

TOP SECRET

1968 JUN 14 23 07Z

OUT 65368

TOP SECRET 142139Z JUN 68 CITE [] 4018

25X1
25X1
25X1

CORONA
SUBJECT: MISSION 1103 PHOTOGRAPHIC EVALUATION INTERIM REPORT (PEIR)

REF A. [] 0006
B. [] 0049

25X1

1. NUMERICAL SUMMARY
MSN NO AND DATES:

1103-1, 1-8 MAY 1968
1103-2, 8-15 MAY 1968

LAUNCH DATE AND TIME:

1 MAY 1968/2131Z

VEHICLE NUMBER:

1643

CAMERA SYSTEM:

CR3

PAN CAMERA NO:

FORWARD LOOKING, 307

AFT LOOKING, 306

DISIC CAMERA NO:

5

STELLAR LENS NOS:

3, 8P

TERRAIN LENS NO:

106

RECOVERY REVS:

MSN 1103-1, 115

MSN 1103-2, 228

2. CAMERA SETTINGS
FWD-LOOKING

WRITTEN 25 FILTER (PRIMARY).
WRITTEN 12 FILTER (ALTERNATE).
SLIT WIDTHS: 0.205, 0.310,
0.310, 0.110, AND A FAIL SAFE
SLIT OF 0.300 INCH

AFT-LOOKING

WRITTEN 21 FILTER (PRIMARY).
SF05 (MODIFIED WRITTEN 57)
FILTER (ALTERNATE). SLIT WIDTHS:
0.134, 0.200, 0.265, 0.134 WITH
FAIL SAFE SLIT OF 0.165 INCH

3. PERFORMANCE SUMMARY

THE PET JUDGED THE GENERAL IMAGE QUALITY OF MISSION 1103 AS FAIR AND NOT AS GOOD AS MISSION 1102. THERE WAS A SIGNIFICANT VARIABILITY IN IMAGE QUALITY THAT WAS GREATER THAN NORMALLY ENCOUNTERED WITH A CORONA SYSTEM. THIS VARIABILITY RANGES FROM RATHER GOOD TO POOR. THE PHOTOINTERPRETERS REPORTED THAT, "THE INTERPRETABILITY OF THE IMAGERY ON THIS MISSION IS CONSIDERED TO BE MORE VARIABLE THAN THE IMAGERY OBTAINED ON MISSIONS 1101 AND 1102. IN ADDITION, THE IMAGERY OF THE FWD LOOKING CAMERA RECORD IS SUPERIOR TO THAT OF THE AFT CAMERA IN ALMOST EVERY CASE. THE OVERALL MISSION INTERPRETABILITY IS RATED AS FAIR". THE EXACT CAUSE OF THE VARIABILITY IS NOT CLEAR, MAJOR FACTORS, HOWEVER, APPEAR TO BE HAZE AND FOCUS. THIS MISSION WAS SEVERELY AFFECTED BY HAZE, BUT IT CANNOT BE POSITIVELY STATED THAT WEATHER WAS THE MAJOR CAUSE OF THE QUALITY VARIATION. THE GENERAL QUALITY OF THE AFT RECORD IS LESS THAN THAT OF THE FWD. IN GENERAL, THE AFT RECORD APPEARS TO HAVE SLIGHTLY SOFTER FORMS. ALTHOUGH THERE IS SOME EVIDENCE OF BETTER AFT IMAGERY ON THE VERY FIRST PORTIONS OF THE MISSION, AFT IMAGERY COMPARABLE TO THAT OF THE EARLY PORTIONS IS NOT EVIDENCED LATER IN THE MISSION, EVEN WHEN FAVORABLE WEATHER CONDITIONS EXISTED. THIS PROBLEM IS DISCUSSED IN SECTION 5, COMMENTS. THE QUALITY OF THE GREEN (SF-05) RECORD IS NOT AS GOOD AS THE NORMAL (WRITTEN 21) AFT RECORD, NOR IS IT AS GOOD AS THE GREEN RECORD FROM MISSION 1102. FURTHER, THE DIFFERENCES IN QUALITY BETWEEN THE SF-05 AND WRITTEN 21 RECORDS FROM 1103 APPEARS TO BE GREATER THAN THE DIFFERENCES BETWEEN THESE RECORDS ON MISSION 1102. THERE IS EVIDENCE THAT AT LEAST A PORTION OF THE DEGRADATION IN OVERALL MISSION QUALITY IS DUE TO IMAGE SMEAR. THIS CONDITION IS APPARENT ON FRAMES WHERE THE MAXIMUM SLIT WIDTH WAS USED. FOCUS VARIABILITY APPEARS TO HAVE

DISTRIBUTION		
CY	OFFICE	FI
1	FILE	
2	CABLE SEC.	
	PF&B/RD	
	SECUR.	
3	TSSG	✓
	PSC/OC	
	ERD	
	REPRO	
	AID	
	LAG	
	PROD	
	SCIEN	
	WEST	
	EAST	
	M&S	
	PGM	
	IAS	
	DIA-XX4	
	SPAD	
	DIA-AP	
	FA	25X1
	OMX	

ADVANCE CY
SANITIZED
WITH TEXT

TOP SECRET

GROUP 1
Excluded from 25X1
downgrading and
declassification

--2--

BEEN THE MAJOR CAUSE OF IMAGE DEGRADATION. HOWEVER, SEVERE HAZE, THERMAL GRADIENTS, FOCUS AND SMEAR OFTEN COMBINED TO PRODUCE IMAGERY POORER THAN THAT ATTRIBUTABLE TO FOCUS ALONE. ALSO, IN SOME CASE, THESE FACTORS APPEARED TO BE MINIMIZED IN SUCH A MANNER TO PRODUCE GOOD IMAGERY. THE ULTIMATE CAPABILITY OF THE MISSION 1103 CAMERA SYSTEM IS INDICATED BY THE RESOLUTION LEVEL AND FROM GROUND TARGETS. THE CORN MOBILE TARGETS WERE THE BEST YET RECORDED. PRODUCING [REDACTED] WHEREAS THE BEST FIXED TARGET PRODUCED [REDACTED] THESE READINGS ARE INDICATIVE, HOWEVER, ONLY OF BEST PERFORMANCE AND NOT GENERAL PERFORMANCE.

25X1
25X1

4. PANORAMIC CAMERA ANOMALIES

A. ANOMALY: AN AREA RANGING FROM ABOUT 1-5 INCHES OF DISTURBED IMAGERY OCCURRED ON THE FORWARD UNIT WITH A SIMILAR BUT SMALLER AREA ON THE AFT. THE AREA OF MAJOR DISTURBANCE (1103-1 ONLY) WAS FOUND TO BE CONFINED TO THE FIRST FIVE FRAMES FOLLOWING A LONG SIT PERIOD; HOWEVER, A SMALLER SOFT FOCUS AREA PERSISTED THROUGHOUT THE MISSION. ABOUT 1.75 PERCENT OF THE FRAMES AND ABOUT 0.2 PERCENT OF THE TOTAL AREA COVERAGE WAS AFFECTED BY THIS ANOMALY.

CAUSE: A LONG SIT PERIOD, USUALLY IN EXCESS OF SIX HOURS DEFORMS THE FILM WHERE IT PASSES AROUND VARIOUS ROLLERS, OR THRU AIR TWISTS.

NORMALLY, CAMERA TRANSPORT TENSIONS TEND TO ELIMINATE THESE DEFORMATIONS, BUT IN MISSION 1103 THIS WAS NOT TRUE AS IT IS BELIEVED THAT THE TAKE-UP TENSIONS ON THE 1103-1 PORTION OF THE MISSION WERE LOWER THAN SPECIFIED.

ACTION: INVESTIGATION AND TESTS ARE CONTINUING AT [REDACTED] TO BETTER UNDERSTAND THIS ANOMALY. (MONITOR: [REDACTED])

25X1
25X1

B. ANOMALY: THE AFT CAMERA FRAMES 15, 16, 17 ON PASS D08 1103-1 AND FRAME 28 ON PASS D218 1103-2 EXHIBIT A LOSS OF SLP DATA BLOCKS. THE HORIZON IMAGERY AND FIDUCIALS ASSOCIATED WITH FRAMES 16 AND 18 OF D08, AND FRAME 29 OF D218 ARE ALSO MISSING. ASSOCIATED WITH THIS ANOMALY AND INSTRUMENT SHUT DOWN ON D08, FRAMES 16, 17, 18, 19 EXHIBITED HEAVIER DENSITY.

CAUSE: DUE TO MARGINAL CF SWITCH OVER TRAVEL ADJUSTMENT, SWITCH ACTUATION WAS NOT COMPLETED DURING THE REPORTED FRAMES.

ACTION: ALL SUBSEQUENT SYSTEMS AND PROCEDURES WILL BE REVIEWED FOR CORRECT SWITCH ADJUSTMENTS. (MONITOR: [REDACTED])

25X1

C. ANOMALY: THE 27TH RAIL HOLE IMAGE FROM THE T/U END OF THE FORMAT (10TH FROM CF) ON THE BINARY TIME EDGE IS MISSING ON BOTH INSTRUMENTS FOR 1103-1 AND 1103-2.

CAUSE: THIS RAIL HOLE WAS INCORRECTLY PLUGGED AT [REDACTED]

25X1

ACTION: NONE REQUIRED.

D. ANOMALY: THE HORIZON IMAGERY AND FIDUCIALS ASSOCIATED WITH FRAMES 13 AND 15 OF PASS D06 ARE MISSING.

CAUSE: DURING THE FLIGHT READINESS AT [REDACTED] A CRACK WAS NOTED IN THE SUPPORT CASE OF THE 1/2 REV SWITCH. THIS SWITCH WAS REPLACED. APPARENT CAUSE OF THE FAILURE IS BELIEVED TO BE A RESULT OF THIS SWITCH REPLACEMENT.

25X1

ACTION: ALL SUBSEQUENT SYSTEMS AND PROCEDURES WILL BE REVIEWED FOR CORRECT SWITCH INSTALLATION AND ADJUSTMENT. (MONITOR: [REDACTED])

25X1

E. ANOMALY: A FOG PATTERN ASSOCIATED WITH THE BINARY TIME WORD OCCASIONALLY APPEARS ON ONE OR MORE FRAMES NEAR THE END OF AN OPERATION OF THE FORWARD-LOOKING CAMERA.

CAUSE: THESE FOG PATTERNS APPROXIMATELY MATCH TWO EDGES OF THE SLP BLOCK. A POSSIBLE CAUSE IS LIGHT REFLECTIONS. LACK OF APPLICABLE O.N. MATERIAL LIMITS ANALYSIS.

ACTION: CONTINUE INVESTIGATION OF CAUSES FROM O.N. AND TEST FILM. (MONITORS: [REDACTED])

25X1

F. ANOMALY: FUZZY BINARY TIME WORDS ON BOTH FORWARD AND AFT CAMERA RECORDS THROUGHOUT THE MISSION.

CAUSE: SLIGHT VARIATIONS IN FILM TENSION, SLP CLAMP ALIGNMENT, OR SCRAPPED EMULSION BUILDUPS, WILL CAUSE NOTICEABLE VARIATIONS IN TIME WORD SHARPNESS AND DENSITY.

ACTION: NO DIFFICULTY WAS ENCOUNTERED DURING AUTOMATIC

--3--

READOUT OF THESE TIME WORDS. MICRODENSITOMETER TRACES SHOW ENTIRELY ACCEPTABLE CHARACTERISTICS. TIME WORDS PRODUCED BY BOTH PAN CAMERAS ARE CONSIDERED NORMAL. NO ACTION IS INDICATED.

G. ANOMALY: MINOR CORONA FOG AFFECTED SMALL AREAS ALONG THE TIME TRACK EDGE OF THE AFT-LOOKING CAMERA RECORD. THIS MARKING GENERALLY AFFECTED THE LAST AND NEXT TO LAST FRAMES OF AN OPERATION BUT OCCASIONALLY EXTENDED FIVE TO EIGHT FRAMES INTO AN OPERATION.

CAUSE: REAL TIME TELEMETRY DATA SHOWED AN ABNORMAL DELAY IN PRESSURE BUILDUP AT THE START OF MONITORED OPERATIONS. THE PROBABLE CAUSE IS A MALFUNCTION OF THE PMU HIGH PRESSURE VALVE. AT LOW SYSTEM PRESSURES, CORONA MARKING WAS EXPECTED.

ACTION: A SIMILAR PROBLEM HAS BEEN IDENTIFIED FROM ENVIRONMENTAL TEST OF THE CR-4 SYSTEM. CORRECTIVE ACTION IS BEING INVESTIGATED AT [REDACTED] (MONITOR: [REDACTED])

25X1 25X1

H. ANOMALY: EXTREMELY SMALL PLUS DENSITY DOTS ARE PRESENT THROUGHOUT MISSION 1103-2 ON THE FWD CAMERA. THESE DOTS OCCUR AT A SIX AND ONE-FOURTH INCH INTERVAL, ONE INCH FROM THE FILM TIME TRACK EDGE.

CAUSE: APPARENTLY, SOMETIME FOLLOWING FILM TRANSFER TO THE B SRV, A FOREIGN PARTICLE WAS IMBEDDED IN EITHER THE INPUT METERING OR THE FRAME METERING ROLLER, WHICH RESULTED IN A PLUS DENSITY MARK ON THE MATERIAL EACH TIME THE ROLLER ROTATED.

ACTION: NO ACTION REQUIRED.

5. DISIC STELLAR CAMERA PERFORMANCE:

A. THE STELLAR CAMERAS FUNCTIONED PROPERLY THROUGHOUT THE MISSION AND RECORDED A FULL FIELD OF STARS ON BOTH THE PORT AND STARBOARD CAMERAS. THE MODIFIED BOOT BAFFLES DID NOT VIGNETTE AND/OR FLARE IN THE MANNER EXHIBITED ON MISSION 1102. THE BAFFLE DESIGN AS USED ON MISSION 1103 IS THEREFORE CONSIDERED SUITABLE FOR FUTURE MISSIONS.

B. DISIC TERRAIN CAMERA EVALUATION: THE IMAGE QUALITY IS GOOD WITH BETTER DEFINITION THAN THAT OBTAINED ON MISSION 1102. THE TERRAIN LENS EMPLOYED A MODIFIED SHUTTER WHICH PROVIDED A RELATIVE APERTURE OF F/6.3 RATHER THAN THE BASIC LENS RELATIVE APERTURE OF F/4.5. THIS CHANGE IS CONSIDERED TO BE THE REASON FOR THE IMPROVED PERFORMANCE. THIS SHUTTER MODIFICATION IS BEING CONSIDERED FOR THE THREE CAMERAS WHICH DO NOT HAVE F/6.3 LENSES.

6. DISIC ANOMALIES

A. ANOMALY: PRESSURE MARKS OUTSIDE FORMAT OF STELLAR RECORD. THESE MARKS ARE PRESENT IN THE BORDERS ALONG BOTH FILM EDGES OF THE ENTIRE STELLAR RECORD. NEITHER THE FORMATS NOR DATA RECORDINGS ARE AFFECTED.

CAUSE: SKEW BEADS. THIS IS A SYSTEM CHARACTERISTIC THAT IS NOT CONSIDERED OBJECTIONABLE AS LONG AS THE MARKS ARE CLEAR OF THE FORMATS AND DATA.

ACTION: NONE.

B. ANOMALY: MINUS DENSITY SPOTS ON FRAMES WHICH APPEAR TO BE CAUSED BY DIRT ON THE RESEAU PLATE.

CAUSE: DIRT AND FILM/EMULSION PARTICLES CARRIED TO THE FOCAL PLANE PLATE BY THE FILM.

ACTION: CONTINUED ATTENTION TO CLEANLINESS PRIOR TO FLIGHT. PARTICLES CARRIED BY FILM CANNOT BE COMPLETELY ELIMINATED.

C. ANOMALY: DENDRITIC AND CORONA TYPE FOG PATTERNS CAUSED BY STATIC DISCHARGES ARE PRESENT INTERMITTENTLY THROUGHOUT THE STELLAR CAMERA RECORD. THEY VARY IN SIZE AND INTENSITY AND IN SOME INSTANCES ENTER THE FORMAT AREA.

CAUSE: THE PRIMARY CORONA FOG PATTERN THAT APPEARS THROUGHOUT THE MISSION IS LIGHT AND IS MOSTLY OUTSIDE THE

--4--

FORMAT AREA. THE SPECIFIC CAUSE IS NOT KNOWN, BUT IT APPEARS TO OCCUR AT A SENSITIVE PRESSURE REGION BETWEEN PMU-ON AND PMU-OFF PAYLOAD PRESSURES. A DENDRITIC FOG PATTERN APPEARS IN THE CENTER OF SEVERAL STELLAR FORMATS NEAR THE END OF 1103-2, FADES, AND DOES NOT APPEAR AT THE END OF 1103-2, THIS MARK HAS NOT BEEN OBSERVED IN ANY DISIC ALTITUDE TESTS TO DATE. CAUSE IS UNKNOWN.

ACTION: DISIC S/N5, INCORPORATED IN 1103, REPRESENTS AN INTERMEDIATE STAGE IN DISIC DESIGN MODIFICATIONS THAT HAVE BEEN MADE TO REDUCE CORONA MARKING. THE CURRENT DESIGN CONFIGURATION IS EFFECTIVE ON DISIC S/N6 AND UP.

D. ANOMALY: DENDRITIC TYPE FOG PATTERNS ARE PRESENT OCCASIONALLY THROUGHOUT THE TERRAIN CAMERA RECORD.

CAUSE: THESE MARKS EMANATE FROM THE FILM EDGE. THIS IS CHARACTERISTIC OF UNSPOOLING OR ROLLER FLANGE DISCHARGE. FREQUENCY AND SEVERITY IS MINOR.

ACTION: NO SPECIFIC ACTION IS PLANNED BEYOND THE CURRENT MARKING FIXES INCORPORATED IN DOWN-STREAM UNITS.

E. ANOMALY: STELLAR AND TERRAIN TIME WORDS APPEAR "FUZZY".

CAUSE: THE SLP'S IN THE TERRAIN AND STELLAR CAMERAS ARE INSTALLED ON THE BASE SIDE OF THE FILM WHICH RESULTS IN IMAGES THAT HAVE LESS THAN THE MAXIMUM POSSIBLE EDGE SHARPNESS. THESE IMAGES, HOWEVER, ARE NORMALLY WELL WITHIN DISIC SPECIFICATION REQUIREMENTS. ON 1103, THE TERRAIN CAMERA TIME WORDS APPEAR NORMAL. THE STELLAR CAMERA TIME WORDS EXHIBIT SOME FALL-OFF IN DENSITY IN THE DIRECTION AWAY FROM THE EDGE OF THE RECORD. THIS IS CHARACTERISTIC OF AN SLP THAT IS NOT ADEQUATELY PARALLEL TO THE FILM SURFACE. THE MOST FREQUENT CAUSE OF THIS ANOMALY IN TEST HAS BEEN SLP COCKING INDUCED BY THE HEAVY SLP CABLES.

ACTION: ADDITIONAL CABLE TIE DOWNS AND TEST PROCEDURES WILL BE EMPLOYED TO MINIMIZE THE POSSIBILITY OF RECURRENCE.

7. SPECIAL EXPERIMENTS

A. ONE THOUSAND FIVE HUNDRED FEET OF SO-230 (UTB) WERE USED ON EACH PANORAMIC CAMERA. THE PET CONSIDERS THAT UTB GAVE AS GOOD A PRODUCT AS 3404 TYPE FILM. FURTHER DETAILED ANALYSIS OF SO-380 IS BEING CONDUCTED BY

B. THE STELLAR RECORD ON MISSION 1103-2 CONTAINED A COMBINATION LOAD (1,800 FEET OF TYPE 3401 FILM WITH A TRAILER OF 200 FEET OF TYPE 3400 FILM). USER EVALUATION OF THE NUMBER OF USEABLE STELLAR IMAGES AND THE MENSURATION ACCURACIES OBTAINED WITH 3400 VERSUS THOSE OBTAINED WITH 3401 IS REQUIRED TO DETERMINE WHICH FILM SHOULD BE USED ON FUTURE MISSIONS. MAXIMUM STAR MAGNITUDES RECORDED ON 3400 FILM, MISSION 1103, RANGE FROM FIFTH MAGNITUDE TO A FEW OF SIXTH MAGNITUDE. STAR IMAGES RECORDED ON FILM TYPE 3401 RANGE TO SIXTH MAGNITUDE WITH A FEW AT SEVENTH MAGNITUDE.

8. COMMENTS:

A. MINUS DENSITY MARKS (SPERM SHAPED) WERE SEEN ON MOST FORWARD CAMERA OPERATES WITH THE SO-380 MATERIAL. THESE MARKINGS ARE MOST APPARENT ON HOMOGENEOUS SCENES OF MODERATE TO HIGH DENSITY. THERE WAS ALSO A CORRELATION WITH THE SIT PERIODS, THAT IS, THE HEAVIEST MARKS OCCURRED ON FRAMES THREE AND FOUR. THIS EFFECT MAY PROVE TO BE ONLY A BEAUTY DEFECT SINCE THIS MISSION DID NOT HAVE TENSIONS CORRECTLY SET FOR THE SO-380 MATERIAL.

B. SOME OF THE FOLLOWING ITEMS HAVE CONTRIBUTED TO THE

25X1

--5--

VARIABILITY SEEN IN THE IMAGERY THROUGHOUT THE MISSION.

(1) A THERMAL GRADIENT ALONG THE LENS ASSEMBLY (HOT DOGGING) INTRODUCED A PLUS OR MINUS 0.0004 INCH FOCUS SHIFT.

(2) THE FILM LIFT PLANE, NORMAL SPREAD PLUS THAT FROM TENSION VARIATIONS GENERATE A PLANE CHANGE OF 0.0005 INCH.

(3) THE CERTAINTY OF THE PEAK FOCUS PLANE HAS A SPREAD OF PLUS OR MINUS 0.0003 INCH.

(4) THIS SYSTEM WAS FOCUSED WITH THE PEAK FOCUS (LOW CONTRAST) AT INFINITY, A MINUS VARIATION OF 0.001 INCH (FILM PLANE MOVED TOWARD THE LENS) WOULD LOWER THE IMAGE QUALITY BY 25 PERCENT WHILE A PLUS MOVEMENT OF 0.001 INCH WILL CHANGE THE IMAGE QUALITY BY 5 PERCENT.

(5) THE FOCUS SETTINGS ON FUTURE SYSTEMS WILL BE SET TO PERMIT A MORE BALANCED IMAGE QUALITY TOLERANCE RANGE, I.E., SLIGHTLY MORE TO THE PLUS SIDE.

T O P S E C R E T

END OF MESSAGE