

SAA09FY12-006
REV. BB/L: 389.00
SYS: 175-TON
BRIDGE
CRANE, VABCritical Item: Potentiometer, Main Hoist
Find Number: FPOT
Criticality Category: 2

AUG 20 1993

SAA No:	09FY12-006	System/Area:	175-Ton Bridge Crane/VAB
NASA Part No:	NA	PMN/ Name:	K60-0528/ 175-Ton Bridge Crane/VAB
Mfg/ Part No:	Ohmite/ RHS750	Drawing/ Sheet No:	67-K-L-11348/ 15

Function: Controls the input excitation voltage to the generator field DC input controller, 1FC, and the resulting output to the generator field winding for main hoist control during float operations.

Critical Failure Mode/Failure Mode No: Fails open/09FY12-006.025

Failure Cause: Corrosion, fatigue

Failure Effect: 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 to float 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 float an External Tank (ET) or the aft end of the orbiter from the stop position, releasing the brakes, the failure occurring, and the effect being the ET or the aft end of the orbiter descending and striking the VAB floor or transporter, resulting in possible damage to a vehicle system. Time to effect: seconds.

OR

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 input to the DC motors controlling the main hoist. The worst case would be floating an External Tank (ET) or the aft end of the orbiter (near zero vertical speed), the failure occurring, causing an inadvertent movement of the load and the effect being the ET or the aft end of the orbiter descending and striking the VAB floor or transporter, resulting in possible damage to a vehicle system. Time to effect: seconds.

Attachment
S0502348L
Sheet 34 of 132

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ACCEPTANCE RATIONALE

Design:

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

- 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 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 releasing the brake switch or pressing the E-Stop button.
- 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 Emergency Stop (E-Stop) operator remote from the operator's cab observing the load lift, and can stop the crane if a failure indication is noticed.

• **Timeframe:**

- Estimated operator reaction time is 3 to 10 seconds.