

## CRITICAL ITEMS LIST

REFERENCE DESIGNATOR: D1 AND D2  
 NAME / QUANTITY: DIODES / 2  
 DRAWING REFERENCE: JANTKV1N5811

PROJECT: C&W CONTINGENCY POWER CABLES  
 LRU NAME / QUANTITY: C&W CONTINGENCY POWER CABLES / 2  
 LRU PART NUMBER: 528-20316

SUBSYSTEM: N/A  
 EFFECTIVITY: All Orbiters

IFM BOX - 31

FAILURE MODE NUMBER 32	CRITICALITY 3/1RB	FAILURE EFFECT	RETENTION RATIONALE
<b>FUNCTION</b> D1 and D2 isolate Orbiter essential bus from IFM breakout box (worst case occurs in failure scenario 1)		<b>END ITEM</b> Loss of redundant power to C&W system if both diodes D1 and D2 fail open	A. DESIGN - The diode design uses axial lead, has a hermetically sealed case, and is metallurgically bonded. The part is designed to meet the requirements of military standard MIL-S-19500/477. The application of the part is analyzed to ensure compliance to the 25 percent derating criteria of the Orbiter project. The current load when powering the C&W system is a nominal .7 A.  B. TESTS - <u>Manufacturing</u> Tests and inspections performed on the entire product check the room temperature parameters, high temperature parameters (100 °C), low temperature parameters (-65 °C), acceleration (20,000 G), hermetic seal (fine and gross), and burn-in (150 °C, 96 hr). An internal visual inspection is also done. Tests and inspections performed on a sample from each lot are done to check solderability,
<b>FAILURE MODE AND CAUSE</b> (B) Mode: Diode D1 or D2 fails open Cause: • Manufacturing defect • Overstress		<b>MISSION</b> None	
<b>REDUNDANCY SCREENS</b> A - Pass B - Fail C - Pass	<b>REMAINING PATHS</b> Use other C&W contingency power cable	<b>CREW / VEHICLE</b> Loss of both D1 and D2 followed by failure of Orbiter main A bus (loss of dc utility outlet and IFM breakout box) would create a time-critical fuel cell emergency due to loss of fuel cell coolant pump	
<b>MISSION PHASE</b> Orbit	<b>TIME TO EFFECT</b> Minutes	<b>INTERFACE</b> See "End Item" and "Crew/Vehicle"	
	<b>TIME TO CORRECT</b> Immediate		

## CRITICAL ITEMS LIST

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REFERENCE DESIGNATOR: D1 AND D2  
 NAME/QUANTITY: DIODES/2  
 DRAWING REFERENCE: JANIXV1N5B11

PROJECT: C&W CONTINGENCY POWER CABLES  
 LRU NAME/QUANTITY: C&W CONTINGENCY POWER CABLES/2  
 LRU PART NUMBER: 52B-20216

SUBSYSTEM: N/A  
 EFFECTIVITY: All Orbiters

## RETENTION RATIONALE (Continued)

resistance to solvents, thermal cycling (100 to 10 °C), hermetic seal (fine and gross), operational life (25 °C, 340 hr), destructive physical analysis, thermal resistance, junction temperature rise, high temperature life (nonoperating), and final electrical function. Tests and inspections done on a periodic basis for qualification check physical dimensions, thermal shock (200 to -65 °C), terminal strength, hermetic seal (fine and gross), moisture resistance, shock, vibration, acceleration, salt atmosphere, operational life, and final electrical function. An external visual inspection is also performed.

Acceptance

Each diode pair is load tested at 4 A. Each diode is tested for continuity prior to installation. The entire cable assembly is tested for continuity.

- C. **INSPECTION** – The part is inspected according to the requirements of military standard MIL-S-19500/477 which includes visual inspections, burn-in, and screening tests as described in item B. In addition, the device manufacturer is required to prepare and maintain a product assurance program that shall ensure that the design, processing assembly, inspection, and testing of semiconductor devices are adequately controlled and comply with the requirements of military standard MIL-S-19500, appendix D. The manufacturer will maintain adequate documentation control to provide assurance in areas of documentation changes and approval authority and will define responsibility to evaluate quality problems and to provide solutions. The controls defined and documented must control, at a minimum, areas of personnel training; inspection of incoming materials, utilities, and work in progress; quality operations; design, processing, manufacturing, equipment, and materials documentation; design material, process change control, test equipment maintenance, and calibration procedures; failure and defect analysis and evaluation; and inventory control. These controls are periodically audited and evaluated by the appropriate Government purchasing agency (Defense Electronic Supply Center).
- D. **FAILURE HISTORY** – There has been one documented issue of this diode type in the history of the Orbiter program. This was documented on the ALERT YA-A-84-01. The ALERT warns of slow recovery time (4 to 15 ns slower) that would be an issue only in high speed switching applications. In this caution and warning systems contingency power cable application, proper operation of the system would not be affected. The diode is applied as a blocking/isolation diode, and the marginally slower recovery time is not an issue.
- E. **OPERATIONAL USE** – The second failure, loss of the Orbiter essential bus, would be detected by the ground except during LOS. There would be 5 to 10 min (9 min nominal) available to shut down the affected fuel cell.

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REVISION: Basic

SUPERSEDING DATE: 8/91

DATE: 2/92