

## Picture Tube

RECTANGULAR GLASS TYPE  
LOW-VOLTAGE ELECTROSTATIC FOCUS  
LOW GRID-No.2 VOLTAGE

ALUMINIZED SCREEN  
MAGNETIC DEFLECTION  
CATHODE-DRIVE TYPE

With Heater Having Controlled Warm-Up Time

## DATA

## General:

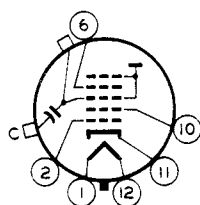
|                                                    |                                            |               |
|----------------------------------------------------|--------------------------------------------|---------------|
| Heater, for Unipotential Cathode:                  |                                            |               |
| Voltage (AC or DC) . . . . .                       | 6.3                                        | volts         |
| Current at 6.3 volts. . . . .                      | 0.6                                        | amp           |
| Warm-up time (Average). . . . .                    | 11                                         | sec           |
| Direct Interelectrode Capacitances:                |                                            |               |
| Grid No.1 to all other electrodes . . .            | 6                                          | $\mu\text{f}$ |
| Cathode to all other electrodes . . . .            | 5                                          | $\mu\text{f}$ |
| External conductive coating to ultor. .            | { 2500 max.                                | $\mu\text{f}$ |
|                                                    | { 2000 min.                                | $\mu\text{f}$ |
| Faceplate, Spherical. . . . .                      | Filterglass                                |               |
| Light transmission (Approx.). . . . .              | 73%                                        |               |
| Phosphor (For Curves, see front of this Section) . | P4—Sulfide Type                            |               |
|                                                    | Aluminized                                 |               |
| Fluorescence. . . . .                              | White                                      |               |
| Phosphorescence . . . . .                          | White                                      |               |
| Persistence . . . . .                              | Medium Short                               |               |
| Focusing Method . . . . .                          | Electrostatic                              |               |
| Deflection Method . . . . .                        | Magnetic                                   |               |
| Deflection Angles (Approx.):                       |                                            |               |
| Diagonal. . . . .                                  | 90°                                        |               |
| Horizontal. . . . .                                | 85°                                        |               |
| Vertical. . . . .                                  | 68°                                        |               |
| Electron Gun. . . . .                              | Type Requiring No Ion-Trap Magnet          |               |
| Tube Dimensions:                                   |                                            |               |
| Overall length. . . . .                            | 19-1/8" $\pm$ 3/8"                         |               |
| Greatest width. . . . .                            | 22-11/16" $\pm$ 1/8"                       |               |
| Greatest height . . . . .                          | 18-7/16" $\pm$ 1/8"                        |               |
| Diagonal. . . . .                                  | 24" $\pm$ 1/8"                             |               |
| Neck length . . . . .                              | 5-1/2" $\pm$ 3/16"                         |               |
| Radius of curvature of faceplate                   |                                            |               |
| (External surface). . . . .                        | 40"                                        |               |
| Screen Dimensions (Minimum):                       |                                            |               |
| Greatest width. . . . .                            | 21-7/16"                                   |               |
| Greatest height . . . . .                          | 16-7/8"                                    |               |
| Diagonal. . . . .                                  | 22-13/16"                                  |               |
| Projected area. . . . .                            | 332 sq. in.                                |               |
| Weight (Approx.) . . . . .                         | 35 lbs                                     |               |
| Operating Position. . . . . Any                    |                                            |               |
| Cap . . . . .                                      | Recessed Small Cavity (JEDEC No.J1-21)     |               |
| Bulb. . . . .                                      | J192 A2/B2                                 |               |
| Socket. . . . .                                    | Cinch Part No.9464-12, or equivalent       |               |
| Base. . . . .                                      | Small-Shell Duodecal 6-Pin, Arrangement 1, |               |
|                                                    | (JEDEC Group 4, No.B6-63)                  |               |



# 24ATP4

Basing Designation for BOTTOM VIEW. . . . . 12L

- Pin 1-Heater
- Pin 2-Grid No.1
- Pin 6-Grid No.4
- Pin 10-Grid No.2
- Pin 11-Cathode
- Pin 12-Heater



Cap-Ultor  
(Grid No.3,  
Grid No.5,  
Collector)  
C-External  
Conductive  
Coating

## CATHODE-DRIVE SERVICE

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

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

|                                            |                            |                |
|--------------------------------------------|----------------------------|----------------|
| ULTOR-TO-GRID-No.1 VOLTAGE. . . . .        | {20000 max.<br>12000* min. | volts<br>volts |
| GRID-No.4-TO-GRID-No.1 (FOCUSING) VOLTAGE: |                            |                |
| Positive value. . . . .                    | 1000 max.                  | volts          |
| Negative value. . . . .                    | 500 max.                   | volts          |
| GRID-No.2-TO-GRID-No.1 VOLTAGE. . . . .    | 68 max.                    | volts          |
| CATHODE-TO-GRID-No.1 VOLTAGE:              |                            |                |
| Positive-peak value . . . . .              | 200 max.                   | volts          |
| Positive-bias value . . . . .              | 140 max.                   | volts          |
| Negative-bias value . . . . .              | 0 max.                     | volts          |
| Negative-peak value . . . . .              | 0 max.                     | volts          |
| PEAK HEATER-CATHODE VOLTAGE:               |                            |                |
| Heater negative with respect to cathode:   |                            |                |
| During equipment warm-up period            |                            |                |
| not exceeding 15 seconds. . . . .          | 410 max.                   | volts          |
| After equipment warm-up period. . . . .    | 180 max.                   | volts          |
| Heater positive with respect to cathode.   | 180 max.                   | volts          |

### Equipment Design Ranges:

*With any ultor-to-grid-No.1 voltage ( $E_{c5g1}$ ) between 12000\* and 20000 volts and grid-No.2-to-grid-No.1 voltage ( $E_{c2g1}$ ) between 40 and 68 volts*

Grid-No.4-to-Grid-No.1 Voltage for focus<sup>§</sup>. 0 to 400 volts

Cathode-to-Grid-No.1 Voltage

( $E_{kg1}$ ) for visual extinction

of focused raster<sup>▲</sup>. . . . . See *Raster-Cutoff-Range Chart for Cathode-Drive Service*

Cathode-to-Grid-No.1 Video

Drive from Raster Cutoff

(Black level):

White-level value

(Peak negative) . . . . . Same value as determined for  $E_{kg1}$  except video drive is a negative voltage

Grid-No.4 Current . . . . . -25 to +25  $\mu$ a

Grid-No.2 Current . . . . . -15 to +15  $\mu$ a

Field Strength of Adjustable

Centering Magnet\* . . . . . 0 to 8 gauss



## Examples of Use of Design Ranges:

|                                                                           |            |              |
|---------------------------------------------------------------------------|------------|--------------|
| <i>With ultor-to-grid-No. 1</i>                                           |            |              |
| <i>voltage of</i>                                                         | 16000      | <i>volts</i> |
| <i>and grid-No. 2-to-grid-No. 1</i>                                       |            |              |
| <i>voltage of</i>                                                         | 50         | <i>volts</i> |
| Grid-No. 4-to-Grid-No. 1 Voltage for focus.                               | 0 to 400   | volts        |
| Cathode-to-Grid-No. 1 Voltage for visual extinction of focused raster . . | 32 to 47   | volts        |
| Cathode-to-Grid-No. 1 Video Drive from Raster Cutoff (Black level):       |            |              |
| White-level value . . . . .                                               | -32 to -47 | volts        |

## Maximum Circuit Values:

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

- 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.
- \* This value is a working design-center minimum. The equivalent *absolute-minimum* ultor-to-grid-No. 1 voltage is 11,000 volts, below which the serviceability of the 24ATP4 will be impaired. The equipment designer has the responsibility of determining a minimum design value such that under the worst probable operating conditions involving supply-voltage variation and equipment variation the absolute minimum ultor-to-grid-No. 1 voltage is never less than 11,000 volts.
- § The grid-No. 4-to-grid-No. 1 voltage required for optimum focus of any individual tube may have a value anywhere between 0 and 400 volts and is independent of ultor current and will remain essentially constant for values of ultor-to-grid-No. 1 voltage or grid-No. 2-to-grid-No. 1 voltage within design ranges shown for these items.
- ▲ The cathode-to-grid-No. 1 voltage ( $E_{k1}$ ) will increase by approximately 2 per cent for every 1000-volt increase in ultor-to-grid-No. 1 voltage and will decrease by approximately 2 per cent for every 1000-volt decrease in ultor-to-grid-No. 1 voltage.
- \* Distance from *Reference Line* for suitable PM centering magnet should not exceed 2-1/4". Excluding extraneous fields, the center of the undeflected focused spot will fall within a circle having a 1/2-inch radius concentric with the center of the tube face. It is to be noted that the earth's magnetic field can cause as much as 1/2-inch deflection of the spot from the center of the tube face.

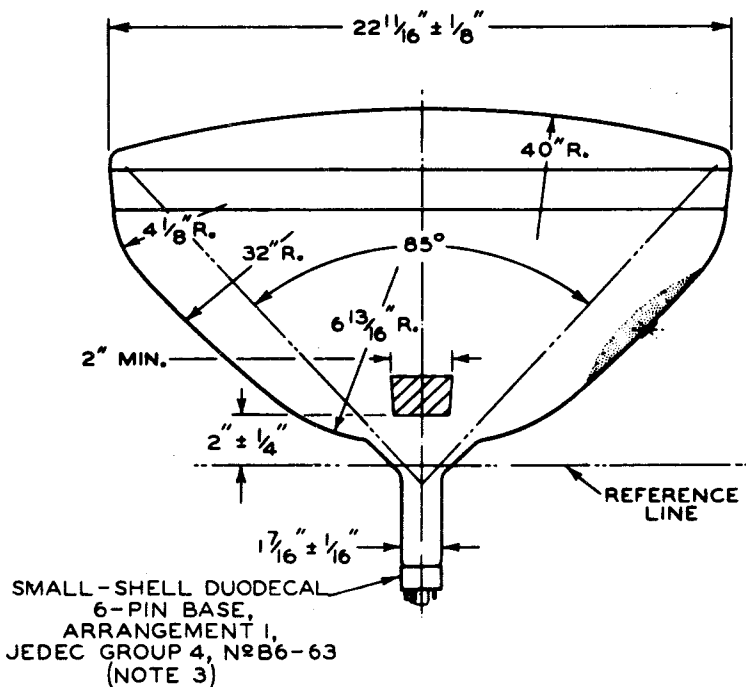
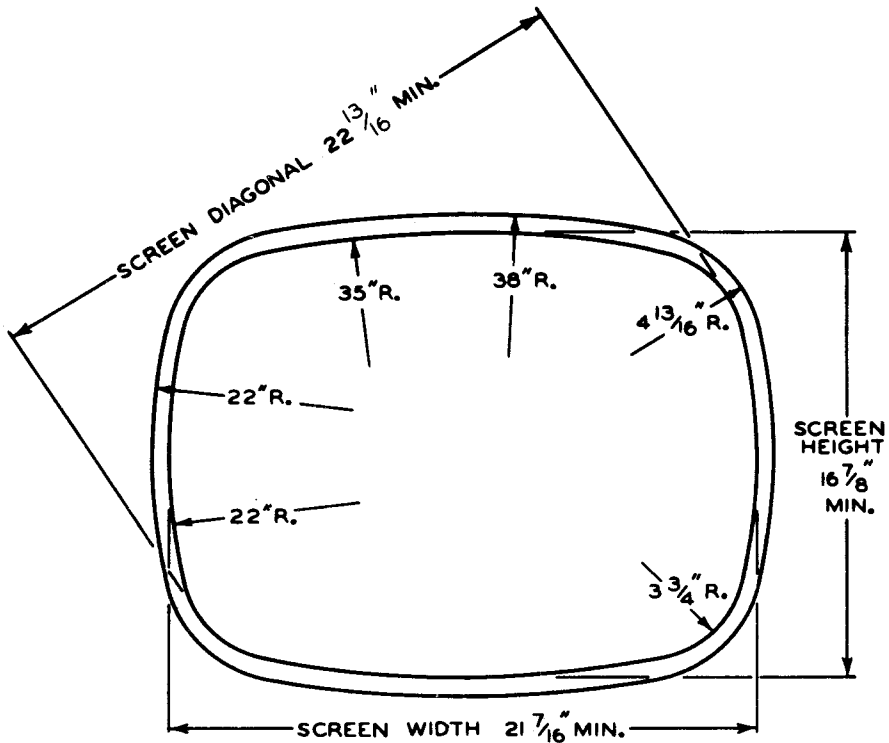
## OPERATING CONSIDERATIONS

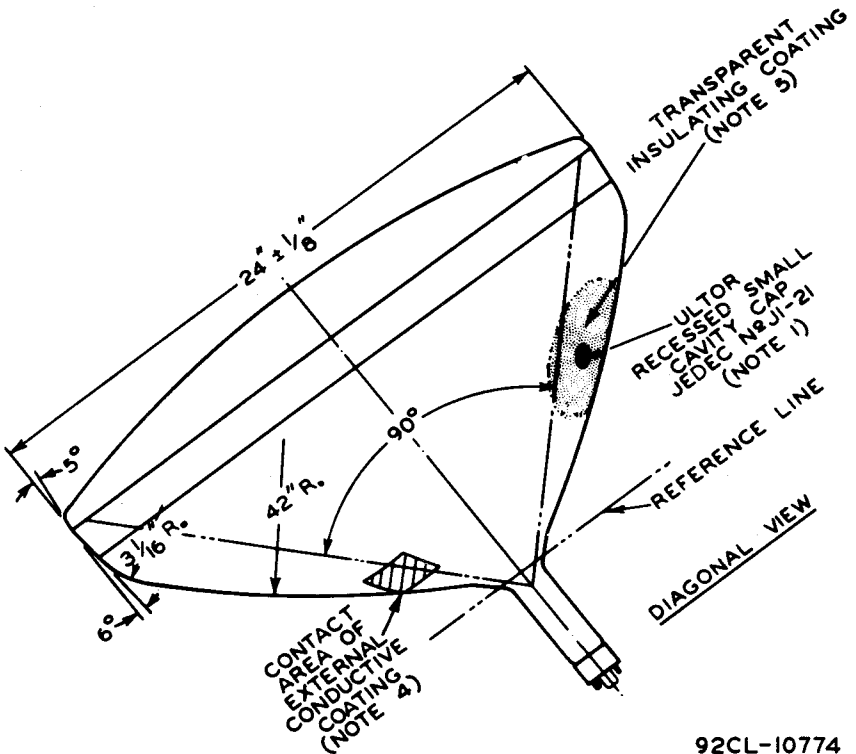
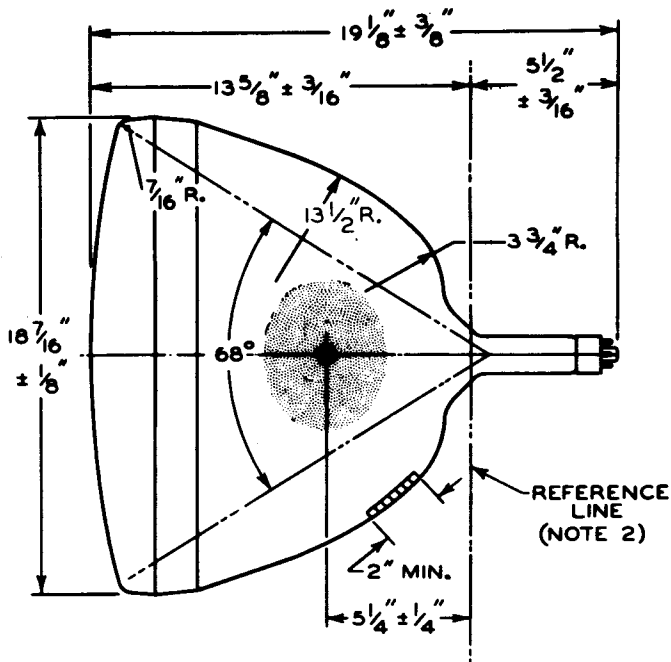
**Shatter-Proof Cover Over the Tube Face.** Following conventional picture-tube practice, it is recommended that the cabinet be provided with a shatter-proof, glass cover over the face of the 24ATP4 to protect it from being struck accidentally and to protect against possible damage resulting from tube implosion under some abnormal condition. This safety cover can also provide X-ray protection when required.

*For X-ray shielding considerations, see sheet  
X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES  
at front of this Section*



# 24ATP4

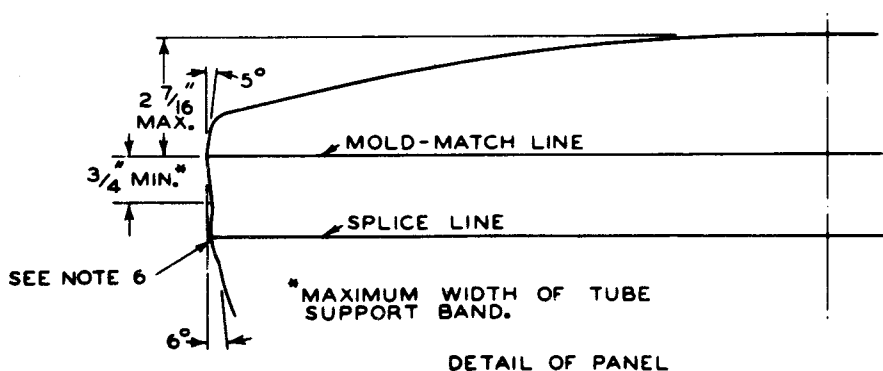




92CL-10774



# 24ATP4



**NOTE 1:** THE PLANE THROUGH THE TUBE AXIS AND PIN 6 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 6.

**NOTE 2:** WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JEDEC No. G-116 (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. BOTTOM CIRCUMFERENCE OF BASE SHELL WILL FALL WITHIN A CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING A DIAMETER OF 2-3/4".

**NOTE 4:** THE DRAWING SHOWS THE MINIMUM SIZE AND LOCATION OF THE CONTACT AREA OF THE EXTERNAL CONDUCTIVE COATING. THE ACTUAL AREA OF THIS COATING WILL BE GREATER THAN THE CONTACT AREA SO AS TO PROVIDE THE REQUIRED CAPACITANCE. EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

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

**NOTE 6:** 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.

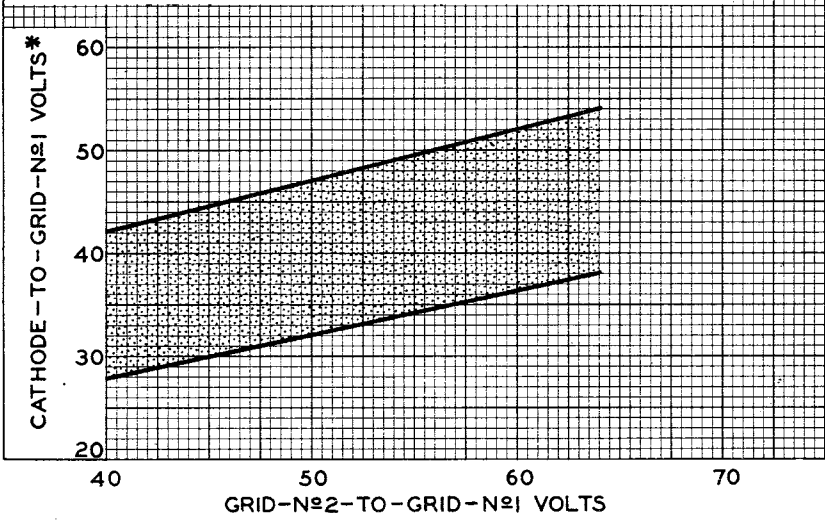
## RASTER-CUTOFF-RANGE CHART Cathode-Drive Service

$E_f = 6.3$  VOLTS

ULTOR-TO-GRID-N $\approx$ 1 VOLTS=16000

GRID-N $\approx$ 4-TO-GRID-N $\approx$ 1 VOLTAGE ADJUSTED FOR FOCUS.

\*INCREASES OR DECREASES DIRECTLY BY APPROX. 2%  
FOR EVERY 1000-VOLT CHANGE IN ULTOR-TO-GRID-N $\approx$ 1  
VOLTAGE.



92CS-10765

