

Calibration Procedure

Proposed Calibration Procedure for Correct Initial Filament Current when using an APtech LaB6 or CeBix cathode.

- Bypass vacuum interlocks, disable high voltage.
- Place load resistor across filament leads in gun chamber with an ammeter in line. Load resistor should be equal to the resistance of the cathode at 1800K (0.67 Ω , 15 watts, 1%*).
- Probe transformer primary inputs outside HV tank on circuit boards.
- Ramp up primary voltage with filament control knob until cathode's 1800 K current is obtained on ammeter (2.81 amps). Read primary voltage (V_{1800}). This is the only calibration point that will be useful, as the resistance of the cathode will change with temperature due to changes in the resistivity of the pyrolytic graphite heater blocks.
- Install cathode, restore interlocks, pump down.
- Ramp cathode slowly to primary $V = V_{1800}$, ideally with HV set as low as system will allow. Initial resistance of the cathode will be somewhat high due to oxidation of block-to-crystal interfaces. Do not try to saturate or locate beam at this point. Let the cathode sit at V_{1800} for ~ 3 hrs to remove oxide and stabilize resistance.
- Assume that at this point the resistance of the cathode is actually 0.67 Ω and stable, and the filament current is as expected (2.81 amps).
- Proceed with saturation procedures. Find correct bias setting to saturate beam without having to increase the primary voltage beyond V_{1800} . The recommended point for maximum brightness is just short of saturation. Align beam, etc.
- Expect that brightness should be different than seen initially with the CeBix cathode, primarily due to a lower temperature. (Assuming here that the CeBix cathode was initially running hotter than 1800 K).

* Allied Electronics 2005 catalog p. 1160. Stock #'s 524-6002, 524-6005, 524-6010, and 524-6015.