1) CIL ITEM : B200-24
2) FMEA CODE : B200
3) COMPONENT : HPFTP
4) PART NUMBER : RS007501
5) SYSTEM/SUBSYSTEM : PUMPS/8XXX (FASCOS REDLINE ACTIVE)
6) FAILURE MODE : FAILURE TO RESTRAIN SHAFT MOVEMENT DURING TURBOPUMP STARTUP (VE)

7) PREPARED : SSME RELIABILITY
8) APPROVED :
9) DATE : 04-19-96
10) REVISION/CHANGE : -001/0
11) EFFECTIVITY : -1091
12) HAZARD REFERENCE : SEE LISTINGS BELOW
13) CCBD # : ME3-01-3285

PHASE	FAILURE DESCRIPTION/EFFECT	CRITICALITY
S	EXCESS SHAFT MOVEMENT CAN RESULT IN RUBBING OF COMPONENTS CAUSING TURBOPUMP PERFORMANCE DEGRADATION. EXCESS TURBINE DISCHARGE TEMPERATURE MAY CAUSE REDLINE SHUTDOWN. LOSS OF VEHICLE DUE TO HPFTP TURBINE FAILURE MAY RESULT IF EXCESSIVE TURBINE TEMPERATURE IS NOT DETECTED. REDUNDANCY SCREENS: TURBOPUMP SYSTEM - SENSOR SYSTEM: UNLIKE REDUNDANCY ---------- A: PASS. REDUNDANT HARDWARE ITEMS ARE CAPABLE OF CHECKOUT DURING NORMAL GROUND TURNAROUND. B: PASS. LOSS OF A REDUNDANT HARDWARE ITEM IS DETECTABLE DURING FLIGHT. C: PASS. LOSS OF REDUNDANT HARDWARE ITEMS COULD NOT RESULT FROM A SINGLE CREDIBLE EVENT.	1R HAZARD REF: ME-01S,M
SM	EXCESSIVE SHAFT MOVEMENT CAN CAUSE HARDWARE DAMAGE AND DEBRIS GENERATION, RESULTING IN PUMP END BEARING DAMAGE AND CONTROLLER INITIATED SHUTDOWN DUE TO INCREASED VIBRATION LEVELS. MISSION ABORT. REDUNDANCY SCREENS: TURBOPUMP SYSTEM - SENSOR SYSTEM: UNLIKE REDUNDANCY. ---------- A: PASS. REDUNDANT HARDWARE ITEMS ARE CAPABLE OF CHECKOUT DURING NORMAL GROUND TURNAROUND. B: PASS. LOSS OF A REDUNDANT HARDWARE ITEM IS DETECTABLE DURING FLIGHT. C: PASS. LOSS OF REDUNDANT HARDWARE ITEMS COULD NOT RESULT FROM A SINGLE CREDIBLE EVENT.	1R HAZARD REF: ME-01S,M

CIL ITEM: 8200-24	DESIGN	DOCUMENT REF.
	FAILURE CAUSE A: FAILURE OF THRUST-CARRYING BALL BEARING: BALL FAILURE, CAGE FAILURE, RACE FAILURE, CORROSION, CONTAMINATION FAILURE CAUSE B: FAILURE OF THRUST BALL FAILURE CAUSE C: FAILURE OF SHAFT INSERT	
	THE THRUST BEARING ASSEMBLY (1) IS DESIGNED TO ABSORB THE ROTOR AXIAL THRUST TOWARDS THE PUMP END DURING START-UP AND SHUTDOWN, WHEN THERE IS INSUFFICIENT FLUID FLOW FOR THE BALANCE PISTON TO FUNCTION. THE THRUST BEARING (1) IS ENGAGED BY ROTOR MOTION TOWARD THE PUMP-END, UNTIL THE SHAFT INSERT (2) MATES WITH THE THRUST BALL (3). THE SHAFT INSERT IS PILOTED IN A RECESS ON THE FACE OF THE SPEED NUT (4) AND PINNED (5) IN PLACE. THE SPEED NUT IS THREADED AND PINNED (6) TO THE END OF THE SHAFT (7). THE INSERT IS MANUFACTURED UTILIZING HAYNES STELLITE ALLOY BAR (8). THIS MATERIAL WAS SELECTED FOR ITS CRYOGENIC TENSILE STRENGTH, WEAR CHARACTERISTICS, AND RESISTANCE TO HYDROGEN ENVIRONMENT EMBRITTLEMENT. DRY-FILM LUBRICATION IS APPLIED TO THE THRUST BALL MATING GROOVE TO ENHANCE ITS RUBBING CHARACTERISTICS. INSERT CONTACT WITH THE THRUST BALL ENGAGES THE THRUST BEARING, WHICH IS PILOTED ON THE INSIDE DIAMETER BY THE THRUST BEARING RING (9) AND ON THE OUTSIDE DIAMETER BY THE THRUST BEARING HOUSING (10). THE THRUST BALL IS SWAGED INTO THE RING ASSEMBLY. THE THRUST BALL IS MANUFACTURED UTILIZING 440 C CRES BAR (8). THIS MATERIAL WAS SELECTED FOR ITS BEARING STRENGTH, WEAR RESISTANCE, CORROSION RESISTANCE, AND INSENSITIVITY TO HYDROGEN ENVIRONMENT EMBRITTLEMENT AT OPERATING TEMPERATURES. THE MATERIAL IS HEAT TREATED TO IMPROVE ITS MECHANICAL PROPERTIES. DRY-FILM LUBRICANT IS APPLIED TO THE BALL TO ENHANCE ITS RUBBING CHARACTERISTICS. THE THRUST BEARING RING IS MANUFACTURED UTILIZING A-286 CRES BAR (8). THIS MATERIAL WAS SELECTED FOR ITS MECHANICAL PROPERTIES AT CRYOGENIC TEMPERATURES ALONG RETENTION OF TOUGHNESS AND DUCTILITY, AND ITS INSENSITIVITY TO HYDROGEN ENVIRONMENT EMBRITTLEMENT. THE MATERIAL IS SOLUTION TREATED AND AGED-HARDENED. THE THRUST BEARING IS A SPLIT INNER RACE THRUST BALL BEARING, DESIGNED TO ACCOMMODATE THE AXIAL LOADS FROM THE SHAFT. THE BEARING BALLS AND RACES ARE MANUFACTURED UTILIZING 440 C CRES (8). THIS MATERIAL WAS SELECTED FOR ITS SURFACE HARDNESS, WEAR RESISTANCE, CORROSION RESISTANCE, AND INSENSITIVITY TO HYDROGEN ENVIRONMENT EMBRITTLEMENT AT TEMPERATURES BELOW -200 DEGREES F. THE MATERIAL IS HARDENED, COLD STABILIZED, TEMPERED, AND STRESS RELIEVED TO ACQUIRE THE DESIRED PROPERTIES. THE BALLS ARE POSITIONED BY AN ARMALON CAGE. THE TFE (TEFLON) CONTAINED IN THIS NANOREL-WRAPPED FIBERGLASS CAGE PROVIDES BEARING LUBRICATION. THE MATERIAL WAS SELECTED FOR ITS LUBRICITY, LOW WEAR CHARACTERISTICS, AND SATISFACTORY MECHANICAL PROPERTIES. THE BEARING INNER RACE IS BOTTOMED AGAINST THE AXIAL LIP OF THE RING BY AN INCONEL 718 NUT (11) WHICH IS LOCK (12) TO PREVENT ROTATION. ASSEMBLY PROCEDURES FOR LOCKING DEVICES ENSURE DEFECT-FREE INSTALLATION (13). THE THRUST BEARING SHIM (14) IS SIZED AT ASSEMBLY TO ASSURE ENGAGEMENT OF THE THRUST BEARING PRIOR TO CONTACT BETWEEN THE THIRD-STAGE IMPELLER (15) AND THE HIGH PRESSURE ORIFICE RING (16). THE OUTER RACE OF THE THRUST BEARING IS BOTTOMED AGAINST THE SHIM AND THRUST BEARING HOUSING AXIAL LIP BY AN INCONEL 718 NUT (17) WHICH IS LOCKED (18) TO PREVENT ROTATION. ASSEMBLY PROCEDURES FOR LOCKING DEVICES ENSURE DEFECT-FREE INSTALLATION (13). AN INCONEL 718 SPRING (19) IS INSTALLED BETWEEN THE NUT AND BEARING OUTER RACE TO PROVIDE STIFFNESS. INCONEL 718 WAS SELECTED FOR THE NUTS AND THE SPRING FOR ITS STRENGTH, RESISTANCE TO CORROSION AND STRESS CORROSION CRACKING, CRYOGENIC DUCTILITY, AND INSENSITIVITY TO HYDROGEN ENVIRONMENT EMBRITTLEMENT AT OPERATING TEMPERATURES. THE MATERIAL IS SOLUTION TREATED AND AGED-HARDENED. THE THRUST BEARINGS ARE CLEANED, PACKAGED, HANDLED, AND STORED TO PRECLUDE INTRODUCTION OF CONTAMINANTS PRIOR TO SERVICE (20). THE THRUST BEARING ASSEMBLY MEETS CEI HIGH AND LOW CYCLE FATIGUE LIFE REQUIREMENTS (21). THE PARTS MEET THE CEI MINIMUM FACTORS OF SAFETY	(1) R0019213, RSD07605 (2) R0019215 (3) RES1163 (4) R0019205 (5) MS9390 (6) R0019216 (7) RS007514 (8) RSS-8580-10 (9) R0019213 (10) R0019204 (11) R0019211 (12) R0019212 (13) RL00351 (14) R0019207 (15) RS007556 (16) RS007577, RS007693 (17) R0019209 (18) R0019210 (19) R0019208 (20) RL00916 (21) RL00532, CP320R00038 (22) RSS-8546-16, CP320R00038 (23) NASA TASK 117 (24) RL00050-04, OMRSD V41BS0.020 (25) RL00528 (26) CP406R0008 3.2.3:5.5

CIL ITEM: B200-24

DESIGN

(22). THE THRUST BEARING ASSEMBLY PARENT MATERIALS WERE CLEARED FOR FRACTURE MECHANICS/NDE FLAW GROWTH SINCE IT CONTAINS NO FRACTURE CRITICAL PARTS (23). THE THRUST BEARING ASSEMBLY IS PARTIALLY DISASSEMBLED AFTER EACH HOT FIRE TO PERFORM THE SHAFT TRAVEL AND TORQUE MEASUREMENTS (24). THE THRUST BALL AND INSERT ARE INSPECTED FOR WEAR DURING THESE CHECKS. REPLACEMENT OF THE THRUST BEARING ASSEMBLY COMPONENTS OR THE SHAFT INSERT FOR WEAR IS A MAINTENANCE ITEM (25). THE CONTROLLER SOFTWARE IS CONFIGURED TO DETECT AND RESPOND PROPERLY TO THE FAILURES IDENTIFIED AND COMMAND A SAFE ENGINE STATE (26). THE SHAFT INSERT AND THRUST BALL ARE NON-SERIALIZED AND NOT TIME HISTORY TRACKED. THESE PARTS ARE REPLACED AT OVERHAUL (25).

DOCUMENT REF.

CIL ITEM: B200-24

INSPECTION AND TEST

POSSIBLE CAUSES	SIGNIFICANT CHARACTERISTICS	INSPECTION(S)/TEST(S)	DOCUMENT REF.
FAILURE CAUSE A:	RS007605 - BEARING		RS007605
	MATERIAL INTEGRITY	MATERIAL INTEGRITY IS VERIFIED PER SPECIFICATION AND DRAWING REQUIREMENTS.	RB013D-013 RB016D-064 RS007605
		THE INNER AND OUTER RACES ARE PENETRANT INSPECTED PER SPECIFICATION REQUIREMENTS.	RA0115-116
		THE BEARING BALLS AND INNER AND OUTER RACES ARE EDDY CURRENT INSPECTED PRIOR TO INSTALLATION.	RS007605 RL00564 RL00743
	HEAT TREAT	THE BEARING BALLS AND INNER AND OUTER RACES ARE HEAT TREATED PER SPECIFICATION REQUIREMENTS.	RA1611-005
	ASSEMBLY INTEGRITY	THE BEARING BALLS AND INNER AND OUTER RACES ARE INSPECTED VISUALLY PER DRAWING AND SPECIFICATION REQUIREMENTS.	RS007501 RL00916
		THE BEARING BALLS ARE INSPECTED PER DRAWING REQUIREMENTS TO AFBMA STANDARDS FOR SIZE AND GRADE.	RS007605
		BEARINGS ARE ASSEMBLED AND DISASSEMBLED PER SPECIFICATION REQUIREMENTS.	RL00916
		THE INNER AND OUTER RACES AND CAGE ARE VERIFIED TO BE COPLANAR PER DRAWING REQUIREMENTS.	RS007605

CIL ITEM: B200-24	INSPECTION AND TEST		
POSSIBLE CAUSES	SIGNIFICANT CHARACTERISTICS	INSPECTION(S)/TEST(S)	DOCUMENT REF.
		THE BEARING CAGE FABRIC LAYERS ARE INSPECTED PER DRAWING REQUIREMENTS.	RS007605
	CLEANLINESS OF COMPONENTS	THE BEARING RACES AND BALLS ARE VERIFIED CLEANED PER SPECIFICATION REQUIREMENTS.	RA1610-051 RL10001
		THE CAGE IS INSPECTED FOR ORGANIC FLUIDS PER DRAWING REQUIREMENTS.	RS007605
		THE BEARINGS ARE INSPECTED FOR CORROSION PRIOR TO PACKAGING, BEFORE ASSEMBLY, AND BEFORE INSTALLATION IN THE PUMP.	RL00916 RS007605 RS007501 RL00006
		THE UPSTREAM COMPONENTS ARE VERIFIED CLEANED PER SPECIFICATION AND DRAWING REQUIREMENTS.	RL10001 RS007501 RS007605
FAILURE CAUSE B:	RES1163 - BALL, THRUST		RES1163
	MATERIAL INTEGRITY	MATERIAL INTEGRITY OF THE THRUST BALL IS VERIFIED PER DRAWING REQUIREMENTS.	RES1163
		THRUST BALL IS PENETRANT INSPECTED PER SPECIFICATION REQUIREMENTS.	RAD115-116
	HEAT TREAT	HEAT TREAT IS VERIFIED PER DRAWING REQUIREMENTS.	RES1163
		HARDNESS IS VERIFIED PER DRAWING REQUIREMENTS.	RES1163
	SURFACE FINISH	BALL DRY FILM LUBE IS VERIFIED PER SPECIFICATION REQUIREMENTS.	RAD112-006
	ASSEMBLY INTEGRITY	BALL INSTALLATION IS VERIFIED PER DRAWING REQUIREMENTS.	R0D19213
FAILURE CAUSE C:	R0D19215 - INSERT, AXIAL STOP		R0D19215
	MATERIAL INTEGRITY	MATERIAL INTEGRITY OF THE INSERT IS VERIFIED PER DRAWING REQUIREMENTS.	R0D19215
		INSERT IS PENETRANT INSPECTED PER SPECIFICATION REQUIREMENTS.	RAD115-116

CIL ITEM: 0200-24

INSPECTION AND TEST

POSSIBLE CAUSES	SIGNIFICANT CHARACTERISTICS	INSPECTION(S)/TEST(S)	DOCUMENT REF.
		HARDNESS IS VERIFIED PER DRAWING REQUIREMENTS.	R0019215
	ASSEMBLY INTEGRITY	DRY FILM LUBRICATION IS VERIFIED PER SPECIFICATION REQUIREMENTS.	RA0112-006
		INSERT BOTTOMING AND STAKING IS VERIFIED PER DRAWING AND SPECIFICATION REQUIREMENTS.	RS007501 RL00351
ALL CAUSES:	RS007501 - HPFTP		RS007501
	CLEANLINESS OF COMPONENTS	COMPONENTS ARE VERIFIED CLEANED PER SPECIFICATION REQUIREMENTS.	RL10001
	ASSEMBLY INTEGRITY	OPERATION/PERFORMANCE IS VERIFIED BY ENGINE HOT FIRE TESTING AND 2ND E & M TESTS ON INSPECTIONS.	RL00050-04 RL00056-06 RL00056-07 RL00461
		THE PUMP SUBASSEMBLIES ARE INSPECTED DURING OVERHAUL PER SPECIFICATION REQUIREMENTS. INSPECTIONS INCLUDE: VISUAL, DIMENSIONAL, PENETRANT, AND REPLACEMENT OF USAGE ITEMS AS APPLICABLE, PER OVERHAUL CLASSIFICATION.	RL00528 RA0115-116
		THRUST BEARING ASSEMBLY IS VISUALLY INSPECTED PRIOR TO EACH FLIGHT.	RF0001-053 OMRSD V41B50.020
		DATA FROM PREVIOUS FLIGHT OR HOT FIRE IS REVIEWED FOR PROPER TURBOPUMP OPERATION/PERFORMANCE. (LAST TEST)	MSFC PLN 1228

FAILURE HISTORY: COMPREHENSIVE FAILURE HISTORY DATA IS MAINTAINED IN THE PROBLEM REPORTING DATABASE (PRAMS/PRACA).
REFERENCE: NASA LETTER SA21/88/308 AND ROCKETDYNE LETTER 88RC09761.

OPERATIONAL USE: NOT APPLICABLE.

SSME FMEA/CIL
FIELD CONFIGURATION VARIANCES FROM CIL RATIONALE

Component Group: Fuel Turbopumps
Item Name: High Pressure Fuel Turbopump
Item Number: B200
Part Number: RS007501

Prepared: D. Early
Approved: T. Nguyen
Approval Date: 4/21/99
Change #: 2
Directive #: CCBD ME3-01-5208

Base Line Rationale	Variance	Change Rationale	Variant Dash Number
1. B200-15 RS007502; CAUSE A. B200-24; RS007605; CAUSE A THE INNER AND OUTER BEARING RACES ARE EDDY CURRENT INSPECTED PER RL00743.	BEARING RACES RECEIVED FROM SUPPLIER SPLIT BALL BEARING INCORPORATED RECEIVED NO GENERAL EDDY CURRENT INSPECTION	GENERAL EDDY CURRENT INSPECTION OF RACES REPLACES TYPE IVC IN PENETRANT INSPECTION IN DETECTING SURFACE FLAWS USE AS IS RATIONALE: 1. RACES SUPPLIED BY SPLIT BALL BEARING INCORPORATED RECEIVED 10X VISUAL AND TYPE IVC PENETRANT INSPECTION INSTEAD OF GENERAL EDDY CURRENT INSPECTION. FLAW DETECTABILITY RELIABILITY LEVELS BETWEEN PENETRANT AND GENERAL EDDY CURRENT INSPECTIONS ARE 0.060 AND 0.057 RESPECTIVELY.	SEE DAR 2745 FOR VARIANT PART SERIAL NUMBERS.
2. B200-13 RS007527, RS007532, CAUSE A & B. B200-26; RS007532; CAUSE B. DIFFUSER HIDDEN SURFACES ARE PENETRANT INSPECTED PER RL00343.	SOME DIFFUSERS MAY NOT RECEIVE THE POST PROOF TEST HIDDEN SURFACE IIa PENETRANT INSPECTION	USE AS IS RATIONALE 1 IMPLEMENTATION OF HIDDEN SURFACE INSPECTION REQUIREMENT IS NOT A RESULT OF AN OBSERVED HARDWARE ANAOMALY BUT AS A RESULT OF ROCKETDYNE'S STAND DOWN.	SEE DAR 2751 FOR VARIANT PART SERIAL NUMBERS
3 B200-14 CAUSE A, RS007568 B200-21 CAUSE B, RS007568 B200-26 CAUSE A, RS007568 WELD JOINTS RS007568 TABLE B200 HPFTP FMEA/CIL WELD JOINTS RS007568 HOUSING CURRENT CONFIGURATION IS THE ONE(1) PIECE "-113" CAP, USING FOUR (4) WELDS AND FOUR (4) WELD NUMBERS	SOME HOUSINGS (POSSIBLY TWO) MAY HAVE BEEN FABRICATED WITH THE TWO (2) PIECE "-113" CAPS (THIS HAS AN EXTRA WELD: #13 AND THREE EXTRA WELD NUMBERS 13, 68 & 69)	TO REDUCE CONFUSION ON THE DRAWING AND ON THE MANUFACTURING FLOOR	SEE MCR 2524. SAME -113 DASH NUMBER.
4 B200-02; CAUSE A, RS007524 CAUSE B, RS007524; CAUSE C, RS007524	SOME TURBINE BEARING SUPPORTS (RS007524) ARE FABRICATED USING A WELDMENT OF HAYFS 188 SHEET METAL INSTEAD OF THE EDM FORGING.	HIGH CYCLE FATIGUE INDUCED INLET SHEET METAL CRACKS DO OCCUR FROM THE OPERATIONAL ENVIRONMENT EXPERIENCED DURING ENGINE OPERATION. THE CRACKING IS CONTROLLED PER THE REQUIREMENTS OF THE SHEET METAL INSPECTION SPECIFICATION (RL00655) WHICH LIMITS THE CRACKING LENGTH, SPACING, AND SHAPE, TO PRECLUDE SHEET METAL PIECES FROM DISLODGING. THE CRITERIA IS BASED ON CRACK GROWTH RATES AND ENGINE TEST EXPERIENCE. ANY CRACKS, WHICH EXCEED THE SPECIFICATION LIMITS, ARE WELD REPAIRED (RF0001-007). THE TURBINE BEARING SUPPORT WITH WELDED SHEET METAL IS LIFE LIMITED BY MAJOR WAIVER DAR 2709.	RS007524-201 AND SUBS.

Component Group: Fuel Turbopumps
Item Name: High Pressure Fuel Turbopump
Item Number: B200
Part Number: RS007501

Prepared: D. Early
Approved: T. Nguyen
Approval Date: 4/21/99
Change #: 2
Directive #: CCBD ME3-01-5206

Base Line Rationale	Variance	Change Rationale	Variant Dash Number
5 B200-16 CAUSE A, B200-17 CAUSE A B200-18 CAUSE A, B200-19 CAUSE A, B200-22; CAUSE A,B,C,E	SOME LIFT-OFF SEAL HOUSING DRAIN LINES ARE FABRICATED USING INTERSECTING LINE DRILLED HOLES THE HOLE THAT INTERSECTS THE OUTSIDE DIAMETER OF THE HOUSING FLANGE HAS A PLUG INSTALLED. THE PLUG IS THEN WELDED AT THE HOUSING OUTSIDE DIAMETER TO FORM A TIGHT GAS SEAL	LOW CYCLE FATIGUE CRACKING HAS BEEN OBSERVED IN THE PLUG WELD. CRACK INITIATION AND PROPAGATION OCCURS AT SHUTDOWN/COOLDOWN ALL UNITS RECEIVE A STANDARD POST FLIGHT INSPECTIONS BY LEAK CHECK. LEAK CHECK POST FLIGHT WILL DETECT A CRACK PRIOR TO REFLIGHT. POST LEAKAGE AT THE DRAIN LINE IS LIMITED TO 10 SCIM. ALL FLIGHT UNITS WILL CONTINUE TO RECEIVE A LEAK CHECK POST FLIGHT FOR THE DRAIN LINE PLUG WELD UNITL THE ENTIRE FLEET IS RETROFIT WITH THE EDM DRAIN LINE CONFIGURATION	R0019230-071 AND SUBS.

SSME FMEA/CIL
WELD JOINTS

Component Group: Fuel Turbopumps
CIL Item: B200
Component: High Pressure Fuel Turbopump
Part Number: RS007501

Prepared: D. Early
Approved: T. Nguyen
Approval Date: 4/21/99
Change #: 2
Directive #: CCBD ME3-01-5206

Component	Basic Part Number	Weld Number	Weld Type	Class	Root Side Not Access	Critical Initial Flaw Size Not Detectable HCF	LCF	Comments
SHIELD	R0012171	1-24, 28-52	GTAW	II	X			
SHIELD	R0012171	26	GTAW	II				
LIFT-OFF SEAL	R0019230	1, 2	GTAW	II	X			
SHIELD	R0019788	25, 26	GTAW	II				
SHIELD	R0019788	27-50	GTAW	II	X			
SHIELD	R0019788	51, 52	GTAW	I				
SHIELD	R0019788	53, 55	GTAW	II				
BELLOWS	RS007505	1-4	GTAW	I		X		
BELLOWS	RS007505	5, 6	EBW	I		X		
INLET	RS007512	4	GTAW	I		X		
INLET	RS007512	5-6	GTAW	I				
INLET	RS007512	7-10, 12, 13	GTAW	I				
INLET	RS007512	11	EBW	II				
INLET	RS007512	14, 15	GTAW	I				
INLET	RS007512	16	GTAW	I		X		
BEARING SUPPORT	RS007524	14	EBW	I				
BEARING SUPPORT	RS007524	18	EBW	I	X			
BEARING SUPPORT	RS007524	29, 30	GTAW	I	X	X		
BEARING SUPPORT	RS007524	118	GTAW	I	X			
BEARING SUPPORT	RS007524	119, 121	EBW	I				
BEARING SUPPORT	RS007524	120	GTAW	II	X			
BEARING SUPPORT	RS007524	229-241	GTAW	II	X			
HOUSING	RS007568	75, 223, 228, 230, 298	GTAW	I	X	X	X	
HOUSING	RS007568	74	GTAW	I				
HOUSING	RS007568	48	EBW	I	X	X	X	
HOUSING	RS007568	49	GTAW	I	X			
HOUSING	RS007568	51	GTAW	II	X	X		
HOUSING	RS007568	52	GTAW	II	X			
HOUSING	RS007568	53	EBW	I				

Component Group: Fuel Turbopumps
CIL Item: B200
Component: High Pressure Fuel Turbopump
Part Number: RS007501

Prepared: D. Early
Approved: T. Nguyen
Approval Date: 4/21/99
Change #: 2
Directive #: CCBD ME3-01-5206

Component	Basic Part Number	Weld Number	Weld Type	Class	Root Side Not Access	Critical Initial Flaw Size Not Detectable HCF	Critical Initial Flaw Size Not Detectable LCF	Comments
HOUSING	RS007568	55	EBW	II	X			
HOUSING	RS007568	56	GTAW	II	X			
HOUSING	RS007568	57, 324 325	GTAW	II				
HOUSING	RS007568	58	GTAW	II	X	X	X	
HOUSING	RS007568	59	EBW	I				
HOUSING	RS007568	74, 229, 297	GTAW	I	X	X	X	
HOUSING	RS007568	76, 77	GTAW	I		X		
HOUSING	RS007568	78-89	GTAW	II	X			
HOUSING	RS007568	90-101	GTAW	II	X			
HOUSING	RS007568	102	GTAW	I	X			
HOUSING	RS007568	139	GTAW	II	X			
HOUSING	RS007568	140	GTAW	II	X			
HOUSING	RS007568	153, 154	GTAW	II	X			
HOUSING	RS007568	174-185	GTAW	II	X			
HOUSING	RS007568	191 192, 195, 196 245, 455 456	GTAW	II	X	X		
HOUSING	RS007568	193, 194, 197-202 204-207	GTAW	II		X		
HOUSING	RS007568	203, 217, 218, 234, 236	GTAW	II	X	X		
HOUSING	RS007568	212, 213	GTAW	II				
HOUSING	RS007568	214 215	GTAW	II	X			
HOUSING	RS007568	222, 239	GTAW	I		X		
HOUSING	RS007568	224, 225	GTAW	I		X	X	
HOUSING	RS007568	226, 227	GTAW	I		X		
HOUSING	RS007568	231, 232	GTAW	II	X	X		
HOUSING	RS007568	233	GTAW	II	X			
HOUSING	RS007568	237 238	GTAW	II				
HOUSING	RS007568	246-248	GTAW	II				
HOUSING	RS007568	326-349	GTAW	II	X			
HOUSING	RS007568	374-397	GTAW	II	X			
HOUSING	RS007568	399	GTAW	I	X	X	X	

Component Group: Fuel Turbopumps
CIL Item: B200
Component: High Pressure Fuel Turbopump
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Prepared: D. Early
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Change #: 2
Directive #: CCBD ME3-01-5206

Component	Basic Part Number	Weld Number	Weld Type	Class	Root Side Not Access	Critical Initial Flaw Size Not Detectable HCF	Critical Initial Flaw Size Not Detectable LCF	Comments
HOUSING	RS007568	401-424	GTAW	II	X			
HOUSING	RS007568	425-448	GTAW	II	X			
HOUSING	RS007568	450 (OPT)	GTAW	II				
HOUSING	RS007568	450 (OPT)	EBW	II	X			
HOUSING	RS007568	454	GTAW	II	X			
HOUSING	RS007568	537 (OPT)	GTAW	II				
ROTOR SEAL	RS007588	1	EBW	I				
SEAL	RS007592	25	EBW	II	X			