14RP4

KINESCOPE

Low-Voltage Electrostatic Focus Magnetic Deflection

Short Rectangular Glass Type Spherical Filterglass Faceplate

TENTATIVE DATA

12-1/8" x 9-5/8" Screen 14-1/8" Max. Bulb Diagonal 14-7/8" Max. Length

RCA-14RP4 is a short, lightweight, directly viewed, rectangular, glass picture tube of the low-voltage electrostatic-focus and magnetic-deflection type. Designed primarily for low-cost, lightweight, transportable instruments, the 14RP4 has a spherical Filterglass faceplate, a screen 12-1/8" x 9-5/8" with slightly curved sides and rounded corners, and a typical projected screen area of 108 square inches.

Employing wide-angle (90°) deflection, the 14RP4 has a very short length--a length approximately 2 inches shorter than a type having the same size faceplate and 70° deflection. Other design features of the 14RP4 include an external conductive bulb coating which with the internal conductive coating forms a supplementary filter capacitor; and an ion-trap gun requiring an external, single-field magnet.

DATA

General:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	6.3	volts
Current	0.6 ± 10%	amp
Direct Interelectrode Capacitances:		
Grid No.1 to all other electrodes	6	μμf
Cathode to all other electrodes	5	μμf
External conductive coating to ultor●	750 max. / 500 min.	μμf
Faceplate, Spherical	Filterglass	
Light transmission (Approx.)	78%	
Phosphor	P4--Sulfide Type	
Fluorescence	White	
Phosphorescence	White	
Persistence	Short	
Focusing Method	Electrostatic	
Deflection Method	Magnetic	
Deflection Angles (Approx.):		
Diagonal	90°	
Horizontal	85°	
Vertical	68°	
Ion-Trap Gun	Requires External Single-Field Magnet	
Tube Dimensions:		
Overall length	14-9/16" ± 5/16"	
Greatest width	13-1/16" ± 1/8"	
Greatest height	10-9/16" ± 1/8"	
Diagonal	14" ± 1/8"	
Neck length	6-7/8" ± 3/16"	
Screen Dimensions (Minimum):		
Greatest width	12-1/8"	
Greatest height	9-5/8"	
Diagonal	13-1/16"	
Projected area	106 sq. in.	
Cap	Recessed Small Cavity (JETEC No.J1-21)	
Bulb	J112	
Base	Small-Shell Duodecal 6-Pin (JETEC No.B6-63)	
Weight (Approx.)	8.5 lbs	
Mounting Position	Any	

GRID-DRIVE▲ SERVICE

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

Maximum Ratings, *Design-Center Values:*

ULTOR● VOLTAGE	14000 max.	volts
GRID-No.4 VOLTAGE:		
Positive value	500 max.	volts
Negative value	500 max.	volts
GRID-No.2 VOLTAGE	400 max.	volts
GRID-No.1 VOLTAGE:		
Negative peak value	160 max.	volts
Negative bias value	110 max.	volts
Positive bias value	0 max.	volts
Positive peak value	2 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	180 max.	volts
Heater positive with respect to cathode	180 max.	volts

TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

Equipment Design Ranges:

With any ultor voltage (E_{c_5k}) between 8000 and 14000 volts and grid-No.2 voltage (E_{c_2k}) between 200 and 400 volts*

Grid-No.4 Voltage Required for Focus:

Changes directly with E_{c_5k} at the rate of approximately 30 volts for each 1000-volt change in E_{c_5k}.

Changes inversely with E_{c_5k} at the rate of approximately 10 volts for each 100-volt change in E_{c_2k}.

Changes inversely with ultor current at the rate of approximately 25 volts for each 50-μamp change in ultor current.

For typical values, see *Examples of Use of Design Ranges.*

Grid-No.1 Voltage (E_{c_1k}) for Visual Extinction of Focused Raster . . . . . See *Cutoff Design 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 positive voltage.

Grid-No.4 Current. . .	−25 to +25	μamp
Grid-No.2 Current. . .	−15 to +15	μamp
Ion-Trap Magnet Current (Average)**.	$\sqrt{E_{c_5k}/14000} \times 38$	ma
Minimum Field Strength of PM Ion-Trap Magnet§.	$\sqrt{E_{c_5k}/14000} \times 43$	gausses
Field Strength of Adjustable Centering Magnet. . . .	0 to 8	gausses

Examples of Use of Design Ranges:

With ultor voltage of	*10000*	*14000*	*volts*
and grid-No.2 voltage of	*300*	*300*	*volts*
Grid-No.4 Voltage for Focus with Ultor Current of 100 μamp. . .	−50 to +350	+70 to +470	volts
Grid-No.1 Voltage for Visual Extinction of Focused Raster	−26 to −70	−26 to −70	volts
Grid-No.1 Video Drive from Raster Cutoff (Black Level):			
White-level value (Peak positive). . . .	26 to 70	26 to 70	volts
Min. Field Strength of PM Ion-Trap Magnet . . .	36	43	gausses

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 Ratings, *Design-Center Values:*

ULTOR•-TO-GRID-No.1 VOLTAGE.	14000 max.	volts
GRID-No.4-TO-GRID-No.1 VOLTAGE:		
Positive value	500 max.	volts
Negative value	500 max.	volts
GRID-No.2-TO-GRID-No.1 VOLTAGE . . .	510 max.	volts
CATHODE-TO-GRID-No.1 VOLTAGE:		
Positive peak value.	160 max.	volts
Positive bias value.	110 max.	volts
Negative bias value.	0 max.	volts
Negative peak value.	2 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode.	180 max.	volts
Heater positive with respect to cathode.	180 max.	volts

Equipment Design Ranges:

With any ultor-to-grid-No.1 voltage ($E_{c_5g_1}$) between 8000 and 14000 volts and grid-No.2-to-grid-No.1 voltage ($E_{c_2g_1}$) between 225 and 510 volts*

Grid-No.4-to-Grid-No.1 Voltage Required for Focus:

Changes directly with $E_{c_5g_1}$ at the rate of approximately 30 volts for each 1000-volt change in $E_{c_5g_1}$.

Changes inversely with $E_{c_2g_1}$ at the rate of approximately 10 volts for each 100-volt change in $E_{c_2g_1}$.

Changes inversely with ultor current at the rate of approximately 25 volts for each 50-μamp change in ultor current.

For typical values, see *Examples of Use of Design Ranges.*

Cathode-to-Grid-No.1 Voltage (E_{kg_1}) for Visual Extinction of Focused Raster . . . . . See *Cutoff Design 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_{kg_1}

Grid-No.4 Current. . . .	−25 to +25	μamp
Grid-No.2 Current. . . .	−15 to +15	μamp
Ion-Trap Magnet Current (Average)**.	$\sqrt{E_{c_5g_1}/14000} \times 38$	ma
Minimum Field Strength of PM Ion-Trap Magnet§.	$\sqrt{E_{c_5g_1}/14000} \times 43$	gausses
Field Strength of Adjustable Centering Magnet.	0 to 8	gausses

Examples of Use of Design Ranges:

With ultor-to-grid-No.1 voltage of	*10000*	*14000*	*volts*
and grid-No.2-to-grid-No.1 voltage of	*300*	*300*	*volts*
Grid-No.4-to-Grid-No.1 Voltage for Focus with Ultor Current of 100 μamp	−50 to +350	+70 to +470	volts
Cathode-to-Grid-No.1 Voltage for Visual Extinction of Focused Raster	26 to 59	26 to 59	volts
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black Level):			
White-level value (Peak negative). . .	26 to 59	26 to 59	volts
Min. Field Strength of PM Ion-Trap Magnet . .	36	43	gausses

Maximum Circuit Values:

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

• 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 14RP4, the ultor function is performed by grid No.5. Since grid No.5, grid No.3, and collector are connected together within the 14RP4, 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.

\# Brilliance and definition decrease with decreasing ultor voltage or ultor-to-grid-No.1 voltage. In general, the ultor voltage or ultor-to-grid-No.1 voltage should not be less than 8000 volts.

** For JETEC Ion-Trap Magnet No.117, or equivalent, located with the trailing edge of the pole pieces located over the gap between grid No.1 and grid No.2 and rotated to give maximum brightness.

§ For specimen PM ion-trap magnet, such as Heppner Model No.E437 or equivalent, located in optimum position and rotated to give maximum brightness. For a given equipment application, the tolerance range for the strength of the PM ion-trap magnet should be added to the minimum value. The maximum strength of this magnet should not exceed the specified minimum value by more than 6 gausses. This procedure will insure use of a PM ion-trap magnet allowing adequate adjustment to permit satisfactory performance without loss of highlight brightness.

■ 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.

OPERATING CONSIDERATIONS

The *maximum ratings* in the tabulated data are working design-center maximums established according to the standard design-center system of rating electron tubes. Tubes so rated will give satisfactory performance in equipment designed so that these maximum ratings will not be exceeded when the equipment is operated from ac or dc power-line supplies whose normal voltage including normal variations falls within ± 10 per cent of line-center voltage value of 117 volts.

When operated at or below the maximum ratings shown in the tabulated data, the 14RP4 does not produce any harmful x-ray radiation. All types of picture tubes may be operated at voltages (if ratings permit) up to 16 kilovolts (absolute value) without personal injury on prolonged exposure at close range. Above 16 kilovolts, special shielding precautions for x-ray radiation may be necessary.

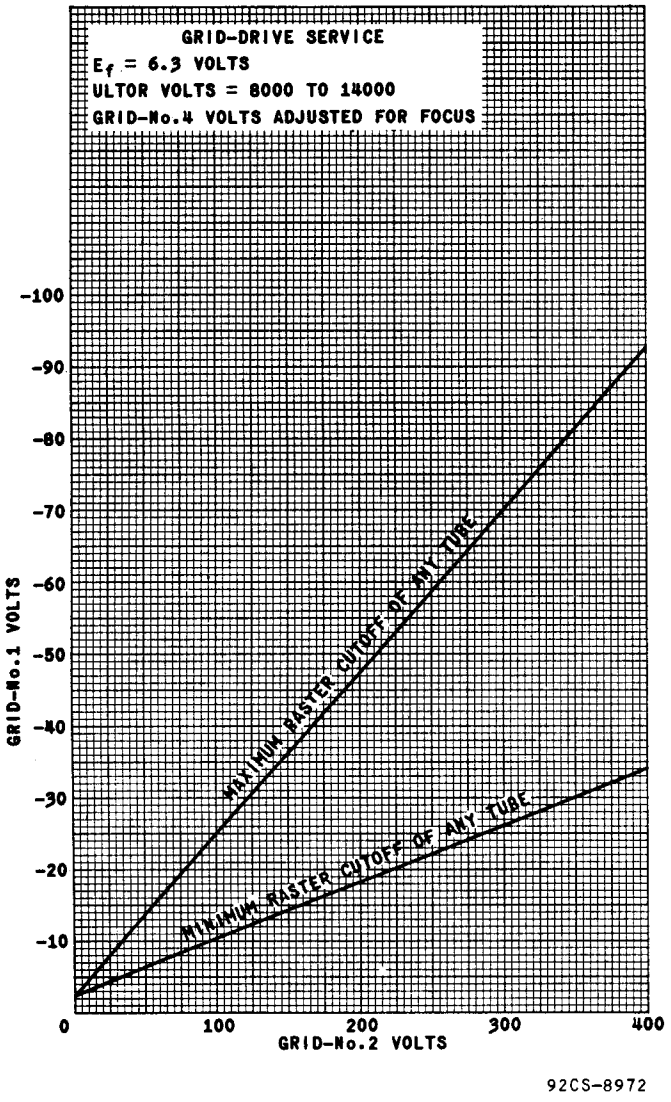


Fig.1 - Cutoff Design Chart for Type 14RP4 in Grid-Drive Service.

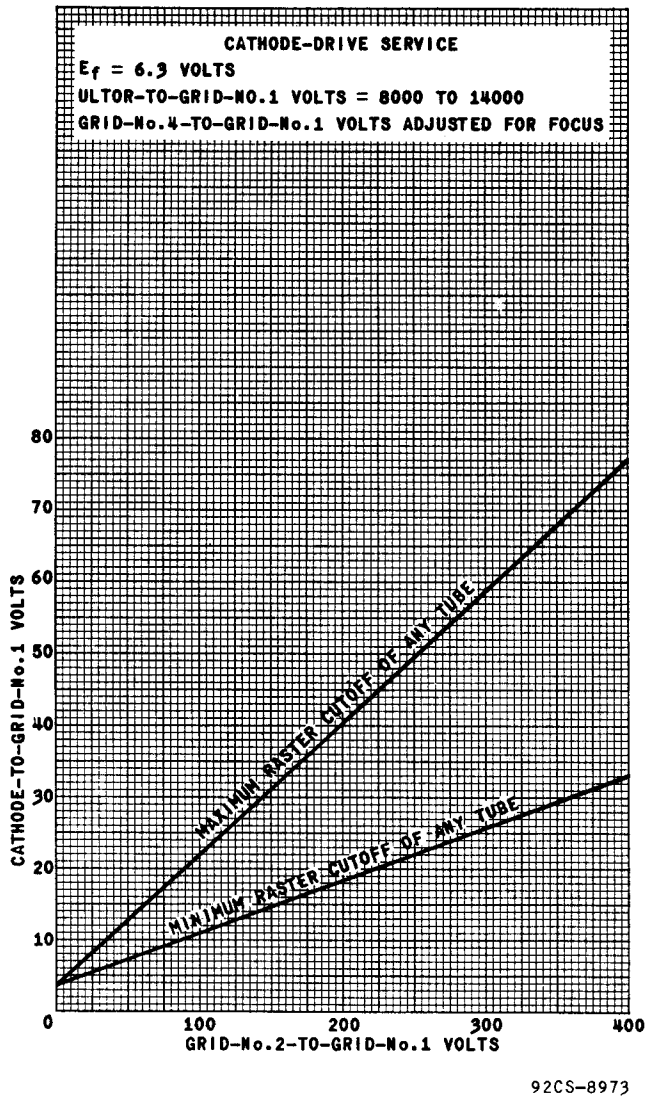


Fig.2 - Cutoff Design Chart for Type 14RP4 in Cathode-Drive Service.

The *Equipment Design Ranges for the 14RP4* include a new method of showing the focusing-voltage adjustment range needed for equipment design under different design conditions of

ultor voltage, ultor current, and grid-No.2 voltage. This new method offers equipment designers flexibility in determining the approximate focusing-voltage range to meet their particular requirements.

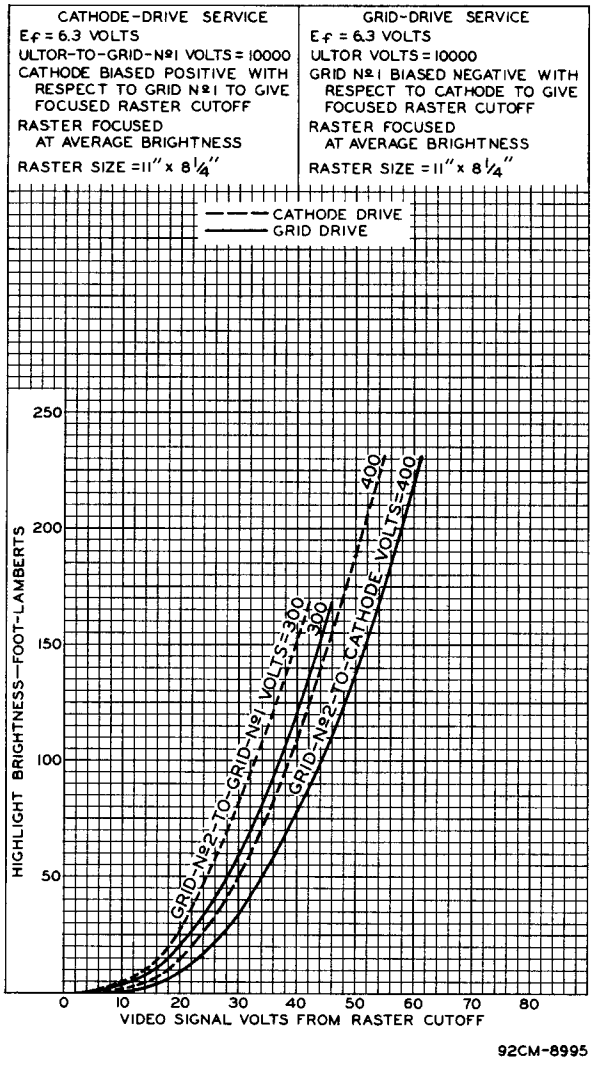


Fig.3 - Average Drive Characteristics of Type 14RP4.

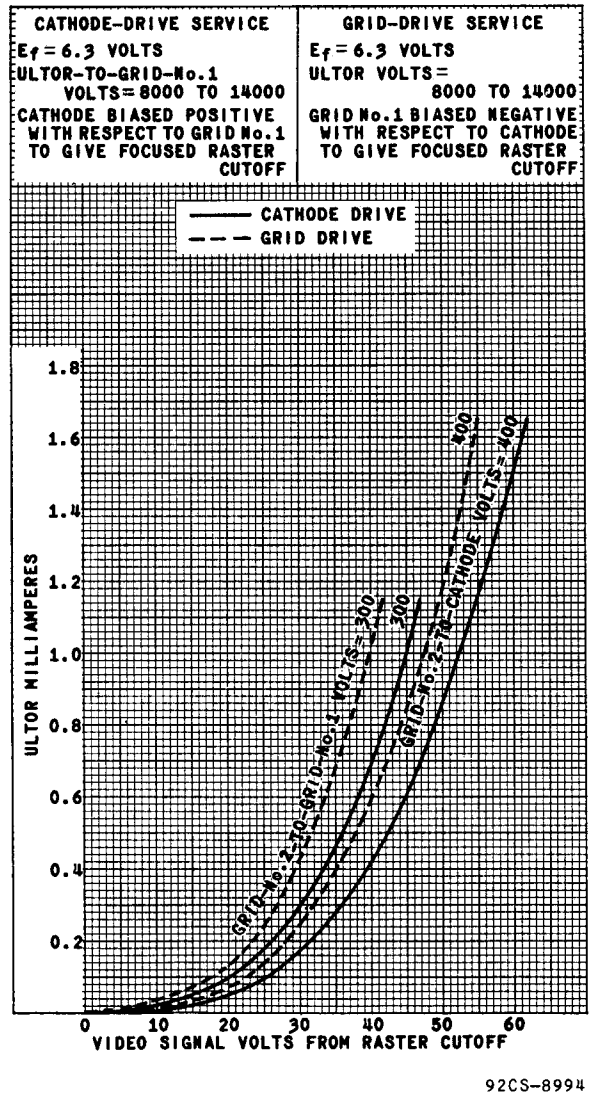


Fig.4 - Average Drive Characteristics of Type 14RP4.

For example, assume the desired operating conditions are as follows: ultor voltage, 12000; grid-No.2 voltage, 250; and ultor current, 150 microamperes.

To determine the focusing-voltage range, first refer to the focusing-voltage-range values shown for the 10000-volt and 300-volt conditions given under *Examples of Use of Design Ranges for Grid-Drive Service*. Starting with these focusing-voltage-range values of -50 to +350 volts at 100 microamperes, then proceed to determine the new values to fit the assumed conditions as follows:

1. Calculate the maximum focusing-voltage range value for the increase in ultor voltage from 10000 to 12000 volts by applying the rule that the focusing voltage changes directly at the rate of approximately 30 volts for each 1000-volt change in ultor voltage. Since the assumed ultor voltage represents an increase of 2000 volts, the 350-volt value for the maximum focusing voltage will be increased by 2 times 30 or 60 volts. This first calculation of the maximum range value, therefore, gives 350 + 60 or 410 volts. Correspondingly, the minimum value increases to +10 volts.

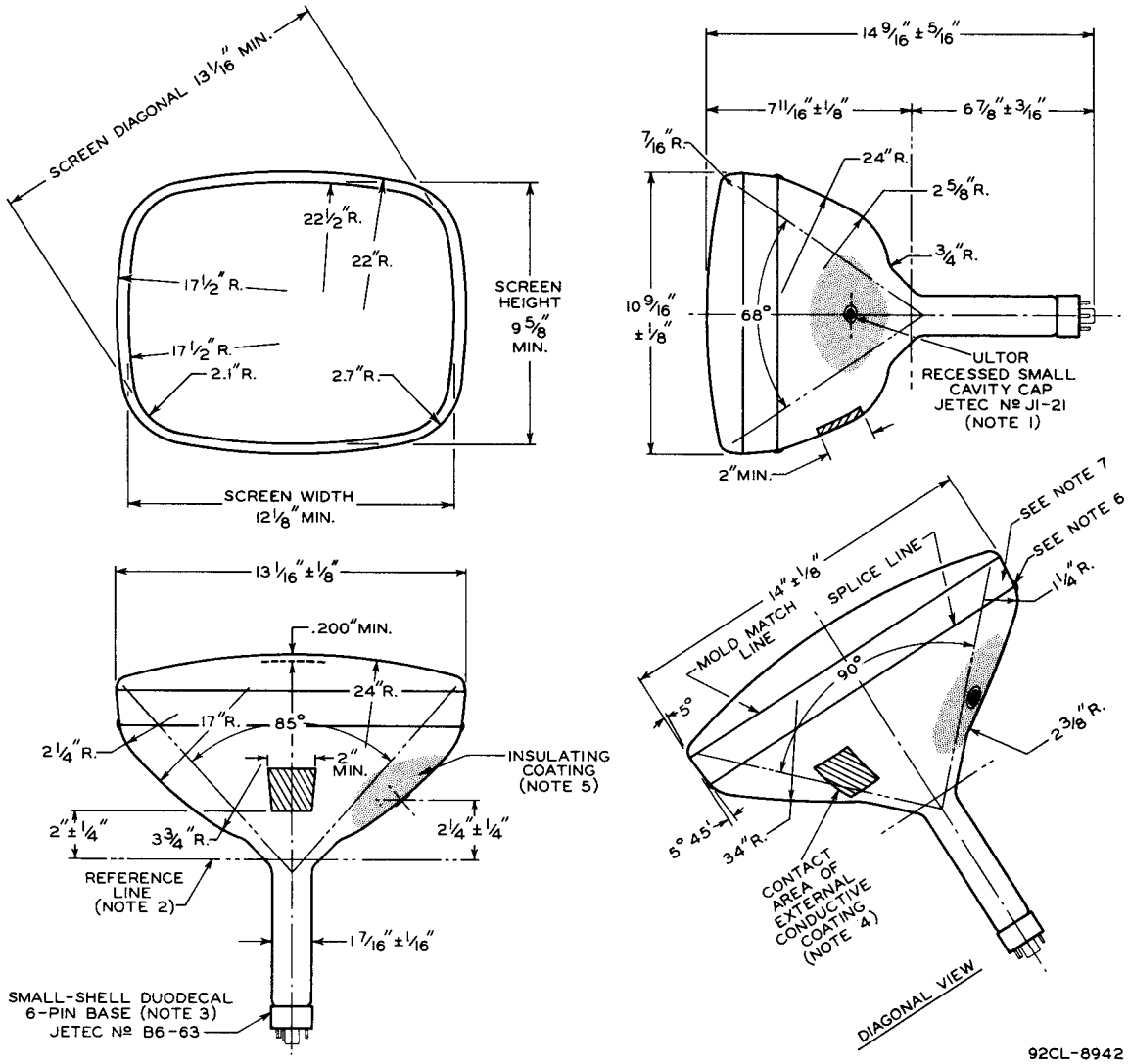
2. Calculate the maximum focusing-voltage-range value for the decrease in grid-No.2 voltage from 300 to 250 volts by applying the rule that the focusing voltage changes inversely at

the rate of approximately 10 volts for each 100-volt change in grid-No.2 voltage. Since the assumed grid-No.2 voltage represents a decrease of 50 volts, the maximum focusing-voltage-range value calculated above will be increased by 1/2 of 10 volts or 5 volts. Adding this value will give 410 + 5 or 415 volts. Correspondingly, the minimum value increases to 15 volts.

3. Calculate the maximum focusing-voltage-range value for the increase in ultor current from 100 to 150 microamperes by applying the rule that the focusing voltage changes inversely at the rate of approximately 25 volts for each 50-microamperes change in ultor current. Since the assumed ultor current represents an increase of 50 microamperes, the maximum focusing-voltage-range value calculated above will be decreased by 25 volts. The maximum range value, therefore, is 415 - 25 or 390 volts. Correspondingly, the minimum value decreases to -10 volts.

The focusing-voltage-range for the assumed conditions is, therefore, -10 to 390 volts.

DIMENSIONAL OUTLINE



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

NOTE 2: WITH THE TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE (JETEC No.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 SHELL WILL FALL WITHIN A CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING A DIAMETER OF 2-3/4".

NOTE 4: THE DRAWING SHOWS THE MINIMUM SIZE AND LOCATION OF THE CONTACT AREA OF THE EXTERNAL CONDUCTIVE COATING. THE ACTUAL AREA OF THIS COATING WILL BE GREATER THAN THE CONTACT AREA SO AS TO PROVIDE THE REQUIRED CAPACITANCE. EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

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

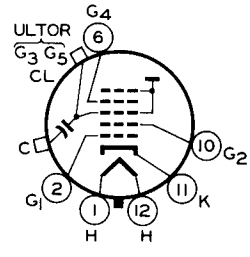
NOTE 6: BULGE AT SPLICE-LINE SEAL WILL NOT PROTRUDE BEYOND THE MAXIMUM INDICATED VALUE FOR ENVELOPE WIDTH, DIAGONAL OR HEIGHT.

NOTE 7: UNDISTURBED AREA BETWEEN MOLD-MATCH LINE AND SPLICE LINE IS 3/4" MINIMUM. THIS SHOULD BE THE MAXIMUM WIDTH OF TUBE SUPPORT BAND.

SOCKET CONNECTIONS

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