

MAR 11 1994

B/L: 389.00
SYS: 250-TON
BRIDGE
CRANE, VAB

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

Find Number: 1VR

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:** General Electric/
1C2820 A1D0 AB2E

**Drawing/
Sheet No:** 69-K-L-11388/
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Function: Monitors voltage in the main hoist motor loop and provides latching to keep relays 1HCR 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 fail closed/09FY12-005.033

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 a critical load (SRB segment, Orbiter, or ET) to a stop while hoisting or lowering, 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:

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

- Contact Material: Silver Cadmium Oxide, Self-cleaning.

Attachment
S050234CK
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- 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 Q6003, 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 ammeter (lack of current) and the Selsyn (positions change) or the failure of the brake set light to illuminate that are 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 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.