### 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: \(600 \pm 30\) ma
- Heater Warm-Up Time (Average): 11 seconds
- Focusing Method: Electrostatic
- Deflection Method: Magnetic
- Deflection Angles (Approx.):
  - Diagonal: \(114^\circ\)
  - Horizontal: \(102^\circ\)
  - Vertical: \(85^\circ\)
- Direct Interelectrode Capacitances:
  - Grid No.1 to all other electrodes: \(6\ \mu\)f
  - Cathode to all other electrodes: \(5\ \mu\)f
  - External conductive coating toulon: \(1500\ max., 1000\ min.\ \mu\)f
- 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: \(10-13/16'' \pm 1/4''\)
  - Greatest width: \(16-13/32'' \pm 1/8''\)
  - Greatest height: \(13-11/32'' \pm 1/8''\)
  - Diagonal: \(18-5/8'' \pm 1/8''\)
  - Neck length: \(3-9/16'' \pm 1/8''\)
  - 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
Base. . . . . Small-Button Neoeightar 7-Pin, Arrangement 1.
(JEDEC No. B7-208)
Basing Designation for BOTTOM VIEW. . . . . . . . . . . . . . . . . BJR
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\textsuperscript{\textsuperscript{\texttrademark}} SERVICE

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

Maximum and Minimum Ratings, Design-Maximum Values:

\begin{align*}
\text{ULTOR VOLTAGE} & \quad \{20000 \text{ max. volts} \}
\{11000 \text{ min. volts} \}
\text{GRID-No. 3 (FOCUSBNG) VOLTAGE:}\quad &
\begin{cases}
\text{Positive value} & \quad 700 \text{ max. volts} \\
\text{Negative value} & \quad 350 \text{ max. volts} \\
\end{cases}
\text{GRID-No. 2 VOLTAGE} & \quad \{600 \text{ max. volts} \}
\{300 \text{ min. volts} \}
\text{GRID-No. 1 VOLTAGE:}\quad &
\begin{cases}
\text{Negative-peak value} & \quad 220 \text{ max. volts} \\
\text{Negative-bias value} & \quad 154 \text{ max. volts} \\
\text{Positive-bias value} & \quad 0 \text{ max. volts} \\
\text{Positive-peak value} & \quad 2 \text{ max. volts} \\
\end{cases}
\text{HEATER VOLTAGE} & \quad \{6.9 \text{ max. volts} \}
\{5.7 \text{ min. volts} \}
\text{PEAK HEATER—CATHODE VOLTAGE:}\quad &
\begin{cases}
\text{Heater negative with respect to cathode:} \\
\text{During equipment warm-up period not exceeding 15 seconds.} & \quad 450 \text{ max. volts} \\
\text{After equipment warm-up period.} & \quad 200 \text{ max. volts} \\
\text{Heater positive with respect to cathode.} & \quad 200 \text{ max. volts} \\
\end{cases}
\text{Typical Operating Conditions:}\quad &
\begin{cases}
\text{With utor voltage } (E_{\text{C1K}}) \text{ of} & \quad 16000 \text{ volts} \\
\text{and grid-No. 2 voltage } (E_{\text{C2K}}) \text{ of} & \quad 500 \text{ volts} \\
\text{Grid-No. 3 Voltage for focus} & \quad 0 \text{ to } 400 \text{ volts} \\
\text{Grid-No. 1 Voltage for visual extinction of focused raster} & \quad -43 \text{ to } -78 \text{ volts} \\
\end{cases}
\text{Field Strength of Adjustable Centering Magnet} & \quad 0 \text{ to } 10 \text{ gausses}
\text{Maximum Circuit Values:}\quad &
\begin{cases}
\text{Grid-No. 1—Circuit Resistance} & \quad 1.5 \text{ max. megohms} \\
\end{cases}
CATHODE-DRIVE 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...

\[ \begin{align*} &20000 \text{ max. volts} \\ &11000 \text{ min. volts} \end{align*} \]

GRID-No.2-TO-GRID-No.1 (FOCUSBING) VOLTAGE:

Positive value... 850 max. volts
Negative value... 200 max. volts

GRID-No.2-TO-GRID-No.1 VOLTAGE...

\[ \begin{align*} &750 \text{ max. volts} \\ &450 \text{ min. volts} \end{align*} \]

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...

\[ \begin{align*} &6.9 \text{ max. volts} \\ &5.7 \text{ min. volts} \end{align*} \]

PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode:
During equipment warm-up period not exceeding 15 seconds...
450 max. volts
After equipment warm-up period...
200 max. volts

Heater positive with respect to cathode.
200 max. volts

Typical Operating Conditions:

With ultor-to-grid-No.1 voltage \((E_{UG1})\) of 16000 volts
and grid-No.2-to-grid-No.1 voltage \((E_{GG1})\) of 500 volts

Grid-No.3-to-Grid-No.1 Voltage for focus...
0 to 400 volts

Cathode-to-Grid-No.1 Voltage for visual extinction of focused raster...
41 to 69 volts

Field Strength of Adjustable Centering Magnet...
0 to 10 gausses

Maximum Circuit Values:

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

PDF Reference:

19YP4

DATA 2
10-60
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 2-1/8". 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:

\[
\sqrt{\frac{E_{c4k} \text{ or } E_{c4g1} \text{ (volts)}}{16000 \text{ (volts)}}} \times 10 \text{ gausses}
\]

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 ultraviolet 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.

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 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 1-3/4".

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.
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

$E_F = 6.3 \text{ VOLTS}$
ULTOR VOLTS = 11000 TO 20000
GRID-N$^3$ VOLTS ADJUSTED FOR FOCUS.

Grid-N$^1$ Volts

-100
-80
-60
-40
-20
0
300
400
500
600
GRID-N$^2$ VOLTS

Cathode-Drive Service

$E_F = 6.3 \text{ VOLTS}$
ULTOR-TO-GRID-N$^1$ VOLTS = 11000 TO 20000
GRID-N$^2$-TO-GRID-N$^1$ VOLTS ADJUSTED FOR FOCUS.

Cathode-TO-GRID-N$^1$ Volts

100
80
60
40
20
500
600
700
GRID-N$^2$-TO-GRID-N$^1$ VOLTS

92CS-10789
92CS-10818