

FAILURE MODES EFFECTS ANALYSIS (FMEA) - CIL HARDWARE
NUMBER: 05-6WD-4070 -X

SUBSYSTEM NAME: EPD&C - ATCS/FCL

REVISION: 0 12/02/97

PART DATA

	PART NAME	PART NUMBER
	VENDOR NAME	VENDOR NUMBER
LRU	: PANEL L2A1	V070-730273
SRU	:RELAY, 2 THROW HYBRID	MC455-0135-0002

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:

RELAY K1, AUTOMATIC CONTROL CIRCUIT, FREON LOOP BYPASS VALVE CONTROL
 SUBSYSTEM.

REFERENCE DESIGNATORS: K1
 K2

QUANTITY OF LIKE ITEMS: 2
 TWO

FUNCTION:

RELAY PROVIDES AC POWER TO THE BYPASS VALVES IN THE AUTOMATIC MODE IN THE
 BYPASS DIRECTION ONLY.

FAILURE MODES EFFECTS ANALYSIS FMEA – CIL FAILURE MODE

NUMBER: 05-6WD-4070-01

REVISION#: 0 12/16/97

SUBSYSTEM NAME: EPD&C - ATCS/FCL

LRU: PANEL L2A1

ITEM NAME: RELAY, HYBRID (DOUBLE THROW)

CRITICALITY OF THIS
FAILURE MODE: 1R3**FAILURE MODE:**

FAILS OPEN, FAILS TO CONDUCT, INADVERTANTLY OPENS, FAILS TO TRANSFER

MISSION PHASE:LO LIFT-OFF
OO ON-ORBIT

VEHICLE/PAYLOAD/KIT EFFECTIVITY:	102	COLUMBIA
	103	DISCOVERY
	104	ATLANTIS
	105	ENDEAVOUR

CAUSE:

PIECE PART FAILURE, CONTAMINATION, VIBRATION, MECHANICAL SHOCK, PROCESSING ANOMALY, THERMAL STRESS

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN	A) PASS
	B) FAIL
	C) PASS

PASS/FAIL RATIONALE:

A)

B)

THE ONLY WAY TO DETERMINE THE FAIL OPEN MODE OF THE RELAY ON ORBIT IS TO CYCLE THE ISOLATION VALVE WHICH IS NOT RECOMMENDED DUE TO POTENTIAL MISSION LOSS BECAUSE ISOLATION VALVE COULD FAIL IN THE RAD BYPASS POSITION THUS LOSING RADIATOR COOLING FOR ONE COOLANT LOOP.

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:

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NONE FIRST FAILURE.

(B) INTERFACING SUBSYSTEM(S):
NONE FIRST FAILURE.

(C) MISSION:
PROBABLE LOSS OF MISSION AFTER 3 FAILURES: (1) RELAY K1 STARBOARD (OR K2 PORT) FAILS OPEN, (2) EXTERNAL LEAK STARBOARD (OR PORT) RADIATOR ARRAY, AND (3) SWITCH S26 FAILS IN AUTOMATIC POSITION (CANNOT BE SWITCHED TO MANUAL) RESULTING IN INABILITY TO BYPASS RAD FLOW FOR ASSOCIATED COOLANT LOOP THUS LOSING THAT COOLANT LOOP DUE TO FREON LOSS THROUGH RADIATOR LEAK..

(D) CREW, VEHICLE, AND ELEMENT(S):
POSSIBLE LOSS OF CREW/VEHICLE AFTER 4 FAILURES: (1) RELAY K1 STARBOARD (OR K2 PORT) FAILS OPEN, (2) EXTERNAL LEAK STARBOARD (OR PORT) RADIATOR ARRAY, (3) SWITCH S26 FAILS IN AUTOMATIC POSITION (CANNOT BE SWITCHED TO MANUAL) PREVENTING MANUAL CONTROL OF ISOLATION VALVE TO PREVENT FREON LOSS THROUGH RADIATOR LEAK, AND (4) LOSS OF REDUNDANT COOLANT LOOP.

(E) FUNCTIONAL CRITICALITY EFFECTS:
PROBABLE LOSS OF MISSION AFTER 3 FAILURES: (1) RELAY K1 STARBOARD (OR RELAY K2 PORT) FAILS OPEN RESULTING IN LOSS OF AUTO RADIATOR ISOLATION FUNCTION, (2) EXTERNAL LEAK STARBOARD (OR PORT) RADIATOR ARRAY, (3) SWITCH S26 FAILS IN AUTOMATIC POSITION (CANNOT BE SWITCHED TO MANUAL) PREVENTS MANUAL CONTROL OF ISOLATION VALVE RESULTING IN FREON LOSS THROUGH RADIATOR LEAK FAILING ASSOCIATED COOLANT LOOP. . POSSIBLE LOSS OF CREW/VEHICLE AFTER FOUR FAILURES: (1) RELAY K1 STARBOARD (OR RELAY K2 PORT) FAILS OPEN, (2) EXTERNAL LEAK STARBOARD (OR PORT) RADIATOR ARRAY, (3) SWITCH S26 FAILS IN AUTOMATIC POSITION (CANNOT BE SWITCHED TO MANUAL) PREVENTS MANUAL CONTROL OF ISOLATION VALVE THUS FREON FOR ASSOCIATED COOLANT LOOP WILL BE LOST THROUGH RADIATOR LEAK FAILING THAT COOLANT LOOP, AND (4) LOSS OF REDUNDANT COOLANT LOOP WILL CAUSE LOSS OF ALL VEHICLE COOLING.

-DISPOSITION RATIONALE-

(A) DESIGN:
REFER TO APPENDIX C, ITEM #1 - HYBRID RELAY.

(B) TEST:
REFER TO APPENDIX C, ITEM #1 - HYBRID RELAY.

GROUND TURNAROUND TEST

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RELAY IS VERIFIED PRIOR TO EACH FLIGHT.

(C) INSPECTION:

REFER TO APPENDIX C, ITEM #1 - HYBRID RELAY.

(D) FAILURE HISTORY:

REFER TO APPENDIX C, ITEM #1 - HYBRID RELAY.

(E) OPERATIONAL USE:

NONE.

- APPROVALS -

SS & PAE MANAGER
SS & PAE ENGINEER
EPD&C ATC
BNA SSM
JSC MOD
JX RDE
USA/orhiter

: D. F. MIKULA
: K. E. RYAN
: D. SOVEREIGN
: R. L. PHAN
:

D.F. Mikula
K.E. Ryan
D. Sovereign
R. Phan
[Signature]

Navette C.ema 11-24-98
Suzanne L. [Signature] 1-4-
[Signature] 11/18/99