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NO. [redacted]

17 October 1967

TO: [redacted]

THRU: [redacted]

FROM: [redacted]

SUBJECT: MISSION 1035-1 and 1035-2 FINAL REPORT

Enclosed is the Final Performance Evaluation Report for Mission 1035-1 and 1035-2.

[redacted]
Manager
Advanced Projects

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CORONA J

PERFORMANCE EVALUATION REPORT

MISSION 1035-1 and 1035-2

FTV 1628, J-36

8 September 1967

Approved: [redacted]
Manager
Advanced Projects

Approved: [redacted]
Mgr.

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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 1628.

Lockheed Missiles and Space Company has the responsibility for evaluating payload performance under the "Level-of-Effort" and "J" System contracts.

This document is the final payload test and performance evaluation report for Missions 1035-1 and 1035-2 which was launched on 26 September 1964.

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INTRODUCTION

This report presents the final performance evaluation of Missions 1035-1 and 1035-2 of the Corona Program. The purpose of this report is to define the performance characteristics of the J-36 payload system and to identify the source of in-flight anomalies.

The performance evaluation was jointly conducted by representatives of Lockheed Missiles and Space Company (LMSC) and ITEK at the facilities of NPIC and AFSPPF. 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, and MTF/AIM resolution are produced by AFSPPF. The vehicle attitude error values, frame correlation times are made at NPIC who also supply the Processing Summary reports published by [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 criteria selected for the mission.

SECTION 1

SYSTEM PERFORMANCE

A. MISSION OBJECTIVES

The payload section of Mission 1035, placed into orbit by Flight Test Vehicle #1023 and LV-2A booster #477, 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-36 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, 5 day photographic periods with no deactivate period.

B. MISSION DESCRIPTION

The payload was launched from Vandenberg Air Force Base (VAFB) at 2114:05 Z (1414:05 PDT) on 20 September 1966. Ascent and injection were normal and the achieved orbit was within nominal tolerances. Tracking and command support was effected by the Air Force Satellite Control Facility consisting of tracking and command stations a[redacted] under central control of the Satellite Test Center at Sunnyvale, California. Mission 1035-1 consisted of a 5 day operation and was completed by air recovery on 25 September 1966. Mission 1035-2 was completed with an air recovery on 30 September 1966 following a 5 day photographic operation.

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

ORBITAL PARAMETERS

Parameter	Orbit 1 Predicted	Orbit 120 Actuals
Period (Min.)	91.06	90.601
Perigee (N.M.)	99.6	100.718
Apogee (N.M.)	254.9	238.820
Inclination (Deg.)	85.00	85.054
Perigee Latitude (Deg. N.)	18	48.780
Eccentricity	0.0215	0.01915

C. PANORAMIC CAMERAS

The instruments operated normally throughout both missions. The photo quality was excellent. The average cloud cover was 30% on the -1 mission and 40% on the -2.

The horizon camera was not veiled, but reported as slightly over-exposed on the sun side of the vehicle.

D. STELLAR-INDEX CAMERAS

Both units operated satisfactorily. Each stellar format contained at least 15 star images. The index camera produced good photo quality.

E. OTHER SUBSYSTEMS

The clock instrumentation, command, pressure make-up and thermal control systems performed satisfactorily.

[redacted]

SCHEMATIC INBOARD PROFILE - CORONA J SYSTEM

MISSION 1055

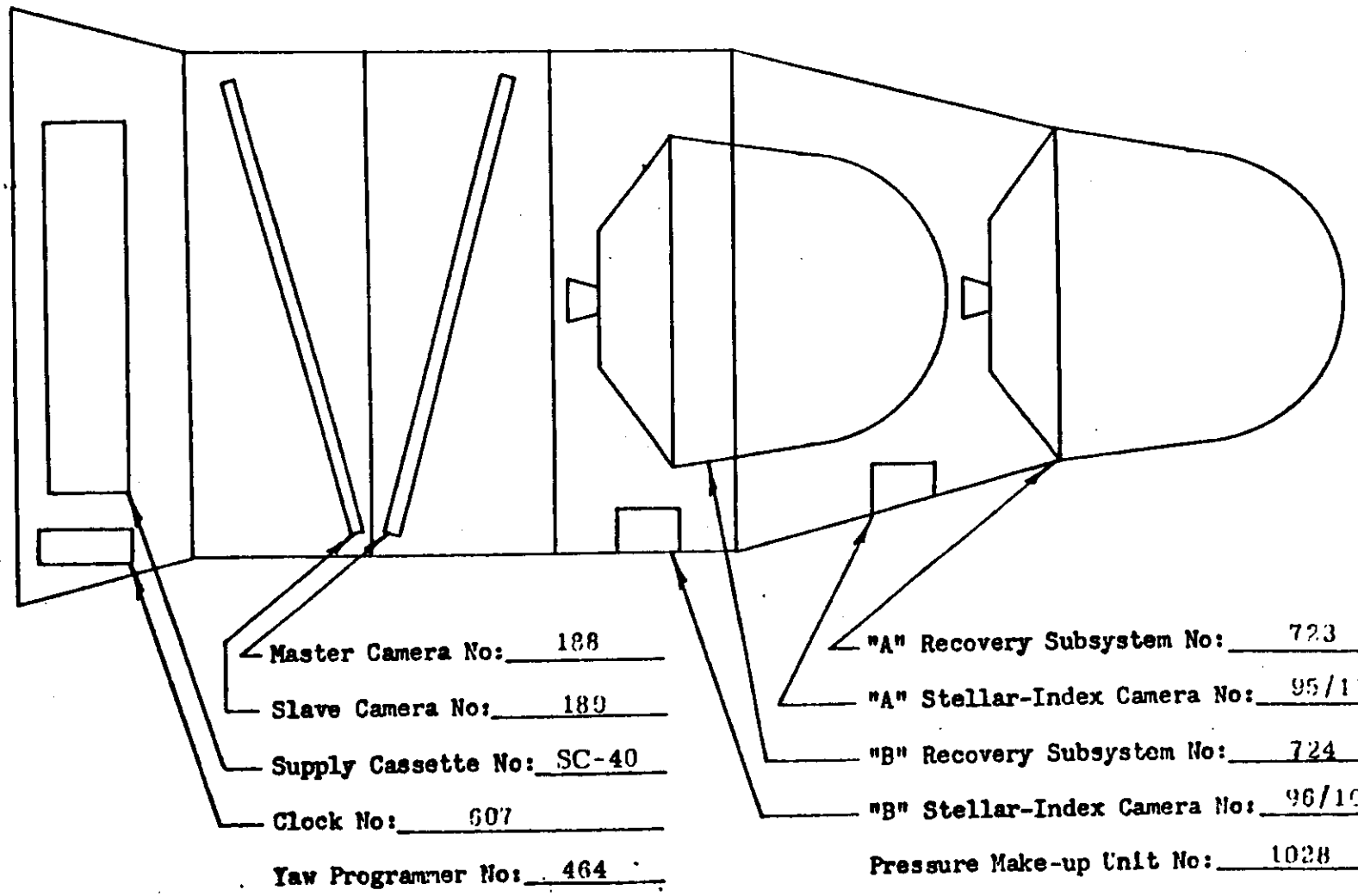


FIGURE 1-1

SECTION 2

PRE-FLIGHT SYSTEMS TESTS

A. ENVIRONMENTAL TESTING

1. Test Objective

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

2. Test Summary

The J-36 system was tested in the HIVOS chamber during the period 13-21 April. Nearly 10,000 feet of payload was cycled through each system in simulated complete "A" and "B" missions. Internal system pressures as low as 1.0 microns were recorded and provided adequate demonstrations of Corona characteristics.

The J-36 system is the first with "pan-geometry" modifications to be tested at A/P. The main features of these modifications on the payload are small reference or fiducial spots exposed through holes in the rails, and three lines exposed through collimators on the main cells indicating IMC displacement.

The main instruments showed good to excellent recording of all data, excluding the PG features described above. Horizon camera functioning appeared normal throughout. Both instruments produced minor Corona from the input metering rollers at low pressure starts. The condition was well within the acceptance standards. Cut and wrap functions between "A" and "B" missions produced no defects on the payload. Scratching from rails and scan head rollers was within the normal range on both instruments. Some unidentified and relatively severe scratches of an apparently random nature appear on the slave payload. Since the scratches appear during the "B" mission as well as the "A" mission, it is demonstrated that the often blamed main payload chute was not the cause.

All data recording in both stellar/index units was acceptable. Both stellar films showed minor Corona marks that are acceptable for flight. The index films showed no Corona marking. Small plus density streaks were noted in some "A" mission stellar formats. The condition does not appear to be a flight hazard, but the cause is not known and investigation is continuing. The "B" mission stellar film shows evidence of several instances of shutter failure in the open position. This condition is not acceptable for flight. The reseau plate of this stellar unit appeared to have a large number of foreign particles and it was cleaned.

The pan geometry features of the J-36 system cannot be adequately evaluated on the basis of data presently available. Ideally, the rail hole images should be circular, about 40 microns in diameter, and of high density with sharp edges. In actual practice, considerable variation may be tolerated if reference points can be identified with sufficient accuracy. From the defined characteristics of the rail hole images, it appears that variations in the placement of cross hairs on any image should not exceed five microns from a mean location. This criterion has been used to subjectively evaluate the rail hole images of the J-36 cameras.

Images of all rail holes on both instruments were detected on the test film. On master camera No. 188, the hole images on the data block edge were acceptable except for the first two and last one (counting in the direction of scan). At the timing mark edge, the first, as well as the last seven hole images are poor. On slave camera #189, there are very few hole images of good quality. In general, the data block edge is better than the timing mark edge. It is estimated that the probable error in placing a cross hair on some hole images would be in the order of 20 microns.

Both cameras recorded continuous IMC traces. Some variation in density and width of these traces is noted. Slight oscillations in the traces were also noted, however, there are no present means for distinguishing an instrumentation defect from a system characteristic in this case.

It is concluded that basic J system functions were performed satisfactorily except for the stellar shutter failure on unit No. D-06. To the extent that the PG functions presently can be evaluated, it is concluded that master unit No. 188 performed acceptably, but that rail hole images on Unit No. 189 had to be improved for acceptable photogrammetric application. These hole images were adjusted to an acceptable condition in subsequent atmospheric tests.

The panoramic camera operation was normal. The cycle rates are shown in Table 2-1.

The clock system performance was acceptable. See Table 2-2.

The pressure make-up system operation was satisfactory. The gas depletion rate was 7 lbs./min. on the -1 mission and 8.1 lbs./min. on -2 mission.

PRESSURE PROFILE (Microns)

-1 Mission	PMU ON	PMU OFF
Pressure (Prior to Camera ON)	4	2
Pressure (At Camera OFF) (Lowest point)	44	7
-2 Mission		
Pressure (Prior to Camera ON)	1	1
Pressure (At Camera OFF) (Lowest point)	43	6

The thermal environment was normal:

Average Panoramic Instrument Temperatures (^{o}F) (Thermocouple)

-1 Mission	Master		Slave		
Day	High	Low	High	Low	Beta Angle ^{o}
1	100	71	90	71	53
2	86	69	76	60	53
3	94	76	84	69	53
4	77	70	73	62	0

-2 Mission	Master		Slave		
Day	High	Low	High	Low	
1	76	66	75	64	0
2	80	71	79	70	0
3	76	72	75	72	0

B. RESOLUTION TEST

Resolution and theodolite tests were performed on 10 May 1966. Results of the thru-focus resolution tests of pan instruments 188 and 189 show the following characteristics:

Master Pan Instrument No. 188

Maximum high contrast resolution 180 lines/mm at 0.000 focal position.

Maximum low contrast resolution 117 lines/mm at 0.000 focal position.

Slave Instrument No. 189

Maximum high contrast resolution 174 lines/mm at 0.000 focal position.

Maximum low contrast resolution 110 lines/mm at 0.000 focal position.

The test data for both instruments is shown in Figures 2-1 and 2-2. Both instruments met the system requirements specification.

C. LIGHT LEAK TEST

The live payload light leak test of the J-36 system was completed on 25 May. Examination of the test payload showed material from the master instrument to be virtually free of light leak fog defects. However, material from the slave instrument showed two regions of light leak fog. One region is where the payload passes the drum side of the slave mainplate; the other is where it passes the same point on the master instrument.

A photomultiplier and visual check verified a suspected leak along the slave instrument laminated strips which form a light seal over the drum flange. It is believed that the RTV seal was broken during installation of improved felt seals at the side of the drum. RTV was applied to the laminated strips and a subsequent photomultiplier check verified the fix.

It was believed that a similar leak on the master camera caused the second fog area on the slave film. However, the visual and photomultiplier checks indicated that much of the fogging light was entering at the mainplate end of the input felt seal. It was recommended that RTV be applied to the laminated strips of the master instrument and that a photomultiplier verification then be attempted. A reduced photomultiplier response would indicate the leakage had been reduced below any significant level, while a substantially unchanged response would indicate that the fog producing leakage entered at the end of the felt seal where no effective remedy is available. The photomultiplier response after applying RTV was unchanged (20 MV. before and after).

The light leakage performance of the J-36 system is therefore considered acceptable except for the leak described in the preceding paragraph for which a waiver is recommended. This leak produced a density of 0.92 at the edge of the film and a maximum density in the format area of 0.51.

It should be noted J-36 is the first system with the felt seal and drum modifications tested at A/P. While this test has demonstrated that the modifications provide a substantial improvement, it is apparent that they are not a complete solution to the chronic problem of the pan camera light leakage.

D. J-36 (PG-1) FLIGHT READINESS AND CERTIFICATION

A final flight readiness test, completed on 15 September, produced pan instrument payload in generally excellent condition. All basic data recording was acceptable and the payload was unusually free of random scratches and minus density streaks.

Photogrammetric data recording was acceptable for the speed at which the system was operated. On master instrument No. 188, rail hole image #40 on the data block side, and hole #10 on the timing mark edge were missing. On slave instrument #189, all rail hole images were present but hole image #14 on the timing mark edge was of low density and probably will not appear on flight material. The lens scan lines of both instruments appeared excellent throughout the format.

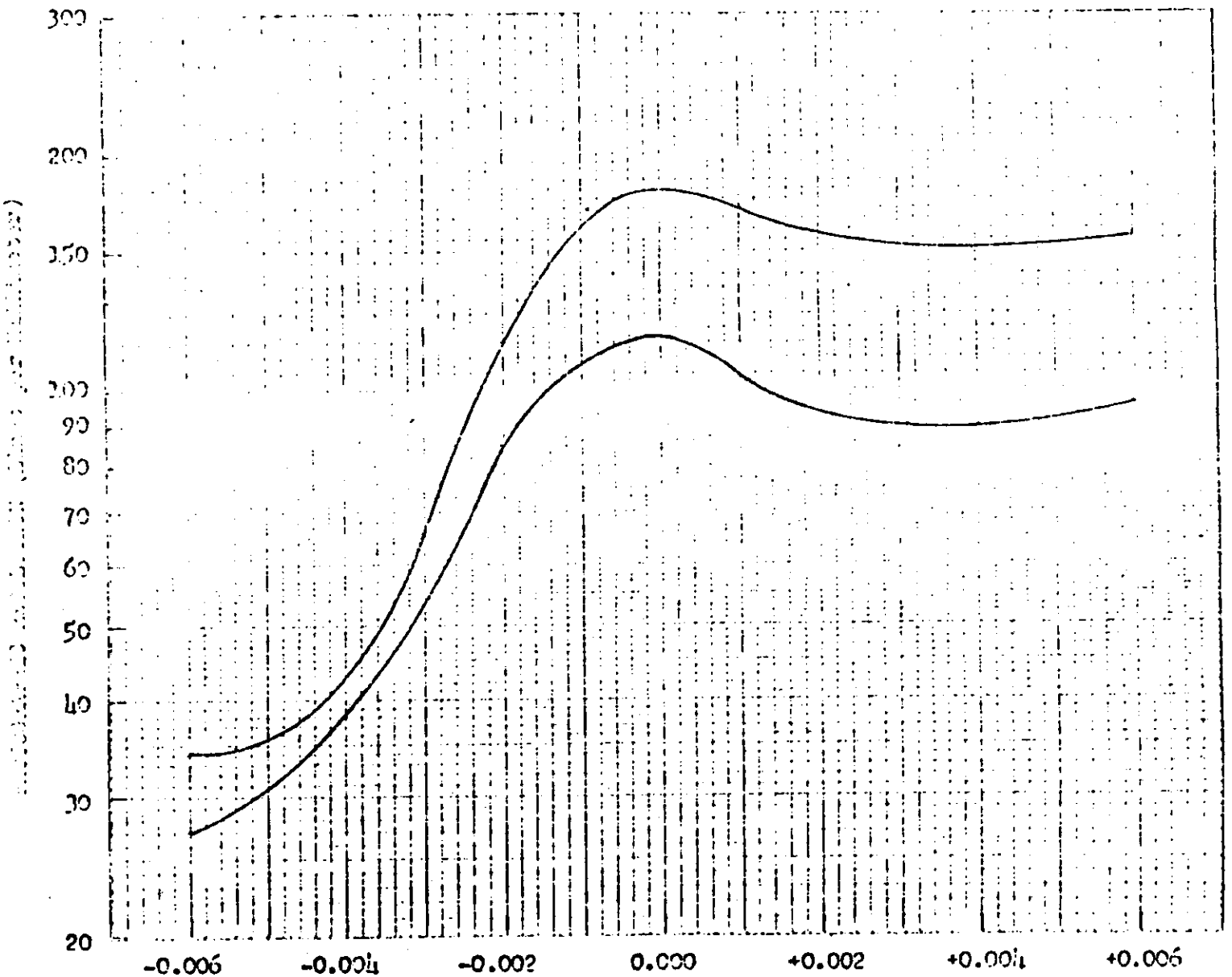
Spacing of the 200 cycle marks indicated that the cycle period for both instruments was about seven seconds. This rate provides an exposure of the PG data that is about three times that provided at flight speeds. Experience with this system has shown that higher cycle rates also cause dynamic anomalies that degrade PG data recording. Therefore, this excellent readiness test payload cannot be considered valid baseline data for flight evaluation purposes.

Loading of the main instruments supply cassette was performed on 16 September. Sensitometric samples of this main payload showed the type 3404 emulsions to have acceptable characteristics. Bands of probable faint backing scratches parallel to the major axis were detected in both flight samples. Similar streaks were observed in these films during subsequent tracking tests. Such streaks are frequently observed during flight loading tracking tests but they have not been detected in processed material. Since this condition causes no detectable density and is on the backing surface, it is not considered a hazard to either the original flight information or subsequently produced copies.

Sensitometric samples of stellar and index flight payloads had been processed on 7 September. Results on all four films were acceptable.

Tracking and light leak tests were completed on 17 September. Other than the backing streaks on main payloads noted above, no anomalies were noted. The J-36 system was then certified for flight.

PRE-FLIGHT DYNAMIC RESOLUTION



Camera No: 188

Payload No: J-36

Resolution (l/mm)

High Contrast: 160

Low Contrast: 117

Film Type: 3404

Test Date: 5/10/66

Figure 2-1

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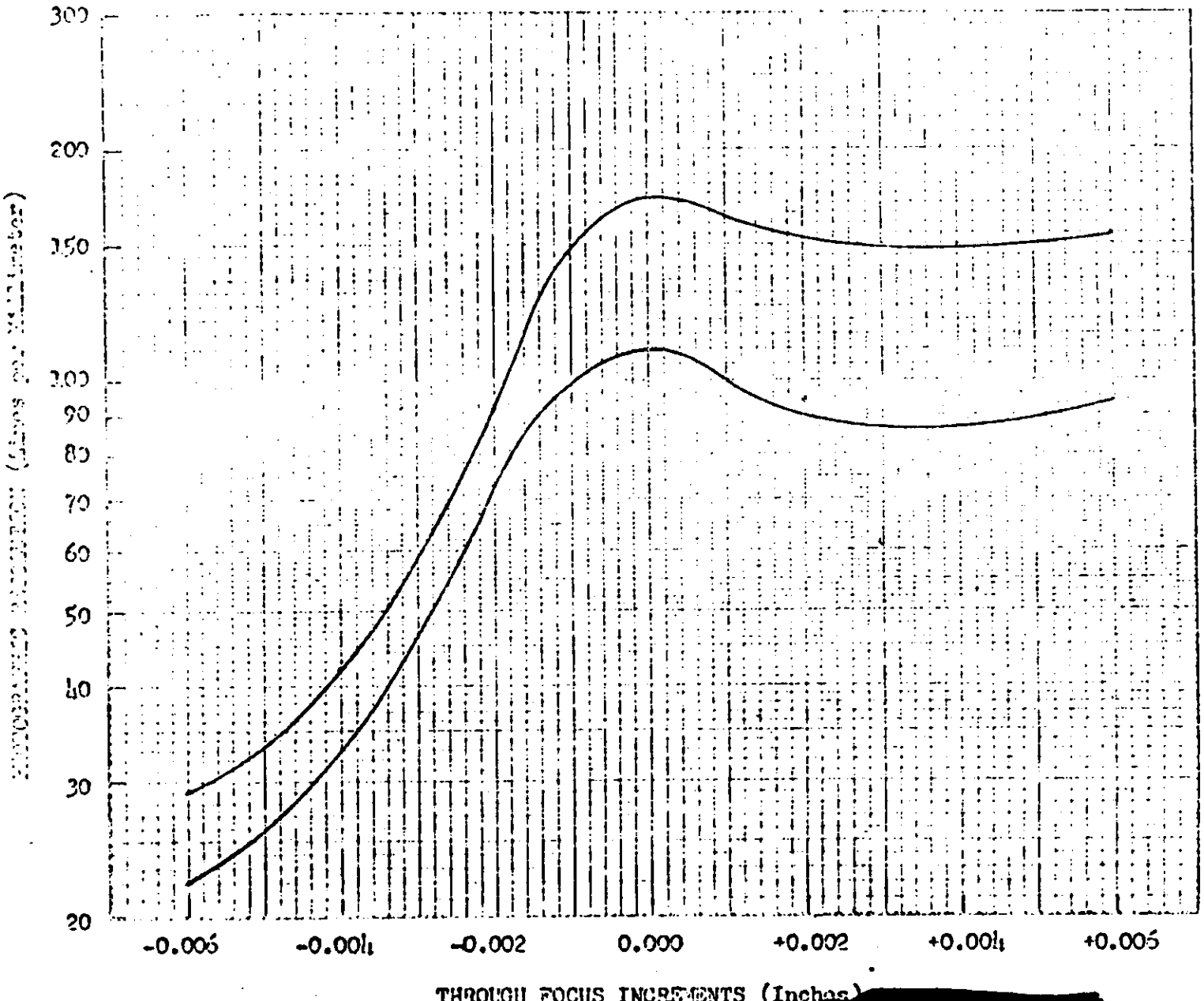
PRE-FLIGHT DYNAMIC RESOLUTION



Camera No: 189

Payload No: J-36

Resolution (l/mm)

High Contrast: 174

Low Contrast: 110

Film Type: 3404

Test Date: 5/10/66

[redacted]

REV. MODE	CP	RAMP	A	TOR SECS	SYSTEM CALIB.	ACTUAL	UNIT DEV.	SYSTEM DEV.	ACTUAL	UNIT DEV.	SYSTEM DEV.	188/189 DIFF
						INST. 188			INST. 189			
1A	4	1		7b	4.34e	4.355	0.00S	0.20S	4.365	0.62S	0.43S	0.2
1A	4	1		1e23	2.2c0	2.216	0.59S	0.74S	2.215	0.83S	0.70S	-0.0
1A	4	1		1e82	2.167	2.212	0.55S	0.70S	2.207	0.62S	0.47S	-0.2
1A	4	1		2011	2.192	2.218	1.02S	1.16S	2.212	1.04S	0.84S	-0.2
1A	4	1		2e32	2.348	2.335	0.90F	0.57F	2.330	0.08F	0.40F	0.1
1A	4	1		265a	2.393	2.370	1.25F	0.96F	2.371	0.80F	0.92F	0.04
1A	4	1		2884	2.789	2.773	0.89F	0.58F	2.772	0.25F	0.61F	-0.04
1A	4	1		3084	3.171	3.149	1.00F	0.70F	3.154	0.24F	0.54F	0.16
1A	4	1		3176	3.367	3.340	1.09F	0.80F	3.344	0.40F	0.69F	0.12
2A	5	8		82	3.083	3.088	0.14F	0.17S	3.080	0.21S	0.09F	-0.26
2A	5	8		2027	2.373	2.376	0.21F	0.12S	2.375	0.40S	0.07S	-0.04
2A	5	8		2879	2.744	2.735	0.65F	0.33F	2.732	0.12F	0.44F	-0.11
2A	5	8		3398	2.993	2.986	0.54F	0.23F	2.983	0.03F	0.33F	-0.10
3A	7	7		0	3.615	3.603	0.60F	0.34F	3.590	0.43F	0.70F	-0.36
3A	7	7		0	3.615	3.592	0.90F	0.64F	3.577	0.79F	1.05F	-0.42
3A	7	7		1591	2.561	2.565	0.17F	0.16S	2.564	0.44S	0.12S	-0.04
3A	7	7		1896	2.478	2.482	0.17F	0.16S	2.481	0.40S	0.12S	-0.04
3A	7	7		1960	2.478	2.469	0.68F	0.35F	2.471	0.05S	0.27F	0.08
3A	7	7		2029	2.484	2.471	0.86F	0.54F	2.469	0.29F	0.62F	-0.08

Table 2-1

REV. CODE	CP	RAMP	TMA	SYSTEM CALIB.	ACTUAL	UNIT DEV.	SYSTEM DEV.	ACTUAL	UNIT DEV.	SYSTEM DEV.	
					INST. 188			INST. 189			
4A	11	1	102	8.7e8	8.484	3.04F	3.43F	8.427	4.25F	3.86F	-0.
4A	11	1	1556	2.484	2.485	0.67F	0.35F	2.484	0.08F	0.39F	-0.
4A	11	1	1631	2.408	2.392	0.92F	0.69F	2.383	0.65F	0.97F	-0.
4A	11	1	1702	2.344	2.328	0.99F	0.67F	2.320	0.63F	1.01F	-0.
4A	11	1	2024	2.273	2.279	0.08F	0.24S	2.273	0.31S	0.02F	-0.
4A	11	1	2351	2.560	2.541	1.08F	0.78F	2.533	0.75F	1.07F	-0.
4A	11	1	2403	2.7e2	2.726	1.61F	1.29F	2.716	1.34F	1.65F	-0.
4A	11	1	2648	3.253	3.215	1.47F	1.18F	3.206	1.17F	1.46F	-0.
4A	11	1	2864	4.100	4.086	1.30F	1.08F	4.045	1.13F	1.35F	-0.
4A	11	1	3418	7.038	6.891	1.80F	1.95F	6.660	2.54F	2.39F	-0.
5A	4	1	93	4.338	4.378	0.72S	0.91S	4.405	1.74S	1.54S	0.
5A	4	1	2369	2.210	2.229	0.67S	0.84S	2.233	1.19S	1.02S	0.
5A	4	1	2463	2.322	2.234	0.34S	0.52S	2.241	1.01S	0.83S	0.
5A	4	1	3421	3.874	3.891	0.20S	0.44S	3.903	1.00S	0.75S	0.
6A	5	8	71	3.082	3.068	0.12F	0.18S				
6A	5	8	2046	2.375				2.404	1.54S	1.21S	
6A	5	8	2654	2.e18	2.830	0.24S	0.57S	2.643	1.39S	1.07S	0.
6A	5	8	2693	2.751	2.757	0.12F	0.21S				
6A	5	8	3061	2.849	2.862	0.14S	0.46S	2.866	0.92S	0.60S	0.
6A	5	8	3179	2.898	2.903	0.13F	0.19S	2.902	0.47S	0.15S	-0.
6A	5	8	3420	3.001				3.003	0.37S	0.06S	
7A	7	7	91	3.610	3.618	0.04F	0.23S	3.617	0.47S	0.20S	-0.

Table 2-1

REV. MODE	CP	RAMP R	A	TOK SECS	SYSTEM CALIB.	INST. 188 ACTUAL	INST. 188 UNIT DEV.	INST. 188 SYSTEM DEV.	INST. 189 ACTUAL	INST. 189 UNIT DEV.	INST. 189 SYSTEM DEV.	188/ DIF
7A		7	7	2033	2.488	2.508	0.60S	0.93S	2.513	1.46S	1.13S	0..
7A		7	7	2657	2.854	2.860	0.10F	0.22S	2.858	0.47S	0.15S	-0.0
7A		7	7	3070	3.212	3.227	0.18S	0.48S	3.225	0.71S	0.42S	-0.0
7A		7	7	3178	3.299	3.303	0.18F	0.11S	3.299	0.28S	0.01F	-0.1
8A		11	1	102	8.788	8.780	0.58S	0.17S				
8A		11	1	2044	2.280				2.286	0.58S	0.26S	
8A		11	1	2654	3.273	3.238	1.37F	1.09F	3.246	0.54F	0.83F	0.1
8A		11	1	2874	4.081	4.088	1.28F	1.06F				
8A		11	1	3173	5.48e	5.456	0.60F	0.54F	5.456	0.48F	0.54F	-0.0
8A		11	1	3438	7.159				7.093	1.09F	0.92F	
9A		4	1	0	4.359	4.338	0.67F	0.48F	4.329	0.50F	0.69F	-0.2
9A		4	1	0	4.359	4.335	0.74F	0.55F	4.332	0.43F	0.62F	-0.0
9A		4	1	0	4.359	4.357	0.24F	0.04F	4.351	0.01S	0.18F	-0.1
9A		4	1	0	4.359	4.362	0.12F	0.07S	4.358	0.17S	0.02F	-0.0
9A		4	1	0	4.359	4.326	0.90F	0.76F	4.316	0.79F	0.99F	-0.2
9A		4	1	0	4.359	4.347	0.47F	0.27F	4.326	0.56F	0.76F	-0.4
10A		5	8	91	3.081	3.069	0.70F	0.39F	3.056	0.51F	0.81F	-0.4
10A		5	8	1056	2.438	2.450	0.17S	0.50S	2.443	0.54S	0.21S	-0.2
10A		5	8	1698	2.395	2.395	0.35F	0.02F	2.390	0.10S	0.23F	-0.2
10A		5	8	2030	2.374	2.378	0.14F	0.19S	2.372	0.26S	0.07F	-0.2
10A		5	8	2323	2.448	2.449	0.16F	0.17S	2.442	0.21S	0.12F	-0.2
10A		5	8	2466	2.508	2.501	0.62F	0.29F	2.492	0.33F	0.65F	-0.3

Table 2-1

REV. MODE	OP	RAMP	TOR A	TOR SECS	SYSTEM CALIB.	INST. 1ØF ACTUAL	INST. 1ØF UNIT DEV.	INST. 1ØF SYSTEM DEV.	INST. 1Ø9 ACTUAL	INST. 1Ø9 UNIT DEV.	INST. 1Ø9 SYSTEM DEV.	186/ DIF
1ØA		5	8	2ØØØ	2.57Ø	1.891	Ø.25S	Ø.87S	2.874	Ø.24S	Ø.Ø9F	-Ø.6
1ØA		5	8	2712	2.Ø4Ø	1.Ø28	Ø.95F	Ø.67F	2.Ø2Ø	Ø.Ø5F	Ø.97F	-Ø.3
1ØA		5	8	2ØØ3	2.748	2.75Ø	Ø.1ØF	Ø.14S	2.731	Ø.23F	Ø.55F	-Ø.6
1ØA		5	8	2941	2.778	3.7Ø3	Ø.8ØF	Ø.48F	2.75Ø	Ø.63F	Ø.95F	-Ø.4
1ØA		5	8	3121	2.8Ø9	2.884	Ø.32F	Ø.ØØF	2.851	Ø.52F	Ø.83F	-Ø.6
1ØA		5	8	3193	2.9Ø4	2.886	Ø.94F	Ø.63F	2.87Ø	Ø.87F	1.18F	-Ø.3
1ØA		5	8	3375	2.934	2.975	Ø.82F	Ø.31F	2.962	Ø.43F	Ø.74F	-Ø.4
1ØA		5	8	3479	3.Ø21	2.99Ø	1.35F	1.Ø4F	2.982	1.ØØF	1.31F	-Ø.2
11A		4	1	9Ø	4.34Ø	4.293	1.27F	1.Ø8F	4.284	1.Ø9F	1.29F	-Ø.2
11A		4	1	1534	2.2Ø9	2.226	Ø.8ØS	Ø.77S	2.213	Ø.34S	Ø.16S	-Ø.5
11A		4	1	1669	2.197	2.2Ø7	Ø.29S	Ø.44S	2.198	Ø.18S	Ø.Ø3S	-Ø.4
11A		4	1	1971	2.192	2.212	Ø.76S	Ø.91S	2.198	Ø.41S	Ø.27S	-Ø.6
11A		4	1	2Ø4Ø	2.214	2.23Ø	Ø.53S	Ø.7ØS	2.216	Ø.24S	Ø.Ø7S	-Ø.6
11A		4	1	2Ø6Ø	2.39Ø	2.385	Ø.52F	Ø.19F	2.371	Ø.45F	Ø.78F	-Ø.5
11A		4	1	2943	2.894	2.8Ø9	Ø.48F	Ø.17F	2.872	Ø.44F	Ø.75F	-Ø.5
11A		4	1	3Ø7Ø	3.143	3.14Ø	Ø.39F	Ø.Ø9F	3.125	Ø.2ØF	Ø.56F	-Ø.4
11A		4	1	3211	3.437	3.4Ø9	1.1ØF	Ø.82F	3.398	Ø.86F	1.14F	-Ø.3
11A		4	1	3449	3.928	3.9Ø1	Ø.92F	Ø.6ØF	3.874	1.13F	1.37F	-Ø.6
12A		11	1	1590	2.451	2.474	Ø.8ØS	Ø.93S	2.464	Ø.85S	Ø.52S	-Ø.4
12A		11	1	1715	2.334	2.338	Ø.16F	Ø.17S	2.331	Ø.19S	Ø.13F	-Ø.3
12A		11	1	2Ø17	2.371	2.283	Ø.18S	Ø.51S	2.276	Ø.53S	Ø.2ØS	-Ø.3
12A		11	1	2372	2.593	2.581	Ø.8ØF	Ø.48F				

Table 2-1

REV. MODE	CP	RAMP	TUR	SYSTEM SECS	CALIB.	INST. 188 ACTUAL	UNIT DEV.	SYSTEM DEV.	INST. 189 ACTUAL	UNIT DEV.	SYSTEM DEV.
12A	11	1	2386	2.617					2.575	1.27F	1.59F
12A	11	1	2644	3.240	3.187	1.93F	1.84F	3.184	1.44F	1.73F	-
12A	11	1	2909	4.199	4.187	0.97F	0.76F	4.137	1.27F	1.47F	-
12A	11	1	3170	5.488	5.441	0.56F	0.50F	5.395	1.24F	1.34F	-
13A	4	1		98 4.336	4.305	0.60F	0.71F	4.282	1.05F	1.24F	-
13A	4	1	1933	2.152	2.217	0.99S	1.14S	2.203	0.64S	0.50S	-
13A	4	1	1977	2.192	2.212	0.78S	0.90S	2.200	0.50S	0.36S	-
13A	4	1	2021	2.198	2.209	0.80S	0.75S				
13A	4	1	2048	2.193	2.207	0.50S	0.64S	2.196	0.29S	0.14S	-0
13A	4	1	3210	3.435	3.433	0.34F	0.06F	3.421	0.13F	0.41F	-0
13A	4	1	3509	4.038	4.007	0.95F	0.73F	3.986	1.02F	1.25F	-0
14A	5	8		98 3.081	3.103	0.41S	0.72S	3.105	1.09S	0.78S	0.
14A	5	8	2310	2.440	2.471	0.94S	1.27S	2.477	1.85S	1.51S	0.
14A	5	8	2381	2.469	2.489	0.80S	0.83S	2.494	1.36S	1.03S	0.
14A	5	8	2406	2.508	2.521	0.18S	0.50S	2.529	1.15S	0.82S	0.
14A	5	8	2871	2.740	2.768	0.70S	1.03S	2.767	1.32S	0.99S	-0.
14A	5	8	2957	2.785	2.805	0.40S	0.73S	2.801	0.90S	0.58S	-0.
13A	7	7		91 3.610	3.634	0.40S	0.07S	3.643	1.19S	0.92S	0.
13A	7	7	2309	2.582	2.610	0.76S	1.09S	2.615	1.61S	1.28S	0.
13A	7	7	2460	2.681	2.686	0.13F	0.20S	2.697	0.93S	0.61S	0.
13A	7	7	2861	3.035	3.064	0.52S	0.83S	3.064	1.14S	0.83S	-0.
13A	7	7	2953	3.115	3.122	0.07F	0.24S	3.127	0.70S	0.40S	0.

Table 2-1

~~TOP SECRET~~ C[redacted]

REV. MODE	CP	RAMP	TOR SECS	SYSTEM CALIB.	INST. 188 ACTUAL	INST. 188 UNIT DEV.	INST. 188 SYSTEM DEV.	INST. 189 ACTUAL	INST. 189 UNIT DEV.	INST. 189 SYSTEM DEV.	188 DI
1EB	4	1	2011	2.192	2.216	0.93S	1.07S	2.213	1.08S	0.94S	-0.
1EB	4	1	2379	2.211	2.227	0.68S	0.72S	2.230	1.02S	0.86S	0.
1EB	4	1	2646	2.370	2.378	0.01F	0.32S	2.368	1.07S	0.74S	0.
1EB	4	1	2911	2.837	2.863	0.59S	0.91S	2.866	1.34S	1.02S	0.
1EB	4	1	3164	3.338	3.376	0.86S	1.15S	3.384	1.69S	1.39S	0.
1EB	4	1	3450	3.930	3.961	0.8eS	0.80S	3.965	1.14S	0.90S	0.
1B	4	1	93	4.338	4.358	0.26S	0.45S	4.360	0.70S	0.50S	0.
1B	4	1	1578	2.203	2.221	0.68S	0.83S	2.215	0.72S	0.56S	-0.
1B	4	1	1705	2.198	2.210	0.50S	0.65S	2.203	0.48S	0.33S	-0.
1B	4	1	2032	2.193	2.209	0.60S	0.74S	2.204	0.66S	0.51S	-0.
1B	4	1	2664	2.404	2.392	0.81F	0.49F	2.393	0.12F	0.44F	0.
1C	4	1	2e81	2.784	2.7e8	0.17F	0.15S	2.783	0.29S	0.03F	-0.
1C	4	1	3059	3.121	3.128	0.06F	0.24S	3.129	0.58S	0.27S	0.
1C	4	1	3182	3.376	3.371	0.42F	0.14F	3.376	0.30S	0.01S	0.
2B	6	8	92	3.081	3.095	0.15S	0.45S				
2B	6	8	1e6	3.0e0				3.085	0.47S	0.17S	
2C	6	8	2042	2.378	2.394	0.48S	0.81S	2.398	1.31S	0.96S	0.
2C	6	8	2883	2.746	2.768	0.47S	0.80S	2.766	1.0eS	0.72S	-0.
2B	6	8	3421	3.002	3.019	0.27S	0.56S	3.017	0.83S	0.51S	-0.
3B	7	7	2034	2.485	2.514	0.83S	1.17S	2.50S	1.25S	0.92S	-0.
3B	7	7	2325	2.591	2.607	0.30S	0.62S	2.604	0.83S	0.51S	-0.
3B	7	7	2485	2.685	2.681	0.45F	0.13F	2.e77	0.04S	0.28F	-0.

Table 2-1

REV. MODE	OP	RAMP	TGT	SYSTEM CALIB.	INST. 188 ACTUAL	INST. 188 UNIT DEV.	INST. 188 SYSTEM DEV.	INST. 189 ACTUAL	INST. 189 UNIT DEV.	INST. 189 SYSTEM DEV.	188 DI
4B	11	1	1540	2.503	2.530	0.75S	1.08S	2.529	1.37S	1.04S	-0.
4B	11	1	1702	2.344	2.350	0.16S	0.49S	2.356	0.86S	0.53S	0.
4B	11	1	2034	2.277	2.296	0.52S	0.85S	2.298	1.27S	0.94S	0.
4B	11	1	2328	2.524	2.538	0.24S	0.57S	2.543	1.06S	0.77S	0.
4B	11	1	2463	2.782	2.780	0.38F	0.06F	2.767	0.51S	0.19S	0.
4B	11	1	2659	3.290	3.294	0.17F	0.12S	3.308	0.94S	0.54S	0.
4B	11	1	2885	4.104	4.142	0.70S	0.92S	4.146	1.24S	1.02S	0.
4B	11	1	3426	7.081	7.205	1.52S	1.76S				
4B	11	1	3437	7.153				7.261	1.34S	1.52S	
5B	4	1	0	4.359	4.382	0.23S	0.53S	4.378	0.63S	0.44S	-0.
5B	4	1	2144	2.195	2.214	0.70S	0.85S	2.216	1.09S	0.94S	0.
5B	4	1	2285	2.203	2.209	0.12S	0.28S	2.218	0.85S	0.69S	0.
5B	4	1	3241	3.501	3.533	0.64S	0.91S	3.539	1.36S	1.09S	0.
6B	5	8	98	3.081	3.082	0.27F	0.04S				
6B	5	8	2048	2.376				2.392	1.02S	0.69S	
6B	5	8	2687	2.617	2.624	0.08F	0.27S	2.626	0.67S	0.34S	0.
6B	5	8	2884	2.747	2.755	0.02F	0.31S				
6B	5	8	3056	2.836	2.853	0.28S	0.59S	2.853	0.91S	0.59S	-0.
6B	5	8	3179	2.858	2.899	0.27F	0.05S	2.900	0.40S	0.08S	0.
6B	5	8	3449	3.011				3.013	0.36S	0.05S	
7B	7	7	2054	2.485	2.503	0.35S	0.72S	2.506	1.17S	0.84S	0.
7B	7	7	2659	2.856	2.854	0.38F	0.06F	2.855	0.29S	0.03F	0.

Table 2-1

REV. MODE	CP	RAMP #	TOR A SECS	SYSTEM CALIB.	INST. 184 ACTUAL	INST. 184 UNIT DEV.	INST. 184 SYSTEM DEV.	INST. 189 ACTUAL	INST. 189 UNIT DEV.	INST. 189 SYSTEM DEV.	184/189 DIF
7B	7	7	3064	3.198	3.214	0.19S	0.49S	3.217	0.68S	0.58S	0.0
7B	7	7	3181	3.302	3.302	0.28F	0.01S	3.302	0.30S	0.01S	-0.0
8B	11	1	2046	2.281				2.285	0.51S	0.18S	
8B	11	1	2059	3.277	3.303	0.51S	0.80S	3.299	0.98S	0.66S	-0.1
8B	11	1	2081	4.089	4.120	0.84S	0.76S				
8B	11	1	3097	5.068	5.145	1.40S	1.51S	5.130	1.40S	1.34S	-0.1
9B	4	1	1999	2.204	2.222	0.68S	0.81S	2.226	1.18S	0.99S	0.1
9B	4	1	2058	2.198	2.210	0.49S	0.64S	2.210	0.79S	0.64S	-0.0
9B	4	1	2064	2.388	2.3e4	0.41F	0.09F	2.392	0.58S	0.25S	0.3
9B	4	1	2077	2.777	2.787	0.08S	0.37S	2.789	0.76S	0.44S	0.0
9B	4	1	2972	2.950	2.947	0.42F	0.11F	2.947	0.21S	0.11F	-0.0
9B	4	1	3065	3.133	3.141	0.04F	0.27S	3.140	0.54S	0.24S	-0.0
9B	4	1	3170	3.367	3.365	0.35F	0.06F	3.376	0.55S	0.26S	0.3
9B	4	1	3411	3.864				3.869	0.63S	0.38S	
9B	4	1	3418	3.864	3.873	0.01F	0.23S				
10B	5	8	93	3.081	3.099	0.04F	0.26S	3.098	0.80S	0.49S	0.2
10B	5	8	1848	2.441	2.465	0.68S	0.99S	2.467	1.40S	1.07S	0.0
10B	5	8	1723	2.390	2.394	0.16F	0.17S	2.403	0.87S	0.54S	0.3
10B	5	8	2402	2.506	2.504	0.42F	0.09F	2.510	0.47S	0.15S	0.2
10B	5	8	2704	2.647	2.643	0.48F	0.15F				
10B	5	8	2942	2.777	2.778	0.28F	0.04S	2.782	0.50S	0.18S	0.1
10B	5	8	3157	2.906	2.908	0.25F	0.06S	2.910	0.45S	0.13S	0.0

Table 2-1

NEW CP NODE	RAMP	TOW	SYSTEM SECS	SYSTEM CALIB.	INST. 188 ACTUAL	INST. 188 UNIT DEV.	INST. 188 SYSTEM DEV.	INST. 189 ACTUAL	INST. 189 UNIT DEV.	INST. 189 SYSTEM DEV.	188/189 DIFF
108	5	8	3389	2.690	2.698	0.08F	0.28S	3.000	0.86S	0.55S	0.2
109	5	8	3479	3.021	3.018	0.49F	0.18F	3.023	0.36S	0.05S	0.2
110	4	1	89	4.340	4.355	0.14S	0.34S	4.360	0.65S	0.45S	0.1
111	4	1	1500	2.209	2.226	0.58S	0.75S	2.232	1.14S	1.02S	0.2
112	4	1	1600	2.201	2.214	0.43S	0.59S	2.219	0.97S	0.81S	0.2
113	4	1	1673	2.197	2.207	0.30S	0.45S	2.213	0.88S	0.72S	0.2
114	4	1	1970	2.192	2.206	0.58S	0.72S	2.212	1.08S	0.91S	0.1
115	4	1	2401	2.214	2.224	0.28S	0.45S	2.233	1.03S	0.86S	0.4
116	4	1	2868	2.411	2.400	0.77F	0.45F	2.406	0.13S	0.20F	0.2
117	4	1	2942	2.894	2.894	0.31F	0.01S	2.898	0.46S	0.14S	0.1
118	4	1	3077	3.157	3.160	0.20F	0.10S	3.165	0.56S	0.25S	0.1
119	4	1	3206	3.426	3.423	0.38F	0.10F	3.429	0.36S	0.07S	0.1
120	4	1	3460	3.930	3.929	0.25F	0.01F	3.938	0.45S	0.21S	0.2
121	11	1	1585	2.467	2.475	0.40S	0.73S	2.482	1.34S	1.01S	0.2
122	11	1	1715	2.334	2.342	0.01S	0.34S	2.345	0.79S	0.47S	0.1
123	11	1	2018	2.272	2.290	0.48S	0.81S	2.299	1.53S	1.20S	0.3
124	11	1	2378	2.600	2.610	0.08S	0.38S	2.617	0.96S	0.65S	0.2
125	11	1	2643	3.237	3.249	0.08S	0.37S	3.255	0.86S	0.56S	0.1
126	11	1	2913	4.215	4.248	0.57S	0.78S	4.253	1.11S	0.90S	0.1
128	4	1	95	4.337	4.376	0.69S	0.89S	4.376	1.09S	0.89S	-0.0
130	4	1	1930	2.192	2.214	0.86S	1.00S	2.211	1.01S	0.87S	-0.1
131	4	1	1998	2.192	2.212	0.76S	0.90S	2.205	0.72S	0.58S	-0.3

Table 2-1

~~TOP SECRET~~ C[redacted]

REV. CP MODE	RAMP R	TOR A	SECS	SYSTEM CALIB.	INST. 108 ACTUAL	UNIT DEV.	SYSTEM DEV.	INST. 109 ACTUAL	UNIT DEV.	SYSTEM DEV.	108/109 DIF
138	4	1	5437	3.891	3.921	0.82S	0.76S	3.917	0.90S	0.66S	-0.1
138	4	1	5512	4.041	4.048	0.06F	0.16S	4.056	0.56S	0.36S	0.2

DEV. AND DIFF. ARE IN PERCENT
THE (-) SIGN INDICATES THAT INST 1 IS SLOWER THAN INST 2
F=FAST AND S=SLOW

Table 2-1

J-36 HIVOS TIME CORRELATION 5-5-66

REV	IRIG DAY-HR-MIN-SEC	IRIG SECONDS	CLOCK SECONDS	DELTA IRIG	DELTA CLOCK	ERRO
0	104 8 22 50.440	9C1577C.440	157284.747	---	---	---
3	104 12 36 35.470	9C3C995.470	172509.790	15225.030	15225.043	0.01
9	105 15 6 32.885	9126292.885	267907.116	95397.414	95397.325	-0.08
14	107 9 5 7.980	9277507.980	419022.180	151115.092	151115.062	-0.03
1	107 12 31 31.370	9289891.370	431405.573	12383.390	12383.393	0.00
	3 4 8 40.930-DELTA TIME			TOTAL ACCUM. ERROR		-0.10
4	108 9 30 54.720	9365454.720	169548.754	---	---	---
6	108 13 33 59.590	9380039.590	184133.619	14584.870	14584.865	-0.00
9	109 9 34 56.700	9452096.700	256190.845	72057.109	72057.225	0.11
10	109 11 4 56.830	9457496.830	261590.921	5400.130	5400.076	-0.05
11	109 13 38 1.970	9466681.970	270776.018	9185.140	9185.097	-0.04
13	110 8 3 12.615	9532992.615	337086.683	66310.645	66310.664	0.02
16	110 11 3 11.960	9543791.960	347886.024	10799.345	10799.341	-0.00
	2 1 32 17.240-DELTA TIME			TOTAL ACCUM. ERROR		0.03

Table 2-2

SECTION 3

FLIGHT OPERATIONS

A. SUMMARY

All launch, ascent and injection events occurred as programmed to achieve orbit. The period was 0.2 minutes low from predicted and slightly below 3 sigma tolerance.

Both panoramic instruments operated properly throughout the flight. The cycle rates were 3.5% slow from preflight calibrations but the instruments were matched within 0.75% of the same rate. The V/H programmer failed on orbit 156 descending or 157 ascending, however this was after the completion of the active mission.

The -1 and -2 Stellar/Index cameras, the clock, and the command system operated properly throughout the flight. Early A to B transfer was successfully executed during acquisition at [redacted] on orbit 72. The pressure make-up system operated properly with 490 PSI supply remaining at Event 2.

The instrumentation system performed properly throughout the flight except for Channels 18 and F Link 2 on ascent and Channel 13 on later orbits.

Both recovery systems operated properly during recovery of each capsule. The -2 telemetry battery spilled electrolyte into the recovery capsule.

B. PANORAMIC CAMERA SYSTEM PERFORMANCE

The camera system dynamics were normal on all engineering operations observed during the mission. The film transport system operation was smooth and produced 99/101 ratios of 6/6 to 7/6 for both instruments. Cycle rate data (Table 3-1) was 0.5 to 3.5% slow compared to preflight calibrations with a typical error of 1.6% slow. The individual instrument rates matched generally to less than 0.5%. Early A to B transfer, (KZ-38 command) was issued on orbit 72 at the [redacted] the A to B transfer was observed via microwave in real time. All events associated with the command occurred properly.

Panoramic Film Consumption

	Actual	
	Master	Slave
Pre-Launch	126	127
-1 Mission	2846	2867
-2 Mission	3073	3057
Total	6045	6051

FMC Match

The V/H ramp to orbit match was acceptable throughout the flight. The following settings of RTC 6, 8, and 10 were used to attain the best match during the mission:

RTC 6	8	10	Remarks
8	3	6	Best settings for nominal orbit.
7	3	5	Changed at Rev. 6. To compensate for orbit dispersions at launch.
8	2	5	Changed at Rev. 12. Additional orbital data permitted improved ramp selection.
8	2	6	Changed at Rev. 76. To compensate for normal orbit decay.
7	3	6	Changed at Rev. 107. To compensate for normal orbit decay.

The V/H Programmer failed either on orbit 156 descending or 157 ascending. The start commands stepped through properly and 400 cycle voltage was present at the OSFG. The main instruments indicated the failure was located in the programmer. The programmer stopped at either 1000 seconds or 2800 seconds. This position of the programmer produced an output voltage level approximating the

reference level. The programmer did not operate again. The most probable point of failure was at the 2800 second point (Ref. Figure 3-1). This is near the time that S-202 closes (approximately 2500 seconds) and resets the start relay K-201. This condition indicates that S-201 failed to close at the proper time (near 400 seconds into the cycle). The failure indications were identical to the failure experienced on J-32 (Mission 1036). The programmer serial numbers were VP43 and VP44 for J-32 and J-36 respectively. Boston ran a complete qualification test on a programmer and ran another programmer to failure.

Yaw Programmer Performance

This yaw programmer was the fifth to be flown on the Corona J Program and was the first of a new design. The programmer was enabled on orbit 1 at [redacted] and remained enabled throughout the flight. A 100 second disable - enable test was conducted on orbit 8 at [redacted] The test indicated proper phasing of the programmer output. Telemetry indicated proper phasing and output on all acquisitions during the flight. It has been noted however, that there is a time delay of approximately 6 minutes in operate from command. This causes an incorrect yaw correction for the vehicle latitude position. This has been corrected on Mission 1041.

C. STELLAR/INDEX CAMERA PERFORMANCE

The -1 Stellar/Index camera operation was normal throughout the mission with telemetry indicating proper shutter, meter, and programmer functions.

The -2 Stellar/Index operation was normal throughout the mission. Telemetry indicated proper shutter, meter, programmer and slewing functions.

D. INSTRUMENTATION AND COMMAND SYSTEM PERFORMANCE

The instrumentation system operated properly throughout the mission with two exceptions:

1. Link II Telemetry data during launch was not recorded at the [redacted] or STC.

2. Link I Channel 13 VCO (AP Status) clipped voltages above 4 volts from orbit 121 for the remainder of the mission.

Link II was reported by voice to be acquired during ascent but telemetry tapes from the [redacted] and STC did not contain any voltage control oscillator (VCO) data.

The VCO of Link I Channel 13 began clipping during orbit 121. The data below the clipping level remained linear when 4 volts was used as a calibrate level. The clipping level became lower with Link I operating time per rev. The lowest levels of the clipping reached 80% toward the end of the mission. This did not severely hamper command verification but some orbit command verification was obtained from the Link II back-up Channel 12-2-00.

The command system operated properly throughout the mission and was the first system with the new operations selection control and the real time early A to B transfer capability.

Clock System Performance

The payload clock system performed satisfactorily throughout the mission. The clock/system time correlation data obtained from the [redacted] acquisitions are included in Table 3-2.

Pressure Make-up System Performance

The pressure make-up system operated satisfactorily throughout the mission. The mission consumed 2035 PSIA supply pressure for a duration of 234 minutes of operate time. This resulted in an average supply consumption of 8.65 PSIA/minute of operate. This system had temperature sensors mounted on the supply bottle. A plot of temperatures vs. orbit is included as Figure 3-5. Figure 3-6 describes the PMU supply pressure vs. operate time. Two points are included for each acquisition, one the uncorrected pressure indication and the second pressure corrected to 70°F.

Thermal Environment

Temperature data obtained from [redacted] acquisitions are contained in Table 3-3. Average master instrument temperatures started with a

high of 85°F and ended with a low of 69°F. The Slave instrument temperatures started with a high of 82°F and ended with a low of 67°F. Specific plots of temperature vs. Beta angle are included as Figure 3-2, 3-3 and 3-4.

This system was equipped with the high range fairing temperature sensors and was to be played out on Link II. As noted earlier, Link II was not recorded on ascent.

J-36 188/189 FLIGHT MISSION

REV. MODE	CP	RAMP R	RAMP A	TOR SECS	SYSTEM CALIB.	INST. 188 ACTUAL	INST. 188 UNIT DEV.	INST. 188 SYSTEM DEV.	INST. 189 ACTUAL	INST. 189 UNIT DEV.	INST. 189 SYSTEM DEV.	188 DI
08	A	7	3	1800	4.714	4.740	0.39S	0.54S	4.745	0.80S	0.65S	0.
16	A	8	2	1709	2.235	2.287	2.16S	2.35S	2.282	2.32S	2.12S	-0.
31	A	8	2	1785	2.230	2.265	1.39S	1.58S	2.260	1.54S	1.35S	-0.
47	A	8	2	1840	2.228	2.272	1.80S	1.99S	2.265	1.86S	1.67S	-0.
63	A	8	2	1920	2.226	2.290	2.67S	2.85S	2.270	2.14S	1.96S	-0.
79	B	8	2	1925	2.226	2.307	3.42S	3.62S	2.300	3.49S	3.30S	-0.
110	B	7	3	2005	2.225	2.270	1.62S	2.00S	2.262	2.73S	2.54S	0.
126	B	7	3	2060	2.227	2.245	0.62S	0.80S	2.255	1.44S	1.25S	0.
142	B	7	3	2120	2.230	2.270	1.61S	1.80S	2.265	1.76S	1.57S	-0.

DEV. AND DIFF. ARE IN PERCENT
THE (-) SIGN INDICATES THAT INST 1 IS SLOWER THAN INST 2
F=FAST AND S=SLOW

Table 3-1

CLOCK CORRELATION SUMMARY

ORDER FIT ONE

SYS TIME I/P	CL TIME I/P	COMP SYS TM	DELTA ST	REV	STA
0.374708890D 05	0.212341429D 06	0.374708871D 05	0.C029	9	
0.772858120 05	0.252156355C 06	0.7728581040 05	C.C016	16	
0.327885680 05	0.294059120C 06	0.3276857250 05	-0.C045	24	
0.726562400 05	0.333926791C 06	0.7265624080 05	-0.C008	31	
0.335269380 05	0.381197488C 06	0.3352693460 05	0.C034	40	
0.733087380 05	0.420979295C 06	0.7330873890 05	-0.0009	47	
0.290478430 05	0.463118404C 06	0.2904784500 05	-0.C020	55	
0.740732970 05	0.508143660C 06	0.7407329790 05	-0.C009	63	
0.295495430 05	0.131491520D 05	0.2954953910 05	0.C039	71	
0.747396300 05	0.582392910D 05	0.7473963500 05	-0.C050	79	
0.301376050 05	0.100137258D 06	0.3013759910 05	0.C059	87	
0.755603700 05	0.145560041D 06	0.7556037900 05	-0.C090	95	
0.310138910 05	0.187413554D 06	0.3101388920 05	0.C016	103	
0.705463110 05	0.226945977D 06	0.7054630950 05	0.C015	110	
0.313533540 05	0.274153023D 06	0.3135335230 05	0.C017	119	
0.766604530 05	0.319460126D 06	0.7666045220 05	0.C008	127	
0.319163810 05	0.361116058D 06	0.3191638130 05	-0.C003	135	
0.715989900 05	0.400798670D 06	0.7159899060 05	-0.C006	142	
0.324478580 05	0.448047540D 06	0.3244785740 05	0.C006	151	

A0=-0.17487052740 06 A1= 0.9999999317440 00
SIGMA=0.00329 NO. POINTS= 19
RATIO OF CLOCK TIME TO SYS TIME= 0.1CC0000068260 01

ORDER FIT TWO

SYS TIME I/P	CL TIME I/P	COMP SYS TM	DELTA ST	REV	STA
0.374708890D 05	0.212341429C 06	0.374708879D 05	0.C021	9	
0.772858120 05	0.252156355C 06	0.7728581090 05	0.C011	16	
0.327885680 05	0.294059120C 06	0.3278857280 05	-0.C048	24	
0.726562400 05	0.333926791C 06	0.7265624090 05	-0.CC09	31	
0.335269380 05	0.381197488C 06	0.3352693450 05	0.C035	40	
0.733087380 05	0.420979295C 06	0.7330873870 05	-0.CC07	47	
0.290478430 05	0.463118404C 06	0.2904784470 05	-0.C017	55	
0.740732970 05	0.508143660C 06	0.7407329750 05	-0.0005	63	
0.295495430 05	0.131491520D 05	0.2954953860 05	0.C044	71	
0.747396300 05	0.582392910C 05	0.7473963450 05	-0.C045	79	
0.301376050 05	0.100137258C 06	0.3013759870 05	0.C063	87	
0.755603700 05	0.145560041C 06	0.7556037860 05	-0.C086	95	
0.310138910 05	0.187413554C 06	0.3101388890 05	0.C021	103	
0.705463110 05	0.226945977C 06	0.7054630930 05	0.C017	110	
0.313533540 05	0.274153023C 06	0.3135335220 05	0.C018	119	
0.766604530 05	0.319460126C 06	0.7666045230 05	0.0007	127	
0.319163810 05	0.361116058C 06	0.3191638160 05	-0.C006	135	
0.715989900 05	0.400798670C 06	0.7155899110 05	-0.C011	142	
0.324478580 05	0.448047540C 06	0.3244785820 05	-0.0002	151	

A0=-0.17487052490 06 A1= 0.9999999219480 00
A2= 0.8209301557234D-14
SIGMA=0.00326 NO. POINTS= 19

Table 3-2

TABLE 3-3

J-36 TEMPERATURE SUMMARY

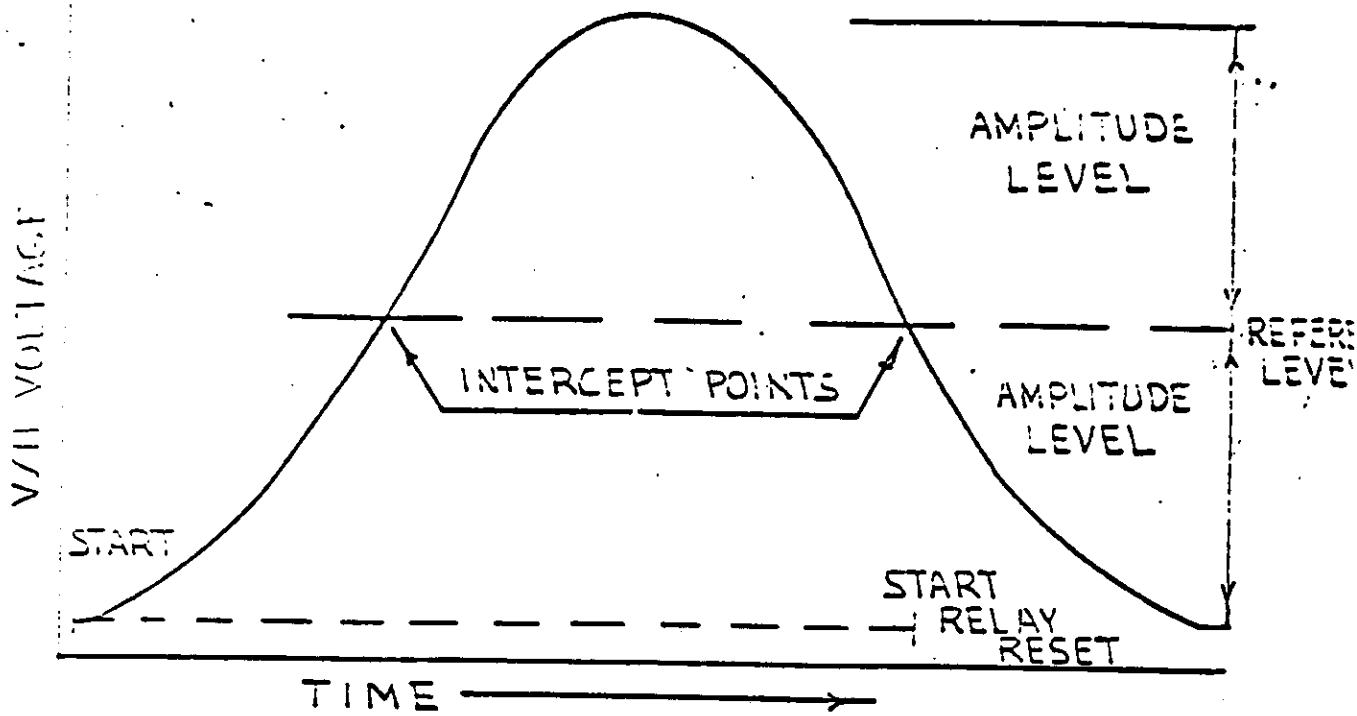
SENSOR	ORBITS ACQUIRED																		
										A	B								
Master Camera	8	16	24	31	40	47	55	63	71	79	87	95	103	110	119	127	135	142	150
3	79	74	78	75	78	75	78	74	75	74	72	67	70	67	69	67	69	64	68
4	83	76	73	77	73	78	81	76	79	77	77	70	75	70	74	69	74	68	72
5	88	83	87	82	87	83	86	81	83	81	80	75	79	74	78	73	78	71	74
6	88	84	86	84	85	83	84	82	82	83	78	75	76	75	75	72	73	71	72
7	84	81	84	81	83	81	82	80	80	80	76	73	74	72	72	72	72	70	70
8	89	83	87	82	87	82	86	82	84	81	81	75	79	75	79	73	78	73	76
9	90	84	88	82	88	82	86	82	84	81	82	76	79	74	78	72	78	72	75
11	86	77	86	80	85	81	83	78	80	78	77	72	74	71	74	69	73	67	70
12	82	75	82	76	82	77	81	76	79	76	77	70	75	70	75	69	74	69	73
13	85	81	83	82	82	81	82	80	79	79	76	72	73	72	72	70	70	68	69
AVG	85	80	85	80	84	80	83	79	80	79	78	73	75	72	75	71	74	69	72
Master Stare								-1 PHASE				-2 PHASE							
3	80	79	82	79	81	78	80	77	77	77	75	70	71	68	69	66	68	65	66
4	80	79	79	75	80	75	79	74	76	74	75	67	71	65	70	64	70	63	66
5	84	78	83	79	83	80	82	79	80	78	77	71	74	71	74	71	73	70	71
6	82	78	81	79	81	79	81	79	78	79	75	72	72	71	72	69	72	69	70
7	84	81	83	82	83	81	82	82	81	81	77	74	75	74	74	71	73	71	71
8	84	78	84	78	83	79	83	78	80	78	78	72	75	71	75	69	74	69	72
9	84	78	84	79	84	80	83	79	81	78	78	73	76	73	77	72	76	71	75
11	76	74	76	73	76	73	75	76	73	74	70	67	78	65	67	64	67	64	66
12	80	80	86	80	86	80	84	79	81	78	80	72	76	71	76	69	75	68	72
13	74	73	73	72	75	73	73	74	71	74	67	66	65	64	64	63	63	62	61
AVG	82	78	82	78	81	78	80	78	78	77	75	70	72	69	72	68	71	67	69
Supply Stare																			
1	70	67	71	68	72	70	72	71	70	70	68	64	65	62	64	62	64	61	62
2	74	69	74	70	75	70	74	70	71	69	68	62	64	60	63	60	63	58	60

TABLE 3-3

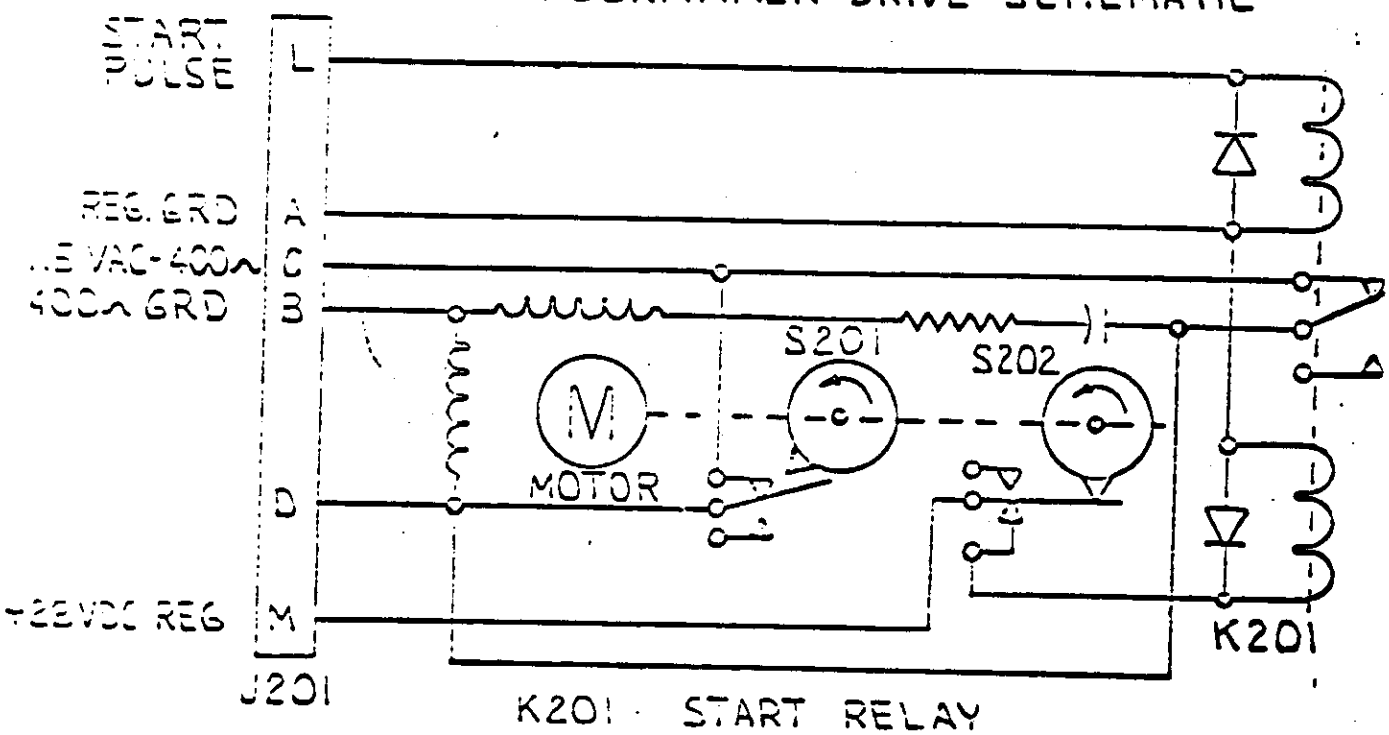
J-36 TEMPERATURE SUMMARY

SENSOR	ORBITS ACQUIRED																	
										A | B								
Fair ("A") Barrel #1 ("B")	8	16	24	31	40	47	55	63	71	79	87	95	103	110	119	127	135	142 1
1	25	40	40	40	40	18	25	40	9	33	22	32	19	35	19	32	22	25
2	OBL	OBL	10	0	13	-5	06	--	13	-9	66	56	56	60	60	56	66	74
3	OBL	OBL	-15	0	-9	-27	-9	--	-1	-16	82	118	70	118	73	106	82	115
4	44	30	44	37	44	37	37	44	44	44	45	69	36	63	36	57	39	51
5	53	46	53	46	59	46	46	46	53	39	39	45	33	42	33	39	36	30
6	49	56	56	56	56	42	49	49	56	42	--	--	--	--	--	--	--	--
Barrel #2																		
1	44	53	47	53	47	50	40	50	37	47	34	37	27	34	27	30	27	20
2	41	80	49	77	49	61	41	69	35	66	41	63	29	58	32	46	35	46
3	66	110	74	110	74	86	69	110	63	110	72	104	63	107	66	89	72	101
4	58	52	62	55	65	52	62	58	62	62	62	52	55	58	58	52	62	55
5	56	56	59	59	62	59	59	65	56	65	42	46	36	49	39	42	39	39
Cold Heater																		
1	54	52	60	51	60	51	52	48	48	48	45	32	35	29	35	26	35	20
Pneu. Manifold Bottle																		
1	103	94	103	91	103	88	97	88	91	88	94	80	88	77	85	77	85	70
2	101	90	101	90	98	87	93	84	87	84	87	75	84	72	81	69	78	63
Clock																		
1	79	72	81	77	81	77	77	77	77	77	70	64	68	64	66	62	66	57
2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Thrust Cone "A" to "B"																		
1 (Skin)	42	34	37	33	38	33	37	33	36	34	60	56	58	56	58	55	57	52
2 (Retro)	61	52	56	49	54	50	54	49	50	77	73	70	70	68	68	68	68	65
Master Cassette "A" SRV																		
2	69	66	68	66	68	67	69	67	67	67	--	--	--	--	--	--	--	--
Recovery Batt. "B" SRV																		
1	67	64	65	64	65	64	65	64	63	65	75	73	81	82	86	82	77	84

V/H PROGRAMMER VOLTAGE PROFILE

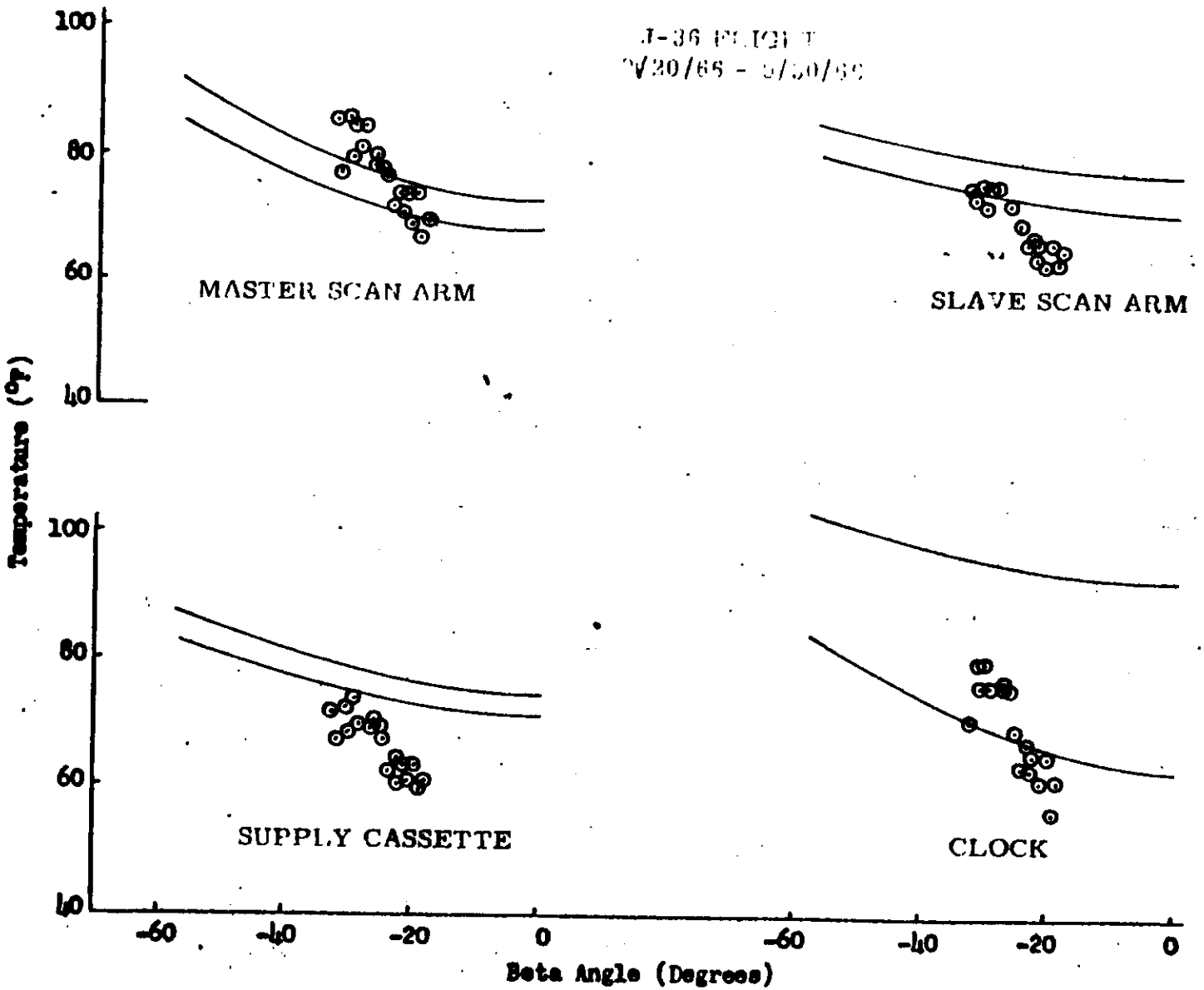


V/H PROGRAMMER DRIVE SCHEMATIC

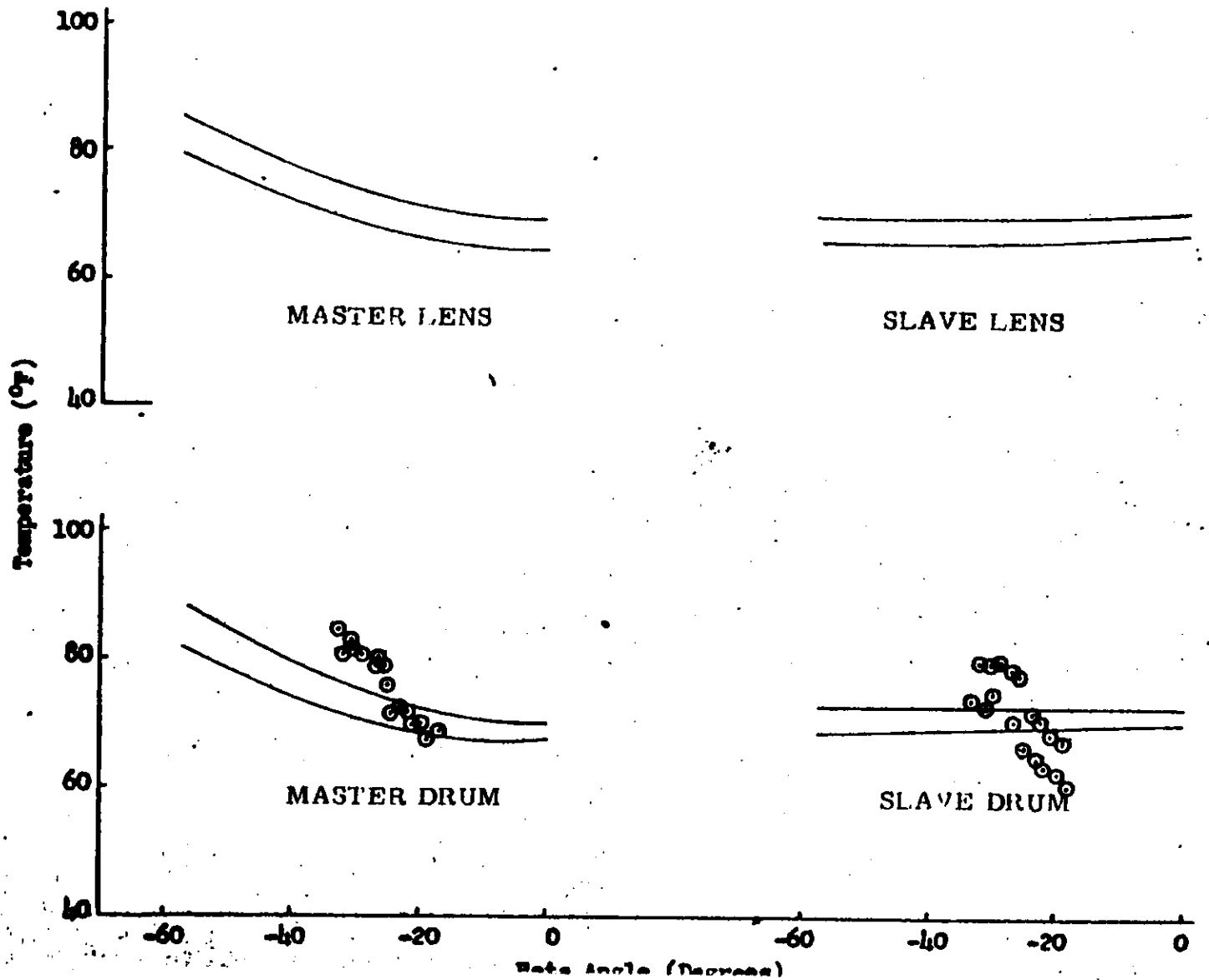


K201 START RELAY
S201 SELF ENERGIZE SWITCH
S202 START RELAY RESET SWITCH

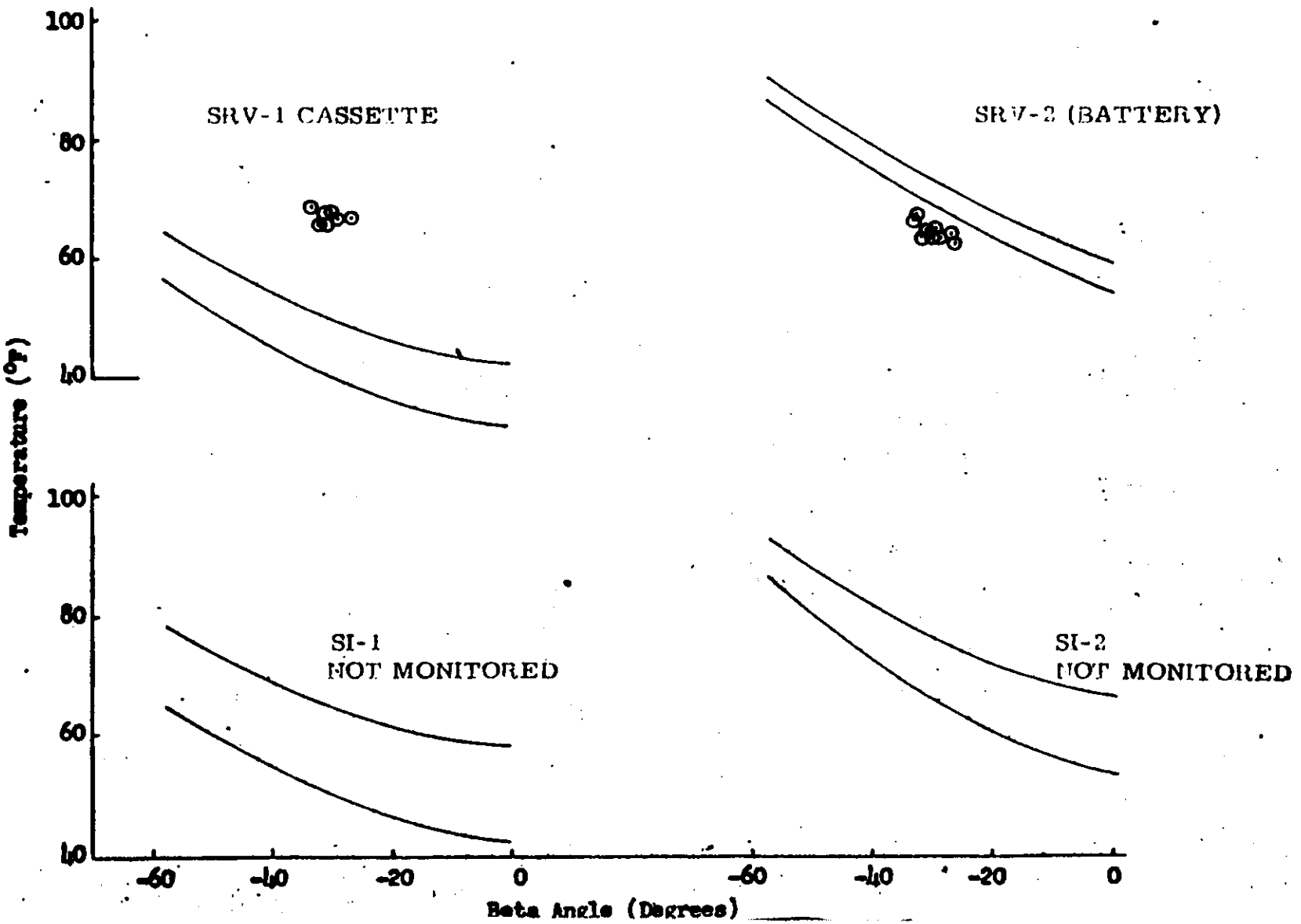
Figure 3-1

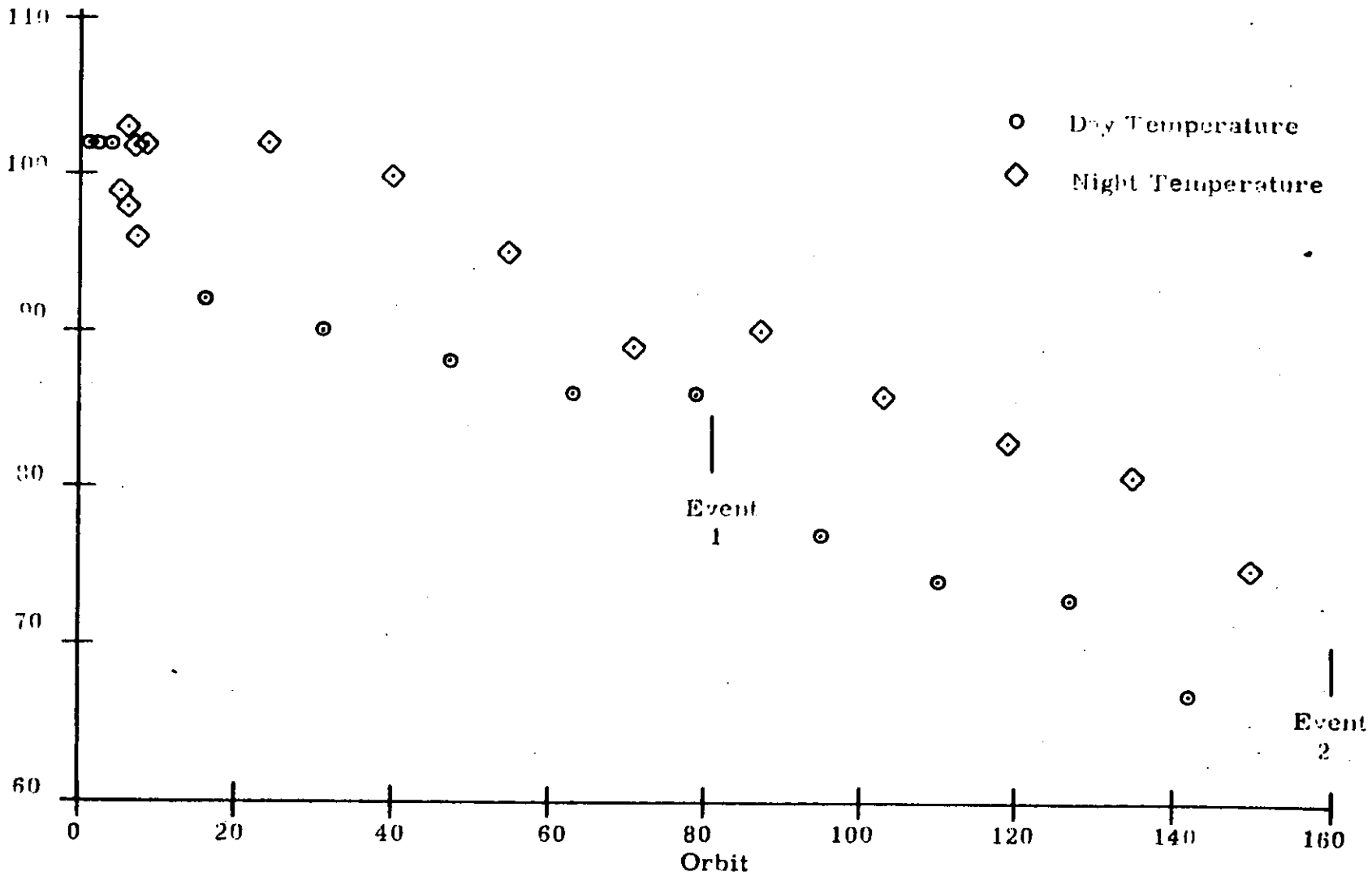

J-36 FLIGHT
7/20/66 - 9/30/66
100
80
60
40
MASTER SCAN ARM
SLAVE SCAN ARM
SUPPLY CASSETTE
CLOCK
Temperature (°F)
-60
-40
-20
0
Beta Angle (Degrees)

J-36 FLIGHT
9/20/66-9/20/66



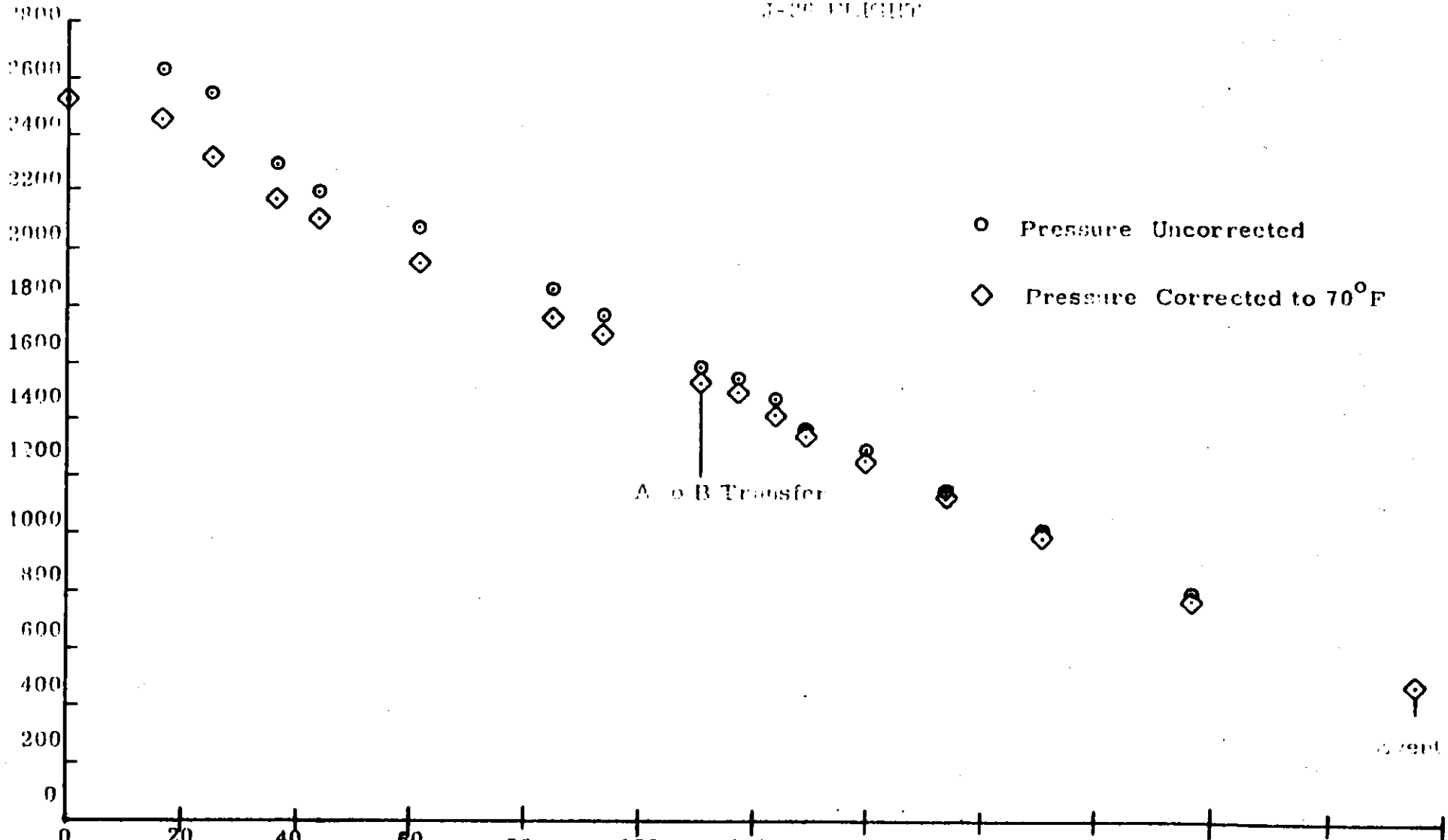
-36 FLIGHT
9/20/66 - 9/20/66




110
100
90
80
70
60
0
20
40
60
80
100
120
140
160
Orbit
Day Temperature
Night Temperature
Event 1
Event 2

PM9 PRESSURE VS. OPERATE TIME

J-2S FLIGHT



SECTION 4

MISSION 1035-1 RECOVERY SYSTEM

SRV #723 was received at A/P on 4 January 1966. The receiving weight was 153.50 pounds. After modifications and incorporation of outstanding E.O.'s, the SRV was delivered to Systems Test for incorporation into the J-36 system.

The capsule was shipped to VAFB on 21 June 1966.

The -1 recovery system was successfully recovered by air catch from orbit 81 at 1719 PDT on 25 September 1966. The impact point was as follows:

Predicted Impact	24°-32'N/166°-30'W
Actual Impact	24°-27'N/166°-31'W

The condition of the recovered capsule was satisfactory with no damage other than normal paint blistering due to the re-entry environment.

Event times are shown in Table 4-1.

MISSION 1035-1

RECOVERY SEQUENCE OF EVENTS

	Event	Delta Time (Seconds) Actual	Nominal
*	Arm	76.90	77.0 ± 1.0
*	Transfer	2.00	2.0 ± 0.25
	Electrical Disconnect	0.81	$0.900^{+0.430}_{-0.400}$
	Separation	--	--
**	Spin	3.38	3.4 ± 0.30
	Retro	7.23	7.55 ± 0.45
	Despin	10.56	10.75 ± 0.59
	T/C Separation	1.50	1.5 ± 0.15
***	"G" Switch Open	496.49	497.7
	Parachute Cover Off	33.99	34.0 ± 1.5
	Drogue Chute Deployed	0.66	0.63 ± 0.08
	Main Chute Bag Separate	12.10	$10.0^{+3.0}_{-2.2}$
	Main Chute Deployed	0.58	0.52 ± 0.13
	Main Chute Disreef	4.33	4.5 ± 0.80

* From Separation
** From Electrical Disconnect
*** From Retro
Spin Rate (RPM) 61.0
Despin Rate (RPM) 8.5
Retro Velocity (Ft/Sec.) 1016

TABLE 4-1

SECTION 5

MISSION 1035-2 RECOVERY SYSTEM

SRV #724 was received at A/P on 4 January 1966. The receiving weight was 152.75 pounds. After modifications and incorporation of outstanding E.O.'s the unit was delivered to Systems Test for mating to the J-36 system.

The capsule was shipped to VAFB on 21 June 1966.

The -2 recovery system was successfully recovered by air catch from orbit 160 at 1641 PDT on 30 September 1966. The impact point was as follows:

Predicted Impact	24^{o}-05'N/164^{o}-17'W
Actual Impact	23^{o}-50'N/164^{o}-22'W

Event times are shown in Table 5-1.

Post flight inspection of the -2 recovery system revealed that the T/M battery spilled electrolyte into the recovery capsule. The electrolyte was blown through the vent valve. The fix of adding a vent valve storage tube has been issued for all further T/M batteries and is incorporated into the next flight units.

MISSION 1035-2

RECOVERY SEQUENCE OF EVENTS

Event	Delta Time (Seconds) Actual	Nominal
* Arm	76.48	77.0 ± 1.0
Transfer	2.00	2.0 ± 0.25
Electrical Disconnect	0.80	$0.900^{+0.430}_{-0.400}$
Separation	--	---
** Spin	3.33	3.4 ± 0.30
Retro	7.40	7.55 ± 0.45
Despin	10.61	10.75 ± 0.59
T/C Separation	1.44	1.5 ± 0.15
*** "G" Switch Open	539.0	536.6
Parachute Cover Off	34.22	34.0 ± 1.5
Drogue Chute Deployed	0.46	0.63 ± 0.08
Main Chute Bag Separate	11.60	$10.0^{+3.0}_{-2.2}$
Main Chute Deployed	0.59	0.52 ± 0.13
Main Chute Disreef	4.07	4.45 ± 0.80

* From Separation
** From Electrical Disconnect
*** From Retro
Spin Rate (RPM) 64.2
Despin Rate (RPM) 11.1
Retro Velocity (Ft/Sec.) 1040

Table 5-1

SECTION 6

MISSION 1035 PANORAMIC CAMERAS

A. COMPONENT ASSIGNMENT

Component	Master (Fwd) Serial Number	Slave (Aft.) Serial Numb
Main Camera	188	189
Main Camera Lens	2072435	2122435
Supply Horizon Camera	289G6H	298G6H
Supply Horizon Camera Lens	E12888	E12835
Take-up Horizon Camera	296-G5H	299G5H
Take-up Horizon Camera Lens	E12898	E12887
Supply Cassette	SC-40	SC-40

B. CAMERA DATA AND FLIGHT SETTINGS

Main Camera:		
Lens	24"f/3.5	24"f/3.5
Slit Width	0.225"	0.175
Filter Type	Wratten 23A	Wratten 21
Film Type (Eastman)	3404	3404
Supply Horizon Cameras:	Port	Stbrd.
Lens	55 mm f/6.3	55 mm f/6
Aperture Setting	f/6.3	f/8.0
Exposure Time	1/100 second	1/100 sec
Filter Type	Wratten 25	Wratten 2
Take-up Horizon Cameras:	Stbrd.	Port
Lens	55 mm f/6.3	55 mm f/6
Aperture Setting	f/8.0	f/6.3
Exposure Time	1/100 second	1/100 sec
Filter Type	Wratten 25	Wratten 2

C. POST FLIGHT PERFORMANCE EVALUATION

The image quality on both missions was excellent. The MIP rating was 85. The high quality is due in part to the unusually clear atmospheric conditions as noted in a cloud cover analysis from the index camera photography. The use of the yaw programmer, first in over a year, provided an improved image motion compensation.

The aft-looking camera photography produced imagery of better detail than the forward looking camera. This same quality relationship has been observed on most missions and it is attributed to the forward looking camera being pointed toward the sub solar point which results in more haze light striking the camera. As a result of this haze light a filter with a higher film - filter factor is used on the forward camera, which requires a longer exposure time.

The horizon camera photography was not veiled, however slight overexposure was reported on the sun side cameras.

Several minor areas of light leak fog were observed on both pan films during inactive periods. This is the first system incorporating improved main camera seals and it is noted that the magnitude of the light leaks was less than generally experienced.

The last few feet of -2 pan film was contaminated by spilled electrolyte from the recovery battery. A new vent device will be incorporated on future missions to prevent the condition.

Mission 1035 is the first "J" system flown with the photogrammetric configuration. The rail hole images and lens scan lines produced by both cameras showed some defects but in general were equivalent to pre-flight test results and provided adequate photogrammetric data points.

Of the 73 programmed dots along each format edge, one dot on each edge was not detected on the master and all the dots on the slave were recorded. As the mission progressed several dots failed to record. These failures are attributed to micro particles of emulsion from the rail surfaces filling the holes.

The nod of traces on the master camera failed to appear occasionally and there were instances of the traces starting after the beginning of the scan.

Both cameras produced random instances of undulating traces. This condition was noted in pre-flight test and are attributed to the operation of the lens to stove interlock and some imbalance of the main lens and collimator assemblies. These conditions are to be improved on future PG systems. The nodal traces do not obscure terrain detail as much as had been anticipated.

SECTION 7

MISSION 1035- STELLAR-INDEX CAMERAS

A. COMPONENT ASSIGNMENT

Component	-1 Mission Serial Number	-2 Mission Serial Number
Camera	D-95	D-96
Index Reseau	112	101
Stellar Reseau	113	116

B. CAMERA DATA AND FLIGHT SETTINGS

Stellar Camera:		
Lens	85 mm f/1.8	85 mm f/1.8
Exposure Time	2 seconds	2 seconds
Filter Type	None	None
Film Type (Eastman)	3401	3401
Index Camera:		
Lens	38 mm f/4.5	38 mm f/4.5
Exposure Time	1/500 second	1/500 second
Filter Type	Wratten 21	Wratten 21
Film Type (Eastman)	3400	3400

C. POST FLIGHT PERFORMANCE EVALUATION

The -1 S/I unit produced 435 frames on each camera. The index imagery was excellent. The stellar formats contained at least 15 stars per exposure. Light flare in the stellar formats was minimal. The plus density streaks that are being called "jettisoned fuel particles" were more frequent that usual.

The streaked timing pulse on the -1 slave film and the 26 unprogrammed S/I exposures reported after the master camera off command are the normal result of a new arrangement which switches control from the master to the slave when only the slave is operating. This operation will be normal on future "J-1" missions.

The -2 stellar and index cameras each produced 475 frames. Each stellar frame contained at least 15 star images for vehicle attitude determination. Earth flare was at a minimum. A small foreign particle was located on the backside of the reseau plate on both stellar cameras causing a focal out of focus condition.