This bulletin also applies to RCA-23FBP4 which is identical with RCA-23ENP4 except for its faceplate which is treated to reduce specular reflection.

23FBP4

from JEDEC release #4649, March 30, 1964

# RCA-23ENP4

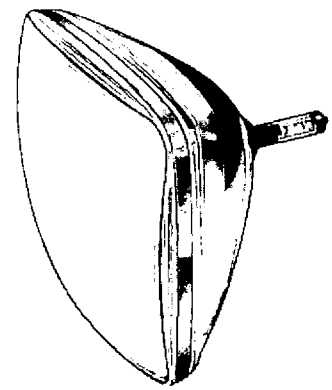
## PAN-O-PLY PICTURE TUBE

*Initial Data*

RCA-23ENP4 is a black-and-white pan-o-ply picture tube which eliminates the need for either an integral protective window or a separate safety-glass window and its companion dust seal in the receiver. As a result internal reflections are reduced, and picture contrast is improved. Integral implosion protection in the pan-o-ply picture tube is provided by means of a formed rim band and a welded tension band around the periphery of the tube panel. The 23ENP4 is a rectangular glass picture tube having an aluminized screen with nearly straight sides and slightly rounded corners.

Features of the 23ENP4 include:

- PAN-O-PLY—Integral Implosion Protection
- 92° Magnetic Deflection
- Low-Voltage Electrostatic Focus
- Aluminized Screen
- Electron Gun Requiring No Ion-Trap Magnet
- 18.500" Max. Overall Length
- 5.625" Neck Length
- 15.125" x 19.250" Screen
- 6.3 Volt/600 Ma Heater
- Low Grid-No.2 Voltage—
  For Cathode-Drive Service
- 25 kv Max. Anode Voltage



### GENERAL DATA

**Electrical:**

| | | |
|---|---|---|
| Focusing Method | Electrostatic | |
| Deflection Method | Magnetic | |
| Deflection Angles (Approx.): | | |
| Diagonal | 92° | |
| Horizontal | 80° | |
| Vertical | 65° | |
| Direct Interelectrode Capacitances: | | |
| Cathode to all other electrodes | 5 | pf |
| Grid No.1 to all other electrodes | 6 | pf |
| External conductive coating to anode[a] | 2500 max. / 1700 min. | pf / pf |
| Heater Current at 6.3 volts | 600 ± 30 | ma |
| Heater Warm-Up Time (Average) | 11 | seconds |

Heater warm-up time is defined as the time required in the test circuit shown in *Fig.1* for the voltage (E) across the heater terminals to increase from zero to 0.8 of rated heater voltage.

Electron Gun . . . . Type Requiring No Ion-Trap Magnet

**Optical:**

Phosphor . . . . . P4—Sulfide Type, Aluminized
Faceplate . . . . . Filterglass
Light transmission at center (Approx.) . . . . . 42%

**Mechanical:**

Weight (Approx.) . . . . . 29 lbs

Tube Dimensions:

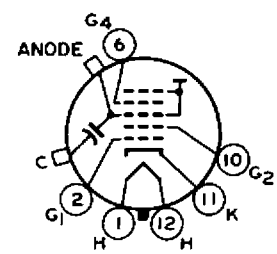
| | |
|---|---|
| Overall length | 18.125" ± .375" |
| Neck length | 5.625" ± .188" |
| Diagonal | 23.500" ± .125" |
| Greatest width | 20.650" ± .125" |
| Greatest height | 16.650" ± .125" |

Minimum Screen Dimensions (Projected):

| | |
|---|---|
| Diagonal | 22.312" |
| Greatest width | 19.250" |
| Greatest height | 15.125" |
| Area | 282 sq. in. |

Bulb Designation . . . . . J187 J
Cap Designation . . . . . Recessed Small Cavity (JEDEC No.J1-21)
Base Designation . . . . . Short Small-Shell Duodecal 6-Pin, (JEDEC Group 4, No.B6-203)
Basing Designation . . . . . 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: Anode (Grid No.3, Grid No.5, Screen, Collector)
C: External Conductive Coating




BOTTOM VIEW

**Maximum and Minimum Ratings,** *Design-Maximum Values:*[b]

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

| | | |
|---|---|---|
| Anode Voltage | 25,000 max. | volts |
| | 11,000 min. | volts |
| Grid-No.4 Voltage: | | |
| Positive value | 1250 max. | volts |
| Negative value | 400 max. | volts |
| Grid-No.2 Voltage | 70 max. | volts |
| | 40 min. | volts |
| Cathode Voltage: | | |
| Negative peak value | 2 max. | volts |
| Negative bias value | 0 max. | volts |
| Positive bias value | 100 max. | volts |
| Positive peak value | 150 max. | volts |
| Heater Voltage[c] | 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 | 300 max. | volts |
| Heater positive with respect to cathode: | | |
| Combined AC & DC voltage | 200 max. | volts |
| DC Component | 100 max. | volts |

**Typical Operating Conditions for Cathode-Drive[d] Service:**

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

| | | |
|---|---|---|
| Anode Voltage | 20,000 | volts |
| Grid-No.4 Voltage[e] | 200 | volts |
| Grid-No.2 Voltage | 50 | volts |
| Cathode Voltage for visual extinction of focused raster (See *Fig.2*) | 36 to 54 | volts |
| Field Strength of required adjustable Centering Magnet[f] | 0 to 12 | gauss |

**Maximum Circuit Value:**

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

[a] Includes implosion protection hardware.

[b] The *maximum ratings* in the tabulated data are established in accordance with the following definition of the *Design-Maximum Rating System* for rating electron tubes.

Design-Maximum ratings are limiting values of operating and environmental conditions applicable to a bogey electron device of a specified type as defined by its published data, and should not be exceeded under the worst probable conditions.

The device manufacturer chooses these values to provide acceptable serviceability of the device, taking responsibility for the effects of changes in operating conditions due to variations in device characteristics.

The equipment manufacturer should design so that initially and throughout life no Design-Maximum value for the intended service is exceeded with a bogey device under the worst probable operating conditions with respect to supply-voltage variation, equipment component variation, equipment control adjustment, load variation, signal variation, and environmental conditions.

[c] Measured between the heater terminals.

[d] 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.

[e] The grid-No.4 voltage required for optimum focus of any individual tube will have a value anywhere between 0 and +400 volts with the combined grid-No.1 voltage and video-signal voltage adjusted to give an anode current of 200 microamperes on a 13-1/2-inch by 18-inch pattern from an RCA-2F21 monoscope, or equivalent.

[f] Distance from Reference Line for suitable PM centering magnet should not exceed 2-1/4 inches. 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

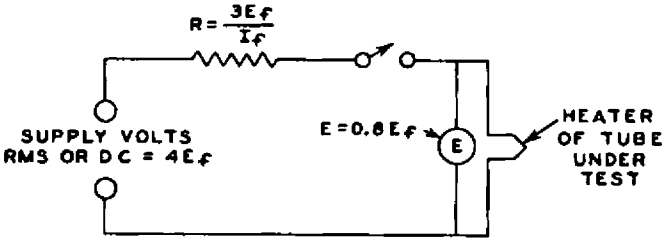
$$\sqrt{\frac{\text{Anode volts}}{16000 \text{ volts}}} \times 10 \text{ gauss}$$

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.

## OPERATING CONSIDERATIONS

*X-Radiation Warning.* When operated at anode voltages up to 16 kilovolts, this picture tube does not produce any harmful X-radiation. However, because the rating of this type permits operation at voltages as high as 25 kilovolts (design-maximum value), shielding of the tube for X-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.

**TEST CIRCUIT FOR DETERMINING HEATER WARM-UP TIME**




Ef = RATED HEATER VOLTAGE OF TUBE UNDER TEST.
If = RATED HEATER CURRENT OF TUBE UNDER TEST.
92CS-8503

Fig.1

## RASTER CUTOFF CHART

*For Cathode-Drive Service*

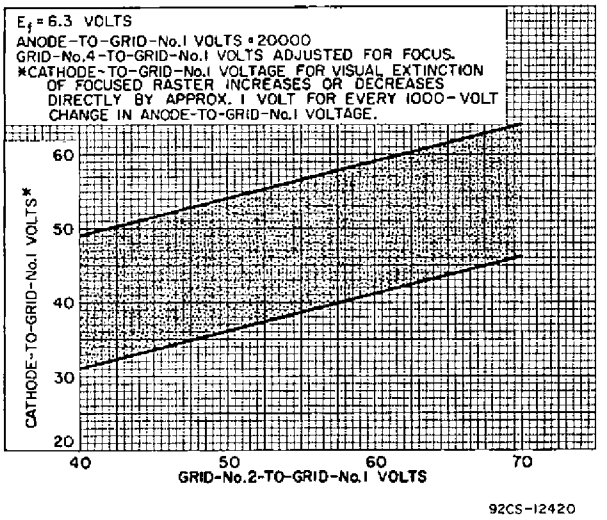
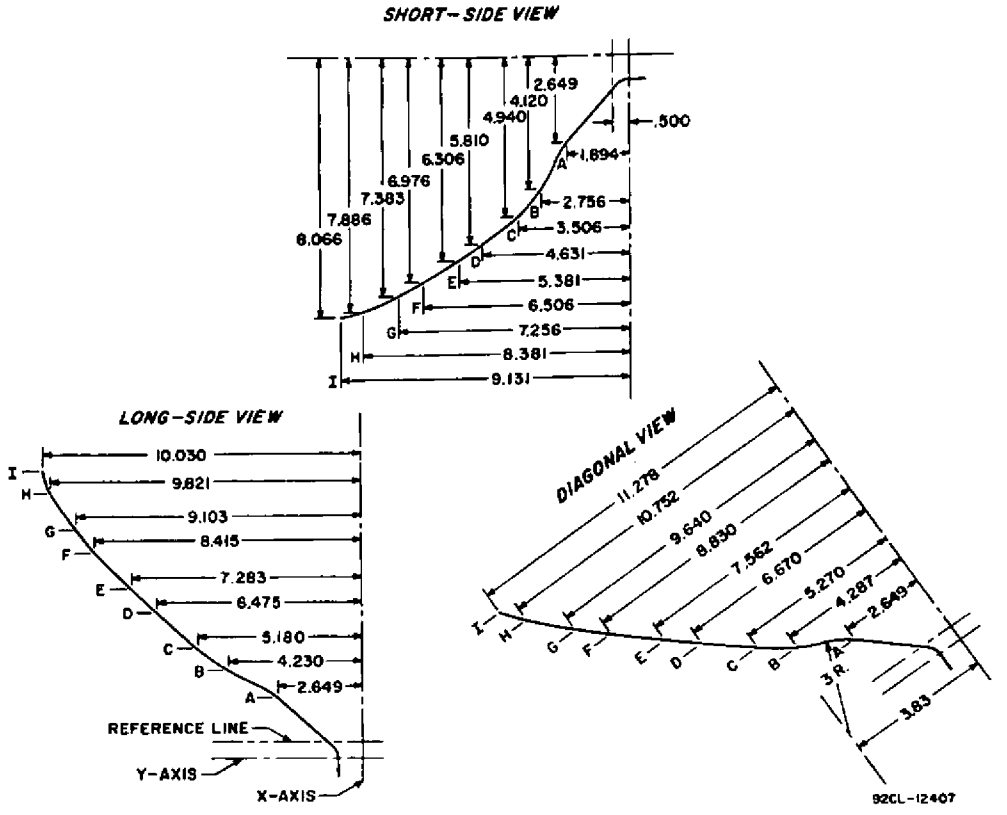


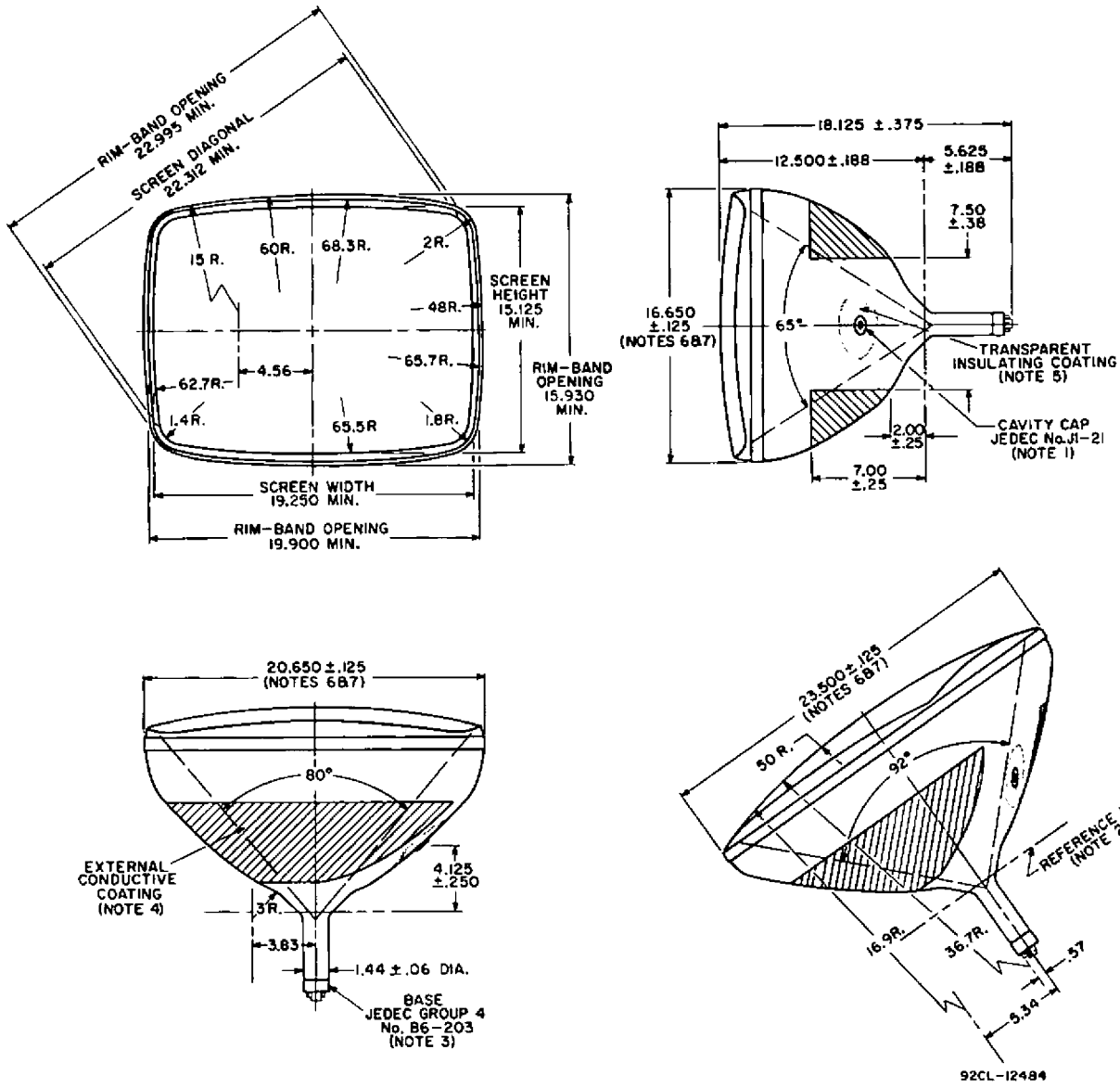

Fig.2

## BULB-CONTOUR DIMENSIONS

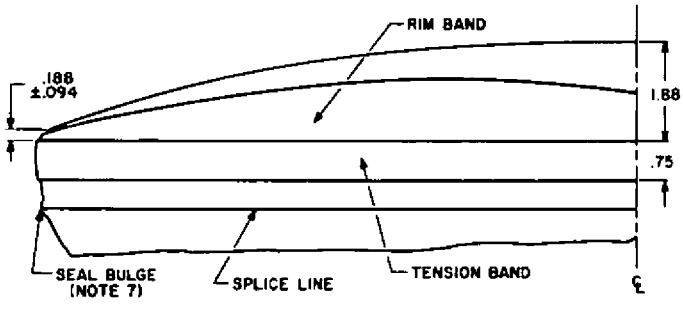



PLANES A THROUGH I ARE NORMAL TO THE TUBE AXIS AND AT FIXED LOCATIONS FROM THE Y AXIS. THESE COORDINATES DESCRIBE THE BOGIE BULB EXTERNAL CONTOUR IN PLANES THROUGH THE TUBE AXIS AND THE RESPECTIVE FACEPLATE AXES.

## DIMENSIONAL OUTLINE




### DETAIL OF PANEL
(Diagonal View)




DIMENSIONS IN INCHES

**NOTE 1:** THE PLANE THROUGH THE TUBE AXIS AND PIN No.6 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ANODE TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF ±30°. ANODE TERMINAL IS ON SAME SIDE AS PIN No.6.

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

**NOTE 4:** EXTERNAL CONDUCTIVE COATING AND IMPLOSION PROTECTION HARDWARE MUST BE GROUNDED.

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

**NOTE 6:** MEASURED FROM THE TENSION BAND.

**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".