CORONA CR

MISSION SUMMARY

and

TELEMETRY ANALYSIS

MISSION 1111

AGENA 1654/PAYLOAD CR-12

25 September 1970

Prepared by: [redacted]

Reviewed by: [redacted]
Supervisor
System Performance Analysis

Approved by: [redacted]
Manager
Eng., Opns. & Analysis

Approved by: [redacted]
Manager
Advanced Projects

Distribution:

[redacted]

MISSION SUMMARY

1.0 SUMMARY

Mission 1111 utilized a Thorad booster (SLV-2H) S/N 69-046, Agena vehicle 1654, and payload system CR-12. The CR-12 payload system contained panoramic cameras S/N 324 and 325, and DISIC camera S/N 2R. Payload profile and additional component serial numbers are included in Figure 7.1.

Lift-off occurred at 1825 PDT on 22 July 1970 from Vandenberg, SLC 3 west pad. All payload ascent events were normal with In-Flight Reset (door ejection), A/P to Orbit Mode, Instrumentation Switchover, and Panoramic Camera Transfer to Orbit Mode occurring as programmed. The orbit attained was within one sigma of predicted.

This mission was the lowest inclination angle (60°) of any Corona flight and performed ascending/descending photography. Special focus experiments utilizing different thickness filters were performed. This mission was the first to use a full load of new 3414 film.

All systems performed satisfactorily with only minor problems encountered.

The -1 mission recovery capsule was successfully recovered by air catch after seven (7) days on orbit, during rev 112. The -2 mission recovery capsule was successfully recovered by air catch during rev 301, after twelve (12) days on orbit. Total mission length was nineteen (19) days as compared to the planned mission length of eighteen (18) days. This mission was the first to use the new telemetry frequency for the recovery capsules.

The panoramic camera film supply was exhausted during rev 298. The DISIC terrain film supply was exhausted during rev 298. The last titled frame of the DISIC stellar camera occurred during rev 300.

2.0 SUBSYSTEM PERFORMANCE

2.1 Panoramic Cameras

Panoramic camera S/N 324 failed to stow at the normal position during revs 69 through 88 in the -1 mission and from rev 149 throughout the remainder

of the -2 mission. Telemetry from engineering passes verified the instrument stowed near the center of format. An analysis of the shut-down circuit indicates a probable malfunction of the stow switch. The mission performance evaluation letter reported a binary bit image anomaly on the second from last frame of each S/N 324 operation following rev 214. An analysis of the DDSC indicates that if the C/F switch remains actuated following shut-down the binary data head will re-image at the next start-up. The SRV tape recorder data confirmed the double data head interrogate during the periods of stow malfunction.

Both panoramic cameras exhibited normal film transport characteristics and excepting the aforementioned stow problem, operated satisfactorily throughout the flight. Refer to Table 7.2 for engineering pass cycle period data.

For the first time glass filters (0.007 inch) were used in the alternate position. The glass filters were commanded into position during selected engineering operations for comparative evaluation to the 0.004 inch gelatin. The glass filter was utilized on panoramic camera S/N 324 during revs 45, 63 and 126 while panoramic camera S/N 325 utilized it on revs 63, 77, 94, and 126.

Both cameras contained 16,300 feet of standard base type 3414 film. Panoramic camera #324 film depletion occurred on frame 38 during rev 298. The film tag end of panoramic camera #325 wrapped in the transport mechanism during rev 298. The last frame recovered was frame 16 of rev 298.

2.1.1 Film Consumption & Type

	Frames		Length/Type	
	Pan 324	Pan 325	Pan 324	Pan 325
Sample	21	20	16300 ft/3414	16300 ft/3414
Pre-launch	132	138		
-1 Mission	2991	2991		
-2 Mission	3019	3013		
Total	6163	6163		

2.2 DISIC Camera

The DISIC camera performed satisfactorily throughout both the -1 and -2 missions. The terrain instrument passed the tag end into the recovery system with film depletion occurring on frame 19 during rev 298. The stellar payload was not exhausted at -2 mission recovery.

2.2.1 Film Consumption

	Frames		Length/Type	
	Stellar	Terrain	Stellar	Terrain
Sample	44	26	2000 ft/3401	2200 ft/3400
Pre-launch	120	104		
-1 Mission	2980	2433		
-2 Mission	3350	2714		
Total	6494	5277		

2.3 Command and Control

2.3.1 Command System

The Real Time Command (RTC) system operation utilizing both SILO and UNCLE command systems operated satisfactorily throughout the flight.

2.3.2 FMC Match

A satisfactory match to the required FMC was maintained during both the -1 and -2 missions. However, the FMC mismatch error experienced as the orbit period changes from nominal was more pronounced during this mission because of the combined effect of optimizing the FMC parameters for a broad range of anticipated ascending and descending operations and the relatively high eccentric orbit dictated by the 60° orbital inclination. The aft looking panoramic camera had 70.9 percent of the -1 mission

operations less than one percent FMC mismatch and 67.6 percent of the -2 mission operations were less than one percent FMC mismatch. The forward looking panoramic camera had 75.5 percent of the -1 mission operations less than one percent FMC mismatch and 68.6 percent of the -2 mission operations were less than one percent FMC mismatch.

2.3.3 Exposure Control System

The slit width control programmer operated satisfactorily throughout both the -1 and -2 missions. All except five of the operations were taken in the automatic mode. SPC 52 was not punched for rev 41 causing the SPC 51 slit width sequence on rev 42 to be wrong. The slit width control was commanded to fixed slit 4 for rev 41.

The panoramic camera slits were selected assuming that film type 3414 will be processed one half stop faster than film type 3404.

2.4 Data System

2.4.1 Instrumentation

The instrumentation system performed satisfactorily throughout the flight with one exception. S/N 324 rear rail temperature sensor (Channel 11-06) failed 'out of band high' on rev 111. This 'out of band high' condition on Channel 11 Point 6 caused a problem with Points 7, 8, and 9 until rev 205. The problem was caused by the Channel 11 SCO slow response to the high out of band condition.

2.4.2 Clock System

The Mission 1111 vehicle clock was very non-linear and required a fourth order polynomial to attain an acceptable system time to clock time fit. The correlation equation and constants are as follows:

First Order Fit

System Time = $A_0 + A_1$ (Clock time)

A_0 = -0.4973188116620789 D06

A_1 = 0.9999996176525097 D00

Sigma = 0.01061234

Number of points = 317

Second Order Fit

System Time = $A_0 + A_1$ (Clock Time) + A_2 (Clock Time)^2

A_0 = -0.4973188916140692 D06

A_1 = 0.9999997526452726 D00

A_2 = -0.4987307006059397 D-13

Sigma = 0.00240167

Number of points = 317

Fourth Order Fit

System Time = $A_0 + A_1$ (Clock Time) + A_2 (Clock Time)^2
+ A_3 (Clock Time)^3 + A_4 (Clock Time)^4

A_0 = -0.4973189865475547 D06

A_1 = 0.1000000052707250 D01

A_2 = -0.3699563330216768 D-12

A_3 = 0.1388799373922082 D-18

A_4 = -0.2094108029608987 D-25

Sigma = 0.00035566

Number of points = 317

2.4.3 SRV Tape Recorder

The SRV tape recorders for the -1 and -2 missions performed satisfactorily. A total of 235 minutes of data was recorded and processed from the two recorders.

2.5 Recovery

There were no Real Time recovery events acquired by [redacted] Tracking Station due to the 60° orbit inclination angle.

2.5.1 -1 Mission

The -1 recovery capsule was successfully recovered by air catch on rev 112. All re-entry events were within tolerance. The impact was 8 miles east of prediction. The sequence of events is included in Table 7.5.

	Actual	Predicted
Impact Location:	20° 51'N/148° 54'W	20° 25.6'N/149° 1.9'W

2.5.2 -2 Mission

The -2 recovery capsule was successfully recovered by air catch on rev 301. All re-entry events were within tolerance. The impact was near predicted. The sequence of events is included in Table 7.5.

	Actual	Predicted
Impact Location:	23° 08'N/144° 13'W	23° 01'N/144° 08'W

3.0 ORBITAL PERFORMANCE

3.1 Orbital Parameters

Parameter	Predicted	Tolerance	Actual STC	Actual APF
Period (Min.)	89.90	+0.38,-0.37	89.84	89.85
Perigee (N.M.)	88.7	+18,-13	88.8	88.6
Apogee (N.M.)	217.9	+14,-20	215.1	215.9
Eccentricity	0.0180	+0.0030,-0.0044	0.0166	0.0175
Inclination (Deg)	60.00	+0.11,-0.10	59.98	60.02
Arg. of Perigee (Deg)	110	+19,-16	106.5	106
Regression Rate (Deg/Rev)	22.81	----	22.79	22.82
Geodetic Latitude of Perigee (Deg)	55°N	+8,-10	----	56°.41°N

3.2 DMU Operation

Seven DMU rockets were fired during the mission to maintain ground track and period control. The Ground Track Error at the ascending node ranged from 7.5 nautical miles west to 45 nautical miles east. DMU No. 5 was retrofired to achieve a desired ground track 138 nautical miles east of the nominal. The DMU firings programmed were satisfactory for attaining mission objectives. Refer to Figures 7.6.1, 7.6.2, and 7.7.

A summary of DMU firing results follows:

Rocket No	Rev. No.	System Time Sec.	Period Change Sec.	Velocity Change Ft/Sec	Period at Firing Min.	Impulse Lb/Sec
1	6	37319	16.40	25.7	89.84	3514
2	79	85901	14.76	23.10	89.89	3166
3	151	42750	16.00	25.10	89.89	3073
4	215	43270	16.10	25.23	89.92	3074
5	282	59228	-16.40	-25.70	89.92	3120
6	310	35967	18.44	28.83	89.49	3012
7	315	64264	18.13	27.99	89.78	2954

NOTE: All seven rockets had 3000 lb-sec impluse.

4.0 ENVIRONMENTAL CONTROL

4.1 Pressure Make-Up System

The pressure make-up system operated properly throughout the flight. The gas consumption rate was 4.63 lbs/min during the -1 mission and 5.48 lbs/min during the -2 mission with 1678 psia remaining at the end of the -2 mission.

4.2 Thermal Environment

The temperature data obtained during this flight indicated the temperature environment was below the pre-flight predictions following rev 152 (refer to Figure 7.8.1). The averages of the panoramic camera temperatures ranged from 62° to 66° for S/N 324 and 62° to 63° for S/N 325 during the -1 mission and during the -2 mission the averages ranged from 70° to 52° for S/N 324 and 66° to 54° for S/N 325. S/N 324 rear rail temperature sensor failed on rev 111 for the remainder of the flight.

The on-orbit temperature profiles for revs 9, 120, and 277 are included in Figures 7.8.1 through 7.8.10.

The temperature data obtained from the [redacted] tracking station acquisitions are included in Tables 7.9.1 through 7.9.8.

5.0 POST RECOVERY TESTING

The system was enabled on rev 325 [redacted] prior to the end of the programmer tape. Panoramic camera S/N 324 operated satisfactorily (20 frames) and the DISIC operated satisfactorily (5 frames). Panoramic camera S/N 325 did not operate because the film tag end was still wrapped in the transport mechanism.

6.0 HARDWARE DEFINITIONS

6.1 Agena

FTV 1654 was an Agena vehicle (SS-01B) and a Thorad booster (SLV-2H) S/N 69-046. The Agena was oriented nose first in orbit with the following configuration:

1) Seven Thiokol DMU rockets installed in positions 1, 2, 5, 6, 7, 8, and 9. All Thiokol DMU rockets were 3000 lb-sec rockets. Positions 3 and 4 were skipped as they require the most control gas when utilized.
2) -3 control gas mixture (2 spheres).
3) AP-3 payload with digital storage register and capability of accepting both SILO and UNCLE commands.
4) SGLE with all frequencies and the UHF command system (UNCLE).
5) 3/4 Speed Type VIII Programmer (325 subcycles)
6) Battery configuration of 6 IH batteries - last vehicle to have this battery configuration.
7) Quantic Horizon Sensor System installed on left side of the vehicle aft rack.
8) [redacted] experiment on aft rack.
9) LB timer times extended so that enable occurs 2 orbits prior to an LB recovery, due to the station acquisition characteristics for a 60° inclination mission.
10) Both recovery capsules' telemetry frequency changed on this flight (remained in VHF region).

6.2 Payload

The CR-12 payload configuration included the following:

1. Panoramic Camera

   a) Constant rotating type with servo-controlled supply cassette.

   b) Digital Storage Register (DSR)/Cascade system used for camera enable/disable.

   c) Emergency program backup capability available by RTC.
   UHF 116/Silo 316 Emergency Program Select
   UHF 118/Silo 318 Emergency Intermix Select
   UHF 120/Silo 320 Instrument Mode Select

   d) Exposure control
      1) Programmer control by SPC (51, 52, 17) and RTC UHF 105/Silo 305.
      2) Automatic slit width control. Override by RTC UHF 101-126/Silo 301-326.

   e) Filter Selection
      1) Control by RTC UHF 103-104/Silo 303-304.
      2) The automatic filter change capability through the material change detector (MCD), was disconnected prior to launch.

2. DISIC Camera

   a) Mode select controlled by RTC UHF 124/Silo 324.

   b) Both slave and independent modes of operation had 1:1 ratio of stellar to terrain frames.

   c) Operate off provided by RTC UHF 107/Silo 307.

3. FMC Programmer

   a) Eccentricity function
      1) Initiated by SPC 27 and RTC UHF 125/Silo 325.
      2) Ramp profile provided by
      UHF 121/Silo 321 eccentricity start level
      UHF 122/Silo 322 eccentricity half-cycle level

4. Pressure Make-up

   a) Enable/disable controlled by RTC UHF 110/Silo 310.

   b) Two bottle system with dual range capability and the low range disabled.

5. Panoramic "A" to "B" transfer
   Available by RTC KIK-Silo 38

6. DISIC "A" to "B" transfer
   Available by RTC KIK-Silo 39

7. Yaw steering
   Available by RTC UHF 106/Silo 306

8. Agena tape recorder
   Time shared with vehicle data

9. SRV Tape Recorder

10 Payload weight
   EWO = 1783 lbs.

11. Instrumentation
    UHF 127/Silo 127 - operational - diagnostic data select

12. Thermal configuration

    a) The standard paint configuration of 180 degrees black surface 90 degrees both top and bottom) and 180 degrees aluminized surface (90 degrees on each side) was modified. The top black surface was reduced to 67 degrees by extending the aluminized surface 15 degrees on the starboard side and 8 degrees on the port side.

13. Command System
    The command system included a DSR for primary operation of the camera system with a two program/4 rev intermix emergency capability.

The CR-12 payload serial numbers are included in Figure 1.

6.3 Camera & Programmer Settings

6.3.1 Panoramic Cameras

	324	325
Filter Type		
Primary	W/21 Gelatin	W/25 Gelatin
Alternate	W/21 Glass	W/25 Glass
Slit Width (Inches)		
Position 1	.083	.132
Position 2	.114	.176
Position 3	.154	.235
Position 4	.202	.314
Failsafe	.123	.190

Auxiliary Optics

	Pan 324		Pan 325	
	Take-up	Supply	Take-up	Supply
Aperture	f6.3	f8.0	f8.0	f6.3
Filter Type	W-25	W-25	W-25	W-25

6.3.2 DISIC Camera

	Stellar	Terrain
Filter type	None	W-12
Cycle period	9.375	9.375

6.3.3 Exposure Control Settings

	Seconds
T-1 20 sec. increment initial setting	20
T-3 slit width #3 duration	180
T-4 slit width #2 duration	200
T-6 420 sec. increment initial setting	220
T-2 DISIC exposure to 1/500	*200
T-5 DISIC exposure to 1/250	*200

*DISIC exposure time will be constant at 1/500 second for this mission

6.3.4 FMC Control Settings

Eccentricity function

1) Eccentricity function period - 3548 seconds

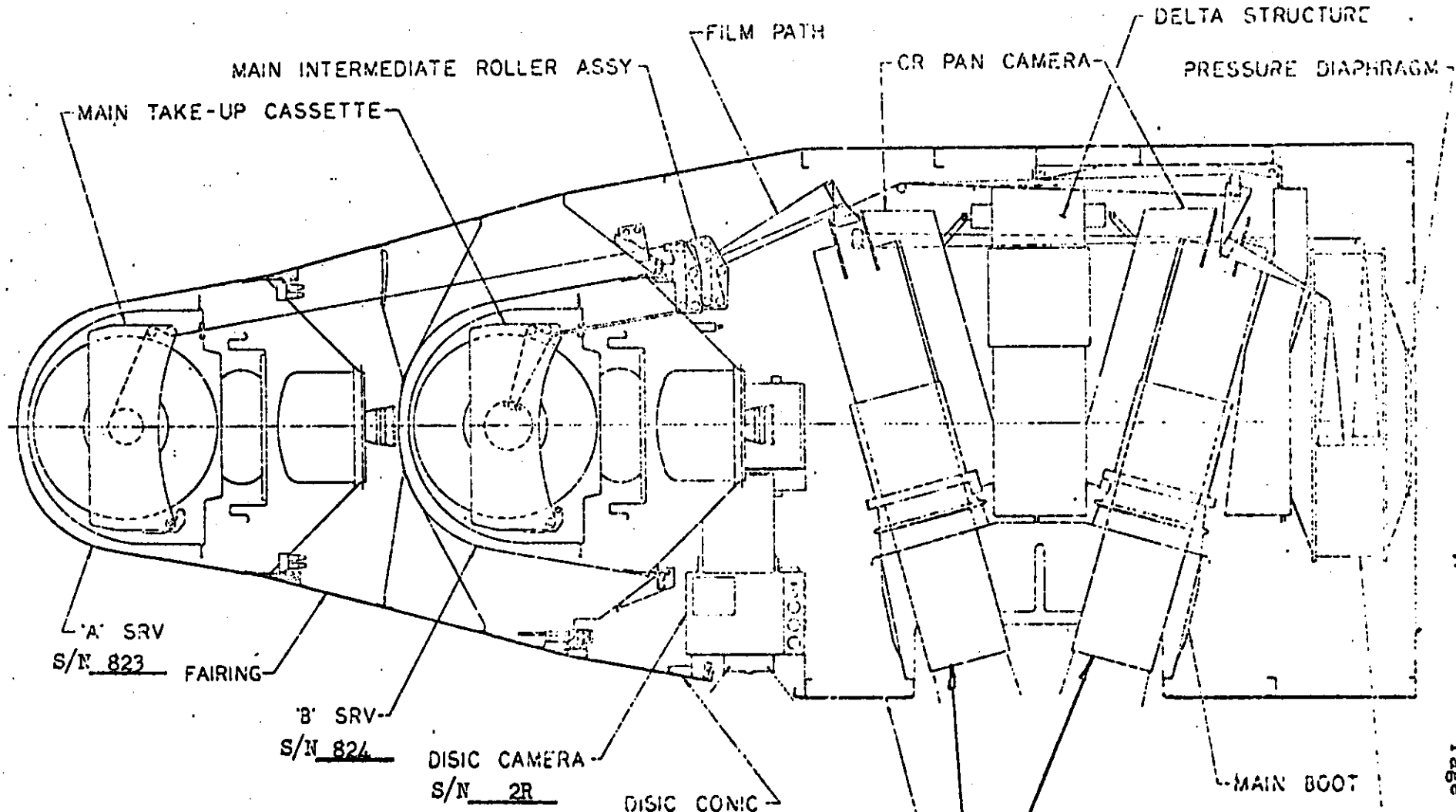
2) Delay step increment - 50 seconds

Oblateness function

1) Oblateness function period - 5244

2) Gain factor - 0.0349

2. PAYLOAD PROFILE AND SERIAL NUMBERS



SYSTEM NO. CR-12

TEST FLIGHT

PMU S/N 101

SLOPE PROGRAMMER S/N 200

CLOCK S/N 625

SWITCH PROGRAMMER S/N 211

FIGURE 7.1

REV	P R	O P	S 1/2 POS.	SYSTEM CALIB.	OBL TUR	ECC TUR	INST. 324 ACTUAL PERIOD	INST. 324 UNIT DEV.	INST. 324 SYSTEM DEV.	INST. 325 ACTUAL PERIOD	INST. 325 UNIT DEV.	INST. 325 SYSTEM DEV.	324/325 DIFF.
10	0	0	2 11	2.761	1946	812	2.775	0.54S	0.51S	2.770	0.29S	0.33S	0.18
45	0	0	1 8	2.042	3212	2053	2.040	0.07F	0.08F	2.041	0.05F	0.03F	-0.05
63	0	0	2 8	2.051	3266	2090	2.045	0.28F	0.29F	2.042	0.45F	0.44F	0.15
94	0	0	1 9	1.981	3098	1888	1.978	0.15F	0.16F	1.981	0.02F	0.01F	-0.15
108	0	0	1 9	1.982	3215	1931	1.992	0.51S	0.49S	1.993	0.53S	0.55S	-0.05
126	0	0	1 10	1.996	3308	2026	1.993	0.12F	0.13F	1.985	0.54F	0.53F	0.40
189	0	0	1 11	1.998	3346	2063	1.995	0.14F	0.15F	1.990	0.41F	0.40F	0.25
252	0	0	1 12	1.932	3215	1875	1.930	0.09F	0.10F	1.930	0.11F	0.10F	0.0

"F" = FAST and "S" = SLOW from the calibrated value.

TABLE 7.2

PAN CAMERA CYCLE RATE ERRORS

FIGURE 7.3.1

FMC MATCH ERROR

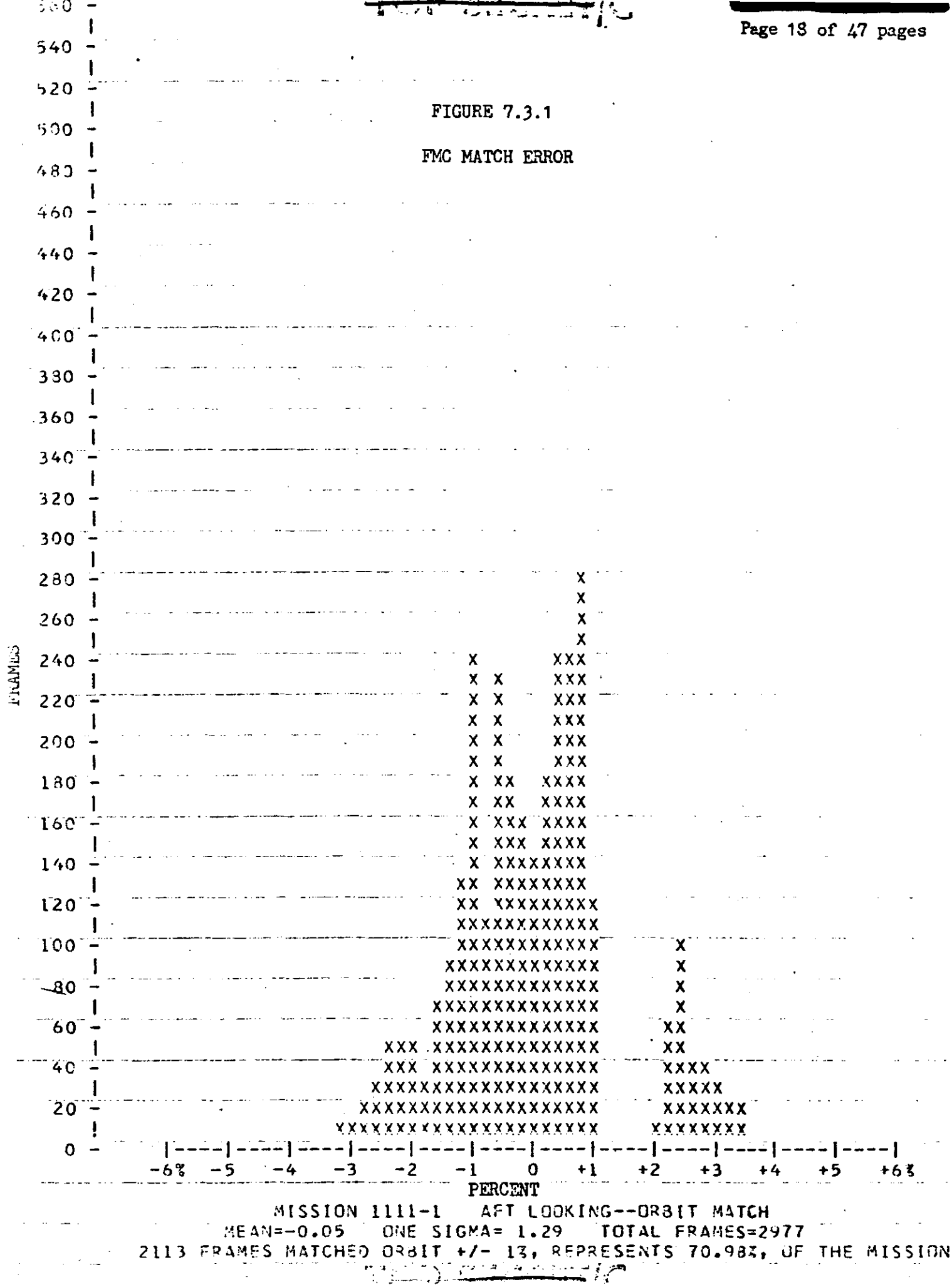
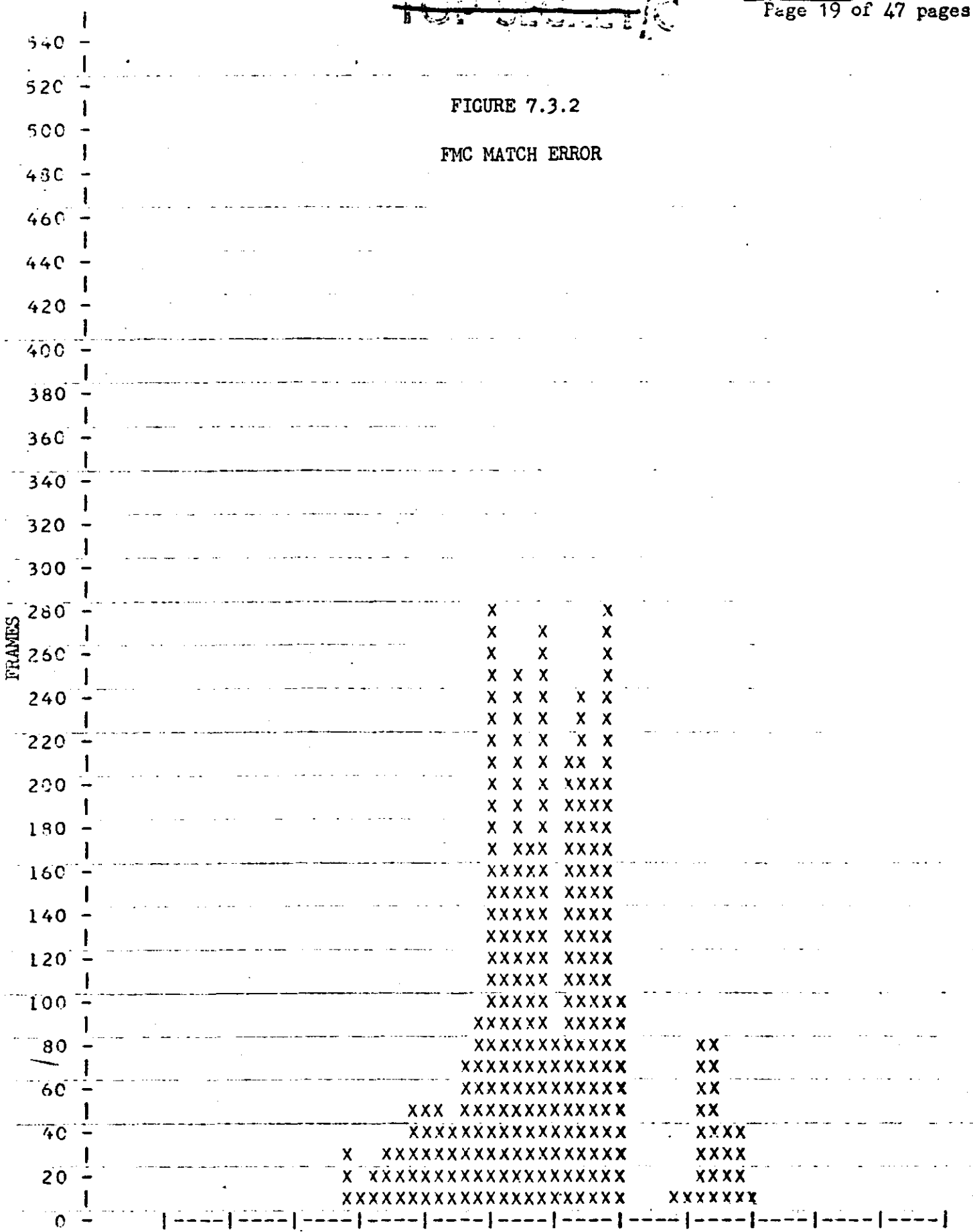


FIGURE 7.3.2

FMC MATCH ERROR



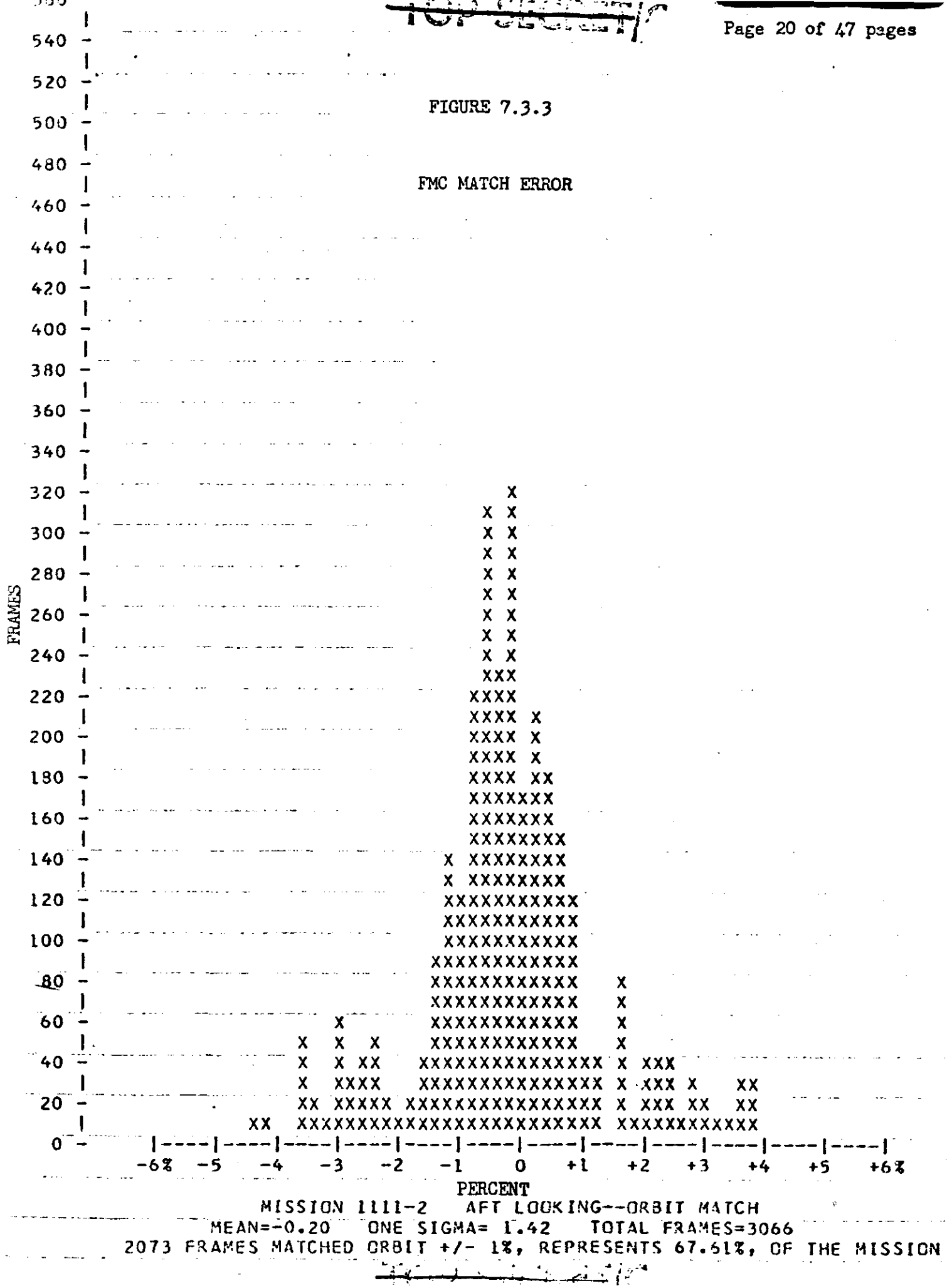
MISSION 1111-1 FWD LOOKING--ORBIT MATCH

MEAN=-0.13 ONE SIGMA= 1.22 TOTAL FRAMES=2977

2248 FRAMES MATCHED ORBIT +/- 1%, REPRESENTS 75.51%, OF THE MISSION

FIGURE 7.3.3

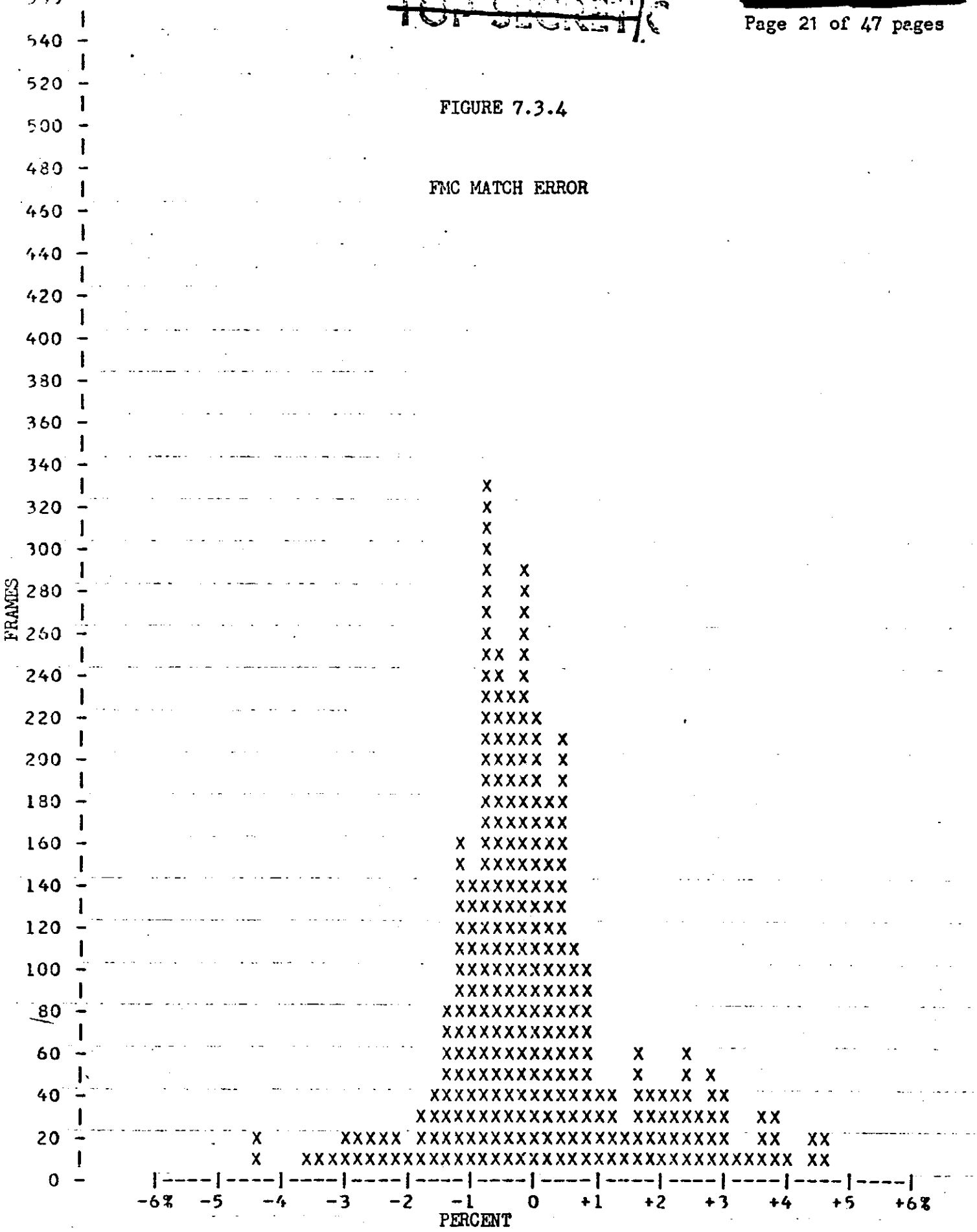
FMC MATCH ERROR



MISSION 1111-2 AFT LOOKING--ORBIT MATCH
MEAN=-0.20 ONE SIGMA= 1.42 TOTAL FRAMES=3066
2073 FRAMES MATCHED ORBIT +/- 1%, REPRESENTS 67.61%, OF THE MISSION

FIGURE 7.3.4

FMC MATCH ERROR



MISSION 1111-2 FWD LOOKING--ORBIT MATCH
MEAN= 0.05 ONE SIGMA= 1.42 TOTAL FRAMES=3075
2109 FRAMES MATCHED ORBIT +/- 1%, REPRESENTS 68.59%, OF THE MISSION

MISSION 1111- AFT LOOKING, TOTAL FRAME COUNT- 2977

FRAME FREQUENCY DISTRIBUTION BETWEEN -6% AND +6% ORBIT MATCH

DISTRIBUTION OVER 61 POINTS INCREMENTED AT .2 PERCENT

PERCENT	FRAMES	PERCENT	FRAMES
		0.0	135
-0.2	157	0.2	182
-0.4	183	0.4	237
-0.6	231	0.6	241
-0.8	111	0.8	277
-1.0	239	1.0	120
-1.2	130	1.2	0
-1.4	94	1.4	0
-1.6	73	1.6	0
-1.8	34	1.8	0
-2.0	49	2.0	9
-2.2	52	2.2	63
-2.4	46	2.4	100
-2.6	29	2.6	37
-2.8	17	2.8	37
-3.0	8	3.0	31
-3.2	8	3.2	18
-3.4	4	3.4	17
-3.6	4	3.6	0
-3.8	4	3.8	0
-4.0	0	4.0	0
-4.2	0	4.2	0
-4.4	0	4.4	0
-4.6	0	4.6	0
-4.8	0	4.8	0
-5.0	0	5.0	0
-5.2	0	5.2	0
-5.4	0	5.4	0
-5.6	0	5.6	0
-5.8	0	5.8	0
-6.0	0	6.0	0

TABLE 7.4.1

MISSION 1111- FWD LOCKING, TOTAL FRAME COUNT- 2977

FRAME FREQUENCY DISTRIBUTION BETWEEN -6% AND +6% ORBIT MATCH

DISTRIBUTION OVER 61 POINTS INCREMENTED AT .2 PERCENT

PERCENT	FRAMES	PERCENT	FRAMES
		0.0	77
-0.2	271	0.2	213
-0.4	166	0.4	240
-0.6	254	0.6	204
-0.8	159	0.8	284
-1.0	281	1.0	99
-1.2	92	1.2	0
-1.4	69	1.4	0
-1.6	39	1.6	0
-1.8	45	1.8	7
-2.0	47	2.0	6
-2.2	46	2.2	80
-2.4	30	2.4	79
-2.6	28	2.6	37
-2.8	24	2.8	37
-3.0	8	3.0	13
-3.2	29	3.2	0
-3.4	4	3.4	0
-3.6	3	3.6	0
-3.8	3	3.8	0
-4.0	3	4.0	0
-4.2	0	4.2	0
-4.4	0	4.4	0
-4.6	0	4.6	0
-4.8	0	4.8	0
-5.0	0	5.0	0
-5.2	0	5.2	0
-5.4	0	5.4	0
-5.6	0	5.6	0
-5.8	0	5.8	0
-6.0	0	6.0	0

TABLE 7.4.2

MISSION 1111- AFT LOOKING, TOTAL FRAME COUNT- 3066

FRAME FREQUENCY DISTRIBUTION BETWEEN -6% AND +6% ORBIT MATCH

DISTRIBUTION OVER 61 POINTS INCREMENTED AT .2 PERCENT

PERCENT	FRAMES	PERCENT	FRAMES
		0.0	169
-0.2	322	0.2	203
-0.4	234	0.4	177
-0.6	310	0.6	154
-0.8	218	0.8	121
-1.0	120	1.0	40
-1.2	144	1.2	40
-1.4	92	1.4	0
-1.6	38	1.6	81
-1.8	21	1.8	14
-2.0	6	2.0	42
-2.2	20	2.2	42
-2.4	49	2.4	42
-2.6	36	2.6	13
-2.8	27	2.8	28
-3.0	62	3.0	15
-3.2	7	3.2	14
-3.4	19	3.4	14
-3.6	50	3.6	30
-3.8	0	3.8	29
-4.0	0	4.0	0
-4.2	9	4.2	0
-4.4	9	4.4	0
-4.6	0	4.6	0
-4.8	0	4.8	0
-5.0	0	5.0	0
-5.2	0	5.2	0
-5.4	0	5.4	0
-5.6	0	5.6	0
-5.8	0	5.8	0
-6.0	0	6.0	0

TABLE 7.4.3

MISSION 1111-2 FWD LOOKING, TOTAL FRAME COUNT- 3075

FRAME FREQUENCY DISTRIBUTION BETWEEN -6% AND +6% ORBIT MATCH

DISTRIBUTION OVER 61 POINTS INCREMENTED AT .2 PERCENT

PERCENT	FRAMES	PERCENT	FRAMES
		0.0	223
-0.2	292	0.2	175
-0.4	230	0.4	211
-0.6	252	0.6	113
-0.8	333	0.8	97
-1.0	143	1.0	40
-1.2	164	1.2	40
-1.4	76	1.4	24
-1.6	36	1.6	60
-1.8	26	1.8	37
-2.0	6	2.0	43
-2.2	20	2.2	43
-2.4	15	2.4	55
-2.6	17	2.6	26
-2.8	15	2.8	47
-3.0	15	3.0	35
-3.2	7	3.2	14
-3.4	7	3.4	13
-3.6	7	3.6	29
-3.8	0	3.8	28
-4.0	0	4.0	13
-4.2	0	4.2	0
-4.4	18	4.4	15
-4.6	0	4.6	15
-4.8	0	4.8	0
-5.0	0	5.0	0
-5.2	0	5.2	0
-5.4	0	5.4	0
-5.6	0	5.6	0
-5.8	0	5.8	0
-6.0	0	6.0	0

TABLE 7.4.4

RE-ENTRY SEQUENCE OF EVENTS

Event	Nominal Time	Sys. Time #1	Delta Time #1	Sys. Time #2	Delta Time #2
Arm	77.00 ± 1.0	5210.43	76.77		
Transfer	2.00 ± .25	5285.15	2.05		
Electrical Disconnect	.90 $^{+.43}_{-.40}$	5286.18	1.03		
Separation	- - - - -	5287.20	- -		
Spin	3.40 ± .30	5289.57	3.39		
Retro	7.55 ± .45	5297.15	7.58		
Despin	10.75 ± .54	5307.90	10.75		
T/C Separation	1.50 ± .15	5309.40	1.50		
V/M Close	180.0 ± .42	- - -	- -		
V/M Open	290.0 ± 67	- - -	- -		
"G" Switch Open	Predicted #1 557.7 #2 493.1	5844.37	547.22	75660.44	
Parachute Cover Off	26.0 ± 1.5	5869.38	25.01	75686.63	26.19
Deceleration Chute Deployed	.58 ± .10	5869.93	.55	75687.16	.53
Main Chute Bag Separate	10.25 ± 1.5	5881.04	10.11	75698.35	11.19
Main Chute Deployed	.52 ± .13	5881.54	.50	75698.85	.50
Main Chute Disreef	4.50 ± .80	5886.14	4.60	75703.24	4.39
K-10 Reset	28.0 ± 1.9	5897.43	28.05	75713.64	27.01

TABLE 7.5

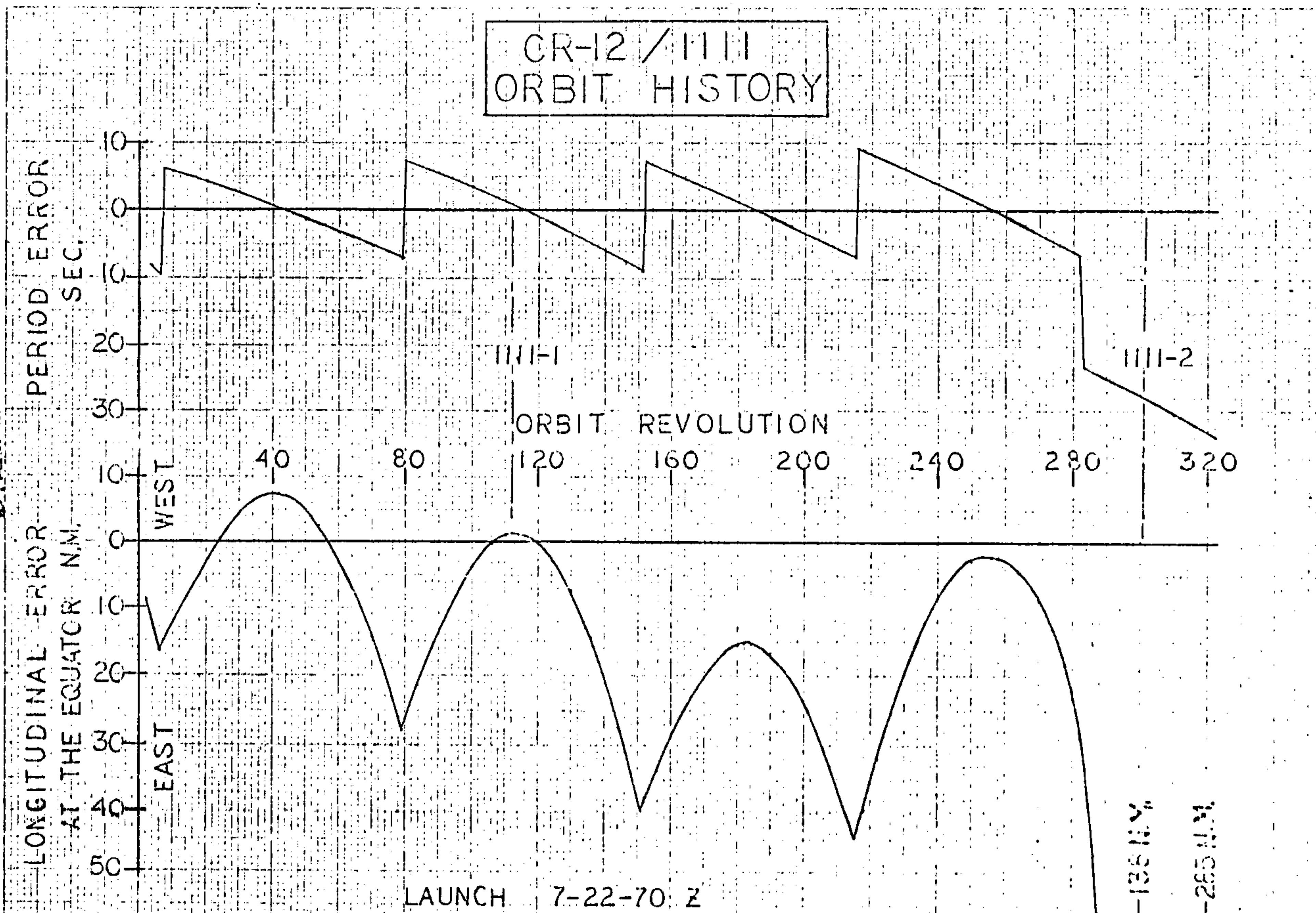


FIGURE 7.6.1

SECRET/C

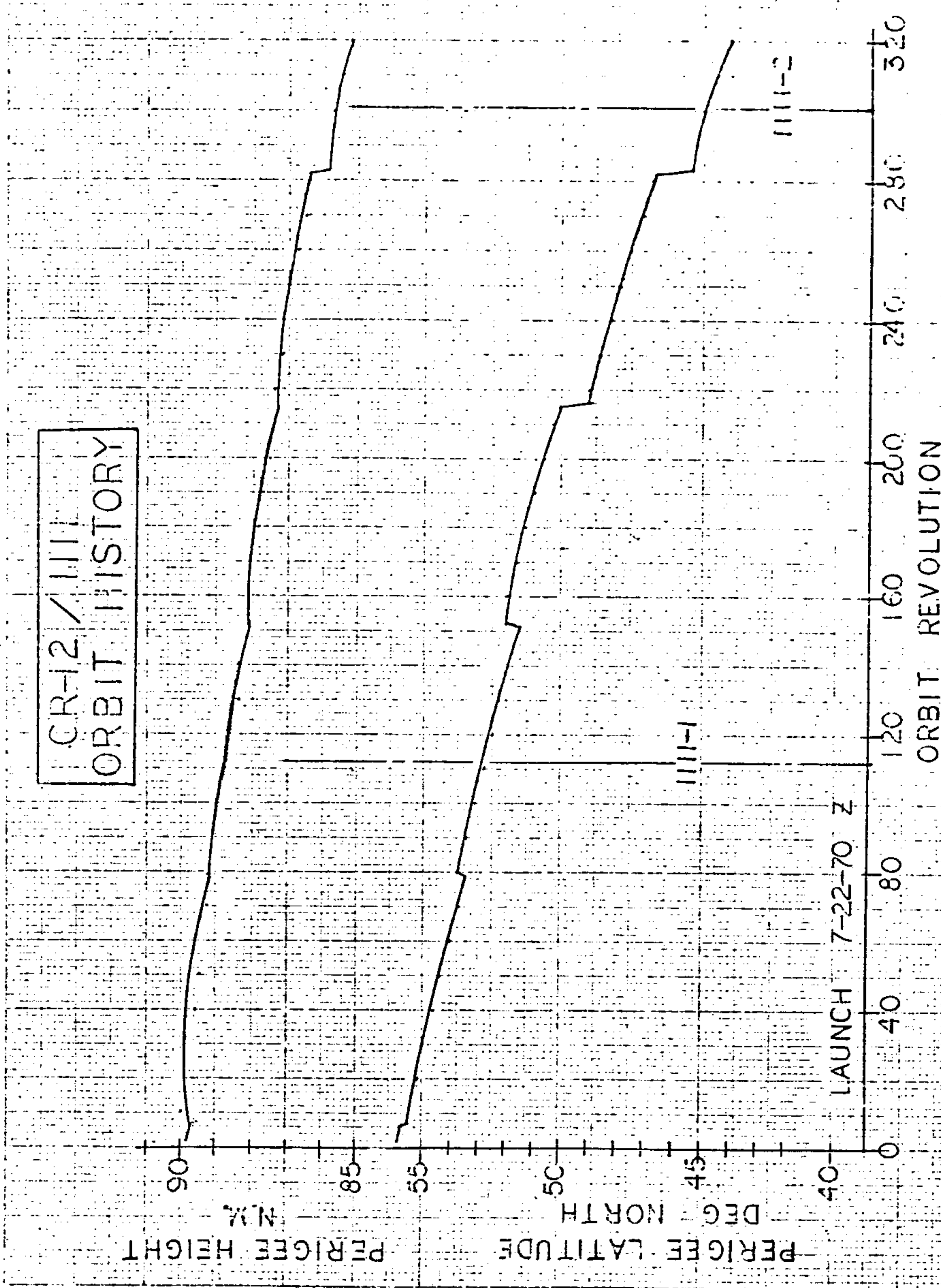

CR-12 / 1111
ORBIT HISTORY
PERIGEE HEIGHT N.M.
PERIGEE LATITUDE DEG NORTH
90
85
55
50
45
40
1111-1
1111-2
LAUNCH 7-22-70 Z
0
40
80
120
160
200
240
280
320
ORBIT REVOLUTION

FIGURE 7.6.2

1111/CR-12 OPERATIONS

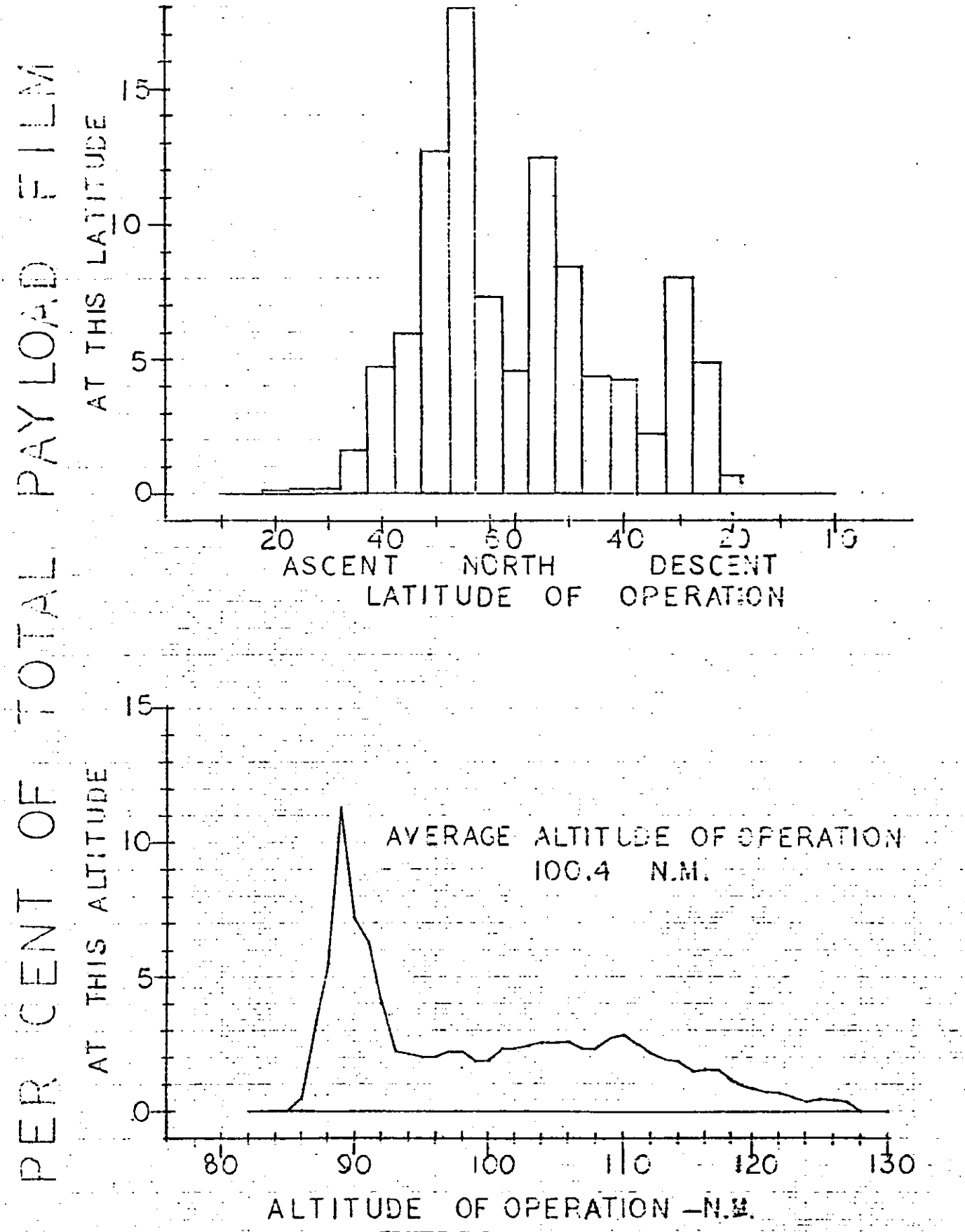


FIGURE 7.7

~~SECRET~~/C

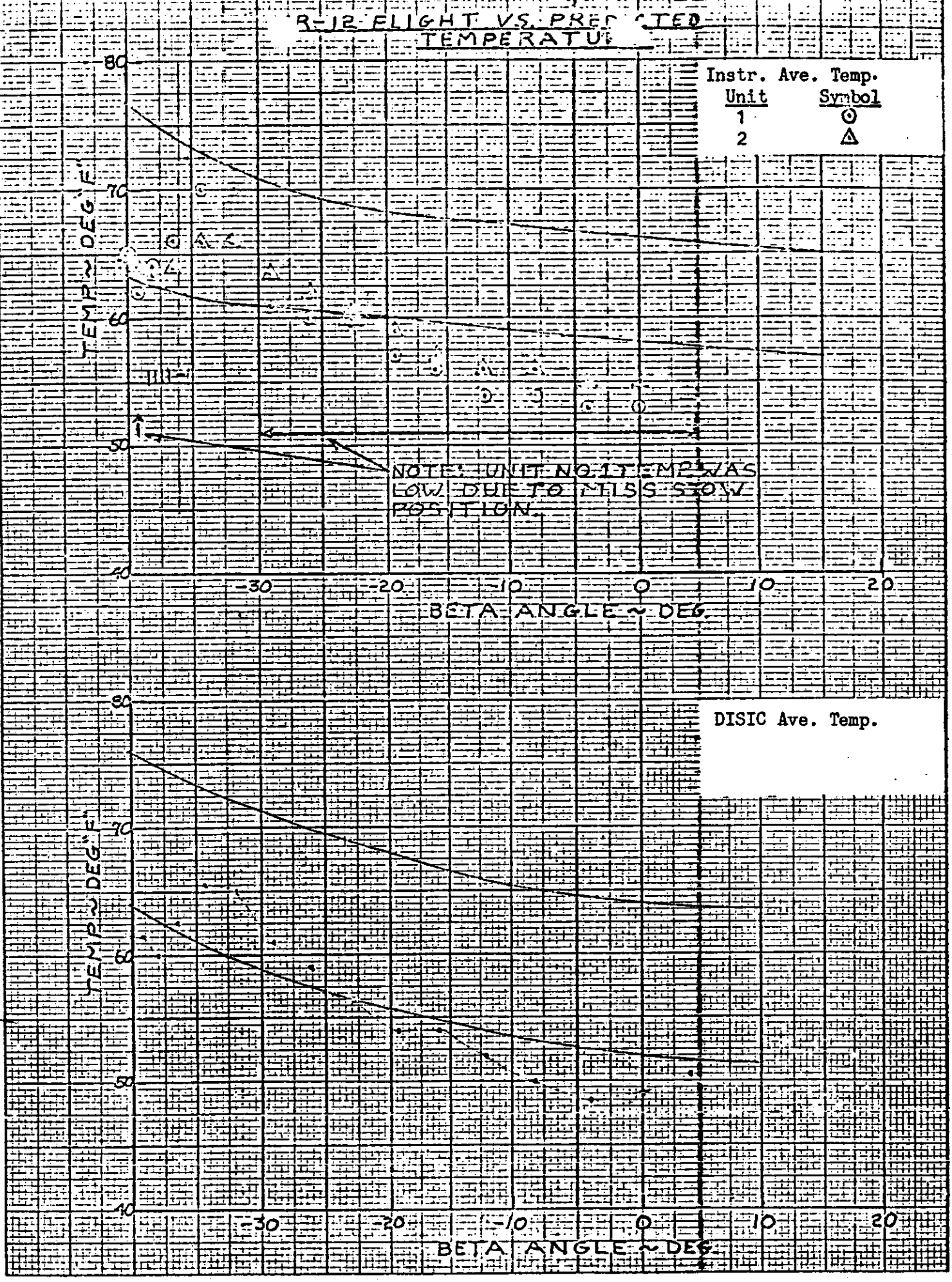


FIGURE 7.8.1 ~~TOP SECRET~~

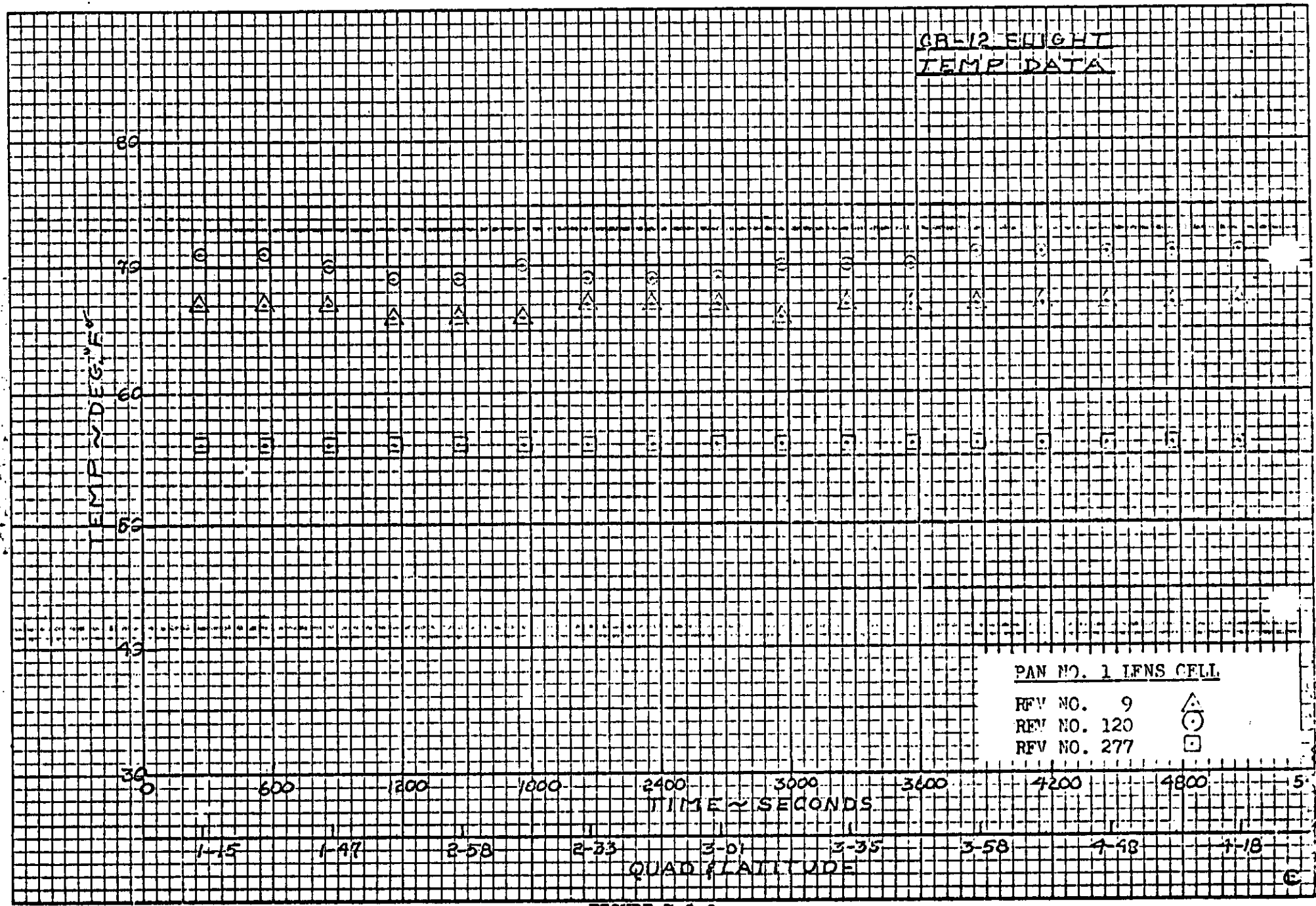


FIGURE 7.8.2

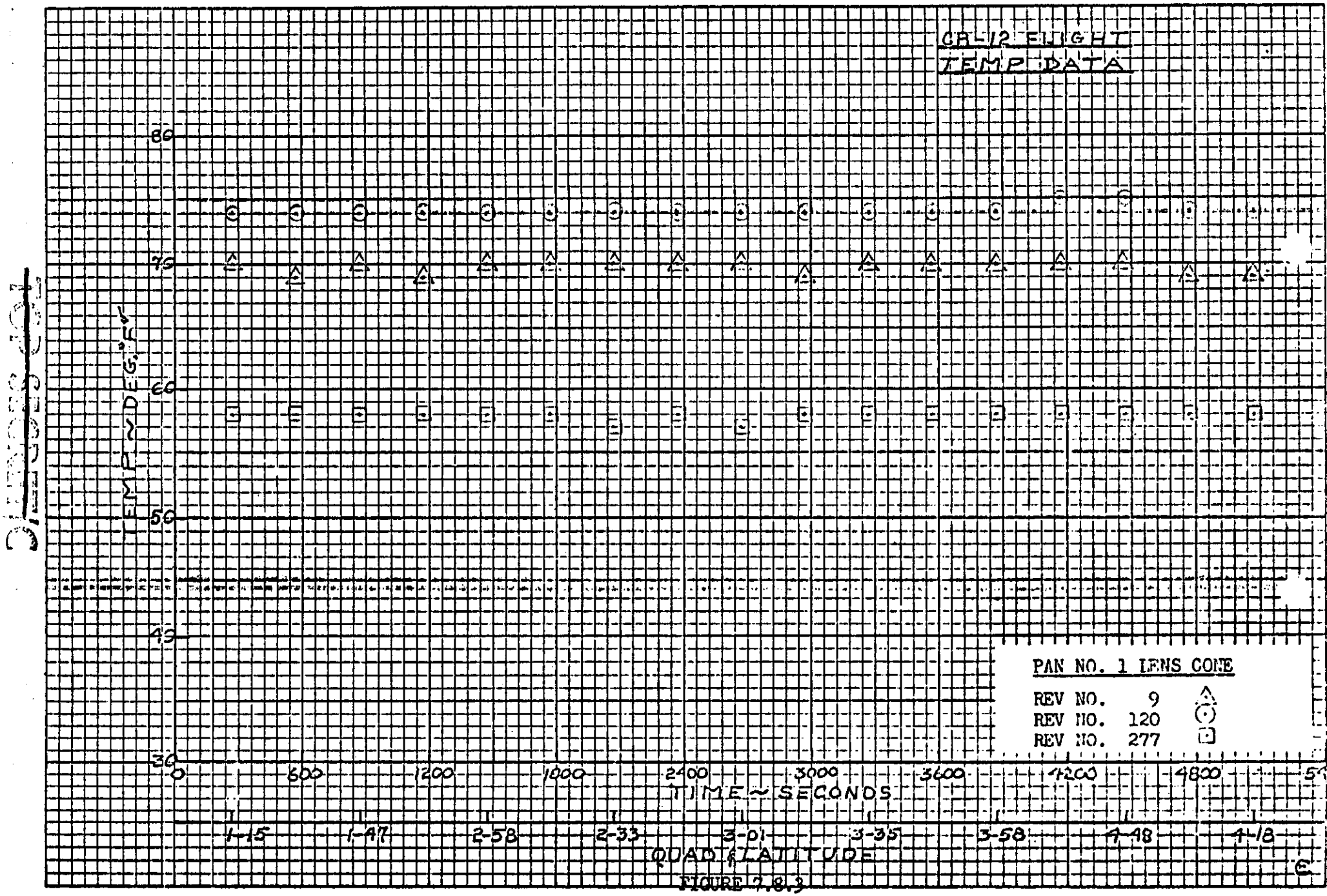


FIGURE 7.8.3

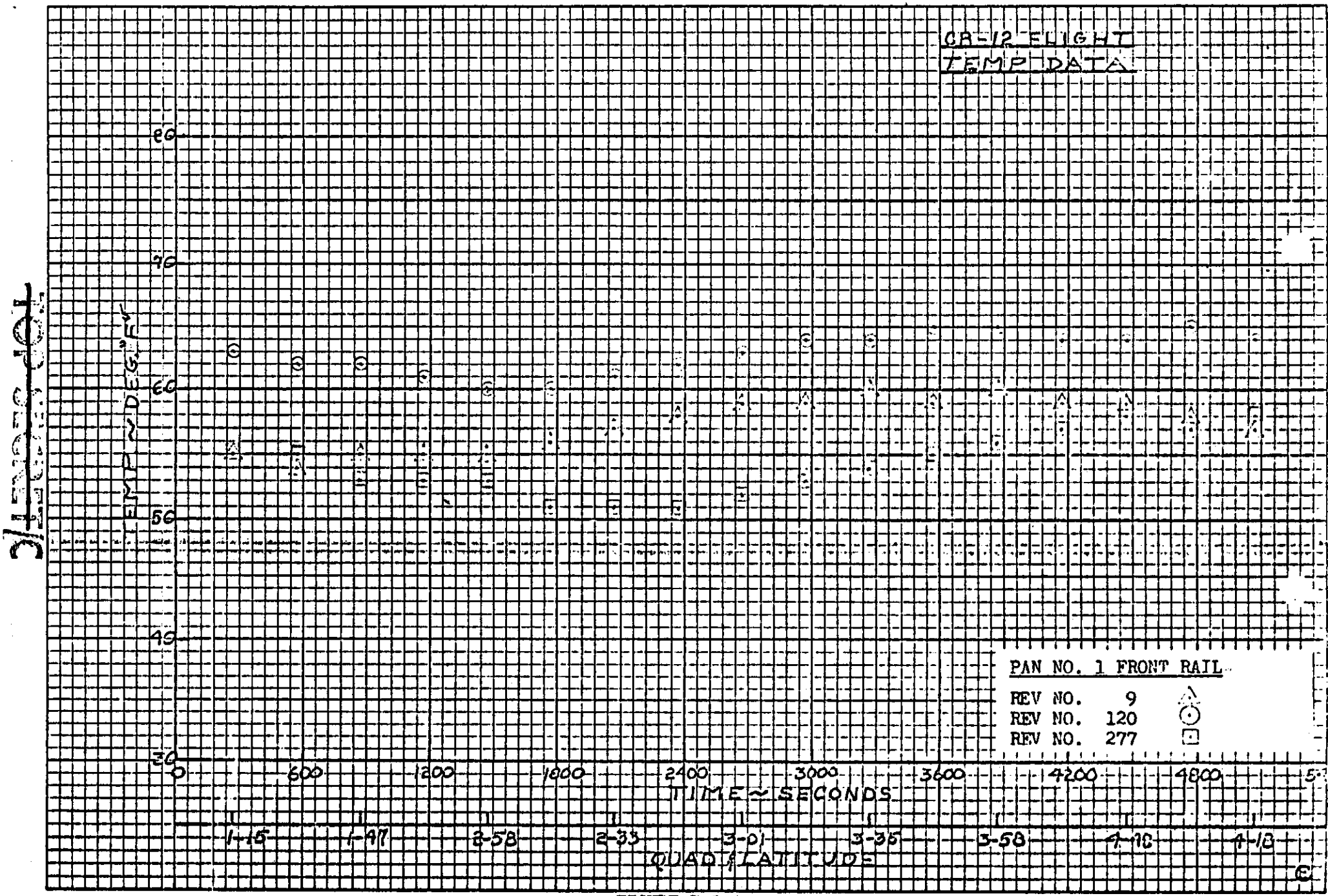


FIGURE 7.8.4