



Thomas

from JEDEC release #4495,
Nov. 18, 1964

INDUSTRIAL & MILITARY TUBES
ENGINEERING DATA Sheet 1 of 2

TYPE 10AJP

BRIEF DESCRIPTION

The 10AJP- is a 10-inch rectangular all glass, magnetic deflection cathode ray tube, featuring an automatic electrostatic focus straight gun. (No separate focus supply required).

An aluminized screen is utilized for greater light output and to minimize screen charging effects.

GENERAL CHARACTERISTICS

ELECTRICAL DATA

	Heater current at 6.3 volts	0.6 $\pm$ 10% amp.
Focusing Method		Electrostatic
Deflection Method		Magnetic
Deflection Angle (Diagonal)		90 Degrees
Direct Interelectrode Capacitances (approx.)		
Cathode to All Other Electrodes		5 uuf
Grid No. 1 to All Other Electrodes		6 uuf

OPTICAL DATA

Phosphor Number (Note 1)	4	7	31
Fluorescence	White	White	Yel-Green
Phosphorescence	White	Yellow	Yel-Green
Persistence	Medium	Long	Med-Short
Faceplate (Aluminized)			Gray Filter Glass
Light Transmission (approx.)			80 Percent

MECHANICAL DATA

Overall Length	10-7/8 $\pm$ 5/16 Inches
Greatest Bulb Dimensions:	
Diagonal	10-3/8 $\pm$ 1/8 Inches
Width	9-3/4 $\pm$ 1/8 Inches
Height	7-1/2 $\pm$ 1/8 Inches
Minimum Useful Screen Dimensions	9-1/16 X 6-5/8 Inches
Bulb Number	J83-A1
Bulb Contact (Recessed Small Cavity)	J1-21
Base (Small Shell Duodecal 5-Pin)	B5-57
Bulb Contact Alignment	
J1-21 Contact Aligns with Vacant Pin No. 6	$\pm$ 30 Degrees
J1-21 Contact on Same Side as Pin No. 6	
Basing	12-S
Weight (approx.)	4 Pounds
Neck Length	5-1/2 $\pm$ 3/16 Inches

THOMAS ELECTRONICS, INC., PASSAIC, NEW JERSEY



Thomas

INDUSTRIAL & MILITARY TUBES
ENGINEERING DATA Sheet 2 of 2

TYPE 10AJP

RATINGS (Design Maximum Values)

Anode Voltage	20,000 Volts DC
Grid No. 2 Voltage	550 Volts DC
Grid No. 1 Voltage	
Negative Bias Value	155 Volts DC
Positive Bias Value	0 Volts DC
Positive Peak Value	2 Volts
Peak Heater-Cathode Voltage	
Heater Negative to Cathode	
During the 15 Second Warm-up	450 Volts
After Warm-up	200 Volts
Heater Positive to Cathode	200 Volts

TYPICAL OPERATING CONDITIONS

Anode Voltage	16,000 Volts DC
Grid No. 2 Voltage	300 Volts DC
Grid No. 1 Voltage (Note 2)	-35 to -72 Volts DC
Focusing Electrode (Note 3)	Internally Connected to Grid No.2
Spot Position (Note 4)	Within a 1/4" Radius Circle
Line Width (Note 5)	Typical .010 Inch

MAXIMUM CIRCUIT VALUES

Grid No. 1 Circuit Resistance	1.5 Megohms Max.
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NOTES

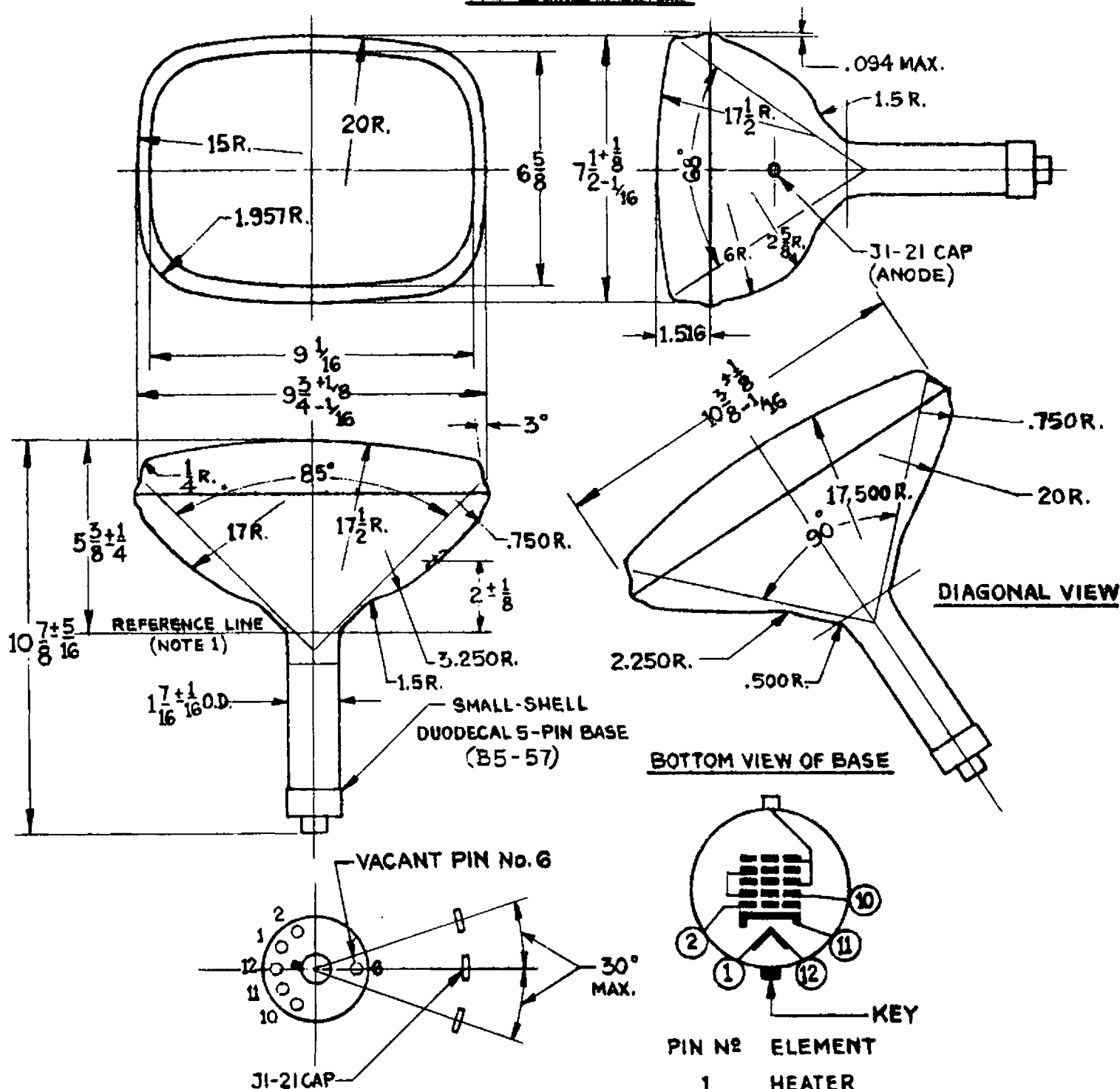
1. Other phosphor screen types are available upon request.
2. Visual extinction of focused raster.
3. Under typical operating conditions, good focus is obtained over the entire screen at normal drive levels. Some loss in focus quality may result if operating conditions depart substantially from those specified above.
4. With the tube shielded against external influences, the undeflected and focused spot will fall within a 1/4" radius circle concentric with the tube face center.
5. As measured with an anode current of 100 uAdc. In terms of resolution, this tube is capable of resolving a minimum of 600 lines.



Thomas

INDUSTRIAL & MILITARY TUBES
ENGINEERING DATA

10AJP-



NOTE:

1. DETERMINED BY THE POINT WHERE JEDEC G-126 REFERENCE GAUGE VILL STOP.



12YP4 Cathode-Ray Picture Tube

Rel. 1002

The T. E. I. 12 YP4 is a 12½" direct-view picture tube for use in television receivers and includes such features as:

- A 3° offset electron gun designed to be used with an external ion-trap magnet.
- An insulating band on the lower edge of the internal conductive coating assuring a sharper picture through the elimination of stray or spurious beams.
- Outside conductive coating
- Automatic electrostatic focusing.

DATA

General

Heater voltage	6.3	volts
Heater current	0.6 ± 10 %	ampere
Direct interelectrode capacitances (approx):		
Grid No. 1 to all other electrodes	6	μμf
Cathode to all other electrodes	5	μμf
Phosphor	No. 4	
Fluorescence	white	
Persistence	medium	
Focusing method	electrostatic	
Deflecting method	magnetic	
Deflection angle, (approx.)	54°	

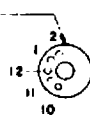
Mechanical

Overall length	18¾" ± ¾"
Greatest diameter of bulb	12¾" + ¼" — ⅞"
Minimum useful screen diameter	11¼"
Cap	Recessed small cavity
Base	Small shell duodecal 5-Pin
Basing	JETEC Designation 12D
Mounting position	Any
Net weight (approx.)	14½ lbs.

*Corresponding socket should not be rigidly mounted but should be wired with flexible leads and allowed to move freely.

Terminal Connections

MAX. ANGLE BETWEEN LINE JOINING TUBE AXIS TO CENTER OF ANODE CONTACT AND LINE JOINING TUBE AXIS TO CENTER OF PIN POSITION NO. 3 = ± 10°



1 HEATER
2 GRID NO. 1
10 GRID NO. 2
11 CATHODE
12 HEATER CAP ANODE

Maximum Ratings (Design-Center Values)

Maximum anode voltage	12000 d-c	volts
Maximum grid-No. 2 voltage	410 d-c	volts
Grid-No. 1 Voltage:		
Maximum negative bias value	125 d-c	volts
Maximum positive bias value	0 d-c	volts
Maximum positive peak value	2 d-c	volts

Peak heater-cathode voltage: (Note 1)

Maximum heater negative with respect to cathode	125	volts
Maximum heater positive with respect to cathode	125	volts
Grid-No. 1-circuit resistance	1.5	megohms

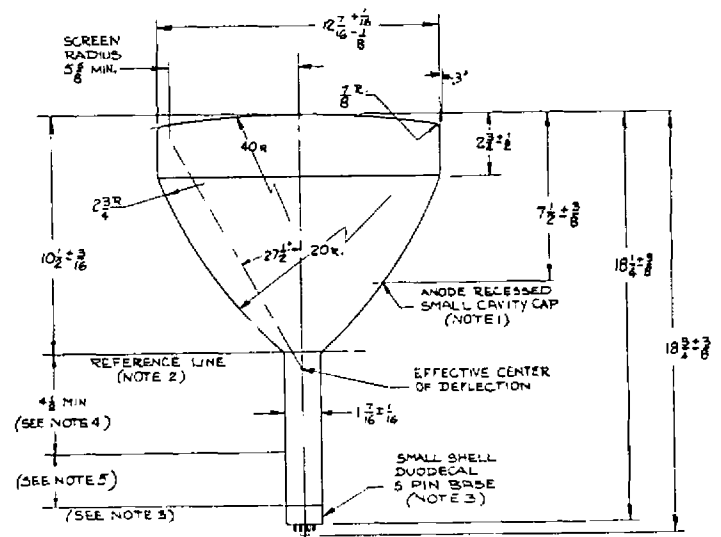
Typical Operating Conditions

Anode voltage	11000 d-c	volts
Grid-No. 2 voltage	250 d-c	volts
Grid-No. 1 voltage (Note 2)	—33 to —73 d-c	volts
External Conductive Coating	3000	μμf
Ion-trap current (Note 3) (approx.)	120 d-c	ma

NOTE 1: A value of 410 max. volts is allowed during equipment warm-up period not to exceed 15 seconds.

NOTE 2: Visual extinction of undeflected focused spot.

NOTE 3: With JETEC standard ion-trap magnet of 40 gauss minimum.



NOTE 1: The plane through the tube axis and vacant pin position No. 3 may vary from the plane through the tube axis and anode terminal by an angular tolerance (measured about the tube axis) of 10°. Anode terminal is on same side as vacant pin position No. 3.

NOTE 2: Reference line is determined by position where hinged gauge 1.500" ± .003" — .000" I.D. and 2" long will rest on bulb cone.

NOTE 3: Align ion-trap magnet with poles of coil A (large coil) adjacent L-shaped pole pieces on mount, north pole on same side as base pin No. 6, and the other poles toward the tube face.

NOTE 4: Location of deflecting yoke must be within this space.

NOTE 5: Keep this space clear for ion-trap magnet.

NOTE: Additional data will be furnished by our engineering department upon request.

THOMAS ELECTRONICS, Inc.

118 Ninth Street

Passaic, New Jersey

CHARACTERISTICS

GENERAL DATA

Focusing Method Electrostatic
Deflecting Method Magnetic
Deflecting Angle-Diagonal (Approx.).....110 Degree
Horizontal 105 Degree
Vertical.....87 Degree

Phosphor P4 Aluminized
Fluorescence.....White
Persistence.....Medium
Faceplate.....Gray Filter Glass
Light Transmission (approx.).....79 Percent

ELECTRICAL DATA

Heater Voltage.....6.3 Volts
Heater Current 6 Ampere $\pm$ 10 %
Direct Interelectrode Capacitances (approx.)
Cathode to All Other Electrodes 5 uuf
Grid No. 1 to All Other Electrodes 6 uuf
Ion Trap Magnet None

MECHANICAL DATA

Minimum Useful Screen Dimensions 12 5/16 x 9 7/8 Inches
Minimum Useful Screen Area (approx.) 108 Sq. In.
Bulb Contact (Recessed Small Cavity Cap).....J1-21
Base (Small Shell Eightar 7 Pin).....JETEC B7-183
Basing 8 HR
J1-21 Contact Aligns with Pin Position No. 4 $\pm$ 30 Degree

RATINGS

MAXIMUM RATINGS (Design Center Values)

Anode Voltage (Note 1) 11,000 Volts dc
Grid No. 4 Voltage-500 to $\pm$ 1000 Volts dc
Grid No. 2 Voltage.....500 Volts dc
Grid No. 1 Voltage
Negative Bias Value.....1140 Volts dc
Positive Bias Value.....0 Volts dc
Positive Peak Value 2 Volts
Peak Heater-Cathode Voltage (Note 2)
Heater Negative with Respect to Cathode
During Warm-up Period Not to exceed 15 sec. 410 Volts dc
After Equipment Warm-up Period 180 Volts dc
Heater Positive with Respect to Cathode 180 Volts dc

RECOMMENDED OPERATING CONDITIONS

Anode Voltage 12,000 Volts dc
Grid No. 4 Voltage (Note 3).....-50 to $\pm$ 350 Volts dc
Grid No. 2 Voltage.....300 Volts dc
Grid No. 1 Voltage (Note 4).....-28 to -72 Volts dc

CIRCUIT VALUES

Grid No. 1 Circuit Resistance 1.5 Max. Megohm
External Conductive Coating to Anode
Capacitance - 850 uuf. Max.
.....500 uuf. Min.

THE 14ASP4 IS A DIRECT-VIEW PICTURE TUBE FOR USE IN TELEVISION RECEIVERS AND INCLUDES SUCH FEATURES AS:

- . A short straight electron gun which does not require an ion trap.
- . A short neck length.
- . A diagonal deflection angle of 110°
- . A gray tinted face affording approximately 79% light transmission.
- . Rectangular Glass Type
- . Spherical Face
- . Electrostatic Focus
- . Metal Backed Screen

NOTES:

1. Grid No. 5, Grid No. 3, and the collector are connected together within the tube, are referred to herein as anode.
2. Cathode should be returned to one side or to the mid-tap of the heater transformer winding.
3. For focus with anode current of 100 ua and 12 5/16 x 9 7/8 raster.
4. Visual extinction of focused raster. Extinction of stationary focused spot will require that these values be about 5 volts more negative.

THOMAS ELECTRONICS, INC.
118 Ninth Street
Passaic, N. J.
Gregory 3-4040

SOCKET CONNECTIONS BOTTOM VIEW

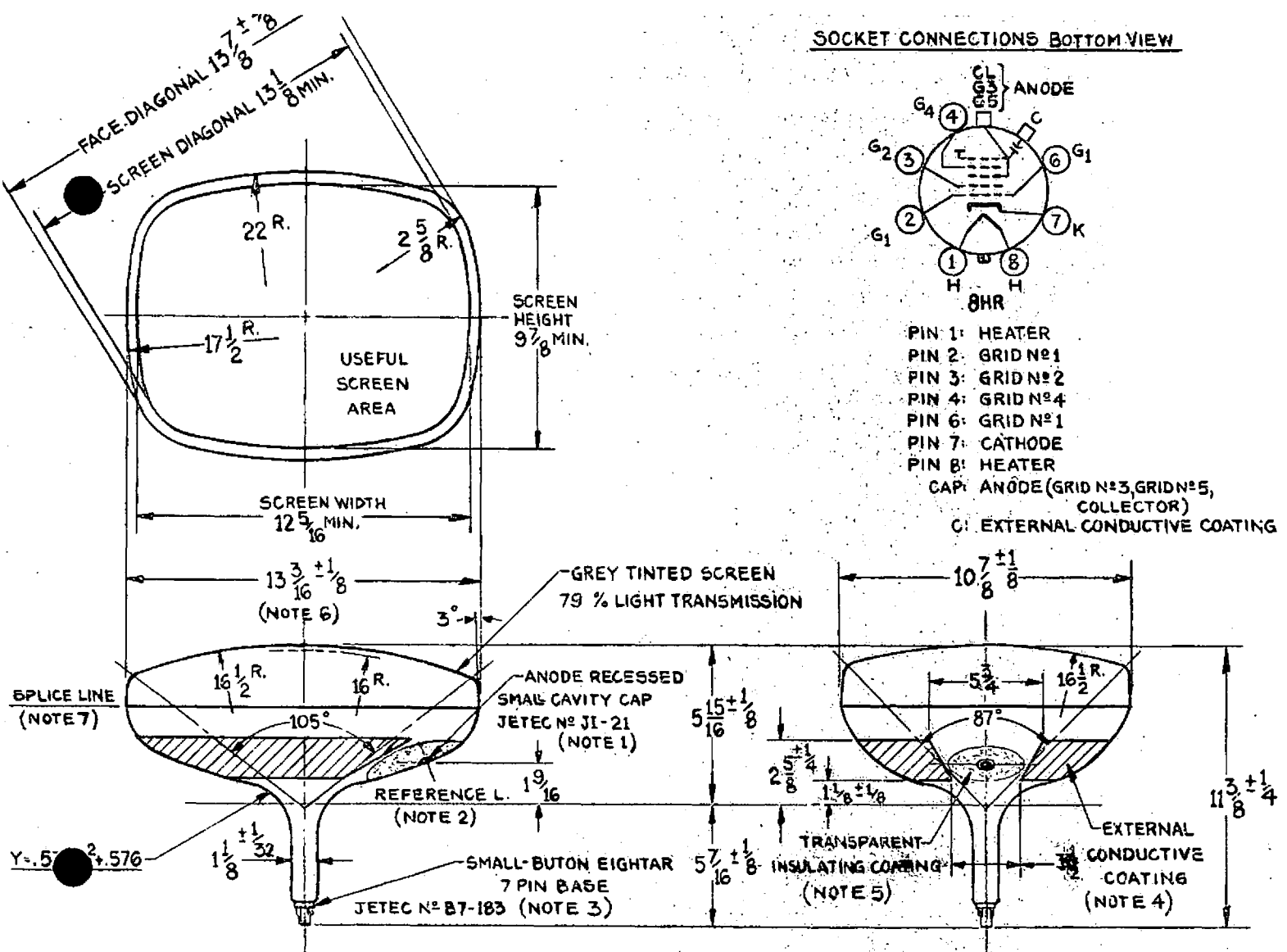


DIAGRAM NOTES:

NOTE 1: The plane through the tube axis and pin No. 4 may vary from the plane through the tube axis and anode terminal by angular tolerance (measured about the tube axis) of $\pm 30^\circ$. Anode 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 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 $1\frac{3}{4}$ inches.

NOTE 4: External conductive coating must be grounded.

NOTE 5: To clean this area, wipe only with soft dry lintless cloth.

NOTE 6: Measured $2\frac{9}{32}$ inches $\pm 1/32$ inch from the plane tangent to the surface of the face-plate at the tube axis.

NOTE 7: Bulge at splice-line seal may increase the indicated maximum value for envelope width, diagonal and height by not more than $1/4$ inch, but at any point around the seal, the bulge will not protrude more than $1/8$ inch beyond the envelope surface at the location specified for dimensioning the envelope width, diagonal, and height.



16ACP4 Cathode-Ray Picture Tube

The T. E. I. 16 ACP4 is a 16" direct-view picture tube for use in television receivers and includes such features as:

- A 3° offset electron gun designed to be used with an external ion-trap magnet.
- An insulating band on the lower edge of the internal conductive coating assuring a sharper picture through the elimination of stray or spurious beams.
- Outside conductive coating
- Automatic electrostatic focusing.

DATA

General

Heater voltage 6.3 volts
Heater current $0.6 \pm 10\%$ ampere

Direct interelectrode capacitances (approx):

Grid No. 1 to all other electrodes 6 μf
Cathode to all other electrodes 5 μf
Phosphor No. 4
Fluorescence white
Persistence medium

Focusing method electrostatic
Deflecting method magnetic
Deflection angle, (approx.) 60°

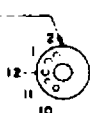
Mechanical

Overall length $20\frac{7}{8}'' \pm \frac{1}{4}''$
Greatest diameter of bulb $15\frac{7}{8}'' \pm \frac{1}{8}''$
Minimum useful screen diameter $15\frac{1}{4}''$

Anode contact Recessed small cavity
Base Small shell duodecal 5-Pin
Basing JETEC Designation 12D
Mounting position Any
Net weight (approx) $18\frac{3}{4}$ lbs.
Bulb contact aligns with pin #3 (vacant) ± 10 degrees
Corresponding socket should not be rigidly mounted but should be wired with flexible leads and allowed to move freely.

Terminal Connections

MAX. ANGLE BETWEEN LINE JOINING TUBE AXIS TO CENTER OF ANODE CONTACT AND LINE JOINING TUBE AXIS TO CENTER OF PIN POSITION NO. 3 $\pm 10^\circ$



1 HEATER
2 GRID NO. 1
10 GRID NO. 2
11 CATHODE
12 HEATER
CAP ANODE

Maximum Ratings (Design-Center Values)

Maximum anode voltage 14000 d-c volts
Maximum grid-No. 2 voltage 410 d-c volts
Grid-No. 1 Voltage:
Maximum negative bias value 125 d-c volts
Maximum positive bias value 0 d-c volts
Maximum positive peak value 2 d-c volts

NOTE: Additional data will be furnished by our engineering department upon request.

Peak heater-cathode voltage: (Note 1)

Maximum heater negative with respect to cathode	125	volts
Maximum heater positive with respect to cathode	125	volts
Grid-No. 1-circuit resistance	1.5	megohms

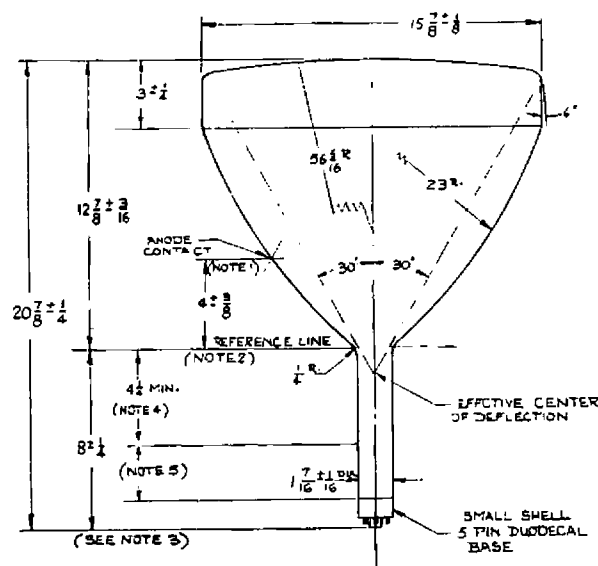
Typical Operating Conditions

Anode voltage	12000—13000 d-c	volts
Grid-No. 2 voltage	250 d-c	volts
Grid-No. 1 voltage (Note 2)	—33 to —68 d-c	volts
External Conductive Coating	2000	μf
Ion-trap current (Note 3) (approx.)	120 d-c	ma

NOTE 1: A value of 410 max. volts is allowed during equipment warm-up period not to exceed 15 seconds.

NOTE 2: Visual extinction of undeflected focused spot.

NOTE 3: With JETEC standard ion-trap magnet of 40 gauss minimum.



NOTE 1: The plane through the tube axis and vacant pin position No. 3 may vary from the plane through the tube axis and anode terminal by an angular tolerance (measured about the tube axis) of 10° . Anode terminal is on same side as vacant pin position No. 3.

NOTE 2: Reference line is determined by position where hinged gauge 1.500" $\pm$.003" — .000" I.D. and 2" long will rest on bulb cone.

NOTE 3: Align ion-trap magnet with poles of coil A (large coil) adjacent L-shaped pole pieces on mount, north pole on same side as base pin No. 6, and the other poles toward the tube face.

NOTE 4: Location of deflecting yoke must be within this space.

NOTE 5: Keep this space clear for ion-trap magnet.

THOMAS ELECTRONICS, Inc.
118 Ninth Street
Passaic, New Jersey

CHARACTERISTICS

GENERAL DATA

Focusing Method	Electrostatic
Deflecting Method	Magnetic
Deflecting Angle-Diagonal (Approx.).....	90 Degrees
Horizontal.....	85 Degrees
Vertical.....	68 Degrees
Phosphor	P4 Aluminized
Fluorescence	White
Persistence	Medium
Faceplate	Gray Filter Glass
Light Transmission (approx.).....	79 Percent

ELECTRICAL DATA

Heater Voltage.....	6.3 Volts
Heater Current.....	45 Ampere $\pm$ 10%
Direct Interelectrode Capacitances (approx.)	
Cathode to All Other Electrodes	5 uuf
Grid No. 1 to All Other Electrodes	6 uuf
Ion Trap Magnet.....	None

MECHANICAL DATA

Minimum Useful Screen Dimensions.....	14 3/4 x 11 11/16 Inches
Minimum Useful Screen Area (approx.).....	155 Sq. In.
Bulb Contact (Recessed Small Cavity Cap).....	J1-21
Base (Small Shell Duodecal 6 Pin).....	JETEC B6-63
Basing	12L
J1-21 Contact Aligns with Pin Position No.	6 $\pm$ 30 Degrees

RATINGS

MAXIMUM RATINGS (Design Center Values)

Anode Voltage (Note 1)	16,000 Volts dc
Grid No. 4 Voltage (focusing electrode)...	-500 to $\pm$ 1000 Volts dc
Grid No. 2 Voltage	500 Volts dc
Grid No. 1 Voltage	
Negative Bias Value.....	140 Volts dc
Positive Bias Value	0 Volts dc
Positive Peak Value	2 Volts
Peak Heater-Cathode Voltage (Note 2)	
Heater Negative with Respect to Cathode	
During Warm-up Period Not to exceed ..	15 sec. 410 Volts dc
After Equipment Warm-up Period	180 Volts dc
Heater Positive with Respect to Cathode.....	180 Volts dc

RECOMMENDED OPERATING CONDITIONS

Anode Voltage.....	14,000 Volts dc
Grid No. 4 Voltage (Note 3).....	-50 to $\pm$ 350 Volts dc
Grid No. 2 Voltage	300 Volts dc
Grid No. 1 Voltage (Note 4)	-28 to -72 Volts dc

CIRCUIT VALUES

Grid No. 1 Circuit Resistance.....	1.5 Max. Megohm
External Conductive Coating to Anode	
Capacitance	1500 uuf. Max.
.....	1200 uuf. Max.

from JETEC release #1876, March 18, 1957

THE 17CEP4 IS A DIRECT-VIEW PICTURE TUBE FOR USE IN TELEVISION RECEIVERS AND INCLUDES SUCH FEATURES AS:

- A short straight electron gun not requiring an ion trap.
- 6.3V. - 450 MA heater.
- Short neck
- A gray tinted face affording approximately 79% light transmission
- Rectangular Glass Type
- Spherical light weight face.
- Electrostatic Focus
- Metal Backed Screen

NOTES:

1. Grid No. 5, Grid No. 3, and the collector are connected together within the tube, are referred to herein as anode.
2. Cathode should be returned to one side or to the mid-tap of the heater transformer winding.
3. For focus with anode current of 100 ua and 14 3/4" x 11 11/16" raster.
4. Visual extinction of focused raster. Extinction of stationary focused spot will require that these values be about 5 volts more negative.

THOMAS ELECTRONICS, INC.
118 Ninth Street
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Gregory 3-4040

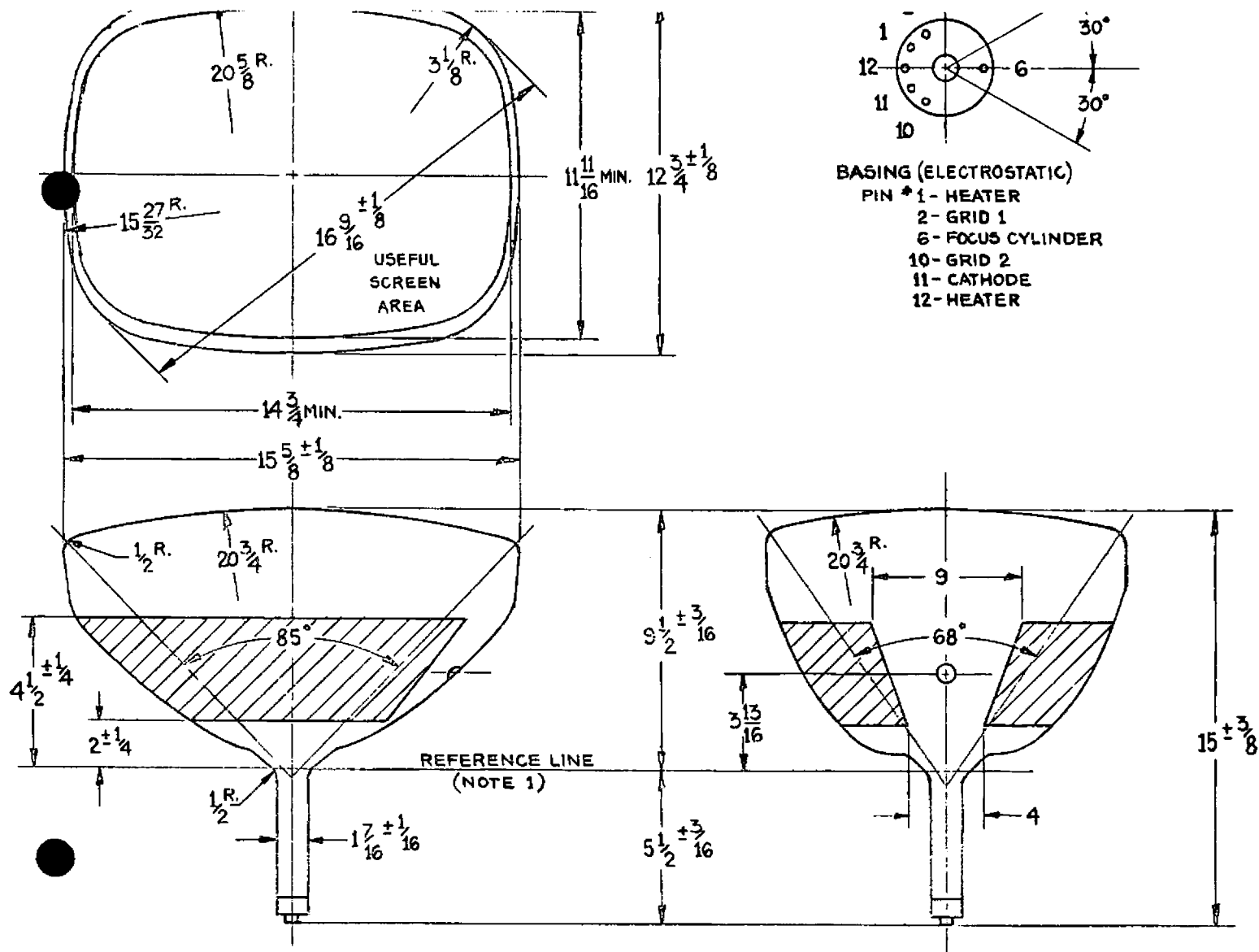


DIAGRAM NOTES:

1. Reference line is determined by the plane C-C1 of the reference line gauge (JETEC No. 116) when the gauge is resting on the glass cone. The neck diameter near the cone may exceed 1.500" but is limited by the internal contour of the yoke reference line gauge.

2. The plane through the tube axis and pin position No. 6 may vary from the plane through the tube axis and anode terminal by an angular tolerance (measured about the tube axis) of 30°. Anode terminal is on same side as pin position No. 6.

WARNING:

X-Ray Warning. If this tube is operated in excess of 16,000 Volts, X-Ray shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range. Such protection may be provided by the protective face viewing window of apparatus using tubes of this type. Protection is sufficient if the radiation measured in contact with the window is less than 6.25 MR/hr.

Additional data will be furnished by our engineering department upon request.



from JEDEC release
#3069, Dec. 12, 1960

Thomas

ENGINEERING DATA

19BFP4
PHOTOTRON
PICTURE
TUBE

CHARACTERISTICS

GENERAL DATA

Focusing Method..... Electrostatic
Deflecting Method Magnetic
Deflecting Angle-Diagonal (Approx.)..... 92 Degrees
Horizontal 80 Degrees
Vertical..... 65 Degrees
Phosphor..... P4 Aluminized
Fluorescence..... White
Persistence Sh= Medium
Faceplate Gray Filter Glass
Light Transmission 78% (Approx.)

ELECTRICAL DATA

Heater Voltage..... 6.3 Volts
Heater Current..... .6 Ampere $\pm$ 5%
Direct Interelectrode Capacitances (Approx.)
Cathode to All Other Electrodes 5 uuf
Grid No. 1 to All Other Electrodes 6 uuf
Ion Trap Magnet None

MECHANICAL DATA

Minimum Useful Screen Dimensions 15 1/8 X 12 Inches
Minimum Useful Screen Area (Approx.) 172 Sq. In.
Bulb Contact (Recessed Small Cavity Cap) J1-21
Base B6-203
Basing 12L
J1-21 Contact Aligns with Pin Position No. 6 $\pm$ 30 Degrees
Bulb Weight 14 3/4 Lbs

RATINGS

MAXIMUM RATINGS (Design Maximum Values)

Anode Voltage (Note 1)..... 20,000 Volts dc
Grid No. 4 Voltage (Focusing electrode)..... -550 To +1100 Volts dc
Grid No. 2 Voltage 550 Volts dc
Grid No. 1 Voltage
Negative Bias Value 154 Volts dc
Positive Bias Value 0 Volts dc
Positive Peak Value 2 Volts
Peak Heater-Cathode Voltage (Note 2)
Heater Negative with Respect to Cathode
During Warm-up Period Not to exceed ...15 Sec. 450 Volts dc
After Equipment Warm-up Period 200 Volts dc
Heater Positive with Respect to Cathode 200 Volts dc

RECOMMENDED OPERATING CONDITIONS

Anode Voltage 16,000 Volts dc
Grid No. 4 Voltage (Note 3)..... 0 to + 400 Volts dc
Grid No. 2 Voltage 400 Volts dc
Grid No. 1 Voltage (Note 4)..... -36 To -94 Volts dc

CIRCUIT VALUES

Grid No. 1 Circuit Resistance 1.5 Max. Megohm
External Conductive Coating to Anode

Capacitance 2500 uuf Max.
THOMAS ELECTRONICS, INC., PASSAIC, NEW JERSEY

THE 19BFP4 IS A DIRECT VIEW PICTURE TUBE FOR USE IN TELEVISION RECEIVERS AND INCLUDES SUCH FEATURES AS:

- A short straight electron gun not requiring an ion trap.
- A diagonal deflection angle of 92°.
- A gray tinted face.
- Rectangular glass type.
- Flat compound face.
- Electrostatic Focus.
- Metal Backed Screen.

NOTES

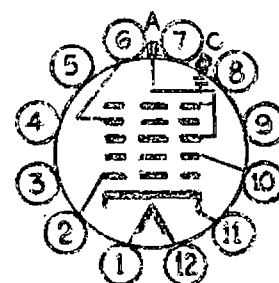
1. Grid No. 5, Grid No. 3, and the collector are connected together within the tube, and referred to herein as anode.
2. Cathode should be returned to one side or to the mid-tap of the heater transformer winding.
3. For focus with anode current of 100 ua and 15 1/8" x 12" raster.
4. Visual extinction of focused raster. Extinction of stationary focused spot will require that these values be about 5 volts more negative.

THOMAS ELECTRONICS, INC.
118 9TH STREET,
PASSAIC, NEW JERSEY

11/17/60

BULB:
19-92°

SOCKET CONNECTIONS
BOTTOM VIEW



12 L

PIN 1: HEATER
PIN 2: GRID #1
PIN 6: GRID #4
PIN 10: GRID #2
PIN 11: CATHODE
PIN 12: HEATER
CAP: ANODE
C: EXTERNAL
CONDUCTIVE
COATING

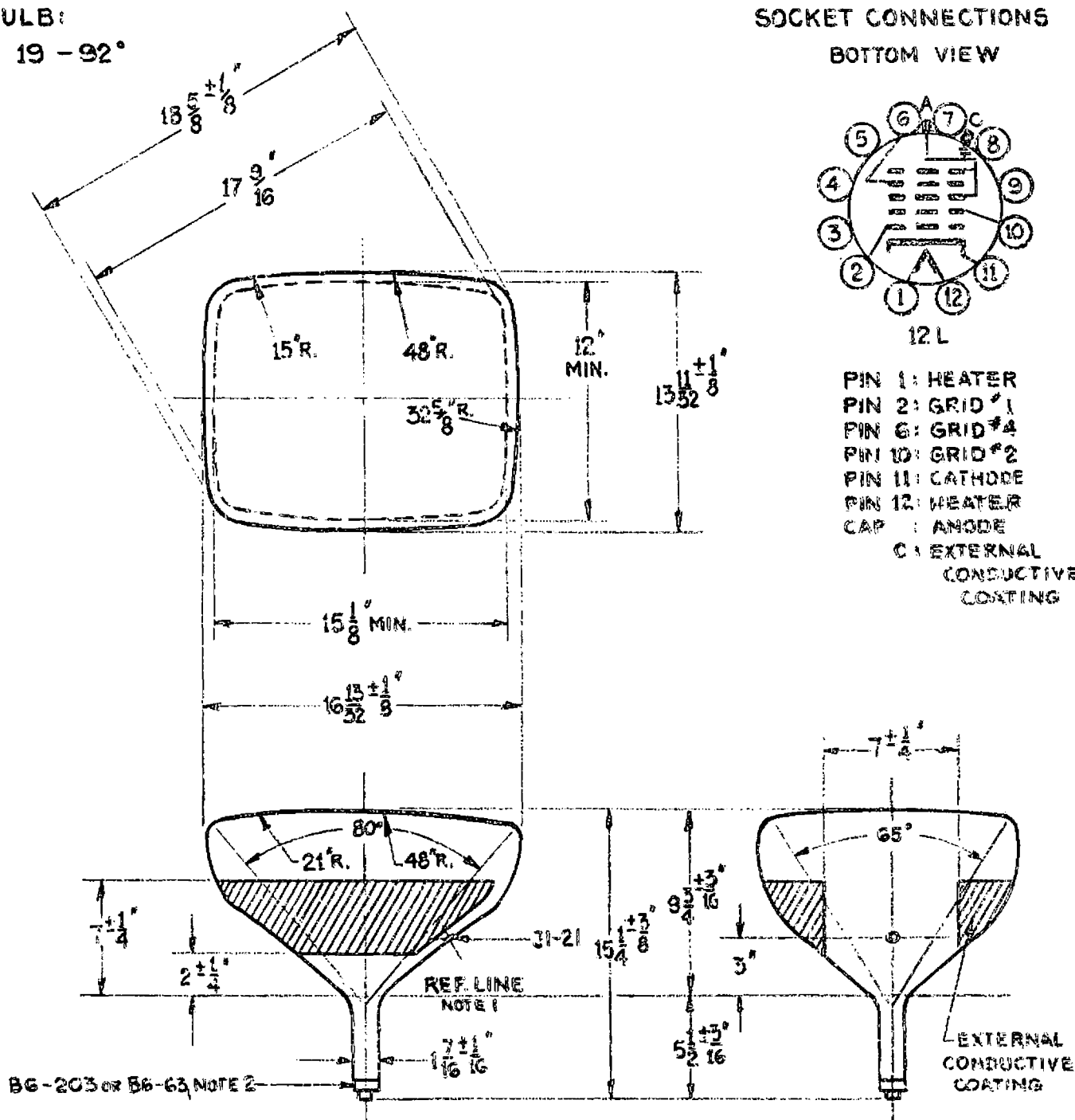


DIAGRAM NOTES:

1. Reference line is determined by plane C-C' of JEDEC No. 116 Reference Line Gauge, when the gauge is seated against the bulb.
2. Base Pin No. 6 aligns with horizontal centerline (A-A') within 30° and is on same side as anode contact, J1-21.
3. Dimensions are in inches.
4. External Conductive Coating must be grounded.
5. Anti-corona coating around connector.
6. Bulge at splice-line seal may increase the indicated maximum value for envelope width, diagonal, and height by not more than 1/4", but at any point around the seal, the bulge will not protrude more than 1/8" beyond the envelope width, diagonal, and height.
7. The tube should be supported on both sides of the bulge. The mechanism used should provide clearance for the maximum dimensions of the bulge. Tube mounting and yoke clamp supports must be spaced from the tube by the use of cushioning pads. Material to be used should be asphalt impregnated felt or equivalent.



Thomas

ENGINEERING DATA

19CAP4
Phototron
Picture
Tube

CHARACTERISTICS

from JEDEC release #3461, Oct. 23, 1961

GENERAL DATA

Focusing Method Tri Potential
Deflecting Method.....Magnetic
Deflecting Angle-Diagonal (Approx.) 110 Degrees
 Horizontal 99 Degrees
 Vertical 82 Degrees
Phosphor.....P4 Aluminized
Fluorescence..... White
Persistence.....Medium
Faceplate.....Grey Filter Glass
Light Transmission 78%(Approx.)

THE 19CAP4 IS A DIRECT-VIEW PICTURE TUBE FOR USE IN TELEVISION RECEIVERS AND INCLUDES SUCH FEATURES AS:

A. A short straight electron gun not requiring an ion trap

B. A short neck

C. A diagonal deflection angle of 110°

D. A grey tinted face.

E. Rectangular Glass Type.

F. Flat compound face.

G. Tri Potential Focus

H. Metal Backed Screen

NOTES

1. Grid No. 4 and the collector are connected together within the tube, and referred to herein as anode.

2. Cathode should be returned to one side or to the mid-tap of the heater transformer winding.

3. For focus with anode current of 100 ua and 15 1/8 x 12 raster.

4. Visual extrinction of focused raster. Extinction of stationary focused spot will require that these values be about 5 volts more negative.

THOMAS ELECTRONICS, INC.
118 9th STREET
PASSAIC, NEW JERSEY

ELECTRICAL DATA

Heater Voltage.....6.3 Volts
Heater Current......6 Ampere $\pm$ 5%
Direct Interelectrode Capacitances(Approx.)
 Cathode to ALL Other Electrodes..... 5 uuf
 Grid No. 1 to ALL Other Electrodes..... 6 uuf
Ion Trap Magnet..... None

MECHANICAL DATA

Minimum Useful Screen Dimensions..... 15 1/8 x 12 Inches
Minimum Useful Screen Area (Approx.)..... 172 Sq. In.
Bulb Contact (Recessed Small Cavity Cap)..... J1-2L
Base (Small Wafer Eightar 7 Pin).....B7-208
Basing..... 8JR
J1-2L Contact Aligns with Pin Position No. 4 $\pm$ 30 Degrees
Bulb Weight..... 13 1/2 Lbs

RATINGS

MAXIMUM RATINGS (Design Maximum Values)

Anode Voltage (Note 1)..... 20,000 Volts dc
Grid No. 3 Voltage (Focusing electrode).... -350 to +700 Volts dc
Grid No. 2 Voltage..... 600 Volts dc
Grid No. 1 Voltage
 Negative Bias Value..... 154 Volts dc
 Positive Bias Value..... 0 Volts dc
 Positive Peak Value..... 2 Volts
Peak Heater-Cathode Voltage (Note 2)
 Heater Negative with Respect to Cathode
 During Warm-up Period Not to exceed. 15 sec. ...450 Volts dc
 After Equipment Warm-up Period 200 Volts dc
Heater Positive with Respect to Cathode..... 200 Volts dc

RECOMMENDED OPERATION CONDITIONS

Anode Voltage 16,000 Volts dc
Grid No. 3 Voltage (Note 3) 0 to + 400 Volts dc
Grid No. 2 Voltage..... 500 Volts dc
Grid No. 1 Voltage (Note 4) -43 To -78 Volts dc

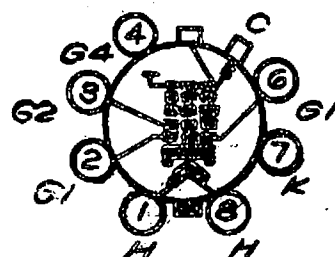
CIRCUIT VALUES

Grid No.1 Circuit Resistance..... 1.5 Max. Megohm
External Conductive Coating to Anode
 Capacitance 1500 uuf. Max.
 1000 uuf. Min.

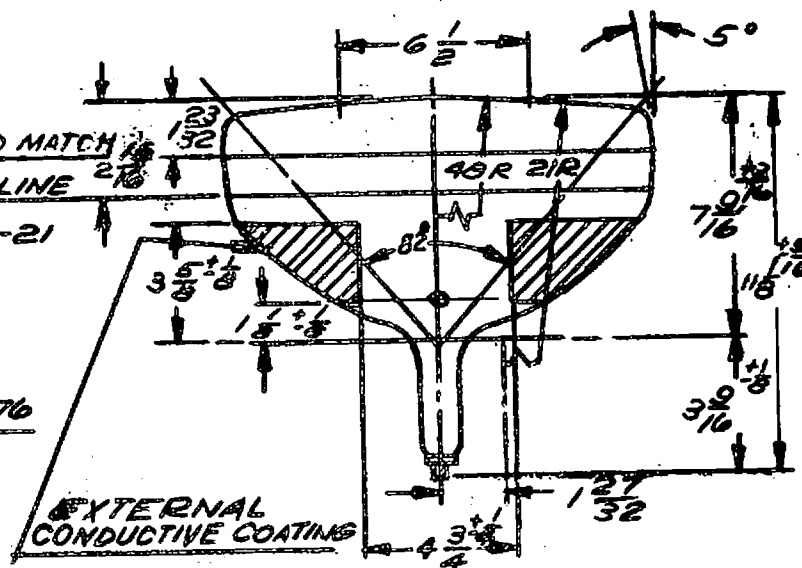
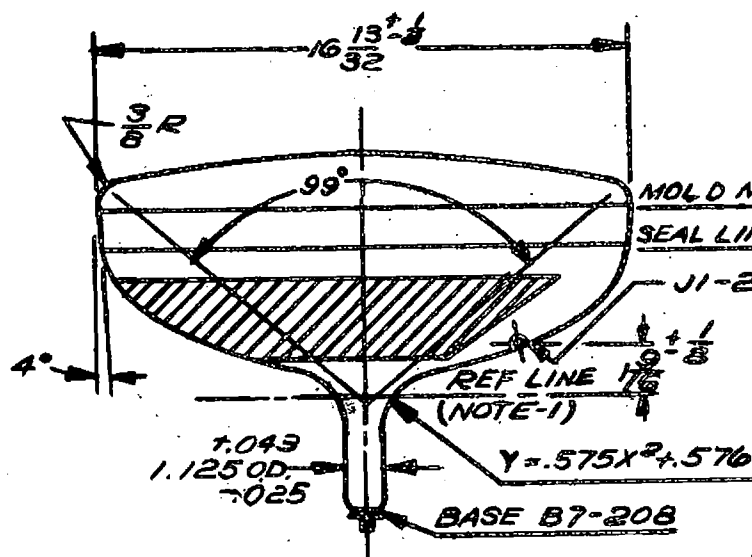
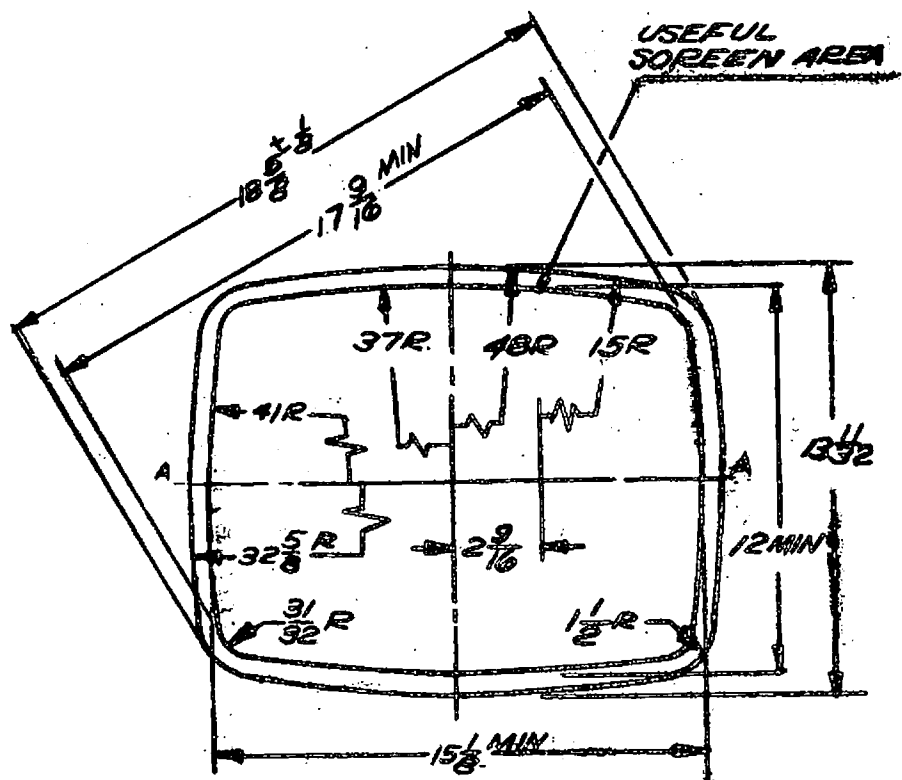
THOMAS ELECTRONICS, INC., PASSAIC, NEW JERSEY

SOCKET CONNECTIONS BOTTOM VIEW

CL }
G3 } ANODE
G5 }



8 HR
PIN 1 : HEATER
PIN 2 : GRID N° 1
PIN 3 : GRID N° 2
PIN 4 : GRID N° 4
PIN 6 : GRID N° 1
PIN 7 : CATHODE
PIN 8 : HEATER
CAP : ANODE (GRID N° 3,
GRID N° 5, COLLECTOR
C : EXTERNAL
CONDUCTIVE COATING



1. Reference Line is determined by plane C-C^o of JEDEC No. 126 Reference Line Gauge, when the gauge is seated against the bulb.
2. Base Pin No. 4 aligns with horizontal centerline (A-A^o) within 30° and is on same side as anode contact, J1-21.
3. Dimensions are in inches.
4. External Conductive Coating must be grounded.
5. Anti-corona coating around connector.
6. Bulge at splice-line seal may increase the indicated maximum value for envelope width, diagonal, and height by not more than 1/4", but at any point around the seal, the bulge will not protrude more than 1/8" beyond the envelope width, diagonal, and height.

CHARACTERISTICS

GENERAL DATA

Focusing Method.....	Electrostatic
Deflecting Method.....	Magnetic
Deflecting Angle-Diagonal (Approx.)	90 Degree
Horizontal	85 Degree
Vertical.....	68 Degree
Phosphor.....	P4 Aluminized
Fluorescence	White
Persistence	Medium
Faceplate	Gray Filter Glass
Light Transmission (approx.).....	74 Percent

THE 21CKP4 IS A DIRECT-VIEW PICTURE TUBE FOR USE IN TELEVISION RECEIVERS AND INCLUDES SUCH FEATURES AS:

- A short straight electron gun not requiring an ion trap.
- A short neck length.
- 6.3V - .45A. heater

ELECTRICAL DATA

Heater Voltage.....	6.3 Volts
Heater Current.....	.45 Amperes $\pm$ 10 %
Direct Interelectrode Capacitances (approx.)	
Cathode to All Other Electrodes	5 uuf
Grid No. 1 to All Other Electrodes	6 uuf
Ion Trap Magnet	None

- A gray tinted face affording approximately 74% light transmission.

- Rectangular Glass Type

- Spherical Face

- Electrostatic Focus

- Metal Backed Screen

MECHANICAL DATA

Minimum Useful Screen Dimensions	19 1/16 x 15 1/16 Inches
Minimum Useful Screen Area (approx.)	262 Sq. In.
Bulb Contact (Recessed Small Cavity Cap).....	J1-21
Base (Small Shell Duodecal 6 Pin).....	JETEC B6-63
Basing	12L
J1-21 Contact Aligns with Pin Position No.	6 $\pm$ 30 Degrees

NOTES:

1. Grid No. 5, Grid No. 3, and the collector are connected together within the tube, are referred to herein as anode.

2. Cathode should be returned to one side or to the mid-tap of the heater transformer winding.

3. For focus with anode current of 100 ua and 19 1/16 x 15 1/16 raster.

4. Visual extinction of focused raster. Extinction of stationary focused spot will require that these values be about 5 volts more negative.

RATINGS

MAXIMUM RATINGS (Design Center Values).

Anode Voltage (Note 1).	20,000 Volts dc
Grid No. 4 Voltage (focusing electrode)-500 to /1000 Volts dc	
Grid No. 2 Voltage	500 Volts dc
Grid No. 1 Voltage	
Negative Bias Value.....	140 Volts
Positive Bias Value	0 Volts dc
Positive Peak Value	2 Volts
Peak Heater-Cathode Voltage (Note 2)	
Heater Negative with Respect to Cathode	
During Warm-up Period Not to exceed 15sec. 410 Volts dc	
After Equipment Warm-up Period.....	180 Volts dc
Heater Positive with Respect to Cathode.....	180 Volts dc

RECOMMENDED OPERATING CONDITIONS

Anode Voltage	16,000 Volts dc
Grid No. 4 Voltage (Note 3).....	-50 to /350 Volts dc
Grid No. 2 Voltage	300 Volts dc
Grid No. 1 Voltage (Note 4).....	-28 to -72 Volts dc

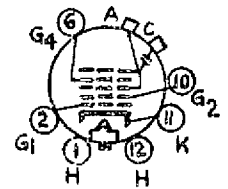
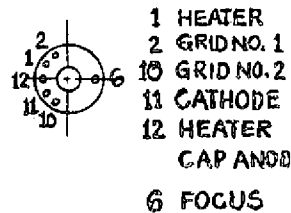
CIRCUIT VALUES

Grid No. 1 Circuit Resistance.....	1.5 Max. Megohm
External Conductive Coating to Anode	
Capacitance-	2500 uuf. Max.
.....	2000 uuf. Min.

THOMAS ELECTRONICS, INC.
118 Ninth Street
Passaic, N. J.
Gregory 3-4040

TERMINAL CONNECTIONS

MAX. ANGLE BETWEEN LINE JOINING TUBE AXIS TO CENTER OF ANODE CONTACT AND LINE JOINING TUBE AXIS TO CENTER OF PIN POSITION NO. 6 $\pm 30^\circ$



12-L

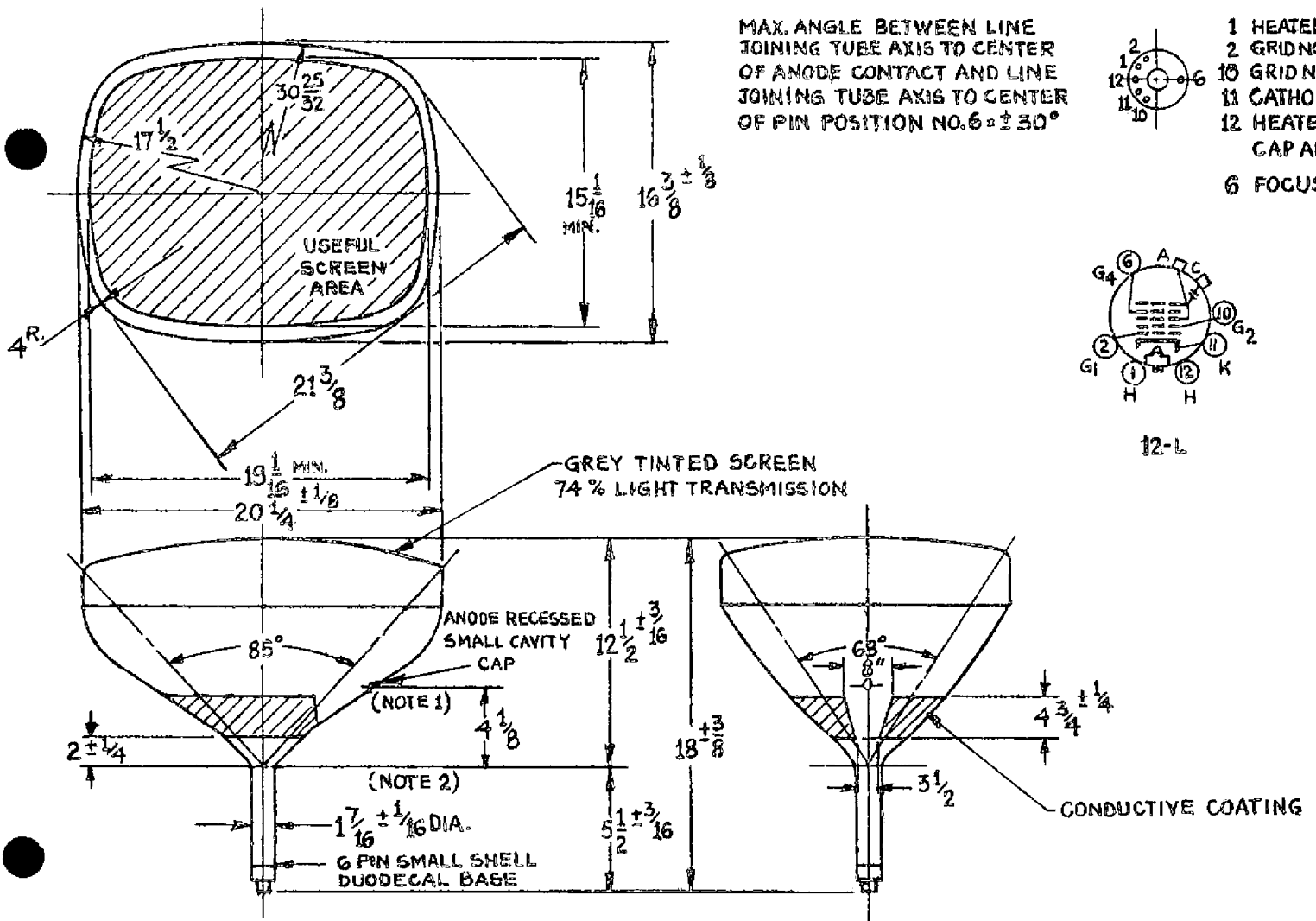


DIAGRAM NOTES:

1. The plane through the tube axis and pin position No. 6 may vary from the plane through the tube axis and anode terminal by an angular tolerance (measured about the tube axis) of 30° . Anode terminal is on same side as pin position No. 6.
2. Reference line is determined by position where upper edge of hinged gauge RTMA #116 will rest on Bulb Cone.

WARNING:

X-Ray Warning. If this tube is operated in excess of 16,000 Volts, X-Ray shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range. Such protection may be provided by the protective face viewing window of apparatus using tubes of this type. Protection is sufficient if the radiation measured in contact with the window is less than 6.25 MR/hr.

Additional data will be furnished by our engineering department upon request.



from JEDEC release
#3069, Dec. 12, 1960

Thomas

23AQF₄
Phototron
Picture
Tube

ENGINEERING DATA

CHARACTERISTICS

GENERAL DATA

Focusing Method Electrostatic
Deflecting Method Magnetic
Deflecting Angle-Diagonal (Approx.) 11 $\frac{1}{2}$ Degrees
 Horizontal 102 Degrees
 Vertical 8 $\frac{1}{2}$ Degrees
Phosphor P₄ Aluminized
 Fluorescence White
 Persistence Medium
Faceplate Gray Filter Glass
 Light Transmission 76% (Approx.)

ELECTRICAL DATA

Heater Voltage 6.3 Volts
Heater Current 3 Ampere $\pm$ 5%
Direct Interelectrode Capacitances (Approx.)
 Cathode to All Other Electrodes 5 uuf
 Grid No. 1 to All Other Electrodes 6 uuf
Ion Trap Magnet None
Heater Warm-up 18 Seconds

MECHANICAL DATA

Minimum Useful Screen Dimensions 19 1/4 x 15 3/16 Inches
Minimum Useful Screen Area (Approx.) 282 Sq. In.
Bulb Contact (Recessed Small Cavity Cap) J1-21
Base (Small Wafer Eightar 7 Pin B7-208
Basing 8 HR
 J1-21 Contact Aligns with Pin Position No. 4 $\pm$ 30 Degrees
Bulb Weight 2 $\frac{1}{2}$ Lbs

RATINGS

MAXIMUM RATINGS (Design Maximum Values)

Anode Voltage (Note 1) 19,800 Volts dc
Grid No. 4 Voltage (Focusing electrode) ... -500 to + 1000 Volts dc
Grid No. 2 Voltage 550 Volts dc
Grid No. 1 Voltage
 Negative Bias Value 154 Volts dc
 Positive Bias Value 0 Volts dc
 Positive Peak Value 2 Volts

Peak Heater-Cathode Voltage (Note 2)

Heater Negative with Respect to Cathode
 During Warm-up Period Not to exceed 15 sec. 450 Volts dc.
 After Equipment Warm-up Period 180 Volts dc.
Heater Positive with Respect to Cathode 180 Volts dc.

RECOMMENDED OPERATING CONDITIONS

Anode Voltage 18,000 Volts dc.
Grid No. 4 Voltage (Note 3) 0 to +400 Volts dc.
Grid No. 2 Voltage 400 Volts dc.
Grid No. 1 Voltage (Note 4) -44 to -94 Volts dc.

CIRCUIT VALUES

Grid No. 1 Circuit Resistance 1.5 Max. Megohm
External Conductive Coating to Anode
 Capacitance 2500 uuf. Max.

THOMAS ELECTRONICS, INC., PASSAIC, NEW JERSEY

The 23AQF₄ is a direct-view picture tube for use in television receivers and includes such features as:

- A short straight electron gun not requiring an ion trap.
- A short neck.
- A diagonal deflection angle of 11 $\frac{1}{2}$ °
- A gray tinted face.
- Rectangular Glass Type.
- Flat compound face.
- Electrostatic Focus.
- Metal Backed Screen.
- Heater Warm-up 18 Sec.

NOTES

1. Grid No. 5, Grid No. 3, and the collector are connected together within the tube, and referred to herein as anode.
2. Cathode should be returned to one side or to the mid-tap of the heater transformer winding.
3. For focus with anode current of 100 ma. and 19 1/4 x 15 3/16" raster.
4. Visual extinction of focused raster. Extinction of stationary focused spot will require that these values be about 5 volts more negative.

THOMAS ELECTRONICS, INC.
118 9TH STREET,
PASSAIC, NEW JERSEY

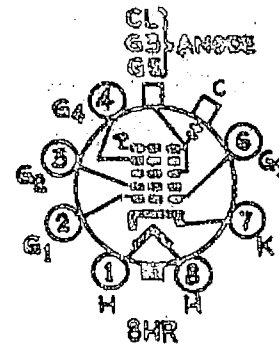
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BULB: J187

23"-114

SOCKET CONNECTIONS

BOTTOM VIEW



- PIN 1: HEATER
- PIN 2: GRID No 1
- PIN 3: GRID No 2
- PIN 4: GRID No 4
- PIN 5: GRID No 1
- PIN 6: GRID No 1
- PIN 7: CATHODE
- PIN 8: HEATER
- CAP: ULTOR (GRID No 3, GRID No 5, COLLECTOR)
- C: EXTERNAL CONDUCTIVE COATING

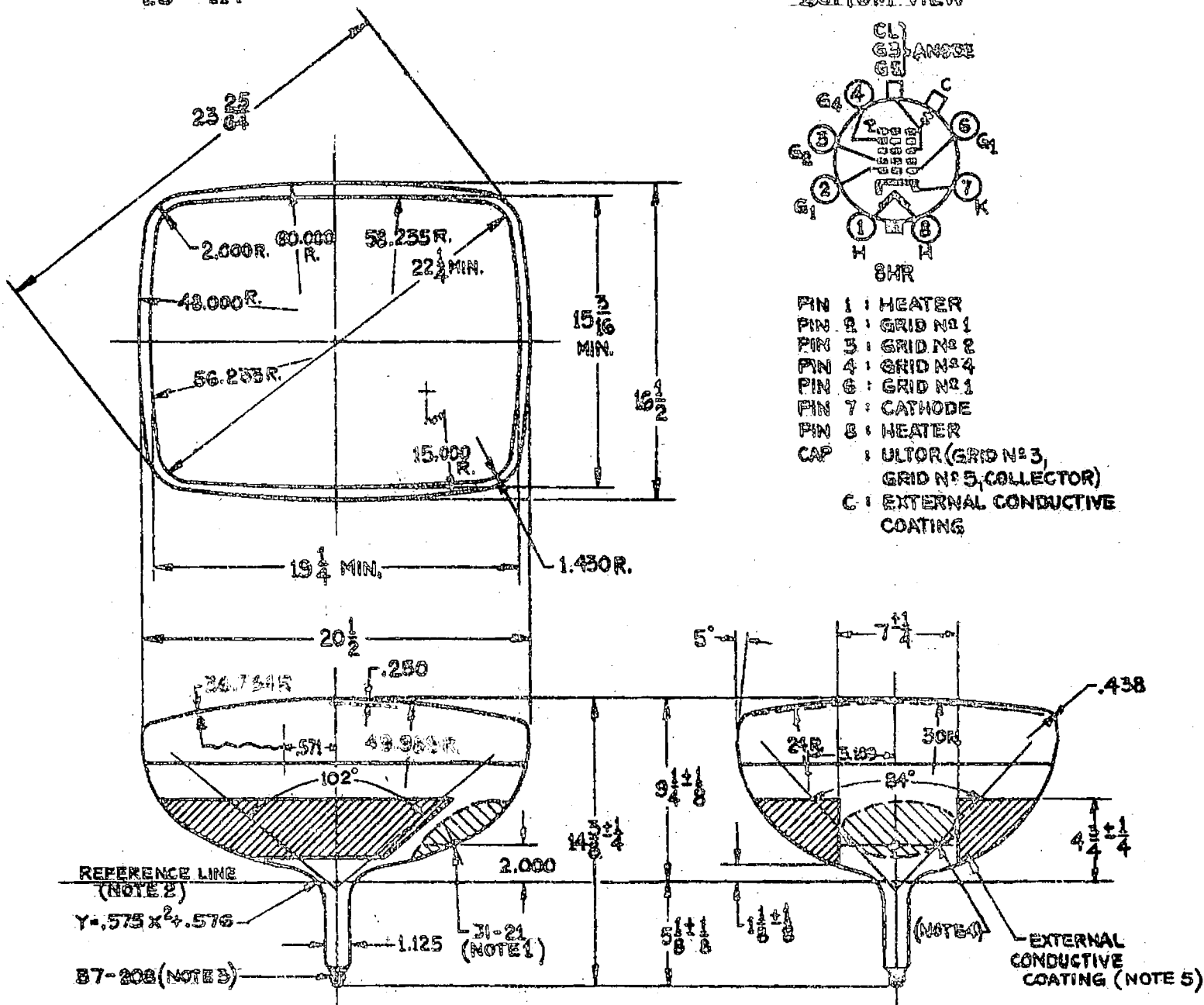


DIAGRAM NOTES:

1. Base Pin No. 4 aligns with horizontal centerline (A-A') within 30° and is on same side as anode contact, J1-21.
2. Reference line is determined by plane C-C' of JEDEC No. 126 Reference Line Gauge, when the gauge is seated against the bulb.
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 1-3/4".
4. Anti-corona coating around connector.
5. External Conductive Coating must be grounded.



23CWPH
Phototron
Picture
Tube

CHARACTERISTICS

Focusing Method.....	Tri Potential
Deflecting Method.....	Magnetic
Deflecting Angle-Diagonal (Approx.)	110 Degrees
Horizontal.....	99 Degrees
Vertical.....	82 Degrees
Phosphor	P4 Aluminized
Fluorescence	White
Persistence.....	Medium
Faceplate	Gray Filter Glass
Light Transmission	76% (Approx.)

Heater Voltage	6.3 Volts
Heater Current	.6 Amperes $\pm$ 5%
Direct Interelectrode Capacitances (Approx.)	
Cathode to ALL Other Electrodes	5 uuf
Grid No. 1 to ALL Other Electrodes	6 uuf
Ion Trap Magnet	None

Minimum Useful Screen Dimensions	19-1/4 x 15-3/16 Inches
Minimum Useful Screen Area (Approx.).....	282 Sq. In.
Bulb Contact (Recessed Small Cavity Cap)	J1-21
Base (Small Wafer Eighteen 7 Pin).....	B7-208
Basing	8 JR
J1-21 Contact Aligns with Pin Position No. 4 $\pm$ 30 Degrees	
Bulb Weight	25 Lbs.

MAXIMUM RATINGS (Design Maximum Values)

Anode Voltage Note 1	22,000 Volts dc
Grid No. 3 Voltage (Focusing electrode)	+700 Volts dc
Grid No. 2 Voltage	600 Volts dc
Grid No. 1 Voltage	
Negative Bias Value	155 Volts dc
Positive Bias Value	0 Volts dc
Positive Peak Value	2 Volts
Peak Heater-Cathode Voltage (Note 2)	
Heater Negative with Respect to Cathode	
During Warm-up Period Not to exceed 15 sec.	450 Volts dc
After Equipment Warm-up Period	200 Volts dc
Heater Positive with Respect to Cathode	200 Volts dc

Anode Voltage	16,000 Volts dc
Grid No. 3 Voltage (Note 3)	0 to + 400 Volts dc
Grid No. 2 Voltage	500 Volts dc
Grid No. 1 Voltage (Note 1)	-43 to -78 Volts dc

Grid No. 1 Circuit Resistance	1.5	Max. Megohm
External Conductive Coating to Anode		
Capacitance	2500	uuf. Max.
	2000	uuf. Min.

PASSAIC, NEW JERSEY

23"-110° H/W

1. Base Pin No. 4 aligns with horizontal centerline (A-A') within 30° and is on same side as anode contact, J1-21.
2. Reference line is determined by plane C-C' of JEDEC No. 126 Reference Line Gauge, when the gauge is seated against the bulb.
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 shall still fall within a circle concentric with bulb axis and having a diameter of 1.441.
4. Anti-corona coating around connector.
5. External conductive coating must be ground-d.



Thomas

23HP4
Phototron
Picture
Tube

ENGINEERING DATA

CHARACTERISTICS

GENERAL DATA

Focusing Method..... Electrostatic
Deflecting Method..... Magnetic
Deflecting Angle-Diagonal (Approx.)..... 110 Degrees
 Horizontal 99 Degrees
 Vertical 82 Degrees
Phosphor P4 Aluminized
 Fluorescence White
 Persistence Medium
Faceplate Gray Filter Glass
 Light Transmission (including twin panel)..... 40% (Approx.)

ELECTRICAL DATA

Heater Voltage 6.3 Volts
Heater Current 6 Ampere $\pm$ 5%
Direct Interelectrode Capacitances (Approx.)
 Cathode to All Other Electrodes..... 5 uuf
 Grid No. 1 to All Other Electrodes..... 6 uuf
Ion Trap Magnet..... None

MECHANICAL DATA

Minimum Useful Screen Dimensions..... 19 5/8" x 15 1/4" Inches
Minimum Useful Screen Area (Approx.)..... 282 Sq.In.
Bulb Contact (Recessed Small Cavity Cap)..... J1-21
Base (Small Wafer Eightar 7 Pin)..... B7-208 or B7-183
Basing..... 8 HR
 J1-21 Contact Aligns with Pin Position No. 4 $\pm$ 30 Degrees

RATINGS

MAXIMUM RATINGS (Design Maximum Values)

Anode Voltage (Note 1). 20,000 Volts dc
Grid No. 4 Voltage (focusing electrode)..... -500 to + 2000 Volts dc
Grid No. 2 Voltage..... 550 Volts dc
Grid No. 1 Voltage
 Negative Bias Value..... 154 Volts dc
 Positive Bias Value..... 0 Volts dc
 Positive Peak Value 2 Volts
Peak Heater-Cathode Voltage (Note 2)
 Heater Negative with Respect to Cathode
 During Warm-up Period Not to exceed.. 15 sec. 450 Volts dc
 After Equipment Warm-up Period..... 200 Volts dc
 Heater Positive with Respect to Cathode..... 200 Volts dc

RECOMMENDED OPERATING CONDITIONS

Anode Voltage 16,000 Volts dc
Grid No. 4 Voltage (Note 3) 0 to + 400 Volts dc
Grid No. 2 Voltage..... 300 Volts dc
Grid No. 1 Voltage (Note 4) -35 To -72 Volts dc

CIRCUIT VALUES

Grid No. 1 Circuit Resistance..... 1.5 Max. Megohm
External Conductive Coating to Anode
 Capacitance- 2500 uuf. Max.
 2000 uuf. Min.

THE 23HP4 IS A DIRECT-VIEW PICTURE TUBE FOR USE IN TELEVISION RECEIVERS AND INCLUDES SUCH FEATURES AS:

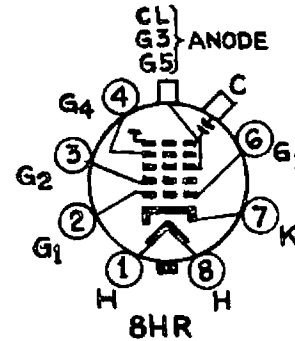
- A short straight electron gun not requiring an ion trap.
- A short neck.
- Integral implosion panel.
- A diagonal deflection angle of 110°
- A gray tinted face
- Rectangular Glass Type.
- Spherical face.
- Electrostatic Focus.
- Metal Backed Screen.

NOTES

1. Grid No. 5, Grid No. 3, and the collector are connected together within the tube, and referred to herein as anode.
2. Cathode should be returned to one side or to the mid-tap of the heater transformer winding.
3. For focus with anode current of 100 ua and 19 5/16" x 15 1/4" raster.
4. Visual extinction of focused raster. Extinction of stationary focused spot will require that these values be about 5 volts more negative.

THOMAS ELECTRONICS, INC
118 9th Street,
Passaic, N. J.

SOCKET CONNECTIONS BOTTOM VIEW



- PIN 1 : HEATER
 PIN 2 : GRID N° 1
 PIN 3 : GRID N° 2
 PIN 4 : GRID N° 4
 PIN 6 : GRID N° 1
 PIN 7 : CATHODE
 PIN 8 : HEATER
 CAP : ANODE (GRID N° 3,
 GRID N° 5, COLLECTOR)
 C : EXTERNAL CONDUCTIVE
 COATING

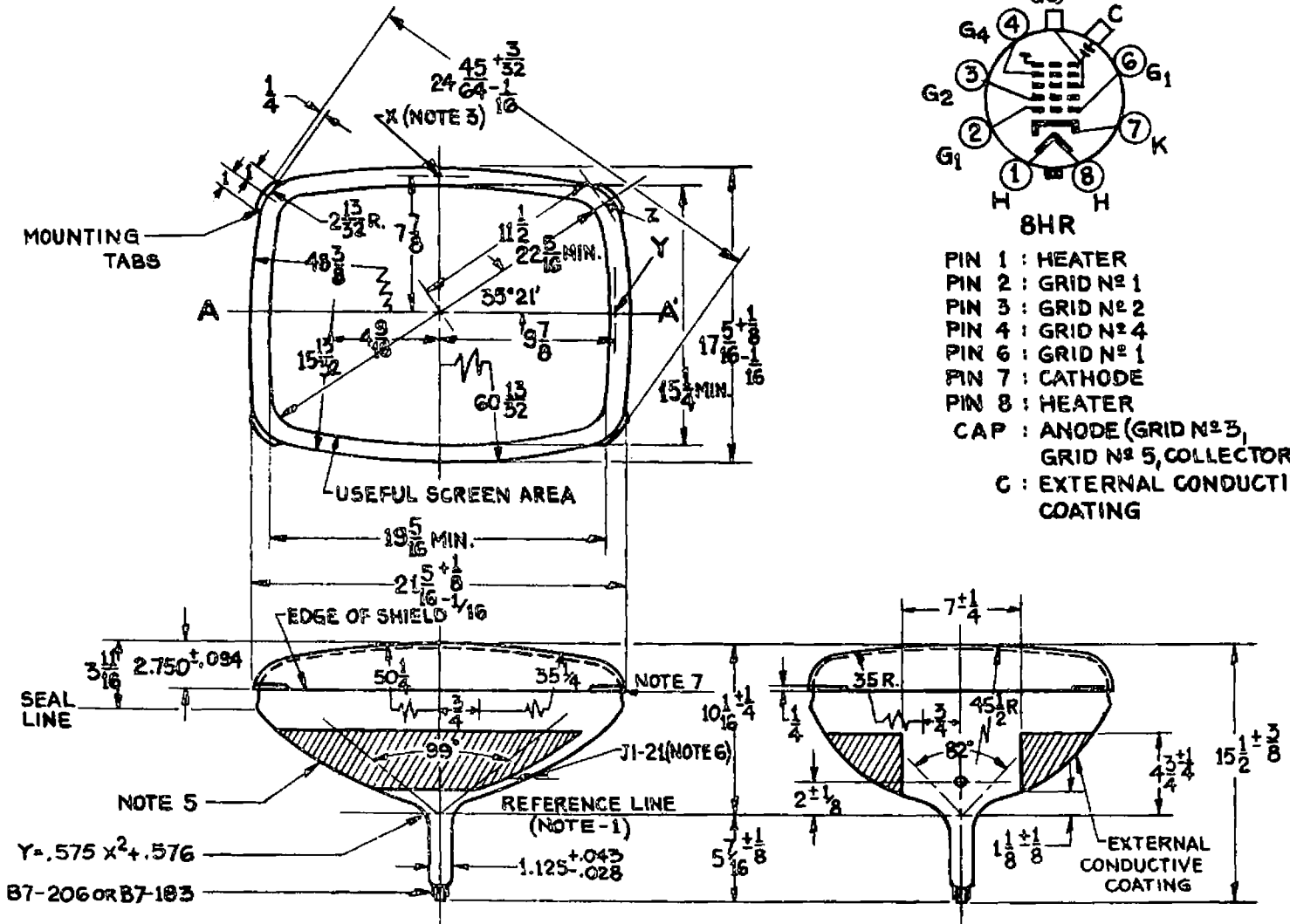


DIAGRAM NOTES:

1. Reference line is determined by plane C-C⁰ of JEDEC No. 126 Reference Line Gauge, when the gauge is seated against the bulb.
2. Base Pin No. 4 aligns with horizontal centerline (A-A') within 30° and is on same side as anode contact, J1-21.
3. Planes perpendicular to tube axis and passing through points X, Y, and Z are located as follows:

Plane tangent to crown of face to plane of X = .758" Nom.

Plane of X to plane of Y = .463" ± .030"

Plane of X to plane of Z = .970" ± .030"

Plane of X to the bottom of ear = 1.960"

4. Dimensions are in inches.
5. External Conductive Coating must be grounded.
6. Anti-corona coating around connector.
7. Panel edge flatness: .075" maximum out of plane.

Thomas

ENGINEERING DATA

23WP4

Phototron
Picture
Tube

CHARACTERISTICS

GENERAL DATA

Focusing Method.....Electrostatic
Deflecting Method.....Magnetic
Deflecting Angle-Diagonal (Approx.) 114 Degrees
Horizontal 102 Degrees
Vertical.....84 Degrees

Phosphor..... P4 Aluminized
Fluorescence White
Persistence Medium
Faceplate Gray Filter Glass
Light Transmission 70% (Approx.)

ELECTRICAL DATA

Heater Voltage 6.3 Volts
Heater Current 6 Ampere $\pm$ 5%
Direct Interelectrode Capacitances (Approx.)
Cathode to All Other Electrodes 5 uuf
Grid No. 1 to All Other Electrodes..... 6 uuf
Ion Trap Magnet..... None

MECHANICAL DATA

Minimum Useful Screen Dimensions 19 1/4 x 15 3/16 Inches
Minimum Useful Screen Area (Approx.)..... 276 Sq. In.
Bulb Contact (Recessed Small Cavity Cap)..... J1-21
Base (Small Wafer Eightpin 7 Pin B7-183 or B7-208
Basing 8 HR
J1-21 Contact Aligns with Pin Position No. 4 $\pm$ 30 Degrees
Bulb Weight 24 Lbs

RATINGS

MAXIMUM RATINGS (Design Maximum Values)

Anode Voltage (Note 1)..... 20,000 Volts dc
Grid No. 4 Voltage (Focusing electrode)=500 to + 2000 Volts dc
Grid No. 2 Voltage 550 Volts dc
Grid No. 1 Voltage
Negative Bias Value..... 154 Volts dc
Positive Bias Value 0 Volts dc
Positive Peak Value 2 Volts
Peak Heater-Cathode Voltage (Note 2)
Heater Negative with Respect to Cathode
During Warm-up Period Not to exceed. 15 sec. 450 Volts dc
After Equipment Warm-up Period 200 Volts dc
Heater Positive with Respect to Cathode 200 Volts dc

RECOMMENDED OPERATING CONDITIONS

Anode Voltage 16,000 Volts dc
Grid No. 4 Voltage (Note 3)..... 0 to + 400 Volts dc
Grid No. 2 Voltage 300 Volts dc
Grid No. 1 Voltage (Note 4) -35 To -72 Volts dc

CIRCUIT VALUES

Grid No. 1 Circuit Resistance 1.5 Max. Megohm
External Conductive Coating to Anode
Capacitance 2500 uuf. Max.
..... 2000 uuf. Min.

THOMAS ELECTRONICS, INC., PASSAIC, NEW JERSEY

THE 23WP4 IS A DIRECT-VIEW PICTURE TUBE FOR USE IN TELEVISION RECEIVERS AND INCLUDES SUCH FEATURES AS:

- A short straight electron gun not requiring an ion trap
- A short neck
- A diagonal deflection angle of 114°
- A gray tinted face.
- Rectangular Glass Type.
- Flat compound face.
- Electrostatic Focus
- Metal Backed Screen

NOTES

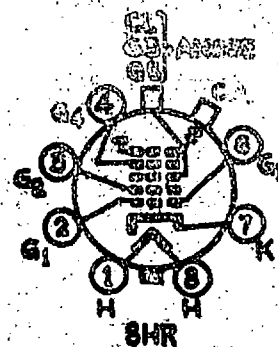
1. Grid No. 5, Grid No. 3, and the collector are connected together within the tube, and referred to herein as anode.
2. Cathode should be returned to one side or to the mid-tap of the heater transformer winding.
3. For focus with anode current of 100 ua and 19 1/4 x 15 3/16" raster.
4. Visual extinction of focused raster. Extinction of stationary focused spot will require that these values be about 5 volts more negative.

THOMAS ELECTRONICS, INC.

118 9TH STREET,

PASSAIC, NEW JERSEY

SECRET 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

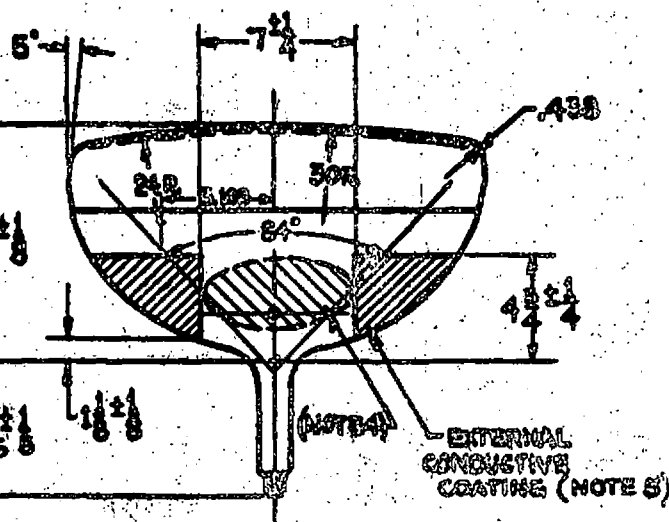


DIAGRAM NOTES:

1. Base Pin No. 4 aligns with horizontal centerline (A-A') within 30° and is on same side as anode contact, J1-21.
2. Reference line is determined by plane C-C' of JEDEC No. 126 Reference Line Gauge, when the gauge is seated against the bulb.
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 1-3/4".
4. Anti-corona coating around connector.
5. External conductive coating must be grounded.



Thomas

INDUSTRIAL & MILITARY TUBES

ENGINEERING DATA

Sheet 1 of 4

TYPE 5CKP-A

DESCRIPTION

The Thomas 5CKP-A is a 5-inch diameter magnetic deflection and focus cathode-ray tube featuring a very high resolution gun and a clear non-browning faceplate of optical quality and flatness.

The fine grained phosphor screen used in this tube has a low noise level and is normally provided with an aluminized backing for maximum brightness and stability in performance.

For maximum protection against corona effects in high voltage and high altitude operations, the tube is provided with a molded accelerator lead.

ELECTRICAL DATA

Focusing Method	Magnetic
Deflection Method	Magnetic
Deflection Angle, Approximately	42 Degrees
Direct Interelectrode Capacitances, Approximately	
Cathode to All	2.0 uuf
Grid No. 1 to All	9.0 uuf

OPTICAL DATA

Phosphor Number	1	11	16	24
Fluorescence	Green	Blue	Violet	Green
Phosphorescence	Green	Blue	Violet	Green
Persistance	Medium	Med-Short	Very Short	Short
Faceplate	Flat, Clear			

MECHANICAL DATA

Overall Length	16 5/8 $\pm$ 3/8 Inches
Neck Length	12 1/8 Inches
Greatest Diameter of Bulb	5 1/4 $\pm$ 3/32 Inches
Minimum Useful Screen Diameter	4 1/4 Inches
Bulb Contact	Special Molded Contact
Bulb Number	J42ZB1A
Weight	Approximately 2 Pounds
Base	B7-51
Basing	12AM
Mounting Position	Any

from JEDEC release #3893, Sept. 24, 1962

THOMAS ELECTRONICS, INC., PASSAIC, NEW JERSEY



Thomas

INDUSTRIAL & MILITARY TUBES
ENGINEERING DATA Sheet 2 of 4
TYPE 5CKP-A

MECHANICAL DATA (Continued)

Bulb Contact Alignment:

Center Line of Molded Contact Aligns
with Vacant Pin No. 3
Molded Contact on Same Side as Pin 3

± 10 Degrees

RATINGS (Absolute Maximum Values)

Heater Voltage	6.3 Volts
Heater Current @ 6.3 Volts	$0.6 \pm 10\%$ Ampere
Accelerator Voltage	22,000 Max. Volts DC
Accelerator Voltage	10,000 Min. Volts DC
Grid No. 2 Voltage	1,500 Max. Volts DC
Grid No. 1 Voltage	
Negative Bias Value	200 Max. Volts DC
Positive Bias Value	-2 Max. Volts DC
Positive Peak Value	0 Volts
Peak Heater-Cathode Voltage	
Heater negative with respect to cathode	180 Max. Volts
Heater positive with respect to cathode	180 Max. Volts

TYPICAL OPERATING CONDITIONS

Accelerator Voltage	20,000 Volts DC
Grid No. 2 Voltage	1,000 Volts DC
Grid No. 1 Voltage (Note 1)	-35 to -110 Volts DC
Focusing Coil Current (Note 2)	Approx. 135 mA
Line Width (Note 3)	.001 Inch Max.
Spot Position (Note 4)	Within a 7.5mm Radius Circle

MAXIMUM CIRCUIT VALUES

Grid No. 1 Circuit Resistance	1.5 Max. Megohms
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NOTES

1. **Visual extinction** of the undeflected, focused spot.
2. As measured with the center of the air gap of the JEDEC #106 focus coil located 3-1/2 inches from the reference line.

To obtain optimum tube performance, care should be taken to align the focus coil with respect to the beam axis. Good alignment is indicated by a minimum swing of the beam when going through focus (from zero to maximum current).



Thomas

INDUSTRIAL & MILITARY TUBES
ENGINEERING DATA Sheet 3 of 4

TYPE 5CKP-A

NOTES (Continued)

3. As measured at the tube face center with the raster adjusted for best center focus and at an accelerator current of 25 uA. Line width determined by the shrinking raster method.
4. With the tube shielded against external influences, the undeflected, unfocused spot will fall within a 7.5 mm radius circle concentric with the tube face center.

PRECAUTIONARY NOTES

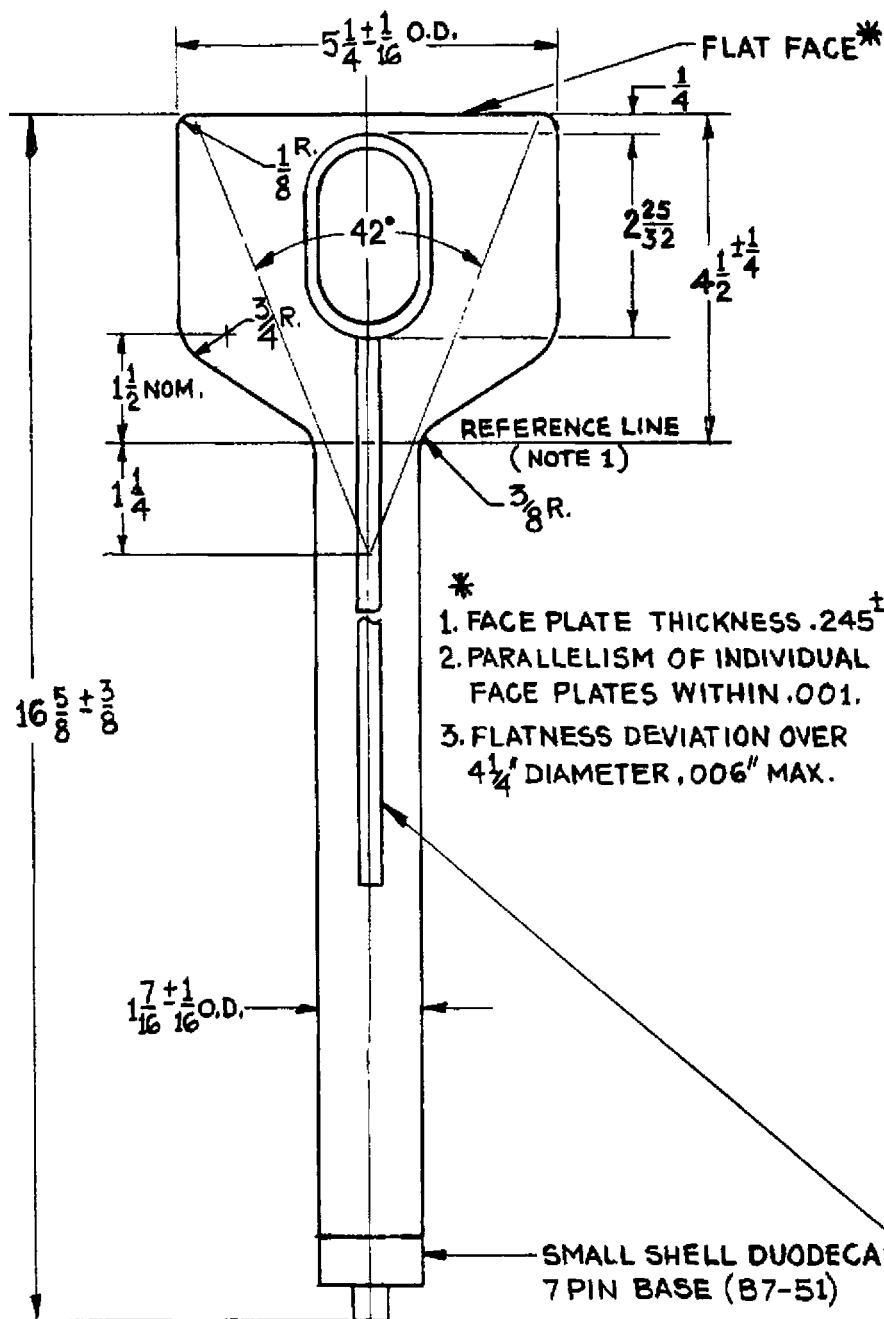
1. To prevent possible permanent damage to the tube, a high voltage insulating sleeve should be placed between the deflection yoke and the neck of the tube.
2. The tube should be adequately shielded for X-ray radiation.
3. To obtain maximum possible resolution it is recommended that the tube, coil, and yoke are shielded against external electrostatic and magnetic fields.



Thomas

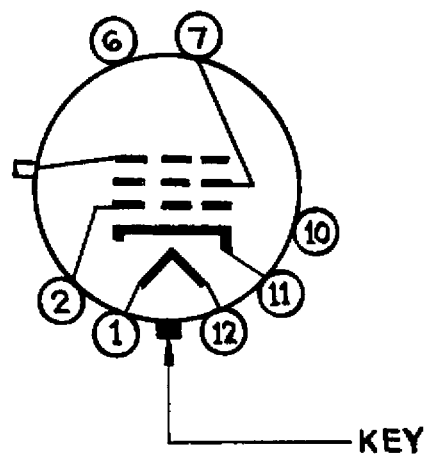
INDUSTRIAL & MILITARY TUBES
ENGINEERING DATA

5CKP-

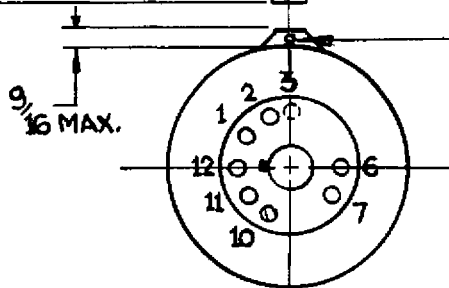


- *
1. FACE PLATE THICKNESS .245 $\pm .005$
2. PARALLELISM OF INDIVIDUAL
FACE PLATES WITHIN .001.
3. FLATNESS DEVIATION OVER
 $4\frac{1}{4}$ DIAMETER, .006" MAX.

BOTTOM VIEW OF BASE



<u>PIN NO.</u>	<u>ELEMENT</u>
1	HEATER
2	GRID No. 1
7	GRID No. 2
11	CATHODE
12	HEATER



NOTE:

1. THE POINT WHERE JEDEC G112 REFERENCE LINE
GAUGE WILL STOP.



Thomas

INDUSTRIAL & MILITARY TUBES

ENGINEERING DATA Sheet 1 of 2

TYPE 5DYP-

BRIEF DESCRIPTION

The Thomas 5DYP- is a 5-inch diameter magnetic deflection cathode-ray tube designed for applications where minimum space and power supply requirements are important considerations. The tube incorporates a low voltage electrostatic focus lens designed to operate at or near cathode potential, a tight tolerance low grid drive characteristic, low heater current, and a short overall length. An aluminized phosphor screen is employed to increase light output and minimize screen charging effects.

GENERAL CHARACTERISTICS

ELECTRICAL DATA

Focusing Method	Electrostatic
Deflection Method	Magnetic
Deflection Angle, Approximately	53 Degrees
Direct Interelectrode Capacitances	
Cathode to All	6 uuf Max.
Grid No. 1 to All	8 uuf Max.
Grid No. 2 to All	6 uuf Max.

OPTICAL DATA

Phosphor Number (Note 1)	2	7	19	31
Fluorescence	Yel-Green	White	Orange	Green
Phosphorescence	Yel-Green	Yellow	Orange	Green
Persistence	Medium	Long	Long	Med-Short

(Note 2)

Faceplate	Spherical, Clear
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MECHANICAL DATA

Overall Length	8 7/8 ± 1/4 Inches
Greatest Diameter of Bulb	4 15/16 ± 1/32 Inches
Minimum Useful Screen Diameter	4 1/4 Inches
Bulb Number	J39 1/2 L1
Bulb Contact	J1-22
Base	B6-203
Basing	12M
Mounting Position	Any
Bulb Contact Alignment	
J1-22 Contact Aligns with Vacant Pin No. 3	±10 Degrees
J1-22 Contact on same side as Vacant Pin No. 3	
Weight	1 Pound

from JEDEC release #3673, April 9, 1962

THOMAS ELECTRONICS, INC., PASSAIC, NEW JERSEY



Thomas

INDUSTRIAL & MILITARY TUBES

ENGINEERING DATA Sheet 2 of 2

TYPE 5DYP-

RATINGS (Absolute Maximum Values)

Heater Voltage	6.3 Volts
Heater Current @ 6.3 Volts	0.3 $\pm$ 10% Ampere
Accelerator Voltage	11,000 Max. Volts DC
Accelerator Input	6 Max. Watts
Focusing Electrode Voltage	1,100 Max. Volts DC
Grid No. 1 Voltage	770 Max. Volts DC
Grid No. 1 Voltage	
Negative Bias Value	180 Max. Volts DC
Positive Bias Value	0 Max. Volts DC
Positive Peak Value	2.0 Max. Volts
Peak Heater-Cathode Voltage	
Heater Negative with respect to cathode	180 Max. Volts
Heater Positive with respect to cathode	180 Max. Volts

TYPICAL OPERATING CONDITIONS

Accelerator Voltage	7,000 Volts DC
Focusing Electrode Voltage	0 to +250 Volts DC
Grid No. 2 Voltage	250 Volts DC
Grid No. 1 Voltage (Note 3)	-15 to -25 Volts DC
Line Width "A" (Note 4)	.013 Inch Max.
Modulation (Note 4)	12 Volts Max.
Spot Position (Note 5)	Within a 5/16 Inch Radius Circle

MAXIMUM CIRCUIT VALUES

Grid No. 1 Circuit Resistance	1.5 Max. Megohms
-------------------------------	------------------

NOTES

1. Other screen phosphors can be supplied upon request.
2. The P19 screen can be permanently damaged should the current density be permitted to rise too high. To prevent burning, minimum beam current densities should be employed.
3. Visual extinction of the undeflected, focused raster.
4. Measured in accordance with MIL-E-1 specifications at an accelerator current of 25 uAdc.
5. With the tube shielded against external influences, the undeflected and focused spot will fall within a 5/16 inch radius circle concentric with the tube face center.

THOMAS ELECTRONICS, INC.

5DYP-

AVERAGE GRID DRIVE CHARACTERISTIC

$E_h = 6.3$ Volts

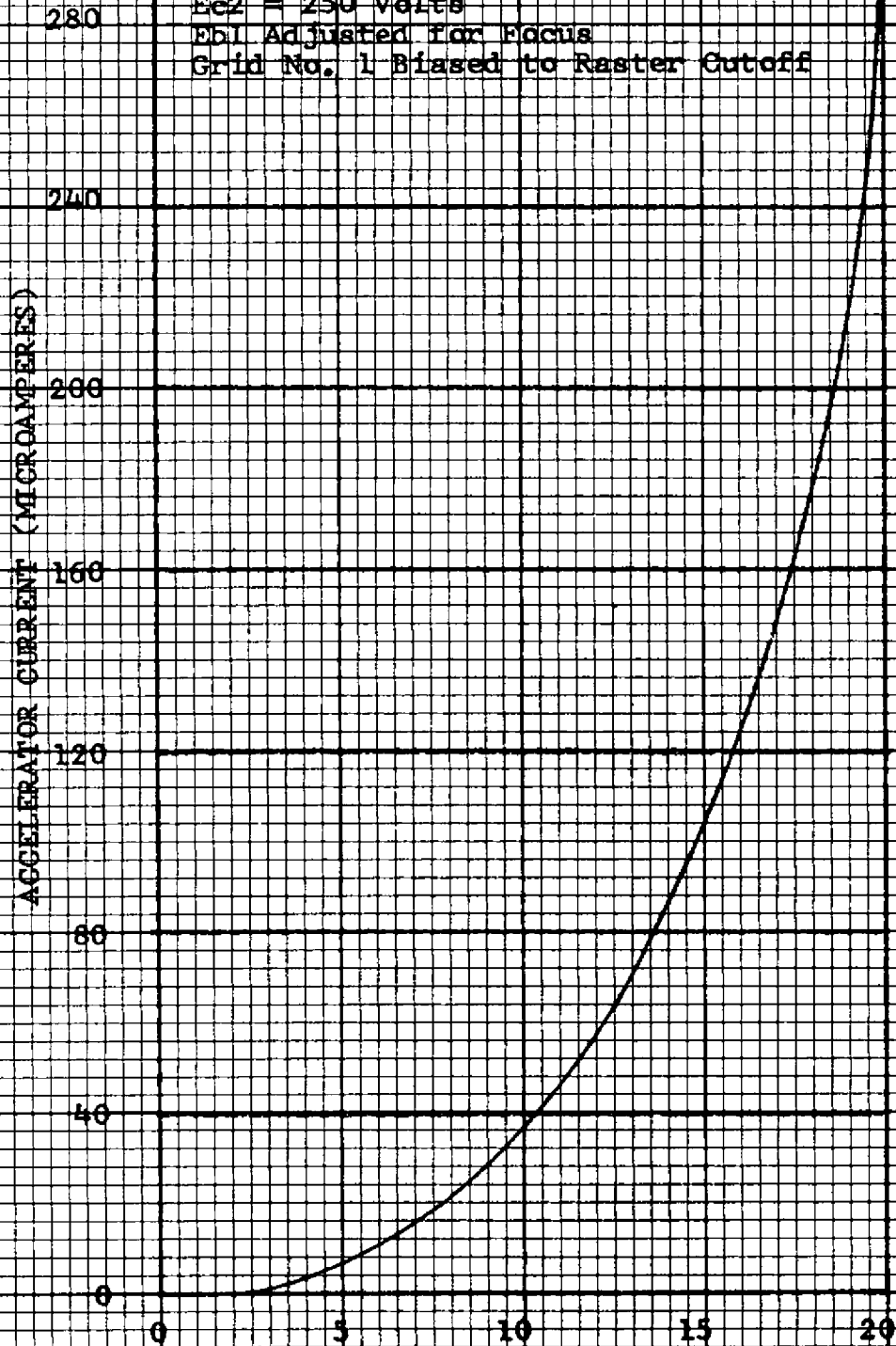
$I_h = 300$ mA

$E_{b2} = 5000$ to 11000 Volts

$E_{c2} = 250$ Volts

E_{b1} Adjusted for Focus

Grid No. 1 Biased to Raster Cutoff



PEAK GRID NO. 1 DRIVE FROM RASTER CUTOFF (VOLTS)



Thomas

INDUSTRIAL & MILITARY TUBES

ENGINEERING DATA

Sheet 1 of 4

TYPE 5EDP-

DESCRIPTION

The 5EDP- is a 5-inch diameter magnetic deflection and electrostatic focus cathode-ray tube. The tube features a very high resolution gun and a clear non-browning faceplate of optical quality and flatness. The electrostatic focus lens is designed to provide exceptional uniformity of line width, and when a good quality deflection yoke is employed with the tube it is not normally necessary to apply dynamic focus correction.

The fine grained phosphor screen used in this tube has a low noise level and is provided with an aluminized backing for maximum brightness and stability in performance.

A potted base is provided for maximum protection against corona effects.

GENERAL CHARACTERISTICS

ELECTRICAL DATA

Focusing Method	Electrostatic
Deflection Method	Magnetic
Deflection Angle, Approximately	42 Degrees
Direct Interelectrode Capacitances	
Cathode to All	7.0 uuf Max.
Grid No. 1 to All	12.0 uuf Max.
Grid No. 2 to All	11.0 uuf Max.

OPTICAL DATA

Phosphor Number	1	11	16	24
Fluorescence	Green	Blue	Violet	Green
Phosphorescence	Green	Blue	Violet	Green
Persistence	Medium	Med-Short	Very Short	Short
Faceplate				Flat, Clear

MECHANICAL DATA

Overall Length	18 ± 3/8 Inches
Greatest Diameter of Bulb	5 1/4 ± 3/32 Inches
Minimum Useful Screen Diameter	4 1/4 Inches
Bulb Number	J42ZB1A
Weight	Approximately 2 1/2 Pounds
Base	B6-63
Basing	12-Q
Mounting Position	Any

from JEDEC release #3774, June 18, 1962

THOMAS ELECTRONICS, INC., PASSAIC, NEW JERSEY



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INDUSTRIAL & MILITARY TUBES
ENGINEERING DATA Sheet 2 of 4

TYPE SEDP-

MECHANICAL DATA (Continued)

Bulb Contact Alignment
J1-22 Contact Aligns with vacant Pin 3 ± 10 Degrees
J1-22 Contact on same side as Pin 3

RATINGS (Absolute Maximum Values)

Heater Voltage	6.3 Volts
Heater Current @ 6.3 Volts	$0.6 \pm 10\%$ Ampere
Accelerator Voltage	30,000 Max. Volts DC
Focusing Electrode Voltage	9,000 Max. Volts DC
Grid No. 2 Voltage	1,000 Max. Volts DC
Grid No. 1 Voltage	
Negative Bias Value	150 Max. Volts DC
Positive Bias Value	0 Max. Volts DC
Positive Peak Value	2 Max. Volts
Peak Heater-Cathode Voltage	
Heater negative with respect to cathode	150 Max. Volts
Heater positive with respect to cathode	150 Max. Volts

TYPICAL OPERATING CONDITIONS

Accelerator Voltage (Note 1)	25,000 Volts DC
Focusing Electrode Voltage (Note 2)	6,300 to 7,500 Volts DC
Grid No. 2 Voltage	650 Volts DC
Grid No. 1 Voltage (Note 3)	-30 to -70 Volts DC
Accelerator Current	2.5 μ Adc
Focusing Electrode Current (Notes 4 & 5)	(typical) 20 μ Adc
Line Width (Notes 4 & 6)	.001 Inch Max.
Spot Position (Note 7)	Within a 5mm Radius Circle.

MAXIMUM CIRCUIT VALUES

Grid No. 1 Circuit Resistance	1.5 Max. Megohms
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NOTES

1. For best operation, the accelerator voltage should not be less than 20,000 volts. At lower voltages, a decrease in brilliance and definition will occur.
2. The focusing electrode voltage remains essentially constant for all values of accelerator current.



Thomas

INDUSTRIAL & MILITARY TUBES

ENGINEERING DATA Sheet 3 of 4

TYPE SEDP-

NOTES (Continued)

3. Visual extinction of the undeflected, focused spot.
4. For an accelerator current as indicated.
5. The focusing electrode supply should be capable of 300 uA average current.
6. As measured at the tube face center with the raster adjusted for best center focus. Line width determined by the shrinking raster method.
7. With the tube shielded against external influences, the undeflected and focused spot will fall within a 5mm radius circle concentric with the tube face center.

PRECAUTIONARY NOTES

1. The external conductive coating should be grounded by fastening a 1/4" wide (Min.) flexible metal band securely around the coated portion of the neck.
2. To protect the tube against possible permanent damage, a high voltage insulating sleeve should be placed between the deflection yoke and the grounded coating on the neck.
3. The tube should be adequately shielded for X-ray radiation.
4. To obtain maximum possible resolution it is recommended the the tube and yoke are shielded against external electrostatic and magnetic fields.



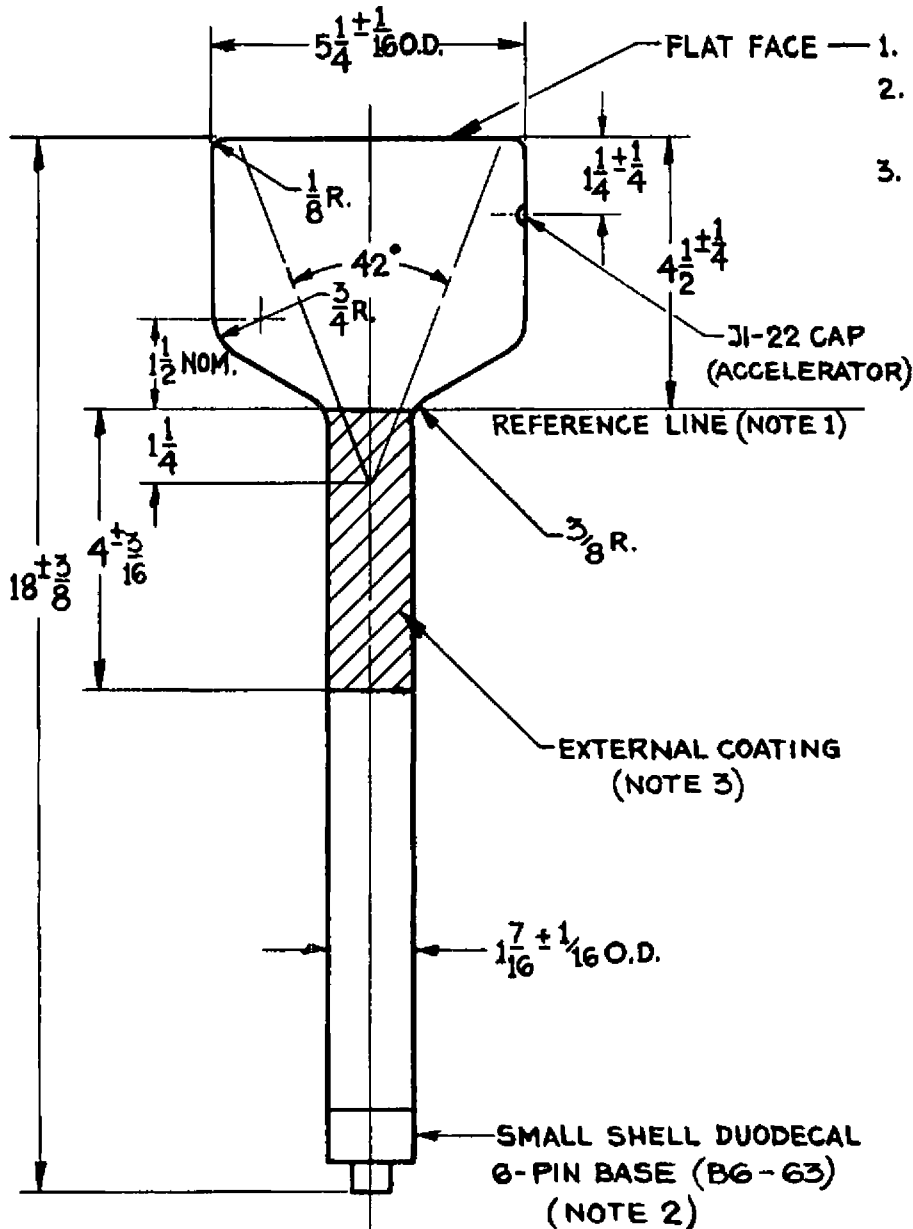
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INDUSTRIAL & MILITARY TUBES

ENGINEERING DATA

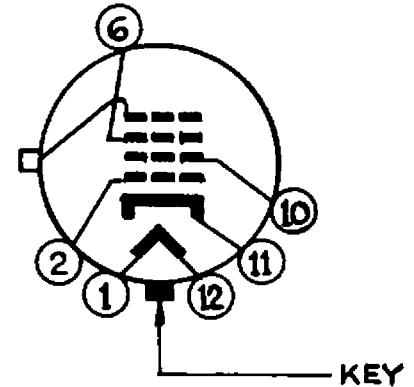
Sheet 4 of 4

5EDP-



1. FACE PLATE THICKNESS $.245 \pm .005$
2. PARALLELISM OF INDIVIDUAL FACE PLATES WITHIN $.001$ "
3. FLATNESS DEVIATION OVER $4\frac{1}{4}$ DIA. $.006$ MAX.

BOTTOM VIEW OF BASE



PIN N ^o	ELEMENT
1	HEATER
2	GRID N ^o 1
6	FOCUSING ELECTRODE
10	GRID N ^o 2
11	CATHODE
12	HEATER

NOTES:

1. THE POINT WHERE JEDEC G112 REFERENCE LINE GAUGE WILL STOP.
2. THE JI-22 CAP ALIGNS WITH VACANT PIN POSITION N^o 3 $\pm 10^\circ$ AND ON THE SAME SIDE.
3. EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

CHARACTERISTICS

THE 8JP4 IS A DIRECT
VIEW RECEIVER CHECK
TUBE AND INCLUDES SUCH
FEATURES AS:

• A gray tinted face
affording approximately
80% light transmission.

- No outside conductive coating.

Ion Trap Magnet	None
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NOTES :

3. Visual extinction of focused raster. Extinction of focused spot will require that these values be increased approximately 5 volts.

Peak Heater-Cathode Voltage (Note 2)
Heater Negative with Respect to Cathode
During Warm-up Period Not to exceed 15 Sec. 410 Volts dc
After Equipment Warm-up Period.....180 Volts dc
Heater Positive with Respect to Cathode.....180 Volts dc

THOMAS ELECTRONICS, INC.

Passaic, N. J.

Gregory 3-1040

Grid No. 1 Circuit resistance.....	1.5 Max. Megohm
External Conductive Coating to Anode	
Capacitance-	None uuf. Max.
	uuf. Min.

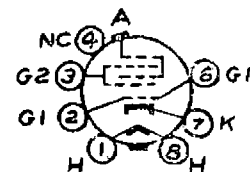
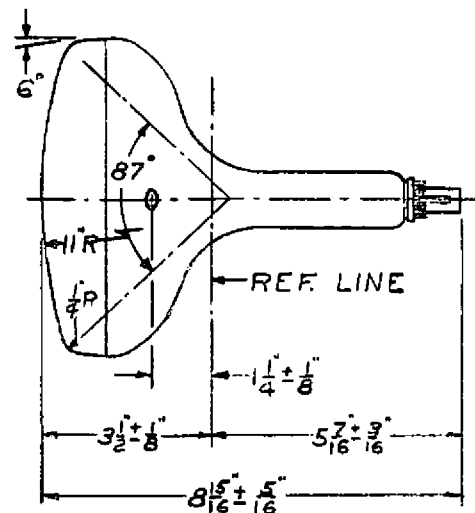
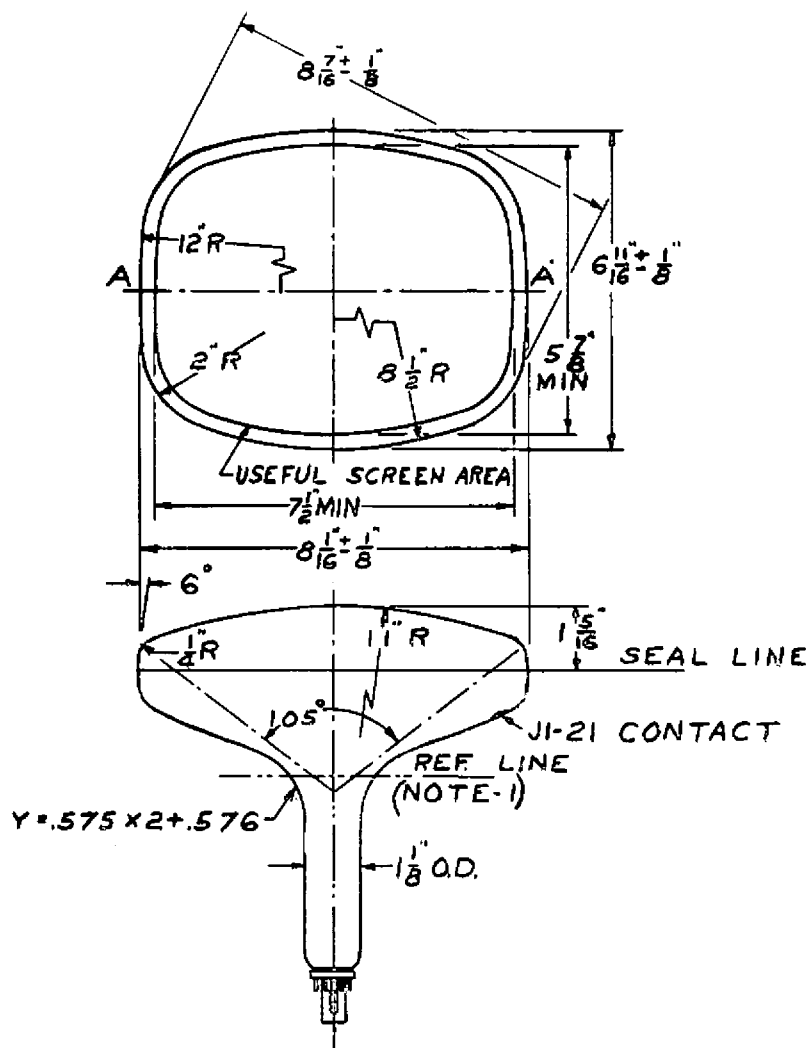


DIAGRAM NOTES:

1. Reference line is determined by the plane C-C' of JEDEC No. 126 reference gauge when the gauge is seated against the bulb.
2. Base Pin No. 4 aligns with horizontal centerline within 30° and is perpendicular to the anode contact (JI-21).
3. Dimensions are in inches.

WARNING:

X-ray radiation shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range if this tube is operated at higher than the manufacturer's Maximum Rated Anode Voltage or 16,000 volts, whichever is less.