CORONA CR

MISSION SUMMARY

AND

TELEMETRY ANALYSIS

MISSION 1117

AGENA 1663/PAYLOAD CR-08

8 JUNE 1972

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Distribution:

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1.0 SUMMARY

Mission 1117 was the last of the Corona missions and utilized a Thorad booster (SLV-2H) S/N 571, Agena vehicle 1663, and Payload system CR-08. The CR-08 payload system contained panoramic cameras S/N 318 and 319. Payload profile and additional component serial numbers are included in Figure 7-1.

Liftoff occurred at 1141 PDT on May 25, 1972 from 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. However, due to failure of the Solar Array to deploy and a high loss of vehicle control gas, the mission was shortened to 2/4 days.

Panoramic cameras S/N 318 and 319 performed satisfactorily throughout the flight with the film supply of both instruments exhausted on Rev 91.

The panoramic camera A to B transfer sequence was performed on Rev 28 [redacted] with all events occurring normally. The -1 mission recovery capsule was recovered by air catch on Rev 34 at 1450 PDT on May 27, 1972. The -2 mission recovery capsule was recovered by air catch on Rev 98 at 1352 PDT on May 31, 1972.

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

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

2.0 SUBSYSTEM PERFORMANCE

2.1 Panoramic Camera. Panoramic cameras S/N 318 and 319 performed normally during the -1 and -2 missions.

2.1.1 Film Consumption and Type.

	Frames	
	Pan 318	Pan 319
Sample	23	23
Pre-launch	118	119
-1 Mission	3023	3035
-2 Mission	3006	2995
Total	6,170	6,172

Film Supply Length and Type

Pan 318	Pan 319
16,300 FT/3414	16,300 FT/3414

2.2 Command and Control. The command system performed satisfactorily throughout the -1 and -2 missions.

2.2.2 FMC Match. The ramp to orbit match was maintained satisfactorily throughout the flight. Approximately 77.1 % of the first mission operations and 80.0 % 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 throughout the -1 and -2 missions.

2.3.2 Clock System. The payload system clock performed normally throughout the -1 and -2 missions. The coefficients for the system time/clock time correlation are:

Second Order Fit

System Time = $A_o + A_1$ (clock time) + A_2 (clock time)^2

A_o = -0.1403495363 + 06

A_1 = 0.999999947479 + 00

A_2 = 0.9362447117082 - 14

Sigma = 0.00063

Number of Points = 10

2.3.3 SRV Tape Recorder. The -1 SRV tape recorder performed normally with 102.4 minutes of data retrieved satisfactorily. The -2 SRV tape recorder performed normally with 109.2 minutes of data extracted satisfactorily.

2.4 Recovery.

2.4.1 -1 Mission. The -1 recovery capsule was successfully recovered by air catch on Rev 34 at 1450 PDT on May 27, 1972. All re-entry events were within tolerance with the impact close to nominal. Refer to Table 7.4.

	Actual	Predicted
Impact Location	24°53.0'N/161°23.0'W	24°35.7'N/161°24.1'W

2.4.2 -2 Mission. The -2 recovery capsule was successfully recovered by air catch on Rev 98 at 1352 PDT on May 31, 1972. All re-entry events were within tolerance with the impact 18 miles from the nominal. Refer to Table 7.4.

	Actual	Predicted
Impact Location	19°32'N/147°51'W	19°14.7'N/148°11.5'W

3.0 ORBITAL PERFORMANCE

3.1 Orbital Parameters.

Parameter	Predicted	Tolerance	Actual(STC)	Actual(APF)
Period(Min.)	89.00	+.32,-.33	88.91	88.91
Perigee(N.M.)	84.8	+7,-6	87.5	87.7
Apogee(N.M.)	163.0	+11,-15	159.2	159.3
Eccentricity	0.0111	+.0020,-.0027	0.00947	0.0098
Inclination(deg.)	96.4	+.19,-.15	96.36	96.35
Arg. of Perigee(deg.)	148	+54,-44	135.8	138

3.2 DMU Operation. The DMU rocket fired on Rev 2 increased the orbit period from 88.9 (approximately one rocket low) to 89.2 min. The DMU rocket fired on Rev 7 was utilized unsuccessfully to aid the deployment of the solar array. In addition, abnormal vehicle control gas usage shortened the mission life and prohibited the firing of DMU rockets for normal ground track and period control. Refer to Table 3.2.

The ground track error at the ascending node ranged from 11 nautical miles east to 100 nautical miles west of nominal.

TABLE 3.2

DMU Performance

Rocket No.	Rev No.	System Time (Sec)	Period Change (Sec)	Velocity Change (Ft/Sec)	Period at Firing (Min)	Impulse Lb/Sec)
1	2	78199	14.95	23.54	89.07	3084
2	7	18637	10.15	16.1	89.51	2075

Note: Only two of the available 12 rockets were fired due to the vehicle anomalies.

4.0 ENVIRONMENTAL CONTROL

4.1 Pressure Make-up System. The pressure make-up system (PMU) operated properly throughout the flight. There were 103 panoramic camera operates for a total of 205 minutes which resulted in a gas consumption rate of 5.8 PSI/min. of operate time.

4.2 Thermal Environment. The temperature data obtained indicated the temperature environment was within the pre-flight predictions. The averages of the panoramic camera temperatures ranged from 57°F to 62°F for instrument S/N 318 and 57°F to 60°F for instrument S/N 319. The orbit was a constant Beta angle of plus 18 degrees. Refer to Tables 7.7, 7.8.1, and 7.8.2.

5.0 POST EVENT 2 TESTING

Due to lack of vehicle power and control gas, no post event 2 testing was performed.

6.0 HARDWARE DEFINITIONS

6.1 Agena. FTV 1663 was an Agena vehicle (SS01B) and a Thorad booster (SLV-2H) S/N 571. The Agena was oriented nose first with the following configuration:

1) Twelve Thiokol DMU rockets with seven 3000 lb/sec rockets in positions 1 and 7 through 12, and five 2000 lb/sec rockets in positions 2 through 6.
2) Three primary control gas spheres with -5 (heavy) control gas mixture.
3) AP-3 payload with digital storage register and capability of accepting both Silo and Uncle commands.
4) Ten panel, single wing, solar array system with three 1K batteries (depleting system) - second flight utilization of 1K batteries by [redacted]
5) 3/4 speed Type VIII Programmer (325 subcycles).

6) High density acid (Oxidizer) and Hyperzen 300 fuel (instead of IRFNA and UDMH).

7) Three real time tape recorder control commands.

8) Aft payload - [redacted] SSARP, CRL S-228, and CRL 901.

9) Six Silo/Uncle commands for use by SSARP, CRL S-228, and CRL 901.

6.2 Payload. The CR-08 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 101-126/Silo 301 - 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 = 1720 lbs.

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

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

6.3 Camera and Programmer Settings.

6.3.1 Panoramic Cameras

	S/N 318	S/N 319
Filter type	W-25	W-25
Primary	.037 glass	.037 glass
Alternate	.040 glass	.040 glass
Slit Width (inches)		
Position 1	0.119	0.115
Position 2	0.146	0.134
Position 3	0.177	0.171
Position 4	0.214	0.205
Failsafe	0.130	0.119

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

6.3.2 Exposure Control Settings

	Seconds
T-1 (20 second increment) initial setting	200
T-3 Slit position 3 duration	440
T-4 Slit position 2 duration	200
T-6 Δ	220
T-6	420

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

6.3.3 FMC Control Settings.

1) Eccentricity function

   a) Period - 3880 seconds

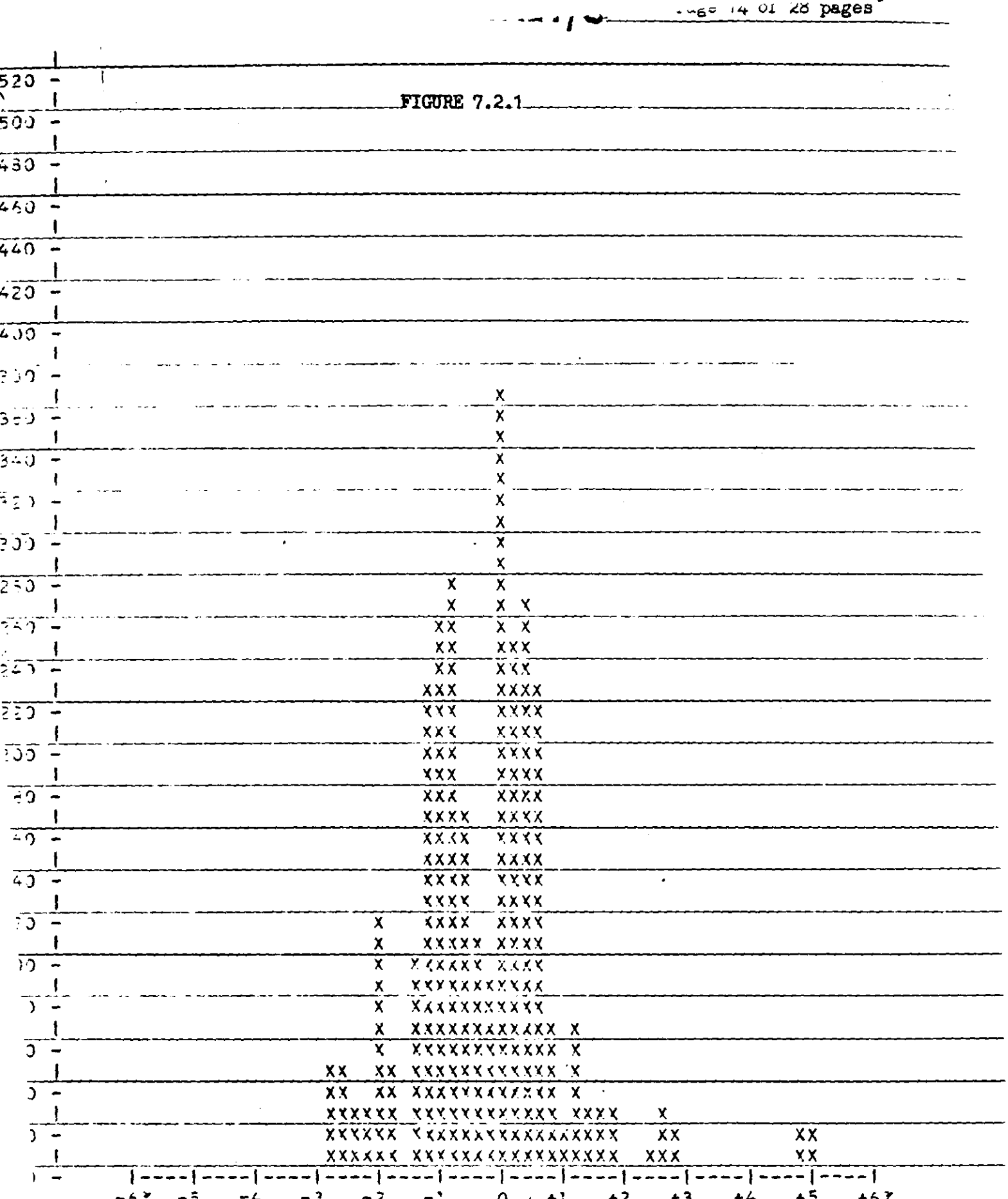
   b) Delay step increment - 50 seconds

2) Oblateness Function

a) Period - 5244 seconds

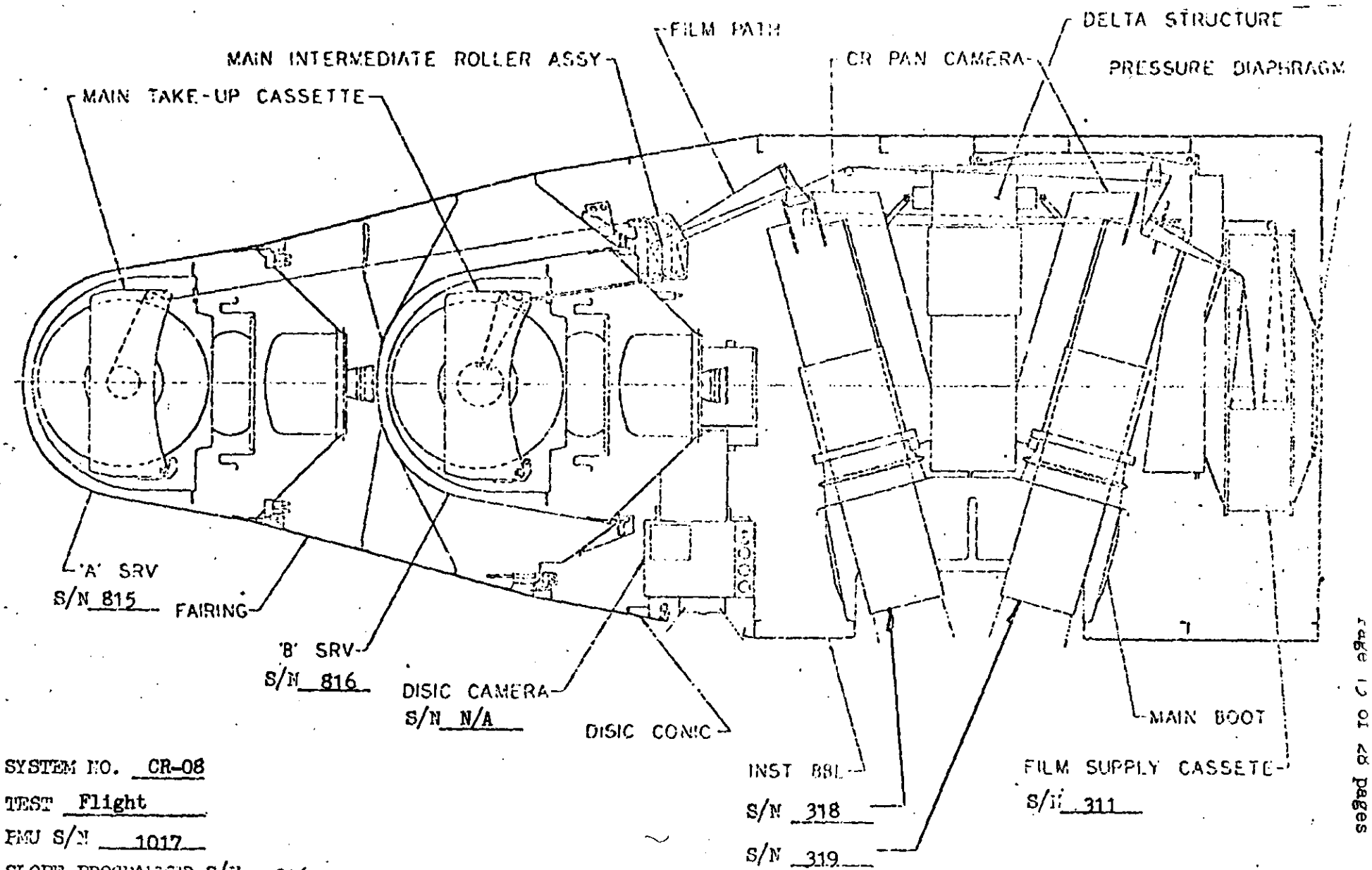
b) Gain factor - 0.0925

FIGURE 7.2.1



MISSION 1117-1 AFT LOOKING--ORBIT MATCH
MEAN=-0.26 ONE SIGMA= 1.22 TOTAL FRAMES=3023
2113 FRAMES MATCHED ORBIT +/- 1.0. REPRESENTS 69.9%, OF THE MISSION

2. PAYLOAD PROFILE AND SERIAL NUMBERS



SYSTEM NO. CR-08
TEST Flight
PMU S/N 1017
SLOPE PROGRAMMER S/N 216
CLOCK S/N 615
SWITCH PROGRAMMER S/N 216

TABLE 7.1

FIGURE 7.2.2

MISSION 1117-1 END LOOKING--ORBIT MATCH
MEAN= 0.07 ONE SIGMA= 1.17 TOTAL FRAMES=3035
2333 FRAMES MATCHED ORBIT +/- 1%. REPRESENTS 77.07%, OF THE MISSION

FIGURE 7.2.3

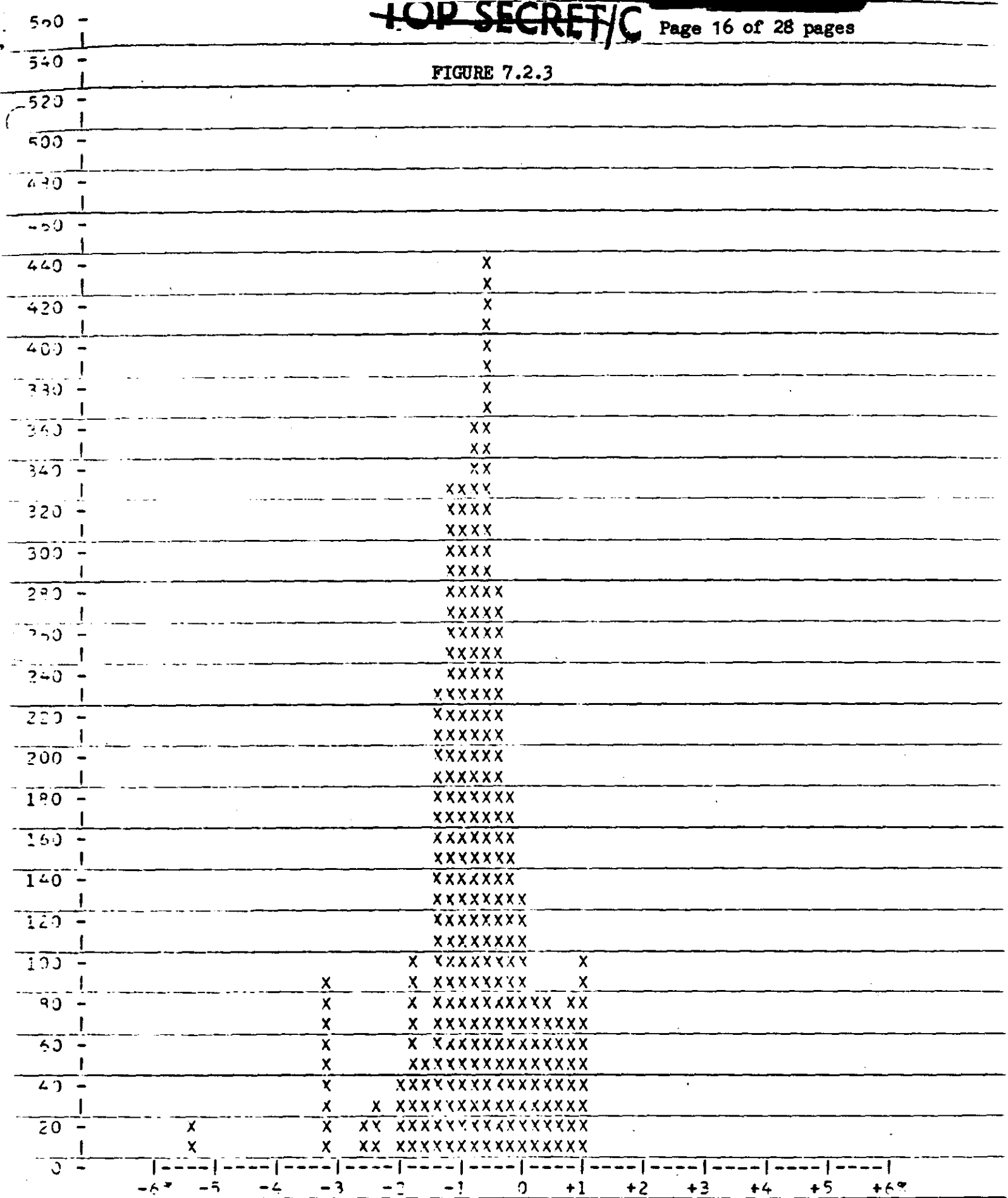

MISSION 1117-2 AFT LOOKING--ORBIT MATCH
MEAN=-0.78 ONE SIGMA= 0.91 TOTAL FRAMES=3034
2126 FRAMES MATCHED ORBIT +/- 1, REPRESENTS 70.07%, OF THE MISSION

FIGURE 7.2.4

MISSION 1117-2 FWD LOOKING--ORBIT MATCH
MEAN=-0.43 ONE SIGMA= 0.85 TOTAL FRAMES=3042
2432 FRAMES MATCHED ORBIT +/- 1%, REPRESENTS 79.98%, OF THE MISSION

MISSION 1117-1 AFT LOOKING, TOTAL FRAME COUNT- 3023

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

DISTRIBUTION OVER 61 POINTS INCREMENTED AT .2 PERCENT

PERCENT	FRAMES	PERCENT	FRAMES
		0.0	368
-0.2	92	0.2	251
-0.4	114	0.4	267
-0.6	170	0.6	225
-0.8	233	0.8	60
-1.0	259	1.0	15
-1.2	237	1.2	72
-1.4	93	1.4	25
-1.6	0	1.6	32
-1.8	46	1.8	31
-2.0	114	2.0	0
-2.2	36	2.2	0
-2.4	76	2.4	17
-2.6	49	2.6	28
-2.8	48	2.8	17
-3.0	0	3.0	0
-3.2	0	3.2	0
-3.4	0	3.4	0
-3.6	0	3.6	0
-3.8	0	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	24
-5.0	0	5.0	23
-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 7.3.1

MISSION 1117-1 FWD LOOKING, TOTAL FRAME COUNT- 3035

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

DISTRIBUTION OVER 61 POINTS INCREMENTED AT .2 PERCENT

PERCENT	FRAMES	PERCENT	FRAMES
		0.0	232
-0.2	172	0.2	508
-0.4	162	0.4	351
-0.6	178	0.6	181
-0.8	87	0.8	123
-1.0	277	1.0	69
-1.2	77	1.2	55
-1.4	44	1.4	41
-1.6	44	1.6	48
-1.8	43	1.8	43
-2.0	77	2.0	10
-2.2	15	2.2	34
-2.4	15	2.4	0
-2.6	15	2.6	30
-2.8	0	2.8	29
-3.0	0	3.0	0
-3.2	0	3.2	0
-3.4	0	3.4	0
-3.6	0	3.6	0
-3.8	0	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	24
-5.4	0	5.4	23
-5.6	0	5.6	0
-5.8	0	5.8	0
-6.0	0	6.0	0

TABLE 7.3.2

MISSION 1117-2 AFT LOOKING, TOTAL FRAME COUNT- 3034

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

DISTRIBUTION OVER 61 POINTS INCREMENTED AT .2 PERCENT

PERCENT	FRAMES	PERCENT	FRAMES
		0.0	126
-0.2	180	0.2	82
-0.4	231	0.4	81
-0.6	441	0.6	74
-0.8	355	0.8	75
-1.0	334	1.0	97
-1.2	327	1.2	0
-1.4	234	1.4	0
-1.6	49	1.6	0
-1.8	97	1.8	0
-2.0	43	2.0	0
-2.2	0	2.2	0
-2.4	24	2.4	0
-2.6	22	2.6	0
-2.8	0	2.8	0
-3.0	0	3.0	0
-3.2	89	3.2	0
-3.4	0	3.4	0
-3.6	0	3.6	0
-3.8	0	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	22	5.4	0
-5.6	0	5.6	0
-5.8	0	5.8	0
-6.0	0	6.0	0

TABLE 7.3.3

MISSION 1117-2 FWD LOOKING, TOTAL FRAME COUNT- 3042

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

DISTRIBUTION OVER 61 POINTS INCREMENTED AT .2 PERCENT

PERCENT	FRAMES	PERCENT	FRAMES
		0.0	261
-0.2	291	0.2	112
-0.4	443	0.4	91
-0.6	497	0.6	71
-0.8	448	0.8	57
-1.0	104	1.0	56
-1.2	48	1.2	98
-1.4	113	1.4	51
-1.6	54	1.6	0
-1.8	123	1.8	0
-2.0	52	2.0	0
-2.2	0	2.2	0
-2.4	24	2.4	0
-2.6	22	2.6	0
-2.8	0	2.8	0
-3.0	0	3.0	0
-3.2	0	3.2	0
-3.4	0	3.4	0
-3.6	0	3.6	0
-3.8	0	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	22	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

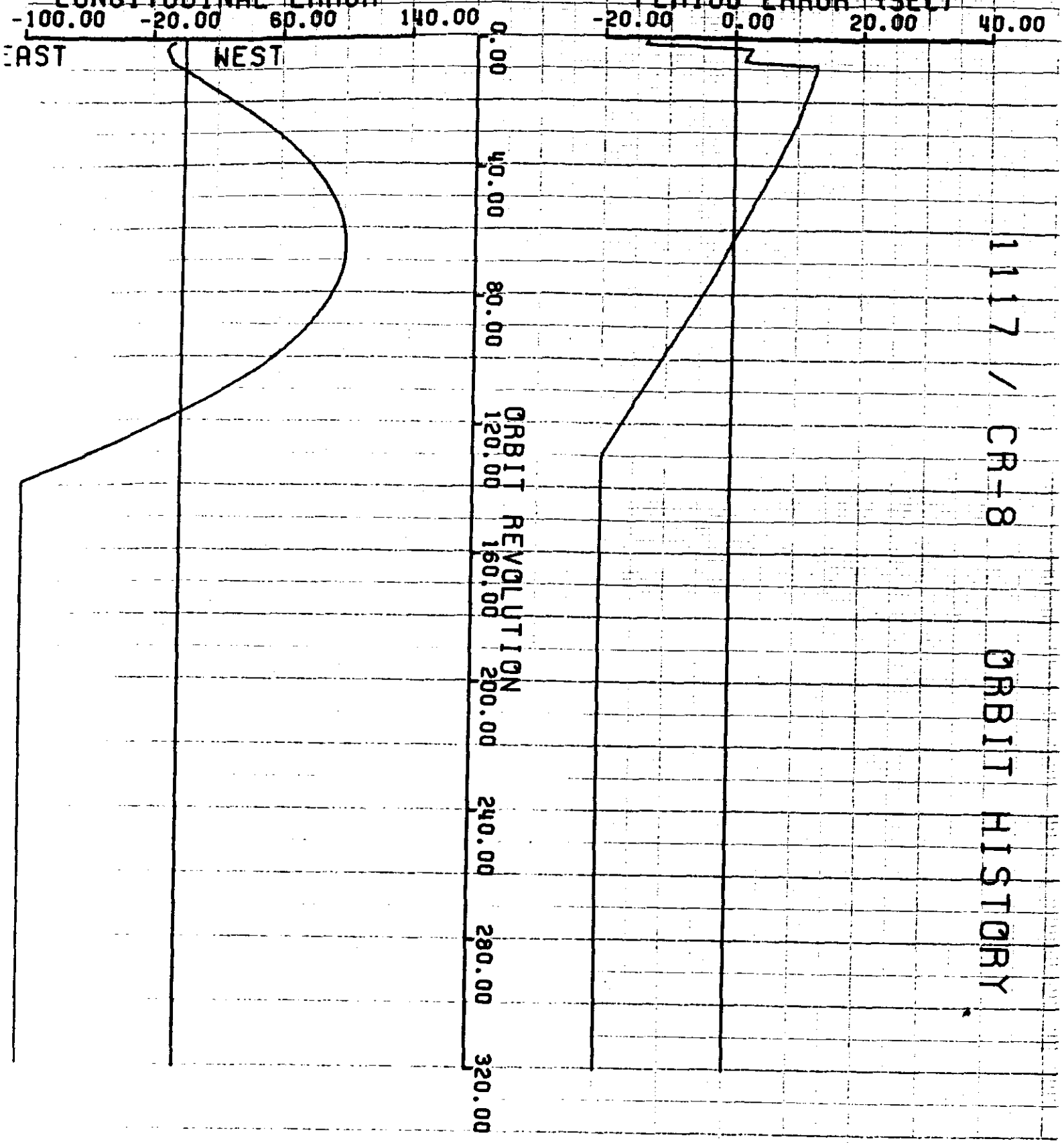
TABLE 7.3.4

Re-Entry Sequence of Events

Event	Delta Time (Seconds) Nominal	Unit #1	Unit #2
D-Timer Start	0	0	N/A
Arm	6.0 ± .5	6	
Transfer	81.0 ± .5	80.82	
Elec. Disconnect	82.0 ± .5	81.82	
Separation	83.0 ± .5	82.82	
Spin	3.40 ± .30	3.42	
Retro	7.55 ± .45	7.54	
Despin	10.75 ± .54	10.58	
Thrust Cone Separation	1.50 ± .15	1.49	N/A
"G" Switch Open			
Parachute Cover Ejection	26.0 ± 1.5	25.57	25.85
Deceleration Chute Deploy	.58 ± .08	.55	.57
Ablative Shell Disconnect	.58 ± .08	.55	.57
Main Chute Bag Separation	10.25 ± 1.5	11.35	11.04
Main Chute Deploy	.52 ± .13	.63	.55
Main Chute Disreef	4.50 ± .80	4.25	4.31
K-10 Reset	28.0 ± 1.9	27.85	28.43

TABLE 7.4

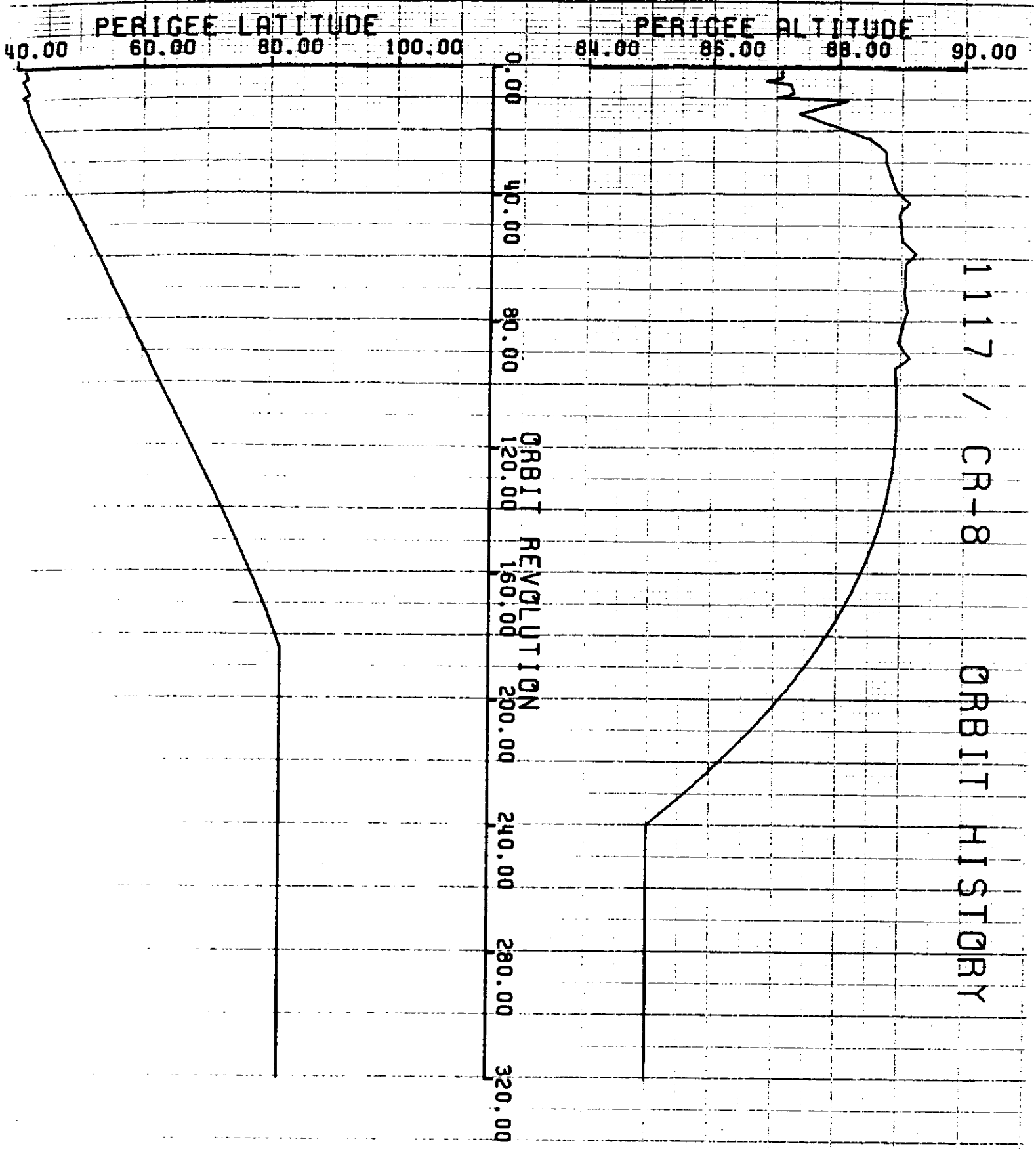
FIGURE 7.5.1



1117 / CR-8 ORBIT HISTORY

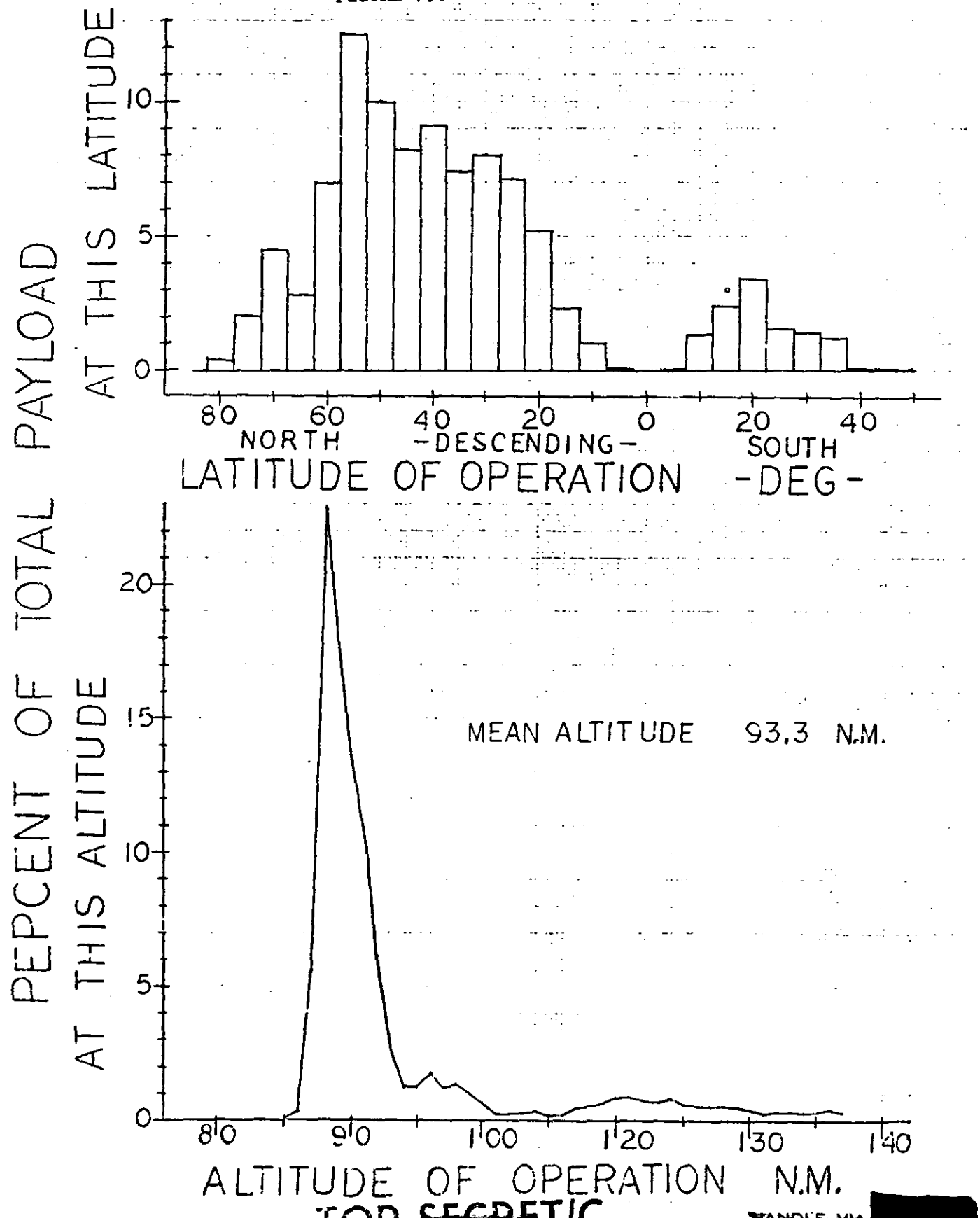
[redacted]

FIGURE 7.5.2


PERIGEE LATITUDE
40.00
60.00
80.00
100.00
PERIGEE ALTITUDE
84.00
86.00
88.00
90.00
0.00
40.00
80.00
120.00
160.00
200.00
240.00
280.00
320.00
ORBIT REVOLUTION
1117 / CR+8 ORBIT HISTORY

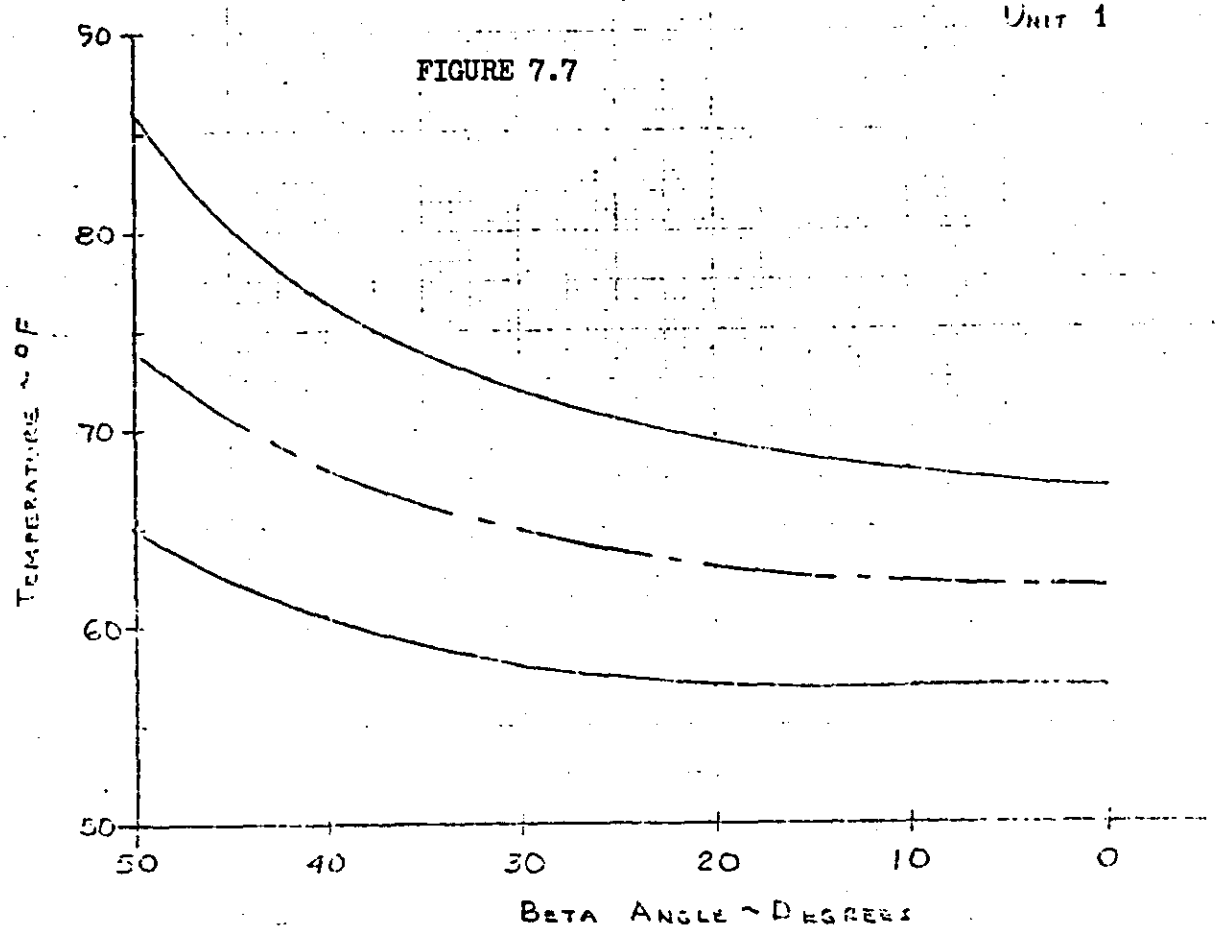
1117/CR17/1663

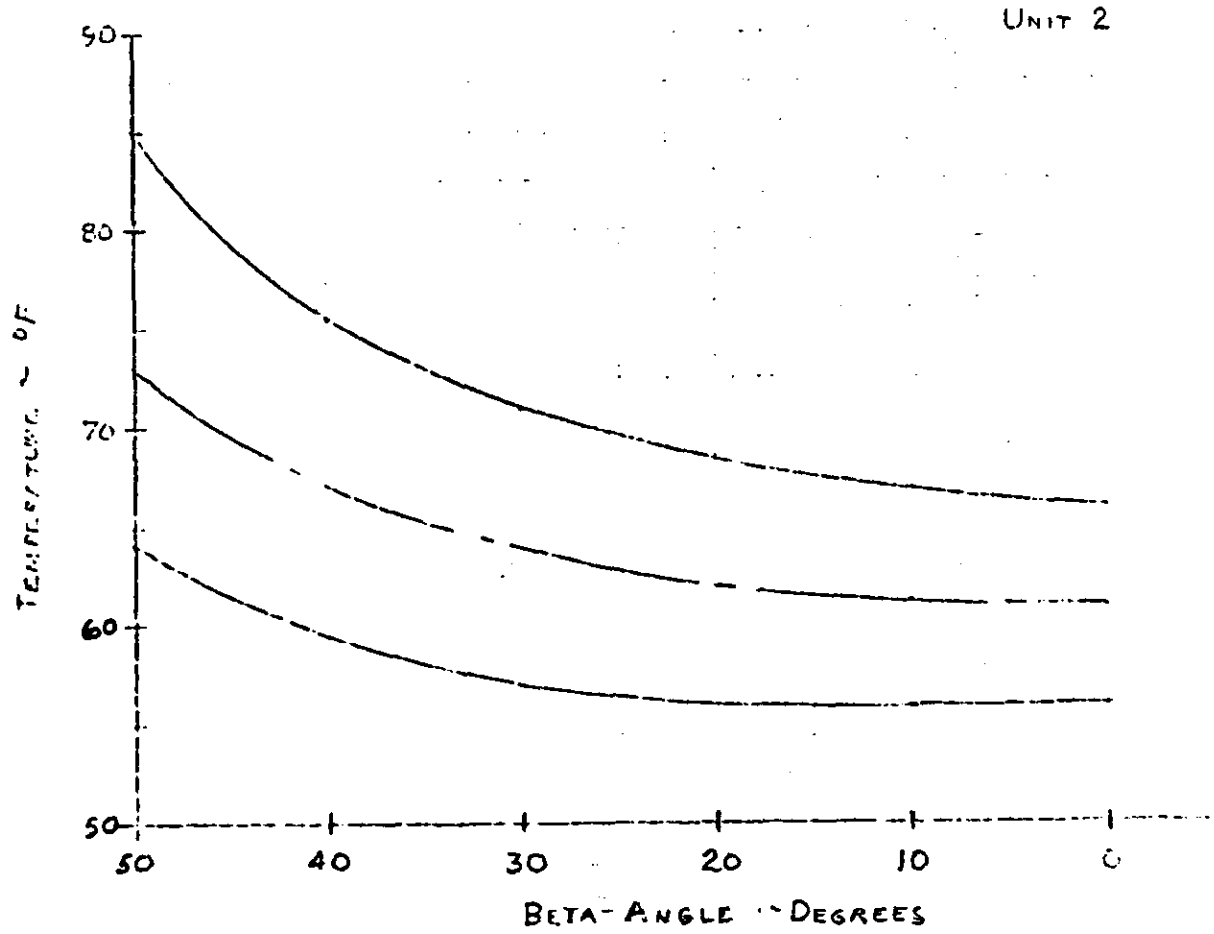
FIGURE 7.6



CR-08 FLIGHT TEMPERATURE PREDICTIONS

FIGURE 7.7





TEMPERATURE SUMMARY (°F) (CR-6 & Up)

Payload CR-08

Rev. No.		8	16	24	32P	40C	48C	56C	65C	72C	81C	89C
Beta Angle		+18	+18	+18	+18	+18	+18	+18	+18	+18	+18	+18
Pan No. 1 Lens Cell	2	62	58	58	58	60	59	60	60	61	61	61
Lens Cone	4	60	56	56	55	58	57	58	58	59	58	59
Rear Rail	6	62	57	60	56	62	57	61	57	62	57	64
Drive Mtr	10	64	61	60	59	61	61	61	61	62	61	63
Front Rail	12	61	56	59	56	61	58	61	58	62	58	64
Average		62	58	59	57	60	58	60	59	61	59	62
Pan 1 Output AO	8	64	59	61	58	64	61	64	60	64	61	66
Delta Top Left	14	54	52	52	46	55	52	53	52	54	53	55
Drum Support	16	61	57	58	57	58	57	59	57	59	58	61
Pan No. 2 Lens Cell	18	60	57	57	57	58	58	58	58	59	58	58
Lens Cone	20	61	59	58	58	59	59	59	59	59	59	59
Rear Rail	22	59	54	59	54	59	54	59	54	59	55	61
Drive Mtr	26	63	61	60	60	60	60	60	60	61	60	62
Front Rail	28	59	54	58	55	59	54	58	54	59	55	61
Average		60	57	58	57	59	57	59	57	59	58	60
Pan 2 Output AO	24	53	48	52	49	52	48	52	49	53	49	54
Supply Cassette	30	60	59	62	61	63	61	64	62	65	62	67
Aux. Electronic Box	32	53	47	51	47	51	47	51	47	51	47	52
Slope Programmer	34	71	72	72	73	73	74	74	73	75	75	75
PCU	36	53	48	51	48	53	53	55	51	55	53	55
Switch Programmer	43	56	56	56	56	56	56	59	53	59	56	59
Aft Power Box	49	65	65	65	65	65	65	68	62	68	62	68
SRV "A" T/U	40	49	41	38	37							
Retro	42	51	45	43	41							
SRV "B" T/U	44	56	54	52	53	54	57	58	59	61	60	63
Retro	46	58	55	54	54	57	58	60	59	61	59	62

TABLE 7.8.1

TEMPERATURE SUMMARY (°F) CR-6 & Up

Payload CR-08

Rev. No.		8	16	24	32P	40C	48C	56	65C	72C	81C	89C
Beta Angle		+18	+18	+18	+18	+18	+18	+18	+18	+18	+18	+18
Black Shield	48	57	57	51	51	29	96	32	93	32	96	35
	50	53	53	50	50	13	117	19	119	22	119	19
DISIC Platen	53	60	62	61	61	60	62	61	61	61	61	62
Lens Cell	55	61	63	62	62	61	62	61	61	61	62	63
Fairing	5	3	98	3	39	6	107	0	101	3	107	0
	7	36	46	36	36	30	61	27	61	27	64	27
	9	17	66	17	48	17	82	10	79	10	79	10
	11	20	66	20	51	4	121	-2	124	-2	121	-2
	13	47	85	47	69	47	127	44	121	44	124	44
	15	6	136	6	70	9	150	6	141	9	147	6
DISICONIC	17	-11	134	-11	56	-8	137	11	131	-8	137	-11
	19	39	42	39	36	39	48	39	48	39	48	39
	21	23	60	23	48	23	66	23	63	23	63	23
	23	25	72	25	66	28	81	28	75	28	75	28
	25	56	78	56	68	59	98	59	98	59	98	59
	31	6	136	6	77	6	142	9	136	9	142	6
Forward Barrel	33	-1	30	-1	2	2	33	2	30	2	30	-1
	35	22	53	19	43	19	56	22	49	22	53	22
	37	30	67	30	61	30	70	33	61	33	64	33
	39	-25	140	-22	40	-22	143	-22	135	-22	140	-22
Aft Barrel	41	-8	19	-5	-5	-5	19	-5	19	-5	19	-5
	45	24	61	24	49	24	61	27	58	24	58	27
	47	31	72	28	65	28	75	31	62	28	65	31
	51	-14	145	-11	57	-14	145	-11	131	-11	145	-11
OUR	38	75	78	74	77	74	3	77	81	77	82	77

TABLE 7.8.2

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HANDLE VIA [redacted]

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