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CORONA CR

MISSION SUMMARY

AND

TELEMETRY ANALYSIS

MISSION 1116

AGENA 1661/PAYLOAD CR-16

10 MAY 1972

Prepared by [redacted]

Reviewed by [redacted]

Approved by [redacted]
Manager
Advanced Projects

Distribution:

[redacted]

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1.0 SUMMARY

Mission 1116 utilized a Thorad booster (SLV-2H) S/N 569, Agena vehicle 1661, and payload system CR-16. The CR-16 payload system contained panoramic cameras S/N 332 and S/N 333. Payload profile and additional component serial numbers are included in Figure 7-1.

Liftoff occurred at 1344 PST on April 19, 1972 from the Vandenberg SLC-3 west pad. All payload ascent events were normal with In-flight Reset (door ejection), AP to orbit mode, instrumentation switchover, and panoramic camera transfer to orbit mode occurring as programmed. The orbit attained was within the three sigma of predicted.

The normal mission plan was 8/11 days with an actual of 11/8 days.

Panoramic cameras S/N 332 and 333 performed normally throughout the flight with the film supply of both instruments exhausted on Rev 300.

The panoramic camera A to B transfer sequence was performed on Rev 155 [redacted] with all events occurring normally. The -1 mission recovery capsule was recovered by air catch on Rev 180 at 1702 PDT on April 30, 1972. The -2 mission recovery capsule was recovered by air catch on Rev 309 at 1535 PDT on May 8, 1972.

The -1 and -2 mission SRV tape recorder systems performed normally with all data extracted.

The twelve second instrumentation delay timer failed on Rev 89 [redacted] with the relays latched in the instrument mode for the duration of the flight.

The vehicle link I failed on Rev 105 [redacted] and remained inoperative for the remainder of the flight.

The slope programmer, switch programmer, command system, pressure make-up system, clock system, and the thermal environment were normal throughout the flight.

2.0 SUBSYSTEM PERFORMANCE

2.1 Panoramic Camera. Panoramic cameras S/N 332 and 333 performed normally during the -1 and -2 missions.

2.1.1 Film Consumption and Type.

	Frames	
	Pan 332	Pan 333
Sample	21	21
Pre-Launch	133	133
-1 Mission	2938	2936
-2 Mission	3083	3083
Total	6,175	6,173

Film Supply Length and Type

Pan 332	Pan 333
16,300 FT/3414	16,300 FT/3414

2.2 Command and Control.

2.2.1 Command System. The DSR malfunctioned three times during the flight, with no impact on the mission. On Rev 66 [redacted] and Rev 288 [redacted] the DSR memory did not erase when receiving the Silo 309 command. The load was disabled with a Silo 319, the next Silo 309 did erase the DSR memory. The block load was then sent and disabled. In testing the DSR in its early stages, this problem had been observed in some units, these units were reworked to eliminate the problem. There is no record of this DSR unit being reworked. On Rev 129 [redacted] a new block load was sent which contained 4 Silo 309's, 4 Silo 319's and 12 Silo 309's. This command was made to eliminate a question of not erasing the DSR memory. Although the DSR memory was erased, a problem occurred, the third word, not the first, in memory was shifted to the out put register upon execution of the next Silo 319. This new block

was used once only and due to lack of data, this problem could not be resolved.

2.2.2 FMC Match. The ramp to orbit match was maintained satisfactorily throughout the flight. Approximately 84% of the first mission operations and 75% of the second mission operations were less than ± 1.0% mismatch error.

2.2.3 Exposure Control System. The slit width control programmer performed satisfactorily throughout the -1 and -2 missions.

2.3 Data Systems.

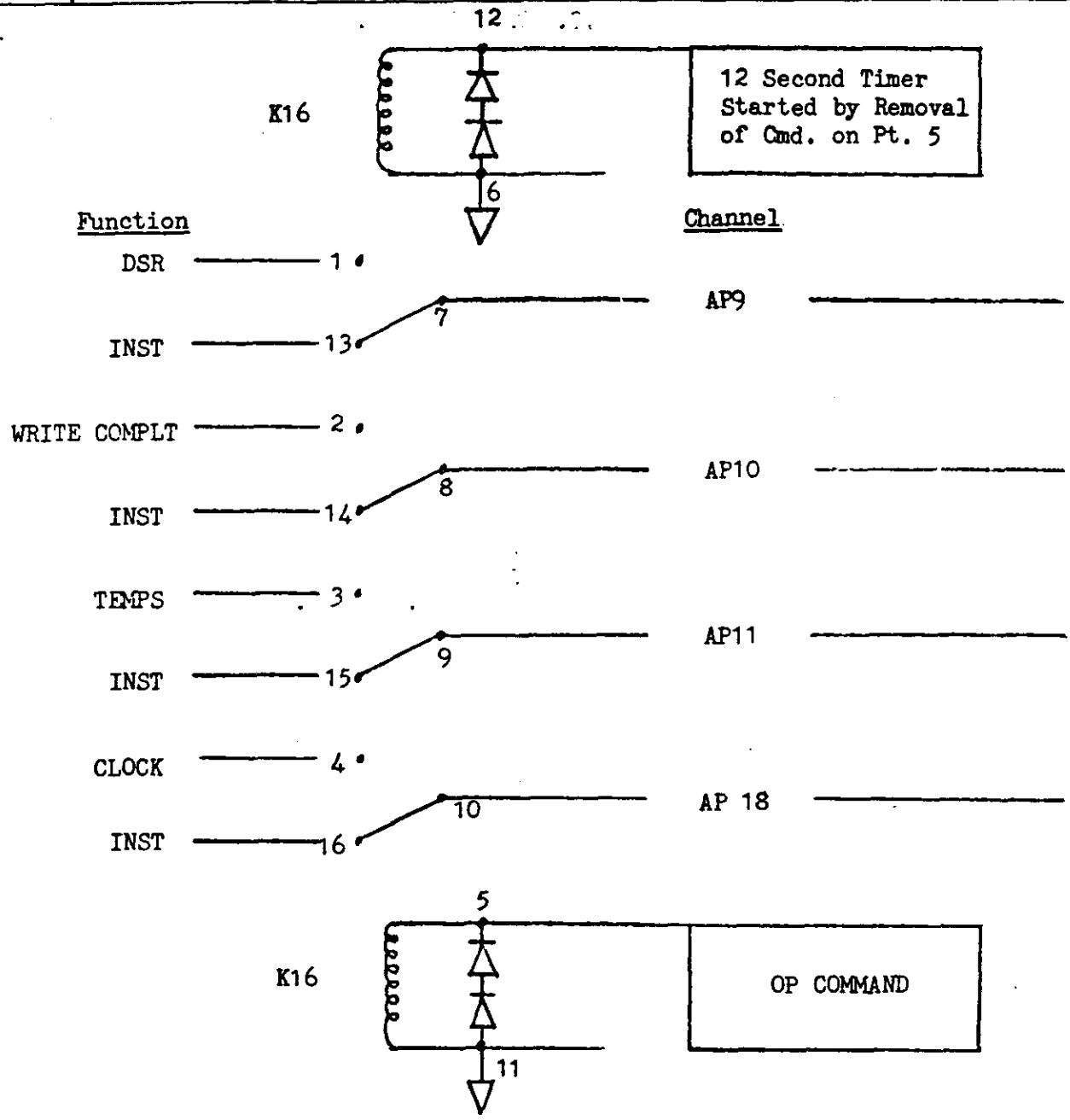
2.3.1 Instrumentation. The instrumentation system performed normally through Rev 88. The twelve (12) second telemetry delay timer failed on Rev 89 [redacted] This resulted in the following telemetry channels to be locked in the instrument mode, Link I CH 9, 10, 11, and 18. The relays remained latched in the instrument mode for the remainder of the flight. (Refer to Figure 2.3.1)

The vehicle telemetry Link I failed on Rev 105 [redacted] and resulted in the use of Link II for both the operational and diagnostic data verification. Link I remained inoperative for the duration of the flight.

The slit width telemetry monitor on instrument No. 1 was intermittent throughout the flight. However, there was no operational impact.

2.3.2 Clock System. The payload clock system performed satisfactorily throughout the -1 and -2 missions. Due to failure of the 12 second delay timer, the real time verification of the clock system was not possible. However, the parallel clock word on the film performed satisfactorily throughout the flight.

Checked			[redacted]	Model
Approved			12 SECOND TIMER FUNCTIONAL SCHEMATIC	Report No.



Problem noted on Rev 89 [redacted]

No OP on Rev 89
OP on Rev 90
Channels (some) changed level

FIGURE 2.3.1 (Shown in failed condition)

[redacted]

Third Order Fit

System Time = $A_o + A_1$ (Clock Time) + A_2 (Clock Time)^2 + A_3 (Clock Time)^3

A_o = 0.9321553467460832 + 05

A_1 = 0.9999999354786997 + 00

A_2 = 0.1105562847760144 - 12

A_3 = 0.1226092317364113 - 18

Sigma = 0.00127336

Number of Points = 161

2.3.3 SRV Tape Recorder. The -1 SRV tape recorder performed normally throughout the -1 mission with 102.7 minutes of data retrieved satisfactorily. The -2 SRV tape recorder performed normally throughout the -2 mission with 109.8 minutes of data retrieved satisfactorily.

2.4 Recovery.

2.4.1 -1 Mission. The -1 recovery capsule was successfully recovered by air catch on Rev 180 at 1702 PDT on April 30, 1972. All re-entry events were within tolerance with the impact close to nominal. Refer to Table 7.5.

	Actual	Predicted
Impact Location	24° 37N 172° 30W	24° 44.6N 172° 38.7W

2.4.2 -2 Mission. The -2 recovery capsule was successfully recovered by air catch on Rev 309 at 1535 PDT on May 8, 1972. All re-entry events were within tolerance with the impact within 5 miles of the predicted. Refer to Table 7.5.

	Actual	Predicted
Impact Location	27° .06N 166° 49W	27° .53N 166° 51.4W

3.0 ORBITAL PERFORMANCE

3.1 Orbital Parameters.

Parameter	Predicted	Tolerance	Actual(STC)	Actual(APF)
Period (min.)	88.67	+0.35,-0.37	88.85	88.85
Perigee(min.)	84.5	+9,-9	83.8	83.8
Apogee(min.)	146.2	+13,-16	152.8	152.3
Eccentricity	0.0088	+0.0027,-0.0030	0.0101	0.0091
Inclination(deg.)	81.50	+0.18,-0.16	81.46	81.48
Arg. of Perigee(deg.)	146	+79,-68	165.4	166

3.2 DMU Operation. The initial orbit period was high by the impulse energy of one DMU rocket. Thus, the ground track location errors were large prior to the first DMU rocket firing. Throughout the remainder of the flight, the ground track error was maintained at approximately 170 N.M. west of the nominal at the equator.

Eight of the twelve DMU rockets were used to maintain period control. Refer to Table 3.2.1 for DMU rocket firings.

TABLE 3.2.1

DMU Performance

Rocket No.	Rev No.	System Time (Sec)	Period Change (Sec)	Velocity Change (Ft/Sec)	Period at Firing (Min)	Impulse (Lb/Sec)
1	61	56934	14.60	23.32	88.49	3106
2	101	11674	14.93	23.81	88.43	3160
3	134	14216	14.75	23.60	88.43	3031
4	158	55635	14.45	23.12	88.44	3019
5	186	31240	15.75	25.25	88.44	2920
6	223	55392	15.50	24.78	88.35	2876
7	249	21130	16.09	25.67	88.41	2967
8	291	70437	16.19	25.83	88.42	2956

NOTE: DMU Rockets 9 and 10 were fired after Event 2.

4.0 ENVIRONMENTAL CONTROL

4.1 Pressure Make-up System. The pressure make-up system (PMU) operated properly throughout the flight. There were 163 panoramic camera operates for a total of 195.5 minutes which resulted in a gas consumption rate of 7.4 psi/min of operate time.

4.2 Thermal Environment. The temperature data obtained indicated the temperature environment was within the pre-flight predictions through Rev 88. The real time temperature data was lost when the 12 second delay timer failed. The temperature environment for the remainder of the flight was obtained once a day from the vehicle tape recorder. The averages of the panoramic camera temperatures ranged from 60°F to 65°F for S/N 332 and 60°F to 64°F for S/N 333 during the flight.

Refer to Tables 7.8.1 and 7.9.1 thru 7.9.4.

The on-orbit temperature profiles for Rev 138 and Rev 300 are included in Figures 7.8.2 thru 7.8.11.

5.0 POST EVENT 2 TESTING

The panoramic cameras were enabled at the end of the H-timer tape in order to deplete the surplus vehicle power. No other payload testing was performed.

6.0 HARDWARE DEFINITION

6.1 Agena. FTV 1661 was an Agena vehicle (SS01B) and a Thorad booster (SLV-2H) S/N 569. The Agena was oriented nose first with the following configuration:

1) Twelve Thiokol 3000 lb/sec DMU rockets.
2) Three primary control gas spheres with the -5 heavy control gas mixture.
3) -3 payload system with a digital storage register (DSR) and the capability of accepting both Silo and Uncle commands.
4) Three 1K battery configuration with a Ten Panel, single wing solar array system.
5) 3/4 speed Type VIII programmer (325 subcycles).
6) Aft payloads - [redacted]
7) High density acid (HDA) oxidizer and new fuel Hyperzine 300.
8) Three real-time tape recorder control commands.
9) Four Silo/Uncle commands for RP SSD-987 and RP SSD 980 payloads.
10) Link II nominal frequency (Previous vehicle utilized Link III frequency).

6.2 Payload. The CR-16 payload system configuration included the following:

1) Panoramic Camera
   a) Constant rotating type with a servo-controlled supply cassette.
   b) Digital Storage Register/Cascade system utilized for camera enable/disable.

c) Emergency program back-up available by RTC.

UHF 116/Silo 316 Emergency Program Select

UHF 118/Silo 318 Emergency Intermix Select

UHF 120/Silo 320 Emergency Mode Select

d) Exposure control

d.1) Programmer control by Stored Programmer Command (SPC) (51,52,17) and Real Time Command (RTC) UHF 105/Silo 305.

d.2) Automatic slit width control with override by RTC UHF 101-UHF 126/Silo 301 - Silo 326.

e) Filter Selection

e.1) Control by RTC UHF 103-104/Silo 303/304.

e.2) The automatic filter change capability through the material change detector (MCD) was disconnected prior to launch.

2) FMC Programmer

a) Initiated by SPC 14 and SPC 27.

b) Control delay increment by RTC UHF 125/Silo 325.

c) Ramp profile by:

UHF 121/Silo 321 Eccentricity start level.

UHF 122/Silo 322 Eccentricity half cycle.

3) Pressure Make-up System

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

b) Two bottle system

4) Panoramic camera "A" to "B" transfer available by RTC KIK-Silo 38.

5) Yaw steering available by RTC UHF 106/Silo 306.

6) Agena tape recorder for on-orbit temperature profiles time shared with vehicle data.

7) SRV tape recorder available in -1 and -2 recovery capsule for camera diagnostic data.

8) Payload weight: EWO = 1717 lbs.

9) Instrumentation: RTC UHF 127/Silo 327 for operational/diagnostic commutator selection.

10) Thermal Configuration: The top black surface was 56 degrees on the fairing and 76 degrees on the conic and barrel section. Also a black surface covering 90 degrees of top and bottom and aluminized mystic tape covering 90 degrees on each side.

11) Command system included a DSR for primary operation of the camera system with a two program/4 rev intermix capability.

6.3 Camera and Programmer Settings.

6.3.1 Panoramic Cameras.

	S/N 332	S/N 333
Filter type	W-23A	W-25
Primary	.037 glass	.037 glass
Alternate	.040 glass	.040 glass
Slit Width (inches)		
Position 1	0.111	0.134
Position 2	0.130	0.169
Position 3	0.162	0.202
Position 4	0.196	0.244
Failsafe	0.119	0.146

Auxiliary Optics	Take-up	Supply	Take-up	Supply
Filter	W-25	W-25	W-25	W-25
Aperature	F6.3	F8.0	F8.0	F6.3

6.3.2 Exposure Control Settings.

	Seconds
T-1 (40 second increment) initial setting	640
T-3 Slit position 3 duration	160
T-4 Slit position 2 duration	200
T-6Δ	200
T-6	840

NOTE: T-2 and T-5 are disconnected.

6.3.3 FMC Control Settings.

1) Eccentricity function

   a) Period - 3712 seconds

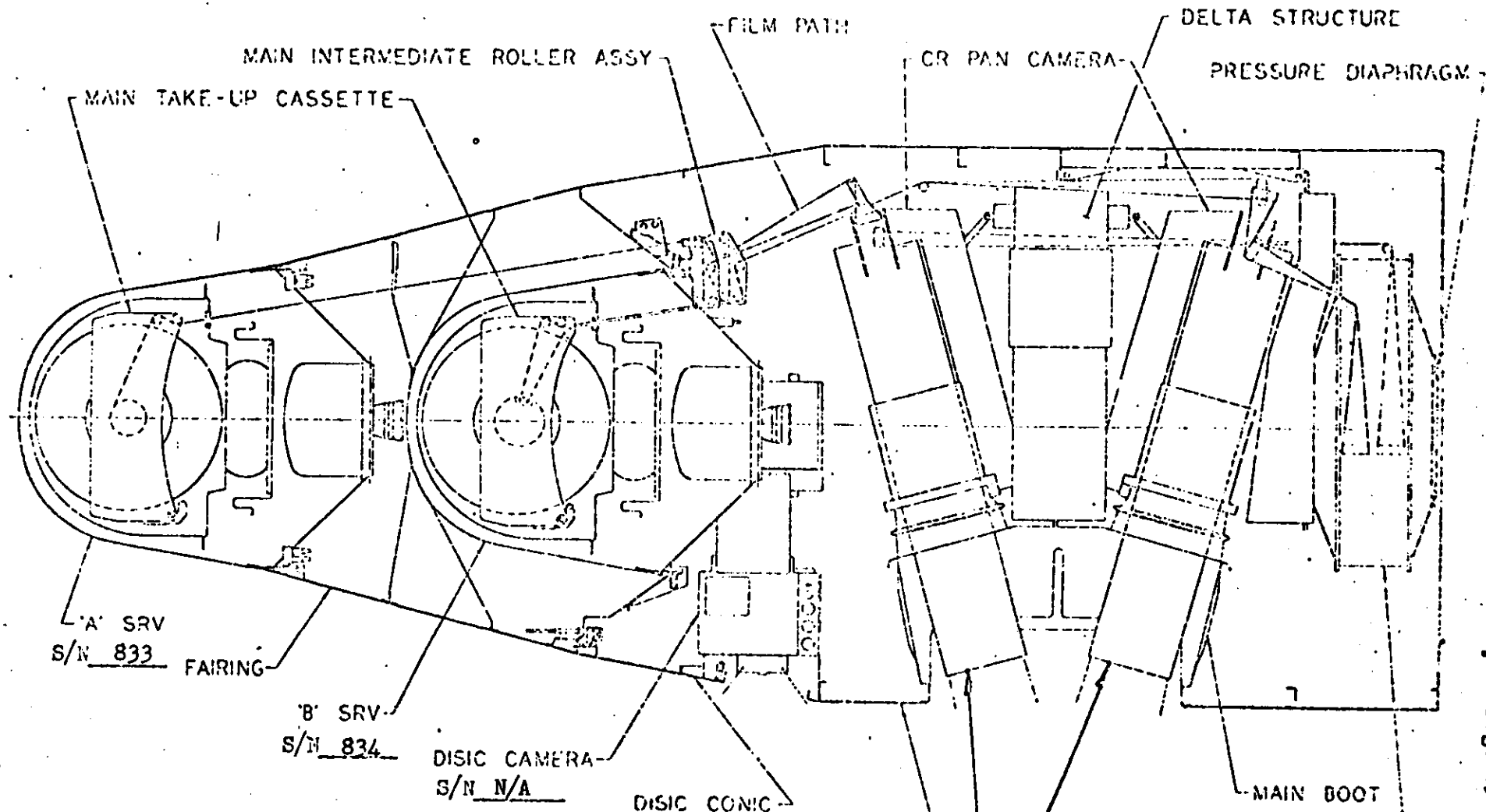
   b) Delay step increment - 50 seconds

2) Oblateness Function

   a) Period - 5249 seconds

   b) Gain factor - 0.1092

2. PAYLOAD PROFILE AND SERIAL NUMBERS



SYSTEM NO. CR-16

TEST Flight

PNU S/N 1018

SLOPE PROGRAMMER S/N 218

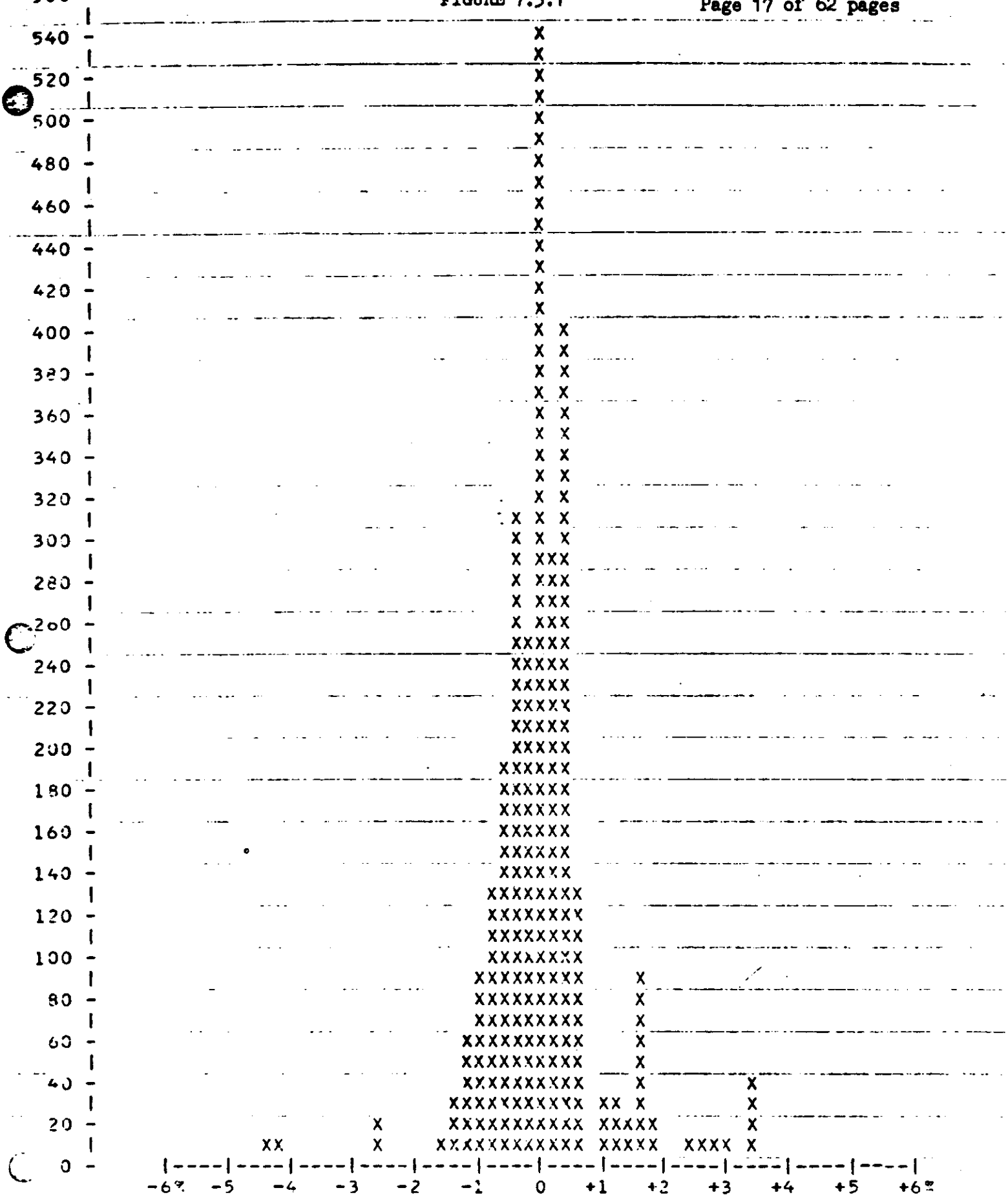
CLOCK S/N 619

SWITCH PROGRAMMER S/N 215

FIGURE 7-1

PANORAMIC CAMERA CYCLE PERIOD DATA

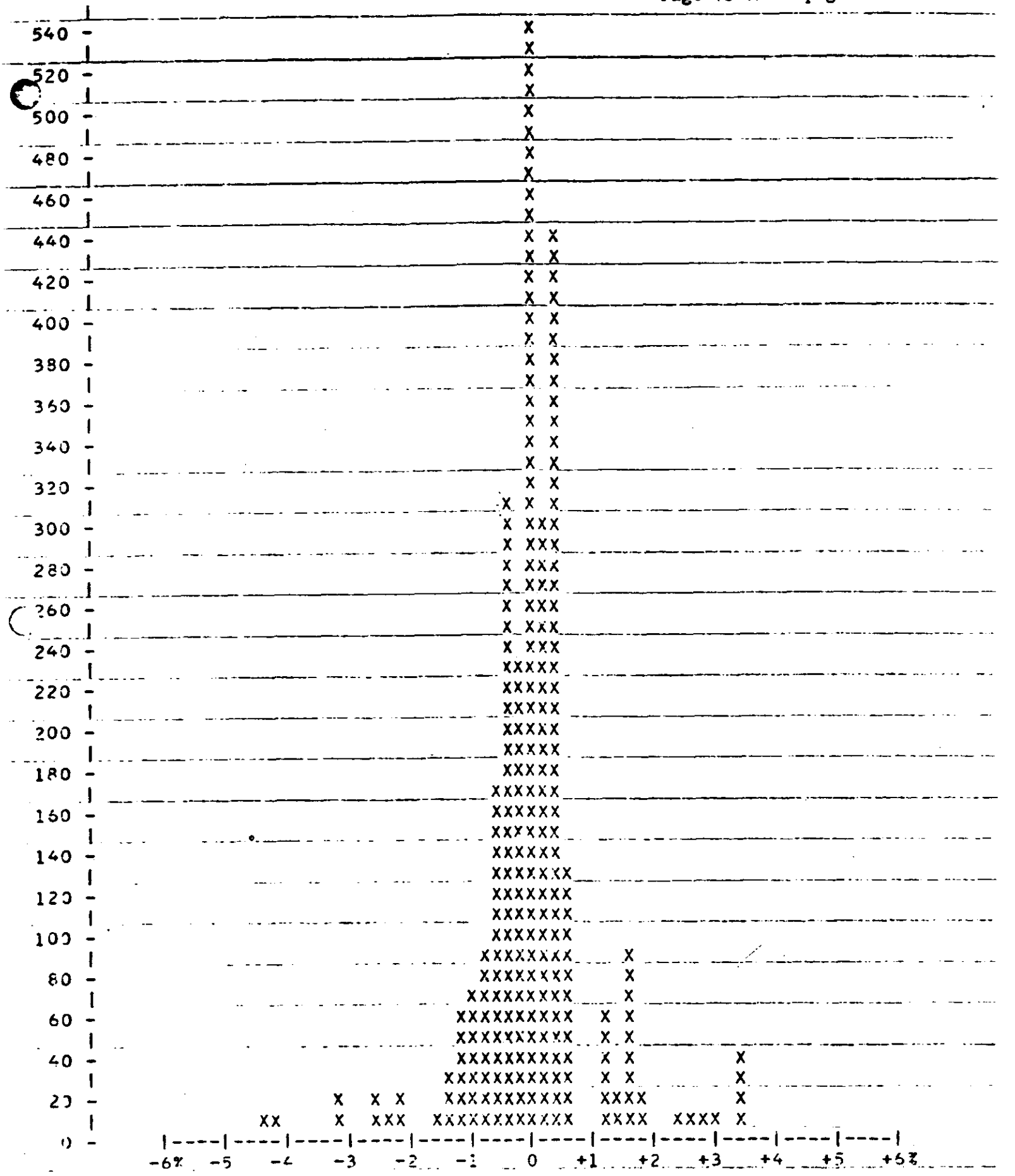
REV	P R	O P	S 1/2 POS.	SYSTEM CALIB.	OBL TUR	ECC TUR	INST. 332 ACTUAL PERIOD	INST. 332 UNIT DEV.	INST. 332 SYSTEM DEV.	INST. 333 ACTUAL PERIOD	INST. 333 UNIT DEV.	INST. 333 SYSTEM DEV.	332/33 DIFF.
9	0	0	1	13	2.841	1925	0	2.810	1.17F	1.10F	2.810	1.05F	1.10F	0.0
30	0	0	1	13	1.977	3275	1462	1.957	1.03F	1.02F	1.955	1.11F	1.12F	0.1C
64	0	0	3	13	1.871	3423	1851	1.870	0.06F	0.05F	1.870	0.04F	0.05F	0.0



MISSION 1116-1 AFT LOOKING--ORBIT MATCH

MEAN= 0.03 ONE SIGMA= 0.94 TOTAL FRAMES=2760

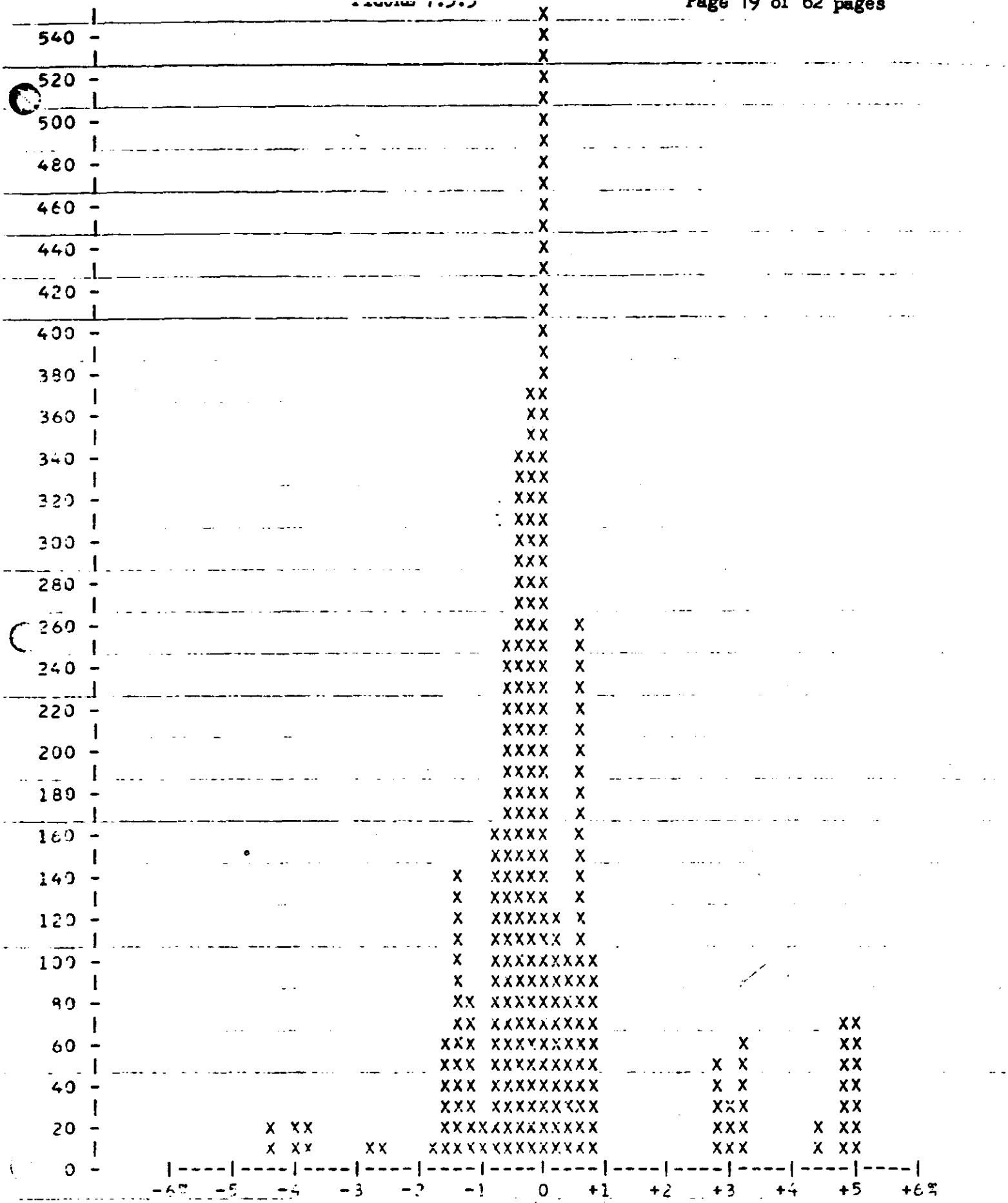
2359 FRAMES MATCHED ORBIT +/- 1σ, REPRESENTS 85.43%, OF THE MISSION



MISSION: 1116-1 FWD LOOKING--ORBIT MATCH

MEAN= 0.01 ONE SIGMA= 1.01 TOTAL FRAMES=2753

2280 FRAMES MATCHED ORBIT +/- 1σ, REPRESENTS 82.67%, OF THE MISSION



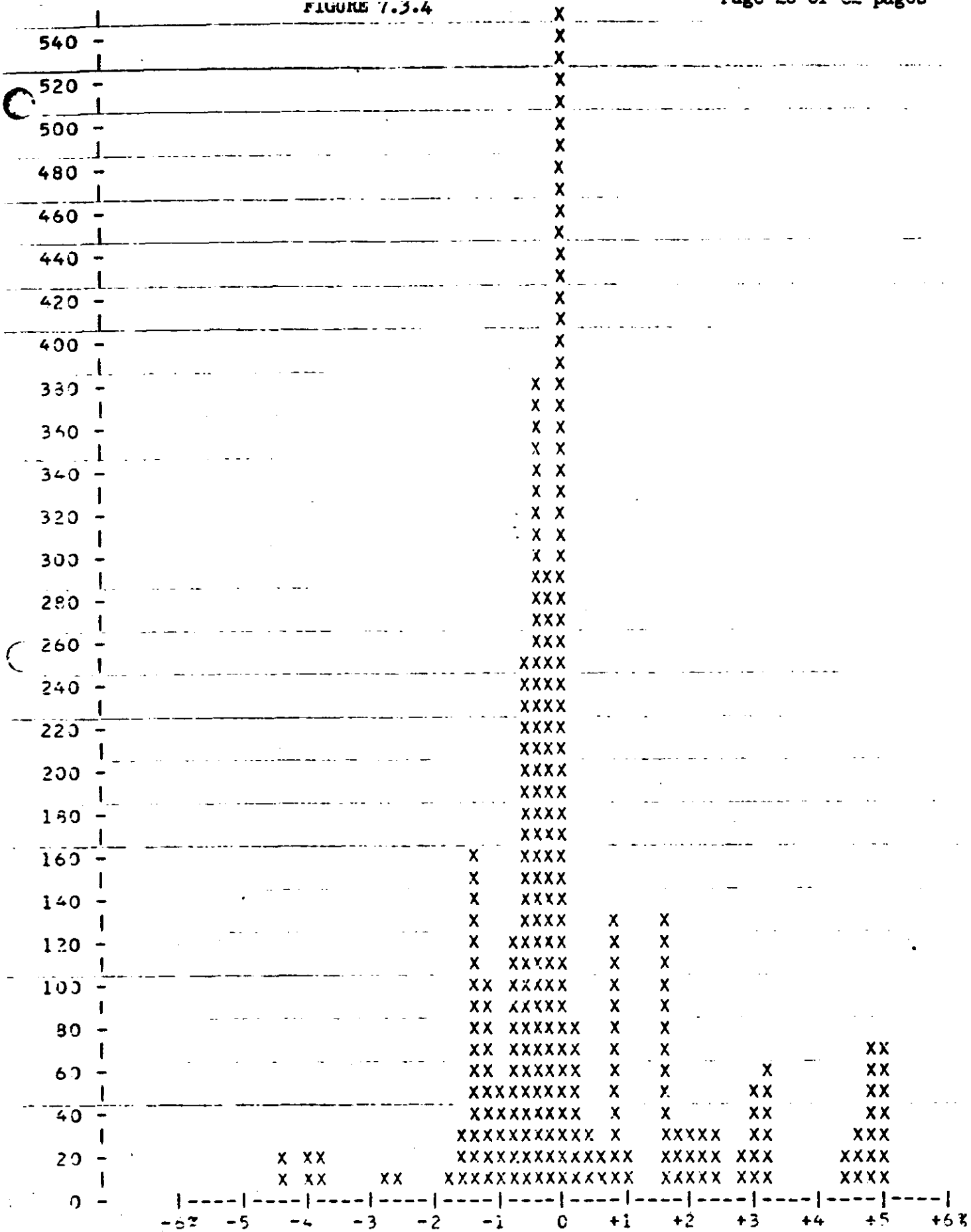
MISSION 1216-2 AFT LOOKING--ORBIT MATCH

MEAN= 0.07 OUT SIGMA= 1.49 TOTAL FRAMES=3102

2477 FRAMES MATCHED 1σ REPRESENTS 7-.05%, OF THE MI

HANDLE VIA

FIGURE 7.3.4



MISSION 1116-2 END LOOKING--ORBIT MATCH

MEAN= 0.21 ONE SIGMA= 1.62 TOTAL FRAMES=3109

2168 FRAMES MATCHED UNIT +/- 1S. REPRESENTS 70.22% OF THE MISSION

[redacted]

HANDLE VIA [redacted]

MISSION 1116-1 AFT LOOKING, TOTAL FRAME COUNT= 2760

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

DISTRIBUTION OVER 61 POINTS INCREMENTED AT .2 PERCENT

PERCENT	FRAMES	PERCENT	FRAMES
		0.0	540
-0.2	251	0.2	294
-0.4	313	0.4	400
-0.6	191	0.6	128
-0.8	125	0.8	0
-1.0	88	1.0	28
-1.2	57	1.2	27
-1.4	27	1.4	24
-1.6	13	1.6	94
-1.8	0	1.8	24
-2.0	0	2.0	0
-2.2	0	2.2	0
-2.4	0	2.4	12
-2.6	22	2.6	12
-2.8	0	2.8	12
-3.0	0	3.0	11
-3.2	0	3.2	0
-3.4	0	3.4	41
-3.6	0	3.6	0
-3.8	0	3.8	0
-4.0	0	4.0	0
-4.2	13	4.2	0
-4.4	13	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 1116-1 FWD LOOKING, TOTAL FRAME COUNT- 2758

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

DISTRIBUTION OVER 61 POINTS INCREMENTED AT .2 PERCENT

PERCENT	FRAMES	PERCENT	FRAMES
		0.0	537
-0.2	232	0.2	304
-0.4	310	0.4	436
-0.6	170	0.6	128
-0.8	90	0.8	0
-1.0	73	1.0	0
-1.2	57	1.2	55
-1.4	27	1.4	24
-1.6	13	1.6	94
-1.8	0	1.8	24
-2.0	0	2.0	0
-2.2	15	2.2	0
-2.4	14	2.4	12
-2.6	22	2.6	12
-2.8	0	2.8	12
-3.0	0	3.0	11
-3.2	19	3.2	0
-3.4	0	3.4	41
-3.6	0	3.6	0
-3.8	0	3.8	0
-4.0	0	4.0	0
-4.2	13	4.2	0
-4.4	13	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 1116-2 AFT LOOKING, TOTAL FRAME COUNT- 3105

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

DISTRIBUTION OVER 61 POINTS INCREMENTED AT .2 PERCENT

PERCENT	FRAMES	PERCENT	FRAMES
		0.0	745
-0.2	367	0.2	121
-0.4	341	0.4	96
-0.6	253	0.6	256
-0.8	159	0.8	98
-1.0	21	1.0	0
-1.2	82	1.2	0
-1.4	136	1.4	0
-1.6	58	1.6	0
-1.8	12	1.8	0
-2.0	0	2.0	0
-2.2	0	2.2	0
-2.4	0	2.4	0
-2.6	12	2.6	0
-2.8	12	2.8	45
-3.0	0	3.0	25
-3.2	0	3.2	62
-3.4	0	3.4	0
-3.6	0	3.6	0
-3.8	16	3.8	0
-4.0	16	4.0	0
-4.2	0	4.2	0
-4.4	23	4.4	21
-4.6	0	4.6	0
-4.8	0	4.8	65
-5.0	0	5.0	65
-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 1116-2 FWD LOOKING, TOTAL FRAME COUNT- 3109

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

DISTRIBUTION OVER 61 POINTS INCREMENTED AT .2 PERCENT

PERCENT	FRAMES	PERCENT	FRAMES
		0.0	909
-0.2	285	0.2	82
-0.4	384	0.4	30
-0.6	248	0.6	18
-0.8	121	0.8	129
-1.0	54	1.0	23
-1.2	100	1.2	0
-1.4	156	1.4	0
-1.6	33	1.6	129
-1.8	12	1.8	27
-2.0	0	2.0	27
-2.2	0	2.2	26
-2.4	0	2.4	26
-2.6	12	2.6	0
-2.8	12	2.8	23
-3.0	0	3.0	48
-3.2	0	3.2	62
-3.4	0	3.4	0
-3.6	0	3.6	0
-3.8	16	3.8	0
-4.0	16	4.0	0
-4.2	0	4.2	0
-4.4	23	4.4	21
-4.6	0	4.6	27
-4.8	0	4.8	65
-5.0	0	5.0	65
-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	Sequence Control	DELTA TIME (SECONDS) Nominal	Unit #1	Unit #2
D-Timer Start		0	0	0
Arm			6.0	6.0
Transfer		81.0 ± .5	80.77	80.78
Elec. Disconnect		82.0 ± .5	81.75	81.77
Separation		83.0 ± .5	82.75	82.78
Spin		3.40 ± .30	3.42	3.42
Retro		7.55 ± .45	7.35	7.52
Despin		10.75 ± .54	10.60	10.77
Thrust Cone Sep.		1.50 ± .15	1.50	1.50
"G" Switch Open Parachute Cover Ejec.		26.0 ± 1.5	24.83	26.40
Deceleration Chute Deploy		.58 ± .08	.55	.55
Ablative Shell Disconnect		.58 ± .08	.55	.55
Main Chute Bag Sep.		10.25 ± 1.5	11.39	11.02
Main Chute Deploy		.52 ± .13	.50	.48
Main Chute Disreef		4.50 ± .80	4.33	4.60
K-10 Reset		28.0 ± 1.9	27.86	28.34

TABLE 7.5

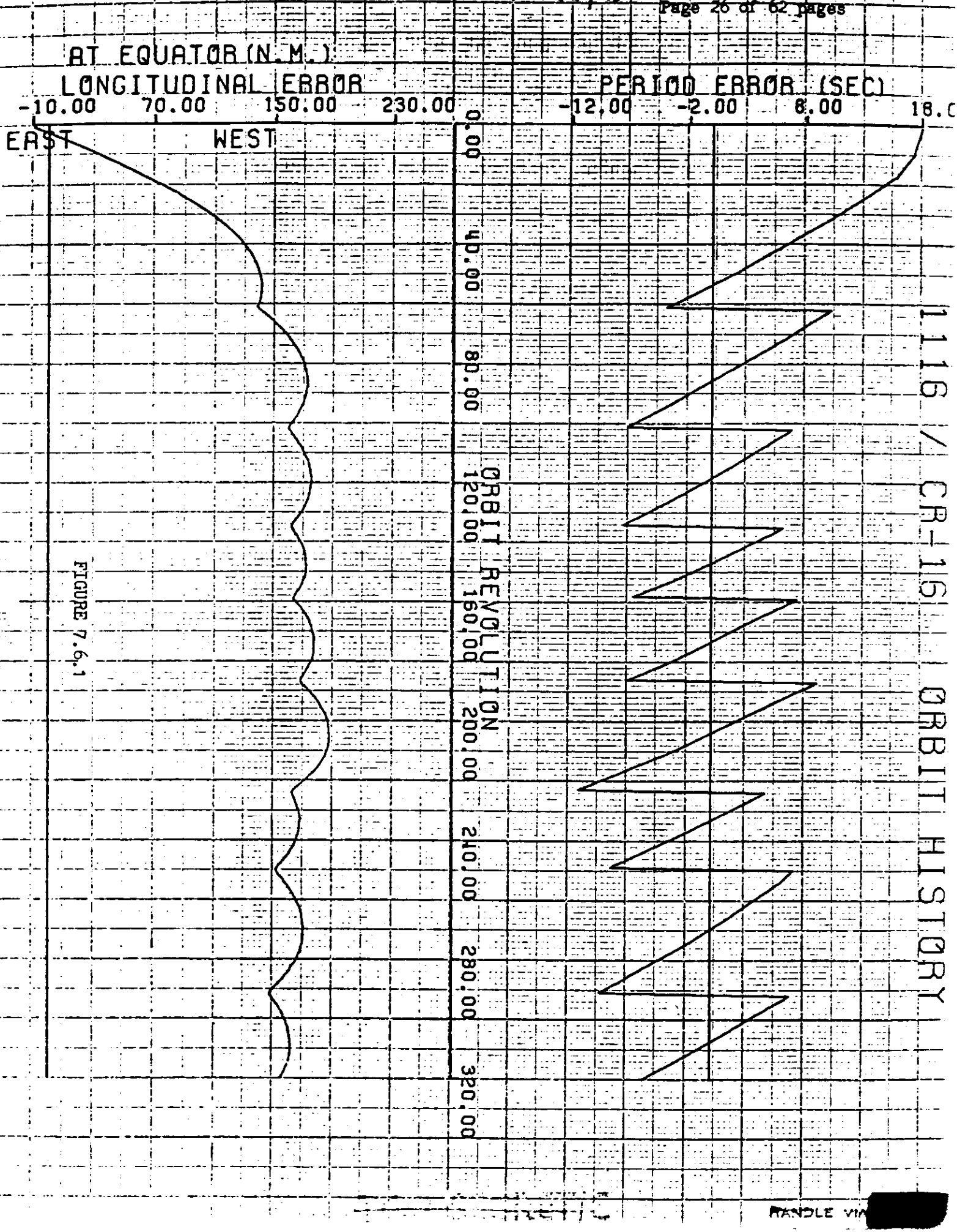

AT EQUATOR (N.M.)
LONGITUDINAL ERROR
-10.00
70.00
150.00
230.00
EAST
WEST
PERIOD ERROR (SEC)
-12.00
-2.00
8.00
18.0
0.00
40.00
80.00
120.00
160.00
200.00
240.00
280.00
320.00
ORBIT REVOLUTION
1116 / CR-15 ORBIT HISTORY

FIGURE 7.6.1

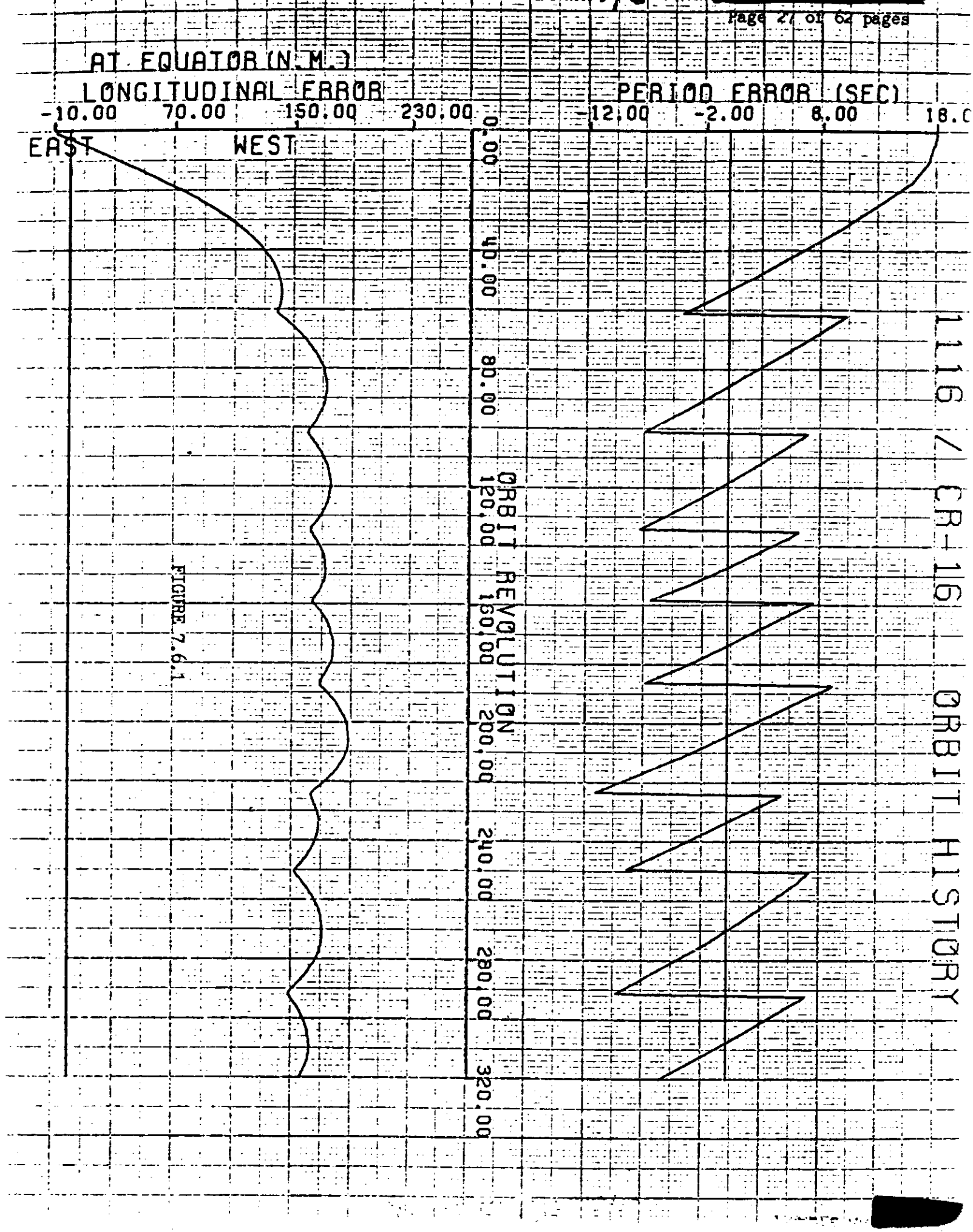

AT EQUATOR (N.M.)
LONGITUDINAL ERROR
-10.00
70.00
150.00
230.00
EAST
WEST
PERIOD ERROR (SEC)
-12.00
-2.00
8.00
18.0
0.00
40.00
80.00
120.00
160.00
200.00
240.00
280.00
320.00
ORBIT REVOLUTION
1116 / CR-16 ORBIT HISTORY

FIGURE 7.6.1

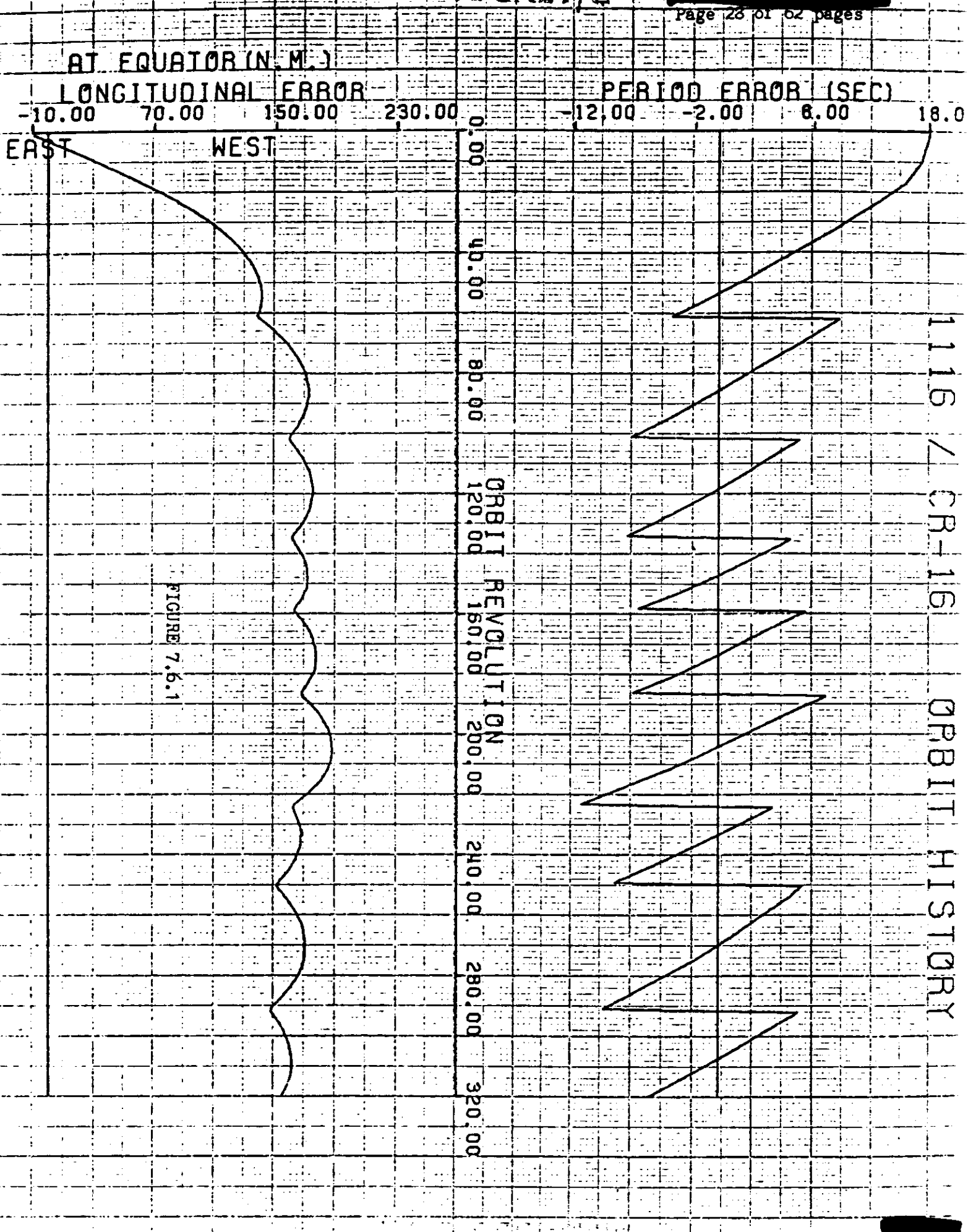

AT EQUATOR (N.M.)
LONGITUDINAL ERROR
-10.00
70.00
150.00
230.00
EAST
WEST
PERIOD ERROR (SEC)
-12.00
-2.00
6.00
18.0
0.00
40.00
80.00
120.00
160.00
200.00
240.00
280.00
320.00
ORBIT REVOLUTION
11116 / CR-116 ORBIT HISTORY

FIGURE 7.6.1

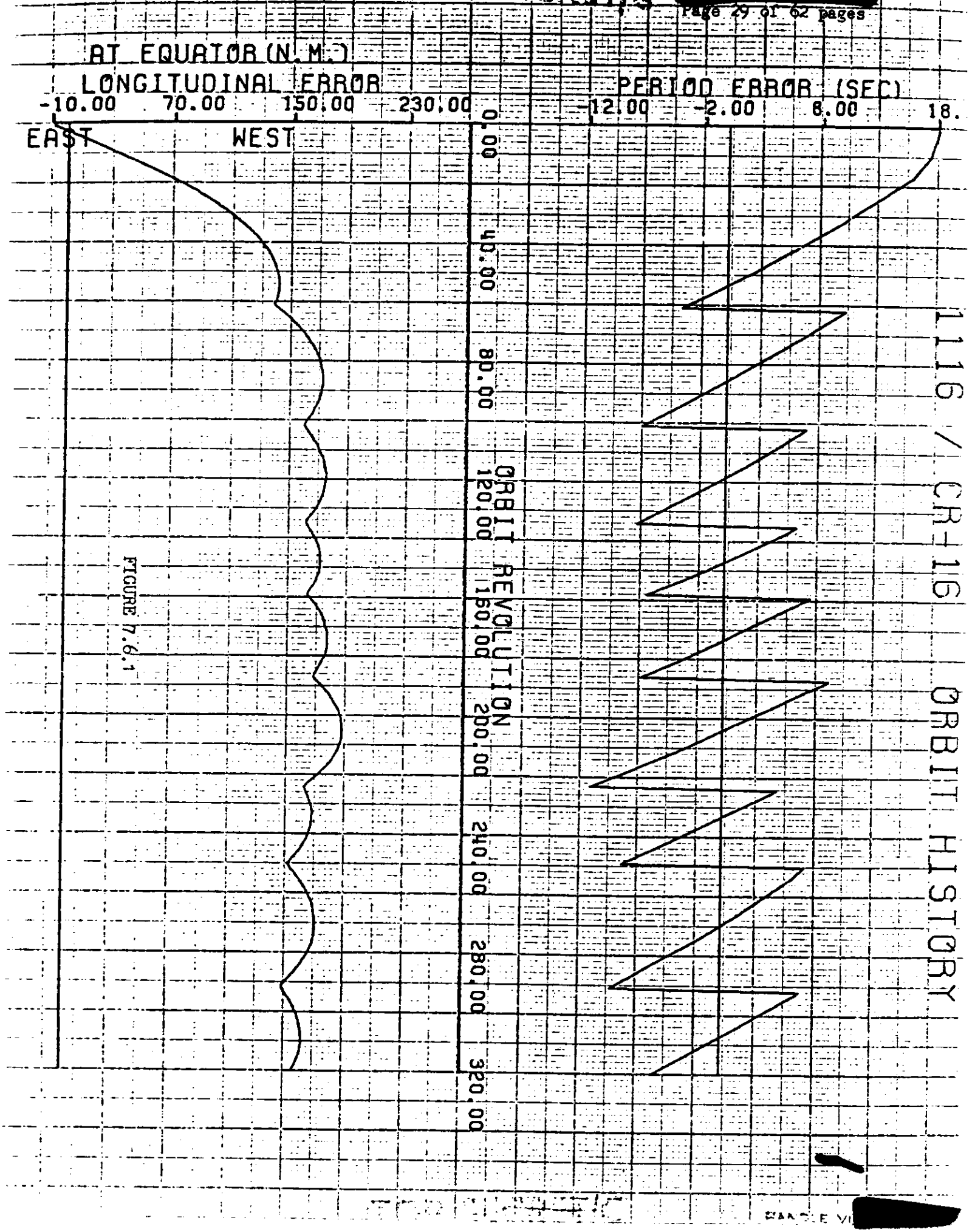

AT EQUATOR (N.M.)
LONGITUDINAL ERROR
-10.00
70.00
150.00
230.00
EAST
WEST
PERIOD ERROR (SEC)
-12.00
-2.00
6.00
18.
0.00
40.00
80.00
120.00
160.00
200.00
240.00
280.00
320.00
ORBIT REVOLUTION
1116 / CR-116 ORBIT HISTORY

FIGURE 7.6.1

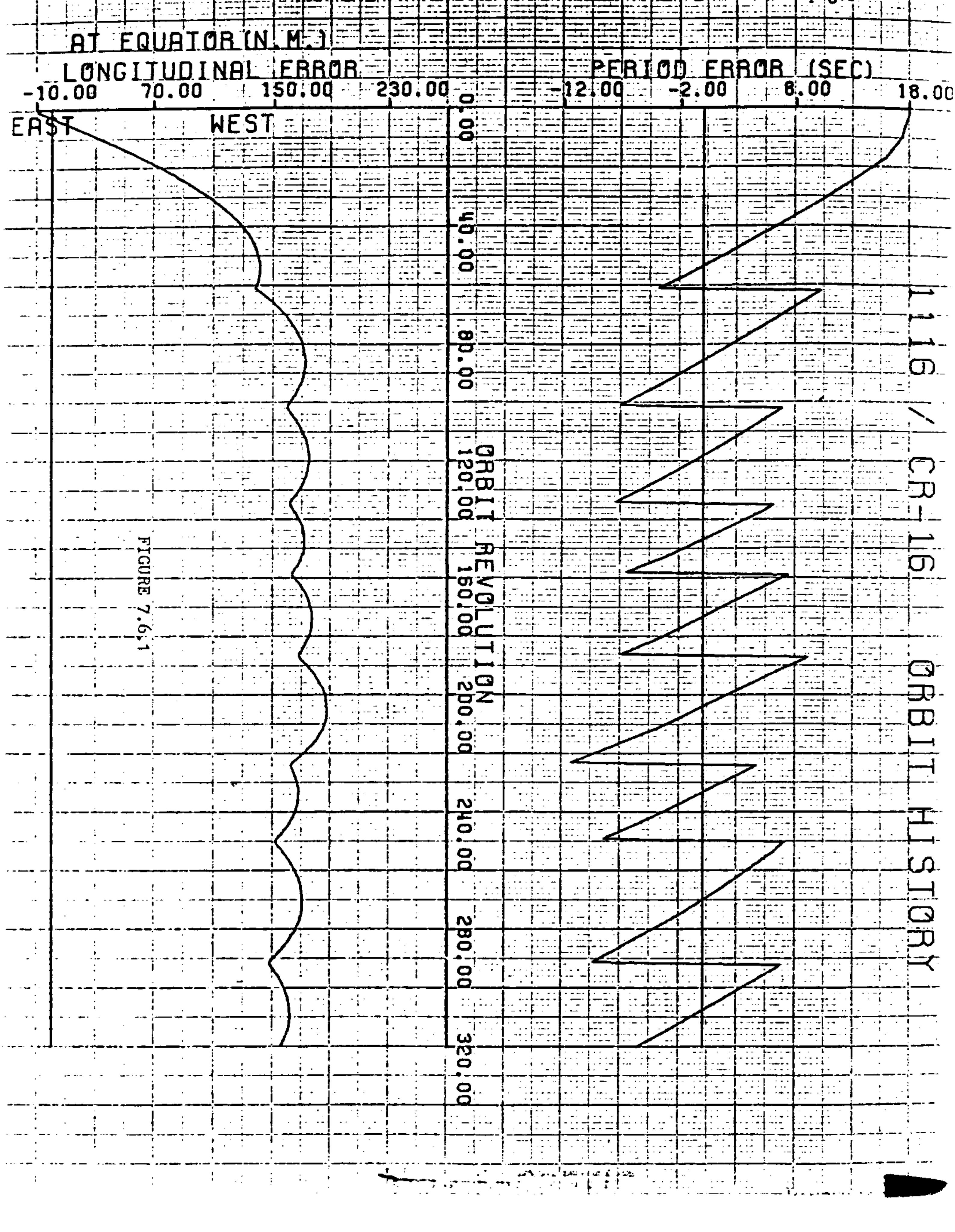

1116 / CR-16 ORBIT HISTORY
LONGITUDINAL ERROR
AT EQUATOR (N.M.)
-10.00
70.00
150.00
230.00
EAST
WEST
PERIOD ERROR (SEC)
-12.00
-2.00
8.00
18.00
ORBIT REVOLUTION
0.00
40.00
80.00
120.00
160.00
200.00
240.00
280.00
320.00

FIGURE 7.6.1

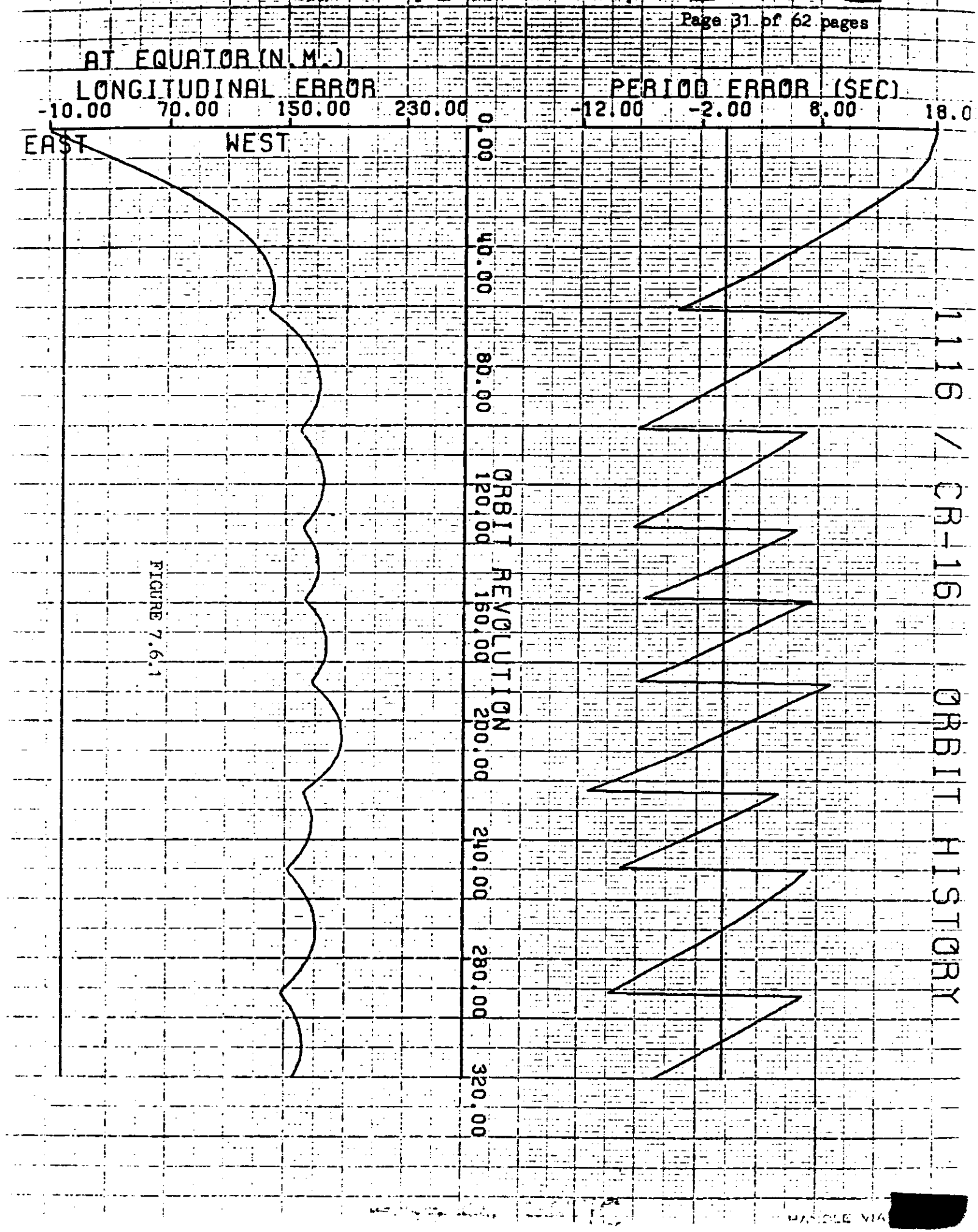
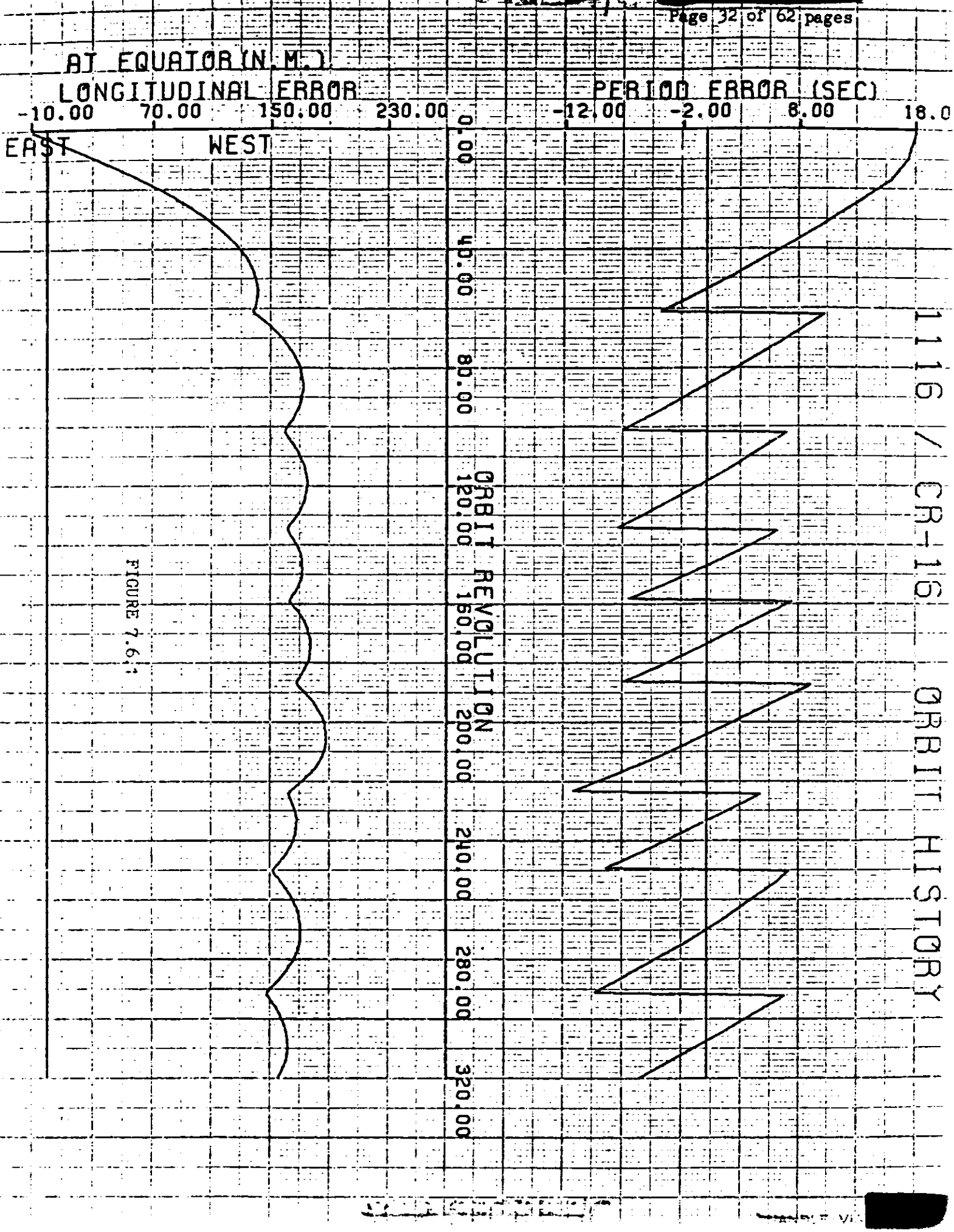

AT EQUATOR(N.M.)
LONGITUDINAL ERROR
-10.00
70.00
150.00
230.00
EAST
WEST
PERIOD ERROR (SEC)
-12.00
-2.00
8.00
18.0
0.00
40.00
80.00
120.00
160.00
200.00
240.00
280.00
320.00
ORBIT REVOLUTION
1116 / CR-16 ORBIT HISTORY

FIGURE 7.6.1


AT EQUATOR (N.M.)
LONGITUDINAL ERROR
PERIOD ERROR (SEC)
-10.00
70.00
150.00
230.00
-12.00
-2.00
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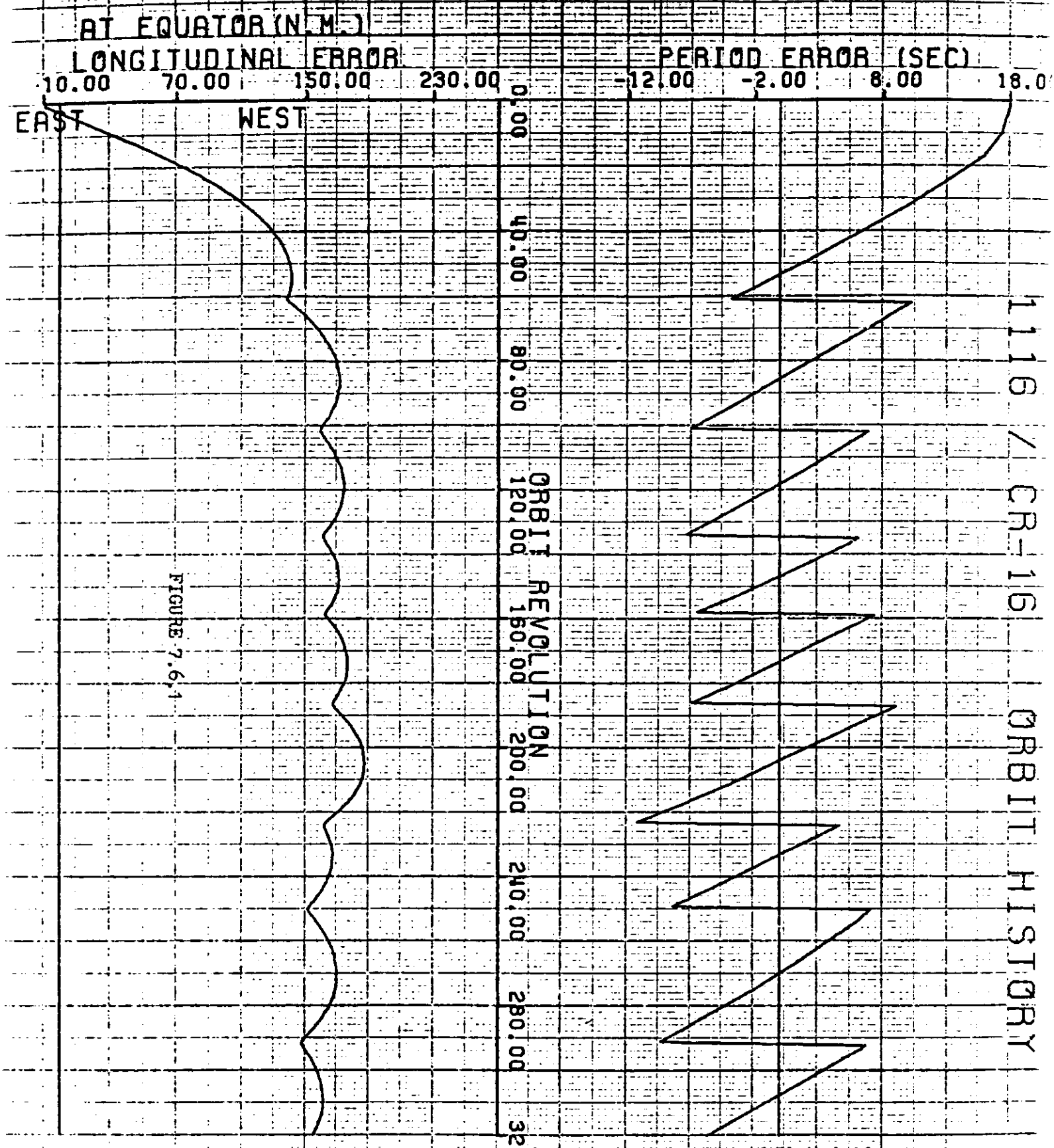
320.00
ORBIT REVOLUTION
1116 / CR-16 ORBIT HISTORY

FIGURE 7.6-1


AT EQUATOR(N.M.)
LONGITUDINAL ERROR
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150.00
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EAST
WEST
PERIOD ERROR (SEC)
-12.00
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0.00
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80.00
120.00
160.00
200.00
240.00
280.00
320.00
ORBIT REVOLUTION

FIGURE 7.6.1

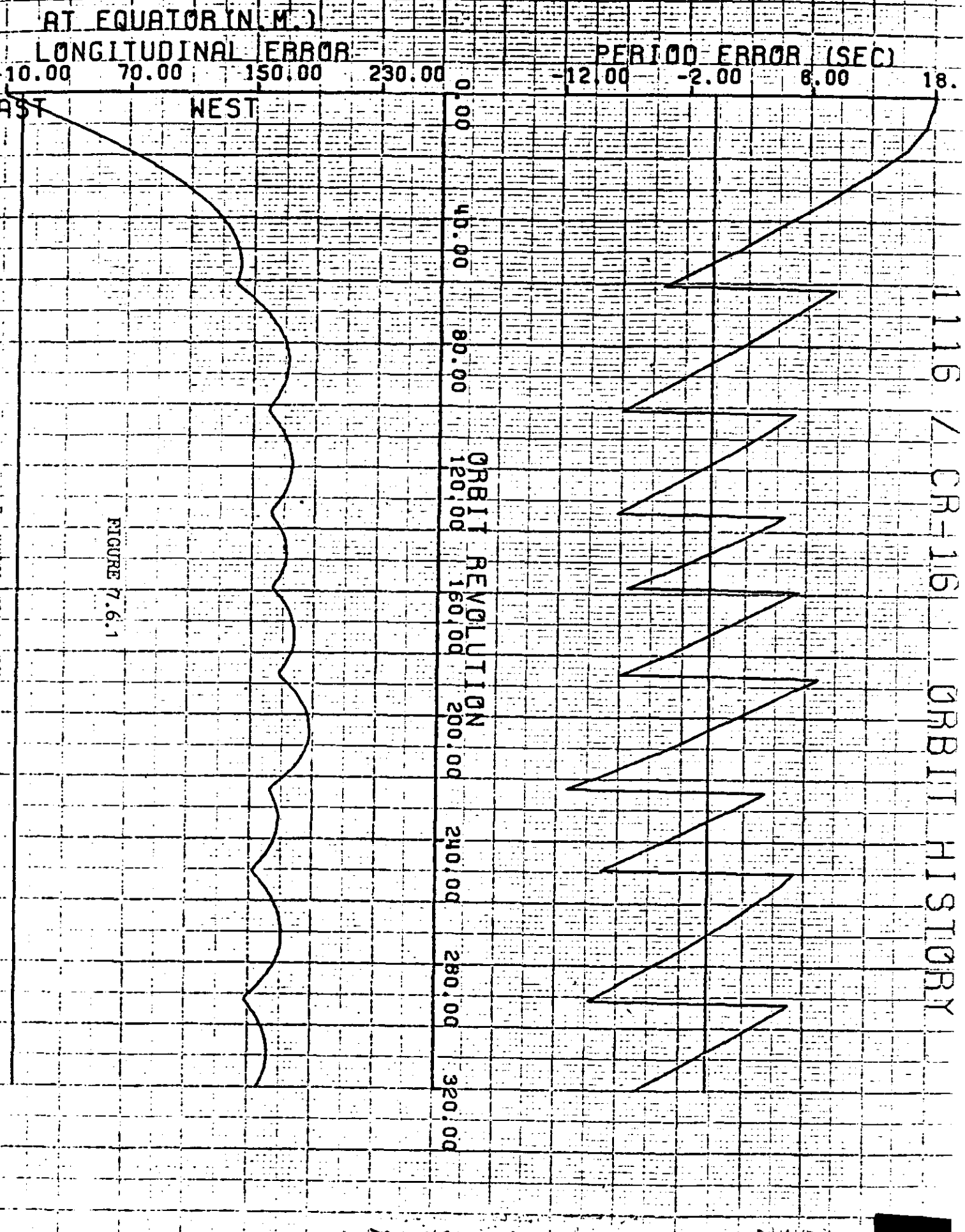
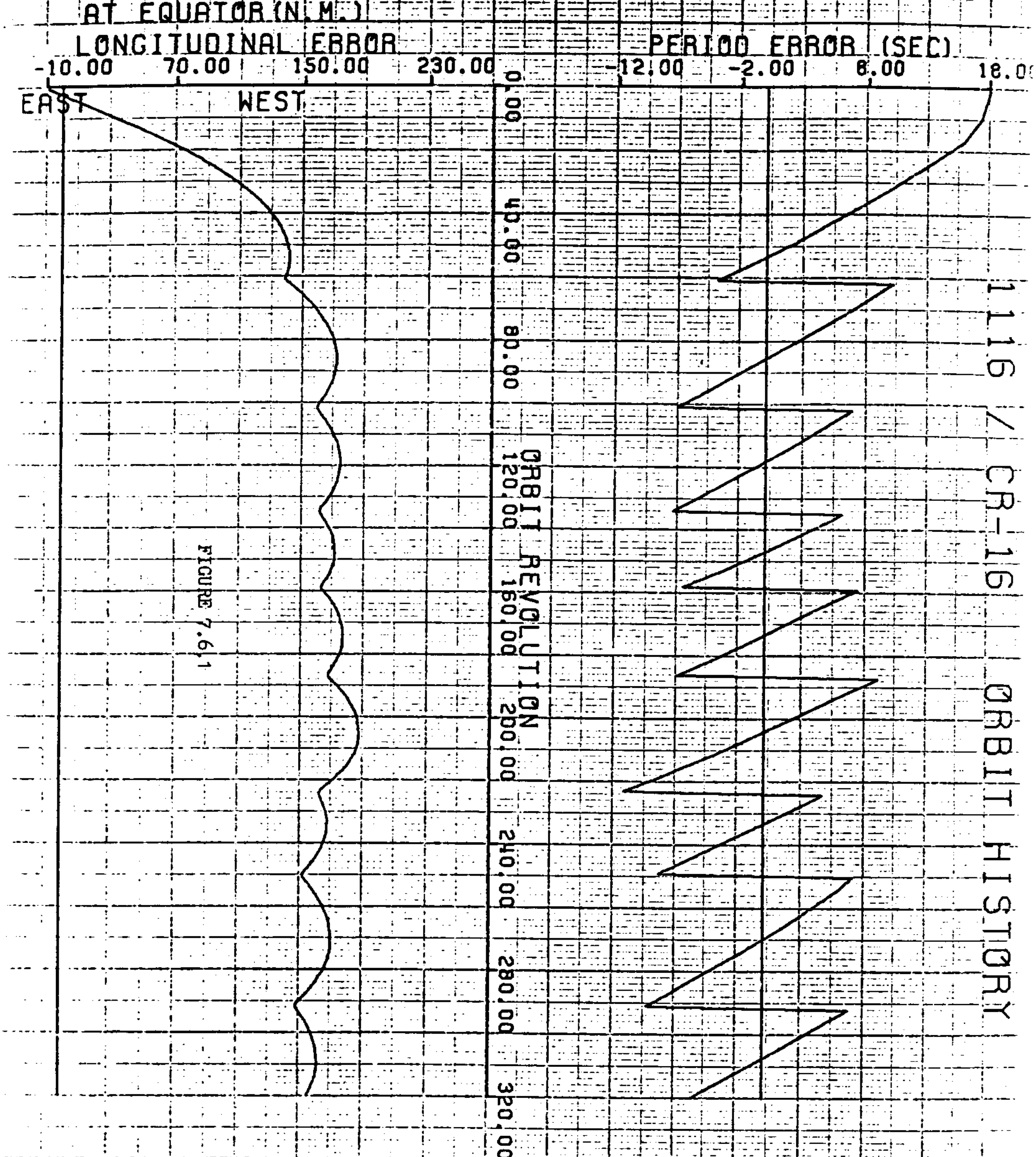


FIGURE 7.6.1

1116 / CR-16 ORBIT HISTORY


AT EQUATOR (N.M.)
LONGITUDINAL ERROR
-10.00
70.00
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EAST
WEST
PERIOD ERROR (SEC)
-12.00
-2.00
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80.00
120.00
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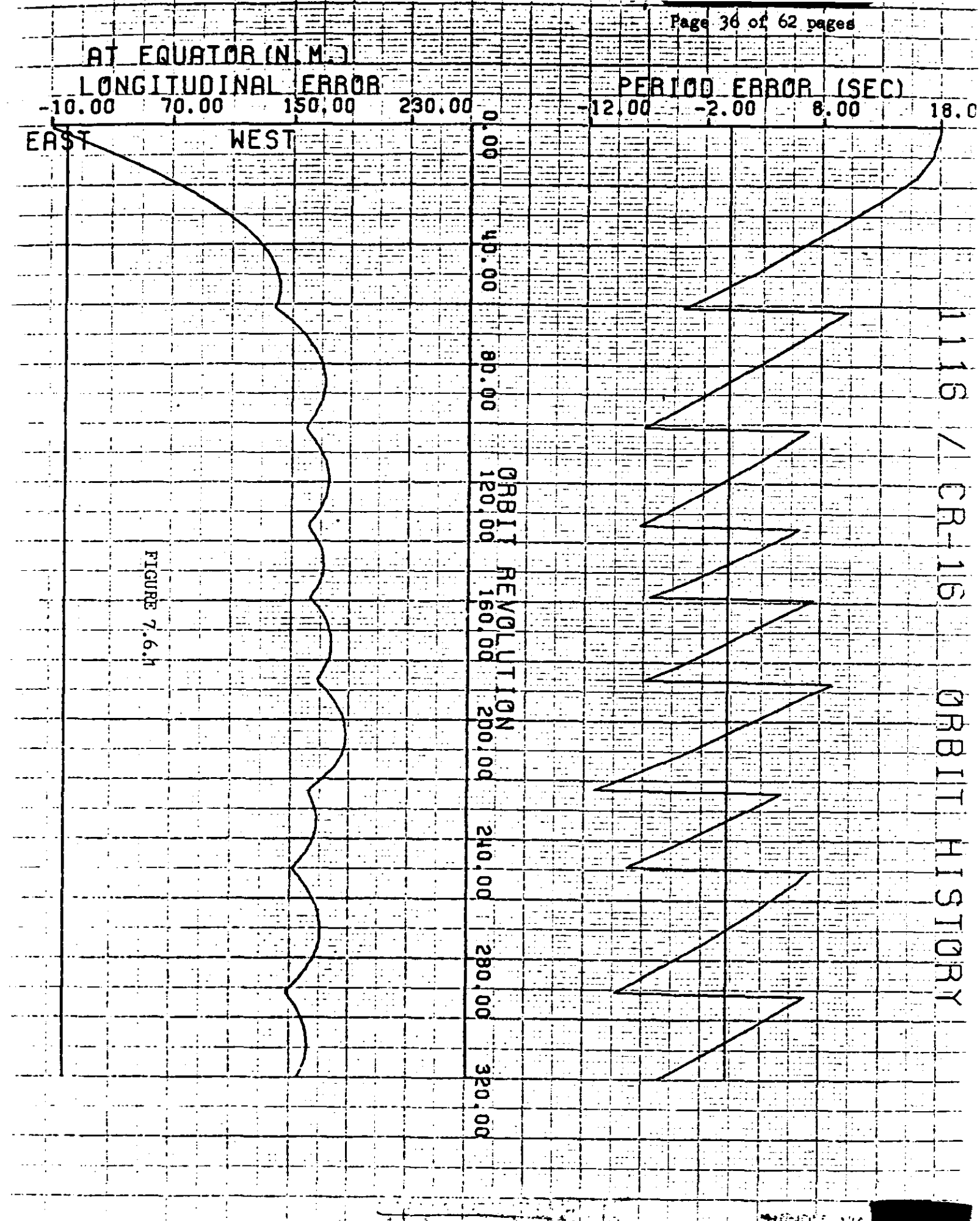
280.00
320.00
ORBIT REVOLUTION
1116 / CR-16 ORBIT HISTORY

FIGURE 7.6.1


AT EQUATOR (N.M.)
LONGITUDINAL ERROR
-10.00
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PERIOD ERROR (SEC)
-12.00
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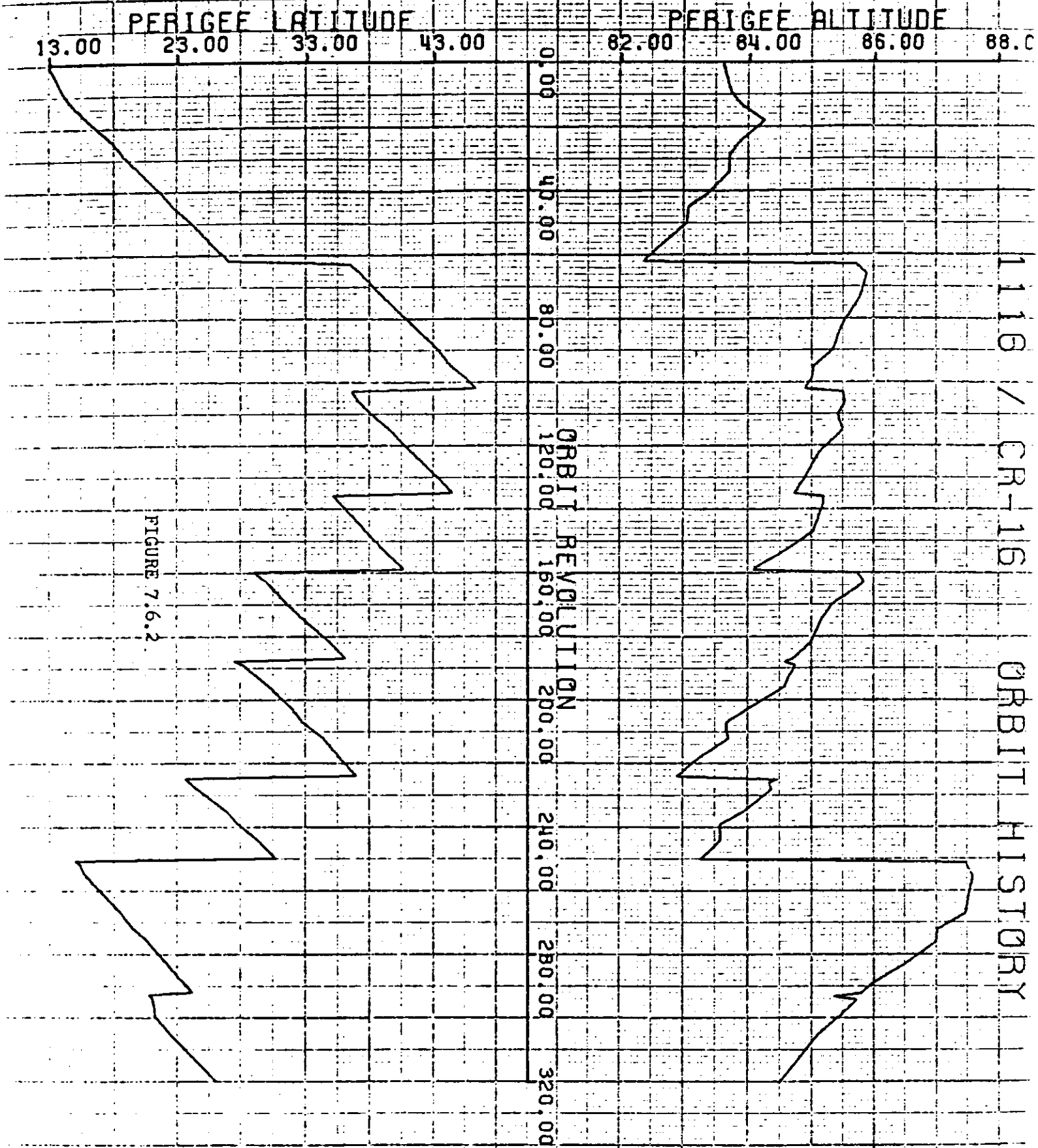
ORBIT REVOLUTION
1116 / CR-16 ORBIT HISTORY

FIGURE 7.6.1


PERIGEE LATITUDE
13.00
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PERIGEE ALTITUDE
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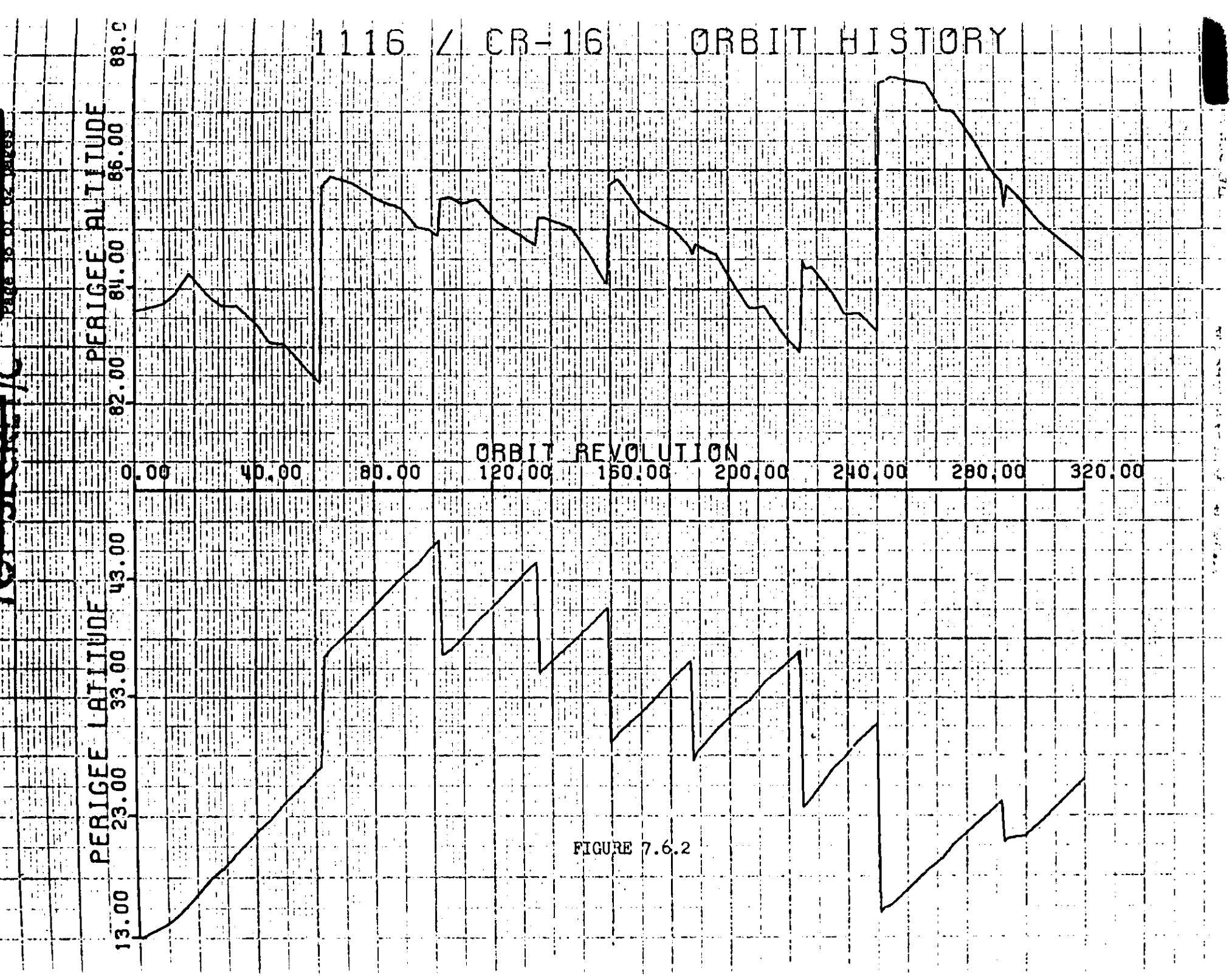
ORBIT REVOLUTION
1116 / CR-16 ORBIT HISTORY

FIGURE 7.6.2


1116 / CR-16 ORBIT HISTORY
PERIGEE ALTITUDE
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ORBIT REVOLUTION
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240.00
280.00
320.00
PERIGEE LATITUDE
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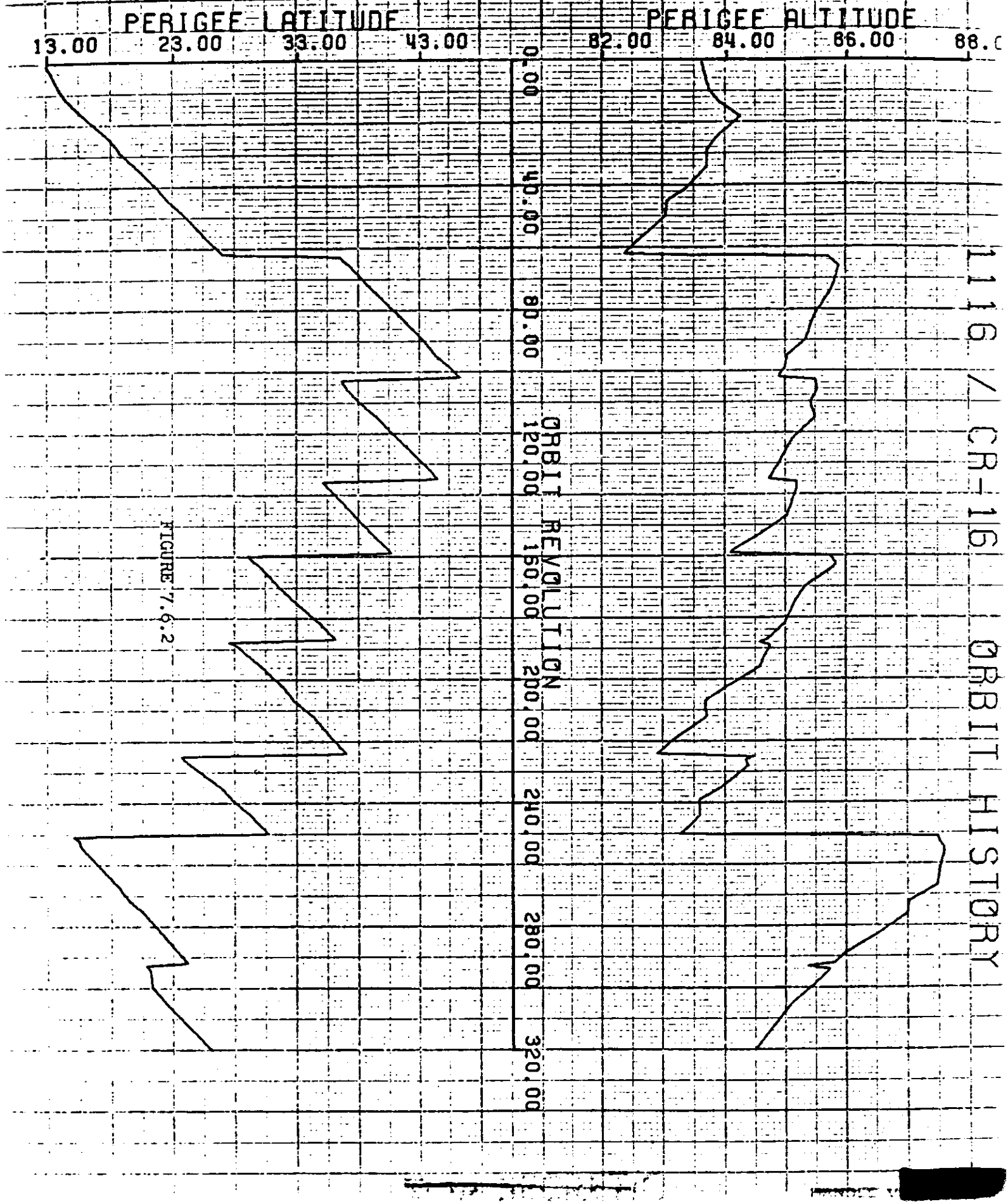
33.00
23.00
13.00

FIGURE 7.6.2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PERIGEE ALTITUDE
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86.00
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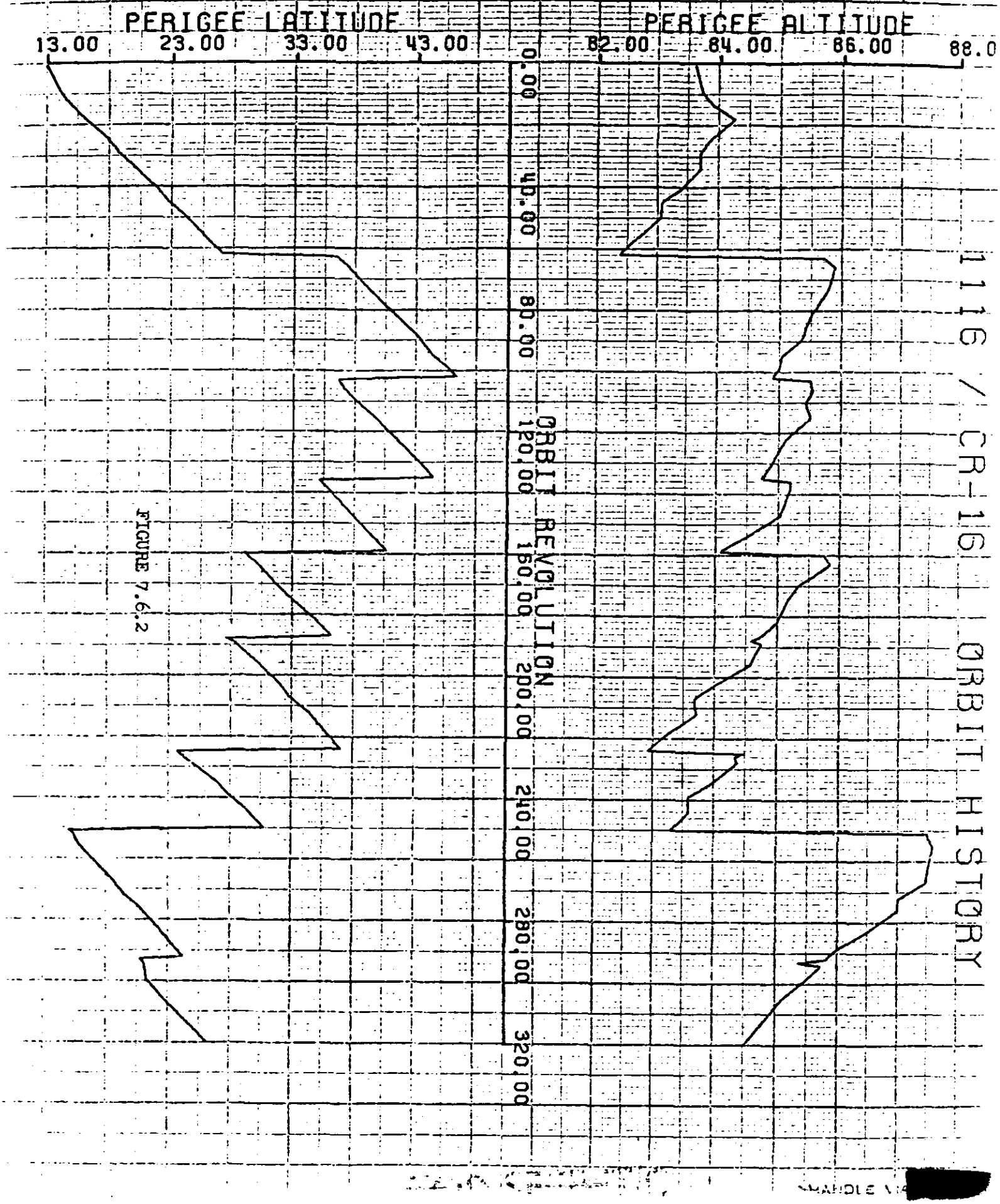
280.00
320.00
ORBIT REVOLUTION
1116 / CR-16 ORBIT HISTORY

FIGURE 7.6.2


PERIGEE LATITUDE
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PERIGEE ALTITUDE
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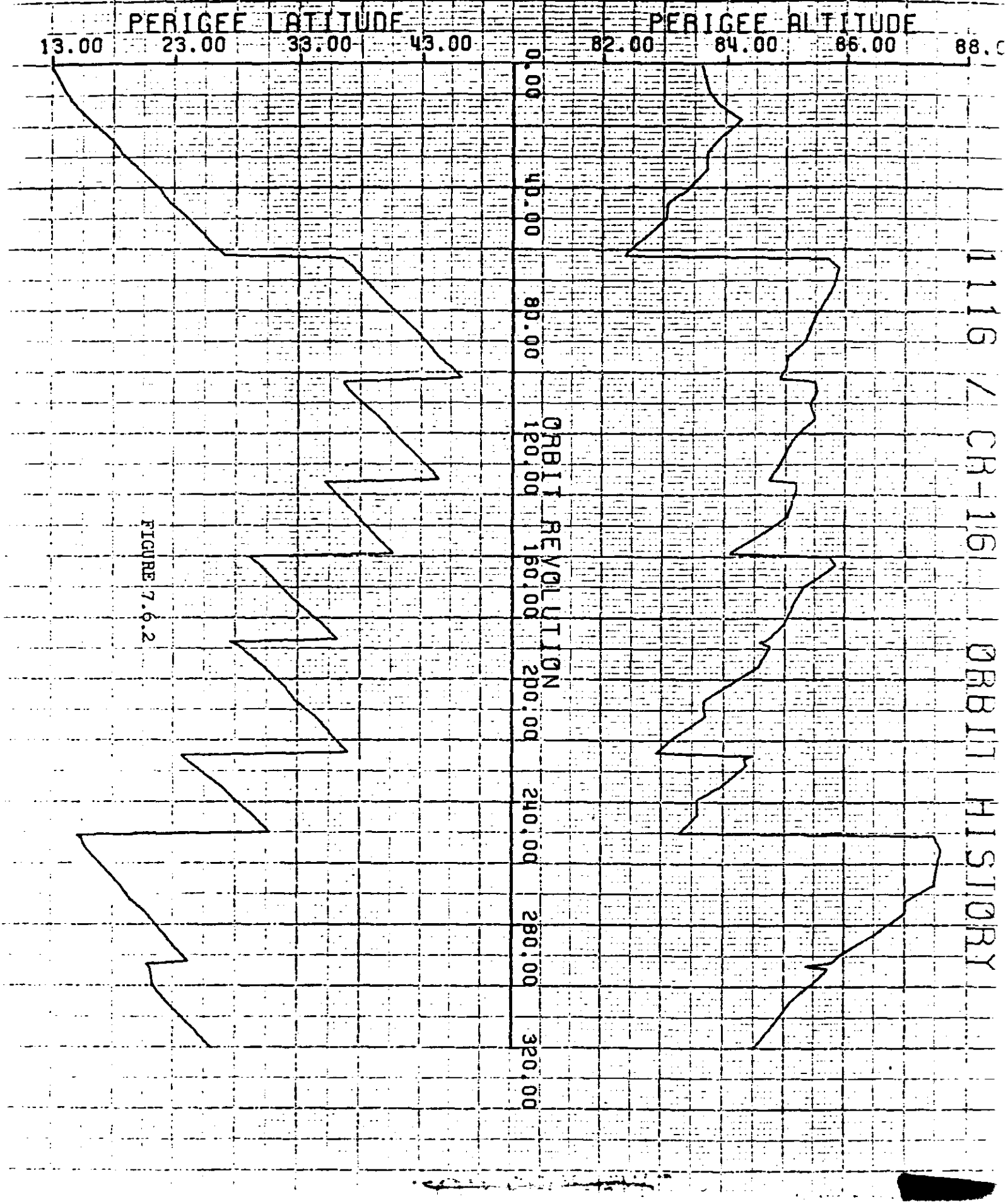
ORBIT REVOLUTION
1116 / CR-16 | ORBIT HISTORY

FIGURE 7.6.2


PERIGEE LATITUDE
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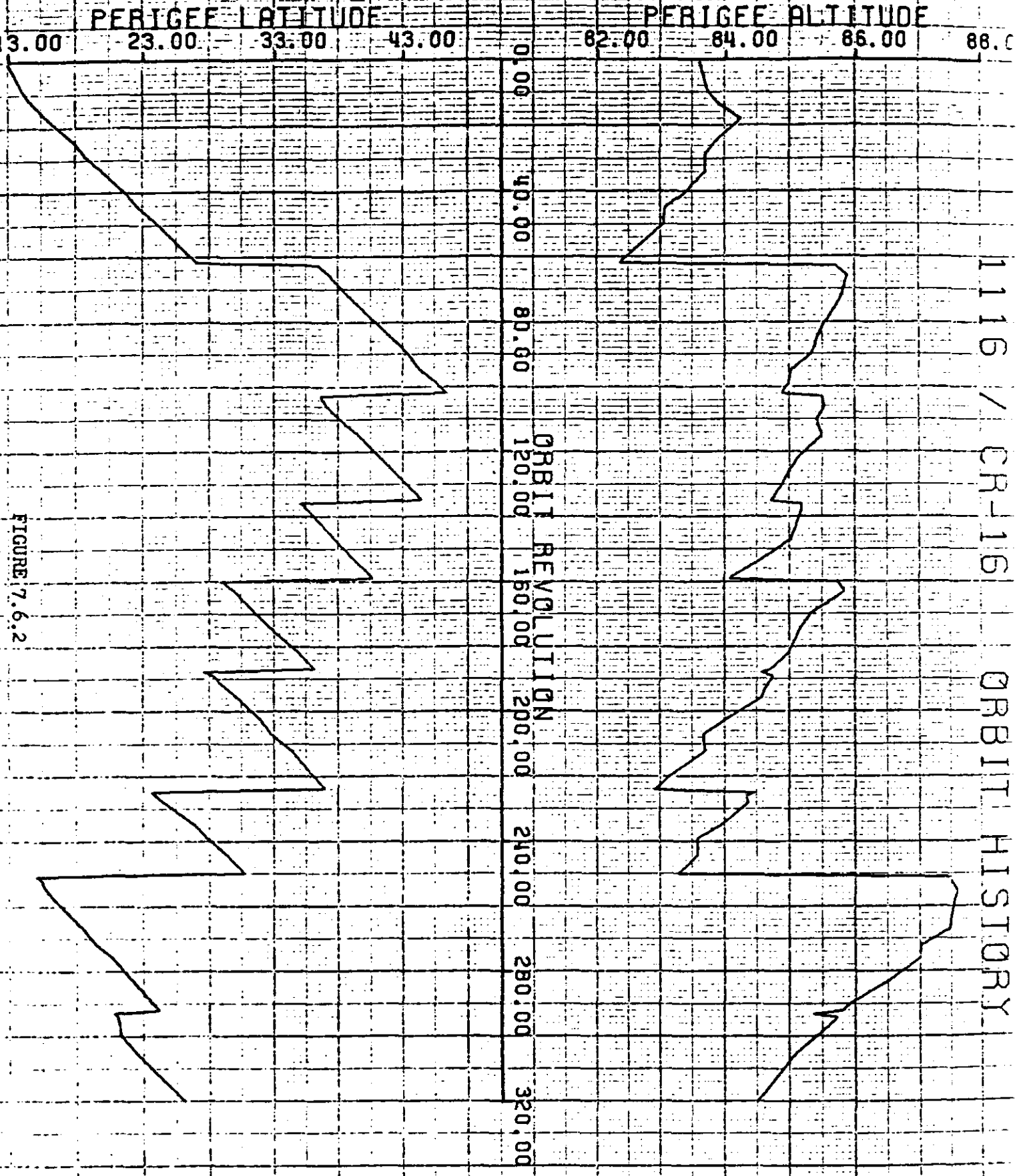
43.00
PERIGEE ALTITUDE
82.00
84.00
86.00
88.0
0.00
40.00
80.00
120.00
160.00
200.00
240.00
280.00
320.00
ORBIT REVOLUTION
1116 / CR-116 ORBIT HISTORY

FIGURE 7.6.2


PERIGEE LATITUDE
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33.00
43.00
PERIGEE ALTITUDE
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84.00
86.00
88.0
0.00
40.00
80.00
120.00
160.00
200.00
240.00
280.00
320.00
ORBIT REVOLUTION

FIGURE 7.6.2

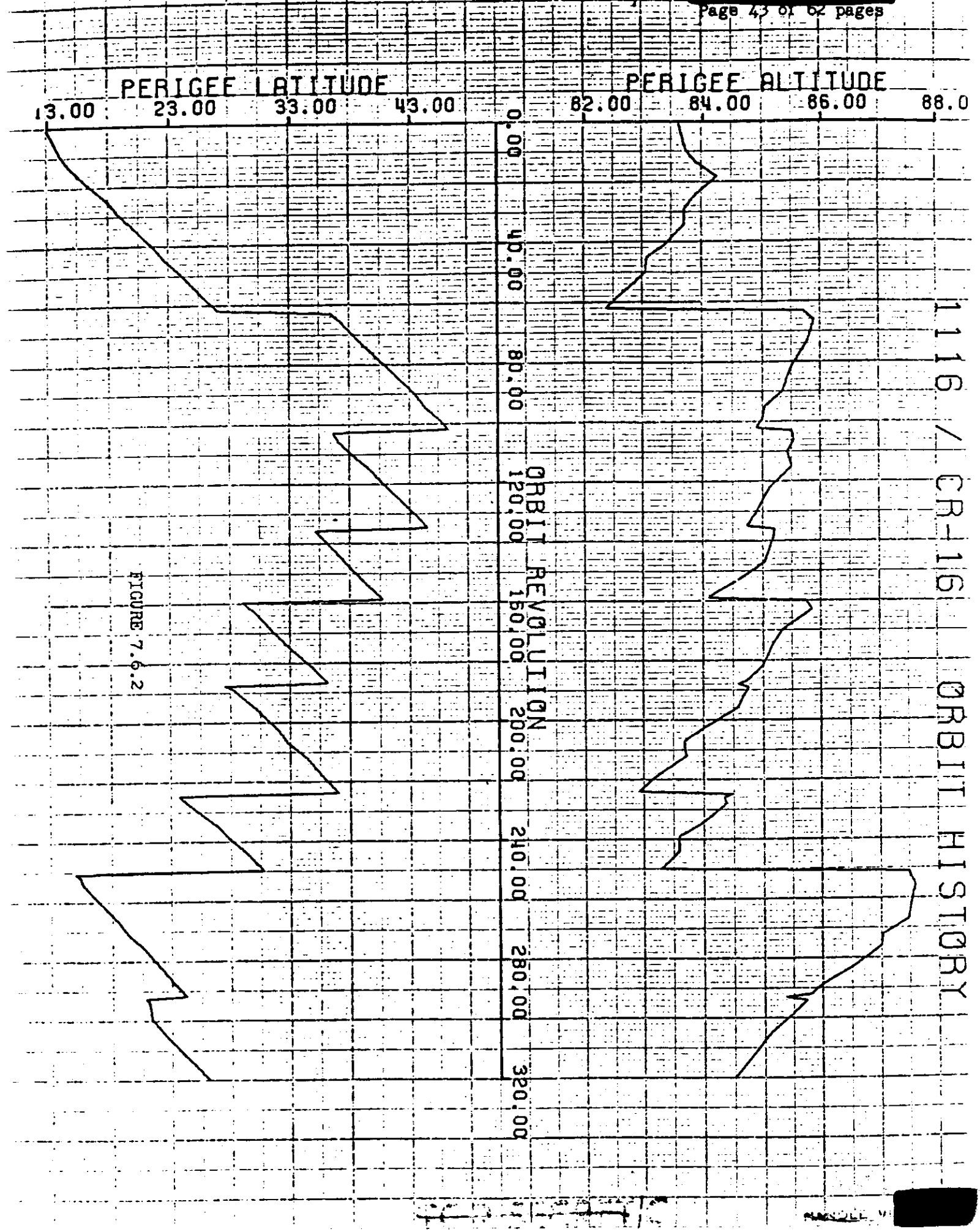

PERIGEE LATITUDE
13.00
23.00
33.00
43.00
PERIGEE ALTITUDE
82.00
84.00
86.00
88.0
0.00
40.00
80.00
120.00
160.00
200.00
240.00
280.00
320.00
ORBIT REVOLUTION
1116 / CR-16 ORBIT HISTORY

FIGURE 7.6.2

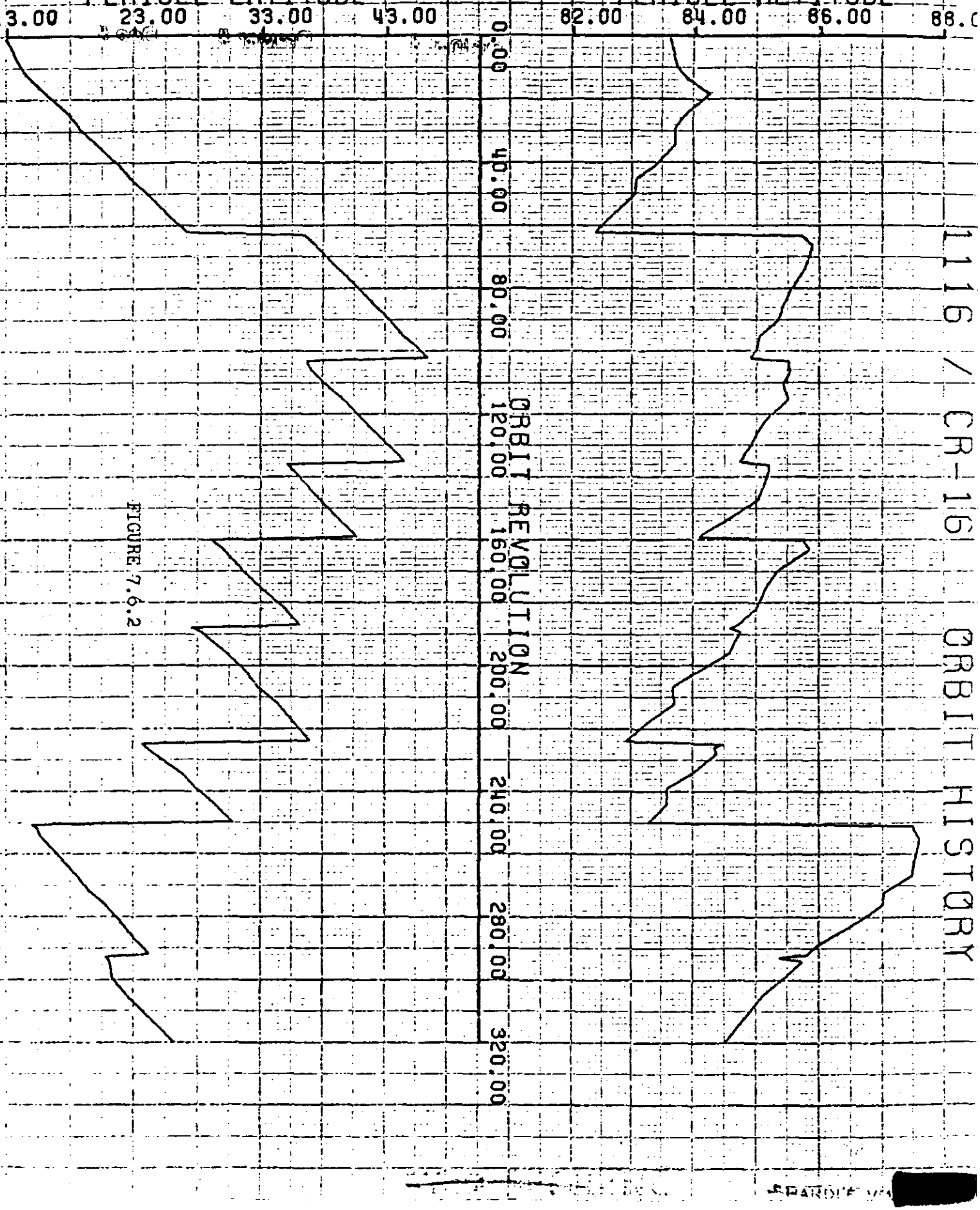

PERIGEE LATITUDE
13.00
23.00
33.00
43.00
PERIGEE ALTITUDE
82.00
84.00
86.00
88.0
0.00
40.00
80.00
120.00
160.00
200.00
240.00
280.00
320.00
ORBIT REVOLUTION

FIGURE 7.6.2

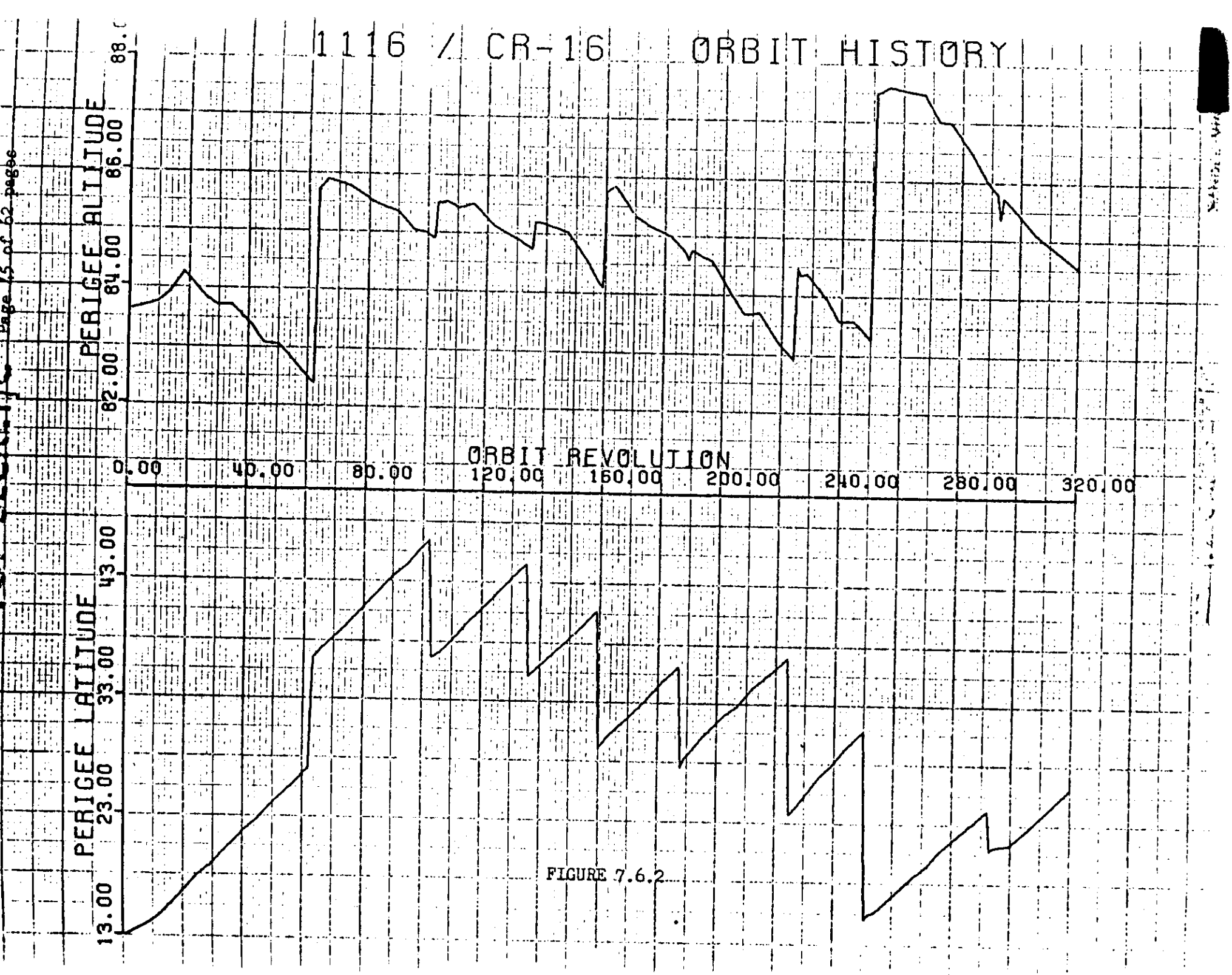

1116 / CR-16 ORBIT HISTORY
PERIGEE ALTITUDE
88.00
86.00
84.00
82.00
ORBIT REVOLUTION
0.00
40.00
80.00
120.00
160.00
200.00
240.00
280.00
320.00
PERIGEE LATITUDE
43.00
33.00
23.00
13.00

FIGURE 7.6.2

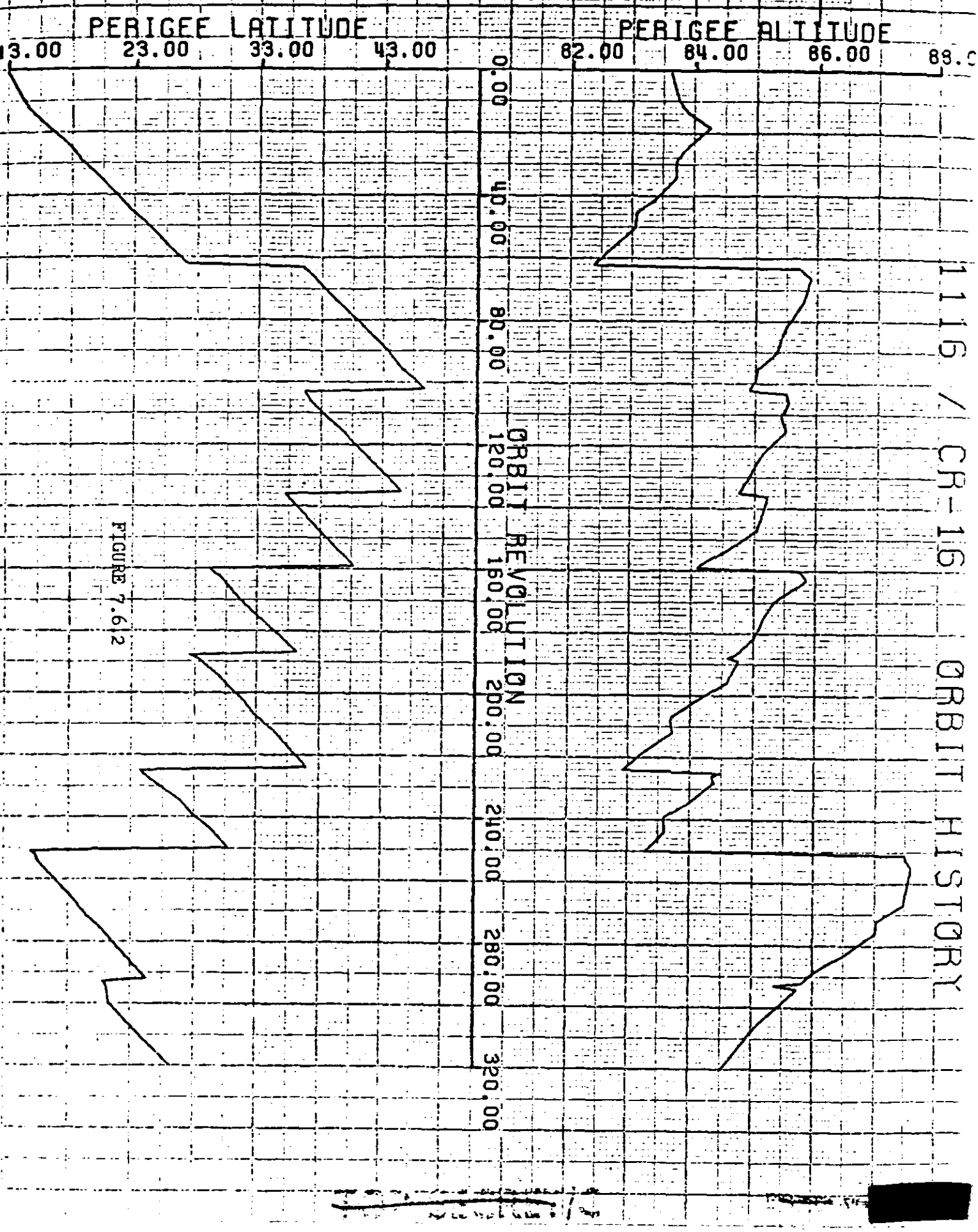
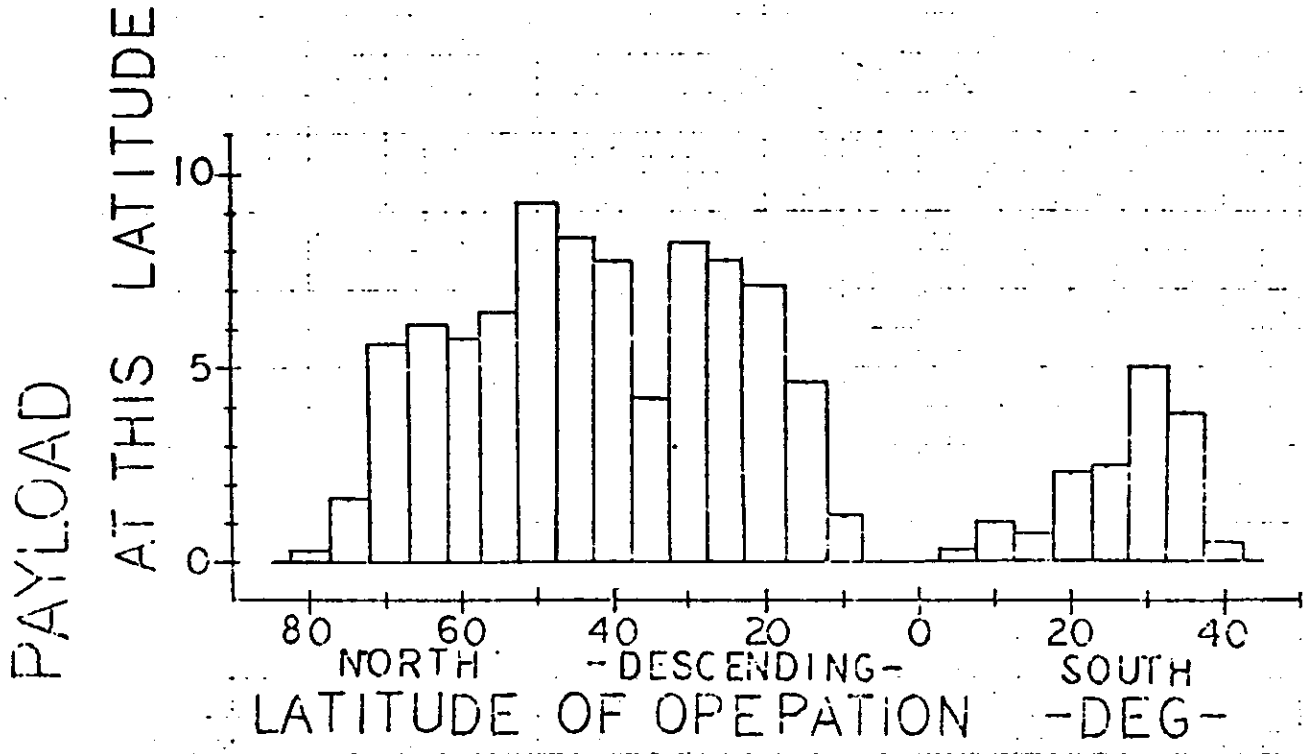

PERIGEE LATITUDE
13.00
23.00
33.00
43.00
PERIGEE ALTITUDE
82.00
84.00
86.00
88.0
0.00
40.00
80.00
120.00
160.00
200.00
240.00
280.00
320.00
ORBIT REVOLUTION
1116 / CR-16 ORBIT HISTORY

FIGURE 7.6.2

1116/CR16/1661

OPERATION DISTRIBUTION



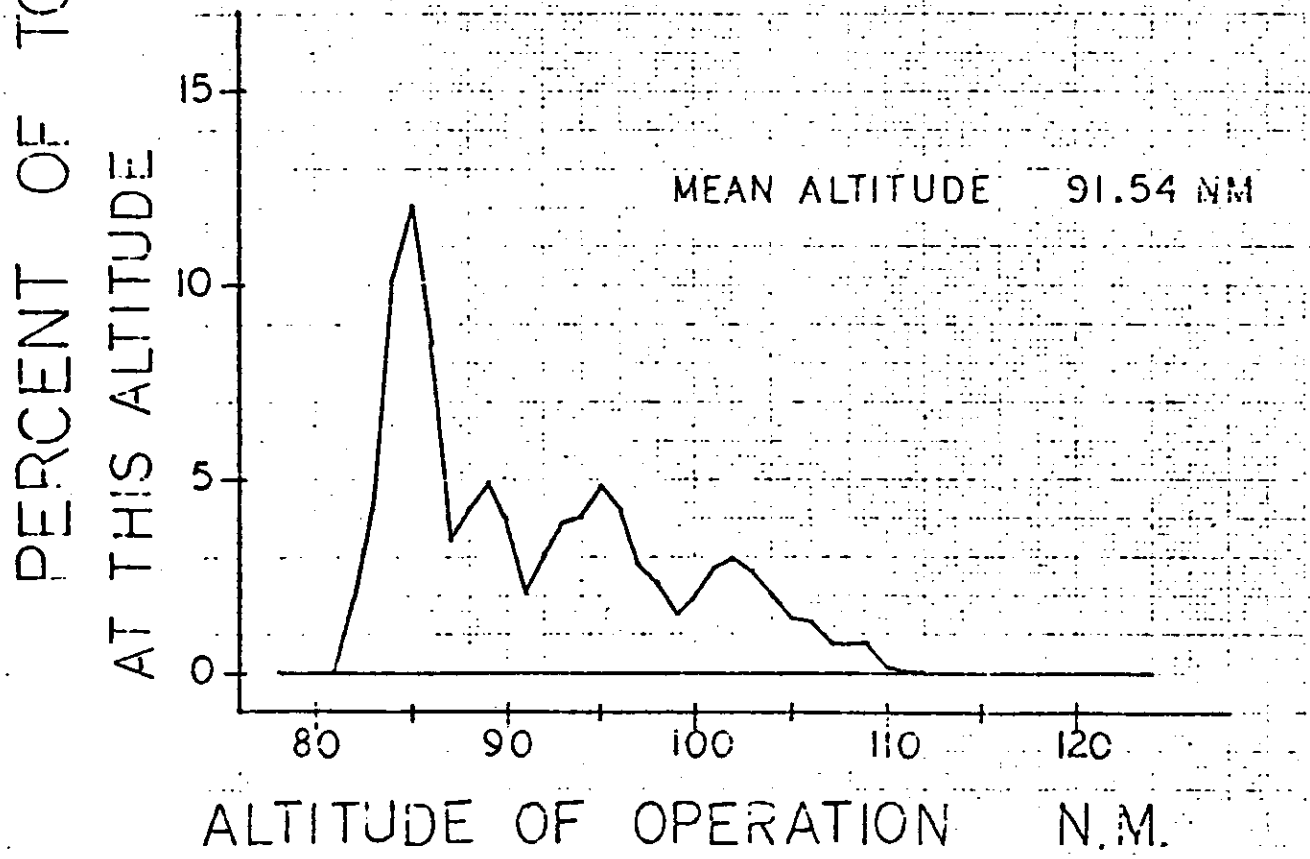


FIGURE 7.7

TOP SECRET

CR~16

FLIGHT VS PREDICTED TEMPERATURE

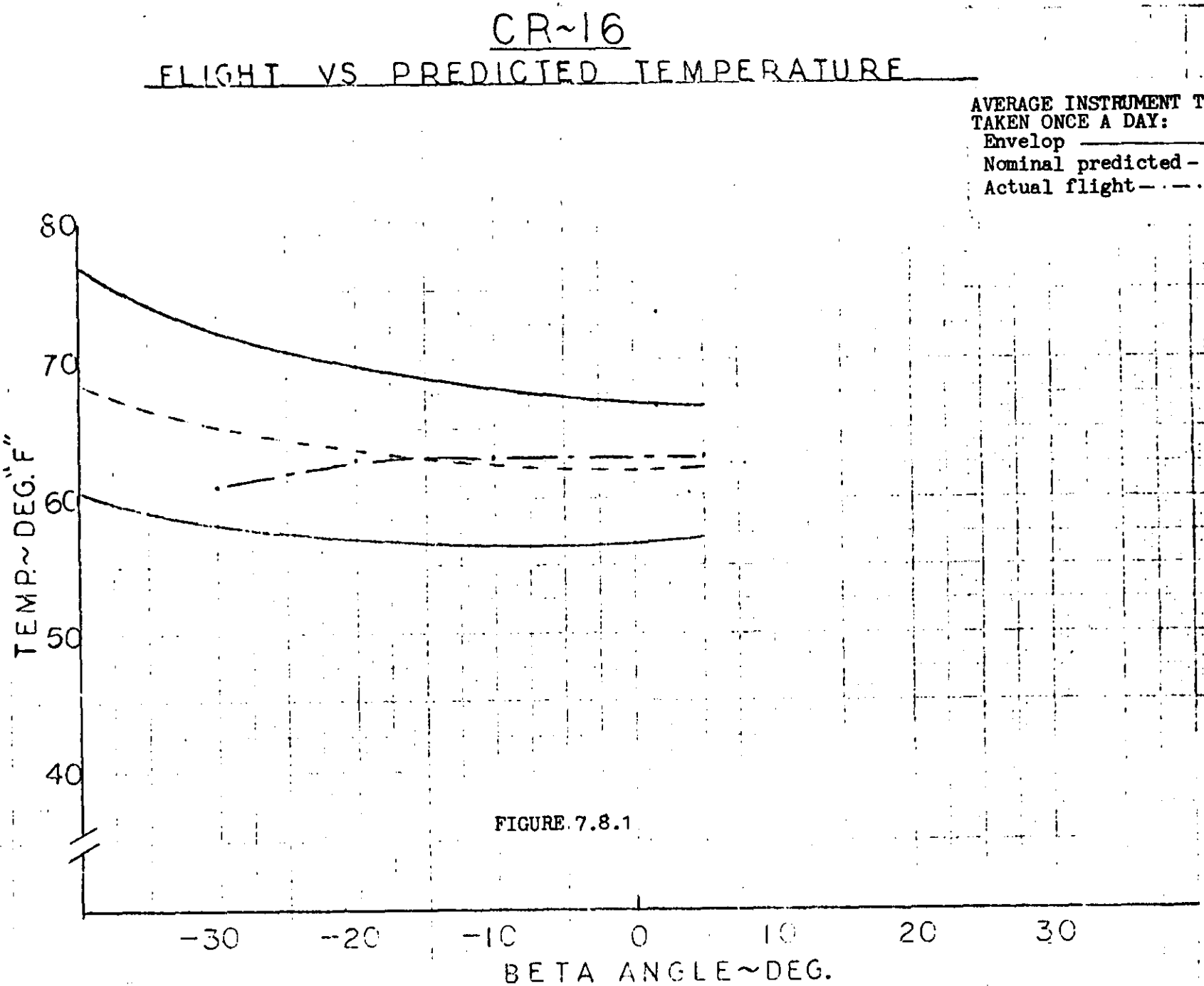


FIGURE 7.8.1

CR-16 Polar Plot of Temp. vs. Latitude, Instrument No. 1 Lens Cell, Rev 138 ⊙, Rev 300 Δ

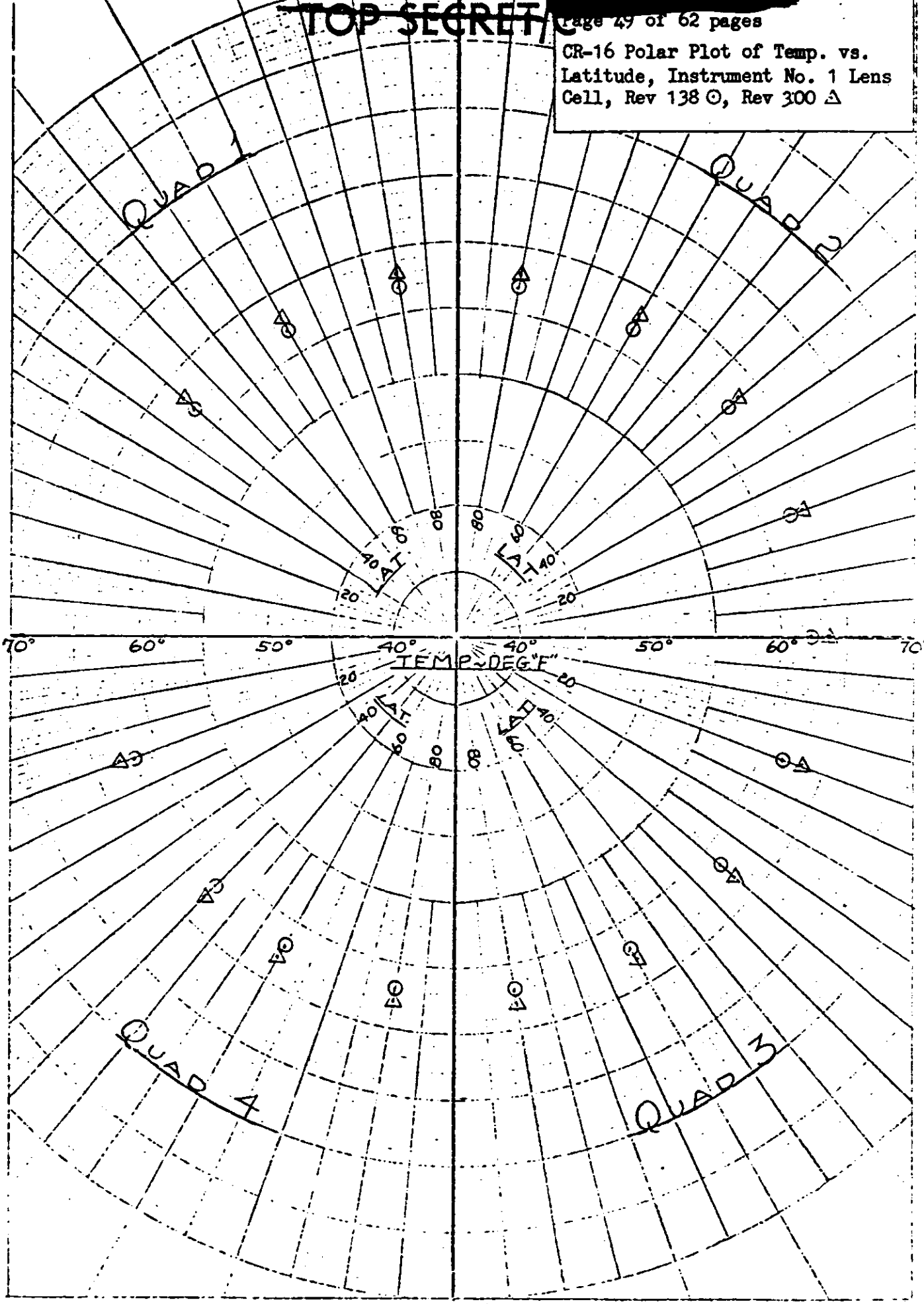


FIGURE 7.8.2

CR-16 Polar Plot of Temp. vs Latitude Instrument No. 1 Lens Cell
Rev 138 ⊙, Rev 300 △

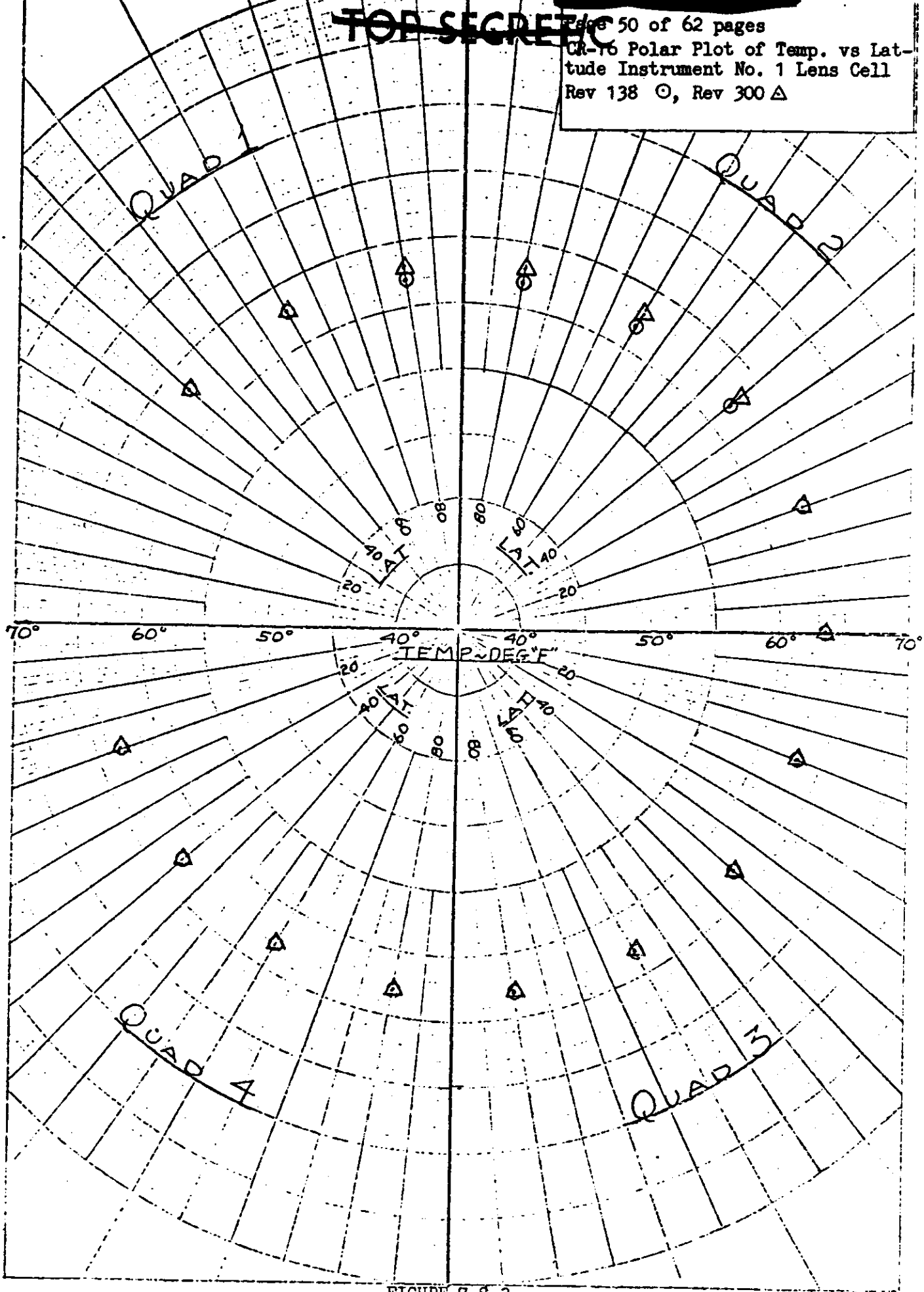


FIGURE 7.8.3

CR-16 Polar Plot of Temp. vs Latitude, Instrument No. 1 Front Rail
Rev 138 ⊙, Rev 300 △

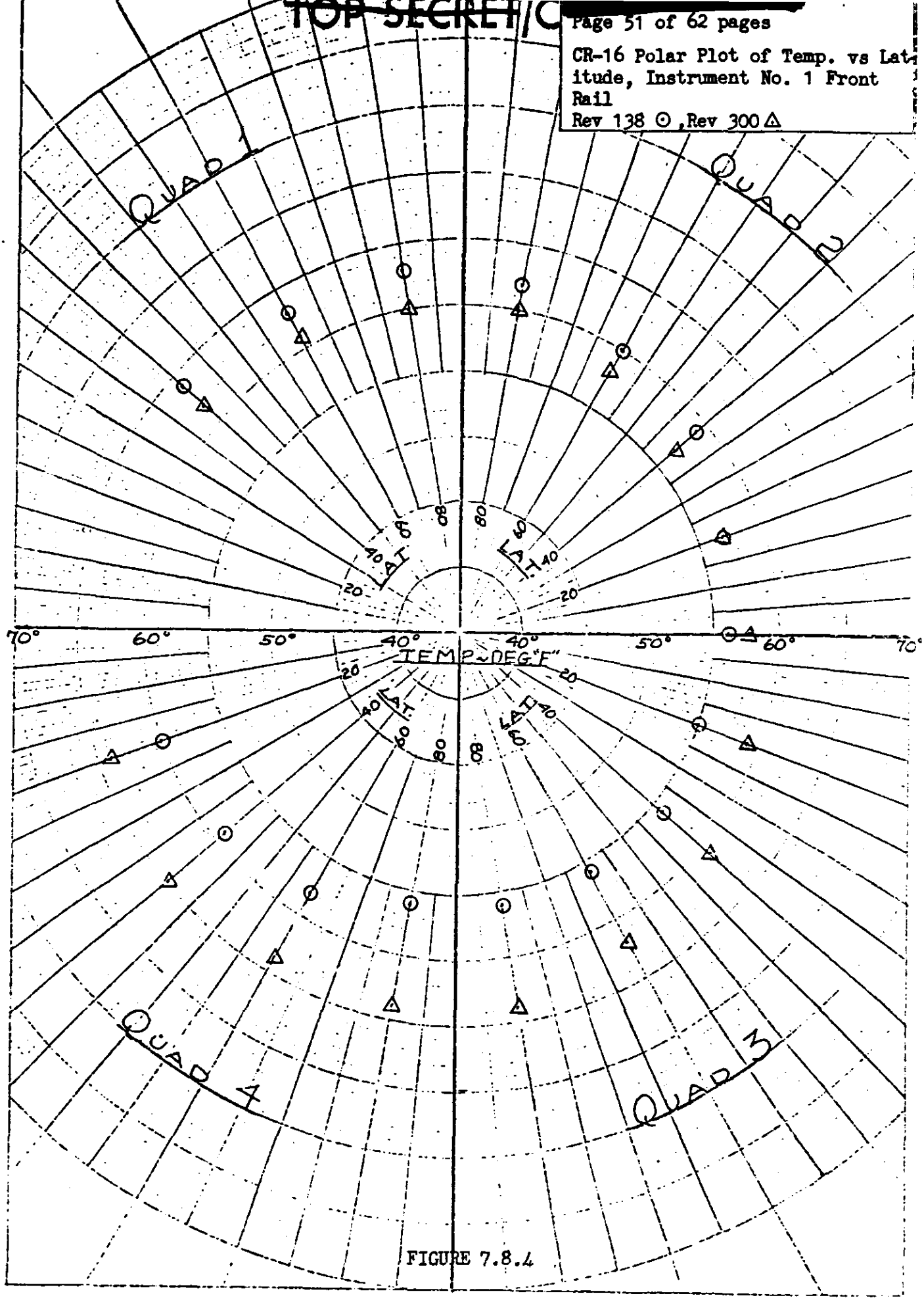


FIGURE 7.8.4

CR-16 Polar Plot of Temp. vs Latitude, Instrument No. 1 Rear Rail
Rev 138 ⊙, Rev 300 △

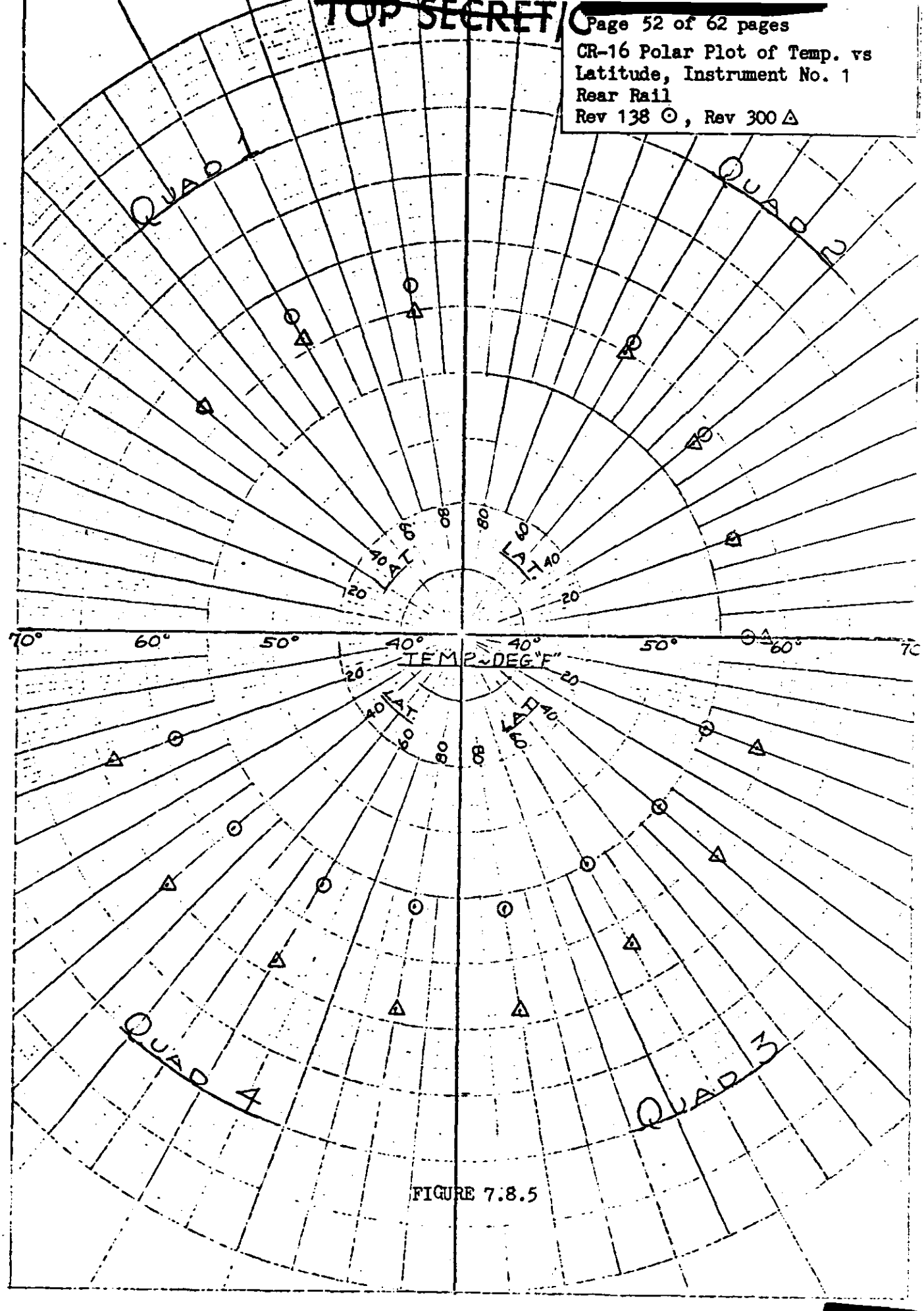


FIGURE 7.8.5

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CR-16 Polar Plot of Temp. vs Latitude, Instrument No. 1 Output/AO
Rev 138 ⊙, Rev 300 △

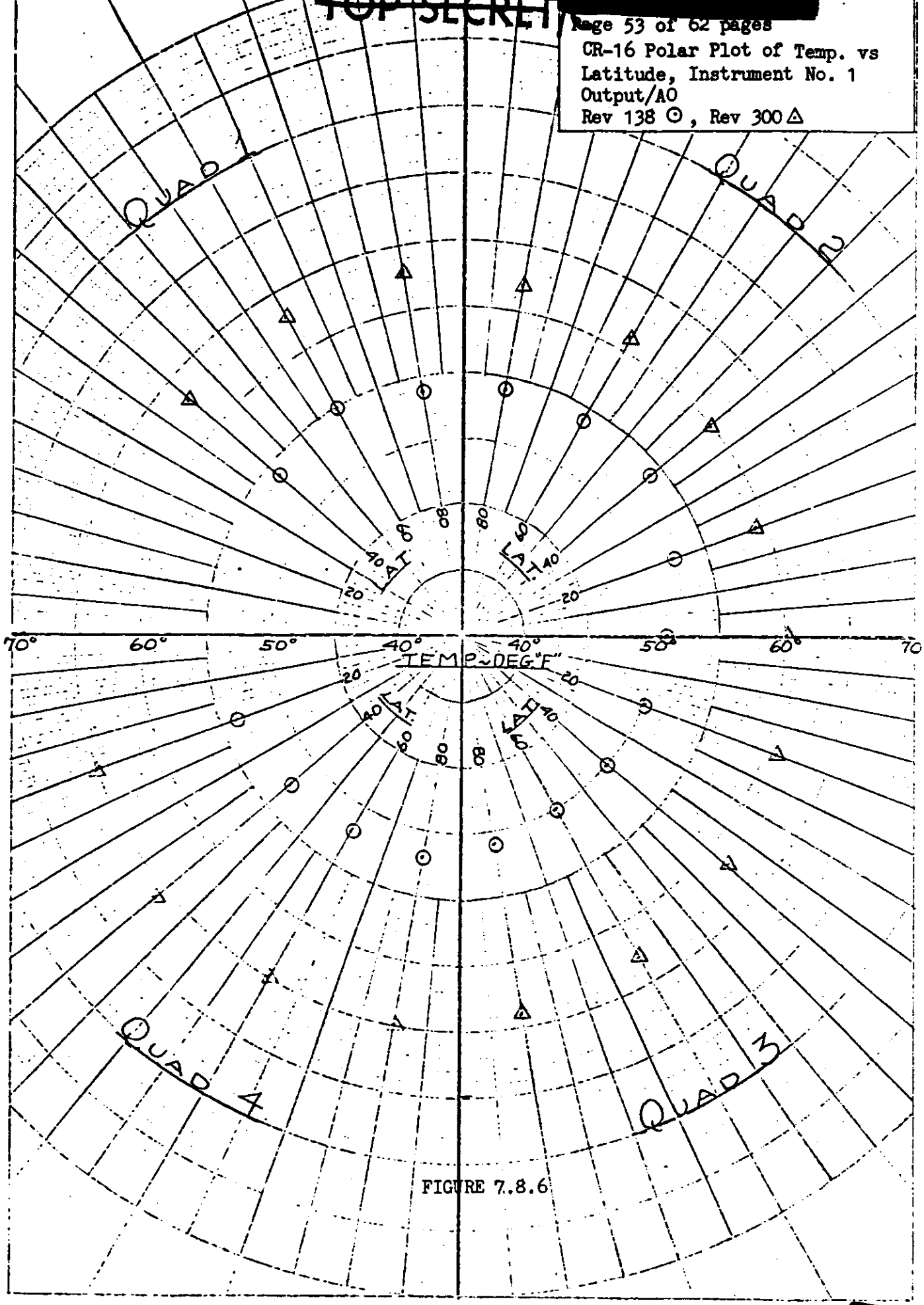

FIGURE 7.8.6

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CR-16 Polar Plot ot Temp. vs Latitude, Instrument No. 2 Lens Cell

Rev 138 ⊙ , Rev 300 △

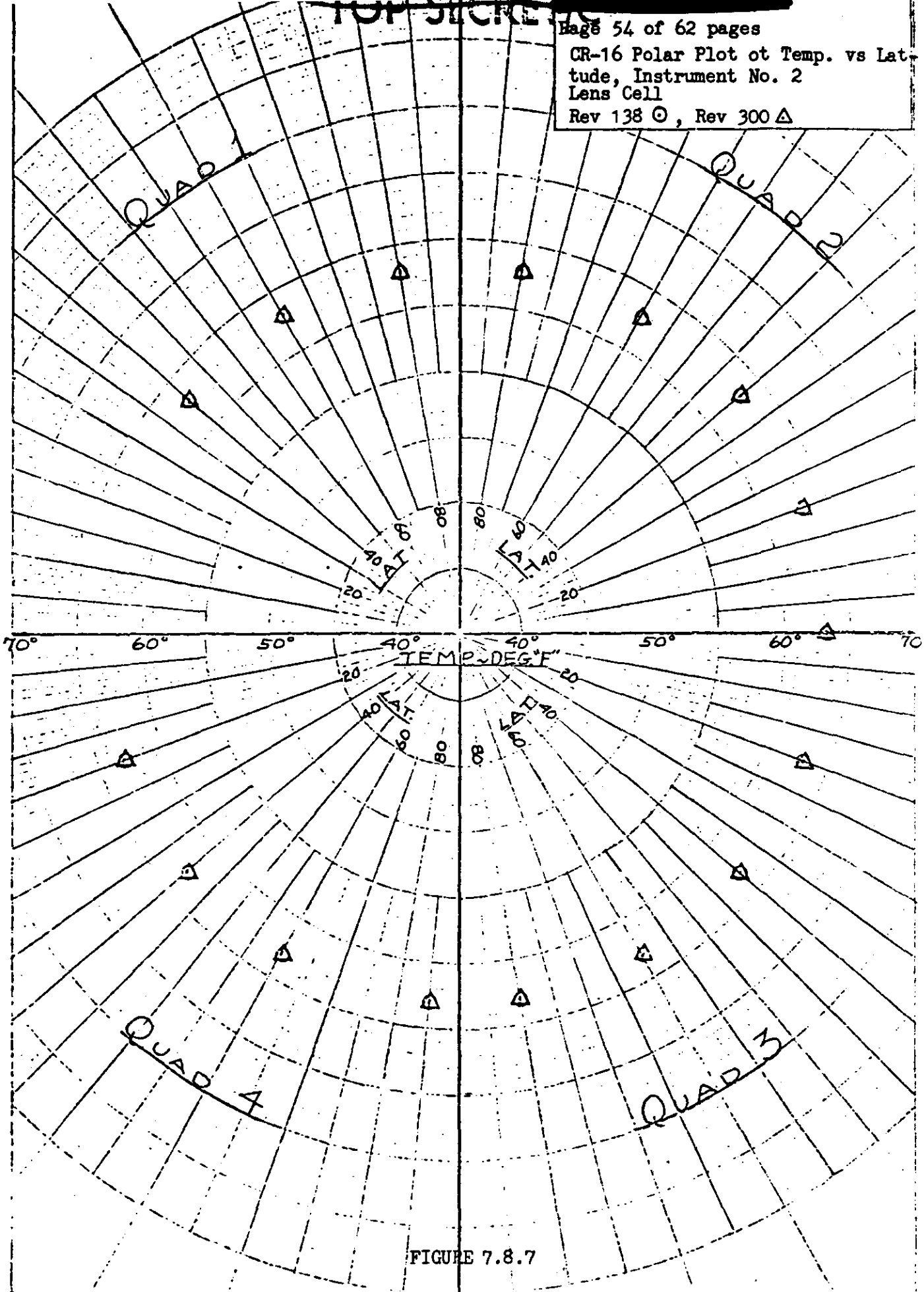

FIGURE 7.8.7

Page 55 of 62 pages
CR-16 Polar Plot of Temp. vs Latitude, Instrument No. 2 Lens Cone
Rev 138 ⊙, Rev 300 △

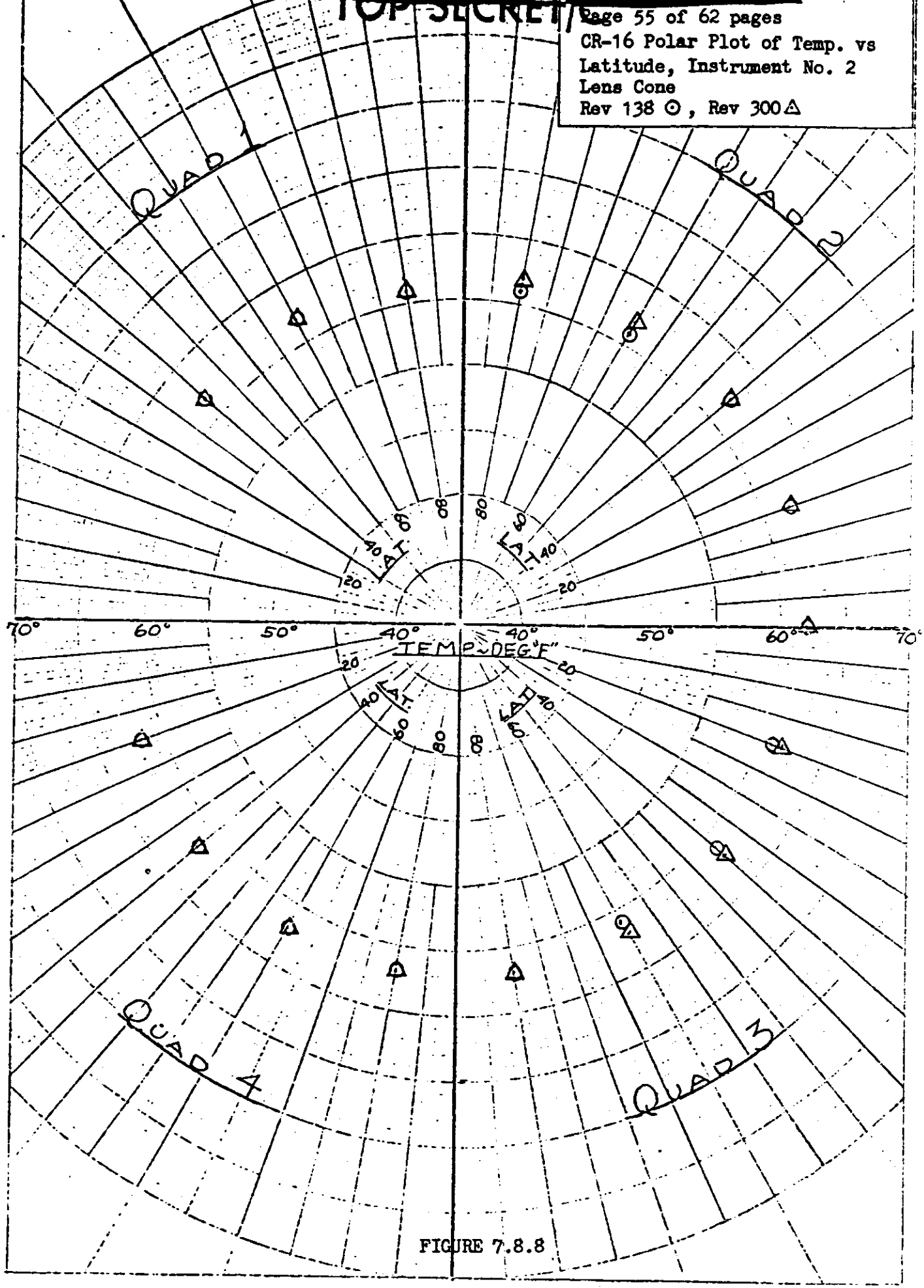

FIGURE 7.8.8

CR-16 Polar Plot of Temp. vs Latitude, Instrument No. 2, Front Rail
Rev 138 ⊙, Rev 300 △

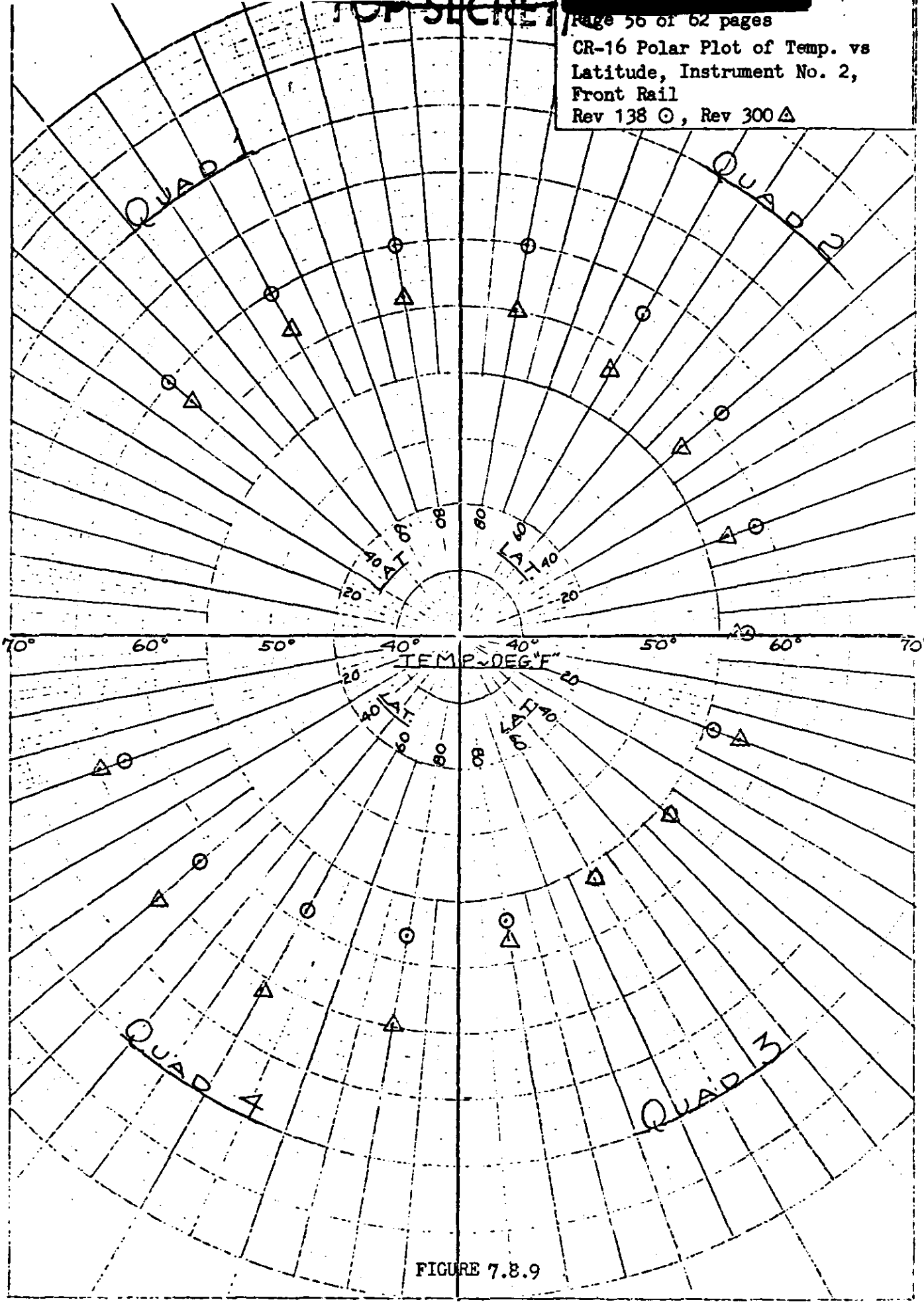

FIGURE 7.8.9

CR-16 Polar Plot of Temp. vs Latitude, Instrument No. 2 Rear Rail
Rev 138 ⊙ , Rev 300 △

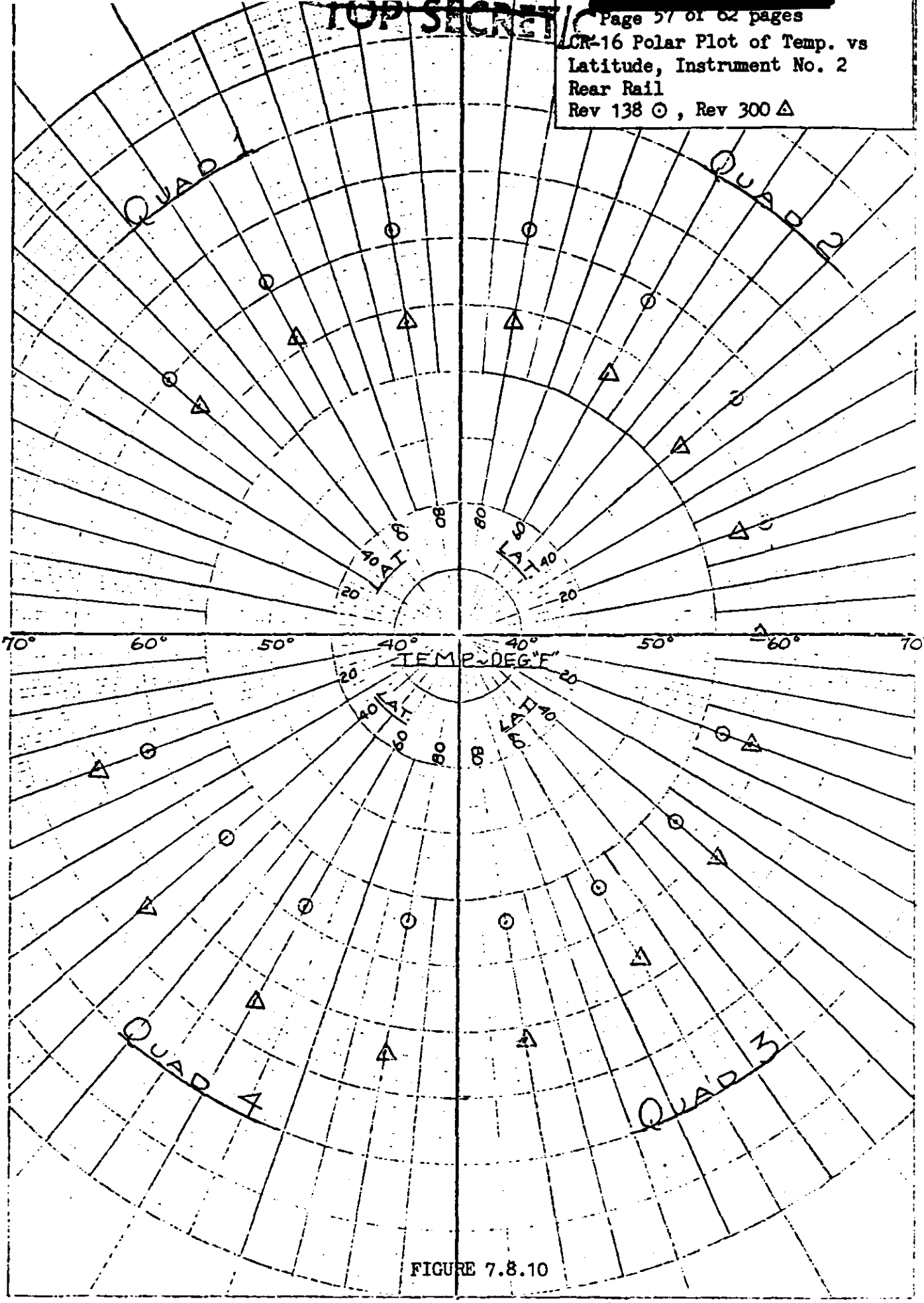

FIGURE 7.8.10

CR-16 Polar Plot of Temp. vs Latitude, Instrument No. 2
Output A/O
Rev 138 ⊙ , Rev 300 △

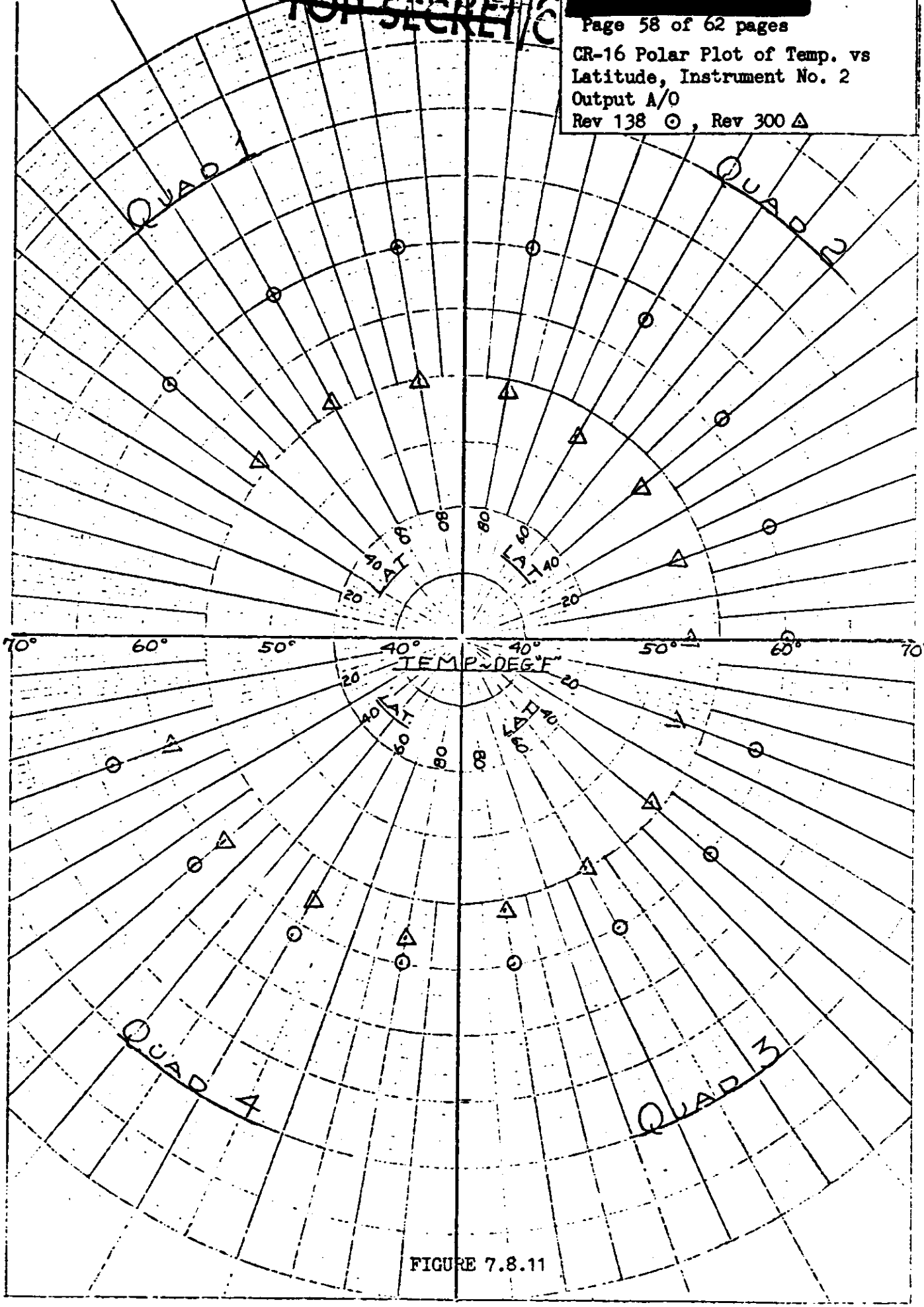

FIGURE 7.8.11

NOTE: Data from Rev 122 - Rev 300 is T/R data due to failure of Link I.

~~TOP SECRET/C~~ [redacted]

TEMPERATURE SUMMARY (°F) (CR-6 & Up)

Payload CR-16

Rev. No.		TASK	9	16	25	32	41	48	57	64	73	81	90	106	122	138	154	1
Beta Angle		12	-31	-30	-29	-28	-27	-25.5	-24	-23	-22	-21	-20	-18	-15.9	-14	-11	
Pan No. 1 Lens Cell	2	65	68	65	64	63	64	63	63	64	63	63	63	63	62	62	63	
Lens Cone	4	65	69	66	65	65	65	65	64	65	64	64	64	64	63	62	63	
Rear Rail	6	62	58	56	60	56	60	55	60	56	59	55	61	62	62	63	63	
Drive Mtr	10	63	63	62	61	61	62	61	61	61	61	61	60	61	61	60	60	
Front Rail	12	62	59	56	60	56	61	56	61	56	60	56	62	62	63	63	64	
Average			64	61	62	60	62	60	62	60	61	60	62	62	62	62	63	
Pan 1 Output AO	8	63	48	46	50	47	51	47	52	48	51	48	53	54	55	55	56	
Delta Top Left	14	65	48	47	54	49	54	50	54	51	54	49	64	72*	64	73	74	
Drum Support	16	62	61	59	60	58	60	57	60	58	60	57	60	60	61	61	61	
Pan No. 2 Lens Cell	18	65	67	65	65	64	64	64	64	65	64	64	64	64	63	63	63	
Lens Cone	20	65	64	62	62	62	62	62	62	62	62	62	62	62	62	61	62	
Rear Rail	22	63	59	57	62	57	63	57	63	58	63	57	66	66	66	66	68	
Drive Mtr	26	63	64	62	62	62	63	62	62	62	62	61	61	61	61	61	61	
Front Rail	28	63	60	51	63	57	63	57	63	58	64	57	65	66	66	61	66	
Average			63	61	63	60	63	60	63	61	63	60	64	64	63	62	63	
Pan 2 Output AO	24	63	68	65	70	65	70	64	69	64	68	62	68	68	67	65	65	
Supply Cassette	30	59	56	55	57	56	59	56	60	57	60	57	60	61	62	60	61	
Aux. Electronic Box	32	63	66	64	68	64	68	63	67	63	66	61	68	69	67	67	68	
Slope Programmer	34	66	86	87	86	87	86	86	85	86	85	84	85	84	83	82	80	
PCU	36	52	54	52	56	52	56	52	56	49	54	52	54	56	54	54	56	
Switch Programmer	43	53	69	69	72	69	76	69	72	69	72	66	72	69	69	69	69	
Aft Power Box	49	59	46	49	49	49	56	49	53	49	56	53	53	53	56	56	62	
SRV "A" T/U	40	63	50	43	43	49	43	49	43	51	44	49	49	50	43	47	46	
Retro	42	61	53	49	49	47	49	46	49	46	47	45	47	46	46	46	48	
SRV "B" T/U	44	60	61	60	59	60	60	60	61	61	61	60	58	58	59	60	57	
Retro	46	58	58	55	55	55	55	54	55	54	54	53	54	53	53	53	54	

~~TOP SECRET/C~~ [redacted]

TABLE 7 (1)

TEMPERATURE SUMMARY (°F) CR-6 & Up

Payload CR-16

W. No.		TASK	9	16	25	32	41	48	57	64	73	81	90	106	122	138	154	170
Sun Angle		12	-31	-30	-29	-28	-27	-25.5	-24	-23	-22	-21	-20	-18	-15.9	-14	-11	-9
Blast Shield	48	59	56	56	56	56	59	53	59	53	56	53	53	56	56	63	63	56
- OPEN	49	-	59	62	56	59	-	-	56	56	56	56	53	53	56	56	53	53
Fixed Resistor	53																	
Approx. 3 volts	55																	
Wiring	5	59	28	112	15	123	15	132	15	135	12	126	31	49	31	55	55	31
	7	58	64	96	58	96	58	93	58	90	55	88	70	82	67	79	79	67
	9	60	73	85	25	82	25	79	25	79	25	79	29	29	29	22	29	19
	11	59	66	81	28	81	28	78	28	75	28	75	28	28	31	28	31	25
	13	58	32	39	39	42	42	45	42	48	42	45	52	58	55	64	71	58
	15	58	-1	74	9	85	6	97	6	102	6	97	18	34	24	43	46	21
VISICONIC	17	59	-7	99	-11	116	-11	130	-11	133	-11	127	2	15	5	15	21	-1
	29	61	77	91	68	91	68	88	64	82	64	82	71	77	71	74	74	64
	21	61	68	77	30	74	30	71	30	68	30	64	30	30	30	27	30	27
	23	59	21	56	21	62	24	59	21	59	24	56	21	21	24	21	21	18
	25	57	35	42	42	45	45	45	42	45	42	45	45	51	51	57	64	54
	31	57	-2	51	5	67	5	79	5	82	5	79	14	26	17	26	33	17
Forward Barrel	33	59	28	83	31	86	28	89	28	89	28	80	47	75	47	72	72	37
	35	60	48	70	32	67	32	63	32	60	32	57	32	35	35	32	35	26
	37	61	20	45	23	52	26	48	23	48	26	45	23	26	30	30	33	23
	39	59	-33	49	-27	68	-27	84	-27	92	-27	84	-14	11	-8	11	11	-14
Aft Barrel	41	62	36	77	39	80	36	83	36	83	36	74	62	83	55	80	80	49
	45	63	57	76	35	73	35	70	31	66	31	66	35	31	72	28	31	25
	47	62	19	56	22	59	22	59	22	59	25	53	22	22	35	25	28	22
	51	63	-24	29	-18	45	-18	60	-18	73	-15	67	-5	13	56	13	23	-2
[illegible]	30	68	68	61	67	68	68	65	67	66	67	69	69	68	66	65	66	67

TABLE 7.9.2

TEMPERATURE SUMMARY (°F) (CR-6 & Up)

Rev. No.		187	203	219	251	267	284	300
Beta Angle		-7	-5	-2	+2	+4	+6	+8
Pan No. 1 Lens Cell	2	64	64	65	64	63	63	63
Lens Cone	4	64	64	64	64	63	63	63
Rear Rail	6	64	65	65	67	64	64	64
Drive Mtr	10	61	61	61	63	61	61	61
Front Rail	12	66	66	65	67	65	65	65
Average		64	64	64	65	63	64	63
Pan 1 Output AO	8	60	61	61	65	63	65	65
Delta Top Left	14	67	70	65	67	64	66	66
Drum Support	16	62	61	62	62	61	62	62
Pan No. 2 Lens Cell	18	64	63	64	63	63	63	63
Lens Cone	20	62	62	62	62	62	62	62
Rear Rail	22	68	68	67	68	65	65	65
Drive Mtr	26	61	61	61	62	61	62	61
Front Rail	28	67	67	65	61	64	64	64
Average		64	64	64	63	63	63	63
Pan 2 Output AO	24	64	62	61	61	59	59	58
Supply Cassette	30	63	62	61	64	63	63	62
Aux. Electronic Box	32	66	65	64	64	62	62	61
Slope Programmer	34	81	80	79	79	78	77	77
IMU	36	58	56	56	56	56	56	55
Switch Programmer	43	66	66	66	63	63	63	60
A/C Power Box	49	62	65	68	68	68	68	69
SRV "A" T/U	40							
Retro	42							
SRV "B" T/U	44	62	64	64	68	65	65	66
Retro	46	58	58	60	60	57	59	58

TEMPERATURE SUMMARY (°F) CR-6 & Up

Ft. No.		187	203	219	251	267	284	300									
Aft Angle		-7	-5	-2	+2	+4	+6	+8									
Blast Shield	45	34	37	40	37	34	37	34									
	50	21	31	31	28	20	21	19									
Fixed Resistor	53																
Approx. 3 volts	55																
Wiring	5	28	40	31	28	24	24	21									
	7	61	70	61	49	49	49	46									
	9	16	22	16	16	10	16	10									
	11	12	18	15	15	6	12	6									
	13	55	68	61	61	61	61	61									
	15	21	37	31	31	27	31	24									
DISICONIC	17	2	12	5	9	2	5	-1									
	19	68	71	64	61	58	58	55									
	21	27	23	23	27	23	23	20									
	23	21	31	23	27	24	24	20									
	25	57	67	65	67	64	67	67									
	31	20	29	23	26	26	26	26									
Forward Barrel	33	41	53	37	34	30	28	25									
	35	22	32	22	29	22	26	22									
	37	26	33	33	36	33	36	33									
	39	-11	+2	-5	-2	-5	-5	-5									
Aft Barrel	41	46	55	46	39	36	36	33									
	45	28	31	65	25	20	25	19									
	47	22	22	23	28	25	28	25									
	51	1	13	4	13	10	10	10									
R	30	70	70	69	72	70	74	73									

TOP SECRET/C

TABLE 7.9.4