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HEXAGON PROGRAM

PRELIMINARY POST FLIGHT REPORT

FOR FLIGHT NO. 6

26 OCTOBER 1973

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. 6 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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FOREWORD

This document presents preliminary evaluation results of vehicle and ground system performances during the sixth 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-6 was launched on the first attempt on 13 July 1973. Liftoff occurred at 1322 PDT near the opening of the launch window. A nominal ascent and injection resulted in achieving the desired orbit. The solar arrays were deployed and positioned on Rev 1. All Day One configuration and test commanding was accomplished as planned. Panoramic camera mission photography started on Rev 5 and Stellar Terrain camera photography on Rev 14 as planned.

A yaw bias in ACS1 developed on Rev 47 and control was transferred to ACS2 on Rev 66. The ST Terrain platen press monitor became intermittent on Rev 91 and the Stellar press monitor failed on Rev 137. Analysis indicated the failures were in the monitors rather than the platen press function and ST operations were continued. Optical Bar B showed an increased torque and SS camera sequences were modified to prevent a potential runaway condition. RV-1 was successfully recovered on Rev 310, operations day 20.

Panoramic and ST photography continued normally through RV-2 recovery on Rev 505, operations day 20. 5000 feet of color were exposed through the aft camera during this segment. DB-B torque level decreased and the camera sequences were returned to the normal configuration. The Stellar Terrain mission was completed on Rev 659 and a successful ST calibration accomplished on Revs 666/667. 54 frames of IR photography were acquired at the end of the ST mission. Three phase lock dropouts of image compensation were detected near the end of the mission.

RV-5 was successfully recovered on Rev 683, operations day 43. Overall photographic quality was rated as good. Atmospheric haze and solar angle resulted in slightly lower quality than that achieved from the previous flight.

Normal panoramic camera photography continued with 10,000 feet of color exposed through the aft camera. Thrust level of REA's #4 and #8 were

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decaying more rapidly than expected, however, ACS/RCS performance remained acceptable. RV-3 was successfully recovered on Rev 926, operations day 58. Normal panoramic photography continued with 6000 feet of color exposed through the aft camera and 500 feet of IR through the forward camera during this segment. The thrust level decay of REA's #4 and #8 continued, but performance remained acceptable. RV-4 was successfully recovered on Rev 1202, operations day 75.

The quality of the black and white and color photography ranged from very good to poor with the majority rated as good. Quality improved in the latter part of the mission as a result of better atmospheric conditions in the fall season.

Active SOLO was conducted from Rev 1203 to Rev 1317. A low manning [redacted] (b)(1) (b)(3) period spanned until Rev 1441 where full manning was resumed to support VAST-3. Substantially all planned SOLO experiments were accomplished. VAST-3 deboost was successfully conducted on Rev 1471, operations day 92.

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SECTION 1

1.0 READINESS, LAUNCH AND ASCENT

1.1 Readiness Activity

SV-6 was shipped to VAFB on the 29th of June for a scheduled launch on 12 July 1973. Replacement of the SGLS Transponder No. 1 required delaying the launch until 13 July 1973.

1.2 SV-6 Operational Configuration

1.2.1 SV-6 Changes

1.2.1.1 Satellite Vehicle

Description	Comment
RCS tanks 1, 3 and 4 cut and capped at output and Isolation Valve added to tank 2 output.	RCS to be operated directly from OAS tank. Tank 2 carries emergency hydrazine supply.
ACS/RCS Cross-Strapping Modified	Systems may be cross-strapped without turning off the non-controlling ACS.
All gyros are Ferrotic units	
RACS IRA torquer power supply isolated from vehicle ground	Prevent torquer shorts from developing rate biases.
APSA thermal blankets modified	Preclude interference with DBS antenna.

1.2.1.2 Panoramic Camera Subsystem

No hardware changes

1.2.1.3 Main Reentry Vehicles (RVs 1-4)

Fifty hour batteries installed in all RV's	Provide lifetime after activation to provide a next day recovery capability.

1.2.1.4 Mapping Camera Subsystem

Terrain Thermal Door modified for low temperature operation	Prevent SV-5 malfunction

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1.2.1.5 Operational

	Description	Comments
a.	Beta angle controlled to be within plus 2° and minus 8° during the mission.	
b.	Single and dual orbit adjusts as required to control orbit and location of perigee.	
c.	Orbit parameters (Nominal)	
	(1) Inclination	96.184 degrees
	(2) Period	88.867 minutes
	(3) Perigee Altitude	87.784 n. miles
	(4) Argument of Perigee	139.626 degrees
d.	Panoramic camera restrictions	
	(1) 30 degree scans at ±45 degree obliquity restricted.	
	(2) Rewind fixed at 5 ips.	
e.	General	
	Doppler beacon to be commanded off and on until the status of the mutual [redacted] DBS interference could be determined.	(b)(1) (b)(3)
	RV-5 not to be released until after RV-1 recovery.	

1.2.1.6 'TUNITY

Mod 1 BR was replaced by Mod 2.

1.2.2 Documentation and Software

1.2.2.1 Documentation

1) Test Operations Order (TOO) 72-12 with RCN #3
2) Test Operating Instructions (TOI), dated 25 June 1973
3) Flight Profile Addendum (FPA), revision 29 June 1973
4) Field Test Force (FTF) Profile FP00A, dated 09 July 1973
5) Computer Usage Schedule (CUS) 6-02, dated 6 July 1973
6) Test Group Operations Plan 2-73
7) Test Group Operations Order 4, dated 27 June 1973
8) Orbital Requirements Document (ORD), dated 31 August 1972
9) CDPTO Requirements Letter, dated 01 June 1973
10) Systems Test Objectives (STO), dated December 1972
11) Orbital Support Plan (OSP), dated 29 December 1972

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12) Sequence Definition Specification (SDS), dated 26 June 1973.
13) Command Definition Specification (CDS), dated 26 June 1973.
14) Hardware/Software Limitations Specification (HSLS), dated 26 June 1973
15) MADCOMX, MS-IV, dated 11 June 1971
16) MOD-IV Training Manual, dated December 1972.

1.2.2.2 Software

1) 'TUNITY
   a) Auxiliary Master Tape Amt MD 230
   b) Auxiliary COMPOOL COMOC PWP
   c) SAFARI Tape 614

2) System II
   a) System Support Tape (SST) 13.1F
   b) SST Corrector Tape CT 13.1F 7B
   c) Data Base FLT 6 DBR
   d) System COMPOOL COMSYSXB

3) Bird Buffer Master 13.1 BE

4) RTS Master Disk 13.1 RE with Corrector Set 8261-1.

1.2.3 SCF

All telemetry modes required for support of SV-6 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 10 July launch and was still valid and used for the 13 July launch with manual time offsets to accommodate the revised launch window. The Pad Load contents are summarized as:

   a) Selected station contacts to Rev 15 and operational activities thru Rev. 6.
   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)
      ACS 2 OFF (inhibited)
   d) Rev 2
      SA deploy
      ACS 2 OFF (inhibited)
      CV Test (inhibited)
   e) Rev 4
      SS Health Test (inhibited)

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

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

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

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

OA Tank	2917 Pounds Propellant	
RCS Tanks 1, 3, 4	Capped	
RCS Tank 2	155 Pounds Propellant	
Panoramic Camera	Camera A*	Camera B**
Film on RV-1 ft.	1532	1546
Film on Supply ft.	108285	101154
Pneumatics lbs.	17.0	16.9

* Includes 500' IR
** Includes 21,000' Color

Mapping Camera	Terrain	Stellar
Film on RV ft	97.7	68.2
Film on Supply	3304.8	1984.8
Available operational frames	2060	2202

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1.3 Launch and Ascent

1.3.1 Launch

The sixth HEXAGON vehicle was launched on the first countdown attempt on 13 July 1973. Liftoff occurred at 1322 PDT near the opening of the launch window (system time 73320).

1.3.2 Ascent

Ascent appeared nominal with a correct BV/SV trajectory and with all events verified.

1.3.3 Injection Accuracy

Rev 1 tracking showed that the achieved orbit closely matched the nominal desired.

Table 1-1 shows the comparison between the actual and planned injection conditions and the Rev 0 orbit comparisons.

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MATCH POINT AND INJECTION ACCURACY

Item	Units	Predicted	Actual	(A-P)
Match Point Geod. Lat.	Deg.	20.3177	20.3177	0
Radius	N.M.	3528.8880	3528.7746	-.1034
Velocity	fps	25742.73	25743.18	+.45
Gamma	Deg.	.1857	.1799	-.0070
Long	Deg.	124.1500	124.1616	.0116
Rev 0 Orbit Comparisons				
Apogee	N.M.	155.593	155.342	-.251
Perigee	N.M.	87.784	87.681	-.103
Arg./Per.	Deg	139.038	139.626	.588
Period	Min.	88.8674	88.8643	-.0031
Eccentricity	nd	.00966995	.00964823	
Inclination	Deg.	96.184	96.207	.023

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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 0 degrees at Rev 1 POGO. All configuration commanding and subsystem health tests were executed as planned. Panoramic camera mission photography started with the Rev 5 load while the mapping system photography started on Rev 14 as scheduled. An ACS1 Yaw Bias developed on Rev 47 and control was transferred to ACS2 on Rev 66. Terrain camera platen press monitor indicated no function on Rev 91 and became erratic on following operations. The stellar platen press monitor failed on Rev 137. Evaluation of the problems indicated the failure was the monitor and operations continued with the stellar camera using the redundant electronics. An apparent increase in the torque of optical bar B (aft camera) was noted and sequence modifications and operational constraints were imposed to prevent failure. Operations on both camera systems continued without problem during the rest of the segment. RV-1 was successfully reentered and aerially recovered on Rev 310, operations day 20.

A summary of significant events and a discussion of problems encountered 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° 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 4. SS subsystem mission photography started with the first command message loaded on Rev 5. The Stellar Terrain Health Check executed on Rev 8 COOK. SGLS2/PCM2 health test was satisfactory on Rev 9. An [redacted] test was conducted on Rev 11 to establish baseline performance prior to Doppler Beacon turn-on. The doppler antenna was successfully erected and the doppler beacon turned on prior to GUAM on Rev 12. (b)(1) (b)(3)

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ST operations started on Rev 14 and the health testing of redundant systems was completed with the MCS/Lifeboat test on Rev 18.

Mission operations continued until Rev 47 where a yaw rate bias was detected and control was transferred to the redundant ACS (RACS) on Rev 66. Thruster (REA) No. 8 displayed a higher than normal temperature from Rev 48 on, although thrust output remained nominal, which is indicative of a minor leak.

The interference between [redacted] DBS was again evident, as on SV-5, and operations were continued by alternate commanding of the two subsystems. (b)(1) (b)(3)

Intermittent indication of the terrain camera platen press function was detected on Rev 91. MOP's and a switch to the back-up mode on Rev 210 indicated the problem to be a faulty telemetry switch

On Rev 137 the stellar camera platen press monitor indicated no function on 2 frames of a 12 frame operation. The stellar platen press was transferred to the redundant electronics with no change noted in the platen press data and analysis indicates a faulty telemetry switch.

High K values, magnetometer readings at Boulder, Colorado and Fairbanks, Alaska were measured on Day 13 but lasted a short time. The majority of data during this segment shows very low K values, between 2 and 3, with respect to the baseline level of 5 where radiation effects may become apparent on the Stellar film.

The aft camera optical bar torque increased during the first half of the segment. Constraints to prevent a possible catastrophic failure were imposed including one operation per rev with the on time limited to 120 seconds. Camera software was later modified to include SS shutdown by the BUFT- (backup film transport off) command which precludes nested operations and eliminates rewind.

RV-1 was reentered and aerially recovered on Rev 310, operations day 20. The capsule was loaded to 97.8 percent of capacity and balanced. The capsule was recovered without damage.

The overall quality of the acquired photography ranged from very good to poor with camera focus determined to be correct for both cameras.

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2.1.2 Problem Summary

a. Battery Heater Cycling

Statement - Battery #3 heater started an abnormal cycling pattern on Rev 7 which continued until Rev 87 when normal cycling resumed. Battery #2 abnormal heater cycling was detected on Rev 211 with normal operation resumed on Rev 212.
Solution - Data monitored. The failures are attributed to the battery thermostats which eventually fail in the closed position and permit resumption of normal cycling under control of the redundant series thermostat.

b. Yaw Bias in ACS1

Statement - A yaw left bias in PACS was detected on Rev 47 which remained in varying amounts during the segment.
Solution - Control was transferred to RACS on Rev 66 cross-strapped to RCS1 (M2V1) with PACS continuing to be powered.

c. Terrain Camera Platen Press Monitor failure

Statement - Intermittent indication of platen press for the terrain camera was detected on Rev 91. No platen press function was detected on operations conducted on Rev 207.
Solution - MOP's were executed which showed normal press functioning. After Rev 207, the ST subsystem was operated in the backup mode, with no improvement in data. Analysis indicated the failure was in the telemetry switch and ST operations were returned to the normal mode.

d. Stellar camera Platen Press Monitor failure

Statement - Stellar platen press gave no indication of operation on 2 frames of the Rev 137 operation.
Solution - Stellar platen press was switched to the redundant electronics on Rev 164 with no improvement in the data. Analysis indicates the failure was a faulty telemetry switch.

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e. RCS Thrustor #8 Leak

Statement - Higher temperatures than normal were measured on REA #8 from Rev 48 on.

Solution - Test maneuvers verified that REA #8 thrust performance was nominal and that the high temperatures were the result of a minor leak.

f. Higher Torque in OB-B

Statement - Torque levels increased on the aft looking camera optical bar drive servo during the first portion of the RV-1 segment.

Solution - To prevent a possible catastrophic failure if the OB should stall, operational constraints were imposed to limit subsystem to one 120 second operation per rev. These constraints were lifted when the operating sequences were modified to use the BUFT- command so placed to prevent nested operations and eliminate rewinds.

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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 - 310). 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 222 messages loaded in the ECS for this segment. This resulted in 53,600 SPC's being stored for readout from the PMU's.

Of the 53,600 SPC's loaded, 28,041 were output from the PMU's for processing by the decoders. The remaining were erased out prior to time label matches. In loading the 53,600 SPC's there were no rejects except at 113 Pogo, where commanding difficulties were experienced because of a problem at the RTS.

2.2.1.1.2 ECS Clock Operation

The accuracy of the ECS clock was 1.43 parts in 10^7. This corresponds to an average frequency offset of .1466 HZ above the nominal frequency of 1.024×10^6 HZ. The frequency of the clock oscillators changed .0225 HZ in 295 revs. This results in a stability of 4.38 parts in 10^8 over 295 revs, or 6.02 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 13,882 PMU-B 14,159

ECS Clock Drift Rate 1.43 parts in 10^7

ECS Clock Stability 4.38 parts in 10^8 for a 295 rev period

Total Hours On ECS 480 MCS 4.5 RD .5 BUD .05

Secure Words Expended at end of Segment 1 PMU-A 36 PMU-B 40

Environmental Data: See F gure 2.2-1 through 2.2-7

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AVERAGE CLOCK ACCURACY =BIAS CHANGE/TIME CHANGE

=(0.3856- 0.1605)/(1634987.2- 62283.0)

= 1.43129E-07

= 1.43129 PARTS IN 10 TO THE 7TH

AVERAGE CLOCK FREQUENCY =(1.43129E-07*1,024,000.0)+1,024,000.0

= 1024000.14656HZ

FREQUENCY 1 (F1) =(BIAS/VTCW)*1.024MHZ+1.024MHZ

=(0.0938/ 715087.8)*1.024MHZ+1.024MHZ

= 1024000.13432HZ

FREQUENCY 2 (F2) =(BIAS/VTCW)*1.024MHZ+1.024MHZ

=(0.1313/ 857616.4)*1.024MHZ+1.024MHZ

= 1024000.15677HZ

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

=(1024000.15677- 1024000.13432)/1.024E+06

= 2.19238E-08

= 4.38476 PARTS IN 10 TO THE 8TH
FOR THIS 295 REV. PERIOD

= 6.02217 PARTS IN 10 TO THE 10TH
FOR A 6 HOUR PERIOD

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KEUFFEL & ESSER CO. 10 X 10 TO THE CENTIMETER 18 X 25 CM.

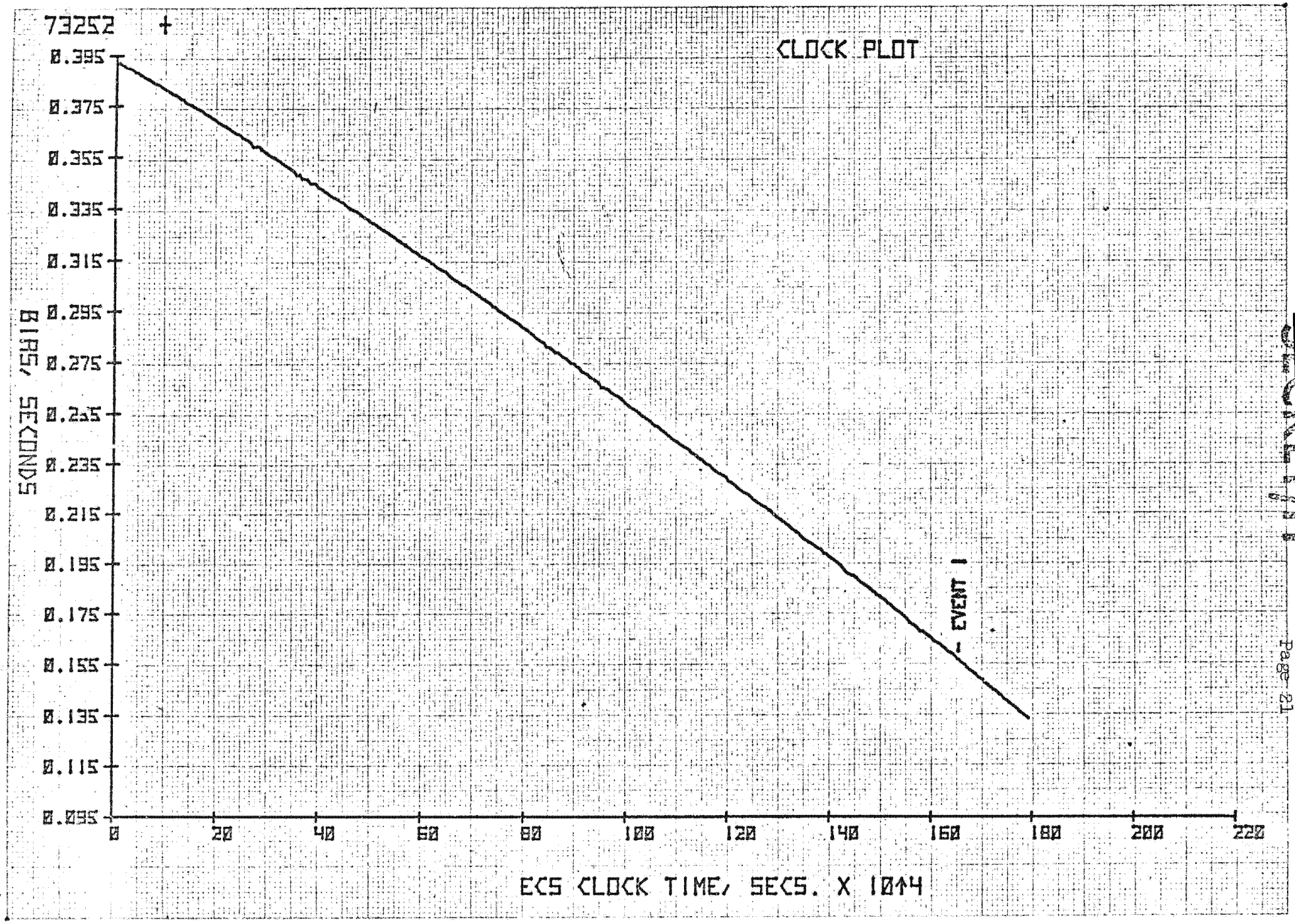

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Figure 2.2-1

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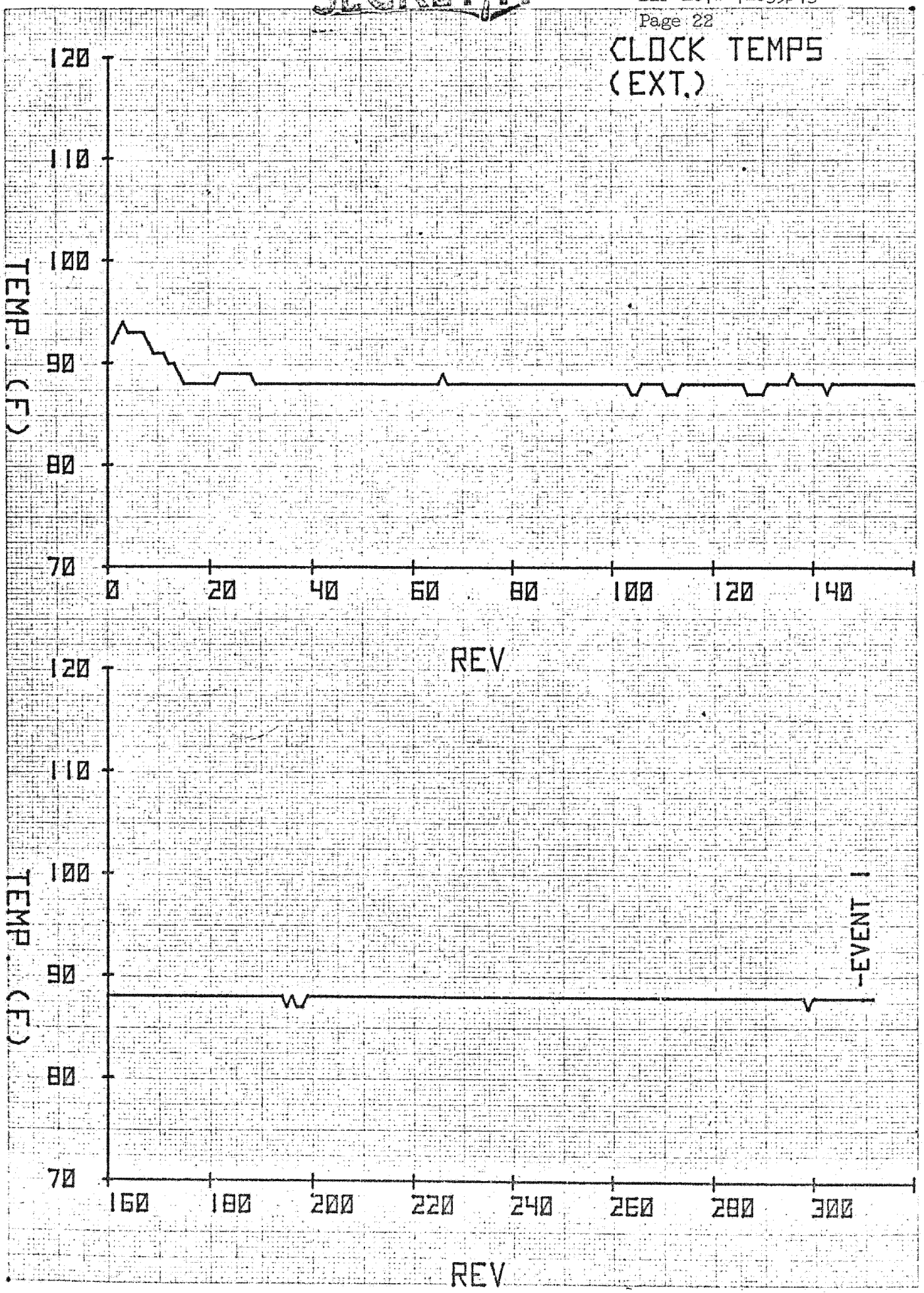

Figure 2.2-2

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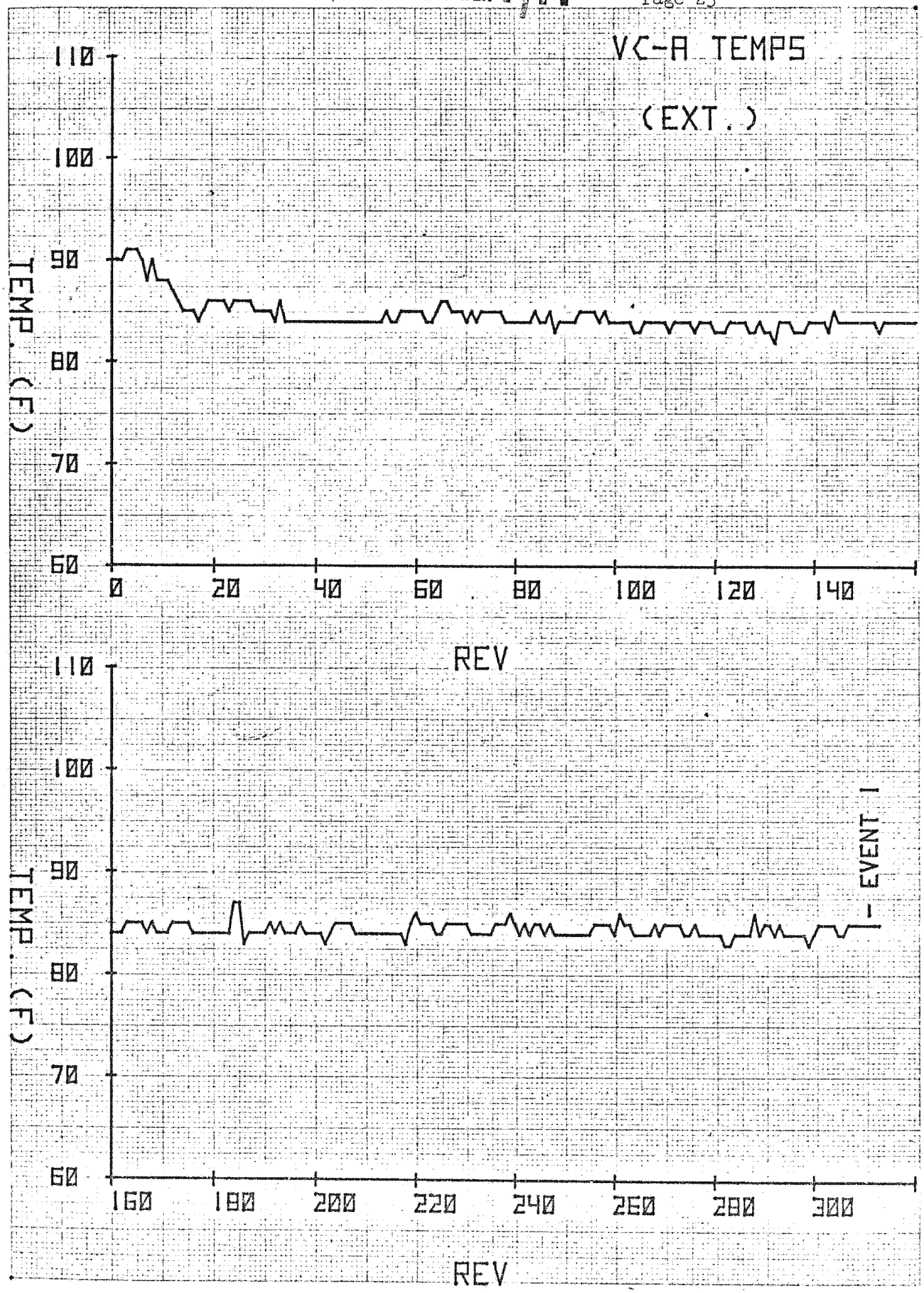

Figure 2.2-3

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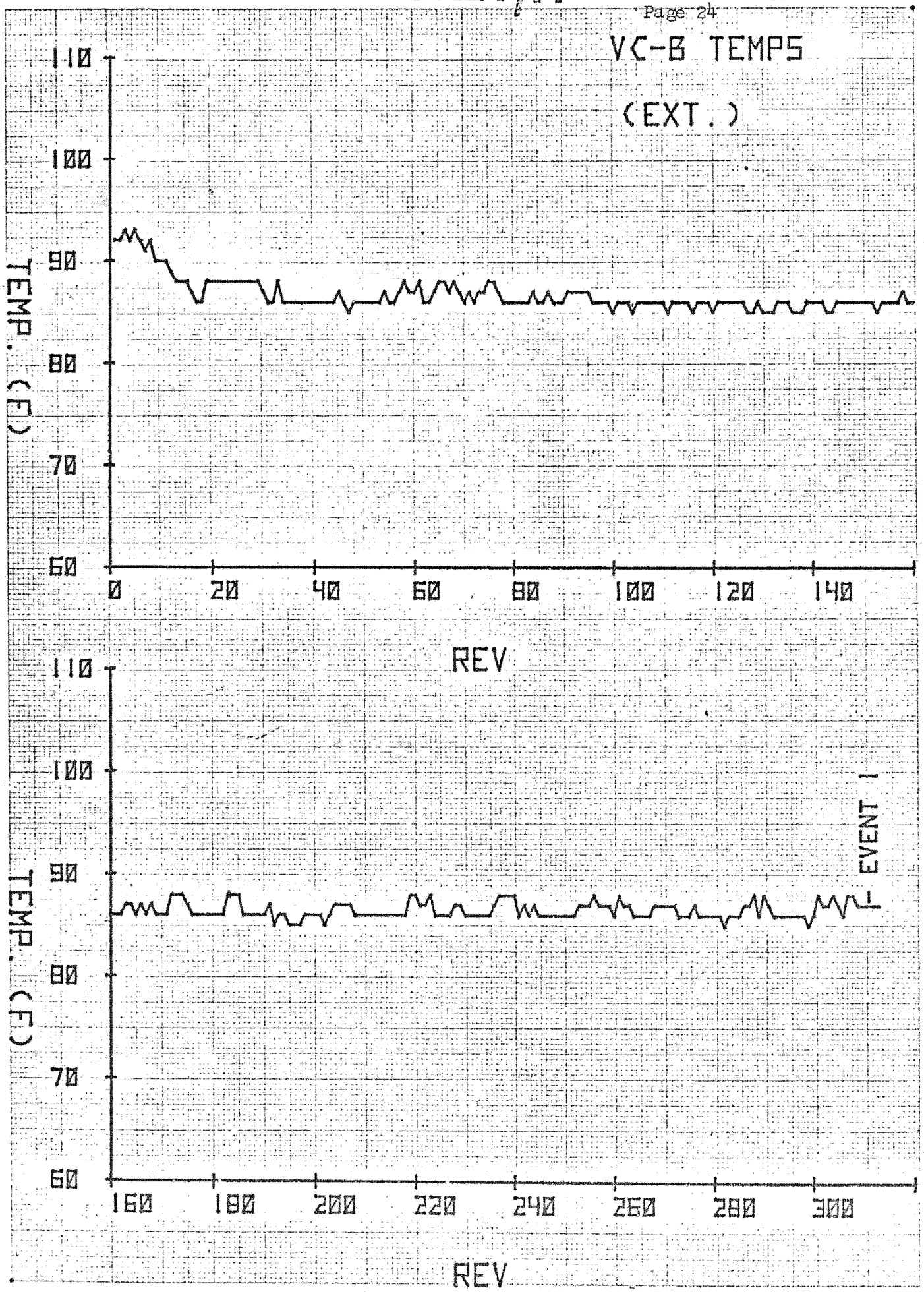

Figure 2.2-4

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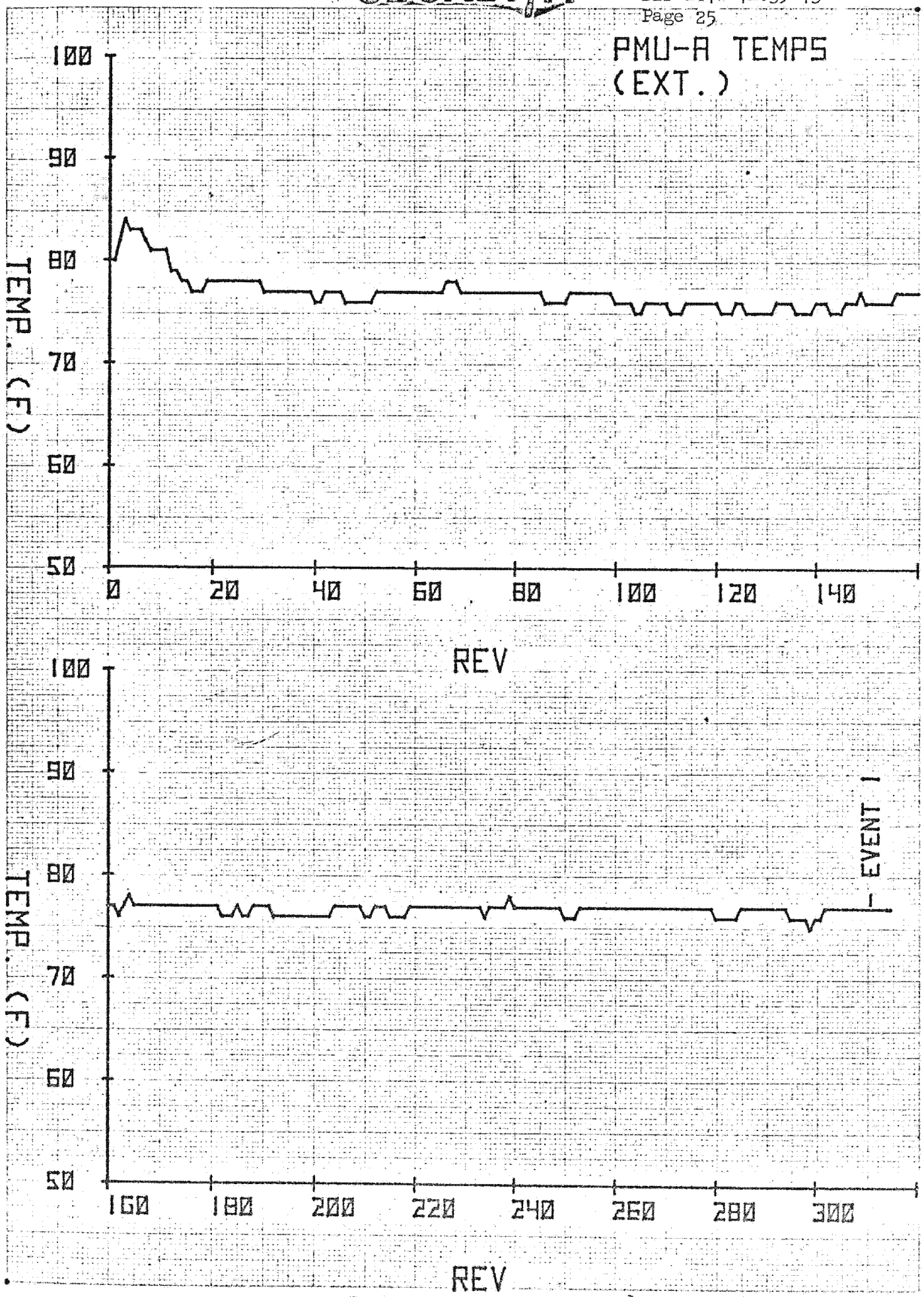

Figure 2.2-5

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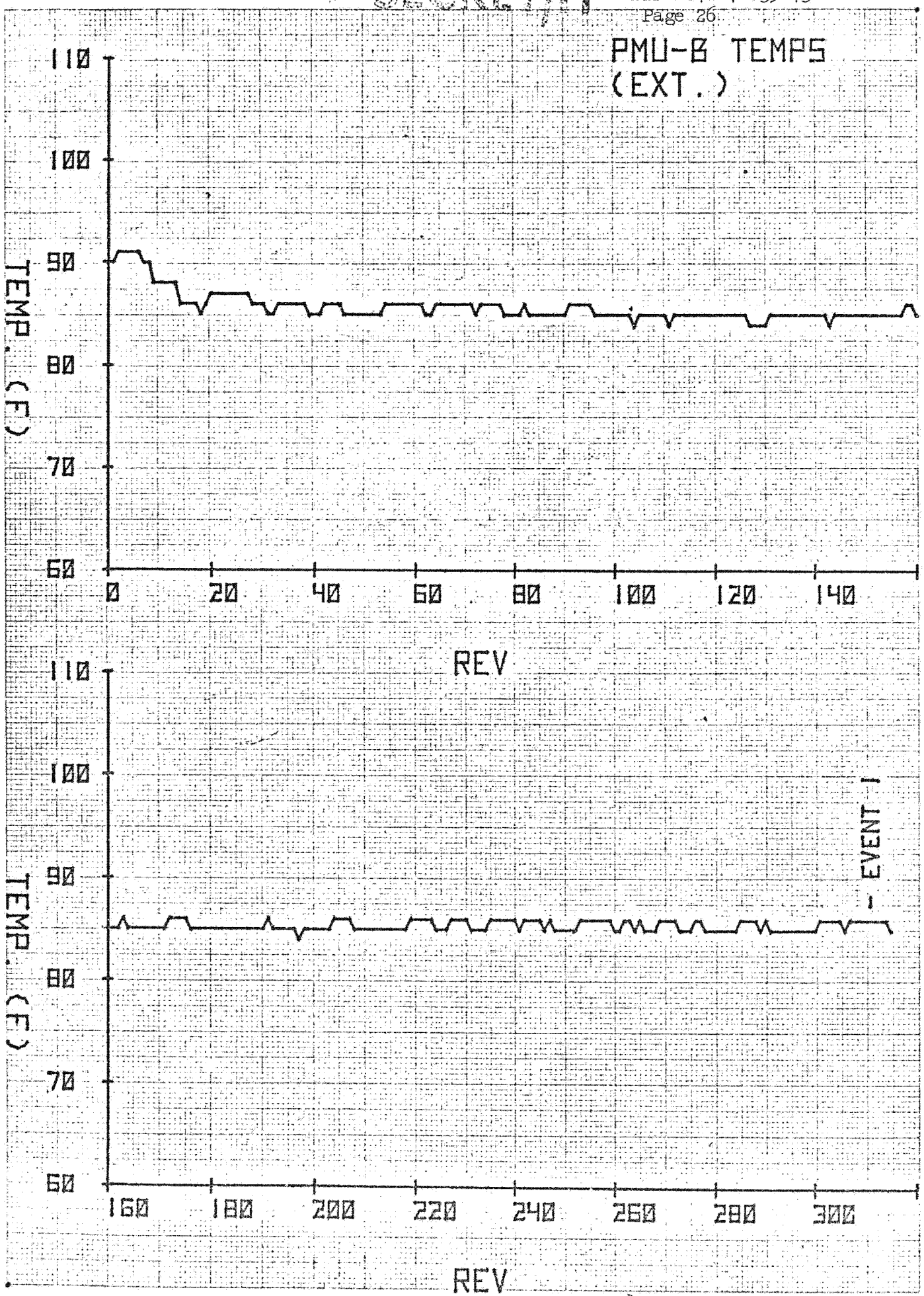

Figure 2.2-6

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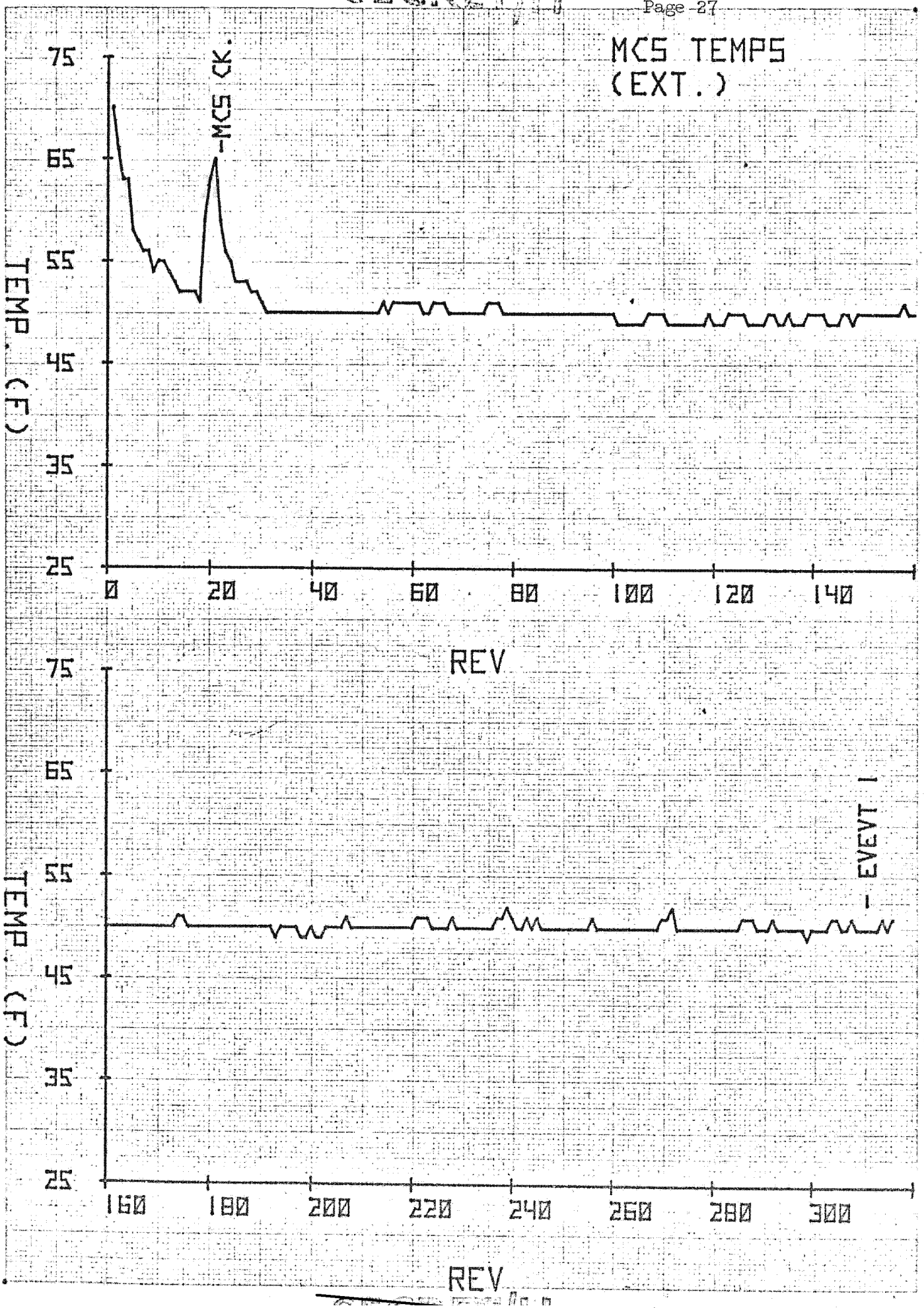

KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1513 10 X 10 TO THE CENTIMETER 25 X 25 CM

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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 stowed just after BV/SV separation. The constant velocity and health check tests performed normally on Revs 2 and 4, respectively, with operational photography beginning 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. There was, however, an apparent degradation in the operating characteristics of the aft-looking camera optical bar drive servo. The apparent torque required to drive the bar at the proper speed increased slightly through the first half of RV-1. In order to protect the SS from a catastrophic failure mode that was potential if the required torque continued to rise, the system was, initially, limited to 1 op per rev and a maximum of 120 seconds camera operate time per op; and, subsequently, placed in a modified operating sequence in which SS shutdown is initiated by BUFT-command.

All operations prior to the implementation of the BUFT-shutdown were terminated with a 5-IPS rewind. The BUFT-command completely shuts down the system immediately, thus precluding any nested operations and eliminating the rewind.

The RV-1 mission segment consisted of 197 sensor system operations, consuming 21,328 seconds of camera power on time, 8.9 pounds of nitrogen gas, and approximately 28,700 feet of film per camera (includes prelaunch footage on TU1 at liftoff). Consumption profiles through RV-1 are graphically depicted in Figure 1.

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CONSUMPTION PROFILES

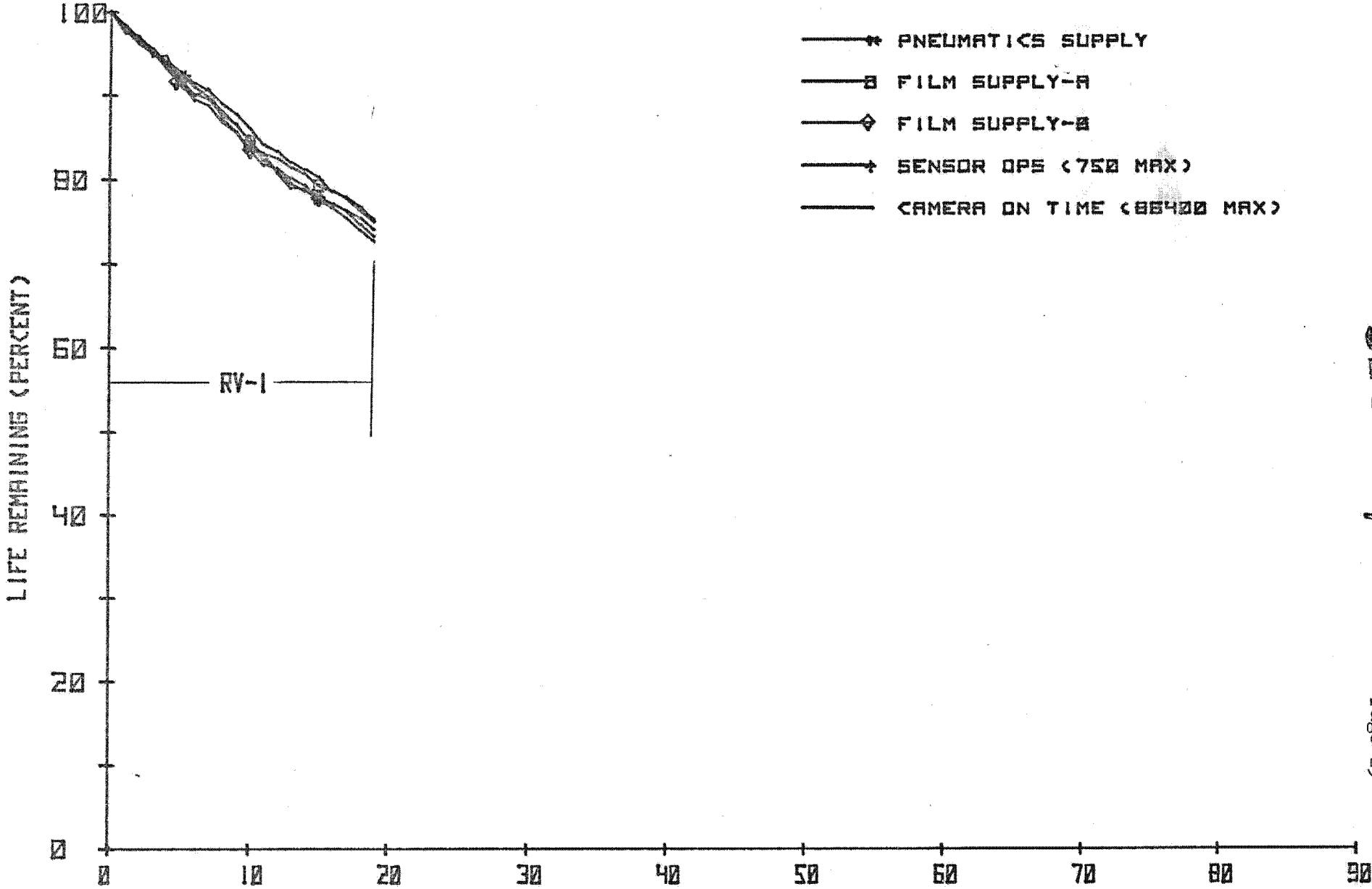

FIGURE 1

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

	Forward-Looking Camera	Aft-Looking Camera
Filter Type	W-12	Clear
Focal Length	60.0103	60.0088
Focus Setting	-7	57
Film Type	1414/S0130	1414/S0255
Total Film Length	109,817	102,700
Supply Spool Number	2271	2340
Pneumatics Loaded	33.9	

The overall quality of the acquired photography ranged from very good to poor, with the majority rated as good. The poor imagery was attributed primarily to an illumination/launch time phenomenon which produces shadowless photography on the aft camera over a distinct band of latitudes. The engineering through-focus MOPs verified the validity of the nominal focus positions. However, the OOAA engineering tests indicated residual smear on the aft camera, requiring adjustments to the aft OOAA nominals (effected early in RV-2).

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 4, respectively. 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 4 - SS health check, sequence 203
Rev 8 - SS engineering
Rev 31 - Through focus MOP, test type 1
Rev 79 - Through focus MOP, test type 1
Rev 81 - OOAA line bias MOP, test type 2

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Rev 112 - Through focus MOP test type 1
Rev 113 - TUCSON, test type 7
Rev 146 - Through focus, OOAA line bias, test type 1 and 2
Rev 160 - Through focus MOP, test type 1
Rev 162 - Through focus/OOAA line bias, test type 1 and 2
Rev 211 - Through focus MOP, test type 1
Rev 226 - OOAA line bias MOP, test type 2
Rev 242 - OOAA line bias MOP, test type 2
Rev 243 - OOAA line bias MOP, test type 2
Rev 292 - Through focus/OOAA line bias, test type 1 and 2
Rev 307 - Through focus MOP, test type 1
Rev 307 - Through focus/OOAA line bias, test type 1 and 2

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2.4 RV 1 (S/N 26) 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 97.84% of the maximum I.C.D. weight and unbalanced 0.00%. The PREP2 event took place on Rev 309 over POGO and separation occurred on Rev 310. Preparation, deorbit, and entry events, and drogue and main parachute deployment conditions were normal and executed as planned. Aerial recovery was accomplished on the second pass at 8700 feet altitude, 18.8 nautical miles from the predicated impact point.

Recovery forces reported chute oscillations of greater than 20° off vertical, with considerable associated lateral movement. The cone remained fully inflated and firm except for a partial dimple at one point. A broken shroud line in the vicinity of the skirt was reported. No capsule damage was reported.

2.4.2 Contamination Experiment

Six, 2 X 10 inch pieces of double adhesive tape were attached to the top of the canister, to collect any debris that came into the canister. The tape was reported to have captured a small amount of dirt. A little contamination was also reported loose in the canister.

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IDENTIFICATION DATA

SV 6	IRON NO 8261			RECOVERY REV 310	
RV 1	RV S/N 26	RETRO MOTOR S/N Q-45		RECOVERY DATE 1 Aug 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
RV 2 OUT T/S	REV/STA 309P			77227.0	77228			0
RV 1 IN T/S				77231.0	77231			0
DT START	81294.2	81293.51	81293.7	81294.4	81294.6			0
POGO TRAN	82376.7			82377.4	82363			-14.4
PITCH START	82406.7			82407.6	82408			0
PITCH STOP				82457.0	82458			0
PYRO ARM BATT				82569.8	82570			0
POGO FADE	82692.0			82689.6	82700			+10.4
KODI TRAN	82810.7			82811.4	82895			+83.6
ORB PWR OFF				82878.0	82877.6			0
RV SEP (0)	82888.08	82888.0	82888.0	82888.0	82887.6	Confirm	NA NOTE 2	0
SPIN UP (+2.4)				82890.4		Confirm	NA	+
RETRO START	83013.48	83013.4	83013.4	83013.4		83015	83014.4	0
DESPIN (+160.4)				83048.4		83053	83049.2	0
PROP JETT (+175.4)				83063.4		83066	83064.8	+1.4
KODI FD (RV)	83167.1					83186	83177.8	+10.7
RV ENTRY (400K	83191.62	83191.7	83191.9		RECOV TWX			
△ 1-2 ACQ					83219	83475		
ION ENTR	83288.2	83287.96	83288.2		83280	NA		-8.2
ION EXIT	83475.5	83474.81	83475.0		83480	NA		+5.0
DROGUE DEPLOY	83521.2	83520.38	83520.6	TONE STOP	83532	83541	NA	+11.4
IMPACT (50K)	83539.2	83538.51	83538.7					
MAIN CHUTE DPL	83542.18	83541.57	83541.8		NA	NA	NA	NA
H/SHLD JETT	83546.18	83545.57	83545.8	TONE START	83548	NA	NA	+2.2
STEADY STATE	83557.18	83556.57	83556.8					
ETPD(RAINDROP)	83536	83586.1	83587.3					
RV @ 13.5K	84490.9	84491.0	84492.2	IN TRAIL	84660*	84660*	NA	+167.8
WATER IMPACT	85041.8	85041.9	85043.1		NA	NA	NA	NA
HULA TRAN (RV)	NA					NA	NA	NA
HULA FADE (RV)	NA					NA	NA	NA
DT RUNOUT	84009.2	84008.51	84008.7		NA	NA	NA	

*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 ⊥ RECOVERY DATA

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RECOVERY DATA

	BASIC STUDY	UPDATED TEAPOT	TEAPOT EVALUATION	QUICK LOOK RPT	EPPD (TWX)	AERIAL RECOVERY
LATITUDE	27.002	27.110	27.097	26.783	27.000	26.783
LONGITUDE	164.05W	164.03W	164.03W	164.03	164.03	164.03

RECOV. A/C DEPLOYMENT FORMATION No. 10, RECOVERING A/C No. 1

RECOV ALT 8700 ft, PASS No. 2, TIME 2331 Z

AIRSPEED 147 KTAS, 125 KIAS; TIME IN TOW 17 min.

RAINDROP ETPD 83586 sec 46000 ft; RATE/DESCENT, 15K 29.1 FPS, 10K 26.8 FPS

CONTACT LOCATION #5 hook engaged load lines in cone

PRESET TENSION LEVEL 3700 lb, PAYOUT Normal

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

OVERSHOOT 18.84 nm, CROSS TRACK 0 nm EAST

RC CONDITION Normal

CHUTE/CONE CONDITION Normal; broken shroud line reported, possible remains of reefing line.

CHUTE/CONE BEHAVIOR Oscillation greater than +20°, partial dimple in cone.

WIND DATA

ALT (K)	DIRECTION PRED	DIRECTION ACT	VELOCITY PRED	VELOCITY ACT	ALT (K)	DIRECTION PRED	DIRECTION ACT	VELOCITY PRED	VELOCITY ACT
SCF	060	030	15	10	25	110	110	20	15
2	070	070	20	15	30	030	170	10	05
4	060	080	15	25	35	310	260	10	10
6	080	070	15	25	40	340	270	10	15
8	100	060	20	20	45	360	310	10	15
10	100	060	15	15	50	080	260	05	05
15	100	030	20	10	55	-	-	-	-
20	110	090	20	05	60	-	-	-	-

RV BATTERY TIME HISTORY

	ACT											
TIME	82573	574	575	576	577	579	581	583	588	590	592	593
MAIN	23.2	24.5	25.1									
PYRO #1	22.1			22.7	23.2	23.9		24.5	25.1	25.6	27.2	
PYRO #2	22.7		23.5			25.3	25.9			26.6		27.9
TIME	82594	595	596	599	684	695	776	ORB PWR 878	- 883			
MAIN	25.6		26.2	26.7	26.9			26.2				
PYRO #1		27.7			28.4		28.8	27.6				
PYRO #2					28.3	28.4			28.4			

SV RATES BEFORE & AFTER SEP (SV TLM)

	TIME	PITCH RATE PGR °/sec	ROLL RATE RGR °/sec	YAW RATE YGR °/sec
	82887	-.068	0	0
SEP	82888	-.07	+.01	+.01
	82889	+1.56	-.08	+.01

MISC DATA

Payload Temp before SEP,	Rn06 63	°F
Payload Temp, Max REENTRY,	TB02 68	°F
Chute Press before PREP 2,	P711 .77	PSI
Supply Press before PREP 2,	P113 .78	PSI
BETA ANGLE of Recovery Rev.	-1.0	°

PITCH ANGLE

BASIC STUDY
Θ rvs -126.73°
$\Delta\Theta 1$ -1.84°

Ωy 1.45 °/sec
$\Delta\Theta 2$ .1 °
Θ sv -34.79 °

PITCH (CMD MSG) -34.827 °
Θ sv (PDWN-SV TLM) -38.1 °
Θ rvs ON UPDATED TEAPOT -126.766°

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RV 1 RECOVERY DATA

RV MASS PROPERTIES

	BASIC STUDY		UPDATED TEAPOT		TEAPOT EVALUATION		ACTUAL POST FLT	
TU-A	229.2	lb	227.0	lb	227.0	lb	233.8	lb
TU-B	229.1	lb	227.0	lb	227.0	lb	234.2	lb
TOTAL	458.3	lb	454.0	lb	454.0	lb	468.0	lb
SEP WGT	1549.65	lb	1545.35	lb	1545.35	lb	UPDATED TEAPOT	
RETRO WGT	1547.96	lb	1543.66	lb	1543.66	lb	% UNBAL	0
ENTRY WGT	1357.15	lb	1352.85	lb	1352.85	lb	% FULL	97.84
AIR RECOV WGT	1135.44	lb	1131.14	lb	1131.14	lb	(100% = 464 lb)	

SV MASS PROPERTIES - AFTER SEP (FROM BASIC STUDY)

SV WEIGHT	18859.9 lb	PITCH INERTIA (Iy)	139108.71 SLUG-FT^2
CG FROM STA 2060 ($\bar{X}r$)	317.82 in	ROLL INERTIA (Ix)	5702.85 SLUG-FT^2
CG FROM LONG AXIS (Y)	.5528 in	YAW INERTIA (Iz)	140189.18 SLUG-FT^2

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REV OF SEP 310	BASIC STUDY		UPDATED TEAPOT		TEAPOT EVALUATION	
PREDICTED FROM REV	300		308		N/A	
APOGEE	151.4	nm	151.333	nm	151.137	nm
PERIGEE	87.834	nm	87.890	nm	87.916	nm
ARG OF PERIGEE	135.499	°	135.579	°	135.620	°
INCLINATION	96.200	°	96.200	°	96.200	°
TRUE ANOMALY AT RETRO	346.91	°	346.77	°	346.73	°
HEATSHIELD JETT ALT	49549.25	FT	49587.79	FT	49644.18	FT

ENTRY PARAMETERS FROM TEAPOT EVALUATION RUN

	SEPARATION	RETRO	REENTRY	DROGUE DEPLOY
SYSTEMS TIME (sec)	82888.0	83013.4	83191.9	83520.6
ALTITUDE (FT)	572697.8	554804.66	399999.98	63608.28
LATITUDE (°N)	65.596	57.204	45.402	27.138
LONGITUDE (°W)	150.95	155.63	159.80	164.02
INERTIAL AZIMUTH (°)	195.18	191.52		
INERT FLT PATH ANGLE (°)	-.2035	-.1269		
INERT VELOCITY (FT/SEC)	25706.36	25722.19	25530.45	
LOCAL AZIMUTH (°)			191.24	190.07
LOCAL FLT PATH ANGLE (°)			-2.1715	-31.1618
LOCAL VELOCITY (FT/SEC)				1430.75
ANGLE OF ATTACK (°)			103.98	
MACH NUMBER				1.48
DYN PRESS (PSF)				194.349

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	81210.206 sec	DECLINATION (MDAC = GEOCENTRIC LAT)	.0008 ° S
LONGITUDE	22.1627 ° E	INERTIAL GEOCENTRIC FLT PATH ANGLE	-.3451 °
ALTITUDE	139.7365 nm	INERTIAL GEOCENTRIC AZIMUTH	353.7997 °
		INERTIAL VELOCITY	25345.62 FT/SEC
SV C_D A/M (DRAG VALUE AT ASCENDING NODE OF RECOVERY REV)			.44327 FT^2/SLUG

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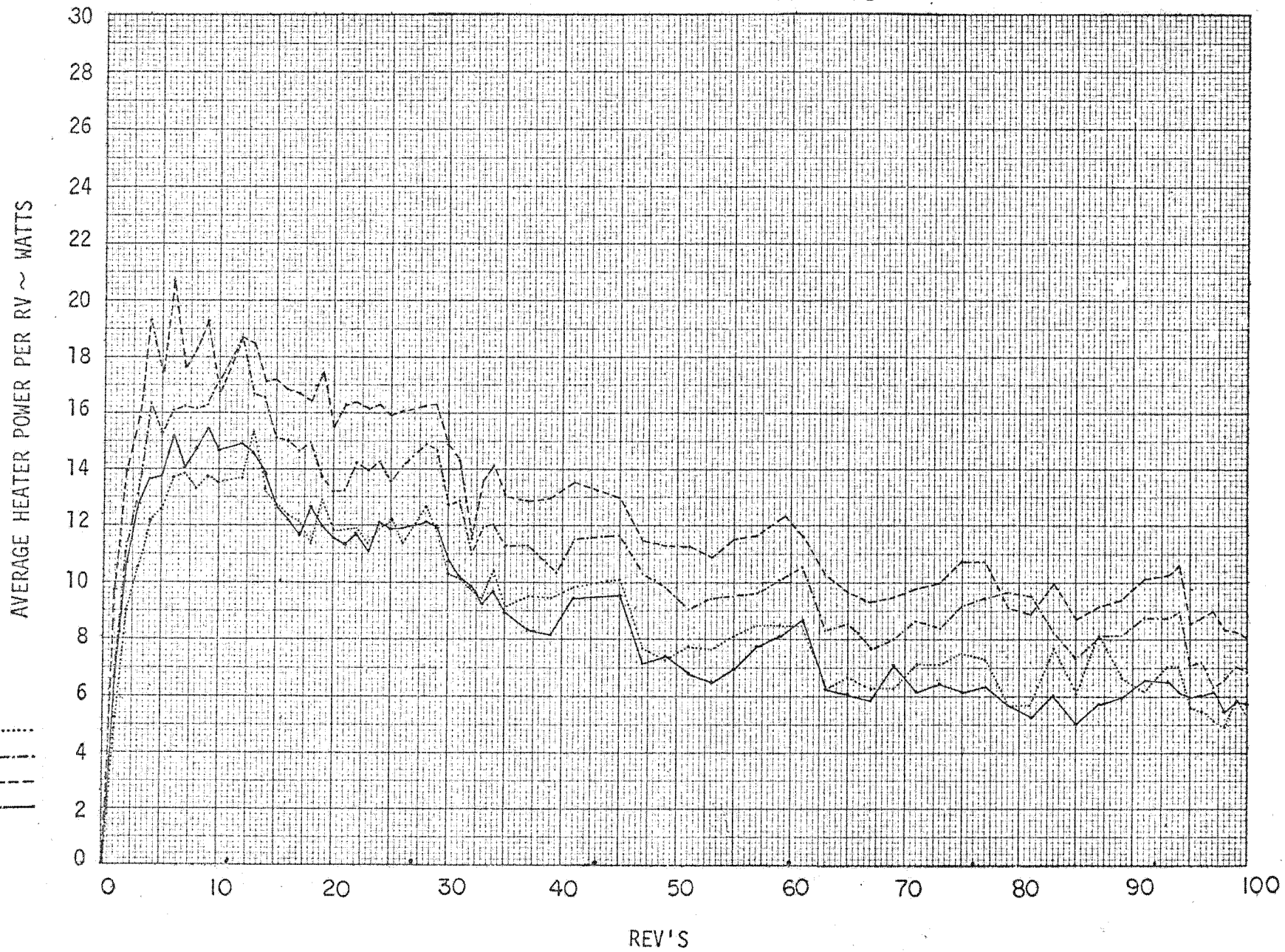
ACTIVE THERMAL CONTROL SYSTEM

RV HEATER POWER CONSUMPTION



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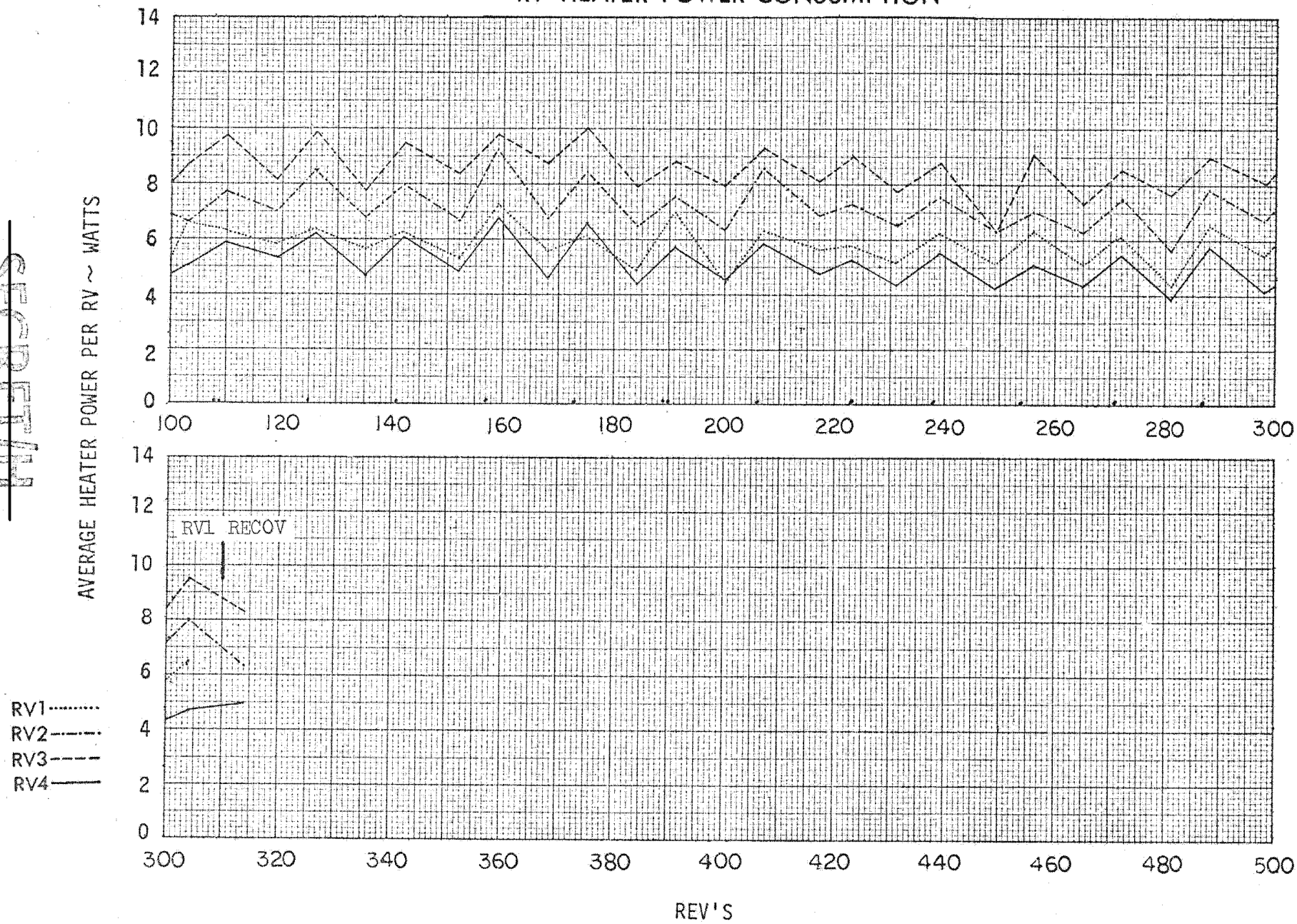
ACTIVE THERMAL CONTROL SYSTEM

RV HEATER POWER CONSUMPTION



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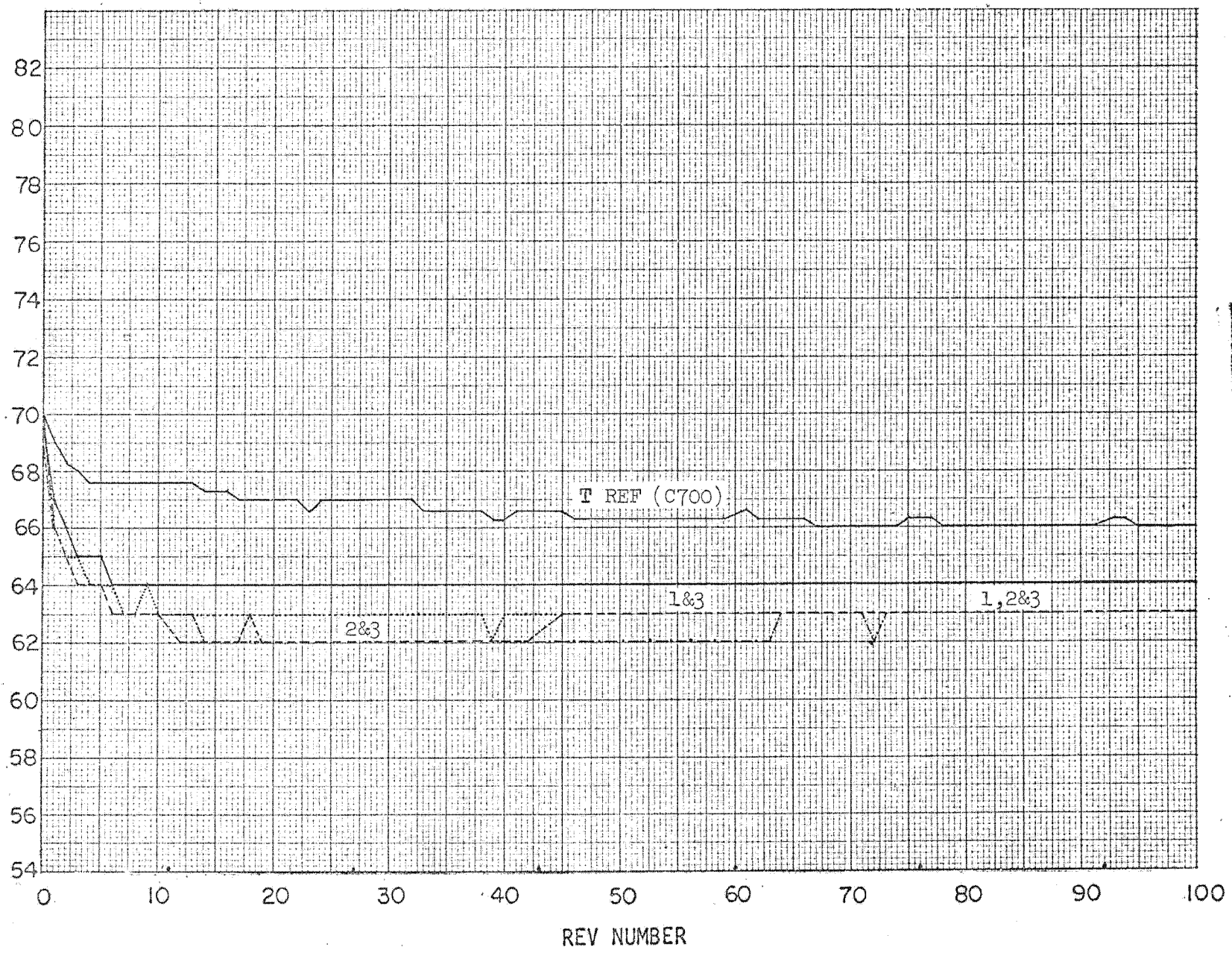
ACTIVE THERMAL CONTROL SYSTEM

RV PAYLOAD CONTAINER & REFERENCE TEMPERATURES



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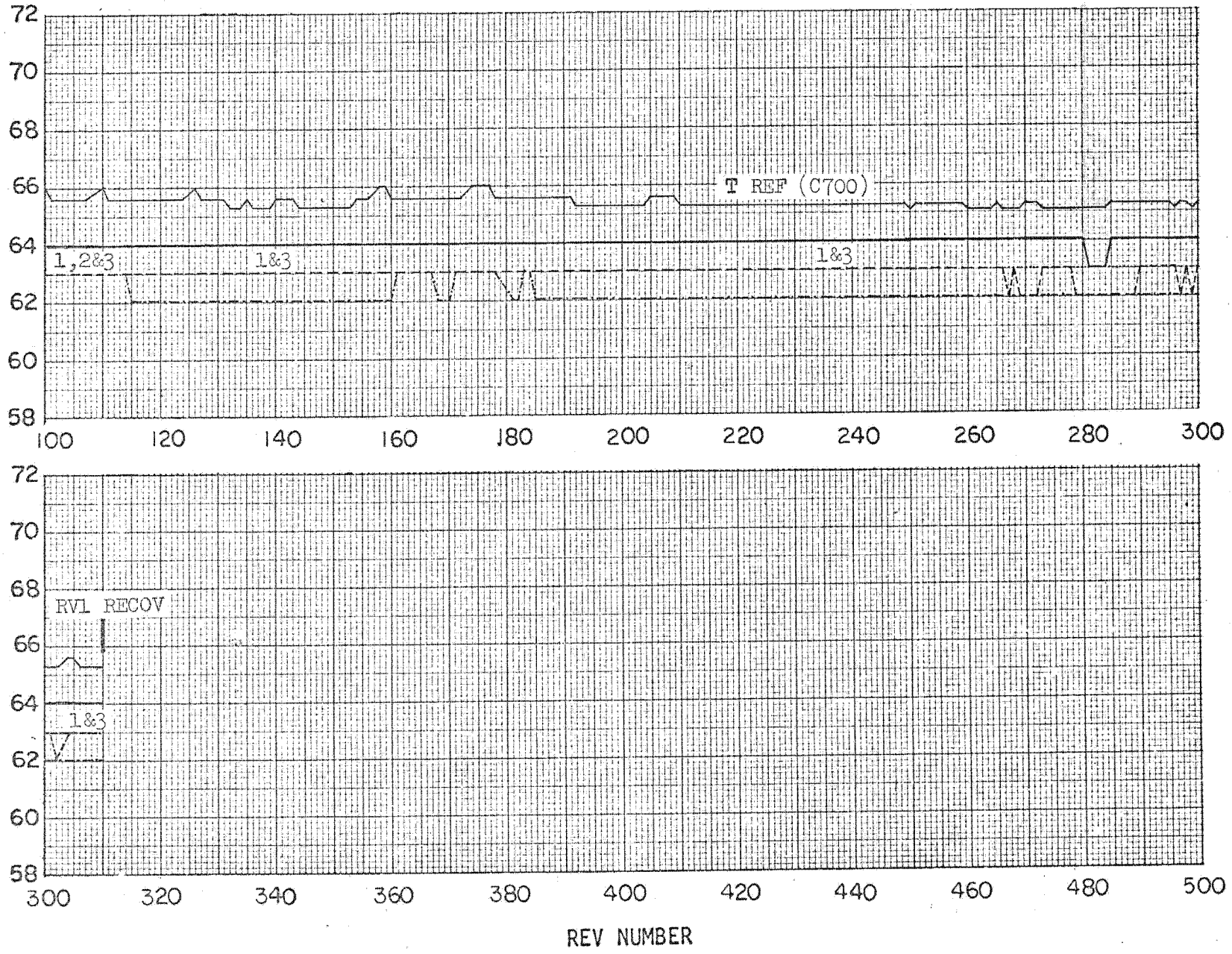
ACTIVE THERMAL CONTROL SYSTEM
RV PAYLOAD CONTAINER & REFERENCE TEMPERATURES



TEMPERATURE ~ °F

RV1 .....
RV2 -·-·-
RV3 - - -
RV4 ——

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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 310. Significant events affecting the orbit included an orbit adjust every two days with the fourth 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-1 segment were:

1. Positive orbit adjust on Rev 30.
2. Positive orbit adjust on Rev 62.
3. Positive orbit adjust on Rev 94 followed by a negative orbit adjust on Rev 96.
4. Positive orbit adjust on Rev 127.
5. Positive orbit adjust on Rev 159.
6. Positive orbit adjust on Rev 192 followed by a negative orbit adjust on Rev 194.
7. Positive orbit adjust on Rev 224.
8. Positive orbit adjust on Rev 257.
9. Positive orbit adjust on Rev 289 followed by a negative orbit adjust on Rev 291.

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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SUMMARY

EPOCH REV	ECCENT.	PERIOD DECAY	INTEG. PERIOD	MAX. ALTIT.	MIN. ALTIT.	ARG. PERIGEE	DRAG	STABLE/ TUMBLE	COMMENTS
000	.0097	.2153	88:52.0	157.37	86.11	139.0	.4080	212/70	
001	.0097	.2153	88:51.7	157.15	86.11	139.2	.4080	210/61	
002	.0096	.2179	88:51.3	156.96	85.97	139.1	.4080	208/60	
003	.0096	.2189	88:51.2	156.92	85.91	138.8	.4080	206/60	
004	.0096	.2170	88:50.9	156.84	85.86	138.5	.4020	208/60	
006	.0096	.2111	88:50.8	156.56	85.96	138.1	.3925	214/62	
008	.0095	.2084	88:50.2	156.32	86.02	137.2	.3874	217/63	
013	.0095	.2073	88:49.1	155.91	85.83	136.3	.3772	218/63	
016	.0094	.2031	88:48.6	155.47	85.98	135.6	.3710	222/64	
019	.0094	.2077	88:47.9	155.24	85.83	134.7	.3738	218/63	
021	.0094	.2090	88:47.4	155.02	85.79	134.3	.3731	217/63	
024	.0093	.2001	88:46.9	154.64	85.91	133.3	.3762	215/63	
029	.0092	.2252	88:45.7	154.07	85.75	132.4	.3948	200/58	
032	.0095	.2151	88:49.2	156.28	86.17	133.9	.3976	214/62	OA #1 Rev 30
035	.0095	.2482	88:48.3	155.94	86.00	133.2	.4468	186/54	
037	.0095	.2406	88:47.8	155.72	85.93	132.7	.4328	191/55	
040	.0094	.2323	88:47.3	155.31	86.07	131.8	.4194	197/56	
045	.0093	.2303	88:46.1	154.71	85.95	130.8	.4079	199/66	
051	.0092	.2355	88:44.6	153.97	85.90	129.1	.4101	193/65	
053	.0091	.2378	88:44.1	153.75	85.82	128.6	.4094	192/65	
056	.0091	.2267	88:43.6	153.36	85.95	127.8	.3919	200/66	
061	.0091	.2175	88:42.5	153.78	85.86	126.8	.3694	209/60	OA #2 Rev 62
064	.0098	.2012	88:50.0	158.21	86.25	129.8	.3709	237/69	
068	.0097	.2328	88:49.0	157.77	86.01	129.2	.4192	204/59	
070	.0097	.2243	88:48.6	157.48	86.09	128.6	.4039	211/61	
073	.0096	.2166	88:48.0	157.12	86.20	127.6	.3904	219/64	
078	.0096	.2117	88:47.0	156.65	86.03	126.7	.3736	223/67	
080	.0095	.2078	88:46.6	156.26	86.24	126.1	.3704	227/66	
084	.0095	.2140	88:45.6	155.88	86.07	125.2	.3734	220/64	
086	.0094	.2109	88:45.2	155.62	86.06	124.8	.3662	223/65	

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SUMMARY

EPOCH REV	ECCENT.	PERIOD DECAY	INTEG. PERIOD	MAX. ALTIT.	MIN. ALTIT.	ARG. PERIGEE	DRAG	STABLE/ TUMBLE	COMMENTS
089	.0094	.2166	88:44.6	155.24	86.16	123.8	.3759	217/63	OA #3 Rev 94
095	.0092	.1373	88:58.4	159.29	91.32	133.9	.3708	355/103	OA #4 Rev 96
097	.0093	.1990	88:49.8	155.07	86.35	139.6	.3808	223/65	
099	.0093	.2097	88:49.3	154.86	86.17	139.3	.3948	211/61	
102	.0093	.2038	88:48.7	154.64	86.09	138.5	.3796	217/63	
105	.0092	.1955	88:48.2	154.30	86.26	137.4	.3663	227/66	
110	.0092	.1993	88:47.2	153.89	86.09	136.5	.3658	222/66	
113	.0091	.2064	88:46.6	153.40	86.22	135.7	.3799	214/64	
116	.0091	.2215	88:45.8	153.16	86.04	134.9	.4001	200/58	
118	.0091	.2244	88:45.3	152.95	85.96	134.4	.4016	198.57	
121	.0089	.2077	88:44.9	152.61	86.09	133.5	.3729	213/64	
126	.0089	.2055	88:43.8	152.10	86.01	132.4	.3631	216/64	
129	.0094	.1966	88:49.0	155.82	86.31	134.4	.3679	233/70	OA #5 Rev 127
133	.0094	.2114	88:48.1	155.43	86.16	133.6	.3888	215/65	
137	.0093	.2011	88:47.4	155.00	86.30	132.3	.3704	227/66	
143	.0092	.2009	88:46.1	154.41	86.20	131.0	.3631	227/65	
145	.0092	.1996	88:45.7	154.03	86.39	130.4	.3639	228/66	
149	.0091	.2115	88:44.8	153.69	86.19	129.4	.3773	215/63	
151	.0091	.2126	88:44.3	153.42	86.19	129.0	.3772	214/63	
154	.0090	.2096	88:43.8	153.08	86.30	128.0	.3724	217/63	
159	.0090	.2228	88:42.8	152.53	86.21	127.3	.3895	204/61	OA #6 Rev 159
162	.0096	.2090	88:49.8	157.60	86.57	130.1	.3946	227/65	
165	.0096	.2246	88:49.0	157.34	86.38	129.4	.4147	211/63	
167	.0096	.2220	88:48.7	157.19	86.35	128.9	.4084	213/63	
170	.0095	.2189	88:48.0	156.72	86.45	128.0	.4028	215/63	
175	.0095	.2247	88:46.8	156.15	86.30	127.0	.4049	210/61	
178	.0094	.2163	88:46.2	155.60	86.51	126.3	.3932	218/63	
181	.0094	.2242	88:45.5	155.35	86.34	125.6	.3973	211/61	
183	.0093	.2244	88:45.0	155.09	86.31	125.2	.3973	210/61	
186	.0093	.2222	88:44.5	154.70	86.43	124.2	.3939	211/61	
191	.0092	.2322	88:43.2	154.02	86.32	123.3	.4036	201/58	
195	.0094	.2109	88:50.5	155.46	86.48	139.9	.4060	213/62	OA # 7 Rev 192 OA #8 Rev 194
199	.0093	.2133	88:50.0	155.25	86.35	139.4	.4089	208/60	
202	.0092	.2089	88:49.0	154.60	86.47	138.1	.4005	213/62	
207	.0091	.2224	88:47.8	153.95	86.43	136.9	.4205	200/58	

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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
210	.0090	.2525	88:47.1	153.39	86.54	136.1	.4782	176/50	
214	.0090	.2687	88:45.9	152.96	86.27	135.0	.4949	165/48	
216	.0090	.2715	88:45.4	152.60	86.25	134.6	.4968	163/47	
219	.0089	.2711	88:44.6	152.12	86.32	133.5	.4947	163/47	
223	.0083	.2723	88:43.5	151.56	86.12	132.8	.4857	161/47	
226	.0094	.2546	88:49.6	155.92	86.46	135.5	.4859	179/52	OA #9 Rev 224
230	.0094	.2672	88:48.5	155.41	86.18	134.8	.4961	170/49	
232	.0094	.2557	88:47.9	155.13	86.13	134.4	.4714	177/51	
235	.0093	.2538	88:47.3	154.67	86.25	133.3	.4683	179/52	
240	.0092	.2431	88:46.1	154.12	86.01	132.4	.4376	186/54	
243	.0091	.2443	88:45.4	153.54	86.20	131.6	.4415	185/54	
246	.0091	.2602	88:44.5	153.23	85.99	130.8	.4561	175/51	
248	.0091	.2562	88:44.0	152.96	85.92	130.4	.4487	176/51	
251	.0090	.2485	88:43.4	152.52	86.04	129.4	.4359	181/52	
256	.0089	.2521	88:42.0	151.85	85.87	128.4	.4322	178/51	
259	.0096	.2312	88:49.8	157.41	86.31	131.7	.4328	203/58	OA #10 Rev 257
262	.0096	.2681	88:49.0	156.93	86.24	131.1	.4957	175/51	
264	.0096	.2804	88:48.3	156.60	86.14	130.6	.5121	167/48	
267	.0094	.2303	88:47.8	156.12	86.44	129.6	.4264	203/58	
272	.0094	.2385	88:46.5	155.55	86.21	128.6	.4296	195/55	
275	.0093	.2454	88:45.9	155.08	86.28	127.8	.4418	189/55	
278	.0093	.2567	88:45.0	154.72	86.11	127.1	.4531	181/52	
280	.0093	.2629	88:44.4	154.46	86.02	126.5	.4589	176/51	
283	.0092	.2555	88:43.9	153.99	86.16	125.7	.4469	181/52	
288	.0091	.2645	88:42.4	153.15	86.08	124.6	.4538	174/49	
292	.0094	.2341	88:50.7	155.64	86.52	139.9	.4578	190/55	OA #11 Rev 289
295	.0094	.2500	88:49.9	155.37	86.12	139.6	.4743	177/51	OA #12 Rev 291
297	.0093	.2453	88:49.4	155.07	86.15	139.1	.4636	181/52	
300	.0093	.2462	88:48.8	154.60	86.29	137.9	.4664	180/52	
304	.0092	.2378	88:47.7	154.15	86.13	137.1	.4419	187/54	
308	.0092	.2349	88:46.9	153.54	86.23	136.1	.4366	188/55	

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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
000	Day 1	-1.749	-2.344	070	5	.270	.912
001	1	- .681	-1.081	073	5	.144	.378
002	1	.134	.600	078	6	-.080	-.146
003	1	.147	.671	080	6	.108	-.265
004	1	.145	.602	084	6	-.034	-.058
006	1/2	.095	.502	086	6	-.148	-.392
008	1/2	.080	.450	089	6/7	.020	-.118
013	2	.116	.211	094	7	-.321	-.447
016	2	-.102	-.102	096	7	-1.796	-3.530
019	2	-.095	-.372	097	7	-.140	-.104
021	2	-.087	-.544	100	7	.410	1.044
024	2/3	-.240	-1.125	102	7/8	.248	.468
029	3	-.389	-1.212	105	8	.036	-.374
032	3	-.324	-.908	110	8	-.336	-.996
035	3	.291	1.092	113	8	-.176	-.356
037	3	.250	.828	116	8	.173	.800
040	3	.115	.398	118	8/9	.434	1.221
045	4	.022	.179	121	9	.188	-.055
048	4	-.022	.122	126	9	-.465	-1.200
050	4/5	.152	.794	129	9	.001	-.179
053	4/5	.315	1.080	133	9	.277	.809
056	5	.264	.448	137	9/10	.058	-.002
061	5	-.387	-1.137	143	10	-.198	-.567
064	5	-.267	-.776	145	10	-.194	-.559
068	5	.361	1.264	149	10	-.004	-.179

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PREDICTION [illegible] ACT SUMMARY

(BFE - Tracking Reduction Predictions)

Tracking Reduction Epoch Rev	BFE ID NO.	5 Revs After Epoch	10 Revs After Epoch
151	10	.008	.372
154	10/11	-.277	-1.362
159	11	-.572	-1.359
162	11	-.284	-.640
165	11	.052	.274
167	11	.019	.079
170	11/12	-.057	-.120
175	12	.101	.339
178	12	-.049	-.180
181	12	-.021	-.175
183	12	-.004	-4.177
186	12/13	-.108	-.501
191	13	.012	.159
195	13	-.260	-.451
199	13	.072	-.523
202	13/14	-.208	-1.366
207	14	-.647	-2.257
210	14	-.259	-.727
214	14	-.109	0
216	14	-.014	.253
219	14/15	.154	.466
223	15	.077	.315
226	15	-.224	-.104
230	15	.184	1.286
232	15	.095	.687

Tracking Reduction Epoch Rev	BFE ID NO.	5 Revs After Epoch	10 Revs After Epoch
235	15/16	.284	.783
240	16	-.117	-.241
243	16	-.195	-.216
246	16	.145	.608
248	16	.165	.503
251	16/17	-.006	-.037
256	17	-.055	-.361
259	17	-.528	-1.207
262	17	-.046	.966
264	17/18	.752	2.680
267	18	-.068	-.313
272	18	-.217	-.714
275	18	-.162	-.433
278	18	-.007	-.006
280	18	.160	.343
283	18/19	-.104	-.769
288	19	-.440	-1.012
292	19	-.345	-.645
295	19	.128	.528
297	19/20	.007	.222
300	20	.177	.705
304	20	.023	-1.135
308	20	-.496	-1.110
311	20	-.310	-.408
313	20/21	.418	1.218

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

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		Period Min:Sec. XX:XX.X	Perigee N.M. XX.XX	Apogee N.M. XXX.XX	Arc of Per. Deg. XXX.XXX	Burn Dur. Sec. XX.X	Delta Velocity XX.XX
OA No. 1	Rev. No. 30						
Orbit at Rev	29	88:45.6	87.65	152.25	132.144	-	-
Predicted	31	88:49.6	87.90	154.93	134.171	19.0	6.49
Actual	31	88:49.5	87.95	154.81	134.176	19.0	6.51
Delta (A-P)		-.07	+.048	-.116	+.005	0	.02
OA No. 2	Rev. No. 62						
Orbit at Rev	61	88:42.4	87.79	151.07	126.586	-	-
Predicted	62	88:50.4	87.98	156.93	130.148	36.8	+12.67
Actual	62	88:50.3	88.01	156.84	130.108	36.8	+12.76
Delta (A-P)		-.075	+.031	-.087	-.040	0	+.09
OA No. 3	Rev. No. 94						
Orbit at Rev	93	88:43.5	87.89	153.21	122.982	-	-
Predicted						68.4	+23.56
Actual						68.4	+23.65
Delta (A-P)						0	+.09
OA No. 4	Rev. No. 96						
Orbit at Rev							
Predicted	97	88:50.0	87.83	153.49	139.875	37.6	-12.81
Actual	97	88:49.8	87.99	153.24	139.554	37.6	-12.71
Delta (A-P)		-.180	+.159	-.257	-.321	0	+.10

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		Period Min:Sec. XX:XX.X	Perigee N.M. XX.XX	Apogee N.M. XXX.XX	Arc of Per. Deg. XXX.XXX	Burn Dur. Sec. XX.X	Delta Velocity XX.XX
OA No. 5	Rev. No. 127						
Orbit at Rev	126	88:43.7	87.93	150.21	132.173	-	-
Predicted	127	88:49.4	88.06	154.38	134.775	27.6	9.11
Actual	127	88:49.3	88.06	154.31	134.690	27.6	9.23
Delta (A-P)		-.114	- 003	-.073	-.085	0	.12
OA No. 6	Rev. No. 159						
Orbit at Rev	158	88:42.7	88.11	150.79	127.173	-	-
Predicted	159	88:50.4	88.26	156.46	130.674	37.2	12.26
Actual	159	88:50.3	88.32	156.32	130.664	37.2	12.30
Delta (A-P)		-.089	+.060	-.139	-.010	0	+.04
OA No. 7	Rev. No. 192						
Orbit at Rev	191	88:43.2	88.22	152.48	123.107	-	-
Predicted						74.9	24.73
Actual						74.9	24.77
Delta (A-P)						0	+.04
OA No. 8	Rev. No. 194						
Orbit at Rev							
Predicted	194	88:50.6	88.07	153.69	140.171	37.2	-12.06
Actual	194	88:50.6	88.11	153.70	140.172	37.2	-11.97
Delta (A-P)		+.068	+.047	+.012	+.001	0	+.09

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		Period Min:Sec. XX:XX.X	Perigee N.M. XX.XX	Apogee N.M. XXX.XX	Arc of Per. Deg. XXX.XXX	Burn Dur. Sec. XX.X	Delta Velocity XX.XX
OA No. 9	Rev. No. 224						
Orbit at Rev	223	88:43.3	87.99	149.65	132.641	-	-
Predicted	224	88:49.9	88.09	154.51	135.730	33.6	10.69
Actual	224	88:50.0	88.15	154.48	135.778	33.6	10.78
Delta (A-P)		+.051	+.062	-.034	+.048	0	+.09
OA No. 10	Rev. No. 257						
Orbit at Rev	256	88:41.9	87.87	150.06	128.188	-	-
Predicted	257	88:50.2	88.05	156.05	131.965	42.00	13.32
Actual	257	88:50.2	88.11	156.03	131.998	42.00	13.41
Delta (A-P)		+.06	+.06	-.03	+.03	-	+.09
OA No. 11	Rev. No. 289						
Orbit at Rev	288	88:42.3	87.98	151.54	124.410	-	-
Predicted						76.6	24.33
Actual						76.6	24.27
Delta (A-P)						0	-.06
OA No. 12	Rev. No. 291						
Orbit at Rev							
Predicted	291	88:51.0	88.09	154.06	140.068	31.0	-9.61
Actual	291	88:50.9	88.14	153.94	140.11	31.0	-9.66
Delta (A-P)		-.07	+.04	-.12	+.04	0	-.05

Table 2.5-3

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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
1	1	.0096	96.21	88:51.6	155.27	87.64	139.3	.3906	0-6
								.3764	6-15
2	31	.0095	96.21	88:49.5	154.70	87.95	134.1	.3779	14-17
								.3814	17-25
								.4070	25-
3	46	.0093	96.21	88:45.9	152.81	87.88	130.5	.3978	30
								.4225	30-38
								.4080	38-
4	41	.0093	96.21	88:47.0	153.27	88.09	131.4	.4090	41-50
								.3915	50-57
								.3588	57-
5	56	.0091	96.20	88:43.7	153.27	86.09	127.9	.4124	56-63
								.4000	63-71
								.3751	71-

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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
6	74	.0096	96.21	88:47.8	156.87	86.30	127.4	.3767	74-82
								.3770	82-88
								.3727	88-
7	90	.0093	96.20	88:44.4	154.85	86.41	123.6	.3897	90-96
								.3734	96-104
								.3723	104-
8	106	.0091	96.21	88:48.0	153.99	86.53	136.9	.4076	106-114
								.3852	114-102
								.3655	120-
9	122	.0089	96.20	88.44.7	152.29	86.42	132.8	.3930	122-128
								.3776	128-136
								.3641	136-

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	143	.0092	96.20	88.46.1	154.30	86.28	131.1	.3801	143-149
								.3776	149-155
								.4142	155-
11	155	.0090	92.20	88:43.5	152.71	86.47	127.9	.4197	155-162
								.4069	162-170
								.4072	170-171
12	171	.0095	96.20	88:47.7	156.36	86.64	127.8	.4007	171-178
								.3981	178-184
								.4148	184-187
13	187	.0092	96.20	88:44.2	154.37	86.67	123.8	.4529	187-194
								.3943	194-201
								.4289	201-204

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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
14	204	.0091	96.20	88:48.5	154.19	86.60	137.5	.4761	204-211
								.4976	211-218
								.4769	218-
15	220	.0088	96.20	88:44.3	151.86	86.33	133.6	.5142	220-228
								.4667	228-235
								.4273	235-
16	236	.0092	96.20	88:47.1	154.42	86.36	133.1	.4572	236-243
								.4412	243-250
								.4366	250-
17	252	.0089	96.20	88:43.2	151.99	86.45	129.2	.5527	252-260
								.4568	260-268
								.4079	268-

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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
18	269	.0094	96.20	88:47.3	155.91	86.34	129.1	.4499	269-276
								.4474	276-282
								.4576	282-
19	284	.0092	96.20	88:43.7	153.80	86.22	125.6	.5858	284-292
								.4692	292-300
								.4388	300-301
20	301	.0092	96.20	88:48.5	154.34	86.41	137.7	.4433	301-310
								2.2593	310
								.4536	310-316
								.4607	316-

Table 2.5-4

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2.5.2 Telemetry and Mode Processing

2.5.2.1 General

The telemetry modes to support SV-6 were validated prior to the dress rehearsals. Mode problems and required improvements are discussed in the following paragraphs.

2.5.2.2 Digital T.V.

The 104 column changes to Modes 11, 13 and 14 were started during this segment.

2.5.2.3 [redacted] (b)(1) (b)(3)

2.5.2.4 Orbit Adjust

Short OA burns of less than 20 seconds duration gave insufficient data from Mode 124.1. Processing of required points was increased from 20 Sps to 50 Sps.

2.5.2.5 Modes 122.1 and 144.1 packed word SPL. When the platen press monitor became intermittent, it was necessary to change the key for outputting the packed word SPL.

SPL was occasionally missed because of too low a sample rate. Sample rate was increased from 1 Sps to 20 Sps.

2.5.2.6 MCS Time Word

MCS time word did not print out in Format D modes. MSTAC had defined an improper number of bits for the MCS time word.

2.5.2.7 I.D.'s

After switch to the redundant ACS it was discovered that when ID's 1 & 2 ON (primary ACS) were entered they could not be turned off. Mode change automatically removed the ON's.

2.5.2.8 Voice Telemetry Reporting

The data in the voice reporting telemetry modes were updated to the actual data requirements from the available displayed data.

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2.5.3 Command Message Planning and Generation

The FPA was updated to reflect SV-6 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 more significant changes included:

a. Addition of an ACS record FPA
b. Modification of the RCS record requirements
c. Addition of the Lifeboat Yaw Bias Determination FPA
d. Modification of the RV 1-4 battery execute time
e. Addition of RV-1 and RV-3 Pre-Prep FPA's to verify Builder Roller down.

Required sequence changes were processed by on-line CSSG (Command Sequence Subgroup) meetings to review sequence priorities, correctness and establish implementation plans.

Command Generation support was excellent during this segment. The major problem concerned the RV-1 recovery message location and order of SPC's and sequences. As a result, message alters were required and the primary load station was missed. The recovery FPA's are being revised to more clearly define the requirements.

2.5.4 SCF Support

SCF operations during RV-1 provided excellent support. Several RTS hardware problems required use of back-up stations for command message loading but this did not impact mission support.

Close monitoring of radiation levels and frequent reporting was provided as a result of the SV-5 stellar film fogging problem.

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SECTION 2.6
PROGRAM COMMAND SOFTWARE PERFORMANCE
(Prepared by HTC)

2.6 PROGRAM COMMAND SOFTWARE PERFORMANCE
(Prepared by Computer Program Associate Contractor - HTC)

2.6.1 Command Message Summary

This section summarizes pertinent command message data from Mission 1206, IRON 8261. The command messages discussed cover the period from the pad load to the RV1 recovery message (Rev 306 load).

Two hundred forty-eight command messages were received by the Technical Advisor (TA) Staff. Two hundred twenty-four were accepted and twenty-four were rejected. Eight of the rejected messages were subsequently altered or regenerated and loaded into the vehicle. The reasons for rejection of the twenty-four messages are summarized below:

Rev. No. and Load Station	Reason for Rejection
29 GUAM	Tape recorder constraint violation occurred.
29 GUAM	Incorrect manual sequence was used. Sequence 272 was desired but 372 was incorrectly punched on the SEQ card.
29 GUAM	Tape recorder constraint violation occurred.
32 POGO	No change in payload requirement from previous SE message.
34 POGO	No change in payload requirement from previous SE message.

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Rev. No. and Load Station	Reason for Rejection
37 POGO	No change in payload requirement from previous SE message.
47 POGO	No change in payload requirement from previous SE message.
49 POGO	No change in payload requirement from previous SE message.
63 POGO	No change in payload requirement from previous SE message.
84 POGO	MCS command status from MCS message propagated into SP message.
112 POGO	SSC focus commands were moved out of place.
137 COOK	Tape recorder constraint violation occurred.
144 POGO	No change in payload requirement from previous SE message.
186 COOK	No change in payload requirement from previous SE message.
195 POGO	No change in payload requirement from previous SE message.
209 POGO	No change in payload requirement from previous SE message.
225 POGO	No change in payload requirement from previous SE message.
233 BOSS	No change in payload requirement from previous SE message.
241 BOSS	No change in payload requirement from previous SE message.
245 POGO	No change in payload requirement from previous SE message.

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Rev. No. and Load Station	Reason for Rejection
259 POGO	No change in payload requirement from previous SE message.
263 POGO	TT/C constraint violation occurred.
274 POGO	No change in payload requirement from previous SE message.
306 POGO	Sequence 241 was not in both PMU's. [redacted] required shortening on Rev 308 and deletion on Rev 309. (b)(1) (b)(3)

Two hundred eighteen messages were loaded and thirty were not for the reasons stated below:

1. The twenty-four rejected messages were not loaded.
2. One altered message was not loaded because it was decided that the original message was satisfactory.
3. One message contained no weather data past the first rev span.
4. A contingency message for tumbling capture was not loaded because it was not required.
5. One message was not loaded because of a change in message requirements.
6. One message was conditionally approved if required, however was not loaded. Sequence 149 had a DT of 73 seconds and 50 seconds was the desired DT.
7. One contingency VBE message concerning RV1 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 nine add-on messages.

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2.6.2 'TUNITY Software Problems

The Flight 6 '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. SPRs 6190 and 6193 were designated Flight Critical but did not require any program mods. SPR 6190 was explained as not being a problem and SPR 6193 was fixed with a DBCR.

Category	No. of SPRs	Comments
Flight Critical	6 (6187)(6190) (6191)(6193) (6198)(6199)	Software corrections were made and incorporated during this flight period.
Non-Flight Critical (Requiring Work-Around)	5	Work-around procedures were developed and implemented.
Non-Flight Critical (Minor)	5	Work-around procedures were not required.
Product Improvement or New Requirements	9	To be considered during future development.
Documentation Error	7	MS-4 or MS-7 affected.

Itemized Software Problems

SPR MD2-6186('TCOMCHK)

- Problem Description: MCS commands which have been erased by an MCS Memory Off continue to appear in the merged chrono listing in command messages. The software does not recognize that the Memory Off erases stored MCS commands. It only recognizes the MCS erase command to cause it to purge the MCS memory.

- Solution or Work-Around: When the MCS message is updated, a "DELLOC" card is used to delete the unwanted commands. This allows only those commands which will actually execute to appear in the merged chrono listing.

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- Operational Impact: None.

- Comment: This SPR should be considered as a product improvement item for a future software delivery. The solution could be to check the execution time of the MCS off command and not put any MCS commands in the 'TMI after that time.

SPR MD2-6187('TFRTIN) - FLIGHT CRITICAL -

- Problem Description: During the processing of the "BIAS" cards in MPR, the read of a rev's data cards is terminated by the next "REV" card or a "TERM" card; however, when the next "REV" card is encountered, 'TFRTIN loses track of which rev is being processed. The result is a Category 4 abort with the option to continue processing with next active rev (in which case one rev is skipped) or to reinput the cards to continue with the current rev.

- Solution or Work-Around: The problem was determined to be flight critical because the proper film totals were not being output by MPR. A change was made to 'TFRTIN correcting the problem and was incorporated on the Flight Aux Master.

- Operational Impact: The proper MPR transmission tape was delayed in being sent to the user.

SPR MD2-6188 ('TMOD)

- Problem Description: A 'TMOD run was begun to update an RPT tape. During the run, an abort occurred because the input RPT was not equipped. The abort message said that the data base didn't need to be reloaded so the users went ahead with the next run which was 'TBAT. 'TBAT aborted with a Category 5 message stating that part of the MOB files were missing.

- Solution or Work-Around: When an abort occurs while running 'TMOD, reload the data base and start the run over again.

- Operational Impact: The data base had to be reloaded and the 'TBAT run started over again causing a delay in the operational time line.

- Comment: The conditions under which the data base needs to be reloaded after a 'TMOD run abort should be clarified. Also, the abort message should be corrected, if necessary, to reflect the true state of the data base after such an abort.

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SPR MD2-6189('TFRTIN MS-4)

- Problem Description: The flow chart on Page 97 has a decision box in which neither the code nor the comment reflect what is being done in the actual JOVIAL code.
- Solution or Work-Around: None.
- Operational Impact: None.
- Comment: The MS-4 flow chart should be changed to reflect the JOVIAL code.

SPR MD2-6190 ('TBALL) - FLIGHT CRITICAL -

- Problem Description: On Rev 25, OP number 24, the desert slit biasing appears to be operating improperly. Frames 16, 20 and 23 through 31 for both A and B are biased. Frames 17, 18, 19, 21 and 22 are not biased. A frame should not be biased unless it is completely within the defined polygon. Frames are being biased that should not be biased causing improper exposure.
- Solution or Work-Around: The problem was determined to be Flight Critical. SOST studied the problem thoroughly and determined that 'TUNITY was operating properly. A memo was written explaining the problem. (Reference Flight Memo Number 8261-460).
- Operational Impact: There was no operational impact, just confusion to the user.
- Comment: 'TUNITY is operating per design in this case. The misunderstanding is that for the frame to be biased, all active cells must be within the polygon and not the entire frame itself.

SPR MD2-6191 ('TFUSE) - FLIGHT CRITICAL -

- Problem Description: Both interop and photo footages for Op 29, Rev 31, in MPR were calculated to be zero. 'TSTATUS also indicated a zero footage for Rev 31 even though there was activity on the rev.
- Solution or Work-Around: The problem was determined to be flight critical because the MPR footage totals were in error and had to be changed manually before they could be used by the customer. A change was made to 'TFUSE correcting this problem and was incorporated on the Flight Aux Master.

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- Operational Impact: The TT tape header was manually changed to advise the customer that the values were incorrect. With the implementation of the new Mod of 'TFUSE the problem has been solved.

SPR MD2-6192 ('TWIT)

- Problem Description: When 'TWIT is run, it is outputting missing weather request cards for ST operations. Checking the 'TBALL output shows that the photographed area, for which no verified weather has been supplied, occurs after the 'TCATCHM computed off-lat of the ST operation. 'TWIT is attempting to countdown the area that occurs in the last frame of an ST op when a hardware constraint of the ST shut down procedure has created an extra frame.

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

- Comment: After studying the problem, it was determined by the SOST that the extra weather request was appearing whenever there was an extra frame for the ST system. This extra frame is due to the hardware design. Even though an off command is executed, the ST system often takes one additional frame that 'TBALL has no knowledge of and therefore requests no weather for it.

SPR MD2-6193 ('TMOUND) - FLIGHT CRITICAL -

- Problem Description: Incorrect slit width A update appears to occur at solar elevation 59.06 to 61.69 degrees (one step update at 59.06^{0}, two steps at 60.38^{0}, back to one step at 60.69^{0} and nominal at 61.69^{0}).

- Solution or Work-Around: The problem was determined to be flight critical because of the undesired overexposure bias errors. An error was discovered in the 'COPTEA array in the data base. DBCR MOD2-190 was implemented on the Flight Data Base to correct this problem.

- Operational Impact: The affected messages were altered to correct the improper commands. With the implementation of the DBCR, the problem has been solved.

SPR MD2-6194 (MPR)

- Problem Description: MPR footage totals should be rounded to the nearest foot.

- Solution or Work-Around: None.

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- Operational Impact: None.

- Comment: DOX is studying the problem to determine if this is really a requirement or if the user wants the display of totals to remain the way they appear now.

SPR MD2-6195 ('TLMP)

- Problem Description: The first 'TFRTFIX run following the 18 July MPR run contained data from the 'TMB that should have been purged by 'TLMP. This causes 'TFRTFIX to contain a great deal of worthless data.

- Solution or Work-Around: The work-around is to use the "erase" option on the BBRT card to purge the 'TMB data that is not needed. This procedure should be accomplished once a day follow-inf the MPR run.

- Operational Impact: None.

- Comment: It is a software problem. The solution is known and should be fixed prior to the launch of SV-7.

SPR MD2-6196 ('THISTLE)

- Problem Description: MCS commands from message 200 (MCS Health check message on Rev 18) remained in the 'TMITAB and when message 770 for Rev 84 was generated (by this time the MCS clock had re-cycled) the MCS commands were again processed by 'CMG. The 'TFSTAB was changed to reflect that the telemetry subsystem was on the "B" side. The ECS 12EV commands which executed after the MCS command has been processed (these commands are filled from the status of the 'TFSX) were configured to command the telemetry units to the "B" side.

- Solution or Work-Around: After the MCS "off" command has executed, an MCS erase message must be generated and updated to reflect the true status of the vehicle in the 'TMITAB.

- Operational Impact: The message had to be regenerated with the use of an SPC card to force the telemetry commands to the "A" side.

- Comment: It is a software problem. 'TUNITY should be fixed so that 'CMU will recognize the MCS "off" command and will not carry the MCS commands in the 'TMI after the "off" command executes. This SPR should be fixed prior to SV-7.

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SPR MD2-6197 (Compool/Data Base Handbook)

- Problem Description: The data block 'TJB should be added to 'CPUNAM as a legal data block under purge control in both the Data Base Handbook and the Compool.
- Solution or Work-Around: None.
- Operational Impact: None.
- Comment: The above mentioned documents should be updated to correct the discrepancy.

SPR MD2-6198 ('TFRTFIX) - FLIGHT CRITICAL -

- Problem Description: A BBRT had a dubious entry for OB "B" which CG attempted to remove via a "MODF" card in 'TFRTFIX. The bad entry remained, and even though the new FRT data listing didn't reflect it, the summary suggested that the "MODF" card had somehow generated a new entry with the "MODF" cards' parameters for OB A.
- Solution or Work-Around: The problem was determined to be flight critical because the "MODF" mode of 'TFRTFIX was not working properly. A change was made to 'TFRTFIX correcting this problem and was incorporated on the Flight Aux Master.
- Operational Impact: The dubious entry was ignored and MPR did not process it. With the implementation of the new mod of 'TFRTFIX, the problem has been solved.

SPR MD2-6199 ('TUMP) - FLIGHT CRITICAL -

- Problem Description: In applying the same procedure of doing thru focus commanding via sequence cards with latitude and time bias as on previous flights, the sequence execution times on this flight are 0.6 to 0.8 seconds early when referenced to the OB rotation. The thru focus operations actually had focal plane transitions during the frames.
- Solution or Work-Around: The problem was determined to be flight critical because of the focus transitions executing in the middle of the frames. A change was made to 'TUMP correcting this problem and was incorporated on the Flight Aux Master.

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- Operational Impact: The THRU FOCUS operations had focus transitions executing in the middle of the frames which rendered these frames of the TEST unusable. With the implementation of the new mod of 'TUMP, the problem has been solved.

SPR MD2-6200 (Data Base Handbook)

- Problem Description: The Data Base Handbook does not list the source agency for items in several "system" data blocks ('STDATA, 'STDATB, 'STDATH, 'STDATX).
- Solution or Work-Around: None.
- Operational Impact: None.
- Comment: The Data Base Handbook should be updated to reflect the above mentioned errors.

SPR MD2-6201 ('TFRTIN)

- Problem Description: 'TEMPER now requires a Rev + 1 card when inputting "TOT" and "BIAS" cards. That is, if the span on the MPR run is 4 - 9, then a "REV" 10 card must be added to the deck; otherwise 'TEMPER will abort on the "TERM" card resulting in the loss of data for one active rev.
- Solution or Work-Around: The work-around procedure is to input a "REV" card with the rev number equal to the end rev of the MPR span plus one in each MPR run containing "TOT" and/or "BIAS" cards.
- Operational Impact: None.
- Comment: It is a software problem; the solution is known and it will be fixed in time to support SV-7.

SPR MD2-6202 ('TBALLA)

- Problem Description: Message 230 had a simultaneous ST/PAN MOP (MOP card input 35.9^{o} to 31.0^{o} N). In order to finish a DEA, the ST ran down to 30.08^{o} N, but the combined "VER" request file only went down to 31.0^{o} N. As a result, MPE had missed weather for some cells on the operation.
- Solution or Work-Around: None.

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- Operational Impact: There was no operational impact because the verified weather that comes back from Weather Central is padded by .5° and the missed cells were outside of the overlap area.

- Comment: It is a software problem; the solution is known and it should be fixed in time to support SV-7.

SPR MD2-6203 ('TCOMLST)

- Problem Description: When 'TIDY deletes functionally redundant "off" commands, the chrono shows an "off" command loaded in both PMUs, at the execution time of the earliest "off" in the redundancy. However, the chrono also shows the sequence number of the lowest event generator (class load order) or lowest serial number in the case of redundancies caused by the same event generator. The end result, that the sequence number attached to the "off" command is not what initiated the "off" command, is confusing to the message checking personnel.

- Solution or Work-Around: None.

- Operational Impact: None.

- Comment: The SOST is now studying the possibilities of solving this problem. At the present time, it is not yet known if the problem can be solved.

SPR MD2-6204 ('TCOMLST)

- Problem Description: It would be helpful to have command sequence serial numbers printed out in the chrono listing as an aid to message checking. The "LOC" field in the chrono list could be deleted and replaced by a "SER" field. This becomes particularly important when trying to check what 'TRIAL/'TIDY does by way of redundant deletion logic and duty cycle logic.

- 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 MD2-6205 ('TOTEM MS-4)

- Problem Description: The recent addition of limitation (f) under polygon limitations should have caused the deletion of limitation (e). The two limitations are contradictory.

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- Solution or Work-Around: None.
- Operational Impact: None.
- Comment: The 'TOTEM MS-4 should be updated to include the above-mentioned discrepancy.

SPR MD2-6206 ('TUMP)

- Problem Description: When SL cards are input, there is about a 6.0 second offset between the time the A side bias is commanded and the time the B side bias is commanded. Examples of this occurrence may be found on Rev 146 (message 520) and on Rev 81. A procedure is currently being followed whereby A and B slit cards are offset by an amount equal to the startup difference between the two sides (3 OB rotations).
- Solution or Work-Around: When inputting slit cards for both the A and B sides, they should be input with the same time tag and they will execute at the proper time.
- Operational Impact: As a result of the way the SL cards were input, the exposure on the MOPs on the two above mentioned revs were incorrect.
- Comment: Due to a MOD 2 requirement, it is no longer necessary to apply the six second bias to B SL card. Both SL cards may now have the same time bias and they will execute properly.

SPR MD2-6207 ('TPURR)

- Problem Description: 'TPURR Daily for 23 July 1973 aborted attempting to purge record 42 of Data Block 'TGY. The record had already been purged the previous day. As a result, the CHG data blocks did not get purged for the day. It appears 'TPURR neglects the zero the 'TGXTBl table entry after it points to a 'TGY record which is to be purged.
- Solution or Work-Around: After the 'TPURR Daily run, CG will 'TPLAY the 'TGX and SOST will examine the dump to determine if any pointers have to be zeroed out via 'SDBG.
- Operational Impact: None.
- Comment: It is a software problem; the solution is known and it should be fixed in time to support SV-7.

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SPR MD2-6208 ('TMOUND MS-4/MS-7)

- Problem Description: The 'TMOUND MS-4 flow charts need updating to agree with the current MOD of 'TMOUND on the Aux Master.

    1. Page 30: Change 'TRRVS to 'TRRVX.

    2. Page 26: Change 'TDOSTT(JN) LQ 'TRRTF AND 'TRRTIM LQ 'TDOENT(JN), to: 'TDOSTT(JN) LQ 'TRRTF-J*3* (1/(10.*'TRRVX)) LQ 'TDOENT(JN).

    3. MS-7 does not provide sufficient detail on the SL bias field. Clarifying comments should be added.

- Solution or Work-Around: None.

- Operational Impact: None.

- Comment: The 'TMOUND MS-4 and the MS-7 should be updated to include the above-mentioned discrepancies.

SPR MD2-6209 ('TUNITY)

- Problem Description: 'TUNITY should have the capability to position the end-of-rev initialize sequences for the camera systems within a specified (Data Base) time of the last op on a rev.

- 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 MD2-6210 ('TMERGE)

- Problem Description: 'TMERGE uses the physical disc track size (512 words) as the logical track size for disc allocation. It should use a logical track size of 32 words to be consistent with SYMON.

- 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 MD2-6211 ('TVEMIN)

- Problem Description: A conflict exists between the Model 15.0 Compool and 'TVEMIN. In Model 15.0 the 'REEK table has been deleted. The table items that were previously in 'REEK are simple items in Model 15.0. 'TVEMIN uses the items 'RSTAB and 'RWI which were previously in the 'REEK table. To make 'TVEMIN compatible with Model 15.0, the subscript for these items must be removed. This change will then make the resultant program incompatible with SST 13.1F.

- 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 MD2-6212 ('TCOBL)

- Problem Description: A conflict exists between the Model 15.0 Compool and 'TCOBL. At program statement Number 392, 'TCOBL calls 'SDHWRT to write 16 words of 'CDATI but 'CDATI is only 11 words long in Model 15. Statement Number 392 should not specify the number of words to write. This should be reflected in the Compool.

- Solution or Work-Around: None.

- Operational Impact: None.

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

SPR MD2-6213 ('TREPLAY)

- Problem Description: On the print line:
THRESHOLD VALUES FOR THIS REV SPAN ARE COPTI = XXX.XX COPTM = XXX,
the last three columns on the right (print columns 134 - 136) are printing 000.

- Solution or Work-Around: None.

- Operational Impact: None.

- Comment: This SPR is a software problem; the solution is known and should be fixed in time to support SV-7.

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SPR MD2-6214 ('TPROPS)

- Problem Description: The first generation of message 460 resulted in the output of 'TPROPS error message 002-4 "INPUT COMMAND OUT OF ORDER. COMMAND = 3640, TIME = 1271424.1". The above time is vehicle time. The problem with the error message is which decoder on command (SPC 3640) is the above error message addressing? There is no way of telling with such an outlandish vehicle time. Since the word "order" in the error message references chronological order and message 460's case demonstrated how badly a time can be changed, then perhaps it would be wise to include in the error message the following:

    1. The memory and location of the command if it is in the 'TMI.

    2. The block and word number if it is in the 'TCL so it can be known for sure which command is being referenced.

- 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 MD2-6215 ('TPLAY)

- Problem Description: Observation of Check Message Number One, entry 288 of 'TCT shows that the error message is correct but the initial error statement is incomplete. It should read "... commanded at T_1 + 1.6 seconds."

- Solution or Work-Around: None.

- Operational Impact: None.

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

SPR MD2-6216 ('TBALL)

- Problem Description: Because of vehicle hardware anomalies, the requirement occassionally exists to prevent "nested" operations from occurring. There is currently no expedient method by which the software can be forced to avoid nesting. The SWFTFD office has indicated that it would be a desirable feature for the software to have the option to suppress nesting of camera operations.

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- Solution or Work-Around: The work-around for this particular flight is to set 'CAMNNO to 4 and 'CAMBIS to 70 seconds. These settings enable 'TBAT to set the 'TIJQ matrix such that nesting will not occur 90% of the time.

- Operational Impact: If nesting were allowed to occur, the second and subsequent operations of the nest would not execute due to the hardware anomaly.

- Comment: This SPR should be considered as a product improvement item for a future software delivery. Thorough consideration should be given to this SPR because the work-around procedure is not straight-forward. It varies from flight to flight and a great deal of time is spent studying the solution for each flight.

SPR MD2-6217 (Data Base Handbook)

- Problem Description: The data base handbook is in error. Source/Responsible Agency for 'CAMNNO should be [redacted] as it is in the Compool. (b)(1) (b)(3)

- Solution or Work-Around: None.

- Operational Impact: None.

- Comment: The data base handbook should be updated with the previously mentioned recommendation.

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2.6.3 Hardware/Software Interface Changes

For IRON 8261, ten change requests were processed from launch day through the RVI recovery message (as shown in Table 2.6.3-1).

These changes were implemented via requests SV6-113 through SV6-122 and have been incorporated in the in-flight data base and hardware/software interface documentation.

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Table 2.6.3-1. Summary of Hardware/Software Interface Changes

Request No.	Identification	Effectivity
SV6-113	Changes the command time biases in sequence 360 to obtain better playback/tape recorder utilization.	SV-6 and nominal data bases.
SV6-114	Deletes pad load and early orbit type sequences to provide space in the 'TSCTAB to add flight peculiar sequence.	SV-6 only.
SV6-115	Deletes MACRO 96 because it is no longer required.	SV-6 and nominal data base.
SV6-116	Modifies sequence 30 by adding a new command to turn on the geocentric rate prior to horizon sensor connect. This will reduce propellant required for the pitch down maneuver completion.	SV-6 and nominal data base.
SV6-117	Adds new FUNCHK (check msg 26) which warns when OVERLAP is commanded to an illegal step.	SV-6 and nominal data base.
SV6-118	Adds new sequences 84 and 85 to manually call out a subcycle 16 COOK pass when there is conflict with a preceeding MOP.	SV-6 and nominal data base.
SV6-119	This change was disapproved. It was a modification to sequence 35 (YAW BACK TO FLY FWD) to provide positive yaw rate data during a yaw around to fly forward maneuver.	
SV6-120	Modifies sequence 122 to prohibit the rewind on normal operation selection from executing. This is done by commanding a BUFT- prior to FT-.	SV-6 only.

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Table 2.6.3-1. Summary of Hardware/Software Interface Changes (Cont'd)

Request No.	Identification	Effectivity
SV6-121	Sequences 120, 122, 126 and 136 were modified by SSC to prevent rewind.	SV-6 only.
SV6-122	Modification to sequence 120 to change incorrect command number.	SV-6 only.

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

2.7.1 EDAP Performance

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 7 was determined to be 23.53 A/H.

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, 5, 14 and 15.

The Main Battery Voltages at sun entrance and the predicted power usage per rev are depicted in Figures 2.7-3, 2.7-4 and 2.7-5. The average main bus voltage, at sun entrance, during the segment was 27.7 volts. The average actual power consumption was 22.18 A/H per rev.

The Main Battery Discharge Load Sharing at sun entrance, is indicated in Figures 2.7-6, 2.7-7 and 2.7-8. Batteries 1 and 3 were carrying about 25% of the load with battery 2 handling slightly more of the load and battery 4 slightly less.

The Main Battery Temperatures as observed in real time, are shown in Figures 2.7-9, 2.7-10 and 2.7-11.

2.7.1.1 Main Battery #1 Temperature Monitor

Launch Base data examination resulted in the finding that the calibration for Main Battery #1 Temperature Monitor was in error. The affect of this error was to require a correction factor of -3° to be applied to data which has been converted to engineering units.

2.7.1.2 Main Battery #3 Heater Cycling

On Rev 7 the Main Battery #3 Heater began an abnormal cycling pattern. A varying abnormal cycling pattern continued until shortly after Rev 87 BOSS, when heater operation returned to normal. The cause of this abnormal operation is attributed to a characteristic of the heater thermostats which culminated in the thermostat failing closed. In which case normal operation returns under the control of the redundant series thermostat.

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2.7.1.3 Main Battery #2 Heater Cycling

On Rev 211 the Main Battery #2 Heater began an abnormal cycling pattern which lasted for approximately 2500 seconds and ended on Rev 212. Since that time heater operation has been normal. The cause of this abnormal operation is attributed to the same thermostat characteristic which caused the cycling of battery #3 heater.

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
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 30-36 - SGLS 2 Evaluation
Rev 47-53 - SGLS 2 Evaluation
Rev 65 - SGLS 2 Evaluation
Rev XXX (Subcycle 16) - SGLS 2 Evaluation

The Back-up Timer was checked on Rev 132. The timer period was 546 seconds. The specification value is 540 seconds $\pm$ 54 seconds.

2.7.2.1 SGLS #2 Transponder

The cubic transponder has been utilized for 36 station contacts during Segment 1. There has been no indication of the previous problem. Power output and telemetry parameters appeared normal throughout the segment. The last 15 station contacts have been on a daily single station contact basis which will be continued to further demonstrate the unit's integrity.

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GRAPH PAPER GRAPHIC CONTROLS CORPORATION BUFFALO, NEW YORK SQUARE 10 X 10 TO THE CENTIMETER AS-8014-07
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FIGURE 2.7-1 SECRET/II

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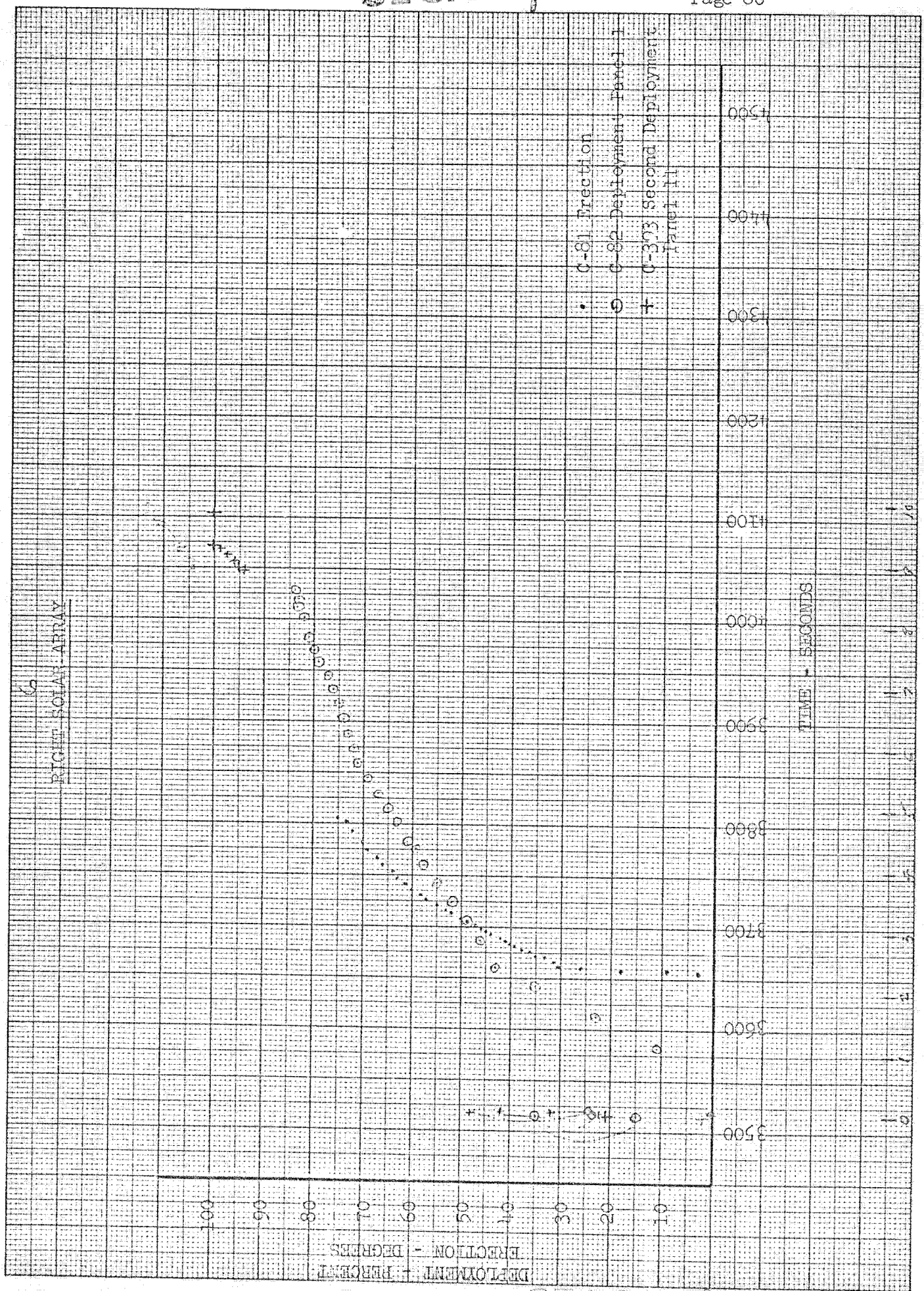

FIGURE 2.7-2

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GRAPH PAPER GRAPHIC CONTROLS Printed in U.S.A.
10 TO THE CENTIMETER AS-8014-07
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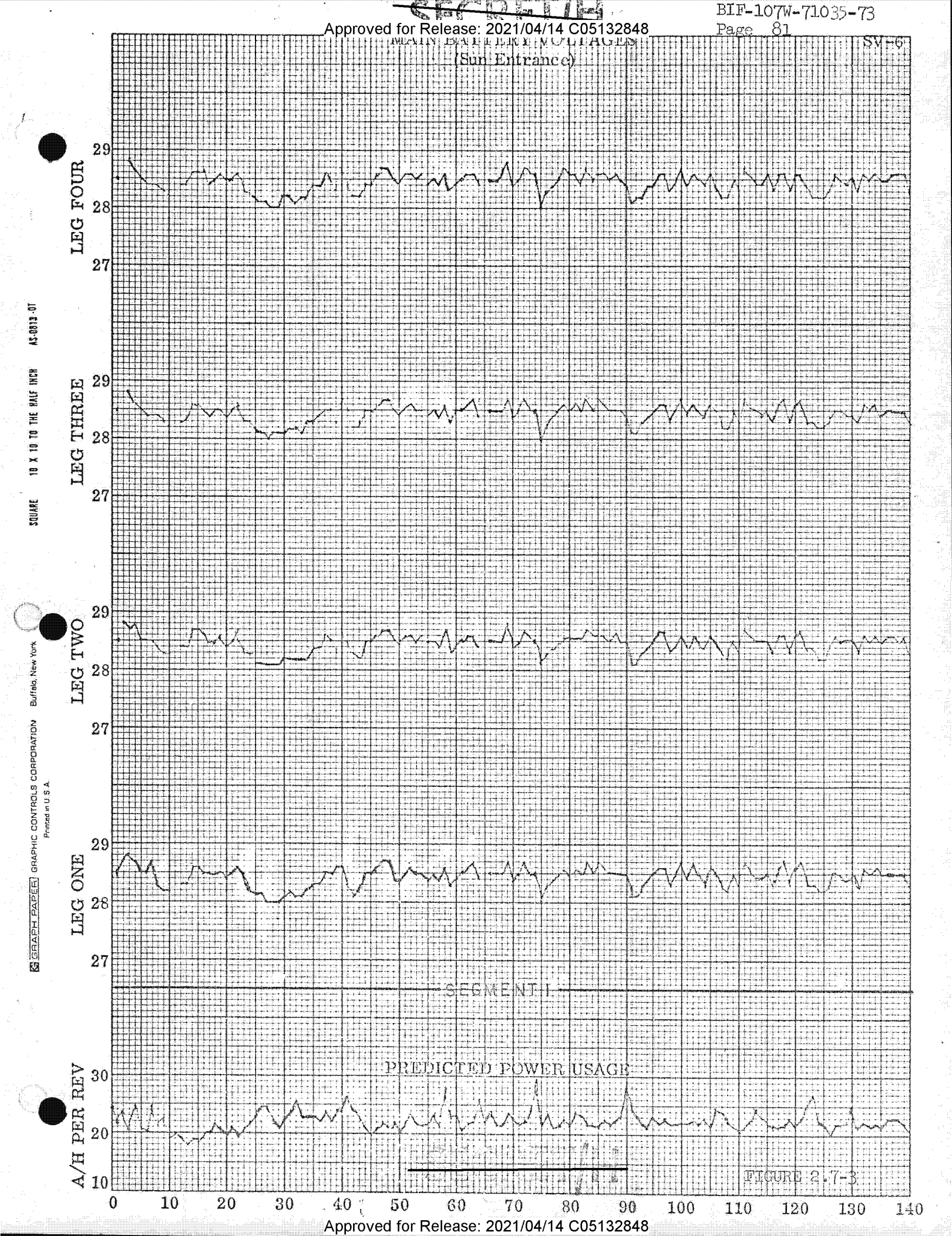

FIGURE 2.7-3

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SV-6

(Sun Entrance)

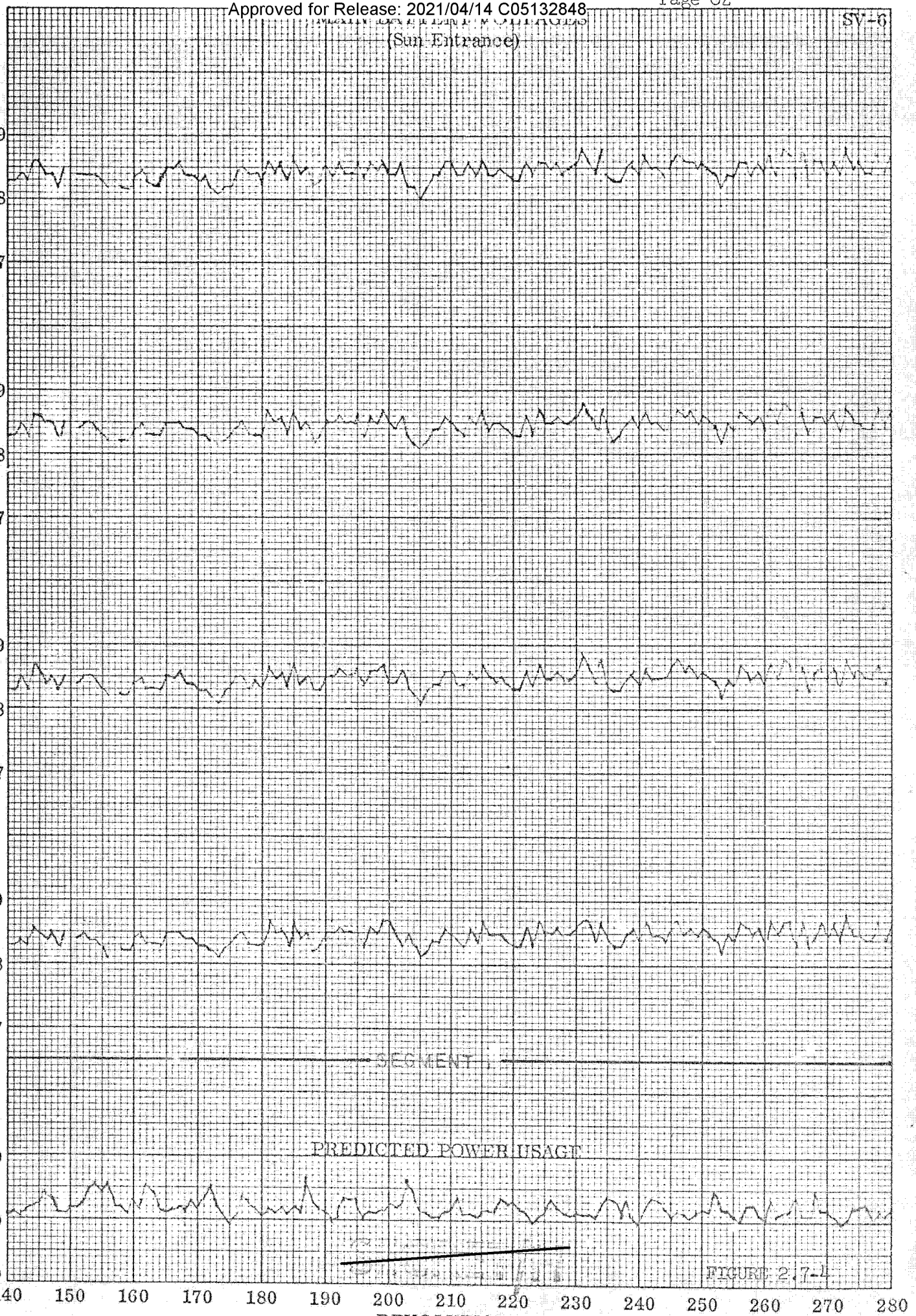

FIGURE 2.7-1

GRAPH PAPER GRAPHIC CONTROLS CORPORATION Buffalo, New York Printed in U.S.A.
SQUARE 10 X 10 TO THE HALF INCH AS-0813-0T

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(Sun Entrance)

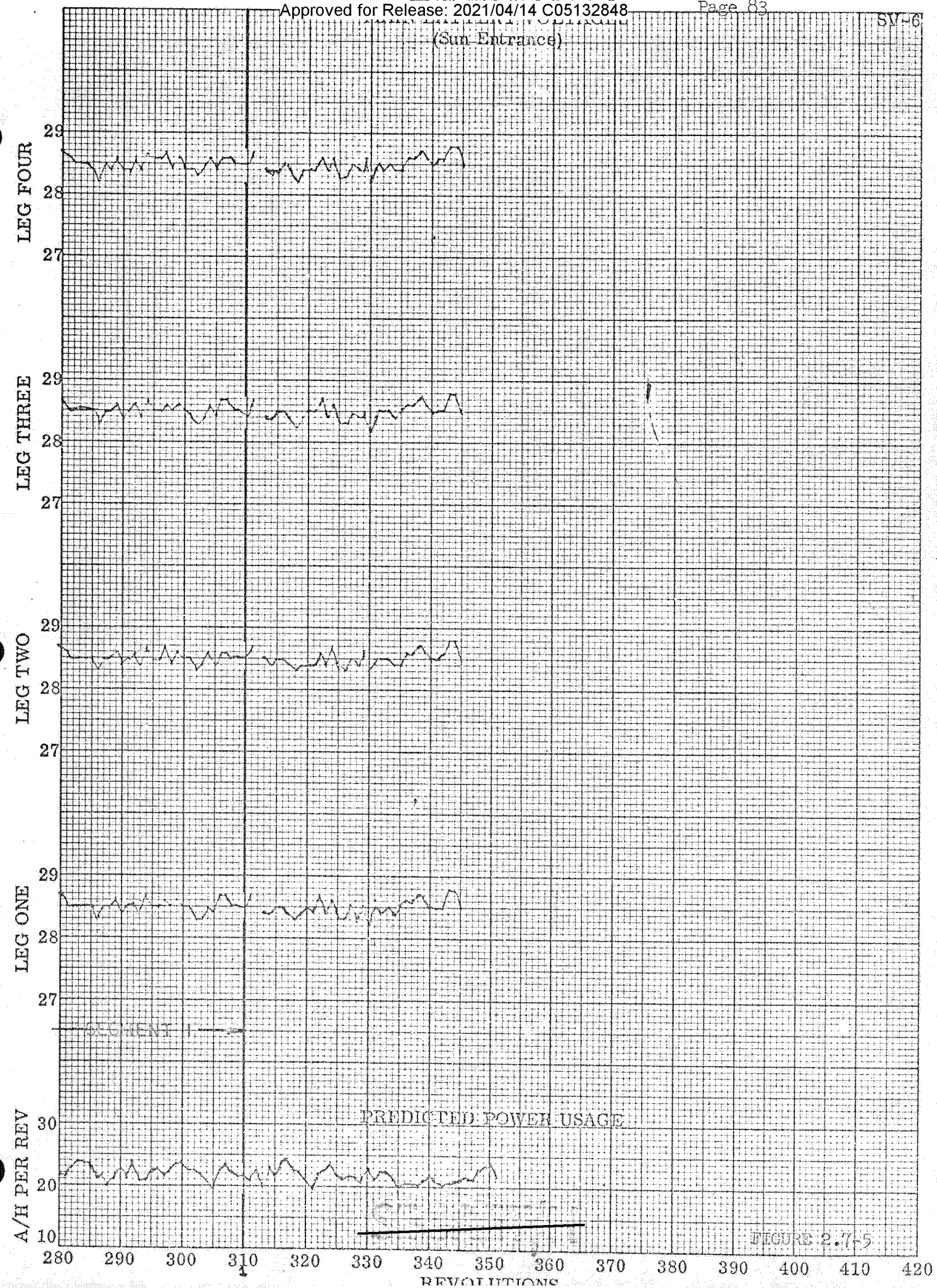

FIGURE 2.7-5

SQUARE 10 X 10 TO THE HALF INCH AS-0813-DT
GRAPH PAPER GRAPHIC CONTROLS CORPORATION Buffalo, New York
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MAIN BATTERY DISCHARGE LOAD SHARING
(Sun Entrance)

SV-6

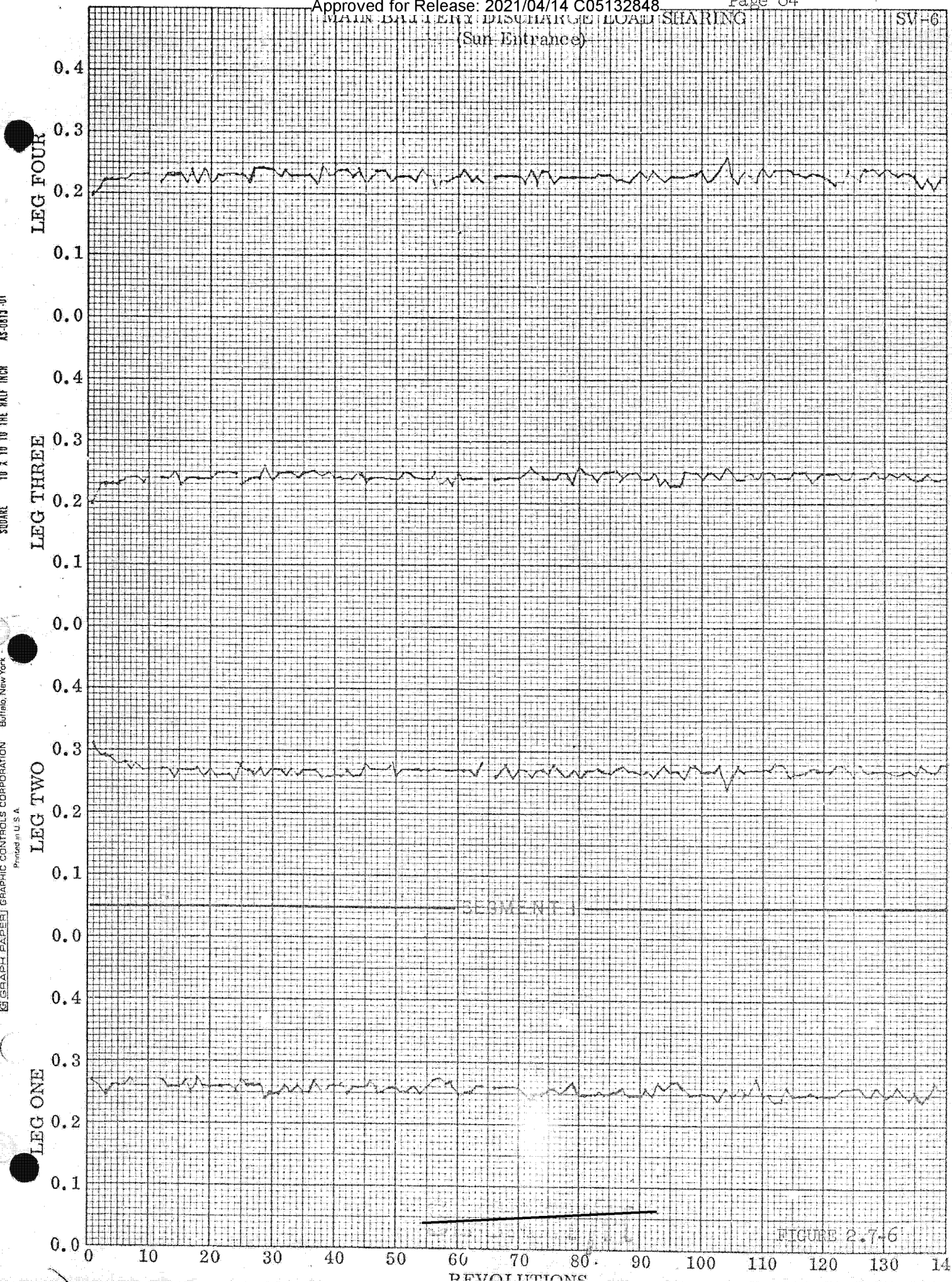

FIGURE 2.7-6

SQUARE 10 X 10 TO THE HALF INCH A5-0813-DT
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MAIN BATTERY DISCHARGE/LOAD SHARING (Sun Entrance) SV-G

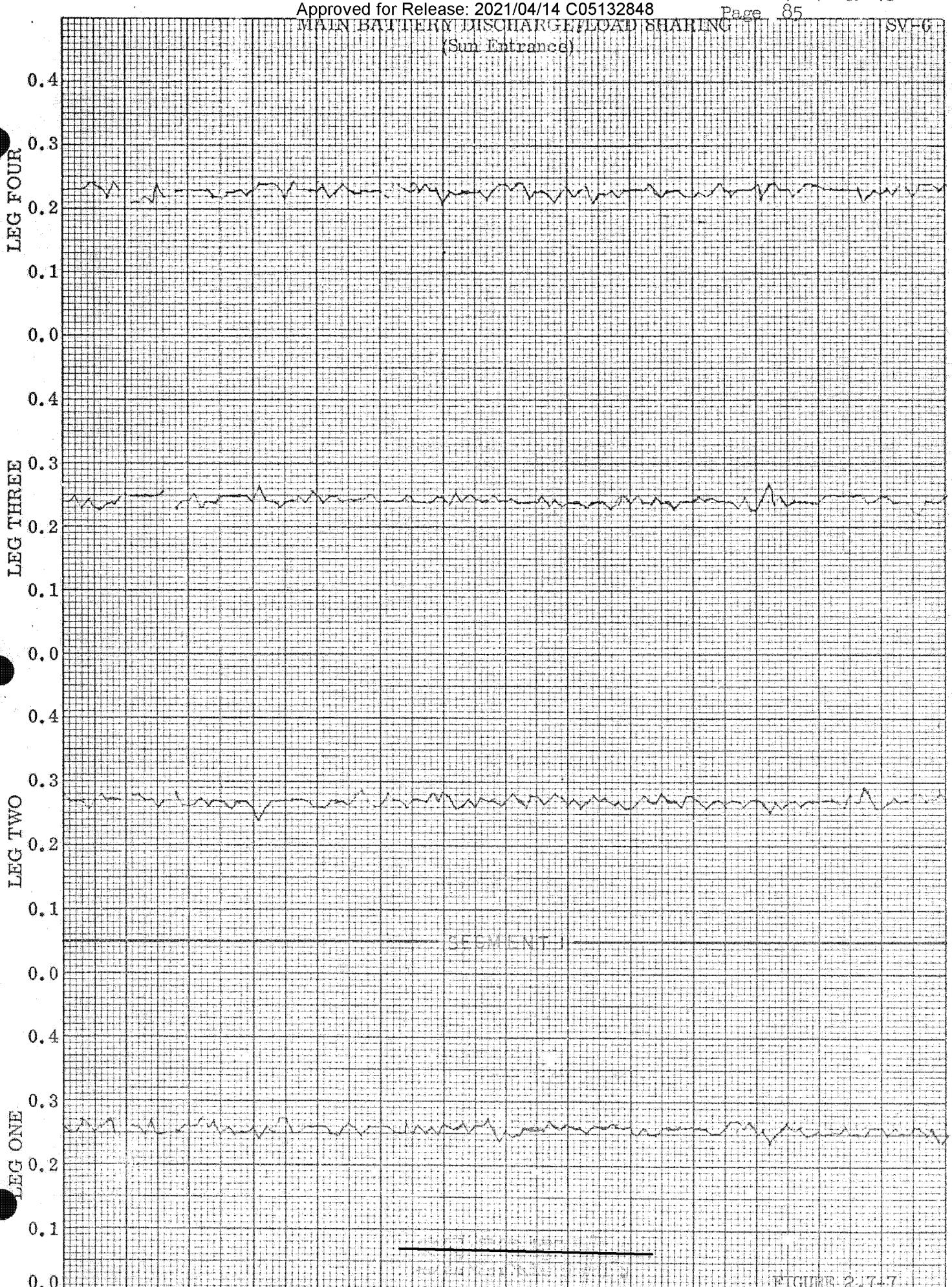

FIGURE 2.7-7

GRAPH PAPER GRAPHIC CONTROLS CORPORATION Buffalo, New York
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SQUARE 10 X 10 TO THE HALF INCH AS-0813-07

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MAIN BATTERY DISCHARGE/LOAD SHARING SV-6
(Sun Entrance)

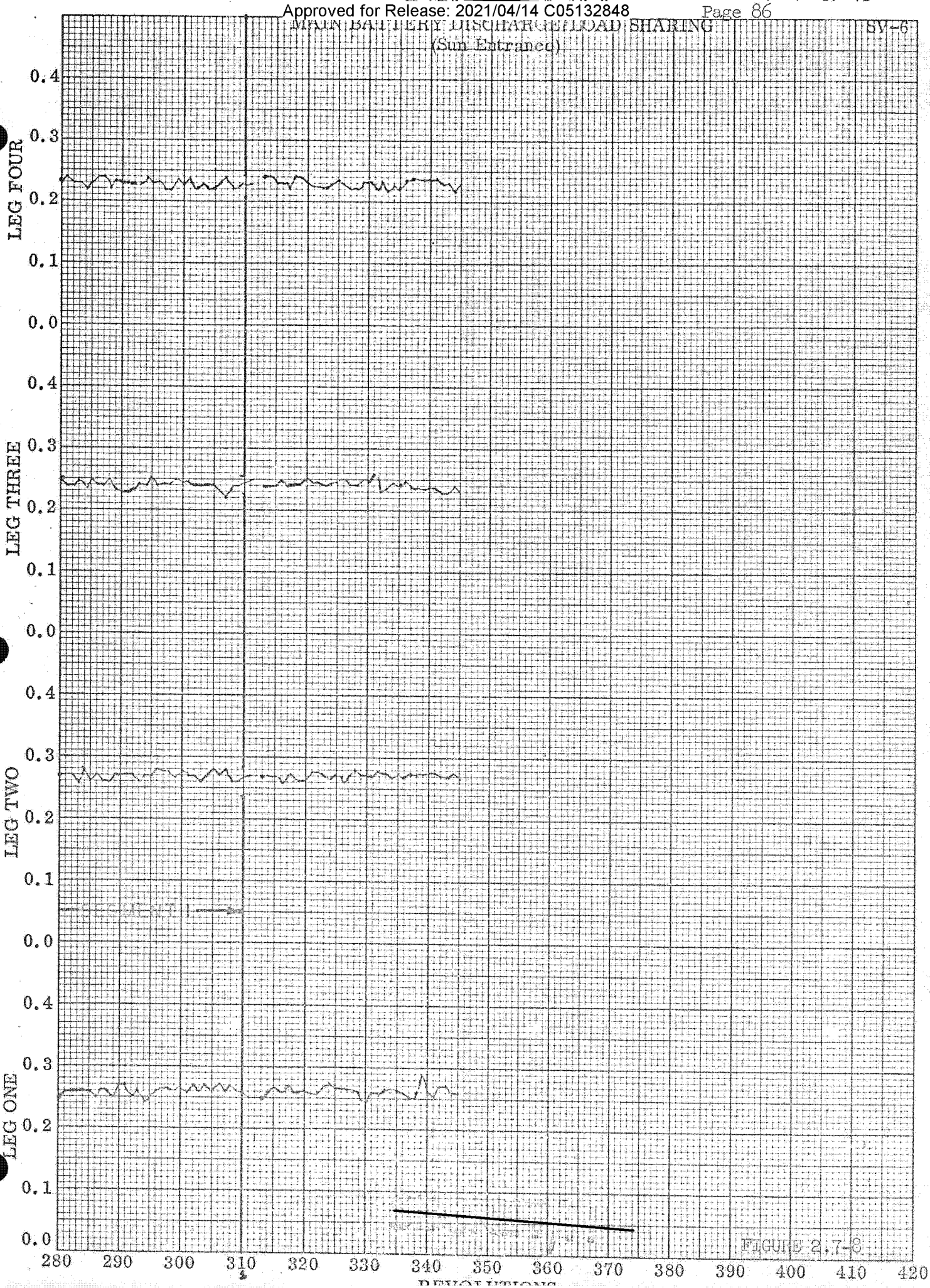

FIGURE 2.7-8

GRAPH PAPER GRAPHIC CONTROLS CORPORATION Buffalo, New York
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SQUARE 10 X 10 TO THE HALF INCH AS-0813-0T

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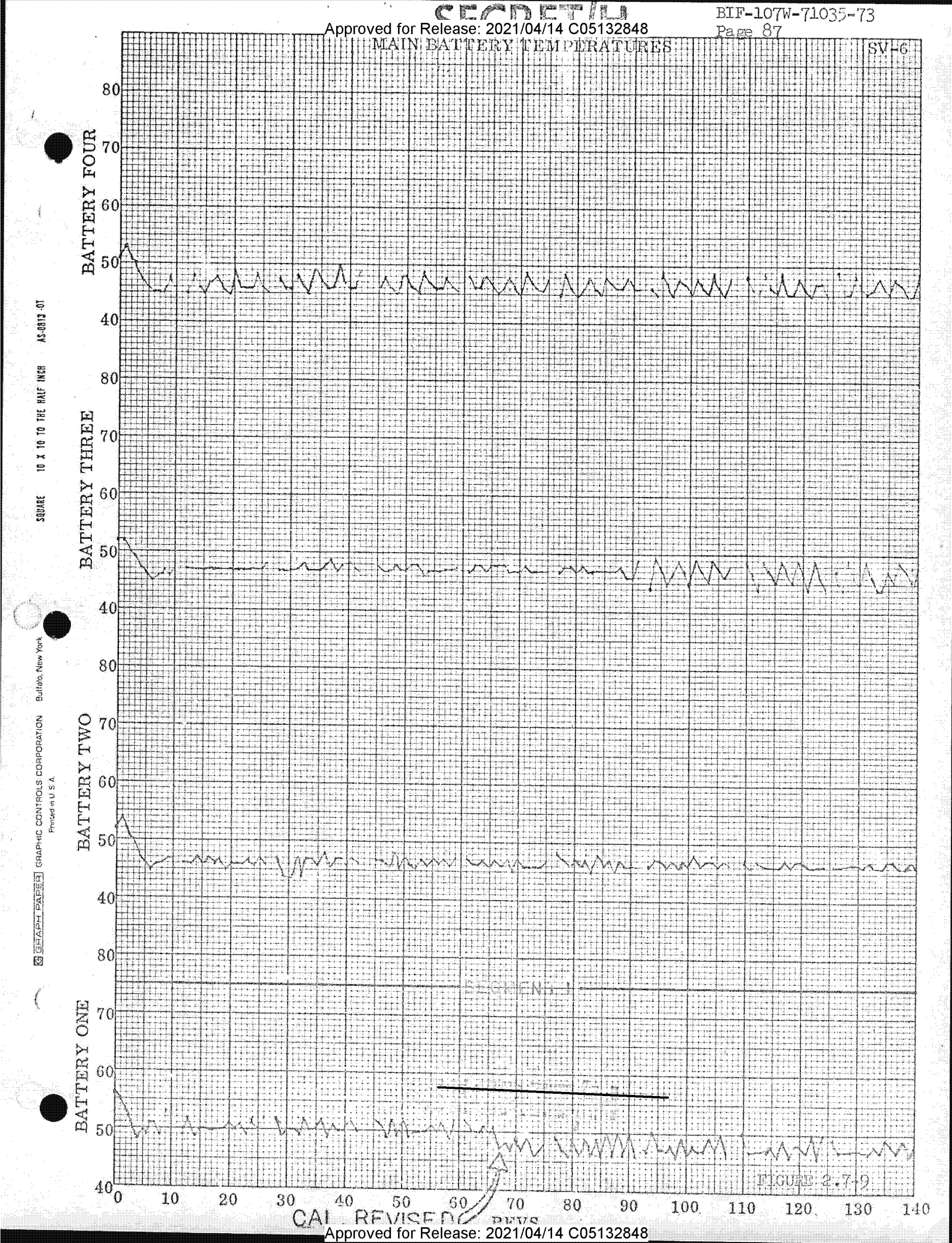

FIGURE 2.7-9

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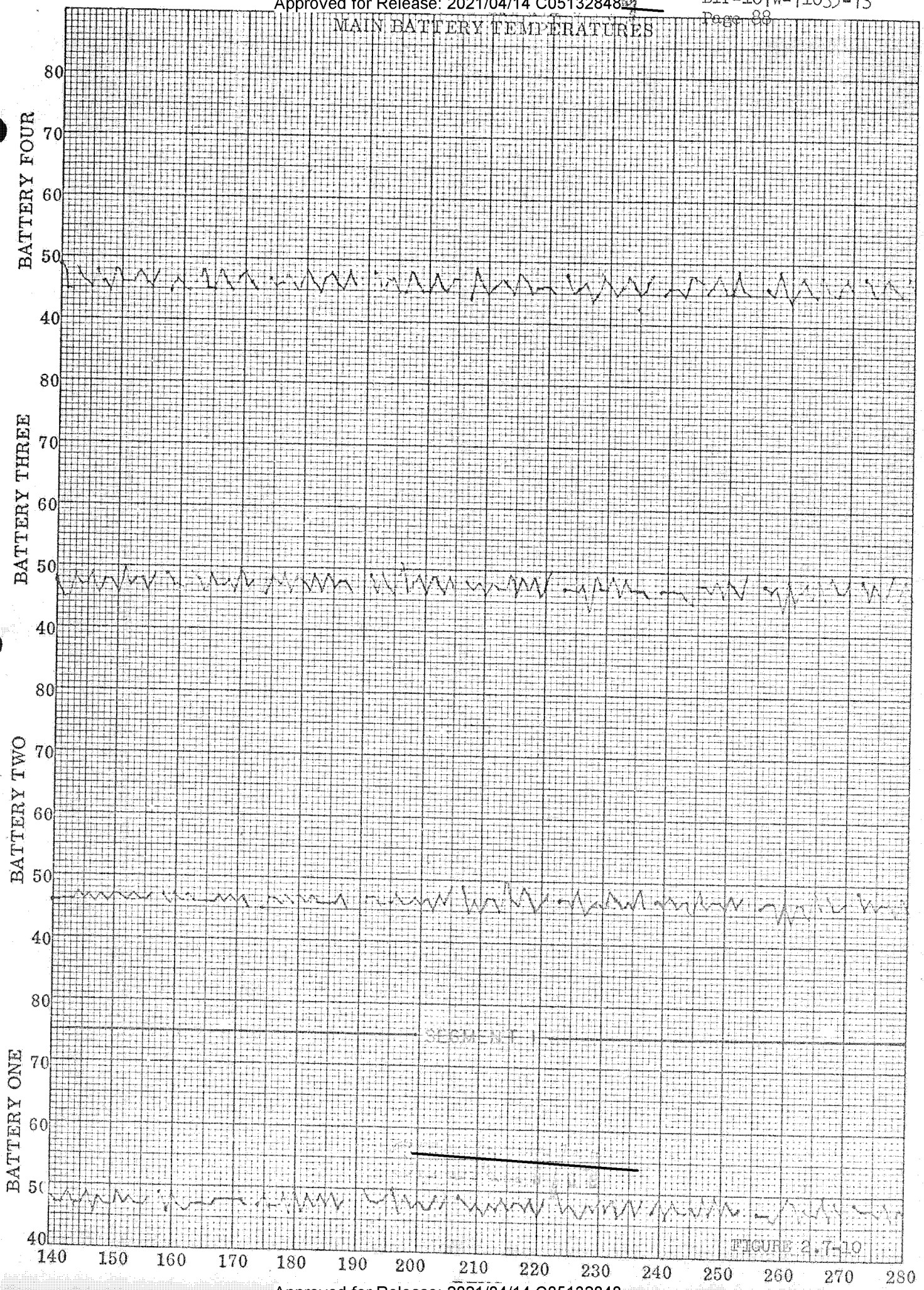

GRAPH-PAPER GRAPHIC CONTROLS CORPORATION Buffalo, New York
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SQUARE 10 X 10 TO THE HALF INCH AS-0813-01

FIGURE 2.7-10

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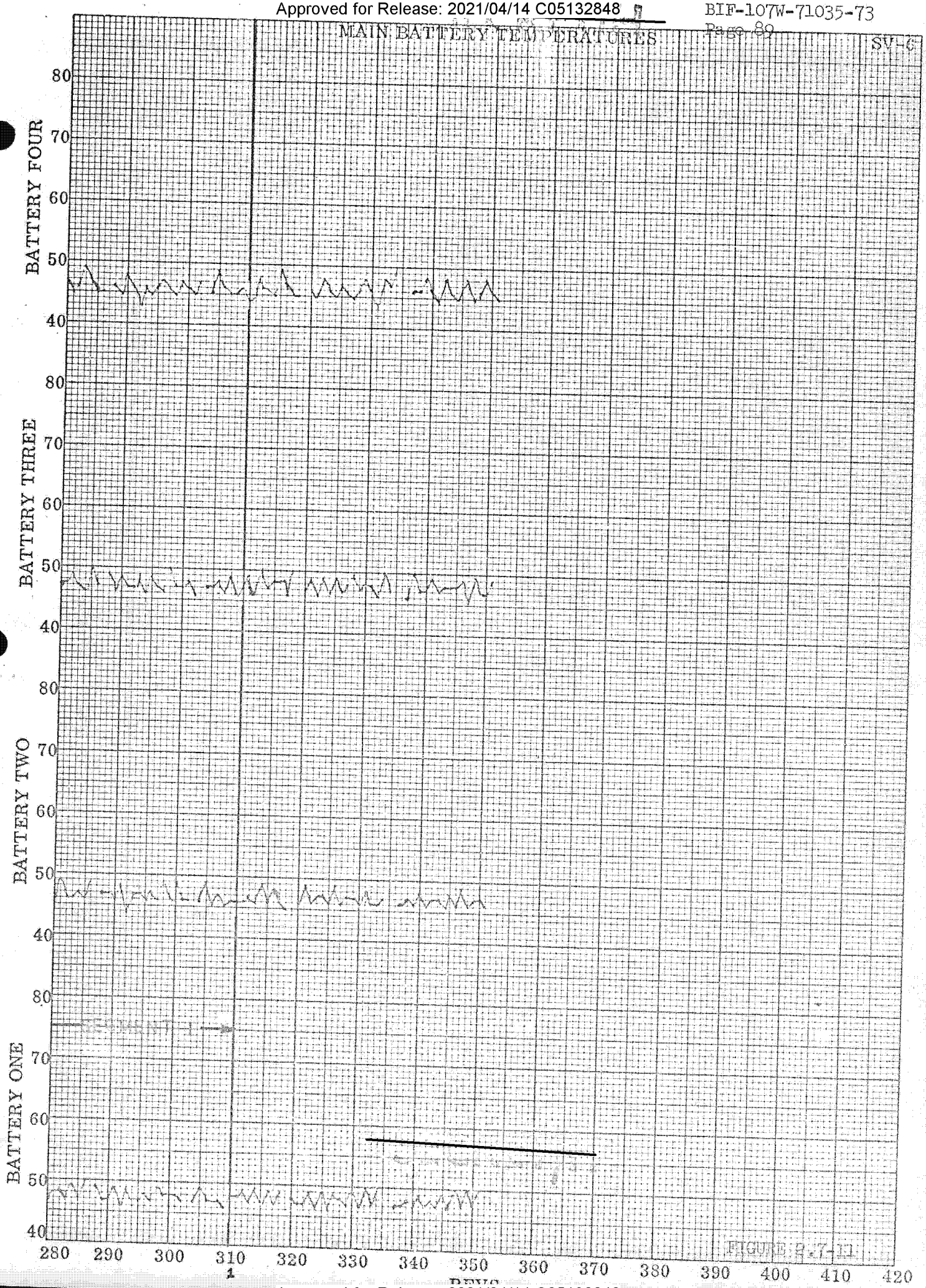

FIGURE 2.7-11

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2.7.3 ACS/RCS Performance

The Attitude Control System (ACS) and Reaction Control System (RCS) maintained nominal control throughout Segment 1. Both the primary and redundant attitude control systems were on from lift-off with the primary ACS providing control after BV/SV separation until Rev 66. During Rev 66, control was transferred to the redundant ACS (with the primary RCS) because of a yaw bias condition which had developed in the primary ACS. The yaw bias was first observed during Rev 47 as increased yaw rate in the primary ACS. The maximum yaw rate seen prior to transfer was - 0.007° per second. After the transfer, primary ACS yaw rates were intermittent and varied from a high of -0.112° per second to a low of 0° per second in a random pattern for the remainder of the segment. Gyro temperatures were generally within 155°F to 172°F. This is in the mid-range of the gyro operating temperature.

Reaction Control System performance was nominal throughout Segment 1. Reaction Engine Assembly (REA) 8 displayed higher than nominal temperature from Rev 48 on. This was attributed to a minor leak which was estimated to be 0.5 pounds per day (0.03 pounds per rev). The 0.5 pounds per day leak rate was established at approximately Rev 100 and no change was experienced up to the end of the Segment (Rev 310). RCS propellant consumption was 92.3 pounds for the Segment which equates to an average of 4.61 pounds per day.

2.7.4 Orbit Adjust System (OAS) Performance

The OAS functioned nominally for each burn throughout Segment 1. A total of 12 orbit adjust burns were accomplished during the Segment. Total propellant used for the orbit adjusts during the Segment was 477.1 pounds.

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

2.7.5 Lifeboat II (LB II) Performance

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

The LB II System electronics were activated on Rev 51 for system calibration at ten (10) selected locations in the orbit. In addition, the

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Table 2.7-1 Orbit Adjust Summary

Segment 1 (Rev 0-310)

OA No./Type	1/POS	2/POS	3/POS	4/NEG	5/POS	6/POS	7/POS	8/NEG
OPS Day	2	4	6	6	8	10	12	12
Rev. No.	30	62	94	96	127	159	192	194
Delta Vel. Req'd (Predict)~fps	6.58	12.87	23.83	-12.96	9.23	12.42	24.70	-12.03
Delta Vel. (Act. Trk Red) ~fps	6.51	12.76	23.65	-12.71	9.23	12.30	24.77	-11.97
Burn Duration~Sec	19.0	36.8	68.4	37.6	27.9	37.2	74.9	37.2
Propellant Used~lbs	18.6	35.9	65.3	35.2	26.0	34.3	68.5	33.6
Avg. OA Tank Temp. ~^{o}F	74.6	75.0	75.0	76.6	75.7	75.7	76.0	76.7
Avg. OA Tank Press~psic	258.8	254.8	247.0	237.0	233.8	230.5	225.2	219.5

OA No./Type	9/POS	10/POS	11/POS	12/NEG
OPS Day	14	16	18	18
Rev. No.	224	257	289	291
Delta Vel. Req'd (Predict) ~fps	10.73	13.32	24.26	-9.60
Delta Vel. (Act. Trk Red) ~fps	10.78	13.41	24.27	-9.66
Burn Duration~Sec	33.6	42.0	76.6	31.0
Propellant Used~lbs	29.9	36.9	66.6	26.7
Avg. OA Tank Temp. ~^{o}F	76.3	76.0	76.7	76.7
Avg. OA Tank Press~psia	212.8	208.2	204.8	197.2

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2.7.5 (cont'd)

system electronics were activated on Rev 172 and 253 at two (2) specific locations to maintain a history of system performance. During the recovery maneuver on Rev 310 the system electronics were activated to observe magnetometer excursion during pitch up after recovery vehicle release.

The system functioned nominally during each activation period. The Lifeboat propellant tank heaters were commanded "on" following orbit injection at vehicle time 579.0 seconds. The heaters were thermostatically controlled between 177° F and 154°F until Rev 292. On Rev 292 the tank heaters were turned off to conserve the Lifeboat batteries. Operation of the heaters was nominal. Approximately 126 amp-hours of LB II battery capacity was used during Segment 1. A total of approximately 353 amp-hours was available in the LB II battery at lift-off.

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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.

The beacon signal strength as received at the ground stations has been approximately three times that reported on the previous mission (SV-5) when the beacon antenna did not deploy. Ground station contact times have been approximately doubled over that of the previous flight with the antenna deployed.

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 some mutual interference with the tertiary payload has been experienced, the program has performed satisfactorily.

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2.7.7 Thermal

2.7.7.1 Overall SBA

Forward section temperatures were in good agreement with predicted nominal values for a Beta Angle of -1°. The average temperature of the APSA inclosure was nominal. The thermal environment provided to the primary payload through midsection structure was nominal as indicated by an active thermal reference temperature that ranged from 68°F to 65°F. Aft Section thermal performance was nominal. The main batteries were on heater/thermostat control system throughout the Segment. Both IRA Systems were continuously powered during Segment 1 without exceeding maximum allowable gyro temperature. Table 2.7-2 shows the stabilized operating temperature ranges of critical Aft Section components.

2.7.7.2 Midsection Control TCEA

The performance of the TCEA through Rev 310 was nominal. Temperatures of all zones were controlled within 1.0°F of the reference temperature. Table 2.7-3 shows APSA, Forward and Midsection temperatures.

2.7.8 A DBS [redacted] interference problem was experienced from Revs 12 (DBS on) through Rev 310. This problem was resolved by alternately commanding the two systems. (b)(1) (b)(3)

B-3 and [redacted] have performed nominally throughout the sequence. (b)(1) (b)(3)

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Table 2.7-2 SV 6 Aft Section Critical Component Temperatures

Segment 1

Critical Component	Design Limits (°F)	SV 6 Actuals (2) (°F)
EDAP		
PDJB	-30/170	75
CCCs	-30/170	82/87
Batteries, Bay 3	35/70	44/49
Batteries, Bay 10	35/70	45/49
PDAs	-30/160	50/75
Solar Arrays	-125/225	-62/140
ACS		
IRA	50/130	101/110
HSA	0/130	76/81
Gyros	50/200	154/170
OAS		
Tank	65/100	76/82
Quad Valve	35/200	100/149
Catalyst Bed	---	116/160 (1)
T&T		
Tape Recorders	20/130	70/84
Transmitters	-30/170	71/87
PCM Master	-30/170	70/88
PCM Remote, B2	-30/170	72/80
PCM Remote, B10	-30/170	63/75
Command		
PMU A	-40/145	76
PMU B	-40/145	85
Clock	-40/153	88/94
MCS	-40/149	50
RCS		
Tanks	40/140	72/82
Plumbing, Bay 12	35/140	76/86

(1) OA not firing
(2) Steady-state

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Table 2.7-3 SV 6 APSA, Forward, and Mid Section Temperatures

Segment 1

Parameter	Design Limit $^{O}_{F}$	Segment 1* Temps $^{O}_{F}$	
$\overline{T}_{fwd}$	47/93	64/69	Forward & Mid Sections
$\overline{T}_{tca}$	48/92	65	
$\overline{T}_{fwd} - \overline{T}_{tca}$	< 20	1/4	
$\overline{T}_{su}$	49/91	66	
$\overline{T}_{su} - \overline{T}_{tca}$	6/-4	1	
$\overline{T}_{enc}$	32/69	51	APSA
$\overline{T}_{tu}$	30/85	46	
$\overline{T}_{dbs\ Panel}$	32/90	58	
$\Delta\overline{T}_{mounts}$	-	7	
$\Delta\overline{T}_{encl}$	-	13	

*Orbit Average Temperature from Rev 231

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2.8 MAPPING CAMERA OPERATIONS THROUGH REV 310
(Prepared by Mapping Camera Contractor - NEC)

2.8.1 Mission Performance

The mapping camera subsystem was successfully removed from the Ascent Mode shortly after BV/SV separation. (Power is applied to some of the mapping camera subsystems during the ascent phase of the flight). A health check was made on Rev 8 COOK. The telemetry data indicated normal operation.

On Rev 91 the terrain platen press monitor indicated no platen press function on the last frame of the second operate. The platen press monitor indicated no press function, erratic press function and/or normal press function on all subsequent operations. The back up mode was exercised on Rev 210 to obtain maximum platen press current with no change in press operation. (During normal operation the current to the platen press is applied in two steps). The problem has been analyzed as a faulty platen press telementry switch.

On Rev 137 the stellar platen press monitor indicated no press on 2 of 12 frames. The monitor indicated random erratic data on subsequent operations. Transfer to the stellar platen press redundant electronics was made on Rev 164 with no resulting change in the data.
The problem has been analyzed as a faulty platen press telemetry switch.

75 mapping camera operations were executed through Rev 310 including one diagnostic engineering run on Rev 219 and 2 single frame health check operates on Rev 8. Total inflight mapping camera frames taken

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was 1051. Total footage transported into RV-5 included 1784 feet of terrain and 1002 feet of stellar.

Operations over the BAR XC calibration range in Arizona were taken on Revs 113 and 178.

Mapping camera operations were inhibited during the rev span 211-220 during the platen press anomaly evaluation.

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 311 THROUGH RV-2 RECOVERY

3.1 Summary

Mission photography for both the panoramic and the mapping subsystems continued throughout the segment without incident. Normal pan camera operations were resumed when the aft camera OB torque level decreased. 5000 feet of color were exposed through the aft camera during the segment. SBA subsystems remained nominal during the segment although a slight decrease in the thrust level of REA No. 8 was measured. RV-2 was successfully reentered and aerially recovered on Rev 505 on operations day 32.

3.1.1 Summary of Events

Successful [redacted] calibrations were achieved on Revs 428 and 436. Normal panoramic camera operations were resumed on Rev 362 after the torque on the aft camera optical bar had decreased to a safe level. Stereo operations, 5.0 ips rewind and nesting were permitted. Aft camera OOAA adjustments and modifications to the exposure curves were made based on PFA evaluation of RV-1 imagery. (b)(1) (b)(3)

The lifeboat and pyro batteries reached the monoxide level and LB heater cycling to preserve battery capacity was started using 104° tank temperature as a reference.

Normal ACS2/RCS1 performance continued during the segment. REA No. 8 remained at a higher than normal temperature. REA No. 8 showed a slight decrease in thrust level but still adequate to support operations.

Measurement of the yaw bias in the primary ACS showed the error remained throughout the segment. Rates varied from -.001°/sec to -.069°/sec in a random pattern.

Six orbit adjust burns were accomplished with nominal performance obtained.

Planning was started to permit possible extension of the SV-6 mission to 90 days. The orbit adjust plan, starting with the dual burn on Revs 386 and 388, was extended to a 3-day cycle with the Argument of Perigee controlled only between 120° and 150° to provide an adequate propellant margin.

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The mapping camera motion compensation (FMC) indicated a loss of phase lock on one frame out of 18 on Rev 478. This indication is attributed to noisey data.

RV-2 was successfully reentered and aerially recovered on Rev 505, operations day 32. The capsule was loaded to 95.0 percent of capacity and 6.4 percent unbalanced. No capsule damage was reported.

Overall quality of the acquired photography ranged from good to poor with the majority rated as fair. The decrease in quality resulted from increased haze with the aft camera again affected by the illumination geometry.

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 310 - 505). There were no equipment malfunctions. None of the Command Systems were subjected to out of specification temperatures of 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 135 messages loaded in the ECS for this segment. This resulted in 32,600 SPC's being stored for readout from the PMU's.

Of the 32,600 SPC's loaded, 16,315 were output from the PMU's for processing by the decoders. The remaining were erased out prior to time label matches. In loading the 32,600 SPC's there were no rejects.

3.2.1.1.2 ECS Clock Operation

The accuracy of the ECS clock was 1.43 parts in 10^7. This corresponds to an average frequency offset of .1466 HZ above the nominal frequency of 1.024×10^6 HZ. The frequency of the clock oscillators changes .0225 HZ in 295 revs. This results in s stability of 4.38 parts in 10^8 over 295 revs, or 6.02 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.

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3.2.1.2 MINIMAL COMMAND SUBSYSTEM

3.2.1.2.1 Command Modes

The MCS was not used during this segment.

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 8,415 PMU-B 7,900

ECS Clock Drift Rate 1.43 parts in 10^7

ECS Clock Stability 4.38 parts in 10^8 for a 295 rev period

Total Hours On ECS 772 MCS 4.5 RD 1.0 BUD .05

Secure Words Expended at end of Segment 2 PMU-A 56 PMU-B 64

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

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	(1)	(2)	(3)
BIAS	1.1412	1.0715	0.9797
VTCW	1751851.2	2162283.8	2673851.8

AVERAGE CLOCK ACCURACY =BIAS CHANGE/TIME CHANGE

=(1.1412- 0.9797)/(2673851.8- 1751851.2)

= 1.75163E-07

= 1.75163 PARTS IN 10 TO THE -7TH

AVERAGE CLOCK FREQUENCY =(1.75163E-07*1,024,000.0)+1,024,000.0

= 1024000.17937HZ

FREQUENCY 1 (F1) =(BIAS/VTCW)*1.024MHZ+1.024MHZ

=(0.0697/ 410432.6)*1.024MHZ+1.024MHZ

= 1024000.17390HZ

FREQUENCY 2 (F2) =(BIAS/VTCW)*1.024MHZ+1.024MHZ

=(0.0918/ 511568.0)*1.024MHZ+1.024MHZ

= 1024000.18376HZ

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

=(1024000.18376- 1024000.17390)/1.024E+06

= 9.62890E-09

= 1.92578 PARTS IN 10 TO THE -8TH
FOR THIS 173 REV. PERIOD

= 4.51159 PARTS IN 10 TO THE -10TH
FOR AN AVERAGE 6 HOUR PERIOD

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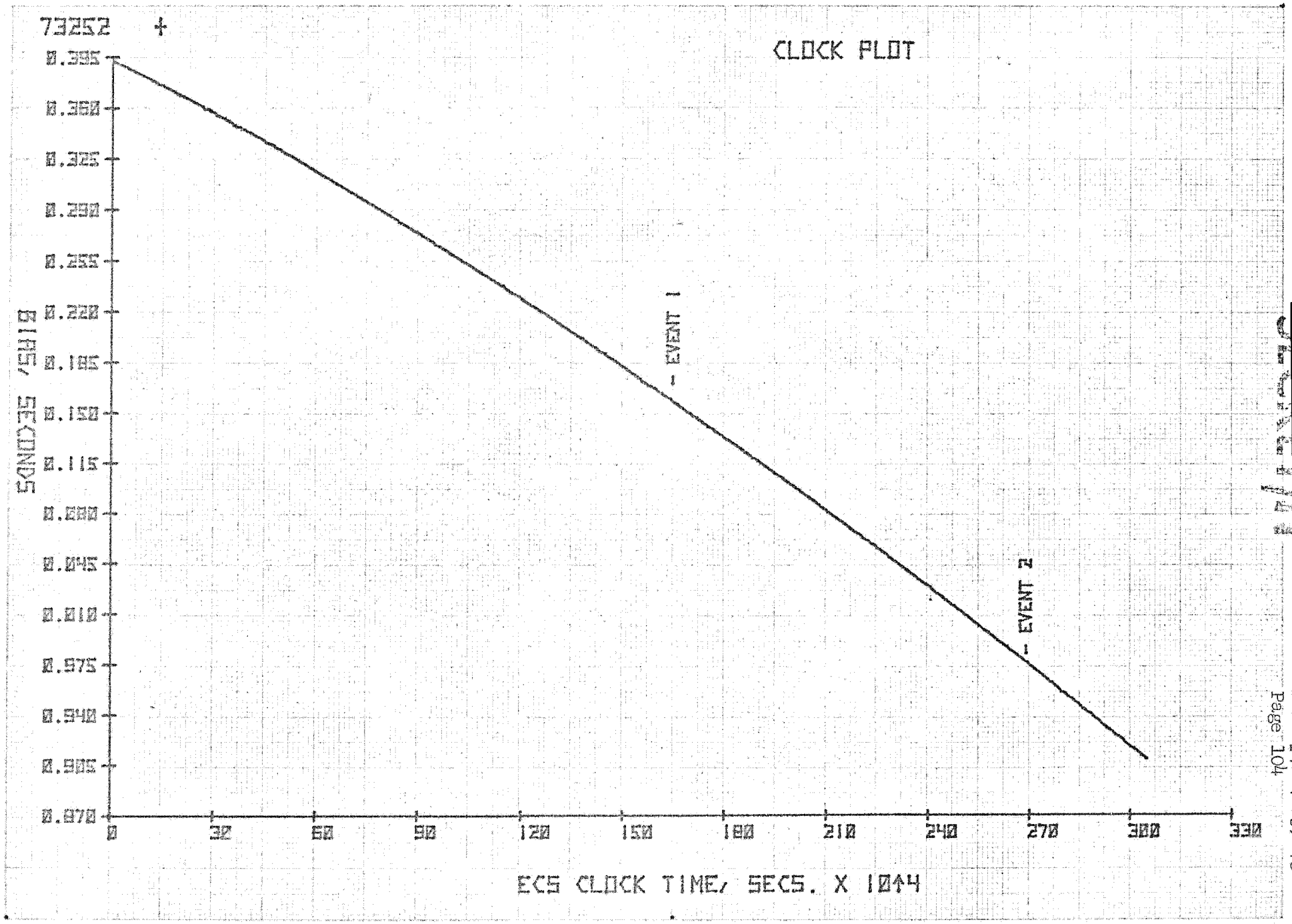

Figure 3.2-1

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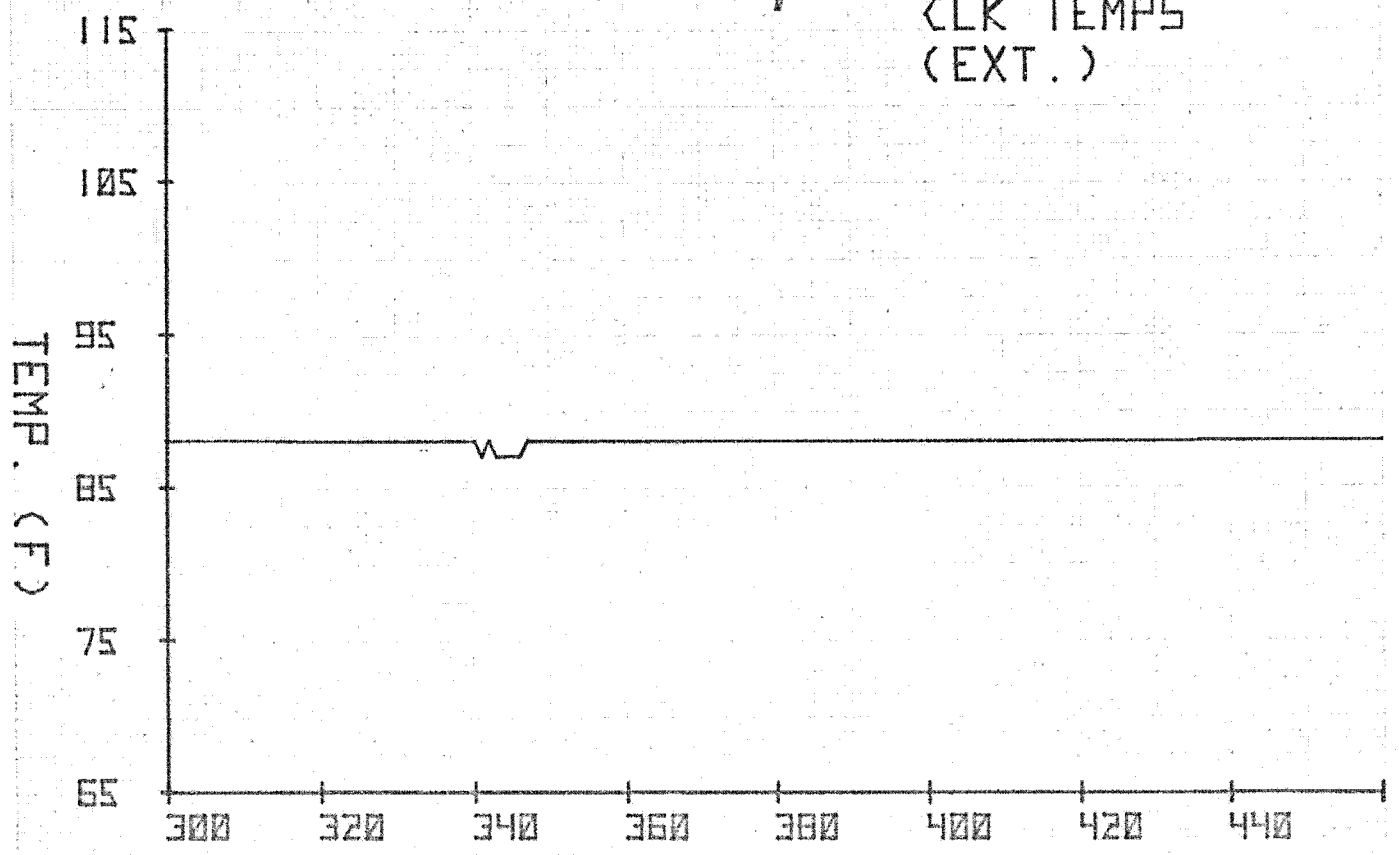
CLK TEMPS
(EXT.)



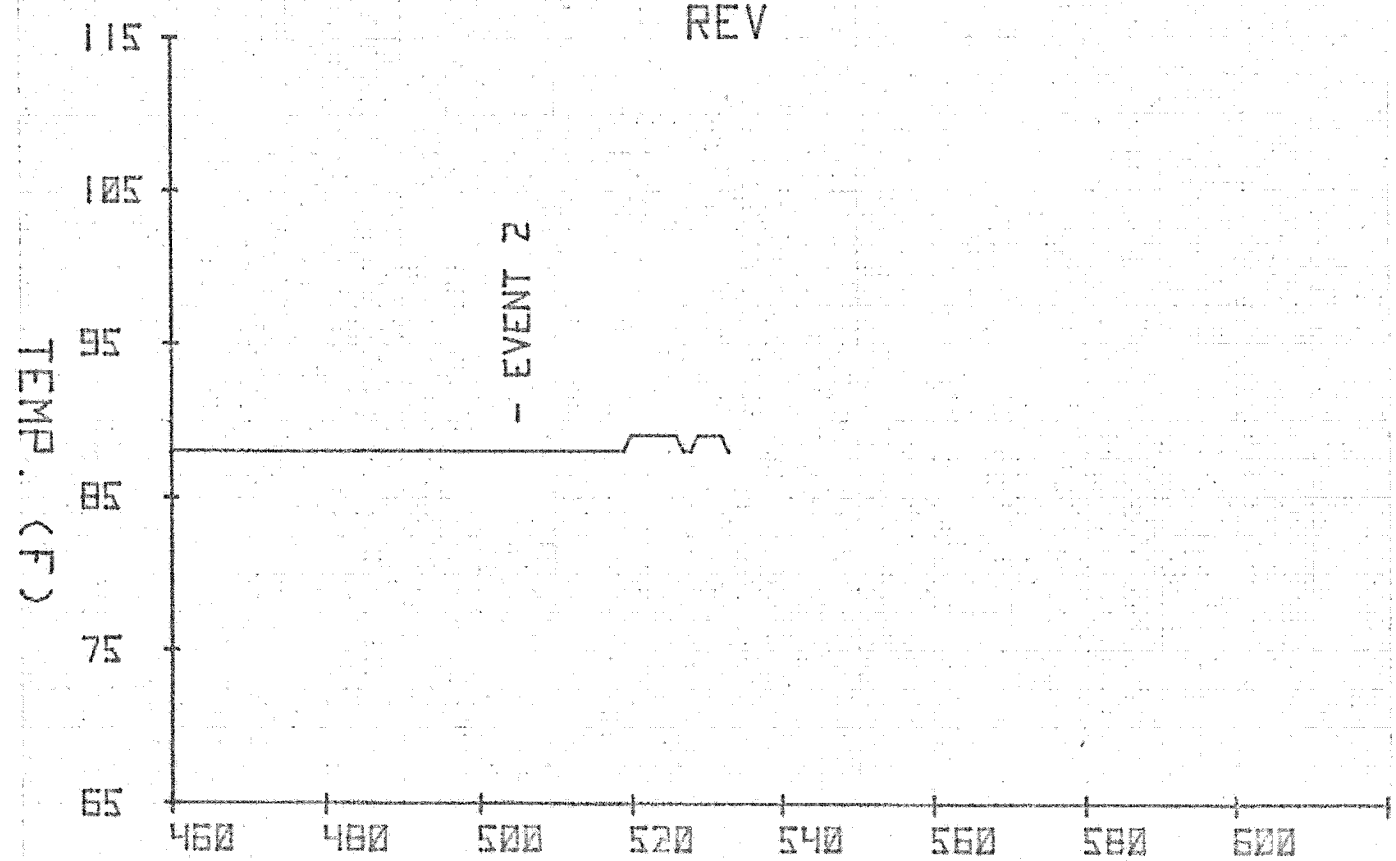


Figure 3.2-2

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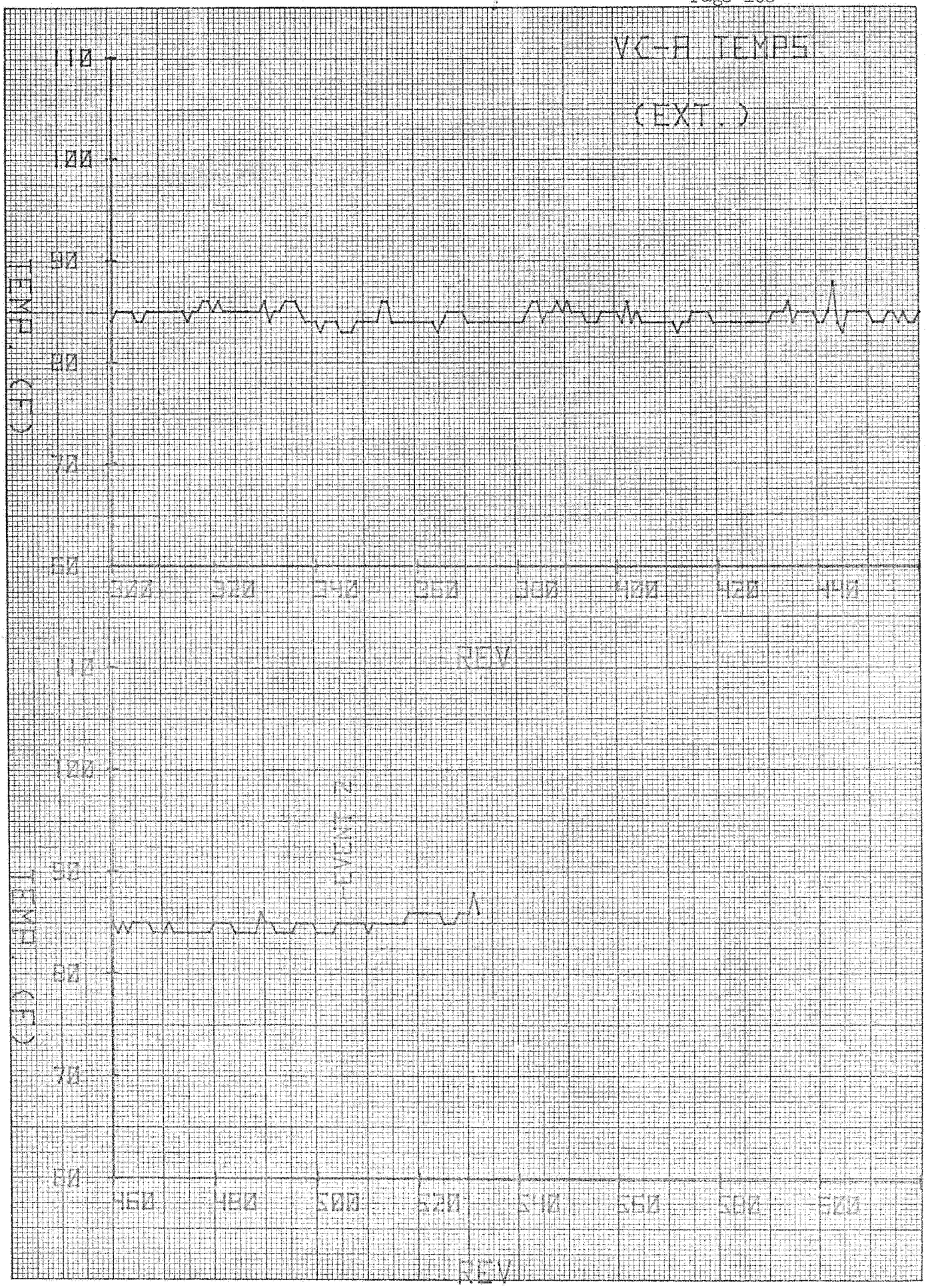

10 X 10 TO THE CENTIMETER 46 1513
18 X 25 CM. MADE IN U.S.A.
KEUFFEL & ESSER CO.

Figure 3.2-3

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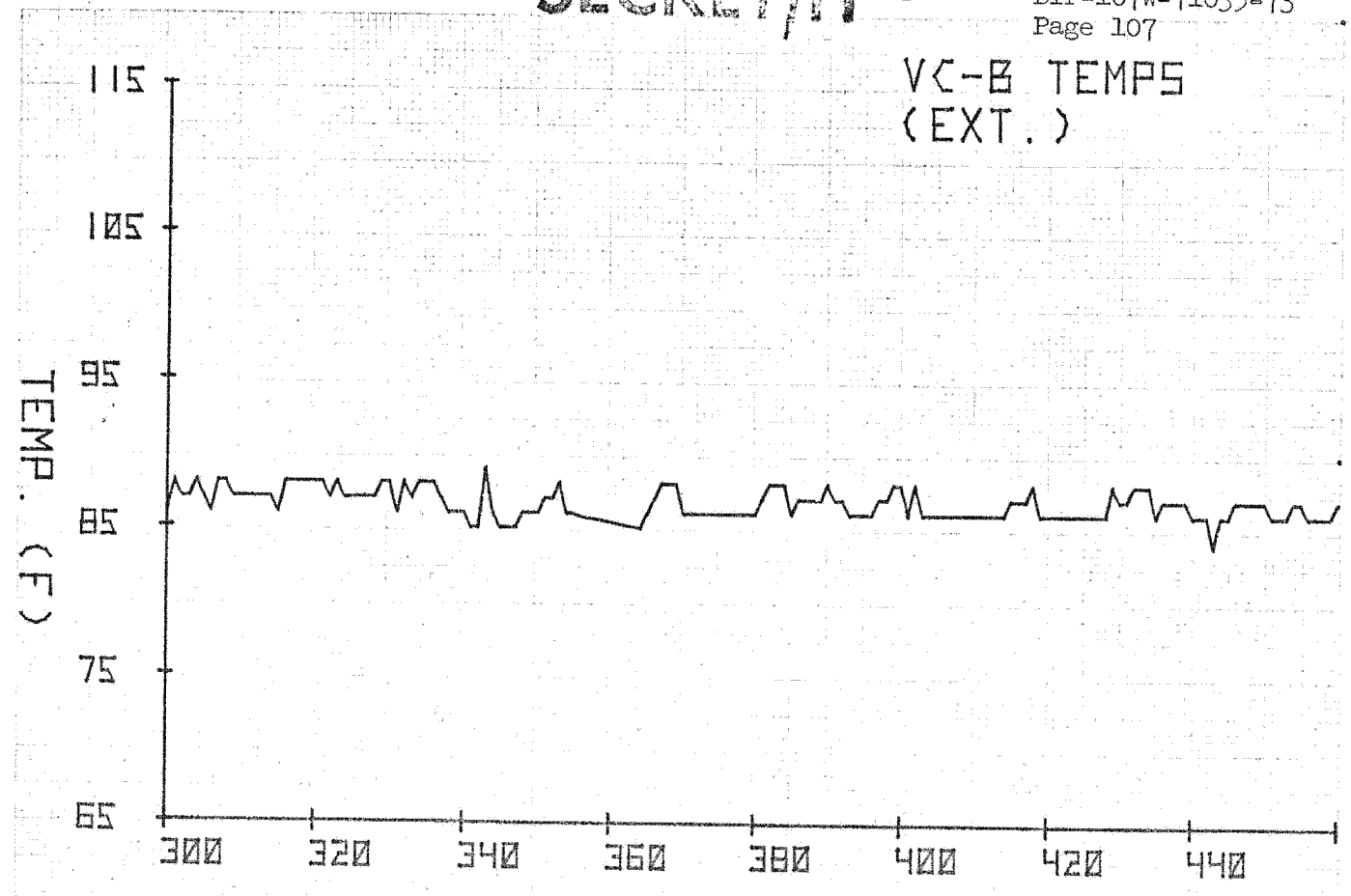

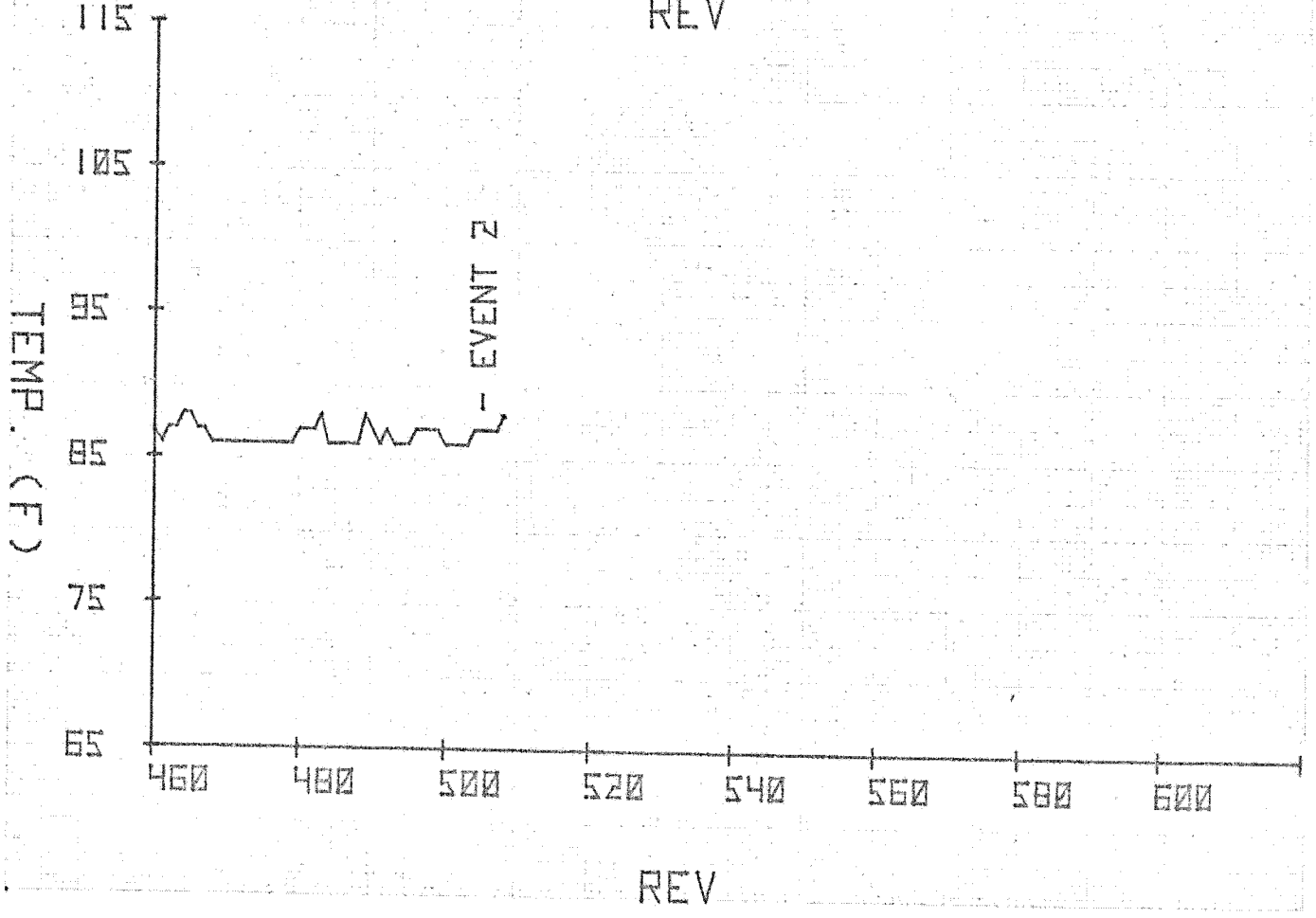

Figure 3.2-4

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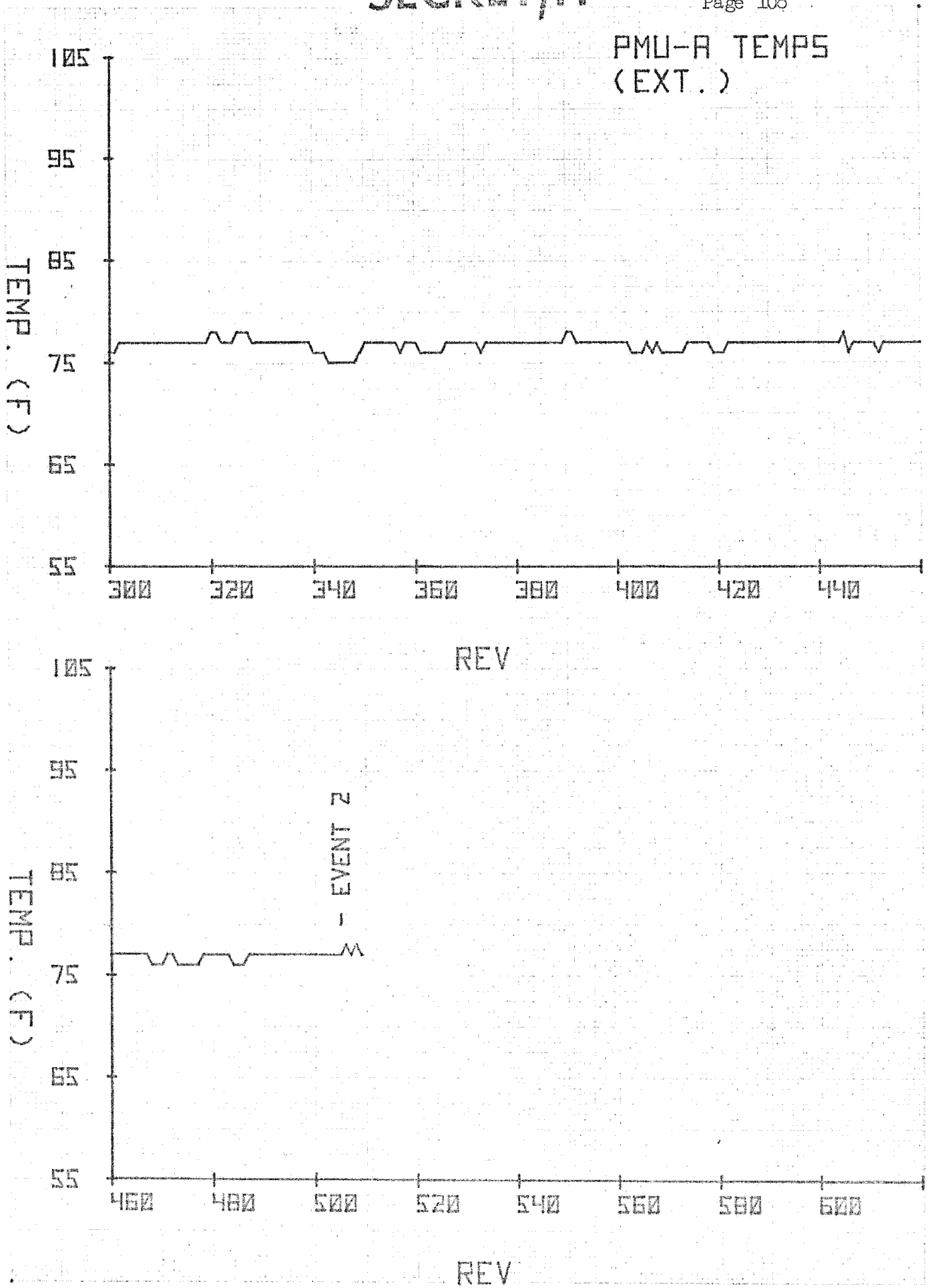

Figure 3.2-5

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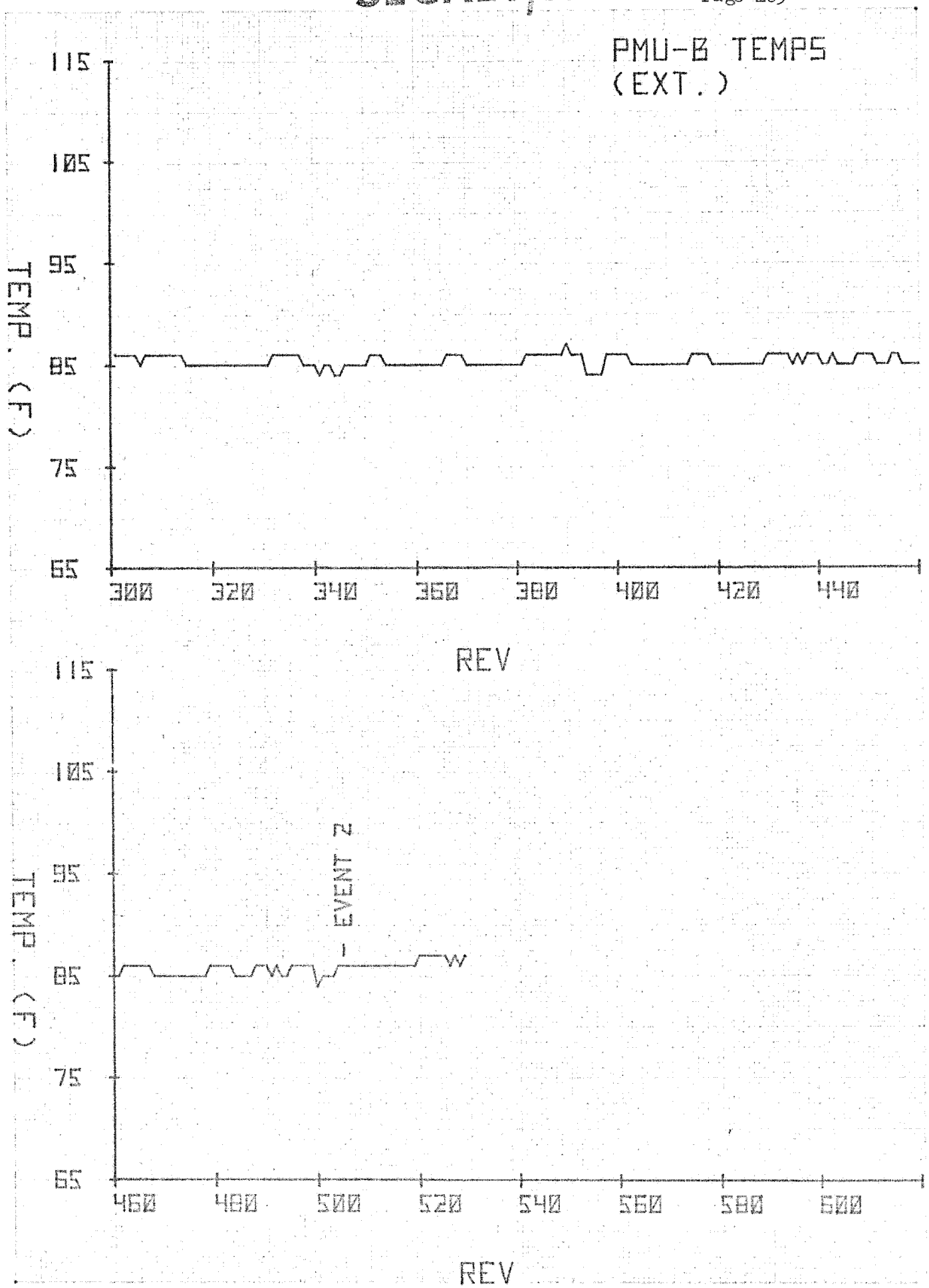

Figure 3.2-6

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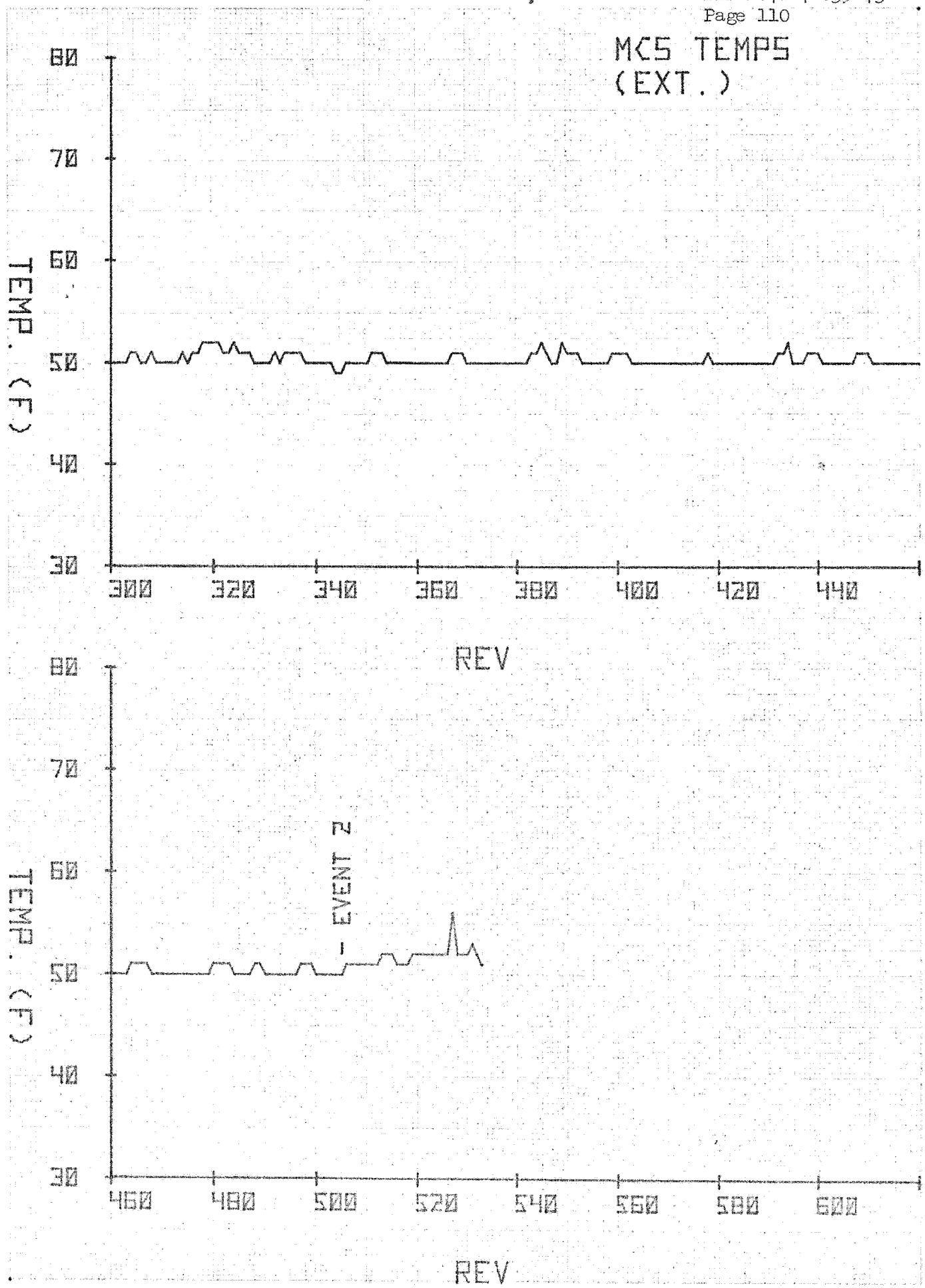

Figure 3.2-7

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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 increased drive torque on the aft camera optical bar noted during RV-1 subsided to a fairly constant, safe level, permitting a return to normal operation, which includes full stereo, 5.0 IPS rewinds and nesting of ops. Resumption of normal ops was effective Rev 362, Op 221, at which time modification of the exposure curves were also made, reducing the slit settings by two command steps.

The aft camera OOAA adjustments recommended by PFA after evaluation of RV-1 imagery were implemented on Rev 376, Op 235. Both the in-track and the cross-track nominals were biased minus four steps to command positions minus four and minus seven, respectively. The rewind evaluation originally planned for RV-2 was delayed until the segment of 1414 material at the end of RV-3.

The RV-2 mission segment consisted of 114 sensor system operations, consuming 14,163 seconds of camera power on time, 5.8 pounds of nitrogen gas, and approximately 26,700 feet of film per camera. The aft camera film included 5000 feet of SO-255 color material, utilized on mission operations 276 through 295. The consumption profiles through RV-2 are graphically depicted in Figure 1.

The overall quality of the acquired photography ranged from good to poor, with the majority rated as fair. The lowering in quality was primarily attributed to an increased incident of haze. The aft camera continued to be subject to image degradations resulting from the illumination geometry which persisted in producing shadowless photography, but at a slightly more southern band of latitudes than in RV-1.

3.3.2 Engineering Tests

Several engineering tests were performed during this segment of the mission, primarily in support of PFA to validate the changes in OOAA settings:

Rev 405	Tucson, Ariz, Engineering Baseline
Rev 438	OOAA MOP

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CONSUMPTION PROFILES

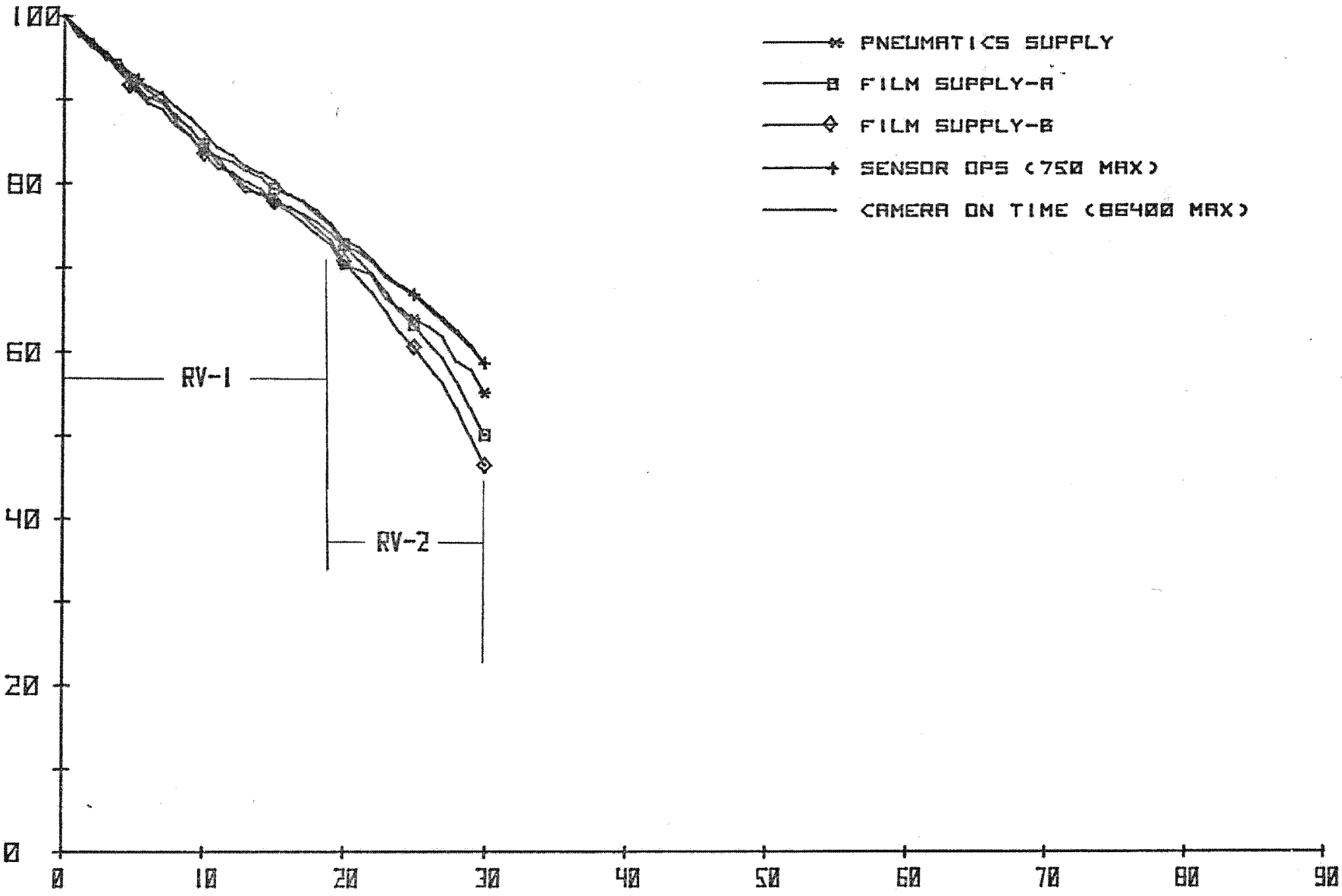

FIGURE 1

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Rev 453	Color Corn Target Acquisition
Rev 454	Tri-Bar Target Acquisition and Color Thru Focus
Rev 469	OOAA MOP
Rev 485 (2 Ops)	OOAA MOPs

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3.4 RV 2 (S/N 27) 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 95.0% of the maximum I.C.D. weight and unbalanced 6.35%. The PREP2 event took place on Rev 489 over POGO and separation occurred on Rev 505. Preparation deorbit, and entry events, and drogue and main parachute deployment conditions were normal and executed as planned. Aerial recovery was accomplished on the second pass at 9800 feet altitude, 9.55 nautical miles from the predicted impact point.

Recovery forces reported parachute oscillation more than 20° off vertical and lateral movement of the canopy. Two partial collapses of the cone were reported by the number 3 aircraft. Several light suspension lines were reported broken. No capsule damage was reported. Several chunks of black material about 7 to 8 inches in length (presumed to be graphite cloth) were reported separating during reel-in. A piece of metal approximately 1 inch by 1 inch by $\frac{1}{2}$ inch (presumed to be an SMDC shim) dropped from the bulkhead area to the aircraft floor.

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IDENTIFICATION DATA

SV 6 IRON NO 8261 RECOVERY REV 505

RV 2 RV S/N 27 RETRO MOTOR S/N Q-47 RECOVERY DATE 13 Aug 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
RV 3 OUT T/S	REV/STA			85506.8	85508			1.2
RV 2 IN T/S	489H			85510.8	85512			1.2
DT START	83340.82	83340.70	83340.95	83340.8	83341.0			0
POGO TRAN	84307.612			84307.2	84297			-10.2
PITCH START	84337.0			84337.4	84338			0
PITCH STOP				84392.6	84394			1.4
PYRO ARM BATT				84499.2	84499.4			0
POGO FADE	84619.769			84619.2	84625			5.8
KODI TRAN	84769.318			84768.8	84802	84802		33.2
ORB PWR OFF				84925.4	84926			0
RV SEP (0)	84935.39	84935.40	84935.4	84935.4	84936	84936	84935.8 NOTE 2	0
SPIN UP (+2.4)				84937.8		CONF	N/A	N/A
RETRO START	85060.79	85060.80	85060.8	85060.8		85062	85061.0	0
DESPIN (+160.4)				85095.8		N/A	N/A	N/A
PROP JETT (+175.4)				85110.8		N/A	N/A	N/A
KODI FD (RV)	85076.444					85085	N/A	N/A
RV ENTRY (400K	85226.38	85226.15	85226.37		RECOV TWX			
Δ 1-2 ACQ					85273	N/A		
ION ENTR	85327.95	85327.76	85327.99		85328	N/A		0
ION EXIT	85522.11	85522.00	85522.24		85521	85526		-1.24
DROGUE DEPLOY	85567.33	85567.21	85567.46	TONE STOP	85579	85579	85571	11.54
IMPACT (50K)	85585.82	85585.70	85585.95					
MAIN CHUTE DPL	85588.96	85588.79	85588.97		N/A	N/A	85600	11.03
H/SHLD JETT	85592.96	85592.72	85592.97	TONE START	85600	85606	85603	7.03
STEADY STATE	85603.96	85603.79	85603.97					
ETPD(RAINDROP)	85635.3	85635.3	85636.8					
RV @ 13.5K	00162.9	00162.9	00164.5	IN TRAIL	00300*	00240*	N/A	135.5
WATER IMPACT	00727.6	00727.6	00729.2		N/A	N/A	N/A	N/A
HULA TRAN (RV)	NA					N/A	N/A	N/A
HULA FADE (RV)	NA					N/A	N/A	N/A
DT RUNOUT	86055.82	86055.70	86055.95		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 3.4-2
RV 2 RECOVERY DATA

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RECOVERY DATA

	BASIC STUDY	UPDATED TEAPOT	TEAPOT EVALUATION	QUICK LOOK RPT	EPPD (TWX)	AERIAL RECOVERY
LATITUDE	21.006	20.944	20.925	20.766	20.750	20.766
LONGITUDE	173.68	173.68	173.69	173.683	173.75	173.683

RECOV. A/C DEPLOYMENT FORMATION No. 10, RECOVERING A/C No. 1

RECOV ALT 9800 ft, PASS No. 2, TIME 0005 Z

AIRSPEED 156 KTAS, 130 KIAS; TIME IN TOW 21 min.

RAINDROP ETPD 85635 sec 46000 ft; RATE/DESCENT, 15K 28.8 FPS, 10K 26.5 FPS

CONTACT LOCATION Right Inside Hook Engaged Two Heavy Load Lines

PRESET TENSION LEVEL 3600 lb, PAYOUT Normal

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

OVERSHOOT 9.54 nm, CROSS TRACK .42 nm EAST

RC CONDITION Normal

CHUTE/CONE CONDITION Normal, Several broken light suspension lines

CHUTE/CONE BEHAVIOR Oscillation greater than 20°, 2 partial cone collapses but not during recovery pass

WIND DATA,

ALT (K)	DIRECTION PRED	DIRECTION ACT	VELOCITY PRED	VELOCITY ACT	ALT (K)	DIRECTION PRED	DIRECTION ACT	VELOCITY PRED	VELOCITY ACT
SCF	170	160	10	10	25	250	260	10	15
2	190	140	10	15	30	250	260	15	20
4	200	080	10	15	35	290	260	10	40
6	210	080	10	15	40	280	260	30	50
8	220	080	10	15	45	280	260	45	45
10	230	080	15	10	50	250	260	10	25
15	230	330	20	10	55	--		--	
20	260	230	15	15	60	--		--	

RV BATTERY TIME HISTORY

TIME	ACT 85501	502	503	504	505	506	507	509	512	516	519	520
MAIN		16.4	23.9	25.3								
PYRO #1		20.9	22.1	23.0	23.5		24.5	25.8		26.3		27.2
PYRO #2		16.7	22.3	23.4		24.2		25.3	25.9		26.6	27.2
TIME	85522	523	525	528	552	873	936	950	078			
MAIN		25.9	26.5	27.0	27.2	26.7	25.2	22.9	22.8			
PYRO #1	27.9				28.1	29.3	27.7	27.3	27.7			
PYRO #2	27.7				27.7	28.8	28.8	28.8	28.4			

SV RATES BEFORE & AFTER SEP (SV TLM)

	TIME	PITCH RATE PGR °/sec	ROLL RATE RGR °/sec	YAW RATE YGR °/sec
	934.4	-.100	0	0
SEP	935.4	-.069	-.001	-.001
	936.6	+1.34	+.015	.004

MISC DATA

Payload Temp before SEP,	Rn06 62	°F
Payload Temp, Max REENTRY,	TB02 62	°F
Chute Press before PREP 2,	P711 .77	PSI
Supply Press before PREP 2,	P113 .80	PSI
BETA ANGLE of Recovery Rev.	-0.6	°

PITCH ANGLE

BASIC STUDY		Ω_y 1.67	°/sec	PITCH (CMD MSG)	55.2 °
Θ_{rvs}	-126.19 °	$\Delta\Theta_2$ .04	°	Θ_{sv} (PDWN-SV TLM)	-38.2 °
$\Delta\Theta_1$	2.84 °			UPDATED TEAPOT	-126.116 °

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RV 2 RECOVERY DATA

RV MASS PROPERTIES

	BASIC STUDY	UPDATED TEAPOT	TEAPOT EVALUATION	ACTUAL POST FLT
TU-A	211.2 lb	211.2 lb	211.2 lb	212.0 lb
TU-B	225.8 lb	225.8 lb	225.8 lb	227.0 lb
TOTAL	437.0 lb	437.0 lb	437.0 lb	439.0 lb
SEP WGT	1525.63 lb	1525.63 lb	1525.63 lb	UPDATED TEAPOT
RETRO WGT	1523.94 lb	1523.94 lb	1523.94 lb	% UNBAL 6.35
ENTRY WGT	1333.13 lb	1333.13 lb	1333.13 lb	% FULL 95.0
AIR RECOV WGT	1114.54 lb	1114.54 lb	1114.54 lb	(100% = 464 lb)

SV MASS PROPERTIES - AFTER SEP (FROM BASIC STUDY)

SV WEIGHT	17025.3 lb	PITCH INERTIA (Iy)	99 005.16 SLUG-FT^2
CG FROM STA 2060 (Xr)	262.82 in	ROLL INERTIA (Ix)	5 497.67 SLUG-FT^2
CG FROM LONG AXIS (Y)	0.1777 in	YAW INERTIA (Iz)	121 799.12 SLUG-FT^2

'DORBEL EPHEMERIS

REV OF SEP 505	BASIC STUDY	UPDATED TEAPOT	TEAPOT EVALUATION
PREDICTED FROM REV	494	502	N/A
APOGEE	155.623 nm	155.271 nm	155.066 nm
PERIGEE	88.198 nm	88.178 nm	88.219 nm
ARG OF PERIGEE	128.468 °	128.446 °	128.368 °
INCLINATION	96.195 °	96.194 °	96.194 °
TRUE ANOMALY AT RETRO	0.09 °	0.19 °	0.27 °
HEATSHIELD JETT ALT	49630.66 FT	49636.97 FT	49713.24 FT

ENTRY PARAMETERS FROM TEAPOT EVALUATION RUN

	SEPARATION	RETRO	REENTRY	DROGUE DEPLOY
SYSTEMS TIME (sec)	84935.4	85060.80	85226.37	85567.46
ALTITUDE (FT)	547794.83	535537.55	400000.05	63892.87
LATITUDE (°N)	59.521	51.046	40.066	20.968
LONGITUDE (°W)	163.04	166.48	169.69	173.68
INERTIAL AZIMUTH (°)	192.30	189.89		
INERT FLT PATH ANGLE (°)	-0.0879	-0.0043		
INERT VELOCITY (FT/SEC)	25735.31	25743.76	25531.50	
LOCAL AZIMUTH (°)			169.28	189.83
LOCAL FLT PATH ANGLE (°)			-2.0563	-31.2419
LOCAL VELOCITY (FT/SEC)				1416.17
ANGLE OF ATTACK (°)			104.30	
MACH NUMBER				1.46
DYN PRESS (PSF)				187.838

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

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

SYS TIME	83171 sec	DECLINATION (MDAC = GEOCENTRIC LAT)	0.1061N °
LONGITUDE	13.6511E °	INERTIAL GEOCENTRIC FLT PATH ANGLE	-0.4163 °
ALTITUDE	138.7614 nm	INERTIAL GEOCENTRIC AZIMUTH	353.8064 °
		INERTIAL VELOCITY	25355.66 FT/SEC
SV C_D A/M (DRAG VALUE AT ASCENDING NODE OF RECOVERY REV)			0.46639 FT^2/SLUG

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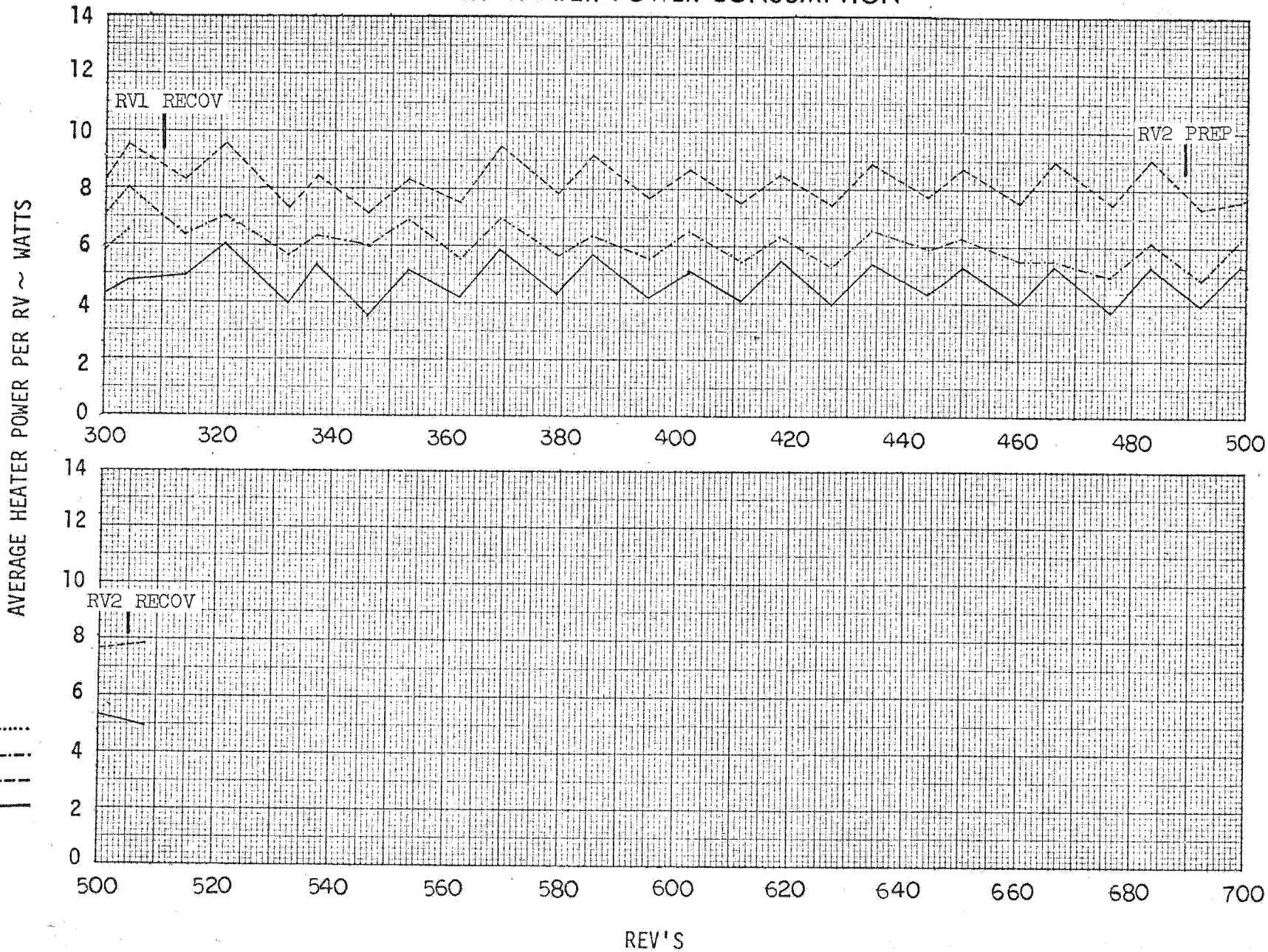
ACTIVE THERMAL CONTROL SYSTEM

RV HEATER POWER CONSUMPTION



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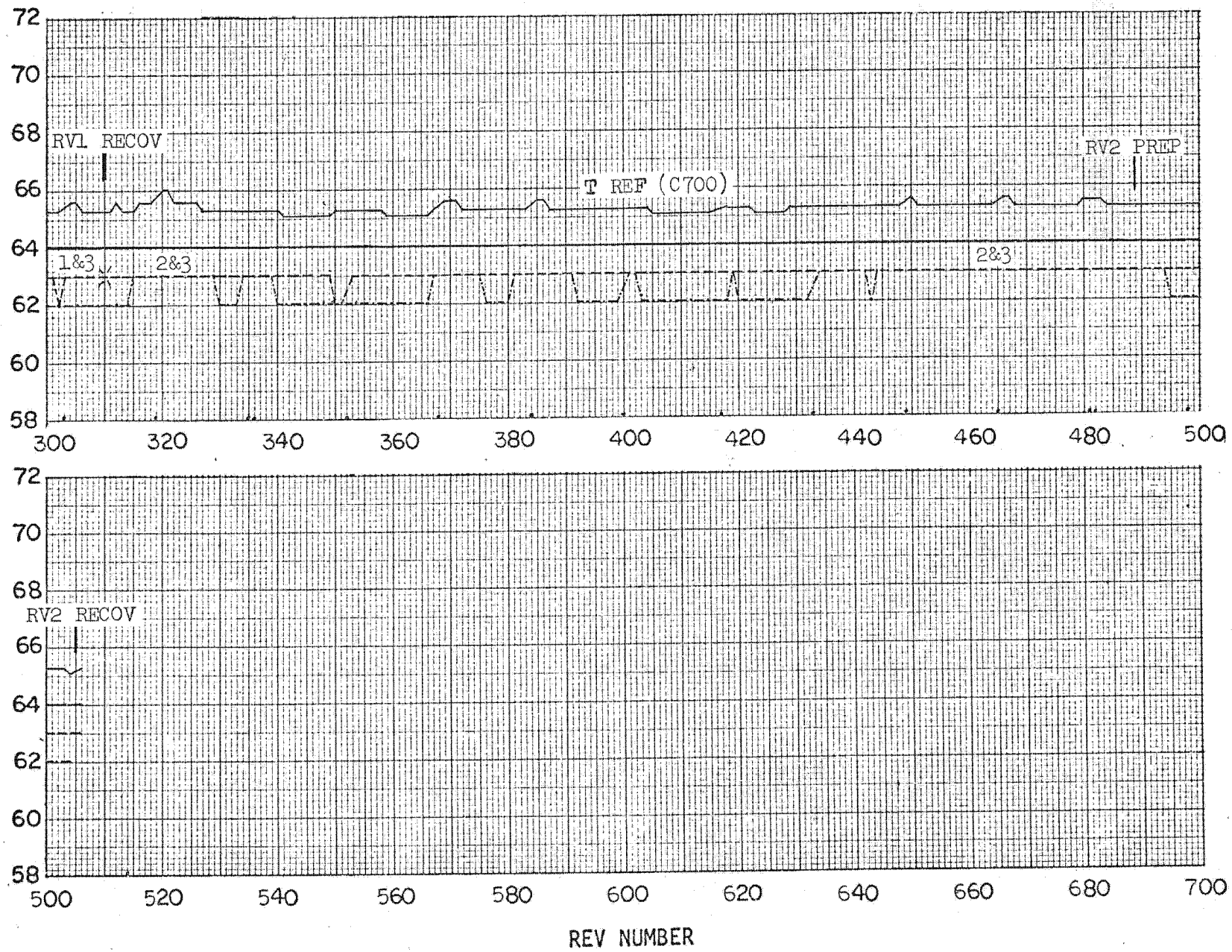
ACTIVE THERMAL CONTROL SYSTEM

RV PAYLOAD CONTAINER & REFERENCE TEMPERATURES



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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 505. 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 321.
2. Positive orbit adjust on Rev 354.
3. Positive orbit adjust on Rev 386 followed by a negative orbit adjust on Rev 388.
4. Positive orbit adjust on Rev 435.
5. Positive orbit adjust on Rev 485.

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
311	.0090	.2588	88:45.8	153.05	86.02	135.3	.4705	170/49	
313	.0090	.2738	88:45.2	152.70	85.96	134.8	.4926	161/46	
316	.0089	.2559	88:44.5	152.27	86.06	133.8	.4604	172/49	
320	.0089	.2596	88:43.4	151.65	85.95	133.1	.4595	169/49	
324	.0094	.2400	88:49.8	155.85	86.46	136.3	.4607	189/55	OA #13 Rev 321
327	.0094	.2454	88:49.0	155.47	86.33	135.7	.4644	184/53	
329	.0093	.2423	88:48.5	155.25	86.25	135.2	.4535	187/54	
332	.0093	.2341	88:47.9	154.82	86.41	134.2	.4407	193/56	
337	.0092	.2329	88:46.7	154.27	86.24	133.2	.4289	194/56	
340	.0091	.2332	88:46.1	153.77	86.36	132.3	.4300	194/56	
343	.0091	.2436	88:45.2	153.45	86.20	131.6	.4412	185/54	
345	.0091	.2493	88:44.7	153.20	86.13	131.0	.4468	181/52	
348	.0090	.2412	88:44.1	152.77	86.24	130.2	.4331	187/54	
353	.0090	.2387	88:42.8	152.12	86.15	129.1	.4206	189/55	
356	.0096	.2215	88:50.3	157.48	86.52	132.2	.4232	212/61	OA #14 Rev 354
359	.0096	.2347	88:49.5	157.10	86.35	131.8	.4407	199/58	
361	.0096	.2428	88:48.9	156.91	86.26	131.2	.4507	193/56	
365	.0095	.2313	88:48.2	156.30	86.50	129.8	.4326	202/59	
369	.0094	.2277	88:47.2	155.85	86.36	129.1	.4182	205/59	
373	.0093	.2250	88:46.4	155.25	86.50	128.1	.4140	207/60	
376	.0093	.2365	88:45.6	154.96	86.32	127.4	.4237	198/58	

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
378	.0093	.2443	88:45.1	154.63	86.29	126.9	.4377	190/55	
381	.0092	.2549	88:44.4	154.16	86.37	125.9	.4552	182/53	
387	.0088	.1365	89:03.3	159.24	93.81	140.7	.4500	347/102	OA #15 Rev 386 OA #16 Rev 388
389	.0090	.2225	88:51.1	152.79	86.90	150.3	.4582	184/54	
392	.0090	.2426	88:50.3	152.47	86.66	149.7	.4930	166/47	
394	.0090	.2333	88:49.8	152.32	86.52	149.3	.4642	175/50	
397	.0089	.2233	88:49.3	151.92	86.66	148.1	.4464	183/54	
402	.0088	.2233	88:48.1	151.48	86.41	147.1	.4354	183/54	
405	.0087	.2272	88:47.5	150.95	86.53	146.3	.4441	180/53	
410	.0087	.2387	88:46.7	150.69	86.34	145.4	.4566	171/49	
413	.0086	.2362	88:45.6	150.03	86.35	143.9	.4487	173/50	
418	.0086	.2427	88:44.3	149.45	86.15	142.8	.4502	169/49	
421	.0085	.2543	88:43.6	148.94	86.20	142.0	.4707	161/47	
424	.0084	.2567	88:42.8	148.61	86.04	141.1	.4665	159/46	
426	.0084	.2546	88:42.2	148.41	85.93	140.6	.4573	160/46	
429	.0083	.2459	88:41.6	147.98	86.03	139.6	.4423	166/48	
434	.0083	.2407	88:40.3	147.41	85.84	138.6	.4226	170/49	
437	.0093	.2103	88:51.8	154.89	86.74	145.2	.4265	204/59	OA #17 Rev 435
441	.0092	.2305	88:50.9	154.43	86.54	144.4	.4582	186/54	
443	.0092	.2235	88:50.4	154.17	86.56	143.9	.4432	192/56	
446	.0091	.2240	88:49.8	153.74	86.70	142.7	.4459	192/56	

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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
450	.0091	.2209	88:48.8	153.38	86.51	141.9	.4309	195/57	
454	.0090	.2207	88:48.0	152.81	86.60	141.0	.4301	195/57	
457	.0090	.2338	88:47.3	152.56	86.41	140.1	.4457	184/53	
459	.0089	.2265	88:46.8	152.34	86.35	139.7	.4295	190/55	
462	.0088	.2251	88:46.2	151.94	86.46	138.6	.4273	191/55	
466	.0088	.2256	88:45.2	151.47	86.33	137.8	.4213	191/55	
470	.0087	.2207	88:44.4	150.94	86.40	136.9	.4114	195/56	
473	.0087	.2282	88:43.7	150.71	86.21	136.1	.4143	190/55	
475	.0087	.2279	88:43.2	150.47	86.15	135.6	.4129	189/55	
478	.0086	.2250	88:42.7	150.08	86.27	135.6	.4084	191/55	
483	.0085	.2282	88:41.4	149.54	86.08	133.7	.4047	188/55	
486	.0099	.2091	88:52.8	159.49	86.45	133.2	.4055	228/66	OA #18 Rev 485
489	.0099	.2171	88:52.3	159.20	86.44	132.7	.4193	219/64	
491	.0099	.2243	88:51.5	158.93	86.30	132.0	.4263	212/61	
494	.0098	.2122	88:51.1	158.55	86.47	131.1	.4059	224/65	
499	.0097	.2232	88:49.9	157.92	86.41	129.9	.4206	213/63	
502	.0096	.2374	88:49.2	157.43	86.49	129.2	.4851	201/58	
505	.0096	.2412	88:48.6	157.21	86.40	128.6		196/97	

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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
316	21	.048	.389	397	25/26	.024	-.043
320	21	.242	.709	402	26	-.205	-.608
324	21	-.015	.329	408	26	0	.077
327	21	.256	.904	410	26	.179	.390
329	21	.272	.981	413	26/27	.016	-.271
332	21/22	.115	.241	418	27	-.222	-.504
337	22	-.107	-.366	421	27	.199	.291
340	22	-.097	-.298	424	27	.279	.997
343	22	.027	.289	426	27/28	.283	.837
345	22	.244	.829	429	28	.177	.837
348	22/23	.163	.324	434	28	.246	.564
353	23	-.125	-.375	437	28	-.151	-.505
356	23	-.102	-.305	441	28	.200	.568
359	23	.086	.309	443	28	.011	.033
361	23	.333	1.000	446	28/29	.091	.331
365	23/24	.131	.408	451	29	-.043	-.119
369	24	.010	-.241	454	29	-.133	-.235
373	24	-.277	-1.062	457	29	.135	.622
376	24	-.429	-1.116	459	29/30	.004	.146
378	24	-.280	-.574	462	30	.071	.297
381	24/25	.130	.125	466	30	.140	.383
386	25	.042	-.047	470	30	-.032	-.042
389	25	-.241	-.272	473	30	.022	.123
392	25	.471	1.513	475	30	.065	.159
394	25	.305	.772	478	30	.003	.231

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PREDICTION [illegible] FACT 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
483	31	.205	.514				
486	31	-.044	-.071				
489	31	.084	.206				
491	31	.333	.645				
494	31/32	-.090	-.735				
499	32	-.332	-2.720				
502	32	-.382	-1.321				
505	32	-.849	-1.493				

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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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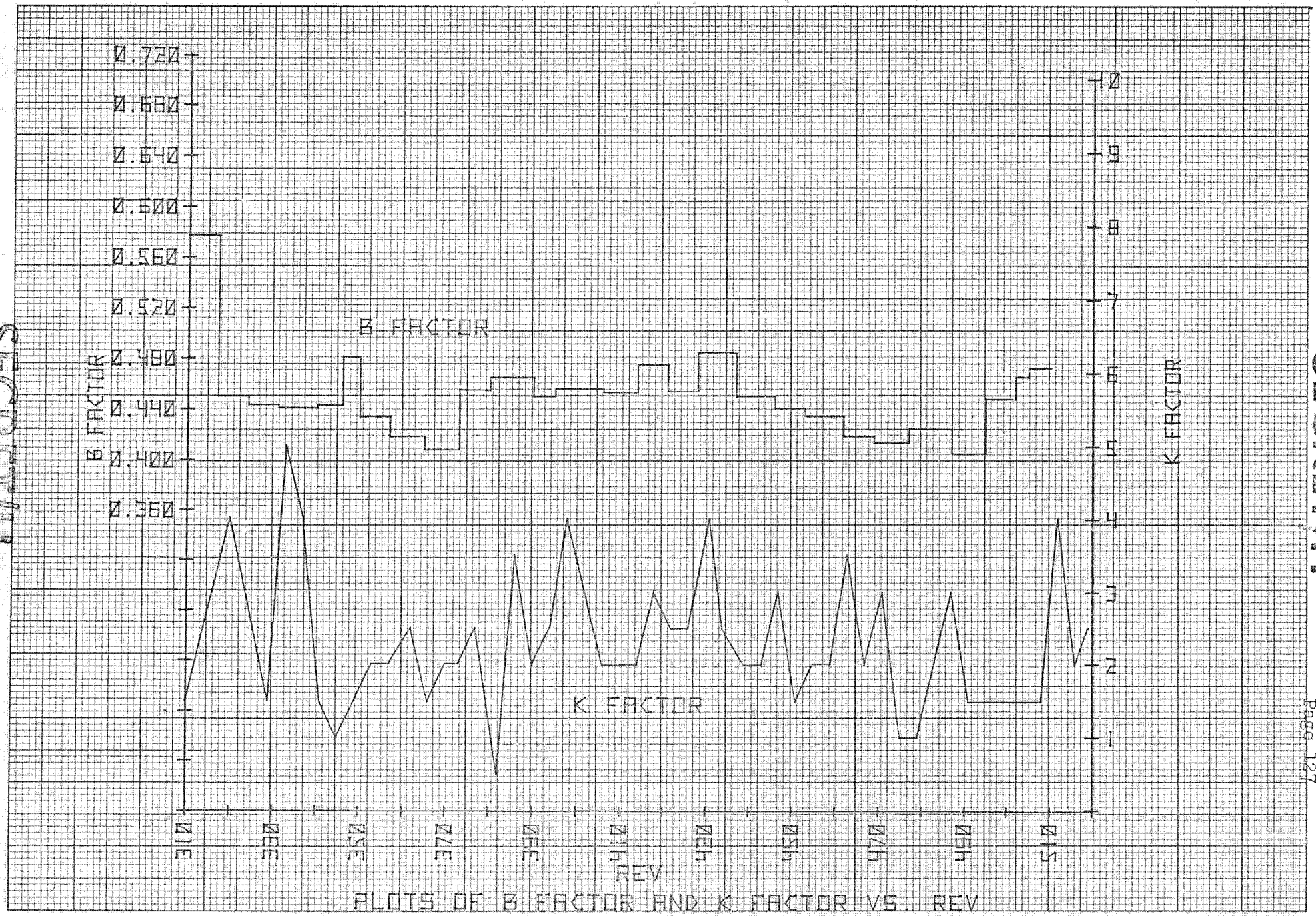

Figure 3.5-1

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		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. 13	Rev. No. 321						
Orbit at Rev	320	88:43.3	87.78	149.74	132.921	--	--
Predicted	322	88:50.3	88.04	154.54	136.770	34.2	11.35
Actual	322	88:50.4	88.01	154.53	136.852	34.2	11.47
Delta (A-P)		+.075	+.057	-.019	+.082	--	+.22
OA No. 14	Rev. No. 354						
Orbit at Rev	353	88:42.8	88.10	150.30	128.857	--	--
Predicted	355	88:50.7	88.26	156.09	132.484	38.60	12.77
Actual	355	88:50.6	88.28	156.07	132.456	38.60	12.78
Delta (A-P)		+.013	+.019	-.023	-.028	--	+.01
OA No. 15	Rev. No. 386						
Orbit at Rev	385	88:43.1	88.11	151.92	125.089	--	--
Predicted						97.6	32.49
Actual						97.6	32.64
Delta (A-P)						--	+.15
OA No. 16	Rev. No. 388						
Orbit at Rev							
Predicted	389	88:51.3	87.92	151.50	150.238	57.6	-18.80
Actual	389	88:51.3	88.02	151.35	150.512	57.6	-18.93
Delta (A-P)		0	+.10	-.15	+.274	--	+.13

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Table 3.5-3

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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. 17	Rev. No. 435						
Orbit at Rev	434	88:40.2	87.63	145.34	138.330	--	--
Predicted	436	88:52.0	88.00	153.48	145.314	59.0	+19.05
Actual	436	88:52.1	88.07	153.49	145.394	59.0	+19.16
Delta (A-P)		+0.1	+.067	+.011	+.080	--	+.11
OA No. 18	Rev. No. 485						
Orbit at Rev	484	88:41.4	88.18	147.43	133.612	--	--
Predicted	486	88:52.8	88.23	157.99	133.331	58.4	+18.75
Actual	486	88:53.4	88.28	157.98	133.457	58.4	+18.86
Delta (A-P)		+.093	+.045	-.006	-.126	--	+.11
OA No.	Rev. No.						
Orbit at Rev							
Predicted							
Actual							
Delta (A-P)							
OA No.	Rev. No.						
Orbit at Rev							
Predicted							
Actual							
Delta (A-P)							

Table 3.5-3

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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
21	317	.0088	96.20	88:44.3	151.83	86.30	133.7	.4506	317 - 324
								.4436	324 - 331
								.4328	331 - 333
22	333	.0092	96.20	88:47.7	154.54	86.61	133.7	.4414	333 - 340
								.4434	340 - 346
								.4205	346 -
23	350	.0089	96.20	88:43.6	152.34	86.43	129.4	.4814	350 - 357
								.4348	357 - 364
								.4194	364 - 365
24	365	.0094	96.19	88:48.2	156.21	86.54	129.9	.4088	365 - 373
								.4553	373 - 380
								.4396	380 - 381

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	381	.0091	96.19	88:44.4	153.91	86.59	126.0	.4653	381 - 390
								.4505	390 - 395
								.4471	395 - 397
26	397	.0088	96.19	88:49.3	151.76	86.81	148.2	.4565	397 - 406
								.4539	406 - 412
								.4581	412 - 414
27	414	.0085	96.19	88:45.3	149.67	86.61	143.4	.4757	414 - 421
								.4551	421 - 428
								.4290	428 - 429
28	429	.0083	96.19	88:41.7	147.83	86.25	139.7	.4856	429 - 437
								.4511	437 - 444
								.4395	444 - 446

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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
29	446	.0091	96.19	88:49.8	153.62	86.82	142.8	.4418	446 - 453
								.4362	453 - 460
								.4189	460 -
30	462	.0088	96.19	88:46.2	151.75	86.62	138.7	.4201	462 - 469
								.4150	469 - 477
								.4113	477 -
31	480	.0097	96.19	88:49.7	157.80	86.44	129.7	.4260	480 - 487
								.4065	487 - 493
								.4278	493 -
32	495	.0097	96.19	88:50.8	158.34	86.60	130.6	.4489	495 - 502
								.4664	502 - 505
								2.0814	505 - 505
								.4738	505 - 510
								.4694	510 -

Table 3.5-4

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3.5.2 Telemetry and Mode Processing

3.5.2.1 General

No SV-6 display mode effort was conducted during this segment.

3.5.2.2 Digital T. V.

Review of the 104 column display continued with additional changes to modes 11, 13, 14 defined as necessary prior to implementation.

3.5.3 Command Message Planning and Generation

FPA changes were processed to better define the PREP and Recovery message requirements for sequence assignment to both PMUs and to define Load order for critical SPCs and sequences.

The one rev load cycle continued in use and no significant generation problems were encountered during the segment.

3.5.4 SCF Support

Completely adequate SCF support continued during the segment.

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SECTION 3.6
PROGRAM COMMAND SOFTWARE PERFORMANCE
(Prepared by HTC)

3.6 PROGRAM COMMAND SOFTWARE PERFORMANCE

(Prepared by Computer Program Associate Contractor - HTC)

3.6.1 Command Message Summary

This section summarizes pertinent command message data from Mission 1206, IRON 8261. The command messages discussed cover the period from the first RV2 message (Rev. 311 load) to the RV 2 recovery message (Rev. 503 load).

One hundred sixty-six command messages were received by the Technical Advisor (TA) Staff. One hundred thirty-seven were accepted and twenty-nine were rejected. Three of the rejected messages were subsequently altered and loaded into the vehicle. The remaining twenty-six were not required due to lack of payload operation or no change in payload selection. The reasons for rejection of the three messages requiring alters are summarized below:

Rev. No. and Load Station	Reason for Rejection
320 GUAM	Tape recorder constraint violation occurred.
454 POGO	SSC focus experiment was done improperly.
483 GUAM	Requirements for manual station contacts changed.

One hundred thirty-six messages were loaded and thirty were not for the reasons stated below:

1. The twenty-nine rejected messages were not loaded.
2. One contingency VBE message concerning RV 2 recovery was not required.

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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 forty-one add-on messages.

3.6.2 'TUNITY Software Problems

The Flight 6 'TUNITY software problems itemized below pertain only to the period for RV 1 recovery through RV 2 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. SPR MD2-6017, although not written during the flight, is included in this report because it describes a problem that was known before the flight but had not been declared flight critical by the SW FTFD until during bucket two.

Category	No. of SPRs	Comments
Flight Critical	(6017)	Software corrections were made and incorporated during this flight period.
Non-Flight Critical (Requiring Work-Around)	2	Work-around procedures were developed and implemented.
Non-Flight Critical (Minor)	8	Work-around procedures were not required.
Product Improvement or New Requirements	3	To be considered during future development.
Documentation Error	1	MS-4 or MS-7 affected.

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Itemized Software Problems

SPR MD2-6017 ('TELPRO) - FLIGHT CRITICAL -

- Problem Description: 'TELPRO forces an abort when a parity is detected on a BBRT. Most parities are not serious and will cause at most the loss of one FRT. A great deal of manual effort is required to delete the parity record.

- Solution or Work-Around: The problem was determined to be flight critical. A change was made to 'TELPRO and was incorporated on the Flight SAFARI.

- Operational Impact: Because of the abort in 'TELPRO when reading a parity, the tape had to be copied on the 160-A omitting the parity error. This delayed the stripping of FRT's for MPR. With the implementation of the new mod of 'TELPRO, parity error records can be ignored by operation option with the possibility of losing mandatory data for MPR.

SPR MD2-6218 ('TRANFUN)

- Problem Description: Sequences defined in the data base for placement in both PMU's can be inadvertently specified on a sequence card for placement in only one PMU.

- Solution or Work-Around: None.

- Operational Impact: Because a PMU preference was put on a sequence card in error, the recovery message had to be regenerated.

- Comment: This SPR should be considered as a product improvement item for a future software delivery. A compatibility check of a PMU assignment and an error message could be put into 'TDCAL when changing PMU preference on a sequence that is set up in the data base to be assembled in both PMU's.

SPR MD2-6219 ('TPURR)

- Problem Description: The information message that states "RELEASED REV 320 TO REV 377 IN CHG TABLES ** END OF CHGPURR ** is in error. The last rev released in the 4 Aug 73 'TPURR run was Rev 333.

- Solution or Work-Around: None.

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

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- Comment: This is a software problem and it should be corrected prior to SV-7.

SPR MD2-6220 ('TDERBY)

- Problem Description: As shown in message 320, for Rev 317 KODI, 'TDERBY is unable to assemble a valid lat "off" for a Beacon circle which laps the equator on the last rev of the span. 'TDERBY determines the correct on time but fails to compute the off time because it occurs outside the 'TDERBY span.

- Solution or Work-Around: None.

- Operational Impact: There is no operational impact but this situation does cause confusion in determining the validity of the beacon events.

- Comment: SOST is currently studying this SPR to determine how big a problem it is and feasibility of a program mod.

SPR MD2-6221 ('TRIAL)

- Problem Description: In the 'TRIAL test run on 27 Jul 73, Test Case II showed that 'TRIAL was not time deconflicting all commands. In the above case, there were six commands (TT/C-, EN07716) about 0.2 of a second apart and within 2.8 seconds of a TR 1 + command. 'TRIAL deconflicted every other command.

- Solution or Work-Around: This situation only occurs when the tape recorder is on over a station and the 'TRIAL duty logic is turned on. To work around this, SUB cards are used to replace the tape recorder commands over stations.

- Operational Impact: Since this problem was discovered in a test message there was no operational impact and with the above mentioned work-around, 'TRIAL handled this problem satisfactorily on flight.

- Comment: This SPR is a software problem, the solution is known and should be fixed prior to SV-7.

SPR MD2-6222 ('TDEFINE)

- Problem Description: 'TDEFINE is clumsy in that it does not allow a user to accept or reject card inputs. A sequence can too easily be voided if one or more input cards has an error on it.

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- Solution or Work-Around: None.
- Operational Impact: None.
- Comment: This SPR should be considered as a product improvement item for a future software delivery. A possible solution would be to only update the data base at the user's option.

SPR MD2-6223 ('TWORT)

- Problem Description: 'TWORT uses system time in its MACRO/SEQ output and it would cause less confusion if it used vehicle time.
- Solution or Work-Around: None.
- Operational Impact: None.
- Comment: 'TWORT displays system time in its output in order to be consistent with all event generators which also display system time.

SPR MD2-6224 ('TWIT)

- Problem Description: The information message in 'TWIT stating that weather does not encompass the requested rev span is erroneously output when the sufficient weather is available to cover all active revs of the 'TWIT span.
- Solution or Work-Around: None.
- Operational Impact: None.
- Comment: This problem causes undue concern because the weather is there for the active revs of the span and no weather is needed for inactive revs -- the situation that is causing the message. This problem should be fixed for use in supporting SV-7.

SPR MD2-6225 ('TBAT)

- Problem Description: 'TBAT appears to consistently "under-calculate" the number of cells within an operation, i.e., the number of cells in the 'TAP and 'TPM are often times much less than the number of cells in the 'TYM.
- Solution or Work-Around: None.
- Operational Impact: None.

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- Comment: SOST is currently studying this problem to determine if it is really a software problem or possibly due to the approximation calculations in 'TBAT.

SPR MD2-6226 ('TMOSES)

- Problem Description: Reference frame 13 on Rev. 379, SS operation 238, OB A in the 6 Aug 73 MPR run. The (x,y) coordinates and frame state of target 9A0268A indicate the target to be well within the frame. If, however, the operation is plotted (FLAT1, FLON1, FLAT4, FLON4) on the earth's surface, the target lies about 18 n.m. outside of this polygon.

- Solution or Work-Around: None.

- Operational Impact: None.

- Comment: This problem was studied by the SOST and it was learned that the author of the SPR had made a mistake in the calculation and the target was indeed well within the frame.

SPR MD2-6227 ('TBAT)

- Problem Description: According to the 6 Aug 73 'TBAT run (revs 393 - 409) SS operation 245 on Rev 395 can have at the most 7 cells in it. MPE counted down 12 cells for that operation at the end of the day.

- Solution or Work-Around: None.

- Operational Impact: None.

- Comment: SOST is currently studying this problem to determine the source of the miscompares.

SPR MD2-6228 ('TWORT)

- Problem Description: In setting the data base items, 'CWOST, 'CWOET, and/or 'CWODUR, to a fraction of a second (i.e., xxx.2, xxx.4, etc.), truncation occurs which causes the start time, end time, and/or duration of a sequence to be shortened by .2 of a second.

- Solution or Work-Around: None.

- Operational Impact: None.

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- Comment: It is a software problem; the solution is known and it should be fixed prior to the support of SV-7.

SPR MD2-6229 "TWORT MS-4)

- Problem Description: The following documentation errors occur in the 'TWORT MS-4:

```
Page 25 is:   Entry ('TSMTAB(B) = Entry ('TSMTAB(B-1))
should be:    Entry ('TSMTAB(I)) = Entry ('TSMTAB(I-1))

Page 28 is:   'TOSTIM(OS+1) = ('TSMST(SM) * ('CWOSTF(II)-1)*2
              + 'TSMET(SM) * 'CWOSTF(II) + STCWO) 60.
should be:    'TOSTIM(OS+1) = ('TSMST(SM) * ('CWOSTF II)-1) * 2
              + 'TSMET(SM) * 'CWOSTF(II) + STCWO)/60.

Page 32 is:   'TSMTYP(SM) = 1?
should be:    'TSMTYP(FIDSM) = 1?

Page 33 is:   FID = BIT(1,7) ('CWOOVR(FD))
should be:    FID = BIT(I,9) ('CWOOVR(FD))

Page 35 is:   OS = MACOS
              SM = NEWMAL
should be:    OS = MACOS
              SM = SVSM
```

- Solution or Work-Around: None.

- Operational Impact: None.

- Comment: The 'TWORT MS-4 should be updated to correct the above mentioned errors.

SPR MD2-6230 ('TFRTIN)

- Problem Description: When an incorrect TOT card was input to an MPR run, the error message gave an option to correct the data card and type in DATA to continue. But correcting the card and typing DATA resulted in more unwanted error messages and a loss of data.

- Solution or Work-Around: The TOT data card has to be corrected and the MPR run started over.

- Operational Impact: None.

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- Comment: This SPR is a software problem and it should be fixed prior to the support of SV-7.

SPR MD2-6231 ('TMOD)

- Problem Description: Presently, if an error occurs in an update of the RPT tape, it is necessary to reload the data base to try again. This is because the RPT update tape number and date are incremented each run causing 'TMOD to only accept the latest tape which is known to be in error. This causes unnecessary delay for a 'TMOD run.

- Solution or Work-Around: Reload the data base, correct the errors and re-run 'TMOD.

- Operational Impact: None.

- Comment: This SPR should be considered a product improvement item for a future software delivery. A new data card could be used to reset these items when an error is made in an RPT update run.

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3.6.3 Hardware/Software Interface Changes

For IRON 8261, nine change requests were processed from the RVI recovery message through the RV2 recovery message (as shown in Table 3.6.3-1). Several of these requests involved more than one request.

These changes were implemented via requests SV6-123 through SV6-154 and have been incorporated in the nominal 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
SV6-123	Modification of sequence 122 to assure only 3 pan camera extra frames at the altitude where majority of the operations take place.	SV-6 only
SV6-124 thru 127	Modification of sequences 120, 122, 126 and 136 to return them to liftoff configuration. This is due to OBB torque levels returning to near nominal.	SV-6 only
SV6-128	Modification of sequence 144 to get O^2A^2 nominal value based on RVI data evaluation.	SV-6 only
SV6-129	Sequence 132 was modified in order to save PNEUMATIC gas when operating FT A only.	SV-6 only
SV6-131 thru 140	Modification of sequences 120, 131, 132, 134 thru 139 and addition of sequence 172 to provide redundant shut down of the OB, TF and PN during SS ops. The change to all sequences of this group were disapproved because they did not result in a satisfactory solution to the problem.	
SV6-141 thru 150	Modification of sequences 148 thru 150 and 153 thru 159 to provide redundant ST off's to be associated with each ST operate. The change to all sequences of this group were disapproved because it did not result in a satisfactory solution to the problem.	
SV6-151 and 152	The purpose of this request is to set hold logic for CA+ and CB+ commands in conjunction with requests SV6-131 thru 140. This request was disapproved for same reason as SV6-131 thru 140.	
SV6-153	Modification of sequence 144 to configure O^2A^2 for color film.	SV-6 only
SV6-154	Modification of sequence 144 to configure O^2A^2 for black and white film.	SV-6 only

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

3.7.1 EDAP Performance

EDAP operations through segment 2 were normal in all areas. The abnormal main battery #2 and #3 heater cycling in segment 1 has not recurred in segment 2.

Battery temperatures are nominal for this segment.

The lifeboat and pyro batteries have reached the monoxide level and are stable.

The main power system is healthy and supporting an average bus load of approximately 21 ampere-hours per rev.

3.7.2 TT&C Performance

SGLS 1, PCM 1A and Tape Recorder 1 performed satisfactorily during segment 2. Tape Recorder 2 was used on Rev 501. SGLS 2 was checked on Revs 324, 340, 357, 373, 389, 405, 422, 438, 454, 470, 486 and 503, and continued to operate normally. These daily health checks will continue in the next segment.

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3.7.3 ACS/RCS Performance

The Redundant Attitude Control System and the Primary Reaction Control System were used for vehicle control throughout segment 2 and performed within specification. The primary attitude control system remained on during this period. The yaw bias in the primary attitude control system continued with rates ranging from -0.001° per second to -0.069° per second in a random pattern. During Revs 373 and 379 the TLM yaw bias indication was noted to spike to a maximum of -4.162° per second for a short duration. The actual vehicle rate during this interval was approx. -0.130° per second rather than that noted on TLM. No recurrence of this condition has been noted since Rev 379. Gyro temperatures were within 155°F to 172°F, which is in the mid-range of the gyro operating temperature.

The Primary Reaction Control System performance was nominal during segment 2. Reaction Engine Assembly (REA) 8 continued to exhibit higher than normal temperatures attributed to a leak which started on Rev 48. No increase in leakage rate from this thruster was noted during the period. From REA 8 thrust data, it was noted the thruster is degrading at a rate in excess of the nominal decline expected by a decrease in feed pressure. The thruster continued to provide adequate thrust to satisfy mission requirements during segment 2. RCS propellant consumption for the segment was 48.2 pounds.

3.7.4 Orbit Adjust System (OAS) Performance

The OAS functioned normally for each orbit adjust throughout segment 2. A total of 6 orbit adjust burns (OA numbers 13 through 18) were performed. Total propellant used for the orbit adjusts was 284.7 pounds. On Day 24 the orbit adjust interval was increased from an adjust every second day to an adjust every third day to permit extension of mission length.

An orbit adjust summary for segment 2 is presented in Table 3.7-1.

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TABLE 3.7-1

ORBIT ADJUST SUMMARY

Segment 2
(Rev 311 - 505)

OA No./Type	13/Pos	14/Pos	15/Pos (1)	16/Neg	17/Pos	18/Pos
Ops Day	20	22	24	24	27	30
Rev No.	321	354	386	388	435	484
Delta Vel.Req'd.(Predict)--fps	11.35	12.77	32.42	18.77	18.93	18.73
Delta Vel.(Act.-Trk Red)--fps	11.47	12.78	32.64	18.93	19.12	18.86
Burn Duration --sec	34.2	38.6	97.6	57.6	59.0	58.4
Propellant Used --lbs	29.0	32.5	81.4	47.3	47.7	46.8
Avg. OA Tank Temp. --^{o}F	76.0	76.7	77.0	77.0	77.0	77.0
Avg. OA Tank Press. --psia	193.2	190.8	187.8	181.8	176.0	173.0

(1) Mission length orbit adjust plan was modified starting with orbit adjust 15 and 16 on Day 24 to permit extension of mission to 90 days.

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3.7.5 Lifeboat II Performance

The Lifeboat II System electronics were activated three times (Revs 334, 399 and 464) for yaw attitude determination and one time (Rev 505) during recovery of RV-2. The system functioned normally during each activation. Magnetometer data for each activation was consistent with previous magnetometer data.

The Lifeboat propellant tank heaters were commanded "OFF" on Rev 292 during segment 1 and remained "OFF" until tank temperatures reached an average temperature of 104° on Rev 475. During segment 2 the tank heaters were "ON" for a period of ten revs (475 to 480 and 522 to 527) to maintain LB-II capability for recovery of 2 RV's and one deboost. Approximately 24.22 amp-hours of LB-II battery capacity were used during segment 2. Approximate LB-II battery capacity at the end of this period was 205.17 amp-hours.

3.7.6 Doppler Beacon System

The Doppler Beacon System continued to function normally throughout segment 2. The software program 'TDERBY was utilized throughout the segment.

(b)(1)
(b)(3)

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3.8 MAPPING CAMERA OPERATIONS (REVS 311 - 505)

3.8.1 Mission Performance (Prepared by NEC)

39 mapping camera operations were executed through the indicated rev span with a total of 768 frames of photography taken. Cumulative total to rev 505 include 114 operates with a total of 1819 frames of photography.

The terrain and stellar platen press monitors still were indicating erratic operation. Problem still analyzed as faulty telemetry switches.

On rev 478 the FMC phase lock indicated an out of phase lock condition during the 15th frame of an 18 frame operate.

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 ACTIVITY - REV 505 THROUGH RV-5 RECOVERY

4.1 General

This section covers the mission activity for the Mapping Camera Module and RV-5 from RV-2 recovery through completion of ST mission with RV-5 recovery on Rev 683.

Other subsystem activity or SCF performance data are provided in this section only where they directly impacted the ST mission.

4.1.1 Summary

Stellar terrain camera operations continued until the successful transfer to the Infra Red material was accomplished on Rev 535. IR photography taking 54 frames over the span from Rev 543 to 659 was successful. An in-flight ST calibration was executed on Rev 666/667 with both the terrain and stellar cameras viewing 3 separate star fields. Terrain film was expended during the calibration operates and the stellar film was run out on Rev 668.

RV-5 was successfully reentered and aerially recovered on Rev 683, operational day 43. No capsule damage was reported.

Quality of the acquired photography is rated as good with the best photography comparable to Mission 1205. Illumination and weather are the primary reasons for the reduction in resolution.

Good quality IR photography was obtained and successful acquisition of star images on both cameras during the calibration was obtained. No radiation damage was evident.

4.1.2 Anomalies

a. Platen press monitors continued erratic operation during the mission although preliminary evaluation of quality indicated proper platen press operation was maintained.

b. Phaselock dropouts were noticed during this segment with 2 frames on Rev 600 and 1 frame on Rev 616 affecting FMC. (motion compensation). Other dropouts were noticed but did not occur during the exposure cycle and did not affect subsystem operation.

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4.2 MAPPING CAMERA OPERATIONS (REVS 506 - 683)

4.2.1 Mission Performance (Prepared by NEC)

9 mapping camera operations were executed through the rev span 506 - 639 with a total of 154 frames of photography taken.

The transfer to the IR material was accomplished at Rev 535. Rev span 543 - 659 consisted of special IR program requirements of 27 operates with 54 frames of photography taken.

The in-flight ST calibration event was attempted on Rev 666/667. This event included a vehicle yaw and pitch maneuver to configure both the stellar and terrain cameras to view stellar images and three separate ST operations. Only eight frames of a programmed 12 frame operate were taken during the third calibration operation. (The MCD strip between SO 131 and 3401 film was only 13 inches long. Because of the short MCD strip, the camera did not respond properly after a normal MCD shutdown. As a result, 4 frames of calibrate film were exposed on ground targets.)

The additional stellar film, approximately 220 feet, was run into the RV-5 on Rev 668 as PREP for RV-5 recovery on Rev 683.

The following table represents three phaselock dropouts that occurred during the indicated rev span:

Rev	OP.	Affected Frame	Phaselock Monitor
600	2	2	FMC (S210)
616	2	1	FMC (S210)
632	2	2	D XPORT (S241)

Other phaselock dropouts occurred but were back in lock during the terrain exposure.

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No change to the stellar and terrain platen press monitors erratic indications were observed. (Still analyzed as a telemetry monitor switch failure.)

4.2.2 The terrain camera and both stellar cameras were operational throughout. There is no obvious damage due to radiation while on orbit.

A total of 2057 terrain frames and 2058 pairs of stellar frames were exposed during on-orbit operation.

Film marking occurred randomly throughout both the stellar and the terrain records were minor emulsion degradations such as scratches, emulsion cracking, and plus and minus density markings which do not significantly contribute to degradation of mission objectives.

The overall quality of the stellar terrain photography acquired on Mission 1206 is good. Specific areas, dependent on favorable illumination conditions, were excellent and considered to be comparable to the best imagery viewed on Mission 1205. Average resolution, as derived from a limited VEM analysis, was 60 L/MM, which is slightly lower than the 70 L/MM reported for Mission 1205. Conditions of illumination (solar elevation), weather and normal lens to lens variations are considered to be the primary reasons for this reduction in resolution level.

Since no deterministic targets are available to assess the spectral and spatial image quality of the SO 131 film, only a subjective determination is possible. The color balance and exposure of the material appears adequate although filtered with a redder (wratten 21) than normal filtration (wratten 12). The resolution of the imagery is estimated to be less than that of the black and white 3400 portion of the mission. A best estimate of the low contrast ground resolution

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is approximately 50 to 75 feet. However, the unique spectral characteristic of the material does provide scene information not available on the higher resolution 3400 film.

The quality of the star images on the stellar film is good and comparable to images acquired in preflight calibration. Each camera recorded approximately 100 stars on the frames examined.

Phaselock dropouts: Telemetry data recorded 29 frames of phaselock dropouts starting on the first operate and recurring randomly throughout the mission. These included 14 rotary shutter, 3 FMC, and 17 terrain transport dropouts (more than one phaselock dropout can occur on one frame). Phaselocks are required to be stable by the first frame exposure of each operate. The sampling rate in the normal telemetry modes is such that it is possible to record an out-of-phase lock condition prior to exposure but does not sample the "in" phaselock condition when exposure occurs. Under certain conditions, it is possible to obtain higher sampling rate diagnostic modes and CEC recorder records of camera performance. Of the 29 frames for which dropouts were initially recorded, diagnostic data available for 9 frames verified phaselocks "in" prior to exposure. Diagnostic data for the remaining 20 frames is not immediately available; however, photography performance strongly indicates that phaselock circuits were stable during exposure in all cases. Additional data for these frames will be recovered from the telemetry records in data storage and further engineering analysis will be conducted.

Corona discharge markings were observed on approximately 25 percent of the terrain frames. There is a potential degradation in the overall exploitation of this film to the corona marking. However, the imagery did not appear to be masked or obliterated by the corona marks. Measurements will be conducted to determine the extent of degradation.

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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 683). 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 Weights

SRV5 weight separated from SV	397.93 lbs
SRV5 weight at retro	396.93 lbs
100% payload predicted weight (58.38 + 10.95)	69.33 lbs
RV5 weight at top of atmosphere (410K Ft)	300.87 lbs
RV5 capsule suspended weight	182.87 lbs
RV5 air snatch weight	207.37 lbs

4.3.2 PREPS

PREP 5.1 (Recovery Battery Power On) occurred on Rev 679P. The temperature monitor indicated 51°F before turn-on, 71°F on Rev 680 and 62°F at the time of battery activation (arm command) on Rev 683.

PREP 5.2 (Run Out Verification) was not required as run-in was accomplished on Rev 668.

PREP 5.3 (RV5 Closure) was accomplished on Rev 681C.

4.3.3 Recovery Conditions

Orbit

Rev. No.	683
Apogee	146.973 N.M.
Perigee	87.685 N.M.
Argument	126.681 Degrees
Inclination	96.185 Degrees
Eccentricity	0.00851720
Period (Keplerian)	88:42.546 Minutes: Seconds

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Retro

True Anomaly	2.98 Degrees
Altitude	529633.02 Ft
Latitude	50.047 Degrees North
Longitude	157.32 Degrees West
Velocity (Inertial)(Start of Retro)	25734.45 Ft/Sec
Velocity (Inertial)(Burn-Out)	25386.54 Ft/Sec
Pitchdown Angle (Sep)	-64.4 Degrees (after Yaw Reverse)

Entry (410K Ft)

Velocity (Inertial)	25519.87 Ft/Sec
Gamma (Geod. Inertial)	-2.1070 Degrees
Alpha	103.67 Degrees
Latitude	41.060 Degrees North
Longitude	159.95 Degrees West

Drogue

Velocity (Local)	935.00 Ft/Sec
Mach No.	0.97
Altitude	59700.88 Ft
Dynamic Pressure	100.036 PSF

Impact

Altitude	54999.99 Ft
Latitude	22.46 Degrees North
Longitude	163.91 Degrees West

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 and EPPD was calculated to be 15.63 N.M. (15.22 N.M. short and 3.57 N.M. east of the ground track).

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4.3.5 Aerial Recovery (Recovery Group TWX Info)

Altitude	12800 Ft
Pass Number	1
Airspeed	158 KTAS 129 KIAS
Chute Condition	Normal
RV5	Normal
Winch Setting	800 lbs
Payout	N/A
Contact Location	No. 8 Hook Contacted No. 2 Lateral and 2 Heavy Load Lines
Deployment 14 Recovery Aircraft	No. 1

4.3.6 Recovery Events

Table 4.2-1 presents the predicted and actual times of RV5 de-orbit/ recovery events. The Beacon 2 modulation became noise at (ST82712.2) approximately the time of spin (ST82712.75). Periodic rep rate(s) could be seen in the data. The downrange beacon 2 data was fairly clean after ionization.

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	76763
Pitch Down Start	82051.8
Pitch Down Stop	82141.8
RV5 Separation	82710.0
RV5 Retro	82720.4
Pitch Up Start	82740.4
Yaw Forward	84500.0

NOTE: RV5 Retro is not an SV command function. The actual predicted time is 82720.25. KODI brush recorder data indicated 82720.35.

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ACS

Pitch Attitude at Separation	-63.4 Degrees
Roll Rate at Separation	0.001 Degrees/Second
Pitch Rate at Separation	0.069 Degrees/Second
Yaw Rate at Separation	-0.003 Degrees/Second
Max Roll Rate after Separation	-0.016 Degrees/Second
Max Pitch Rate after Separation	0.151 Degrees/Second
Max Yaw Rate after Separation	-0.021 Degrees/Second

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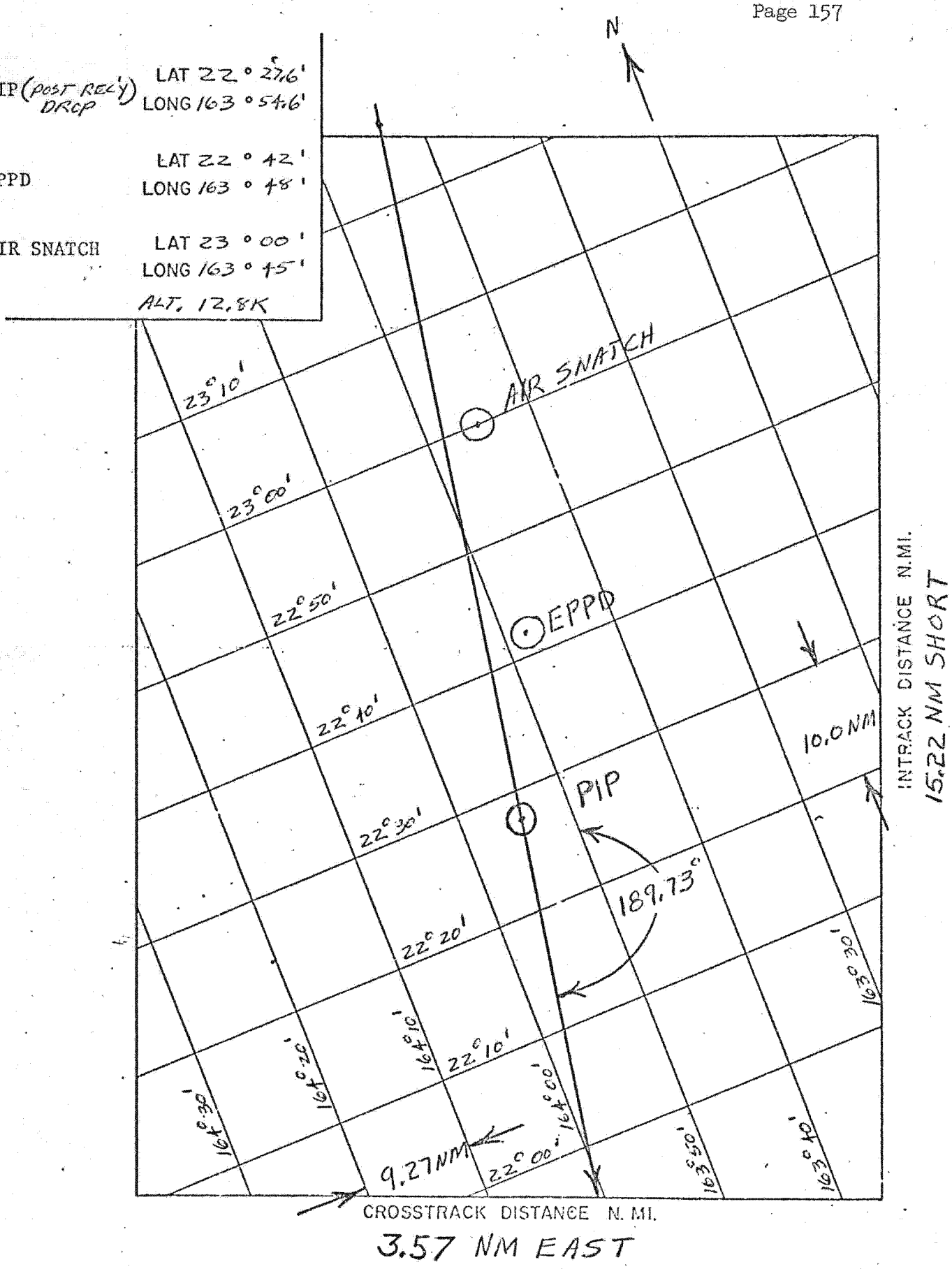

Figure 4.3.1 Predicted / Actual Impact Locations

FORM DB-28-C4

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2.4 Recovery Events

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RECOVERY DATE 8/24/73 SRV RV5 SERIAL NO. 1802 SHIELD SERIAL NO. 453

RECOVERY REV 683 MANUFACTURING DATE 2 Feb 72

STRESS LEVEL 2350 PSI

	PLANNED	ACTUAL
IMPACT LOCATION	Lat 22°27.6'N	Lat 22°42'N
	Long 163°54.6'W	Long 163°48'W

Events	Predicted Time System Time (sec)	Execution Time System Time (sec)	Beacon Rep. Rate CPS	Source of Data
Arm	82592.4	82592.4	NA	A(M156.1)
Beacon 1 On (△4)	82617.4	82605.8	4.0 / --	KTS
Beacon 2 On (△5)	82617.4	82615.8	-- / 3.93	KTS
Recovery Battery 1 On	82616.4	82608	NO CHANGE	A(M54.1)
Recovery Battery 2 On	82816.4	82621	NO CHANGE	A(M54.1)
Transfer	82708.4	82709	NO CHANGE	A(M54.1)
IFD Disconnect	82709.3	82709.35	NO CHANGE	KTS-MAG
Separation	82710.0	82710.07	NO CHANGE	A, KTS
Spin Time/RPM	82712.7	82712.75/55.2	NO CHANGE	KTS
Retro	82720.25	82720.15	2.00 / NA(1)	KTS
Despin Time/RPM	82731.0/10-16	82731.02/12.12	NO CHANGE	KTS
T/C Separation	82732.5	82732.6	1.03 / NA(1)	KTS
G Switch Close	83073.97	N A-Blackout	8.4 / 8.0	RS
G. Switch Open	83182.25	83174.55	1.0 / 1.01	RS-1
Piston Fire	83208.25	83200.73	.508 / .494	RS-1
Drogue Shock Time/Duration (sec)	83209.05	83202.4/1.68	7.75 / 7.50	RS-1
Main Shock Time/Duration (sec)	83219.05	None	NONE	RS
Air Snatch Time/Duration	84253.9	84282.55/1.2	7.8 / 7.6	RS-1
B/U G Switch Close	84663.4	84658.6	7.1 / OFF	RS-1
G Switch Open B/U	84723.4	NA - Data Ends 84664	NA / OFF	RS-1

(1) △5 MODULATION DATA NOISY.

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

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DB-30-C3

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Table 4.3-1

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4.4 ST Calibrate (Prepared by SBAC)

The ST Calibrate sequences were executed on Revs 666 and 667 on day 42.

No attitude measuring capability existed during the sequence at angles greater than ±10 degrees. Therefore, the attitude performance may only be inferred by noting that the entire sequence was executed as planned.

The predicted pitch attitude at the final geocentric rate connect (196825.6 sec) was -0.4 degrees and the actual was -2.0 degrees as measured with the pitch H/S. The pitch error at sequence completion was within the ±3.0 degree requirement of the initial pitch down maneuver.

The vehicle rates and nominal attitudes of each CAL are shown below:

			VEHICLE RATES AT FRAME 1			NOM. ATTITUDE AT ST+		
CAL	ST+	FRAME 1	PITCH	ROLL	YAW	PITCH	ROLL	YAW
1	195527.0	195557.8	-.001°/S	.004°/S	.001°/S	-135.0°	-180.0°	0.0°
2	195918.4	195944.6	-.002°/S	.002°/S	0 °/S	-141.0°	-180.0°	0.0°
3	196308.4	196334.6	-.004°/S	-.003°/S	-.001°/S	-147.0°	-180.0°	0.0°

RV 5 Recovery

All SBA maneuvers executed as planned for a nominal recovery.

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SECTION 5

5.0 ORBIT PHASE - REV 506 THROUGH RV-3 RECOVERY

5.1 Summary

Mission photography for the panoramic camera subsystem continued throughout the segment. 10,000 feet of color was exposed through the aft camera in two separate 5000 foot segments. SBA subsystems remained nominal during the segment with REA No. 8 thrust level lower than nominal and REA No. 4 determined to be degrading at a faster than normal rate. RV-3 was successfully reentered and aerially recovered on Rev. 926 on operations day 58.

5.1.1 Summary of Events

A successful [redacted] was achieved on Rev. 509. Panoramic camera operations continued using Mono and Stereo operations, 5.0 IPS rewind and with nesting permitted. Aft camera platen position change for the color segments was implemented, based on PFA team evaluation of RV-2, on Rev. 557. (b)(1) (b)(3)

The Lifeboat tank temperature was permitted to decay to a minimum of 75°F, with tank heaters turned on to maintain this temperature on Rev 830.

Normal ACS-2/RCS-1 performance continued during the segment. REA No. 8 temperature remained higher than nominal with the thrust level degrading but still sufficient to support operations. A thrust decay of REA No. 4 was detected and mini-yaw maneuvers were conducted on Revs. 519, 843, 860 and 892 to evaluate REA thrust levels, which remained satisfactory.

ACS-1 yaw bias was measured at temps during the segment with the bias ranging from -.001 to -4.343 degrees per second randomly during the segment. Procedures and an emergency MCS message were developed to use the Lifeboat subsystem if required.

Ten orbit adjust firings were conducted during the segment, eight positive and two negative, with nominal performance.

The planning required to support the VAST deboost on day 90 was started.

Doppler beacon subsystem was turned off on Rev. 760 after completion of ST mission operations and the DBS Solo tests.

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RV-3 was planned for recovery on Rev. 910, however, bad recovery area weather required aborting the recovery attempt and rescheduling for Rev. 926. The initial recovery message for a 24°N Lat PIP was changed to a 26°N Lat PIP for weather reasons on Rev. 926. RV-3 was successfully reentered and aerially recovered with no capsule damage. Two tears were reported in the cone skirt extending into the main canopy.

Overall quality of the acquired photography ranged from very good to poor with the majority rated good and improved over RV-2.

5.1.2 Problem Summary

None

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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 4 (Revs 506-926) of SV-VI. 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 274 messages loaded in the ECS for this segment. This resulted in 61,782 SPC's being stored for readout from the PMU's.

Of the 61,782 SPC's loaded, 31,005 were output from the PMU's for processing by the decoders. The remaining were erased out prior to time label matches. In loading the 61,782 SPC's there were no rejects.

The Emergency VBE Message for Event 3 was used on Rev 910 Pogo. Delay in VBE'ing both PMU's occurred when the initial commands conflicted with SPC readouts:

910 POGO COMMANDING EVENTS

	Time	Event	PMU	
	81662.1	DECS ON	B	
	662.3	DECS ON	A	
	663.6	XDR+REDUN	A	12EV6
.7+ SEC. SPC PRIORITY	663.8	XDR+REDUN	A	12EV7
	664.0	TR 1+2+	B	

Status report at time 81664.0 showed four transmissions (of Initialize CMD as start of block) rejected due to SPC priority with a halt on Step 1. (Verbal report-Step 9.)

Configuration Report showed block re-initiated at Step 10, as briefed, in event of a reject on Step 9.

Status Report showed five transmissions, all accepted, which erased PMU B only.

Step 10 = Initialize
11 = Add. B via Dec A
12 = VBE 364
13 = Initialize

Same Status Report showed Final Step = 13.

Later retransmission of the Block VBE'd PMU A with commanding halts at Steps 3, 9 and 12.

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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.

5.2.1.3 REMOTE DECODER/BUD

5.2.1.3.1 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.

No commands were issued from the BUD during this segment.

5.2.1.3.2 Remote Decoder/BUD Anomalies

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 15,640 PMU-B 15,365
ECS Clock Drift Rate	2.05 parts in 10^7
ECS Clock Stability	3.77 parts in 10^8 for a 410 rev period.
Total Hours On	ECS 1389 MCS 4.5 RD 1.5 BUD .05
Secure Words Expended at e d of Segment 4	PMU-A 108 PMU-B 120
Environmental Data:	See Figures 5.2-1 through 5.2-7

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	(1)	(2)	(3)
BIAS	0.9763	0.785	0.517
VTCW	2694939.2	3679740.0	4937436.2

AVERAGE CLOCK ACCURACY =BIAS CHANGE/TIME CHANGE

=(0.9763- 0.5170)/(4937436.2- 2694939.2)

= 2.04816E-07

= 2.04816 PARTS IN 10 TO THE 7TH

AVERAGE CLOCK FREQUENCY =(2.04816E-07*1,024,000.0)+1,024,000.0

= 1024000.20973HZ

FREQUENCY 1 (F1) =(BIAS/VTCW)*1.024MHZ+1.024MHZ

=(0.1913/ 984800.8)*1.024MHZ+1.024MHZ

= 1024000.19891HZ

FREQUENCY 2 (F2) =(BIAS/VTCW)*1.024MHZ+1.024MHZ

=(0.2680/ 1257696.2)*1.024MHZ+1.024MHZ

= 1024000.21820HZ

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

=(1024000.21820- 1024000.19891)/1.024E+06

= 1.88379E-08

= 3.76758 PARTS IN 10 TO THE 8TH
FOR THIS 421 REV. PERIOD

= 3.62898 PARTS IN 10 TO THE 10TH
FOR AN AVERAGE 6 HOUR PERIOD

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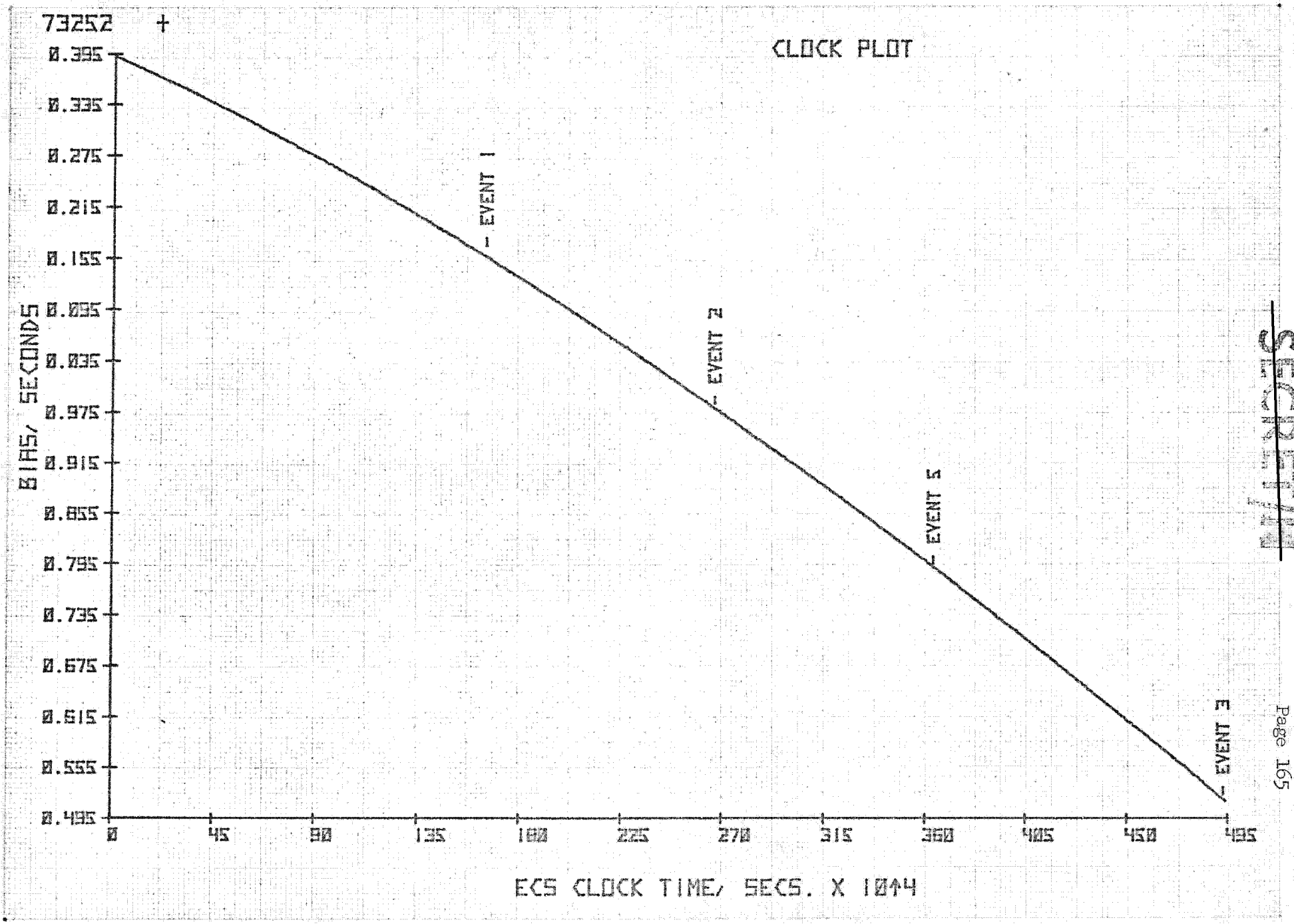

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Figure 5.2-1

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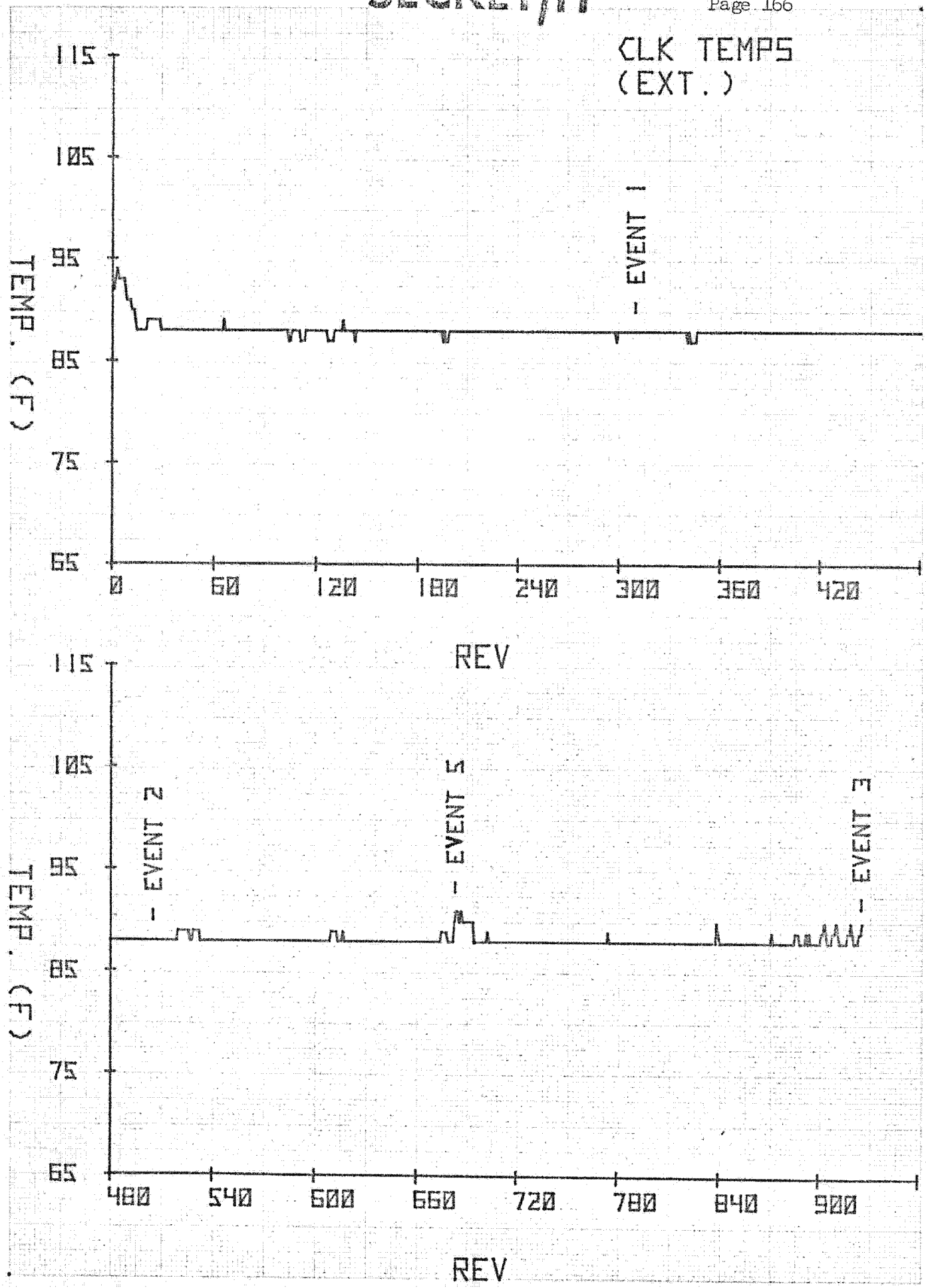

Figure 5.2-2

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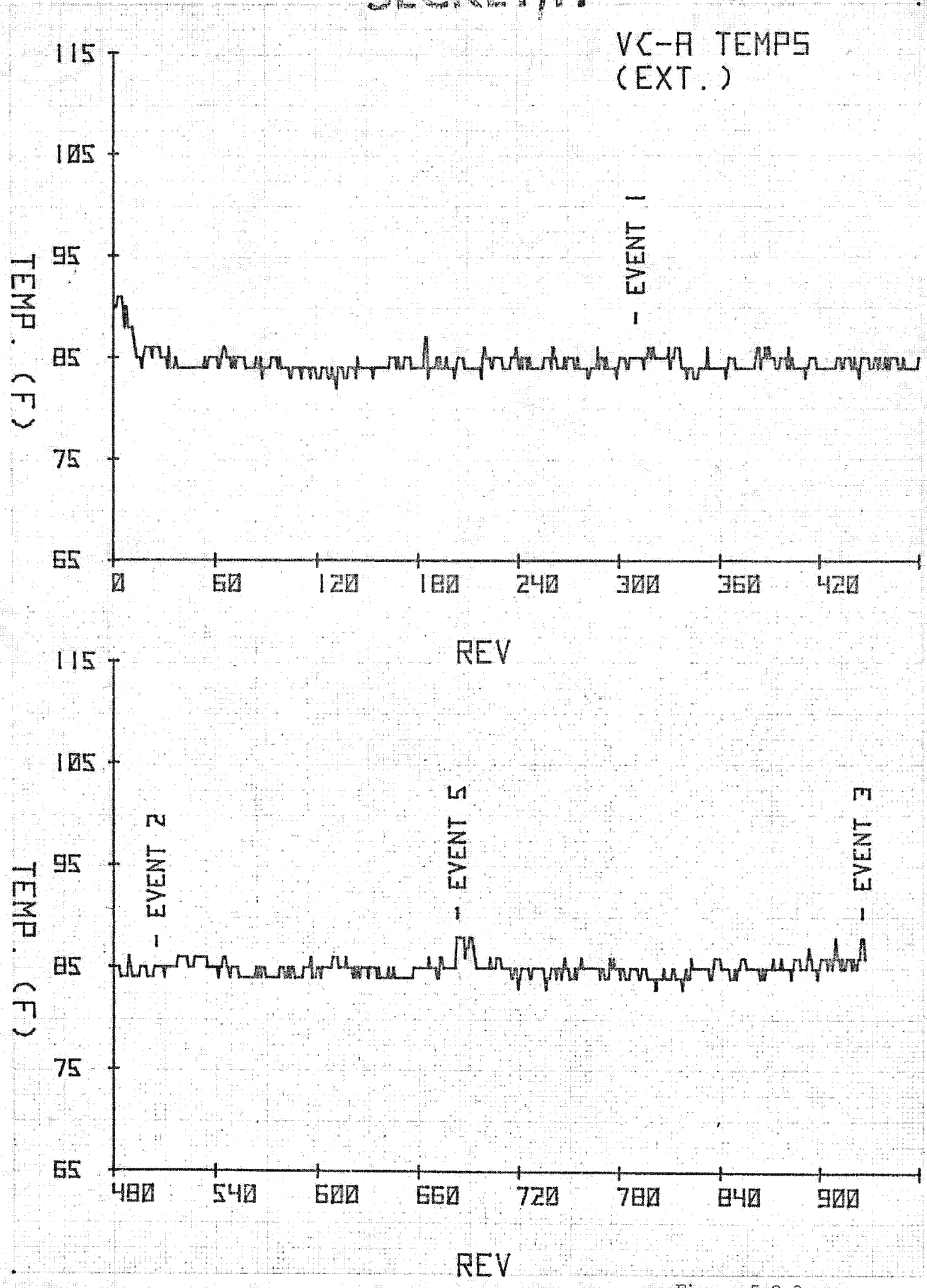

Figure 5.2-3

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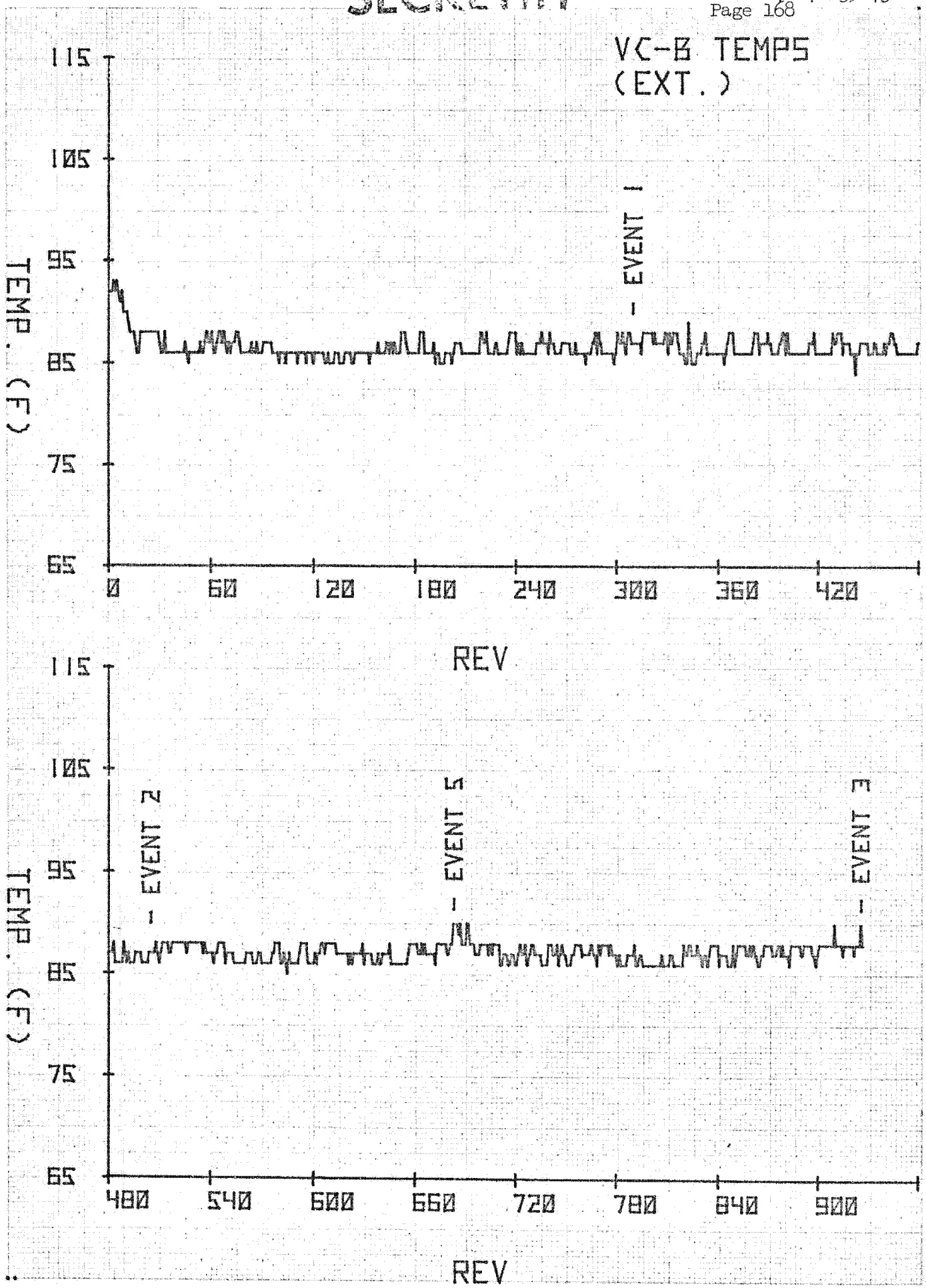

Figure 5.2-4

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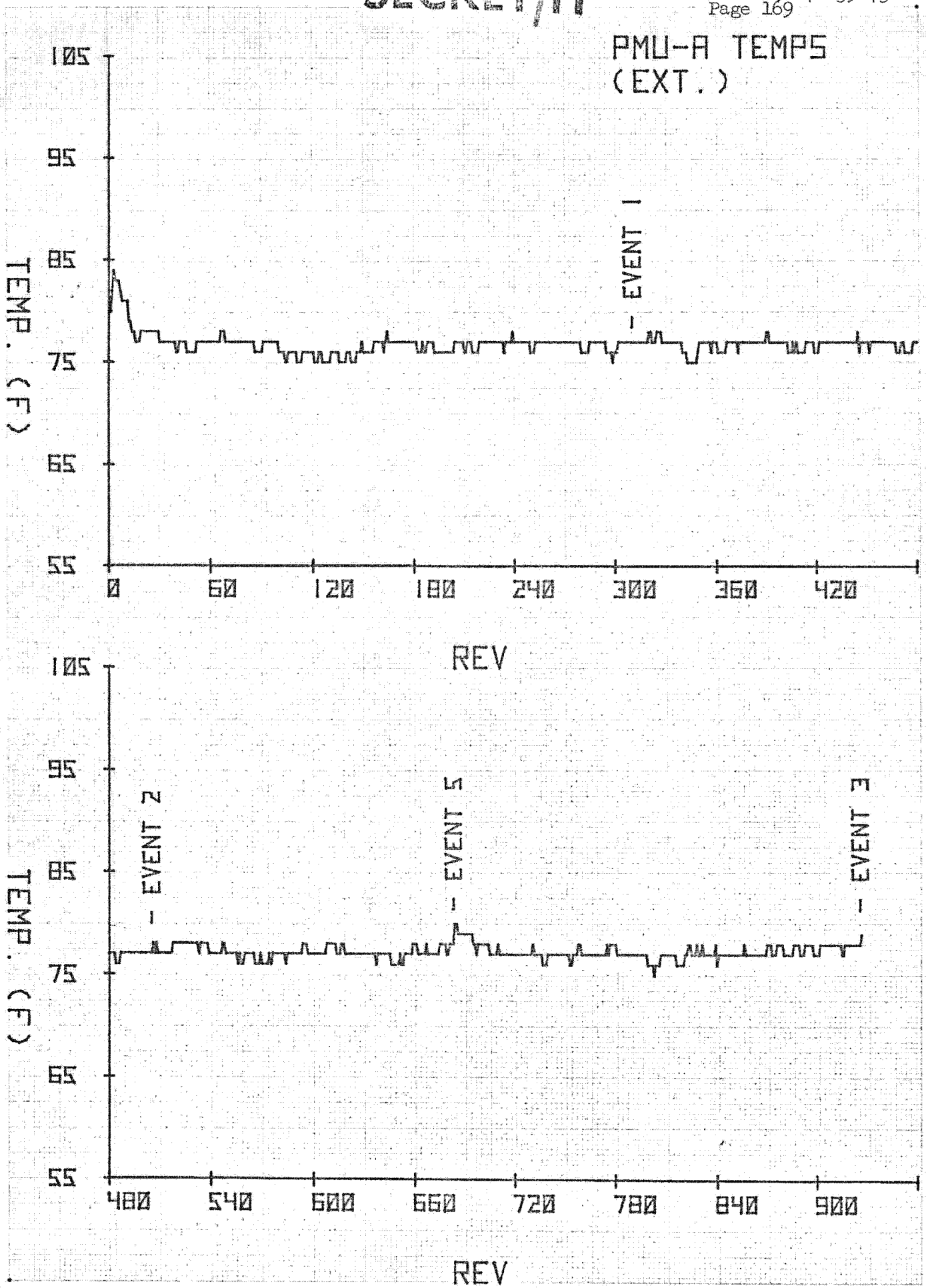

Figure 5.2-5

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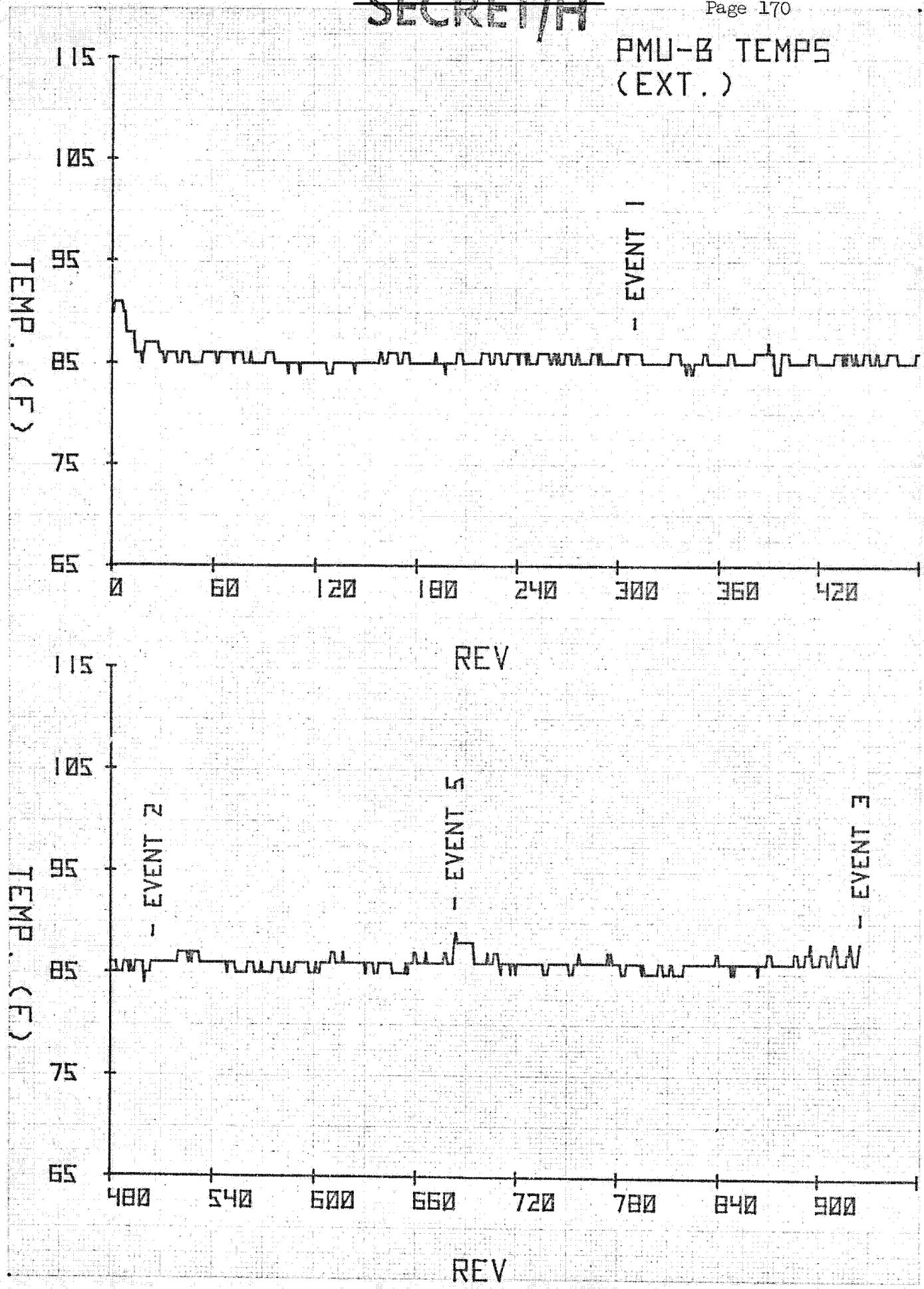

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Figure 5.2-6

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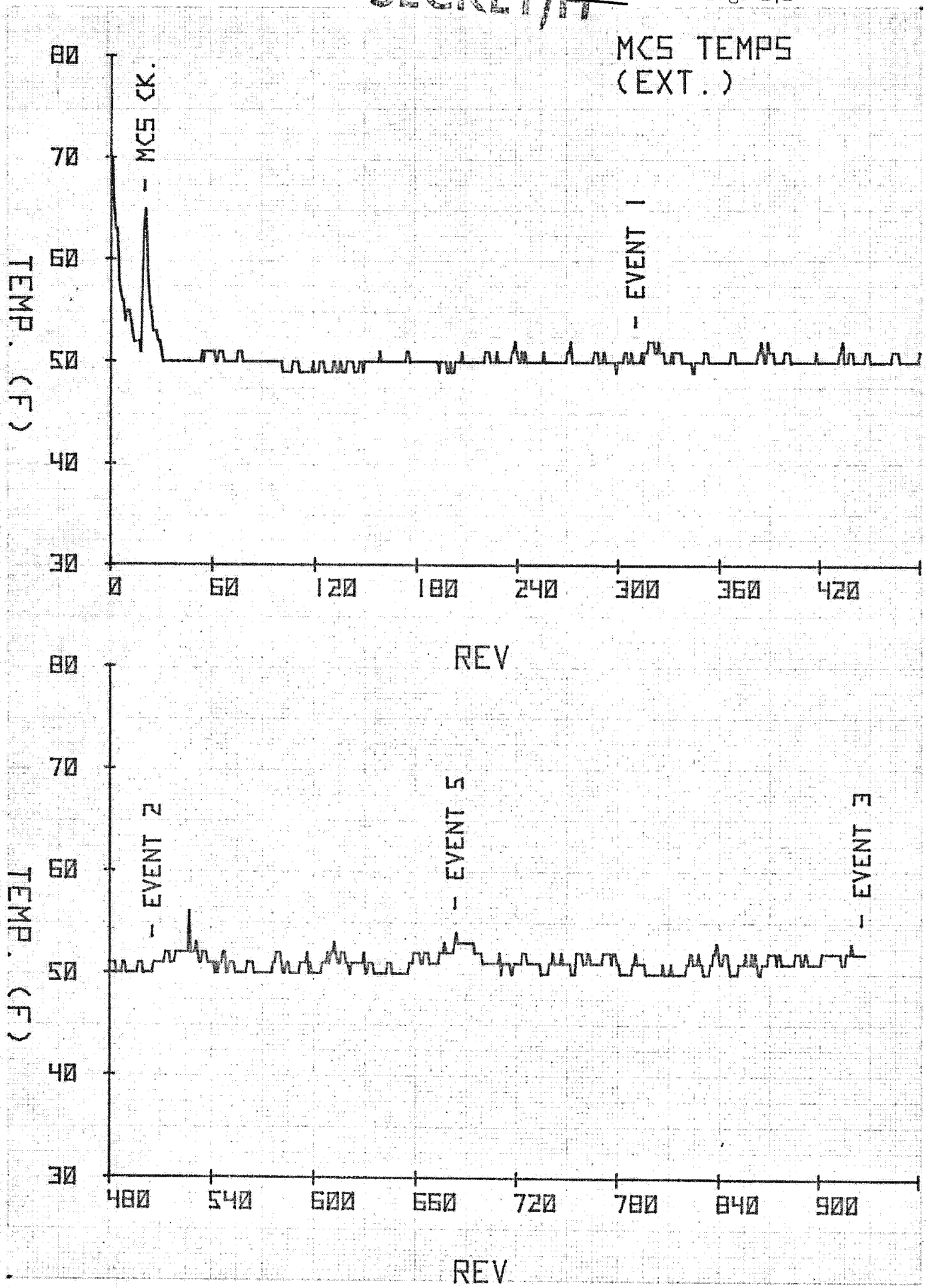

Figure 5.2-7

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5.3 SENSOR SYSTEM OPERATIONS THROUGH RV-3

5.3.1 Mission Operations Performance

The Sensor Subsystem exhibited nominal operationsl characteristics throughout RV-3, with no anomalies or malfunctions experienced.

The drive torque on the aft camera optical bar remained higher than normal but at a level which allowed normal operations.

Initial constraints of 5.0 IPS maximum rewinds and no 30 degree scans at ±45 centers remained in effect throughout RV-3. The rewind evaluation for RV-3 was deleted.

The aft camera focal plane position change (87 to 93 microns) for color film recommended by PFA following evaluation of RV-2 imagery was implemented on Rev 557, Op 355.

The RV-3 mission segment consisted of 204 sensor system operations, consuming 21,748 seconds of camera power on time, 9.2 pounds of nitrogen gas, 28,139 feet of film on the forward camera and 24,708 feet of film on the aft camera. The aft camera film included two 5000-ft segments of SO-255 material which were utilized on mission operations 351 through 395 and 467 through 505. The consumption profiles through RV-3 are graphically depicted in Figure 1.

The overall quality of the acquired photography ranged from very good to poor, with the majority rated as good. Improvement in image quality over RV-2 was attributed to the following:

A. Reduction in acquisitions beyond ±45 degrees of scan.

B. Higher than average cloud free acquisitions.

C. Clearer atmospheric conditions which are typical of Sept/Oct photography.

D. Significantly lower percentage of photography affected by specular reflections and shadowless acquisitions. (During RV-3 these reflections were centered at approximately 20 degrees north.)

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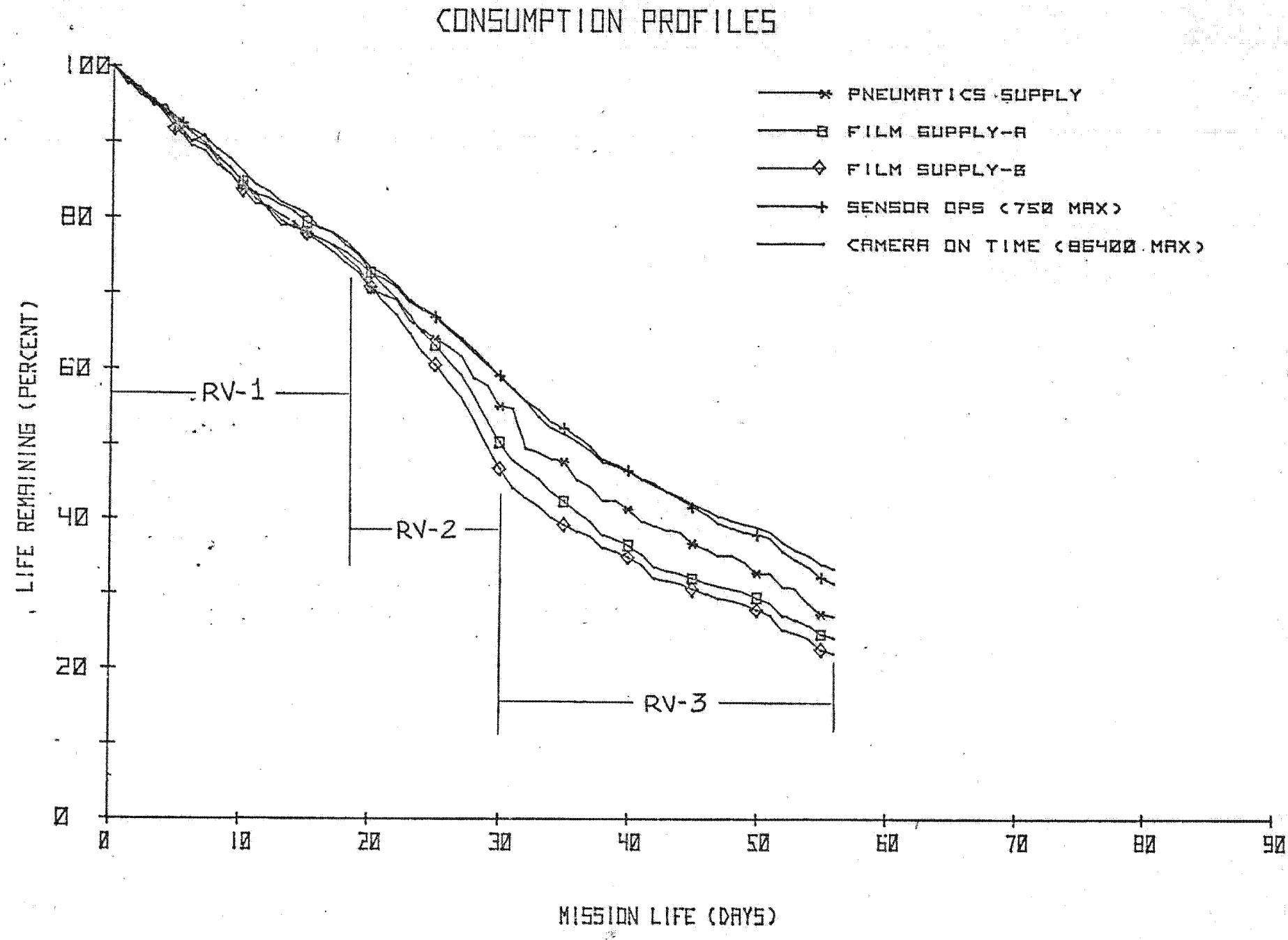

FIGURE 1

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E. Longer object shadows due to lower solar altitude as the mission progresses.

5.3.2 Engineering Tests

The following engineering tests in support of PFA requirements were performed during RV-3:

Rev 535	Color Smear Slits
Rev 631	Color Thru-Focus
Rev 712	Tri-Bar Acquisition
Rev 745	Tri-Bar Acquisition
Rev 762	Tri-Bar Acquisition
Rev 778	Tucson, Ariz. Eng. Baseline
Rev 827	Color Corn Acquisition and Color Thru-Focus
Rev 858	Color Corn Acquisition
Rev 876	Color Thru-Focus and Smear Slits

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5.4 RV 3 (S/N 25) Performance

This report presents an analysis of the RV 3 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 96.44% of the maximum I.C.D. weight and unbalanced 0.82%. The PREP2 event took place on Rev 909 over POGO and separation occurred on Rev 926. 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 13,500 feet altitude, 9.74 nautical miles from the predicted impact point.

The recovery forces reported sighting two parachute tears on the look-see pass. Both tears originated in the cone skirt and extended into the main canopy. These tears measured approximately 3 feet and 6 feet in length, respectively. The parachute system was reported to be unusually stable as compared to previous flight systems. No capsule damage was reported. However, the flashing light and recovery beacon were observed to be operating during the recovery pass.

It should be noted that the PIP change procedures were utilized for this recovery. The original PIP of 24°N Latitude was changed to 26°N due to weather conditions. The DT start and pitch angles obtained for the 24°N PIP were used, without change, for the 26°N PIP.

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TABLE 5.4.1

RV 3 RECOVERY DATA ~~SECRET/H~~

IDENTIFICATION DATA

SV 6	IRON NO 8261			RECOVERY REV 926	
RV 3	RV S/N 25	RETRO MOTOR S/N Q46		RECOVERY DATE 8 Sept 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
RV OUT T/S	REV/STA 909P			76507.3	76508			0
RV IN T/S				76511.3	76512			0
DT START (3)	79357.4	79328.5	79328.6	79357.3	79358			0
POGO TRAN	80427.1			80427.1	80424			-3.1
PITCH START	80457.1			80457.3	80458			0
PITCH STOP				80513.5	80515			1.5
PYRO ARM BATT				80608.1	80608			0
POGO FADE	80728.1			80727.9	80739			11.1
KODI TRAN	80845.5			80845.5	80936			90.5
ORB PWR OFF				80919.1	80919			0
RV SEP (0)	80929.2	80929.1	80929.1	80929.1	80929.3	CONF	80929.5 NOTE 2	0
SPIN UP (+2.4)				80931.5		CONF	N/A	N/A
RETRO START	81054.6	81054.5	81054.5	81054.5		81054	810558	0
DESPIN (+160.4)				81089.5		81091	81090.8	0
PROP JETT (+175.4)				81104.5		81106	81106.4	1.9
KODI FD (RV)	81198.6					81212	81210	11.4
RV ENTRY (400K	81222.0	81222.0	81222.2		RECOV TM			
△ 1-2 ACQ					81286	81286		
ION ENTR	81320.5	81320.4	81320.6		81320	81320		0
ION EXIT	81509.8	81509.8	81509.9		81504	81504		-5.9
DROGUE DEPLOY	81555.3	81555.2	81555.4	TONE STOP	81566	81566	N/A	10.6
IMPACT (50K)	81573.5	81573.5	81573.6					
MAIN CHUTE DPL	81576.4	81576.5	81576.7		N/A	N/A	N/A	N/A
H/SHLD JETT	81580.5	81580.5	81580.7	TONE START	81582	81582	N/A	0
STEADY STATE	81591.4	81591.5	81591.7					
ETPD(RAINDROP)	81623.1	81623.0	81622.1					
RV @ 13.5K	82550.8	82550.7	82549.7	IN TRAIL	82500	82500	N/A	N/A
WATER IMPACT	83115.5	83115.4	83114.4		N/A	N/A	N/A	N/A
HULA TRAN (RV)	81463.5					81501	N/A	N/A
HULA FADE (RV)	81547.3					82165	N/A	N/A
DT RUNOUT	82072.4	82043.5	82043.6		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.

3. Determined for 24°N PIP.

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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	26.001	26.001	25.993	25.900	25.917	25.900
LONGITUDE	157.09	157.09	157.10	156.97	157.05	156.967

RECOV. A/C DEPLOYMENT FORMATION No. 10, RECOVERING A/C No. 1

RECOV ALT 13,500 ft, PASS No. 1, TIME 2255 Z

AIRSPEED 165 KTAS, 130 KIAS; TIME IN TOW 20 min.

RAINDROP ETPD 81622 sec 46000 ft; RATE/DESCENT, 15K 28.9 FPS, 10K 26.7 FPS

CONTACT LOCATION Right lower loop hook

PRESET TENSION LEVEL 3600 lb, PAYOUT Normal

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

OVERSHOOT 5.58 nm, CROSS TRACK 7.98 nm EAST

RC CONDITION No damage,but flashing light & recovery beacon were operating.

CHUTE/CONE CONDITION Two tears (3ft & 6ft) beginning in cone skirt and extending into main.

CHUTE/CONE BEHAVIOR Unusually stable.

WIND DATA

ALT (K)	DIRECTION PRED	DIRECTION ACT	VELOCITY PRED	VELOCITY ACT	ALT (K)	DIRECTION PRED	DIRECTION ACT	VELOCITY PRED	VELOCITY ACT
SCF	70	70	15	13	25	80	130	10	12
2	70	-	20	-	30	120	155	7	15
4	70	-	20	-	35	180	170	15	20
6	80	75	15	16	40	180	200	20	30
8	90	-	15	-	45	190	190	30	25
10	80	30	20	11	50	200	185	15	20
15	50	160	15	5	55	-	-	-	-
20	60	105	10	4	60	-	-	-	-

RV BATTERY TIME HISTORY

TIME	ACT 80610.1	611	612	613	614	615	616	617	619	620	623	626
MAIN		18.5	24.1							24.6		
PYRO #1		23.4			23.9		24.9	25.8			26.3	
PYRO #2		23.1	22.5	23.1		24.1			25.5			26.2

TIME	628	629	630	633	638	663	710	919	924			
MAIN				25.3	25.9	25.8	25.8	25.3				
PYRO #1	27.3		28.0			28.3	28.7	28.1				
PYRO #2	27.0	27.6				28.0	28.6		28.7			

SV RATES BEFORE & AFTER SEP (SV TLM)

	TIME	PITCH RATE PGR °/sec	ROLL RATE RGR °/sec	YAW RATE YGR °/sec
	80927.3	.069	.001	0
SEP	80929.3	0.21	-.03	.01
	80930.3	1.45	-.06	.01

MISC DATA

Payload Temp before SEP,	Rn06 64	°F
Payload Temp, Max REENTRY,	TB02 69	°F
Chute Press before PREP 2,	P711 0.77	PSI
Supply Press before PREP 2,	P113 0.79	PSI
BETA ANGLE of Recovery Rev.	-0.6	°

PITCH ANGLE (Determined for 24°N PTP)

BASIC STUDY
θ_{rvs} -126.37 °
$\Delta\theta_1$ 3.35 °
Ω_y 1.9 °/sec
$\Delta\theta_2$ .043 °
θ_{sv} -129.68°

PITCH (CMD MSG) -39.62 °
θ_{sv} (PDWN-SV TLM) -40.20 °
θ_{rvs} ON UPDATED TEAPOT -126.31 °

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TABLE 5.4.3

RV 3 RECOVERY DATA

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RV MASS PROPERTIES

	BASIC STUDY	UPDATED TEAPOT	TEAPOT EVALUATION	ACTUAL POST FLT
TU-A	222.8 lb	222.8 lb	222.8 lb	224.0 lb
TU-B	224.7 lb	224.7 lb	224.7 lb	225.0 lb
TOTAL	447.5 lb	447.5 lb	447.5 lb	449.0 lb
SEP WGT	1538.08 lb	1538.08 lb	1538.08 lb	UPDATED TEAPOT
RETRO WGT	1536.39 lb	1536.39 lb	1536.39 lb	% UNBAL 0.82
ENTRY WGT	1345.58 lb	1345.58 lb	1345.58 lb	% FULL 96.44
AIR RECOV WGT	1123.65 lb	1123.65 lb	1123.65 lb	(100% = 464 lb)

SV MASS PROPERTIES - AFTER SEP (FROM BASIC STUDY)

SV WEIGHT	14384.47 lb	PITCH INERTIA (Iy)	70858.52 SLUG-FT^2
CG FROM STA 2060 ($\bar{X}r$)	200.92 in	ROLL INERTIA (Ix)	5204.25 SLUG-FT^2
CG FROM LONG AXIS (Y)	.19552 in	YAW INERTIA (Iz)	93862.18 SLUG-FT^2

'DORBEL EPHEMERIS

REV OF SEP 926	BASIC STUDY	UPDATED TEAPOT	TEAPOT EVALUATION
PREDICTED FROM REV	921	924	N/A
APOGEE	146.391 nm	146.101 nm	145.872 nm
PERIGEE	87.447 nm	87.456 nm	87.479 nm
ARG OF PERIGEE	131.063 °	131.123 °	131.199 °
INCLINATION	96.172 °	96.172 °	96.172 °
TRUE ANOMALY AT RETRO	352.89 °	352.83 °	352.75 °
HEATSHIELD JETT ALT	49658.34 FT	49649.01 FT	49588.17 FT

ENTRY PARAMETERS FROM TEAPOT EVALUATION RUN

	SEPARATION	RETRO	REENTRY	DROGUE DEPLOY
SYSTEMS TIME (sec)	80929.10	81054.5	81222.21	81555.35
ALTITUDE (FT)	556199.19	541345.35	400K	63710.5
LATITUDE (°N)	64.103	55.681	44.592	26.035
LONGITUDE (°W)	144.86	149.15	152.89	157.09
INERTIAL AZIMUTH (°)	194.27	191.01		
INERT FLT PATH ANGLE (°)	-.1425	-.0691		
INERT VELOCITY (FT/SEC)	25712.75	25724.78	25520.89	
LOCAL AZIMUTH (°)			191.05	189.99
LOCAL FLT PATH ANGLE (°)			-2.1209	-31.1854
LOCAL VELOCITY (FT/SEC)				1430.37
ANGLE OF ATTACK (°)			104.31	
MACH NUMBER				1.48
DYN PRESS (PSF)				193.3

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	79232.665 sec	DECLINATION (MDAC = GEOCENTRIC LAT)	-.0017 °
LONGITUDE	29.3116 °	INERTIAL GEOCENTRIC FLT PATH ANGLE	-.3474 °
ALTITUDE	133.0825 nm	INERTIAL GEOCENTRIC AZIMUTH	353.828 °
		INERTIAL VELOCITY	25380.48 FT/SEC
SV C_D A/M (DRAG VALUE AT ASCENDING NODE OF RECOVERY REV)			.6181 FT^2/SLUG

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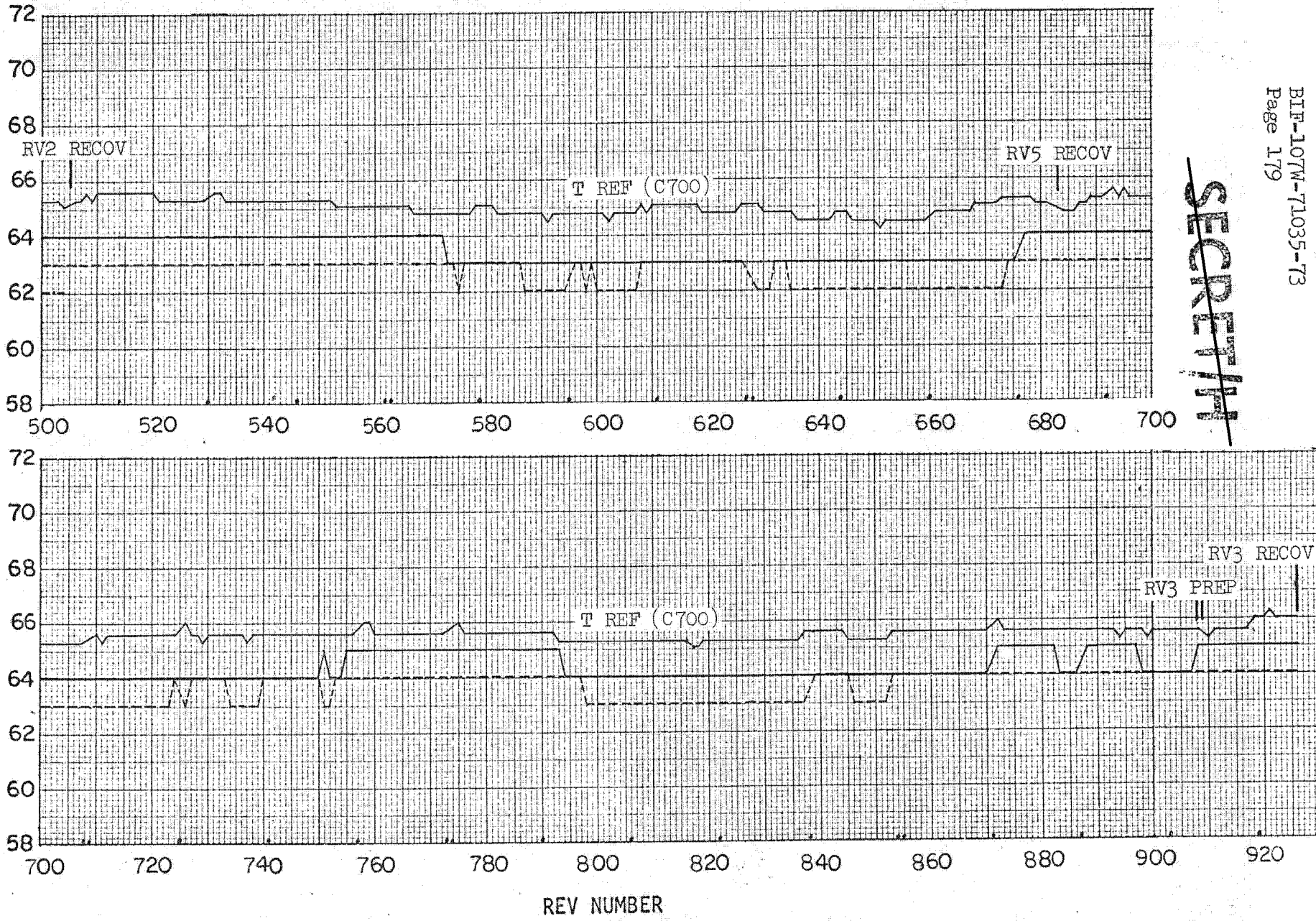
ACTIVE THERMAL CONTROL SYSTEM

RV PAYLOAD CONTAINER & REFERENCE TEMPERATURES



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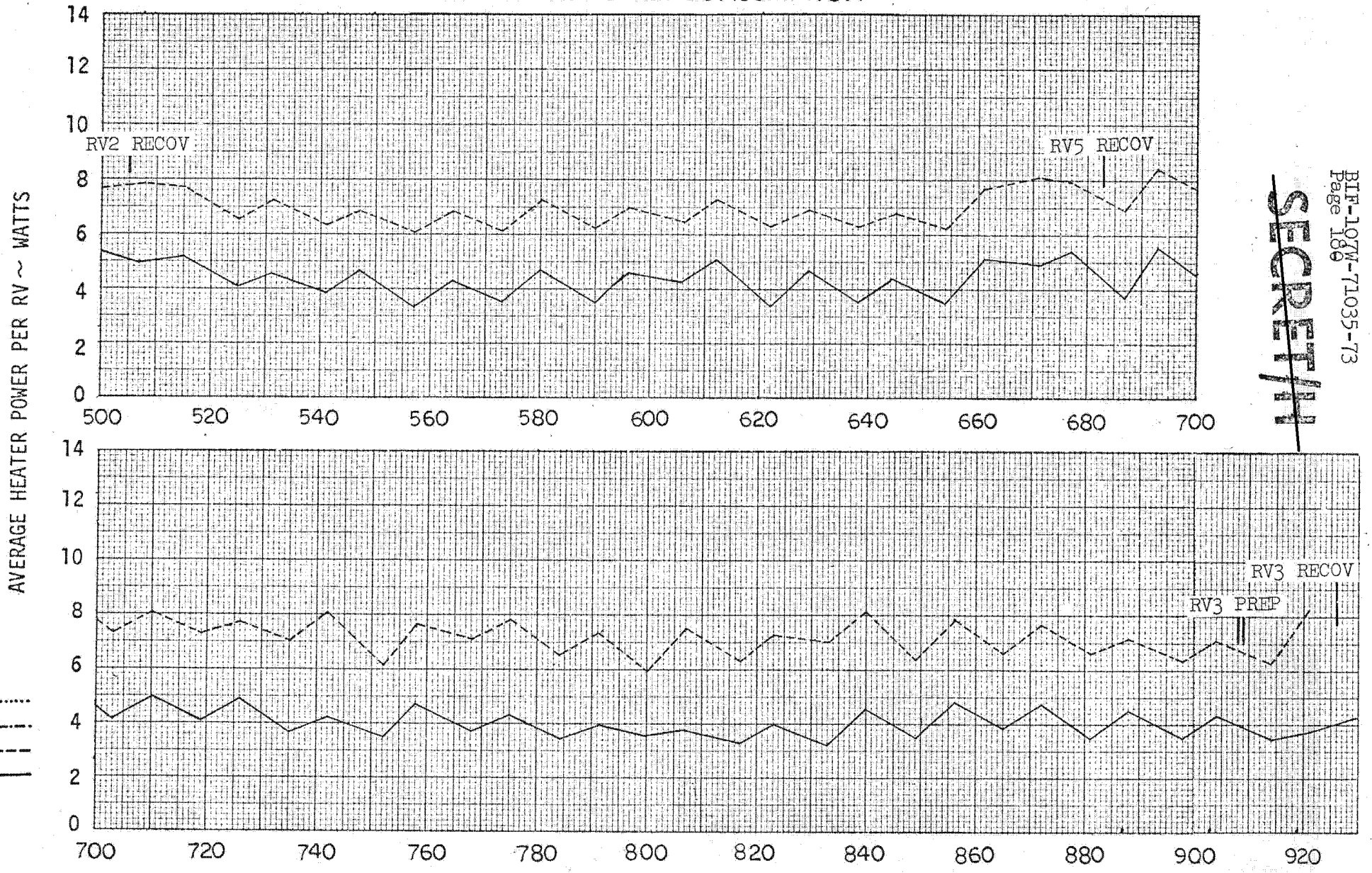
ACTIVE THERMAL CONTROL SYSTEM

RV HEATER POWER CONSUMPTION



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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. 926. 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. 532 followed by a negative orbit adjust on Rev. 534.
2. Positive orbit adjust on Rev. 581
3. Positive orbit adjust on Rev. 630
4. ST calibration maneuver Rev. 666/667
5. RV-5 recovery Rev. 683
6. Positive orbit adjust on Rev. 685
7. Positive orbit adjust on Rev. 727
8. Positive orbit adjust on Rev. 776 followed by a negative orbit adjust on Rev. 778.
9. Positive orbit adjust on Rev. 824
10. Positive orbit adjust on Rev. 873

5.5.1.2 Prediction Accuracy

Table 5.5.2 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-3 segment.

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SUMMARY

EPOCH REV	ECCENT.	PERIOD DECAY	INTEG. PERIOD	MAX ALTIT.	MIN. ALTIT.	ARG. PERIGEE	DRAG	STABLE/ TUMBLE	COMMENTS
507	.0096	.2701	88:47.5	156.61	86.18	127.9	.4904	175/51	
508	.0095	.2695	88:47.2	156.38	86.23	127.7	.4903	175/57	
510	.0094	.2591	88:46.8	155.95	86.49	126.9	.4764	182/55	
515	.0093	.2638	88:45.4	155.18	86.35	125.8	.4746	178/51	
519	.0092	.2607	88:44.451	154.54	86.42	124.8	.4671	179/22	
522	.0092	.2939	88:43.5	154.09	86.22	124.1	.5111	159/46	
524	.0092	.2916	88:42.9	153.71	86.20	123.7	.5072	159/46	
527	.0091	.2787	88:42.2	153.26	86.24	122.8	.4824	166/48	
531	.0090	.2782	88:41.0	152.58	86.13	122.0	.4728	165/48	OA #19 Rev 532
535	.0090	.2306	88:51.2	152.94	86.76	150.5	.4726	177/51	OA #20 Rev 534
538	.0090	.2325	88:50.5	152.72	86.55	149.5	.4674	176/51	
540	.0090	.2238	88:50.0	152.51	86.48	149.1	.4460	183/53	
543	.0089	.2169	88:49.5	152.14	86.57	148.1	.4329	189/55	
548	.0089	.2238	88:48.3	151.71	86.31	147.1	.4352	183/53	
552	.0088	.2184	88:47.5	151.08	86.45	146.0	.4259	187/54	
554	.0088	.2252	88:46.9	150.93	86.28	145.4	.4325	182/52	
556	.0088	.2336	88:50.6	150.69	86.21	144.9	.4441	175/51	
559	.0087	.2235	88:45.9	150.31	86.32	143.9	.4262	183/53	
564	.0086	.2199	88:44.7	149.88	86.09	142.9	.4090	187/54	
567	.0085	.2379	88:44.1	149.36	86.18	142.1	.4426	172/50	
570	.0085	.2449	88:43.2	149.05	86.02	141.2	.4475	167/49	

Table 5.5-1

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SUMMARY

EPOCH REV	ECCENT.	PERIOD DECAY	INTEG. PERIOD	MAX ALTIT.	MIN. ALTIT.	ARG. PERIGEE	DRAG	STABLE/ TUMBLE	COMMENTS
572	.0084	.2453	88:42.7	148.84	85.92	140.4	.4434	167/49	
575	.0084	.2334	88:42.2	148.45	86.02	139.8	.4226	175/50	
580	.0084	.2284	88:41.0	147.91	85.86	138.7	.4046	178/52	
583	.0092	.2049	88:51.2	154.60	86.67	144.6	.4132	210/61	OA #21 Rev 581
587	.0092	.2354	88:50.2	154.11	86.50	143.7	.4660	182/52	
589	.0091	.2293	88:49.8	153.82	86.56	143.1	.4538	187/54	
592	.0090	.2249	88:49.2	153.42	86.67	142.0	.4459	191/55	
596	.0090	.2282	88:48.2	153.02	86.48	141.3	.4436	188/54	
600	.0089	.2389	88:47.3	152.42	86.54	140.3	.4626	179/52	
603	.0089	.2532	88:46.5	152.11	86.35	139.4	.4792	170/49	
605	.0089	.2500	88:45.9	151.81	86.30	139.0	.4710	172/50	
608	.0088	.2502	88:45.3	151.36	86.40	137.9	.4714	171/50	
611	.0087	.2531	88:44.4	150.86	86.35	137.3	.4720	169/49	
616	.0086	.2557	88:43.3	150.19	86.28	136.2	.4699	167/48	
619	.0086	.2720	88:42.4	149.85	86.06	135.4	.4852	158/45	
621	.0086	.2760	88:41.7	149.54	86.00	134.9	.4909	155/45	
624	.0085	.2676	88:41.1	149.07	86.09	133.9	.4761	159/46	
629	.0084	.2720	88:39.7	148.37	85.87	132.9	.4707	156/45	
632	.0097	.2282	88:53.4	158.15	86.52	139.4	.4717	194/56	OA #22 Rev 630
635	.0097	.2525	88:52.4	157.74	86.40	138.7	.4985	180/52	
637	.0097	.2576	88:52.0	157.52	86.27	138.3	.5011	177/52	

Table 5.5-1

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SUMMARY

EPOCH REV	ECCENT.	PERIOD DECAY	INTEG. PERIOD	MAX ALTIT.	MIN. ALTIT.	ARG. PERIGEE	DRAG	STABLE/ TUMBLE	COMMENTS
640	.0096	.2416	88:51.5	157.07	86.46	137.3	.4734	189/55	
645	.0095	.2383	88:50.3	156.51	86.32	136.2	.4577	192/56	
648	.0094	.2608	88:49.5	155.97	86.40	135.3	.4962	176/51	
651	.0094	.2741	88:48.6	155.57	86.23	134.5	.5162	166/48	
653	.0094	.2820	88:47.9	155.3	86.13	133.9	.5246	161/46	
656	.0093	.2740	88:47.4	154.8	86.24	133.1	.5104	165/47	
661	.0092	.2818	88:45.8	153.96	86.10	132.0	.5133	161/46	
665	.0091	.3053	88:44.7	153.12	86.14	131.0	.5520	147/43	
668	.0090	.3223	88:43.5	152.54	85.91	130.2	.5647	140/40	ST CAL, Rev 666/667
670	.0089	.3371	88:42.7	152.08	85.86	129.8	.5871	133/38	
673	.0088	.3392	88:41.8	151.44	85.89	128.8	.5888	131/38	
677	.0088	.3501	88:40.3	150.57	85.72	128.0	.5928	127/37	
681	.0086	.3602	88:39.0	149.55	85.78	127.0	-	122/35	Yaw Reverse Rev 682
684	.0085	.3821	88:37.4	148.65	85.50	126.3	.6222	113/32	RV-5 Recovery - Rev 683
686	.0100	.3129	88:53.9	159.95	86.37	135.5	.6150	151/43	OA #23 Rev 685
689	.0099	.3027	88:53.2	159.39	86.45	135.5	.5942	156/44	
694	.0098	.3013	88:51.6	158.51	86.30	133.6	.5787	156/44	
697	.0097	.3047	88:50.8	157.80	86.44	132.7	.5869	154/44	
700	.0097	.3177	88:49.7	157.35	86.24	131.9	.5965	149/43	
702	.0096	.3228	88:49.0	156.97	86.16	131.4	.6015	145/42	
705	.0095	.3123	88:48.3	156.39	86.27	130.5	.5812	150/43	

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TRACKING REDUCTION

SUMMARY

EPOCH REV	ECCENT.	PERIOD DECAY	INTEG. PERIOD	MAX ALTIT.	MIN. ALTIT.	ARG. PERIGEE	DRAG	STABLE/ TUMBLE	COMMENTS
710	.0094	.3100	88:46.7	155.53	86.08	129.4	.5622	150/43	
713	.0093	.3168	88:45.8	154.83	86.17	128.6	.5739	146/42	
716	.0093	.3360	88:44.7	154.31	85.97	127.8	.5907	138/40	
718	.0092	.3378	88:44.0	153.93	85.87	127.3	.5904	136/40	
721	.0091	.3284	88:43.2	153.31	85.97	126.4	.5780	139/40	
726	.0091	.3399	88:41.4	152.22	85.84	125.3	.5784	134/39	
729	.0101	.2947	88:53.5	160.70	86.48	131.0	.5801	163/47	OA #24 Rev 727
732	.0101	.3107	88:52.4	160.21	86.19	130.7	.5901	155/44	
734	.0100	.3173	88:51.8	159.91	86.10	130.1	.5953	152/44	
738	.0099	.3108	88:50.7	159.04	86.30	128.3	.5850	155/44	
743	.0098	.3110	88:49.1	158.20	86.08	127.8	.5696	153/43	
746	.0097	.3301	88:48.1	157.41	86.20	127.0	.6047	144/41	
749	.0096	.3509	88:47.0	156.86	85.98	126.2	.6237	136/40	
751	.0096	.3547	88:46.2	156.38	85.94	125.7	.6279	133/30	
754	.0095	.3424	88:45.3	155.76	86.00	124.7	.6033	137/40	
759	.0094	.3548	88:43.6	154.71	85.76	123.9	.6056	131/38	
762	.0092	.3534	88:42.5	153.86	85.95	123.0	.6042	131/38	
765	.0092	.3701	88:41.4	153.29	85.71	122.3	.6086	126/37	
767	.0091	.3731	88:40.6	152.79	85.63	121.7	.6137	123/36	
770	.0090	.3573	88:39.7	152.14	85.68	120.9	.5845	128/37	
775	.0089	.3619	88:37.8	151.01	85.48	119.9	.5738	125/36	OA #25 Rev 776

Table 5.5-1 ~~SECRET/H~~

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SUMMARY

EPOCH REV	ECCENT.	PERIOD DECAY	INTEG. PERIOD	MAX ALTIT.	MIN. ALTIT.	ARG. PERIGEE	DRAG	STABLE/ TUMBLE	COMMENTS
779	.0094	.2711	88:54.7	155.85	87.02	150.2	.5799	155/45	OA #26 Rev 778
781	.0094	.2777	88:53.8	155.49	86.66	149.8	.5763	152/44	
783	.0094	.2912	88:53.1	155.14	86.51	149.7	.5956	144/42	
786	.0093	.2765	88:52.5	154.60	86.65	148.6	.5682	152/44	
791	.0092	.2758	88:51.0	153.96	86.42	147.5	.5524	152/44	
794	.0091	.2894	88:50.2	153.37	86.46	146.6	.5779	144/41	
797	.0091	.2946	88:49.3	152.98	86.26	145.6	.5761	142/41	
799	.0090	.2977	88:48.6	152.72	86.14	145.1	.5746	141/41	
802	.0089	.2876	88:48.0	152.17	86.24	144.1	.5555	145/42	
807	.0087	.2839	88:46.5	151.46	86.02	143.0	.5342	147/42	
811	.0087	.2941	88:45.4	150.66	86.09	141.9	.5510	141/40	
814	.0087	.3058	88:44.4	150.28	85.85	141.0	.5549	137/40	
816	.0087	.3051	88:43.7	149.90	85.80	140.5	.5533	136/39	
819	.0086	.3008	88:42.9	149.37	85.86	139.4	.5441	138/40	
824	.0093	.2660	88:51.8	154.86	86.68	145.3	.5428	161/46	OA #27 Rev 824
827	.0092	.2636	88:51.3	154.40	86.82	144.9	.5409	162/46	
830	.0091	.2862	88:50.3	153.99	86.57	144.2	.5739	149/43	
832	.0091	.2819	88:49.7	153.70	86.50	143.8	.5597	151/43	
835	.0090	.2814	88:49.0	153.15	86.62	142.6	.5598	151/43	
840	.0090	.2955	88:47.5	152.41	86.35	141.7	.5708	144/42	
843	.0088	.2984	88:46.6	151.74	86.44	140.8	.5760	142/41	
846	.0088	.3225	88:45.6	151.29	86.22	139.9	.6041	132/38	

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SUMMARY

EPOCH REV	ECCENT.	PERIOD DECAY	INTEG. PERIOD	MAX ALTIT.	MIN. ALTIT.	ARG. PERIGEE	DRAG	STABLE/ TUMBLE	COMMENTS
848	.0088	.3309	88:44.9	150.91	86.12	139.4	.6161	128/37	
851	.0086	.3263	88:44.0	150.29	86.20	138.4	.6065	129/37	
856	.0086	.3405	88:42.3	149.36	85.92	137.3	.6128	124/36	
859	.0084	.3553	88:41.2	148.60	85.97	136.4	.6359	118/34	
862	.0084	.3847	88:40.0	147.96	85.76	135.5	.6711	109/32	
864	.0083	.3936	88:39.1	147.50	85.64	135.0	.6768	105/30	
867	.0082	.3843	88:38.2	146.79	85.68	134.0	.6566	107/31	
872	.0081	.3786	88:36.3	145.75	85.41	132.9	.6249	109/32	
876	.0097	.2993	88:55.3	158.20	86.84	144.1	.6288	150/44	OA #28 Rev 873
878	.0097	.3290	88:54.6	157.84	86.58	143.9	.6758	135/39	
880	.0097	.3305	88:53.9	157.55	86.43	143.3	.6687	134/38	
883	.0096	.3210	88:53.1	156.89	86.58	142.4	.6525	138/40	
888	.0095	.3160	88:51.5	156.07	86.38	141.5	.6255	140/41	
892	.0093	.3334	88:50.2	155.17	86.41	140.1	.6555	132/38	
895	.0093	.3527	88:49.1	154.64	86.18	139.2	.6766	124/36	
897	.0092	.3490	88:48.4	154.22	86.12	138.8	.6632	126/36	
900	.0091	.3334	88:47.5	153.63	86.17	137.7	.6316	131/38	
904	.0091	.3321	88:46.1	152.89	85.98	136.9	.6143	132/38	
908	.0089	.3297	88:44.9	152.03	86.02	135.9	.6055	132/38	
911	.0089	.3538	88:43.8	151.51	85.80	135.0	.6322	123/35	
913	.0088	.3604	88:43.0	151.07	85.70	134.6	.6377	120/34	

Table 5.5-1

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SUMMARY

EPOCH REV	ECCENT.	PERIOD DECAY	INTEG. PERIOD	MAX ALTIT.	MIN. ALTIT.	ARG. PERIGEE	DRAG	STABLE/ TUMBLE	COMMENTS
916	.0087	.3493	88:42.1	150.44	85.76	133.6	.6155	123/35	
921	.0086	.3523	88:40.4	149.45	85.51	132.6	.6012	122/35	
924	.0085	.3590	88:39.3	148.66	85.58	131.7	.6754	119/34	

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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
507	32	-.068	.133
508	32	-.031	.255
510	32/33	-.035	-.039
515	33	-.024	-1.173
519	33	-.483	-1.000
522	33/34	.183	1.052
525	34	.410	1.726
527	34	.130	.879
531	34	.443	.925
535	34	.096	.677
538	34	.252	.931
540	34/35	.109	.332
543	35	-.051	-.178
548	35	.005	.084
552	35	-.172	-.240
554	35	-.033	.194
556	35	.315	1.031
559	35/36	.290	-.256
564	36	-.254	-1.035
567	36	.027	.335
570	36	.248	1.005
572	36	.391	1.266
575	36/37	.232	.432
580	37	-.200	-.750
583	37	-.290	-.935
587	37	.286	.772
589	37	.127	.303
592	37/38	-.011	-.279
596	38	-.203	-.820
600	38	-.376	-.624
603	38	.006	.174
605	38	-.053	-.100
608	38/39	-.014	-.070
612	39	.042	-.075
616	39	-.015	-.551
619	39	-.001	.139
621	39	.803	.597
624	39/40	-.002	.314
629	40	.265	.677
632	40	-.109	-.103
635	40	.123	.984
637	40	.543	1.666
640	40/41	.285	.284
645	41	-.435	-1.623
648	41	-.236	-.754
651	41	-.148	-.101
653	41	.266	.369
656	41/42	-.087	-.803
661	42	-.546	-1.347
665	42	-.742	-2.133

Table 5.5-2

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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
668	42	-.320	-1.058	749	47	.116	.553
670	42/43	-.054	-.260	751	47	.362	1.106
673	43	-.038	-.348	754	47/48	-.012	-.204
677	43	-.121	.281	759	48	-.008	.134
681	43	-.031	.887	762	48	-.140	.005
684	43	.890	2.516	765	48	.023	.581
686	43	.213	.809	767	48	.339	1.383
689	43	.077	.227	770	48/49	.087	.595
694	44	-.156	-.384	775	49	.278	.658
697	44	-.111	-.103	778	49	-1.635	-2.064
700	44	.047	.545	781	49	-.045	.292
702	44	.295	1.155	783	49	.509	1.515
705	44/45	.159	.317	786	49/50	.268	.423
710	45	-.264	-.723	791	50	-.259	-.690
713	45	-.159	-.295	794	50	.065	.412
716	45	.103	.451	797	50	.177	.775
718	45	.253	.647	799	50	.329	1.104
721	45/46	-.025	-.133	802	50/51	.227	.382
726	46	.044	.062	807	51	-.298	.742
729	46	-.096	-.238	811	51	-.034	.023
732	46	.147	.322	814	51	.086	.307
734	46	.262	.739	816	51/52	.137	.267
738	46/47	.147	-.161	819	52	-.077	.130
743	47	-.550	-1.620	824	52	.169	.266
746	47	-.200	-.392	827	52	-.319	-.850

Table 5.5-2

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PREDICTION ACY 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
830	52	.176	.390	911	57	.028	.524
832	52	-.003	-.217	913	57	.318	1.211
835	52/53	-.126	-.662	916	57/58	.124	.339
840	53	-.199	-.885	921	58	-.077	-2.141
843	53	-.389	-1.242	924	58	-.425	.082
846	53	-.142	-.399				
848	53	.106	.179				
851	53/54	-.092	-.691				
856	54	-.421	-1.527				
859	54	-.410	-1.081				
862	54	.019	-1.247				
864	54	.367	1.754				
867	54/55	.473	1.526				
872	55	.183	.358				
876	55	-.398	-.841				
878	55	.275	1.100				
880	55	.398	1.400				
883	55/56	.354	.696				
888	56	-.305	-.891				
892	56	-.189	.052				
895	56	.384	1.665				
897	56	.499	1.786				
900	56/57	.226	.615				
904	57	.134	.258				
908	57	-.208	-.510				

Table 5.5-2

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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. 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 from Rev 506 to RV-5 recovery on Rev 683.

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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K+E 20 X 20 TO TH
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.

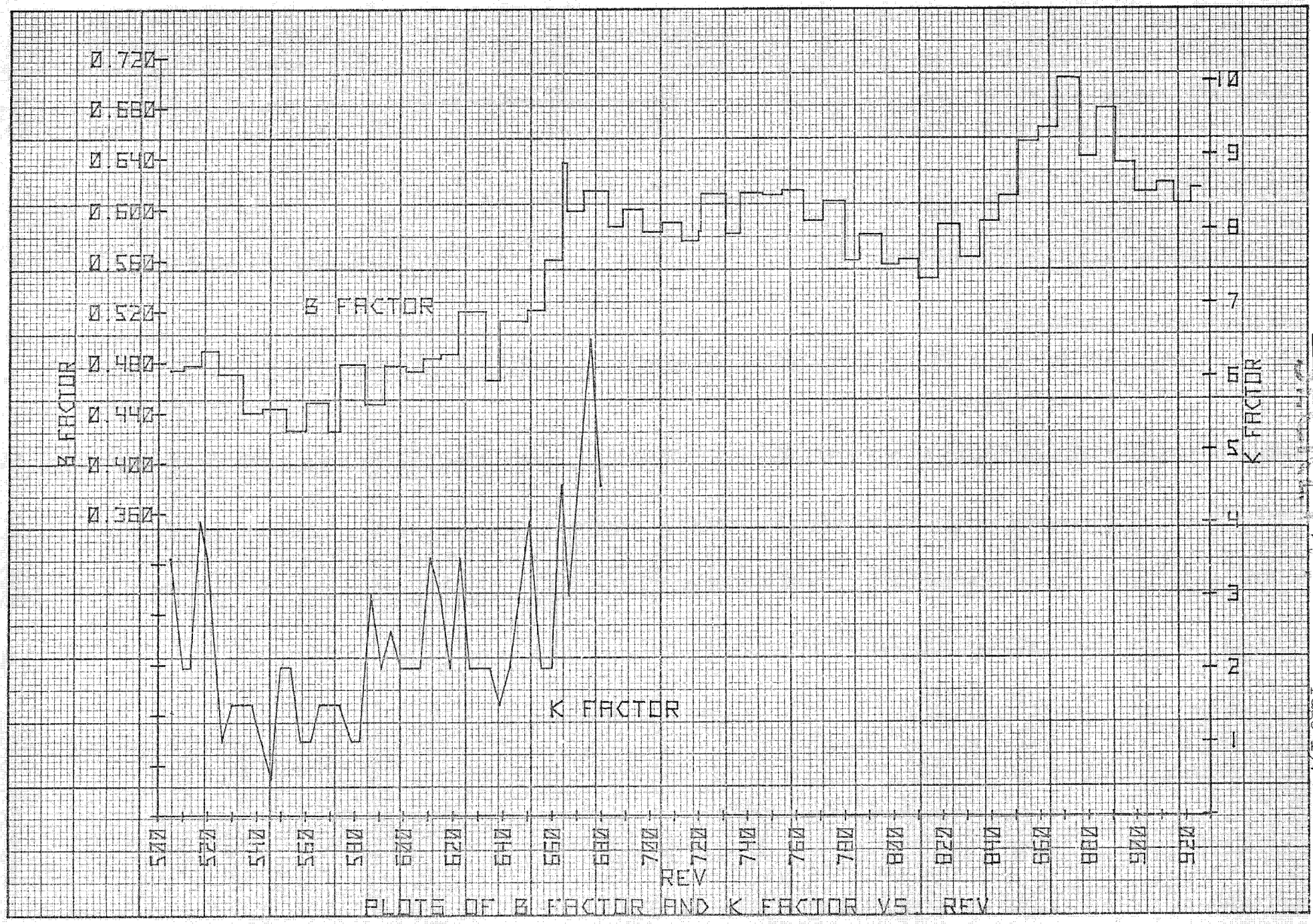

Figure 5.5-1

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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. 19 Rev. No. 532						
Orbit at Rev 531	88:40.7	88.04	150.89	121.704	-	-
Predicted					-	+37.50
Actual					107.4	+37.86
Delta (A-P)						+ 0.36
OA No. 20 Rev. No. 534						
Orbit at Rev	-	-	-	-	-	-
Predicted	88:51.1	88.01	151.26	150.180	-	-20.03
Actual	88:51.4	87.88	151.52	150.732	58.8	-20.39
Delta (A-P)	+0.29	-0.14	+0.26	+0.552	-	+0.36
OA No. 21 Rev. No. 581						
Orbit at Rev 580	88:40.9	87.63	145.87	138.483	-	-
Predicted 581	88:51.5	87.99	153.23	144.759	-	+17.14
Actual 581	88.51.5	88.04	153.17	144.766	50.6	+17.19
Delta (A-P)	0	+0.05	-0.06	+0.007	-	+0.05
OA No. 22 Rev. No. 630						
Orbit at Rev 629	88:39.6	87.88	146.36	132.663	-	-
Predicted 630	88:53.7	88.00	156.79	139.551	-	+22.76
Actual 630	88:53.8	88.09	156.76	139.638	67.2	+22.90
Delta (A-P)	+0.1	+0.09	-0.03	+0.087	-	+0.14

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. 23	Rev. No. 685						
Orbit at Rev	685	88:37.6	87.50	146.86	126.017	-	-
Predicted	686	88:53.9	88.06	158.31	135.322	-	+27.04
Actual	686	88:54.1	88.05	158.46	135.469	78.6	+27.34
Delta (A-P)		+0.2	-0.01	+0.15	+0.147	-	+0.30
OA No. 24	Rev. No. 727						
Orbit at Rev	727	88:41.2	87.76	150.56	125.123	-	-
Predicted	728	88:53.9	88.17	159.50	131.293	-	+20.43
Actual		88:53.9	88.19	159.51	131.284	60.0	+20.51
Delta (A-P)		0	+0.02	+0.01	-.009	-	-0.08
OA No. 25	Rev. No. 776						
Orbit at Rev	775	88:37.8	87.36	149.60	119.633	-	-
Predicted						-	+45.66
Actual						133.6	+46.04
Delta (A-P)						-	+ 0.38
OA No. 26	Rev. No. 778						
Orbit at Rev		-	-	-	-	-	-
Predicted	778	88:54.5	87.88	154.42	150.427	-	-17.79
Actual		88:54.9	88.12	154.47	150.573	53.4	-17.54
Delta (A-P)		+0.4	+0.24	+0.05	+0.146	-	-0.25

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. 27	Rev. No. 824						
Orbit at Rev	823	88:41.5	87.34	146.70	138.466	-	-
Predicted	825	88:51.9	88.04	153.31	145.309	-	16.87
Actual	825	88:51.9	88.16	153.22	145.393	50.8	16.97
Delta (A-P)		0	+0.12	-0.09	+0.084	-	+0.10
OA No. 28	Rev. No. 873						
Orbit at Rev	873	88:36.1	87.44	143.67	132.634	-	-
Predicted	874	88:56.0	88.10	157.19	144.505	-	+32.04
Actual	874	88:56.1	88.21	157.16	144.549	95.8	+32:21
Delta (A-P)		+0.1	+0.11	-0.03	+0.044	-	+0.17
OA No.	Rev. No.						
Orbit at Rev							
Predicted							
Actual							
Delta (A-P)							
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
33	511	.0094	96.19	88:46.5	155.64	86.55	126.8	.4773	511 - 517
								.4892	517 - 524
								.4691	524 -
34	527	.0090	96.19	88:42.2	152.99	86.49	122.8	.4708	527 - 534
								.4408	534 - 542
								.4400	542 - 544
35	544	.0088	96.19	88:49.2	151.80	86.75	148.0	.4439	544 - 552
								.4270	552 - 558
								.4131	558 - 560
36	560	.0086	96.19	88:45.7	150.00	86.55	143.6	.4481	560 - 569
								.4260	569 - 574
								.4062	574 -

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
37	576	.0083	96.19	88:42.0	148.10	86.32	139.4	.4787	576 - 584
								.4473	584 - 592
								.4493	592 - 593
38	593	.0090	96.19	88:48.9	153.19	86.74	141.9	.4776	593 - 601
								.4731	601 - 608
								.4708	608 -
39	608	.0087	96.19	88:45.3	151.17	86.55	138.1	.4823	608 - 615
								.4869	615 - 622
								.4785	622 -
40	625	.0084	96.19	88:40.8	148.63	86.37	133.6	.5202	625 - 633
								.4662	633 - 639
								.4515	639 -

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
41	642	.0095	96.18	88:51.0	156.72	86.61	136.6	.5128	642 - 650
								.5214	650 - 657
								.5261	657 -
42	658	.0092	96.18	88:46.7	154.27	86.32	132.7	.5610	658 - 664
								.6370	664 - 666
								.5997	666 - 673
								.5941	673 -
43	673	.0088	96.18	88:41.9	151.3	86.00	129.1	.6154	673 - 683
								2.1222	683 - 683
								.5875	683 - 689
								.5841	689 -
44	689	.0099	96.18	88:53.2	159.39	86.45	134.5	.6009	689 - 697
								.5833	697 - 705
								.5562	705 - 705

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
45	705	.0095	92.18	88:48.3	156.36	86.32	130.5	.5903	705 - 713
								.5762	713 - 720
								.5833	720 - 721
46	721	.0091	96.18	88:43.2	153.28	86.02	126.4	.6128	721 - 731
								.5823	731 - 737
								.5731	737 - 738
47	738	.0099	96.18	88:50.7	158.96	86.38	128.9	.6136	738 - 746
								.6123	746 - 754
								.6011	754 -
48	755	.0094	96.18	88:45.0	155.38	86.08	124.7	.6161	755 - 763
								.5921	763 - 771
								.5655	771 -

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
49	770	.0090	96.18	88:39.7	151.92	85.89	120.9	.6071	770 - 780
								.5611	780 - 786
								.5520	786 -
50	786	.0092	96.18	88:52.5	154.58	86.76	148.5	.5810	786 - 795
								.5579	795 - 802
								.5374	802 -
51	803	.0089	96.18	88:47.7	151.90	86.36	143.8	.5615	803 - 810
								.5463	810 - 818
								.5485	818 -
52	820	.0085	96.18	88:42.6	148.99	86.00	139.3	.5890	820 - 827
								.5634	827 - 835
								.5761	835 -

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
53	836	.0090	96.18	88:48.7	152.86	86.70	142.5	.5919	836 - 843
								.6115	843 - 851
								.6205	851 -
54	852	.0089	96.17	88:43.7	149.94	86.32	138.1	.6538	852 - 859
								.6651	859 - 867
								.6011	867 -
55	869	.0081	96.17	88:37.4	146.19	85.80	133.4	.7038	869 - 876
								.6422	876 - 883
								.6084	883 -
56	885	.0095	96.17	88:52.5	156.39	86.69	142.0	.6803	885 - 891
								.6375	891 - 899
								.6005	899 -

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
57	901	.0091	96.17	88:47.2	153.27	86.28	137.7	.6151	901 - 908
								.6221	908 - 915
								.5971	915 -
58	917	.0087	96.17	88:41.8	150.10	85.85	133.3	.6063	917 - 922
								.6181	922 - 926
								2.7568	926 - 926
								.6212	926 - 931
								.6642	931 -

Table 5.5-4

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5.5.2 Telemetry and Mode Processing

5.5.2.1 General

Major mode effort during this period was expended on SV-7 requirements during the segment with satisfactory results. The DTV remained the primary display monitor for support.

5.5.2.2 Digital T.V

The 104 column display format for modes 11, 13 and 14 was implemented during the segment with satisfactory results. The DTV remained the primary display monitor for support.

5.5.3 Command Message Planning and Generation

Mini-CSSG (Command Sequence Subgroup) meetings were held as required to review and approve sequence and FPA changes prior to implementation.

Policy was redefined to establish that pen and ink changes to FPA's which would have several uses was not acceptable. CSSG approval of formal changes to sequences and FPA's would be the required procedure.

5.5.4 SCF Support

Station procedure error on COOK Rev 600 (manually shortened station) caused loss of recorder readout. SCF procedures were revised to prevent further occurrence.

Improper planning and RTS briefing caused improper use of the recovery abort message at POGO Rev 910. Tighter control of briefings, definition of allowable VBE windows and redesign of the abort message should prevent future occasions.

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SECTION 5.6
PROGRAM COMMAND SOFTWARE PERFORMANCE
(Prepared by HTC)

5.6 PROGRAM COMMAND SOFTWARE PERFORMANCE
(Prepared by Computer Program Associate Contractor - HTC)

5.6.1 Command Message Summary

This section summarizes pertinent command message data from Mission 1206, IRON 8261. The command messages discussed cover the period from the first RV 3 message (Rev 506 load) to the RV 3 recovery message (Rev 925 load).

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

Rev No. and Load Station	Reason for Rejection
508 BOSS	[redacted] command time in error (key punch error). (b)(1) (b)(3)
544 KODI	O^2A^2 sequence 144 called at incorrect time.
567 POGO	An additional ST- command was required in the message.
653 COOK	To modify SS payload operation to make first event a MONO operation.
659 HULA	To change the execution time of ST+ and ST- commands in sequence 150 to mask with sequence 148.

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Rev. No. and Load Station	Reason for Rejection
892 POGO	Conflict because of a PCM C SELECT command executing during a PCM FORMAT A check.
906 POGO	Message was regenerated because of operator error which resulted in no retrieval capability on completion of the message generation.

Two hundred sixty-two messages were loaded and sixty-three were not for the reasons stated below:

1. The fifty-eight rejected messages were not loaded.
2. A contingency message for emergency tumbling capture was not loaded.
3. Two messages were generated for use if RV 5 recovery was postponed. They were not loaded into the vehicle.
4. An MCS operate message was generated but not loaded.
5. One contingency VBE message concerning RV 3 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 seventy-eight add-on messages.

5.6.2 'TUNITY Software Problems

The Flight 6 'TUNITY software problems itemized below pertain only to the period for RV 2 recovery through RV 3 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.

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Category	No. of SPR's	Comments
Flight Critical	5 (6232, 6235, 6236, 6239, 6245)	Software corrections were made and incorporated during the flight period.
Non-Flight Critical (Requiring Work-Around)	10	Work-around procedures were developed and implemented.
Non-Flight Critical (Minor)	6	Work-around procedures were not required.
Product Improvement or New Requirements	2	To be considered during future development.
Documentation Error	2	MS-4 and MS-7 affected.

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Itemized Software Problems

SPR MD2-6232 ('TBALL) - FLIGHT CRITICAL -

- Problem Description: 'TBALL outputs a zero in the score field if a MOP is input for a particular operation. Also if a MOP combines with an automatic selection, the score is zero for the total operation and the combined operations in the deletion comments.

- Solution or Work-Around: The problem was determined to be flight critical by the SWFTFD. A change was made to 'TREPLAY correcting the problem and was incorporated on the flight SAFARI.

- Operational Impact: The user was unable to determine the score of an operation when manual inputs were used, thus impacting their calculating of the usage of resource versus score.

- Comment: It should be noted that this is a MOD 2 problem only and does not exist in MOD 3. The correction to 'TREPLAY will not be carried forward to MOD 3.

SPR MD2-6233 ('TAPOUT)

- Problem Description: In message 360 for Rev 512.3, 'TAPOUT logged the total record time (902.4 secs) properly but the subtotal for mono operations appears to be truncated.

- Solution or Work-Around: If the sub-total record time is needed for the mono operations, then it must be obtained from the chrono listing.

- Operational Impact: There is no operational impact, just confusion to the user. The sub-total times for mono operations cannot be found in 'TAPOUT and must be obtained from the chrono listing.

- Comment: This SPR should be considered as a product improvement item for a future software delivery. Current 'TUNITY design allows only one function to be tracked for 'TAPOUT's system log. If two functions could be tracked the problem in this case would not occur.

SPR MD2-6234 ('TBAT)

- Problem Description: In examining a full acquisition list from 'TBAT and comparing the cells acquired in 'TBAT with the cells acquired in MPE, there appears to be a significant discrepancy. It appears that 'TBAT is acquiring too late or MPE is acquiring too early.

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- Solution or Work-Around: None.
- Operational Impact: None.
- Comment: SOST is currently studying this problem to determine the source of these miscompares.

SPR MD2-6235 (MPR) - FLIGHT CRITICAL -

- Problem Description: Ref: MPR reporting of operation 329 on Rev 512. For the B side reporting of this operation, MPR lists frames 4 on as having slit biases of 0.000 which is not correct.
- 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 was incorporated on the Flight SAFARI.
- Operational Impact: The slit bias values had to be inserted manually before the output could be of use to the user. With the implementation of the new mod of 'THISUM, the slit bias values are correct.

SPR MD2-6236 ('TFRTIN) - FLIGHT CRITICAL -

- Problem Descritpion: MPR was unable to process the one frame ST operation which occurred on Rev 543.
- Solution or Work-Around: The problem was determined to be flight critical by the SWFTFD. A change was made to 'TFRTIN correcting the problem and was incorporated on the flight SAFARI.
- Operational Impact: The ST system had to be processed through MPR by itself thus causing a delay in the receipt of the output by the user. With the implementation of the new mod of 'THISUM the problem has been solved.

SPR MD2-6237 ('TSTAGEN)

- Problem Description: Ref: Message 110 - 580 GUAM SP message 18 Aug 73. The BOSS station on Rev 589 had two cones. SGLS2 was input on the STA card for Rev 589 BOSS. Two SGLS2 SELECTS were generated including a transponder blink at the second cone to allow the second SGLS2 SELECT to execute.
- Solution or Work-Around: The extra commands caused by the split cone had to be altered out of the message.
- Operational Impact: None.

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- Comment: This SPR is a software problem and should be fixed prior to the support of SV-7.

SPR MD2-6238 (THISTLE MS-7)

- Problem Description: The MS-7, 'THISTLE section, NOLOAD card page states that all messages with LOAD TIMES greater than NOLOADED message will also be deleted from the 'TULTAB. A message (170) was updated three revs early by mistake. The previous message (160) had been updated at the proper time. According to the MS-7 when message 170 was NOLOADED, message 160 should have been released from the 'TULTAB also, but it was not.

- Solution or Work-Around: None.

- Operational Impact: None.

- Comment: The MS-4 and MS-7 should be updated to correct this noted discrepancy.

SPR MD2-6239 ('TREPLAY) - FLIGHT CRITICAL -

- Problem Description: 'TREPLAY is not computing the correct score for SS MOPS. A prime example is the second operation on Rev 607 (see message 340, 607 POGO). The 'TREPLAY output shows a score of zero. A review of the 'TBAT output shows that zero is not correct.

- Operational Impact: The problem was determined to be flight critical by the SWFTFD. A change was made to 'TREPLAY correcting the problem and was incorporated on the flight SAFARI.

- Comment: There was no operational impact as such just confusion to the user. With implemention of the new mod of 'TREPLAY, the problem no longer exists.

SPR MD2-6240 ('TCATCHM)

- Problem Description: 'TAPWRP sets 'TIMBND (Inhibit Flag) within 'TBAT to indicate the end of active bands for predicted weather requests. The problem is that 'TCATCHM does not zero out these inhibit flags prior to building the inhibit bands for INH and STA INH data cards. Then if a selection is attempted involving the noted DEA's, 'TCATCHM cannot select the DEA's.

- Solution or Work-Around: None.

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- Operational Impact: None.

- Comment: This SPR is a software problem and should be fixed prior to supporting SV-7.

SPR MD2-6241 ('TFENCE)

- Problem Description: If the rev specified on a PUL card is prior to the first rev of the span, the card type ('TDOTYP(KK)) is set from 6 to 7. Prior to MOD 2, type 7 was not used. This code in MOD 2 will cause the PUL card to be considered a LAT-LON card.

- Solution or Work-Around: There is an error message stating that the PUL card is on the wrong rev. When this error message occurs, correct the PUL card and rerun 'TBALL.

- Operational Impact: None.

- Comment: This is a software problem and should be fixed prior to the support of SV-7.

SPR MD2-6242 ('TFUSE)

- Problem Description: The interop film totals in MPR are frequently incorrect because of the need of a 4 by 4 by 2 matrix to account for changes of going from one mode of operation to another mode.

- Solution or Work-Around: TOT cards must be input to MPR for the inter-op footage if the difference between telemetry readout and 'TFUSE is greater than two feet.

- Operational Impact: With the use of the above mentioned work-around procedure, there is no operational impact.

- Comment: This SPR is a design defficiency of 'TFUSE and should be fixed prior to the support of SV-7.

SPR MD2-6243 ('TFUSE/'TINCO)

- Problem Description: MPR will give incorrect inter-op film totals when going from mono to stereo operations on the side that was not operating. The reason for this is because the 'TIP data block items are simple items and not arrays to account for the A and B sides of the camera.

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- Solution or Work-Around: When running mono operations TOT cards will have to be used for the side of the camera system that was not operating when that side is brought back into operation.

- Operational Impact: None.

- Comment: This SPR is another example of a design defficiency and should be fixed prior to the support of SV-7.

SPR MD2-6244 ('THISTLE)

- Problem Description: Predicted PMU readout telemetry counts ("ECSC" on chrono listing) are always in error when an add-on message is generated without VBE's and updated.

- 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 MD2-6245 ('TLMP) - FLIGHT CRITICAL -

- Problem Description: The 710 GUAM 'TFRTFIX run shows a 'TMB which is structured incorrectly. The Rev 703, 704 and Rev 706 FRTDATA appears after the "new" Rev 707 data. The most recent data should appear at the end of the 'TMB in 'TFRTFIX.

- Solution or Work-Around: The problem was determined to be flight critical by the SWFTFD. A change was made to 'TLMP correcting the problem and was incorporated on the flight SAFARI.

- Operational Impact: The 'TMB had to be rebuilt before MPR could be run. With the implementation of the new Mod of 'TLMP the problem has been corrected.

SPR MD2-6246 ('THISUM)

- Problem Description: The CHG run for 27 Aug 73 aborted with an illegal instruction because the ST system had been inactive for an extended period of time and brought up for engineering tests.

- Solution or Work-Around: This problem occurs when RV-5 is recovered and at some time later (30 revs or more), the ST system is again activated for tests. This causes CHG to write different MPR records for the two systems. The work-around is to SDBG daily 'TADSTS = 'TADST and 'TADSOE = 'TADGOE so that the MPR records are equal.

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- Operational Impact: With the implementation of the above mentioned work-around, there was no operational impact.

- Comment: This SPR is a software problem and should be fixed prior to the support of SV-7.

SPR MD2-6247 ('TRANFUN)

- Problem Description: If a command contains multiple FID's which are generator filled and each function value is not specified 'TRANFUN does not fill the command bits for any generator functions in that command.

- Solution or Work-Around: Each function value must be specified for all generator filled FID's of a particular command.

- Operational Impact: The message had to be regenerated specifying the proper function values for all of the generator filled FIDS.

- Comment: This SPR is a software problem and it should be corrected prior to the support of SV-7.

SPR MD2-6248 (Data Base Handbook)

- Problem Description: Item 'CHGDUR has no source/responsible agency stated for it in the data base handbook. It should be the same as the COMPOOL (NEC/SSPO).

- Solution or Work-Around: None.

- Operational Impact: None.

- Comment: The Data Base Handbook should be updated to correct the above mentioned discrepancy.

SPR MD2-6249 ('TFCOM/'TINCO)

- Problem Description: Incorrect telemetry attitude data is being used to calculate the operation corners when processing the ST system in MPR.

- Solution or Work-Around: None.

- Operational Impact: There was no operational impact for SV-6 because attitude data was not used at all in MPR when processing operations.

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- Comment: This SPR is a software problem and it should be corrected prior to the support of SV-7.

SPR MD2-6250 ('TDERBY/'TOTEM)

- Problem Description: The longitude printed out by both 'TDERBY ad 'TOTEM in their respective summaries is quite often wrong. Significant variations have been noted.
- Solution or Work-Around: None.
- Operational Impact: This SPR creates no operational impact because it is an output problem; the commands still execute at the proper times.
- Comment: It is a software problem; the solution is known and should be fixed prior to the support of SV-7.

SPR MD2-6251 (CMU/CHG)

- Problem Description: It is not operationally feasible to strip RTC's from BBRT's so they can be reflected in CHG. CMU requires that RTC's be included after load time of the previous U/D to load time of the present U/D to be passed to CHG. CMU is run before the required RTC's are available.
- Solution or Work-Around: None.
- Operational Impact: There is no operational impact because RTC's are not being processed for SV-6.
- Comment: TRW is studying the problem now to evaluate the possibility of changing the design of CMU/CHG.

SPR MD2-6252 ('TCOMTIM)

- Problem Description: Compound time field station events (R,S,T,F) are not the same as those used by 'TSTAGEN for broken passes due to the multiple station events. 'TUNITY should be modified such that compound time field events for broken passes are the same as the unwidened events used by 'TSTAGEN to assemble station events. This will allow proper meshing of events during or near station passes with station pass sequences generated by 'TSTAGEN.
- Solution or Work-Around: Another compound time field must be used for broken station passes.

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- Operational Impact: If the work-around procedure is not used, the message will have to be altered.

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

SPR MD2-6253 ('TSTAGEN)

- Problem Description: Reference SPR MD2-6237. When a station pass has two cones (R-S cones) (T-F cones), 'TSTAGEN will generate two sequences instead of one to satisfy special requests via the STA data card. This is due to the multiplicity of events for the same rev/station.

- Solution or Work-Around: If the extra commands are not needed or wanted, the message has to be altered to delete these commands.

- Operational Impact: None.

- Comment: It is a software problem; the solution is known and it should be fixed prior to the support of SV-7.

SPR MD2-6254 ('THISUM)

- Problem Description: MPR is reporting erroneous focal plane position for the B side. The number being reported is 4 microns higher than it should be.

- Solution or Work-Around: MPR's data blocks were 'SDBGed to the proper value and SUB cards for mono operations are now being used for mono operations to update focus only for the camera system that is in operation, be it the "A" side or the "B" side.

- Operational Impact: None.

- Comment: This SPR is a software problem and it should be fixed prior to the support of SV-7.

SPR MD2-6255 ('TAPWRP)

- Problem Description: 'TAPWRP (in 'TBAT) writes the 'TAWTAB for WAC cells above LATBAR so 'TBALL can perform internal countdown. However, if there are no cells above LATBAR for the specific rev, no record of the 'TAW is written. Then, 'TBALL attempts to perform internal countdown for a specified rev span. When 'SDAHA cannot locate a record for the rev, countdown is turned off and an error message is displayed telling of the problem.

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- Solution or Work-Around: None.
- Operational Impact: Possible undesirable selection due to no ICD.
- Comment: This SPR is a software problem; the solution is known and it should be fixed prior to the support of SV-7.

SPR MD2-6256 ('TPITCH)

- Problem Description: When 'TPITCH is called in the "ICD" mode and the 'TIJ is not available for that rev, internal countdown is bypassed and no error message is output to inform the user. If the 'TIJ is purged prior to "ICD" ('TPURR), countdown will not be performed for the earlier ICD revs.
- Solution or Work-Around: Care must be taken when running 'TPURR so as not to purge the 'TIJ prior to "ICD".
- Comment: This SPR is a software problem; the solution is known and should be fixed prior to the support of SV-7.

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5.6.3 Hardware/Software Interface Changes

For IRON 8261, thirty-five change requests were processed from the RV2 recovery message through the RV3 recovery message (as shown in Table 5.6.3-1).

These changes were implemented via requests SV6-155 through SV6-189 and have been incorporated in the nominal data base and hardware/software interface documentation.

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Table 5.6.3-1. Summary of Hardware/Software Interface Changes

Request No.	Description	Effectivity
SV6-155	Modification of sequence 132 for MONO A operations.	SV-6 only
SV6-156 thru 158	Modification of NEC sequences 150, 151 and 158 to accommodate single frame operations.	SV-6 only
SV6-159	Modification of O^2A^2 sequence 144 to configure for color film.	SV-6 only
SV6-160	Modification of sequence 144 due to revision of nominal values based on data reduction.	SV-6 only
SV6-161	New sequence 172 to provide redundant shut-down of the OB and FT during SS operation.	SV-6 and nominal data base
SV6-162 thru 170	New sequence 172 is made redundant to sequences 120, 131, 132, 134, 135, 136, 137, 138 and 139 thereby providing redundant OB and FT shutdown.	SV-6 only nominal data base
SV6-171	New sequence 148 to provide redundant shutdown of the ST system.	SV-6 and nominal data base
SV6-172 thru 180	New sequence 148 is made redundant to sequences 149, 150, 153, 154, 155, 156, 157, 158 and 159.	SV-6 and nominal data base
SV6-181	Modification of sequence 159 to permit IR photography.	SV-6 only
SV6-182	Modification of sequence 148 to change execution time of the redundant off commands.	SV-6 only
SV6-183 & 184	Modification to NTC sequences 158 and 159 to insure redundant "off" command execution after normal "off".	SV-6 only
SV6-185	Modification of O^2A^2 sequence 144 to configure for black and white film.	SV-6 only
SV6-186	Modification of POST FA CAL ROLL SEQUENCE(380).	SV-6 and nominal data base

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Table 5.6.3-1. Summary of Hardware/Software Interface Changes (cont'd)

Request No.	Description	Effectivity
SV6-187	Addition of new POST FA CAL ROLL SEQUENCE(71).	SV-6 and nominal data base
SV6-188	Modification of 0^2A^2 sequence 144 to configure for color operation.	SV-6 only
SV6-189	Modification of 0^2A^2 sequence 144 to configure for black and white film.	SV-6 only

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

5.7.1 EDAP Performance

EDAP operations through segment 3 were normal in all areas.

Battery temperatures and heater cycling were nominal for this segment.

The main power system was healthy and supported an average bus load of approximately 21 ampere-hours per rev.

5.7.2 TT&C Performance

SGLS 1, PCM 1A and Tape Recorder 1 performed satisfactorily during segment 3. SGLS 2 was checked on a daily basis, on subcycle 16, throughout segment 3.

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

The Redundant Attitude Control System (RACS) and the Primary Reaction Control System (RCS-1) were used for vehicle control throughout segment 3 and performed within specifications. In addition to the normal control, the system was used for the ST calibrate on Rev 666, the ST Inhibit on Rev 777 and RV-5 on Rev 683. The Primary Attitude Control System (PACS) remained on during this period. The PACS yaw bias continued with rates from -.012 to -1.504. There was a period (Rev 760 to Rev 777) when the bias dropped to (-.001 to -.005) and another period (Rev 783 to Rev 786) where it increased to (-3.586 to -4.343). Gyro temperatures remained at nominal range of 155°F to 172°F.

The Primary Reaction Control System performance was nominal during segment 3. Reaction Engine Assembly (REA) 8 continues to exhibit higher than normal temperatures, attributed to a leak that started on Rev 48. There has been no change in the leakage rate. REA 8 thrust level has been lower than the remaining thrusters with normal degradation. REA 4 thrust level had degraded at a faster than nominal rate. Mini-yaw maneuvers were performed on Revs 519, 843, 860 and 892 to evaluate the REA thrust levels. The REA has provided adequate thrust to satisfy mission requirements. 128.7 pounds of propellant were consumed by the RCS. The thrust history of REAs No. 8 and 4 are shown in Figure 5.7-1.

5.7.4 Orbit Adjust System (OAS) Performance

The OAS functioned normally for the 10 burns accomplished during this segment. There were 2 negative adjusts. The orbit adjusts required a total of 569.2 pounds of propellant. The orbit adjusts are summarized in Table 5.7-1. At the end of segment 3, there was 1334 lbs of propellant remaining in the OAS.

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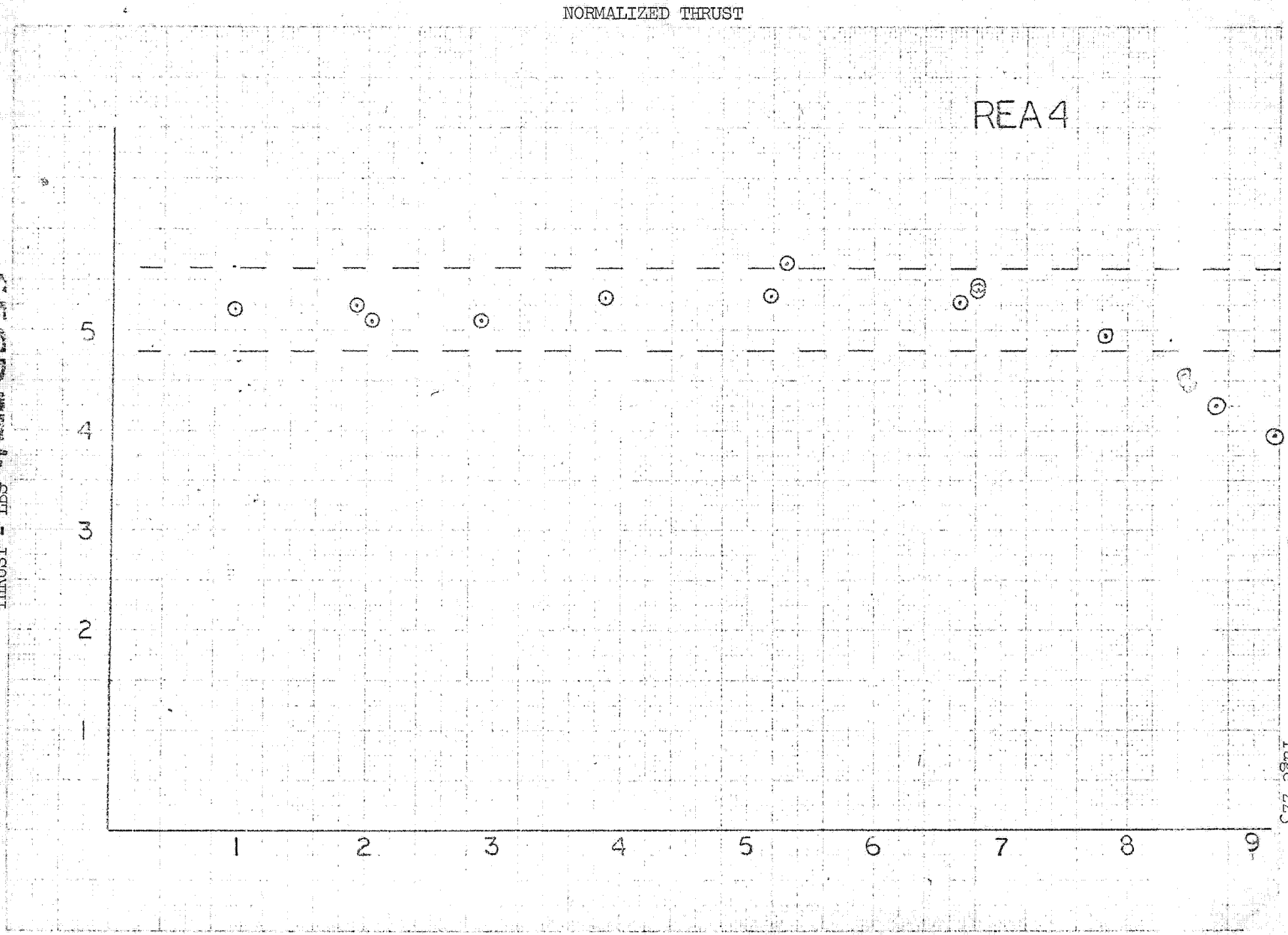

Figure 5.7-1

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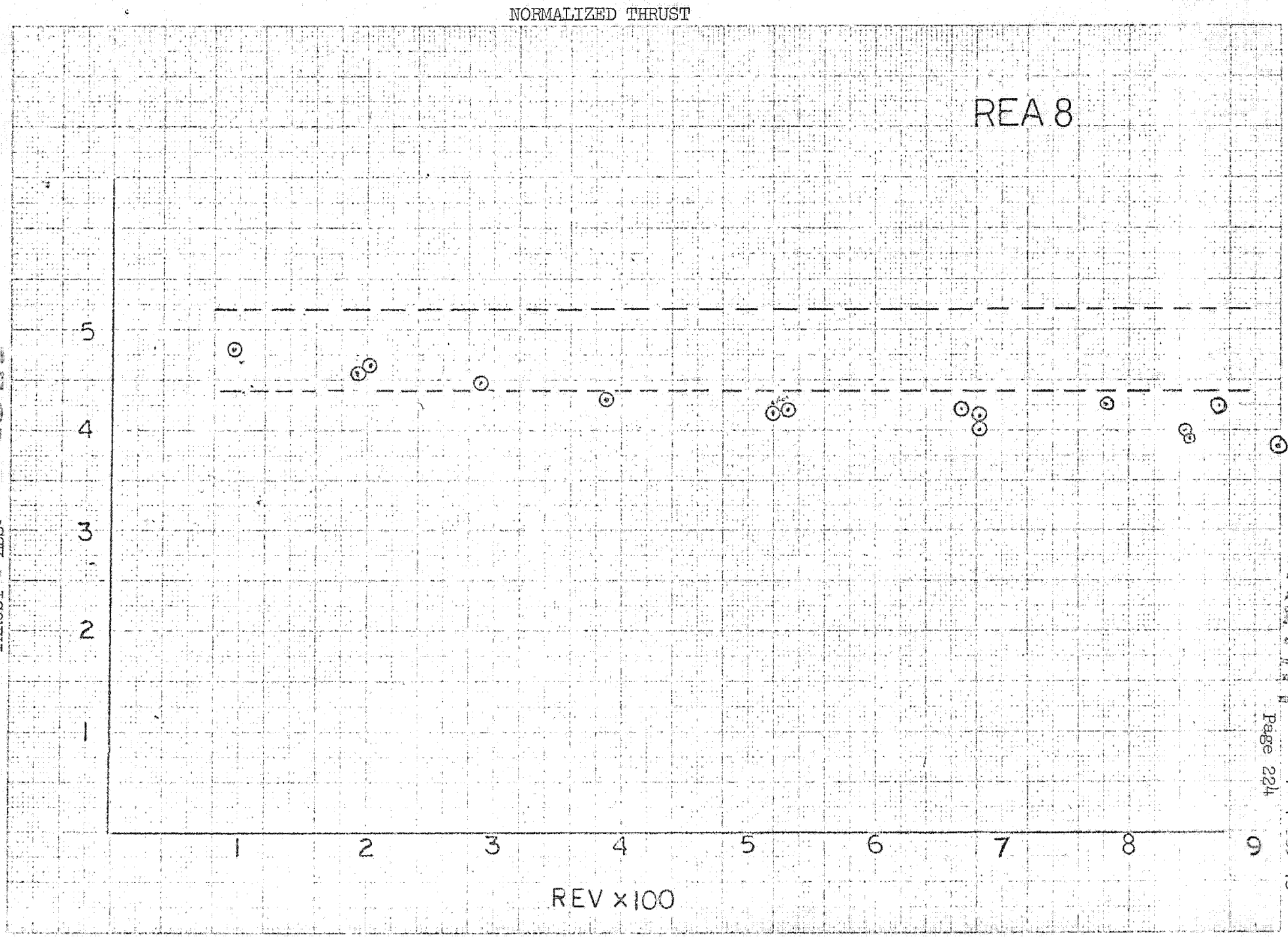

Figure 5.7-1

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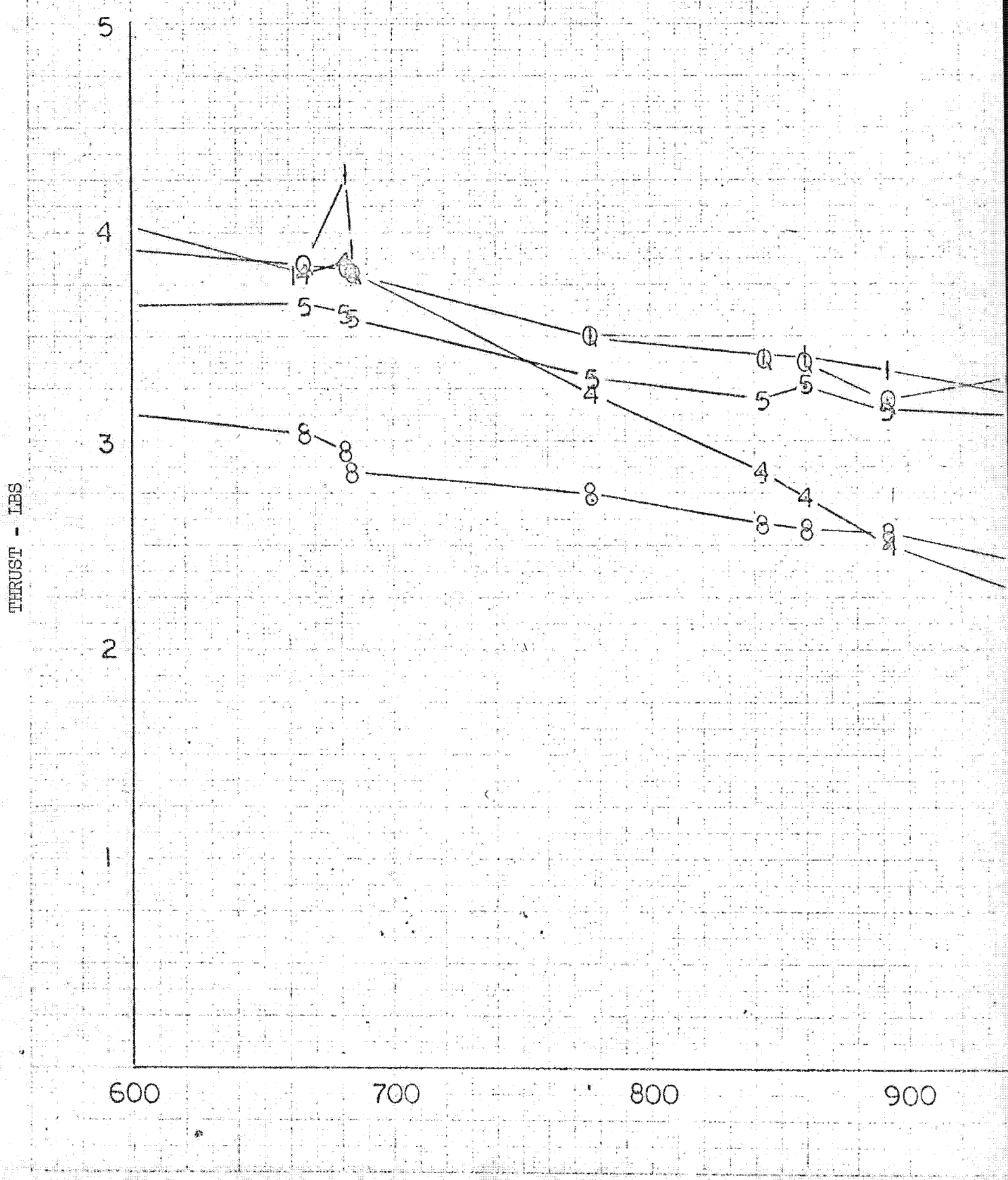

Figure 5.7-1
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TABLE 5.7-1

ORBIT ADJUST SUMMARY

SEGMENT 3

(REV 506 - 926)

OA NO/TYPE	19/POS	20/NEG	21/POS	22/POS	23/POS	24/POS	25/POS	26/NEG	27/POS	28/POS
OPS DAY	33	33	36	39	42	45	48	48	51	54
REV NO	532	534	581	630	685	727	776	778	824	928
DELTA VEL REQ (FPS)	37.415	20.016	17.145	22.728	27.039	20.444	45.672	17.80	16.85	32.012
DELTA VEL ACTUAL (FPS)	37.861	20.388	17.186	22.899	27.337	20.514	46.043	17.542	16.971	32.214
BURN DURATION	107.4	58.8	50.6	67.2	78.6	60.0	133.6	53.4	50.8	95.8
PROPELLANT REQUIRED	84.9	45.6	39.0	51.3	59.3	44.8	99.98	38.8	36.8	68.7
AVG OA TANK TEMP (^{o}F)	77.3	77.3	77.7	78.0	78.0	78.0	78.0	78.0	78.0	78.0
AVG OA TANK PRES (PSIA)	168.25	162.75	160.0	156.75	152.75	149.25	147.25	143.0	139.50	138.0

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5.7.5 Lifeboat II (LB II) Performance

The LB II system electronics were activated four times (Revs 545, 610, 691 and 772) for yaw attitude determination and on Rev 683 during RV-5 recovery and on Rev 926 during RV-3 recovery. The system functioned nominally and the magnetometer data was consistent with predicted values.

The LB II tank heaters were commanded on for five revs (Revs 522 to 527) to maintain the impulse capability. On Rev 578 it was agreed to allow the tanks to cool to 75°F. This temperature was reached on Rev 821. The heaters were turned on from Revs 830 to 835 and the tanks reached 85.5°F. By Rev 926 the tanks had cooled to 77°F.

(b)(1)
(b)(3)

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SECTION 6

6.0 ORBIT PHASE - REV 927 THROUGH RV-4 RECOVERY

6.1 Summary

Panoramic camera mission photography continued throughout the segment with only minor instrumentation problems. All film was expended through both cameras at the termination of mission operations. In addition to the black and white film, 500 feet of infrared film were exposed through the forward camera and 6000 feet of color film were exposed through the aft camera. SBA subsystems performance remained nominal throughout the segment although the thrust level of REA's #8 and #4 continued degrading. RV-4 was successfully reentered and aerially recovered on Rev. 1202 on operations day 75.

6.1.1 Summary of Events

A successful [redacted] was conducted on Rev. 955. (b)(1) (b)(3)
Panoramic camera operations continued using both stereo and mono and with 5.0 ips rewind. The 00AA crosstrack nominal for color film and a revised exposure bias curve for color film were implemented based on PFA recommendations on review of the RV-3 imagery. A number of instances of delayed function of SS instrumentation power "ON" were noted during the last portion of the segment, however, this did not impact camera operation.

Lifeboat tank temperature was permitted to decay to 68°F to preserve Lifeboat battery capacity.

Acceptable ACS-2/RCS-1 performance was maintained during the segment, however, the thrust of REA #8 and #4 continued to decrease. REA #8 thrust was approximately 1.8 lbs. and REA #4 1.45 lbs. at the end of the segment compared to the required minimum of 1.0 lbs. at which level a switch to the redundant RCS would be required. A series of mini-yaw maneuvers were conducted during the segment to provide the required REA performance data. ACS-1 yaw bias was present during the entire segment.

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Six positive orbit adjusts were conducted during the segment with nominal performance achieved on all burns.
VAST deboost planning continued as well as detail planning for the execution of the required Solo testing.
RV-4 was successfully reentered and aerially recovered on Rev. 1202 with no capsule damage. A tear in the main parachute extended from apex to skirt but did not appear to affect parachute performance.
The quality of the acquired black and white photography ranged from very good to fair with the improvement resulting from better atmospheric conditions. Color quality was better than RV-3. IR image quality was fair to poor and contained no IR information due to fogging that occurred during inspection prior to launch.

6.1.2 Problem Summary

a. Delayed turn-on of Instrumentation Power Supply.
Statement - Delayed turn-on resulted in late or no pneumatics and thermal data at times during the segment.
Solution - Continued operations as normal. Film chute pressure data were available during camera operations.

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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 926-1202). There were no equipment malfunctions. None of the Command Systems were subjected to out of specification temperatures of 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 168 messages loaded in the ECS for this segment. This resulted in 37,731 SPC's being stored for readout from the PMU's.

Of the 37,731 SPC's loaded, 19,535 were output from the PMU's for processing by the decoders. The remaining were erased out prior to time label matches. In loading the 37,731 SPC's there were no rejects.

6.2.1.1.2 ECS Clock Operation

The accuracy of the ECS clock was 2.34 parts in 10^7. This corresponds to an average frequency offset of .2399 HZ above the nominal frequency of 1.024×10^6 HZ. The frequency of the clock oscillators changed .009 HZ_8 in 270 revs. This results in stability of 1.76 parts in 10^8 over 270 revs, or 2.64 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 6.2-1.

6.2.1.1.3 ECS Anomalies

There were no ECS anomalies experienced during this segment.

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6.2.1.2 MINIMAL COMMAND SUBSYSTEM

6.2.1.2.1 Command Modes

The MCS was not used during this segment.

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.

No commands were issued from the BUD during this segment.

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 9,660 PMU-B 9,875

ECS Clock Drift Rate 2.34 parts in 10^7

ECS Clock Stability 1.76 parts in 10^8 for a 270 rev period

Total Hours On ECS 415 MCS 4.5 RD 1.0 BUD .05

Secure Words Expended at end of Segment 4 PMU-A 124 PMU-B 148

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

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	(1)	(2)	(3)
BIAS	0.5133	0.3493	0.1761
VTCW	4952684.4	5666156.2	6391884.4

AVERAGE CLOCK ACCURACY =BIAS CHANGE/TIME CHANGE

=(0.5133- 0.1761)/(6391884.4- 4952684.4)

= 2.34297E-07

= 2.34297 PARTS IN 10 TO THE 7TH

AVERAGE CLOCK FREQUENCY =(2.34297E-07*1,024,000.0)+1,024,000.0

= 1024000.23992HZ

FREQUENCY 1 (F1) =(BIAS/VTCW)*1.024MHZ+1.024MHZ

=(0.1640/ 713471.8)*1.024MHZ+1.024MHZ

= 1024000.23538HZ

FREQUENCY 2 (F2) =(BIAS/VTCW)*1.024MHZ+1.024MHZ

=(0.1732/ 725728.2)*1.024MHZ+1.024MHZ

= 1024000.24438HZ

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

=(1024000.24438- 1024000.23538)/1.024E+06

= 8.78906E-09

= 1.75781 PARTS IN 10 TO THE 8TH
FOR THIS 270 REV. PERIOD

= 2.63818 PARTS IN 10 TO THE 10TH
FOR AN AVERAGE 6 HOUR PERIOD

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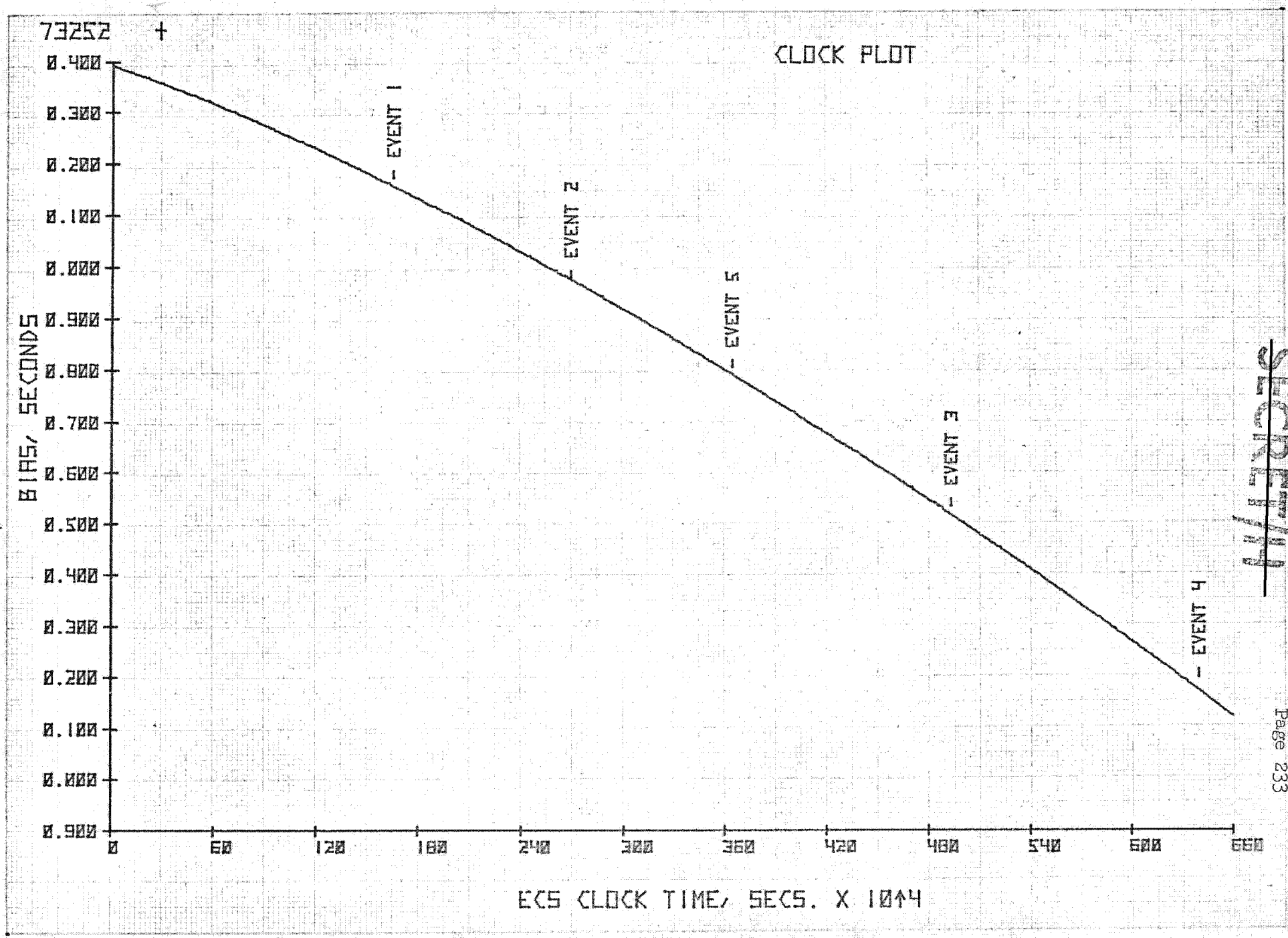

Figure 6.2-1

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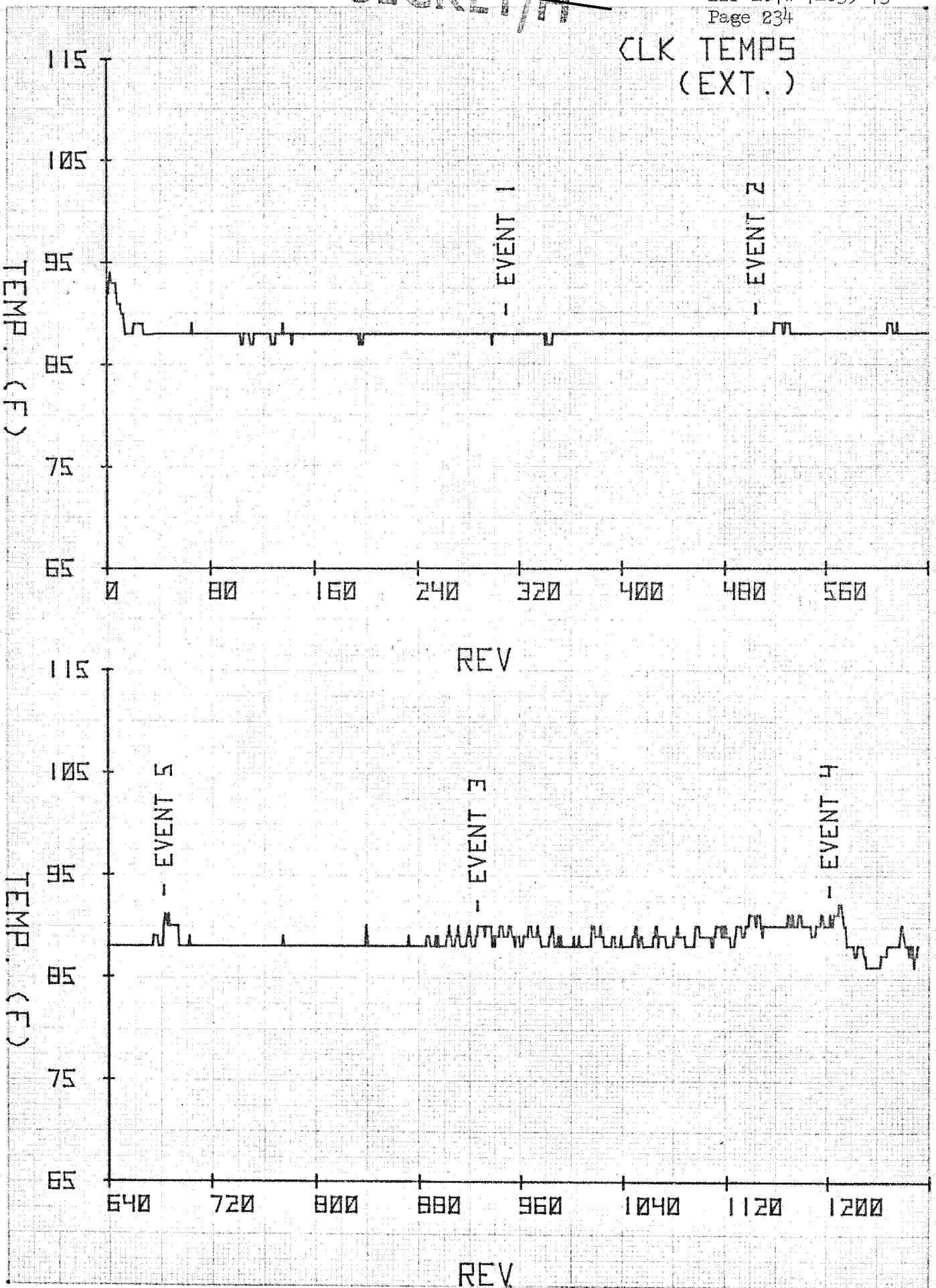

Figure 6.2-2

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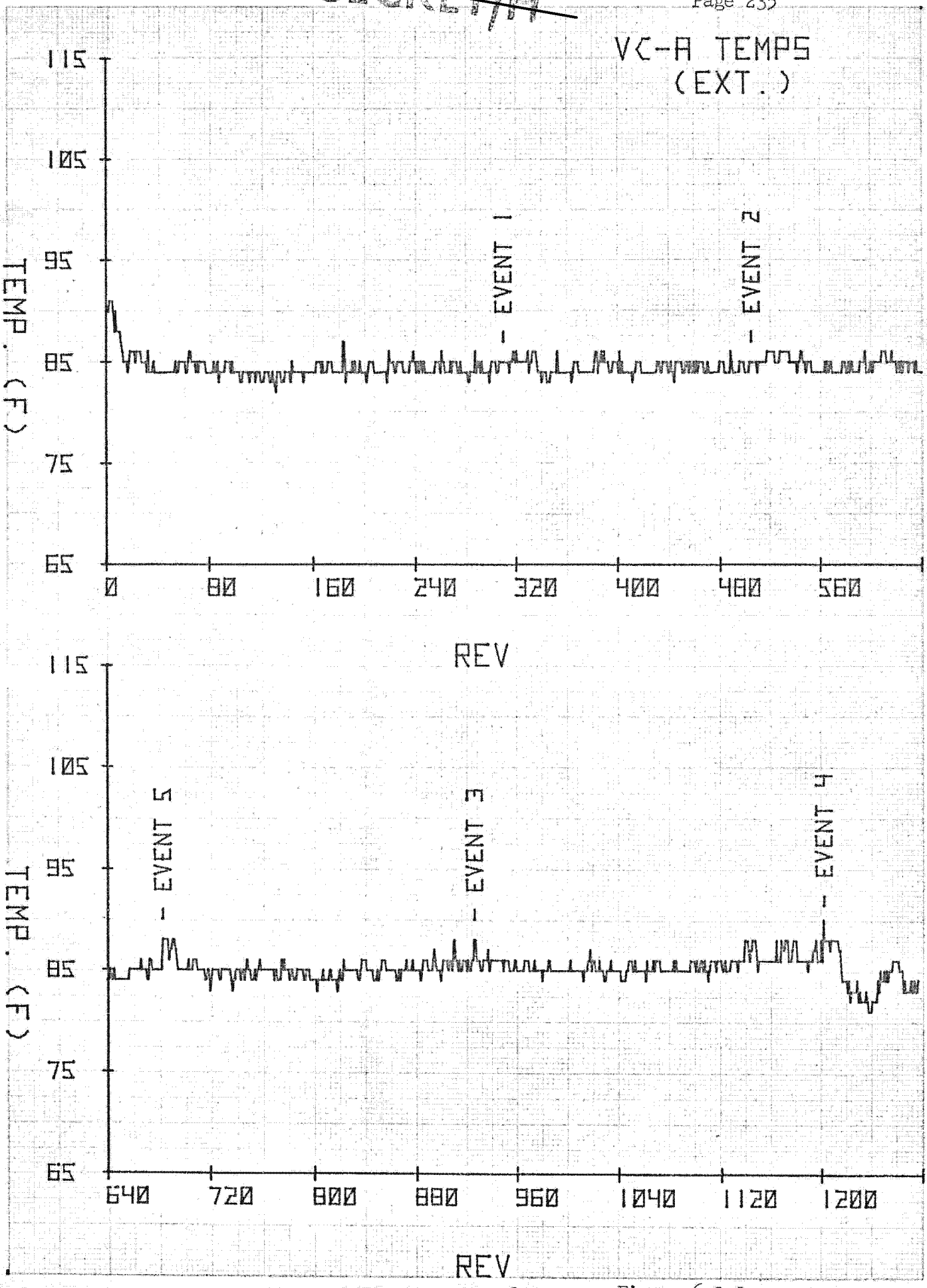

Figure 6.2-3

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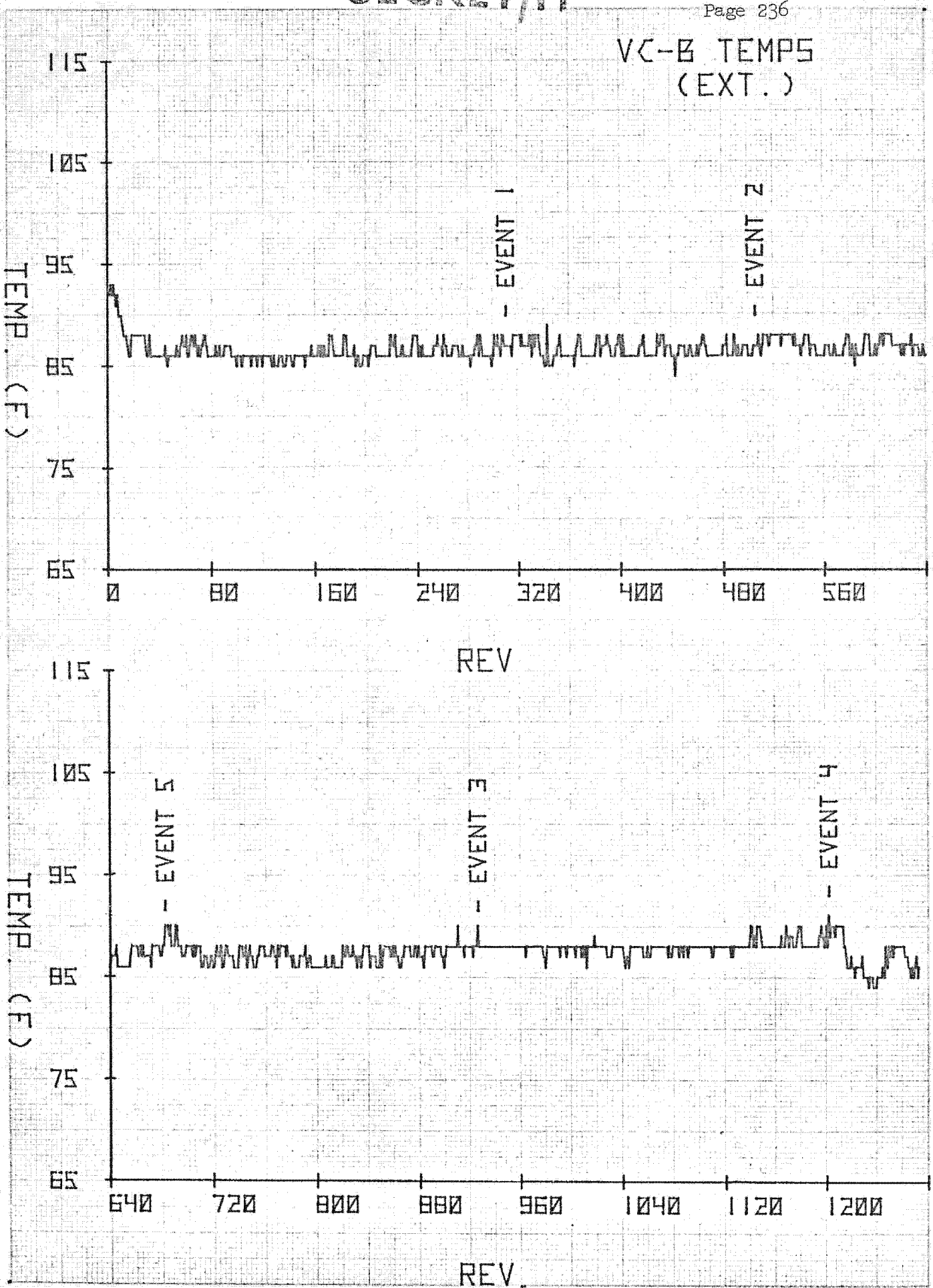

Figure 6.2-4

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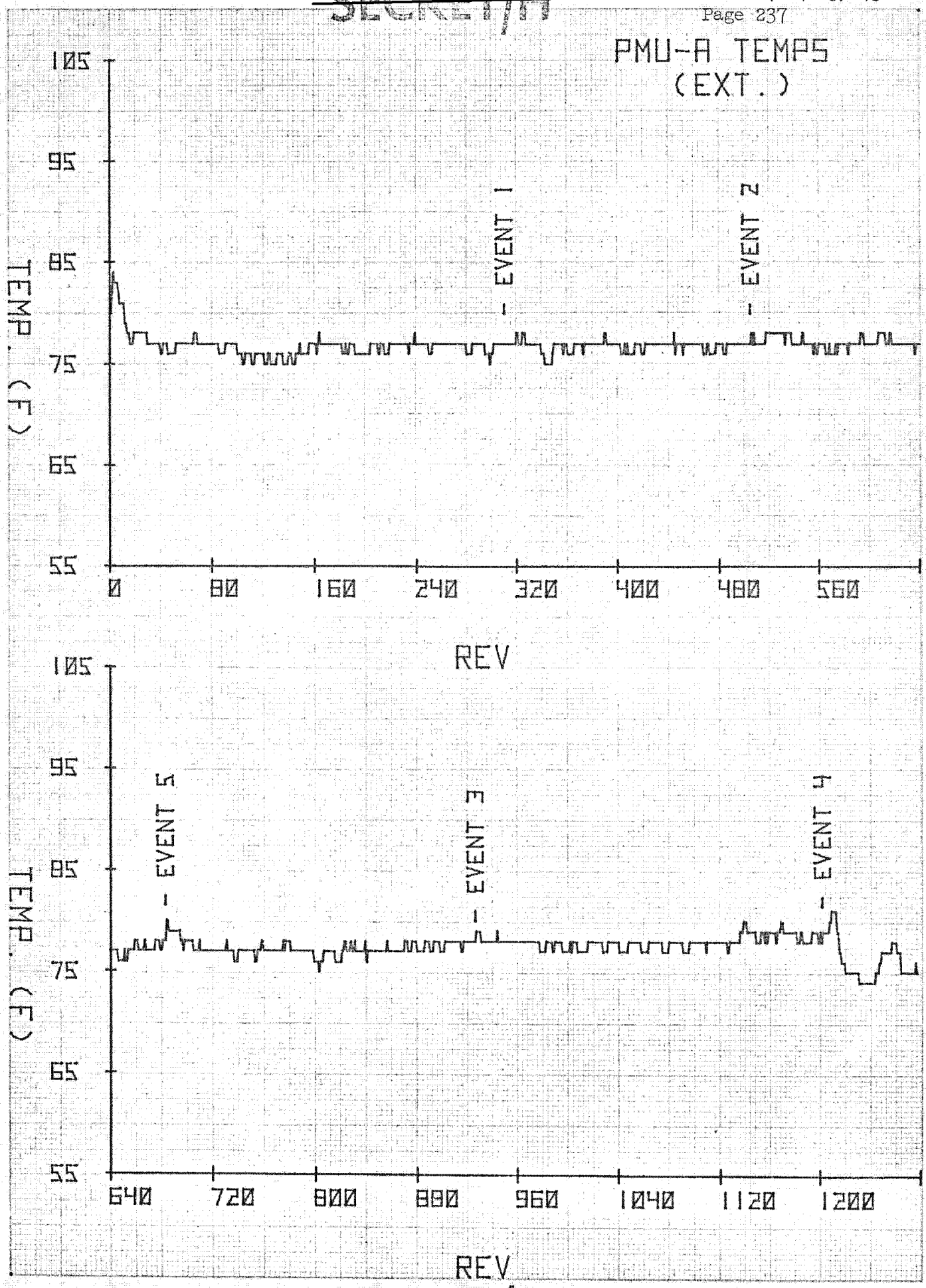

Figure 6.2-5

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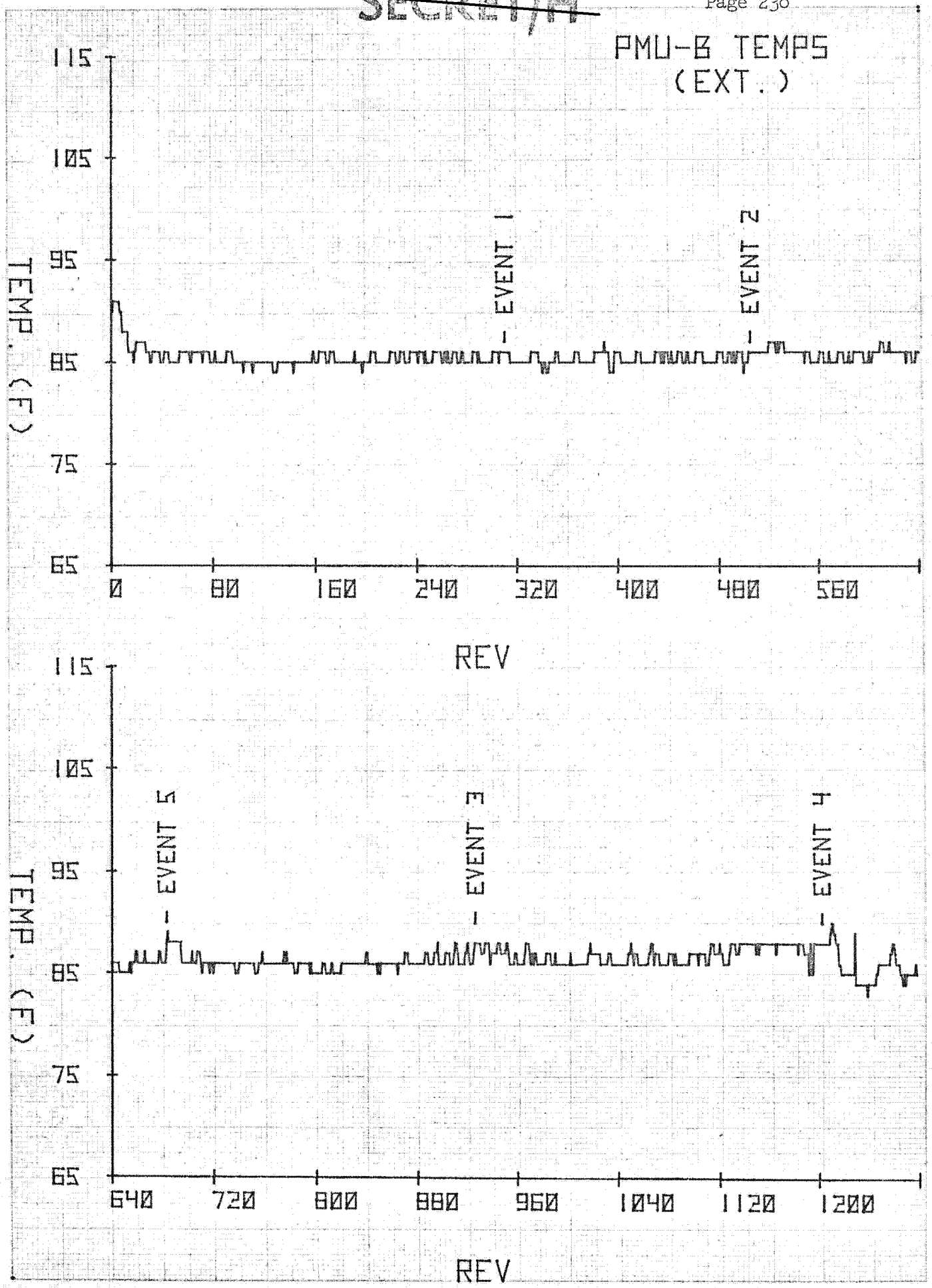

Figure 6.2-6

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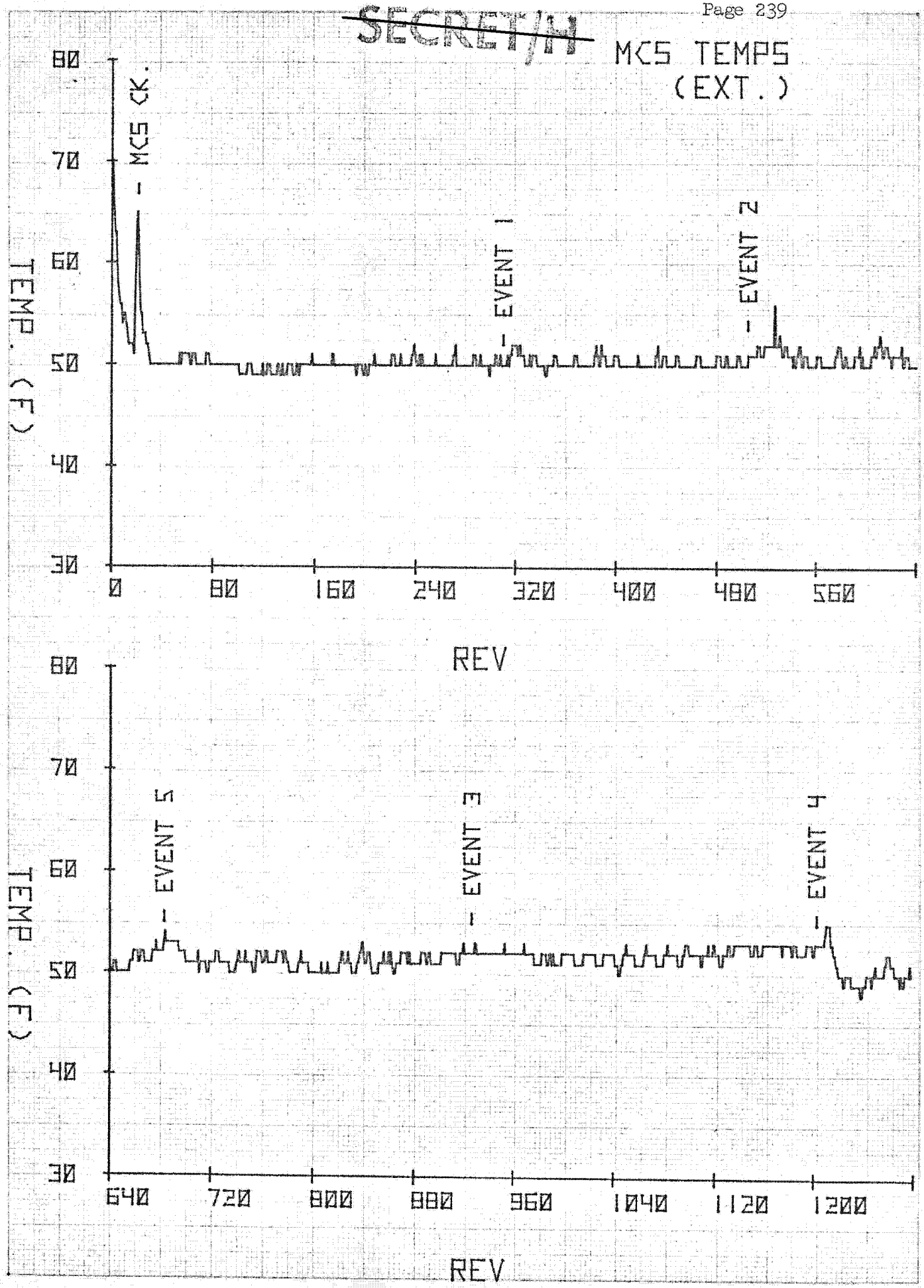

Figure 6.2-7

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6.3 SENSOR SYSTEM OPERATIONS THROUGH RV-4

6.3.1 Mission Operations Performance

The sensor subsystem exhibited nominal operational characteristics throughout RV-4, with no major anomalies or malfunctions experienced.

On a few occasions the sensor system temperature and pressure monitors which are powered via the I+ (Sensor System Instrumentation Power) command indicated zero TM volts several seconds after the command was executed. On one occasion it took 346 seconds before the monitors indicated proper levels.

The Aft Camera OOAA cross track nominal change from -31 to -27 steps for color film, recommended by PFA following evaluation of RV-3 imagery, was in effect for all S0255 transferred in RV-4. The PFA also provided a revised exposure bias curve for the S0255 which was in effect for all S0255 transferred in RV-4.

The scan and rewind constraints imposed at liftoff remained in effect throughout RV-4. The RV-4 mission segment consisted of 152 sensor system operations, consuming 16,484 seconds of camera power on time, 6.6 pounds of nitrogen gas, 25,935 feet of film on the Forward Camera and 22,214 feet of film on the Aft Camera. The Forward Camera film included one 500 foot segment of SO-130 (IR) utilized on mission operations 660 through 667. The Aft Camera film included 6,000 feet of SO-255 (Color) utilized on mission operations 588 through 626, 654 through 660, 662 and 664. The Consumption Profiles through RV-4 are graphically depicted in Figure 1.

The black and white photographic quality in Segment 4 ranged from very good to fair, the majority being rated as good.

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The best of Segment 4 is comparable to the best of Segment 3 and better than Segments 1 and 2. Improvement was essentially due to the improving atmospheric conditions as the mission progressed. The quality of the S0255 (Color) photography was good to poor, but overall better than in Segment 3. The image quality of the SO-130 (IR) was fair to poor. The film contained no IR information due to the fogging that occurred during the inspection of the load prior to launch.

6.3.2 Engineering Tests

The following engineering tests in support of PFA requirements were performed during RV-4:

Rev. 971	Smear slits at high scan angle
Rev. 989	Lens MTF evaluation
Rev. 1038	Smear slits at high scan angle.
Rev. 1054	Smear slits and 6C target (S0255)
Rev. 1070	6C Target (S0255)
Rev. 1085	Smear slits (S0255)
Rev. 1117	Smear slits (S0255)
Rev. 1184	6C Target (S0255).

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CONSUMPTION PROFILES

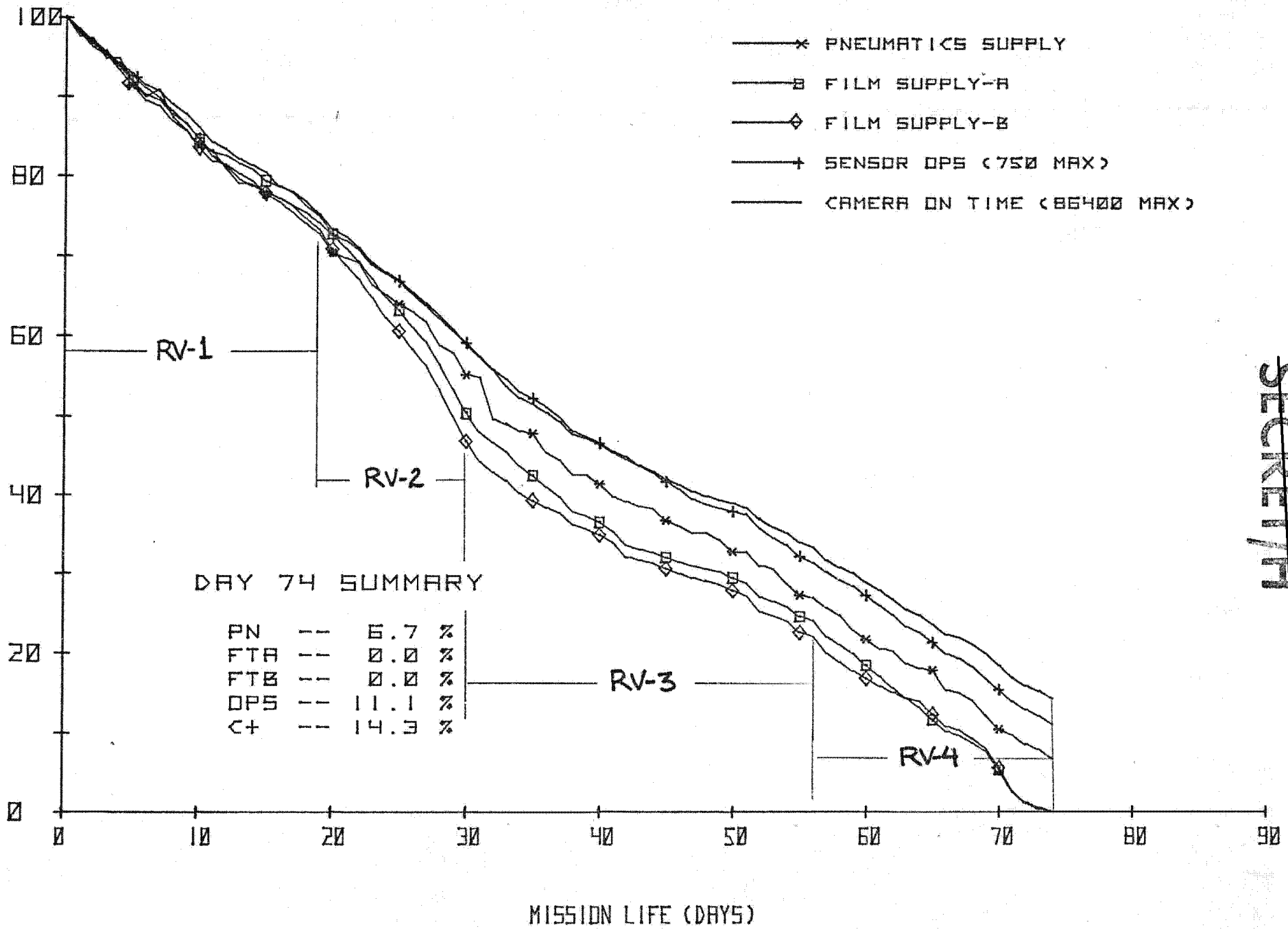

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FIGURE 1

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6.4 RV-4 (S/N 28) 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 relevent data. RV heater performance graphs are also included.

6.4.1 Summary

The RV payload was 86.82% of the maximum I.C.D. weight and unbalanced 5.86%. The PREP 2 event took place on Rev. 1200 over POGO and separation occurred on Rev. 1202. 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 14000 feet altitude, 1.74 nautical miles from the predicted impact point.

The recovery forces reported a large tear in the main parachute that extended from the apex to the skirt. This tear had negligible affect on descent rate. This parachute was reported to be more stable than previous systems. No capsule damage was reported other than the fact that the gold tape in the vicinity of the drogue mortar hole was peeled back approximately 2 inches. The flashing light and recovery beacon turned on approximately 7 minutes after aerial recovery. Neither core pin sheared.

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TABLE 6.4-1
RV RECOVERY DATA ~~SECRET/H~~

IDENTIFICATION DATA

SV 6 IRON NO 8261 RECOVERY REV 1202

RV 4 RV S/N 28 RETRO MOTOR S/N Q-43 RECOVERY DATE 25 Sep 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
RV OUT T/S	REV/STA			N/A	N/A			N/A
RV IN T/S	1200P			71510.2	71511			0
DT START	80739.1	80739.0	80739.08	80738.9	80739.4			0
POGO TRAN	81809.7			81809.6	81800			9.6
PITCH START	81839.7			81839.6	81841			0
PITCH STOP				81893.0	81895			2
PYRO ARM BATT				81988.4	81990			1.6
POGO FADE	82108.2			82108.0	82120			12
KODI TRAN	82236.7			82236.6	82348	82348		111.4
ORB PWR OFF				82331.0	82331.2			0
RV SEP (0)	82341.2	82341.2	82341.2	82341.0	82341.2	confirm	NOTE 2	0
SPIN UP (+2.4)				82343.4		confirm	N/A	N/A
RETRO START	82466.6	82466.6	82466.6	82466.4		82467	82467.7	1.3
DESPIN (+160.4)				82501.4		82505	82502.7	1.3
PROP JETT (+175.4)				82516.4		82521	82518.4	2.0
KODI FD (RV)	82593.3					82607	82622.0	15.0
RV ENTRY (400K	82632.9	82633.1	82633.07		RECOV TM			
Δ 1-2 ACQ					82727	N/A		
ION ENTR	82731.1	82731.1	82731.14		82730	N/A		-1.1
ION EXIT	82920.1	82920.1	82920.12		82918	82922		2.0
DROGUE DEPLOY	82964.7	82964.7	82964.71	TONE STOP	82976	82975	N/A	11.0
IMPACT (50K)	82984.1	82984.0	82984.08					
MAIN CHUTE DPL	82987.2	82987.2	82987.21		N/A	N/A	N/A	N/A
H/SHLD JETT	82991.2	82991.2	82991.21	TONE START	82992	82992	N/A	0
STEADY STATE	83002.2	83002.2	83002.21					
ETPD(RAINDROP)	83038.7	83038.5	83039.1					
RV @ 13.5K	82975.8	83975.6	83976.2	IN TRAIL	84000	84000	84039	63
WATER IMPACT	84546.3	84546.1	84546.7		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	83454.1	83454.0	83454.08		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 RECOVERY DATA SECRET/H

RECOVERY DATA

	BASIC STUDY	UPDATED TEAPOT	TEAPOT EVALUATION	QUICK LOOK RPT	EPPD (TWX)	AERIAL RECOVERY
LATITUDE	25.50	25.533	25.521	25.5	25.467	25.50
LONGITUDE	163.59	163.59	163.59	163.57	163.58	163.57

RECOV. A/C DEPLOYMENT FORMATION No. 10, RECOVERING A/C No. 1

RECOV ALT 14,000 ft, PASS No. 1, TIME 23:20 Z

AIRSPEED 164 KTAS, 130 KIAS; TIME IN TOW 19 min.

RAINDROP ETPD 83038 sec 46000 ft; RATE/DESCENT, 15K 28.2 FPS, 10K 26.0 FPS

CONTACT LOCATION Number 6 Hook engaged load lines in cone

PRESET TENSION LEVEL 3,500 lb, PAYOUT Normal

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

OVERSHOOT 1.26 nm, CROSS TRACK 1.2 nm EAST

RC CONDITION Normal

CHUTE/CONE CONDITION Main chute canopy had a vertical tear from apex to skirt.

CHUTE/CONE BEHAVIOR Stable

WIND DATA

ALT (K)	DIRECTION PRED	DIRECTION ACT	VELOCITY PRED	VELOCITY ACT	ALT (K)	DIRECTION PRED	DIRECTION ACT	VELOCITY PRED	VELOCITY ACT
SCF	100	100	15	15	25	190	220	15	15
2	120	120	15	15	30	180	220	15	20
4	130	130	15	10	35	200	230	15	25
6	150	140	15	05	40	230	250	20	15
8	160	150	10	05	45	210	250	15	10
10	180	160	10	05	50	200	230	15	10
15	180	180	15	05	55	---	---	--	--
20	200	200	15	10	60	---	---	--	--

RV BATTERY TIME HISTORY

TIME	ACT 81991	81992	81993	81994	81995	81996	81997	81998	81999	82003	82006	82009
MAIN	12.3	23.7	25.3								26.0	
PYRO #1		17.4	23.8	23.2	24.1		24.9	25.6		26.2		27.0
PYRO #2		6.4	23.2	23.9	23.1	23.7	24.2		24.8	25.8		26.6
TIME	82011	82014	82017	82045	82083	82107		Orbit power off				
MAIN			26.6	26.9		26.9		25.9				
PYRO #1	27.7			28.3		28.8		28.3				
PYRO #2	27.4	28.0		28.0	28.6	28.0		29.1				

SV RATES BEFOPE & AFTER SEP (SV TLM)

	TIME	PITCH RATE PGR °/sec	ROLL RATE RGR °/sec	YAW RATE YGR °/sec
	82341.0	0.00	0.00	0.00
SEP	82342.0	-.069	0.00	0.00
	82343.0	+1.36	+0.020	-.070

MISC DATA

Payload Temp before SEP,	Rn06 65	°F
Payload Temp, Max REENTRY,	TB02 66	°F
Chute Press before PREP 2,	P711 .90	PSI
Supply Press before PREP 2,	P113 .78	PSI
BETA ANGLE of Recovery Rev.	-0.9	°

PITCH ANGLE

BASIC STUDY
Θ_{rvs} 125.67 °
$\Delta\Theta 1$ +1.92 °

Ω_y 1.18 °/sec
$\Delta\Theta 2$ 0.02 °
Θ_{sv} -37.57 °

PITCH (CMD MSG) 37.5 °
Θ_{sv} (PDWN-SV TLM) 41.7 °
Θ_{rvs} UPDATED TEAPOT -125.77 °

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TABLE 6.4-3

RV RECOVERY DATA ~~SECRET/H~~

RV MASS PROPERTIES

	BASIC STUDY	UPDATED TEAPOT	TEAPOT EVALUATION	ACTUAL POST FLT
TU-A	206.43 lb	206.43 lb	206.43 lb	206.4 lb
TU-B	192.96 lb	192.96 lb	192.96 lb	193.6 lb
TOTAL	399.39 lb	399.39 lb	399.39 lb	400.0 lb
SEP WGT	1481.63 lb	1481.63 lb	1481.63 lb	UPDATED TEAPOT
RETRO WGT	1479.94 lb	1479.94 lb	1479.94 lb	% UNBAL 5.86
ENTRY WGT	1289.13 lb	1289.13 lb	1289.13 lb	% FULL 86.82
AIR RECOV WGT	1078.81 lb	1078.81 lb	1078.81 lb	(100% = 460 lb)

SV MASS PROPERTIES - AFTER SEP (FROM BASIC STUDY)

SV WEIGHT	12512.0 lb	PITCH INERTIA (Iy)	84549.78 SLUG-FT^2
CG FROM STA 2060 ($\bar{X}r$)	154.01 in	ROLL INERTIA (Ix)	5012.66 SLUG-FT^2
CG FROM LONG AXIS (Y)	.2384 in	YAW INERTIA (Iz)	86089.14 SLUG-FT^2

'DORBEL EPHEMERIS

REV OF SEP 1202	BASIC STUDY	UPDATED TEAPOT	TEAPOT EVALUATION
PREDICTED FROM REV	1192	1200	N/A
APOGEE	152.367 nm	152.227 nm	152.202 nm
PERIGEE	89.027 nm	89.027 nm	89.043 nm
ARG OF PERIGEE	124.274 °	124.406 °	124.452 °
INCLINATION	96.156 °	96.156 °	96.157 °
TRUE ANOMALY AT RETRO	0.36 °	0.2i °	0.17 °
HEATSHIELD JETT ALT	49854.6 FT	49842.54 FT	49875.94 FT

ENTRY PARAMETERS FROM TEAPOT EVALUATION RUN

	SEPARATION	RETRO	REENTRY	DROGUE DEPLOY
SYSTEMS TIME (sec)	82341.2	82466.6	82633.07	82964.71
ALTITUDE (FT)	552289.88	540695.56	400,000	64585.44
LATITUDE (°N)	63.466	55.030	44.017	25.565
LONGITUDE (°W)	151.69	155.82	159.45	163.58
INERTIAL AZIMUTH (°)	193.91	190.80		
INERT FLT PATH ANGLE (°)	-0.0859	-0.0056		
INERT VELOCITY (FT/SEC)	25726.57	25734.63	25524.71	
LOCAL AZIMUTH (°)			191.03	189.96
LOCAL FLT PATH ANGLE (°)			-2.1295	-31.2099
LOCAL VELOCITY (FT/SEC)				1421.66
ANGLE OF ATTACK (°)			103.67	
MACH NUMBER				1.47
DYN PRESS (PSF)				183.136

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	80636.753 sec	DECLINATION (MDAC = GEOCENTRIC LAT)	0.0019 °
LONGITUDE	22.9114 °	INERTIAL GEOCENTRIC FLT PATH ANGLE	- 0.4146 °
ALTITUDE	134.1620 nm	INERTIAL GEOCENTRIC AZIMUTH	353.8430 °
		INERTIAL VELOCITY	25382.29 FT/SEC
SV C_D A/M (DRAG VALUE AT ASCENDING NODE OF RECOVERY REV)			.77328 FT^2/SLUG

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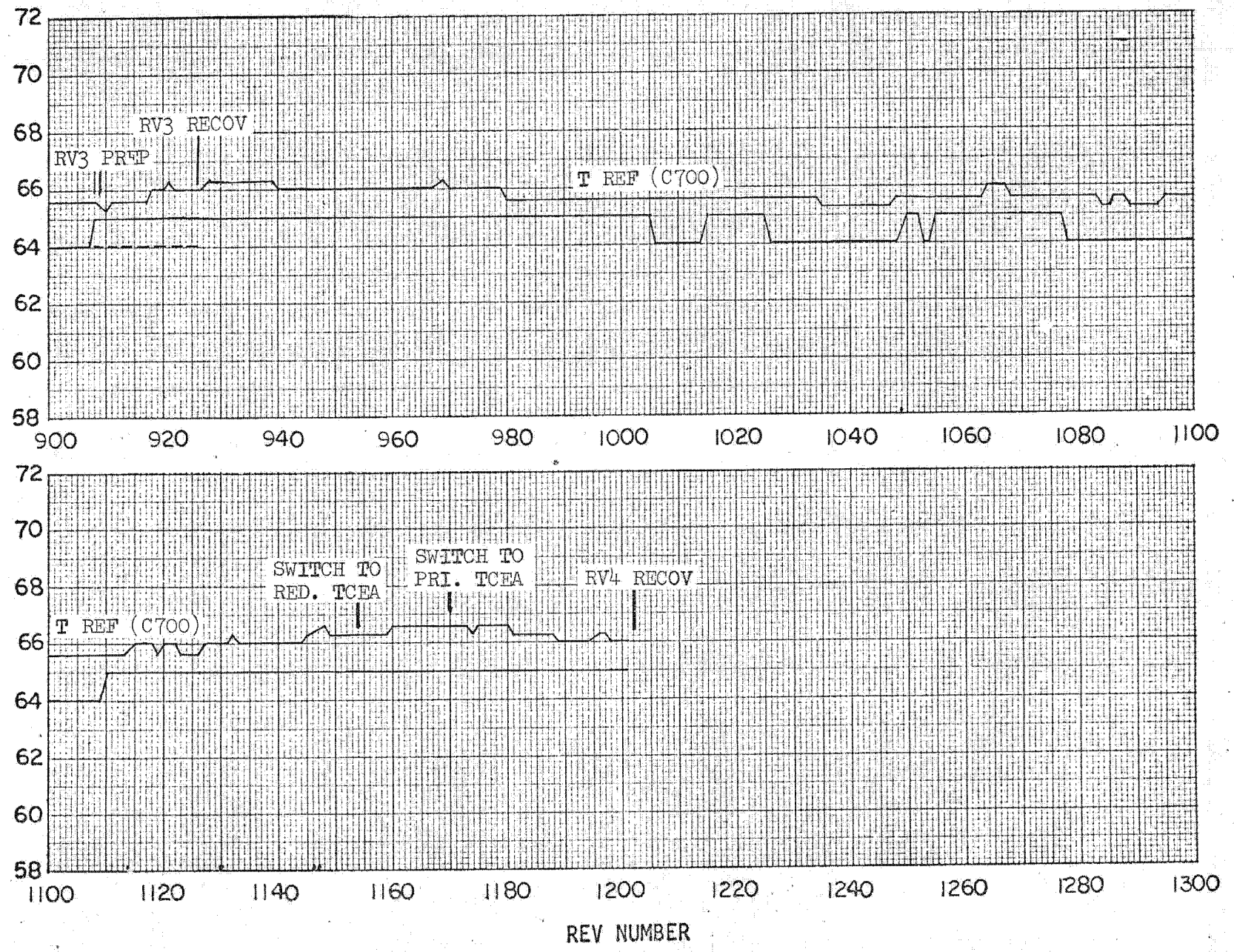
ACTIVE THERMAL CONTROL SYSTEM

RV PAYLOAD CONTAINER & REFERENCE TEMPERATURES



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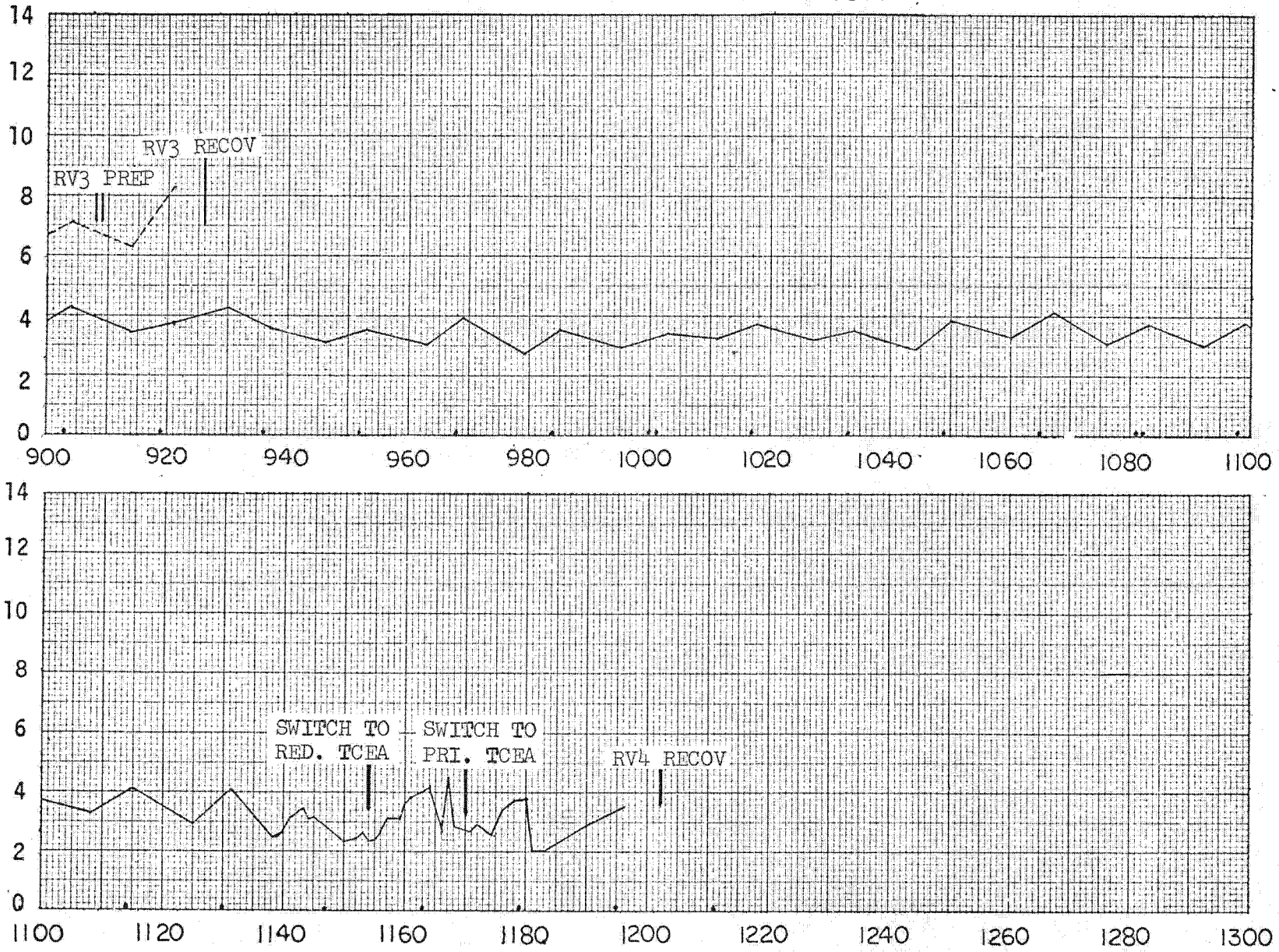
ACTIVE THERMAL CONTROL SYSTEM

RV HEATER POWER CONSUMPTION



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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. 1202. 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. 928.
2. Positive orbit adjust on Rev. 970.
3. Positive orbit adjust on Rev. 1019.
4. Positive orbit adjust on Rev. 1068.
5. Positive orbit adjust on Rev. 1116.
6. Positive orbit adjust on Rev. 1167.

The step increase in B factor shown on the Rev. 1122 vector up-date resulted from a Mag Storm the previous day (20 September 1973). The B factor remained significantly higher for the remainder of the RV-4 segment.

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.

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SUMMARY

EPOCH REV	ECCENT.	PERIOD DECAY	INTEG. PERIOD	MAX ALTIT.	MIN. ALTIT.	ARG. PERIGEE	DRAG	STABLE/ TUMBLE	COMMENTS
927	.0084	.4039	88:37.8	147.74	85.36	130.9	.6680	104/30	
929	.0091	.2872	88:54.2	155.45	88.60	144.1	.6736	153/44	OA #29 Rev 928
932	.0089	.2414	88:53.7	154.70	89.12	142.9	.5824	181/52	
934	.0088	.2609	88:53.0	154.38	89.03	142.5	.6231	168/49	
937	.0088	.2908	88:52.1	154.03	88.70	142.1	.6754	150/43	
940	.0088	.3083	88:51.2	153.45	88.69	141.2	.7104	142/41	
943	.0087	.3455	88:50.0	152.92	88.46	140.2	.7778	126/36	
945	.0086	.3657	88:49.2	152.50	88.34	139.6	.8114	119/34	
948	.0085	.3568	88:48.3	151.84	88.40	138.7	.7890	121/35	
953	.0085	.3431	88:46.6	150.98	88.11	137.6	.7345	126/36	
956	.0084	.3549	88:45.6	150.25	88.14	136.8	.7548	121/35	
960	.0083	.3801	88:44.1	149.47	87.83	135.6	.7824	113/33	
962	.0082	.3760	88:43.3	148.97	87.79	135.2	.7669	114/33	
965	.0081	.3643	88:42.3	148.38	87.77	134.1	.7352	118/34	
969	.0080	.3622	88:40.8	147.56	87.53	133.3	.7111	117/33	
973	.0090	.3053	88:52.9	155.18	88.57	141.0	.7057	145/42	OA #30 Rev 970
976	.0090	.3224	88:51.9	154.70	88.28	140.4	.7266	138/40	
978	.0089	.3114	88:51.2	154.36	88.21	139.9	.6946	143/42	
981	.0089	.2903	88:50.5	153.86	88.31	138.8	.6476	153/44	
986	.0088	.2955	88:49.0	153.14	88.02	137.9	.6396	149/43	
989	.0087	.3009	88:48.2	152.48	88.12	137.1	.6506	146/42	

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
991	.0087	.3103	88:47.4	152.18	87.96	136.4	.6604	142/41	
994	.0086	.3112	88:46.5	151.71	87.71	135.7	.6505	142/41	
997	.0085	.3035	88:45.7	151.15	87.91	134.7	.6337	145/42	
1002	.0084	.3147	88:44.1	150.30	87.67	133.7	.6385	139/40	
1005	.0083	.3268	88:43.2	149.60	87.73	132.8	.6602	133/38	
1008	.0083	.3455	88:42.1	149.10	87.50	132.0	.6761	127/37	
1010	.0083	.3416	88:41.4	148.73	87.39	131.5	.6646	128/37	
1013	.0081	.3293	88:40.6	148.15	87.46	130.6	.6382	132/38	
1018	.0080	.3372	88:38.8	147.16	87.25	129.5	.6345	128/37	
1021	.0092	.2813	88:53.5	156.56	88.37	138.5	.6410	163/47	OA #31 Rev 1019
1024	.0092	.2960	88:52.5	156.04	88.23	137.9	.6639	154/45	
1026	.0092	.2913	88:51.9	155.81	88.11	137.3	.6447	157/45	
1029	.0091	.2760	88:51.3	155.30	88.26	136.4	.6137	165/47	
1034	.0090	.2760	88:49.8	154.56	88.09	135.3	.5996	165/47	
1038	.0089	.3019	88:48.7	153.73	88.08	134.4	.6492	150/43	
1041	.0088	.3133	88:47.6	153.29	87.86	133.6	.6587	145/42	
1043	.0088	.3182	88:46.9	152.89	87.80	133.1	.6623	142/41	
1046	.0087	.3275	88:46.0	152.25	87.88	131.9	.6796	138/40	
1050	.0086	.3430	88:44.6	151.44	87.68	131.2	.6938	131/38	
1054	.0085	.3476	88:43.3	150.53	87.68	130.1	.6952	129/37	
1057	.0084	.3490	88:42.2	150.04	87.45	129.4	.6812	128/37	
1059	.0084	.3417	88:41.5	149.62	87.39	128.9	.6598	130/38	

Table 6.5-1

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TRACKI[illegible] REDUCTION

SUMMARY

EPOCH REV	ECCENT.	PERIOD DECAY	INTEG. PERIOD	MAX ALTIT.	MIN. ALTIT.	ARG. PERIGEE	DRAG	STABLE/ TUMBLE	COMMENTS
1062	.0083	.3394	88:40.6	149.01	87.43	127.9	.6571	130/38	
1067	.0082	.3503	88:38.8	148.00	87.16	126.9	.6500	126/37	
1070	.0094	.2852	88:54.2	157.91	88.38	136.1	.6502	165/48	OA #32 Rev 1068
1073	.0093	.3179	88:53.1	157.34	88.35	135.1	.7205	147/42	
1075	.0093	.3136	88:52.5	157.05	88.14	134.9	.6948	149/43	
1078	.0092	.2988	88:51.8	156.49	88.30	133.9	.6646	156/45	
1083	.0091	.2941	88:50.3	155.72	88.10	132.9	.6375	158/45	
1086	.0090	.3012	88:49.5	155.11	88.15	132.0	.6502	154/44	
1089	.0090	.3095	88:48.4	154.67	88.95	131.20	.6539	150/43	
1091	.0089	.3141	88:47.8	154.35	87.85	130.6	.6554	148/43	
1094	.0088	.3038	88:47.0	153.79	87.95	129.7	.6337	152/43	
1099	.0088	.2984	88:45.5	152.96	87.78	128.7	.6071	155/44	
1102	.0087	.3189	88:44.6	152.28	87.84	127.9	.6454	144/41	
1106	.0086	.3343	88:43.2	151.62	87.56	126.9	.6562	137/40	
1108	.0086	.3355	88:42.5	151.16	87.54	126.4	.6537	136/40	
1111	.0085	.3349	88:41.6	150.55	87.59	125.3	.6478	136/40	
1117	.0095	.2910	88:52.5	158.10	88.03	131.4	.6344	165/47	OA #33 Rev 1116
1118	.0094	.2896	88:52.2	157.76	88.17	131.1	.6353	165/47	
1122	.0093	.3551	88:50.6	156.90	87.92	130.4	.7574	134/39	Note Drag Increase
1124	.0093	.3444	88:49.9	156.48	87.86	129.9	.7279	138/40	
1127	.0092	.3439	88:49.0	155.82	87.95	128.8	.7240	138/40	

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
1131	.0091	.3497	88:47.5	154.94	87.80	128.0	.7201	135/39	
1135	.0090	.3568	88:46.2	154.03	87.78	127.1	.7252	131/38	
1138	.0089	.3841	88:45.0	153.42	87.54	126.3	.7532	123/36	
1143	.0087	.3678	88:43.3	152.27	87.52	124.8	.7159	126/37	
1148	.0086	.3746	88:41.4	151.14	87.30	123.8	.7062	123/36	
1151	.0085	.3810	88:40.3	150.31	87.35	122.9	.7127	120/35	
1154	.0084	.4037	88:38.9	149.65	87.10	122.2	.7319	113/33	
1156	.0084	.4239	88:38.1	149.12	86.97	121.6	.7577	107/31	
1159	.0083	.4228	88:37.0	148.30	87.01	120.7	.7486	106/31	
1164	.0081	.4507	88:34.6	146.82	86.76	119.6	.7679	99/29	
1168	.0100	.3604	88:57.3	161.90	88.07	133.1	.8148	137/40	OA #34 Rev 1167
1170	.0100	.4024	88:56.4	161.41	87.87	132.7	.8921	122/35	
1172	.0099	.3836	88:55.6	161.03	87.75	132.1	.8380	128/37	
1175	.0098	.3776	88:54.7	160.31	87.84	131.2	.8152	131/38	
1181	.0097	.3666	88:52.5	159.07	87.59	129.8	.7739	133/39	
1184	.0096	.3754	88:51.4	158.21	87.68	129.0	.7895	129/37	
1187	.0095	.3907	88:50.1	157.60	87.43	128.2	.8002	123/35	
1189	.0095	.3770	88:49.4	157.11	87.40	127.7	.7654	127/36	
1192	.0093	.3763	88:48.3	156.40	87.44	126.7	.7588	127/36	
1196	.0092	.3798	88:46.8	155.44	87.27	125.9	.7481	125/36	
1200	.0091	.3877	88:45.3	154.41	87.27	124.9	.7535	122/35	

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Table 6.5-1

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PREDICTION IMPACT SUMMARY

(BFE - Tracking Reduction Predictions)

Tracking Reduction Epoch Rev	BFE ID NO.	5 Revs After Epoch	10 Revs After Epoch
927	58	.279	1.195
929	58	.597	1.384
932	58/59	-.794	-3.102
934	59	-.707	-2.803
937	59	-.521	-2.212
940	59	-.695	-2.143
943	59	-.312	-.039
945	59	.405	1.975
948	59/60	--	1.555
953	60	-.423	-.939
956	60	-.326	-.486
960	60	.257	1.543
962	60	.372	1.692
965	60/61	.362	1.686
969	61	.627	1.788
973	61	-.236	.173
976	61	.498	1.986
978	61	.498	1.672
981	61/62	.049	-.012
986	62	-.137	-.259
989	62	-.151	.050
992	62	.157	.776
994	62	.267	.725
997	62/63	.040	-.420
1002	63	-.379	-.825
1005	63	-.150	.099
1008	63	.277	1.274
1010	63	.386	1.284
1013	63/64	.124	.486
1018	64	.243	.735
1021	64	.042	.568
1024	64	.470	1.657
1026	64	.558	1.491
1029	64	.256	-.001
1034	65	-.576	-1.969
1038	65	-.169	-.732
1041	65	-.149	-.783
1043	65	-.107	-.924
1046	65/66	-.184	-.608
1050	66	-.053	.252
1059	66	.214	.997
1062	66/67	-.039	.397
1067	67	.499	1.279
1070	67	-.269	-.396
1073	67	.361	1.783
1075	67	.509	1.701
1078	67/68	.262	.620
1083	68	-.175	-.425
1086	68	.004	.235
1089	68	.109	.792

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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
1091	68	.345	1.349
1094	68/69	.286	.437
1099	69	-.433	-1.418
1102	69	-.129	-.284
1106	69	.047	.330
1108	69	.091	.395
1111	69/70	.117	-.029
1116	70	-.421	-1.743
1118	70	-.844	-2.625
1122	70	.315	1.091
1124	70	.065	.180
1127	70/71	.028	-.030
1131	71	-.026	-.281
1135	71	-.189	-.285
1138	71	.218	1.120
1140	71	.409	1.415
1143	71/72	.128	.124
1148	72	-.152	-.861
1151	72	-.198	-.980
1154	72	-.273	-.920
1156	72	.112	.129
1159	72/73	-.119	-1.341
1164	73	-.769	-1.414
1168	73	-.216	-0.345
1170	73	.697	2.376
1172	73	.384	1.557
1175	73	.426	1.068
1181	74	-.433	-.575
1184	74	-.069	.498
1187	74	.343	1.418
1189	74	.089	.418
1192	74/75	.116	.192
1196	75	-.041	-1.112
1200	75	-.172	-.708

Table 6.5-2

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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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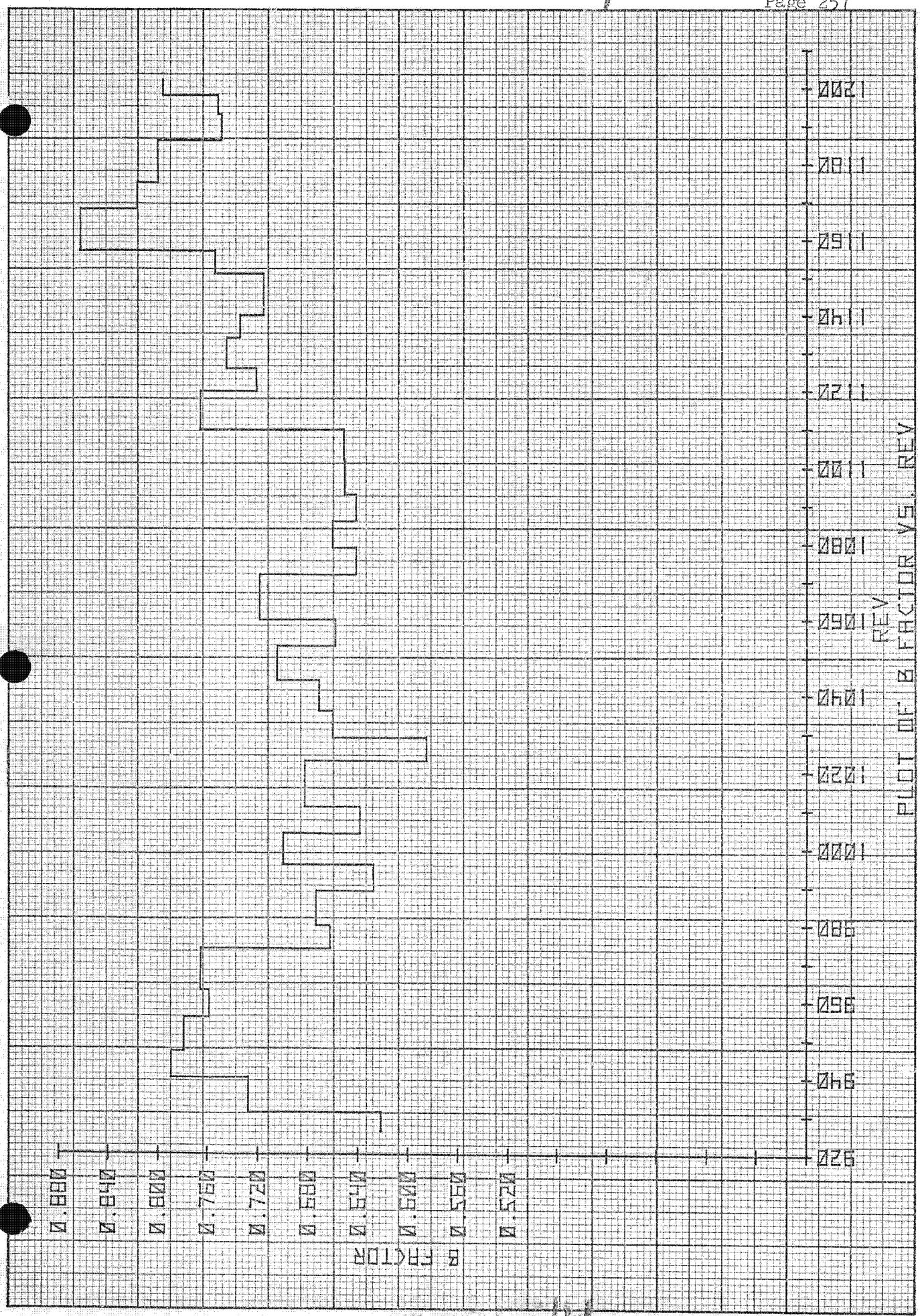

K+E 20 X 20 TO THE INCH 46 1242
7 X 10 INCHES
KEUFFEL & ESSER CO.
MADE IN U.S.A.

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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. 29	Rev. No. 928						
Orbit at Rev	927	88:37.5	87.34	145.77	130.630	-	-
Predicted	929	88:54.3	90.06	153.81	144.004	-	27.28
Actual	929	88:54.3	90.05	153.82	144.149	74.6	+27.41
Delta (A-P)		+ .047	- .011	+ .011	+ .145	-	+ .13
OA No. 30	Rev. No. 970						
Orbit at Rev	969	88:40.6	89.51	145.47	133.162	-	-
Predicted	970	88:53.5	90.01	153.94	141.305	-	20.78
Actual	971	88:53.7	90.13	153.95	141.452	57.4	21.05
Delta (A-P)		+ .202	+ .126	+ .007	+ .147	-	+ .27
OA No. 31	Rev. No. 1019						
Orbit at Rev	1018	88:38.7	89.37	145.15	129.291	-	-
Predicted	1019	88:53.8	89.99	155.10	138.701	-	+24.43
Actual	1019	88:53.9	90.02	155.14	138.717	67.4	+24.58
Delta (A-P)		+ .084	+ .033	+ .036	+ .016		
OA No. 32	Rev. No. 1068						
Orbit at Rev	1067	88:38.7	89.32	146.11	126.658	-	-
Predicted	1068	88:54.5	90.03	156.49	136.238	-	+25.62
Actual	1068	88:54.7	90.12	156.52	136.374	71.0	+25.86
Delta (A-P)		+ .184	+ .091	+ .028	+ .136	-	+ .24

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. 33	Rev. No. 1116						
Orbit at Rev	1115	88:40.1	89.41	148.01	124.455	-	-
Predicted	1117	88:52.6	89.88	156.52	131.432	-	+20.16
Actual	1117	88:52.6	89.97	156.42	131.441	56.2	+20.22
Delta (A-P)		+ .001	+ .091	- .097	+ .009	-	+ .06
OA No. 34	Rev. No. 1167						
Orbit at Rev	1166	88:33.7	88.83	144.76	118.712	-	-
Predicted	1167	88:57.4	89.92	160.40	132.742	-	38:93
Actual	1167	88:57.4	89.80	160.40	133.083	106.8	38:93
Delta (A-P)		- .004	- .118	+ .003	+ 0.34	-	+ .30
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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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
59	933	.0089	96.17	88:53.3	154.58	88.95	142.9	.7275	933 - 940
								.7892	940 - 947
								.7004	947 -
60	949	.0085	96.17	88:48.1	151.60	88.43	138.7	.7793	949 - 956
								.7587	956 - 963
								.6922	963 -
61	966	.0081	96.17	88:42.0	147.98	87.86	134.2	.7655	966 - 974
								.6628	974 - 980
								.6281	980 -
62	982	.0088	96.17	88:50.2	153.50	88.44	138.7	.6737	982 - 989
								.6282	989 - 996
								.6400	996 -

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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
63	998	.0085	96.17	88:45.5	150.87	87.99	134.6	.6995	998 - 1004
								.6392	1004 - 1011
								.6275	1011 -
64	1014	.0081	96.17	88:40.2	147.78	87.67	130.0	.6824	1014 - 1023
								.5856	1023 - 1029
								.6160	1029 -
65	1030	.0090	96.16	88:51.0	155.10	88.31	136.1	.6600	1030 - 1036
								.6716	1036 - 1044
								.7043	1044 -
66	1046	.0086	96.16	88:46.0	152.10	87.99	132.0	.7046	1046 - 1053
								.6586	1053 - 1060
								.6588	1060 -

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
67	1063	.0082	96.16	88:40.3	148.57	87.62	127.7	.7189	1063 - 1072
								.6422	1072 - 1079
								.6342	1079 -
68	1079	.0092	96.16	88:51.6	156.27	88.38	133.5	.6605	1079 - 1086
								.6421	1086 - 1093
								.5986	1093 -
69	1095	.0088	96.16	88:46.8	153.55	88.04	129.5	.6511	1095 - 1102
								.6522	1102 - 1110
								.6382	1110 -
70	1112	.0084	96.16	88:4 .3	150.18	87.74	125.2	.7661	1112 - 1120
								.7221	1120 - 1126
								.7224	1126 -

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
71	1128	.0091	96.16	88:48.7	155.48	88.05	128.6	.7453	1128 - 1134
								.7350	1134 - 1140
								.7009	1140 -
72	1144	.0087	96.16	88:42.9	151.92	87.63	124.5	.7160	1144 - 1151
								.7543	1151 - 1157
								.7661	1157 -
73	1160	.0082	96.16	88:36.6	147.96	87.02	120.6	.8631	1160 - 1168
								.8174	1168 - 1175
								.7474	1175
74	1177	.0098	96.16	88:53.9	159.76	87.89	130.8	.8011	1177 - 1186
								.7498	1186 - 1193
								.7508	1193 -

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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
75	1193	.0093	96.16	88:48.0	156.08	87.49	126.6	.7733	1193 - 1202
								1.2916	1202 - 1202
								.8816	1202 - 1208
								1.0060	1208 -

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Table 6.5-4

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6.5.2 Telemetry and Mode Processing

No effort on SV-6 modes was required during the segment.

6.5.3 Command Message Planning and Generation

The major effort was to revise the recovery abort sequences and abort message to provide a configuration that would provide cross-strapping and not hang up during transmission of the recovery abort message.

6.5.4 SCF Support

Excellent SCF support was provided during this segment. There were no STC or RTS problems that affected mission support.

6.5.5 Miscellaneous

A substantial effort on the part of the Field Test Force, primarily SWFTFD and CG, and the T.A. Staff in support of SV-7 development and readiness was expended during this period in parallel with mission support. These activities included:

a. TVEM exercise

b. SV-7 Mode development

c. SV-7 Orbit case study and validation.

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SECTION 6.6
PROGRAM COMMAND SOFTWARE PERFORMANCE
(Prepared by HTC)

6.6 PROGRAM COMMAND SOFTWARE PERFORMANCE

(Prepared by Computer Program Associate Contractor - HTC)

6.6.1 Command Message Summary

This section summarizes pertinent command message data from Mission 1206, IRON 8261. The command messages discussed cover the period from the first RV 4 message (Rev 927 load) to the RV 4 recovery message (Rev 1200 load).

Two-hundred three command messages were received by the Technical Advisor (TA) Staff. One hundred sixty-nine were accepted and thirty-four were rejected. Five of the rejected messages were subsequently altered and loaded into the vehicle. The remaining twenty-nine were not required due to lack of payload operation or no change in payload selection. The reasons for rejection of the five messages requiring alters are summarized below:

Rev No. and Load Station	Reason for Rejection
947 BOSS	Change in MOP inputs resulted in message regeneration.
979 BOSS	Change in MOP inputs resulted in message regeneration.
1135 POGO	PCM was not on for recording of ACS-2 test.
1184 POGO	Sequences 144 and 185 were inadvertently omitted from the command message.
1196 GUAM	Alter required to delete a SGLS command and add a TT/C- command.

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

1. The thirty-four rejected messages were not loaded.
2. One contingency VBE message concerning RV 4 recovery was not required.
3. One alternate recovery message for movement of the PIP to 22.5° N 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 one hundred sixty-six add-on messages.

6.6.2 'TUNITY Software Problems

The Flight 6 'TUNITY software problems itemized below pertain only to the period for RV-3 recovery through RV-4 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 SPR's	Comments
Flight Critical	0	Software corrections were made and incorporated during the flight period.
Non-Flight Critical (Requiring Work-Around)	1	Work-around procedures were developed and implemented.
Non-Flight Critical (Minor)	5	Work-around procedures were not required.
Product Improvement or New Requirement	2	To be considered during future development.
Documentation Error	1	MS-4 or MS-7 affected.

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Itemized Software Problems

SPR MD2-6260 (MPR)

- Problem Description: Post Flight 5 Hard Copy photos from bucket 5 showed the MPR OP corners to be too conservative (In Track). The software model was checked and no error could be found. If SV-6 shows the same, the geometry model should be subject to review.
- Solution of Work-Around: None
- Operational Impact: None.
- Comment: SOST is currently waiting for the results from RV 5, SV 6 to determine if the problem still exists.

SPR MD2-6261 ('TREPLAY)

- Problem Description: Message 802 included a SELUP run and a REJ of the second MOP on Rev 947. The score, as printed by 'TREPLAY in the list od deleted and modified operations, was 124 less than in the original run (Msg. 800). The difference was that the first DE row of the operation was excluded from consideration in the REJ run.
- Solution or Work-Around: None.
- Operational Impact: None.
- Comment: It is a software problem; the solution is known and should be fixed at the first opportunity not involving a flight.

SPR MD2-6262 (COMPOOL)

- Problem Description: As presently defined, the 'CGUTAB contains room for 75 entries. For SV-7 more entries will be needed because of hardware changes.
- Solution or Work-Around: None.
- Operational Impact: None.
- Comment: It is a COMPOOL restriction and it will be increased prior to the support of SV-7.

SPR MD2-6263 ('TPITCH)

- Problem Description: When a MOP is taken over an inhibit band or above LATBAR, 'TPITCH does not calculate the score times predicted weather for the MOP and hence the wrong score is printed out in 'TBALL.

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- Solution or Work-Around: The user must calculate the score manually by taking the raw score times the predicted weather.

- Operational Impact: None.

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

SPR MD2-6268 ('TSTAGEN)

- Problem Description: The following data cards were used in a 'TLOAD run:

```
SP 1017 1024
STA CAP 0
TERM
```

Those stations occurring on rev 1024 did not have their capability set to zero.

- Solution or Work-Around: The data base was not configured properly to accept cards past Rev 1023. A DBCR was input to the system to correct this problem.

- Operational Impact: None.

- Comment: With the implementation of DBCR MOD2-388, this problem no longer exists.

SPR MD2-6270 ('TSTAGEN)

- Problem Description: Reference SPR MD2-6253. When a station pass has 2 cones (R-S cones) (T-F cones) and the first cone overlaps (CTE conflict) with a previous station, 'TSTAGEN will generate two sequences instead of one to satisfy special requests via the STA data card.

- Solution or Work-Around: None.

- Operational Impact: None.

- Comment: This SPR is not a problem. When the checkout run was made for SPR MD2-6253, the correct AUX master was not loaded and therefore the problem still existed.

SPR MD2-6272 ('TAPOUT)

- Problem Description: 'TAPOUT does not correctly process a pseudo readout when a TR2 command is encountered between two repeated sequences.

- Solution or Work-Around: The user must use the chrono listing and figure the pseudo read-outs manually.

- Operational Impact: None.

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

APR MD2-6274 ('TBALL)

- Problem Description: The slit width update scheme only keys one sequence number for both cameras. This design causes both cameras slit width to be commanded each time an update is required on one of the cameras.

- 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 MD2-6275 ('TBALL)

- Problem Description: The exposure curve, data base items 'COPTER and/or 'COPTEB, had to be changed each time the film type in use changed for a camera. In order to eliminate the requirement for a data base table change each time a different type of film segment is encountered, an additional exposure curve table should be provided for each camera. Control for these tables should be via data card.

- 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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6.6.3 Hardware/Software Interface Changes

For IRON 8261, sixteen change requests were processed from the RV 3 recovery message through the RV 4 recovery message (as shown in Table 6.6.3-1).

These changes were implemented via requests SV 6-190 through SV 6-205 and have been incorporated in the nominal data base and hardware/software interface documentation.

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Table 6.6.3-1. Summary of Hardware/Software Interface Changes

Request No.	Description	Effectivity
SV6-190	Modification of sequence 32 to cause FDU plus command to occur later in time.	SV-6 only
SV6-192	New sequence 432 for SSC Mis-Stow solo test.	SV-6 only.
SV6-191	Modification to macro 32 required by change to sequence 32.	SV-6 only
SV6-193	New sequence 431 for SSC OB Phase Lock solo test.	SV-6 only
SV6-194	Modification to sequence 131 to conserve pneumatics during MONO B operations.	SV-6 only
SV6-195	Modification of O^2A^2 sequence 144 to configure for color film.	SV-6 only
SV6-196	Modification to sequence 85 which moves XDR+ diagnostic ON's before the decoder on command for a shortened pass.	SV-6/nominal
SV6-197	Modification of sequences 268 and 269 to add a dummy command to simplify loading of the recovery abort message.	SV-6 only
SV6-198	Modification of sequence 144 to configure for Black and white film.	SV-6 only
SV6-199	New station contact sequence 499 required for solo experiment ACS-2. This sequence has TR #1 recording over the station.	SV-6 only
SV6-200	New station contact sequence 500. This sequence is identical to seq 499 referenced above except TR #2 is used instead of TR #1.	SV-6 only
SV6-201	Modification to sequence 87 which moves XDR+ diagnostic ON's before the decoder ON and tape recorder ON commands.	SV-6/nominal
SV6-202	Modification to sequence 110 which moves XDR+ diagnostic ON's before the decoder ON command.	SV-6/nominal

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Request No.	Description	Effectivity
SV6-203	Modification to sequence 119 which moves the tape recorder command before decoder ON command.	SV-6/nominal
SV6-204	Modification to sequence 144 which configures the O^2A^2 for color operations.	SV-6 only
SV6-205	Modification to sequence 144 which configures the O^2A^2 for Infra-Red operations on the forward camera.	SV-6 only

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

6.7.1 EDAP Performance

EDAP operations through segment 4 were normal.

Battery temperatures and heater cycling were nominal for this segment with the exception of one brief period between Revs 1089 and 1093. On Rev 1089, Battery #3 primary heater did not turn-on after cooling to 46 or 45 degrees as expected. As indicated on Figure 6.7-1, the battery temperature dropped to 41 degrees before turn-on. This is the same relay that showed abnormally high cycling rates, shortly after lift-off, for a short period. Battery temperature cycling resumed normal operation following Rev 1093.

The main power system was healthy and supported an average bus load of approximately 20 ampere-hours per rev.

6.7.2 TT&C Performance

SGLS 1, PCM 1A and Tape Recorder 1 performed satisfactorily during segment 4. SGLS 2 was checked on a daily basis, on subcycle 16 throughout segment 4, and operated satisfactorily.

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

The Redundant Attitude Control System (RACS) and the Primary Reaction Control System (RCS-1) were used for vehicle control throughout segment 4 and performed within specifications. The Primary Attitude Control System (PACS) remained on during this period. The PACS yaw bias continued with rates from -1.10 to -1.6 degrees per second. Gyro temperatures remained at nominal range of 155°F to 172°F.

The Primary Reaction Control System performance was nominal during segment 4. Reaction Engine Assembly (REA) 8 continues to exhibit higher than normal temperatures, attributed to a leak that started on Rev 48. REA 8 thrust level has been lower than the remaining thrusters with normal degradation. REA 4 thrust level had degraded at a faster than nominal rate. Mini-yaw maneuvers were performed on Revs 941, 973, 1022, 1071, 1119 and 1168 to evaluate the REA thrust levels. The REA #4 and #8 thrusters have provided adequate thrust to satisfy mission requirements. REA thrusters 4 and 8 actual thrust degradation during segment 4 are shown in Figure 6.7-2. Normalized thrust from early revs through segment 4 are shown for all thrusters in Figures 6.7-3 through Figure 6.7-6.

6.7.4 Orbit Adjust System (OAS) Performance

The OAS functioned normally for the 6 positive burns accomplished during this segment. There were no negative adjusts. The orbit adjusts are summarized in Table 6.7.1. At the end of segment 4, there was 948 lbs of propellant remaining in the OAS. The OAS "Bed Resistance" degraded during Segment 4 as shown on Figure 6.7-7. SV-6 OAS Bed Resistance is compared with SV-5.

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MAIN BATTERY TEMPERATURES SV-6

BATTERY FOUR

BATTERY THREE

BATTERY TWO

BATTERY ONE

80 70 60 50 40

980 990 1000 1010 1020 1030 1040 1050 1060 1070 1080 1090 1100 1110 1120

SQUARE 10 X 10 TO THE HALF INCH AS-0813-OT

GRAPH PAPER GRAPHIC CONTROLS CORPORATION Buffalo, New York Printed in U.S.A.

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SV-6

ACTUAL THRUSTER PERFORMANCE

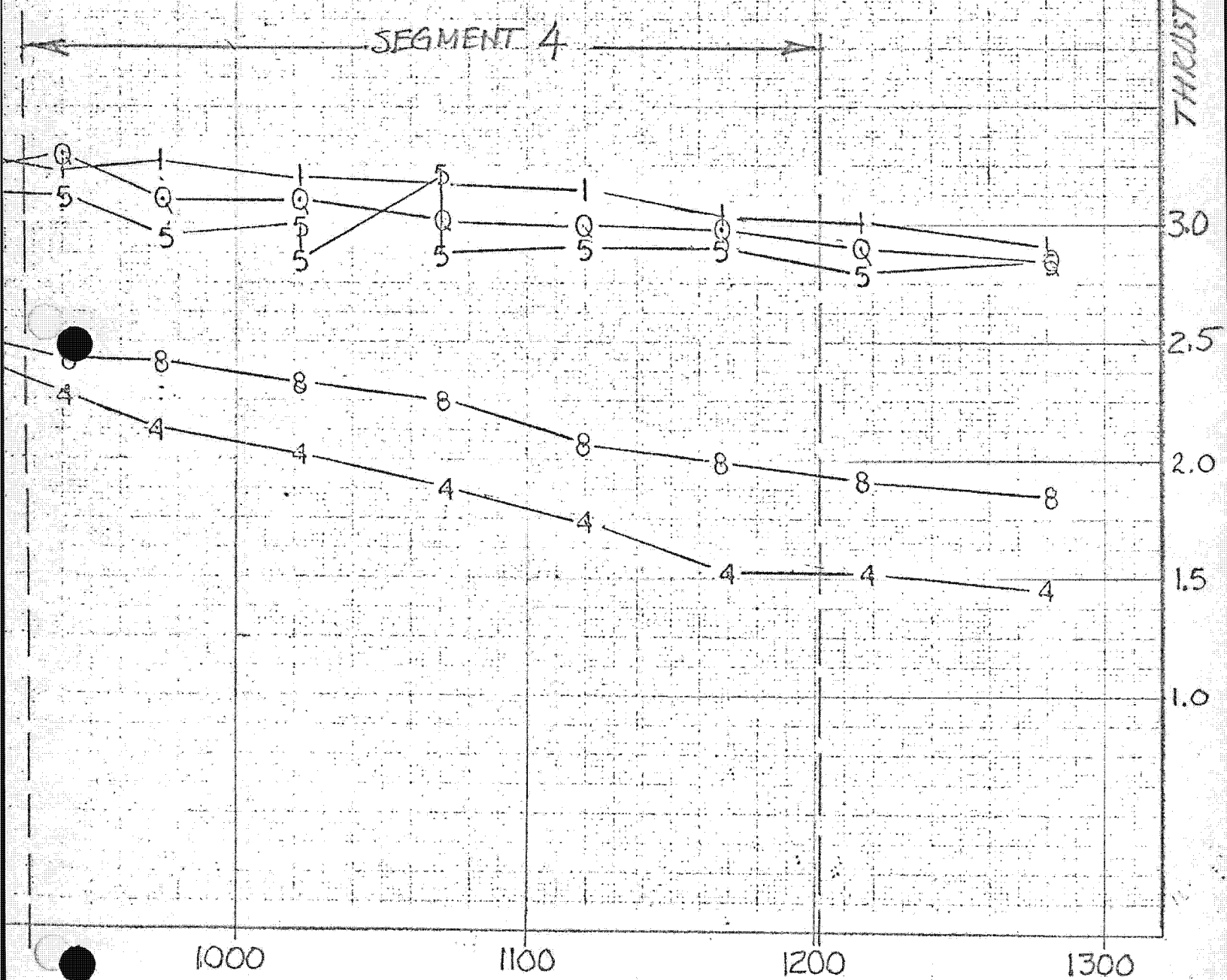

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FIGURE 6.7-2

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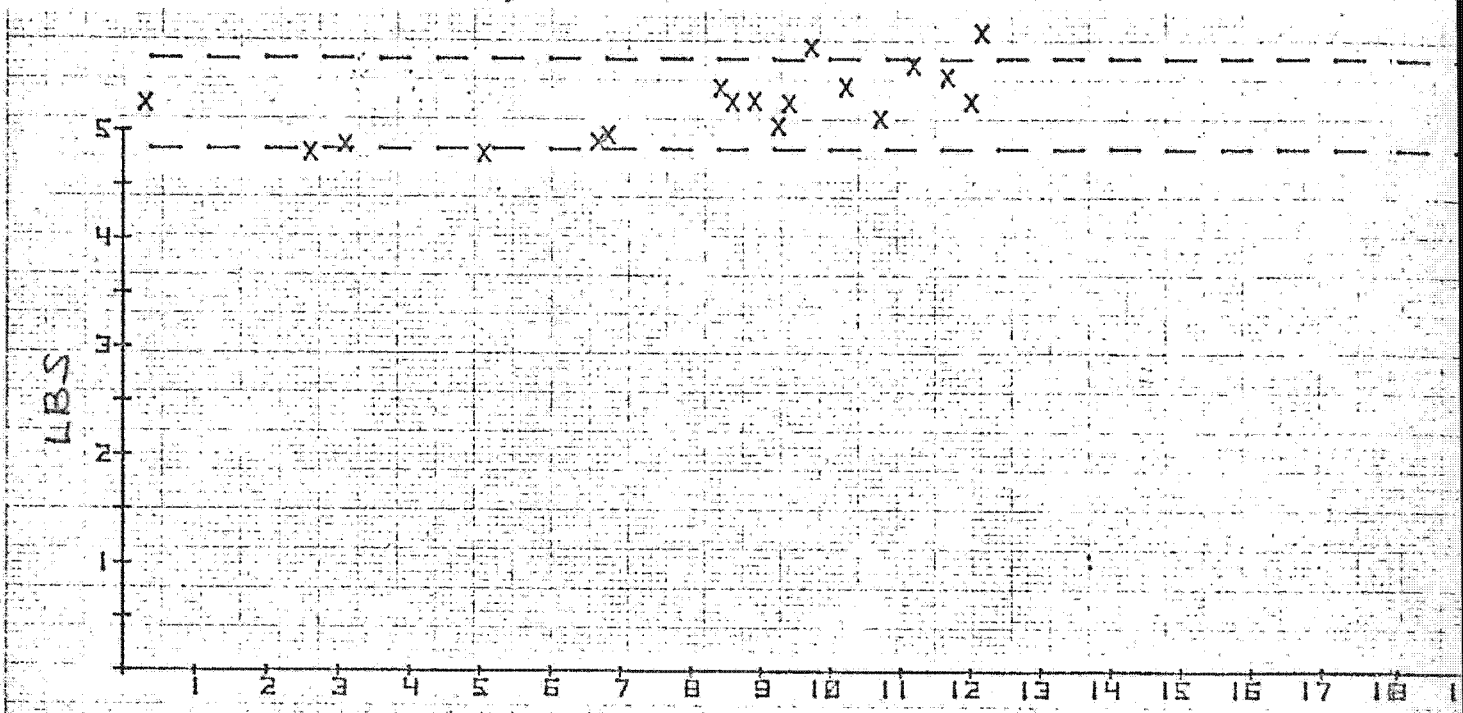
REA 2

NORMALIZED THRUST LBF.



REA 6

NORMALIZED THRUST LBF.

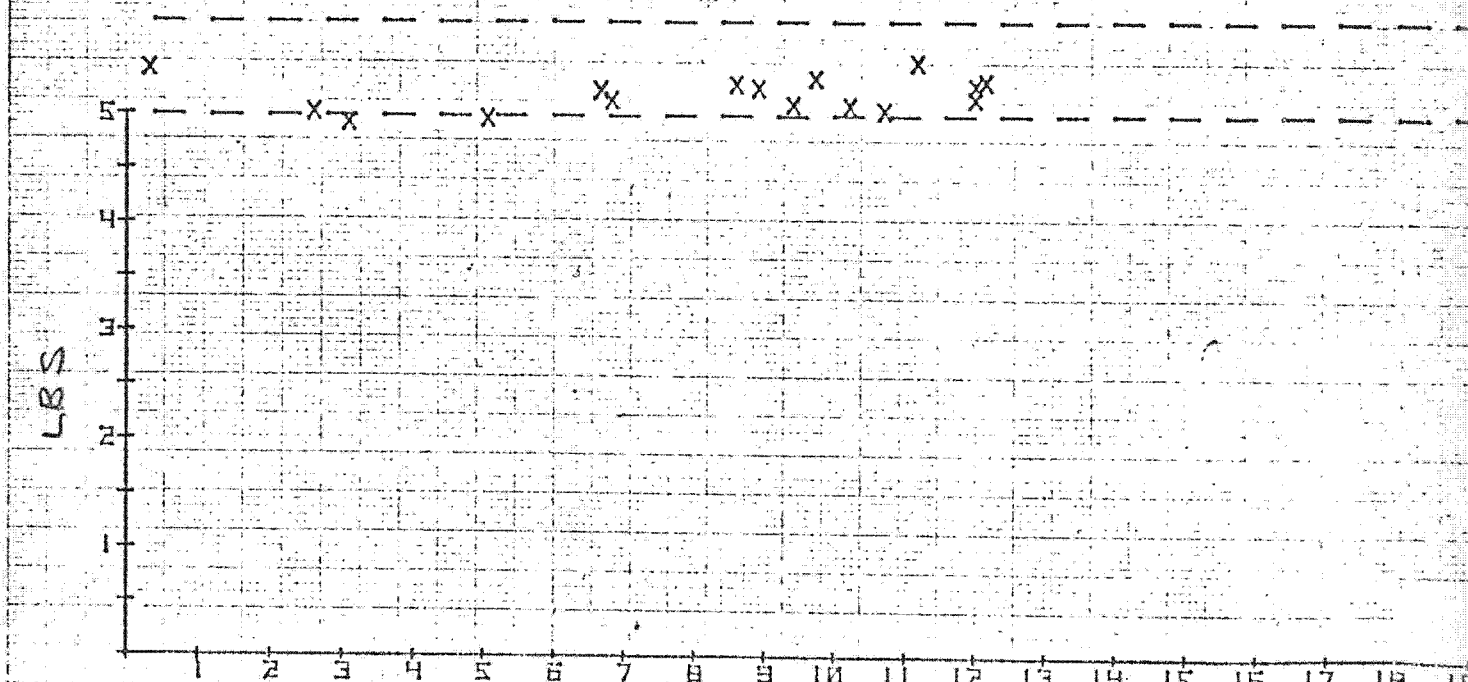


FIGURE 6.7-3

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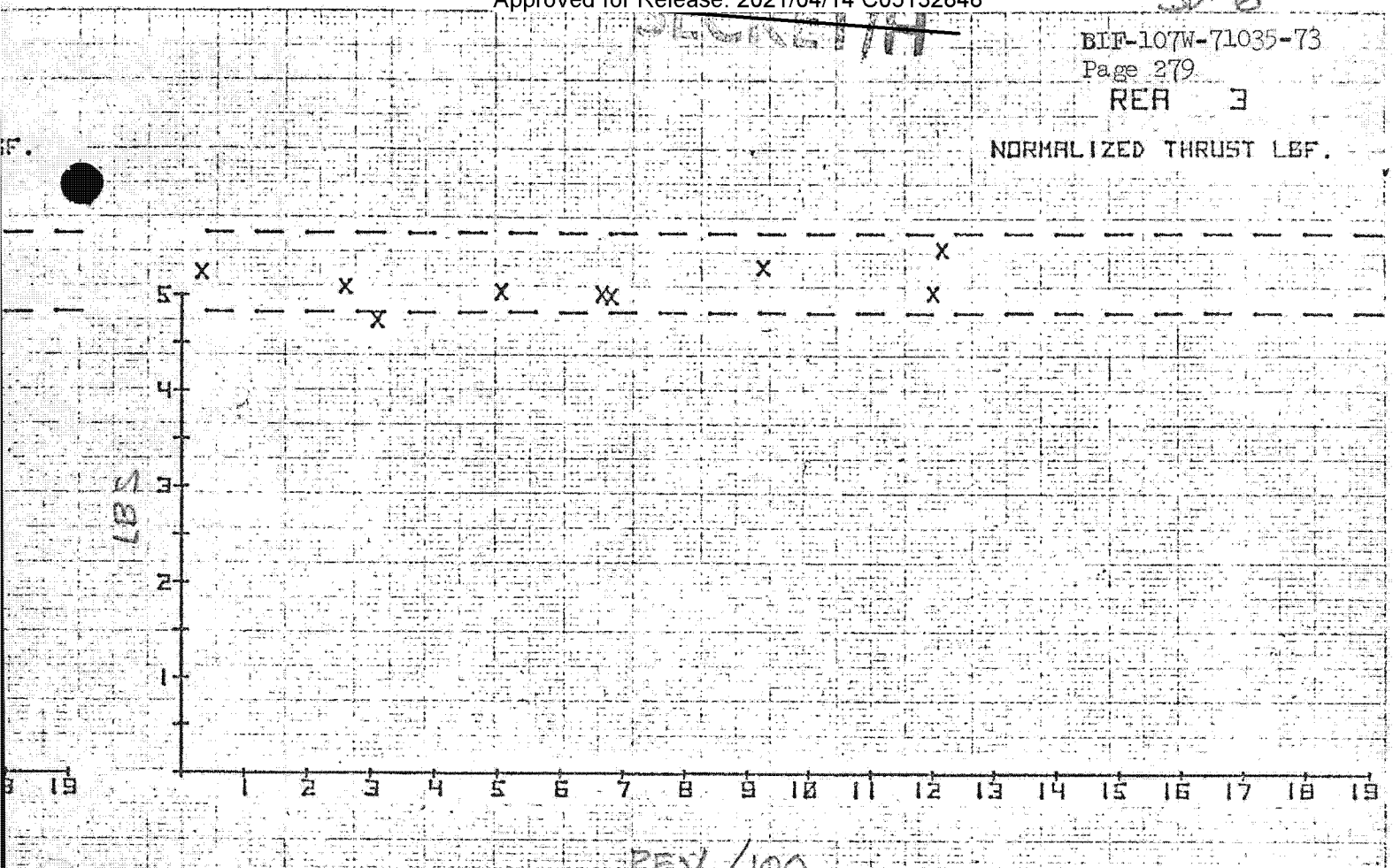

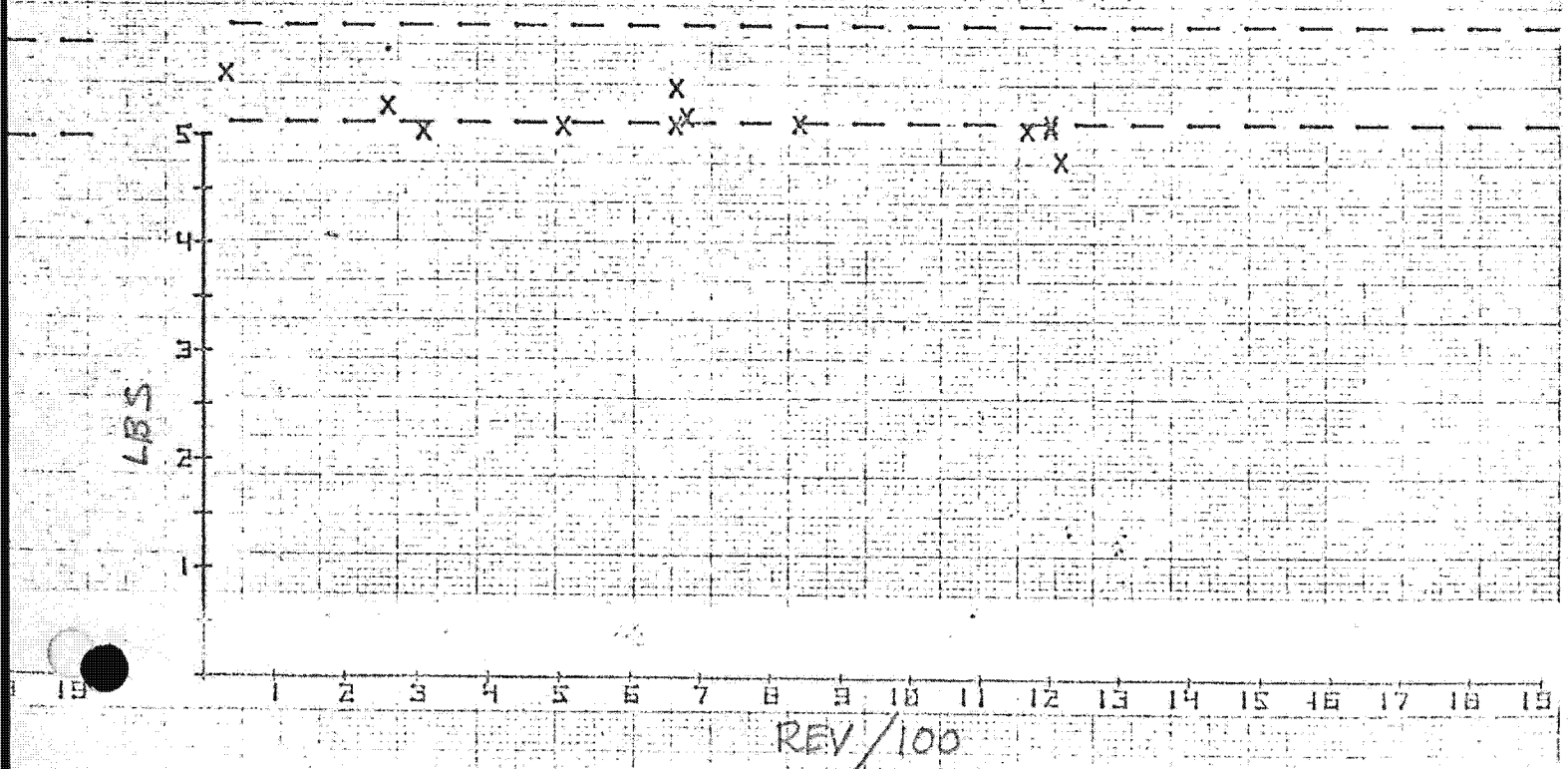

FIGURE 6.7-4

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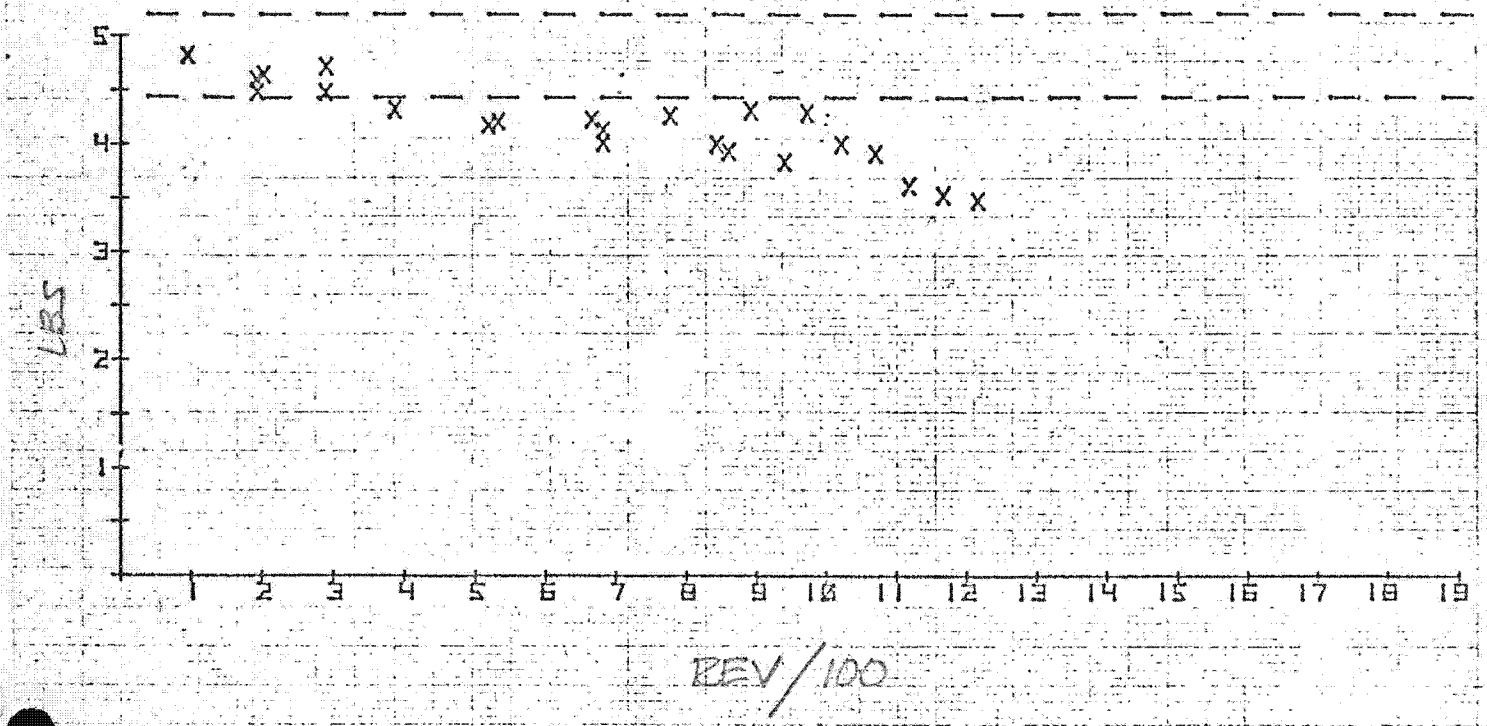
REA 8

NORMALIZED THRUST LBF.



REA 5

NORMALIZED THRUST LBF.

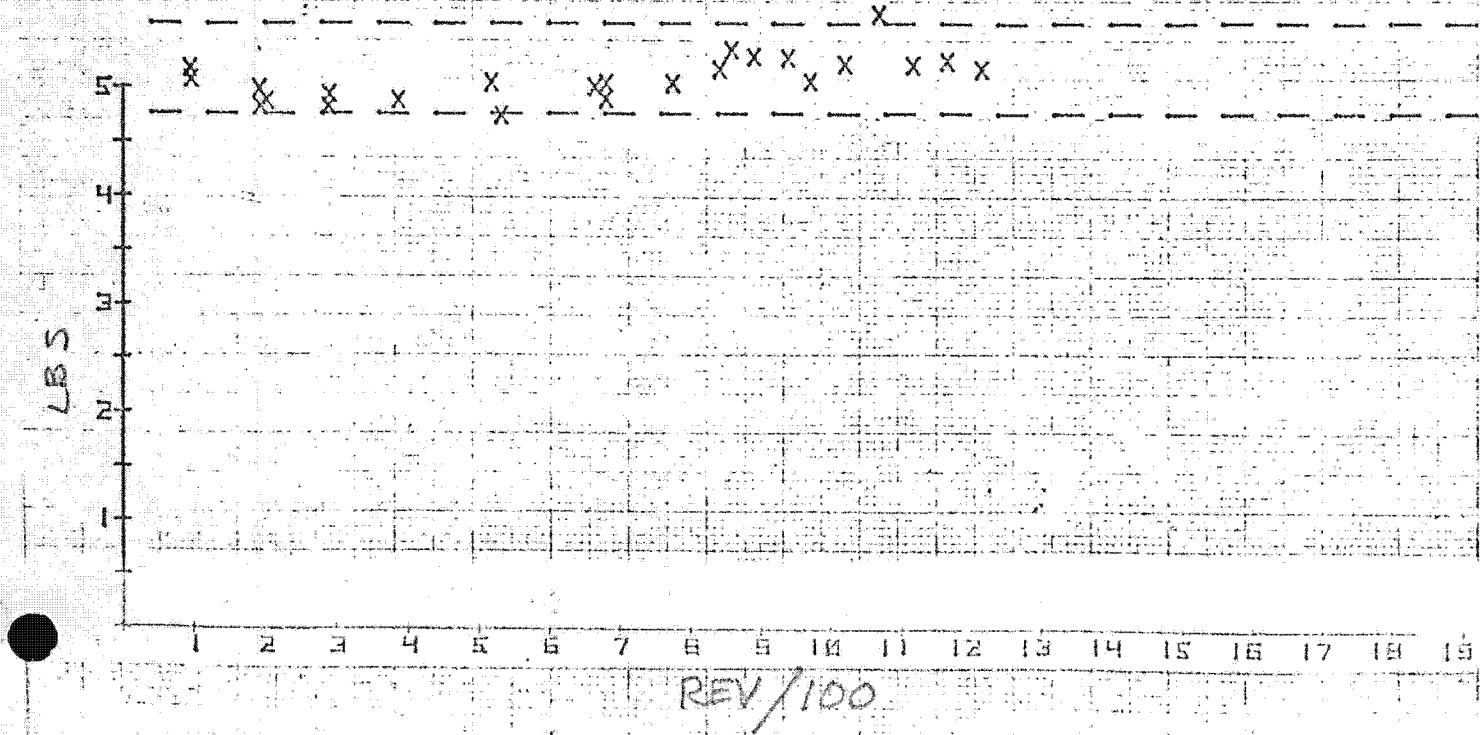


FIGURE 6.7-5

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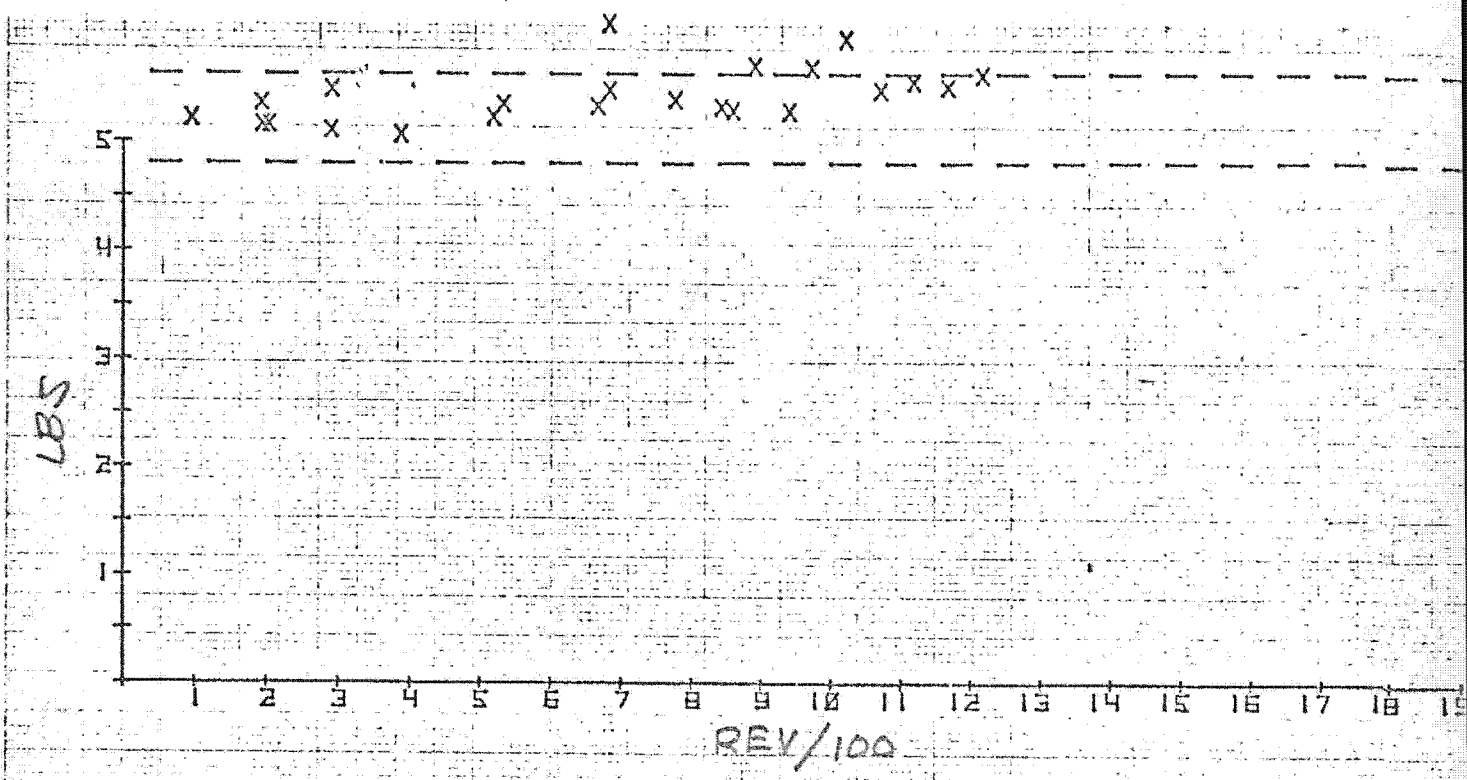
SV-6

REA 1

NORMALIZED THRUST LBF.



REA 4

NORMALIZED THRUST LBF.

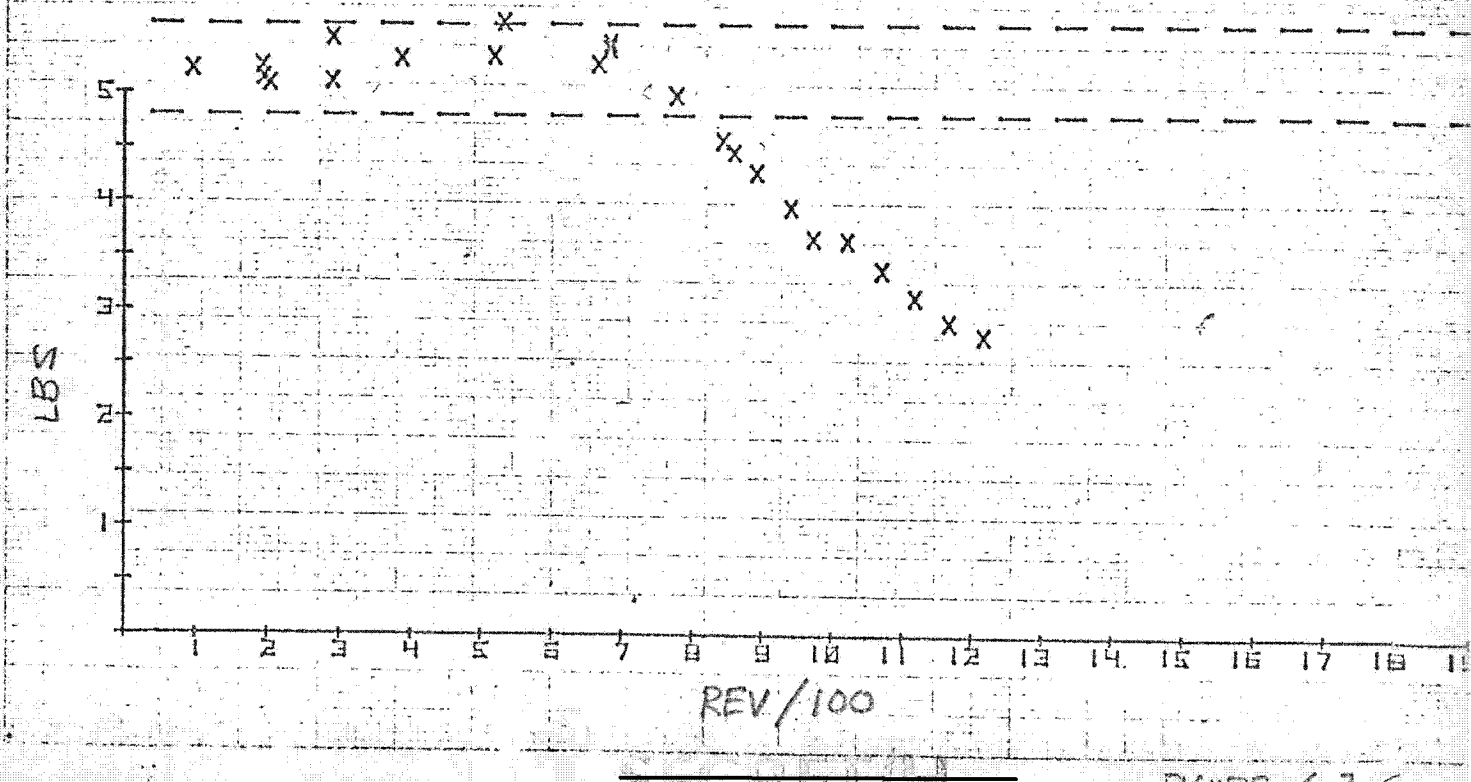


FIGURE 6.7-6

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TABLE 6.7-1

ORBIT ADJUST SUMMARY

SEGMENT 4

(REV 926 - 1202)

OA NO/TYPE	#29/POS	#30/POS	#31/POS	#32/POS	#33/POS	#34/POS
OPS DAY	57	60	63	66	69	72
REV NO	928	970	1019	1068	1116	1167
DELTA VEL REQ (FPS)	27.255	20.759	24.410	25.549	20.231	38.542
DELTA VEL ACTUAL (FPS)	27.405	21.054	24.579	25.857	20.215	38.929
BURN DURATION	74.6	57.4	67.4	71.0	56.2	106.8
PROPELLANT REQUIRED	52.9	40.1	46.7	48.6	38.4	72.3
AVG OA TANK TEMP (^{o}F)	78.5	79.0	79.7	79.7	80.0	80.0
AVG OA TANK PRES (PSIA)	135.0	131.3	129.5	126.3	125.3	123.3

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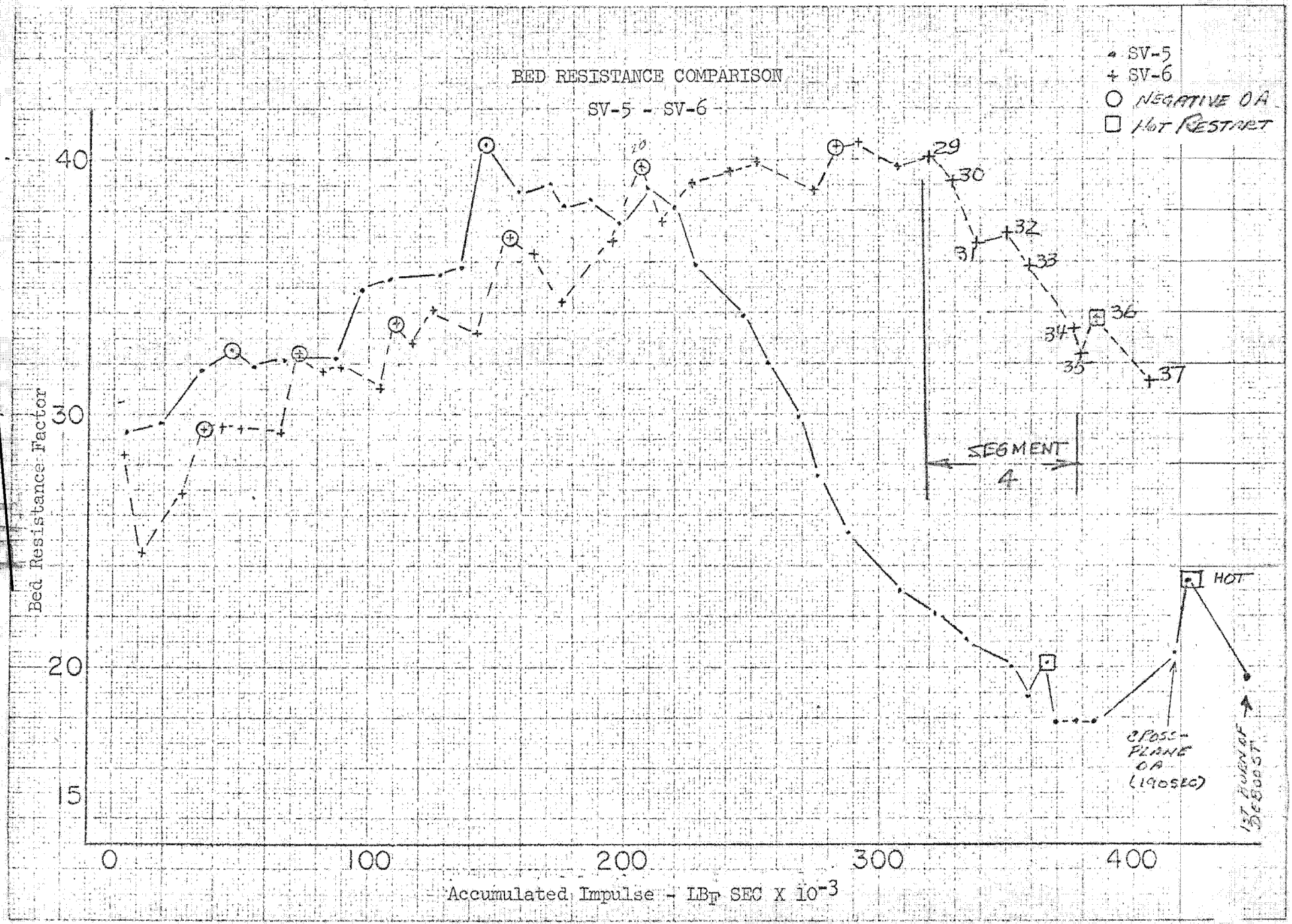

FIGURE 6.7-7

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6.7.5 Lifeboat II (LB II) Performance

The LB II system electronics were activated on Rev 1064 for yaw attitude determination and on Rev 1202 during RV-4 recovery. The system functioned nominally and the magnetometer data was consistent with predicted values.

The LB II tank heaters were commanded on for three revs (Revs 1085 to 1088) to maintain the impulse capability. The temperature was increased from 69 degrees to 76 degrees. By the time of RV-4 separation the tanks had cooled to 70.5°F. It was agreed to allow the LB tank heaters to remain OFF until 12 revs before deboost, in order to save LB battery power.

(b)(1)
(b)(3)

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SECTION 7

7.0 SOLO AND DEBOOST

7.1 Summary

Solo testing started in a limited way after completion of the Stellar Terrain Subsystem mission on the tests that could be conducted without impacting the primary mission. Full Solo testing started after RV-4 recovery on Rev. 1202, using the approved Solo Plan and formally approved test sequences. All planned Solo activities were successfully completed, including the VAST deboost on Rev. 1471 to terminate the operation. A

(b)(1)
(b)(3)

characteristics of this type of operation. The chronology of Solo testing and the cross reference to the applicable test result is given in paragraph 7.2.

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7.1.2 Solo Chronology

Completion of ST Mission/RV-5 Recovery Rev. 683

Rev/Sta	Event	Reference
743	OPS-2(o) DBS Red. Oscillator	7.7.9
745	OPS-2(p, q, r, s) ST Red. Equipment	7.8.8
747	OPS-2(n) DBS Red. Heater	7.7.9
760	ST-1 Evaluate Emergency Shutter Open	7.8.1
	DBS Off	--
777	ST-3 Verify Stellar Shutter Inhibit	7.8.3
858	ST-5 Verify Terrain Thermal Shutter Reset	7.8.5
RV-3 Recovery Rev. 926		
956/957	ST-5 Verify Terrain Thermal Shutter Reset	7.8.5
1132-1194	T&T-2 SGLS-2 PRN Modulation Test	7.7.11
1136-1138	ACS-2 Horizon Sensor Mapping	7.7.4
1154-1170	OPS-2(l) Redundant TCEA Test	7.4.1
RV-4 Recovery Rev. 1202 - Full Solo Start		
1204-End	T&T-3 SGLS-2 Life Test	7.7.12
1204	OPS-2(m) SCC-1 Verification	7.3.1
1205	SS-3 OB Phase Lock Minus Test	7.3.2
1205	OPS-2(b) PCM 2, TPS 2, APS 2 Test	7.7.9
1209-1242	ACS-1A Ferrotic Gyro Start Test	7.7.3
1217	Yaw-Mini RCS-1 Evaluation	--
1222-1226	SS-1 SS Pneumatics Depletion	7.3.3
1222-1226	SS-2 OB Thermal Gradient	7.3.4
1244-1259	ACS-1B Ferrotic Gyro Start Test	7.7.3
1246-1250	SS-2 OB Thermal Gradient	7.3.3
1254-1258	SS-2 OB Thermal Gradient	7.3.3
1265-1403	T&T-1 Signal Strength Evaluation	7.7.10
1270	OPS-2(d) Backup Timer Test	7.7.9
1271-End	ACS-1C Ferrotic Gyro Start Test	7.7.3
1274-1284	RCS-1A Degraded Thruster Evaluation	7.7.2
1281	Yaw-Mini RCS-1 Evaluation	--
1285-1286	RCS-1B Degraded Thruster Evaluation	7.7.2
1288-1393	RCS-1A Degraded Thruster Evaluation	7.7.2
1291-1306	EDAP-1 Inertial Flight Characteristics	7.7.6

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Rev/Sta	Event	Reference	
1300	ST-6 ST Thermal Response - Extended Cal.	7.8.6	
1313-1315	OPS-4 MCS Recovery Message Test	7.4.2	
1317	-- [redacted]	--	(b)(1) (b)(3)
1330-1332	OPS-5 Recovery PCON Message Test	7.4.3	
1336	[redacted]	7.7.15	(b)(1) (b)(3)
1346	ST-3 Verify Stellar Shutter Inhibit	7.8.3	
1347	ST-2 Verify Stellar Capping Shutter	7.8.2	
1347	ST-4 3 millisecond Exposure Test	7.8.4	
1347	ST-7 ST Data Quality - PCM 2	7.8.7	
1379	Yaw-Mini RCS 1 Evaluation	--	
1380-1393	EDAP-2 Inertial Flight Characteristics	7.7.8	
1423	DBS "ON" VAST Tracking	--	
1425	[redacted]	7.7.15	(b)(1) (b)(3)
1427	Yaw-Mini RCS 1 Evaluation	--	
1429	T&T-4 Signal Strength During Roll	7.7.13	
1441	[redacted]	--	(b)(1) (b)(3)
1443	Transfer to RCS-2	--	
1443	RCS-3 Thruster Performance - High Pressure	7.7.1	
1443	Yaw-Mini RCS Evaluation	--	
1444	PD-Mini RCS Evaluation	--	
1451	Fly Reverse - Pre-VAST	--	
1459	OPS-6 ST Operation after Extended OFF	7.8.9	
1464-1467	Solar Array Positioning	--	
1467	OPS-2(e) Aft Sw. Bus to Lifeboat Battery	7.7.14	
1471	VAST-3 Vehicle Atmospheric Survivability Test	7.7.14 & 7.5.4	

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7.2 COMMAND SUBSYSTEMS PERFORMANCE

(Prepared by CSC)

7.2.1 Health

The health of the Command Systems remained excellent throughout Segment 7 (Revs 1202-1470). 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.

7.2.1.1 EXTENDED COMMAND SUBSYSTEM

7.2.1.1.1 Command Modes

The ECS responded properly in all modes into which it was commanded. There were a total of 76 messages loaded in the ECS for this segment. This resulted in 34,054 SPC's being stored for readout from the PMU's.

Of the 34,054 SPC's loaded, 20,617 were output from the PMU's for processing by the decoders. The remaining were erased out prior to time label matches. In loading the 34,054 SPC's, there was an upper bound error at rev 1277 Guam on an SP load. PMU-B SUB should have been 296, but was 297. One command in the SP message was erased when the SE message was loaded. The command was redundant and its time label was past the next SP message, so there was no operational impact. This extra transmission and load was caused by a "MFSB" (noisy data).

At 1304 Pogo there was a "spoof" (SPF) alarm-transmit/verify counts were 546/545. This was also caused by noisy data.

7.2.1.1.2 ECS Clock Operation

The accuracy of the ECS clock was 2.55 parts in 10^7. This corresponds to an average frequency offset of .2614 HZ above the nominal frequency of 1.024×10^6 HZ. The frequency of the clock oscillators changed .0104 HZ in 268 revs. This results in a stability of 2.04 parts in 10^8 over 268 revs, or 3.107 parts in 10^{10} for an average six hour period. The clock plot is presented in Figure 7.2-1.

7.2.1.1.3 ECS Anomalies

There were no ECS anomalies experienced during this segment.

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7.2.1.2 MINIMAL COMMAND SUBSYSTEM

7.2.1.2.1 Command Modes

The MCS was commanded on to the Operate mode at 1313 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. This was for a simulated MCS RV recovery. At deboost, MCS secure keys 1, 2, 3, 4, 6 and 10 had been used. Keys 5, 7, 8, and 9 remained available.

7.2.1.2.2 MCS Anomalies

There were no MCS anomalies.

7.2.1.3 REMOTE DECODER/BUD

7.2.1.3.1 Command Modes

The remote decoder was used for a simulated recovery of RV-3. The performance of both channels was verified from telemetry to be proper for all commands. MCS PCON was also sent. This was done to turn on the transponders to load the ECS recovery message.

No commands were issued from the BUD during this segment.

7.2.1.3.2 Remote Decoder/BUD Anomalies

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

7.2.1.4 SUMMARY

7.2.1.4.1 Expendables and Environmental Data

Total Command Readouts PMU-A 9,910 PMU-B 10,707

ECS Clock Drift Rate 2.55 parts in 10^7

ECS Clock Stability 2.04 parts in 10^8 for a 295 rev period

Total Hours On ECS 2208 R/D 5.5 MCS 9 BUD 0.3

Secure Words Expended at end of Segment 7 PMU-A 152 PMU-B 176

Environmental Data: See Figure 7.2-1 through 7.2-7.

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	(1)	(2)	(3)
BIAS	1.1721	0.9974	0.8102
VTCW	6407484.2	7106028.6	7825244.6

AVERAGE CLOCK ACCURACY =BIAS CHANGE/TIME CHANGE

=(1.1721- 0.8102)/(7825244.6- 6407484.2)

= 2.55262E-07

= 2.55262 PARTS IN 10 TO THE 7TH

AVERAGE CLOCK FREQUENCY =(2.55262E-07*1,024,000.0)+1,024,000.0

= 1024000.26139HZ

FREQUENCY 1 (F1) =(BIAS/VTCW)*1.024MHZ+1.024MHZ

=(0.1747/ 698544.4)*1.024MHZ+1.024MHZ

= 1024000.25609HZ

FREQUENCY 2 (F2) =(BIAS/VTCW)*1.024MHZ+1.024MHZ

=(0.1872/ 719216.0)*1.024MHZ+1.024MHZ

= 1024000.26653HZ

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

=(1024000.26653- 1024000.25609)/1.024E+06

= 1.01953E-08

= 2.03906 PARTS IN 10 TO THE 8TH
FOR THIS 266 REV. PERIOD

= 3.10657 PARTS IN 10 TO THE 10TH
FOR AN AVERAGE 6 HOUR PERIOD

Figure 7.2-1
Solo Clock Accuracy Calculations

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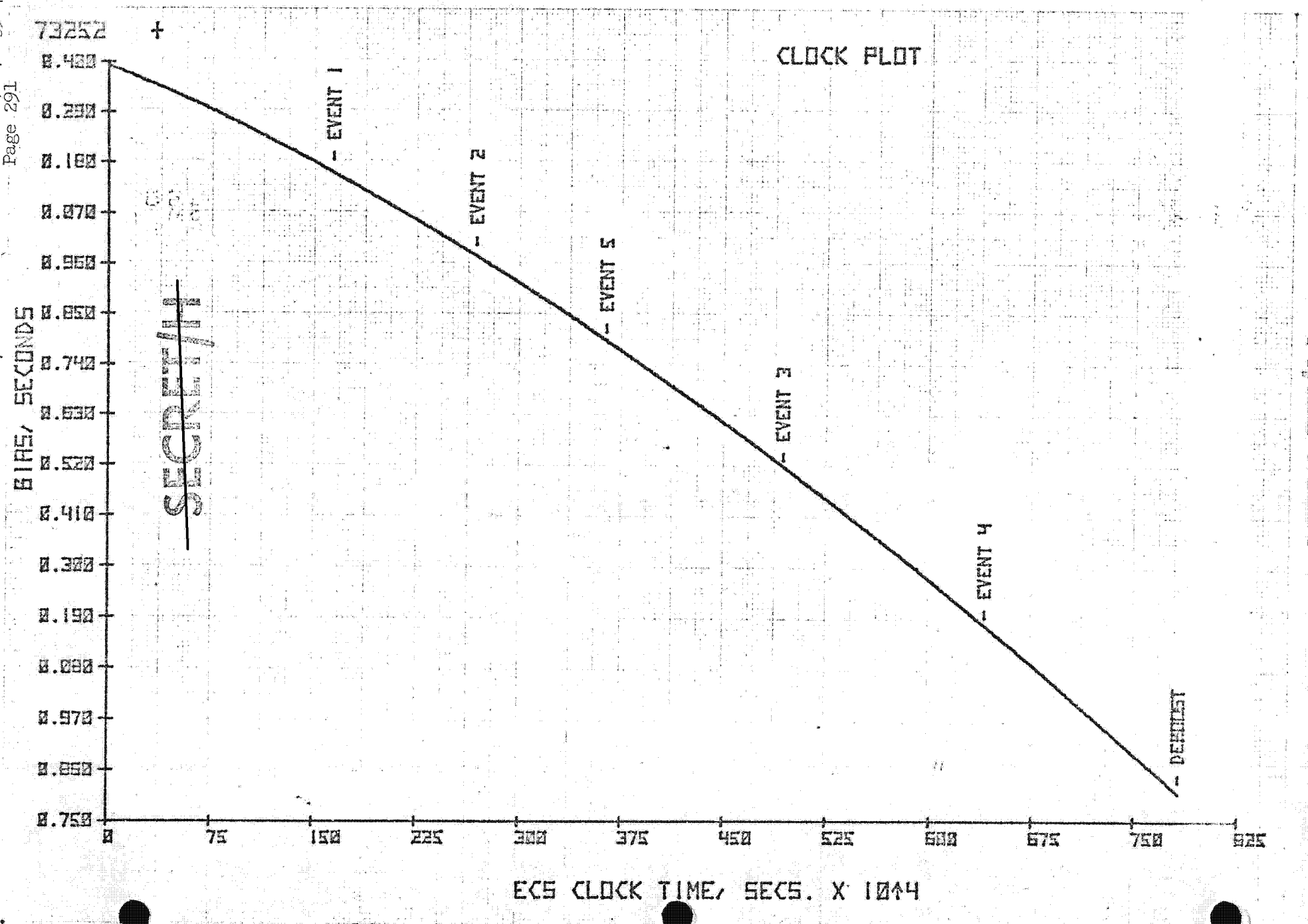

Figure 7.2-2

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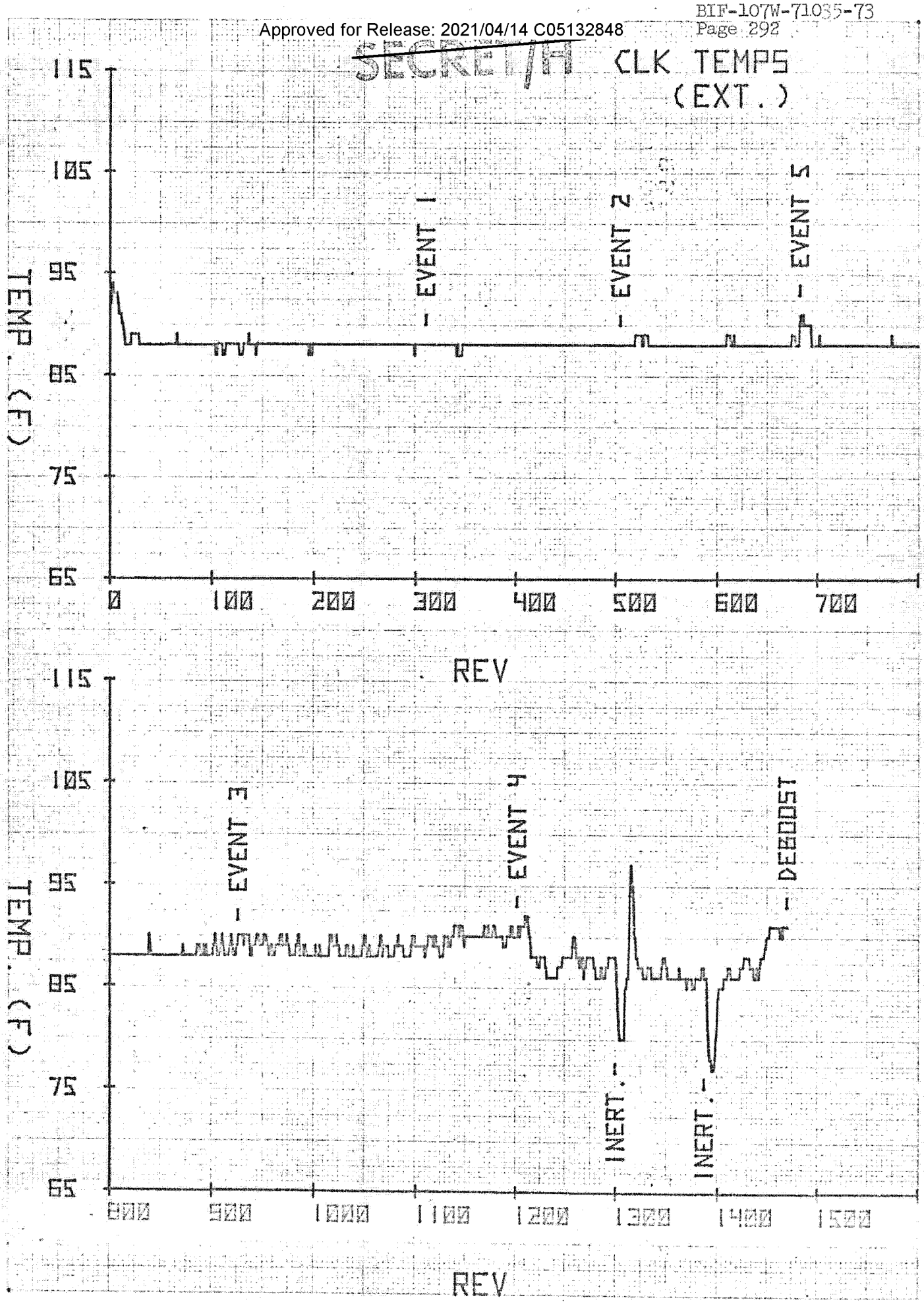

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Figure 7.2-3
Clock Temp (Ext.)

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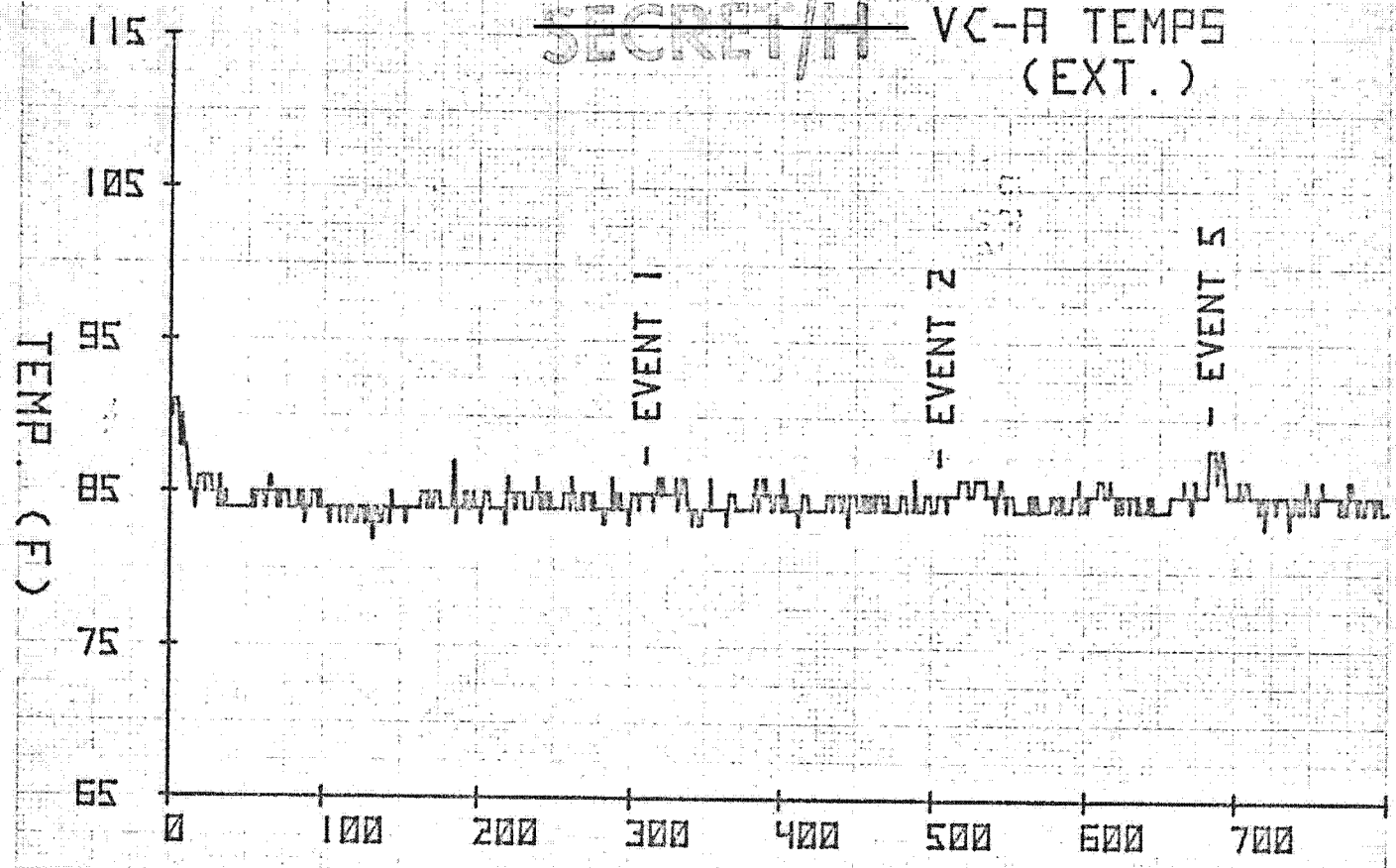

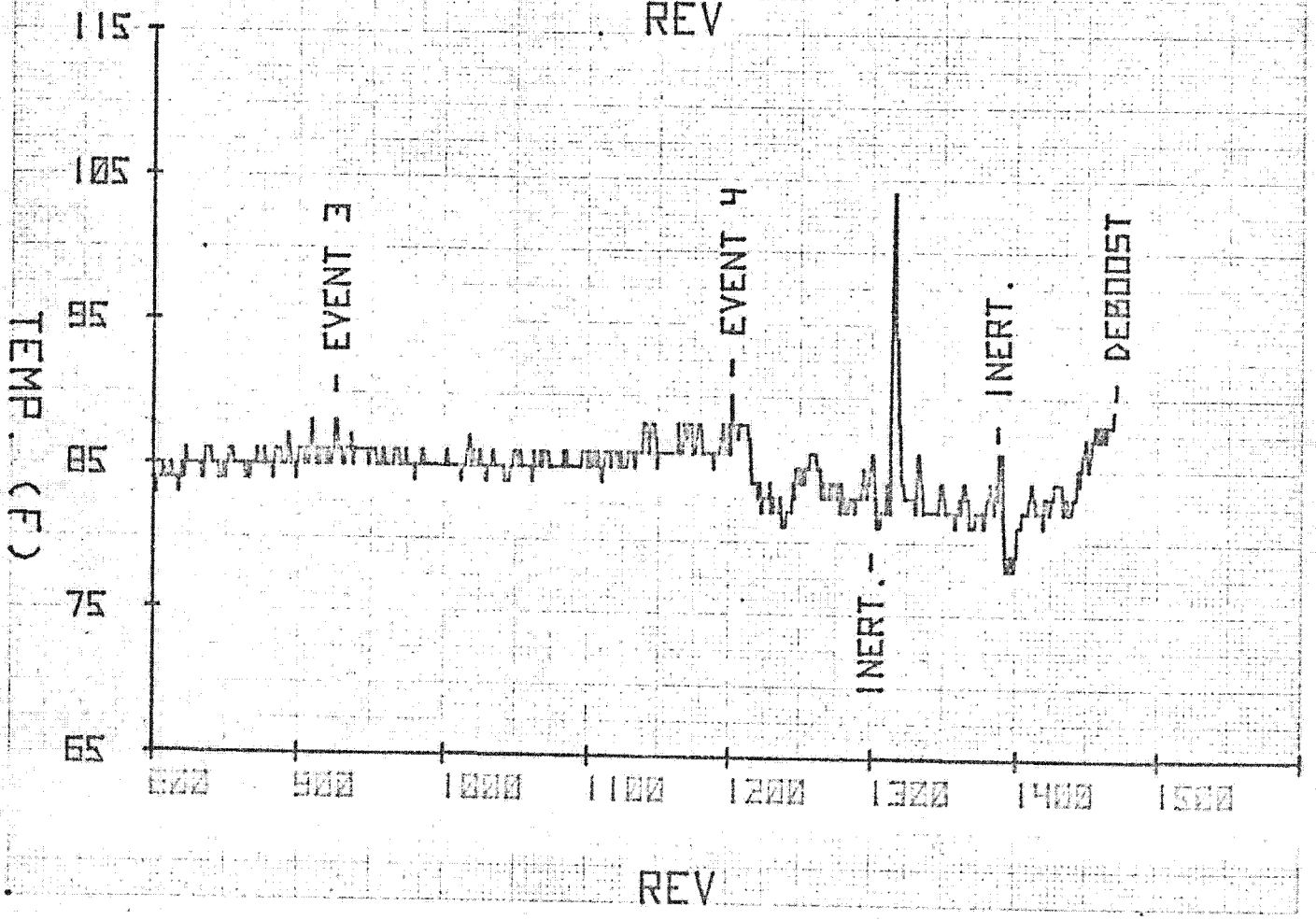

Figure 7.2-4
VC-A Temp (Ext.)

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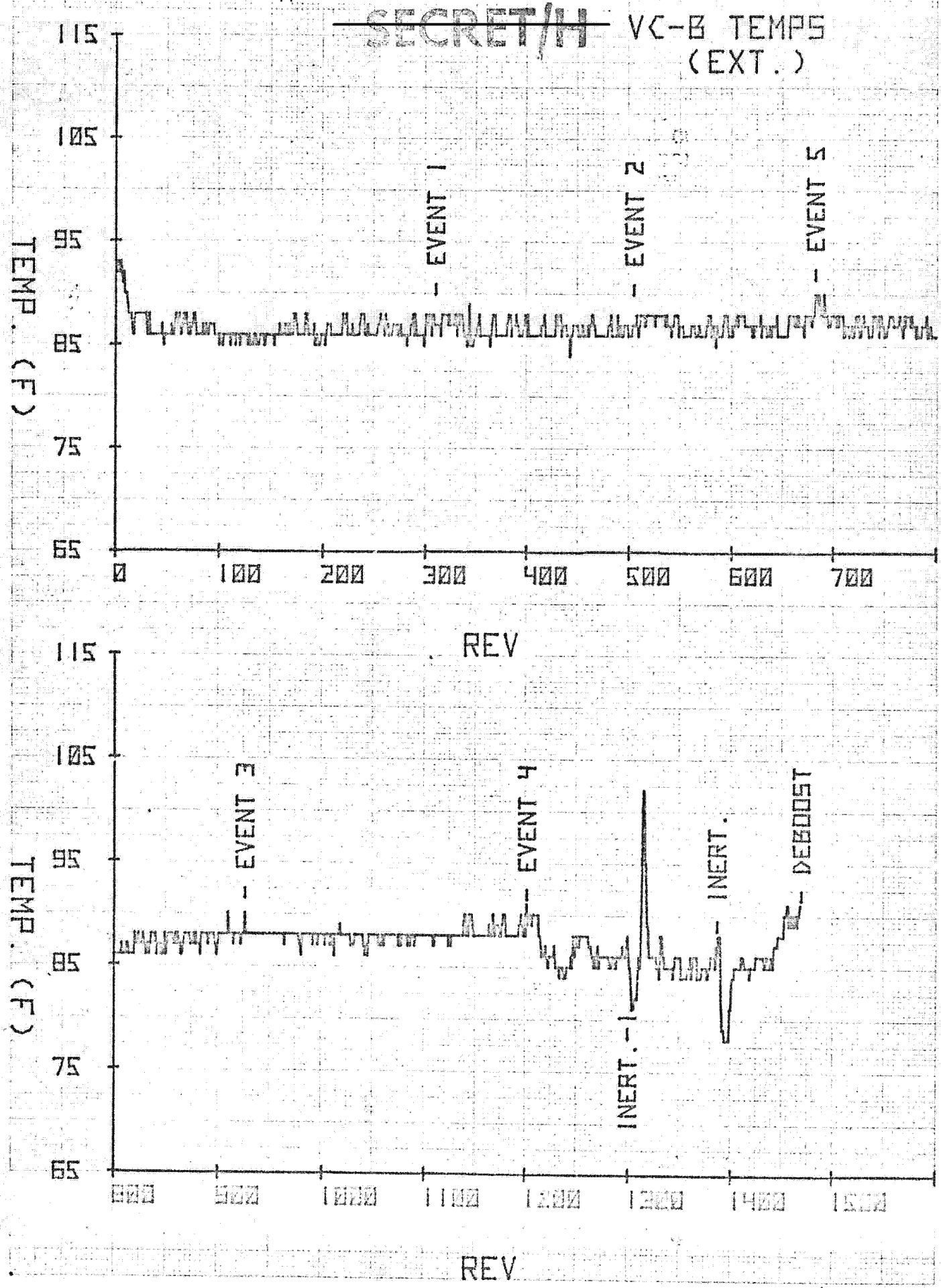

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Figure 7.2-5
VC-B Temp (ext.)

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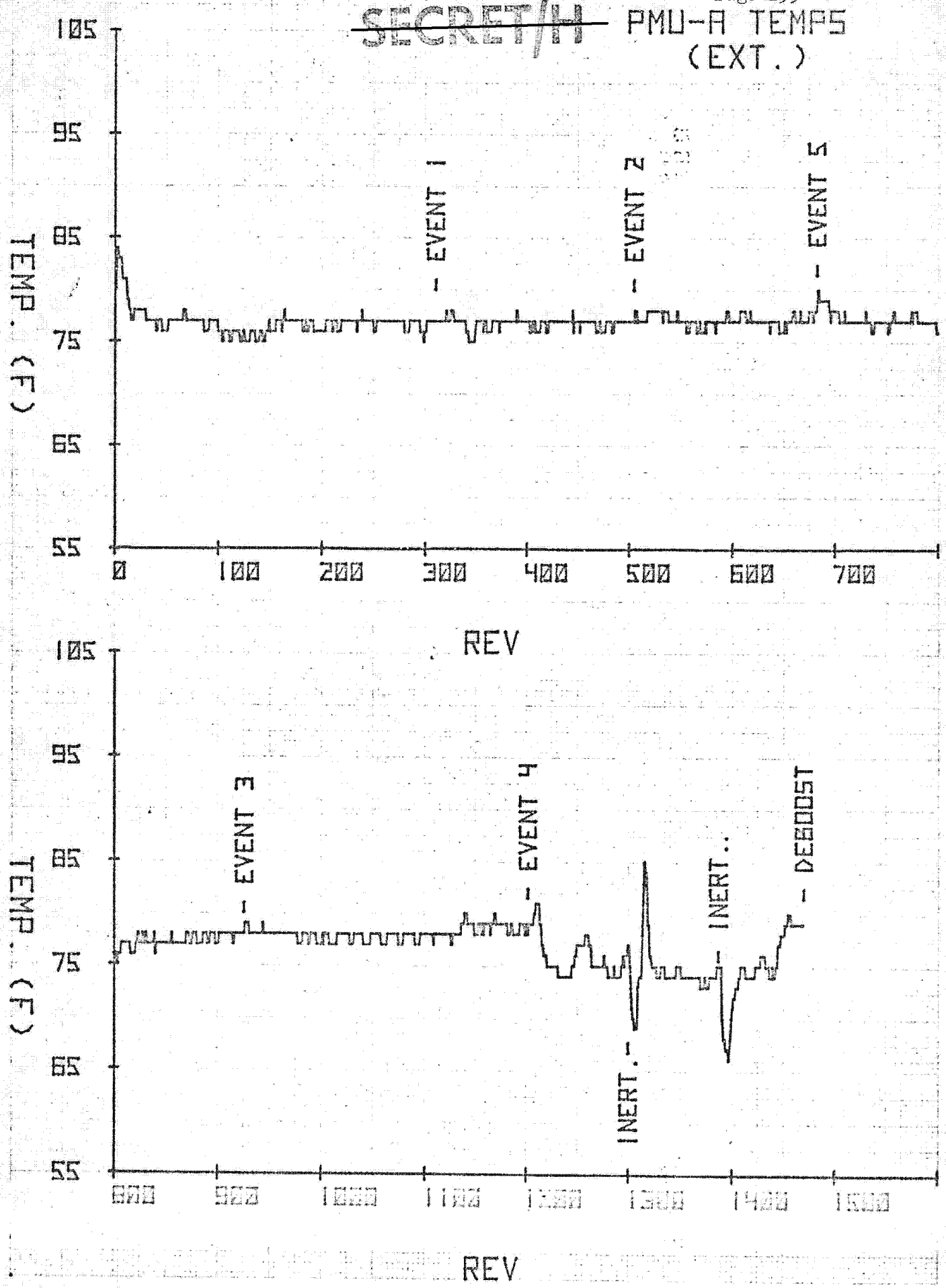

Figure 7.2.6
PMU-A Temp. (Ext.)

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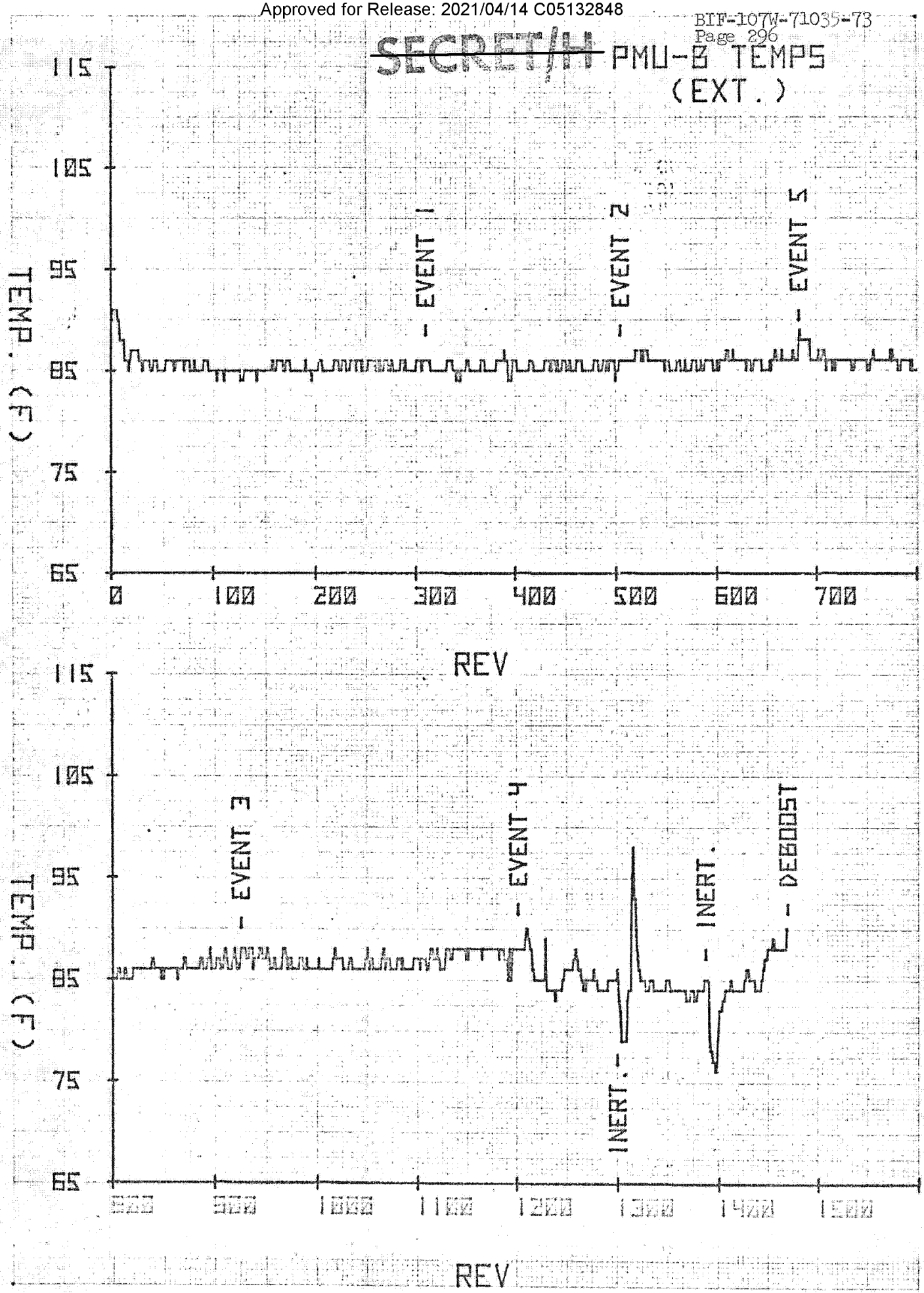

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Figure 7.2.7
PMU-B Temp. (Ext.)

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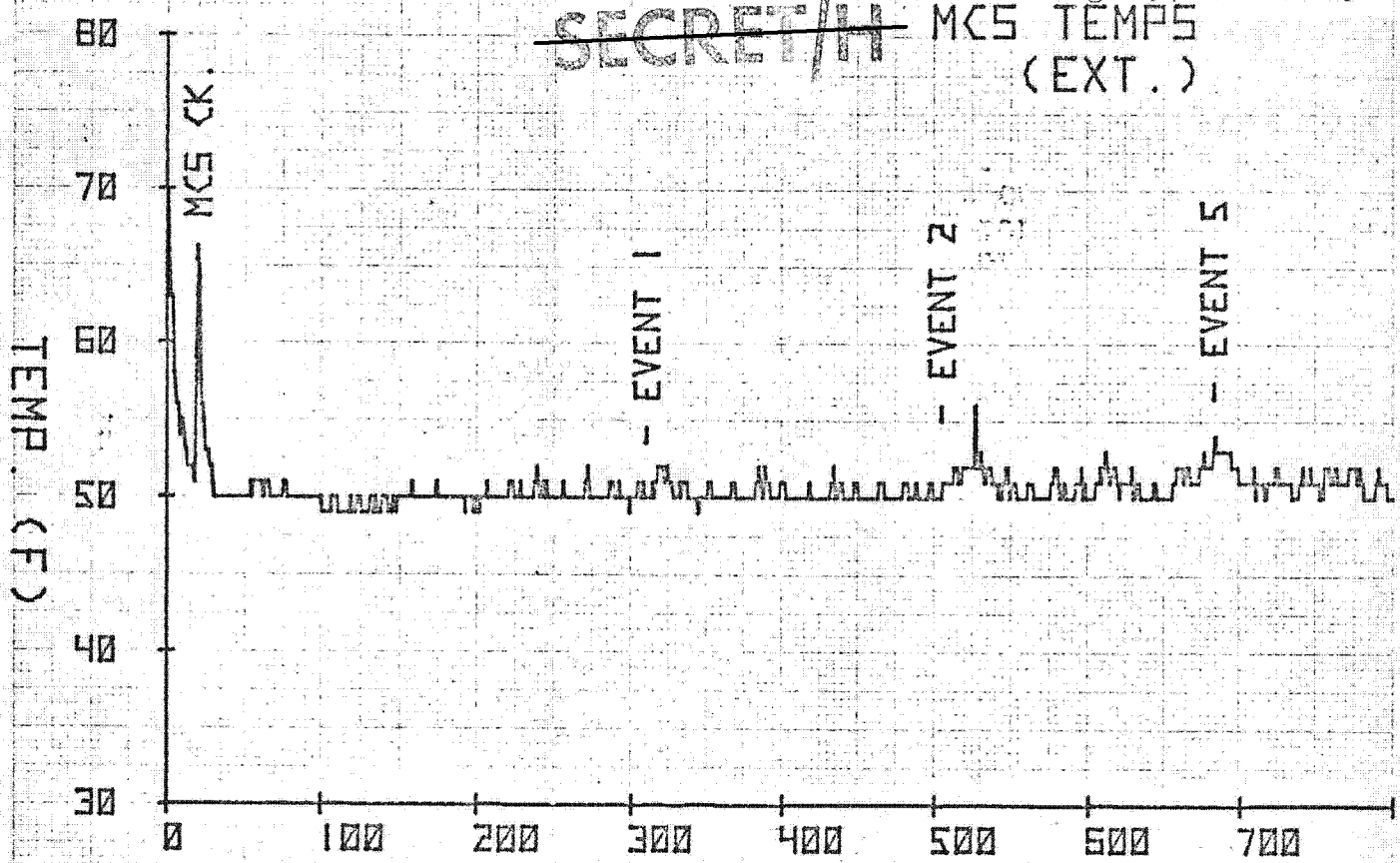

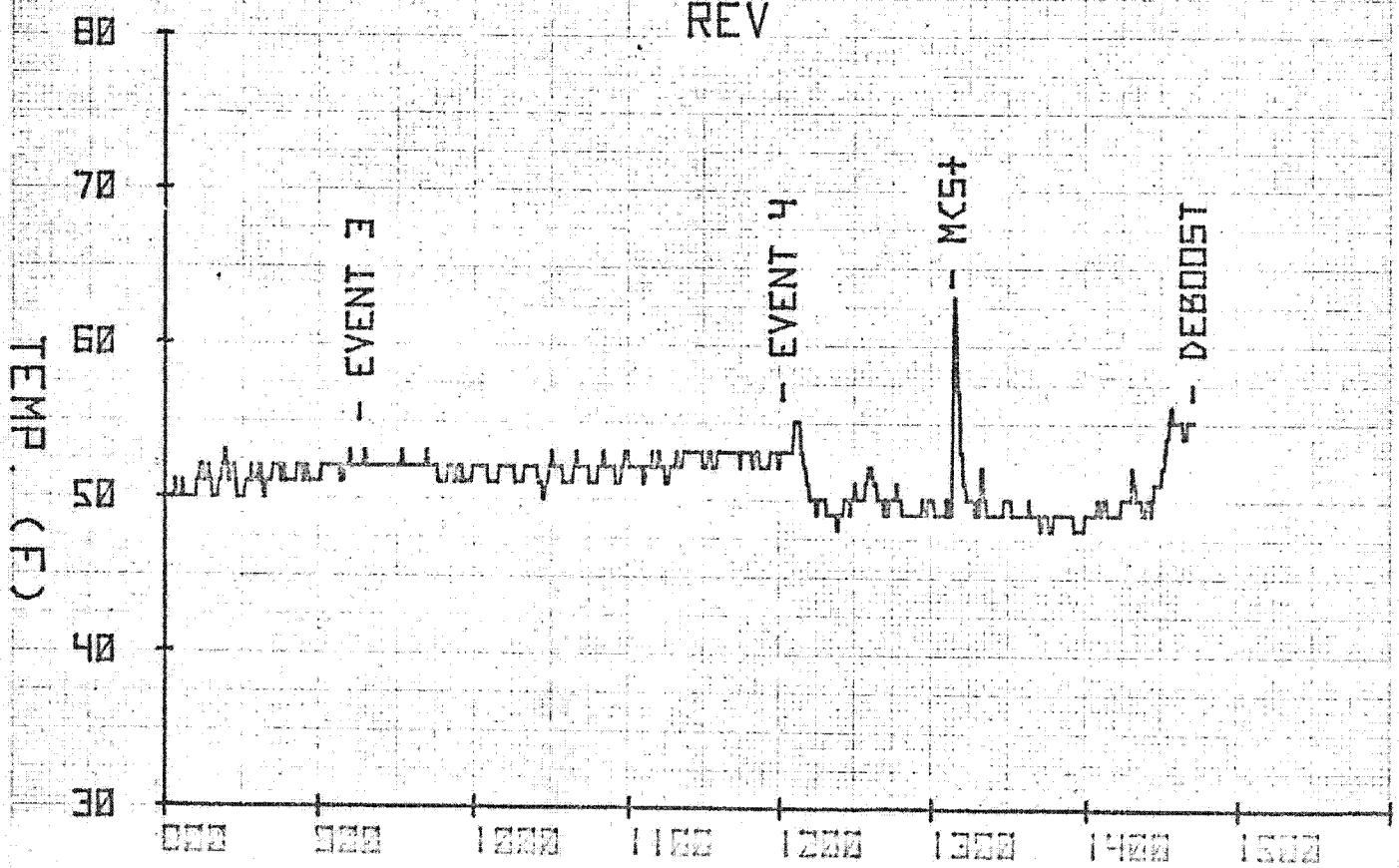

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Figure 7.2.8
MCS Temp. (EXT.)

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7.3 SENSOR SUBSYSTEM OPERATIONS DURING SOLO PHASE (Prepared by SSC)

The solo phase of Mission 1206 was utilized to perform several tests as follows.

7.3.1 SCC-1 Health Test (OPS-2M).

A health test of SCC-1 was run during the 1204G contact to verify operability of the unit. The check was satisfactory.

7.3.2 OB Phase-lock Minus Test (SS-3)

A test was run on Rev 1205 to study bar to bar phasing with the phasing locking the Aft bar to the Fwd bar disabled. This test revealed that the forward bar ran 0.473 degrees per second slower than the aft bar at the command Vx/h of 0.0478. This difference in velocity led to a mismatch in bar to bar phasing of approximately one degree per bar revolution.

7.3.3 Pneumatics Depletion (SS-1)

A solo test was initiated on Rev 1224 and terminated on Rev 1226 to deplete the pneumatics supply to enable calculation of an overall usage rate. This calculation utilized the pneumatics on time during the active mission and the solo testing along with the amount of GN_2 loaded.

$$\frac{33.99 \text{ lbs } (GN_2 \text{ loaded})}{1584 \text{ min (on time)}} = 0.02146 \text{ lbs/min}$$

7.3.4 OB Thermal Gradient Evaluation (SS-2)

A solo test was run to evaluate the thermal gradient that develops across the corrector plate when the optical bars are mis-stowed. The data which will be subsequently evaluated was collected as follows:

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7.3.4.1 Mis-stow at Zero Degrees

The OB's were mis-stowed at zero degrees during the 1222B contact and left in this condition until stowed at the 1223P contact. During this period, and for 4 Revs following, around-the-rev records were made to obtain thermal data.

7.3.4.2 Mis-stow at Minus 85 Degrees

The OB's were mis-stowed at -85 degrees during the 1246P contact and left in this condition until stowed at the 1247P contact. During this period, and for 4 Revs following, around-the-rev records were made to obtain thermal data.

7.3.4.3 Mis-stow at Plus 85 Degrees

The OB's were mis-stowed at +85 degrees during the 1254B contact and left in this condition until stowed at the 1255B contact. During this period, and for 4 Revs following, around-the-rev records were made to obtain thermal data.

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7.4 SOLO Recovery Tests
(Prepared by MWC)

7.4.1 OPS 2 (L) Redundant TCEA Test

Objective:

The objective is to determine if the change in RV heater power requirements during the switch to the redundant TCEA is a result of a different set point in the primary and redundant TCEA's, and to determine the cause of the lower power usage experienced on SV5, RV4 and SV6, RV4.

Conclusions:

The redundant heaters were active from Rev 1154 to Rev 1170. During this period, a rev-by-rev heater survey was made and compared to the primary system. This data is presented graphically in the RV4 section of the PPFR. There were no discernable differences in the two power utilization profiles. From this, we conclude that the set points of the two systems must be very close and, furthermore, the lower power usage experienced on RV4 is not a result of any peculiarities of the control electronics.

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7.4.2 OPS-4 Load MCS Recovery Message

Objective

To demonstrate "system" capability to plan and execute a MCS Recovery.

Procedure

Profile the Recovery Day sequence of events for a MCS/Lifeboat recovery including the required station contacts.

Generate and load the resulting MCS Command Messages. Delete the Lifeboat Execute Command from the Recovery Sequence.

Allow the MCS commands to execute and observe the vehicle and RTS responses.

Results

Message 990 (PCON) was loaded and executed uneventfully at 1313P.

MCS RECOVERY MESSAGE 1 (Msg. 252) was generated and loaded at 1313P. This message was altered because 'SCLOCK was set incorrectly in the initial message. Normally this message consists of RV SEP ENA, LB REG HTR ON, ACS DEACTIVATION, MCS and MCS Station Contacts. Because of Solo flight considerations LB REG HTR ON and ACS DEACTIVATION, MCS were deleted. The events executed as planned.

MCS RECOVERY MESSAGE 2 (Msg. 262) was generated and loaded at 1314 P. This message was altered because the MCS MEMORY DISABLE was set wrong in the initial message. Normally this message consists of the RV Battery Activate/ Destruct Timer Start, RV Prep/Sep, MCS LB Recovery and Station Contacts. The RV PYRO ARM commands and LIFEBOAT EXECUTE command were deleted from these sequences for Solo flight considerations. A MCS MEMORY OFF command was added at 1315H Fade plus 60 seconds. All events executed as planned.

MCS RECOVERY MESSAGE 3 (Msg. 270) was generated with no intent to load. This is the RV/LB ABORT message. This message would have aborted the Recovery had it been loaded.

It can be concluded that had the messages that were loaded been normal (without the planned deletions) a normal Lifeboat Recovery would have occurred.

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7.4.3 Recovery PCON Message - OPS 5

Procedure:

Generate and load a typical ECS RV 1-3 Recovery Command Message, including the SV Pitch Maneuvers.

Modify the ECS Recovery Command Message to change the XDR+PCM+ commands to XDR-PCM+ commands to simulate a SGLS-1 transponder failure.

Generate the normal Recovery PCON message and load it at POGO on the recovery rev according to the procedures defined in the Contingency Plan.

Observe RTS and Vehicle responses.

Rationale:

To demonstrate the structure of the Recovery PCON Message with the MCS and the ECS Recovery Command Message.

Test Results:

The modified RV3 recovery command message was loaded at 1330 POGO for execution at 1332 POGO.

1332 POGO TRAN was at System Time 83701 with no acquisition. Recovery PCON message 992 was sent at 83764 and acquisition was at 83768 in Format B. The SV stopped pitching at the correct time and from that, it could be assumed that the pitchdown angle for separation was correct. All events occurred as expected and a normal recovery could have ensued.

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7.5 SATELLITE CONTROL FACILITY PERFORMANCE

7.5.1 Orbit Determination and Prediction Accuracy

Table 7.5-1 shows a summary of the orbital conditions computed for the SOLO Phase from RV-4 recovery on Rev 1202 until completion of the operation with the VAST Deboost on Rev 1471. Table 7.5-2 shows the prediction accuracy of the individual tracking reductions as compared to the daily Best Fit Ephemeris. The orbit was significantly affected by the SOLO test maneuvers accomplished during this phase.

7.5.2 Orbit Adjust Performance

Table 7.5-3 shows the predicted and actual results of the orbit adjusts employed during SOLO. The VAST deboost is presented in para. 7.5.4.

7.5.3 Best Fit Ephemeris

Table 7.5-4 shows the orbital conditions for each day of the SOLO phase of the operation.

7.5.4 Vehicle Atmospheric Survivability Test

SV-6 VAST-3 experiment was designed to use Eniwetok Lagoon as the target impact point for major surviving objects. The Test was conducted on Rev 1471, operational day 92, with the deboost occurring on a South-to-North pass. As a result of this pass configuration, tracking data for the rev prior to VAST deboost or the deboost rev except for the terminal portion were not available. Table 7.5-5 shows the Impact Point criteria.

VAST-3 was supported by TRAP aircraft, ARIA and ARIS. Object impact within the Lagoon was verified.

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SUMMARY

EPOCH REV	ECCENT.	PERIOD DECAY	INTEG. PERIOD	MAX ALTIT.	MIN. ALTIT.	ARG. PERIGEE	DRAG	STABLE/ TUMBLE	COMMENTS
1205	.0089	.4636	88:42.9	152.98	86.90	123.7	.8501	101/29	
1208	.0088	.4803	88:41.6	152.05	86.92	122.5	.8815	96/27	
1213	.0086	.5523	88:38.8	150.20	86.59	121.4	.9681	82/23	OA #35 REV 1214
1218	.0066	.2547	88:51.3	149.35	99.16	118.0	.9701	202/60	OA #36 REV 1216
1221	.0066	.2815	88:50.4	148.77	99.04	117.7	1.058	182/53	
1224	.0065	.2659	88:49.8	148.37	99.11	116.6	.9924	193/56	
1229	.0064	.2785	88:48.3	147.53	98.88	115.8	1.01260	183/53	
1232	.0064	.2753	88:47.5	147.02	98.90	114.9	.9934	185/53	
1235	.0064	.2868	88:46.6	146.67	98.62	114.4	.9904	181/52	
1237	.0064	.2824	88:46.0	146.40	98.47	113.9	.9829	180/52	
1241	.0063	.2672	88:45.1	145.77	98.57	112.7	.9215	190/55	
1245	.0062	.2624	88:44.0	145.19	98.35	112.1	.8846	193/56	
1248	.0061	.2809	88:43.3	144.65	98.34	111.4	.9359	180/52	
1252	.0061	.2890	88:42.1	144.14	97.98	110.7	.9342	173/50	
1257	.0060	.2808	88:40.7	143.31	97.94	109.3	.8903	177/51	
1262	.0060	.2848	88:39.3	142.50	97.63	108.7	.8743	174/51	
1265	.0059	.3040	88:38.4	141.83	97.65	107.9	.9210	162/47	
1269	.0059	.3207	88:37.0	141.22	97.21	107.2	.9393	152/44	
1273	.0058	.3092	88:35.9	140.47	97.19	106.1	.8893	157/45	
1281	.0017	.1132	89:08.8	140.78	123.27	80.7	.8961	521/150	OA #37 REV 1278
1286	.0016	.1268	89:08.1	140.41	123.03	81.0	.9288	495/143	

Table 7.5-1

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SUMMARY

EPOCH REV	ECCENT.	PERIOD DECAY	INTEG. PERIOD	MAX ALTIT.	MIN. ALTIT.	ARG. PERIGEE	DRAG	STABLE/ TUMBLE	COMMENTS
1289	.0016	.1038	89:07.9	140.33	122.78	80.0	.8076	568/164	
1294	.0016	.1039	89:07.3	139.95	122.58	80.2	.8007	564/163	
1297	.0016	.1049	89:07.1	139.72	122.45	79.6	.8042	559/161	
1301	.0016	.1186	89:06.5	139.59	122.20	260.1	.8993	493/142	
1306	.0016	.2826	89:04.4	138.37	121.13	258.2	.8356	143/42	
1310	.0015	.1119	89:03.8	137.94	121.02	79.2	.8062	517/150	
1313	.0015	.1458	89:03.3	137.65	120.74	78.1	1.0420	396/115	
1326	.0015	.1501	89:01.3	136.65	119.82	77.8	1.0320	382/110	
1340	.0014	.1344	88:58.8	135.26	118.66	76.1	1.0102	421/120	
1358	.0013	.1406	88:56.4	133.74	117.76	76.6	.8798	399/114	
1374	.0012	.1476	88:54.1	132.48	116.88	76.6	.8844	377/107	
1378	.0012	.1357	88:53.7	132.17	116.79	76.9	.8064	410/117	
1387	.0012	.2961	88:52.3	131.49	116.12	76.3	.8714	367/104	
1393	.0011	.4892	88:49.6	130.07	115.22	77.7	.8714	112/32	
1394	.0011	.4816	88:49.1	129.78	114.96	77.3	.8714	113/32	
1407	.0018	.1114	88:57.7	132.10	114.29	18.2	.7115	337/97	OA #38 REV 1400
1412	.0017	.1208	88:57.1	131.77	114.17	19.6	.7624	313/93	
1423	.0017	.1177	88:55.8	130.70	113.62	10.8	.7246	305/90	
1440	.0015	.1506	88:53.4	129.10	113.38	4.1	.8884	233/69	
1443	.0015	.533	88:53.0	128.80	113.16	1.1	.8968	228/68	
1445	.0015	.1760	88:52.4	128.55	113.05	0.6	1.0192	198/60	

Table 7.5-1

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SUMMARY

EPOCH REV	ECCENT.	PERIOD DECAY	INTEG. PERIOD	MAX ALTIT.	MIN. ALTIT.	ARG. PERIGEE	DRAG	STABLE/ TUMBLE	COMMENTS
1453	.0021	.1459	88:56.6	131.78	112.76	348.9	.9066	247/74	OA #39 REV 1448
1459	.0020	.1285	88:56.0	131.66	112.73	344.0	.7897	285/85	
1461	.0020	.1292	88:55.6	131.46	112.72	343.3	.7890	285/85	
1464	.0019	.1349	88:55.2	131.26	112.73	341.5	.8185	275/80	

Table 7.5-1

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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
1204	75	-.105	-1.658
1205	75	-.318	-2.406
1208	75/76	-.748	-3.051
1213	76	-.403	-1.012
1218	76	-.468	-.987
1221	76	.403	1.116
1224	77	-.018	-.186
1229	77	.069	.506
1232	77	.140	.699
1235	77	.263	5.244
1237	77	.493	1.694
1241	77/78	.306	.291
1245	78	-.484	-.996
1248	78	.016	.332
1252	78	.226	.905
1257	78/79	.091	-.176
1262	79	-.459	-1.302
1265	79	-.169	-.175
1269	79	.202	.903
1273	79/80	.022	1.856
1281	80	-.162	-.143
1286	80	.347	1.005
1289	80/81	-.017	-.202
1294	81	-.127	-1.971
1297	81	-.388	-6.208
1301	81	-3.843	-12.292
1306	81/82	.554	-1.711
1310	82	-.653	-2.168
1313	82	.080	.133
1326	82/83	-.193	-1.828
1340	83	.175	-.066
1358	83/84	-.003	.038
1374	85/86	-.710	.307
1378	86	-.376	-.877
1387	86/87	.738	3.114
1393	87	.377	23.825
1394	87	.064	.818
1407	87	-.242	-.669
1412	88	-.057	.096
1423	88	-.053	-.763
1440	89/90	-.128	-2.972
1443	90	-.412	-.393
1445	90	.344	1.752

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Table 7.5-2

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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. 35	Rev. No. 1214						
Orbit at Rev	1213	88:38.5	88.56	148.32	121.187	--	--
Predicted						--	+ 9.39
Actual						24.2	+ 9.29
Delta (A-P)						--	- .10
OA No. 36	Rev. No. 1216						
Orbit at Rev	--						
Predicted	Rev 1217	88:51.8	101.76	147.77	118.346	--	+14.07
Actual	Rev 1217	88:51.7	101.76	147.74	118.292	35.8	+14.12
Delta (A-P)		-.054	-.006	-.026	-.054	--	+ .05
OA No. 37	Rev. No. 1278						
Orbit at Rev	1277	88:34.3	98.84	138.68	105.428	--	--
Predicted	1279	89:08.7	128.83	139.06	82.16	--	+55.36
Actual	1279	89:09.1	129.18	138.70	81.39	137.4	+55.95
Delta (A-P)		+.477	+.353	-.361	- .77	--	+ .59
OA No. 38	Rev. No. 1400						
Orbit at Rev	1399	88:47.1	121.42	122.75	257.897	--	--
Predicted	Rev 1401	88:58.3	116.54	127.27	25.577	--	+18.03
Actual	Rev 1401	88:58.5	115.88	127.49	21.489	45.8	+18.15
Delta (A-P)		+.178	-.660	+.219	-4.088	--	+ .12

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Table 7.5-3

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OA No. 39 Rev. No. 1448	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 1447	88:51.9	113.02	123.00	1.526	--	--
Predicted Rev 1448	88:57.1	113.22	127.63	352.061	--	+ 8.34
Actual Rev 1448	88:57.3	113.39	127.70	350.932	21.8	+ 8.44
Delta (A-P)	+.201	+.171	+.072	-1.129		+ .10
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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Table 7.5-3

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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
76	1209	.0087	96.15	88:41.0	151.44	87.07	122.3	1.0308	1209 - 1216
								.9869	1216 - 1222
								1.0104	1222 -
77	1225	.0065	96.15	88:49.4	148.07	99.27	116.0	1.0021	1225 - 1233
								0.9480	1233 - 1239
								.8787	1239 -
78	1241	.0063	96.15	88:45.2	145.81	98.59	112.7	.9496	1241 - 1249
								.8995	1249 - 1256
								.8711	1256 -
79	1258	.0060	96.15	88:40.5	143.05	97.98	109.2	.9397	1258 - 1265
								.9156	1265 - 1271
								.8823	1271 -

Table 7.5-4

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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
80	1274	.0057	96.15	88:35.6	140.13	97.36	105.5	.9252	1274 - 1280
								.8864	1280 - 1286
								.8103	1286 -
81	1290	.0016	96.15	89:07.7	140.18	122.58	78.8	.8113	1290 - 1300
								2.9630	1300 - 1306
								1.1263	1306 -
82	1306	.0016	96.15	89:04.3	138.34	120.98	257.5	1.0223	1306 - 1313
								1.0499	1313 - 1320
								1.0736	1320 -
83	1323	.0015	96.15	89:01.8	137.03	119.88	257.1	1.0531	1323 - 1332
								17.0238	1332 - 1332
								0.8924	1332 - 1339
								0.7958	1339 -

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Table 7.5-4

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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
84	1337	.0014	96.14	88:59.4	135.48	119.00	77.0	.9024	1337 - 1346
								.8854	1346 - 1355
								.7769	1355 -
85	1356	.0013	96.15	88:56.7	133.91	117.84	75.9	.8525	1356 - 1364
								.8856	1364 - 1373
								.8127	1373 -
86	1376	.0012	96.15	88:54.1	132.38	117.02	77.6	.9709	1376 - 1382
								.7908	1382 - 1387
								.6816	1387 -
87	1392	.0012	96.15	88:50.1	130.29	115.32	76.8	2.6474	1392 - 1397
								.7315	1397 - 1405
								.7864	1405 -

Table 7.5-4

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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
88	1411	.0017	96.14	88:57.3	131.79	114.21	18.1	.7607	1411 - 1415
								.7030	1415 - 1421
								.7516	1421 -
89	1426	.0016	96.14	88:55.5	130.41	113.81	11.6	.8880	1426 - 1431
								.8734	1431 - 1437
								.9418	1437 -
90	1443	.0015	96.14	88:52.9	128.80	113.16	358.8	.8455	1443 - 1450
								.8125	1450 -
91	1452	.0021	96.14	88:56.8	131.90	112.77	348.4	.8044	1452 - 1459
								.7913	1459 - 1465
								.7885	1465 -

Table 7.5-4

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DEBOOST IMPACT POINT

	MAIN OBJECT			LEADING OBJECT	TRAILING OBJECT
	Nominal	Worst Case Uptrace	Worst Case Downtrace		
LATITUDE:	11.50°N	13.31°N	9.81°N	14.38°N	6.23°N
LONGITUDE:	162.25°E	161.94°E	162.54°E	161.75°E	163.14°E
DELTA VEL: FPS	419.64	435.94	403.34	---	---

Table 7.5-5

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SECTION 7.6

PROGRAM COMMAND SOFTWARE PERFORMANCE
(Prepared by HTC)

7.6.1 Command Message Summary

This section summarizes pertinent command message data from Mission 1206, IRON 8261. A total of one thousand fifty-one command messages were reviewed by the Technical Advisor (TA) Staff throughout the flight. Eight hundred sixty-seven of these messages were loaded into the vehicle. Additional information regarding these messages may be found in Sections 2 through 7 of this report.

During the solo phase of the flight, one hundred nine command messages were received by the TA Staff. Ninety-three of these messages were accepted. Sixteen were rejected. All of the rejected messages were altered and subsequently loaded. The reasons for rejection of the sixteen messages are summarized below.

Rev. No. & Load Station	Reason for Rejection
1220 POGO	Required OB- command not within station cone.
1285 GUAM	Manually input records contained load order violations.
1302 POGO	Contained commands in station cone.
1310 GUAM	[redacted] (b)(1) (b)(3)
1313 POGO	In this MCS add-on, SCLOCK was wrongly set to 1 October when it should have been 2 October.
1313 POGO	In this MCS add-on, decoders were required to be ON between POGO and HULA.
1315 KODI	This MCS add-on required a link 1/2 ENA and PCM 2B for the GUAM/BOSS contacts.

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Rev. No. & Load Station	Reason for Rejection
1330 COOK	An XDR- was improperly moved to the end of 1332 POGO and an MFA- was not deconflicted from the beginning of 1332 KODI.
1344 BOSS	Incorrect TAS solo inputs were used.
1334 BOSS	An additional alter was required because solo inputs were still incorrect.
1361 POGO	This SP message brought up a useless low elevation pass.
1361 POGO	Commands occurring prior to and after 1377 BOSS contained no records.
1361 POGO	An additional alter was required because commands were executing immediately prior to 1377 BOSS TTC+.
1444 POGO	Post-capture initialize SEQ 264 was omitted.
1447 POGO	The correct secure words were not called.
1467 COOK	Commands occurred in a station cone.

Of the one hundred nine messages, sixteen were rejected and not loaded for the reasons stated above. Of the ninety-three messages accepted, nine were not loaded because they were contingency messages and were not required.

Summary:

Total solo messages	-	109
Messages rejected	-	16
Total messages accepted	-	93
Contingency messages not required	-	9
Total messages accepted and loaded	-	84

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7.6.2 'TUNITY Software Problems

The Flight 6 'TUNITY software problems itemized below pertain only to the period from RV-4 recovery through DEBOOST. 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. It should be noted that SPR's MD2-6281, MD2-6283, MD2-6284, MD2-6287, MD2-6289 and MD2-6292 do not appear in this section. These SPR's were discovered during the 'TVEM exercise or in software checkout for SV-7.

Category	No. of SPR's	Comments
Flight Critical		Software corrections were made and incorporated during the flight period.
Non-Flight Critical (Requiring Work-Around)	2	Work-around procedures were developed and implemented.
Non-Flight Critical (Minor)	2	Work-around procedures were not required.
Product Improvement or New Requirements	2	To be considered during future development.
Documentation Error	1	MS-4 and/or MS-7 affected.

Itemized Software Problems

SPR MD2-6282 ('TBAT)

- Problem Description: If more than 1 AQ card is input to a 'TSEL or 'TLOAD run, informational message #4 has extraneous information in it. It appears to be the rev number from the previous output of informational message #3.
- Solution or Work-Around: None.
- Operational Impact: None.
- Comment: It is a software problem and it should be fixed at the first opportunity not involving a flight.

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SPR MD2-6285 ('TAPOUT)

- Problem Description: In the 'TAPOUT listing from message 810, Rev 1257 COOK, the tape recorder log records a time from 838412.6 to 838904.2. The actual times are 838412.6 to 43.4, time 838904.2 does not exist.
- Solution or Work-Around: The tape recorder time must be obtained from the chrono listing.
- 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 MD2-6286 ('TCOMTIM)

- Problem Description: The update of message 230 (1310 GUAM) aborted with a 'TENT error message stating "COMPOUND TIME FIELD IN ERROR". An ephemeris listing shows that rise occurs on Rev. 1309 (also, RISE+60, which was the specified load), although mid-angle rev is 1310.
- Solution or Work-Around: A different compound time field must be used on the LOAD card in place of rev and station.
- 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 MD2-6288 ('TBLOCK)

- Problem Description: At Rev 1313, Message 0 (emergency PCON) was altered to 990 so that it could be loaded. 'TBLOCK aborted, however, because it was looking for a Rev. 1 ephemeris.
- Solution or Work-Around: The message had to be regenerated for Rev. 1313.
- Operational Impact: None.
- Comment: This SPR should be considered as a product improvement item for a future software delivery.

SPR MD2-6290 ('TALT)

- Problem Description: When altering out commands from an MCS message, no fill commands are inserted for the deleted commands.

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- Solution or Work-Around: When deleting MCS commands in the alter mode, the replace option should be used rather than the delete option.
- Operational Impact: None.
- Comment: This SPR should be considered as a product improvement item for a future software delivery.

SPR MD2-6291 ('THISUM)

- Problem Description: The CHG run for 2 Oct 73 did not include printout for the last message (262) which was in the days' span. Message 262 was MCS and the update looked nominal. A dump of the 'TUL shows it to be a normal update.
- Solution or Work-Around: None.
- Operational Impact: None.
- Comment: SOST is currently studying this SPR to determine what the problem is.

SPR MD2-6293 ('TBLOCK)

- Problem Description: Page 3 of the MS-4 documentation of 'TBLOCK states that sequence load order is chronological. However, sequence 90 of Rev 1449 and sequence 94 of Rev 1447, appearing in message 580 for Rev 1444 POGO, demonstrate that load order is based on card input order.
- Solution or Work-Around: None.
- Operational Impact: None.
- Comment: The MS-4 should be updated to correct this error.

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7.6.3 Hardware/Software Interface Changes

For IRON 8261, twelve change requests were processed during the SOLO phase of the flight (as shown in Table 7.6.3-1). These changes were implemented via requests SV6-206 through SV6-217 and have been incorporated in the nominal data base and hardware/software interface documentation.

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Table 7.6.3-1. Summary of Hardware/Software Interface Changes

Request No.	Identification	Effectivity
SV6-206	New sequence 450 titled FERROTIC GYRO START/STOP for solo testing.	SV-6 only
SV6-207	New sequence 451 titled FERROTIC GYRO START/STOP for solo testing.	SV-6 only
SV6-208	New sequence 452 titled PN MONITOR SOLO TEST SS-1.	SV-6 only
SV6-209	Macro that contains new sequence 450 and seq. 90 for purposes of 16 rev gyro test.	SV-6 only
SV6-210	Macro that contains new sequence 451 and seq. 90 for purposes of 16 rev gyro test.	SV-6 only
SV6-211	New sequence 371 titled MCS LIFEBOAT N - S SOLO OPS 4.	SV-6 only
SV6-212	Sequence 44 (RV4 PREP/SEP MCS) modified by deletion of RV4 PYR ARM command for solo test OPS-4.	SV-6 only
SV6-213	Sequence 48 (RV4 BAT ACT/DT START MCS) modified by deletion of RV4 PYR ARM command for solo test "OPS-4".	SV-6 only
SV6-214	New sequence 453 titled NEG ROLL TO VEH UPSIDE DOWN for solo test "T+T4".	SV-6 only
SV6-215	New sequence 454 titled POS ROLL TO VEH HORIZONTAL (FWD) for solo test "T+T4".	SV-6 only
SV6-216	New sequence 472 titled ORBIT ADJUST START/STOP FOR VAST DEBOOST.	SV-6 only
SV6-217	New sequence 473 titled VAST DEBOOST ORBIT ADJUST SV6.	SV-6 only

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7.7 SOLO SATELLITE VEHICLE AND AUXILIARY PAYLOAD TESTS (Prepared by SBAC)

7.7.1 RCS 3

Thruster Performance at Increased Pressure

The objective of this experiment was to obtain data from RCS 1 Thrusters (in the existing degraded state) using propellant at higher feed pressure from the RCS Tank.

This test was performed on Revolution 1443 utilizing the RCS-1 Thrusters which had been the controlling system for 89 consecutive days. Vehicle disturbances were produced by rotation of the OB's to provide the control system torques to react against. The RCS Propellant Tank fuel supplied to the RCS 1 Thrusters was at approximately 240 psia replacing the fuel provided by the OA Tank which was approximately 115 psia.

The data showed an expected increase in thrust level as a result of the increase in feed pressure. Analysis of the data is continuing and the results will be reported in the SVIC SOLO Report.

7.7.2 RCS 1A, RCS 1B

Degraded Thruster Performance

The objective of the RCS 1 tests was to acquire a chronological history of thruster performance from degraded thrusters. The test consisted of performing the OB Stow Sequences either as pass events (RCS 1A) or as a revolution event (RCS 1B). These sequences provided repetitive vehicle activities so that a continuing evaluation of thruster performance could be maintained. In addition, the data was used to assist in determining whether further degradation was taking place.

A total of 19 tests were performed as pass events (RCS 1A). These were on Revolutions 1274, 1275, 1279, 1284, 1288, 1289, 1345, 1346, 1347, 1348, 1360, 1363, 1364, 1377, 1379, 1380, 1382 and 1393.

RCS 1B was performed as a revolution event on two revolutions, 1285 and 1286. A thruster degradation curve was compiled and the trend data tracked. Complete results of these tests will be reported in the SVIC SOLO Report.

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7.7.3 ACS 1

Ferrotic Gyro Start Capability

The objective of ACS 1 was to verify the 'on orbit' startup capability of the Ferrotic Bearing Gyros when subjected to various "on-off" cycling. Testing was performed in three (3) phases, ACS 1A, ACS 1B, and ACS 1C. ACS 1A consisted of the following: The Primary ACS (PACS) was turned "off" for ten (10) revs. (The Redundant ACS, RACS, was controlling the vehicle.) At the end of this ten rev span, the system was cycled 'on' for 48 seconds, then 'off' once per rev for ten on/off cycles. ACS 1A testing was initiated on Rev 1209 and concluded on Rev 1242. Test data showed that the restarts were within specification limits. Indicated time to gyro speed was 11 to 15 seconds. ACS 1A on/off cycles were performed on Revs 1209, 1219, 1222, 1223, 1226, 1231, 1234, 1235, 1238, 1239 and 1242.

ACS 1B testing consisted of the following: The Primary ACS was cycled on for 48 seconds then off for 282 seconds for approximately 246 on/off cycles. The test was performed beginning with Rev 1244 and ending with Rev 1260. The data showed gyro restart capability was not degraded due to this test. Gyros came up to speed within specification limits.

ACS 1C testing consisted of the following: The Primary ACS was cycled on for one rev then off for ten revs for as many on/off cycles as possible. The testing started on Rev 1271. Test was terminated on Rev 1442 by leaving the system in the 'on' state. No indication of out-of-specification start capability was noted during the test period.

7.7.4 ACS-2

Horizon Sensor Mapping

The objective of this test was to obtain Horizon Sensor noise data during two continuous revolutions of quiescent flight (no vehicle disturbing torques).

The horizon mapping was completed on Revolution 1138 (September 21, 1973) using both the Primary and Redundant Horizon Sensor Systems. The revolution span was from Revolution 1136 to 1138. Analysis of the station tapes will determine the seasonally and latitude dependent horizon noise.

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7.7.5 OAS-2

Long Range Orbit Adjust

The objective of the test was to acquire diagnostic information of the Orbit Adjust Engine operational characteristics in order to improve deboost prediction accuracy.

The test consisted of determining the hot restart characteristics utilizing dual burns and determining the effect of burns longer than 120 seconds. Orbit Adjust 35 and 36 provided the hot restart characteristics and OA 37 provided the data for the long duration burn.

The data from these orbit adjust burns were used in predicting the characteristics of the engine during the deboost burns.

7.7.6 EDAP 1

Inertial Flight Characteristics

The purpose of this test was to determine the maximum possible Solar Array output, thermal environment changes, antenna patterns, and any unpredicted conflicts during inertial flight.

At Rev 1295 BOSS the Solar Arrays were positioned at -18° and the OA Tank and manifold heaters turned on in order to deplete the batteries by approximately 80 A/H prior to flying inertial. The OB's were also operated 1200 seconds per rev.

At Rev 1300 POGO The Solar Arrays were repositioned to 0°. At mid sun Rev 1300 the vehicle was put in inertial flight configuration. Prior to sunrise, Rev 1301, the OA Heaters were commanded off.

All four Main Batteries recovered to the K-2 level on Rev 1302 and remained there throughout the test. At mid sun on Rev 1306, the vehicle was returned to geocentric flight configuration.

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7.7.7 EDAP-2

Inertial Flight Characteristics - Extended

The purpose of this test was to determine thermal stability during longer inertial flights, battery heater duty cycle changes while flying inertial, and Solar Array output at +18°, 0°, and -18° under similar load conditions while flying inertial and flying geocentric.

Under constant load conditions the Solar Arrays were moved from 0° to +18° at Rev 1380 POGO; back to 0° at 1381 POGO; and to -18° at 1382 POGO. At 1384 POGO the OA Tank and Manifold Heaters were commanded on and the OB's rotated for 1200 seconds per rev to deplete the power system by approximately 80 AH prior to inertial flight.

At Rev 1386 COOK the Solar Arrays were repositioned to 0°, and at mid sun Rev 1387 the vehicle was commanded to fly inertially. Batteries 1 and 3 recovered to the K2 level on Rev 1389 and from then until the vehicle was returned to geocentric flight, at mid sun, Rev 1397, two or three K2's occurred every rev.

Following the return to geocentric flight the OA Heaters were turned off and OB rotation discontinued. As a result all four batteries experienced K2's on Rev 1398.

At Rev 1391 GUAM the Solar Arrays were repositioned to +18°, at Rev 1392 BOSS they were moved to -18°, and at Rev 1393 BOSS they were returned to the 0° position.

No "out-of-specification" temperatures were observed during the test.

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7.7.8 OPS 2

Verification of Redundant Systems

Prior to deboost of the SBA, each of the Subsystems or components listed below was operated to verify operational capability.

(a) SGLS 2 - Capability was demonstrated successfully during the TT-1, TT-2 and TT-3 testing.

(b) PCM B, TPS 2, APS 2 and FPS 2 - Capability was demonstrated successfully during the SS-3 and ST-7 testing.

(d) Backup Timer - This test was performed on Rev 1270, BOSS, with a timeout of 546 seconds, in agreement with the time demonstrated on R-1 day testing.

(e) Aft Switch Bus to LB Battery - Switching was demonstrated successfully during Rev 1467 COOK.

(f) Lifeboat Execute - This test was cancelled on 9/25/73 by SBAC and the SPO.

(h, i, j) TCA Injector Manifold Heaters, TCA Propellant Valve Heaters and OAS Tank Heaters - Capability was demonstrated successfully during EDAP-1.

(n, o) DBS Redundant Heaters and DBS Redundant Oscillator - Capability was demonstrated successfully on Revs 743 through 760.

(u) Tape Recorder 2 - Capability was demonstrated successfully during the ACS 2 testing.

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7.7.9 T & T-1

Signal Strength Evaluation

The purpose of the test is to demonstrate signal strength characteristics of the Cubic Transponder and the allocation of modulation power between 1.024 and 1.7 MHz Channels.

Tape Recorder 2 was read out by real time commands from PCM sync and command capability to plus 60 seconds and from fade minus 60 seconds to fade five times each over POGO and KODI. The following is a log of the test execution.

Record	Playback	Station
1265	1266	P
1267	1268	P
1269	1270	P
1270	1271	P
1273	1274	K
1274	1278	P
1282	1283	K
1289	1290	K
1339	1340	K
1403	1404	K

Signal strength records were requested from each station supporting the test.

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7.7.10 T & T-2

SGLS-2 PRN Modulation Test

The purpose of this test was to determine if an increase in the PRN Modulation Index will cause an increase in noise on the down link telemetry signal at low signal levels.

This test consisted of programming a TR 2 record for 427 seconds outside the RTS and then programming the tape recorder playback at TRAN-20 seconds. The playback continuing through the acquisition phase until BOT was reached at TRAN +60 seconds. The RTS was directed to increase the PRN Modulation Index from 0.1 radians to 0.3 radians prior to going active at ETA-2 minutes.

The T&T-2 Test was performed twice at each RTC with a signal strength record requested as indicated below:

COOK	Rev 1152 and Rev 1176
KODI	Rev 1145 and Rev 1194
HULA	Rev 1153 and Rev 1177
BOSS	Rev 1165 and Rev 1190
GUAM	Rev 1156 and Rev 1172
INDI	Rev 1135 and Rev 1167
POGO	Rev 1132 and Rev 1141

7.7.11 T & T-3

SGLS 2 Life Test

The purpose of this test was to evaluate the performance of the Cubic Transponder installed in SGLS-2 because of the signal strength degradation encountered on SV-5 with this unit.

The procedure was to operate on SGLS-2 from RV 4 separation (Rev 1204) until the conclusion of the flight, Rev 1471.

No signal strength degradation was discernable in the R/T or P/B data during the T & T-3 Test.

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7.7.12 T & T-4

Signal Strength Test

The purpose of this test is to determine the vehicle antenna radiation pattern and signal strength at various vehicle attitudes. These characteristics are needed for planning purposes in the event that a vehicle becomes unstable.

The T & T-4 experiment was conducted on two successive station passes during Rev 1429. Over station POGO the vehicle was rolled so that it was upside down at mid pass. Over station HULA the vehicle was rolled so that it was at normal attitude shortly after mid pass. The SGLS 2 downlink was active and the MCS Command Link was transmitting S-pulses continuously during the roll maneuvers. Signal strength records were requested from POGO and HULA, Rev 1429.

7.7.13 VAST 3

Vehicle Atmospheric Survivability Test

The object of this test was to determine the vehicle reentry breakup process, identify those items of debris which might identify the satellite mission and establish the band of impact location of debris with respect to the PIP determined by the 'DROP software program.

This test was successfully executed on Revolution 1471. A 5 segmented deboost burn was initiated on Revolution 1470. Telemetry and tracking was obtained from aircraft and ship plus optical tracking and sonabouys. Tracking of individual pieces was obtained visually and with radar. Recovery of surviving pieces in the Eniwetok Lagoon target area has been initiated. On Rev 1467, COOK, the aft switch bus was transferred from the Main Bus to the LB II Battery to provide power during the VAST-3 Test.

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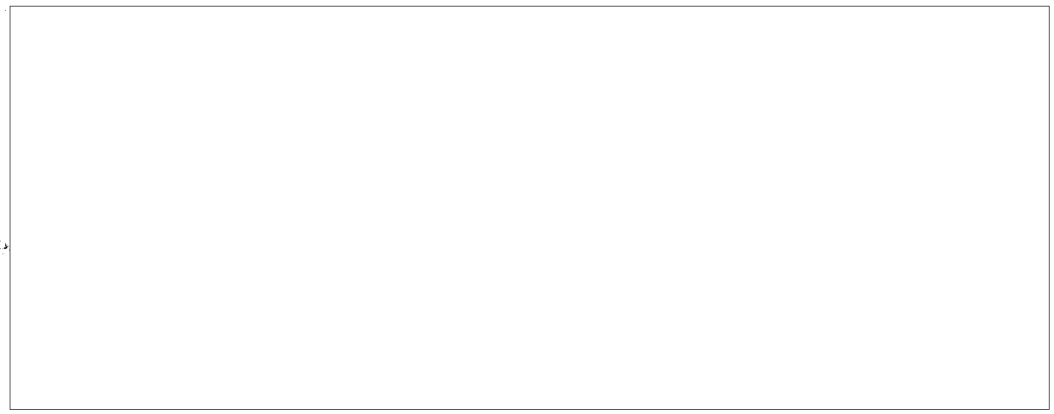

(b)(1)
(b)(3)

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7.8 STELLAR TERRAIN SUBSYSTEM SOLO TESTS (Prepared by NEC)

7.8.1 ST-1 EVALUATE EMERGENCY SHUTTER OPEN CHARACTERISTICS

This experiment was to evaluate the thermal effects on the terrain camera system with the terrain thermal shutter opened.

This test was executed on rev 760 by commanding the thermal shutter open and monitoring the temperatures. All terrain temperature monitors responded by indicating a drop in temperature.

Temperature stabilization was achieved by the end of the third rev. Terrain average temperature before the experiment was 73.2 degrees and with thermal shutter open average temperature was 72.1 degrees. The shutter was kept open for five days.

7.8.2 ST-2 VERIFY OPERATION OF Y STELLAR CAPPING SHUTTERS

This experiment was to demonstrate that the + and - Y stellar capping shutters would have operated if required.

Both stellar capping shutters were successfully executed on rev 1347. (The + and - Y stellar capping shutter contingencies are non-recoverable).

7.8.3 ST-3 VERIFY STELLAR SHUTTER INHIBIT CAPABILITY

This experiment was to demonstrate that the stellar shutter inhibit circuitry would function if either stellar shutter viewed the sun.

This experiment was completed on rev 777 for the +Y camera and on rev 1347 for the -Y camera.

Both events were accomplished by operating the mapping camera while the vehicle was maneuvered to allow each stellar to view the sun. Both stellar inhibit circuits responded correctly as each viewed the sun.

7.8.4 ST-4 EVALUATE EXTENDED OPERATE AT THE THREE MILLISECOND EXPOSURE SELECTION

This experiment was to evaluate the terrain rotary shutter operation at the 3 millisecond exposure for a 20 minute operate.

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This experiment was completed on rev 1347. A 136 frame operate was executed with a 3 msec exposure commanded. Rotary shutter operation was normal throughout the operation.

7.8.5 ST-5 VERIFY TERRAIN THERMAL SHUTTER RESET CAPABILITY

This experiment was to verify the thermal shutter emergency open reset capability.

The thermal shutter was successfully reset back to normal on rev 858.

Special sequences were generated and successfully executed to effect an emergency open at the start of an operate and an emergency open reset at the close of the operate. This test was completed on revs 956 and 957.

7.8.6 ST-6 ST THERMAL RESPONSE FOR EXTENDED CALIBRATE EVENT

This experiment was to determine the temperature effects on the terrain thermal shutter drive motor with the vehicle oriented to the in-flight mapping camera calibration position for one complete rev.

This test was completed on rev 1301 by turning off the vehicle geocentric rate for a complete rev and allowing the vehicle to "tumble" into th ST calibrate position. The lowest temperature the terrain thermal shutter drive motor temperature sensor reported was -3 degrees. An 20 cycle calibrate operation was successfully executed when the terrain and stellar fields of view were oriented for a typical calibrate event.

7.8.7 ST-7 EVALUATE ST DATA VIA PCM-2

This experiment was to test the ST telemetry data from PCM Side 2.

This experiment was completed during the execution of ST-4 on rev 1347. No difference in telemetry data was observed between PCM sides 1 and 2.

7.8.8 OPS-2 (f,g,p,r and s) ST REDUNDANT SYSTEMS

These experiments were to verify the ST redundant electronic systems would have functioned if required.

These experiments were successfully executed on revs 745 and 746. All redundant/backup systems operated as commanded.

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7.8.9 OPS-6 ST OPERATION PRIOR TO DEBOOST

This experiment was to verify ST operation after an extended inactive period.

On day 90, the ST was operated for three 20 cycle operates. The ST responded as commanded.

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