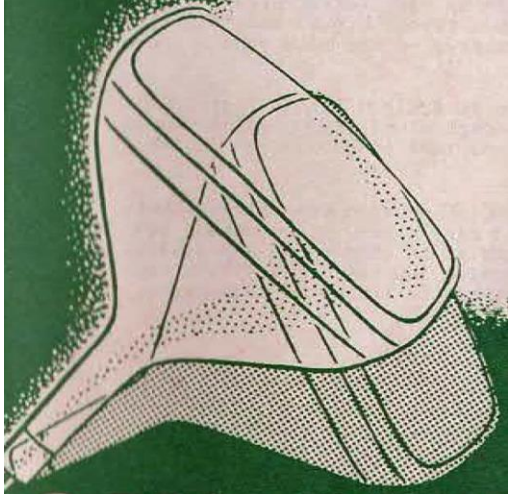
INCLUDING FOREIGN SUBSTITUTIONS

PRICE 50 CENTS

# CISIN'S NEW 1959 TV AND RADIO TUBE SUBSTITUTION GUIDE





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## SECTION 2

### Television Picture Tube Replacement Guide

Picture tubes are listed in the following INDEX according to type designations, starting with 7AP4 and ending with 30BP4. Wherever substitution is possible, each type number is followed by the number of a SUBSTITUTION GROUP. Tubes in any individual substitution group are interchangeable, some directly with no changes whatsoever, while others require certain changes.

### Easy as A, B, C to Find Tubes Which Are 100% Interchangeable.

Use the INDEX to find the tube to be replaced. This will direct you to the SUBSTITUTION GROUP to which this tube belongs. Next, refer to the KEY column of this group. If tube to be replaced has an "A" in the KEY column, any other tube in this particular group with an "A" in the same column may be used as a substitute without any changes whatsoever. If tube to be replaced has a "B" in the KEY column, it can be replaced without changes, by any tube in the same group with a "B"in that column. Similarly, tubes with "C" are 100% replaceable by other tubes with "C", if in the same substitution group.

In other words, all tubes with the same letter in the KEY column in any particular substitution group are directly interchangeable, since they are identical in all essential features including basing, dimensions, external coating, type of ion trap, etc. This feature makes it as easy as A, B, C to locate a 100% interchangeable picture tube using this guide.

If no letter appears in the KEY COLUMN after any particular tube, this indicates that this tube, while interchangeable with other tubes in its group, will require changes or that it has different dimensions from the other tubes. In many instances, these changes are slight. Their extent can be determined readily by consulting the characteristics given under the other column headings.

### Explanation of Other Column Headings in Substitution Group Tables

The FACE DESCRIPTION column tells whether face of tube is clear, gray, gray frosted, etc. Differences in this column do not affect interchangeability. Treated and frosted screens reduce reflections of external light; aluminized screens give increased brightness, while gray faced tubes improve contrast.

The BASING column designations refer to the basing diagrams which follow Substitution Group 32. These show the socket wiring used with each tube. No changes in the socket wiring are needed in any individual substitution group, with the exception of Group 1. Where two different basing designations are shown with identical socket wiring such as 12L and 12M these are used merely to indicate the absence or presence of external conductive coating.

The DIMENSIONS column permits selection of a suitable substitution tube to fit the cabinet dimensions. Where the neck length of the tube to be replaced is longer than that of the replacement, there may not be sufficient room for best adjustment of the focus coil, yoke and ion trap. It is better to select a replacement tube with the same or slightly longer neck length.

Presence or absence of EXTERNAL TUBE COATING must be taken into consideration when making picture tube substitutions. When a tube without external coating is used to replace one with this coating, it is necessary to connect a 500 MMF condenser of suitable high voltage rating between anode and chassis. When a tube with external coating is used to replace one without such coating, the external coating must be grounded to the chassis.

The ANODE CONNECTOR column shows whether ball or cavity connector is used. If the replacement tube has a different connector, the change must be made accordingly.

Note from the ION TRAP column that some replacement tubes do not require an ion trap. If a different ion trap is specified for the new tube, this should be installed.

The MAXIMUM ANODE VOLTAGE column gives the rating of each tube. If the set operating voltage is higher than the maximum rating of the tube, it is undesirable to use the tube as a replacement.

When substituting an electrostatic or self-focusing tube for a magnetically focused tube, remove the focus coil from the tube neck and mount it in the cabinet as far from the tube as possible. It should not be disconnected from the circuit unless it is replaced by an equivalent inductance or focus resistance. In substituting an automatic electrostatic focus tube for an electrostatic focus tube, no change in socket wiring is needed and it is unnecessary to remove the focus electrode lead from the socket.

## How to Use the TV Picture Tube Guide to Select a Replacement Tube

a. Carefully read the preceding instructions regarding column headings and necessary adjustments.

b. Locate the tube you wish to replace in the following INDEX and find the substitution group for this tube.

c. Pick a tube which is directly interchangeable by consulting the KEY column (tubes with same letters in same group are directly interchangeable). If no tube in the group is directly interchangeable, select the replacement tube which requires the least number of changes. (Different type faces such as bold, italics, regular, indicate need for changes).

d. Note significant differences in neck length and anode voltages, checking with preceding instructions to determine whether substitution is feasible. Make sure tube selected as a replacement will fit cabinet.

EXAMPLE: To Replace a 17AP4 Tube. This tube is in SUBSTITUTION GROUP 18. Since there is no letter in the KEY column, there is no direct replacement. The 17BP4A shown in bold face is identical with the 17AP4 in every respect except in overall length and in neck length. The longer neck length will not affect the substitution. If the 17BP4A is not available, the 17BP4B or 17BP4C may be used as substitutes or the more popular 17JP4 (shown in italics). Its higher anode voltage rating of 18 KV permits it to be used in a set supplying an operating voltage of 16 KV. The most popular tubes are listed in bold faced type. Other popular tubes are shown in italics.

# INDEX

# SUBSTITUTION GROUPS

| Type Number | Key (See "Introductory Notes") | Face Description | Basing | Maximum Dimensions in Inches: Over-all Length | Diameter or Height x Width | Neck Length | External Tube Coating | Anode Connector | Ion Trap | Maximum Anode Voltage (KV) |
|---|---|---|---|---|---|---|---|---|---|---|
| **GROUP 1: *Glass, spherical, round, electrostatic-focus, 50° to 57° deflection angles.*** | | | | | | | | | | |
| 7CP4 | | Clear | **8BQ** | 13 13/16 | 7 1/8 | 7 5/8 | **No** | **Ball** | **None** | 8 |
| **7DP4** | | Clear | 12R | 14 7/16 | 7 3/16 | 8 5/16 | Yes | Cavity | Double | 8 |
| **GROUP 2: *Glass, spherical, round, magnetic-focus, 50° to 52° deflection angles.*** | | | | | | | | | | |
| 7HP4 | | Clear | 12N | 13 3/8 | 7 5/16 | 7 5/16 | Yes | Ball | Double | 8.8 |
| 7QP4 | | Clear | 12D | 13 1/4 | 7 5/16 | 7 1/8 | **No** | **Cavity** | **Single** | **10** |
| **GROUP 3: *Glass, spherical, round, projection, magnetic-focus, 35° deflection angle.*** | | | | | | | | | | |
| 7NP4 | | Clear | 14N | 20 1/8 | 7 5/16 | 10 5/8 | No | Cap | None | 80 |
| 7WP4 | | Clear | 14N | 20 1/16 | 7 5/16 | 10 5/8 | **Yes** | Cap | None | 80 |
| **GROUP 4: *Metal, spherical, round, magnetic-focus, 54° deflection angle.*** | | | | | | | | | | |
| 8AP4 | A | Clear | 12H | 14 5/8 | 8 11/16 | 7 3/16 | — | Cone Lip | Single | 9 |
| **8AP4A** | A | Gray | 12H | 14 5/8 | 8 11/16 | 7 3/16 | — | Cone Lip | Single | 9 |



| Type Number | Key (See "Introductory Notes") | Face Description | Basing | Maximum Dimensions in Inches: Over-all Length | Diameter or Height x Width | Neck Length | External Tube Coating | Anode Connector | Ion Trap | Maximum Anode Voltage (KV) |
|---|---|---|---|---|---|---|---|---|---|---|
| **GROUP 5: *Glass, spherical, round, magnetic-focus, 50° to 54° deflection angles.*** | | | | | | | | | | |
| 10BP4 | A | Clear | 12N | 18 | 10 3/8 | 8 3/8 | Yes | Cavity | Double | 10 |
| **10BP4A** | A | Gray | 12N | 18 | 10 3/8 | 8 3/8 | Yes | Cavity | Double | 10 |
| 10CP4 | | Clear | 12N | 17 | 10 3/8 | 7 7/16 | Yes | **Ball** | Double | **12** |
| 10EP4 | | Clear | 12N | 18 | 10 3/8 | 8 3/8 | Yes | **Ball** | Double | **12** |
| 10FP4 | B | Clear, Alum. | 12N | 18 | 10 3/8 | 8 3/8 | Yes | Cavity | **None** | **12** |
| *10FP4A* | B | Gray, Alum. | 12N | 18 | 10 3/8 | 8 3/8 | Yes | Cavity | **None** | **12** |
| **GROUP 6: *Glass, spherical, round, magnetic-focus, 52° deflection angle.*** | | | | | | | | | | |
| 10MP4 | A | Clear | 12G | 17 3/8 | 10 7/16 | 7 3/4 | Yes | Cavity | Double | 10 |
| **10MP4A** | A | Gray | 12G | 17 3/8 | 10 7/16 | 7 3/4 | Yes | Cavity | Double | 10 |
| **GROUP 7: *Glass, spherical, round, magnetic-focus (unless otherwise indicated), 50° to 56° deflection angles.*** | | | | | | | | | | |
| 12JP4 | | Clear | 12D | 18 | 12 3/16† | 7 1/4 | **No** | **Ball** | *None* | 12 |
| 12KP4 | A | Clear, Alum. | 12N | 18 | 12 5/16 | 7 5/16 | Yes | Cavity | *None* | 12 |
| *12KP4A* | A | Gray, Alum. | 12N | 18 | 12 5/16 | 7 5/16 | Yes | Cavity | *None* | 12 |
| 12LP4 | B | Clear | 12N | 19 1/8 | 12 1/2 | 8 1/16 | Yes | Cavity | Double | 12 |
| **12LP4A** | B | Gray | 12N | 19 1/8 | 12 1/2 | 8 1/16 | Yes | Cavity | Double | 12 |
| 12QP4 | C | Clear | 12D | 17 7/8 | 12 5/16 | 7 3/16 | **No** | **Ball** | **Single** | 12 |
| 12QP4A | C | Gray | 12D | 17 7/8 | 12 5/16 | 7 3/16 | **No** | **Ball** | **Single** | 12 |
| 12RP4 | | Clear | 12D | 18 | 12 3/16† | 7 1/4 | **No** | **Ball** | **Single** | 12 |
| 12TP4 | | Clear | 12D | 19 1/8 | 12 1/2 | 8 7/16 | **No** | Cavity | Double | 12 |
| 12YP4* | | Clear | 12N | 19 1/8 | 12 1/2 | 8 7/16 | Yes | Cavity | **Single** | 12 |

**GROUP 8:** ***Metal, spherical, round, magnetic-focus, 54° deflection angle.***

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 12UP4 | A | Clear | 12D | 19 | 12½ | 8 1/16 | — | Cone Lip | **Double** | 12 |
| 12UP4A | A | Gray | 12D | 19 | 12½ | 8 1/16 | — | Cone Lip | **Double** | 12 |
| **12UP4B** | | Gray, Treated | 12D | 19 | 12½ | 8 1/16 | — | Cone Lip | Single | 12 |

**GROUP 9:** ***Glass, spherical, round, magnetic-focus, 55° deflection angle.***

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 12VP4 | A | Clear | 12G | 18⅜ | 12½ | 7 11/16 | Yes | Cavity | Double | 12 |
| **12VP4A** | A | Gray | 12G | 18⅜ | 12½ | 7 11/16 | Yes | Cavity | Double | 12 |

**GROUP 10:** ***Glass, spherical, rectangular, magnetic-focus, 65° deflection angle.***

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| *14BP4* | A | Gray | 12N | 17 3/16 | 9 13/16 x 12 5/8 | 7 23/32 | Yes | Cavity | Single | 14 |
| 14BP4A | A | Gray, Treated | 12N | 17 3/16 | 9 13/16 x 12 5/8 | 7 23/32 | Yes | Cavity | Single | 14 |
| **14CP4** | A | Gray | 12N | 17⅛ | 9 27/32 x 12 21/32 | 7 21/32 | Yes | Cavity | Single | 14 |
| 14DP4 | | Gray | 12D | 17⅛ | 9 27/32 x 12 21/32 | 7 21/32 | **No** | Cavity | **Double** | 14 |
| 14EP4 | | Gray | 12N | 16 17/32 | 9 27/32 x 12 21/32 | 7 1/16 | Yes | Cavity | Single | 14 |
| 14FP4 | | Gray | 12D | 16½ | 9 27/32 x 12 21/32 | 7 1/16 | **No** | Cavity | Single | 14 |

**GROUP 11:** ***Glass, spherical, round, magnetic-focus, 50° to 57° deflection angles.***

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 15AP4 | | Clear | 12D | 20⅞ | 15¾ | 7⅛ | **No** | **Ball** | *None* | **15** |
| 15CP4 | | Clear | 12D | 21⅞ | 15¾ | 8 3/16 | **No** | Cavity | Double | **15** |
| 15DP4 | | Clear | 12D | 20⅞ | 15¾ | 7⅛ | **No** | **Ball** | **Single** | **15** |
| 16CP4 | | Clear | 12D | 21⅞ | 15 15/16 | 6 13/16 | **No** | Cavity | Double | **15** |
| 16LP4 | A | Clear | 12N | 22⅝ | 16 | 7 9/16 | Yes | Cavity | Double | 14 |
| **16LP4A** | A | Gray | 12N | 22⅝ | 16 | 7 9/16 | Yes | Cavity | Double | 14 |
| *16ZP4* | | Gray | 12N | 22⅝ | 16 | 7 9/16 | Yes | Cavity | Double | *16* |



| Type Number | Key (See "Introductory Notes") | Face Description | Basing | Maximum Dimensions in Inches: Over-all Length | Maximum Dimensions in Inches: Diameter or Height x Width | Maximum Dimensions in Inches: Neck Length | External Tube Coating | Anode Connector | Ion Trap | Maximum Anode Voltage (KV) |
|---|---|---|---|---|---|---|---|---|---|---|

**GROUP 12:** ***Glass, spherical, round, magnetic-focus (unless otherwise indicated), 60° to 62° deflection angles.***

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 16ACP4* | | Clear | 12N | 21⅛ | 16 | 8 1/4 | Yes | Cavity | **Single** | 14 |
| 16DP4 | | Clear | 12D | 21 | 16 | 8 5/16 | **No** | Cavity | Double | **15** |
| *16DP4A* | | Gray | 12D | 21 | 16 | 7 15/16 | **No** | Cavity | Double | **15** |
| 16FP4 | | Clear | 12D | 20⅝ | 16⅜ | 7 3/16 | **No** | **Ball** | **Single** | *16* |
| 16HP4 | A | Clear | 12N | 21⅝ | 16 | 8 9/16 | Yes | Cavity | Double | 14 |
| 16HP4A | A | Gray | 12N | 21⅝ | 16 | 8 9/16 | Yes | Cavity | Double | 14 |
| 16JP4 | B | Clear | 12N | 21⅛ | 16⅜ | 7 11/16 | Yes | Cavity | Double | 14 |
| **16JP4A** | B | Gray | 12N | 21⅛ | 16⅜ | 7 11/16 | Yes | Cavity | Double | 14 |
| 16MP4 | C | Clear | 12N | 22⅛ | 16⅜ | 8 11/16 | Yes | Cavity | Double | 14 |
| 16MP4A | C | Gray | 12N | 22⅛ | 16⅜ | 8 11/16 | Yes | Cavity | Double | 14 |

**GROUP 13:** ***Glass, spherical, rectangular, low-voltage electrostatic-focus (unless otherwise indicated), 65° deflection angle.***

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 16ABP4* | | Gray | 12N | 19⅛ | 11⅝ x 14 7/8 | 7 11/16 | Yes | Cavity | Single | 16 |
| *16AEP4* | | Gray | 12L | 19⅛ | 11⅝ x 14 7/8 | 7 11/16 | Yes | Cavity | Single | 16 |
| **17HP4** | A | Gray | 12L | 19 9/16 | 12⅜ x 15½ | 7 11/16 | Yes | Cavity | Single | 16 |
| 17HP4A | A | Gray, Treated | 12L | 19 9/16 | 12⅜ x 15½ | 7 11/16 | Yes | Cavity | Single | 16 |
| 17KP4* | | Gray | 12P | 19⅝ | 12⅜ x 15½ | 7 11/16 | Yes | Cavity | Single | 16 |
| 17RP4 | A | Gray | 12L | 19⅝ | 12⅜ x 15½ | 7 11/16 | Yes | Cavity | Single | 16 |

**GROUP 14:** ***Metal, spherical, round, magnetic-focus, 53° to 60° deflection angles.***

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 16AP4 | A | Clear | 12D | 22⅝ | 16 | 7⅝ | — | Cone Lip | Double | 14 |
| **16AP4A** | A | Gray | 12D | 22⅝ | 16 | 7⅝ | — | Cone Lip | Double | 14 |
| 16AP4B | A | Gray, Frosted | 12D | 22⅝ | 16 | 7⅝ | — | Cone Lip | Double | 14 |
| 16EP4 | B | Clear | 12D | 20 | 16 | 6 15/16 | — | Cone Lip | Double | 14 |
| 16EP4A | B | Gray | 12D | 20 | 16 | 6 15/16 | — | Cone Lip | Double | 14 |
| 16EP4B | | Gray, Treated | 12D | 20 | 16 | 6 15/16 | — | Cone Lip | **Single** | 14 |

**GROUP 15:** ***Metal, spherical, round, magnetic-focus, 70° deflection angle.***

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **16GP4** | A | Gray | 12D | 17 11/16 | 16 | 7 | — | Cone Lip | Single | 14 |
| 16GP4A | A | Clear | 12D | 17 11/16 | 16 | 7 | — | Cone Lip | Single | 14 |
| *16GP4B* | A | Gray, Frosted | 12D | 17 11/16 | 16 | 7 | — | Cone Lip | Single | 14 |
| 16GP4C | A | Clear, Frosted | 12D | 17 11/16 | 16 | 7 | — | Cone Lip | Single | 14 |

**GROUP 16:** ***Glass, spherical, rectangular, magnetic-focus (unless otherwise indicated), 65° deflection angle.***

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 16ABP4* | | Gray | 12N | 19⅛ | 11⅝x14⅞ | 7 11/16 | Yes | Cavity | Single | 16 |
| *16KP4* | A | Gray | 12N | 19⅛ | 11⅝x14⅞ | 7 11/16 | Yes | Cavity | Single | 16 |
| 16KP4A | A | Gray, Alum. | 12N | 19⅛ | 11⅝x14⅞ | 7 11/16 | Yes | Cavity | Single | 16 |
| 16QP4 | | Gray | 12D | 19⅛ | 11⅝x14⅞ | 8 1/16 | **No** | Cavity | **Double** | 16 |
| **16RP4** | A | Gray | 12N | 19⅛ | 11⅝x14⅞ | 7 11/16 | Yes | Cavity | Single | 16 |
| *16TP4* | | Gray | 12N | 18½ | 11⅝x14⅞ | 7 1/16 | Yes | Cavity | Single | *14* |
| 16UP4 | | Gray | 12D | 18⅝ | 11⅝x14⅞ | 7⅛ | **No** | Cavity | Single | **15** |
| 16XP4 | | Gray | 12D | 19⅛ | 11⅝x14⅞ | 7 11/16 | **No** | Cavity | **Double** | **15** |

**GROUP 17:** ***Glass, spherical, round, magnetic-focus, 70° deflection angle.***

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 16SP4 | A | Clear | 12N | 17 11/16 | 16 | 7 3/16 | **Yes** | Cavity | Double | **14** |
| 16SP4A | A | Gray | 12N | 17 11/16 | 16 | 7 3/16 | **Yes** | Cavity | Double | **14** |
| 16VP4 | | Gray | 12D | 17 9/16 | 16 | 7 1/16 | No | Cavity | **Single** | 15 |
| **16WP4** | | Gray | 12D | 18⅛ | 16 | 7⅝ | No | Cavity | Double | 15 |
| *16WP4A* | | Gray | 12N | 18⅛ | 16 | 7⅝ | **Yes** | Cavity | Double | *16* |
| 16YP4 | | Gray | 12N | 17 11/16 | 16 | 7 3/16 | **Yes** | Cavity | **Single** | **14** |

| Type Number | Key (See "Introductory Notes") | Face Description | Basing | Maximum Dimensions in Inches: Over-all Length | Maximum Dimensions in Inches: Diameter or Height x Width | Maximum Dimensions in Inches: Neck Length | External Tube Coating | Anode Connector | Ion Trap | Maximum Anode Voltage (KV) |
|---|---|---|---|---|---|---|---|---|---|---|

**GROUP 18:** ***Glass, spherical, rectangular, magnetic-focus (unless otherwise indicated), 65° deflection angle.***

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 17AP4 | | Gray | 12N | 19 | 12⅜x15½ | 7 1/16 | Yes | Cavity | Single | 16 |
| 17BP4 | | Gray | 12D | 19⅝ | 12⅜x15½ | 7 11/16 | **No** | Cavity | Single | 16 |
| **17BP4A** | A | Gray | 12N | 19⅝ | 12⅜x15½ | 7 11/16 | Yes | Cavity | Single | 16 |
| 17BP4B | A | Gray, Alum. | 12N | 19⅝ | 12⅜x15½ | 7 11/16 | Yes | Cavity | Single | 16 |
| 17BP4C | A | Gray, Treated | 12N | 19⅝ | 12⅜x15½ | 7 11/16 | Yes | Cavity | Single | 16 |
| *17JP4* | | Gray | 12N | 19⅝ | 12⅜x15½ | 7 11/16 | Yes | Cavity | Single | **18** |
| 17KP4* | | Gray | 12P | 19⅝ | 12⅜x15½ | 7 11/16 | Yes | Cavity | Single | 16 |

**GROUP 19:** ***Glass, cylindrical, rectangular, magnetic-focus (unless otherwise indicated), 65° to 70° deflection angles.***

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **17QP4** | | Gray | 12N | 19 9/16 | 12⅜x15½ | 7 11/16 | Yes | Cavity | Single | 16 |
| 17SP4* | | Gray | 12N | 19 9/16 | 12⅜x15½ | 7 11/16 | Yes | Cavity | Single | **14** |
| 17UP4 | | Gray | 12N | 19 9/16 | 12⅜x15½ | 7 11/16 | Yes | Cavity | Single | **14** |

**GROUP 20:** ***Metal, spherical, rectangular, magnetic-focus, 66° deflection angle.***

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **17CP4** | A | Gray, Frosted | 12D | 19 | 12⅜x16 1/16 | 7⅜ | — | Cone Lip | Single | 16 |
| 17CP4A | A | Gray | 12D | 19 | 12⅜x16 1/16 | 7⅜ | — | Cone Lip | Single | 16 |

**GROUP 21:** ***Glass, spherical, rectangular, high-voltage electrostatic-focus (unless otherwise indicated), 65° deflection angle.***

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 16ABP4* | | Gray | 12N | 19⅛ | 11⅝x14⅞ | 7 11/16 | Yes | Cavity | Single | **16** |
| **17FP4** | A | Gray | 12L | 19⅝ | 12⅜x15½ | 7 11/16 | Yes | Cavity | Single | 18 |
| 17FP4A | A | Gray | 12L | 19⅝ | 12⅜x15½ | 7 11/16 | Yes | Cavity | Single | 18 |
| 17KP4* | | Gray | 12P | 19⅝ | 12⅜x15½ | 7 11/16 | Yes | Cavity | Single | **16** |

**GROUP 22:** ***Glass, cylindrical, rectangular, low-voltage electrostatic-focus (unless otherwise indicated), 65 to 66° deflection angles.***

| Type Number | Key (See "Introductory Notes") | Face Description | Basing | Maximum Dimensions in Inches: Over-all Length | Diameter or Height x Width | Neck Length | External Tube Coating | Anode Connector | Ion Trap | Maximum Anode Voltage (KV) |
|---|---|---|---|---|---|---|---|---|---|---|
| **17LP4** | A | Gray | 12L | 19 9/16 | 12 3/8 x 15 1/2 | 7 11/16 | Yes | Cavity | Single | 16 |
| 17LP4A | A | Gray | 12L | 19 9/16 | 12 3/8 x 15 1/2 | 7 11/16 | Yes | Cavity | Single | 16 |
| 17SP4* | | Gray | 12N | 19 9/16 | 12 3/8 x 15 1/2 | 7 11/16 | Yes | Cavity | Single | **14** |
| 17VP4 | A | Gray | 12L | 19 9/16 | 12 3/8 x 15 1/2 | 7 11/16 | Yes | Cavity | Single | 16 |

**GROUP 23:** ***Metal, spherical, round, magnetic-focus, 66° deflection angle.***

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 19AP4 | A | Clear | 12D | 22 | 18 3/4 | 7 3/8 | — | Cone Lip | Single | 19 |
| **19AP4A** | A | Gray | 12D | 22 | 18 3/4 | 7 3/8 | — | Cone Lip | Single | 19 |
| 19AP4B | A | Gray, Frosted | 12D | 22 | 18 3/4 | 7 3/8 | — | Cone Lip | Single | 19 |
| 19AP4C | A | Gray, Alum. | 12D | 22 | 18 3/4 | 7 3/8 | — | Cone Lip | Single | 19 |
| 19AP4D | A | Clear, Frosted | 12D | 22 | 18 3/4 | 7 3/8 | — | Cone Lip | Single | 19 |

**GROUP 24:** ***Glass, spherical, round, magnetic-focus, 66° deflection angle.***

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 19DP4 | A | Clear | 12N | 21 7/8 | 19 | 7 5/16 | **Yes** | Cavity | Double | **17** |
| 19DP4A | A | Gray | 12N | 21 7/8 | 19 | 7 5/16 | **Yes** | Cavity | Double | **17** |
| **19FP4** | | Gray | 12D | 22 1/2 | 19 | 7 7/8 | No | Cavity | Double | 19 |
| 19GP4 | | Gray | 12D | 21 7/8 | 19 | 7 1/8 | No | Cavity | **Single** | 19 |

**GROUP 25:** ***Glass, spherical, rectangular, magnetic-focus (unless otherwise indicated), 65° to 66° deflection angles.***

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 19EP4 | | Gray | 12D | 21 1/2 | 13 3/32 x 17 1/8 | 7 11/16 | **No** | Cavity | Single | **19** |
| 19JP4 | | Gray | 12D | 21 3/16 | 13 5/16 x 17 3/16 | 7 3/8 | **No** | Cavity | Single | 18 |
| *20CP4* | A | Gray | 12D | 21 13/16 | 15 1/8 x 18 7/8 | 7 3/8 | **No** | Cavity | Single | 18 |
| *20CP4A* | | Gray | 12N | 21 13/16 | 15 1/8 x 18 7/8 | 7 3/8 | Yes | Cavity | Single | 18 |
| 20CP4C | A | Gray, Treated | 12D | 21 13/16 | 15 1/8 x 18 7/8 | 7 3/8 | **No** | Cavity | Single | 18 |
| 20DP4 | | Gray | 12D | 22 1/8 | 15 1/8 x 18 7/8 | 7 11/16 | **No** | Cavity | Single | 18 |
| **20DP4A** | | Gray | 12N | 22 1/8 | 15 1/8 x 18 7/8 | 7 11/16 | Yes | Cavity | Single | 18 |
| 20JP4* | | Gray | 12P | 22 1/8 | 15 1/8 x 18 7/8 | 7 11/16 | Yes | Cavity | Single | 18 |
| 21WP4 | | Gray | 12N | 22 5/8 | 15 1/8 x 18 7/8 | 7 11/16 | Yes | Cavity | Single | 18 |
| 21ZP4 | | Gray | 12D | 23 3/32 | 15 3/4 x 20 7/16 | 7 11/16 | **No** | Cavity | Single | 18 |
| *21ZP4A* | | Gray | 12N | 23 3/8 | 15 3/4 x 20 7/16 | 7 11/16 | Yes | Cavity | Single | 18 |

**GROUP 26:** ***Glass, spherical, rectangular, low-voltage electrostatic-focus (unless otherwise indicated), 65° to 66° deflection angles.***

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 19QP4 | | Gray | 12L | 21 1/2 | 13 5/16 x 17 3/16 | 7 11/16 | Yes | Cavity | Single | **18** |
| 20HP4 | A | Gray | 12M | 22 1/8 | 15 1/8 x 18 7/8 | 7 11/16 | **No** | Cavity | Single | 16 |
| **20HP4A** | B | Gray | 12L | 22 1/8 | 15 1/8 x 18 7/8 | 7 11/16 | Yes | Cavity | Single | 16 |
| 20HP4B | A | Gray, Treated | 12M | 22 1/8 | 15 1/8 x 18 7/8 | 7 11/16 | **No** | Cavity | Single | 16 |
| 20JP4* | | Gray | 12P | 22 1/8 | 15 1/8 x 18 7/8 | 7 11/16 | Yes | Cavity | Single | **18** |
| 20LP4 | B | Gray | 12L | 22 1/8 | 15 1/8 x 18 7/8 | 7 11/16 | Yes | Cavity | Single | 16 |
| 20MP4 | B | Gray | 12L | 22 1/8 | 15 1/8 x 18 7/8 | 7 11/16 | Yes | Cavity | Single | 16 |
| *21XP4* | C | Gray | 12L | 22 5/8 | 15 1/8 x 18 7/8 | 7 11/16 | Yes | Cavity | Single | **18** |
| 21XP4A | C | Gray | 12L | 22 5/8 | 15 1/8 x 18 7/8 | 7 11/16 | Yes | Cavity | Single | **18** |
| *21YP4* | | Gray | 12L | 23 3/8 | 15 3/4 x 20 7/16 | 7 11/16 | Yes | Cavity | Single | **18** |

**GROUP 27:** ***Glass, spherical, rectangular, high-voltage electrostatic-focus (unless otherwise indicated), 65° to 66° deflection angles.***

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **20FP4** | | Gray | 12M | 22 1/8 | 15 1/8 x 18 7/8 | 7 11/16 | No | Cavity | Single | 18 |
| 20GP4 | | Gray | 12L | 22 1/8 | 15 1/8 x 18 7/8 | 7 11/16 | **Yes** | Cavity | Single | 18 |
| 20JP4* | | Gray | 12P | 22 1/8 | 15 1/8 x 18 7/8 | 7 11/16 | **Yes** | Cavity | Single | 18 |

**GROUP 28:** ***Glass, cylindrical, rectangular, magnetic-focus (unless otherwise indicated), 65° to 70° deflection angles.***

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 21EP4 | | Gray | 12D | 23 3/8 | 15 3/4 x 20 7/16 | 7 11/16 | **No** | Cavity | Single | 18 |
| **21EP4A** | A | Gray | 12N | 23 3/8 | 15 3/4 x 20 7/16 | 7 11/16 | Yes | Cavity | Single | 18 |
| 21EP4B | A | Gray, Alum. | 12N | 23 3/8 | 15 3/4 x 20 7/16 | 7 11/16 | Yes | Cavity | Single | 18 |
| 21KP4* | | Gray | 12D | 23 1/4 | 15 11/16 x 20 3/16 | 7 11/16 | **No** | Cavity | Single | 18 |
| 21KP4A* | | Gray | 12P | 23 3/8 | 15 11/16 x 20 3/8 | 7 11/16 | Yes | Cavity | Single | 18 |

**GROUP 29:** ***Glass, cylindrical, rectangular, low-voltage electrostatic-focus (unless otherwise indicated), 65° to 70° deflection angles.***

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| *21FP4* | | Gray | 12M | 22⅜ | 15¾ x20⅞ | 7 11/16 | **No** | Cavity | Single | 18 |
| **21FP4A** | | Gray | 12L | 22⅜ | 15¾ x20⅞ | 7 11/16 | Yes | Cavity | Single | 18 |
| 21KP4* | | Gray | 12D | 23¼ | 15 11/16x20⅜ | 7 11/16 | **No** | Cavity | Single | 18 |
| 21KP4A* | | Gray | 12P | 23⅜ | 15 11/16x20⅜ | 7 11/16 | Yes | Cavity | Single | 18 |

**GROUP 30:** ***Metal, spherical, round, magnetic-focus, 70° deflection angle.***

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 22AP4 | A | Clear | 12D | 23⅜ | 21 13/16 | 7 5/16 | — | Cone Lip | Single | 19 |
| **22AP4A** | A | Gray | 12D | 23⅜ | 21 13/16 | 7 5/16 | — | Cone Lip | Single | 19 |

**GROUP 31:** ***Metal, spherical, round, magnetic-focus, 70° deflection angle.***

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **24AP4** | A | Gray | 12D | 24 3/16 | 24⅛ | 7 1/32 | — | Cone Lip | Single | 16 |
| 24AP4A | A | Gray, Alum. | 12D | 24 3/16 | 24⅛ | 7 1/32 | — | Cone Lip | Single | 16 |
| 24AP4B | A | Gray, Treated | 12D | 24 3/16 | 24⅛ | 7 1/32 | — | Cone Lip | Single | 16 |

**GROUP 32:** ***Glass, spherical, rectangular, magnetic-focus, 85° to 90° deflection angles.***

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **27EP4** | | Gray, Alum. | 12D | 23 3/16 | 20 13/32x25 13/32 | 7 11/16 | No | Cavity | Single | 20 |
| 27GP4 | | Gray | 12D | 23 3/16 | 20 9/32 x25 11/32 | 7 11/16 | No | Cavity | Single | *22.5* |
| 27NP4 | | Gray | 12N | 23⅜ | 20 11/32x25 13/32 | 7 11/16 | **Yes** | Cavity | Single | **18** |
| 27RP4 | | Gray, Alum. | 12N | 23 3/16 | 20 13/32x25 13/32 | 7 11/16 | **Yes** | Cavity | Single | 20 |

* Tube has automatic electrostatic-focus. This tube may be used as a substitute only. Replace it with other automatic electrostatic-focus tubes of the same Substitution Group.

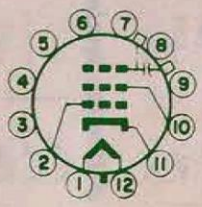
† This tube has a face-plate radius of curvature of 20 inches. Dimension A (see Outline Drawings) of this tube is approximately half an inch larger than that of other tubes in this group. Inspect the particular mask to determine if this additional half inch can be accommodated.

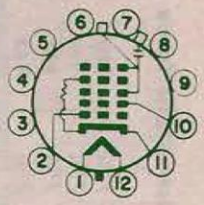
# Outline and Basing Diagrams

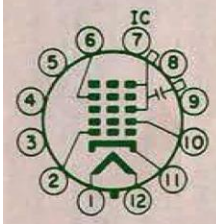


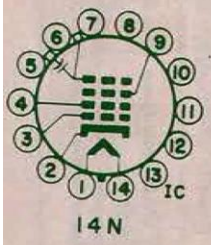


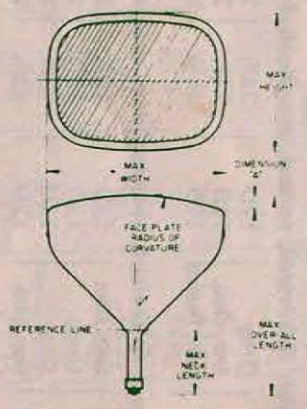




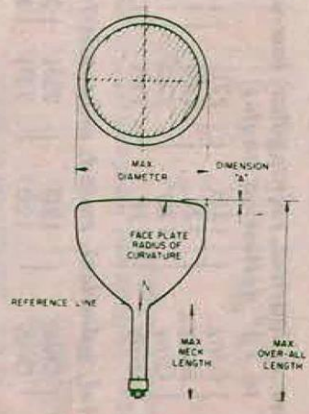




RECTANGULAR PICTURE TUBE




ROUND PICTURE TUBE