from JEDEC release #2874, July 4, 1960

Attention is called to the use of Design-Maximum Ratings for this type.

23MP4

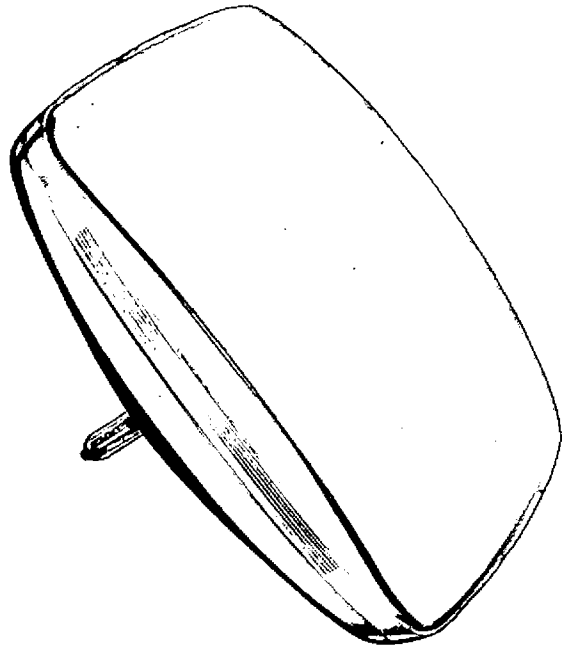
PICTURE TUBE

Low-Voltage Electrostatic Focus
114° Magnetic Deflection

Aluminized Screen
Rectangular Glass Type
Requires No Ion-Trap Magnet

19-1/4" x 15-1/8" Screen
23-31/64" Max. Bulb Diagonal
14-11/16" Max. Overall Length

RCA-23MP4 is a directly viewed, rectangular glass picture tube having an aluminized screen 19-1/4" x 15-1/8" with nearly straight sides and slightly rounded corners, and a minimum projected screen area of 282 square inches. Maximum overall length is 14-11/16".



The 23MP4 features an envelope having a relatively flat, compound radius faceplate and special internal contouring in the deflecting-yoke region to obtain 114° deflection with 110° deflecting components.

Other design features of the 23MP4 include an electron gun that minimizes deflection distortion and requires no ion-trap magnet; a neck diameter of 1-1/8"; an external conductive bulb coating; and a "neoeightar" 7-pin base of the integral glass-button type having straight through leads fitted with an indexing plug.

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.

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 max.	μμf
	1700 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	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:	
External surface—	
Center radius	50"
Edge radius	36-3/4"
Internal surface—	
Center radius	30"
Intermediate radius	48"
Edge radius	24"
Screen Dimensions (Minimum):	
Greatest width	19-1/4"
Greatest height	15-1/8"
Diagonal	22-5/16"
Projected area	282 sq. in.
Bulb	J187 (114°)
Cap	Recessed Small Cavity (JEDEC No.J1-21)
Base	Small-Button Neoeightar 7-Pin, Arrangement 1, (JEDEC No.B7-208)
Basing	BHR
Weight (Approx.)	24 lbs.
Operating Position	Any

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ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

23MP4 6-60
Printed in U.S.A.

GRID-DRIVE▲ SERVICE

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

Maximum and Minimum Ratings, *Design-Maximum Values:*♦

ULTOR● VOLTAGE	22000 max. 11000 min.	volts volts
GRID-No.4 VOLTAGE:		
Positive value	1100 max.	volts
Negative value	550 max.	volts
GRID-No.2 VOLTAGE	550 max. 200 min.	volts volts
GRID-No.1 VOLTAGE:		
Negative peak value	220 max.	volts
Negative bias value	154 max.	volts
Positive bias value	0 max.	volts
Positive peak value	2 max.	volts
HEATER VOLTAGE	6.9 max. 5.7 min.	volts 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 ultor voltage (E_{c_5k}) between 11000 and 22000 and grid-No.2 voltage (E_{c_2k}) between 220 and 550 volts

Grid-No.4 Voltage for focus§	0 to 400	volts
Grid-No.1 Voltage (E_{c_1k}) for visual extinction of focused raster	*See Raster-Cutoff-Range Chart for Grid-Drive Service*	
Grid-No.1 Video Drive from Raster Cutoff (Black Level): White-level value (Peak positive)	Same value as determined for E_{c_1k} except video drive is a positive voltage	
Grid-No.4 Current	−25 to +25	μa
Grid-No.2 Current	−15 to +15	μa
Field Strength of Adjustable Centering Magnet♦	0 to 8	gausses

Examples of Use of Design Ranges:

With ultor voltage of	*18000*	*volts*
and grid-No.2 voltage of	*400*	*volts*
Grid-No.4 Voltage for focus§	0 to 400	volts
Grid-No.1 Voltage for visual extinction of focused raster	−36 to −94	volts
Grid-No.1 Video Drive from Raster Cutoff (Black Level): White-level value	36 to 94	volts

Maximum Circuit Values:

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

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. 11000 min.	volts volts
GRID-No.4-TO-GRID-No.1 VOLTAGE:		
Positive value	1100 max.	volts
Negative value	550 max.	volts
GRID-No.2-TO-GRID-No.1 VOLTAGE	700 max. 200 min.	volts volts
GRID-No.2-TO-CATHODE VOLTAGE	550 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 max.	volts 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 ultor-to-grid-No.1 voltage ($E_{c_5g_1}$) between 11000 and 22000 volts and grid-No.2-to-grid-No.1 voltage ($E_{c_2g_1}$) between 225 and 700 volts

Grid-No.4-to-Grid-No.1 Voltage for focus§	0 to 400	volts
Cathode-to-Grid-No.1 Voltage (Ekg_1) 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 Ekg_1 except video drive is a negative voltage	
Grid-No.4 Current	−25 to +25	μa
Grid-No.2 Current	−15 to +15	μa
Field Strength of Adjustable 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	*400*	*volts*
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	36 to 78	volts
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black Level): White-level value	−36 to −78	volts

Maximum Circuit Values:

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

♦ 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.

● 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 the 23MP4, the ultor function is performed by grid No.5. Since grid No.5, grid-No.3, and collector are connected together within the 23MP4, they are collectively referred to simply as "ultor" for convenience in presenting data and curves.

▲ Grid drive is the operating condition in which the video signal varies the grid-No.1 potential with respect to cathode.

■ 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 (or grid-No.4-to-grid-No.1) voltage between 0 and 400 volts under conditions with the combined bias voltage and video-signal voltage adjusted to produce 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 3/8-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, the 23MP4 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 the 23MP4 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 shatter-proof, glass cover over the face of the 23MP4 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.

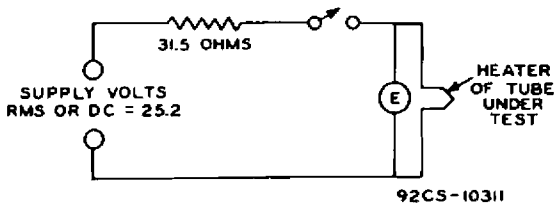


Fig. 1 - Test Circuit for Determining Heater Warm-Up Time.

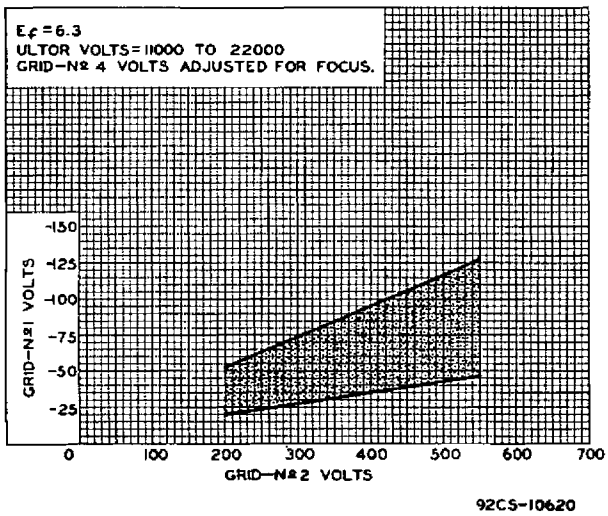


Fig. 2 - Raster-Cutoff-Range Chart for Type 23MP4 in Grid-Drive Service.

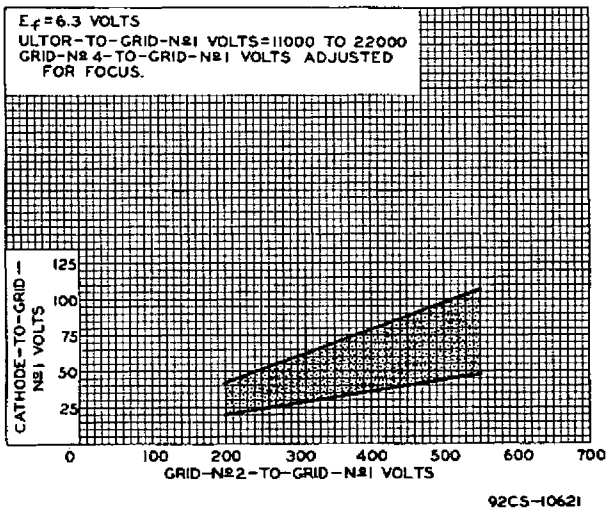


Fig. 3 - Raster-Cutoff-Range Chart for Type 23MP4 in Cathode-Drive Service.

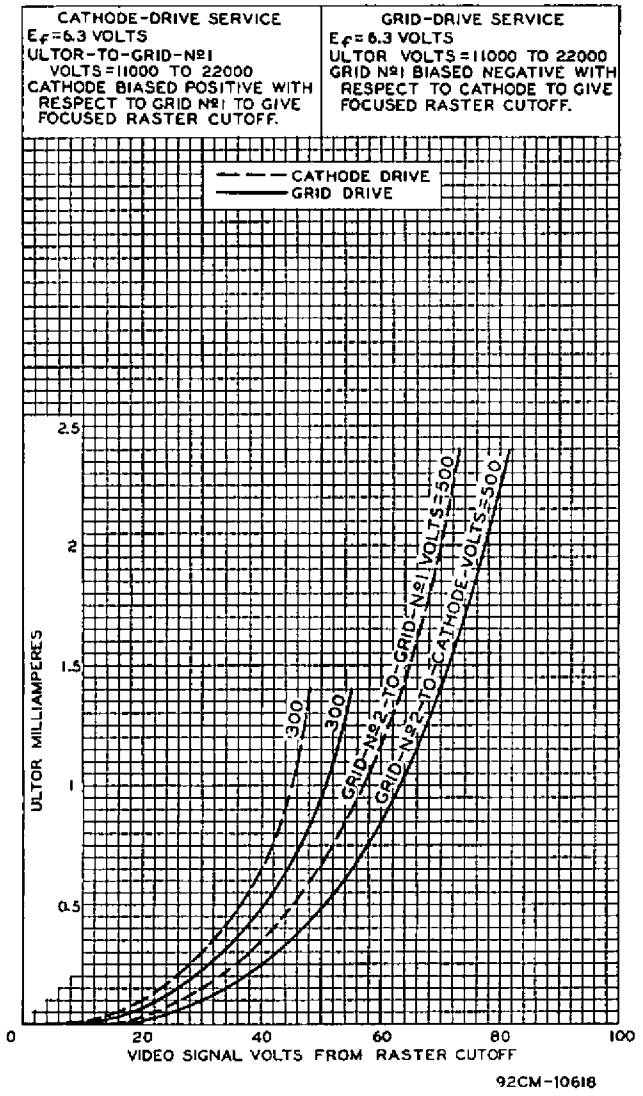


Fig. 4 – Average Drive Characteristics of Type 23MP4.

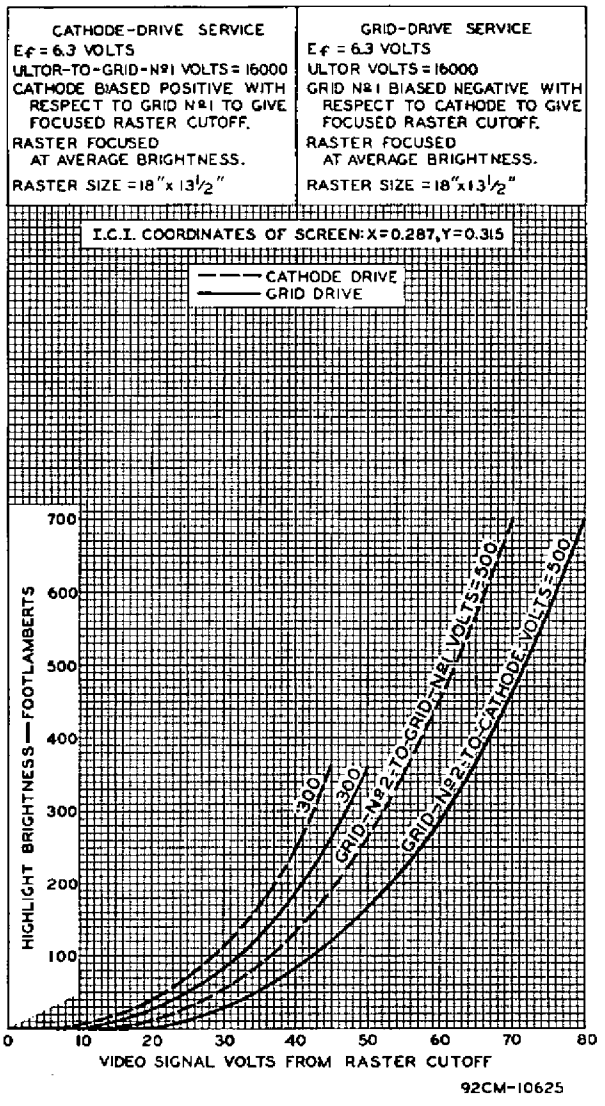
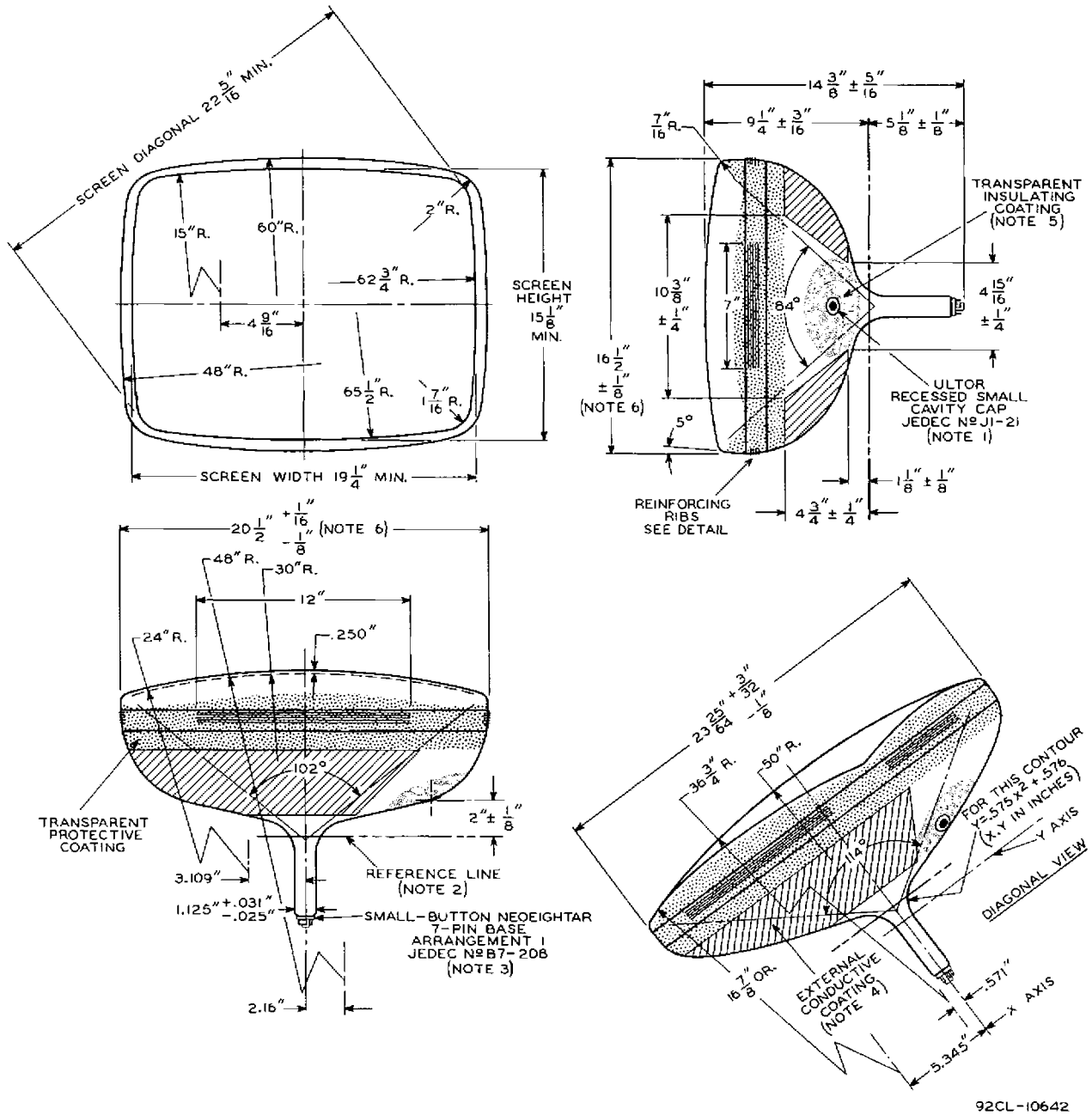
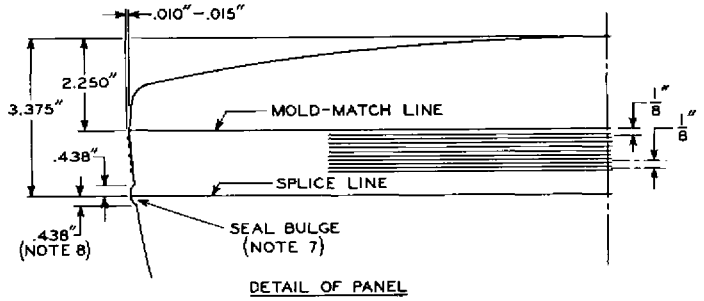


Fig. 5 – Average Drive Characteristics of Type 23MP4.

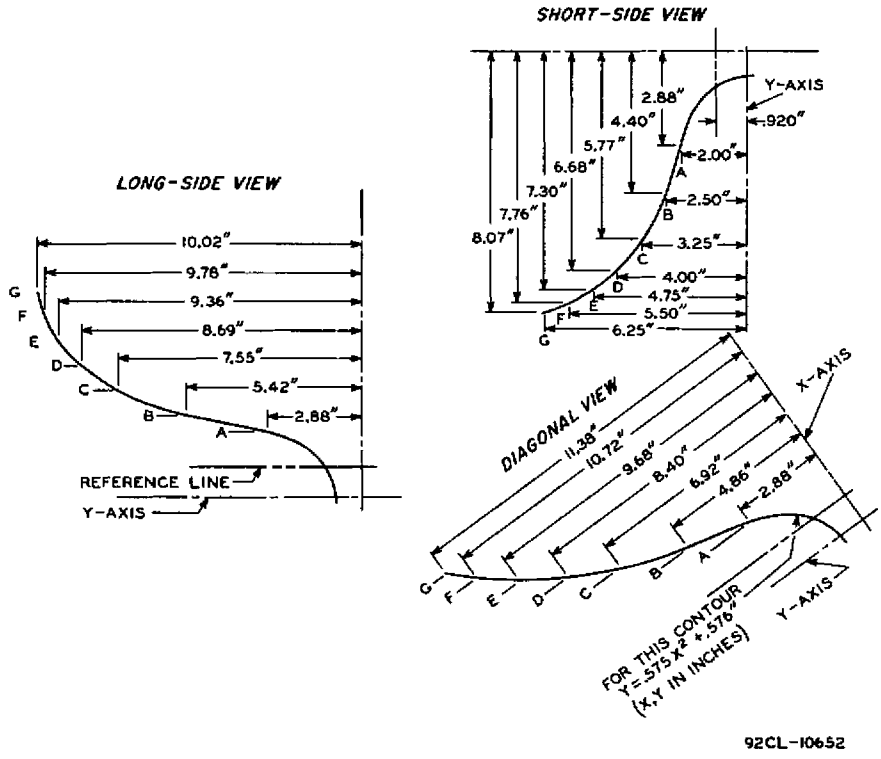
DIMENSIONAL OUTLINE





DETAIL OF PANEL

BULB-CONTOUR DIMENSIONS



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

NOTES FOR DIMENSIONAL OUTLINE

NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND PIN NO.4 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.4.

NOTE 2: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JEDEC NO.G-126 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. THE DESIGN OF THE SOCKET SHOULD BE SUCH THAT THE CIRCUITRY 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 LINTLESS CLOTH.

NOTE 6: MEASURED AT THE MOLD-MATCH LINE.

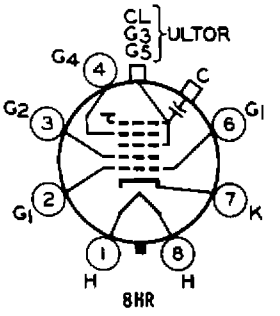
NOTE 7: BULGE AT SPLICE-LINE SEAL MAY INCREASE THE INDICATED MAXIMUM VALUE FOR ENVELOPE WIDTH, DIAGONAL, AND HEIGHT BY NOT MORE THAN 1/8", BUT AT ANY POINT AROUND THE SEAL, THE BULGE WILL NOT PROTRUDE MORE THAN 1/16" BEYOND THE ENVELOPE SURFACE AT THE LOCATION SPECIFIED FOR DIMENSIONING THE ENVELOPE WIDTH, DIAGONAL, AND HEIGHT.

NOTE 8: AREA BETWEEN MOLD-MATCH LINE AND SEAL BULGE IS 1/2" MINIMUM. THIS SHOULD BE THE MAXIMUM WIDTH OF TUBE SUPPORT BAND. SUPPORTS MUST BE SPACED FROM THE TUBE BY THE USE OF CUSHIONING PADS MADE OF ASPHALT, IMPREGNATED FELT OR EQUIVALENT.

SOCKET CONNECTIONS

Bottom View

PIN 1: HEATER
PIN 2: GRID NO.1
PIN 3: GRID NO.2
PIN 4: GRID NO.4
PIN 6: GRID NO.1



8HR

PIN 7: CATHODE
PIN 8: HEATER
CAP: ULTOR (Grid No.3, Grid No.5, Collector)
C: EXTERNAL CONDUCTIVE COATING

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