Picture Tube

NO ION-TRAP MAGNET REQUIRED

RECTANGULAR GLASS TYPE  ALUMINIZED SCREEN
LOW-VOLTAGE ELECTROSTATIC FOCUS  114° MAGNETIC DEFLECTION
LOW GRID-No.2 VOLTAGE  CATHODE-DRIVE TYPE

Electrical:
Direct Interelectrode Capacitances:
    Grid No.1 to all other electrodes. 6 pf
    Cathode to all other electrodes. 5 pf
    External conductive coating to anode 2500 max. pf
       1700 min. pf
Heater Current at 6.3 volts. 600 ± 30 ma
Heater Warm-Up Time (Average). 11 seconds
Electron Gun Type Requiring No Ion-Trap Magnet

Optical:
Phosphor (for curves, see front of this section). P4—Sulfide Type
     Aluminized
Faceplate. Filterglass
Light transmission at center (Approx.) 78%

Mechanical:
Weight (Approx.) 24 lbs
Overall Length 14.531" ± .281"
Neck Length 5.125" ± .125"
Projected Area of Screen 282 sq. in.
External Conductive Coating:
    Type: Regular-Band
    Contact area for grounding Near Reference Line
For Additional Information on Coatings and Dimensions:
    See Picture-Tube Dimensional-Outlines and Bulb J187 B sheets
    at front of this section
Cap. Recessed Small Cavity (JEDEC No.J1-21)
Base Small-Button Neoeightar 7-Pin
    Arrangement 1 (JEDEC No.B7-208)
Basing Designation for BOTTOM VIEW. BHR

Pin 1-Heater
Pin 2-Grid No.1
Pin 3-Grid No.2
Pin 4-Grid No.4
Pin 6-Grid No.1
Pin 7-Cathode
Pin 8-Heater
Cap-Anode (Grid No.3, Grid No.5, Screen, Collector)
     C-External Conductive Coating
Maximum and Minimum Ratings, Design-Maximum Values:

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

Anode Voltage: \( \{22000 \text{ max. volts}\) \(\{11000 \text{ min. volts}\)

Grid-No. 4 (Focusing) Voltage:
- Positive value: \(1250 \text{ max. volts}\)
- Negative value: \(400 \text{ max. volts}\)

Grid-No. 2 Voltage:
- 70 max. volts
- 40 min. volts

Cathode Voltage:
- Negative peak value: \(2 \text{ max. volts}\)
- Negative bias value: \(0 \text{ max. volts}\)
- Positive bias value: \(155 \text{ max. volts}\)
- Positive peak value: \(220 \text{ max. volts}\)

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 not exceeding 15 seconds: \(450 \text{ max. volts}\)
  - After equipment warm-up period: \(300 \text{ max. volts}\)

Typical Operating Conditions for Cathode-Drive Service:

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

Anode Voltage: \(18000 \text{ volts}\)
Grid-No. 4 Voltage: \(200 \text{ volts}\)
Grid-No. 2 Voltage: \(50 \text{ volts}\)
Cathode Voltage for visual extinction of focused raster: \(34 \text{ to } 52 \text{ volts}\)

Maximum Circuit Value:
Grid-No. 1 Circuit Resistance: \(1.5 \text{ max. megohms}\)

For X-radiation shielding consideration, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this Section
RECTANGULAR GLASS TYPE
LOW-VOLTAGE ELECTROSTATIC FOCUS
LOW GRID-No.2 VOLTAGE

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
Direct Interelectrode Capacitances:
Grid No.1 to all other electrodes. ... 6 μμf
Cathode to all other electrodes. ... 5 μμf
External conductive coating to ultor. \[2500 \text{ max.}\]
\[1700 \text{ min.}\] μμf
Focusing Method. ... Electrostatic
Deflection Method. ... Magnetic
Deflection Angles (Approx.):
Diagonal ... 114°
Horizontal ... 102°
Vertical ... 84°
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 ... 14-3/8" ± 5/16"
Greatest width ... 20-1/2" + 1/16" − 1/8"
Greatest height ... 16-1/2" ± 1/8"
Diagonal ... 23-25/64" + 3/32" − 1/8"
Neck length ... 5-1/8" ± 1/8"
Curvature of faceplate (Radii):
Center 30° 50° 36-3/4"
Intermediate 48" Edge 24"

Screen Dimensions (Minimum):
Greatest width ... 19-1/4"
Greatest height ... 15-1/8"
Diagonal ... 22-5/16"
Projected area ... 282 sq. in.
Weight (Approx.) ... 24 lbs
Operating Position ... Any
Cap. ... Recessed Small Cavity (JEDEC No.J1-21)
Bulb ... J187 (114°)
Base. Small-Button Neonightar 7-Pin, Arrangement 1, (JEDEC No.87-208)
Basing Designation for BOTTOM VIEW. ............... 8HR

Pin 1 - Heater
Pin 2 - Grid No.1
Pin 3 - Grid No.2
Pin 4 - Grid No.4
Pin 6 - Grid No.1
Pin 7 - Cathode
Pin 8 - Heater

Cap - Ultron
(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-Maximum Values:

ULTOR-TO-GRID-No.1 VOLTAGE. ......... 22000 max. volts
.... 11000 min. volts

GRID-No.4-TO-GRID-No.1 (FOCUSING) VOLTAGE:
Positive value. ............... 1250 max. volts
Negative value. ............... 400 max. volts

GRID-No.2-TO-GRID-No.1 VOLTAGE. ......... 70 max. volts
.... 40 min. 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. volts
.... 5.7 min. volts

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

Equipment Design Ranges:

With any ultron-to-grid-No.1 voltage \( E_{C5G1} \) between 11000 and 22000 volts and grid-No.2-to-grid-No.1 voltage \( E_{C2G1} \) between 44 and 70 volts

Grid-No.4-to-Grid-No.1 Voltage for focus. ............... 0 to 400 volts
Cathode-to-Grid-No.1 Voltage \( (E_{K1}) \) for visual extinction of focused raster. ............... 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 \( E_{K1} \) except video drive is a negative value

RADIO CORPORATION OF AMERICA
Electron Tube Division Harrison, N. J.
Grid-No.4 Current .......... -25 to +25 \( \mu \)A
Grid-No.2 Current .......... -15 to +15 \( \mu \)A
Field Strength of Adjust-
able Centering Magnet* ...... 0 to 8 gausses

Examples of Use of Design Ranges:

- With ultor-to-grid-
  No.1 voltage of 18000 volts
- and grid-No.2-to-grid-
  No.1 voltage of 50 volts
Grid-No.4-to-Grid-No.1 Voltage for focus* ...... 0 to 400 volts
Cathode-to-Grid-No.1 Voltage for visual extinc-
tion of focused raster ...... 34 to 49 volts
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff
  (Black level):
    White-level value ...... -34 to -49 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.
- Individual tubes will have satisfactory focus at some value of grid-
  No.4-to-grid-No.1 voltage between 0 and 400 volts with the combined
  bias voltage and video-signal voltage adjusted to give an ultor current
  of 200 microamperes.
- 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 7/16-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

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 22 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 voltage in excess of 16 kilovolts.

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

DIMENSIONAL OUTLINE and
BULB-CONTOUR DIMENSIONS
shown under Type 23N4P4 also apply to the 23NP4
RASTER-CUTOFF-RANGE CHART
Cathode-Drive Service

$E_f = 6.3$ VOLTS
ULTOR-TO-GRID-N&I VOLTS = 16000
GRID-N&4-TO-GRID-N&I VOLTS ADJUSTED FOR FOCUS.
*CATHODE-TO-GRID-N&I VOLTAGE FOR VISUAL EXTINCTION
OF FOCUSED RASTER INCREASES OR DECREASES
DIRECTLY BY APPROX. 2% FOR EVERY 1000-VOLT
CHANGE IN ULTOR-TO-GRID-N&I VOLTAGE.

92CS-10623
CATHODE-DRIVE CHARACTERISTICS

E_f=6.3 VOLTS
ULTOR-TO-GRID-N&1 VOLTS=16000
GRID-N&2-TO-GRID-N&1 VOLTS=50
CATHODE BIASED POSITIVE WITH RESPECT TO GRID N&1 TO GIVE FOCUSED RASTER CUTOFF.
RASTER FOCUSED AT AVERAGE BRIGHTNESS.
RASTER SIZE=18"x13×1/2"

CIE COORDINATES OF SCREEN: X=0.287, Y=0.315

- LOW-CUTOFF TUBE
- HIGH-CUTOFF TUBE

VIDEO SIGNAL VOLTS FROM RASTER CUTOFF

92CM-10622

RADIO CORPORATION OF AMERICA
Electron Tube Division
Harrison, N. J.
DATA 3
10-60
CATHODE-DRIVE CHARACTERISTICS

$E_p = 6.3$ VOLTS
ULTOR-TO-GRID-$N\#1$ VOLTS$=16000$
GRID-$N\#2$-TO-GRID-$N\#1$ VOLTS$=50$
CATHODE BIASED POSITIVE WITH RESPECT TO
GRID $N\#1$ TO GIVE FOCUSED RASTER CUTOFF.

ULTOR MICROAMPERES

VIDEO SIGNAL VOLTS FROM RASTER CUTOFF

LOW-CUTOFF TUBE

HIGH-CUTOFF TUBE

92CM-9946RI