

## D0527

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Polar Crane Inspection			

## 1.0 Purpose and Scope

- 1.1 This procedure provides instructions for lubrication and inspection of the Polar Crane(s).
- 1.2 This procedure satisfies Significant Event Report (SER) 85-002 Commitment regarding warm up time prior to use and preservice checks saved on anticipated operating modes.
- 1.3 This procedure satisfies Significant Event Report (SER) 81-45 Commitment regarding locking devices on safety related equipment.
- 1.4 This procedure satisfies in part the commitment made in the response to NRC Generic Letter 81-07.

## 2.0 Definitions

- 2.1 TIGHTEN: Term used in an approved procedure, instruction, vendor manual or drawing which indicate, unless specifically defined otherwise, that a fastener be adequately secured based on the crafts skill and expertise.
- 2.2 WORK CONTROL DOCUMENT (WCD): Any authorizing document described in the Work Process Program such as a Service Request or Preventative Maintenance activity.

## 3.0 Responsibilities

- 3.1 WHEN a blank ( ) follows a step, THEN the Performer SHALL enter a check mark ( ✓ ) in the blank when the step is completed. IF a conditional step is NOT required, THEN N/A SHALL be entered.
- 3.2 WHEN a signoff blank ( / ) follows a step, THEN ensure that the appropriate initials and date are placed in the blank upon step completion. IF a conditional step is NOT required, THEN N/A SHALL be entered.
- 3.3 The Performer SHALL record all discrepancies discovered during the performance of this procedure in the Remarks section.
- 3.4 Any additional performers, performing signoffs, SHALL be identified in the Additional Performers Section.

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#### 4.0 Prerequisites

4.1 Obtain the following tools/materials as required to perform the task specified on the WCD.

- Surface prep
- Wipes
- Assorted hand tools and small hammer
- Flashlight
- Safety belts
- Containers for fluids
- Funnel
- Inspection mirror
- Containers for parts and fasteners
- For lubricants, refer to MPL Lubrication Specification
- Ruler, 6 in.
- 6 in. dial caliper
- Assorted pressure grease fittings
- Lanyards, for tying off tools and parts

4.2 Record M&TE description, STPEGS I.D. No. and Calibration Due Date below:

Description: \_\_\_\_\_

STPEGS I.D. No.: \_\_\_\_\_

Calibration Due Date: \_\_\_\_\_

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- 4.3 Notify QC that Polar Crane inspection is being performed and a NDE needs to be performed on main and auxiliary hooks.
- 4.4 Notify Electricians for assistance in performing subsections 6.5 and 6.7 of this procedure.
- 4.5 Obtain working copies of the procedures needed to perform those tasks specified on the WCDs.
- 4.6 Work Control Document has been approved by Work Start Authority.

#### 5.0 Precautions and Notes

- 5.1 Place ALL controllers in "OFF" position.
- 5.2 After inspection, adjustments and or repairs have been made, the crane SHALL NOT be placed in service until ALL guards have been installed, safety devices reactivated, and maintenance equipment removed.
- 5.3 IF necessary to move or operate crane during inspection, THEN operator SHALL make ALL persons involved aware.
- 5.4 Ensure locking devices, where provided, are properly secured during reassembly. (SER 81-45)
- 5.5 Crane SHOULD be located in a position where the least amount of traffic is expected.
- 5.6 ALL tools and loose parts SHOULD be secured with lanyards.
- 5.7 Periodic inspections SHALL be performed by a designated person. The individual outer wires in the strands of wire rope that are visible and accessible, SHALL be inspected. Any deterioration resulting in appreciable loss of original strength, such as described in this procedure, SHALL be noted and determination SHALL be made as to whether further use of the wire rope would constitute a hazard.
- 5.8 In order to establish data such as a basis of judging the proper time for replacement, a continuing inspection record SHALL be maintained. This record SHALL cover points of deterioration listed.
- 5.9 Maintenance SHALL keep preventive maintenance inspection data sheets indicating conditions of wire ropes associated with the specific crane/hoist applications.

- 5.10 Steps in this procedure MAY be repeated, as required, by the Cognizant Supervisor.
- 5.11 This procedure SHALL be performed in accordance with conditions or Plant Operating Modes as specified on the WCD.
- 5.12 To ensure accountability and traceability of parts during maintenance, parts SHALL be labeled, tagged, or placed in labeled or marked containers at time of disassembly.
- 5.13 Additional work instructions for support craft will be addressed in the implementing Work Control Document.
- 5.14 Sections in this procedure MAY be performed in any sequence as directed by the Cognizant Supervisor except as noted in the body of the procedure.

## 6.0 Procedure

### 6.1 Preparation

#### 6.1.1 Record WCD Number:

WCD Number: \_\_\_\_\_

#### 6.1.2 Record Unit Number:

Unit Number: \_\_\_\_\_

### CAUTION

Ensure function and cleanliness of foot-walks, ladders and handrails prior to starting inspection.

### 6.2 Clean and inspect footwalks, ladders, and handrails. \_\_\_\_\_

### 6.3 Bridge lubrication and inspection: \_\_\_\_\_

#### 6.3.1 Allow proper warmup period of electrical components prior to operation. (SER 85-002) \_\_\_\_\_

#### 6.3.2 IF any abnormal conditions are found, THEN initiate a SR for repairs. \_\_\_\_\_

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NOTE

Ensure locking devices, where provided, are properly secured during reassembly.  
(SER 81-45)

CAUTION

Steps 6.3.3 through 6.3.18 SHALL be performed on each of the four bridge drive gearboxes.

- 6.3.3 Remove inspection cover from bridge drive unit gearcase. (Refer to Figure 1)

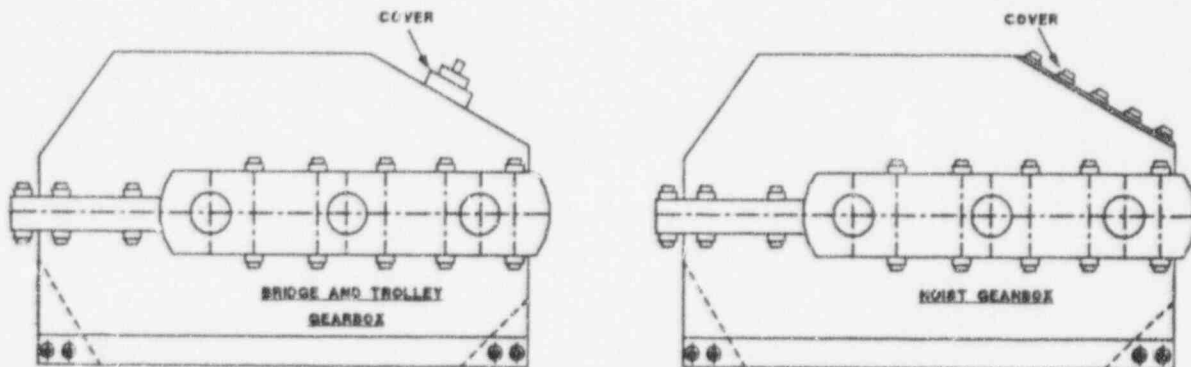


Figure 1

- 6.3.4 Place parts and fasteners in labeled or marked containers.

6.3.5 Visually inspect inside of gearcase for the following: \_\_\_\_\_

- a. Burrs on gears \_\_\_\_\_
- b. Chipped teeth \_\_\_\_\_
- c. Unusual wear \_\_\_\_\_
- d. Cleanliness \_\_\_\_\_
- e. Cracks \_\_\_\_\_

6.3.6 Visually inspect oil in gearcase for the following: \_\_\_\_\_

- a. Foreign material \_\_\_\_\_
- b. Cleanliness \_\_\_\_\_
- c. Metal slivers \_\_\_\_\_
- d. Proper level \_\_\_\_\_

6.3.6.1 IF required, THEN obtain oil sample. \_\_\_\_\_

6.3.6.2 Record results in Remarks section. \_\_\_\_\_

6.3.7 IF oil sample was taken and sample indicates oil needs changing or oil requires the FOUR YEAR changing, THEN perform the following:

6.3.7.1 Drain oil. \_\_\_\_\_

6.3.7.2 Flush reservoir with new oil. \_\_\_\_\_

### CAUTION

Do NOT overfill gearcase.

6.3.7.3 Add approved lubricant until proper level is observed. \_\_\_\_\_

- 6.3.8 Check condition of gearcase inspection cover gasket. \_\_\_\_\_
- 6.3.8.1 Replace gearcase inspection cover gasket, if necessary. \_\_\_\_\_
- 6.3.9 Install gearcase inspection cover with gasket, and tighten fasteners. \_\_\_\_\_
- 6.3.10 Check gearcase for signs of leakage. \_\_\_\_\_
- 6.3.11 Remove gearcase breather and clean. \_\_\_\_\_
- 6.3.12 Install gearcase breather. \_\_\_\_\_

NOTE

Coupling guards MAY have to be removed for accessibility.

- 6.3.13 Check coupling fasteners for tightness. \_\_\_\_\_



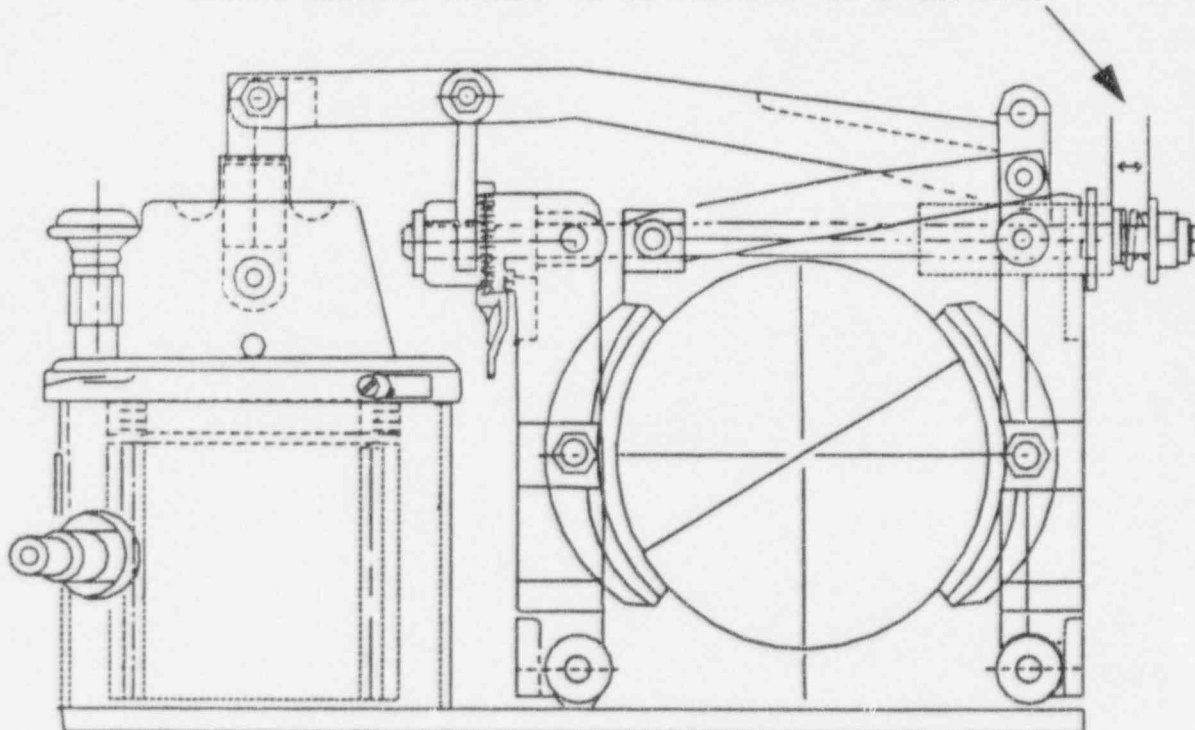
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**NOTE**

Brake covers MAY have to be removed for accessibility.

- 6.3.14 Apply a few drops of approved oil to motor brake linkage pivot points.  
(Refer to Figure 2)

**SPRING LENGTH VARIES TO OBTAIN SMOOTH EVEN STOP**



**BRIDGE AND TROLLEY BRAKE**

Figure 2

## Polar Crane Inspection

6.3.15 Check condition of brake pawl and ratchet wheel for the following:

- a. Cracks
- b. Battered or broken pawls on ratchet teeth
- c. Inoperative pawl shifter
- d. Broken or worn springs

NOTE

Brake shoes **SHOULD** be replaced when worn to 1/16 in. thickness at center of shoe. Riveted brake linings **SHOULD** be replaced before wearing down to rivet heads.

6.3.16 Check condition of brake shoes.

6.3.17 Ensure 1/32 in. to 1/16 in. clearance between brake shoes and drum.

6.3.18 IF necessary, THEN adjust brake. (Refer to Figure 2)

6.3.18.1 Remove adjusting lever.

6.3.18.2 Turn adjusting nut until desired clearance is obtained.

6.3.18.3 Install adjusting lever.

6.3.19 IF pressure grease fittings, pipe plugs are NOT correctly installed on each bridge wheel bearing, (inside and outside) THEN correct as necessary. Fittings **MAY** be left installed. **See Figure 3**

6.3.20 Pipe plug to be removed for lubrication, wheel jacked up to clear rail and rolled during lubrication. Reinstall pipe plug.

CAUTION

Do NOT over lubricate bearings, as this **MAY** cause excessive heating and wear.

6.3.21 Using approved grease, lubricate each bridge wheel inside and outside bearings. (Refer to Figure 3 for grease fitting location).

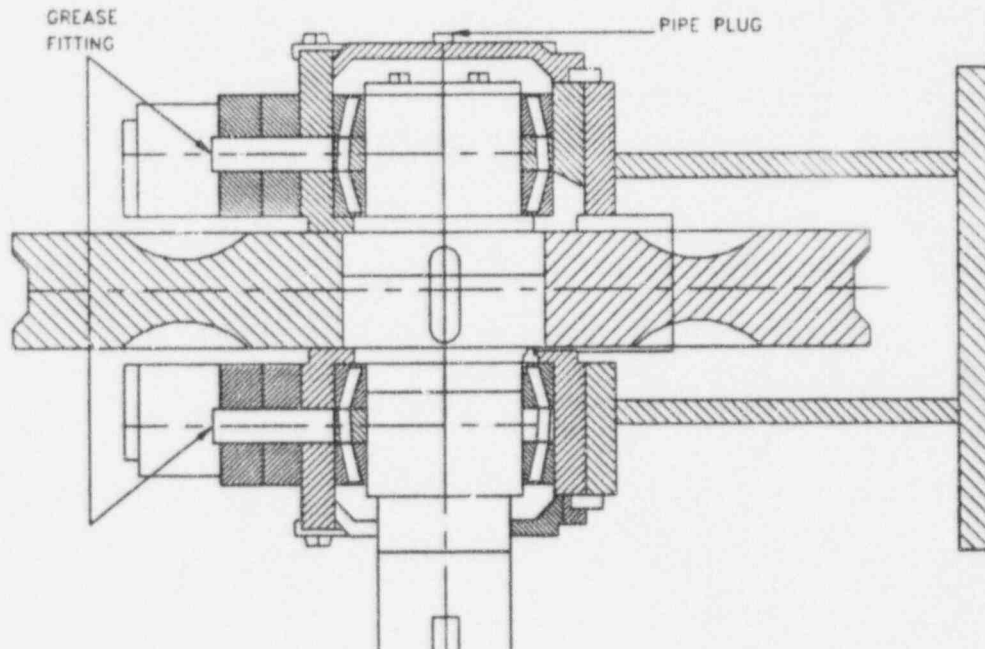
## Polar Crane Inspection

6.3.22 Check bridge truck wheels for the following:

6.3.22.1 Flange and tread wear (replace if flanges are visibly bent). \_\_\_\_\_

NOTE

IF wheel(s) need replacing, THEN never change only one, change in pairs.



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Figure 3

## Polar Crane Inspection

- 6.3.23 Apply approved grease to each bridge truck pin to bridge. —
- 6.3.24 Check fluid level of magnetic bridge brake solenoid. —
  - 6.3.24.1 Add approved hydraulic oil, if necessary. —
- 6.3.25 Check for cracks, deformed or corroded members in web, truck flanges, and truck webs. —
- 6.3.26 Ensure proper warning signs are posted and clearly visible. —
- 6.3.27 Using a small hammer, sound fasteners on crane runway rails and end truck connecting bolts for tightness. —
- 6.3.28 Check runway rails for cleanliness. —
- 6.3.29 Visually inspect all accessible welds for cracking. —
- 6.4 Trolley, main and auxiliary hoist lubrication and inspection:

NOTE

Trolley will have to be located on operators end of crane to perform the following substeps.

- 6.4.1 Perform substeps 6.3.3 through 6.3.21 on trolley drive unit. —
  - 6.4.1.1 Apply approved grease to trolley drive unit flanged bearings. (Refer to Addendum 1 for location.) —
- 6.4.2 Perform substeps 6.3.3 through 6.3.14 and 6.3.16 through 6.3.21 on main hoist unit. —
  - 6.4.2.1 Apply approved grease to each main hoist drum shaft bearing, (4 bearings). (Refer to Addendum 1, for locations) —
  - 6.4.2.2 Check upper sheaves for wear and breakage, lubricate periodically, at the discretion of the system engineer. —
  - 6.4.2.3 IF necessary, THEN apply approved lubricant, or equivalent, to open drum gears. (Refer to Addendum 1, for location) —

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- 6.4.3 Perform substeps 6.3.3 through 6.3.14 and 6.3.16 through 6.3.21 on auxiliary hoist unit. \_\_\_\_\_
- 6.4.3.1 Apply approved grease to auxiliary hoist drum shaft bearing (1 bearing). (Refer to Addendum 1, for location) \_\_\_\_\_
- 6.4.3.2 Apply approved grease to auxiliary hoist equalizer sheave assembly, if necessary. (Refer to Addendum 1 for locations) \_\_\_\_\_
- 6.4.4 IF pressure grease fittings are NOT already installed on trolley wheel bearings, THEN remove existing pipe plugs and install appropriate pressure grease fitting. Fittings MAY be left installed. ( Refer to figure 3 )

**CAUTION**

Do NOT over lubricate bearings, as this MAY cause excessive heating and wear.

- 6.4.5 Apply approved grease to inside and outside bearings of each trolley wheel, (8 wheels). \_\_\_\_\_
- 6.4.6 Check trolley wheels for wear on flanges and treads. \_\_\_\_\_
- 6.4.7 Apply approved grease to flanged bearing supports on trolley. (Refer to Addendum 1 for locations) \_\_\_\_\_
- 6.4.8 Check to see that hoisting cables are going into grooves on drum properly and when in full raised position, cable SHOULD remain in grooves. IF cable is too long, THEN it will run out of grooves or overlap. \_\_\_\_\_
- 6.4.9 Check hoist drum groove wear by visual inspection of rope laying on drum. Pay particular attention to the way rope lays on drum. \_\_\_\_\_
- 6.4.10 Check trolley rails and rail clips for cleanliness, tightness, excessive wear and alignment. \_\_\_\_\_

## Polar Crane Inspection

- 6.4.11 Check trolley stops and bumpers for abnormal conditions and alignment.

6.5 Operational inspection:

NOTE

After mechanical and electrical inspections are in progress and it has been determined that crane is in good operating condition, an operational test can be made. It is suggested that mechanic work in conjunction with electrician for this operational check.

- 6.5.1 Release clearance on power supply.
- 6.5.2 Ensure everyone is in clear before switches are thrown.
- 6.5.3 Ensure all controllers are in a neutral position.
- 6.5.4 Notify everyone concerned that crane is to be put back into operation.
- 6.5.5 Ensure warning devices function properly, as intended.

NOTES

- Polar crane hook lower limit switches need NOT be checked.
- WHEN hoist is lowered to it's maximum lower position, THEN there SHOULD be two wraps of cable at anchors unless hoist is equipped with a lower limit switch.

- 6.5.6 Ensure all limit switches are functioning.



NOTE

A short run of trolley SHALL be performed in Micro Drive mode to verify the function of micro drive.

- 6.5.7 Run trolley approximate length of bridge to ensure all speeds are functioning.
  - 6.5.7.1 Electrician can observe operation of components in panel and mechanic can watch operation of trolley.
  - 6.5.7.2 Pay particular attention to watch for vibration and excessive backlash in gears, and listen for noises that might be out of the ordinary.
- 6.5.8 Ensure trolley brake, is functioning and when controller is returned to neutral, that trolley decelerates and comes to a smooth stop.
- 6.5.9 Ensure trolley is tracking properly and wheels are NOT flanging.
- 6.5.10 Whenever possible, trolley SHOULD be moved near end stops to ensure trolley approaches end stops squarely.( Trolley limit switch trip points SHOULD be close enough to satisfy this inspection).

CAUTION

An insulating mat SHOULD be used for protection of electrician during this inspection.

- 6.5.11 Operate hoists, both auxiliary and main, one at a time.
  - 6.5.11.1 Electrician is to watch to see that all timers and contactors are functioning properly.
- 6.5.12 Check to see that brakes are functioning.

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6.5.13 Ensure all sheaves in upper sheave nest and block are turning.  
(All sheaves SHOULD rotate with exception of equalizer.)  
Equalizer MAY rotate a part of a turn to equalize load and level block.

6.5.14 Check to see that cables are NOT rubbing on trolley framework or on block housing.

6.5.15 Whenever possible, block SHOULD be raised and trolley placed at end stops to ensure hook clearance is maintained from collectors at runway conductor end.

6.6 Hoists lubrication and inspection:

ENP

6.6.1 Notify cranes and hoists system engineer or designee that inspection is to be performed.

\_\_\_\_\_  
Engineer Signature / Date / Time

NOTE

Both main and auxiliary blocks will need to be lowered near 68' elevation.

6.6.2 Coordinate with system engineer and check for evidence of improper lubrication. (SPR-920177)

6.6.3 Cranes and hoists system engineer or designee SHALL determine if wire ropes are to be replaced. (SPR-920177)

6.6.4 Notify QC to perform a NDE inspection on auxiliary hook.

6.6.5 Notify QC to perform a NDE inspection on main hook.

6.6.6 Measure O.D. of main hoist wire rope in three places, along the block, and record measurements taken.

\_\_\_\_\_  
Measurement #1      Measurement #2      Measurement #3



- 6.6.7 Measure O.D. of auxiliary hoist wire rope in three places, along the block , and record measurements taken. \_\_\_\_\_

Measurement #1	Measurement #2	Measurement #3
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- 6.6.8 Replace wire rope if diameter is reduced more than: \_\_\_\_\_

6.6.8.1 3/64 inch for rope diameters from 9/16 inch through 3/4 inch \_\_\_\_\_

6.6.8.2 3/32 inch for rope diameters from 1 1/4 inch through 1 1/2 inch \_\_\_\_\_

- 6.6.9 Check for twelve randomly distributed broken wires in one rope lay, or four broken wires in one strand in one rope lay. \_\_\_\_\_

- 6.6.10 Check in several places for outside wires worn 1/3 of their original diameter. \_\_\_\_\_

- 6.6.11 Check for corroded or broken wires at end connections. \_\_\_\_\_

- 6.6.12 Check for corroded, cracked, bent, worn or improperly applied end connections. \_\_\_\_\_

- 6.6.13 Check for kinking, crushing, cutting or unstranding. \_\_\_\_\_

NOTE

Cranes and hoist system engineer or designee SHALL determine if auxiliary and main hoist wire rope requires lubrication. (SPR-920177)

- 6.6.14 IF necessary, THEN apply approved lubricant, or equivalent to auxiliary and main hoist wire rope.

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- 6.6.15 Measure between prick punch marks on auxiliary hook, and record throat gage measurement taken. (Refer to Figure 4)

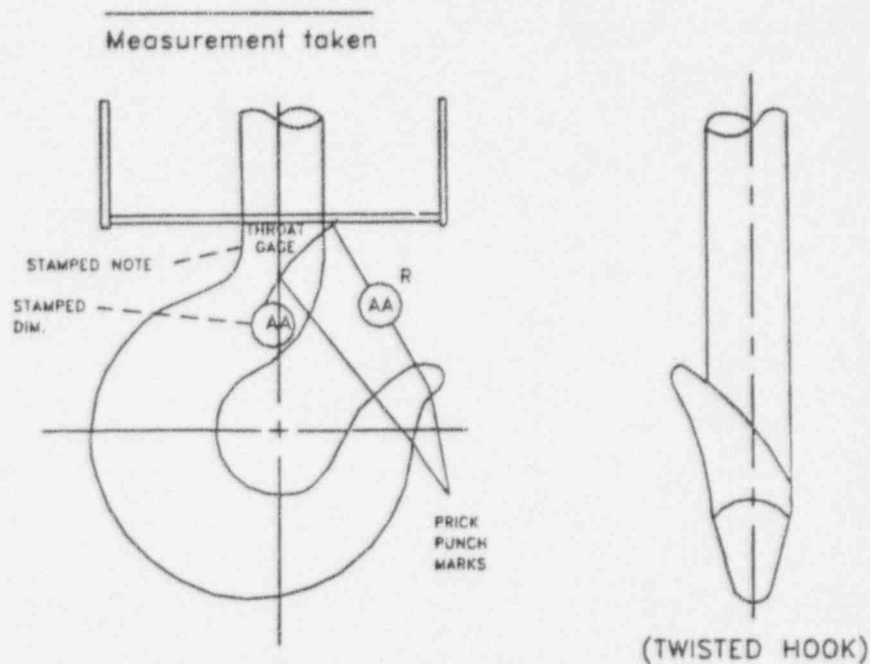


Figure 4

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- 6.6.16 Measure between prick punch marks on main hook (two places) and record throat gage measurement taken. (Refer to Figure 4)

Measurement taken

Measurement taken

- 6.6.17 Replace hooks if measurements are 1.15 times original throat gage stamped on hooks.

6.6.18 Visually inspect auxiliary hook for evidence of twisting. (Refer to Figure 4) \_\_\_\_\_

6.6.19 Visually inspect main hook for evidence of twisting. (Refer to Figure 4) \_\_\_\_\_

6.6.20 Notify system engineer if any twist found.

\_\_\_\_\_  
System Engineer Name

\_\_\_\_\_  
Date/Time

6.6.20.1 Replace hooks, if defective. \_\_\_\_\_

6.6.21 IF applicable, THEN apply approved grease to auxiliary and main hook sheave bearings and hook thrust bearings. \_\_\_\_\_

6.6.22 Check sheaves on auxiliary and main block for wear and breakage. \_\_\_\_\_

6.6.23 Check for reverse reeving by hoist rotation to lever direction. \_\_\_\_\_

6.6.24 Check upper limit switch function on each block. \_\_\_\_\_

6.7 Operation of bridge:

6.7.1 Ensure adequate clearance is maintained between bridge and any obstruction at each end of bridge. \_\_\_\_\_

6.7.2 Check cab for proper clearance along with trolley clearance overhead and at ends. \_\_\_\_\_

6.7.3 Check by driving around runway to see that crane is NOT binding or that wheels are NOT flanging on any portion of runway rails. \_\_\_\_\_

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- 6.7.4 Whenever possible, operate bridge the full length of runway. \_\_\_\_\_

**CAUTION**

While panel doors are opened during this inspection, the electrician **SHOULD** be standing on an insulating mat.

- 6.7.4.1 Check to see that all speeds are operating and that all contactors and timers are functioning. \_\_\_\_\_
- 6.7.4.2 Check to ensure micro drive is functioning by a short movement of bridge in micro drive.
- 6.7.5 Watch operation of runway collector for entire length of runway. \_\_\_\_\_
- 6.7.5.1 Pay particular attention to arcing, loss of contact and clearance with brackets and insulators. \_\_\_\_\_

**NOTE**

Crane **SHOULD** cross joints in rails with minimum of bumping or vibration.

- 6.7.6 While bridge is traveling, drive shaft, couplings, and gearcases and entire drive train **SHOULD** be observed for vibration or looseness of any fasteners or equipment. \_\_\_\_\_
- 6.7.7 Ensure brakes are functioning properly and crane can be brought to a smooth safe stop. \_\_\_\_\_
- 6.7.8 Check to see that electrical panels and resistors are anchored and braced properly, especially against vibration and freedom of movement in direction of bridge travel. \_\_\_\_\_
- 6.7.9 Record results of operational test. IF unsatisfactory, THEN note corrective action to be taken in Remarks section with WCD number included. \_\_\_\_\_



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7.0 Acceptance Criteria

- 7.1 Manufacturer's requirements have been met upon satisfactory completion of this procedure.

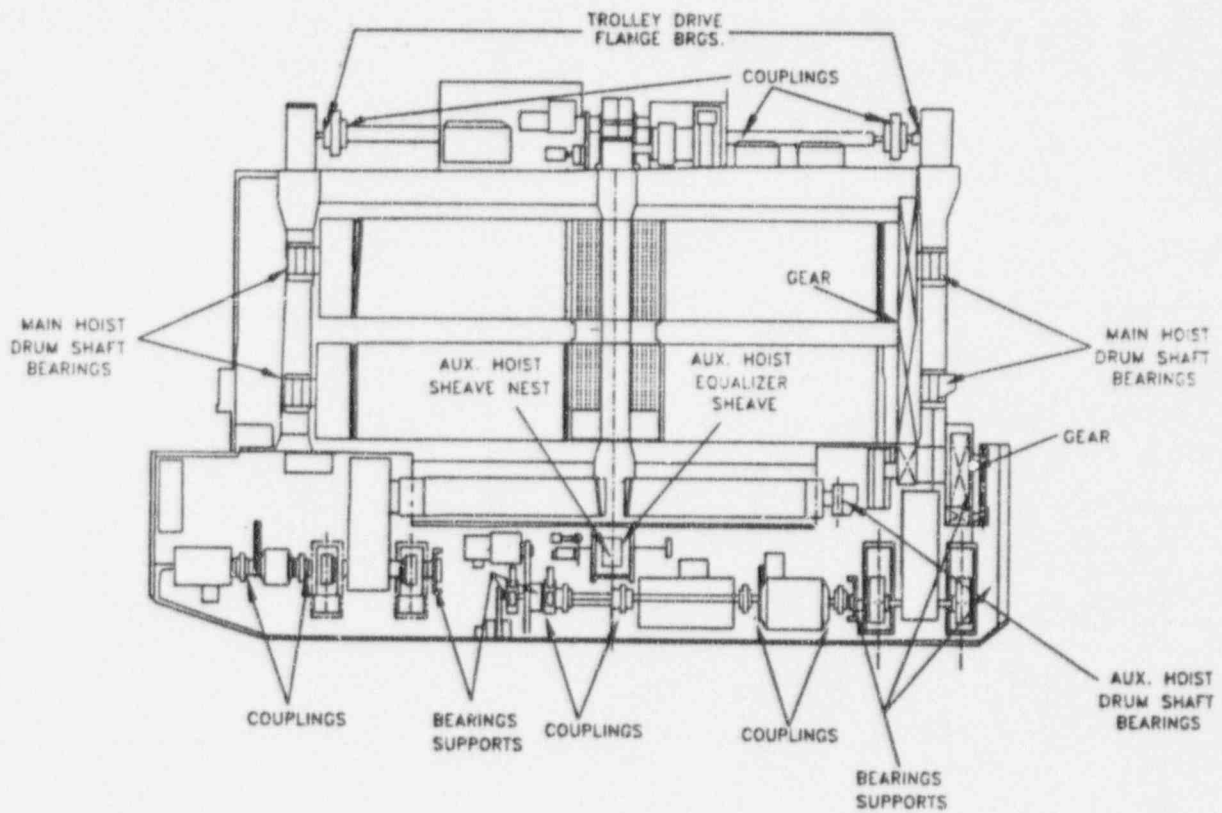
8.0 References

- 8.1 Manufacturer Technical Manual (4013-01001-WG)
- 8.2 SER 85-002 (ST-HS-HS-3207)
- 8.3 SER 81-45 (ST-HS-HS-3860)
- 8.4 ANSI B30.2.0 - 1976 (Overhead and Gantry Cranes)
- 8.5 ANSI N45.2.2 - 1972 (Packaging, Shipping, Receiving, Storage and Handling of items for Nuclear Power Plants)
- 8.6 NRC Generic Letter 81-07
- 8.7 SPR-920177

9.0 Support Documents

- 9.1 Addendum 1 - Lubrication Points

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