

SAA09FY12-006
REV. BB/L: 389.00
SYS: 175-TON
BRIDGE
CRANE, VAB

AUG 20 1993

Critical Item: Relay, Main Hoist
 Find Number: 1XR
 Criticality Category: 2

SAA No:	09FY12-006	System/Area:	175-Ton Bridge Crane/VAB
NASA		PMN/	K60-0528/
Part No:	NA	Name:	175-Ton Bridge Crane/VAB
Mfg/	General Electric/	Drawing/	67-K-L-11348/
Part No:	CR120AC4002AA	Sheet No:	13

Function: N.O. contacts close to energize the brake relays, 1BR and 1BR1, when the main hoist controller is moved to release the brakes in normal operation.

Critical Failure Mode/Failure Mode No: N.O. contact fail closed/09FY12-006.016

Failure Cause: Welded contact, binding mechanism

Failure Effect: Brake relays will remain energized. Brakes will not set when main hoist motors are commanded, via the Master Control Switch to stop. 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 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>Contact Ratings</u>	<u>Actual</u>
300 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 brake set light or 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.
- Timeframe:
 - Estimated operator reaction time is 3 to 10 seconds.