CRITICAL ITEMS LIST (CIL)

No. 10-01-01-07R/01

SYSTEM:	Space Shuttle RSRM 10	CRITICALITY CATEGORY:	1
SUBSYSTEM:	Case Subsystem 10-01	PART NAME:	Factory Joint, Metal Components (1)
ASSEMBLY:	Case 10-01-01	PART NO.:	(See Section 6.0)
FMEA ITEM NO.:	10-01-01-07R Rev N	PHASE(S):	Boost (BT)
CIL REV NO.:	N	QUANTITY:	(See Section 6.0)
DATE:	27 Jul 2001	EFFECTIVITY:	(See Table 101-6)
SUPERSEDES PAGE:	206-1ff.	HAZARD REF.:	BC-02, BC-09, BC-11
DATED:	31 Jul 2000		
CIL ANALYST:	F. Duersch		
APPROVED BY:		DATE:	

RELIABILITY ENGINEERING: K. G. Sanofsky 27 July 2001

ENGINEERING: V. B. Call 27 July 2001

1.0 FAILURE CONDITION: Failure during operation (D)

2.0 FAILURE MODE: 1.0 Structural failure

3.0 FAILURE EFFECTS: Failure of components could result in a case burst causing loss of the RSRM, SRB, crew, and vehicle

4.0 FAILURE CAUSES (FC):

FC NO.	DESCRIPTION	FAILURE CAUSE KEY
1.1	Nonconforming material	A
1.2	Nonconforming heat treatment	B
1.3	Corrosion	C
1.4	Stress corrosion	D
1.5	Fracture of tang or clevis leg	E
1.6	Nonconforming dimensions	F
1.7	Transportation and handling damage	G
1.8	In-service degradation/fatigue	H
1.9	Cracks, voids, or other material defects	I
1.10	Improper assembly techniques	J
1.11	Bushing replacement	
1.11.1	Nonconforming material	K
1.11.2	Nonconforming heat treatment of bushing	L
1.11.3	Corrosion	M
1.11.4	Stress corrosion	N

1.11.5	Nonconforming dimensions	O
1.11.6	Cracks, voids, or other material defects	P
1.11.7	Improper assembly techniques	Q

5.0 REDUNDANCY SCREENS:

SCREEN A: N/A
SCREEN B: N/A
SCREEN C: N/A

6.0 ITEM DESCRIPTION:

1. Factory joint, metal components (Figures 1 and 2). Materials are listed in Table 1.

TABLE 1. MATERIALS

Drawing No.	Name	Material	Specification	Quantity
1U76793	Case Segment, Forward, Forging	D6AC Steel	STW4-2606, STW7-2608	1/motor
1U76794	Case Segment, Aft, Forging	D6AC Steel	STW4-2606, STW7-2608	1/motor
1U76796	Case Segment, Cylinder, Forging	D6AC Steel	STW4-2606, STW7-2608	6/motor
1U76797	Case Segment, Attach, Forging	D6AC Steel	STW4-2606, STW7-2608	1/motor
1U76798	Case Segment, Stiffener, Forging	D6AC Steel	STW4-2606, STW7-2608	2 (alt.)
1U51473	Case Segment, Forward	D6AC Steel	STW4-2606	1/motor
1U52982	Case Segment, Capture Cylinder, Light Wt	D6AC Steel	STW4-2606	2/motor
1U52983	Case Segment, Capture Cylinder, Std Weight	D6AC Steel	STW4-2606	1/motor
1U50717	Case Segment, Cylinder, Light Weight	D6AC Steel	STW4-2606	2/motor
1U50131	Case Segment, Cylinder	D6AC Steel	STW4-2606	1/motor
1U50185	Case Segment, Stiffener, Standard Weight	D6AC Steel	STW4-2606	2 (alt.)
1U50716	Case Segment, Attach, Light Weight	D6AC Steel	STW4-2606	1/motor
1U50130	Case Segment, Attach, Std Weight (rfb. Only)	D6AC Steel	STW7-2744	1 (alt.)
1U50715	Case Segment, Stiffener, Light Weight	D6AC Steel	STW4-2606	2/motor
1U50129	Case Segment, Aft	D6AC Steel	STW4-2606	1/motor
1U51055	Pin, Straight, Headless	MP35N	AMS 5844	1239/motor
1U51899	Pin Retainer	Inconel 718	AMS 5596	1239/motor
1U77713	Case Assembly, Painted Fwd Segment	Various		1/motor
1U77714	Case Assembly, Painted Center Segment	Various		2/motor
1U77715	Case Assembly, Painted Aft Segment	Various		1/motor
1U75642	Case Assembly, Painted Aft Dome	Various		1/motor
1U77503	Case Assembly, Aft Segment (Insulated)	Various		1/motor
1U82840	Pin Retainer Band, Joint--Steel/Steel			
	Case: Strap and Retainer	Inconel 718	AMS 5596	21/motor
	Socket Head Cap screw		NAS1351N5H36	
	Barrel Nut and Trunnion	Inconel 718	AMS 5662 or AMS 5664	
	Top Coating (Paint)	Epoxy	STW5-3225	A/R
	Primer, Zinc-Rich	Epoxy	STW5-3226	A/R
	Corrosion-Preventive Compound and O-ring Lubricant	HD Calcium Grease	STW5-2942	A/R
1U51916	Cartridge Assembly filtered Grease	HD Calcium	STW7-3657	A/R
	Bushing, RSRM Replacement	D6AC Steel	STW7-9135	A/R

6.1 CHARACTERISTICS:

1. Factory joints and their associated parts were designed to allow for ease in manufacturing, handling, and transportation, while maintaining structural integrity.

2. Four subassembly segments are transported to KSC where final assembly is accomplished by joining the four segments at the field joints.

3. The RSRM case functions as a pressure vessel upon which static and flight loads are also transmitted and reacted.

4. RWW498R1 was written to waive the requirement for interchangeability of the stiffener segments between the right or left hand motor. This waiver is for Case Segment, Stiffener Light Weight Serial Number 0000039 only. During refurbishment a required inspection, CIL Code FAB157, verifies the case wall axial straightness variation (buckling criterion). The defect in the S/N 0000039 segment does not meet the

intent of this inspection. The defect criteria allow 0.090 inch refurbishment anomalies. This stiffener has an anomaly of 0.125 inch at the 319°, OD location.

Minimum margins of safety for this component when flown in the LH forward position are +.07 for pre-launch and +.00 for rebound based on a 1.4 safety factor. The cylinder is limited use for only the LH forward position. Change in margins of safety from the basic waiver is also due to improved measurement techniques, and not on condition worsening.

The case segment will continue to be monitored during each flow with inspections and tests. Wall thickness of 0.479 inches is required at this location for each refurbishment. Hydro proof at 1.12 MEOP is also performed on the segment, along with magnetic particle inspection prior to flight use.

No specific flight effectivity for this segment is identified since the waiver is hardware specific. The S/N 0000039 will continue to be used as long as hardware condition does not change and calculated margins of safety remain positive.

7.0 FAILURE HISTORY/RELATED EXPERIENCE:

1. Current data on test failures, flight failures, unexplained failures, and other failures during RSRM ground processing activity can be found in the PRACA Database.

8.0 OPERATIONAL USE: N/A

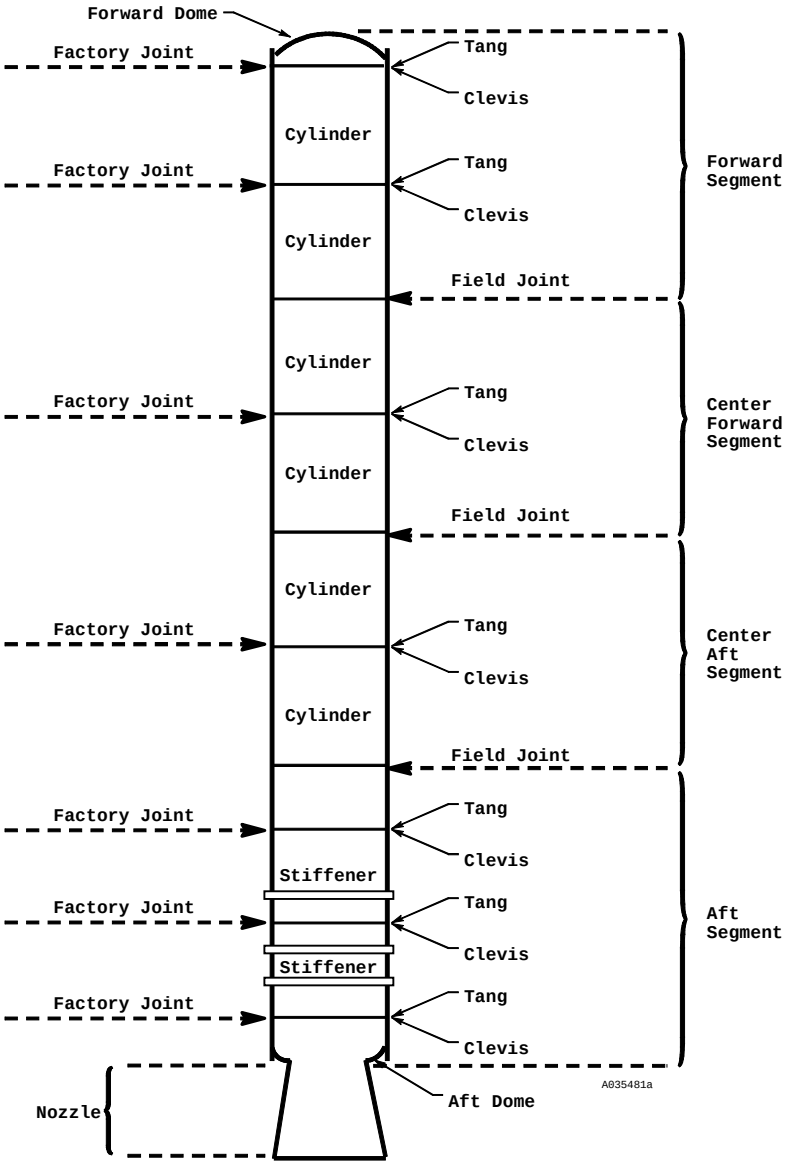

Figure 1. Factory Joint Locations

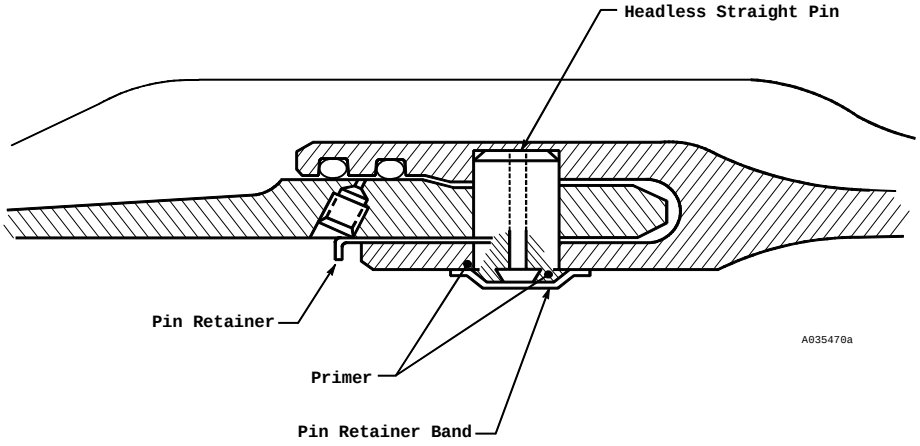

Figure 2. Factory Joint, Metal Components

9.0 RATIONALE FOR RETENTION:

9.1 DESIGN:

DCN	FAILURE CAUSES	
A,B,C,F	1.	Joints (tang and clevis) are an integral part of the case and are made from low-alloy, high-strength D6AC steel per engineering. D6AC mechanical properties meet the design intent. Structural integrity of the case material meets the positive margin of safety requirement with a safety factor of 1.4 in all areas except the forward most stub of reused stiffener segments which is certified safe for flight by proof testing. TWR-11269 and TWR-17118 establish the design safety factor. Corrosion prevention is controlled by application of filtered grease prior to assembly per engineering. Refurbishment is per engineering.
A,B	2.	Tensile properties of the cases are per engineering. Heat-treated sample material, representative of each heat of steel, must meet the properties and other requirements per engineering. Properties are verified by test methods and standards.
A,B	3.	Chemical composition of D6AC steel is tested per mill analysis for each heat of steel. The analysis is per engineering.
A,B	4.	Case segment D6AC steel is heat treated per engineering. Engineering calls for heat treatment and test verification of tensile properties, fracture toughness, micro-hardness, grain size, macro structure, and inclusion content. Characteristics of D6AC provide capability of obtaining excellent heat treat results.
A,B	5.	Tests conducted on the forgings for the SRM forward case segment, SRM attach case segment, and SRM aft dome segment per TWR-10701, TWR-10703, and TWR-10705 showed that the forgings meet requirements per JSC Specifications.
A,B	6.	Metal components used on the RSRM are tested in pressure test articles, joint environmental simulation tests, and full-scale static tests to qualify metal components per TWR-18764-02.
C	7.	Bushings are made from the same material as the base material of the factory joint. Bushings and other metals used in the joint (MP35N, Inconel 718, and NAS 1135N) form an incompatible couple to galvanic corrosion with the D6AC steel used in the bushings. Protection against galvanic corrosion at the joint is provided by an application of filtered grease to the bushings and other joint metal components. External covering around the outside of the joints prevents moisture from setting up a galvanic cell.
F	8.	Joints (tang and clevis) are machined to critical dimensions that affect component performance per engineering.
C,F	9.	Factors with the potential to cause nonconforming dimensions such as machining processes, effects of hydroproof testing, effects of water impact loads, and corrosion are controlled as follows: a. New and refurbished case hardware acceptance criteria and dimensions are per engineering drawings and specifications. b. The supplier applies corrosion-preventive oil to rough-machined forgings and grease to machined case parts for corrosion protection. c. During processing, Thiokol takes steps to protect all case segment exposed bare metal surfaces as required to minimize corrosion. Superficial discoloration is allowed as long as it does not interfere with the inspection of the hardware. Corrosion is removed prior to hardware assembly per

engineering.

d. During local transportation, Thiokol uses environmentally controlled shipping containers, which allow case segments to be shipped without grease. This was demonstrated to be acceptable per TWR-65920.

e. Case segments are painted with primer and topcoat.

F — 10. Acceptance criteria at refurbishment per engineering, identify acceptable dimensions critical to case design for multiple use.

F — 11. Case assembly and hydroproof qualification (Referee 3A, hydroproofs 6,7, and 8) per TWR-16205 demonstrates that case dimensional growth is negligible after three hydroproofs.

D,E,H,I — 12. The case is fabricated from D6AC steel. Sustained tensile stresses in a corrosive environment are below the stress corrosion-cracking threshold. A Material Use Agreement is required per MSFC specifications.

D,E,H,I — 13. TWR-12718 describes development test methods used to determine residual stresses in development case segments. A hole-drilling method with strain gauge instrumentation was used to measure stress levels. The maximum tensile stress was found to be less than the stress corrosion-cracking threshold.

A,B,D,E,F,H,I — 14. Case segments are fracture-controlled items per TWR-16873. This report indicates that proof test, complemented by nondestructive evaluation, shall satisfy safe-life requirements of four missions of the case membrane. In some elastic regions of case segments where proof test logic is not applicable, nondestructive evaluation alone shall satisfy the safe life requirements. Fracture mechanics analysis is performed to determine the proof factor for the proof test and is equal to or greater than 1.12 to satisfy safe-life requirements. However, for some regions in case components where a proof-test cannot adequately screen critical initial flaws, more sensitive methods for detecting flaws are required. Detectable flaw size has to be smaller than the critical initial flaw size.

D,E,H,I — 15. TWR-16873 identifies all areas that are not verified by proof testing, which include specific areas of the tang-clevis joint. For these areas, the report 1) identifies the maximum limit applied stress in flight, 2) calculates the minimum critical flaw size during the flight loading condition, and 3) compares the critical flaw size with that detectable in a part by nondestructive inspection methods. The report asserts acceptability of the design based on readily detectable critical flaw sizes in critical areas.

D,E,F,H,I — 16. Hydroproof tests are performed on each new RSRM case segment three times, followed by magnetic particle inspection per engineering to detect and monitor flaws having potential to initiate part failure. Also, each time a case is refurbished it is hydroproof tested followed by magnetic particle inspection on the entire surface of the case per engineering. Concerns about crack detection capability of magnetic particle inspection in the case joint clevis and capture feature gap as reported in TWR-65649, led to qualification of eddy current inspection in these areas.

D,E,H,I — 17. Leak check ports and vent ports are stress risers in the case, but are too small for magnetic particle inspection. After each hydroproof test, the interior of vent ports, leak check ports, bolt holes, alignment slots, and clevis pin holes are examined for cracks by eddy current inspection as documented in TWR-17191 and TWR-66310.

D,E,F,H,I — 18. All new RSRM case segments are hydroproof tested three times followed by magnetic particle inspection per engineering. The final hydroproof and magnetic particle inspection ensure a four-mission capability. Each refurbished RSRM case segment is hydroproofed one time to ensure a four-mission capability. The use of new tooling spools simulates joint hoop loads and therefore produces joint

deflections similar to flight conditions. TWR-66845 reported test results and comparisons of measured strains to analytically predicted strains, thus verifying the analytical models. TWR-64835 analytically determined the joint stress ratios between proof test and flight meet or exceed the 1.05 proof factor requirement. TWR-16873 verifies that safe-life requirements are met. For all joint locations it was shown that safe-life is met by proof test, magnetic particle, and eddy current inspections.

D,E,H,I 19. TWR-11153 defines requirements for evaluating fatigue cycling capabilities of case cylinders. A test conducted in compliance with the test plan met all design requirements and consisted of a calibration cycle, 60 pressurization cycles to demonstrate the 20-use requirement, and a burst cycle per TWR-11664.

D,E,H,I 20. TWR-16205 demonstrates that case growth is negligible after three hydroproofs.

D,E,H,I 21. Development Motors DM-8 and DM-9 were static test fired to evaluate the performance of accepted baseline RSRM factory joint and factory joint case hardware. The case is certified based on qualification motor static test QM-6 as reported in TWR-18764-02.

D,E,H,I 22. Metal parts that make up the motor case and RSRM components are designed for specific loads and safety factors for 20 uses. TWR-10104 and TWR-13236 provide justification for use and criteria for acceptance of RSRM components. Controls inherent in this program are detailed per engineering, and provide justification for use or reuse of parts containing cracks, voids, or other material defects.

D,E,H,I 23. Heat treatment provides for high strength and high toughness with reduced internal and surface stresses per engineering.

D,E,H,I 24. The seven RSRM factory joints consist of two dome-to-segment joints and five segment-to-segment joints. Each factory joint joins case segments using 177 pins per joint to make a tang-to-clevis joint connection. All seven RSRM factory joints are of similar design. The tang and clevis joint is designed to withstand the tensile and bending load combinations induced by critical flight loads. The tang or clevis is an integral part of the D6AC steel case and dome segments. The D6AC steel case and dome segment chemical composition is per engineering, and tensile properties (ultimate strength, yield strength, elongation, area reduction, and fracture toughness) are per engineering.

D,E,H,I 25. Hydroburst tests verify positive margins of safety per TWR-11664 and TWR-12890.

D,E,H,I 26. Structural Test Article tests (STA-1 & STA-3) are performed to demonstrate strength and service life of the SRM when subject to design loads. STA-1 test results are reported per TWR-12051, TWR-12679, TWR-12726, and TWR-12727. STA-3 test results are reported per TWR-16343.

D,E,H,I 27. The RSRM factory joint includes standard pin retainers, redesigned clevis joint pins, and the new style "hat" type pin retainer band. Minor modifications to the case clevis, necessitated by the field joint redesign, were also included in the factory joint. The factory joint was extensively analyzed per TWR-17118 to verify structural integrity.

A,B,C,D,E,F,H,I 28. Headless straight pins are made from cobalt alloy (MP35N) with specific mechanical property requirements, and heat-treated per engineering. MP35N has excellent corrosion resistance. The pins were designed to meet positive margins of safety per TWR-17118, and are refurbished per engineering.

D,E,H,I 29. Headless straight pins are made of MP35N cobalt alloy. Sustained tensile stresses in a corrosive environment are below the stress corrosion-cracking threshold. A

Material Use Agreement is required per MSFC specifications.

A,B,C,D,E,F,H,I 30. The pin retainer acts as a shim to adjust the tang-to-clevis joint fit. The pin retainer is made from Inconel 718 per engineering, and is solution heat-treated and aged. The pin retainer is designed to meet positive margins of safety for an ultimate safety factor of 1.4 per TWR-17118. Inconel 718 has excellent corrosion resistance. Further corrosion prevention is controlled by application of filtered grease prior to assembly.

D,E,H,I 31. The pin retainer and pin retainer band are made of Inconel 718. Sustained tensile stresses in a corrosive environment are below the stress corrosion-cracking threshold. A Material Use Agreement is required per MSFC specifications.

A,B,C,D,E,F,H,I 32. The pin retainer band joint is fabricated from Inconel 718 and heat treated to ultimate tensile strength per engineering drawings. It was designed to meet positive margins of safety for an ultimate safety factor of 1.4 per TWR-17118. Inconel 718 has excellent corrosion resistance.

a. Strap and retainer material (Inconel) 718 steel.
b. Socket head cap screws (NAS 1351N5H36).
c. Trunnion material (Inconel) 718 steel.

G,J 33. Railway coupling and transportation tests were conducted on an inert forward segment per TWR-11712 to verify the adequacy of the tie down provisions and to record actual g-loads during transit. Acceleration of 1.01 g longitudinal and 0.86 g vertical were measured and were less than the vibration and shock transportation design loads.

G,J 34. Additional tests were per TWR-12079 to analyze transportation loads on the RSRM forward segment grain. This testing provided additional data for verification of vibration and shock transportation environment.

G,J 35. Requirements for handling RSRM components during assembly, storage, and transportation are similar to those for previous and other current programs at Thiokol. These requirements dictate that RSRM case segments must be handled by or near a joint to avoid damage. All lifting hooks and slings are fitted with safety hooks per TWR-13880.

G,J 36. Positive cradling or support devices and tie downs that conform to shape, size, weight, and contour of components to be transported are provided to support RSRM segments and other components. Shock mounting and other protective devices are used on trucks and dollies to move sensitive loads per TWR-13880.

G,J 37. To assure that no damage occurs to flight hardware during transportation to the launch site, specially designed 200-ton railroad flatcars are used per TWR-13880.

G,J 38. Rail car transportation shock and vibration levels are monitored per engineering with loads derived per analysis. Monitoring records are evaluated to verify that shock and vibration levels per MSFC specifications were not exceeded.

G,J 39. The factory joint has a tang and clevis configuration held together by 177 straight headless pins with a 3-piece retainer band to hold the pins in place and 177 pin retainers (shims) to ensure proper O-ring squeeze and to minimize joint rotation. Pin retainer band torque analyses are per TWR-17118, Supplement E. The pin retainer band can be refurbished and used again if inspection requirements are met per TWR-73775.

G,J 40. The RSRM is assembled from four shipping segments (forward, center forward, center aft, and aft) joined by three field joints. Each shipping (casting) segment is

made up of two to four case components (forward dome, cylinders, attach segment, stiffener segments, or aft dome) joined by one to three factory joints for a total of seven factory joints.

G,J

41. Case components are assembled at the factory in the same way for each shipping segment. A typical shipping segment is the center forward segment that consists of two cylinders joined by a factory joint before lining and casting. This segment is joined to the forward segment and the center aft segment at KSC during stacking.

G,J

42. Examples of Quality Assurance and manufacturing procedures used in assembling the casting segments include the following:

a. In the final stages of case component-to-component mating performed at Thiokol, shop planning requires the use of micro-inch controls (extremely slow speeds) so that final alignments are precisely made.
b. To assure no damage occurs to RSRM components during assembly and transportation, periodic proof loading of all lifting equipment is conducted to verify the integrity of the hardware. Structural support items are tested after fabrication completion. Changes to structural equipment requires an additional proof-test. GSE is proof loaded by Thiokol. Proof-load requirements and general equipment categories are per TWR-10299.

A,B,C,D,E,
F,G,H,I,J

43. TWR-61410 was updated to include boundary conditions created by the Performance Enhancement (PE) Program. This report analyzed temperature conditions created from flight loads. PE temperatures are equal to current generic temperatures for all locations for the critical time of liftoff. For a few locations at the factory joints and case acreage during flight, temperatures rise, but only slightly, and maximum case temperatures are lower than current generic certification. For flight load events, PE temperatures are not significantly different from current generic temperatures. There is no impact on previous analyses or margins of safety for the case membranes, factory joints, and field joints per TWR-61410.

A,B,C,D,E
582 F,G,H,I,J

44. As a result of implementing the SSME Block II engine, analyses were performed to determine structural responses to Block II engine load cases. Based on these loads, critical generic ground wind speeds were reduced to ensure that stiffener segments maintain a safety factor equal to or greater than 1.4, as referenced in TWR-61408.

K,L

45. Bushings are made from low-alloy, high strength D6AC steel per engineering. D6AC mechanical properties meet the design intent.

K,L

46. Tensile properties of the bushings are per engineering. Heat-treated sample material, representative of each heat of steel, must meet the properties and other requirements per engineering. The properties are verified by test methods and standards.

K,L

47. Chemical composition of D6AC steels tested per mill analysis for each heat of steel. The analysis is per engineering.

M

48. Bushings are made from the same material as the base material of the factory joint. Bushings and other metals used in the joint (MP35N, Inconel 718, and NAS 1135N) form an incompatible couple to galvanic corrosion with the D6AC steel used in the bushings. Protection against galvanic corrosion at the joint is provided by an application of grease to the bushings and other joint metal components. External covering around the outside of the joints prevents moisture from setting up a galvanic cell.

N 49. Bushings are fabricated from D6AC steel. D6AC steel has low-to-moderate resistance to stress corrosion. A Material Use Agreement (MUA) is required for D6AC steel per MSFC specifications.

N 50. Fracture control of the bushings and parent hole is addressed as follows:

a. Fracture control procedures are described in TWR-16873
b. Analysis of bushings and parent material found the increased tensile stresses of the parent material to be insignificant per TWR-73519.
c. At refurbishment, bushings shall be removed, the parent material of the hole inspected for crack-like defects, raised metal, and sharp edges. Bushings and holes shall be protected by filtered grease, bushings shall be protected by filtered grease prior to installation. Subsequent to bushing installation, case segments are proof tested. Joints, including bushed holes, are covered after assembly that provides protection from environments.
d. The results of the safe-life analysis in the elastic-plastic regions of the tang and clevis joint are presented in TWR-16873.

N 51. Heat treatment of bushings provides for high strength and high toughness with reduced internal and surface stresses per engineering.

O 52. Bushing general features and dimensions are per engineering. Machining and fabrication are also per engineering.

P 53. Bushing surfaces are visually inspected for surface defects. Defects or flaws that are crack-like in nature are unacceptable per engineering.

Q 54. Bushings are removed and installed per engineering. This technique was shown to have no detrimental impact per TWR-73965.

9.2 TEST AND INSPECTION:

DCN	FAILURE CAUSES and TESTS	(T)			CIL CODES
			1.	For New Case Segment, Cylinder, Forging, verify:	
A,B		(T)	a.	Chemical composition (D6AC)	ADW123
A,B		(T)	b.	Heat treatment or re-heat treatment - austenitize	FAA032
A,B		(T)	c.	Heat treatment or re-heat treatment - quench	FAA033
A,B		(T)	d.	Heat treatment or re-heat treatment - snap temper	FAA034
A,B		(T)	e.	Heat treatment or re-heat treatment - cleaning	FAA035
A,B		(T)	f.	Heat treatment or re-heat treatment - first and second tempers	FAA036
A,B		(T)	g.	Heat treatment or re-heat treatment - additional thermal sizing	FAA038
A,B		(T)	h.	Ultimate strength, uniaxial, after heat treatment	ADW167,ADW169
A,B		(T)	i.	Yield strength after heat treatment	ADW189,ADW193
A,B		(T)	j.	Elongation after heat treatment	ADW061,ADW065
A,B		(T)	k.	Reduction in area after heat treatment	ADW009,ADW137
A,B		(T)	l.	Fracture toughness after heat treatment	ADW069,ADW074
A,B		(T)	m.	Micro-hardness/decarburization after heat treatment	FAA041,FAA042
A,B		(T)	n.	Grain size after heat treatment	FAA039A
A,B		(T)	o.	Macro structure after heat treatment	FAA040A
A,B,C, D,E,H,I		(T)	p.	Inclusion rating after heat treatment	ADX085A
C			q.	Application of oil preservative to the forging	FAA030A
D,E,H,I		(T)	r.	Ultrasonic inspection of the forging	ADW175
			2.	For New Case Segment, Attach, Forging, verify:	
A,B		(T)	a.	Chemical composition (D6AC)	ABL118
A,B		(T)	b.	Heat treatment or re-heat treatment - austenitize	FAA332
A,B		(T)	c.	Heat treatment or re-heat treatment - quench	FAA333
A,B		(T)	d.	Heat treatment or re-heat treatment - snap temper	FAA334
A,B		(T)	e.	Heat treatment or re-heat treatment - cleaning	FAA335
A,B		(T)	f.	Heat treatment or re-heat treatment - first and second tempers	FAA336
A,B		(T)	g.	Heat treatment or re-heat treatment - additional thermal sizing	FAA338
A,B		(T)	h.	Ultimate strength, uniaxial, after heat treatment	ABL154,ABL159
A,B		(T)	i.	Yield strength after heat treatment	ABL182,ABL183
A,B		(T)	j.	Elongation after heat treatment	ABL036,ABL037
A,B		(T)	k.	Reduction in area after heat treatment	ABL002,ABL003
A,B		(T)	l.	Fracture toughness after heat treatment	ABL043,ABL044
A,B		(T)	m.	Micro-hardness/decarburization after heat treatment	FAA341,FAA342
A,B		(T)	n.	Grain size after heat treatment	FAA339
A,B		(T)	o.	Macro structure after heat treatment	FAA340
A,B,C, D,E,H,I		(T)	p.	Inclusion rating after heat treatment	ABL066
C			q.	Application of oil preservative to the forging	FAA330
D,E,H,I		(T)	r.	Ultrasonic inspection of the forging	ABL163

3. For New Case Segment, Stiffener, Forging, verify:

A,B	(T)	a.	Chemical composition (D6AC)	FAB904
A,B	(T)	b.	Heat treatment or re-heat treatment - austenitize	FAB432
A,B	(T)	c.	Heat treatment or re-heat treatment - quench	FAB433
A,B	(T)	d.	Heat treatment or re-heat treatment - snap temper	FAB434
A,B	(T)	e.	Heat treatment or re-heat treatment - cleaning	FAB435
A,B	(T)	f.	Heat treatment or re-heat treatment - first and second tempers	FAB436
A,B	(T)	g.	Heat treatment or re-heat treatment - additional thermal sizing	FAB438
A,B	(T)	h.	Ultimate strength, uniaxial, after heat treatment	FAB912,FAB905
A,B	(T)	i.	Yield strength after heat treatment	FAB913,FAB906
A,B	(T)	j.	Elongation after heat treatment	FAB914,FAB907
A,B	(T)	k.	Reduction in area after heat treatment	FAB915,FAB908
A,B	(T)	l.	Fracture toughness after heat treatment	FAB916,FAB909
A,B	(T)	m.	Micro-hardness/decarburization after heat treatment	FAB441,FAB911
A,B	(T)	n.	Grain size after heat treatment	FAB439
A,B	(T)	o.	Macro structure after heat treatment	FAB440
A,B,C, D,E,H,I	(T)	p.	Inclusion rating after heat treatment	FAB910
C		q.	Application of oil preservative to the forging	FAB924
D,E,H,I	(T)	r.	Ultrasonic inspection of the forging	FAB917

4. For New Case Segment, Aft, Forging, verify:

A,B	(T)	a.	Chemical composition (D6AC)	AAJ021
A,B	(T)	b.	Heat treatment or re-heat treatment - austenitize	FAA532
A,B	(T)	c.	Heat treatment or re-heat treatment - quench	FAA533
A,B	(T)	d.	Heat treatment or re-heat treatment - snap temper	FAA534
A,B	(T)	e.	Heat treatment or re-heat treatment - cleaning	FAA535
A,B	(T)	f.	Heat treatment or re-heat treatment - first and second tempers	FAA536
A,B	(T)	g.	Heat treatment or re-heat treatment - additional thermal sizing	FAA538
A,B	(T)	h.	Ultimate strength, uniaxial, after heat treatment	AAJ174,AAJ175
A,B	(T)	i.	Yield strength after heat treatment	AAJ201,AAJ204
A,B	(T)	j.	Elongation after heat treatment	AAJ055,AAJ058
A,B	(T)	k.	Reduction in area after heat treatment	AAJ006,AAJ153
A,B	(T)	l.	Fracture toughness after heat treatment	AAJ065,AAJ068
A,B	(T)	m.	Micro-hardness/decarburization after heat treatment	FAA541,FAA542
A,B	(T)	n.	Grain size after heat treatment	FAA539
A,B	(T)	o.	Macro structure after heat treatment	FAA540
A,B,C, D,E,H,I	(T)	p.	Inclusion rating after heat treatment	AAJ089
D,E,H,I	(T)	q.	Ultrasonic inspection of the forging	AAJ177
C		r.	Application of oil preservative to the forging	FAA530

5. For New Case Segment, Forward, Forging, verify:

A,B	(T)	a.	Chemical composition (D6AC)	ACD135
A,B	(T)	b.	Heat treatment or re-heat treatment - austenitize	FAA132
A,B	(T)	c.	Heat treatment or re-heat treatment - quench	FAA133
A,B	(T)	d.	Heat treatment or re-heat treatment - snap temper	FAA134
A,B	(T)	e.	Heat treatment or re-heat treatment - cleaning	FAA135
A,B	(T)	f.	Heat treatment or re-heat treatment - first and second tempers	FAA136
A,B	(T)	g.	Heat treatment or re-heat treatment - additional thermal sizing	FAA138
A,B	(T)	h.	Ultimate strength, uniaxial, after heat treatment	ACD189,ACD193
A,B	(T)	i.	Yield strength after heat treatment	ACD210,ACD212
A,B	(T)	j.	Elongation after heat treatment	ACD046,ACD047
A,B	(T)	k.	Reduction in area after heat treatment	ACD001,ACD002
A,B	(T)	l.	Fracture toughness after heat treatment	ACD060,ACD061
A,B	(T)	m.	Micro-hardness/decarburization after heat treatment	FAA141,FAA142

A,B	(T)	n.	Grain size after heat treatment	FAA139
A,B	(T)	o.	Macro structure after heat treatment	FAA140
A,B,C, D,E,H,I	(T)	p.	Inclusion rating after heat treatment	ACD085
D,E,H,I	(T)	q.	Ultrasonic inspection of the forging	ACD195
C		r.	Application of oil preservative to the forging	FAA130

6. For New Case Segment, Capture Cylinder, Standard Weight, verify:

C		a.	Corrosion protection	ADX018
D,E,H,I	(T)	b.	Hydroproof test	ADX074
D,E,H,I	(T)	c.	Magnetic particle inspection after hydroproof test	ADX105
F		d.	Clevis pin hole depth	ADX035,ADX035A
F		e.	Clevis pin hole diameter	ADX036,ADX036A
F		f.	Outer clevis leg wall thickness	ADX131,ADX131A
F		g.	Inner clevis leg wall thickness	ADX090,ADX090A
F		h.	Clevis gap	ADX034,ADX034A
F		i.	Clevis sealing surface gap	ADX037,ADX037A
F		j.	Depth of clevis O-ring grooves	ADX129,ADX129A
F		k.	Width of clevis O-ring grooves	ADX130,ADX130A
F		l.	Clevis O-ring grooves corner radius (4 places)	ADX132,ADX132A
F		m.	Inner clevis leg outer diameter (Datum -C-)	ADX088
F		n.	Alignment pin hole diameters at clevis	ADX000
D,E,F,H,I		o.	Clevis pin hole by eddy current for cracks	BAA513A

7. For Refurbished Case Segment, Capture Cylinder, Standard Weight, verify:

D,E,H,I	(T)	a.	Hydroproof test	ADX073
D,E,H,I	(T)	b.	Magnetic particle inspection after hydroproof test	ADX113
D,E,H,I		c.	Inner and outer clevis joint holes for galling or other surface defects, and no raised metal	FAH005
F		d.	Clevis pin hole depth	FAA901
F		e.	Clevis pin hole diameter	FAA902
F		f.	Outer clevis leg wall thickness	FAA903
F		g.	Inner clevis leg wall thickness	ADX089
F		h.	Clevis sealing surface gap	FAA904
F		i.	Width of clevis O-ring grooves	FAA910
F		j.	Depth of clevis O-ring grooves	ADX047
D,E,F,H,I	(T)	k.	Clevis pin hole by eddy current for cracks	BAA513
N	(T)	l.	Eddy current inspection for crack-like flaws in parent material of clevis pin hole requiring bushing reinstallation	SER025
O		m.	Bushing outside diameter	SER028
M,N,P		n.	Inner and outer surface of bushing for contamination, crack-like defects, raised metal, and sharp edges	SER033
M,N		o.	Filtered grease applied to outer surface of bushing and surface of clevis pin hole requiring bushing reinstallation	SER027
P		p.	Visual inspection for contamination, raised metal, and sharp edges of clevis pin hole requiring bushing reinstallation	SER026
Q	(T)	q.	Clevis bushing position following hydroproof test	SER029
Q	(T)	r.	Clevis bushing pull test following hydroproof test.	SER200

8. For New Case Segment, Capture Cylinder, Light Weight, verify:

C		a.	Corrosion protection	ADW019
D,E,H,I	(T)	b.	Hydroproof test	ADW084
D,E,H,I	(T)	c.	Magnetic particle inspection after hydroproof test	ADW107
F		d.	Clevis pin hole depth	ADW036,ADW036A
F		e.	Clevis pin hole diameter	ADW037,ADW037A
F		f.	Outer clevis leg wall thickness	ADW134,ADW134A

F		g.	Inner clevis leg wall thickness	ADW094,ADW094A
F		h.	Clevis gap	ADW035,ADW035A
F		i.	Clevis sealing surface gap	ADW038,ADW038A
F		j.	Depth of clevis O-ring grooves	ADW132,ADW132A
F		k.	Width of clevis O-ring grooves	ADW133,ADW133A
F		l.	Clevis O-ring grooves corner radius (4 places)	ADW135,ADW135A
F		m.	Inner clevis leg outer diameter (Datum -C-)	ADW090
F		n.	Alignment pin hole diameters at clevis	ADW000
D,E,F,H,I	(T)	o.	Clevis pin hole by eddy current for cracks	BAA511A

9. For Refurbished Case Segment, Capture Cylinder, Light Weight, verify:

D,E,H,I	(T)	a.	Hydroproof test	ADW077
D,E,H,I	(T)	b.	Magnetic particle inspection after hydroproof test	ADW117
D,E,H,I		c.	Inner and outer clevis joint holes for galling or other surface defects, and no raised metal	FAH007
F		d.	Clevis pin hole depth	FAA201
F		e.	Clevis pin hole diameter	FAA202
F		f.	Outer clevis leg wall thickness	FAA203
F		g.	Inner clevis leg wall thickness	ADW093
F		h.	Clevis sealing surface gap	FAA204
F		i.	Depth of clevis O-ring grooves	ADW047
F		j.	Width of clevis O-ring grooves	ADW186
D,E,F,H,I	(T)	k.	Clevis pin hole by eddy current for cracks	BAA511
N	(T)	l.	Eddy current inspection for crack-like flaws in parent material of clevis bolt hole requiring bushing reinstallation	SER045
O		m.	Bushing outside diameter	SER048
M,N,P		n.	Inner and outer surface of bushing for contamination, crack-like defects, raised metal, and sharp edges	SER053
M,N		o.	Filtered grease applied to outer surface of bushing and surface of clevis pin hole requiring bushing reinstallation	SER047
P		p.	Visual inspection for contamination, raised metal, and sharp edges of clevis pin hole requiring bushing reinstallation	SER046
Q	(T)	q.	Clevis bushing position following hydroproof test	SER049
Q	(T)	r.	Clevis bushing pull test following hydroproof test.	SER201

10. For Refurbished Case Segment, Cylinder, verify:

D,E,H,I	(T)	a.	Hydroproof test	AAK032
D,E,H,I	(T)	b.	Magnetic particle inspection after hydroproof test	AAK048
D,E,H,I	(T)	c.	Leak check port by eddy current probe after hydroproof	FAA773
D,E,H,I		d.	Inner and outer clevis joint holes for galling or other surface defects, and no raised metal	FAB088
D,E,H,I		e.	Tang joint holes for galling or other surface defects, and no raised metal	FAH006
F		f.	Clevis pin hole depth	FAA701
F		g.	Clevis pin hole diameter	FAA702
F		h.	Outer clevis leg wall thickness	FAA703
F		i.	Clevis sealing surface gap	FAA704
F		j.	Inner clevis leg wall thickness	FAA706
F		k.	Depth of clevis O-ring grooves	FAA709
F		l.	Width of clevis O-ring grooves	FAA710
F		m.	Tang pin hole diameter	FAA712
F		n.	Tang thickness	FAA714
F		o.	Tang sealing surface thickness	FAA715
D,E,H,I	(T)	p.	Alignment slots at tang by eddy current after hydroproof test	RAA256
D,E,F,H,I	(T)	q.	Clevis pin hole by eddy current for cracks	BAA503
N	(T)	r.	Eddy current inspection for crack-like flaws in parent material of	

			clevis pin hole requiring bushing reinstallation	SER015
N	(T)	s.	Eddy current inspection for crack-like flaws in parent material of tang pin hole requiring bushing reinstallation	SER020
O		t.	Bushing outside diameter	SER018
M,N,P		u.	Inner and outer surface of bushing for contamination, crack like defects, raised metal, and sharp edges	SER023
M,N		v.	Filtered grease applied to outer surface of bushing and surface of clevis pin hole requiring bushing reinstallation	SER017
M,N		w.	Filtered grease applied to outer surface of bushing and surface of tang pin hole requiring bushing reinstallation	SER022
P		x.	Visual inspection for contamination, raised metal, and sharp edges of clevis pin hole requiring bushing reinstallation	SER016
P		y.	Visual inspection for contamination, raised metal, and sharp edges of tang pin hole requiring bushing reinstallation	SER021
Q	(T)	z.	Clevis bushing position following hydroproof test	SER019
Q	(T)	aa.	Tang bushing position following hydroproof test	SER024
Q	(T)	ab.	Tang bushing pull test following hydroproof test	SER202
Q	(T)	ac.	Clevis bushing pull test following hydroproof test	SER203

11. For New Case Segment, Cylinder, Light Weight, verify:

D,E,F,H,I	(T)	a.	Clevis pin hole by eddy current for cracks	BAA509A

12. For Refurbished Case Segment, Cylinder, Light Weight, verify:

D,E,H,I	(T)	a.	Hydroproof test	ABM060
D,E,H,I	(T)	b.	Magnetic particle inspection after hydroproof test	ABM107
D,E,H,I	(T)	c.	Leak check port by eddy current probe after hydroproof test	ABM038
D,E,H,I		d.	Tang joint holes for galling or other surface defects, and no raised metal	FAB098
F		e.	Tang pin hole diameter	FAA612
F		f.	Tang thickness	FAA614
F		g.	Tang sealing surface thickness	FAA615
D,E,H,I	(T)	h.	Alignment slots at tang by eddy current after hydroproof test	RAA260
D,E,F,H,I	(T)	i.	Clevis pin hole by eddy current for cracks	BAA509
N	(T)	j.	Eddy current inspection for crack-like flaws in parent material of tang pin hole requiring bushing reinstallation	SER040
O		k.	Bushing outside diameter	SER038
M,N,P		l.	Inner and outer surface of bushing for contamination, crack-like defects, raised metal, and sharp edges	SER043
M,N		m.	Filtered grease applied to outer surface of bushing and surface of tang pin hole requiring bushing reinstallation	SER042
P		n.	Visual inspection for contamination, raised metal, and sharp edges of tang pin hole requiring bushing reinstallation	SER041
Q	(T)	o.	Tang bushing position following hydroproof test	SER044
Q	(T)	p.	Tang bushing pull test following hydroproof test	SER204

13. For Refurbished Case Segment, Attach, Standard Weight, verify:

D,E,H,I	(T)	a.	Hydroproof test	ABL054A
D,E,H,I	(T)	b.	Magnetic particle inspection after hydroproof test	FAB921
D,E,H,I	(T)	c.	Leak check port by eddy-current probe after hydroproof	FAB373
D,E,H,I		d.	Tang joint holes for galling or other surface defects, and no raised metal	RAA201
F		e.	Tang pin hole diameter	FAB712
F		f.	Tang thickness	FAB714
F		g.	Tang sealing surface thickness	FAB715
D,E,H,I	(T)	h.	Alignment slots at tang by eddy current after hydroproof test	RAA255
D,E,F,H,I	(T)	i.	Clevis pin hole by eddy current for cracks	BAA502

N		j.	Eddy current inspection for crack-like flaws in parent material of tang pin hole requiring bushing reinstallation	SER060
O		k.	Bushing outside diameter	SER058
M,N,P		l.	Inner and outer surface of bushing for contamination, crack-like defects, raised metal, and sharp edges	SER068
M,N		m.	Filtered grease applied to outer surface of bushing and surface of tang pin hole requiring bushing reinstallation	SER062
P		n.	Visual inspection for contamination, raised metal, and sharp edges of tang pin hole requiring bushing reinstallation	SER061
Q	(T)	o.	Tang bushing position following hydroproof test	SER064
Q	(T)	p.	Tang bushing pull test following hydroproof test	SER205

14. For New Case Segment, Attach, Light Weight, verify:

C		a.	Corrosion protection	ABL008
D,E,H,I	(T)	b.	Hydroproof test	ABL055
D,E,H,I	(T)	c.	Magnetic particle inspection after hydroproof test	ABL094
D,E,H,I	(T)	d.	Leak check port by eddy current probe after hydroproof test	ABL034
F		e.	Tang pin hole diameter	ABL150,ABL150A
F		f.	Sealing surface diameter at tang (Datum -A-)	ABL133
F		g.	Tang thickness	ABL152,ABL152A
F		h.	Tang sealing surface thickness	ABL151,ABL151A
F		i.	Alignment pin slot dimensions at tang	ABL001,ABL001A
D,E,H,I	(T)	j.	Alignment slots at tang by eddy current after hydroproof test	RAA251
D,E,F,H,I	(T)	k.	Clevis pin holes by eddy current for cracks	BAA508A

15. For Refurbished Case Segment, Attach, Light Weight, verify:

D,E,H,I	(T)	a.	Hydroproof test	ABL054
D,E,H,I	(T)	b.	Magnetic particle inspection after hydroproof test	ABL112
D,E,H,I	(T)	c.	Leak check port by eddy-current probe after hydroproof	FAA373
D,E,H,I		d.	Tang joint holes for galling or other surface defects, and no raised metal	FAB097
F		e.	Tang pin hole diameter	FAA312
F		f.	Tang thickness	FAA314
F		g.	Tang sealing surface thickness	FAA315
D,E,H,I	(T)	h.	Alignment slots at tang by eddy current after hydroproof test	RAA259
D,E,F,H,I	(T)	i.	Clevis pin hole by eddy current for cracks	BAA508
N	(T)	j.	Eddy current inspection for crack-like flaws in parent material of tang pin hole requiring bushing reinstallation	SER075
O		k.	Bushing outside diameter	SER073
M,N,P		l.	Inner and outer surface of bushing for contamination, crack-like defects, raised metal, and sharp edges	SER078
M,N		m.	Filtered grease applied to outer surface of bushing and surface of tang pin hole requiring bushing reinstallation	SER077
P		n.	Visual inspection for contamination, raised metal, and sharp edges of tang pin hole requiring bushing reinstallation	SER076
Q	(T)	o.	Tang bushing position following hydroproof test	SER079
Q	(T)	p.	Tang bushing pull test following hydroproof test	SER206

16. For New Case Segment, Stiffener, Standard Weight, verify:

C		a.	Corrosion protection	ABK006
D,E,H,I	(T)	b.	Hydroproof test	FAB919
D,E,H,I	(T)	c.	Magnetic particle inspection after hydroproof test	FAB920
D,E,H,I	(T)	d.	Leak check port by eddy current probe after hydroproof	FAB463
F		e.	Clevis pin hole depth	FAB131,FAC831
F		f.	Clevis pin hole diameter	FAB132,FAC832
F		g.	Outer clevis leg wall thickness	FAB133,FAC833

F		h.	Inner clevis leg wall thickness	FAB136,FAC836
F		i.	Clevis gap	FAB134,FAC834
F		j.	Clevis sealing surface gap	FAB135,FAC835
F		k.	Depth of clevis O-ring grooves	FAB139,FAC839
F		l.	Width of clevis O-ring grooves	FAB140,FAC840
F		m.	Clevis O-ring grooves corner radius (4 places)	FAB138,FAC838
F		n.	Inner clevis leg outer diameter (Datum -C-)	FAB137
F		o.	Alignment pin hole diameters at clevis	FAB141
F		p.	Sealing surface diameter at tang (Datum -A-)	FAB143
F		q.	Tang pin hole diameter	FAB142,FAC842
F		r.	Tang sealing surface thickness	FAB145,FAC845
F		s.	Tang thickness	FAB144,FAC844
F		t.	Alignment pin slot dimensions at tang	FAB146,FAC846
D,E,H,I	(T)	u.	Alignment slots at tang by eddy current after hydroproof	RAA249
D,E,F,H,I	(T)	v.	Clevis pin hole by eddy current for cracks	BAA504A

17. For Refurbished Case Segment, Stiffener, Standard Weight, verify:

D,E,H,I	(T)	a.	Hydroproof test	ABK032A
D,E,H,I	(T)	b.	Magnetic particle inspection after hydroproof test	FAB922
D,E,H,I	(T)	c.	Leak check port by eddy-current probe after hydroproof	FAB473
D,E,H,I		d.	Inner and outer clevis joint holes for galling or other surface defects, and no raised metal	FAB089
D,E,H,I		e.	Tang joint holes for galling or other surface defects, and no raised metal	FAB095
F		f.	Clevis pin hole depth	FAA401
F		g.	Clevis pin hole diameter	FAA402
F		h.	Outer clevis leg wall thickness	FAA403
F		i.	Inner clevis leg wall thickness	FAA406
F		j.	Clevis sealing surface gap	FAA404
F		k.	Depth of clevis O-ring grooves	FAA409
F		l.	Width of clevis O-ring grooves	FAA410
F		m.	Tang pin hole diameter	FAA412
F		n.	Tang thickness	FAA414
F		o.	Tang sealing surface thickness	FAA415
D,E,H,I	(T)	p.	Alignment slots at tang by eddy current after hydroproof test	RAA257
D,E,F,H,I	(T)	q.	Clevis pin hole by eddy current for cracks	BAA504
D,E,F,H,I	(T)	r.	Stiffener Flange and hole regions by eddy current for cracks	BAA505
N	(T)	s.	Eddy current inspection for crack-like flaws in parent material of clevis pin hole requiring bushing reinstallation	SER085
N	(T)	t.	Eddy current inspection for crack-like flaws in parent material of tang pin hole requiring bushing reinstallation	SER090
O		u.	Bushing outside diameter	SER088
M,N,P		v.	Inner and outer surface of bushing for contamination, crack-like defects, raised metal, and sharp edges	SER093
M,N		w.	Filtered grease applied to outer surface of bushing and surface of clevis pin hole requiring bushing reinstallation	SER087
M,N		x.	Filtered grease applied to outer surface of bushing and surface of tang pin hole requiring bushing reinstallation	SER092
P		y.	Visual inspection for contamination, raised metal, and sharp edges of clevis pin hole requiring bushing reinstallation	SER086
P		z.	Visual inspection for contamination, raised metal, and sharp edges of tang pin hole requiring bushing reinstallation	SER091
Q	(T)	aa.	Clevis bushing position following hydroproof test	SER089
Q	(T)	ab.	Tang bushing position following hydroproof test	SER094
Q	(T)	ac.	Tang bushing pull test following hydroproof test	SER207
Q	(T)	ad.	Clevis bushing pull test following hydroproof test	SER208

18. For New Case Segment, Stiffener, Light Weight, verify:

C		a.	Corrosion protection	FAB925
D,E,H,I	(T)	b.	Hydroproof test	ABK033
D,E,H,I	(T)	c.	Magnetic particle inspection after hydroproof test	ABK053
D,E,H,I	(T)	d.	Leak check port by eddy current probe after hydroproof	FAA463
F		e.	Clevis pin hole depth	ABK014,ABK014A
F		f.	Clevis pin hole diameter	ABK015,ABK015A
F		g.	Outer clevis leg wall thickness	ABK073,ABK073A
F		h.	Inner clevis leg wall thickness	ABK042,ABK042A
F		i.	Clevis gap	ABK013,ABK013A
F		j.	Clevis sealing surface gap	ABK016,ABK016A
F		k.	Depth of clevis O-ring grooves	ABK071,ABK071A
F		l.	Width of clevis O-ring grooves	ABK072,ABK072A
F		m.	Clevis O-ring grooves corner radius (4 places)	ABK074,ABK074A
F		n.	Inner clevis leg outer diameter (Datum -C-)	ABK041
F		o.	Alignment pin hole diameters at clevis	ABK000
F		p.	Sealing surface diameter at tang (Datum -A-)	ABK078
F		q.	Tang pin hole diameter	ABK079,ABK079A
F		r.	Tang sealing surface thickness	ABK080,ABK080A
F		s.	Tang thickness	ABK081,ABK081A
F		t.	Alignment pin slot dimensions at tang	ABK001,ABK001A
D,E,H,I	(T)	u.	Alignment slots at tang by eddy current after hydroproof test	RAA250
D,E,F,H,I	(T)	v.	Clevis pin holes by eddy current for cracks	BAA506A

19. For Refurbished Case Segment, Stiffener, Light Weight, verify:

D,E,H,I	(T)	a.	Hydroproof test	ABK032
D,E,H,I	(T)	b.	Magnetic particle inspection after hydroproof test	ABK051
D,E,H,I	(T)	c.	Leak check port by eddy current probe after hydroproof	FAA473
D,E,H,I		d.	Inner and outer clevis joint holes for galling or other surface defects, and no raised metal	FAB090
D,E,H,I		e.	Tang joint holes for galling or other surface defects, and no raised metal	FAB096
F		f.	Clevis pin hole depth	FAB401
F		g.	Clevis pin hole diameter	FAB402
F		h.	Outer clevis leg wall thickness	FAB403
F		i.	Inner clevis leg wall thickness	FAB406
F		j.	Clevis sealing surface gap	FAB404
F		k.	Depth of clevis O-ring grooves	FAB409
F		l.	Width of clevis O-ring grooves	FAB410
F		m.	Tang pin hole diameter	FAB412
F		n.	Tang thickness	FAB414
F		o.	Tang sealing surface thickness	FAB415
D,E,H,I	(T)	p.	Alignment slots at tang by eddy current after hydroproof test	RAA258
D,E,F,H,I	(T)	q.	Clevis pin hole by eddy current for cracks	BAA506
D,E,F,H,I	(T)	r.	Stiffener flange and hole region by eddy current for cracks	BAA507
N	(T)	s.	Eddy current inspection for crack-like flaws in parent material of clevis pin hole requiring bushing reinstallation	SER095
N	(T)	t.	Eddy current inspection for crack-like flaws in parent material of tang pin hole requiring bushing reinstallation	SER100
O		u.	Bushing outside diameter	SER098
M,N,P		v.	Inner and outer surface of bushing for contamination, crack-like defects, raised metal, and sharp edges	SER103
M,N		w.	Filtered grease applied to outer surface of bushing and surface of clevis pin hole requiring bushing reinstallation	SER097
M,N		x.	Filtered grease applied to outer surface of bushing and surface of tang pin hole requiring bushing reinstallation	SER102
P		y.	Visual inspection for contamination, raised metal, and sharp	

			edges of clevis pin hole requiring bushing reinstallation	SER096
P		z.	Visual inspection for contamination, raised metal, and sharp edges of tang pin hole requiring bushing reinstallation	SER101
Q	(T)	aa.	Clevis bushing position following hydroproof test	SER099
Q	(T)	ab.	Tang bushing position following hydroproof test	SER104
Q	(T)	ac.	Tang bushing pull test following hydroproof test	SER209
Q	(T)	ad.	Clevis bushing pull test following hydroproof test	SER210

20. For New Case Segment, Aft, verify:

C		a.	Corrosion protection	AAJ013
D,E,H,I	(T)	b.	Hydroproof test	AAJ078
D,E,H,I	(T)	c.	Magnetic particle inspection after hydroproof test	AAJ114
F		d.	Clevis pin hole depth	AAJ029,AAJ029A
F		e.	Clevis pin hole diameter	AAJ030,AAJ026A
F		f.	Outer clevis leg wall thickness	AAJ146,AAJ146A
F		g.	Inner clevis leg wall thickness	AAJ092,AAJ092A
F		h.	Clevis gap	AAJ024,AAJ024A
F		i.	Clevis sealing surface gap	AAJ031,AAJ031A
F		j.	Diameter of Datum -A-	AAJ040,AAJ041
F		k.	Clevis O-ring grooves corner radius (4 places)	AAJ151,AAJ151A
F		l.	Depth of clevis O-ring grooves	AAJ143,AAJ143A
F		m.	Width of clevis O-ring grooves	AAJ144,AAJ144A
F		n.	Alignment pin hole diameters at clevis	AAJ004
D,E,F,H,I	(T)	o.	Clevis pin hole by eddy current for cracks	BAA501A

21. For Refurbished Case Segment, Aft, verify:

D,E,H,I	(T)	a.	Hydroproof test	AAJ075
D,E,H,I	(T)	b.	Magnetic-particle inspection after hydroproof test	AAJ105
D,E,H,I		c.	Inner and outer clevis joint holes for galling or other surface defects, and no raised metal	FAB100
F		d.	Clevis pin hole depth	FAA501
F		e.	Clevis pin hole diameter	AAJ025
F		f.	Clevis sealing surface gap	AAJ028
F		g.	Outer clevis leg wall thickness	AAJ147
F		h.	Inner clevis leg wall thickness	AAJ093
F		i.	Depth of clevis O-ring grooves	FAA509
F		j.	Width of clevis O-ring grooves	FAA510
D,E,F,H,I	(T)	k.	Clevis pin hole by eddy current for cracks	BAA501
D,E,F,H,I	(T)	l.	Aft Y-joint by eddy current for cracks	BAA512
N	(T)	m.	Eddy current inspection for crack-like flaws in parent material of clevis pin hole requiring bushing reinstallation	SER105
O		n.	Bushing outside diameter	SER108
M,N,P		o.	Inner and outer surface of bushing for contamination, crack-like defects, raised metal, and sharp edges	SER113
M,N		p.	Filtered grease applied to outer surface of bushing and surface of clevis pin hole requiring bushing reinstallation	SER107
P		q.	Visual inspection for contamination, raised metal, and sharp edges of clevis pin hole requiring bushing reinstallation	SER106
Q	(T)	r.	Clevis bushing position following hydroproof test	SER109
Q	(T)	s.	Clevis bushing pull test following hydroproof test	SER211

22. For New Case Segment, Forward, verify:

C		a.	Corrosion protection	ACD007
D,E,H,I	(T)	b.	Hydroproof test	ACD074
D,E,H,I	(T)	c.	Magnetic particle inspection after hydroproof test	ACD121
D,E,H,I	(T)	d.	Leak check port by eddy-current probe after hydroproof test	FAA163

F		e.	Alignment pin slot dimensions at tang	ACD000,ACD000A
F		f.	Sealing surface diameter at tang	ACD168
F		g.	Tang pin hole diameter	ACD172,ACD172A
F		h.	Tang sealing surface thickness	ACD173,ACD173A
F		i.	Tang thickness	ACD174,ACD174A
D,E,H,I	(T)	j.	Alignment slots at tang by eddy current after hydroproof test	RAA252

23. For Refurbished Case Segment, Forward, verify:

D,E,H,I	(T)	a.	Hydroproof test	ACD073
D,E,H,I	(T)	b.	Magnetic particle inspection after hydroproof test	ACD096
D,E,H,I	(T)	c.	Leak check port by eddy-current probe after hydroproof	ACD045
D,E,H,I		d.	Tang joint holes for galling or other surface defects, and no raised metal	FAB099
F		e.	Tang pin hole diameter	FAA812
F		f.	Tang thickness	FAA814
F		g.	Tang sealing surface thickness	FAA815
D,E,H,I	(T)	h.	Alignment slots at tang by eddy current after hydroproof test	RAA261
D,E,F,H,I	(T)	i.	Forward Y-joint by eddy current for cracks	BAA510
N	(T)	j.	Eddy current inspection for crack-like flaws in parent material of tang pin hole requiring bushing reinstallation	SER010
O		k.	Bushing outside diameter	SER008
M,N,P		l.	Inner and outer surface of bushing for contamination, crack-like defects, raised metal, and sharp edges	SER013
M,N		m.	Filtered grease applied to outer surface of bushing and surface of tang pin hole requiring bushing reinstallation	SER012
P		n.	Visual inspection for contamination, raised metal, and sharp edges of tang pin hole	SER011
Q	(T)	o.	Tang bushing position following hydroproof test	SER014
Q	(T)	p.	Tang bushing pull test following hydroproof test	SER212

24. For New Pin, Straight, Headless, verify:

A,B	(T)	a.	Elongation	ABR014
A,B	(T)	b.	Area reduction	ABR021
A,B	(T)	c.	Shear strength	ABR026
A,B	(T)	d.	Tensile strength	ABR031
A,B	(T)	e.	Yield strength	ABR036
A,B		f.	Material and heat treat	FAA111
D,E,H,I	(T)	g.	Eddy current inspection, no cracks allowed	ABR009
F		h.	Pin diameter	ABR016A,ABR016
F		i.	Pin length	ABR018A,ABR018

25. For Refurbished Pin, Straight, Headless, verify:

D,E,H,I	a.	No visible cracks, or surface defects	FAB201
D,E,F,H,I	b.	Straightness	FAB202
D,E,F,H,I	c.	Minimum diameter	FAB203

26. For New Pin Retainer, verify:

F	a.	Shim thickness	ACO007

27. For Refurbished Pin Retainer, verify:

D,E,H,I	a.	No bends, cracks, or scratches	RAA213

		28.	For New Assembly, Retainer Band, Pin, verify:	
A,B,D, E,H,I	(T)	a.	Fluorescent dye penetrant inspection of assembly, after load test, no cracks allowed	FAA119
C		b.	Complete and acceptable coverage of primer on interior surfaces of band	FAA118
F		c.	Cross-sectional dimensions of band	AHG001
F		d.	Radius when part is restrained in fixture	AHG002
		29.	For Refurbished Assembly, Retainer Band, Pin, verify:	
C		a.	Complete and acceptable coverage of primer on interior surfaces of band	FAA118A
F		b.	Cross-sectional dimensions of band	AHG001A
F		c.	Visual for cracks and damage	AHG002A
		30.	For New Case Assembly, Painted Segment (Forward, Center, and Aft) verify:	
C,G,J		a.	Filtered grease is applied to case joint and pin holes	AGP002,FAA113,AFS032 AFK087,AFB009,AFB011
C		b.	Complete and acceptable coverage of primer on the case surface at locations of retainer band contact	FAA114,FAA115,FAA116
G,J	(T)	c.	Weight test, NDT, and proper hookup of handling equipment used for mating	AEY009,AEZ008,AFB008
G,J		d.	Installation of pins, in case joints	AEY019,FAA060,AEZ017,AFB017,FAA360
G,J		e.	Proper handling operations for case segments	AEY017,AEZ015,AFB015
G,J		f.	Pins are fully seated in case joints	FAA061,FAA062,FAA262,FAA361,FAA362
G,J		g.	Mating operations, in case joints	AEY022,FAA064,AEZ019,AFB019,FAA364
G,J		h.	Installation of pin retainers, in case joints	AEY053,FAA081,AEZ049 AFB049,FAA381
G,J		i.	Torque of retainer band cap screw in case joints	FAA082,FAA083,AEZ052 AFB052,FAA383
G,J		j.	No visible damage to case joint tang or clevis area	AEY059,AEY023,FAA105 FAA106,AEZ055,AEZ020 AFB021,AFB020,FAA107,FAA108
C		k.	Shelf life and environmental history, paint and primer	AEY035,AEY048,AEZ035 AEZ045,AFB035,AFB045
C		l.	For application of paint and primer, facilities and equipment are clean	AEY037,AEZ034,AFB034
C		m.	For application of paint and primer, humidity and case temperature	AEY018,AEZ016,AFB016
C		n.	Surfaces to be primed are clean and free from contamination	AEY005,AEZ005,AFB005
C		o.	Container is covered after mixing, paint and primer	AEY034,AEY040,AEZ031 AEZ037,AFB031,AFB037
C		p.	Full cover coat, paint and primer	AEY014,AEY015,AEZ012 AEZ013,AFB012,AFB013
C		q.	Runs, sags, drips, and inclusions are acceptable per specification, paint and primer	AEY033,AEY047,AEZ030, AEZ044,AFB044,FAA103
C		r.	Dry film thickness, paint and primer	AEY025,AEY002,AEZ022 AEZ002,AFB022,AFB002
F		s.	Final grit blast is complete and acceptable	RAA270,RAA271,RAA272
		31.	For New Case Assembly, Aft Dome, Painted verify:	
C		a.	Shelf life and environmental history, paint and primer	FAA090,FAA091
C		b.	For application of paint and primer, facilities and equipment are clean	FAA092
C		c.	For application of paint and primer, humidity and case temperature	FAA098

C			d. Surfaces to be primed are clean and free from contamination	FAA097
C			e. Container is covered after mixing, paint and primer	FAA099,FAA100
C			f. Full cover coat, paint and primer	FAA093,FAA094
C			g. Runs, sags, drips, and inclusions are acceptable per specification, paint and primer	FAA095,FAA096
C			h. Dry film thickness, paint and primer	FAA101,FAA102
C			i. Final grit blast is complete and acceptable	RAA273
		32.	For New Insulated (Forward, center) segment assembly verify:	
C			a. External insulation defects and repairs are acceptable	FAA823A,FAA824A
C			b. Paint and primer touchup is acceptable	FAB853,FAB854
C			c. Weight test, NDT, and proper hookup of handling equipment used for mating	DJM019
C			d. Installation of pins, forward dome to cylinder joint	DJM020
C			e. Mating operations, forward dome to cylinder joint	DJM021
C			f. Installation of pin retainers, forward dome to cylinder joint	DJM022
C			g. Torque of retainer band cap screw, forward dome to cylinder joint	DJM023
C			h. No visible damage, forward dome to cylinder joint, clevis area	DJM024
C			i. No visible damage, forward dome to cylinder joint, tang area	DJM025
C			j. Filtered grease is applied to clevis joint and pin holes	DJM026
C			k. Pins are fully seated, forward dome to cylinder joint	DJM027
C			l. Filtered grease is applied to tang joint and pin holes	DJM028
C			m. Proper handling operations for case segments	DJM029
C			n. Shelf life and environmental history, primer (STW5-3226)	DJM030
		33.	For New Insulated Aft Segment Assembly, verify:	
C			a. External insulation defects and repairs are acceptable	FAA825A
C			b. Paint and primer touchup is acceptable	FAB855
C,G,J			c. A film of lubricant is applied to clevis joint and pinholes	FAA112
C,G,J			d. A film of lubricant is applied to tang joint and pin holes	AFK089
C			e. Complete and acceptable coverage of primer on the case surface at locations of retainer band contact	FAA117
G,J	(T)		f. Weight test, NDT, and proper hookup of handling equipment for mating	AFA000
G,J			g. All pins are fully seated, stiffener-to-aft dome joint	FAA462
G,J			h. Proper handling operations for aft dome and case segment	FAA066
G,J			i. Mating operations, stiffener-to-aft dome joint	FAA366
G,J			j. Installation of pins, stiffener-to-aft dome joint	AFA001
G,J			k. Installation of pin retainers, stiffener-to-aft dome joint	AFK142
G,J			l. Torque of retainer band cap screw, stiffener-to-aft dome joint	FAA084
G,J			m. No visible damage to stiffener-to-aft dome joint, Tang joint area	AFA004
G,J			n. No visible damage to stiffener-to-aft dome joint, Clevis joint area	AFA003
		34.	For New Bushing, Replacement verify:	
K			a. Bushing material is D6AC	SER001
L			b. Bushing material is heat treated	SER002
		35.	KSC verifies:	
C,G,J			a. Segments and nozzle components are free of damage per OMRSD File V, Vol I, B47SG0.061	OMD079
C,G,J			b. Tang and Clevis Field Joint unpainted surfaces are free from surface defects or contamination per OMRSD File V, Vol I, B47SG0.122	OMD085