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E-GUN SPOT SIZE and POWER SET-UP

Re-store system vacuum. See Page 6-6, Paragraph 6.3.3.6 in SSX-100 Operators Manual. After analyzer pressure is in the 10^{-8} torr range, the E-Gun start-up and alignment can be done.

- A. With an external power supply, bring the E-Gun filament up to 1.2 Amp. Start at about .75 Amp and slowly increase the current. Monitor the system pressure, when the pressure rises above 1×10^{-7} Torr stop increasing the current and wait for pressure to drop below 5×10^{-8} Torr. When the filament current is about 1.2 Amp, leave at this current for 2 hours.

NOTE: The microscope lamp power supply can be used to supply the current to the filament. This is an SCR supply and you must use an AC TRUE RMS meter. Average measuring meters will read low and result in filament burn out. Do not leave the instrument unattended with this supply. The supply is not interlocked for vacuum failures.

WARNING

Use extreme caution when using these procedures as potentially lethal voltages are present.

- B. Remove top cover of 8702 X-Ray Controller. The left side cover screw is an interlock screw, replace this screw. Do not remove the plastic cover.
- C. Locate the four pots (potentiometers) on the High Voltage Regulator Board in the front of the 8702. See Figure 1. These are the F1 (focus) adjustments. Turn all four pots two turns CCW (counter clockwise).
- D. Locate the four large pots on the Pierce Board in the center of the 8702. See Figure 1. These are the pierce adjustments. Turn all four pots fully CCW then turn them $1/8$ turn CW (clockwise).
- E. Locate the pot on the Filament Regulator Board at the rear of the 8702. See Figure 1. This is the I-2KV Adjustment. Turn this pot 15 to 20 turns CCW.
- F. I 2KV can be measured three ways.
1. Using a floating DC Volt Meter across TP3 and TP4 on the Filament Regulator Board. The meter will be floating at about 2000 Volts, when the Glassman is off and at 12,000 Volts when the Glassman is at 10,000 Volts.

WARNING

*Use caution
DO NOT TOUCH THE METER
while the 8702 is turned on!*

The current is calculated by measuring the voltage between TP3 and TP4 and using the formula:

$$I_{2KV} = \text{Voltage}/(40)$$

This method is used for all measurements at SPI.

2. Using the 8702 front panel meter. This is safe, but the 8702 meter has poor accuracy. We recommend this meter be calibrated before using in this procedure.
3. Using a DC Milli Amp meter in the cathode lead. Arcing may damage the meter. The meter is near ground when the Glassman is off. The meter is at 10,000 Volts when the Glassman is on.

WARNING

*Use caution
DO NOT TOUCH THE METER
if the Glassman supply is turned on!*

- G. We recommend setting up to measure I_{2KV} by method 1 so the valued can be compared to SPI provided values.

*When turning on the E-Gun
Watch the system pressure
on the Ion gauge controller.
If system pressure rises into
the 10⁻⁷ torr range go back
to the previous step.*

- H. Set meter function switch on the 8702 to I Fil. Turn 8702 power ON and press the pre-heat switch. Watch the front panel meter. I Fil will increase slowly over 1 minute. After 30 to 45 seconds the I_{2KV} will come up slowly. The I_{2KV} should settle at between 1 and 2 mA after a few minutes. Leave at this current for at least an hour. Be sure the pressure has dropped below 5 X 10⁻⁸ Torr before proceeding.
- I. Adjust I_{2KV} pot for 3 mA of current. Leave at this current for 1/2 hour. If the vacuum permits, proceed to 5.0 mA. If you are unable to get 5.0 mA, see attached Filament Regulator Modification.

- J. Check Calibration of 8702 Front Panel I2KV Meter. Adjust if required. See Figure 1 for meter calibration instructions.
- K. Turn OFF the 8702 and remove the meter used to measure I 2KV.
- L. **The following 2 steps are essential for the proper operation of SPI supplied filament and cathode. FAILURE TO PERFORM THESE 2 STEPS VOIDS THE WARRANTY.**

STEP 1

Turn on 8702. After 2 minutes measure Pierce voltage. See Figure 1. The Pierce voltage should be greater than 850 Volts. If below 850 Volts - STOP, CALL SPI.

STEP 2

Place the Spot Size switch on the front panel of the 8702 to the 1000 micron position. Set the Pierce Voltage to 110 +/-5Volts. See Figure 1 for location of adjustment and measurement point.

If you are unable to set the pierce pot in this range you will have to move the Pierce jumpers.

WARNING

*Turn OFF the 8702 before
moving the pierce jumpers*

Move the jumpers one set of holes forward to decrease the pierce voltage move the jumpers backwards to increase the pierce voltage. See Figure 1.

- M. Set the Spot Size switch on the front panel to OFF.
- N. Turn the voltage control on the Glassman power supply to zero. Turn on the Glassman power. Slowly increase the Glassman power supply voltage. Watch analyzer vacuum pressure on the Ion gauge. If the system pressure starts to rise above 1×10^{-7} Torr STOP increasing the Glassman voltage. Wait until the system pressure comes back down below 5×10^{-8} Torr, then increase the Glassman voltage gradually. Continue until the Glassman is at maximum voltage (10KV). Also watch for signs of arcing which will show a quick change in Glassman current or vacuum pressure. Stop increasing voltage until arcing stops.
- O. Note the current reading on the Glassman power supply, write it down. This current will be 2 to 3 mA. This is the base current. If this current is above 3mA, STOP - CALL SPI.

- P. Switch the Spot Size switch to 150 microns. Check Glassman current. Be sure it is below 4 mA, if necessary turn down I2KV. Check vacuum. Vacuum should be kept below 1×10^{-7} Torr.
- Q. Continue to increase to larger spot sizes. Follow above procedure. Glassman current should be below 7 mA for 300 micron spot and below 12 mA for 600 micron spot. After spot size is at 1000 micron wait for system pressure to drop below 5×10^{-8} Torr.
- R. Read the Glassman power supply current. If the Glassman current is less than 22 mA, use the I2KV pot to increase the I2KV. If the Glassman current is greater than 23 mA, decrease I 2KV until the Glassman current is 23 mA. Make adjustment slowly keeping vacuum pressure below 1×10^{-7} Torr.

**SETTING THE GLASSMAN CURRENT TO 22mA
FOR THE LARGEST SPOT BY ADJUSTING
THE I2KV WITH PIERCE SET IN THE
RANGE OF 105 TO 115 VOLTS IS VERY
IMPORTANT TO FILAMENT & CATHODE LIFE.**

**S-PROBE POWER OF 250 WATTS MAY BE
OBTAINED BY SLIGHTLY HIGHER I2KV
SETTINGS.**

It is normal for the Glassman current to drift for the first hour of operation. Let gun and supply stabilize before proceeding. Readjust the I2KV to keep the Glassman current between 22 and 23 mA.

- S. Measure E2KV and E10KV with suitable 1000:1 voltage probe. Compute:

$$(E2KV - E10KV) * I2KV$$

This is the Cathode power. If value for Cathode power has been supplied compare to the installed value. Contact SPI immediately if installed power is greater than 1 Watt above factory test value.

- T. Select 150 micron spot. Set the 150 micron Pierce pot for 4.0 mA on the Glassman meter.
- U. Select 300 micron spot. Set the 300 micron Pierce pot for 7.5 mA on the Glassman meter.
- V. Select 600 micron spot. Set the 600 micron Pierce pot for 12.5 MA on the Glassman meter.

- W. Load a phosphor sample or X-ray film into analyzer.

*If E-Gun test data sheet
is with E-Gun, the voltages
on data sheet may be used to
initially set F1. Use a 4-1/2
digit DVM with 1000:1 High
Voltage divider probe.*

*Final values must be obtained
by measuring actual spot size.*

- X. Set 8702 Spot size switch to 150 micron spot position. Adjust 150 micron spot F1 pot (turn CW slowly) to get a 150 micron spot on the phosphor. This is measured in the microscope on 50X. See Figure 2. Check the power (Glassman current) when setting spot size, if it changes re-adjust pierce to correct power.
- Y. Set 300 and 600 micron spots the same as 150 micron spot. Error with caution make the spot a little large (i.e 300=310; 600=620).
- Z. The 1000 micron spot may be set to 800 microns. The spot may appear a little odd. See Figure 3.

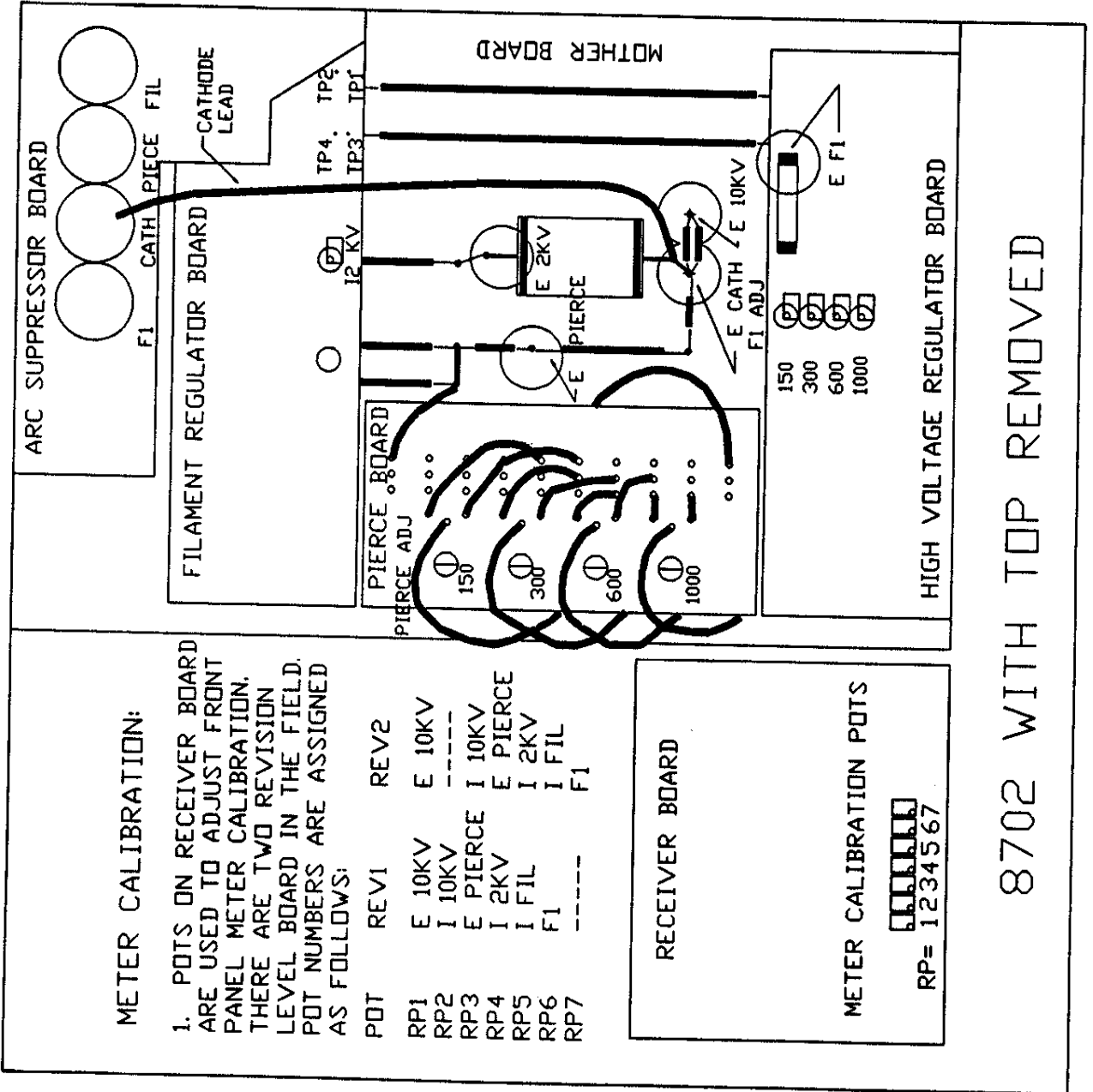
On the Line/Spot Guns and S-Probes follow existing instructions for spot size adjustment.

- AA. With a 4-1/2 digit DVM and a 1000:1 high voltage divider probe, measure F1 and pierce voltages for all four spot sizes. Record these voltages for future use.

**AFTER COMPLETING THIS PROCEDURE FOLLOW INSTRUCTIONS ON WARRANTY
CERTIFICATE AND FAX OR MAIL TO SPI.**

- BB. Replace 8702 top cover. Be sure to get the long top cover screw into the left side hole for the interlock.

FIGURE 1



METER CALIBRATION:

1. POTS ON RECEIVER BOARD ARE USED TO ADJUST FRONT PANEL METER CALIBRATION. THERE ARE TWO REVISION LEVEL BOARD IN THE FIELD. POT NUMBERS ARE ASSIGNED AS FOLLOWS:

POT	REV1	REV2
RP1	E 10KV	E 10KV
RP2	I 10KV	-----
RP3	E PIERCE	I 10KV
RP4	I 2KV	E PIERCE
RP5	I FIL	I 2KV
RP6	F1	I FIL
RP7	-----	F1

RECEIVER BOARD

METER CALIBRATION POTS

RP= 1234567

8702 ADJUSTMENTS

NOTES:

1. PIERCE JUMPERS SHOWN AT TYPICAL POSITIONS. ADJUST PAIRS OF WIRES FORWARD OR BACK TO KEEP CONSTANT DROP ACROSS POTS.
2. THE VOLTAGE BETWEEN TP3 - TP4 DIVIDED BY 40 PROVIDES GOOD MEASUREMENT OF I 2KV. TEST POINTS ARE AT 2000 VOLTS WITH GLASMAN OFF. TEST POINTS ARE AT 12,000 VOLTS WITH GLASMAN ON.
DO NOT TOUCH METER WHEN CONNECTED TO TEST POINTS WITH EITHER SUPPLY ON!!
3. THE VOLTAGE BETWEEN TP1 - TP2 DIVIDED BY .33 PROVIDES GOOD MEASUREMENT OF I FILAMENT. ALL CAUTIONS ABOVE APPLY.
4. THIS IS A SIMPLIFIED DRAWING OF THE 8702. PARTS AND CONNECTION ARE ONLY SHOWN TO AID IN MAKING ADJUSTMENTS. DETAIL HAS BEEN REMOVED.

8702 WITH TOP REMOVED

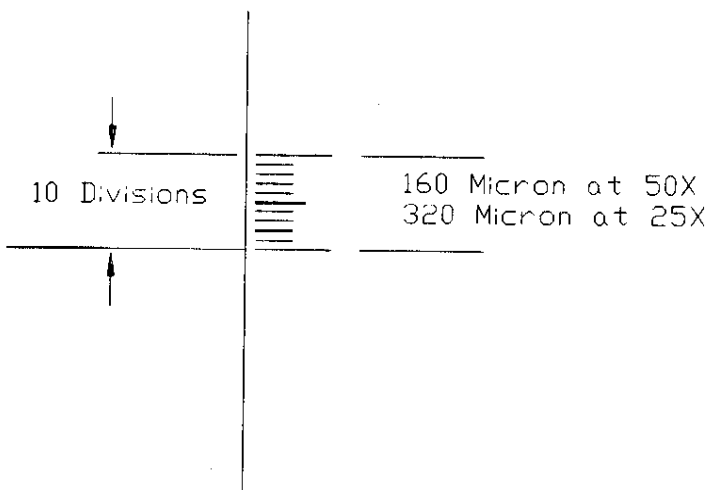


FIGURE 2

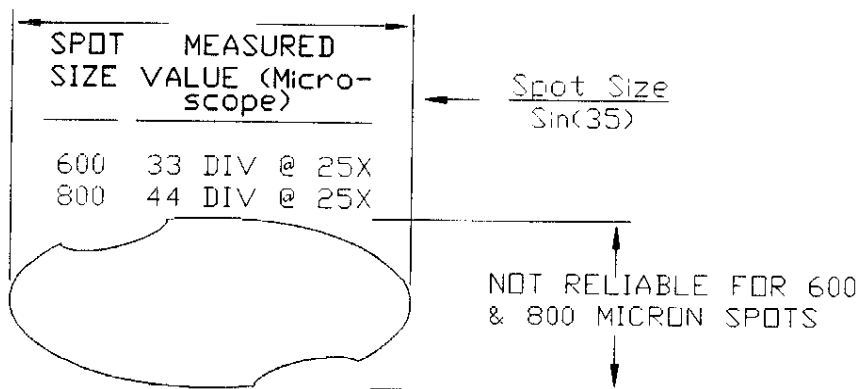


FIGURE 3