



24AHP4 PICTURE TUBE

Low-Voltage Electrostatic
Focus
110° Magnetic Deflection

Aluminized Screen
Very Short Rectangular Glass Type
Requires No Ion-Trap Magnet

21-7/16" x 16-7/8" Screen
24-1/8" Max. Bulb Diagonal
16-3/16" Max. Length

TENTATIVE DATA

RCA-24AHP4 is a very short, directly viewed, rectangular, glass picture tube of the low-voltage electrostatic-focus and magnetic-deflection type. It has a spherical Filterglass faceplate, an aluminized screen 21-7/16" x 16-7/8" with slightly curved sides and rounded corners and a minimum projected screen area of 332 square inches.

The 24AHP4 has a neck diameter of only 1-1/8" which not only makes possible the use of a deflecting yoke having high deflection sensitivity but also permits deflection of the beam through the wide deflection angle with only slightly more power than is required to scan a tube with 90° deflection angle.

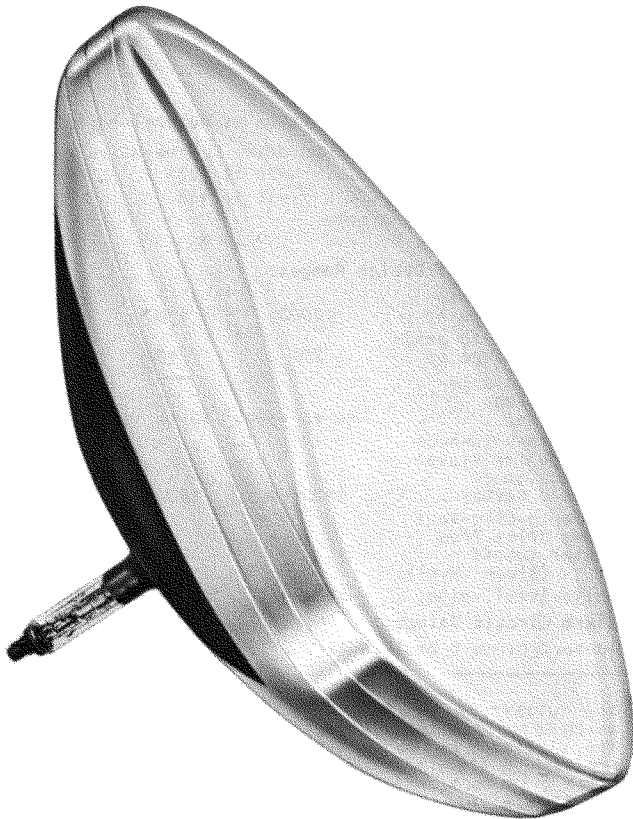
The 24AHP4 utilizes a new electron gun of the "straight" type designed to minimize deflection distortion. This new electron gun eliminates the need for an ion-trap magnet.

Another design feature of the 24AHP4 is an integral glass-button base having straight-through leads fitted with an indexing plug. This basing arrangement eliminates any possibility of loose base-pin connections. In addition, the 24AHP4 has an external conductive bulb coating which with the internal conductive coating forms a supplementary filter capacitor.

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	{ 2500 max. 2000 min.	{ μμf μμf
Faceplate, Spherical	Filterglass	
Light transmission (Approx.)	76%	
Phosphor	P4--Sulfide Type, Aluminized	
Fluorescence	White	
Phosphorescence	White	
Persistence	Short	
Focusing Method	Electrostatic	
Deflection Method	Magnetic	
Deflection Angles (Approx.):		
Diagonal	110°	
Horizontal	105°	
Vertical	87°	
Electron Gun	Type Requiring No Iron-Trap Magnet	
Tube Dimensions:		
Overall length	15-7/8" ± 5/16"	
Greatest width	22-11/16" ± 1/8"	
Greatest height	18-1/2" ± 1/8"	
Diagonal	24" ± 1/8"	
Neck length	5-7/16" ± 1/8"	



Designed with a 110°-diagonal deflection angle, the 24AHP4 has very short length--a length approximately 5-1/4" shorter than types having the same size faceplate and 90° deflection. As a result, this tube establishes new concepts for cabinet styling and for the design of more compact TV receivers utilizing 24"-type picture tubes.



Screen Dimensions (Minimum):

Greatest width	21-7/16"
Greatest height	16-7/8"
Diagonal	22-13/16"
Projected area	332 sq. in.
Cap.	Recessed Small Cavity (JETEC No. J1-21)
Bulb	J192 (110°)
Base	Small-Button Eightar 7-Pin, Arrangement 2, (JETEC No. B7-183)
Weight (Approx.)	28 lbs
Mounting Position.	Any

GRID-No. 4-TO-GRID-No. 1 VOLTAGE:

Positive value	1000 max. volts
Negative value	500 max. volts
GRID-No. 2-TO-GRID-No. 1 VOLTAGE	640 max. volts
GRID-No. 2-TO-CATHODE VOLTAGE	500 max. volts
CATHODE-TO-GRID-No. 1 VOLTAGE:	
Positive peak value.	200 max. volts
Positive bias value.	140 max. volts
Negative bias value.	0 max. volts
Negative peak value.	2 max. volts

PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode:	
During equipment warm-up period not exceeding 15 seconds.	410 max. volts
After equipment warm-up period	180 max. volts
Heater positive with respect to cathode	180 max. volts

GRID-DRIVE[▲] SERVICE

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

Maximum Ratings, Design-Center Values:

ULTOR [●] VOLTAGE	{ 20000 max. volts 12000 [‡] min. volts
GRID-No. 4 VOLTAGE:	
Positive value	1000 max. volts
Negative value	500 max. volts
GRID-No. 2 VOLTAGE.	500 max. volts
GRID-No. 1 VOLTAGE:	
Negative peak value.	200 max. volts
Negative bias value.	140 max. volts
Positive bias value.	0 max. volts
Positive peak value.	2 max. volts
PEAK HEATER-CATHODE VOLTAGE:	
Heater negative with respect to cathode:	
During equipment warm-up period not exceeding 15 seconds.	410 max. volts
After equipment warm-up period	180 max. volts
Heater positive with respect to cathode	180 max. volts

Equipment Design Ranges:

With any ultor-to-grid-No. 1 voltage (E_{C5g1}) between 12000 and 20000 volts and grid-No. 2-to-grid-No. 1 voltage (E_{C2g1}) between 225 and 640 volts

Grid-No. 4-to-Grid-No. 1 Voltage for Focus \S -50 to +350 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 voltage

Grid-No. 4 Current. -25 to +25 μ amp

Grid-No. 2 Current. -15 to +15 μ amp

Field Strength of Adjustable Centering Magnet*. 0 to 8 gauss

Examples of Use of Design Ranges:

With ultor-to-grid-No. 1 voltage of 14000 volts and grid-No. 2-to-grid-No. 1 voltage of 300 volts

Grid-No. 4-to-Grid-No. 1 voltage for Focus. -50 to +350 -50 to +350 volts

Cathode-to-Grid-No. 1 Voltage for Visual Extinction of Focused Raster 28 to 60 36 to 78 volts

Cathode-to-Grid-No. 1 Video Drive from Raster Cutoff (Black Level):

White-level value. . . -28 to -60 -36 to -78 volts

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 24AHP4, the ultor function is performed by grid No. 5. Since grid No. 5, grid No. 3, and collector are connected together within the 24AHP4, 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.

‡ This value is a working design-center minimum. The equivalent absolute minimum ultor, or ultor-to-grid-No. 1, voltage is 11000 volts, below which the serviceability of the 24AHP4 will be impaired. The equipment designer has the responsibility of determining a minimum design value such that under the worst probable operating conditions involving supply-voltage variation and equipment variation the absolute minimum ultor, or ultor-to-grid-No. 1, voltage is never less than 11000 volts.

Equipment Design Ranges:

With any ultor voltage (E_{C5k}) between 12000 and 20000 volts and grid-No. 2 voltage (E_{C2k}) between 200 and 500 volts

Grid-No. 4-Voltage for Focus \S	-50 to +350	volts
Grid-No. 1 Voltage (E_{C1k}) 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_{C1k} except video drive is a positive voltage		
Grid-No. 4 Current.	-25 to +25	μ amp
Grid-No. 2 Current.	-15 to +15	μ amp
Field Strength of Adjustable Centering Magnet*.	0 to 8	gausses

Examples of Use of Design Ranges:

With ultor voltage of 14000 volts and grid-No. 2 voltage of 300 volts

Grid-No. 4 Voltage for Focus. -50 to +350 -50 to +350 volts

Grid-No. 1 Voltage for Visual Extinction of Focused Raster -28 to -72 -36 to -94 volts

Grid-No. 1 Video Drive from Raster Cutoff (Black Level):

White-level value. . . 28 to 72 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 Ratings, Design-Center Values:

ULTOR [●] -TO-GRID-No. 1 VOLTAGE.	{ 20000 max. volts 12000 [‡] min. volts
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§ The grid-No.4 voltage or grid-No.4-to-grid-No.1 voltage required for focus of any individual tube is independent of ultor current and will remain essentially constant for values of ultor voltage (or ultor-to-grid-No.1 voltage) or grid-No.2 voltage (or grid-No.2-to-grid-No.1 voltage) within design ranges shown for these items.

* 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.

■ 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

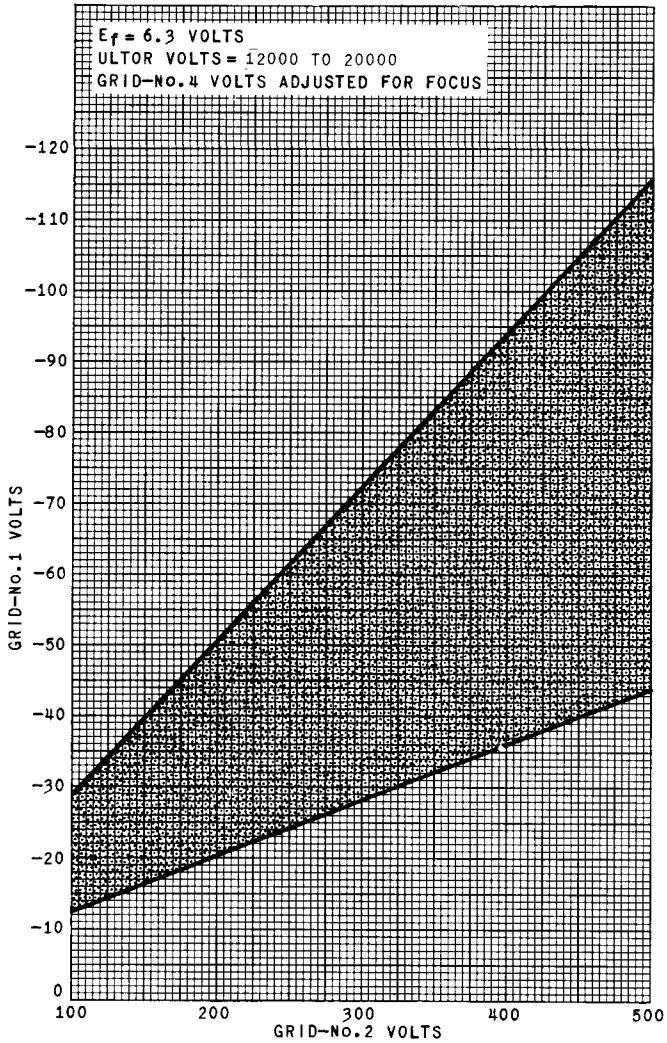
The *maximum ratings* in the tabulated data are working design-center maximums established according to the standard design-center system of rating electron tubes. Tubes so rated will give satisfactory performance in equipment designed so that these maximum ratings will not be exceeded when the equipment 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.

X-Ray Warning. When operated at ultor voltages up to 16 kilovolts, the 24AHP4 does not produce any harmful X-ray radiation. However, because the rating of this type permits operation at voltages as high as 22 kilovolts (absolute maximum value), shielding of the 24AHP4 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 24AHP4 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.

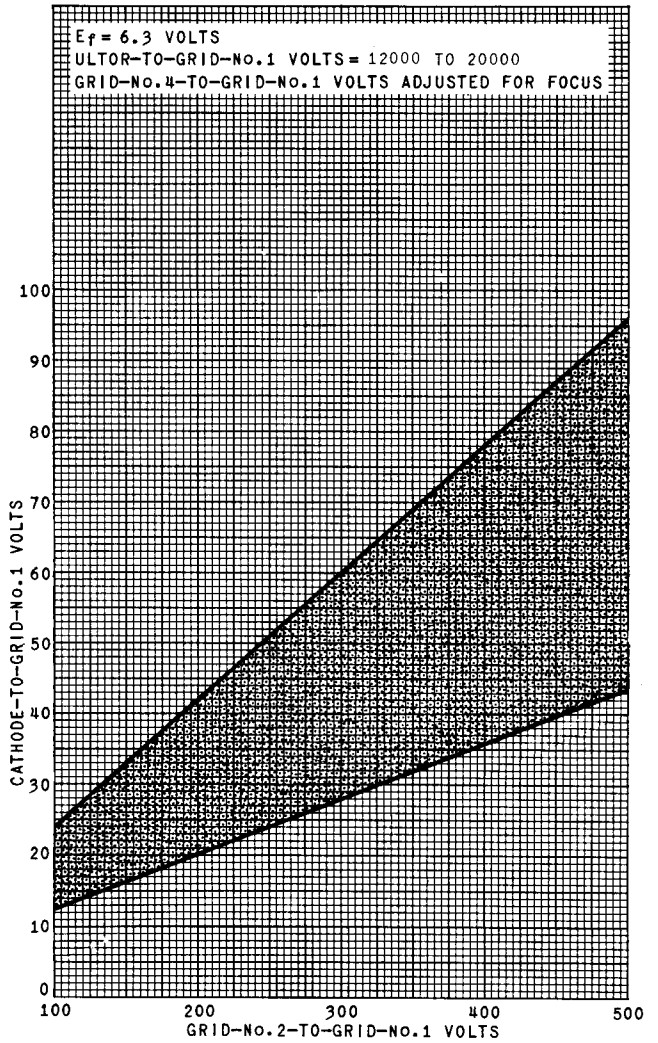
The *base pins* of the 24AHP4 fit the Eightar 8-contact socket, such as Ucinite Part No. 115446, or equivalent. The design of the socket should be such that the circuit wiring cannot impress lateral strains through the socket contacts on the base pins.

Devices and arrangements shown or described herein may use patents of RCA or others. Information contained herein is furnished without responsibility by RCA for its use and without prejudice to RCA's patent rights.



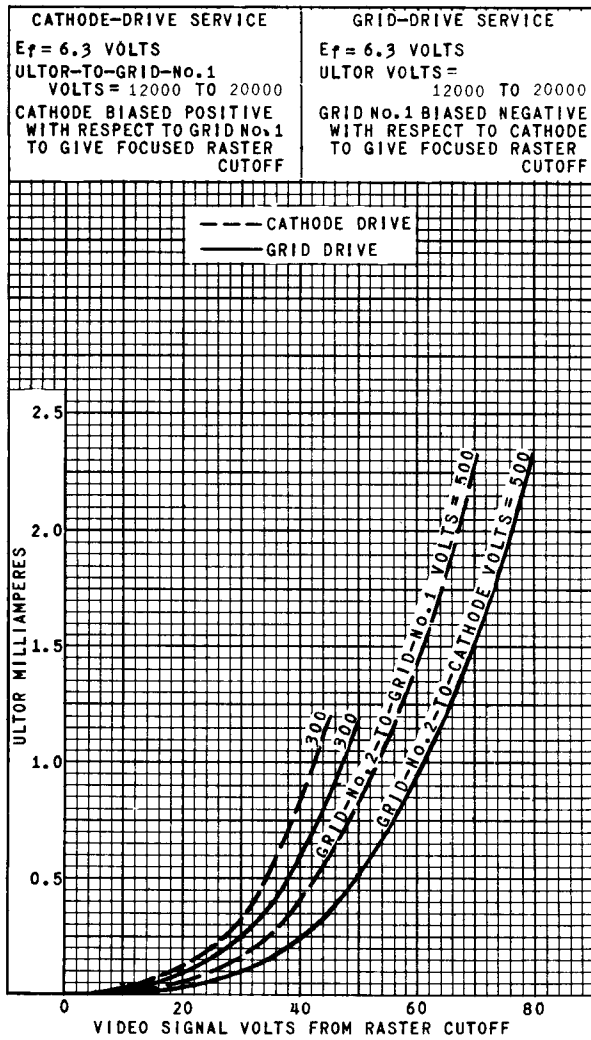
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Fig. 1 - Raster-Cutoff Range for Type 24AHP4 in Grid-Drive Service.



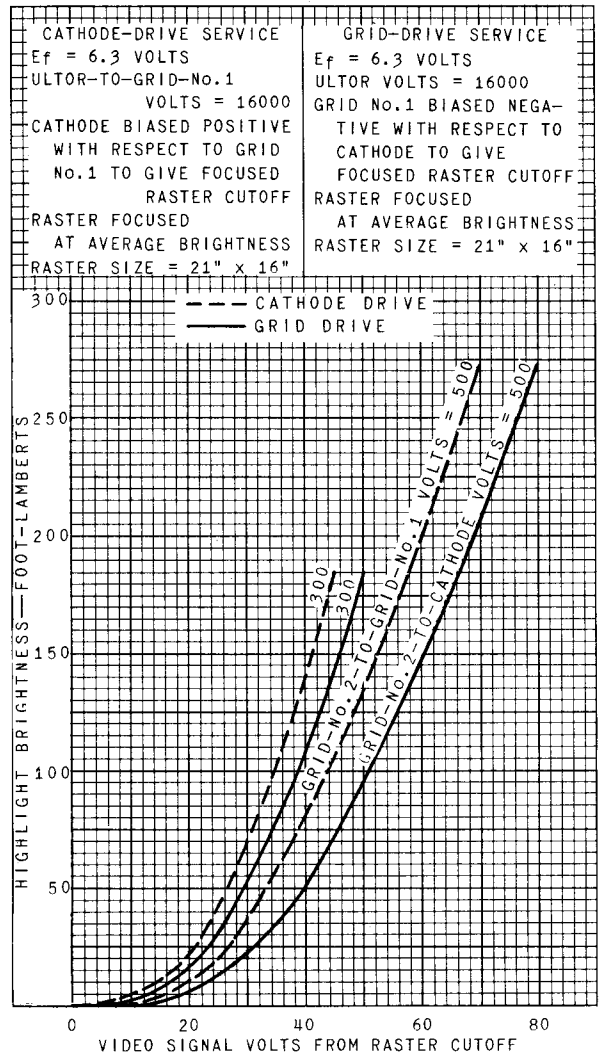
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Fig. 2 - Raster-Cutoff Range for Type 24AHP4 in Cathode-Drive Service.



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Fig. 3 - Average Drive Characteristics of Type 24AHP4.

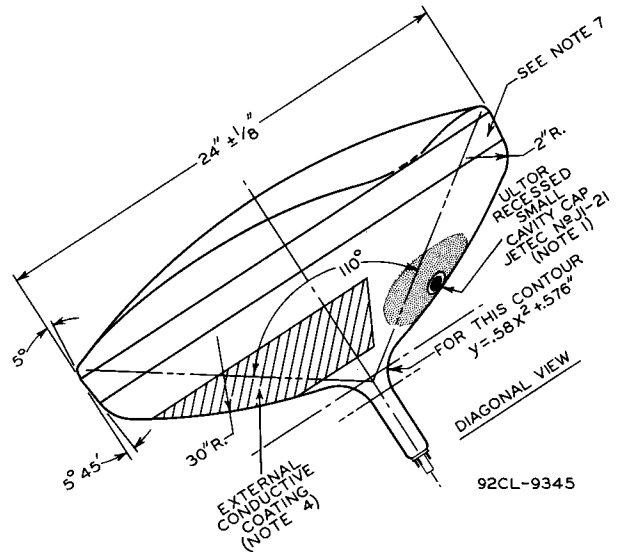
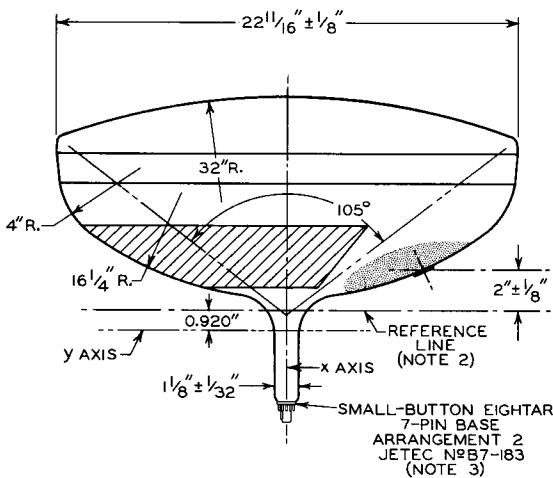
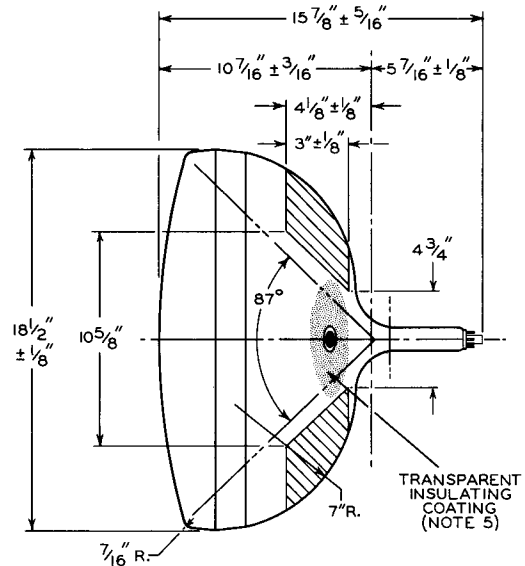
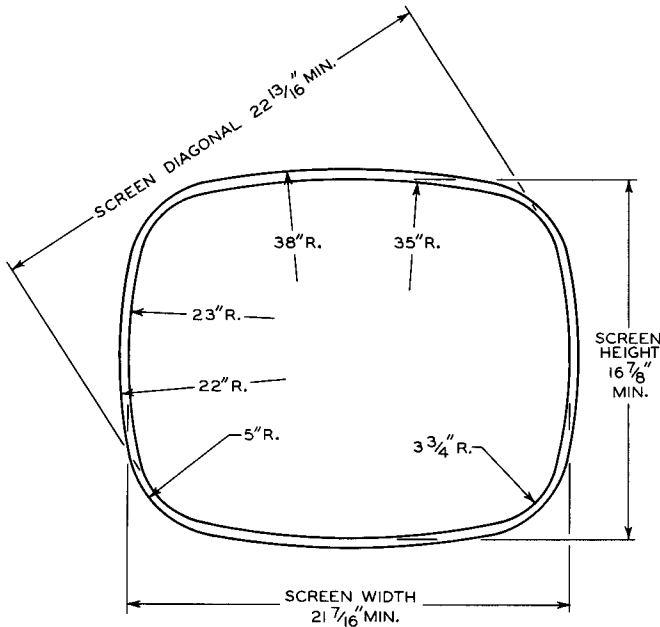


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Fig. 4 - Average Drive Characteristics of Type 24AHP4.



DIMENSIONAL OUTLINE



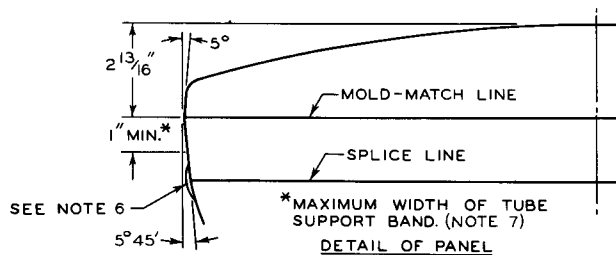
NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND PIN No. 4 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF $\pm 30^\circ$. ULTOR TERMINAL IS ON SAME SIDE AS PIN No. 4.

NOTE 2: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JETEC No. 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 CIRCUIT WIRING 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 LINT-LESS CLOTH.

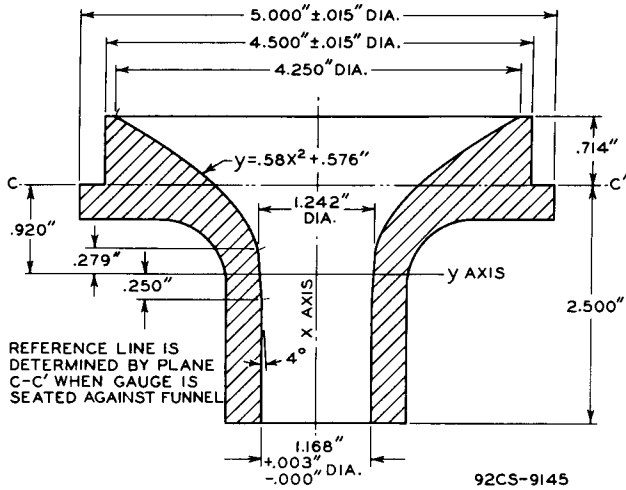


NOTE 6: BULGE AT SPLICE-LINE SEAL MAY INCREASE THE INDICATED MAXIMUM VALUE FOR ENVELOPE WIDTH, DIAGONAL, AND HEIGHT BY NOT MORE THAN 1/8", BUT AT ANY POINT AROUND THE SEAL, THE BULGE WILL NOT PROTRUDE MORE THAN 1/16" BEYOND THE ENVELOPE SURFACE AT THE MOLD-MATCH LINE.

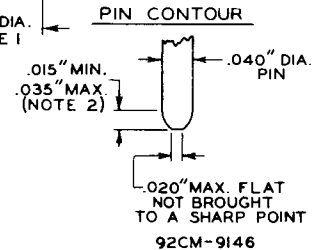
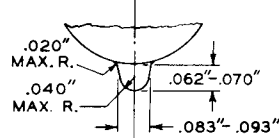
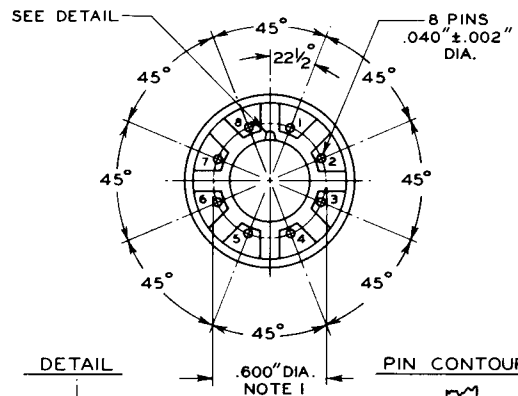
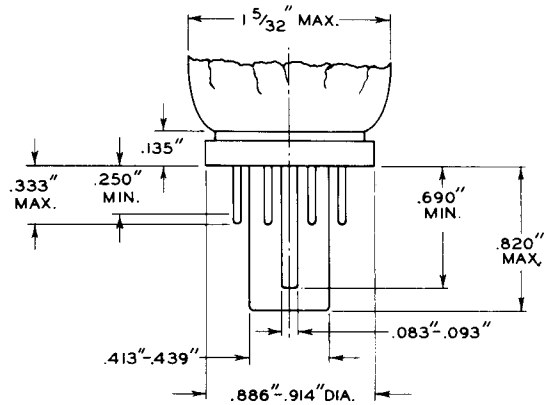
NOTE 7: UNDISTURBED AREA BETWEEN MOLD-MATCH LINE AND SPLICE LINE IS 1" MINIMUM. THIS SHOULD BE THE MAXIMUM WIDTH OF TUBE SUPPORT BAND.



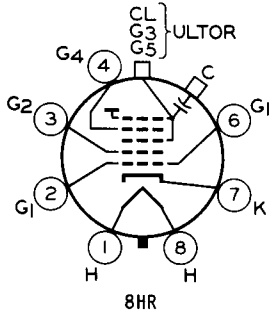
REFERENCE-LINE AND
NECK-FUNNEL-CONTOUR GAUGE
JETEC No 126



SMALL-BUTTON EIGHTAR BASE



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

NOTE 1: BASE-PIN POSITIONS ARE HELD TO TOLERANCES SUCH THAT THE BASE WILL FIT A FLAT-PLATE GAUGE HAVING A THICKNESS OF 3/8" AND EIGHT EQUALLY SPACED HOLES OF 0.0550" ± 0.0005" DIAMETER LOCATED ON A 0.6000" ± 0.0005" DIAMETER CIRCLE. THE GAUGE IS ALSO PROVIDED WITH A CENTER HOLE TO PROVIDE 0.010" DIAMETRIC CLEARANCE FOR THE LUG AND KEY. PIN FIT IN THE GAUGE SHALL BE SUCH THAT THE ENTIRE LENGTH OF PINS WILL, WITHOUT UNDUE FORCE, ENTER INTO AND DISENGAGE FROM THE GAUGE.

NOTE 2: THIS DIMENSION AROUND THE PERIPHERY OF ANY INDIVIDUAL PIN MAY VARY WITHIN THE LIMITS SHOWN.

JETEC No.	No. OF PINS	PINS
B8-181	8-Pin	1,2,3,4,5,6,7,8
B7-182	7-Pin Arrangement 1	2,3,4,5,6,7,8
B7-183	7-Pin Arrangement 2	1,2,3,4, 6,7,8