

## Technical Service Bulletin 030611

### Calibration of IOX / DCX Beam Voltage and Current Meters

The beam current meter plays a critical role in assessing the performance of a transmitter. The level of beam current indicates how "hard" an IOT is working on the inside. Errors in tube tuning or power meter calibrations are often discovered by the presence of abnormally high or low level of beam current. A correct beam current meter calibration is also necessary to set the proper idle current (bias point) for the IOT.

The level of beam voltage has a significant effect on the amount of peak signal compression. This translates to sync compression for NTSC and residual (uncorrectable) IMD sidebands in ATSC/DVB. The beam voltage meter calibration should be checked in cases when it is impossible to achieve acceptable peak signal performance or the meter indication has suddenly changed from its previous nominal value.

<b>Procedure 030611: Calibration of IOX / DCX Beam Voltage and Current Meters</b>	
Applicability	All IOX and DCX transmitters.
Prerequisites	HPA in Beam Mode with HV relay connected
Equipment Required	High voltage probe, precision current shunt, multimeter.
Comments	

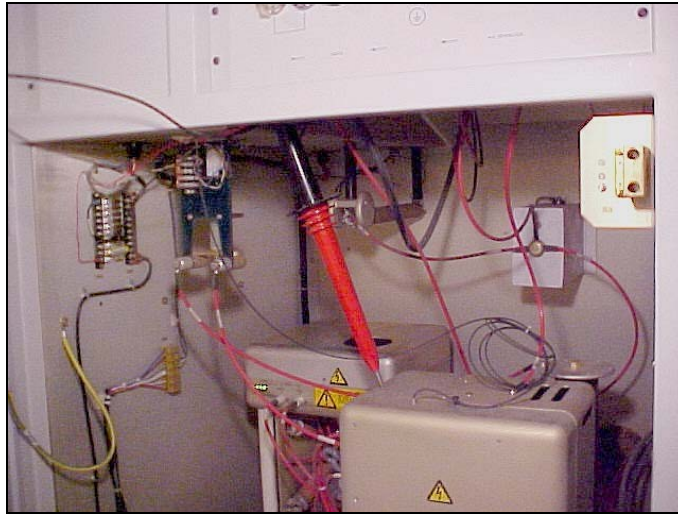
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**WARNING:** The procedure described in this document involves potentially lethal high voltages if not executed properly. Do not attempt this procedure without a second person present. Do not attempt this procedure while tired or otherwise not fully alert. Always use the transmitter grounding hook to properly ground all high voltage circuits before attempting to touch them. Consult Service Bulletin 940911 for information on proper high voltage safety procedures.

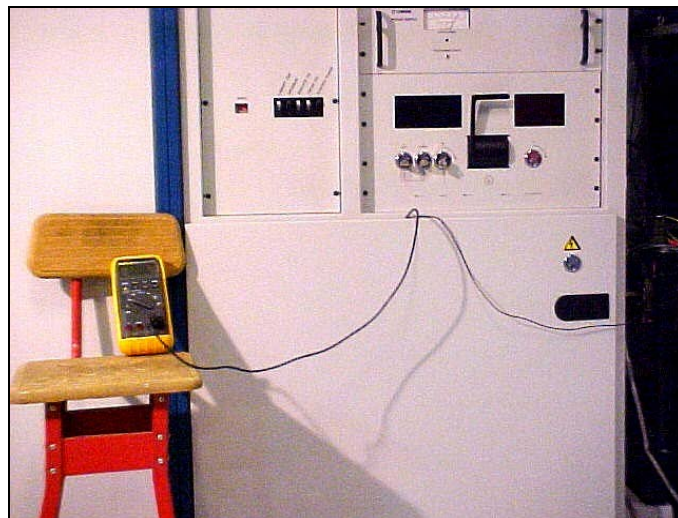
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#### Calibrate beam voltage meter.

1. Press **HPA START MODE** button on HPA control panel to extinguish high voltage.
2. Allow high voltage to fall completely to zero.
3. Gain access to high voltage compartment via key interlock system.
4. Discharge all high voltage circuits with grounding hook.
5. Mechanically rest high voltage (HV) probe against filament / bias / ion supply or other suitable component exposed to beam voltage during normal operation. (See photo).



6. Feed HV probe lead to outside of HV compartment.
7. Carefully position multimeter outside of HV compartment (see photo). Select DC volts measurement function.



8. Close high voltage compartment door.
9. Restore key interlock system to original position.
10. Press **BEAM MODE** button on HPA control panel to activate high voltage.
11. Carefully read scaled high voltage reading. Do not touch meter or cables. Consult HV probe manual to obtain correct scaling factor.

12. Calibrate beam voltage meter, as necessary, by issuing following commands via HPA control panel: **Information Access > System Operations > HPA Maintenance > Password = 55555 > Meter Calibrations > Focus, Beam, Body > Beam > Voltage.**
13. Use **Up** and **Down** menu options to adjust displayed meter readings until correct value is obtained. Press **Save** to save calibration and return to previous menu.
14. Select **Previous Screen** option five times to return to top-level **Information Access** menu.
15. Compare measure beam voltage reading to tube data sheet, proof date, or last known-good log measurement. If the measurement and calibration procedure has revealed an incorrect beam voltage, procedure continues with instructions on how to change beam voltage tap setting. If beam voltage is correct, procedure is complete.

### Change beam voltage tap setting.

16. Press **HPA START MODE** button on HPA control panel to extinguish high voltage.
17. Allow high voltage to fall completely to zero.
18. Retrieve key for beam supply from key interlock system.
19. Pull handle on outdoor safety disconnect on beam supply 480VAC primary feed to OFF position.
20. Open front door to beam supply.

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**NOTE:** The following section applies to those beam supplies with an internal tap selector switch. For those beam supplies with an external tap selector switch, the switch may be accessed via an interlocked cover on the side of the oil tank portion of the beam supply. In such cases, it is not necessary to open the beam supply front door.

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21. Ground HV components with internal grounding hook. Be sure to ground simultaneously BOTH posts of each high voltage capacitor. This may require that the manufacturer-supplied ground hook be modified (straightened) to make this physically possible.
22. Change tap selector switch to desired setting. Increasing the tap setting to the next highest number will result in an increase of beam voltage of typically 2 kV.
23. Take advantage of opportunity to inspect inside of beam supply for signs of damage, moisture.
24. Close front door to beam supply.
25. Reset handle on outdoor safety disconnect on beam supply 480VAC primary feed to ON position.
26. Press **BEAM MODE** button on HPA control panel to activate high voltage.

27. Observe new beam voltage level. Repeat procedure as necessary until satisfactory beam voltage level is obtained. Procedure continues with calibration of beam current meter.

**Calibrate beam current meter.**

28. Press **STOP MODE** on HPA control panel to extinguish high voltage and filament supply.
29. Allow high voltage to fall completely to zero.
30. Gain access to high voltage compartment via key interlock system.
31. Discharge all high voltage circuits with grounding hook.
32. Locate terminal strip TB11 on the upper, left wall of the high voltage compartment.
33. Break wire connection at TB11-2 (rear strip, second position from top) and insert precision current metering shunt between TB11-2 and the wire previously connected to TB11-2.

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**NOTE:** The precision current shunt and wire harness shown in this procedure is available from Comark Customer Service. Request part number 412828-01.

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34. Carefully position metering shunt on floor of high voltage compartment, far from any areas normally exposed to high voltage. Ensure that jumper cables used to connect current shunt to TB11 do not approach any high voltage circuits.
35. Connect multimeter leads to shunt measuring posts, and carefully position multimeter outside of high voltage compartment. Select DC millivolts measurement function.



36. Close high voltage compartment door, and restore key interlock system to original position.
37. Press **BEAM MODE** button on HPA control panel. Allow transmitter to complete warm-up cycle and activate high voltage.
38. Once high voltage is present, carefully read scaled current reading on multimeter. Do not touch multimeter body. Consult current shunt datasheet to obtain correct scaling factor.
39. Observe beam current reading as displayed on transmitter beam current meter.
40. Calibrate beam current meter, as necessary, by issuing following commands via HPA control panel: **Information Access > System Operations > HPA Maintenance > Password = 55555 > Meter Calibrations > Focus, Beam, Body > Beam > Current.**
41. Use **Up** and **Down** menu options to adjust displayed meter readings until correct value is obtained. Press **Save** to save calibration and return to previous menu.
42. Select **Previous Screen** option five times to return to top-level **Information Access** menu.
43. Restore equipment to original condition.
44. Procedure complete.



*Exploded view of current shunt connections. TB11 is at upper right of photo.*

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