PRINT DATE: 12/13/89

SHUTTLE CRITICAL ITEMS LIST - ORBITER NUMBER: 03-2A-211110-X

SUBSYSTEM NAME: AFT REACTION CONTROL SYSTEM (RCS)

REVISION : 2 12/12/89

		PART NAME VENDOR NAME	PART NUMBER VENDOR NUMBER
LRU	:	TANK ASSEMBLY, PROPELLANT ~~PARKER-HANNIFIN~~ Martin Marietta	MC282-0061-0603 855C3310000-049
LRU	:	TANK ASSEMBLY, PROPELLANT ~~PARKER-HANNIFIN~~ Martin Marietta	MC282-0061-0604 855C3310000-050/060
LRU	:	TANK ASSEMBLY, PROPELLANT ~~PARKER-HANNIFIN~~ Martin Marietta	MC282-0061-0614 855C3310000-050/060

EXTENDED DESCRIPTION OF PART UNDER ANALYSIS:
TANK ASSY, PROPELLANT INCLUDING ACQUISITION DEVICE. ACQUISITION DEVICE INCLUDES UPPER AND LOWER COMPARTMENT CHANNELS, SCREENS, FEEDOUT TUBE, PLENUM BULKHEAD, BARRIER AND COLLECTOR. TK 203/204/303/304

QUANTITY OF LIKE ITEMS: 4
TWO PER MODULE

FUNCTION:
TO STORE/SUPPLY PROPELLANT FOR REACTION CONTROL THRUSTERS. ACQUISITION DEVICE RETAINS PROPELLANTS FOR ADEQUATE FEED DURING 1"G", 0"G" AND HIGH "G" CONDITIONS. REGULATED HELIUM IS SUPPLIED TO THE ULLAGE TO FORCE PROPELLANT TO THE THRUSTERS AS REQ'D. TANK OPERATING PRESSURE IS 243 (+/- 4 PSI). THE TANK VOLUME IS 17.95 CUBIC FEET.

SHUTTLE CRITICAL ITEMS LIST - ORBITER NUMBER: 03-2A-211110-01

REVISION# 2 12/12/89

SUBSYSTEM: AFT REACTION CONTROL SYSTEM (RCS)
LRU :TANK ASSEMBLY, PROPELLANT CRITICALITY OF THIS
ITEM NAME: TANK ASSEMBLY, PROPELLANT FAILURE MODE:1/1

FAILURE MODE:
STRUCTURAL FAILURE, EXTERNAL LEAK, TANK WALL CRACK OR SEAL FAILURE

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

CAUSE:
MECH SHOCK, FATIGUE/VIB, OVERPRESS, STRESS CORROS, IMPROPER PROP PURITY OR TEST FLUID, STRESS RISER, WELD OR MAT'L DEFECT, INCORRECT OR DAMAGED SEAL.

CRITICALITY 1/1 DURING INTACT ABORT ONLY? NO

REDUNDANCY SCREEN A) N/A
B) N/A
C) N/A

PASS/FAIL RATIONALE:
A)

B)

C)

- FAILURE EFFECTS -

(A) SUBSYSTEM:
LOSS OR DEGRADATION OF SUB-SYSTEM DEPENDENT ON EXTENT OF FAILURE.

(B) INTERFACING SUBSYSTEM(S):
LOSS OR DEGRADATION OF INTERFACE SUB-SYSTEM-AFT RCS, POD, TPS OR VEHICLE DAMAGE.

(C) MISSION:
EARLY MISSION MODIFICATIONS.

(D) CREW, VEHICLE, AND ELEMENT(S):
POSSIBLE LOSS OF CREW/VEHICLE DUE TO OVERPRESSURIZATION. LOSS OF PROPELLANT.

(E) FUNCTIONAL CRITICALITY EFFECTS:

- DISPOSITION RATIONALE -

(A) DESIGN:
DESIGN FACTOR OF SAFETY IS 1.5 FOR BURST AND 1.34 FOR PROOF.

DEVELOPMENT TESTS INCLUDE WELD CYCLE LIFE (800 CYCLES), FRACTURE MECHANICS, FORGING EVALUATION. MATERIALS ARE SELECTED THAT ARE COMPATIBLE WITH PROPELLANTS.

(B) TEST:
THE QUALIFICATION TEST PROGRAM INCLUDES EXPULSION CYCLES (188,000 FLOW TRANSIENTS OVER 200 EXPULSION CYCLES), PRESSURE CYCLES (800 CYCLES), BOOST RANDOM VIBRATION (48 MIN/AXIS), ACCELERATION, EXTERNAL PRESSURE, SHUTTLE CRITICAL ITEMS LIST - ORBITER PROPELLANT EXPOSURE, PRESSURE HOLD CREEP, BURST (525 PSIG), FUNCTIONAL TEST, HANDLING SHOCK, SHIPPING CONTAINER SHOCK, 100 MISSION LIFT-OFF VIBRATION.

THE TANK ALSO QUALIFIED AS PART OF THE POD IN THE VIBRO-ACOUSTIC TEST AT JSC (131 EQUIVALENT MISSIONS) AND THE HOT FIRE TEST AT WSTF (24 EQUIVALENT MISSION DUTY CYCLES AND APPROX 7 YEARS OF PROPELLANT EXPOSURE).

THE ACCEPTANCE TEST PROGRAM INCLUDES SUBASSEMBLY BUBBLE POINT VERIFICATION, PAD SUBASSEMBLY VISUAL INSPECTION, PROOF PRESSURE (470 PSIG), BUBBLE POINT RETENTION, OUTFLOW DELTA PRESSURE PERFORMANCE, INTERNAL CLEANLINESS, HOT N2 PURGE WITH SAMPLES FOR IPA.

OMRSD PERFORMS THE FOLLOWING: PROPELLANT SAMPLING FOR THE SECOND FLIGHT AND THEN ON A CONTINGENCY WHEN SUSPECTED CONTAMINATION (FLIGHT DATA INDICATES FLOW RESTRICTION), OR PROPELLANT OFF-LOAD EXCEPT AT LAUNCH PAD. PROPELLANT LOADING FOR EVERY FLIGHT. A STATIC AIR SAMPLE THE SECOND FLIGHT AND EVERY MISSION THEREAFTER AND THEN ON A CONTINGENCY BASIS. TOXIC VAPOR LEAK CHECK OF THE PROPELLANT TANKS FOR THE FIRST FLIGHT AND ON A CONTINGENCY BASIS. AN EXTERNAL LEAKAGE VERIFICATION OF THE SYSTEM FOR THE FIRST FLIGHT AND ON A CONTINGENCY BASIS. SUBSYSTEM INSPECTION THE FIFTH AND EVERY FIVE FLIGHTS THEREAFTER. ALSO, CONTINGENCY EXISTS IF STRUCTURAL AND COMPONENT

EXTERNAL DEGRADATION IS SUSPECTED OR WHENEVER THE POD/MODULE IS REMOVED, THIS INSPECTION SHALL BE PERFORMED. V42 7.1.2 CONTROLS SPECIFICATION FOR N2O4.

(C) INSPECTION:
RECEIVING INSPECTION
CHEMICAL AND PHYSICAL PROPERTIES TESTS REPORTS ARE VERIFIED BY INSPECTION. CERTIFICATION FOR ALL TANK RAW MATERIALS AND DETAIL PARTS IS VERIFIED BY INSPECTION.

CONTAMINATION CONTROL
CLEANLINESS TO LEVEL 200 FOR MMH AND 200A FOR N2O IS VERIFIED BY INSPECTION. CORROSION PROTECTION IS VERIFIED BY INSPECTION.

ASSEMBLY/INSTALLATION
TANK HEMISPHERES ARE DIMENSIONALLY AND VISUALLY INSPECTED. VISUAL INSPECTION OF TANK BARRIER WELDS IS VERIFIED BY INSPECTION. BUBBLE POINT TESTING OF PROPELLANT ACQUISITION AND RETENTION DEVICE SCREEN IS VERIFIED BY INSPECTION.

NONDESTRUCTIVE EVALUATION
FORGINGS ARE ULTASONICALLY INSPECTED. AFT TANK GIRTH WELDS ARE ULTRASONICALLY INSPECTED IN THE COLLECTOR DOME AREA. WELD START AND STOP POINTS ARE INSPECTED WITH FIBER OPTICS. GIRTH WELDS PENETRANT AND RADIOGRAPHICALLY INSPECTED PRIOR TO AND AFTER PROOF PRESSURE TESTING.

CRITICAL PROCESSES
WELDING PER SPECIFICATION REQUIREMENTS IS VERIFIED BY INSPECTION.

TESTING
ATP IS WITNESSED AND VERIFIED BY INSPECTION.

HANDLING/PACKAGING
HANDLING, PACKAGING, AND STORAGE ENVIRONMENTS FOR SHIPMENT ARE VERIFIED BY INSPECTION.

(D) FAILURE HISTORY:
NONE

(E) OPERATIONAL USE:
IF LEAK RATE SUPPORTS, CROSSFEED FOR ET SEP AND DUMP PROPELLANT ON-ORBIT. DEORBIT NEXT PLS. USE CROSSFEED FOR ENTRY.

IF LEAK OCCURS DURING ENTRY, USE FAILED SYSTEM TO ZERO PVT. NOT SUFFICIENT PROPELLANT FOR NOMINAL ENTRY. SWITCH TO CROSSFEED FOR REMAINDER OF ENTRY.

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- APPROVALS -

RELIABILITY ENGINEERING:	F.E. BARCENAS	:
DESIGN ENGINEERING :	B. DIPONTI	:
QUALITY ENGINEERING :	M. SAVALA -	:
NASA RELIABILITY :		:
NASA SUBSYSTEM MANAGER :		:
NASA QUALITY ASSURANCE :		: