



PROCESSING CATHODE-RAY TUBE CATHODES

SUBJECT: Process Specifications

DATE August 3, 1951 PAGE 0

STANDARDIZING  
NOTICE 34-14-5F

MAY 1955

SUPERSEDED DATE

Formerly part of 34-14-5A

Processing of cathodes is a vital division of cathode-ray tube manufacture. Extreme cleanliness must be maintained at all times. Clean gloves must be worn by all operators and tweezers must be used in handling of parts. Clean boxes or preferably clean bottles with screw tops must be used in storing parts overnight or between operations. Each work position must be kept clean and used exclusively for cathode processing operations. As an additional control over processing, one operator should be made responsible for proper processing of cathodes. Responsibilities of this operator should include (added to those above): (1) A spot visual inspection of all parts for spots, stains, non-uniform finish, contamination, etc., after washing and other operations; (2) Firing precautions such as use of clean nickel boats, reserved for firing cathode-ray work only; inspection of caps for uniformity of oxidation after firing in air and to check on prevention of firing caps in hydrogen furnace used for any carbonized parts; (3) Removal of oil and dust from sizing machine; and (4) Final inspection of assemblies prior to spraying and the checking of depression depths on specified cathodes.

1. EQUIPMENT

- a. Pressure assly fixture (marked R210 & T5) for clamping cap to sleeve.
- b. Metal rod (.110" dia. x 8") and steel block for rolling ends of sleeve to fit cap and ceramic. (Optional)
- c. Welding device such as Westinghouse Lamp Co. Welder model #36D with electrodes shaped to meet requirements of welding.
- d. Sizing machine Model No. R13861 for flat top cathodes.
- e. Sizing and depression forming machine marked 16220 with depression die marked R210 and S.O. 11121.
- f. Metal cathode holder Model #788BL with inside spacing bar. Use bar only when spraying cathodes with short sleeves.
- g. A spray chamber connected to a blower of sufficient capacity so that no odor or dust can be detected outside of the chamber during spraying, also equipped with spray gun guide rail to hold gun perpendicular to cathode spray bar and required distance from cathode surface during each pass.
- h. A removable spray stand for supporting a cathode bar in a horizontal position.
- i. A DeVilbiss Areon Type CV spray gun, preferably equipped with a glass jar for convenience in observing when to refill.  
or
- j. A DeVilbiss spray finishing system, type QM, 5 or 10 gallon pressure tank equipped with a type QS air driven agitator and the necessary rubber hose, gauges, valves, type CV gun, etc. The type CV gun requires the use of a No. 90 air cap and a letter F fluid tip and needle. This gun is for hand spraying.
- k. High pressure air source.
- l. Air transformer capable of delivering 60 psi with air filter in line before transformer.
- m. Electric circulating air oven in which a uniform temperature of 90-110°C can be maintained.
- n. A device to roll bottles of spray mixture.
- o. Motor driven brush for cleaning cathode bars. For this purpose a 3-section brush consisting of a Newark Brush Co., 8" dia., 3" hub, .006" brass wire, safety section between two Newark Brush Co. 8" dia. Union Fiber safety brushes has been used and found satisfactory.

SCALE—  
DIMENSIONS IN

(Continued on page 0-1)

UNLESS OTHERWISE SHOWN. DIMENSIONS SHOWN WITHOUT TOLERANCES ARE DESIGN CENTERS

19-517-24-60 126DS

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

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DATE August 3, 1951 PAGE 0-1

STANDARDIZING  
NOTICE 34-14-5F

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SUBJECT: PROCESSING CATHODE-RAY TUBE CATHODES  
Process Specifications

SUPERSEDED DATE

Formerly part of 34-14-5A

1. EQUIPMENT (Cont'd)

- p. Hand brush (such as a paint brush of suitable size) for cleaning dust out of cavities in cathode holders.
- q. Torsion balance-200 mg. capacity  
Precision torsion balance - 0-15 mg. capacity.  
Small bristle brush for removing coating from gun nozzle.  
Spray Machine Mod. No. 788-AE
- r. Barrel micrometer.
- s. Magnifying glass, tweezers, clean silk gloves, etc.
- t. Continuity checker Model #831-EE for measuring depth of depressions.

2. MATERIALS Emission mixture as specified on FK assembly.

- A53 Acetone
- W7E 33-W-7E Distilled Water
- A66 Acetic Acid
- M15 Methanol or equivalent solvent for cleaning sizing machine.

**DANGER**

ACETIC ACID HANDLING PRECAUTIONS: See S.N. 33-2-7C.

3. PROCEDURE

- a. Prior to this point, all parts that make up cathode assembly must have been given a washing and firing as specified on FK assembly

(Schedules on following page)

SCALE—

DIMENSIONS IN

UNLESS OTHERWISE SHOWN.

DIMENSIONS SHOWN WITHOUT TOLERANCES ARE DESIGN CENTERS

30-517-24-60 126DS

0 CHANGE  
00 ADDITION  
000 DELETION

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MAY

1955

SUBJECT: PROCESSING CATHODE-RAY TUBE CATHODES  
 Process Specifications.

SUPERSEDED DATE \$(See Below)

**SCHEDULE NO. 2**  
**(For Depression Top Cathodes)**

**A. PREPARATION OF ASSEMBLY**

Procedure is the same as in Sched. #1 except that a depression is formed in cap during sizing operation. The die set for this operation consists of a fixed post (recessed on top), on which the assembly is seated, and an upper forming die, plunger operated. Each time dies are set up for forming depression, make sure that depressions are of a depth as specified on FK assembly. Visually inspect 100% of formed cap assemblies for defective forming. Make 10% check inspection on depth of depressions, using continuity checker for measuring.

**1. Checking Depth of Depression**

When using continuity checker it is very important that platform be clean and smooth, i.e., free from dust, lint, or any other substance which might prevent perfect sealing of the object to be checked, and result in an erroneous measurement. Surfaces of test objects, making contact with platform, must also be clean and smooth.

- a. Observing above precautions, place test block in position on platform of continuity checker, and, using micrometer head, adjust contact making pin so that it just touches test block, contact being indicated when shadow on screen of electron-ray tube changes from one of a large angle to a small angle. Read setting of micrometer. This reading corresponds to zero depression.
- b. Place cap and sleeve assembly, cap end down, over contact pin and against stop which positions cap off-center with respect to pin and allows depth reading to be taken on a circle about midway between edge and center of depression. To seat cap flush on platform, place small weight, which is supplied with checker, on top end of cathode sleeve. Elevate pin by turning micrometer head until contact is again made as indicated by change in shadow on screen of tube. Read micrometer. To check depth of depression at other points, rotate cap.

**B. SPRAYING CATHODE ASSEMBLIES**

1. Load assemblies into grooves of holder which, when closed, leaves only the ends of cathodes exposed.
2. Position loaded holder in support in spraying chamber so that cathodes rest horizontally and with exposed ends facing operator and front of chamber.
3. Use following Schedule:

|                             |           |   |                                      |
|-----------------------------|-----------|---|--------------------------------------|
| Type Spray - - - - -        | Medium    | Gun Pres. - - - - -                               | 38-40 lb/sq. in.                     |
| Nozzle Setting (Dial) - - - | 20        | Gap Opening (Turns) - - -                         | 2                                    |
| Gun to Cathodes - - - - -   | About 10" | Rate of Passes - - - - -                          | Approx. 1, 2 sec. for 1 1/4" holder. |
| Number of Passes - - - - -  | 75-80     | \$Supersedes p.2 dtd. 2/10/50<br>p.6 dtd. 4/11/46 |                                      |

Data rearranged.

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 ADDITION  
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24-517-24-60 126JK

1328

**RADIO CORPORATION OF AMERICA**

RCA VICTOR DIVISION,

TUBE DEPT. STANDARDIZING K2cp4K

HARRISON, N. J. LANCASTER, PA.

**PROCESSING CATHODE-RAY TUBE CATHODES**

SUBJECT: Process Specifications

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NOTICE

SUPERSEDED DATE Mar. 19, 1947 Page 7

**SCHEDULE NO. 2 (Cont'd)****B. SPRAYING CATHODE ASSEMBLIES (Cont'd)**

4. Oven Dry for 3-5 min. at 100°C.
5. Mount each cathode on individual holder, and trim sides of cathode cap with clean cloth.
6. Using a sharp razor blade, carefully shave off excess coating flush with end of cathode. The coating must be removed a little at a time, otherwise the coated surface is likely to become badly scarred.

If after the trimming operation less than 15 good cathodes remain out of a lot of 26 cathodes (or a proportionate number out of a larger lot), due to poor quality coating as a result of the inherent character of the spray material, reject the bottle of spray material used for coating and cathodes.

**C. REJECTION OF SPRAY MATERIAL BECAUSE OF DIFFICULTY IN TRIMMING COATING**

Coated cathodes which are rejected because of poor trimming, regardless of the underlying cause, should be cleaned, refired, and resprayed; but if not satisfactory after the third refiring, they should be permanently rejected, consequently, cathodes held for recovery should, regardless of spray lot number be kept separate according to firing, i.e., whether they were initially fired refired once, twice, or three times.

**\* Data Rearranged**

SCALE—

DIMENSIONS IN

UNLESS OTHERWISE SHOWN.

DIMENSIONS SHOWN WITHOUT TOLERANCES ARE DESIGN CENTERS

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

25-517-24-60

126JK

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126JK





SUBJECT: CATHODES  
Process Specification

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NOTICE

34-14-5F

SUPERSEDES Jan. 27, 1954

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1955

4. SPRAY PREPARATION

- a. Spray shall be rolled for forty-eight hours before use and will roll continuously throughout its use.
- b. Only spray with approval lot number shall be used.
- c. If lot number is not approved, fifty cathodes will be sprayed with the unapproved lot and MIB and cutoff readings recorded and submitted to engineer for comparison with past approved lots. Lot will be held until approval has been received.

5. PROCEDURE

- a. Cathodes are loaded into bars using tweezers. Operator inspects for cracks or imperfections in cathodes. All holes in bar must be loaded; operator should also watch out for oversize holes and notify foreman of same. Correct back plate (having covered sides and ends) shall be bolted on.
- b. Bar is placed in holder in spray booth.
- c. Spray gun is cleaned thoroughly with acetone and filled approximately 2/3 full with approved spray.
- d. Initially spraying will be done past the bar into the booth to assure a proper spray. The spray should give a uniform covering with no spurts or voids in the process.
- e. Spray data:

|                                  | Initially Spray | Final Spray |
|----------------------------------|-----------------|-------------|
| Distance nozzle to bar in inches | 5               | 5           |
| Gun type, DeVilbiss              | Type CH87706    | #90 Nozzle  |
| Seconds per pass                 | 4               | 4           |
| → Number of passes               | * 3-5           | * 3-5       |
| Air pressure (PSI gauge)         | 18              | 18          |
| Bake after spray                 | FGA20           | FGA20       |
| Nozzle setting                   | 8-10            | 8-10        |

- f. A measurement of six cathodes for coating thickness will be made from each sprayed bar. These will be picked from the ends of each row of a bar. The thickness will not be less than .002" or more than .003". There will be no chipping or peeling when the cathodes are scratched with tweezers.
  1. Respray all rows with thickness below limit (one pass will give approximately .0004").
  2. Reject a row if adjacent cathodes to the ones measured are also over limit.
  3. Partial bars may be rejected or reclaimed, but technique and apparatus should be examined if situation persists.

Note: Whenever bars are resprayed, the holes in the bar caused by removing cathodes to check the thickness must be plugged. This may be done by putting back into the bar the cathodes previously checked but these must be removed after respraying.
- g. Every two hours fresh spray will be used to prevent settling of material in spray gun jar. Three times a shift, cathode density will be determined by spraying a 2cm x 2cm nickel plate with the density being determined by the cathode spray operator. Density results will be posted on an average and range chart and are also picked up by the Quality Control Engineer concerned. Cathode density must be maintained within the limits of .9 to 1.1mg./cu.cm.

SCALE—

DIMENSIONS IN

UNLESS OTHERWISE SHOWN.

DIMENSIONS SHOWN WITHOUT TOLERANCES ARE DESIGN CENTERS

2-542-26-60

PCL23532-133EB

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(Cont'd on supplementary page)



RADIO CORPORATION OF AMERICA  
RCA VICTOR DIV., TUBE DEPT.  
STANDARDIZING, LANCASTER, PA.  
PROCESSING CATHODE-RAY TUBE

KS-  
2x4-  
KX3

DATE Jan. 27, 1954 PAGE 4b

STANDARDIZING  
NOTICE 34-14-5F

SUBJECT:

CATHODES  
Process Specification

SUPERSEDES Nov. 13, 1951

MAY

1951

## 5. PROCEDURE (Cont'd)

- h. All used spray bars will be washed in acetone and cleaned with motor driven brush before reuse.
- i. Spray gun will be cleaned with acetone four times a shift or any time it is inoperative for longer than 15 minutes. Cleaning will be accomplished by spraying a jar of acetone through the gun. The gun will be filled with acetone after final cleaning when it will be inoperative for more than fifteen minutes.
- j. Cathodes will be delivered to ceramic and eyelet operator in spray bars. Care will be taken in handling and no cathodes sprayed or unsprayed will be stored without precautions to prevent contamination. Continued storage will be in a cool, dry atmosphere and sprayed cathodes held for more than three week will require the approval of the engineer before use.

\*\* End of Schedule #4

→  
SCALE—

DIMENSIONS IN

UNLESS OTHERWISE SHOWN.

DIMENSIONS SHOWN WITHOUT TOLERANCES ARE DESIGN CENTERS

11-541-20-61

PCL23160-133EB

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13D26-R1



# RADIO CORPORATION OF AMERICA

RCA VICTOR DIVISION

TUBE DEPT. STANDARDIZING L-2wx4-K

HARRISON, N. J.

LANCASTER, PA.

DATE Nov. 19, 1953 PAGE 6

STANDARDIZING  
NOTICE

34-14-5F

MAY

1955

SUBJECT: PROCESSING CATHODE-RAY TUBE CATHODES  
Process Specifications

SUPERSEDED DATE Mar. 31, 1953

## SCHEDULE NO. 6 (Initially for KS623A) (Lancaster Only)

### EQUIPMENT:

- a. Sizing machine - Permanent property.
- b. Spray bars Model L788B, C1802 General assembly.
- c. Spray booth equipped with spray gun guide rail to hold gun perpendicular to cathode spray bar at the required distance from cathode surface during each pass. Model No. \*780U
- d. Spray gun Devilbiss No. Type \*CH88369 #90 nozzle.
- e. Oven, included in spray booth.
- \* f. Cathode material thickness coater Model No. L836B-2137
- g. Precision balance Roller. \*\*\*\*
- h. Motor driven brush. \*\*\*
- i. Tweezers, cotton gloves, glass jars with screw lids.
- j. Hydrogen furnace, C.I. Hayes. \*\*\*
- k. Acetone can Justrite Manufacturing Co. 1 gal.
- l. Stainless steel baskets.

### 2. MATERIALS:

- \* A55 Acetone
- E11 Ether
- T251 Trichlorethylene
- W60C Demineralized water
- \* C185A Cathode Spray



TRICHLORETHYLENE HANDLING PRECAUTIONS: See 33-2-11C  
ETHER HANDLING PRECAUTIONS: See 33-2-60

### 3. PROCEDURE:

#### a. Cathode preparation

- \* 1. Wash W614E.
2. Fire FHH10.
3. Size.

- a. Cap height will be held \*.0995" ± .0005" (bottom of flange to face of cathode).
- b. Measurements will be made once each hour on a sample of three cathodes taken at random. If one of the samples is found to be out of specifications, \*call the maintenance man to go over the sizing machine.

4. Ether wash 2 to 3 seconds.

- \* 5. Wash W42.

6. Fire FGH 5. Parts must come out of air firing free of spots and contamination. \*\*(Use baskets specified above under equipment).

7. Fire FHH10.

- \*\* 8. Once a day perform step #6 on 100 cathodes ready for spraying. If parts are not free of contamination, reject entire days lot. This is a check on possible contamination from step #7.

NOTE: From this point on cathodes when not in process will be stored in clean glass jars with screw type lids. Handling will only be done with clean white gloves or tweezers.

SCALE—

DIMENSIONS IN

UNLESS OTHERWISE SHOWN.

DIMENSIONS SHOWN WITHOUT TOLERANCES ARE DESIGN CENTERS

12-5311-2-60

PC122266-133LG

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### 3. PROCEDURE (Cont'd)

#### b. Spray preparation.

1. Spray shall be rolled for forty-eight hours before use and will roll continuously throughout its use.
2. Only approved spray material shall be used.
3. Fifty cathodes will be required for an approval test. MIB and cut-off readings will be recorded and submitted to engineer for his approval.

#### c. Spraying cathodes.

1. Cathodes are loaded in bars using tweezers. Operator inspect for cracks or imperfections.
2. Bar is placed in holder on spray booth.
3. Spray gun is cleaned thoroughly with acetone and filled approximately 2/3 full with approved spray.
4. Initially spraying will be done past the bar into the booth to assure a proper spray. The spray should give a uniform covering with no spurts or voids in the process.

#### 5. Spray data:

| Spray application             | 1st      | 2nd      | 3rd      | 4th      |
|-------------------------------|----------|----------|----------|----------|
| Passes per application        | 1-10     | 11-20    | 21-30    | 31-40    |
| Type of spray                 | Med. Wet | Med. Wet | Med. Wet | Med. Wet |
| Gun pressure (psi)            | 30-40    | 30-40    | 30-40    | 30-40    |
| Nozzle setting                | 19       | 19       | 19       | 19       |
| Gun opening (turns)           | 1-1/4    | 1-1/4    | 1-1/4    | 1-1/4    |
| Distance - gun to K           | 4"       | 4"       | 4"       | 4"       |
| Rate of passes (sec/pass) * 1 | * 1      | * 1      | * 1      | * 1      |
| Number of passes              | 10       | 10       | 10       | 10       |

Dry 5 to 15 minutes between applications.

6. A measurement of three cathodes for coating thickness will be made from each sprayed bar. The thickness will not be less than .0022" or more than .0027". There will be no chipping or peeling when the cathodes are scratched with tweezers. Twice a shift check cathode spray weight by positioning a 2 cm x 2cm square plate at the center of the spray bar. Use standard spraying technique. The weight of cathode material on the plate should be 22 - 35 mg (5.5 - 9 mg/sq cm). The data obtained shall be plotted on a graph displayed in the mounting department.
  - a. Respray all rows with thickness below limit (one pass will give approximately .0004").
  - b. Reject a row if adjacent cathodes to the one measured are also over limit.
  - c. Partial bars may be rejected or reclaimed, but technique and apparatus should be examined if the situation persists.
7. Every two hours fresh spray will be used to prevent settling of material in spray gun jar.
8. All used spray bars will be washed in acetone and cleaned with motor driven brush before reuse.

SCALE

DIMENSIONS IN

UNLESS OTHERWISE SHOWN. DIMENSIONS SHOWN WITHOUT TOLERANCES ARE DESIGN CENTERS

14-5412-8-60 PCL26152-126JD

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13D26-R2





# RADIO CORPORATION OF AMERICA

RCA VICTOR DIVISION

TUBE DEPT. STANDARDIZING L-2wx4-K

HARRISON, N. J. LANCASTER, PA.

DATE Nov. 9, 1953 PAGE 6b

STANDARDIZING  
NOTICE

34-14-57

MAY

1955

SUBJECT:

PROCESSING CATHODE-RAY TUBE CATHODES  
Process Specifications

SUPERSEDED DATE Mar. 16, 1953

## 3. PROCEDURE (Cont'd)

### c. Spraying cathodes (cont'd)

9. Spray gun will be cleaned with acetone twice a shift or any time it is inoperative for longer than 15 minutes. Cleaning will be accomplished by spraying a jar of acetone through the gun. The gun will be filled with acetone after final cleaning when it will be inoperative for more than fifteen minutes.
10. Cathodes will be delivered to \*cathode crimping operator in special cathode boxes. Care will be taken in handling and no cathodes sprayed or unsprayed will be stored without precautions to prevent contamination. Continued storage will be in a cool, dry atmosphere and sprayed cathodes held for more than three weeks will require the approval of the engineer before use.

\*\* NOTE: For sample test of each lot of incoming cathodes for contamination, see procedure outlined in S.N. 33-N-1098.

\*\* End of Schedule #6

SCALE—

DIMENSIONS IN

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DIMENSIONS SHOWN WITHOUT TOLERANCES ARE DESIGN CENTERS

14-5311-2-60

PCL22266-1331G

CHANGE

ADDITION

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13D26



MAY 1955

**SUBJECT: PROCESSING CATHODE-RAY TUBE CATHODES**  
**Process Specification**

This specification applies to the process of assembling cathode cylinder and ceramic spacer using expansion and press method.

**SCHEDULE NO. 7**

(Initially for Tube Type A2334C)

**1. EQUIPMENT**

- a. Cathode to ceramic spacer machine - model L875BM.  
Description: Equipment is a 12 head manually indexed machine which firmly affixes cathode cylinder to ceramic spacer and flares the end of the cathode cylinder. The operations are accomplished in three steps as follows:
1. Mandrel is inserted in cathode cylinder and expanded to form a boss as shown in figure 1. At this point cathode should be able to rotate within ceramic, but there should be a minimum of vertical movement.
  2. Boss in cylinder is flattened against ceramic by means of a press position figure 2. At this point, as after all subsequent operations, the assembly is tight and no movement can take place between ceramic and cathode.
  3. Cathode is very slightly flared to permit easier insertion of heater and provide deburring of cathode. This is accomplished with a tapered mandrel inserted in the open end of cathode cylinder.

**2. PROCEDURE**

- a. Load cathode open end up in head of machine.
- b. Place ceramic over cathode and seat ceramic against cathode flange.
- c. Index machine.
- d. Unload assembly and place in tray.

**3. INSPECTION**

- a. Check 5 assemblies/machine/hr for the following:
1. Check flare -- flare should not be so deep as to distort cylinder.
  2. Check for splitting of metal at press or chipped ceramic -- both indicate too much pressure.
  3. Check cathode height -- large dimension changes indicate incorrect operation of machine.
  4. Check for looseness by attempting to rotate ceramic about cylinder.
  5. Check for cylinder contact inside ceramic. This is done by cutting ceramic in half and checking amount of distortion of cylinder within ceramic. Excessive distortion is caused by: expanding cathode too far above ceramic in step 1 of process; by a worn press in step 2; or by incorrect adjustment of restraining mandrel in press position. Figure 3 shows a good assembly. Figure 4 shows a badly distorted assembly with too much contact against ceramic, a condition which may materially lower operating temperature of cathode.

SCALE—

DIMENSIONS IN

UNLESS OTHERWISE SHOWN.

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18-5310-28-60

PCL22167-1331G

CHANGE  
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 STANDARDIZING, LANCASTER, PA.  
**PROCESSING CATHODE-RAY TUBE**  
**CATHODES**  
 Process Specifications

KF  
 2cw4-  
 Kc

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**NOTICE** 34-14-5F  
 SUPERSEDES MAY 1955

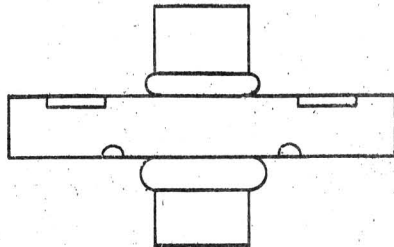


Figure 1

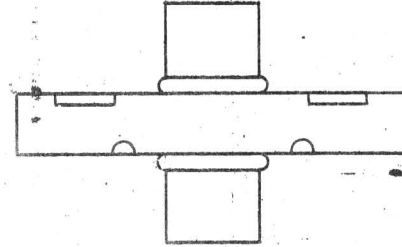


Figure 2

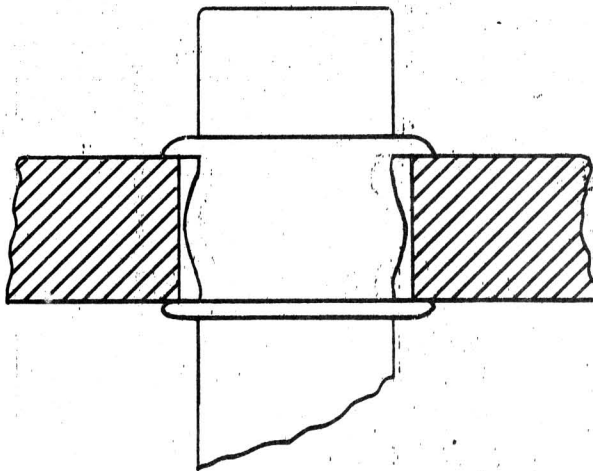


Figure 3

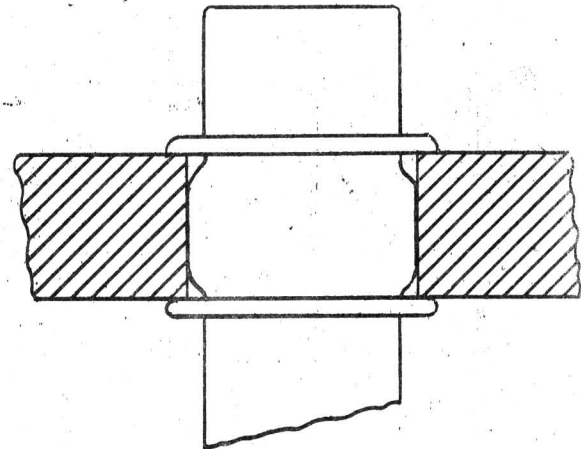


Figure 4

SCALE—  
 DIMENSIONS IN

UNLESS OTHERWISE SHOWN.

End of Schedule No. 7

DIMENSIONS SHOWN WITHOUT TOLERANCES ARE DESIGN CENTERS

19-5310-28-60

PC122167-133132JD

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12545-11