Technical Service Bulletin 030609
Calibration of IOX / DCX Ion Voltage and Current Meters

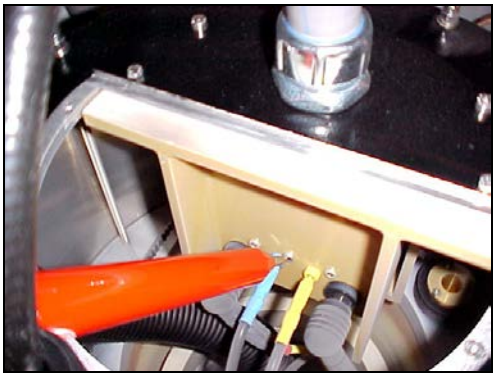
The ion pump uses an electrode charged to +3.5kV by an external power supply to trap charged gas molecules and maintain the IOT vacuum. A non-zero ion pump current indication reveals that gas molecules are being intercepted by the pump (i.e. there is gas inside the IOT). When sufficient gas is present, an ionization path will form and the IOT will arc internally (crowbar).

Procedure 030609: Calibration of IOX / DCX Ion Voltage and Current Meters	
Applicability	All IOX and DCX transmitters using IOTs with an ion pump.
Prerequisites	None.
Equipment Required	Multimeter, High voltage probe, Ion supply dummy load (70 Mohm).
Comments	Does not apply to those IOT types not equipped with an ion pump.

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. Remove cover to gain access to IOT terminal connections in IOT junction box.

NOTE: This procedure shows the measurement of ion current and voltage for an E2V 2100 series IOT. Other makes and models of IOT may require a slight modification of this procedure.

6. Mechanically support multimeter on trolley deck. Connect high voltage probe ground lead to IOT trolley ground. Select DC volts measurement function.
7. Measure IOT ion pump voltage with high voltage probe resting against ion pump terminal (see photo). Consult IOT manufacturer datasheet / literature to determine best location to place high voltage probe.



8. Calibrate ion voltage meter, as necessary, by issuing following commands via HPA control panel: **Information Access > System Operations > HPA Maintenance > Password = 55555 > Meter Calibrations > Filament, Bias, Ion > Ion > Voltage.**
9. 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.
10. Press **STOP MODE** button on HPA control panel to extinguish ion supply.
11. Carefully ground ion supply terminal with transmitter grounding hook.
12. Install a 70 Mohm dummy load across IOT ion and cathode terminals.

13. Press **HPA START MODE** button on HPA control panel to activate ion supply.
14. Dummy load should cause a current of approximately 50 microamps to flow for an ion voltage of 3.5 kV. Use the Ohm's Law relation I = V / R to determine exact current level, based on ion voltage measured in previous steps.
15. Calibrate ion current meter, as necessary, by selecting (ion) **Current** option on HPA control panel.
16. 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.

17. Select **Previous Screen** option five times to return to top-level **Information Access** menu.
18. Remove ion dummy load and restore equipment to original condition.
19. Procedure complete.

Construction details for 70M-ohm ion dummy load shown in procedure

1. Solder together string of seven 10M-ohm 1/4 W resistors.
2. Solder each end to banana plug.
3. Fill tube of heat shrink tubing with silicon sealant.
4. Slide tubing over resistor string assembly.
5. Shrink tubing with heat gun.
6. Wipe way excess silicone.
7. Allow to cool & dry. Resulting load is flexible and sturdy.

NOTE: Ready-made ion dummy load assemblies are available from Comark. Request part numbers 453255-01 for original style FBI supplies (photo below) or 453254-01 for Millennium style FBI supplies.

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