



STANFORD LINEAR ACCELERATOR CENTER

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## **IR-2 RIGGING PROCEDURE and JOB HAZARD ANALYSIS FOR SPECIAL PURPOSE HANDLING FIXTURE FORWARD LOWER CENTER GAP PLATE**

**1.0 Loads:**

FWD Lower Center Gap Plate	2824 lbs
Fixture	1870 lbs
Total Load (excluding rigging)	4694 lbs

**2.0 Rigging Layout:**

Drawing number SK-HJK080104-4

**3.0 Rigging Equipment:**

Beginning configuration: The 10-ton hoist shall support two 4-ft long slings of 10,000 lb minimum working load rating plus 6.5 ton minimum capacity screw pin shackles on each end. The 50-ton hoist shall have a 4-ft long sling of 10,000 lb minimum working load rating with 6.5 ton minimum capacity screw pin shackles on each end.

**4.0 Removal Procedure:**

Refer to drawing number SK-HJK080104-4. The fixture is designed such that the CGZ of the unloaded fixture is located at points A and B. Points C and D represent the CGZ of the combined fixture plus the FWD Lower Center Gap Plate.

- 4.1 10 ton hoist: Connect one sling shackle to Point A on the fixture. Connect the other shackle to Point B.
- 4.2 Lift the fixture using the 10-ton hoist. The fixture should hang fairly horizontal. The total load on the 10-ton hoist is approximately 1900 lbs.
- 4.3 Take the fixture to the detector area and place on the floor just east of the FWD PEP Raft but as far west as possible. Disconnect the screw pin shackles from Points A and B on the fixture.
- 4.4 Bring the crane back to the assembly area to reconfigure the rigging on the 10-ton hoist.
- 4.5 Remove the two 4-ft long slings on the 10-ton hoist. The 10 ton hoist shall then have a 10,000 lb capacity digital crane scale (Scale 10) supported from the hook. The Forward End Plug Spreader Bar shall be supported from Scale 10 using a 17-ton minimum capacity screw pin shackle. A 12-ft long sling of 10,000 lb minimum working load rating shall be supported from Point A on the spreader bar with a 12-ton minimum capacity screw pin shackle at the spreader bar end and a 6.5 ton minimum capacity screw pin shackle on the other end. An 8-ft long sling of 10,000 lb minimum working load rating shall be supported from Point B on the spreader bar using a 12-ton minimum

- capacity screw pin shackle. A 3-ton minimum capacity manual hoist (come-along) shall be supported from this sling along with a 6.5 ton minimum capacity screw pin shackle.
- 4.6 Zero the crane scale readout with the rigging hardware hanging clear of the ground.
  - 4.7 Bring the 10-ton hoist back to the detector area and place the 12-ft long sling over on the west side of the FWD PEP Raft.
  - 4.8 Connect the 12-ft long sling shackle to Point A on the fixture.
  - 4.9 Connect the manual hoist to Point B on the fixture.
  - 4.10 Gently lift the fixture using the 10-ton hoist. Be careful not to touch the FWD PEP Raft.
  - 4.11 Place the fixture in the proper position to mate to the FWD Lower Center Gap Plate using the 10-ton hoist, the bridge, and the crane trolley. It may be necessary to make slight angular adjustments using the manual hoist. Bolt the fixture to the FWD Lower Center Gap Plate.
  - 4.12 Place dunnage under the forward most portion of the fixture counterweight.
  - 4.13 Move the rigging from Points A and B on the fixture to Points C and D respectively.
  - 4.14 Reposition the trolley over Points C and D on the fixture.
  - 4.15 Gently lift on the 10-ton hoist until Scale 10 reads 4694 lbs.
  - 4.16 Gently loosen the FWD Lower Center Gap Plate bolts.
  - 4.17 Readjust fixture/gap plate position using the 10-ton hoist and the manual hoist as needed to minimize side loading on the gap plate bolts until all bolts are removed.
  - 4.18 Remove the gap plate and set on the floor as far east as possible. Place dunnage under the forward most portion of the fixture.
  - 4.19 10-ton hoist: Disconnect shackles from Points C and D on the fixture.
  - 4.20 Bring the crane to the assembly area to reconfigure the rigging on the 10-ton hoist.
  - 4.21 Remove the spreader bar and associated rigging from the 10-ton hoist. Connect two 4-ft long slings with 10,000 lb minimum working load rating to the 10-ton hoist with 6.5 ton minimum capacity screw pin shackles on each end.
  - 4.22 Bring the crane back to the detector area.
  - 4.23 10-ton hoist: Connect the two 4-ft long slings to Points C and D on the fixture.
  - 4.24 Gently lift fixture/ gap plate assembly using the 10-ton hoist. Be careful not to touch the FWD PEP Raft.
  - 4.25 Bring the gap plate to the IR-2 assembly area.
  - 4.26 Lower the 50-ton hoist and connect the 4-ft long sling shackle to Point E on the fixture.
  - 4.27 Raise the 50-ton hoist and lower the 10-ton hoist. The gap plate/fixture assembly will rotate until the gap plate attains a horizontal position.
  - 4.28 Lower the gap plate on 4x4 wood dunnage using the 50-ton hoist.
  - 4.29 Unbolt the fixture from the gap plate.
  - 4.30 Raise the 10-ton hoist until the fixture rotates to the horizontal position.

## 5.0 Installation Procedure:

- 5.1 The Upper Center Gap Plate should be lying on dunnage in a horizontal position.
- 5.2 10 ton hoist: Connect the sling shackles to Points C and D on the fixture.
- 5.3 50-ton hoist: Connect the shackle to Point E on the fixture.
- 5.4 Raise the 50-ton hoist and lower the 10-ton hoist until the fixture rotates to vertical.
- 5.5 Bolt the fixture to the FWD Lower Center Gap Plate.
- 5.6 Lift the gap plate using the 50-ton hoist.
- 5.7 Raise the 10-ton hoist until the gap plate rotates to vertical and the 50-ton hoist is unloaded.
- 5.8 Disconnect the 50-ton hoist.
- 5.9 Bring the fixture/gap plate assembly to the forward detector area and place on the floor to the east of the FWD PEP Raft but as far west as possible.

- 5.10 10-ton hoist: Disconnect the two slings from Points C and D.
- 5.11 Bring the crane back to the assembly area to reconfigure the rigging on the 10-ton hoist.
- 5.12 Remove the two 4-ft long slings on the 10-ton hoist. The 10 ton hoist shall then have a 10,000 lb capacity digital crane scale (Scale 10) supported from the hook. The Forward End Plug Spreader Bar shall be supported from Scale 10 using a 17-ton minimum capacity screw pin shackle. A 12-ft long sling of 10,000 lb minimum working load rating shall be supported from Point A on the spreader bar using a 12-ton minimum capacity screw pin shackle with 6.5 ton minimum capacity screw pin shackles on the other end. An 8-ft long sling of 10,000 lb minimum working load rating shall be supported from Point B on the spreader bar using a 12-ton minimum capacity screw pin shackle. A 3-ton minimum capacity manual hoist (come-along) shall be supported from this sling along with a 6.5 ton minimum capacity screw pin shackle.
- 5.13 Zero the crane scale readout with the rigging hardware hanging clear of the ground.
- 5.14 Bring the 10-ton hoist back to the detector area and place the 12-ft long sling over on the west side of the FWD PEP Raft.
- 5.15 Connect the 12-ft long shackle to Point C on the fixture.
- 5.16 Connect the manual hoist to Point D on the fixture.
- 5.17 Gently lift fixture/gap plate assembly using the 10-ton hoist. Be careful not to touch the FWD PEP Raft.
- 5.18 Place the gap plate in its proper position.
- 5.19 Bolt the gap plate to the detector.
- 5.20 Place dunnage under the forward most portion of the fixture counterweight.
- 5.21 Lower the 10-ton hoist and move the rigging from Points C and D on the fixture to Points A and B respectively. Reposition the trolley over points A and B.
- 5.22 Raise the 10-ton hoist until scale 10 reads 1870 lbs.
- 5.23 Gently unbolt the fixture from the FWD Lower Center Gap Plate.
- 5.24 Lower the fixture to the floor but as far east as possible.
- 5.25 Disconnect the rigging from Points A and B on the fixture.
- 5.26 Bring the crane back to the assembly area to reconfigure the rigging on the 10-ton hoist.
- 5.27 Remove the spreader bar and associated rigging from the 10-ton hoist. Connect two 4-ft long slings with 10,000 lb minimum working load rating to the 10-ton hoist with 6.5 ton minimum capacity screw pin shackles on each end.
- 5.28 Bring the fixture back to the detector area.
- 5.29 10-ton hoist: Connect the two 4-ft long slings to Points A and B on the fixture.
- 5.30 Take fixture away using the 10-ton hoist. Be careful not to touch the FWD PEP Raft.

## 6.0 Potential Hazards:

- 6.1 Crushed extremities.
- 6.2 Personnel in path of load movement or under load.
- 6.3 Unexpected load movement.
- 6.4 Operator error.
- 6.5 Equipment failure.

## 7.0 Hazard Controls:

- 7.1 Crane Operator shall be a SLAC-certified (EFD) rigger.
- 7.2 No one will be allowed under a suspended load or in the path of a load.
- 7.3 Strict controls of crane control box and rigging procedures.
- 7.4 Inspection of equipment prior to use.

