

## **DYNAPOWER IR (INTERSECT REGION) HOUSEKEEPING POWER SUPPLY REPLACEMENT**

This procedure explains the steps required to replace the internal housekeeping power supply used in RHIC 200, 300, and 450Amp Dynapower (brand) IR Power Supplies.

The Dynapower IR supplies are:

- A) Rack-mounted, painted blue, and identified with site wide names. The PS current output is labeled both on the 3U control chassis front and PS rear.
- B) Located in the power supply area of service buildings 1012A, 1002A, 1004B, 1006B, 1008B, and 1010A.

The acronym "IRPS" refers to Intersect Region Power Supply

The acronym "HKPS" refers to the internal Housekeeping Power Supply

### **1.0 PRELIMINARY STEPS FOR REMOVAL OF HKPS**

- 1.1 Obtain a replacement housekeeping power supply labeled "Dynapower 208V" from the 1004B (PS area) south wall beige **Spare Parts Cabinet #2**.
- 1.2 Ask the Main Control Room to:
  - 1.3.1 Ramp all IR power supplies to zero amps.
  - 1.3.2 "Trip" the IRPS's Quench Link (blue or yellow) unless the PS shares the rack with another PS connected to the opposite ring. Trip both Quench Links if that's the case.
- 1.3 Locate the IRPS to be serviced. On the Control Card (on the 3U control chassis) toggle from REMOTE to LOCAL, press STANDBY, then press OFF. Ensure the green LED's on the control card in the 3U chassis reflect the PS state you set.
- 1.4 Shut off the PS front panel 208V circuit breaker. Identify the rack name (at top), then locate, shut-off, and lock out its disconnect switch on the wall.

### **2.0 REMOVAL OF HKPS:**

- 2.1 Prepare IRPS for sliding out by:
  - 2.1.1 Removing the perforated aluminum panel and lexan cover on the PS front.
  - 2.1.2 Disconnect the three orange colored fiber optic lines from the 16 bit Interface card (control chassis right side). Note their labels for reconnect.
  - 2.1.3 Remove any 10-32 screws securing the PS front panel to the rack mount front rail.
  - 2.1.4 Open the rear door of the rack by removing the pair of 7/16" (head) bolts that secure it.

**CAUTION: INJURY WILL RESULT FROM CONTACT WITH ENERGIZED DC CONNECTIONS FOUND AT THE REAR OF POWER SUPPLIES.**

DC buss may still be energized even though the Quench Link is down (tripped). Refer to Main Quad Buss LOTO procedure if required.

- 2.2 While a 2<sup>nd</sup> person watches the PS rear connecting cables for snagging, slide the IRPS fully forward. Close the rear door when PS is fully extended.
- 2.3 Remove the left and right hand lower side panel as follows (refer to diagram 1 & 2):
  - 2.3.1 Remove the four **front** 8-32 slotted flatheads on the BOTTOM panel. Note that these screws (2 per side) thread into the lower side panel's bottom flange. Note that the remaining five bottom panel 8-32 slotted flatheads thread into the PS frame.
  - 2.3.2 Remove the six phillips panhead screws from the side panels and remove panels.
- 2.4 Secure the 3U control chassis to the PS by girding a strap or wire around the 3U control chassis bottom (not the blue PS bottom panel) and whole upper portion of the IRPS. Minimum strap or wire lengths as follows:  
200A PS: 76", 300A PS: 90", and 450A PS: 101".
- 2.5 The HKPS is located rearward of the 3U control chassis.  
Disconnect the eleven molex style connectors from the HKPS PCB. Refer to Diagram 3 for the HKPS connector footprint. Pry off any tiwrap mounting pads that may hinder the removal of the HKPS.
- 2.6 Support the bottom panel for removal as follows:
  - 2.6.1 If the IRPS is mounted only a few inches off the floor, slide a scissor jack underneath the bottom panel, center it below the HK PS then raise its platform.
  - 2.6.2 If the IRPS is more than 12" from the floor affix c-clamps (minimum 1" anvil to swivel), one per side, by hooking the clamp's anvil over the PS angle iron frame and lightly snug the clamp screw against the bottom panel.
- 2.7 Free the BOTTOM panel by removing the five remaining 8-32 slotted flatheads. The 200Amp IRPS's have a rectifier assembly (located on the left side, adjacent to the HKPS) with a heatsink attached to the bottom panel with two 10-32 flatheads. Locate the screwheads on the underside of the bottom panel. Retrieve the loose 10-32 nuts from inside the heatsink mounting slots (refer to Diagram 4).

**CAUTION: OBSERVE ALL HKPS SIDES AS YOU LOWER IT TO AVOID WIRE OR PS SNAGGING!**

- 2.8 Remove the HKPS:
  - 2.8.1 If using the scissor jack, lower in to the minimum height, support the bottom panel by hand, slide the jack out and drop panel to the floor. Go to step 2.9.
  - 2.8.2 If using the c-clamps, support the bottom panel by hand, remove the c-clamps, and lower the bottom panel.
- 2.9 Set the bottom panel with the HKPS facing down. Remove the six 6-32 flathead screws securing the PS to the panel and transfer panel to new PS. Ensure the new PS is oriented correctly.

### 3.0 **INSTALLATION of HKPS:**

- 3.1 If using the scissor jack perform steps 3.1.1 through 3.1.4:
  - 3.1.1 Slide new PS into position under IRPS.
  - 3.1.2 Reconnect the molex connectors that can reach.
  - 3.1.3 **Observing the caution in STEP 2.7**, lift the HKPS up into IRPS far enough to slide the scissor jack under it.
  - 3.1.4 Raise the jack until the bottom panel contacts the IRPS frame. Go to step 3.3.
- 3.2 If using the c-clamps:
  - 3.2.1 Lift the HKPS until the top of it almost re-enters the IRPS. Hold it in that position by hand, use a lift, or thread three 6" long 8-32 threaded rods with nuts and washers through the bottom panel holes into the IR bottom frame. Let the bottom panel sit atop the nuts/washers.
  - 3.2.2 Reconnect the molex connectors that can reach. Ensure the female plug tabs engage/overlap the HKPS male connector tabs.
  - 3.2.3 **Observing the caution in STEP 2.7**, raise the bottom panel until it contacts the IRPS frame.
  - 3.2.4 Affix c-clamps as in step 2.6.2.
- 3.3 Reconnect any remaining molex connectors.
- 3.4 Install the five 8-32 slotted flatheads on the BOTTOM panel. Remove devices used to support bottom panel.
- 3.5 If the IR PS is a 200Amp:
  - 3.5.1 Insert the two 10-32 flatheads into the bottom panel and thread the nuts a few turns.
  - 3.5.2 Push the heatsink assembly toward the HKPS until you clear the 10-32's. Tilt and lift it to gain this clearance (this is a tight fit).
  - 3.5.3 Slide the heatsink slots over the nuts and stop when it nearly contacts the IR PS frame. Tighten the screws.
- 3.6 Remove the strap installed in step 2.4.

3.7 Install the side panels in reverse of step 2.3. Ensure that the 3U control chassis's side (rear-most) allen head screws fit into the holes provided in the lower side panel (refer to diagram 2).

3.8 Perform steps 2.2 through 2.1 in reverse to complete installation.

3.9 Re-energize the IRPS. Switch Local/Remote switch to LOCAL, press RESET then STANDBY.

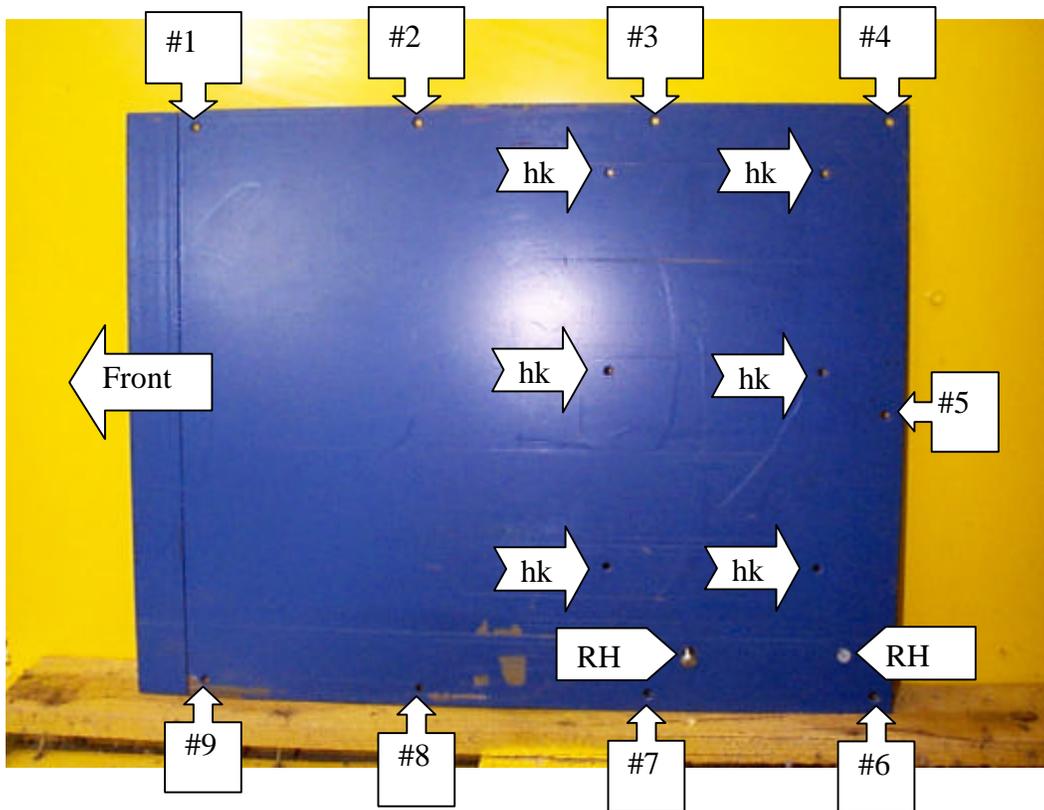
3.9.1 Ensure the following LED'S are lit:

AC PWR and HEART BT on Control Card.  
+16V, +15V1, -15V1, +15V2, -15V2 on Buffer Card.  
+5V, +15V, -15V on Current Regulator Card.  
+5V, +15V, -15V on 16 Bit Interface Card.  
+15V, -15V on Voltage Regulator Card  
Head Connected, Output Valid, and Zero I on ZFCT Card

3.9.2 If all are lit, press OFF and return switch to REMOTE. Inform the Main Control Room.

3.9.3 If any of the above LED'S are unlit or PS fails to enter STANDBY state:  
Repeat enough procedure steps to re-open the IRPS to ensure molex connectors are fully seated and oriented correctly in their proper mates.  
If no error is found, the new HKPS may be defective. Install another one or consult with a knowledgeable engineer to determine the fault.

Document filename: Dynapower IR housekeeping ps.doc  
Seven pages with diagrams.  
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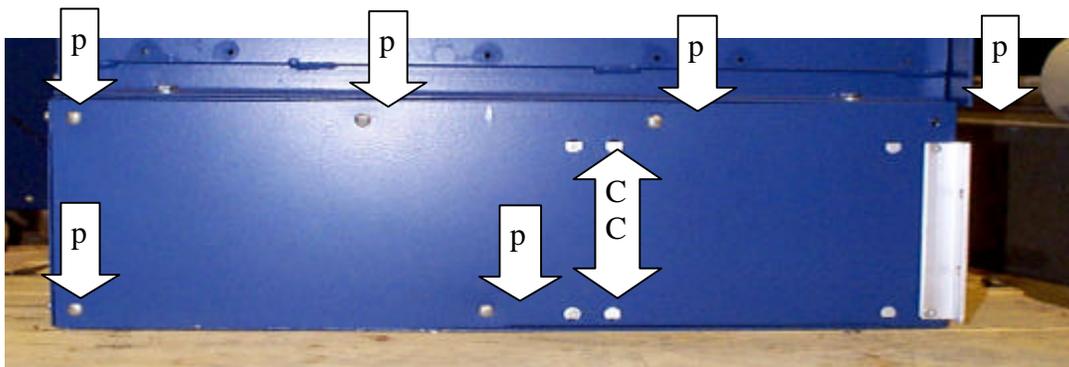


**Diagram #1 : Bottom Panel:**

Bottom panel fastener holes are #1 to #9. #1, 2, 8, 9 are removed in step 2.3.1 to free the sides.

“hk” holes are the HKPS mounting holes.

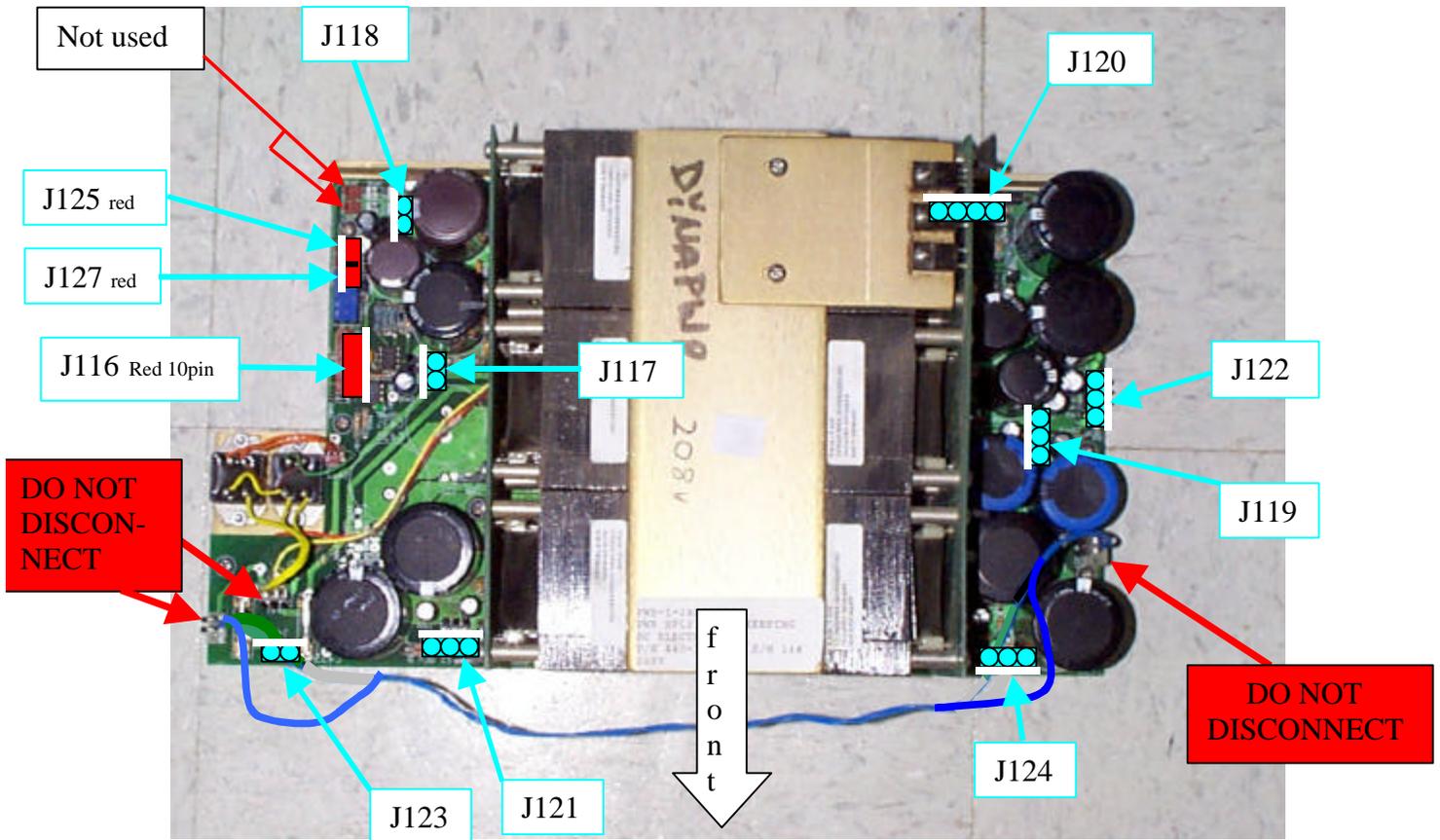
“RH” holes are for the 200A IRPS rectifier/heatsink assembly.



**Diagram #2: Lower side panel:**

. “p” arrows indicate phillips panhead screws holding panel to frame.

“CC” indicates the control chassis screw head alignment holes in step 3.7.



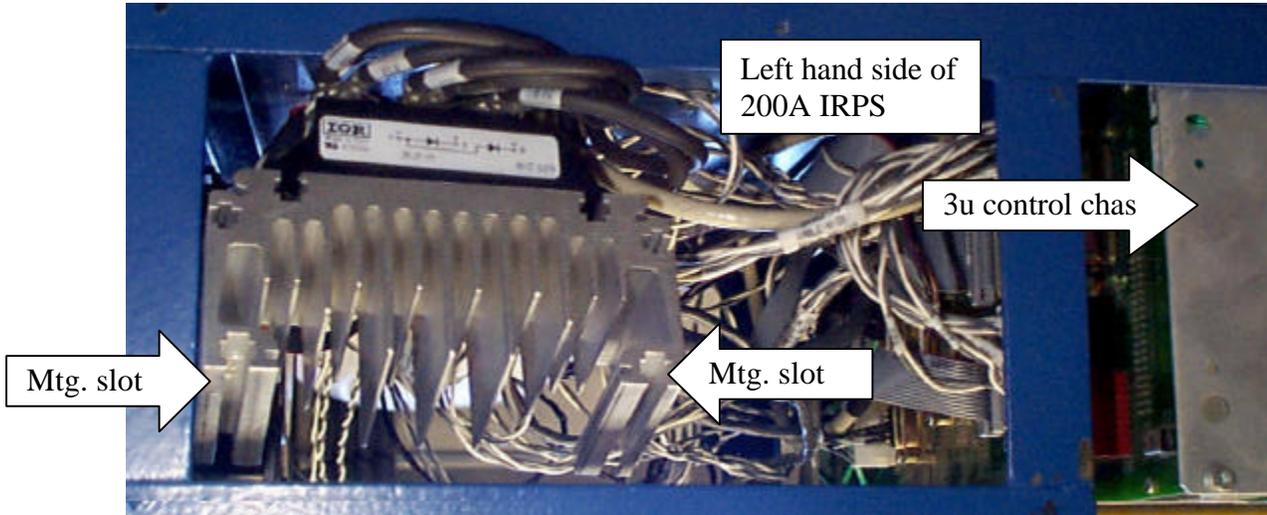
**Diagram #3: Housekeeping Power Supply:**

Footprint with overlays of molex connectors for clarification. White bars represent lock tab side. “J” numbers shown are found on female plugs.

**Molex Connector List:**

J120	J118
J122	J125
J119	J127
J124	J116
	J117
	J121
	J123

Do not remove the molex connectors labeled above as “DO NOT DISCONNECT”. They are internal HKPS connectors.



**Diagram #4: Rectifier/heatsink:**

Rectifier/heatsink assembly found in 200A IRPS only. Heatsink tilted to show mounting slots that slide over 10-32 nuts.