

MAR 11 1994

B/L: 389.00

SYS: 250-TON

BRIDGE

CRANE, VAB

**Critical Item:** Switch, Master Control, Main Hoist (2 Total, 1/Crane)  
**Find Number:** 1MC  
**Criticality Category:** 2

<b>SAA No:</b> 09FY12-005	<b>System/Area:</b> 250-Ton Bridge Crane (#1 & #2)/VAB
<b>NASA Part No:</b> NA	<b>PMN/ Name:</b> K60-0533, K60-0534/ 250-Ton Bridge Crane (#1 & #2)/VAB
<b>Mfg/ Part No:</b> General Electric/ 1C3012-K-620-D6	<b>Drawing/ Sheet No:</b> 69-K-L-11388/ 13

**Function:** A "joystick" connected to mechanical contacts and reference potentiometer (RPOT), to provide the operator control of the main hoist for raising or lowering the load and releasing the brakes by energizing the hoist control or lower control relays in the normal mode of operation.

**Critical Failure Mode/Failure Mode No:** N.O. contact fails closed/09FY12-005.005

**Failure Cause:** Welded contact, binding mechanism

**Failure Effect:** Brakes will not set when master control lever is returned to neutral position (no motor armature current). 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:

- Double-break silver alloy contacts.
- Phenolic cams impregnated with graphite for self-lubrication to allow for millions of operations without significant wear.
- This switch was off-the-shelf hardware selected by the crane manufacturer for this application.

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**Test:**

- OMRSD File VI requires verification of proper performance of hoist operational test annually.
- OMI Q3008, Operating Instructions, requires all crane systems to be operated briefly in all speeds to verify satisfactory operation before lifting operations.

**Inspection:**

- OMI Q6003 Maintenance Instructions, requires annual inspection of switch contacts and contact members for burning, pitting, proper alignment, and discoloration caused by overheating.

**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 Salsyn (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.

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