

12/24/91 SUPERSEDES 01/02/90

ANALYST:

| NAME P/N QTY | CRIT | FAILURE MODE & CAUSES | FAILURE EFFECT | RATIONALE FOR ACCEPTANCE |
|--|------|--|--|---|
| FAN/SEPARATOR/ PUMP/MOTOR ASSEMBLY, ITEM 123 ----- SV787994-B (1) | 2/1R | 125FM10: Motor stops or drops in speed. CAUSE: Excessive bearing wear or contamination resulting in increased bearing drag or seizure; electrical short or open in the winding; electronic failure; binding. | END ITEM: The motor electronics incorporate an underspeed cutoff which will eliminate power to the motor windings if the speed drops below a predetermined limit (See Note 1 under remarks). GFE INTERFACE: Reduction or loss of CO2 and moisture removal capability. Increase in suit temperature, humidity, and CO2 level. Possible sublimator (Item 160) freezing. MISSION: Termination of EVA. CREW/VEHICLE: None for single failure. Possible loss of crew with loss of SDP. | A. Design - The bearings are changed after 750 hours of operation due to limitations of the grease. An underspeed/stall detector monitors the 123 tachometer signal and shuts off the motor by removing both the motor winding power and control logic drive signals when speed is below trip point. The wires are embedded in epoxy to prevent damage. Semiconductor failure is minimized through the use of high reliability components. Established reliability capacitors (level S) and resistors (level R) are used and are qualified to the requirements of their respective MIL specs and thermal shocked per conditions B of MIL-STD-202 Method 107. The transistors and diodes are qualified to the requirements of MIL-S-19500 and receive the burn-in of JAN78V level parts per the applicable methods, 1058, 1059, 1060 of MIL-STD-750. The electronic components are operating within the power derating requirements of SWHS7804. The printed circuit boards are fiberglass/epoxy per MIL-P-13949 Type GF or polyimide per MIL-P-13949 Type G1 and manufactured per NSFC-STD-154. Parts mounting and soldering is per NSFC-STD-136 and MHS300.6 (3A-1). The board assemblies are hard mounted to the case to provide a thermal transfer path between the board heatinks and the case to direct heat away from the electronic components. The board assemblies are also conformal coated per MIL-A-46146 Dow Corning RTV 9840 for environmental protection. All wiring used in the motor is M22759/11 (tether insulated). Soldering is per MHS300.4 (3A-1) and wire crimping is per SWHS 4909 (based on MSC SPEC 0 1A). All wires are strain relieved. Electrical connectors are environmentally sealed to prevent damage due to contamination and humidity. The Hall sensors are hermetically sealed to prevent damage due to contamination, humidity and pressure fluctuations. B. Test - Component Acceptance Test - Motor RPM is calibrated and verified during assembly (SV787993 level). The item is performance tested in the EVA and IVA modes. For the various set conditions in the FVB mode, the motor current shall be 2.6 amps max. For the various set conditions in the IVA mode, the motor current shall be 4.7 amps max. The item is tested for max current draw during start up. The max start up current shall be 6 amps within |

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| | 2/1A | 125FM10: | | <p>the first five seconds of start up. The item is then subjected to a burn in cycle test where it must operate for 24 hours. It is cycled 3 times at 3 hours IVA and 5 hours EVA conditions. RPM is monitored during the test.</p> <p>PDA Test - The item is performance tested in the IVA mode and the PRESS mode. For the various set conditions in the IVA mode the motor current shall be 4.5 amps max and in the PRESS mode conditions, 4.7 amps maximum. RPM is monitored during the test.</p> <p>Certification Test - The item completed 30,000 hours of operation and 8400 on/off cycles exceeding the 15 year certification requirement by more than a factor of three. The 15 year structural vibration, electrical vibration and design shock was completed 12/84. The following engineering changes have been incorporated and certified since this configuration was certified: 42804-342-35 (change power consumption requirement - more amps), 42805-406 (incorporate Nitronic 50 retaining nut), 42806-424 (seal cup change to assure a good weld), 42806-518 (Water pump changes 10% inspection in areas susceptible to contamination, remove break edges and deburring operation to class 80R J-EMU-123-810), 42806-934 (change Bearing limited life requirements).</p> <p>c. inspection - Stall speed is adjusted at electronics build using a fixed resistor in the R133 position on inner board assembly (3077PBB4). An HSO and gov't NIP exists to verify proper resistance value is chosen based on testing performed to determine the resistance required to facilitate a stall speed of 15,000 +/- 10% RPM. A test is performed to verify proper functioning of the shutdown logic and relay (KC 382) drive transistor. Stall speed is verified just after boards are wired together (first performance) just after boards are stacked on housing (second performance) just after electronics cover is assembled (third performance) and at final performance test after all assembly and testing (including vibration) are completed.</p> |

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