

12AJ7 is a 9-pin miniature type triode-heptode designed for use as a frequency converter, IF and RF amplifier of transformer-less AM/FM receivers.

BASE E9-1 Small Button Noval 9-Pin

MOUNTING POSITION—Any

HEATER

Voltage 12.6 (V)

Current 0.15 (A)

DIRECT INTERELECTRODE CAPACITANCES

(Without Shield)

Triode
Unit

Heptode
Unit

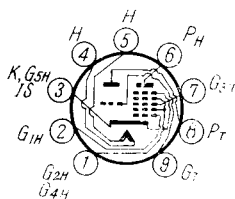
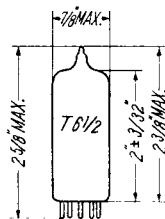
Grid No. 1 to Plate 1.0 0.006_{max.} (pF)

Input 2.6 4.8 (pF)

Output 2.1 7.9 (pF)

Grid No. 3 to All — 6.0 (pF)

Plate to Plate 0.2 (pF)



MAXIMUM RATINGS (Design Center Values)				TYPICAL OPERATION			
	Triode Unit	Heptode Unit			Heptode Unit (Con- verter)	RF/IF Amp.	Triode Unit (Class A ₁ Amp.)
Plate Voltage	250	240	(V)	Plate Voltage	100	100	100 (V)
Grid No. 2 Supply				Grid No. 3 Voltage			
Voltage	—	125	(V)			0	(V)
Plate Dissipation	0.8	1.7	(W)	Grid No. 2 & No. 4			
Grid No. 2 Dissipation	—	1.0	(W)	Voltage	63	60	(V)
Total Cathode Current	6.5	12.5	(mA)	Grid No. 1 Voltage			
Peak Heater—Cathode Voltage					—1.1	—1.1	0 (V)
Heater negative with				Grid No. 3 & Triode			
respect to cathode		100	(V)	Grid Resistor	47	—	(kΩ)
Heater positive with				Plate Current	1.7	3.4	13.5 (mA)
respect to cathode		100	(V)	Grid No. 3+Triode			
Grid No. 1 Circuit				Grid Current	115		(μA)
Resistance	3.0	3.0	(MΩ)	Grid No. 2+No. 4			
				Current	3.7	2.2	(mA)
				Transconductance			
						2,000	3,700 (μS)
				Conversion Trans-			
				conductance	620		(μS)
				Plate Resistance			
				(Approx.)	800	450	(kΩ)
				Amplification Factor			
							22
				Grid No. 1 Voltage (Approx.)			
				$G_m = 20 \mu S$	—	—16.5	(V)
				$G_r = 6.2 \mu S$	—14.5	—	(V)

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HITACHI PICTURE TUBE

12AYP4

110° Deflection Squared Corner Type

The Hitachi 12AYP4 is a directly viewed, squared corner type rectangular 12" glass picture tube having aluminized screen 7-11/16"×9-13/16" with nearly area of 71 square inches.

The 12AYP4 features an envelope having relatively flat, compound radius faceplate that minimizes the obstruction of outer light reflection and make the picture clearer.

Other design features of the 12AYP4 include a very short electron gun that minimizes deflection distortion and requires no ion trap magnet; a neck diameter of 1-1/8"; and "neoeighter" 7-pin base of the integral glass button type having straight through leads fitted with an indexing plug.

ELECTRICAL DATA

Focusing Method	Electrostatic
Deflection Angles (approx.)	
Horizontal	101 Degrees
Vertical	82 Degrees
Diagonal	110 Degrees
Direct Interelectrode Capacitances	
Cathode to All Other Electrodes (approx.)	5 μ f
Grid No. 1 to All Other Electrodes (approx.)	6 μ f
External Conductive Coating to Anode	900 μ f max.
	400 μ f min.
Heater Characteristics	
Heater Voltage	6.3 Volts
Heater Current	0.45 Amperes
Heater Warm up Time	11 Seconds

OPTICAL DATA

Phosphor Number	P4-Sulfide Type, Aluminized
Light Transmittance at Center (approx.)	78 Percent

MECHANICAL DATA

Overall Length	9-5/16±1/4 Inches
Minimum Useful Screen Dimensions (projected)	
Diagonal	11-5/16 Inches
Horizontal Axis	9-13/16 Inches
Vertical Axis	7-11/16 Inches
Area	71 Sq. Inches
Neck Length	4-1/8±1/8 Inches
Bulb Contact	JEDEC No. J1-21
Base	JEDEC No. B7-208
Basing	.8HR
Bulb Contact Alignment with Pin Position No. 7	30 Degrees
Weight (approx.)	5.3 Pounds

MAXIMUM RATINGS (Design Maximum Values)

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

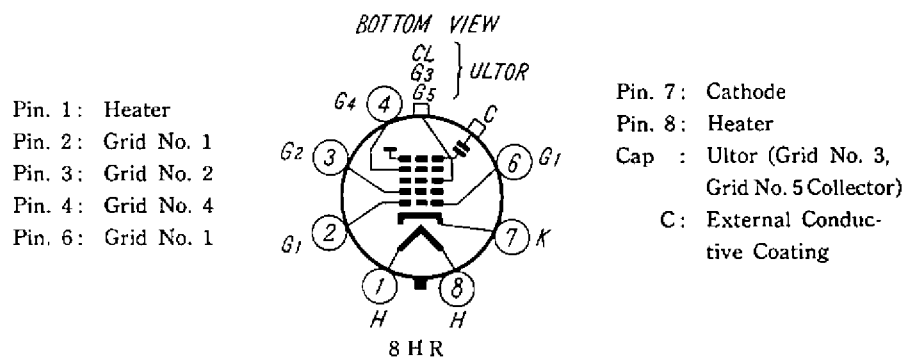
Maximum Anode Voltage	14,000 Volts
Minimum Anode Voltage	9,000 Volts
Maximum Grid No. 4 (Focusing Electrode) Voltage	+1,100 Volts
.....	−550 Volts
Maximum Grid No. 2 Voltage	550 Volts
Minimum Grid No. 2 Voltage.....	200 Volts
Grid No. 1 Voltage	
Maximum Negative Value	154 Volts
Maximum Negative Peak Value	200 Volts
Maximum Positive Value.....	0 Volts
Maximum Positive Peak Value	2 Volts
Maximum Heater-Cathode Voltage	
Heater Negative with Respect to Cathode during	
Warm-up Period not to Exceed 15 Seconds	450 Volts
After Equipment Warm-up Period	200 Volts
Heater Positive with Respect to Cathode	200 Volts

TYPICAL OPERATING CONDITION

Grid Drive Service

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

SOCKET CONNECTIONS



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 JEDEC 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 lintless cloth.

NOTE 6: Measured at the mold match line.



Head Office: 4, 1-chome, Marunouchi, Chiyoda-ku, Tokyo
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Cable Address: "HITACHY" TOKYO
Codes: All Codes Used

HITACHI PICTURE TUBE

12AZP4

110° Deflection Squared Corner Type

The Hitachi 12AZP4 is a directly viewed, squared corner type rectangular 12" glass picture tube having aluminized screen 7-11/16"×9-13/16" with nearly area of 71 square inches.

The 12AZP4 features an envelope having relatively flat, compound radius faceplate that minimizes the obstruction of outer light reflection and make the picture clearer.

Other design features of the 12AZP4 include a very short electron gun that minimizes deflection distortion and requires no ion trap magnet; a neck diameter of 1-1/8"; and "neoeigher" 7-pin base of the integral glass button type having straight through leads fitted with an indexing plug.

ELECTRICAL DATA

Focusing Method	Electrostatic
Deflection Angles (approx.)	
Horizontal.....	101 Degrees
Vertical	82 Degrees
Diagonal	110 Degrees
Direct Interelectrode Capacitances	
Cathode to All Other Electrodes (approx.)	5 μ f
Grid No. 1 to All Other Electrodes (approx.)	6 μ f
External Conductive Coating to Anode.....	900 μ f max.
	400 μ f min.
Heater Characteristics	
Heater Voltage	6.3 Volts
Heater Current	0.6 Amperes
Heater Warm up Time	11 Seconds

OPTICAL DATA

Phosphor Number.....	P4-Sulfide Type, Aluminized
Light Transmittance at Center (approx.)	78 Percent

MECHANICAL DATA

Overall Length	9-5/16±1/4 Inches
Minimum Useful Screen Dimensions (projected)	
Diagonal	11-5/16 Inches
Horizontal Axis	9-13/16 Inches
Vertical Axis	7-11/16 Inches
Area	71 Sq. Inches
Neck Length	4-1/8±1/8 Inches
Bulb Contact	JEDEC No. J1-21
Base	JEDEC No. B7-208
Basing	.8HR
Bulb Contact Alignment with Pin Position No. 7	30 Degrees
Weight (approx.)	5.3 Pounds

MAXIMUM RATINGS (Design Maximum Values)

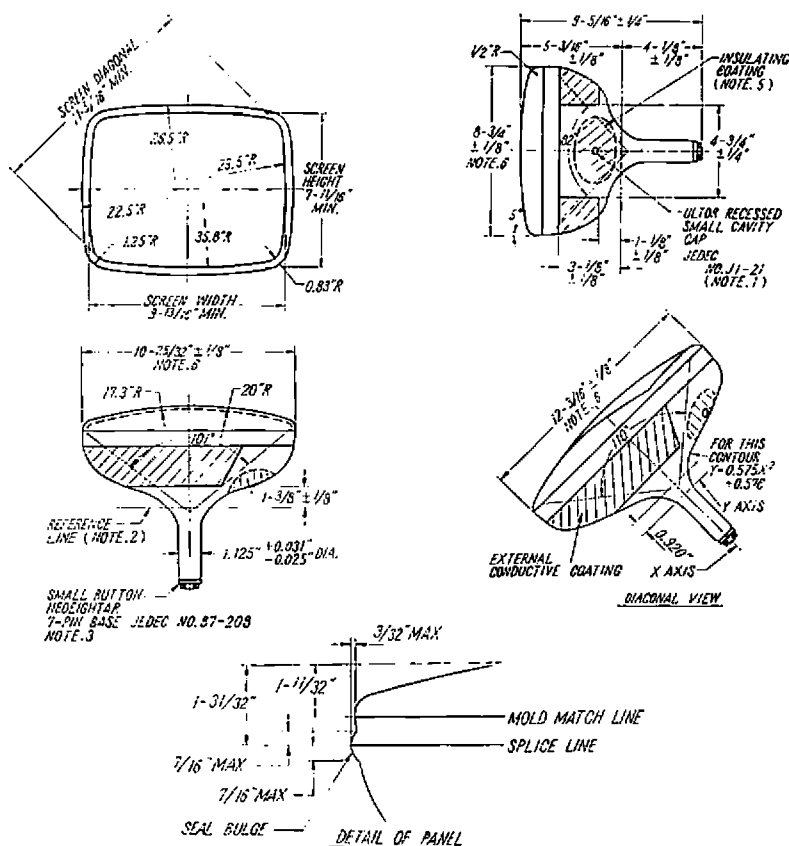
Unless otherwise specified, voltage values are positive and measured with respect to cathode.

Maximum Anode Voltage	14,000 Volts
Minimum Anode Voltage	9,000 Volts
Maximum Grid No. 4 (Focusing Electrode) Voltage	+1,100 Volts
.....	-550 Volts
Maximum Grid No. 2 Voltage	550 Volts
Minimum Grid No. 2 Voltage.....	200 Volts
Grid No. 1 Voltage	
Maximum Negative Value	154 Volts
Maximum Negative Peak Value	200 Volts
Maximum Positive Value.....	0 Volts
Maximum Positive Peak Value	2 Volts
Maximum Heater-Cathode Voltage	
Heater Negative with Respect to Cathode during	
Warm-up Period not to Exceed 15 Seconds	450 Volts
After Equipment Warm-up Period	200 Volts
Heater Positive with Respect to Cathode	200 Volts

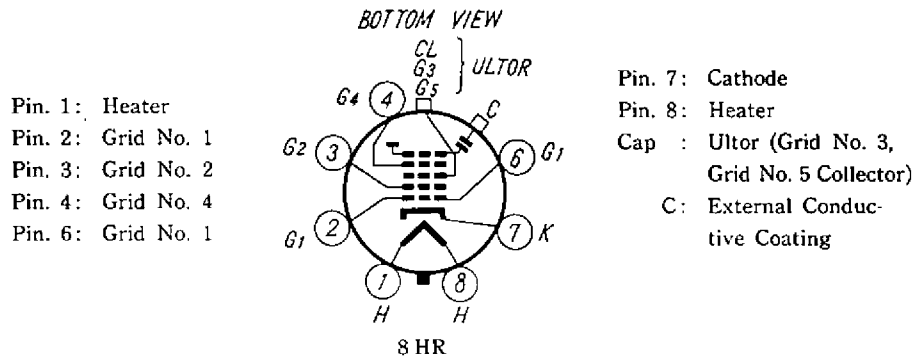
TYPICAL OPERATING CONDITION

Grid Drive Service

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



SOCKET CONNECTIONS



- 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 JEDEC 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 lintless cloth.
- NOTE 6 :** Measured at the mold match line.



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HITACHI PICTURE TUBE

12BAP4

110° Deflection

Squared Corner Type

The Hitachi 12BAP4 is a directly viewed, squared corner type rectangular 12" glass picture tube having aluminized screen 7-11/16"×9-13/16" with nearly area of 71 square inches.

The 12BAP4 features an envelope having relatively flat, compound radius faceplate that minimizes the obstruction of outer light reflection and make the picture clearer.

Other design features of the 12BAP4 include a very short electron gun that minimizes deflection distortion and requires no ion trap magnet; a neck diameter of 1-1/8"; and "neoeighter" 7-pin base of the integral glass button type having straight through leads fitted with an indexing plug.

ELECTRICAL DATA

Focusing Method	Electrostatic
Deflection Angles (approx.)	
Horizontal	101 Degrees
Vertical	82 Degrees
Diagonal	110 Degrees
Direct Interelectrode Capacitances	
Cathode to All Other Electrodes (approx.)	5 μ f
Grid No. 1 to All Other Electrodes (approx.)	6 μ f
External Conductive Coating to Anode	900 μ f max.
	400 μ f min.
Heater Characteristics	
Heater Voltage	6.3 Volts
Heater Current	0.3 Amperes
Heater Warm up Time	11 Seconds

OPTICAL DATA

Phosphor Number.....	P4-Sulfide Type, Aluminized
Light Transmittance at Center (approx.)	78 Percent

MECHANICAL DATA

Overall Length	9-5/16±1/4 Inches
Minimum Useful Screen Dimensions (projected)	
Diagonal.....	11-5/16 Inches
Horizontal Axis	9-13/16 Inches
Vertical Axis	7-11/16 Inches
Area	71 Sq. Inches
Neck Length	4-1/8±1/8 Inches
Bulb Contact	JEDEC No. J1-21
Base	JEDEC No. B7-208
Basing	8HR
Bulb Contact Alignment with Pin Position No. 7	30 Degrees
Weight (approx.).....	5.3 Pounds

MAXIMUM RATINGS (Design Maximum Values)

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

Maximum Anode Voltage	14,000 Volts
Minimum Anode Voltage	9,000 Volts
Maximum Grid No. 4 (Focusing Electrode) Voltage	+1,100 Volts
.....	-550 Volts
Maximum Grid No. 2 Voltage	550 Volts
Minimum Grid No. 2 Voltage.....	200 Volts
Grid No. 1 Voltage	
Maximum Negative Value	154 Volts
Maximum Negative Peak Value	200 Volts
Maximum Positive Value.....	0 Volts
Maximum Positive Peak Value	2 Volts
Maximum Heater-Cathode Voltage	
Heater Negative with Respect to Cathode during	
Warm-up Period not to Exceed 15 Seconds	450 Volts
After Equipment Warm-up Period	200 Volts
Heater Positive with Respect to Cathode	200 Volts

TYPICAL OPERATING CONDITION

Grid Drive Service

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

Anode Voltage.....	10,000 Volts
Grid No. 4 Voltage (Focusing Electrode) (Notes 2 & 3).....	0 to 400 Volts
Grid No. 2 Voltage.....	400 Volts
Grid No. 1 Voltage (Note 1).....	-36 to -94 Volts

Cathode Drive Service

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

Anode Voltage.....	10,000 Volts
Grid No. 4 Voltage (Focusing Electrode) (Note 2 & 3).....	0 to 400 Volts
Grid No. 2 Voltage.....	400 Volts
Cathode Voltage (Note 1).....	36 to 78 Volts

Maximum Circuit Value

Maximum Grid No. 1 Circuit Resistance.....	1.5 Megohms
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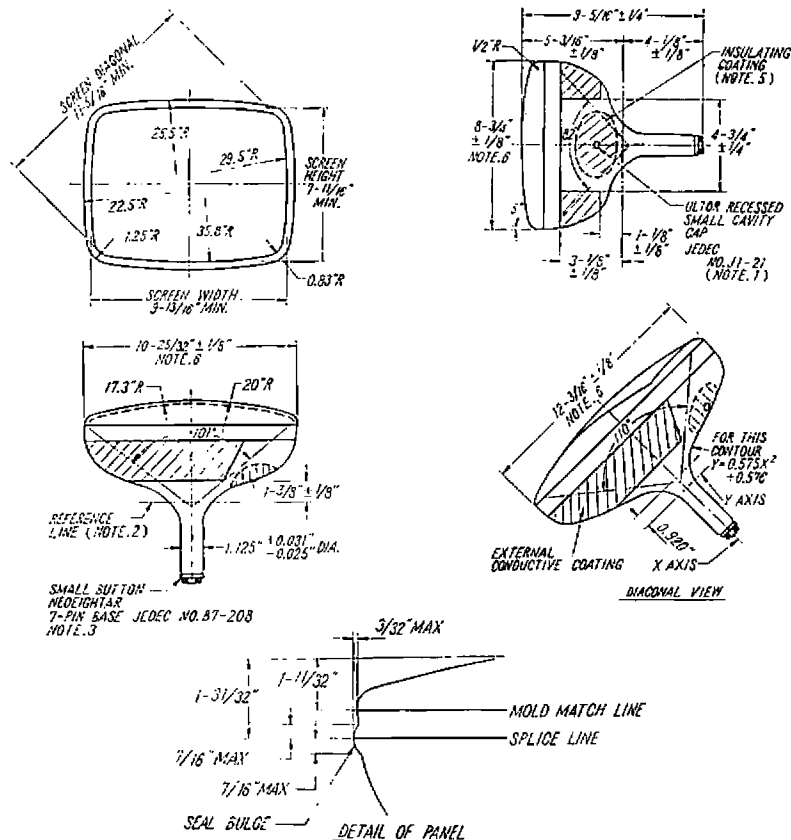
Note 1. Visual extinction of focused raster.

Note 2. With the combined grid No. 1 bias voltage and video-signal voltage adjusted to give an anode current of 100 microamperes on a 7-11/16" × 9-13/16" pattern from RCA 2F21 Monoscope or equivalent.

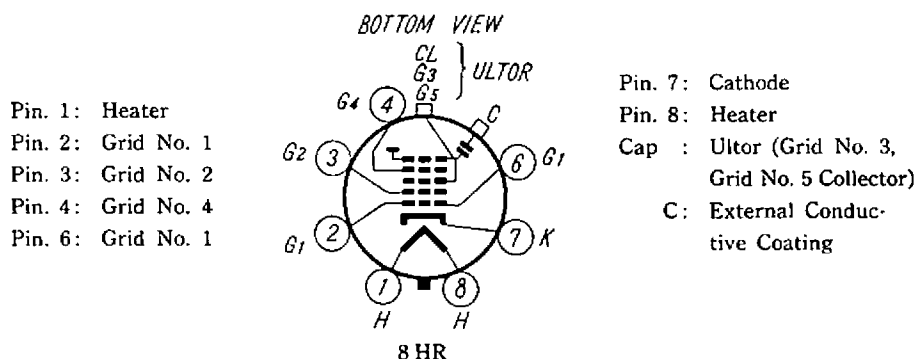
Note 3. Individual tubes will have satisfactory focus at some value between 0 and +400 Volts.

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.



SOCKET CONNECTIONS



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 JEDEC 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 lintless cloth.

NOTE 6: Measured at the mold match line.



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12G-B3 is a high-perviance, beam pentode designed for use as a horizontal deflection output amplifier in transformer-less television receivers.

BASE B5-187 Octal

TOP CAP C1-2 Skirted Miniature

MOUNTING POSITION—Any

HEATER

Voltage 12.6 (V)

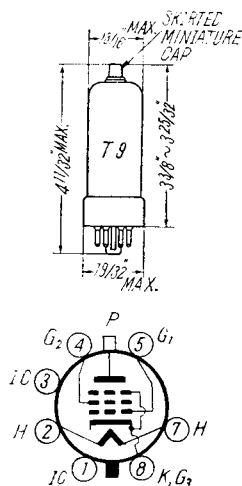
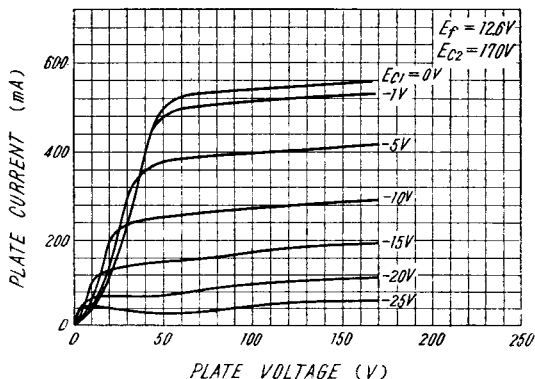
Current 0.6 (A)

Warm-up Time 11 (sec)

MAXIMUM RATINGS (Design Center Values)§		TYPICAL OPERATION	
D.C. Plate Voltage	550 (V)	Plate Voltage	40 100 (V)
Peak Pulse Plate Voltage	$\begin{cases} +6,600 \diamond \\ -1,500 \end{cases}$ (V)	Grid No. 2 Voltage	100 100 (V)
Grid No. 2 Voltage	200 (V)	Grid No. 1 Voltage	0 -7.7 (V)
Peak Negative Grid No. 1 Voltage	-1,000 (V)	Plate Current	240 100 (mA)
Plate Dissipation	10 (W)	Grid No. 2 Current	19 7 (mA)
Grid No. 2 Dissipation	5 (W)	Transconductance	— 14,000 ($\mu\Omega$)
Total Cathode Current	150 (mA)	Plate Resistance	(Approx.) — 5.3 (k Ω)
Peak Heater—Cathode Voltage			
Heater negative with respect to cathode	200 (V)		
Heater positive with respect to cathode	200 Δ (V)		
Grid No. 1 Circuit Resistance	2.2 (M Ω)		

§ For operation in a 525-line, 30-frame system.
 ◇ The duration of the voltage pulse must not exceed 15 per cent of one horizontal scanning cycle.
 Under on circumstances should this absolute value be exceeded.
 △ The D.C. component must not exceed 100 volts.

AVERAGE PLATE CHARACTERISTICS



12G-B7 is a beam power pentode designed for use as a horizontal deflection amplifier in television receivers utilizing 110°-deflection system picture tube.

BASE B8-118, B7-119, B6-122, B5-190

TOP CAP C1-2 Skirted Miniature

MOUNTING POSITION—Any

HEATER

Voltage 12.6 (V)

Current 0.6 (A)

Warm-up Time 11 (sec)

DIRECT INTERELECTRODE

CAPACITANCES (Without Shield)

Grid No. 1 to Plate 0.55 (pF)

Input 17.5 (pF)

Output 7 (pF)

MAXIMUM RATINGS (Design Center Values)§	TYPICAL OPERATION	
D.C. Plate Voltage	700 (V)	40 100 (V)
Peak Pulse Plate Voltage	$\begin{cases} +7,700 \diamond \\ -1,850 \end{cases}$ (V)	100 100 (V)
Grid No. 2 Voltage	250 (V)	0 -7.7 (V)
Peak Negative Grid No. 1 Voltage	-1,000 (V)	240 100 (mA)
Plate Dissipation	15 (W)	19 7 (mA)
Grid No. 2 Dissipation	5 (W)	Transconductance
Total Cathode Current	200 (mA)	— 14,000 (μ S)
Peak Heater—Cathode Voltage		Plate Resistance
Heater negative with respect to cathode	225 (V)	(Approx.)
Heater positive with respect to cathode	225 Δ (V)	— 5.3 (k Ω)
Grid No. 1 Circuit Resistance For Grid Resistor Bias	1.0 (M Ω)	

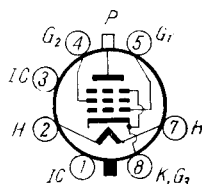
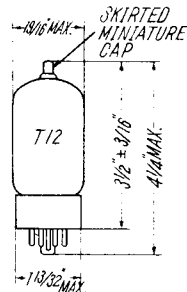
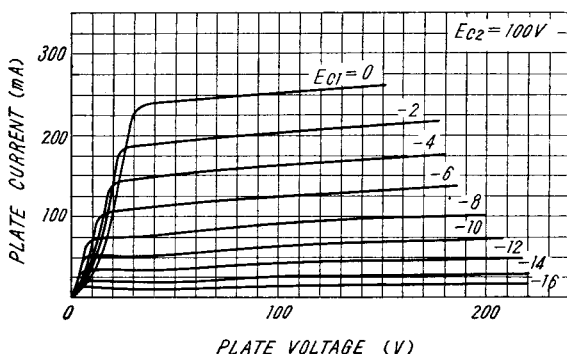
§ For operation in a 525-line, 30-frame system.

◇ The duration of the voltage pulse must not exceed 15 per cent of one horizontal scanning cycle.

Under no circumstances should this absolute value be exceeded.

△ The D.C. component must not exceed 100 volts.

AVERAGE PLATE CHARACTERISTICS



12G-K17 is a high-perviance, half-wave rectifier tube designed for use as a damper in transformer-less television receivers.

BASE B5-85 Octal

MOUNTING POSITION—Any

HEATER

Voltage 12.6 (V)

Current 0.6 (A)

Warm-up Time 11 (sec)

MAXIMUM RATINGS (Design Center Values)§

Peak Inverse Plate Voltage 4,500◇ (V)

Peak Plate Current 1,050 (mA)

D.C. Plate Current 175 (mA)

Peak Heater—Cathode Voltage

Heater negative with respect to
cathode 4,500△ (V)

Heater positive with respect to cathode 300☆ (V)

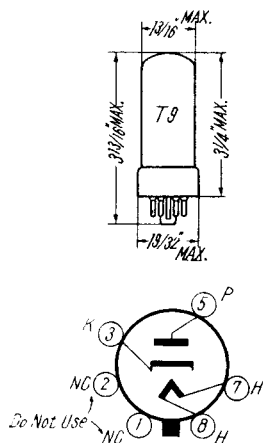
§ For operation in a 525-line, 30-frame television system.

◇ The duration of the voltage pulse must not exceed 15 per cent of one horizontal scanning cycle.
Under no circumstances should this absolute value be exceeded.

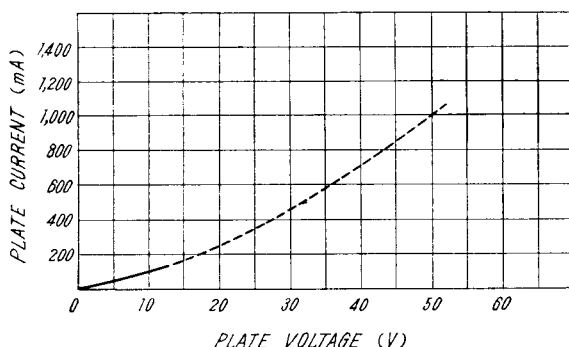
△ The D.C. component must not exceed 900 volts.

☆ The D.C. component must not exceed 100 volts.

Notice: Socket terminals 1, 2, 4 and 6 should not be used as tie points.



AVERAGE PLATE CHARACTERISTICS



HITACHI

COLOR PICTURE TUBE

14BCP22

The Hitachi 14BCP22 is a directly viewed, 14"-rectangular glass picture tube for use in color television receivers. It is capable of producing either a full-color or a black-and-white picture measuring 9-1/8" x 11-27/32" rectangular area.

The 14BCP22 utilizes three gun shadow mask system and offers two major features-simplified color-field set up, and very bright screen with a new sulfide group of color phosphors. This outstanding new phosphor group is more efficient, producing color pictures up to 300% brighter than that of 17" and 21" color tubes; has medium short persistence to provide sharper pictures on rapid-action scenes; and produces white light with nearly equal current from each of the three electron guns.

The 14BCP22 also utilizes the graded-hole shadow mask which has holes that increase gradually in diameter from the outer edge of the mask inward to the center. As a result of this gradation, the mask permits increased light output from the screen.

ELECTRICAL DATA

Electron Guns, Three with Axes Tilted Toward Tube Axis		
	Blue, Green, Red	
Focusing Method.....	Electrostatic	
Convergence Method	Magnetic	
Deflection Method	Magnetic	
Deflection Angles, (approx.)		
Horizontal	65	Degrees
Vertical	50	Degrees
Diagonal	70	Degrees
Direct Interelectrode Capacitances		
Cathode of Blue Gun+Cathode of Green Gun		
÷ Cathode of Red Gun to all other Electrodes	16	μf
Grid No. 1 of any Gun to all other Electrodes.....	7	μf
External Conductive Coating to Ultor	Min. 500	μf
	Max. 1,500	μf
Heater Characteristics		
Heater Voltage	6.3	Volts
Heater Current	1.8	Amperes
Heater Warm up Time	11	Seconds

OPTICAL DATA

Phosphor Number P22-A11-Sulfide Type, Aluminized
Fluorescence and phosphorescence of separate phosphors, respectively Blue,
Green, Red.
Dot Arrangement.... Triangular group of Blue Dot, Green Dot, and Red Dot.

MECHANICAL DATA

Overall Length	19-9/32 ±3/8	Inches
Greatest Dimension of Tube		
Diagonal	14 ±1/8	Inches
Width	13-1/16 ±1/8	Inches
Height	10-9/16 ±1/8	Inches
Minimum Useful Screen Dimensions		
Diagonal	12-19/32	Inches
Horizontal	11-27/32	Inches
Vertical	9-1/8	Inches
Area	100 Sq.	Inches
Neck Length	9-9/16 ±1/4	Inches
Bulb Contact	J1-21	
Base	B12-131	
Basing	14AU	

MAXIMUM RATINGS (Design Maximum System)

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

Maximum Anode Voltage	22,000	Volts
Minimum Anode Voltage	12,000	Volts
Maximum Grid No. 3 Voltage	5,300	Volts
Maximum Grid No. 2 Voltage	650	Volts
Grid No. 1 Voltage		
Maximum Negative Value	400	Volts DC
Maximum Positive Value	0	Volts DC
Maximum Positive Peak Value	2	Volts
Maximum Heater Voltage	6.9	Volts
Minimum Heater Voltage	5.7	Volts
Maximum Heater-Cathode Voltage		
Heater Negative with Respect to Cathode		
During warm-up period not to exceed		
15 seconds	450	Volts
After equipments warm-up period	200	Volts
Heater Positive with Respect to Cathode	200	Volts

EQUIPMENT DESIGN RANGES

Percentage of Total Ultor Current Supplied by Each Gun (average) to Produce White of 9,300°K+27 M.P.C.D. (CIE Coordinates $x=0.281$, $y=0.311$)

Red Gun	42	Percent
Blue Gun	28	Percent
Green Gun	30	Percent
Ratio of Cathode Current to produce White of 9,300°K+27 M.P.C.D.		
	Min.	Av. Max.
Red to Green	0.85	1.4 1.95
Red to Blue	0.8	1.5 2.2

TYPICAL OPERATING CONDITIONS

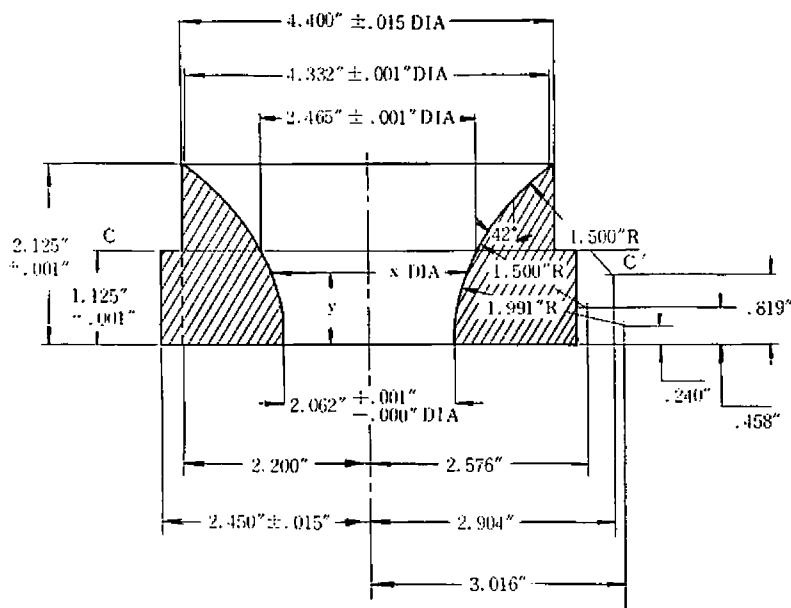
Anode Voltage	16,000	Volts
Grid No. 3 Voltage (Focusing Electrode)	2,400 to 3,400	Volts
Grid No. 2 Voltage	200	Volts
Grid No. 1 Voltage (Note 1)	-45 to -100	Volts

Note 1. Visual extinction of focused raster.

MAXIMUM CIRCUIT VALUES

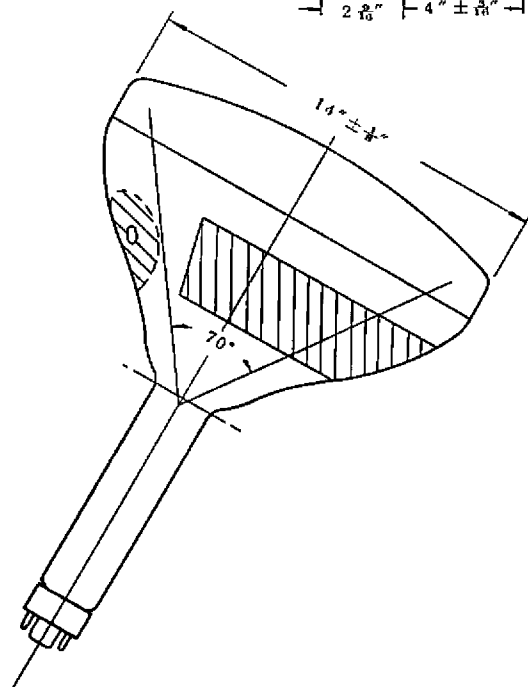
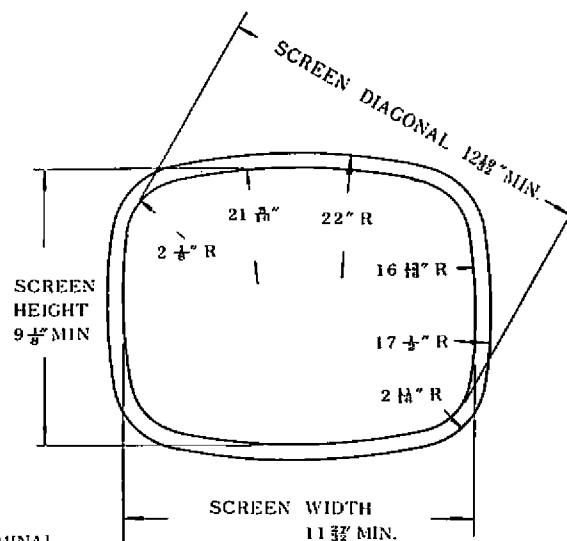
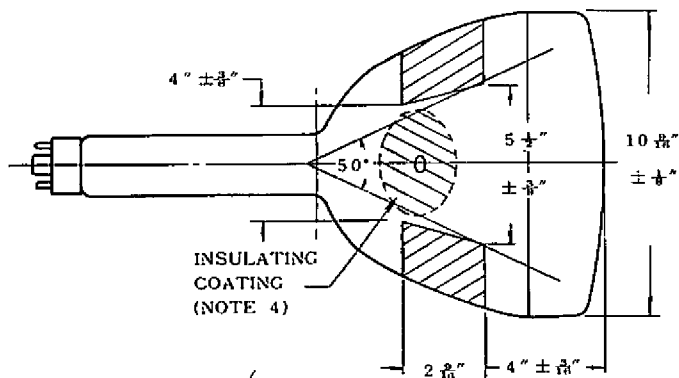
Maximum Grid No. 3 Circuit Resistance	7.5	Megohms
Maximum Grid No. 1 Circuit Resistance	0.75	Megohms

REFERENCE-LINE AND NECK-FUNNEL-CONTOUR GAUGE

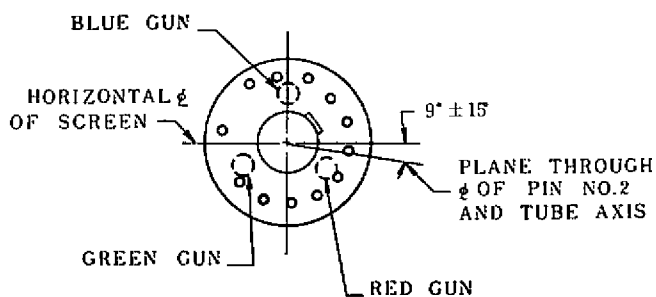
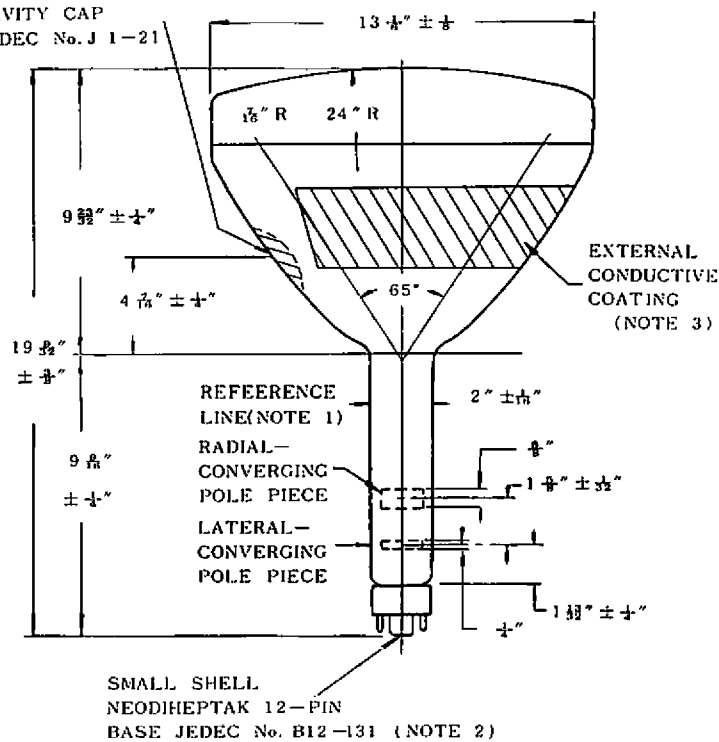


Reference Line is Determined
by Plane C-C' When Gauge is
Seated Against Funnel.

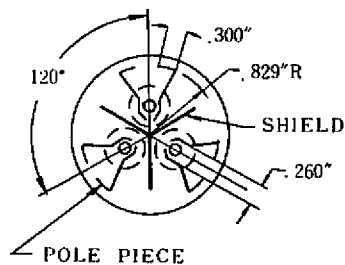
y	x	y	x
0.000"	2.062" ± 0.001 " -0.000"	1.000"	2.352" ± 0.001 "
0.125"	2.062" ± 0.001 " -0.000"	1.125"	2.465" ± 0.001 "
0.250"	2.062" ± 0.001 " -0.000"	1.250"	2.604" ± 0.001 "
0.375"	2.062" ± 0.001 " -0.000"	1.375"	2.778" ± 0.001 "
0.385"	2.062" ± 0.001 " -0.000"	1.500"	2.990" ± 0.001 "
0.500"	2.084" ± 0.001 "	1.625"	3.216" ± 0.001 "
0.625"	2.122" ± 0.001 "	1.750"	3.400" ± 0.001 "
0.750"	2.182" ± 0.001 "	1.875"	3.678" ± 0.001 "
0.875"	2.258" ± 0.001 "	2.000"	3.958" ± 0.001 "
		2.125"	4.332" ± 0.001 "



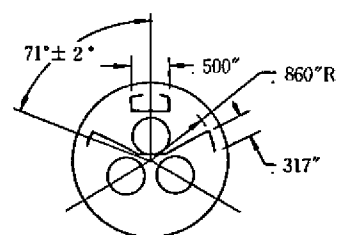
ULTOR TERMINAL
RECESSED SMALL
CAVITY CAP
JEDEC No. J 1-21



Base Bottom View



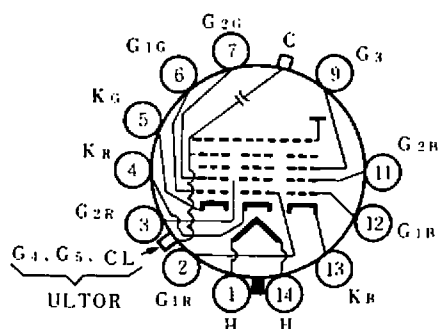
Radial Converging Pole Pieces



Lateral Converging Pole Pieces

BASING DIAGRAM

Bottom View



Pin 1: Heater	Pin 9: Grid No. 3
Pin 2: Grid No. 1 of Red Gun	Pin 11: Grid No. 2 of Blue Gun
Pin 3: Grid No. 2 of Red Gun	Pin 12: Grid No. 1 of Blue Gun
Pin 4: Cathode of Red Gun	Pin 13: Cathode of Blue Gun
Pin 5: Cathode of Green Gun	Pin 14: Heater
Pin 6: Grid No. 1 of Green Gun	Cap : Ultor (Grid No. 4, Grid No. 5, Collector)
Pin 7: Grid No. 2 of Green Gun	C : External Conductive Coating

NOTE 1 : With tube neck inserted through flared end of reference-line and neck-funnel contour gauge (shown on preceding page) 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 2 : 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 3".

NOTE 3 : The drawing shows the minimum size and location of the contact band of the external conductive coating. The actual area of this coating will be greater than that of the contact band so as to provide the required capacitance. External conductive coating must be grounded.

NOTE 4 : To clean this area, wipe only with soft dry lintless cloth.



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Cable Address: "HITACHY" TOKYO

Codes: All Codes Used

HITACHI PICTURE TUBE

16AUP4

114° deflection
Squared corner type

The Hitachi 16AUP4 is a directly viewed, squared corner type rectangular 16" glass picture tube having aluminized screen $12\frac{3}{4}" \times 10\frac{1}{8}"$ with nearly straight sides and slightly rounded corners, and a minimum projected screen area of 119 square inches. Maximum overall length is $10\frac{1}{8}"$.

The 16AUP4 features an envelope having relatively flat, compound radius faceplate and special internal contouring in the deflecting yoke region to obtain 114° deflection with 110° deflecting components. These features minimize the obstruction of outer light reflection and make the picture clearer.

Other design features of the 16AUP4 include a very short electron gun that minimizes deflection distortion and requires no ion-trap magnet; a neck diameter of $1\frac{1}{8}"$; and a "neoeighter" 7-pin base of the integral glass-button type having straight through leads fitted with an indexing plug.

The 16AUP4 is also very suitable for portable televisions.

ELECTRICAL DATA

Focusing Method	Electrostatic
Deflection Angles (approx.)	
Horizontal	102 Degrees
Vertical	85 Degrees
Diagonal	114 Degrees
Direct Interelectrode Capacitances	
Cathode to All Other Electrodes (approx.)	5 μf
Grid No. 1 to All Other Electrodes (approx.)	6 μf
External Conductive Coating to Anode	1,500 max. μf
.....	800 min. μf
Heater Characteristics	
Heater Voltage	6.3 Volts
Heater Current	0.6 Amperes
Heater Warm up Time	11 Seconds

OPTICAL DATA

Phosphor Number	P4-Sulfide Type, Aluminized
Light Transmittance at Center (approx.)	78 Percent

MECHANICAL DATA

Overall Length	$10\frac{1}{16} + \frac{3}{8}$	Inches
	$-\frac{1}{4}$	Inches
Greatest Dimensions of Tube		
Diagonal	$15\frac{5}{8} \pm \frac{1}{8}$	Inches
Width	$13\frac{49}{64} \pm \frac{1}{8}$	Inches
Height	$11\frac{3}{32} \pm \frac{1}{8}$	Inches
Minimum Useful Screen Dimensions (Projected)		
Diagonal	$14\frac{11}{16}$	Inches
Horizontal axis	$12\frac{3}{4}$	Inches
Vertical axis	$10\frac{1}{16}$	Inches
Area	119 Sq.	Inches
Neck Length	$4 + \frac{1}{4}$	Inches
	$-\frac{1}{8}$	Inches
Bulb Contact	J1-21	
Base	B7-208	
Basing	8 HR	

MAXIMUM RATINGS (Design Maximum System)

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

Maximum Anode Voltage	15,400	Volts
Minimum Anode Voltage	9,000	Volts
Maximum Grid No. 4 (Focusing Electrode) Voltage	$+1,100$	Volts
	-550	Volts
Maximum Grid No. 2 Voltage	550	Volts
Minimum Grid No. 2 Voltage	200	Volts
Grid No. 1 Voltage		
Maximum Negative Value	154	Volts DC
Maximum Negative Peak Value	220	Volts
Maximum Positive Value	0	Volts DC
Maximum Positive Peak Value	2	Volts
Maximum Heater Voltage	6.9	Volts
Minimum Heater Voltage	5.7	Volts
Maximum Heater Cathode Voltage		
Heater Negative with Respect to Cathode		
During warm-up period not to exceed 15 seconds	450	Volts
After equipment warm-up period	200	Volts
Heater Positive with Respect to Cathode	200	Volts

TYPICAL OPERATING CONDITIONS

Grid Drive Service

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

Anode Voltage	12,000	Volts DC
Grid No. 4 Voltage (Note 2 & 3)	0 to +400	Volts DC
Grid No. 2 Voltage	400	Volts DC
Grid No. 1 Voltage	-36 to -94	Volts DC

Cathode Drive Service

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

Anode Voltage	12,000	Volts DC
Grid No. 4 Voltage (Note 2 & 3)	0 to +400	Volts DC
Grid No. 2 Voltage	400	Volts DC
Cathode Voltage (Note 1)	36 to 78	Volts DC

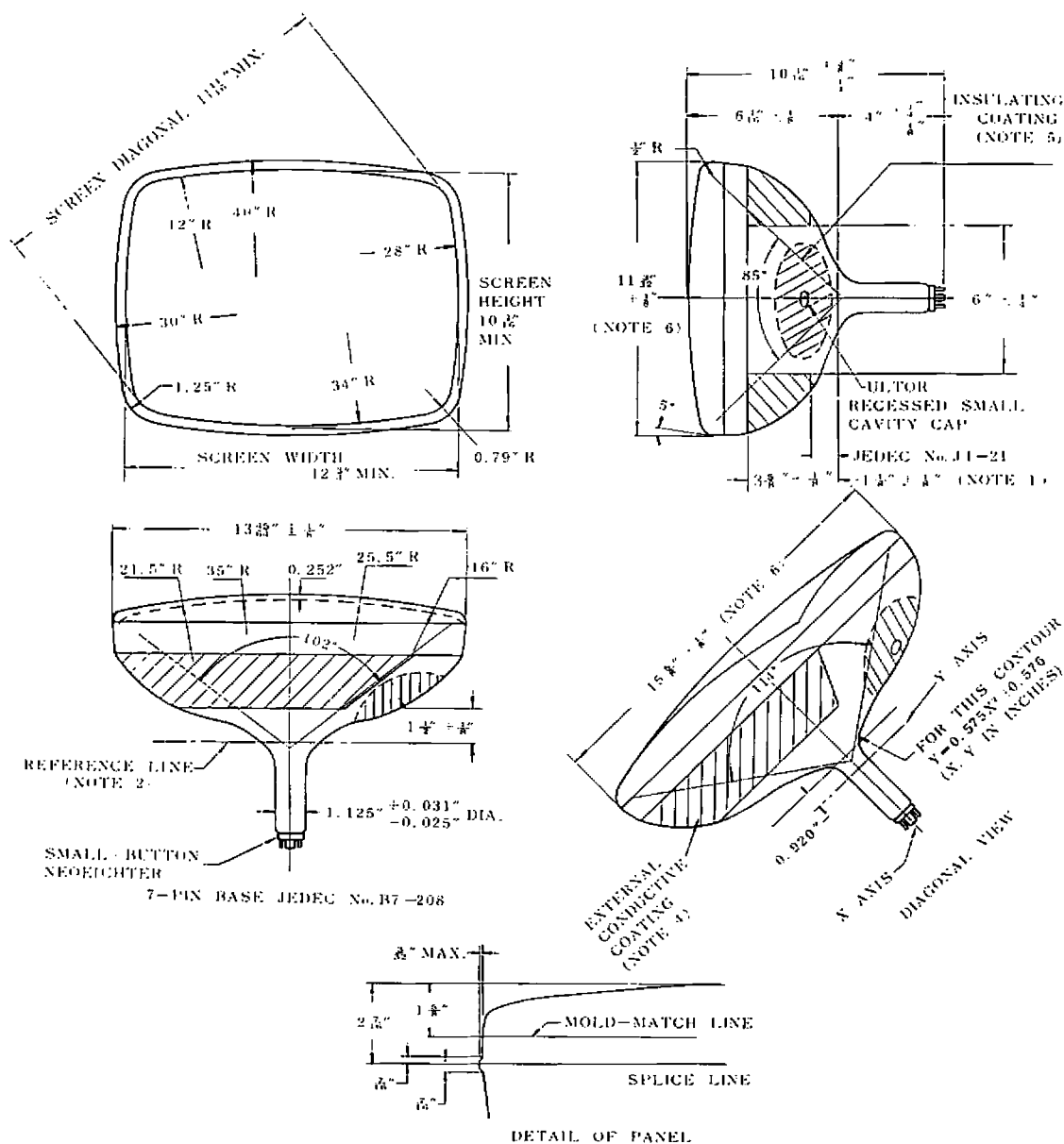
- Notes**
1. Visual extinction of focused raster.
 2. With the combined grid No. 1 bias voltage and video-signal voltage adjusted to give an anode current of 100 microamperes on a $10\frac{1}{16}'' \times 12\frac{3}{4}''$ pattern from RCA 2F21 Monoscope or equivalent.
 3. Individual tubes will have satisfactory focus at some value between 0 and 400 Volts.

GRAPHS AND DRAWINGS

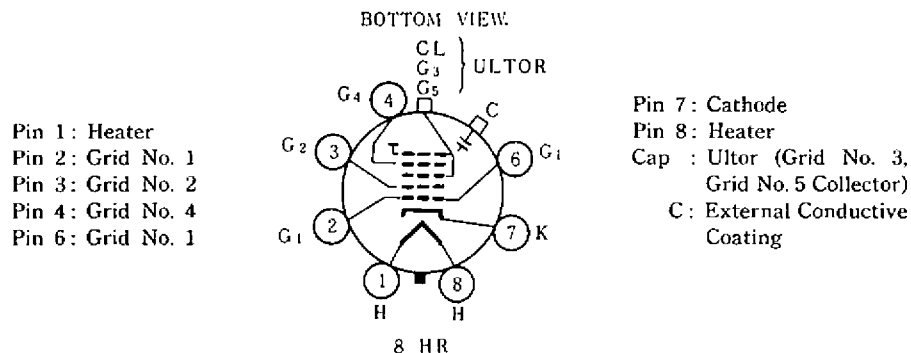
Tube Outline with essential dimensions and tolerances

Pin Connections

Pin 1 Heater	Pin 6 Grid No. 1
Pin 2 Grid No. 1	Pin 7 Cathode
Pin 3 Grid No. 2	Pin 8 Heater
Pin 4 Grid No. 4	
Bulb Contact Ultor (Grid No. 3, No. 5, Collector)	



SOCKET CONNECTIONS



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 $\pm 80\%$. Ultor terminal is on same side as pin No. 4.

NOTE 2 : With tube neck inserted through flared end of reference-line gauge JEDEC No. 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 $1\frac{3}{4}$ ".

NOTE 4 : External conductive coating must be grounded.

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

NOTE 6 : Measured at the mold match line.



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17R-HH2 is a high- μ twin triode designed for use as a RF amplifier, frequency converter and oscillator of the VHF band. This tube is used in tuners of transformer-less FM/AM receivers. As the mutual conductance is very high and operates well at low plate voltage, this tube is most suitable for transformer-less radio receivers.

BASE E9-1 Small Button Noval 9-Pin

MOUNTING POSITION—Any

HEATER

Voltage 17.0 (V)

Current 0.15 (A)

DIRECT INTERELECTRODE

CAPACITANCES (With Shield)

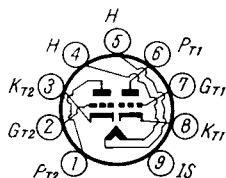
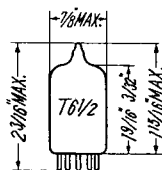
Grid No. 1 to Plate 1.2 1.2 (pF)

Input { Grounded Cathode 3.3 — (pF)
Grounded Grid — 5.6 (pF)

Output { Grounded Cathode.....1.3 — (pF)
Grounded Grid..... — 2.4 (pF)

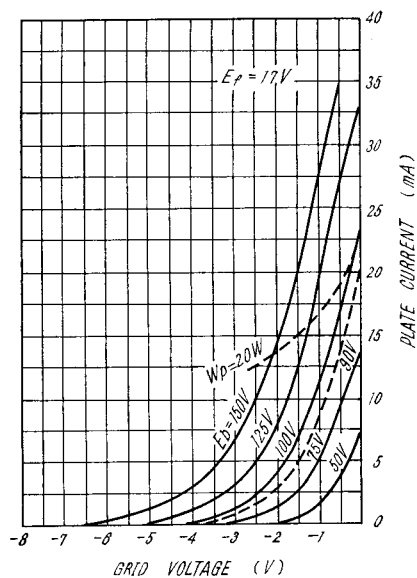
Heater to Cathode 2.5 2.5 (pF)

Plate to Plate 0.01 max. (pF)

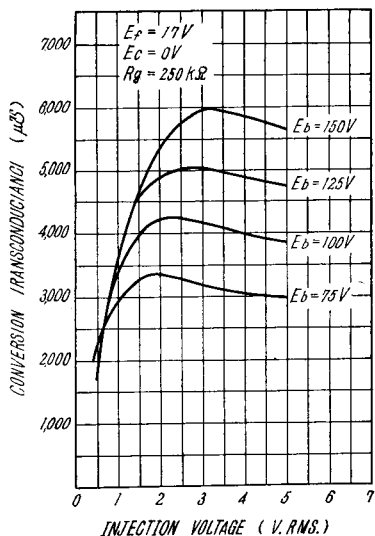


MAXIMUM RATINGS (Design Center Values)		TYPICAL OPERATION	
Plate Voltage	150 (V)	Plate Voltage	90 (V)
Plate Dissipation	2.0 (W)	Grid No. 1 Voltage	—1 (V)
Total Cathode Current	20 (mA)	Plate Current	8.5 (mA)
Peak Heater—Cathode Voltage		Transconductance	8,000 (μ S)
Heater negative with		Amplification Factor	36
respect to cathode	200 (V)	Grid No. 1 Voltage (Approx.)	
Heater positive with		$I_b = 10 \mu A$	—5.5 (V)
respect to cathode	200 Δ (V)		
Grid No. 1 Circuit Resistance	500 (k Ω)		
Δ The D.C. component must not exceed 100 volts.			

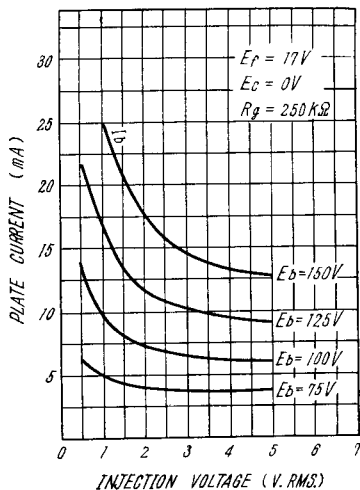
OPERATION CHARACTERISTICS



OPERATION CHARACTERISTICS



AVERAGE CHARACTERISTICS



19A3 is a half-wave rectifier tube for use in transformer-less radio receivers. As the heater voltage is 19 V, this tube is most suitable for use in FM/AM radio receivers, etc.

BASE E7-1 Miniature Button 7-Pin

MOUNTING POSITION—Any

HEATER

Voltage { Pins 3 and 4.. 19* 17.3** (V)
 { Pins 4 and 6.. 3.0 2.2 (V)
 Current 0.15 0.15 (A)

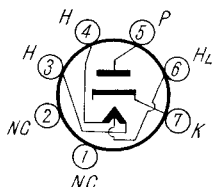
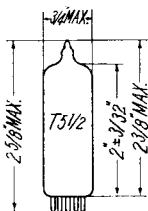
* Without Panel Lamp

** With Panel Lamp (3.2 V, 0.16 A)

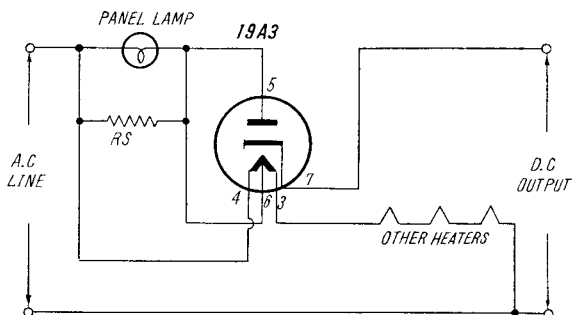
MAXIMUM RATINGS (Design Center Values)		TYPICAL OPERATION (With Capacitor Input to Filter)			
Peak Inverse Plate Voltage	350 (V)	A.C. Plate Supply Voltage (RMS)			
Peak Plate Current	450 (mA)	100**	117**	127**	127* (V)
D.C. Output Current		D.C. Output Current			
With Panel Lamp and		70	60	70	70 (mA)
{ No Shunting Resistor	60 (mA)	Panel Lamp Shunting Resistor			
{ Shunting Resistor	70 (mA)	200	—	200	— (Ω)
Without Panel Lamp	70 (mA)	Effective Plate—Supply Impedance			
Peak Heater—Cathode Voltage		25	25	40	0 (Ω)
Heater negative with		Filter Input Capacitor			
respect to cathode	350 (V)	100	50	100	100 (μF)
Heater positive with		D.C. Output Voltage at Input to Filter			
respect to cathode	350 (V)	(Approx)			
		At Half-Load Current of 35 (mA)			
		—	—	—	150 (V)
		At Full-Load Current of 70 (mA)			
		—	—	—	140 (V)

* Without Panel Lamp

** With Panel Lamp (3.2 V, 0.16 A)



TYPICAL CIRCUIT FOR OPERATION WITH PANEL LAMP



19M-R10 is a long-life, miniature tube for use as a voltage amplifier in wire communication equipment. This tube is not suitable for applications where the heater circuit is switched "ON and OFF" often.

BASE E7-1 Miniature Button 7-Pin

MOUNTING POSITION—Any

HEATER

Voltage 19.0 (V)

Current 0.1 (A)

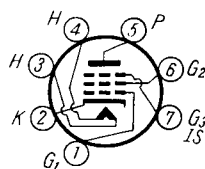
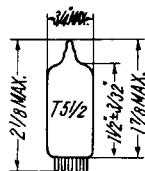
DIRECT INTERELECTRODE

CAPACITANCES (With Shield)

Grid No. 1 to Plate 0.02 max. (pF)

Input 7.2 (pF)

Output 4.1 (pF)



MAXIMUM RATINGS (Absolute Maximum Values)		TYPICAL OPERATION	
Plate Voltage	275 (mA)	Plate Voltage	120 (V)
Grid No. 2 Voltage	165 (V)	Grid No. 3 Voltage	0 (V)
Plate Dissipation	2.2 (V)	Grid No. 2 Voltage	120 (V)
Grid No. 2 Dissipation	0.44 (W)	Cathode-Bias Resistor	180 (Ω)
Total Cathode Current	22 (mA)	Plate Current	9.5 (mA)
Peak Heater—Cathode Voltage		Grid No. 2 Current	2.8 (mA)
Heater negative with respect to cathode	100 (V)	Transconductance	6,200 (μS)
Heater positive with respect to cathode	100 (V)	Plate Resistance (Approx.)	260 (k Ω)

19R-LL1 is a multi-purpose long-life miniature tube for use as an oscillator, amplifier, etc. in wire communication equipment. This tube is not suitable for applications where the heater circuit is switched "On and Off" often.

BASE E9-1 Small Button Noval 9-Pin

MOUNTING POSITION—Any

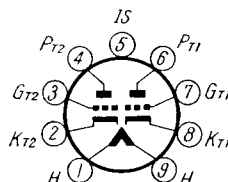
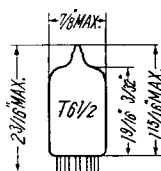
HEATER

Voltage.....19.0 (V)

Current.....0.15 (A)

DIRECT INTERELECTRODE CAPACITANCES

(Without Shield)	Unit No. 1	Unit No. 2
Grid No. 1 to Plate	1.6	1.6 (pF)
Input	2.1	2.1 (pF)
Output	1.4	1.4 (pF)



MAXIMUM RATINGS (Absolute Maximum Values)		TYPICAL OPERATION	
Plate Voltage	275 (V)	Plate Voltage	120 (V)
Plate Dissipation	2.8 (W)	Cathode-Bias Resistor	180 (Ω)
Total Cathode Current	22 (mA)	Plate Current	8.5 (mA)
Peak Heater—Cathode Voltage		Transconductance	5,500 (μS)
Heater negative with respect to cathode	100 (V)	Plate Resistance (Approx.)	5.5 (k Ω)
Heater positive with respect to cathode	100 (V)	Amplification Factor	30

19R-P11 is a long-life, miniature tube for use as a power amplifier in wire communication equipment. This tube is not suitable for applications where the circuit is switched "On and Off" often.

BASE E9-1 Small Button Noval 9-Pin

MOUNTING POSITION—Any

HEATER

Voltage 19.0 (V)

Current 0.2 (A)

DIRECT INTERELECTRODE

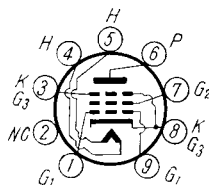
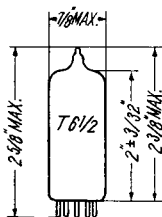
CAPACITANCES (Without Shield)

Grid No. 1 to Plate 0.15*_{max.} (pF)

Input 9.5 (pF)

Output 5.5 (pF)

* With Shield.



MAXIMUM RATINGS (Absolute Maximum Values)		TYPICAL OPERATION	
Plate Voltage	275 (V)	Plate Voltage	120 (V)
Grid No. 2 Voltage	165 (V)	Grid No. 2 Voltage	120 (V)
Plate Dissipation	8.2 (W)	Grid No. 1 Voltage	-7 (V)
Grid No. 2 Dissipation	1.9 (W)	Plate Current	35 (mA)
Total Cathode Current	55 (mA)	Grid No. 2 Current	7.5 (mA)
Peak Heater—Cathod Voltage		Transconductance	5,500 ($\mu\Omega$)
Heater negative with		Plate Resistance (Approx.)	25 (k Ω)
respect to cathode	100 (V)		
Heater positive with			
respect to cathode	100 (V)		

30A5 is a power amplifier pentode for use in transformer-less radio receivers. This tube features a large output and the heater voltage can be made 5 volts less than that of the 35C5 tube.

BASE E7-1 Miniature Button 7-Pin

MOUNTING POSITION—Any

HEATER

Voltage 30 (V)

Current 0.15 (A)

DIRECT INTERELECTRODE

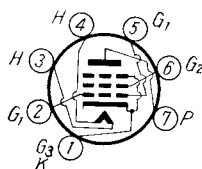
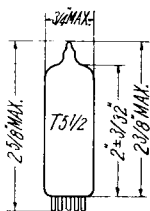
CAPACITANCES (Without Shield)

Grid No. 1 to Plate 0.3 (pF)

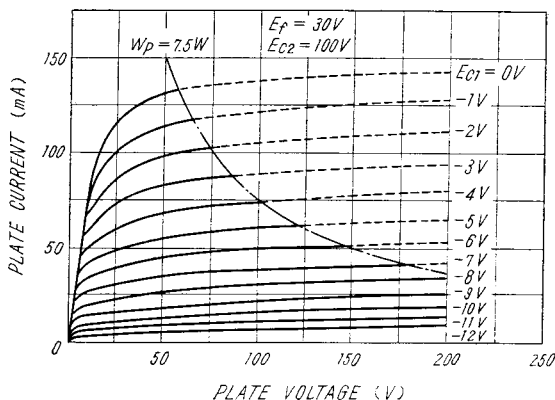
Input 12 (pF)

Output 5.8 (pF)

MAXIMUM RATINGS (Design Center Values)		TYPICAL OPERATION	
Plate Voltage	150 (V)	Plate Voltage	100 (V)
Grid No. 2 Voltage	150 (V)	Grid No. 2 Voltage	100 (V)
Plate Dissipation	7.5 (W)	Grid No. 1 Voltage	-6.7 (V)
Grid No. 2 Dissipation	1.5 (W)	Peak AF Grid No. 1 Voltage	6.7 (V)
Total Cathode Current	100 (V)	Plate Current	
Peak Heater—Cathode Voltage		Zero-Signal	43 (mA)
Heater negative with		Max.-Signal	43 (mA)
respect to cathode	150 (V)	Grid No. 2 Current	
Heater positive with		Zero-Signal	3 (mA)
respect to cathode	150 (V)	Max.-Signal	11 (mA)
Grid No. 1 Circuit Resistance		Transconductance	9,200 (μ U)
with Cathode Bias	1.0 (M Ω)	Plate Resistance (Approx.)	22 (k Ω)
		Load Resistance	2.4 (k Ω)
		Max.-Signal Power Output	2.1 (W)
		Total Harmonic Distortion	11 (%)



AVERAGE PLATE CHARACTERISTICS



32A8 is a triode-pentode designed for use as an AF amplifier and output tube in transformer-less radio receivers.

BASE E9-1 Small Button Noval 9-Pin

MOUNTING POSITION—Any

HEATER

Voltage..... 32 (V)

Current 0.15 (A)

DIRECT INTERELECTRODE CAPACITANCES

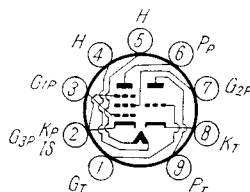
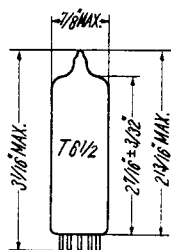
(Without Shield)

Triode Unit
Pentode Unit

Grid No. 1 to Plate.....4.2 0.3 max. (pF)

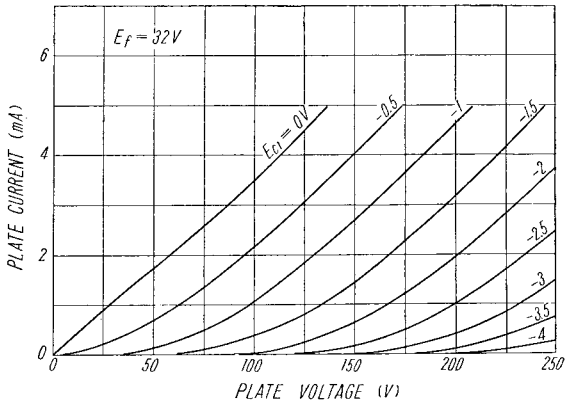
Input.....2.7 9.3 (pF)

Output 4.3 8.0 (pF)

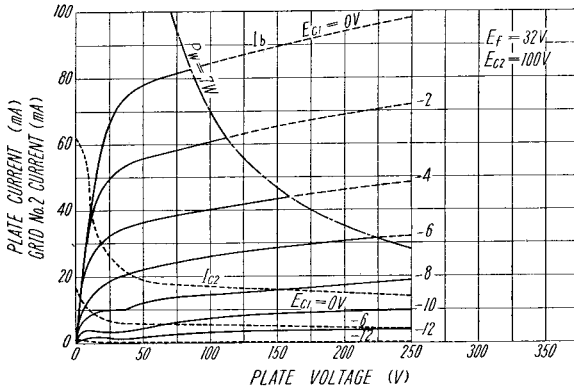


MAXIMUM RATINGS (Design Center Values)			TYPICAL OPERATION		
	Triode Unit	Pentode Unit		Triode Unit	Pentode Unit
Plate Voltage	250	250 (V)	Plate Voltage	100	100 (V)
Grid No. 2 Voltage	250	250 (V)	Grid No. 2 Voltage	—	100 (V)
Plate Dissipation	1	7 (W)	Grid No. 1 Voltage	0	—6 (V)
Grid No. 2 Dissipation	—	1.8 (W)	Grid No. 1 Input		
Total Cathode Current	15	50 (mA)	Voltage (RMS)	—	3.8 (V)
Peak Heater—Cathode Voltage			Plate Current	3.5	26 (mA)
Heater negative with			Grid No. 2 Current	—	5.0 (mA)
respect to cathode		200 (V)	Transconductance	2,500	6,800 (μ S)
Heater positive with			Plate Resistance		
respect to cathode		200 Δ (V)	(Approx.)	—	15 (k Ω)
Grid No. 1 Circuit Resistance			Amplification Factor	70	—
with Fixed Bias	1	1 (M Ω)	Load Resistance	—	3.9 (k Ω)
with Cathode Bias	3	2 (M Ω)	Max. Signal Power		
with Grid Bias	22	— (M Ω)	Output	—	1.05 (W)
Δ The D.C. component must not exceed 100 volts.			Total Harmonic Distortion	—	10 (%)

AVERAGE PLATE CHARACTERISTICS (Triode Unit)



AVERAGE PLATE CHARACTERISTICS (Pentode Unit)



HITACHI

6KN8 • 4KN8

TWIN TRIODE

for VHF cascode amplifier application

The Hitachi 6KN8 and 4KN8 are miniature, medium-mu twin triode designed for use as a cascode connected VHF amplifier of television tuners. As 6KN8 and 4KN8 have considerably high transconductance and low interelectrode capacitance with their special frame grid structure, these tubes enable the television tuner to have high gain and low noise characteristics.

The Hitachi 6KN8 and 4KN8 are newly registered JEDEC type name and have been famous by the name of Hitachi 6R-HH8 and 4R-HH8.

ELECTRICAL DATA

Cathode Coated Unipotential

Heater ;

	4KN8	6KN8
Heater Voltage	4.2	6.3 Volts
Heater Current	0.6	0.4 Amperes
Heater Warm up Time	11	- Seconds

Maximum Heater-Cathode Voltage

Heater Negative with Respect to Cathode		
DC Component	220	220 Volts
Total DC and Peak	220	220 Volts
Heater Positive with Respect to Cathode		
DC Component	110	110 Volts
Total DC and Peak	220	220 Volts

Direct Interelectrode Capacitance (with external shield)

	Unit No. 1	Unit No. 2
Grid to Plate	1.7	1.7 μf
Input : grounded cathode	3.6	- μf
grounded grid	-	6.0 μf
Output : grounded cathode	2.4	- μf
grounded grid	-	3.6 μf
Plate to Cathode	0.17	0.17 μf
Heater to Cathode	2.5	2.5 μf
Plate to Plate, max.	0.015	μf

MAXIMUM RATINGS (Absolute Maximum System, A-class Amplifier)

Plate Voltage*	220 Volts
Plate Dissipation	2.2 Watts
DC Cathode Current	22 Milliamperes
Fixed Bias Grid Circuit Resistance	1 Megohms

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

Class A₁ Amplifier (each unit)

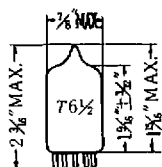
Plate Voltage	110 Volts
Grid Voltage	-1 Volts
Amplification Factor	45
Plate Resistance (approx.)	2,800 Ohms
Transconductance	16,000 Micromhos
Plate Current	16 Milliamperes
Grid Voltage, approximately for Gm=50 Micromhos	-5 Volts

Cascode Amplifier

Plate Supply Voltage	220 Volts
Grid Supply Voltage	0 Volts
Grid Circuit Resistance	1 Megohms
Plate Current	17 Milliamperes
Transconductance	16,500 Micromhos

Note*; When the tube is used as a cascode amplifier and the two sections are connected in series, this voltage may be as high as 330 Volts maximum under cutoff condition.

MAX.



9AJ

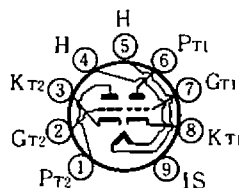


PLATE CHARACTERISTICS (1)
(each section)

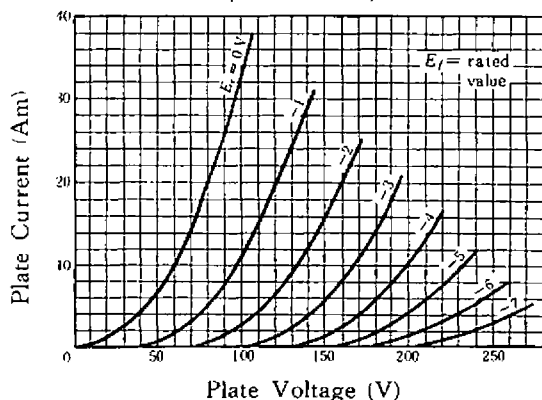
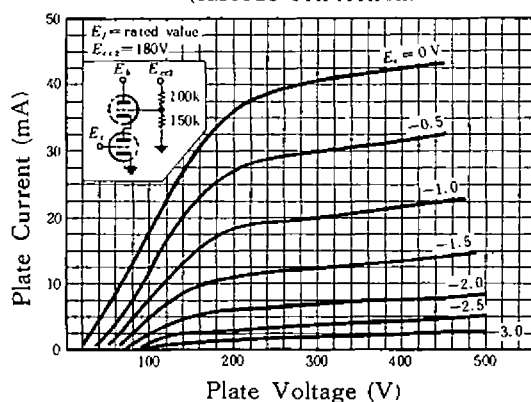
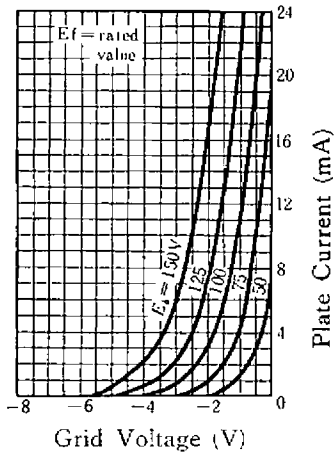


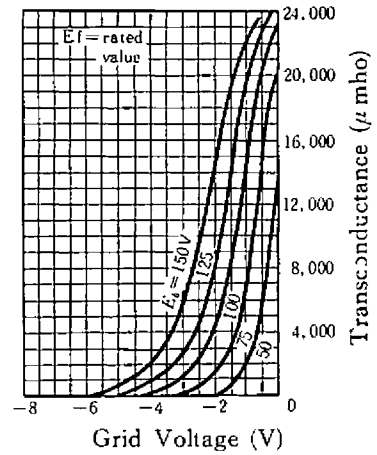
PLATE CHARACTERISTICS (2)
(cascode connection)



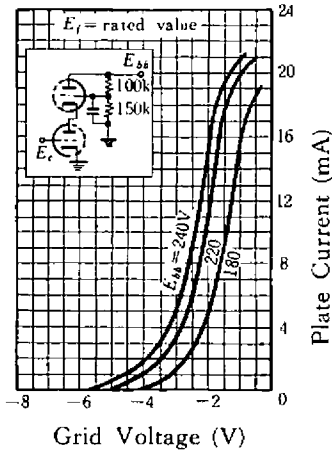
GRID CHARACTERISTICS (1)
(each section)



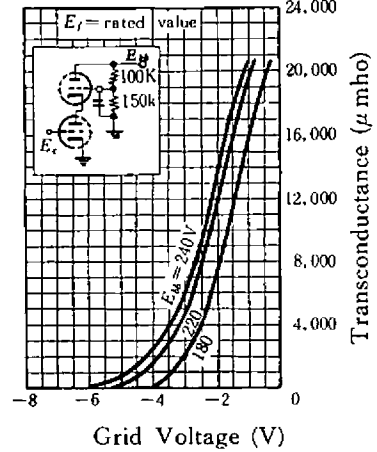
GRID CHARACTERISTICS (2)
(each section)



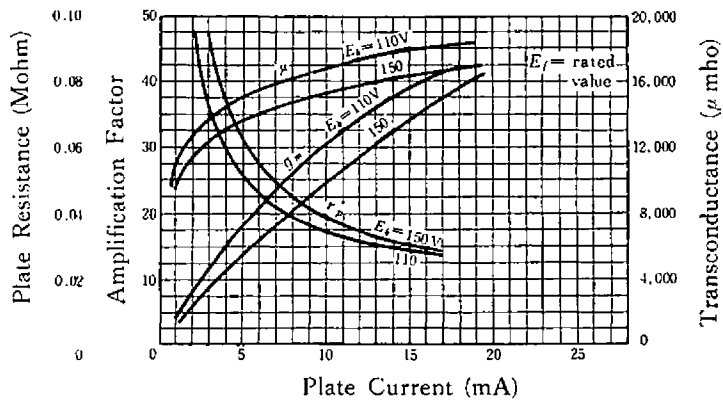
GRID CHARACTERISTICS (3)
(cascode connection)



GRID CHARACTERISTICS (4)
(cascode connection)



AVERAGE CHARACTERISTICS
(each section)



MAIN PRODUCTS

Electrical and Mechanical Machinery and Equipment for Power Generation, Transformation and Transmission

General Purpose Motor-Driven Machinery and Equipment

Machinery and Equipment for Coal and Ore Mining

Machinery and Equipment for Iron and Steel Refining

Locomotives, Rolling Stock and Other Transportation Equipment

Machinery and Equipment for Material Handling and Transporting

Machinery and Equipment for Marine Service

Household Electric Machines and Appliances

Machinery and Equipment for Agricultural and Fishing Industries

Machinery and Equipment for Waterworks and Gasworks

Machinery and Equipment for Refrigeration and Cold Storage Plants

Machinery and Equipment for Civil Engineering and Construction

Machinery and Equipment for Chemical Industry

Machinery and Equipment for Textile and Paper Manufacturing Industries

Machinery and Equipment for Wire and Wireless Communications

Electronic Computers and Applied Electronic Instruments

Precision Instruments for Scientific Researches

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Electron Tubes for Radio and Television

Transistors and Semiconductor Products

Insulating Materials; Synthetic Resin Products

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Machine Tools

Products by Associated Companies

Malleable Cast Iron, Cast and Forged Steel Products

Rolls; Special Steels

Electric Wires and Cables



Head Office: 4, 1-chome, Marunouchi, Chiyoda-ku, Tokyo

Tel. Tokyo (212) 1111 (80 lines)

Cable Address: "HITACHY" TOKYO

Codes: All Codes Used

4M-P12 is a power amplifier pentode designed for use in the audio output stage of transformer-less television receivers. A large output can be obtained from a comparatively small input voltage.

BASE E7-1 Miniature Button 7-Pin

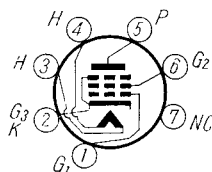
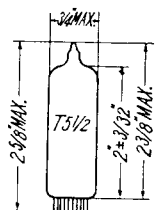
MOUNTING POSITION—Any

HEATER

Voltage 4.7 (V)

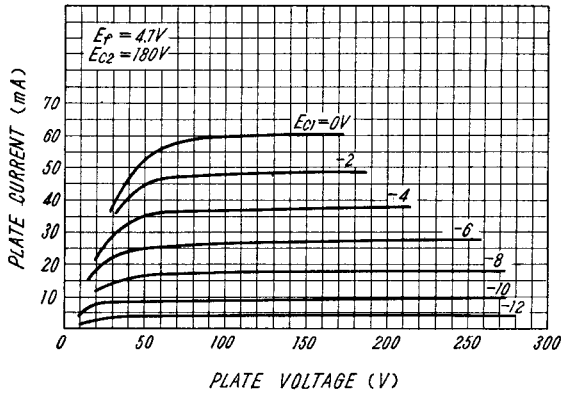
Current 0.6 (V)

Warm-up Time..... 11 (sec)



MAXIMUM RATINGS (Design Center Values)		TYPICAL OPERATION	
Plate Voltage	250 (V)	Plate Voltage	180 (V)
Grid No. 2 Voltage	250 (V)	Grid No. 2 Voltage	180 (V)
Plate Dissipation	8.5 (W)	Grid No. 3 Voltage	-6 (V)
Grid No. 2 Dissipation	2.5 (W)	Peak AF Grid No. 1 Voltage	6 (V)
Peak Heater—Cathode Voltage		Plate Current	
Heater negative with		Zero-Signal	25 (mA)
respect to cathode	200 (V)	Grid No. 2 Current	
Heater positive with		Zero-Signal	5.0 (mA)
respect to cathode	200Δ (V)	Transconductance	5,500 (μΩ)
Δ The D.C. component must not exceed		Plate Resistance (Approx.)	100 (kΩ)
100 volts.		Load Resistance	6 (kΩ)
		Max.-Signal Power Output	2.0 (W)
		Total Harmonic Distortion	10 (%)

AVERAGE PLATE CHARACTERISTICS



4R-HH2 is a twin triode designed for use as a cascade connected RF amplifier in the VHF tuner of transformer-less television receivers.

The electrostatic capacity between electrodes is almost the same with 4BQ7A, while the mutual conductance is higher. A high sensitivity, low noise tuner can be made with this tube.

BASE E9-1 Small Button Noval 9-Pin

MOUNTING POSITION—Any

HEATER

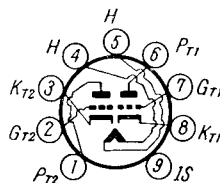
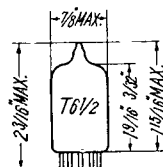
Voltage 4.2 (V)

Current 0.6 (A)

Warm-up Time 11 (sec)

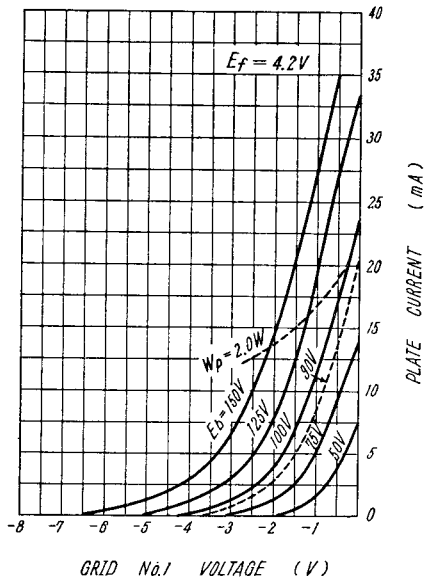
DIRECT INTERELECTRODE CAPACITANCES

(With Shield)	Unit No.1	Unit No.2	
Grid No.1 to Plate	1.2	1.2	(pF)
Input {Grounded Cathode	3.3	—	(pF)
{Grounded Grid	—	5.6	(pF)
Output {Grounded Cathode	1.3	—	(pF)
{Grounded Grid	—	2.4	(pF)
Heater to Cathode	2.5	2.5	(pF)
Plate to Plate	0.01	max.	(pF)

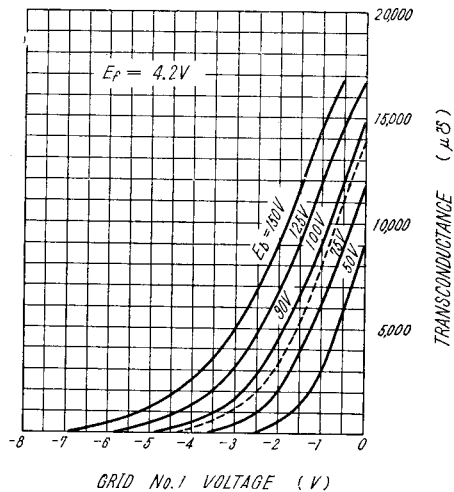


MAXIMUM RATINGS (Design Center Values)		TYPICAL OPERATION	
Plate Voltage	150 (V)	Plate Voltage	90 (V)
Plate Dissipation	2 (W)	Grid No.1 Voltage	—1 (V)
Total Cathode Current	20 (mA)	Plate Current	8.5 (mA)
Peak Heater—Cathode Voltage		Transconductance	8,000 (μ S)
Heater negative with		Amplification Factor	36
respect to cathode	200 (V)	Grid No.1 Voltage (Approx.)	
Heater positive with		$I_b = 10 \mu$ A	—5.5 (V)
respect to cathode	200 Δ (V)		
Grid No.1 Circuit Resistance	500 (k Ω)		
Δ The D.C. component must not exceed 100 volts.			

AVERAGE TRANSFER CHARACTERISTICS



AVERAGE TRANSFER CHARACTERISTICS



50BM8 is a miniature type triode-pentode designed for use as an AF amplifier by triode section and AF power amplifier by pentode section in radio receivers.

BASE E9-1 Small Button Noval 9-Pin

MOUNTING POSITION—Any

HEATER

Voltage 50 (V)

Current 0.1 (A)

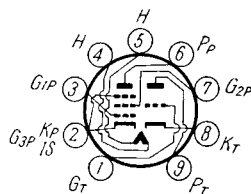
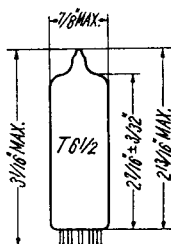
DIRECT INTERELECTRODE CAPACITANCES

(Without Shield)

	Triode Unit	Pentode Unit
Grid No. 1 to plate	4.2	0.3 max. (pF)

Input	2.7	9.3 (pF)
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Output	4.3	8.0 (pF)
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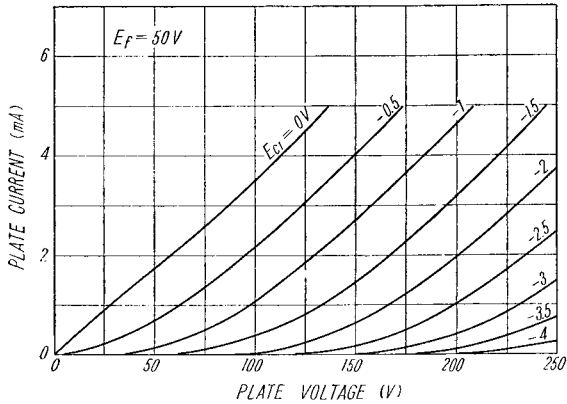


MAXIMUM RATINGS (Design Center Values)			TYPICAL OPERATION		
	Triode Unit	Pentode Unit		Triode Unit	Pentode Unit
Plate Voltage	250	250 (V)	Plate Voltage	100	100 (V)
Grid No. 2 Voltage	250	250 (V)	Grid No. 2 Voltage	—	100 (V)
Plate Dissipation	1	7 (W)	Grid No. 1 Voltage	0	—6 (V)
Grid No. 2 Dissipation	—	1.8 (W)	Grid No. 1 Input Voltage (RMS)	—	3.8 (V)
Total Cathode Current	15	50 (mA)	Plate Current	3.5	26 (mA)
Peak Heater—Cathode Voltage			Grid No. 1 Current	—	5.0 (mA)
Heater negative with respect to cathode		200 (V)	Transconductance	2,500	6,800 (μU)
Heater positive with respect to cathode		200 Δ (V)	Plate Resistance (Approx.)	—	15 (k Ω)
Grid No. 1 Circuit Resistance			Amplification Factor	70	—
with Fixed Bias	1	1 (M Ω)	Load Resistance	—	3.9 (k Ω)
with Cathode Bias	3	2 (M Ω)	Max.-Signal Power Output	—	1.05 (W)
with Grid Bias	22	— (M Ω)	Total Harmonic Distortion	—	10 (%)

Δ The D.C. component must not exceed 100 volts.

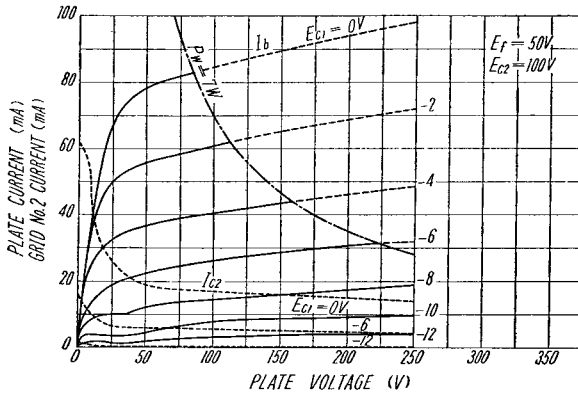
AVERAGE PLATE CHARACTERISTICS

(Triode Unit)



AVERAGE PLATE CHARACTERISTICS

(Pentode Unit)



5M-HH3 is a twin triode for use as a RF oscillator and mixer of the VHF tuner in transformer-less television receivers.

As this tube has high mutual conductance although its electrostatic capacity between electrodes is almost the same as that of the 5J6 tube, a tuner of high sensitivity and low noise can be made in combination with 4R-HH2.

BASE E7-1 Miniature Button 7-Pin

MOUNTING POSITION—Any

HEATER

Voltage.....4.7 (V)

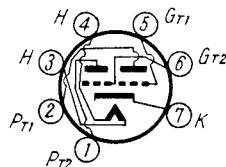
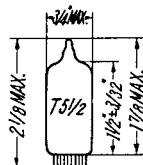
Current.....0.6 (A)

Heater Warm-up Time 11 (sec)

DIRECT INTERELECTRODE CAPACITANCES

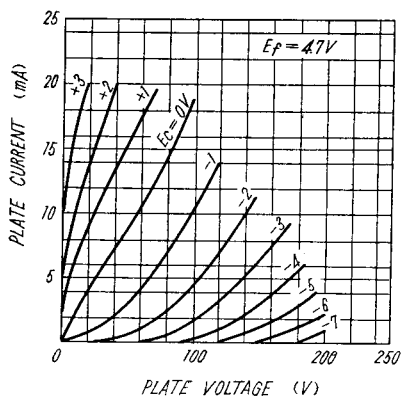
(Without Shield)

	Unit No.1	Unit No.1
Grid No. 1 to Plate	1.3	1.3 (pF)
Input	2.4	2.4 (pF)
Output	0.4	0.4 (pF)

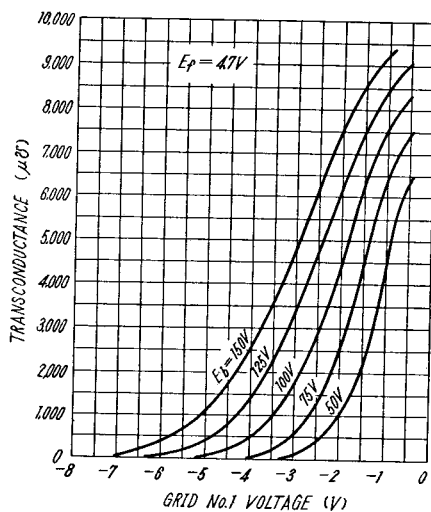


MAXIMUM RATINGS (Design Center Values)		TYPICAL OPERATION	
Plate Voltage	200 (V)	Plate Voltage	100 (V)
Plate Dissipation	1.5 (W)	Grid No. 1 Voltage	-1 (V)
Peak Heater-Cathode Voltage		Plate Current	11 (mA)
Heater negative with		Transconductance	7,500 (μU)
respect to cathode	200 (V)	Amplification Factor	38
Heater positive with			
respect to cathode	200 Δ (V)		
Grid No. 1 Circuit Resistance	500 (k Ω)		
Δ The D.C. component must not exceed 100 volts.			

AVERAGE PLATE CHARACTERISTICS (Each Unit)



AVERAGE TRANSFER CHARACTERISTICS (Each Unit)



5M-K9 is a half-wave rectifier having a maximum output current of 60mA for use in transformer-less radio receivers.

BASE E7-1 Miniature Button 7-Pin

MOUNTING POSITION—Any

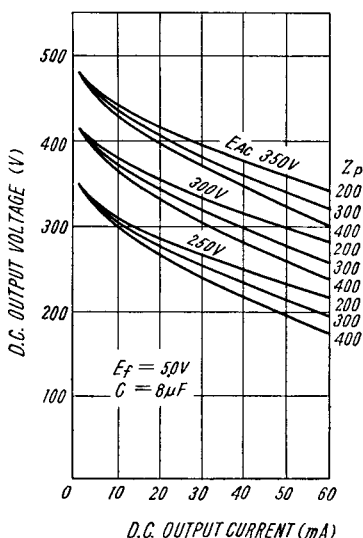
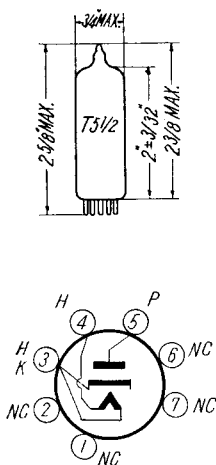
HEATER

Voltage 5.0 (V)

Current 0.6 (A)

MAXIMUM RATINGS (Design Center Values)		TYPICAL OPERATION (With Capacitor Input to Filter)	
Peak Inverse		A.C. Plate Supply Voltage	
Plate Voltage	1,000 (V)	(RMS)	350 (V)
Peak Plate Current	360 (mA)	D.C. Output Current	60 (mA)
D.C. Output Current	60 (mA)	Effective Plate-Supply	
		Impedance	200 (Ω)
		Filter Input Capacitor	8 (μ F)
		D.C. Output Voltage at	
		Input to Filter (Approx.)	
		At Half-Load Current	390 (V)
		At Full-Load Current	340 (V)

OPERATING CHARACTERISTICS WITH
CAPACITOR INPUT FILTER



5R-K16 is a 9-pin, miniature, indirectly heated cathode type full-wave rectifier from which an output current of up to 150 mA can be obtained. This tube is most suitable for use as a rectifier tube in Hi-Fi sets.

BASE E 9-1 Small Button Noval 9-Pin

MOUNTING POSITION—Any

HEATER

Voltage 5.0 (V)

Current 1.2 (A)

MAXIMUM RATINGS (Design Center Values)

Peak Inverse Plate Voltage 1,000 (V)

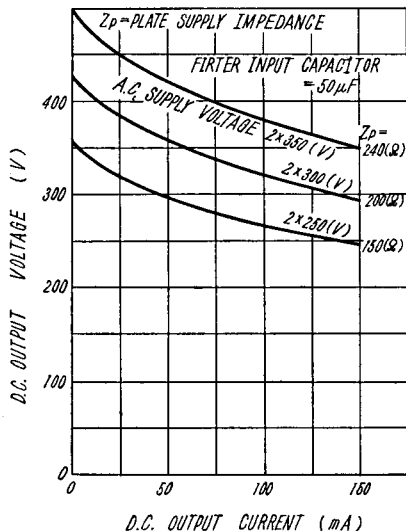
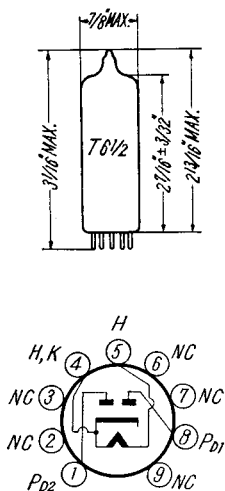
Peak Plate Current (Per Plate) 450 (mA)

A.C. Plate Supply Voltage

(Per Plate, RMS) 350 (V)

D.C. Output Current 150 (mA)

OPERATION CHARACTERISTICS FULL-WAVE CIRCUIT, CAPACITOR INPUT TO FILTER



MAXIMUM RATINGS (Absolute Maximum Values, CCS)§

	AF. Power Amplifier	Class C (200Mc) Telegraphy	Class* C (200Mc) Telephony	Frequency (66.6/200Mc) Tripler
Plate Voltage	300	300	240	300 (V)
Grid No. 2 Voltage	200	200	200	200 (V)
Negative D.C. Grid No. 1 Voltage	-150	-150	-150	-150 (V)
Plate Dissipation	7	5	3.3	5 (W)
Grid No. 2 Dissipation	1	1	—	— (W)
Grid No. 1 Dissipation	0.2	0.2	—	— (W)
Plate Input	—	11.25	7.5	7.5 (W)
Grid No. 2 Input	—	—	0.63	1 (W)
Plate Current	50	45	37.5	30 (mA)
Grid No. 2 Current	15	—	—	— (mA)
Grid No. 1 Current	4	3	3	2 (mA)
Peak Cathode Current	300	225	180	225 (mA)
Total Cathode Current	60	50	40	35 (mA)
Peak Heater—Cathode Voltage				
Heater negative with respect to cathode	100	100	100	100 (V)
Heater positive with respect to cathode	100	100	100	100 (V)
Grid No. 1 Circuit Resistance	100	—	—	— (kΩ)

§ Each unit

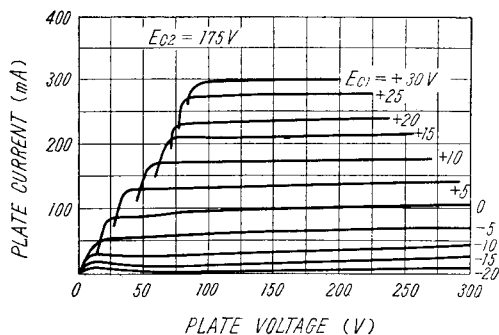
* Plate and grid No. 2 modulation.

TYPICAL OPERATION (Push-Pull Operation)

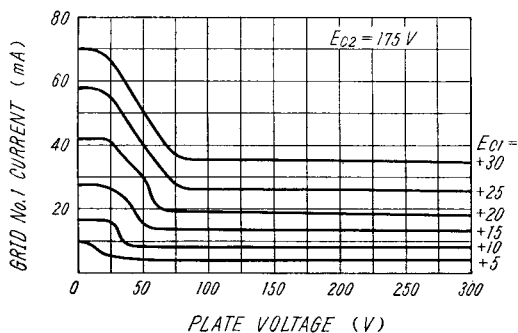
	Class C (200Mc) Telegraphy		Class* C (200Mc) Telephony		Frequency (66.6/200Mc) Tripler	
	CCS	ICAS	CCS	ICAS	CCS	ICAS
Plate Voltage	300	300	200	200	300	300 (V)
Grid No. 2 Voltage	175	200	Note	Note	150	150 (V)
Grid No. 1 Voltage	-40	-45	—	—	-100	-100 (V)
Grid No. 1 Bias Resistor	—	—	33	15	—	— (kΩ)
Peak RF Grid No. 1 to Grid No. 1 Voltage	110	130	130	130	230	240 (V)
Plate Current	2×37.5	2×50	2×33.5	2×43	2×24	2×32.5 (mA)
Grid No. 2 Current	2.3	3.0	2.6	3.1	2.0	3.5 (mA)
Grid No. 1 Current (Approx.)	1.8	3.0	1.5	3.3	2×1	2×1.9 (mA)
Driving Power (Approx.)	0.1	0.2	0.1	0.2	0.23	0.45 (W)
Power Output (Approx.)	14.5	18.5	8.1	9.8	6.4	7.8 (W)
Efficiency	65	62	60	57	45	40 (%)
Useful Power	12	16	7.1	8.8	3.5	4.8 (W)
Modulation Power (for 100% Modulation)	—	—	6.7	8.6	—	— (W)

* Plate and grid No. 2 modulation

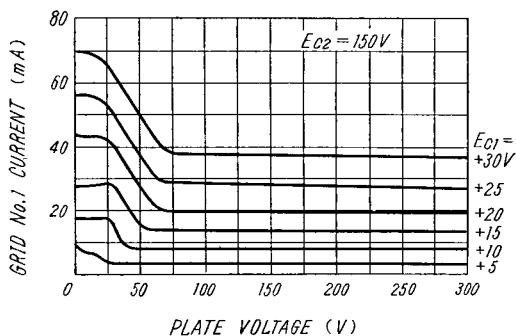
AVERAGE PLATE CHARACTERISTICS
(Each Unit)



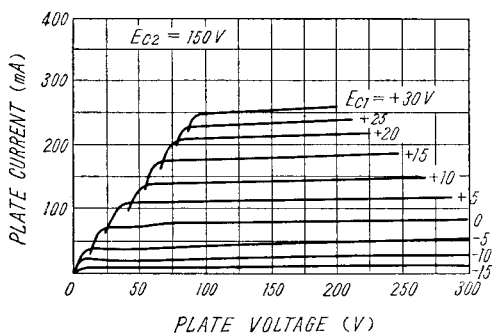
AVERAGE GRID No. 1 CHARACTERISTICS
(Each Unit)



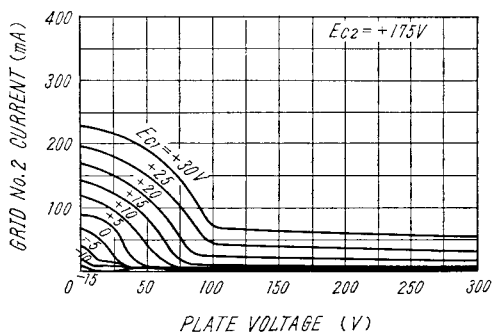
AVERAGE GRID No. 1 CHARACTERISTICS
(Each Unit)



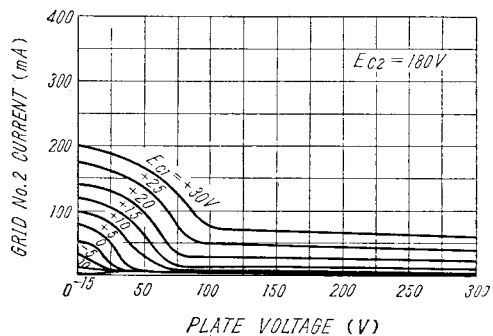
AVERAGE PLATE CHARACTERISTICS
(Each Unit)



AVERAGE GRID No. 2 CHARACTERISTICS
(Each Unit)



AVERAGE GRID No. 2 CHARACTERISTICS
(Each Unit)



6AC7-GT is a sharp cutoff pentode having high mutual conductance, and used for wide band amplification.

BASE B8-26 Octal

MOUNTING POSITION—Any

HEATER

Voltage 6.3 (V)

Current 0.45 (A)

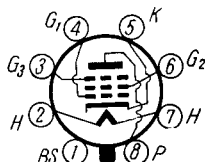
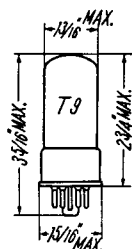
DIRECT INTERELECTRODE

CAPACITANCES (With Shield)

Grid No. 1 to Plate.....0.02 max. (pF)

Input 11.5 (pF)

Output..... 5.5 (pF)



MAXIMUM RATINGS (Design Center Values)		TYPICAL OPERATION	
Plate Voltage	300 (V)	Plate Voltage	300 300 (V)
Grid No. 2 Supply Voltage	300 (V)	Grid No. 3 Voltage	0 0 (V)
Grid No. 2 Voltage—See curve page 10		Grid No. 2 Voltage	150 300 (V)
Plate Dissipation	3 (W)	Grid No. 2 Resistor	— 60 (kΩ)
Grid No. 2 Dissipation	0.4 (W)	Cathode-Bias Resistor	160 160 (Ω)
Peak Heater—Cathode Voltage		Plate Current	10 10 (mA)
Heater negative with		Grid No. 2 Current	2.5 2.5 (mA)
respect to cathode	90 (V)	Transconductance	9,000 9,000 (μS)
Heater positive with		Plate Resistance	
respect to cathode	90 (V)	(Approx.)	1.0 1.0 (MΩ)
Grid No. 1 Circuit Resistance			
with Cathode Bias Operation with			
Fixed Grid No. 2 Voltage	250 (kΩ)		
with Cathode Bias Operation with			
Grid No. 2 Resistor	500 (kΩ)		

6AJ8 is a compound tube designed for FM-AM receiver sets. The triode unit is used as a local oscillator of the medium wave band while the heptode unit is used as a frequency converter in case of the medium wave band and as an IF amplifier tube in case of FM (VHF).

BASE E9-1 Small Button Noval 9-Pin

MOUNTING POSITION—Any

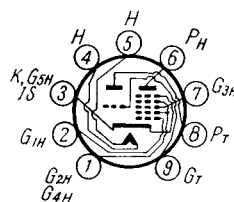
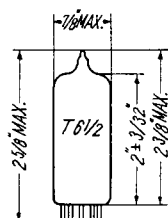
HEATER

Voltage 6.3 (V)

Current 0.3 (mA)

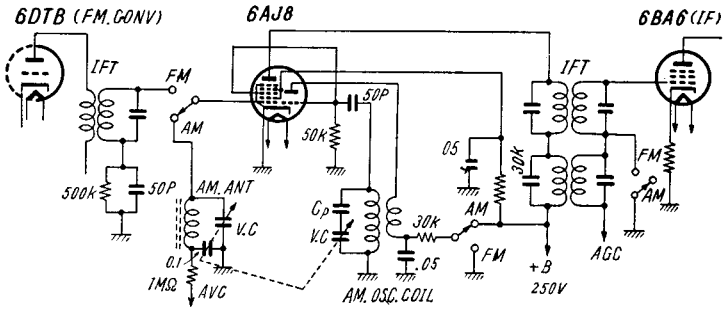
DIRECT INTERELECTRODE CAPACITANCES

(Without Shield)	Triode Unit	Heptode Unit
Grid No. 1 to Plate.....	1.0	0.006 max. (pF)
Input.....	2.6	4.8 (pF)
Output.....	2.1	7.1 (pF)
Grid No. 3 to All.....	—	6.0 (pF)
Plate to Plate.....	0.2	(pF)



MAXIMUM RATINGS (Design Center Values)			TYPICAL OPERATION		
	Triode Unit	Heptode Unit		Heptode Unit (Con- verter)	Triode Unit (RF/IF Amp.)
Plate Voltage	250	300 (V)	Plate Voltage	250	100 (V)
Grid No. 2 Supply Voltage		300 (V)	Grid No. 3 Voltage	—	0 (V)
Plate Dissipation	0.8	1.7 (W)	Grid No. 2 & No. 4 Voltage	103	100 (V)
Grid No. 2 Dissipation	—	1.0 (W)	Grid No. 1 Voltage	—2	—2 (V)
Total Cathode Current	6.5	12.5 (mA)	Grid No. 3 & Triode Grid Resistor	47	— (kΩ)
Peak Heater—Cathode Voltage			Plate Current	3.25	6.5 13.5 (mA)
Heater negative with respect to cathode		100 (V)	Grid No. 3 & Triode Grid Current	200	— (μA)
Heater positive with respect to cathode		100 (V)	Grid No. 2+No. 4 Current	6.7	3.8 (mA)
Grid No. 1 Circuit			Transconductance	— 2,400	3,700 (μΩ)
Resistance	3.0	3.0 (MΩ)	Conversion Trans- conductance	775	— (μΩ)
			Plate Resistance (Approx.)	1,000	700 (kΩ)
			Amplification Factor	—	22
			Grid No. 1 Voltage (Approx.)		
			$G_m = 24 \mu\Omega$	—	—42 (V)
			$G_c = 7.75 \mu\Omega$	—28.5	— (V)

TYPICAL CIRCUIT



6G-B3A is a high perviance, beam pentode designed for use as a horizontal deflection output tube in television receivers.

BASE B5-187 Octal

TOP CAP C1-2 Skirted Miniature

MOUNTING POSITION—Any

HEATER

Voltage 6.3 (V)

Current 1.2 (A)

MAXIMUM RATINGS (Design Center Values)§

Plate Voltage	550 (V)
Peak Pulse Plate Voltage	$\begin{cases} +6,600\Delta \text{ (V)} \\ -1,500 \text{ (V)} \end{cases}$
Grid No. 2 Voltage	200 (V)
Peak Negative Grid No. 1 Voltage	1,000 (V)
Plate Dissipation	13 (W)
Grid No. 2 Dissipation	5 (W)
Total Cathode Current	150 (mA)
Peak Heater—Cathode Voltage	
Heater negative with respect to cathode	200 (V)
Heater positive with respect to cathode	200 Δ (V)
Grid No. 1 Circuit Resistance	2.2(M Ω)

§ For operation in a 525-line, 30-frame system. The duration of the voltage pulse must not exceed 15 per cent of one horizontal scanning cycle.

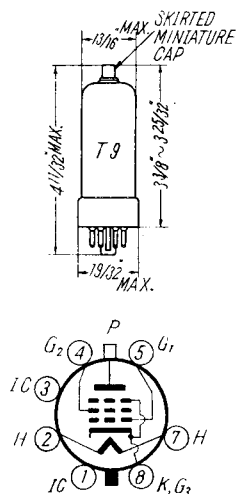
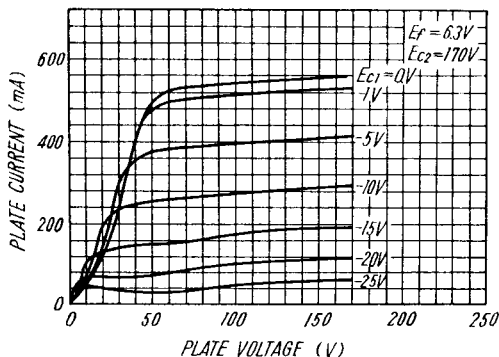
Under no circumstances should this absolute value be exceeded.

Δ The D.C. component must not exceed 100 volts.

TYPICAL OPERATION

Plate Voltage	40	100 (V)
Grid No. 2 Voltage	100	100 (V)
Grid No. 1 Voltage	0	-7.7 (V)
Plate Current	240	100 (mA)
Grid No. 2 Current	19	7 (mA)
Transconductance	--	14,000 (μ S)
Plate Resistance		
(Approx.)	--	5.3 (k Ω)

AVERAGE PLATE CHARACTERISTICS



6G-B7 is a beam power pentode designed for use as a horizontal deflection amplifier in television receivers employing the picture tube of 110° deflection angles.

BASE B8-118, B7-119, B6-122 or B5-190

Octal

TOP CAP C1-2 Skirted miniature

MOUNTING POSITION—Any

HEATER

Voltage 6.3 (V)

Current 1.2 (A)

DIRECT INTERELECTRODE

CAPACITANCES (Without Shield)

Grid No.1 to Plate 0.55 (pF)

Input 17.5 (pF)

Output 7 (pF)

MAXIMUM RATINGS (Design Center Values)§

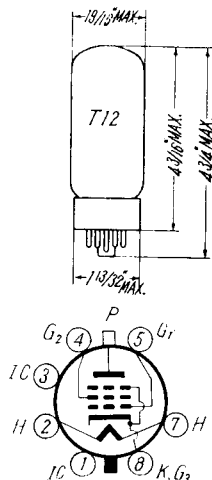
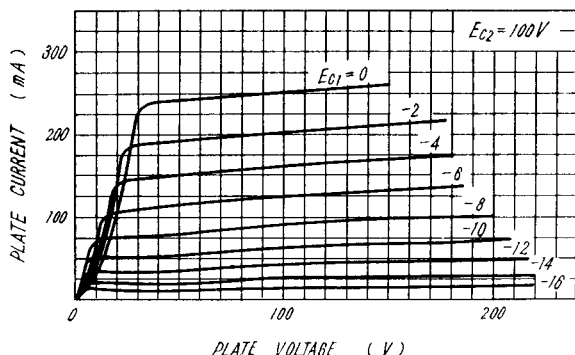
TYPICAL OPERATION

D.C. Plate Voltage	700 (V)
Peak Pulse Plate Voltage	$\begin{cases} +7,700 \diamond (V) \\ -1,850 (V) \end{cases}$
Grid No. 2 Voltage	250 (V)
Peak Negative Grid No. 1 Voltage	-1,000 (V)
Plate Dissipation	15 (W)
Grid No. 2 Dissipation	5 (W)
Total Cathode Current	200 (mA)
Peak Heater—Cathode Voltage	
Heater negative with respect to cathode	225 (V)
Heater positive with respect to cathode	225Δ (V)
Grid No. 1 Circuit Resistance	
For Grid Resistor Bias	1.0 (MΩ)

Plate Voltage	40	100 (V)
Grid No. 2 Voltage	100	100 (V)
Grid No. 1 Voltage	0	-7.7 (V)
Plate Current	240	100 (mA)
Grid No. 2 Current	19	7 (mA)
Transconductance	--	14,000 (μS)
Plate Resistance		
(Approx.)	--	5.3 (kΩ)

- § For operation in a 525-line, 30-frame television system.
- ◇ The duration of the voltage pulse must not exceed 15 per cent of one horizontal scanning cycle.
- Under no circumstances should this absolute value be exceeded.
- Δ The D.C. component must not exceed 100 volts.

AVERAGE PLATE CHARACTERISTICS



6G-K17 is a half-wave rectifier tube designed for use as a damper tube in television receivers. This tube features a high perviance and comparatively large current capacity.

BASE B5-85 Octal

MOUNTING POSITION—Any

HEATER

Voltage 6.3 (V)

Current 1.3 (A)

MAXIMUM RATINGS

(Design Center Values)§

Peak Inverse Plate Voltage 4,500☆ (V)

Peak Plate Current 1,050 (mA)

D.C. Plate Current 175 (mA)

Peak Heater—Cathode Voltage

Heater negative with respect to cathode 4,500◇ (V)

Heater positive with respect to cathode 300△ (V)

§ For operation in a 525-line, 30-frame system.

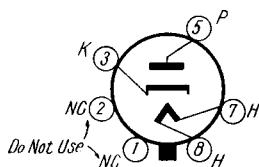
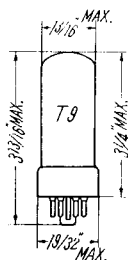
☆ The duration of the voltage pulse must not exceed 15 per cent of one horizontal scanning cycle.

Under no circumstances should this absolute value be exceeded.

◇ The D.C. component must not exceed 900 volts.

△ The D.C. component must not exceed 100 volts.

Notice: Socket terminals 1, 2, 4, and 6 should not be used as tie points.



AVERAGE PLATE CHARACTERISTICS

