J-23

IN-FLIGHT FAILURE ANALYSIS SUMMARY

[redacted]
Manager
Payload Integration

9/9/65
Date

SUMMARY OF FAILURE

J-23 flight vehicle was operating normally for over one hundred orbits. However, during orbit No. 102 when the system was programmed to operate emergency mode (system on stereo and by-passing intermix circuits) the slave instrument completed 147 cycles as programmed while the master instrument only operated on the last 34 cycles of the program.

On orbit No. 104 (engineering pass) the master instrument failed to operate on stereo mode. Telemetry data had shown no drive voltage on the instrument which indicated the operate relays were not pulled in. At the same time the program on/off monitor telemetry data reflected the receipt by the operate command. After analyzing the T/M data it is concluded the probable cause of the failure lies between the holding relay for the master instrument operate signal in the command box, and the operate relays of the master instrument.

The master instrument failed to respond to operate signal in either mono 1 mode or stereo mode from orbit No. 104 through to orbit No. 132. Meanwhile no PMU TM changes were noted during any of the mono 1 mode operations.

On orbit No. 133 the master instrument operated on the last 2 cycles of 162 programmed cycles. On orbits No. 134 and 135 it responded to operate signals as programmed, but from them on until orbit No. 144, SRV-B recovery, it failed again to respond to any operate command.

On Orbit no. 183 the vehicle went through the deactivate exercise and the system responded as designed, both the master and slave instrument operated.

CONCLUSION

In reviewing the events, it is concluded that the most probable cause of failure is located in the command box on the circuit associated with the master instrume operate relay, K-13, which feeds the voltage to the PMU and the master instrument (ref. block diagram and schematic attached.)

When both components did not receive the necessary voltage, the suspicion is logically cast on K-13 circuitry. This further substantiated when the by-pass circuit, vehicle deactivate, successfully operated the system.

OPERATIONAL INVESTIGATIONS

As result of the above analysis, the following actions were taken to minimize failures of similiar nature on future systems.

A. Pad-readied System

All black-box assemblies from J-24 system were subjected to vibration and functional re-tests to assure integrity and to develop higher confidence levels of the holding relays and their associated circuitries. No anomalies were detected and all assemblies undergone tests successfully.

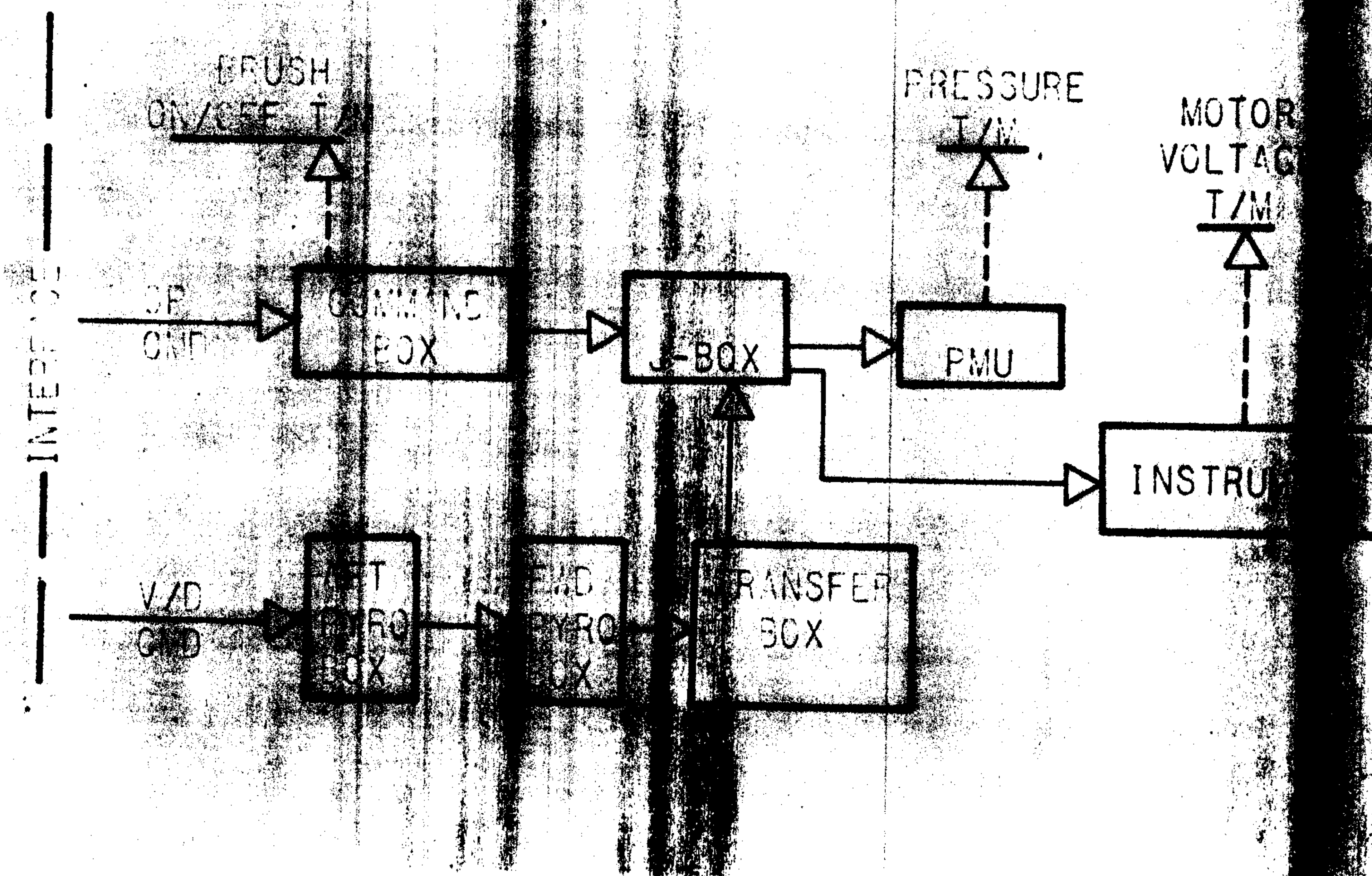
B. Future Systems

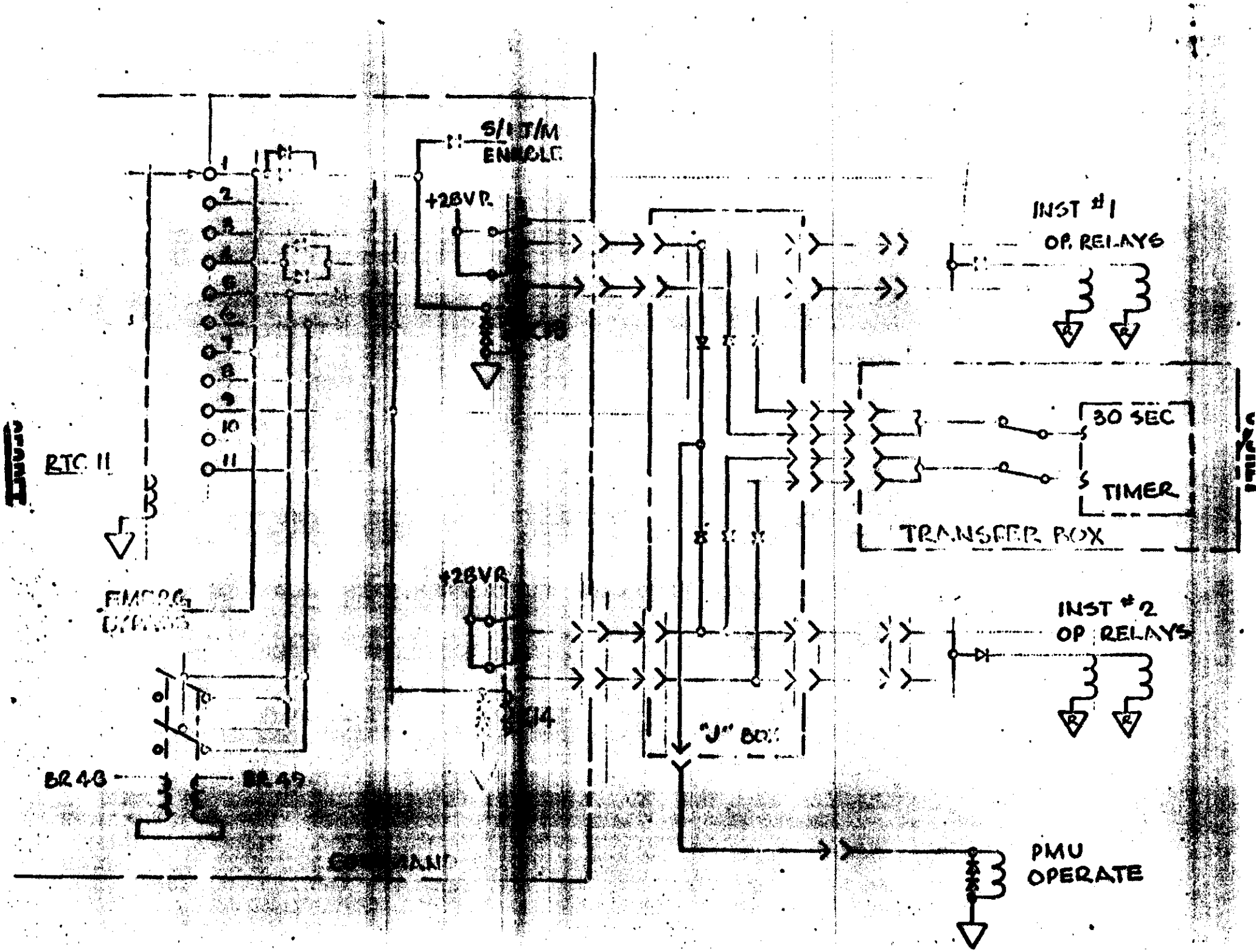
In the course of the failure analysis, potential problem areas in the system were uncovered and investigations are now underway to improve the condition. They are as follows:

1. CR-117 on the operate relay line in the instrument no longer serve its original function. Should it fail open or the connecting lead break the operation of the instrument will be permanently halted.

2. Operate relays in the command box feed operate voltages to the instruments for both standard operation mode and emergency operation mode. Any relay circuit failure as in the case of J23 will disable the instrument.

BLOCK DIAGRAM
INSTRUMENT OPERATE COMMAND




S/L T/M ENCLS.
+28VP.
INST #1 OP. RELAYS
30 SEC
TIMER
TRANSFER BOX
RTC II
+28VP
INST #2 OP RELAYS
"J" BOX
BR43
PMU OPERATE

B- [illegible] FAILU

1. [illegible]
   A - [illegible] AT FAILURE (REV. 102)

12	6	8	9	10	11	12	15
POS	7	6	1	6	7	8	4

   B - CONDITION:
   - INTERRUPT OFF
   - [illegible]Y OF[illegible]TE MODE
   - [illegible] FILE: 34 out of 147 CYCLES OPERATED.

2. FAST [illegible] (MICROWAVE)
   A - [illegible] SETTINGS AT [illegible]INELRIN[illegible] ([redacted] 104)

12	6	8	9	10	11	12	15
POS	7	6	3	6	7	11	4

   B - CONDITION:
   - INTERRUPT ON
   - PROGRAM 3
   - MASTER INSTRUMENT FAILED TO OPERATE:
     Operate Relay monitor indicates No Operate Signal received. Drive motor armature

J-23 FAILURE (Continued)

monitor read Zero volts. S/I Programmer and C/I not working. Temp Sensors, Clock and PMU were all O.K.

3. DIAGNOSTIC OPERATION PERFORMED

A - PASS 105 RTC II to Port on 1 (STEREO). MASTER INSTRUMENT failed to operate on Pass 105.

B - PASS 106 RTC II to Port on 2 (MONO #1) MASTER INSTRUMENT failed to operate on Pass 106.