14 000224680

# CORONA J

# PERFORMANCE EVALUATION REPORT

# MISSION 1019-1 AND 1019-2

# FTV 1614; J-04

**September 19, 1966**

APPROVED: [redacted]
Manager
Advanced Projects

APPROVED: [redacted]
Manager
Program [redacted]

Declassified and Released by the N R O

In Accordance with E. O. 12958

on NOV 26 1997

# FOREWORD

This report details the performance of the payload system during the operational phase of the Program [redacted] Flight Test Vehicle 1614.

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 paylead test and performance evaluation report for Missions 1019-1 and 1019-2 which was launched on 23 April 1965.

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# INTRODUCTION

This report presents the final performance evaluation of Missions 1019-1 and 1019-2 of the Corona Program. The purpose of this report is to define the performance characteristics of the J-04 payload system and 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.

[redacted]

## SECTION 1

## SYSTEM PERFORMANCE

### A. MISSION OBJECTIVES

The payload section of Mission 1019, placed into orbit by Flight Test Vehicle #1614 and SLV-2A booster #437, 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 on the J-04 payload system. This Corona "J" system is designed to acquire search and reconnaissance photography of selected areas of the earth from orbital altitudes. The mission consisted of a 5 day and a 4 day photographic operation with no deactivate/reactivate.

### B. MISSION DESCRIPTION

The payload was launched from Vandenberg Air Force Base (VAFB) at 2144:57 Z (1444:57 PDT) on 29 April 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 1019-1 consisted of five days operation and was completed by air recovery on 4 May 1965. Mission 1019-2 followed immediately, with no deactivate, and consisted of four days operation terminating with an unsuccessful recovery attempt on 8 May 1965.

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

ORBITAL PARAMETERS

| Parameter | Predicted | Orbit 1 Actuals |
|---|---|---|
| Period (Min.) | 91.06 | 91.12 |
| Perigee (N.M.) | 99.98 | 99.08 |
| Apogee (N.M.) | 255.05 | 259.73 |
| Inclination (Deg.) | 85.00 | 85.03 |
| Perigee Latitude (Deg. N.) | 21.72 | 27.14 |
| Eccentricity | 0.02145 | 0.02219 |

[redacted]

SCHEMATIC INBOARD PROFILE - CORONA J SYSTEM

MISSION 1019

Master Camera No: 118

Slave Camera No: 119

Supply Cassette No: SC 6

Clock No: 512

Yaw Programmer No: N/A

"A" Recovery Subsystem No: 626

"A" Stellar-Index Camera No: 39/39/35

"B" Recovery Subsystem No: 627

"B" Stellar-Index Camera No: 19/18/19

Pressure Make-up Unit No: 1008

[redacted]

C. PANORAMIC CAMERAS

The Master and Slave panoramic cameras operated throughout both missions with no significant problems and Mission 1019-1 produced good photographic coverage. The cloud cover and atmospheric haze observed in the photography was nominal.

D. STELLAR-INDEX CAMERAS

The Mission 1019 Stellar-Index cameras operated properly throughout both missions.

E. OTHER SUB-SYSTEMS

The telemetry and command system performance was satisfactory throughout the flight with the following exceptions:

1. The film footage pot on the slave instrument take-up cassette became erratic on orbit 110 during -2 mission.
2. Three programmed stereo operations consisting of 131 cycles were missed on orbit 53 descending.
3. The instruments operated for 11 cycles when inadvertently turned on during orbit 76, [redacted] acquisition.

The clock performance was satisfactory throughout the flight. The pressure makeup system functioned properly during both missions. Gas consumption was normal.

The thermal environment for both instruments was within tolerance for the entire flight.

The -1 SRV unit was air recovered successfully. The impact point was within tolerance.

The -2 SRV unit was not recovered. Restarting of the recovery timer caused the retro events to occur with the capsule in the wrong attitude. The retro rocket imposed a velocity component on the capsule in the direction of flight causing it to continue in a changed orbit.

F. CONCLUSIONS

Mission 1019-1 achieved the objective of acquiring high quality search and reconnaissance photography from orbital altitudes.

[redacted]

## 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 susceptability to Corona discharge. Such discharge fogs the film thus degrading the operational photography.

2. Test Summary

The environmental test for the J-04 payload system was conducted in the TASC chamber at Sunnyvale from 15 December to 20 December 1964. The test consisted of three days of operation in the "A" mode, a one day soak period and two days of operation in the "B" mode.

The panoramic camera operation was satisfactory throughout the test. Both instruments ran to 2.5% fast in the "A" mission and to 2.0% slow in the "B" mission. The "A" stellar index operated properly throughout the "A" mission. The "B" stellar index failed to meter from orbit 8 to the end of the test.

Both the "A" and "B" recovery sequences operated properly with the exception of tape recorder channel #1. This channel read out-of-band high during the cut and wrap sequence. Both instruments stowed properly and transfer to the "B" mode was normal.

This payload system does not have the provisions for deactivation. The instruments were operated for 30 seconds at the bottom of Ramp 8, Amplitude 2 and the stow position was attained.

The clock performance was satisfactory.

3. Panoramic Camera Performance

The panoramic instrument S/N 118 (Master) performance was satisfactory throughout the environmental test. The cycle rate predictability errors varied from 2.5% fast to 1.5% slow. The instrument cycle rates were an average of 1.5% fast throughout the "A" mission where the simulated "$\beta$" angle was 53°. In the "B" mission the instrument cycle rates were an average of 1% slow where the simulated "$\beta$" angle was 0°.

The panoramic instrument S/N 119 (Slave) performance was satisfactory through orbit 15 of the "B" mission. Fail-safe occurred just prior to the end of a stereo instrument operation. Inspection revealed that the instrument had depleted the payload supply. Cycle rates for the slave panoramic instrument varied from 1% fast to 0.7% slow for the "A" mission and 0.5% fast to 2.0% slow in the "B" mission. The average deviation was 0.7% fast in the "A" mission and 1.4% slow in the "B" mission.

Tables 2-1, 2-2, 2-3, and 2-4 are a tabulation of cycle rate comparison made during the entire environmental test.

Evaluation of the test film showed that both cameras produced minor start-up Corona marking which was well within the acceptance criteria. The J-04 system was recommended for flight.

4. Stellar-Index Camera Performance

The "A" stellar index S/N D/39 operation was acceptable throughout the environmental test.

The "B" stellar index S/N D/19 failed to meter once in orbit 7 and failed completely in orbit 8. The failure was caused by a faulty take-up clutch. This take-up unit was replaced with a flight certified unit and faulty unit was returned to ITEK for repair.

5. Instrument Performance

The instrumentation system performed satisfactory throughout the test.

6. Temperature Environment

Two temperature sensor self heating calibrations were conducted. One in the "A" mode and one in the "B" mode. Results of the "A" mode calibration is included as Table 2-5. The "B" mode test was invalidated because the start of the test was improperly recorded.

The simulated temperature conditions were for a "S" angle of 53° during the "A" mission and a "S" angle of 0° for the "B" mission.

The following is a tabulation of the average instrument temperatures recorded at various times during the test.

AVERAGE INSTRUMENT-TEMPERATURES

| A Mode | Orbit 1 | Orbit 13 |
|---|---|---|
| Master Instrument | 65 | 73 |
| Slave Instrument | 69 | 81 |

| B Mode | Orbit 5 | Orbit 15 |
|---|---|---|
| Master Instrument | 67 | 58 |
| Slave Instrument | 70 | 61 |

7. Pressure Make-up System Performance

The pressure make-up system produced an internal pressure that varied from 15 microns to 45 microns. The internal pressure was stable once a pressure level was reached. The alphatron pressure gauge wiring in the TASC chamber was found to be defective. The pressure make-up system supply pressure depletion rate was 9.8 PSIA per minute of instrument operation. This rate is slightly higher than normal. The pressure regulator was found to have a high flow rate and was changed. The pressure depletion is graphically illustrated in Figure 2-1.

B. RESOLUTION TEST

The dynamic resolution test of the J-04 payload system was performed at the A/P facility on 8 January 1965. 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-04 system during the light leak test determined only minor fogging was present. The light leak integrity of the system was considered acceptable for flight.

D. FLIGHT LOADING CERTIFICATION

The J-04 flight readiness test was completed on 23 April 1965. Processed film exhibits from instrument 118 contained no anomolies. All data recording was present and acceptable. No density banding was evidenced. Processed film exhibits from instrument 119 contained multiple scratches and in some areas the emulsion coating was torn away from the Estar support. The multiple scratches on the emulsion side of the film proved to be from the take-up cassette retrieval operation. The torn emulsion coating defect was attributed to VAFB processing. The emulsion scratches and the torn emulsion effect present in the film exhibit from instrument 119 are attributed

to improper film handling and are considered not to represent J-04 system performance. All instrument 119 data recording was acceptable with no density banding evidenced in the test film exhibit. Processed readiness test film exhibits indicate that J-04 system is acceptable for flight.

The J-04 supply cassette was loaded with flight film on 23 April 1965. Supply cassette loading was completed without incident in 42 minutes. Cassette mate and final system operations were completed in 8 hours on 24 April 1965. J-04 system was certified for flight.

[redacted]

J-04 118/119 ENVIRONMENTAL TEST CYCLE RATES 12-15-64

| REV/MODE | | RAMP | | T.U.R. | INST 118 ACT. | INST 118 NOM. | INST 118 DEV. | INST 119 ACT. | INST 119 NUM. | INST 119 DEV. | 118/119 DIFF. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | A | 7 | 7 | 375 | 3.510 | 3.504 | -0.17 | 3.530 | 3.505 | -0.71 | 0.57 |
| 2 | A | 4 | 1 | 1428 | 2.173 | 2.184 | 0.52 | | | | |
| 2 | A | 4 | 1 | 1593 | | | | 2.173 | 2.166 | -0.33 | |
| 2 | A | 4 | 1 | 2128 | 2.140 | 2.158 | 0.85 | 2.160 | 2.160 | 0.02 | 0.93 |
| 3 | A | 5 | 8 | 703 | 2.873 | 2.898 | 0.88 | 2.886 | 2.896 | 0.33 | 0.45 |
| 3 | A | 5 | 8 | 1548 | 2.430 | 2.442 | 0.51 | 2.440 | 2.437 | -0.14 | 0.41 |
| 4 | A | 7 | 7 | 2275 | 2.546 | 2.570 | 0.92 | 2.550 | 2.565 | 0.57 | 0.16 |
| 5 | A | 8 | 2 | 325 | 5.080 | 5.123 | 0.83 | 5.130 | 5.131 | 0.02 | 0.98 |
| 5 | A | 8 | 2 | 0 | 5.410 | 5.523 | 2.04 | 5.470 | 5.533 | 1.13 | 1.11 |
| 6 | A | 11 | 1 | 1450 | 2.626 | 2.685 | 2.21 | 2.653 | 2.681 | 1.05 | [redacted] |
| 6 | A | 11 | 1 | 1980 | 2.270 | 2.300 | 1.31 | 2.285 | 2.293 | 0.33 | 0.66 |
| 7 | A | 5 | 8 | 1075 | 2.660 | 2.702 | 1.54 | 2.683 | 2.698 | 0.54 | 0.86 |
| 7 | A | 5 | 8 | 1425 | 2.465 | 2.496 | 1.23 | 2.480 | 2.490 | 0.40 | 0.61 |
| 8 | A | 7 | 7 | 1175 | 2.846 | 2.874 | 0.96 | 2.870 | 2.871 | 0.03 | 0.84 |
| 8 | A | 7 | 7 | 1600 | 2.533 | 2.563 | 1.16 | 2.550 | 2.558 | 0.30 | 0.67 |
| 8 | A | 7 | 7 | 2525 | 2.703 | 2.731 | 1.03 | 2.720 | 2.727 | 0.27 | 0.63 |
| 9 | A | 4 | 1 | 1000 | 2.713 | 2.751 | 1.37 | 2.723 | 2.747 | 0.81 | 0.37 |
| 9 | A | 4 | 1 | 1745 | 2.138 | 2.158 | 0.92 | | | | |
| 9 | A | 4 | 1 | 2600 | | | | 2.320 | 2.295 | -1.10 | |
| 9 | A | 4 | 1 | 3205 | 3.370 | 3.432 | 1.80 | 3.410 | 3.432 | 0.65 | 1.19 |
| 10 | A | 11 | 1 | 875 | 4.420 | 4.483 | 1.40 | 4.475 | 4.489 | 0.31 | 1.24 |
| 10 | A | 11 | 1 | 1885 | 2.265 | 2.299 | 1.49 | 2.275 | 2.292 | 0.76 | 0.44 |

Table 2-1

[redacted]

| REV/MODE | | RAMP | | T.U.R. | INST 118 ACT. | INST 118 NOM. | INST 118 DEV. | INST 119 ACT. | INST 119 NOM. | INST 119 DEV. | 118/119 DIFF. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | A | 11 | 1 | 2975 | 4.330 | 4.440 | 2.47 | 4.380 | 4.446 | 1.48 | 1.15 |
| 11 | A | 7 | 7 | 275 | 3.515 | 3.553 | 1.06 | 3.540 | 3.554 | 0.40 | 0.71 |
| 11 | A | 7 | 7 | 2055 | 2.455 | 2.497 | 1.70 | 2.475 | 2.492 | 0.67 | 0.81 |
| 11 | A | 7 | 7 | 2370 | 2.566 | 2.622 | 1.36 | 2.600 | 2.617 | 0.64 | 0.54 |
| 12 | A | 8 | 2 | 1150 | 2.940 | 2.985 | 1.51 | 2.970 | 2.983 | 0.43 | 1.02 |
| 12 | A | 8 | 2 | 1751 | | | | 2.180 | 2.192 | 0.56 | |
| 13 | A | 8 | 2 | 840 | 3.605 | 3.702 | 2.63 | 3.640 | 3.705 | 1.74 | 0.97 |
| 13 | A | 4 | 1 | 2625 | 2.345 | 2.342 | -0.13 | 2.330 | 2.335 | 0.22 | -0.64 |
| 14 | A | 11 | 1 | 1975 | 2.270 | 2.299 | 1.28 | 2.280 | 2.292 | 0.54 | 0.44 |
| 14 | A | 11 | 1 | 3075 | 4.840 | 4.896 | 1.14 | 4.890 | 4.904 | 0.28 | 1.03 |
| 15 | A | 5 | 8 | 1931 | 2.350 | 2.369 | 0.81 | 2.355 | 2.363 | 0.33 | [illegible] |
| 15 | A | 5 | 8 | 3095 | 2.840 | 2.867 | 0.93 | 2.853 | 2.864 | 0.37 | 0.46 |
| CW | A | 8 | 2 | 0 | 5.650 | 5.523 | -2.30 | 5.710 | 5.533 | -3.20 | 1.06 |
| 1 | B | 7 | 7 | 385 | 3.465 | 3.498 | 0.96 | 3.480 | 3.499 | 0.56 | 0.43 |
| 2 | B | 4 | 1 | 1430 | 2.150 | 2.184 | 1.55 | | | | |
| 2 | B | 4 | 1 | 1610 | | | | 2.140 | 2.165 | 1.15 | |
| 2 | B | 4 | 1 | 2130 | 2.125 | 2.158 | 1.54 | 2.135 | 2.160 | 1.18 | 0.47 |
| 3 | B | 5 | 8 | 730 | 2.860 | 2.885 | 0.85 | 2.870 | 2.882 | 0.41 | 0.35 |
| 3 | B | 5 | 8 | 1545 | 2.440 | 2.444 | 0.15 | 2.430 | 2.438 | 0.31 | -0.41 |
| 4 | B | 7 | 7 | 2580 | 2.770 | 2.777 | 0.26 | 2.780 | 2.774 | -0.23 | 0.36 |
| 5 | B | 8 | 2 | 336 | 5.080 | 5.097 | 0.33 | 5.100 | 5.105 | 0.10 | 0.39 |
| 5 | B | 8 | 2 | 1730 | 2.188 | 2.201 | 0.61 | | | | |

Table 2-2

[redacted]

| REV/MODE | | RAMP | | T.U.R. | INST 118 ACT. | NUM. | DEV. | INST 119 ACT. | NUM. | DEV. | 118/119 DIFF. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | B | 8 | 2 | 2250 | | | | 2.255 | 2.261 | 0.27 | |
| 6 | B | 11 | 1 | 1450 | 2.680 | 2.685 | 0.20 | 2.673 | 2.681 | 0.30 | -0.26 |
| 6 | B | 11 | 1 | 2035 | 2.310 | 2.313 | 0.15 | 2.310 | 2.306 | -0.15 | -0. |
| 7 | B | 5 | 8 | 1090 | 2.710 | 2.694 | -0.82 | 2.726 | 2.690 | -1.35 | 0.37 |
| 7 | B | 5 | 8 | 1450 | 2.512 | 2.484 | -1.14 | 2.512 | 2.478 | -1.37 | -0. |
| 8 | B | 7 | 7 | 1180 | 2.887 | 2.869 | -0.63 | 2.893 | 2.866 | -0.95 | 0.21 |
| 8 | B | 7 | 7 | 1595 | 2.583 | 2.565 | -0.70 | 2.593 | 2.560 | -1.29 | 0.39 |
| 8 | B | 7 | 7 | 2530 | 2.763 | 2.735 | -1.02 | 2.766 | 2.731 | -1.27 | 0.11 |
| 9 | B | 4 | 1 | 1015 | 2.733 | 2.725 | -0.30 | 2.733 | 2.721 | -0.44 | -0. |
| 9 | B | 4 | 1 | 1745 | 2.148 | 2.158 | 0.46 | | | | |
| 9 | B | 4 | 1 | 2605 | | | | 2.353 | 2.303 | -2.1 | [redacted] |
| 9 | B | 4 | 1 | 3200 | 3.445 | 3.421 | -0.70 | 3.465 | 3.422 | -1.27 | [redacted] |
| 10 | B | 11 | 1 | 880 | 4.480 | 4.461 | -0.42 | 4.495 | 4.467 | -0.62 | 0.33 |
| 10 | B | 11 | 1 | 1865 | 2.295 | 2.303 | 0.34 | 2.300 | 2.296 | -0.18 | 0.22 |
| 10 | B | 11 | 1 | 2960 | 4.420 | 4.377 | -0.99 | 4.440 | 4.382 | -1.32 | 0.45 |
| 11 | B | 7 | 7 | 0 | 3.640 | 3.610 | -0.83 | 3.650 | 3.612 | -1.06 | 0.27 |
| 11 | B | 7 | 7 | 140 | 3.615 | 3.596 | -0.53 | 3.645 | 3.598 | -1.32 | 0.83 |
| 11 | B | 7 | 7 | 1910 | 2.500 | 2.487 | -0.54 | 2.505 | 2.481 | -0.97 | 0.20 |
| 11 | B | 7 | 7 | 2280 | 2.596 | 2.572 | -0.93 | 2.593 | 2.567 | -1.01 | -0.12 |
| 12 | B | 8 | | 1850 | | | | 2.183 | 2.189 | 0.25 | |
| 13 | B | 8 | 2 | 845 | 3.745 | 3.689 | -1.51 | 3.755 | 3.692 | -1.72 | 0.27 |
| 13 | B | 8 | 2 | 2740 | 2.350 | 3.060 | 23.20 | 2.375 | 3.058 | 22.33 | 1.06 |

Table 2-3

[redacted]

| REV/MODE | RAMP | T.U.K. | INST 118 ACT. | INST 118 NOM. | INST 118 DEV. | INST 119 ACT. | INST 119 NOM. | INST 119 DEV. | 118/119 DIFF. |
|---|---|---|---|---|---|---|---|---|---|
| 14 B | 11 1 | 1975 | 2.310 | 2.299 | -0.46 | 2.330 | 2.292 | -1.64 | 0.87 |
| 14 B | 11 1 | 3065 | 4.920 | 4.848 | -1.49 | 4.930 | 4.855 | -1.54 | 0.20 |
| 15 B | 5 8 | 1935 | 2.400 | 2.369 | -1.30 | 2.413 | 2.363 | -2.13 | 0.54 |
| 15 B | 5 8 | 3115 | 2.913 | 2.877 | -1.25 | 2.930 | 2.874 | -1.95 | 0.58 |
| 16 B | 8 2 | 1735 | 2.213 | 2.201 | -0.55 | 2.188 | 2.193 | 0.24 | -1.13 |

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 2-4

[redacted]

VEHICLE 1613 PAYLOAD J-04 SELF HEATING TEST

SUMMARY OF SELF HEATING CORRECTION CURVES

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 39 TC2 | 37 TC1 | 31 203 | 33 204 | 36 205 | 28 113 | 50 211 | |
| 53 BAT | 21 SS1 | 20 110 | 41 207 | 44 CA1 | 55 213 | 23 111 | |
| | 40 SS2 | 08 105 | | | | | |
| | 10 106 | 18 109 | | | | | |
| | | 03 103 | | | | | |
| | | 13 107 | | | | | |
| | | 38 206 | | | | | |
| | | 48 210 | | | | | |
| | | 15 108 | | | | | |
| | | 25 112 | | | | | |
| | | 43 208 | | | | | |
| | | 52 212 | | | | | |
| | | 05 104 | | | | | |
| | | 46 209 | | | | | |

| TIME | NO. 1 | NO. 2 | NO. 3 | NO. 4 | NO. 5 | NO. 6 | NO. 7 |
|---|---|---|---|---|---|---|---|
| 0.10 | -0.1 | 0.8 | 1.0 | 2.4 | 2.3 | 2.4 | 4.5 |
| 0.13 | 0.0 | 1.0 | 1.2 | 2.5 | 2.5 | 2.6 | 5.2 |
| 0.16 | 0.1 | 1.1 | 1.4 | 2.7 | 2.8 | 2.9 | 6.2 |
| 0.20 | 0.2 | 1.3 | 1.6 | 2.9 | 3.0 | 3.2 | 7.3 |
| 0.25 | 0.3 | 1.5 | 1.9 | 3.2 | 3.3 | 3.6 | 8.7 |
| 0.32 | 0.5 | 1.9 | 2.2 | 3.5 | 3.7 | 4.2 | 10.5 |
| 0.40 | 0.6 | 2.2 | 2.7 | 4.0 | 4.2 | 4.8 | 12.8 |
| 0.50 | 0.9 | 2.7 | 3.3 | 4.5 | 4.8 | 5.7 | 15.7 |
| 0.63 | 1.0 | 2.8 | 3.5 | 4.8 | 5.1 | 6.1 | 16.6 |
| 0.79 | 1.1 | 3.0 | 3.8 | 5.1 | 5.5 | 6.7 | 17.8 |
| 1.00 | 1.2 | 3.2 | 4.2 | 5.5 | 5.9 | 7.4 | 19.3 |
| 1.26 | 1.3 | 3.4 | 4.4 | 5.7 | 6.2 | 7.8 | 20.1 |
| 1.58 | 1.4 | 3.5 | 4.7 | 6.1 | 6.6 | 8.4 | 21.1 |
| 2.00 | 1.6 | 3.7 | 5.1 | 6.5 | 7.2 | 9.1 | 22.3 |
| 2.51 | 1.6 | 3.8 | 5.3 | 6.7 | 7.5 | 9.4 | 22.8 |
| 3.16 | 1.7 | 3.9 | 5.5 | 6.9 | 7.9 | 9.8 | 23.5 |
| 3.98 | 1.8 | 4.1 | 5.8 | 7.3 | 8.3 | 10.4 | 24.3 |
| 5.01 | 2.0 | 4.2 | 6.1 | 7.7 | 9.0 | 11.0 | 25.3 |
| 6.31 | 2.0 | 4.4 | 6.3 | 7.9 | 9.3 | 11.3 | 25.7 |
| 7.94 | 2.1 | 4.5 | 6.5 | 8.1 | 9.8 | 11.7 | 26.1 |
| 10.00 | 2.2 | 4.7 | 6.8 | 8.4 | 10.4 | 12.1 | 26.7 |
| 12.59 | 2.3 | 4.8 | 7.0 | 8.6 | 10.9 | 12.4 | 27.0 |
| 15.85 | 2.3 | 5.0 | 7.2 | 8.8 | 11.4 | 12.6 | 27.3 |
| 19.95 | 2.4 | 5.2 | 7.5 | 9.1 | 12.1 | 12.8 | 27.6 |
| 25.12 | 2.5 | 5.4 | 7.6 | 9.2 | 12.5 | 12.8 | 27.7 |
| 31.62 | 2.5 | 5.6 | 7.7 | 9.3 | 13.0 | 12.8 | 27.7 |
| 39.81 | 2.6 | 5.8 | 7.9 | 9.5 | 13.7 | 12.8 | 27.8 |
| 50.12 | 2.6 | 6.1 | 8.1 | 9.7 | 14.5 | 12.8 | 27.8 |
| 63.10 | 2.7 | 6.4 | 8.2 | 9.8 | 15.1 | 12.6 | 27.7 |
| 79.43 | 2.7 | 6.7 | 8.3 | 9.8 | 15.8 | 12.3 | 27.5 |
| 100.00 | 2.8 | 7.1 | 8.5 | 9.9 | 16.7 | 11.9 | 27.3 |

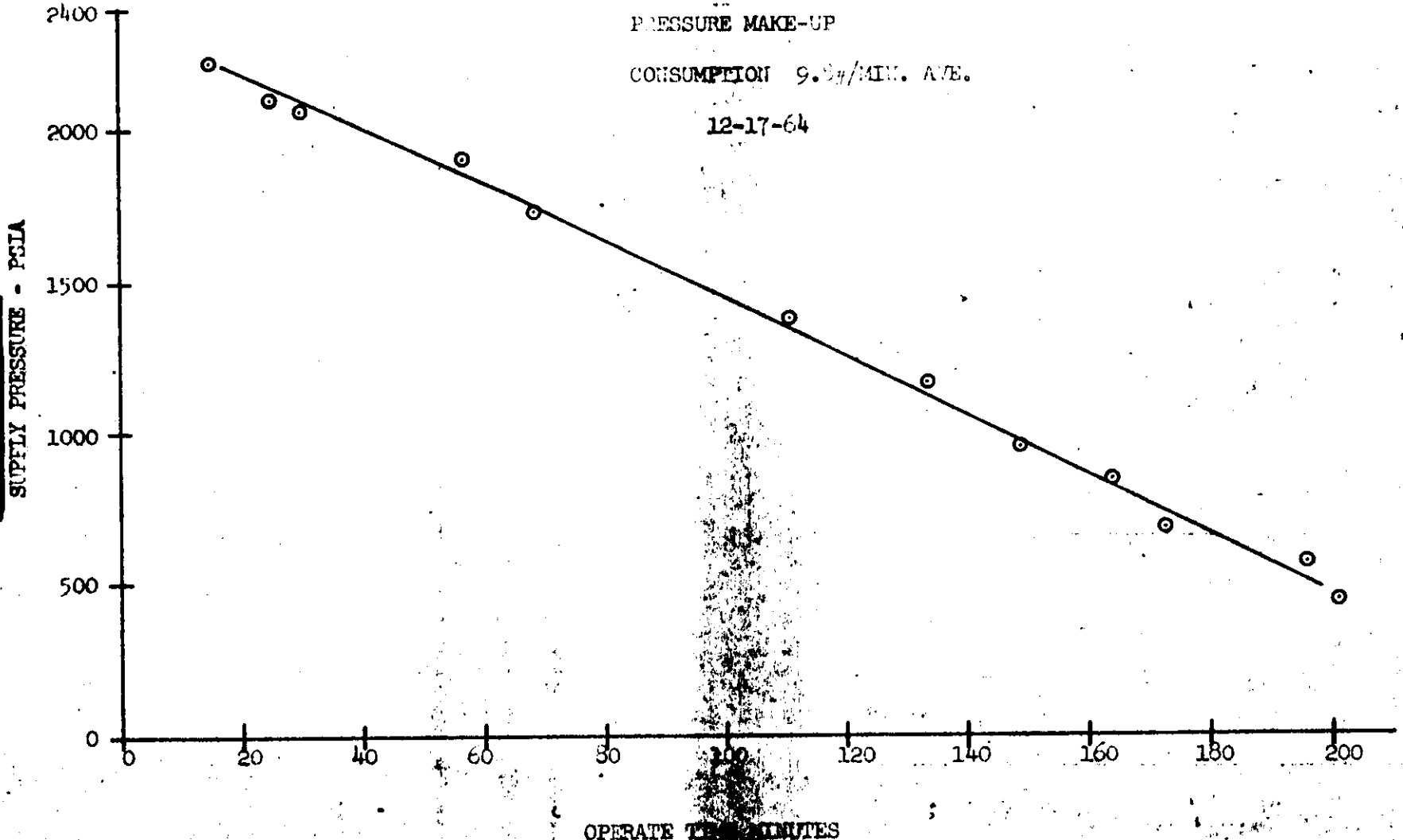
Table 2-5

J-04 TASC

PRESSURE MAKE-UP

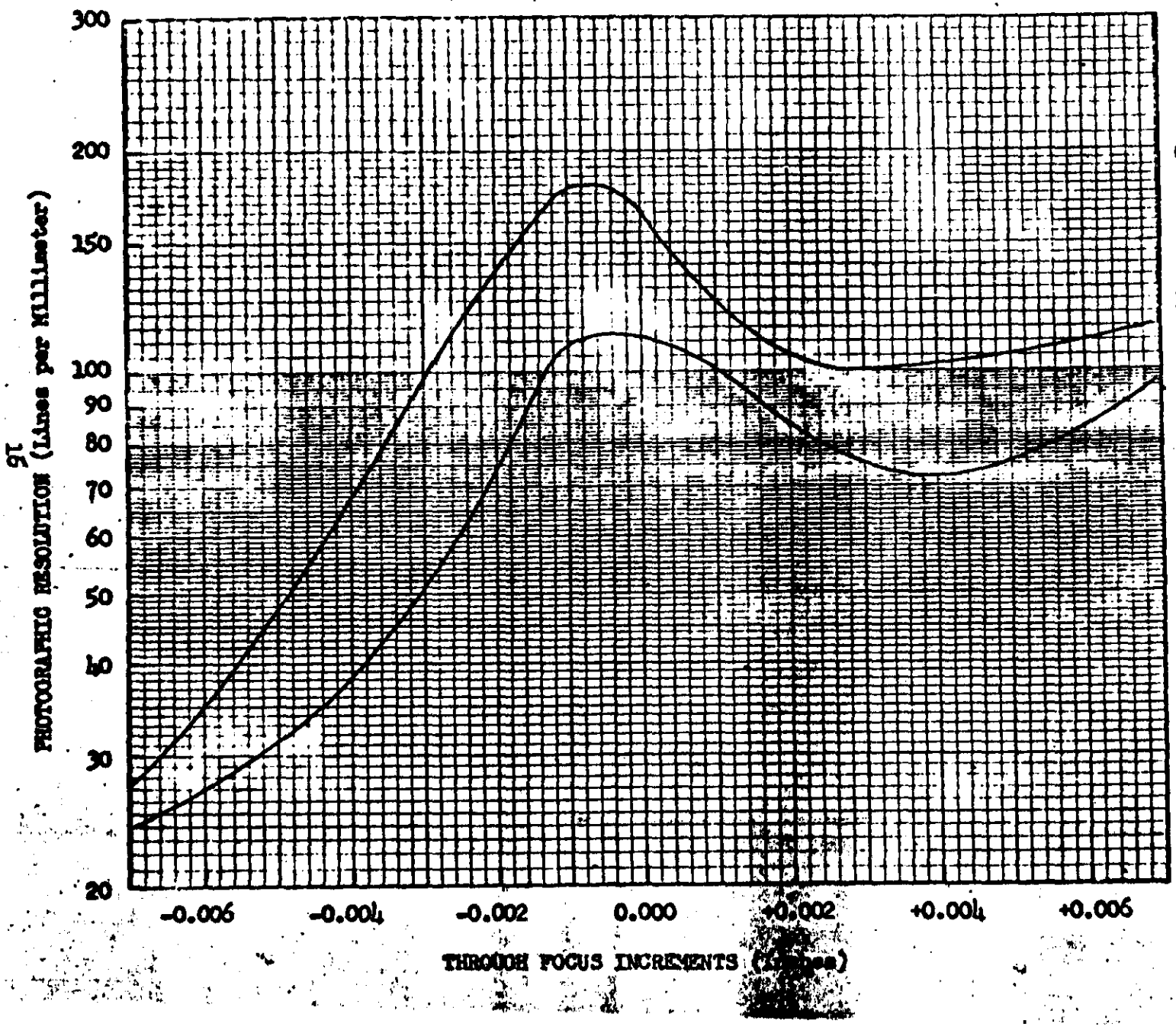
CONSUMPTION 9.[illegible]#/MIN. AVE.

12-17-64



[redacted]

## PRE-FLIGHT DYNAMIC RESOLUTION




Camera No: 118

Payload No: J-04

Resolution (1/mm)

High Contrast: 179

Low Contrast: 112

Film Type: 3404

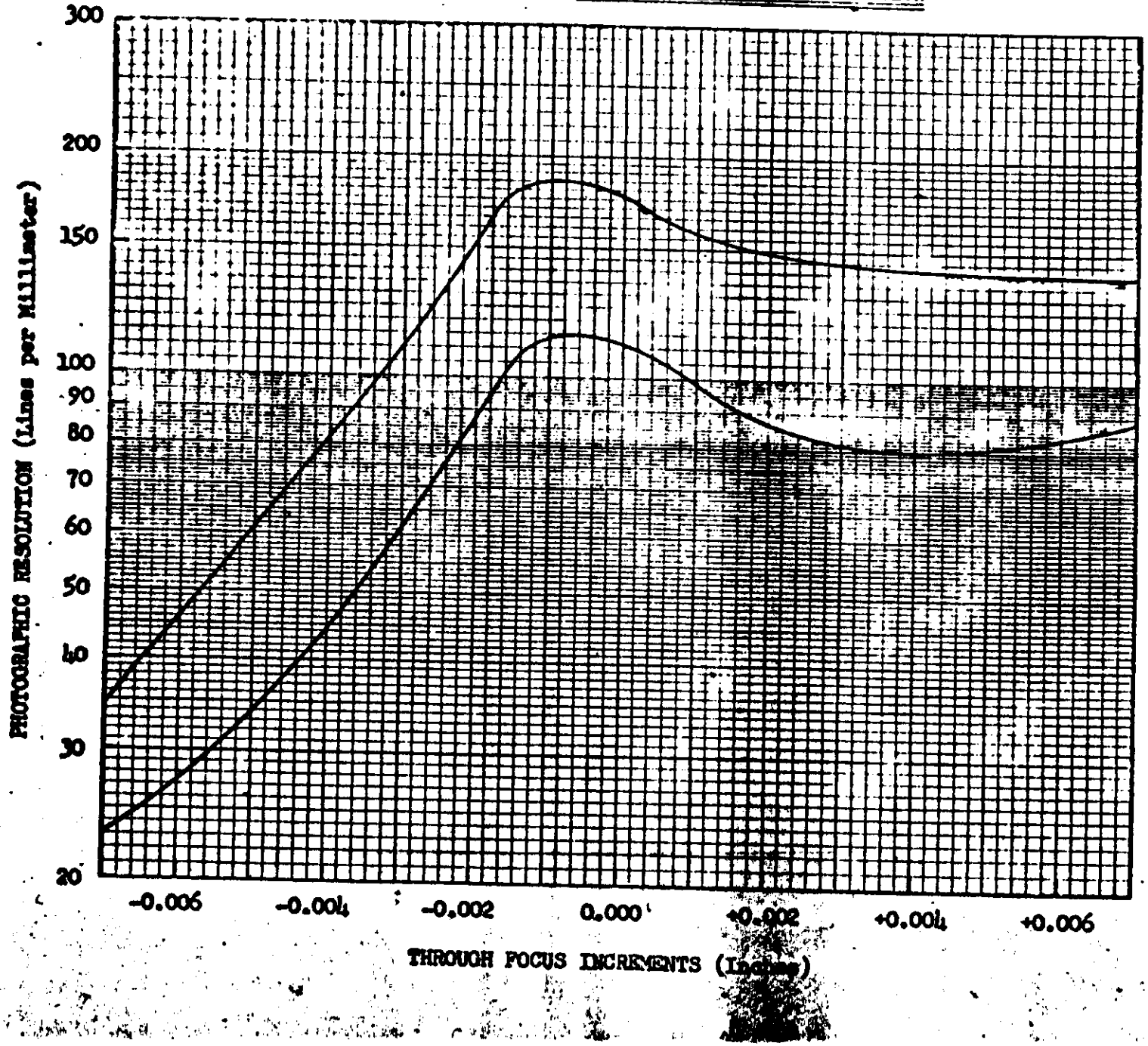
Test Date: 1/8/65

Figure 2-2

[redacted]

TOP SECRET [redacted]

## PRE-FLIGHT DYNAMIC RESOLUTION




Camera No: 119

Payload No: J-04

Resolution (1/mm)

High Contrast: 186

Low Contrast: 114

Film Type: 3404

Test Date: 1/8/65

Figure 2-3

TOP SECRET [redacted]

## SECTION 3

## FLIGHT OPERATIONS

### A. INSTRUMENTATION AND COMMAND PERFORMANCE

The telemetry instrumentation was satisfactory throughout the flight. The only exception was the film footage pot for the slave instrument payload on the -2 SRV take-up cassette unit. Erratic TLM voltage levels were observed on both Auggie and [redacted] microwave data from orbit 110 throughout the remainder of the flight, or to orbit 142. The pot voltage monitor (13-1-31) read 2.7 volts which was the proper level corresponding to the cycle counter data. At instrument "on" command for the orbit 110, [redacted] Engineering Operation, the pot voltage level stepped down to 1.5 volts. After 45 seconds the level changed to 2.1v and remainded at this level for 8 seconds. The level changed to 1.5v for another 28 seconds and then back to 2.1v until fade. During subsequent acquisitions stable voltage levels from 2.0 to 3.45 volts were indicated. After orbit 133 the level remained at approximately 3.0 volts.

The command system performance was satisfactory throughout the flight except for the loss of three stereo operations (131 cycles) programmed on orbit 53 and an inadvertent instrument turn-on during orbit 76 over the [redacted] The three programmed stereo operations consisting of 23, 76, and 32 cycles were missed on orbit 53 descending. The RTC settings were:

| RTC | 6 | 8 | 9 | 10 | 11 | 12 | 15 |
|---|---|---|---|---|---|---|---|
| POS. | 8 | 3 | 6 | 4 | 7 | 8 | 1 |

With the real time command switches in the above position, the instrument should have turned on with a brush 40 command. Analysis disclosed the following:

1. The RTC command settings were verified by Auggie data on orbits 53 and 54 and the tracking data from orbit 53 [redacted] acquisition. All RTC settings were in the proper position.
2. The H-timer brush 40 which turns the instruments "on" when RTC-9 is in program 6 functioned properly for operations during orbits 3, 4, 56, 71, 80 through 85, 103, 128 and 132.

3. The H-timer tape verification list verified that the brush 40 punches were on the tape.
4. A 400 cycle power failure would have caused a 1 cycle instrument operation when power resumed. This did not occur.
5. A ± 28v regulated power failure would have caused a clock time discontinuity. The clock time was continuous throughout the entire flight.
6. A 24v unregulated power failure cannot be determined.
7. The possibility of a stepper switch failure for either RTC 9, 11, 12 or 15 is discounted because identical settings were used on orbit 71 Engineering Operation and the instruments responded properly.
8. This malfunction was not repeated for any other programmed operation during the remainder of the flight.

During orbit 76, [redacted] acquisition, the instruments were inadvertently commanded "on". An error made in converting latitude to system time resulted in an RTC-12 being sent which put the system into an "on" mode during a stored program. (Program 1). RTC-9 was commanded to program 3 prior to the brush 31 which was the stored command to turn the instrument off. The "redundant off" brush 28 command was then required for instrument off. The instruments operated for 11 cycles before shut-down.

B. PANORAMIC CAMERA PERFORMANCE

Engineering operations were observed on TLM for several orbits acquired by the [redacted] Tracking Station. Table 3-1 presents the cycle rate data for these instrument operations.

Instrument dynamics were good for each of the operations observed as indicated by the center-of-format, lens rotation, film supply, and film take-up monitors. Payload transport was smooth. Instrument start-up and shut-down was normal for each operation observed.

The master instrument operated approximately 1.5% faster then the slave throughout both missions. Cycle rates obtained for the Engineering Operations indicated that the instruments were operating within ± 3% of the nominal cycle rate data. Average 99/101 clutch ratios were 7/6 and 6/6 for master and slave, respectively.

Film consumption for the flight was as follows:

Mission 1019-1

| | Master | Slave |
|---|---|---|
| Cycles | 2955 | 2953 |
| Feet | 7816 | 7811 |

Mission 1019-2*

| | | |
|---|---|---|
| Cycles | 3085 | 3094 |
| Feet | 8160 | 8184 |

*The values given for the 1019-2 mission represent the amount of payload in the capsule at the time that recovery was attempted.

All of the payload was used up during the flight. Payload depletion for the slave instrument was observed by TLM during the Engineering Operation on orbit 142. The master instrument ran out of payload during orbit 143. The above consumption value for the master instrument during -2 mission was estimated since the payload was already depleted when the instrument operation was observed on TLM during orbit 142.

The V/H ramp setting of Ramp 8, Amplitude 3 provided a satisfactory FMC match for the entire flight. The V/H ramp start delay selector, RTC-10 was changed from position 6 to position 4 at orbit 5 to adjust the V/H ramp start time to compensate for the difference in predicted and actual perigee latitude (See Orbital Parameters, Section 1).

Payload consumption was up to 3.75% slower than nominal for the master instrument during the -1 mission and .2% slower during the -2 mission. The slave instrument consumption was 5.5% and 1.5% slower for the -1 and -2 missions, respectively.

C. STELLAR-INDEX PERFORMANCE

Both -1 and -2 stellar-index units operated normally during the flight. All of the S/I programmer commands occurred in their proper sequence. S/I metering was observed on TLM for all of the Engineering Operations acquired at [redacted] Shutter pulses were observed during orbits 16, 31, 47, 63, 79, 94, 110, 126, and 142 which were daytime passes over [redacted] Metering ratios were 7/3 and 8/3 for both units. The index payload was out prior to Rev 142 which was the last time the S/I was observed on TLM prior to -2 recovery attempt.

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 times 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 - $y = a_2x^2 + a_1x + a_0$, where y = corrected system time and x = clock time.

E. PRESSURE MAKE-UP SYSTEM PERFORMANCE

The PMU system operated satisfactorily throughout both missions of the flight.

The supply pressure decay history is shown on Figure 3-1 where the supply bottle pressure is plotted as a function of total instrument operate time. The pressure values plotted were obtained from [redacted] TIM acquisitions. The average gas consumption rate for the flight was 6.9 psi/min.

F. TEMPERATURE ENVIRONMENT

The temperature data obtained on [redacted] TLM acquisitions are summarized on Table 3-3. Predicted and actual flight temperatures are compared in Figures 3-2 to 3-4.

The average instrument temperatures were within tolerance, $70 \pm 10^{\circ}F$, for the entire flight.

J-04/1614 MISSION 1019-CYCLE RATE SUMMARY-ENGR. OPERATIONS

| REV/MODE | RAMP | T.U.R. | INST 118 ACT. | INST 118 NOM. | INST 118 DEV. | INST 119 ACT. | INST 119 NOM. | INST 119 DEV. | 118/119 DIFF. |
|---|---|---|---|---|---|---|---|---|---|
| 8 A | 8 3 | 259 | 4.750 | 4.866 | 2.38 | 4.830 | 4.874 | 0.89 | 1.68 |
| 16 A | 8 3 | 1821 | 2.224 | 2.236 | 0.52 | 2.272 | 2.228 | -1.97 | 2.16 |
| 24 A | 8 3 | 316 | 4.710 | 4.774 | 1.34 | 4.760 | 4.781 | 0.45 | 1.06 |
| 31 A | 8 3 | 1963 | 2.215 | 2.223 | 0.37 | 2.251 | 2.216 | -1.60 | 1.63 |
| 47 A | 8 3 | 1936 | 2.237 | 2.222 | -0.67 | 2.278 | 2.214 | -2.87 | 1.83 |
| 56 A | 8 3 | 432 | 4.495 | 4.549 | 1.19 | 4.573 | 4.556 | -0.38 | 1.74 |
| 63 A | 8 3 | 2012 | 2.230 | 2.230 | -0.01 | 2.260 | 2.222 | -1.70 | 1.35 |
| 71 A | 8 3 | 485 | 4.397 | 4.434 | 0.84 | 4.453 | 4.440 | -0.29 | 1.27 |
| 79 A | 8 3 | 2085 | 2.254 | 2.250 | -0.19 | 2.288 | 2.242 | -2.05 | [redacted] |
| 87 B | 8 3 | 541 | 4.248 | 4.308 | 1.38 | 4.316 | 4.313 | -0.07 | [redacted] |
| 94 B | 8 3 | 2142 | 2.275 | 2.274 | -0.05 | 2.306 | 2.267 | -1.73 | 1.36 |
| 110 B | 8 3 | 2124 | 2.289 | 2.265 | -1.04 | 2.298 | 2.258 | -1.76 | 0.39 |
| 126 B | 8 3 | 2159 | 2.317 | 2.283 | -1.50 | 2.330 | 2.276 | -2.39 | 0.56 |
| 142 B | 8 3 | 2223 | 2.327 | 2.322 | -0.21 | 2.360 | 2.315 | -1.94 | 1.42 |

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