

EXPEDITE  
PROCESSING

# CRITICAL ITEMS LIST

PAGE 1 OF 2

REFERENCE DESIGNATOR:  
 NAME/QUANTITY: MFR to RMS Tether  
 DRAWING REFERENCE: SEP221001E

PROJECT: Orbiter  
 LRU NAME/QUANTITY: MFR/RCS Assembly  
 LRU PART NUMBER: SEP221001E

SUBSYSTEM: GFE  
 EFFECTIVITY: All Orbiters

FAILURE MODE NUMBER MFR-RMS-01	CRITICALITY 2/10	FAILURE EFFECT	RETENTION RATIONALE
<b>FUNCTION</b> Provides adjustable safety tether between the RMS and effector and MFR.		<b>END ITEM</b> Tether function is lost.	<ol style="list-style-type: none"> <li>1) Design features to minimize failure mode               <ol style="list-style-type: none"> <li>a. Design working load of 150 lbs. Minimum factor of safety is 1.4 for all components</li> <li>b. Kevlar webbing rated minimum break strength of 5740 lbs</li> <li>c. Hook is made of 7075-T73 aluminum. It has been previously proof tested to 600 lbs.</li> <li>d. Stitching pattern and material rated for 400 lbs. minimum break strength</li> <li>e. Buckle is made of stainless steel. It is load rated at 667 lbs.</li> <li>f. Fraycheck 574 is used to coat all cut edges of webbing to prevent fraying</li> <li>g. Kevlar strap is replaced if it is frayed or damaged</li> </ol> </li> <li>2. Test or analysis to detect failure mode               <p><u>Acceptance</u></p> <ol style="list-style-type: none"> <li>a. MFR to RMS tether is proof tested at 150 lbs. prior to each flight</li> <li>b. Hook and buckle operation are verified prior to flight</li> </ol> <p><u>Certification</u></p> <ol style="list-style-type: none"> <li>a. Tether passed 150 proof load and 400 lbs. ultimate load test</li> <li>b. Functional test on the tether was conducted at temperature of -133°F and +124°F. Hook and buckle adjustment functions were verified</li> </ol> <p><u>Turnaround</u></p>           Functional test of all tether functions and visual inspection per P528/PIA-05001         </li> <li>3) Inspection               <p><u>Manufacturing</u></p> <ol style="list-style-type: none"> <li>a. Quality Assurance inspection of manufacturing process</li> <li>b. Verification of conformance to drawing</li> </ol> </li> </ol>
<b>FAILURE MODE AND CAUSE</b> Buckle pin, small EVA hook, or kevlar webbing/stitching break or small EVA hook latch fails open.  <b>CAUSE:</b> Defective material, contamination, or spring deformation.		<b>MISSION</b> Terminate MFR's EVA mission.	
<b>REUNDANCY SCREENS</b>  A - Pass B - N/A C - Pass		<b>CREW/VEHICLE</b> Possible loss of crew/vehicle due to impact or loss of crew due to separation from Orbiter.	
<b>REMAINING PATHS</b>  None. <i>This is a standby/redundant item</i>		<b>INTERFACE</b> MFR will not be tethered to the RMS end effector.	
<b>MISSION PHASE</b>	<b>TIME TO EFFECT</b>	<b>TIME TO CORRECT</b>	
EVA	Immediate	N/A	

23

# CRITICAL ITEMS LIST

REFERENCE DESIGNATOR:  
NAME/QUANTITY: MFR to RMS Tether  
DRAWING REFERENCE: 562310013

PROJECT: Orbiter  
LRU NAME/QUANTITY: MFR/APS Assembly  
LRU PART NUMBER: 5623102150

SUBSYSTEM: GEE  
EFFECTIVITY: All Orbiters

FAILURE MODE NUMBER MFR-RMS-01	CRITICALITY 2/1R	FAILURE EFFECT	RETENTION RATIONALE
<b>FUNCTION</b> Provides adjustable safety tether between the RMS end effector and MFR.		<b>END ITEM</b> Tether function is lost.	d. Monitoring of acceptance and certification test  <u>Turnaround</u> a. Complete PIA inspection according to PSJB/PA 05001  4. <u>Failure History</u> None.  5. <u>Operational Use</u> a. <u>Operational Effect of Failure</u> Worst case this failure would allow the crewmember to become separated from the Orbiter. The EVA task would be stopped temporarily. Over all time of EVA may be increased. b. <u>Crew Action</u> : The remaining crew in the Orbiter would be required to maneuver the Orbiter over to the free-floating crewmember for rescue. At this point the crewmember could tether to the Orbiter using the waist tether. c. <u>Crew Training</u> : None. d. <u>Mission Constraints</u> : EVA tasks and hardware will be designed so that positive crewmember restraint aids will be provided at all work sites and EVA translation paths. e. <u>In-flight Checkout</u> : The EVA crewmember will inspect the EVA restraint hardware prior to use. This will minimize the effect of failures during EVA.
<b>FAILURE MODE AND CAUSE</b> Buckle pin, small EVA hook, or kevlar webbing/sticking break or small EVA hook latch fails open.  <b>CAUSE:</b> Defective material, contamination, or spring deformation.		<b>MISSION</b> Terminate MFR's EVA mission.	
<b>REUNDANCY SCREENS</b> A - Pass B - N/A C - Pass		<b>CREW/VEHICLE</b> Possible loss of crew/vehicle due to impact or loss of crew due to separation from Orbiter.	
<b>REMAINING PATHS</b> None  This is a standby redundant item		<b>INTERFACE</b> MFR will not be tethered to the RMS end effector.	
<b>MISSION PHASE</b> EVA	<b>TIME TO EFFECT</b> Immediate	<b>TIME TO CORRECT</b> N/A	