

TOP SECRET

TOP SECRET 130034Z CITE [redacted] 2711. 19Z 25X1

CORONA [redacted]
SUBJ: MISSION 1102 (CR-2) PHOTOGRAPHIC EVALUATION INTERIM REPORT (PEIR)
REF: A [redacted]
B [redacted]

Cy No.	Office	Action
1	File	25X1
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1. NUMERICAL SUMMARY
MSN NO AND DATES:

1102-1, 9-14 DECEMBER 1967
1102-2, 15-22 DECEMBER 1967
9 DECEMBER 1967/2226Z

LAUNCH DATE AND TIME:
VEHICLE NO:
CAMERA SYSTEM:
PAN CAMERA NOS:

1642
CR-2
FORWARD-LOOKING, 305
AFT-LOOKING, 304

DISIC NO:
STELLAR LENS NOS:
TERRAIN LENS NO:
RECOVERY REVS:

4
4, 4P
101

2. CAMERA SETTINGS
FWD-LOOKING

WRITTEN 25 FILTER (PRIMARY) SF 09
(20 DEGREES POLARIZER) FILTER
(ALTERNATE). SLIT WIDTHS: 0.215,
0.270, 0.340, AND A FAIL SAFE SLIT OF
0.340 INCH

AFT-LOOKING

WRITTEN 21 FILTER (PRIMARY). SF 05
(MODIFIED WRITTEN 57) FILTER
(ALTERNATE). SLIT WIDTHS: 0.134,
0.170, 0.215, 0.270 WITH FAIL SAFE SLIT
OF 0.230 INCH

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With Text

3. PERFORMANCE SUMMARY

A. PAN CAMERAS: THE [redacted] GROUP AND PHOTOINTERPRETERS AGREE THAT THE BEST PHOTOGRAPHY OF MISSION 1102 IS BETTER THAN ANY PREVIOUS CORONA PHOTOGRAPHY. THE PERFORMANCE OF THE FORWARD-LOOKING CAMERA APPEARS TO BE SLIGHTLY BETTER THAN THE AFT-LOOKING CAMERA. THE FORWARD-LOOKING CAMERA, HOWEVER, CONTAINED A SECOND GENERATION LENS WHICH HAD A SLIGHTLY HIGHER PREFLIGHT PERFORMANCE THAN THE FIRST GENERATION LENS IN THE AFT-LOOKING CAMERA. NINE MOBILE AND FIXED CORN TARGETS WERE RECORDED. THE BEST TARGETS OBSERVED IN THE 0. NEG YIELDED [redacted]

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RESOLVED DISTANCE ALONG THE LINE OF FLIGHT (FMC DIRECTION) [redacted] ACROSS THE LINE OF FLIGHT (SCAN DIRECTION) FOR THE AFT-LOOKING CAMERA; THE FORWARD-LOOKING CAMERA YIELDED APPROXIMATELY [redacted] IN BOTH DIRECTIONS. SEVERAL VERY FAVORABLE FACTORS COMBINED TO PRODUCE THE BEST CORONA MISSION TO DATE. THE PRIMARY FACTORS WERE GOOD ATMOSPHERIC CONDITIONS, INCREASED SCALE THROUGH LOWER ALTITUDE AND IMPROVED CAMERA PERFORMANCE.

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B. DISIC STELLAR CAMERA PERFORMANCE: THE STELLAR CAMERA FUNCTIONED PROPERLY THROUGHOUT THE MISSION AND RECORDED A FULL FIELD OF STARS ON BOTH THE PORT AND STARBOARD CAMERAS. THE STARBOARD CAMERA WAS MORE AFFECTED BY MISSION PARAMETERS (INCREASED FLARE) AND OCCASIONALLY WAS INHIBITED BY THE AUTOMATIC SUN SENSING CIRCUITRY AS DESIGNED. THE MODIFIED BAFFLES AND REDUCED RESEAU FOGGING LAMP ILLUMINATION LEVELS IMPROVED PERFORMANCE TO THE EXTENT THAT STARS DIMMER THAN 6.5 MAGNITUDE WERE RECORDED. EVERY PORT AND STARBOARD FORMAT IS SLIGHTLY VIGNETTED AND/OR FLARED BY THE BOOT BAFFLES. THE FLARE APPEARS AS NARROW BARS ALONG THE LEADING AND TRAILING

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EDGES OF THE FORMATS. TYPE 3401 FILM WAS USED THROUGHOUT THE ENTIRE MISSION.

C. TERRAIN EVALUATION: THE IMAGE QUALITY IS FAIR TO GOOD AND OF SIGNIFICANTLY BETTER DEFINITION THAN THAT OBTAINED ON MISSION 1101. THE MATERIAL IS CONSIDERED SUITABLE FOR ATTITUDE DETERMINATION AND AUXILIARY MAP MAKING. A SHUTTER ANOMALY NEGATED THE VALUE OF MOST OF THE PHOTOGRAPHY AFTER REVOLUTION 182. FOR THE ENTIRE MISSION THE EXPOSURE TIME WAS 1/500 SECOND, AND THE FILM TYPE WAS 3400.

4. PAN CAMERA ANOMALIES:

A. ANOMALY: CROSS TRACK SMEAR.

CAUSE: FOR THE FIRST TIME THERE IS IDENTIFIABLE EVIDENCE OF IMAGE DEGRADATION DUE TO THE UNCOMPENSATED CROSS TRACK SMEAR AND THAT CAUSED BY LIFT ABOVE THE RAILS. THE FORWARD-LOOKING CAMERA EXHIBITED ADDITIONAL SMEARING. THIS ADDED SMEAR OCCURRED ON THE TAKE-UP SIDE ONLY AND IS ATTRIBUTED TO AN UNIDENTIFIED TRANSIENT WHICH CAUSED FILM DISTURBANCE IN THE SCAN DIRECTION.

ACTION: (1) [] CONTINUE CURRENT TEST ENDEAVORS TO DETERMINE SOURCE OF TRANSIENTS FOR EARLY IMPLEMENTATION. (2) [] WILL INVESTIGATE AND PROPOSE A LONG RANGE APPROACH FOR SOLUTION OF THE BASIC UNCOMPENSATED SMEAR. (3) [] TO INSURE THAT FUTURE CR FLIGHTS WILL HAVE A PAINT PATTERN WHICH WILL ALLOW PAYLOAD ON-ORBIT OPERATION BETWEEN 60 DEGREES AND 80 DEGREES FAHRENHEIT. (MONITORS:

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[] ACKNOWLEDGEMENT IS MADE OF THE POST OPERATIONAL FAILURE OF THE FORWARD-CAMERA. THE IMAGE SMEAR DISCUSSED ABOVE HAS NO KNOWN OR PERCEIVED CORRELATION TO THIS FAILURE. INVESTIGATION OF THIS ANOMALY IS STILL UNDERWAY.

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B. ANOMALY: IT WAS REPORTED THAT THE PAN GEOMETRY TRACE WAS GENERALLY SHARP AND WELL DEFINED ON BOTH INSTRUMENTS; HOWEVER, NEAR THE END OF BUCKET ONE AND THROUGHOUT BUCKET TWO, THE TRACE ON THE BINARY EDGE OF THE AFT CAMERA IS BROKEN. THIS ANOMALY ALSO OCCURS ON THE FWD CAMERA MIDWAY THROUGH BUCKET TWO.

CAUSE: THIS ANOMALY IS ANALOGOUS TO THE RAGGED FORMAT EDGE EXHIBITED OCCASIONALLY ON THE J-1 SYSTEM, AND IS CAUSED BY A CLUMPING OF SMALL PARTICLES OF EMULSION ALONG THE RAIL EDGE. THIS PARTICLE CLUMPING EXTENDS INTO THE PAN GEOMETRY TRACE AREA CAUSING THE TRACE IMAGE TO BE OBSCURED.

ACTION: NONE

C. ANOMALY: LIGHT FOG FROM MISSION 1102-1 WAS OBSERVED ON THE THIRD AND EIGHTH FRAME FROM THE END OF MANY FORWARD-LOOKING CAMERA OPERATIONS OF INSTRUMENT 305 AND ON THE SECOND AND SEVENTH FRAME FROM THE END OF MANY AFT-LOOKING CAMERA OPERATIONS (INSTRUMENT 304). MINOR IMAGE DEGRADATION OCCURRED.

CAUSE: THE THIRD FRAME FROM THE END OF INSTRUMENT 305 OPERATIONS AND THE SECOND FRAME FROM THE END OF INSTRUMENT 304 OPERATIONS APPEAR TO BE FOGGED BY LIGHT FROM THE DRUM AREA OF INSTRUMENT 304. PRIOR TO FLIGHT, PHOTO MULTIPLIER TESTS REVEALED NOTICEABLE LIGHT LEAKAGE PAST THE DRUM OF INSTRUMENT 304. WHILE THE DRUM LIGHT LEAK WAS SIGNIFICANTLY REDUCED BY CORRECTIVE APPLICATIONS OF RTV, THE LIGHT LEAK WAS NOT ENTIRELY ELIMINATED. FOG ON THE EIGHTH FRAME FROM THE END OF PASS ON INSTRUMENT 305 AND ON THE SEVENTH FROM THE END OF PASS ON INSTRUMENT 304 IS ATTRIBUTED TO A SPACE STRUCTURE LIGHT LEAK IN THE VICINITY OF THE NUMBER ONE SRV/FAIRING INTERFACE.

ACTION: THE PRESENT LIGHT LEAK TEST PROCEDURE WILL BE RE-EXAMINED AND APPROPRIATELY MODIFIED TO MINIMIZE OR ELIMINATE LIGHT LEAKS. (MONITOR []

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D. SCRATCHES IN THE FORMAT AREA: THE AFT CAMERA HAD SEVERAL SCRATCHES IN THE FORMAT AREA. THESE WERE NOTED TO OCCUR INTER-

MITTENTLY AND BECAME LESS SEVERE AS THE FLIGHT PROGRESSED. THEY ARE NOT ASSOCIATED WITH FRAME TO FRAME PROGRESSION.

CAUSE: THE PREFLIGHT FILM SHOWED NO SCRATCHES OF THIS NATURE AND THEREFORE IT IS CONCLUDED TO BE ASSOCIATED WITH IN-FLIGHT CONDITIONS.

ACTION: REVIEW SYSTEM CLEARANCES, AND APPLY THE FIELD F.O. TO ALL NEARBY WIRE TIES. CONTINUE ACTION AS OUTLINED IN CR-1 PEIR REPORT. (MONITOR: [REDACTED])

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E. ANOMALY: IT WAS REPORTED THAT OCCASIONALLY THE INDEX COLUMN OR BOTH THE INDEX AND TIME WORD COLUMNS FAILED TO BE IMAGED (BOTH PAN CAMERAS).

CAUSE: THIS ANOMALY WAS NOTED DURING THE FLIGHT PREPARATIONS AND WAS SUBSEQUENTLY REPORTED PRE-MISSION BY [REDACTED] THIS PROBLEM WAS INDUCED BY ELECTRICAL TRANSIENTS ON THE POWER LINE (PAYLOAD SYSTEM GENERATED) AND ACTUALLY REPRESENTS AN INTERROGATION OF THE CLOCK JUST PRIOR TO THE FILM BECOMING STATIONARY.

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ACTION: [REDACTED] IS CURRENTLY IMPLEMENTING A CHANGE TO THE INTERROGATION CIRCUITRY WHICH WILL CORRECT THIS PROBLEM PRIOR TO MISSION 1103. (MONITOR: [REDACTED])

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F. ANOMALY: IT WAS REPORTED THAT THE FREQUENCY MARKS WERE OCCASIONALLY WEAK OR PARTIALLY MISSING OR COMPLETELY MISSING ON SOME FRAMES (BOTH PAN CAMERAS).

CAUSE: THIS PROBLEM HAS BEEN EXPERIENCED ON OTHER SYSTEMS AND IS ATTRIBUTED TO THE STARTING CHARACTERISTICS OF THE NEON BULB (DARK EFFECT POSSIBLE AGGRAVATED BY LOW TEMPERATURE).

ACTION: [REDACTED] IS CURRENTLY TESTING A CIRCUIT CHANGE WHICH WILL KEEP THE NEON BULBS ON DURING ALL CAMERA OPERATIONS. THIS CHANGE SHOULD CORRECT THIS PROBLEM. (MONITOR: [REDACTED])

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5. DISIC ANOMALIES

A. ANOMALY: FLARE IN FORMAT EDGE OF STELLAR RECORDS. ON ALL IN-FLIGHT FRAMES OF BOTH CAMERAS, FLARE PATTERNS APPEAR ALONG THE ENTIRE FORMAT EDGES AND EXTEND APPROXIMATELY 1/16 TO 3/32 OF AN INCH INTO THE ACTIVE FORMAT. STAR IMAGES ARE GENERALLY NOT DETECTABLE IN THESE AREAS. OVERALL FOGGING IS SIGNIFICANTLY LESS THAN WITH CR-1 INDICATING THAT THE INTERIM BAFFLE FIX, IN CR-2 MET ITS BASIC OBJECTIVES.

CAUSE: IT IS LIKELY THAT THE APERTURE IN THE NEW BAFFLE LOCATED IN THE FIBER-GLASS BOOT WAS TOO CLOSE TO THE CAMERA FIELD OF VIEW. THIS RESULTED IN REFLECTED LIGHT FROM THE BAFFLE EDGE ENTERING THE LENS AND CAUSING THE FOGGING.

ACTION: BASED ON CR-2 RESULTS, PERMANENT J-3 [REDACTED] BAFFLE DESIGNS WILL BE REVIEWED AND APPROVED [REDACTED] ON 16 JANUARY 1968. (MONITORS: [REDACTED])

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B. ANOMALY: PRESSURE MARKS OUTSIDE FORMAT OF STELLAR RECORD. PRESSURE INDUCED FOG MARKINGS 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

C. ANOMALY: ELECTROSTATIC DISCHARGES ON STELLAR RECORDS. ELECTROSTATIC MARKINGS OF THE DENDRITIC AND CORONA TYPES ARE PRESENT INTERMITTENTLY THROUGHOUT THE MISSION.

CAUSE: THE GREATEST OCCURENCE IN FREQUENCY AND EXTENT RESULTS FROM THE PRESSURE/METERING ROLLERS.

ACTION: ELIMINATION OF PRESSURE/METERING ROLLER MARKING DURING [REDACTED] ALTITUDE TESTING HAS BEEN REALIZED BY INCORPORATION ON ROLLER MATERIAL AND ROLLER FORCE CHANGES. EFFECTIVENESS OF THESE

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CHANGES IN [] HIVOS TESTING WILL BE DETERMINED IN FEBRUARY 1968.
(MONITORS: [])

D. ANOMALY: ALL PORT STELLAR CAMERA FRAMES CONTAIN REPEATING PATTERNS OF MINUS DENSITY SPOTS WHICH APPEAR TO BE CAUSED BY DIRT ON THE RESEAU PLATE.

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

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

E. ANOMALY: BEGINNING WITH REVOLUTION 182 OF 1102-2, MOST TERRAIN FRAMES ARE SERIOUSLY DEGRADED BY WHAT APPEARS TO BE MULTIPLE EXPOSURES AT A LEVEL SIGNIFICANTLY LESS THAN NORMAL EXPOSURE. BETWEEN REVOLUTIONS 149 AND 182 SOME SLIGHT DEGRADATION WAS NOTED INTERMITTENTLY. MEASURED SEPARATIONS OF EXPOSURES IN THE FLIGHT AND FILM TRANSPORT DIRECTIONS ARE CONSISTENT WITH IMAGE, FILM TRANSPORT AND SHUTTER DISC VELOCITIES. THIS INDICATES INCOMPLETE CLOSING OF THE CAPPING SHUTTER AS THE LIKELY FAILURE. FAILURE WAS INITIALLY QUITE INTERMITTENT, BECOMING PROGRESSIVELY MORE FREQUENT UNTIL, AT THE END OF THE MISSION IT WAS PREVALENT. ANALYSIS INDICATES THAT THE TERRAIN CAPPING SHUTTER WAS SLIGHTLY OPEN DURING THE TIMES WHEN IT WAS COMMANDED CLOSED.

POSSIBLE CAUSES:

(1) ELECTRICAL: FAILURES IN ANY ONE OF FOUR ELECTRICAL COMPONENTS OF THE TERRAIN CAPPING SOLENOID CIRCUIT WOULD PRESENT A VOLTAGE ACROSS THE SOLENOID DURING NORMAL OFF PERIODS THAT WOULD PROVIDE A FORCE OPPOSING THE SPRING RETURN SHUTTER CLOSING. TESTS AT [] INDICATE THAT THIS WOULD RESULT IN BOTH THE SLIGHT CRACKING OF THE CAPPING SHUTTER AND THE INTERMITTENT NATURE OF THE FAILURE. ALTHOUGH INITIAL ANALYSIS OF T/M INDICATED THAT A FAILURE OF THIS NATURE DID NOT OCCUR, INVESTIGATION OF THIS POSSIBLE FAILURE MODE AND MORE DETAILED ANALYSIS OF THE CORRESPONDING T/M WILL CONTINUE.

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(2) MECHANICAL: NO MEASUREMENTS ARE AVAILABLE THAT WOULD PINPOINT A PARTICULAR TYPE OF MECHANICAL FAILURE. OF THE SEVERAL POSSIBLE FAILURES CONSIDERED, CONTAMINATION BY DIRT OR LUBE BREAKDOWN OR DAMAGE TO THE SOLENOID BALLS AND RACES APPEARED MOST LIKELY.

ACTION: [] WILL CONTINUE ANALYSIS TO DETERMINE IF T/M OVERALL ACCURACY AND SAMPLING ARE ADEQUATE TO INDICATE WHETHER AN ELECTRICAL FAILURE CAN BE DETECTED. [] WILL ALSO INVESTIGATE ALTERNATE LUBES AND CAPPING SHUTTER ACTUATION METHODS. (MONITOR: [])

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6. COMMENTS ON SPECIAL EXPERIMENTS

A. FILTER TESTS: A GREEN SF 05 FILTER AND A POLARIZING FILTER WERE FLOWN IN THE ALTERNATE FILTER POSITIONS. SINCE [] IS CHARGED WITH A DETAILED ANALYSIS AND REPORT OF THE POLARIZER AND BI-SPECTRAL FILTER EXPERIMENTS, THE [] LIMITED ITS ANALYSIS TO CONCLUDE THE GENERALIZATION THAT WHEN THESE FILTERS WERE USED THERE WAS NO MAJOR DEGRADATION IN IMAGE QUALITY; HOWEVER, THERE WERE NOTICEABLE DIFFERENCES IN SCENE CONTRAST AND INFORMATION CONTENT.

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B. USE OF SO-230: A COMPARATIVE ANALYSIS OF SIMILAR TARGETS ON SO-230 AND TYPE 3404 FILM SHOWED LITTLE DIFFERENCE IN IMAGE QUALITY. [] WILL PERFORM A DETAILED ANALYSIS AND REPORT ON THE USE OF SO-230 IN THE CORONA J-3 PAYLOAD.

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C. THROUGH EXPOSURE RUN: A THROUGH EXPOSURE RUN WAS MADE DURING DO32. EVALUATION OF THE IMAGE QUALITY ON FRAMES PRODUCED UNDER THE MAXIMUM AND MINIMUM SLIT CONDITION INDICATED PERCEPTIVELY IMPROVED IMAGERY. AGAIN [] WILL SUBMIT A DETAILED REPORT ON CORONA J-3 EXPOSURE INCLUDING THIS THROUGH EXPOSURE RUN.

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T O P S E C R E T

END OF MESSAGE