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CORONA J

PERFORMANCE EVALUATION REPORT

MISSION 1026-1 and 1026-2

FTV 1620; J-25

20 June 1966

Approved: [redacted]
Mgr.
Advanced Projects

Approved [redacted]
Mgr.
Program [redacted]

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NO. [redacted]

22 July 1966

To: V. Webb
C. Murphy
A. Johnson
[redacted]

Thru: [redacted]

From: [redacted]

Subject: MISSION 1026-1 AND 1026-2 FINAL REPORT

Enclosed is the Final Performance Evaluation Report for Mission 1026-1 and 1026-2.

[redacted]
Manager
Advanced Projects

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FOREWORD

This report details the performance of the payload system during the operational phase of the Flight Test Vehicle 1620.

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 1026-1 and 1026-2 which was launched on 28 October 1965.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ILLUSTRATIONS

INTRODUCTION

This report presents the final performance evaluation of Missions 1026-1 and 1026-2 of the Corona Program. The purpose of this report is to define the performance characteristics of the J-25 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 [redacted] frame correlation times are made at NPIC who also supply the [redacted] Summary and MTF/AIM resolution reports published [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 1026, placed into orbit by Flight Test Vehicle #1620 and LV-2A booster #439, 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-25 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 2117:12 Z (1417:12 PDT) on 28 October 1965. 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 at [redacted] under central control of the Satellite Test Center at Sunnyvale, California. Mission 1026-1 consisted of a 5 day operation and was completed by air recovery on 2 Nov[illegible] 1965. Mission 1026-2 was completed with an air recovery on 7 Nove[illegible] 1965 following a 5 day photographic operation.

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

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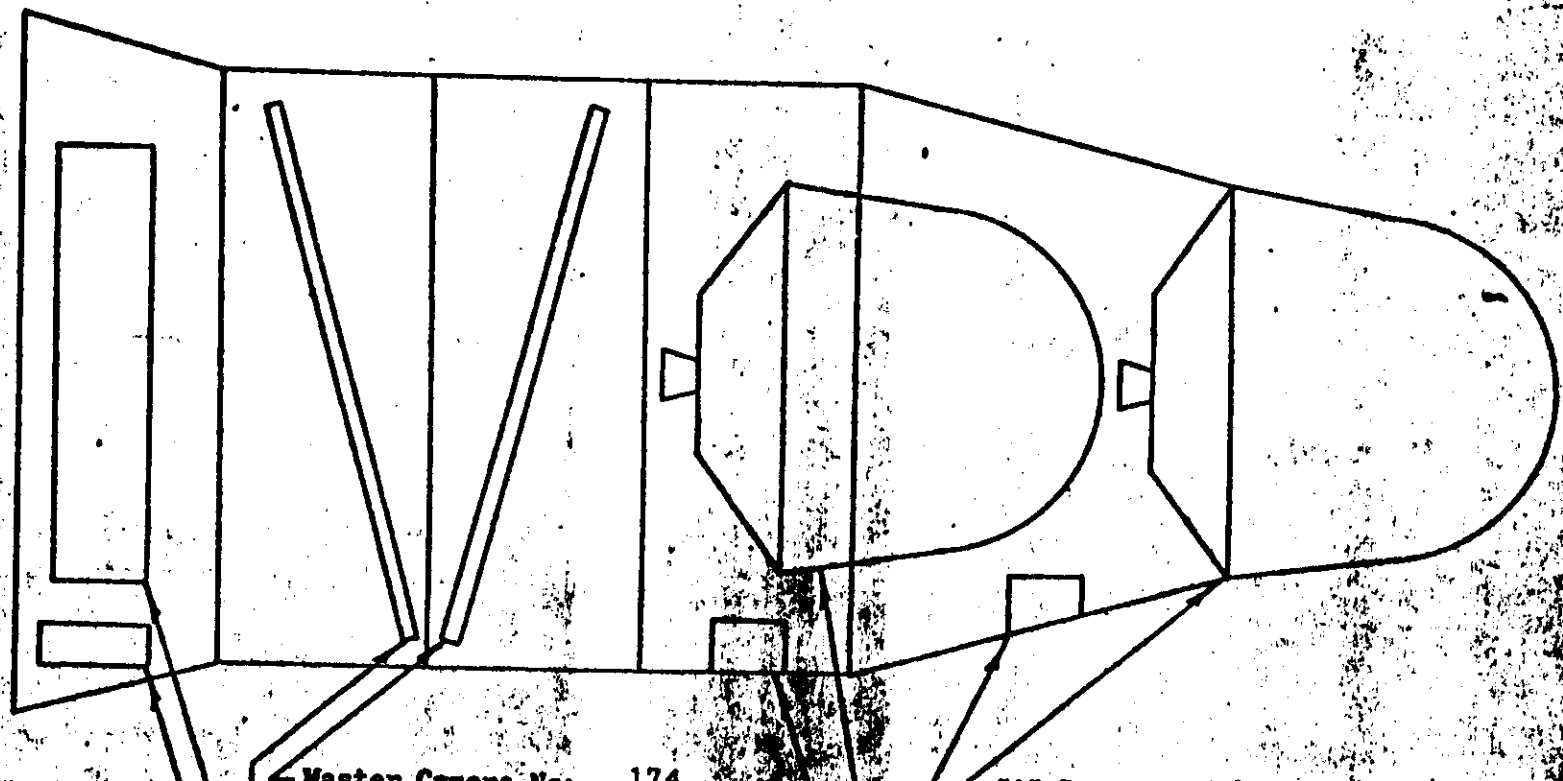
SCHEMATIC INBOARD PROFILE - CORONA J SYSTEM

MISSION 1026



FIGURE

ORBITAL PARAMETERS

Parameter	Predicted	Orbit 1 Actuals
Period (Min.)	90.72	90.77
Perigee (N. M.)	99.8	95.12
Apogee (N. M.)	238.1	240.6
Inclination (Deg.)	75.00	74.98
Perigee Latitude (Deg. N.)	23.00	10.05
Eccentricity	0.0192	0.02041

C. PANORAMIC CAMERAS

The Master instrument operated normally through both missions. The photo quality suffered from heavy haze, low sun elevations and 50% cloud cover.

The Slave instrument photo quality was rated as being slightly better than the Master. The center of format switch operated intermittently from pass D-24 thru D-70.

The horizon cameras on the sun side of the vehicle exhibited veiling on both missions.

D. STELLAR-INDEX CAMERAS

The "A" S/I produced star imagery adequate to determine the vehicle attitude. Four stellar frames were affected by shutter malfunction. The index camera produced no anomalies.

The "B" S/I camera operation is rated as excellent.

E. OTHER SUB-SYSTEMS

The clock, instrumentation, command and thermal control subsystems performed satisfactorily.

F. CONCLUSIONS

Mission 1026 achieved its objective of search and reconnaissance, however atmospheric conditions obscured some target areas.

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

2. Test Summary

The J-25 payload system was subjected to an environmental TASC Chamber test from July 10 through July 17, 1965. The environmental test consisted of 13 orbits in the "B" mode. The payload was removed from the chamber on two occasions as a result of two fail-safes. This was done between prbit 13 in the "A" mode and the "A" recovery sequence.

Panoramic camera #1 experienced erratic payload metering, cycle period in excess of the 2.15 sec. maximum at one point, cycle rate errors ranging from 1.9% fast to 2.9% slow, and two fail-safes.

Instrument #2 performance was satisfactory except the cycle rate errors ranged from 0 to 4.5% slow in the "A" mode and 0.4% to 2.6% slow in the "B" mode.

The stellar/index camera performance was satisfactory throughout both the "A" and "B" mode of operation.

The clock performance was out of allowable offset limits.

The instrumentation system performance was satisfactory with the exception of several noisy idler commutators and Sanborn channel setup discrepancies.

The PMU system operation was satisfactory with the average gas depletion rate being somewhat higher than normal.

The temperature environment was cold for the "A" mode and near 70° for the "B" mode.

3. Panoramic Camera Performance

Instrument #1 performance disclosed the following problems:

a. Erratic metering in the "A" mode.

b. Cycle rate predictability exceeded the 1% specification limit in the "A" mode.

c. Two fail-safes occurred in the "A" mode and the payload was pulled out of the rails.

d. Cycle period exceeded the maximum limit of [redacted] sec. on one operation.

Payload metering was erratic as observed on the takeup idler. Uneven payload motion was also indicated on the supply idler monitor. On orbit 2, "B" mode, the cycle period exceeded the maximum allowable of 2.15 secs. This occurred at 2130 seconds up the ramp of R4A1 and was 1.9% faster than predicted. A cycle period was obtained in orbit 2, "A" mode, which was within 1% of the predicted cycle period.

The instrument had two fail-safes during the test. The first occurred near the end of orbit 13 during the mono portion of a stereo surpress operation. The chamber was brought to [redacted]spheric pressure and the system was inspected and no [redacted]malies were detected. The system was reinstalled in the environmental chamber and the test was restarted at orbit 12 of the "A" mode. Fail-safe occurred again during the stereo portion of the stereo surpress operation in orbit 13. The system was again removed from the chamber. The master instrument film was found to be out of the rails and the takeup cassettes of the "A" SRV was found to be rubbing. Erratic payload metering was evident on both instruments prior to each fail-safe. The system

was transferred to the "B" mode by performing a cut and wrap recovery sequence. A confidence run was made and the system reinstalled in the chamber. Instrument #1 completed the test without further problems.

Instrument #2 performance was satisfactory except cycle rate errors ranged from 0 to 4.5% slow in the "A" mode and 0.4 to 2.6% slow in the "B" mode. The chamber temperature was low in the "A" mode and more nearly normal in the "B" mode. Analysis is continuing to establish the degree of correlation, if any, between cycle rate error and temperature.

The supply cassette rotation monitor indicated supply cassette rotation in the latter half of the "B" mode of operation.

A tabulation of cycle rate data from the chamber test is included as Table 2-1.

4. Stellar/Index Performance

Both the "A" and the "B" stellar/index cameras performed properly throughout the test. The "A" index idler T/M was noisy.

5. Clock Performance

The clock offset was 1 millisecond per hour in both the "A" and "B" mode when compared to IRIG C. This exceeds the offset limit of 2 milliseconds per 12 hours.

6. Instrumentation Performance

Instrumentation performance throughout the test was satisfactory. Minor problems such as improper Sanborn calibrations and noisy idler contacts occurred.

The status commutator and temperature commutator has no open points.

The film footage pots and cycle counters showed good correlation throughout the test.

[redacted]

J-25 TASC CHAMBER TEST NO 1 TEST CYCLE RATES

REV/MODE	RAMP	T.U.R.	INST 174 ACT.	INST 174 CALIB.	INST 174 DEV.	INST 175 ACT.	INST 175 CALIB.	INST 175 DEV.	174/175 DIFF.
0 A	8 2	0	5.570	5.479	-1.66	5.600	5.539	-1.10	0.54
1 A	7 7	400	3.525	3.494	-0.90	3.520	3.489	-0.88	-0.14
2 A	4 1	1430	2.190	2.216	1.18				
2 A	4 1	1610				2.208	2.207	-0.07	
2 A	4 1	2130	2.170	2.189	0.89	2.200	2.200	0.01	1.38
3 A	5 8	730	2.893	2.879	-0.48	2.887	2.869	-0.61	-0.21
3 A	5 8	1550	2.458	2.446	-0.47	2.460	2.437	-0.95	0.08
4 A	7 7	2280	2.580	2.559	-0.83	2.580	2.549	-1.22	-0.[redacted]
5 A	8 2	340	5.130	5.076	-1.07	5.178	5.117	-1.19	0.9[redacted]
6 A	5 8	1090	2.733	2.693	-1.47	2.753	2.683	-2.60	0.73
6 A	5 8	1440	2.518	2.493	-1.01	2.535	2.483	-2.09	0.68
7 A	7 7	1180	2.927	2.875	-1.81	2.957	2.865	-3.21	1.02
7 A	7 7	1590	2.610	2.562	-1.86	2.627	2.552	-2.92	0.65
8 A	7 7	2530	2.767	2.723	-1.63	2.793	2.713	-2.97	0.94
9 A	4 1	1015	2.767	2.743	-0.86	2.823	2.733	-3.29	2.02
9 A	4 1	3200	3.500	3.405	-2.78	3.540	3.400	-4.13	1.14
9 A	11 1	890	4.585	4.459	-2.82	4.680	4.477	-4.53	2.07
10 A	11 1	1880	2.283	2.271	-0.53	2.320	2.263	-2.54	1.62
10 A	11 1	2970	4.470	4.384	-1.95	4.560	4.400	-3.64	2.01

TABLE 2-1