

CRITICAL ITEMS LIST

ASSY NOMENCLATURE: EVA WINCH

SYSTEM: 4.1, 4.2 AND 4.3

ASSY P/N: SED 33101570

SUBSYSTEM: 5.3

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FMEA		NAME, QTY & DRAWING REF DESIGNATION	CRITY	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	RATIONALE FOR ACCEPTANCE
REF	REV					
1C		EVA WINCH, (2) SED 33101570	2/1R	<p>Mode: Rope jams</p> <p>Cause: • Knots in rope • Contamination • Mechanical malfunction</p>	<p>1. Unable to cradle RMS or payload winch prevents closing payload bay doors.</p> <p>2. Unable to close payload bay doors.</p> <p>Redundancy</p> <p>1. RMS jettison system.</p> <p>2. Second EVA winch</p>	<p>1. Design Features to Minimize Failure Mode.</p> <p>a. Rope guide rollers are provided to prevent knotting or tangling; also prevents fraying</p> <p>b. Megalon spring provided to keep low force tension on rope to prevent knotting and tangling</p> <p>c. Side of spool tapered to minimize rope bunching on sides of spool</p> <p>d. Larger than required diameter Kevlar rope selected to minimize knotting and for ease in handling</p> <p>e. Safety factor of 1.4</p> <p>2. Test or Analysis to Detect Failure Mode.</p> <p><u>Acceptance</u></p> <p>Functional Test -- Complete functional testing to assure that the controls operate smoothly and that the rope can be extended and retracted.</p> <p><u>Certification</u></p> <p>a. Qualification test consists of: working load test with 200 lb. and 600 lb. static loads, verification of smooth operation with static loads applied, verification that a max force (during one hand operation) of approximately 50 lbs. is exerted during ratcheting with the crank grip in the 90° position.</p> <p>b. Stress analysis to certify this tool for 584 lb. working load with 1.4 safety factor.</p> <p>c. Thermal qualification testing to certify this tool for a temperature environment of -200°F to +350°F for 160 hours.</p> <p><u>Turnaround</u></p> <p>a. Complete functional testing to assure that the controls operate smoothly and that the rope can be extended and retracted once a year, or anytime winch is used in flight</p> <p>b. Replace Kevlar rope after each mission use</p> <p>c. Inspect Kevlar rope for fraying or other damage once a year</p>

PREPARED BY: P. F. Hoopes

DATE: 03/01/88

APPROVED BY: J. D. Bink

DATE: 02/20/88

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FMEA		NAME, QTY & DRAWING REF DESIGNATION	CNTY	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	RATIONALE FOR ACCEPTANCE
REF	REV					
3C		EVA WINCH, (2) SED 33101570 (Continued)	2/1R	<p>Mode: Rope jams</p> <p>Cause: • Knots in rope • Contamination • Mechanical malfunction</p> <p>Redundancy -</p> <p>1. RMS jettison system.</p> <p>2. Second EVA winch.</p>	<p>1. Unable to cradle RMS or payload which prevents closing payload bay doors</p> <p>2. Unable to close payload bay doors.</p>	<p>3. Inspection.</p> <p><u>Manufacturing</u> (Completed)</p> <p>a. Verify as-built configuration</p> <p>b. Verify cleanliness according to drawing requirements.</p> <p>c. Verify spring tensions according to drawing requirements</p> <p><u>Turnaround</u></p> <p>a. Verify rope is knot and tangle free.</p> <p>b. Inspect for surface contamination, and clean according to PS28/PIA-05001</p> <p>c. Verify completion of functional test for acceptance.</p> <p>4. Failure History.</p> <p>H0004 - A deterioration of the control handle positioning springs that correctly position the spool pawl. New springs and spring guides have been fabricated and installed on all winch assemblies, with the exception of S/N 1001, the qualification unit. All units fitted with the new spring guide assemblies were functionally tested by reeling out 5 feet of rope, reeling in by automatic reel in and ratchet handle, and verify ratchet-out feature. Reference TPS 26220018</p> <p>H0007, H0008 - During thermal testing at the -200°F cold functional test, the ratchet control lever would not move into its detents, the rope could not be reeled out, and the crank grip would not unstow. All units were relubricated with Dow Corning molykote 32TR and functionally tested successfully (TPS 57820012)</p> <p>5. Operational Use.</p> <p>a. <u>Operational Effect of Failure</u>. The winch cannot be used if the rope jams</p> <p>b. <u>Crew Action</u>. The PRD can be used to close the PLBD and cradle the RMS in combination with the RMS rope reel and/or wrist/waist tethers</p> <p>d. <u>Mission Constraints</u>. None identified</p> <p>e. <u>In-flight Checkout</u>. No in-flight check out of the winch will take place before its used during EVA</p>

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