



ASSEMBLY & INSPECTION OF ELECTRON GUNS  
SUBJECT: Process Specifications

Initially for image orthicons.

## I. ADJUSTING THE CATHODE-GRID SPACING.

### A. Equipment

1. L-875P cathode spacing jig and arbor press.
2. Cathode-grid spacer made to a thickness of .011"  $\pm$ .0005".
3. Tweezer welder.

### B. Procedure:

1. Retract the inner pin of the cathode spacing jig and lock it in this position with the thumb screw.
2. Place the cathode flange assembly and the cathode assembly on the spacing jig.
3. Carefully place the cathode spacer on top of the cathode cap taking care not to mar the coated surface.
4. Carefully place the grid assembly over the cathode assembly on the jig and seat the parts firmly by applying pressure with the arbor press.
5. Release the thumb screw and allow the inner pin of the jig to slowly raise the cathode cap until the spacer is in contact with the G<sub>1</sub> cup. Lock the jig in position with the thumb screw.
6. Remove the grid assembly and the spacer from the cathode assembly. After making sure that the cathode assembly is seated against the inner pin in the position determined in step #5, weld the skirt of the cathode assembly to the cathode flange at several points in the area where the surfaces over-lap, using the tweezer welder.
7. This particular cathode assembly is now matched to the grid assembly used in adjusting the spacing and only these two components can be assembled in making the complete gun. Replace the grid assembly over the cathode assembly and inspect the cathode grid spacing, rejecting any assembly which is obviously too close or too wide spaced.
8. Slide the entire assembly off the jig and store it as a unit.

## II. ASSEMBLY OF COMPLETE GUNS.

### A. Equipment

1. Retainer welding electrodes, Model No. L-875-AW and L-755-IA.
2. Voltohmyst or other leakage and high resistance testing device.
3. Extension welding jig (Model L-755-LG).

### B. Procedure:

1. Remove the complete cathode assembly from the grid assembly and holding it in an inverted position insert the complete heater assembly into the inner sleeve of the cathode. Seat the lug on the heater ceramic into the notch of the cathode support flange and bend the cathode lead wire to hold the cathode assembly firmly against the ceramic.
2. Carefully insert this assembly into the matching grid assembly (See step #7 of part I), threading the G<sub>1</sub> lead through the hole in the lug of the heater ceramic. Press the assembly firmly together.
3. Check for electrical shorts between gun elements and for continuity between the external leads and the proper gun element.

→SCALE—

\* General Revision

(Cont'd on page 2)

DIMENSIONS IN

UNLESS OTHERWISE SHOWN.

DIMENSIONS SHOWN WITHOUT TOLERANCES ARE DESIGN CENTERS

3-494-28-60 PCL11004-121JD

\* CHANGE  
\*\* ADDITION  
\*\*\* DELETION

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4. With the final retainer fitted on the welding electrode, insert it in the grid cylinder, press the gun parts tightly together and weld the retainer in place.
5. Check for electrical shorts and for tightness of grid and cathode in the assembly.

### III. X-RAY INSPECTION OF GUNS:

#### A. Equipment:

1. X-ray camera.
2. Bausch and Lomb Shop Microscope (Cat. No. 31-29-33), with reticule graduated in thousandths of an inch.

#### B. Procedure:

1. Place #14 guns in a tray in which their axes will lie in a horizontal plane. Rotate each gun so that the plane in which the four leads lie is horizontal.
2. Mask half the photographic plate from X-radiation and make an exposure  
\*\*at 120KV, 15 sec, 7ma, 2 views, 1 tray per film. Rotate all guns through 90°, reverse tray and mask on photographic plate, and take a second exposure. The tray of guns should be located such that the center of the X-ray beam strikes the gun opposite the cathode cap and normal to the gun axis so that planes normal to the gun axis photograph as lines and not elliptical projections.
3. Examine the developed photograph and reject for the following items in either exposure of each gun:
  - a. Tilted or distorted G<sub>1</sub> or cathode.
  - b. Bent leads which might cause shorts.
  - c. Deformed or improperly located heaters. The top end of each heater should be within one mm of the top of the cathode cap.
4. Using the X-ray photograph measure the cathode-grid spacing with the shop microscope. Measure from the upper surface of the cathode cap to the lower surface of the G<sub>1</sub> cup. Spacing of 7 through 12 mils. inclusive may be used. Spacing closer or wider should be rejected. Record the measured spacing on the photograph and indicate rejected guns. Assign a plate number to the X-ray and after guns have been used in mounts file the photograph for a period of three months.
5. Mark the spacing and X-ray number on the gun with an electric pencil.
6. Add the gun extension cylinder being careful to align its axis with that of the grid cylinder.
7. Thread the ceramic insulators over the heater, cathode and G<sub>1</sub> leads.

### IV. ADDITION OF DYNODE APERTURE.

#### A. Equipment:

1. Model L-875-S Aperture aligning fixture and microscope.
2. Tweezer welder.

#### B. Procedure:

1. The dynode should have been checked for aperture size and uniformity of beryllium coating as per S.N. 34-13-4B.
2. Place the gun in the V-block clamp making sure the axis is vertical.
3. By adjusting the standard microscope compound micrometer screws align the center of the G<sub>1</sub> aperture under the cross hairs. Record reading on micrometer screws.

(Cont'd on page 3.)



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SUPERSEDES

IV. ADDITION OF DYNODE APERTURE (Cont.)

B. Procedure (Cont.)

4. Place the dynode over the gun and hold it down with claw attached to the second set of compound micrometer screws. Using these adjustments move the dynode around until the aperture is centered under the cross hairs. Check the reading noted in step #3.
5. Weld the dynode to the gun by making several welds to the flange on the grid cylinders using the tweezer welder.
6. Recheck the alignment after welding. Reject any assembly in which the aperture is more than .002" from the cross hair setting.
7. Remove the assembly from the jig and reweld the dynode to the grid flange to assure a strong bond.
8. Check the alignment to see that the plane of the dynode is at 90° with the gun axis.

ENGINEERING SECTION  
STANDARDIZING

SCALE—

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