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9 JUN 65 15 45

Declassified and Released by the N R C
In Accordance with E. O. 12958
on NOV 26 1997

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PRIORITY [redacted] CITE [redacted]

ATTN: [redacted]

REF: [redacted]

SUBJECT: RECOVERY PROGRAMMER PRELIMINARY FAILURE ANALYSIS

1. PRELIMINARY RESULTS OF FAILURE ANALYSIS BEING CONDUCTED ON RECOVERY PROGRAMMER 692D918G4, LOT M3 REV. J, AN 15 ARE AS FOLLOWS:

A. BENCH CHECK VERIFIED THAT CHANNEL NO. 1 DID NOT OPERATE. VISUAL INSPECTION OF DISASSEMBLED UNIT INDICATED THAT PRINTED CIRCUITRY NEAR PIN F ON BOARD 2A1A1 WAS OPEN. PRINTED STRIP AND ASSOCIATED SOLDER HAD MELTED, APPARENTLY DUE TO SEVERE LOCAL HEATING.

B. VISUAL INSPECTION OF OTHER AREAS ON BOARD AND THE BOARD CIRCUITRY SHOWED NO DISCOLORATION OR OTHER INDICATION OF HIGH CURRENTS OR SHORT CIRCUITS. SOLDER COVERING THE COPPER PRINTED CIRCUITS APPEARED TO NECK-DOWN ON SOME CIRCUITS WHERE THEY APPROACHED BOARD CONNECTOR TABS. MAY BE OPTICAL ILLUSION DUE TO NONUNIFORMITY OF CONFORMAL COATING THICKNESS. THIS WILL BE CHECKED WHEN BOARD IS DISECTED AFTER TESTS ARE COMPLETED. BOARD CONNECTOR TABS ALSO WERE SCORED ALONG EDGE OF CONFORMAL COATING AS RESULT OF TRIMMING OPERATION PERFORMED AFTER BOARD WAS COATED. FAILURE DID NOT OCCUR AT A SCORE MARK, BUT A SHORT DISTANCE FURTHER UP CIRCUIT.

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C. FAILED AREA SHOWED INDICATIONS THAT FAILURE MAY HAVE BEEN PROGRESSIVE. PRINTED CIRCUIT APPEARS TO HAVE NECKED DOWN UNTIL ONLY A PORTION OF TOTAL CROSS SECTION REMAINED PRIOR TO FINAL BURN THROUGH.

D. WITH FAILED PORTION OF CIRCUIT JUMPERED, PROGRAMMER (BOTH CHANNELS) FUNCTIONED NORMALLY WHEN OPERATED AS A UNIT AND WHEN CONNECTED TO THE RECOVERY TRAY AND BACK - UP TIMER.

2. THE SPECIFIC CAUSE OF THE FAILURE IS NOT APPARENT AT THIS TIME. EVIDENCE TO DATE INDICATES THAT FAILURE COULD HAVE BEEN THE RESULT OF AN IMPROPERLY MANUFACTURED PRINTED CIRCUIT, IMPROPER MANUFACTURING TECHNIQUE, UNUSUALLY SEVERE TEST CONDITIONS, A BAD RELAY OR OTHER PART OR A COMBINATION OF ONE OR MORE OF THESE FACTORS. APPEARANCE OF PRINTED CIRCUIT IN FAILED AREA AND LACK OF SHORT CIRCUIT EVIDENCE DOES SUGGEST THAT FAILURE WAS PROGRESSIVE.

3. PLANNED EVALUATION TO BE PERFORMED IS AS FOLLOWS:

A. RECOVERY TRAY TO BE SUBJECTED TO O/A VIBRATION TEST. PROGRAMMER FAILURE AREA WILL BE BY-PASSED.

B. CIRCUIT ANALYSIS TO DETERMINE PATHS THROUGH WHICH HIGH CURRENT COULD FLOW.

C. INSPECTION OF CHANNEL 7 AND 9 T/M FLIGHT RECORDS BEING RETURNED FROM FIELD.

D. THERMAL ANALYSIS TO DETERMINE IF SCORING OF CONNECTOR TABS COULD CAUSE GENERATION OF SUFFICIENT HEAT TO DANAGE PRINTED CIRCUIT.

E. PREPARE SAMPLE BOARDS SAME AS FAILED UNIT AND SUBJECT TO VARIED CURRENT PULSES TO DETERMINE DEGREDATION. ALSO TEST TO DESTRUCTION.

F. PERFORM TEAR DOWN ANALYSIS OF FAILED BOARD AND PARTS.

1) METALURGICAL EVALUATION OF WIRING AND PRINTED CIRCUIT ON EACH SIDE OF FAILURE.

2) MATERIALS EVALUATION OF TRAY AND PROGRAMMER WIRING INSULATION FOR EVIDENCE OF HIGH TEMPERATURE.

3) TEAR DOWN OF RELAYS K1 AND K3.

4. ADDITIONAL EVALUATION WILL BE DONE IF REVIEW OF ABOVE ANALYSES INDICATES FURTHER EFFORT WILL BE PRODUCTIVE.

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END OF MESSAGE