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CORONA J

PERFORMANCE EVALUATION REPORT

MISSION 1018-1 and 1018-2

31 OCTOBER 1966

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Manager
Advanced Projects



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Manager

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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 1612.

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 1018-1 and 1018-2 which was launched on 25 March 1965.

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# INTRODUCTION

This report presents the final performance evaluation of Missions 1018-1 and 1018-2 of the Corona Program. The purpose of this report is to define the performance characteristics of the J-19 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 and MTF/AIM resolution 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 I

# SYSTEM PERFORMANCE

## A. MISSION OBJECTIVES

The payload section of Mission 1018, placed into orbit by Flight Test Vehicle #1612 and SLV-2A booster #429, 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-19 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 2111:17 Z (1311:17 PST) on 25 March 1965. 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 1018-1 consisted of four days operation and was completed by air recovery on 29 March 1965. Mission 1018-2 followed immediately with no deactivate, and consisted of two days operation concluding with a successful air recovery on 31 March 1965.

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

ORBITAL PARAMETERS

| Parameter | Predicted | Orbit 33 Actuals |
|---|---|---|
| Period (Min.) | 88.98 | 88.96 |
| Perigee (N. M.) | 100.00 | 100.26 |
| Apogee (N. M.) | 144.20 | 148.60 |
| Inclination (Deg.) | 96.00 | 96.01 |
| Perigee Latitude (Deg. N.) | 22.06 | 40.37 |
| Eccentricity | 0.0063 | 0.0067 |

SCHEMATIC INBOARD PROFILE - CORONA J SYSTEM

MISSION 1018

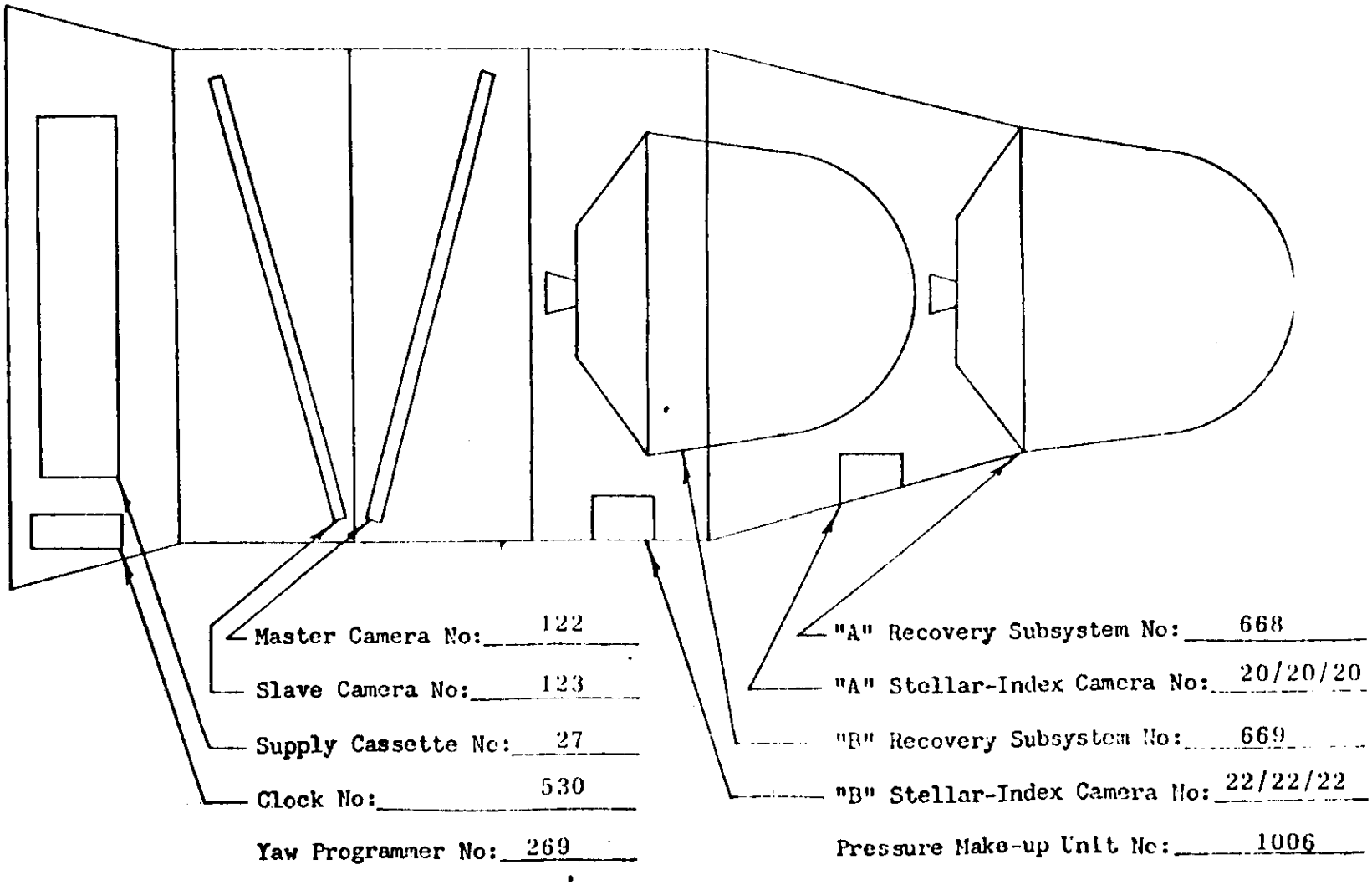



FIGURE 1-1

## C. PANORAMIC CAMERAS

The Master and Slave panoramic cameras operated throughout both missions with no significant problems and produced good photographic coverage. The cloud cover and atmospheric haze observed in the photography was nominal. The thermal environment of the instruments were fairly constant throughout the flight due to a constant $\beta$ angle.

## D. STELLAR-INDEX CAMERAS

The S/I Programmer failed during the third operation of Rev. 8 resulting in the loss of command capability to both the -1 and -2 stellar-index cameras.

## E. OTHER SUBSYSTEMS

The clock, instrumentation, pressure make-up, command and thermal control subsystems performed satisfactorily through both missions. The yaw programmer was activated at orbit 8 and functioned properly throughout both missions.

## F. CONCLUSIONS

Mission 1018 achieved the objective of acquiring high quality search and reconnaissance photography from orbital altitudes.

# SECTION 2

# PRE-FLIGHT SYSTEMS TEST

## 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 susceptibility to corona discharge. Such discharge fogs the film thus degrading the operational photography.

### 2. Test Summary

The Environmental Test for the J-19 payload system was conducted in the TASC chamber at Sunnyvale from 5 December to 12 December 1964. The test consisted of 3 days of operation in the "A" mode; a 1 day soak; and 3 days of "B" operation. The payload system was only operated during the daytime.

The J-19 payload system consisted of panoramic cameras 122 and 123. There were no Stellar-Index cameras installed.

Panoramic camera operation was satisfactory. Both instruments ran approximately 1.5 to 2% fast in the "A" mode and approximately 1 to 1.5% slow in the "B" mode.

Both "A" and "B" recovery sequences were satisfactory with the exception of the tape recorder data for the master instrument. This channel went to an out of hand voltage during cut and wrap. Transfer to the "B" bucket was normal and both instruments stowed properly.

A deactivate command was given between the "A" and "B" operations. Both instruments operated for 5 cycles and stowed normally.

The lens rotation monitor on the slave instrument became intermittent during the "B" mode. The 1000 count cycle counter on the slave instrument read 0.2 volts high in the 6 position.

The PMU operation appeared normal.

The clock performance was satisfactory. The Corona level on the processed payload met the acceptance criteria and is acceptable for flight.

3. Panoramic Camera Performance

Both instruments operated satisfactorily throughout the test. Film transport and instrument dynamic operation as monitored by the lens rotation, center of format, monitors, and supply and take-up idlers was normal. Instrument start and shut-down appeared normal.

The 99/101 percent clutch ratios were 5/5 to 5/7 for both instruments.

The cycle periods for both instruments were approximately 1.5 to 2% fast for the "A" mission and from 1 to 1.5% slow for the "B" mission. A tabulation of the rates are included as Tables 2-1 and 2-2.

The lens rotation monitor for the slave instrument became intermittent during the "B" mission. Post TASC adjustment and cleaning corrected this condition. The 6 position of the 1000 count cycle counter read 0.2 volts high. No corrective action was taken as the significance of the 1000 count does not constitute a primary flight item.

Corona discharge marking was not present in the master and only an occasional trace amount of start up Corona in the slave photography. The system was altitude tested between 1.8 and 50 microns internal pressure.

Scratches in the master and slave camera photography are attributed to the scan head rollers. A fix was made by Itek.

Heavy intermittent light leak fogging of master and slave photography was traced to a light leak in the silver dollar. A fix and subsequent lighting test verifying the light tight integrity of the system was performed.

Dendritic static spotting was observed at random points throughout the master payload to a density of approximately 0.06 above the base fog level. Some static marks occurred along the film edge. Dendritic marks are attributed to retrieval static and do not represent the expected performance of the flight system.

The horizon camera exposure lamps were inoperative for master and slave. Verification of flight acceptable horizon shutter operation was made prior to generation of the theodolite test film exhibit.

Slave instrument data recording was acceptable except for the 200 PPS timing track. Serial number, binary lamps, index lamps, and horizon camera fiducials were good. The 200 PPS timing track was acceptable for all formats except 17. The timing track became discontinuous exposing in spurts for 17 frames, approximately 2000 feet from the cut and wrap event.

4. Instrumentation

The instrumentation system performance was satisfactory with the exception of the rotation monitor and cycle counter discussed above.

5. Clock Performance

The clock performance was normal with the recorded error being approximately 4 milliseconds in 24 hours.

6. Temperature Environment

Typical instrument temperatures recorded through the test are as follows:

| Mission | Orbit | Master Camera | Slave Camera |
|---|---|---|---|
| A | 1 | 85° | 81° |
| A | 15 | 88° | 89° |
| B | 5 | 70° | 71° |
| B | 16 | 72° | 73° |

The self-heating characteristics of the temperature sensors were determined during the TASC test. Results of these calibrations are included in Tables 2-3 and 2-4.

7. Pressure Environment

The PMU system operated satisfactorily throughout the test. Figure 2-1 is a plot showing the pressure supply as a function of the operate time. This plot indicates no leakage in the system. The pressure increased to 85 microns when the PMU system was operated.

## B. RESOLUTION TEST

The dynamic resolution test of the J-19 payload system was performed at the A/P facility on 15 December 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.

## C. LIGHT LEAK TEST

The examination of the film threaded in the J-19 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.

J-19 122/123 ENVIRONMENTAL TEST CYCLE RATES 12-06-64 3840

| REV/MOD | | RAMP | | T.U.R. | INST 122 ACT. | INST 122 NOM. | INST 122 DEV. | INST 123 ACT. | INST 123 NOM. | INST 123 DEV. | 122/123 DIFF. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | A | 7 | 7 | 2280 | 2.450 | 2.492 | 1.70 | 2.470 | 2.495 | 1.02 | 0.82 |
| 4 | A | 8 | 2 | 340 | 5.400 | 5.478 | 1.42 | 5.480 | 5.531 | 0.92 | 1.48 |
| 5 | A | 8 | 2 | 1730 | 2.200 | 2.215 | 0.67 | | | | |
| 5 | A | 8 | 2 | 2250 | | | | 2.270 | 2.315 | 1.95 | |
| 5 | A | 11 | 1 | 1460 | 2.620 | 2.668 | 1.81 | 2.630 | 2.669 | 1.47 | 0.38 |
| 6 | A | 11 | 1 | 2040 | 2.290 | 2.330 | 1.73 | 2.290 | 2.335 | 1.94 | -0. |
| 6 | A | 5 | 8 | 1090 | 2.850 | 2.867 | 0.58 | 2.860 | 2.866 | 0.22 | 0.35 |
| 6 | A | 5 | 8 | 1440 | 2.440 | 2.466 | 1.05 | 2.460 | 2.469 | 0.37 | 0.82 |
| 7 | A | 7 | 7 | 1180 | 2.930 | 2.944 | 0.47 | 2.950 | 2.943 | -0.24 | 0.68 |
| 8 | A | 7 | 7 | 2530 | 2.700 | 2.752 | 1.90 | 2.720 | 2.753 | 1.19 | 0.74 |
| 8 | A | 4 | 1 | 1015 | 2.900 | 2.914 | 0.50 | 2.910 | 2.914 | 0.13 | 0.34 |
| 8 | A | 4 | 1 | 1750 | 2.170 | 2.191 | 0.94 | | | | |
| 9 | A | 11 | 1 | 890 | 4.350 | 4.386 | 0.82 | 4.380 | 4.400 | 0.46 | 0.69 |
| 9 | A | 4 | 1 | 3210 | 3.710 | 3.797 | 2.28 | 3.750 | 3.800 | 1.30 | 1.08 |
| 9 | A | 4 | 1 | 2620 | | | | 2.460 | 2.505 | 1.79 | |
| 10 | A | 11 | 1 | 1880 | 2.270 | 2.310 | 1.73 | 2.270 | 2.315 | 1.96 | -0. |
| 10 | A | 11 | 1 | 2970 | 4.360 | 4.469 | 2.44 | 4.410 | 4.485 | 1.67 | 1.15 |
| 10 | A | 7 | 7 | 140 | 4.300 | 4.376 | 1.74 | 4.350 | 4.390 | 0.91 | 1.16 |
| 11 | A | 7 | 7 | 1910 | 2.340 | 2.358 | 0.75 | 2.350 | 2.362 | 0.52 | 0.43 |
| 11 | A | 7 | 7 | 2280 | 2.460 | 2.492 | 1.30 | 2.470 | 2.495 | 1.02 | 0.41 |
| 12 | A | 8 | 2 | 1150 | 3.010 | 3.068 | 1.89 | 3.025 | 3.067 | 1.37 | 0.50 |
| 12 | A | 8 | 2 | 1850 | | | | 2.200 | 2.218 | 0.81 | |
| 13 | A | 4 | 1 | 2630 | 2.470 | 2.521 | 2.03 | 2.500 | 2.524 | 0.94 | 1.21 |

*Time up ramp not verified

| REV/AUD | | RAMP | | T.U.R. | INST 122 ACT. | NOM. | DEV. | INST 123 ACT. | NOM. | DEV. | 122/123 DIFF. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 13 | A | 11 | 1 | 1975 | 2.250 | 2.312 | 2.69 | 2.250 | 2.318 | 3.91 | -0. |
| 14 | A | 11 | 1 | 3080 | 4.850 | 4.965 | 2.32 | 4.910 | 4.997 | 1.74 | 1.24 |
| 1 | B | 7 | 7 | 390 | 4.140 | 4.140 | 0.14 | 4.160 | 4.154 | -0.14 | 0.46 |
| 2 | B | 4 | 1 | 1430 | 2.200 | 2.212 | 0.53 | | | | |
| 2 | B | 4 | 1 | 1610 | | | | 2.190 | 2.203 | 0.61 | |
| 4 | B | 7 | 7 | 2280 | 2.460 | 2.492 | 1.30 | 2.470 | 2.495 | 1.02 | 0.4. |
| 5 | B | 11 | 1 | 1460 | 2.670 | 2.668 | -0.06 | 2.670 | 2.669 | -0.02 | -0. |
| 6 | B | 11 | 1 | 2040 | 2.310 | 2.330 | 0.87 | 2.330 | 2.335 | 0.23 | 0.87 |
| 6 | B | 5 | 8 | 1090 | 2.900 | 2.867 | -1.16 | 2.900 | 2.866 | -1.17 | -0. |
| 6 | B | 5 | 8 | 1440 | 2.490 | 2.466 | -0.97 | 2.500 | 2.469 | -1.25 | 0.40 |
| 7 | B | 7 | 7 | 1180 | 3.000 | 2.944 | -1.91 | 3.000 | 2.943 | -1.94 | -0. |
| 7 | B | 7 | 7 | 1590 | 2.450 | 2.471 | -0.78 | 2.500 | 2.474 | -1.06 | 0.40 |
| 8 | B | 7 | 7 | 2530 | 2.760 | 2.752 | -0.28 | 2.770 | 2.753 | -0.63 | 0.36 |
| 8 | B | 4 | 1 | 1015 | 2.950 | 2.914 | -1.22 | 2.960 | 2.914 | -1.59 | 0.34 |
| 9 | B | 11 | 1 | 890 | 4.410 | 4.380 | -0.54 | 4.420 | 4.400 | -0.45 | 0.23 |
| 10 | B | 11 | 1 | 1880 | 2.300 | 2.310 | 0.43 | 2.320 | 2.315 | -0.20 | 0.87 |
| 13 | B | 11 | 1 | 1975 | 2.330 | 2.312 | -0.77 | 2.340 | 2.318 | -0.97 | 0.43 |
| 15 | B | 5 | 8 | 1930 | 2.270 | 2.263 | -0.30 | 2.300 | 2.269 | -1.35 | 1.32 |

DEV. AND DIFF. ARE IN PERCENT
THE (-) SIGN INDICATES THAT THE INST IS SLOWER THAN PREDICTED OR THAT INST 1 IS SLOWER THAN INST 2

*Time up ramp not verified





Table 2-2

VEHICLE 1612 PAYLOAD J-19 SELF HEATING TEST

## SUMMARY OF SELF HEATING CORRECTION CURVES

10 106 40 SS2 03 103 43 208 28 113 23 111
39 TC2 20 110 08 105 55 213 50 211
21 SS1 37 TC1 52 212
38 206 46 209
36 205 41 207
31 203 33 204
48 210 05 104
25 112 15 108
18 109 44 CA2
13 107

| TIME | NO. 1 | NO. 2 | NO. 3 | NO. 4 | NO. 5 | NO. 6 |
|---|---|---|---|---|---|---|
| 0.10 | 0.6 | 1.4 | 2.1 | 2.9 | 2.4 | 4.3 |
| 0.13 | 0.8 | 1.7 | 2.6 | 3.6 | 3.0 | 5.4 |
| 0.16 | 1.0 | 2.2 | 3.3 | 4.5 | 3.8 | 6.8 |
| 0.20 | 1.1 | 2.3 | 3.5 | 4.8 | 4.2 | 7.9 |
| 0.25 | 1.1 | 2.4 | 3.7 | 4.9 | 4.5 | 9.1 |
| 0.32 | 1.2 | 2.5 | 3.8 | 5.0 | 4.9 | 10.5 |
| 0.40 | 1.3 | 2.6 | 4.1 | 5.2 | 5.4 | 12.3 |
| 0.50 | 1.4 | 2.8 | 4.3 | 5.4 | 6.0 | 14.6 |
| 0.63 | 1.5 | 3.0 | 4.5 | 5.6 | 6.4 | 15.6 |
| 0.79 | 1.6 | 3.2 | 4.8 | 5.8 | 6.9 | 16.9 |
| 1.00 | 1.8 | 3.4 | 5.1 | 6.1 | 7.6 | 18.6 |
| 1.26 | 1.9 | 3.6 | 5.3 | 6.4 | 8.0 | 19.5 |
| 1.58 | 2.1 | 3.9 | 5.6 | 6.7 | 8.6 | 20.6 |
| 2.00 | 2.4 | 4.2 | 6.0 | 7.1 | 9.3 | 22.1 |
| 2.51 | 2.6 | 4.5 | 6.3 | 7.5 | 9.8 | 23.0 |
| 3.16 | 2.8 | 4.8 | 6.6 | 7.9 | 10.4 | 24.1 |
| 3.98 | 3.1 | 5.1 | 7.0 | 8.4 | 11.0 | 24.9 |
| 5.01 | 3.4 | 5.5 | 7.4 | 8.9 | 11.6 | 25.9 |
| 6.31 | 3.6 | 5.8 | 7.7 | 9.3 | 12.0 | 26.5 |
| 7.94 | 3.9 | 6.1 | 8.2 | 9.8 | 12.5 | 27.2 |
| 10.00 | 4.2 | 6.5 | 8.7 | 10.4 | 13.2 | 28.1 |
| 12.59 | 4.4 | 6.8 | 9.0 | 10.8 | 13.4 | 28.4 |
| 15.85 | 4.7 | 7.0 | 9.4 | 11.3 | 13.8 | 28.8 |
| 19.95 | 5.0 | 7.4 | 10.0 | 11.9 | 14.2 | 29.2 |
| 25.12 | 5.4 | 7.8 | 10.6 | 12.6 | 14.7 | 29.8 |
| 31.62 | 5.8 | 8.3 | 11.3 | 13.5 | 15.2 | 30.3 |
| 39.81 | 6.0 | 8.6 | 11.8 | 14.0 | 15.4 | 30.4 |
| 50.12 | 6.4 | 8.9 | 12.5 | 14.7 | 15.6 | 30.6 |
| 63.10 | 6.8 | 9.3 | 13.2 | 15.6 | 15.9 | 30.7 |
| 79.43 | 7.1 | 9.7 | 13.9 | 16.3 | 16.0 | 30.6 |
| 100.00 | 7.5 | 10.1 | 14.7 | 17.1 | 16.1 | 30.5 |



Table 2-3

VEHICLE 1612 PAYLOAD J-19 SELF HEATING TEST

SUMMARY OF SELF HEATING CORRECTION CURVES

37 TC1A
40 SS2 31 203 15 108 55 213 50 211
37 TC1 41 207 33 204 28 113 23 111
39 TC2 38 206 08 105
21 SS1 36 205 44 CA2
39 TC2A 46 209
20 110
48 210
52 212
03 103
18 109
25 112
13 107
05 104
10 106
43 206

| TIME | NO. 1 | NO. 2 | NO. 3 | NO. 4 | NO. 5 |
|---|---|---|---|---|---|
| 0.10 | 0.1 | 0.4 | 0.7 | 1.0 | 3.3 |
| 0.13 | 0.1 | 0.6 | 0.8 | 1.2 | 4.2 |
| 0.16 | 0.2 | 0.7 | 1.1 | 1.5 | 5.3 |
| 0.20 | 0.2 | 0.8 | 1.2 | 1.8 | 6.2 |
| 0.25 | 0.3 | 1.0 | 1.4 | 2.1 | 7.2 |
| 0.32 | 0.4 | 1.1 | 1.6 | 2.4 | 8.5 |
| 0.40 | 0.5 | 1.4 | 1.9 | 2.8 | 10.1 |
| 0.50 | 0.7 | 1.6 | 2.3 | 3.3 | 12.1 |
| 0.63 | 0.8 | 1.8 | 2.5 | 3.8 | 13.1 |
| 0.79 | 1.0 | 2.1 | 2.9 | 4.4 | 14.3 |
| 1.00 | 1.2 | 2.4 | 3.3 | 5.1 | 15.9 |
| 1.26 | 1.4 | 2.7 | 3.6 | 5.6 | 16.8 |
| 1.58 | 1.6 | 3.0 | 4.1 | 6.3 | 17.9 |
| 2.00 | 1.8 | 3.4 | 4.6 | 7.1 | 19.4 |
| 2.51 | 2.0 | 3.8 | 5.0 | 7.8 | 20.3 |
| 3.16 | 2.3 | 4.2 | 5.5 | 8.5 | 21.4 |
| 3.98 | 2.5 | 4.5 | 6.0 | 9.2 | 22.3 |
| 5.01 | 2.8 | 5.0 | 6.5 | 10.0 | 23.4 |
| 6.31 | 3.0 | 5.4 | 7.0 | 10.6 | 24.1 |
| 7.94 | 3.3 | 5.9 | 7.5 | 11.3 | 24.9 |
| 10.00 | 3.6 | 6.5 | 8.2 | 12.1 | 26.0 |
| 12.59 | 3.8 | 6.9 | 8.5 | 12.5 | 26.4 |
| 15.85 | 4.0 | 7.3 | 9.0 | 13.0 | 26.9 |
| 19.95 | 4.3 | 7.9 | 9.6 | 13.6 | 27.5 |
| 25.12 | 4.7 | 8.6 | 10.3 | 14.3 | 28.2 |
| 31.62 | 5.1 | 9.4 | 11.1 | 15.0 | 29.0 |
| 39.81 | 5.3 | 10.0 | 11.6 | 15.4 | 29.3 |
| 50.12 | 5.6 | 10.7 | 12.2 | 15.8 | 29.7 |
| 63.10 | 6.0 | 11.5 | 12.9 | 16.2 | 30.1 |
| 79.43 | 6.3 | 12.2 | 13.5 | 16.4 | 30.3 |
| 100.00 | 6.7 | 13.2 | 14.3 | 16.7 | 30.5 |

Table 2-4

[redacted]

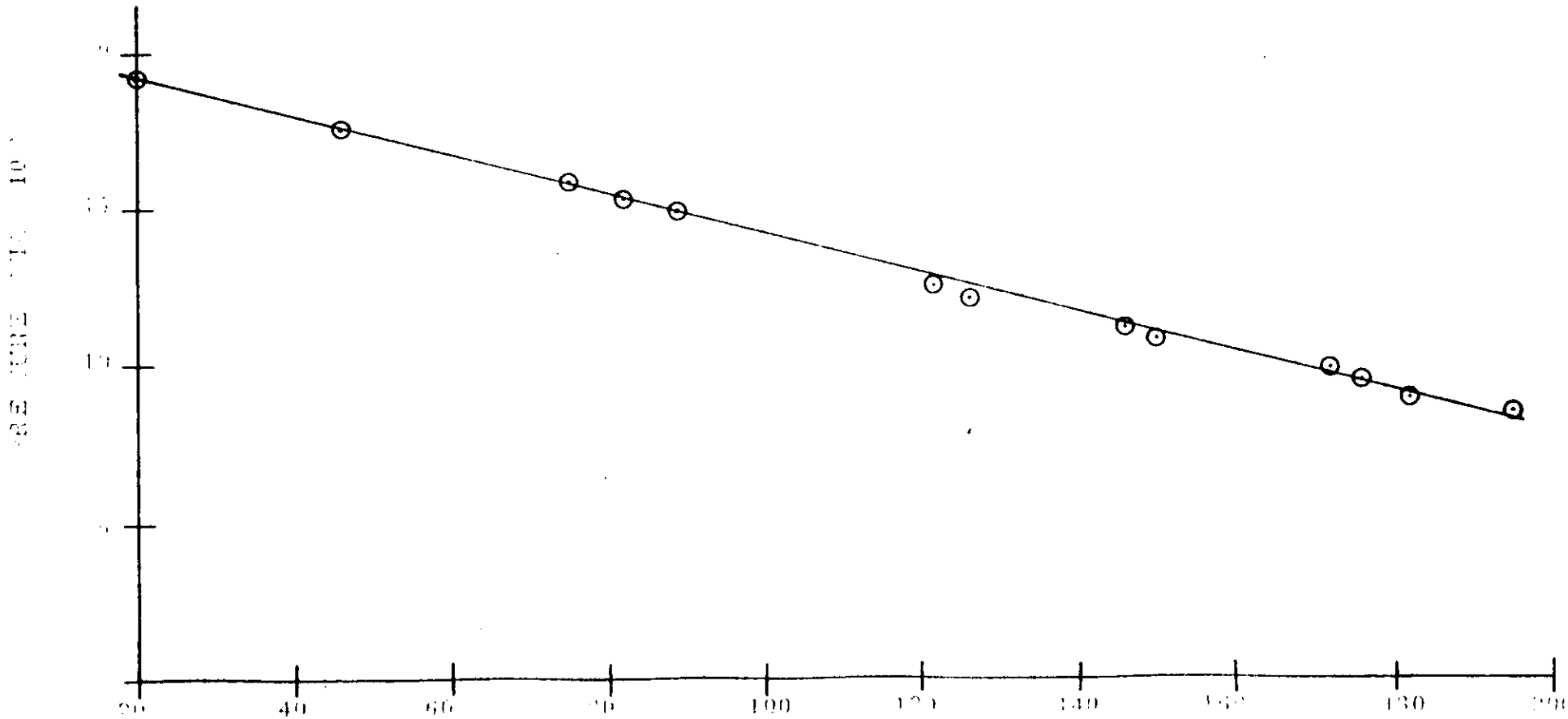
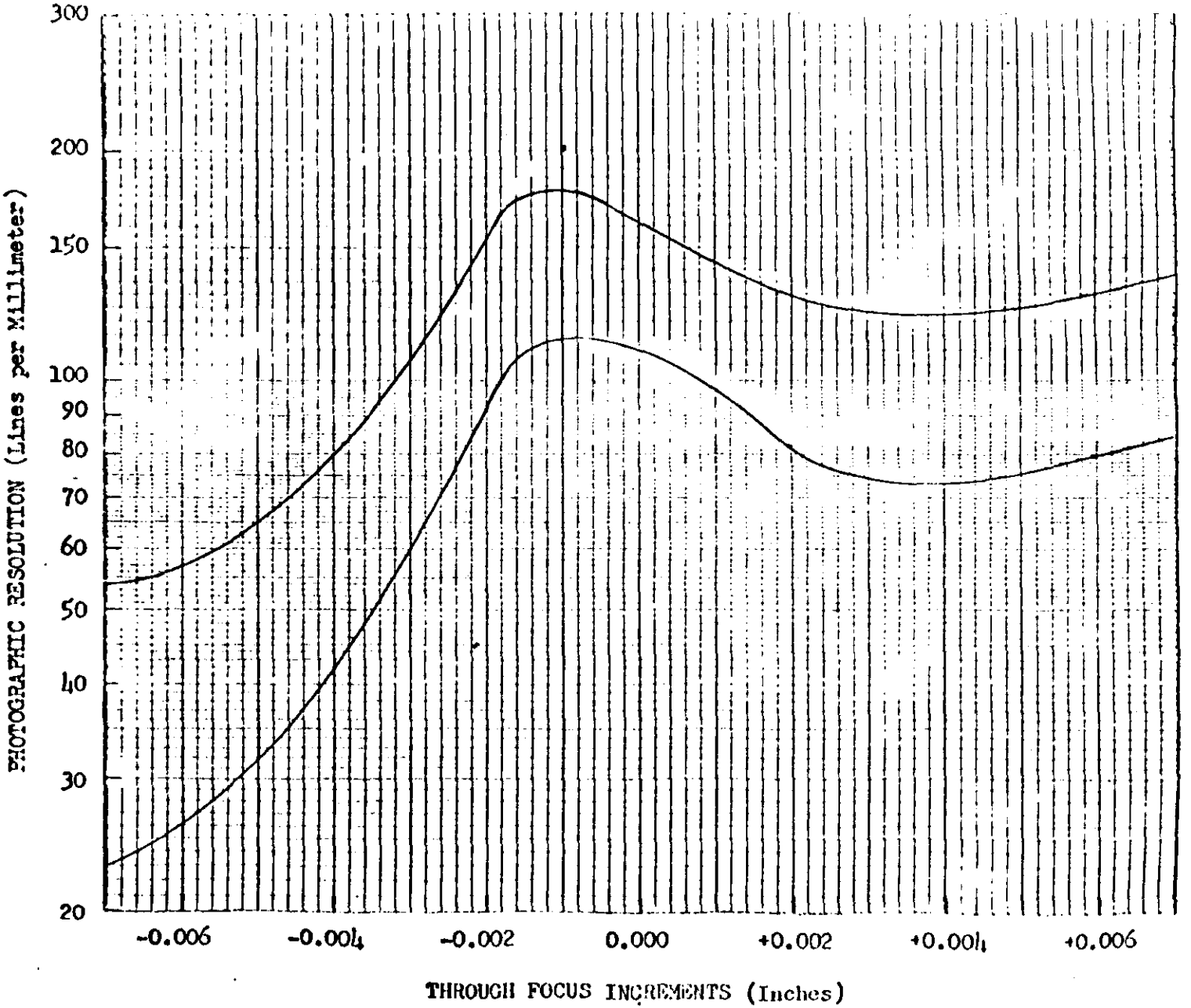





Figure 2-1

PRE-FLIGHT DYNAMIC RESOLUTION




Camera No: 122

Payload No: J-19

Resolution (l/mm)

High Contrast: 178

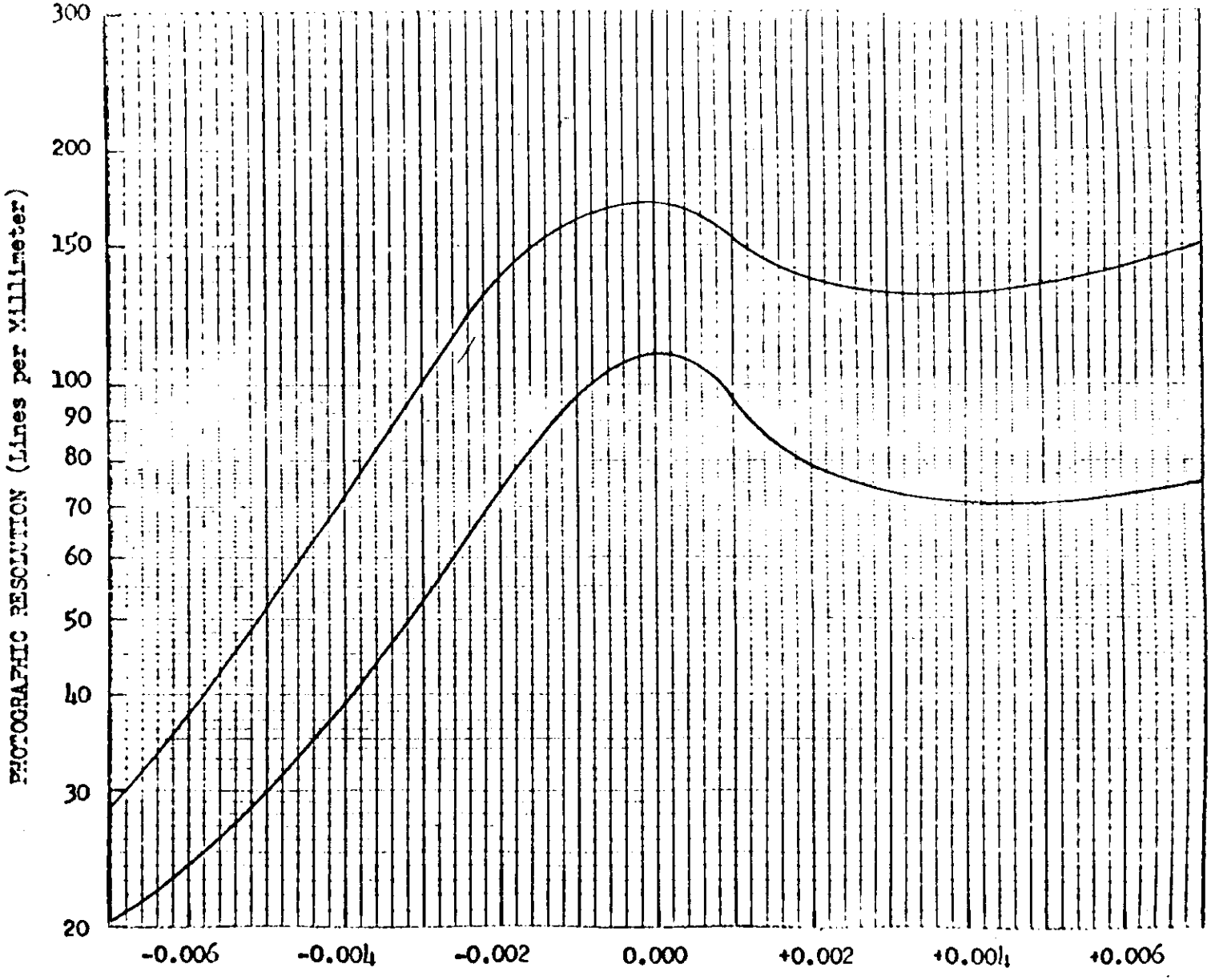
Low Contrast: 114

Film Type: 3404

Test Date: 18 December 1964

Figure 2-2

PRE-FLIGHT DYNAMIC RESOLUTION




Camera No: 123

Payload No: J-19

Resolution (l/mm)

High Contrast: 172

Low Contrast: 110

Film Type: 3404

Test Date: 18 December 1964

Figure 2-3

# SECTION 3

# FLIGHT OPERATIONS

## A. INSTRUMENTATION AND COMMAND PERFORMANCE

The telemetry instrumentation system was satisfactory throughout the flight. The only exceptions being the lens rotation monitor (Ch 10, Lk I, cont.) and the cycle counter units monitor (Ch 13, Lk I, Pt 27) for Instrument #2.

The Instrument #2 lens rotation monitor pulse randomly changed length and at times was missing completely. The trailing edge of the pulse when present was always in the proper position.

The units cycle count for Instrument #2 read a maximum of 3.7V (9 count) on and after orbit 32. Step levels were proper on orbits 16 and 24. Analysis of the cycle counter circuit shown on Figure 3-1 indicates that the most probable cause of failure is a high resistance short from either the wiper or high side of counter resistor divider network to TLM ground. The resistance of the short would be approximately 6K from data observed on orbit 32 and as low as 1K from data observed on orbit 73.

Good correlation was obtained for the cycle counters and film footage potentiometers during the first mission. The potentiometers agreed within plus or minus 50 cycles which is the minimum resolution obtainable from reading the TLM records. During the second mission the readings of both potentiometers were off from the corresponding cycle counters by values up to 150 cycles.

## B. PANORAMIC CAMERA PERFORMANCE

Engineering operations were programmed for acquisition over [redacted] Tracking Station during Orbits 8, 16, 24, 32, 48 and 65 of Mission 1018-1, and 3, 81 and 97 of Mission 1018-2.

Instrument operation and payload metering was satisfactory throughout both Missions 1018-1 and 1018-2 as indicated on TLM by the center-of-format, lens rotation, and payload supply and take-up monitors. Start-up and shut-down was normal.

Cycle period data for these operations are contained in Table 3-1. The instruments ran consistently slower than predicted throughout the flight. The predictability error was approximately -1.5% for Instrument #1 and -.75% for Instrument #2. The difference in operating rates between the instruments was generally within ± 1%.

Film consumption for the flight was as follows:

MISSION 1018-1

| | Master | Slave |
|---|---|---|
| Cycles | 2856 | 2804 |
| Feet | 8023* | 7887* |

MISSION 1018-2

| | | |
|---|---|---|
| Cycles | 2956 | 2964 |
| Feet | 7786 | 7832 |

* Includes pre-flight test film footage.

The general instrument response, based upon nominal vs. actual consumption, was approximately 3% slow during the first mission, and 3% decaying to 5% slow during the second mission. The slave camera was slightly faster ($< 1\%$) than the master.

FMC match was within 5% of rates required after the early revs when orbit parameters and camera response were being determined.

| Orbit | R-A-D | Approx. Match | Remarks |
|---|---|---|---|
| 1 - 5 | 4-7-7 | 5 % slow | Settings for nominal orbit and response |
| 6 - 18 | 4-7-6 | 4% slow | Change on rev 6 to move perigee northwards; valid settings except for camera response. |

| Orbit | R-A-D | Approx. Match | Remarks |
|---|---|---|---|
| 19 - 66 | 3-7-6 | 1% mean | Increase rates for camera response; good actual match for first mission, but errors increasing as orbit decays. |
| 67 - 83 | 2-8-6 | 2 1/2% mean | Increase rates to compensate orbit decay; errors increase as orbit decays. |
| 84 - 99 | 2-7-5 | 1% mean | (D-5 effective on rev 85) increase rates to compensate slower cameras and to adjust limiter action to desired latitude range. |

## C. STELLAR-INDEX PERFORMANCE

The Stellar-Index camera for the first mission operated normally for eight and one-half orbits and metered 55 frames. During the third operation of orbit eight the S/I command programmer failed. This failure resulted in loss of all commands to the S/I unit and the loss of the smear pulse on the main panoramic camera film. With the failure of the programmer both the first and second mission S/I units were rendered inoperative. Both units slew during recovery indicating that both units were functional.

## D. CLOCK PERFORMANCE

Satisfactory clock correlation was obtained for both missions. Clock/System time correlation data is contained in Table 3-2. The system time is fitted to a best fit curve of clock versus system time which is represented by a second order equation in this case. The table includes the amounts that the recorded values of system time deviate from the corrected values.

The corrected system time values are computed from the equation - $y = a_2x^2 + a_1x + a_o$, where y = corrected system time and x = clock time.

## E. PRESSURE MAKE-UP SYSTEM PERFORMANCE

Supply pressure history for the PMU system is shown on Figure 3-2, where the supply pressure decay is plotted as a function of the total instrument operate time. The irregular slope of the curve indicates that gas is passing through the PMU system at times other than when the instruments are operating.

The average consumption rate was 7.0 psi/min. during flight. The value obtained during the environmental test was 6.25 psi/min. with no leakage being indicated.

## F. TEMPERATURE ENVIRONMENT

The temperature data obtained on TLM during the [redacted] acquisitions are summarized on Table 3-3.

Average instrument temperatures varied only 5°F on both instruments due to an almost constant $\beta$ angle for the entire flight. The instruments averaged 79°F for the master and 69° F for the slave.

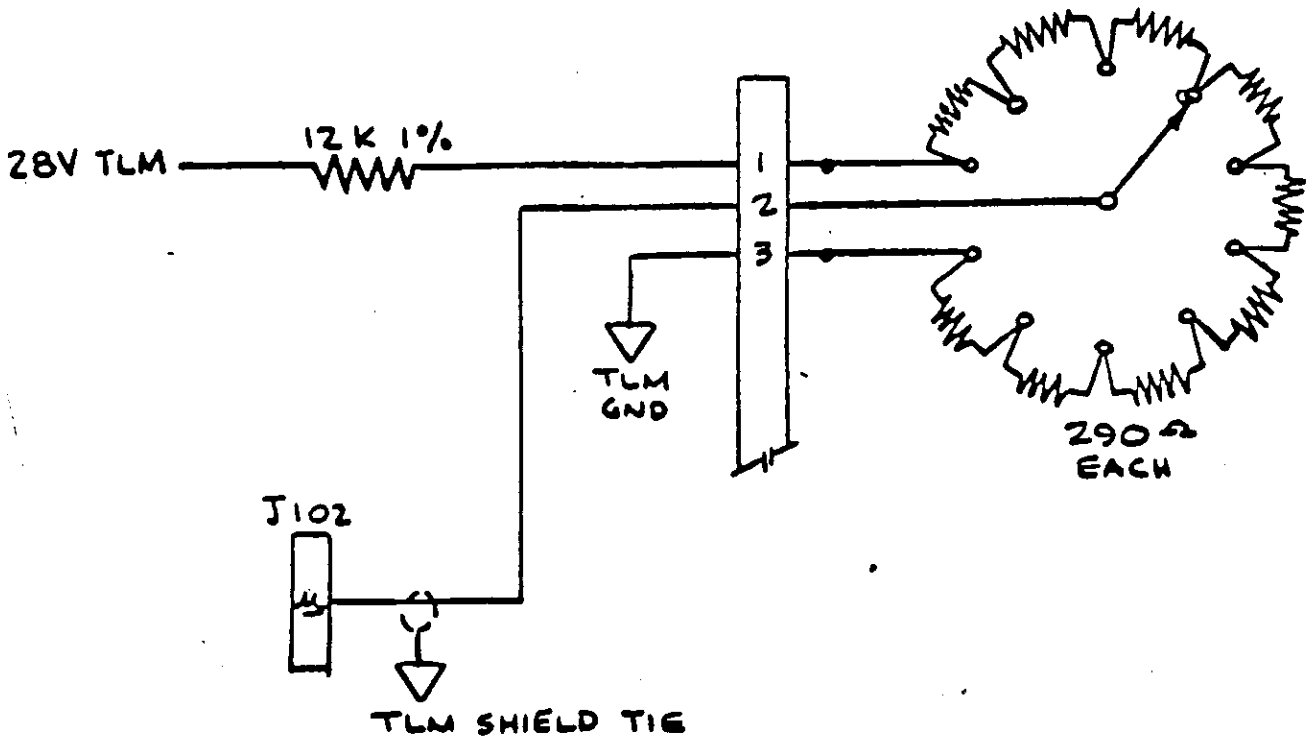
## G. RECOVERY SYSTEM PERFORMANCE

The -1 and -2 SRV units were successfully air recovered on orbit 66, 3/29/65 and on orbit 99, 3/31/65, respectively. Impact points were within tolerance for both recoveries.

## H. SINE FUNCTION GENERATOR PERFORMANCE

This orbital sine function generator (S/N 269) was the fourth unit to be flown with a Corona J system. The unit was first enabled by real time command on orbit 8. The output to the Agena guidance at this time should have been 7.5 milli-volts. The "enable" transient was not detected by the vehicle response. The telemetry monitor indicated the unit was in the correct phase position throughout both missions. Figure 3-3 shows the telemetry voltage vs. the actual elapsed time.

After second recovery the unit was disabled on orbit 112 and then enabled on orbit 113. At the "enable" the output of the unit should have been 21.5 millivolts. Again the vehicle did not detect the "enable" transient and could indicate that the output of the unit was not being received by the vehicle guidance system.




INST. #2 UNITS CYCLE COUNTER TLM CIRCUIT



Figure 4-1

[redacted]

J-19/1612 FLIGHT CYCLE RATE SUMMARY - MISSION 1018

| REV/MODE | | RAMP | | T.O.R. | INST 122 ACT. | INST 122 NOM. | INST 122 DEV. | INST 123 ACT. | INST 123 NOM. | INST 123 DEV. | 122/123 DIFF. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 008 | A | 4 | 7 | 182 | 3.112 | 3.107 | -0.15 | 3.120 | 3.106 | -0.44 | 0.26 |
| 016 | A | 4 | 7 | 1740 | 2.275 | 2.215 | -2.73 | 2.255 | 2.222 | -1.50 | -0.88 |
| 024 | A | 3 | 7 | 224 | 2.973 | 2.961 | -0.41 | 2.974 | 2.960 | -0.48 | 0.03 |
| 032 | A | 3 | 7 | 1830 | 2.230 | 2.206 | -1.08 | 2.230 | 2.213 | -0.77 | -0. |
| 048 | A | 3 | 7 | 1800 | 2.237 | 2.206 | -1.39 | 2.221 | 2.213 | -0.34 | -0.72 |
| 065 | A | 3 | 7 | 1845 | 2.238 | 2.206 | -1.45 | 2.229 | 2.213 | -0.73 | -0.40 |
| 073 | B | 2 | 8 | 355 | 2.700 | 2.699 | -0.03 | 2.700 | 2.700 | -0.00 | -0. |
| 081 | B | 2 | 8 | 1940 | 2.245 | 2.207 | -1.70 | 2.222 | 2.214 | -0.34 | -1.02 |
| 097 | B | 2 | 7 | 2056 | 2.193 | 2.201 | 0.35 | 2.225 | 2.207 | -0.79 | 1.46 |

DEV. AND DIFF. ARE IN PERCENT
THE (-) SIGN INDICATES THAT THE INST IS SLOWER THAN PREDICTED OR THAT INST 1 IS SLOWER THAN INST 2

Table 3-1

[redacted]

[redacted]

PRELIMINARY CLOCK CORRELATION

ORDER FIT 1

| SYS TIME I/P | CL TIME I/P | COMP SYS TM | DELTA ST | REV | STA |
|---|---|---|---|---|---|
| 56632.268 | 395404.54190 | 56632.27520 | -0.00628 | 0 | 1 |
| 31321.622 | 456493.08690 | 31321.61980 | 0.00314 | 8 | 1 |
| 75649.309 | 500821.57590 | 75649.30850 | 0.00145 | 16 | 1 |
| 30360.145 | 5061.49890 | 30360.14320 | 0.00273 | 24 | 1 |
| 74671.579 | 49372.93390 | 74671.57790 | 0.00203 | 32 | 1 |
| 29276.552 | 90377.90990 | 29276.55360 | -0.00069 | 40 | 1 |
| 73568.432 | 134669.79290 | 73568.43630 | -0.00338 | 48 | 1 |
| 28333.667 | 175835.02690 | 28333.67010 | -0.00210 | 56 | 1 |
| 77875.992 | 225377.34590 | 77875.98870 | 0.00424 | 65 | 1 |
| 32594.385 | 266495.73990 | 32594.38240 | 0.00352 | 73 | 1 |
| 76841.137 | 310742.49690 | 76841.13910 | -0.00117 | 81 | 1 |
| 31482.427 | 351783.78690 | 31482.42880 | -0.00089 | 89 | 1 |
| 75704.865 | 396006.22690 | 75704.86850 | -0.00259 | 97 | 1 |

A0=-0.33877226400 06 A1= 0.9999999931370 00

SIGMA=0.00291 NO. POINTS= 13

RATIO OF CLOCK TIME TO SYS TIME= 0.100000000686D 01

ORDER FIT 2

| SYS TIME I/P | CL TIME I/P | COMP SYS TM | DELTA ST | REV | STA |
|---|---|---|---|---|---|
| 56632.268 | 395404.54190 | 56632.27280 | -0.00389 | 0 | 1 |
| 31321.622 | 456493.88690 | 31321.61890 | 0.00404 | 8 | 1 |
| 75649.309 | 500821.57590 | 75649.30850 | 0.00150 | 16 | 1 |
| 30360.145 | 5061.49890 | 30360.14380 | 0.00217 | 24 | 1 |
| 74671.579 | 49372.93390 | 74671.57890 | 0.00101 | 32 | 1 |
| 29276.552 | 90377.90990 | 29276.55490 | -0.00196 | 40 | 1 |
| 73568.432 | 134669.79290 | 73568.43770 | -0.00474 | 48 | 1 |
| 28333.667 | 175835.02690 | 28333.67130 | -0.00336 | 56 | 1 |
| 77875.992 | 225377.34590 | 77875.98960 | 0.00332 | 65 | 1 |
| 32594.385 | 266495.73990 | 32594.38290 | 0.00308 | 73 | 1 |
| 76841.137 | 310742.49690 | 76841.13890 | -0.00092 | 81 | 1 |
| 31482.427 | 351783.78690 | 31462.42780 | 0.00019 | 89 | 1 |
| 75704.865 | 396006.22690 | 75704.86640 | -0.00043 | 97 | 1 |

A0=-0.33877228510 06 A1= 0.1000000060410 01

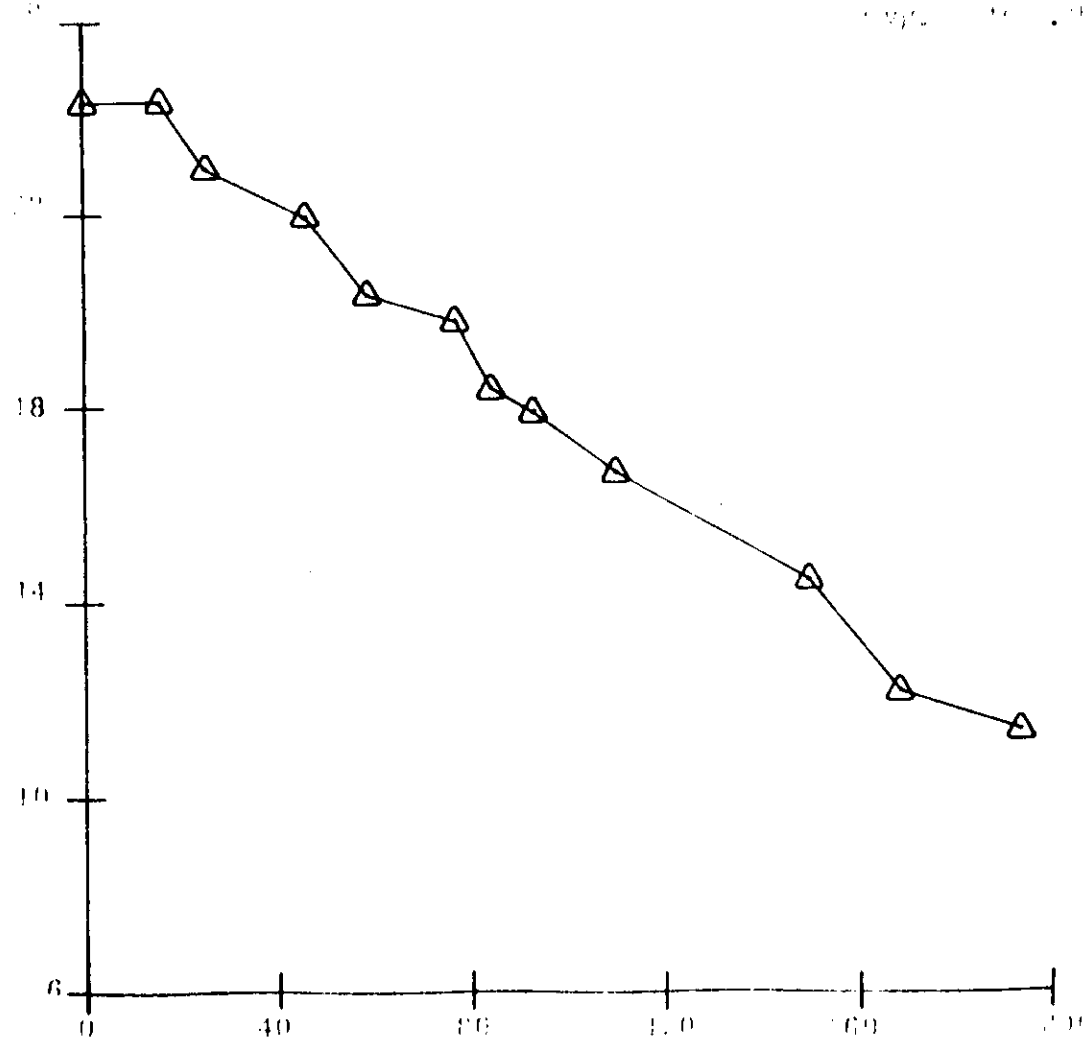
A2=-0.5031740567485D-13

SIGMA=0.00265 NO. POINTS= 13

Table 3-3

[redacted]

[redacted]




INSTRUMENT ON TIME (MIN.)

Figure 7-3

[redacted]

[redacted]

## TABLE 3-3

## J-19 TEMPERATURE SUMMARY

| SENSOR | ORBITS ACQUIRED | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Master Camera | 0 | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 65 | 73 | 81 | 89 | 97 |
| 3 | 73 | 65 | 75 | 72 | 72 | 71 | 71 | 72 | 74 | 71 | 70 | 69 | 67 |
| 4 | 80 | 75 | 80 | 79 | 77 | 79 | 78 | 79 | 81 | 79 | 75 | 77 | 73 |
| 5 | 75 | 76 | 69 | 78 | 77 | 78 | 78 | 79 | 80 | 78 | 77 | 78 | 72 |
| 6 | 77 | 73 | 79 | 78 | 79 | 76 | 79 | 78 | 81 | 78 | 78 | 75 | 73 |
| 7 | 82 | 78 | 89 | 86 | 86 | 84 | 86 | 85 | 89 | 84 | 85 | 81 | 80 |
| 8 | 76 | 76 | 68 | 80 | 78 | 78 | 78 | 80 | 81 | 79 | 77 | 77 | 71 |
| 9 | 75 | 76 | 80 | 79 | 78 | 79 | 78 | 80 | 80 | 79 | 78 | 76 | 73 |
| 10 | 78 | 78 | 92 | 85 | 88 | 84 | 87 | 85 | 89 | 84 | 86 | 82 | 81 |
| 11 | 69 | 69 | 74 | 73 | 72 | 74 | 73 | 77 | 76 | 72 | 74 | 73 | 65 |
| 12 | 68 | 76 | 79 | 79 | 77 | 79 | 77 | 80 | 81 | 75 | 75 | 78 | 72 |
| 13 | 79 | 74 | 81 | 77 | 79 | 77 | 79 | 78 | 81 | 76 | 77 | 75 | 72 |
| AVG | 76 | 74 | 77 | 79 | 79 | 79 | 79 | 79 | 82 | 79 | 78 | 77 | 73 |
| Slave Camera | | | | | | | | | | | | | |
| 3 | 72 | 68 | 72 | 71 | 70 | 71 | 70 | 71 | 73 | 70 | 70 | 69 | 66 |
| 4 | 72 | 68 | 67 | 68 | 66 | 68 | 66 | 70 | 70 | 68 | 65 | 67 | 61 |
| 5 | 69 | 66 | 69 | 68 | 67 | 68 | 67 | 69 | 70 | 66 | 66 | 65 | 62 |
| 6 | 69 | 68 | 75 | 71 | 73 | 71 | 73 | 71 | 76 | 71 | 71 | 69 | 69 |
| 7 | 68 | 67 | 73 | 71 | 73 | 71 | 73 | 72 | 76 | 71 | 71 | 69 | 69 |
| 8 | 71 | 69 | 73 | 72 | 70 | 72 | 71 | 74 | 75 | 71 | 71 | 70 | 68 |
| 9 | 74 | 70 | 75 | 72 | 73 | 74 | 73 | 74 | 76 | 72 | 72 | 70 | 68 |
| 10 | 69 | 64 | 75 | 71 | 72 | 69 | 71 | 69 | 75 | 68 | 70 | 66 | 67 |
| 11 | 71 | 58 | 51 | 60 | 58 | 61 | 60 | 61 | 64 | 60 | 60 | 69 | 54 |
| 12 | 71 | 62 | 65 | 65 | 62 | 66 | 63 | 66 | 68 | 65 | 63 | 64 | 60 |
| 13 | 70 | 60 | 66 | 62 | 63 | 62 | 64 | 64 | 67 | 70 | 61 | 60 | 58 |
| AVG | 70 | 66 | 69 | 69 | 69 | 69 | 69 | 70 | 73 | 69 | 68 | 67 | 65 |
| Supply Spool Spool | | | | | | | | | | | | | |
| 1 | 64 | 53 | 55 | 55 | 57 | 56 | 57 | 58 | 60 | 56 | 56 | 55 | 52 |
| 2 | 66 | 59 | 61 | 61 | 60 | 61 | 60 | 63 | 64 | 61 | 59 | 58 | 55 |

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

## TABLE 3-3

## J-19 TEMPERATURE SUMMARY

| SENSOR / Fair ("A") / Barrel #1 ("B") | 0 | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 65 | 73 | 81 | 89 | 97 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | OBH | 37 | 59 | 43 | 55 | 43 | 40 | 43 | 55 | 33 | 53 | -- | -- |
| 2 | OBH | 11 | 13 | 17 | 10 | 16 | 2 | 17 | 10 | 67 | 71 | -- | -- |
| 3 | 215 | 2 | 20 | 7 | 20 | 7 | 12 | 10 | 20 | 77 | 131 | -- | -- |
| 4 | 248 | 53 | 68 | 60 | 71 | 58 | 62 | 61 | 68 | 44 | 83 | -- | -- |
| 5 | OBH | 52 | 57 | 57 | 61 | 57 | 52 | 57 | 61 | 46 | 63 | | |
| 6 | OBH | 52 | 61 | 57 | 57 | 57 | 48 | 57 | 61 | -- | -- | -- | -- |
| **Barrel #2** | | | | | | | | | | | | | |
| 1 | 162 | 33 | 51 | 38 | 51 | 38 | 42 | 41 | 51 | 31 | 47 | 31 | 33 |
| 2 | 162 | 36 | 77 | 45 | 77 | 45 | 66 | 48 | 77 | 45 | 81 | 45 | 69 |
| 3 | 226 | 53 | 117 | 62 | 114 | 62 | 101 | 65 | 114 | 62 | 117 | 58 | 109 |
| 4 | 205 | 56 | 74 | 61 | 74 | 64 | 62 | 67 | 71 | 61 | 70 | 61 | 59 |
| 5 | 178 | 48 | 73 | 56 | 72 | 56 | 67 | 56 | 72 | 47 | 63 | 50 | 54 |
| **Conic Adapter** | | | | | | | | | | | | | |
| 1 | 187 | 37 | 43 | 46 | 42 | 46 | 34 | 46 | 46 | 35 | 35 | 35 | 27 |
| **Clock** | | | | | | | | | | | | | |
| 1 | 94 | 64 | 67 | 67 | 67 | 67 | 62 | 70 | 67 | 63 | 59 | 63 | 53 |
| 2 | 96 | 64 | 67 | 67 | 67 | 70 | 64 | 70 | 70 | 63 | 59 | 63 | 53 |
| **Thrust Cone "A" to "B" SRV** | | | | | | | | | | | | | |
| 1 | 107 | 32 | 35 | 33 | 31 | 33 | 34 | 28 | 30 | 57 | 57 | 56 | 56 |
| 2 | 72 | 52 | 44 | 43 | 42 | 41 | 43 | 43 | 43 | 63 | 63 | 62 | 63 |
| **Stellar/Index "A" to "B"** | | | | | | | | | | | | | |
| 1 | 90 | 56 | 65 | 61 | 64 | 61 | 56 | 61 | 65 | 65 | 62 | 62 | 57 |
| 2 | 78 | 56 | 62 | 59 | 58 | 59 | 53 | 62 | 59 | 75 | 65 | 68 | 57 |
| **Recovery Battery "B" SRV** | | | | | | | | | | | | | |
| 1 | 70 | 69 | 68 | 66 | 66 | 66 | 64 | 66 | 68 | 87 | 89 | 85 | 86 |
| **Master Cassette "A" SRV** | | | | | | | | | | | | | |
| 2 | 92 | 51 | 52 | 45 | 44 | 44 | 48 | 45 | 51 | -- | -- | -- | -- |

NOTE: Only Thrust Cone Data corrected for Self-heating.
OBH - Out of Range High

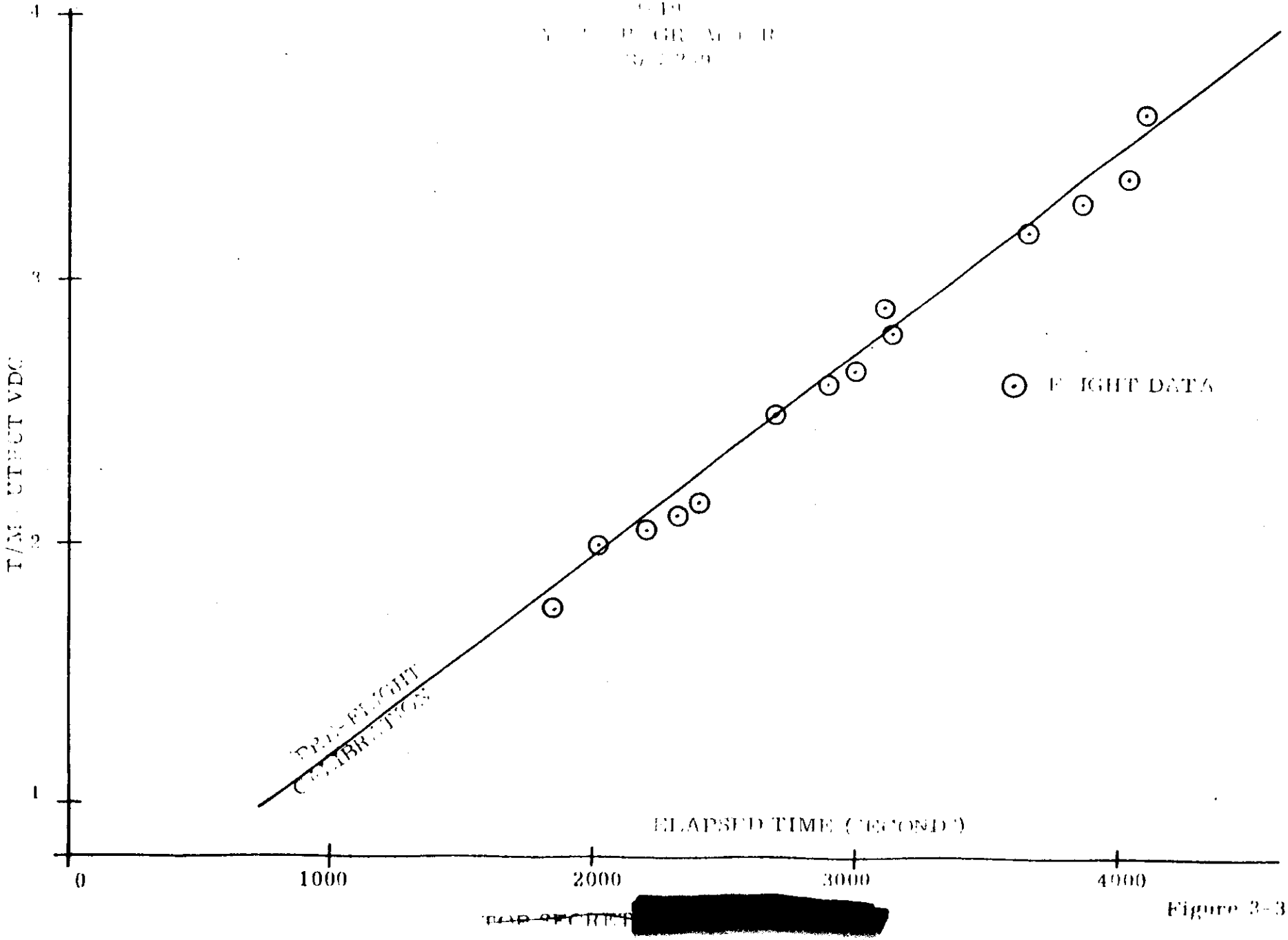

T/M CIRCUIT VDC
3
2
1
0
1000
2000
3000
4000
ELAPSED TIME (SECOND)
PRE-FLIGHT CALIBRATION
FLIGHT DATA

Figure 3-3

## SECTION 4

## MISSION 1018-1 RECOVERY SYSTEM

SRV #668 was received at A/P on 30 July 1964. The receiving weight was 149.7 pounds. After modifications and incorporation of outstanding E.O.'s, the SRV was delivered to Systems Test for incorporation into the J-19 system.

The capsule was shipped to VAFB on 13 January 1965.

The -1 recovery system was successfully recovered by air catch from orbit 66 at 15:38 PST on 29 March 1965. The impact point was as follows:

| | |
|---|---|
| Predicted Impact | $22^{\circ}03.2'N/151^{\circ}12.4'W$ |
| Actual Impact | $21^{\circ}58'N/151^{\circ}15'W$ |

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 1018-1

## RECOVERY SEQUENCE OF EVENTS

| | Event | Delta Time (Seconds) Actual | Nominal |
|---|---|---|---|
| * | Arm | 74.66 | 75.0 ± 1.0 |
| * | Transfer | 2.02 | 2.0 ± 0.25 |
| | Electrical Disconnect | 0.92 | $0.900^{+0.430}_{-0.400}$ |
| | Separation | --- | --- |
| ** | Spin | 3.43 | 3.4 ± 0.30 |
| | Retro | 7.57 | 7.55 ± 0.45 |
| | Despin | 10.74 | 10.75 ± 0.54 |
| | T C Separation | 1.49 | 1.5 ± 0.15 |
| *** | "G" Switch Open | 467.85 | $515.0^{+65.0}_{-50.0}$ |
| | Parachute Cover Off | 33.98 | 34.0 ± 1.5 |
| | Drogue Chute Deployed | 0.74 | 0.63 ± 0.08 |
| | Main Chute Bag Separate | 9.91 | $10.14^{+0.48}_{-0.40}$ |
| | Main Chute Deployed | 0.54 | $0.52^{+0.13}$ |
| | Main Chute Disreef | 4.67 | $4.46^{+0.49}_{-0.29}$ |

* From Separation
** From Electrical Disconnect
*** From Retro

Spin Rate 66 RPM
Despin Rate 9.1 RPM
Retro Velocity 1024 ft./sec.

TABLE 4-1

## SECTION 5

## MISSION 1018-2 RECOVERY SYSTEM

SRV #669 was received at A/P on 30 July 1964. The receiving weight was 151.9 pounds. After modifications and incorporation of outstanding E.O.'s the unit was delivered to Systems Test for mating to the J-19 system.

The capsule was shipped to VAFB on 13 January 1965.

The -2 recovery system was successfully recovered by air catch from orbit 99 at 16:29 PST on 31 March 1965. The impact point was as follows:

| | |
|---|---|
| Predicted Impact | $20^{\circ}01.1'N/164^{\circ}34'W$ |
| Actual Impact | $20^{\circ}00'N/164^{\circ}24'W$ |

Event times are shown in Table 5-1.

The condition of the recovered capsule indicated no abnormal re-entry effects.

MISSION 1018-2

RECOVERY SEQUENCE OF EVENTS

| Event | Delta Time (Seconds) Actual | Nominal |
|---|---|---|
| Arm | 74.94 | 75.0 ± 1.0 |
| Transfer | 2.03 | 2.0 ± 0.25 |
| Electrical Disconnect | 0.93 | $0.900^{+0.430}_{-0.400}$ |
| Separation | -- | -- |
| Spin | 3.37 | 3.4 ± 0.30 |
| Retro | 7.83 | 7.55 ± 0.45 |
| Despin | 10.74 | 10.75 ± 0.54 |
| T/C Separation | 1.51 | 1.5 ± 0.15 |
| "G" Switch Open | 468.82 | $515.0^{+65.0}_{-50.0}$ |
| Parachute Cover Off | 33.30 | 34.0 ± 1.5 |
| Drogue Chute Deployed | 0.69 | 0.63 ± 0.08 |
| Main Chute Bag Separate | 9.66 | $10.14^{+0.48}_{-0.40}$ |
| Main Chute Deployed | 0.60 | 0.52 ± 0.13 |
| Main Chute Disreef | 4.00 | $4.46^{+0.49}_{-0.29}$ |

* From Separation
** From Electrical Disconnect
*** From Retro

Spin Rate 66 RPM
Despin Rate 10 RPM
Retro Velocity 1024 ft./sec.

TABLE 5-1

SECTION 6

# MASTER (FWD) PANORAMIC CAMERA

## A. COMPONENT ASSIGNMENT

| Component | Serial Number |
|---|---|
| Main Camera | 122 |
| Main Camera Lens | 0652435 |
| Supply Horizon Camera | 149B |
| Supply Horizon Camera Lens | 813523 |
| Take-up Horizon Camera | 163A |
| Take-up Horizon Camera Lens | 814011 |
| Supply Cassette | SC-27 |

## B. CAMERA DATA AND FLIGHT SETTINGS

Main Camera:

| | |
|---|---|
| Lens | 24" f/3.5 |
| Slit Width | 0.250" |
| Filter Type | Wratten 25 |
| Film Type | Eastman Type 3404 |

Supply (Port) Horizon Camera:

| | |
|---|---|
| Lens | 55 mm f/6.8 |
| Aperture Setting | f/6.8 |
| Exposure Time | 1/100 second |
| Filter Type | Wratten 25 |

Take-up (Starboard) Horizon Camera:

| | |
|---|---|
| Lens | 55 mm f/6.8 |
| Aperture Setting | f/8.0 |
| Exposure Time | 1/100 second |
| Filter Type | Wratten 25 |

## C. POST FLIGHT PERFORMANCE EVALUATION

This camera produced 2857 frames (8023 feet, including preflight test footage) of photography during Mission 1018-1, and 2956 frames (7786 feet) during Mission 1018-2. The overall photographic quality was judged to be about the same for both missions. Compared to past missions, the present ones are considered better than 1014, but not quite as good as 1015, 1016, and 1017.

Image contrast of the master camera was about the same as that of the slave although the filter that was used provided higher wavelength cutoff. Customer personnel using the material expressed no preference between master and slave results in terms of either information content or image contrast. The MIP frames selected for both missions were however produced by the master camera.

The only probable explanation for the slightly less than optimum image quality appears to be unfavorable atmospheric conditions over the areas of interest. The basis for this explanation, which is far from conclusive, is: (1) weather conditions observed on the small number of index images obtained at the beginning of the mission, and (2) the exposure and preliminary processing data tends to suggest atmospheric reflection of solar illumination.

The master panoramic camera and its auxiliary equipment operated in a generally satisfactory manner throughout both missions. The horizon cameras functioned normally and provided imagery of good quality. Lights for the time word, serial number, and index marks, and fiducial marks functioned normally throughout. The 200 cps timing marks appeared normally except that the density was less than desirable.

Emulsion scratches occurred at each edge of the format under the camera number on all frames of both missions. Similar scratches have

been observed on past missions, however the scratches generally are not detected on preflight test materials. These scratches match the ends of the scan rollers. There were also many very small longitudinal scratches in the region within one inch of the timing mark edge throughout both missions. Such marks have been observed occasionally on past missions, but in much smaller regions of the format. Similar scratches appeared on the slave photography and are described in the following section.

Minor light leak fogging during instrument shut down periods is observed at three places on the first or last frames of most passes. The approximate locations of the leaks have been identified and are discussed further in the following section on the slave camera.

SECTION 7

SLAVE (AFT) PANORAMIC CAMERA

A. COMPONENT ASSIGNMENT

| Component | Serial |
|---|---|
| Main Camera | 123 |
| Main Camera Lens | 0632435 |
| Supply Horizon Camera | 129B |
| Supply Horizon Camera Lens | 812270 |
| Take-up Horizon Camera | 130A |
| Take-up Horizon Camera Lens | 812277 |
| Supply Cassette | SC-27 |

B. CAMERA DATA AND FLIGHT SETTINGS

| | |
|---|---|
| Main Camera: | |
| Lens | 24" f/3.5 |
| Slit Width | 0.175" |
| Filter Type | Wratten 21 |
| Film Type | Eastman Type 3404 |
| Supply (Starboard) Horizon Camera: | |
| Lens | 55mm f/6.8 |
| Aperture Setting | f/8.0 |
| Exposure Time | 1/100 second |
| Filter Type | Wratten 25 |
| Take-up (Port) Horizon Camera: | |
| Lens | 55mm f/6.8 |
| Aperture Setting | f/6.8 |
| Exposure Time | 1/100 second |
| Filter Type | Wratten 25 |

## C. POST FLIGHT PERFORMANCE EVALUATION

This camera produced 2804 frames (7887 feet, including preflight test footage) photography during Mission 1018-1, and 2964 frames (7832 feet) of photography during Mission 1018-2. The overall photographic quality was judged to be about the same as that produced by the master instrument.

Operation of the slave panoramic camera system was normal except for a low intensity mark and fluctuations in the 200 cps timing marks. The horizon cameras functioned normally throughout both missions, and lights for the time word, serial number, and fiducial marks were all normal. The low intensity index mark had been observed in preflight test but could not be corrected by field adjustments. The timing mark fluctuations, previously reported as intermittent operation, were observed only in flight material. In many places where the timing mark appeared to be missing, careful study showed that the marks were very faintly imaged. The cause of the fluctuating timing light intensity is not known.

Emulsion scratches occurred at each edge of the format under the camera number on all frames. Similar scratches occurred with the master camera. Also the small longitudinal scratches appeared on the slave panoramic material under the serial number and at the take-up end of the format, extending into the horizon image.

Minor light leaks were also observed near the end or start of passes. While the light leak fogging occurs at different places on master and slave material with respect to the end of a pass, common light sources are identified by comparison of film paths. One light leak occurring on the first frame of a pass from both instruments results from a leak at the drum of each instrument. Fogging of frames near the end of either master or slave passes can be traced to light leaks at one of two points: the interface between the master instrument barrel and the recovery barrel, or some point near the No. 1 SRV water seal. The latter of course only affects material during the first mission.

## SECTION 8

## PANORAMIC CAMERA EXPOSURE

The Master camera contained a 0.250 inch slit with a Wratten 25 filter while the Slave camera contained a 0.175 inch slit with a Wratten 21 filter. These conditions place the nominal exposure between the intermediate and full level processing curves, as published by [redacted] for their [redacted]

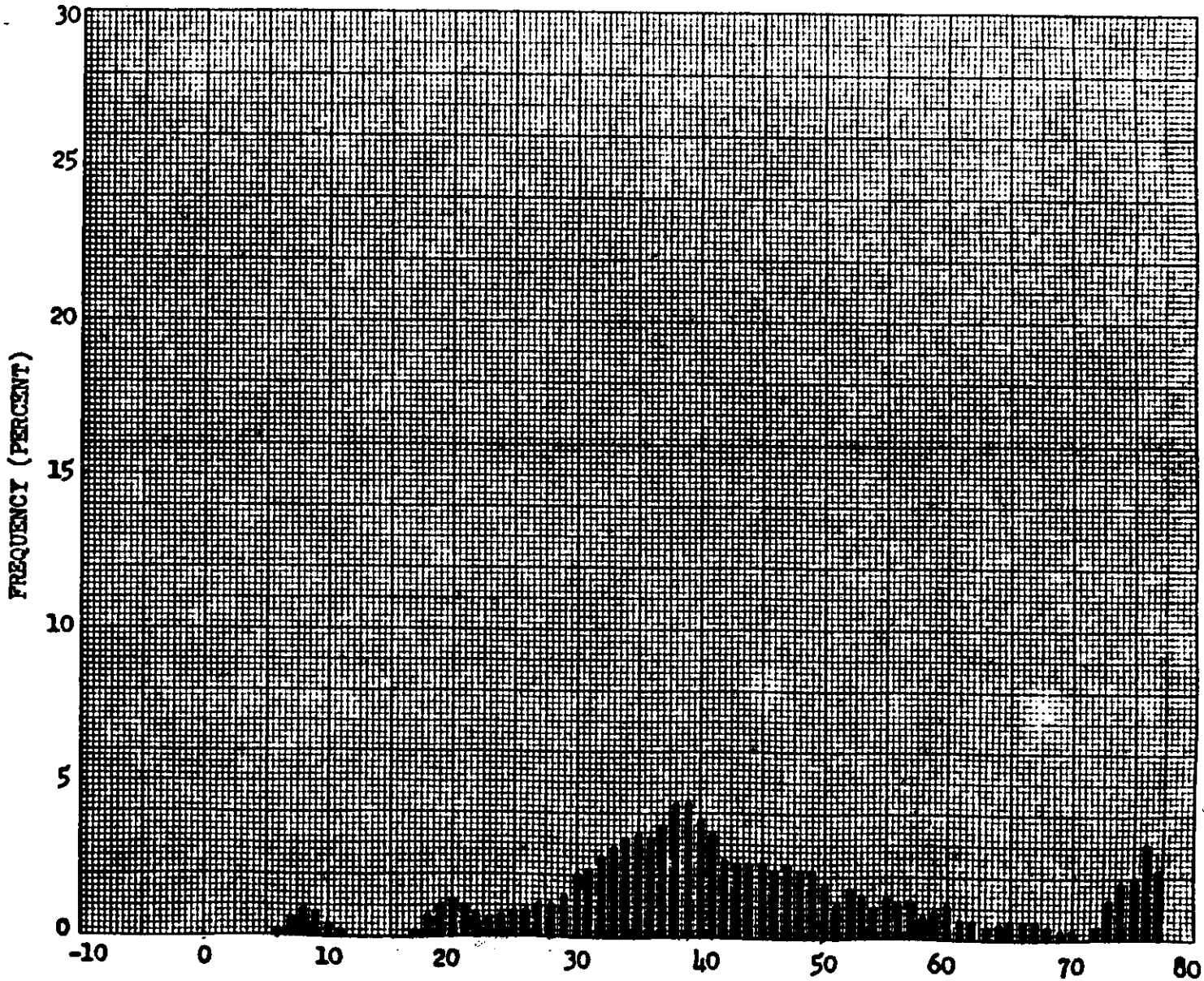
The illumination conditions during the mission were relatively broad as the flight was conducted near the autumnal equinox. The frequency distributions of the solar elevations and solar azimuths encountered during the photographic operations are shown in Figures 8-1 to 8-4.

The nominal exposure times are shown as a function of latitude for passes D-08, D-56 and D-89 in Figures 8-5 through 8-7 for the Master instrument, and Figures 8-8 through 8-10 for the Slave. The predicted level of processing for the original negative is based on the in-flight performance estimate and is tabulated below with the processing levels reported by [redacted]

| Mission | Camera | | Primary | Intermediate | Full |
|---|---|---|---|---|---|
| 1018-1 | FWD | Predicted | 0 | 0 | 100 |
| | | Reported | 9 | 63 | 28 |
| 1018-1 | AFT | Predicted | 0 | 22 | 78 |
| | | Reported | 9 | 53 | 38 |
| 1018-2 | FWD | Predicted | 0 | 0 | 100 |
| | | Reported | 18 | 74 | 8 |
| 1018-2 | AFT | Predicted | 0 | 15 | 85 |
| | | Reported | 1 | 50 | 49 |

The variation in the predicted and reported processing levels is generally consistent with the data observed from recent missions. The use of greater percentages of full processing has been experienced throughout the Corona program. Further analysis and calculations are in process to attempt to ascertain the optimum exposure-processing conditions.

SOLAR ELEVATION FREQUENCY DISTRIBUTION




Mission No: 1018-1

Payload No: J-19

Camera No: 122

Launch Date: 3/25/65

Launch Time: 2111 Z

Inclination: 96°

Figure 8-1