

## Picture Tube

SHORT RECTANGULAR GLASS TYPE  
LOW-VOLTAGE ELECTROSTATIC FOCUS

ALUMINIZED SCREEN  
MAGNETIC DEFLECTION

With Heater Having Controlled Warm-Up Time

## GENERAL DATA

## Electrical:

|                                                |                                   |            |
|------------------------------------------------|-----------------------------------|------------|
| Heater Current at 6.3 volts. . . . .           | 600 ± 30                          | ma         |
| Heater Warm-Up Time (Average). . . . .         | 11                                | seconds    |
| Focusing Method. . . . .                       | Electrostatic                     |            |
| Deflection Method. . . . .                     | Magnetic                          |            |
| Deflection Angles (Approx.):                   |                                   |            |
| Diagonal . . . . .                             | 114°                              |            |
| Horizontal . . . . .                           | 102°                              |            |
| Vertical . . . . .                             | 85°                               |            |
| Direct Interelectrode Capacitances:            |                                   |            |
| Grid No.1 to all other electrodes. . . . .     | 6                                 | μf         |
| Cathode to all other electrodes. . . . .       | 5                                 | μf         |
| External conductive coating to uitor . . . . . | { 1500 max.<br>1000 min.          | { μf<br>μf |
| Electron Gun . . . . .                         | Type Requiring No Ion-Trap Magnet |            |

## Optical:

|                                                            |                 |  |
|------------------------------------------------------------|-----------------|--|
| Faceplate. . . . .                                         | Filterglass     |  |
| Light transmission at center (Approx.) . . . . .           | 78%             |  |
| Phosphor (For Curves, see front of this Section) . . . . . | P4—Sulfide Type |  |
|                                                            | Aluminized      |  |
| Fluorescence . . . . .                                     | White           |  |
| Phosphorescence. . . . .                                   | White           |  |
| Persistence. . . . .                                       | Medium Short    |  |

## Mechanical:

|                                          |                                         |  |
|------------------------------------------|-----------------------------------------|--|
| Tube Dimensions:                         |                                         |  |
| Overall length . . . . .                 | 10-13/16" ± 1/4"                        |  |
| Greatest width . . . . .                 | 16-13/32" ± 1/8"                        |  |
| Greatest height. . . . .                 | 13-11/32" ± 1/8"                        |  |
| Diagonal . . . . .                       | 18-5/8" ± 1/8"                          |  |
| Neck length. . . . .                     | 3-9/16" ± 1/8"                          |  |
| Curvature of faceplate (External Radii): |                                         |  |
| Center . . . . .                         | 48"                                     |  |
| Edge . . . . .                           | 21"                                     |  |
| Screen Dimensions (Minimum):             |                                         |  |
| Greatest width . . . . .                 | 15-1/8"                                 |  |
| Greatest height. . . . .                 | 12"                                     |  |
| Diagonal . . . . .                       | 17-9/16"                                |  |
| Projected area . . . . .                 | 172 sq. in.                             |  |
| Weight (Approx.) . . . . .               | 14 lbs                                  |  |
| Operating Position . . . . .             | Any                                     |  |
| Cap. . . . .                             | Recessed Small Cavity (JEDEC No. J1-21) |  |
| Bulb . . . . .                           | J149A1                                  |  |



# 19YP4

Base. . . . . Small-Button Neoeightar 7-Pin, Arrangement 1,  
(JEDEC No. B7-208)

Basing Designation for BOTTOM VIEW. . . . . 8JR

Pin 1 - Heater

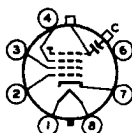
Pin 2 - Grid No. 1

Pin 3 - Grid No. 2

Pin 4 - Grid No. 3

Pin 6 - Internal  
Connection—  
Do Not Use

Pin 7 - Cathode



Pin 8 - Heater

Cap - Ultor  
(Grid No. 4,  
Collector)

C - External  
Conductive  
Coating

## GRID-DRIVE<sup>A</sup> SERVICE

*Unless otherwise specified, voltage values are positive with respect to cathode*

### Maximum and Minimum Ratings, Design-Maximum Values:

|                         |              |       |
|-------------------------|--------------|-------|
| ULTOR VOLTAGE . . . . . | { 20000 max. | volts |
|                         | { 11000 min. | volts |

### GRID-No. 3 (FOCUSING) VOLTAGE:

|                         |          |       |
|-------------------------|----------|-------|
| Positive value. . . . . | 700 max. | volts |
|-------------------------|----------|-------|

|                         |          |       |
|-------------------------|----------|-------|
| Negative value. . . . . | 350 max. | volts |
|-------------------------|----------|-------|

|                              |            |       |
|------------------------------|------------|-------|
| GRID-No. 2 VOLTAGE . . . . . | { 600 max. | volts |
|                              | { 300 min. | volts |

### GRID-No. 1 VOLTAGE:

|                               |          |       |
|-------------------------------|----------|-------|
| Negative-peak value . . . . . | 220 max. | volts |
|-------------------------------|----------|-------|

|                               |          |       |
|-------------------------------|----------|-------|
| Negative-bias value . . . . . | 154 max. | volts |
|-------------------------------|----------|-------|

|                               |        |       |
|-------------------------------|--------|-------|
| Positive-bias value . . . . . | 0 max. | volts |
|-------------------------------|--------|-------|

|                               |        |       |
|-------------------------------|--------|-------|
| Positive-peak value . . . . . | 2 max. | volts |
|-------------------------------|--------|-------|

|                         |            |       |
|-------------------------|------------|-------|
| HEATER VOLTAGE. . . . . | { 6.9 max. | volts |
|                         | { 5.7 min. | volts |

### PEAK HEATER-CATHODE VOLTAGE:

Heater negative with  
respect to cathode:

|                                                                      |          |       |
|----------------------------------------------------------------------|----------|-------|
| During equipment warm-up period<br>not exceeding 15 seconds. . . . . | 450 max. | volts |
|----------------------------------------------------------------------|----------|-------|

|                                         |          |       |
|-----------------------------------------|----------|-------|
| After equipment warm-up period. . . . . | 200 max. | volts |
|-----------------------------------------|----------|-------|

|                                                     |          |       |
|-----------------------------------------------------|----------|-------|
| Heater positive with<br>respect to cathode. . . . . | 200 max. | volts |
|-----------------------------------------------------|----------|-------|

### Typical Operating Conditions:

|                                         |       |       |
|-----------------------------------------|-------|-------|
| With ultor voltage ( $E_{c4k}$ ) of     | 16000 | volts |
| and grid-No. 2 voltage ( $E_{c2k}$ ) of | 500   | volts |

|                                                     |          |       |
|-----------------------------------------------------|----------|-------|
| Grid-No. 3 Voltage for focus <sup>•</sup> . . . . . | 0 to 400 | volts |
|-----------------------------------------------------|----------|-------|

|                                                                                      |            |       |
|--------------------------------------------------------------------------------------|------------|-------|
| Grid-No. 1 Voltage for visual<br>extinction of focused raster <sup>★</sup> . . . . . | -43 to -78 | volts |
|--------------------------------------------------------------------------------------|------------|-------|

|                                                                         |         |         |
|-------------------------------------------------------------------------|---------|---------|
| Field Strength of Adjustable<br>Centering Magnet <sup>♦</sup> . . . . . | 0 to 10 | gausses |
|-------------------------------------------------------------------------|---------|---------|

### Maximum Circuit Values:

|                                        |          |         |
|----------------------------------------|----------|---------|
| Grid-No. 1-Circuit Resistance. . . . . | 1.5 max. | megohms |
|----------------------------------------|----------|---------|



CATHODE-DRIVE<sup>▲</sup> SERVICE

Unless otherwise specified, voltage values are positive with respect to grid No.1

## Maximum and Minimum Ratings, Design-Maximum Values:

|                                                                      |                           |                |
|----------------------------------------------------------------------|---------------------------|----------------|
| ULTOR-TO-GRID-No.1 VOLTAGE. . . . .                                  | {20000 max.<br>11000 min. | volts<br>volts |
| GRID-No.3-TO-GRID-No.1<br>(FOCUSING) VOLTAGE:                        |                           |                |
| Positive value. . . . .                                              | 850 max.                  | volts          |
| Negative value. . . . .                                              | 200 max.                  | volts          |
| GRID-No.2-TO-GRID-No.1 VOLTAGE. . . . .                              | {750 max.<br>450 min.     | volts<br>volts |
| GRID-No.2-TO-CATHODE VOLTAGE. . . . .                                | 600 max.                  | volts          |
| CATHODE-TO-GRID-No.1 VOLTAGE:                                        |                           |                |
| Positive-peak value . . . . .                                        | 220 max.                  | volts          |
| Positive-bias value . . . . .                                        | 154 max.                  | volts          |
| Negative-bias value . . . . .                                        | 0 max.                    | volts          |
| Negative-peak value . . . . .                                        | 2 max.                    | volts          |
| HEATER VOLTAGE. . . . .                                              | {6.9 max.<br>5.7 min.     | volts<br>volts |
| PEAK HEATER-CATHODE VOLTAGE:                                         |                           |                |
| Heater negative with<br>respect to cathode:                          |                           |                |
| During equipment warm-up period<br>not exceeding 15 seconds. . . . . | 450 max.                  | volts          |
| After equipment warm-up period. . . . .                              | 200 max.                  | volts          |
| Heater positive with<br>respect to cathode. . . . .                  | 200 max.                  | volts          |

## Typical Operating Conditions:

|                                                                                                |          |         |
|------------------------------------------------------------------------------------------------|----------|---------|
| With ultor-to-grid-No.1<br>voltage ( $E_{c4g1}$ ) of                                           | 16000    | volts   |
| and grid-No.2-to-grid-No.1<br>voltage ( $E_{c2g1}$ ) of                                        | 500      | volts   |
| Grid-No.3-to-Grid-No.1 Voltage<br>for focus <sup>●</sup> . . . . .                             | 0 to 400 | volts   |
| Cathode-to-Grid-No.1 Voltage for visual<br>extinction of focused raster <sup>▲</sup> . . . . . | 41 to 69 | volts   |
| Field Strength of Adjustable<br>Centering Magnet <sup>▲</sup> . . . . .                        | 0 to 10  | gausses |

## Maximum Circuit Values:

|                                       |          |         |
|---------------------------------------|----------|---------|
| Grid-No.1-Circuit Resistance. . . . . | 1.5 max. | megohms |
|---------------------------------------|----------|---------|

▲ Grid drive is the operating condition in which the video signal varies the grid-No.1 potential with respect to cathode.

● The grid-No.3 voltage required for optimum focus of any individual tube may have a value anywhere between 0 and 400 volts and is a function of the value of the ultor voltage, ultor current, and grid-No.2 voltage. It changes directly with the ultor voltage at the rate of approximately 46 volts for each 1000-volt change in ultor voltage; inversely with grid-No.2 voltage at the rate of about 60 volts for each 100-volt change in grid No.2 voltage; and inversely with ultor current at the rate of about 60 volts for each 100-microampere change in ultor current. Because this tube has a narrow depth of focus, it is necessary to provide means such as a potentiometer or a 4-tap switch for adjusting the focusing voltage. In general, commercially acceptable focus is obtained if the focusing voltage is within 75 volts of the value



required for optimum focus and if the focusing voltage is maintained to within 75 volts of the optimum value during line-voltage fluctuations.

★ See *Raster-Cutoff-Range Chart for Grid-Drive Service.*

◆ Distance from *Reference Line* for suitable PM centering magnet should not exceed 2-1/4". The specified centering magnet compensates only for the effect which mechanical tube tolerances may have on the location of the undeflected focused spot with respect to the center of the tube face. Maximum field strength of adjustable centering magnet equals:

$$\sqrt{\frac{E_{c4k} \text{ or } E_{c4g_1} \text{ (volts)}}{16000 \text{ (volts)}}} \times 10 \text{ gauss}$$

The equipment manufacturer must determine and supply additional compensation for the effects of the earth's magnetic field and extraneous fields due to choice of circuitry and components. The additional compensation should preferably be applied as part of the magnetic field of the deflecting yoke.

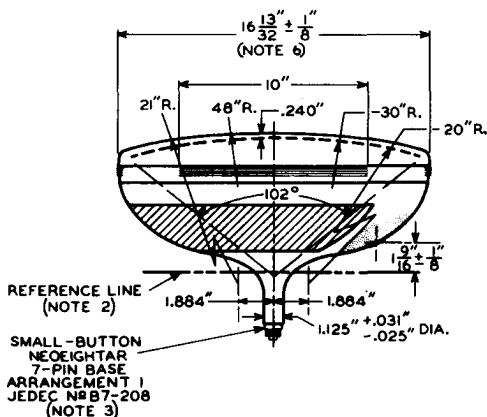
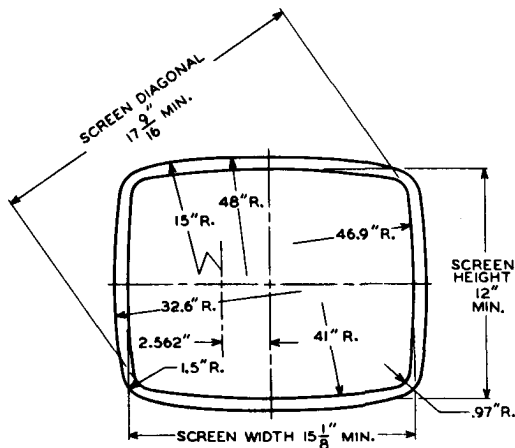
◆ Cathode drive is the operating condition in which the video signal varies the cathode potential with respect to grid No.1 and the other electrodes.

◆ See *Raster-Cutoff-Range Chart for Cathode-Drive Service.*

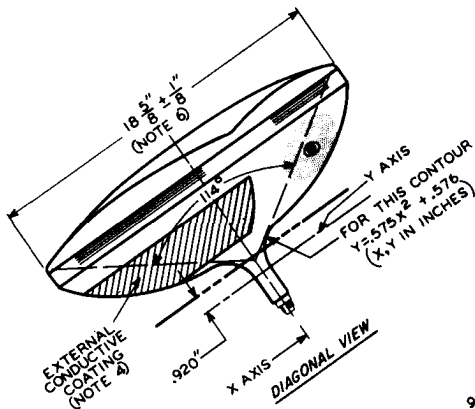
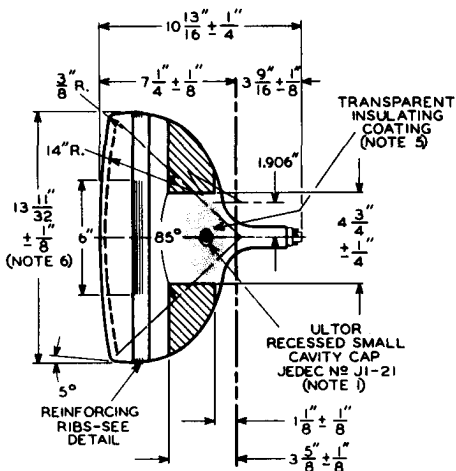
## OPERATING CONSIDERATIONS

**X-Ray Warning.** When operated at ultor voltages up to 16 kilovolts, this picture tube does not produce any harmful X-ray radiation. However, because the rating of this type permits operation at voltages as high as 20 kilovolts (Design-maximum value), shielding of this picture tube for X-ray radiation may be needed to protect against possible injury from prolonged exposure at close range whenever the operating conditions involve voltages in excess of 16 kilovolts.

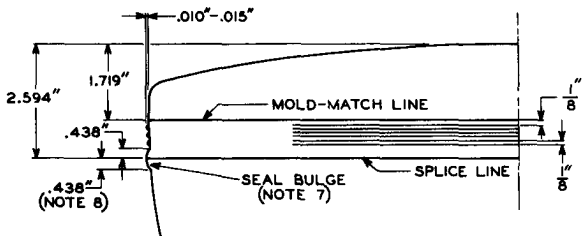
**Shatter-Proof Cover Over the Tube Face.** Following conventional picture-tube practice, it is recommended that the cabinet be provided with a shatterproof, glass cover over the face of this picture tube to protect it from being struck accidentally and to protect against possible damage resulting from tube implosion under some abnormal condition. This safety cover can also provide X-ray protection when required.



# 19YP4



92CL-10699

DETAIL OF PANEL

**NOTE 1:** THE PLANE THROUGH THE TUBE AXIS AND PIN 4 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF  $\pm 30^\circ$ . ULTOR TERMINAL IS ON SAME SIDE AS PIN 4.

**NOTE 2:** WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JEDEC No.G-126 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

**NOTE 3:** SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. THE DESIGN OF THE SOCKET SHOULD BE SUCH THAT THE CIRCUIT WIRING CANNOT IMPRESS LATERAL STRAINS THROUGH THE SOCKET CONTACTS ON THE BASE PINS. BOTTOM CIRCUMFERENCE OF BASE WAFER WILL FALL WITHIN A CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING A DIAMETER OF  $1\text{--}3/4"$ .

**NOTE 4:** EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

**NOTE 5:** TO CLEAN THIS AREA, WIPE ONLY WITH SOFT DRY LINT-LESS CLOTH.

**NOTE 6:** MEASURED AT THE MOLD-MATCH LINE.

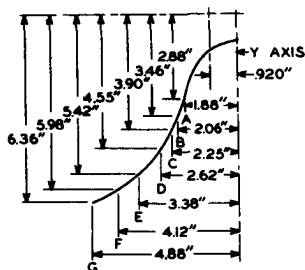
**NOTE 7:** BULGE AT SPLICE-LINE SEAL MAY INCREASE THE INDICATED MAXIMUM VALUE FOR ENVELOPE WIDTH, DIAGONAL, AND HEIGHT BY NOT MORE THAN  $1/8"$ , BUT AT ANY POINT AROUND THE SEAL, THE BULGE WILL NOT PROTRUDE MORE THAN  $1/16"$  BEYOND THE ENVELOPE SURFACE AT THE MOLD-MATCH LINE.

**NOTE 8:** UNDISTURBED AREA BETWEEN MOLD-MATCH LINE AND SPLICE LINE IS  $3/8"$  MINIMUM. THIS SHOULD BE THE MAXIMUM WIDTH OF THE TUBE SUPPORT BAND. TUBE MOUNTING AND YOKE SUPPORT CLAMPS MUST BE SPACED FROM THE TUBE BY USE OF CUSHIONING PADS MADE OF MATERIAL SUCH AS ASPHALT-IMPREGNATED FELT, OR EQUIVALENT.

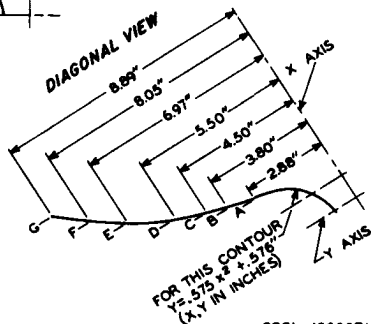
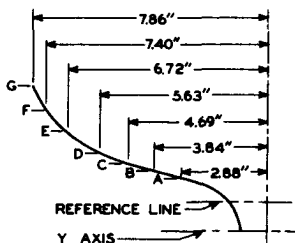


## BULB-CONTOUR DIMENSIONS

### SHORT-SIDE VIEW



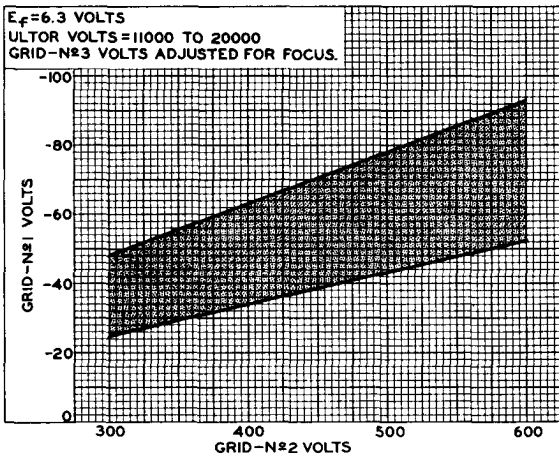
### LONG-SIDE VIEW



92CL-10669RI

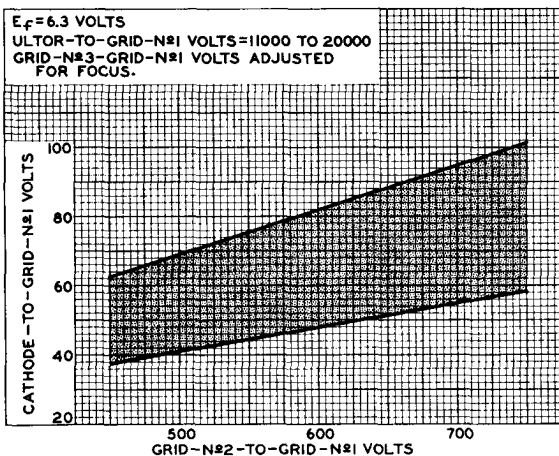
**NOTE:** PLANES A THROUGH G ARE NORMAL TO THE TUBE AXIS AND AT FIXED LOCATIONS FROM THE Y-AXIS. THESE COORDINATES DESCRIBE THE BOGIE-BULB EXTERNAL CONTOUR IN PLANES THROUGH THE TUBE AXIS AND THE RESPECTIVE FACEPLATE AXES.

# RASTER-CUTOFF-RANGE CHARTS Grid-Drive Service



92CS-10789

## Cathode-Drive Service



92CS-10818

