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PRINT DATE: 03/01/90

SHUTTLE CRITICAL ITEMS LIST - ORBITER NUMBER: 06-IC~~Y~~-0134-X

SUBSYSTEM NAME: ARS - ARPCS

REVISION : 2 01/09/90

	PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU :	N2/O2 CONTROL PANEL CARLETON TECHNOLOGIES	MC250-0002-1001 2720-0001
SRU :	VALVE, TOGGLE	1-4-00-51-45

PART DATA

QUANTITY OF LIKE ITEMS: 2
ONE PER LOOP
TWO PER SUBSYSTEM

FUNCTION:
SUPPLY VALVE,
PAYLOAD MANUAL OXYGEN

PROVIDES ON/OFF CONTROL OF 100 PSI OXYGEN TO THE PAYLOAD FROM EITHER
CRYO LOOP ONE OR TWO FOR USE IN PAYLOAD OPERATIONS.

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SHUTTLE CRITICAL ITEMS LIST - ORBITER

NUMBER: 06-101-0134-03

REVISION# 2 01/09/90

SUBSYSTEM: ARS - ARPCS
LRU :N2/O2 CONTROL PANEL
ITEM NAME: VALVE, TOGGLE

CRITICALITY OF THIS
FAILURE MODE:IR2

■ FAILURE MODE:
EXTERNAL LEAKAGE

MISSION PHASE:

PL PRELAUNCH
LO LIFT-OFF
OO ON-ORBIT
DO DE-ORBIT
LS LANDING SAFING

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

CAUSE:
MECHANICAL SHOCK, VIBRATION, CORROSION

CRITICALITY I/I DURING INTACT ABORT ONLY? NO

REBUNDANCY SCREEN A) PASS
B) PASS
C) PASS

PASS/FAIL RATIONALE:

A)

B)

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:

LEAKAGE OF OXYGEN INTO CABIN UNTIL ASSOCIATED REG INLET VALVE IS CLOSED.

(B) INTERFACING SUBSYSTEM(S):

INCREASED CABIN PPO2 UNTIL REGULATOR INLET VALVE IS CLOSED.

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(C) MISSION:

POSSIBLE LOSS OF MISSION; ONLY REG INLET VALVE REMAINS TO ISOLATE LEAKAGE IN ORDER TO PRECLUDE LOSS OF EMERGENCY SYSTEM (LES).

(D) CREW, VEHICLE, AND ELEMENT(S):

NO EFFECT.

(E) FUNCTIONAL CRITICALITY EFFECTS:

GROSS LEAKAGE OF PAYLOAD O2 VALVE, COMBINED WITH INLET VALVE INTERNAL LEAKAGE, CAUSES LOSS OF LES SYSTEM AND POSSIBLE LOSS OF CREW/VEHICLE.

 - DISPOSITION RATIONALE -

(A) DESIGN:

VALVE BODY IS MADE OF 6061-T6 ALUMINUM ANODIZED FOR CORROSION RESISTANCE. FITTINGS ARE MADE OF 17-4 PH CONDITION A CRES, WHICH IS PRECIPITATION HARDENED CORROSION RESISTANT STEEL AND HAS A HIGH STRENGTH TO WEIGHT RATIO. STATIC SEALS ARE MADE OF SILASTIC 675 SILICONE RUBBER. POPPET IS PRESSURE COMPENSATED THROUGH THE USE OF DYNAMIC SEALS AT EACH END, WHICH SLIDE ON THE VALVE STEM. VALVE STEM IS HIGHLY POLISHED FOR EASE OF OPERATION (REDUCED FRICTION PROTECTS SEALS). DYNAMIC SEALS ARE ALSO SILASTIC 675 SILICONE AND ARE LUBRICATED WITH BRAYCO LUBE. SILASTIC 675 SILICONE RUBBER HAS GOOD RESISTANCE TO ENVIRONMENTAL EXPOSURE, FLEXING AND FATIGUE. IT ALSO HAS LOW FLAMMABILITY AND OUTGASSING. THE OZONE RESISTANCE OF SILICONE RUBBER IS EXCELLENT. BRAYCO LUBE IS COMPATIBLE WITH LOW AND HIGH PRESSURE O2. INLET/OUTLET PORTS ARE FILTER PROTECTED TO 25 MICRONS. CONSTANT SEAT FORCES DUE TO BELLEVILLE CLOSING SPRING ELIMINATE EXCESS SEAL AND SEAT WEAR. OPERATING FORCE IS 4.5 POUNDS MAXIMUM AND IS INDEPENDENT OF PRESSURE LOADS. THE MOST PROBABLE LEAK (TWO CUT O-RINGS WORST CASE) IS ESTIMATED AT 100 SCCM (0.175 LB/HR).

(B) TEST:

ACCEPTANCE TEST - PROOF PRESSURE 1875 PSIG, EXTERNAL LEAK 0.2 SCCM MAX AT 1250 PSIG. NORMAL OPERATING PRESSURE IS 100 PSIG.

CERTIFICATION - CERTIFIED BY SIMILARITY TO IDENTICAL VALVES (O2 ISOLATION VALVE AND NITROGEN CROSSOVER VALVE) ON O2/N2 CONTROL PANEL AND TO SIMILAR TYPE VALVES USED ON APOLLO PROGRAM. LIFE CYCLE TESTING - THE VALVES WERE SUBJECTED TO 150 OPEN/CLOSE CYCLES AT A PRESSURE OF 300 PSIG, AND TESTED FOR EXTERNAL LEAKAGE PRE AND POST LIFE CYCLE TESTING. COMPONENT BURST PRESSURE TESTED AT 490 PSIG FOR A MINIMUM OF FIVE MINUTES (2 TIMES MAXIMUM OPERATING PRESSURE). O2 ISOLATION VALVE AND N2 CROSSOVER VALVE WERE SUBJECTED TO THE FOLLOWING AS PART OF THE N2/O2 CONTROL PANEL. RANDOM VIBRATION SPECTRUM - 20 TO 150 HZ INCREASING AT 6 DB/OCTAVE TO 0.03 G**2/HZ AT 150 HZ. CONSTANT AT 0.03

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G**2/HZ FROM 150 TO 1000 HZ, DECREASING AT 6 DB/OCTAVE FROM 1000 TO 2000 HZ FOR 48 MINUTES PER AXIS FOR THREE ORTHOGONAL AXES. DESIGN SHOCK - 20 G TERMINAL SAWTOOTH PULSE OF 11 MS DURATION IN EACH DIRECTION OF THREE ORTHOGONAL AXES. ATP TO VERIFY LEAKAGE PERFORMED AFTER SHOCK AND VIBRATION TESTING, NOT TO EXCEED 0.2 SCCM AT PRESSURE OF 110 PSIG.

IN-VEHICLE TESTING - OVERPRESSURE AND LEAK TEST PERFORMED.

OMRSD - EXTERNAL LEAK TEST IS PERFORMED AT INTERVALS OF FIVE FLIGHTS AT 900 - 950 PSIG, 70 SCCM MAX LEAKAGE. INFLIGHT CHECKOUT DURING EACH MISSION VERIFIES NO EXTERNAL LEAKAGE.

(C) INSPECTION:

RECEIVING INSPECTION

RAW MATERIAL VERIFIED BY INSPECTION FOR MATERIAL AND PROCESS CERTIFICATION.

CONTAMINATION CONTROL

CORROSION PROTECTION PROVISIONS AND CONTAMINATION CONTROL PLAN ARE VERIFIED BY INSPECTION. CLEANLINESS LEVEL 200A PER MA0110-301 AND 100ML RINSE VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION

RAW MATERIAL INSPECTED PRIOR TO MACHINING. IN-PROCESS INSPECTION FOR CRITICAL DIMENSIONS VERIFIED. MANDATORY INSPECTION POINTS ARE INCLUDED IN THE ASSEMBLY PROCEDURE.

NONDESTRUCTIVE EVALUATION

X-RAY AND PENETRANT VERIFIED BY INSPECTION.

CRITICAL PROCESSES

PARTS PASSIVATION AND HEAT TREATMENT ARE VERIFIED BY INSPECTION.

TESTING

ATP VERIFIED BY INSPECTION.

HANDLING/PACKAGING

HANDLING, PACKAGING, STORAGE AND SHIPPING PROCEDURES ARE VERIFIED.

(D) FAILURE HISTORY:

NO FAILURE HISTORY.

(E) OPERATIONAL USE:

TBS.

- APPROVALS -

RELIABILITY ENGINEERING:	D. R. RISING	<i>DR</i>	:	DR
DESIGN ENGINEERING	: K. KELLY	<i>KK</i>	:	DR
QUALITY ENGINEERING	: M. SAVALA	<i>MS</i>	:	DR
NASA RELIABILITY	:		:	DR
NASA SUBSYSTEM MANAGER	:		:	DR
NASA QUALITY ASSURANCE	:		:	DR

3/1/90
5/10/90
5/11/90
4/15/90