

MAR 11 1994

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

Critical Item: Motor - Main Hoist (4 total, 2/Crane)
Find Number: M13, M14 (1 ea/Crane)
Criticality Category: 1

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: Imperial Electric/ Type DV Form C	Drawing/ Sheet No: 69-K-L-11388/ 15

Function: Two 150 HP shunt wound DC motors with the armatures arranged in series to provide mechanical torque to raise, lower or float the load. The field windings, F1-F2 & F3-F4, provide a constant magnetic field to work against the varying magnetic field of the armature loop to produce torque.

Critical Failure Mode/Failure Mode No: Open armature winding/09FY12-005.032

Failure Cause: Brush/commutator failure, open/shorted armature winding, structural failure (brush spring, brush yoke, brush rigging), open/shorted cable or connector.

Failure Effect: Loss of armature DC current to both motors. Loss of main hoist motor torque while the command is given to raise, lower or float load and the brakes are released. The load will drop without regenerative braking. The worst case would be a critical load (SRB segment, Orbiter, or ET) being hoisted, lowered, or floated, 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 a potential loss of life and/or vehicle, or damage to a vehicle system. Time to effect: seconds.

ACCEPTANCE RATIONALE

Design:

- 150 HP
- 240 VDC (2 motors arranged in series with the 480 VDC generator)
- 340 A
- 500-1500 RPM
- Field and armature arranged in shunt configuration.

- This was designed for crane use and 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 to be operated briefly in all speeds to verify satisfactory operation before lifting operations.
- OMI Q3008, Pre-Operation Setup Instructions, requires current limit checks prior to all major lifts of flight hardware (verifies motor, generator, generator field DC input controller, float control loop and DC power loop components are operational).

Inspection:

- OMI Q3008, Pre-Operation Setup Instructions, require visual and audible check of commutators on hoist drive motors for proper operation and condition.
- OMI Q6003, Maintenance Instructions, requires semi-annual inspection of brushes on main hoist drive motors for freedom of movement, wear, clearance, security and cleanliness.
- OMI Q6003, Maintenance Instructions, requires semi-annual inspection of main hoist drive motors for acceptable condition or damage.
- OMI Q6003, Maintenance Instructions, requires semi-annual inspection of armature loop insulation resistance at each motor.

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) 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 remote Emergency Stop (E-Stop) operator observing the load lift and can stop the crane if a failure indication is noticed.
- 5) During final SRB mate, all crane operations are ceased and final mate is accomplished by use of the 250-Ton Hydra-Set.

MAR 11 1994

- Timeframe:
 - Estimated operator reaction time is 3 to 10 seconds.