SAA09FY12-006
REV. B

B/L: 389.00
SYS: 175-TON
BRIDGE
CRANE, VAB

AUG 2 0 1993

Critical Item: Relay, Main Hoist

Find Number: 1RUN

Criticality Category: 2

SAA No:	09FY12-006	**System/Area:**	175-Ton Bridge Crane/VAB
NASA Part No:	NA	**PMN/ Name:**	K50-0528/ 175-Ton Bridge Crane/VAB
Mfg/ Part No:	Westinghouse/ Type: M-011 Style: 493A571G01	**Drawing/ Sheet No:**	67-K-L-11348/ 13, 15

Function: Energizes to allow input current from the generator field DC input controller to the generator field winding to move the DC drive motors.

Critical Failure Mode/Failure Mode No:

a. 'Pull In' coil fails open/09FY12-006.018

b. N.O. contact fails open OR N.C. contact fails closed/09FY12-006.019

Failure Cause:

a. Corrosion, fatigue

b. Corrosion, binding mechanism

Failure Effect: (For both failures) Generator field winding will not be energized. No output from the generator. No hoist motor torque while the command is being given to raise, lower or float the load 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 or 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.

ACCEPTANCE RATIONALE

Design:

Contact Ratings	Actual
600 volts	109 volts max
150 amps	Testing required
Coil Ratings	Actual
600 volts	120 volts

- Contact material: silver.
- Coil can withstand 110% of rated voltage without burnout.
- 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 Q3006, 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 relay 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 returning the Master Control Switch to neutral 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.