CRITICAL ITEMS LIST (CIL)

No. 10-05-01-07R/01

SYSTEM:	Space Shuttle RSRM 10	CRITICALITY CATEGORY:	1R
SUBSYSTEM:	Assembly Hardware/Interfaces 10-05	PART NAME:	Field Joint, Primary Clevis O-ring, Leak Check Port Seal (2)
ASSEMBLY:	Field Joints and Kits 10-05-01		
FMEA ITEM NO.:	10-05-01-07R Rev N		
CIL REV NO.:	M (DCN-562R1)	PART NO.:	(See Section 6.0)
DATE:	05 Oct 2001	PHASE(S):	Boost (BT)
SUPERSEDES PAGE:	225-1ff.	QUANTITY:	(See Section 6.0)
DATED:	31 Jul 2000	EFFECTIVITY:	(See Table 101-6)
CIL ANALYST:	F. Duersch	HAZARD REF.:	BC-01
APPROVED BY:		DATE:	

RELIABILITY ENGINEERING: K. G. Sanofsky 05 Oct 2001

ENGINEERING: K. J. Speas 05 Oct 2001

1.0 FAILURE CONDITION: Failure during operation (D)

2.0 FAILURE MODE: 1.0 Leakage due to primary clevis O-ring and leak check port O-ring seal failure

3.0 FAILURE EFFECTS: Failure in the primary O-ring and leak check port leak path would allow hot gas to flow through this path resulting in burn-through causing loss of the RSRM, SRB, crew, and vehicle

4.0 FAILURE CAUSES (FC):

FC NO.	DESCRIPTION	FAILURE CAUSE KEY
1.1	Nonconforming dimensions or improper O-ring splice joint	A
1.2	O-ring gland does not meet dimensional and surface finish requirements	B
1.3	Joint rotation	C
1.4	Improper mating of segments	D
1.5	Damage to sealing surface during transportation and handling	E
1.6	O-ring cut, damaged, or improperly installed	F
1.7	Sealing surface contamination	G
1.8	O-ring voids, inclusions, and subsurface indications	H
1.9	Low O-ring resiliency	I
1.10	Leak check port plug incorrectly installed	J
1.11	Nonconforming materials	K
1.12	Aging degradation of O-ring	L
1.13	Moisture and/or fungus degradation of O-ring	M

5.0 REDUNDANCY SCREENS:

SCREEN A: Fail--The leak check port seal can not be verified during mission turnaround.
SCREEN B: Fail--No provision is made for failure detection by the crew.
SCREEN C: Pass--The primary O-ring and leak check port plug seals can not be lost by a single credible cause.

1. The primary O-ring and leak check port plug form part of a redundant seal system when the secondary O-ring seals. The leak check port plug will not be pressurized unless the primary O-ring fails. If the primary O-ring fails, the leak check port plug (in addition to the secondary O-ring) will be pressurized and maintain a seal. If the primary O-ring and the leak check port plug fail, a leak path will exist and could result in loss of vehicle and crew.

6.0 ITEM DESCRIPTION:

1. Field joint, primary clevis O-ring, and leak check port (Figures 1 and 2), are assembled at KSC per engineering drawings. The three field joint locations are shown in Figure 3. Materials are listed in Table 1.

2. The Leak Check Port Plug is also known as the RSRM Port Plug (leak check port plug).

TABLE 1. MATERIALS

Drawing No.	Name	Material	Specification	Quantity
1U77648	Assembly and Closeout, RSRM, KSC	Various, Field Joint Interference Fit	STW9-3668	1/motor
1U50716	Case Segment, Attach, Light Weight	D6AC Steel	STW7-2744	1/motor
1U50717	Case Segment, Cylinder, Light Weight	D6AC Steel	STW7-2744	2/motor
1U50130	Case Segment, Attach, Standard Wt	D6AC Steel	STW7-2744	1/motor
1U52982	Case Segment, Capture Cyl, Light Wt	D6AC Steel	STW7-2744	2/motor
1U52983	Case Segment, Capture Cyl, Std Wt	D6AC Steel	STW7-2744	1/motor
1U77610	Segment, Rocket Motor, Forward	Various		1/motor
1U77620	Segment, Rocket Motor, Fwd Center	Various		1/motor
1U77630	Segment, Rocket Motor, Aft Center	Various		1/motor
1U77640	Segment, Rocket Motor, Aft	Various		1/motor
1U75150	Packing, Preformed Fluorocarbon (Primary)	Rubber	STW4-3339	3/motor
1U75801	Packing, Lubricated (Primary)	Black Fluorocarbon Rubber O-ring and Lubricant	STW7-2999	3/mtr
1U50228	Packing, Preformed Fluorocarbon (Leak Check Port)	Rubber	MIL-R-83248, Ty 1, Cl 1	6/motor
1U78676	RSRM Port Plug (leak check port plug)	CRES Steel	QQ-S-763, Cl 316 or AMS 5648	3/motor
1U51916	Cartridge Assembly	HD Filtered Calcium Grease	STW7-3657	A/R

6.1 CHARACTERISTICS:

1. The field joints and their associated seals were designed to allow for handling smaller segments that could later be assembled into RSRMs.

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

3. The seals at each field joint are designed so that the O-ring maintains constant contact with its sealing surface at all times. Squeeze and fill are taken into account relating to O-ring grooves, tolerance, swell, case growth, joint rotation, and resiliency. The design allows easy installation without overstretching.

4. The leak check port plug and its O-ring, as well as the primary O-ring, are one-time-use items.

5. The assembled RSRM is a combustion chamber made up of segments sealed with O-rings that must contain pressure generated by burning propellant.

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

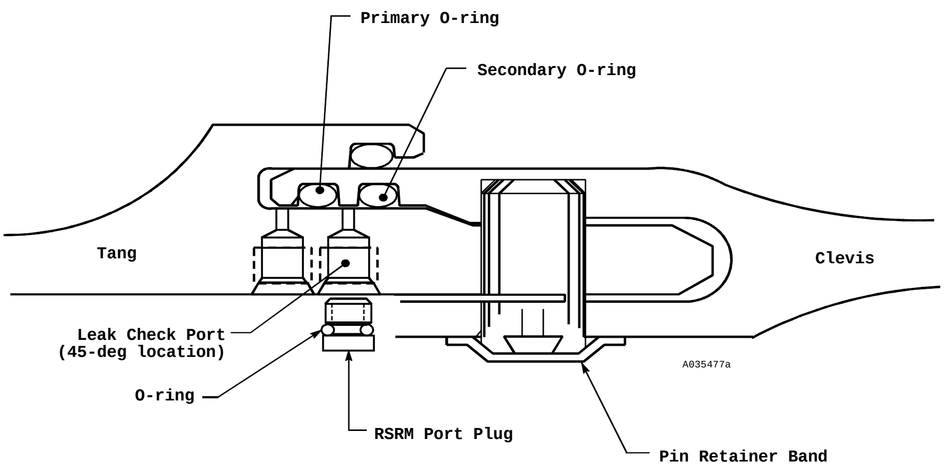

Figure 1. Preformed Packing and Leak Check Ports

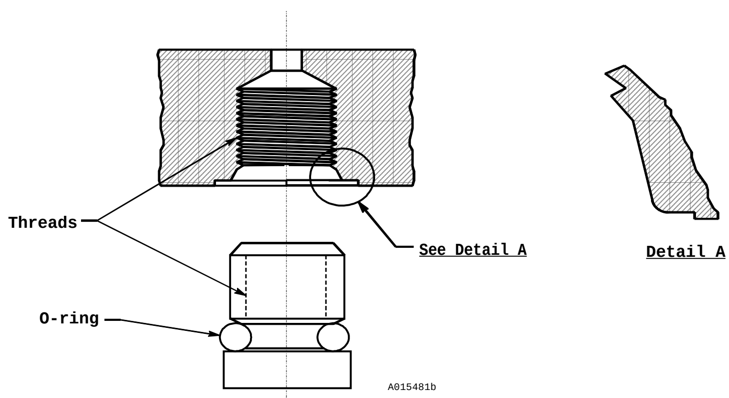

Figure 2. RSRM Port Plug and Seal

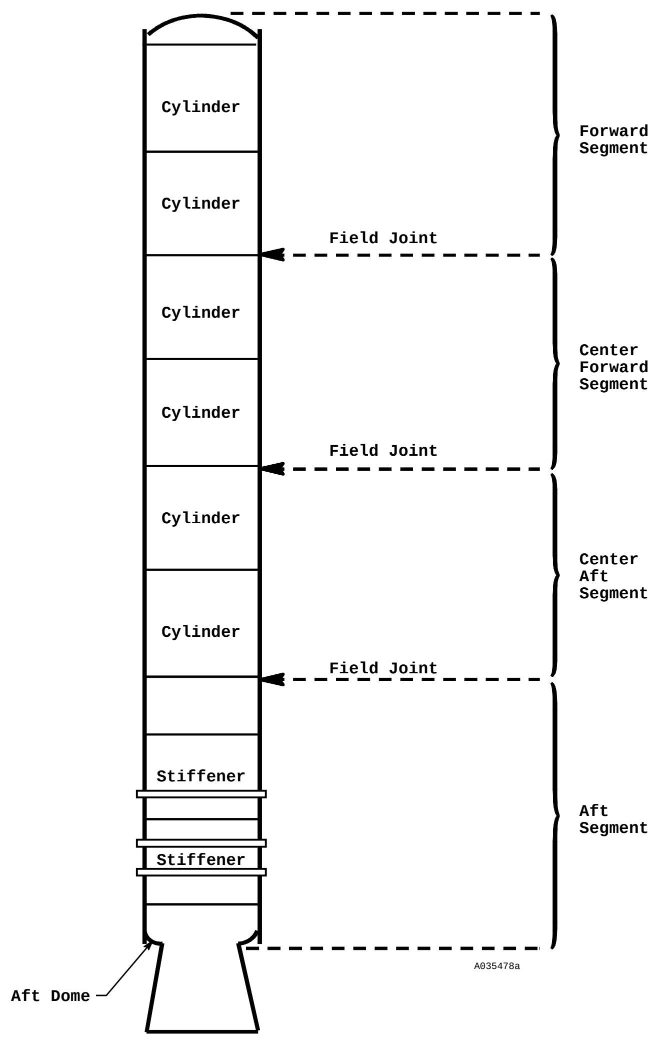

Figure 3. Field Joint Locations

9.0 RATIONALE FOR RETENTION:

9.1 DESIGN:

DCN	FAILURE CAUSES	
A	1.	Criteria for primary O-ring dimensions are per TWR-15771.
A	2.	Both primary and RSRM Port Plug (leak check port plug) O-ring designs provide a constant contact between the O-ring and mating sealing surfaces.
A,H,I	3.	Small and large O-rings are per engineering that establishes design requirements and fabrication details.
A	4.	Splice joints are cut on an angle and bonded together in a mold (using 100 percent of the scarf area) using an adhesive with the same physical and chemical properties as the parent stock.
A,H	5.	O-rings were tested to determine size and types of flaws that could cause sealing problems per TWR-17750.
A	6.	The leak check port O-ring is not spliced.
B	7.	Primary O-ring groove dimensions and surface finish are per engineering and calculations for squeeze and fill are per TWR-15771.
B	8.	Clevis and tang dimensions are per engineering.
B	9.	The sealing surface of the tang where the seal takes place is per engineering.
B	10.	Sealing surfaces for the leak check port are per engineering.
B	11.	RSRM Port Plug (leak check port plug) requirements are per engineering. The RSRM Port Plug (leak check port plug) is a one-time-use item.
B	12.	Design verification analysis of data from live-firing tests per TWR-16534 and TWR-17563 shows that O-ring sealing surfaces are acceptable for flight as reported in TWR-18764-02.
B	13.	Qualification of sealing surface finish value is per TWR-17065.
B	14.	Quality of case segment sealing surfaces during refurbishment is per engineering.
B	15.	The RSRM Port Plug (leak check port plug) and its O-ring, as well as the primary O-ring, are one-time-use items.
C	16.	The tang of the case segment was redesigned to provide a capture feature with custom shimming to minimize joint rotation per engineering. Selection criteria for the custom shims are per engineering.
C	17.	The O-ring and gland are designed to provide constant contact at all times per TWR-15771.
C	18.	Squeeze and fill calculations are performed including effects of joint rotation, thermal effects, and compression set per TWR-15771 and TWR-16682.
C	19.	The design development test for O-ring sealing surfaces was performed by a live-firing JES test series per TWR-16534, TWR-18347, and TWR-18348.

C	20.	Resiliency is maintained by thermal conditioning of the field joints prior to launch per TWR-15832.
C	21.	Requirements for the RSRM field joint interference fit, as determined by profile measuring device data under temperature-controlled conditions, are per engineering.
D	22.	O-ring and sealing surface damage due to mechanical deformation is minimized by the use of a field joint assembly fixture (FJAF) which mates the RSRM field joints. Due to shipping and handling effect and propellant loads, actual shape of the RSRMs may not be circular. Design of the FJAF minimizes the effects of mechanical deformation.
D	23.	Metal segments are selected by matching dimensional fitting to obtain acceptable O-ring squeeze and interference fit per engineering. Segments that comply with drawing dimensional criteria (within stated tolerances) will provide an acceptable O-ring squeeze and interference fit.
D	24.	Case assembly design requirements were met or exceeded in static tests and other special tests as reported in TWR-18764-02.
E	25.	Transportation and handling of case segments by Thiokol while at Thiokol is per IHM 29-063.
E,G	26.	The RSRM and its component parts, when protected per TWR-10299 and TWR-11325, are capable of being handled and transported by rail or other suitable means to and from fabrication, test, operational launch, recovery, retrieval, and refurbishment sites.
E,G	27.	The vent port protective plug is screwed into the case port to protect the sealing surface and to keep out contaminants during transportation and handling to KSC. Installation is with a light coat of filtered grease.
E	28.	Positive cradling or support devices and tie downs that conform to shape, size, weight, and contour of the component 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.
E	29.	Support equipment used to test, handle, transport, and assemble or disassemble the RSRM is certified and verified per TWR-15723.
E	30.	Motor segments are protected during shipping by a segment shipping cover assembly per engineering.
E	31.	Railcar transportation shock and vibration levels for the segments are monitored per engineering with loads derived per analysis. Monitoring records are evaluated by Thiokol to verify that shock and vibration levels per MSFC specifications were not exceeded.
F	32.	Large O-rings are individually packaged. a. Per engineering drawings prior to lubrication. b. Per engineering drawings after lubrication.
F	33.	Small O-rings are individually packaged per engineering.
F	34.	Primary O-ring design allows for a minimum of stretching without damage to the O-

ring per engineering drawings.

F	35.	The leak check port O-ring is assembled with the RSRM Port Plug (leak check port plug) at KSC using an O-ring installation aid.
F	36.	Design development testing of O-ring twisting and its effect on performance was performed per ETP-0153 and TWR-17991.
F	37.	Material selection for the O-rings was based in part on resistance to damage per TWR-17082.
F	38.	O-ring installation is with a light coat of filtered grease per shop planning.
G	39.	Sealing surfaces are inspected for contamination, and cleaned as necessary. a. During processing, Thiokol takes steps to protect all case segment exposed bare metal surfaces to minimize corrosion. Superficial discoloration is allowed as long as it does not interfere with inspection of the hardware. Corrosion is removed prior to hardware assembly per engineering. b. During local transportation, Thiokol uses environmentally controlled shipping containers, which allow the case segments to be shipped without grease per TWR-65920.
G	40.	Filtered grease is applied to sealing surfaces during final assembly processes per engineering drawings.
G	41.	Requirements for process environmental control are established for all critical process operations per SN-C-0005.
G	42.	Filtered grease filtering is per engineering to control contamination.
I	43.	Engineering developed an O-ring resiliency testing procedure per TWR-300186 and TWR-15774.
I	44.	Additional resiliency testing was performed on O-rings per TWR-16818 and TWR-16952.
I	45.	Temperature prior to launch is monitored for the case field joint and is maintained per TWR-15832. O-ring resiliency within required temperature boundaries is per TWR-17991.
J	46.	Required torque for the RSRM Port Plug (leak check port plug) is called out per engineering drawings and specifications. This value is based on results from sealability tests documented in TWR-16964.
J	47.	The O-ring provides a pressure seal when it is seated and the leak check port plug is at least finger tight per TWR-300027.
J	48.	The design development test for the leak check port plug was performed by a live-firing JES test series per TWR-16534 and TWR-17563.
J	49.	A light coat of filtered grease is applied to the leak check port plug at installation per engineering drawings.
K,M	50.	Small and large O-rings are high-temperature, low-compression set, fluid-resistant, black fluorocarbon rubber.
K	51.	Filtered grease conforms to materials per engineering drawings and specifications.

K 52. RSRM Port Plug (leak check port plug) design requirements are per engineering. The RSRM Port Plug (leak check port plug) is made from stainless steel per aerospace material specifications or Federal Specifications.

K 53. Joint temperature for the primary O-ring prior to launch meets RSRM launch restraints for fluorocarbon O-rings per TWR-15832.

L 54. Fluorocarbon rubber O-rings are suitable for periods of storage of up to 20 years (O-ring Handbook, ORD 5700, Copyright 1982, by Parker Seal Group, Lexington, KY). Environment and age are significant to useful seal life, both in storage and actual service as follows:

a. O-rings are packaged and stored to preclude deterioration caused by ozone, grease, ultraviolet light, and excessive temperature.

L 55. Small and large O-ring time duration of supplier storage and total shelf life prior to installation is per engineering.

L 56. Aging studies of O-rings after 5 years installation life were performed. Test results are also applicable to all RSRM fluorocarbon seals. Fluorocarbon maintained its tracking ability and resiliency. Fluorocarbon was certified to maintain its sealing capability over 5 years per TWR-65546.

L 57. O-rings (leak check port and primary) are one-time-use items.

L 58. Grease is stored at warehouse-ambient condition that is any condition of temperature and relative humidity experienced by the material when stored in an enclosed warehouse, in unopened containers, or containers that were resealed after each use. Storage life under these conditions is per engineering.

L 59. Aging studies to demonstrate characteristics of grease after 5 years installation life were performed on TEM-9. Results showed that grease provided adequate corrosion protection for D6AC steel, and that all chemical properties of grease remained intact per TWR-61408 and TWR-64397.

M 60. O-ring swell is negligible unless the O-ring undergoes a long period of water immersion (O-ring Handbook, ORD 5700, Copyright 1982, by Parker Seal Group, Lexington, KY).

M 61. Fluorocarbon rubber is a non-nutrient to fungus growth (O-ring Handbook, ORD 5700, Copyright 1982, by Parker Seal Group, Lexington, KY).

M 62. Small and large O-rings are kept dry and clean prior to packaging.

M 63. Small O-rings are individually packaged in an opaque, waterproof, grease proof, and heat-sealed bag per engineering.

G 64. Filtered grease is included in the life verification.

I 65. Small and large O-rings are included in the life verification.

C 66. 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 case membranes, factory joints, and field joints per TWR-61410.

J 67. RSRM Port Plug (leak check port plug) vibration testing documented in TWR-73485, demonstrated that a very small amount of torque from any combination of O-ring load or thread friction is sufficient to prevent loss of port plugs during flight.

9.2 TEST AND INSPECTION:

DCN	FAILURE CAUSES and TESTS	(T)				CIL CODE
			1.		For New Large O-ring verify:	
	A			a.	Diameter	AEB014,AEB015,AEB018,AEB023,AEB026,AEB027
	A			b.	Correct identification	AEB087,AEB100
	A			c.	Splice is bonded over 100 percent of the scarf area	AEB133,AEB134
	A			d.	No more than five splices	AEB167,AEB169
	A			e.	Repairs	AEB265,AEB266
	A			f.	Adhesive is made from fluorocarbon rubber	AEB308,AEB311
	A			g.	Splice bond integrity	AEB317,AEB319
	A,H	(T)		h.	Subsurface indications	AEB354
	A,F,H,M			i.	Surface quality	AEB388,AEB389
	A,K	(T)		j.	Tensile strength	AEB401,AEB402
	A,K	(T)		k.	Ultimate elongation	AEB442,AEB443
	C,K	(T)		l.	Compression set	AKW006,AKW011
	K,M			m.	Material is fluorocarbon rubber	AEB141,AEB151
	K	(T)		n.	Shore A hardness	AGM304,AGM312
	M			o.	Clean and dry when packaged	AEB031,AEB034
			2.		For New Small O-ring verify:	
	A			a.	Correct identification	AAQ047,AAQ037
	A			b.	Inside diameter "A"	AAQ002,AAQ003
	A			c.	Cross-sectional dimension "W"	AAQ004,AAQ062
	A			d.	Flash dimensions	AAQ111,AAQ112
	F,H,M			e.	Surface quality	AEB389,AEB388
	I			f.	Time from cure date to shipment	AAQ251
	K,M			g.	Material is fluorocarbon rubber	AAQ157,AAQ117
	K	(T)		h.	Shore A hardness	LAA001,LAA006,LAA011,LAA016
	K	(T)		i.	Tensile strength	LAA002,LAA007,LAA012,LAA017
	K	(T)		j.	Ultimate elongation	LAA003,LAA008,LAA013,LAA018
	K	(T)		k.	Compression-set	LAA004,LAA009,LAA014,LAA019
	K	(T)		l.	Tear strength	LAA005,LAA010,LAA015
	M			m.	Dry and clean prior to packaging	AAQ092,AAQ023
	M			n.	Individually packaged and sealed in opaque bags; material is per engineering	AAQ211LAA020
			3.		For New Case Segment, Capture Cylinder, Standard Weight, verify:	
	B			a.	Surface finish of tang sealing surfaces	ADX125,ADX125A
	B,C			b.	Sealing surface diameter at tang	ADX015,ADX052
	B			c.	Surface finish of ports	ADX025,ADX025A
	B			d.	Case port depth	ADX027
	B			e.	Case port thread length	ADX021,ADX021A
	B			f.	Diameter -D- on ports	ADX049,ADX049A
	B			g.	Case port angle K	ADX137,ADX137A
	C			h.	Tang thickness	ADX157,ADX157A
	C			i.	Tang sealing surface thickness	ADX156,ADX156A
	C			j.	Capture feature gap	ADX011,ADX094
	C			k.	Tang outer diameter	FAC010
	C			l.	Capture feature outer diameter	FAC012
	C			m.	Distance from Datum -A- to capture feature inner diameter	MKL013
			4.		For Refurbished Case Segment, Capture Cylinder, Standard Weight, verify:	

B	a.	Surface finish of tang sealing surfaces	AOJ002C
B,C	b.	Sealing surface diameter at tang	FAC014
B	c.	Surface finish of ports	ADX023
B	d.	Case leak check port and vent port thread	FAB244A
B,E	e.	Field joint sealing surfaces for defects	AOJ003C
C	f.	Tang thickness	ADX153
C	g.	Tang sealing surface thickness	ADX152
C	h.	Capture feature gap	ADX141
C	i.	Tang outer diameter	FAC013
C	j.	Capture feature outer diameter	FAC015

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

B	a.	Surface finish of tang sealing surfaces	ADW129,ADW129A
B,C	b.	Sealing surface diameter at tang	ADW149,ADW053
B	c.	Surface finish of ports	ADW141,ADW141A
B	d.	Case port depth	ADW022
B	e.	Case port thread length	ADW028,ADW028A
B	f.	Diameter -D- on port	ADW050,ADW050A
B	g.	Case port angle K	ADW142,ADW142A
C	h.	Tang thickness	ADW161,ADW161A
C	i.	Tang sealing surface thickness	ADW160,ADW160A
C	j.	Capture feature gap	ADW012,ADW098
C	k.	Tang outer diameter	FAC201
C	l.	Capture feature outer diameter	FAC203
C	m.	Distance from Datum -A- to capture feature inner diameter	MKL012

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

B	a.	Surface finish of tang sealing surfaces	AOJ002B
B,C	b.	Sealing surface diameter at tang	FAC205
B	c.	Surface finish of ports	ADW024
B	d.	Case leak check port and vent port thread	FAB233A
B,E	e.	Field joint sealing surfaces for defects	AOJ003B
C	f.	Tang thickness	ADW155
C	g.	Tang sealing surface thickness	FAB231
C	h.	Capture feature gap	ADW145
C	i.	Tang outer diameter	FAC204
C	j.	Capture feature outer diameter	ADW051

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

B	a.	Depth of clevis O-ring grooves	ABM028
B	b.	Width of clevis O-ring grooves	ABM174
B	c.	Surface finish of clevis O-ring grooves	AOJ003
B,E	d.	Field joint sealing surfaces for defects	AOJ003A
C	e.	Outer clevis leg wall thickness	FAB221
C	f.	Inner clevis leg wall thickness	ABM083
C	g.	Outer clevis leg inner diameter (two places)	FAC601
C	h.	Inner clevis leg inner diameter	FAC602

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

B	a.	Surface finish of clevis O-ring grooves	MAA100
B	b.	Depth of clevis O-ring grooves	MAA101
B	c.	Width of clevis O-ring grooves	MAA102
B,E	d.	Field joint sealing surfaces for defects	RAA231

C	e.	Outer clevis leg wall thickness	FAB703
C	f.	Inner clevis leg wall thickness	MAA104
C	g.	Outer clevis leg inner diameter (two places)	FAC701
C	h.	Inner clevis leg inner diameter	FAC702

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

B	a.	Surface finish of clevis O-ring grooves	ABL140,ABL141
B	b.	Clevis O-ring grooves corner radius (4 places)	ABL129,ABL129A
B	c.	Depth of clevis O-ring grooves	ABL031,ABL031A
B	d.	Width of clevis O-ring grooves	ABL181,ABL181A
C	e.	Outer clevis leg wall thickness	ABL127,ABL127A
C	f.	Inner clevis leg wall thickness	ABL078,ABL081
C	g.	Outer clevis leg inner diameter (two places)	FAC301
C	h.	Inner clevis leg inner diameter	FAC302
C	i.	Inner clevis leg outer diameter (Datum -C-)	ABL075

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

B	a.	Surface finish of clevis O-ring grooves	AOJ002
B	b.	Depth of clevis O-ring grooves	ABL028
B	c.	Width of clevis O-ring grooves	ABL179
B,E	d.	Field joint sealing surfaces for defects	AOJ002A
C	e.	Outer clevis leg wall thickness	FAB212
C	f.	Inner clevis leg wall thickness	ABL077
C	g.	Outer clevis leg inner diameter (two places)	FAC305
C	h.	Inner clevis leg inner diameter	FAC306

11. For New RSRM Port Plug (leak check port plug) verify:

B	a.	O-ring groove width dimension	AAB047
B	b.	O-ring groove diameter dimension	AAB036
B	c.	O-ring groove surface finish	AAB043
B	d.	O-ring groove sealing surface blemishes	LAA264
B,G	e.	No shipping or handling damage to packaging	AAB090
G,K	f.	Plug material	AAB053
J	g.	Thread surface blemishes	LAA268
J	h.	Correct thread form	AAB082
J	i.	Plug length	AAB018
K	j.	Tensile strength	AAB081
K	k.	Yield strength	AAB091

12. For RSRM Acceptance Criteria for Interference Fit, verify:

C	a.	Interference fit of the RSRM field joints for each flight set	FAE001

13. For New Segment, Rocket Motor (Forward, Forward Center, and Aft Center), verify:

E	a.	Vent port protective plug is installed finger tight	AFR037,AFS038,AFU038
G	b.	Vent port located at 135 degrees is free of contamination prior to installation of the vent port protective plug	AFR020,AFS019,AFU019

14. For New O-ring, Lubricated verify:

F,L,M	a.	O-ring packaging has not been damaged or violated	LAA103
F,G,M	b.	O-ring is cleaned and lubricated per drawing requirements	LAA104
F,G,L,M	c.	O-ring is packaged per drawing requirements	LAA105

L			d.	O-ring shelf life has not expired prior to lubrication	LAA097
K,L			e.	There is at least the minimum required shelf life of the filtered grease remaining prior to use	LAA255
		15.	For New Grease verify:		
K	(T)		a.	Penetration	LAA037
K	(T)		b.	Dropping point	ANO042
K	(T)		c.	Zinc concentration	LAA038
		16.	For New Filtered Grease verify:		
G,K	(T)		a.	Contamination	ANO064
		17.	KSC verifies:		
A,B,D,E, F,G,H	(T)		a.	Clevis Joint Leak Test results are acceptable for each segment per OMRSD File V, Vol I, B47CJ0.011	OMD026
B,E,G			b.	Tang and Clevis Field Joint unpainted surfaces are free from surface defects or contamination per OMRSD File V, Vol I, B47SG0.122	OMD085
J			c.	RSRM Port Plugs are properly torqued after the leak test per OMRSD File V, Vol I, B47GEN.130	OMD037
F,M			d.	No damage to shipping box, shipping bag, or O-rings prior to installation per OMRSD File V, Vol I, B47SG0.152	OMD087
G,I,L			e.	Expiration date is not exceeded for materials installed at KSC per OMRSD File V, Vol I, B47GEN.160	OMD042
D			f.	RSRM field joint (segments) radial alignment prior to mating per OMRSD File V, Vol I, B47SG0.170	OMD089
D			g.	RSRM field joint parallel alignment per OMRSD File V, Vol I, B47SG0.180	OMD090
D			h.	For tang/clevis joint clocking, matching pins and slots are vertically aligned per OMRSD File V, Vol I, B47SG0.191	OMD091
D			i.	Segment joint pin protrusion is acceptable per OMRSD File V, Vol I, B47SG0.214	OMD093
D			j.	Acceptable field joint engagement rate during segment mating per OMRSD File V, Vol I, B47SG0.290	OMD095
D			k.	Field joint leak check and vent ports are open and unobstructed per OMRSD File V, Vol I, B47SG0.300	OMD096
B,E,F,G,J,M			l.	Leak check and vent port O-ring package for no penetrations or broken seals, use of plastic thread protector for O-ring installation, and filtered grease applied to the O-ring per OMRSD File V, Vol I, B47SG0.310	OMD097
B,E,F,G,J,M			m.	RSRM Port Plugs (adjustable vent port plug, closure screw, and leak check port plug) shipping containers for no damage and application of filtered grease per OMRSD File V, Vol I B47SG0.310	OMD098
B,E,F,G,J,M			n.	Field joint leak check and vent ports for damage, contamination, or corrosion per OMRSD File V, Vol I, B47SG0.310	OMD099
D			o.	RSRM field joint geometry (tang and outer clevis leg) prior to mating per OMRSD File V, Vol I, B47SG0.330	OMD100
D			p.	Field joint assembly fixture shim selection and joint gaps per OMRSD File V, Vol I, B47SG0.360	OMD102
F,G			q.	Application of filtered grease to the field joints (O-ring grooves, sealing surfaces, pin holes) per OMRSD File V, Vol I, B47SG0.370	OMD103
F,G			r.	Application of filtered grease to Field Joint O-rings and Thermal	

		Barrier per OMRSD File V, Vol I, B47SG0.380	OMD104
D	s.	Acceptable contact between FJAF and segment outer clevis leg during mating operations per OMRSD File V, Vol I, B47SG0.390	OMD105
C	t.	Correct field joint pin retainer clips (custom shims) are installed per OMRSD File V, Vol I, B47SG0.510	OMD110
I	u.	Field joint heaters are activated and that temperatures are in compliance with NASA Launch Commit Criteria (NSTS-16007) per OMRSD File II, Vol I, S00FA0.610	OMD011