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17 July 1967

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To: Col. C. Murphy

From: [redacted]

Subject: CR-1 Flight Engineering Evaluation

Reference: A. Memo [redacted] to Murphy dated 19 May, subject Corona J-3 Payload System Engineering Evaluation

B. [redacted]

1. Attached for your review is a copy of the detailed plan for CR-1 Flight Engineering Evaluations. The plan has been prepared in order that personnel associated with mission operations can be made familiar in advance with the additional command requirements. The plan will be issued to the Satellite Control Facility, (SCF) SSOTP-1 at R-9 when the payload system is released for flight.

2. A similar plan will be prepared for payload systems CR-2, CR-3, and CR-4. Your comments on the format, completeness of content, and clarity are requested.

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CR-1 FLIGHT ENGINEERING EVALUATION

1.0 Purpose: The CR-1 flight engineering evaluation is designed to demonstrate: 1) the reliability and operational control of the exposure control device, 2) the operational control of the filter change device.

2.0 Scope: This document provides the guidelines for the pre-flight programming and the flight operations plan.

3.0 Applicable Organizations:

3.1 Satellite Operations Center (SOC)

3.2 System Program Director (SPD), [redacted]

3.3 Payload Subassembly Project Office (PSAPO)

3.4 Satellite Control Facility (SCF), SSOTP-1

3.5 Advanced Projects (AP), LMSC

4.0 Operation Plan

4.1 Panoramic System

4.1.1 The engineering evaluation is to be performed in five basic steps to fully exercise both the exposure control and the filter selection devices.

4.1.2 Task Outline

4.1.2.1 Initial baseline with nominal slit and filter

4.1.2.2 Filter obscuration during exposure.

4.1.2.3 Filter change with nominal and optimum slit, two tests.

4.1.2.4 Through exposure with nominal and alternate filters - - two tests.

4.1.2.5 Nominal and alternate filters with selected slits.

4.2 DISIC System

4.2.1 Initial baseline on Days 2 through 4, programming in independent mode.

4.2.2 During selected revolutions on Days 12, 13, and 14, the DISIC terrain camera will be programmed to remain in the 1/250 exposure position. The panoramic slits and filters will be optimized during these periods and the auto slit timer will be disabled.

OPERATIONS PLAN

GENERAL:

Each task is identified by day and revolution. A brief description of the activity desired is followed by the panoramic forward and aft looking camera filter and slit positions. Commanding is called out by the UHF command number and selector position as appropriate. Each camera operate is identified by on and off latitude and approximate stereo frame count.

COMMANDING:

Unless otherwise specified, command transmission is to be at the maximum rate consistent with system limitations. If both a mode switch and command number change are required, five (5) seconds are allowed. If only a command number change is required, the transmission rate is specified.

1.0 Initial Baseline

1.1 Day 1, Rev. 14

1.1.1 FWD, W23A/.171 (S2); AFT W21/.134 (S2).

1.1.2 No commanding required if exposure control is in auto slit position two (S2) during engineering ops.

1.1.3 On Lat. 243 10, Off Lat. 240 00, approx. 24 stereo frames.

1.2 Day 1, Rev. 16

1.2.1 Same as Rev. 14; filter, slit and commanding.

1.2.2 On Lat. 239 00, Off Lat. 236 00, approx. 23 frames.

2.0 Filter Obscuration

2.1 Day 8, Rev. 127

2.1.1 Step filters on both instruments during instrument operation to determine obscuration during filter change; allow 2 or 3 frames at each filter step position. FWD step from W23A to W25; AFT step from W21 to W23A. Command filters back to original positions after operate off.

2.1.2 Commanding

2.1.2.1 At operate start, alternately command U103 1x then U104 1x for a total of 5 each command; selector position moving from pos. 1 to pos. 6 on both U103 and U104. Rate of command transmission to be once every three (3) seconds, i.e., U103 1x, 3 sec., U104 1x, 3 sec., U103 1x, etc.

2.1.2.2 After operate off, command U103 5x from pos. 6 to pos. 1, then U104 5x from pos. 6 to 1.

2.1.3 On Lat. 237 00,Off Lat. 233 30, approx. 26 frames.

3.0 Filter Change with Optimum and Nominal Slit

3.1 Day 9, Rev. 141

3.1.1 Step filters on both instruments during operation with commanding centered around slit change S2 to S3 which will be commanded at the center of the operate. FWD 23A/.171 (S2) to W25/.218 (S3); AFT W21/.134 (S2) to W23A/.175 (S3). DISIC in 1/500 speed through operate.

3.1.2 Commanding

3.1.2.1 Prior to operate start, Command U101 2x from position 1 to 3 (S-2).

3.1.2.2 Fifteen (15) seconds prior to center of operate, Command U103 5 x from pos. 1 to 6. At center of operate, command U101 1x from pos. 3 to 4 (S-3), then command U104 5x from pos. 1 to 6. Commands to be transmitted as rapidly as possible. Five seconds are allowed for each simultaneous command number and transmit mode change.

3.1.2.3 After operate off, command U101 5x from pos.4to 1. U103 and U104 will fade in position 6. (Configured for Rev. 143).

3.1.3 On Lat. 245 40, Off Lat. 240 30, approx. 39 frames. Slit change commanded at Lat. 243 05, S2 to S3.

3.2 Day 9, Rev. 143

3.2.1 Step filters back to nominal position with commanding centered around auto slit change, S3 to S2, which will be adjusted to occur at the center of the operate. FWD W25/.218 (S3) to W23A/.171 (S2); AFT W23A/.175 (S3) to W21/.134 (S2).

3.2.2 Commanding

3.2.2.1 Adjust U105 as necessary so that the auto slit change occurs at the center of operate.

3.2.2.2 10 seconds prior to the auto slit change, command U103 5x from position 6 to 1. Immediately follow with U104 5x from position 6 to 1.

3.2.2.3 U103 and U104 will fade in position 1.

3.2.3 On Lat. 237 30, Off Lat. 232 30, approx. 38 frames. Auto slit change at Lat. 235 00, S3 to S2.

4.0 Thru exposure, nominal and alternate filters.

4.1 Day 10, Rev. 157

4.1.1 Step slit control through each position during operation, allowing 2 to 3 frames at each slit position. FWD W23A; AFT W21.

4.1.2 At operate start, command U101 8x from pos. 1 to pos. 1. Rate of command transmission to be once every five (5) seconds.

4.1.3 On Lat. 242 00, Off Lat. 239 30, approx. 26 frames.

4.2 Day 10, Rev. 159

4.2.1 Step slit control through each position during operation, allowing 2 to 3 frames at each slit position. Prior to operation, command alternate filter into position. After operation, return filter to nominal position. FWD W25; AFT W23A.

4.2.2 Commanding

4.2.2.1 Prior to operate start, command U103 5 x from pos. 1 to pos. 6 and U104 5x from pos. 1 to pos. 6.

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4.2.2.2 10 seconds after operate start, command U101 8x from pos. 1 to pos. 1. Rate of command transmission to be once every five (5) seconds.

4.2.2.3 After operate stop, command U103 5x from pos. 6 to pos. 1 and U104 5x from pos. 6 to pos. 1.

4.2.3 On Lat. 238 30, Off Lat. 234 00, approx. 34 frames.

5.0 Final Baseline, Nominal and Alternate Filters with Selected Slit.

5.1 Day 11, Rev. 173

5.1.1 Configure system with alternate filter in forward looking camera and Fail Safe 1, Auto 2 slit position prior to operate. During operate, command slit to full auto position. The nominal slit will be position S3. FWD W25/.250 (Fail Safe) and .218 (S-3); AFT W21/.175 (S3). Adjust exposure control delay to insure auto slit in S3 position through operate.

5.1.2 Commanding

5.1.2.1 Prior to operate start, command U103 5x from pos. 1 to pos. 6; and U101 6x from pos. 1 to pos.7. Adjust U105 as necessary to insure auto slit remains in position S3 through operate.

5.1.2.2 20 seconds after operate start, command U101 2x from pos. 7 to pos. 1 (Auto slit S3).

5.1.2.3 After operate stop, command U103 5x from pos. 6 to pos. 1.

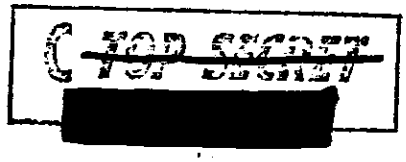
5.1.3 On Lat. 243 10, Off Lat. 240 00, approx. 24 frames. Auto slit in position S3 during operate.

5.2 Day 11, Rev. 175

5.2.1 Configure system with alternate filter in aft looking camera and slit in S-3 prior to operate. FWD W23A/.218 (S-3); AFT W23A/.175 (S3).

5.2.2 Commanding

5.2.2.1 Prior to operate start. command U104 5x from pos. 1 to 6; and U101 3x from pos. 1 to 4 (S-3).



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5.2.2.2 After operate stop, command U104 5x from pos. 6 to pos. 1 and U101 5 x from position 4 to 1.

5.2.3 On Lat. 239 00, Off Lat. 236 00, approx. 23 frames.

6.0 DISIC Evaluation

6.1 Initial Baseline: Day 2, Rev. 23
Day 3, Rev. 47
Day 4, Rev. 63

Baseline DISIC evaluation operations (Film type 3400) will be programmed in independent mode. On lat. 240 00, Off Lat. 235 00.

6.2 Day 7 Rev. 111

DISIC independent operations to be programmed on over Arizona test range - On Lat. 240 00, Off Lat. 230 00.

6.3 Day 8 Rev. 127

DISIC independent operations to be programmed on over Arizona test range - On Lat. 240 00, Off Lat. 230 00.

A Pan Engineering operation is also programmed on Rev. 127 from 237 00 to 233 30; therefore, the mid section of this operation will be in slave mode with the beginning and end in independent mode.

6.4 Day 12 Rev. 185 to 192

6.4.1 Exposure control of pan cameras optimized in real time. The brush 51 and 52 punches will be deleted for the above revs. This will keep DISIC in the 1/250 exposure position. Nominal pan filter/slit: FWD W23A/.250 (Fail Safe); Aft W21/.200 (Fail Safe).

6.4.2 Commanding

6.4.2.1 Rev. 185, U101 commanded into pos. 8 for "nominal" slits - but will RTC as desired. See Para. 6.5.3 and 6.5.4 below.

6.4.2.2 Rev. 192 Command U101 1x from pos. 8 to 1.

6.4.3 The DISIC will be programmed on over the Arizona test range, Day 12, Rev. 189. In addition, there will be no Br. 51 and 52 punches programmed on Revs. 185 through 192. On Lat. 240 00, Off Lat. 235 00.

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6.5 Final Baseline, Day 13 & 14, Rev. 201 to End of Mission

6.5.1 Final DISIC Baseline engineering evaluations (Film Type SO 230) will be programmed in independent mode on Day 13 Rev. 206 and Day 14 Rev. 222. On Lat. 240 00, Off Lat. 235 00, both days.

6.5.2 Same as 6.4.1 except filters will be in alternate position and slits will be selected as desired depending on operations latitudes and illumination. Brush 51's and 52's deleted from Rev. 201 through the end of mission.

6.5.3 Commanding U101 as necessary to insure optimum slit position on pan cameras.

SUGGESTED CORN DEPLOYMENT

DAY	REV.	LAT.	LONG	LAT.	LONG
1	14	43 00 N (Buffalo, N.Y.)	78 35 W	40 20 N (Johnstown, Penn.)	78 55 W
1	16	38 10 N (Hamilton AFB)	122 35 W	37 20 N (Moffett NAS)	122 05 W
8	127	36 20 N (Nellis AFB)	114 45 W		
9	141	44 35 N (Canton N.Y.)	75 10 W	41 10 N (Westchester Co. Airport)	73 45 W
9	143	37 25 N (Bishop, Calif.)	117 15 W	33 50 N (March AFB)	117 30 W
10	157	41 15 N (Williamsport, Penn.)	77 00 W	39 10 N (Dover, AFS)	75 30 W
10	159	37 55 N (Stockton, Calif.)	121 15 W	34 55 N (Santa Maria, Calif.)	120 25 W
11	173	43 00 N	78 35 W	40 20 N	78 55 W
11	175	38 10 N	122 35 W	37 20 N	122 05 W

Addendum #1 to CR-1 Engr. Plan

Page 3 Add:

1.3 Day 2, Rev. 30 (Fixed CORN, Shaw AFB)

1.3.1 Same as Rev. 14; filter slit and commanding.

1.3.2 On Lat. 235 00, Off Lat. 233 00, approx. 15 frames.

1.4 Day 12, Rev. 189 (Fixed CORN, Shaw AFB)

1.4.1 Fwd W23A/.250 (Fail Safe); Aft W21/.200 (Fail Safe); Ref. Para. 6.4.1

1.4.2 On Lat. 235 00, Off Lat. 233 00, approx. 15 frames.

Page 10 Add to Table:

Day	Rev.	Lat.	
2	30	234 00	Shaw AFB, fixed display
9	127	236 40	Indian Springs, fixed display
12	189	234 00	Shaw AFB, fixed display