

MAR 11 1994

B/L: 389.00

SYS: 250-TON

BRIDGE

CRANE, VAB

Critical Item: Potentiometer, Main Hoist (2 Total, 1/Crane)**Find Number:** RPOT**Criticality Category:** 1

SAA No:	09FY12-005	System/Area:	250-Ton Bridge Crane (#1 & #2)/VAB
NASA Part No:	NA	PMN/ Name:	K60-0533, K80-0534/ 250-Ton Bridge Crane (#1 & #2)/VAB
Mfg/ Part No:	Ohmite/ RHS750	Drawing/ Sheet No:	69-K-L-11388/ 15

Function: Reference potentiometer connected to the master control switch, 1MC, (joystick) to control the input excitation voltage to the generator field DC input controller, 1FC, and the resulting output to the generator field winding for main hoist speed control during raising or lowering operations.

Critical Failure Mode/Failure Mode No: Fails open/09FY12-005.022

Failure Cause: Corrosion, fatigue

Failure Effect: If the failure occurs on the resistive element, it would result in a loss of the parallel resistance branch which will create a larger input into the generator field DC input controller which will cause an increasing speed of the DC motors controlling the main hoist. The worst case scenario would be lowering a critical load (SRB segment, Orbiter, or ET) in the slow coarse speed mode (maximum coarse speed is 10 ft/min), the failure occurring, causing a sudden increase to full coarse speed and the effect being the critical load descending and striking the VAB floor, transporter, work platforms, MLP, or Shuttle Stack resulting in a potential loss of life and/or vehicle, or damage to a vehicle system. Time to effect: seconds. (Criticality category 1 effect)

OR

If the failure occurs on the wiper arm it would result in no generator field DC input controller excitation voltage and the resulting output to the generator field winding. No output from generator. No hoist motor torque while the command is being given, via the Master Control Switch to raise or lower and the brakes are released. 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 lift 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. (Criticality category 2 effect)

ACCEPTANCE RATIONALE

Design:

<u>Rated Power</u> 25 watts	<u>Actual Power</u> .18 watts
<u>Rated Voltage</u> 300 volts	<u>Actual Voltage</u> 12 volts
<u>Rated Current</u> .176 amps	<u>Actual Current</u> .015 amps

- Material:
 - Body: Ceramic
 - Windings: High grade resistance alloy
 - Coating: Vitreous enamel
 - Contact Arm: Metal graphite composition
 - Terminals: Solder coated
- Resistance tolerance: +/- 10 %

Test:

- OMRSD file VI requires verification of proper performance of hoist operational test annually.
- OMI Q3008, Operating Instructions, requires all crane systems be operated briefly in all speeds to verify satisfactory operation before lifting operations.

Inspection:

- This item is not readily accessible for inspection. OMI Q6003, Maintenance Instructions, instructs that inspections shall not entail disassembly of equipment.

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.

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Operational Use:

• **Correcting Action:**

- 1) The failure can be recognized via the ammeter (lack or increase 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 returning the Master Control Switch to neutral.
- 3) When the high output failure occurs in the fine speed mode of operation, the motor generator set will be shut down by an overvoltage protection relay when the voltage in the DC motor loop reaches 115% of the full fine voltage output.
- 4) Operators are trained and certified to operate these cranes and know and understand what to do if a failure indication is present.
- 5) 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.
- 6) 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.
- 7) 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.