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CORONA J

PERFORMANCE EVALUATION REPORT

MISSION 1013-1 and 1013-2

FTV 1173; J-15

22 December 1965

Approved: [redacted]
Advanced Projects

Approved [redacted]

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Notice of Missing Page(s)

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FOREWORD

This report details the performance of the payload system during the operational phase of the Program [redacted] Flight Test Vehicle 1173.

Lockheed Missiles and Space Company has the responsibility for evaluating payload performance under the Systems Integration and "J" System contracts.

This document is the final payload test and performance evaluation report for Missions 1013-1 and 1013-2 which was launched on 2 November 1964.

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INTRODUCTION

This report presents the final performance evaluation of Missions 1013-1 and 1013-2 of the Corona Program. The purpose of this report is to define the performance characteristics of the J-15 payload system, to identify the source of in-flight anomalies and recommend the appropriate corrective action.

The performance evaluation was jointly conducted by representatives of Lockheed Missiles and Space Company (LMSC) and ITEK at the facilities of NPIC and AFSPPL. The off-line evaluation using Corona engineering photography acquired over the United States was performed at the individual contractors plants.

The quantitative data used for this report is obtained from government organizations. The diffuse density data, visual RES values and MTF/AIM resolution are produced by AFSPPL. The vehicle attitude error values, frame correlation times are made at NPIC who also supply the Processing Summary and MTF/AIM resolution reports [redacted]

Computer programs developed by A/P are utilized to calculate and plot the frequency distribution of the various contributors to image smear to permit analysis and correlation of the conditions of photography to the information content and quality of the acquired pictures. Computer analysis of the exposure, processing and illumination data provides the necessary data to analyze the exposure cirteria selected for the mission.

SECTION 1

SYSTEM PERFORMANCE

A. MISSION OBJECTIVES

The payload section of Mission 1013, placed into orbit by Flight Test Vehicle #1173 and SLV-2A booster #420, consisted of two panoramic cameras, two Stellar-Index cameras, two Mark 5A recovery capsules and a space structure to enclose the cameras and provide mounting surfaces for all equipments. Figure 1-1 presents an inboard profile of the J-15 payload system. This Corona "J" system is designed to acquire search and reconnaissance photography of selected areas of the earth from orbital altitudes. The planned mission was two, four day photographic periods with no deactive period.

B. MISSION DESCRIPTION

The payload was launched from Vandenberg Air Force Base (VAFB) at 2130:20 Z (1:30:20 PST) on 2 November 1964. Ascent and injection were normal and the achieved orbit within nominal tolerances. Tracking and command support was effected by the Air Force Satellite Control Facility consisting of tracking and command stations at [redacted] under central control of the Satellite Test Center at Sunnyvale, California. Mission 1013-1 consisted of four days operation and was completed by air recovery on 6 November 1964. Telemetry indicated that both panoramic cameras had failed during pass D52. Mission 1013-2 was completed on pass D81, 6 November 1964, with an air recovery.

The comparison of the planned and actual orbit parameters is tabulated as follows:

ORBITAL PARAMETERS

Parameter	Predicted	Orbit 2 Actuals
Period (Min.)	90.87	90.86
Perigee (N.M.)	99.8	100.0
Apogee (N.M.)	244.8	246.0
Inclination (Deg.)	80.0	80.0
Perigee Latitude (Deg.N.)	18.0	25.0
Eccentricity	0.0201	0.0202

SCHEMATIC INBOARD PROFILE - CORONA J SYSTEM

MISSION 1013

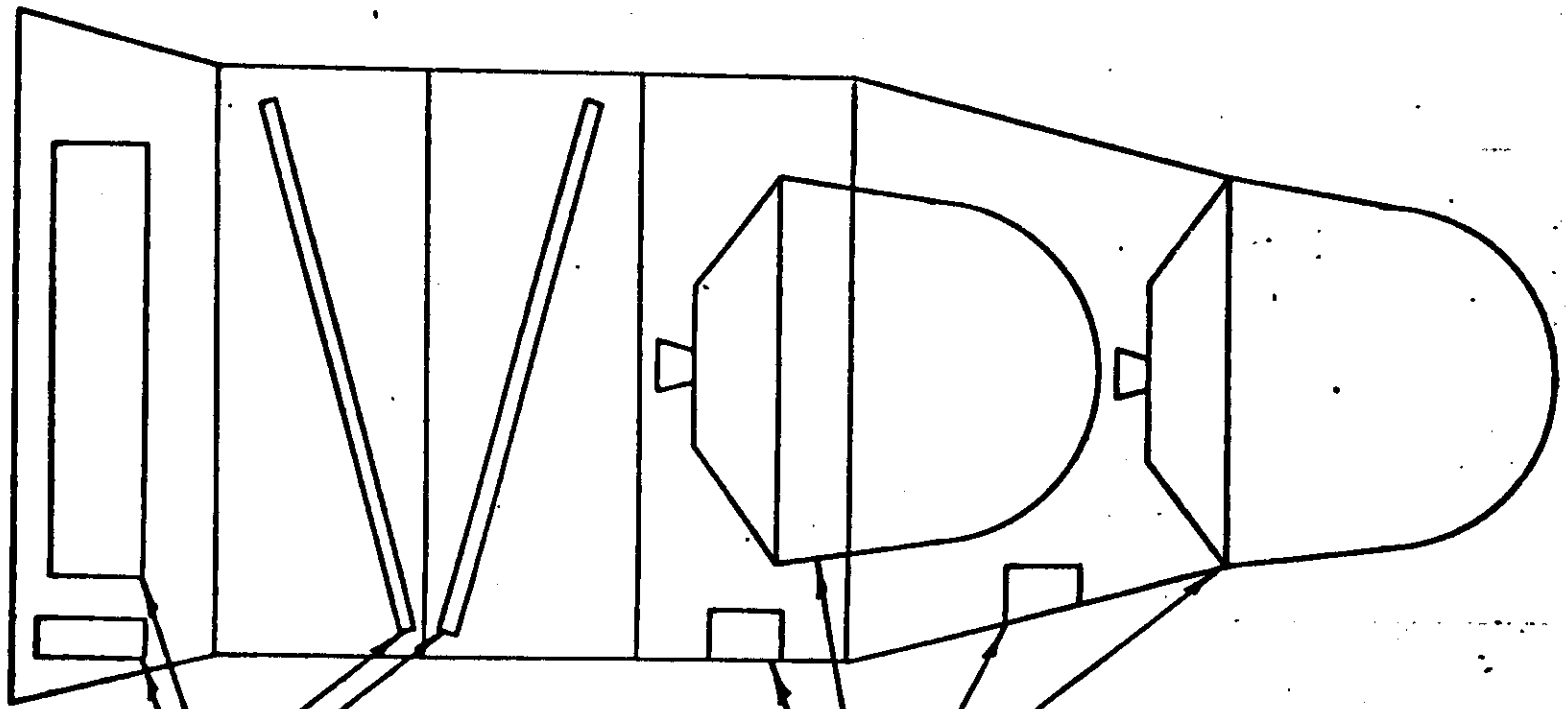

FIGURE 1-1

C. PANORAMIC CAMERAS

The Master and Slave cameras operated through pass D51. Both cameras failed near the start of a programmed operation of pass D52. The quality and information content of the Master camera photography was very good up to the point of failure. The Slave camera photography was comparable to the Master camera up to frame 90 of pass D24. Subsequent photography was out of focus across half of the format parallel and adjacent to the time track edge. This soft area began at a manufacturers splice and continued up to the point of failure.

D. STELLAR-INDEX CAMERAS

The Stellar-Index cameras of both Mission 1013-1 and 1013-2 operated properly during their respective missions. Both cameras produced excellent stellar and terrain photography.

E. OTHER SUB-SYSTEMS

An erroneous signal from the command programmer caused both the Master and Slave cameras to acquire approximately 400 unprogrammed photographic frames during pass A01 and D01. The clock, instrumentation, pressure make-up and thermal control sub-systems performed satisfacorily through both missions.

F. CONCLUSIONS

Missions 1013-1 and 1013-2 did not fully achieve the objective of acquiring high quality search and reconnaissance photography from orbital altitudes.

G. RECOMMENDATIONS

The evaluation and analysis of the data produced by the missions has resulted in the following recommendations:

1. Visually inspect all optical surfaces following delivery to A/P, prior to and after environmental testing.

2. Review the splicing materials and techniques used by the film manufacturer.

SECTION 2

PRE-FLIGHT SYSTEMS TESTS

A. ENVIRONMENTAL TESTING

1. Test Objective

As a standard procedure, the J payload systems are subject to thermal/altitude environmental testing which simulates orbital environment. One of the purposes of this test is to demonstrate the system susceptability to corona discharge. Such discharge fogs the film thus degrading the operational photography.

2. Test Summary

The J-15 Payload System was tested for pressure, thermal and Corona effects in the TASC Chamber starting 14 August 1964. The test consisted of three (3) days active operation with the "A" bucket; one (1) day of de-active soak and two (2) days of active operation with the "B" bucket.

The J-15 system contained a flight pressure make-up system; however, this system failed toward the end of the first day, "A" bucket. Corona markings were reported to be acceptable for flight, without pressure make-up.

Several abnormalities in system performance were evident during the test and are summarized below:

1) Aforementioned pressure make-up failure.
2) Power turned off during "A" Mission caused the clock to experience a re-start.
3) V/h programmer received nine (9) of eleven (11) transmitted commands during "B" Mission, second day - orbit #13.
4) Fogging light problem around pressure make-up failure time.
5) Uneven shutdown on slave instrument on orbits 3 and 4, second day - "A" Mission.

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J-15 TASC TEST

INTERNAL CAMERA PRESSURE

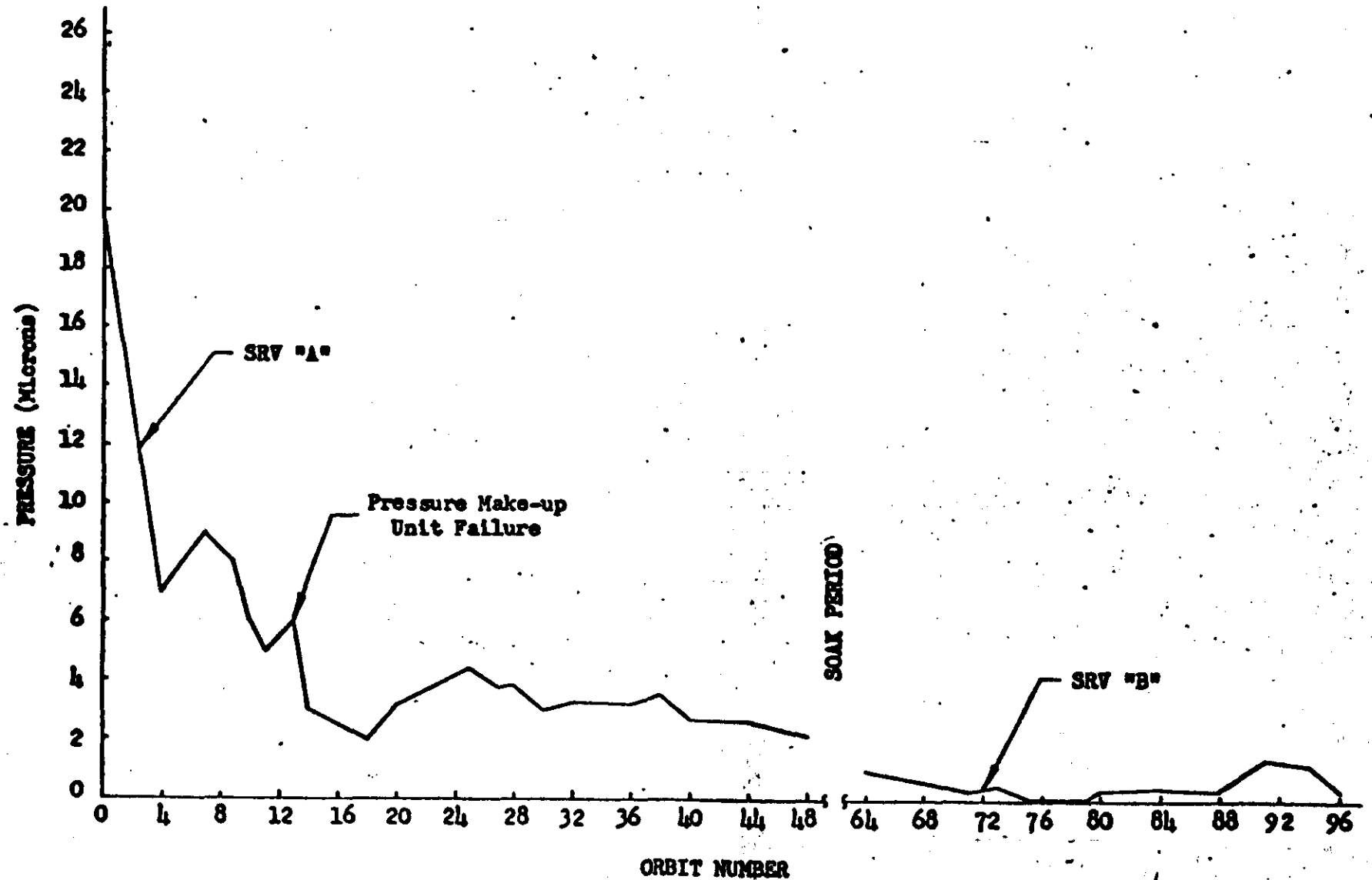

Figure 2-1

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5. Panoramic Camera Performance

The Panoramic Camera system operation was normal throughout the test, with the exception of the uneven metering at shutdown of the Slave instrument on orbits 3 & 4 of the second day of "A" Mission operation. This uneven metering was found to be due to incorrect tension of the telemetry monitor on the Horizon idler. The cycle periods were within ± 1.5% of the calibrated values.

Examination of the film transported through the system during the environmental test showed that minor start-up corona discharge fogging occurred in the Slave camera only. Inspection of the camera systems revealed a film of oil on the field flatteners of both cameras. The source of the oil was not determined hence it is not known whether the oil was present prior to the environmental test. All future systems are to be visually inspected prior to and following the environmental test to assure clean lens surfaces.

6. Stellar-Index Camera Performance

The "A" Mission stellar index operation was normal, with the exception of film movement at platen down time during orbit 15 of the second day.

The "B" mission stellar index metering monitors indicated film motion at platen commands throughout the test. The shutter monitor did not indicate the shutter was opening. The processed film did not indicate any metering anomalies nor shutter failures. The shutter monitor anomaly was caused by insufficient intensity of the fogging lamps, due to instrumentation hook-up.

Post-test examination of the film metered through both cameras showed that the cameras were suitable for flight.

7. Clock Performance

The clock operated throughout both "A" and "B" Missions. The console power was turned off during the "A" Mission, which prevented any clock correlation due to unscheduled clock restart. The clock took four (4) orbits to stabilize during the "B" Mission, after soak,

and thereafter gained approximately 60 milliseconds between orbits 4 and 15. This was attributed to clock offset.

8. Instrumentation and Commanding System Performance

The V/h programmer brush 27 which indicated a failure to acknowledge two of the eleven commands sent was attributed to operate error in failure to wait approximately seventeen (17) seconds for brush filter delay.

The RTC 6 anomaly was traced to a misaligned relay tension spring. Re-alignment of the relay curbed the problem.

B. RESOLUTION TEST

The dynamic resolution test of the J-15 payload system was performed at the A/P facility on 27 August 1964. Each panoramic camera photographed high and low contrast resolution targets. The resulting through focus resolution data is shown in Figure 2-2 for the Master camera and in Figure 2-3 for the Slave camera.

Examination of the resolution data from the Master camera showed that peak performance occurred at -0.002" which is a greater departure from zero focus than normally experienced. Analysis showed that the three sigma focus limits of the A/P collimator are from -0.00225" to +0.00075 hence the peak resolution point of camera #158 is within the expected limits. A re-test of this camera showed no change in the peak resolution setting therefore the test data was approved.

C. LIGHT LEAK TEST

The examination of the film threaded in the J-15 system during the light leak test determined that no film fogging was present. The light leak integrity of the system was considered acceptable for flight.

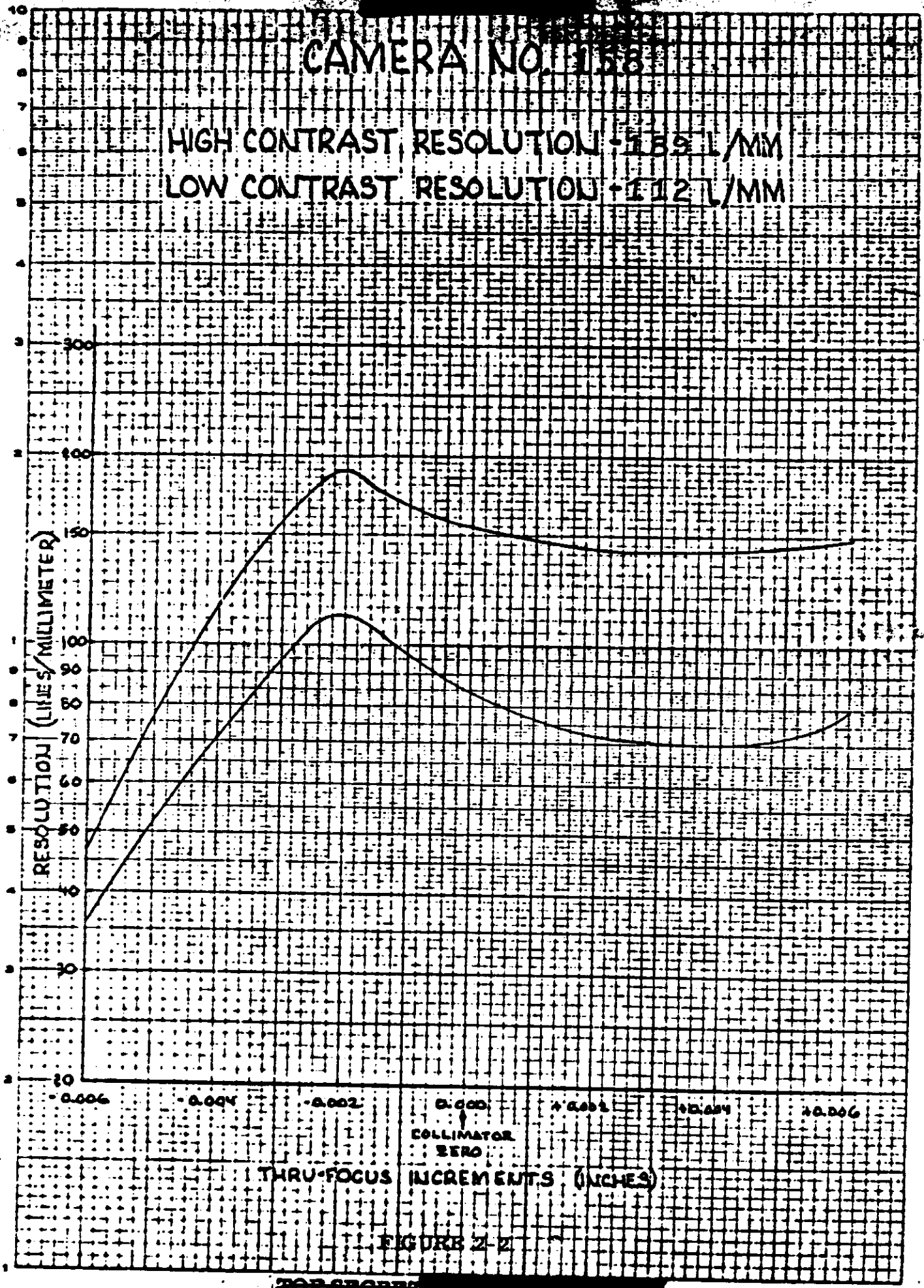

CAMERA NO. 1588
HIGH CONTRAST RESOLUTION +185 L/MM
LOW CONTRAST RESOLUTION +112 L/MM
RESOLUTION (LINES/MILLIMETER)
300
200
150
100
90
80
70
60
50
40
30
20
-0.006
-0.004
-0.002
0.000
COLLIMATOR ZERO
+0.002
+0.004
+0.006
THRU-FOCUS INCREMENTS (INCHES)

FIGURE 2-2

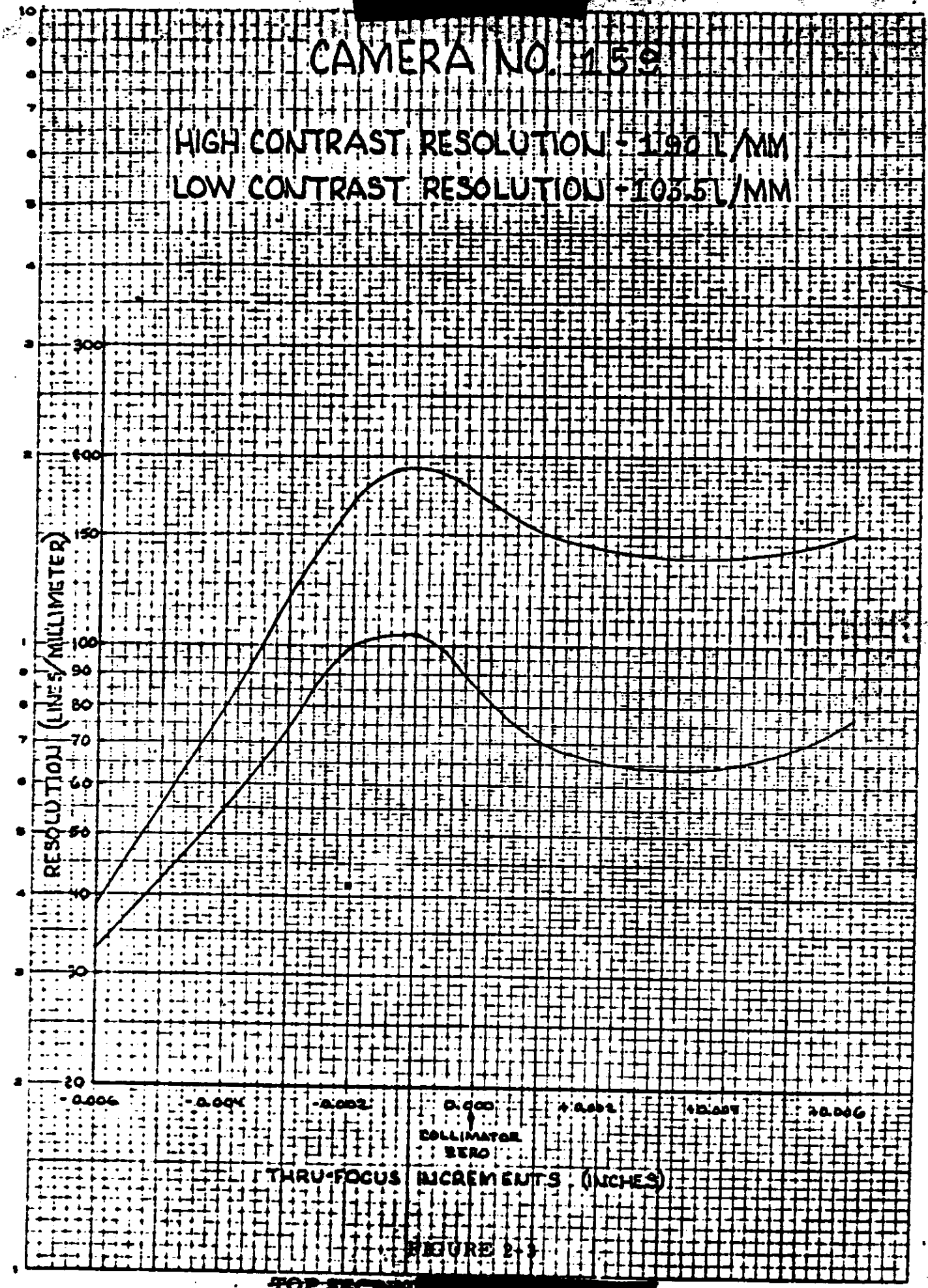

CAMERA NO. 159
HIGH CONTRAST RESOLUTION = 1190 L/MM
LOW CONTRAST RESOLUTION = 1035 L/MM
RESOLUTION (LINES/MILLIMETER)
300
200
150
100
90
80
70
60
50
40
30
20
-0.006
-0.004
-0.002
0.000
COLLIMATOR ZERO
+0.002
+0.004
+0.006
THRU-FOCUS INCREMENTS (INCHES)

FIGURE 2-3

SECTION 3

FLIGHT OPERATIONS

A. INSTRUMENTATION AND COMMAND PERFORMANCE

At acquisition at [redacted]on orbit 1 the camera system was operating and had completed 345 cycles from launch. The system continued to run until an OFF command was received at the end of a programmed 14 cycle engineering operation. A total of 416 cycles were completed with the Master camera and 417 cycles with the Slave camera. The vehicle telemetry signal strength was very low resulting in only 50 to 60 seconds of good telemetry data during this pass. This precluded analysis of the complete operation occurring within the normal acquisition range at the [redacted] Tracking Station. The only anomaly evident in the data was an indicated OFF position on the ON/OFF command monitor. During the time of the normal programmed engineering operation the telemetry was unusable. Therefore, the status of the ON/OFF monitor was not verified during this programmed operation.

The telemetry monitor relay in the command box is in parallel with the operate relay. From an analysis of the circuitry involved to turn the instrument system on it appears that the operate relay was latched without latching the telemetry relay. This was substantiated by an interrupt to the operate signal to the instrument system by the initiation of 2 intermix commands (RTC 12).

These commands caused a normal OFF of the camera system as evidenced by end of pass markers on the processed film coincident with the time the intermix commands were issued. A sequence of programmed events from launch to orbit 1 is tabulated below.

SEQUENCE OF EVENTS (LAUNCH TO [redacted]

Time	Delta Time	Event
T +0		Launch
T +161	161	Inflight reset (door eject)
T +434	273	Burnout (28v reg. to instr. and cassette power switch over)

SEQUENCE OF EVENTS (LAUNCH TO [redacted])
(Continued)

Time	Delta Time	Event
T +3810	3376	1st of 12 programmed brush 27's 1 every 50 sec. (V/h start delay)
T +3910	100	1st recorder center of format on slave
T + 5256	1346	[redacted]acq. start sending 2 RTC 12's (intermix mode change)
T + 5260	4	End of pass marker (frame 344M-345S)
T +5401	141	Programmed brush 36 (on command) frame 400
T +5436	35	Programmed brush 37 (off cmd) end of pass mark frame 416-416S

An attempt to duplicate the "run away" operation was made on the engineering operation on Pass 9. All command settings were the same as the initial command settings for launch. The "run away" operation was not duplicated on this or any other pass during the flight.

The most probable cause of the "run away" operation was a short in the command box operate relay. This short was apparently cleared when the relay was reset by the OFF command.

The instrumentation system performance was satisfactory with the exception of the low signal strength of the telemetry transmitter. This low signal strength did not impair the payload system operation.

No other command or instrumentation anomalies were evident in the telemetry data.

B. PANORAMIC CAMERA PERFORMANCE

The panoramic camera system operation appeared normal during the limited data available on the orbit 1 [redacted] "run away" operation. Cycle periods were 0.8% faster than the pre-flight calibrations. All camera status monitors indicated normal operation during this operation with the exception of command monitor anomaly noted above.

The camera system operation was normal on the engineering operations on orbits 9, 16, and 31. The operation on orbit 47 was normal with the exception of uneven metering at shutdown of the Slave camera indicating possible slack in the film path. Below is a tabulation of the cycle periods observed on the engineering passes as compared to the pre-flight calibrations.

CYCLE PERIOD DATA

Pass	Cycle Period	Error	Cycle Period	Error
1	2.72	.8% Fast	2.70	.8% Fast
9	5.01	0%	4.96	0.4% Fast
16	2.31	1.7% Slow	2.27	1.3% Slow
*31	2.21	2.2% Fast	2.21	.9% Fast
47	2.20	.9% Fast	2.21	.45% Fast

* V/h ramp changed to increase instrument speed after orbit 16.

At the [redacted] acquisition on orbit 56, the film footage monitors indicated the camera system had failed on approximately orbit 52. The engineering operation on pass 63 confirmed the suspected failure. Both cameras were still operating; however, no film was being transported. All status monitors were normal with the exception of the lens rotation/center of format monitor relationship on the Slave camera. This monitor indicated slippage had occurred in the transport system. The cause of the failure was not evident in the telemetry data nor has it been conclusively determined. However, the most probable explanation appears to be a common loss of power to the take-up cassettes. The programmed operations between orbit 47 and the last recovered film are shown below.

J-15 SEQUENCE

ORBIT	ON TIME	OFF TIME	REMARKS
47	74470	74580	Master - 50 cycles (normal operation) Slave - 51 cycles (uneven shutdown)
51	9259	9378	Master - 48 cycles (metering anomaly on frame 20) Slave - 48 cycles (metering anomaly on frame 10)
52 Operation 1	14560	14692	Master - 50 cycles (metering anomaly throughout pass) Slave - 51 cycles (metering anomaly throughout pass)
52 Operation 2	14730	14834	Master - 59 cycles (frame to frame length anomaly) Slave - 59 cycles (metering anomaly throughout pass)
52	14948	15033	Master - 38 cycles (failed at start up) Slave - 38 cycles (failed after 2-1/2 cycle

The camera system transferred to the second recovery system and continued to operate without transporting film after the recovery of the second recovery system.

Several operational command modes were utilized in an unsuccessful attempt to duplicate the "run away" operation on orbit 1 after the recovery of the second recovery system.

C. STELLAR-INDEX PERFORMANCE

The Stellar-Index camera operated normally on engineering passes during Mission 1013-1 with no anomalies evident in the telemetry data. The Stellar-Index camera for Mission 1013-2 operated normally on the engineering pass on orbit 72 prior to second recovery and continued operating after second recovery.

D. CLOCK PERFORMANCE

The clock system operation was satisfactory throughout the mission. The following correlation constants were derived using 8 hand-read data points and performing a least squares linear fit through the data:

SYSTEM TIME I/P	CL TIME I/P	COMP SYS TM
33323.4335	395863.1399	33323.4374
38772.4478	401312.1609	38772.4561
78439.7810	440979.4969	78439.7750
39377.2445	488316.9819	39377.2397
73857.0135	522796.7629	73857.0059
34884.8462	33353.7099	34884.8445
74611.3319	73080.2169	74611.3345
35630.6569	120499.5649	35630.6621

AO = 362539.5526
A1 = 0.999999570617
SIGMA = 0.00511
RATIO OF CLOCK TIME TO SYS TIME = 0.100000042938D 01

The following constants were derived by performing a 2nd order fit:

REV.	SYSTEM TIME I/P	CL TIME I/P	COMP SYS TM
8	33323.4335	395863.1399	33323.4325
9	38772.4478	401312.1609	38772.4521
16	78439.7810	440979.4969	78439.7765
25	39377.2445	488316.9819	39377.2448
31	73857.0135	522796.7629	73857.0117
40	34884.8462	33353.7099	34884.8485
47	74611.3319	73080.2169	74611.3346
56	35630.6569	120499.5649	35630.6546

A0 = 362539.7161
A1 = 1.00000029943
A2 = 0.7013757130203D - 12
SIGMA = 0.00258

E. PRESSURE MAKE-UP SYSTEM PERFORMANCE.

Operation of the pressure make-up system was satisfactory throughout the mission with a surplus of approximately 1700 PSIA of nitrogen at the end of the Mission 1013-1. Figure 3-1 is a plot showing the consumption during the flight.

F. TEMPERATURE ENVIRONMENT

A tabulation of the real time temperature data recorded at the [redacted] Tracking Station are included as Tables 3-1 and 3-2. These data have been corrected for self heating from data obtained from self-heating tests conducted during environmental testing.

Figures 3-2 through 3-4 are plots showing actual versus predicted temperatures for selected temperature sensors throughout the payload system.

J-15 PRESSURE MAKE-UP SUPPLY CONSUMPTION
"A" MISSION ONLY

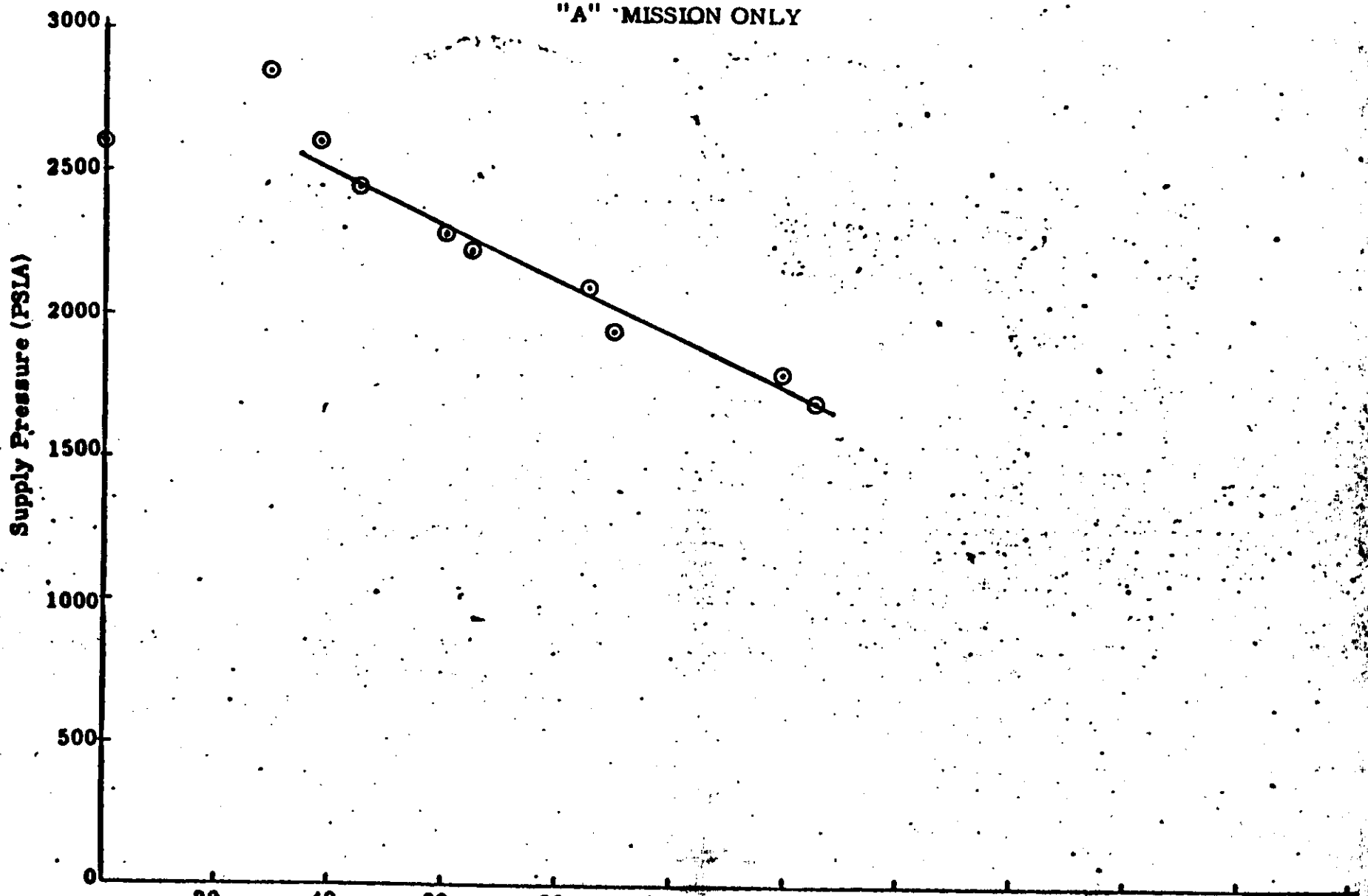


FIGURE 3-1

J-15 1173 TEMPERATURE SUMMARY

SENSOR	ORBIT											
Master	L	08	09	16	25	31	40	47	56	63	72	79
3	70	61	59	54	54	52	56	51	54	49	49	47
4	73	69	68	65	65	61	65	60	66	58	60	54
5	70	72	67	62	63	60	64	58	65	57	59	55
6	68	77	76	69	70	67	70	65	71	64	65	59
7	69	72	71	65	66	63	67	62	68	61	63	57
8	75	77	73	68	68	65	68	64	71	62	65	58
9	73	82	79	72	75	69	74	67	76	66	71	64
10	71	71	67	63	65	59	63	59	64	57	59	55
11	97	81	75	69	72	67	73	65	71	62	65	58
12	77	67	65	58	60	57	62	55	61	52	57	49
13	73	76	71	68	67	65	68	64	66	61	62	57
AVG. INSTR. TEMP.	72	73	70	64	65	62	66	60	66	59	61	56
Slave												
3	68	77	75	69	71	66	69	63	70	63	65	59
4	68	72	68	62	66	59	65	57	66	56	60	51
5	70	72	68	62	64	62	65	59	66	58	60	54
6	68	66	64	58	59	58	60	56	61	53	56	50
7	66	71	68	63	65	61	64	60	65	58	60	54
8	69	67	65	59	61	58	63	56	64	55	58	50
9	71	64	61	56	58	56	59	53	59	51	54	49
10	69	68	67	62	64	59	63	58	64	57	59	53
11	92	63	60	55	58	53	58	52	54	50	52	49
12	71	74	71	63	68	62	67	59	68	57	64	54
13	76	69	66	62	62	61	63	60	62	58	57	56
AVG. INSTR. TEMP.	70	69	67	62	64	60	64	58	64	57	59	53
Supply Spool												
1	69	61	60	56	57	56	57	55	58	55	54	52
2	69	65	64	59	60	59	62	57	62	55	57	52

NOTE: All data corrected for self-heating, except injection

TABLE 3-1

J-15 1173 TEMPERATURE SUMMARY

SENSOR		ORBIT										
Fairing/Barrel #1	L	08	09	16	25	31	40	47	56	63	72	79
1	OBH	49	42	29	52	33	46	29	51	26	-3	4
2	OBH	12	9	-1	12	-1	12	-5	18	-5	-2	-5
3	OBH	3	0	3	-1	3	0	-4	8	-4	27	43
4	256	63	60	51	57	48	57	45	59	41	52	84
5	OBH	87	84	75	90	71	78	65	83	59	46	53
6	OBH	78	72	75	81	75	68	68	74	56	FAIRING	
Barrel #2												
1	156	59	59	72	62	69	56	62	49	56	43	49
2	155	56	56	84	66	84	53	78	50	69	50	75
3	180	23	20	30	27	36	20	33	52	27	20	42
4	189	6	3	-4	6	-4	6	-10	3	-4	3	-4
5	178	17	14	11	11	11	14	11	11	11	4	1
Conic Adapter												
1	163	63	63	63	66	60	57	54	62	50	44	41
Clock												
1	97	71	67	65	67	62	67	60	70	60	60	54
2	105	82	80	73	77	73	77	71	81	71	71	60
Thrust Cone "A" to "B" SRV												
1	110	52	49	41	42	40	43	38	43	38	37	57
2	80	72	72	62	63	59	60	57	60	56	70	66
Stellar/Index "A" to "B"												
1	84	66	62	56	56	56	59	53	65	50	50	43
2	69	66	60	57	57	53	57	53	62	50	58	48
Recovery Batt. "B" SRV												
1	72	76	75	72	68	69	68	67	69	66	80	84
Master Cassette "A" SRV												
2	--	--	--	--	--	--	--	--	--	--	--	--

NOTE: Only thrust Cone Data corrected for self-heating

TABLE 3-2

J-15 PREDICTED AND ACTUAL TEMPERATURES

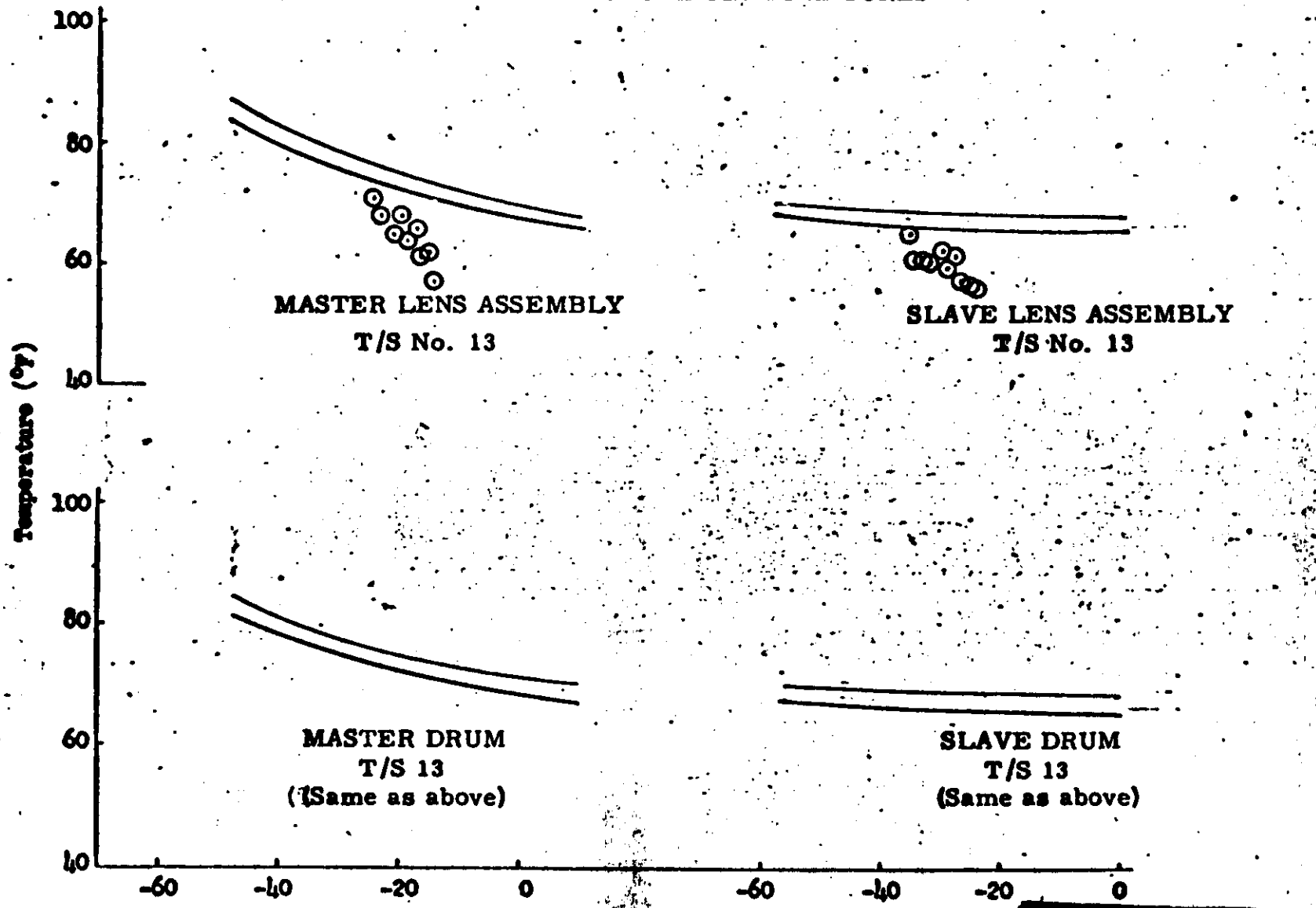


FIGURE 3-2

J-15 PREDICTED AND ACTUAL TEMPERATURES

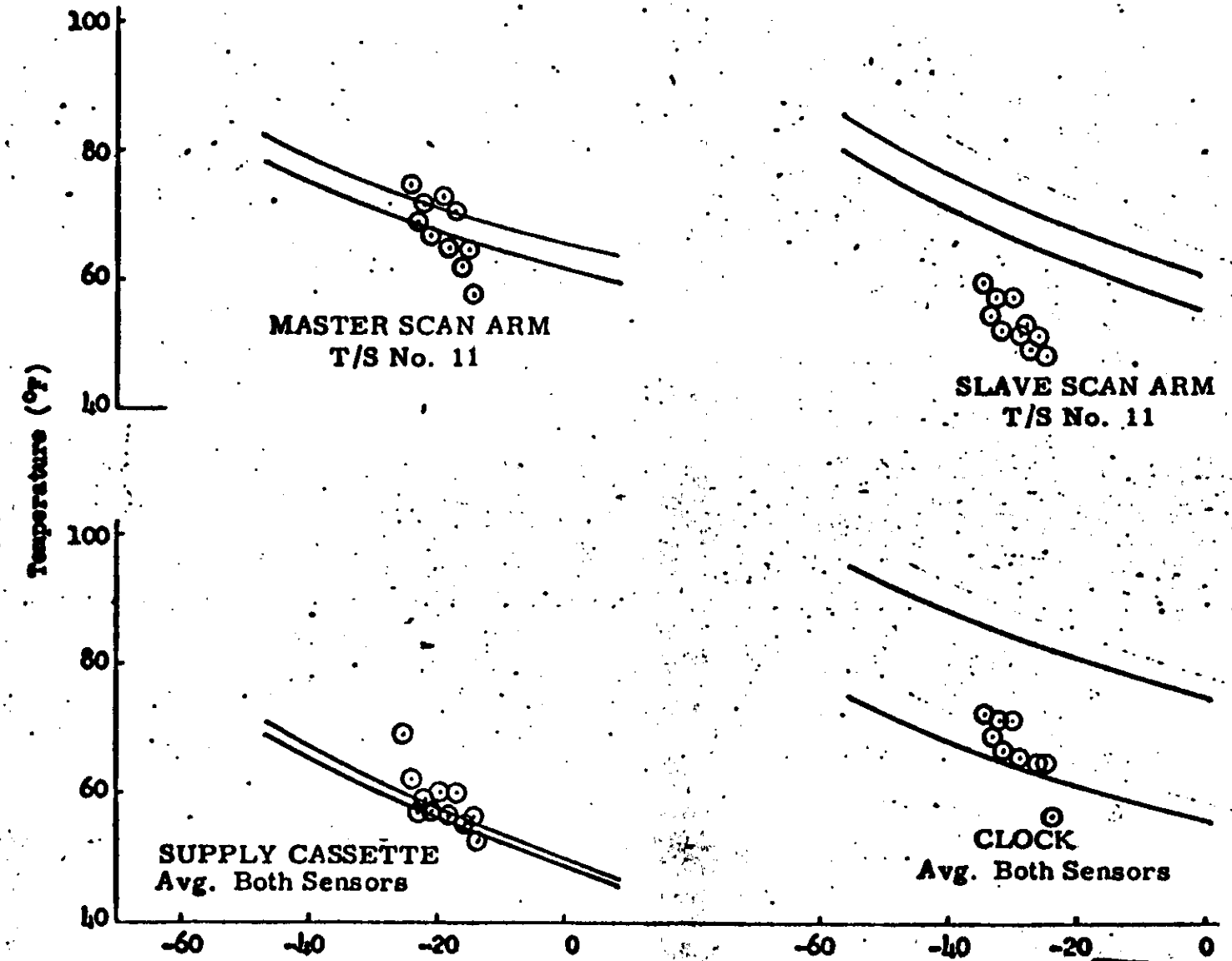


FIGURE 3-3

J-15 PREDICTED AND ACTUAL TEMPERATURES

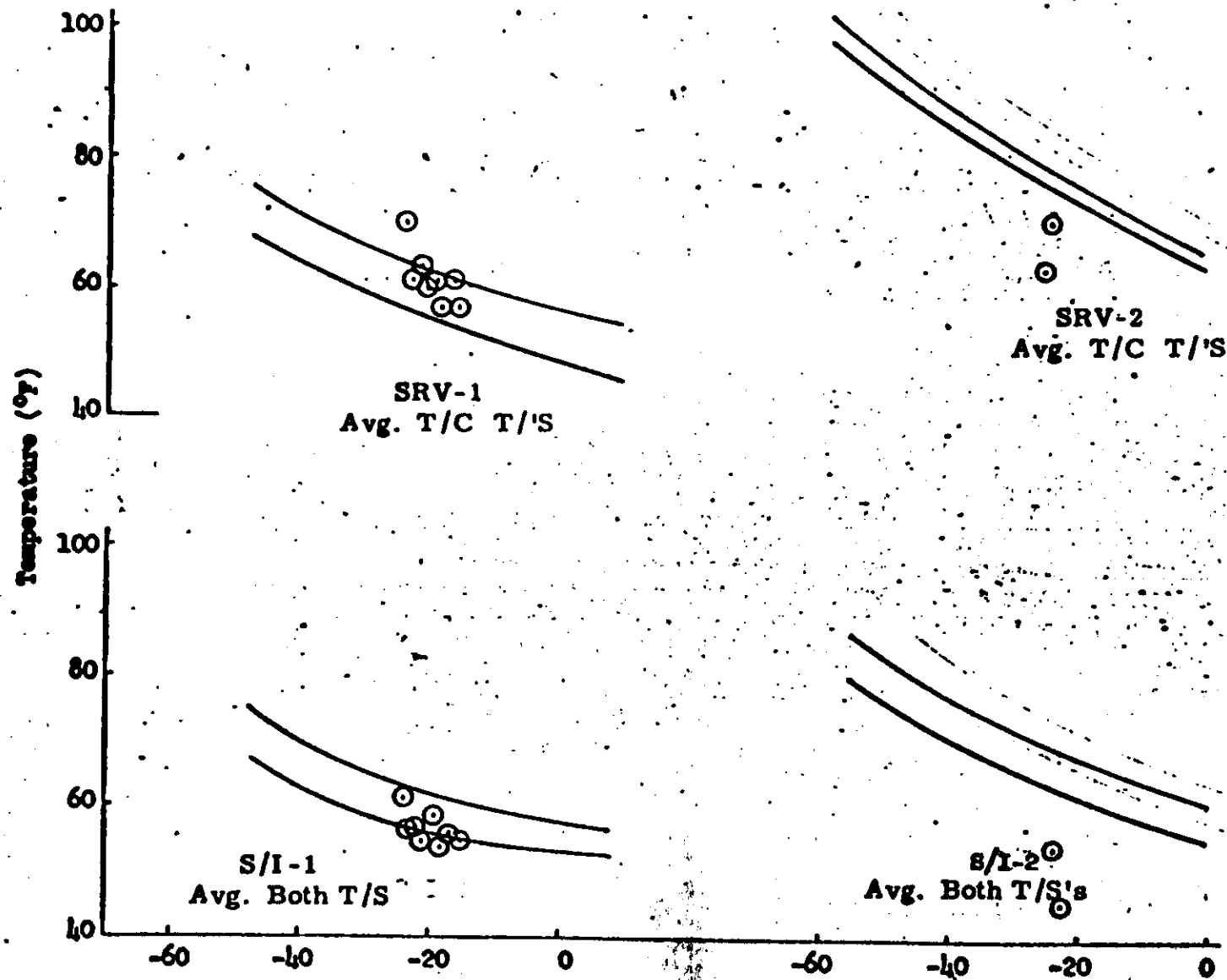


FIGURE 3-4

SECTION 4

MISSION 1013-1 RECOVERY SYSTEM

SRV #656 was received at A/P on 30 December 1963. The receiving inspection weight was 152.2 pounds. After modifications and incorporation of outstanding E.O.'s, the SRV was delivered to Systems Test for incorporation into the J-10 system. The SRV was subsequently found defective and after repair was assigned to J-15.

The Recovery System was shipped to VAFB on 16 September 1964 and finally mated to the J-15 system on 29 October 1964. A successful air catch was made during orbit 65 on 6 November 1964. Table 4-1 gives a tabulation of the sequence of recovery events.

The condition of the recovered capsule was satisfactory with damage limited to normal paint blistering. Figures 4-1 and 4-2 show the location and temperatures encountered by Templates attached to the capsule cover for the recovery system.

A complete post flight recovery sequence was conducted on the recovered capsule including cassettes and all parameters were within specification.

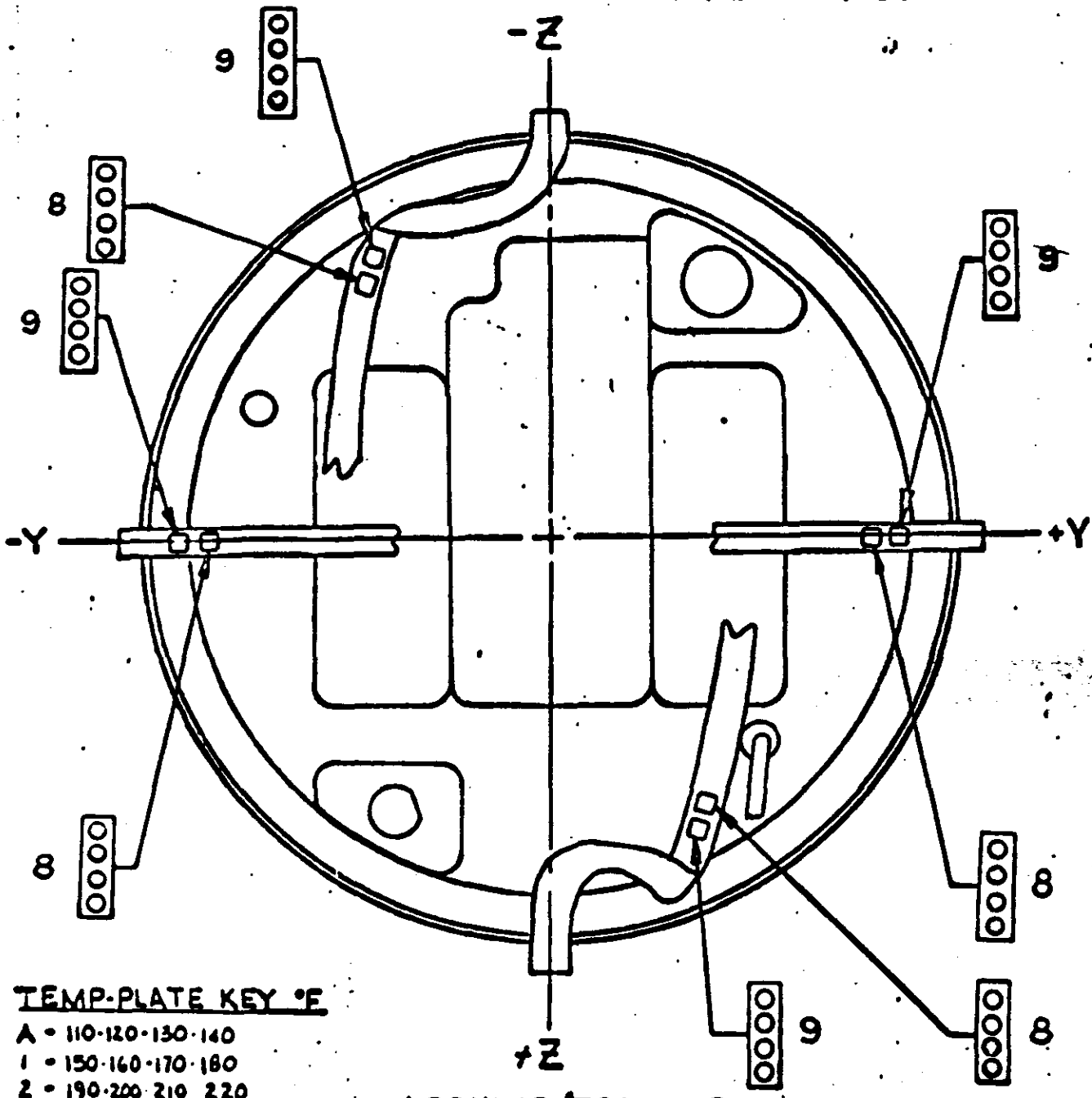
MISSION 1013-1
RE-ENTRY SEQUENCE OF EVENTS

EVENT	SYSTEM TIME	DELTA TIME Actual	DELTA TIME Nominal
Transfer	260.15	-	--
Electrical Disconnect	261.18	1.03	.90 $^{+.43}_{-.40}$
*Separation	262.15	2.00	2.0 ± .25
**Spin	264.60	3.42	3.4 ± .30
Retro	272.13	7.53	7.55 ± .45
Despin	282.82	10.69	10.75 ± .54
T/C Separation	284.49	1.67	1.5 ± .15
"G" Switch Open	677.12	392.63	--
Parachute Cover Off	710.80	33.68	34.0 ± 1.5
Drogue Chute Deployed	711.38	0.58	.63 ± .08
Drogue Chute Release	721.41	10.03	10.05 ± 1.0
Main Chute Deployed	722.04	0.63	.52 ± .12
Main Chute Disreefed	726.40	4.36	4.0 ± 1.7

* From Transfer
** From Elect. Disc.

TABLE 4-1

TEMP-PLATE INSTALLATION - Mk V-A CAPSULE



TEMP-PLATE KEY °F

A • 110-120-130-140
1 • 150-160-170-180
2 • 190-200-210-220
3 • 230-240-250-260
4 • 270-280-290-300
5 • 310-320-330-340
6 • 350-360-370-380
7 • 390-410-435-450
8 • 100-150-800-850
9 • 900-950-1000-1050

LOOKING FORWARD

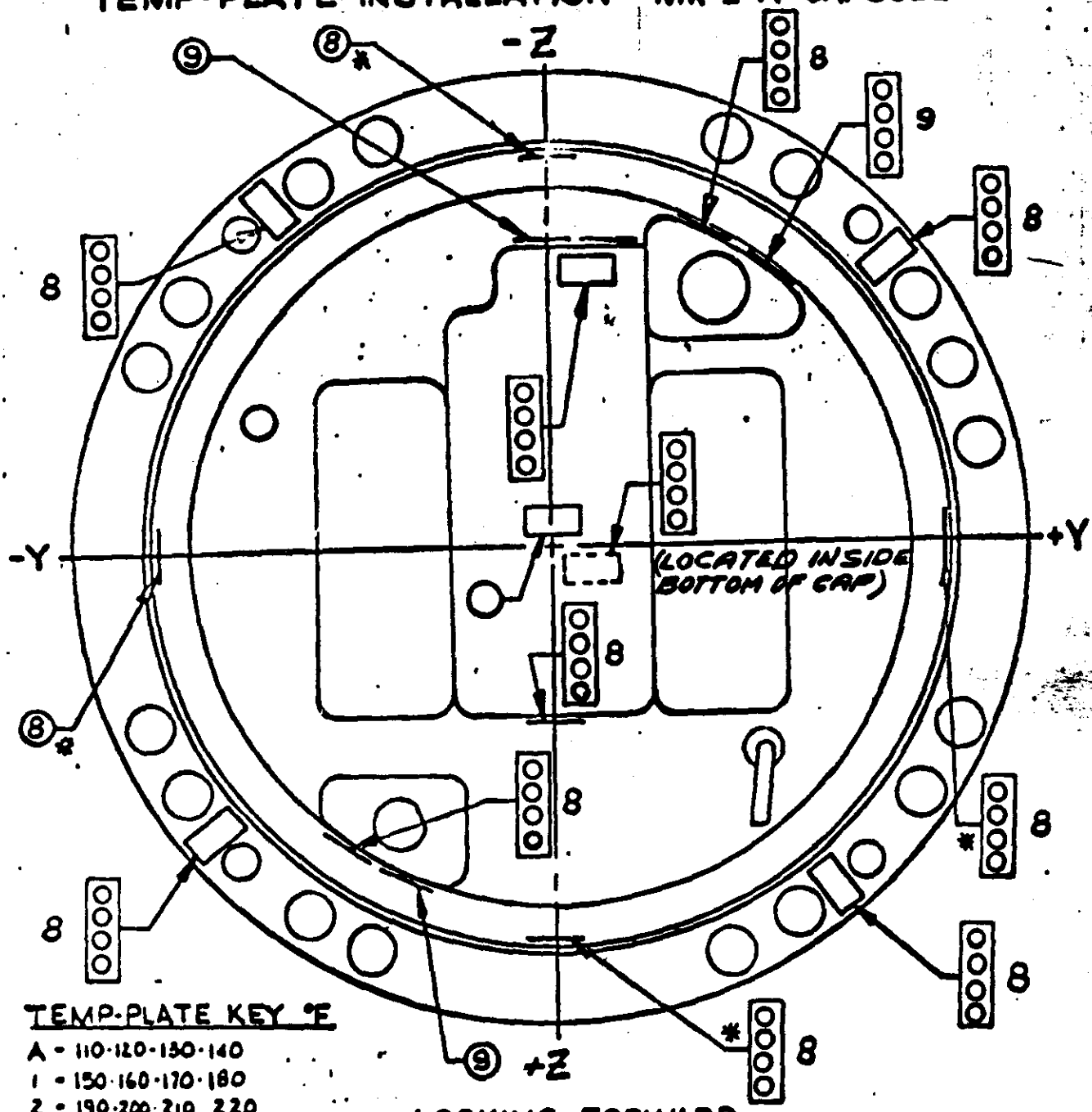
USE OF TEMP PLATES ON PARACHUTE SHROUDS

● INDICATOR TURNED BLACK TEMP REACHED OR EXCEEDED INDICATED LEVEL

1013-1

FIGURE 4-1

TEMP-PLATE INSTALLATION - Mk V-A CAPSULE



TEMP-PLATE KEY °F

A - 110-120-130-140
1 - 150-160-170-180
2 - 190-200-210 220
3 - 230 240-250-260
4 - 270 280-290-300
5 - 310-320 330-340
6 - 350-360-370 380
7 - 390-410-435-450
8 - 100-150-200-250
9 - 300-350-400-450

*LOCATED INSIDE CAPSULE ON NOSE WALL

●INDICATOR TURNED BLACK TEMP REACHED OR EXCEEDED INDICATED LEVEL

1013-1

FIGURE 4-2

SECTION 5

MISSION 1013-2 RECOVERY SYSTEM

SRV #657 was received at A/P on 20 January 1964 at a receiving weight of 149.4 pounds. After modification and incorporation of outstanding E.O.'s the capsule was delivered to systems test for incorporation into the J-10 system. An over-rich resin concentration resulted in cracks in the forebody during TASC testing. Following repair the SRV was assigned to the J-15 payload.

The capsule was shipped to VAFB on 16 September 1964. A successful air catch was made during orbit 81 on 7 November 1964. Table 5-1 lists the recovery sequence of events.

The condition of the recovered capsule was satisfactory with damage limited to normal paint blistering. Figures 5-1 and 5-2 show the location and temperatures encountered by the Templates attached to the capsule.

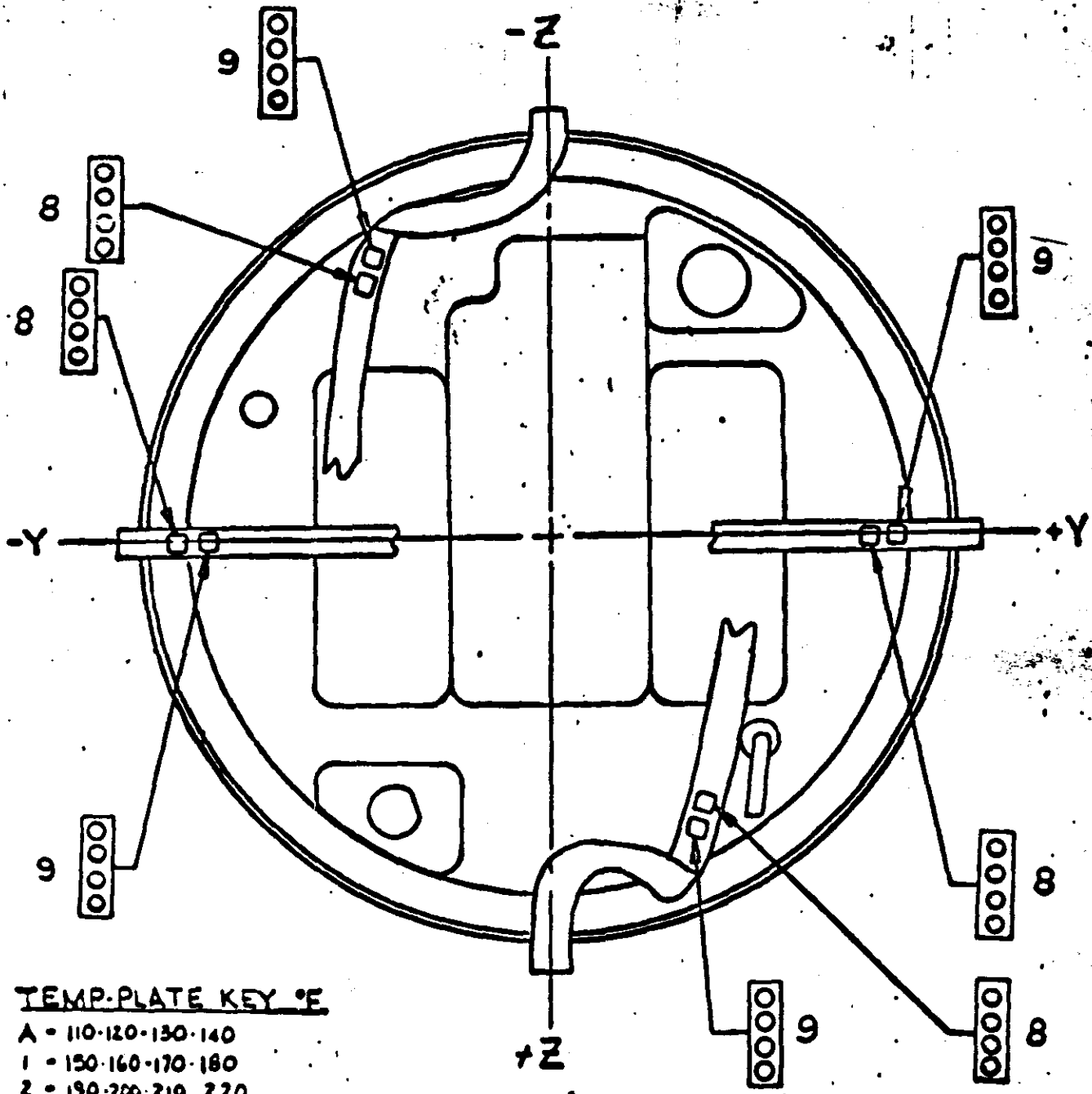
MISSION 1013-2
RE-ENTRY SEQUENCE OF EVENTS

EVENT	SYSTEM TIME	DELTA TIME Actual	DELTA TIME Nominal
Transfer	85881.45	-	--
Electrical Disconnect	85882.56	1.11	.90 $^{+.43}_{-.40}$
*Separation	85883.44	1.99	2.0 ± .25
** Spin	85885.98	3.42	3.4 ± .30
Retro	85893.52	7.54	7.55 ± .45
Despin	85904.19	10.67	10.75 ± .54
T/C Separation	85905.74	1.55	1.5 ± .15
"G" Switch Open	86369.46	463.72	--
Parachute Cover Off	003.71	34.25	34.0 ± 1.5
Drogue Chute Deployed	004.37	0.76	.63 ± .08
Drogue Chute Release	014.43	10.06	10.05 ± 1.0
Main Chute Deployed	014.93	0.50	.52 ± .12
Main Chute Disreefed	019.68	4.75	4.0 ± 1.7

* From Transfer
** From Elect. Disc.

TABLE 5-1

TEMP-PLATE INSTALLATION - Mk V-A CAPSULE



TEMP-PLATE KEY °F

A - 110-120-130-140
1 - 150-160-170-180
2 - 190-200-210 220
3 - 230-240-250-260
4 - 270 280-290-300
5 - 310-320 330-340
6 - 350-360-370 380
7 - 390-410-435-450
8 - 100-150-200-250
9 - 300-350-400-450

LOOKING FORWARD

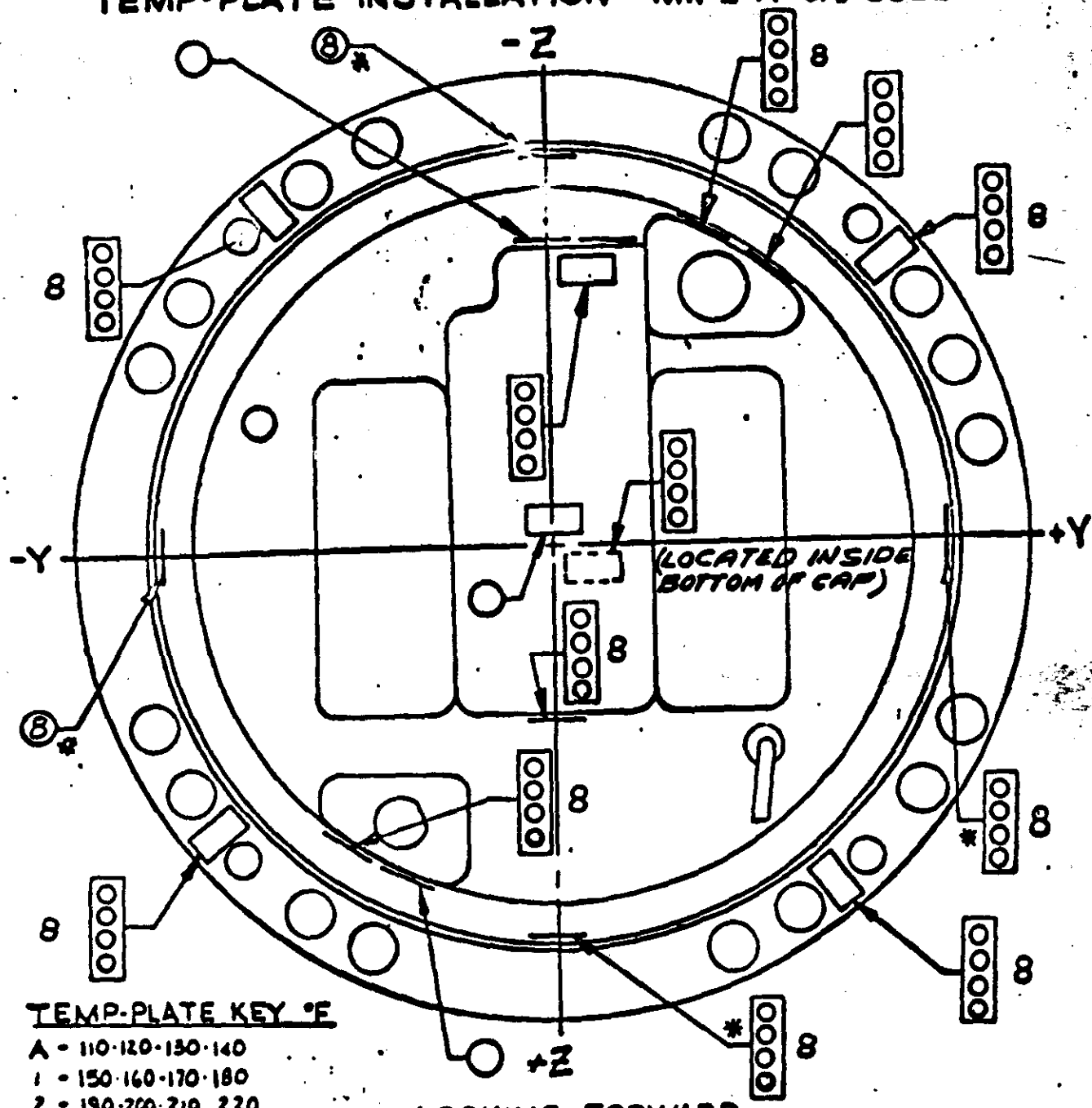
USE OF TEMP PLATES ON PARACHUTE SHROUDS

● INDICATOR TURNED BLACK TEMP REACHED OR EXCEEDED INDICATED LEVEL

1013-2

FIGURE 5-1

TEMP-PLATE INSTALLATION - Mk V-A CAPSULE



TEMP-PLATE KEY °F

A = 110·120·130·140
1 = 150·160·170·180
2 = 190·200·210 220
3 = 230 240·250·260
4 = 270 280·290·300
5 = 310·320 330·340
6 = 350·360·370 380
7 = 390·410·435·450
8 = 100·150·200·250
9 = 300·350·400·450

* LOCATED INSIDE CAPSULE ON NOSE WALL

● INDICATOR TURNED BLACK TEMP REACHED OR EXCEEDED INDICATED LEVEL

1013-2

FIGURE 5-2