

SAA09FY12-006
REV. 8B/L: 389.00
SYS: 175-TON
BRIDGE
CRANE, VAB
AUG 20 1993Critical Item: Relay, Main Hoist
Find Number: 1VR
Criticality Category: 2

SAA No:	D9FY12-006	System/Area:	175-Ton Bridge Crane/VAB
NASA Part No:	NA	PMN/ Name:	K60-0525/ 175-Ton Bridge Crane/VAB
Mfg/ Part No:	General Electric/ 1C2530 A1D0 AB2E	Drawing/ Sheet No:	67-K-L-11348/ 13, 15

Function: Monitors voltage in the main hoist motor loop and provides latching to keep relays THCR or 1LCR energized after master control switch, 1MC, is returned to neutral position. This prevents the brakes from setting while voltage in the motor loop is above a predetermined limit.

Critical Failure Mode/Failure Mode No: N.O. contact fails closed/09FY12-006.033

Failure Cause: Welded contact, binding mechanism

Failure Effect: Brake relays will remain energized and the brakes will not set when main hoist motors are commanded to stop via the Master Control 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 bring an External Tank (ET) or the aft end of the orbiter to a stop while hoisting or lowering, 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.

ACCEPTANCE RATIONALE

Design:

<u>Rating</u>	<u>Actual</u>
600 volts	120 volts
10 amps	Testing required

- Contact Material: Silver Cadmium Oxide, Self-cleaning.
- This relay was off-the-shelf hardware selected by the crane manufacturer for this application.

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:

- OMI Q5003, Maintenance Instructions, requires annual inspection of contacts and contact members for burning, pitting, proper alignment, and discoloration caused by overheating; visual check of closing coils for deteriorated insulation and evidence of overheating or burning.

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 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.
- 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.

• **Timeframes:**

- Estimated operator reaction time is 3 to 10 seconds.