

ASSEMBLY : F-LCA-1,2,3  
 P/N RI : MC477-0262-0002  
 P/N VENDOR:  
 QUANTITY : 4  
 : FOUR  
 :

VEHICLE	102	103	104
EFFECTIVITY:	X	X	X
PHASE(S):	PL	LO	OO DO X LS X

PREPARED BY:	J KRAGER	DES	APPROVED BY:	J.M. Williams	6-2-90	REDUNDANCY SCREEN: A-PASS B-FAIL C-PASS	APPROVED BY (NASA):	R. Balasubramanian
DES	T KIMURA	REL	REL	S. Gutierrez	6-5-90	SSM	REL	L. Houston
REL	E GUTIERREZ	QE	QE			QE		

ITEM:  
 HYBRID DRIVER, TIME DELAY (TYPE 2) - AIR DATA PROBE (ADP), LEFT AND RIGHT  
 SENSOR HEATER POWER CIRCUIT

FUNCTION:  
 PROVIDES CONTROL OF HEATERS FOR THE LEFT AND RIGHT AIR DATA SENSOR  
 ASSEMBLIES. 81V76A16AR(J4-90); 82V76A17AR(J4-90), (J4-91);  
 83V76A18AR(J4-90)

FAILURE MODE:  
 INADVERTENT OUTPUT, FAILS "ON"

CAUSE(S):  
 PIECE PART FAILURE, CONTAMINATION, VIBRATION, MECHANICAL SHOCK  
 PROCESSING ANOMALY, THERMAL STRESS

EFFECT(S) ON:  
 (A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE (E) FUNCTIONAL  
 CRITICALITY EFFECT:

(A) LOSS OF SERIES REDUNDANCY FOR THE CONTROL OF POWER TO THE HEATERS FOR  
 THE LEFT OR RIGHT AIR DATA SENSOR ASSEMBLY.

(B) FIRST FAILURE - NO EFFECT. THE HEATERS FOR ONE ADP CAN FAIL ON AFTER  
 THREE FAILURES AND THERMALLY DAMAGE THE ADP WHEN STOWED.

(C) NO EFFECT - FIRST FAILURE

(D) NO EFFECT - FIRST FAILURE. POSSIBLE LOSS OF CREW/VEHICLE AFTER THREE  
 FAILURES.

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM : EPD&C - ADP DEPLOY & HTR FMEA NO 05-6EE-2017 -2 REV:05/11/90

(E) POSSIBLE LOSS OF CREW/VEHICLE AFTER TWO OTHER FAILURES (2 RELAYS FAIL SHORT CONTACT-TO-CONTACT) DUE TO LOSS OF CAPABILITY TO OBTAIN AIR PRESSURE DATA REQUIRED FOR SAFE DESCENT. ONE OF THE THREE HEATER ELEMENTS FOR ONE ADP CAN FAIL "ON" AFTER THREE FAILURES AND THERMALLY DAMAGE THE ADP WHEN STOWED. PROPER LIMIT SWITCH INDICATIONS WITH ERRONEOUS DATA TO ADP CAN CAUSE A SIDE-TO-SIDE DILEMMA AND THE SOFTWARE DOWNMODES TO USING DEFAULT GAINS.

FIRST FAILURE IS NOT DETECTABLE IN FLIGHT SINCE THE OPERATIONAL STATUS OF THIS DRIVER IS NOT MONITORED.

DISPOSITION & RATIONALE:

(A) DESIGN (B) TEST (C) INSPECTION (D) FAILURE HISTORY (E) OPERATIONAL USE

(A-D) FOR DISPOSITION AND RATIONALE

REFER TO APPENDIX B, ITEM NO. 1 - HYBRID DRIVER

(B) TEST

GROUND TURNAROUND TEST -

"RH ADP HTR CKT CK" - TESTS RIGHT HAND ADP HEATER CIRCUITS FOR SYSTEMS 1 AND 2.

"LH ADP HTR CKT CK", TESTS LEFT HAND ADP HEATER CIRCUITS FOR SYSTEMS 1 AND 2.

TESTS LISTED ABOVE ARE TO BE PERFORMED FOR THE NEXT FLIGHT FOR ALL VEHICLES AND INTERVALS OF TEN FLIGHTS THEREAFTER OR AFTER LRU REPLACEMENT WITH PROBE DEPLOYED AND ASSOCIATED SWITCHES IN THE PROPER POSITIONS.

(E) OPERATIONAL USE

THE PROBE FAILURE CAUSES A SIDE-TO-SIDE DILEMMA AND THE SOFTWARE DOWNMODES TO USING DEFAULT GAINS. THE CREW MUST MAINTAIN PITCH ATTITUDE WITHIN THETA LIMITS DISPLAYED ON CRT. CRT DISPLAYS ALPHA, MACH, AND ALTITUDE FROM EACH ADTA TO THE CREW. IF THE NAV DERIVED ALPHA, MACH, AND ALTITUDE DISPLAYED ON DEDICATED DISPLAYS (AMI, AVVI) ARE CORRECT, THE CREW CAN COMPARE THE ADTA DATA WITH THE NAV DERIVED DATA TO RESOLVE THE DILEMMA.

SHUTTLE CRITICAL ITEMS LIST - ORBITER.

SUBSYSTEM :EPD&C - STAR TRKR DOORS FMEA NO 05-6EF-2003 -1 REV:10/29/87

ASSEMBLY :PANEL 06  
P/N RI :ME452-0102-7406  
P/N VENDOR:  
QUANTITY :2  
: TWO, 1/STAR TRACKER DOOR  
:-Y AND - Z, SYS 1 AND 2

	VEHICLE	102	103	104
EFFECTIVITY:		X	X	X
PHASE(S):	PL	LO	OO X	DO X LS

PREPARED BY:		REDUNDANCY SCREEN:	A-PASS	B-PASS	C-PASS
DES	J KRAGER	APPROVED BY:	APPROVED BY (NASA):		
REL	T KIMURA	DES	SSM		
QE	W SMITH	REL	REL		
		QE	QE		

ITEM:  
SWITCH, TOGGLE (4 POLE, 3 POSITION), STAR TRACKER DOOR CONTROL, SYSTEMS AND 2

FUNCTION:  
PROVIDES OPEN/CLOSE CONTROL OF STAR TRACKER DOORS. REDUNDANT MOTORS TO COMMON ACTUATOR FOR EACH STAR TRACKER -Y AND -Z DOOR SUBSYSTEM 33V73A6S2, S3 (S2 FOR SYSTEM 1 AND S3 FOR SYSTEM 2)

FAILURE MODE:  
FAILS OPEN, SHORTS TO GROUND (MULTIPLE CONTACT SETS)

CAUSE(S):  
PIECE-PART STRUCTURAL FAILURE, CONTAMINATION, MECHANICAL SHOCK, VIBRATION.

EFFECT(S) ON:  
(A) SUBSYSTEM (B) INTERFACES (C) MISSION (D) CREW/VEHICLE (E) FUNCTIONAL CRITICALITY

(A) LOSS OF HYBRID RELAY FUNCTION

(B) DOOR OPERATION WILL BE PERFORMED BY A SINGLE MOTOR AND TIME WILL BE DOUBLED. WORST CASE - LOSS OF TRANSFER FUNCTION OF FOUR CONTACT SETS

(C,D) NONE - FIRST FAILURE. REDUNDANT DOOR MOTOR WILL COMPLETE DOOR OPERATION AS REQUIRED. NEXT ASSOCIATED FAILURE RESULTS IN LOSS OF CAPABILITY TO OPERATE BOTH DOORS. PROBABLE VEHICLE DAMAGE ON ENTRY DUE TO THERMAL FLOW THROUGH OPEN DOOR(S).

(E) POSSIBLE LOSS OF CREW/VEHICLE DUE TO THE LOSS OF CAPABILITY TO CLOSE BOTH STAR TRACKER DOORS DUE TO FAILURE OF BOTH SYSTEMS 1 AND 2 TOGGLE SWITCHES (THERMAL FLOW THROUGH).

SHUTTLE CRITICAL ITEMS LIST - ORBITER

SUBSYSTEM :EPD&C - STAR TRKR DOORS FMEA NO 05-6EF-2003 -1 REV:10/29

DISPOSITION & RATIONALE:

(A)DESIGN (B)TEST (C)INSPECTION (D)FAILURE HISTORY (E)OPERATIONAL USE

(A-D) DISPOSITION AND RATIONALE

REFER TO APPENDIX A, ITEM NO. 1 - TOGGLE SWITCH

(B) GROUND TURNAROUND TEST

"STAR TRACKER - Y DOOR OPEN-MTR 1 AND 2", VERIFIES OPENING OF SYSTEM AND 2 STAR TRACKER Y DOOR. "STAR TRACKER - Y DOOR CLOSE- MTR 1 AND 2, VERIFIES CLOSING OF SYSTEM 1 AND 2 STAR TRACKER Y DOOR. "STAR TRACKER Z DOOR OPEN - MTR 1 AND 2", VERIFIES OPENING OF SYSTEM 1 AND 2 STAR TRACKER Z DOOR. "STAR TRACKER - Z DOOR CLOSE - MTR 1 AND 2," VERIFIE CLOSING OF SYSTEM 1 AND 2 STAR TRACKER Z DOOR. ALL OF THE ABOVE TEST ARE PERFORMED PRIOR TO EACH FLIGHT OR AFTER LRU REPLACEMENT.

(E) OPERATIONAL USE

FOLLOWING AN OPEN FAILURE OF ONE SWITCH, ONE STAR TRACKER DOOR WILL B CLOSED TO PRECLUDE THE POSSIBILITY OF A SECOND SWITCH FAILURE RESULTIN IN A TWO DOOR OPEN ENTRY. IMPACT TO MISSION IS SINGLE STAR TRACKER INERTIAL MEASUREMENT UNIT (IMU) ALIGNMENT