ORM 124 USE PREVIOUS EDITIONS

CLASSIFIED MESSAGE

~~TOP SECRET~~

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ROUTINE

DATE 0041Z 28 APR 66

TO : DIRECTOR

FROM : [redacted]

ACTION:

INFO :

TOR: 0303Z 28 APR 66

[redacted]

TO [redacted] INFO [redacted] CITE [redacted]

[redacted]

REF [redacted]

FROM: [redacted]

SUBJ: MISSION 1031 FLIGHT PROBLEMS ANALYSIS REF IS PRELIM REPORT.

1. THREE FLIGHT MALFUNCTIONS OCCURRED DURING MISSION 1031. THESE FAILURES WERE:

1.1 THE SLAVE CAMERA FAILED AT THE START OF THE "B" MISSION.

1.2 THE "A" CAPSULE TELEMETRY DID NOT RADIATE.

1.3 THE "A" CAPSULE IMPACT POINT WAS 90 N. MILES BEYOND THE NOMINAL POINT, EXCEEDING THE 3 SIGMA DISPERSIONS.

2. SLAVE INSTRUMENT FAILURE

A NORMAL ENGINEERING OPERATION WAS TAKEN ON REV 111 [redacted] RECOVERY WAS EFFECTED ON REV 113, [redacted] ACQUISITION.) THE NEXT ENGINEERING PASS WAS REV 120, [redacted] TELEMETRY DATA WERE OBTAINED DURING THE THREE PERIODS DESCRIBED.

THE REV 111 ENGINEERING OPERATION WAS THE LAST OPERATION TAKEN PRIOR TO RECOVERY AND WAS NORMAL IN ALL RESPECTS. THE CUT

~~TOP SECRET~~

ENGINEERING PASS 120, THE SLAVE CASSETTE WAS FOUND TO BE "FREE RUNNING" WITH NO FILM ON THE HUB. THE RETURNED CASSETTE WAS TESTED AT A/P AND FOUND TO FUNCTION NOMINALLY.

THE ANALYSIS HAS DEVELOPED THE FOLLOWING SEQUENCE RESULTING IN THE CAMERA FAILURE. AT THE "ARM" SIGNAL, THE LOW TORQUE VOLTAGE WAS PLACED ON THE TAKE-UP CASSETTE, AND THE "A" CAPSULE FILM CUTTER FIRED. AS THE CASSETTE STARTED TO ROTATE, THE SLAVE FILM END BECAME BOUND IN THE AREA OF THE PANORAMIC FILM CHUTE (WITHIN THE THRUST CONE), THUS RESTRICTING ROTATION ON THE SLAVE CASSETTE. IT IS BELIEVED THAT THE SLAVE CASSETTE ROTATED AT LEAST 90 DEGREES, THE "CINCHING" THE FILM AND CASSETTE. AFTER SEVEN SECONDS OF REDUCED TORQUE, THE CAMERAS ARE PROGRAMMED ON FOR 23 SECONDS. FOUR FRAMES OF FILM WERE METERED INTO THE CAMERA, NONE WERE TAKEN-UP BY THE SLAVE CASSETTE. AS A RESULT, THE CAMERA LOST SYSTEM TENSION AND THE FILM EVENTUALLY DOUBLE WRAPPED ABOUT THE FRAME METERING ROLLER.

AT "A" CAPSULE SEPARATION THE FILM HANG-UP WAS FREED, BUT THE TENSION LOSS HAD ALREADY FAILED THE SLAVE CAMERA, ON THE ENGINEERING PASS 120, THE SLAVE CAMERA TELEMETRY INDICATED THE RESULT OF INTERNAL BINDING, AS THE LENS ROTATION MONITOR AND THE CENTER-OF- FORMAT MONITOR HAD CHANGED PHASE BY APPROXIMATELY 180 DEGREES.

IT IS BELIEVED THAT THE FILM "HANG-UP" WITHIN THE CHUTE RESULTED IN ALTERING THE CAPSULE PITCH-DOWN ANGLE AND RESULTED IN THE CAPSULE IMPACT POINT OVERSHOOT.

AND WRAP DATA INDICATED NORMAL COMMAND SEQUENCING, HOWEVER, LITTLE OR NO SLAVE TAKE-UP FILM MOTION DURING THE 7 SECOND OR THE PROGRAMMED FOUR CYCLE C & W OPERATION. POSITIVE INPUT METERING TO THE CAMERA WAS PRESENT. APPROXIMATELY 620 CYCLES WERE PROGRAMMED BETWEEN THE RECOVERY PASS AND THE REV 120 ENGINEERING PASS. THE REV 120 ENGINEERING PASS DATA INDICATED NORMAL MASTER INSTRUMENT OPERATION, NO SLAVE PAYLOAD MOVEMENT AND THE PRESENCE OF ROTATION OF SLAVE INSTRUMENT COMPONENTS. HOWEVER, THE CENTER OF FORMAT AND LENS ROTATION MONITORS WERE PHASE SHIFTED. SLAVE CASSETTE ROTATION WAS INDICATED BY THE FILM FOOTAGE POT MONITOR BOUNCING OVER THE THREADING ROLLERS. RECOVERY OF THE "A" BUCKET INDICATED A CLEAN SLAVE PAYLOAD CUT AND THE PROPER LENGTH OF FILM FOR BOTH INSTRUMENTS FOR THE REV 111 ENGINEERING PASS. RECOVERY OF THE "B" BUCKET INDICATED THE SLAVE CASSETTE HAD MOVED FROM THE INDEX POINT, BOTH CASSETTES AND BRAKES WERE OPERATIONAL, AND NO FILM FOR THE SLAVE CASSETTE WAS PRESENT.

THE ANALYSIS HAS RESULTED IN SEVERAL FIRM FACTS CONCERNING THE FAILURE. THE SLAVE INSTRUMENT FAILED DUE TO LACK OF CASSETTING. THAT IS TO SAY THAT THE FAILURE RESULTED FROM FILM ACCUMMULATING WITHIN THE SLAVE INSTRUMENT. THE TELEMETRY DATA INDICATED THAT THE FILM WAS NOT BEING REMOVED FROM THE SYSTEM, RESULTING IN A LOSS OF TENSION AND THE SUBSEQUENT FILM WRAP-UP AROUND THE METERING ROLLERS.

THE "B" SLAVE CASSETTE BRAKE AND MOTOR WERE FOUND TO BE FUNCTIONING BOTH IN ORBIT AND IN THE RECOVERED CAPSULE. ON THE

THE J-30 SYSTEM CONTAINED THE FIRST FLIGHT USAGE OF THE PANORAMIC FILM CHUTE. THIS CHUTE WAS ADDED TO THE SYSTEM TO ELIMINATE THE LIGHT LEAKS DUE TO THE TRANSLUCENT CHARACTERISTIC OF THE ABLATIVE SHIELD.

THE CONSTRUCTION OF THE CHUTE, THE USE OF THE CHUTE, AND ALL POSSIBLE AREAS OF FILM HANG-UP IN THE THRUST CONE AREA ARE UNDER INVESTIGATION.

RECOVERY WAS EFFECTED ABOUT 99 N. MILES DOWN RANGE FROM NOMINAL WITH NO CROSS TRACK DISPERSION. THE FOLLOWING FACTORS IN THE RECOVERY DYDNAMICS HAVE BEEN CONSIDERED, AND ARE WITHIN NOMINAL LIMITS.

1. EVENT TIMES

	SYSTEM TIME
D TIMER START	81522.3
ARM	81528.96
TRANSFER	81604.0
SEPARATE	81606.2

2. AGENA ATTITUDE AT SEPARATION

ATTITUDE DETERMINED TO BE 60 DEGREES, BASED ON PITCH DOWN TIME, RATE AND VERIFIED BY MAGNETOMETER DATA.

THE SEPARATION APPEARED CLEAN TO THE AGENA, IN THAT NO DISTURBANCE WAS SEEN BY THE AGENA CONTROL SYSTEM.

3. RECOVERY SYSTEM WEIGHT AND RE-ENTRY TRAJECTORY CALCULATION

THE COMPUTED WEIGHT OF THE SEPARATED CAPSULE WAS BASED ON A PREDICTED SUSPENDED WEIGHT OF 176.17 LBS. THE UNIT WAS

WEIGHT AT 177.2 WHEN RETURNED TO A/P. THE PREDICTED WEIGHTS WERE INPUT TO A SEPARATE RE-ENTRY TRAJECTORY COMPUTATION, AND FOUND TO AGREE WITHIN 2 N. MILES TO THE OPERATIONAL TRAJECTORY.

4. DUE TO THE ABSENCE OF ANY "CROSS" TRACK DISPERSION IN CONJUNCTION WITH THE INTRACK DISPERSION, IT IS MOST PROBABLE THE OVERSHOOT WAS A RESULT OF A FILM HANGUP OF THE PANORAMIC SYSTEM.

IN CONNECTION WITH THE DISCUSSION OF THE FAILURE OF THE SLAVE INSTRUMENT, IT IS POSTULATED THAT THE OVERSHOOT IS DUE TO HANG UP OF THE SLAVE FILM WITHIN THE AREA OF THE SEPARATED CAPSULE BETWEEN THE FILM CUTTER AND SEAL AND THE BACK EDGE OF THE THRUST CONE. THIS RESULTED IN A PITCH ANGLE OF APPROXIMATELY 43 DEGREES NOSE DOWN INSTEAD OF THE NOMINAL 60 DEGREES ND.

AT SEPARATION, THE FILM WAS UNDER TENSION AND RESTRICTED THE UPPER SEPARATION PUSH RODS UNTIL SUFFICIENT FORCE BUILT UP TO TEAR OR BREAK THE FILM FROM ITS RESTRICTION. DELAY OF ONE PUSH ROD FOR .07 SEC. WOULD RESULT IN THE REQUIRED CAPSULE PITCH ERROR TO OBTAIN THE OVERSHOOT. DELAY OF A PUSH ROD RESULTS IN CAPSULE PITCH ERROR WITH LITTLE RESIDUAL PITCH RATE ERROR. THE REACTION RESULT ON THE AGENA IS THE SAME: E.E., PITCH DISPLACEMENT WITHOUT RATE ERROR; THE ATTITUDE DISPLACEMENT OT THE AGENA WOULD NOT BE DETECTABLE.

THE FAILURE OF THE "A" CAPSULE TO RADIATE WAS CONCLUSIVELY FOUND TO BE THE RESULT OF A BATTERY FAILURE. AT THE TIME THE BATTERY IS ENERGIZED, A PYROTECHNIC DEVICE IS FIRED TO FORCE THE

STORED ELECTROLYTE (AFTER RUPTURING TWO DIAPHRAMS) INTO A DISTRIBUTION MANIFOLD AND THEN INTO THE BATTERY CELLS.

THE RECOVERED BATTERY WAS DISSECTED BY THE MANUFACTURER, FINDING THAT THE PYRO GAS GENERATOR HOUSING FAILED, SEPARATING THE PYRO FROM THE CHAMBER PRIOR TO RUPTURE OF THE SECOND DIAPHRAM AND THUS NO ELECTROLYTE REACHED THE CELLS. THE GAS GENERATOR HOUSING IS A DUAL CHAMBER UNIT CONTAINING 2 PYROS.

THIS FAILURE MODE HAD BEEN RECOGNIZED BY THE BATTERY MANUFACTURER, BUT CORRECTIVE ACTION HAD NOT BEEN IMPLEMENTED BECAUSE OF THE EXISTING RELIABILITY (.9997) OF THE UNIT. [redacted] IS CONSIDERING A REDESIGNED GAS GENERATOR CHAMBER, RESULTING IN A SINGLE CYLINDRICAL CHAMBER WITH A SINGLE PYRO (DUAL BRIDGE WIRES). THE STRUCTURAL INTEGRITY IS IMPROVED, PARTICULARLY IN THE MANNER IN WHICH THE PYRO IS INSTALLED AND SECURED.

END OF MESSAGE