



STANFORD LINEAR ACCELERATOR CENTER

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IR-2 RIGGING PROCEDURE and JOB HAZARD ANALYSIS FOR SPECIAL PURPOSE HANDLING FIXTURE FORWARD LOWER FLUX BAR

1.0 Loads:

FWD Lower Flux Bar	4903 lbs
Fixture	1817 lbs
Total Load (excluding rigging)	5910 lbs

2.0 Rigging Layout:

Drawing number SK-HJK080104-5

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 is not used in this operation.

4.0 Removal Procedure:

Refer to drawing number SK-HJK080104-5. 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 Flux Bar weight.

- 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 fixture load on the 10-ton hoist is approximately 1817 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 using a 12-ton minimum capacity screw pin shackle with 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 Flux Bar 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 Flux Bar using two special 1.812-12UN stainless steel bolts.
- 4.12 Place dunnage under the forward most portion of the fixture.
- 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 5910 lbs.
- 4.16 Insert the flux bar guide pins as far apart as possible.
- 4.17 Gently loosen the FWD Lower Flux Bar bolts.
- 4.18 Readjust fixture/flux bar position using the 10-ton hoist and the manual hoist as needed to minimize side loading on the flux bar bolts until all bolts are removed.
- 4.19 Remove the flux bar and set on the floor as far east as possible.
- 4.20 Disconnect shackles from Points C and D on the fixture.
- 4.21 Bring the crane to the assembly area to reconfigure the rigging on the 10-ton hoist.
- 4.22 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.
- 4.23 Bring the crane back to the detector area.
- 4.24 Connect the two 4-ft long slings to Points C and D on the fixture.
- 4.25 Gently lift fixture/flux bar assembly using the 10-ton hoist. Be careful not to touch the FWD PEP Raft.
- 4.26 Bring the flux bar to the IR-2 assembly area.
- 4.27 Lower the flux bar on 4x4 wood dunnage using the 10-ton hoist.
- 4.28 Place dunnage under the fixture.
- 4.29 Unbolt the fixture from the flux bar.
- 4.30 Move the rigging for the 10-ton hoist from Points C and D on the fixture to Points A and B.
- 4.31 Take the fixture away.
- 4.32 Remove the flux bar guide pins from the detector.

5.0 Installation Procedure:

- 5.1 Connect the sling shackles to Points A and B on the fixture.
- 5.2 Bolt the fixture to the FWD Lower Flux Bar using two special 1.812-12UN stainless steel bolts.
- 5.3 Place dunnage under the fixture end opposite the flux bar.
- 5.4 Move the sling shackles from Points A and B on the fixture to Points C and D respectively.
- 5.5 Lift the flux bar using the 10-ton hoist.
- 5.6 Bring the fixture/flux bar 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.
- 5.7 Disconnect the two slings from Points C and D.
- 5.8 Bring the crane back to the assembly area to reconfigure the rigging on the 10-ton hoist.

- 5.9 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 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.
- 5.10 Zero the crane scale readout with the rigging hardware hanging clear of the ground.
- 5.11 Install two flux bar guide pins as far apart as possible.
- 5.12 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.
- 5.13 Connect the 12-ft long shackle to Point C on the fixture.
- 5.14 Connect the manual hoist to Point D on the fixture.
- 5.15 Gently lift fixture/flux bar assembly using the 10-ton hoist. Be careful not to touch the FWD PEP Raft.
- 5.16 Place the flux bar in its proper position.
- 5.17 Bolt the flux bar to the detector.
- 5.18 Place dunnage under the forward most portion of the fixture.
- 5.19 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.
- 5.20 Raise the 10-ton hoist until scale 10 reads 1817 lbs.
- 5.21 Gently unbolt the fixture from the FWD Lower Flux Bar.
- 5.22 Lower the fixture to the floor but as far east as possible.
- 5.23 Disconnect the rigging from Points A and B on the fixture.
- 5.24 Bring the crane back to the assembly area to reconfigure the rigging on the 10-ton hoist.
- 5.25 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.
- 5.26 Bring the fixture back to the detector area.
- 5.27 10-ton hoist: Connect the two 4-ft long slings to Points A and B on the fixture.
- 5.28 Take fixture away using the 10-ton hoist. Be careful not to touch the FWD PEP Raft.
- 5.29 Remove the two flux bar guide pins on the detector.

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.

