23BKP4

BI-PANEL PICTURE TUBE

Low-Voltage Electrostatic Focus
92° Magnetic Deflection

Aluminized Screen
Low-Grid-No.2-Voltage Type
for Cathode-Drive Operation

19-5/16" x 15-1/4" Screen
24-51/64" Max. Bulb Diagonal
18-7/8" Max. Overall Length

RCA-23BKP4 is a directly viewed, bi-panel, rectangular, glass picture tube having an aluminized screen 19-5/16" x 15-1/4" with nearly straight sides and slightly rounded corners, and a minimum projected screen area of 282 square inches. Employing 92°-angle magnetic deflection and low-voltage electrostatic focus, it is intended for use in cathode-drive circuits.

The bi-panel construction used in the 23BKP4 provides an integral Filterglass protective panel which is sealed to the faceplate of the tube. This construction eliminates the need for a separate safety-glass window and its companion dust seal in the receiver. It also eliminates the air separation between faceplate and protective window and thereby reduces reflections; consequently, picture contrast is improved.

The 23BKP4 has an electron gun that has improved cathode-drive sensitivity; that requires no ion-trap magnet; and that minimizes deflection distortion.

GENERAL DATA

Electrical:

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 5 volts.		
Focusing Method	Electrostatic	
Deflection Method	Magnetic	
Deflection Angles (Approx.):		
Diagonal	92°	
Horizontal	81°	
Vertical	66°	
Direct Interelectrode Capacitances:		
Grid No.1 to all other electrodes	6	μμf
Cathode to all other electrodes	5	μμf
External conductive coating to ultor[a]	2500 max. / 1700 min.	μμf
Electron Gun	Type Requiring No Ion-Trap Magnet	

Optical:

Faceplate	Filterglass
Light Transmission at Center (Approx.)	40%
Phosphor	P4-Sulfide Type, Aluminized
Fluorescence	White
Phosphorescence	White
Persistence	Medium Short

Mechanical:

Tube Dimensions:	
Overall length	18-7/16" ± 7/16"
Greatest width	21-5/16" ± 1/8"
Greatest height	17-13/32" + 3/32" - 1/8"
Diagonal	24-45/64" + 3/32" - 1/16"
Neck length	5-5/8" ± 3/16"
Curvature of Faceplate (External)	See *Dimensional Outline*
Screen Dimensions (Minimum):	
Greatest width	19-5/16"
Greatest height	15-1/4"
Diagonal	22-5/16"
Projected area	282 sq. in.
Bulb Designation	J18701/02 fitted with Protective Panel FP198A1
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
Weight (Approx.)	35 lbs
Operating Position	Any

CATHODE-DRIVE[b] SERVICE

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

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

ULTOR[a]-TO-GRID-No.1 VOLTAGE	25000 max. / 15000 min.	volts
GRID-No.4-TO-GRID-No.1 VOLTAGE:		
Positive value	1250 max.	volts
Negative value	400 max.	volts
GRID-No.2-TO-GRID-No.1 VOLTAGE	225 max. / 40 min.	volts
GRID-No.2-TO-CATHODE VOLTAGE	70 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. / 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

Typical Operating Conditions:

With ultor-to-grid-No.1 voltage (E_{c5g1}) of	*20000*	*volts*
and grid-No.2-to-grid-No.1 voltage (E_{c2g1}) of	*50*	*volts*
Grid-No.4-to-Grid-No.1 Voltage for focus[d]	200	volts
Cathode-to-Grid-No.1 Voltage for visual extinction of focused raster (See *Fig.2*)	36 to 54	volts
Field Strength of Adjustable Centering Magnet[e]	0 to 12	gauss

Maximum Circuit Values:

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

[a] The "ultor" in a cathode-ray tube is the electrode to which is applied the highest dc voltage for accelerating the electrons in the beam prior to its deflection. In this tube type, the ultor function is performed by grid No.5. Since grid No.3, grid No.5, and collector are connected together within the tube, they are collectively referred to simply as "ultor" for convenience in presenting data and curves.

[b] 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.

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

Design-Maximum ratings are limiting values of operating and environmental conditions applicable to a bogey electron device of 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.

[d] The grid-No.4-to-grid-No.1 voltage required for optimum focus of any individual tube will have a value anywhere between 0 and 400 volts, 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 the design-maximum ratings shown for these items.

[e] 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

$$\sqrt{\frac{Ec_5g_1\ (volts)}{16000\ (volts)}} \times 10 \text{ gausses}$$

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.

OPERATING CONSIDERATIONS

X-Ray Warning. When operated at ultor voltages up to 16 kilovolts, the 23BKP4 does not roduce any harmful X-ray radiation. However, ecause the rating of this type permits operation at voltages as high as 25 kilovolts (design-maximum value), shielding of the 23BKP4 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.

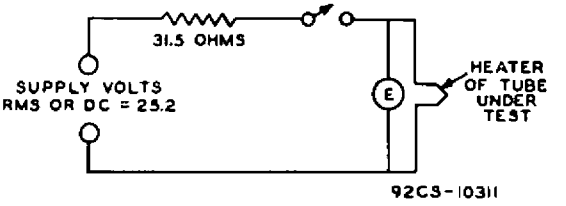


Fig.1 - Test Circuit for Determining Heater Warm-Up Time.

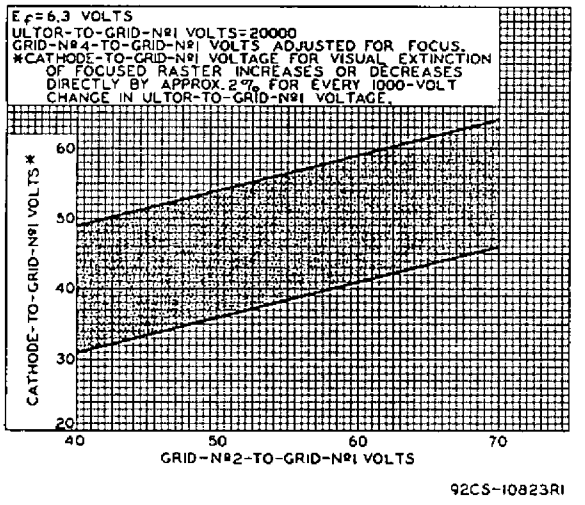
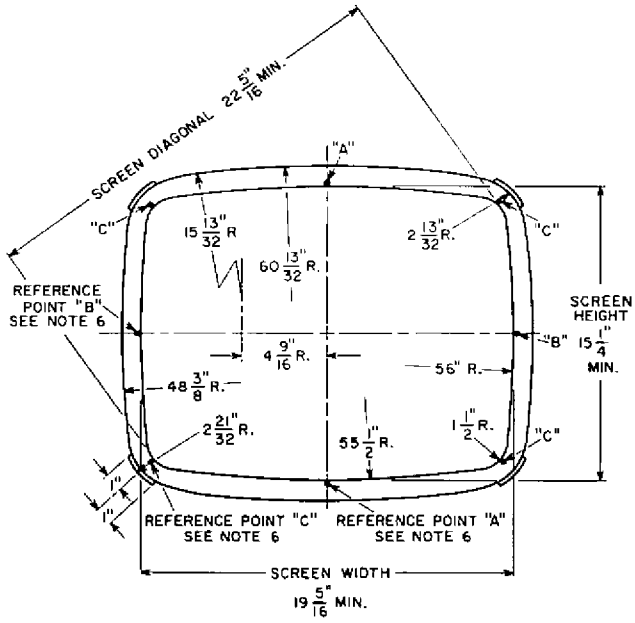
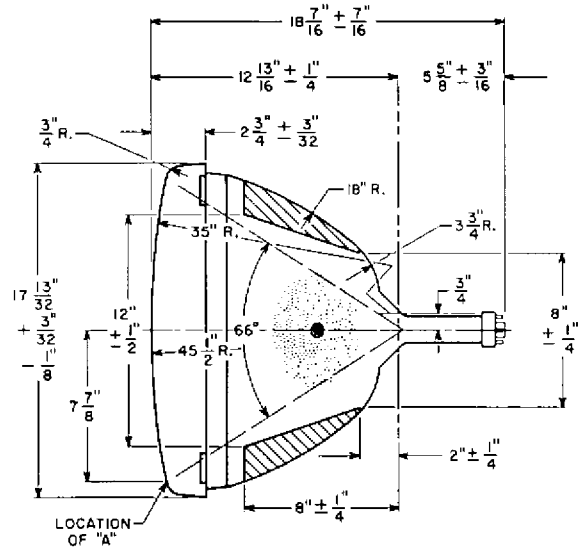
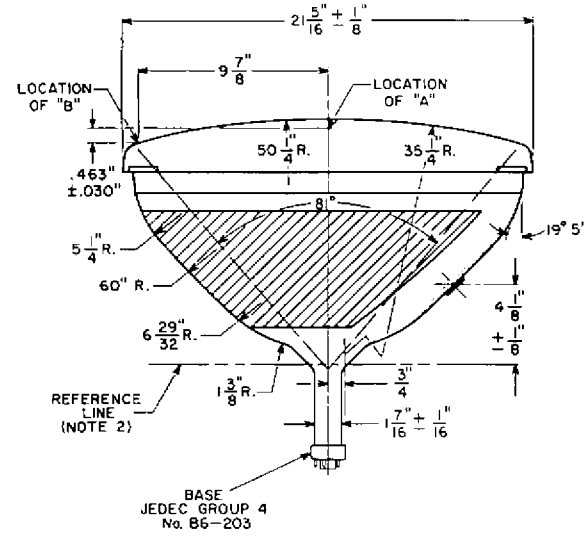


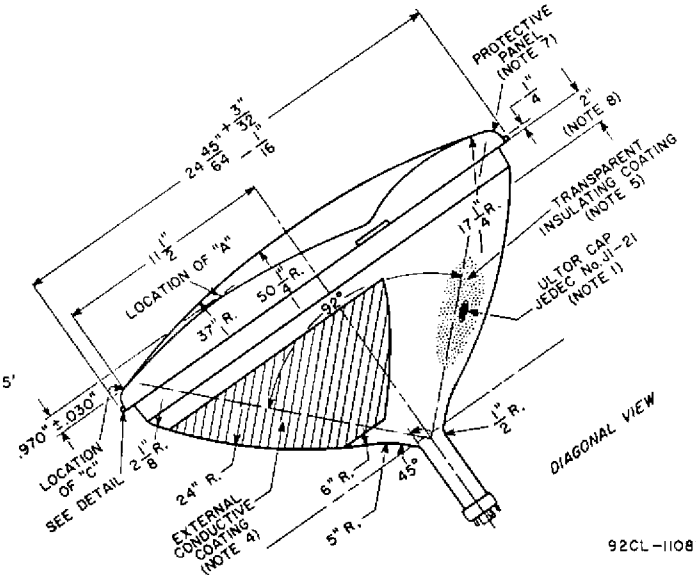
Fig.2 - Raster-Cutoff-Range Chart for Type 23BKP4.

DIMENSIONAL OUTLINE

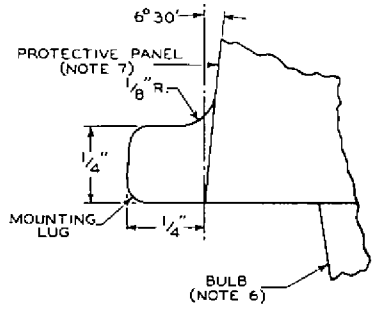








DETAIL OF MOUNTING LUG



NOTES FOR DIMENSIONAL OUTLINE

NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND PIN No.6 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF ± 30°. ULTOR 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 MUST BE GROUNDED.

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

NOTE 6: REFERENCE POINTS A,B, AND C ARE PROVIDED FOR USE IN DESIGN OF A MASK CONTOURED FOR CLOSE FIT TO THE PROTECTIVE PANEL.

NOTE 7: THE CENTER OF THE PROTECTIVE PANEL MAY BE ECCENTRIC WITH RESPECT TO THE AXIS OF THE TUBE ENVELOPE. ASSOCIATED SHIFT OF THE PROTECTIVE PANEL ALONG ITS MINOR AND/OR MAJOR AXIS WILL NOT EXCEED 1/16".

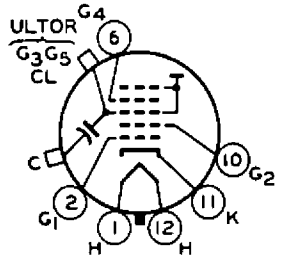
NOTE 8: KEEP THIS CIRCUMFERENTIAL AREA FREE OF MOUNTING HARDWARE.

NOTE 9: ADEQUATE TUBE SUPPORT IS OBTAINED BY CLAMPING TO THE MOUNTING LUGS PROVIDED AT EACH CORNER OF THE PROTECTIVE PANEL. 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.

BASING DIAGRAM

Bottom View

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

12L