Critical Item: Resistor, Fixed, Main Hoist (2 Total, 1/Crane)

Find Number: 1RR7

Criticality Category: 2

SAA No:	09FY12-005	**System/Area:**	250-Ton Bridge Crane (#1 & #2)/VAB
NASA Part No:	NA	**PMN/ Name:**	K60-0533, K60-0534/ 250-Ton Bridge Crane (#1 & #2)/VAB
Mfg/ Part No:	DIGI-KEY/ P 56KW-2	**Drawing/ Sheet No:**	69-K-L-11398/ 15

Function: Provides a voltage divider for the input from the float potentiometer, F POT, to the generator field DC input controller, 1FC, to allow for main hoist operation in the float mode.

Critical Failure Mode/Failure Mode No: Fails open/09FY12-005.073

Failure Cause: Contamination, corrosion, fatigue

Failure Effect: No generator field DC input controller excitation voltage in the float mode of operation. No generator field winding voltage. No output from the generator. No hoist motor torque when the command is given to float the load while the brakes are released, via the brake switch. The load will descend with regenerative braking at 0.25 ft/min (0.05 in/sec) max (based on maximum load capacity of the hoist, in reality this would descend slower). The worst case would be attempting to float a critical load (SRB segment, Orbiter, or ET) from the stop position, releasing the brakes, the failure occurring, and the effect being the critical load descending and striking the VAB floor, transporter, work platforms, MLP, or Shuttle Stack resulting in possible damage to a vehicle system. Time to effect: seconds.

ACCEPTANCE RATIONALE

Design:

- 56000 Ohm Resistor
- 5% Metal Oxide Film Resistor
- Resistance tolerance: +/- 5%
- Meets overload tests in accordance with UL (Underwriters Laboratories) specification #1412 without producing a fire hazard.

- Withstands solvents in accordance with Mil-Std-202E without producing mechanical or electrical damage.
- Temperature coefficient: +/- 100 PPM/°C typ., +/- 200 PPM/°C max.
- Maximum working voltage: 350 volts
- Actual working voltage: 6 volts
- Rated power: 2 watts
- Actual power: 0.00064 watts

Test:

- OMRSD file VI requires verification of proper performance of hoist operational test annually.
- OMI Q3005, Operating Instructions, requires all crane systems be operated briefly in all speeds to verify satisfactory operation before lifting operations.
- OMI Q3008, Pre-Operation Setup Instructions, requires current limit checks prior to all major lifts of flight hardware (verifies motor, generator, generator field DC input controller float control loop and DC power loop components are operational).

Inspection:

- OMI Q6003, Maintenance Instructions, requires annual inspection of resistors for deterioration/discoloration caused by corrosion or overheating.

Failure History:

- The PRACA database was researched and no failure data was found on this component in the critical failure mode.
- The GIDEP failure data interchange system was researched and no failure data was found on this component in the critical failure mode.

Operational Use:

- Correcting Action:
  1) The failure can be recognized via the ammeter (lack of current) and the Selsyn (positions change) that is in view of both operators.
  2) When the failure indication is noticed, the operator can stop all crane operations by pressing the E-Stop button or releasing the brake switch.
  3) Operators are trained and certified to operate these cranes and know and understand what to do if a failure indication is present.
  4) During all critical lifts, there is at least one remote Emergency Stop (E-Stop) operator observing the load lift, and can stop the crane if a failure indication is noticed.
  5) Operationally, the crane must be operated in the fine or float speed mode if a critical load is within 10 feet of any structure in the direction of travel.

6) During final SRB mate, all crane operations are ceased and final mate is accomplished by use of the 250-Ton Hydra-Set.

- Timeframe:
  - Estimated operator reaction time is 3 to 10 seconds.