.86	86.99	143.1	.5058 .4958 .4594	268 - 276 276 - 284 284 -
19	284	.0084	96.91	88:43.0	148.86	86.64	138.8	.4983 .4829 .4783	284 - 292 292 - 298 298 -
20	301	.0086	96.91	88:51.6	152.44	89.14	144.7	.4749 .4739 .4732	301 - 307 307 - 314 314 -
21	317	.0084	96.91	88:48.5	150.94	88.95	140.5	.4694 .4973 .4813	317 - 324 324 - 331 331 -
22	333	.0081	96.91	88:45.1	149.32	88.79	136.1	.5255 .4708 .4429	333 - 342 342 - 347 347 -
23	349	.0088	96.91	88:51.1	154.38	88.87	137.1	.4850 .4560 .4150	349 - 357 357 - 365 365 -
24	366	.0086	96.91	88:47.7	152.76	88.68	132.9	.4702 .5002 .5081	366 - 374 374 - 380 380 -

TABLE 3.5-4

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BEST FIT EPHEMERIS

SUMMARY

DAY	EPOCH REV	ECCENT.	INCL.	INTEG. PERIOD	MAX. ALTITUDE	MIN. ALTITUDE	ARG. PERIGEE	DRAG	REV. SPAN
XX	XXX	.XXXX	XX.XX	XX:XX.X	XXX.XX	XX.XX	XXX.X	.XXXX	XXX - XXX
25	382	.0084	96.91	88:44.3	150.91	88.56	128.9	.6254 .5984 .5283	382 - 391 391 - 396 396 -
26	398	.0090	96.91	88:49.3	155.19	88.65	129.6	.5192 .5294 .4688	398 - 406 406 - 413 413 -
27	414	.0087	96.91	88:45.6	153.23	88.45	125.5	.4907 .4760 .4271	414 - 421 421 - 428 428 -
28	431	.0085	96.90	88:41.8	151.18	88.33	121.4	.5301 .4430 .4299	431 - 437 437 - 444 444 -
29	447	.0087	96.90	88:53.5	153.18	89.40	147.4	.4435 .4364 .4407	447 - 454 454 - 461 461 -
30	463	.0085	96.90	88:50.7	152.01	89.18	143.2	.4631 .4824 .4412	463 - 470 470 - 476 476 -
31	479	.0083	96.90	88:47.6	150.60	89.00	138.9	.4592 .4246 .4173	479 - 486 486 - 492 492 -
32	495	.0085	96.90	88:48.1	152.27	88.89	134.8	.4497 .4366 .4049	495 - 503 503 - 509 509 -
33	511	.0084	96.90	88:45.0	150.87	88.70	130,8	.4199 .4204 .4030	511 - 519 519 - 524 524 -

TABLE 3.5-4

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BEST FIT EPHEMERIS

SUMMARY

DAY	EPOCH REV	ECCENT.	INCL.	INTEG. PERIOD	MAX. ALTITUDE	MIN. ALTITUDE	ARG. PERIGEE	DRAG	REV. SPAN
XX	XXX	.XXXX	XX.XX	XX:XX.X	XXX.XX	XX.XX	XXX.X	.XXXX	XXX - XXX
34	528	.0081	96.90	88:41.8	149.17	88.66	126.7	.3935 .4057 .3996	528 - 536 536 - 542 542 -
35	543	.0095	96.90	88:53.4	158.73	88.84	129.4	.4095 .4387 .4272	543 - 551 551 - 558 558 -
36	560	.0093	96.90	88:50.3	157.19	88.91	125.0	.4601 .4347 .4143	560 - 568 568 - 575 575 -
37	577	.0091	96.90	88:47.0	155.54	88.79	120.9	.5061 .4430 .4641	577 - 585 585 - 592 592 -
38	592	.0083	96.90	88:50.4	150.47	89.19	147.9	.3985 .5355 .5854 .4571	592 - 597 597 - 602 602 - 607 607 -

TABLE 3.5-4

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3.5.2 Telemetry and Mode Processing

No SV-7 mode effort was conducted during this segment.

3.5.3 Command Message Planning and Generation

FPA changes were processed to update the PREP sequences and to provide for the use of MACRO's for the generation of RV 1-4 and RV-5 recovery messages and PIP change messages.

Planning for back-up STC operation was finalized and to provide for extended SV contact, the SP message configuration was modified to extend the SP span to approximately 28 revs. The contingency span used slope widening of both transponder and decoders to the maximum of 240 seconds.

An exercise to determine the feasibility of reducing the block SE message timeline (Subcycle 3 to 11) from the nominal 85 minute generation timeline to 70 minutes to improve the quality of the input data was conducted during the segment. The test was satisfactory and the 70 minute timeline was implemented after RV-2 recovery.

3.5.4 SCF Support

Acceptable SCF support continued during this segment of the mission; however, a significant number of RTS equipment failures and personnel errors were encountered. These problems caused loss of tape recorder data and required emergency profiling to work around the RTS outages. The more significant problems included

a. HULA Rev 269 - Tape recorder data lost due to personnel error.

b. POGO Rev 308 - SGLS transmitter went off during the pass. No impact. POGO Rev 311 and 329 - SGLS transmitter problems caused loss of tape recorder data and required bringing up additional RTS for mission support.

c. POGO Rev 372 - a time critical tape recorder command was missed - TR data were lost due to personnel error.

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d. KODI Rev 382 - tape recorder data could not be processed - no reason determined.

e. GUAM Rev 515 - SGLS transmitter faulted - tape recorder data were lost. Operational procedures to minimize impact on mission were implemented.

f. The Microwave link data were assymetrical because of a STC equipment problem but were repaired. The MWC link was down from 12 to 13 Dec from equipment failures.

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SECTION 3.6
PROGRAM COMMAND SOFTWARE PERFORMANCE
(Prepared by HTC)

3.6.1 Command Message Summary

This section summarizes pertinent command message data from Mission 1207, IRON 6630. The command messages discussed cover the period of RV2 initiation (Rev 230 load) to the RV2 recovery message (Rev 600 load).

Two hundred seventy-three command messages were received by the Technical Advisor (TA) staff. Two hundred thirteen were accepted and sixty were rejected. Six of the rejected messages were subsequently altered and loaded into the vehicle. The remaining fifty-four were not required due to lack of payload activity or no change in payload activity. The reasons for rejection of the six messages are summarized below:

Rev No. and Load Station	Reason for Rejection
231 POGO	No BC card (doppler beacon) was input into the execution deck. Therefore, the message contained no doppler beacon operations.
249 BOSS	This message was altered at user option to acquire additional payload activity.
337 GUAM	Two station contacts not on the flight profile were called up by the execution card deck.
363 POGO	This message was regenerated to include snow bias slit width cards in the execution deck.
460 BOSS	This message was regenerated at user option to modify the payload activity.
580 GUAM	This message was altered to place orbit adjust maneuver commands in one PMU

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Two hundred seven messages were loaded and sixty-six were not for the reasons stated below:

1. The sixty rejected messages were not loaded.
2. Three messages were accepted but were not loaded because of changes in message requirements (Rev 269 HULA, Rev 292 POGO, and Rev 405 POGO).
3. Two messages were not loaded due to tracking station outages (Rev 311 POGO and Rev 329 POGO).
4. The contingency VBE message concerning RV2 recovery was not required.

A one rev load cycle was employed while the vehicle was over the area of interest. The "add-on" message generation and loading philosophy was in effect. This resulted in the generation of two hundred twenty-five "add-on" messages.

Summary

Total RV2 messages	-	273
Messages rejected	-	60
Total messages accepted	-	213
Messages not required	-	6
Total messages accepted and loaded	-	207

3.6.2 'TUNITY Software Problems

The flight 7 'TUNITY software problems itemized below pertain only to the period for RV1 recovery through RV2 recovery. They have been grouped into the following categories to demonstrate their impact on the flight. The classification of these software problems will be determined by the Configuration Control Board.

Category	No. of SPRs	Comments
Flight Critical	0	Software corrections were made and incorporated during this flight period.
Non-Flight Critical (Requiring Work-Around)	2	Work-around procedures were developed and implemented.

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Category	No. of SPRs	Comments
Non-Flight Critical (Minor)	1	Work-around procedures were not required.
Product Improvement or New Requirement	3	To be considered during future development.
Documentation Error	0	MS-4 or MS-7 affected.

Itemized Software Problems

SPR MD2-6332 ('TMOD)

- Problem Description: Request that a page eject be inserted into the output when the processing of a rev is terminated. As the output is configured now, it is sometimes difficult to see the missed weather error message when checking the output.
- Solution or Work-Around: None
- Operational Impact: None
- Comment: This SPR should be considered as a product improvement item for a future software delivery.

SPR MD2-6333 ('TBALL)

- Problem Description: The "INH" data card is potentially dangerous. Request output at the end of each rev of 'TBALL indicating that area of the rev which has been inhibited. Note: "STA INH" should also be accounted for in the output. Distinguish between the ST and SS INH spans.
- Solution or Work-Around: None
- Operational Impact: None
- Comment: This SPR should be considered as a product improvement item for a future software delivery.

SPR MD2-6334 ('TWORT)

- Problem Description: Since macros are being used more often, it is requested that 'TWORT be given the capability to make PMU and class load order assignments to individual sequences within a macro.
- Solution or Work-Around: None
- Operational Impact: None
- Comment: This SPR should be considered as a product improvement item for a future software delivery.

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SPR MD2-6335 ('TRANFUN)

- Problem Description: Message 510 contained commands for a POS/NEG OA. The positive OA was commanded via macro 32. The MAC 32 card requested PMU A as a preferred PMU assignment. The sequence 90 records out of macro 32 had the normal sub cards to prevent records over active station cones. Since PMU A was specified, the substituted sequence 101 was held by 'TRANFUN and assembled.

- Solution or Work-Around: When inputting a macro card that will eventually be subbed for do not specify PMU assignment on the macro card.

- Operational Impact: The message had to be regenerated using the above mentioned work-around procedure thus causing a delay in the checking of the message.

- Comment: This SPR should be considered as a product improvement item for a future software delivery.

SPR MD2-6336 ('TBALL)

- Problem Description: Rev 436 was intentionally left off of the SE span between messages 510 and 520, i.e., non-contiguous rev spans. This caused the alarm from 'TBALL "'TLITAB NOT FOUND FOR REV, ICD DISCONTINUED = 436." The result is that ICD is prematurely discontinued thus no ICD for the rest of the span.

- Solution or Work-Around: 'TBALL must be run in contiguous rev spans to avoid this problem.

- Operational Impact: There was no operational impact because at this time of year there is no ICD to be performed.

- Comment: It is a software problem, the solution is known and it should be fixed prior to the support of SV-8.

SPR MD2-6337 ('TMOD)

- Problem Description: Operation 168 on rev 363 failed to countdown cell 127-20-03 because of missed Wx data. VER data did cover this cell, however, and several cells in the operation north of the one in question were counted down.

- Solution or Work-Around: None

- Operational Impact: The one cell that should have been counted down was not counted down.

- Comment: SOST is currently studying the problem to determine if the cell was really in the operation or if it was outside of the operation.

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3.6.3 Hardware/Software Interface Changes

For IRON 6630, eight change requests were processed from RV-1 recovery day through the RV-2 recovery message (as shown in Table 3.6.3-1).

These requests were implemented via requests SV7-200 through SV7-207 and have been incorporated into the flight data base and hardware/software interface documentation.

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Table 3.6.3-1 Summary of Hardware/Software Interface Changes

Request No.	Identification	Effectivity
SV7-200	Modifies Sequence 144 by changing aft camera in-track 0^2A^2 nominal; for 1414 material only.	SV-7 only
SV7-201	Deletes current Macro 11	SV-7 and nominal data base
SV7-202	Provides new Macro 10 manual HULA contact on recovery rev. Insures recording or real time monitoring of all pitch commands post RV separate.	SV-7 only
SV7-203	Provides new Macro 11 compatible with recovery revs which have no HULA contact.	SV-7 only
SV7-204	Provides new Sequence 230 which includes back-up timer enable and tape recorder off commands. For use in recovery Macros.	SV-7 only
SV7-205	Modifies Sequence 85 to be loaded in PMU 2 only. For use in recovery Macros.	SV-7 only
SV7-206	Provides new Sequence 86 manual HULA contact; PMU 1 only. For use in recovery macros.	SV-7 only
SV7-207	Modifies Sequence 218 to include Sequence 172 as a redundant sequence. Provides redundant off when doing a pneumatic equalize away from a station contact.	SV-7 and nominal data base

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3.7 SATELLITE VEHICLE AND AUXILLIARY PAYLOAD PERFORMANCE
(Prepared by SBAC)

3.7.1 EDAP Performance

The EDAP system continued to operate in a satisfactory manner. During the segment, the actual average power consumption was 20.86 A-H per rev.

The abnormal cycling of the heater on secondary battery #4 which commenced on Rev 186 during Segment 1, ceased on Rev 306 in this segment. Abnormal cycling of this battery heater was again observed on Rev 345. Since the occurrence of cycling on Rev 345, the #4 battery heater operation was normal except for a period of two revs. During Revs 511 and 512, available data indicated that the heater did not turn on and the observed #4 battery temperature had dropped to 42°F at 513H.

During this segment, abnormal cycling of the heater on secondary battery #3 was observed on Revs 333, 334 and 335. No further abnormal cycling of the #3 battery heater was observed.

Battery temperatures were in the nominal range throughout the segment.

3.7.2 T&T Performance

The SGLS1, PCM1A and Tape Recorder #1 have demonstrated satisfactory performance throughout Segment 2. Tape Recorder #2 was not utilized during this segment. SGLS2 was checked on Revs 243, 373, 471 and 584 and continued to operate normally. The weekly SGLS2 health checks will continue during the next segment.

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3.7.3 ACS/RCS Performance

Vehicle attitude was maintained by the Primary Attitude Control System (ACS) and Reaction Control System (RCS) throughout Segment 2. Control was nominal during the segment. The Redundant Attitude Control System was enabled during the entire segment. Its output was not used for control. Comparative data showed good correlation between both systems. Gyro temperatures were nominal during the segment. Primary System roll and yaw gyro temperature range was 176° to 182°. The pitch gyro temperature range was between 192° to 195°F. Gyro temperature range of the non-controlling, redundant system was 159° to 167°F.

The Reaction Control System performance was nominal throughout Segment 2. Thrust level was approximately 4 pounds-force for each engine except REA 1. The lowest thrust level computed for REA 1 was 3.2 pounds-force, down approximately 10% from nominal. RCS propellant consumption was 44.4 pounds during Segment 2.

3.7.4 Orbit Adjust System (OAS) Performance

The OAS functioned nominally for all burns throughout Segment 2. A total of 11 drag make-up burns were accomplished with a total propellant usage of 646.8 pounds.

An orbit adjust summary for Segment 2 appears in Table 3.7.1.

3.7.5 Lifeboat II (LB II) Performance

Lifeboat II electronics were activated on Revs 343, 489 and 570 for system calibration checks at two (2) selected locations in the orbit. This provided data for the scheduled subsequent calibration checks against the baseline. During the recovery maneuver on Rev 602 the system electronics were activated to observe the magnetometer excursions.

Analysis of the magnetometer data indicated that system performance was nominal. The magnetometer bias error noted in the North to South region is +5 to +7 milligauss and -1 to -4 milligauss in the South to North region. These bias errors are considered to be well within the system tolerance range. Nominal performance was noted during both recoveries, error

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Table 3.7-1

ORBIT ADJUST SUMMARY

SEGMENT 2 (REV 229-602)

OA No/Type	6/Pos	7/Neg	8/Pos	9/Pos	10/Pos	11/Pos	12/Neg	13/Pos	14/Pos	15/Pos	16/Neg
Operations Day	15	15	18	21	24	27	27	30	33	36	36
Rev No.	240	242	289	338	386	435	437	484	534	581	583
Delta Vel. (Predict) - fps	40.5	-20.8	19.3	14.6	14.2	39.6	-16.5	5.3	22.3	34.4	-24.5
Delta Vel. (Tracking)- fps	41.0	-21.1	19.5	14.7	14.7	40.3	-16.8	5.4	22.6	34.3	-24.6
Burn Duration - Sec	117.0	61.8	57.8	44.2	43.6	121.0	52.0	17.2	70.4	108.8	79.0
Propellant Used - Lbs	105.4	53.9	50.0	37.7	36.9	101.5	42.3	13.9	56.9	86.7	61.6
Avg. OA Tank Temp - ^{o}F	78.0	78.3	79.0	79.3	80.6	81.0	81.3	82.0	82.0	82.3	83.0
Avg. OA Tank Press - psia	219.5	206.5	202.5	196.5	191.0	189.5	181.5	176.5	176.5	170.5	165.5
Bed Res. Factor	28.1	31.0	30.1	29.3	29.6	30.8	32.5	31.7	28.2	27.3	30.1

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indications were less than 0.5 degree in the pitch sensor and less than 1 degree in the roll sensor.

During the Rev 51 calibration, a shift of 6 milligauss was observed on telemetry monitor D202 (Y, Z axis). A test on Rev 570 was performed to observe this shift and determine whether it was a telemeter bias. During the rev 570 test Monitor D202 did not exhibit any shift or telemeter bias.

The LB II Propellant Tank Heaters remained off throughout Segment 2. The tank temperature decreased from 102.5°F (average) on Rev 229 to 74.5°F (average) on Rev 602.

3.7.6 DOPPLER BEACON SYSTEM

The Doppler Beacon System continued to operate normally throughout Segment 2. The Software program 'TDERBY was utilized throughout the Segment. No anomalous conditions were observed in either hardware or software performance.

3.7.7 [redacted]

[redacted]

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3.8 Mapping Camera Operations (Revs. 230-602)

3.8.1 Mission Performance (Prepared by NEC)

44 mapping camera operations were executed through the indicated rev. span with a total of 576 frames of photography taken. Cumulative totals to Rev. 602 include 91 operates and 1457 frames of photography. Film footage totals transported into RV-5 are: terrain - 2423 Ft.; Stellar - 1391 Ft.; including 65 cycles of ground test footage.

The terrain platen press continued to indicate erratic operation. No change in diagnosis.

On Rev. 427, S204 terrain capping shutter telemetry monitor indicated the capping shutter did not open. Another capping shutter monitor S206, indicated normal capping shutter operation. S204 is a micro switch TLM monitor that is actuated when the capping shutter is "not closed". S206 is a commutator "rotary switch type" TLM monitor that indicates when the capping shutter is open.

Subsequently S204 failures have been randomly observed. Failure is diagnosed as an intermittent telemetry switch failure.

Operation over the BARXC calibration range in Arizona was taken on Rev. 405.

3.9 RV-5 (Prepared by RV-5 Contractor - OPC)

The telemetry measurements indicated that the RV-5 system status (temperatures and discrete monitors) remained within specification limits during the second phase of the mission.

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SECTION 4

4.0 MAPPING CAMERA AND RV-5 OPERATIONS - REV 603 THROUGH RV-5 RECOVERY

4.1 General

This section covers mission activity for the Mapping Camera Module and RV-5 from RV-2 through completion of the ST mission with the recovery of RV-5 on Rev 942.

All other mission activity and SCF performance data for this rev span are provided in the RV-3 section of this report.

4.1.1 Summary

Stellar terrain mission operations were successfully completed with the MCD shutdown at the 3414 (special terrain film).

Three operate cycles, using 3414 film, were successfully conducted. The in-flight calibration (two cycles) was conducted on Revs 935/936.

An attempted stellar camera calibrate of Kohoutek was not successful when the terrain camera stalled on reaching the tag end of the terrain film.

Run-out of terrain and stellar film was not completed and both films were successfully cut during the RV-5 closure function with 7 terrain and 9 exposed stellar frames not recovered.

RV-5 was successfully reentered and aerially recovered on Rev 942, operational day 58.

Quality of the acquired photography ranged from good to excellent. Stellar images were acquired on the terrain film from the in-flight calibration.

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4.1.2 Anomalies

a. Instrumentation - Telemetry data indicated erratic operation of platen press and capping shutter operation. Film inspection showed proper operation during the mission.

b. Improper shutdown (early) was experienced during the in-flight calibration. The problem is being analyzed.

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4.2 MAPPING CAMERA OPERATIONS (REVS 603 - 942)

4.2.1 Mission Performance (Prepared by NEC)

58 mapping camera operations were executed through the indicated rev span with a total of 624 frames of photography taken. Total cumulative mapping camera frames executed in flight was 2087. In addition, 2 FA in-flight calibration operations were executed with a total of 19 frames.

Terrain platen press and capping shutter monitors (S203 and S204) indicated erratic operation. On Rev 719, the D shutter and lens structure #2 temperature sensor (S154) indicated 81.2°F, out-of-band high. This sensor had been indicating 73.4 ± 1°. This discrepancy has been diagnosed as either a shorted temperature sensor or open circuit in other circuitry. Subsequent to the RV-5 recovery, this monitor indicated out-of-band low, which could represent an open sensor.

During the two FA in-flight calibration operations, the mapping camera shutdown was abnormal and 1 frame short for each operate. Shutdown did occur upon the receipt of the off command. Shutdown should have occurred at the end of a completed cycle. This problem is under analysis.

Film run out did not occur on either the terrain or stellar cameras. The terrain camera stalled after the tag end of the film came free of the supply spool, preventing camera operations. The film cutter in the recovery vehicle successfully cut both terrain and stellar films. The final 7 terrain frames and 9 stellar frames were not recovered. This condition is under investigation.

Total recovered payload was:

Terrain:	2167 frames, 3482.8 ft.	58.8 lbs.
Stellar:	2178 frames, 1960.0 ft.	10.0 lbs.

Operation over the Bar XC Range was taken on Rev 632.

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On Revs 932, 933 and 934, three operates were taken with the special 3414 type film. These operations were taken with a known mismatch in IMC rate in order to meet the slower terrain shutter exposure requirements. Increased resolution was subjectively observed on the recovered film.

Initial review of the recovered film indicated the terrain platen press and capping shutter were operational throughout the mission. The majority of the photography is good to excellent. Stellar images were present on the terrain from the in-flight stellar calibration operations.

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4.3 RV-5 Performance (Prepared by OPC)

The telemetry measurements indicated that the RV-5 system status (temperatures and discrete monitors) remained within specification limits during the third phase of the mission (through successful recovery on Rev 942, 7 January 1974). The following information is reported after evaluating DROP recovery studies, commanded messages, RV5 telemetry, PCM telemetry, voice reports, and the recovery test report TWX.

4.3.1 Weight

NOTE: The following weights assume that the terrain "jam" left 7 frames (0.2 lbs) of terrain film and 205 frames (0.94) of stellar film with the SV. Later estimate was 7 frames plus 221 frames.

SRV weight separated from SV	395.62 lbs
SRV5 weight at retro	394.62 lbs
100% payload predicted weight (58.73 +10.05)	68.78 lbs ⊛
RV5 weight at top of atmosphere (410K ft)	299.12 lbs
RV5 capsule suspended weight	182.82 lbs
RV5 air snatch weight	201.82 lbs

⊛ The flight performance analysis TWX reported the total payload weight as 67 pounds.

4.3.2 PREPS

Recovery Battery Heater Power On occurred on Rev 939B. The temperature monitor indicated 49°F before turn-on, 79°F on Rev 940 and 64°F at the time of battery activation (arm command) on Rev 942.

Run Out Verification was not accomplished as run-in did not occur because of a terrain camera "jam".

RV5 Closure was accomplished on Rev 941P. The closure cut the terrain and stellar film and sealed the capsule from light, water or other contaminants.

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4.3.3. Recovery Conditions (Evaluation TPOT Data)

Orbit

Rev No.	942 (Rev 941 Data)
Apogee	154.576 N.M.
Perigee	90.439 N.M.
Argument	124.867 Degrees
Inclination	96.881 Degrees
Eccentricity	0.00916544
Period (Keplerian)	88:52.847 Minutes: Seconds

Retro

True Anomaly	9.87 Degrees
Altitude	540263.78 Ft
Latitude	45.075 Degrees North
Longitude	147.25 Degrees West
Velocity (Inertial) (Start of Retro)	25734.47 Ft/Sec
Velocity (Inertial) (Burn-Out)	25383.14 Ft/Sec
Pitchdown Angle (Sep)	-63.3 Degrees (after Yaw Reverse)

Entry (410K Ft)

Velocity (Inertial)	25513.41 Ft/Sec
Gamma (Geod. Inertial)	-2.0527 Degrees
Alpha	103.71 Degrees
Latitude	34.990 Degrees North
Longitude	150.03 Degrees West

Drogue

Velocity (Local)	921.36 Ft/Sec
Mach No.	0.95
Altitude	59816.56 Ft
Dynamic Pressure	96.605 PSF

Impact

Altitude	55000.03 Ft
Latitude	16.007 Degrees North
Longitude	154.02 Degrees West

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4.3.4 Miss Distance

Figure 4.3.1 shows the predicted impact point (PIP), the actual impact point (EPPD) and the air snatch point. The miss distance between the distance between PIP (Eval TPOT) and EPPD was calculated to be 33.51 N.M. (33.46 N.M. short and 1.94 N.M. east of the ground track).

The PIP (Reeval TPOT using the 67 pound payload weight) and the PIP (Reeval TPOT using 67 pounds and the Jan.AFCRL density) are also plotted for comparison. The following table summarizes the data:

PIP Case	PIP to EPPD	Intrack	Cross Track
(Eval)	33.51 NM	33.46 NM Short	1.94 NM East
(Reeval)	25.79 NM	25.7 NM Short	2.18 NM East
(Reeval - Jan.Density)	35.57 NM	35.51 NM Short	2.16 NM East

4.3.5 Aerial Recovery (Recovery Group TWX Info)

Altitude	12000 Ft
Pass Number	1
Airspeed	150 KTAS 122 KIAS
Chute Condition	Normal
RV5	Normal
Winch Setting	800 lbs
Payout	Normal
Contact Location	No. 7 & No. 8 Hooks Contacted No. 3 Lateral
Recovery Aircraft	No. 1

Parachute system not visually sighted until 20000 ft due to high thick layered clouds.

4.3.6 Recovery Events

Table 4.3-1 presents the predicted and actual times of RV5 de-orbit/recovery events.

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4.3.7 SV Maneuvers Information

The following information is related to the SV maneuvers required for RV5 recovery and post recovery operations:

Sequence Item	System Time
Yaw Reverse Start	70700.0
Pitch Down Start	80164.0
Pitch Down Stop	80253.8
RV5 Separation	80867.0
RV5 Retro	80877.4
Pitch Up Start	80897.3
Yaw Forward	82227.3

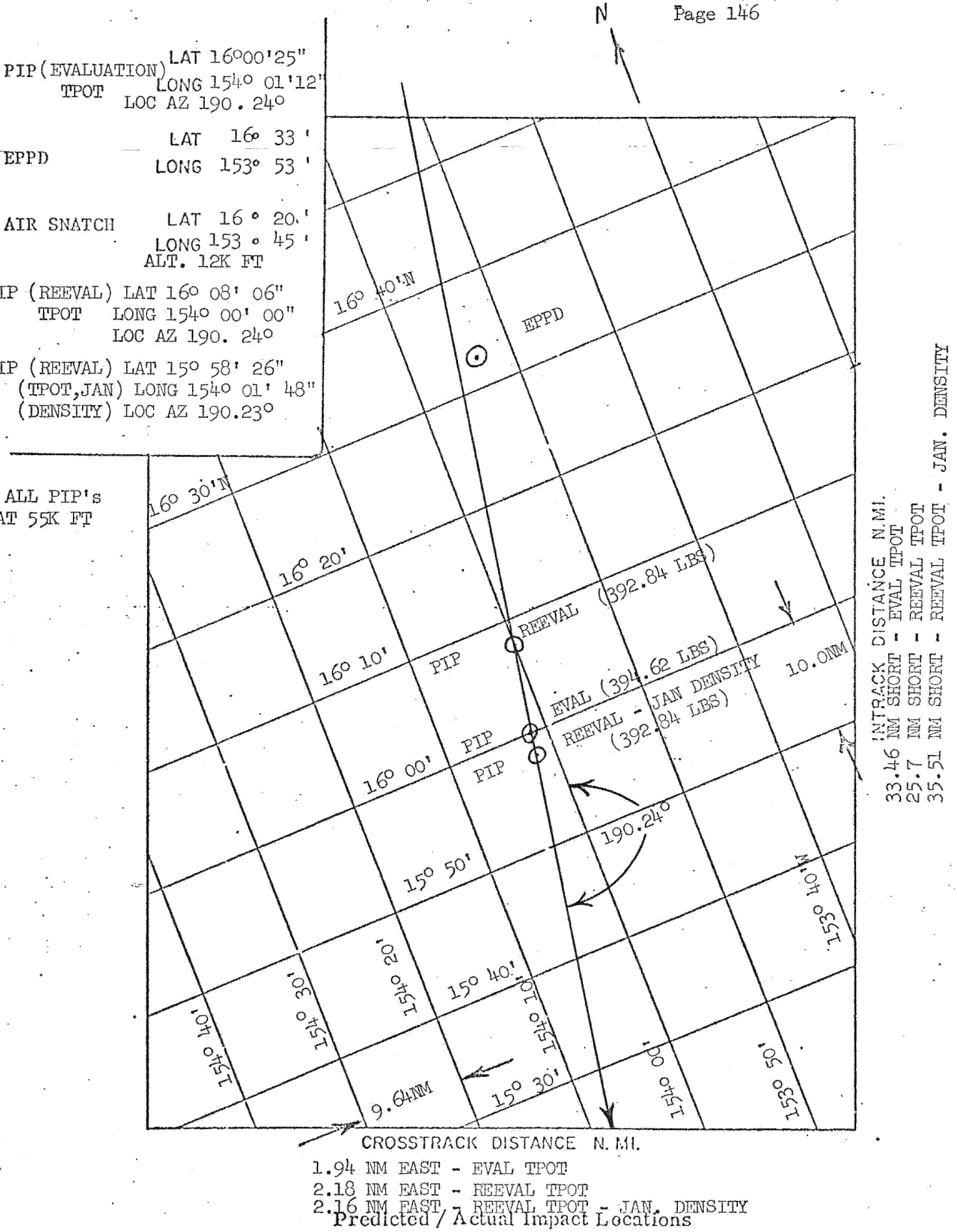
NOTE: RV5 Retro is not an SV command function. The actual predicted time is 80877.15. Uprange aircraft magnetic tape reduction data indicated retro occurred at 80877.1.

ACS

Pitch Attitude at Separation	-63.3	Degrees
Roll Rate at Separation	- 0.010	Degrees/Second
Pitch Rate at Separation	- 0.064	Degrees/Second
Yaw Rate at Separation	- 0.001	Degrees/Second
Max Roll Rate after Separation	0.091	Degrees/Second
Max Pitch Rate after Separation	0.704	Degrees/Second
Max Yaw Rate after Separation	0.054	Degrees/Second

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Predicted / Actual Impact Locations

FIGURE 4.3.1

FORM DB-28-C4

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RECOVERY DATE 1/7/74 SRV RV 5 SERIAL NO. 1803 SHIELD SERIAL NO. 457

RECOVERY REV 942 MANUFACTURING DATE 17 May 72

STRESS LEVEL 2200 PSI

	PLANNED (EVAL)	ACTUAL
IMPACT LOCATION	Lat 16° 00' 25"N. Long 154° 01'12"W.	Lat 16° 33' N. Long 153° 53' W.

Events	Predicted Time System Time (sec)	Execution Time System Time (sec)	Beacon Rep. Rate CPS	Source of Data
Arm	80749.3	80750	NA	A(M156.1)
Beacon 1 On (Δ4)	80774.3	80773	4.0 / --	KTS MAG
Beacon 2 On (Δ5)	80774.3	80859.6	-- / 3.93	KTS MAG
Recovery Battery 1 On	80773.3	80779	No / Change	A
Recovery Battery 2 On	80773.3	80779	No / Change	A
Transfer	80865.3	80866	No / Change	A
IFD Disconnect	80866.2	80867 80866.3	No / Change	A KTS MAG
Separation	80866.9	80867.6 80867	No / Change	A KTS MAG
Despin Time/RPM	80869.6/50-70	80869.6/57.1	No / Change	RS6 MAG
Retro	80877.3	80877.1	2.0 / 1.99	RS6 MAG
Despin Time/RPM	80888.1/10-16	80888.03/13.6	No / Change	KTS MAG
T/C Separation	80889.6	80889.56	0.975 / 0.99	KTS MAG
G Switch Close	81253.9	NA - BLACKOUT	8.3 / 8.1	RS
G. Switch Open	81362.6	81353.0	0.98 / 0.99	RS3 MAG
Piston Fire	81388.6	81379.1	0.5 / 0.49	RS3 MAG
Drogue Shock Time/Duration (sec)	81389.4	81381.0/2.68	8.0 / 7.5	RS3 MAG
Main Shock Time/Duration (sec)	81399.4	NONE.	NONE	RS
Air Snatch Time/Duration	82446.8	82440 82440.2	NONE[1]	TWX RS3 MAG
B/U G Switch Close	82810.3	82812.6	7.0 / OFF	RS3 MAG
B/U G Switch Open	82874.3	82877.7	0.5 / OFF	RS2

DF-Data Fax V-Voice Report SP-Slow Poke Mag-Mag Tape Reduction RS-Recovery A/C Strip
A-Augie RTA-Real Time Audio NA - Not Available

1 No Frequency Change. Blip On Signal Strength Traces.

DB-30-C3

TABLE 4.3-1

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4.4 ST Calibrate and ST Calibrate-Kohoutek

The ST Calibrate sequences were executed on Revs 935 and 936 and the ST Calibrate-Kohoutek sequences on Rev 938. Both calibrate sequences occurred on ops day 58.

No attitude measuring capability exists during maneuvers at angles greater than ± 10 degrees. Therefore, the attitude performance during the ST Calibrate (Revs 935 and 936) and the ST Calibrate-Kohoutek (Rev 938) may only be inferred by noting the entire sequence was executed as planned.

The ST Calibrate maneuver was performed by pitching the vehicle nose down to an attitude of -142° followed by two periods of inertial flight (Cal 1 and Cal 2) to a final nose down angle of -112°. Upon completion of the ST Calibrate the vehicle was pitched up to normal flight attitude. The vehicle rates and nominal attitudes for the ST Calibrate are shown in the table below:

			VEHICLE RATES AT FRAME 1			NOM. ATTITUDE AT ST+		
CAL	ST+	FRAME 1	PITCH	ROLL	YAW	PITCH	ROLL	YAW
1	791205.2	791234.5	+.002°/S	+.009°/S	-.002°/S	-142.0°	0.0°	0.0°
2	791685.2	791706.8	-.005°/S	-.005°/S	.000°/S	-130.0°	0.0°	0.0°

The vehicle attitude and rates for the ST Calibrate-Kohoutek were nominal as this sequence was performed with the vehicle yawed to the left 20° with the geocentric rate and horizon sensors connected.

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SECTION 5

5.0 ORBIT PHASE - REV 603 THROUGH RV-3 RECOVERY

5.1 Summary

Mission photography on the panoramic camera continued throughout the segment without incident although an aft camera film tear was discovered after recovery. SBA subsystems performance remained nominal although minor variations in Solar array output were detected and the RCS-1 thrust level decay on REAs #1 and #4 continued. RV-3 was successfully reentered and aerially recovered on Rev 1039, operations day 65.

5.1.1 Summary of Events

Minor Solar Array output variations were noted while the arrays were cold but disappeared on array warming. The variation, equivalent to $\frac{1}{2}$ panel, has no effect on mission operations and is attributed to solder connections.

A number of KODI and POGO outages were encountered which caused no mission support problems.

BOSS was routinely scheduled on Subcycles 6 and 7 to preclude losing message loading capability for Block revs if a long POGO outage were to occur.

One panoramic camera operation was missed as a result of the inability to generate a message containing a ST MOP on Rev 930.

Thrust level decay of REAs #1 and #4 continued, however, adequate thrust was available to support all mission operations. More frequent Mini-Yaw maneuvers were accomplished to provide data on thrust levels.

RV-3 was successfully reentered and aerially recovered on Rev 1039, operations day 65. No parachute or capsule damage was reported. The heat shield was also recovered.

The overall quality of the acquired photography ranged from good to poor. The lowered quality resulted from poor weather, increased snow

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cover and low solar elevations requiring longer exposures.

Examination of the recovered film, showed a tear in the aft camera early in the segment. There were no telemetry indications of any disturbance that could be correlated with the tear.

5.1.2 Problem Summary

a. Reduced S/A Output When Cold.

Statement - S/A output on legs 1 and 2 was approximately 1.2 amps low when the array was cold. Normal output was restored as the array warmed up.

Solution - No mission impact as adequate power was available at all times. The variation is attributed to soldered connections.

b. U Shaped Tear in Aft Camera Film.

Statement - A tear early in RV-3 segment was discovered on examination of the film. No telemetry distrubances were detected that could correlate with the tear.

Solution - None. Problem was detected during processing. No real time data showed any problem.

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5.2 COMMAND SUBSYSTEMS PERFORMANCE (Prepared by CSC)

5.2.1 Health

The health of the Command Systems remained excellent throughout Segment 3 (Revs 602-1039) of SV-VII. There were no equipment malfunctions. None of the Command Systems were subjected to out of specification temperatures or voltages. There were no power dropouts, relay driver overloads, or clock status errors experienced.

5.2.1.1 EXTENDED COMMAND SUBSYSTEM

5.2.1.1.1 Command Modes

The ECS responded properly in all modes into which it was commanded. There were a total of 239 messages loaded in the ECS for this segment. This resulted in 67,543 SPC's being stored for readout from the PMU's.

Of the 67,543 SPC's loaded, 27,859 were output from the PMU's for processing by the decoders. The remaining were erased out prior to time label matches. In loading the 67,543 SPC's there were no rejects.

On Rev 770C, a VBE in a block was rejected twelve times consecutively. The SOC panel was finally completely reset and transmission started from scratch. This time the block was loaded with no problems. The possibility exists that the RTS was not configured properly. Playbacks of the echo record were requested [redacted] They were contradictory and did not shed light on what caused the problem. The echo record from Cook was requested. It looked the same as we had previously seen. The problem is still unresolved.

5.2.1.2 MINIMAL COMMAND SUBSYSTEM

5.2.1.2.1 Command Modes

The MCS was not used during this segment.

5.2.1.2.2 MCS Anomalies

There were no MCS anomalies.

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5.2.1.3 REMOTE DECODER/BUD

5.2.1.3.1 Command Modes

The remote decoder was used for the recovery of RV-3 which ended this segment of the flight. It was also used for the recovery of RV-5 on Rev 942. The performance of both channels was verified from telemetry to be proper for all commands.

No commands were issued from the BUD during this segment.

5.2.1.3.2 Remote Decoder/BUD Anoamlies

There were no remote decoder or back-up decoder anomalies.

5.2.1.4 SUMMARY

5.2.1.4.1 Expendables and Environmental Data

Total Command Readouts PMU-A 14,021 PMU-B 13,838

ECS Clock Drift Rate 3.02 parts in 10^7

ECS Clock Stability 1.75 parts in 10^8 for a 422 rev period

Total Hours On ECS 1519 MCS 4.5 RD 2.0 BUD .05

Secure Words Expended at end of Segment 3 PMU-A 108 PMU-B 108

Environmental Data: See Figures 4.2-1 through 4.2-7

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	(1)	(2)
VEH. TIME SPAN	3212618.6 TO	5541629.2 SECS.

AVERAGE CLOCK ACCURACY =BIAS CHANGE/TIME CHANGE

=(1.4219- 0.7182)/(5541629.2- 3212618.6)

= 3.02145E-07

= 3.02145 PARTS IN 10 TO THE 7TH

AVERAGE CLOCK FREQUENCY =(3.02145E-07*1,024,000.0)+1,024,000.0

= 1024006.30940 HZ

FREQUENCY 1 (F1) =(SLOPE AT 1)*1.024MHZ+1.024MHZ

=(2.91150E-07)*1.024MHZ+1.024MHZ

= 1024000.29814 HZ

FREQUENCY 2 (F2) =(SLOPE AT 2)*1.024MHZ+1.024MHZ

=(3.08661E-07)*1.024MHZ+1.024MHZ

= 1024000.31606 HZ

CLOCK STABILITY =(F2-F1)/AVERAGE CLOCK FREQ.

=(1024000.31606- 1024000.29814)/1.024E+06

= 1.75000E-08

= 1.75000 PARTS IN 10 TO THE 8TH
FOR THIS 437 REV. PERIOD

= 1.62301 PARTS IN 10 TO THE 10TH
FOR AN AVERAGE 6 HOUR PERIOD

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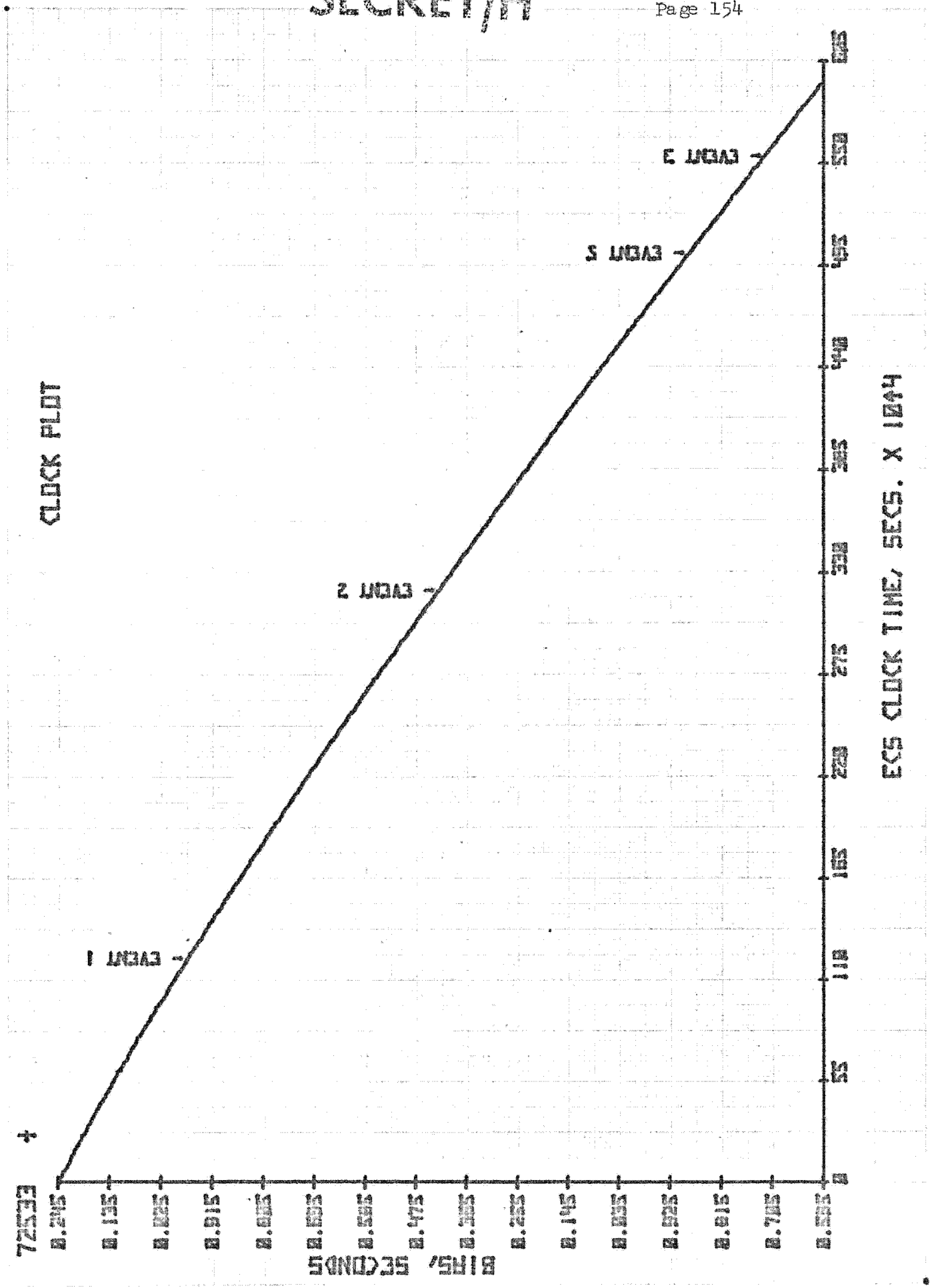


Figure 5.2-1

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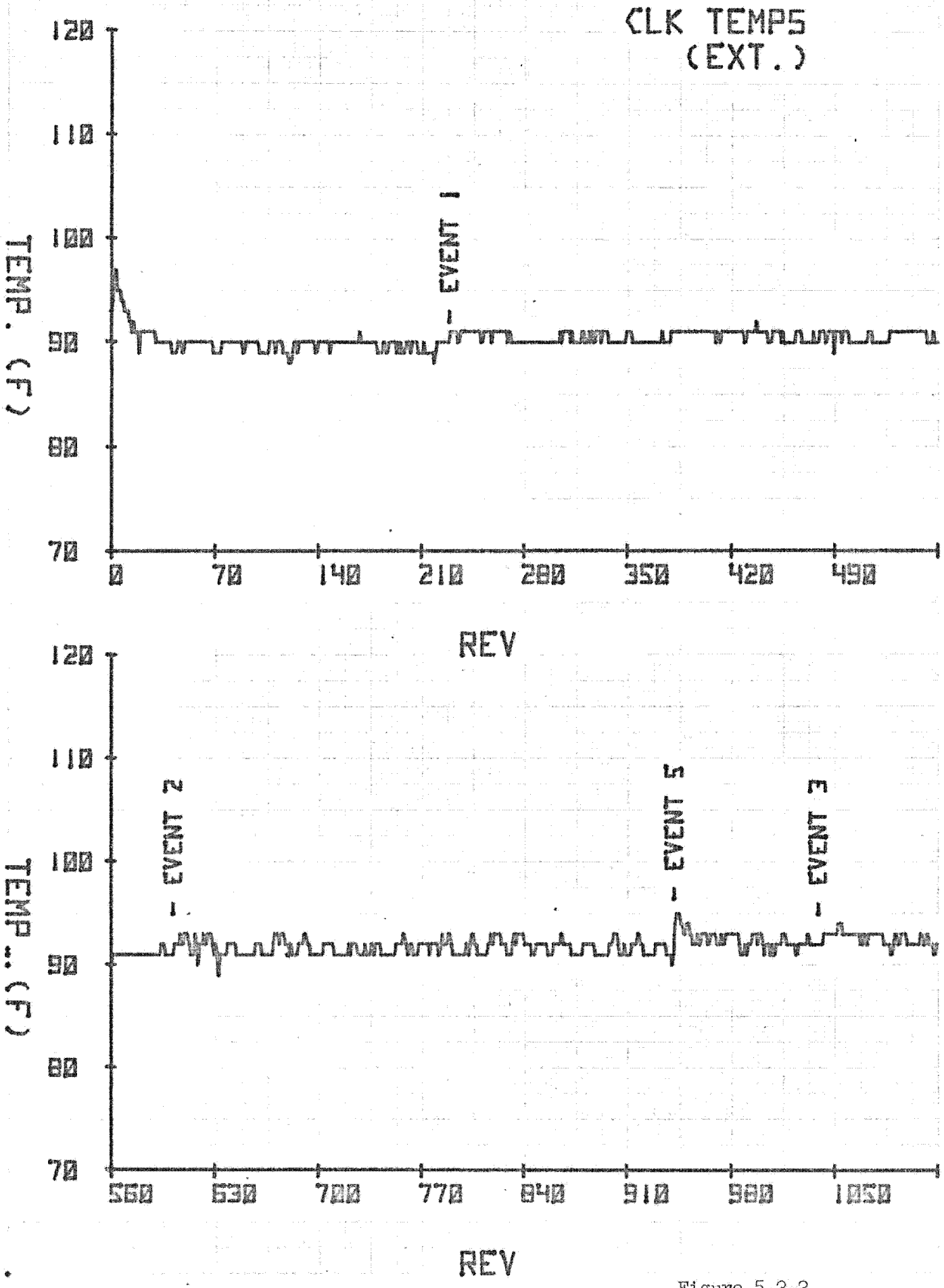


Figure 5.2-2

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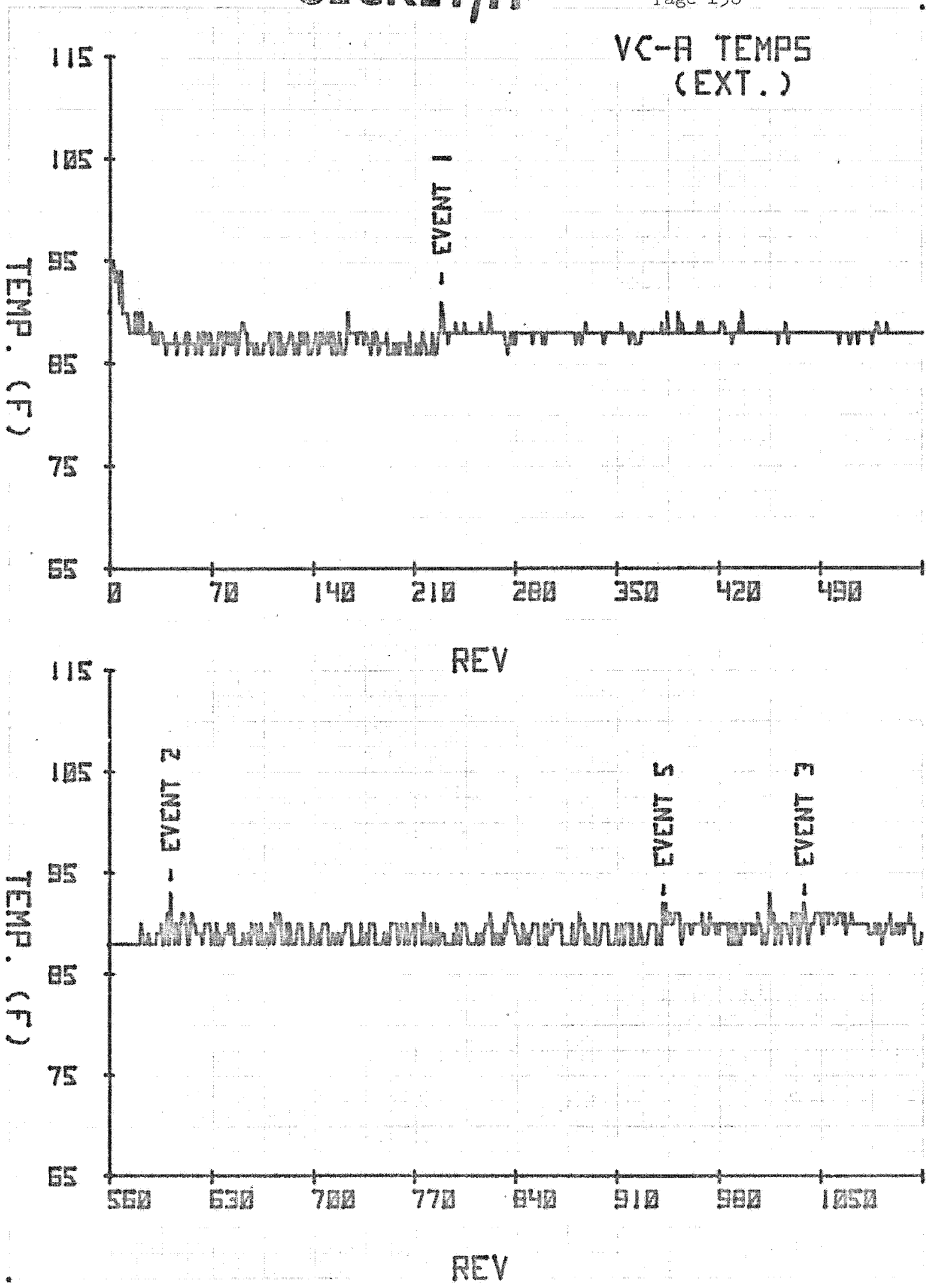


Figure 5.2-3

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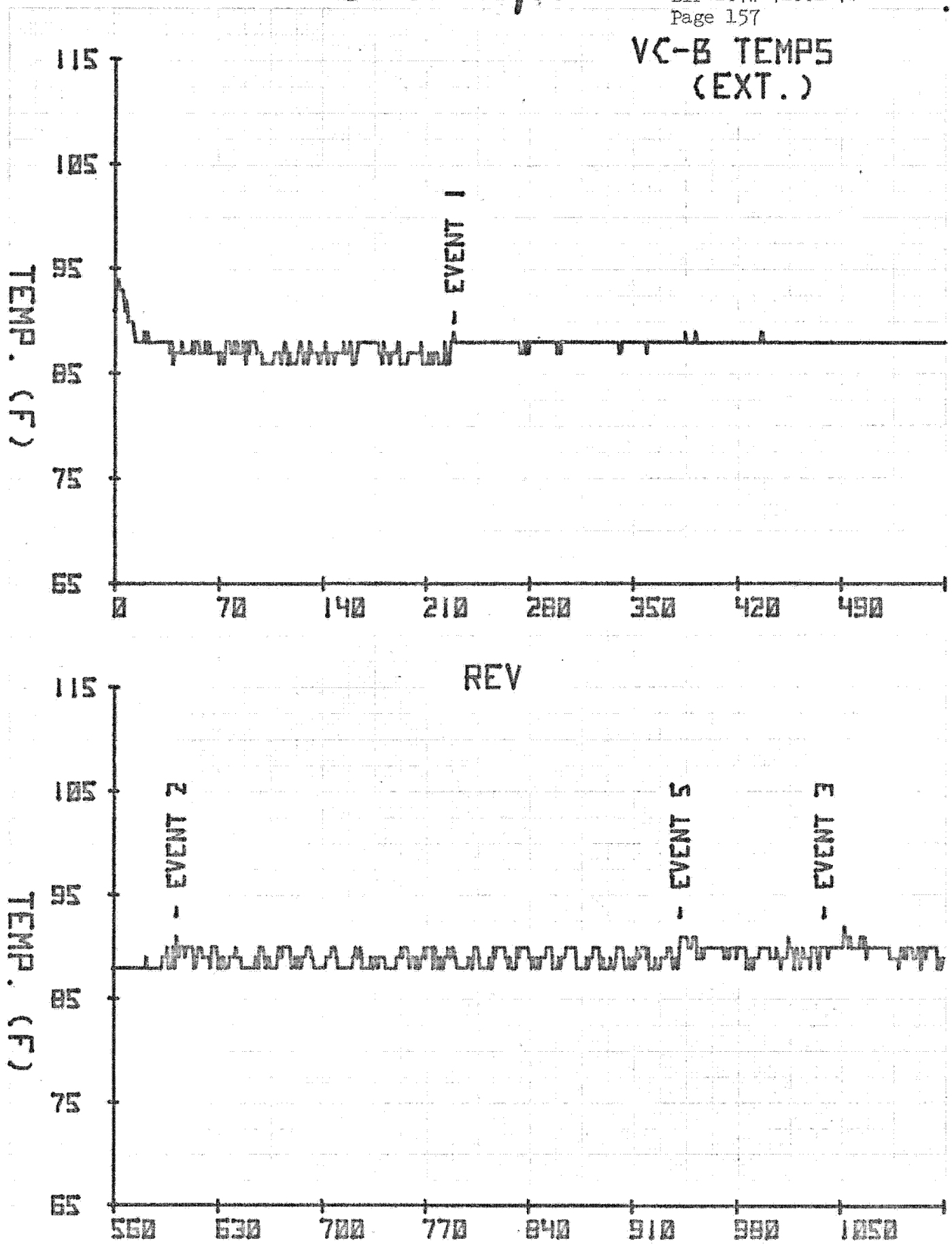


Figure 5.2-4

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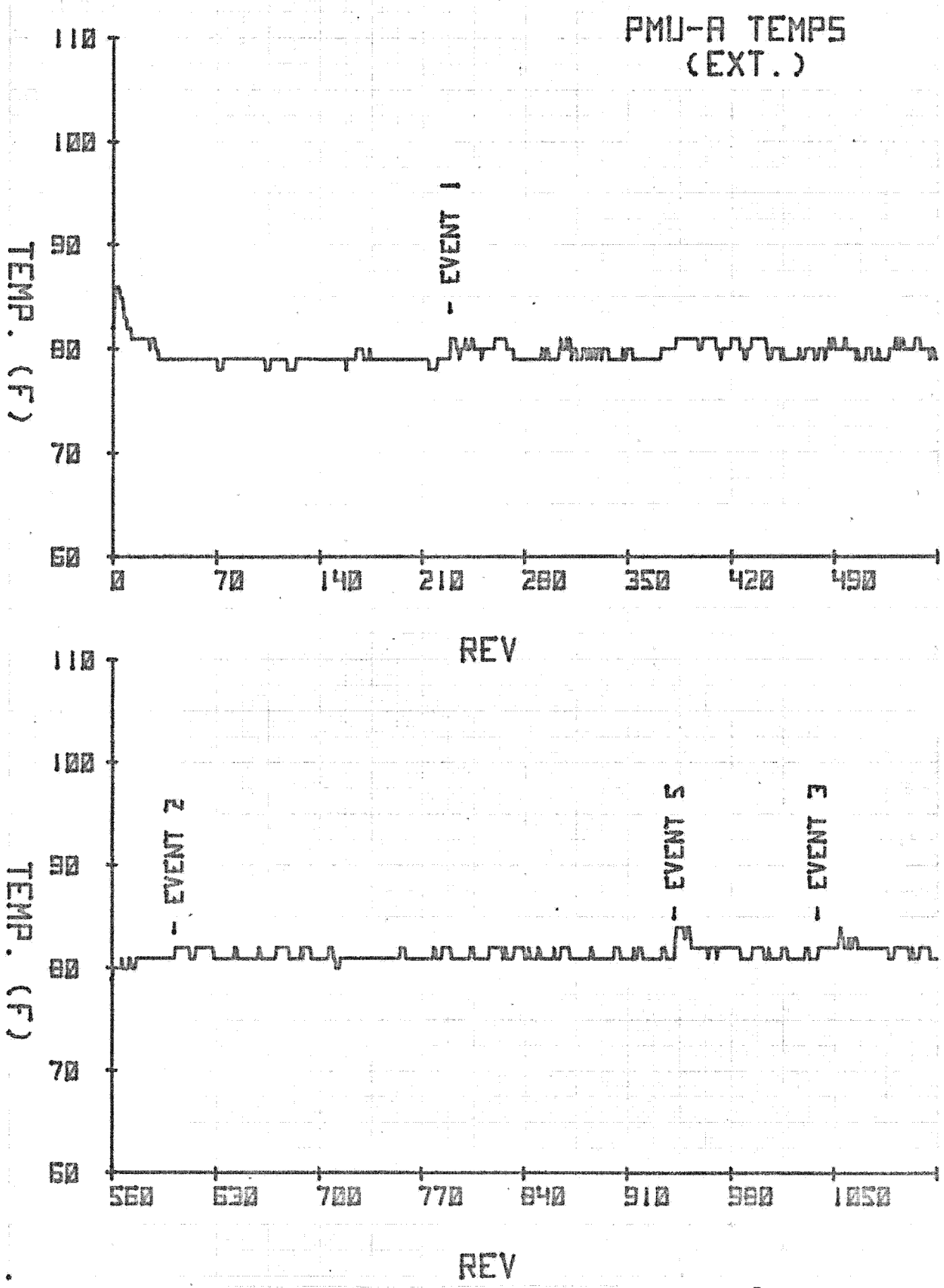


Figure 5.2-5

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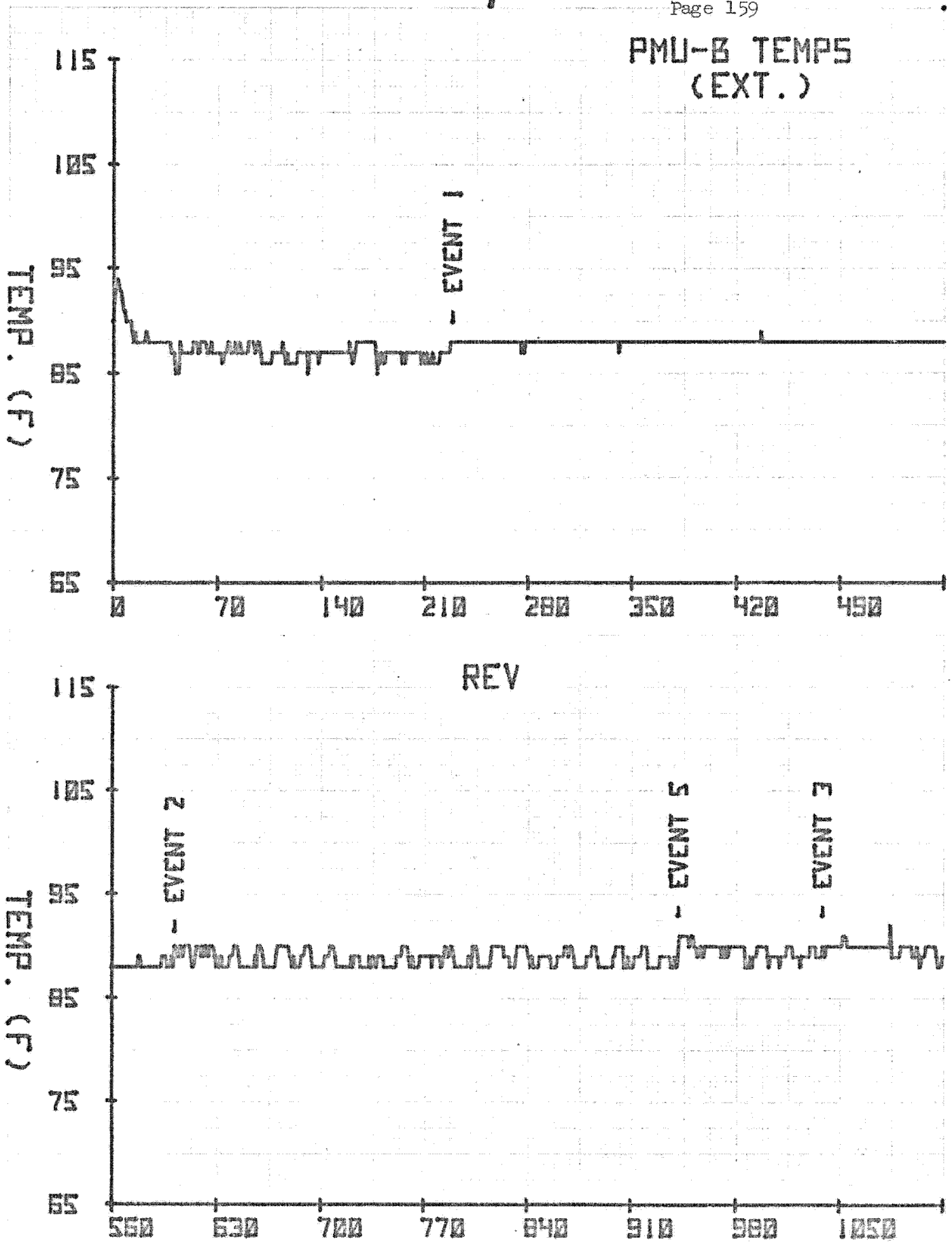


Figure 5.2-6

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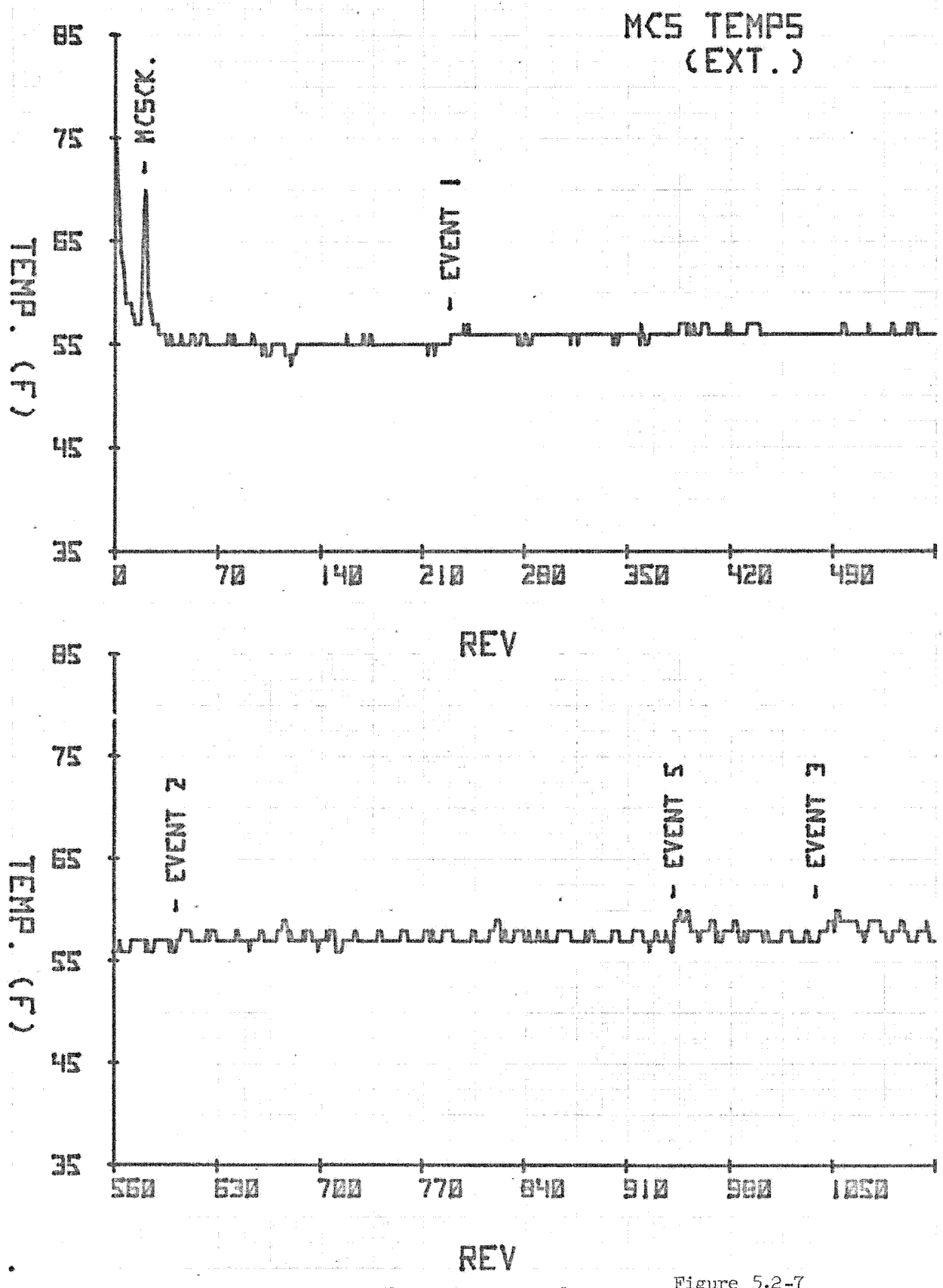


Figure 5.2-7

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5.3 Sensor System Operations through RV-3

5.3.1 Mission Operations Performance

The sensor subsystem exhibited basically nominal operating characteristics throughout RV-3, with no anomalies or malfunctions experienced.

The RV-3 mission segment consisted of 174 sensor system operations, consumed 29,048 seconds of camera power on time, 7.3 pounds of nitrogen gas, and approximately 29,030 feet of film per camera. The consumption profiles through RV-3 are graphically depicted in Figure 1.

The overall quality of the acquired photography ranged from good to poor, with the majority rated as fair. Primary reasons for the lowered quality were high haze levels, overall generally poor weather, an increase in snow cover, and a greater number of low solar elevation acquisitions which require longer exposure times and thus subject the imagery to increased smear.

Examination of the recovered film revealed a "U" shaped tear location at frame 26 of Op 304. There is no evidence of the source or reason for the tear. There were no indications on telemetry of any disturbance or other irregularities that could be correlated with the tear.

5.3.2 Engineering Tests

Two engineering tests were achieved in this segment of the mission. The first (Rev 616) was a lens MTF evaluation using line targets deployed at Quartzite, Arizona. The results of this test were diminished because of disturbances to the targets by unusually high winds. The second test was an OOAA bias over Los Angeles for evaluation of image smear at various scan angles. The usual Tucson/Tri-Bars performance baseline acquisition was not achieved during this segment of the mission because of adverse weather opportunities.

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CONSUMPTION PROFILES

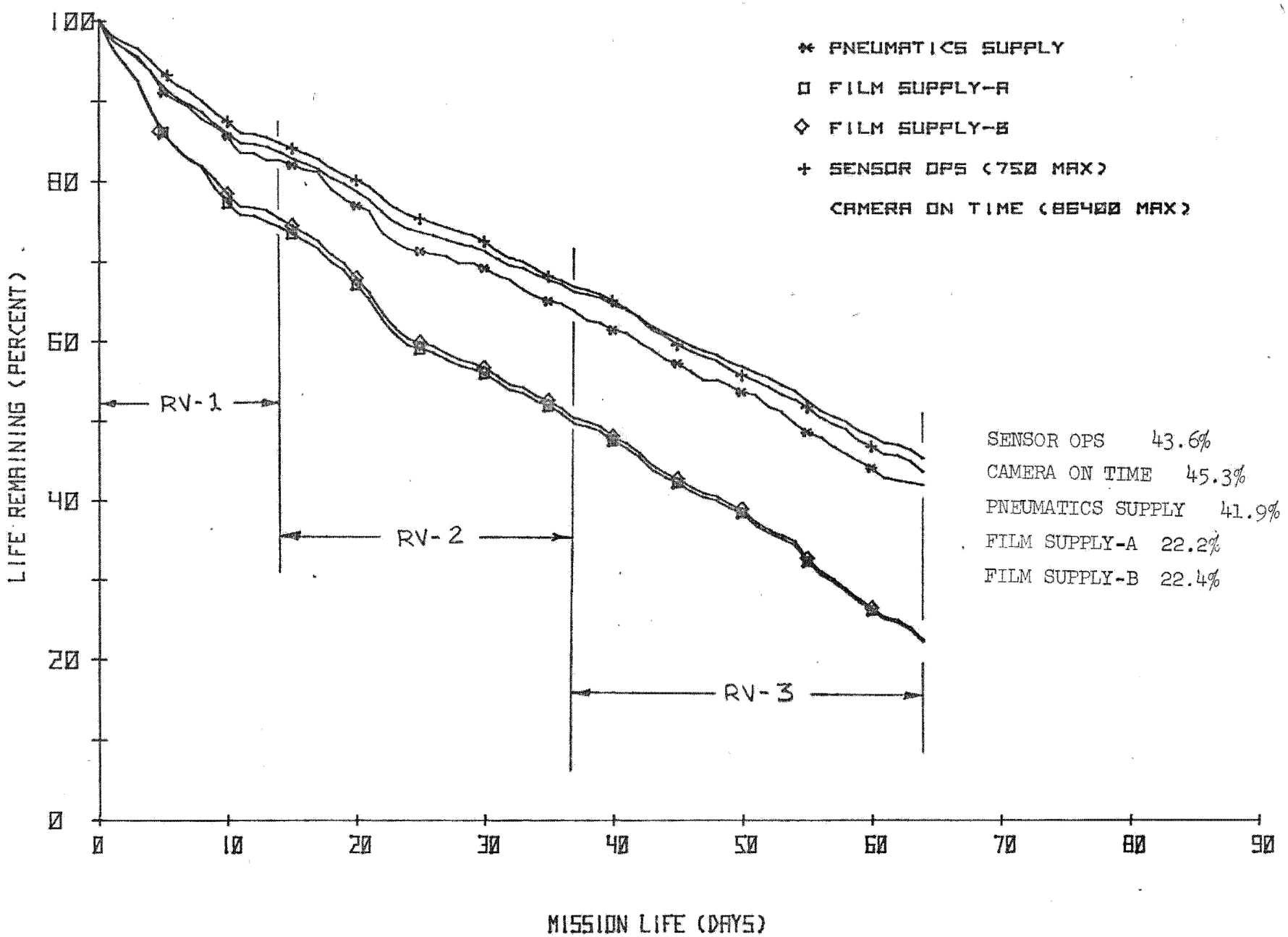


FIGURE 1

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5.4 RV3 (S/N 30) Performance

This report presents an analysis of the RV3 performance based on evaluation of recovery studies, command message, RV and SV telemetry, voice reports, and the recovery test report TWX. Tables 5.4-1 thru 5.4-3 list all relevant data. RV heater performance graphs are also included.

5.4.1 Summary

The RV payload was 100.0% of the maximum I.C.D. weight and unbalanced 0.0%. The PREP2 event took place on Rev 1038 over POGO and separation occurred on Rev 1039. Preparation, deorbit, and entry events, and drogue and main parachute deployment conditions were normal and executed as planned. Aerial recovery was accomplished on the first pass at 10,800 feet altitude, 6.5 nautical miles from the predicted impact point. At the time of recovery, the Recovery Aircraft's LORAN and Doppler Computer were malfunctioned and they were using the SRU TACAN for positioning. The Aerial Recovery location was later derived from this information in the navigator's log. The heat shield was also recovered.

The recovering aircraft reported the Delta 3 (water recovery) Beacon was received immediately after recovery contact. This later proved to be caused by malfunctioned switch on the recovery aircraft, which when turned to the Delta 3 frequency remained at the Delta 2 frequency.

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TABLE - 4.4

RV 3 RECOVERY DATA

IDENTIFICATION DATA

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SV	7	IRON NO	6630	RECOVERY REV	1039
RV	3	RV S/N	30	RETRO MOTOR S/N	Q-50	RECOVERY DATE	13 Jan 74

EVENT TIMES (IN SYSTEMS TIME - SECONDS)

EVENT	BASIC STUDY	UPDATED TEAPOT	TEAPOT EVAL	COMMAND MESSAGE	SV TLM	VOICE REPORTS	RV TLM MODE 51	DIFF NOTE 1
RV 4 OUT T/S	REV/STA			73776.5	73777			0
RV 3 IN T/S	1038P			73780.5	73781			0
DT START	77982.1	77981.3	77982.1	77982.1	77982.3			0
POGO TRAN	78951.3			78950.1	78942			-8.1
PITCH START	78981.3			78980.1	78981			0
PITCH STOP				79036.7	79038			1.3
PYRO ARM BATT				79150.1	79150			0
POGO FADE	79303.9			79302.9	79308			5.1
KODI TRAN	79397.9			79396.7	79396	79398		0
ORB PWR OFF				79546.1	79546.3			0
RV SEP (0)	79556.1	79556.1	79556.1	79556.1	79556.3	Confirm	NOTE 2	0
SPIN UP (+2.4)				79558.5		Confirm	N/A	N/A
RETRO START	79681.5	79681.5	79681.5	79681.5		79681	79682.5	1.0
DESPIN (+160.4)				79716.5		N/A	N/A	N/A
PROP JETT (+175.4)				79731.5		N/A	N/A	N/A
KODI FD (RV)	79718.8					79731	79730.3	11.5
RV ENTRY (400K	79881.3	79880.9	79881.7		RECOV TM			
△ 1-2 ACQ					79916	N/A		
ION ENTR	79976.5	79975.9	79976.6		79974	N/A		-2.6
ION EXIT	80163.4	80162.6	80163.4		80155	N/A		-8.4
DROGUE DEPLOY	80209.0	80208.2	80209.0	TONE STOP	80223	80227	80223.1	14.1
IMPACT (50K)	80227.1	80226.3	80227.1					
MAIN CHUTE DPL	80230.0	80229.4	80230.1		N/A	N/A	N/A	N/A
H/SHLD JETT	80234.0	80233.4	80234.1	TONE START	80243	80242	N/A	8.9
STEADY STATE	80245.0	80244.4	80245.1					
ETPD(RAINDROP)	80275.1	80274.1	80275.6					
RV @ 13.5K	81180.0	81179.1	81180.5	1N TRAIL	81180	81180	N/A	0
WATER IMPACT	81730.9	81730.0	81731.4		N/A	N/A	N/A	N/A
HULA TRAN (RV)	N/A					N/A	N/A	N/A
HULA FADE (RV)	N/A					N/A	N/A	N/A
DT RUNOUT	80697.1	80696.3	80697.1		N/A	N/A	N/A	

*To nearest Minute.

NOTES: 1. DIFF = Actual - Predicted times, TLM differences of less than 1.0 sec are ignored. [ ] = PREDICTED TIME, [ ] = ACTUAL TIME.

2. Assume RV SEP Sequencing starts 0.4 seconds after RV SEP Command msg. time.

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RV 3 RECOVERY DATA

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RECOVERY DATA

	BASIC STUDY	UPDATED TEAPOT	TEAPOT EVALUATION	QUICK LOOK RPT	EPPD (TWX)	AERIAL RECOVERY
LATITUDE	17.000	17.000	16.941	16.917	16.750	16.833
LONGITUDE	148.61	148.61	148.62	149.167	148.583	148.633

RECOV. A/C DEPLOYMENT FORMATION No. 1, RECOVERING A/C No. 1

RECOV ALT 10800 ft, PASS No. 1, TIME 2233 Z

AIRSPEED 134 KTAS, 123 KIAS; TIME IN TOW 15 min.

RAINDROP ETPD 80275 sec 46000 ft; RATE/DESCENT, 15K 29.2 FPS, 10K 26.9 FPS

CONTACT LOCATION Bottom center engaged cone load lines.

PRESET TENSION LEVEL 3600 lb, PAYOUT Normal

MISS DISTANCE (TEAPOT EVAL VS AERIAL RECOV) (Uncorrected for Wind)

OVERSHOOT 6.48 nm, CROSS TRACK -.78 nm EAST

RC CONDITION Normal, heatshield also recovered.

CHUTE/CONE CONDITION Normal

CHUTE/CONE BEHAVIOR Normal

WIND DATA

ALT (K)	DIRECTION PRED	DIRECTION ACT	VELOCITY PRED	VELOCITY ACT	ALT (K)	DIRECTION PRED	DIRECTION ACT	VELOCITY PRED	VELOCITY ACT
SCF	150	140	10	12	25	310	320	35	35
2	160	160	12	12	30	320	340	45	45
4	180	180	15	12	35	330	330	77	55
6	190	200	15	15	40	320	340	90	80
8	230	230	20	18	45	330	350	85	90
10	240	250	25	20	50	330	340	55	50
15	280	270	30	30	55	N/A		N/A	
20	310	270	33	35	60	N/A		N/A	

RV BATTERY TIME HISTORY

TIME	ACT 79152	79153	79154	79156	79157	79158	79162	79164	79165	79167	79169	79171
MAIN		20.3	24.9					24.4				
PYRO #1		17.6	22.5		23.1	23.7	24.2		24.9	25.5		
PYRO #2		22.4	23.0	23.9		24.9	25.5				26.0	26.7

TIME	79172	79175	79177	79197	79263	79410
MAIN		25.3	25.9			25.6
PYRO #1	26.0				26.6	26.6
PYRO #2				27.3		27.7

SV RATES BEFORE & AFTER SEP (SV TLM)

TIME	PITCH RATE PGR °/sec	ROLL RATE RGR °/sec	YAW RATE YGR °/sec
79556	-.07	0.01	0.0
SEP 79557	0.21	-0.02	0.0
79558	1.50	-.04	0.0

MISC DATA

Payload Temp before SEP,	Rn06 70	°F
Payload Temp, Max REENTRY,	TB02 73	°F
Chute Press before PREP 2,	P711 .73	PSI
Supply Press before PREP 2,	P113 .77	PSI
BETA ANGLE of Recovery Rev.	1.6	°

PITCH ANGLE

BASIC STUDY		Ω_y 1.46 °/sec		PITCH (CMD MSG)	-39.90 °
Θ_{rvs}	-127.92 °	$\Delta\Theta 2$ .26 °		Θ_{sv} (PDWN-SV TLM)	-40.5 °
$\Delta\Theta 1$	2.31 °	Θ_{sv} -39.97 °		Θ_{rvs} ON UPDATED TEAPOT	-127.85 °

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TABLE 3.4-3

RV 3 RECOVERY DATA

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RV MASS PROPERTIES

	BASIC STUDY		UPDATED TEAPOT		TEAPOT EVALUATION		ACTUAL POST FLT	
TU-A	231.2	lb	230.0	lb	230.0	lb	228.3	lb
TU-B	231.2	lb	230.0	lb	230.0	lb	228.7	lb
TOTAL	462.4	lb	460.0	lb	460.0	lb	457.0	lb
SEP WGT	1548.35	lb	1545.95	lb	1545.95	lb	UPDATED TEAPOT	
RETRO WGT	1546.66	lb	1544.26	lb	1544.26	lb	% UNBAL 0.0	
ENTRY WGT	1355.85	lb	1353.45	lb	1353.45	lb	% FULL 100.0	
AIR RECOV WGT	1140.51	lb	1138.11	lb	1138.11	lb	(100% = 460 lb)	

SV MASS PROPERTIES - AFTER SEP (FROM BASIC STUDY)

SV WEIGHT	14710.82 lb	PITCH INERTIA (Iy)	93933.57 SLUG-FT^2
CG FROM STA 2220.2($\bar{X}$)	201.01 in	ROLL INERTIA (Ix)	5175.41 SLUG-FT^2
CG FROM LONG AXIS(Y)	.4059 in	YAW INERTIA(Iz)	95536.07 SLUG-FT^2

'DORBEL EPHEMERIS

REV OF SEP 1039	BASIC STUDY		UPDATED TEAPOT		TEAPOT EVALUATION	
PREDICTED FROM REV	1024		1034		N/A	
APOGEE	166.575	nm	166.435	nm	166.165	um
PERIGEE	90.486	nm	90.440	nm	90.571	nm
ARG OF PERIGEE	147.605	°	147.707	°	147.727	°
INCLINATION	96.877	°	96.877	°	96.876	°
TRUE ANOMALY AT RETRO	343.32	°	343.28	°	343.27	°
HEATSHIELD JETT ALT	49625.73	FT	49606.36	FT	49649.72	FT

ENTRY PARAMETERS FROM TEAPOT EVALUATION RUN

	SEPARATION	RETRO	REENTRY	DROGUE DEPLOY
SYSTEMS TIME (sec)	79556.1	79681.5	79881.68	80208.95
ALTITUDE (FT)	601228.9	578957.58	400000.	63614.00
LATITUDE (°N)	56.904	48.470	35.188	16.983
LONGITUDE (°W)	137.58	140.94	144.76	148.61
INERTIAL AZIMUTH (°)	192.68	190.41		
INERT FLT PATH ANGLE (°)	-0.2622	-0.1767		
INERT VELOCITY (FT/SEC)	25704.46	25724.62	25546.95	
LOCAL AZIMUTH (°)			191.21	190.42
LOCAL FLT PATH ANGLE (°)			-2.2111	-31.1955
LOCAL VELOCITY (FT/SEC)				1431.22
ANGLE OF ATTACK (°)			103.56	
MACH NUMBER				1.48
DYN PRESS (PSF)				194.424

CORE PINS SHEARED (FROM REBOUND TWX) A: YES X NO ___, B: YES X NO ___

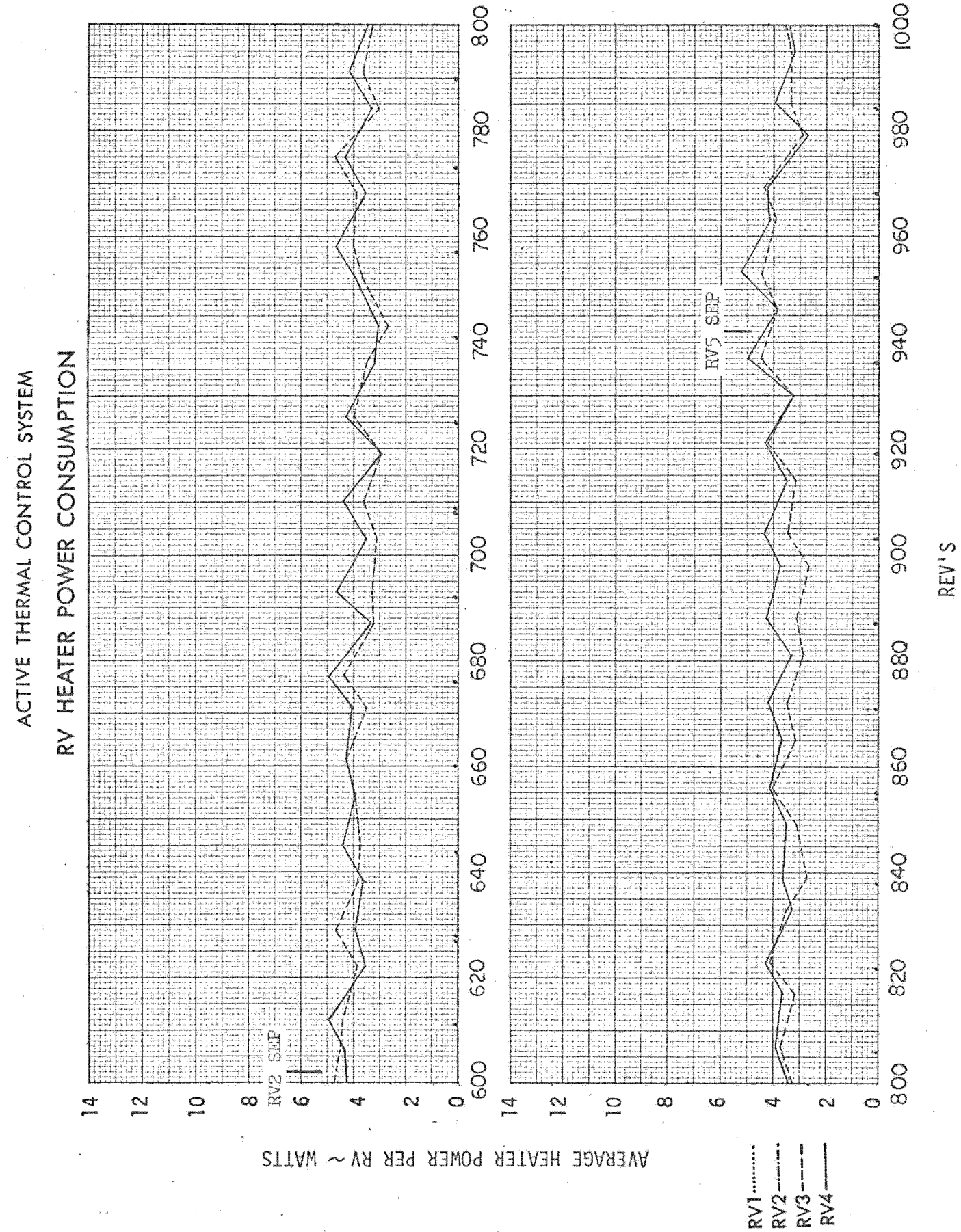
BFE VECTOR, Parameters from a SYS Time near the ascending node of the Recovery Rev.

SYS TIME	77736 sec	DECLINATION (MDAC = GEOCENTRIC LAT)	-0.0590 °
LONGITUDE	39.3306 °	INERTIAL GEOCENTRIC FLT PATH ANGLE	-0.3072 °
ALTITUDE	159.2088 nm	INERTIAL GEOCENTRIC AZIMUTH	353.1242 °
		INERTIAL VELOCITY	25245.16 FT/SEC
SV C_D A/M (DRAG VALUE AT ASCENDING NODE OF RECOVERY REV)			.52292 FT^2/SLUG

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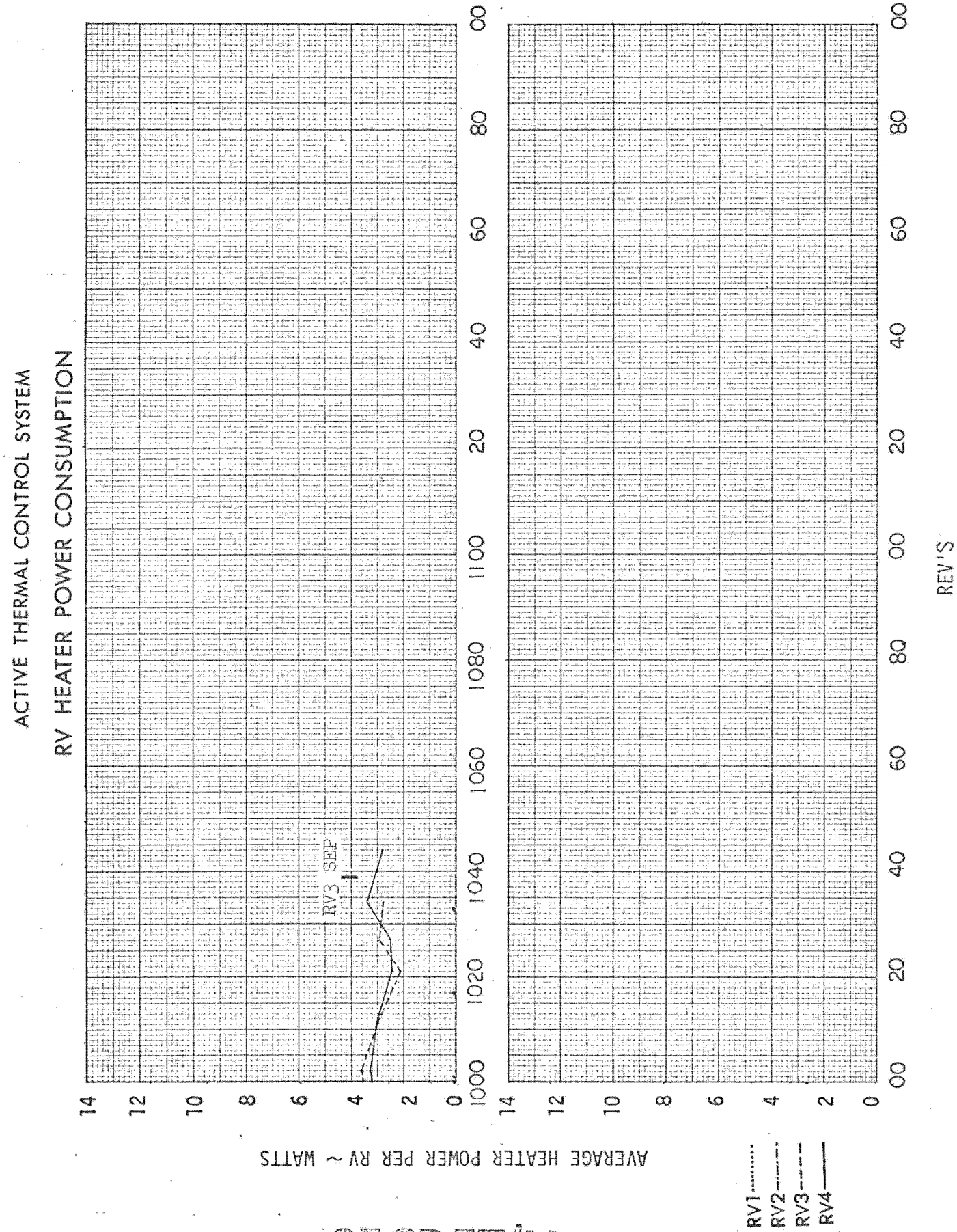
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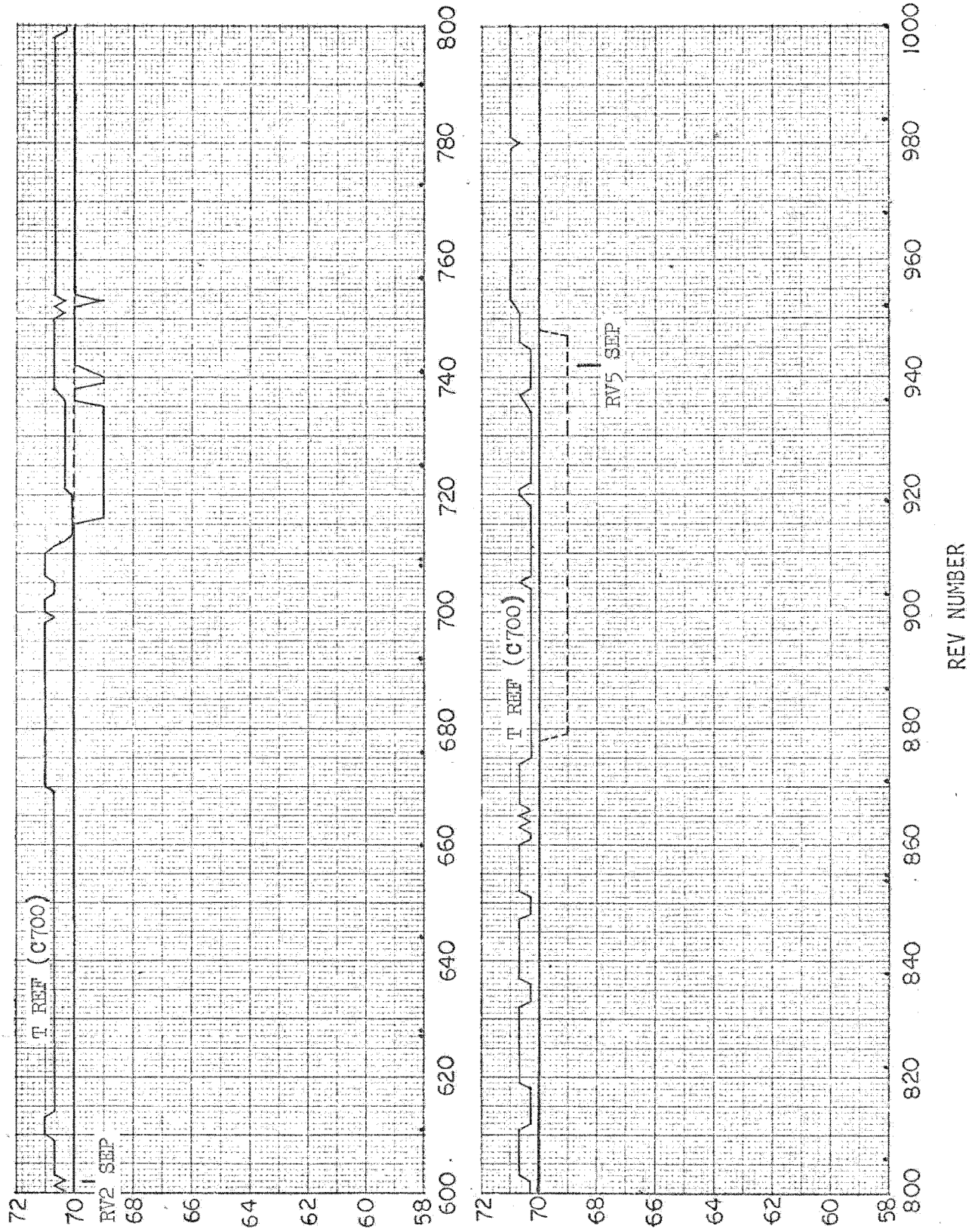


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ACTIVE THERMAL CONTROL SYSTEM
RV PAYLOAD CONTAINER & REFERENCE TEMPERATURES

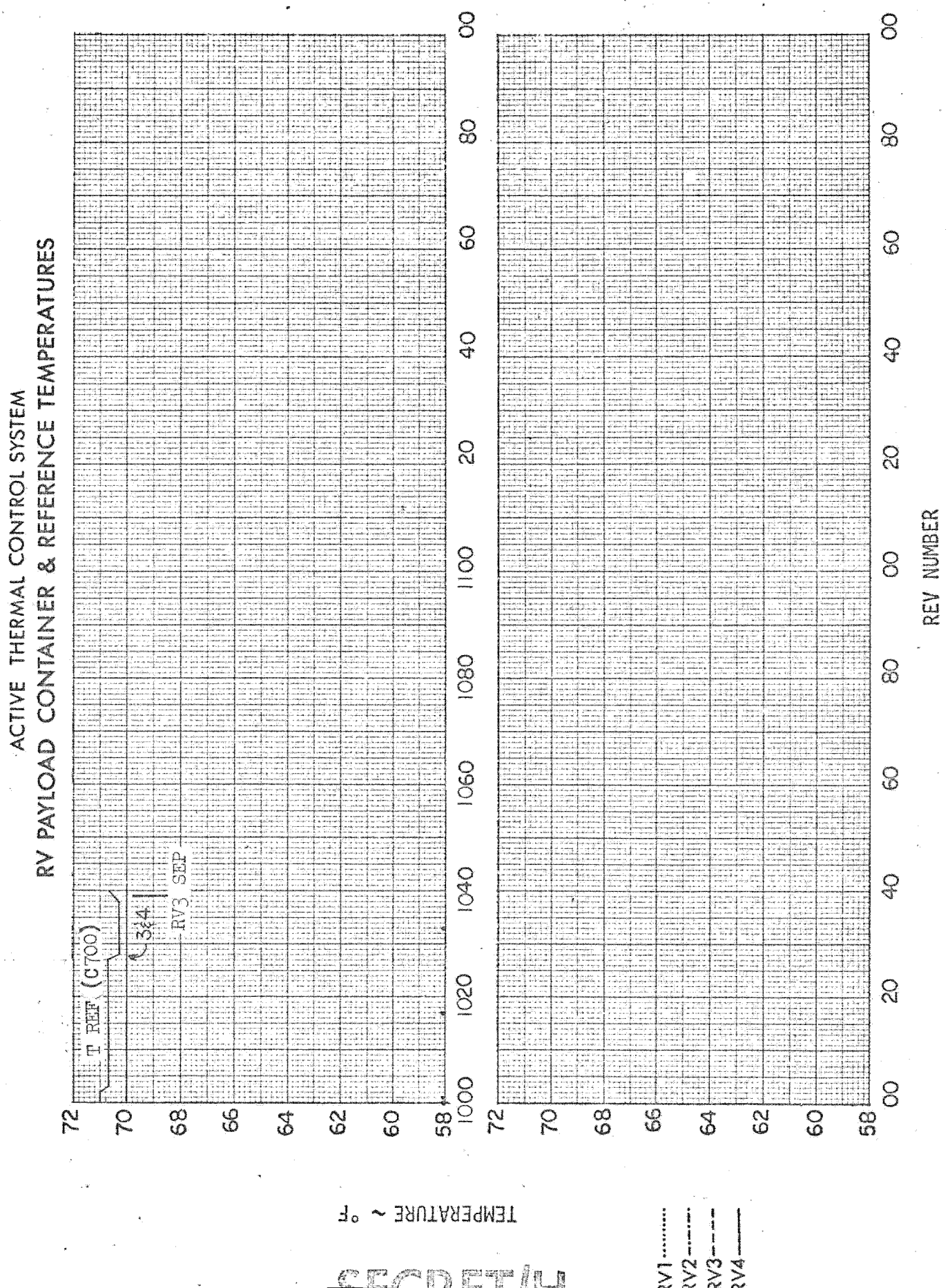


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5.5 SATELLITE CONTROL FACILITY PERFORMANCE

5.5.1 Orbit Determination and Prediction

5.5.1.1 Orbit Determination

Table 5.5.1 shows a summary of the orbital conditions computed from each tracking reduction from RV-2 recovery to RV-3 recovery on Rev 1039. Significant events affecting the orbit included an orbit adjust every three days with dual positive/negative orbit adjusts as required to control orbit characteristics, including the location of Argument of Perigee. The events during the RV-3 segment were:

1. Positive orbit adjust on Rev 630.
2. Positive orbit adjust on Rev 678.
3. Positive orbit adjust on Rev 727.
4. Positive orbit adjust on Rev 776 followed by a negative orbit adjust on Rev 778.
5. Positive orbit adjust on Rev 824.
6. Positive orbit adjust on Rev 873.
7. Positive orbit adjust on Rev 922.
8. ST calibrate maneuvers on Rev 938.
9. RV-5 recovery on Rev 942.
10. Positive orbit adjust on Rev 970 followed by a negative orbit adjust on Rev 972.
11. Positive orbit adjust on Rev 1019.

5.5.1.2 Prediction Accuracy

Table 5.5.2 contains a summary of prediction accuracies over a ten rev span from each tracking reduction epoch rev. Accuracies are determined by comparing the nodal crossing differences between the Best Fit Ephemeris and the tracking reduction ephemeris predictions. Prediction accuracies were within acceptable limits throughout the RV-3 segment.

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TRACKING [illegible]UCTION

SUMMARY

EPOCH REV	ECCENT.	PERIOD DECAY	INTEG. PERIOD	MAX ALTIT.	MIN. ALTIT.	ARG. PERIGEE	DRAG	STABLE/ TUMBLE	COMMENTS
604	.0083	.2137	88:47.9	149.65	88.57	145.0	.5010	193/56	
605	.0082	.2362	88:47.6	149.45	88.56	144.8	.5528	174/51	
608	.0081	.2203	88:47.1	149.08	88.69	143.7	.5170	187/55	
612	.0081	.2127	88:46.1	148.71	88.53	142.9	.4905	194/57	
616	.0080	.2038	88:45.4	148.31	88.52	142.0	.4668	202/60	
619	.0080	.2218	88:44.7	148.10	88.32	141.0	.4958	188/55	
621	.0080	.2208	88:44.2	147.90	88.24	140.6	.4908	188/55	
624	.0079	.2112	88:43.7	147.55	88.37	139.5	.4709	197/58	
628/629	.0079	.2146	88:42.6	147.10	88.15	138.5	.4671	194/57	OA#17 Rev 630
632	.0088	.1908	88:53.2	154.08	88.95	144.9	.4749	277/81	
635	.0088	.2099	88:52.5	153.82	88.76	144.0	.5081	208/61	
637	.0088	.2323	88:51.9	153.57	88.69	143.5	.5622	187/55	
640	.0087	.2197	88:51.4	153.19	88.79	142.5	.5333	198/58	
645	.0087	.2228	88:50.2	152.68	88.62	141.4	.5296	196/57	
648	.0086	.2439	88:49.6	152.20	88.66	140.6	.5773	179/52	
651	.0085	.2587	88:45.7	151.85	88.48	139.7	.5958	170/50	
656	.0085	.2548	88:47.5	151.19	88.46	138.3	.5851	171/51	
661	.0084	.2532	88:46.1	150.56	88.28	137.1	.5675	172/50	
665	.0083	.2785	88:45.1	149.78	88.35	136.1	.6217	156/44	
668	.0082	.2888	88:44.2	149.44	88.11	135.2	.6256	151/44	
670	.0082	.2826	88:43.6	149.10	88.06	134.8	.6107	154/44	
673	.0081	.2877	88:42.8	148.57	88.14	133.7	.6197	151/44	
678	.0091	.2323	88:54.7	156.37	88.88	141.1	.5768	195/56	OA#18 Rev 678
681	.0091	.2300	88:54.3	156.06	88.97	140.7	.5725	197/57	
684	.0091	.2436	88:53.4	155.77	88.78	139.9	.5953	186/54	
686	.0090	.2415	88:52.9	155.53	88.71	139.4	.5846	188/54	
689	.0090	.2374	88:52.3	155.10	88.83	138.4	.5761	192/55	
694	.0089	.2336	88:51.1	154.59	88.61	137.4	.5532	195/57	
697	.0088	.2282	88:50.5	154.12	88.72	136.6	.5409	200/58	
700	.0088	.2405	88:49.7	153.86	88.52	135.7	.5585	190/55	
702	.0088	.2409	88:49.2	153.63	88.45	135.2	.5544	189/55	

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Table 5.5-1

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SECRET/RFL

TRACKING DUCTION

SUMMARY

EPOCH REV	ECCENT.	PERIOD DECAY	INTEG. PERIOD	MAX ALTIT.	MIN. ALTIT.	ARG. PERIGEE	DRAG	STABLE/ TUMBLE	COMMENTS
705	.0087	.2288	88:48.6	153.26	88.57	134.2	.5277	199/58	
710	.0087	.2293	88:47.3	152.74	88.37	133.2	.5163	199/58	
713	.0086	.2201	88:46.8	152.32	88.45	132.4	.4953	207/60	
716	.0085	.2217	88:46.1	152.05	88.34	131.3	.4899	206/60	
718	.0086	.2338	88:45.6	151.84	88.24	131.0	.5127	195/57	
721	.0085	.2252	88:45.1	151.45	88.36	130.2	.4947	203/59	
726	.0084	.2230	88:43.8	150.87	88.25	129.1	.4803	205/60	
729	.0093	.2059	88:52.5	157.07	88.62	132.9	.4863	232/67	OA# 19 Rev 727
732	.0093	.2098	88:51.7	156.83	88.45	132.2	.4860	227/66	
734	.0092	.2123	88:51.3	156.69	88.36	131.7	.4875	224/65	
738	.0091	.2106	88:50.6	156.15	88.53	130.5	.4852	226/66	
742	.0091	.2074	88:49.6	155.77	88.39	129.7	.4694	230/67	
746	.0090	.2103	88:48.9	155.20	88.51	128.8	.4765	227/66	
749	.0090	.2250	88:48.2	154.94	88.33	128.1	.4971	212/62	
751	.0090	.2201	88:47.7	154.68	88.31	127.6	.4863	216/63	
754	.0089	.2214	88:47.1	154.28	88.44	126.6	.4897	215/63	
758	.0088	.2244	88:46.1	153.77	88.34	125.8	.4878	212/61	
762	.0088	.2171	88:45.3	153.28	88.39	124.9	.4700	219/64	
765	.0088	.2358	88:44.6	152.99	88.20	124.2	.4945	202/59	
767	.0087	.2377	88:44.0	152.72	88.15	123.7	.4994	199/58	
770	.0087	.2356	88:43.4	152.30	88.26	122.8	.4954	200/58	
775	.0085	.2388	88:42.2	151.48	88.31	121.7	.4969	197/57	OA #20 Rev 776
779	.0086	.1947	88:53.5	152.45	89.43	150.0	.5060	212/61	OA #21 Rev 778
781	.0086	.2063	88:52.9	152.28	89.27	149.4	.5284	200/58	
783	.0085	.2363	88:52.3	152.07	89.16	148.8	.5914	177/50	
786	.0085	.2228	88:51.8	151.65	89.29	147.8	.5662	185/53	
791	.0084	.2170	88:50.6	151.23	89.09	146.7	.5392	191/55	
795	.0083	.2219	88:49.9	150.78	89.06	145.5	.5469	187/54	
797	.0083	.2301	88:49.3	150.61	88.89	144.9	.5584	181/52	
799	.0083	.2352	88:48.8	150.45	88.78	144.3	.5640	177/50	

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Table 5.5-1

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TRACKING I UCTION

SUMMARY

EPOCH REV	ECCENT.	PERIOD DECAY	INTEG. PERIOD	MAX ALTTT.	MIN. ALTTT.	ARG. PERIGEE	DRAG	STABLE/ TUMBLE	COMMENTS
802	.0082	.2307	88:48.3	150.02	88.90	143.4	.5548	180/52	
807	.0082	.2307	88:47.0	149.47	88.73	142.7	.5429	181/52	
811	.0081	.2411	88:46.1	148.95	88.70	141.2	.5622	173/50	
814	.0081	.2474	88:45.3	148.70	88.47	140.6	.5642	169/48	
816	.0081	.2394	88:44.8	148.43	88.44	139.7	.5423	175/50	
819	.0080	.2410	88:44.2	148.02	88.53	138.2	.5454	174/50	
823	.0079	.2395	88:43.2	147.57	88.34	138.0	.5305	175/50	OA #22 Rev 824
827	.0088	.2112	88:52.8	154.18	88.89	143.3	.5225	207/60	
830	.0088	.2114	88:52.1	153.96	88.70	142.4	.5321	199/58	
832	.0088	.2166	88:51.6	153.76	88.64	141.9	.5216	202/58	
835	.0087	.2110	88:51.1	153.39	88.76	140.9	.5097	208/59	
839	.0087	.2134	88:50.2	152.96	88.63	140.1	.5073	206/60	
843	.0086	.2087	88:49.4	152.54	88.64	139.1	.4930	211/61	
846	.0086	.2219	88:48.7	152.32	88.44	138.3	.5146	199/58	
848	.0086	.2212	88:48.2	152.12	88.37	137.8	.5077	200/58	
851	.0085	.2088	88:47.8	151.77	88.51	136.8	.4816	212/61	
856	.0085	.2088	88:46.6	151.31	88.34	135.8	.4714	212/64	
859	.0084	.2094	88:46.1	150.89	88.42	135.0	.4726	211/62	
862	.0084	.2224	88:45.3	150.64	88.25	134.2	.4909	199/58	
864	.0084	.2236	88:44.8	150.46	88.16	133.7	.4898	198/58	
867	.0083	.2148	88:44.3	150.08	88.30	132.8	.4723	206/60	
872	.0082	.2095	88:43.2	149.54	88.22	131.6	.4530	212/62	OA #23 Rev 873
875	.0091	.1946	88:53.5	156.65	88.77	137.0	.4735	239/70	
878	.0091	.1974	88:52.7	156.43	88.62	136.1	.4723	236/70	
880	.0092	.1974	88:52.4	156.33	88.52	135.6	.4675	236/70	
884	.0091	.1924	88:51.7	155.85	88.68	134.4	.4573	243/71	
889	.0091	.1978	88:50.7	155.47	88.47	133.5	.4596	236/67	
892	.0090	.2020	88:50.1	154.98	88.65	132.7	.4720	231/67	
895	.0089	.2162	88:49.4	154.75	88.46	132.0	.4916	218/63	
897	.0089	.2129	88:48.9	154.50	88.44	131.5	.4853	220/64	

Table 5.5-1

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TRACKING DUCTION

SUMMARY

EPOCH REV	ECCENT.	PERIOD DECAY	INTEG. PERIOD	MAX ALTIT.	MIN. ALTIT.	ARG. PERIGEE	DRAG	STABLE/ TUMBLE	COMMENTS
900	.0088	.2178	88:48.4	154.12	88.56	130.5	.4971	215/62	
904	.0088	.2174	88:47.4	153.66	88.44	129.7	.4878	215/62	
908	.0087	.2110	88:46.7	153.17	88.51	128.8	.4719	221/63	
911	.0087	.2338	88:45.9	152.88	88.34	128.1	.5065	202/59	
913	.0087	.2323	88:45.4	152.62	88.30	127.6	.5057	201/58	
916	.0086	.2222	88:44.8	152.25	88.41	126.7	.4848	210/61	
920	.0085	.2276	88:43.8	151.66	88.38	125.8	.4901	204/59	OA #24 Rev 922
924	.0094	.2096	88:52.3	158.15	88.58	129.1	.4889	233/67	
927	.0094	.2172	88:51.6	157.92	88.41	128.4	.4923	227/66	
932	.0093	.2000	88:50.7	157.39	88.50	127.0	-	242/70	
937	.0093	.1967	88:49.6	156.88	88.35	126.0	.4394	248/71	S.T. Cal
940	.0092	.1983	88:48.9	156.37	88.44	125.1	.4533	245/70	RV-5 Recovery
943	.0092	.2132	88:47.9	155.92	88.28	124.5	.4664	228/65	
945	.0092	.1428	88:47.7	155.97	88.19	124.1	.3095	340/	
948	.0091	.1929	88:47.3	155.52	88.46	123.1	.4233	251/73	
953	.0090	.2060	88:46.1	154.87	88:44	121.9	.4451	235/69	
956	.0089	.2180	88:45.5	154.43	88.53	121.2	.4711	222/65	
960	.0089	.2425	88:44.5	154.02	88.26	120.3	.5091	198/58	
962	.0089	.2398	88:43.9	153.67	88.28	119.8	.5005	201/58	
965	.0088	.2383	88:43.3	153.27	88.35	118.9	.4962	201/58	
968/969	.0088	.2360	88:42.3	152.71	88.26	118.1	.4827	202/59	OA#25 Rev 970 OA#26 Rev 972
973	.0085	.2058	88:52.9	151.99	89.30	150.4	.5283	198/58	
976	.0085	.2079	88:52.2	151.85	89.09	149.4	.5203	198/58	
978	.0085	.2078	88:51.7	151.65	89.02	149.0	.5207	197/58	
981	.0084	.2006	88:51.3	151.31	89.14	147.9	.5046	204/58	
985	.0084	.2006	88:50.4	150.97	88.97	147.1	.4954	205/58	
989	.0083	.2076	88:49.6	150.54	88.94	146.2	.5086	198/57	
992	.0083	.2373	88:48.8	150.23	88.74	145.3	.5705	173/50	
994	.0083	.2356	88:48.3	150.02	88.66	144.7	.5607	175/50	
997	.0082	.2203	88:47.8	149.64	88.80	143.7	.5265	187/53	

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TRACKING : UCTION

SUMMARY

EPOCH REV	ECCENT.	PERIOD DECAY	INTEG. PERIOD	MAX ALTIT.	MIN. ALTIT.	ARG. PERIGEE	DRAG	STABLE/ TUMBLE	COMMENTS
1002	.0082	.2171	88:46.7	149.21	88.57	142.7	.5066	191/55	
1005	.0081	.2156	88:46.1	148.80	88.63	141.9	.5020	192/56	
1008	.0081	.2201	88:45.4	148.59	88.43	140.9	.5013	189/54	
1010	.0080	.2249	88:44.8	148.42	88.34	140.4	.5080	185/52	
1013	.0080	.2166	88:44.4	148.04	88.46	139.4	.4905	192/55	
1018	.0079	.2139	88:43.2	147.55	88.30	138.3	.4744	196/57	OA #27 Rev 1019
1021	.0110	.1662	89:13.3	169.25	89.58	152.4	.4889	292/87	
1024	.0109	.1663	89:12.7	169.08	89.47	151.5	.4837	293/84	
1026	.0109	.1751	89:12.3	168.93	89.41	150.9	.5058	278/81	
1029	.0108	.1727	89:11.9	168.61	89.53	150.2	.5017	282/82	
1034	.0108	.1707	89:10.9	168.32	89.37	149.1	.4872	287/86	
1037	.0107	.1764	89:10.5	167.94	89.48	148.3	.5058	278/81	

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Table 5 5-1

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PREDICTION ACCURACY SUMMARY

(BFE - Tracking Reduction Predictions)

Tracking Reduction Epoch Rev	BFE ID NO.	5 Revs After Epoch	10 Revs After Epoch
632	40	-.388	-1.528
635	40	-.357	-1.006
637	40	.265	.810
640	40/41	.055	- .349
645	41	-.450	-1.587
648	41	-.075	-0.371
651	41	.122	.288
653	41	.213	.414
656	41/42	.116	-0.120
661	42	-0.466	-0.513
665	42	.001	.091
668	42	.106	.592
670	42	.025	.410
673	42/43	.402	1.660
678	43	.426	.856
681	43	-0.141	-0.343
684	43	.154	.560
686	43	.117	.382
689	43/44	.073	.449
694	44	.068	.255
697	44	-0.015	.003
700	44	.179	.718
702	44	.293	.907
705	44/45	.106	.393
710	45	.113	.454
713	45	.107	.150
716	45	-0.114	-0.247
718	45	.240	.711
721	45/46	.106	.392
726	46	.058	.059
729	46	.096	.057
732	46	.050	.033
734	46	.072	.130
738	46/47	.089	.126
742	47	-0.149	-0.548
746	47	-0.142	-0.514
749	47	.074	.118
751	47	-0.069	-0.302
754	47/48	-0.028	.100
758	48	.142	.214
762	48	-0.187	-0.742
765	48	-0.004	-0.124
767	48	.070	.054
770	48/49	-0.027	.408
775	49	.451	.485
779	49	-0.484	-1.550
781	49	-0.325	-0.892
783	49	.303	1.060
786	49/50	.226	.595
791	50	-0.132	-0.456

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PREDICTION ACCURACY SUMMARY

(BFE - Tracking Reduction Predictions)

Tracking Reduction Epoch Rev	BFE ID NO.	5 Revs After Epoch	10 Revs After Epoch
795	50	-0.073	-0.270
797	50	.044	.115
799	50	-0.157	.421
802	50/51	.062	.067
807	51	-0.186	-0.528
811	51	.033	.238
814	51	.173	.625
816	51	-0.028	—
819	51/52	.078	.924
823	52	.454	1.233
827	52/53	-0.040	.021
830	52/53	.144	.561
832	53	.108	.389
835	53	.057	.140
839	53	.129	.311
843	53	-0.062	-0.092
846	53	.212	.812
848	53	.308	-0.911
851	53/54	.097	.112
856	54	-0.141	-0.403
859	54	-0.089	-0.252
862	54	.162	.583
864	54	.289	-4.654
867	54/55	.156	.525
872	55	.046	-0.010
875	55	-0.060	.119
878	55	.103	.213
880	55	.094	.121
884	55/56	-0.047	-0.376
889	56	-0.195	-0.740
892	56	-0.185	-0.617
895	56	.010	-0.012
897	56	-0.093	-0.291
900	56/57	.052	.292
904	57	.107	.106
908	57	-0.260	-0.755
911	57	.090	.391
913	57	.201	.573
916	57/58	-0.035	.283
920	58	.379	1.098
924	58/59	.093	.456
927	58/59	.207	.706
930	59	.089	-0.442
932	59	-0.020	-0.842
937	59	-0.938	-1.259
940	59	.542	1.790
943	59	.014	2.359
945	59	-0.718	-3.063
948	59/60	-0.275	-1.134
953	60	-0.352	-1.492

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PREDICTION ACCURACY SUMMARY

(BFE - Tracking Reduction Predictions)

Tracking Reduction Epoch Rev	BFE ID NO.	5 Revs After Epoch	10 Revs After Epoch	Tracking Reduction Epoch Rev	BFE ID NO.	5 Revs After Epoch	10 Revs After Epoch
956	60	-4.407	-1.228	1037	65	-0.246	-0.844
960	60	.010	.285				
962	60	+0.020	12.999				
965	60/61	+0.106	.965				
969	61	.514	.902				
973	61	.129	.379				
976	61	.118	.397				
978	61	.189	.661				
981	61/62	.043	-0.181				
985	62	-0.175	-0.964				
989	62	-0.578	-1.113				
992	62	.257	1.087				
994	62	.414	1.310				
997	62/63	.151	.407				
1002	63	-0.047	-0.006				
1005	63	.103	.211				
1008	63	.078	.275				
1010	63	.272	.778				
1013	63/64	.130	2.167				
1018	64	1.784	4.336				
1021	64	.037	-0.089				
1024	64	-0.155	-0.471				
1026	64	.116	.190				
1029	64/65	.059	.084				
1034	65	-0.108	-0.899				

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5.5.1.3 B-Factor and K-Factor

Figure 5.5-1 shows a plot of B-factor for this segment of the mission. The B-factors shown are from the individual tracking reductions and from the BFE for comparison.

The daily average K-factor, i.e., the ground magnetometer readings from Alaska and Colorado as indicative of possible radiation damage to the stellar film, is also shown on this figure from Rev 602 to RV-5 recovery on Rev 942.

5.5.1.4 Orbit Adjust Summary

Table 5.5-3 reflects a summary of each orbit adjust during this segment. For each orbit adjust or set of orbit adjusts occurring on the same or adjacent revs, orbital conditions are provided which describe the orbit prior to the first orbit adjust. In addition, the predicted velocity change and orbit resulting from each orbit adjust or set of orbit adjusts is provided and compared with the actual orbit and velocity change obtained. The actual orbit and velocity change was determined from the Best Fit Ephemeris. All orbit adjusts were close to nominal.

5.5.1.5 Best Fit Ephemeris

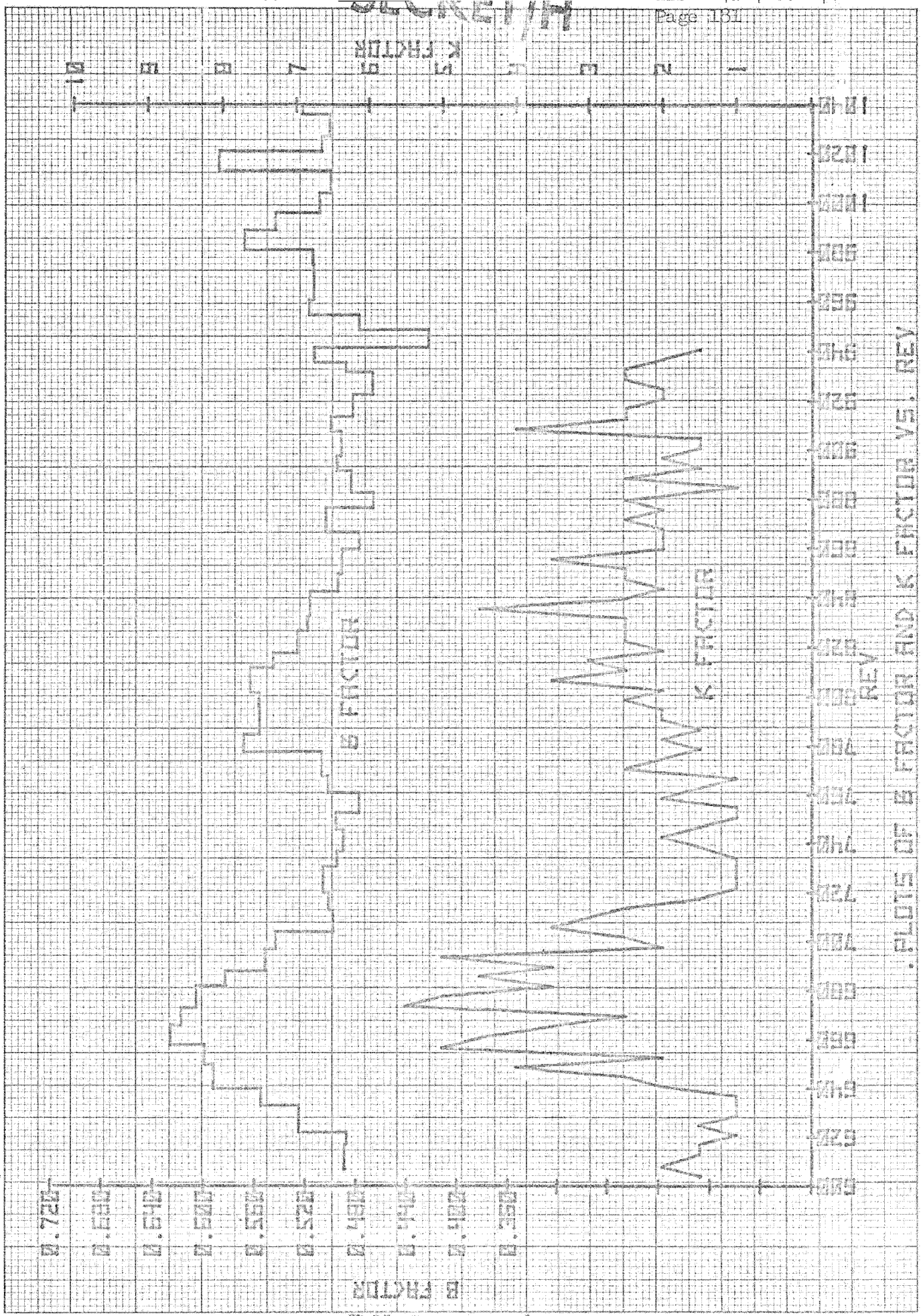
Table 5.5-4 shows the orbital conditions for each day of this segment of the mission.

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Figure 5.5-1

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		Period Min:Sec. XX:XX.X	Perigee N.M. XX.XX	Apogee N.M. XXX.XX	Arg of Per. Deg. XXX.XXX	Burn Dur. Sec. XX.X	Delta Velocity XX.XX
OA No. 17	Rev. No. 630						
Orbit at Rev	629	88:42.5	90.06	144.96	138.17		
Predicted	630	88:53.5	90.35	152.49	145.05		+17.64
Actual	630	88:53.6	90.37	152.51	145.11	53	+17.91
Delta (A-P)		+.1	+.02	+.02	+.06	-	+ .27
OA No. 18	Rev. No. 678						
Orbit at Rev	677	88:41.5	89.94	145.95	132.75		
Predicted	679	88:54.7	90.45	154.67	141.10		+21.15
Actual	679	88:54.8	90.51	154.68	141.20	63.6	+21.44
Delta (A-P)		+.1	+.06	+.01	+.10	-	.29
OA No. 19	Rev. No. 727						
Orbit at Rev	726	88:43.8	90.24	148.96	128.87		
Predicted	728	88:52.8	90.40	155.55	133.25		+14.44
Actual	728	88:52.8	90.41	155.56	133.24	44.0	+14.64
Delta (A-P)		-	+.01	+.01	-.01	-	+ .20
OA No. 20	Rev. No. 776						
Orbit at Rev	775	88:42.2	90.32	149.92	121.48		
Predicted							+36.61
Actual						111.1	+37.12
Delta (A-P)							+ .51

Table 5.5-3

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		Period Min:Sec. XX:XX.X	Perigee N.M. XX.XX	Apogee N.M. XXX.XX	Arg of Per. Deg. XXX.XXX	Burn Dur. Sec. XX.X	Delta Velocity XX.XX
OA No. 21	Rev. No. 778						
Orbit at Rev							
Predicted	778	88:53.4	90.61	150.80	150.01		-17.86
Actual	778	88:53.6	90.61	150.84	150.33	55.3	-18.10
Delta (A-P)		+.2	+.01	+.04	+.32	-	+ .24
OA No. 22	Rev. No. 824						
Orbit at Rev	823	88:43.0	90.16	145.44	137.78		
Predicted	825	88:53.2	90.28	152.74	143.64		+16.35
Actual	825	88:53.3	90.34	152.77	143.73	50.8	+16.71
Delta (A-P)		+.1	+.06	+.03	+.09	-	+ .36
OA No. 23	Rev. No. 873						
Orbit at Rev	872	88:43.1	90.25	147.53	131.45		
Predicted	874	88:53.8	90.46	155.06	137.21		+17.08
Actual	874	88:53.8	90.47	155.08	137.20	53	+17.30
Delta (A-P)		-	+.01	+.02	-.01	-	+ .22
OA No. 24	Rev. No. 922						
Orbit at Rev	921	88:43.6	90.35	149.88	125.44		
Predicted	922	88:52.6	90.43	156.68	129.33		+14.59
Actual	922	88:52.7	90.44	156.76	129.40	45.6	+14.69
Delta (A-P)		+.1	+.01	+.08	+.07		+ .10

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Table 5.5-3

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		Period Min:Sec. XX:XX.X	Perigee N.M. XX.XX	Apogee N.M. XXX.XX	Arg of Per. Deg. XXX.XXX	Burn Dur. Sec. XX.X	Delta Velocity XX.XX
OA No. 25	Rev. No. 970						
Orbit at Rev	969	88:42.2	90.04	151.39	118.05		
Predicted							+39.66
Actual						121.2	+40.62
Delta (A-P)							+ .96
OA No. 26	Rev. No. 972						
Orbit at Rev							
Predicted	972	88:53.0	90.44	150.54	150.02		-22.30
Actual	972	88:53.1	90.46	150.45	150.69	68.6	-22.57
Delta (A-P)		+.1	+.02	-.09	+.67		+ .27
OA No. 27	Rev. No. 1019						
Orbit at Rev	1018	88:43.1	90.16	145.42	138.12		
Predicted	1020	89:12.9	90.38	167.94	152.45		+47.33
Actual	1020	89:13.5	90.42	168.35	152.60	146.2	+48.59
Delta (A-P)		+ 6	+.04	+.41	+.15	-	+ .26
OA No.	Rev. No.						
Orbit at Rev							
Predicted							
Actual							
Delta (A-P)							

Table 5.5-3

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BEST FIT EPHEMERIS

SUMMARY

DAY	EPOCH REV	ECCENT.	INCL.	INTEG. PERIOD	MAX. ALTITUDE	MIN. ALTITUDE	ARG. PERIGEE	DRAG	REV. SPAN
XX	XXX	.XXXX	XX.XX	XX:XX.X	XXX.XX	XX.XX	XXX.X	.XXXX	XXX - XXX
39	607	.0081	96.90	88:47.4	149.08	88.87	144.0	.4896	607 - 617
								.4873	617 - 622
								.4888	622 -
40	625	.0079	96.90	88:43.5	147.22	88.64	139.0	.5249	625 - 633
								.5547	633 - 640
								.5326	640 -
41	642	.0086	96.90	88:50.9	152.75	89.03	141.7	.5921	642 - 650
								.5991	650 - 658
								.5703	658 -
42	658	.0084	96.90	88:46.9	150.76	88.62	137.5	.6259	658 - 666
								.6177	666 - 673
								.5719	673 -
43	674	.0080	96.90	88:42.5	148.31	88.28	133.3	.6056	674 - 682
								.5832	682 - 688
								.5679	688 -
44	690	.0089	96.90	88:52.1	154.83	88.98	137.9	.5518	690 - 697
								.5431	697 - 704
								.5229	704 -
45	706	.0087	96.90	88:48.4	152.98	88.75	133.7	.4987	706 - 713
								.5020	713 - 720
								.4911	720 -
46	722	.0084	96.90	88:44.8	151.21	88.57	129.5	.5061	722 - 731
								.4956	731 - 737
								.4829	737 -
47	739	.0091	96.89	88:50.3	155.90	88.69	130.1	.4901	739 - 746
								.4960	746 - 753
								.4991	753 -
48	755	.0088	96.89	88:46.8	154.01	88.59	126.2	.4780	755 - 761
								.5018	761 - 768
								.5057	768 -
49	771	.0086	96.89	88:43.2	151.95	88.54	122.1	.5072	771 - 778
								.5682	778 - 785
								.5382	785 -

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SUMMARY

DAY	EPOCH REV	ECCENT.	INCL.	INTEG. PERIOD	MAX. ALTITUDE	MIN. ALTITUDE	ARG. PERIGEE	DRAG	REV. SPAN
XX	XXX	.XXXX	XX.XX	XX:XX.X	XXX.XX	XX.XX	XXX.X	.XXXX	XXX - XXX
50	788	.0084	96.89	88:51.4	151.42	89.35	147.0	.5567	788 - 796
								.5577	796 - 802
								.5489	802 -
51	804	.0082	96.89	88:47.7	149.72	88.96	142.6	.5635	804 - 812
								.5457	812 - 818
								.5321	818 -
52	818	.0080	96.88	88:44.5	148.07	88.60	139.2	.5271	818 - 827
								.5189	827 - 833
								.5161	833 -
53	837	.0087	96.89	88:50.6	153.00	88.92	140.3	.5164	837 - 843
								.4955	843 - 850
								.4785	850 -
54	852	.0084	96.88	88:47.5	151.49	88.73	136.3	.4913	852 - 860
								.4783	860 - 867
								.4564	867 -
55	869	.0082	96.88	88:43.9	149.74	88.50	131.8	.5038	869 - 877
								.4668	877 - 883
								.4724	883 -
56	885	.0090	96.88	88:51.5	155.61	88.81	134.2	.4839	885 - 892
								.4958	892 - 898
								.4938	898 -
57	901	.0088	96.88	88:48.1	153.82	88.74	130.2	.4922	901 - 908
								.5002	908 - 914
								.4905	914 -
58	917	.0086	96.88	88:44.8	150.71	88.61	126.4	.4793	917 - 924
								.4807	924 - 930
								.4441	930 -
59	932	.0093	96.88	88:50.8	157.38	88.59 (ST Calibrate)	126.8	.4883	932 - 936
								4.39158	936 - 936
								.5131	936 - 942
						RV-5 Recovery		.4235	942 - 942
								.4360	942 - 949
								.4482	949 -

Table 5.5-4

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BEST FIT EPHEMERIS

SUMMARY

DAY	EPOCH REV	ECCENT.	INCL.	INTEG. PERIOD	MAX. ALTITUDE	MIN. ALTITUDE	ARG. PERIGEE	DRAG	REV. SPAN
XX	XXX	.XXXX	XX.XX	XX:XX.X	XXX.XX	XX.XX	XXX.X	.XXXX	XXX - XXX
60	949	.0091	96.88	88:47.0	155.33	88.53	122.7	.4777	949 - 955
								.5175	955 - 961
								.4844	961 -
61	966	.0087	96.88	88:43.1	152.97	88.54	118.5	.5136	966 - 975
								.5154	975 - 981
								.4776	981 -
62	982	.0084	96.88	88:51.2	151.05	89.35	147.6	.5682	982 - 989
								.5443	989 - 996
								.5106	996 -
63	998	.0081	96.88	88:47.6	149.38	88.99	143.1	.5100	998 - 1004
								.5011	1004 - 1013
								.4821	1013 -
64	1014	.0079	96.88	88:44.2	147.70	88.82	138.8	.5884	1014 - 1021
								.5083	1021 - 1027
								.5105	1027 -
65	1029	.0108	96.87	89:11.9	168.52	89.62	150.2	.5020	1029 - 1036
								.5229	1036 - 1039
								.5779	1039 - 1045
								.5815	1045 -

Table 5.5-4

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5.5.2 Telemetry and Mode Processing

5.5.2.1 MCR 7-47

Problem: In Mode 117.3 and 157.3, the output of the Valve Driver Accumulative total is incorrect.

Solution: Correct the Chain Table in MSTAC to accumulate and output total valve driver pulses for a given operation.

OPS Impact: Increase in RCS analysis time.

Comment: The corrected modes were shipped to all stations by 24 January 1974.

5.5.2.2 Digital T. V.

Preliminary tests of the Format F (command and status display) were conducted during this segment to aid further development.

5.5.3 Command Message Planning and Generation

Message planning and generation were acceptable except for the Rev 930 load. Ambiguous message inputs and personnel errors resulted in the inability to assemble a message containing a ST MOP. As a result, a pan camera operation was missed.

Revised FPAs were issued to update the subcycle 14/15/16 MOP requirements and to revise the PD Mini and Yaw Mini tests.

5.5.4 SCF Support

Satisfactory SCF support continued during the segment although numerous RTS failures were experienced. The more significant of these were:

a. Rev 625 KODI - RTS computer down - load moved.

b. Rev 966 KODI - RTS computer down - profiled around station.

c. Rev 981-83 POGO - No command capability - message not loaded.

To protect against a long duration POGO outage, BOSS subcycle 6 or 7 was routinely scheduled as an alternate load station for the remainder of the mission.

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SECTION 5.6

PROGRAM COMMAND SOFTWARE PERFORMANCE

(Prepared by HTC)

5.6.1 Command Message Summary

This section summarizes pertinent command message data from Mission 1207, IRON 6630. The command messages discussed cover the period from RV3 initiation (Rev 603 load) to the RV3 recovery message (Rev 1034 load).

Two hundred eighty-eight command messages were received by the Technical Adviser (TA) staff. Two hundred forty-one were accepted and forty-seven were rejected. Six of the rejected messages were subsequently altered and loaded into the vehicle. One of the six rejected messages required a second alter prior to loading. A seventh rejected message was incorrectly altered and was not loaded due to lack of sufficient time for a second alter. The remaining thirty-eight were not required due to a lack of payload activity or no change in payload activity. The reasons for rejection of the nine messages are summarized below:

Rev No. and Load Station	Reason for Rejection
930 BOSS	FID cards were incorrectly input in the execution deck.
930 BOSS	SPC cards were incorrectly input in altering the above message.
932 COOK	This was a planned alter to update V/H for a Forward Assembly operation.
933 KODI	This was a planned alter to update V/H for a Forward Assembly operation.
934 HULA	This was a planned alter to update V/H for a Forward Assembly operation.
934 HULA	This was a second alter required to switch to Tape Recorder Number Two when Tape Recorder Number One exceeded its capacity.

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Rev. No. and Load Station	Reasons for Rejection
981 COOK	This message was regenerated at user option to extend a payload operation.
988 POGO	This message was altered to add a PCM Format D Select SPC prior to 989 COOK contact.
1018 GUAM	This message was altered to add an MFA OFF SPC at 1018 GUAM fade.

Two hundred thirty-seven messages were loaded and fifty-one were not for the reasons stated below:

1. The forty-seven rejected messages were not loaded.
2. One message was accepted and subsequently regenerated at user option to extend a payload operation (REV 670 BOSS LOAD).
3. The three contingency messages for RV5 and RV3 recovery were not required (REV 942 POGO, REV 1038 COOK and REV 1039 POGO LOADS).

A one-rev load cycle was employed while the vehicle was over the area of interest. The "add-on" message generation and loading philosophy was in effect. This resulted in the generation of two hundred thirty-three "add-on" messages.

Summary

Total RV3 messages	-	288
Messages rejected	-	47
Total messages accepted	-	241
Messages not required	-	4
Total messages accepted and loaded.	-	237

5.6.2 'TUNITY Software Problems

The Flight 7 'TUNITY software problems itemized below pertain only to the period for RV2 recovery through RV3 recovery. They have been

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grouped into the following categories to demonstrate their impact on the flight. The classification of these software problems will be determined by the Configuration Control Board.

Category	No. of SPRs	Comments
Flight Critical	0	Software corrections were made and incorporated during the flight period.
Non-Flight Critical (Requiring Work-Around)	3	Work-around procedures were developed and implemented.
Non-Flight Critical (Minor)	4	Work-around procedures were not required.
Product Improvement or New Requirements	0	To be considered during future development.
Documentation Error	1	MS-4 and MS-7 affected.

Itemized Software Problems

SPR MD2-6338 ('TWORT)

- Problem Description: An array EVG 5H8 is defined in 'TWORT to hold the names of the event generators whose sequences may be subbed by 'TWORT. However, there are six event generators put into the array which causes the last one to be entered into an item following the array. Later, this item is filled by a call to a system routine. This clobbers the event generator name. When 'TWORT outputs the line containing the event generator name for this entry, a hollerith representation of some date is output.
- Solution or Work-Around: None.
- Operational Impact: There is no operational impact just confusion to the user. This problem has no effect on 'TUNITY processing.
- Comment: It is a software problem and should be fixed prior to the support of SV-8.

SPR MD2-6339 ('TWORT)

- Problem Description: CMG "MACRO EVENT SEQUENCES" and "MODIFIED SEQUENCE LISTING" display system time instead of vehicle time.
- Solution or Work-Around: None.

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- Operational Impact: None.
- Comment: The output of system time by 'TWORT is consistent with 'TUNITY design of all event generators outputting system time.

SPR MD2-6340 ('TCOMTIM)

- Problem Description: The update of message 270 aborted in 'TENT with a message stating that the station requested on the load card did not exist.
- Solution or Work-Around: Rather than using station rise time on the load card another compound time field must be used.
- Operational Impact: None.
- Comment: It is a software problem and it should be fixed prior to the support of SV-8.

SPR MD2-6341 ('TREPLAY)

- Problem Description: In a 'TBALL full list (FLIST) erroneous WAC cells are sometimes output. Under special circumstances a pointer to the 'TAP block erroneously causes a read of the prior record rather than the next record thereby picking up cells from the wrong rev.
- Solution or Work-Around: None.
- Operational Impact: None.
- Comment: It is a software problem and it should be fixed prior to the support of SV-8.

SPR MD2-6342 ('TAPWRP)

- Problem Description: After day 102 the 'TAP and other 'TBAT data blocks used by 'TBALL reach record number 32,767 which is the system maximum. No provisions have been made for recycling these records so an 'SDAHA abort will occur at this point.
- Solution or Work-Around: The slope of the affected data blocks must be changed to 10 instead of 20 thus allowing the capability of running the software for 204 days.
- Operational Impact: With the implementation of the above mentioned work-around procedure there will be no operational impact.
- Comment: SOST is currently drafting a memo to document the above mentioned work-around procedure.

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SPR MD2-6343 ('TCATCHM)

- Problem Description: Neither the MS-4 nor the MS-7 explain clearly how the start time from the MOP card (ST system) is biased by 'TCATCHM and what the actual coverage will be in the following situations:

  (1) If the MOP begins outside of a 'TJM band but overlaps into a band of DEA's.

  (2) If the MOP ends outside of a 'TJM band, but overlaps into a band of DEA's.

- Solution or Work-Around: None.

- Operational Impact: None.

- Comment: Both the MS-4 and the MS-7 should be updated to correct the above mentioned discrepancy.

SPR MD2-6344 ('TCOMP)

- Problem Description: 'TCOMP tries to compare a MACRO on the data base which it should not do.

- Solution or Work-Around: None.

- Operational Impact: None.

- Comment: It is a software problem and it should be fixed prior to the support of SV-8.

SPR MD2-6345 ('THISUM)

- Problem Description: The 10 Jan 74 CHG run aborted with an 'SDAHA error. CHG was attempting to process record 31 of the 'TGX but it had been released by 'TPURR. The problem is related to the fact that the 'TGX contains tables for both the PAN and the ST, but the ST is now inactive.

- Solution or Work-Around: When CHG aborts then an 'SDBG must be run to set 'TADSTS = 'TADST and then CHG can be run.

- Operational Impact: None.

- Comment: It is a software problem and it should be fixed prior to the support of SV-8.

SPR MD2-6346 ('TPURR)

- Problem Description: 'TPURR aborted with an 'SDAHA error while attempting to read record number 32 which had been released the day before. This appears to be an indexing problem.

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- Solution or Work-Around: When the abort occurs the CHG data blocks may be released via 'SDBG.

- Operational Impact: None.

- Comment: It is a software problem and it should be fixed prior to the support of SV-8.

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5.6.3 Hardware/Software Interface Changes

For IRON 6630, two changes were processed from RV2 recovery day through the RV3 recovery message (as shown in Table 5.6.3-1).

These changes were implemented via requests SV7-208 and SV7-209, and have been incorporated into the flight data base and hardware/software interface documentation.

Table 5.6.3-1 Summary of Hardware/Software Interface Changes

Request No.	Identification	Effectivity
SV7-208	Corrects an error in Hardware/Software error check #3, "CA+ within 1.8 secs of PNA+" and "CB+ within 1.8 secs of PNB+".	SV-7 and nominal data base
SV7-209	Provides a new Sequence 444 to perform a special Stellar-Terrain camera exposure test.	SV-7 only

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5.7 SATELLITE VEHICLE AND AUXILLIARY PAYLOAD PERFORMANCE (prepared by SBAC)

5.7.1 EDAP Performance

The main power system supported an average bus load of 21 ampere-hours per rev during this segment and battery temperatures were in the nominal range.

The abnormal cycling of the heaters on secondary batteries #3 and #4 previously seen did not recur during this segment. On Revs 621, 698 and 812 there was an indication of output variation of solar array Leg 2. Since it was minor, the variation was attributed to a shading effect. On Rev 960 the variation on leg 2 was more pronounced. During Rev 977 data showed a 1.2 Amp increase on leg 1 with no variation on leg 2.

Leg 1 data also indicated a reduced output on Rev 232. The reduction was equal to 1/2 S/A panel output which amounts to 1.2 amperes at peak output. Leg 2 data began a similar reduced output starting Rev 495. The amount of the reduction was approximately 2.4 amperes or 1 S/A panel. The reduced output occurred when arrays were cold and shifted to normal output when the arrays warmed up. The most common temperature for return to normal output was in the range of 109° to 124°F. These conditions have continued intermittently through this segment. An investigation considered all elements which constitute the current path of the array output to the batteries. The result of the investigation pointed to the S/A panels in general and the solder connections between the terminal pins and circuit board conductors in particular, as the problem area.

5.7.2 TT&C Performance

SGLS 1, PCM 1A and Tape recorder 1 performed satisfactorily during segment 3. SGLS 2 was checked on revs 697, 811 and 924 and tape recorder 2 was used on rev 936.

5.7.3 Attitude Control System (ACS)/Reaction Control System (RCS) Performance.

The primary attitude control system (ACS) and primary reaction control system (RCS) were used for vehicle attitude control throughout segment 3, with both sytems performing within specifications. In addition to normal control, the system was used for the ST calibrate (Revs 935 and 936), ST Calibrate-Kohoutek (Rev 938) and RV-5 Recovery (Rev 942).

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The Redundant ACS remained enabled during the entire segment, but its output was not used for control. Comparative data from both ACS's showed good correlation. The gyro temperature range of the controlling system was between 176°F and 196°F, with the non-controlling system being 159°F to 167°F.

The performance of the Reaction Control System (RCS) was satisfactory during the entire segment. The thrust for each Reaction Engine Assembly (REA) was approximately 3 pounds force with the exception of REA's 1 and 4. The lowest thrust level computed from REA 1 was 1.78 pounds force and the thrust for REA 4 was 2.18-force. The levels represent a thrust degradation of approximately 43% and 31% respectively. RCS propellant consumption for segment 3 was 73.4 pounds.

5.7.4 Orbit Adjust System (OAS) Performance

The OAS functioned normally for all orbit adjusts throughout Segment 3. A total of 11 drag make-up burns, 9 positive and 2 negative, were accomplished. The total propellant usage for these adjusts was 594.2 pounds.

Table 5.7-1 is a summary of the orbit adjusts performed during segment 3.

5.7.5 Lifeboat II (LB II) Performance

Lifeboat II electronics were activated on Revs 635, 797 and 943 for system calibration checks at two (2) selected locations in the orbit. The L B II system electronics were also activated during the recovery maneuver (Rev 1039) to observe the magnetometer excursions.

Analysis of the magnetometer data indicated the system to be performing nominally. The calibration checks indicated the bias is remaining, in the North-south region, at +5 to +7 Milligaus; and -1 to -4 milligaus in the south-north region. During the recovery maneuver the magnetometer errors were Q(roll) 9.8 milligaus and P (Yaw) 4.3 milligaus. These errors are less than 1.5 degrees for Q and less than 1.0 degrees for P.

The LB II Propellant Tank Heaters remained off throughout segment 3, with the average tank temperature decreasing from 74.5°F to 70°F.

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TABLE 5.7-

ORBIT ADJUST SUMMARY

SEGMENT 3 (REV 603-1039)

OA No./TYPE	17/POS	18/POS	19/POS	20/POS	21 /NEG	22/POS	23/POS	24/POS	25/POS	26/NEG	27/POS
OPERATIONS DAY	39	42	45	48	48	51	54	57	60	60	63
REV. NO.	630	678	727	776	778	824	873	922	970	972	1019
DELTA VEL. -fps (PREDICT)	17.6	21.2	14.5	36.7	17.9	16.3	17.0	14.5	40.0	22.3	47.
DELTA VEL. -fps (TRACKING)	17.9	21.4	14.6	37.1	18.1	16.7	17.3	14.7	40.6	22.6	48.
BURN DURATION -SEC	53.0	63.6	44.0	110.6	55.0	50.8	53.0	45.6	121.2	68.6	146.
PROPELLANT USED -LBS	40.8	48.7	33.4	83.4	40.8	37.3	38.7	33.1	86.8	48.8	102.
AVG OA TANK TEMP- ^{o}F	83.3	84.0	84.0	84.3	85.0	85.0	85.0	85.3	86.7	86.7	86.
AVG OA TANK PRESS-PSIA	160.5	158.5	155.5	152.5	147.5	145.5	144.5	142.5	138.5	136.5	132.
BED RES. FACTOR	25.5	26.8	25.8	24.8	27.6	26.5	24.0	24.1	24.4	25.8	20.

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5.7.6 DOPPLER BEACON SYSTEM

The Doppler Beacon System continued to operate normally during Segment 3 until turned off on Rev 963 after a check of redundant systems. The Software program 'TDERBY was utilized throughout this time. No anomalous conditions were observed in either hardware or software performance.

The Doppler Beacon System was reactivated on Rev 997 for limited operations through the remainder of the segment.

5.7.7 [redacted]

[redacted]

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SECTION 6

6.0 ORBIT PHASE-REV 1040 THROUGH RV-4 RECOVERY

Mission photography on the panoramic camera continued throughout the segment. A four frame MOP was generated with too short FT + to FT - and the aft camera showed an improper frame count. A VBE was executed to remove subsequent payload. Analysis of the operation showed proper aft camera shutdown with no ESD or damage and operations were resumed. The thrust level decay on REA's No 1 and 4 continued with #1 below 1 lb force. A yaw reverse using gyrocompassing was attempted on Rev 1442 for a negative OA, however, insufficient time was allowed for the maneuver and the negative OA occurred with the vehicle not flying reverse. A transfer to ACS 2/RCS2 was accomplished and the remainder of the segment operated in this configuration. RV-4 was reentered and aerially recovered on Rev 1656, operations day 102.

6.1.1 Summary of Events

The minor solar array output variations noted during RV-3 finally resulted in the loss of one and one half panels, however, adequate output was available to support all operations.

On Rev 1223 the aft camera frame count showed only 1 frame had executed while the forward camera had executed 4 frames properly. Evaluation determined that the command timing was too short and caused the improper shutdown. The camera had shut down properly with no damage so operations were resumed with the software modified to use a 5 frame minimum operation.

Degradation of REA thrust level continued and a decision was made to yaw reverse by gyrocompassing for a negative OA. Insufficient time was allowed for the maneuvers and the horizon sensors inhibited during the Rev 1442 POGO pass. A VBE was attempted near fade but because of improper system briefing the wrong PMU was erased and time did not permit a VBE of the other PMU. The negative OA executed while the SV was not in the proper yaw reverse attitude. (achieved approximately 50% of the desired velocity decrement). The SV was transferred to ACS2/RCS2 and a

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second negative OA executed on the next day to properly position the orbit trace.

Numerous RTS failures were again encountered during this segment. Except for KODI Rev 1436, where an inability to command resulted in missing a payload operation, the RTS outages were profiled around with only minor problems. A [redacted] direct solar photography experiment was performed on Rev 1650. All on-board film was used and stored in RV-4. RV-4 was reentered and aerially recovered on Rev 1656, operations day 102 with only minor capsule and parachute damage reported.

The overall quality of the acquired photography ranged from good to poor with the majority rated as fair. Improved imagry resulted from higher solar elevations and improved weather conditions.

6.1.2 Problem Summary

a. Reduced S/A Output

Statement - loss of one and one half panels.

Solution - No problem - adequate output was available to support all mission activity.

b. Camera shutdown Rev 1223

Statement - Improper frame count on aft camera.

Solution - VBE to contacts. Analysis showed proper shutdown of aft camera. Operation resumed with a 5 frame minimum to insure adequate FT + to FT - time.

c. Loss of Sv Stability Rev 1442

Statement - SV was yawed reverse using gyrocompassing. The horizon sensors inhibited during the Pogo pass and a VBE to the wrong PMU was exercised just prior to fade.

Solution - Insufficient time to yaw reverse caused the HS inhibit. Improper system procedures resulted in executing the wrong VBE. A switch to RCS2 and a second negative OA the next day returned the orbit trace to normal.

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6.2 COMMAND SUBSYSTEMS PERFORMANCE (Prepared by CSC)

6.2.1 Health

The health of the Command Systems remained excellent throughout Segment 4 (Revs 1039-1656) of SV-VII. There were no equipment malfunctions. None of the Command Systems were subjected to out of specification temperatures or voltages. There were no power dropouts, relay driver overloads, or clock status errors experienced.

6.2.1.1 EXTENDED COMMAND SUBSYSTEM

6.2.1.1.1 Command Modes

The ECS responded properly in all modes into which it was commanded. There were a total of 348 messages loaded in the ECS for this segment. This resulted in 94,074 SPC's being stored for readout from the PMU's.

Of the 94,074 SPC's loaded, 39,712 were output from the PMU's for processing by the decoders. The remaining were erased out prior to time label matches. In loading the 94,074 SPC's, the only rejects occurred at Rev 1200 Pogo and were due to station problems.

6.2.1.2 MINIMAL COMMAND SUBSYSTEM

6.2.1.2.1 Command Modes

The MCS responded properly in all modes into which it was commanded during MCS/LB health check on Revs 1477 to 1481.

6.2.1.2.2 MCS Anomalies

There were no MCS anomalies.

6.2.1.3 REMOTE DECODER/BUD

6.2.1.3.1 Command Modes

The remote decoder was used for the recovery of RV-4 which ended this segment of the flight. The performance of both channels was verified from telemetry to be proper for all commands.

The BUD responded properly during MCS/LB health check.

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6.2.1.3.2 Remote Decoder/BUD Anomalies

There were no remote decoder or back-up decoder anomalies.

6.2.1.4 SUMMARY

6.2.1.4.1 Expendables and Environmental Data

Total Command Readouts PMU-A 19,293 PMU-B 20,419

ECS Clock Drift Rate 3.25 parts in 10^7

ECS Clock Stability 2.60 parts in 10^8 for a 617 rev period

Total Hours On ECS 2432.6 MCS 10.4 RD 2.6 BUD .1

Secure Words Expended at end of Segment 6 PMU-A 148 PMU-B 152

Environmental Data: See Figures 6.2-1 through 6.2-7

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	(1)	(2)
VEH. TIME SPAN	5541629.2	TO 8824941.8 SECS.

AVERAGE CLOCK ACCURACY =BIAS CHANGE/TIME CHANGE

=(1.7182- 0.6504)/(8824941.8- 5541629.2)

= 3.25220E-07

= 3.25220 PARTS IN 10 TO THE 7TH

AVERAGE CLOCK FREQUENCY =(3.25220E-07*1,024,000.0)+1,024,000.0

= 1024000.33302 HZ

FREQUENCY 1 (F1) =(SLOPE AT 1)*1.024MHZ+1.024MHZ

=(3.13522E-07)*1.024MHZ+1.024MHZ

= 1024000.32104 HZ

FREQUENCY 2 (F2) =(SLOPE AT 2)*1.024MHZ+1.024MHZ

=(3.30105E-07)*1.024MHZ+1.024MHZ

= 1024000.33803 HZ

CLOCK STABILITY =(F2-F1)/AVERAGE CLOCK FREQ.

=(1024000.33803- 1024000.32104)/1.024E+06

= 1.65918E-08

= 1.65918 PARTS IN 10 TO THE 8TH
FOR THIS 617 REV. PERIOD

= 1.09153 PARTS IN 10 TO THE 10TH
FOR AN AVERAGE 6 HOUR PERIOD

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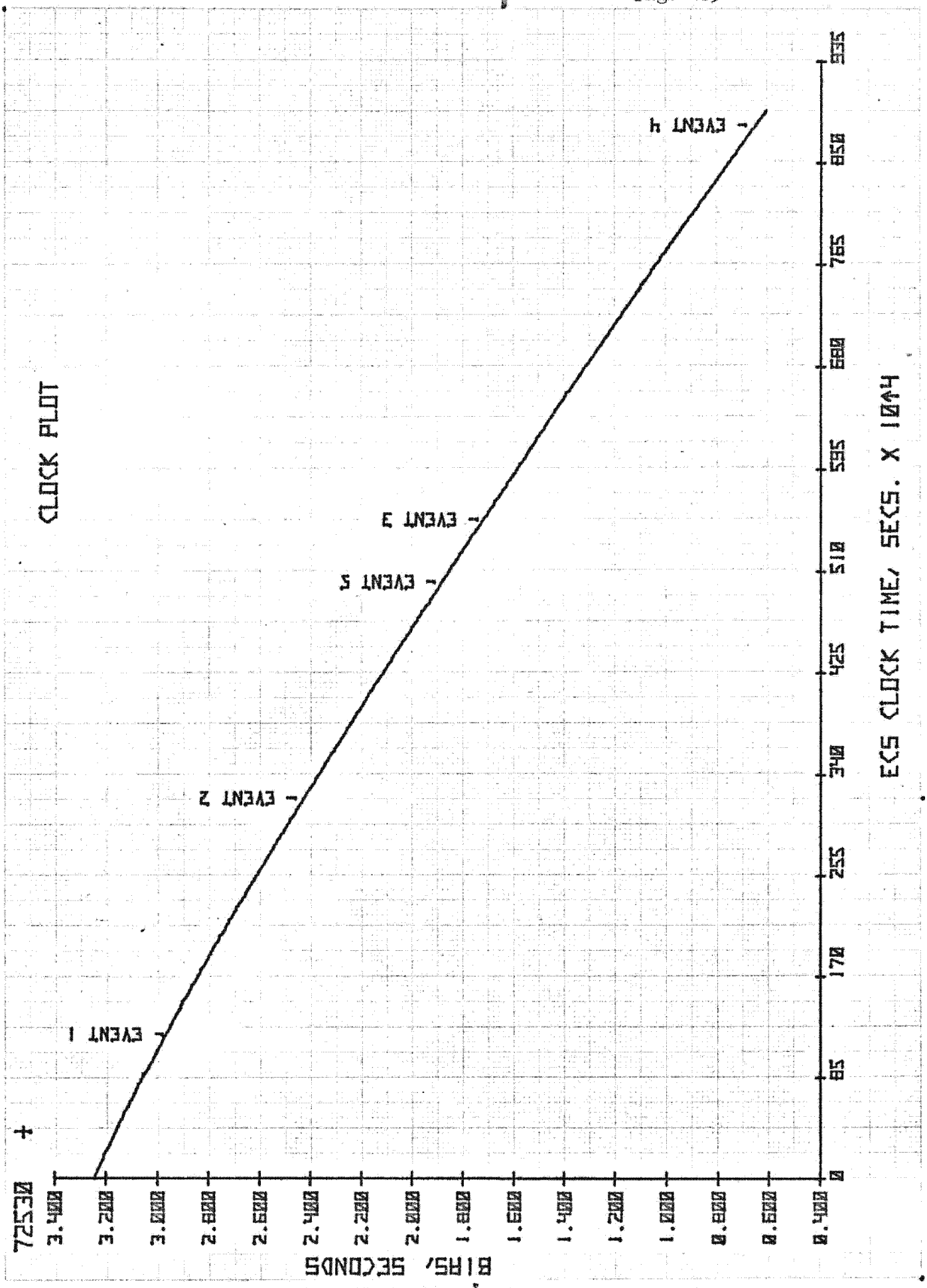
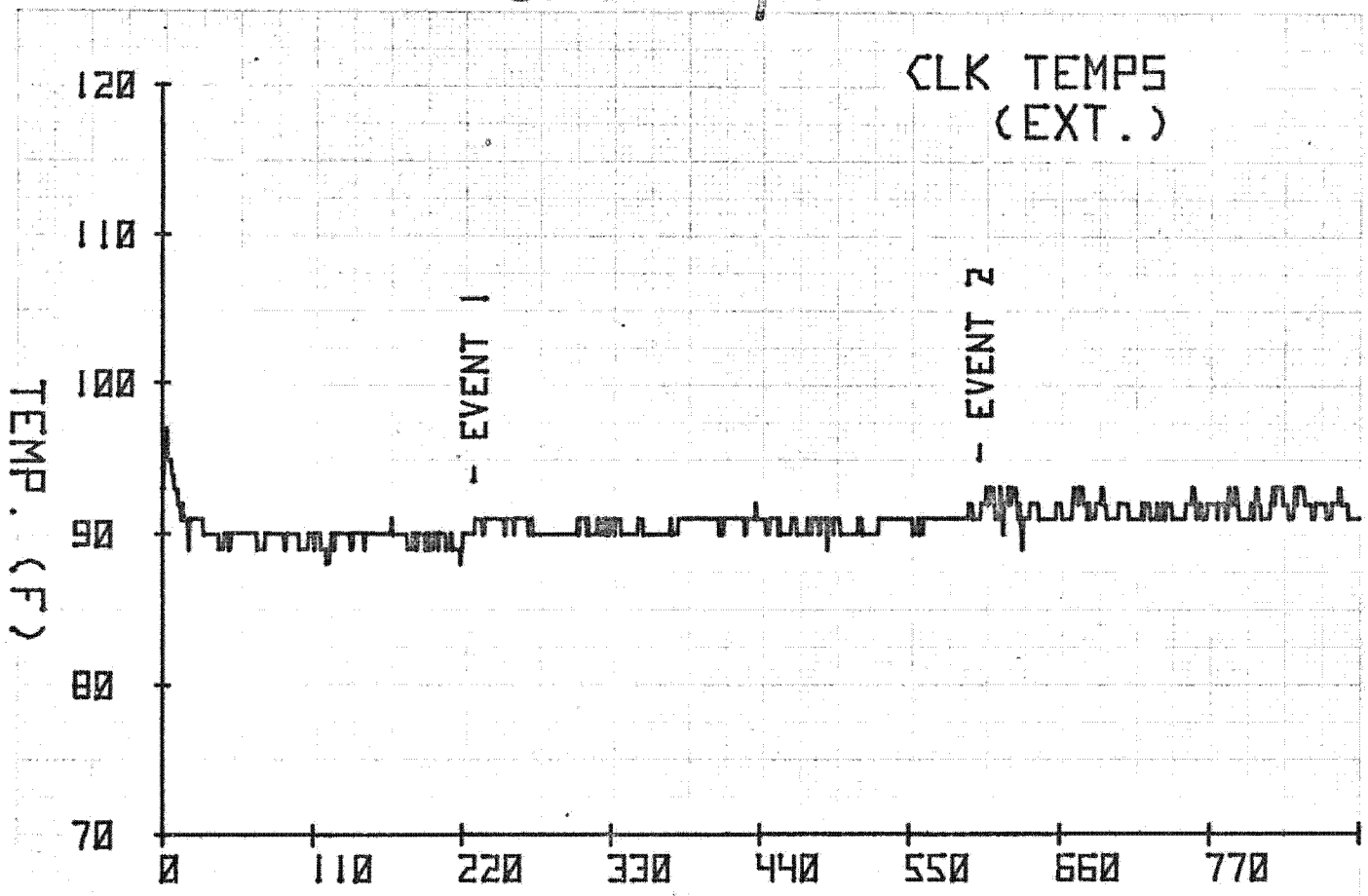


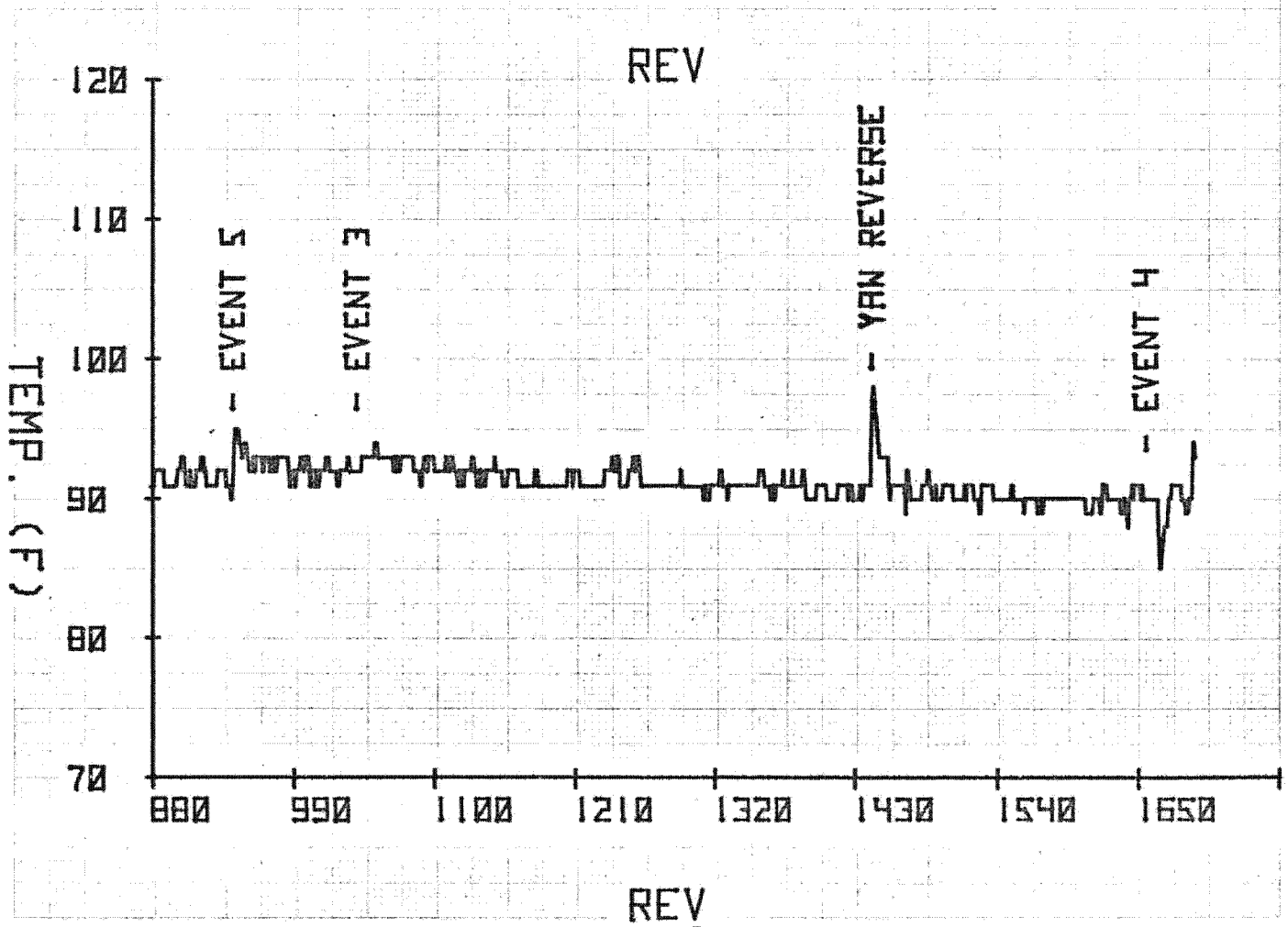
Figure 6.2-1

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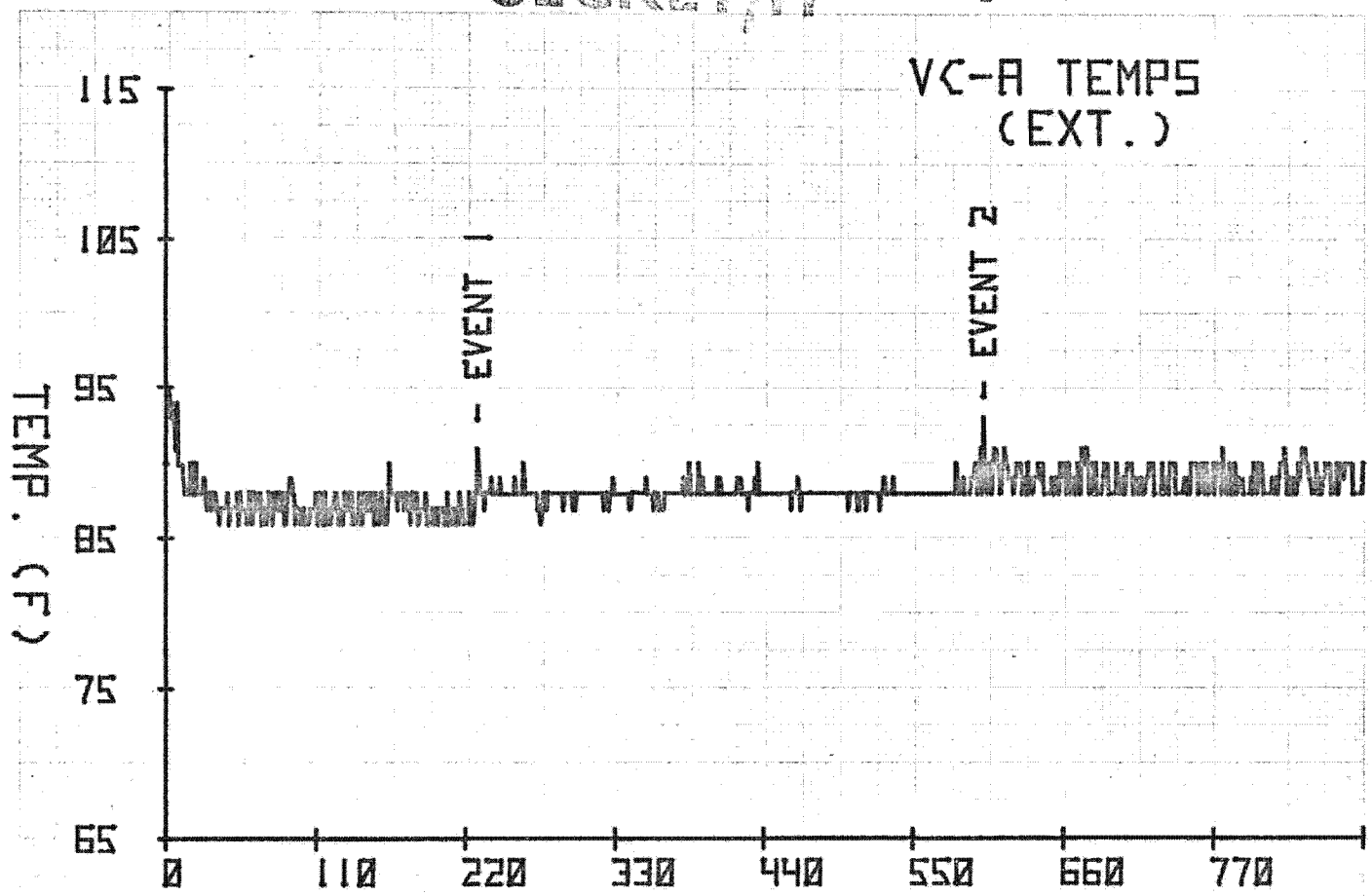
Figure 6.2-2

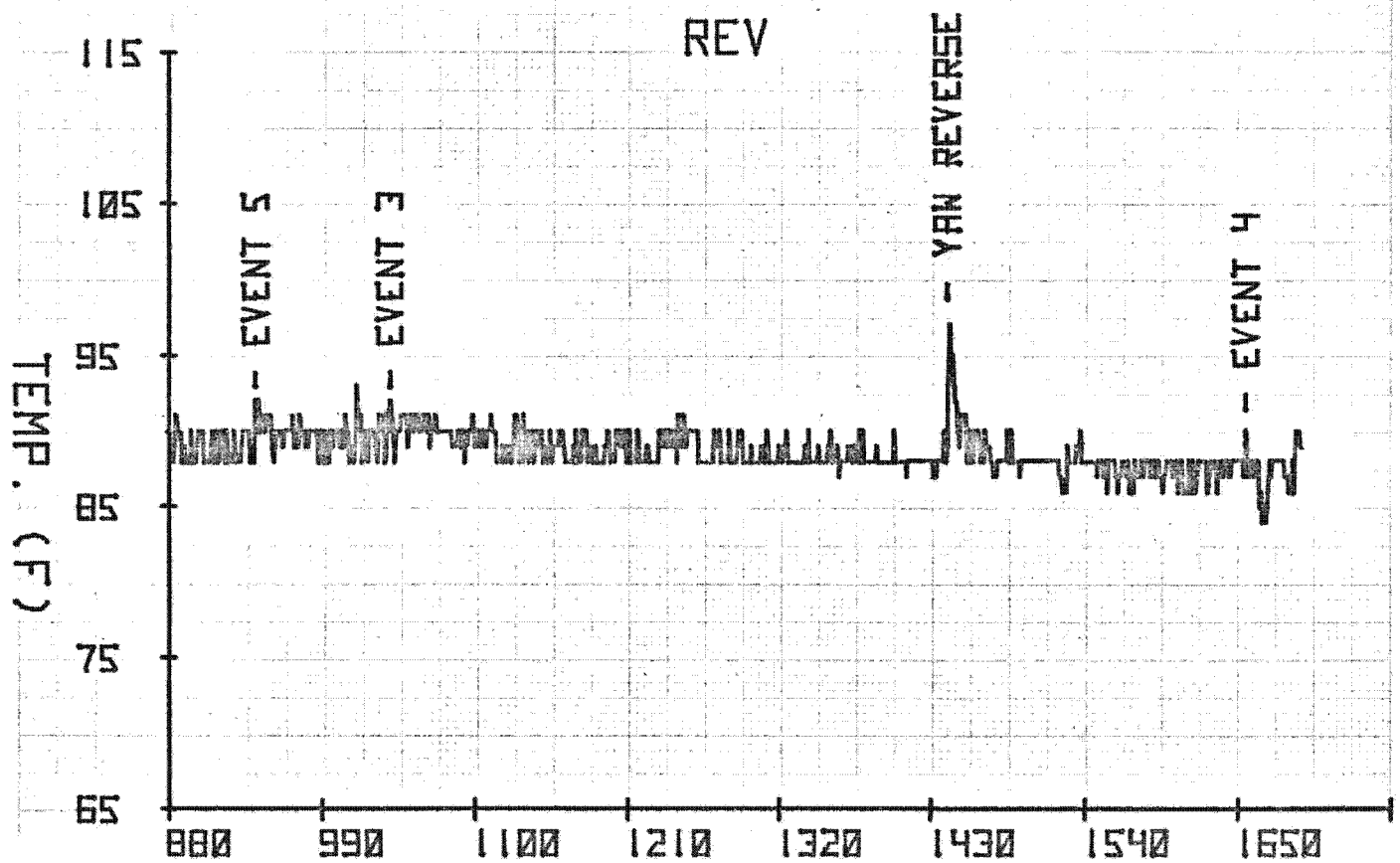
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SECRET

Figure 6.2-3

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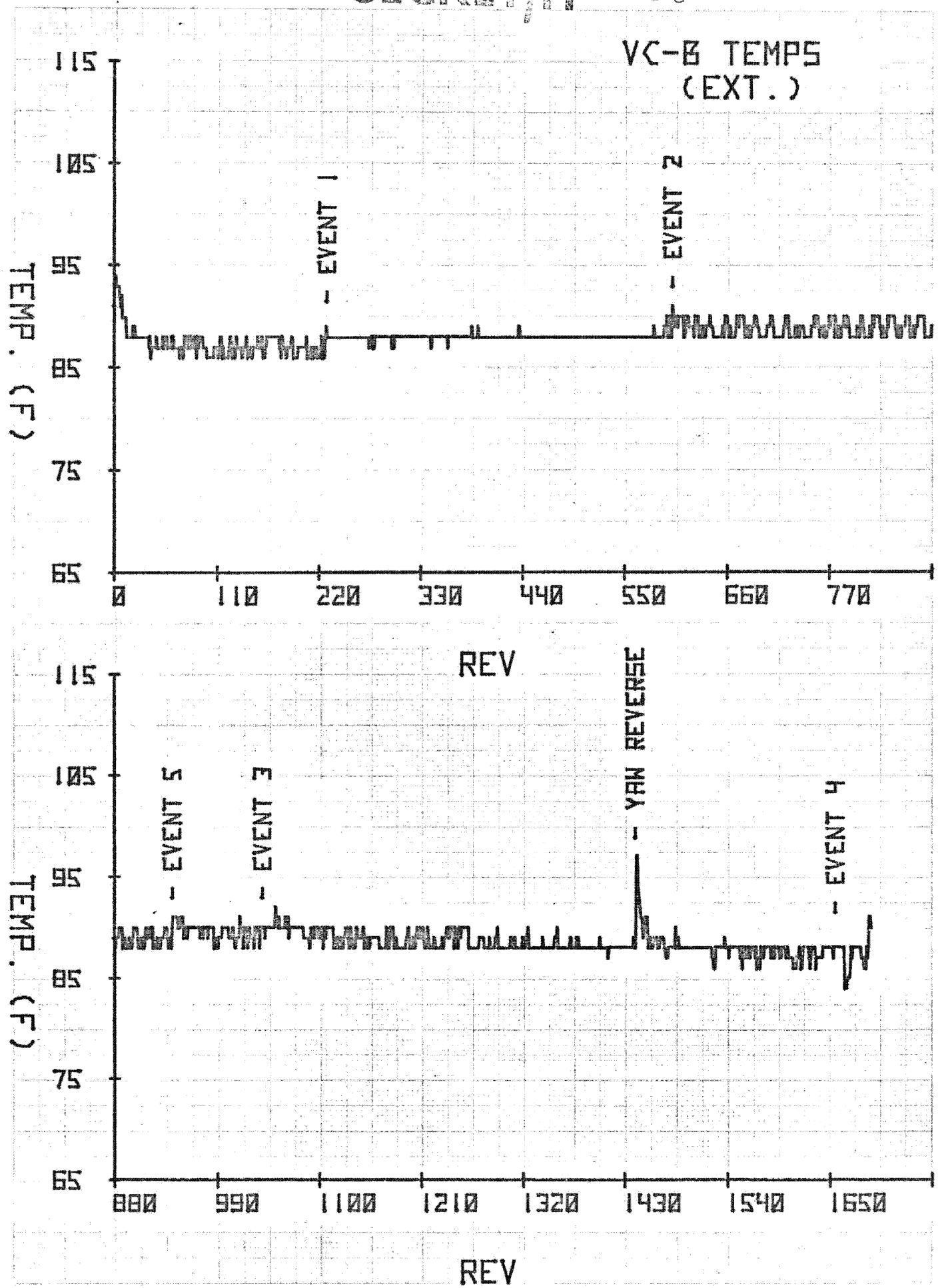
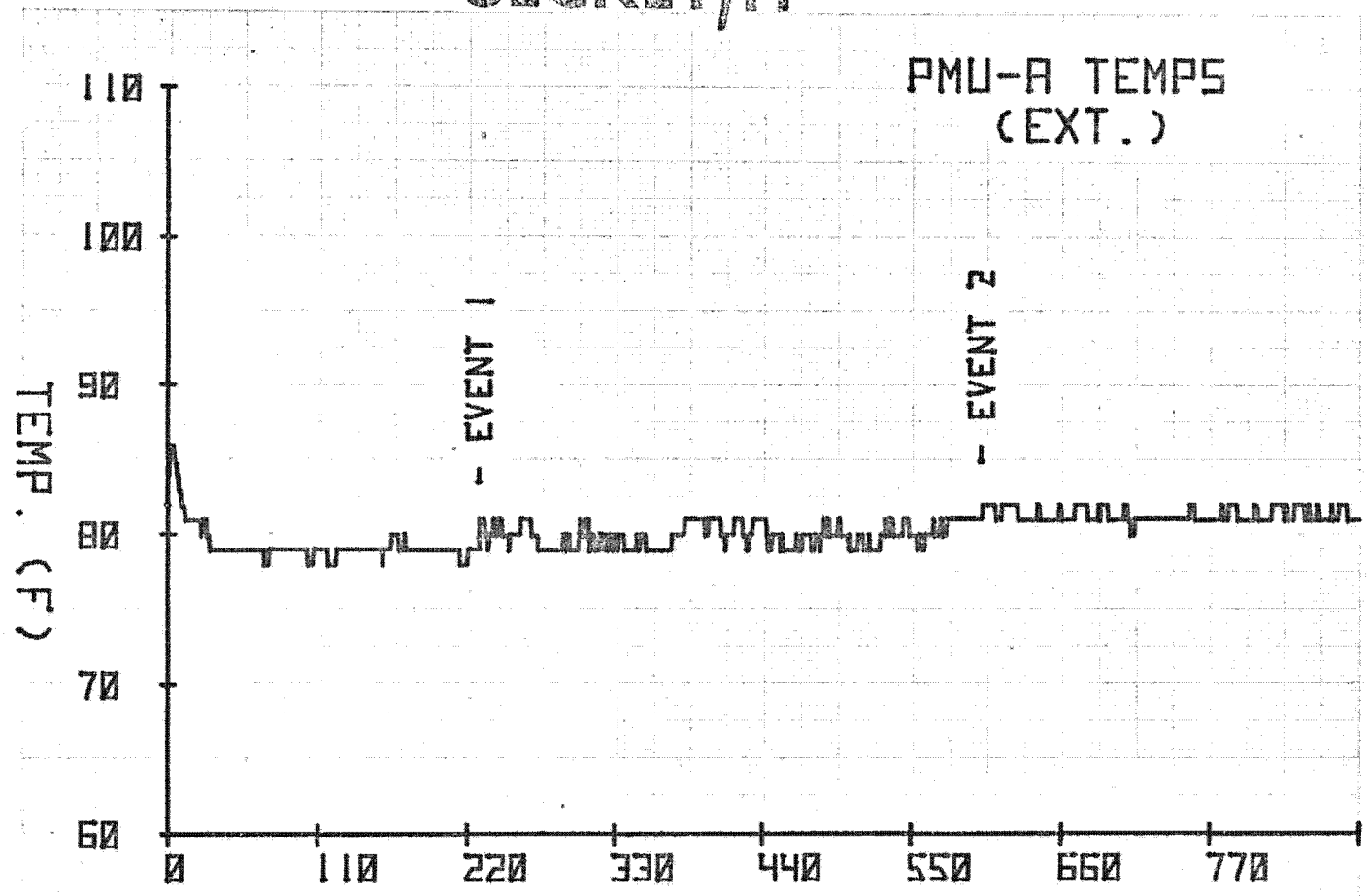


Figure 6.2-4
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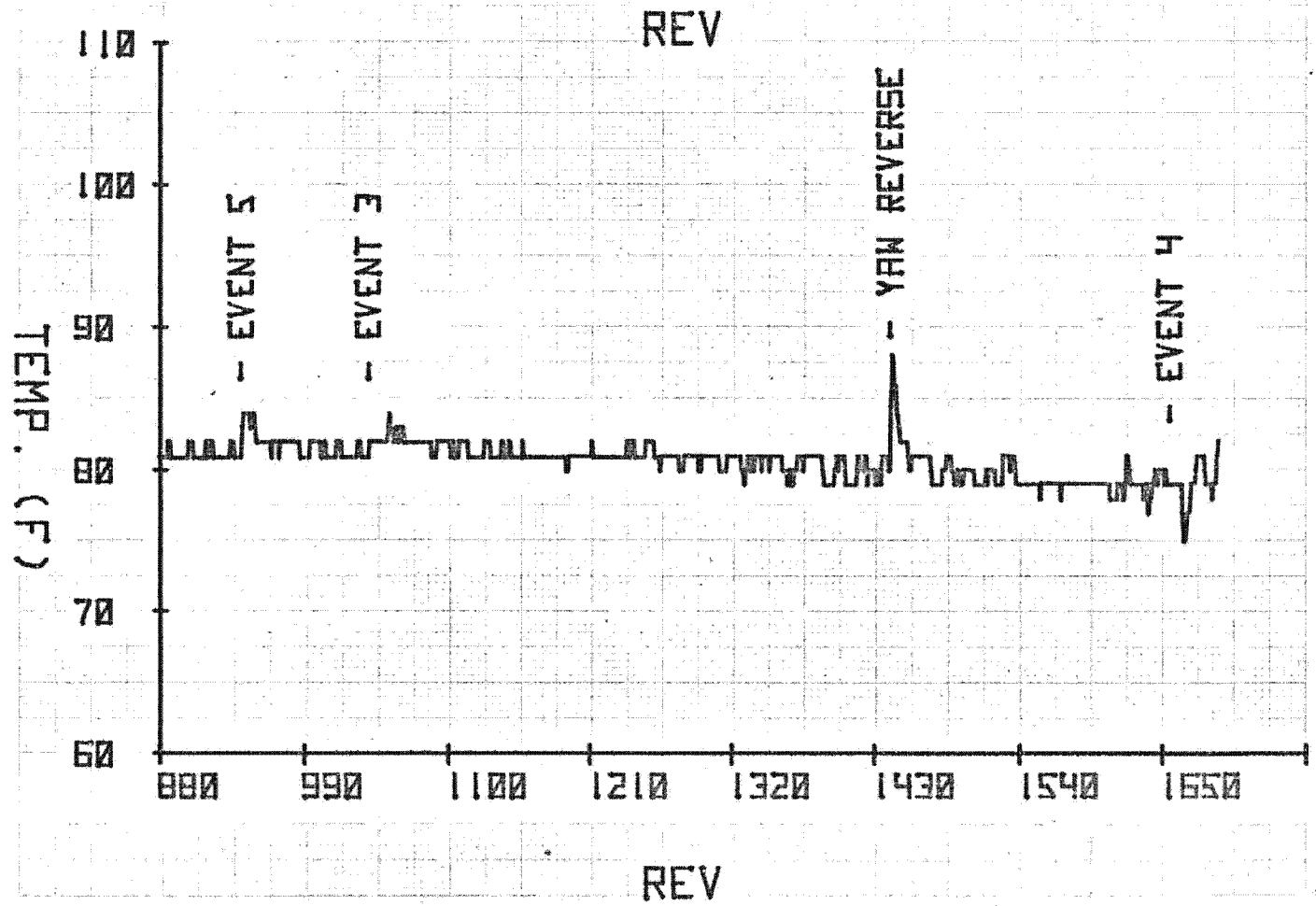


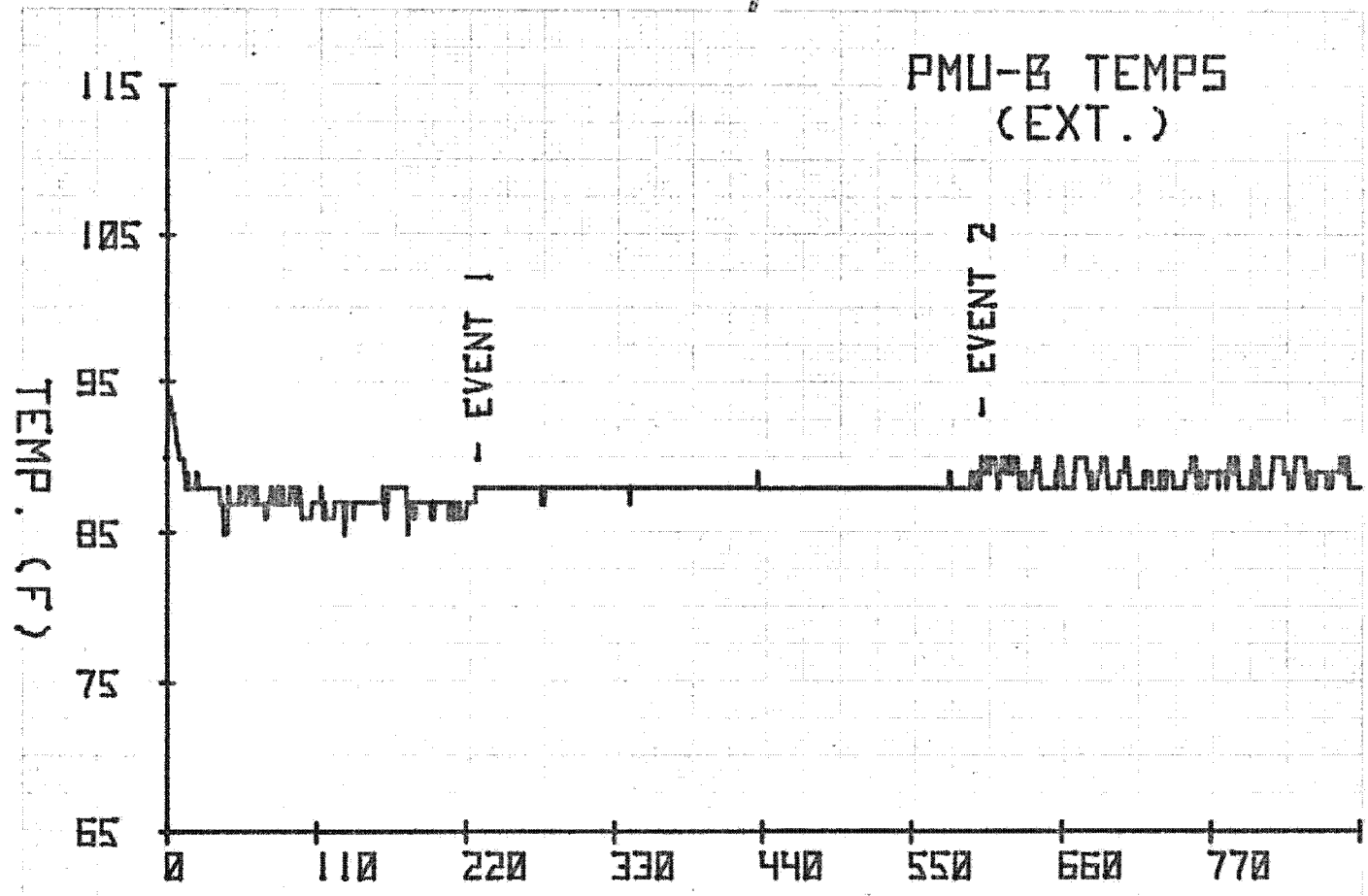
Figure 6.2-5

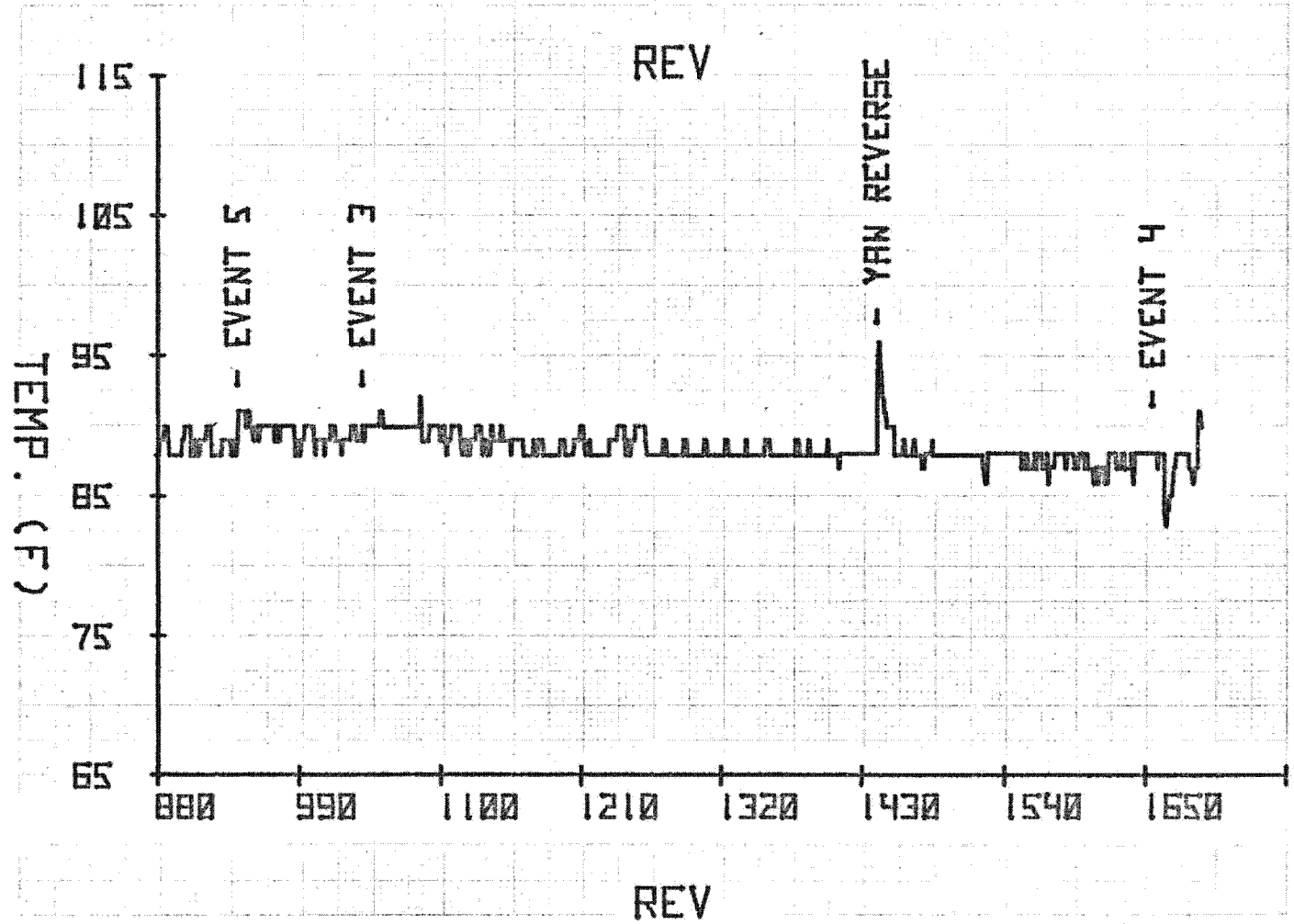
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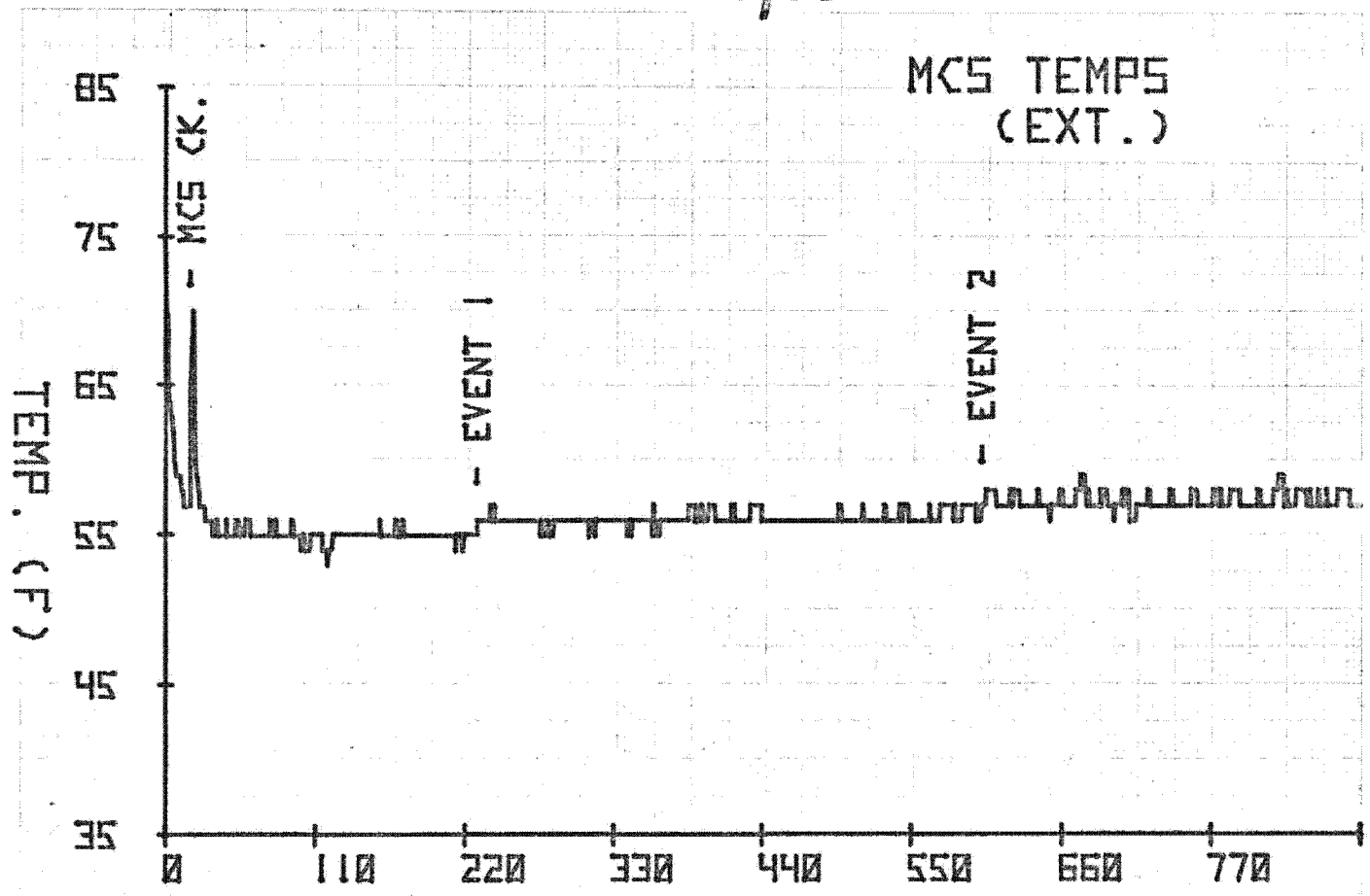


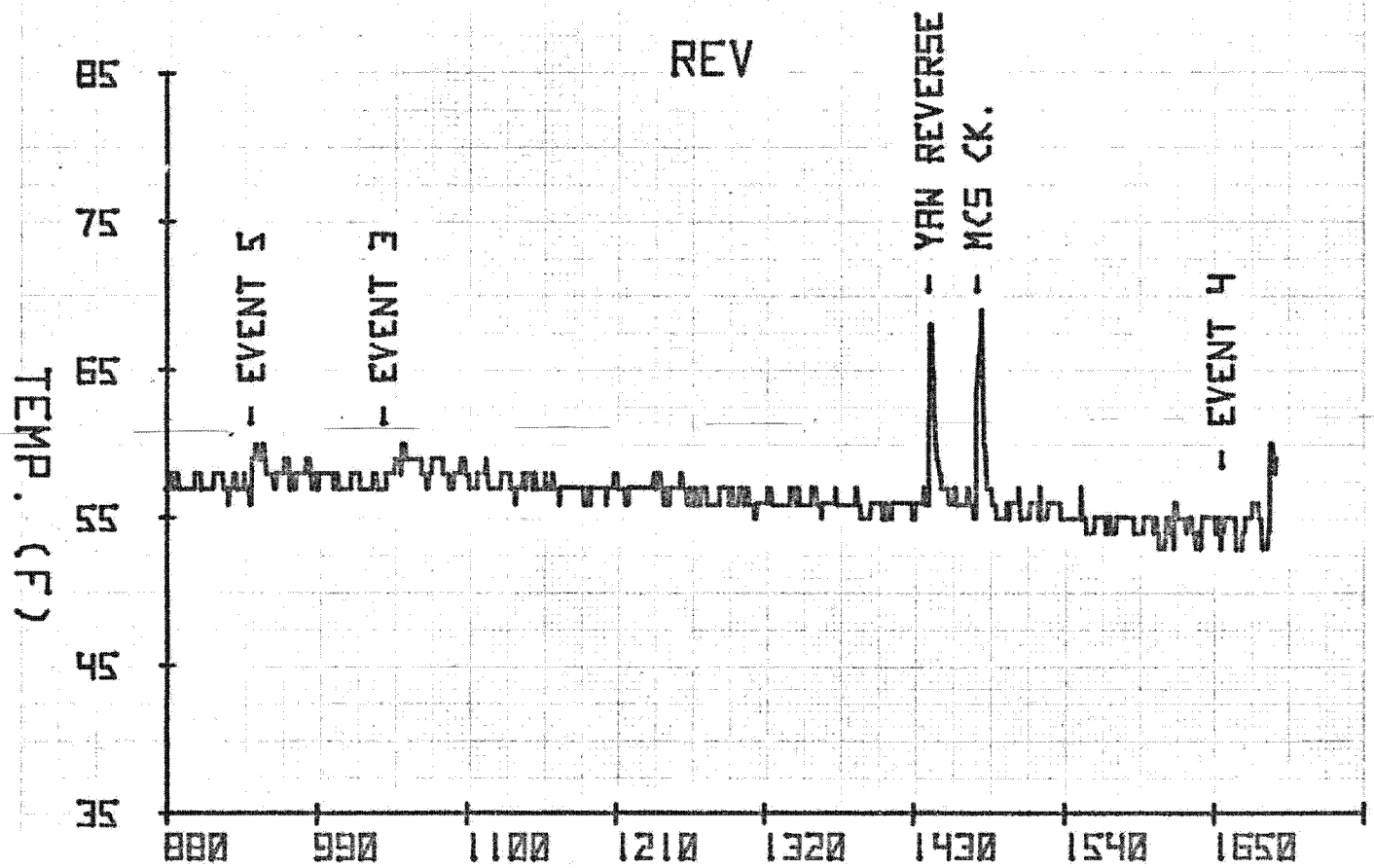
REV

Figure 6.2-6

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REV

Figure 6.2-7

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6.3 SENSOR SYSTEM OPERATIONS THROUGH RV-4

6.3.1 Mission Operations Performance

The Sensor Subsystem exhibited nominal operating characteristics throughout RV-4, with no anomalies or malfunctions experienced.

The RV-4 mission segment consisted of 277 sensor system operations, consumed 22,454 seconds of camera power on time, 10.1 lbs of nitrogen gas, and approximately 23,400 ft of film per camera. The consumption history profiles throughout the mission are graphically depicted in Figure 1. Figure 2 shows the RV-4 takeup footage history.

The overall quality of the acquired photography ranged from good to poor with the majority rated as fair. The image quality for a large portion of this segment has significantly improved from the RV-3 segment, negating the concern that the performance of the camera system was degrading as a function of mission life. The acquisitions of low latitude geographic areas show a marked improvement over the image quality from RV-3 because of higher solar elevations, improved weather conditions resulting in less haze, and increased cloud-free coverage in these areas.

6.3.2 Engineering Tests

Several engineering operations were accomplished during RV-4 for the purpose of PFA evaluation of SS photo quality performance.

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Rev 1184	Smear Evaluation at High Scan
Rev 1232	Resolution Target at Tucson
Rev 1263	Dense Culture for Photo/EM Correlation
Rev 1280	Smear Evaluation at High Scan
Rev 1281	Dense Culture for Photo/EM Correlation
Rev 1344	Dense Culture for Photo/EM Correlation
Rev 1362	Smear Evaluation at High Scan
Rev 1409	Smear Evaluation at High Scan
Rev 1633	IR-Color Evaluation Target (Mono B)

[redacted] one direct solar photography experiment (Mono A, Rev 1650) were performed during RV-4.

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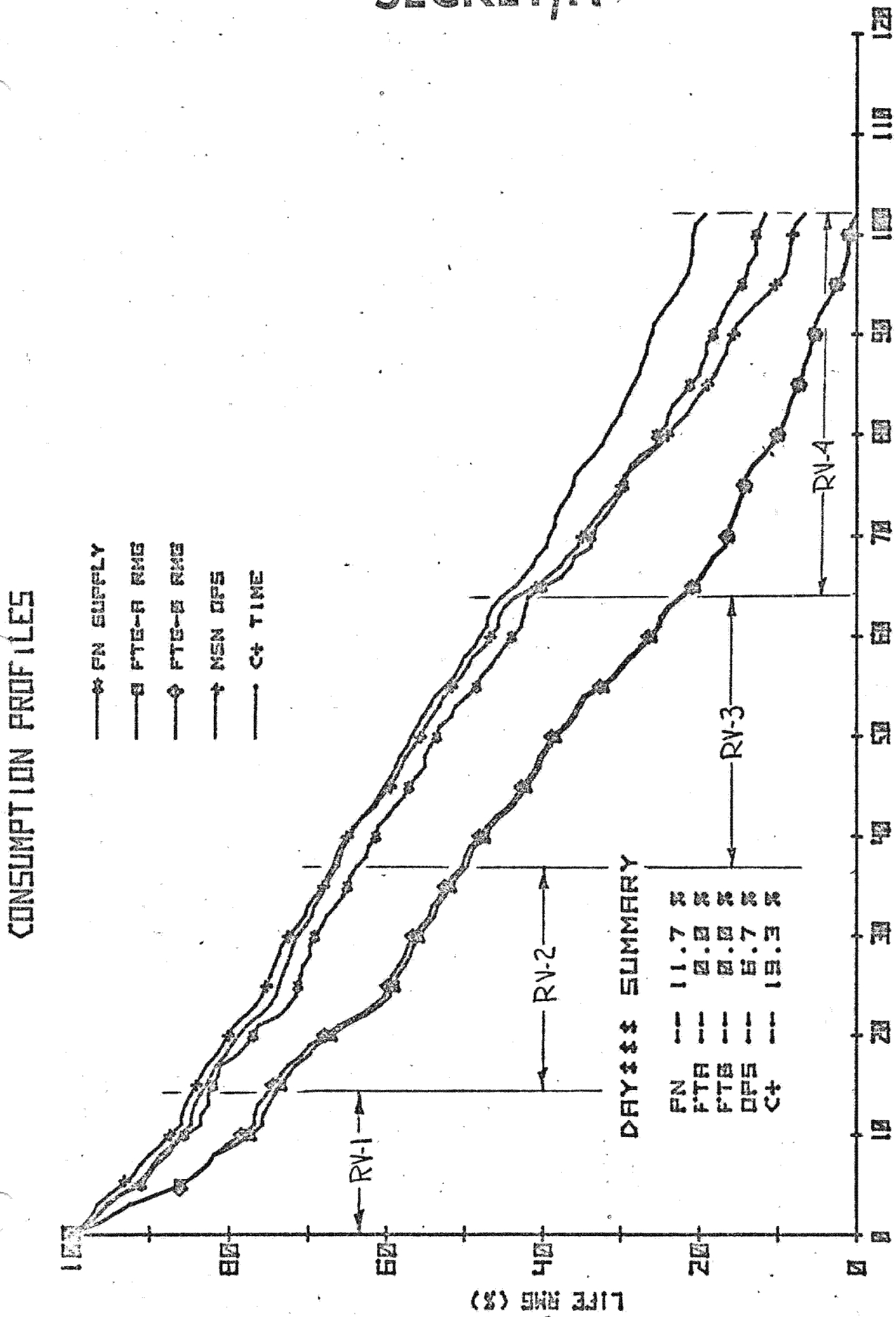


FIGURE 1

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SECRET/Rs

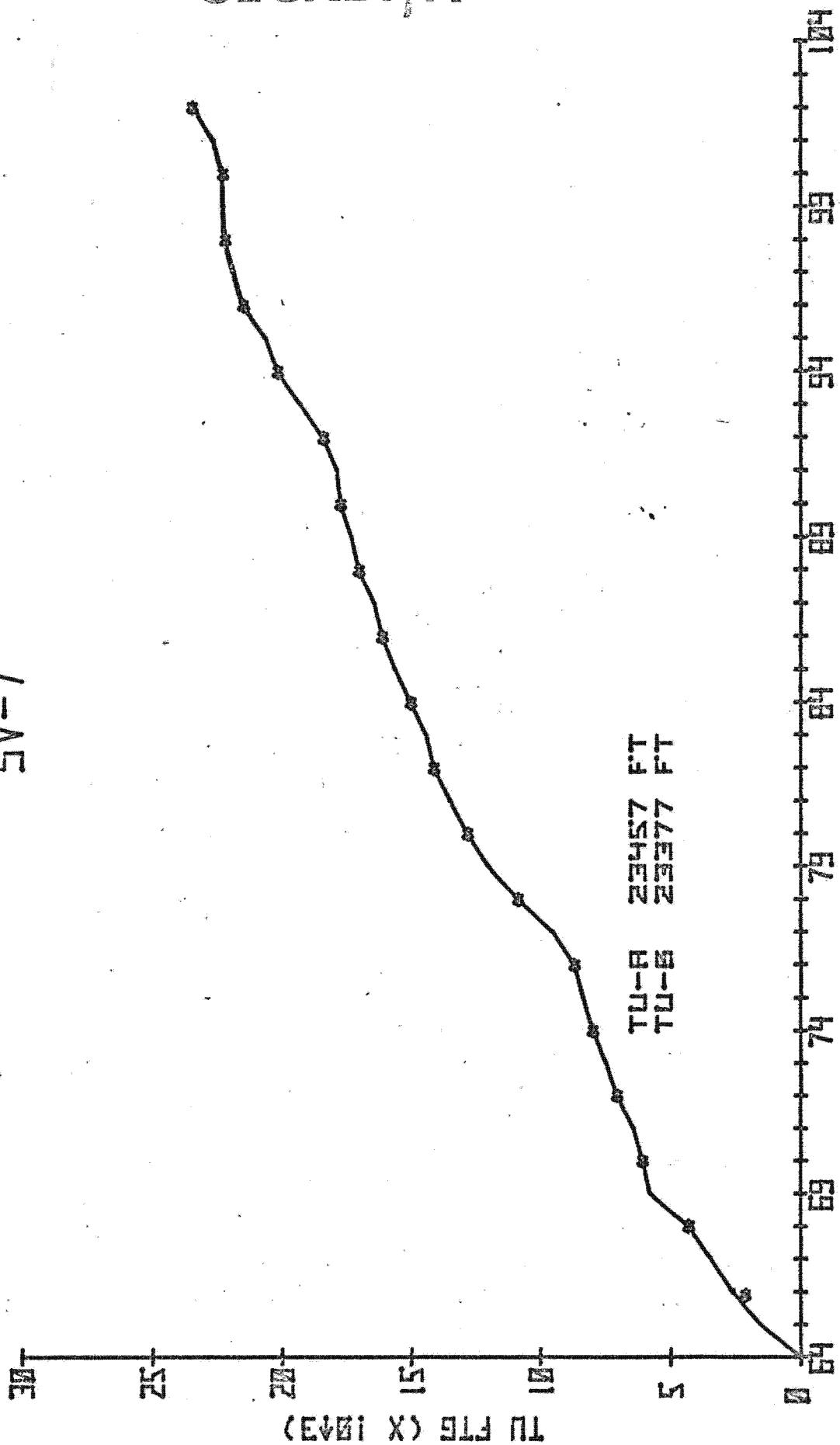


FIGURE 2

SECRET/Rs

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6.4 RV-4 (S/N 29) Performance

This report presents an analysis of the RV-4 performance based on evaluation of recovery studies, command message, RV and SV telemetry, voice reports, and the recovery test report TWX. Tables 6.4-1 thru 6.4-3 list all relevant data. RV heater performance graphs are also included.

6.4.1 Summary

The RV payload was 80.76% of the maximum I.C.D. weight and unbalanced 0.39%. The PREP2 event took place on Rev 1654 over COOK and separation occurred on Rev 1656. Preparation, deorbit, and entry events, and drogue and main parachute deployment conditions were normal and executed as planned. Aerial recovery was accomplished on the 2nd pass at 10,300 feet altitude, 20.5 nautical miles from the predicted impact point.

The Recovery Forces reported that the VHF antenna, on drogue mortar hole side of RV, was missing. One heavy suspension line was broken and a possible tear in upper part of main canopy was also reported.

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RV 4 RECOVERY DATA

IDENTIFICATION DATA

SV	7	IRON NO	6630			RECOVERY REV	1656
RV	4	RV S/N	29	RETRO MOTOR S/N	Q 54	RECOVERY DATE	20 Feb 74

EVENT TIMES (IN SYSTEMS TIME - SECONDS)

EVENT	BASIC STUDY	UPDATED TEAPOT	TEAPOT EVAL	COMMAND MESSAGE	SV TLM	VOICE REPORTS	RV TLM MODE 51	DIFF NOTE 1
~~RV---OUT-T/S-~~	REV/STA			N/A	N/A			N/A
RV IN T/S	1654C			73807.6	73808			--
DT START	82397	82396.5	82397.2	82396.9	82397			--
POGO TRAN	83454.7			83452.3	83440			12
PITCH START	83484.7			83482.3	83484			+1.7
PITCH STOP				83536.4	83538			+1.6
PYRO ARM BATT				83652.1	83653			--
POGO FADE	83776.4			83773.5	83798			+24.5
KODI TRAN	83890.8			83888.1	84011	84016		+122.9
ORB PWR OFF				83991.4	83992			--
RV SEP (0)	84001.7	84001.6	84001.6	84001.4	84002	Confirm	-- NOTE 2	--
SPIN UP (+2.4)				84003.8		84004	84004	--
RETRO START	84127.1	84127	84127	84126.8		84127	84127	--
DESPIN (+160.4)				84161.8		84163	84163	+1.2
PROP JETT (+175.4)				84176.8		84178	84178	+1.2
KODI FD (RV)	84254.6					84268	84263	+9
RV ENTRY (400K	84301.7	84301.3	84301.9		RECOV TLM			
Δ 1-2 ACQ					84379	84380		
ION ENTR	84395.2	84394.7	84395.4		84410	84410		+14.6
ION EXIT	84577.8	84577.3	84578.1		84550	84575		-28.1
DROGUE DEPLOY	84621.9	84621.4	84622	TONE STOP	84634	84644	84624	+12
IMPACT (50K)	84642.0	84641.5	84642.2					
MAIN CHUTE DPL	84645.3	84644.8	84645.5		N/A	N/A	84649	+3.5
H/SHLD JETT	84649.3	84648.8	84649.5	TONE START	84653	84652	84653	+3.5
STEADY STATE	84660.3	84659.8	84660.5					
ETPD(RAINDROP)	84701	84699.7	84701					
RV @ 13.5K	85668.2	85666.9	85668.2	IN TRAIL	85740	85740	85760	+71.8
WATER IMPACT	86257	86255.7	86257		N/A	N/A	N/A	N/A
HULA TRAN (RV)	N/A				N/A	N/A	N/A	N/A
HULA FADE (RV)	N/A					N/A	N/A	N/A
DT RUNOUT	85112	85111.5	85112.2		N/A	N/A	N/A	

*To nearest Minute.

NOTES: 1. DIFF = Actual - Predicted times, TLM differences of less than 1.0 sec are ignored. [ ] = PREDICTED TIME, [ ] = ACTUAL TIME.

2. Assume RV SEP Sequencing starts 0.4 seconds after RV SEP Command msg time.

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RV 4 RECOVERY DATA

RECOVERY DATA

	BASIC STUDY	UPDATED TEAPOT	TEAPOT EVALUATION	QUICK LOOK RPT	EPPD (TWX)	AERIAL RECOVERY
LATITUDE	25.499	25.515	25.458	25.167	25.50	25.167
LONGITUDE	163.07	163.07	163.08	162.90	163.0	162.54

RECOV. A/C DEPLOYMENT FORMATION No. 1, RECOVERING A/C No. 3

RECOV ALT 10,300 ft, PASS No. 2, TIME 23.49 Z

AIRSPEED 153 KTAS, 125 KIAS; TIME IN TOW 19 min.

RAINDROP ETPD 84701 sec 46000 ft; RATE/DESCENT, 15K 27.7 FPS, 10K 25.6 FPS

CONTACT LOCATION #6 Hook in load line

PRESET TENSION LEVEL 3200 lb, PAYOUT Normal

MISS DISTANCE (TEAPOT EVAL VS AERIAL RECOV) (Uncorrected for Wind)

OVERSHOOT 17.46 nm, CROSS TRACK 10.8 nm EAST

RC CONDITION VHF ant on drogue mortar hole side of RV missing

CHUTE/CONE CONDITION Possible tear in upper part of main canopy

CHUTE/CONE BEHAVIOR Chute moved laterally on first pass

WIND DATA

ALT (K)	DIRECTION PRED	DIRECTION ACT	VELOCITY PRED	VELOCITY ACT	ALT (K)	DIRECTION PRED	DIRECTION ACT	VELOCITY PRED	VELOCITY ACT
SCF	360	300	15	05	25	240	310	30	50
2	070	--	04	--	30	250	290	35	55
4	340	--	04	--	35	290	300	70	70
6	270	350	09	05	40	290	300	70	75
8	250	--	10	--	45	300	290	55	50
10	230	170	10	05	50	290	290	40	45
15	210	310	25	15	55				
20	220	270	25	25	60				

RV BATTERY TIME HISTORY

TIME	ACT 83654	83655	83656	83658	83659	83660	83661	83662	83663	83666	83667	83668
MAIN		23.0										
PYRO #1		---	21.1	22.8		23.8		24.4		25.2	25.9	
PYRO #2		5.6	22.0		22.5		23.1	24.2	25.2			25.8
TIME	83673	83675	83676	83678	83679	83681	83707	83780				
MAIN			23.5	24.6	25.2	25.6	25.8	25.8				
PYRO #1		26.6					27.3	27.6				
PYRO #2	26.3	26.9					27.0	27.3				

SV RATES BEFORE & AFTER SEP (SV TLM)

	TIME	PITCH RATE PGR °/sec	ROLL RATE RGR °/sec	YAW RATE YGR °/sec
	84000	-.07	0.0	0.0
SEP	84001	-0.069	0.0	0.0
	84002	+1.4	+0.04	+0.02

MISC DATA

Payload Temp before SEP, Rn06 67 °F

Payload Temp, Max REENTRY, TB02 69 °F

Chute Press before PREP 2, P711 .94 PSI

Supply Press before PREP 2, P113 .70 PSI

BETA ANGLE of Recovery Rev. -1.3 °

PITCH ANGLE

BASIC STUDY

Θ rvs 126.58 °

$\Delta\Theta$1 1.72 °

Ωy 1.06 °/sec

$\Delta\Theta$2 .073 °

Θsv -38.227 °

PITCH (CMD MSG) -38.211 °

Θ sy (PDNN-SV TLM) -37.4 °

Θ ON UPDATED TEAPOT -126.564 °

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RV 4 RECOVERY DATA

RV MASS PROPERTIES

	BASIC STUDY	UPDATED TEAPOT	TEAPOT EVALUATION	ACTUAL POST FLT
TU-A	185.3 lb	185.3 lb	185.3 lb	184.6 lb
TU-B	186.2 lb	186.2 lb	186.2 lb	185.4 lb
TOTAL	371.5 lb	371.5 lb	371.5 lb	370.0 lb
SEP WGT	1449.37 lb	1449.37 lb	1449.37 lb	UPDATED TEAPOT
RETRO WGT	1447.68 lb	1447.68 lb	1447.68 lb	% UNBAL 0.39
ENTRY WGT	1256.87 lb	1256.87 lb	1256.87 lb	% FULL 80.76
AIR RECOV WGT	1047.94 lb	1047.94 lb	1047.94 lb	(100% = 460 lb)

SV MASS PROPERTIES - AFTER SEP (FROM BASIC STUDY)

SV WEIGHT	12443.5 lb	PITCH INERTIA (Iy)	84082.2 SLUG-FT^2
CG FROM STA 2060 (Xr)	137.6 in	ROLL INERTIA (Ix)	4979.3 SLUG-FT^2
CG FROM LONG AXIS (Y)	0.48 in	YAW INERTIA (Iz)	85802.6 SLUG-FT^2

'DORBEL EPHEMERIS

REV OF SEP 1656	BASIC STUDY	UPDATED TEAPOT	TEAPOT EVALUATION
PREDICTED FROM REV	1646	1654	N/A
APOGEE	153.790 nm	153.651 nm	153.663 nm
PERIGEE	90.160 nm	90.088 nm	90.221 nm
ARG OF PERIGEE	130.325 °	130.474 °	130.212 °
INCLINATION	96.827 °	96.827 °	96.827 °
TRUE ANOMALY AT RETRO	354.23 °	354.1 °	354.36 °
HEATSHIELD JETT ALT	49980.19 FT	49940.45 FT	49971.40 FT

ENTRY PARAMETERS FROM TEAPOT EVALUATION RUN

	SEPARATION	RETRO	REENTRY	DROGUE DEPLOY
SYSTEMS TIME (sec)	84001.6	84127.0	84301.86	84622.17
ALTITUDE (FT)	569654.56	555207.66	400000	65117.15
LATITUDE (°N)	63.097	54.712	43.183	25.503
LONGITUDE (°W)	150.34	154.77	158.84	163.07
INERTIAL AZIMUTH (°)	195.25	191.89		
INERT FLT PATH ANGLE (°)	-0.1358	-0.0567		
INERT VELOCITY (FT/SEC)	25713.69	25725.15	25511.06	
LOCAL AZIMUTH (°)			191.86	190.69
LOCAL FLT PATH ANGLE (°)			-2.2347	-31.1735
LOCAL VELOCITY (FT/SEC)				1427.39
ANGLE OF ATTACK (°)			103.97	
MACH NUMBER				1.47
DYN PRESS (PSF)				179.986

CORE PINS SHEARED (FROM REBOUND TWX) A: YES X NO ___, B: YES X NO ___.

BFE VECTOR, Parameters from a SYS Time near the ascending node of the Recovery Rev.

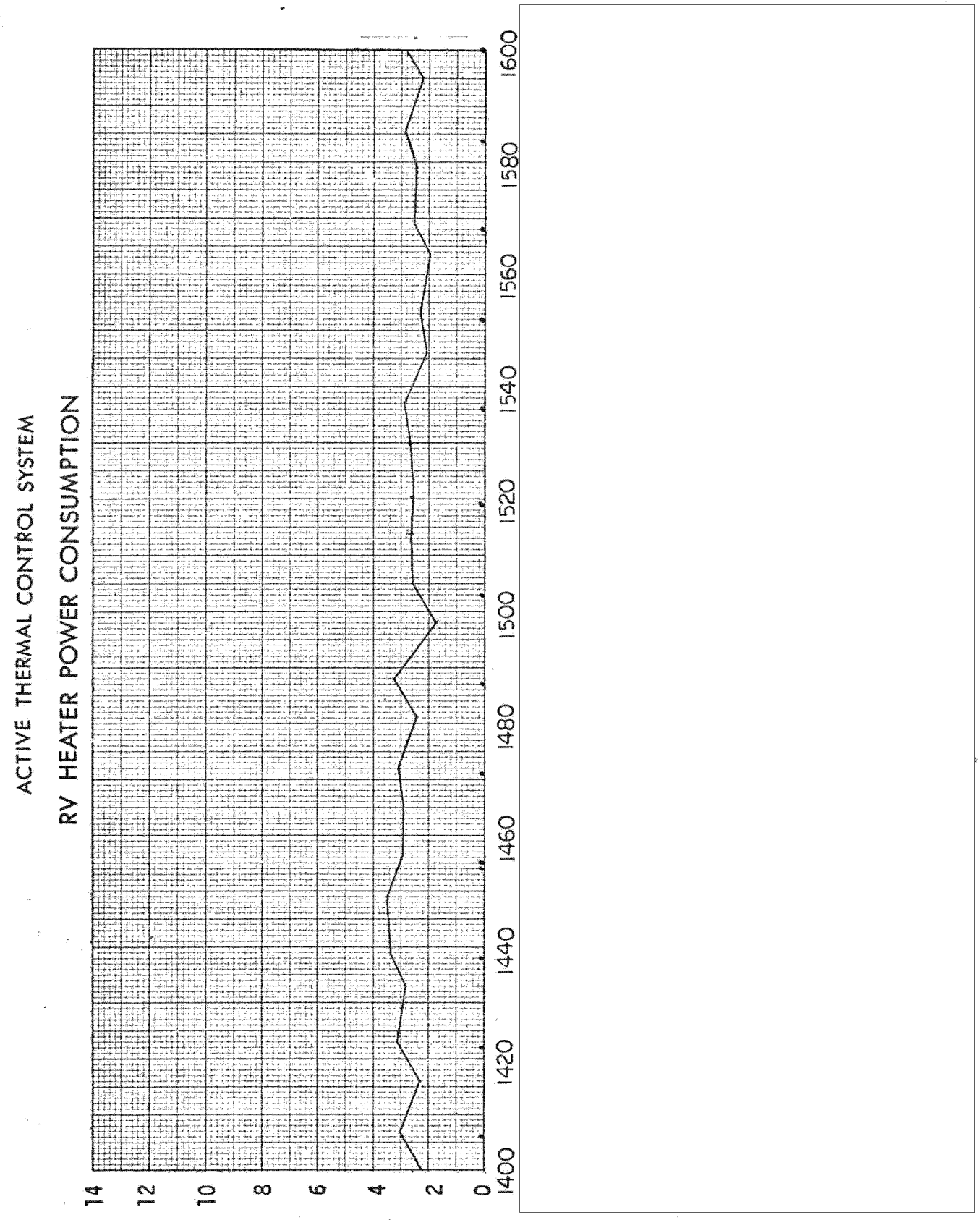
SYS TIME	82289 sec	DECLINATION (MDAC = GEOCENTRIC LAT)	0.0019 °
LONGITUDE	23.1245 °	INERTIAL GEOCENTRIC FLT PATH ANGLE	-0.3803 °
ALTITUDE	138.9886 nm	INERTIAL GEOCENTRIC AZIMUTH	353.173 °
		INERTIAL VELOCITY	25355.79 FT/SEC
SV C_D A/M (DRAG VALUE AT ASCENDING NODE OF RECOVERY REV)			0.68850 FT^2/SLUG

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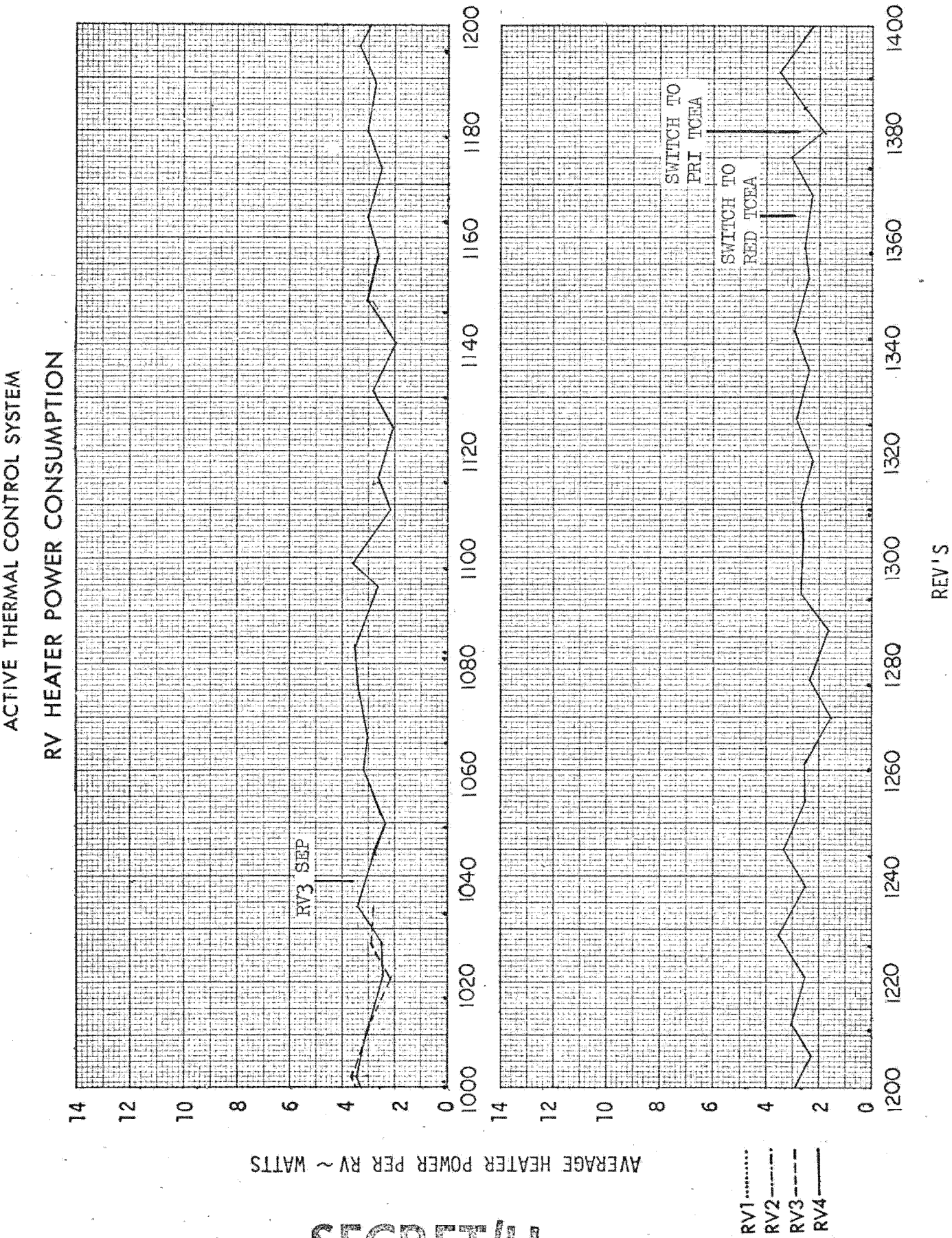


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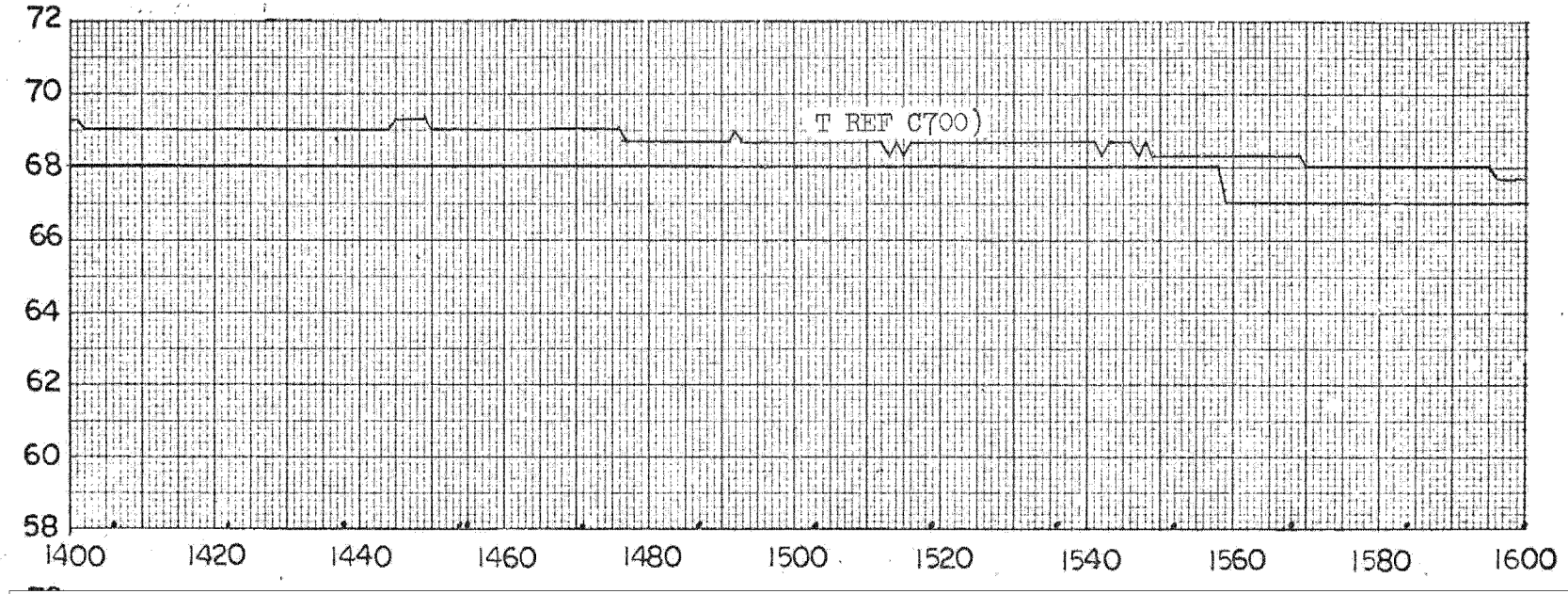
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ACTIVE THERMAL CONTROL SYSTEM

RV PAYLOAD CONTAINER & REFERENCE TEMPERATURES



TEMPERATURE ~ °F

RV1 .....
RV2 -.-.-
RV3 - - - -
RV4 ——

REV NUMBER

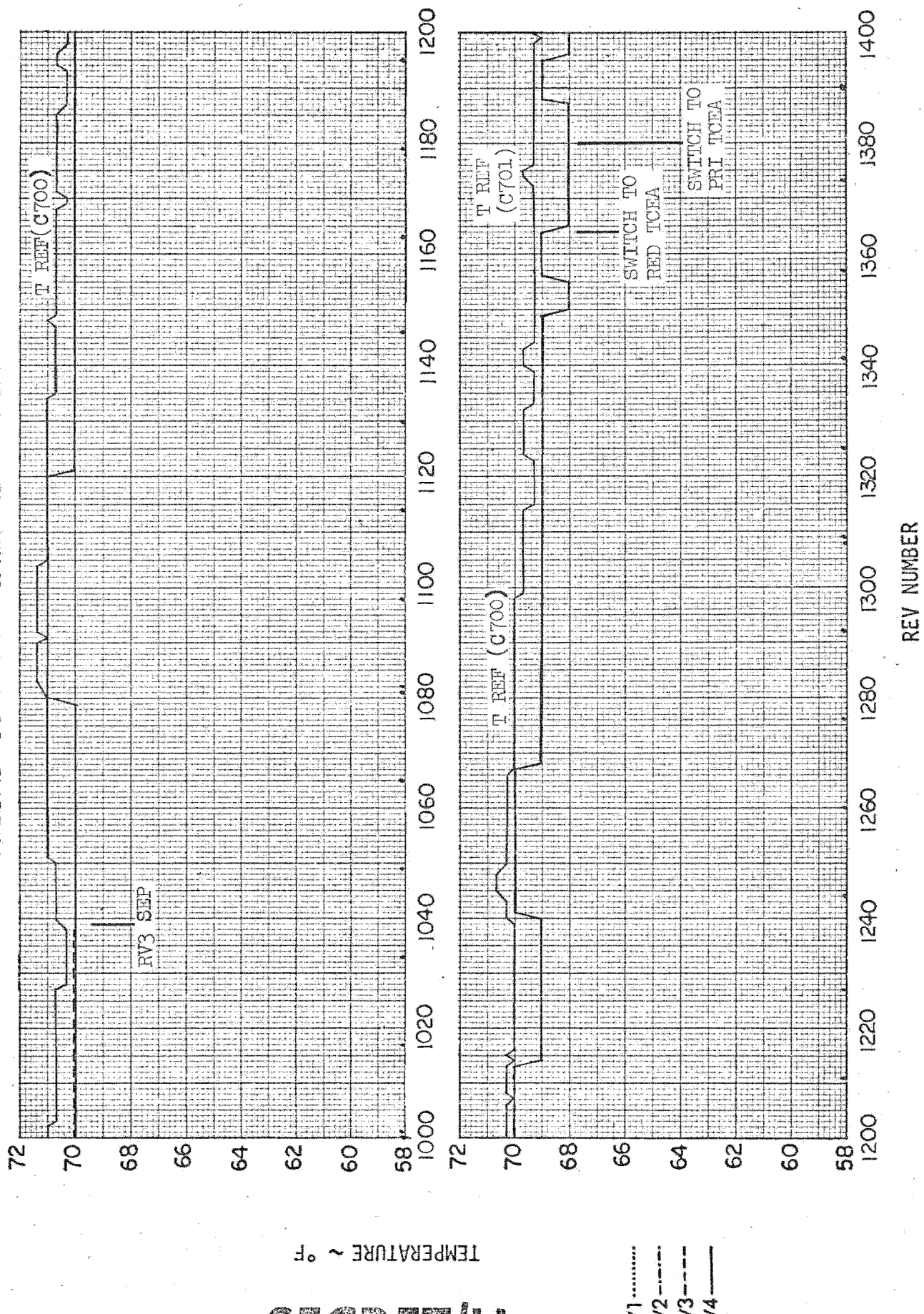
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ACTIVE THERMAL CONTROL SYSTEM
RV PAYLOAD CONTAINER & REFERENCE TEMPERATURES



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6.5 SATELLITE CONTROL FACILITY PERFORMANCE

6.5.1 Orbit Determination and Prediction

6.5.1.1 Orbit Determination

Table 6.5.1 shows a summary of the orbital conditions computed from each tracking reduction from RV-3 recovery to RV-4 recovery on Rev. 1656. Significant events affecting the orbit included an orbit adjust every three days. The events during the RV-4 segment were:

1. Positive orbit adjust on Rev. 1052.
2. Positive orbit adjust on Rev. 1100.
3. Positive orbit adjust on Rev 1149.
4. Positive orbit adjust on Rev 1197.
5. Positive orbit adjust on Rev 1246 followed by a negative orbit adjust on Rev 1248.
6. Positive orbit adjust on Rev 1295.
7. Positive orbit adjust on Rev 1343.
8. Positive orbit adjust on Rev 1392.
9. Positive orbit adjust on Rev 1440 followed by a negative orbit adjust on Rev 1443 (Note: The SV was not in the correct YAW reverse for the OA and the achieved velocity was only partially effective).
10. Negative orbit adjust on Rev 1459. (NOTE: Required to bring the orbit trace back to nominal).
11. Positive orbit adjust on Rev 1489.
12. Positive orbit adjust on Rev 1538.
13. Positive orbit adjust on Rev 1587.
14. [redacted]
15. Positive orbit adjust on Rev 1635.
16. [redacted]
17. Sun maneuvers on Rev 1650.

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6.5.1.2 Prediction Accuracy

Table 6.5.2 contains a summary of prediction accuracies over ten rev span from each tracking reduction epoch rev. Accuracies are determined by comparing the nodal crossing differences between the Best Fit Ephemeris and the tracking reduction ephemeris predictions. Prediction accuracies were within acceptable limits throughout the RV-4 segment, except over the span from 1439 - 1444. Acceptable ephemeris accuracy was, however, obtained by the generation time of the first payload message of the day.

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SUMMARY

EPOCH REV	ECCENT.	PERIOD DECAY	INTEG. PERIOD	MAX ALTIT.	MIN. ALTIT.	ARG. PERIGEE	DRAG	STABLE/ TUMBLE	COMMENTS
XXXX	.XXXX	.XXXX	XX:XX.X	XXX.XX	XX.XX	XXX.X	.XXXX	XXX/XX	
1041	.0107	.1939	89:09.5	167.57	89.27	147.2	.5444	252/72	
1043	.0107	.2090	89:09.0	167.31	89.25	146.8	.5843	234/66	
1046	.0106	.2053	89:08.5	166.78	89.53	145.6	.5822	239/67	
1050	.0105	.2094	89:07.6	166.43	89.37	144.9	.5837	235/68	OA# 28 Rev 1052
1054	.0083	.2378	88:49.7	150.88	89.07	144.3	.5863	176/51	
1057	.0083	.2495	88:48.8	150.59	88.87	143.3	.6029	168/49	
1059	.0083	.2537	88:48.3	150.31	88.80	142.9	.6073	165/48	
1062	.0082	.2564	88:47.6	149.86	88.87	141.8	.6129	164/47	
1066	.0082	.2540	88:46.5	149.36	88.69	141.0	.5948	165/47	
1070	.0081	.2629	88:45.5	148.77	88.64	140.1	.6087	159/46	
1073	.0081	.2987	88:44.6	148.39	88.39	139.2	.6719	141/41	
1075	.0080	.3041	88:43.9	148.06	88.29	138.7	.6783	139/40	
1078	.0079	.2941	88:43.2	147.54	88.38	137.7	.6554	143/42	
1083	.0079	.2993	88:41.6	146.77	88.13	136.6	.6471	140/41	
1086	.0078	.2938	88:40.8	146.20	88.15	135.8	.6312	142/41	
1089	.0077	.3196	88:39.8	145.77	87.91	134.9	.6614	132/38	
1091	.0077	.3195	88:39.1	145.44	87.80	134.4	.6600	130/38	
1094	.0076	.3116	88:38.4	144.90	87.88	133.4	.6324	136/40	
1099	.0075	.2920	88:36.8	144.1	87.68	132.2	.5855	142/41	OA# 29 Rev 1100
1102	.0092	.2382	88:56.7	156.94	89.12	145.0	.6161	187/54	
1105	.0092	.2456	88:55.9	156.63	88.94	144.2	.6238	181/52	

Table 6.5-1

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SUMMARY

EPOCH REV	ECCENT.	PERIOD DECAY	INTEG. PERIOD	MAX ALTIT.	MIN. ALTIT.	ARG. PERIGEE	DRAG	STABLE/ TUMBLE	COMMENTS
XXXX	.XXXX	.XXXX	XX:XX.X	XXX.XX	XX.XX	XXX.X	.XXXX	XXX/XX	
1107	.0092	.2529	88:55.4	156.42	88.83	143.6	.6348	176/48	
1110	.0091	.2466	88:54.8	155.96	88.94	142.7	.6211	181/52	
1116	.0090	.2427	88:53.3	155.32	88.09	141.3	.5938	183/52	
1118	.0089	.2556	88:52.7	154.84	88.81	140.8	.6277	174/50	
1122	.0089	.2744	88:51.6	154.32	88.57	139.7	.6573	162/47	
1124	.0088	.2741	88:51.0	153.99	88.53	139.3	.6512	162/47	
1127	.0088	.2738	88:50.2	153.49	88.61	138.2	.6500	162/47	
1131	.0087	.2614	88:49.1	153.00	88.42	137.4	.6069	170/49	
1135	.0086	.2677	88:48.1	152.38	88.41	136.4	.6155	166/47	
1138	.0086	.2851	88:47.2	152.01	88.18	135.6	.6408	156/45	
1140	.0086	.2809	88:46.6	151.68	88.13	135.1	.6259	158/46	
1143	.0085	.2758	88:45.9	151.22	88.23	134.0	.6138	161/46	
1148	.0084	.2839	88:44.4	150.46	88.00	133.0	.6145	156/44	OA# 30 Rev 1149
1151	.0091	.2562	88:52.6	155.81	88.63	137.6	.6172	178/51	
1154	.0091	.2659	88:51.8	155.50	88.43	136.8	.6230	173/50	
1156	.0090	.2627	88:51.2	155.24	88.35	136.3	.6134	174/51	
1159	.0090	.2485	88:50.6	154.80	88.48	135.3	.5819	184/54	
1164	.0089	.2603	88:49.2	154.11	88.29	134.3	.5950	175/50	
1167	.0088	.2779	88:48.2	153.54	88.34	133.5	.6324	164/47	
1170	.0088	.2854	88:47.5	153.14	88.15	132.7	.6365	160/46	

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SUMMARY

EPOCH REV	ECCENT.	PERIOD DECAY	INTEG. PERIOD	MAX ALTIT.	MIN. ALTIT.	ARG. PERIGEE	DRAG	STABLE/ TUMBLE	COMMENTS
XXXX	.XXXX	.XXXX	XX:XX.X	XXX.XX	XX.XX	XXX.X	.XXXX	XXX/XX	
1172	.0087	.2857	88:46.9	152.88	88.05	132.1	.6288	160/46	
1175	.0087	.2661	88:46.3	152.40	88.18	131.2	.5877	171/50	
1180	.0087	.2564	88:44.9	151.67	88.09	130.0	.5552	177/51	
1183	.0085	.2617	88:44.2	151.17	88.15	129.2	.5645	173/50	
1186	.0085	.2629	88:43.6	150.93	88.04	128.7	.5601	173/50	
1189	.0084	.2652	88:42.5	150.36	87.88	127.8	.5530	171/50	
1192	.0083	.2685	88:41.8	149.89	87.96	126.7	.5575	169/49	
1196	.0083	.2715	88:40.6	149.29	87.79	125.9	.5511	166/48	OA# 31 Rev 1197
1200	.0095	.2213	88:55.2	159.14	88.75	133.8	.5402	218/64	
1203	.0095	.2275	88:54.6	158.94	88.62	133.2	.5475	212/61	
1205	.0095	.2344	88:53.9	158.58	88:54	132.5	.5578	206/59	
1208	.0094	.2287	88:53.3	158.18	88.66	131.6	.5455	211/61	
1212	.0094	.2297	88:52.3	157.68	88.55	130.8	.5386	210/60	
1216	.0093	.2239	88:51.5	157.18	88.59	129.9	.5226	215/63	
1219	.0093	.2310	88:50.8	156.88	88.46	129.1	.5242	211/01	
1221	.0092	.2313	88:50.3	156.61	88.42	128.6	.5270	208/60	
1224	.0092	.2349	88:49.6	156.19	88.53	127.7	.5362	205/59	
1229	.0091	.2712	88:48.2	155.33	88.41	126.7	.6061	176/51	
1232	.0089	.3459	88:47.1	154.51	88.43	125.9	.7665	137/40	
1235	.0088	.3847	88:45.8	153.86	88.20	125.1	.8281	123/35	
1237	.0088	.3957	88:44.9	153.83	88.08	124.5	.8398	119/34	

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SUMMARY

EPOCH REV	ECCENT.	PERIOD DECAY	INTEG. PERIOD	MAX ALTIT.	MIN. ALTIT.	ARG. PERIGEE	DRAG	STABLE/ TUMBLE	COMMENTS
XXXX	.XXXX	.XXXX	XX:XX.X	XXX.XX	XX.XX	XXX.X	.XXXX	XXX/XX	
1240	.0087	.3703	88:44.0	152.70	88.16	123.6	.7823	126/36	
1245	.0086	.3520	88:42.3	151.70	87.94	122.5	.7206	133/39	OA# 32 Rev 1246
1248	.0086	.2890	88:53.5	152.63	89.23	150.1	.7446	142/41	OA# 33 Rev 1248
1251	.0086	.3396	88:52.5	152.23	88.93	149.5	.8531	120/34	
1253	.0086	.2660	88:52.1	152.05	88.84	149.1	.6620	154/44	
1256	.0085	.2621	88:51.4	151.55	88.96	148.0	.6538	156/44	
1261	.0084	.2618	88:50.0	150.91	88.76	146.8	.6375	157/45	
1265	.0083	.2538	88:49.1	150.33	88.76	145.8	.6135	162/47	
1268	.0083	.2806	88:52.5	149.98	88.53	144.8	.6561	147/42	
1270	.0083	.2786	88:47.6	149.65	88.47	144.4	.6528	147/42	
1273	.0082	.2687	88:46.9	149.19	88.55	143.3	.6293	152/43	
1277	.0081	.2638	88:45.8	148.71	88.34	142.5	.6033	156/45	
1281	.0080	.2560	88:44.9	148.13	88.33	141.5	.5808	160/46	
1284	.0080	.2738	88:44.0	147.80	88.10	140.5	.6055	150/43	
1286	.0080	.2689	88:43.4	147.52	88.02	140.1	.5904	152/43	
1289	.0079	.2697	88:42.7	147.03	88.12	138.9	.5915	152/53	
1293	.0078	.2818	88:41.7	146.45	88.06	138.3	.6110	146/42	OA# 34 Rev 1295
1297	.0088	.2359	88:54.3	154.06	89.25	147.2	.6095	180/52	
1300	.0088	.2515	88:53.4	153.78	89.02	146.3	.6347	151/43	
1302	.0087	.2438	88:52.9	153.49	88.99	145.8	.6126	174/49	
1305	.0087	.2267	88:52.4	153.10	89.12	144.7	.5721	187/54	

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SUMMARY

EPOCH REV	ECCENT.	PERIOD DECAY	INTEG. PERIOD	MAX ALTIT.	MIN. ALTIT.	ARG. PERIGEE	DRAG	STABLE/ TUMBLE	COMMENTS
XXXX	.XXXX	.XXXX	XX:XX.X	XXX.XX	XX.XX	XXX.X	.XXXX	XXX/XX	
1310	.0086	.2322	88:51.2	152.60	88.90	143.7	.5722	183/53	
1313	.0085	.2334	88:50.5	152.17	88.95	142.9	.5733	183/53	
1316	.0085	.2455	88:49.7	151.85	88.78	141.9	.5923	174/51	
1318	.0085	.2507	88:49.1	151.62	88.69	141.4	.5983	170/49	
1321	.0084	.2407	88:48.6	151.20	88.80	140.5	.5757	177/52	
1326	.0083	.2410	88:47.3	150.59	88.66	139.3	.5648	178/51	
1329	.0083	.2529	88:46.6	150.11	88.70	138.44	.5906	169/49	
1332	.0082	.2605	88:45.7	149.79	88.49	137.6	.5954	164/48	
1334	.0082	.2633	88:45.2	149.59	88.37	137.0	.5941	163/47	
1338	.0081	.2538	88:44.3	148.95	88.50	135.7	.5726	169/49	
1343	.0090	.2175	88:53.7	155.42	88.94	141.2	.5432	205/59	OA# 35 Rev 1343
1346	.0089	.2222	88:53.3	155.10	89.04	140.8	.5566	201/58	
1349	.0089	.2396	88:52.5	154.82	88.84	140.0	.5889	186/54	
1351	.0089	.2328	88:52.0	154.56	88.80	139.6	.5678	191/56	
1354	.0088	.2343	88:51.4	154.14	88.92	138.4	.5728	190/55	
1358	.0088	.2373	88:50.3	153.65	88.79	137.7	.5697	188/53	
1361	.0087	.2388	88:49.8	153.27	88.81	136.9	.5712	187/55	
1365	.0086	.2470	88:48.7	152.81	88.61	135.9	.5778	181/52	
1367	.0086	.2461	88:48.1	152.55	88.54	135.4	.5701	182/52	
1370	.0085	.2387	88:47.5	152.13	88.67	134.3	.5541	187/54	
1374	.0085	.2470	88:46.4	151.52	88.60	133.4	.5652	181/52	

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SUMMARY

EPOCH REV	ECCENT.	PERIOD DECAY	INTEG. PERIOD	MAX ALTIT.	MIN. ALTIT.	ARG. PERIGEE	DRAG	STABLE/ TUMBLE	COMMENTS
XXXX	.XXXX	.XXXX	XX:XX.X	XXX.XX	XX.XX	XXX.X	.XXXX	XXX/XX	
1378	.0084	.2492	88:45.5	150.98	88.58	132.5	.5646	179/52	
1381	.0084	.2713	88:44.6	150.64	88.36	131.7	.5985	165/48	
1383	.0083	.2679	88:44.1	150.38	88.27	131.2	.5864	167/49	
1386	.0083	.2537	88:43.5	149.95	88.39	130.2	.5560	176/51	
1391	.0082	.2518	88:42.2	149.29	88.24	129.2	.5395	177/51	OA# 36 Rev. 1392
1394	.0094	.2286	88:54.0	157.83	88.69	134.8	.5536	206/59	
1397	.0093	.2453	88:53.1	157.46	88.56	133.9	.5844	193/56	
1399	.0093	.2462	88:52.6	157.25	88.47	133.4	.5806	192/56	
1402	.0092	.2346	88:52.1	156.83	88.61	132.6	.5554	202/59	
1407	.0092	.2241	88:50.9	156.27	88.49	131.4	.5204	211/61	
1411	.0090	.2547	88:49.9	155.56	88.59	130.4	.5905	185/54	
1414	.0090	.2938	88:48.9	155.10	88.39	129.6	.6623	161/44	
1416	.0090	.2430	88:48.4	154.79	88.42	129.1	.5538	192/56	
1419	.0089	.2622	88:47.7	154.28	88.54	128.0	.5924	179/52	
1423	.0088	.2592	88:46.6	153.74	88.38	127.3	.5732	181/53	
1427	.0087	.2569	88:45.7	153.08	88.45	126.3	.5660	182/53	
1430	.0087	.2807	88:44.8	152.70	88.25	125.6	.5988	168/49	
1432	.0087	.2833	88:44.1	152.34	88.21	125.1	.6047	165/48	
1435	.0086	.2821	88:43.4	151.82	88.30	124.1	.6007	165/48	
1439	.0085	.2858	88:42.1	151.08	88.21	123.2	.5974	162/47	OA# 37 Rev 1440
1443	.0089	.1924	88:59.3	156.93	91.56	144.5	.5917	233/67	OA# 38 Rev 1443

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SUMMARY

EPOCH REV	ECCENT.	PERIOD DECAY	INTEG. PERIOD	MAX ALTIT.	MIN. ALTIT.	ARG. PERIGEE	DRAG	STABLE/ TUMBLE	COMMENTS
XXXX	.XXXX	.XXXX	XX:XX.X	XXX.XX	XX.XX	XXX.X	.XXXX	XXX/XX	
1444	.0088	.2201	88:55.8	154.53	90.01	147.7	.6038	193/56	
1446	.0087	.2117	88:55.3	154.24	90.00	147.1	.5786	201/58	
1448	.0087	.2176	88:54.8	154.05	89.93	146.6	.5894	196/57	
1451	.0086	.2078	88:54.3	153.67	90.07	145.5	.5653	206/60	
1456	.0086	.2156	88:53.2	153.21	89.88	144.4	.5737	198/58	OA# 39 Rev 1459
1460	.0080	.2505	88:47.0	148.13	88.96	146.2	.6062	158/46	
1462	.0080	.2486	88:46.3	147.86	88.78	145.6	.5913	160/46	
1464	.0079	.2618	88:45.7	147.63	88.66	145.0	.6145	152/44	
1467	.0079	.2455	88:45.1	147.20	88.77	144.0	.5775	162/47	
1472	.0078	.2475	88:43.8	146.59	88.59	142.9	.5688	161/47	
1476	.0078	.2557	88:42.9	146.01	88.59	141.7	.5823	156/47	
1478	.0077	.2558	88:42.3	145.83	88.40	141.1	.5724	156/47	
1480	.0077	.2632	88:41.7	145.64	88.27	140.5	.5812	152/44	
1483	.0076	.2606	88:41.1	145.17	88.35	139.6	.5750	153/44	
1490	.0088	.2303	88:53.8	153.77	89.03	147.4	.5855	182/53	OA# 40 Rev 1489
1492	.0087	.2348	88:53.4	153.42	89.12	147.2	.5989	178/52	
1495	.0087	.2617	88:52.6	153.11	88.88	146.3	.6528	161/47	
1497	.0087	.2699	88:51.9	152.80	88.81	145.8	.6669	156/45	
1500	.0086	.2669	88:51.3	152.30	88.92	144.7	.6601	158/46	
1504	.0085	.2615	88:50.1	151.80	88.71	143.9	.6327	161/46	
1508	.0084	.2722	88:49.1	151.14	88.69	142.9	.6523	154/44	

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SUMMARY

EPOCH REV	ECCENT.	PERIOD DECAY	INTEG. PERIOD	MAX ALTIT.	MIN. ALTIT.	ARG. PERIGEE	DRAG	STABLE/ TUMBLE	COMMENTS
XXXX	.XXXX	.XXXX	XX:XX.X	XXX.XX	XX.XX	XXX.X	.XXXX	XXX/XX	
1511	.0084	.3100	88:48.1	150.71	88.45	142.0	.7225	136/40	
1513	.0084	.3151	88:47.4	150.36	88.35	141.5	.7823	133/39	
1516	.0083	.3048	88:46.6	149.80	88.44	140.4	.7035	138/40	
1521	.0082	.3132	88:45.0	149.00	88.17	139.3	.7009	134/39	
1524	.0081	.3124	88:44.1	148.37	88.20	138.5	.6953	134/39	
1527	.0080	.3302	88:43.1	147.83	88.04	137.6	.7151	127/37	
1529	.0080	.3283	88:42.4	147.49	87.92	137.1	.7064	127/37	
1532	.0079	.3160	88:45.9	146.91	88.01	136.1	.6787	132/38	
1537	.0078	.3185	88:39.9	146.05	87.77	135.0	.6632	130/38	OA# 41 Rev 1538
1540	.0091	.2641	88:55.5	155.92	88.99	145.0	.6734	165/48	
1543	.0091	.2775	88:54.5	155.53	88.82	144.1	.6880	159/46	
1545	.0090	.2818	88:54.0	155.28	88.71	143.5	.6968	155/45	
1548	.0089	.2727	88:53.3	154.76	88.82	142.6	.6758	160/46	
1553	.0089	.2655	88:51.9	154.10	88.64	141.5	.6430	165/48	
1557	.0088	.2776	88:51.1	153.59	88.66	140.6	.6661	158/46	
1560	.0087	.2816	88:49.9	153.10	88.41	139.5	.6608	155/44	
1562	.0087	.2781	88:49.4	152.76	88.38	139.1	.6484	156/44	
1565	.0086	.2722	88:48.6	152.29	88.46	137.9	.6341	160/46	
1569	.0086	.2668	88:47.5	151.79	88.25	137.2	.6071	164/47	
1573	.0084	.2648	88:46.5	151.04	88.36	136.2	.6016	165/47	
1576	.0086	.2790	88:45.6	150.70	88.14	135.3	.6168	156/45	

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Table 6.5-1

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TRACKING [illegible]UCTION

SUMMARY

EPOCH REV	ECCENT.	PERIOD DECAY	INTEG. PERIOD	MAX ALTIT.	MIN. ALTIT.	ARG. PERIGEE	DRAG	STABLE/ TUMBLE	COMMENTS
XXXX	.XXXX	.XXXX	XX:XX.X	XXX.XX	XX.XX	XXX.X	.XXXX	XXX/XX	
1578	.0084	.2740	88:45.1	150.40	88.08	134.8	.6029	159/46	
1581	.0083	.2709	88:44.4	149.91	88.19	133.8	.5955	161/47	
1585	.0082	.2768	88:43.1	149.27	88.04	132.9	.5961	157/45	OA# 42 Rev 1587
1589	.0092	.2410	88:54.1	156.54	88.75	139.2	.5926	189/55	
1592	.0092	.2638	88:53.2	156.18	88.56	138.4	.6364	172/50	
1595	.0090	.2693	88:52.4	155.59	88.67	137.5	.6495	168/49	
1597	.0090	.2664	88:51.9	155.31	88.70	136.8	.6437	169/49	
1602	.0089	.2815	88:50.4	154.57	88.49	135.7	.6598	161/47	
1605	.0088	.2902	88:49.6	153.96	88.55	134.9	.6781	156/45	
1608	.0088	.3028	88:48.6	153.55	88.34	134.1	.6920	149/43	
1610	.0088	.3054	88:48.0	153.23	88.25	133.5	.6892	148/43	
1613	.0087	.2948	88:47.3	152.69	88.36	132.6	.6661	153/45	
1616	.0086	.2842	88:46.3	152.14	88.35	131.8	.6356	159/46	
1618	.0086	.2839	88:45.8	151.93	88.20	131.5	.6260	158/45	
1621	.0085	.5111	88:44.9	151.19	88.24	130.6	.6134	160/46	
1624	.0085	.2826	88:43.7	150.80	87.98	129.5	.6022	159/45	
1626	.0084	.3031	88:43.0	150.51	87.85	129.0	.6361	148/43	
1629	.0083	.2963	88:42.3	149.97	87.94	128.1	.6211	151/44	
1634	.0082	.2896	88:40.7	149.16	87.77	126.9	.5912	154/44	OA# 43 Rev 1635
1637	.0095	.2463	88:55.4	158.97	88.70	135.1	.6025	193/56	
1641	.0095	.2577	88:54.3	158.50	88.50	134.1	.6161	184/53	

Table 6.5-1

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TRACKING [illegible]UCTION

SUMMARY

EPOCH REV	ECCENT.	PERIOD DECAY	INTEG. PERIOD	MAX ALTIT.	MIN. ALTIT.	ARG. PERIGEE	DRAG	STABLE/ TUMBLE	COMMENTS
XXXX	.XXXX	.XXXX	XX:XX.X	XXX.XX	XX.XX	XXX.X	.XXXX	XXX/XX	
1644	.0093	.2602	88:53.0	157.52	88.48	133.6	.6158	181/52	
1646	.0093	.2635	88:52.5	157.21	88.51	132.8	.6211	179/52	
1650	.0092	.2612	88:51.1	156.34	88.36	132.0	.6065	178/51	
1654	.0091	.2763	88:54.3	155.79	88.33	131.0	.6307	170/49	

Table 6.5-1

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PREDICTION ACCURACY SUMMARY

(BFE - Tracking Reduction Predictions)

Tracking Reduction Epoch Rev	BFE ID NO.	5 Revs After Epoch	10 Revs After Epoch
1041	65	-.339	-1.018
1043	65	-.031	0.024
1046	65/66	-.068	-.785
1050	66	-.694	-2.194
1054	66	-.223	-.656
1057	66	-.150	-.159
1059	66	-.043	.154
1062	66/67	.164	.279
1066	67	-.068	-.831
1070	67	-.490	-1.502
1073	67	.022	.326
1075	67	.269	.892
1078	67/68	.041	.069
1083	68	-.083	-.159
1086	68	-.250	-.507
1089	68	.167	1.138
1091	68	.440	1.872
1094	68/69	.440	2.063
1099	69	.629	1.375
1102	69	-.090	-.236
1105	69	-.070	.018
1107	69	.179	.643
1110	69/70	.112	.048
1116	70	-.593	7.100
1118	70	-.323	-.935
1122	70	-.008	.264
1124	70	.031	.310
1127	70/71	.177	.708
1131	71	-.131	-.505
1135	71	-.192	-.453
1138	71	.153	.501
1140	71	.080	.123
1143	71/72	-.117	.184
1148	72	.381	1.123
1151	72	.069	.344
1154	72	.255	.754
1156	72/73	.282	.584
1159	73	-.106	-.823
1164	73	-.401	-1.028
1167	73	.075	.551
1170	73	.348	1.400
1172	73	.549	1.744
1175	73/74	.246	.606
1180	74	-.143	-.464
1183	74	.037	-.018
1186	74	-.020	-.128
1189	74	-.079	-.331
1192	74/75	-.034	.971
1196	75	.708	1.857
1200	75	-.119	-.348

Table 6.5-2

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PREDICTION ACCURACY SUMMARY

(BFE - Tracking Reduction Predictions)

Tracking Reduction Epoch Rev	BFE ID NO.	5 Revs After Epoch	10 Revs After Epoch
1203	75	-.042	-.174
1205	75	.142	.243
1208	75/76	-.094	.226
1212	76	.183	.499
1216	76	-.018	-.352
1219	76	-.064	-.953
1221	76	-.209	-1.418
1224	76/77	-.602	-3.538
1229	77	-1.523	-5.433
1232	77	-.518	-1.459
1235	77	.188	1.347
1237	77	.690	3.045
1240	77/78	.608	2.916
1245	78	1.054	2.902
1248	78	-.892	-.982
1251	78	1.243	4.684
1253	78	.190	.537
1256	78/79	.124	.435
1261	79	.016	.052
1265	79	-.329	-.780
1268	79	.159	.855
1270	79	.309	1.222
1273	79/80	.229	.916
1277	80	.165	.408
1281	80	-.181	-.553
1284	80	.132	.078
1286	80	-.087	-.731
1289	80/81	-.339	-.249
1293	81	.340	.977
1297	81	-.285	-.202
1300	81	.299	1.308
1302	81	.408	1.217
1305	81/82	-.004	-.098
1310	82	-.090	-.326
1313	82	-.101	-.301
1316	82	.071	.369
1318	82	.297	.886
1321	82/83	.096	-.017
1326	83	-.294	-.838
1329	83	.016	.119
1332	83	.159	.377
1334	83	.250	5.924
1338	83/84	.186	1.053
1343	84	.392	.569
1346	84	-.179	-.560
1349	84	.124	.374
1351	84	-.048	-.178
1354	84/85	-.010	+.003
1358	85	0	-.087
1361	85	-.086	-.118

Table 6.5-2

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PREDICTION ACCURACY SUMMARY

(BFE - Tracking Reduction Predictions)

Tracking Reduction Epoch Rev	BFE ID NO.	5 Revs After Epoch	10 Revs After Epoch	Tracking Reduction Epoch Rev	BFE ID NO.	5 Revs After Epoch	10 Revs After Epoch
1365	85	.106	.325	1444	90	.100	.380
1367	85	.144	.249	1446	90	.040	-.017
1370	85/86	-.134	-.546	1448	90	.155	.321
1374	86	-.087	-.303	1451	90/91	-.108	-.922
1378	86	-.198	-.320	1456	91	-.638	-2.420
1381	86	.298	1.217	1460	91	-.486	-.788
1383	86	.393	1.303	1462	91	.002	.124
1386	86/87	.178	1579	1464	91	.406	1.167
1391	87	.063	-.041	1467	91/92	.110	.120
1394	87	-.151	-.386	1472	92	-.145	-.456
1397	87	.182	.906	1476	92	.139	.133
1399	87	.365	1.276	1478	92	.021	-.266
1402	87/88	.276	.105	1480	92	.073	-.106
1407	88	-.760	-2.595	1483	92/83	-.124	-.102
1411	88	-.542	-1.111	1489	93	.436	.327
1414	88	529	2.038	1492	93	-.383	-1.433
1416	88	-.323	-.780	1495	93	-.106	-.213
1419	88/89	.153	.539	1497	93	.098	.404
1423	80	.048	-.124	1500	93/94	.106	.135
1427	89	-.268	-1.010	1505	94	-.372	-1.559
1430	89	-.080	-.233	1508	94	-.502	-1.661
1432	89	.001	.005	1511	94	.066	.249
1435	89/90	-.047	6.119	1513	94	.266	.671
1439	90	3.414	17.450	1516	94/95	-.051	-.247
1443	90	-17.704	-35.761	1521	95	-.169	-.279

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PREDICTION ACCURACY SUMMARY

(BFE - Tracking Reduction Predictions)

Tracking Reduction Epoch Rev	BFE ID NO.	5 Revs After Epoch	10 Revs After Epoch
1524	95	-.153	-.177
1527	95	.256	.967
1529	95	.330	1.041
1532	95/96	.116	.831
1537	96	.455	1.156
1540	96	-.075	-.205
1543	96	.052	.384
1545	96	.322	1.122
1548	96/97	.257	.609
1553	97	-.201	-.512
1557	97	.120	.530
1560	97	.187	.821
1562	97	.158	.739
1565	97/98	.197	.597
1569	98	-.029	-.058
1573	98	-.062	-.117
1575	98	-.178	.516
1578	98	.069	.114
1581	98/99	-.042	.040
1585	99	.144	.037
1589	99	-.324	-.207
1592	99	-.061	-.302
1595	99/100	.005	-.251
1597	100	-.135	-.726
1602	100	-.263	-.712
1605	100	-.088	0
1608	100	.169	.967
1610	100	.347	1.373
1613	100/101	.332	.685
1616	101	.254	-.198
1618	101	-.419	-2.393
1621	101	.778	3.588
1624	101	-.236	-.506
1626	101	.256	.978
1629	101/102	.366	1.325
1634	102	.469	.007
1637	102	-.086	-.253
1641	102	.056	-.043
1644	102/103	-.023	-.911
1646	103	.056	-.321
1650	103	2.124	4.014
1654	103	.123	-.038

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6.5.1.3 B-Factor

Figure 6.5-1 shows a plot of B-factor for this segment of the mission. The B-factors shown are from the individual tracking reductions and from the BFE for comparison. Maneuvers are indicated as to the rev. of occurrence.

6.5.1.4 Orbit Adjust Summary

Table 6.5-3 reflects a summary of each orbit adjust during this segment. For each orbit adjust orbital conditions are provided which describe the orbit prior to the first orbit adjust. In addition, the predicted velocity change and orbit resulting from each orbit adjust is provided and compared with the actual orbit and velocity change obtained. The actual orbit and velocity change was determined from the Best Fit Ephemeris. All orbit adjusts were close to nominal.

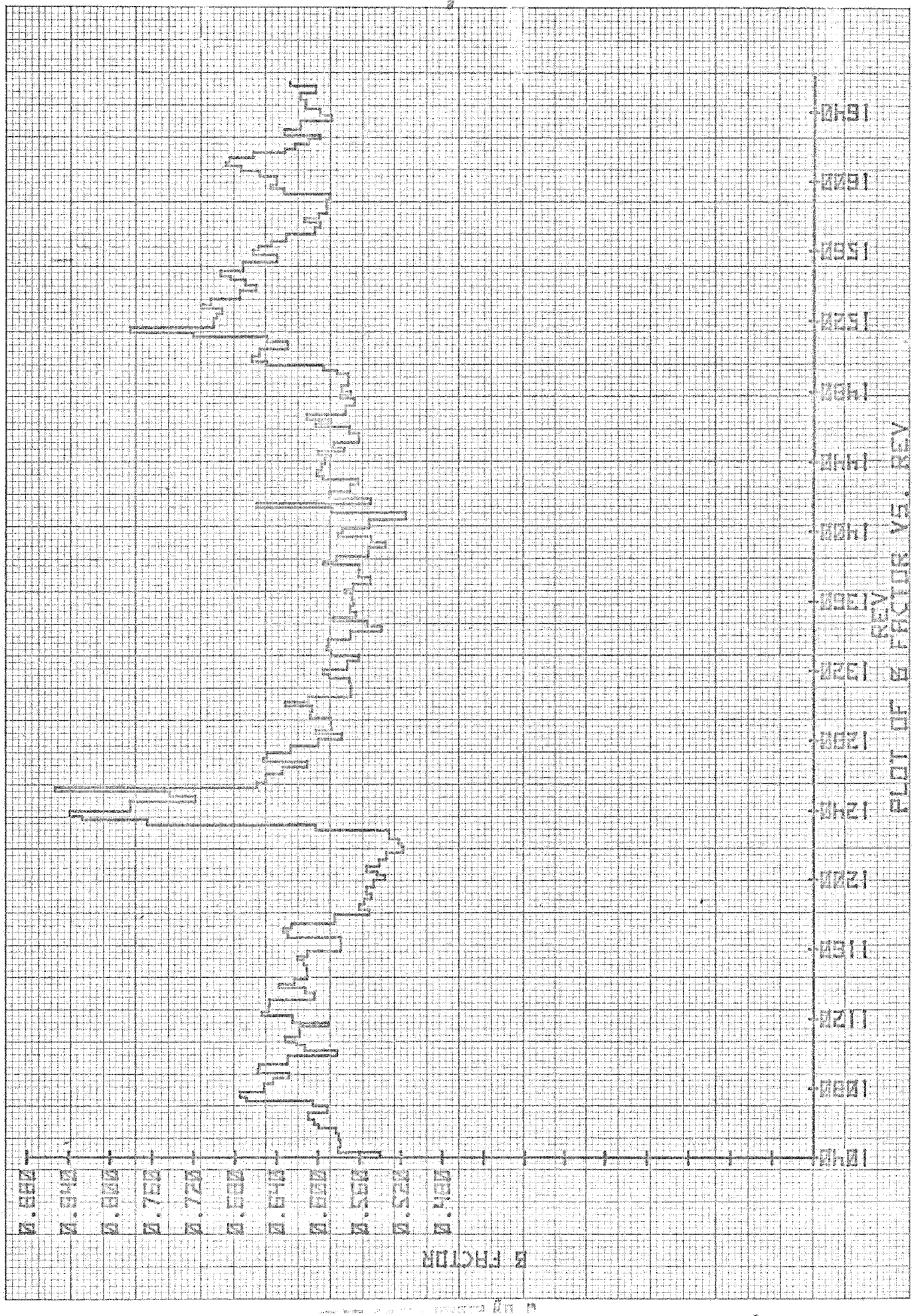
6.5.1.5 Best Fit Ephemeris

Table 6.5-4 shows the orbital conditions for each day of this segment of the mission.

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10 X 10 TO ½ INCH 46 1320
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.

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Figure 6.5-1

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		Period Min:Sec. XX:XX.X	Perigee N.M. XX.XX	Apogee N.M. XXX.XX	Arg of Per. Deg. XXX.XXX	Burn Dur. Sec. XX.X	Delta Velocity XX.XX
OA No. 28	Rev. No. 1052						
Orbit at Rev	1051	89:07.3	90.56	164.86	144.651	---	---
Predicted	1052	88:50.3	90.62	149.50	144.448	---	-26.54
Actual	1052	88:50.0	90.61	149.27	144.514	75.0	-26.97
Delta (A-P)		-.3	-.01	-.23	+.066	---	+.43
OA No. 29	Rev. No. 1100						
Orbit at Rev	1099	88:36.7	89.84	141.95	132.05	---	---
Predicted	1101	88:56.9	90.45	155.41	145.14	---	+32.13
Actual	1101	88:57.1	90.47	155.58	145.23	91.2	+33.07
Delta (A-P)		+.2	+.02	+.17	+.09	---	+.94
OA No. 30	Rev. No. 1149						
Orbit at Rev	1148	88:44.3	90.02	148.46	132.746	---	---
Predicted	1149	88:52.9	90.33	154.27	137.756	---	+13.93
Actual	1149	88:53.1	90.36	154.32	137.837	40.2	+14.10
Delta (A-P)		+.2	+.03	+.05	+.081	---	.17
OA No. 31	Rev. No. 1197						
Orbit at Rev	1197	88:40.5	89.84	147.48	125.781	---	---
Predicted	1198	88:55.5	90.33	157.77	134.225	---	+24.13
Actual	1198	88:55.7	90.45	157.81	134.285	69.0	+24.77
Delta (A-P)		+.2	+.12	+.04	+.060	---	+.64

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Table 6.5-3

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SECRET

		Period Min:Sec. XX:XX.X	Perigee N.M. XX.XX	Apogee N.M. XXX.XX	Arg of Per. Deg. XXX.XXX	Burn Dur. Sec. XX.X	Delta Velocity XX.XX
OA No. 32	Rev. No. 1246						
Orbit at Rev	1246	88:42.2	89.91	150.11	122.354	---	---
Predicted						---	+36.04
Actual						103.2	+36.83
Delta (A-P)						---	+.79
OA No. 33	Rev. No. 1248						
Orbit at Rev		---	---	---	---	---	---
Predicted	1248	88:53.1	90.19	150.90	150.222	---	-17.46
Actual	1248	88:53.6	90.39	151.12	150.439	51.0	-17.69
Delta (A-P)		+.5	+.20	+.22	+.217	---	+ .23
OA No. 34	Rev. No. 1295						
Orbit at Rev	1294	88:41.1	89.79	144.14	137.729	---	---
Predicted	1295	88:54.5	90.50	152.64	147.233	---	+21.48
Actual		88:54.7	90.56	152.68	147.388	62.4	+21.91
Delta (A-P)		+.2	+.06	+.04	+.155	---	+.43
OA No. 35	Rev. No. 1343						
Orbit at Rev	1342	88:43.1	90.36	146.32	134.703	---	---
Predicted	1343	88:53.7	90.65	153.59	141.104	---	+17.01
Actual	1343	88:53.8	90.62	153.67	141.282	50.0	+17.39
Delta (A-P)		+.1	-.03	+.08	+.018	---	+.38

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Table 6.5-3

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		Period Min:Sec. XX:XX.X	Perigee N.M. XX.XX	Apogee N.M. XXX.XX	Arg of Per. Deg. XXX.XXX	Burn Dur. Sec. XX.X	Delta Velocity XX.XX
OA No. 36	Rev. No. 1392						
Orbit at Rev	1391	88:42.1	90.34	147.33	128.966	---	---
Predicted	1392	88:54.3	90.44	156.30	135.021	---	+19.58
Actual	1392	88:54.4	90.44	156.36	135.020	57.4	+19.95
Delta (A-P)		+.1	0	+.06	-.001	---	+.37
OA No. 37	Rev. No. 1440						
Orbit at Rev	1439	88:42.0	90.16	149.43	123.151	---	---
Predicted							+35.35
Actual						103.4	+35.79
Delta (A-P)							+.44
OA No. 38	Rev. No. 1443						
Orbit at Rev		---	---	---	---	---	---
Predicted	1443	88:53.2	90.16	151.02	150.102	---	-16.53
Actual	1443	88:55.9	91.31	152.88	148.066	49.2	
Delta (A-P)		+2.7	+1.15	+1.86	-2.063	---	
OA No. 39	Rev. No. 1459						
Orbit at Rev	1458	88:52.7	91.47	151.04	143.846	---	---
Predicted	1459	88:47.2	90.48	146.42	146.467	---	-8.12
Actual	1459	88:47.0	90.44	146.27	146.551	24.8	-8.69
Delta (A-P)		-.2	-.04	-.15	-.084	---	+.52

Table 6.5-3

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SECRET/II

		Period Min:Sec. XX:XX.X	Perigee N.M. XX.XX	Apogee N.M. XXX.XX	Arg of Per. Deg. XXX.XXX	Burn Dur. Sec. XX.X	Delta Velocity XX.XX
OA No. 40	Rev. No. 1489						
Orbit at Rev	1488	88:39.4	90.05	142.18	138.140	---	---
Predicted	1489	88:53.9	90.32	152.19	147.416	---	+23.07
Actual	1489	88:54.0	90.41	152.16	147.644	68.4	+23.58
Delta (A-P)		+.1	+.09	-.03	+.228	---	+.49
OA No. 41	Rev. No. 1538						
Orbit at Rev	1537	88:39.8	89.80	143.88	134.736	---	---
Predicted	1538	88:55.7	90.37	154.43	145.136	---	+25.56
Actual	1538	88:55.8	90.38	154.57	145.212	76.0	+26.10
Delta (A-P)		+.1	+.01	+.14	+.076	---	+.54
OA No. 42	Rev. No. 1587						
Orbit at Rev	1586	88:42.8	90.01	147.18	132.505	---	---
Predicted	1587	88:54.4	90.36	155.06	139.345	---	+18.61
Actual	1587	88:54.5	90.41	155.04	139.391	55.6	+18.73
Delta (A-P)		+.1	+.05	-.02	+.046	---	+.12
OA No. 43	Rev. No. 1635						
Orbit at Rev	1634	88:40.6	89.83	147.30	126.793	---	---
Predicted	1635	88:55.6	90.33	157.52	135.265	---	+23.99
Actual	1635	88:55.8	90.39	157.54	135.419	71.8	+24.42
Delta (A-P)		+.2	+.06	+.02	+.154	---	+.33

Table 6.5-3

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BEST FIT EPHEMERIS

SUMMARY

DAY	EPOCH REV	ECCENT.	INCL.	INTEG. PERIOD	MAX. ALTITUDE	MIN. ALTITUDE	ARG. PERIGEE	DRAG	REV. SPAN
XX	XXX	.XXXX	XX.XX	XX:XX.X	XXX.XX	XX.XX	XXX.X	.XXXX	XXX - XXX
69	1096	.0075	96.87	88:37.8	144.52	88.01	132.5	.6970	1096 - 1103
								.6184	1103 - 1110
								.6042	1110 -
70	1111	.0090	96.87	88:54.6	155.77	89.01	142.4	.6566	1111 - 1117
								.6702	1117 - 1123
								.6268	1123 -
71	1128	.0087	96.87	88:50.0	153.29	88.69	137.9	.6384	1128 - 1135
								.6239	1135 - 1140
								.6285	1140 -
72	1142	.0084	96.87	88:46.2	151.18	88.39	134.4	.6123	1142 - 1151
								.5996	1151 - 1157
								.6071	1157 -
73	1160	.0089	96.87	88:50.3	154.47	88.71	134.8	.6484	1160 - 1168
								.6059	1168 - 1174
								.5691	1174 -
74	1176	.0086	96.87	88:46.0	152.17	88.37	130.5	.5749	1176 - 1183
								.5705	1183 - 1189
								.5643	1189 -
75	1193	.0083	96.87	88:41.5	149.57	88.15	126.2	.6229	1193 - 1200
								.5504	1200 - 1205
								.5609	1205 -

SECRET/NFD

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SECRET/II

BEST FIT EPHEMERIS

SUMMARY

DAY	EPOCH REV	ECCENT.	INCL.	INTEG. PERIOD	MAX. ALTITUDE	MIN. ALTITUDE	ARG. PERIGEE	DRAG	REV. SPAN
XX	XXX	.XXXX	XX.XX	XX:XX.X	XXX.XX	XX.XX	XXX.X	.XXXX	XXX - XXX
76	1209	.0093	96.87	88:53.1	157.88	88.83	131.3	.5346	1209 - 1217
								.5205	1217 - 1222
								.6172	1222 -
77	1225	.0091	96.87	88:49.5	155.87	88.80	127.2	.8045	1225 - 1233
								.8083	1233 - 1240
								.6667	1240 -
78	1242	.0087	96.87	88:43.4	152.26	88.23	122.8	.7397	1242 - 1250
								.6397	1250 - 1255
								.6424	1255 -
79	1258	.0084	96.86	88:50.8	151.10	89.09	147.4	.6425	1258 - 1265
								.6346	1265 - 1272
								.5908	1272 -
80	1274	.0081	96.86	88:46.7	148.96	88.62	143.0	.5977	1274 - 1281
								.5960	1281 - 1288
								.6461	1288 -
81	1290	.0078	96.86	88:42.5	146.68	88.27	138.8	.6596	1290 - 1299
								.5742	1299 - 1305
								.5726	1305 -
82	1306	.0086	96.86	88:52.1	152.83	89.30	144.3	.5920	1306 - 1315
								.5838	1315 - 1322
								.5658	1322 -

Table 6.5-4

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BEST FIT EPHEMERIS

SUMMARY

DAY	EPOCH REV	ECCENT.	INCL.	INTEG. PERIOD	MAX. ALTITUDE	MIN. ALTITUDE	ARG. PERIGEE	DRAG	REV. SPAN
XX	XXX	.XXXX	XX.XX	XX:XX.X	XXX.XX	XX.XX	XXX.X	.XXXX	XXX - XXX
83	1323	.0083	96.86	88:48.1	150.83	88.95	139.6	.6000	1323 - 1331
								.5807	1331 - 1338
								.5463	1338 -
84	1339	.0081	96.86	88:44.0	148.72	88.62	135.4	.5953	1339 - 1347
								.5770	1347 - 1354
								.5731	1354 -
85	1355	.0087	96.86	88:55.4	153.86	89.08	138.1	.5893	1356 - 1363
								.5670	1363 - 1370
								.5739	1370 -
86	1371	.0085	96.86	88:47.3	151.83	88.86	133.9	.5919	1372 - 1379
								.5638	1379 - 1386
								.5390	1386 -
87	1387	.0082	96.86	88:43.3	149.59	88.72	129.6	.6106	1387 - 1395
								.5753	1395 - 1401
								.5273	1401 -
88	1402	.0091	96.86	88:51.7	156.33	88.93	131.9	.5500	1404 - 1411
								.5900	1411 - 1418
								.5920	1418 -
89	1420	.0088	96.86	88:47.4	154.05	88.63	127.8	.5827	1420 - 1429
								.6116	1429 - 1435
								.6036	1435 -

Table 6.5-4

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BEST FIT EPHEMERIS

SUMMARY

DAY	EPOCH REV	ECCENT.	INCL.	INTEG. PERIOD	MAX. ALTITUDE	MIN. ALTITUDE	ARG. PERIGEE	DRAG	REV. SPAN
XX	XXX	.XXXX	XX.XX	XX:XX.X	XXX.XX	XX.XX	XXX.X	.XXXX	XXX - XXX
90	1435	.0084	96.85	88:43.4	151.17	88.97	123.8	.5967	1435 - 1447
								.5843	1447 - 1451
								.5836	1451 -
91	1452	.0085	96.84	88:54.0	153.42	90.26	144.8	.5620	1452 - 1459
								.5894	1459 - 1466
								.5786	1466 -
92	1468	.0078	96.84	88:44.9	146.96	88.95	143.2	.5801	1468 - 1475
								.5860	1475 - 1483
								.6013	1483 -
93	1484	.0075	96.83	88:40.8	144.83	88.56	139.1	.6638	1484 - 1492
								.6663	1492 - 1500
								.6402	1500 -
94	1501	.0085	96.84	88:51.0	151.99	89.08	144.5	.6837	1501 - 1507
								.7173	1507 - 1515
								.7164	1515 -
95	1517	.0082	96.83	88:46.3	149.40	88.66	140.0	.7243	1517 - 1524
								.6934	1524 - 1531
								.6712	1531 -
96	1533	.0078	96.83	88:41.3	146.56	88.26	135.4	.7392	1533 - 1539
								.6868	1539 - 1548
								.6376	1548 -

Table 6.5-4

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BEST FIT EPHEMERIS

SUMMARY

DAY	EPOCH REV	ECCENT.	INCL.	INTEG. PERIOD	MAX. ALTITUDE	MIN. ALTITUDE	ARG. PERIGEE	DRAG	REV. SPAN
XX	XXX	.XXXX	XX.XX	XX:XX.X	XXX.XX	XX.XX	XXX.X	.XXXX	XXX - XXX
97	1548	.0089	96.83	88:57.5	154.68	88.96	142.5	.6702	1548 - 1558
								.6465	1558 - 1565
								.6033	1565 -
98	1566	.0085	96.83	88:48.3	151.98	88.63	137.6	.6239	1566 - 1574
								.6017	1574 - 1580
								.6037	1580 -
99	1582	.0082	96.83	88:44.0	149.50	88.42	133.4	.5900	1582 - 1589
								.6480	1589 - 1596
								.6627	1596 -
100	1598	.0090	92.83	88:51.6	155.05	88.79	136.4	.6910	1598 - 1606
								.6734	1606 - 1612
								.6254	1612 -
101	1614	.0086	92.83	88:46.9	152.49	88.47	131.9	.6000	1614 - 1621
								3.6812	1621 - 1622
								.6352	1622 - 1628
								.5939	1628 -
102	1630	.0083	96.82	88:42.0	149.73	88.02	127.7	.6244	1630 - 1636
								.6183	1636 - 1642
								.6208	1642 -
103	1644	.0093	96.83	88:53.0	157.49	88.53	133.5	.6199	1644 - 1650
								.6885	1650 - 1656
								.7539	1656 -

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Table 6.5-4

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6.5.2 Telemetry and Mode Processing

No SV-7 mode effort was required during the segment.

6.5.3 Command Message Planning and Generation

The major command planning involved modifications to existing FPA's and sequences as a result of operating the SV with the degraded thrust levels of RCS-1 thrusters. Development of new sequences and FPA's for Solo and SFO tests including a substantial effort on SSP was successfully completed.

6.5.4 SCF Support

Acceptable SCF support was maintained during the segment although numerous POGO and KODI SGLS transmitter and RTS computer failures required profiling around the stations. The major impacts were:

a. Loss of tape recorder readout data.
b. 1436 KODI SGLS failure prevented loading of a payload message.
c. Delayed MPR runs from inability to reproduce the tape recorder
d. The requirement for generating additional messages to bring up alternate RTS's.

6.5.5 Miscellaneous

A substantial effort on the part of the Field Test Force, primarily CG, and the T.A. Staff in support of SV-8 development and readiness was expended during this period in parallel with mission support. These activities included:

a. SV-8 Development Exercise (11 to 16 Feb).
b. SV-8 Mode development
c. SV-8 Orbit case study and validation.

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SECTION 6.6
PROGRAM COMMAND SOFTWARE PERFORMANCE
(Prepared by HTC)

6.6.1 Command Message Summary

This section summarizes pertinent command message data from Mission 1207, IRON 6630. The command messages discussed cover the period from RV4 initiation (Rev. 1041 load) to the RV4 recovery message (Rev 1652 load).

Three hundred forty-eight command messages were received by the Technical Advisor (TA) staff. Three hundred thirty-nine were accepted and nine were rejected. The messages which were rejected were altered or regenerated and subsequently loaded. The reasons for rejection of the nine messages are summarized below:

Rev No. and Load Station	Reason for Rejection
1177 KODI	This message was rejected by DOX because there was no change in payload activity.
1203 POGO	The slit cards for Rev 1203 were omitted.
1221 POGO	DOX rejected the message in order to add a MOP.
1312 BOSS	The message was regenerated to add a station contact.
1366 POGO	The message was altered to move an FT- command two seconds later in time.
1394 POGO	An additional FMT D command was required in the message.
1456 GUAM	The MFA and I- commands had to be added for the load station.
1650 GUAM	Improper command sequencing due to error in FPA input.
1650 GUAM	The message was altered but still had problems with proper command sequencing.

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Three hundred thirty-one messages were loaded and seventeen were not for the reasons stated below:

1. The nine rejected messages were not loaded.
2. Message not loaded at POGO due to station outage.
3. Message not loaded at KODI due to station outage.
4. Five contingency tumbling capture messages not required.
5. RV4 contingency abort message not required.

A one-rev load cycle was employed while the vehicle was over the area of interest. The "add on" message generation and loading philosophy was in effect. This resulted in the generation of two hundred sixty-six "add on" messages.

Summary

Total RV4 messages	-	348
Messages rejected	-	9
Total messages accepted	-	339
Messages not required	-	8
Total messages accepted and loaded	-	331

6.6.2 'TUNITY Software Problems

The Flight 7 'TUNITY software problems itemized below pertain only to the period for RV3 recovery through RV4 recovery. They have been grouped into the following categories to demonstrate their impact on the flight. The classification of these software problems will be determined by the Configuration Control Board.

Category	No. of SPRs	Comments
Flight Critical	3 (SPRs MD2-6348, 6351 & 6352)	Software corrections were made and incorporated during the flight period.
Non-Flight Critical (Requiring Work-Around)	0	Work-around procedures were developed and implemented.

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Category	No. of SPRs	Comments
Non-Flight Critical (Minor)	5	Work-around procedures were not required.
Product Improvement or New Requirements	0	To be considered during future development.
Documentation Error	1	MS-4 and/or MS-7 affected.

Itemized Software Problems

SPR MD2-6347 ('TPURR)

- Problem Description: 'TPURR is looping in the new code at the tag "REPEAT" of the CHGPUR PURGE.
- Solution or Work-Around: None.
- Operational Impact: There was no operational impact because this SPR was discovered during integration testing and was not yet delivered for operational use.
- Comment: It is a software problem and it should be fixed prior to its incorporation into the operational software.

SPR MD2-6348 ('TOREP) -- FLIGHT CRITICAL --

- Problem Description: 'TOREP calculates a coefficient of C in the clock variance parameters. These equations in 'TOREP are supposed to model the AOES routine 'SCLOCK. However, the 'SCLOCK routine provides for a 1 second change in the coefficient of C at the year end. The 'TOREP model does not look at the proper discontinuities to achieve this 1 second shift.
- Solution or Work-Around: The problem was determined to be flight critical by the SWFTED. A change was made to 'TOREP correcting the problem and was incorporated on the flight AUX Master.
- Operational Impact: The proper coefficient C had to be input manually to MPR output. With the implementation of the new mod of 'TOREP the problem is solved.
- Comment: It should be noted that this problem exists in MOD3 also. The MOD3 software should be fixed prior to the support of SV-8.

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SPR MD2-6349 ('TLIST)

- Problem Description: 'TLIST calculates a coefficient of C in the clock variance parameters. The equations in 'TLIST are supposed to model the AOES Routine 'SCLOCK. However, the 'SCLOCK Routine has a provision for modifying the coefficient of C by 1 second at year end which is not modeled by 'TLIST.

- Solution or Work-Around: None.

- Operational Impact: There was no operational impact because the coefficient C in 'TLIST is used only as a convenience in the output.

- Comment: It is a software problem and should be fixed prior to the support of SV-8.

SPR MD2-6350 ('THISTLE)

- Problem Description: Message 502 was constructed as a pure add-on to message 500 and was to be loaded at 1200 POGO. Between the time the message was built and the time it was loaded, the vehicle was erased to station contacts. When the message was updated, the computer listing showed the commands to be located in their original position; i.e., as far as the software was concerned there was a 200 word gap between the last contact command and the first command in message 502, even though the commands were correctly loaded into the vehicle right after the contact commands and the XPR's reflected the erasures were input to the update.

- Solution or Work-Around: None.

- Operational Impact: There is no operational impact, just confusion to the user.

- Comment: SOST is currently investigating this SPR to determine if it is a software problem.

SPR MD2-6351 ('TFUNCHK) -- FLIGHT CRITICAL --

- Problem Description: On REV 1222 a MOP was input that resulted in four frames being taken on the A side but only one frame on the B side, due to the placement of the FT- command.

- Solution or Work-Around: To insure that the software assembles the proper number of frames for both sides, the MOP card input must have a delta time equal to five frames. The problem was determined to be Flight Critical by the SWFTFD. A change was made to 'TFUNCHK to change the calculation of frames to flag this problem and it was incorporated on the flight AUX Master.

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SPR MD2-6351 (Continued)

- Operational Impact: The MOP resulted in fewer frames than desired. With the implementation of the work-around procedure and the software modification the problem has been solved.

- Comment: This same problem exists in MOD3 and it should be fixed prior to the support of SV-8.

SPR MD2-6352 ('THISUM) -- FLIGHT CRITICAL --

- Problem Description: Today's CHG run aborted with an 'SDAHA error while attempting to read a non-existent record zero.

- Solution or Work-Around: The problem was determined to be flight critical by the SWFTFD. A change was made to 'THISUM correcting the problem and it was incorporated on the Flight AUX Master.

- Operational Impact: CHG had to be delayed while in 'SDBG was run to allow CHG to process. With the implementation of the new MOD of 'THISUM, the problem has been solved.

- Comment: The same problem exists in the MOD3 software package and it should be fixed prior to the support of SV-8.

SPR MD2-6353 ('TUMP)

- Problem Description: 'TUMP assembled a manual operation which had four frames on the A-side, but was not of sufficient length to guarantee a proper B-side execution. 'TUNITY does not pad manual operations in order to guarantee a minimum length.

- Solution or Work-Around: The manual input must have a DT of at least five frames.

- Operational Impact: Less frames were taken than were desired.

- Comment: Both the MS-4 and the MS-7 should be updated to include the above mentioned limitation.

SPR MD2-6354 ('TFUNCHK)

- Problem Description: Message 220 in the 1448 POGO load printed the message, "FMSG06----ACS 1 EXECUTE COMMANDED WITHOUT CURRENT STATUS OF ACS 1 ENA", when in fact ACS 1 was enabled.

- Solution or Work-Around: None.

- Operational Impact: There was no operational impact, just confusion to the user.

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SPR MD2-6354 (Continued)

- Comment: This check should not be used in this case. The same function cannot be checked for two states at the same time.

SPR MD2-6355 ('TFUNCHK)

- Problem Description: In the tumbling capture message for 1447 POGO the following message was output: "FMSG06----ACS 2 EXECUTE COMMANDED WITHOUT CURRENT STATUS OF ACS 2 ENA", when ACS 2 was in fact enabled.
- Solution or Work-Around: None.
- Operational Impact: There was no operational impact, just confusion to the user.
- Comment: This check should not be used in this case. The same function cannot be checked for two states at the same time.

6.6.3 Hardware/Software Interface Changes

For IRON 6630, twenty-four change requests were processed from RV-3 recovery day through the RV-4 recovery message (as shown in Table 6.6.3-1).

These requests were implemented via requests SV7-210 through SV7-233 and have been incorporated into the flight data base and hardware/software interface documentation.

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Table 6.6.3-1 Summary of Hardware/Software Interface Changes

Request No.	Identification	Effectivity
SV7-210 & 211	These requests add new sequences 450 and 451 which provide the capability to command the satellite vehicle to roll negative and positive.	SV-7 only
SV7-212 thru 217	These requests add new sequences for use during SSP operation. These sequences are required for the following vehicle maneuvers: Seq. 490 - Pitchdown (negative) Seq. 491 - Pitchup (positive) Seq. 492 - Yaw Left (negative) Seq. 493 - Yaw Right (positive) Seq. 494 - Roll Left (negative) Seq. 495 - Roll Right (positive)	SV-7 only
SV7-218	This request modifies Sequence 208 (Constant Velocity Test) to provide DT for load orders 1 thru 8.	SV-7 only
SV7-219	This request modifies Sequence 34 (Yaw Around to Fly Reverse) to allow longer time to achieve yaw rates.	SV-7 only
SV7-220	This request modifies Sequence 35 (Yaw Around to Fly Forward) to allow longer time to achieve yaw rates.	SV-7 only
SV7-221	This request modifies MAC 32 to add sequence 96 and change end time of first Sequence 90.	SV-7 only
SV7-222	This request modifies Sequence 283 (Yaw Mini Maneuver) to allow longer time to achieve yaw rates.	SV-7 only
SV7-223	This request is an additional change to MAC 32 to zero values in 'CWOTAB entries 0 thru 5.	SV-7 only
SV7-224	This request modifies Sequence 147 to configure O^2A^2 for IR operation.	SV-7 only
SV7-225	This request deletes Sequence 96 from MAC 32.	SV-7 only
SV7-226	This request adds new Sequence 452 (TR1 ON/OFF Without Format Select) for ACS-1 solo test.	SV-7 only

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Table 6.6.3-1 Summary of Hardware/Software Interface Changes (Continued)

Request No.	Identification	Effectivity
SV7-227	This request adds new Sequence 453 (TR2 ON/OFF Without Format Select) for ACS-1 solo test.	SV-7 only
SV7-228	This request adds new Sequence 454 (Station Contact Without PCM Off) for ACS-1 solo test.	SV-7 only
SV7-229	This request modifies Sequence 180 (Constant Velocity A-Side) by providing a DT for some of the commands.	SV-7 only
SV7-230	This request modifies Sequence 181 (Constant Velocity B-Side) by providing a DT for some of the commands.	SV-7 only
SV7-231	This request adds new Sequence 460 (Solar Array Dynamic Test) for solo testing.	SV-7 only
SV7-232	This request adds new Sequence 461 (Return to Geocentric Attitude Control While Flying Nose Aft) for solo testing.	SV-7 only
SV7-233	This request adds new Sequence 462 (Fly Inertial While Nose Aft) for solo testing.	SV-7 only

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6.7 SATELLITE VEHICLE AND AUXILIARY PAYLOAD PERFORMANCE (Prepared by SBAC)

6.7.1 EDAP Performance

The main power system supported an average bus load of 20.10 ampere-hours per rev during this segment. Battery temperatures were in the nominal range, and the battery heaters continued to cycle normally.

The loss of one and a half panels of the solar array had no appreciable effect on the electrical system. The solar array output (with no K-2's) of 21.46 A-H was sufficient to maintain the applied loads throughout this segment.

The primary battery voltages remained at the monoxide level throughout the segment.

6.7.2 TT&C Performance

The T&T system demonstrated satisfactory performance during this segment. SGLS 2 was checked on Revs 1054, 1151, 1265, 1378, 1477, 1492, and 1606, and continued to operate in a satisfactory manner.

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6.7.3 Attitude Control System (ACS)/Reaction Control System (RCS) Performance

The primary ACS and RCS were used for vehicle attitude control until Rev 1447 when the control was transfered to the redundant ACS and RCS. All the systems performed within specifications with normal control. Due to a combination of low feed pressure and normal thruster degradation, the RCS 1 performance was reduced to a marginal level. The thrust level for Primary Thruster #1 was computed to be 0.97 pound force prior to the transfer.

On Rev 1442 in preparation for a Negative Orbit Adjust, it was decided to do the yaw maneuver via gyro compassing. Insufficient time was allowed for the completion of the maneuver. The Horizon Sensors inhibited and the vehicle was unable to stablize prior to the Orbit Adjust. Control had been restablished and the vehicle was normal at the next station contact.

RCS propellant consumption for Segment 4 was 104.3 pounds.

6.7.4 Orbit Adjust System (OAS) Performance

The OAS functional normally for all orbit adjusts throughout Segment 4. A total of 16 engine firings occurred with 12 positive and 4 negative (2 of which could be classified as hot restarts). The total propellant usage for these firings was 685.8 pounds.

Table 6.7-1 is a summary of the orbit adjusts performed during Segment 4.

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TABLE 6.7-1

ORBIT ADJUST SUMMARY (SEGMENT 4)

OA NO/TYPE	28/Neg	29/Pos	30/Pos	31/Pos	32/Pos	33/Neg	34/Pos	35/Pos
OPS DAY	65	68	71	74	77	77	80	83
DELTA VEL (PRED)-FPS	26.6	32.3	14.0	24.2	36.2	17.6	21.6	17.1
DELTA VEL (ACT)-FPS	27.0	33.1	14.1	24.8	36.8	17.7	21.9	17.4
BURN DURATION-SEC	75.0	91.2	40.2	69.0	103.2	51.0	62.4	50.0
PROPELLANT REQ-LBS	51.7	62.4	27.3	46.5	69.0	33.7	41.0	32.4
TANK TEMP ^{o}F	87.0	87.0	87.0	87.0	87.0	87.0	87.0	87.0
TANK PRESSURE PSI	128.5	125.5	123.5	122.5	120.5	117.5	116.5	113.5
BED RES. FACTOR	22.5	21.3	21.4	20.2	20.3	24.6	21.9	20.7

OA NO/TYPE	36/Pos	37/Pos	38/Neg	39/Neg	40/Pos	41/Pos	42/Pos	43/Pos
OPS DAY	86	89	89	90	92	95	98	101
DELTA VEL (PRED)-FPS	20.0	35.5	16.6	8.2	23.1	25.6	18.7	24.1
DELTA VEL (ACT)-FPS	20.0	35.8	17.1	8.7	23.6	26.1	18.7	24.4
BURN DURATION-SEC	57.4	103.4	49.2	24.8	68.5	76.0	55.6	71.8
PROPELLANT REQ-LBS	37.1	66.2	31.2	15.7	43.3	47.5	34.7	44.3
TANK TEMP ^{o}F	87.0	87.0	87.0	87.0	87.0	87.0	87.0	87.0
TANK PRESSURE PSI	112.5	110.5	108.5	107.7	107.5	105.0	104.5	102.5
BED RES. FACTOR	20.8	18.2	23.9	22.6	24.0	19.9	20.0	21.5

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6.7.5 Lifeboat II (LB II) Performance

Lifeboat II electronics were activated for system calibration checks at two (2) selected locations in the orbit on Revs 1089, 1251, 1397 and 1543. The calibrations were satisfactory with the magnetometer remaining, in the N-S region at +5 to +7 milligauss, and in the S-N region at 0 to -2 milligauss.

On Rev 1656 the electronics were activated for the recovery maneuver with normal performance. The magnetometer errors were 5.7 milligauss in the Q axis and 4.3 milligauss in the P axis. These errors are equivalent to less than a degree.

The LB II propellant tank heaters remained off throughout Segment 4. The average tank temperature remained at approximately 79°F.

6.7.6 [redacted]

[redacted]

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SECTION 7

7.0 SECONDARY FLIGHT OBJECTIVE ACCOMPLISHMENT

7.1 General

The requirement and definition of the Secondary Flight Objectives (SFO) that were identified prior to the launch of HEXAGON Mission No. 7 are provided in Annex H to the System Test Objectives (STO).

7.2 New SFO's

During the mission two new objectives were defined:

a. [redacted]

b. SUN Photography - Exercise a direct solar photography experiment to determine camera and film degradation. The experiment will be run at the end of the RV-4 segment.

7.3 Early Rev Activity

All primary and redundant system testing was completed as planned by Rev 27.

7.4 SFO Accomplishment

7.4.1 Sv Shroud Separation Dynamics - Conducted during ascent

7.4.2 Reaction Control Subsystem Evaluation

Continued on RCS-1 until the transfer to RCS-2 on Day 90. Additional tests on RCS-1 will be conducted during SOLO.

7.4.3 Orbit Adjust Subsystem Evaluation

Conducted throughout the mission segments. A daily ambient OA and a long burn to determine engine washout characteristics is scheduled during SOLO.

7.4.4 Electrical Subsystem Rev Status Determination

Conducted after each of the 5 RV recoveries.

7.4.5 T&T Redundant Equipment Evaluation

SGLS 2 has been tested weekly during the mission.

7.4.6 Lifeboat Magnetometer Calibration

Tests have been conducted routinely during the mission.

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7.4.7 Lifeboat Health Check

The check was satisfactorily conducted on Rev 18 as part of the early rev activities.

7.4.8 Horizon Sensor Noise Evaluation

Full Rev recordings were made early in the mission on Revs 124/125 and 140/141. These recordings were repeated over the span from Revs 1525 to 1527.

7.4.9 RCS, EDAP and Thermal Weekly Performance Check

Performed weekly

7.4.10 Electrical System Rev Status Determination

Performed each Rev.

7.4.11 SGLS Signal Strength

Data were collected on a programmed basis from each RTS.

7.4.12 Panoramic Camera Photographic Operations

All planned Photographic engineering was completed except for Test Type 6.

7.4.13 Panoramic Camera Thermal Evaluation

Thermal data were collected and evaluated daily throughout the mission.

7.4.14 Panoramic Camera NCVU Operation

Planned but not conducted - SPO direction

7.4.15 RV-1-4 Thermal Record

Conducted in a quiescent mode on Rev 125 and with a panoramic camera operating on Rev 162. The test data are provided in paragraph 7.5.

7.4.16 Stellar Terrain BAR XC MOPs

MOP's were executed on REVS 113, 405 and 632.

7.4.17 Stellar Terrain Calibration

The ST calibration was successfully executed on Revs 935/936.

7.4.18 Stellar Terrain Type 3414 Film Test

Three operates using 3414 were successfully conducted on Revs 932, 933 and 934.

7.4.19 K-Value Monitoring and Reporting

K-Value monitoring continued until the end of the ST Mission on Rev 942.

7.4.20 INDI Commanding

Commanding at INDI was exercised weekly.

7.4.21

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1328, 1628, and 1701.

7.4.22

7.4.23

7.4.24 SUN Photography

A direct solar photography experiment was conducted on Rev 1650 using MONO A.

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7.5 RV 1-4 Thermal Record

OBJECTIVE: To obtain a complete rev of data showing what effects PAN camera operation and crossing of sun lines has on the TCEA heater duty cycle and RV temperatures.

PROCEDURE: A Rev, that included a PAN camera operation, was chosen and the SV tape recorder was run from ascending node to ascending node. Due to the difficulty in predicting when an event generated operation would occur and managing the associated tape recorder commanding in sufficient time for generation of the command message, it was decided to use a manual operation (MOP). Rev 162, with a MOP occurring over the COOK RTS, was chosen. The MOP was relatively short, 129 feet (1.02 lb) per side.

In addition to Rev 162, heater duty cycle and voltage data was obtained from Rev 125, which was tape recorded from ascending node to ascending node for another purpose. Rev 125 was a quiescent rev and can be used as a basis of comparison for Rev 162. Note, a data dropout occurred during the playback of the tape recorder.

The orbit parameters for the two revs are as follows:

REV NO.	125	162
SUBCYCLE	12 (DEAD REV)	16
INCLINATION	96.921	96.919
APOGEE	152.49 NM	152.79 NM
PERIGEE	88.64 NM	88.65 NM
POSITION OF PERIGEE	36.62°N	40.19°N
LONG. OF ASCEND. NODE	168.60°E	67.34°E
BETA ANGLE	0.0°	0.0°

The data for the two revs is presented on the following pages.

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DATA SOURCE: The data on the following pages was obtained from realtime and playback telemetry, command history and the BFE. Pressure and temperature data were obtained from telemetry modes which printed out in 7 second increments. RV heater duty cycles and main Bus voltage printed out in one second increments.

The RV heater duty cycle power is the average power for one duty cycle (an off to an off) with the power being plotted at the second off.

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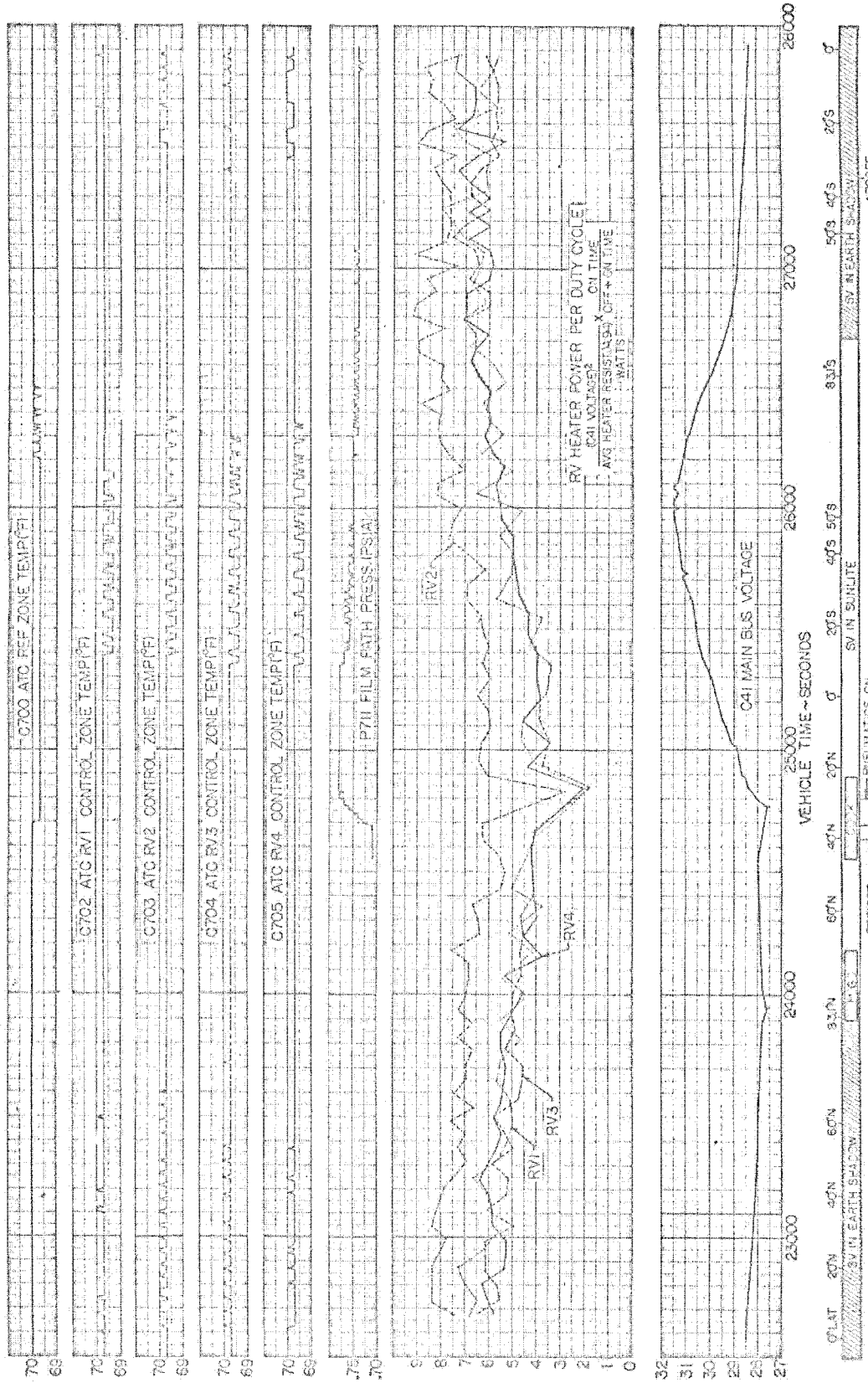
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SECRET/H

SV7 REV 162 THERMAL RECORD

NOTE: RV PAYLOAD CONTAINER TEMPERATURES (R106 R206 R306 & R406) REMAINED AT 69°F THRUOUT THE RECORD



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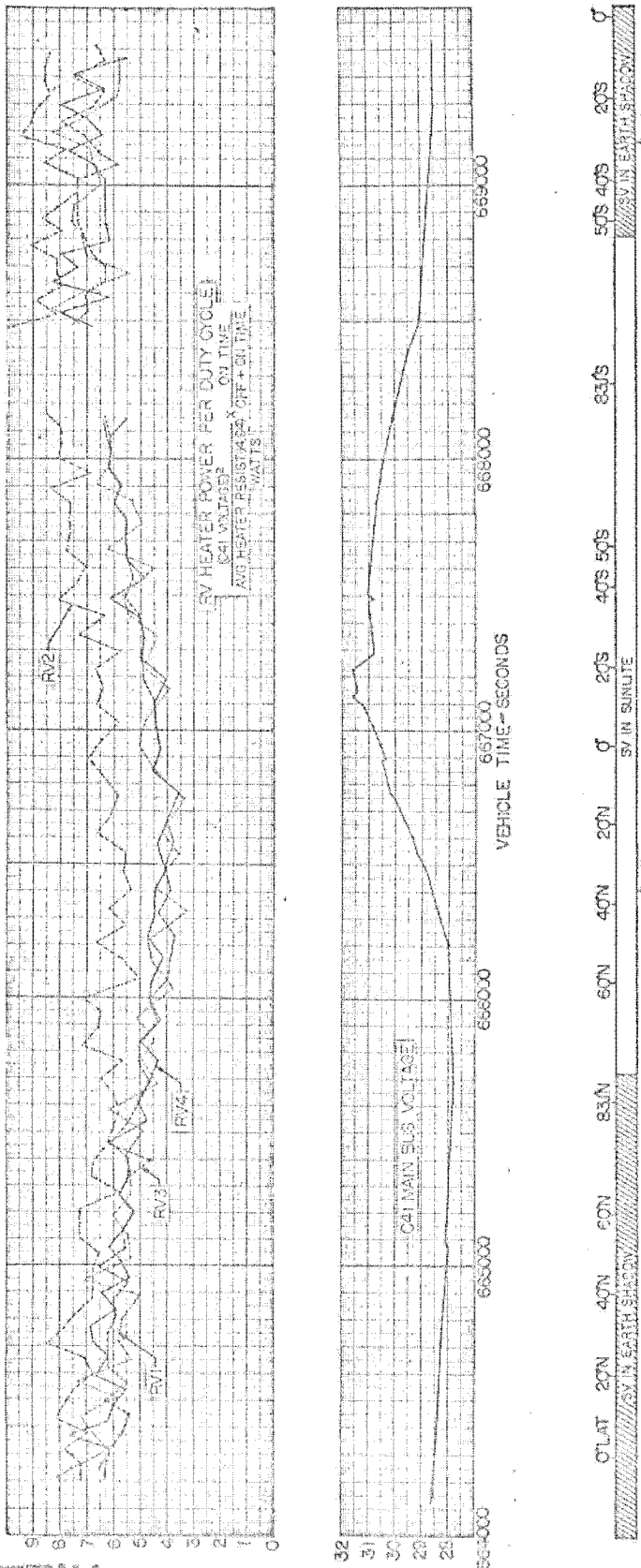
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SV7 REV 125 RECORD AROUND THE REV



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