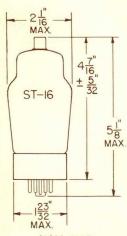




TUNG-SOL

The same of the sa

TUMG-SOL .



COATED UNIPOTENTIAL CATHODE

HEATER 6.3 VOLTS 2.5 AMP.

AC OR DC ANY MOUNTING POSITION



BOTTOM VIEW SHORT JUMBO SHELL 8 PIN OCTAL

GLASS BULB SMALL CAP

GRID WA TO PLATE

THE 6CB5 IS A HIGH-PERVEANCE BEAM POWER TUBE. IT IS DESIGNED FOR USE AS A HORIZONTAL-DEFLECTION AMPLIFIER TUBE IN COLOR TELEVISION. ITS FEATURES INCLUDE LOW AMPLIFICATION, HIGH PLATE CURRENT AT LOW PLATE VOLTAGE, AND A HIGH OPERATING RATIO OF PLATE CURRENT TO GRID #2 CURRENT.

DIRECT INTERELECTRODE CAPACITANCES - APPROX. WITH NO EXTERNAL SHIELD

SKID WI TO TEXTE	0.0	hepe I
INPUT	24	μμ f
OUTPUT	10	ии f
RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM		
HORIZONTAL DEFLECTION AMPLIFIER ^B		
HEATER VOLTAGE	6.3	VOLTS
MAXIMUM PEAK-HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE	200	VOLTS

HEATER VOLTAGE	0.)		VOLIS
MAXIMUM PEAK-HEATER-CATHODE VOLTAGE:			
HEATER NEGATIVE WITH RESPECT TO CATHODE	200	,	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	200		VOLTS
DC COMPONENT	100		VOLTS
MAXIMUM PLATE SUPPLY VOLTAGE (DC AND BOOST)	700	,	VOLTS
MAXIMUM PEAK POSITIVE PULSE PLATE VOLTAGE (ABSOLUTE MAXIMUM)	6 800 ^D		VOLTS
MAXIMUM PEAK NEGATIVE PULSE PLATE VOLTAGE	-1 500		VOLTS
MAX!MUM DC GRID #2 VOLTAGE	200		VOLTS
MAXIMUM DC GRID #1 VOLTAGE	-50	,	VOLTS
MAXIMUM PEAK NEGATIVE PULSE GRID #1 VOLTAGE	-200		VOLTS
MAXIMUM DC PLATE CURRENT	200	, ,	MA.
MAXIMUM GRID #2 INPUT	3.6	* 1	WATTS
MAXIMUM PLATE DISSIPATION	- 23	1	WATTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE	0.47	,	MEGOHM

AEXCEPT AS NOTED.

B FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEER ING PRACTICE CONCERNING TELEVISION BROADCAST STATIONS", FEDERAL COMMUNICATIONS COMMISSION.

CTHE DURATION OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE HORIZONTAL SCANNING CYCLE. IN A 525-LINE, 30-FRAME SYSTEM, 15% OF ONE HORIZONTAL SCANNING CYCLE IS 10 MICROSECONDS.

DUNDER NO CIRCUMSTANCES SHOULD THIS ABSOLUTE VALUE BE EXCEEDED.

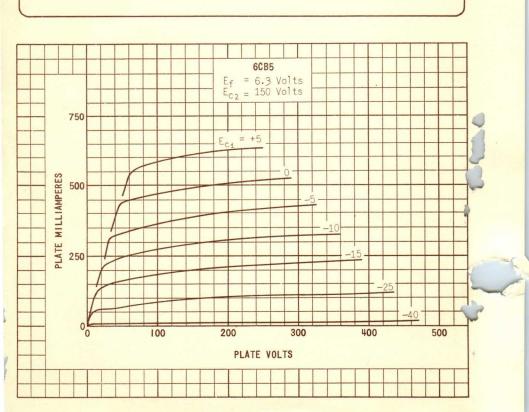
INDICATES A CHANGE.

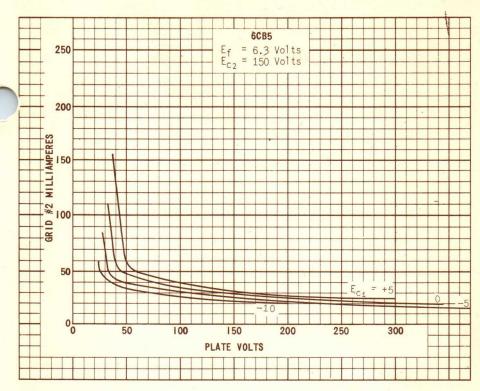
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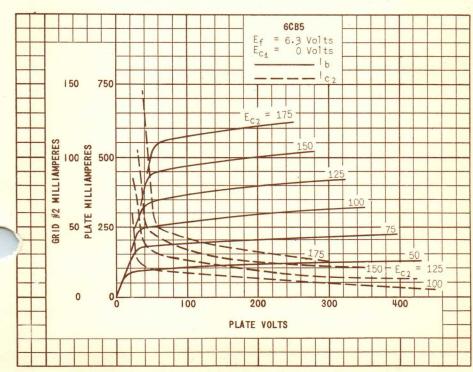
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER

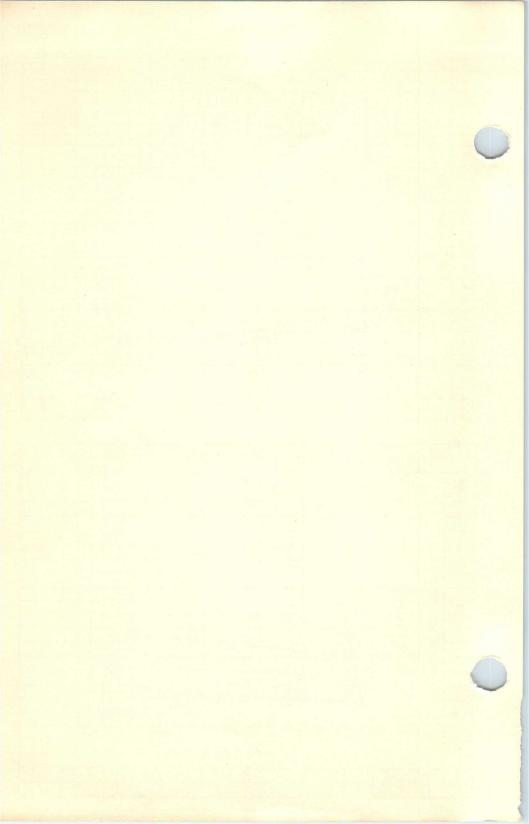
HEATER VOLTAGE	6.3	VOLTS
HEATER CURRENT	2.5	AMP.
PLATE VOLTAGE	175	VOLTS
GRID #2 VOLTAGE	175	VOLTS
GRID #1 VOLTAGE	-30	VOLTS
AMPLIFICATION FACTOR (G2 TO G4)	3.8	
PLATE RESISTANCE (APPROX.)	5 000	OHMS
TRANSCONDUCTANCE	8 800	μMH0S
GRID BIAS (APPROX.) FOR Ib .= 4 MA.	-60	VOLTS
PLATE CURRENT	90	MA.
GRID #2 CURRENT	6	MA.







PRINTED IN U. S. A.



THE 6CB5A IS A HIGH PERVENCE BEAM POWER PENTODE IN A T-12 GLASS ENVELOPE. IT IS DESIGNED ESPECIALLY FOR USE AS A HORIZONTAL-DEFLECTION AMPLIFIER IN COLOR TELEVISION RECEIVERS. THE 6CB5A IS UNILATERALLY INTERCHANGEABLE WITH THE 6CB5.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

GRID 1 TO PLATE	0.4	pf
GRID 1 TO CATHODE AND GRID 3, GRID 2, AND HEATER	22	pf
PLATE TO CATHODE AND GRID 3, GRID 2, AND HEATER	10	pf

JEDEC B8-118

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3	VOLTS	2.5	AMP.	
LIMITS OF APPLIED VOLTAGE		6	.3 ± 0.6	VOLTS	
PEAK HEATER - CATHODE VOLTAGE HEATER NEGATIVE WITH RESPECT TO CATHODE			200	VOLTS	
DC COMPONENT			100	VOLTS	
HEATER POSITIVE WITH RESPECT TO CATHODE			200	VOLTS	

CONTINUED ON FOLLOWING PAGE

MAXIMUM RATINGS

DESIGN MAXIMUM RATINGS - SEE EIA STANDARD RS-239

HORIZONTAL - DEFLECTION AMPLIFIER SEE NOTE 1

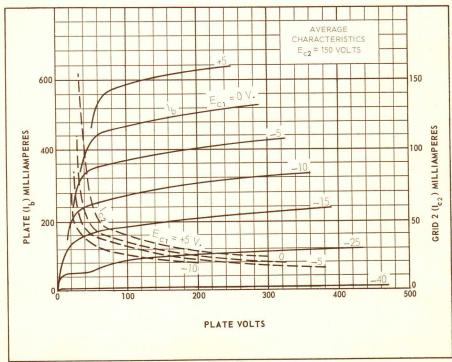
DC PLATE VOLTAGE - INCLUDING BOOST	880	VOLTS
PEAK POSITIVE - PULSE PLATE VOLTAGE	6,800	VOLTS
PEAK NEGATIVE - PULSE PLATE VOLTAGE	1,650	VOLTS
DC GRID 2 VOLTAGE	220	VOLTS
DC GRID 1 VOLTAGE	-55	VOLTS
PEAK NEGATIVE - PULSE GRID 1 VOLTAGE	220	VOLTS
PLATE DISSIPATION SEE NOTE 2	26	WATTS
GRID 2 INPUT	4	WATTS
CATHODE CURRENT:		
PEAK	850	mA
DC	240	mΑ
COLD 1 CIDCUIT DEGICT WAS		
GRID 1 CIRCUIT RESISTANCE:		
FOR GRID - RESISTOR - BIAS OPERATION	0.47	MEGOHM

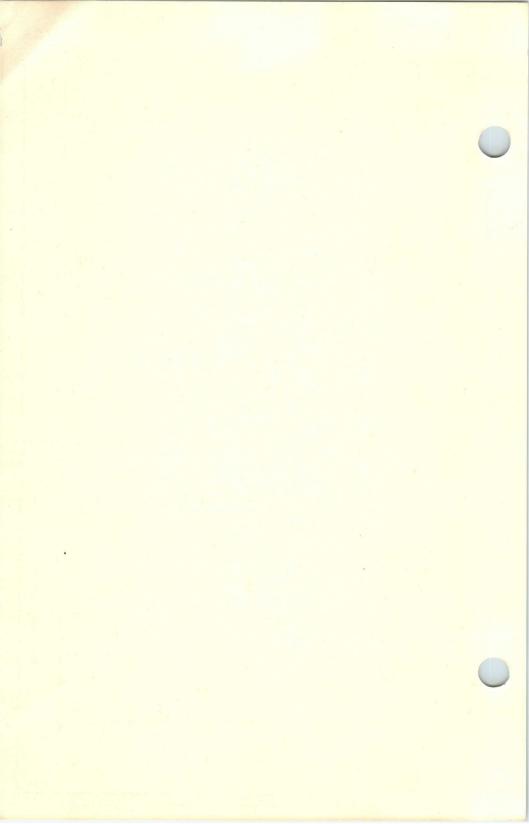
- 1. FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE CONCERNING TELEVISION BROADCAST STATIONS," FEDERAL COMMUNICATIONS COMMISSION. THE DURATION OF THE VOLTAGE PULSE MUST NOT EXCEED 15 PER CENT OF ONE HORIZONTAL SCANNING CYCLE. IN A 525-LINE, 30-FRAME SYSTEM, 15 PER CENT OF ONE HORIZONTAL SCANNING CYCLE IS 10/6EC.
- AN ADEQUATE BIAS RESISTOR OR OTHER MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

CHARACTERISTICS

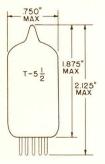
CLASS A, AMPLIFIER

7 5	175	VOLTS
150	175	VOLTS
0	-30	VOLTS
460	90	mA
42	6	mA
_	8,800	μMHOS .
-	3.8	
- App	prox.5,000	OHMS
- Apr	prox60	VOLTS
	150 0 460 42 - - - App	150 175 0 -30 460 90 42 6 - 8,800 - 3.8





TUNG-SOL



PENTODE

MINIATURE TYPE

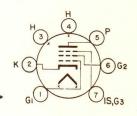
COATED UNIPOTENTIAL CATHODE

HEATER

6.3±0.6 VOLTS 300 MA.

AC OR DC

ANY MOUNTING POSITION



ANT MOSITING TOOTING

BOTTOM VIEW
BASING DIAGRAM
JEDEC 7CM

GLASS BULB
MINIATURE BUTTON
7 PIN BASE E7-1
OUTLINE DRAWING
JEDEC 5-2

THE 6CB6 AND 6CB6A ARE SHARP CUTOFF PENTODES USING THE MINIATURE BUTTON 7 PIN BASE. THEY ARE ESPECIALLY DESIGNED FOR USE AS IF AMPLIFIERS OPERATING AT FREQUENCIES ABOVE 20MC, BUT THEY ARE ALSO WELL SUITED FOR USE AS RF AMPLIFIERS IN VHF TELEVISION TUNERS. IN ADDITION, THERMAL CHARACTERISTICS OF THE 6CB6A ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM—UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED. EXCEPT FOR THE CONTROLLED HEATER WARM—UP TIME THE TWO TUBES ARE IDENTICAL.

DIRECT INTERELECTRODE CAPACITANCES

	SHIELD	SHIELD	
GRID TO PLATE: (G, TO P) MAX.	0.025	.015	pf
INPUT: G4 TO (H+K+G2+G3&IS)	6.5	6.5	pf
OUTPUT: P TO (H+K+G2+G3&IS)	2.0	3.0	pf
AEXTERNAL SHIELD #316 CONNECTED TO PIN #2-			

RATINGS

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM^B

MAXIMUM PLATE VOLTAGE	330	VOLTS
MAXIMUM GRID #2 VOLTAGE	SEE J5-C4-2	
MAXIMUM GRID #2 SUPPLY VOLTAGE	330	VOLTS
MAXIMUM PLATE DISSIPATION	2.3	WATTS
MAXIMUM GRID #2 DISSIPATION	0.55	WATT
MAXIMUM POSITIVE DC GRID #1 VOLTAGE	- 0	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC	100	VOLTS
TOTAL DC AND PEAK	200	VOLTS
HEATER WARM-UP TIME (APPROX.)* (6CB6A -ONLY)	11.0	SECONDS

INDICATES A CHANGE.

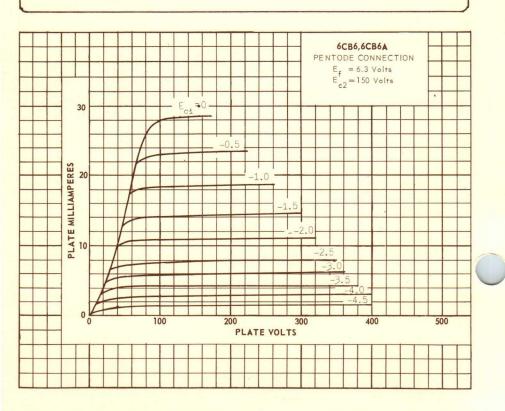
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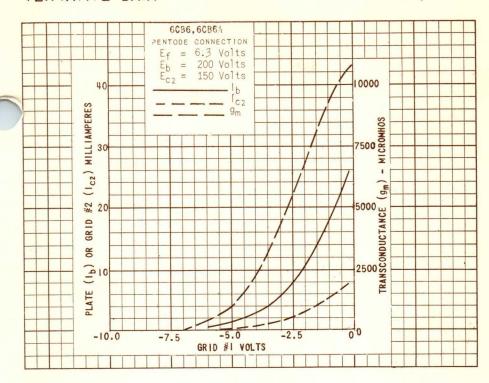
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

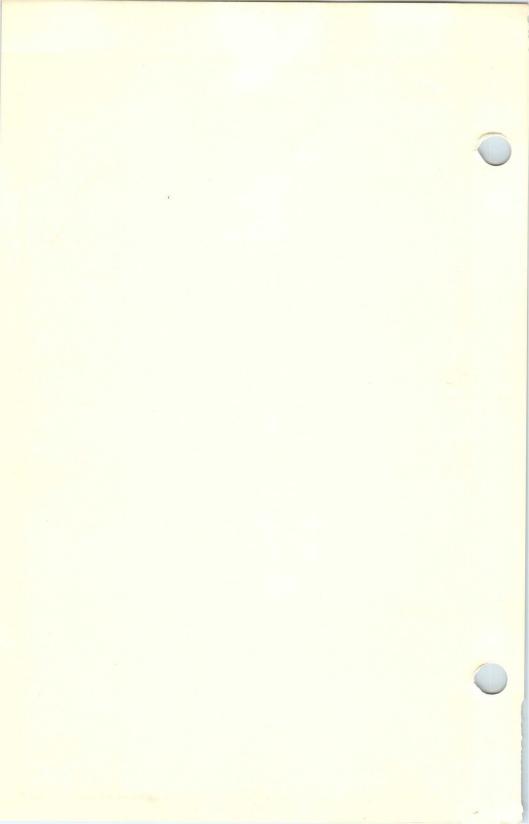
125	VOLTS
125	VOLTS
56	OHMS
0.28	MEGOHM
8 000	µмноs
13.0	MA.
3.7	MA.
-6.5	VOLTS
2.8	MA.
	56 0.28 8 000 13.0 3.7 -6.5

B
DESIGN MAXIMUM RATINGS ARE THE LIMITING VALUES EXPRESSED WITH RESPECT TO BOGIE TUBES AT WHICH
SATISFACTORY TUBE LIFE CAN BE EXPECTED TO OCCUR IN THE TYPES OF SERVICE FOR WHICH THE TUBE IS
RATED. THRREFORE, THE EQUIPMENT DESIGNER MUST ESTABLISH THE CIRCUIT DESIGN SOT THAT INITIALLY
AND THROUGHOUT EQUIPMENT LIFE NO DESIGN MAXIMUM VALUE IS EXCEEDED WITH A BOGIE TUBE UNDER THE
WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD, VARIATION, AND EVALUENCEMENTAL CONDITIONS.

*HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.



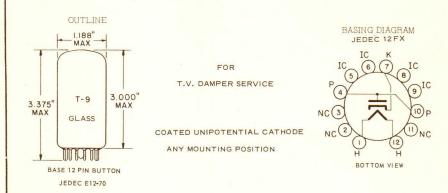




AVERAGE CHARACTERISTICS

TUNG-SOL

DIODE



THE TUNG-SOL 6CD3 IS AN INDIRECTLY-HEATED DIODE IN COMPACTRON CONSTRUCTION. IT IS INTENDED FOR USE IN DAMPER SERVICE OF TELEVISION HORIZONTAL DEFLECTION CIRCUITS. IT IS DESIGNED TO WITHSTAND HIGH VOLTAGE PULSES BETWEEN CATHODE AND BOTH HEATER AND PLATE ELEMENTS SUCH AS NORMALLY ENCOUNTERED IN "DIRECT DRIVE" CIRCUITS. ITS HIGH CURRENT CAPABILITY MAKES IT PARTICULARLY SUITABLE FOR COLOR TELEVISION APPLICATIONS.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

CATHODE TO PLATE AND HEATER: K TO (P+H)	16	pf
PLATE TO CATHODE AND HEATER: P TO (K+H)	14	pf
HEATER TO CATHODE: H TO K	4.0	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM SYSTEM-SEE EIA STANDARD RS-239

6.3 VOLTS

2.5 AMPS.

LIMITS OF APPLIED VOLTAGE *AC OR DC	6.3 ± 0.6	VOLTS
MAXIMUM HEATER CATHODE VOLTAGE *		
HEATER NEGATIVE WITH RESPECT TO CATHODE		
DC	1,000	VOLTS
TOTAL DC AND PEAK	6,000	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC	100	VOLTS
TOTAL DC AND PEAK	300	VOLTS

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

DESIGN MAXIMUM SYSTEM - SEE ELA STANDARD RS-239

DAMPER DIODE SERVICE *
PEAK INVERSE PLATE VOLTAGE
DC OUTPUT CURRENT
STEADY STATE PEAK PLATE CURRENT
PLATE DISSIPATION

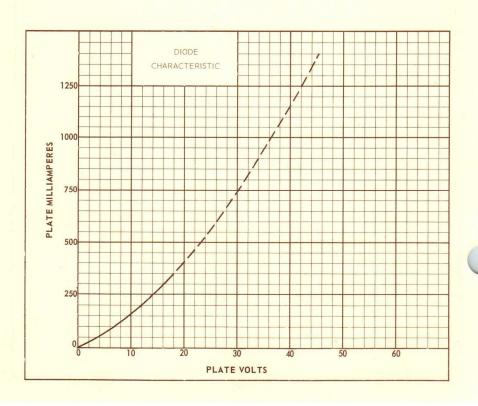
6,000 VOLTS 350 MA. 1,500 MA.

AVERAGE CHARACTERISTICS

TUBE VOLTAGE DROP

SEE GRAPH BELOW

* FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCASTING STATIONS; FEDERAL COMMUNICATIONS COMMISSION. THE DUTY CYCLE OF THE VOLTAGE PULSE IS NOT EXCEED 15 PER CENT OF A SCANNING CYCLE.



C1-1 T-12 4.438 MAX 5.000' MAX 1377" MAX

GLASS BULB B8-110 OR B5-123 SHORT MEDIUM SHELL 5-PIN WITH EXTERNAL BARRIERS

BEAM PENTODE

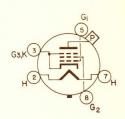
COATED UNIPOTENTIAL CATHODE

HEATER

6.3 VOLTS 2.5 AMP.

AC OR DC

VERTICAL MOUNTING POSITION HORIZONTAL OPERATION IS PERMITTED IF PINS 2 AND 7 ARE IN A VERTICAL



BOTTOM VIEW BASING DIAGRAM JEDEC 5BT

THE 6CD6GA IS A BEAM PENTODE DESIGNED FOR USE AS A HORIZONTAL-DEFLECTION AMPLIFIER IN TELEVISION RECEIVERS. FEATURES OF THIS TUBE ARE AN EXTREMELY HIGH PERVEANCE, HIGH PLATE CURRENT AT LOW PLATE AND SCREEN VOLTAGES AND A HIGH RATIO OF PLATE TO SCREEN CURRENT.

DIRECT INTERELECTRODE CAPACITANCES - APPROX. WITH NO EXTERNAL SHIFLD

GRID #1 TO PLATE INPUT OUTPUT

pf 1.1 pf 8.5 pf

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM HORIZONTAL-DEFLECTION AMPLIFIER SERVICEB

MAXIMUM HEATER-CATHODE VOLTAGE: HEATER POSITIVE WITH RESPECT TO CATHODE

DC VOLTS TOTAL DC AND PEAK 200 VOLTS HEATER NEGATIVE WITH RESPECT TO CATHODE TOTAL DC AND PEAK VOLTS MAXIMUM DC PLATE-SUPPLY VOLTAGE (BOOST + DC POWER SUPPLY) 700 VOL TS MAXIMUM PEAK POSITIVE PULSE PLATE VOLTAGE 7 000 VOLTS MAXIMUM NEGATIVE PULSE PLATE VOLTAGE 500 VOLTS MAXIMUM GRID #2 VOLTAGE 175 VOLTS MAXIMUM PEAK NEGATIVE GRID #1 VOLTAGE VOLTS MAXIMUM PLATE DISSIPATIONC WATTS WATTS MAXIMUM GRID #2 DISSIPATION 3.0 MAXIMUM DC CATHODE CURRENT MA. MAXIMUM PEAK CATHODE CURRENT 700 MA. MAXIMUM GRID #1 CIRCUIT RESISTANCE 0.47 MEGOHM ° C MAXIMUM BULB TEMPERATURE (AT HOTTEST POINT) 225

AUNLESS OTHERWISE SPECIFIED.

BFOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCASTING STATIONS; FEDERALL COMMUNICATIONS COMMISSION". THE DUTY CYCLE OF THE VOLTAGE PULSE NOT TO EXCEED 15 PERCENT OF A SCANNING CYCLE.

CIN STAGES OPERATING WITH GRID-LEAK BIAS, AN ADEQUATE CATHODE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

INDICATES A CHANGE.

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

PLATE VOLTAGE	60	175	VOLTS
GRID #2 VOLTAGE	100	175	VOLTS
GRID #1 VOLTAGE	OD	-30	VOLTS
PLATE RESISTANCE (APPROX.)		7 200	OHMS
TRANSCONDUCTANCE		7 700	MMHOS
PLATE CURRENT	230	75	MA.
GRID #2 CURRENT	21	5.5	MA.
GRID #1 VOLTAGE (APPROX.)			
FOR 1 = 1.0 MA.		-55	VOLTS
TRIODE AMPLIFICATION FACTORE		3.9	

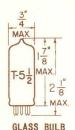
DAPPLIED FOR VERY SHORT INTERVAL SO AS NOT TO DAMAGE TUBE.

SIMILAR TIPE REFERENCE: The GCDGGA may be used as a replacement for the GCDGG; it differs from the GCDGG by employing a straight-sided T-12 envelope and incorporating increased maximum ratings for plate dissipation, pulse plate voltage, and bulb temperature.

 $E_{ ext{TRIODE}}$ CONNECTION (SCREEN TIED TO PLATE) WITH $E_{ ext{b}}^{-}$ = $E_{ ext{c}2}$ = 175 VOLTS AND $E_{ ext{c}1}$ = -30 VOLTS.

TUNG-SOL

PENTODE



MINIATURE TYPE

COATED UNIPOTENTIAL CATHODE

HEATER

6.3 VOLTS 0.3 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW MINIATURE BUTTON 7 PIN BASE

THE 6CE5 IS AN RF PENTODE HAVING HIGH TRANSCONDUCTANCE COUPLED WITH CLOSELY CONTROLLED GRID CUTOFF CHARACTERISTICS IN THE MINIATURE SEVEN PIN CONSTRUCTION. DESIGNED TO OBTAIN BETTER PERFORMANCE OF LOW COST VHF TELEVISION TUNERS AND TELEVISION IF STAGES, THE 6CE5 IMPROVES AUTOMATIC GAIN CONTROL WITH RESULT THAT SIGNAL CAPACITY IS INCREASED. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED.

DIRECT INTERELECTRODE CAPACITANCES WITHOUT EXTERNAL SHIELD

GRID TO PLATE (MAX.) INPUT OUTPUT	0.030 6.5 1.9	μμ f μμ f μμ f
OUTPUT	1.9	μμΙ

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER VOLTAGE	6.3	VOLTS
MAXIMUM PLATE VOLTAGE	300	VOLTS
* MAXIMUM GRID #2 SUPPLY VOLTAGE	300	VOLTS
* MAXIMUM GRID #2 VOLTAGE SEE SCREEN RATING	CHART	
MAXIMUM POSITIVE DC GRID #1 VOLTAGE	0	VOLTS
MAXIMUM PLATE DISSIPATION	2.0	WATTS
* MAXIMUM GRID #2 DISSIPATION	0.5	WATTS
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC COMPONENT	100	VOLTS
TOTAL DC AND PEAK	200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	200	VOLTS
HEATER WARM-UP TIME (APPROX.) A	11.0	SECONDS

HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF 1-TS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

TUNG-SOL

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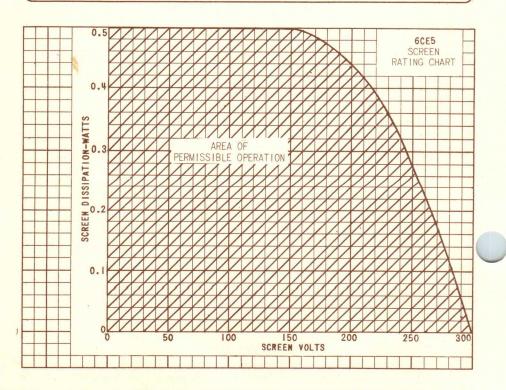
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

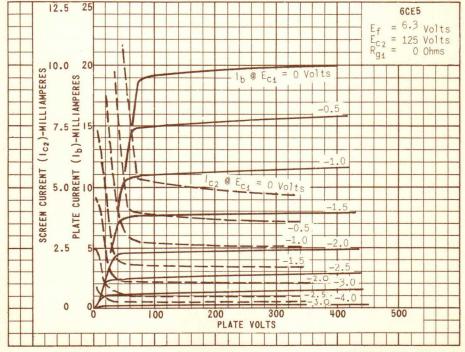
CLASS A1 AMPLIFIER

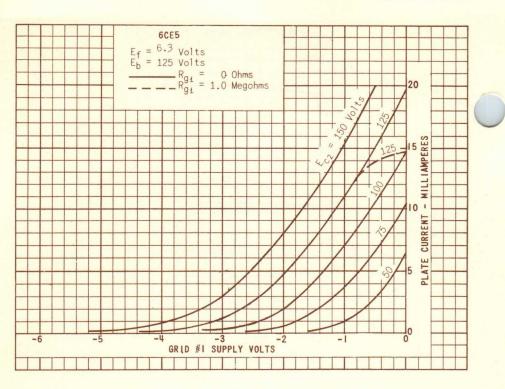
HEATER VOLTAGE	6.3 0.3	VOLTS
PLATE VOLTAGE	125	VOLTS
SCREEN VOLTAGE	125	VOLTS
* GRID #1 SUPPLY VOLTAGE	-1.0	VOLTS
GRID #1 RESISTOR (BYPASSED)	1.0	MEGOHMS
PLATE RESISTANCE (APPROX.)	0.3	MEGOHMS
TRANSCONDUCTANCE	7 600	MHOS
PLATE CURRENT	11	MA.
SCREEN CURRENT	2.8	MA.
GRID #1 VOLTAGE (APPROX.) Ib = 35 μ AMPS.	-5.0	VOLTS

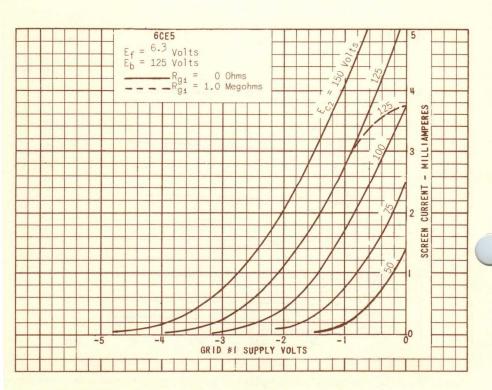
SIMILAR TIPS REFERENCE: Except for heater ratings, the 8CE5 is identical to the 3CE5 and the 4CE5.

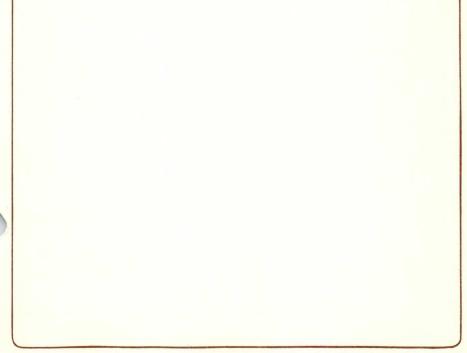
- -- INDICATES A CHANGE.
- * INDICATES AN ADDITION.









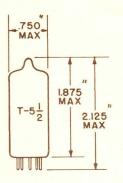




TUNG-SOL .

PENTODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

FOR

IF AND RF APPLICATIONS IN

T.V. RECEIVERS

ANY MOUNTING POSITION



BOTTOM VIEW
BASING DIAGRAM
JEDEC 7CM

GLASS BULB
MINIATURE BUTTON
7 PIN BASE E7-1
OUTLINE DRAWING

JEDEC 5-2

THE 6CF6 IS A SHARP CUT-OFF PENTODE ESPECIALLY DESIGNED FOR USE IN GAIN CONTROLLED VIDEO IF STAGES OPERATING AT FREQUENCIES IN THE ORDER OF 40 MEGACYCLES. IT IS ALSO WELL SUITED FOR USE AS AN RF AMPLIFIER IN VHF TELEVISION TUNERS. IT FEATURES CONTROLLED PLATE-CURRENT CUT-OFF AND VERY HIGH TRANSCONDUCTANCE COMBINED WITH LOW CAPACITANCE VALUES.

DIRECT INTERELECTRODE CAPACITANCES

	SHIELDA	WITHOUT	
GRID TO PLATE: (G1 TO P) MAX.	→ 0.015	→ 0.025	pf
INPUT: G1 TO (H+K+G2+G3+1.S.)	6.5	6.5	pf
OUTPUT: P TO (H+K+G2+G3+1.S.)	3.0	2.0	pf

AEXTERNAL SHIELD 316 CONNECTED TO PIN 2.

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS	300	MA.
HEATER SUPPLY LIMITS: VOLTAGE OPERATION		6.3±0.6	VOLTS
MAXIMUM HEATER CATHODE VOLTAGE:			
HEATER NEGATIVE WITH RESPECT T TOTAL DC AND PEAK	O CATHODE	→ 200	VOLTS
HEATER POSITIVE WITH RESPECT T	O CATHODE	→ 100	VOLTS
DC TOTAL DC AND PEAK		→ 200	VOLTS

- INDICATES A CHANGE.

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

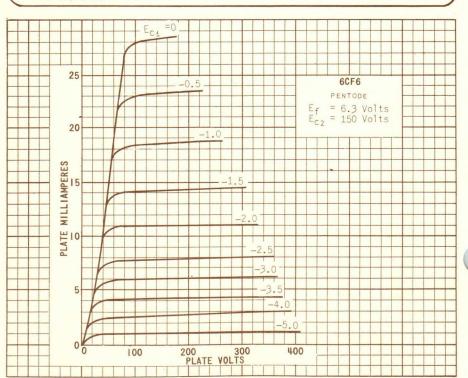
PLATE VOLTAGE	330	VOLTS
GRID #2 VOLTAGE	SEE RATING CHART	
GRID #2 SUPPLY VOLTAGE	330	VOLTS
PLATE DISSIPATION	→ 2.3	WATTS
GRID #2 DISSIPATION	0.55	WATT
POSITIVE DC GRID #1 VOLTAGE	0	VOLTS

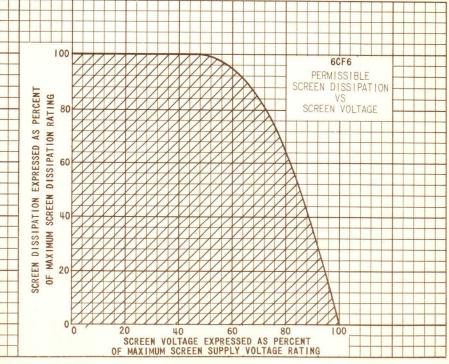
→ TYPICAL OPERATING CHARACTERISTICS

CLASS A1 AMPLIFIER

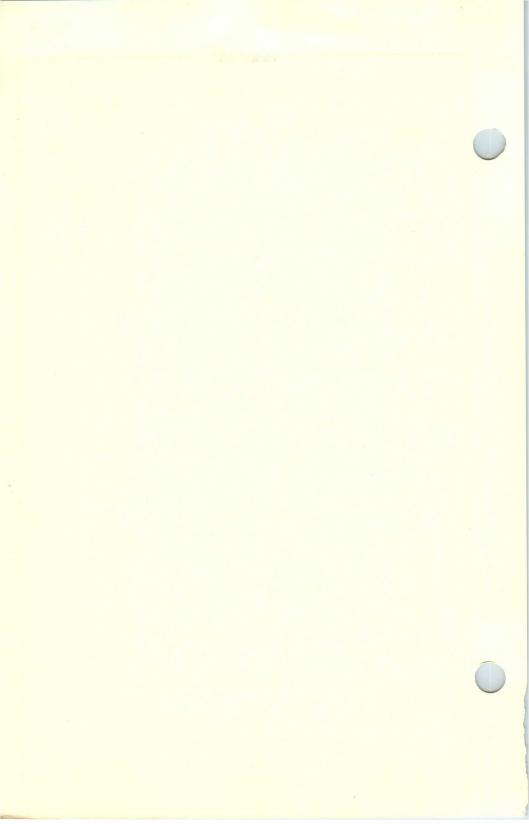
PLATE VOLTAGE		125	VOLTS
GRID #2 VOLTAGE		125	VOLTS
GRID #3 VOLTAGE	PIN 7 CONNECTED TO	PIN 2 AT SOCKET	
CATHODE BIAS RESISTOR		56	OHMS
PLATE RESISTANCE (APPROX.)	0.3	MEGOHM
TRANSCONDUCTANCE		7800	µмноs
PLATE CURRENT		12.5	MA.
GRID #2 CURRENT		3.7	MA.
GRID #1 VOLTAGE (APPROX.)	FOR 1b = $20 \mu A$	-6.0	VOLTS
PLATE CURRENT AT EC1=-3V.	, Rk =0	2.2	MA.

→ INDICATES A CHANGE.





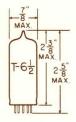
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TUNG-SOL .

DOUBLE TRIODE

MINIATURE TYPE



GLASS BULB

COATED UNIPOTENTIAL CATHODE

HEATER
6.3±10% VOLTS 0.6 AMP.
AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
SMALL BUTTON NOVAL
9 PIN BASE

THE 6CG7 IS A GENERAL PURPOSE, MEDIUM-MU TWIN TRIODE USING THE 9 PIN MINIATURE CONSTRUCTION. IT IS INTENDED PARTICULARLY FOR USE AS A VERTICAL DEFLECTION OSCILLATOR AND HORIZONTAL DEFLECTION OSCILLATOR IN TELEVISION RECEIVERS. THIS TYPE IS DESIGNED WITH A 600 MA. HEATER HAVING A CONTROLLED WARM-UP TIME TO INSURE DEPENDABLE PERFORMANCE IN TELEVISION RECEIVERS EMPLOYING A SINGLE SERIES-CONNECTED HEATER STRING INCLUDING THE HEATER OF THE PICTURE TUBE. IT MAY ALSO BE USED AS A PHASE INVERTER, MULTIVIBRATOR, SYNCHRONIZING SEPARATOR AND AMPLIFIER, AND RESISTANCE COUPLED AMPLIFIER IN ELECTRONIC EQUIPMENT.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

	UNIT 1	UNIT 2	
GRID TO PLATE: G TO P	4.0	4.0	uu f
INPUT: G TO (K+H&IS)	2.3	2.3	uu f
OUTPUT: P TO (K+H&IS)	2.2	2.2	μμf

RATINGS

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM EACH UNIT

	01.100.1	
	CLASS A1	
HEATER VOLTAGE	6.3±10% ←	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE A	200	VOLTS
MAXIMUM PLATE VOLTAGE	330 ←	VOLTS
MAXIMUM GRID VOLTAGE:		
POSITIVE BIAS VALUE	0	VOLTS
MAXIMUM PLATE DISSIPATION:	0.0	
EACH PLATE	4.0 -	WATTS
BOTH PLATES (BOTH UNITS OPERATING)	5.7 ←	WATTS
MAXIMUM CATHODE CURRENT	22 🕶	MA.
MAXIMUM GRID CIRCUIT RESISTANCE:		
FIXED BIAS OPERATION	1.0	MEGOHMS
HEATER WARM-UP TIME (APPROX.) B	11.0	SECONDS

ATHE DC COMPONENT MUST NOT EXCEED 100 VOLTS.

BHEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

CONTINUED FROM PRECEDING PAGE

RATINGS C- CONT'D INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

EACH UNIT

EACH UNIT		
	VERTICAL HORIZONTAL DEFLECTION DEFLECTION OSCILLATOR	
HEATER VOLTAGE	6.3±10% ←	VOLTS
MAXIMUM PEAK HEATER CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	200 ^D	VOLTS
MAXIMUM DC PLATE VOLTAGE	330 ← 330 ←	VOLTS
MAXIMUM NEGATIVE PULSE GRID VOLTAGE	440 ^E ← 660 ^F ←	VOLTS
MAXIMUM CATHODE CURRENT:		
PEAK	77 ← 330 ←	MA.
DC	22 - 22 -	MA.
MAXIMUM PLATE DISSIPATION:		
EACH PLATE	4.0 ← 4.0 ←	WATTS
BOTH PLATES (BOTH UNITS OPERATING)	5.7 ← 5.7 ←	WATTS
MAXIMUM GRID CIRCUIT RESISTANCE:	3.1	
FIXED BIAS, GRID—RESISTOR BIAS OR CATHODE—BIAS OPERATION	2.2 2.2	MEGOHMS
HEATER WARM-UP TIME (APPROX.) G	11.0	SECONDS

CFOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE CONCERNING TELEVISION BROADCAST STATIONS", FEDERAL COMMUNICATIONS COMMISSION.

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

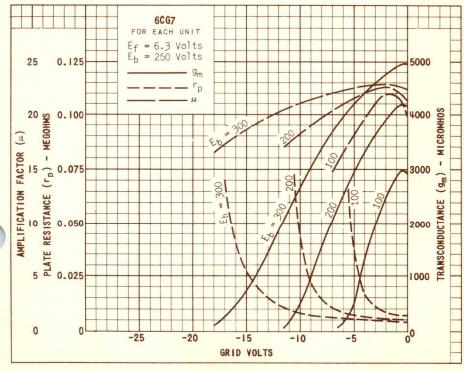
EACH UNIT HEATER VOLTAGE HEATER CURRENT	6.3±1	SS A ₁ IFIER 0%	VOLTS
PLATE VOLTAGE	90	250	VOLTS
GRID VOLTAGE	0	-8	VOLTS
AMPLIFICATION FACTOR	20	20	
PLATE RESISTANCE (APPROX.)	6700	7700	OHMS
TRANSCONDUCTANCE	3000	2600	имноs
GRID VOLTAGE (APPROX.)			
FOR $I_b = 10 \mu AMP$.	-7	-18	VOLTS
PLATE CURRENT OR GRID VOLTAGE OF -12.5 VOLTS		1.3	MA.
PLATE CURRENT	10	9	MA -

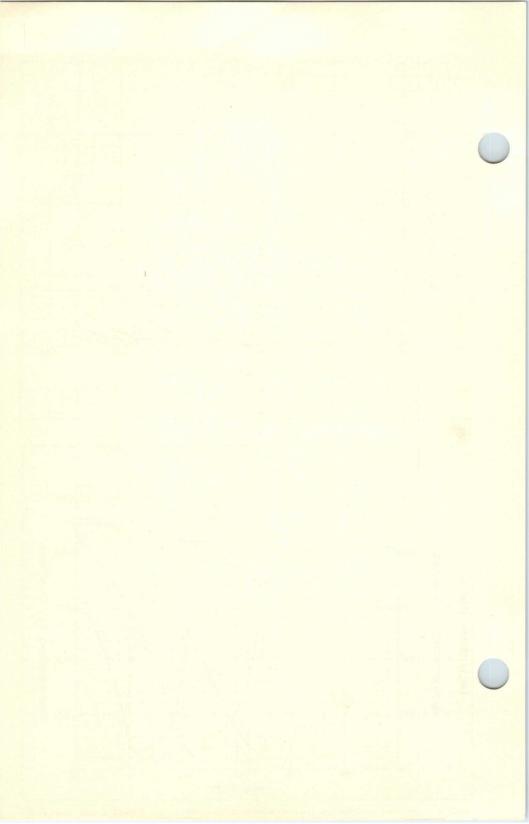
DTHE DC COMPONENT MUST NOT EXCEED 100 VOLTS.

THIS RATING IS APPLICABLE WHERE THE DURATION OF THE VOLTAGE PULSE DOES NOT EXCEED 15 PERCENT OF ONE VERTICAL SCANNING CYCLE. IN A 525-LINE, 30-FRAME SYSTEMS 15 PERCENT OF ONE VERTICAL SCANNING CYCLE IS 2-5 MILLISECONDS.

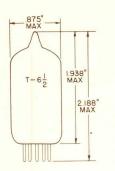
THIS RATING IS APPLICABLE WHERE THE DURATION OF THE VOLTAGE PULSE DOES NOT EXCEED 15 PERCENT OF ONE HORIZONTAL SCANNING CYCLE IN A 525-LINE, 30-FRAME SYSTEM; 15 PERCENT OF ONE HORIZONTAL SCANNING CYCLE IS 10 MICROSECONDS.

GHEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OFF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.





TUNG-SOL .



TRIODE PENTODE

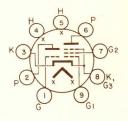
MINIATURE TYPE

UNIPOTENTIAL CATHODE

HEATER

6.3 VOLTS 450±30 MA. AC OR DC

ANY MOUNTING POSITION



BASING DIAGRAM
JEDEC 9GF

GLASS BULB MINIATURE BUTTON 9 PIN BASE E9-1 OUTLINE DRAWING JEDEC 6-2

THE 6CG8A CONTAINS A MEDIUM-MU TRIODE AND SHARP CUTOFF PENTODE IN THE 9-PIN MINI-ATURE CONSTRUCTION. IT IS DESIGNED PRIMARILY FOR USE AS A COMBINED OSCILLATOR AND MIXER IN TELEVISION RECEIVERS UTILIZING AN INTERMEDIATE FREQUENCY IN THE ORDEROF 40 MC. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SÍMILARLY CONTROLLED.

DIRECT INTERELECTRODE CAPACITANCES

GRID TO PLATE GRID TO CATHODE & HEATER GRID TO CATHODE & HEATER PLATE TO CATHODE & HEATER PENTODE UNIT: GRID %1 TO PLATE (MAX.) GRID %1 TO CATHODE & GRID %3, GRID %2, AND HEATER PLATE TO CATHODE & GRID %3, GRID %2, AND HEATER PLATE TO CATHODE & GRID %3, GRID %2, AND HEATER PENTODE GRID %4 TO TRIODE PLATE (MAX.) PENTODE PLATE TO TRIODE PLATE (MAX.) O.05 O.04 pf PENTODE PLATE TO TRIODE PLATE (MAX.) O.05 O.007 pf HEATER TO CATHODE 5.5 Pf	TD	IODE UNIT:	WITHOUT EXTERNAL SHIELD	WITH A EXTERNAL SHIELD	
GRID TO CATHODE & HEATER 2.6 3 pf PLATE TO CATHODE & HEATER 0.05 1 pf PENTODE UNIT: GRID %1 TO PLATE (MAX.) 0.03 0.016 pf GRID %1 TO CATHODE & GRID %3, GRID %2, AND HEATER 4.8 5 pf PLATE TO CATHODE & GRID %3, GRID %2, AND HEATER 0.9 1.6 pf PENTODE GRID %1 TO TRIODE PLATE (MAX.) 0.05 0.04 pf PENTODE PLATE TO TRIODE PLATE (MAX.) 0.05 0.007 pf			1.5	1.5	pf
PENTODE UNIT: GRID %1 TO PLATE (MAX.) GRID %1 TO CATHODE & GRID %3, GRID %2, AND HEATER PLATE TO CATHODE & GRID %3, GRID %2, AND HEATER PLATE TO CATHODE & GRID %3, GRID %2, AND HEATER PENTODE GRID %1 TO TRIODE PLATE (MAX.) PENTODE PLATE TO TRIODE PLATE (MAX.) O.05 O.04 pf PENTODE PLATE TO TRIODE PLATE (MAX.) O.05 O.007 pf	GR	ID TO CATHODE & HEATER	2.6	3	
GRID #1 TO PLATE (MAX.) GRID #1 TO CATHODE & GRID #3, GRID #2, AND HEATER PLATE TO CATHODE & GRID #3, GRID #2, AND HEATER PENTODE GRID #1 TO TRIODE PLATE (MAX.) PENTODE PLATE TO TRIODE PLATE (MAX.) O.05 O.04 pf PENTODE PLATE TO TRIODE PLATE (MAX.) O.05 O.07 pf	PL	ATE TO CATHODE & HEATER	0.05	1	
GRID #1 TO CATHODE & GRID #3, GRID #2, AND HEATER 4.8 5 pf PLATE TO CATHODE & GRID #3, GRID #2, AND HEATER 0.9 1.6 pt PENTODE GRID #1 TO TRIODE PLATE (MAX.) 0.05 0.04 pf PENTODE PLATE TO TRIODE PLATE (MAX.) 0.05 0.007 pf	000		0.03	0.036	
GRID #2, AND HEATER 4.8 5 pf PLATE TO CATHODE & GRID #3, GRID #2, AND HEATER 0.9 1.6 pf PENTODE GRID #1 TO TRIODE PLATE (MAX.) 0.05 0.04 pf PENTODE PLATE TO TRIODE PLATE (MAX.) 0.05 0.007 pf			0.03	0.016	55
PLATE TO CATHODE & GRID #3, GRID #2, AND HEATER PENTODE GRID #1 TO TRIODE PLATE (MAX.) PENTODE PLATE TO TRIODE PLATE (MAX.) 0.05 0.007 pf				-	
GRID \$2, AND HEATER PENTODE GRID \$4 TO TRIODE PLATE (MAX.) PENTODE PLATE TO TRIODE PLATE (MAX.) 0.05 0.007 pf		The state of the s	4.8	5	P1
PENTODE GRID \$4 TO TRIODE PLATE (MAX.) 0.05 0.04 pf PENTODE PLATE TO TRIODE PLATE (MAX.) 0.05 0.007 pf			0.9	1.6	pi
B			0.05	0.04	pf
HEATER TO CATHODE 5.5 5.5 ^B pf			0.05	0.007	pf
	HE	ATER TO CATHODE	5.5	5.5 ⁸	pf

A .IT- EXTERNAL SHIELD #315 CONNECTED TO CATHODE. AITH EXTERNAL SHIELD #315 CONNECTED TO GROUND.

→ MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE ELA STANDARD RS-239

PENTODE PLATE VOLTAGE	275	VOLTS
TRIODE PLATE VOLTAGE	275	VOLTS
GRID #2 SUPPLY VOLTAGE	275	VOLTS
GRID #2 VOLTAGE	SEE J5-C4-2	
PENTODE PLATE DISSIPATION	2.3	WATTS
GRID #2 DISSIPATION:		
FOR GRID #2 VOLTAGES UP TO 137.5 V.	0.45	WATTS
FOR GRID #2 VOLTAGES BETWEEN 137.5 & 275 V.	SEE J5-C4-2	

CONTINUED ON FOLLOWING PAGE

- INDICATES A CHANGE.

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS - cont'd. DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

POSITIVE DC PENTODE GRID #1 VOLTAGE	0	VOL TS
POSITIVE DC TRIODE GRID VOLTAGE	0	VOLTS
TRIODE PLATE DISSIPATION	1.7	WATTS
HEATER-CATHODE VOLTAGE;		
HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC	100	VOLTS
TOTAL DC AND PEAK	200	VOLTS
HEATER WARM-UP TIME	11	SECONDS

HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACHOSS THE HEAFER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS TYPICAL OPERATION

	TRIODE UNITE AS 250-MC OSCILLATOR	PENTODE D AS UNIT MIXER	
PLATE VOLTAGE	150	150	VOLTS
GRID #2 VOLTAGE		150	VOLTS
MIXER GRID #1 SUPPLY VOLTAGE		-3.5	VOLTS
OSCILLATOR VOLTAGE AT MIXER GRID #1 (RMS)	-	2.6	VOLTS
MIXER GRID #1 CIRCUIT RESISTANCE		120 000	OHMS
OSCILLATOR GRID RESISTOR	2700		OHMS
CONVERSION TRANSCONDUCTANCE		2 100	μMHOS.
PLATE CURRENT	13	6.2	MA.
GRID #2 CURRENT		1.8	MA.
GRID #1 CURRENT	3.6		MA.
GRID #4 CURRENT		2	MAMP
OSCILLATOR POWER OUTPUT (APPROX.)	0.5		WATT
MAXIMUM CIRCUIT VALUES: GRID #1 CIRCUIT RESISTANCE:			
FOR FIXED-BIAS OPERATION (MAX.)	0	.]	MEGOHM

CHARACTERISTICS

0.5

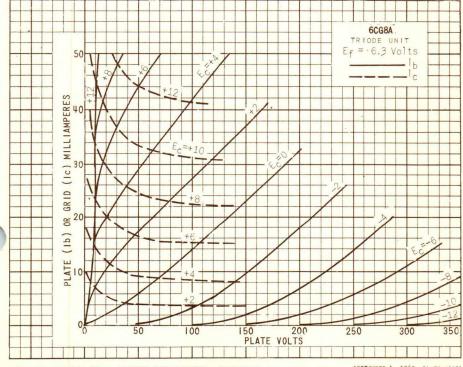
MEGOHM

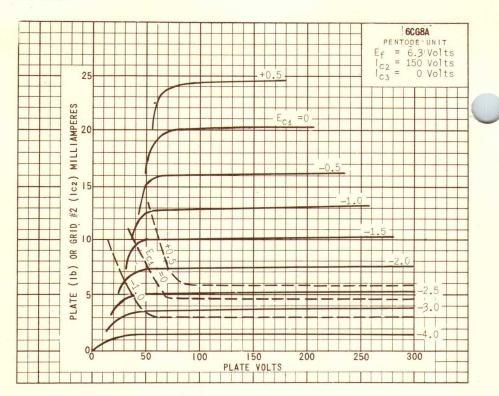
	TRIODE	PENTODE	
PLATE VOLTAGE	100	250	VOLTS
GRID #2 VOLTAGE		150	VOLTS
CATHODE—BIAS RESISTOR AMPLIFICATION FACTOR	100	200	OHMS
PLATE RESISTANCE (APPROX.) TRANSCONDUCTANCE	6900 5800	750 000 4 600	OHMS
GRID #1 VOLTAGE (APPROX.)	9800	4 000	μMHOS
FOR PLATE CURRENT OF 10 MAMP	-10	-10	VOLTS
PLATE CURRENT GRID #2 CURRENT	8.5	7.7 1.6	MA.

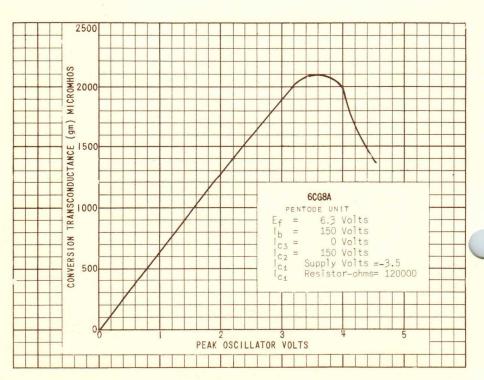
DWITH SEPARATE EXCITATION AND TRIODE UNIT GROUNDED.

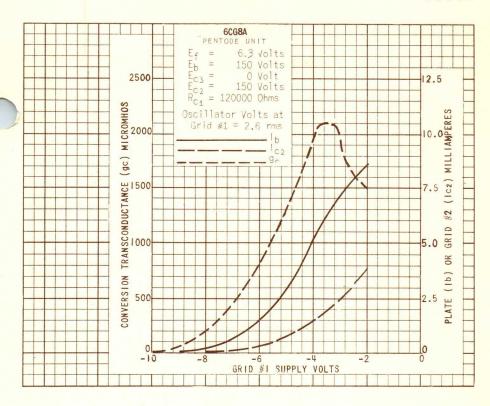
FOR CATHODE-BIAS OPERATION (MAX.)

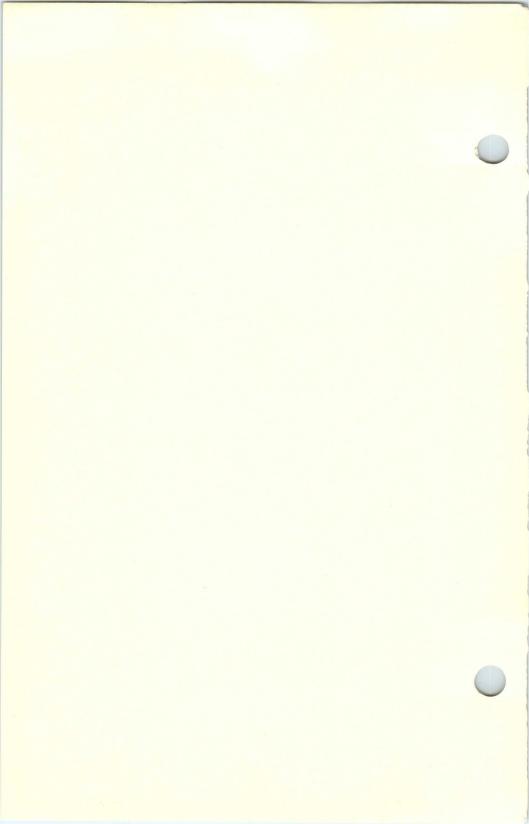
E IN TV OR FM RECEIVERS, IT IS GENERALLY DESIRABLE TO OPERATE THE OSCILLATOR WITH LESS POWER INPUT THAN SHOWN IN THE TABULATED DATA IN ORDER TO AVOID OVER-EXCITATION AND EXCESSIVE OSCILLATOR RADIATION.











T-6 & MAX

GLASS BULB

TUNG-SOL -

TWIN TRIODE

MINIATURE TYPE

COATED UNIPOTENTIAL CATHODE

6.3 VOLTS 0.4 AMP.
AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

SMALL BUTTON
9 PIN BASE
9FC

BECAUSE OF THE CONNECTION OF THE INTERNAL SHIELD, SECTION 1 (PINS 6, 7, 8, AND 9) NUST BE USED AS THE INPUT OR GROUNDED-CATHODE SECTION.

THE 6CH7 IS A MEDIUM MU TWIN TRIODE IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED PRIMARILY FOR USE AS A CASCODE RF AMPLIFIER IN VHF TELE-VISION TUNERS. THE ELECTRICAL CHARACTERISTICS OF THE TUBE ARE ESSENTIALLY EQUIVALENT TO THOSE OF THE 6BZ7 FROM WHICH IT DIFFERS PRIMARILY IN BASING. BECAUSE OF THE REVISED BASING, THE 6CH7 EXHIBITS AN IMPROVED NOISE FIGURE IN CASCODE SERVICE.

DIRECT INTERELECTRODE CAPACITANCES WITH EXTERNAL SHIELD #315 CONNECTED TO HEATER UNLESS OTHERWISE SPECIFIED

	SECTION #1	SECTION #2	
GRID TO PLATE	1.1	µ	щf
INPUT	2.4	µ	щf
OUTPUT	0.8		щf
HEATER TO CATHODE	2.8 ^A	2.8 ^A µ	шf
GRID TO GRID (MAX.)	0.1	.5 µ	цц f
PLATE TO PLATE (MAX.)	0.01	.5 µ	щf
PLATE TO CATHODE (MAX.)	0.15	0.15 µ	щf
GROUNDED-GRID INPUT		5.5 µ	щf
GROUNDED-GRID OUTPUT		2.2 µ	щf

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM EACH SECTION

HEATER VOLTAGE	6.3	VOLTS
MAXIMUM PLATE VOLTAGE	250B	VOLTS
MAXIMUM NEGATIVE DC GRID VOLTAGE	50	VOLTS
MAXIMUM PLATE DISSIPATION	2.0	WATTS
MAXIMUM DC CATHODE CURRENT	20	MA.
MAXIMUM HEATER—CATHODE VOLTAGE HEATER POSITIVE WITH RESPECT TO CATHODE DC COMPONENT	100	VOLTS
TOTAL DC AND PEAK	200	VOL TS
	200	VOLIS
HEATER NEGATIVE WITH RESPECT TO CATHODE TOTAL DC AND PEAK	200 B	VOLTS
MAXIMUM GRID CIRCUIT RESISTANCE	0.5	MEGOHMS

AWITH EXTERNAL SHIELD #315 CONNECTED TO GROUND.

BTHIS RATING MAY BE AS HIGH AS 300 VOLTS MAXIMUM UNDER CUTOFF CONDITIONS WHEN THE TUBE IS USED AS A CASCODE AMPLIFIER AND THE TWO SECTIONS ARE CONNECTED IN SERIES.

⁻ INDICATES A CHANGE.

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER - EACH SECTION

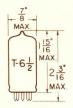
CEASS AT AMPETITEM EACH SECTION	Oli	
HEATER VOLTAGE	6.3	VOLTS
HEATER CURRENT	0.4	AMP.
PLATE VOLTAGE	150	VOLTS
CATHODE-BIAS RESISTOR	220	OHMS
AMPLIFICATION FACTOR	36	
PLATE RESISTANCE (APPROXIMATE)	5 300	OHMS
TRANSCONDUCTANCE	6 800	MHOS
PLATE CURRENT	10	MA.
GRID VOLTAGE (APPROXIMATE) Ib=100 HAMP.	-7	VOLTS

SIMILAR TYPE REFERENCE: 6BZ7

- TUNG-SOL

TRIODE-PENTODE

MINIATURE TYPE



GLASS BULB

UNIPOTENTIAL CATHODE

HEATER

6.3 VOLTS 0.45 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

SMALL-BUTTON NOVAL 9 PIN BASE

9FT

THE 6CH8 IS A GENERAL PURPOSE MULTIUNIT TUBE OF THE 9 PIN MINIATURE CONSTRUCTION CONTAINING A MEDIUM MU TRIODE AND SHARP CUTOFF PENTODE IN ONE ENVELOPE. IT IS INTENDED FOR A WIDE VARIETY OF APPLICATIONS IN BLACK AND WHITE AND COLOR TELEVISION RECEIVERS. THE PENTODE UNIT MAY BE USED AS AN INTERMEDIATE FREQUENCY AMPLIFIER, VIDEO AMPLIFIER, AGC AMPLIFIER AND AS A REACTANCE TUBE WHILE THE TRIODE UNIT IS WELL SUITED FOR USE IN LOW-FREQUENCY OSCILLATOR, SYNC-SEPARATOR, SYNC-CLIPPER, AND PHASE-SPLITTER CIRCUITS.

DIRECT INTERELECTRODE CAPACITANCES

TRIODE UNIT:		
GRID TO PLATE	1.6	μμ f
GRID TO CATHODE, HEATER & GRID #3		
AND INTERNAL SHIELD	1.9	μμ f
PLATE TO CATHODE, HEATER & GRID #3	. (
AND INTERNAL SHIELD	1.6	μμ f
PENTODE UNIT:		
GRID #1 TO PLATE (MAX.)	0.025	μμ f
GRID #1 TO HEATER & INTERNAL SHIELD &		
GRID #3, GRID #2, & CATHODE	7	μμ f
PLATE TO HEATER & INTERNAL SHIELD &		
GRID #3, GRID #2, & CATHODE	2.25	µµ f
PENTODE GRID #1 TO TRIODE PLATE	0.02	μμ f
PENTODE PLATE TO TRIODE PLATE	0.04	µµ f
TRIODE GRID TO PENTODE PLATE	0.005	μμ f

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

CLASS A1 AMPLIFIER

	TRIODE	PENTODE
HEATER VOLTAGE	6.3	6.3 VOLTS
MAXIMUM PLATE VOLTAGE	300	300 VOLTS
MAXIMUM GRID #3 VOLTAGE		
POSITIVE VALUE		0 VOLTS
MAXIMUM GRID #2 SUPPLY VOLTAGE		300 VOLTS
MAXIMUM GRID #2 (SCREEN) VOLTAGE		SEE FIGURE #1

CONTINUED FROM PRECEDING PAGE

$\begin{array}{c} \textbf{RATINGS} \ - \ \texttt{CONT}^{\, \text{I}} \, \texttt{D} \\ \texttt{INTERPRETED} \ \ \texttt{according} \ \ \texttt{TO} \ \ \texttt{DESIGN} \ \ \texttt{CENTER} \ \ \texttt{SYSTEM} \end{array}$

CLASS A7 AMPLIFIER

	TRIODE	PENTODE	
MAXIMUM GRID #1 (CONTROL-GRID) VOLTAGE:			
POSITIVE BIAS VALUE	0	0	VOLTS
MAXIMUM PLATE DISSIPATION	2.6	2 1	WATTS
MAXIMUM GRID #2 INPUT:			
FOR GRID #2 VOLTAGES UP TO 150 VOLTS		0.5 V	TTAW
FOR GRID #2 VOLTAGES BETWEEN 150 & 300V. MAXIMUM PEAK HEATER—CATHODE VOLTAGE:		SEE FIGURE 1	
HEATER NEGATIVE WITH RESPECT TO CATHODE	200	A	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE MAXIMUM GRID #4 CIRCUIT RESISTANCE:*	200 ^B	0	VOLTS
FOR CATHODE-BIAS OPERATION	1.0	1.0	MEGOHM
FOR FIXED-BIAS OPERATION	0.5	0.25 N	MEGOHM

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS CLASS ${\sf A}_{\top}$ AMPLIFIER

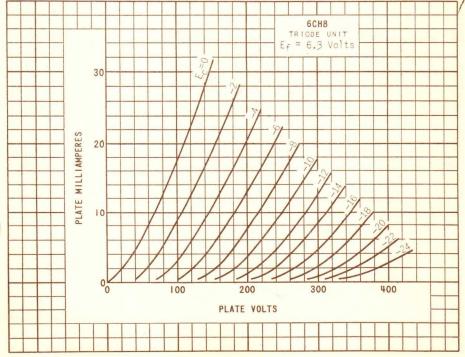
UNIT UNIT	
HEATER VOLTAGE 6.3 6.3	OLTS
HEATER CURRENT 0.45 A	MP.
PLATE SUPPLY VOLTAGE 200 v	OLTS
GRID #3 SUPPLY VOLTAGE O V	OLTS
GRID #2 SUPPLY VOLTAGE 150 V	OLTS
GRID #1 VOLTAGE -6 V	OLTS
CATHODE-BIAS RESISTOR 180 Q	HMS
AMPLIFICATION FACTOR 19	
PLATE RESISTANCE (APPROX.) 5 750 300 000 0	HMS
	MHOS
GRID #4 VOLTAGE (APPROX.) FOR	
PLATE CURRENT OF 10 HAMP -19 -8 V	OLTS
	1A .
GRID #2 CURRENT 2.8 N	1A .

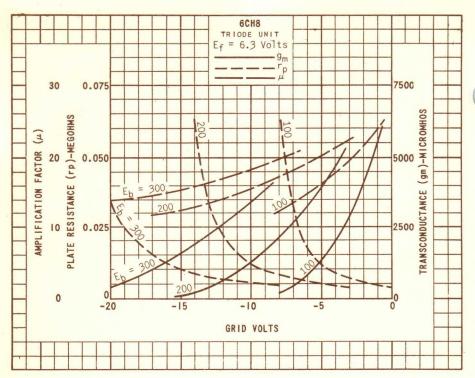
A
THE HEATER-CATHODE VOLTAGE SHOULD NOT EXCEED THE VALUE OF THE OPERATING CATHODE BIAS BECAUSE
THE VOLTAGE BETWEEN THE HEATER AND CATHODE IS ALSO APPLIED BETWEEN THE CATHODE AND GRID #3.
THE NET RESULT IS TO MAKE GRID #3 NEGATIVE WITH RESPECT TO CATHODE WITH POSSIBLE CHANGE IN
TUBE CHARACTERISTICS.

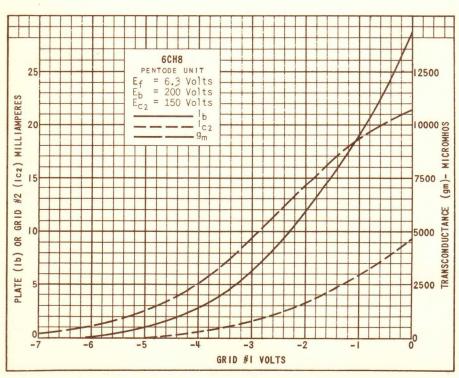
B_{THE DC} COMPONENT MUST NOT EXCEED 100 VOLTS.

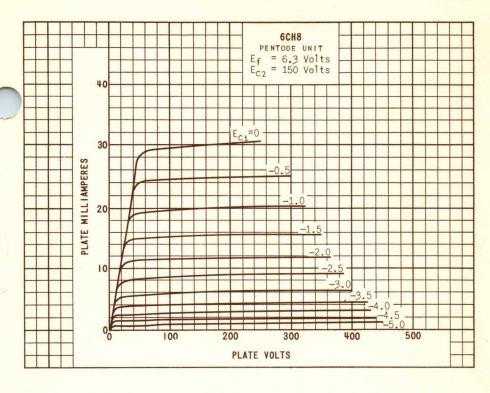
^{*}IF EITHER UNIT IS OPERATED AT MAXIMUM RATED CONDITIONS, GRID-#1-CIRCUIT RESISTANCE FOR BOTH
UNITS SHOULD NOT EXCEED THE STATED VALUES.

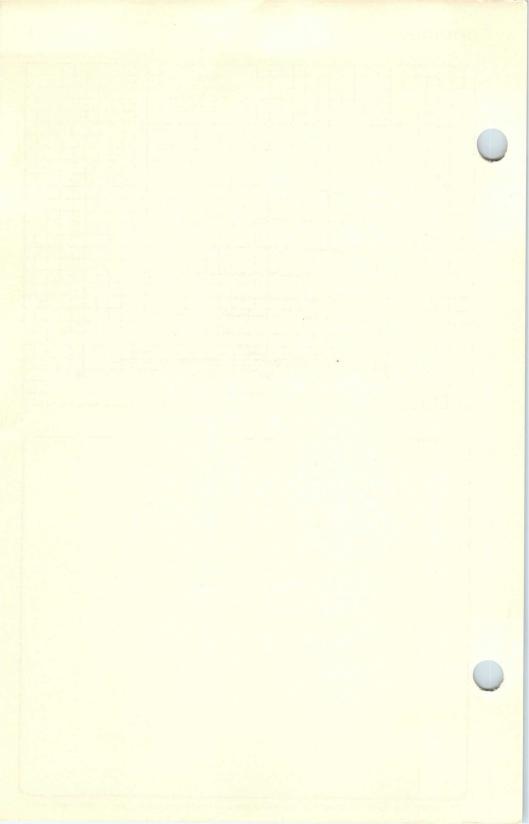
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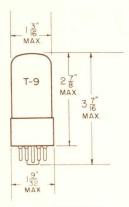








TRIODE



COATED UNIPOTENTIAL CATHODE

HEATER
6.3 VOLTS 1.25 AMP.
AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

SHORT INTERMEDIATE SHELL 6 PIN OCTAL BJB

GLASS BULB

THE 6CK4 IS A LOW MU TRIODE INTENDED FOR USE PRIMARILY AS A VERTICAL DEFLECTION AMPLIFIER IN TELEVISION RECEIVERS. CONTAINED IN A T-9 EN-VELOPE, THE TUBE HAS A HIGH ZERO-BIAS PLATE CURRENT.

DIRECT INTERELECTRODE CAPACITANCES

GRID TO PLATE (G TO P)	6,5	HH f
INPUT: G TO (H+K)	8.0	μμf
OUTPUT: P TC (H+K)	1.8	μμf

RATINGSA INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM VERTICAL DEFLECTION AMPLIFIER^B

HEATER VOLTAGE	6.3	VOLTS
MAXIMUM DC PLATE VOLTAGE	550	VOLTS
MAXIMUM PEAK POSITIVE PULSE PLATE VOLTAGE (ABS. MAX.)	2 000	VOLTS
MAXIMUM PEAK NEGATIVE PULSE GRID VOLTAGE	250	VOLTS
MAXIMUM PLATE DISSIPATIONC	12.0	WATTS
MAXIMUM AVERAGE CATHODE CURRENT	100	MA -
MAXIMUM PEAK CATHODE CURRENT	350	MA.
MAXIMUM GRID CIRCUIT RESISTANCE		
SELF BIAS	2.2	MEGOHMS
MAXIMUM HEATER-CATHODE VOLTAGE		
HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC	100	VOLTS
TOTAL DC AND PEAK	200	VOLTS

TUNG-SOL .

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

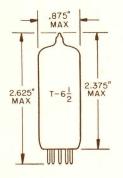
HEATER VOLTAGE	6.3	VOLTS
HEATER CURRENT	1.25	AMP.
PLATE VOLTAGE	250	VOLTS
GRID #1 VOLTAGE	-28 ←	VOLTS
PLATE CURRENT	40 ←	MA.
TRANSCONDUCTANCE	5 500 ←	µмноs
AMPLIFICATION FACTOR	6.6←	
PLATE RESISTANCE (APPROX.)	1 200 ←	OHMS
GRID VOLTAGE FOR Ih = 0.5 MA.	-50	VOLTS
PLATE CURRENT AT E =- 38 Vdc.	10	MA.
ZERO BIAS PLATE CURRENT: Eb =100 V;		
Ec = O (INSTANTANEOUS VALUES)	125	MA -

- INDICATES A CHANGE.

A DESIGN-MAXIMUM RATINGS ARE THE LIMITING VALUES EXPRESSED WITH RESPECT TO BOGIE TUBES AT WHICH SATISFACTORY TUBE LIFE CAN BE EXPECTED TO OCCUR. TO OBTAIN SATISFACTORY CIRCUIT DERFORMANCE, THEREFORE, THE EQUIPMENT DESIGNER MUST ESTABLISH THE CIRCUIT DESIGN SO THAT NO DESIGN-MAXIMUM VALUE IS EXCEEDED WITH A BOGIE TUBE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, AND ENVIRONMENTAL CONDITIONS.

B FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE.

C IN STAGES OPERATING WITH GRID LEAK BIAS, AN ADEQUATE CATHODE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.



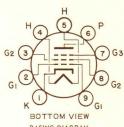
FOR

USE IN VIDEO STAGE

OF TV RECEIVERS

COATED UNIPOTENTIAL CATHODE

ANY MOUNTING POSITION



BASING DIAGRAM JEDEC 9BV

GLASS BULB SMALL BUTTON 9 PIN NOVAL E9-1 OUTLINE DRAWING JEDEC 6-3

THE 6CL6 IS A POWER PENTODE USING THE 9 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED ESPECIALLY FOR USE IN THE FINAL VIDEO STAGE OF TELEVISION RECEIVERS. FEATURES OF THIS TUBE ARE LOW CAPACITANCES AND HIGH OUTPUT CAPABILITY. IT IS ALSO USEFUL AS A WIDE-BAND AMPLIFIER TUBE IN INDUSTRIAL AND LABORATORY EQUIPMENT.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

GRID 1 TO PLATE	0.12	pf
INPUT	11	pf
OUTPUT	5.5	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN CENTER VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS 6.3 VOLTS 650

MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE	→100	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	—>100	VOLTS

MAXIMUM RATINGS

→ DESIGN CENTER VALUES - SEE EIA STANDARD RS-239

PLATE VOLTAGE	300	VOLTS
GRID 3 VOLTAGE	0	VOLTS
GRID 2 SUPPLY VOLTAGE	300	VOLTS
GRID 2 VOLTAGE	→150	VOLTS

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS - CONT'D. → DESIGN CENTER VALUES - SEE EIA STANDARD RS-239

GRID 1 VOLTAGE:		
POSITIVE BIAS VOLTAGE	0	VOLTS
NEGATIVE BIAS VOLTAGE	50	VOLTS
PLATE DISSIPATION	7.5	WATTS
GRID 2 INPUT	1.7	WATTS
BULB TEMPERATURE AT HOTTEST POINT ON BULB SURFACE	200°	C
GRID 1 CIRCUIT RESISTANCE *		
FOR FIXED BIAS OPERATION	0.1	MEGOHM
FOR CATHODE BIAS OPERATION	0.5	MEGOHM

TYPICAL OPERATING CHARACTERISTICS

CLASS A1 AMPLIFIER

PLATE VOLTAGE		250	VOLTS
GRID 3 VOLTAGE - CONNECTED TO CATHODE AT SO	CKET		
GRID 2 VOLTAGE		150	VOLTS
GRID 1 VOLTAGE		-3	VOLTS
PEAK AF GRID 1 SIGNAL VOLTAGE		3	VOLTS
ZERO SIGNAL DC PLATE CURRENT		30	MA.
MAXIMUM SIGNAL DC PLATE CURRENT		31	MA.
ZERO SIGNAL DC GRID 2 CURRENT		7	MA.
MAXIMUM SIGNAL DC GRID 2 CURRENT		7.2	MA.
PLATE RESISTANCE	(APPROX.)	0.9 ←	MEGOHMS
TRANSCONDUCTANCE		11,000	μ MHOS
LOAD RESISTANCE		7,500	OHMS
TOTAL HARMONIC DISTORTION		8	PERCENT
MAXIMUM SIGNAL POWER OUTPUT		2.8	WATTS
GRID 1 VOLTAGE FOR PLATE CURRENT OF 10 HAMP.	(APPROX.)	-14	VOLTS

4 MC. BANDWIDTH VIDEO AMPLIFIER

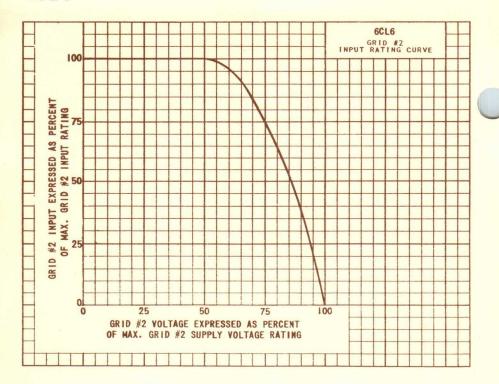
PLATE SUPPLY VOLTAGE	300	VOLTS
GRID 3 VOLTAGE - CONNECTED TO CATHODE AT SOCKET		
GRID 2 SUPPLY VOLTAGE	300	VOLTS
GRID 1 BIAS VOLTAGE	-2	VOLTS
PEAK TO PEAK GRID 1 SIGNAL VOLTAGE	3	VOLTS
GRID 2 RESISTOR	24,000	OHMS
GRID 1 RESISTOR	0.1	MEGOHM
LOAD RESISTOR	3,900	OHMS
ZERO SIGNAL PLATE CURRENT	30	MA.
ZERO SIGNAL GRID 2 CURRENT	7.0	MA.
PEAK TO PEAK VOLTAGE OUTPUT	132	VOLTS

^{-&}gt; INDICATES A CHANGE.

^{*} INDICATES AN ADDITION.

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PLATE 3021 SEPT. 1 1952



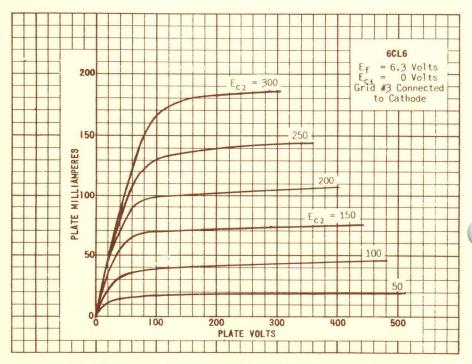
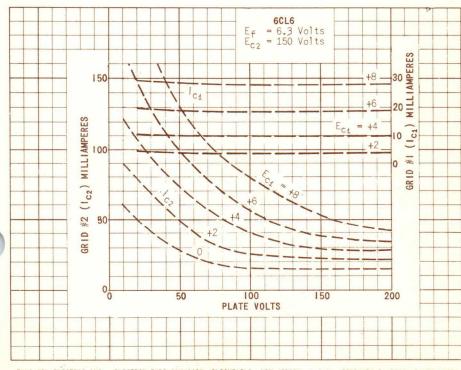
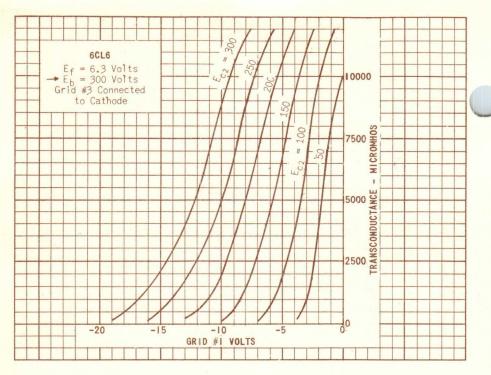
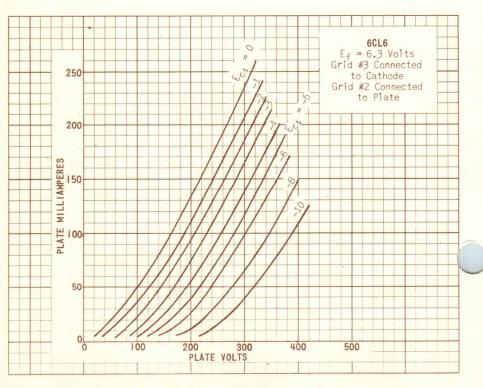


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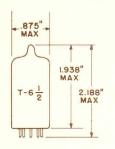






TRIODE PENTODE

MINIATURE TYPE

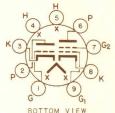


COATED UNIPOTENTIAL CATHODE

FOR

VHF TELEVISION TUNER
APPLICATIONS

ANY MOUNTING POSITION



BASING DIAGRAM
JEDEC 9FX

GLASS BULB
MINIATURE BUTTON
9 PIN BASE E9-1
OUTLINE DRAWING
JEDEC 6-2

THE 6CL8A IS A SHARP CUTOFF TETRODE AND MEDIUM-MU TRIODE IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS INTENDED FOR USE, PRIMARILY AS A COMBINED TRIODE OSCILLATOR AND TETRODE MIXER IN VHF TELEVISION TUNERS. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED. IT IS UNILATERALLY INTERCHANGEABLE, BOTH ELECTRICALLY AND MECHANICALLY, WITH THE 6CL8 AND DIFFERS PRIMARILY FROM THE 6CL8 IN HAVING A TETRODE SECTION WITH LOWER GRID-PLATE CAPACITANCE AND HIGHER TRANSCONDUCTANCE. EXCEPT FOR HEATER RATINGS, THE 6CL8A IS IDENTICAL TO THE 5CL8A.

→ DIRECT INTERELECTRODE CAPACITANCES

	pf pf
GRID #1 TO PLATE: (G1 TO P) (MAX.) 0.01 0.02 INPUT: G1 TO (K+G2+H+I.S.) 5.0 5.0	
OUTPUT: P TO (K+G2+H+1.S.) 3.0 2.0 CATHODE TO HEATER: (K TO H) 3.0 3.0	pf pf
TRIODE:	
GRID TO PLATE: (G TO P) 1.8 1.8 INPUT: G TO (TK+TEK+H+1.S.) 2.8 2.8	pf pf
OUTPUT: G TO (TK+TEK+H+1.S.) 2.0 1.5 CATHODE TO HEATER: (TK TO H) 3.0 ^B 3.0	pf pf
TETRODE GRID #4 TO TRIODE PLATE	
(TEG1 TO TP) (MAX.) 0.01 0.015 TETRODE PLATE TO TRIODE PLATE	pf
(TEP TO TP) (MAX.) 0.03 0.15	pf

A EXTERNAL SHIELD #315 CONNECTED TO PIN #4.

 $^{^{\}mbox{\footnotesize B}}_{\mbox{\footnotesize EXTERNAL}}$ shield *315 CONNECTED TO PIN *6.

CONTINUED FROM PRECEDING PAGE

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS	450	MA.
HEATER SUPPLY LIMITS: CURRENT OPERATION		450±27	MA.
MAXIMUM HEATER-CATHODE VOLTAGE			
HEATER NEGATIVE WITH RESPECT TOTAL DC AND PEAK	TO CATHODE	200	VOLTS
HEATER POSITIVE WITH RESPECT	TO CATHODE	100	
TOTAL DC AND PEAK		200	VOLTS
HEATER WARM-UP TIMEA		11	SECONDS

→ MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

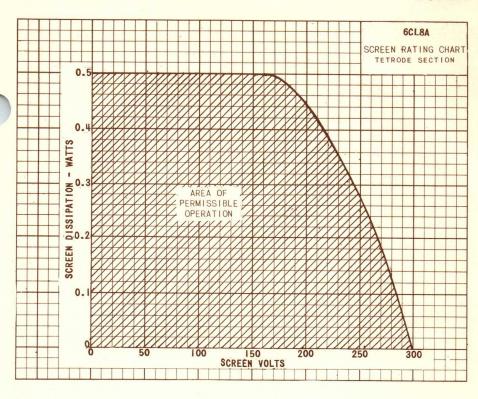
TETRODE PLATE VOLTAGE			330	VOLTS
TRIODE PLATE VOLTAGE			330	VOLTS
GRID #2 SUPPLY VOLTAGE			330	VOLTS
GRID #2 VOLTAGE	SEE	RATING	CHART	
TETRODE PLATE DISSIPATION			3.0	WATTS
GRID #2 DISSIPATION			0.55	WATT
POSITIVE DC TETRODE GRID #1 VOLTAGE			0	VOLTS
POSITIVE DC TRIODE GRID VOLTAGE			0	VOLTS
TRIODE PLATE DISSIPATION			2.5	WATTS
TETRODE GRID #1 CIRCUIT RESISTANCE:				
FIXED BIAS			0.25	MEGOHM
CATHODE BIAS			1.0	MEGOHM
TRIODE GRID CIRCUIT RESISTANCE:				
FIXED BIAS			0.5	MEGOHM
CATHODE BIAS			1.0	MEGOHM

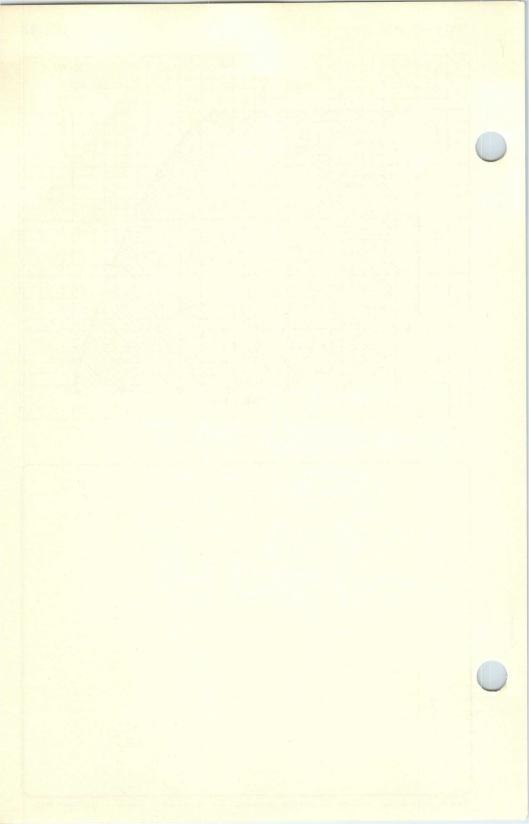
→ TYPICAL OPERATING CHARACTERISTICS

CLASS A1 AMPLIFIER

	TRIODE	TETRODE	
PLATE VOLTAGE	125	125	VOLTS
GRID #2 VOLTAGE		125	VOLTS
GRID #1 VOLTAGE	-1.0	-1.0	VOLTS
TRANSCONDUCTANCE	8000	6500	µмноѕ
PLATE CURRENT	14.0	12.0	MA.
GRID #2 CURRENT		4.0	MA.
PLATE RESISTANCE (APPROX.)	5000Ω	0.2	MEGOHM
AMPLIFICATION FACTOR	40		
GRID #1 VOLTAGE (APPROX.) FOR Ib=20 μ A	-9	-9	VOLTS
ZERO BIAS TRANSCONDUCTANCE (WITH Eb = 100 v, Ec2 = 70 v.)		7000	µмноs

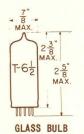
A MEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES THE RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE MEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.





BEAM PENTODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER

6.3 VOLTS 0.45 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
9 PIN BASE

9CK

TRIODE

THE 6CM6 IS A BEAM POWER AMPLIFIER USING THE 9 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED FOR SERVICE AS A GENERAL PURPOSE AUDIO POWER AMPLIFIER OR VERTICAL DEFLECTION AMPLIFIER IN TELEVISION RECEIVER SWEEP CIRCUITS.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

GRID TO PLATE: G TO P	0.7	μμf
INPUT: G4 TO (H+K+G2&G3)	8.0	μμf
OUTPUT: P TO (H+K+G2&G3)	8.5	μμf

RATINGS^A INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

VERTICAL DEFLECTION AMPLIFIERB

	CONNECTION	CONNECTION	
HEATER VOLTAGE	6.3	6.3	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE:			
HEATER POSITIVE DC	100	100	VOLTS
TOTAL DC AND PEAK HEATER NEGATIVE	200	200	VOLTS
TOTAL DC AND PEAK	200	200	VOLTS
MAXIMUM PEAK POSITIVE PLATE VOLTAGE (ABSOLUTE MAX.		2	KV.
MAXIMUM DC GRID #2 VOLTAGE	285		VOLTS
MAXIMUM PLATE DISSIPATIONC	8	→ 9.0	WATTS
MAXIMUM GRID #2 DISSIPATIONC	1.75		WATTS
MAXIMUM PEAK NEGATIVE GRID #1 VOLTAGE	250	250	VOLTS
MAXIMUM AVERAGE CATHODE CURRENT	40	40	MA.
MAXIMUM PEAK CATHODE CURRENT	120	120	MA .
MAXIMUM GRID #1 CIRCUIT RESISTANCE (CATHODE BIAS)	2.2	2.2	MEGOHMS

ATHESE ARE DESIGN CENTER VALUES EXCEPT WHERE ABSOLUTE MAXIMUM IS INDICATED.

CLASS A1 AMPLIFIER

MAXIMUM PLATE VOLTAGE	315	VOLTS
MAXIMUM GRID #2 VOLTAGE	285	VOLTS
MAXIMUM PLATE DISSIPATION	12	WATTS
MAXIMUM GRID #2 DISSIPATION	2	WATTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE		
FIXED BIAS	0.1	MEGOHM
CATHODE BAAS	0.5	MEGOHM

BFOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE CONCERNING TELEVISION BROADCASTING STATIONS: FEDERAL COMMUNICATIONS COMMISSION". THE DUTY CYCLE OF THE VOLTAGE PULSE IS NOT TO EXCEED 15% OF ONE SCANNING CYCLE.

C IN STAGES OPERATING WITH A GRID-LEAK BIAS, AN ADEQUATE CATHODE-BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

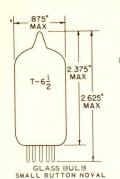
CLASS A1 AMPLIFIER - SINGLE TUBE

6.3	6.3	6.3	VOLTS
0.45	0.45	0.45	AMP.
180	250	315	VOLTS
180	250	225	VOLTS
-8.5	-12.5	-13.0	VOLTS
8.5	12.5	13.0	VOLTS
29	45	34	MA.
30	47	35	MA.
3.0	4.5	2.2	MA.
4.0	7.0	1000	MA .
50	50	80	KILOHMS
3 700	4 100	3 750	имноs
5 500	5 000	8 500	OHMS
2.0	4.5	5.5	WATTS
8	8	12	PERCENT
	0.45 180 180 -8.5 8.5 29 30 3.0 4.0 50 3.700 5.500 2.0	0.45 0.45 180 250 180 250 -8.5 -12.5 8.5 12.5 29 45 30 47 3.0 4.5 4.0 7.0 50 50 3 700 4 100 5 500 5 000 2.0 4.5	0.45 0.45 0.45 180 250 315 180 250 225 -8.5 -12.5 -13.0 8.5 12.5 13.0 29 45 34 30 47 35 3.0 4.5 2.2 4.0 7.0 6.0 50 80 3 700 4 100 3 750 5 500 5 000 8 500 2.0 4.5 5.5

TRIODE CONNECTED*

PLATE VOLTAGE	250	VOLTS
GRID VOLTAGE	-12.5	VOLTS
PLATE CURRENT	49.5	MA.
TRANSCONDUCTANCE	5 000	MHOS
AMPLIFICATION FACTOR	9.8	
PLATE RESISTANCE (APPROX.)	1 960	OHMS
GRID VOLTAGE (APPROX.) FOR Ib = 0.5 MA	-37	VOLTS

^{*}INDICATES AN ADDITION.



9 PIN BASE E9-1 OUTLINE DRAWING

DOUBLE TRIODE MINIATURE TYPE

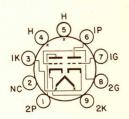
COATED UNIPOTENTIAL CATHODES

HEATER

6.3 VOLTS 600±40 MA.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW BASING DIAGRAM JEDEC 9ES

THE 6CM7 IS A MEDIUM-MU DOUBLE TRIODE OF THE 9 PIN MINIATURE TYPE CONTAINING TWO DISSIMILAR TRIODES IN ONE ENVELOPE. IT IS INTENDED FOR USE AS A VERTICAL DEFLECTION AMPLIFIER IN 600 MA. SERIES HEATER OPERATED TELEVISION RECEIVERS. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

	UNIT #1 OSCILLATOR	UNIT #2 AMPLIFIER	
GRID TO PLATE	3.8	3	pf
GRID TO CATHODE AND HEATER	2	3.5	pf
PLATE TO CATHODE AND HEATER	0.5	0.4	pf

RATINGS A
INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

UNIT #1

VERTICAL
DEFLECTION
OSCILLATOR
VERTICAL
DEFLECTION
DEFLECTION
MAYLIFIER

MAXIMUM PEAK HEATER-CATHODE VOLTAGE: HEATER NEGATIVE WITH RESPECT TO CATHODE HEATER POSITIVE WITH RESPECT TO CATHODE			200 200c		VOLTS VOLTS
MAXIMUM DC PLATE VOLTAGE	-	550		550	VOLTS
MAXIMUM PEAK NEGATIVE-PULSE GRID VOLTAGED MAXIMUM PEAK POSITIVE-PULSE PLATE VOLTAGED	-	220		2200	VOLTS VOLTS
MAXIMUM CATHODE CURRENT: PEAK AVERAGE	→	77 17		77 22	MA. MA.
MAXIMUM PLATE DISSIPATION		1.45		6.0	WATTS
MAXIMUM GRID CIRCUIT RESISTANCE: CATHODE BIAS FIXED BIAS GRID RESISTOR BIAS		2.2		2.5	MEGOHMS MEGOHMS MEGOHMS
HEATER WARM-UP TIME (APPROX.) F			11.0		SECONDS

A FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE CONCERNING TELEVISION BROADCAST STATIONS", FEDERAL COMMUNICATIONS COMMISSION.

CTHE OC COMPONENT MUST NOT EXCEED 100 VOLTS.

DTHIS RATING IS APPLICABLE WHERE THE DURATION OF THE VOLTAGE PULSE DOES NOT EXCEED 15% OF ONE VERTICAL SCANNING CYCLE IS 2.5 MILLISECONDS.

F
HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH
80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING
OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING
RESISTANCE.

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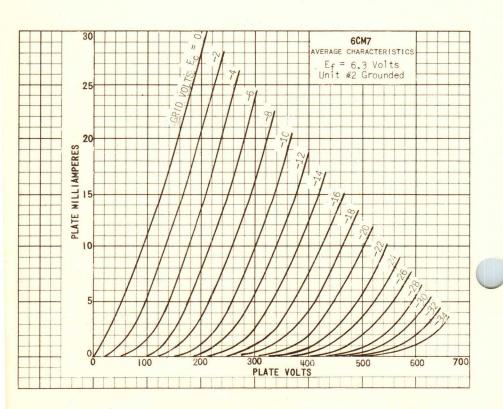
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

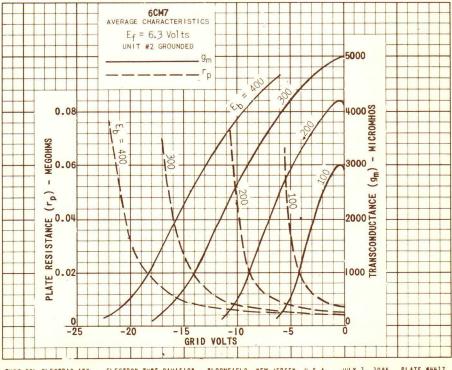
CLASS A1 AMPLIFIER

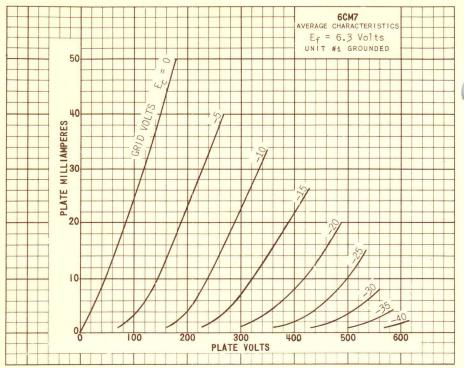
	UNIT #1 OSCILLATOR	UNIT #2 AMPLIFIER	
PLATE VULTAGE	200	250	VOLTS
GRID VOLTAGE	-7	-8	VOLTS
AMPLIFICATION FACTOR	21	18	
PLATE RESISTANCE (APPROX.)	10 500	4 100	OHMS
TRANSCONDUCTANCE	2 000	4 400	MHOS
PLATE CURRENT	5	20	MA.
PLATE CURRENT FOR GRID VOLTAGE OF -10 VOL	TS 1		MA.
GRIN VOLTAGE (APPROX.) FOR ID = 10 MA.	14		VOLTS

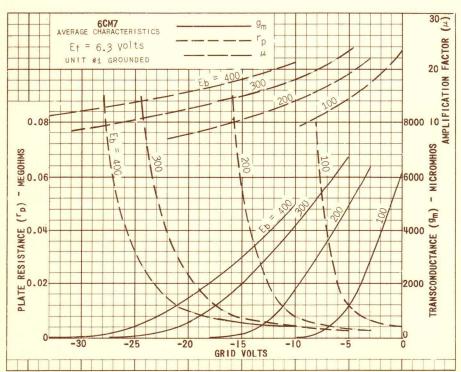
SIMILAR TYPE REFERENCE: Except for heater ratings, the 6CM7 is identical to the 8CM7.

→ INDICATES A CHANGE.

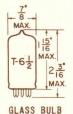








MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER 6.3 VOLTS 0.45 AMP. AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW SMALL BUTTON 9FZ

THE 6CM8 IS A MULTIUNIT TUBE OF THE 9-PIN MINIATURE CONSTRUCTION CON-TAINING A HIGH-MU TRIODE AND SHARP CUTOFF PENTODE IN ONE ENVELOPE. THE PENTODE SECTION MAY BE USED AS AN INTERMEDIATE FREQUENCY AMPLIFIER. AGC AMPLIFIER AND REACTANCE TUBE. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CON-TROLLED. EXCEPT FOR HEATER RATINGS AND HEATER WARM-UP TIME. THE 6CM8 IS IDENTICAL TO THE 5CM8.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

TRIODE SECTION		
GRID TO PLATE G TO P	1.9	μμf
INPUT G TO (H+K)	1.6	μμf
OUTPUT P TO (H+K)	0.22	μμf
PENTODE SECTION		
GRID #1 TO PLATE G1 TO P (MAX.)	0.04	µµ f
INPUT: G1 TO (H+K+G2+G3+I.S.)	6.0	μμf
OUTPUT: P TO (H+K+G2+G3+1.S.)	2.6	μμ f
COUPLING		
PENTODE PLATE TO TRIODE GRID (MAX.)	0.01	μμf
PENTODE GRID #1 TO TRIODE PLATE (MAX.)	0.15	щи f
PENTODE PLATE TO TRIODE PLATE (MAX.)	0.10	μμf

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

	TRIODE	PENTODE	
HEATER VOLTAGE	6.	3	VOLTS
MAXIMUM PLATE VOLTAGE	300	300	VOLTS
MAXIMUM GRID #2 SUPPLY VOLTAGE		300	VOLTS
MAXIMUM GRID .#2 VOLTAGE	SEE RATI	NG CHART	
MAXIMUM POSITIVE GRID #1 VOLTAGE	0	0	VOLTS
MAXIMUM PLATE DISSIPATION	1.0	2.0	WATTS
MAXIMUM GRID #2 DISSIPATION		0.5	WATT
MAXIMUM GRID #4 CIRCUIT RESISTANCE			
SELF BIAS		1.0	MEGOHM
FIXED BIAS		0.25	MEGOHM

CONTINUED FROM PRECEDING PAGE

RATINGS —. CONT DINTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

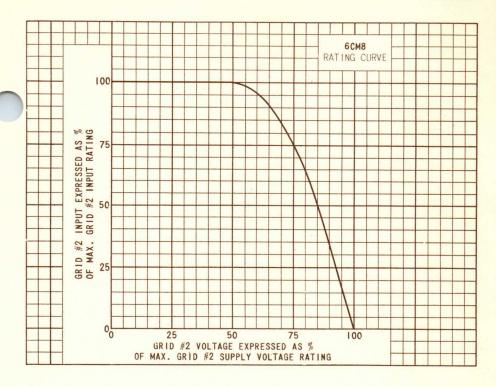
	TRIODE	PENTODE	
MAXIMUM HEATER-CATHODE VOLTAGE			
HEATER NEGATIVE WITH RESPECT TO CATHODE			
TOTAL DC AND PEAK	200	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE			
DC	100	100	VOLTS
TOTAL DC AND PEAK	200	200	VOLTS
HEATER WARM-UP TIME (APPROX.)*	11	.0	SECONDS

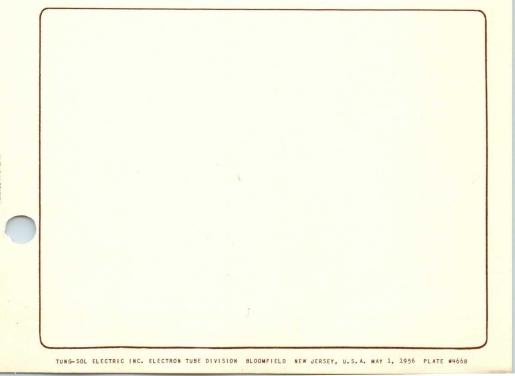
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS CLASS ${\bf A}_{\top}$ AMPLIFIER

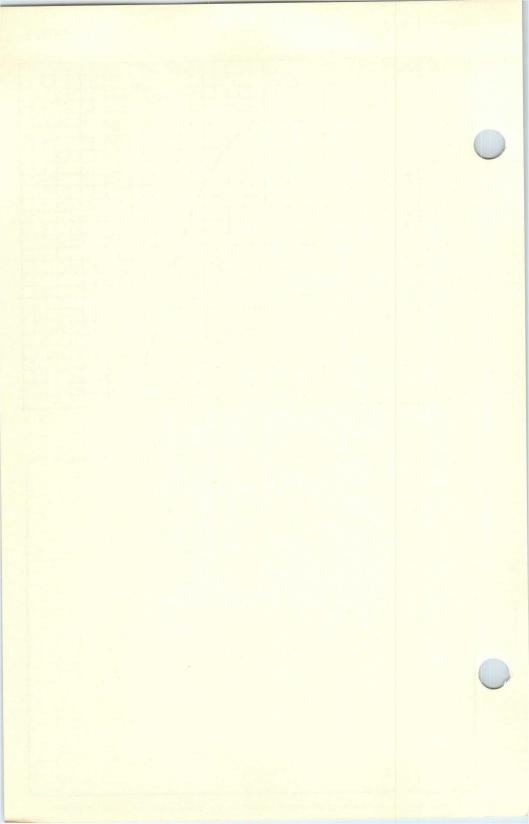
		TRIODE		PENTODE	
HEATER VOLTAGE			6.3		VOLTS
HEATER CURRENT		0	.45		AMP.
PLATE SUPPLY VOLTAGE		250		200	VOLTS
GRID #2 VOLTAGE				150	VOLTS
GRID #1 VOLTAGE		-2		0	VOLTS
CATHODE BIAS RESISTOR				180	OHMS
PLATE CURRENT		1.8		9.5	MA.
GRID #2 CURRENT				2.8	MA.
AMPLIFICATION FACTOR		100			
PLATE RESISTANCE (APPROX.)	50	000	600	000	OHMS
TRANSCONDUCTANCE	2	000	6	200	μMH0S
GRID #1 VOLTAGE FOR Ib=10µA (APPROX.)				-8	VOLTS

^{*}HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

- INDICATES A CHANGE.

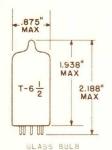






DUPLEX-DIODE TRIODE

MINIATURE TYPE



SMALL BUTTON

9 PIN BASE E9-1 OUTLINE DRAWING JEDEC 6-2 COATED UNIPOTENTIAL CATHODE

 SERIES
 HEATER
 PARALLEL

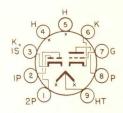
 6.3±0.6
 VOLTS
 3.15
 VOLTS

 300
 MA.
 600±40
 MA.

AC OR DC

ANY MOUNTING POSITION

CONTROL OF HEATER WARM-UP TIME APPLIES ONLY TO PARALLEL CONNECTION.



BOTTOM VIEW
BASING DIAGRAM

JEDEC 9EN

THE 6CN7 IS A DUPLEX DIODE HIGH-MU TRIODE IN WHICH SEPARATE CATHODES ARE PROVIDED FOR THE DIODE AND TRIODE SECTIONS. IT IS INTENDED PRIMARILY FOR SERVICE AS A COMBINED HORIZONTAL PHASE DETECTOR AND REACTANCE TUBE IN TELEVISION RECEIVERS. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED. EXCEPT FOR HEATER RATINGS, THE 6CN7 IS IDENTICAL TO THE 8CN7.

DIRECT INTERELELECTRODE CAPACITANCES WITHOUT EXTERNAL SHIELD

TRIODE GRID TO PLATE	1.8	pf
TRIODE INPUT	1.5	pf
TRIODE OUTPUT	0.5	pf
GRID TO EACH DIODE PLATE	0.006	pf
DIODE #1 PLATE TO DIODE CATHODE AND HEATER	3.6	pf
DIODE #2 PLATE TO DIODE CATHODE AND HEATER	3.6	pf

RATINGS INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

MAXIMUM PLATE VOLTAGE	→ 330	VOLTS
MAXIMUM POSITIVE DC GRID VOLTAGE	2	VOLTS
MAXIMUM PLATE DISSIPATION	→ 1.1	WATTS
MAXIMUM HEATER-CATHODE VOLTAGE		
HEATER POSITIVE WITH RESPECT TO	DEITHER CATHODE	
DC COMPONENT	100	VOLTS
TOTAL DC AND PEAK	200	VOLTS
HEATER NEGATIVE WITH RESPECT TO	EITHER CATHODE	
TOTAL DC AND PEAK	200	VOLTS
MAXIMUM DIODE CURRENT FOR CONTINU	Jous	
OPERATION, (EACH DIODE)	→ 5.5	MA.
HEATER WARM-UP TIME*	11.0	SECONDS

AHEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

INDICATES A CHANGE.

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER

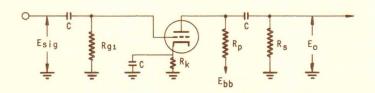
PLATE VOLTAGE	100	250	VOLTS
GRID VOLTAGE	-1.0	-3.0	VOLTS
AMPLIFICATION FACTOR	70	70	
PLATE RESISTANCE (APPROX.)	54 000	58 000	OHMS
TRANSCONDUCTANCE	1 300	1 200	MHOS
PLATE CURRENT	0.8	1.0	MA.
AVERAGE DIODE CURRENT (EACH DIODE)			
WITH 5.0 VOLTS DC APPLIED		20	MA.

CLASS A RESISTANCE - COUPLED AMPLIFIER

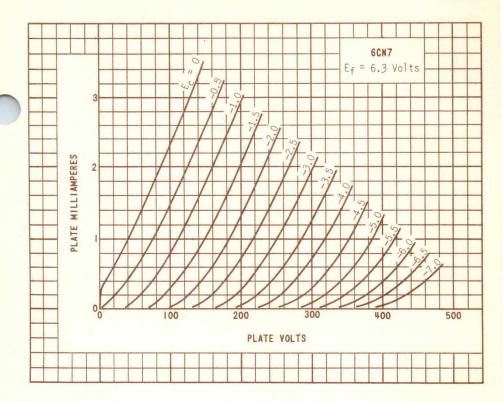
Rp	Rs	Rg1		= 90 V	olts	Ebb =	180	Volts	Ebb =	300	Volts
Meg.	Meg.	Meg.	Rk	Gain	Eo	Rk	Gain	Eo	Rk	Gain	Eo
0.10	0.10	0.10	5700 6100	21 26	7.0	2400 2700	29 34	18 23	1800 2000	33 38	35 42
0.24	and the same of	0.10	9100 10000	30 34	10 13	4300 4700	40 45	24 31	3000 3300	44 49	43 52
0.51	0.51 1.0		15000 16000	37 40	14 16	7500 8200	47 50	28 35	5600 6200	51 55	50 60
0.24	0.24 0.51	10 10	0	31 37	5.0 7.0	0	44 49	19 25	0	48 52	40 52
0.51	0.51	10 10	0	39 42	7.5 10	0	51 54	22 28	0	54 58	44 56

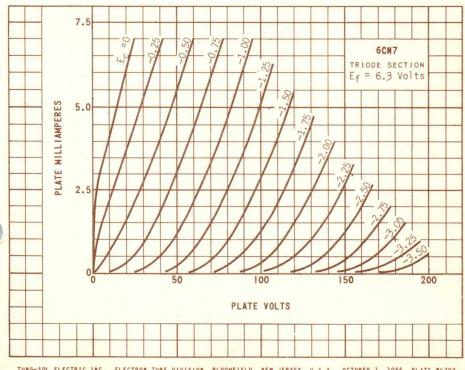
EO IS MAXIMUM RMS VOLTAGE OUTPUT FOR FIVE PERCENT TOTAL HARMONIC DISTORTION. GAIN MEASURED AT 2.0 VOLTS RMS OUTPUT.

FOR ZERO-BIAS DATA, GENERATOR IMPEDANCE IS NEGLIGIBLE.

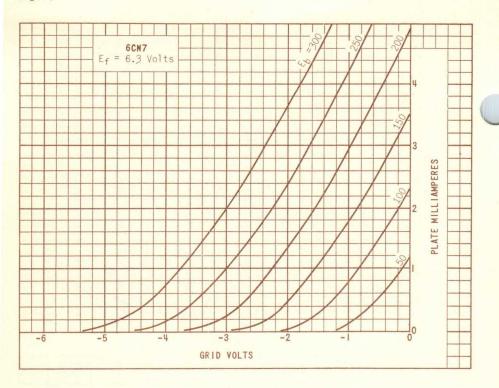


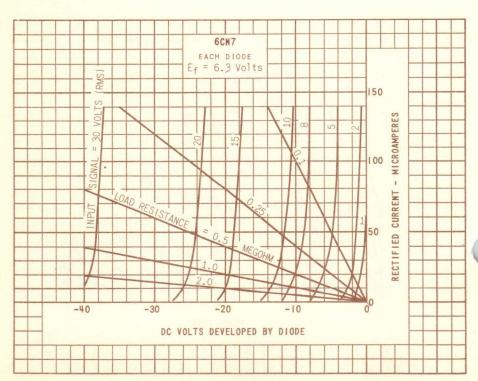
NOTE: COUPLING CAPACITORS (C) SHOULD BE SELECTED TO GIVE DESIRED FREQUENCY RESPONSE. RK SHOULD BE ADEQUATELY BY-PASSED.

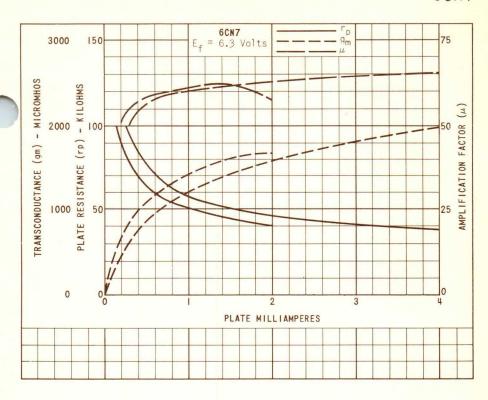


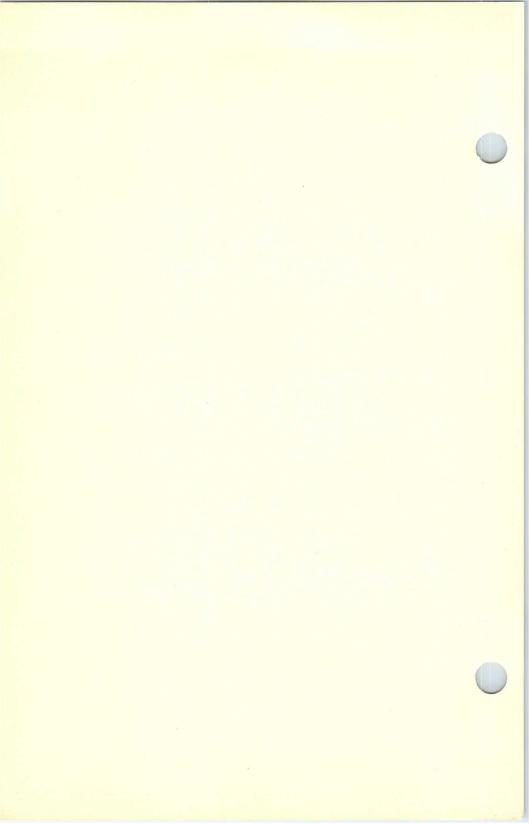


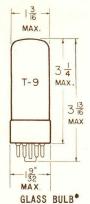
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COATED UNIPOTENTIAL CATHODE

HEATER

6.3±0.6 VOLTS 1.6 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

BASING DIAGRAM

SHORT INTERMEDIATE SHELL OCTAL JEDEC B5-85

> INTERMEDIATE SHELL OCTAL JEDEC 85-147

THE 6CQ4 IS AN INDIRECTLY—HEATED HALF—WAVE RECTIFIER DESIGNED PRIMARILY FOR TELEVISION DAMPING DIODE SERVICE IN HORIZONTAL DEFLECTION CIRCUITS. TUBE VOLTAGE DROP AND DC PLATE CURRENT RATINGS HAVE BEEN ESTABLISHED WHICH PERMITS SINGLE TUBE OPERATION IN LOW B+ AS WELL AS WIDE DEFLECTION ANGLE TV SYSTEMS.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

HEATER-TO-CATHODE	4.0	pf
PLATE-TO-CATHODE AND HEATER	8.5	pf
CATHODE-TO-PLATE AND HEATER	11.5	pf

RATINGS INJERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM^A DAMPER SERVICE^B

HEATER VOLTAGE	6.3±0.6	VOLTS
MAXIMUM PEAK INVERSE PLATE VOLTAGE	5500	VOLTS
MAXIMUM PEAK PLATE CURRENT	1200	MA.
MAXIMUM DC PLATE CURRENT	190	MA.
MAXIMUM PLATE DISSIPATION	6.5	WATTS
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE		
DC COMPONENT	900	VOLTS
TOTAL DC AND PEAK	5500	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC COMPONENT	100	VOLTS
TOTAL DC AND PEAK	300	VOLTS

TUNG-SOL -

CONTINUED FROM PRECEDING PAGE

AVERAGE CHARACTERISTICS

TUBE VOLTAGE DROP Ib = 250 MA. DC

25 VOLTS

DESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURE CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABLILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND INFOURDED THE MORST PROBABLE DEPRATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION,

B FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE.

THE JEDEC 85 - 85 AND 85-147 BASES SPECIFIED FOR USE WITH THE 6CO4, DO NOT HAVE PINS IN BASE POSITIONS 41, 84 4 86, HOWEVER POSITIONS 1 & 6 HAVE INTERNAL CONNECTIONS TERMINATING IN STEM LEADS. BASE TERMINAL FOSITION 2 HAS A BASE PIN WHICH MAY BE CONNECTED TO A STEM LEAD. BECAUSE OF THE CLOSE PROXIMITY OF STEM LEADS TO THE SOCKET PIN CLIPS WHEN THE TUBE IS SEATED IN THE SOCKET, CIRCUIT THE POINTS SHOULD NOT BE MADE TO SOCKET TERMINALS 1, 2, 4 4 6 UNLESS ADEQUATE PRECAUTIONS ARE TAKEN AGAINST VOLTAGE BREAKDOWN IN BOTH THE TUBE BASE AND THE SOCKET. TO REDUCE THE POSSIBILITY OF ACCOUNT.

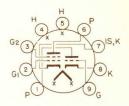
450±30 MA.

TRIODE-TETRODE MINIATURE TYPE UNIPOTENTIAL CATHODE HEATER MAX T-6½ MAX TRIODE-TETRODE MINIATURE TYPE

2.188 MAX AC OR DC

ANY MOUNTING POSITION

6.3 VOLTS



BOTTOM VIEW
BASING DIAGRAM
JEDEC 9GE



THE 6CO8 IS A MEDIUM-MU TRIODE AND SHARP CUTOFF TETRODE IN THE 9 PIN MINIATURE CONSTRUCTION. IT MAY BE USED IN A WIDE VARIETY OF APPLICATIONS IN BLACK AND WHITE AND COLOR TELEVISION RECEIVERS, PARTICULARLY AS A COMBINED VHF OSCILLATOR AND MIXER IN TUNERS OF SUCH RECEIVERS UTILIZING AN INTERMEDIATE FREQUENCY IN THE ORDER OF 40 MC. THE TETRODE UNIT IS INTENDED FOR USE AS A MIXER TUBE, BUT IT IS ALSO USEFUL AS A VIDEO INTERMEDIATE—FREQUENCY AMPLIFIER TUBE AND AS A SOUND INTERMEDIATE FRE—OUENCY AMPLIFIER TUBE UNIT IS SUITABLE FOR USE NOT ONLY AS A VHF OSCILLATOR, BUT ALSO AS A PHASE SPLITTER, SYNC—CLIPPER, SYNC—SEPARATOR, AND RF AMPLIFIER. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM—UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED.

DIRECT INTERELECTRODE CAPACITANCES

TRIODE UNIT:	WITHOUT EXTERNAL SHIELD	WITH ^A EXTERNAL SHIELD	
GRID TO PLATE GRID TO CATHODE & HEATER PLATE TO CATHODE AND HEATER	1.8 2.7 0.4	1.8 2.7 1.2	pf pf pf
TETRODE UNIT: GRID #1 TO PLATE (MAX.) GRID #1 TO CATHODE & I.S.,	0.019	0.015	pf
GRID #2 & HEATER PLATE TO CATHODE & I.S.,	5.0	5.0	pf
GRID #2 & HEATER	2.5	3.3	pf
TETRODE PLATE TO TRIODE PLATE (MAX.) HEATER TO CATHODE	0.07	0.01 3.0 ^B	pf pf

- TUNG-SOL -

CONTINUED FROM PRECEDING PAGE

RATINGS INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM -

CONVERTER SERVICE

	TRIODE UNIT AS OSC.	TETRODE UNIT AS MIXER	
MAXIMUM PLATE VOLTAGE	330 ←	330 ←	VOLTS
MAXIMUM GRID #2 SUPPLY VOLTAGE		330 ←	VOLTS
MAXIMUM GRID #2 (SCREEN-GRID) VOLTAGE	SEE	FIGURE #2	
MAXIMUM GRID #1 (CONTROL-GRID) VOLTAGE:			
POSITIVE BIAS VALUE	0	0	VOLTS
MAXIMUM PLATE DISSIPATION	3.1 ←	3.2 ←	WATTS
MAXIMUM GRID #2 INPUT:			
→ FOR GRID #2 VOLTAGES UP TO 165 VOLTS		0.7 -	WATT
→ FOR GRID #2 VOLTAGES BETWEEN 165 & 300V.	SEE	FIGURE #2	
MAXIMUM GRID #1 INPUT	0.55 -		WATT
MAXIMUM PEAK HEATER-CATHODE VOLTAGE:			
HEATER NEGATIVE WITH RESPECT TO CATHODE	200	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	200	200°C	VOLTS
HEATER WARM-UP TIME (APPROX.)*	11.0		SECONDS
TEATER HARM OF TIME (AFFROX.)	11.0		SECONDS

MAXIMUM CIRCUIT VALUES

	TRIODE	TETRODE	
GRID #1 CIRCUIT RESISTANCE:			
FOR CATHODE-BIAS OPERATION (MAX.)	1.0	1.0	MEGOHM
FOR FIXED-BIAS OPERATION (MAX.)	0.5	0.25	MEGOHM

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS AT AMPLIFIER

TRIODE	TETRODE UNIT	
125	1.25	VOLTS
	125	VOLTS
	-1	VOLT
56		OHMS
40		
5 000	140 000	OHMS
8 000	5 800	MHOS
-7	-7	VOLTS
15	12	MA.
	4.2	MA.
	125 56 40 5 000 8 000 -7 15	125 125 125 1 56 5 000 140 000 8 000 5 800 -7 -7 15 12

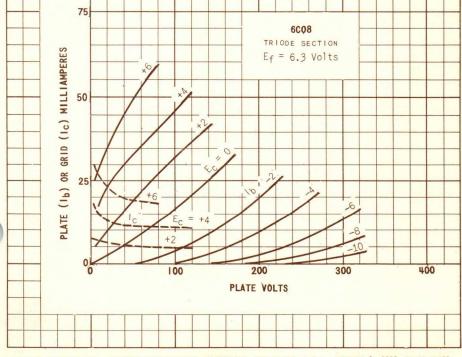
Awith External shield *315 connected to cathode of unit under test.

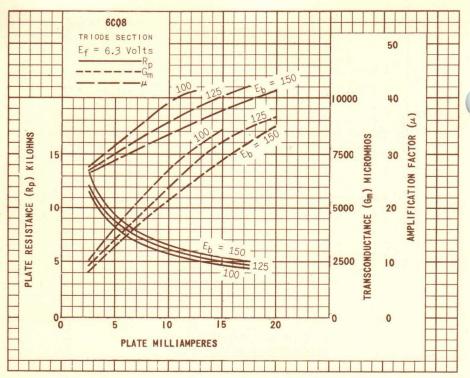
Bwith external shield #315 connected to ground.

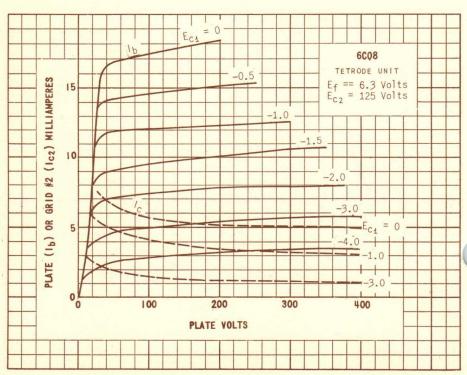
CTHE DC COMPONENT MUST NOT EXCEED 100 VOLTS.

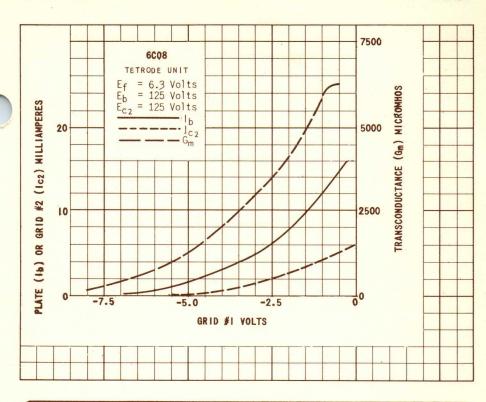
^{*}HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH
80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING
OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING
RESISTANCE.

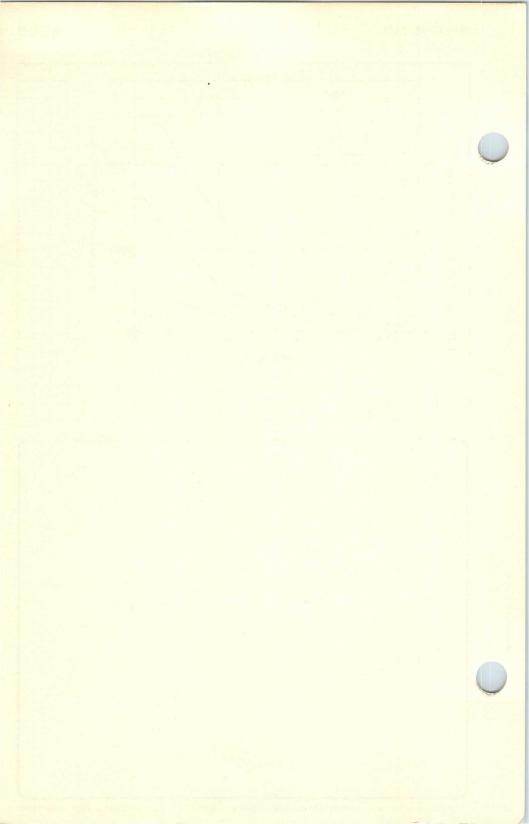
[→]INDICATES A CHANGE.







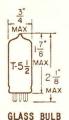




TUNG-SOL .

DIODE PENTODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER

6.3 VOLTS 0.3 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
7 PIN BASE
7EA

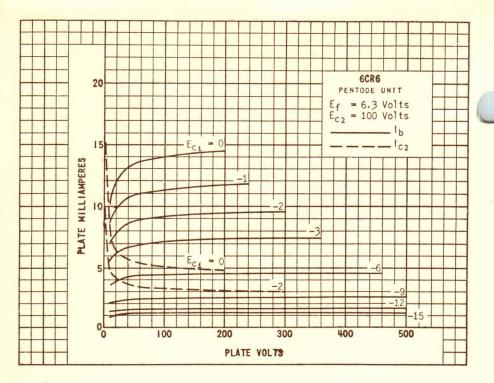
THE 6CR6 IS A COMBINED SINGLE DETECTOR DIODE AND REMOTE CUT-OFF PENTODE WITH A COMMON CATHODE IN THE 7 PIN MINIATURE CONSTRUCTION. THE PENTODE SECTION IS INTENDED FOR USE AS AN AUDIO AMPLIFIER IN WHICH AVC VOLTAGE IS APPLIED TO THE CONTROL GRID FOR IMPROVED OVER-ALL RECEIVER AVC.

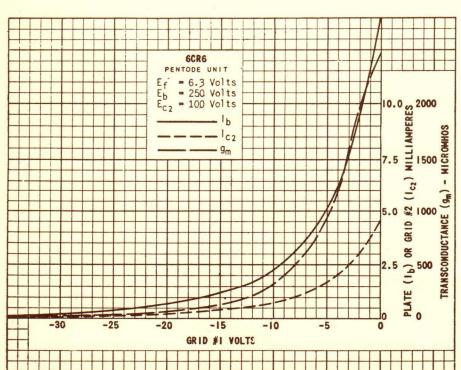
RATINGS INTERPRETED ACCORDING TO RMA STANDARD M8-210

HEATER VOLTAGE	6.3	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE	100	VOLTS
MAXIMUM PLATE VOLTAGE	300	VOLTS
MAXIMUM GRID #2 VOLTAGE	150	VOLTS
MAXIMUM POSITIVE DC GRID #1 VOLTAGE	0	VOLTS
MAXIMUM PLATE DISSIPATION	2.5	WATTS
MAXIMUM GRID #2 DISSIPATION	0.3	WATTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE	1.0	MEGOHM
AVERAGE DIODE CURRENT WITH 10 VOLTS DC APPLIED	2.0	MA .

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

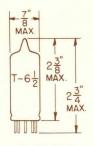
HEATER VOLTAGE	6.3	VOLTS
HEATER CURRENT	0.3	AMP.
PLATE VOLTAGE	250	VOLTS.
GRID #2 VOLTAGE	100	VOLTS
GRID #1 VOLTAGE	-2	VOLTS
PLATE CURRENT	9.5	MA.
GRID #2 CURRENT	3.0	MA.
TRANSCONDUCTANCE	1950	имноs
PLATE RESISTANCE (APPROX.)	0.2	ME GOHM
GRID #1 VOLTAGE (APPROX.) FOR Gm = 10 MMHOS	-40	VOLTS





BEAM PENTODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER

6.3 VOLTS 1.2 AMP. AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW MINIATURE BUTTON 9 CK

GLASS BULB

THE 6CS5 IS A MINIATURE BEAM PENTODE DESIGNED FOR USE IN AUDIO POWER OUTPUT STAGES WHERE THE SUPPLY VOLTAGE IS FURNISHED DIRECTLY FROM THE POWER LINES BY THE USE OF A SINGLE DIODE RECTIFIER. ELECTRICALLY THE 6CS5 IS SIMILAR TO THE 6W6GT AND IS CAPABLE OF DEVELOPING THE SAME POWER OUTPUT. EXCEPT FOR HEATER RATINGS, THE 6CS5 IS IDENTICAL TO THE 12CS5.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

GRID TO PLATE: G4 TO P	0.5	μμf
INPUT: G1 TO (K+H+G2+B.P.,)	15	μμ f
OUTPUT: P TO (K+H+G2+B.P.)	9	μμ f

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER VOLTAGE	6.3	VOLTS
MAXIMUM PLATE VOLTAGE	300	VOLJS
MAX1MUM GRID #2 VOLTAGE	150	VOLTS
MAXIMUM PLATE DISSIPATION	10	WATTS
MAXIMUM GRID #2 DISSIPATION	1.25	WATTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE		
FIXED BIAS	0.1	MEGOHM
SELF BIAS	0.5	MEGOHM
MAXIMUM PEAK HEATER-CATHODE VOLTAGE		
HEATER NEGATIVE WITH RESPECT TO CATHODE	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE*	200	VOLTS

^{*}DC COMPONENT MUST NOT EXCEED 100 VOLTS.

TUNG-SOL .

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

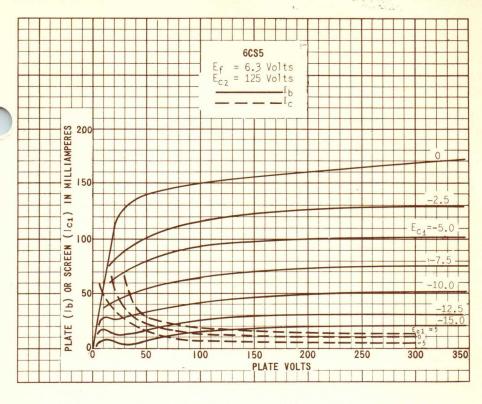
CLASS A7 AMPLIFIER

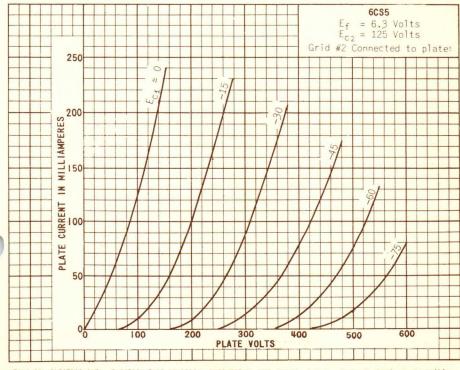
HEATER VOLTAGE	6.3	6.3	VOLTS
HEATER CURRENT	1.2	1.2	AMP.
PLATE VOLTAGE	110	200	VOLTS
GRID #2 (SCREEN) VOLTAGE	110	125	VOLTS
GRID #1 (CONTROL-GRID) VOLTAGE	-7.5		VOLTS
CATHODE BIAS RESISTOR		180	OHMS
PLATE RESISTANCE (APPROX.)	13 000	28 000	OHMS
TRANSCONDUCTANCE	8 000	8 000	MHOS
GRID #1 INPUT VOLTAGE, PEAK AF	7.5	8.5	VOLTS
PLATE CURRENT, ZERO SIGNAL	49	46	MA.
PLATE CURRENT, (MAX. SIGNAL)	50	47	MA.
GRID #2 CURRENT, ZERO SIGNAL	4	2.2	MA.
GRID #2 CURRENT, (MAX. SIGNAL)	10	8.5	MA.
LOAD RESISTANCE IMPEDANCE	2 000	4 000	OHMS
TOTAL HARMONIC DISTORTION (APPROX.)	10	10	PERCENT
POWER OUTPUT, (MAX. SIGNAL)	2.1	3.8	WATTS

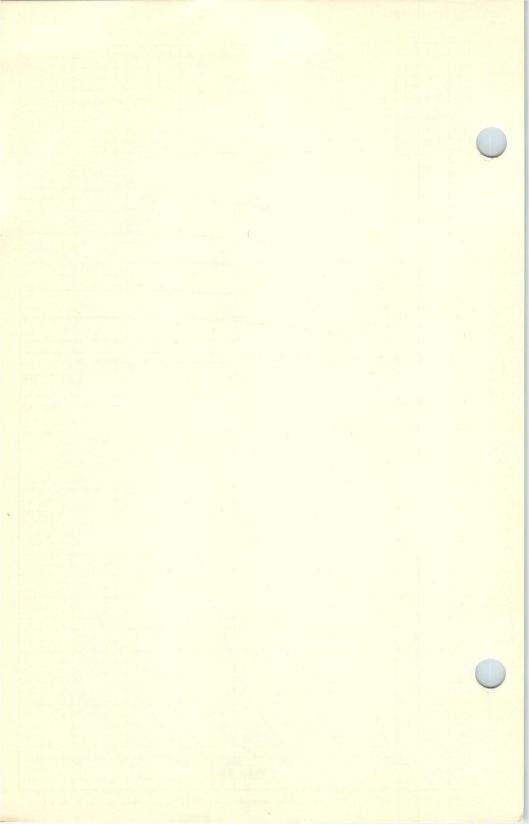
TRIODE CONNECTION

HEATER VOLTAGE	6.3	VOLTS
HEATER CURRENT	1.2	AMP.
PLATE & GRID #2 VOLTAGE (P+G2 TIED TOGETHER)	225	VOLTS
GRID #1 VOLTAGE	-30	VOLTS
PLATE RESISTANCE	500	OHMS
TRANSCONDUCTANCE	800	μMH0S
PLATE CURRENT	22	MA.
AMPLIFICATION FACTOR	6.2	
GRID #1 VOLTAGE (APPROX.) FOR Ib = 0.5 MA.	-42	VOLTS

SINILAR TIPE REPERENCE: Except for heater ratings and heater warm-up time the GCSS is identical to the 12CS5.



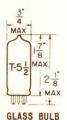




IONO-OOL

HEPTODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER

6.3 VOLTS 0.3 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
7 PIN BASE
7CH

THE 6CS6 IS A MINIATURE DUAL CONTROL PENTAGRID TUBE INTENDED FOR USE IN SYNC SEPARATOR CIRCUITS. IN THESE CIRCUITS IT PROVIDES IMPROVED NOISE IMMUNITY. BOTH CONTROL GRIDS HAVE SHARP CUT-OFF CHARACTERISTICS.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

GRID #1 TO PLATE: G4 TO P (MAX.)	0.05	μμf
GRID #3 TO PLATE: G3 TO P (MAX)	0.36	μμf
#1 INPUT: G1 TO (H+K+G2+G3&5)	5.5	Mut
#3 INPUT: G3 TO (H+K+G4+G2&5)	7.0	μμf
OUTPUT: P TO (H+K+G1+G2+G3&5)	7.5	μμf
COUPLING: G1 TO G3 (MAX.)	0.22	μμf

RATINGS ← INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

DESIGN CENTER VALUES

HEATER VOLTAGE	*	6.3	VOLTS
MAXIMUM HEATER-CATHODE	VOLTAGE:		
HEATER NEGATIVE TOTAL DC AND PEAK		200	VOLTS
HEATER POSITIVE		100	VOLTS
TOTAL DC AND PEAK		200	VOLTS
MAXIMUM PLATE VOLTAGE		300	VOLTS
MAXIMUM GRID #2 & #4 V	OLTAGE A		
MAXIMUM GRID #2 & #4 S	UPPLY VOLTAGE	300	VOLTS
MAXIMUM PLATE DISSIPAT	ION	1.0	WATT
MAXIMUM GRID #2 & #4 D	ISSIPATION:		
FOR GRID #2 & GRID #	4 VOLTAGES UP TO 150 VOLTS	1.0	VOLTS
FOR GRID #2 & GRID #	4 VOLTAGES BETWEEN 150 & 300V.		
MAXIMUM CATHODE CURRENT	Т	14	MA.
MAXIMUM GRID #1 CIRCUI	T RESISTANCE	0.47	MEGOHM
MAXIMUM GRID #3 CIRCUI	T RESISTANCE	2.2	MEGOHMS

ASEE SCREEN DISSIPATION RATING CHART JEDEC #J5-C4-2.

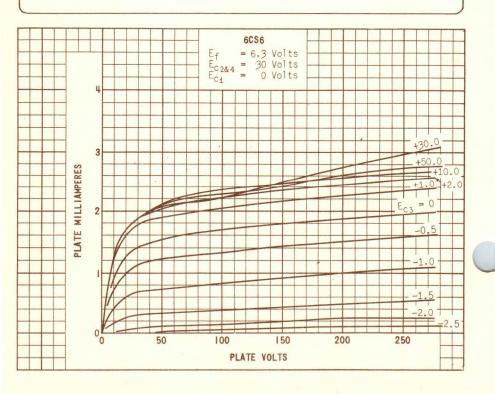
INDICATES A CHANGE.

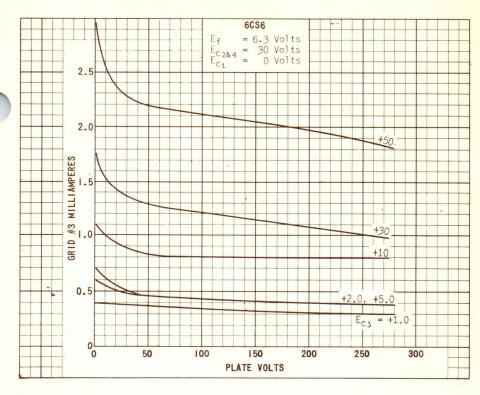
- TUNG-SOL -

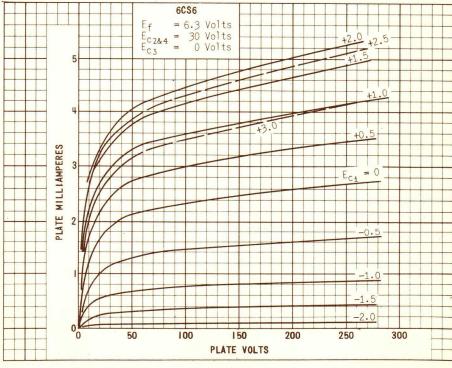
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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS CLASS A1 AMPLIFIER

HEATER VOLTAGE 6.3 6.3 6.3 VOLTS HEATER CURRENT 0.3 0.3 0.3 AMP. PLATE VOLTAGE 10 100 100 VOLTS 30 30 GRID #2 & #4 VOLTAGE 30 VOLTS GRID #1 VOLTAGE 0 0 -1VOLTS 0 GRID #3 VOLTAGE -1 0 VOLTS 1.0 PLATE CURRENT 2.0 0.8 MA. 5.5 GRID #2 & #4 CURRENT 4.5 1.3 MA. TRANSCONDUCTANCE (MEASURED BETWEEN GRID #1 AND PLATE) 100 MHOS TRANSCONDUCTANCE (MEASURED BETWEEN GRID #3 AND PLATE) 1 500 µмноs PLATE RESISTANCE (APPROX.) 1.0 0.7 MEGOHM ---GRID #1 VOLTAGE (APPROX.) FOR Ib=50 HA -2.5VOLTS -2.2 GRID #3 VOLTAGE (APPROX.) FOR Ib=50 HA VOLTS

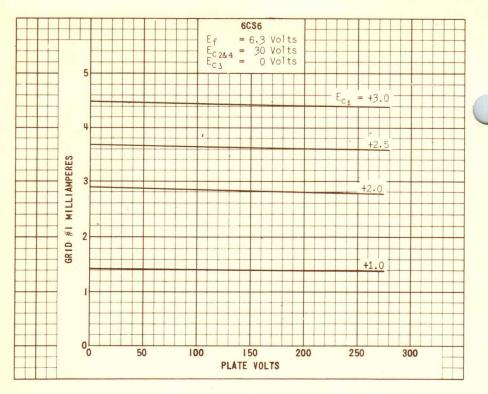


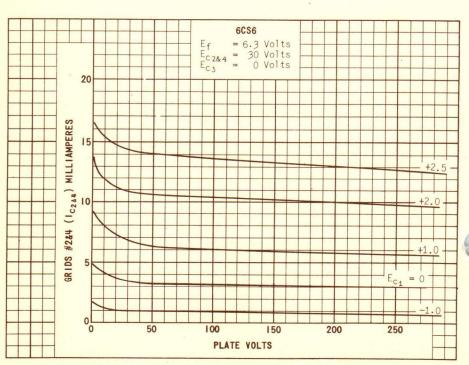


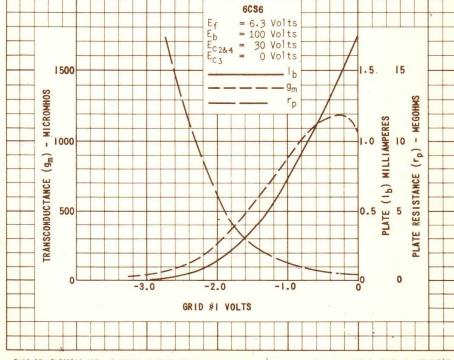


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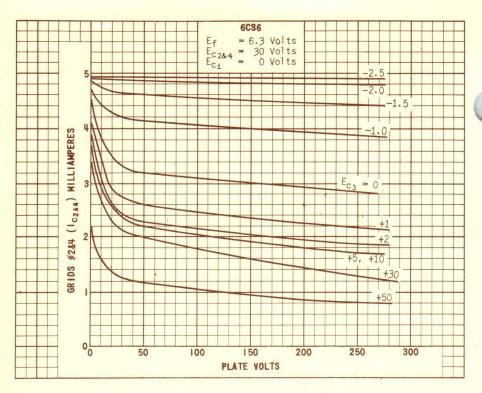
6CS6(12CS6)





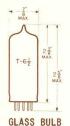


6CS6(12CS6)



DOUBLE TRIODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER 6.3 VOLTS 0.6 AMP. AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW SMALL BUTTON 9 PIN BASE 9EF

THE 6CS7 IS A DOUBLE TRIODE IN THE 9 PIN MINIATURE CONSTRUCTION. SECTION #1 IS INTENDED FOR OPERATION AS A VERTICAL DEFLECTION OSCILLATOR AND SECTION #2 AS A VERTICAL DEFLECTION AMPLIFIER. THERMAL CHARACTERISTICS ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED.

DIRECT INTERELECTRODE CAPACITANCES WITH NO EXTERNAL SHIELD

	TRIODE #1	TRIODE #2	
GRID TO PLATE (G TO P)	2.6	2.6	ии f
INPUT: G TO (K+H+E.S.)	1.8	3.0	μu f
OUTPUT: P TO (K+H+E.S.)	0.5	0.5	ши f

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

VERTICAL DEFLECTION OSCILLATOR AND AMPLIFIER B

	TRIODE #1A		TRIODE #2	
HEATER VOLTAGE		6.3		VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE				
HEATER NEGATIVE WITH RESPECT TO CATHODE				
TOTAL DC AND PEAK		200		VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE				
DC		100		VOLTS
TOTAL DC AND PEAK		200		VOLTS
MAXIMUM DC PLATE VOLTAGE	500		500	VOLTS
MAXIMUM PEAK POSITIVE PULSE PLATE			III WARRANGO	
VOLTAGE (ABSOLUTE MAX.)			2 200	VOLTS
MAXIMUM PEAK NEGATIVE PULSE GRID VOLTAGE	400		250	VOLTS
MAXIMUM PLATE DISSIPATION C	1.25		6.5	WATTS
MAXIMUM AVERAGE CATHODE CURRENT	20		30	MA.
MAXIMUM PEAK CATHODE CURRENT	70		105	MA.
MAXIMUM GRID CIRCUIT RESISTANCE	2.2		2.2	MEGOHMS
HEATER WARM-UP TIME D		11		SECONDS

 $^{^{}m A}$ TRIODE \$1 CONNECTS TO PINS \$6, \$7 AND \$8. TRIODE \$2 CONNECTS TO PINS \$1, \$3 AND \$9.

Bor operation in a 525 line, 30-frame system as described in "standards of good engineering practice for television broadcasting stations: federal communications commission". The duty cycle of the voltage pulse must not exceed 15% of one scanning cycle.

CIN STAGES OPERATING WITH GRID LEAK BIAS, AN ADEQUATE CATHODE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN ABSENCE OF EXCITATION.

DHEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

TUNG-SOL -

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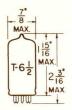
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

	TRIODE #1	TRIODE #2	
HEATER VOLTAGE	6.3	6.3	VOLTS
HEATER CURRENT	0.6	0.6	AMP.
PLATE VOLTAGE	250	250	VOLTS
GRID VOLTAGE	-8.5	-10.5	VOLTS
PLATE CURRENT	10.5	19.0	MA.
TRANSCONDUCTANCE	2 200	4 500	<i>µ</i> мноѕ
AMPLIFICATION FACTOR	17.0	15.5	
PLATE RESISTANCE	7 700	3 450	OHMS
PLATE CURRENT AT Ec=-16 VOLTS		3.0	MA.
GRID VOLTAGE FOR ID=104A	-24		VOLTS
GRID VOLTAGE FOR ID= 50µA		-22	VOLTS

ATRIODE \$1 CONNECTS TO PINS \$6, \$7 AND \$8. TRIODE \$2 CONNECTS TO PINS \$1, \$3 AND \$9.

TRIODE-PENTODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER 6.3 VOLTS 0.45 AMP. AC OR DC.

ANY MOUNTING POSITION



BOTTOM VIEW MINIATURE BUTTON 9 PIN BASE 9FZ

GLASS BULB

THE 6CS8 IS A TRIODE-PENTODE IN THE 9-PIN MINIATURE CONSTRUCTION. THE PENTODE SECTION IS DESIGNED FOR TELEVISION IF AND THE TRIODE FOR GENERAL PURPOSE SERVICE. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED. WITH THE EXCEPTION OF THE BASING AND THE "DIRECT INTERELECTRODE CAP-ACITANCES", THE 6CS8 IS IDENTICAL TO THE 6CR8.

DIRECT INTERELECTRODE CAPACITANCES - APPROX. WITHOUT EXTERNAL SHIELD

TRIODE:		
GRID TO PLATE: G TO P	1.6	μμ f
INPUT: G TO (H + K)	1.9	щи f
OUTPUT: P TO (H + K)	0.26	μμf
PENTODE:		
GRID #1 TO PLATE: G1 TO P (MAX.)	0.020	μμ f
INPUT: G1 TO (H+K+G2+G3+1.S.)	6.0	μμf
OUTPUT: P TO (H+K+G2+G3+1.S.)	2.8	μμf
COUPLING:		
PENTODE PLATE TO TRIODE PLATE (MAX.)	0.12	μμ f
PENTODE GRID #1 TO TRIODE PLATE (MAX.)	0.15	μμf
PENTODE PLATE TO TRIODE GRID (MAX.)	0.012	μμ f

RATINGS A INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER VOLTAGE	6.3	PENTODE 6.3	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE			
HEATER NEGATIVE WITH RESPECT TO CATHODE			
DC AND PEAK	200	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE			
DC	100	100	VOLTS
DC AND PEAK	200	200	VOLTS
MAXIMUM PLATE VOLTAGE	330	330	VOLTS
MAXIMUM GRID #2 SUPPLY VOLTAGE		330	VOLTS
MAXIMUM GRID #2 VOLTAGE	SEE RATI	NG CHART	

CONTINUED FROM PRECEDING PAGE

RATINGS - CONTIDA INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

	TRIODE	PENTODE	
HEATER VOLTAGE	6.3	6.3	VOLTS
MAXIMUM POSITIVE GRID #1 VOLTAGE	0	0	VOLTS
MAXIMUM PLATE DISSIPATION	2.75	2.3	WATTS
MAXIMUM GRID #2 DISSIPATION		0.55	WATT
MAXIMUM GRID #1 CIRCUIT RESISTANCE			
FIXED BIAS	0.5		MEGOHM:
SELF BIAS	1.0		MEGOHM
HEATER WARM-UP TIME*	11	.0	SECONDS

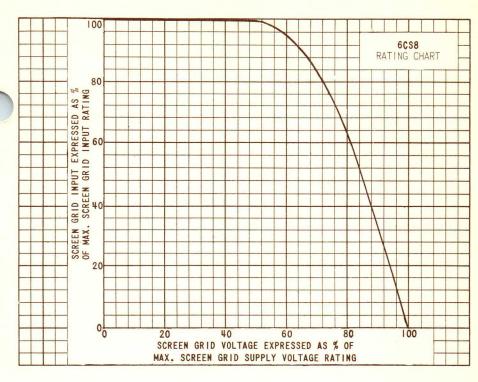
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

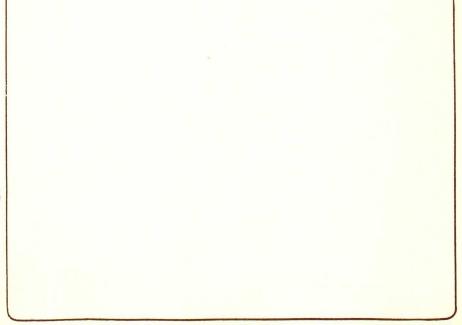
CLASS A1 AMPLIFIER

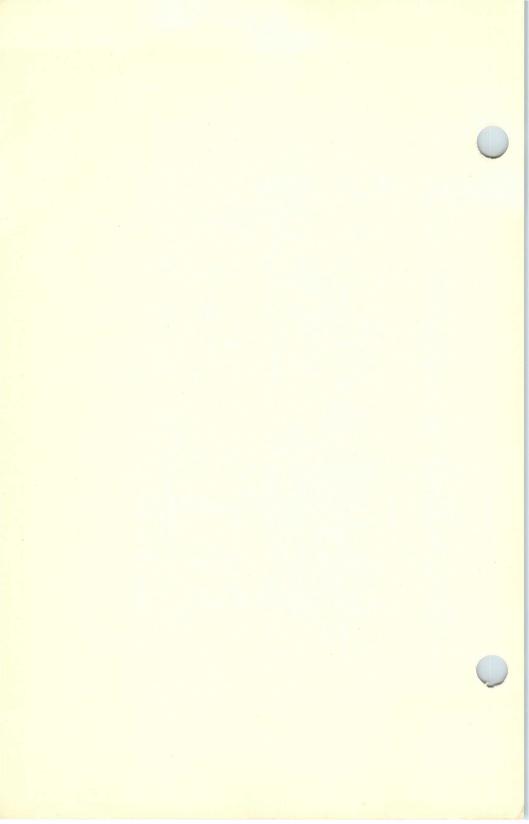
	TRIODE	PENTODE	
HEATER VOLTAGE	6.3	6.3	VOLTS
HEATER CURRENT	0.45	0.45	AMP.
PLATE VOLTAGE	125	125	VOLTS
GRID #2 VOLTAGE		125	VOLTS
GRID #1 VOLTAGE	-2	0	VOLTS
CATHODE BIAS RESISTOR		56	OHMS
PLATE CURRENT	12	13	MA.
GRID #2 CURRENT		3	MA.
AMPLIFICATION FACTOR	22		
TRANSCONDUCTANCE	4 000	7 700	μMH0S
PLATE RESISTANCE (APPROX.)	5 500	300 000	OHMS
GRID #4 VOLTAGE (APPROX.) FOR Ib = 10 HA	-13		VOLTS
GRID #1 VOLTAGE (APPROX.) FOR 16 = 20 MA		-6.5	VOLTS
PLATE CURRENT WITH Ec1 =-3 Vdc, RK=0		2.8	MA.

A DESIGN-MAXIMUM RATINGS ARE THE LIMITING VALUES EXPRESSED WITH RESPECT TO BOGIE TUBES AT WHICH SATISFACTORY TUBE LIFE CAN BE EXPECTED TO OCCUR. TO OBTAIN SATISFACTORY CIRCUIT PERFORMANCE, THEREFORE, THE EQUIPMENT DESIGNER MUST ESTABLISH THE CIRCUIT DESIGN SO THAT NO DESIGN-MAXIMUM VALUE IS EXCEEDED WITH A BOGIE TUBE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, AND ENVIRONMENTAL CONDITIONS.

^{*}HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80\$ OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.







2.375" T-6½ 2.375" AAX 2.625" MAX

GLASS BULB SMALL-BUTTON MINIATURE 7 PIN BASE E7-1 OUTLINE DRAWING JEDEC 6-3

BEAM PENTODE

MINIATURE TYPE

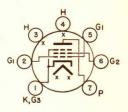
COATED UNIPOTENTIAL CATHODE

HEATER

6.3±0.6 VOLTS 1200 MA.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
BASING DIAGRAM
JEDEC 7CV

THE 6CU5 IS A MINIATURE BEAM POWER PENTODE DESIGNED FOR USE IN THE AUDIO OUTPUT STAGE OF TELEVISION RECEIVERS. HIGH-POWER SENSITIVITY AND HIGH EFFICIENCY AT LOW PLATE AND SCREEN VOLTAGES ENABLE THE 6CU5 TO PROVIDE RELATIVELY HIGH POWER OUTPUT. EXCEPT FOR HEATER RATINGS, THE 6CU5 IS IDENTICAL TO THE 12CU5.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

GRID #1 TO PLATE		0.6	pf
GRID #1 TO CATHODE HEATER, AND GRID		13.0	pf
PLATE TO CATHODE & HEATER, AND GRID	10000	8.5	pf

RATINGS INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM CLASS A AMPLIFIER

MAXIMUM PEAK HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE A	200	VOLTS
MAXIMUM PLATE VOLTAGE	150	VOLTS
MAXIMUM GRID #2 (SCREEN) VOLTAGE	130	VOLTS
MAXIMUM GRID #4 (CONTROL-GRID) VOLTAGE:		
POSITIVE BIAS VALUE	0	VOLTS
MAXIMUM PLATE DISSIPATION	7	WATTS
MAXIMUM GRID #2 INPUT	1.4	WATTS
MAXIMUM BULB TEMPERATURE		
(AT HOTTEST POINT ON BULB SURFACE)	220	°C

INDICATES A CHANGE.

A DC COMPONENT MUST NOT EXCEED 100 VOLTS.

TUNG-SOL .

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER

PLATE VOLTAGE	120	VOLTS
GRID #2 VOLTAGE	110	VOLTS
GRID #1 VOLTAGE	-	VOLTS
PEAK AF GRID #1 VOLTAGE		3 VOLTS
ZERO-SIGNAL PLATE CURRENT	49	MA.
MAXIMUM-SIGNAL PLATE CURRENT	50) MA.
ZERO-SIGNAL GRID #2 CURRENT		MA.
MAXIMUM-SIGNAL GRID #2 CURRENT	8.	MA.
PLATE RESISTANCE (APPROX.)	10 000	OHMS
TRANSCONDUCTANCE	7 500	μMHOS
LOAD RESISTANCE	2 500	OHMS
TOTAL HARMONIC DISTORTION	10	PERCENT
SIGNAL POWER OUTPUT (MAX.)	2.	3 WATTS

MAXIMUM CIRCUIT VALUES

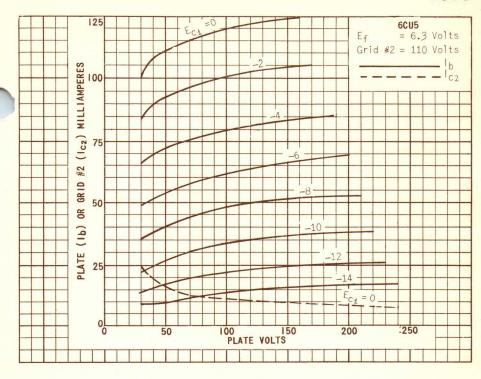
GRID #1 CIRCUIT RESISTANCE:

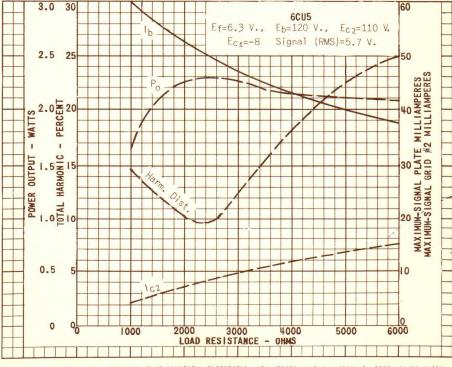
FOR FIXED—BIAS OPERATION (MAX.)

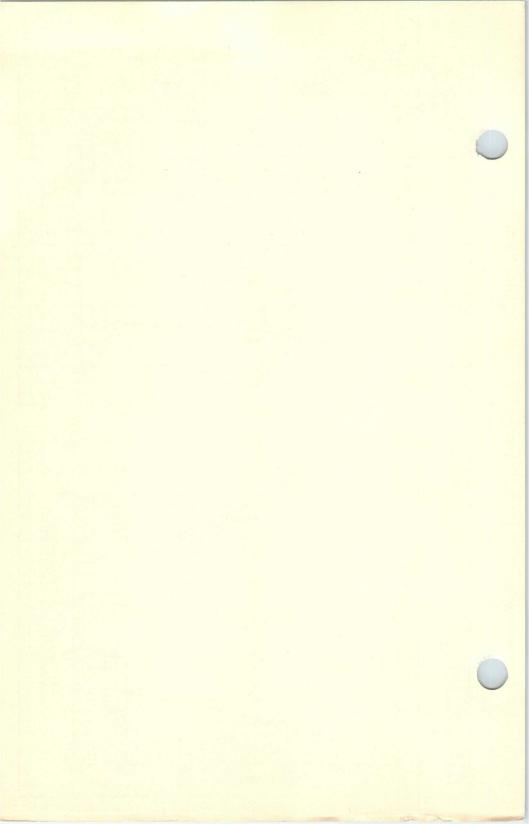
FOR CATHODE—BIAS OPERATION (MAX.)

0.5 MEGOHM

SIMILAR TYPE REFERENCE: Except for heater warm-up time and heater ratings, the 8CU5 is identical to the 12CU5.

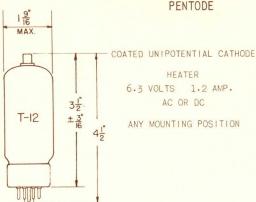






TUNG-SOL -

PENTODE





BOTTOM VIEW SHORT MEDIUM SHELL 7 PIN OCTAL 6 AM

GLASS BULB

THE 6CU6 IS A BEAM-POWER TUBE INTENDED FOR USE AS A HORIZONTAL DEFLECTION AMPLIFIER IN TELEVISION RECEIVERS. IT IS DESIGNED TO PROVIDE LONGER LIFE AT HIGH-LINE CONDITIONS AND INCREASED RUGGEDNESS TO WITHSTAND MOMENTARY OVERLOADS.

DIRECT INTERELECTRODE CAPACITANCES WITH NO EXTERNAL SHIELD

GRID #1	TO	PLATE: G4 TO P	0.6	4	μμf
INPUT:	G1	TO (H+K+G2+BP)	15	4	uu f
OUTPUT:	P	TO (H+K+G2+BP)	7	4	uuf

RATINGSA INTERPRETED ACCORDING TO RETMA STANDARD M8-210

HORIZONTAL DEFLECTION AMPLIFIER B

HEATER VOLTAGE	6.3	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE: HEATER REGATIVE WITH RESPECT TO CATHODE TOTAL DC AND PEAK	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE DC TOTAL DC AND PEAK	100 200	VOLTS VOLTS
MAXIMUM DC PLATE SUPPLY VOLTAGE (BOOST + POWER SUPPLY)	600 ←	VOLTS
MAXIMUM PEAK POSITIVE PLATE VOLTAGE (ABSOLUTE MAXIMUM)	6 000	VOLTS
MAXIMUM PEAK NEGATIVE PLATE VOLTAGE	1 250	VOLTS
MAXIMUM PLATE DISSIPATION ^C	11	WATTS
MAXIMUM PEAK NEGATIVE GRID #1 VOLTAGE	300	VOLTS
MAXIMUM DC GRID #2 VOLTAGE	200 -	VOLTS
MAXIMUM GRID #2 DISSIPATION	2.5	WATTS
MAXIMUM AVERAGE CATHODE CURRENT	110	MA.
MAXIMUM PEAK CATHODE CURRENT	400	MA.
MAXIMUM GRID #4 CIRCUIT RESISTANCE	0.47	MEGOHM
MAXIMUM BULB TEMPERATURE (AT HOTTEST POINT)	220	°C

ADESIGN CENTER VALUES EXCEPT WHERE ABSOLUTE MAXIMUM IS STATED.

BFOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCASTING STATIONS; FEDERAL COMMUNICATIONS COMMISSION". THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15% (10 MICROSECONDS) OF A SCANNING CYCLE.

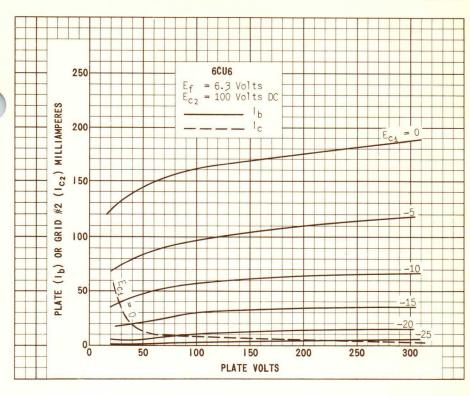
 $^{^{}m C}_{
m IN}$ stages operating with grid-leak bias, an adequate cathode-bias resistor or other suitable means is required to protect the tube in the absence of excitation.

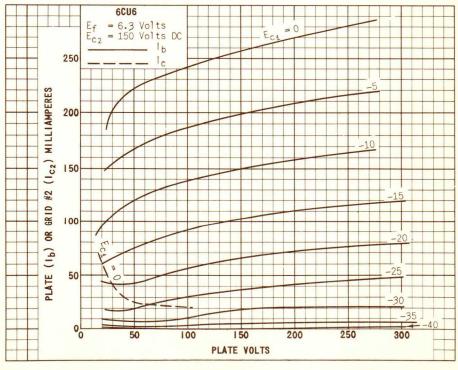
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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS -

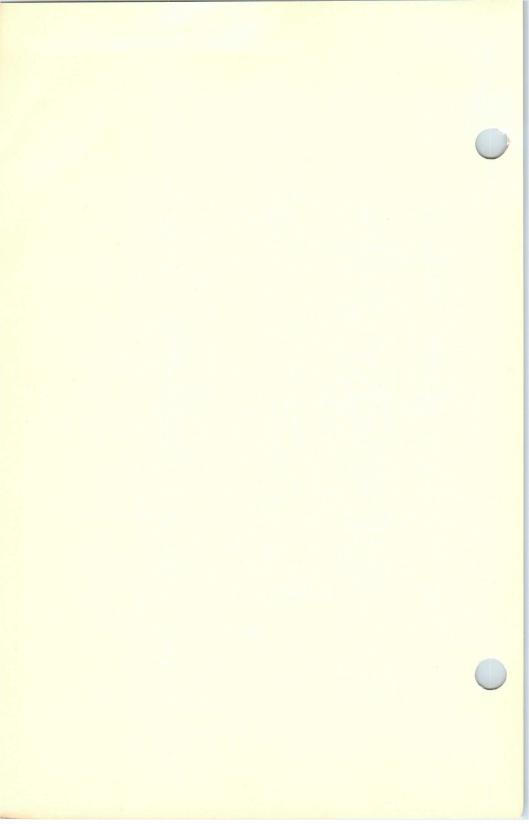
PENTODE OPERATION: WITH Eb = 250V., Ec2 = 150V. AND Ec1 = -22.5V.			
PLATE CURRENT		57	MA.
GRID #2 CURRENT		2.1	MA.
TRANSCONDUCTANCE	5	900	MMHOS
PLATE RESISTANCE (APPROX.)	14	500	OHMS
ZERO BIAS: WITH Eb = 60V. AND Ec2 = 150V. (INSTANTANEOUS VALUES)			
PLATE CURRENT		260	MA.
GRID #2 CURRENT		26	MA.
CUT-OFF: FOR I_b = 1 MA., WITH E_b = 250V. AND E_{c2} = 150V.			
GRID #1 VOLTAGE (APPROX.)		-43	VOLTS
TRIODE μ : WITH $E_b = E_{c2} = 150V$. AND $E_{c1} = -22.5V$.		4.3	

SIMILAR TYPE REPERENCE. Except for heater operation the 8008 is identical to the 12006 and 25008. It is a rugged replacement for the 68086T.



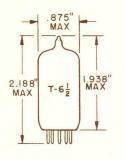


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TUMG-SOL

TRIODE PENTODE



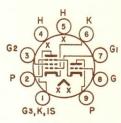
FOR

COLOR AND BLACK AND WHITE

T.V. APPLICATIONS

COATED UNIPOTENTIAL CATHODE

ANY MOUNTING POSITION



BOTTOM VIEW

BASING DIAGRAM
JEDEC 9GM

GLASS BULB

MINIATURE BUTTON 9 PIN BASE E9-1 OUTLINE DRAWING JEDEC 6-2

THE 6CU8 IS A GENERAL-PURPOSE MEDIUM-MU TRIODE AND SHARP-CUTOFF PENTODE IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS INTENDED FOR A WIDE VARIETY OF APPLICATIONS IN BLACK-AND-WHITE AND COLOR TELEVISION RECEIVERS. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED.

DIRECT INTERELECTRODE CAPACITANCES WITHOUT EXTERNAL SHIELD

PENTODE GRID 1 TO PENTODE PLATE: (PG TO PP)	max.	0.025	pf
PENTODE INPUT: PG1 TO (H+PK+PG3+TK+I,S,+PG2)		7	pf
PENTODE OUTPUT: PP TO (H+PK+PG3+TK+I.S.+PG2)		2.4	pf
TRIODE GRID TO TRIODE PLATE: TG TO TP		1.6	pf
TRIODE INPUT: TG TO (TK +H+PG3+I.S.)		1.9	pf
TRIODE OUTPUT: TP TO (TK+H+PG3+I.S.)		1.6	pf
PENTODE GRID 1 TO TRIODE PLATE (PG1 TO TP)	max.	0.03 <	pf
PENTODE PLATE TO TRIODE PLATE (PP TO TP)	max.	0.07 <	pf

HEATER CHARACTERISTICS AND RATINGS DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239 ←

AVERAGE CHARACTERISTICS	6.3	VOLTS	450	MA.
HEATER WARM- UP TIME A			11	SECONDS
LIMITS OF APPLIED VOLTAGE			6.3±0.6	VOLTS
LIMITS OF SUPPLIED CURRENT			450 ± 30	MA.
MAXIMUM HEATER-CATHODE VOLTA	AGE:			
HEATER NEGATIVE WITH RESPE	CT TO CATHODE			
TO TAL DC AND PEAK			200	VOLTS
HEATER POSITIVE WITH RESPEC	T TO CATHODE			
DC			100	VOLTS
TOTAL DC AND PEAK			200	VOLTS

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

→ DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

PENTODE PLATE VOLTAGE	→ 330	VOLTS
TRIODE PLATE VOLTAGE	→ 330	VOLTS
GRID 2 SUPPLY VOLTAGE	→ 330	VOLTS
GRID 2 VOLTAGE	See rating chart	
PENTODE PLATE DISSIPATION	→ 2.3	WATTS
TRIODE PLATE DISSIPATION	→ 2.8	WATTS
GRID 2 DISSIPATION	→ 0.55	WATT
POSITIVE DC PENTODE GRID 1 VOLTAGE	0	VOLTS
POSITIVE DC TRIODE GRID VOLTAGE	0	VOLTS

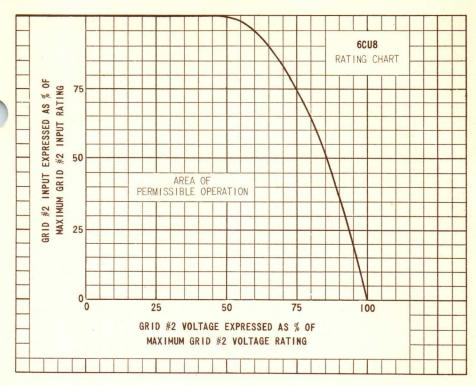
-> TYPICAL OPERATING CHARACTERISTICS

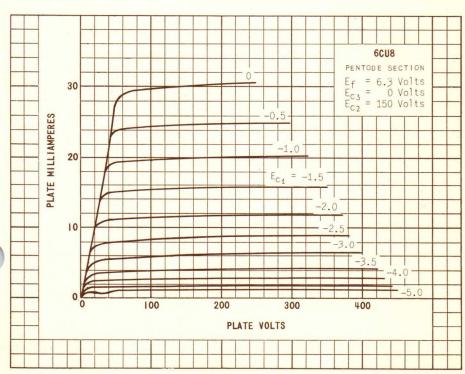
CLASS A1 AMPLIFIER

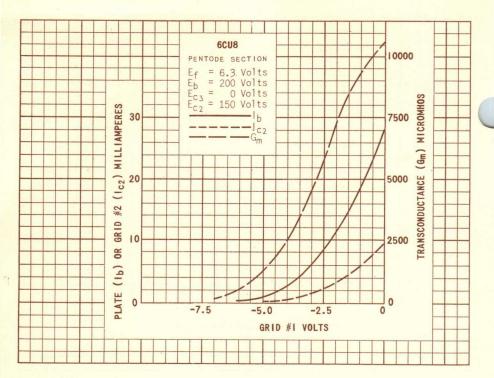
	TRIODE	PENTODE	
	125	125	VOLTS
		125	VOLTS
	-1.0	0	VOLTS
	0	56	OHMS
	17	12	MA.
		3.8	MA.
	5,800	7,800	MHOS
	24		
APPROX.	4.1	170	KOHMS
		1.6	MA.
	12	-6	MA.
		-1.0 0 17 -5,800 24 APPROX. 4.1	125 125 -1.0 0 0 56 17 12

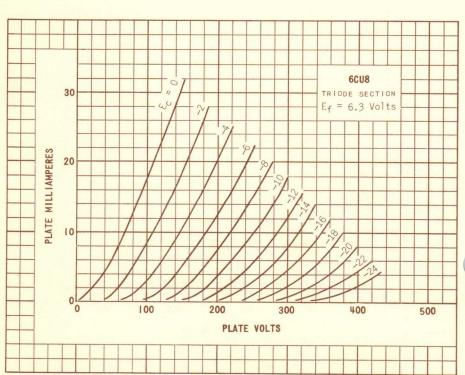
^{-&}gt; INDICATES A CHANGE.

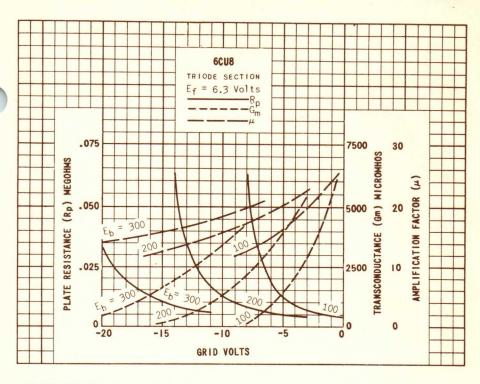
A
HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO
REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT
CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER
HEATER OPERATING RESISTANCE.

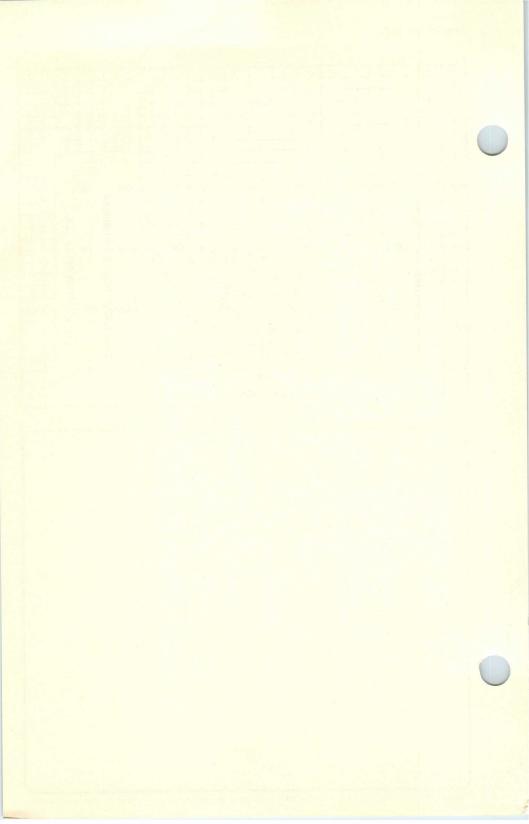




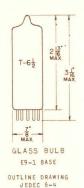








PENTODE



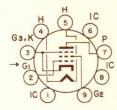
COATED UNIPOTENTIAL CATHODE

HEATER

6.3 VOLTS 0.76 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

BASING DIAGRAM JEDEC 9CV

OHMS

THE 6CW5 IS AN A.F. OUTPUT PENTODE IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS INTENDED FOR USE IN SINGLE-ENDED PUSH-PULL OUTPUT STAGES.

DIRECT INTERELECTRODE CAPACITANCES

GRID #1 TO ALL OTHER ELEMEN TS	12	μμf
PLATE TO ALL OTHER ELEMEN TS	6.0	μμέ
PLATE TO GRID #1 (MAX.)	0.6	$\mu\mu f$
GRID #1 TO HEATER (MAX.)	0.25	μμξ

RATINGS

INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER VOLTAGE	6.3	VOLTS
MAXIMUM PLATE VOLTAGE	250	VOLTS
MAXIMUM PLATE VOLTAGE WITHOUT PLATE CURRENT	550	VOLTS
MAXIMUM PLATE DISSIPATION	12	WATTS
MAXIMUM GRID #2 VOLTAGE	200	VOLTS
MAXIMUM GRID #2 VOLTAGE WITHOUT CURRENT	550	VOLTS
MAXIMUM GRID #2 DISSIPATION	1.75	WATTS
MAXIMUM GRID #2 PEAK DISSIPATION	6	WATTS
MAXIMUM CATHODE CURRENT	100	MAMPS
MAXIMUM GRID #1 CIRCUIT RESISTANCE WITH AUTOMATIC BIA	AS 1	MEGOHM
MAXIMUM PEAK CATHODE TO HEATER VOLTAGE (CATHODE		
POSITIVE WITH RESPECT TO THE HEATER)	300	VOLTS
DC COMPONENT OF SAME	150	VOLTS
MAXIMUM CATHODE TO HEATER VOLTAGE (CATHODE		
NEGATIVE WITH RESPECT TO HEATER)	. 100	VOLTS

- INDICATES A CHANGE.

CONTINUED ON FOLLOWING PAGE

MAXIMUM CIRCUIT RESISTAN CE BETWEEN HEATER AND CATHODE 20 000

CONTINUED FROM PRECEDING PAGE

TYPICAL CHARACTERISTICS

HEATER VOLTAGE	6.3	VOLTS
HEATER CURRENT	0.76	AMP.
PLATE VOLTAGE	170	VOLTS
GRID #2 VOL TAGE	170	VOLTS
GRID #1 VOLTAGE	-12.5	VOLTS
PLATE CURRENT	70	MAMPS
GRID #2 CURRENT	5	MAMPS
TRANSCONDUCTANCE	10 000	μMHOS
AMPLIFICATION FACTOR OF GRID #2 WITH RESPECT TO GRID #1	8	
PLATE RESISTANCE	23 000	OHMS

OPERATING CHARACTERISTICS

CLASS A, ONE TUBE

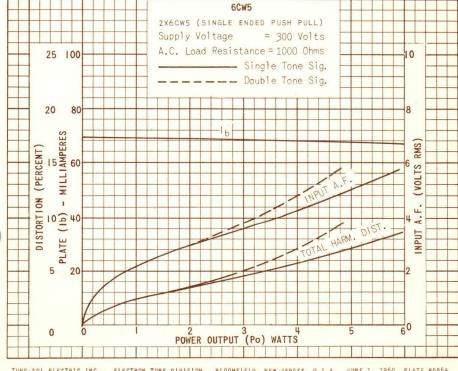
HEATER VOLTAGE	6.3	VOLTS
HEATER CURRENT	0.76	AMP.
PLATE VOLTAGE	170	VOLTS
GRID #2 VOLTAGE	170	VOLTS
GRID #1 BIAS	-12.5	VOLTS
LOAD RESISTANCE	2400	OHMS
ZERO-SIGNAL PLATE CURRENT	70	MAMPS
ZERO-SIGNAL GRID #2 CURRENT	5	MAMPS
INPUT AF VOLTAGE (RMS)	7.0	VOLTS
MAX. SIGNALPLATE CURRENT	70	MAMPS.
MAX. SIGNAL GRID #2 CURRENT	22	MAMPS
MAX. POWER OUTPUT	5.6	WAT TS
TOTAL HARMONIC DISTORTION AT MAX. POWER OUTPUT	10	PERCENTS
INPUT AF VOLTAGE AT A POWER OUTPUT OF 50 MWATTS (RMS)	0.5	VOLTS

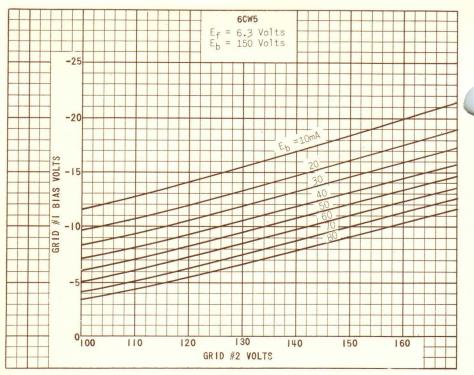
SINGLE-ENDED PUSH-PULL; TWO TUBES, SINGLE TONE

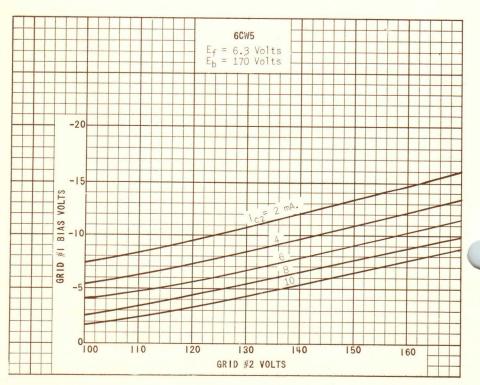
HEATER VOLTAGE	6.3	VOLTS
HEATER CURRENT	0.76	AMP.
SUPPLY VOLTAGE	300	VOLTS
LOAD RESISTANCE	1000	OHMS
ZERO-SIGNAL CATHODE CURRENT	69	MAMPS
INPUT AF VOLTAGE (RMS)	5.7	VOLTS
MAX. SIGNAL CATHODE CURRENT	67	MAMPS
MAX. POWER OUTPUT	4.8	WATTS
TOTAL HARMONIC DISTORTION AT MAX. POWER OUTPUT	9.3	PERCENTS
INPUT AF VOLTAGE AT A POWER OUTPUT OF 50 MWATTS (RMS)	0.55	VOLTS

SINGLE-ENDED PUSH-PULL; TWO TUBES, DOUBLE TONE $^{\mbox{\scriptsize A}}$

HEATER VOLTAGE	6.3	VOLTS
HEATER CURRENT	0:76	AMP.
SUPPLY VOLTAGE	300	VOLTS
LOAD RESISTANCE	1000	OHMS
ZERO-SIGNAL CATHODE CURRENT	69	MAMPS
INPUT AF VOLTAGE FOR EACH TONE SEPARATELY (RMS)	2.85	VOLTS
MAX. SIGNAL CATHODE CURRENT	67	MAMPS
MAX. POWER OUTPUT	5.9	WATTS
TOTAL HARMONIC DISTORTION AT MAX. POWER OUTPUT	8.5	PERCENTS
ASEE CIRCUIT DIAGRAM AND REMARK ON FOLLOWING PAGE		



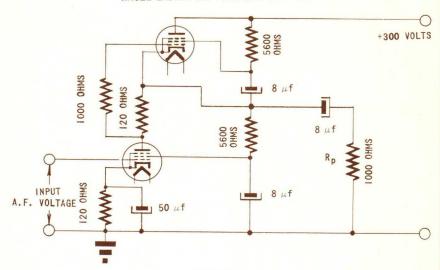




CIRCUIT DIAGRAM

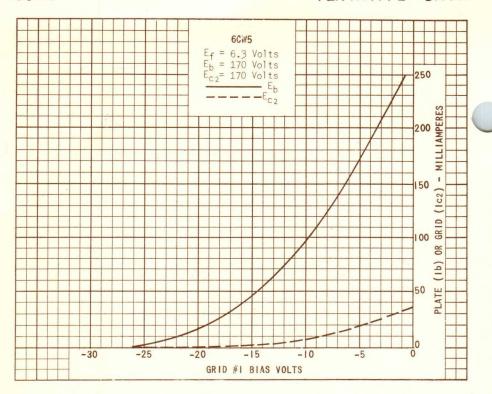
OF

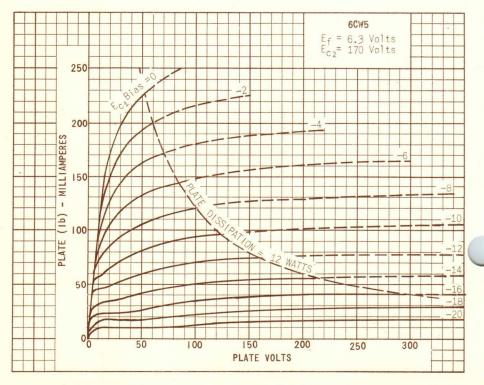
SINGLE-ENDED PUSH-PULL OUTPUT STAGE



REMARK

SINGLE TONE DATA ARE OBTAINED WITH A PURE SINUSOIDAL INPUT VOLTAGE. HOWEVER, SUCH AN INPUT VOLTAGE IS IN GENERAL NOT REPRESENTATIVE FOR THE REPRODUCTION OF MUSIC AND SPEECH, SINCE A PURELY SINUSOIDAL TONE SELDOM OCCURS. THE DOUBLE TONE DATA ARE OBTAINED WITH TWO SINUSOIDAL SIGNALS OF DIFFERENT FREQUENCIES BUT OF THE SAME AMPLITUDE. THIS APPEARS TO BE FAR BETTER IN AGREEMENT WITH PRACTICE. IN THE CASE OF FULL DRIVE WITH TWO SINUSOIDAL SIGNALS DIFFERENT IN FREQUENCY BUT HAVING THE SAME AMPLITUDE THE OUTPUT POWER IS ABOUT HALF THE VALUE OBTAINED AT FULL DRIVE WITH A SINGLE SINUSOIDAL INPUT VOLTAGE OF TWICE THIS AMPLITUDE. TO MAKE COMPARISON POSSIBLE THE OBTAINED OUTPUT POWER WITH DOUBLE TONE IS THEREFORE MULTIPLIED BY 2.





TWIN TRIODE

7"
MAX.

155"
MAX.

1-6½
MAX.

2 3"
MAX.

MAX.

GLASS BULB

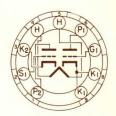
MINIATURE TYPE

COATED UNIPOTENTIAL CATHODE

HEATER

6.3 VOLTS 0.4 AMP.
AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW SMALL BUTTON 9 PIN BASE

9FC

THE 6CX7 IS A MEDIUM MU TWIN TRIODE IN THE 9 PIN MINIATURE CONSTRUCTION AND IS DESIGNED FOR OPERATION AS A CASCODE (VHF) AMPLIFIER. EXCEPT FOR HEATER CHARACTERISTICS AND HEATER WARM-UP TIME, IT IS IDENTICAL TO THE 4CX7.

DIRECT INTERELECTRODE CAPACITANCES SHIELD #315 CONNECTED TO HEATER UNLESS SPECIFIED DIFFERENTLY

	SECTION #1	SECTION #2	
GRID TO PLATE: (G TO P)	1.2		μμ f
INPUT: G TO (H+K+E.S.)	2.4		μμ f
OUTPUT: P TO (H+K+E.S.)	1.3		ии f
HEATER TO CATHODE: (H TO K) A	2.4	2.2	ии f
PLATE TO CATHODE: (P TO K) (MAX)	0.17	0.17	ии f
#2 PLATE TO #1 PLATE AND #1 GRID:			
#2 P TO (#1P+#1G) (MAX.)	.02	27	uu f
PLATE TO PLATE: (#1 P TO #2 P) (MAX.	.01	L7	μμ f
GROUNDED GRID OPERATION:			
INPUT: K TO (G+1.S.+H+E.S.)		4.2	ии f
OUTPUT: P TO (G+1.S.+H+E.S.)	-	1.7	μμ f

RATINGS

INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

EACH SECTION

HEATER VOLTAGE	6.3	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE		
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC COMPONENT	100	VOLTS
TOTAL DC AND PEAK C	200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	200	VOLTS
MAXIMUM PLATE VOLTAGE C	250	VOLTS
MAXIMUM PLATE DISSIPATION	2	WATTS

ASHIELD #315 CONNECTED TO GROUND.

 $^{^{\}mbox{C}}_{\mbox{UNDER}}$ CUTOFF CONDITIONS WHEN THE TUBE IS USED AS A CASCODE AMPLIFIER, THIS RATING MAY BE AS HIGH AS 300 VOLTS MAXIMUM.

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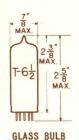
RATINGS — CONTID. INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM EACH SECTION

CATHODE CURRENT (MAX.)		20	MA.
GRID CIRCUIT RESISTANCE	(MAX.)	0.5	MEGOHM

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS CLASS A_1 AMPLIFIER — EACH SECTION

HEATER VOLTAGE	6.3	VOLTS
HEATER CURRENT	0.4	AMP.
PLATE VOLTAGE	150	VOLTS
GRID VOLTAGE	0	VOLTS
CATHODE BIAS RESISTOR	220	OHMS
PLATE CURRENT	9.0	MA.
TRANSCONDUCTANCE	6 400	MHOS
AMPLIFICATION FACTOR	39	
GRID VOLTAGE FOR Ib =10 HA (APPROX.)	-10	VOLTS

TRIODE-PENTODE MINIATURE TYPE



COATED UNIFOTENTIAL CATHODE

HEATER

6.3 VOLTS 0.75 AMP.
AC OR DC

ANY MOUNTING POSITION



SMALL BUTTON 9 PIN BASE

9DX

THE 6CX8 IS A SHARP-CUTOFF PENTODE AND A MEDIUM-MU TRIODE IN THE 9 PIN MINIATURE CONSTRUCTION. THE PENTODE SECTION IS INTENDED PRIMARILY FOR USE AS A VIDEO AMPLIFIER. THE TRIODE SECTION IS SUITABLE FOR A 4.5 MEGACYCLE SOUND IF AMPLIFIER, SWEEP OSCILLATOR, SYNC SEPARATOR, SYNC AMPLIFIER, OR SYNC CLIPPER. EXCEPT FOR HEATER RATINGS AND HEATER WARM-UP TIME, THE 6CX8 IS IDENTICAL TO THE 8CX8.

DIRECT INTERELECTRODE CAPACITANCES

PENTODE SECTION:		
GRID #1 TO PLATE	0.06	μμf
INPUT	9.0	μμ f
OUTPUT	4.4	μμ f
TRIODE SECTION:		
GRID TO PLATE	4.4	µµ f
INPUT	2.2	μμ f
OUTPUT	0.38	μμ f
PENTODE GRID #1 TO TRIODE PLATE (MAX.)	.005	µµ f
TRIODE GRID TO PENTODE PLATE (MAX.)	.018	μμ f
PENTODE PLATE TO TRIODE PLATE (MAX.)	0.17	μμ f

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

	PENTODE SECTION	TRIODE	
HEATER VOLTAGE	6.3±10%	6.3±10%	VOLTS
MAXIMUM PLATE VOLTAGE	330	330	VOLTS
MAXIMUM SCREEN-SUPPLY VOLTAGE	330		VOLTS
MAXIMUM SCREEN VOLTAGE	SEE RATIN	G CHART	
MAXIMUM POSITIVE DC GRID #1 VOLTAGE	0	0	VOLTS
MAXIMUM PLATE DISSIPATION	5.Q	2.0	WATTS
MAXIMUM SCREEN DISSIPATION	1.1		WATTS

CONTINUED FROM PRECEDING PAGE

RATINGS - CONT'D INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

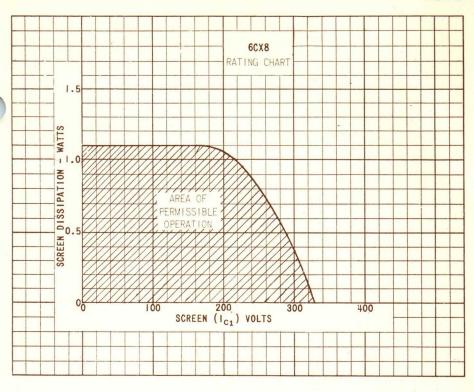
	PENTODE SECTION	TRIODE SECTION	
MAXIMUM HEATER-CATHODE VOLTAGE:			
HEATER POSITIVE WITH RESPECT TO CATHODE			
DC COMPONENT	100	100	VOLTS
TOTAL DC AND PEAK	200	200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE			
TOTAL DC AND PEAK	200	200	VOLTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE			
WITH FIXED BIAS	0.25	0.5	MEGOHMS
WITH CATHODE BIAS	1.0	1.0	MEGOHMS
HEATER WARM-UP TIME (APPROX.)*	11	.0	SECONDS

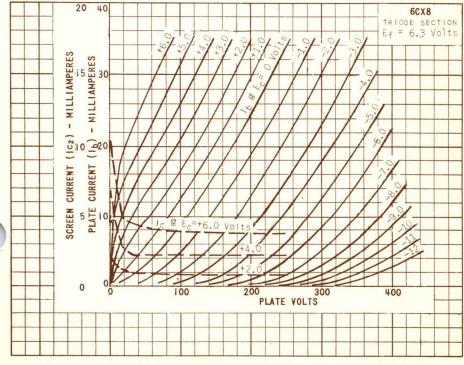
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

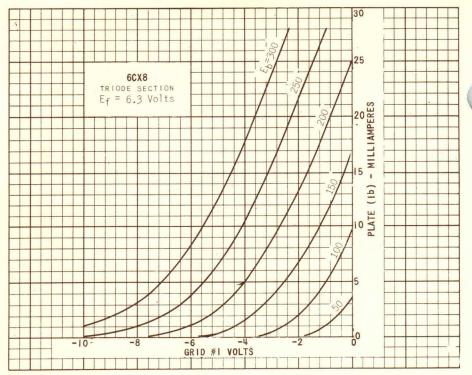
CLASS A1 AMPLIFIER

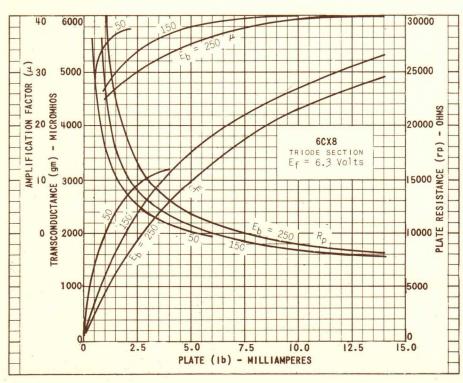
		NTODE	TRIODE	
HEATER VOLTAGE HEATER CURRENT	6.3±10% 0.75	6.3±10% 0.75	6.3±10% 0.75	VOLTS
PLATE VOLTAGE SCREEN VOLTAGE	40 125	200 125	150	VOLTS
GRID #1 VOLTAGE	OA			VOLTS
CATHODE—BIAS RESISTOR AMPLIFICATION FACTOR		68	150 40	OHMS
PLATE RESISTANCE (APPROX.)		70 000	8 700	OHMS
TRANSCONDUCTANCE PLATE CURRENT	40	10 000 24	4 600	μMHOS MA.
SCREEN CURRENT GRID #4 VOLTAGE (APPROX.)	15.5	5.2		MA.
IP = 100/14.		-8.5	-5.0	VOLTS

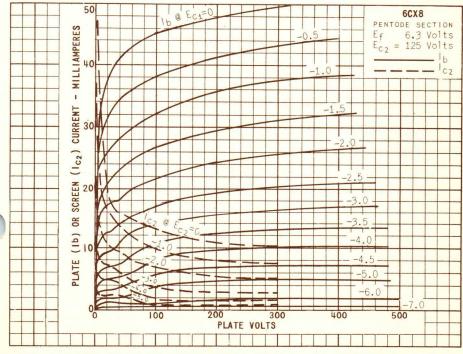
DESIGN-MAXIMUM RATINGS ARE THE LIMITING VALUES EXPRESSED WITH RESPECT TO BOGIE TUBES AT WHICH SATISFACTORY TUBE LIFE CAN BE EXPECTED TO OCCUR. TO OBTAIN SATISFACTORY CIRCUIT PERFORMANCE, THEREFORE, THE FOUNDMENT DESIGNER MUST SETABLISH THE CIRCUIT DESIGN SO THAT NO DESIGN-MAXIMUM VALUE IS EXCEEDED WITH A BOGIE TUBE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, AND ENVIRONMENTAL CONDITIONS.



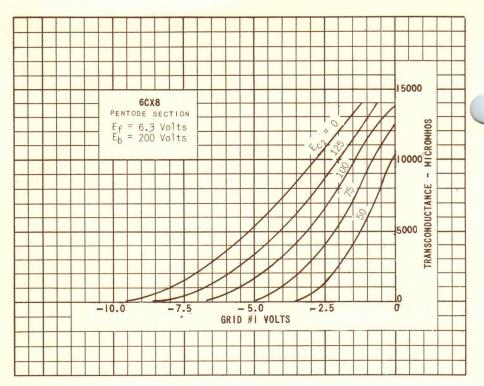


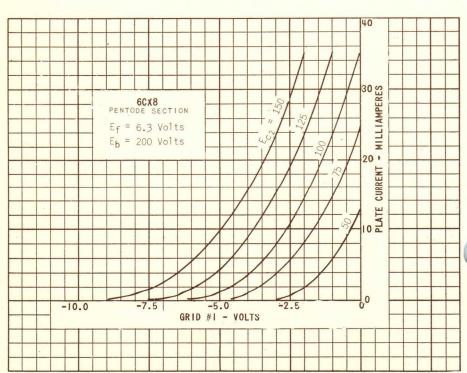


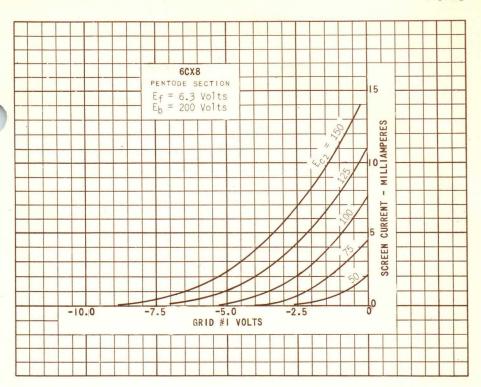


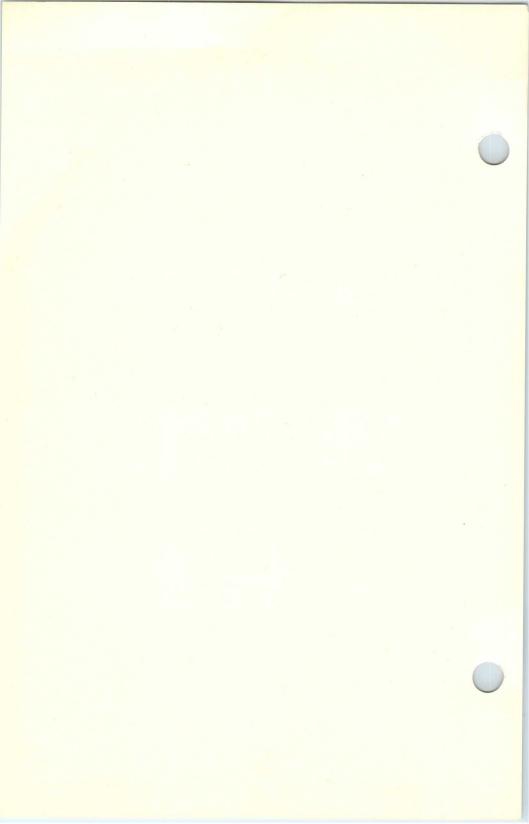


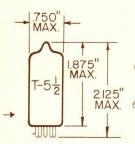
PRINTEGINUS. S. A.











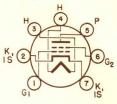
TETRODE MINIATURE TYPE

COATED UNIPOTENTICAL CATHODE

HEATER

6.3±0.6 VOLTS 0.2 AMP. ← AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW BASING DIAGRAM JEDEC 7EW

GLASS BULB MINIATURE BUTTON 7 PIN BASE E7-1 OUTLINE DRAWING JEDEC 5-2

THE 6CY5 IS A SHARP-CUTOFF TETRODE IN THE 7-PIN MINIATURE CONSTRUCTION AND IS DESIGNED FOR SERVICE IN VHF TUNERS OF TELEVISION RECEIVERS. EXCEPT FOR HEATER RATINGS AND HEATER WARM-UP TIME, THE 6CY5 IS IDENTICAL TO THE 2CY5, 3CY5 AND 4CY5.

DIRECT INTERELECTRODE CAPACITANCESA

GRID #1 TO PLATE	0.03	μμ f
INPUT	4.5	μμ f
OUTPUT	3.0	μμ f

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

MAXIMUM PLATE VOLTAGE	180	VOLTS
MAXIMUM GRID #2 (SCREEN) SUPPLY VOLTAGE	180	VOLTS
MAXIMUM GRID #2 VOLTAGE SEE GRID #2 INPU	TRATING	CHART
MAXIMUM PLATE DISSIPATION	2.0	WATTS
MAXIMUM GRID #2 DISSIPATION	0.5	WATTS
MAXIMUM GRID #1 (CONTROL GRID) VOLTAGE		
POSITIVE VALUE	0	MA.
MAXIMUM CATHODE CURRENT	20	MA.
MAXIMUM HEATER-CATHODE VOLTAGE		
HEATER POSITIVE WITH RESPECT TO CATHODE	100	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE	100	VOLIS

- INDICATES A CHANGE.

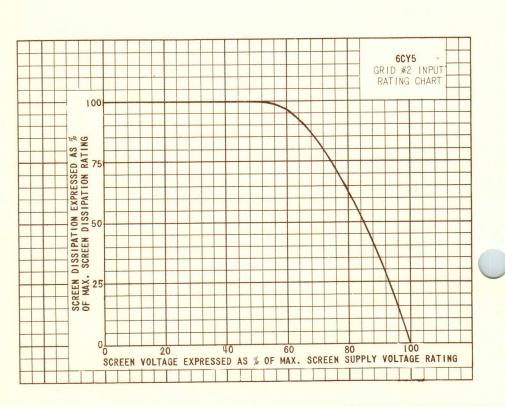
Awith SHIELD #316 CONNECTED TO CATHODE.

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

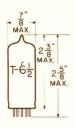
PLATE VOLTAGE	125	VOLTS
GRID #2 VOLTAGE	80	VOLTS
GRID #1 VOLTAGE	-1	VOLTS
PLATE RESISTANCE	0.1	MEGOHM
TRANSCONDUCTANCE	8 000	µмноs
GRID #1 CUTOFF BIASC	-6	VOLTS
PLATE CURRENT	10	MA .
GRID #2 CURRENT	1.5	MA.

CPLATE CURRENT 20 MA.



DOUBLE TRIODE

MINIATURE TYPE

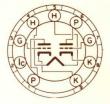


GLASS BULB

COATED UNIPOTENTIAL CATHODE

HEATER
6.3±10% VOLTS 0.75 AMP.
AC OR DC

ANY MOUNTING POSITION



SMALL BUTTON 9 PIN BASE

9LG -

THE 6CY7 IS A DISSIMILAR DOUBLE TRIODE IN THE 9 PIN MINIATURE CONSTRUCTION AND IS INTENDED FOR USE AS A COMBINED VERTICAL-DEFLECTION OSCILLATOR AND AMPLIFIER IN TELEVISION RECEIVERS. EXCEPT FOR HEATER RATINGS AND HEATER WARM-UP TIME, THE 6CY7 IS IDENTICAL TO THE 8CY7.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.®

	SEC. 1	SEC. 2	
GRID TO PLATE	1.8	4.4	μμf
INPUT	1.5	5.0	μμf
OUTPUT	0.30	1.0	μμf

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

	VERTICAL-B OSCILLATOR SERVICE (SEC. 1)	VERTICAL-B DEFLECTION AMPLIFIER (SEC. 2)	
HEATER VOLTAGE	6.3	6.3	VOLTS
MAXIMUM DC PLATE VOLTAGE	350	350	VOLTS
MAXIMUM PEAK POSITIVE PULSE PLATE VOLTAGE		1 800	VOLTS
MAXIMUM PEAK NEGATIVE GRID VOLTAGE	400	250	VOLTS
MAXIMUM PLATE DISSIPATION	1.0	5.5 ^A	WATTS
MAXIMUM DC CATHODE CURRENT		35	MA.
MAXIMUM DC PEAK CATHODE CURRENT		120	MA.
MAXIMUM HEATER CATHODE VOLTAGE HEATER POSITIVE WITH RESPECT TO CATHODE			
DC COMPONENT	100	100	VOLTS
TOTAL DC AND PEAK	200	200	VOLTS.
HEATER NEGATIVE WITH RESPECT TO CATHODE			
TOTAL DC AND PEAK	200	200	VOLTS
MAXIMUM GRID CIRCUIT RESISTANCE			
WITH FIXED BIAS	2.2		MEGOHMS
WITH CATHODE BIAS	2.2	2.2	MEGOHMS

CONTINUED ON FOLLOWING PAGE

- INDICATES A CHANGE.

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

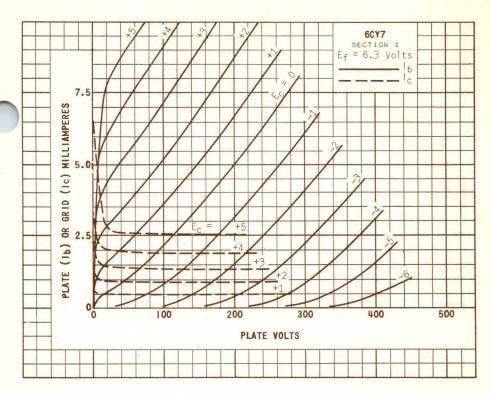
	SECTION 1 SECTION 2 (OSCILLATOR)				
HEATER VOLTAGE HEATER CURRENT	6.3 0.75	6.3	6.3	VOLTS	
PLATE VOLTAGE GRID VOLTAGE	250 -3.0	60	150	VOLTS	
CATHODE—BIAS RESISTOR AMPLIFICATION FACTOR	68		620 5.0	OHMS	
PLATE RESISTANCE (APPROX.) TRANSCONDUCTANCE	52 000 1 300		920	OHMS µMHOS	
PLATE CURRENT	1.2	80	30	MA.	
PLATE CURRENT (APPROX.) $E_c = -30V$. GRID VOLTAGE (APPROX.) $I_b = 200 \mu A$.			3.5	MA. VOLTS	
GRID VOLTAGE (APPROX.) $I_b = 10 \mu A$.	-5.5			VOLTS	

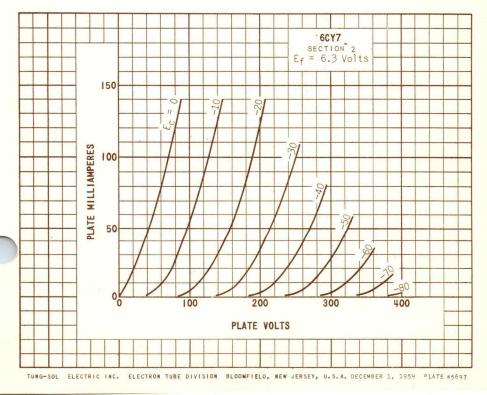
WITHOUT EXTERNAL SHIELD.

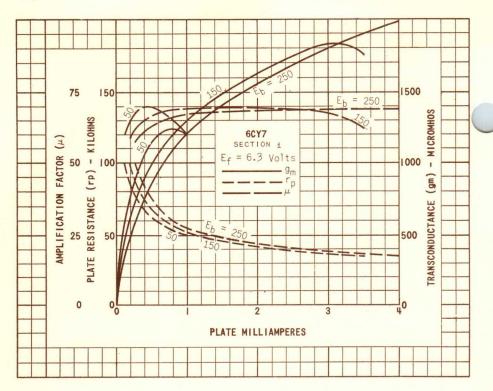
DESIGN-MAXIMUM RATINGS ARE THE LIMITING VALUES EXPRESSED WITH RESPECT TO BOGIE TUBES AT WHICH SATISFACTORY TUBE LIFE CAN BE EXPECTED TO OCCUR. TO OBTAIN SATISFACTORY CIRCUIT PERFORMANCE, THEREFORE, THE EQUIPMENT DESIGNER MUST ESTABLISH THE CIRCUIT DESIGN SO THAT NO DESIGN-MAXIMUM VALUE IS EXCEEDED WITH A BOGIE TUBE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT OSUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, AND ENVIRONMENTAL CONDITIONS.

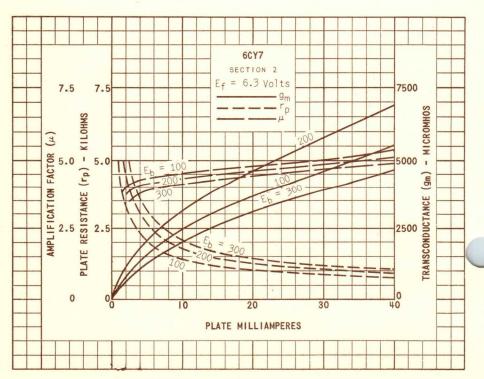
A IN STAGES OPERATING WITH GRID LEAK BIAS, AN ADEQUATE CATHODE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

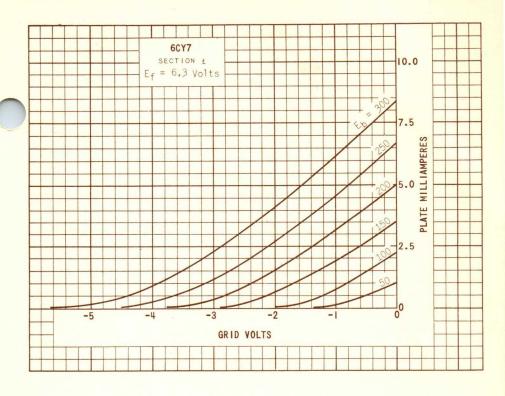
B FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOODENGINEERING PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE.

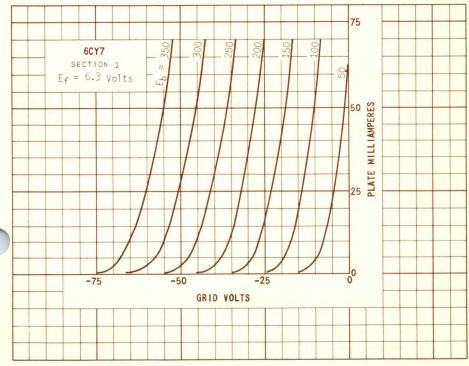


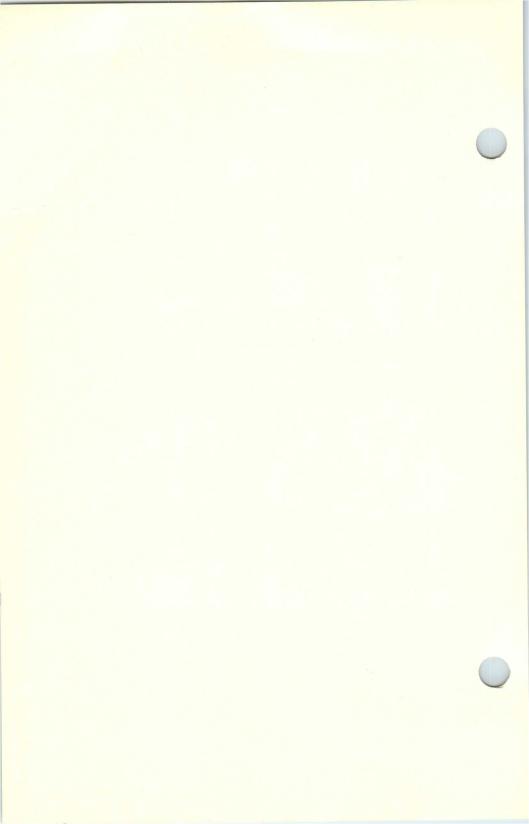


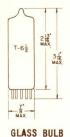












UNIPOTENTIAL CATHODE

HEATER 6.3 VOLTS 0.45±6% AMP. AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

SMALL BUTTON 9 PIN NOVAL

THE 6CZ5 IS A HIGH PERVEANCE BEAM POWER PENTODE IN THE 9-PIN MINIATURE CONSTRUCTION. IT IS INTENDED PRIMARILY FOR USE AS A VERTICAL-DEFLECTION AMPLIFIER TUBE IN HIGH-EFFICIENCY DEFLECTION CIRCUITS OF TELEVISION RECEIVERS UTILIZING PICTURE TUBES HAVING DIAGONAL DEFLECTION ANGLES OF 110 DEGREES AND OPERATING AT VOLTAGES UP TO 18,000 VOLTS. IT IS ALSO USEFUL IN THE AUDIO OUTPUT STAGES OF TELEVISION AND RADIO RECEIVERS. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED.

DIRECT INTERELECTRODE CAPACITANCES WITHOUT EXTERNAL SHIELD

GRID #1 TO PLATE (MAX.)	0.4	μμ f
GRID #1 TO: (K+G3+G2+H)	9.0 ←	μμf
PLATE TO: (K+G3+G2+H)	6.0	μμf

RATINGS INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM VERTICAL DEFLECTION AMPLIFIERA

MAXIMUM PLATE VOLTAGE: DC PEAK POSITIVE PULSE (ABS. MAX.)B 2 200C MAXIMUM GRID #2 VOLTAGE MAXIMUM PEAK NEGATIVE—PULSE GRID #1 VOLTAGE MAXIMUM CATHODE CURRENT: PEAK AVERAGE MAXIMUM PLATE DISSIPATION MAXIMUM GRID #2 INPUT MAXIMUM GRID #2 INPUT MAXIMUM PEAK HEATER—CATHODE VOLTAGE: HEATER NEGATIVE WITH RESPECT TO CATHODE HEATER POSITIVE WITH RESPECT TO CATHODE BULB TEMPERATURE (AT HOTTEST POINT ON BULB SURFACE) HEATER WARM—UP TIME (APPROX.)*	VOLTS
PEAK POSITIVE PULSE (ABS. MAX.)B MAXIMUM GRID #2 VOLTAGE MAXIMUM PEAK NEGATIVE—PULSE GRID #4 VOLTAGE MAXIMUM CATHODE CURRENT: PEAK AVERAGE MAXIMUM PLATE DISSIPATION MAXIMUM PLATE DISSIPATION MAXIMUM GRID #2 INPUT MAXIMUM PEAK HEATER—CATHODE VOLTAGE: HEATER NEGATIVE WITH RESPECT TO CATHODE HEATER POSITIVE WITH RESPECT TO CATHODE BULB TEMPERATURE (AT HOTTEST POINT ON BULB SURFACE) 200 BULB TEMPERATURE (AT HOTTEST POINT ON BULB SURFACE)	
MAXIMUM GRID #2 VOLTAGE MAXIMUM PEAK NEGATIVE—PULSE GRID #1 VOLTAGE —275 MAXIMUM CATHODE CURRENT: PEAK AVERAGE MAXIMUM PLATE DISSIPATION MAXIMUM PLATE DISSIPATION MAXIMUM GRID #2 INPUT MAXIMUM PEAK HEATER—CATHODE VOLTAGE: HEATER NEGATIVE WITH RESPECT TO CATHODE HEATER POSITIVE WITH RESPECT TO CATHODE BULB TEMPERATURE (AT HOTTEST POINT ON BULB SURFACE) 250	VOLTS
MAXIMUM PEAK NEGATIVE—PULSE GRID #1 VOLTAGE —275 MAXIMUM CATHODE CURRENT: PEAK 155 AVERAGE 456 MAXIMUM PLATE DISSIPATION 10 MAXIMUM GRID #2 INPUT 2.2 MAXIMUM PEAK HEATER—CATHODE VOLTAGE: HEATER NEGATIVE WITH RESPECT TO CATHODE 200 BULB TEMPERATURE (AT HOTTEST POINT ON BULB SURFACE) 250	C VOLTS
MAXIMUM CATHODE CURRENT: PEAK AVERAGE MAXIMUM PLATE DISSIPATION MAXIMUM GRID \$2 INPUT MAXIMUM PEAK HEATER-CATHODE VOLTAGE: HEATER NEGATIVE WITH RESPECT TO CATHODE HEATER POSITIVE WITH RESPECT TO CATHODE BULB TEMPERATURE (AT HOTTEST POINT ON BULB SURFACE) 250	→ VOLTS
PEAK AVERAGE MAXIMUM PLATE DISSIPATION MAXIMUM GRID #2 INPUT MAXIMUM PEAK HEATER—CATHODE VOLTAGE: HEATER NEGATIVE WITH RESPECT TO CATHODE HEATER POSITIVE WITH RESPECT TO CATHODE BULB TEMPERATURE (AT HOTTEST POINT ON BULB SURFACE) 155 445 420 45 45 45 46 47 47 48 48 49 49 40 40 40 40 40 40 40 40	← VOLTS
AVERAGE MAXIMUM PLATE DISSIPATION MAXIMUM GRID #2 INPUT MAXIMUM PEAK HEATER—CATHODE VOLTAGE: HEATER NEGATIVE WITH RESPECT TO CATHODE HEATER POSITIVE WITH RESPECT TO CATHODE BULB TEMPERATURE (AT HOTTEST POINT ON BULB SURFACE) 250	
MAXIMUM PLATE DISSIPATION 10 MAXIMUM GRID #2 INPUT 2.2 MAXIMUM PEAK HEATER-CATHODE VOLTAGE: HEATER NEGATIVE WITH RESPECT TO CATHODE 200 HEATER POSITIVE WITH RESPECT TO CATHODE 200 BULB TEMPERATURE (AT HOTTEST POINT ON BULB SURFACE) 250	◆ MA.
MAXIMUM GRID #2 INPUT MAXIMUM PEAK HEATER-CATHODE VOLTAGE: HEATER NEGATIVE WITH RESPECT TO CATHODE HEATER POSITIVE WITH RESPECT TO CATHODE BULB TEMPERATURE (AT HOTTEST POINT ON BULB SURFACE) 200 BULB TEMPERATURE (AT HOTTEST POINT ON BULB SURFACE)	◆ MA.
MAXIMUM PEAK HEATER-CATHODE VOLTAGE: HEATER NEGATIVE WITH RESPECT TO CATHODE HEATER POSITIVE WITH RESPECT TO CATHODE BULB TEMPERATURE (AT HOTTEST POINT ON BULB SURFACE) 200 250	WATTS
HEATER NEGATIVE WITH RESPECT TO CATHODE 200 HEATER POSITIVE WITH RESPECT TO CATHODE 200 BULB TEMPERATURE (AT HOTTEST POINT ON BULB SURFACE) 250	₩ATTS.
HEATER POSITIVE WITH RESPECT TO CATHODE 2000 BULB TEMPERATURE (AT HOTTEST POINT ON BULB SURFACE) 250	
BULB TEMPERATURE (AT HOTTEST POINT ON BULB SURFACE) 250	
HEATER WARM-UP TIME (ADDROVA)*	°C
HEATER WARM-UP TIME (APPROX.)*	SECONDS

CONTINUED ON FOLLOWING PAGE

- INDICATES A CHANGE.

CONTINUED FROM PRECEDING PAGE

RATINGS - CONTID. INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM VERTICAL DEFLECTION AMPLIFIERA

MAXIMUM CIRCUIT VALUES

GRID #1 CIRCUIT RESISTANCE:
FOR FIXED—BIAS OPERATION
FOR CATHODE—BIAS OPERATION

0.5 MEGOHM 1 MEGOHM

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CHARACTERISTICS

CLASS A1 AMPLIFIER

HEATER VOLTAGE	6.3	6.3	VOLTS
HEATER CURRENT	0.45	0.45	AMP.
PLATE VOLTAGE	75	250	VOLTS
GRID #2 (SCREEN-GRID) VOLTAGE	250	250	VOLTS
GRID #1 (CONTROL-GRID) VOLTAGE	0	-14	VOLTS
PLATE RESISTANCE (APPROX.)		73 000	OHMS
TRANSCONDUCTANCE		4 800	MHOS
PLATE CURRENT	130 ^G	46	MA.
GRID #2 CURRENT	16 ^G	4.6	MA.
GRID #1 VOLTAGE (APPROX.) FOR			
PLATE CURRENT OF 100 HAMP.		-40 ←	VOLTS

NOTES

A AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE CONCERNING TELEVISION BROADCAST STATIONS", FEDERAL COMMUNICATIONS COMMISSION.

BTHIS RATING IS APPLICABLE WHERE THE DURATION OF THE VOLTAGE PULSE DOES NOT EXCEED 15 PER CENT OF ONE VERTICAL SCANNING CYCLE. IN A 525-LINE, 30-FRAME SYSTEM, 15 PER CENT OF ONE SCANNING CYCLE IS 2.5 MILLISECONDS.

CUNDER NO CIRCUMSTANCES SHOULD THIS ABSOLUTE VALUE BE EXCEEDED.

DTHE DC COMPONENT MUST NOT EXCEED 100 VOLTS.

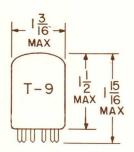
ESUBSCRIPT 1 INDICATES THAT GRID #1 CURRENT DOES NOT FLOW DURING ANY PART OF THE INPUT CYCLE.

FTHE TYPE OF INPUT COUPLING NETWORK USED SHOULD NOT INTRODUCE TOO MUCH RESISTANCE IN THE GRID #1 CIRCUIT. TRANSFORMER OR IMPEDANCE-COUPLING DEVICES ARE RECOMMENDED

G THESE VALUES CAN BE MEASURED BY A METHOD INVOLVING A RE-CURRENT WAVEFORM SUCH THAT THE PLATE DISSIPATION AND GRID #2 INPUT WILL BE KEPT WITHIN RATINGS IN ORDER TO PREVENT DAMAGE TO THE TIBE.

^{*}HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE MEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

TRIPLE TRIODE



COATED UNIPOTENTIAL CATHODE

HEATER

6.3±10% VOLTS 0.45 AMP.

AC OR DC

ANY MOUNTING POSITION



BUTTOM VIEW BUTTON 12 PIN BASE 1280

GLASS BULB

THE 6D10 IS A COMPACTRON, CONTAINING THREE HIGH-MU TRIODES WITH SEPARATE PIN CONNECTIONS FOR ALL THREE CATHODES, GRIDS, AND PLATES IN A COMPACT T-9 GLASS ENVELOPE. IT IS ESPECIALLY DESIGNED FOR USE AS AN OSCILLATOR-MIXER, GROUNDED-GRID AMPLIFIER, AND AUTOMATIC FREQUENCY CONTROL SERVICE.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD		
GRID TO PLATE (EACH SECTION)	1.5	pf
INPUT (EACH SECTION)	2.2	pf
OUTPUT (EACH SECTION)	0.5	pf

RATINGS

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

EACH SECTION

MAXIMUM PLATE VOLTAGE	330	VOLTS
MAXIMUM POSITIVE DC GRID VOLTAGE	0	VOLTS
MAXIMUM NEGATIVE DC GRID VOLTAGE	50	VOLTS
MAXIMUM PLATE DISSIPATION, EACH PLATE	2.0	WATTS
MAXIMUM TOTAL PLATE DISSIPATION, ALL PLATES	6.0	WATTS
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC COMPONENT	100	VOLTS
TOTAL DC AND PEAK	200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	200	VOLTS

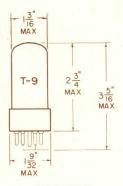
DESIGN-MAXIMUM PATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT LIFE NO DESIGN-MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND FNVIRONMENTAL CONDITIONS,

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

AVERAGE CHARACTERISTICS - EACH SECTION

PLATE VOLTAGE	125	VOLTS
GRID VOLTAGE	-1.0	VOLTS
AMPLIFICATION FACTOR	57	
PLATE RESISTANCE (APPROX.)	13 600	OHMS
TRANSCONDUCTANCE	4 200	µмноs
PLATE CURRENT	4.2	MA.
GRID VOLTAGE (APPROX.)		
Ib = 20 μAMPERES	-4	VOLTS



UNIPOTENTIAL CATHODE

HEATER 6.3 VOLTS 1.2 AMP. AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW .

INTERMEDIATE SHELL SHORT INTERMEDIATE SHELL 8 PIN OCTAL

4CG

GLASS BULB

THE 6DA4 IS AN INDIRECTLY-HEATED HALF WAVE RECTIFIER DESIGNED FOR SERVICE AS A DAMPING DIODE IN HORIZONTAL DEFLECTION CIRCUITS OF 1200 MA. SERIES HEATER OPERATED TELEVISION RECEIVERS. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

HEATER TO CATHODE	3.0	μμf
PLATE TO CATHODE & HEATER A	6.0	μμf
CATHODE TO PLATE & HEATER A	8.0	μμf

RATINGS

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM - UNLESS OTHERWISE INDICATED DAMPER SERVICE B

HEATER VOLTAGE			6.3	VOLTS
HEATER CURRENT			1.2	AMP.
MAXIMUM HEATER-CATHODE	VOLTAGE:			
HEATER NEGATIVE WITH	H RESPECT TO CATHODE			
DC			900	VOLTS
TOTAL DC AND PEAK		4	400	VOLTS
HEATER POSITIVE WITH	H RESPECT TO CATHODE			
DC			100	VOLTS
TOTAL DC AND PEAK			300	VOLTS
MAXIMUM PEAK INVERSE	VOLTAGE	4	400	VOLTS
MAXIMUM DC PLATE CURRE	ENT		155	MA.
MAXIMUM DC PLATE CURRE	ENT (DESIGN CENTER SYSTEM)		145	MA.
MAXIMUM PEAK PLATE CUP	RRENT		900	MA.
MAXIMUM PLATE DISSIPAT	TION		5.5	WATTS
TUBE VOLTAGE DROP WITH	Ib= 250 MA.		22	VOLTS
HEATER WARM-UP TIME (A	APPROX.)*		11.0	SECONDS

PINS 1, 2, 4, & 6 MUST NOT BE USED AS TIE POINTS.

ATTE UNUSED PINS AND METAL PART TO HEATER.

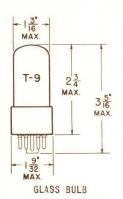
B for operation in a 525-line, 30-frame system as described in "Standards of good engineering practice for television broadcast stations; federal communications commission." The duty of the horizontal voltage pulse not to exceed 15% of one scanning cycle.

INDICATES A CHANGE.

CONTINUED FROM PRECEDING PAGE

*HEATER WARM—UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80≴ OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE MEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

DESIGN-MAXIMUM RATINGS ARE THE LIMITING VALUES EXPRESSED WITH RESPECT TO BOGIE TUBES AT WHICH SATISFACTORY TUBE LIFE CAN BE EXPECTED TO OCCUR. TO OBTAIN SATISFACTORY CIRCUIT PERFORMANCE, THEREFORE, THE EQUIPMENT DESIGNER MUST ESTABLISH THE CIRCUIT DESIGN SO THAT NO DESIGN-MAXIMUM VALUE IS EXCEEDED WITH A BOGIE TUBE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, AND ENVIRONMENTAL CONDITIONS.



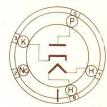
UNIPOTENTIAL CATHODE

HEATER

6.3±0.6 VOLTS 1.2 AMP.

ANY MOUNTING POSITION

ASOCKET PINS 1, 2, 4 & 6 MUST NOT BE USED AS TIE POINTS.



BOTTOM VIEW A

SHORT INTERMEDIATE SHELL

5 PIN OCTAL
WITH BARRIERS

THE 6DA4A IS A SINGLE INDIRECTLY-HEATED DIODE INTENDED FOR USE IN TELE-VISION HORIZONTAL FREQUENCY DAMPER SERVICE. IT IS DESIGNED TO WITHSTAND HIGH VOLTAGE PULSES BETWEEN CATHODE AND BOTH HEATER AND PLATE ELEMENTS SUCH AS NORMALLY ENCOUNTERED IN "DIRECT DRIVE" CIRCUITS.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

HEATER TO CATHODE: H	TO K	3.0	μμ f
CATHODE TO PLATE AND	HEATER: K TO (P+ H)	9.0	μμf
PLATE TO CATHODE AND	HEATER: P TO (K +H)	7.0	μμf

RATINGS

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

HEATER VOLTAGE ^C	6.3±0.6	VOLTS
MAXIMUM PEAK INVERSE PLATE VOLTAGE	5000	VOLTS
MAXIMUM DC PLATE CURRENT	185	MA.
MAXIMUM STEADY STATE PEAK PLATE CURRENT	900	MA.
MAXIMUM PLATE DISSIPATION	8.0	WATTS
MAXIMUM HEATER-CATHODE VOLTAGED		
HEATER NEGATIVE WITH RESPECT TO CATHODE		
DC	1000	VOLTS
TOTAL DC AND PEAK	5000	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC	100	VOLTS
TOTAL DC AND PEAK	300	VOLTS

AVERAGE CHARACTERISTICS

HEATER VOLTAGE	6.3±Q.6	VOLTS
HEATER CURRENT	1.2	AMP.
TUBE VOLTAGE DROP (WITH TUBE CONDUCTING PLATE CURRENT -340 MA.)	30	VOLTS

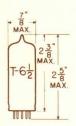
В

DESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE BEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT LIFE NO DESIGN-MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.

CONTINUED FROM PRECEDING PAGE

CTHE EQUIPMENT DESIGNER SHALL SO DESIGN THE EQUIPMENT THAT THE HEATER CURRENT IS AT THE SPECIFIED BOGIE VALUE. HEATER SUPPLY VARIATIONS SHOULD BE RESTRICTED SO THAT THE HEATER CURRENT WILL BE MAINTAINED WITHIN THE SPECIFIED TOLERANCE.

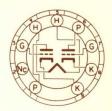
DFOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF G OD ENGINEERING PRACTICE FOR TELEVISION BROAD AST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE.



COATED UNIPOTENTIAL CATHODE

HEATER 6.3 VOLTS 1.0 AMP. AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW MINIATURE BUTTON 9 PIN BASE 9EF

THE 6DA7 IS A MINIATURE 9-PIN DOUBLE TRIODE WITH DISSIMILAR SECTIONS. ONE IS A MEDIUM-MU TRIODE INTENDED FOR VERTICAL OSCILLATOR SERVICE; THE OTHER IS A LOW-MU TRIODE WITH HIGH PLATE DISSIPATION FOR VERTICAL AMPLIFIER SERVICE. THE 6DA7, THEREFORE, COMBINES THE FUNCTION OF OSCILLATOR AND HIGH CURRENT OUTPUT AMPLIFIER FOR VERTICAL SWEEP OF LARGE 90° PICTURE TUBES.

DIRECT INTERELECTRODE CAPACITANCES

	SECTION #1	SECTION #2	
GRID TO PLATE: G1 TO P	2.3	6.9	μμ f
INPUT: G1 TO K+H	2.0	5.5	μμf
OUTPUT: P TO K+H	0.415	0.82	$\mu\mu$ f

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER VOLTAGE		6.3	VOLTS
MAXIMUM PLATE VOLTAGE	300	500	VOLTS
MAXIMUM PLATE VOLTAGE, PEAK			
POSITIVE PULSE*		1800	VOLTS
MAXIMUM CONTROL-GRID VOLTAGE,			
PEAK NEGATIVE PULSE*	-400	-400	VOLTS
MAXIMUM CONTROL-GRID VOLTAGE, NEG., DC	-50	-50	VOLTS
MAXIMUM PLATE DISSIPATION	2.0	6.0	WATTS
MAXIMUM CATHODE CURRENT	20	40	MA.
MAXIMUM CONTROL-GRID CIRCUIT RESISTANCE			
SELF BIAS		2.2	MEGOHMS
MAXIMUM HEATER CATHODE VOLTAGE:			
HEATER NEGATIVE WITH RESPECT TO CATHODE		200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODEB		200	VOLTS
HEATER WARM-UP TIME (APPROX.) A		11.0	SECONDS

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

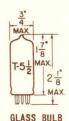
SECTION #1 SECTION #2

HEATER VOLTAGE HEATER CURRENT		6.3	VOLTS VOLTS
PLATE VOLTAGE	250	150	VOLTS
CONTROL-GRID VOLTAGE	-8	-17.5	VOLTS
PLATE RESISTANCE (APPROX.)	7700	1100	OHMS
TRANSCONDUCTANCE	2600	5700	µмноѕ
AMPLIFICATION FACTOR	20	6.3	
PLATE CURRENT	9.0	40	MA.
CONTROL-GRID VOLTAGE (APPROX.)			
FOR Ib = 0.5 MA.		-42	VOLTS
CONTROL-GRID VOLTAGE (APPROX.)			
FOR gm = 30 μ MHOS AND Ib = 50 μ A ZERO BIAS PLATE CURRENT	-16.5		VOLTS
FOR Eb = 60 VOLTS		80	MA.

SIMILAR TYPE REFERENCE: Except for heater ratings, and heater warm-up time, the GAD7 is identical to the 10AD7.

^{*}FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE.

B DC COMPONENT MUST NOT EXCEED 100 VOLTS MAX.



COATED UNIPOTENTIAL CATHODE

HEATER
6.3 VOLTS 0.3 AMP.
AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
7 PIN BASE
7CM

THE 6DC6 IS A SEMI-REMOTE CUTOFF PENTODE USING THE 7 PIN MINIATURE CONSTRUCTION. IT IS INTENDED FOR USE PARTICULARLY IN THE GAIN CONTROLLED PICTURE IF STAGES OF COLOR TELEVISION RECEIVERS. IT IS ALSO USEFUL AS A RADIO-FREQUENCY AMPLIFIER IN THE TUNERS OF SUCH RECEIVERS.

DIRECT INTERELECTRODE CAPACITANCES

GRID #1 TO PLATE (MAX.)	0.02	μμf
INPUT	6.5	ии f
OUTPUT	2	uut

RATINGS INTERPRETED ACCORDING TO RETMA STANDARD M8-210

CLASS A7 AMPLIFIER - DESIGN CENTER VALUES

HEATER VOLTAGE	6.3	VOLTS
MAXIMUM PLATE VOLTAGE	300	VOLTS
MAXIMUM GRID #3 VOLTAGE	0	VOLTS
MAXIMUM GRID #2 SUPPLY VOLTAGE	300	VOLTS
MAXIMUM GRID #2 VOLTAGE	SEE	CURVE #1
MAXIMUM GRID #1 VOLTAGE: POSITIVE BIAS VALUE	0	VOLTS
MAXIMUM PLATE DISSIPATION	2	WATTS
MAXIMUM GRID #2 INPUT	0.5	WATT
MAXIMUM PEAK HEATER-CATHODE VOLTAGE: HEATER NEGATIVE WITH RESPECT TO CATHODE HEATER POSITIVE WITH RESPECT TO CATHODEA	200	VOLTS VOLTS
MAXIMUM GRID #4 CIRCUIT RESISTANCE: FIXED BIAS OPERATION CATHODE BIAS OPERATION	0.25	MEGOHM MEGOHM

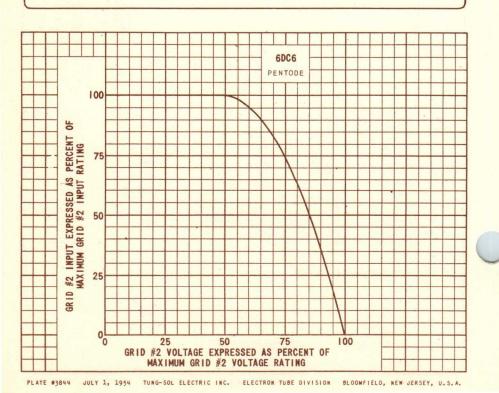
ATHE DC COMPONENT MUST NOT EXCEED 100 VOLTS.

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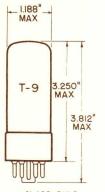
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER

HEATER VOLTAGE	6.3 v	OLTS
HEATER CURRENT	0.3 A	MP.
PLATE VOLTAGE	200 v	OLTS
GRID #3	CONNECTED TO CATHODE AT SO	CKET
GRID #2 VOLTAGE	150 v	OLTS
CATHODE BIAS RESISTOR	180	HMS
PLATE RESISTANCE (APPROX.)	0.5 M	EGOHM
TRANSCONDUCTANCE	5 500 µ	MHOS
TRANSCONDUCTANCE OF 50 MMHOS	-12.5 V	OLTS
PLATE CURRENT	9 M	Α .
GRID #2 CURRENT	3 M	A .



HALF-WAVE VACUUM RECTIFIER



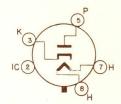
UNIPOTENTIAL CATHODE

HEATER

6.3±0.6 VOLTS 1.6 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

BASING DIAGRAM JEDEC 4CG

GLASS BULB JEDEC GROUP 1 85-85 SHORT INTERMEDIATE-SHELL 5 PIN OCTAL

WITH EXTERNAL BARRIERS PINS 1, 4, & 6 ARE OMITTED OUTLINE DRAWING JEDEC 9-44

THE 6DE4 IS A HALF-WAVE VACUUM RECTIFIER OF THE GLASS-OCTAL TYPE. IT IS DESIGNED SPECIFICALLY FOR USE AS A DAMPER DIODE IN HORIZONTAL-DEFLECTION CIRCUITS OF BLACK-AND-WHITE TELEVISION RECEIVERS.

EXCEPT FOR HEATER RATINGS AND HEATER WARM-UP TIME, THE 6DE4 IS IDENTICAL TO THE 17DE4 AND 22DE4.

DIRECT INTERELECTRODE CAPACITANCES - APPROX. WITHOUT EXTERNAL SHIELD

PLATE TO HEATER AND CATHODE	8.5	μμι f
CATHODE TO HEATER AND PLATE	11.5	μμ f
HEATER TO CATHODE	4	μμ f

RATINGS

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM DAMPER SERVICE

MAXIMUM PEAK INVERSE PLATE VOLTAGE MAXIMUM PEAK PLATE CURRENT	→ 5500 ^A	VOLTS
MAXIMUM DC PLATE CURRENT MAXIMUM PLATE DISSIPATION	→ 180 6.5	MA. WATTS
MAXIMUM PEAK HEATER-CATHODE VOLTAGE:	9.5	100000000000000000000000000000000000000
HEATER NEGATIVE WITH RESPECT TO CATHODE HEATER POSITIVE WITH RESPECT TO CATHODE	→ 5500 ^B	VOLTS

INDICATES A CHANGE.

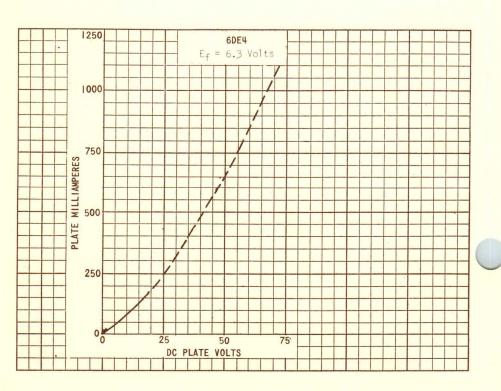
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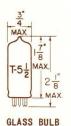
NOTES

AFOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE.

BTHE DC COMPONENT MUST NOT EXCEED 900 VOLTS.

CTHE DC COMPONENT MUST NOT EXCEED 100 VOLTS.





COATED UNIPOTENTIAL CATHODE

HEATER

6.3 VOLTS 0.3 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
7 PIN BASE
7CM

THE 6DE6 IS A SHARP-CUTOFF PENTODE USING THE 7 PIN MINIATURE CONSTRUCTION.
IT IS DESIGNED FOR USE IN 40 MAGACYCLE GAIN-CONTROLLED VIDEO IF STAGES.

DIRECT INTERELECTRODE CAPACITANCES -

	WITH SHIELD ^A	WITHOUT SHIELD	
GRID TO PLATE: (G1 TO P) (MAX.)	.015	.025	μμ f
INPUT: G1 TO (H+K+G2+G3+i.s.)	6.5	6.5	uuf
OUTPUT: P TO (H+ K+G2+G3+i.s.)	3.0	2.0	uu f

A EXTERNAL SHIELD #316 CONNECTED TO PIN #2.

RATINGS ^B ← INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

CLASS A1 AMPLIFIER

HEATER VOLTAGE	6.3±10%	VOLTS
MAXIMUM HEATER CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC	100	VOLTS
TOTAL DC AND PEAK	200	VOLTS
MAXIMUM PLATE VOLTAGE	330	VOLTS
MAXIMUM GRID #2 SUPPLY VOLTAGE	330	VOLTS
MAXIMUM GRID #2 VOLTAGE		SEE CURVE
MAXIMUM PLATE DISSIPATION	2.3	WATTS
MAXIMUM GRID #2 DISSIPATION	0.55	WATT
MAXIMUM POSITIVE DC GRID #1 VOLTAGE	0	VOLTS

B
DESIGN MAXIMUM RATINGS ARE THE LIMITING VALUES EXPRESSED WITH RESPECT TO BOGIE TUBES AT WHICH
SATISFACTORY TUBE LIFE CAN BE EXPECTED TO OCCUR IN THE TYPES OF SERVICE FOR WHICH THE TUBE IS
RATED. THEREFORE, THE EQUIPMENT DESIGNER MUST ESTABLISH THE CIRCUIT DESIGN SO THAT INITIALLY
AND THROUGHOUT EQUIPMENT LIFE NO DESIGN MAXIMUM VALUE IS EXCECDED WITH ABOILE TUBE UNDER THE
WORST PROBABLE OPERATING CONCITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, AND ENVIRONMENTAL CONDITIONS.

- INDICATES A CHANGE.

PRINTED IN U. S. A.

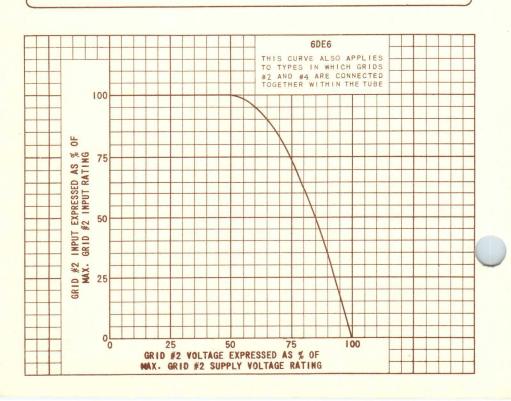
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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS -

CLASS A7 AMPLIFIER

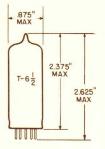
HEATER VOLTAGE					6.3		VOLTS
HEATER CURRENT					0.3		AMP.
PLATE VOLTAGE					125		VOLTS
GRID #3 VOLTAGE	IN	7	CONNECTED	TO	PIN ;	AT	SOCKET
GRID #2 VOLTAGE					125		VOLTS
CATHODE BIAS RESISTOR					56		OHMS
PLATE RESISTANCE (APPROX.)					0.25		MEGOHM
TRANSCONDUCTANCE				1	8 000		MMHOS
GRID #1 VOLTAGE (APPROX.) FOR Ib = 20 μ	A				-9		VOLTS
TRANSCONDUCTANCE (Ec1 =- 5.5V., Rk = 0)					700		MHOS
PLATE CURRENT					15.5		MA.
GRID #2 CURRENT					4.2		MA.

- INDICATES A CHANGE.



DOUBLE TRIODE

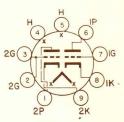
MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE
HEATER
6.3 VOLTS 0.90 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
BASING DIAGRAM
JEDEC 9HF

GLASS BULB MINIATURE BUTTON 9 PIN BASE E9-1 OUTLINE DRAWING JEDEC 6-3

THE 6DE7 IS A MINIATURE DOUBLE TRIODE IN THE 9-PIN MINIATURE CONSTRUCTION. SECTION #1 IS INTENDED FOR USE AS A VERTICAL DEFLECTION OSCILLATOR HAVING MEDIUM MU AND SECTION #2 IS INTENDED FOR USE AS A VERTICAL DEFLECTION AMPLIFIER WITH LOW MU. EXCEPT FOR HEATER RATINGS AND HEATER WARM-UP TIME THE 6DE7 IS IDENTICAL TO THE 10DE7 AND 13DE7.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

RATINGS INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

VERTICAL DEFLECTION OSCILLATOR AND AMPLIFIERA

	TRIODE #1 OSCILLATOR	TRIODE #2	
			VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE ^B			
HEATER NEGATIVE WITH RESPECT TO CA	ATHODE		
TOTAL DC AND PEAK		200	VOLTS
HEATER POSITIVE WITH RESPECT TO CA	THODE		
DC		100	VOLTS
TOTAL DC AND PEAK		200	VOLTS
MAXIMUM DC PLATE VOLTAGE	330	275	
MAXIMUM PEAK POSITIVE PULSE PLATE			
VOLTAGE (ABS. MAX.)		1500	VOLTS
MAXIMUM PEAK NEGATIVE PULSE GRID VOI	TAGE 400	250	VOLTS
MAXIMUM PLATE DISSIPATIONC	1.5	7.0	WATTS
MAXINUM AVERAGE CATHODE CURRENT	22	50	MA.
MAXIMUM PEAK CATHODE CURRENT	77	175	MA.
MAXIMUM GRID CIRCUIT RESISTANCE			
SELF BIAS	2.2	2.2	MEGOHMS

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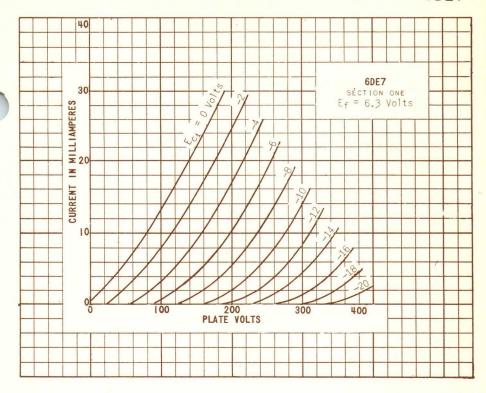
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

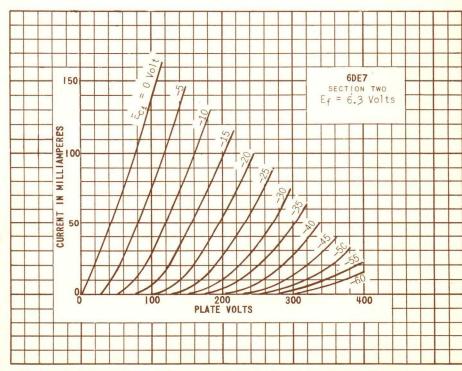
	TRIODE #1	TRIODE #2	
PLATE VOLTAGE	250	150	VOLTS
GRID #1 VOLTAGE	-11	-17.5	VOLTS
PLATE CURRENT	5.5	35	MA.
TRANSCONDUCTANCE	2000	6500	μMH0S
AMPLIFICATION FACTOR	17.5	6.0	
PLATE RESISTANCE (APPROX.)	8750	925	
GRID VOLTAGE FOR Ib = 10 HA	-20		VOLTS
GRID VOLTAGE FOR Ib = 50 µA		-44	VOLTS
PLATE CURRENT AT Ec =-24 Vdc		10	MA.
ZERO BIAS PLATE CURRENT			
Eb = 60V; Ec = 0 (INSTANTANEOUS VALUES))		80	MA.

A FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE.

B
DESIGN-MAXIMUM RATINGS ARE THE LIMITING VALUES EXPRESSED WITH RESPECT TO BOGIE TUBES AT WHICH
SATISFACTORY TUBE LIFE CAN BE EXPECTED TO OCCUR. TO OBTAIN SATISFACTORY CIRCUIT PERFORMANCE,
THEREFORE, THE EQUIPMENT DESIGNER MUST ESTABLISH THE CIRCUIT DESIGN SO THAT NO DESIGN-MAXIMUM
VALUE IS EXCEEDED WITH A BOGIE TUBE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT
TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD
VARIATION, AND ENVIRONMENTAL CONDITIONS.

C IN STAGES OPERATING WITH GRID LEAK BIAS, AN ADEQUATE CATHODE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

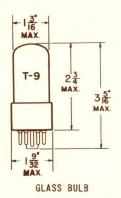




TUNG-SOL ELECTRIC INC. ELECTRON TUBE DIVISION BLOOMFIELD, NEW JERSEY, U.S.A. MARCH 1, 1957 PLATE #4918



BEAM PENTODE



COATED UNIPOTENTIAL CATHODE

HEATER
6.3 VOLTS 1.2 AMP.
AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
INTERMEDIATE SHELL
7 PIN OCTAL
OR
6 PIN OCTAL
PIN #1 NO CONNECTION
OR OMITTED

75

THE 6DG6GT IS A HEATER-CATHODE TYPE BEAM PENTODE POWER AMPLIFIER DESIGNED PRIMARILY FOR USE AS AN OUTPUT TUBE IN AUDIO APPLICATIONS.

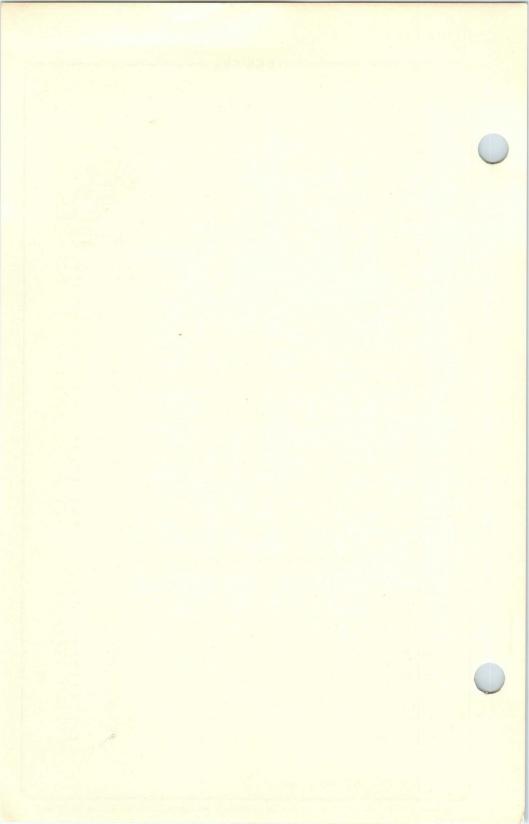
RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER VOLTAGE	6.3	VOLTS
MAXIMUM PLATE VOLTAGE	200	VOLTS
MAXIMUM GRID #2 VOLTAGE	125	VOLTS
MAXIMUM PLATE DISSIPATION	10	WATTS
MAXIMUM GRID #2 DISSIPATION	1.25	WATTS
MAXIMUM GRID #4 CIRCUIT RESISTANCE:		
CATHODE-BIAS	0.5	MEGOHM
FIXED-BIAS	0.1	MEGOHM
MAXIMUM HEATER-CATHODE VOLTAGE	90	VOLTS

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS CLASS A₁ AMPLIFIER

HEATER VOLTAGE		6.3	VOLTS
HEATER CURRENT		1.2	AMP.
PLATE VOLTAGE	110	200	VOLTS
GRID #2 VOLTAGE	110	125	VOLTS
GRID #1 VOLTAGE	-7.5	0	VOLTS
CATHODE BIAS RESISTOR	O	180	OHMS
PEAK AF GRID #1 VOLTAGE	7.5	8.5	VOLTS
ZERO-SIGNAL PLATE CURRENT	49	46	MA.
MAXSIGNAL PLATE CURRENT	50	47	MA.
ZERO-SIGNAL GRID #2 CURRENT	4	2.2	MA.
MAXSIGNAL GRID #2 CURRENT	10	8.5	MA.
PLATE RESISTANCE (APPROX.)	13 000	28 000	OHMS
TRANSCONDUCTANCE	8 000	8 000	MHOS
LOAD RESISTANCE	2 000	4 000	OHMS
TOTAL HARMONIC DISTORTION	10	10	PERCENT
MAXSIGNAL POWER OUTPUT	2.1	3.8	WATTS

SIMILAR TYPE REFERENCE: 6DG6G.



SHARP-CUTOFF PENTODE

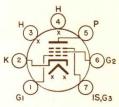
FOR

USE AS AN IF AMPLIFIER

IN TV RECEIVERS

COATED UNIPOTENTIAL CATHODE

ANY MOUNTING POSITION



BOTTOM VIEW BASING DIAGRAM JEDEC 7CM

GLASS BULB MINIATURE BUTTON 7 PIN BASE E7-1

OUTLINE DRAWING JEDEC 5-2

T-5 1

2.125'

1.875' MAX

THE 6DK6 IS A SHARP-CUTOFF PENTODE IN THE 7 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED FOR SERVICE AS A WIDE-BAND HIGH-FREQUENCY AMPLIFIER AND IS PARTICULARLY SUIT-ABLE FOR USE AS AN IF AMPLIFIER IN TELEVISION RECEIVERS. EXCEPT FOR HEATER CHARACTERISTICS AND RATINGS, THE 6DK6 IS IDENTICAL TO THE 3DK6 AND THE 4DK6.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

 GRID 1 TO PLATE
 MAX.
 0,025
 pf

 INPUT
 6.3
 pf

 OUTPUT
 1,9
 pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS *	6.3	VOLTS	300	MA.
LIMITS OF APPLIED VOLTAGE			6.3 ± 0.6	VOLTS
MAXIMUM HEATER CATHODE VOLTAGE HEATER NEGATIVE WITH RESPECT				
TOTAL DC AND PEAK HEATER POSITIVE WITH RESPECT	TO CATHODE		200	VOLTS
DC COMPONENT	TO CATHODE		100	VOLTS
TOTAL DC AND PEAK			200	VOLTS

TUNG-SOL .

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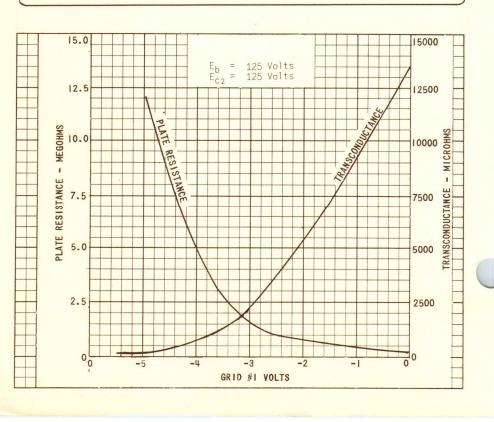
MAXIMUM RATINGS

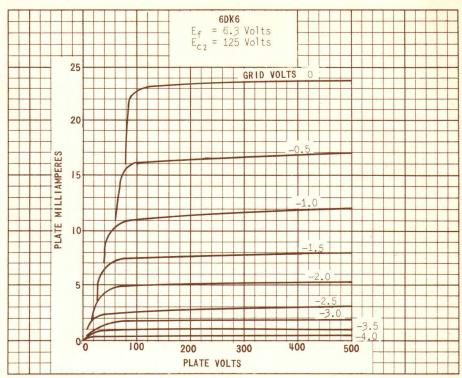
DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

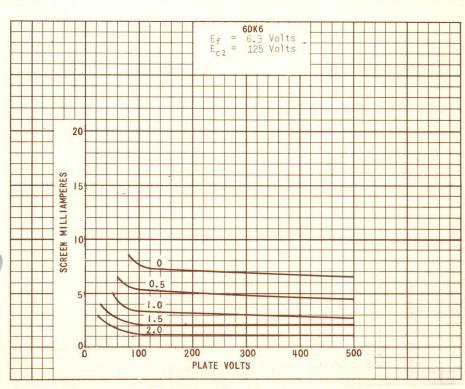
PLATE VOL TAGE	330	VOLTS
GRID 2 SUPPLY VOLTAGE	330	VOLTS
GRID 2 VOLTAGE	See Rating Chart	
PLATE DISSIPATION	2.3	WATTS
GRID 2 DISSIPATION	0.55	WATTS
GRID 1 VOL TAGE - POSITIVE VALUE	0	VOLTS

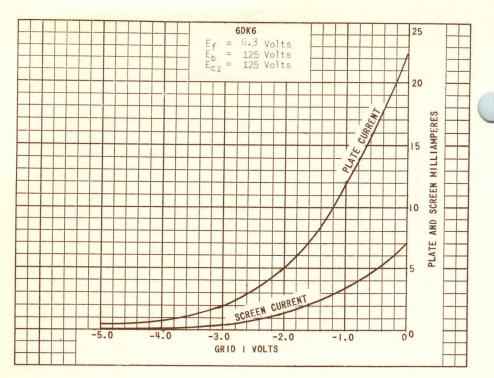
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

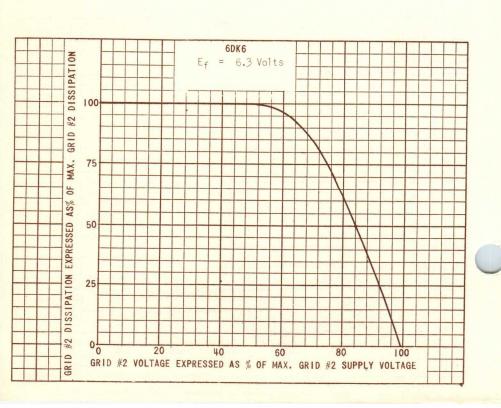
PLATE VOLTAGE		125	VOLTS
GRID 3 (SUPPRESSOR)	Connected To Cathode At	Socket	
GRID 2 VOLTAGE		125	VOLTS
CATHODE BIAS RESISTOR		56	OHMS
PLATE CURRENT		12.0	MA.
GRID 2 CURRENT		3.8	MA.
TRANSCONDUCTANCE		9 800	μMHOS
PLATE RESISTANCE	APPROX.	0.35	MEGOHMS
GRID 1 VOLTAGE FOR 1b = 20 µA		-6.5	VOLTS







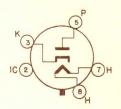




SHORT INTERMEDIATE SHELL 5 PIN OCTAL WITH EXTERNAL BARRIERS B5 - 85 OUTLINE DRAWING JEDEC 9-44

UNIPOTENTIAL CATHODE FOR DAMPER SERVICE IN TELEVISION RECEIVERS

ANY MOUNTING POSITION



BOTTOM VIEW BASING DIAGRAM JEDEC 4CG

THE 6DM4 IS A HALF-WAVE VACUUM RECTIFIER EMPLOYING A T-9 ENVELOPE. IT IS DESIGNED SPECIFICALLY FOR USE AS A DAMPER DIODE IN HORIZONTAL-DEFLECTION CIRCUITS OF BLACK-AND-WHITE TELEVISION RECEIVERS. EXCEPT FOR HEATER CHARACTERISTICS AND HEATER WARM-UP TIME, THE 6DM4 IS IDENTICAL TO THE 12DM4 AND THE 17DM4.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

WITHOUT EXTERNAL SHIELD

PLATE TO HEATER AND CATHODE CATHODE TO HEATER AND PLATE HEATER TO CATHODE

8.5 pf 11.5 pf pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS

6.3 VOLTS

1200

MA.

HEATER SUPPLY LIMITS: VOLTAGE OPERATION

6.3±0.6

VOLTS

MAXIMUM PEAK HEATER CATHODE VOLTAGE:

5000^A

HEATER NEGATIVE WITH RESPECT TO CATHODE HEATER, POSITIVE WITH RESPECT TO CATHODE

300B

VOLTS VOLTS

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

DESIGN MAXIUM VALUES - SEE EIA STANDARD RS-239

DAMPER SERVICE

PEAK INVERSE PLATE VOLTAGE	5000 ^D	VOLTS
PEAK PLATE CURRENT	1100	MA.
DC PLATE CURRENT	175	MA.
PLATE DISSIPATION	6.5	WATTS

CHARACTERISTICS

TUBE VOLTAGE DROP FOR PLATE CURRENT OF

400 MA. APPROXIMATE

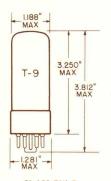
35 VOLTS

ATHE DC COMPONENT MUST NOT EXCEED 900 VOLTS.

B THE DC COMPONENT MUST NOT EXCEED 100 VOLTS.

DFOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE. (15% OF ONE HORIZONTAL SCANNING CYCLE IS 10 MICROSECONDS.)

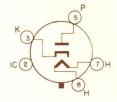
DIODE



FOR DAMPER SERVICE IN TELEVISION RECEIVERS

COATED UNIPOTENTIAL CATHODE

ANY MOUNTING POSITION



BOTTOM VIEW

BASING DIAGRAM
JEDEC 4CG

SOCKET TERMINALS 1,2,4 & 6,
SHOULD NOT BE USED AS
TIE POINTS.

300

VOLTS

GLASS BULB

SHORT INTERMEDIATE SHELL 5 PIN OCTAL BASE B5-85 OUTLINE DRAWING JEDEC 9-44

TOTAL DC AND PEAK

THE 6DMAA IS AN INDIRECTLY-HEATED HALF-WAVE RECTIFIER EMPLOYING A T-9 ENVELOPE. IT IS DESIGNED SPECIFICALLY FOR USE AS A DAMPER DIODE IN HORIZONTAL DEFLECTION CIRCUITS OF TELEVISION RECEIVERS.

EXCEPT FOR HEATER CHARACTERISTICS AND RATINGS, THE 6DM4A IS IDENTICAL TO THE 12DM4A AND THE 17DM4A.

ALSO, THE 6DM4A IS IDENTICAL TO THE 6DM4 EXCEPT FOR HIGHER PLATE CURRENT RATINGS.

DIRECT INTEREL'ECTRODE CAPACITANCES

HEATER TO CATHODE	4	pf
PLATE TO CATHODE	8.5	pf
CATHODE TO PLATE AND HEATER	11.5	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3	VOLTS	1200	MA.
HEATER SUPPLY LIMITS: VOLTAGE OPERATION			6.3 ± 0.6	VOL TS
VOLTAGE OFERATION			0.3 ± 0.6	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE:				
HEATER NEGATIVE WITH RESPECT TO C	CATHODE		900	VOLTS
TOTAL DC AND PEAK			5000	VOLTS
HEATER POSITIVE WITH RESPECT TO C	ATHODE		100	

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

DAMPER SERVICE B

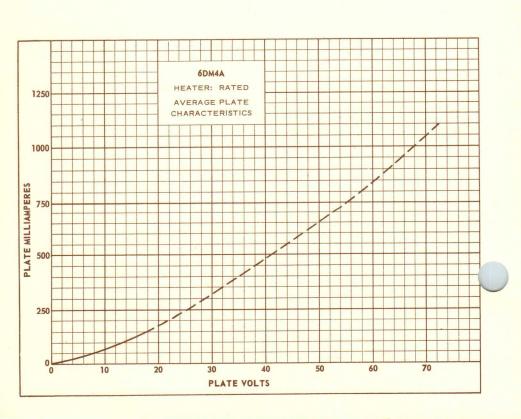
PEAK INVERSE VOLTAGE	5000	VOLTS
PEAK PLATE CURRENT	1200	MA.
DC PLATE CURRENT	200	MA.
PLATE DISSIPATION	6.5	WATTS

CHARACTERISTICS

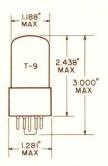
VOLTAGE DROP AT 1b = 400 MA. 35 VOLTS

B

FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN 'STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCASTING STATIONS; FEDERAL COMMUNICATIONS COMMISSION'. THE DUTY CYCLE OF THE VOLTAGE PULSE NOT TO EXCEED 15 PERCENT OF A SCANNING CYCLE.



→ DOUBLE TRIODE



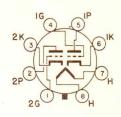
HEATER

6.3±10% VOLTS 0.9 AMP.

AC OR DC

ANY MOUNTING POSITION

COATED UNIPOTENTIAL CATHODE



BOTTOM VIEW
BASING DIAGRAM
JEDEC 88D

GLASS BULB
INTERMEDIATE-SHELL
B PIN OCTAL B8-142
OUTLINE DRAWING
JEDEC 9-5

THE 6DN7 IS A DOUBLE TRIODE WITH DISSIMILAR SECTIONS. SECTION #1 IS DE-SIGNED FOR USE AS A VERTICAL-DEFLECTION OSCILLATOR IN TELEVISION RE-CEIVERS AND SECTION #2 FOR USE AS A VERTICAL DEFLECTION AMPLIFIER.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

RATINGS INTERPRETED ACCORDING TO DESIGN-MAXIMUM SYSTEM

	OSC. SERV. (SEC.1)	VERT. DEFL. AMP. (SEC.2)	
MAXIMUM DC PLATE VOLTAGE	350	550	VOLTS
MAXIMUM PEAK POSITIVE PULSE PLATE VOLTAGE		2500	VOLTS
MAXIMUM PEAK NEGATIVE GRID VOLTAGE	400	250	VOLTS
MAXIMUM PLATE DISSIPATION	1.0	10 ^B	WATTS
MAXIMUM DC CATHODE CURRENT	A THE MADE NAME	50	MA.
MAXIMUM PEAK CATHODE CURRENT		150	MA.
MAXIMUM HEATER-CATHODE VOLTAGE:			
HEATER POSITIVE WITH RESPECT TO CATHODE			
DC COMPONENT	100	100	VOLTS
TOTAL DC AND PEAK	200	200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE			
TOTAL DC AND PEAK	200	200	VOLTS
MAXIMUM GRID-CIRCUIT RESISTANCE			
WITH FIXED BIAS	2.2	2.2	MEGOHMS
WITH CATHODE BIAS	2.2		MEGOHMS

INDICATES A CHANGE.

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

AVERAGE CHARACTERISTICS

	SECTION 1 (OSCILLATOR)	SECTION 2 (AMPLIFIER)			
PLATE VOLTAGE GRID VOLTAGE AMPLIFICATION FACTOR	250 -8.0 22.5	150 0 ^c	250 -9.5 15.4	VOLTS VOLTS	
PLATE RESISTANCE (APPROX.) TRANSCONDUCTANCE	9000 2500 8.0		2000 7700	OHMS μMHOS	
PLATE CURRENT GRID VOLTAGE (APPROX.) I _b = 10 μAMPS.	-18	68	41	MA. VOLTS	
GRID VOLTAGE (APPROX.) Ib = 50 μAMPS.			-23	VOLTS	

DESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT LIFE NO DESIGN-MAXIMM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.

AFOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE CUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE.

BIN STAGES OPERATING WITH GRID LEAK BIAS; AN ADEQUATE CATHODE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

Capplied for short interval (Two seconds maximum) so as not to damage tube.

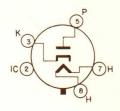
FOR

HORIZONTAL FREQUENCY DAMPER

SERVICE IN T.V. RECEIVERS

ANY MOUNTING POSITION

SOCKET TERMINALS, NUMBERS 1, 2, 4 & 6 SHALL NOT BE USED AS TIE POINTS



BOTTOM VIEW

BASING DIAGRAM JEDEC 4CG

GLASS BULB SHORT INTERMEDIATE SHELL 5 PIN OCTAL B5-85 OUTLINE DRAWING JEDEC 9-43

THE 6DQ4 IS A HEATER-CATHODE TYPE DIODE DESIGNED FOR USE IN HORIZONTAL FREQUENCY DAMPER SERVICE IN TELEVISION RECEIVERS. IN OPERATION, THE TUBE CAN WITHSTAND HIGH VOLTAGE PULSES OF HORIZONTAL LINE FREQUENCY BETWEEN CATHODE AND BOTH HEATER AND PLATE ELEMENTS, SUCH AS NORMALLY ENCOUNTERED IN "DIRECT-DRIVE" CIRCUITS.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

HEATER TO CATHODE	4.0	pf
PLATE TO CATHODE AND HEATER	5.0	pf
CATHODE TO PLATE AND HEATER	8.5	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS	1200	MA.
HEATER SUPPLY LIMITS: VOLTAGE OPERATION		6.3±0.6	VOLTS
MAXIMUM HEATER CATHODE VOLTAGE			
DC COMPONENT	TO CATHODE	900	VOLTS
TOTAL DC AND PEAK HEATER POSITIVE WITH RESPECT	TO CATHODE	5500	VOLTS
DC COMPONENT	TO GATHOUT	100	VOLTS
TOTAL DC AND PEAK		300	VOLTS

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

FOR TV DAMPER SERVICE A, B

PEAK INVERSE PLATE VOLTAGE	5500	VOLTS
STEADY STATE PEAK PLATE CURRENT	1000	MA.
DC OUTPUT CURRENT	175	MA.
PLATE DISSIPATION	6.0	WATTS

CHARACTERISTICS

TUBE VOLTAGE DROP

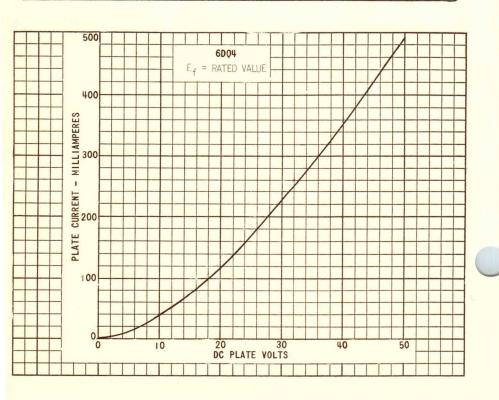
(TUBE CONDUCTING AT 250 MA.)

SEE CHART

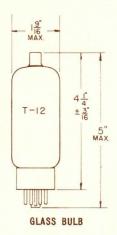
32 VOLTS

A FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE OF THE YOUTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE AND ITS DURATION IS LIMITED TO 10 MICRO SECONDS.

BOPERATION OF THIS TUBE AS A POWER RECTIFIER IS NOT RECOMMENDED.



BEAM POWER PENTODE



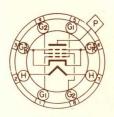
UNIPOTENTIAL CATHODE

HEATER

6.3±10% VOLTS 2.5 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

SMALL MEDIUM—SHELL 8-PIN OCTAL WITH EXTERNAL BARRIERS

810

SMALL CAP

THE 6D05 IS A HIGH SERVEANCE BEAM POWER PENTODE DESIGNED FOR USE AS A HORIZONTAL-DEFLECTION AMPLIFIER IN COLOR TELEVISION RECEIVERS.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

WITHOUT EXTERNAL SHIELD

GRID #1 TO PLATE	0.5	μμf
GRID #1 TO: (K+G3+H & G2)	23	μμf
PLATE TO: (K+G3+H & G2)	11	μμf

RATINGS A -

HORIZONTAL DEFLECTION AMPLIFIER

HEATER VOLTAGE	5.3±10%	VOLTS
MAXIMUM PLATE VOLTAGE:		
DC (INCLUDING BOOST)	990	VOLTS
PEAK POSITIVE-PULSE (ABS. MAX.) B	6 500°	VOLTS
PEAK NEGATIVE-PULSEB	1 100	VOLTS
MAXIMUM DC GRID #2 (SCREEN-GRID) VOLTAGE	190	VOLTS
MAXIMUM PEAK NEGATIVE -PULSE GRID #4		
(CONTROL-GRID) VOLTAGE	250	VOLTS
MAXIMUM CATHODE CURRENT:		
DC	315	MA .
PEAK	1 100	MA.
MAXIMUM GRID #2 INPUT	3.2	WATTS
MAXIMUM PLATE DISSIPATIOND	24	WATTS

CONTINUED FROM PRECEDING PAGE

RATINGS - CONTID. A INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HORIZONTAL DEFLECTION AMPLIFIER

MAXIMUM PEAK HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE		VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	200 ^E	VOLTS
BULB TEMPERATURE (AT HOTTEST POINT		
ON BULB SURFACE)	220 ←	°C

MAXIMUM CIRCUIT VALUES

GRID #1 CIRCUIT RESISTANCE:		
FOR GRID RESISTOR-BIAS OPERATIOND	0.47	MEGOHM

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS CLASS A₁ AMPLIFIER

HEATER VOLTAGE	6.3	6.3	6.3	VOLTS
HEATER CURRENT	2.5	2.5	2.5	AMP.
PLATE VOLTAGE	125	70	175	VOLTS
GRID #2 (SCREEN-GRID) VOLTAGE	125	125	125	VOLTS
GRID #1 (CONTROL-GRID) VOLTAGE	-25	0	-25	VOLTS
MU-FACTOR, GRID #2 TO GRID #1	3.3			
PLATE RESISTANCE (APPROX.)			5 500	OHMS
TRANSCONDUCTANCE			10 500	μMH0s
GRID VOLTAGE (APPROX.) FOR PLATE				
CURRENT OF 1 MA.			-55	VOLTS
PLATE CURRENT		550F	110	MA.
GRID #2 CURRENT		42 ^F	5	MA.

As described in "standards of good engineering practice concerning television broadcast stations", federal communications commission.

BTHIS RATING IS APPLICABLE WHERE THE DURATION OF THE VOLTAGE PULSE DOES NOT EXCEED 15 PERCENT OF ONE HORIZONTAL SCANNING CYCLE. IN A 525-LINE, 30-FRAME SYSTEM 15 PER CENT OF ONE HORIZONTAL SCANNING CYCLE IS 10 #SECONDS.

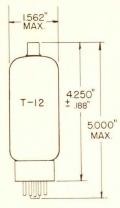
Cunder no circumstances should this absolute value be exceeded.

DIT IS ESSENTIAL THAT THE PLATE DISSIPATION BE LIMITED IN THE EVENT OF LOSS OF GRID SIGNAL-FOR THIS PURPOSE, SOME PROTECTIVE MEANS SUCH AS A CATHODE RESISTOR OF SUITABLE VALUE SHOULD BE EMPLOYED.

ETHE DC COMPONENT MUST NOT EXCEED 100 VOLTS.

F_{THESE} VALUES CAN BE MEASURED BY A METHOD INVOLVING A RECURRENT WAVEFORM SUCHTHAT THEPLATE DISSIPATION AND GRID \$2 INPUT WILL BE KEPT WITHIN RATINGS IN ORDER TO PREVENT DAMAGE TO THE TUBE.

BEAM POWER PENTODE



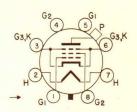
UNIPOTENTIAL CATHODE

HEATER

6.3±0.6 VOLTS 2.5 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
BASING DIAGRAM
JEDEC BJC

GLASS BULB

SMALL MEDIUM-SHELL 8 PIN OCTAL B8-118 WITH EXTERNAL BARRIERS

STYLE B OUTLINE DRAWING JEDEC 12-22

THE 6D05 IS A HIGH-PERVEANCE BEAM POWER PENTODE DESIGNED FOR USE AS A HORIZONTAL-DEFLECTION AMPLIFIER IN COLOR TELEVISION RECEIVERS.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

WITHOUT EXTERNAL SHIELD

GRID #1 TO PLATE 0.5 $\mu\mu$ f GRID #1 TO: (K+G3+H & G2) 23 $\mu\mu$ f PLATE TO: (K+G3+H & G2) 11 $\mu\mu$ f

RATINGS A INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM HORIZONTAL DEFLECTION AMPLIFIER

MAXIMUM PLATE VOLTAGE:			
DC (INCLUDING BOOST)		990	VOLTS
PEAK POSITIVE-PULSE (ABS. MAX.) B	6	500°	VOLTS
PEAK NEGATIVE-PULSE B	1	100	VOLTS
MAXIMUM DC GRID #2 (SCREEN-GRID) VOLTAGE		190	VOLTS
MAXIMUM PEAK NEGATIVE -PULSE GRID #1			
(CCNTROL-GRID) VOLTAGE		250	VOLTS
MAXIMUM CATHODE CURRENT:			
DC		315	MA.
PEAK	1	100	MA.
MAXIMUM GRID #2 INPUT		3.2	WATTS
MAXIMUM PLATE DISSIPATIOND		24	WATTS

CONTINUED ON FOLLOWING PAGE

- INDICATES A CHANGE.

- TUNG-SOL .

CONTINUED FROM PRECEDING PAGE

RATINGS — CONTID. A INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HORIZONTAL DEFLECTION AMPLIFIER

MAXIMUM PEAK HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	200E	VOLTS
BULB TEMPERATURE (AT HOTTEST POINT		
ON BULB SURFACE)	220	°C

MAXIMUM CIRCUIT VALUES

GRID #1 CIRCUIT RESISTANCE:		
FOR GRID RESISTOR-BIAS OPERATIOND	0.47	MEGOHM

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS CLASS A1 AMPLIFIER

PLATE VOLTAGE	125	70	175	VOLTS
GRID #2 (SCREEN-GRID) VOLTAGE	125	125	125	VOLTS
GRID #1 (CONTROL-GRID) VOLTAGE	-25	0	-25	VOLTS
MU-FACTOR, GRID #2 TO GRID #1	3.3			
PLATE RESISTANCE (APPROX.)			5 500	OHMS
TRANSCONDUCTANCE			10 500	MMHOS
GRID VOLTAGE (APPROX.) FOR PLATE				
CURRENT OF 1 MA.			-55	VOLTS
PLATE CURRENT		550F	110	MA.
GRID #2 CURRENT		42 ^F	5	MA.

Ass described in "standards of good engineering practice concerning television broadcast stations", federal communications commission.

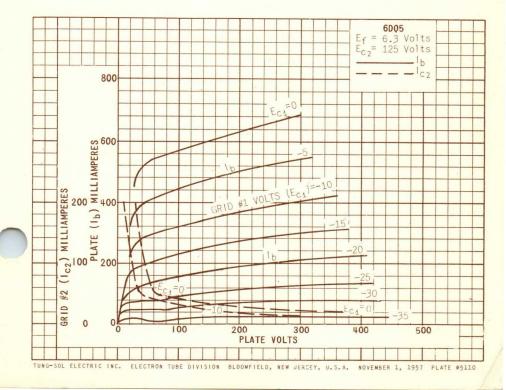
B THIS RATING IS APPLICABLE WHERE THE DURATION OF THE VOLTAGE PULSE DOES NOT EXCEED 15 PERCENT OF ONE HORIZONTAL SCANNING CYCLE. IN A 525-LINE, 30-FRAME SYSTEM 15 PER CENT OF ONE HORIZONTAL SCANNING CYCLE IS 10 μSECONDS.

Cunder no circumstances should this absolute value be exceeded.

D IT IS ESSENTIAL THAT THE PLATE DISSIPATION BE LIMITED IN THE EVENT OF LOSS OF GRID SIGNAL. FOR THIS PURPOSE, SOME PROTECTIVE MEANS SUCH AS A CATHODE RESISTOR OF SUITABLE VALUE SHOULD BE EMPLOYED.

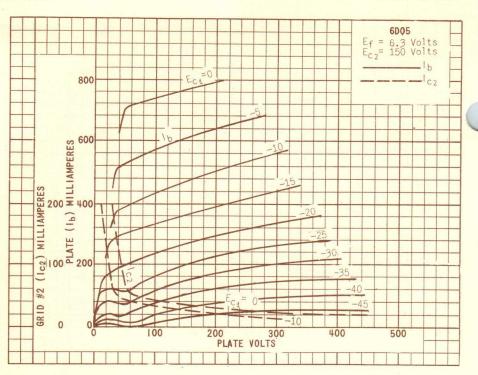
ETHE DC COMPONENT MUST NOT EXCEED 100 VOLTS.

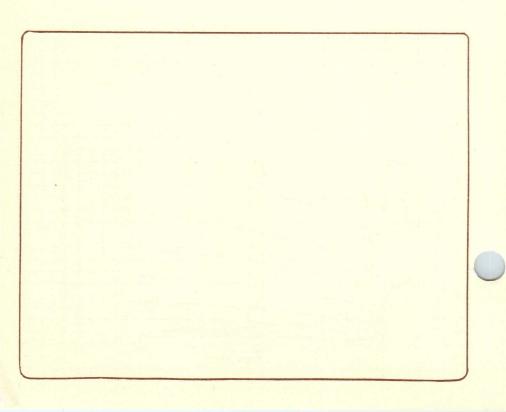
F THESE VALUES CAN BE MEASURED BY A METHOD INVOLVING A RECURRENT WAVEFORM SUCH THAT THE PLATE DISSIPATION AND GRID #2 INPUT WILL BE KEPT WITHIN RATINGS IN ORDER TO PREVENT DAMAGE TO THE TUBE.



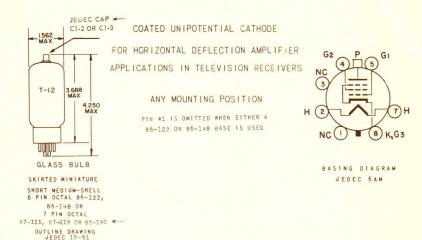
6DQ5

TENTATIVE DATA





BEAM PENTODE



THE 6DQ6A IS A HIGH-PERVEANCE BEAM POWER PENTODE DESIGNED FOR USE AS A HORIZONTAL DEFLECTION AMPLIFIER TUBE IN HIGH EFFICIENCY DEFLECTION CIRCUITS OF TELEVISION RECEIVERS. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TUBES WHICH ARE SIMILARLY CONTROLLED. EXCEPT FOR THE CONTROLLED HEATER WARM-UP TIME AND HEATER RATINGS THE 6DQ6A IS IDENTICAL TO THE 12DQ6A.

DIRECT INTERELECTRODE CAPACITANCES - APPROX. WITHOUT EXTERNAL SHIELD

GRID TO PLATE (G TO P)	0.5	pf
INPUT: (G1 TO H+K, BP + G2)	15.0	pf
OUTPUT: (P TO HEK, BP + B2)	7.0	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS	1200	MA.
HEATER SUPPLY LIMITS: VOLTAGE OPERATION		6.3±0.6	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE:			
HEATER POSITIVE WITH RESPECT TO CATHODE DC		100	VOLTS
TOTAL DC AND PEAK		200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE TOTAL DC AND PEAK		200	VOLTS

-- INDICATES A CHANGE.

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239
HORIZONTAL DEFLECTION AMPLIFIER A

PLATE SUPPLY VOLTAGE, DC (BOOST+DC POWER SUPPLY)	770	VOLTS
PLATE VOLTAGE, PEAK PULSE, POSITIVE	6000	VOLTS
PLATE VOLTAGE, PEAK PULSE, NEGATIVE	1500	VOLTS
PLATE DISSIPATION, B	18	WATTS
GRID #1 VOLTAGE, PEAK PULSE, NEGATIVE	330	VOLTS
GRID #2 VOLTAGE, DC	220	VOLTS
GRID #2 DISSIPATION	3.6	WATTS
CATHODE CURRENT, AVERAGE	155	MA.
CATHODE CURRENT, PEAK	540	MA.
GRID #1 CIRCUIT RESISTANCE, B	1.0	MEGOHM
BULB TEMPERATURE, (AT HOTTEST POINT)	220	°C

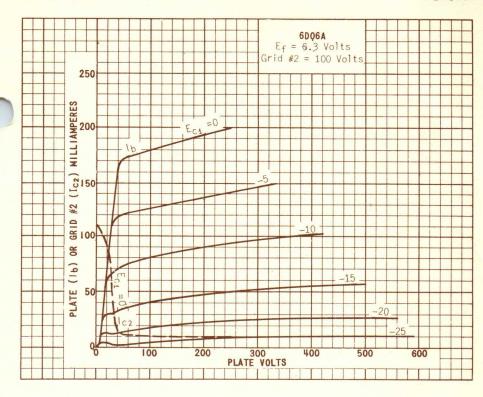
AVERAGE CHARACTERISTICS

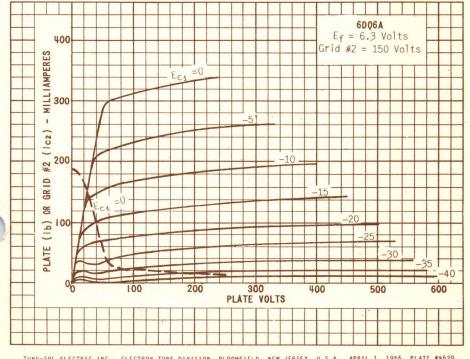
PENTODE OPERATION: Eb = 250V, Ec2 = 150V, Ec1=-22.5V.		
PLATE CURRENT	55	MA.
GRID #2 CURRENT	1.5	MA.
TRANSCONDUCTANCE	6600	<i>µмно</i> ѕ
PLATE RESISTANCE, APPROX.	20,000	OHMS
ZERO BIAS: Eb = 60V, Ec2 = 150V. (INSTANTANEOUS VALUES)		
PLATE CURRENT	315	MA.
GRID #2 CURRENT	25	MA.
CUTOFF: Ib = 1 MA, Eb = 250 V, Ec2 = 150 V.		
GRID #1 VOLTAGE, APPROX.	-40	VOLTS
CUTOFF: Ib = 1 Ma, Eb = 5000 V, Ec2 = 150 V.		
GRID #1 VOLTAGE, APPROX.	-100	VOLTS
TRIODE MU: Eb = Ec2 = 150 V, Ec1 =-22.5 V.	4.5	

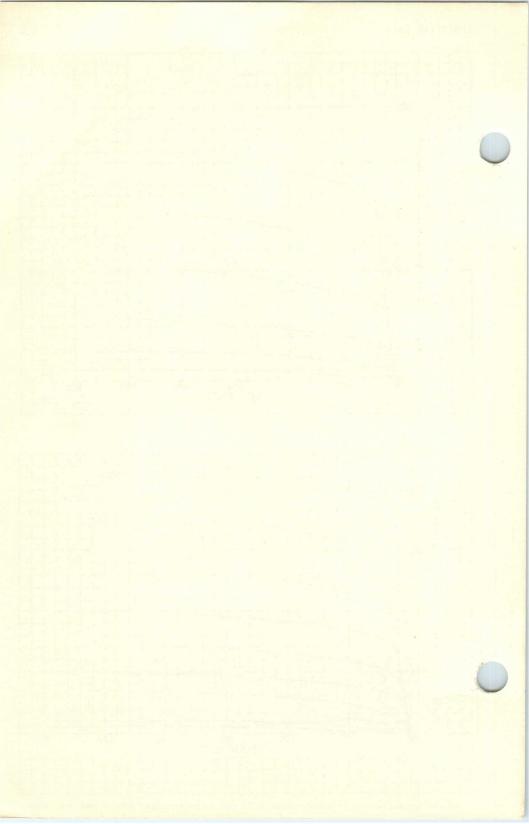
- INDICATES A CHANGE.

A FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE.

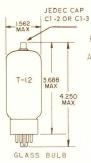
B IN STAGES OPERATING WITH GRID LEAK BIAS, AN ADEQUATE CATHODE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.







BEAM PENTODE



COATED UNIPOTENTIAL CATHODE

FOR HORIZONTAL DEFLECTION AMPLIFIER APPLICATIONS IN TELEVISION RECEIVERS

ANY MOUNTING POSITION

PIN #1 IS OMITTED WHEN EITHER A B6-122 OR B6-148 BASE IS USED G2 P G1 NC 3 7 H

BASING DIAGRAM
JEDEC 6AM

SKIRTED MINIATURE
SHORT MEDIUM-SHELL
6 PIN 'OCTAL B6-122,
B6-148 OR
7 PIN OCTAL
87-111, B7-119 OR B5-190

DUTLINE DRAWING
JEDEC 17-51

THE 6DQ6B IS A BEAM-POWER PENTODE PRIMARILY DESIGNED FOR USE AS THE HORIZONTAL-DEFLECTION AMPLIFIER IN TELEVISION RECEIVERS. ITS HIGH ZEROBIAS PLATE CURRENT AT LOW PLATE AND SCREEN VOLTAGES MAKES THE TUBE WELL SUITED FOR USE IN RECEIVERS THAT OPERATE AT LOW PLATE-SUPPLY VOLTAGES. IT DIFFERS FROM THE 6DQ6A IN HAVING HIGHER RATINGS AND HIGHER ZERO-BIAS PLATE CURRENT.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

WITHOUT EXTERNAL SHIELD

GRID TO PLATE (G TO P)

INPUT: (G1 TO H+K, BP+G2)

OUTPUT: (P TO H+K, BP+B2)

7.0 pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE ETA STANDARD RS-239

AVERAGE CHARACTERISTICS 6.3 VOLTS	1200	MA.
HEATER SUPPLY LIMITS:		
VOLTAGE OPERATION	6.3±0.6	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC	100	VOLTS
TOTAL DC AND PEAK	200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	200	VOLTS

->INDICATES A CHANGE.

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

HORIZONTAL DEFLECTION AMPLIFIERA

PLATE SUPPLY VOLTAGE, DC (BOOST+DC POWER SUPPLY)	770	VOLTS
PLATE VOLTAGE, PEAK PULSE, POSITIVE	6500	VOLTS
PLATE VOLTAGE, PEAK PULSE, NEGATIVE	1500	VOLTS
PLATE DISSIPATION, B	18	WATTS
GRID #1 VOLTAGE, PEAK PULSE, NEGATIVE	330	VOLTS
GRID #2 VOLTAGE, DC	220	VOLTS
GRID #2 DISSIPATION	3.6	WATTS
CATHODE CURRENT, AVERAGE	175	MA.
CATHODE CURRENT, PEAK	610	MA.
GRID #1 CIRCUIT RESISTANCE, B	1.0	MEGOHM
BULB TEMPERATURE, (AT HOTTEST POINT)	220	°C

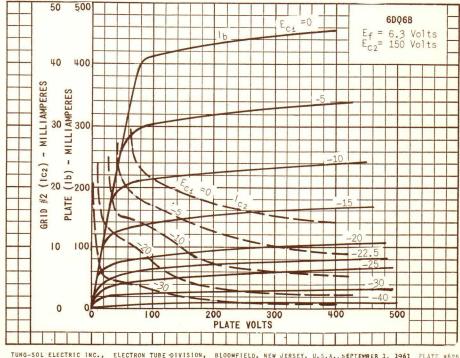
AVERAGE CHARACTERISTICS

PENTODE OPERATION: Eb = 250V, Ec2 = 150V, Ec4=-22.5V.		
PLATE CURRENT	65	MA.
GRID #2 CURRENT	1.8	MA.
TRANSCONDUCTANCE	7300	µмноs
PLATE RESISTANCE, APPROX.	18,000	OHMS
ZERO BIAS: Eb = 60V, Ec2 = 150V. (INSTANTANEOUS VAL	UES)	
PLATE CURRENT	345	MA.
GRID #2 CURRENT	27	MA.
CUTOFF: Ib = 1 MA, Eb = 250 V, Ec2 = 150 V.		
GRID #1 VOLTAGE, APPROX.	-42	VOLTS
CUTOFF: Ib = 1 Ma, Eb = 5000 V, Ec2 = 150 V.		
GRID #1 VOLTAGE, APPROX.	-100	VOLTS
TRIODE MU: Eb = Ec2 = 150 V, Ec1 =-22.5 V.	4.4	

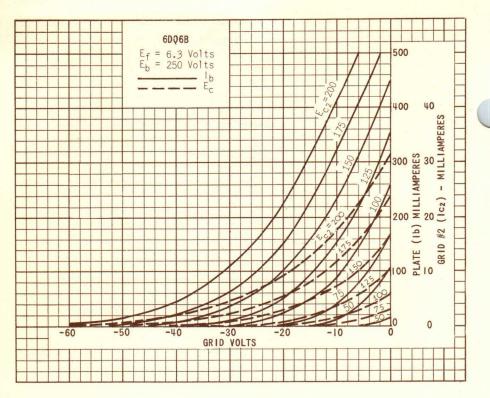
→ INDICATES A CHANGE.

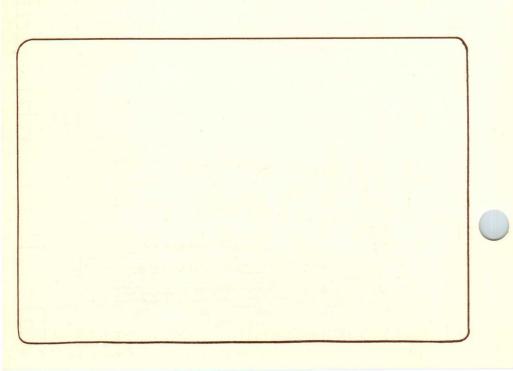
A FOR OPERATION IN A 525-line, 30-frame system as described in "standards of good engineering practice for television broadcast stations: feberal communications commission", the duty cycle of the voltage pulse must not exceed 15% of one scanning cycle.

B IN STAGES OPERATING WITH GRID LEAK BIAS, AN ADEQUATE CATHODE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

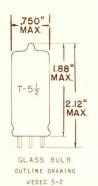


6DQ6B





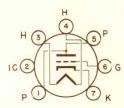
TRIODE MINIATURE TYPE



BASE - E7-1

COATED UNIPOTENTIAL CATHODE

HIGH VOLTAGE-GAIN APPLICATIONS



BOTTOM VIEW BASING DIAGRAM JEDEC 6BG

1.7

1.6

0.46

pf

pf

pf

THE 6DR4 IS A HIGH-MU TRIODE IN THE 7 PIN MINIATURE CONSTRUCTION. IT IS INTENDED FOR USE AS A VOLTAGE AMPLIFIER, PHASE INVERTER, AND OTHER HIGH VOLTAGE-GAIN APPLICATIONS. THE 6DR4 IS ELECTRICALLY EQUIVALENT TO ONE SECTION OF THE 12AX7.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

GRID TO PLATE INPUT OUTPUT

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS	150	MA.
HEATER SUPPLY LIMITS: VOLTAGE OPERATION		6.3±0.6	VOLTS
MAXIMUM HEATER CATHODE VOLTAGE:	1		
BEATER POSITIVE WITH RESPECT TO CATH	ODE		
DC COMPONENT		100	VOLTS
TOTAL DC AND PEAK		200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATH	ODE		
TOTAL DC AND PEAK		200	VOLTS

MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

PLATE VOLTAGE	330	VOLTS
POSITIVE DC GRID VOLTAGE	0	VOLTS
NEGATIVE DC GRID VOLTAGE	55	VOLTS
PLATE DISSIPATION	1.2	WATTS

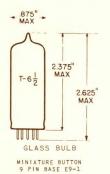
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TYPICAL OPERATING CHARACTERISTICS

CLASS A1 AMPLIFIER

PLATE VOLTAGE	100	250	VOLTS
GRID VOLTAGE	-1.0	-2.0	VOLTS
PLATE CURRENT	0.5	1.2	MA.
PLATE RESISTANCE (APPROX.)	80 000	62 500	OHMS
TRANSCONDUCTANCE	1250	1600	<i>µ</i> мноѕ
AMPLIFICATION FACTOR	100	100	

DOUBLE TRIODE MINIATURE TYPE



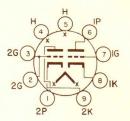
OUTLINE DRAWING JEDEC 6-3 COATED UNIPOTENTIAL CATHODE

HEATER

6.3 VOLTS 900 MA.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW BASING DIAGRAM JEDEC 9HF

THE 6DR7 IS A DOUBLE TRIODE WITH DISSIMILAR SECTION IN THE 9-PIN MINIATURE CONSTRUCTION. SECTION #1 HAS A HIGH MU AND IS INTENDED FOR USE AS A VERTICAL DEFLECTION OSCILLATOR, SECTION #2 HAS A LOW MU AND IS DESIGNED FOR USE AS A VERTICAL DEFLECTION AMPLIFIER. SECTION #2 OF THE 6DR7 IS IDENTICAL TO SECTION #2 OF THE 6DE7.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

GRID TO PLATE: (G TO P)	4.5	8.5	pf
INPUT: G TO (H+K)	2.2	5.5	pf
OUTPUT: P TO (H+K)	0.34	1.0	pf

RATINGS

DESIGN CENTER VALUES - SEE EIA STANDARD RS-239
VERTICAL DEFLECTION OSCILLATOR AND AMPLIFIER^A

TRIODE #1 TRIODE #2

	OSCILLATOR	AMPLIFIER	
MAXIMUM HEATER-CATHODE VOLTAGEB			
HEATER NEGATIVE WITH RESPECT TO CATHODE			
TOTAL DC AND PEAK	2	00	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE			
DC	1	00	VOLTS
TOTAL DC AND PEAK	2	00	VOLTS
MAXIMUM DC PLATE VOLTAGE	330	275	
MAXIMUM PEAK POSITIVE PULSE PLATE VOLTAGE (ABS. MAX.)		1500	VOLTS
MAXIMUM PEAK NEGATIVE PULSE GRID VOLTAGE	400	250	VOLTS
MAXIMUM PLATE DISSIPATIONC	1.0	7.0	WATTS
MAXIMUM AVERAGE CATHODE CURRENT	20	50	MA.
MAXIMUM PEAK CATHODE CURRENT	70	175	MA.
MAXIMUM GRID CIRCUIT RESISTANCE			
SELF BIAS	2.2	2.2	MEGOHMS

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

TRIODE #1

TRIODE #2

PLATE VOLTAGE	250	150	VOLTS
GRID #1 VOLTAGE	-3	-17.5	VOLTS
PLATE CURRENT	1.4	35	MA.
TRANSCONDUCTANCE	1600	6500	MMHOS
AMPLIFICATION FACTOR	64 ←	6.0	
PLATE RESISTANCE (APPROX.)	40 000	925	
GRID VOLTAGE FOR Ib = 10 MA	5.5		VOLTS
GRID VOLTAGE FOR Ib = 50 MA		-44	VOLTS
PLATE CURRENT AT Ec =-24 Vdc	-	10	MA.
ZERO BIAS PLATE CURRENT			
Eb = 60V; Ec = 0 (INSTANTANEOUS VALUES)		80	MA.

- INDICATES A CHANGE.

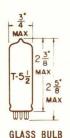
C IN STAGES OPERATING WITH GRID LEAK BIAS, AM ADEQUATE CATHODE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

SIMILAR TYPE REFERENCE: The 6DR7 is identical to the 10DR7 except for heater ratings and heater warm-up time of the 10DR7.

A FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE.

B
DESIGN-MAXIMUM RATINGS ARE THE LIMITING VALUES EXPRESSED WITH RESPECT TO BOGIE TUBES AT WHICH SATISFACTORY TUBE LIFE CAN BE EXPECTED TO OCCUR. TO OBTAIN SATISFACTORY CIRCUIT PERFORMANCE, THEREFORE, THE EQUIPMENT DESIGNER MUST ESTABLISH THE CIRCUIT DESIGN SO THAT NO DESIGN-MAXIMUM VALUE IS EXCEEDED WITH A BOGIE TUBE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, AND ENVIRONMENTAL CONDITIONS.

PENTODE MINIATURE TYPE



UNIPOTENTIAL CATHODE

HEATER 6.3±10% VOLTS 0.8 AMP. AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
SMALL-BUTTON MINIATURE
7 PIN BASE

THE 60S5 IS A BEAM POWER PENTODE IN THE 7 PIN MINIATURE CONSTRUCTION. IT IS INTENDED FOR USE PRIMARILY IN THE AUDIO OUTPUT STAGES OF TELEVISION AND RADIO RECEIVERS.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

WITHOUT EXTERNAL SHIELD

GRID #1 TO PLATE	0.19	μμf
GRID #1 TO CATHODE & GRID #3, HEATER & GRID #2	9.5	μμ f
PLATE TO CATHODE & GRID #3, HEATER & GRID #2	6.3	μμ f

- RATINGS

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM CLASS A_1 AMPLIFIER

HEATER VOLTAGE	6.3±10%	VOLTS
MAXIMUM PLATE VOLTAGE	275	VOLTS
MAXIMUM GRID #2 (SCREEN-GRID) VOLTAGE	275	VOLTS
MAXIMUM GRID #1 (CONTROL-GRID) VOLTAGE:		
POSITIVE BIAS VALUE	0	VOLT
MAXIMUM PLATE DISSIPATION	9	WATTS
MAXIMUM GRID #2 INPUT	2.2	WATTS
MAXIMUM PEAK HEATER-CATHODE VOLTAGE:		
HEATER POSITIVE WITH RESPECT TO CATHODE	200 ^A	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE	200	VOLTS
MAXIMUM BULB TEMPERATURE (AT HOTTEST POINT		
ON BULB SURFACE)	250	°C

ATHE DC COMPONENT MUST NOT EXCEED 100 VOLTS.

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS CATHODE—BIAS OPERATION

HEATER VOLTAGE	6.	3±10%	VOLTS
HEATER CURRENT		0.8	AMP.
PLATE SUPPLY VOLTAGE	200	250	VOLTS
GRID #2 VOLTAGE	200	200	VOLTS
CATHODE-BIAS RESISTOR	180	270	OHMS
PEAK AF GRID-NO.1 VOLTAGE	7.5	9.2	VOLTS
ZERO-SIGNAL PLATE CURRENT	34.5	27	MA.
MAXSIGNAL PLATE CURRENT	32.5	25	MA.
ZERO-SIGNAL GRID #2 CURRENT	3.5	3	MA.
MAXSIGNAL GRID #2 CURRENT	9	9	MA.
PLATE RESISTANCE (APPROX.)	28 000	28 000	OHMS
TRANSCONDUCTANCE	6 000	5 800	MMHOS
TOTAL HARMONIC DISTORTION	10	10	PERCENT
LOAD RESISTANCE	6 000	8 000	OHMS
MAXSIGNAL POWER OUTPUT	2.8	3.6	WATTS

- INDICATES A CHANGE.

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS - CONT'D.

FIXED-BIAS OPERATION

HEATER VOLTAGE	6.	3±10%	VOLTS
HEATER CURRENT		0.8	AMP.
PLATE VOLTAGE	200	250	VOLTS
GRID #2 VOLTAGE	200	200	VOLTS
GRID #1 (CONTROL-GRID) VOLTAGE	-7.5	-8.5	VOLTS
PEAK AF GRID #1 VOLTAGE	7.5	8.5	VOLTS
ZERO-SIGNAL PLATE CURRENT	35	29	MA.
MAXSIGNAL PLATE CURRENT	36	32	MA.
ZERO-SIGNAL GRID #2 CURRENT	3	3	MA.
MAXSIGNAL GRID #2 CURRENT	9	10	MA.
PLATE RESISTANCE (APPROX.)	28 000	28 000	OHMS
TRANSCONDUCTANCE	6 000	5 800	MHOS
LOAD RESISTANCE	6 000	8 000	OHMS
TOTAL HARMONIC DISTORTION	9	10	PERCENT
MAXSIGNAL POWER OUTPUT	3	3.8	WATTS

MAXIMUM CIRCUIT VALUES

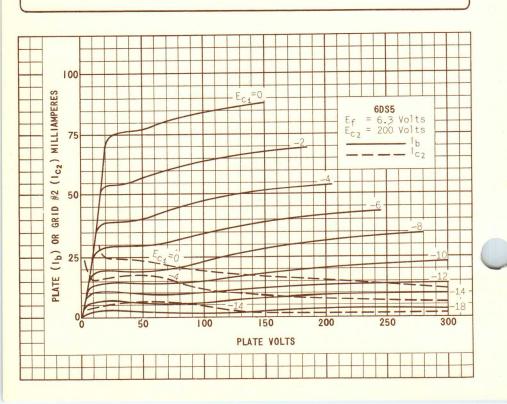
GRID #1 CIRCUIT RESISTANCE:

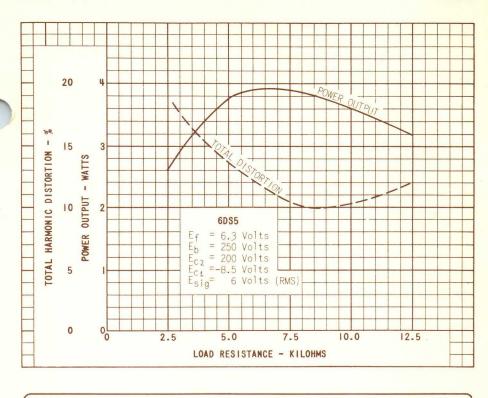
FOR FIXED—BIAS OPERATION

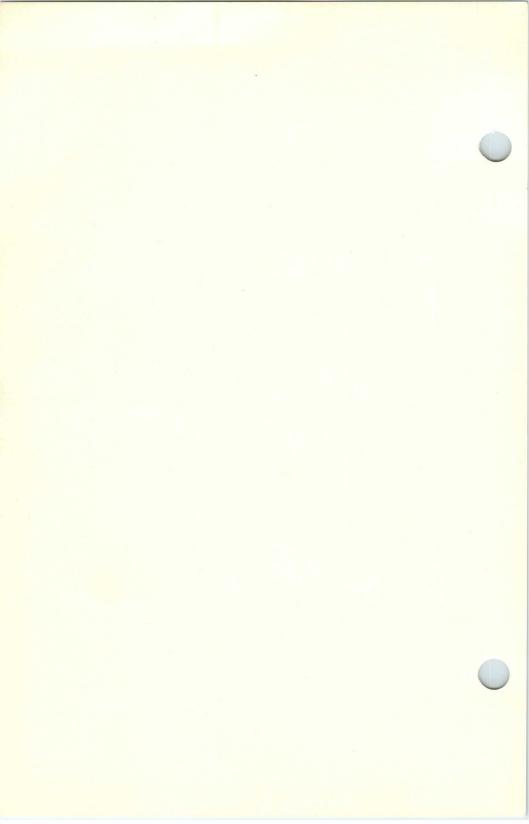
FOR CATHODE—BIAS OPERATION

1.0 MEGOHM

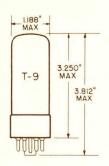
MEGOHM







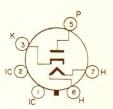
DIODE



DIODE
FOR

DAMPER SERVICE
IN COLOR
T.V. RECEIVERS

ANY MOUNTING POSITION



GLASS BULB
SHORT INTERMEDIATE
SHELL OCTAL 5 PIN
BASE B5-85
OUTLINE DRAWING
JEDEC 9-44

JEDEC 4CG

SOCKET TERMINALS
1,2,4 AND 6

SHOULD NOT BE USED AS
TIE POINTS

THE 6DT4 IS A HEATER-CATHODE TYPE DIODE DESIGNED FOR USE AS THE DAMPER DIODE IN THE HORIZONTAL-DEFLECTION CIRCUIT OF COLOR TELEVISION RECEIVERS. IT IS CAPABLE OF HANDLING THE HIGHER DISSIPATIONS AND VOLTAGES OF COLOR APPLICATIONS.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

HEATER TO CATHODE	3.5	pf
PLATE TO CATHODE AND HEATER	7.5	pf
CATHODE TO PLATE AND HEATER	10.0	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES . SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOL.TS	1.2	AMPS.
MAXIMUM HEATER - CATHODE VOLTAGE			
HEATER POSITIVE WITH RESPECT TO CATHODE:			
DC COMPONENT		100	VOLTS
TOTAL DC AND PEAK		300	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE:			
DC COMPONENT		900	VOLTS
TOTAL DC AND PEAK		5,500	VOLTS

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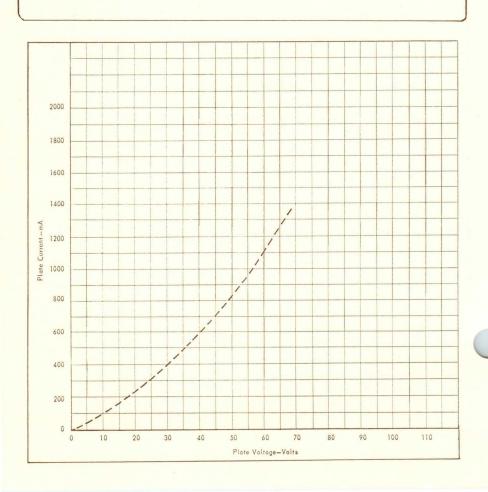
MAXIMUM RATINGS

TV DAMPER SERVICE
DESIGN MAXIMUM RATINGS - SEE EIA STANDARD RS-239

PEAK INVERSE PLATE VOLTAGE	5,500	VOLTS
PEAK PLATE CURRENT	1,450	MA
DC PLATE CURRENT	235	MA
PLATE DISSIPATION	7.5	WATTS

CHARACTERISTICS

TUBE VOLTAGE DROP AT 1 = 350 MA 28 VOLTS



GRID #1 TO PLATE

COATED UNIPOTENTIAL CATHODE HEATER

6.3 VOLTS 1.2 AMP.
AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

MINIATURE SMALL—BUTTON 9 PIN BASE

9HN

0.57 μμή

THE 6DT5 IS A BEAM POWER PENTODE IN THE 9-PIN MINIATURE CONSTRUCTION. IT IS DESIGNED FOR SERVICE AS A VERTICAL DEFLECTION OUTPUT AMPLIFIER IN TELEVISION RECEIVERS UTILIZING A 110° DEFLECTION ANGLE PICTURE TUBE AND A B+ SUPPLY VOLTAGE OF 250 VOLTS. IT HAS HIGH ZERO BIAS PLATE CURRENT AND A HIGH PLATE CURRENT TO GRID #2 CURRENT RATIO. EXCEPT FOR HEATER RATINGS AND WARM-UP TIME, THE 6DT5 IS IDENTICAL TO THE 12DT5 & 25DT5.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

INPUT	0.5	India a
	12.5	uu f
ОИТРИТ	4.9	μμ f
RATINGSA		
INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM		
VERTICAL DEFLECTION SERVICEB		
DEFLECTING 110° PICTURE TUBE		
HEATER VOLTAGE	6.3	VOLTS
MAXIMUM PLATE VOLTAGE	315	VOLTS
MAXIMUM PEAK POSITIVE PULSE PLATE VOLTAGE (ABS. MAX.)	2 200	VOLTS
MAXIMUM GRID #2 VOLTAGE	285	VOLTS
MAXIMUM PEAK NEGATIVE PULSE GRID #1 VOLTAGE	-250	VOLTS
MAXIMUM PLATE DISSIPATION ^C	9.0	WATTS
MAXIMUM GRID #2 DISSIPATION	2.0	WATTS
MAXIMUM CATHODE CURRENT:		
AVERAGE	55	MA.
PEAK	190	MA.
MAXIMUM HEATER POSITIVE OR NEGATIVE WITH RESPECT TO ®		
CATHODE (TOTAL DC AND PEAK)	200	VOLTS
MAXIMUM GRID #4 CIRCUIT VALUES		
FIXED BIAS	0.5	
CATHODE BIAS HEATER WARM-UP TIME (APPROX.)*	-1.0	MEGOHM
CONTINUED ON FOLLOWING PAGE	11.0	SECUNDS
CONTINUED ON FOLLOWING FAGE		

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

HEATER VOLTAGE	6.3	6.3	6.3	VOLTS
HEATER CURRENT	1.2	1.2	1.2	AMP.
PLATE VOLTAGE	60	80 -	- 250	VOLTS
GRID #2 (SCREEN) VOLTAGE	150	250	250	VOLTS
GRID #1 VOLTAGE	OE	OE	-16.5	VOLTS
TRANSCONDUCTANCE			6 200	μMH0S
PLATE CURRENT	→ 95	195.	44	MA.
GRID #2 CURRENT	→ 8.5	19 ^F	1.5	MA.
GRID #1 CUTOFF VOLTAGE G	=		-35	VOLTS

A DESIGN-MAXIMUM RATINGS ARE THE LIMITING VALUES EXPRESSED WITH RESPECT TO BOGIE TUBES AT WHICH SATISFACTORY TUBE LIFE CAN BE EXPECTED TO OCCUR. TO OBTAIN SATISFACTORY CIRCUIT PERFORMANCE, THEREFORE, THE EQUIPMENT DESIGNER MUST ESTABLISH THE CIRCUIT DESIGN SO THAT NO DESIGN-MAXIMUM VALUE IS EXCEEDED WITH A BOGIE TUBE UNDER THE WORST PROBABLE OPERATIOG CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, AND ENVIRONMENTAL CONDITIONS.

B FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE.

C IN STAGES OPERATING WITH GRID LEAK BIAS, AN ADEQUATE CATHODE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

E APPLIED FOR SHORT INTERVAL (MAXIMUM OF 2 SECONDS) SO AS NOT TO DAMAGE TUBE.

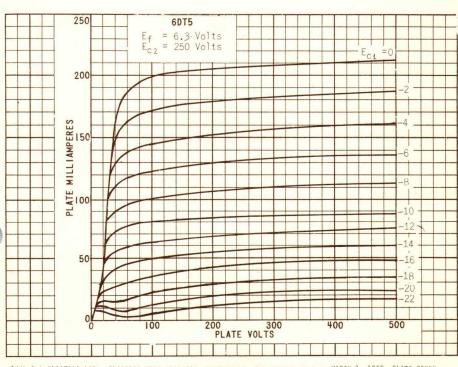
F
THESE VALUES CAN BE MEASURED BY A METHOD INVOLVING A RE-CURRENT WAVEFORM SUCH THAT THE PLATE
DISSIPATION AND GRID \$2 INPUT WILL BE KEPT WITHIN RATINGS IN ORDER TO PREVENT DAMAGE TO THE
TUBE.

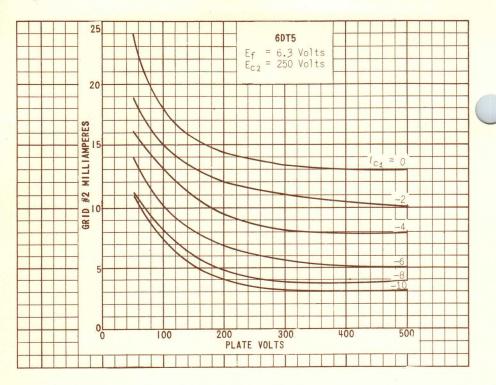
GFOR PLATE CURRENT OF 100 MAMPERES.

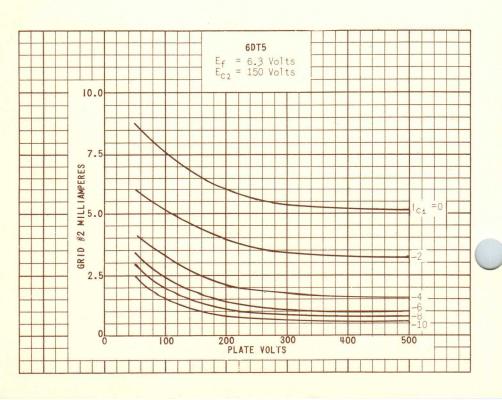
*HEATER WARM—UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATBR OPERATING RESISTANCE.

DC COMPONENT MUST NOT EXCEED 100 VOLTS.

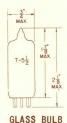
- INDICATES A CHANGE.







PENTODE



MINIATURE TYPE

UNIPOTENTIAL CATHODE

HEATER
6.3±10% VOLTS 0.3 AMP.
AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
SMALL—BUTTON MINIATURE
7 PIN BASE

7EN

THE 6DT6 IS A SHARP CUTOFF PENTODE IN THE 7 PIN MINIATURE CONSTRUCTION. IT IS INTENDED FOR USE AS AN FM DETECTOR IN TELEVISION RECEIVERS. DESIGNED SO THAT GRID #1 AND GRID #3 CAN-EACH BE USED AS INDEPENDENT SHARP CUTOFF CONTROL ELECTRODES, THE TUBE MAY ALSO BE USED IN DELAY CIRCUITS, GAIN-CONTROLLED AMPLIFIER CIRCUITS, AND MIXER CIRCUITS. WITH THE EXCEPTION OF HEATER WARM-UP TIME AND HEATER CHARACTERISTICS, IT IS IDENTICAL TO THE 3DT6.

DIRECT INTERELECTRODE CAPACITANCES - APPROX. WITH EXTERNAL SHIELD, *316, CONNECTED TO CATHODE

GRID #1 TO PLATE	0.02	ии f
GRID #1 TO GRID #3	0.1	uu f
GRID #3 TO ALL OTHER ELECTRODES	6.1	μμ f
GRID #1 TO GRID #2, GRID #3, HEATER,		
AND INTERNAL SHIELD AND CATHODE	5.8	uu f
GRID #3 TO PLATE	1.4	uµ f

RATINGS INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

FM DETECTOR SERVICE

HEATER VOLTAGE	6.3±10% ←	VOLTS
MAXIMUM PLATE VOLTAGE	330 ←	VOLTS
MAXIMUM GRID #3 (SUPPRESSOR) VOLTAGE	28 ←	VOLTS
MAXIMUM GRID #2 SUPPLY VOLTAGE	330 ←	VOLTS
MAXIMUM GRID #2 (SCREEN) VOLTAGE	SEE RATING	CHART
MAXIMUM GRID #1 (CONTROL-GRID) VOLTAGE:		
POSITIVE BIAS VALUE	0	VOLTS
MAXIMUM PLATE DISSIPATION	1.7 -	WATTS
MAXIMUM GRID #2 INPUT:		
FOR GRID #2 VOLTAGES UP TO 165 VOLTS	1.1 ←	WATTS
FOR GRID #2 VOLTAGES BETWEEN 165 AND 330 VOLTS	SEE RATING	CHART
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE		VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	200 A	VOLTS
HEATER WARM-UP TIME (APPROX.) *	11	SECONDS
HEATER WARM-UP TIME (APPROX.)	11	SECONDS

ATHE DC COMPONENT MUST NOT EXCEED 100 VOLTS.

CONTINUED ON FOLLOWING PAGE

- INDICATES A CHANGE.

^{*}HEATER WARM—UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH
80⊈ OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING
OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING
RESISTANCE.

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER

HEATER VOLTAGE	→ 6.3±10%	VOLTS
HEATER CURRENT	0.3	AMP.
PLATE SUPPLY VOLTAGE	150	VOLTS
GRID #3 SUPPLY VOLTAGE	0	
GRID #2 SUPPLY VOLTAGE	100	
CATHODE-BIAS RESISTOR	560	OHMS
PLATE RESISTANCE (APPROX.)	0.15	MEGOHM
TRANSCONDUCTANCE:		
GRID #1 TO PLATE	800	MMHOS
GRID #3 TO PLATE	515	MHOS
GRID #1 VOLTAGE (APPROX.) FOR PLATE CURRENT OF 10 HAMP	-4.5	VOLTS
GRID #3 VOLTAGE (APPROX.) FOR PLATE CURRENT OF 10 HAMP	-3.5	VOLTS
PLATE CURRENT	1.1	MA.
GRID #2 CURRENT	2.1	MA.

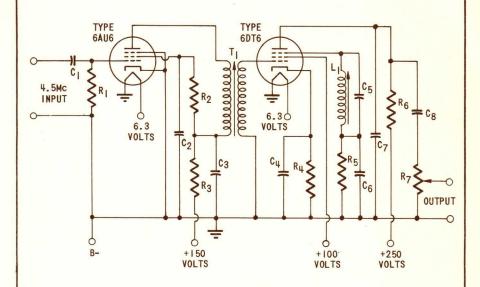
TYPICAL OPERATION IN THE ACCOMPANYING LOCKED-OSCILLATOR,
QUADRATURE-GRID FM DETECTOR CIRCUIT
AT A CARRIER FREQUENCY OF 4.5 MC:

AT A CARRIER FREQUENCY	UF 4.5 MC			
INPUT SIGNAL TO GRID OF DRIVER TUBE	15	200	500	MV RMS
PLATE SUPPLY VOLTAGE	250	250	250	VOLTS
GRID #3 VOLTAGE (OBTAINED FROM				
A 560000-OHM RESISTOR)		-6		VOLTS
GRID #2 SUPPLY VOLTAGE		100		VOLTS
CATHODE-BIAS RESISTOR	560		560	OHMS
PLATE LOAD RESISTOR	0.27		-	MEGOHM
PLATE CURRENT	0.23	0.22	0.21	MA.
GRID #2 CURRENT	3.4	5.5	6	MA.
GRID #1 CURRENT	0.013	0.6	0.8	MA.
BANDWIDTH:				
FOR A TOTAL HARMONIC DISTORTION				
OF 10 PERCENT	65			KC
AM REJECTION (APPROX.) B	33	29	28	DB
AUDIO OUTPUT VOLTAGE (RMS, APPROX.):				
WITH ± 7.5-KC DEVIATION FROM		-	7 -	
MEAN VALUE OF 4.5 MC	5.5	6.5	7.5	VOLTS
WITH ± 25-KC DEVIATION FROM MEAN VALUE OF 4.5 MC	17	21	23	VOLTS
TOTAL HARMONIC DISTORTION:	11	21	2)	VULIS
WITH + 25-KC DEVIATION FROM				
MEAN VALUE OF 4.5 MC	2	3	4	PERCENT
SENSITIVITY:				
WITH +7.5-KC DEVIATION FROM				
MEAN VALUE OF 4.5 MC			5C	MILLIVOLTS
WITH +25-KC DEVIATION FROM				
MEAN VALUE OF 4.5 MC			15 ^C	MILLIVOLTS
MAXIMUM CIRCUIT VALUES:				
GRID #1 CIRCUIT RESISTANCE;				
FOR FIXED-BIAS OPERATION			0.25	MEGOHM
FOR CATHODE-BIAS OPERATION			0.5	MEGOHM

B RATIO OF THE AUDIO OUTPUT VOLTAGE PRODUCED BY 30-PERCENT AMPLITUDE MODULATION OF THE 4.5-MC CARRIER FREQUENCY TO THE AUDIO OUTPUT PRODUCED BY ± 25-KC DEVIATION FROM THE 4.5-MC CARRIER FREQUENCY, WITH A MODULATING FREQUENCY OF 400 CPS IN BOTH CASES.

 $^{^{}m C}$ Signal level at which detector circuit will handle the indicated deviation in frequency from the mean value of 4.5 mc, before distortion occurs.

LOCKED-OSCILLATOR, QUADRATURE-GRID DETECTOR CIRCUIT UTILIZING TYPE 6DT6



c1: 4744 f, 400 VOLTS C2 C3:0.014f, 400 VOLTS 0.014f, 200 VOLTS

1844 f, 200 VOLTS c6: 0.054f, 200 VOLTS

100 TO 1000µµf,

0.014f, 400 VOLTS

SLUG-TUNED INDUCTOR WITH Q OF 50 AND TUNEABLE TO 4.5-MC.

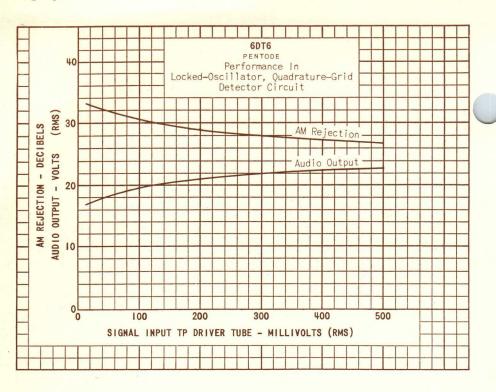
R1: 100000 OHMS, 0.5 WATT 12000 OHMS, 0.5 WATT

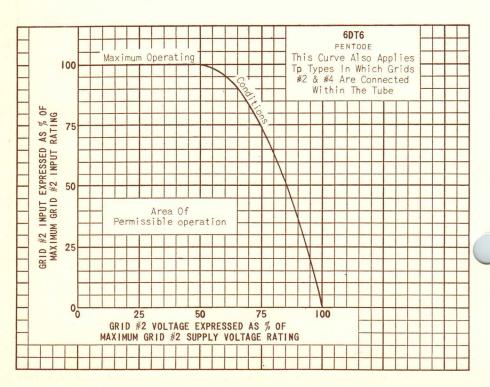
R 2: R3: 1000 OHMS, 0.5 WATT

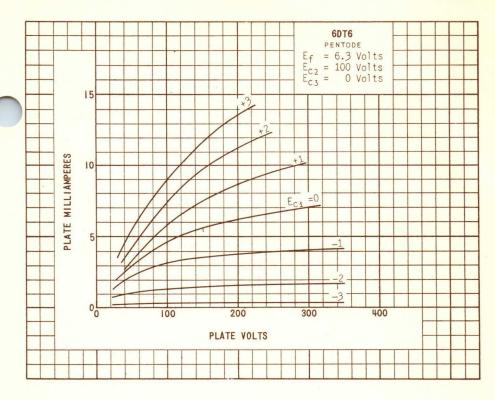
R4: 560 OHMS, 0.5 WATT R 5: 560000 OHMS, 0.5 WATT

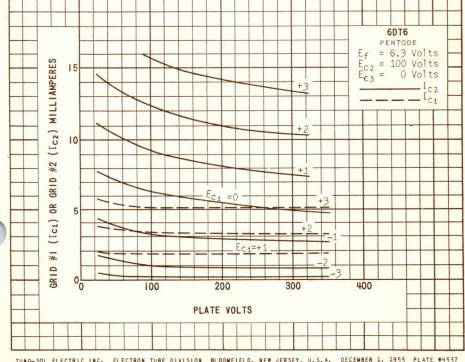
R6: 270000 OHMS, 0.5 WATT R7: 0.5 MEGOHM POTENTIOMETER

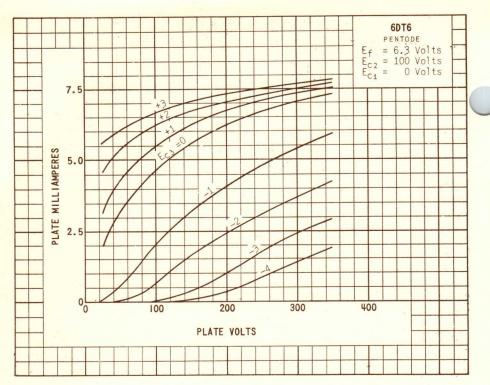
SLUG-TUNED, BIFILAR WOUND IF TRANSFORMER т1: WITH RATIO OF 1:1.5, Q >60, AND TUNEABLE TO 4.5-MC WITH TUBE AND WIRING CAPACITANCE. **6DT6**

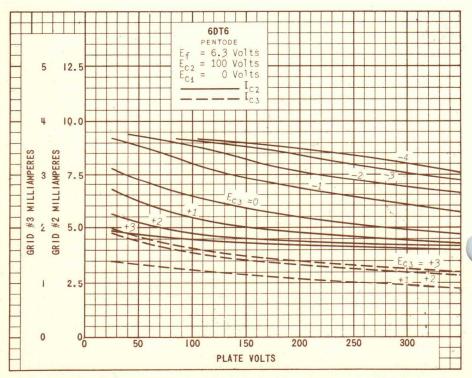


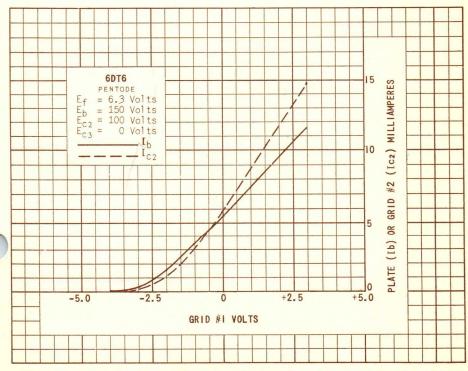


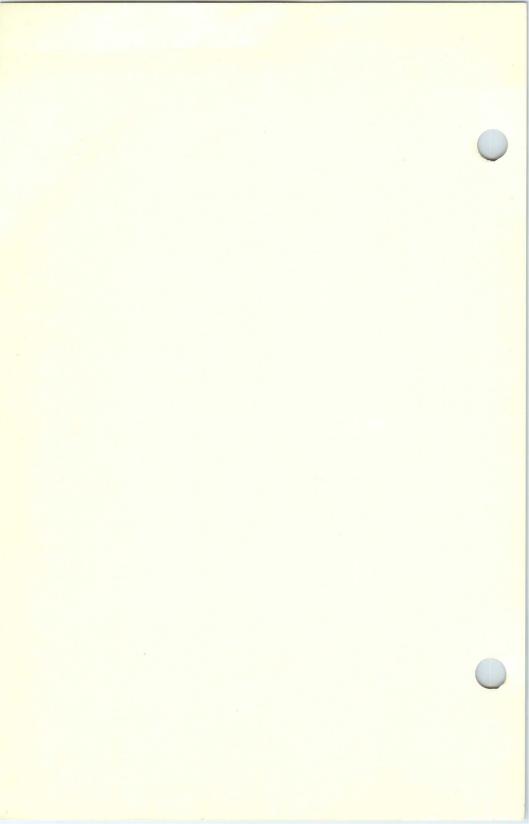






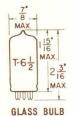






TWIN TRIODE

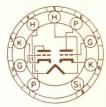
MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER
6.3 VOLTS 0.3 AMP
AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW SMALL-BUTTON 9-PIN NOVAL 9DE

THE 6DT8 IS A GENERAL-PURPOSE HIGH-MU TWIN TRIODE OF THE 9-PIN MINIATURE TYPE INTENDED FOR USE AS AN RF AMPLIFIER AND AS A COMBINED OSCILLATOR-MIXER IN FM TUNERS. THIS TUBE IS ALSO USEFUL IN A WIDE VARIETY OF APPLICATIONS IN RADIO AND TELEVISION RECEIVERS.

DIRECT INTERELECTRODE CAPACTANCES - APPROX.

	UNIT #1	UNIT #2	
GRID-DRIVE OPERATION: A			
GRID TO PLATE	1.6	1.6	μμ f
GRID TO CATHODE, HEATER & I.S.	2.7	2.7	μμ f
PLATE TO CATHODE, HEATER & I.S.	1.6	1.6	uu f
HEATER TO CATHODE	3.0	3.0	μμι f
CATHODE-DRIVE OPERATION: B			
CATHODE TO GRID, HEATER, & I.S.		5.3	μμf
PLATE TO GRID, HEATER, & I.S.		2.8	μμf

RATINGS

INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM CLASS A1 AMPLIFIER

EACH UNIT

EACH UNIT		
HEATER VOLTAGE	6.3	VOLTS
MAXIMUM PLATE VOLTAGE	300	VOLTS
MAXIMUM GRID VOLTAGE:		
NEGATIVE BIAS VALUE	50	VOLTS
MAXIMUM PLATE DISSIPATION	2.5	WATTS
MAXIMUM PEAK HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	200 ^C	VOLTS
MAXIMUM GRID-CIRCUIT RESISTANCE:		
FOR FIXED-BIAS OPERATION	0.25	MEGOHM
FOR CATHODE-BIAS OPERATION	1	MEGOHM

Awith external shield, #315 connected to cathode of unit under test.

BWITH EXTERNAL SHIELD, #315, CONNECTED TO GRID OF UNIT UNDER TEST.

CDC COMPONENT MUST NOT EXCEED 100 VOLTS.

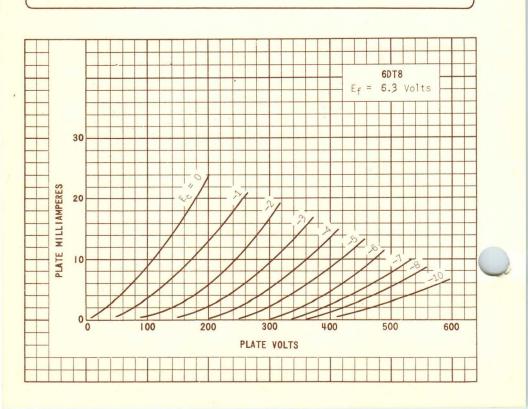
TUNG-SOL .

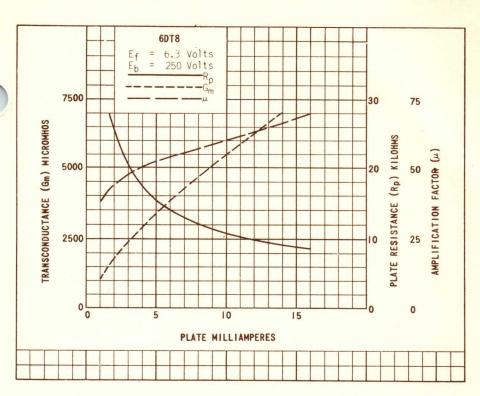
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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

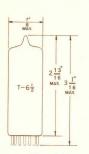
CLASS A₁ AMPLIFIER EACH UNIT

HEATER VOLTAGE		6.3		6.3	VOLTS
HEATER CURRENT		0.3		0.3	AMP.
PLATE-SUPPLY VOLTAGE		100		250	VOLTS
CATHODE-BIAS RESISTOR		270		200	OHMS
AMPLIFICATION FACTOR		60		60	
PLATE RESISTANCE (APPROX.)	15	000	10	900	OHMS
TRANSCONDUCTANCE	4	000	5	500	μMHOS.
PLATE CURRENT		3.7		10	MA.
GRID VOLTAGE (APPROX.) FOR PLATE					
CURRENT OF 10 HA.		-5		-12	VOLTS









GLASS BULB

BEAM POWER PENTODE

MINIATURE TYPE

COATED UNIPOTENTIAL CATHODE

HEATER

6.3 VOLTS 1.2 AMP. AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

SMALL BUTTON 9 C K

THE 6DW5 IS A BEAM POWER PENTODE IN THE 9-PIN MINIATURE CONSTRUCTION. IT IS DESIGNED PRIMARILY FOR VERTICAL DEFLECTION AMPLIFIER SERVICE IN TELE-VISION RECEIVERS EMPLOYING 110° DEFLECTION SYSTEMS. IT HAS A HIGH ZERO BIAS PLATE CURRENT AND IS DESIGNED TO OPERATE AT RELATIVELY LOW B SUPPLY VOLTAGES. EXCEPT FOR HEATER RATINGS AND HEATER WARM-UP TIME THE 6DW5 IS IDENTICAL TO THE 12DW5.

DIRECT INTERELECTRODE CAPACITANCES WITHOUT EXTERNAL SHIELD

GRID TO PLATE: (G4 TO P)	0.5	μμ f
INPUT: (G1 TO H+K)	14	μμf
OUTPUT: (P TO H+K)	9	щи f

RATINGS A

INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM VERTICAL DEFLECTION AMPLIFIERB

(PENTODE CONNECTED)

HEATER VOLTAGE	6.3	VOLTS
MAXIMUM DC PLATE VOLTAGE	330	VOLTS
MAXIMUM DC GRID #2 VOLTAGE	220	VOLTS
MAXIMUM PEAK POSITIVE PULSE PLATE VOLTAGE (ABS. MAX.)	2 200	VOLTS
MAXIMUM PEAK NEGATIVE PULSE GRID VOLTAGE	250	VOLTS
MAXIMUM PLATE DISSIPATIONC	11	WATTS
MAXIMUM GRID #2 DISSIPATIONC	2.5	WATTS
MAXIMUM AVERAGE CATHODE CURRENT	65	MA .
MAXIMUM PEAK CATHODE CURRENT	225	MA.
MAXIMUM GRID CIRCUIT RESISTANCE:		
SELF BIAS	2.2	MEGOHMS

CONTINUED FROM PRECEDING PAGE

RATINGS - CONT'D.
INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM
VERTICAL DEFLECTION AMPLIFIER^B
(PENTODE CONNECTED)

MAXIMUM HEATER-CATHODE VOLTAGE

HEATER NEGATIVE WITH RESPECT TO CATHODE

TOTAL DC AND PEAK

HEATER POSITIVE WITH RESPECT TO CATHODE

DC

TOTAL DC AND PEAK

200 200 VOLTS

200 200 VOLTS

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

VERTICAL DEFLECTION AMPLIFIER

(PENTODE CONNECTED)

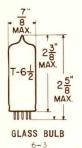
HEATER VOLTAGE	6.3	VOLTS
HEATER CURRENT	1.2	AMP.
PLATE VOLTAGE	200	VOLTS
GRID #1 VOLTAGE	-22.5	VOLTS
GRID #2 VOLTAGE	150	VOLTS
PLATE CURRENT	55	MA.
GRID #2 CURRENT	2.0	MA.
TRANSCONDUCTANCE	5 500	MHOS
PLATE RESISTANCE (APPROX.)	5 000	OHMS
GRID VOLTAGE FOR Ib = 0.1 MA.	-55	VOLTS
ZERO BIAS WITH Eb =60VDC; Ec1 =0; Ec2 =150VDC (INSTANTANEC	DUS VALUE	s)
PLATE CURRENT	260	MA.
GRID #2 CURRENT	20	MA .
TRIODE AMPLIFICATION FACTOR WITH Eb =Ec2=150 V; Ec1=-22.5	4.3	

DESIGN-MAXIMUM RATINGS ARE THE LIMITING VALUES EXPRESSED WITH RESPECT TO BOGIE TUBES AT WHICH SATISFACTORY URBELIFE CAN BE EXPECTED TO OCCUR. TO OBTAIN SATISFACTORY CIRCUIT PERFORMANCE, THEREFORE, THE FOUNDMENT DESIGNER MUST ESTABLISH THE CIRCUIT DESIGN SO THAT NO DESIGN-MAXIMUM VALUE IS EXCEEDED WITH A BOGIE TUBE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, AND ENVIRONMENTAL CONDITIONS.

B FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE.

C IN STAGES OPERATING WITH GRID LEAK BIAS, AN ADEQUATE CATHODE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

TRIODE-PENTODE MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER

6.3 VOLTS 0.72 AMP.

ANY MOUNTING POSITION



BOTTOM VIEW MINIATURE BUTTON

9 H X

THE 6DX8 IS A TRIODE-PENTODE IN THE 9 PIN MINIATURE CONSTRUCTION. THE TRIODE SECTION IS DESIGNED FOR USE IN CIRCUITS FOR KEYED A.G.C. SYNC-SEPARATION, SYNC-AMPLIFICATION AND NOISE SUPPRESSION; THE PENTODE SECTION IS DESIGNED FOR USE AS A VIDEO AMPLIFIER.

DIRECT INTERELECTRODE CAPACITANCES

	PENTODE	SECTION	
GRID #1 TO ALL OTHER ELEMENTS EXCEPT PLATE	9.0	4.0	pf
PLATE TO ALL OTHER ELEMENTS EXCEPT GRID #1	4.5	2.3	pf
PLATE TO GRID #1 (MAX.)	0.1	2.7	pf
GRID #1 TO HEATER (MAX.)	0.1	0.1	pf
BETWEEN TRIODE AND PENTODE SECTION:			
TRIODE PLATE TO PENTODE GRID #1 (MAX.)	0.	01	pf
TRIODE GRID TO PENTODE GRID #1 (MAX.)	0.	01	pf

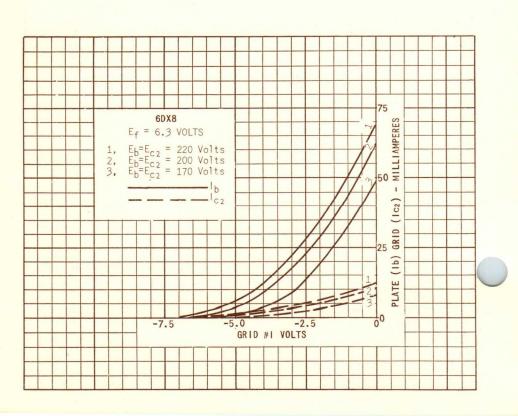
RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

	PENTODE SECTION	TRIODE	
HEATER VOLTAGE	6	.3	VOLTS
MAXIMUM PLATE VOLTAGE	300	300 A	VOLTS
MAXIMUM PEAK PULSE PLATE VOLTAGE AT			
PLATE CURRENT MAX. O.1 MAMP B		600	VOLTS
MAXIMUM PLATE DISSIPATION	4	1	WATTS
MAXIMUM GRID #2 VOLTAGE	300		VOLTS
MAXIMUM GRID #2 DISSIPATION	1.7		WATTS
MAXIMUM CATHODE CURRENT	40	12	MA.
MAXIMUM GRID #1 CIRCUIT RESISTANCE			
WITH FIXED BIAS	1	1	MEG.
MAXIMUM GRID #1 CIRCUIT RESISTANCE			
WITH CATHODE RESISTOR	2	3	MEG.
MAXIMUM VOLTAGE BETWEEN HEATER & CATHO	DE 200	200	VOLTS
MAXIMUM CIRCUIT RESISTANCE BETWEEN			
HEATER & CATHODE	20,000	20,000	OHMS

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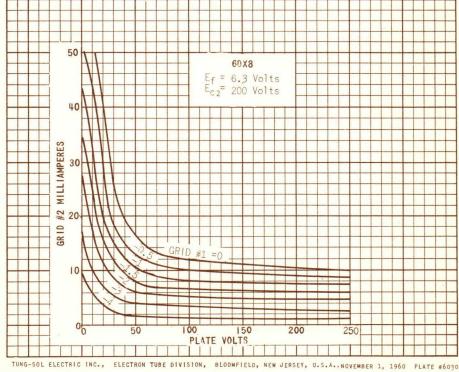
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

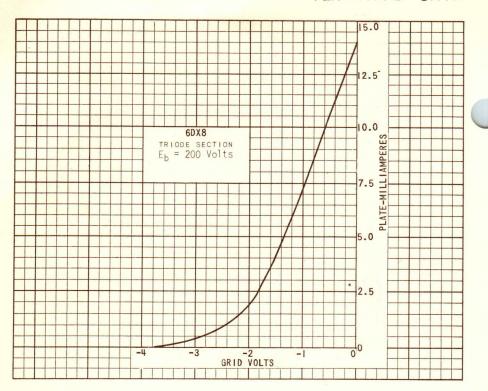
	TRIODE	PEI	PENTODE SECTION			
PLATE VOLTAGE	200	170	200	220	VOLTS	
GRID #2 VOLTAGE		170	200	220	VOLTS	
GRID #1 BIAS	-1.7	-2.1	-2.9	-3.4	VOLTS	
PLATE CURRENT	3	18	18	18	MAM	
GRID #2 CURRENT		3	3	3	MA.	
TRANSCONDUCTANCE	4000	11000	10400	10000	µмноs	
PLATE RESISTANCE		0.1	0.13	0.15	MEG.	
AMPLIFICATION FACTOR OF GRID						
#2 WITH RESPECT TO GRID #1		36	36	36		
AMPLIFICATION FACTOR	65					

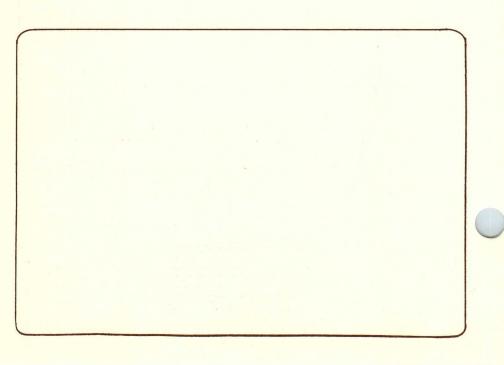


APOSITIVE AND NEGATIVE.

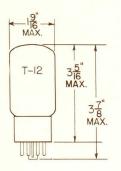
B_{MAX}. PULSE DURATION 18% OF A CYCLE WITH A MAXIMUM OF 18 MICROSECONDS.





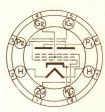


DUAL PENTODE



COATED UNIPOTENTIAL CATHODE HEATER 6.3 VOLTS 1.2 AMP.

AC OR DC ANY MOUNTING POSITION



BOTTOM VIEW SHORT MEDIUM SHELL 8 PIN OCTAL 8 J P

GLASS BULB

THE 6DY7 IS A DUAL BEAM POWER PENTODE IN THE 8 PIN OCTAL CONSTRUCTION. IT IS DESIGNED FOR APPLICATION IN STEREOPHONIC SOUND SYSTEMS.

RATINGS INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEMA FACH SECTION

EACH SECTION		
HEATER VOLTAGE	6.3	VOLTS
MAXIMUM PLATE VOLTAGE	400	VOLTS
MAXIMUM GRID #2 VOLTAGE	300	VOLTS
MAXIMUM PLATE DISSIPATION	15	WATTS
MAXIMUM GRID #2 DISSIPATION	2.0	WATTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE		
FIXED BIAS	0.1	MEGOHM
SELF BIAS	0.47	MEGOHM
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER POSITIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE		
DC	100	VOLTS
TOTAL DC AND PEAK	200	VOLTS

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

AVERAGE CHARACTERISTICS - EACH SECTION

HEATER VOLTAGE	6.3	VOLTS
HEATER CURRENT	1.2	AMPS.
PLATE VOLTAGE	250	VOLTS
GRID #2 VOLTAGE	250	VOLTS
GRID #1 VOLTAGE	-12.5	VOLTS
PLATE CURRENT	50	MA.
GRID #2 CURRENT	3.0	MA.
TRANSCONDUCTANCE	6 000	имноs
PLATE RESISTANCE (APPROX.)	28 000	OHMS

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS - CONT'D.

CLASS AB1 AMPLIFIER (TWO SECTIONS IN PUSH-PULL)

6.3	6.3	VOLTS
1.2	1.2	AMP.
250	400	VOLTS
250	250	VOLTS
-16	-20	VOLTS
32	40	VOLTS
77	58	MA.
74	74	MA.
3.5	1.7	MA.
15.5	14.0	MA.
9 000	14 000	OHMS
11	20	WATTS
2.5	2.0	PERCENT
	1.2 250 250 -16 32 77 74 3.5 15.5 9 000 11	1.2 1.2 250 400 250 250 -16 -20 32 40 77 58 74 74 3.5 1.7 15.5 14.0 9 000 14 000 11 20

CLASS A1 - SINGLE SECTION B

PLATE VOLTAGE	250	VOLTS
GRID #2 VOLTAGE	250	VOLTS
GRID #4 VOLTAGE	-12.5	VOLTS
PEAK AF SIGNAL VOLTAGE	12.5	VOLTS
ZERO SIGNAL PLATE CURRENT	50	MA.
MAXIMUM SIGNAL PLATE CURRENT	45	MA.
ZERO SIGNAL GRID #2 CURRENT	3.0	MA.
MAXIMUM SIGNAL GRID #2 CURRENT	9.0	MA.
LOAD RESISTANCE	5 000	OHMS
MAXIMUM SIGNAL POWER OUTPUT	5.0	WATTS
TOTAL HARMONIC DISTORTION	9.0	PERCENT

DESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT LIFE NO DESIGN-MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT COMPONENT VARIATIONS.

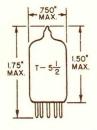
 $^{^{}m B}$ THE EFFECTS OF CROSS-COUPLING BETWEEN SECTIONS, WITH BOTH SECTIONS OPERATING SIMULTANEOUSLY AS SINGLE CHANNEL CLASS ALAMPLIFIERS, IS 50 db DOWN.

TUMG-SOL

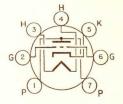
TRIODE

MINIATURE TYPE

MEDIUM MU TRIODE
FOR
UHF OSCILLATOR SERVICE



COATED UNIPOTENTIAL CATHODE ANY MOUNTING POSITION



GLASS BULB
MINIATURE BUTTON
7 PIN BASE E7-1
OUTLINE DRAWING
JEDEC 5-1

BOTTOM VIEW BASING DIAGRAM 7 DK

THE 6DZ4 IS A MEDIUM MU TRIODE IN THE 7 PIN MINIATURE CONSTRUCTION.IT IS DESIGNED FOR UHF OSCILLATOR SERVICE. EXCEPT FOR HEATER CHARACTERISTICS AND RATINGS, THE 6DZ4 IS IDENTICAL TO THE 2DZ4 AND THE 3DZ4.

DIRECT INTERELECTRODE CAPACITANCES

WITH SHIELD

GRID TO PLATE	1.8	pf
INPUT: G TO (H+K+E.S.)	2.2	pf
OUTPUT: P TO (H + K + E.S.)	1.3	pf

HEATER CHARACTERISTICS AND RATINGS DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS	225	MA.
LIMITS OF APPLIED VOLTAGE		6.3 ± 0.6	VOLTS
HEATER-CATHODE VOLTAGE			
HEATER NEGATIVE WITH RESPECT TO CATHO	DE		
TOTAL DC AND PEAK		50	VOLTS
HEATER POSITIVE WITH-RESPECT TO CATHOD	E		
DC		25	VOLTS
TOTAL DC AND PEAK		50	VOLTS

- TUNG-SOL -

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MAXIMUM RATINGS DESIGN MAXIMUM RATINGS - SEE EIA STANDARD RS-239

UHF OSCILLATOR SERVICE

PLATE VOLTAGE	135	VOLTS
NEGATIVE GRID VOLTAGE	50	VOLTS
PLATE DISSIPATION	2.3	WATTS
CATHODE CURRENT	20	MA.
GRID CURRENT	2	MA.

CHARACTERISTICS AND TYPICAL OPERATION

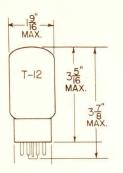
CLASS AI AMPLIFIER

PLATE SUPPLY VOLTAGE	80	VOLTS
PLATE DROPPING RESISTOR	2,700	OHMS
PLATE CURRENT	15	MA.
TRANSCONDUCTANCE	6,700	μMHOS.
AMPLIFICATION FACTOR	14	
PLATE RESISTANCE	APPROX. 2,000	OHMS
GRID VOLTAGE FOR $I_b = 20 \mu A$	APPROX11	VOLTS

OSCILLATOR AT 1000 Mc/s MEASURED IN JEDEC STANDARD OSCILLATOR NO. 400

PLATE SUPPLY VOLTAGE	80	VOLTS
PLATE DROPPING RESISTOR	2,700	OHMS
GRID RESISTOR	10,000	OHMS
PLATE CURRENT	15.5	MA.
GRID CURRENT	APPROX. 800	μ A

TWIN PENTODE



COATED UNIPOTENTIAL CATHODE

HEATER

6.3 VOLTS 1.52 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

SHORT MEDIUM SHELL 8 PIN OCTAL

GLASS BULB

BJP.

THE 6DZ7 IS A TWIN POWER PENTODE ESPECIALLY SUITABLE FOR COMPACT STEREO SYSTEMS. IT IS DESIGNED FOR USE IN THE OUTPUT STAGE OF HIGH-FIDELITY AUDIO AMPLIFIERS.

DIRECT INTERELECTRODE_CAPACITANCES - approx.

WITHOUT EXTERNAL SHIELD

GRID #1 TO PLATE	.07	0.5	$\mu\mu f$
INPUT	11	11	$\mu\mu f$
OUTPUT	5.0	5.0	$\mu\mu f$
GRID #1, SECTION 1 TO GRID #1, SECTION 2	0.0	03	$\mu\mu f$
PLATE, SECTION 1 TO PLATE, SECTION 2	1	.5	μμf

RATINGS

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

HEATER VOLTAGE	6.3	VOLTS
MAXIMUM PLATE VOLTAGE MAXIMUM SCREEN VOLTAGE	300	VOLTS
MAXIMUM PLATE DISSIPATION	13.2	WATTS
MAXIMUM SCREEN DISSIPATION, TOTAL	4.0	WATTS

AEACH SECTION UNLESS OTHERWISE INDICATED.

CONTINUED FROM PRECEDING PAGE

RATINGS - cont'd.

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEMA

HEATER VOLTAGE	6.3	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC COMPONENT	100	VOLTS
TOTAL DC AND PEAK	200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	200	VOLTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE	0.27	MEGOHMS

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

AVERAGE CHARACTERISTICS - EACH SECTION

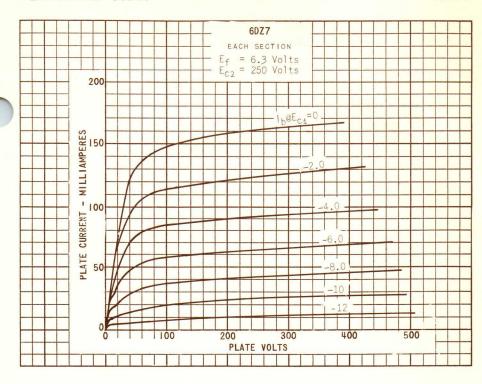
HEATER VOLTAGE	6.3	VOLTS
HEATER CURRENT	1.52	AMP.
PLATE VOLTAGE	250	VOLTS
SCREEN VOLTAGE	250	VOLTS
GRID #1 VOLTAGE	-7.3	VOLTS
PLATE RESISTANCE (APPROX.)	38000	OHMS
TRANSCONDUCTANCE	11300	μMHOS
PLATE CURRENT	48	MA.
SCREEN CURRENT	5.5	MA.

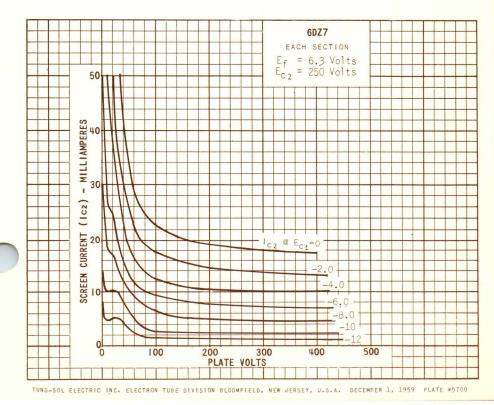
PUSH-PULL CLASS AB AMPLIFIER - SINGLE TUBE

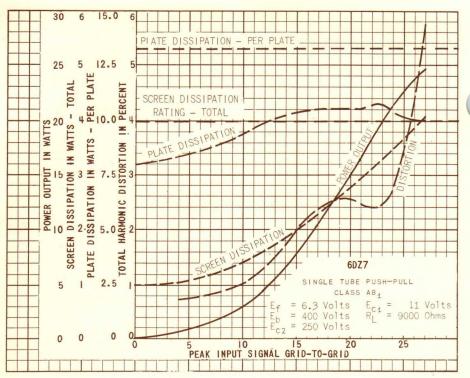
	FIXED	CATHODE	
	BIAS	BIAS	
HEATER VOLTAGE	6	.3	VOLTS
HEATER CURRENT	1.	52	AMP.
PLATE VOLTAGE	400	300	VOLTS
SCREEN VOLTAGE	250	250	VOLTS
GRID #1 VOLTAGE	-11		VOLTS
CATHODE-BIAS RESISTOR		120	OHMS
PEAK AF GRID-TO-GRID VOLTAGE	22	22	VOLTS
ZERO-SIGNAL PLATE CURRENT	40	66	MA.
MAXIMUM-SIGNAL PLATE CURRENT	100	80	MA.
ZERO-SIGNAL SCREEN CURRENT	4.0	7.0	MA.
MAXIMUM-SIGNAL SCREEN CURRENT	13	15	MA.
EFFECTIVE LOAD RESISTANCE, PLATE-TO-PLATE	9000	9000	OHMS
TOTAL HARMONIC DISTORTION	2.5	3.5	PERCENT
MAXIMUM-SIGNAL POWER OUTPUT	18	12	WATTS

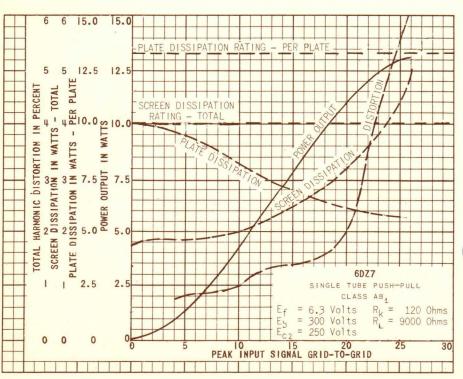
DESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY TUBE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE TUBE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE TUBE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN TUBE CHARACTERISTICS THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT LIFE NO DESIGN-MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY TUBE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.

A EACH SECTION UNLESS OTHERWISE INDICATED.

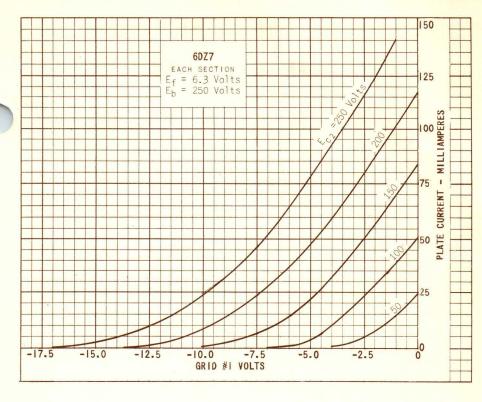


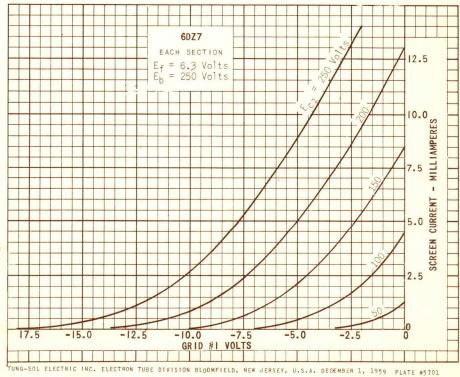


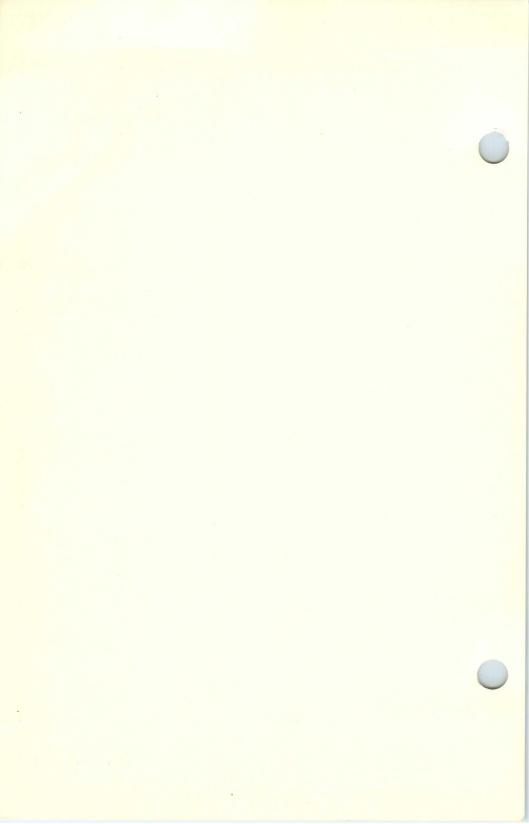


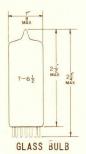


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COATED UNIPOTNETIAL CATHODE

HEATER

6.3 VOLTS 0.90 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

MINIATURE 9 PIN BASE

THE 6DZ8 IS A HIGH-MU TRIODE, POWER PENTODE IN THE MINIATURE 9 PIN CONSTRUCTION. IT IS DESIGNED AS A TWO STAGE AUDIO FREQUENCY AMPLIFIER WHERE THE PLATE SUPPLY VOLTAGE IS OBTAINED FROM A SINGLE HALF-WAVE RECTIFIER DIRECTLY FROM THE 120 VOLT AC LINE.

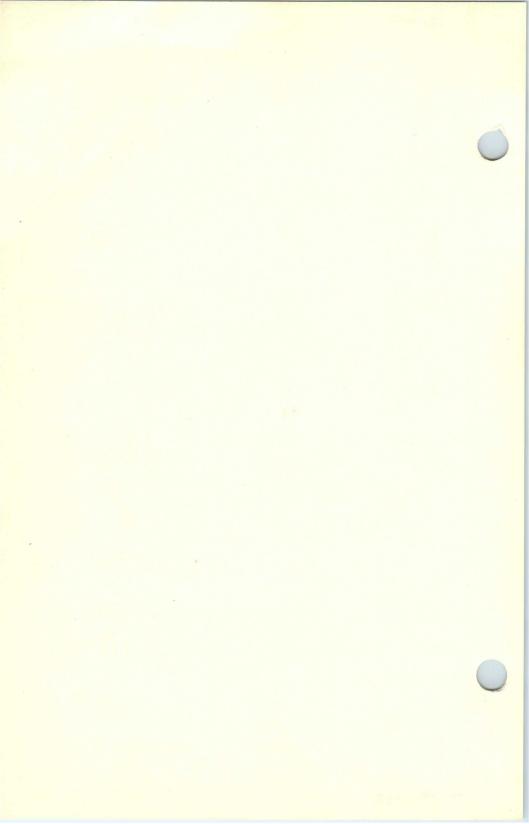
RATINGS
INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

	TRIODE	PENTODE	
HEATER VOLTAGE	6.	3	VOLTS
MAXIMUM PLATE VOLTAGE	150	150	VOLTS
MAXIMUM PLATE DISSIPATION	. 75	6.5	WATTS
MAXIMUM GRID (2) VOLTAGE		135	VOLTS
MAXIMUM GRID (2) DISSIPATION		1.5	WATTS
MAXIMUM DC HEATER-CATHODE POTENTIAL	110	110	VOLTS
MAXIMUM GRID CIRCUIT RESISTANCE	5.0	0.5	MEGOHMS
MAXIMUM CATHODE CURRENT	5.0	60.0	MA.
MAXIMUM HEATER-CATHODE VOLTAGE:			
HEATER NEGATIVE WITH RESPECT TO CATHODE	20	00	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	20	00	VOLTS

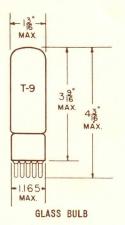
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

	TRIODE	PENTODE	
HEATER VOLTAGE	(5.3	VOLTS
HEATER CURRENT	0.	.90	AMP.
PLATE VOLTAGE	120 -	145	VOLTS
GRID #2 VOLTAGE		120	VOLTS
GRID #1 VOLTAGE	0	0	VOLTS
CATHODE RESISTOR	1500	180	OHMS
PLATE CURRENT	0.8	45	MA.
GRID #2 CURRENT		6	MA -
TRANSCONDUCTANCE	1400	7500	MMHOS
LOAD RESISTANCE		2500	OHMS
GRID CUTOFF VOLTAGE FOR 204A	-2.5		VOLTS
AMPLIFICATION FACTOR	100		
POWER OUTPUT		2.0	WATTS

SIMILAR TYPE REFERENCE: Except for heater ratings the 6DZ8 is identical to the 9DZ8, 12DZ8, 18DZ8, and the 35DZ8.

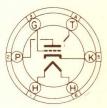


TRIODE INDICATOR



COATED UNIPOTENTIAL CATHODE

HEATER 6.3 VOLTS 0.3 AMP. AC OR DC ANY MOUNTING POSITION



BOTTOM VIEW SMALL 6 PIN BASE 6R

THE 6E5 CONSISTS OF A CIRCULAR FLUORESCENT TARGET WITH AN INDICATING SHADOW ANGLE CONTROLLED BY AN INTERNALLY CONNECTED SHARP CUT-OFF AMPLIFIER. WHEN THE 6E5 IS USED AS A TUNING INDICATOR AVC VOLTAGE IS APPLIED TO THE TRIODE GRID.

RATINGS INTERPRETED ACCORDING TO RMA STANDARD M8-210

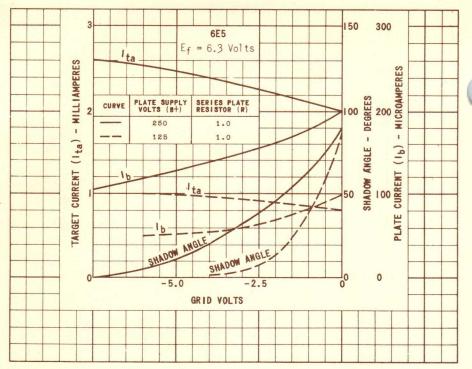
HEATER VOLTAGE	6.3	VOLTS
MAXIMUM HEATER CATHODE VOLTAGE	90	VOLTS
MAXIMUM PLATE SUPPLY VOLTAGE	250	VOLTS
MAXIMUM TARGET VOLTAGE	250	VOLTS
MINIMUM TARGET VOLTAGE	125	VOLTS

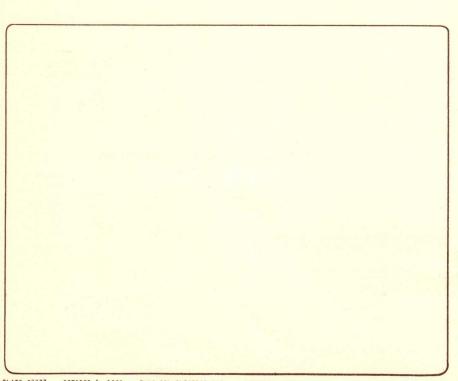
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

HEATER VOLTAGE	6.3	6.3	VOLTS
HEATER CURRENT	0.3	0.3	AMP.
PLATE AND TARGET SUPPLY VOLTAGE	200	250	VOLTS
SERIES TRIODE-PLATE RESISTOR	1	1	MEGOHM
TARGET CURRENT (SUBJECT TO WIDE VARIATION) A	3	4	MA.
TRIODE-PLATE CURRENTA	0.19	0.24	MA.
GRID BIAS (APPROX.) FOR SHADOW ANGLE = 0°	-6.5	-8.0	VOLTS
GRID BIAS (APPROX.) FOR SHADOW ANGLE = 90°	0	0	VOLTS

AMEASURED AT ZERO GRID BIAS.

-- INDICATES A CHANGE OR ADDITION.

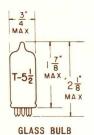




TUNG-SOL -

TETRODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER

6.3±10% VOLTS 0.20 AMP.

AC OR DC

ANY MOUNTING POSITION

BOTTOM VIEW
SMALL BUTTON MINIATURE
7 PIN BASE
7 EW

THE 6EA5 IS A SHARP CUTOFF TETRODE IN THE 7 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED FOR HIGH PLATE VOLTAGE OPERATION AS AN RF AMPLIFIER IN VHF TUNERS OF TELEVISION RECEIVERS. EXCEPT FOR HEATER RATINGS, AND WARM-UP TIME THE 6EA5 IS IDENTICAL TO THE 2EA5 AND THE 3EA5.

DIRECT INTERELECTRODE CAPACITANCES

	SHIELDA	SHIELD	
GRID TO PLATE (G1 TO P) (MAX.)	0.05	0.06	$\mu\mu f$
INPUT: G1 TO (H+K+G2+1.S.)	4.5	3.8	μμ f
OUTPUT: P TO (H+K+G2+1.S.)	3.0	2.3	μμ f

RATINGS
INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM^B

HEATER VOLTAGE	6.3±10%	6.3±10%	6.3±10%	VOLTS
MAXIMUM PLATE VOLTAGE	250	250	250	VOLTS
MAXIMUM GRID #2 VOLTAGE	150	150	150	VOLTS
MAXIMUM PLATE DISSIPATION	3.25	3.25	3.25	WATTS
MAXIMUM GRID #2 DISSIPATION	0.5	0.5	0.5	WATTS
MAXIMUM CATHODE CURRENT (DC)	20	20	20	MA.
MAXIMUM HEATER-CATHODE VOLTAGE	:			
HEATER NEGATIVE WITH RESPECT	TO CATHODE	200	200	WOL TO
TOTAL DC AND PEAK	200	200	200	VOLTS
HEATER POSITIVE WITH RESPECT				
DC	100	100	100	VOLTS
TOTAL DC AND PEAK	200	200	200	VOLTS

AWITH EXTERNAL SHIELD #316 CONNECTED TO PIN 2.

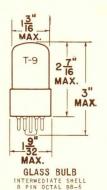
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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

HEATER VOLTAGE HEATER CURRENT	6.3±10% 0.20	6.3±10% 0.20	6.3±10% 0.20	VOLTS AMPS.
PLATE VOLTAGE	250	250	250	VOLTS
GRID #2 VOLTAGE	140	140	140	VOLTS
GRID #1 VOLTAGE	-1.0	-1.0	-1.0	VOLTS
PLATE RESISTANCE (APPROX.)	0.15	0.15	0.15	MEGOHM
TRANSCONDUCTANCE	8000	8000	8000	<i>µ</i> мно
PLATE CURRENT	10	10	10	MA.
GRID #2 CURRENT	0.95	0.95	0.95	MA.
GRID #1 VOLTAGE FOR GM LESS				
THAN 100 μΜΗΟ	-6	-6	-6	VOLTS

DESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCREDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND INFOUGHOUT LIFE NO DESIGN-MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.

DOUBLE-TRIODE



OUTLINE DRAWING JEDEC 9-5

COATED UNIPOTENTIAL CATHODE

HEATER 6.3 VOLTS 1.05 AMP. AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

BASING DIAGRAM JEDEC 8BD

THE 6EA7 IS A DISSIMILAR DOUBLE-TRIODE DESIGNED FOR USE AS A COMBINED VERTICAL DEFLECTION OSCILLATOR AND AMPLIFIER IN TELEVISION RECEIVERS. SECTION ONE, A HIGH-MU TRIODE, IS INTENDED FOR SERVICE AS AN OSCILLATOR; SECTION TWO, A LOW-MU, HIGH PERVEANCE TRIODE, IS INTENDED FOR SERVICE AS AN AMPLIFIER.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

	SECTION 1	SECTION 2	
GRID TO PLATE	4.0	8.0	$\mu\mu f$
INPUT	2.2	6.0	uu f
OUTPUT	0.6	1.3	μμ f

RATINGS INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

	VERTICAL A OSCILLATOR SERVICE (SECTION 1)	VERTICAL A DEFLECTION AMPLIFIER (SECTION 2)	
HEATER VOLTAGE	6.3	6.3	VOLTS
MAXIMUM ALLOWABLE HEATER VOLTAGE	5.7 to	6.9	VOLTS
MAXIMUM DC PLATE VOLTAGE	350	550	VOLTS
MAXIMUM PEAK POSITIVE PULSE PLATE VOLTAGE		1500	VOLTS
MAXIMUM PEAK NEGATIVE GRID VOLTAGE	400	250	VOLTS
MAXIMUM PLATE DISSIPATION	1.0	10 ^B	WATTS
MAXIMUM DC CATHODE CURRENT		50	MA.
MAXIMUM PEAK CATHODE CURRENT MAXIMUM HEATER—CATHODE VOLTAGE:		175	MA.
HEATER POSITIVE WITH RESPECT TO CATHODE			
DC COMPONENT	100	100	VOLTS
TOTAL DC AND PEAK	200	200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE			
TOTAL DC AND PEAK MAXIMUM GRID CIRCUIT RESISTANCE:	200	200	VOLTS
WITH FIXED BIAS	1.0	1.0	MEGOHMS
WITH CATHODE BIAS	2.2	2.2	MEGOHMS

TUNG-SOL -

CONTINUED FROM PRECEEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

AVERAGE CHARACTERISTICS -

	SECTION 1 (OSCILLATOR)	SECTI (AMPLI		
PLATE VOLTAGE	250	60	175	VOLTS
AMPLIFICATION FACTOR	-3.0 66		-25 5.5	VOLTS
PLATE RESISTANCE (APPROX.) TRANSCONDUCTANCE	30 000 2 200		6 000	OHMS µMHOS
GRID VOLTAGE (APPROX.)	2.0	100	40	MA.
I _b = 20 μAMPS. GRID VOLTAGE (APPROX.)	5.3			VOLTS
$I_b = 200 \mu AMPS.$			-45	VOLTS

DESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND INFOURDED THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT CONFORM VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.

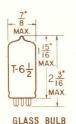
-- INDICATES A CHANGE.

A FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE.

BIN STAGES OPERATING WITH GRID-LEAK BIAS, AN ADEQUATE CATHODE-BIAS RESISTOR OF OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

CAPPLIED FOR SHORT INTERVAL (TWO SECONDS MAXIMUM) SO AS NOT TO DAMAGE TUBE.

TRIODE PENTODE MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE HEATER

6.3 VOLTS 0.45±6% AMP. AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

SMALL BUTTON 9 PIN BASE 9AE

THE 6EA8 IS A SHARP CUTOFF PENTODE AND A TRIODE IN THE 9-PIN MINIATURE CONSTRUCTION. EACH SECTION HAS ITS OWN CATHODE AND IS ELECTRICALLY INDEPENDENT. THE TUBE IS INTENDED PRIMARILY FOR USE AS A COMBINED TRIODE OSCILLATOR AND PENTODE MIXER IN TELEVISION RECEIVERS. THERMAL CHARACTER-ISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED. EXCEPT FOR HEATER RATINGS, THE 6EA8 IS IDENTICAL TO THE 5EA8.

DIRECT INTERELECTRODE CAPACITANCES -

	WITH ^A SHIELD	WITHOUT	
PENTODE SECTION:			
GRID #1 TO PLATE: (Pg1 TO Pp) (MAX.)	0.01	0.02	uu f
INPUT: Pg1 TO (H+Pk+Pg2+Pg3+1.S.)	5.0	5.0	μμf
OUTPUT: Pp TO (H+Pk+Pg2+Pg3+1.S.)	3.4	2.6	μμf
HEATER TO CATHODE: (Pk TO h)	3.0 ^B	3.0	μμ f
TRIODE SECTION:			
GRID TO PLATE: (Tg TO Tp)	1.7	1.7	μμf
INPUT: Tg TO (Tk+H+Pk+Pg3+1.S.)	3.2	3.0	μμε
OUTPUT: TP TO (Tk+H+Pk+Pg3+1.S.)	1.9	1.4	μμf
HEATER TO CATHODE: (Tk TO H)	3.0 ⁸	3.0	μμf

RATINGS

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

	PENTODE	TRIODE	
HEATER VOLTAGE	6.3	6.3	VOLTS
MAXIMUM PLATE VOLTAGE	330	330	VOLTS
MAXIMUM SCREEN SUPPLY VOLTAGE	330		VOLTS
MAXIMUM SCREEN VOLTAGE			
MAXIMUM POSITIVE DC GRID #1 VOLTAGE	0	0	VOLTS
MAXIMUM PLATE DISSIPATION	3.1	3.0	WATTS
MAXIMUM SCREEN DISSIPATION	0.55		WATTS

→ INDICATES A CHANGE.

CONTINUED FROM PRECEDING PAGE

RATINGS - CONT'D. INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

MAXIMUM HEATER-CATHODE VOLTAGE:	PENTODE SECTION	TRIODE	
HEATER POSITIVE WITH RESPECT TO CATHODE			
DC COMPONENT	100	100	VOLTS
TOTAL DC AND PEAK	200	200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE			
TOTAL DC AND PEAK	200	200	VOLTS
HEATER WARM-UP TIME*	11	.0	SECONDS

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

AVERAGE CHARACTERISTICS

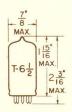
	PENTODE SECTION	TRIODE	
HEATER VOLTAGE	6.3	6.3	VOLTS
HEATER CURRENT	0.45	0.45	AMP.
PLATE VOLTAGE	125	150	VOLTS
SCREEN VOLTAGE	125		VOLTS
GRID #1 VOLTAGE	-1.0		
CATHODE-BIAS RESISTOR		56	OHMS
AMPLIFICATION FACTOR		40	
PLATE RESISTANCE (APPROX.)	80 000	5 000	OHMS
TRANSCONDUCTANCE	6 400	8 500	MAMPS
PLATE CURRENT	12	18	MA.
SCREEN CURRENT	4.0		MA.
GRID #1 VOLTAGE (APPROX.)			
$I_b = 10 \mu AMPS.$	-9	-12	VOLTS

Awith external shield 315 connected to cathode of section under test unless otherwise indicated.

Bwith external shield 315 connected to ground.

^{*}HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

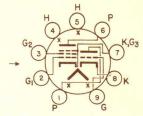
TRIODE PENTODE



GLASS BULB SMALL BUTTON 9 PHN BASE E9-1 OUTLINE DRAWING JEDEC 6-2 COATED UNIPOTENTIAL CATHODE

HEATER
6.3 VOLTS 0.45±6% AMP.
AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

BASING DIAGRAM
JEDEC 9AE

THE 6EA8 IS A SHARP CUTOFF PENTODE AND A TRIODE IN THE 9-PIN MINIATURE CONSTRUCTION. EACH SECTION HAS ITS OWN CATHODE AND IS ELECTRICALLY INDEPENDENT. THE TUBE IS INTENDED PRIMARILY FOR USE AS A COMBINED TRIODE OSCILLATOR AND PENTODE MIXER IN TELEVISION RECEIVERS. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED. EXCEPT FOR HEATER RATINGS, THE 6EA8 IS IDENTICAL TO THE 5EA8.

DIRECT INTERELECTRODE CAPACITANCES

	WITH ^A SHIELD	WITHOUT	
PENTODE SECTION:			
GRID #1 TO PLATE: (Pg1 TO Pp) (MAX.)	0.01	0.02	pf
INPUT: Pg1 TO (H+Pk+Pg2+Pg3+1.S.)	5.0	5.0	pf
OUTPUT: Pp TO (H+Pk+Pg2+Pg3+1.S.)	3.4	2.6	pf
HEATER TO CATHODE: (Pk TO h)	3.0 ^B	3.0	pf
TRIODE SECTION:			
GRID TO PLATE: (Tg TO Tp)	1.7	1.7	pf
INPUT: Tg TO (Tk+H+Pk+Pg3+1.S.)	3.2	3.0	pf
OUTPUT: Tp TO (Tk+H+Pk+Pg3+1.S.)	1.9	1.4	pf
HEATER TO CATHODE: (Tk TO H)	3.0 ^B	3.0	pf

RATINGS INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

	PENTODE SECTION	SECTION	
HEATER VOLTAGE	6.3	6.3	VOLTS
MAXIMUM PLATE VOLTAGE	330	330	VOLTS
MAXIMUM SCREEN SUPPLY VOLTAGE	330		VOLTS
MAXIMUM SCREEN VOLTAGE			
MAXIMUM POSITIVE DC GRID #1 VOLTAGE	0	0	VOLTS
MAXIMUM PLATE DISSIPATION	3.1	2.5	WATTS
MAXIMUM SCREEN DISSIPATION	0.55		WATTS

- INDICATES A CHANGE.

TUNG-SOL .

CONTINUED FROM PRECEDING PAGE

RATINGS - CONT D. INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

MAXIMUM HEATER-CATHODE VOLTAGE:	PENTODE	TRIODE	
HEATER POSITIVE WITH RESPECT TO CATHODE			
DC COMPONENT	100	100	VOLTS
TOTAL DC AND PEAK	200	200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE			
TOTAL DC AND PEAK	200	200	VOLTS
HEATER WARM-UP TIME*	11	.0	SECONDS

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

AVERAGE CHARACTERISTICS

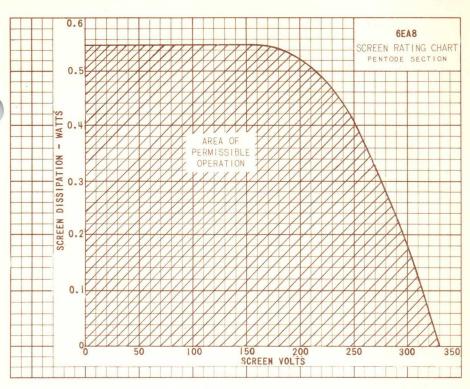
	PENTODE SECTION	TRIODE	
PLATE VOLTAGE	125	150	VOLTS
SCREEN VOLTAGE	125		VOLTS
GRID #1 VOLTAGE	-1.0		
CATHODE-BIAS RESISTOR		56	OHMS
AMPLIFICATION FACTOR		40	
PLATE RESISTANCE (APPROX.)	200 000	5 000	OHMS
TRANSCONDUCTANCE	6 400	8 500	HAMPS
PLATE CURRENT	12	18	MA.
SCREEN CURRENT	4.0		MA.
GRID #1 VOLTAGE (APPROX.)			
$I_b = 10 \mu AMPS.$	-9	-12	VOLTS

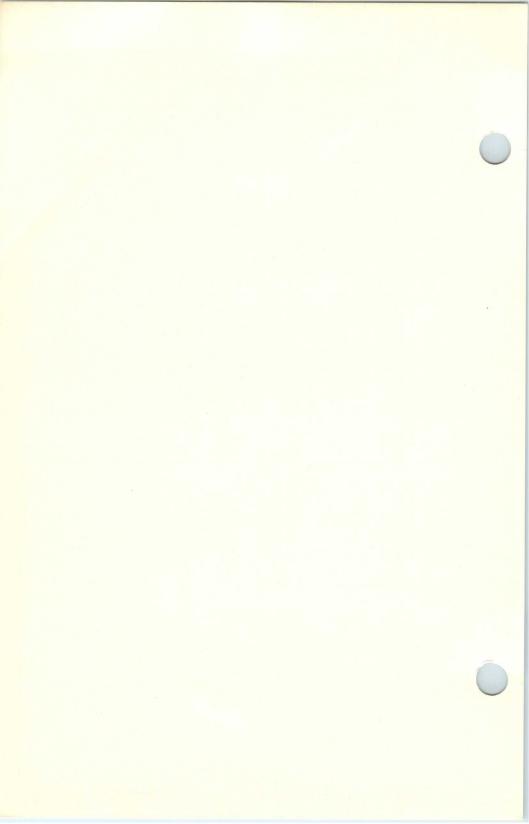
Awith external shield 315 connected to cathode of section under test unless otherwise indicated.

- INDICATES A CHANGE.

BWITH EXTERNAL SHIELD 315 CONNECTED TO GROUND.

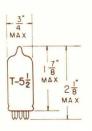
^{*}HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUDE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.





DOUBLE DIODE

MINIATURE TYPE



GLASS BULB

DC

TOTAL DC AND PEAK

COATED UNIPOTENTIAL CATHODE

HEATER

6.3±10% VOLTS 0.30 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

SMALL BUTTON MINIATURE
7 PIN BASE

6BT

WITHOUT

SHIELD

100

200

VOLTS

VOLTS

WITHA

SHIELD

THE 6EB5 IS A DOUBLE DIODE IN THE 7 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED FOR LOW CURRENT AND HIGH PEAK INVERSE VOLTAGE IN VOLTAGE DOUBLER APPLICATIONS.

DIRECT INTERELECTRODE CAPACITANCES

PLATE INPUT: P TO (K+H+I.S.)	2.4	1.7	$\mu\mu d$
CATHODE INPUT: K TO (P+H+I.S.) EACH UNIT	2.8	2.6	$\mu\mu f$
COUPLING: PLATE TO PLATE (1P TO 2P) (MAX.)	0.04	0.10	μμf
RATINGS	В		
INTERPRETED ACCORDING TO DESIGN MAXIM			
HEATER VOLTAGE		6.3±10%	VOLTS
MAXIMUM PEAK INVERSE PLATE VOLTAGE		550	VOLTS
MAXIMUM STEADY STATE PEAK PLATE CURRENT		40	MA.
MAXIMUM DC OUTPUT CURRENT, EACH PLATE		5.5	MA.
MAXIMUM HEATER-CATHODE VOLTAGE:			
HEATER NEGATIVE WITH RESPECT TO CATHODE			
DC		200	VOLTS
TOTAL DC AND PEAK		330	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE			

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

HEATER VOLTAGE	6.3±10%	VOLTS
HEATER CURRENT	0.30	AMP.
DIODE VOLTAGE DROP WITH DIODE CONDUCTING 11 MA.		
EACH PLATE (APPROX.)	10	VOLTS

TUNG-SOL -

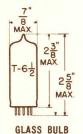
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NOTES

- A. WITH EXTERNAL SHIELD #316 CONNECTED TO PIN 6.
- B. DESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACEPTABLE SERVICEABILITY OF THE DEVICE TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANCES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT LIFE NO DESIGN-MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.

TRIODE PENTODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER 6.3 VOLTS 0.75 AMP. AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW MINIATURE BUTTON 9 PIN BASE 90X

THE 6EB8 IS A HIGH-MU TRIODE AND SHARP CUTOFF PENTODE IN THE 9 PIN-MINIATURE CONSTRUCTION. THE TRIODE SECTION IS DESIGNED FOR USE AS A VOLTAGE AMPLIFIER WHILE THE PENTODE SECTION HAS A CONTROLLED PLATE KNEE CHARACTERISTIC AND IS DESIGNED FOR USE AS A VIDEO AMPLIFIER.

DIRECT INTERELECTRODE CAPACITANCES WITHOUT EXTERNAL SHIELD

IRIODE SECTION:		
GRID TO PLATE	4.4	µµ f
INPUT: G TO (H + K)	2.4	μμ f
OUTPUT: P TO(H + K)	0.36	μμ f
PENTODE SECTION:		
GRID #1 TO PLATE (MAX.)	0.1	µµ f
INPUT: G4 TO (H+K+G2+G3+1.S.)	11	μμf
OUTPUT: P TO $(H+K+G_2^2+G_3^2+1.S.)$	4.2	μμ f
COUPLING:		
TRIODE GRID TO PENTODE PLATE (MAX.)	.018	μμf
PENTODE GRID #1 TO TRIODE PLATE (MAX.)	.005	μμ f
PENTODE PLATE TO TRIODE PLATE (MAX.)	0.17	µµ f

RATINGS INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM^A

	TRIODE	PENTODE	
HEATER VOLTAGE	6.3	6.3	VOLTS
MAXIMUM PLATE VOLTAGE	330	330	VOLTS
MAXIMUM GRID #2 SUPPLY VOLTAGE		330	VOLTS
MAXIMUM GRID #2 VOLTAGE			
MAXIMUM POSITIVE GRID #1 VOLTAGE	0	0	VOLTS
MAXIMUM PLATE DISSIPATION	1.0	5.0	WATTS
MAXIMUM GRID #2 DISSIPATION		1.1	WATTS

TUNG-SOL -

CONTINUED FROM PRECEDING PAGE

RATINGS - CONT'D. INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

MAXIMUM HEATER-CATHODE VOLTAGE:			
HEATER NEGATIVE WITH RESPECT TO CATHODE			
TOTAL DC AND PEAK	2	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE			
DC	1	.00	VOLTS
TOTAL DC AND PEAK	2	200	VOLTS
MAXIMUM GRID #4 CIRCUIT RESISTANCE			
FIXED BIAS	0.5	0.25	MEGOHM
CATHODE BIAS	1.0	1.0	MEGOHM

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

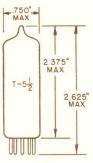
	TRIODE	PENTODE SECTION
HEATER VOLTAGE	6.3	6.3 VOLTS
HEATER CURRENT	0.75	0.75 AMP.
PLATE VOLTAGE	250	200 VOLTS
GRID #2 VOLTAGE		125 VOLTS
GRID #1 VOLTAGE	-2	VOLTS
CATHODE BIAS RESISTOR		68 OHMS
PLATE CURRENT	2	25 MA.
GRID #2 CURRENT		7 MA.
TRANSCONDUCTANCE	2 7.00	12 500 µмноs
AMPL BEICATION FACTOR	100	
PLATE RESISTANCE (APPROX.)	37 000	75 000 OHMS
GRID #1 VOLTAGE FOR Ib= 100 HA (APPROX.)		-9 VOLTS
GRID #1 VOLTAGE FOR Ib= 20 A (APPROX.)	-5	

PLATE KNEE CHARACTERISTICS - INSTANTANEOUS VALUES

Eb = 45 VOLTS, Ec2 = 125 VOLTS AND Ec1 = O VOLTS		
PLATE CURRENT	40	MA.
GRID #2 CURRENT	15	MA .

DESIGN-MAXIMUM RATINGS ARELIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING RONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT HE NO DESIGN—MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT CONFORM TY VARIATION, EQUIPMENT CONFORM TY VARIATION, EQUIPMENT CONFORM TY VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.

PENTODE MINIATURE TYPE

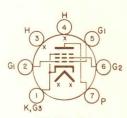


GLASS BULB SMALL-BUTTON MINIATURE 7 PIN BASE E7-1 OUTLINE DRAWING JEDEC 5-3

FOR USE IN AUDIO OUTPUT STAGES OF RADIO AND TV RECEIVERS AND PHONOGRAPHS

UNIPOTENTIAL CATHODE

ANY MOUNTING POSITION



BOTTOM VIEW BASING DIAGRAM JEDEC 7CV

THE 6EH5 IS A POWER PENTODE IN THE 7 PIN MINIATURE CONSTRUCTION, IT HAS BEEN SPECIFI-CALLY DESIGNED FOR USE IN THE AUDIO OUTPUT STAGE OF RADIO AND TELEVISION RECEIVERS AND PHONOGRAPHS. EXCEPT FOR HEATER CHARACTERISTICS AND RATINGS, IT IS IDENTICAL TO THE 12EH5, 25EH5 AND THE 50EH5.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

WITHOUT EXTERNAL SHIELD

GRID 1 TO PLATE	0.65	pf
GRID 1 TO CATHODE & GRID 3, HEATER & GRID 2	17	pf
PLATE TO CATHODE & GRID 3, HEATER & GRID 2	9	pf

HEATER CHARACTERISTICS AND RATINGS DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3	VOLTS	1200	MA.
HEATER SUPPLY LIMITS: VOLTAGE OPERATION			6.3 ± 0.6	VOLTS
MAXIMUM PEAK HEATER-CATHODE HEATER NEGATIVE WITH RESPE	ECT TO CATHODE		200 200 B	VOLTS VOLTS

THE DC COMPONENT MUST NOT EXCEED 100 VOLTS.

- TUNG-SOL -

MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AMPLIFIER

PLATE VOLTAGE	→ 150	VOLTS
GRID 2 (SCREEN-GRID) VOLTAGE	→ 130	VOLTS
PLATE DISSIPATION	→ 5.5	WATTS
GRIÐ 2 INPUT	→ 2	WATTS
BULB TEMPERATURE (AT HOTTEST POINT ON BULB SURFACE) GRID 1 CIRCUIT RESISTANCE:	220	°C
FOR FIXED-BIAS OPERATION	0.1	MEGOHM
FOR CATHODE-BIAS OPERATION	0.5	
FOR CATHODE-BIAS OPERATION	0.5	MEGOHM

TYPICAL OPERATING CHARACTERISTICS

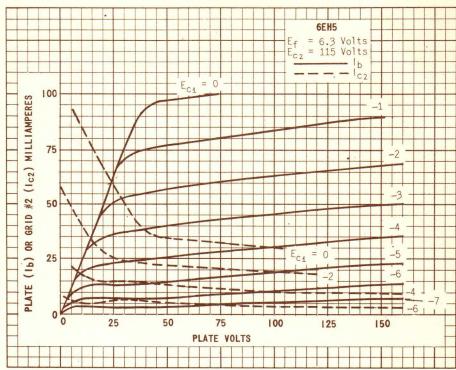
CLASS A1 AMPLIFIER

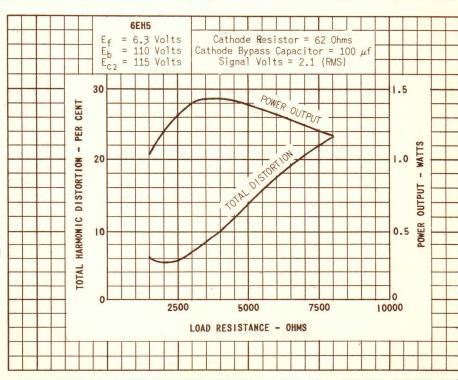
PLATE SUPPLY VOLTAGE	110	VOLTS
GRID 2 SUPPLY VOLTAGE	1-15	VOLTS
CATHODE RESISTOR	62	OHMS
PEAK AF GRID 1 VOLTAGE	3	VOLTS
ZERO-SIGNAL PLATE CURRENT	42	MA.
SIGNAL PLATE CURRENT (MAX.)	42	MA.
ZERO-SIGNAL GRID 2 CURRENT	11.5	MA.
SIGNAL GRID 2 CURRENT (MAX.)	14.5	MA.
TRANSCONDUCTANCE	14,600	μMHOS.
PLATE RESISTANCE (APPROX.)	11,000	OHMS
LOAD RESISTANCE	3,000	OHMS
TOTAL HARMONIC DISTORTION	7	PERCENT
SIGNAL POWER OUTPUT (MAX.)	1.4	WATTS

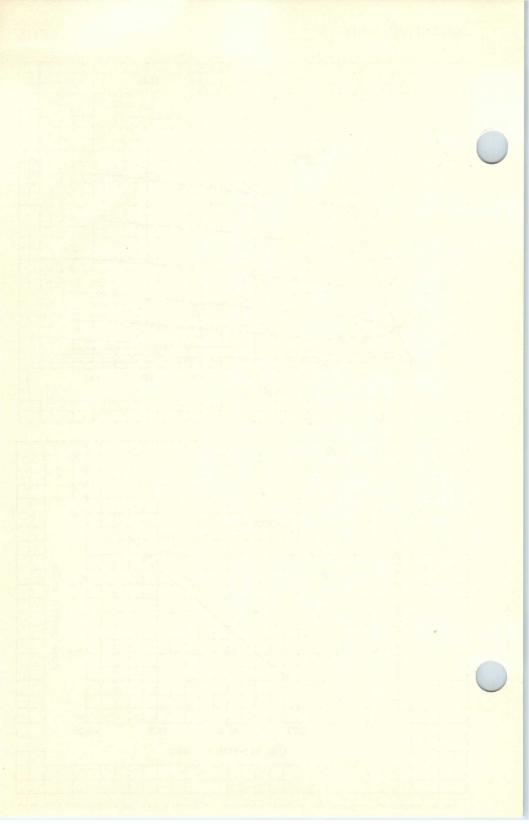
PUSH-PULL AF POWER AMPLIFIER - CLASS AB1 VALUES ARE FOR TWO TUBES

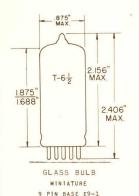
PLATE SUPPLY VOLTAGE	140	VOLTS
GRID 2 SUPPLY VOLTAGE	120	VOLTS
CATHODE RESISTOR	68	OHMS
PEAK AF GRID 1 TO GRID 1 VOLTAGE	9.4	VOLTS
ZERO-SIGNAL PLATE CURRENT	47	MA.
MAX. SIGNAL PLATE CURRENT	51	MA.
ZERO-SIGNAL GRID 2 CURRENT	11	MA.
MAXSIGNAL GRID 2 CURRENT	17.7	MA.
EFFECTIVE LOAD RESISTANCE (PLATE TO PLATE)	6000	OHMS
TO TAL HARMONIC DISTORTION	5	PERCENT
MAXSIGNAL POWER OUTPUT	3.8	WATTS.

→ INDICATES A CHANGE.



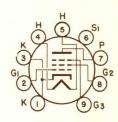






UNIPOTENTIAL CATHODE

HIGH GM, SMALL SIGNAL RF & IF AMPLIFIER WITH GAIN CONTROL



BOTTOM VIEW BASING DIAGRAM JEDEC 9AQ

THE 6EH7 IS A REMOTE-CUTOFF PENTODE IN THE 9 PIN MINIATURE CONSTRUCTION. IT FEATURES VERY HIGH GM WITH A REMOTE CUTOFF AND IS DESIGNED FOR FRE-QUENCIES INTO THE VHF RANGE. ITS CHIEF APPLICATION IS IN THE IF AMPLIFIER STAGES OF TELEVISION RECEIVERS.

DIRECT INTERELECTRODE CAPACITANCES WITHOUT EXTERNAL SHIELD

GRID #1 TO PLATE: (G1 TO P) MAX.	0.0055	pf
INPUT: G1 TO (H+G2+G3+K+IS)	9.5	pf
OUTPUT: P TO (H+G2+G3+K+1S)	2.8	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS 6.3 VOLTS	300	MA
HEATER SUPPLY LIMITS:		
VOLTAGE OPERATION	6.3±0.6	VOLTS
CURRENT OPERATION	300±20	MA.
MAXIMUM HEATER-CATHODE VOLTAGE	165	VOLTS

MAXIMUM RATINGS

DESING CENTER VALUES - SEE EIA STANDARD RS-239

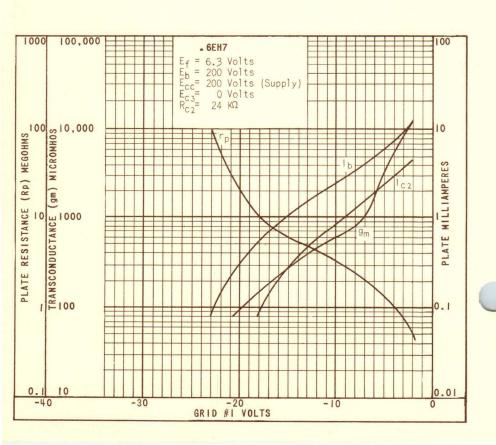
PLATE VOLTAGE	250	VOLTS
PLATE DISSIPATION	2.5	WATTS
GRID #2 VOLTAGE	250	VOLTS
GRID #2 DISSIPATION	0.65	WATTS
CATHODE CURRENT	20	MA
GRID #1 CIRCUIT RESISTANCE	1	MEGOHM

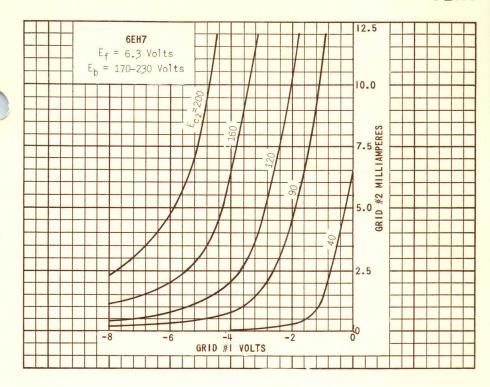
TUNG-SOL -

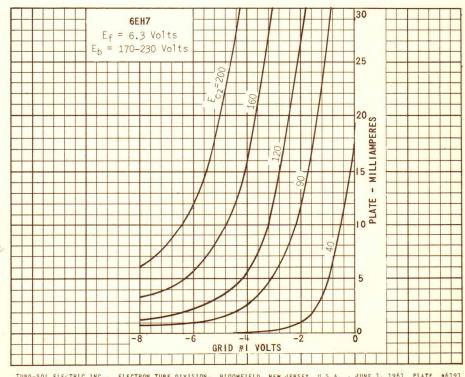
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TYPICAL OPERATING CHARACTERISTICS

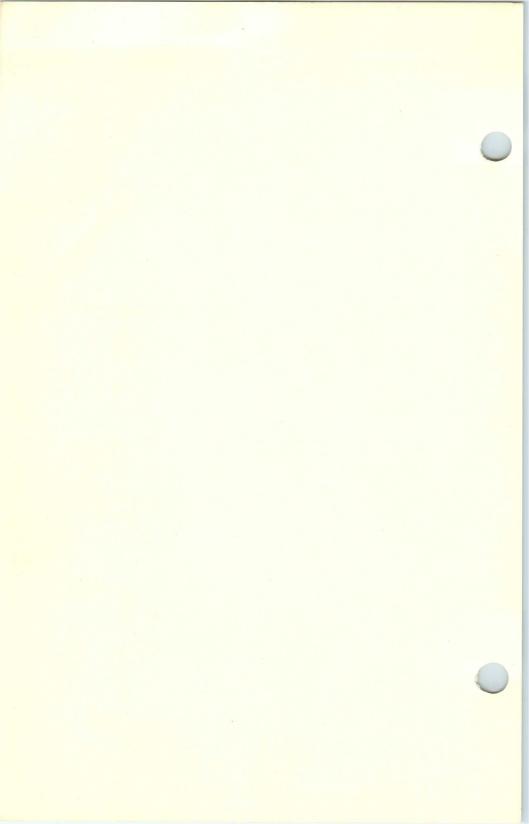
PLATE VOLTAGE	200	200	VOLTS
GRID #3 VOLTAGE	0	0	VOLTS
GRID #2 VOLTAGE (SUPPLY)	90	200	VOLTS
GRID #2 SERIES RESISTOR	0	24	KILOHMS
GRID #1 VOLTAGE	-2	-2	VOLTS
PLATE CURRENT	12		MA.
GRID #2 CURRENT	4.5		MA.
TRANSCONDUCTANCE	12500	12500	μMHOS
PLATE RESISTANCE	0.5		MEGOHMS
GRID #1 IMPEDANCE AT 40 MC	13		KILOHMS
GRID #1 CUTOFF: Ec1 =-6.5		1250	MMHOS
Ec1 =-9.5		625	MMHOS
Ec1=-19.5		125	имноs
GRID #1 VOLTAGE FOR A CROSS-MODULATION			
FACTOR OF 1%:			
Ec1 =-6.5		100	MV.
Ec1 =-9.5		160	MV.
Ec1=-19.5		450	MV.







PRINTED IN U. S. A.



T-6½ 1.938" MAX 2.188" MAX

GLASS BULB
MINIATURE BUTTON
9 PIN BASE E9-1
OUTLINE DRAWING
JEDEC 6-2

TRIODE PENTODE MINIATURE TYPE

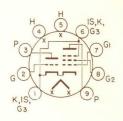
COATED UNIPOTENTIAL CATHODE

HEATER

6.3 VOLTS 450 MA.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
BASING DIAGRAM
JEDEC 9JG

THE 6EH8 IS A MEDIUM MU-TRIODE AND A SHARP CUTOFF PENTODE IN THE 9-PIN MINIATURE CONSTRUCTION. IT IS INTENDED PRIMARILY FOR USE AS A COMBINED VHF OSCILLATOR AND MIXER. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT THE HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH CTHER TYPES WHICH ARE SIMILARLY CONTROLLED.

DIRECT INTERELECTRODE CAPACITANCES

TRIODE:*	SHIELD #315	WITHOUT	
GRID TO PLATE	1.8	18	pf
INPUT: G TO (H+K+PK+PG3+1.S.)	2.8	2.8	pf
OUTPUT: P TO (H+K+PK+PG3+1.S.)	2.2	1.7	pf
PENTODE:*			
GRID #1 TO PLATE (MAX.)	.012	.020	pf
INPUT: G_4 TO $(H^+K^+G_2^+G_3^+TK^+I.S.)$	4.8	4.8	pf
OUTPUT: P TO (H+K+G2+G3+TK+1.5.)	3.2	2.4	pf
CATHODE TO HEATER: H TO (TK+PK+PG+PG3+1.8)	8.5	8.5	pf

RATINGS INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

	TRIODE SECTION	PENTODE	
MAXIMUM PLATE VOLTAGE	300	300	VOLTS
MAXIMUM GRID #2 SUPPLY VOLTAGE		300	VOLTS
MAXIMUM GRID #2 VOLTAGE			
MAXIMUM PLATE DISSIPATION	2.5	2.8	WATTS
MAXIMUM GRID #2 DISSIPATION		0.5	WATT

*INDICATES AN ADDITION.

TUNG-SOL .

CONTINUED FROM PRECEDING PAGE

RATINGS - CONT'D. INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM A

	TRIODE	PENTODE SECTION	
MAXIMUM POSITIVE GRID #1 VOLTAGE	0	0	VOLTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE:			
WITH FIXED BIAS	0.5	0.25	MEGOHM
WITH SELF BIAS	1.0	1.0	MEGOHM
MAXIMUM HEATER-CATHODE VOLTAGE:			
HEATER NEGATIVE WITH RESPECT TO CATHODE			
TOTAL DC AND PEAK	200	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE			
DC -	100	100	VOLTS
TOTAL DC AND PEAK	200	200	VOLTS
HEATER WARM-UP TIME*	11.	0	SECONDS

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

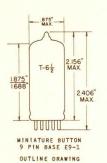
CLASS A1 AMPLIFIER

	TRIODE		TODE	
PLATE VOLTAGE	125	100	125	VOLTS
GRID #2 VOLTAGE		70	125	VOLTS
GRID #1 VOLTAGE	-1.0	0	-1.0	VOLTS
PLATE CURRENT	13.5		12	MA.
GRID #2 CURRENT			4.0	MA.
TRANSCONDUCTANCE	7500	6500	6000	µмноs
AMPLIFICATION FACTOR	40			
PLATE RESISTANCE (APPROX.)			0.17	MEGOHM
GRID #1 VOLTAGE FOR Ib= 20 HA (APPROX.)	-9		-10	VOLTS

ADESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT LIFE NO DESIGN-MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.

^{**}HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE

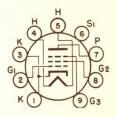
SHARP CUTOFF PENTODE



SPECIAL GLASS BULB COATED UNIPOTENTIAL CATHODE

FOR IF CIRCUITS IN TV RECEIVERS

ANY MOUNTING POSITION



BASING DIAGRAM
JEDEC 9AQ

WAIN MCTTOR

THE 6EJ7 IS A HIGH TRANSCONDUCTANCE SHARP-CUTOFF PENTODE IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED FOR SERVICE AS AN IF AMPLIFIER IN TELEVISION RECEIVERS.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

GRID #1 TO PLATE (MAX.)	.005	pf
INPUT: G1 TO (H+K+G2+G3+1.S.)	10	pf
OUTPUT: P TO (H+K+G2+G3+1.S.)	3	pf

HEATER CHARACTERISTICS AND RATINGS DESIGN CENTER VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS	300	MA.
HEATER SUPPLY LIMITS: VOLTAGE OPERATION		6.3±0.6	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE: HEATER NEGATIVE WITH RESPECT TO CAT	HODE		
TOTAL DC AND PEAK	HODE	150	VOLTS
HEATER POSITIVE WITH RESPECT TO CAT	HODE	150	VOLTS

MAXIMUM RATINGS

DESIGN CENTER VALUES - SEE EIA STANDARD RS-239 B

PLATE VOLTAGE WJTH Tb = O MA.	550	VOLTS
PLATE VOLTAGE	250	VOLTS
GRID #2 VOLTAGE WITH IC2 = O MA	550	VOLTS
GRID #2 VOLTAGE	250	VOLTS
PLATE DISSIPATION	2.5	WATTS
GRID #2 DISSIPATION	0.9	WATTS
CATHODE CURRENT	25	MA.
GRID #1 CIRCUIT RESISTANCE	1.0	MEGPHM

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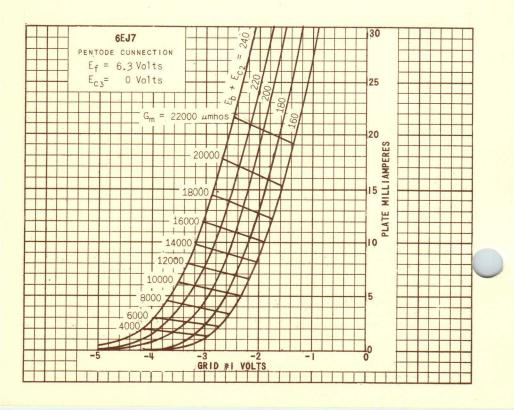
TYPICAL OPERATING CHARACTERISTICS

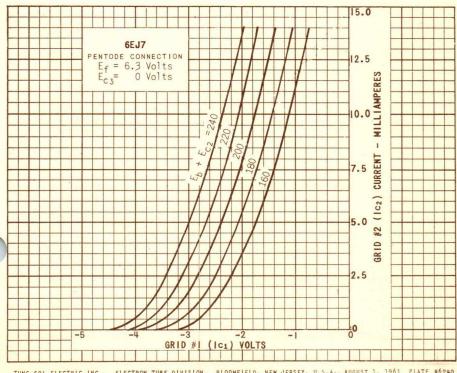
CLASS A7 AMPLIFIER

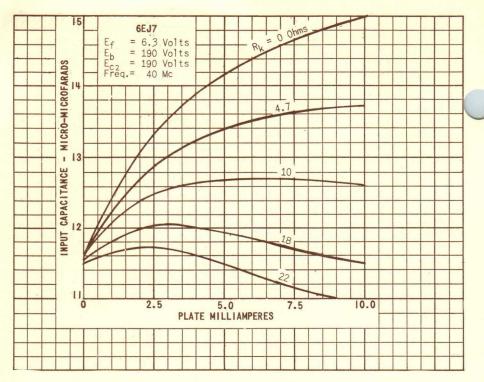
PLATE VOLTAGE	200	VOLTS
GRID #3 VOLTAGE	0	VOLTS
GRID #2 VOLTAGE	200	VOLTS
GRID #1 VOLTAGE	-2.5	VOLTS
PLATE CURRENT	10	MA.
GRID #2 CURRENT	4.1	MA.
TRANSCONDUCTANCE	15000	MHOS
AMPLIFICATION FACTOR (G2 TO G1)	60	
PLATE RESISTANCE (APRROX)	0.35	MEGOHM
GRID #1 IMPEDANCE AT 40 MC	30000	OHMS ^C
TRANSCONDUCTANCE AMPLIFICATION FACTOR (G2 TO G1) PLATE RESISTANCE (APRROX)	15000 60 0.35	µмноѕ

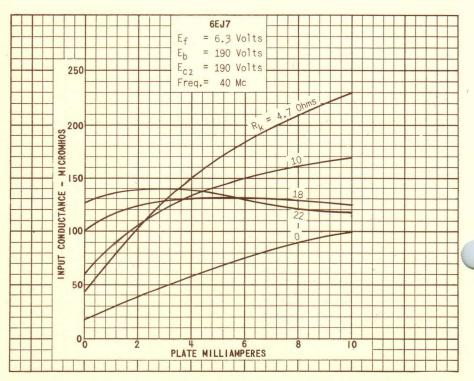
BFOR PARALLEL OPERATION OF HEATERS, EQUIPMENT SHOULD BE DESIGNED THAT AT NORMAL SUPPLY VOLTAGE BOGEY TUBES WILL OPERATE AT THIS VALUE OF HEATER VOLTAGE.

CINPUT DAMPING OF TUBE AND TYPICAL CERAMIC SOCKET WITH BOTH CATHODE LEADS TIED DIRECTLY TO GROUND IS ABOUT 10,000 OHMS.

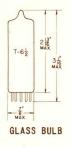








PENTODE MINIATURE TYPE



UNIPOTENTIAL CATHODE

HEATER

6.3 VOLTS 0.8 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
SMALL—BUTTON NOVAL
9 PIN BASE
9 HN

VOLTS

VOLTS

THE 6EM5 IS A BEAM POWER PENTODE IN THE 9 PIN MINIATURE CONSTRUCTION AND IS INTENDED FOR USE AS THE VERTICAL DEFLECTION AMPLIFIER IN HIGH-EFFICIENCY DEFLECTION CIRCUITS OF TV RECEIVERS WHICH USE PICTURE TUBES WITH A 110° DIAGONAL DEFLECTION ANGLE. WITH THE EXCEPTION OF HEATER RATINGS AND HEATER WARM-UP TIME, THE 6EM5 IS IDENTICAL TO THE 8EM5.

DIRECT INTERELECTRODE CAPACITANCES WITHOUT EXTERNAL SHIELD

GRID #1 TO PLATE		0.7	μμ f
GRID #1 TO CATHODE & G3, G2,	AND HEATER	10	μμf
PLATE TO CATHODE & G3, G2, AN	D HEATER	5.1	μμf

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM VERTICAL DEFLECTION AMPLIFIER

HEATER VOLTAGE

MAXIMUM PLATE VOLTAGE:

DC

PEAK POSITIVE PULSE (ABS. MAX.) B

AXIMUM GRID #2 VOLTAGE

285

AXIMUM PEAK NECOTIVE—PULSE CRID #4 VOLTAGE

PEAK POSITIVE PULSE (ABS. MAX.)	2 2000	VOLTS
MAXIMUM GRID #2 VOLTAGE	285	VOLTS
MAXIMUM PEAK NEGATIVE-PULSE GRID #1 VOLTAGE	-250	VOLTS
MAXIMUM CATHODE CURRENT:		
PEAK	210	MA.
AVERAGE	60	MA.
MAXIMUM PLATE DISSIPATION	10	WATTS
MAXIMUM GRID #2 INPUT	1.5	WATTS
MAXIMUM PEAK HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	200 ^D	VOLTS
MAXIMUM BULB TEMPERATURE (AT HOTTEST POINT)	250	°C
MAXIMUM CIRCUIT VALUES:		
GRID #1 CIRCUIT RESISTANCE:		
FOR FIXED-BIAS OPERATION	2.2	MEGOHMS
FOR CATHODE-BIAS OPERATION	2.2	MEGOHMS

CONTINUED FROM PRECEEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER

HEATER VOLTAGE	6.3	6.3	VOLTS
HEATER CURRENT	0.8	0.8	AMP.
PLATE VOLTAGE	60	250	VOLTS
GRID #2 (SCREEN-GRID) VOLTAGE	250	250	VOLTS
GRID #1 (CONTROL-GRID) VOLTAGE	0	-18	VOLTS
MU-FACTOR, GRID #1 TO GRID #2		8.7	
TRANSCONDUCTANCE		5100	µмноs
PLATE CURRENT	180 ^E	40	MA.
GRID #2 CURRENT	30E	3	MA.
PLATE RESISTANCE (APPROX.)		50 000	OHMS
GRID #4 VOLTAGE FOR PLATE CURRENT O. 2 MA.		-37	

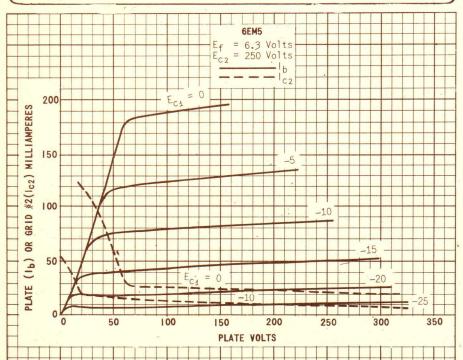
INDICATES AN ADDITION.

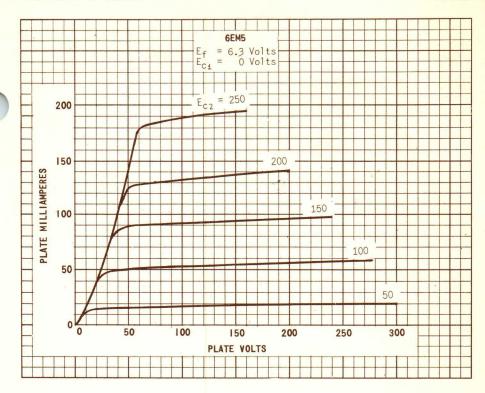
Bor operation in a 525-line, 30-frame system as described in "standards of good engineering practice for television broadcast stations: federal communications commission", the duty cycle of the voltage pulse must not exceed 15% of one scanning cycle.

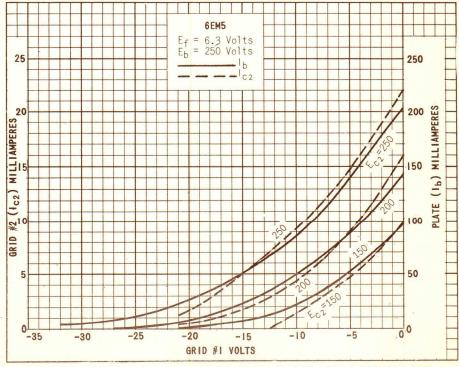
CUNDER NO CIRCUMSTANCES SHOULD THIS ABSOLUTE VALUE BE EXCEEDED.

DTHE DC COMPONENT MUST NOT EXCEED 100 VOLTS

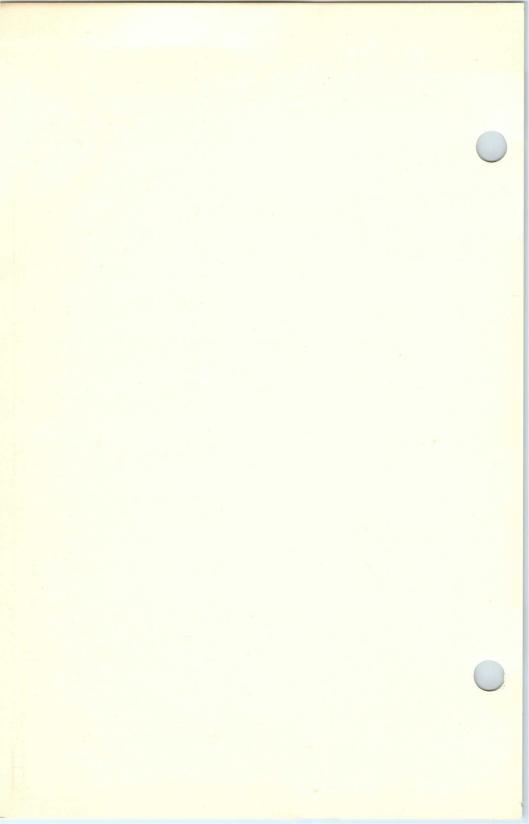
E_{THESE} VALUES CAN BE MEASURED BY A METHOD INVOLVING A RE-CURRENT WAVEFORM SUCH THAT THE PLATE DISSIPATION. AND GRID #2 INPUT WILL BE KEPT WITHIN RATINGS. IN ORDER TO PREVENT DAMAGE TO THE TUBE.







PRINTED IN U. S. A.



SHORT INTERMEDIATE SHELL 8 PIN OCTAL B8-58 OUTLINE DRAWING **JEDEC 9-37**

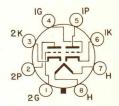
COATED UNIPOTENTIAL CATHODE

HEATER

6.3±0.6 VOLTS 925 MA.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW BASING DIAGRAM JEDEC 8BD

THE 6EM7 CONTAINS TWO DISSIMILAR TRIODES IN ONE ENVELOPE. SECTION 1 HAS A HIGH MU AND IS INTENDED FOR USE AS A VERTICAL DEFLECTION OSCILLATOR. SECTION 2 HAS A LOW MU AND IS DESIGNED FOR USE AS A VERTICAL DEFLECTION AMPLIFIER. EXCEPT FOR HEATER CHARAC-TERISTICS, THE 6EM7 IS IDENTICAL TO THE 13EM7.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

GRID TO PLATE INPUT: G TO (H+K) OUTPUT: P TO (H+K)

SEC.#1	SEC.#2	
4.8	10	pf
2.2	7.0	pf
0.6	1.8	pf

RATINGS

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM (EXCEPT AS NOTED)

VERTICAL DEFLECTION OSCILLATOR AND AMPLIFIERA

SEC.#1 D SEC.#2 D OSCILLATOR AMPLIFIER SEC.#1 D

MAXIMUM	DC PLATE VOLTAGE	330	330	VOLTS
MAXIMUM	PEAK POSITIVE PULSE PLATE VOLTAGE (ABS.MAX)	-	1500	VOLTS
	PEAK NEGATIVE PULSE GRID VOLTAGE	400	250	VOLTS
MAYIMUM	PLATE DISSIPATION ^C	1.5	10	WATTS
	AVERAGE CATHODE CURRENT	22	50	MA.
	PEAK CATHODE CURRENT	77	175	MA.
	GRID CIRCUIT RESISTANCE (SELF BIAS)	2.2	2.2	MEGOHMS

- INDICATES A CHANGE.

CONTINUED FROM PRECEDING PAGE

RATINGS - CONTID.

INTERPRETED ACCORDING TO DESING MAXIMUM SYSTEM

VERTICAL DEFLECTION OSCILLATOR AND AMPLIFIERA

MAXIMUM HEATER—CATHODE VOLTAGE:

HEATER NEGATIVE WITH RESPECT TO CATHODE

TOTAL DC AND PEAK

HEATER POSITIVE WITH RESPECT TO CATHODE

DC 100 VOLTS

TOTAL DC AND PEAK 200 VOLTS

AVERAGE CHARACTERISTICS

SEC. #1^D SEC. #2^D

PLATE VOLTAGE	250	150	VOLTS
GRID #1 VOLTAGE	-3	-20	VOLTS
PLATE CURRENT	1.4	50	MA.
TRANSCONDUCTANCE	1 600	7 200	µмноѕ
AMPLIFICATION FACTOR	64 🕶	5.4	
PLATE RESISTANCE (APPROX.)	40 000	750	OHMS
EC FOR Ib = 10 μ A (APPROX.)	-5.5		VOLTS
EC FOR Ib = 100µA (APPROX.)		-45	VOLTS
Ib AT Ec =-28 Vdc APPROX.		10	MA.

INSTANTANEOUS PLATE KNEE VALUES (SECTION #2)

Eb = 60 V; Ec =0

Ib = 95 MA.

A FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCASTING STATIONS; FEDERAL COMMUNICATIONS COMMISSION". THE DUTY CYCLE OF THE VOLTAGE PULSE NOT TO EXCEED 15 PERCENT OF A SCANNING CYCLE.

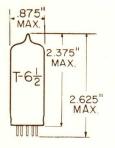
Bosign-maximum ratings are limiting values of operating and environmental conditions applicable to a bogey electron device of a specified type as defined by its published data, and should not be exceeded under the worst probable conditions. The delice ma upfacturer chooses these values to provide acceptable serviceability of the device, taking responsibility for the effects of changes in operating conditions due to variations in device characteristics. The eguliphent manufacturer should design so that initially and throughout lie no design-maximum value for the intended service is exceeded with a bogey device under the worst probable operating conditions with respect to supply-voltage variation, edulphent component variation, equiphent component variation, equiphent component variation,

C IN STAGES OPERATING WITH GRID-LEAK BIAS, AN ADEQUATE CATHODE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

DSECTION #1 CONNECTS TO PINS 4, 5 AND 6.

DIODE-REMOTE-CUTOFF PENTODE

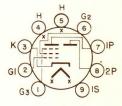
MINIATURE TYPE



UNIPOTENTIAL CATHODE

FOR AM AND AM/FM
BROADCAST RECEIVERS

ANY MOUNTING POSITION



BOTTOM VIEW

BASING DIAGRAM
JEDEC 9LQ

GLASS BULB SMALL BUTTON 9 PIN NOVAL E9-1

OUTLINE DRAWING JEDEC 6-3

THE 6EO7 IS A DIODE AND A REMOTE-CUTOFF PENTODE WITH A COMMON CATHODE OF THE 9 PIN MINIATURE TYPE ESPECIALLY DESIGNED FOR USE AS COMBINED IF-AMPLIFIER AND AM-DETECTOR TUBES IN AM AND AM/FM BROADCAST RECEIVERS. THE PENTODE UNIT MAY ALSO BE USED AS AN RF OR IF-AMPLIFIER TUBE; THE DIODE UNIT MAY BE USED FOR AUTOMATIC VOLUME CONTROL OR DETECTION.

DIRECT INTERELECTRODE CAPACITANCES WITHOUT EXTERNAL SHIELD

GRID #1 TO PLATE (MAX.)	.002	pf
GRID #1 TO K, H, G2, G3, & I.S.	5.5	pf
PLATE TO K, H, G2, G3, & 1.S.	5.0	pf
GRID #1 TO DIODE PLATE (MAX.)	0.0015	pf
PENTODE PLATE TO DIODE PLATE	.095	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS	300	MA.
HEATER SUPPLY LIMITS: VOLTAGE OPERATION		6.3±0.6	VOLTS
MAXIMUM PEAK HEATER CATHODE VOLTA HEATER NEGATIVE WITH RESPECT TO HEATER POSITIVE WITH RESPECT TO	CATHODE	200 200 ^A	VOLTS VOLTS

ATHE DC COMPONENT MUST NOT EXCEED 100 VOLTS.

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

CLASS A1 AMPLIFIER-PENTODE UNIT

PLATE VOLTAGE	300	VOLTS
GRID #3 VOLTAGE:		
POSITIVE VALUE	300	VOLTS
NEGATIVE VALUE	300	VOLTS
GRID #2 SUPPLY VOLTAGE	300	VOLTS
GRID #2 VOLTAGE SEE R	ATING CHART	
GRID #1 VOLTAGE:		
POSITIVE BIAS VALUE	0	VOLTS
NEGATIVE BIAS VALUE	50	VOLTS
PLATE DISSIPATION	3	WATTS
GRID #3 INPUT	0.2	WATT
GRID #2 INPUT:		
FOR GRID #2 VOLTAGES UP TO 150 VOLTS	0.6	WATT
FOR GRID #2 VOLTAGES BETWEEN		
150 & 300 VOLTS SEE R	ATING CHART	
BULB TEMPERATURE (AT HOTTEST POINT ON BULB SURFACE)	150	°C

DIODE UNIT

PLATE CURRENT

1.0 MA.

TYPICAL OPERATING CHARACTERISTICS

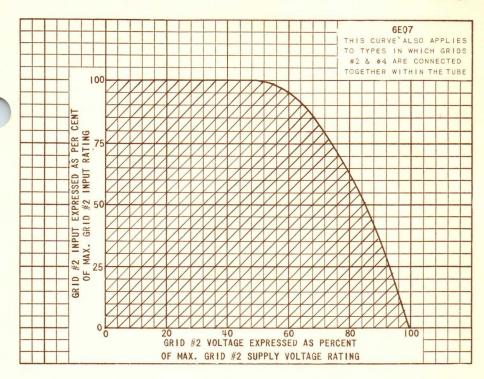
CLASS A1 AMPLIFIER

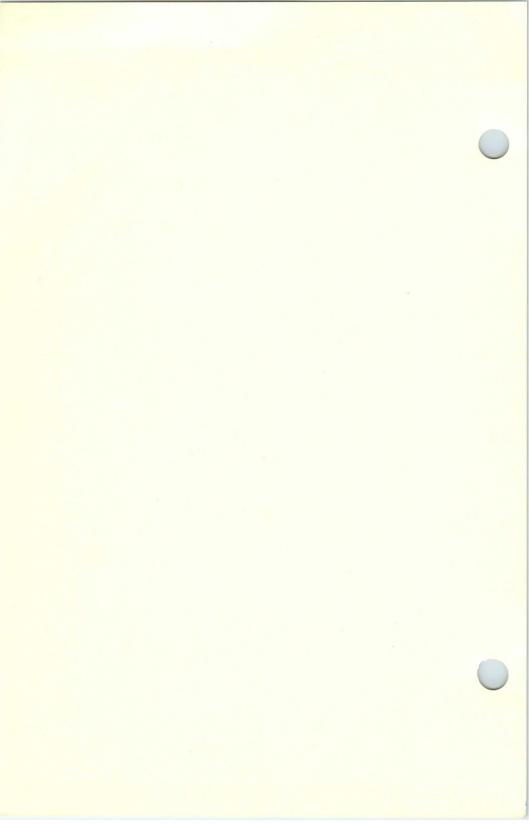
PENTODE UNIT

PLATE VOLTAGE					100	VOLTS
GRID #3	CONNECT	TO	CATHODE	AT	SOCKET	
INTERNAL SHIELD	CONNECT	TO	CATHODE	AT	SOCKET	
GRID #2 VOLTAGE					100	VOLTS
GRID #1 SUPPLY VOLTAGE					0	VOLT
GRID #1 RESISTOR (BYPASSED)					2.2	MEGOHMS
TRANSCONDUCTANCE					3800	µмноѕ
PLATE RESISTANCE (APPROX.)					0.25	MEGOHM
PLATE CURRENT					9	MA.
GRID #2 CURRENT					3.5	MA.
GRID #1 VOLTAGE (APPROX.) FOR						
TRANSCONDUCTANCE OF 40 MMHOS					-20	VOLTS

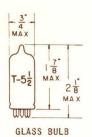
DIODE UNIT - AVERAGE CHARACTERISTICS

PLATE	VOLTAGE	10	VOLTS
PLATE	CURRENT	2	MA.





TETRODE MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER
6.3 VOLTS 0.18 AMP.

ANY MOUNTING POSITION



THE 6ER5 IS A REMOTE CUT-OFF FRAME GRID TETRODE DESIGNED ESPECIALLY FOR V.H.F. TELEVISION TUNERS. SEPARATE CATHODE LEADS PROVIDE LOW LEAD INDUCTANCE; THE SCREEN GRID IS DESIGNED PRIMARILY AS A SHIELD TO REDUCE DIRECT GRID TO PLATE CAPACITANCE. EXCEPT FOR HEATER RATINGS THE 6ER5 IS IDENTICAL TO THE 2ER5 AND 3ER5.

DIRECT INTERELECTRODE CAPACITANCES

	SHIELD	SHIELD	
INPUT	4.4	4.4	μμ f
OUTPUT	3.0	4.0	uu f
GRID TO HEATER (MAX.)	0.28	0.28	HHL I
PLATE TO CATHODE	0.24	0.20	$\mu\mu$ f
CATHODE TO GRID	3.1	3.1	μμ f
CATHODE TO HEATER	2.8	2.8	μμf
PLATE TO GRID	0.38	0.36	μμ f

RATINGS

6.3	VOLTS
550	VOLTS
250	VOLTS
100	VOLTS
50	VOLTS
1	MEGOHM
20	MA.
100	VOLTS
20,000	OHMS
2.2	WATTS
0.5	WATTS
	550 250 100 50 1 20 100 20,000 2.2

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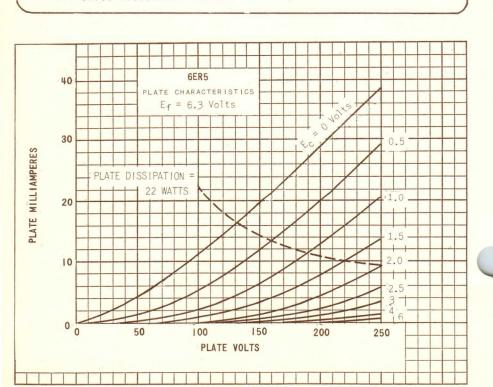
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

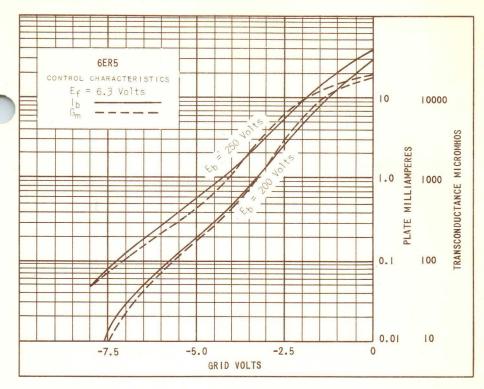
HEATER VOLTAGE	6.3	VOLTS
HEATER CURRENT	0.18	AMP.
PLATE VOLTAGE	200	VOLTS
GRID #1 VOLTAGE	-1.2	VOLTS
GRID #2 VOLTAGE	0	VOLTS
PLATE CURRENT	10	MA.
GRID #2 CURRENT	0	MA.
PLATE RESISTANCE	8000	OHMS
TRANSCONDUCTANCE	10500	MMHOS
AMPLIFICATION FACTOR	80	
NEGATIVE GRID VOLTAGE (S = 5000 μMHOS)	3.8	VOLTS
NEGATIVE GRID VOLTAGE (S = 1000 \(\mu\)MHOS)	5.6	VOLTS

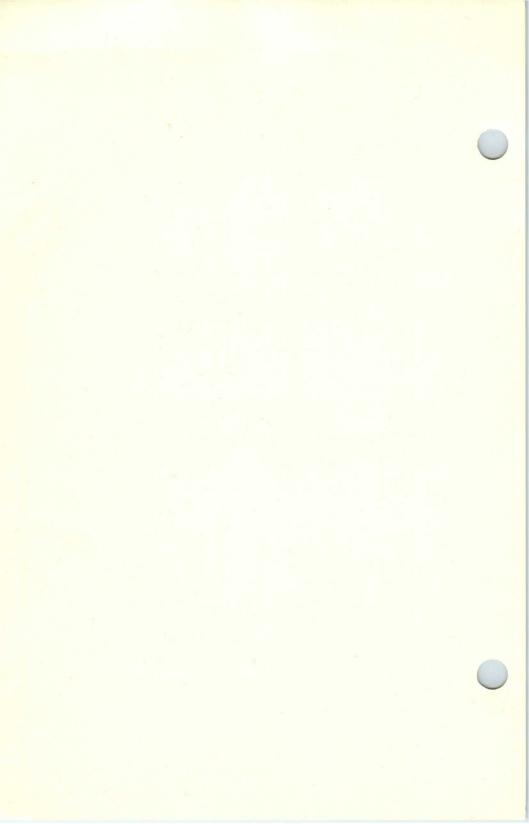
CROSS MODULATION

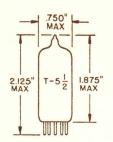
AC	INPUT	VOLTAGE	(K	=	1%	S	=	10,500	µMHOS) A	(MIN.)	100	MV
AC	INPUT	VOLTAGE	(K	=	1%	S	=	5,000	µMHOS) A		100	MV
AC	INPUT	VOLTAGE	(K	=	1%	S	=	1,000	MHOS) A	(MIN.)	100	MV

A_K = CROSS MODULATION FACTOR.





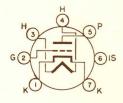




TRIODE MINIATURE TYPE

FOR

V.H.F. TELEVISION TUNERS



GLASS BULB
MINIATURE BUTTON
7 PIN BASE E7-1
OUTLINE DRAWING

JEDEC 5-2

COATED UNIPOTENTIAL CATHODE

ANY MOUNTING POSITION

BOTTOM VIEW BASING DIAGRAM JEDEC 7FP

THE 6ERS IS A SEMI-REMOTE CUTOFF HIGH-MU SHIELDED TRIODE DESIGNED ESPECIALLY FOR V.H.F. TELEVISION TUNERS. SEPARATE CATHODE LEADS PROVIDE LOW LEAD INDUCTANCE. THE SHIELD REDUCES DIRECT GRID TO PLATE CAPACITANCE.

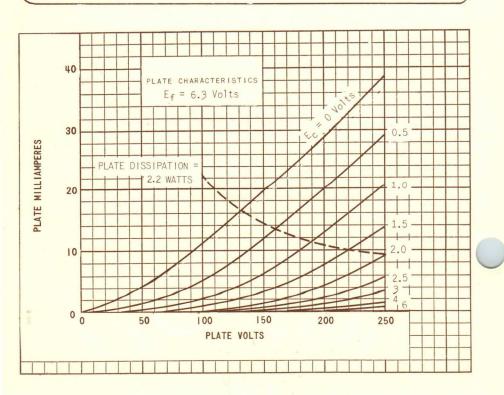
DIRECT INTERELECTRODE CAPACITANCES

WITHOUT SHIELD		
INPUT 4.4	4.4	pf
OUTPUT 3.0	4.0	pf
GRID TO HEATER (MAX.) 0.28	0.28	pf
PLATE TO CATHODE 0.24	0.20	pf
CATHODE TO GRID 3.1	3.1	pf
CATHODE TO HEATER 2.8	2.8	Pf
PLATE TO GRID 0.38	0.36	pf
WEATER AWARACTERISTIAN AND DATINGS		
HEATER CHARACTERISTICS AND RATINGS DESIGN CENTER VALUES - SEE ELA STANDARD RS-239		
AVERAGE CHARACTERISTICS 6.3 VOLTS	180	MA.
LIMITS OF APPLIED VOLTAGE	6.3±0.6	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE; HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC	100	VOLTS
TOTAL DC AND PEAK	200	VOLTS
MAXIMUM RATINGS		
DESIGN CENTER VALUES - SEE ELA STANDARD RS-239		
SUPPLY VOLTAGE	550	VOLTS
PLATE VOLTAGE	250	VOLTS
PLATE DISSIPATION	2.2	WATTS
NEGATIVE GRID VOLTAGE	50	VOLTS
GRID CIRCUIT RESISTANCE	1	MEGOHM
DC CATHODE CURRENT	20	MA.
9		

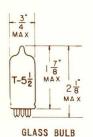
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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

PLATE VOLTAGE	200	VOLTS
GRID VOLTAGE	-1.2	VOLTS
PLATE CURRENT	10	MA.
TRANSCONDUCTANCE	10,500	µмноs
AMPLIFICATION FACTOR	80	
PLATE RESISTANCE	8,000	OHMS
NEGATIVE GRID VOLTAGE (Gm = 5,000 \(\mu\)mHOS)	3.8	VOLTS
NEGATIVE GRID VOLTAGE (Gm = 1,000 µMHOS)	5.6	VOLTS



TRIODE MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE HEATER 6.3±10% VOLTS 0.20 AMP.

ANY MOUNTING POSITION



BOTTOM VIEW SMALL BUTTON MINIATURE 7 PIN BASE

7 F P

THE 6ES5 IS A TRIODE TUNER IN THE 7 PIN MINIATURE CONSTRUCTION. IT IS DBSIGNED FOR USE IN GROUNDED CATHODE RF AMPLIFIERS. EXCEPT FOR HEATER RATINGS AND HEATER WARM-UP TIME, THE 6ES5 IS IDENTICAL TO THE 2ES5 AND THE 3ES5.

DIRECT INTERELECTRODE CAPACITANCES

	SHIELDA	WITHOUT	
GRID TO PLATE: G TO P (MAX.)	0.5	0.5	μμ f
INPUT: G TO (H+K+1.S.)	3.2	3.2	μμ f
OUTPUT: P TO(H+K+1.S.)	4.0	3.2	μμ f

Awith External shield #316 connected to Pin 1.

RATINGS

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM B

6.3±10%	VOLTS
250	VOLTS
0	VOLTS
2.2	WATTS
22	MA.
1.0	MEGOHM
100	VOLTS
100	VOLTS
	250 0 2.2 22 1.0

TUNG-SOL .

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER

HEATER VOLTAGE	6.3±10%	VOLTS
HEATER CURRENT	0.20	AMP.
PLATE VOLTAGE	200	VOLTS
GRID VOLTAGE	-1.0	VOLT
PLATE RESISTANCE (APPROX.)	8000	OHMS
TRANSCONDUCTANCE	9000	µмноѕ
AMPLIFICATION FACTOR	75	
PLATE CURRENT	10	MA.
GRID VOLTAGE (APPROX.) FOR 100 HA PLATE CURRENT	-6.0	VOLTS

DESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT LIFE NO DESIGN-MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.

10110 006

TWIN TRIODE

MINIATURE TYPE

GLASS BULB

UNIPOTENTIAL CATHODE

HEATER

6.3±10% VOLTS 0.3 AMP.

AC OR DC

ANY MOUNTING POSITION

BOTTOM VIEW

SMALL-BUTTON NOVAL
9 PIN BASE
9LS

THE 6EU7 IS A HIGH-MU TWIN TRIODE IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS ESPECIALLY DESIGNED FOR USE IN HIGH-GAIN RESISTANCE-COUPLED LOW-LEVEL AUDIO-AMPLIFIER APPLICATIONS, SUCH AS PREAMPLIFIERS FOR MONOPHONIC AND STEREOPHONIC PHONOGRAPHS, AND MICROPHONE AMPLIFIERS. THE BASING ARRANGEMENT ENABLES THE CIRCUIT DESIGNER TO OBTAIN GOOD ISOLATION BETWEEN CHANELS WHEN THE TUBE IS USED IN A STEREO SYSTEM.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

	UNIT #1	UNIT #2	
GRID TO PLATE	1.5	1.5	$\mu\mu f$
GRID TO CATHODE AND HEATER	1.6	1.6	$\mu\mu f$
PLATE TO CATHODE AND HEATER	0.2	0.2	$\mu\mu f$

RATINGS

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

AMPLIFIER - CLASS A₁
VALUES ARE FOR EACH UNIT

HEATER VOLTAGE	6.3±10%	VOLTS
MAXIMUM PLATE VOLTAGE	330	VOLTS
MAXIMUM GRID VOLTAGE:		
NEGATIVE BIAS VALUE	55	VOLTS
POSITIVE BIAS VALUE	0	VOLTS
MAXIMUM PLATE DISSIPATION	1.2	WATTS
MAXIMUM PEAK HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	200	VOLTS

THE DC COMPONENT MUST NOT EXCEED 100 VOLTS.

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A, AMPLIFIER

HEATER VOLTAGE	6.3±10%		VOLTS	
HEATER CURRENT		0.3		
PLATE VOLTAGE	100	250	VOLTS	
GRID VOLTAGE	-1	-2	VOLTS	
AMPLIFICATION FACTOR	100	100		
PLATE RESISTANCE (APPROX.)	80 000	62 500	OHMS	
TRANSCONDUCTANCE	1 250	1 600	μMHOS	
PLATE CURRENT	0.5	1.2	MA.	

EQUIVALENT NOISE AND HUM VOLTAGE

REFERENCED TO GRID, EACH UNIT

AVERAGE VALUE RMS

1.8 µVOLTS

- MEASURED IN "TRUE RMS" UNITS UNDER THE FOLLOWING CONDITIONS; HEATER VOLTAGE OF 6.3 VOLTS
 AC; CENTER TAP OF HEATER TRANSFORMER GROUNDED; PLATE SUPPLY VOLTAGE, 250 VOLTS DC;
 PLATE LOAD RESISTOR, 100,000 OHMS; CATHODE RESISTOR, 2700 OHMS BYPASSED BY 100-μf CAPACITOR
 GRID RESISTOR, 0 OHMS; AND AMPLIFIER COVERING FREQUENCY RANGE BETWEEN 25 AND 10,000 CPS.
- B. DESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A, SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANU-FACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPESATING CONDITIONS DUE TO VARIAIN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT LIFE NO DESIGN MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS,

OPERATING CONDITIONS AS RESISTANCE COUPLED AMPLIFIER

EACH UNIT

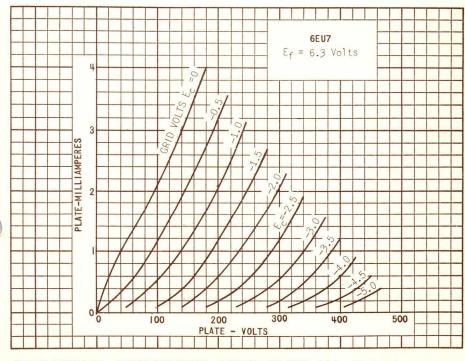
PLATE SUPPLY VOLTAGE		90			180			300		VOLTS
PLATE LOAD RESISTOR	0.1	0.22	0.47	0.1	0.22	0.47	0.1	0.22	0.47	медонм
GRID RESISTOR (OF										
FOLLOWING STAGE)	0.22	0.47	1.0	0.22	0.47	1.0	0.22	0.47	1.0	MEGOHMS
CATHODE RESISTOR	4700	7400	13000	2000	8500	6700	1500	2800	5200	OHMS
PEAK OUTPUT VOLTAGE	6	9	11	25	34	39	57	69	77	VOLTS
VOLTAGE GAIN	35 ^C	45	52E	47	59	66	52	65	73	

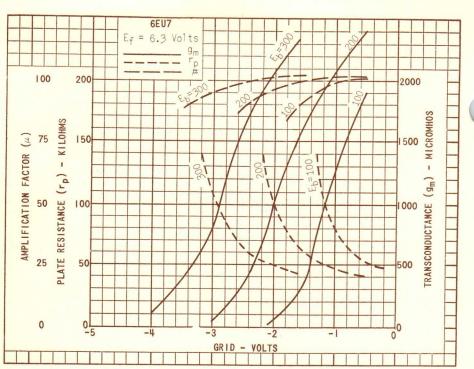
CAT 2 VOLTS (RMS) OUTPUT

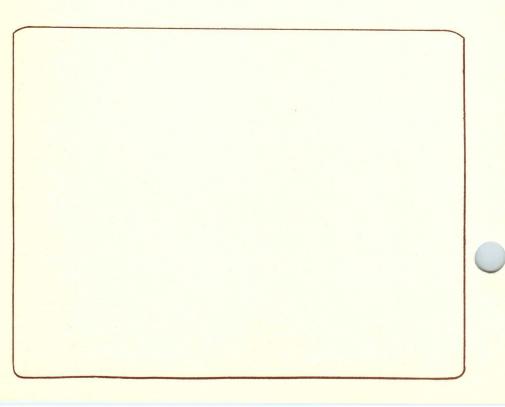
DAT 3 VOLTS (RMS) OUTPUT

EAT 4 VOLTS (RMS) OUTPUT

NOTE: COUPLING CAPACITORS SHOULD BE SELECTED TO GIVE DESIRED FREQUENCY RESPONSE, CATHODE RESISTORS SHOULD BE ADEQUATELY BYPASSED.

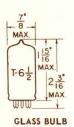






TRIODE PENTODE

MINIATURE TYPE



HEATER

6.3 VOLTS 0.45 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

MINIATURE BUTTON
9 PIN BASE
9JF

THE 6EU8 IS A HEATER-CATHODE TYPE TRIODE-PENTODE IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED PRIMARILY FOR THE USE AS A COMBINED TRIODE OSCILLATOR AND PENTODE MIXER IN TELEVISION RECEIVERS. THE TRIODE HAS A CONTROLLED CATHODE WARM-UP CHARACTERISTIC. EXCEPT FOR HEATER CHARACTERISTICS, THE 6EU8 IS IDENTICAL TO THE 5EU8.

DIRECT INTERELECTRODE CAPACITANCES

	WITH	WITHOU	Т
PENTODE SECTION:	SHIELD	SHIELD	
GRID #1 TO PLATE: (G1 TO P) (MAX.)	0.10	0.02	μμf
INPUT: G1 TO (H+K)	5.0	5.0	$\mu\mu f$
OUTPUT: P TO (H+K)	3.4	2.6	$\mu\mu f$
TRIODE SECTION:			
GRID TO PLATE: (G TO P)	1.7	1.7	μμf
INPUT: G TO (H+K)	3.2	3.0	$\mu\mu f$
OUTPUT: P TO (H+K+S)	1,1	1.6	μμf
CATHODE TO HEATER (EACH SECTION): (K TO H)	3.60	3.60	$\mu\mu f$

RATINGS

INTERPRETED ACCORDING TO DESIGN CENTE	R MAXIMUM SYSTE	M	
	TRIODE	PENTODI	E
HEATER VOLTAGE	6.3	6.3	VOLTS
MAXIMUM PLATE VOLTAGE	330	330	VOLTS
MAXIMUM GRID #2 SUPPLY VOLTAGE		330	VOLTS
MAXIMUM POSITIVE DC GRID #1 VOLTAGE	0	0	VOLTS
MAXIMUM PLATE DISSIPATION	3.0	3.1	WATTS
MAXIMUM GRID #2 DISSIPATION		0.55	WATTS
MAXIMUM GRID #1 RESISTANCE	100	100	KILOHMS

CONTINUED FROM PRECEDING PAGE

RATINGS - cont'd.

INTERPRETED ACCORDING TO DESIGN CENTER MAXIMUM SYSTEM

HEATER VOLTAGE	6.3	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC COMPONENT	100	VOLTS
TOTAL DC AND PEAK	200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	200	VOLTS
HEATER WARM-UP TIME*	11.0	SECONDS

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

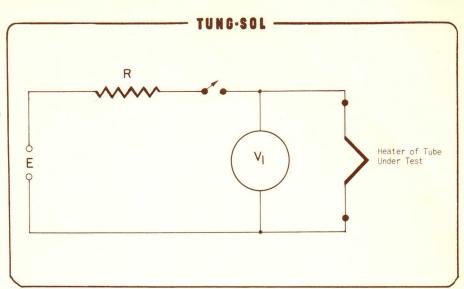
	TRIODE	PENTOD	E
HEATER VOLTAGE	6.3	6.3	VOLTS
HEATER CURRENT	0.45	0.45	AMP.
PLATE VOLTAGE	150	125	VOLTS
GRID #2 VOLTAGE		125	VOLTS
CATHODE RESISTOR	56		OHMS
GRID #1 VOLTAGE		-1.0	VOLT
AMPLIFICATION FACTOR	40.0		
TRANSCONDUCTANCE	8500	6400	μMHOS
PLATE RESISTANCE (APPROX.)	5000	80000	OHMS
PLATE CURRENT	18.0	12.0	MA.
GRID #2 CURRENT		4.0	MA.
GRID #1 VOLTAGE (APPROX.) FOR Ib=10 μA	-12.0	-9.0	VOLTS
CATHODE WARM-UP TIMEA	35		SECONDS

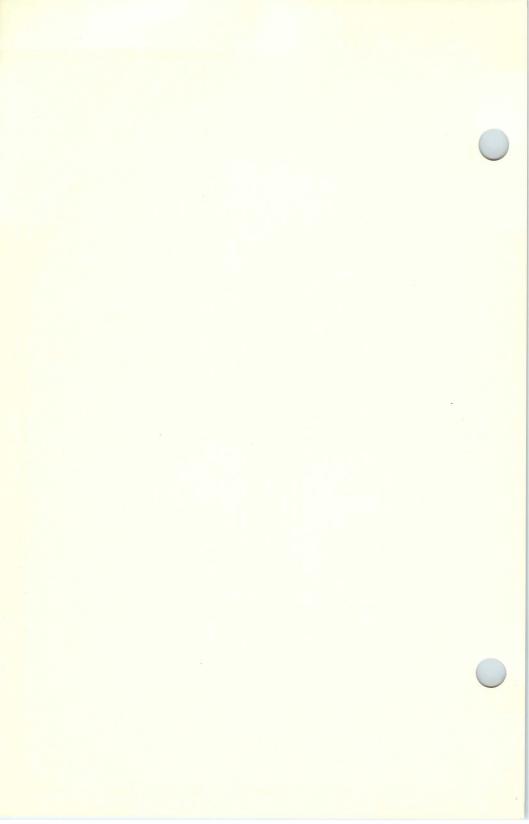
* HEATER WARM UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TERMINALS TO INCREASE FROM ZERO TO THE HEATER TEST VOLTAGE (V_1).

FOR TYPE 6EU8

E= 25.2 VOLTS (RMS OR DC).
Y1 5.0 VOLTS (RMS OR DC).
R= 31.5 OHMS

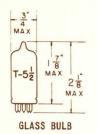
A. CATHODE WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR TRANSCONDUCTANCE TO REACH 6500 MMHOS WHEN A TUBE IS OPERATED FROM A COLD START AT A PLATE POTENTIAL OF 100 VOLTS DC, ZERO GRID BIAS, AND AT A CONSTANT HEATER CURRENT OF 560 MILLIAMPERES FOR 5EU8 OR A HEATER POTENTIAL OF 5.5 VOLTS FOR THE 6EU8.





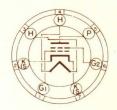
TETRODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE
HEATER
6.3 VOLTS 0.20 AMP.
AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

MINIATURE 7 PIN BASE 7EW

THE 6EV5 IS A HIGH GAIN, SHARP-CUTOFF SEVEN PIN TETRODE DESIGNED PARTICULARLY FOR SERVICE IN V.H.F. TELEVISION TUNERS. IT HAS HIGH TRANS-CONDUCTANCE, EXTREMELY LOW SCREEN CURRENT AND HIGH INPUT IMPEDANCE AT 200 MC. RESULTING IN IMPROVED NOISE FIGURE. THE 6EV5 IS SIMILAR TO THE 2EV5 AND THE 3EV5.

DIRECT INTERELECTRODE CAPACITANCES

GRID #1 TO PLATE (MAX.)	0.035	μμ f
INPUT	4.50	μμ f
OUTPUT	2.90	μμ f

RATINGS INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

HEATER VOLTAGE	6.3	VOLTS
MAXIMUM PLATE VOLTAGE	275	VOLTS
MAXIMUM GRID #2 SUPPLY VOLTAGE	180	VOLTS
MAXIMUM GRID #2 VOLTAGE SEE GRID #2 INPUT RAT	ING CHART	
MAXIMUM PLATE DISSIPATION	3.25	WATTS
MAXIMUM GRID #2 DISSIPATION	0.2	WATTS
MAXIMUM GRID #1 VOLTAGE:		
POSITIVE VALUE	0	VOLTS
MAXIMUM CATHODE CURRENT	20	MA.
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	100	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC	50	VOLTS
TOTAL DC AND PEAK	100	VOLTS
MAXIMUM GRID CIRCUIT RESISTANCE	0.5	MEGOHM

AWITH SHIELD #316 CONNECTED TO PIN #2.

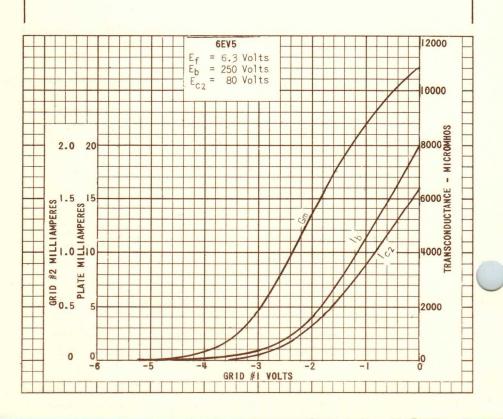
Bossign-maximum ratings are limiting values of operating and environmental conditions applicable to a bogey electron device of a specified type as defined by its published data, and should not be exceeded under the worst probable conditions. The device manufacturer chooses these values to provide acceptable servicesbellity of the device, taking responsibility for the effects of changes in operating conditions due to variations in device characteristics. The eculypent manufacturer should design so that initially and throughout the no design-maximum value for the intended service is exceeded with a bogey device under the worst probable operating conditions with respect to supply-voltage variation, eculypent component variation, equipment control adjustment, load variation, signal variation, and environmental conditions.

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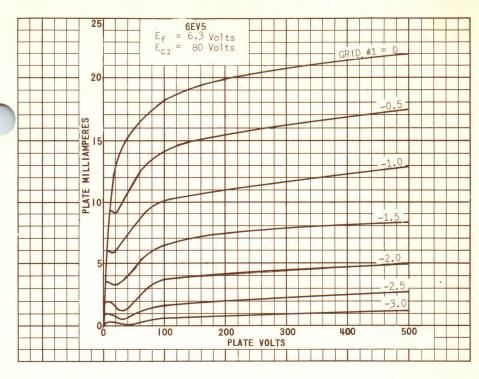
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

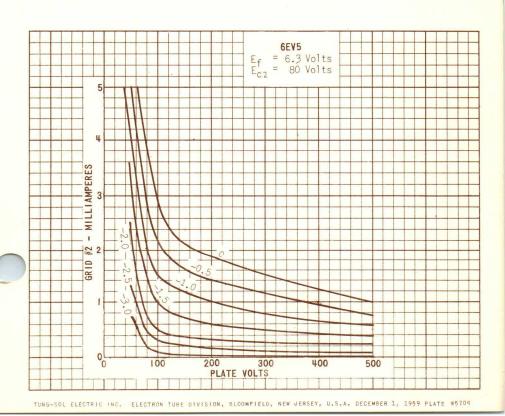
HEATER VOLTAGE	2.4	VOLTS
HEATER CURRENT	0.60	AMP.
PLATE VOLTAGE	250	VOLTS
GRID #2 VOLTAGE	80	VOLTS
GRID #1 VOLTAGE	-1	VOLTS
PLATE RESISTANCE	0.150	MEGOHM
TRANSCONDUCTANCE	8800	µмноs
GRID #1 CUTOFF BIASC	4.5	VOLTS
PLATE CURRENT	11.5	MA.
GRID #2 CURRENT	0.90	MA.

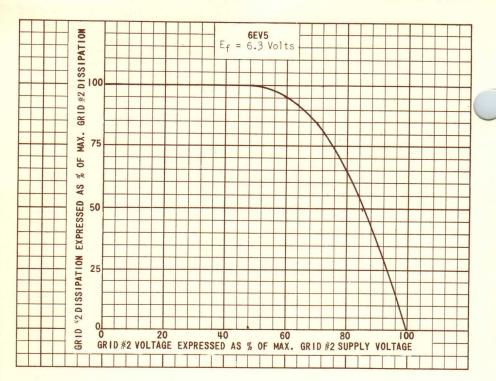
CFOR TRANSCONDUCTANCE OF 100 MMHOS.

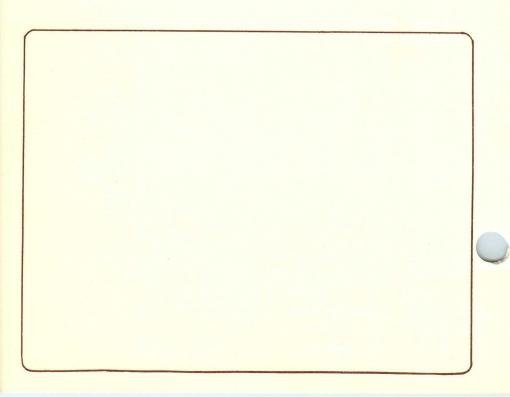


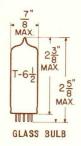
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UNIPOTENTIAL CATHODE HEATER 6.3±10% VOLTS 0.6 AMP. AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW SMALL—BUTTON NOVAL 9 PIN BASE 9 LP

THE 6EV7 IS A HIGH-MU TWIN TRIODE DESIGNED FOR USE AS A RELAY-CONTROL TUBE IN REMOTE-CONTROL TUNING UNITS OF TELEVISION RECEIVERS. IT IS PRO-CESSED SPECIFICALLY FOR OPERATION UNDER STANDBY CONDITIONS.

DIRECT INTERELECTRODE CAPACITANCES

(APPROX.)
WITHOUT EXTERNAL SHIELD

	UNIT #1	UNIT #2	
GRID TO PLATE	3.4	3.4	HH f
GRID TO CATHODE AND HEATER	3	3	μμf
PLATE TO CATHODE AND HEATER	0.33	0.33	HH f

RATINGS

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM RELAY-CONTROL SERVICE

VALUES ARE FOR EACH UNIT

HEATER VOLTAGE	6.3±10%	VOLTS
MAXIMUM PLATE VOLTAGE	300	VOLTS
MAXIMUM GRID VOLTAGE:		
POSITIVE BIAS VALUE	0	VOLTS
MAXIMUM CATHODE CURRENT	20	MA.
MAXIMUM PLATE DISSIPATION		
WHEN THE "ON" TIME EXCEEDS 30 SECONDS IN ANY		
2-MINUTE INTERVAL	2.5	WATTS
WHEN THE "ON" TIME DOES NOT EXCEED 30 SECONDS		
IN ANY 2-MINUTE INTERVAL	4.5	WATTS
MAXIMUM PEAK HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	200 ^A	VOLTS
MAXIMUM CIRCUIT VALUES:		
GRID-CIRCUIT RESISTANCE	3.9	MEGOHMS

ATHE DC COMPONENT MUST NOT EXCEED 100 VOLTS.

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TYPICAL OPERATION

WITH 2500-OHM RELAY LOAD - EACH UNIT

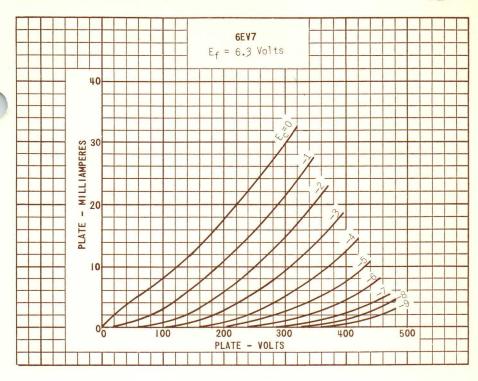
RELAY-CONTROL SERVICE VALUES ARE FOR EACH UNIT

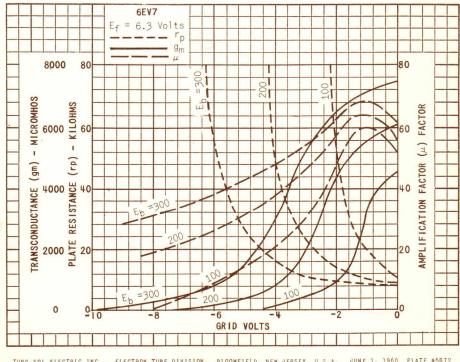
	"ON" TIME MORE THAN 30sec. IN ANY 2 MIN INTERVAL	"ON" TIME UP TO 30sec. IN ANY 2 MIN. INTERVAL	
PLATE SUPPLY VOLTAGE	150	250	VOLTS
ZERO-BIAS PLATE CURRENT GRID VOLTAGE (APPROX.) FOR	10	18.5	MA.
PLATE CURRENT OF 100 HA.	-5	-9	VOLTS

CHARACTERISTICS

CLASS A1 AMPLIFIER - EACH UNIT

HEATER VOLTAGE	6.3±10%	VOLTS
HEATER CURRENT	0.6	AMP.
PLATE VOLTAGE	250	VOLTS
GRID VOLTAGE	-2	VOLTS
AMPLIFICATION FACTOR	60	
PLATE RESISTANCE (APPROX.)	11 500	OHMS
TRANSCONDUCTANCE	5 200	<i>µ</i> MHOS
PLATE CURRENT	9.2	MA.
GRID VOLTAGE (APPROX.) FOR PLATE CURRENT OF $100~\mu\mathrm{A}$.	-9	VOLTS







TUNG-SOL .

T-5½ I.875" MAX 2.125" MAX CLASS BULB MINITATURE BUTTON 7 PIN BASE E7-1

OUTLINE DRAWING JEDEC 5-2

PENTODE

MINIATURE TYPE

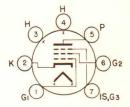
COATED UNIPOTENTIAL CATHODE

HEATER

6.3±0.6 VOLTS 400 MA. ←

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

JEDEC 7CM

THE 6EW6 IS A SHARP CUTOFF PENTODE IN THE 7-PIN MINIATURE CONSTRUCTION AND HAS BEEN DESIGNED FOR INTERMEDIATE AMPLIFIER SERVICE IN TELEVISION RECEIVERS.

DIRECT INTERELECTRODE CAPACITANCES

	SHIELDA	SHIELD	
GRID #1 TO PLATE (MAX.)	0.03	0.04	pt
INPUT	10.0	10.0	pf
OUTPUT	3.4	2.4	pf

RATINGS

INTERPRETED ACCORDING TO DESIGN-MAXIMUM VALUES

MAXIMUM PLATE VOLTAGE	330	VOLTS
MAXIMUM SCREEN-SUPPLY VOLTAGE	330	VOLTS
MAXIMUM SCREEN VOLTAGE	SEE SCREEN RATING CHART	
MAXIMUM POSITIVE DC GRID #1 VOLTAGE	O	VOLTS
MAXIMUM PLATE DISSIPATION	3.1	WATTS
MAXIMUM SCREEN DISSIPATION	0.65	WATTS
MAXIMUM HEATER CATHODE VOLTAGE:		
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC COMPONENT	100	VOLTS
TOTAL DC AND PEAK	200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	200	VOLTS

DESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND INFOURDHOUT LIFE NO DESIGN-MAXIMM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT CONFORMEN VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.

AWITH EXTERNAL SHIELD (EIA 316) CONNECTED TO CATHODE.

- INDICATES A CHANGE.

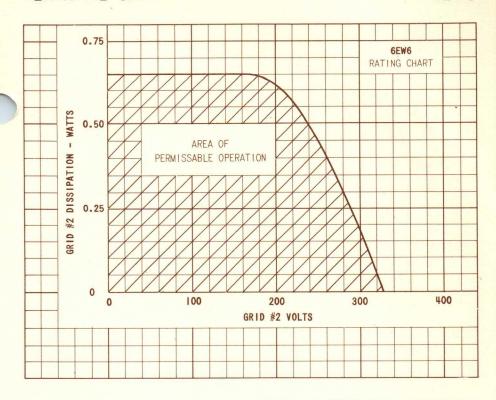
- TUNG-SOL -

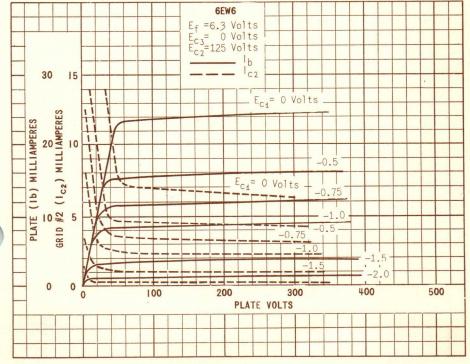
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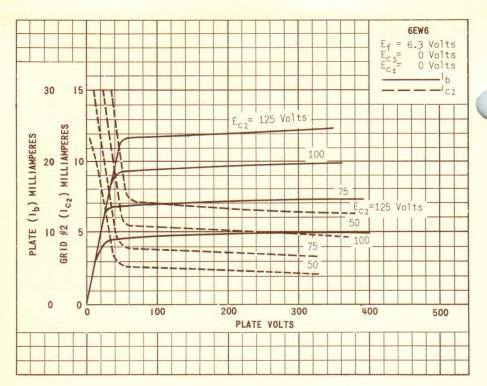
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

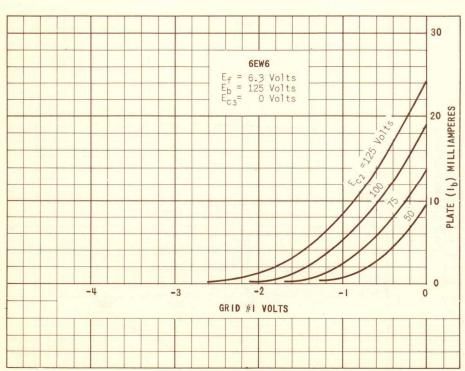
CLASS A1 AMPLIFIER

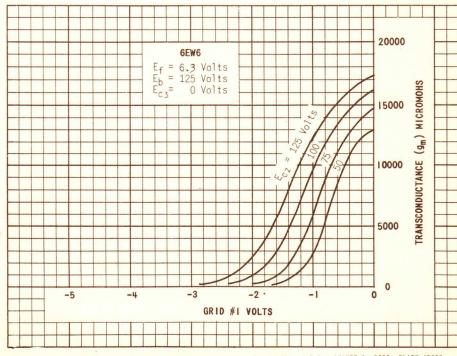
PLATE VOLTAGE	125	VOLTS
SUPPRESSOR, CONNECTED TO CATHODE AT SOCKET		
SCREEN VOLTAGE	125	VOLTS
CATHODE-BIAS RESISTOR	56	OHMS
PLATE RESISTANCE (APPROX.)	0.2	MEGOHMS
TRANSCONDUCTANCE	14 000	μMHOS
PLATE CURRENT	11	MA.
SCREEN CURRENT	3.2	MA.
GRID #1 VOLTAGE (APPROX.) Tb= 20 HAMPS.	-3.5	VOLTS

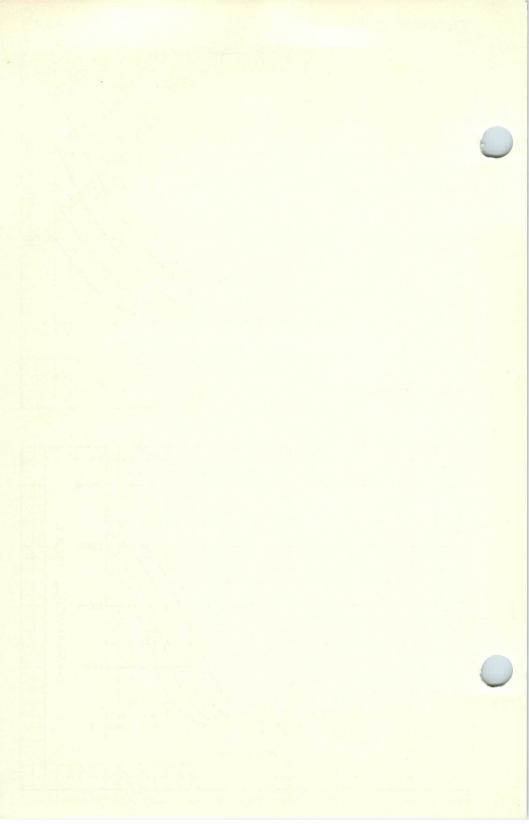










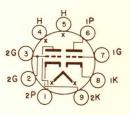


COATED UNIPOTENTIAL CATHODE

HEATER

6.3 VOLTS 0.90 AMP.

ANY MOUNTING POSITION



BOTTOM VIEW

BASING DIAGRAM
JEDEC 9HF

BASE E9-68

JEDEC OUTLINE 9-70

THE 6EW7 IS A DISSIMILAR DOUBLE TRIODE UTILIZING THE 9T9 BULB AND PIN CONFIGURATION. THE TUBE IS DESIGNED TO SERVE AS A COMBINED VERTICAL DEFLECTION OSCILLATOR AND AMPLIFIER. EXCEPT FOR HEATER CHARACTERISTICS AND HEATER WARM-UP TIME, THE 6EW7 IS IDENTICAL TO THE 10EW7.

THE 9T9 DESIGN UTILIZES A T-9(1 1/8" DIAM.) BULB BASED TO FIT MOST STAND-ARD 9 PIN MINIATURE SOCKETS.

DIRECT INTERELECTRODE CAPACITANCES WITHOUT EXTERNAL SHIELD

	SECT. #1	SECT. 2	
GRID TO PLATE	4.2	9.0	µµ f
INPUT: G TO (H+K)	2.2	7.0	μμ f
OUTPUT: P TO (H+K)	0.4	1.2	µµ f

RATINGS

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM B
VERTICAL DEFLECTION OSCILLATOR AND AMPLIFIER C

	SECT. #1 OSCILLATOR D	SECT. #2 AMPLIFIER	D
HEATER VOLTAGE	6.3	3	VOLTS
MAXIMUM PLATE VOLTAGE	330	330	VOLTS
MAXIMUM PEAK POSITIVE PULSE PLATE VOLTAGE		1500	VOLTS
MAXIMUM PEAK NEGATIVE PULSE GRID VOLTAGE	400	250	VOLTS
MAXIMUM PLATE DISSIPATION E	1.5	10	WATTS
MAXIMUM AVERAGE CATHODE CURRENT	22	50	MA.
MAXIMUM PEAK CATHODE CURRENT	77	175	MA.
MAXIMUM GRID CIRCUIT RESISTANCE:			
SELF BIAS	2.2	2.2	MEGOHMS

- INDICATES A CHANGE.

TUNG-SOL .

CONTINUED FROM PRECEDING PAGE

RATINGS - CONT'D.

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM B

VERTICAL DEFLECTION OSCILLATOR AND AMPLIFIERC

MAXIMUM HEATER—CATHODE VOLTAGE:

HEATER NEGATIVE WITH RESPECT TO CATHODE

TOTAL DC AND PEAK

DC

TOTAL DC AND PEAK

200 VOLTS

100 VOLTS

TOTAL DC AND PEAK

200 VOLTS

AVERAGE CHARACTERISTICS

SECT. #1D SECT. #2D HEATER VOLTAGE A 6.3 VOLTS HEATER CURRENT 0.90 AMP. PLATE VOLTAGE 250 150 VOLTS -17.5GRID #1 VOLTAGE -11 VOLTS 5.5 PLATE CURRENT 45 MA. TRANSCONDUCTANCE 7500 µмноs 17.5 6.0 AMPLIFICATION FACTOR PLATE RESISTANCE (APPROX.) 8750 800 OHMS E_C FOR I_b = 10 μ A (APPROX.) E_C FOR I_b = 100 μ A (APPROX.) I_b AT E_C =-25 VDC -20VOLTS -40 VOLTS 8 MA. Ib WITH Eb =60 V AND Ec=0 V 95 (INSTANTANEOUS VALUES) MA.

AFOR PARALLEL HEATER OPERATION, EQUIPMENT SHOULD BESO DESIGNED SO THAT AT NORMAL SUPPLY VOLTAGE BOGEY TUBES WILL OPERATE AT THIS VALUE OF HEATER VOLTAGE.

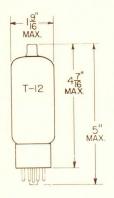
DESIGN-MAXIMUM RATINGS.ARELIMITING VALUES OF OPERATING AND EMVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT LIPE NO DESIGN-MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING COMDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT COMPONENT VARIATION,

C
FOR OPERATION IN A 525+LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCASTING STATIONS; FEDERAL COMMUNICATIONS COMMISSION". THE DUTY CYCLE OF THE VOLTAGE PULSE NOT TO EXCEED 15 PERCENT OF A SCANNING CYCLE.

DSECTION #1 CONNECTS TO PINS 6, 7 AND 8. SECTION #2 CONNECTS TO PINS 1, 2, 3 AND 9.

IN STAGES OPERATING WITH GRID LEAK BIAS, AN ADEQUATE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

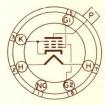
BEAM PENTODE



HEATER 6.3 VOLTS 2.25 AMP. AC OR DC

VERTICAL MOUNTING POSITION

HORIZONTAL OPERATION IS PERMITTED IF PINS 2 AND 7 ARE IN A VERTICAL PLANE



BOTTOM VIEW

SHORT MEDIUM-SHELL
5 PIN OCTAL WITH

EXTERNAL BARRIERS

5 B T

GLASS BULB

THE 6EX6 IS A BEAM-POWER PENTODE DESIGNED PRIMARILY FOR USE AS THE HORI-ZONTAL-DEFLECTION AMPLIFIER IN TELEVISION RECEIVERS WHICH INCORPORATE LARGE-DEFLECTION-ANGLE PICTURE TUBES. FEATURES OF THE TUBE INCLUDE AN EXTREMELY HIGH PERVEANCE, HIGH PLATE CURRENT AT LOW PLATE AND SCREEN VOLTAGES, AND A HIGH RATIO OF PLATE TO SCREEN CURRENT. EXCEPT FOR HEATER RATINGS, THE 6EX6. IS IDENTICAL TO THE 21EX6.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

GRID #1 TO PLATE	1.1	μμ f
INPUT	22	July f
OUTPUT	8.5	HH f

RATINGS

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM HORIZONTAL-DEFLECTION AMPLIFIER SERVICE A

HEATER VOLTAGE	6.3	VOLTS
MAXIMUM DC PLATE-SUPPLY VOLTAGE (BOOST + DC POWER SUPPLY)	770	VOLTS
MAXIMUM PEAK POSITIVE PULSE PLATE VOLTAGE (ABS. MAX.)	7000	VOLTS
MAXIMUM PEAK NEGATIVE PULSE PLATE VOLTAGE (ABS. MAX.)	1500	VOLTS
MAXIMUM SCREEN VOLTAGE	195	VOLTS
MAXIMUM PEAK NEGATIVE GRID #1 VOLTAGE MAXIMUM PLATE DISSIPATION B	220 22	VOLTS WATTS
MAXIMUM SCREEN DISSIPATION	3.5	WATTS
MAXIMUM DC CATHODE CURRENT	220	MA.
MAXIMUM PEAK CATHODE CURRENT	770	MA.
MAXIMUM HEATER CATHODE VOLTAGE:		
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC COMPONENT	100	VOLTS
TOTAL DC AND PEAK	200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	200	VOLTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE	0.47	MEGOHMS
BULB TEMPERATURE AT HOTTEST POINT	225	°C

CONTINUED ON FOLLOWING PAGE

TUNG-SOL -

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

AVERAGE CHARACTERISTICS

HEATER VOLTAGE	6.3	6.3	6.3	VOLTS
HEATER CURRENT	2.25	2.25	2.25	AMP.
PLATE VOLTAGE	60	60	175	VOLTS
SCREEN VOLTAGE		150	175	VOLTS
GRID #1 VOLTAGE	OC	OC	-30	VOLTS
PLATE RESISTANCE (APPROX.)			8500	OHMS
TRANSCONDUCTANCE			7700	µмноs
PLATE CURRENT	360	460	67	MA.
SCREEN CURRENT	30	45	3.3	MA.
GRID #1 VOLTAGE (APPROX.)				
FOR I _b = 1.0 MA.			-50	VOLTS
TRIODE AMPLIFICATION FACTOR			5.0	
WITH Eb = Ec2 = 175V.			4.2	
GRID #1 VOLTAGE WITH				
Eb=5000V. FOR Ib=1.0 MA.	-88	-94	-101	VOLTS

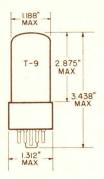
A FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE.

BIN STAGES OPERATING WITH GRID LEAK BIAS, AN ADEQUATE CATHODE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

CAPPLIED FOR VERY SHORT INTERVAL SO AS NOT TO DAMAGE TUBE.

TUNG-SOL -

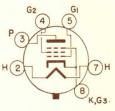
PENTODE



COATED UNIPOTENTIAL CATHODE.

HEATER
6.3 VOLTS 0.68 AMP.
AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
BASING DIAGRAM
JEDEC 7AC

GLASS BULB
INTERMEDIATE-SHELL
6 PIN OCTAL
B6-81 AND B6-84
OUTLINE DRAWING
JEDEC 9-15

THE 6EY6 IS A BEAM POWER PENTODE DESIGNED FOR USE AS THE VERTICAL DEFLECTION AMPLIFIER IN TELEVISION RECEIVERS EMPLOYING 110° DEFLECTION PICTURE TUBES. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

WITHOUT EXTERNAL SHIELD

GRID #1 TO PLATE	0.7	pf
INPUT	8.5	pf
OUTPUT	7.0	rf

RATINGS INTERPRETED ACCORDING TO DESIGN-MAXIMUM SYSTEM VERTICAL—DEFLECTION AMPLIFIER SERVICE A

MAXIMUM DC PLATE VOLTAGE	350	VOLTS
MAXIMUM PEAK PULSE PLATE VOLTAGE	2 500	VOLTS
MAXIMUM PEAK NEGATIVE-PULSE GRID #1 VOLTAGE*	250	VOLTS
MAXIMUM SCREEN VOLTAGE	300	VOLTS
MAXIMUM PLATE DISSIPATIONB	11	WATTS
MAXIMUM SCREEN DISSIPATION ^B	2.75	WATTS
MAXIMUM DC CATHODE CURRENT	60	MA.
MAXIMUM PEAK CATHODE CURRENT	180	MA.
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC COMPONENT	100	VOLTS
TOTAL DC AND PEAK	200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	200	VOLTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE WITH CATHODE BIAS	2.2	MEGOHMS
MAXIMUM GRID #1 CIRCUIT RESISTANCE WITH FIXED BIAS	1.0	MEGOHMS
MAXIMUM BULB TEMPERATURE AT HOTTEST POINT	200	°C
HEATER WARM-IIR TIME (ARRENY)	11 0	CECONDE

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

PLATE VOLTAGE	50	250	VOLTS
SCREEN VOLTAGE	250	250	VOLTS
GRID #1 VOLTAGE	OC	-17.5	VOLTS
PLATE RESISTANCE (APPROX.)		60 000	OHMS
TRANSCONDUCTANCE		4 400	µмноѕ
PLATE CURRENT	153	44	MA.
SCREEN CURRENT	21	3.0	MA.
GRID #1 VOLTAGE (APPROX.)			
$I_b = 100 \mu AMPS.$		-48	VOLTS

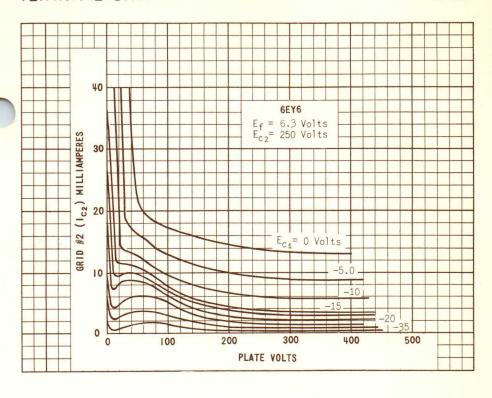
DESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOSEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABLLITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT THE NO DESIGN—MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING CONDITIONS, WITH RESPECT TO SUPPLY-WOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.

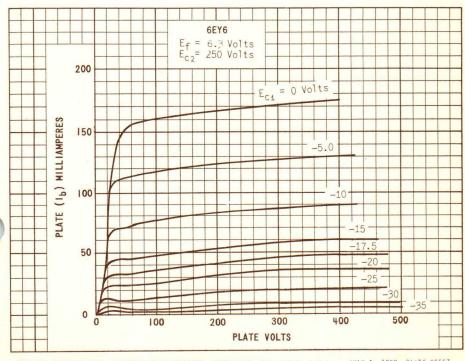
HEATER WARN-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THI TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

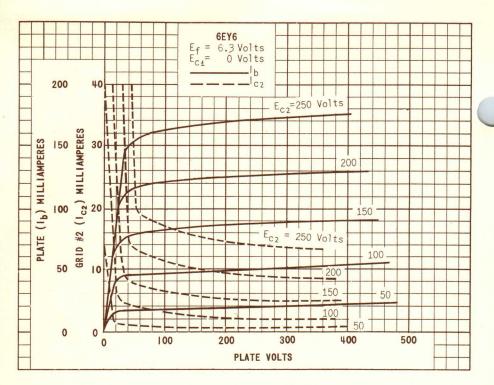
AFOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE.

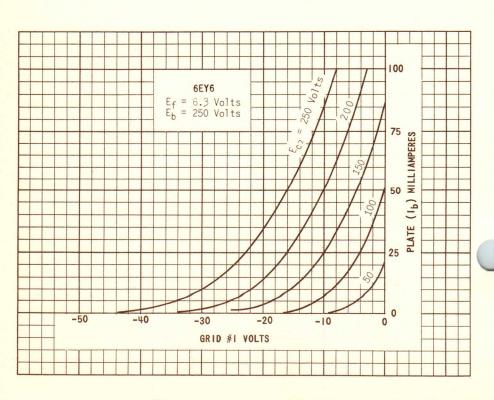
BIN STAGES OPERATING WITH GRID LEAK BIAS, AN ADEQUATE CATHODE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

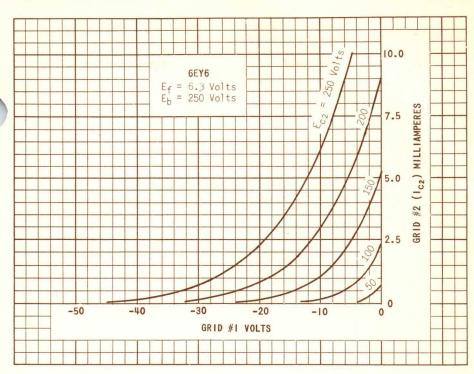
CAPPLIED FOR SHORT INTERVAL (TWO SECONDS MAXIMUM) SO AS NOT TO DAMAGE TUBE.





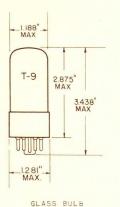








BEAM-POWER PENTODE

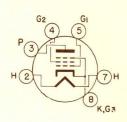


HEATER

6.3±10% VOLTS 0.8 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
BASING DIAGRAM
JEDEC 7AC

INTERMEDIATE - SHELL 6 PIN OCTAL B6-81 OUTLINE DRAWING JEDEC 9-15

THE 6EZ5 IS A BEAM-POWER PENTODE DESIGNED FOR USE AS THE VERTICAL-DEFLECTION AMPLIFIER IN TELEVISION RECEIVERS THAT EMPLOY 110-DEGREE DEFLECTION PICTURE TUBES. FEATURES OF THE TUBE INCLUDE HIGH PERVEANCE AND HIGH PLATE DISSIPATION.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

GRID #1 TO PLATE	0.6	µµ f
INPUT	9.0	μμ f
OUTPUT	7.0	μμ f

RATINGS INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM VERTICAL—DEFLECTION—AMPLIFIER SERVICE A

MAXIMUM DC PLATE VOLTAGE	350	VOLTS
MAXIMUM PEAK PULSE PLATE VOLTAGE	2500	VOLTS
MAXIMUM PEAK NEGATIVE-PULSE GRID #1 VOLTAGE*	250	VOLTS
MAXIMUM SCREEN VOLTAGE	300	VOLTS
MAXIMUM PLATE DISSIPATION ^B	12	WATTS
MAXIMUM SCREEN DISSIPATION ^B	2.75	WATTS
MAXIMUM DC CATHODE CURRENT	75	MA.
MAXIMUM PEAK CATHODE CURRENT	260	MA.
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC COMPONENT	100	VOLTS
TOTAL DC AND PEAK	200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	200	VOLTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE:		
WITH CATHODE BIAS	2.2	MEGOHMS
WITH FIXED BIAS	1.0	MEGOHMS
BULB TEMPERATURE AT HOTTEST POINT	200	C

*INDICATES AN ADDITION.

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

AVERAGE CHARACTERISTICS

HEATER VOLTAGE	6.3±10%	6.3±10%	VOLTS
HEATER CURRENT	0.8	0.8	AMP.
PLATE VOLTAGE	60	250	VOLTS
SCREEN VOLTAGE	250	250	VOLTS
GRID #1 VOLTAGE	OC	-20	VOLTS
PLATE RESISTANCE (APPROX.)	-	50 QOO	OHMS
TRANSCONDUCTANCE		4 100	µмноs
PLATE CURRENT	180	43	MA.
SCREEN CURRENT	26	3.5	MA.
GRID #1 VOLTAGE (APPROX.)			
FOR $I_b = 100 \mu AMPS$.		-50	VOLTS

AFOR OPERATION IN A 525 LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE OF THE VO DAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE.

DESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT THE NO DESIGN-MAXIMM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND DNVIRONMENTAL CONDITIONS.

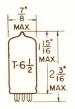
BIN STAGES OPERATING WITH GRID LEAK BIAS, AN ADEQUATE CATHODE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

Capplied for short interval (Two seconds maximum) so as not to damage Tube.

TRIPLE TRIODE

MINIATURE TYPE

COATED UNIPOTENTIAL CATHODE



HEATER

6.3±10% VOLTS 0,45 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

SMALL BUTTON 9 PIN BASE

9KA

GLASS BULB

THE 6EZ8 IS A HIGH-MU, TRIPLE TRIODE IN THE 9 PIN MINIATURE CONSTRUCTION. THE CATHODES OF SECTION 1 AND 2 HAVE A COMMON CONNECTION WITH ONE SIDE OF THE HEATER. IT WAS DESIGNED PRIMARILY FOR USE AS AN FM TUNER TUBE.

DIRECT INTERELECTRODE CAPACITANCES

	WITH A SHIELD	WITHOUT SHIELD	
GRID TO PLATE, EACH SECTION	1.5	1.5	$\mu\mu f$
INPUT, EACH SECTION	2.6	2.4	$\mu\mu f$
OUTPUT, SECTION 1	1.4	0.21	$\mu\mu f$
OUTPUT, SECTION 2	1.2	0.4	$\mu \mu d$
OUTPUT, SECTION 3	1.2	0.36	$\mu\mu f$
HEATER TO CATHODE, SECTION 3	0.15	0.17	$\mu\mu f$

A WITH EXTERNAL SHIELD #315 CONNECTED TO CATHODE OF SECTION UNDER TEST.

RATINGS

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM EACH SECTION

HEATER VOLTAGE	6.3±10%	VOLTS
MAXIMUM PLATE VOLTAGE	330	VOLTS
MAXIMUM POSITIVE DC GRID VOLTAGE	0	VOL TS
MAXIMUM NEGATIVE DC GRID VOLTAGE	50	VOLTS
MAXIMUM PLATE DISSIPATION, EACH PLATE	2.0	WAT TS
MAXIMUM TOTAL PLATE DISSIPATION, ALL PLATES	5.0	WAT TS
MAXIMUM HEATER-CATHODE VOLTAGE (SECTION 3):		
HEATER POSITIVE WITH RESPECT TO CATHODE	100	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE	100	VOLTS

CONTINUED ON FOLLOWING PAGE

- INDICATES A CHANGE.

TUNG-SOL -

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

HEATER VOLTAGE	6.3±10%	VOLTS
HEATER CURRENT	0.45	AMP.
PLATE VOLTAGE	125	VOLTS
GRID VOLTAGE	-1.0	VOLTS
AMPLIFICATION FACTOR	57	
PLATE RESISTANCE (APPROX.)	13600	OHMS
TRANSCONDUCTANCE	4200	μ MHOS
PLATE CURRENT	4.2	MA.
GRID VOLTAGE (APPROX.) Ib = 20 µAMPS.	-4	VOLTS

DESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOOEY TUBE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE TUNE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE TUBE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN TUBE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT LIFE NO DESIGN-MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY TUBE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.

PENTODE POWER AMPLIFIER

COATED UNIPOTENTIAL CATHODE

HEATERS

6F6, 6F6GT/G, 42 - 6.3 V., 0.7 AMPERE 2A5 - 2.5 V., 1.75 AMPERES

TYPES 6F6, 6F6GT/G, 2A5 AND 42 ARE PENTODE AMPLIFIERS DESIGNED FOR APPLICATION IN POWER OUTPUT STAGES OF RECEIVERS. WITH THE EXCEPTION OF HEATER RATINGS, THEIR ELECTRICAL CHARACTERISTICS ARE IDENTICAL.

MAXIMUM RATINGS

	PENTODE	CONNECTION	
MAXIMUM PLATE VOLTAGE	375	350	VOLTS
MAXIMUM SCREEN VOLTAGE	285	-	VOLTS
MAXIMUM PLATE DISSIPATION	11	_	WATTS
MAXIMUM SCREEN DISSIPATION.	3.75	_	WATTS
MAXIMUM TOTAL PLATE AND SCREEN DISSIPATION	-	10	WATTS

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER - SINGLE TUBE C

		TODE	TRIODE	
PLATE VOLTAGE	250	285	250	VOLTS
SCREEN VOLTAGE	250	285	_	VOLTS
CONTROL GRID VOLTAGE A	-16.5	-20	-20	VOLTS
PEAK AF SIGNAL VOLTAGE	16.5	20	20	VOLTS
ZERO-SIGNAL PLATE CURRENT	34	38	31	MA.
ZERO-SIGNAL SCREEN CURRENT	6.5	7	_	MA.
MAXIMUM-SIGNAL PLATE CURRENT	36	40	34	MA.
MAXIMUM-SIGNAL SCREEN CURRENT	10.5	13	_	MA.
PLATE RESISTANCE (APPROX.)	80000	78000	2600	OHMS
TRANSCONDUCTANCE	2500	2550	2600	имноs
AMPLIFICATION FACTOR	_	_	6.8	
LOAD RESISTANCE	7000	7000	4000	OHMS
TOTAL HARMONIC DISTORTION	8	9	6.5	PER CENT
POWER OUTPUT	3.2	4.8	0.85	WATTS

PUSH-PULL AMPLIFIER - TWO TUBES F

CLASS A1 AMPLIFIER C CLASS AB2 AMPLIFIER D

	PENTODE	PENTODE	TRIODE	
PLATE VOLTAGE	315	375	350	VOLTS
SCREEN VOLTAGE	285	250	_	VOLTS
CONTROL GRID VOLTAGE	-24 A	-26	-38	VOLTS
PEAK AF SIGNAL VOLTAGE (GRID TO GRID)	48	82	123	VOLTS
ZERO-SIGNAL PLATE CURRENT	62	34	48	MA.
ZERO-SIGNAL SCREEN CURRENT	12	5	-	MA .
MAXIMUM-SIGNAL PLATE CURRENT	80	82	92	MA .
MAXIMUM-SIGNAL SCREEN CURRENT	19.5	19.5	_	MA.
EFFECTIVE LOAD RESISTANCE (PLATE TO PLATE)	10000	10000	6000	OHMS
TOTAL HARMONIC DISTORTION	4	3.5	2	PER CENT
POWER OUTPUT	11	18.5	13	WATTS

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- TUNG-SOL

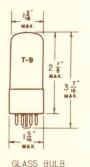
TYPICAL OPERATING CONDITIONS FOR CATHODE BIAS

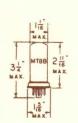
CLASS A, AMPLIFIER C

CLASS AB, AMPLIFIER D

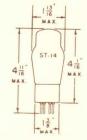
	SINGLE TUBE AMPLIFIER		PUSH-PULL AMPLI.	PUSH-PULL AMPLI.			
	Pentode	Conn.	Triode Conn.	Pentode Conn. F	Pentode Conn.	P Triode Con	n.F
Plate	250	285	250	315	375	350	Volts
Screen	250	285	-	285	250	-	Volts
Cathode Resistor	410	-	650	320	340 B	730 E	Ohms
Feak A-F Grid Voltage	16.5	20	20	-	-	-	Volts
Peak A-F Grid-to-							
Grid Voltage	-	-	-	58	94	132	Volts
Zero-Sig. Plate Cur.	34	38	31	62	54	50	Ma.
MaxSig. Plate Cur.	35	38	32	73	77	60	Ma.
Zero-Sig. Screen Cur.	6.5	7	-	12	R	-	Ma.
MaxSig. Screen Cur.	9.7	12	-	18	18	-	Ma.
Load Resistance	7000	7000	4000	-	-	-	Ohms
Effective Load Resis.							
(plate to plate)	-	-	-	10000	10000	10000	Ohms
Total Harmonic Dist.	8.5	9	6.5	3	5	3	96
MaxSig. Power Output	3.1	4.5	0.8	10.5	19	9	Watts

- A THE DC RESISTANCE IN THE GRID CIRCUIT, UNDER RATED MAXIMUM CONDITIONS, SHOULD NOT EXCEED 0.5 MEGOMM FOR SELF-BIAS OPERATION AND 0.1 MEGOMM FOR FIXED-BIAS OPERATION.
- B THE VALUE GIVEN FOR THE CATHODE RESISTOR IS DETERMINED FOR A GRID BIAS OF -21 VOLTS.
- C SUBSCRIPT 1 INDICATES THAT GRID CURRENT DOES NOT FLOW DURING ANY PART OF INPUT CYCLE.
- D SUBSCRIPT 2 INDICATES THAT GRID CURRENT FLOWS DURING SOME PART OF INPUT CYCLE.
- B THE VALUE GIVEN FOR THE CATHODE RESISTOR IS DETERMINED FOR A GRID BIAS OF -36.5 VOLTS.
- F UNLESS OTHERWISE SPECIFIED, VALUES ARE FOR 2 TUBES.





METAL SHELL



GLASS BULB

6F6GT/G

6F6

2A5 - 42



MEDIUM 7 PIN OCTAL BASE



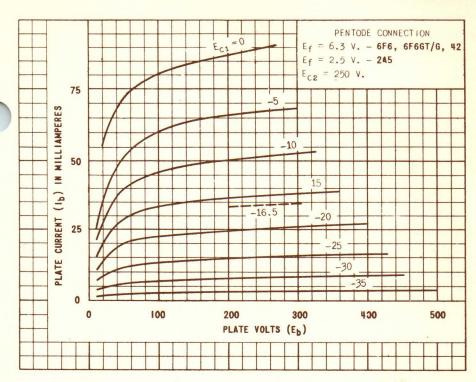
7 PIN OCTAL BASE

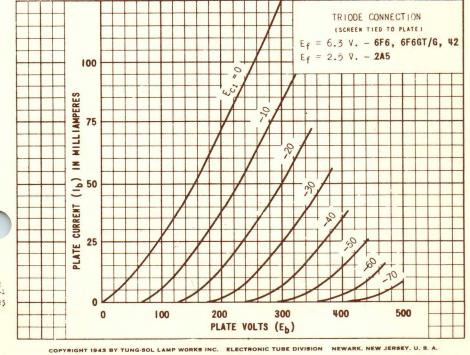


MEDIUM 6 PIN BASE

H H OEC. 15

1386-1

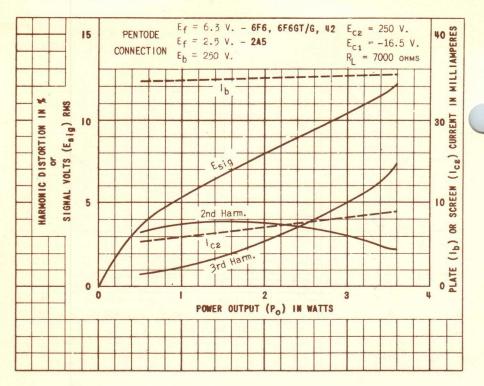




PRINTED IN U. S.

PLATE 1339-1 OCT. 25 1943

6F6, 6F6GT/G (2A5, 42)



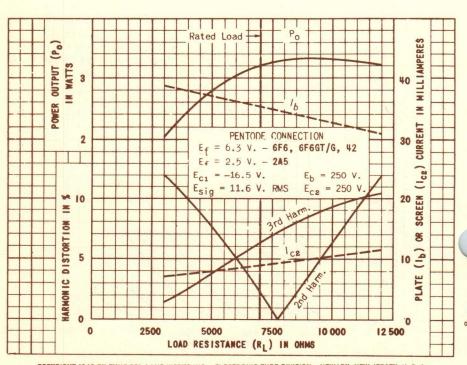
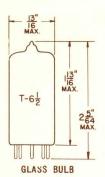


PLATE 1340-1 OCT. 25 1943



HEATER

6.3 VOLTS 0.34 AMP. ANY MOUNTING POSITION

THE TRIODE ON PINS 6,7,8 & 9 SHOULD HAVE GROUNDED CATHODE CONNECTION, AND THAT ON PINS 1,2,7,4 3 SHOULD HAVE GROUNDED GRID CONNECTION. IT IS RECOMMENDED THAT PINS 7 & 8 BE STRAPPED.



BOTTOM VIEW MINIATURE 9 PIN BASE

9 D D

THE 6FC7 IS A FRAME GRID DOUBLE TRIODE IN THE 9 PIN MINIATURE CONSTRUC-TION. IT IS INTENDED FOR USE AS A CASCODE AMPLIFIER AT FREQUENCIES UP TO 220 MEGACYCLES PER SECOND. EXCEPT FOR HEATER RATINGS, THE 6FC7 IS IDEN-TICAL TO THE 7FC7.

DIRECT INTERELECTRODE CAPACITANCES

WITH EXTERNAL SHIELD

PLATE #1 TO PLATE #2 (MAX.)	0.015	μμf
GRID #1 TO PLATE #2 (MAX.)	0.005	μμ f
GROUNDED CATHODE SECTION:		
PLATE TO GRID	1.9	μμ f
INPUT	3.8	μμf
OUTPUT	2.5	μμf
GRID TO HEATER (MAX.)	0.3	μμ f
GROUNDED GRID SECTION:		
PLATE TO GRID	4.1	μμ f
PLATE TO CATHODE	0.2	μμ f
INPUT	6.3	μμf
OUTPUT	4.5	μμ f
CATHODE TO HEATER	2.9	μμ f

RATINGS

INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM EACH SECTION

HEATER VOLTAGE	6.3	VOLTS
MAXIMUM PLATE VOLTAGE	130	VOLTS
MAXIMUM PLATE DISSIPATION	1.8	WATTS
MAXIMUM CATHODE CURRENT	22	MA.
MAXIMUM NEGATIVE GRID VOLTAGE	50	VOLTS
MAXIMUM GRID CIRCUIT RESISTANCE (GROUNDED CATHODE SECT.)	1.0	MEGOHMS
MAXIMUM GRID CIRCUIT RESISTANCE (GROUNDED GRID SECT.)	500	KOHMS
MAXIMUM HEATER TO CATHODE VOLTAGE (RMS)	50	VOLTS
MAXIMUM HEATER TO CATHODE VOLTAGE (HEATER NEGATIVE) A	180	VOLTS

AMAXIMUM DC COMPONENT 130 V.

TUMG-SOL

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CHARACTERISTICS

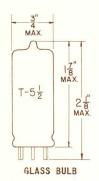
EACH SECTION

HEATER VOLTAGE	6.3	VOLTS
HEATER CURRENT	0.34	AMP.
PLATE VOLTAGE	90	VOLTS
PLATE CURRENT	15	MA.
GRID VOLTAGE	-1.2	VOLTS
MUTUAL CONDUCTANCE	12 000	µмноs
NOISE FACTOR (IN CASCODE CIRCUIT)	5.5	dB

TUNG-SOL .

PENTODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE
HEATER

6.3±10% VOLTS 0.2 AMP. AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
7 PIN BASE
764

THE 6FG5 IS A "SHADOW GRID" BEAM PENTODE IN THE 7 PIN MINIATURE CONSTRUCTION. IT HAS AN INTERNALLY CONNECTED GRID BETWEEN THE CONTROL GRID AND THE SCREEN GRID WHICH SERVES TO REDUCE THE RATIO OF SCREEN CURRENT TO PLATE CURRENT. THE TUBE IS DESIGNED FOR USE AS A RADIO-FREQUENCY AMPLIFIER IN VHF TELEVISION RECEIVERS.

DIRECT INTERELECTRODE CAPACITANCES WITHOUT EXTERNAL SHELD

GRID #1 TO PLATE (MAX.) (G1 TO P)	0.02	μμ f
INPUT: G1 TO (H+K+G2+G3+B.P.)	4.2	μμ f
OUTPUT: P TO (H+K+G2+G3+B.P.)	2.8	μμ f

RATINGS

INTERPRETED	ACCORDING TO DESIGN	MAXIMUM	SYSTE		

HEATER VOLTAGE	6.3±10%	VOLTS
MAXIMUM PLATE VOLTAGE	275	VOLTS
MAXIMUM SCREEN VOLTAGE	275	VOLTS
MAXIMUM POSITIVE DC GRID #1 VOLTAGE	0	VOLTS
MAXIMUM NEGATIVE DC GRID #1 VOLTAGE	50	VOLTS
MAXIMUM PLATE DISSIPATION	2.75	WATTS
MAXIMUM SCREEN DISSIPATION	0.15	WATTS
MAXIMUM DC CATHODE CURRENT	20	MA.
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC COMPONENT	100	VOLTS
TOTAL DC AND PEAK	200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	200	VOLTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE	3.3	MEGOHMS

TUNG-SOL .

CONTINUED FROM PRECEDING PAGE

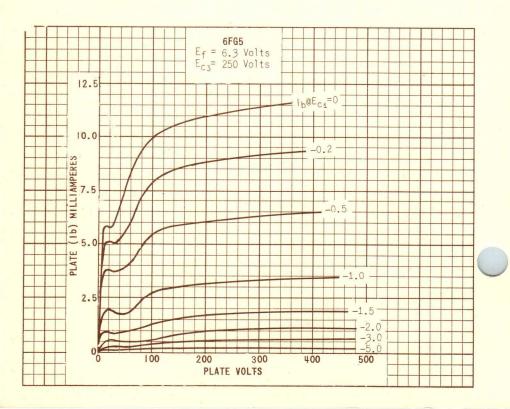
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

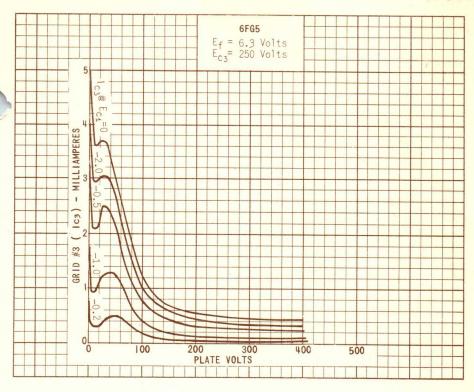
AVERAGE CHARACTERISTICS

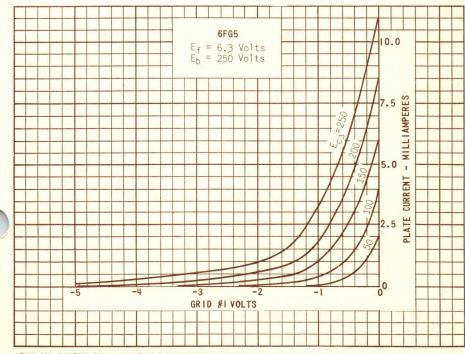
HEATER VOLTAGE	6.3±10%	VOLTS
HEATER CURRENT	0.2	AMP.
PLATE VOLTAGE	250	VOLTS
SCREEN VOLTAGE	250	VOLTS
GRID #1 VOLTAGE	-0.2	VOLTS
PLATE RESISTANCE (APPROX.)	0.25	MEGOHMS
TRANSCONDUCTANCE	9500	µмноs
PLATE CURRENT	9.0	MA.
SCREEN CURRENT	0.42	MA.

GRID #1 VOLTAGE (APPROX.) Gm = 100μ MHOS -5 VOLTS

DESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE, MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND INFOURDED THE MOST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.

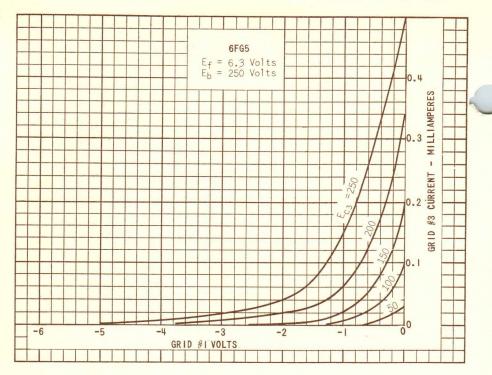


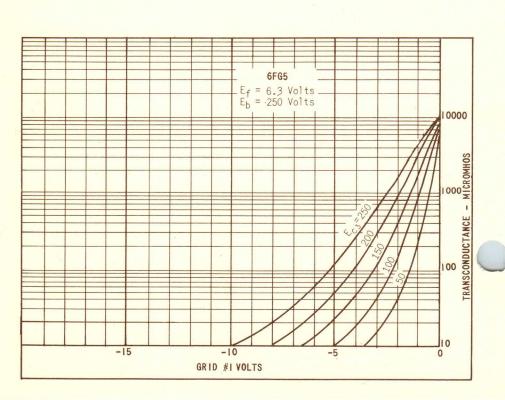


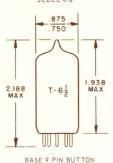


TUNG-SOL ELECTRIC INC., ELECTRON TUBE DIVISION, BLOOMFIELD, NEW JERSEY, U.S.A. AUGUST 1, 1960 PLATE \$5939

PRINTED IN U. S. A.





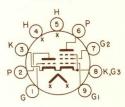


JEDEC E9-1

FOR USE IN VHF TV RECEIVERS

COATED UNIPOTENTIAL CATHODE ANY MOUNTING POSITION

BASING DIAGRAM JEDEC 9GF



BOTTOM VIEW

THE 6FG7 IS A MEDIUM-MU TRIODE AND SHARP-CUTOFF PENTODE IN THE 9-PIN MINIATURE CON-STRUCTION, IT IS DESIGNED FOR USE AS A COMBINED TRIODE OSCILLATOR AND PENTODE MIXER IN VHF TELEVISION RECEIVERS. EXCEPT FOR HEATER CHARACTERISTICS AND RATINGS, THE 6FG7 IS IDENTICAL TO THE 5FG7.

DIRECT INTERELECTRODE CAPACITANCES

***		SHIELD #315		
			0	
SHIELD	CATHO	DE		
1.8	1.8	pf		
3	. 3	pf		
1.3	1.9	pf		
0.02	0.01	pf		
5	5	pf		
2.4	3.4	pf		
6	6 A	pf		
	1.8 3 1.3 0.02	1.8 1.8 3 3 3 1.3 1.9 0.02 0.01 5 5 2.4 3.4	SHIELD CATHODE 1.8 1.8 pf 3 3 pf 1.3 1.9 pf 0.02 0.01 pf 5 5 pf 2.4 3.4 pf	

A - SHIELD #315 CONNECTED TO GROUND

TUNG-SOL .

CONTINUED FROM PRECEDING PAGE

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS	450	mA
HEATER WARM-UP TIME		11	SECONDS
LIMITS OF SUPPLIED CURRENT	450	+ 30	mΑ
LIMITS OF APPLIED VOLTAGE	6.3 ±	0.6	VOLTS
PEAK HEATER - CATHODE VOLTAGE - EACH UNIT:			
HEATER NEGATIVE WITH RESPECT TO CATHODE		200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE		200	VOLTS
DC COMPONENT		100	VOLTS

MAXIMUM RATINGS

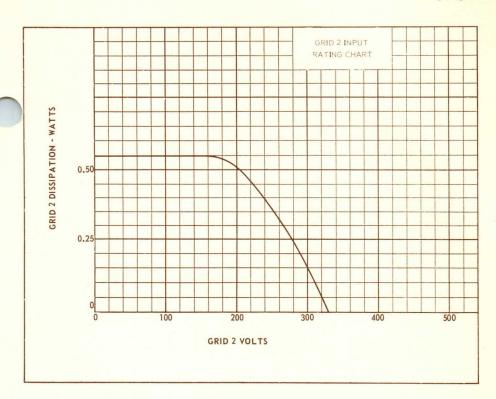
DESIGN MAXIMUM RATINGS . SEE EIA STANDARD RS-239

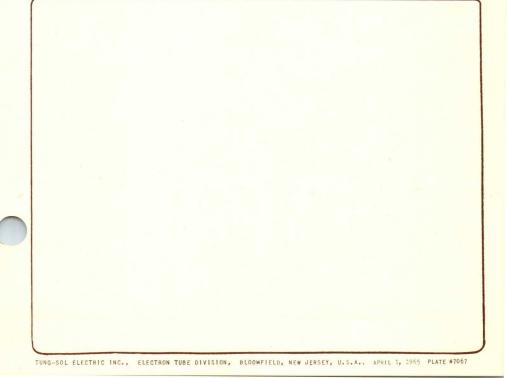
	TRIODE	PENTODE	
	UNIT	UNIT	
PLATE VOLTAGE	330	330	VOLTS
GRID 2 SUPPLY VOLTAGE		330	VOLTS
GRID 2 VOLTAGE	SEE RA	TING CHART	
GRID 1 VOLTAGE:			
POSITIVE * BIAS VALUE	0	0	VOLTS
GRID 2 INPUT:			
FOR GRID 2 VOLTAGES UP TO 165 VOLTS		0.55	WATT
FOR GRID 2 VOLTAGES BETWEEN 165 AND 330 VOLTS	SEE RA	TING CHART	
PLATE DISSIPATION	2.5	3	WATTS

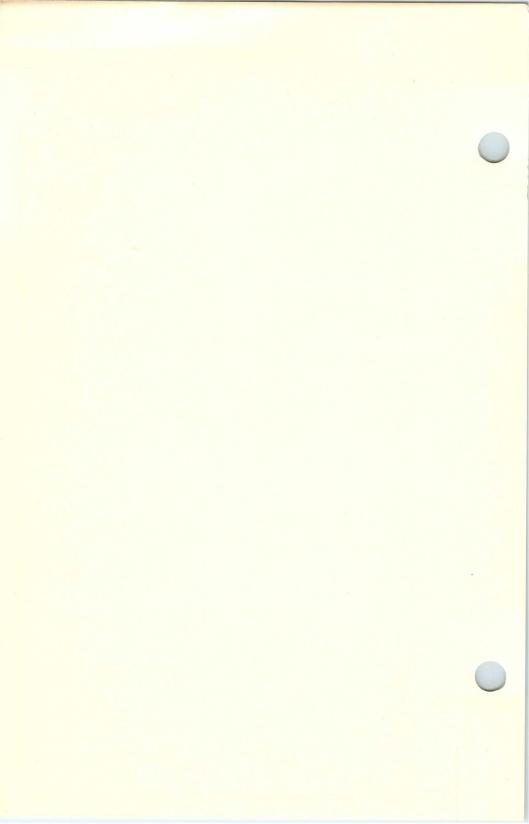
CHARACTERISTICS

CLASS A1 AMPLIFIER

	TRIODE UNIT	PENT		
PLATE VOLTAGE	125	100	125	VOLTS
GRID 2 VOLTAGE	_	100	125	VOLTS
GRID 1 VOLTAGE	-1	0	-1	VOLTS
PLATE CURRENT	13		11	mA
GRID 2 CURRENT	_	_	4	mA
TRANSCONDUCTANCE	7,500	7,400	6,000	μMHOS.
AMPLIFICATION FACTOR	43			
PLATE RESISTANCE - APPROX.	5.7	-	180	KOHMS
GRID 1 VOLTAGE FOR IL = 30 MA - APPROX.	-6.5	-	-7.5	VOLTS

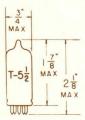






TRIODE

MINIATURE TYPE



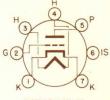
GLASS BULB SMALL BUTTON MINIATURE 7 PIN BASE E7-1 OUTLINE DRAWING JEDEC 5-2 COATED UNIPOTENTIAL CATHODE

HEATER

6.3±10% VOLTS 0.2 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

BASING DIAGRAM
JEDEC 7FP

THE 6FH5 IS A NEUTRODE TRIODE TUNER IN THE 7 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED FOR USE IN GROUNDED CATHODE RF AMPLIFIERS, WITH THE NEUTRODE CONSTRUCTION PROVIDING A LOWER GRID TO PLATE CAPACITANCE WITH CONSEQUENT EASE OF NEUTRALIZATION. THE CONVENTIONAL GRID RESULTS IN LOW INPUT CAPACITANCE. EXCEPT FOR HEATER RATINGS AND HEATER WARM-UP TIME, THE 6FH5 IS IDENTICAL TO THE 2FH5 AND 3FH5.

DIRECT INTERELECTRODE CAPACITANCES

	WITH ^A SHIELD	WITHOUT	
GRID TO PLATE: G TO P (MAX.) (BOGEY)	→ 0.52	→0.52	pf
INPUT: G TO (H+K+I.S.)	3.2	3.2	pf
OUTPUT: P TO (H+K+I.S.)	4.0	3.2	pf

WITH EXTERNAL SHIELD #316 CONNECTED TO PIN #1.

RATINGS

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

	HEATER VOLTAGE	6.3±10%	VOLTS
	MAXIMUM PLATE VOLTAGE	150	VOLTS
	MAXIMUM GRID VOLTAGE (POSITIVE)	0	VOLT
	MAXIMUM PLATE DISSIPATION	2.2	WATTS
	MAXIMUM DC CATHODE CURRENT	22	MA.
	MAXIMUM GRID CIRCUIT RESISTANCE	1.0	MEGOHM
-	MAXIMUM DC HEATER-CATHODE VOLTAGE: TOTAL DC AND PEAK:		
	HEATER NEGATIVE WITH RESPECT TO CATHODE	100	VOLTS
	HEATER POSITIVE WITH RESPECT TO CATHODE	100	VOLTS

⁻INDICATES A CHANGE.

TUNG-SOL .

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

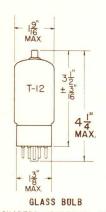
CLASS A AMPLIFIER

HEATER VOLTAGE	6.3±10%	VOLTS
HEATER CURRENT	0.2	AMP.
PLATE VOLTAGE	135	VOLTS
GRID VOL TAGE	-1.0	VOLT
PLATE RESISTANCE (APPROX.)	5600	OHMS
TRANSCONDUCTANCE	9000	μMHOS
AMPLIFICATION FACTOR	50	
PLATE CURRENT	11	MA.
GRID VOLTAGE (APPROX.) FOR 100 µA PLATE CURRENT	-5.5	VOLTS

DESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT LIFE NO DESIGN-MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.

TUNG-SOL -

PENTODE



COATED UNIPOTENTIAL CATHODE

HEATER 6.3 VOLTS 1.2 AMP. AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW SHORT MEDIUM SHELL 7 PIN OCTAL 6 A M

SKIRTED MINIATURE CAP

THE 6FH6 IS A BEAM POWER PENTODE DESIGNED FOR USE AS A HORIZONTAL DE-FLECTION AMPLIFIER IN TELEVISION RECEIVERS.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

GRID #1 TO PLATE	0.4	μμ f
INPUT	33	$\mu\mu f$
OUTPUT	8	μμ f

RATINGS
INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM A HORIZONTAL DEFLECTION AMPLIFIER B

HEATER VOLTAGE	6.3	VOLTS
MAXIMUM DC PLATE SUPPLY VOLTAGE		
(BOOST + DC POWER VOLTAGE)	770	VOLTS
MAXIMUM PEAK POSITIVE PLATE VOLTAGE	6 000	VOLTS
MAXIMUM PEAK NEGATIVE PLATE VOLTAGE	1 500	VOLTS
MAXIMUM PLATE DISSIPATION ^C	17	WATTS
MAXIMUM PEAK NEGATIVE GRID #1 VOLTAGE	300	VOLTS
MAXIMUM DC GRID #2 VOLTAGE	220	VOLTS
MAXIMUM GRID #2 DISSIPATION	3.6	WATTS
MAXIMUM AVERAGE CATHODE CURRENT	155	MA.
MAXIMUM PEAK CATHODE CURRENT	500	MA.
MAXIMUM GRID #1 CIRCUIT RESISTANCE (SELF BIAS)	1.0	MEG.
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC	100	VOLTS
TOTAL DC AND PEAK	200	VOLTS
MAXIMUM BULB TEMPERATURE (AT HOTTEST POINT)	240	°C

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

HEATER VOLTAGE	6.3	VOLTS
HEATER CURRENT	1.2	AMP.
PLATE VOLTAGE	250	VOLTS
GRID #2 VOLTAGE	150	VOLTS
GRID #1 VOLTAGE	-22.5	VOLTS
PLATE CURRENT	75	MA.
GRID #2 CURRENT	1.7	MA.
TRANSCONDUCTANCE	6 000	имноs
TRIODE AMPLIFICATION FACTORD	4.3	
PLATE RESISTANCE	12 000	OHMS
Ec1 FOR Ib = 1.0 MA.	-53	VOLTS

ZERO BIAS CHARACTERISTICS

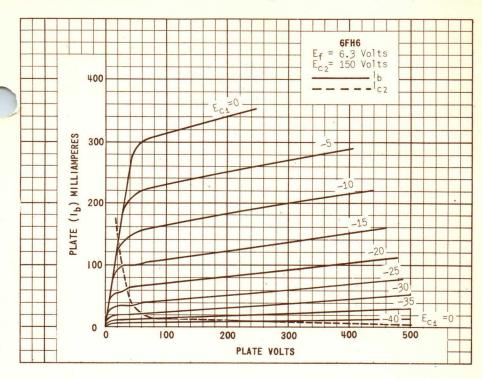
PLATE VOLTAGE	60	VOLTS
GRID #2 VOLTAGE	150	VOLTS
GRID #1 VOLTAGE	0	VOLTS
PLATE CURRENT (INSTANTANEOUS VALUE)	300	MA -
GRID #2 CURRENT (INSTANTANEOUS VALUE)	15	MA.

DESIGN-MAXIMUM RATINGS ARELIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGET ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD MOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT LIFE NO DESIGN-MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT COMPONENT VARIATION,

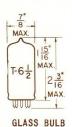
BFOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE.

CIN STAGES OPERATING WITH GRID LEAK BIAS, AN ADEQUATE CATHODE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

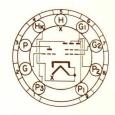
 $^{
m D}$ $_{
m E_B}$ T I ED TO $_{
m C_2}$ WITH 150 VDC APPLIED AND $_{
m C_1}$ =-22.5.







COATED UNIPOTENTIAL CATHODE HEATER 6.3±10% VOLTS 0.45 AMP. AC OR DC ANY MOUNTING POSITION



BOTTOM VIEW SMALL-BUTTON 9 PIN NOVAL 9 K P

THE 6FH8 IS A MEDIUM-MU TRIODE AND A SHARP CUTOFF TETRODE IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED FOR USE IN HARMONIC-GENERATOR APPLICATIONS, WITH THE TETRODE UNIT EMPLOYING THREE PLATES.

DIRECT INTERELECTRODE CAPACITANCESA

TRIODE UNIT:

GRID TO PLATE	1.4	μμ f
GRID TO CATHODE AND HEATER	2.6	μμ f
PLATE TO CATHODE AND HEATER	1	μμ f
Andrews and Markets		

TETRODE UNIT:

GRID #1 TO PLATE #1 (MAX.)	0.060	μμ f
GRID #1 TO CATHODE, HEATER, GRID #2, PLATE #2 	4.5	μμ f
PLATE #1 TO CATHODE, HEATER, GRID #2, PLATE #2 & #3	1.4	$\mu\mu$ f
TETRODE GRID #1 TO TRIODE PLATE (MAX.)	0.35	μμ f
TETRODE PLATE #1 TO TRIODE PLATE (MAX.)	0.008	μμ f

A WITH EXTERNAL SHIELD *315 CUNNECTED TO CATHODE.

RATINGS

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

HARMONIC-GENERATOR SERVICE

	TRIODE	TETRODE	
HEATER VOLTAGE	6.3±]	.0%	VOLTS
MAXIMUM PLATE VOLTAGE (MAX.)	275		VOLTS
MAXIMUM PLATE #1 VOLTAGE		275	VOLTS
MAXIMUM PLATE #2 VOLTAGE		200	VOLTS
MAXIMUM PLATE #3 VOLTAGE		200	VOLTS
MAXIMUM GRID #2 SUPPLY VOLTAGE		275	VOLTS

70 µMHOS

TUNG-SOL

CONTINUED FROM PRECEDING PAGE

RATINGS - cont'd.

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

HARMONIC-GENERATOR SERVICE

	TRIODE	TETRODE	
MAXIMUM GRID #2 (SCREEN-GRID) VOLTAGE	SEE RATIN	G CHART	
MAXIMUM GRID #1 (CONTROL-GRID) VOLTAGE:			
NEGATIVE-BIAS VALUE	40	40	VOLTS
POSITIVE-BIAS VALUE	0	0	VOLTS
MAXIMUM PLATE DISSIPATION	1.7		WATTS
MAXIMUM PLATE #1 DISSIPATION		2.3	WATTS
MAXIMUM PLATE #2 DISSIPATION		0.3	WATT
MAXIMUM PLATE #3 DISSIPATION		0.3	WATT
MAXIMUM GRID #2 INPUT:			
FOR GRID #2 VOLTAGES UP TO 137.5 VOLTS		0.45	WATT
FOR GRID #2 VOLTAGES BETWEEN			
137.5 AND 275 VOLTS	SEE RATIN	G CHART	
MAXIMUM CIRCUIT VALUES:			
GRID #1 CIRCUIT RESISTANCE:	0 5	0 =	
FOR FIXED—BIAS OPERATION	0.5	0.5	MEGOHM

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CHARACTERISTICS - CLASS A1 AMPLIFIER

TRIODE UNIT

HEATER VOLTAGE	6.3±10%	VOLTS
HEATER CURRENT	0.45	AMP.
PLATE VOLTAGE	100	VOLTS
GRID VOLTAGE	-1	VOLT
AMPLIFICATION FACTOR	40	65
PLATE RESISTANCE (APPROX.)	7400	QHMS
TRANSCONDUCTANCE	5400	µмноs
PLATE CURRENT	7.9	MA.
GRID VOLTAGE (APPROX.) FOR PLATE CURRENT OF $100~\mu\mathrm{A}$	-7	VOLTS

TETRODE UNIT

WITH PLATE #2 & #3 CONNECTED TO CATHODE

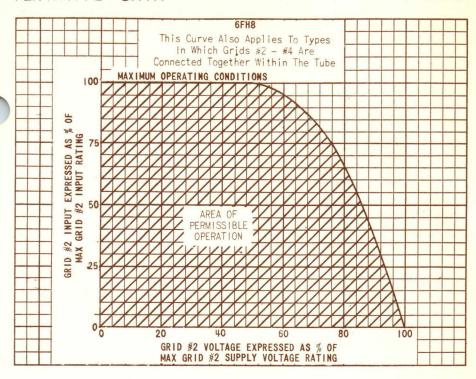
PLATE #1 VOLTAGE	250	VOLTS
GRID #2 VOLTAGE	250	VOLTS
GRID #1 VOLTAGE	-2	VOLTS
PLATE #1 RESISTANCE (APPROX.)	750 000	OHMS
TRANSCONDUCTANCE, GRID #1 TO PLATE #1	4400	µмноs
PLATE #1 CURRENT	7.3	MA.
GRID #2 CURRENT	1.4	MA.
GRID #1 VOLTAGE (APPROX.) FOR PLATE #1 CURRENT OF 1004A	-7	VOLTS

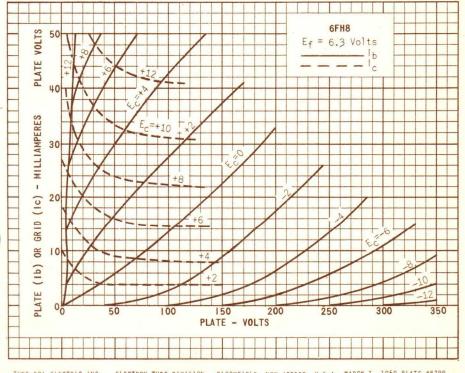
HARMONIC-GENERATOR SERVICE

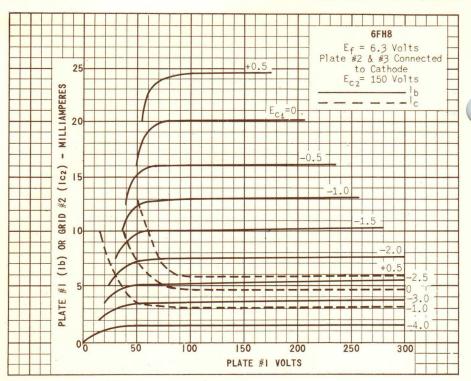
TYPICAL OPERATION WITH SEPARATE PLATE OPERATION

HEATER VOLTAGE	6.3±10%	VOLTS
HEATER CURRENT	0.45	AMP.
PLATES #1, #2 & #3 VOLTAGE	100	VOLTS
GRID #2 VOLTAGE	50	VOLTS
GRID #1 VOLTAGE	-1	VOLT
PLATE #1 CURRENT	1.6	MA.
PLATE #2 CURRENT	0.04	MA -
PLATE #3 CURRENT	0.04	MA.
GRID #2 CURRENT	0.3	MA.
TRANSCONDUCTANCE (APPROX.):		
GRID #1 TO PLATE #1	2500	µмноs
GRID #1 TO PLATE #2	70	µмноѕ

GRID #1 TO PLATE #3

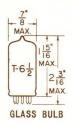






DUPLEX-DIODE TRIODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER

6.3 VOLTS 0.45 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

SMALL BUTTON 9 PIN BASE

9KR

THE 6FM8 IS A DUPLEX-DIODE, HIGH-MU TRIODE WITH SEPARATE CATHODES FOR EACH OF THE DIODE SECTIONS AND THE TRIODE SECTION. THE TUBE IS DESIGNED PRIMARILY FOR USE AS AN FM DETECTOR AND AF VOLTAGE AMPLIFIER.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

TRIODE GRID TO PLATE	1.8	μμ f
TRIODE INPUT	1.5	μμ f
TRIODE OUTPUT	0.16	μμ f
GRID TO DIODE #1 PLATE	0.05	μμ f
GRID TO DIODE #2 PLATE	0.04	μμ f
DIODE #1 INPUT	2.4	μμf
DIODE #2 INPUT	2.2	$\mu\mu$ f
DIODE #1 CATHODE TO ALL	4.6	μμ f
DIODE #2 CATHODE TO ALL	4.8	μμ f

RATINGS

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

HEATER VOLTAGE	6.3	VOLTS
MAXIMUM PLATE VOLTAGE	330	VOLTS
MAXIMUM POSITIVE DC GRID VOLTAGE	0	VOLTS
MAXIMUM PLATE DISSIPATION	1.1	WATTS
MAXIMUM HEATER-CATHODE VOLTAGE;		
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC COMPONENT	100	VOLTS
TOTAL DC AND PEAK	200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	200	VOLTS
MAXIMUM DIODE CURRENT FOR CONTINUOUS OPERATION		
(EACH DIODE)	5.0	MA.

TUNG-SOL .

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITION AND CHARACTERISTICS

CLASS A1 AMPLIFIER

HEATER VOLTAGE	6.3	VOLTS
HEATER CURRENT	0.45	AMP.
PLATE VOLTAGE	250	VOLTS
GRID VOLTAGE	-3.0	VOLTS
AMPLIFICATION FACTOR	70	102.0
PLATE RESISTANCE (APPROX.)	58000	OHMS
TRANSCONDUCTANCE	1200	имноs
PLATE CURRENT	1.0	MA.
AVERAGE DIODE CURRENT, EACH DIODE		
WITH 5.0 VOLTS DC APPLIED	20	MA.

DESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT LIFE NO DESIGN-MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT CONFORM VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.

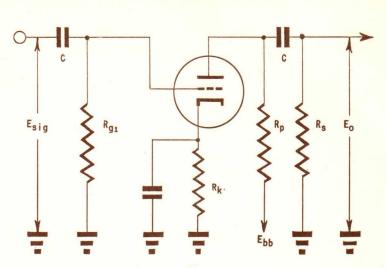
RESISTANCE COUPLED AMPLIFIER

Rp	Rs	Rg1	Ebb	= 90 V	OLTS	Ерр	= 180	VOLTS	Ebb	= 300	VOLTS
MEG.	ME G.	MEG.	Rk	GAIN	Eo	Rk	GAIN	Eo	Rk	GAIN	Eo
0.10	0.10	0.10	5700 6100	21 26	7.0 9.0	2400 2700	29 34	18 23	1800 2000	33 38	35 42
0.24	0.24	0.10	9100 10000	30 34	10 13	4300 4700	40 45	24 31	3000 3300	44 49	43 52
0.51 0.51	0.51	200 B 100 B 100 B	15000 16000	37 40	14 16	7500 8200	47 50	28 35	5600 6200	51 55	50 60
0.24	0.24 0.51	10 10	0	31 37	5.0 7.0	0	44 49	19 25	0	48 52	40 52
0.51 0.51	0.51	10 10	0	39 42	7.5 10	0	51 54	22 28	0	54 58	44 56

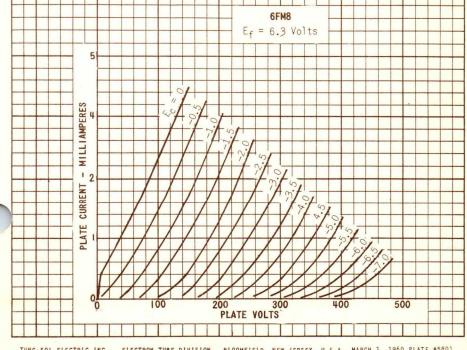
EO IS MAXIMUM RMS VOLTAGE OUTPUT FOR FIVE PERCENT TOTAL HARMONIC DISTORTION.

GAIN MEASURED AT 2.0 VOLTS RMS OUTPUT.

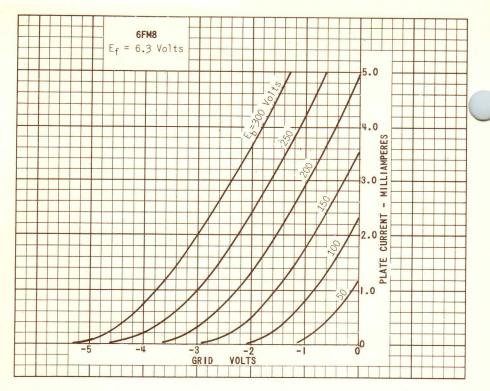
FOR ZERO-BIAS DATA, GENERATOR IMPEDANCE IS NEGLIGIBLE.

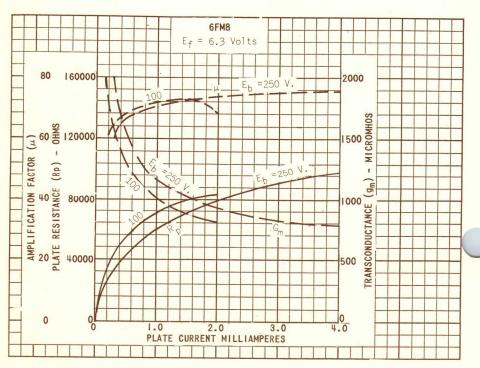


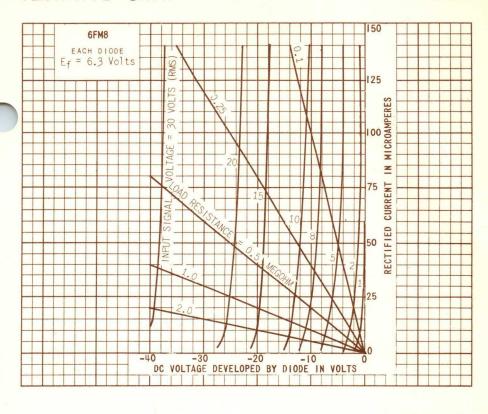
NOTES: COUPLING CAPACITORS (C) SHOULD BE SELECTED TO GIVE DESIRED FREQUENCY RESPONSE. R SHOULD BE ADEQUATELY BY-PASSED

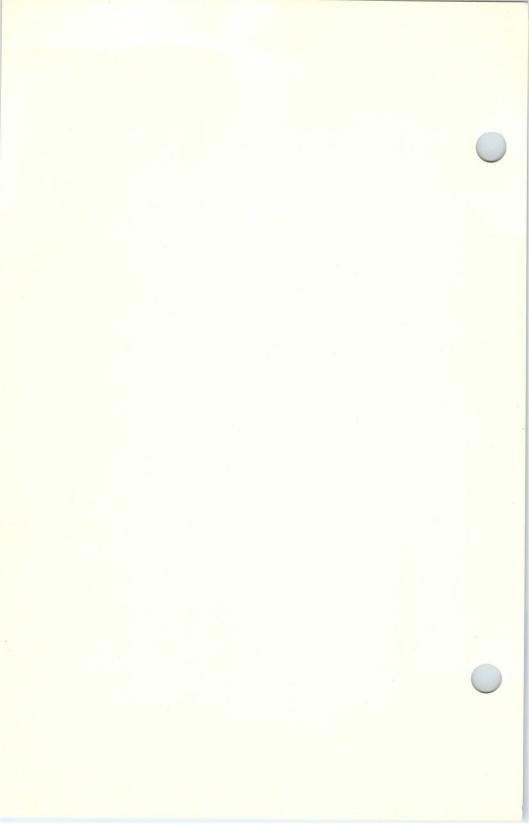


TUNG-SOL ELECTRIC INC., ELECTRON TUBE DIVISION, BLOOMFIELD, NEW JERSEY, U.S.A.. MARCH 1, 1960 PLATE #5801



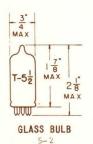






TRIODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER

6.38 VOLTS 0.18 AMP.

ANY MOUNTING POSITION



BOTTOM VIEW

MINIATURE BUTTON 7 PIN BASE 7 FP

THE 6FQ5 IS A SEMI-REMOTE CUTOFF TRIODE IN THE 7 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED FOR USE AS A VHF AND RF AMPLIFIER AT A B+ OF 135 $\,$ VOLTS. EXCEPT FOR HEATER RATINGS AND HEATER WARM-UP TIME, THE 6F05 IS MDENTICAL TO THE 2F05 AND THE 3F05.

DIRECT INTERELECTRODE CAPACITANCES

WITH EXTERNAL SHIELD

GRID TO PLATE	0.4	μμ f
INPUT: G TO (H+K+1.S.+E.S.)	4.8	μμf
OUTPUT: P TO (H+K+1.S.+E.S.)	4.0	µµ f
HEATER TO CATHODE	2.8	μμf

RATINGS INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

HEATER VOLTAGED	6.3±0.6	VOLTS
MAXIMUM PLATE VOLTAGE	200	VOLTS
MAXIMUM PLATE DISSIPATION	2.5	WATTS
MAXIMUM DC CATHODE CURRENT	22	MA.
MAXIMUM NEGATIVE GRID VOLTAGE	50	VOLTS
MAXIMUM GRID CIRCUIT RESISTANCE (SELF BIAS)	1.0	MEGOHMS
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	100	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	100	VOLTS

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

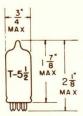
CLASS A1 AMPLIFIER

HEATER VOLTAGED	6.3±0.6	VOLTS
HEATER CURRENT ^D	0.18 ^A	AMP.
PLATE VOLTAGE	135	VOLTS
GRID VOLTAGE	-1.2	VOLTS
PLATE CURRENT	11.5	MA.
TRANSCONDUCTANCE	11 000	µмноs
AMPLIFICATION FACTOR	60	
PLATE RESISTANCE (APPROX.)	5 500	OHMS
EC FOR Ib = $100 \mu A$ (APPROX.)	-5	VOLTS

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NOTES

- ATHE BOGEY VALUE OF VOLTAGE/CURRENT PRECEDING THIS NOTE IS OBTAINED WHEN OPERATING THE HEATER WITH THE SPECIFIED VALUE OF CURRENT/VOLTAGE.
- BFOR SERIES/PARALLEL OPERATION OF HEATERS, EQUIPMENT SHOULD BE DESIGNED THAT AT NORMAL SUPPLY VOLTAGE BOGEY TUBES WILL OPERATE AT THIS VALUE OF HEATER/CURRENT VOLTAGE.
- C DESIGN-MAXIMUM PATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD HOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEBELLITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT LIFE NO DESIGN.—MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING COMDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND FNVIRONMENTAL CONDITIONS.
- DHEATER VOLTAGE SUPPLY VARIATIONS SHALL BE RESTRICTED TO MAINTAIN HEATER VOLTAGE/CURRENT WITHIN THE SPECIFIED TOLERANCE.
- *HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80≴ OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.



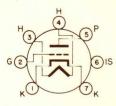
GLASS BULB
MINIATURE BUTTON
7 PIN BASE E7-1
OUTLINE DRAWING
JEDEC 5-2

COATED UNIPOTENTIAL CATHODE

HEATER

6.3B VOLTS 0.18 AMP.

ANY MOUNTING POSITION



BOTTOM VIEW

BASING DIAGRAM
JEDEC 7FP

THE 6F05A IS A SEMI-REMOTE CUTOFF TRICDE IN THE 7 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED FOR USE AS A VHF AND RF AMPLIFIER AT A B+ OF 135 VOLTS. EXCEPT FOR HEATER RATINGS AND HEATER WARM-UP TIME, THE 6F05A IS IDENTICAL TO THE 2F05A AND THE 3F05A.

DIRECT INTERELECTRODE CAPACITANCES

GRID TO	PLATE	0.52	pf
INPUT:	G TO (H+K+1.S.+E.S.)	5.0	pf
OUTPUT:	P TO (H+K+1.S.+E.S.)	3.5	pf
HEATER	TO CATHODE	2.5	pf

RATINGS INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM C

HEATER VOLTAGED	6.3±0.6	VOLTS
MAXIMUM PLATE VOLTAGE	200	VOLTS
MAXIMUM PLATE DISSIPATION	2.5	WATTS
MAXIMUM DC CATHODE CURRENT	22	MA.
MAXIMUM NEGATIVE GRID VOLTAGE	50	VOLTS
MAXIMUM GRID CIRCUIT RESISTANCE (SELF BIAS)	1.0	MEGOHMS
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	100	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	100	VOLTS

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER

_		
HEATER VOLTAGED	6.3±0.6	VOLTS
HEATER CURRENT ^D	0.18	AMP.
PLATE VOLTAGE	135	VOLTS
GRID VOLTAGE	-1.2	VOLTS
PLATE CURRENT	8.9	MA.
TRANSCONDUCTANCE	12000	µмноs
AMPLIFICATION FACTOR	74	
PLATE RESISTANCE (APPROX.)	6300	OHMS
EC FOR Ib = 100 HA (APPROX.)	-4.5	VOLTS

TUNG-SOL -

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NOTES

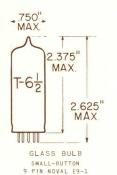
BFOR SERIES/PARALLEL OPERATION OF HEATERS, EQUIPMENT SHOULD BE DESIGNED THAT AT NORMAL SUPPLY VOLTAGE BOGEY TUBES WILL OPERATE AT THIS VALUE OF HEATER/CURRENT VOLTAGE.

C.
DESIGN-MAXINUM PATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE
TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD
NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE
WALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE
EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE
EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT LIFE NO DESIGN-MAXIMUM
WALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE
OPERATING COMDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, FOULPMENT COMPONENT VARIATION
EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND FNVIRONMENTAL CONDITIONS.

 $D_{
m HEATER}$ VOLTAGE SUPPLY VARIATIONS SHALL BE RESTRICTED TO MAINTAIN HEATER VOLTAGE/CURRENT WITHIN THE SPECIFIED TOLERANCE.

TWIN TRIODE

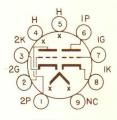
MINIATURE TYPE



OUTLINE DRAWING JEDEC 6-3 COATED UNIPOTENTIAL CATHODE

FOR SERIES STRING OPERATION
IN TELEVISION RECEIVERS

ANY MOUNTING POSITION



BOTTOM VIEW

BASING DIAGRAM
JEDEC 9LP

THE 6FQ7 IS A GENERAL PURPOSE, MEDIUM—MU TWIN TRIODE IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS INTENDED PRIMARILY FOR USE AS A VERTICAL—DEFLECTION OSCILLATOR AND HORIZONTAL—DEFLECTION OSCILLATOR IN TE_EVISION RECEIVERS. THE 6FQ7 MAY ALSO BE USED IN PHASE—INVERTER, MULTIVIBRATOR, SYNC—SEPARATOR, SYNC—AMPLIFIER, AND IN RESISTANCE—COUPLED AF AMPLIFIER CIRCUITS OF ELECTRONIC EQUIPMENT.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

WITHOUT EXTERNAL SHIELD

	UNIT #1	UNIT #2	
GRID TO PLATE	3.6	3.8	pf
GRID TO CATHODE AND HEATER	2.4	2.4	pf
PLATE TO CATHODE AND HEATER	0.34	0.26	pf
PLATE OF UNIT #1 TO PLATE OF UNIT #2	1.	0	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIUMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS	600	MA
HEATER SUPPLY LIMITS:			
VOLTAGE OPERATION		6.3±0.6	VOLTS
CURRENT OPERATION		600±36	MA.
MAXIMUM PEAK HEATER-CATHODE VOLTAGE:			
HEATER NEGATIVE WITH RESPECT TO CAT	HODE	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CAT	HODE	200	VOLTS
HEATER WARM-UP TIME (APPROX.) *		11	SECONDS

• THE DC COMPONENT MUST NOT EXCEED 100 VOLTS.

HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

- TUNG-SOL

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MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

CLASS A1 AMPLIFIER

VALUES ARE FOR EACH UNIT

PLATE VOLTAGE	330	VOLTS
GRID VOLTAGE:		
POSITIVE-BIAS VALUE	0	VOLTS
CATHODE CURRENT	22	MA.
PLATE DISSIPATION:		
EITHER PLATE	4	WATTS
BOTH PLATES (BOTH UNITS OPERATING)	5.7	WATTS
MAX. CIRCUIT VALUES:		
GRID-CIRCUIT RESISTANCE:		
FOR FIXED -BIAS OPERATION	1	MEGOHM

HORIZONTAL-DEFLECTION OSCILLATOR B

DC PLATE VOLTAGE PEAK NEGATIVE—PULSE GRID VOLTAGE C	330 660	VOLTS VOLTS
CATHODE CURRENT: PEAK	330	MA.
DC	22	MA.
PLATE DISSIPATION:		
EITHER PLATE	4	WATTS
BOTH PLATES (BOTH UNITS OPERATING)	5.7	WATTS
MAX. CIRCUIT VALUES:		
GRID-CIRCUIT RESISTANCE	2.2	MEGOHM

VERTICAL-DEFLECTION OSCILLATOR B VALUES ARE FOR EACH UNIT

DC PLATE VOLTAGE	330	VOLTS
PEAK NEGATIVE-PULSE GRID VOLTAGED	440	VOLTS
CATHODE CURRENT:		
PEAK	77	MA.
DC	22	MA.
PLATE DISSIPATION:		
EITHER PLATE	4	WATTS
BOTH PLATES (BOTH UNITS OPERATING)	5.7	WATTS
MAX. CIRCUIT VALUES:		
GRID-CIRCUIT RESISTANCE	2.2	MEGOHMS

CHARACTERISTICS

CLASS A1 AM	MPLIFIER		
EACH UN	TIN		
PLATE VOLTAGE	90	250	VOLTS
GRID VOLTAGE	0	-8	VOLTS
AMPLIFICATION FACTOR	20	20	
PLATE RESISTANCE (APPROX.)	6700	7700	OHMS
TRANSCONDUCTANCE	3000	2600	μMH0S
PLATE CURRENT	10	9	MA.
PLATE CURRENT FOR GRID VOLTS =-12.5		1.3	MA.
GRID VOLTAGE (APPROX.) FOR PLATE μ A=10	-7	-18	VOLTS

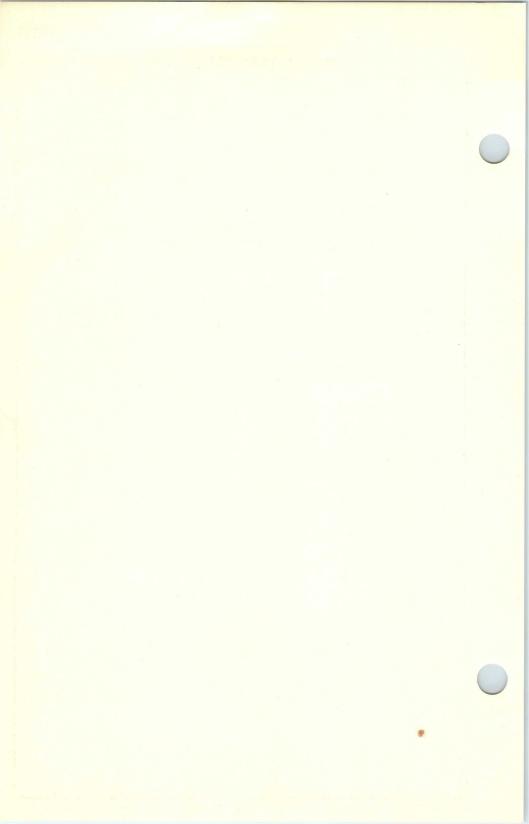
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NOTES

B FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE CONCERNING TELEVISION BROADCAST STATIONS." FEDERAL COMMUNICATIONS COMMISSION.

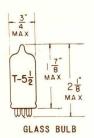
CTHIS RATING IS APPLICABLE WHERE THE DURATION OF THE VOLTAGE PULSE DOES NOT EXCEED 15 PER CENT OF ONE HORIZONTAL SCANNING CYCLE. IN A 525-LINE, 30-FRAME SYSTEM, 15 PER CENT OF ONE HORIZONTAL SCANNING CYCLE IS 10 MICROSECONDS.

DTHIS RATING IS APPLICABLE WHERE THE DURATION OF THE VOLTAGE PULSE DORS NOT EXCEED 15 PER CENT OF ONE VERTICAL SCANNING CYCLE. IN A 525-LINE, 30-FRAME SYSTEM, 15 PER CENT OF ONE VERTICAL SCANNING CYCLE IS 2.5 MILLISECONDS.



TETRODE

MINIATURE TYPE



UNIPOTENTIAL CATHODE

HEATER

6.3±10% VOLTS 0.2 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW SMALL-BUTTON MINIATURE 7 PIN BASE 7 FQ

THE 6FV6 IS A SHARP-CUTOFF TETRODE IN THE 7 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED FOR USE AS AN RF AMPLIFIER IN VHF TUNERS OF TELEVISION RECEIVERS. THIS TUBE FEATURES HIGH TRANSCONDUCTANCE AND A HIGH RATIO OF PLATE CURRENT TO GRID #2 CURRENT.

DIRECT INTERELECTRODE CAPACITANCES - APPROX. WITH EXTERNAL SHIELD *316 CONNECTED TO CATHODE

GRID #4 TO PLATE (MAX.)	0.03	µµ f
GRID #1 TO CATHODE, I.S., G2, & H.	4.5	μμf
PLATE TO CATHODE, I.S., G2, & H.	3	μμf
CATHODE TO HEATER	2.7	μμ f

RATINGS INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

CLASS A1 AMPLIFIER

HEATER VOLTAGE	6.3±10%	VOLTS
MAXIMUM PLATE VOLTAGE	275	VOLTS
MAXIMUM GRID #2 (SCREEN-GRID) SUPPLY VOLTAGE	180	VOLTS
MAXIMUM GRID #2 VOLTAGE	SEE FIG. #3	
MAXIMUM GRID #1 (CONTROL-GRID) VOLTAGE:		
POSITIVE-BIAS VALUE	0	VOLTS
MAX'IMUM CATHODE CURRENT	20	MA.
MAXIMUM GRID #2 INPUT:		
FOR GRID #2 VOLTAGES UP TO 90 VOLTS	0.5	WATT
FOR GRID #2 VOLTAGES BETWEEN 90 & 180 VOLTS	SEE FIG. #3	
MAXIMUM PLATE DISSIPATION	2	WATTS
MAXIMUM PEAK HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	200 ^A	VOLTS
MAXIMUM CIRCUIT VALUES:		
GRID #1 CIRCUIT RESISTANCE	0.5	MEGOHM

ATHE DC COMPONENT MUST NOT EXCEED 100 VOLTS.

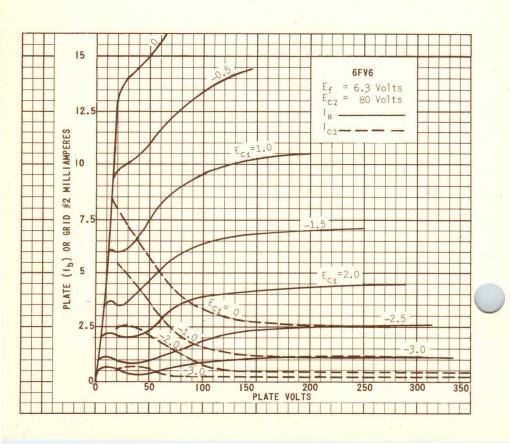
- TUNG-SOL

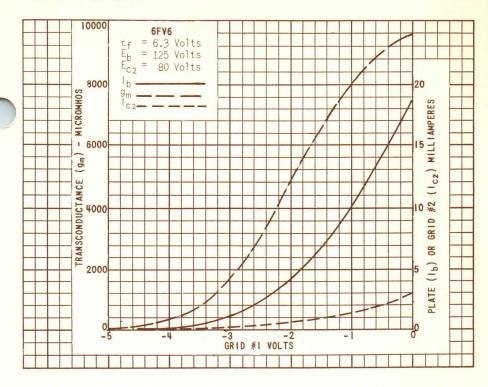
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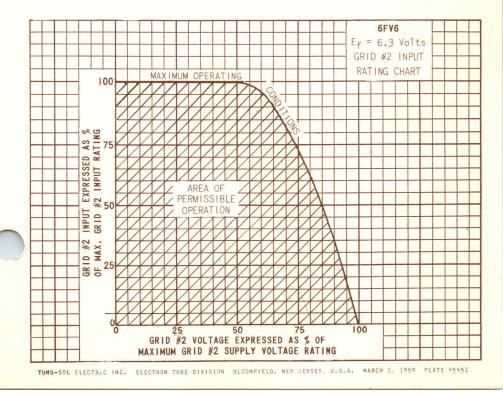
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

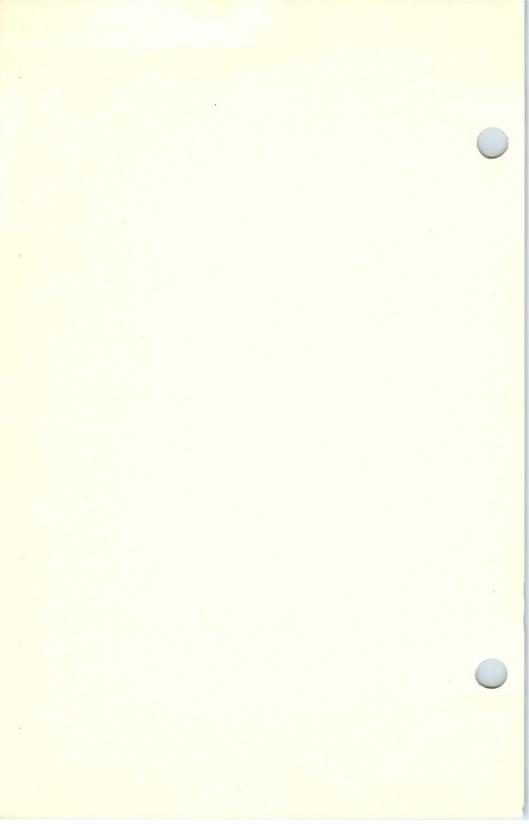
CLASS A1 AMPLIFIER

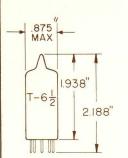
HEATER VOLTAGE	6.3±10%	VOLTS
HEATER CURRENT	0.2	AMP.
PLATE VOLTAGE	125	VOLTS
GRID #2 (SCREEN-GRID) VOLTAGE	80	VOLTS
GRID #1 (CONTROL-GRID) VOLTAGE	-1	VOLTS
PLATE RESISTANCE (APPROX.)	0.1	MEGOHM
TRANSCONDUCTANCE	8 000	µмноs
PLATE CURRENT	10	MA.
GRID #2 CURRENT	1.5	MA.
GRID #1 VOLTAGE (APPROX.)		
FOR PLATE CURRENT OF 20 μ A.	-6	VOLTS











GLASS BULB

9 PIN BASE E9-1

OUTLINE DRAWING

JEDEC 6-2

TRIODE-PENTODE MINIATURE TYPE

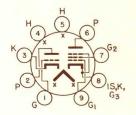
COATED UNIPOTENTIAL CATHODE

HEATER

6.3 VOLTS 0.45 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW BASING DIAGRAM JEDEC 9FA

THE 6FV8 IS A TRIODE-PENTODE USING THE 9 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED PRIMARILY FOR SERVICE IN TELEVISION RECEIVERS WITH THE TRIODE SERVING AS A VERTICAL DEFLECTION OSCILLATOR, AND THE PENTODE SERVING AS A GENERAL PURPOSE OR IF AMPLIFIER. DESIGN OF THE TUBE IS SUCH THAT HIGH VALUES OF INTERELEMENT LEAKAGE RESISTANCE ARE MAINTAINED THROUGHOUT LIFE. EXCEPT FOR HEATER RATINGS, THE 6FV8 IS IDENTICAL TO THE 5FV8.

DIRECT INTERELECTRODE CAPACITANCES

TRIODE SECTION:	SHIELD	SHIELD	
	1 0	1 0	
GRID TO PLATE	1.8	1.8	μμ f
INPUT: G TO (H+TK+1.S.)	2.8	2.8	$\mu\mu$ f
OUTPUT: P TO (H+TK+1.S.)	2.0	1.5	$\mu\mu$ f
PENTODE SECTION:			
GRID #1 TO PLATE (MAX.)	.010	.020	HH f
INPUT: G1 TO (H+PK+G2+G3+1.S.)	5.0	5.0	$\mu\mu$ f
OUTPUT: P TO (H+PK+G2+G3+I.S.)	3.0	2.0	μμ f
PENTODE PLATE TO TRIODE PLATE((MAX.)	0.03	0.15	μμ f

RATINGS INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

	TRIODE B SECTION VER-DEF OSC.	PENTODE SECTION CLASS A AMPLIFIER	
		7-0	
MAXIMUM PLATE VOLTAGE	330	330	VOLTS
MAXIMUM GRID #2 SUPPLY VOLTAGE		330	VOLTS
MAXIMUM GRID #2 VOLTAGE	SEE RATING	CHART	
MAXIMUM POSITIVE GRID #1 VOLTAGE		0	VOLTS
MAXIMUM PEAK NEGATIVE PULSE GRID VOLTAGE	250		VOLTS
MAXIMUM AVERAGE CATHODE CURRENT	20		MA.
MAXIMUM PEAK CATHODE CURRENT	70		MA.
MAXIMUM PLATE DISSIPATION	2.0	2.3	WATTS
MAXIMUM GRID #2 DISSIPATION		0.55	WATT
MAXIMUM HEATER-CATHODE VOLTAGE;			
HEATER NEGATIVE WITH RESPECT TO CATHODE			
TOTAL DC AND PEAK	200	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE			
DC	100	100	VOLTS
TOTAL DC AND PEAK	200	200	VOLTS
MAXIMUM GRID #4 CIRCUIT RESISTANCE	200		
FIXED BIAS		0.25	MEGOHM
SELF BIAS	3.0 ^C	1.0	MEGOHMS
HEATER WARM-UP TIME (APPROX.)*	1:	1.0	SECONDS

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

TRIODE PENTODE

	SECTION	SECTION	
PLATE VOLTAGE	125	125	VOLTS
GRID #2 VOLTAGE		125	VOLTS
GRID #1 VOLTAGE	-1.0	-1.0	VOLTS
TRANSCONDUCTANCE	8 000	6 500	μMH0S
PLATE CURRENT	14.0	12.0	MA.
GRID #2 CURRENT		4.0	MA.
PLATE RESISTANCE (APPROX.)	5 000	200,000	OHMS
AMPLIFICATION FACTOR	40		
GRID #1 VOLTAGE (APPROX.)			
FOR $I_b = 20 \mu A$.	-9	-9	VOLTS

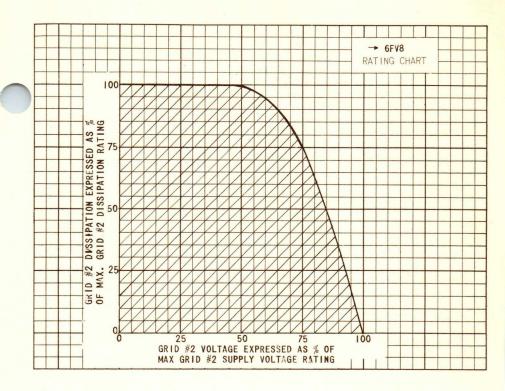
ASHIELD #315 TIED TO PIN #4.

DESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUPACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT LIFE NO DESIGN-MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT COMPONENT VARIATIONS, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.

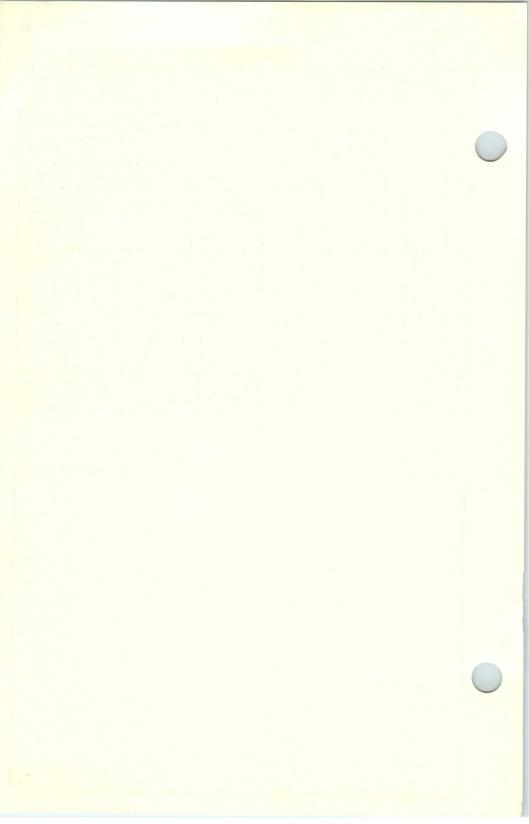
BFOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE.

CIN STAGES OPERATING WITH GRID LEAK BIAS, AN ADEQUATE CATHODE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

^{*}HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH
80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING
OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING
RESISTANCE.



-- INDICATES A CHANGE.



T-6½ 1.938" MAX 2.188" MAX

GLASS BULB SMALL BUTTON 9 PIN BASE E9-1 OUTLINE DRAWING JEDEC 6-2

TRIODE-PENTODE

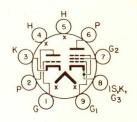
MINIATURE TYPE

COATED UNIPOTENTIAL CATHODE HEATER

6.3 VOLTS 450 MA.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
BASING DIAGRAM
JEDEC 9FA

THE 6FV8A IS A TRIODE-PENTODE USING THE 9 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED PRIMARILY FOR SERVICE IN TELEVISION RECEIVERS WITH THE TRIODE SERVING AS A VERTICAL DEFLECTION OSCILLATOR, AND THE PENTODE SERVING AS A GENERAL PURPOSE OR IF AMPLIFIER. DESIGN OF THE TUBE IS SUCH THAT HIGH VALUES OF INTERELEMENT LEAKAGE RESISTANCE ARE MAINTAINED THROUGHOUT LIFE.

DIRECT INTERELECTRODE CAPACITANCES

SHIELD	SHIELD	
1.8	1.8	pf pf
2.8	2.8	
2.0	1.5	pf
.010	.020	pf
5.0	5.0	pf
3.0	2.0	pf
0.03	0.15	pf
	1.8 2.8 2.0 .010 5.0 3.0	1.8 1.8 2.8 2.8 2.0 1.5 .010 .020 5.0 5.0 3.0 2.0

RATINGS INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

	SECTION VER-DEF OSC.	PENTODE SECTION CLASS A AMPLIFIER	
MAXIMUM PLATE VOLTAGE	330	330	VOLTS
MAXIMUM GRID #2 SUPPLY VOLTAGE		330	VOLTS
MAXIMUM GRID #2 VOLTAGE	SEE RATING	CHART	
MAXIMUM POSITIVE GRID #1 VOLTAGE		0	VOLTS
MAXIMUM PEAK NEGATIVE PULSE GRID VOLTAGE	250		VOLTS
MAXIMUM AVERAGE CATHODE CURRENT	20		MA.
MAXIMUM PEAK CATHODE CURRENT	70		MA.
MAXIMUM PLATE DISSIPATION	2.0	2.3	WATTS
MAXIMUM GRID #2 DISSIPATION		0.55	WATT
MAXIMUM HEATER-CATHODE VOLTAGE:			
HEATER NEGATIVE WITH RESPECT TO CATHODE			
TOTAL DC AND PEAK	200	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE			
DC	100	100	VOLTS
TOTAL DC AND PEAK	200	200	VOLTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE		0 0=	
FIXED BIAS	3.0°	0.25	MEGOHM
SELF BIAS HEATER WARM-UP TIME (APPROX.)*	3.0-	1.0	MEGOHMS
DI FLECTRIC INC. FLECTRON TURE DIVISION BLOOMFIELD, NEW JERS		JULY 1, 1962	PLATE \$65

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

	TRIODE SECTION	PENTODE SECTION	
PLATE VOLTAGE	125	125	VOLTS
GRID #2 VOLTAGE		125	VOLTS
GRID #4 VOLTAGE	-1.0	-1.0	VOLTS
TRANSCONDUCTANCE	8 000	6 500	µмноѕ
PLATE CURRENT	12	12	MA.
GRID #2 CURRENT		4.0	MA.
PLATE RESISTANCE (APPROX.)	5600	200,000	OHMS
AMPLIFICATION FACTOR	45		
GRID #1 VOLTAGE (APPROX.)			
FOR $I_b = 20 \mu A$.	-7.5	-9	VOLTS

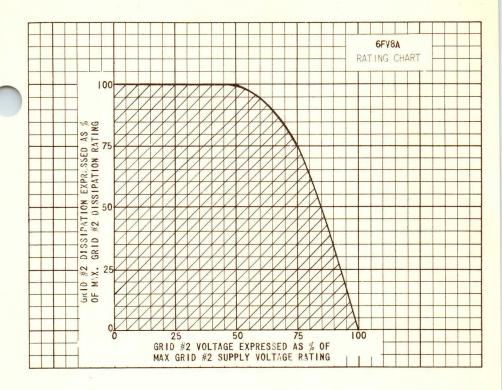
ASHIELD #315 TIED TO PIN #4.

DESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE, MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND INFOURDHOUT LIFE NO DESIGN-MAXIMM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, CQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.

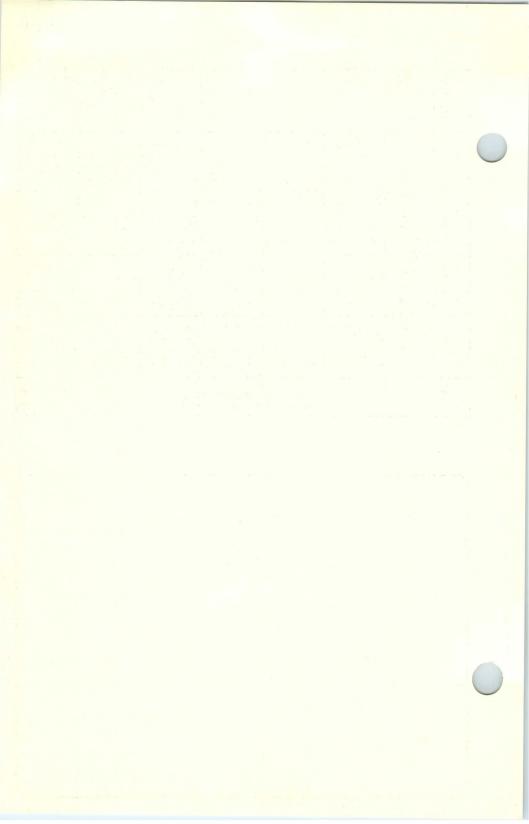
BFOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE.

 $^{^{}m C}$ in stages operating with Grid Leak Blas, an adequate cathode Blas resistor or other suitable means is required to protect the tube in the absence of excitation.

^{**}HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH
BOS OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING
OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING
RESISTANCE.

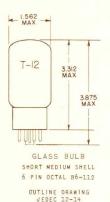


→ INDICATES A CHANGE.



PRINCE OF D. D.

BEAM PENTODE



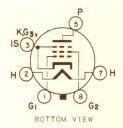
COATED UNIPOTENTIAL CATHODE

FOR HORIZONTAL-DEFLECTION

AMPLIFIER APPLICATIONS

IN TV RECEIVERS

ANY MOUNTING POSITION



BASING DIAGRAM
JEDEC 6CK

THE 6FW5 IS A BEAM-POWER PENTODE PRIMARILY DESIGNED FOR USE AS THE HORI-ZONTAL-DEFLECTION AMPLIFIER IN TELEVISION RECEIVERS. ITS HIGH ZERO-BIAS PLATE CURRENT AT LOW PLATE AND SCREEN VOLTAGES MAKES THE TUBE WELL SUITED FOR USE IN RECEIVERS THAT OPERATE AT LOW PLATE-SUPPLY VOLTAGES.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

WITHOUT EXTERNAL SHIELD

GRID #1 TO PLATE: (G1 TO P)	0.5	pf
INPUT: G1 TO (H+K+G2+B.P.)	15	pf
OUTPUT: P TO (H+K+G2+B.P.)	7.0	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS	1200	MA.
HEATER SUPPLY LIMITS:			
VOLTAGE OPERATION		6.3±0.6	VOLTS
MAXIMUM HEATER CATHODE VOLTAGE:			
HEATER POSITIVE WITH RESPECT TO	CATHODE		
TOTAL DC AND PEAK		200	VOLTS
HEATER NEGATIVE WITH RESPECT TO	CATHODE		
DC		100	VOLTS
TOTAL DC AND PEAK		200	VOLTS

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

HORIZONTAL-DEFLECTION AMPLIFIER SERVICEA

DC PLATE-SUPPLY VOLTAGE (BOOST FDC POWER SUPPLY)	770	VOLTS
PEAK POSITIVE PULSE PLATE VOLTAGE	6500	VOLTS
SCREEN VOLTAGE	220	VOLTS
NEGATIVE DC GRID #1 VOLTAGE	55	VOLTS
PEAK NEGATIVE GRID #1 VOLTAGE	330	VOLTS
PLATE DISSIPATION ^B	18	WATTS
SCREEN DISSIPATION	3.6	WATTS
DC CATHODE CURRENT	175	MA.
PEAK CATHODE CURRENT	610	MA.
GRID #1 CIRCUIT RESISTANCE	1.0	MEGOHMS
BULB TEMPERATURE AT HOTTEST POINT	220	°C

TYPICAL OPERATING CHARACTERISTICS

AVERAGE CHARACTERISTICS

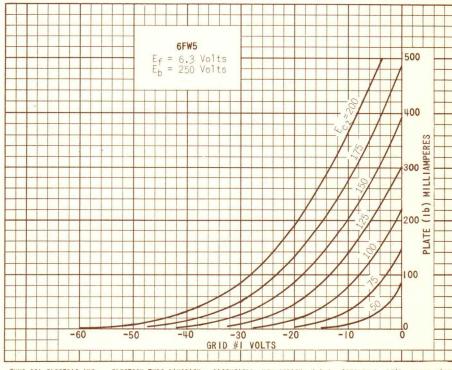
PLATE VOLTAGE	5000	60	250	VOLTS
SCREEN VOLTAGE	150	150	150	VOLTS
GRID #1 VOLTAGE		OC	-22.5	VOLTS
PLATE RESISTANCE (APPROX.)			18000	OHMS
TRANSCONDUCTANCE			7300	MMHOS
PLATE CURRENT		345	65	MA.
SCREEN CURRENT		27	1.8	MA.
GRID #1 VOLTAGE (APPROX.)				
Ib = 1.0 MA.	-100		-42	VOLTS
TRIODE AMPLIFICATION FACTORD			4.4	

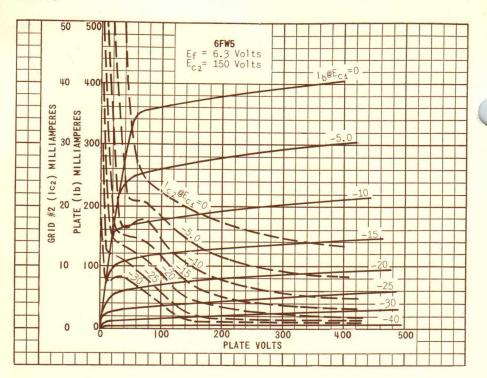
AFOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE.

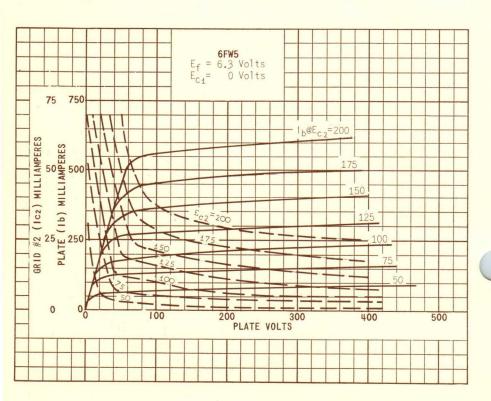
BIN STAGES OPERATING WITH GRID LEAK BIAS, AN ADEQUATE CATHODE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

Capplied for short interval (Two seconds maximum) so as not to damage tube.

DTRIODE CONNECTION (SCREEN TIED TO PLATE) WITH Eb=Ec2=150 VOLTS AND Ec1=-22.5 VOLTS.



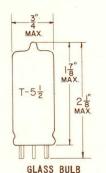




TUNG-SOL -

TRIODE

MINIATURE TYPE



5-2

COATED UNIPOTENTIAL CATHODE

HEATER

PARALLEL SUPPLY

6.3 VOLTS 0.20 AMP.

ANY MOUNTING POSITION



BOTTOM VIEW

7 F P

THE 6FY5 IS A REMOTE CUT-OFF, FRAME GRID SHIELDED TRIODE IN THE 7 PIN MINIATURE CONSTRUCTION. IT IS ESPECIALLY DESIGNED FOR SERVICE IN VHF TUNERS OF TELEVISION RECEIVERS, AND IS CONTROLLED FOR LOW NOISE FIGURE AT 220 MC/S AND OPERATION AT LOW SUPPLY VOLTAGES. EXCEPT FOR HEATER RATINGS, THE 6FY5 IS IDENTICAL TO THE 2FY5 AND THE 3FY5.

DIRECT INTERELECTRODE CAPACITANCES

	EXT. SHIELD	EXT. SHIELD	
INPUT	4.75	4.75	щи f
OUTPUT	3.3	4.3	щи f
GRID TO HEATER (MAX.)	0.28	0.28	μμf
PLATE TO CATHODE	0.25	0.21	μμ f
GRID TO CATHODE	3.2	3.2	μμf
CATHODE TO HEATER	2.5	2.5	μμf
PLATE TO GRID	0.50	0.48	μμf

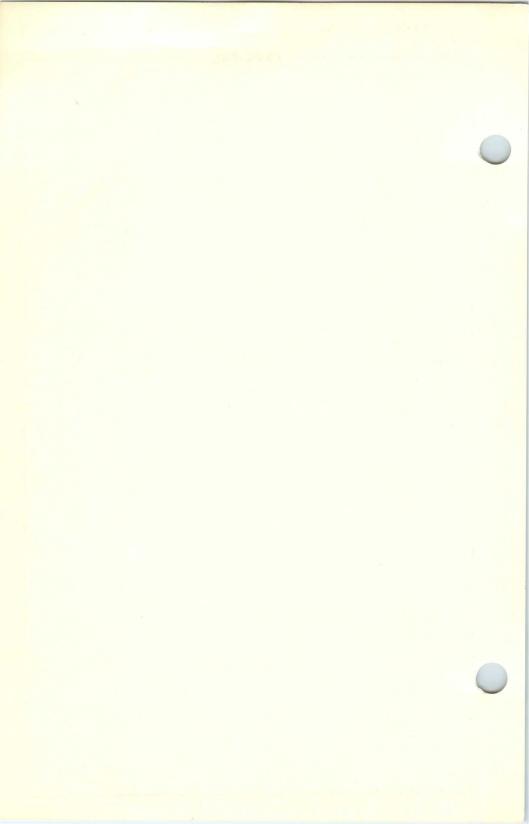
RATINGS

ABSOLUTE MAXIMUM VALUES

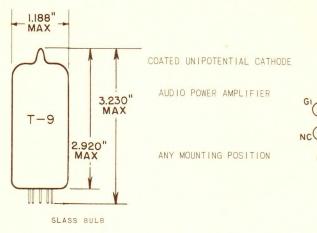
HEATER VOLTAGE	6.3	VOLTS
MAXIMUM PLATE VOLTAGE	200	VOLTS
MAXIMUM PLATE VOLTAGE (ZERO PLATE CURRENT)	550	VOLTS
MAXIMUM PLATE DISSIPATION	2.2	WATTS
MAXIMUM CATHODE CURRENT	20	MA.
MAXIMUM NEGATIVE GRID VOLTAGE	50	VOLTS
MAXIMUM GRID CIRCUIT RESISTANCE	1	MEGOHM
MAXIMUM CATHODE-HEATER VOLTAGE	100	VOLTS
MAXIMUM CATHODE-HEATER CIRCUIT RESISTANCE	20 000	OHMS

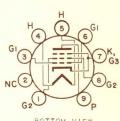
TYPICAL OPERATION

HEATER VOLTAGE		6	.3		VOLTS
HEATER CURRENT		0.	20		AMP.
PLATE VOLTAGE	135	135	135	135	VOLTS
NEGATIVE GRID BIAS	1	3.1	5	4.5	VOLTS
PLATE CURRENT	11			0.1	MA.
TRANSCONDUCTANCE	13 000	625	125		µмноs
AMPLIFICATION FACTOR	70				



BEAM PENTODE





BOTTOM VIEW BASING DIAGRAM JEDEC 9EU

BASE E9-68
OUTLINE DRAWING
JEDEC 9-71

THE 6GC5 IS A BEAM-POWER PENTODE UTILIZING A T-9 ENVELOPE BASED TO FIT A STANDARD 9-PIN MINIATURE SOCKET. IT FEATURES HIGH POWER SENSITIVITY AS AN AUDIO AMPLIFIER. IN CLASS AL OPERATION, THE 6GC5 CAN DELIVER 2.1 WATTS OF POWER WITH A B+ VOLTAGE OF ONLY 110 VOLTS.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

GRID #1 TO PLATE	0.9	pf
INPUT: G1 TO (H+K, G3 +G2)	18	pf
OUTPUT: P TO (H+K, G3 +G2)	7	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS	12	MA.
HEATER SUPPLY LIMITS: VOLTAGE OPERATION		6.3±0.6	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE	:		
HEATER NEGATIVE WITH RESPECT TOTAL DC AND PEAK	TO CATHODE	200	VOLTS
HEATER POSITIVE WITH RESPECT	TO CATHODE		
DC		100	VOLTS
TOTAL DC AND PEAK		200	VOLTS

TUNG-SOL -

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

PLATE VOLTAGE	220	VOLTS
GRID #2 VOLTAGE	140	VOLTS
PLATE DISSIPATION	12	WATTS
GRID #2 DISSIPATION	1.4	WATTS
GRID #1 CIRCUIT RESISTANCE:		
FIXED BIAS	0.1	MEGOHM
CATHODE BIAS	0.5	MEGOHM

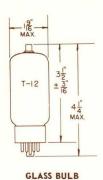
TYPICAL OPERATING CHARACTERISTICS

CLASS A1 AMPLIFIER

(SINGLE TUBE)

PLATE VOLTAGE	110	200	VOLTS	
GRID #2 VOLTAGE	110	125	VOLTS	
GRID #1 VOLTAGE	-7.5		VOLTS	
CATHODE RESISTOR		180	OHMS	
PEAK AF GRID #1 VOLTAGE	7.5	8.5	VOLTS	
ZERO SIGNAL PLATE CURRENT	49	46	MA.	
MAX. SIGNAL PLATE CURRENT	50	47	MA.	
ZERO SIGNAL GRID #2 CURRENT	4	2.2	MA.	
MAX. SIGNAL GRID #2 CURRENT	10	8.5	MA.	
TRANSCONDUCTANCE	8000	8000	µмноs	
PLATE RESISTANCE, APPROX.	13,000	28,000	OHMS	
LOAD RESISTANCE	2000	4000	OHMS	
MAX. SIGNAL POWER OUTPUT	2.1	3.8	WATTS	
TOTAL HARMONIC DISTORTION, APPROX.	10	10	PERCENT	

PENTODE



HEATER

6.3 VOLTS 1.2 AMP.

ANY MOUNTING POSITION



BOTTOM VIEW

SHORT MEDIUM OCTAL
WITH EXTERNAL BARRIERS

81X

THE 6GC6 IS A HEATER-CATHODE TYPE BEAM PENTODE DESIGNED FOR USE AS A HORIZONTAL DEFLECTION AMPLIFIER IN TELEVISION RECEIVERS. IT HAS EXTREMELY HIGH PERVEANCE, SUCH THAT THE DESIGN OF WIDE-ANGLE DEFLECTION SYSTEMS IS MADE POSSIBLE WITHOUT THE NECESSITY OF USING AN EXPENSIVE DEFLECTION AMPLIFIER TUBE. EXCEPT FOR HEATER CHARACTERISTICS, THE 6GC6 IS IDENTICAL TO THE 12GC6.

DIRECT INTERELECTRODE CAPACITANCES

GRID #1 TO PLATE: (G1 TO P)	0.55	μμε
INPUT: G1 TO (H+K+G2+B.P.)	15	μμf
OUTPUT: P TO (H+K+G2+B.P.)	7.0	$\mu\mu f$

RATINGS

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM
HORIZONTAL DEFLECTION AMPLIFIER

HEATER VOLTAGE	6.3	VOLTS
MAXIMUM PLATE SUPPLY VOLTAGE (BOOST + DC POWER SUPPLY)	770	VOLTS
MAXIMUM GRID #2 VOLTAGE	220	VOLTS
MAXIMUM PLATE DISSIPATION B	17.5	WATTS
MAXIMUM GRID #2 DISSIPATION	4.5	WATTS
MAXIMUM AVERAGE CATHODE CURRENT	175	MA.
MAXIMUM PEAK CATHODE CURRENT	550	MA
MAXIMUM PEAK POSITIVE PLATE VOLTAGE	6500	VOLTS
MAXIMUM PEAK NEGATIVE PLATE VOLTAGE	1500	VOLTS
MAXIMUM NEGATIVE GRID #1 VOLTAGE	330	VOLTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE	1.0	MEG.
MAXIMUM BULB TEMPERATURE (AT HOTTEST POINT)	220	°C
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC	100	VOLTS
TOTAL DC AND PEAK	200	VOLTS

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

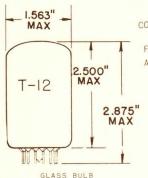
AVERAGE CHARACTERISTICS

HEATER VOLTAGE	6.3	VOLTS
HEATER CURRENT	1.2	AMP.
PLATE VOLTAGE	250	VOLTS
GRID #2 VOLTAGE	150	VOLTS
GRID #1 VOLTAGE	-22.5	VOLTS
PLATE CURRENT	75	MA.
GRID #2 CURRENT	2.4	MA.
TRIODE AMPLIFICATION FACTOR C	4.1	
TRANSCONDUCTANCE	6600	μ MHOS
PLATE RESISTANCE	20000	OHMS
GRID #1 VOLTAGE (APPROX.) FOR Ib = 1 MA. (APPROX.)	-46	VOLTS
ZERO-BIAS: WITH Eb= 60 VOLTS, AND Ec2 = 150 V (INSTANTANEOUS V	ALUE)	
PLATE CURRENT	345	MA.
GRID #2 CURRENT	30	MA.
CUTOFF: FOR Ib = 1 MA. WITH Eb= 5000 V. AND Ec2=150 V.		
(APPROX. VALUE)	-100	VOLTS

- A. FOR OPERATION IN A 525 LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEER-ING PRACTICE FOR TELEVISION BROADCASTING STATIONS; FEDERAL COMMUNICATIONS COMMISSION." THE DUTY CYCLE OF THE VOLTAGE PULSE NOT TO EXCEED 15% OF A SCANNING CYCLE.
- B. IN STAGES OPERATING GRID LEAK BIAS, AN ADEQUATE CATHODE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.
- C. Eb=Ec2=150 VOLTS.

DESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOOEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO ARRATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT LIFE NO DESIGN - MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEYDEVICE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY - VOLTAGE VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.

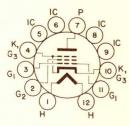




COATED UNIPOTENTIAL CATHODE

FOR HORIZONTAL-DEFLECTION AMPLIFIER APPLICATIONS IN T.V. RECEIVERS

ANY MOUNTING POSITION



BOTTOM VIEW

BASING DIAGRAM JEDEC 128J

BUTTON 12 PIN BASE E12-74 OUTLINE DRAWING JEDEC 12-56

THE 6GE5 IS A BEAM-POWER PENTODE UTILIZING A T-12 ENVELOPE AND A 12 PIN BASE. IT IS DESIGNED PRIMARILY FOR USE AS THE HORIZONTAL DEFLECTION AM-PLIFIER IN TELEVISION RECEIVERS.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

WITHOUT EXTERNAL SHIELD.

GRID #1 TO PLATE: (G1 TO P)	0.34	pf
INPUT: G1 TO (H+K+G2+B.P.)	16	pf
OUTPUT: P TO (H+K+G2+B.P.)	7.0	pf

HEATER CHARACTERISTICS AND RATINGS DESIGN MAXIMUM VALUES - SEE ELA STANDARD RS-239

AVERAGE CHARACTERISTICS 6.3 VOLTS	1200	MA.
HEATER SUPPLY LIMITS: VOLTAGE OPERATION	6.3±0.6	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE		
HEATER POSITIVE WITH RESPECT TO CATHODS DC COMPONENT	100	VOLTS
TOTAL DC AND PEAK HEATER NEGATIVE WITH RESPECT TO CATHODE	200	VOLTS
TOTAL DC AND PEAK	200	VOLTS

TUNG-SOL -

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239 HORIZONTAL-DEFLLCTION AMPLIFIER SERVICE

DC PLATE-SUPPLY VOLTAGE (BOOST + DC POWER SUPPLY))	770	VOLTS
PEAK POSITIVE PULSE PLATE VOLTAGE	6500	VOLTS
PEAK NEGATIVE PULSE PLATE VOLTAGE	1500	VOLTS
GRID #2 VOLTAGE	220	VOLTS
NEGATIVE DC GRID #1 VOLTAGE	55	VOLTS
PEAK NEGATIVE GRID #1 VOLTAGE	330	VOLTS
PLATE DISSIPATIONA	17.5	WATTS
GRID #2 DISSIPATION	3.5	WATTS
DC CATHODE CURRENT	175	MA.
PEAK CATHODE CURRENT	550	MA.
GRID #1 CIRCUIT RESISTANCE	1.0	MEGOHMS
BULB TEMPERATURE AT HOTTEST POINT	220	°C

TYPICAL OPERATING CHARACTERISTICS

AVERAGE CHARACTERISTICS

PLATE VOLTAGE	5000	60	250	VOLTS
GRID #2 VOLTAGE	150	150	150	VOLTS
GRID #1 VOLTAGE		OB	-22.5	VOLTS
PLATE RESISTANCE, APPROX.		1	8,00C -	OHMS
TRANSCONDUCTANCE	-		7,300 -	µмноѕ
PLATE CURRENT		345	65 ←	MA.
GRID #2 CURRENT		27 ←	1.8 ←	MA.
GRID #1 VOLTAGE, APPROX.				
Ib = 1.0 MA.	-100		-42 -	VOLTS
TRIODE AMPLIFICATION FACTOR				
G2 TIED TO PLATE, Eb =Ec2 =150 V.,				
$E_{c1} = -22.5 \text{ V}.$			4.4 -	

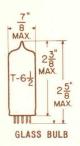
--- INDICATES A CHANGE.

FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE.

A IN STAGES OPERATING WITH GRID LEAK BIAS, AN ADEQUATE CATHODE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

B APPLIED FOR SHORT INTERVAL (TWO SECONDS MAXIMUM) SO AS NOT TO DAMAGE TUBE.

^{*}INDICATES AN ADDITION.



COATED UNIPOTENTIAL CATHODE

HEATER

6.3 VOLTS 0.90 AMP.

ANY MOUNTING POSITION



BOTTOM VIEW MINIATURE BUTTON 9 PIN BASE

THE 6GES IS A COMBINED LOW MU, HIGH PERVEANCE TRIODE AND A SHARP CUT-OFF PENTODE IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS PARTICULARLY SUITABLE FOR VOLTAGE REGULATION APPLICATIONS.

DIRECT INTERELECTRODE CAPACITANCES WITHOUT EXTERNAL SHIELD

TRIODE SECTION:

GRID TO PLATE	7.5	μμf
INPUT: G TO (H+K)	5.5	μμf
OUTPUT: P TO(H+K)	1.3	μμ f
PENTODE SECTION:		
GRID #1 TO PLATE	.02	μμf
INPUT: G1 TO (H+K+G2+G3)	8.0	μμ f
OUTPUT: P TO (H+K+G2+G3)	2.4	$\mu\mu f$

RATINGS

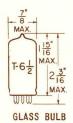
INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

	SEC. #1 PENTODE	SEC. #2 TRIODE	
HEATER VOLTAGE	6.	3	VOLTS
MAXIMUM DC PLATE VOLTAGE	330	275	VOLTS
MAXIMUM DC GRID #2 VOLTAGE	275		VOLTS
MAXIMUM PLATE DISSIPATION	1.0	7.0	WATTS
MAXIMUM GRID #2 INPUT	0.5		WATTS
MAXIMUM AVERAGE CATHODE CURRENT		50	MA.
MAXIMUM PEAK CATHODE CURRENT		175	MA.
MAXIMUM GRID CIRCUIT RESISTANCE:			
SELF BIAS	2.2	2.2	MEGOHMS
MAXIMUM HEATER-CATHODE VOLTAGE			
HEATER NEGATIVE WITH RESPECT TO CATHODE	20	0	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	10	0	VOLTS

CONTINUED FROM PRECEDING PAGE

AVERAGE CHARACTERISTICS

	PENTODE	TRIODE	
HEATER VOLTAGE	6	.3	VOLTS
HEATER CURRENT	0.	90	AMP.
PLATE VOLTAGE	150	150	VOLTS
GRID #2 VOLTAGE	150		VOLTS
PLATE CURRENT	5.5	35	MA.
GRID #2 CURRENT	1.7		MA.
GRID #1 VOLTAGE	-2	-21	VOLTS
TRANSCONDUCTANCE	3200	5000	µмноs
AMPLIFICATION FACTOR		5.4	
PLATE RESISTANCE	340 000	1 080	OHMS
GRID #1 VOLTAGE FOR Ib=50 HA	-8		VOLTS
GRID #1 VOLTAGE FOR Ib= 500µA		-42	VOLTS
ZERO BIAS PLATE CURRENT AT			
Eb=50V, Ec1=0 V.		70	MA.
PLATE RESISTANCE AT Eb=100,			
Ec2=50 V & Ib =100 μA	>7		MEGOHMS



COATED UNIPOTENTIAL CATHODE HEATER

> 6.3 VOLTS 0.45 AMP. AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW SMALL BUTTON 9 PIN BASE 9 A E

THE 6GH8 IS A SHARP-CUTOFF PENTODE AND A MEDIUM-MU TRIODE CONTAINED IN A 9 PIN MINIATURE ENVELOPE. EACH SECTION HAS A SEPARATE CATHODE AND IS ELECTRICALLY INDEPENDENT. THE PENTODE SECTION IS INTENDED PRIMARILY FOR SERVICE AS AN OSCILLATOR IN THE HORIZONTAL DEFLECTION SYSTEM OF TELE-VISION RECEIVERS. EXCEPT FOR HEATER CHARACTERISTICS, THE 6GH8 IS IDENTI-CAL TO THE 5GH8.

DIRECT INTERELECTRODE CAPACITANCES -

PENTODE SECTION:	SHIELDA	SHIELD	
GRID #1 TO PLATE: (Pg1 TO Pp) (MAX.)	0.015	0.02	μμ f
INPUT: Pg1 TO (H+Pk+Pg2+Pg3+1.S.)	5.5	5.5	µµ f
OUTPUT: Pp TO (H+Pk+pg2+pg3+1.S.)	3.4	2.6	μμ f
HEATER TO CATHODE (Pk TO H)	3.0 ^B	3.0	μμ f
TRIODE SECTION:			
GRID TO PLATE: (Tg TO Tp)	1.6	1.6	$\mu\mu$ f
INPUT: Tg TO (Tk+H+Pk+Pg3+1.S.)	3.6	3.4	μμf
OUTPUT: Tp TO (Tk+H+Pk+Pg3+1.S.)	2.2	1.7	μμ f
HEATER TO CATHODE: (Tk TO H)	3.0 ^B	3.0	uu f

RATINGS

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

	PENTODE C SECTION (HORIZONTAL OSCILLATOR SERVICE)	TRIODE SECTION	
HEATER VOLTAGE	6.3	6.3	VOLTS
MAXIMUM ALLOWABLE HEATER CURRENT	0.42 to	0.48	AMP.
MAXIMUM DC PLATE VOLTAGE	350	330	VOLTS
MAXIMUM SCREEN SUPPLY VOLTAGE	330		VOLTS
MAXIMUM SCREEN VOLTAGE	SEE SCREEN RATING	CHART	
MAXIMUM POSITIVE DC GRID #1 VOLTAGE	0	0	VOLTS
MAXIMUM PEAK NEGATIVE DC GRID #1 VOLTAGE	E 175		VOLTS
MAXIMUM PLATE DISSIPATION	2.5	2.5	WATTS
MAXIMUM SCREEN DISSIPATION	0.55		WATTS
MAXIMUM DC CATHODE CURRENT	20		MA.
MAXIMUM PEAK CATHODE CURRENT	300		MA.

- INDICATES A CHANGE.

CONTINUED FROM PRECEDING PAGE

RATINGS - CONT'D.
INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

	PENTODE C SECTION (HORIZONTAL OSCILLATOR SERVICE)	TRIODE SECTION	
HEATER VOLTAGE	6.3	6.3	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE:			
HEATER POSITIVE WITH RESPECT TO CA	ATHODE		
DC COMPONENT	100	100	VOLTS
TOTAL DC AND PEAK	200	200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CA	ATHODE		
TOTAL DC AND PEAK	200	200	VOLTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE			
WITH FIXED BIAS	2.2	2.2	MEGOHMS
WITH CATHODE BIAS	2.2	2.2	MEGOHMS
HEATER WARM-UP TIME (APPROX.)*	11.0		SECONDS

DESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT LIFE NO DESIGN-MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

AVERAGE CHARACTERISTICS

	PENTODE SECTION	TRIODE	
HEATER VOLTAGE	6.3	6.3	VOLTS
HEATER CURRENT	0.45	0.45	AMP.
PLATE VOLTAGE	125	125	VOLTS
SCREEN VOLTAGE	125		VOLTS
GRID #1 VOLTAGE	-1.0	-1.0	VOLTS
AMPLIFICATION FACTOR	-	46	
PLATE RESISTANCE (APPROX.)	200 000	5400	OHMS
TRANSCONDUCTANCE	7500	8500	µмноѕ
PLATE CURRENT	12	13.5	MA.
SCREEN CURRENT	4.0		MA.
GRID #1 VOLTAGE (APPROX.)			
$I_b = 10 \mu AMPS.$	-8	-8	VOLTS

^{*}HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

Awith external shield 315 connected to cathode of section under test unless otherwise indicated.

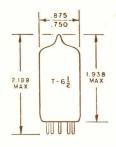
Bwith external shield 315 connected to ground.

CFOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE.

TUNG-SOL .

TRIODE-PENTODE

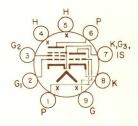
MINIATURE TYPE



MEDIUM-MU TRIODE AND SHARP-CUTOFF PENTODE FOR HORIZONTAL-DEFLECTION OSCILLATOR CIRCUITS IN T.V. RECEIVERS

COATED UNIPOTENTIAL CATHODE

ANY MOUNTING POSITION



BOTTOM VIEW BASING DIAGRAM JEDEC 9 AE

GLASS BULB

MINIATURE BUTTON 9 PIN BASE E9-1 OUTLINE DRAWING JEDEC 6-2

THE 6GH8A IS A MEDIUM-MU TRIODE AND SHARP-CUTOFF PENTODE IN THE 9 PIN MINIATURE CON-STRUCTION. IT IS INTENDED FOR USE IN MULTIVIBRATOR-TYPE HORIZONTAL-DEFLECTION OS-CILLATOR CIRCUITS IN TELEVISION RECEIVERS. THE TUBE IS ALSO SUITABLE FOR USE AS AN AGC AMPLIFIER OR SYNC SEPARATOR IN SUCH RECEIVERS.

THE 6GH8A IS CONTROLLED TO ASSURE LOW INTERELECTRODE LEAKAGE, IT HAS A MINIMUM LEAKAGE RESISTANCE OF 100 MEGOHMS BETWEEN GRID#1 OF EACH UNIT AND ALL OTHER ELEC-TRODES TIED TOGETHER, AND 100 MEGOHMS BETWEEN THE PLATE OF EACH UNIT AND ALL

DIRECT INTERELECTRODE CAPACITANCES

	WITHOUT EXTERNAL SHIELD	WITH EXTERNAL SHIELD	
TRIODE UNIT			
GRID TO PLATE (Tg TO Tp)	1.7	1.7 A	pf
GRID TO (H+ Pg3 + TK + PK + I.S.)	3	3.2 A	pf
PLATE TO (H + Pg3 + TK + PK + 1.5.)	1.4	1.9 A	p:
HEATER TO CATHODE (TK TO H)	3	3 B	pf
PENTODE UNIT			
GRID 1 TO PLATE (Pg1 TO Pp)	MAX. 0.02	MAX. 0.01 C	pf
GRID 1 TO (Pk + Pg3 + Pg2 + H + I.S.)	5	5 C	pf
PLATE TO (PK + Pg3 + Pg2 + H + I.S.)	2.6	3.4 C	pf
HEATER TO (Pk + Pg3 + I,S.)	3	3 B	pf

EXTERNAL SHIELD #315 CONNECTED TO TRIODE CATHODE. EXTERNAL SHIELD #315 CONNECTED TO GROUND.

EXTERNAL SHIFLD # 315 CONNECTED TO PENTODE CATHODE.

CONTINUED FROM PRECEDING PAGE

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM RATINGS - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS	450	MA.
HEATER WARM-UP TIME - AVERAGE		11	SECONDS
LIMITS OF SUPPLIED CURRENT		450 ± 30	MA.
PEAK HEATER-CATHODE VOLTAGE	TRIODE	PENTODE UNIT	
HEATER NEGATIVE WITH RESPECT TO CATHODE	200	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	200	200	VOLTS
DC COMPONENT	100	100	VOLTS

MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

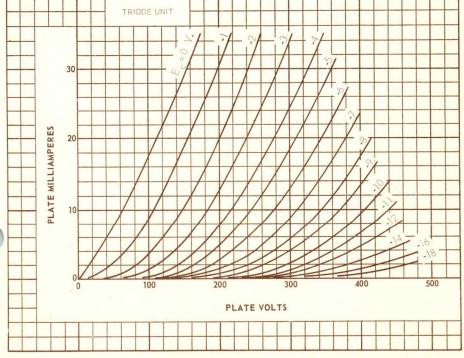
HORIZONTAL - DEFLECTION - OSCILLATOR SERVICE

	TRIODE UNIT	PENTODE	
PLATE VOLTAGE	330	350	VOLTS
GRID 2 VOLTAGE		330	VOLTS
GRID 1 VOLTAGE			
POSITIVE-BIAS VALUE	0	0	VOLTS
PEAK NEGATIVE VALUE		175	VOLTS
PLATE DISSIPATION	2.5	2.5	WATTS
GRID 2 INPUT	-	0.55	WATTS
CATHODE CURRENT			
PEAK		330	MA.
DC		20	MA.
GRID 1 CIRCUIT RESISTANCE			
FOR FIXED-BIAS OPERATION	2.2	2.2	MEGOHMS
FOR CATHODE-BIAS OPERATION	2.2	2.2	MEGOHMS

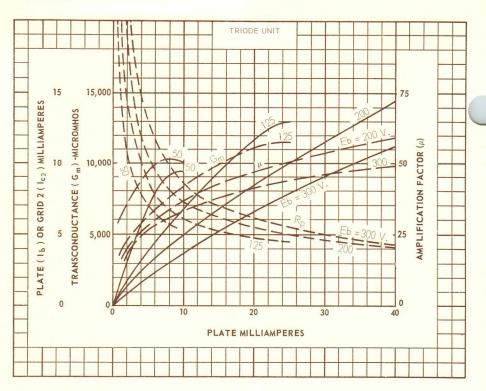
CHARACTERISTICS

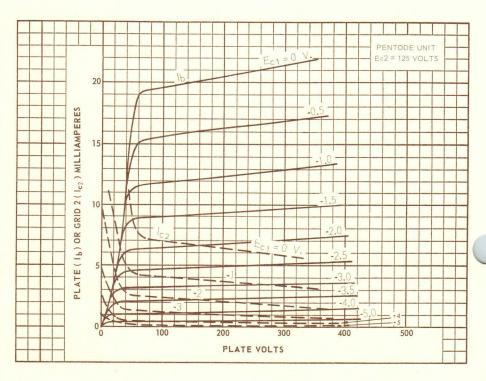
CLASS AL AMPLIFIER

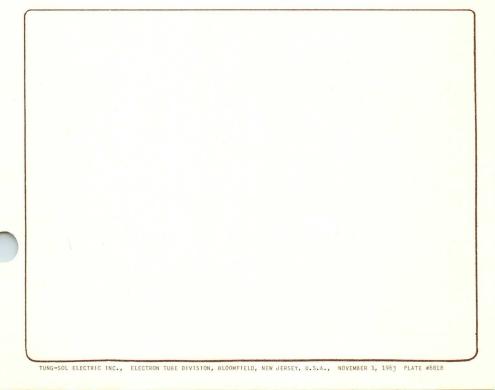
	TRIODE	PENTODE UNIT	
PLATE VOLTAGE	125	125	VOLTS
GRID 2 VOLTAGE		125	VOLTS
GRID 1 VOLTAGE	-1	-1	VOLTS
PLATE CURRENT	13.5	12	MA.
GRID 2 CURRENT		4.0	MA.
AMPLIFICATION FACTOR	46		
TRANSCONDUCTANCE	8,500	7,500	μ MHOS
PLATE RESISTANCE	5,400	200,000	OHMS
GRID 1 VOLTAGE FOR I = 10 µA (APPROX.)	-8	-8	VOLTS

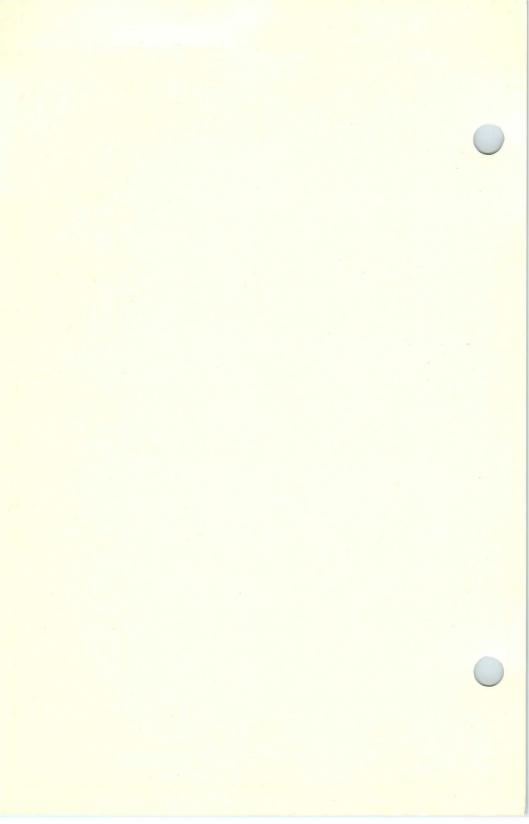


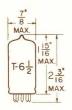
6GH8A











COATED UNIPOTENTIAL CATHODE

HEATER 6.3 VOLTS 0.60 AMP.

ANY MOUNTING POSITION



BOTTOM VIEW MINIATURE BUTTON 9 PIN BASE

9AE

GLASS BULB

THE 6GJ8 IS A SHARP CUTOFF PENTODE AND A MEDIUM MU TRIODE IN THE 9 PIN MINIATURE CONSTRUCTION. THE PENTODE SECTION IS INTENDED PRIMARILY FOR SERVICE AS AN OSCILLATOR IN THE HORIZONTAL DEFLECTION SYSTEM OF TELE-VISION RECEIVERS.

DIRECT INTERELECTRODE CAPACITANCES

TRIODE SECTION:	WITH SHIELD A	WITHOUT	
GRID TO PLATE INPUT: G TO (H+K+Pk,G3,I.S.)	2.6	2.6	μμ f μμ f
OUTPUT: P TO (H+K+Pk, G3,1.s.)	2.4	1.6	μμ f
PENTODE SECTION:			
GRID #1 TO PLATE (MAX.)	0.025	0.036	$\mu\mu$ f
INPUT: G1 TO (H+K G3, 1.S.+G2)	8.0	8.0	μμ f
OUTPUT: P TO (H+K G3, I.S.+G2)	3.2	2.4	μμf
٨			

Awith external shield 315 connected to cathode of section under test.

RATINGS

INTERPRETED ACCORDING TO DESIGN	MAXIMUM SYSTEM		
	TRIODE SECTION	PENTODE SECTION	
HEATER VOLTAGE	6.	3	VOLTS
MAXIMUM PLATE VOLTAGE	330	330	VOLTS
MAXIMUM GRID #2 VOLTAGE	SEE RATI	NG CHART	
MAXIMUM GRID #2 SUPPLY VOLTAGE		330	VOLTS
MAXIMUM POSITIVE GRID VOLTAGE	0	0	VOLTS
MAXIMUM PLATE DISSIPATION	2.5	2.5	VOLTS
MAXIMUM GRID #2 DISSIPATION	man years print	0.55	WATT
MAXIMUM GRID #1 CIRCUIT RESISTANCE:			
FIXED BIAS	1.0		MEGOHM
SELF BIAS	2.2		MEGOHM

CONTINUED FROM PRECEDING PAGE

RATINGS - CONT'D.
INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

HEATER VOLTAGE ^B	6.3	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC	100	VOLTS
TOTAL DC AND PEAK	200	VOLTS
HEATER WARM-UP TIME* (APPROX.)	11.0	SECONDS

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER

	TR I ODE SECTION	PENTODE SECTION	
HEATER VOLTAGE	6	.3	VOLTS
HEATER CURRENT ^C	0.	60	AMP.
PLATE VOLTAGE	125	125	VOLTS
GRID #2 VOLTAGE		125	VOLTS
GRID #1 VOLTAGE	-1.0	-1.0	VOLTS
PLATE CURRENT	13.5	12	MA.
GRID #2 CURRENT		4.5	MA.
TRANSCONDUCTANCE	8500	7500	μMH0S
AMPLIFICATION FACTOR	40		
PLATE RESISTANCE (APPROX.)	5000	150 000	OHMS
E_{C1} FOR $I_b = 20 \mu A$ (APPROX.)	-9	-6.5	VOLTS

^{*}HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

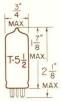
DESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE, TAKING RESPONSIBILITY FOR THE SEVENCE TO PROVIDE ACCEPTABLE SERVICEABLILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT THE NO DESIGN-MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.

B
FOR PARALLEL HEATER OPERATION, EQUIPMENT SHOULD BESO DESIGNED SO THAT AT NORMAL SUPPLY VOLTAGE
BOGEY TUBES WILL OPERATE AT THIS VALUE OF HEATER VOLTAGE.

 $C_{\sf FOR}$ SERIES HEATER OPERATION, EQUIPMENT SHOULD BE SO DESIGNED SO THAT AT NORMAL SUPPLY VOLTAGE BOGEY TUBES WILL OPERATE AT THIS VALUE OF HEATER CURRENT.

TRIODE

MINIATURE TYPE.



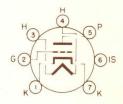
GLASS BULB

MINIATURE BUTTON 7 PIN BASE E7-1 OUTLINE DRAWING JEDEC 5-2

COATED UNIPOTENTIAL CATHODE

LOW INPUT CAPACITANCE HIGHER INPUT IMPEDANCE DUAL CATHODE LEADS PARTIAL SHIELD BETWEEN THE GRID AND PLATE

ANY MOUNTING POSITION



BOTTOM VIEW BASING DIAGRAM JEDEC 7FP

THE 6GK5 IS A FRAME GRID GAIN CONTROLLED SHIELDED TRIODE IN THE SEVEN PIN MINIATURE CONSTRUCTION. IT IS DESIGNED FOR USE AS A VHF RF AMPLI-FIER AT A B+ OF 135 VOLTS.

DIRECT INTERELECTRODE CAPACITANCES WITH EXTERNAL SHIELD

GRID TO PLATE	0.52	pf
INPUT: G TO (H+K+1.S.+E.S.)	5.0	pf
OUTPUT: P TO (H+K+1.S. + E.S.)	3.5	pf
HEATER TO CATHODE	2.5	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS	180	MA.
HEATER SUPPLY LIMITS: VOLTAGE OPERATION		6.3±0.6	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE:			
HEATER NEGATIVE WITH RESPECT TO	CATHODE	3.00	
TOTAL DC AND PEAK		100	VOLTS
HEATER POSITIVE WITH RESPECT TO	CATHODE	100	
TOTAL DC AND PEAK		100	VOLTS

MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

PLATE VOLTAGE	200	VOLTS
PLATE DISSIPATION	2.5	WATTS
DC CATHODE CURRENT	22	MA-
NEGATIVE GRID VOLTAGE	.50	VOLTS
GRID CIRCUIT RESISTANCE (SELF BIAS)	1.0	MEGOHMS

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CHARACTERISTICS

CLASS A1 AMPLIFIER

PLATE VOLTAGE	135	VOLTS
GRID VOLTAGE	-1.0	VOLTS
PLATE CURRENT	11.5	MA.
TRANSCONDUCTANCE	15 000	µмноs
AMPLIFICATION FACTOR	78	
PLATE RESISTANCE (APPROX.)	5400	OHMS
EC FOR Gm = 150 MMHOS (APPROX.)	-4.2	VOLTS
EC FOR Gm = 1500 MMHOS (APPROX.)	-2.5	VOLTS
HOT INPUT RESISTANCE (200 Mc) C	275	OHMS
HOT INPUT CAPACITANCE (200 Mc)C	11.2	pf
NOISE FIGURE (200 Mc)D	4.7	db

CMEASURED UNDER GROUNDED PLATE CONDITIONS.

DOPTIMIZED NEUTRALIZED TRIODE RF AMPLIFIER STAGE, NOISE MATCHED.

GLASS BULB

COATED UNIPOTENTIAL CATHODE

HEATER

6.3 VOLTS 0.76 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

9 PIN BASE 9GK

THE 6GK6 IS POWER PENTODE DESIGNED FOR USE EITHER IN AUDIO OUTPUT AMPLIFIER STAGES OR IN VIDEO POWER OUTPUT AMPLIFIER STAGES OF TELEVISION RECEIVERS. THE TUBE FEATURES AN EXTRA RESERVE OF SCREEN DISSIPATION RATING AND A NEW BASING ARRANGEMENT THAT GIVES A LOWER GRID TO PLATE CAPACITY FOR THE SAME HIGH TRANSCONDUCTANCE OF PROTOTYPE TUBES.

DIRECT INTERELECTRODE CAPACITANCES

GRID TO PLATE: G1 TO P (MAX.)	.14	$\mu\mu f$
INPUT: G1 TO ALL	10.0	$\mu\mu f$
OUTPUT: P TO ALL	7.0	$\mu\mu f$

RATINGS

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

HEATER VOLTAGE	6.3	VOLTS
MAXIMUM PLATE VOLTAGE	330 ^A	VOLTS
MAXIMUM PLATE SUPPLY VOLTAGE	605	VOLTS
MAXIMUM GRID #2 VOLTAGE	330	VOLTS
MAXIMUM GRID #2 SUPPLY VOLTAGE	605	VOLTS
MAXIMUM NEGATIVE GRID #1 VOLTAGE	100	VOLTS
MAXIMUM PLATE DISSIPATION	13.2 ^A	WATTS
MAXIMUM GRID #2 DISSIPATION (AVERAGE)	2	WATTS
MAXIMUM GRID #2 DISSIPATION, PEAK	4	WATTS
MAXIMUM CATHODE CURRENT (AVERAGE)	65	MA.
MAXIMUM GRID #1 VOLTAGE FOR GRID CURRENT STARTING		
POINT WITH Ic1 = 0.3 μ A.	-1.3	VOLTS
MAXIMUM GRID CIRCUIT RESISTANCE:		
FIXED BIAS	0.3	MEG.
SELF BIAS	1.0	MEG.
MAXIMUM PEAK HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE TO CATHODE	100	VOLTS
HEATER POSITIVE TO CATHODE	100	VOLTS

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

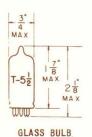
CLASS A AMPLIFIER

HEATER VOLTAGE	6.3	VOLTS
HEATER CURRENT	0.76	AMP.
PLATE VOLTAGE	250	VOLTS
GRID #2 (SCREEN) VOLTAGE	250	VOLTS
GRID 1 (CONTROL-GRID) VOLTAGE	-7.3	VOLTS
CATHODE BIAS RESISTOR	135	OHMS
PLATE RESISTANCE (APPROX.)	38000	OHMS
TRANSCONDUCTANCE	11300	μMHOS
PLATE CURRENT ZERO SIGNAL	48	MA.
GRID #2 CURRENT, ZERO SIGNAL	5.5	MA.
LOAD RESISTANCE	5200	OHMS
TOTAL HARMONIC DISTORTION (APPROX.)	10	PERCENT
POWER OUTPUT, MAXIMUM SIGNAL	5.7	WATTS
AMPLIFICATION FACTOR OF GRID #2 WITH RESPECT TO		
GRID #1 ZERO SIGNAL	19	

PUSH PULL AMPLIFIER - VALUE FOR TWO TUBES

	CLASS AB		CLASS B		
PLATE VOLTAGE	250	300	250	300	VOLTS
GRID #2 (SCREEN) VOLTAGE	250	300	250	300	VOLTS
GRID #1 (CONTROL-GRID) VOLTAGE			-11.6	-14.7	VOLTS
CATHODE BIAS RESISTOR	130	130			OHMS
GRID TO GRID INPUT VOLTAGE					
PEAK A-F	22.4	28	22.4	28	VOLTS
PLATE CURRENT, ZERO SIGNAL	62	72	20	15	MA.
PLATE CURRENT, MAXIMUM SIGNAL	75	92	75	92	MA.
GRID #2 CURRENT, ZERO SIGNAL	7	8	2.2	1.6	MA.
GRID #2 CURRENT, MAXIMUM SIGNAL	15	22	15	22	MA.
LOAD RESISTANCE, PLATE-TO-PLATE	8000	8000	8000	8000	OHMS
TOTAL HARMONIC DISTORTION					
(APPROX.)	3	4	3	4	PERCENT
POWER OUTPUT, MAXIMUM SIGNAL	11	17	11	17	WATTS

A. WHEN THE HEATER AND POSITIVE VOLTAGE ARE OBTAINED FROM A STORAGE BATTERY BY MEANS OF A VIBRATOR, THE MAXIMUM VALUES OF THE PLATE AND GRID 2 VOLTAGES ARE 275 VOLTS AND THE PLATE DISSIPATION IS 9.9 WATTS.



UNIPOTENTIAL CATHODE

HEATER 6.3±10% VOLTS 0.4 AMP. AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW SMALL-BUTTON MINIATURE 7 PIN BASE 7 C M

THE 6GM6 IS A SEMIREMOTE-CUTOFF PENTODE IN THE 7 PIN MINIATURE CONSTRUC-TION. IT IS ESPECIALLY DESIGNED FOR USE IN GAIN-CONTROLLED PICTURE-IF STAGES OF TELEVISION RECEIVERS OPERATING AT INTERMEDIATE FREQUENCIES OF THE ORDER OF 40 MEGACYCLES.

DIRECT INTERELECTRODE CAPACITANCES WITHOUT EXTERNAL SHIELD

GRID #1 TO	PLATE (MAX.)	0.036	μμ f
GRID #1 TO	CATHODE, INTERNAL SHIELD & G3,G2 & H.	10	μμ f
PLATE TO C	ATHODE, INTERNAL SHIELD & G3, G2 & H.	2.4	μμ f

RATINGS

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

CLASS A1 AMPLIFIER

HEATER VOLTAGE	6.3±10%	VOLTS
MAXIMUM PLATE VOLTAGE	330	VOLTS
MAXIMUM GRID #3 (SUPPRESSOR) VOLTAGE	0	VOLTS
MAXIMUM GRID #2 SUPPLY VOLTAGE	330	VOLTS
MAXIMUM GRID #2 (SCREEN-GRID) VOLTAGE		
(SEE JEDEC INPUT RATING CHART J5-C4-2)		
MAXIMUM GRID #1 (CONTROL-GRID) VOLTAGE:		
POSITIVE BIAS VALUE	0	VOLTS
MAXIMUM PLATE DISSIPATION	3.1	WATTS
MAXIMUM GRID #2 INPUT:		
FOR GRID #2 VOLTAGES UP TO 165 VOLTS	0.65	WATT
FOR GRID #2 VOLTAGES BETWEEN 165 AND 330 VOLTS		
(SEE JEDEC INPUT RATING CHART J5-C4-2)		
MAXIMUM PEAK HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	200 ^A	VOLTS

ATHE DC COMPONENT MUST NOT EXCEED 100 VOLTS.

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER

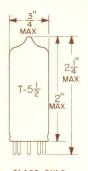
HEATER VOLTAGE	6.3±10%	VOLTS
HEATER CURRENT	0.4	AMP
PLATE SUPPLY VOLTAGE	125	VOLTS
GRID #3	CONNECTED TO CATHODE AT SOCKET	
GRID #2 SUPPLY VOLTAGE	125	VOLTS
CATHODE RESISTOR	56	OHMS
PLATE RESISTANCE (APPROX.)	0.2	MEGOHMS
TRANSCONDUCTANCE	13 000	μMHOS.
PLATE CURRENT	14	MA.
GRID #2 CURRENT	3.4	MA.
GRID #1 VOLTAGE (APPROX.) FOR		
TRANCONDUCTANCE = $60 \mu MHOS$	-15	VOLTS

DESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT SE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE AND EXTOURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT LIFE NO DESIGN-MAXIMUM VALUE FOR THE INTENDED SER ICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WROST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.

SIMILAR TYPE REFERENCE: Except for heater ratings and heater warm-up time, the 6GM6 is identical to the 4GM6 and the 5GM6.

PENTODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER

6.3 VOLTS 0.3 AMP.

6.3 VOLTS 0.3 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
7 PIN BASE

7 F W

GLASS BULB

THE 6GN6 IS A REMOTE-CUTOFF PENTODE IN THE 7 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED PRIMARILY FOR USE AS A HIGH GAIN R.F. OR I.F. AMPLIFIER AND A DEMODULATOR DIODE BOTH CN A COMMON CATHODE. EXCEPT FOR HEATER CHARACTERISTICS AND HEATER WARM-UP TIME, THE 6GN6 IS IDENTICAL TO THE 12GN6.

DIRECT INTERELECTRODE CAPACITANCES

	WITH A SHIELD	WITHOUT	
GRID #1 TO PLATE (MAX.)	.0035	.0035	μμ f
INPUT	5.5	5.5	HHL f
OUTPUT	5.5	5.0	Muf
COUPLING DIODE PLATE TO GRID (MAX.)	.05	.05	μμ f

Awith external Shield #316 connected to PIN 2.

RATINGS

INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER VOLTAGE	6.3	VOLTS
MAXIMUM PLATE VOLTAGE	300	VOLTS
MAXIMUM SCREEN-SUPPLY VOLTAGE	300	VOLTS
MAXIMUM POSITIVE GRID #1 VOLTAGE	0	VOLTS
MAXIMUM NEGATIVE GRID #1 VOLTAGE	50	VOLTS
MAXIMUM PLATE DISSIPATION	3.0	WATTS
MAXIMUM SCREEN DISSIPATION	0.6	WATTS
MAXIMUM DIODE CURRENT (CONTINUOUS OPERATION)	1.0	MA.
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC COMPONENT	100	VOLTS
TOTAL DC PLUS PEAK	200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC PLUS PEAK	200	VOLTS
HEATER WARM-UP TIME* (APPROX.)	11.0	SECONDS
ALMANDE WAS AND ADDRESS OF THE PARTY OF THE		

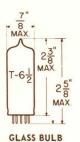
*HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH BO\$ OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A AMPLIFIER

HEATER VOLTAGE	6	. 3	VOLTS
HEATER CURRENT	0	. 3	AMP.
PLATE VOLTAGE	100	250	VOLTS
SUPPRESSOR, CONNECTED TO CATHODE AT SOCKET			
SCREEN VOLTAGE	100	100	VOLTS
CATHODE-BIAS RESISTOR	68	.68	OHMS
PLATE RESISTANCE (APPROX.)	0.25	1.0	MEGOHMS
TRANSCONDUCTANCE	4300	4400	<i>µ</i> мноs
PLATE CURRENT	10.8	11	MA.
SCREEN CURRENT	4.4	4.2	MA.
GRID #1 VOLTAGE (APPROX.)			
$G_{\rm m} = 40 \mu \rm MHOS$	-20	-20	VOLTS
AVERAGE DIODE CURRENT AT 10V D.C.	1.5	1.5	MA-



COATED UNIPOTENTIAL CATHODE

HEATER

6.3 VOLTS 0.75 AMP.

ANY MOUNTING POSITION



BOTTOM VIEW

9 PIN BASE

THE 6GN8 IS A HIGH MU TRIODE AND A SHARP CUTOFF PENTODE IN THE 9 PIN MINIATURE CONSTRUCTION. THE TRIODE SECTION IS DESIGNED FOR USE AS A VOLTAGE AMPLIFIER OR SYNC-SEPARATOR. THE PENTODE SECTION IS DESIGNED FOR VIDEO AMPLIFIER SERVICE FEATURING A CONTROLLED PLATE KNEE CHARACTERISTIC. EXCEPT FOR HEATER RATINGS AND HEATER WARM-UP TIME, THE 6GN8 IS IDENTICAL TO THE 8GN8.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

TRIODE SECTION

GRID TO PLATE	4.4	μμ
INPUT: G TO (H+K)	2.4	μμf
OUTPUT: P TO (H+K)	0.36	μμf

PENTODE SECTION

GRID #1 TO PLATE (MAX)	0.1	$\mu\mu f$
INPUT: G1 TO (H+K+G2+G3+I.S.)	11	μμf
OUTPUT: P TO (H+K+G2+G3+I.S.)	4.2	$\mu\mu f$

COUPLING

TRIODE GRID TO PENTODE PLATE (MAX.)	.018	μμf
PENTODE GRID #1 TO TRIODE PLATE (MAX.)	.005	$\mu\mu f$
PENTODE PLATE TO TRIODE PLATE (MAX.)	0.17	μμf

RATINGS

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM A

	TRIODE	PENTODE	
HEATER VOLTAGE	6.3	3	VOLTS
MAXIMUM PLATE VOLTAGE	330	330	VOLTS
MAXIMUM GRID #2 SUPPLY VOLTAGE		330	VOLTS

TUNG-SOL .

CONTINUED FROM PRECEDING PAGE

	TRIODE	PENTODE	
HEATER VOLTAGE	6.	.3	VOLTS
MAXIMUM GRID #2 VOLTAGE	SEE RAT	ING CHART	
MAXIMUM POSITIVE GRID #1 VOLTAGE	0	0	VOLTS
MAXIMUM PLATE DISSIPATION	1.0	5.0	WATTS
MAXIMUM GRID #2 DISSIPATION		1.1	WATTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE:			
FIXED BIAS	0.5	0.25	MEGOHM
CATHODE BIAS	1.0	1.0	MEGOHM
MAXIMUM HEATER - CATHODE VOLTAGE:			
HEATER NEGATIVE WITH RESPECT TO CATHODE			
TOTAL DC AND PEAK	20	00	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE			
DC	10	00	VOLTS
TOTAL DC AND PEAK	20	00	VOLTS

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

	TRIODE	PENTODE SECTION	
HEATER VOLTAGE		6.3	VOLTS
HEATER CURRENT	(0.75	AMP
PLATE VOLTAGE	250	200	VOLTS
GRID #2 VOLTAGE		150	VOLTS
GRID #1 VOLTAGE	-2		VOLTS
CATHODE BIAS RESISTOR		100	OHMS
PLATE CURRENT	2	25	MA.
GRID #2 CURRENT		5.5	MA.
TRANSCONDUCTANCE	2700	11500	μMHOS
AMPLIFICATION FACTOR	100		
PLATE RESISTANCE	37000	60000	OHMS
Ec1 FOR $lb = 100 \mu A$ (APPROX.)		-10	VOLTS
Ec1 FOR Ib = 20 μA (APPROX.)	-5		VOLTS

INSTANTANEOUS PLATE KNEE CHARACTERISTICS

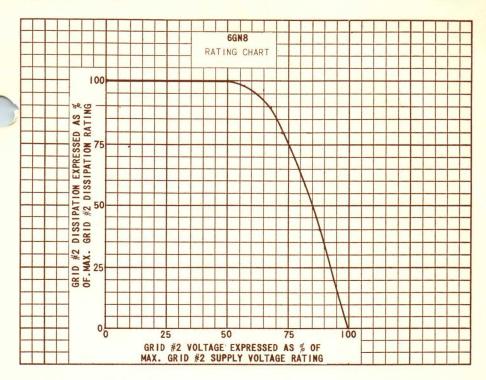
PENTODE SECTION

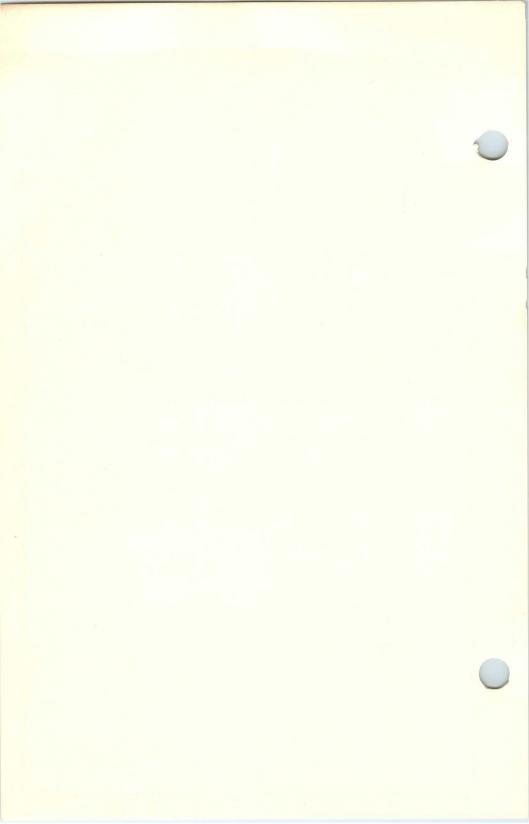
Eb = 60 VOLTS, Ec2 = 150 VOLTS AND Ec1 = 0 VOLTS Ib = 55 MA AND Ic2 = 18 MA.

A. DESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDERTHE WORST PROBABLE CONDITIONS.

THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS.

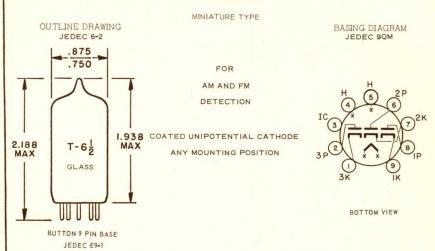
THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT LIFE NO DESIGN-MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION AND ENVIRONMENTAL CONDITIONS.





TUNG-SOL

TRIPLE DIODE



THE 6GQ7 IS A TRIPLE HIGH PERVEANCE DIODE IN THE 9 PIN MINIATURE CONSTRUCTION, IT IS DESIGNED FOR SERVICE AS AN AM DETECTOR AND FM RADIO-DETECTOR OR DISCRIMINATOR.

DIRECT INTERELECTRODE CAPACITANCES

PLATE INPUT EACH UNIT: P TO (K +H)	2.05	pf
CATHODE INPUT EACH UNIT: K TO (P+H)	3.10	pf
PLATE, UNIT #1 TO PLATE, UNIT #2	0.47	pf
PLATE, UNIT #1 TO PLATE, UNIT #3	0.47	pf
PLATE, UNIT #2 TO PLATE, UNIT #3	0.05	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS	450	mA
LIMITS OF APPLIED VOLTAGE		6.3 ± 0.6	VOLTS
PEAK HEATER-CATHODE VOLTAGE:			
HEATER NEGATIVE WITH RESPECT	TO CATHODE	330	VOLTS
DC COMPONENT		330	VOLTS
HEATER POSITIVE WITH RESPECT T	O CATHODE	200	VOLTS
DC COMPONENT		100	VOLTS

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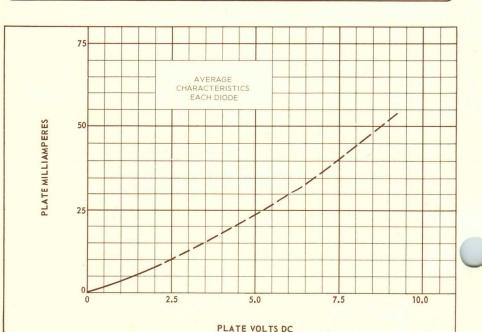
MAXIMUM RATINGS

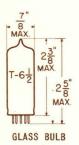
DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

PEAK INVERSE VOLTAGE	330	VOLTS
AC PLATE VOLTAGE RMS - EACH PLATE	117	VOLTS
STEADY STATE PEAK PLATE CURRENT - EACH PLATE	54	mA
DC OUTPUT CURRENT - EACH PLATE	9	mA
MINIMUM TOTAL EFFECTIVE PLATE SUPPLY IMPEDENCE - EACH PLATE	300	OHMS

CHARACTERISTICS

TUBE VOLTAGE DROP AT 60 mA 10 VOLTS RESONANT FREQUENCY - EACH UNIT APPROX. 700 Mc/s



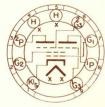


COATED UNIPOTENTIAL CATHODE

HEATER

6.3 VOLTS 0.30 AMP.

ANY MOUNTING POSITION



BOTTOM VIEW SMALL BUTTON 9 PIN BASE

9 L W

THE 6GS8 IS A DUAL PENTODE WITH A SEPARATE PLATE AND A SEPARATE #3 GRID IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS PRIMARILY INTENDED FOR SERVICE AS A COMBINED SYNC SEPARATOR-CLIPPER AND AGC TUBE IN TELEVISION RECEIVERS. EXCEPT FOR HEATER RATINGS AND HEATER WARM-UP TIME THE 6GS8 IS IDENTICAL TO THE 3GS8 AND THE 4GS8.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

GRID #3 TO PLATE (EACH SECTION)	2.0	μμ f
GRID #1 TO ALL	6.0	μμ f
GRID #3 (EACH SECTION) TO ALL	3.8	μμf
PLATE (EACH SECTION) TO ALL	3.2	μμf
GRID #3 (SECTION #4) TO		
GRID #3 (SECTION 2) (MAX.)	0.015	HH f

RATINGS

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM A

HEATER VOLTAGE	6.3	VOLTS
MAXIMUM PLATE VOLTAGE (EACH SECTION)	300	VOLTS
MAXIMUM GRID #2 VOLTAGE	150	VOLTS
MAXIMUM POSITIVE DC GRID #3 VOLTAGE (EACH SECTION)	3.0	VOLTS
MAXIMUM NEGATIVE DC GRID #3 VOLTAGE (EACH SECTION)	50	VOLTS
MAXIMUM PEAK POSITIVE GRID #3 VOLTAGE (EACH SECTION)	50	VOLTS
MAXIMUM NEGATIVE DC GRID #1 VOLTAGE	50	VOLTS
MAXIMUM PLATE DISSIPATION (EACH SECTION)	1.1	WATTS
MAXIMUM GRID #2 DISSIPATION	0.75	WATTS
MAXIMUM DC CATHODE CURRENT	12	MA.
MAXIMUM GRID #1 CIRCUIT RESISTANCE	0.5	MEGOHM
MAXIMUM GRID #3 CIRCUIT RESISTANCE (EACH SECTION)	0.5	MEGOHM
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC	100	VOLTS
TOTAL DC AND PEAK	200	VOLTS

TUNG-SOL

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

BOTH SECTIONS OPERATING

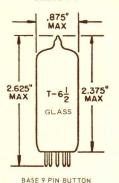
HEATER VOLTAGE		6.3	VOLTS
HEATER CURRENT		0.30	AMP.
PLATE VOLTAGE (EACH SECTION)	100	100	VOLTS
GRID #2 VOLTAGE	67.5	67.5	VOLTS
GRID #3 VOLTAGE (EACH SECTION)	-10	0	VOLTS
GRID #1 VOLTAGE	NOTE B	NOTE B	
PLATE CURRENT (EACH SECTION)		2.0	MA.
GRID #2 CURRENT	6.0	3.6	MA.
CATHODE CURRENT	6.1	7.7	MA.

EACH SECTION OPERATING SEPARATELY WITH PLATE AND GRID #3 OF OPPOSITE SECTION GROUNDED.

PLATE VOLTAGE	100	100	VOLTS
GRID #2 VOLTAGE	67.5	67.5	VOLTS
GRID #3 VOLTAGE	0	0	VOLTS
GRID #1 VOLTAGE	0	NOTE B	
PLATE CURRENT		2.0	MA.
GRID #3 TRANSCONDUCTANCE		270	<i>µмноѕ</i>
GRID #1 TRANSCONDUCTANCE	1200		MMHOS
EC3 FOR $1b = 100 \mu A$ (APPROX.)		-3.7	VOLTS
Ec1 FOR Ib = 100 HA (APPROX.)		-2.0	VOLTS

DESIGN-MAXIMUM RATINGS ARELIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE
TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD
NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE
VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE
EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE
EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT LIFE NO DESIGN-MAXIMUM
VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE
OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION,
EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS,

B_{GRID} CURRENT ADJUSTED FOR 100 μA DC.



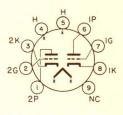
JEDEC E9-1

FOR

USE IN MATRIXING CIRCUITS

OF COLOR T.V. RECEIVERS

COATED UNIPOTENTIAL CATHODE ANY MOUNTING POSITION



BOTTOM VIEW

THE 6GUT IS A MEDIUM-MU TWIN TRIODE IN THE 9 PIN T-61/2 ENVELOPE. IT IS DESIGNED FOR USE IN THE MATRIXING CIRCUITS OF COLOR T.V. RECEIVERS, THE 6GU7 CAN ALSO BE USED IN PHASE-INVERTER AND MUTIVIBRATOR CIRCUITS OR AS A GENERAL-PURPOSE AMPLIFIER TUBE.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

	UNIT #1	UNIT #2	
GRID TO PLATE	3.0	3.0	pf
GRID TO CATHODE AND HEATER	3.4	3.6	pf
PLATE TO CATHODE AND HEATER	0.44	0.34	pf
PLATE OF UNIT #1 TO PLATE OF UNIT #2	1.0	1.0	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES . SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS 600	mA
HEATER WARM-UP TIME	APPROX. 11	SECONDS
LIMITS OF APPLIED VOLTAGE	6.3 ± 0.6	VOLTS
LIMITS OF SUPPLIED CURRENT	600 ± 40	mA
PEAK HEATER CATHODE VOLTAGE - EACH UNIT HEATER NEGATIVE WITH RESPECT TO CATHODE HEATER POSITIVE WITH RESPECT TO CATHODE DC COMPONENT	200 200 100	VOLTS VOLTS VOLTS

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

CLASS A, AMPLIFIER - EACH UNIT

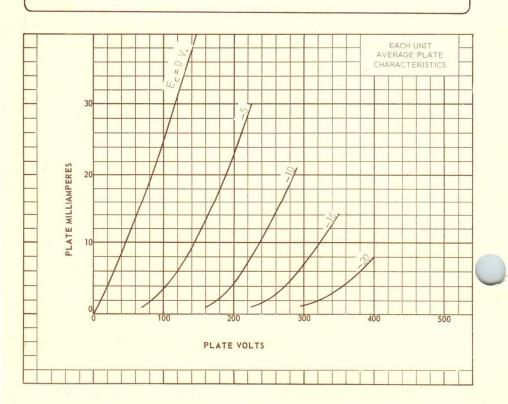
PLATE VOLTAGE GRID VOLTAGE:	330	VOLTS
POSITIVE BIAS VALUE	0	VOLTS
PLATE DISSIPATION	3	WATTS

GRID - CIRCUIT RESISTANCE:
FOR FIXED BIAS OPERATION 1 MEGOHM

CHARACTERISTICS

CLASS A, AMPLIFIER - EACH UNIT

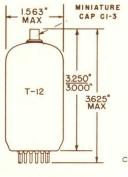
PLA	ATE VOLTAGE		250	VOLTS
GRI	D VOLTAGE	-	-10.5	VOLTS
PLA	ATE CURRENT		11.5	mΑ
TRA	ANSCONDUCTANCE		3,100	μ MHOS
AMF	PLIFICATION FACTOR		17	
PLA	ATE RESISTANCE	APPROX.	5,500	OHMS
PLA	ATE CURRENT AT E = -14 VOLTS		4	mA
	D VOLTAGE FOR I = 50 μA	APPROX.	-23	VOLTS
0,11	D TOLINOL TON TO		2.0	10210



NC

TUNG-SOL

BEAM PENTODE



FOR

TV HORIZONTAL DEFLECTION

AMPLIFIER APPLICATIONS

ANY MOUNTING POSITION

COATED UNIPOTENTIAL CATHODE

BOTTOM VIEW

BASING DIAGRAM

JEDEC 12DR

GLASS BULB BUTTON 12 PIN BASE E12-74

OUTLINE DRAWING
JEDEC 12-79

THE 6GV5 IS A COMPACTRON BEAM-POWER PENTODE EMPLOYING A 12 PIN T-12 ENVELOPE. IT IS DESIGNED PRIMARILY FOR USE AS THE HORIZONTAL-DEFLECTION AMPLIFIER IN TELEVISION RECEIVERS.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

WITHOUT EXTERNAL SHIELD

GRID 1 TO PLATE: (G1 TO P)	0.6	pf
INPUT: G1 TO (H+K+G2+B.P)	16	pf
OUTPUT: P TO (H+K+G2+B.P.)	7.0	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	0.3	VOLIS	1200	IVIA,	
HEATER SUPPLY LIMITS:					
VOLTAGE OPERATION			6.3 ± 0.6	VOLTS	
MAXIMUM HEATER CATHODE VOLTAGE:					
HEATER NEGATIVE WITH RESPECT TO C.	ATHODE				
TOTAL DC AND PEAK			200	VOLTS	
HEATER POSITIVE WITH RESPECT TO CA	THODE				
DC			100	VOLTS	
TOTAL DC AND PEAK			200	VOLTS	

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

HORIZONTAL-DEFLECTION AMPLIFIER SERVICE

DC PLATE-SUPPLY VOLTAGE (BOOST + DC POWER SUPPLY)	770	VOLTS
PEAK POSITIVE PULSE PLATE VOLTAGE	6500	VOLTS
PEAK NEGATIVE PULSE PLATE VOLTAGE	1500	VOLTS
GRID 2 VOLTAGE	220	VOLTS
NEGATIVE DC GRID 1 VOLTAGE	55	VOLTS
PEAK NEGATIVE GRID 1 VOLTAGE	330	VOLTS
PLATE DISSIPATION B	17.5	WATTS
GRID 2 DISSIPATION	3.5	WATTS
DC CATHODE CURRENT	175	MA.
PEAK CATHODE CURRENT	550	MA.
GRID 1 CIRCUIT RESISTANCE	1.0	MEGOHMS
BULB TEMPERATURE AT HOTTEST POINT	220	C

TYPICAL OPERATING CHARACTERISTICS

AVERAGE CHARACTERISTICS

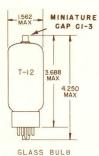
	The second secon			
PLATE VOLTAGE	5000	60	250	VOLTS
GRID 2 VOLTAGE	1.50	150	150	VOLTS
GRID 1 VOLTAGE	****	OC	-22.5	VOLTS
PLATE RESISTANCE, APPROX.			18000	OHMS
TRANSCONDUCTANCE			7300	μMHOS.
PLATE CURRENT		345	65	MA.
GRID 2 CURRENT		27	1.8	MA.
GRID 1 VOLTAGE, APPROX. Ib=1.0 MA.	-100		-42	VOLTS
TRIODE AMPLIFICATION FACTORD			4.4	

APPLIED FOR SHORT INTERVAL (TWO SECONDS MAXIMUM) SO AS NOT TO DAMAGE TUBE.

D
TRIODE CONNECTION (SCREEN TIED TO PLATE) WITH Eb=Ec2=150 VOLTS AND Ec1=-22.5 VOLTS

B IN STAGES OPERATING WITH GRID-LEAK BIAS, AN ADEQUATE CATHODE-BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

BEAM PENTODE



FOR HORIZONTAL-DEFLECTION-AMPLIFIER CIRCUITS IN TELEVISION RECEIVERS H(2 K,G3

ANY MOUNTING POSITION

PIN #3 IS OMITTED WHEN B5-190 BASE IS USED

BOTTOM VIEW BASING DIAGRAM JEDEC 6AM

SHORT MEDIUM SHELL 5 OR 6 PIN OCTAL WITH EXTERNAL BARRIERS STYLE B: 86-122 OR 85-190

THE 6GW6 IS A BEAM POWER PENTODE EMPLOYING A T-12 ENVELOPE. IT IS DE-SIGNED ESPECIALLY FOR USE IN HORIZONTAL-DEFLECTION-AMPLIFIER CIRCUITS OF TELEVISION RECEIVERS WHICH OPERATE WITH LOW PLATE SUPPLY VOLTAGES.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

WITHOUT EXTERNAL SHIELD

GRID #1 TO PLATE	0.5	pf
GRID #1 TO CATHODE, GRID #3, GRID #2 & HEATER	17	pf
PLATE TO CATHODE, GRID #3, GRID #2 & HEATER	7	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS	1200	MA.
HEATER SUPPLY LIMITS: VOLTAGE OPERATION		6.3±0.6	VOLTS
MAXIMUM PEAK HEATER CATHODE V HEATER NEGATIVE WITH RESPEC HEATER POSITIVE WITH RESPEC	T TO CATHODE	200 200 ^A	VOLTS VOLTS

MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

HORIZONTAL-DEFLECTION AMPLIFIER

DC PLATE-SUPPLY VOLTAGE (BOOST + DC POWER SUPPLY)	770	VOLTS
PEAK POSITIVE-PULSE PLATE VOLTAGE B	6500	VOLTS
PEAK NEGATIVE-PULSE PLATE VOLTAGE	1500	VOLTS
DC GRID #2 VOLTAGE	220	VOLTS
DC GRID #1 VOLTAGE	-55	VOLTS

TUNG-SOL

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS-CONTID.

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

PEAK NEGATIVE-PULSE GRID #1 VOLTAGE	330	VOLTS
CATHODE CURRENT:		
PEAK	550	MA.
AVERAGE	175	MA.
PLATE DISSIPATION ^C	17.5	WATTS
GRID #2 INPUT	3.5	WATTS
BULB TEMPERATURE (AT HOTTEST POINT ON BULB SURFACE)	240	°c
MAXIMUM CIRCUIT VALUES:		
GRID #1 CIRCUIT RESISTANCE	1.0	MEGOHM
The state of the s	1.0	SOTTIM

CHARACTERISTICS CLASS A1 AMPLIFIER

PLATE VOLTAGE	60	250	VOLTS
GRID #2 VOLTAGE	150	150	VOLTS
GRID #1 VOLTAGE	0	-22.5	VOLTS
MU-FACTOR, GRID #2 TO GRID #1 WITH PLATE			
CONNECTED TO GRID #2, PLATE VOLTS =			
GRID #2 VOLTS =150, AND GRID #1 VOLTS			
=-22.5		4.4	
PLATE RESISTANCE (APPROX.)		15000	OHMS
TRANSCONDUCTANCE		7100	µмноѕ
PLATE CURRENT	→ 390 D	70	MA.
GRID #2 CURRENT	32 ^D	2.1	MA.
GRID #1 VOLTAGE (APPROX.) FOR			
PLATE CURRENT OF 1 MA.		42	VOLTS

ATHE DC COMPONENT MUST NOT EXCEED 100 VOLTS.

B
FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING
PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE
OF THE VOLTAGE POLSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE.
15% OF ONE HORIZONTAL SCANNING CYCLE IS 10 MIGROSECONDS.

C IN STAGES OPERATING WITH GRID-RESISTOR BIAS, AN ADEQUATE CATHODE-BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

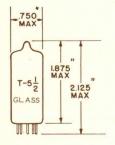
D THESE VALUES CAN BE MEASURED BY A METHOD INVOLVING A RECURRENT WAVE FORM SUCH THAT THE CATHODE CURRENT WILL BE KEPT WITHIN RATINGS IN ORDER TO PREVENT DAMAGE TO THE TUBE.

PENTODE

MINIATURE TYPE

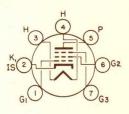
OUTLINE DRAWING JEDEC 5-2

BASING DIAGRAM JEDEC 7EN



FOR FM SOUND DETECTOR SERVICE

COATED UNIPOTENTIAL CATHODE ANY MOUNTING POSITION



BOTTOM VIEW

BASE 7 PIN BUTTON JEDEC E7-1

THE 6GX6 IS A SHARP-CUTOFF PENTODE WITH DUAL CONTROL GRIDS IN THE 7 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED PRIMARILY FOR FM SOUND DETECTOR - SERVICE, EXCEPT FOR HEATER CHARACTERISTICS AND RATINGS, THE 6GX6 IS IDENTICAL TO THE 5GX6.

DIRECT INTERELECTRODE CAPACITANCES WITHOUT EXTERNAL SHIELD

GRID 1 TO PLATE	0.26	pf
GRID 1 TO (K & I.S., G3, G2, H)	8	pf
GRID 1 TO GRID 3	0.12	pf
GRID 3 TO PLATE	1.6	pf
GRID 3 TO (K & I.S., P, G2, G1, H)	6.5	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS	450	mA
HEATER WARM - UP TIME - AVERAGE		11	SECONDS
LIMITS OF APPLIED VOLTAGE - AC OR DC		6.3 ± .6	VOLTS
LIMITS OF SUPPLIED CURRENT - AC OR DC		450 ± 30	mA
PEAK HEATER - CATHODE VOLTAGE:			
HEATER POSITIVE WITH RESPECT TO CATHODE		200	VOLTS
DC COMPONENT		100	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE		200	VOLTS

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

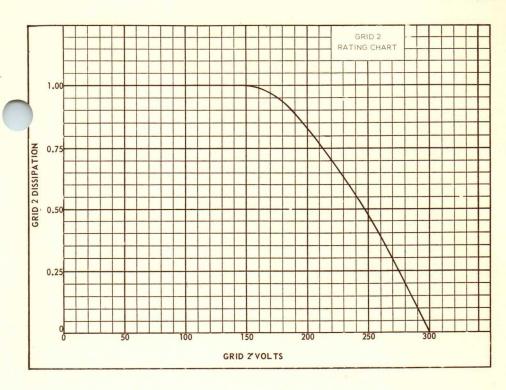
FM SOUND DETECTOR SERVICE

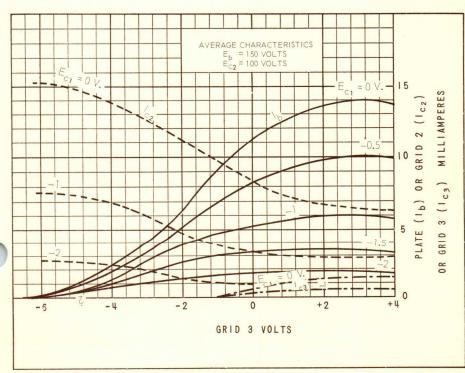
PLATE VOLTAGE	300	VOLTS
GRID 3 VOLTAGE:		
NEGATIVE VALUE - DC AND PEAK	100	VOLTS
POSITIVE VALUE - DC AND PEAK	25	VOLTS
GRID 2 SUPPLY VOLTAGE	300	VOLTS
GRID 2 VOLTAGE	SEE RATING CHART	
GRID 1 VOLTAGE:		
NEGATIVE - BIAS VALUE	50	VOLTS
POSITIVE - BIAS VALUE	0	VOLTS
GRID 3 INPUT	0.1	WATT
GRID 2 INPUT - UP TO 150 VOLTS	1	WATT
- BETWEEN 150 VOLTS AND 300 VOLTS	SEE RATING CHART	
PLATE DISSIPATION	1.7	WATTS
GRID 3 CIRCUIT RESISTANCE	0.68	MEGOHM
GRID 1 CIRCUIT RESISTANCE:		
FOR FIXED - BIAS OPERATION	0.22	MEGOHM
FOR CATHODE - BIAS OPERATION	0.47	MEGOHM

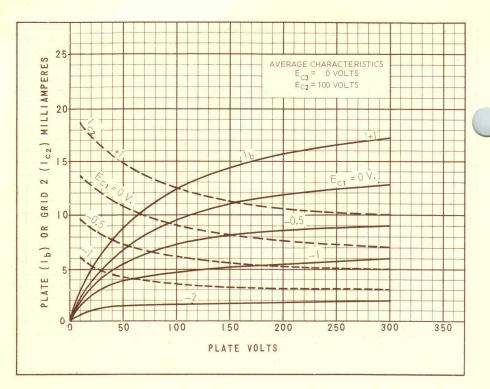
CHARACTERISTICS

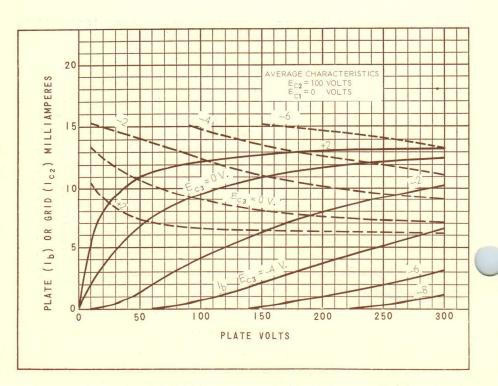
CLASS A, AMPLIFIER

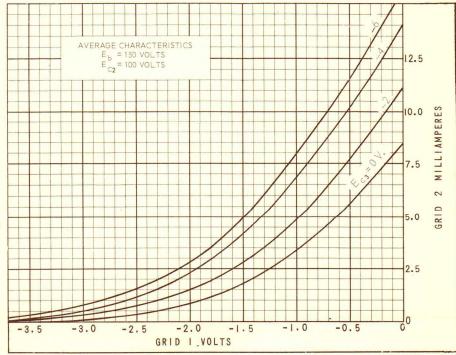
PLATE SUPPLY VOLTAGE		150	VOLTS
GRID 3 SUPPLY VOLTAGE		0	VOLTS
GRID 2 SUPPLY VOLTAGE		100	VOLTS
GRID 1 SUPPLY VOLTAGE		0	VOLTS
CATHODE RESISTOR		180	OHMS
PLATE CURRENT		3.7	mΑ
GRID 2 CURRENT		3.0	mΑ
TRANSCONDUCTANCE - GRID 1 TO PLATE		3,700	μ MHOS
TRANSCONDUCTANCE - GRID 3 TO PLATE		750	μ MHOS
PLATE RESISTANCE	APPROX.	0.14	MEGOHM
GRID 1 VOLTAGE FOR $I_b = 20 \mu\text{A}$	APPROX.	-4.5	VOLTS
GRID 3 VOLTAGE FOR $I_b = 20 \mu A$	APPROX.	-7	VOLTS

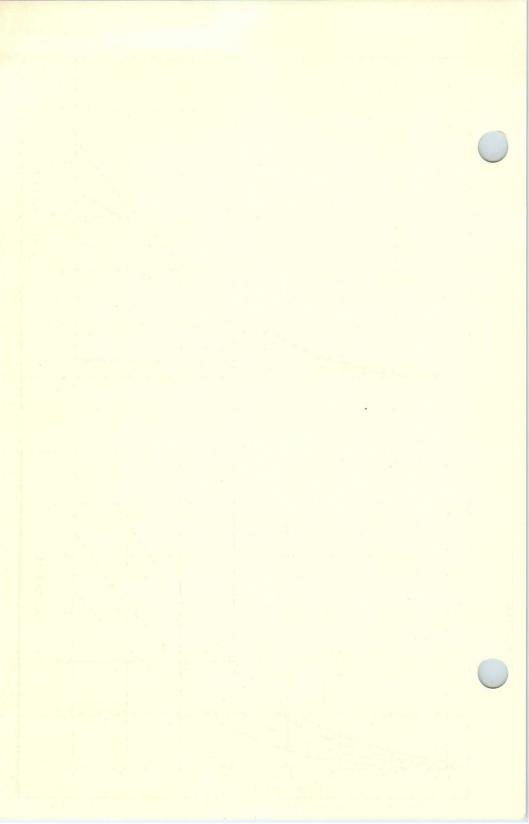








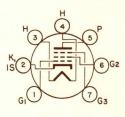




SHARP-CUTOFF PENTODE
WITH
DUALCONTROL GRIDS

COATED UNIPOTENTIAL CATHODE

ANY MOUNTING POSITION



BOTTOM VIEW
BASING DIAGRAM
JEDEC 7EN

pf

pf

pf

6.5

GLASS BULB
SMALL-BUTTON MINIATURE
7 PIN BASE E7-1
OUTLINE DRAWING
JEDEC 5-2

THE 6GY6 IS A SHARP-CUTOFF PENTODE IN THE 7 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED PRIMARILY FOR USE IN GATED AGC AMPLIFIER AND NOISE-INVERTER SERVICE. PLATE CURRENT IS CONTROLLED BY THE ACTIONS OF GRID 1 AND GRID 3.

DIRECT INTERELECTRODE CAPACITANCES WITHOUT EXTERNAL SHIELD

GRID 1 TO PLATE 0.026
GRID 1 TO CATHODE & I.S., GRID 3, GRID 2 & HEATER 8
GRID 1 TO GRID 3 0.12
GRID 3 TO PLATE 1.6

GRID 3 TO CATHODE & I.S., PLATE, GRID 2, GRID 1 & HEATER

HEATER CHARACTERISTICS AND RATINGS DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVER	AGE CHARACTERISTICS	6.3	VOLTS	450	MA.
	ER WARM-UP TIME S OF APPLIED VOLTAGE			11 6.3±0.6	SECONDS VOLTS
LIMIT	S OF SUPPLIED CURRENT			450 ± 30	MA.
MAXI	MUM PEAK HEATER-CATHODE VOLTAGE:				
Н	HEATER NEGATIVE WITH RESPECT TO CAT	HODE		200	VOLTS
Н	HEATER POSITIVE WITH RESPECT TO CATH	HODE		200	VOLTS
	DC COMPONENT			100	VOLTS

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

GATED AGC AMPLIFIER AND NOISE-INVERTER SERVICE

DI 175 1/0/ 7/05 DO	000	1101 =0
PLATE VOLTAGE, DC	300	VOLTS
PEAK POSITIVE-PULSE PLATE VOLTAGE A	600	VOLTS
GRID 3 (CONTROL-GRID) VOLTAGE:		
POSITIVE VALUE	0	VOLTS
NEGATIVE VALUE	100	VOLTS
GRID 2 (SCREEN-GRID) SUPPLY VOLTAGE	300	VOLTS
GRID 1 (CONTROL-GRID) VOLTAGE:		
POSITIVE VALUE	0	VOLTS
NEGATIVE VALUE	50	VOLTS
PLATE DISSIPATION	1.7	WATTS
GRID 2 INPUT:		
FOR GRID 2 VOLTAGES UP TO 150 VOLTS	1.0	WATTS
FOR GRID 2 VOLTAGES BETWEEN		
150 VOLTS AND 300 VOLTS	See Rating Chart	

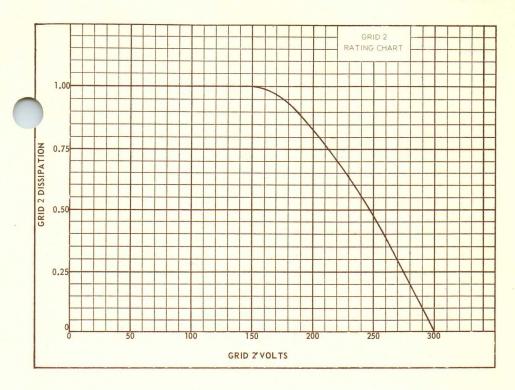
MAXIMUM CIRCUIT VALUES

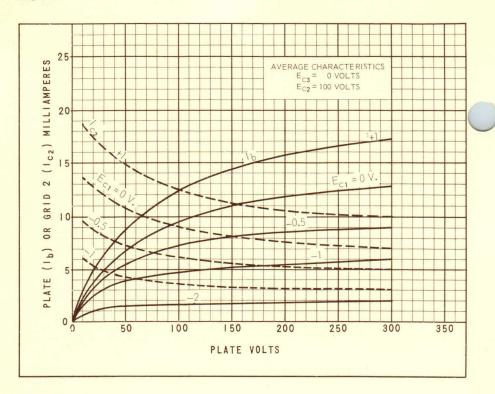
GRID 3 CIRCUIT RESISTANCE	0.68	MEGOHM
GRID 1 CIRCUIT RESISTANCE:		
FOR FIXED-BIAS OPERATION	0.22	MEGOHM
FOR CATHODE-BIAS OPERATION	0.47	MEGOHM

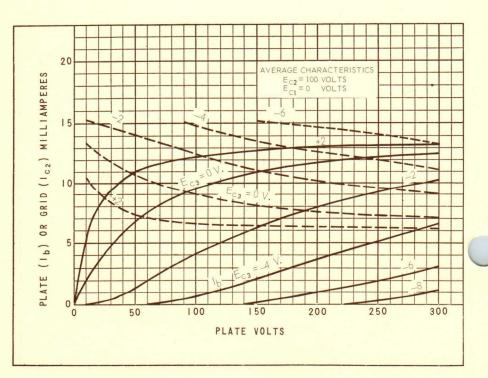
CHARACTERISTICS

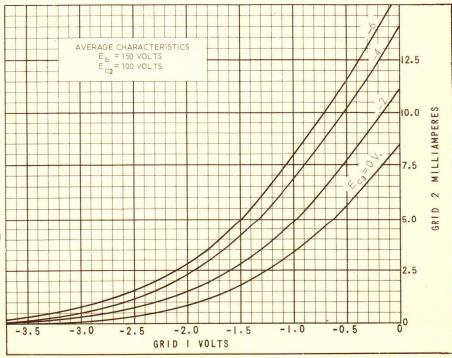
PLATE SUPPLY VOLTAGE		150	VOLTS
GRID 3 SUPPLY VOLTAGE		0	VOLTS
GRID 2 SUPPLY VOLTAGE		100	VOLTS
GRID 1 SUPPLY VOLTAGE		0	VOLTS
CATHODE BIAS RESISTOR		180	OHMS
PLATE CURRENT		3.7	MA.
GRID 2 CURRENT		3	MA.
TRANSCONDUCTANCE, GRID 1 TO PLATE		3700	μMHOS.
TRANS CONDUCTANCE, GRID 3 TO PLATE		750	μ MHOS
PLATE RESISTANCE	(APPROX.)	0.14	MEGOHM
GRID 1 SUPPLY VOLTAGE FOR 16 = 20 µA	(APPROX.)	-4.5	VOLTS
GRID 3 SUPPLY VOLTAGE FOR 1b = 20 µA	(APPROX.)	- 7	VOLTS

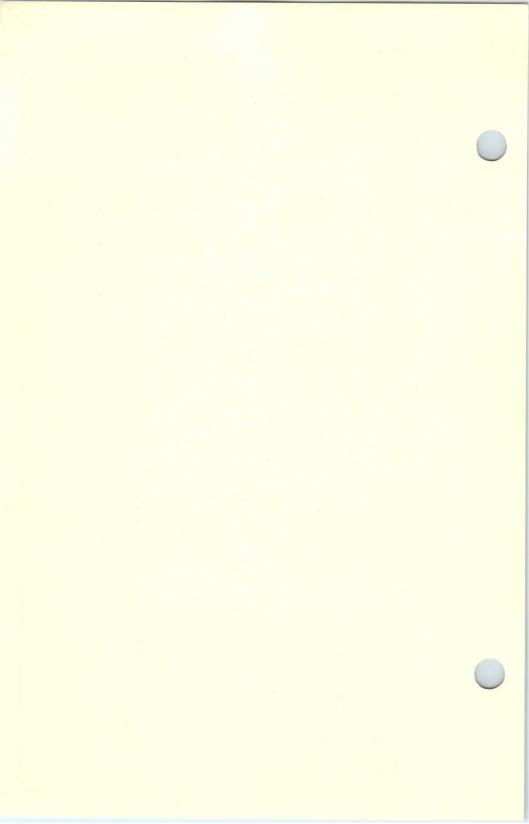
A
THE DURATION OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE HORIZONTAL SCANNING CYCLE.IN
A 525-LINE, 30-FRAME SYSTEM, 15% OF ONE HORIZONTAL SCANNING CYCLE IS 10 MICROSECONDS.

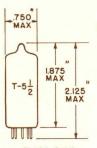












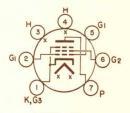
GLASS BULB MINIATURE BUTTON 7 PIN BASE E7-1 OUTLINE DRAWING JEDEC 5-2

AVERAGE CHARACTERISTICS

COATED UNIPOTENTIAL CATHODE

FOR AUDIO OUTPUT STAGE APPLICATIONS" IN RADIO AND T.V. RECEIVERS

ANY MOUNTING POSITION



BOTTOM VIEW

BASING DIAGRAM JEDEC 7CV

380

THE 6GZ5 IS A POWER PENTODE IN THE 7 PIN MINIATURE CONSTRUCTION. IT IS INTENDED FOR USE IN THE AUDIO OUTPUT STAGE OF RADIO AND TELEVISION RE-CEIVERS. ITS HEATER IS DESIGNED FOR TRANSFORMER OPERATION.

EXCEPT FOR HEATER CHARACTERISTICS, THE 6GZ5 IS IDENTICAL TO THE 4GZ5.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

GRID #1 TO PLATE: G1 TO P	0.24	pf
INPUT: G1 TO (H+K+G2)	8.5	pf
OUTPUT: P TO (H+K+G2)	3.8	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

6.3 VOLTS

HEATER SUPPLY LIMITS:	6.3±0.6	VOLTS
VOLTAGE OPERATION	0.510.0	VULIS
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC	100	VOLTS
TOTAL DC AND PEAK	200	VOLTS

MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

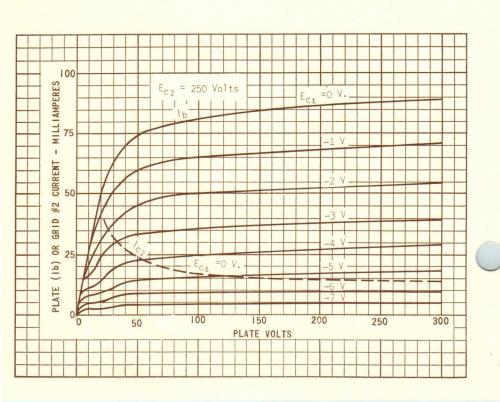
PLATE VOLTAGE	300	VOLTS
GRID #2 VOLTAGE	300	VOLTS
POSITIVE DC GRID #1 VOLTAGE	0	VOLTS
PLATE DISSIPATION	4.8	WATTS
GRID #2 DISSIPATION - CONTINUOUS	1:1	WATTS
CATHODE CURRENT- AVERAGE	30	MA.
GRID #1 CIRCUIT RESISTANCE		
FIXED BIAS	.5	MEGOHM
SELF BIAS	1.0	MEGOHM
BULB TEMPERATURE	200	°c

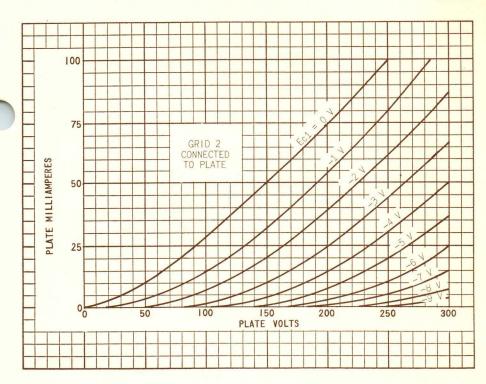
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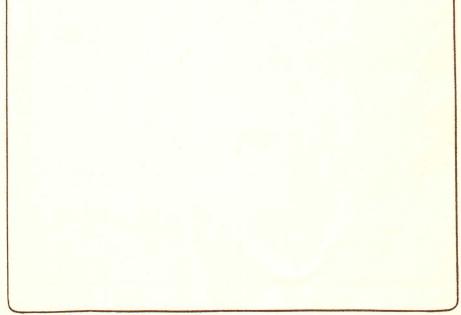
TYPICAL OPERATING CHARACTERISTICS

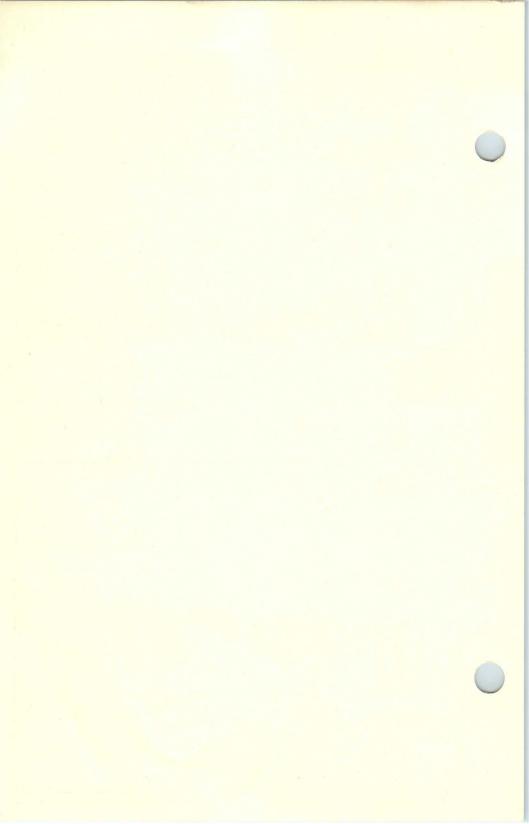
CLASS AL AUDIO AMPLIFIER

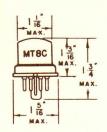
PLATE SUPPLY VOLTAGE	250	250	VOLTS
GRID #2 SUPPLY VOLTAGE	250	250	VOLTS
CATHODE RESISTOR	270	270	OHMS
BYPASSING	NONE	CONDENSER	
PEAK AUDIO GRID #1 VOLTAGE	9.8	2.0	VOLTS
ZERO SIGNAL PLATE CURRENT	- 16	16	MA.
MAXIMUM SIGNAL PLATE CURRENT	16	16	MA.
ZERO SIGNAL GRID #2 CURRENT	2.7	2.7	MA.
MAXIMUM SIGNAL GRID #2 CURRENT	5.0	5.0	MA.
TRANSCONDUCTANCE		8400	MMHOS
PLATE RESISTANCE (APPROX.)		.15	MEGOHMS
LOAD RESISTANCE	15 000	15 000	OHMS
TOTAL HARMONIC DISTORTION	10	10	PERCENT
POWER OUTPUT	1.8	1.1	WATTS









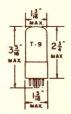


TWIN DIODE

UNIPOTENTIAL CATHODE

HEATER

6.3 VOLTS 0.3 AMPERE AC OR DC



METAL SHELL 7 PIN OCTAL BASE **6H6**





GLASS BULB INTERMEDIATE 7 PIN OCTAL BASE SH6GT/G

BOTTOM VIEWS

THE TUNG-SOL 6H6 AND 6H6GT/G ARE DESIGNED FOR USE AS DIODE DETECTORS, AVC RECTIFIERS, AND POWER RECTIFIERS IN LOW DRAIN APPLICATIONS. TWO SEPARATE RECTIFIER SECTIONS ALLOW CONSIDERABLE FLEXIBILITY IN THEIR APPLICATION. WITH THE EXCEPTION OF CAPACITANCES, THEIR ELECTRICAL CHARACTERISTICS ARE IDENTICAL.

RATINGS

MAXIMUM AC PLATE VOLTAGE PER PLATE (RMS)	150	VOLTS
MAXIMUM DC OUTPUT CURRENT PER PLATE	8	MA.
TUBE VOLTAGE DROP AT 16 MA. DC PER PLATE	11	VOLTS

DIRECT INTERELECTRODE CAPACITANCES A

	6н6	6H6GT/G	
PLATE (1) TO CATHODE (1)	3.0	3.0	μμf
PLATE (2) TO CATHODE (2)	3.4	4.0	μμf
PLATE TO PLATE	0.1 MAX.	0.1 MAX.	μμf

A WITH EXTERNAL SHIELD OR SHELL CONNECTED TO CATHODE

FOR "INTERPRETATION OF RATINGS" REFER TO FRONT OF BOOK.

CONTINUED NEXT PAGE

1341-1 OCT. 25

6H6, 6H6GT/G

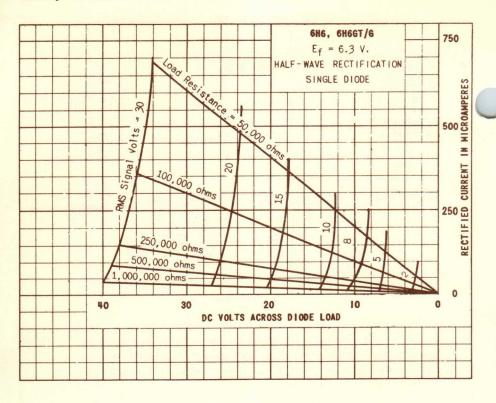
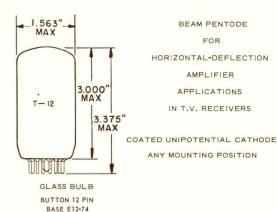


PLATE 1342-1 OCT. 25 1943

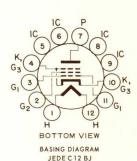
TUNG-SOL

PENTODE

COMPACTRON



OUTLINE DRAWING JEDEC 12-58



THE 6HB5 IS A BEAM PENTODE IN THE T-12 COMPACTRON CONSTRUCTION. IT IS DESIGNED SPECIFICALLY FOR USE AS THE HORIZONTAL-DEFLECTION AMPLIFIER IN T.V. RECEIVERS. EXCEPT FOR HEATER CHARACTERISTICS AND RATINGS, THE 6HB5 IS IDENTICAL TO THE 21HB5.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

GRID 1 TO PLATE: (G1 TO P)	0.4	pf
INPUT: G1 TO (H + K + G2 + G3)	22	pf
OUTPUT: P TO (H+K+G3+G3)	9.0	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS	1.5	AMPS
LIMITS OF APPLIED VOLTAGE	6.3 ± 0.6		VOLTS
HEATER - CATHODE VOLTAGE			
HEATER POSITIVE WITH RESPECT TO CATHODE			
DC COMPONENT		100	VOLTS
TOTAL DC AND PEAK		200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE			
TOTAL DC AND PEAK		200	VOLTS

CONTINUED ON PRECEDING PAGE

MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

HORIZONTAL-DEFLECTION AMPLIFIER SERVICE

DC PLATE-SUPPLY VOLTAGE (BOOST + DC POWER SUPPLY	770	VOLTS
PEAK POSITIVE PULSE PLATE VOLTAGE	6,000	VOLTS
PEAK NEGATIVE PULSE PLATE VOLTAGE	1,500	VOLTS
GRID 2 VOLTAGE	220	VOLTS
NEGATIVE DC GRID 1 VOLTAGE	55	VOLTS
PEAK NEGATIVE GRID 1 VOLTAGE	330	VOLTS
PLATE DISSIPATION A	18	WATTS
GRID 2 DISSIPATION	3.5	WATTS
DC CATHODE CURRENT	230	MA.
PEAK CATHODE CURRENT	800	MA.
GRID 1 CIRCUIT RESISTANCE	1.0	MEGOHMS
BULB TEMPERATURE AT HOTTEST POINT	220	° C

A- IN STAGES OPERATING WITH GRID-LEAK BIAS, AN ADEQUATE CATHODE-BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

CHARACTERISTICS AND TYPICAL OPERATION

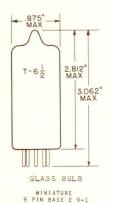
PLATE VOLTAGE	5,000	60	130	VOLTS
GRID 2 VOLTAGE	130	130	130	VOLTS
GRID 1 VOLTAGE	-	0 B	-20	VOLTS
PLATE CURRENT	-	410	50	MA.
GRID 2 CURRENT	-	24	1.75	MA.
TRANSCONDUCTANCE	•	-	9,100	μMHOS
PLATE RESISTANCE	•	- /	Approx.11,000	OHMS
GRID 1 VOLTAGEFOR 1 = 1.0 MA.				
-APPROX.	-66		-33	VOLTS
TRIODE AMPLIFICATION FACTOR C			4.7	

B- APPLIED FOR SHORT INTERVAL (2 SECONDS) SO AS NOT TO DAMAGE TUBE.

C- TRIODE CONNECTION (GRID 2 TIED TO PLATE) WITH $E_b = E_{c2} = 130$ VOLTS AND $E_{c1} = -20$ VOLTS.

POWER PENTODE

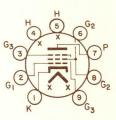
MINIATURE TYPE



OUTLINE DRAWING

POWER PENTODE FOR VERTICAL DEFLECTION AND VIDEO AMPLIFIER

SERVICE



BOTTOM VIEW

BASING DIAGRAM

JEDEC 9NW -

THE 6HB6 IS A POWER PENTODE IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED FOR USE AS A VERTICAL DEFLECTION AMPLIFIER FOR TELEVISION RE-CEIVERS WITH WIDE ANGLE PICTURE TUBES.

DIRECT INTERELECTRODE CAPACITANCES

GRID #1 TO PLATE (G1 TO P)	0.18	pf
INPUT G1 TO (H+K+G2+ G3)	13	pf
OUTPUT P TO (H+K+G2+G3)	8	pf

HEATER CHARACTERISTICS AND RATINGS DESIGN MAXIMUM VALUES - SEE ELA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS	760	MA.
HEATER SUPPLY LIMITS: VOLTAGE OPERATION MAX. PEAK HEATER-CATHODE VOLTAGE:		6.3±0.6	VOLTS
HEATER NEGATIVE TO CATHODE HEATER POSITIVE TO CATHODE		200 200 ^A	VOLTS VOLTS

ATHE DC COMPONENT MUST NOT EXCEED 100 VOLTS.

MAXIMUM RATINGS

350	VOLTS
2500	VOLTS
300	VOLTS
-100	VOLTS
10	WATTS
2	WATTS
1.0	MEGOHM
2.2	MEGOHM
	2500 300 -100 10 2

-- INDICATES A CHANGE.

CONTINUED FROM PRECEDING PAGE

AVERAGE CHARACTERISTICS

PLATE VOLTAGE	250	250	VOLTS
GRID #2 VOLTAGE	125	250	VOLTS
GRID #3 VOLTAGE	Ō	0	VOLTS
CATHODE RESISTOR	33	100	OHMS
PLATE CURRENT	40	40	MA.
GRID #2 CURRENT	4.2	6.2	MA.
MU-FACTOR: GRID #1 TO GRID #2		33	
TRANSCONDUCTANCE	24000	20000	µмноs
PLATE RESISTANCE	28	24	KOHMS
GRID #1 VOLTAGE			
FOR Ib = $100 \mu A$ (APPROX.)	-6.4	-13	VOLTS

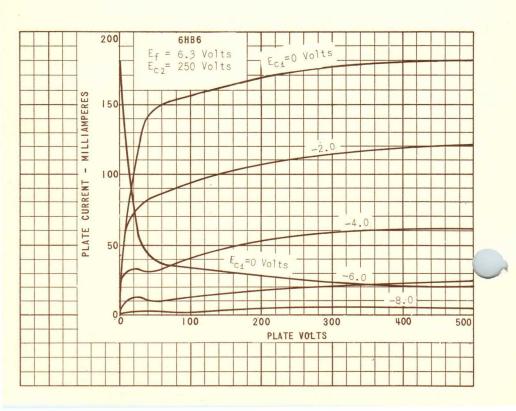
PLATE KNEE CHARACTERISTICS

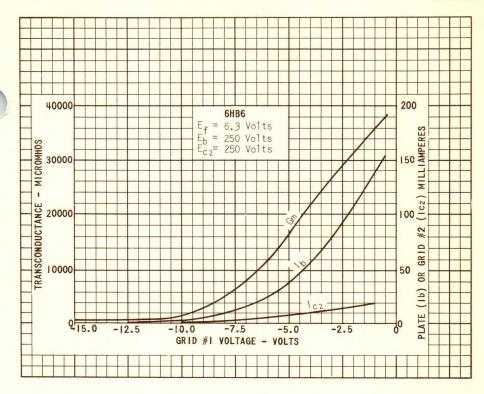
INSTANTANEOUS READINGS

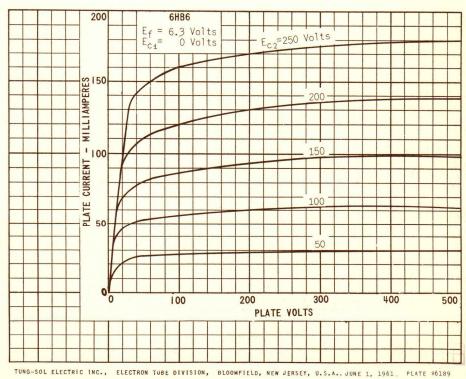
Eb= 60 v. Ec2=250 v., Ec1=0 v.

PLATE CURRENT 150 MA.

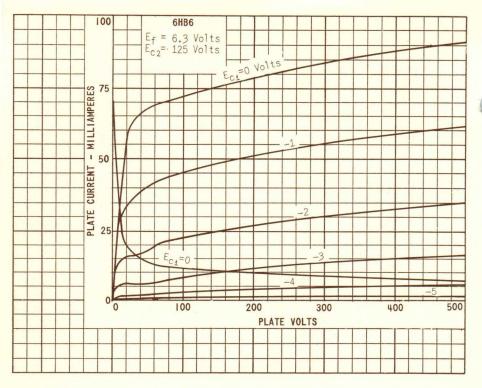
GRID #2 CURRENT 37 MA.

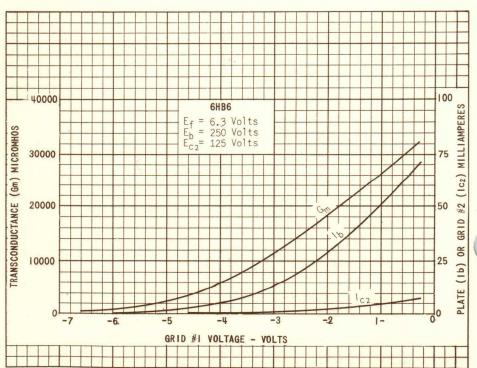






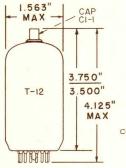
6HB6





PENTODE

COMPACTRON



BEAM PENTODE

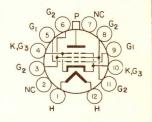
FOR

HORIZONTAL-DEFLECTION

AMPLIFIER APPLICATIONS

IN TELEVISION RECEIVERS

COATED UNIPOTENTIAL CATHODE ANY MOUNTING POSITION



BOTTOM VIEW BASING DIAGRAM JEDEC 12 FB

GLASS BULB BUTTON 12 PIN BASE E 12-74 OUTLINE DRAWING JEDEC 12-89

THE 6HF5 IS A BEAM-POWER PENTODE IN THE 12 PIN COMPACTRON CONSTRUCTION, IT IS DE-SIGNED PRIMARILY FOR USE AS THE HORIZONTAL-DEFLECTION AMPLIFIER IN COLOR TELE-VISION RECEIVERS.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

GRID 1 TO PLATE (G1 TO P)	0.56	pf
INPUT: G1 TO (H + K + G2 + G3)	24	pf
OUTPUT: P TO (H + K + G2 + G3)	10	pf

HEATER CHARACTERISTICS AND RATINGS

AVERAGE CHARACTERISTICS	6.3 VOLTS	2.25	AMPS.
LIMITS OF APPLIED VOLTAGE-AC OR DC		6.3 ± 0.6	VOLTS
HEATER-CATHODE VOLTAGE: HEATER POSITIVE WITH RESPECT TO CATHODE			
DC COMPONENT		100	VOLTS
TOTAL DC AND PEAK		200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE			
TOTAL DC AND PEAK		200	VOLTS

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

DESIGN MAXIMUM RATINGS - SEE EIA STANDARD RS-239

DC PLATE-SUPPLY VOLTAGE - BOOST + DC POWER SUPPLY	990	VOLTS
PEAK POSITIVE PULSE PLATE VOLTAGE - ABSOLUTE MAX. VALUE	7,500	VOLTS
PEAK NEGATIVE PULSE PLATE VOLTAGE	1,100	VOLTS
GRID 2 VOLTAGE	190	VOLTS
PEAK NEGATIVE GRID 1 VOLTAGE	250	VOLTS
PLATE DISSIPATION A	28	WATTS
GRID 2 DISSIPATION	5.5	WATTS
DC CATHODE CURRENT	315	MA
PEAK CATHODE CURRENT	1,100	MA
GRID 1 CIRCUIT RESISTANCE	1.0	MEGOHM
BULB TEMPERATURE AT HOTTEST POINT	225	0 C

A- IN STAGES OPERATING WITH GRID-LEAK BIAS, AN ADEQUATE CATHODE-BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

CHARACTERISTICS AN TYPICAL OPERATION

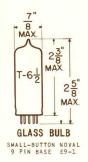
PLATE VOLTAGE	5,000	70	175	VOLTS
GRID 2 VOLTAGE	125	125	125	VOLTS
GRID 1 VOLTAGE		0	-25	VOLTS
PLATE CURRENT		570 B	125	MA
GRID 2 CURRENT	-	34 B	4.5	MA
TRANSCONDUCTANCE			11,300	μMHOS
PLATE RESISTANCE - APPROX.		-	5,600	OHMS
GRID 1 VOLTAGE FOR Ib = 1.0 MA-APPROX	-140	-	-54	VOLTS
TRIODE AMPLICATION FACTOR C	-	-	3	

B- VALUES MEASURED BY A METHOD INVOLVING A RECURRENT WAVE FORM SUCH THAT THE PLATE AND GRID 2 DISSIPATIONS WILL BE KEPT WITHIN RATINGS IN ORDER TO PREVENT DAMAGE TO THE TUBE.

C- GRID 2 TIED TO PLATE - Eb = Ec2 = 125 VOLTS, Ec1 = -25 VOLTS

TRIODE PENTODE

MINIATURE TYPE

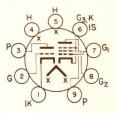


UNIPOTENTIAL CATHODE

HEATER

6.3±0.6 VOLTS 0.75 AMP. AC OR DC

ANY MOUNTING POSITION



BASING DIAGRAM
JEDEC 9DX

THE 6HF8 IS A HIGH-MU TRIODE AND A SHARP-CUTOFF PENTODE IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS INTENDED FOR USE IN COLOR AND BLACK-AND-WHITE TELEVISION RECEIVERS.

THE PENTODE UNIT IS ESPECIALLY USEFUL AS A VIDEO OUTPUT AMPLIFIER AND THE TRIODE UNIT IS USEFUL IN VOLTAGE-AMPLIFIER APPLICATIONS SUCH AS SYNC-SEPARATOR, SYNC-CLIPPER AND PHASE-INVERTER CIRCUITS.

EXCEPT FOR HEATER RATINGS AND HEATER WARM-UP TIME, THE 6HF8 IS IDENTICAL TO THE 10HF8.

DIRECT INTERELECTRODE CAPACITANCES WITHOUT EXTERNAL SHIELD

TRIODE UNIT:

GRID TO PLATE

GRID TO TRIODE-CATHODE, PK,G3,1.S. & H.	2.8	pf
PLATE TO TRIODE CATHODE, PK,G3,I.S. & H.	2.6	pf
PENTODE UNIT:		
	0.1	
GRID #1 TO PLATE (MAX.)	0.1	pf
GRID #1 TO K, I.S., G3, G2 & H	10	pf
PLATE TO K, I.S., G3, G2 & H.	4.2	pf
TRIODE GRID TO PENTODE PLATE (MAX.)	0.015	pf

RATINGS

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

CLASS A AMPLIFIER

	TRIODE	PENTODE	
HEATER VOLTAGE	6. 7	±0.6	VOLTS
MAXIMUM PLATE VOLTAGE	330	±0.6	
MAXIMUM GRID #2 SUPPLY VOLTAGE		330	VOLTS
MAXIMUM GRID #2 (SCREEN-GRID) VOLTAGE		SEE INPUT	
MAXIMUM GRID #1 (CONTROL-GRID) VOLTAGE:			
POSITIVE-BIAS VALUE	0	0	VOLTS

TUNG-SOL

CONTINUED FROM PRECEDING PAGE

RATINGS - CONT'D. INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM CLASS A1 AMPLIFIER

	TRIODE	PENTODE	
MAXIMUM PLATE DISSIPATION MAXIMUM GRID #2 INPUT	1	5	WATTS
FOR GRID #2 VOLTAGES UP TO 165 V.		1.1	WATTS
165 AND 330 VOLTS	S E R A T I N	E INPUT G CHART	
MAXIMUM PEAK HEATER-CATHODE VOLTAGE: HEATER NEGATIVE WITH RESPECT TO CATHODE HEATER POSITIVE WITH RESPECT TO CATHODE	200 200 ^A	200 200 ^A	VOLTS VOLTS

ATHE DC COMPONENT MUST NOT EXCEED 100 VOLTS.

CHARACTERISTICS

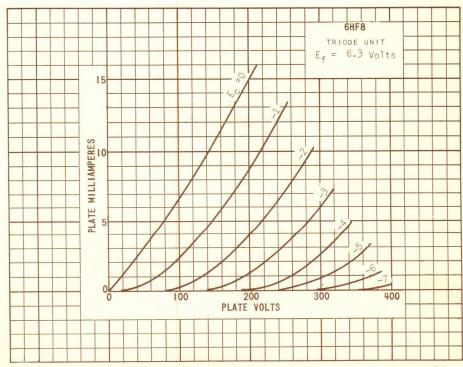
CLASS A AMPLIFIER

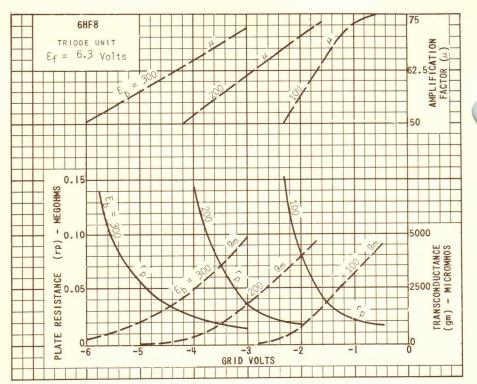
	TRIODE	77 55 07	TODE NIT	
PLATE-SUPPLY VOLTAGE	200	45	200	VOLTS
GRID #2 SUPPLY VOLTAGE		125	125	VOLTS
GRID #1 VOLTAGE	-2	0		VOLTS
CATHODE RESISTOR			68	OHMS
AMPLIFICATION FACTOR	70			
PLATE RESISTANCE (APPROX.)	17500		75000	OHMS
TRANSCONDUCTANCE	4000		12500	имноs
PLATE CURRENT	- 4	40B	25	MA.
GRID #2 CURRENT		15B	7	MA.
GRID #1 VOLTAGE (APPROX.)				
FOR PLATE CURRENT OF 100 HA			-9	VOLTS
GRID #1 VOLTAGE (APPROX.)				
FOR PLATE CURRENT OF 20 HA	-6			VOLTS

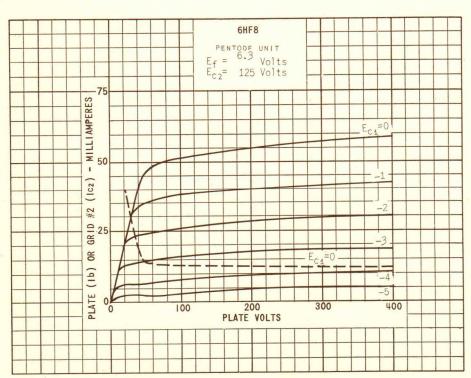
MAXIMUM CIRCUIT VALUES

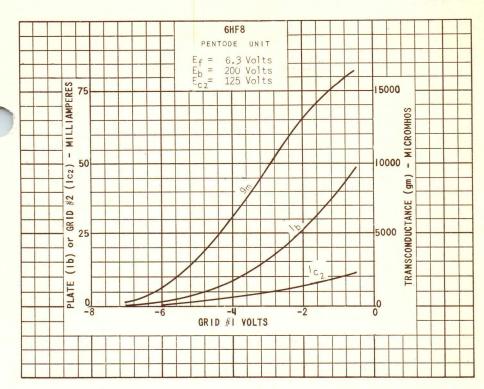
	TRIODE	PENTODE	
GRID #4 CIRCUIT RESISTANCE:			
FOR CATHODE-BIAS OPERATION (MAX.)	1.0	1.0	MEGOHM
FOR FIXED-BIAS OPERATION (MAX.)	0.5	0.25	MEGOHM

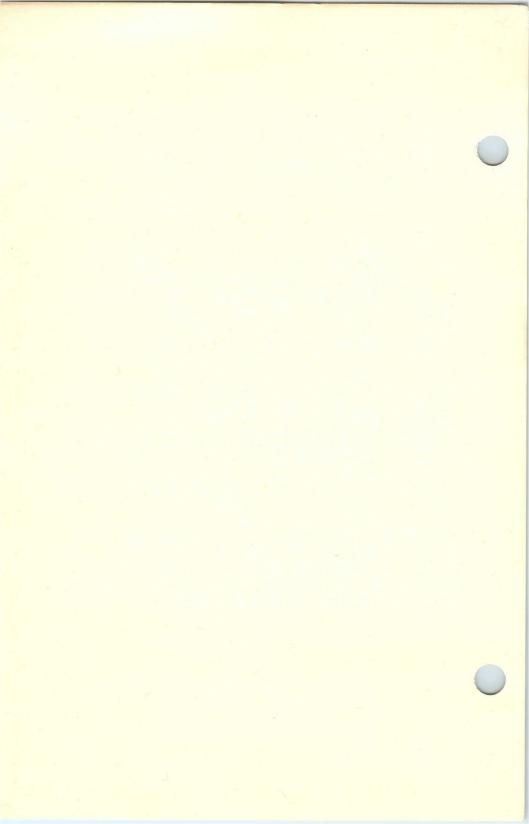
BTHESE VALUES CAN BE MEASURED BY A METHOD INVOLVING A RECURRENT WAVEFORM SUCH THAT PLATE DISSI-PATION AND GRID #2 INPUT WILL BE KEPT WITHIN RATINGS IN ORDER TO PREVENT DAMAGE TO THE TUBE.







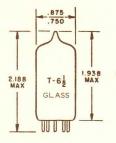




DIODE - PENTODE

MINIATURE TYPE

OUTLINE DRAWING JEDEC 6-2 BASING DIAGRAM
JEDEC 9CY

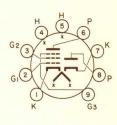


FOR

VIDEO DETECTOR

AND IF AMPLIFIER

APPLICATIONS IN T.V. RECEIVERS



BOTTOM VIEW

BASE 9 PIN BUTTON JEDEC E9-1

THE 6HJ8 IS A DIODE AND SHARP-CUTOFF PENTODE WITH SEPARATE CATHODES IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED ESPECIALLY FOR USE AS A VIDEO DETECTOR AND IF AMPLIFIER IN TELEVISION RECEIVERS.

DIRECT INTERELECTRODE CAPACITANCES

WITH EXTERNAL SHIELD #315

DIODE SECTION:			
PLATE TO CATHODE AND HEATER		2.4	pf
CATHODE TO PLATE AND HEATER		3.0	pf
PENTODE SECTION:			
GRID 1 TO PLATE	MAX.	0.015	pf
GRID 1 TO CATHODE, GRID 3 & INTERNAL SHIELD,			
GRID 2, & HEATER		7.0	pf
PLATE TO CATHODE, GRID 3 & INTERNAL SHIELD,			
GRID 2, & HEATER		3.2	pf
DIODE PLATE TO PENTODE GRID 1	MAX.	0.005	pf
DIODE CATHODE TO PENTODE PLATE	MAX.	0.015	pf
CIODE PLATE TO PENTODE PLATE	MAX.	0.035	pf

HEATER CHARACTERISTICS AND RATINGS DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS HEATER WARM-UP TIME - AVERAGE	6.3	VOLTS	450 11	mA SECONDS
LIMITS OF APPLIED VOLTAGE - AC OR DC LIMITS OF SUPPLIED CURRENT - AC OR DC			6.3 ± 0.6 450 ± 30	VOLTS mA
PEAK HEATER - CATHODE VOLTAGE - EACH SECTION HEATER NEGATIVE WITH RESPECT TO CATHODE HEATER POSITIVE WITH RESPECT TO CATHODE			200	VOLTS VOLTS

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

PENTODE SECTION - CLASS A AMPLIFIER

PLATE VOLTAGE	330	VOLTS
PLATE VOLTAGE	330	VOLTS
GRID 2 SUPPLY VOLTAGE	330	VOLTS
GRID 2 VOLTAGE	SEE RATING CHART	
GRID 1 VOLTAGE:		
POSITIVE - BIAS VALUE	0	VOLTS
PLATE DISSIPATION	3.2	WATTS
GRID 2 DISSIPATION:		
FOR GRID 2 VOLTAGE UP TO 165 VOLTS	0.55	WATTS
FOR GRID 2 VOLTAGE BETWEEN 165 AND 330 VOLTS	SEE RATING CHART	
GRID 1 CIRCUIT RESISTANCE:		
FOR FIXED - BIAS OPERATION	0.25	MEGOHM
FOR CATHODE - BIAS OPERATION	1	MEGOHM

DIODE SECTION

mA

DC	PLATE CURRENT			

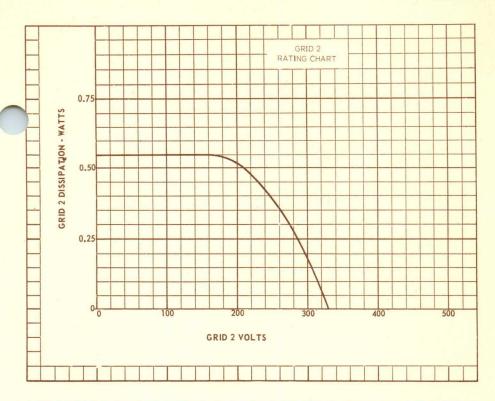
CHARACTERISTICS

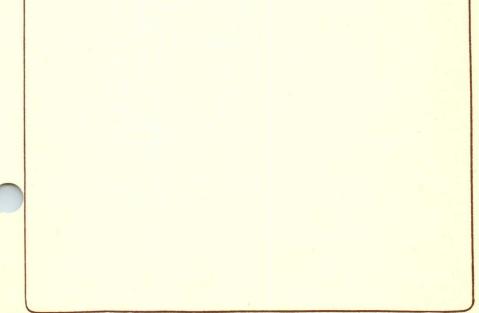
PENTODE SECTION - CLASS A1 AMPLIFIER

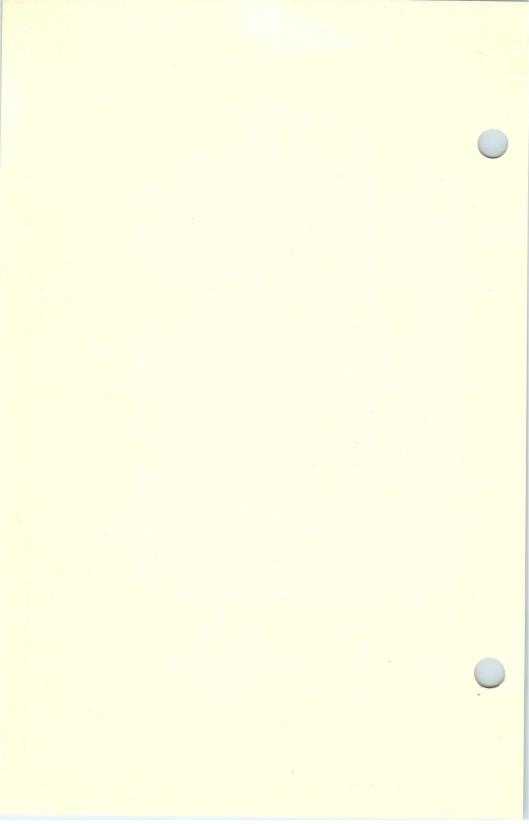
PLATE VOLTAGE	125	VOLTS
GRID 3	CONNECTED TO CATHODE AT SOCKET	
GRID 2 VOLTAGE	125	VOLTS
CATHODE RESISTOR	56	OHMS
PLATE CURRENT	11,5	mA
GRID 2 CURRENT	3.6	mA
TRANSCONDUCTANCE	9,300	μMHOS
PLATE RESISTANCE	APPROX. 0.2	MEGOHM
GRID 1 VOLTAGE FOR I = 20 µA	APPROX6	VOLTS
GRID 1 VOLTAGE FOR I = 2 MA AND R = 0 C	HMS APPROX3	VOLTS

DIODE SECTION - INSTANTANEOUS VALUE

VOLTAGE DROP AT 50 mA 10 VOLTS

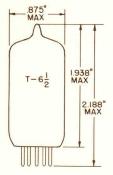






TUNG-SOL .

PENTODE MINIATURE TYPE



GLASS BULB
SMALL BUTTON
9 PIN BASE E9-1
OUTLINE DRAWING

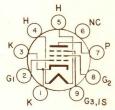
JEDEC 6-2

SHARP-CUTOFF PENTODE

FOR

IF AMPLIFIER STAGES

IN TV RECEIVERS



BOTTOM VIEW
BASING DIAGRAM
JEDEC 9PM

THE 6HM6 IS A FRAME-GRID, SHARP-CUTOFF PENTODE IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED FOR SERVICE IN THE IF AMPLIFIER STAGES OF TELEVISION RECEIVERS, EXCEPT FOR HEATER CHARACTERISTICS AND RATINGS, THE 6HM6 IS IDENTICAL TO THE 3HM6 AND THE 4HM6.

DIRECT INTERELECTRODE CAPACITANCES

	WITH SHIELD #315 CONNECTED TO CATHODE	WITHOUT SHIELD		
GRID TO PLATE	0.024	0.031	pf	
INPUT	8.70	8.70	pf	
OUTPUT	3.00	2.15	pf	

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3	VOLTS		300	MA.
LIMITS OF APPLIED VOLTAGE				6.3±0.6	VOLTS
HEATER-CATHODE VOLTAGE:					
HEATER NEGATIVE WITH RESPECT TO	CATHODE				
TOTAL DC AND PEAK			MAX.	200	VOLTS
HEATER POSITIVE WITH RESPECT TO	CATHODE				
TOTAL DC AND PEAK			MAX.	200	VOLTS

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

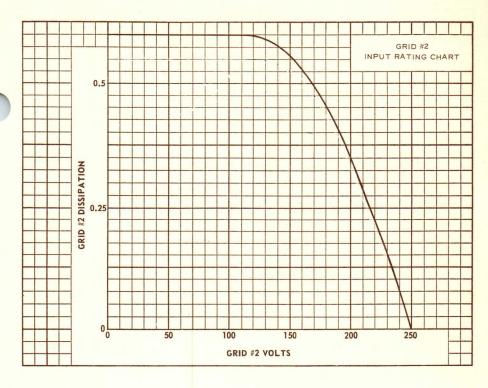
DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

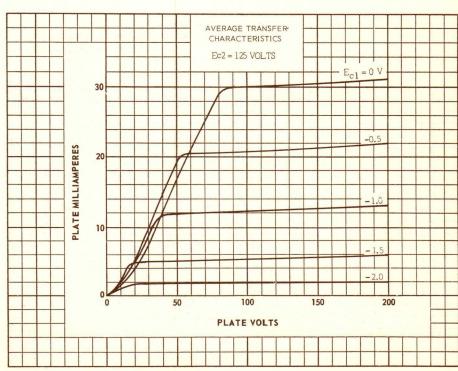
PLATE VOLTAGE	250	VOLTS
GRID 2 SUPPLY VOLTAGE	250	VOLTS
GRID 2 VOLTAGE	See Rating Chart	
NEGATIVE GRID 1 VOLTAGE	50	VOLTS
PLATE DISSIPATION	2.5	WATTS
GRID 2 DISSIPATION - UP TO 125 VOLTS	0.6	WATT
GRID 1 CIRCUIT RESISTANCE:		
CATHODE-BIAS RESISTOR	1	MEGOHM
FIXED BIAS	0.25	MEGOHM

CHARACTERISTICS AND TYPICAL OPERATION

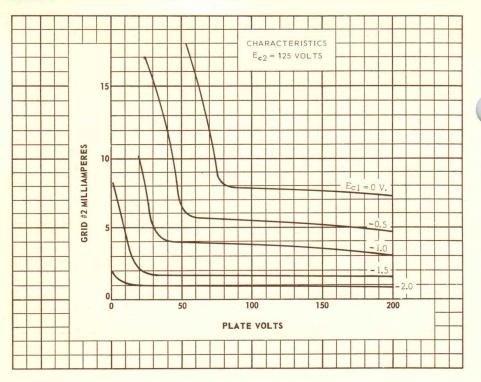
PLATE VOLTAGE	125	VOLTS
GRID 3 VOLTAGE	Connected To Cathode At Socket	
GRID 2 VOLTAGE	125	VOLTS
CATHODE-BIAS RESISTOR	56	OHMS
PLATE CURRENT	13	MA.
GRID 2 CURRENT	3.2	MA.
TRANSCONDUCTANCE	15,000	μMHOS
PLATE RESISTANCE	0.156	MEGOHM
HOT INPUT RESISTANCE A	13,000	OHMS
HOT INPUT CAPACITANCE A	7.4	pf
GRID 1 VOLTAGE AT Gm = 100 µMHOS	-3.0	VOLTS

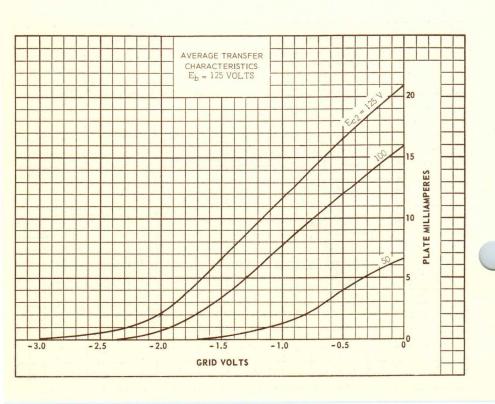
MEASURED AT 44 MC/S WITH UNBYPASSED 56 OHM CATHODE RESISTOR.

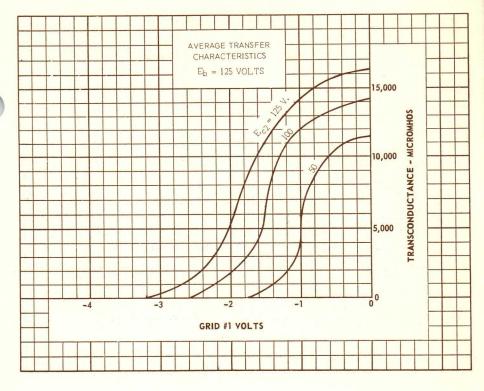


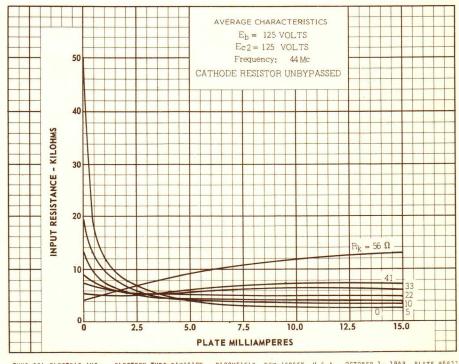


6НМ6

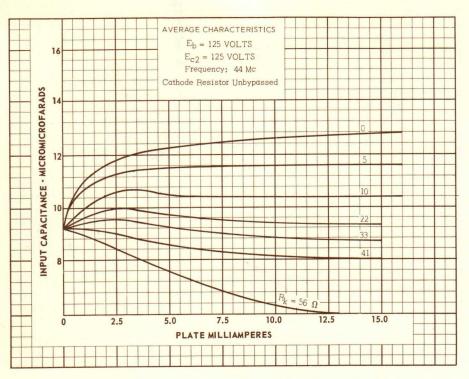


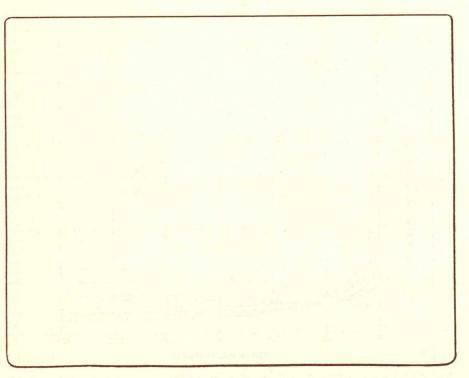






6НМ6





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TUNG-SOL -

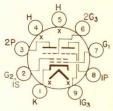
2.375" T-6½ 2.625" MAX 2.625" MAX

SMALL BUTTON
9 PIN BASE E9-1
OUTLINE DRAWING
JEDEC 6-3

TWIN PENTODE MINIATURE TYPE

COATED UNIPOTENTIAL CATHODE

FOR T.V. APPLICATIONS



ANY MOUNTING POSITION

BOTTOM VIEW
BASING DIAGRAM
JEDEC 9FG

ANY MOUNTING POSTITO

THE 6HS8 IS A MINIATURE TWIN PENTODE THAT INCORPORATES SEPARATE PLATES AND #3 GRIDS FOR THE TWO SECTIONS TOGETHER WITH A COMMON SCREEN, #1 GRID, AND CATHODE. IT IS INTENDED FOR USE AS A COMBINED SYNC-AGC TUBE IN TELEVISION RECEIVERS.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

WITHOUT EXTERNAL SHIELD

GRID #3 TO PLATE, EACH SECTION	2.0	pf
GRID #1 TO ALL	6.0	pf
GRID #3 (EACH SECTION) TO ALL	3.6	pf
PLATE (EACH SECTION) TO ALL	3.0	pf
GRID #3 (SECTION 1) TO GRID #3 (SECTION 2), MAX.	0.015	pf

HEATER RATINGS AND CHARACTERISTICS

DESIGN-MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS	300	MA.
HEATER SUPPLY LIMITS: VOLTAGE OPERATION		6.3±0.6	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE HEATER POSITIVE WITH RESPECT			
DC COMPONENT TOTAL DC AND PEAK		100	VOLTS
HEATER NEGATIVE WITH RESPECT TOTAL DC AND PEAK	TO CATHODE	200	VOLTS

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

PLATE VOLTAGE, EACH SECTION	300	VOLTS
SCREEN VOLTAGE	150	VOLTS
POSITIVE DC GRID #3 VOLTAGE, EACH SECTION	3.0	VOLTS
NEGATIVE DC GRID #3 VOLTAGE, EACH SECTION	50	VOLTS
PEAK POSITIVE GRID #3 VOLTAGE, EACH SECTION	50	VOLTS
NEGATIVE DC GRID #1 VOLTAGE	50	VOLTS
PLATE DISSIPATION, EACH SECTION	1.1	WATTS
SCREEN DISSIPATION	0.75	WATT
DC CATHODE CURRENT	12	MA.
GRID #1 CIRCUIT RESISTANCE	0.5	MEGOHM
GRID #3 CIRCUIT RESISTANCE, EACH SECTION	0.5	MEGOHM

TYPICAL OPERATING CHARACTERISTICS

AVERAGE CHARACTERISTICS - BOTH SECTIONS OPERATING

PLATE VOLTAGE, EACH SECTION	100	100	VOLTS
SCREEN VOLTAGE	67.5	67.5	VOLTS
GRID #3 VOLTAGE, EACH SECTION GRID #1 VOLTAGE B	-10	0	VOLTS
PLATE CURRENT, EACH SECTION		2.0	MA.
SCREEN CURRENT	7.0	4.4	MA.
CATHODE CURRENT	7.1	8.5	MA.

AVERAGE CHARACTERISTICS - EACH SECTION SEPARATELY WITH PLATE & GRID *3 OF OPPOSITE SECTION GROUNDED

PLATE VOLTAGE SCREEN VOLTAGE	100 67.5	100	VOLTS VOLTS
GRID #3 VOLTAGE	0	0	VOLTS
GRID #1 VOLTAGE	0	В	VOLTS
GRID #3 TRANSCONDUCTANCE		450	имноs
GRID #1 TRANSCONDUCTANCE	1100		µмноs
PLATE CURRENT		2.0	MA.
GRID #3 VOLTAGE, (APPROX.)			
AT Ib = 100 μA •		-3.5 ←	VOLTS
GRID #1 VOLTAGE, (APPROX.)			
Ib = $100 \mu AMPS$.		-2.3	VOLTS'

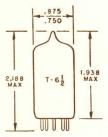
B WITH GRID CURRENT ADJUSTED FOR 100 MICROAMPERES DC.

SIMILAR TYPE REFERENCE: Except for heater characteristics, the 6HS8 is identical to the 4HS8

TUNG-SOL

PENTODE

MINIATURE TYPE



GLASS BULB

SMALL BUTTON
9 PIN BASE E9-1

OUTLINE DRAWING

JEDEC 6-2

SEMI-REMOTE-CUTOFF PENTODE

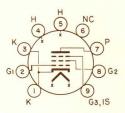
FOR

I.F. AMPLIFIER STAGES

IN TV RECEIVERS

COATED UNIPOTENTIAL CATHODE

ANY MOUNTING POSITION



BOTTOM VIEW
BASING DIAGRAM
JEDEC 9 PM

THE 6HT6 IS A SEMI-REMOTE-CUTOFF PENTODE IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED FOR SERVICE IN TELEVISION RECEIVER I.F. AMPLIFIER STAGES. THE SEMI-REMOTE CUTOFF CHARACTERISTICS IS DESIRABLE FOR USE IN AGC CONTROLLED STAGES.

EXCEPT FOR HEATER CHARACTERISTICS AND RATINGS, THE 6HT6 IS IDENTICAL TO THE 3HT6 AND THE 4HT6.

DIRECT INTERELECTRODE CAPACITANCES

SHIELD 315

| CONNECTED TO GROUND | UNSHIELDED | CONNECTED TO GROUND | CONTENT | CONNECTED TO GROUND | CONTENT | CONTE

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM RATINGS - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3	VOLTS	300	MA.
LIMITS OF APPLIED VOLTAGE			6.3 ± 0.6	VOLTS
HEATER CATHODE VOLTAGE:				
HEATER NEGATIVE WITH RESPECT TO CATHODE				
TOTAL DC AND PEAK			200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE				
TOTAL DC AND PEAK			200	VOLTS

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

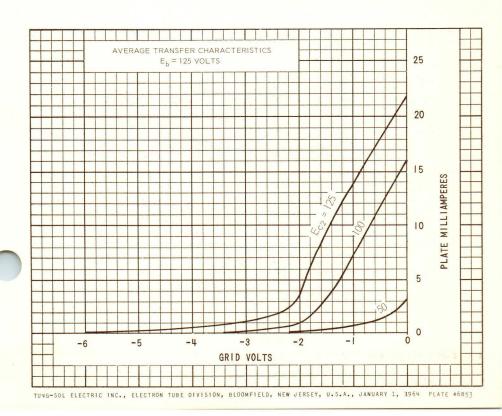
DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

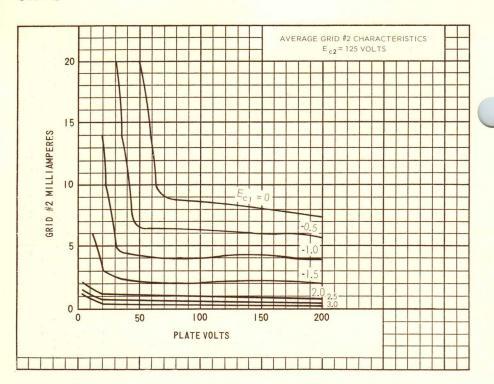
PLATE VOLTAGE	250	VOLTS
GRID 2 SUPPLY VOLTAGE	250	VOLTS
GRID 2 VOLTAGE	RATING CHART	
GRID 1 VOLTAGE	-50	VOLTS
PLATE DISSIPATION	2.5	WATTS
GRID 2 DISSIPATION	0,6	WATTS
CATHODE CURRENT	25	MA.
GRID 1 CIRCUIT RESISTANCE:		
CATHODE BIAS RESISTOR	1	MEGOHM
FIXED BIAS	0.25	MEGOHM

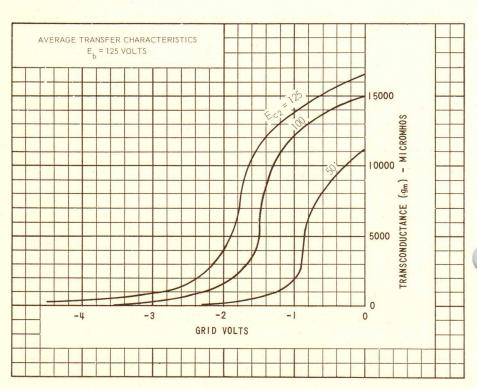
CHARACTERISTICS AND TYPICAL OPERATION

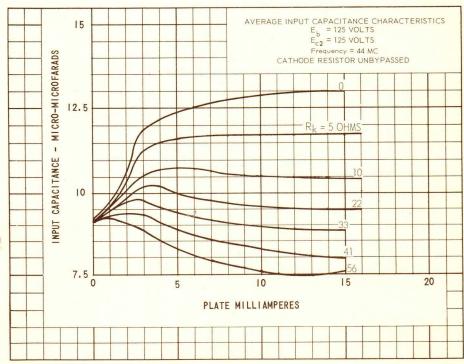
PLATE VOLTAGE	125	VOLTS
GRID 3 VOLTAGE CONNECTED TO CATHODE	AT SOCKET	
GRID 2 VOLTAGE	125	VOLTS
CATHODE BIAS RESISTOR	56	OHMS
PLATE CURRENT	15	MA.
GRID 2 CURRENT	4.0	MA.
TRANSCONDUCTANCE	14,000	μMHOS
PLATE RESISTANCE	0.143	MEGOHM
GRID 1 CUTOFF BIAS FOR G m = 50 µMHOS	-6.7	VOLTS
CUTOFF TRANSCONDUCTANCE:		
FOR E _{c1} = -1.5	12,000	μ MHOS
FOR E = -3.5	300	μMHOS.
HOT INPUT RESISTANCE A	12,700	OHMS
HOT INPUT CAPACITANCE A	7.45	pf

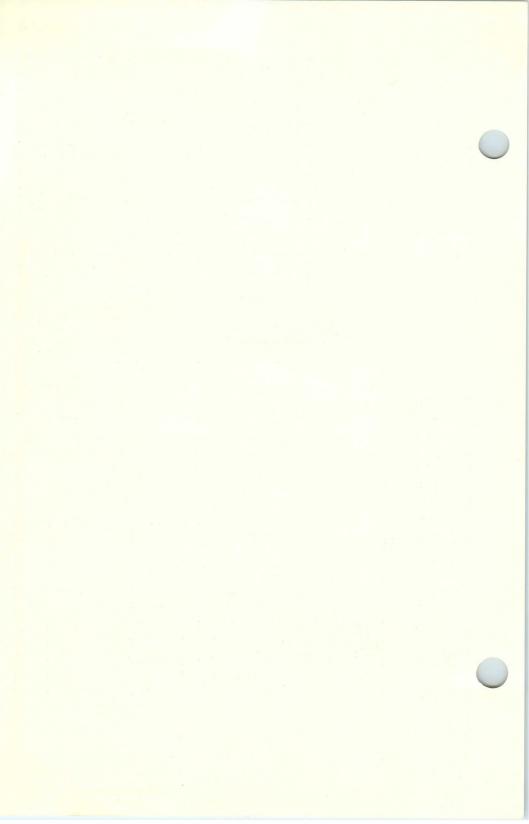
A - MEASURED 44 Mc/s WITH UNBYPASSED 56 OHM CATHODE RESISTANCE





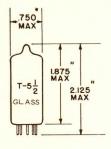






OUTLINE DRAWING JEDEC 5-2

BASING DIAGRAM JEDEC 7EN



FOR FM SOUND DETECTOR SERVICE

15(2 GI

COATED UNIPOTENTIAL CATHODE ANY MOUNTING POSITION

BOTTOM VIEW

BASE 7 PIN BUTTON JEDEC E7-1

THE 6HZ6 IS A SHARP-CUTOFF PENTODE WITH DUAL CONTROL GRIDS IN THE 7 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED PRIMARILY FOR FM SOUND DETECTOR SERVICE.

DIRECT INTERELECTRODE CAPACITANCES WITHOUT EXTERNAL SHIELD

GRID 1 TO PLATE	0.023	pf
GRID 1 TO (K & I.S., G3, G2 & I.S., H)	8.2	pf
GRID 1 TO GRID 3	0.09	pf
GRID 3 TO PLATE	1.6	pf
GRID 3 TO (K&I S., P. G2 & L.S., G1, H)	7.2	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS	450	mA
HEATER WARM - UP TIME - AVERAGE		11	SECONDS
LIMITS OF APPLIED VOLTAGE - AC OR DC		6.3 ± .6	VOLTS
LIMITS OF SUPPLIED CURRENT - AC OR DC	4	450 ± 30	mA
PEAK HEATER - CATHODE VOLTAGE:			
HEATER POSITIVE WITH RESPECT TO CATHODE		200	VOLTS
DC COMPONENT		100	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE		200	VOLTS

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS
DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

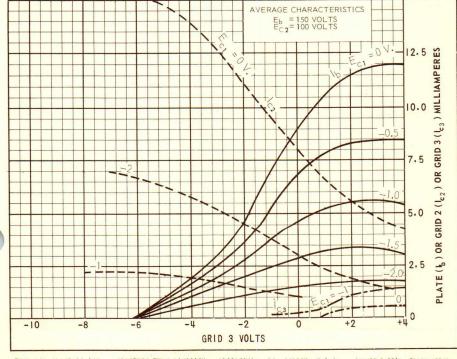
FM SOUND DETECTOR SERVICE

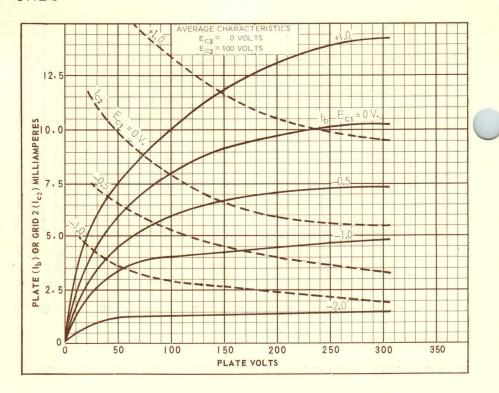
PLATE VOLTAGE	300	VOLTS
GRID 3 VOLTAGE:		
NEGATIVE VALUE - DC AND PEAK	100	VOLTS
POSITIVE VALUE - DC AND PEAK	25	VOLTS
GRID 2 SUPPLY VOLTAGE	300	VOLTS
GRID 2 VOLTAGE	SEE RATING CHART	
GRID 1 VOLTAGE:		
NEGATIVE - BIAS VALUE	50	VOLTS
POSITIVE - BIAS VALUE	0	VOLTS
GRID 3 INPUT	0.1	WATT
GRID 2 INPUT - UP TO 150 VOLTS	1	WATT
- BETWEEN 150 VOLTS AND 30	0 VOLTS SEE RATING CHART	
PLATE DISSIPATION	1.7	WATTS
GRID 3 CIRCUIT RESISTANCE	0.68	MEGOHM
GRID 1 CIRCUIT RESISTANCE:		
FOR FIXED - BIAS OPERATION	0.22	MEGOHM
FOR CATHODE - BIAS OPERATION	0.47	MEGOHM

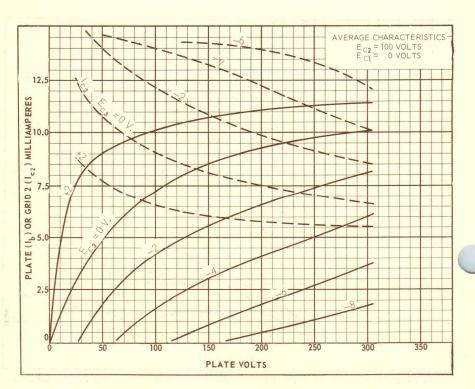
CHARACTERISTICS

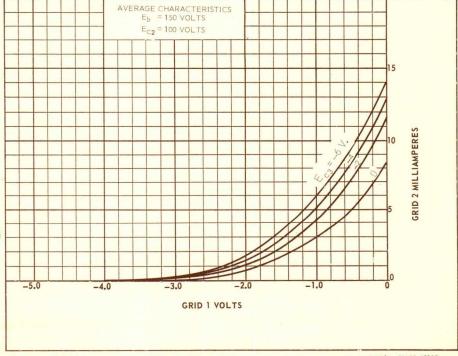
CLASS A, AMPLIFIER

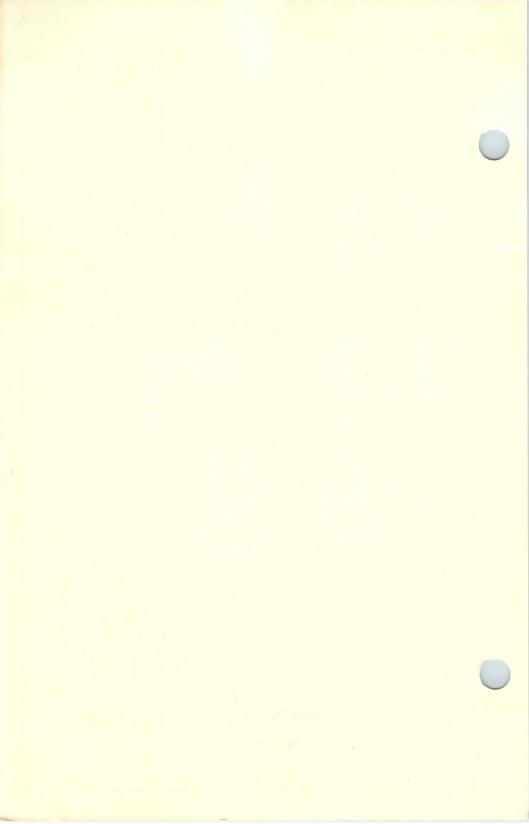
PLATE SUPPLY VOLTAGE	150	VOLTS
GRID 3 SUPPLY VOLTAGE	0	VOLTS
GRID 2 SUPPLY VOLTAGE	100	VOLTS
GRID 1 SUPPLY VOLTAGE	0	VOLTS
CATHODE RESISTOR	180	OHMS
PLATE CURRENT	3.2	mA
GRID 2 CURRENT	3.2	rn.A
TRANSCONDUCTANCE - GRID 1 TO PLATE	3,400	μ MHOS
TRANSCONDUCTANCE - GRID 3 TO PLATE	600	μMHOS .
PLATE RESISTANCE APPROX	0.11	MEGOHM
GRID 1 VOLTAGE FOR $I_b = 20 \mu A$ APPROX.	4.5	VOLTS
GRID 3 VOLTAGE FOR I_b = 20 μ A	7	VOLTS

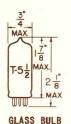












COATED UNIPOTENTIAL CATHODE

HEATER 6.3 VOLTS 0.4 AMP. AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW MINIATURE BUTTON PIN BASE 780

THE 6J4 IS A TRIODE USING THE MINIATURE CONSTRUCTION AND INTENDED FOR USE PRIMARILY AS A GROUNDED-GRID UHF AMPLIFIER AT FREQUENCIES UP TO APPROXIMATELY 500 MEGACYCLES. ITS DESIGN FEATURES AN AMPLIFICATION FACTOR OF 55 COMBINED WITH AN EXTREMELY HIGH TRANSCONDUCTANCE OF 12000 MICROMHOS, AND PERMITS GROUNDED-GRID OPERATION WITH A HIGH SIGNAL-TO-NOISE RATIO. IT MAY ALSO BE USED IN CONVENTIONAL TRIODE CIRCUITS WITH UNGROUNDED GRID.

DIRECT INTERELECTRODE CAPACITANCES GROUNDED GRID OPERATION

	SHIELDA	
Ck-p SHIELD TIED TO GROUND	0.12	uu f
INPUT Ck TO (G+H+SHIELD)	7.5	иµ f
OUTPUT CP TO (G+H+SHIELD)	3.9	uu f
Ch-k SHIELD TIED TO GROUND	3.7	µц f

AEXTERNAL SHIELD #316.

RATINGS INTERPRETED ACCORDING TO RMA STANDARD M8-210

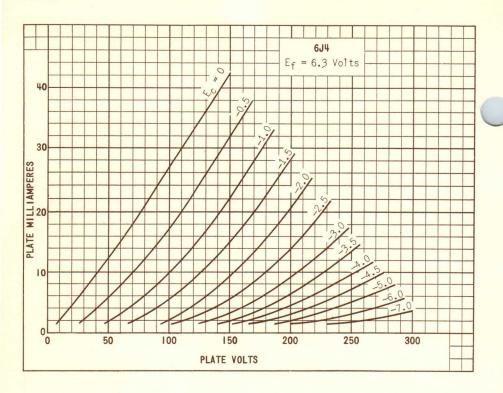
HEATER VOLTAGE	6.3	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE	90	VOLTS
MAXIMUM PLATE VOLTAGE	150	VOLTS
MAXIMUM PLATE DISSIPATION	2.25	WATTS
MAXIMUM PLATE CURRENT	20	MA.
MAXIMUM GRID CIRCUIT RESISTANCE (CATHODE BIAS)	0.25	MEGOHM

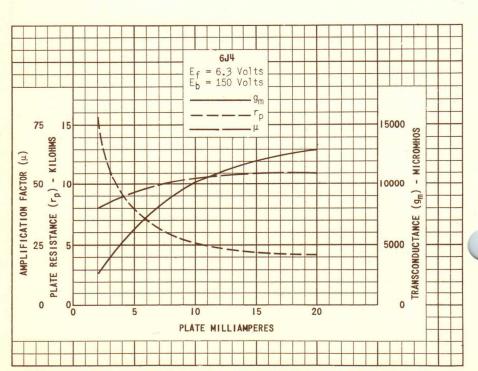
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

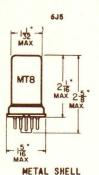
CLASS A1 AMPLIFIER - GROUNDED-GRID

HEATER VOLTAGE	6.3	6.3	VOLTS
HEATER CURRENT	0.4	0.4	AMP.
PLATE VOLTAGE	100	150	VOLTS
CATHODE RESISTOR B	100	100	OHMS
PLATE CURRENT	10	15	MA -
TRANSCONDUCTANCE	11 000	12 000	имно ѕ
AMPLIFICATION FACTOR	55	55	

BNOT RECOMMENDED FOR FIXED BIAS OPERATION.





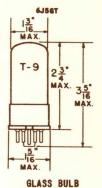


COATED UNIPOTENTIAL CATHODE

6.3 VOLTS 300 MA.

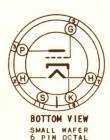
AC OR DC

ANY MOUNTING POSITION





BOTTOM VIEW SMALL WAFER 6 PIN OCTAL METAL SLEEVE



THE 6J5 AND 6J5GT ARE GENERAL PURPOSE MEDIUM-MU TRIODES. THEY ARE USEFUL

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

FOR SERVICE AS OSCILLATORS OR AUDIO-FREQUENCY AMPLIFIERS.

	6J5 ^A	6J5GTB	
GRID TO PLATE: (G TO P)	3.4	3.8	μμf
INPUT: G TO (H+K)	3.4	4.2	μμf
OUTPUT: P TO (H+K)	3.6	5	μμf

Awith SHELL CONNECTED TO CATHODE.

Bwith close-fitting shield connected to cathode.

RATINGS INTERPRETED ACCORDING TO RMA STANDARD M8-210

HEATER VOLTAGE	6.3	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE	90	VOLTS
MAXIMUM PLATE VOLTAGE	300	VOL TS
MINIMUM NEGATIVE DC GRID VOLTAGE	0	VOL TS
MAXIMUM GRID CIRCUIT RESISTANCE	1.0	MEG.
MAXIMUM PLATE DISSIPATION	2.5	WATTS
MAXIMUM CATHODE CURRENT	20	MA.

CONTINUED ON FOLLOWING PAGE

- INDICATES A CHANGE OR ADDITION

PLATE 1944 JAN. 2, 1948

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER

HEATER VOLTAGE	6.3	6.3	VOLTS
HEATER CURRENT	300	300	MA.
PLATE VOLTAGE	90	250	VOL TS
GRID VOLTAGE	0	-8	VOLTS
PLATE CURRENT	10	9	MA .
PLATE RESISTANCE	6 700	7 700	OHMS
TRANSCONDUCTANCE	3 000	2 600	ДМНО S
AMPLIFICATION FACTOR	20	20	

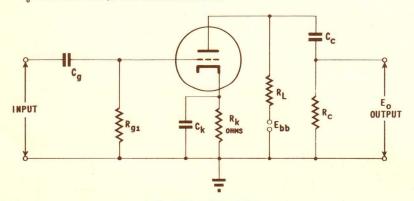
SIMILIAR TIPE REPERENCE: Ratings and characteristics are identical to 744.

RESISTANCE COUPLED AMPLIFIER

R ₁	R _{G4}	Rs	E bb =	Ebb = 90 VOLTS Ebb = 480 VOLTS Ebb = 300		Ebb = 480 VOLTS		= 300 V	OL TS		
MEG.	MEG.	ME G.	Rk	GAIN	Eo	Rk	GAIN	Eo	Rk	GAIN	Eo
0.10	A	0.10	3300	14	13	2200	14	26	1800	14	40
0.10	A	0.24	3600	14	16	2700	15	33	2200	15	51
0.24	A	0.24	7500	14	16	5100	15	30	4300	15	44
0.24	A	0.51	9100	14	19	6800	15	39	5100	15	54
0.51	A	0.51	13000	14	16	9100	15	30	6800	16	40
0.51	A	1.0	15000,	14	19	10000	16	32	7500	16	45
0.24	10	0.24		15	13		16	33		17	46
0.24	10	0.51		16	17		17	38		18	62
0.51	10	0.51		16	14		18	32		18	53
0.51	10	1.0		17.	18		18	41		19	68

AVALUE OF R gl IS NOT CRITICAL.

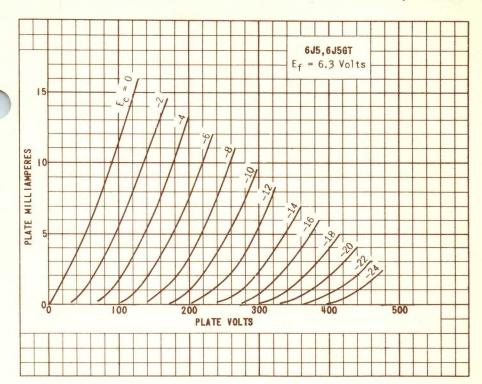
GAIN MEASURED AT E $_{\rm O}$ = 2.0 VOLTS RMS OUTPUT. E $_{\rm O}$ IS RMS OUTPUT FOR 5% TOTAL HARMONIC DISTORTION.

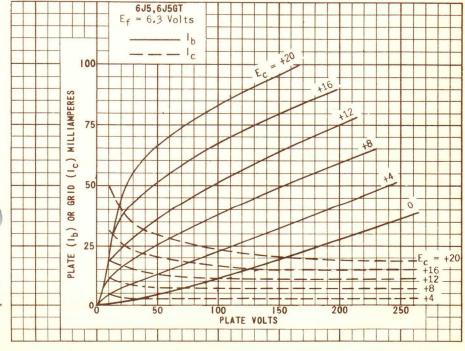


NOTE: COUPLING CAPACITORS C AND C SHOULD BE SELECTED TO GIVE DESIRED FREQUENCY RESPONSE, SHOULD BE ADEQUATELY BY-PASSED BY CAPACITOR

- INDICATES A CHANGE OR ADDITION

PLATE 1945 JAN. 2, 1948

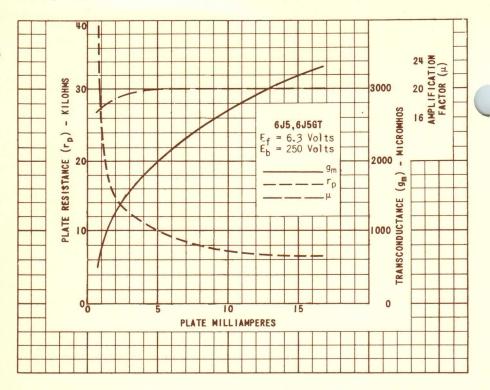


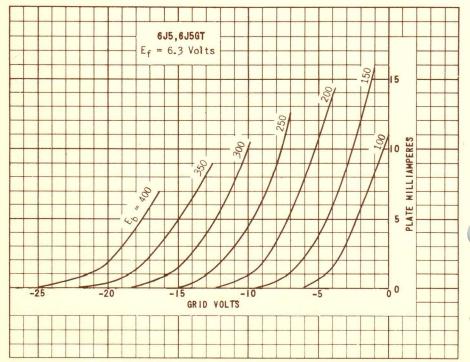


PRINTED IN U. S.

PLATE 1946 JAN. 2, 1948

6J5,6J5GT

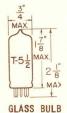




1947 JAN. 2, 1948

DOUBLE TRIODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER 6.3 VOLTS 0.45 AMP. AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW MINIATURE BUTTON 7 PIN BASE

78F

THE 6J6 AND 6J6A ARE TWIN TRIODES IN THE 7-PIN MINIATURE CONSTRUCTION. THEY MAY BE OPERATED IN PARALLEL OR PUSH-PULL. WITH THE GRIDS IN A PUSH-PULL ARRANGEMENT AND THE PLATES IN PARALLEL, THE TUBES ARE PARTICULARLY ADAPTABLE FOR SERVICE AS MIXERS AT FREQUENCIES AS HIGH AS 600 MEGACYCLES. THERMAL CHARACTERISTICS OF THE HEATER OF THE 6J6A ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PRO-VIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED. EXCEPT FOR THE CONTROLLED HEATER WARM-UP TIME OF THE 6J6A, THE TWO TUBES ARE IDENTICAL.

DIRECT INTERELECTRODE CAPACITANCES

	WITHOUT SHIELD	SHIELDA	
GRID TO PLATE (EACH SECTION)	1.6	1.5	uuf
INPUT (EACH SECTION)	2.2	2.6	μμf
OUTPUT (SECTION 1)	0.4	1.6	щи f
OUTPUT (SECTION 2)	0.4	1.0	иµ f

AEXTERNAL SHIELD #316 CONNECTED TO PIN #7.

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

EACH SECTION

	AF	AMPLIFIER	
HEATER VOLTAGE	6	• 3	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE	±100	±100	VOLTS
MAXIMUM PLATE VOLTAGE	300	300	VOLTS
MAXIMUM POSITIVE DC GRID VOLTAGE	0	0	VOLTS
MAXIMUM NEGATIVE DC GRID VOLTAGE		-40	VOLTS
MAXIMUM PLATE INPUT		4.5	WATTS
MAXIMUM PLATE DISSIPATION	1.5	1.5	WATTS
MAXIMUM PLATE CURRENT		15	MA.
MAXIMUM GRID CURRENT		8	MA.
MAXIMUM GRID CIRCUIT RESISTANCE (CATHODE BIAS)	0.5		MEGOHMS
HEATER WARM-UP TIME (APPROX.)* (6J6A ONLY)	1	.1.0	SECONDS

HEATER-WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER - EACH SECTION

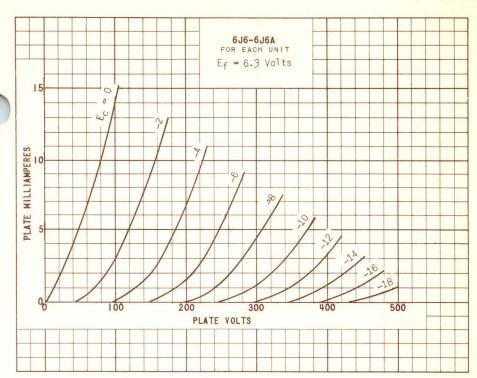
1		
HEATER VOLTAGE	6.3	VOLTS
HEATER CURRENT	0.45	AMP.
PLATE VOLTAGE	100	VOLTS
CATHODE BIAS RESISTOR (BOTH SECTIONS) B	50	OHMS
AMPLIFICATION FACTOR	38	
PLATE RESISTANCE	7 100	OHMS
TRANSCONDUCTANCE	5 300	LIMHOS
PLATE CURRENT	8.5	MA.

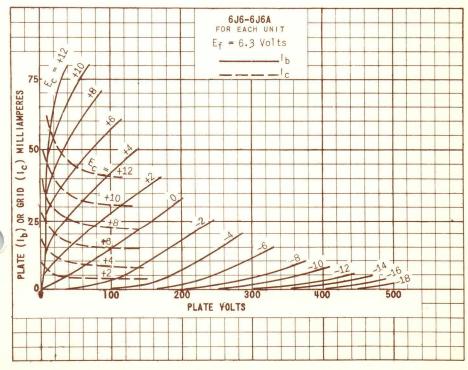
BOPERATION WITH FIXED BIAS IS NOT RECOMMENDED.

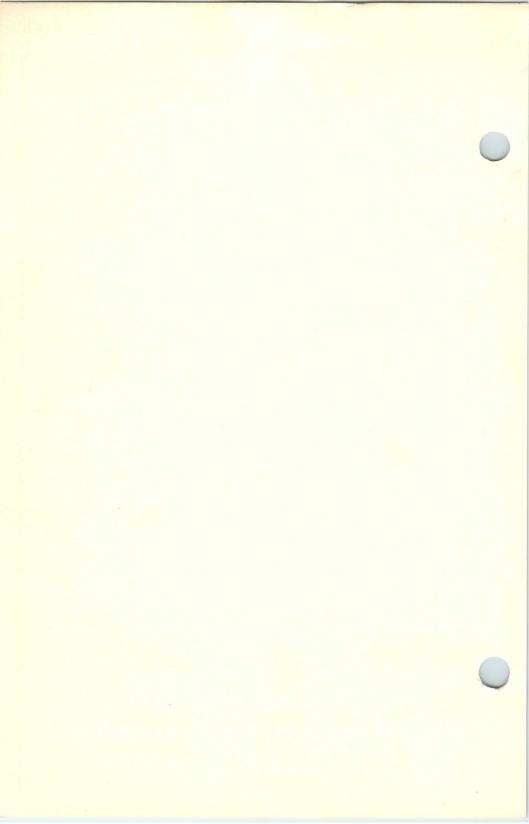
CLASS C TELEGRAPHY - RF POWER AMPLIFIER AND OSCILLATOR BOTH SECTIONS IN PUSH PULL

HEATER VOLTAGE	6.3	VOLTS
HEATER CURRENT	0.45	AMP.
DC PLATE VOLTAGE	150	VOLTS
DC GRID VOLTAGE ^C	-10	VOLTS
DC PLATE CURRENT	30	MA.
DC GRID CURRENT (APPROX.)	16	MA -
DRIVING POWER (APPROX.)	0.35	WATT
POWER OUTPUT (APPROX.)	3.5	WATTS

COBTAINED BY A 525-OHMS GRID RESISTOR, A 220-OHMS CATHODE RESISTOR, OR A FIXED VOLTAGE SUPPLY.







1.188" MAX

COMPACTRON FOR 2G2 2GI DISCRIMINATOR AND 2 G 3 (6) 7 2K,IS AUDIO POWER OUTPUT SERVICE 10)NC 1K,1G3 (3 COATED UNIPOTENTIAL CATHODE IG2 IGI ANY MOUNTING POSITION

BOTTOM VIEW

BASING DIAGRAM JEDEC 12BT

THE 6J10 IS A GATED-BEAM DISCRIMINATOR PENTODE AND A BEAM PENTODE IN THE T-9 COM-PACTRON CONSTRUCTION. SECTION 2 THE GATED-BEAM DISCRIMINATOR PENTODE IS SUITABLE FOR FM AND TV LIMITER AND DISCRIMINATOR APPLICATIONS AND SECTION 1 THE BEAM PENTODE FOR AUDIO POWER OUTPUT SERVICE.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

DISCRIMINATOR SECTION: (SECTION 2)		
GRID 1 TO GRID 3	0.01	pf
GRID 1 TO ALL	4.0	pf
GRID 3 TO ALL	3.2	pf
OUTPUT SECTION: (SECTION 1)		
GRID 1 TO PLATE	0.2	pf
INPUT:	11	pf
OUTPUT:	7.0	nf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS	950	MA.
LIMITS OF APPLIED VOLTAGE		6,3 ± 0.6	VOLTS
HEATER CATHODE VOLTAGE HEATER POSITIVE WITH RESPECT TO CATHODE	D:SCRIMINATOR SECTION	OUTPUT	
DC COMPONENT	100	100	VOLTS
TOTAL DC AND PEAK	200	200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE TOTAL DC AND PEAK	200	200	VOLTS

TUNG-SOL .

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239 **OUTPUT SECTION 1**

PLATE VOLTAGE	275	VOLTS
GRID 2 VOLTAGE	275	VOLTS
PLATE DISSIPATION	10	WATTS
GRID 2 DISSIPATION	2.0	WATTS
GRID 1 CIRCUIT RESISTANCE		
WITH FIXED BIAS	0.25	MEGOHM
WITH CATHODE BIAS	0.5	MEGOHM
DISCRIMINATOR SECTION 2		
PLATE SUPPLY VOLTAGE	330	VOLTS
GRID 2 VOLTAGE	110	VOLTS
PEAK POSITIVE GRID 1 VOLTAGE	60	VOLTS
CATHODE CURRENT - DC	13	MA

CHARACTERISTICS AND TYPICAL OPERATION CLASS A AMPLIFIER

OUTPUT SECTION 1

PLATE VOLTAGE	250	VOLTS
GRID 2 VOLTAGE	250	VOLTS
GRID - NUMBER 1 VOLTAGE	-8.0	VOLTS
PEAK AF GRID - NUMBER 1 VOLTAGE	8.0	VOLTS
ZERO-SIGNAL PLATE CURRENT	35	MA.
MAXIMUM - SIGNAL PLATE CURRENT	39	MA.
ZERO-SIGNAL GRID 2 CURRENT	2.5	MA.
MAXIMUM - SIGNAL GRID 2 CURRENT	7.0	MA.
TRANSCONDUCTANCE	6,500	μMHOS .
PLATE RESISTANCE, APPROXIMATE	100,000	OHMS
LOAD RESISTANCE	5,000	OHMS
TOTAL HARMONIC DISTORTION, APPROXIMATE	10	PERCENT
MAXIMUM - SIGNAL POWER OUTPUT	4.2	WATTS

DISCRIMINATOR SECTION 2

INPUT-SIGNAL CENTER FREQUENCY	10.7	10.7	4.5	Mc/s
FREQUENCY DEVIATION	±75	±75	±25	Kc/s
PLATE-SUPPLY VOLTAGE	85	285	270	VOLTS
PLATE VOLTAGE	62	122	121	VOLTS
GRID 2 VOLTS	55	100	100	VOLTS
CATHODE-BIAS RESISTOR (VARIABLE) SEE BELOW	200-400	200-400	200-400	OHMS
PLATE LOAD RESISTOR	85,000	330,000	330,000	OHMS
PLATE LINEARITY RESISTOR	470	1,500	1,000	OHMS
INTEGRATING CAPACITOR	0.002	0.001	0.001	μF
COUPLING CAPACITOR	0.25	0.01	0.25	μF
MINIMUM SIGNAL VOLTAGE FOR LIMITING ACTION-RMS	1.25	1.25	1.25	VOLTS
AT SIGNAL LEVELS ABOVE THIS VALUE, LIMITING IS WITHIN ± 3	3 dbs			
PLATE CURRENT-DC ACCELERATOR CURRENT	0.25	0.49	0.44	MA.
INPUT SIGNAL LEVEL FOR AM REJECTION AJDUSTMENT	1.25	2.0	2.0	VOLTS
AM REJECTION AT ESIG = 2.0 VOLTS, RMS	31	20	25	DECIBELS
AM REJECTION AT ESIG = 3.0 VOLTS, RMS	30	29	30	DECIBELS
TOTAL HARMONIC DISTORTION	2.0	1.6	1.8	PERCENT
PEAK AUDIO OUTPUT VOLTAGE	6.0	16.6	16.8	VOLTS

THE CATHODE RESISTOR SHOULD BE ADJUSTED FOR MAXIMUM AM REJECTION IN THE OUTPUT OF THE LIMITER-DISCRIMINATOR STAGE AT THE SPECIFIED SIGNAL LEVEL. AM REJECTION IS MEASURED WITH AN APPLIED SIGNAL CONTAINING 30-PERCENT AMPLITUDE MODULATION AND 30-PERCENT FREQUENCY MODULATION.

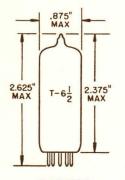
ADEQUATE SHIELDING BETWEEN COMPONENTS OF THE LIMITER GRID AND THE QUADRATURE GRID MUST BE USED TO INSURE PROPER PHASING OF THE VOLTAGE DEVELOPED ON THE QUADRATURE GRID.

STANDARD DE-EMPHASIS REQUIREMENTS FOR FM ARE INCLUDED.

THE Q OF THE QUADRATURE GRID CIRCUIT SHOULD BE HIGH ENOUGH TO DEVELOP A MINIMUM OF 4 VOLTS (RMS) SIGNAL WITH 2 VOLTS(RMS) OF THE CENTER-FREQUENCY SIGNAL APPLIED TO THE LIMITER IGRID. IT IS RECOMMENDED THAT THE COIL BE SHUNTED BY A MINIMUM OF 10pf. THE CAPACITANCE MAY BE COMPOSED OF TUBE INPUT CAPACITANCE, STRAY CAPACITANCE, AND DISTRIBUTED CAPACITANCE, AS WELL AS PHYSICAL CAPACITANCE.

TRIODE - PENTODE

MINIATURE TYPE



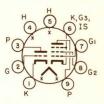
FOR COLOR

AND BLACK-AND-WHITE

T.V. RECEIVERS

COATED UNIPOTENTIAL CATHODE

ANY MOUNTING POSITION



BOTTOM VIEW BASING DIAGRAM JEDEC 9DX

GLASS BULB SMALL BUTTON 9 PIN BASE E9-1 OUTLINE DRAWING JEDEC 6-3

THE 6JA8 IS A HIGH-MU TRIODE AND A PENTODE IN THE 9 PIN MINIATURE CONSTRUCTION. THE TRIODE UNIT IS DESIGNED FOR SERVICE AS A SYNC SEPARATOR, SYNC CLIPPER AND PHASE INVERTER WHILE THE PENTODE UNIT IS DESIGNED FOR OPERATION AS A VIDEO AMPLIFIER. EXCEPT FOR HEATER RATINGS AND CHARACTERISTICS, THE 6JA8 IS IDENTICAL TO THE 10JA8.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

		NIT	PENTODE	
GRID 1 TO PLATE		4.6	MAX. 0.1	pf
INPUT		2.6	11	pf
OUTPUT		2.6	4.4	pf
COUPLING:				
PENTODE GRID1 TO TRIODE PLATE	MAX.	0.005		pf
PENTODE PLATE TO TRIODE GRID	MAX.	0.018		pf
PENTODE PLATE TO TRIODEPLATE	MAX.	0.17		pf

CONTINUED FROM PRECEDING PAGE

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES -SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS	750	MA.
LIMITSOF APPLIED VOLTAGE		6.3 ± 0.6	VOLTS
HEATER-CATHODE VOLTAGE: HEATER NEGATIVE WITH RESPECT TO CATHODE	TRIODE UNIT	PENTODE	
TOTAL DC AND PEAK	200	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE			
DC COMPONENT	100	100	VOLTS
TOTAL DC AND PEAK	200	200	VOLTS

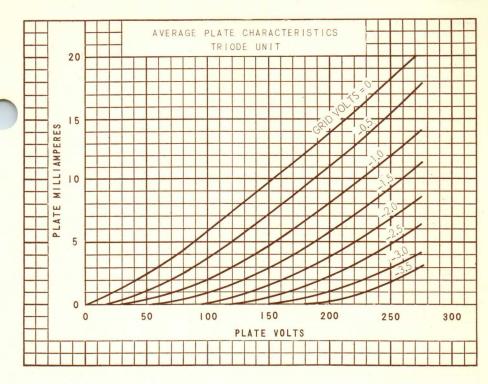
MAXIMUM RATINGS

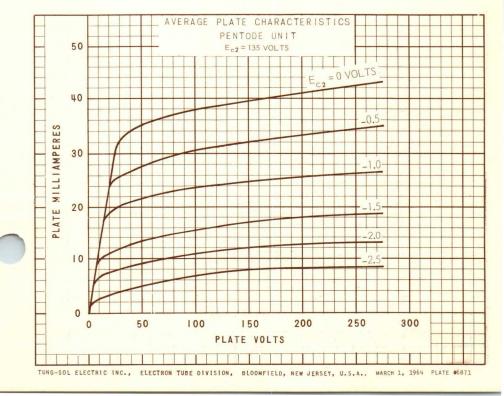
DESIGN MAXIMUM RATINGS-SEE EIA STANDARD RS-239

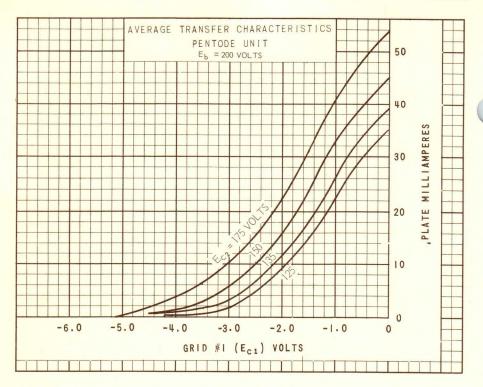
PLATE VOLTAGE	TRIODE UNIT 300	PENTODE UNIT 300	VOLTS
GRID2 SUPPLY VOLTAGE GRID2 VOLTAGE		330 SEE RATING CHART	VOLTS
PLATE DISSIPATION	1	5	WATTS
GRID 2 DISSIPATION	-	1.5	WATTS
POSITIVE GRID 1 BIAS VOLTAGE	0	0	VOLTS
GRID 1 CIRCUIT RESISTANCE			
FIXED BIAS	0.5	0.25	MEGOHM
CATHODE RESISTOR BIAS	1.0	1.0	MEGOHM

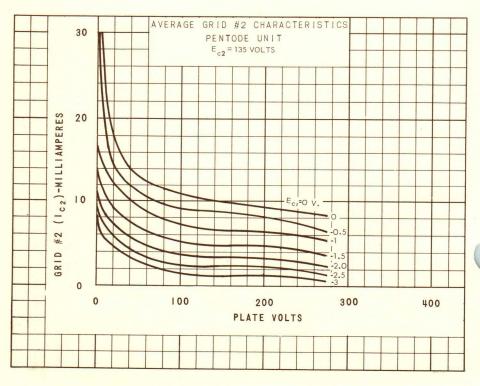
CHARACTERISTICS AND TYPICAL OPERATION

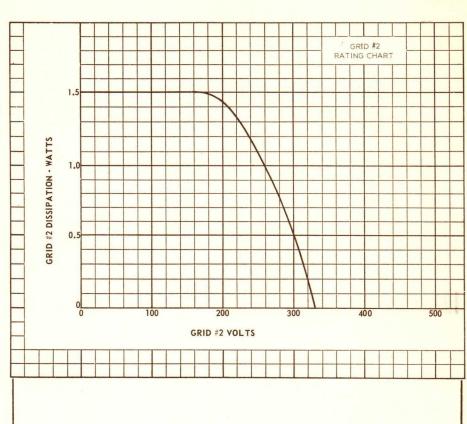
TRIODE UNIT:				
PLATE VOLTAGE		135	200	VOLTS
GRID VOLTAGE		-2	-2	VOLTS
PLATE CURRENT		1	3.5	MA.
TRANSCONDUCTANCE		1,550	3,700	μ MHOS
AMPLIFICATION FACTOR		60	70	
PLATE RESISTANCE		39,000	19,000	OHMS
GRID 1 VOLTAGE FOR Ib = 10 µ A		-4.8	-7	VOLTS
PENTODE UNIT:				
PLATEVOLTAGE	30	135	200	VOLTS
GRID 2 VOLTAGE	135	135	135	VOLTS
GRIDI VOLTAGE	0	-1.5	-1.5	VOLTS
PLATE CURRENT	32	17	18	MA.
GRID 2 CURRENT	14	4.2	4	MA.
TRANCONDUCTANCE		12,600	14,000	μ MHOS
PLATE RESISTANCE		66,000	70,000	OHMS
GRID 1 VOLTAGE FOR I = 10 µA		-5	-5	VOLTS

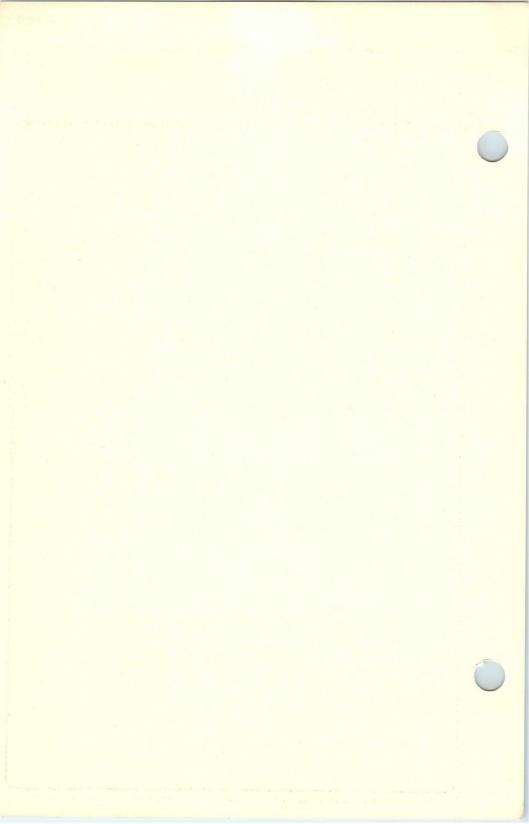


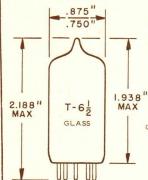












JEDEC 6-2

SEMI-REMOTE-CUTOFF PENTODE FOR

I.F. AMPLIFIER STAGES

IN TV RECEIVERS

COATED UNIPOTENTIAL CATHODE

ANY MOUNTING POSITION

H 4 5 6 NC F P S 3, IS S G 3, IS

BOTTOM VIEW

BASE 9 PIN BUTTON
JEDEC E9-1

THE 6JC6 IS A FRAME-GRID, SHARP-CUTOFF PENTODE IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED FOR SERVICE IN THE IF AMPLIFIER STAGES OF TELEVISION RECEIVERS. EXCEPT FOR HEATER CHARACTERISTICS AND RATINGS, THE 6JC6 IS IDENTICAL TO THE 3JC6 AND THE 4JC6.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

GRID 1 TO PLATE - MAX.	.019	pf
INPUT (G1 TO H + K + G3 + I.S. + G2)	8.2	pf
OUTPUT (P TO H + K + G3 + 1.S. + G2)	3.0	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM RATINGS - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS	300	mA
LIMITS OF APPLIED VOLTAGE		6.3 ± 0.6	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE:			
HEATER NEGATIVE WITH RESPECT TO CATHODE TOTAL DC AND PEAK		200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE			
DC		100	VOLTS
TOTAL DC AND PEAK		200	VOLTS

TUNG-SOL -

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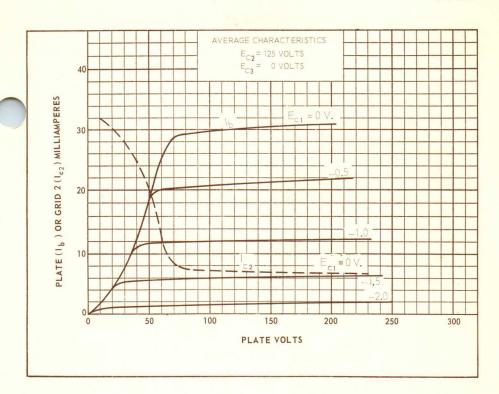
MAXIMUM RATINGS

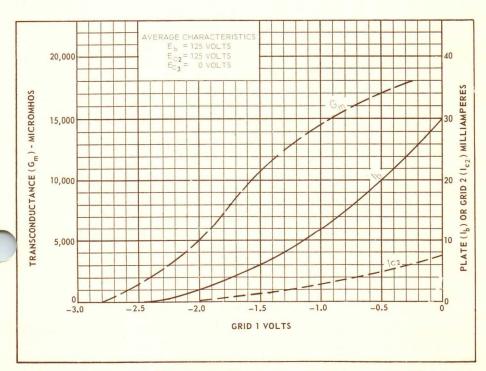
DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

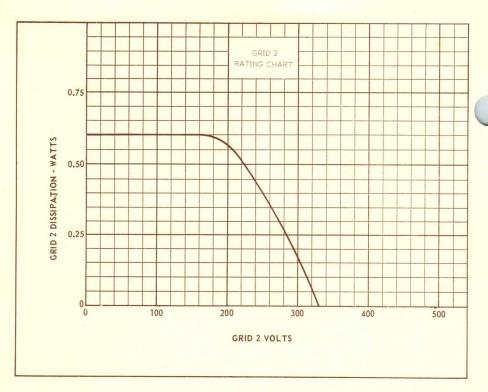
PLATE VOLTAGE	330	VOLTS
GRID 2 SUPPLY VOLTAGE	330	VOLTS
GRID 2 VOLTAGE	See Rating Chart	
POSITIVE GRID 1 VOLTAGE	0	VOLTS
PLATE DISSIPATION	2.5	WATTS
GRID 2 DISSIPATION - UP TO 165 VOLTS	0.6	TTAW
GRID 1 CIRCUIT RESISTANCES:		
CATHODE-BIAS RESISTOR	1	MEGOHM
FIXED BIAS	0.25	MEGOHM

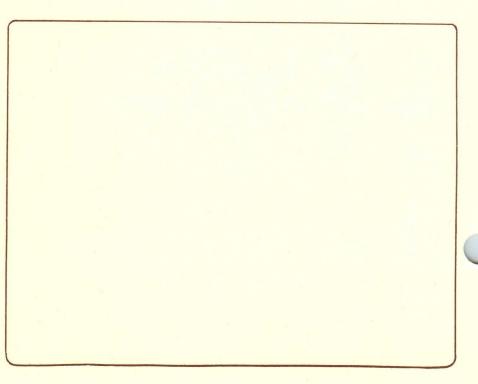
CHARACTERISTICS AND TYPICAL OPERATION

PLATE VOLTAGE	125	VOLTS
GRID 3 VOLTAGE	Connected To Cathode At Socket	
GRID 2 VOLTAGE	125	VOLTS
CATHODE-BIAS RESISTOR	56	OHMS
PLATE CURRENT	13	mA
GRID 2 CURRENT	3.2	mA
TRANSCONDUCTANCE	15,000	μMHOS.
PLATE RESISTANCE	0.18	MEGOHM
GRID 1 VOLTAGE FOR I = 100 mA	-3. 0	VOLTS





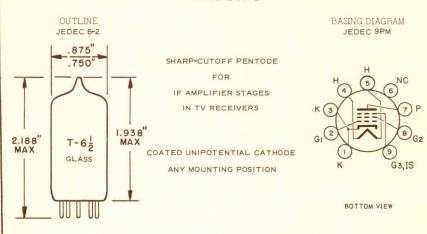




TUNG-SOL -

PENTODE

MINIATURE TYPE



THE 6JD6 IS A SEMI-REMOTE-CUTOFF PENTODE IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED FOR SERVICE IN TELEVISION RECEIVER I.F. AMPLIFIER STAGES. THE SEMI-REMOTE CUTOFF CHARACTERISTICS IS DESIRABLE FOR USE IN AGC CONTROLLED STAGES. EXCEPT FOR HEATER CHARACTERISTICS AND RATINGS, THE 6JD6 IS IDENTICAL TO THE 3JD6 AND THE 4JD6.

BASE 9 PIN BUTTON
JEDEC E9-1

DIRECT INTERELECTROCE CAPACITANCES

WITHOUT EXTERNAL SHIELD

GRID 1 TO PLATE - MAX.	0.019	pf
INPUT (G TO H + K + G3 + I,S. + G2)	8.2	pf
OUTPUT (P TO H + K + G3 + I.S. + G2)	3.0	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3	VOLTS	300	mA
LIMITS OF APPLIED VOLTAGE			6.3 ± 0.6	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE:				
TOTAL DC AND PEAK			200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE				
DC			100	VOLTS
TOTAL DC AND PEAK			200	VOLTS

- TUNG-SOL -

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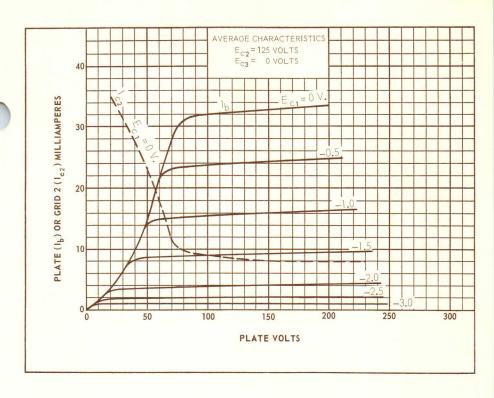
MAXIMUM RATINGS

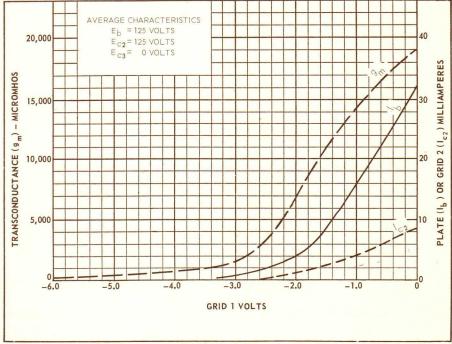
DESIGN MAXIMUM VALUES . SEE EIA STANDARD RS-239

PLATE VOLTAGE	330	VOLTS
GRID 2 SUPPLY VOLTAGE	330	VOLTS
GRID 2 VOLTAGE	SEE RATING CHART	
POSITIVE DC GRID 1 VOLTAGE	0	VOLTS
PLATE DISSIPATION	2.5	WATTS
GRID 2 DISSIPATION - UP TO 165 VOLTS	0.6	WATTS
GRID 1 CIRCUIT RESISTANCE:		
CATHODE BIAS RESISTOR	1	MEGOHM
FIXED BIAS	0.25	MEGOHM

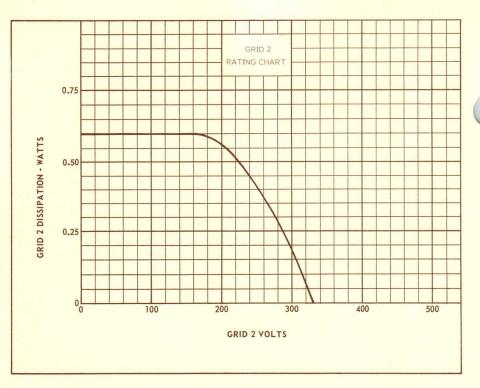
CHARACTERISTICS AND TYPICAL OPERATION

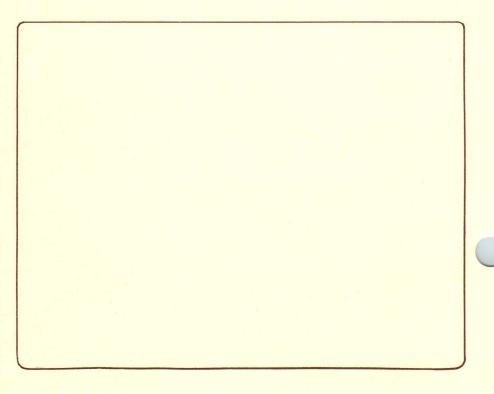
PLATE VOLTAGE	125	VOLTS
GRID 3 VOLTAGE	CONNECTED TO CATHODE AT SOCKET	
GRID 2 VOLTAGE	125	VOLTS
CATHODE BIAS RESISTOR	56	OHMS
PLATE CURRENT	15	mA
GRID 2 CURRENT	4	mA
TRANSCONDUCTANCE	14,000	μMHOS.
PLATE RESISTANCE	0.16	MEGOHM
GRID 1 VOLTAGE FOR G = 600 MMHOS	-4.5	VOLTS





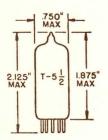
6JD6





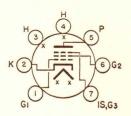
PENTODE

MINIATURE TYPE



GLASS BULB SMALL-BUTTON 7 PIN BASE E7-1 OUTLINE DRAWING JEDEC 5-2 SEMIREMOTE-CUTOFF PENTODE
FOR
USE IN THE GAIN-CONTROLLED
PICTURE-IF AMPLIFIER STAGES

OF COLOR T.V. RECEIVERS



BOTTOM VIEW BASING DIAGRAM

THE 6JH6 IS A SEMIREMOTE-CUTOFF PENTODE IN THE 7 PIN MINIATURE CONSTRUCTION. IT IS INTENDED FOR USE IN THE GAIN-CONTROLLED PICTURE-IF AMPLIFIER STAGES OF TELEVISION RECEIVERS. BECAUSE OF ITS CONTROLLED SEMIREMOTE-CUTOFF CHARACTERISTIC, THE 6JH6 CAN SUBSTANTIALLY REDUCE THE EFFECTS OF CROSS MODULATION IN THE IF STAGES OF COLOR T.V. RECEIVERS.

DIRECT INTERELECTRODE CAPACITANCES

pf
pf
pf

HEATER CHARACTERISTICS AND RATINGS DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS	300	MA.
LIMITS OF APPLIED VOLTAGE		6.3 ± 0.6	VOLTS
PEAK HEATER-CATHODE VOLTAGE:			
HEATER NEGATIVE WITH RESPECT TO CAT	THODE	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CAT	HODE	200	VOLTS
DC COMPONENT		100	VOLTS

TUNP-SOL -

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MAXIMUM RATINGS DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

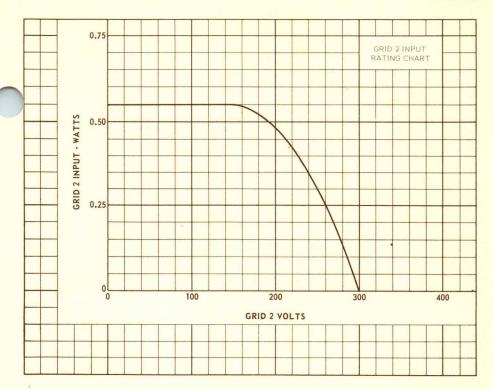
CLASS AI AMPLIFIER

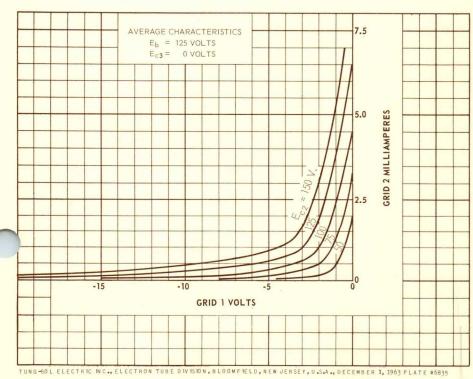
300	VOLTS
0	VOLTS
300	VOLTS
SEE RATING CHART	
0	VOLTS
0.55	VOLTS
SEE RATING CHART	
2.3	WATTS
MAX. 0.25	MEGOHM
MAX. 1	MEGOHM
	0 300 SEE RATING CHART 0 0.55 SEE RATING CHART 2.3 MAX. 0.25

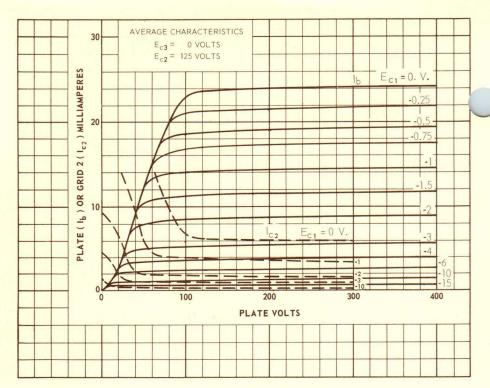
CHARACTERISTICS

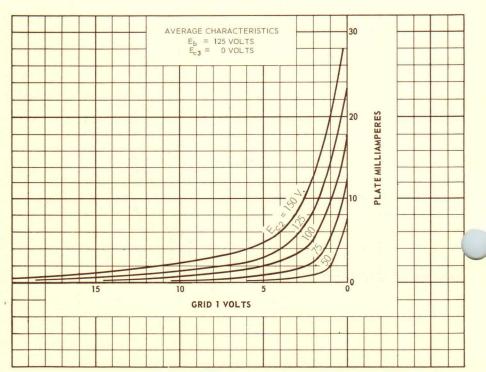
CLASS AI AMPLIFIER

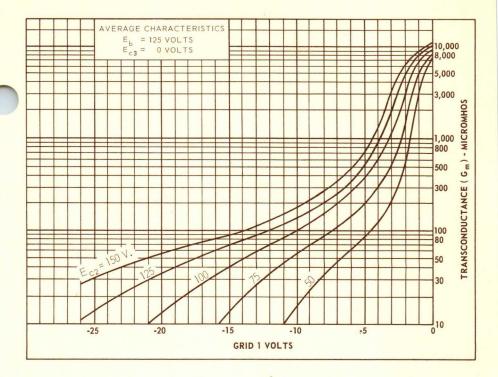
PLATE VOLTAGE		125	VOLTS
GRID 3 VOLTAGE - CONNECTED TO CATHODE AT SOCKET			
GRID 2 VOLTAGE		125	VOLTS
CATHODE RESISTOR		56	OHMS
PLATE CURRENT		14	MA.
GRID 2 CURRENT		3.6	MA.
TRANSCONDUCTANCE		8,000	μ MHOS
PLATE RESISTANCE	APPROX.	0.26	MEGOHM
GRID 1 VOLTAGE FOR G m = 50 µMHOS		-19	VOLTS
TRANCONDUCTANCE RANGE AT E $_{\mathrm{C1}}$ = 4.5 V. AND R $_{\mathrm{k}}$ = 56 Ω		400-900	μ MHOS

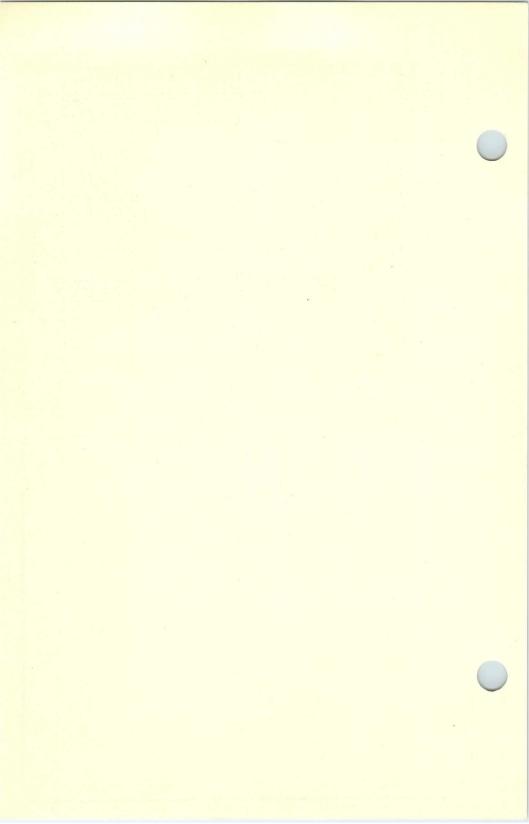






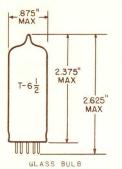






SHEET-BEAM TUBE

MINIATURE TYPE

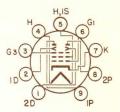


SMALL BUTTON
9 PIN BASE E9-1
OUTLINE DRAWING
JEDEC 6-3

COATED UNIPOTENTIAL CATHODE

COLOR TELEVISION APPLICATIONS

ANY MOUNTING POSITION



BOTTOM VIEW

BASING DIAGRAM

JEDEC 9DP

PIN 5 SHOULD BE CONNECTED

DIRECTLY TO GROUND.

THE 6JH8 IS A DOUBLE-PLATE SHEET-BEAM TUBE IN THE 9 PIN MINIATURE CONSTRUCTION. IT INCORPORATES A PAIR OF BALANCED DEFLECTORS TO DIRECT THE ELECTRON BEAM TO EITHER OF THE TWO PLATES AND A CONTROL GRID TO VARY THE INTENSITY OF THE BEAM. THE RESULTING UNIQUE CHARACTERISTICS OF THIS TUBE MAKE IT ESPECIALLY SUITED FOR SERVICE AS A SYNCHRONOUS DETECTOR IN COLOR TELEVISION RECEIVERS. THE 6JH8 IS ALSO SUITABLE FOR SERVICE IN THE BURST GATE CIRCUIT OF COLOR TV RECEIVERS AND A VARIETY OF OTHER SWITCHING AND GATING APPLICATIONS.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

WITHOUT EXTERNAL SHIELD

DEFLECTOR #1 TO ALL	4.8	pf
DEFLECTOR #2 TO ALL	4.8	pf
GRID #1 TO ALL EXCEPT PLATES	7.5	pf
PLATE #1 TO ALL	5.0	pf
PLATE #2 TO ALL	5.0	pf
GRID #1 TO DEFLECTOR #1 (MAX.)	0.04	pf
GRID #1 TO DEFLECTOR #2 (MAX.)	0.07	pf
PLATE #1 TO PLATE #2	0.4	pf
DEFLECTOR #1 TO DEFLECTOR #2	0.38	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RE-239

AVERAGE CHARACTERISTICS 6.3 VOLTS 300 MA.

HEATER SUPPLY LIMITS:

VOLTAGE OPERATION 6.3±0.6 VOLTS

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

PLATE VOLTAGE, EACH PLATE	330	VOLTS
ACCELERATOR VOLTAGE	330	VOLTS
PEAK POSITIVE DEFLECTOR VOLTAGE	165	VOLTS
PEAK NEGATIVE DEFLECTOR VOLTAGE	165	VOLTS
POSITIVE DC GRID #1 VOLTAGE	0	VOLTS
PLATE DISSIPATION, EACH PLATE	3.0	WATTS
ACCELERATOR DISSIPATION	1.0	WATTS
DC CATHODE CURRENT	33	MA.
GRID #1 CIRCUIT RESISTANCE		
WITH FIXED BIAS	0.1	MEGOHMS
WITH CATHODE BIAS	0.25	MEGOHMS

TYPICAL OPERATING CHARACTERISTICS

AVERAGE CHARACTERISTICS WITH DEFLECTORS GROUNDED

PLATE #1 VOLTAGE	250	VOLTS
PLATE #2 CONNECTED TO PLATE #1 ACCELERATOR VOLTAGE DEFLECTOR #1 VOLTAGE DEFLECTOR #2 VOLTAGE CATHODE—BIAS RESISTOR TOTAL PLATE CURRENT	250 0 0 220 14	VOLTS VOLTS VOLTS OHMS
ACCELERATOR CURRENT GRID #1 TRANSCONDUCTANCE	1.5	MA. μMHOS
GRID #1 VOLTAGE, APPROXIMATE Ib (TOTAL) = 10 μAMPS.	-13	VOLTS

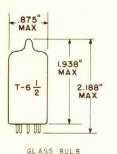
AVERAGE DEFLECTOR CHARACTERISTICS

PLATE #1 VOLTAGE	250	VOLTS
PLATE #2 VOLTAGE	250	VOLTS
ACCELERATOR VOLTAGE	250	VOLTS
CATHODE-BIAS RESISTOR	220	OHMS
DEFLECTOR SWITCHING VOLTAGE, MAX. A	20	VOLTS
DEFLECTOR BIAS VOLTAGE FOR MINIMUM DEFLECTOR		
SWITCHING VOLTAGE A	-14	VOLTS
VOLTAGE DIFFERENCE BETWEEN DEFLECTORS FOR		
Ib = Ib2, APPROX.	0	VOLTS
PLATE #1 CURRENT, MAXIMUM		
Ed1 =-15 VOLTS, Ed2=+15 VOLTS	0.7	MA.
PLATE #2 CURRENT, MAXIMUM		
Ed1 =+15VOLTS, Ed2=-15 VOLTS	0.7	MA.
DEFLECTOR-#1 CURRENT, MAXIMUM		
Ed1 =+25VOLTS, Ed2 =-25 VOLTS	0.1	MA.
DEFLECTOR #2 CURRENT, MAXIMUM		
Ed1 =-25 VOLTS, Ed2 =+25 VOLTS	0.1	MA.

ADEFLECTOR SWITCHING VOLTAGE IS DEFINED AS THE TOTAL VOLTAGE CHANGE ON EITHER DEFLECTOR WITH AN EQUAL AND OPPOSITE CHANGE ON THE OTHER DEFLECTOR REQUIRED TO SWITCH THE PLATE CURRENT FROM ONE PLATE TO THE OTHER.

NOTE: THE 6JH8 SHOULD BE SO LOCATED IN THE EQUIPMENT THAT IT IS NOT SUBJECTED TO STRAY MAGNETIC FIELDS.

DUO TRIODE MINIATURE TYPE

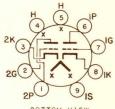


MINIATURE BUTTON
9 PIN E9-1
OUTLINE DRAWING
JEDEC 6-2

COATED UNIPOTENTIAL CATHODE

FRAME GRID RF AMPLIFIER
AND OSCILLATOR MIXER

ANY MOUNTING POSITION



BOTTOM VIEW BASING DIAGRAM JEDEC 9AJ

THE 6JKB IS A DISSIMILAR DUO TRIODE IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED SPECIFICALLY FOR FM TUNERS.

DIRECT INTERELECTRODE CAPACITANCES

WITH SHIELD

	SECTION #1	SECTION #	2
GRID TO PLATE	1.4	.60	pf
INPUT: G TO (H+K+1.S.+E.S.)	3.0	5.0	pf
OUTPUT: P TO(H+K+1.S.+E.S.)	1.0	4.0	pf
HEATER TO CATHODE	2.8	2.8	pf
GRID TO GRID (MAX.)	.00)3	pf
PLATE TO PLATE (MAX.)	.00	9	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS 6.3 VOLTS	400	MA.
HEATER SUPPLY LIMITS: VOLTAGE OPERATIONB	6.3±0.6	VOLTS
MAXIMUM HEATER CATHODE VOLTAGE: HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	100	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE TOTAL DC AND PEAK	100	VOLTS

TUNG-SOL .

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS DESIGN MAXIMUM VALUES - SEE ELA STANDARD RS-239

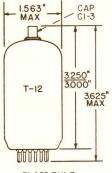
	OSCILLATOR SECTION #1	R-F AMP. SECTION #2	
PLATE VOLTAGE	165	200	VOLTS
PLATE DISSIPATION	1.0	2.0	WATTS
DC CATHODE CURRENT	22	22	MA.
NEGATIVE GRID VOLTAGE	50	50	VOLTS
GRID CIRCUIT RESISTANCE (SELF BIAS)	1.0	1.0	MEGOHMS

TYPICAL OPERATING CHARACTERISTICS

CLASS A1 AMPLIFIER

	OSCILLATOR SECTION #1	R-F AMP. SECTION #2	
PLATE VOLTAGE	100	135	VOLTS
GRID VOLTAGE	-1.0	-1.2	VOLTS
PLATE CURRENT	5.3	10	MA.
TRANSCONDUCTANCE	6800	13 000	μMH0S
AMPLIFICATION FACTOR	55	70	
PLATE RESISTANCE (APPROX.)	8000	5400	OHMS
Ec for $Ib = 20 \mu A$. (APPROX.)	-4.4	new team town	VOLTS
Ec FOR Gm = 150 µMHOS (APPROX.)		-5.5	VOLTS
Ec FOR Gm = $1500 \mu MHOS$ APPROX.)		-2.8	VOLTS

BHEATER VOLTAGE SUPPLY VARIATIONS SHALL BE RESTRICTED TO MAINTAIN HEATER VOLTAGE WITHIN THE SPECIFIED VALUES.



BEAM PENTODE

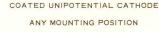
FOR

HORIZONTAL-DEFLECTION
AMPLIFIER APPLICATIONS

IN TV RECEIVERS

H H
BOTTOM VIEW
BASING DIAGRAM
JEDEC 12FK

10) G3



GLASS BULB 12 PIN BASE E12-74 OUTLINE DRAWING JEDEC 12-56

THE 6JM6 IS A BEAM-POWER PENTODE IN THE T-12 COMPACTRON CONSTRUCTION. IT IS DESIGNED PRIMARILY FOR USE AS THE HORIZONTAL-DEFLECTION AMPLIFIER IN TELEVISION RECEIVERS. A SEPARATE CONNECTION IS PROVIDED FOR THE BEAM PLATES (GRID 3) TO MINIMZE "SNIVETS"

EXCEPT FOR HEATER CHARACTERISTICS AND RATINGS, THE 6JM6 IS IDENTICAL TO THE 17JM6.

DIRECT INTERELECTRODE CAPACITANCES WITHOUT EXTERNAL SHIELD

GRID 1 TO PLATE: G1 TO P

INPUT: G1 TO (H + K + G2 + G3)

OUTPUT: P TO (H + K + G2 + G3)

7.0 pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS	1.2	AMPS.
LIMITS OF APPLIED VOLTAGE		6.3 ± 0.6	VOLTS
MAXIMUM HEATER - CATHODE VOLTAGE:			
HEATER NEG. W/ RESPECT TO CATHODE			
TOTAL DC AND PEAK		200	VOLTS
HEATER POS. W/ RESPECT TO CATHODE			
DC		100	VOLTS
TOTAL DC AND PEAK		200	VOLTS

TUNG-SOL -

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

DESIGN MAXIMUM RATINGS - SEE EIA STANDARD RS-239
HORIZONTAL-DEFLECTION AMPLIFIER SERVICE

	PLY VOLTAGE (BOOST + DC POWER SUPPLY PULSE PLATE VOLTAGE). 770 6,500	VOLTS VOLTS
PEAK NEGATIVE	PULSE PLATE VOLTAGE	1,500	VOLTS
POSITIVE DC GRI	D 3 VOLTAGE	70	VOLTS
GRID 2 VOLTAGE		220	VOLTS
NEGATIVE DC GR	RID 1 VOLTAGE	55	VOLTS
PEAK NEGATIVE	GRID 1 VOLTAGE	330	VOLTS
PLATE DISSIPAT	ION A	17.5	WATTS
GRID 2 DISSIPATI	ON	3.5	WATTS
DC CATHODE CU	RRENT	175	MA.
PEAK CATHODE	CURRENT	550	MA.
GRID 1 CIRCUIT F	RESISTANCE	1.0	MEGOHMS
BULB TEMPERAT	TURE AT HOTTEST POINT	220	°C

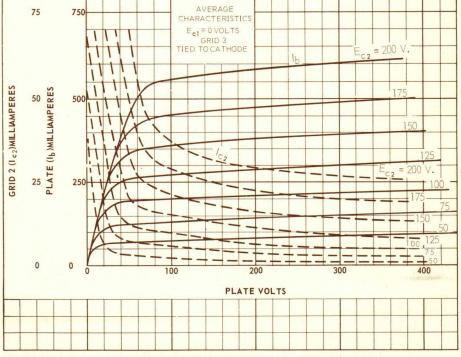
A - IN STAGES OPERATING WITH GRID-LEAK BIAS, AN ADEQUATE CATHODE-BIAS RESISTOR OR OTHER SUIT-ABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

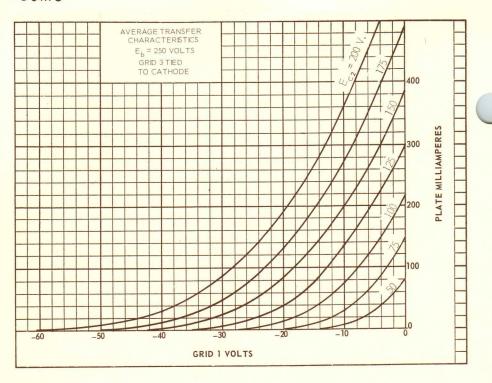
CHARACTERISTICS AND TYPICAL OPERATION

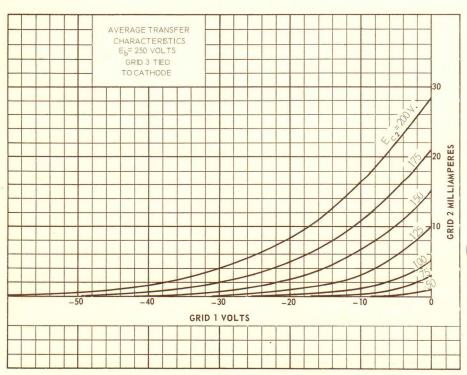
PLATE VOLTAGE	5,000	60	250	VOLTS
GRID 3 - CONNECTED TO CATHODE AT SOCKET	Г			
GRID 2 VOLTAGE	150	150	150	VOLTS
GRID 1 VOLTAGE	-	0 B	-22.5	VOLTS
PLATE CURRENT	-	345	65	MA.
GRID 2 CURRENT	-	27	1.8	MA.
TRANSCONDUCTANCE	-	-	7,300	μ MHOS
PLATE RESISTANCE - APPROX.	-	-	18,000	OHMS
GRID 1 VOLTAGE AT I = 1.0 MA APPROX.	-100	-	-42	VOLTS
TRIODE AMPLIFICATION FACTOR C	-	-	4.4	

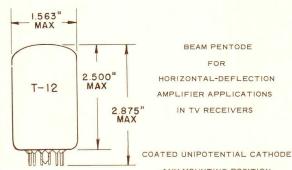
B - APPLIED FOR SHORT INTERVAL (2 SECONDS) SO AS NOT TO DAMAGE TUBE.

C - TRIODE CONNECTION (GRID 2 TIED TO PLATE) WITH E = E = 150 VOLTS AND E = -22.5 VOLTS









BEAM PENTODE FOR HORIZONTAL-DEFLECTION AMPLIFIER APPLICATIONS IN TV RECEIVERS

ANY MOUNTING POSITION

10) G3 G2 (3 BOTTOM VIEW BASING DIAGRAM JEDEC 12FK

GLASS BULB 12 PIN BASE E12-74 OUTLINE DRAWING JEDEC 12-56

THE 6JN6 IS A BEAM-POWER PENTODE IN THE T-12 COMPACTRON CONSTRUCTION. IT IS DESIGN-ED PRIMARILY FOR USE AS THE HORIZONTAL DEFLECTION AMPLIFIER IN TELEVISION RECEIV-ERS. A SEPARATE CONNECTION IS PROVIDED FOR THE BEAM PLATES (GRID 3) TO MINIMZE "SNIVETS".

EXCEPT FOR HEATER CHARACTERISTICS AND RATINGS, THE 6JN6 IS IDENTICAL TO THE 12JN6.

DIRECT INTERELECTRODE CAPACITANCES WITHOUT EXTERNAL SHIELD

GRID 1 TO PLATE: G1 TO P 0.34 pf INPUT: G1 TO (H+K+G2+G3) 16 pf OUTPUT: P TO (H + K + G2 + G3) 7.0 pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS	1.2	AMPS.
LIMITS OF APPLIED VOLTAGE		6.3 ± 0.6	VOLTS
MAXIMUM HEATER - CATHODE VOLTAGE: HEATER NEG, W/ RESPECT TO CATHODE			
TOTAL DC AND PEÁK		200	VOLTS
HEATER POS. W/ RESPECT TO CATHODE DC		100	VOLTS
TOTAL DC AND PEAK		200	VOLTS

TUNG-SOL -

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

DESIGN MAXIMUM RATINGS - SEE EIA STANDARD RS-239
HORIZONTAL-DEFLECTION AMPLIFIER SERVICE

DC PLATE - SUPPLY VOLTAGE (BOOST + DC POWER SUPPLY). PEAK POSITIVE PULSE PLATE VOLTAGE	770 6,500	VOLTS VOLTS
PEAK NEGATIVE PULSE PLATE VOLTAGE	1,500	VOLTS
POSITIVE DC GRID 3 VOLTAGE	70	VOLTS
GRID 2 VOLTAGE	220	VOLTS
NEGATIVE DC GRID 1 VOLTAGE	55	VOLTS
PEAK NEGATIVE GRID 1 VOLTAGE	330	VOLTS
PLATE DISSIPATION A	17.5	WATTS
GRID 2 DISSIPATION	3.5	WATTS
DC CATHODE CURRENT	175	MA.
PEAK CATHODE CURRENT	550	MA.
GRID 1 CIRCUIT RESISTANCE	1.0	MEGOHMS
BULB TEMPERATURE AT HOTTEST POINT	220	° C

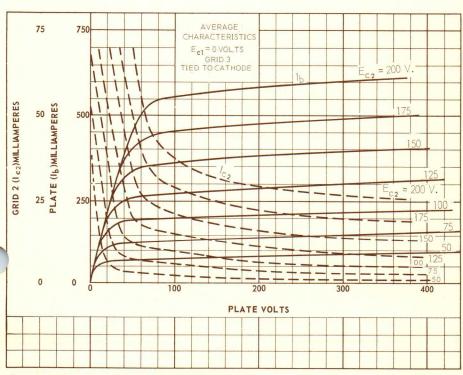
A - IN STAGES OPERATING WITH GRID-LEAK BIAS, AN ADEQUATE CATHODE-BIAS RESISTOR OR OTHER SUIT-ABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

CHARACTERISTICS AND TYPICAL OPERATION

PLATE VOLTAGE	5,000	60	250	VOLTS
GRID 3 - CONNECTED TO CATHODE AT SOCKE	Т			
GRID 2 VOLTAGE	150	150	150	VOLTS
GRID 1 VOLTAGE	-	0 B	-22.5	VOLTS
PLATE CURRENT	-	345	65	MA.
GRID 2 CURRENT	_	27	1.8	MA.
TRANSCONDUCTANCE	-	-	7,300	μMHOS .
PLATE RESISTANCE - APPROX.	-	_	18,000	OHMS
GRID 1 VOLTAGE AT I = 1.0 MA APPROX.	-100	-	-42	VOLTS
TRIODE AMPLIFICATION FACTOR C	_	_	4.4	

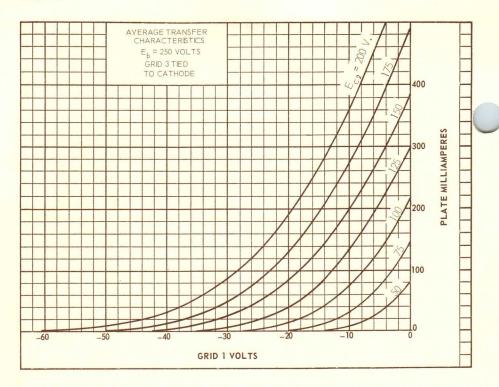
B - APPLIED FOR SHORT INTERVAL (2 SECONDS) SO AS NOT TO DAMAGE TUBE.

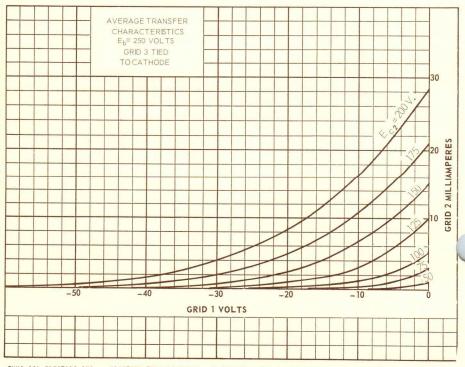
C - TRIODE CONNECTION (GRID 2 TIED TO PLATE) WITH E = E = 150 VOLTS AND E = -22.5 VOLTS



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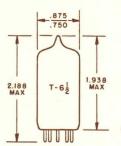
TUNG-SOL ELECTRIC INC., ELECTRON TUBE DIVISION, BLOOMFIELD, NEW JERSEY, U.S.A.. APRIL 1, 1964 PLATE #6881





TRIODE-PENTODE

MINIATURE TYPE



OUTLINE DRAWING

JEDEC 6-2

FOR APPLICATIONS IN

FM OR TV RECEIVERS

COATED UNIPOTENTIAL CATHODE
ANY MOUNTING POSITION

DATED UNIPOTENTIAL CATHODE

BASING DIAGRAM

JEDEC 9FA

BOTTOM VIEW

SMALL BUTTON BASE 9 PIN JEDEC E9-1

THE 6JN8 IS A SHARP-CUTOFF PENTODE AND MEDIUM-MU TRIODE IN THE 9 PIN MINIATURE CON-STRUCTION. THE PENTODE SECTION IS INTENDED FOR OSCILLATOR SERVICE IN THE HORIZONTAL DEFLECTION SYSTEM OF TELEVISION RECEIVERS. EXCEPT FOR HEATER CHARACTERISTICS AND RATINGS, THE 6JN8 IS IDENTICAL TO THE 19JN8.

DIRECT INTERELECTRODE CAPACITANCES

WITH EXTERNAL SHIELD #315 CONNECTED TO CATHODE

PENTODE SECTION:

GRID 1 TO PLATE: (G1 TO P)	MAX.	0.01	pf
INPUT: G1 TO (H + K + G2+ G3 + I.S.)		5.5	pf
OUTPUT: P TO (H + K + G ₂ + G ₃ + I.S.)		3.4	pf
RIODE SECTION:			
GRID TO PLATE: (G TO P)		1.7	pf
INPUT: G TO (H + TK + PK + PG3 + I.S.)		3.2	pf
OUTPUT: P TO (H + TK + PK + PG3 + I.S.)		2.2	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS	450	mA
AVERAGE HEATER WARM-UP		11	SECONDS
LIMITS OF APPLIED VOLTAGE		6.3 ± 0.6	VOLTS
LIMITS OF SUPPLIED CURRENT		450 ± 30	mA
HEATER-CATHODE VOLTAGE: EACH SECTION: HEATER POSITIVE WITH RESPECT TO CATH ODE			
DC COMPONENT		100	VOLTS
TOTAL DC AND PEAK		200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE TOTAL DC AND PEAK		200	VOLTS

TUNG-SOL -

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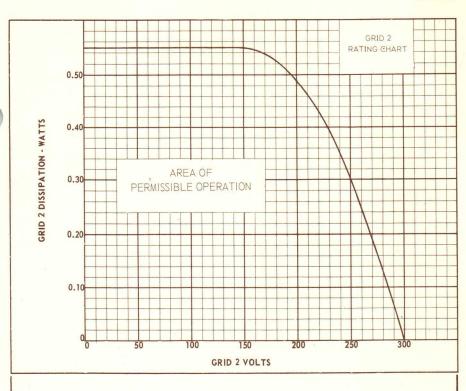
MAXIMUM RATINGS

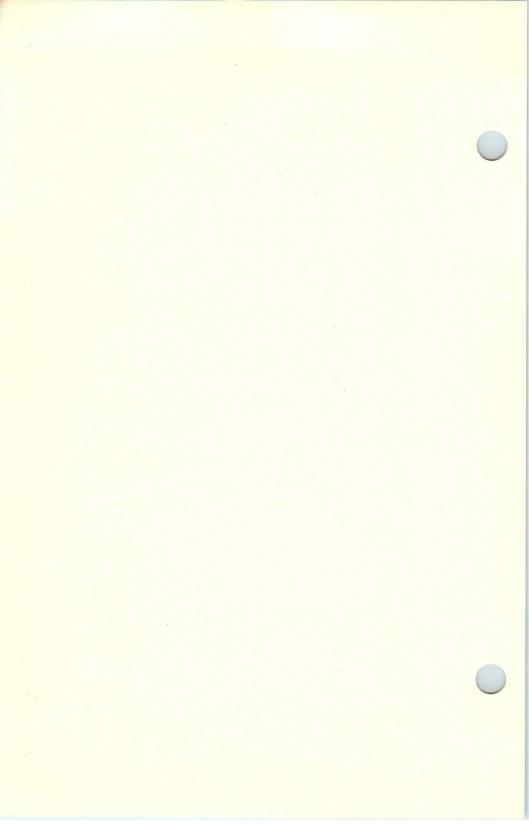
DESIGN - MAXIMUM VALUES - SEE EIA STANDARD RS-239

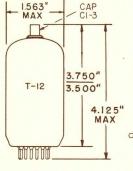
PLATE VOLTAGE GRID 2 SUPPLY VOLTAGE GRID 2 VOLTAGE	TRIODE SECTION 300	PENTODE SECTION 300 300 SEE RATING CHART	VOLTS VOLTS
POSITIVE DC GRID 1 VOLTAGE	0	0	VOLTS
PLATE DISSIPATION	2.5	2.5	WATTS
GRID 2 DISSIPATION	-	0.55	WATTS
GRID 1 CIRCUIT RESISTANCE:			
WITH FIXED BIAS	2.2	2.2	MEGOHMS
WITH CATHODE BIAS	2.2	2.2	MEGOHMS

AVERAGE CHARACTERISTICS AND TYPICAL OPERATION

	TRIODE	PENTODE	
	SECTION	SE CTION	
PLATE VOLTAGE	125	125	VOLTS
GRID 2 VOLTAGE	-	125	VOLTS
GRID 1 VOLTAGE	-1.0	-1.0	VOLTS
PLATE CURRENT	13.5	12	mA
GRID 2 CURRENT	_	4.0	mA
TRANSCONDUCTANCE	8,500	7,500	μMHOS.
AMPLIFICATION FACTOR	46	-	
PLATE RESISTANCE	5,400	200,000	OHMS
GRID 1 VOLTAGE (APPROX.) FOR I = 10 MA	-8	-8	VOLTS







BEAM PENTODE

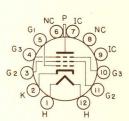
FOR

TV HORIZONTAL-DEFLECTION

AMPLIFIER APPLICATIONS

COATED UNIPOTENTIAL CATHODE ANY MOUNTING POSITION

GLASS BULB BUTTON 12 PIN BASE E12-74 OUTLINE DRAWING JEDEC 12-89



BOTTOM VIEW BASING DIAGRAM JEDEC 12FY

THE 6JS6 IS A BEAM-POWER PENTODE IN THE T-12 COMPACTRON CONSTRUCTION, IT IS DESIGNED PRIMARILY FOR USE AS THE HORIZONTAL-DEFLECTION AMPLIFIER IN TELEVISION RECEIVERS. A SEPARATE CONNECTION IS PROVIDED FOR THE BEAM PLATES (GRID 3) TO MINIMIZE "SNI-VETS".

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

GRID 1 TO PLATE: (G1 TO P)
INPUT: G1 TO (H + K + G2 + G3)
OUTPUT: P TO (H + K + G2 + G3)

0.7 pf 0.24 pf 0.10 pf

HEATER CHARACTERISTICS AND RATINGS

AVERAGE CHARACTERISTICS	6.3 VOLTS	2.25	AMPS.
LIMITS OF APPLIED VOLTAGE		6.3 ± 0.6	VOLTS
HEATER-CATHODE VOLTAGE HEATER POSITIVE WITH RESPECT TO CATHODE			
DC COMPONENT		100	VOLTS
TOTAL DC AND PEAK		200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE			
TOTAL DC AND PEAK		200	VOLTS

- TUNG-SOL -

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

DESIGN-MAXIMUM VALUES - SEE EIA STANDARD RS-239

HORIZONTAL - DEFLECTION AMPLIFIER SERVICE

DC PLATE-SUPPLY VOLTAGE (BOOST + DC POWER SUPPLY)	990	VOLTS
PEAK POSITIVE PULSE PLATE VOLTAGE - ABSOLUTE MAXIMUM	7,500	VOLTS
PEAK NEGATIVE PULSE PLATE VOLTAGE	1,100	VOLTS
POSITIVE DC GRID 3 VOLTAGE	70	VOLTS
GRID 2 VOLTAGE	190	VOLTS
PEAK NEGATIVE GRID 1 VOLTAGE	250	VOLTS
PLATE DISSIPATION A	28	WATTS
GRID 2 DISSIPATION	5.5	WATTS
DC CATHODE CURRENT	315	MA.
PEAK CATHODE CURRENT	1,100	MA.
GRID 1 CIRCUIT RESISTANCE	1.0	MEGOHMS
BULB TEMPERATURE AT HOTTEST POINT ON BULB	225	° C

A- IN STAGES OPERATING WITH GRID-LEAK BIAS, AN ADEQUATE CATHODE-BIAS RESISTOR OR OTHER SUIT-ABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

CHARACTERISTICS AND TYPICAL OPERATION

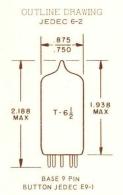
5,000	70	175	VOLTS
125	125	125	VOLTS
-	0	-25	VOLTS
-	570 B	125	MA.
-	34 B	4.5	MA.
-140	-	-54	VOLTS
,		3	
	125	125 125 - 0 - 570 B - 34 B	125 125 125 - 0 -25 - 570 B 125 - 34 B 4.5

B- VALUES MEASURED BY A METHODE INVOLVING A RECURRENT WAVEFORM SUCH THAT THE PLATE AND GRID 2 DISSIPATIONS WILL BE KEPT WITHIN RATINGS IN ORDER TO PREVENT DAMAGE TO THE TUBE.

C- TRIODE CONNECTION (Grid 2 tied to plate) WITH $E_b = E_{c2} = 125$ VOLTS, AND $E_{c1} = -25$ VOLTS.

OLIADRUPI E DIODE

MINIATURE TYPE



FOR

FM STEREO MULTIPLEX

EQUIPMENT AND COLOR

T.V. RECEIVERS

3K 3 T 7 7 3P 2 A N 9 K

BASING DIAGRAM

JEDEC 9PQ

ANY MOUNTING POSITION

THE 6JU8A IS A GENERAL-PURPOSE QUADRUPLE DIODE IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS INTENDED FOR USE IN PHASE-DETECTOR AND NOISE-IMMUNE COLOR-KILLER CIRCUITS OF COLOR-TELEVISION RECEIVERS AND PARTICULARLY FOR USE IN BRIDGE-MATRIXING CIRCUITS SUCH AS THOSE USED IN FM STERO MULTIPLEX EQUIPMENT. EXCEPT FOR A SMALLER T-6½ ENVELOPE, THE 6JU8A IS IDENTICAL TO THE 6JU8.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

PLATE OF UNIT 1 & CATHODE OF UNIT 2 TO CATHODE OF UNIT 1	1.8	pf
PLATE OF UNIT 1 & CATHODE OF UNIT 2 TO	1.0	Pi
PLATE OF UNIT 2	2.2	pf
PLATE OF UNIT 2 TO INTERNAL SHIELD AND HEATER	0.62	pf
PLATE OF UNIT 3 & CATHODE OF UNIT 4 TO	0.62	pr
CATHODE OF UNIT 3	1.9	p.f
PLATE OF UNIT 3 & CATHODE OF UNIT 4 TO		
PLATE OF UNIT 4	2.2	Pf
PLATE OF UNIT 4 TO INTERNAL SHIELD	0.04	
AND HEATER CATHODE OF UNIT 1 TO INTERNAL SHIELD	0.94	pf
AND HEATER	1.8	pf
CATHODE OF UNIT 3 TO INTERNAL SHIELD		
AND HEATER	1.9	pf

- TUNG-SOL -

CONTINUED FROM PRECEDING PAGE

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS	600	mA
LIMITS OF APPLIED VOLTAGE		6.3 ± 0.6	VOLTS
PEAK HEATER - CATHODE VOLTAGE - EACH UNIT: HEATER NEGATIVE WITH RESPECT TO CATHODE		300	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE		300	VOLTS

MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

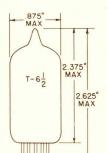
EACH UNIT

PEAK INVERSE PLATE VOLTAGE	300	VOLTS
PEAK PLATE CURRENT	54	mA
DC OUTPUT CURRENT	9	mA

CHARACTERISTICS - INSTANTANEOUS VALUE

EACH UNIT

PLATE CURRENT	FOR E _b = 10 VOLTS	60	mA
---------------	-------------------------------	----	----



COATED UNIPOTENTIAL CATHODE

FOR COMBINED VIDEO AMPLIFIER AND GENERAL PURPOSE T.V. APPLICATIONS

ANY MOUNTING POSITION

BOTTOM VIEW BASING DIAGRAM JEDEC 9DX

GLASS BULB MINIATURE BUTTON 9 PIN BASE E9-1 OUT LINE DRAWING JEDEC 6-3

THE 6JV8 IS A TRIODE PENTODE IN THE 9 PIN MINIATURE CONSTRUCTION. THE TRIODE SECTION IS DESIGNED FOR USE IN SOUND IF, KEYED A.G.C., SYNC-SEPARATION, SYNC-AMPLIFICATION OR NOISE SUPPRESSION CIRCUITS; THE PENTODE SECTION IS DESIGNED FOR USE AS A VIDEO AMP-LIFIER. THE HEATER MAY BE OPERATED FROM A TRANSFORMER OR IN A SERIES STRING.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

TRIODE:		
GRID TO PLATE: Tg TO Tp	2.2	pf
INPUT. Tg TO (h+Tk+Pk, Pg3, i.s.)	3.0	pf
OUTPUT: Tp TO (h+Tk+Pk, Pg3, i.s.)	2.0	pf
PENTODE:		
GRID 1 TO PLATE: Pg 1 to Pp (MAX)	0.08	pf
INPUT: Pgl TO (h+Pg2+Pk, Pg3, i.s.)	8.0	pf
OUTPUT: Pp TO (h+Pg2+Pk, Pg3, i.s.)	3.2	pf
COUPLING:		
PENTODE GRID 1 TO TRIODE PLATE:		
Pgl TO Tp (MAX.)	0.012	pf
PENTODE PLATE TO TRIODE PLATE:		
Pp TO Tp (MAX.)	0.24	pf

CONTINUED FROM PRECEDING PAGE

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM SYSTEM - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS	600	MA.
HEATER WARM-UP TIME		11	SECONDS
LIMITS OF APPLIED VOLTAGE		6.3±0.6	VOLTS
LIMITS OF SUPPLIED CURRENT		600±40	MA.
MAXIMUM HEATER-CATHODE VOLTAG	E - BOTH SECTIONS		
HEATER NEGATIVE WITH RESPEC	T TO CATHODE		
TOTAL DC AND PEAK		200	VOLTS
HEATER POSITIVE WITH RESPECT	TO CATHODE		
DC		100	VOLTS
TOTAL DC AND PEAK		200	VOLTS

MAXIMUM RATINGS

DESIGN MAXIMUM SYSTEM - SEE EIA STANDARD RS-239

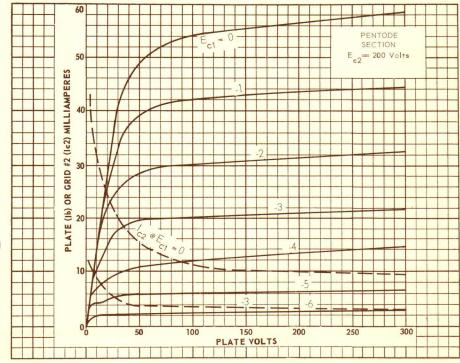
	TRIODE	PENTODE	
PLATE VOLTAGE	330	330	VOLTS
PLATE DISSIPATION	1.1	4,0	WATTS
GRID 2 VOLTAGE		330	VOLTS
GRID 2 DISSIPATION		1.7	WATTS
NEGATIVE GRID 1 VOLTAGE	50	50	VOLTS
POSITIVE GRID 1 VOLTAGE	0	0	VOLTS
GRID 1 CIRCUIT RESISTANCE:			
FOR CATHODE-BIAS OPERATION	1.0	1.0	MEGOHMS
FOR FIXED BIAS OPERATION	0.5	0.25	MEGOHM

AVERAGE CHARACTERISTICS

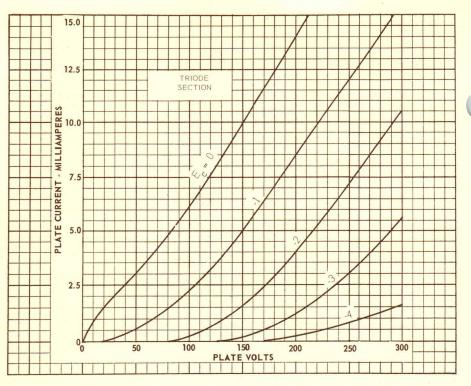
	TRIODE	PENT	ODE	
PLATE VOLTAGE	200	125	200	VOLTS
GRID 2 VOLTAGE		125	200	VOLTS
GRID 1 VOLTAGE	-2.0	-1.0	-2.9	VOLTS
PLATE CURRENT	4	22	22	MA.
GRID 2 CURRENT		4	4	MA.
TRANSCONDUCTANCE	4,000	11,500	10,700	μ MHOS
PLATE RESISTANCE - APPROX.	17.5	100	150	KOHMS
AMPLIFICATION FACTOR	70			
GRID 1 VOLTAGE FOR 16=20µA (APPROX.)	-5	-5.5	-9	VOLTS

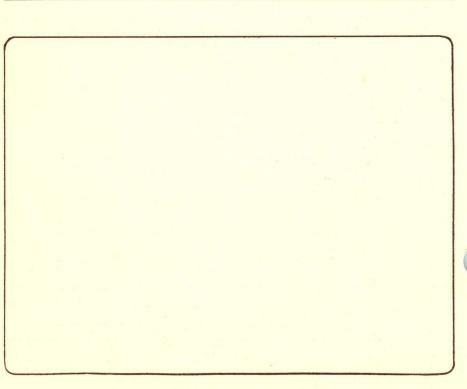
KNEE CHARACTERISTICS Ec1 = 0 INSTANTANEOUSLY

PLATE VOLTAGE	****	40	60	VOLTS
GRID 2 VOLTAGE	****	125	200	VOLTS
PLATE CURRENT		28	51	MA.
GRID 2 CURRENT		9	14	MA.



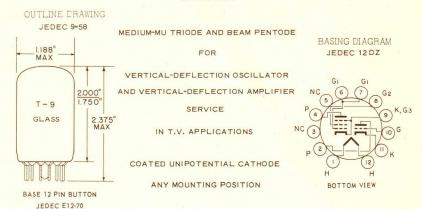
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TRIODE-PENTODE

COMPACTRON



THE 6JZ8 IS A MEDIUM - MU TRIODE AND A BEAM PENTODE IN THE 12 PIN COMPACTRON CON-STRUCTION. THE TRIODE IS DESIGNED FOR SERVICE AS A VERTICAL-DEFLECTION OSCILLATOR AND THE PENTODE AS A VERTICAL-DEFLECTION AMPLIFIER IN TELEVISION RECEIVERS.

DIRECT INTERELECTRODE CAPACITANCES WITHOUT EXTERNAL SHIELD

PENTODE SECTION	
GRID 1 TO PLATE (9 TO P)	0.34 pf
INPUT: G1 TO (H + K + G2+ G3)	11 pf
OUTPUT: P TO (H + K + G ₂ +G ₃)	7.0 pf
TRIODE SECTION	
GRID TO PLATE (G TO P)	3.6 pf
INPUT: G TO (H + K)	2.2 pf
OUTPUT: P TO (H + K)	0.7 pf

TUNG-SOL -

CONTINUED FROM PRECEDING PAGE

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUE - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6,3 VOLTS	1,200	MA
LIMITS OF APPLIED VOLTAGE		6.3 ± 0.6	VOLTS
HEATER-CATHODE VOLTAGE:			
DC COMPONENT		100	VOLTS
TOTAL DC AND PEAK		200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE			
TOTAL DC AND PEAK		200	VOLTS

MAXIMUM RATINGS DESIGN MAXIMUM RATINGS - SEE EIA STANDARD RS-239

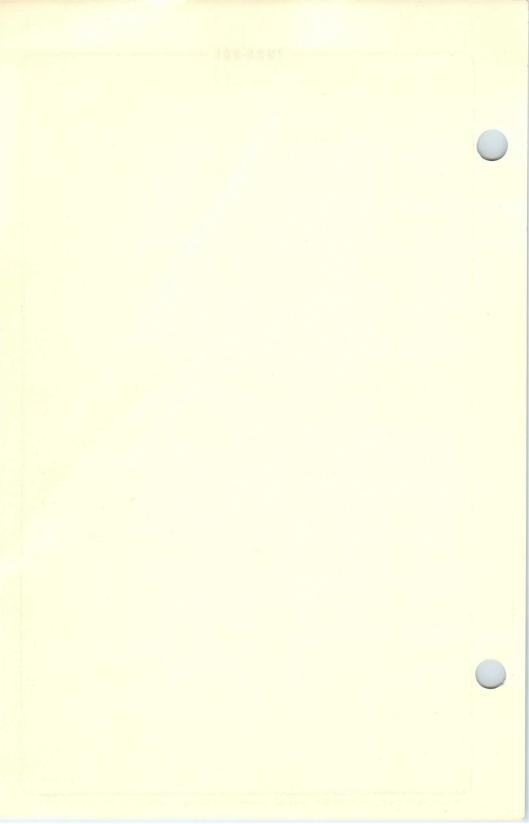
	TRIODE SECTION	PENTODE	
	VERTICAL OSCILLATOR A SERVICE	VERTICAL DEFLECTION A AMPLIFIER SERVICE	
PLATE VOLTAGE - DC	250	250	VOLTS
PEAK PULSE PLATE VOLTAGE		2,000	VOLTS
GRID 2 VOLTAGE		200	VOLTS
PEAK NEGATIVE GRID 1 VOLTAGE	400	150	VOLTS
PLATE DISSIPATION	1.0	7.0 B	WATTS
GRID 2 DISSIPATION		1.8	WATTS
CATHODE CURRENT - DC	20	70	MA
PEAK CATHODE CURRENT	70	245	MA
GRID 1 CIRCUIT RESISTANCE			
WITH FIXED BIAS	1.0	1.0	MEGOHMS
WITH CATHODE BIAS	2.0	2.0	MEGOHMS

- A FOR OPERATION IN A 525 LINE, 30 FRAME TELEVISION SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE CONCERNING BROADCAST STATIONS", FEDERAL COMMUNICATIONS COMMISSION. THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE.
- B IN STAGES OPERATING WITH GRID-LEAK BIAS, AN ADEQUATE CATHODE-BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE.

CHARACTERISTICS AND TYPICAL OPERATION

	TRIODE SECTION	PENTODE	SECTION	
PLATE VOLTAGE	150	45	120	VOLTS
GRID 2 VOLTAGE		110	110	VOLTS
GRID 1 VOLTAGE	-5.0	0 C	-8.0	VOLTS
PLATE CURRENT	5.5	122	46	MA
GRID 2 CURRENT		16.5	3.5	MA
AMPLIFICATION FACTOR	20			
TRANSCONDUCTANCE	2,350		7,100	μMHOS
PLATE RESISTANCE - APPROX.	8.5		11.7	KOHMS
GRID 1 VOLTAGE FOR I_b = 10 μ A APPROX.	-11		-25	VOLTS

C APPLIED FOR SHORT INTERVAL (2 SECONDS) SO AS NOT TO DAMAGE TUBE.



COATED UNIPOTENTIAL CATHODE

HEATER
6.3 VOLTS 0.4 AMP.
AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
INTERMEDIATE SHELL
7 PIN OCTAL

75

THE $6\kappa6GT$ IS AN INDIRECTLY HEATED CATHODE TYPE POWER AMPLIFIER PENTODE DESIGNED FOR SERVICE IN THE OUTPUT STAGES OF AC, AC/DC AND STORAGE BATTERY OPERATED RECEIVERS.

DIRECT INTERELECTRODE CAPACITANCES

GRID TO PLATE: (G1 TO P)	0.5 μμf
INPUT: G4 TO (H+K+G2+G3)	5.5 μuf
OUTPUT: P TO (H+K+G2+G3)	6.0 µµf

RATINGS INTERPRETED ACCORDING TO RMA STANDARD M8-210

	CLASS A1	VERTICAL AB DEFLECTION AMPLIFIER	
HEATER VOLTAGE	6.3	6.3	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE: HEATER NEGATIVE WITH RESPECT TO CATHODE TOTAL DC AND PEAK	200	200	VQLTS
HEATER POSITIVE WITH RESPECT TO CATHODE DC TOTAL DC AND PEAK	100 200	100 200	VOLTS VOLTS
MAXIMUM PLATE VOLTAGE	315	315	VOLTS
MAXIMUM GRID #2 VOLTAGE	285		VOLTS
MAXIMUM PEAK POSITIVE VOLTAGE (ABSOLUTE MAXIMUM)		1 200	VOLTS
MAXIMUM PLATE DISSIPATIONC	8.5	7	WATTS
MAXIMUM GRID #2 DISSIPATION	2.8		WATTS
MAXIMUM PEAK NEGATIVE GRID VOLTAGE		250	VOLTS
MAXIMUM AVERAGE CATHODE CURRENT		25	MA.
MAXIMUM PEAR CATHODE CURRENT		75	MA.
MAXIMUM GRID CIRCUIT RESISTANCE: FIXED BIAS OPERATION CATHODE BIAS OPERATION	0.1	2.2	ME GOHM ME GOHMS

ATRIODE CONNECTION.

CONTINUED ON FOLLOWING PAGE

Brown operation in a 525-line, 30-frame system as described in "standards of good engineering practice for television broadcasting stations; federal communications commission". The duty cycle of the voltage pulse not to exceed 15 percent of a scanning cycle.

C. IN STAGES OPERATING WITH GRID-LEAK BIAS, AN ADEQUATE CATHODE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A ₁ AMPLIF	ER - SING	LE TUBE		
HEATER VOLTAGE	6.3	6.3	6.3	VOLTS
HEATER CURRENT	0.4	0.4	0.4	AMP.
PLATE VOLTAGE	100	250	315	VOLTS
GRID #2 VOLTAGE	100	250	250	VOLTS
GRID #1 VOLTAGE	-7	-18	-21	VOLTS
PEAK AF GRID #1 VOLTAGE	7	18	21	VOLTS
ZERO-SIGNAL PLATE CURRENT	9	32	25.5	MA.
MAXIMUM-SIGNAL PLATE CURRENT	9.5	33	28	MA.
ZERO-SIGNAL GRID #2 CURRENT	1.6	5.5	4.0	MA.
MAXIMUM-SIGNAL GRID #2 CURRENT	3	10	9	MA -
PLATE RESISTANCE (APPROX.)	104 000	90 000	110 000	OHMS
TRANSCONDUCTANCE	1 500	2 300	2 100	имноѕ
LOAD RESISTANCE	12 000	7 600	9 000	OHMS
MAXIMUM-SIGNAL POWER OUTPUT	0.35	3.4	4.5	WATTS
TOTAL HARMONIC DISTORTION (APPROX.)	11	11	15	PERCEN1

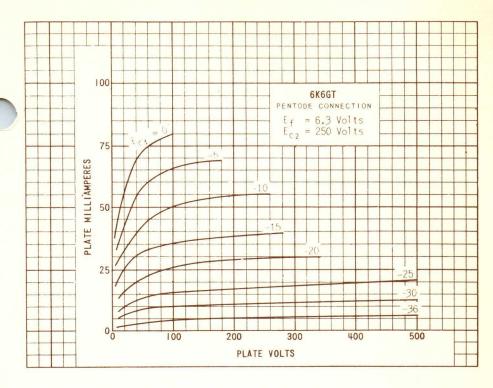
CLASS A1 AMPLIFIER - PUSH-PULLD

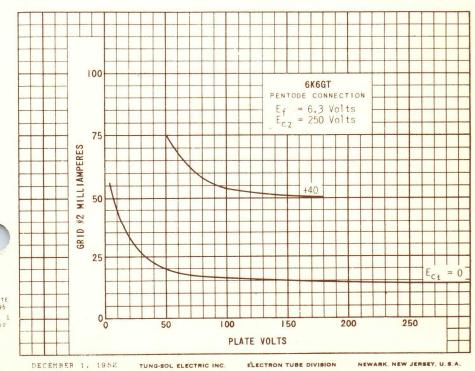
	FIXED	BIAS	
HEATER VOLTAGE	6.3	6.3	VOLTS
HEATER CURRENT	0.4	0.4	AMP.
PLATE VOLTAGE	235	285	VOLTS
GRID #2 VOLTAGE	285	285	VOLTS
GRID #1 VOLTAGE	-25.5		VOLTS
CATHODE RESISTOR		400	OHMS
PEAK AF GRID #1 TO GRID #1 VOLTAGE	51	51	VOLTS
ZERO-SIGNAL PLATE CURRENT	55	55	MA.
MAXIMUM-SIGNAL PLATE CURRENT	72	61	MA -
ZERO-SIGNAL GRID #2 CURRENT	9	9	MA.
MAXIMUM-SIGNAL GRID #2 CURRENT	17	13	MA.
PLATE-TO-PLATE LOAD RESISTANCE	12 000	12 000	OHMS
MAXIMUM-SIGNAL POWER OUTPUT	10.5	9.8	WATTS
TOTAL HARMONIC DISTORTION	6	4	PERCENT

PUNLESS OTHERWISE SPECIFIED, VALUES ARE FOR TWO TUBES.

CLASS A1 AMPLIFIER - TRIODE CONNECTION

HEATER VOLTAGE	6.3	VOLTS
HEATER CURRENT	0.4	AMP.
PLATE VOLTAGE	250	VOLTS
GRID VOLTAGE	-18	VOLTS
PLATE CURRENT	37.5	MA -
TRANSCONDUCTANCE	2 700	UMHOS
AMPLIFICATION FACTOR	6.8	
PLATE RESISTANCE (APPROX.)	2 500	OHMS
GRID VOLTAGE FOR I = 0.5 MA. (APPROX.)	-48	VOLTS

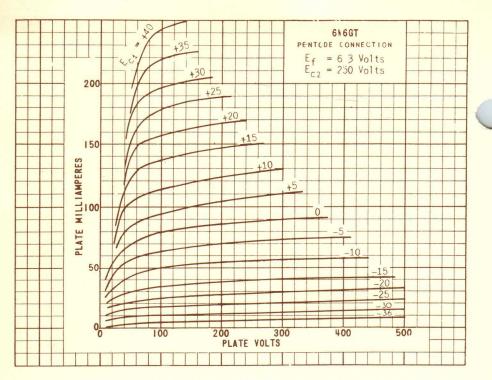




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PLATE 3096 DEC. 1 1952

6K6GT (7B5, 41)



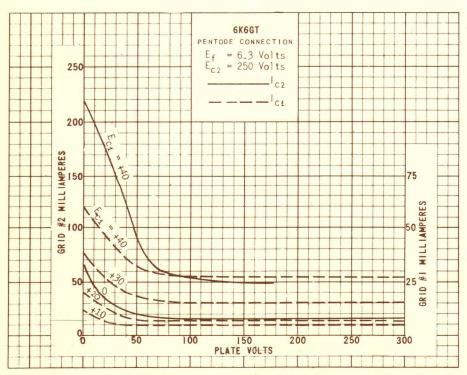


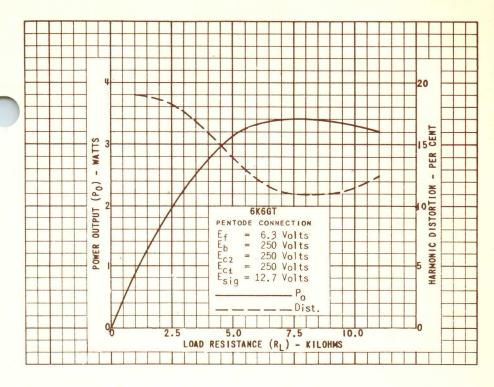
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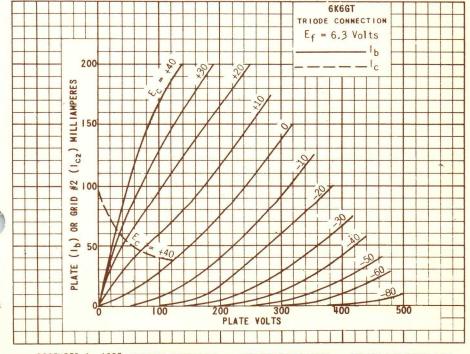
DECEMBER 1, 1952 TUNG-

TUNG-SOL ELECTRIC INC.

ELECTRON TUBE DIVISION

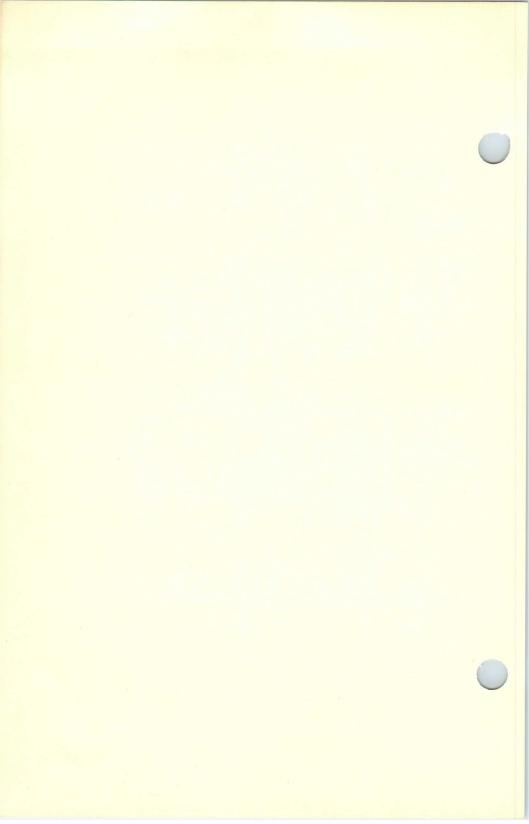
NEWARK, NEW JERSEY, U.S.A





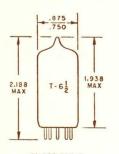
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PLATE 3098 DEC. 1 1952



TRIODE-PENTODE

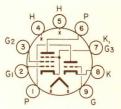
MINIATURE TYPE



FOR
USE AS A COMBINED
VHF OSCILLATOR AND MIXER

COATED UNIPOTENTIAL CATHODE

ANY MOUNTING POSITION



BOTTOM VIEW BASING DIAGRAM JEDEC 9 AE

GLASS BULB SMALL BUTTON 9 PIN BASE E9-1 OUTLINE DRAWING JEDEC 6-2

THE 6KD8 IS A MEDIUM MU TRIODE AND SHARP CUTOFF PENTODE IN THE 9 PIN MINATURE CON-STRUCTION, IT IS INTENDED FOR USE AS A COMBINED VHF OSCILLATOR AND MIXER IN TELE-VISION RECEIVERS.

GRID 1 (CONTROL GRID) TO CATHODE SPACING ON THE 6KD8 IS OF SUCH LOW ORDER OF MAGNITUDE AS TO PRECLUDE THE USE OF VOLTAGE BETWEEN THESE ELEMENTS OF MORE THAN 100 VOLTS DC OR PEAK AC IN COMMERCIAL TUBE CHECKERS AND SHORTS INDICATING DEVICES, PARTICULARLY WHERE MECHANICAL EXCITATION OF THE TUBE IS EMPLOYED.

DIRECT INTERELECTRODE CAPACITANCES

PENTODE SECTION	SHIELD 315 CONNECTED TO PIN 4	UNSHIELDED	
GRID 1 TO PLATE	Max007	Max015	pf
INPUT: G1 TO (H+ K + G2 + G3 + I.S.)	5.0	5.0	pf
OUTPUT: P TO (H + K + G2 + G3 + I.S.)	3.5	2.6	pf
CATHODE TO HEATER	3.0 A	3.0	pf
TRIODE SECTION			
GRID TO PLATE	1.8	1.8	pf
INPUT: G TO (H + PK + TK + G3 + I.S.)	2.8	2.8	pf
OUTPUT: P TO (H + PK + TK + G3 + I.S.)	2.0	1.5	pf
CATHODE TO HEATER	3.0 A	3.0	pf
COUPLING			
PENTODE GRID 1 TO TRIODE PLATE	Max. 0.2	Max. 0.2	pf
PENTODE PLATE TO TRIODE PLATE	Max02	Max. 0.1	pf

A- SHIELD 315 CONNECTED TO PIN 6.

CONTINUED FROM PRECEDING PAGE

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS		6.3	VOLTS	400	MA.
HEATER-CATHODE VOLTAGE - TRIODE HEATER NEGATIVE WITH RESPECT		ECTIONS			
TOTAL DC AND PEAK				200	VOLTS
HEATER POSITIVE WITH RESPECT 1	O CATHODE				
DC				100	VOLTS
TOTAL DC AND PEAK				200	VOLTS

MAXIMUM RATINGS

DESIGN MAXIMUM RATINGS - SEE EIA STANDARD RS-239

	TRIODE	PENTODE	
PLATE VOLTAGE	330	330	VOLTS
GRID 2 SUPPLY VOLTAGE		330	VOLTS
GRID 2 VOLTAGE		SEE RATING CHART	
POSITIVE DC GRID 1 VOLTAGE	0	0	VOLTS
PLATE DISSIPATION	2.5	3.0	WATTS
GRID 2 DISSIPATION		0.55	WATTS
GRID 1 CIRCUIT RESISTANCE			
FIXED BIAS		0.5	MEGOHM
SELF BIAS		1.0	MEGOHM

CHARACTERISTICS AND TYPICAL OPERATION

	TRIODE	PENTODE	
PLATE VOLTAGE	125	125	VOLTS
GRID 2 VOLTAGE		110	VOLTS
GRID 1 VOLTAGE	-1.0	-1.0	VOLTS
PLATE CURRENT	13.5	9.5	MA.
GRID 2 CURRENT		3.5	MA.
TRANSCONDUCTANCE	7,500	5,000	μMHOS
AMPLIFICATION FACTOR	40		
PLATE RESISTANCE	А	pprox. 0.2	MEGOHM
Ec1 FOR $I_b = 20 \mu A$	Approx9 A	Approx8	VOLTS
$G_{m}AT E_{c1} = 0 V., E_{b} = 100 V., E_{c2} = 70 V.$		5,500	μMHOS

COATED UNIPOTENTIAL CATHODE

HEATER

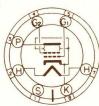
6.3 VOLTS 0.9 AMP. AC OR DC

ANY MOUNTING POSITION

6L6G 216 MAX 43 ST-16 MAX 55 MAX MAX GLASS BULB

METAL SHELL

MAX



BOTTOM VIEW SMALL WAFER 7 PIN OCTAL 7AC

BOTTOM VIEW MEDIUM SHELL 7 PIN OCTAL 7AC

THE 6L6 AND 6L6G ARE DESIGNED WITH HIGH POWER SENSITIVITY AND HIGH EFFICIENCY FOR SERVICE IN THE OUTPUT STAGES OF AC RECEIVERS. THEY ARE CAPABLE OF DELIVERING AN OUTPUT AT ALL POWER LEVELS WITH A VERY LOW PERCENTAGE OF HARMONIC DISTORTION.

DIRECT INTERELECTRODE CAPACITANCES

6L6 6L6G GRID TO PLATE 0.4 0.9 MILE INPUT 10 11.5 щиf OUTPUT 12 9.5 ILL f

CONTINUED ON FOLLOWING PAGE

--- INDICATES A CHANGE OR ADDITION.

CONTINUED FROM PRECEDING PAGE

RATINGS INTERPRETED ACCORDING TO RMA STANDARD M8-210

	TRIODE ^A	PENTODE	
HEATER VOLTAGE	6.3	6.3	VOLTS
MAXIMUM HEATER CATHODE VOLTAGE	180	180	VOLTS
MAXIMUM PLATE VOLTAGE	275	360	VOLTS
MAXIMUM GRID #2 VOLTAGE	PLATE	270	VOLTS
MAXIMUM PLATE DISSIPATION	19	19	WATTS
MAXIMUM GRID #2 DISSIPATION		2.5	WATTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE FIXED BIAS OPERATION CATHODE BIAS OPERATION	0.1	0.1	ME GOHM ME GOHM

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER - PENTODE CONNECTION

HEATER VOLTAGE	6.3	6.3	6.3	VOLTS
HEATER CURRENT	0.9	0.9	0.9	AMP.
PLATE VOLTAGE	250	300	350	VOLTS
GRID #2 VOLTAGE	250	200	250	VOLTS
GRID #1 VOLTAGE	-14	-12.5	-18	VOLTS
PEAK AF SIGNAL VOLTAGE	14	12.5	18	VOLTS
TRANSCONDUCTANCE	6 000	5 300	5 200	µм ноs
PLATE RESISTANCE	22 500	35 000	33 000	OHMS
ZERO SIGNAL PLATE CURRENT	72	48	54	MA.
MAXIMUM SIGNAL PLATE CURRENT	79	55	66	MA.
ZERO SIGNAL GRID #2 CURRENT	5	2.5	2.5	MA.
MAXIMUM SIGNAL GRID #2 CURRENT	7.3	4.7	7	MA.
LOAD RESISTANCE	2 500	4 500	4 200	OHMS
POWER OUTPUT	6.5	6.5	10.8	WATTS
TOTAL HARMONIC DISTORTION	10	11	15	PERCENT

CLASS A1 AMPLIFIER - TRIODE CONNECTIONA

HEATER VOLTAGE	6.3	VOLTS
HEATER CURRENT	0.9	AMP.
PLATE VOLTAGE	250	VOLTS
GRID #2 VOLTAGE	PLATE	
GRID #1 VOLTAGE	-20	VOLTS
PEAK AF SIGNAL VOLTAGE	20	VOLTS
TRANSCONDUCTANCE	4 700	VOLTS
PLATE RESISTANCE	1 700	OHMS
AMPLIFICATION FACTOR	8	
ZERO SIGNAL PLATE CURRENT	40	MA.
MAXIMUM SIGNAL PLATE CURRENT	44	MA.
LOAD RESISTANCE	5 000	OHMS
POWER OUTPUT	1.4	WATTS
TOTAL HARMONIC DISTORTION	5	PERCENT

AGRID #2 CONNECTED TO PLATE

CONTINUED ON FOLLOWING PAGE

--- INDICATES A CHANGE OR ADDITION.

3026 SEPT. 1 1952

HEATER VOLTAGE	6.3	6.3	VOLTS
HEATER CURRENT	0.9	0.9	AMP.
PLATE VOLTAGE	250	270	VOLTS
GRID #2 VOLTAGE	250	270	VOLTS
GRID #1 VOLTAGE	-16	-17.5	VOLTS
PEAK AF GRID TO GRID VOLTAGE	32	35	VALTS
TRANSCONDUCTANCE (EACH TUBE)	5 500	5 700	µм ноs
PLATE RESISTANCE (EACH TUBE)	24 500	23 500	OHMS
ZERO SIGNAL PLATE CURRENT	120	134	MA.
MAXIMUM SIGNAL PLATE CURRENT	140	155	MA.
ZERO SIGNAL GRID #2 CURRENT	10	11	MA -
MAXIMUM SIGNAL GRID #2 CURRENT	16	17	MA -
LOAD RESISTANCE	5 000	5 000	OHMS
POWER OUTPUT	14.5	17.5	WATTS
TOTAL HARMONIC DISTORTION	2	2	PERCENT

CLASS AB 1 PUSH-PULL AMPLIFIER - PENTOPE CONNECTION

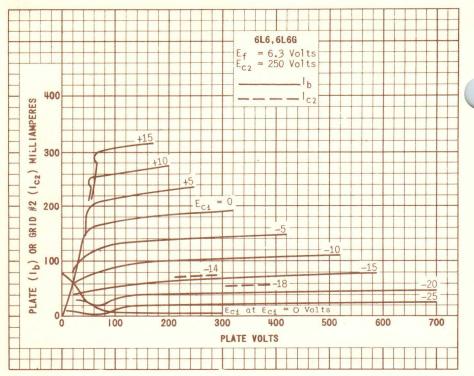
VALUES ARE FOR TWO TUBES

HEATER VOLTAGE	6.3	6.3	VOLTS
HEATER CURRENT	0.9	0.9	AMP.
PLATE VOLTAGE	360	360	VOLTS
GRID #2 VOLTAGE	270	270	VOLTS
GRID #1 VOLTAGE	-22.5	-22.5	VOLTS
PEAK AF GRID TO GRID VOLTAGE	45	45	VOLTS
ZERO SIGNAL PLATE CURRENT	88	88	MA -
MAXIMUM SIGNAL PLATE CURRENT	132	140	MA.
ZERO SIGNAL GRID #2 CURRENT	5	5	MA .
MAXIMUM SIGNAL GRID #2 CURRENT	15	11	MA -
LOAD RESISTANCE	6 600	3 800	OHMS
POWER OUTPUT	26.5	18	WATTS
TOTAL HARMONIC DISTORTION	2	2	PERCENT

CLASS AB2 PUSH-PULL AMPLIFIER - PENTODE CONNECTION

VALUES ARE FOR TWO TUBES

HEATER VOLTAGE	6.3	6.3	VOLTS
HEATER CURRENT	0.9	0.9	AMP.
PLATE VOLTAGE	360	360	VOLTS
GRID #2 VOLTAGE	225	270	VOLTS
GRID #1 VOLTAGE	-18	-22.5	VOLTS
PEAK AF GRID TO GRID VOLTAGE	52	72	VOLTS
ZERO SIGNAL PLATE CURRENT	78	88	MA.
MAXIMUM SIGNAL PLATE CURRENT	142	205	MA.
ZERO SIGNAL GRID #2 CURRENT	3.5	5	MA -
MAXIMUM SIGNAL GRID #2 CURRENT	11	16	MA -
LOAD RESISTANCE	6 000	3 800	OHMS
POWER OUTPUT	31	47	WATTS
TOTAL HARMONIC DISTORTION	2	2	PERCENT



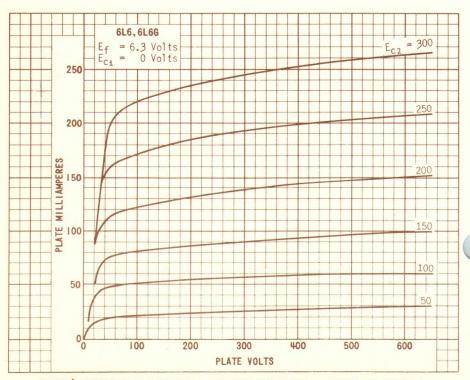
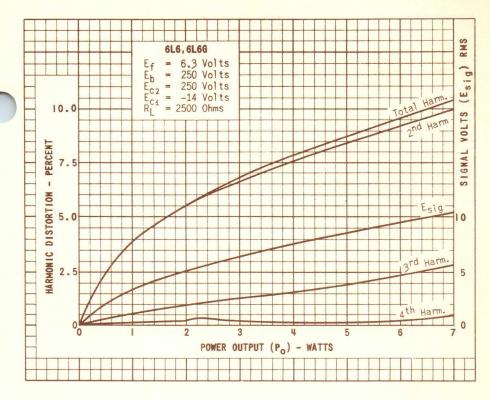
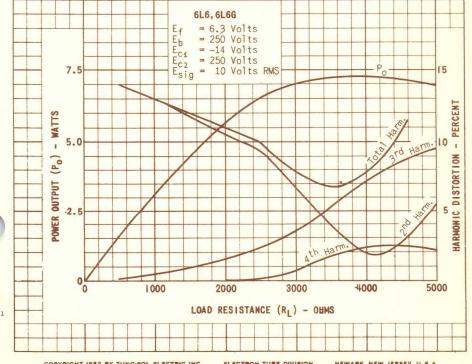


PLATE 3028

SEPT. 1 1952





POINTED IN U. S. A.

6L6, 6L6G

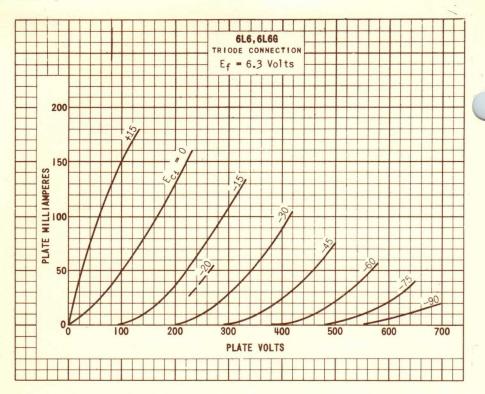
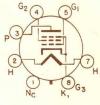


PLATE 3030 SEPT. 1 1952 COATED UNIPOTENTIAL CATHODE HEATER 6.3±0.6 VOLTS 0.9 AMP. AC OR DC ANY MOUNTING POSITION



BOTTOM VIEW BASING DIAGRAM JEDEC 75

GLASS BULB

MEDIUM SHELL OR SHORT MEDIUM SHELL 7 PIN OCTAL B7-12 OUTLINE DRAWING JEDEC 12-15

THE 6L6GB IS A BEAM PENTODE DESIGNED WITH HIGH POWER SENSITIVITY AND HIGH EFFICIENCY FOR SERVICE IN THE OUTPUT STAGES OF AC RECEIVERS. IT IS CAPABLE OF DELIVERING AN OUTPUT AT ALL POWER LEVELS WITH A VERY LOW PERCENTAGE OF HARMONIC DISTORTION.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

GRID TO PLATE: G TO P	0.9	pf
INPUT: GA TO (H+K+G2+BP)	11.5	pf
OUTPUT: P TO (H+K+G2+BP)	9.5	pf

- RATINGS

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

HEATER VOLTAGE MAXIMUM HEATER—CATHODE VOLTAGE: HEATER NEGATIVE WITH RESPECT TO CATHODE TOTAL DC AND PEAK 200 VOLTS	PENTODE ONNECTION
HEATER NEGATIVE WITH RESPECT TO CATHODE	VOLTS
TOTAL DO AND BEAK	
TOTAL DC AND FEAK	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	
TOTAL DC AND PEAK 200 VOLTS	VOLTS
DC 100 VOLTS	VOLTS
MAXIMUM PLATE VOLTAGE 300 400 VOLTS	400 VOLTS
MAXIMUM GRID #2 VOLTAGE 300 VOLTS	300 VOLTS
MAXIMUM PLATE DISSIPATION 22 WATTS	22 WATTS
MAXIMUM GRID #2 DISSIPATION 2.8 WATTS	2.8 WATTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE:	
FIXED BIAS 0.1 MEGOHI	0.1 MEGOHM
SELF BIAS 0.5 MEGOH	0.5 MEGOHM

AGRID #2 CONNECTED TO PLATE.

CONTINUED ON FOLLOWING PAGE

- INDICATES A CHANGE.

- TUNG-SOL -

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A₁ AMPLIFIER - PENTODE CONNECTION

PLATE VOLTAGE	250	300	350	VOLTS
GRID #2 VOLTAGE	250	200	250	VOLTS
GRID #1 VOLTAGE	-14	-12.5	-18	VOLTS
PEAK AF SIGNAL VOLTAGE	14	12.5	18	VOLTS
TRANSCONDUCTANCE	6 000	5 300	5 200	имноѕ
PLATE RESISTANCE	22 500	35 000	33 000	OHMS
ZERO SIGNAL PLATE CURRENT	72	48	54	MA.
MAXIMUM SIGNAL PLATE CURRENT	79	55	66	MA.
ZERO SIGNAL GRID #2 CURRENT	5	2.5	2.5	MA.
MAXIMUM SIGNAL GRID #2 CURRENT	7.3	4.7	₹	MA.
LOAD RESISTANCE	2 500	4 500	4 200	OHMS
POWER OUTPUT	6.5	6.5	10.8	WATTS
TOTAL HARMONIC DISTORTION	10	11	15	PERCENT

CLASS A1 AMPLIFIER - TRIODE CONNECTIONA

PLATE VOLTAGE	250	VOLTS
GRID #1 VOLTAGE	-20	VOLTS
PEAK AF SIGNAL VOLTAGE	20	VOLTS
TRANSCONDUCTANCE	4 700	VOLTS
PLATE RESISTANCE	1 700	OHMS
AMPLIFICATION FACTOR	8	
ZERO SIGNAL PLATE CURRENT	40	MA.
MAXIMUM SIGNAL PLATE CURRENT	44	MA -
LOAD RESISTANCE	5 000	OHMS
POWER OUTPUT	1.4	WATTS
TOTAL HARMONIC DISTORTION	5	PERCENT

AGRID #2 CONNECTED TO PLATE.

CLASS A1 PUSH-PULL AMPLIFIER - PENTODE CONNECTION

VALUES ARE FOR TWO TUBES

HEATER VOLTAGE	6.3	6.3	VOLTS
HEATER CURRENT	0.9	0.9	AMP.
PLATE VOLTAGE	250	270	VOLTS
GRID #2 VOLTAGE	250	270	VOLTS
GRID #1 VOLTAGE	-16	-17.5	VOLTS
PEAK AF GRID TO GRID VOLTAGE	32	35	VOLTS
TRANSCONDUCTANCE (EACH TUBE)	5 500	5 700	имноѕ
PLATE RESISTANCE (EACH TUBE)	24 500	23 500	OHMS
ZERO SIGNAL PLATE CURRENT	120	134	MA.
MAXIMUM SIGNAL PLATE CURRENT	140	155	MA.
ZERO SIGNAL GRID #2 CURRENT	10	11	MA.
MAXIMUM SIGNAL GRID #2 CURRENT	16	17	MA.
LOAD RESISTANCE	5 000	5 000	OHMS
POWER OUTPUT	14.5	17.5	WATTS
TOTAL HARMONIC DISTORTION	2	2	PERCENT

CLASS AB1 PUSH-PULL AMPLIFIER - PENTODE CONNECTION

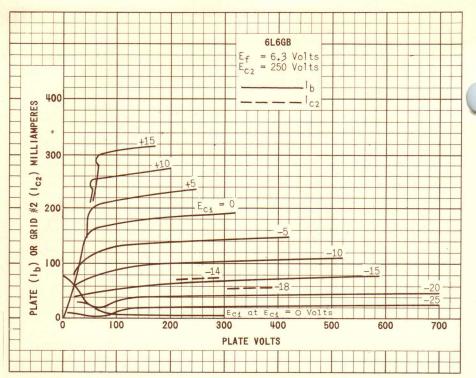
VALUES ARE FOR TWO TUBES

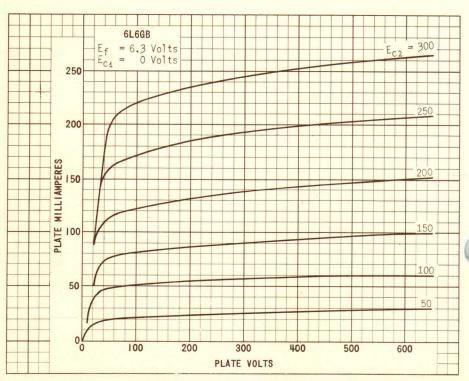
HEATER VOLTAGE	6.3	6.3	VOLTS
HEATER CURRENT	0.9	0.9	AMP.
PLATE VOLTAGE	360	360	VOLTS .
GRID #2 VOLTAGE	270	270	VOLTS
GRID #1 VOLTAGE	-22.5	-22.5	VOLTS
PEAK AF GRID TO GRID VOLTAGE	45	45	VOLTS
ZERO SIGNAL PLATE CURRENT	88	88	MA.
MAXIMUM SIGNAL PLATE CURRENT	132	140	MA.
ZERO SIGNAL GRID #2 CURRENT	5	5	MA.
MAXIMUM SIGNAL GRID #2 CURRENT	15	11	MA.
LOAD RESISTANCE	6 600	3 800	OHMS
POWER OUTPUT	26.5	18	WATTS
TOTAL HARMONIC DISTORTION	2	2	PERCENT

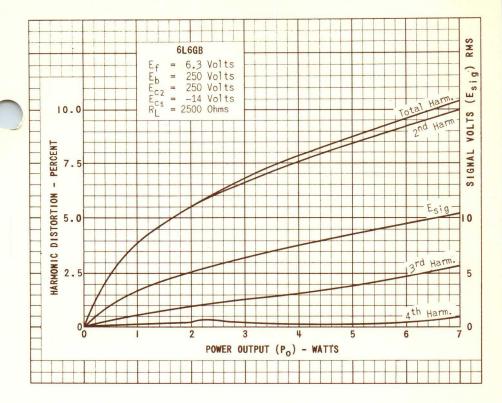
CLASS AB2 PUSH-PULL AMPLIFIER - PENTODE CONNECTION

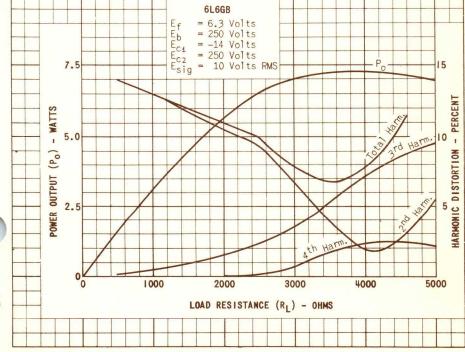
VALUES ARE FOR TWO TUBES

HEATER VOLTAGE	6.3	6.3	VOLTS
HEATER CURRENT	0.9	0.9	AMP.
PLATE VOLTAGE	360	360	VOLTS
GRID #2 VOLTAGE	225	270	VOLTS
GRID #1 VOLTAGE	-18	-22.5	VOLTS
PEAK AF GRID TO GRID VOLTAGE	52	72	VOLTS
ZERO SIGNAL PLATE CURRENT	78	88	MA.
MAXIMUM SIGNAL PLATE CURRENT	142	205	MA.
ZERO SIGNAL GRID #2 CURRENT	3.5	5	MA.
MAXIMUM SIGNAL GRID #2 CURRENT	11	16	MA.
LOAD RESISTANCE	6 000	3 800	OHMS
POWER OUTPUT	31	47	WATTS
TOTAL HARMONIC DISTORTION	2	2	PERCENT



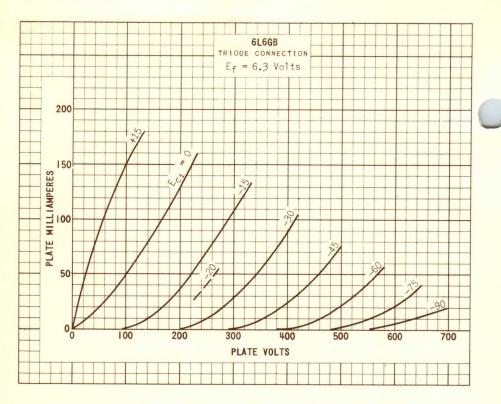






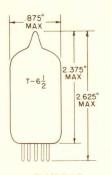
PRINTED IN U. S. A.

PLATE 554-3



TRIODE PENTODE

MINIATURE TYPE

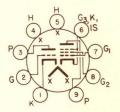


COATED UNIPOTENTIAL CATHODE

FOR USE AS A SYNC SEPARATOR

AND VIDEO AMPLIFIER

ANY MOUNTING POSITION



BOTTOM VIEW
BASING DIAGRAM
JEDEC 9DX

GLASS BULB
MINIATURE BUTTON
9 PIN BASE E9-1
OUTLINE DRAWING
JEDEC 6-3

THE 6LF8 IS A SHARP CUT-OFF PENTODE AND A HIGH MU TRIODE FEATURING A CONTROLLED PLATE KNEE CHARACTERISTIC FOR THE PENTODE SECTION. THE TRIODE SECTION MAY BE USED AS A SYNC SEPARATOR WHILE THE PENTODE SECTION IS DESIGNED TO SERVE AS A VIDEO AMPLIFIER.

THE 6LF8 IS SIMILAR TO THE 6AW8A.

DIRECT INTERELECTRODE CAPACITANCES

	SHIELD A	SHIELD	
PENTODE GRID 1 TO PENTODE PLATE (PG1 TO PP) MAX.	→ 0.05	→ 0.06	pf
PENTODE INPUT: PG TO (H+PG2+PK,G3,1.S.)	10	10	pf
PENTODE OUTPUT: PP TO (H+ PG2+PK,G3,1.S.)	4.5	3.6	pf
TRIODE GRID TO TRIODE PLATE: (TG TO TP)	2.2	2.2	pf.
TRIODE INPUT: TG TO (H+TK-PK, PG3, I.S.)	3.4	3.2	pf
TRIODE OUTPUT: TP TO (H+TK-PK, PG3, I.S,)	3.0	1.8	pf
PENTODE GRID 1 TO TRIODE PLATE: (PG1 TO TP) MAX.	.005	.008	pf
PENTODE PLATE TO TRIODE PLATE: (PP TO TP) MAX.	.025	.150	pf

EXTERNAL SHIELD 315 CONNECTED TO PIN 4 AND PIN 5.

CONTINUED ON FOLLOWING PAGE

-- INDICATES A CHANGE.

TUNG-SOL -

CONTINUED FROM PRECEDING PAGE

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS HEATER WARM-UP TIME	6.3 VOLTS	600	MA. SECONDS
LIMITS OF APPLIED VOLTAGE - AC OR DC		6.3 ± 0.6	VOLTS
LIMITS OF SUPPLIED CURRENT - AC OF	R DC	600 ± 40	MA.
MAXIMUM HEATER-CATHODE VOLTAGE:	CATHORE		
HEATER NEGATIVE WITH RESPECT TO	CATHODE	200	VOL TO
TOTAL DC AND PEAK		200	VOLTS
HEATER POSITIVE WITH RESPECT TO	CATHODE		
DC		100	VOLTS
TOTAL DC AND PEAK		200	VOLTS

MAXIMUM RATINGS

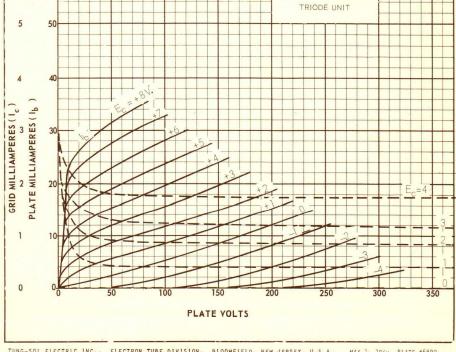
DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

	TRIODE	PENTODE	
PLATE VOLTAGE	330	330	VOLTS
GRID 2 VOLTAGE		SEE RATING CHART	
GRID 2 SUPPLY VOLTAGE	****	330	VOLTS
PLATE DI SSIPATION	1.1	3.75	WATTS
GRID 2 DISSIPATION UP TO 165 VOLTS		1.1	WATTS
POSITIVE DC GRID 1 VOLTAGE	4	0	VOLTS
NEGATIVE DC GRID 1 VOLTAGE	55	55	VOLTS
GRID 1 CIRCUIT RESISTANCE			
FOR CATHODE-BIAS OPERATION	1.0	1.0	MEGOHM
FOR FIXED BIAS OPERATION	0.5	0.25	MEGOHM

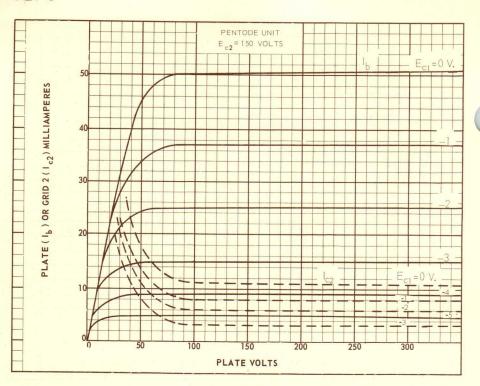
TYPICAL OPERATING CHARACTERISTICS

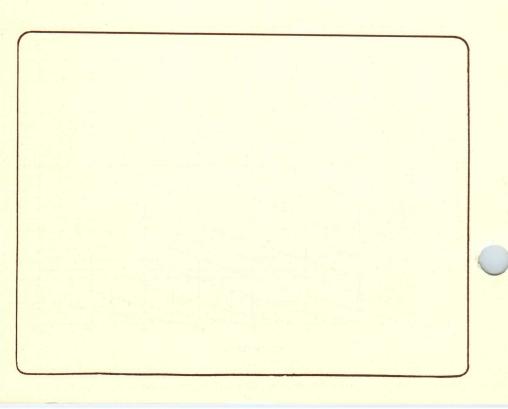
CLASS A1 AMPLIFIER

	TR	IODE	PEN'	TODE	
PLATE VOLTAGE	200	40	75	100	VOLTS
GRID 2 VOLTAGE	7-	_	150	150	VOLTS
GRID 1 VOLTAGE	-2	+3	0	-2.5	VOLTS
PLATE CURRENT	4	-11	50	20	MA.
GRID 1 CURRENT	0	2.7	0	0	MA.
GRID 2 CURRENT	_	-	12	5	MA.
TRANSCONDUCTANCE	4,000	4,000		11,000	μ MHOS
AMPLIFICATION FACTOR	70	40	_	-	-
PLATE RESISTANCE (APPROX.)	17.5	10.0	-	200	KOHMS
GRID 1 VOLTAGE (APPROX.) FOR $I_b = 20 \mu A$	-5			-8	VOLTS



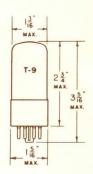
6LF8





TWIN TRIODE AMPLIFIERS

COATED UNIPOTENTIAL CATHODE HEATER 6.3 VOLTS 0.8 AMPERE AC OR DC 34



6N7

METAL SHELL 8 PIN OCTAL BASE



BOTTOM VIEW



BOTTOM VIEW

THE TUNG-SOL 6N7, 6N7GT/G ARE TWIN TRIODES DESIGNED PRIMARILY FOR SERVICE AS CLASS B AMPLIFIERS. THEIR ELECTRICAL CHARACTERISTICS ARE IDENTICAL.

RATINGS

MAXIMUM PLATE VOLTAGE	300	VOLTS
MAXIMUM PEAK PLATE CURRENT PER PLATE	125	MA.
MAXIMUM AVERAGE DISSIPATION PER PLATE	5.5	WATTS

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS AL AMPLIFIER

TRIODES CONNECTED IN PARALLEL

PLATE VOLTAGE	250	294	VOLTS
GRID VOLTAGE	-5	-6	VOLTS
PLATE CURRENT	6	7	MA.
PLATE RESISTANCE	11 300	11 000	OHMS
TRANSCONDUCTANCE	3100	3200	µмноs
AMPLIFICATION FACTOR	35	35	

RESISTANCE COUPLED AMPLIFIER AND PHASE INVERTER

PLATE SUPPLY VOLTAGE	100	100	250	250	VOLTS
PLATE LOAD RESISTOR	0.1	0.5	0.1	0.5	MEGOHM
CATHODE RESISTOR	2500	7000	1800	5000	OHMS
VOLTAGE GAIN	20	22	23	24	

CONTINUED NEXT PAGE

TYPICAL AND IDEAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS B2 AMPLIFIER - PUSH-PULL

	IDEAL	TYPICAL	
ZERO-SIGNAL PLATE VOLTAGE	300	300	VOLTS
DC GRID VOLTAGE	0	0	VOLT
AF-PEAK SIGNAL VOLTAGE PER GRID A	29	41	VOLTS
MAXIMUM-PEAK-SIGNAL GRID CURRENT PER GRID	20	22	MA.
ZERO-SIGNAL PLATE CURRENT PER PLATE	17.5	17.5	MA.
MAXIMUM-SIGNAL DC PLATE CURRENT PER PLATE	35	35	MA.
GRID IMPEDANCE AT 400 CYCLES	0	516 ⁸	OHMS
PLATE SUPPLY IMPEDANCE	0	1000	OHMS
EFFECTIVE LOAD RESISTANCEPLATE TO PLATE	8000	8000	OHMS
TOTAL HARMONIC DISTORTION	4	8	PER CENT
THIRD HARMONIC	3.5	7.5	PER CENT
FIFTH HARMONIC	1.5	2.5	PER CENT
POWER OUTPUT	10	10	WATTS

A FOR POWER OUTPUT SHOWN

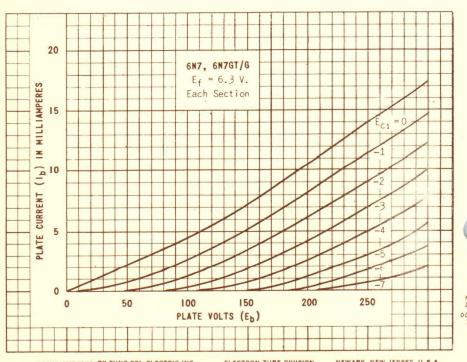
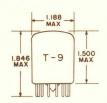


PLATE 1344-1 OCT. 25 1943

^{8 500} OHMS AND 50 MH.

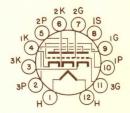
THREE TRIODES

COATED UNIPOTENTIAL CATHODE



FOR SYNC CLIPPER AND GATED AGC AMPLIFIER SERVICE IN TV RECEIVERS

ANY MOUNTING POSITION



BASING DIAGRAM JEDEC 12BY

BOTTOM VIEW

BUTTON
12 PIN BASE E12-70
OUTLINE DRAWING
JEDEC 9-56

GLASS BULB

THE 6011 CONSISTS OF THREE TRIODES IN A 12 PIN COMPACT CONSTRUCTION. TWO OF THE TRIODES HAVE A HIGH MU, THE OTHER HAS A MEDIUM MU. ONE OF THE HIGH MU SECTIONS IS ESPECIALLY SHIELDED FROM THE OTHER SECTIONS. EACH ELEMENT IS BROUGHT OUT TO A SEPARATE BASE PIN. THE 6011 IS DESIGNED FOR SYNC CLIPPER AND GATED AGC AMPLIFIER SERVICE IN TV RECEIVERS. THE HEATER MAY BE OPERATED FROM A TRANSFORMER OR IN A SERIES STRING.

DIRECT INTERELECTRODE CAPACITANCES

	TRIODE 1	TRIODE 2	TRIODE 3	
GRID TO PLATE	1.8	2.0	2.0	pf
INPUT: G TO (H+K+1.S.)	1.9	1.8	1.8	pf
OUTPUT: P TO (H+K+1.S.)	1.7	0.6	1.7	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM SYSTEM - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS	0.60	AMPS
HEATER WARM-UP TIME A		11	SECONDS
HEATER SUPPLY LIMITS:			
VOLTAGE OPERATION (AC OR D	c)	6.3±0.6	VOLTS
CURRENT OPERATION (AC OR D	C)	0.60±.04	AMPS
MAXIMUM HEATER-CATHODE VOLTA	GE:		
HEATER NEGATIVE WITH RESPE	CT TO CATHODE		
TOTAL DC AND PEAK		200	VOLTS
HEATER POSITIVE WITH RESPE	CT TO CATHODE		
DC		100	VOLTS
TOTAL DC AND PEAK		200	VOLTE

CONTINUED ON FOLLOWING PAGE

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MAXIMUM RATINGS

DESIGN MAXIMUM SYSTEM - SEE EIA STANDARD RS-239

	TRIODE 1	TRIODE 2 & 3	
PLATE VOLTAGE	330	330	VOLTS
NEGATIVE DC GRID VOLTAGE	100	100	VOLTS
POSITIVE DC GRID VOLTAGE	0	0	VOLTS
POSITIVE TRANSIENT GRID VOLTAGE	60		VOLTS
POSITIVE STEADY STATE PULSE VOLTAGE B	5		VOLTS
PLATE DISSIPATION, EACH	3	1.2	WATTS
GRID RESISTANCE	5.0	5.0	MEGOHM

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER

	TRIODE 1	TRIODE	2 & 3 EACH	
PLATE VOLTAGE GRID VOLTAGE	150	100	250 -2	VÒLTS VOLTS
PLATE CURRENT TRANSCONDUCTANCE AMPLIFICATION FACTOR	22 2500 18	.5 1250 100	1.2 1600 100	MA. μMHOS
PLATE RESISTANCE GRID VOLTAGE FOR	7000	80000	62500	OHMS
$Ib = 10 \mu A (APPROX.)$	-13		-4.5	VOLTS

PULSE AMPLIFIERB

PLATE VOLTAGE	30	 VOLTS
GRID VOLTAGE	30	 VOLTS
PEAK CATHODE CURRENT	200	 MA.
RATIO PLATE CURRENT TO GRID CURRENT	1.0	

A

MEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH

80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING

OF THE TUBE MEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING

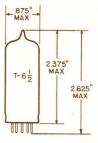
RESISTANCE.

Bthe duration of the voltage pulse must not exceed 15% of one horizontal scanning cycle. In a 525-line, 30-frame system, 15% of one horizontal scanning cycle is 10 microseconds.

TUNG-SOL -

TRIODE

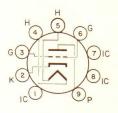
MINIATURE TYPE



GLASS BULB
SMALL BUTTON
9 PIN BASE E9-1
OUTLINE DRAWING
JEDEC 6-3

COATED UNIPOTENTIAL CATHODE

FOR
SERVICE AS VERTICAL
DEFLECTION AMPLIFIER IN
T.V. RECEIVERS
ANY MOUNTING POSITION



BOTTOM VIEW
BASING DIAGRAM
JEDEC 9AC

THE 684A IS A HIGH PERVEANCE TRIODE USING THE SMALL BUTTON 9 PIN MINIATURE CONSTRUCTION. DESIGNED FOR USE IN 600 MA. SERIES HEATER OPERATED RECEIVERS. IT IS INTENDED FOR SERVICE AS A VERTICAL DEFLECTION AMPLIFIER IN TELEVISION RECEIVERS. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED. EXCEPT FOR CONTROL OF THE HEATER THERMAL CHARACTERISTICS, ITS CHARACTERISTICS ARE IDENTICAL TO THE 684.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

GRID TO PLATE: (G TO P)	→ 2.4	pf
INPUT: G TO(H+K)	4.2	pf
OUTPUT: P TO (H+K)	→ 0.6	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS	600	MA.
HEATER WARM-UP TIME A		11	SECONDS
HEATER SUPPLY LIMITS:			
CURRENT OPERATION		600±36	MA.
MAXIMUM HEATER-CATHODE VOLTAG	E:		
HEATER NEGATIVE WITH RESPEC	T TO CATHODE		
TOTAL DC AND PEAK		100	VOLTS
HEATER POSITIVE WITH RESPEC	T TO CATHODE		
DC		100	VOLTS
TOTAL DC AND PEAK		200	VOLTS

A. HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

CONTINUED ON FOLLOWING PAGE

TUNG-SOL -

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

VERTICAL DEFLECTION AMPLIFIER B

DC PLATE VOLTAGE	→ 550	VOLTS
PEAK POSITVE PLATE VOLTAGE (ABS MAX.)	2200	VOLTS
PLATE DISSIPATION ^C	→ 8.5	WATTS
PEAK NEGATIVE GRID VOLTAGE	250	VOLTS
AVERAGE CATHODE CURRENT	30	MA.
PEAK CATHODE CURRENT	105	MA.
GRID CIRCUIT RESISTANCE (CATHODE BIAS)	2.2	MEGOHMS

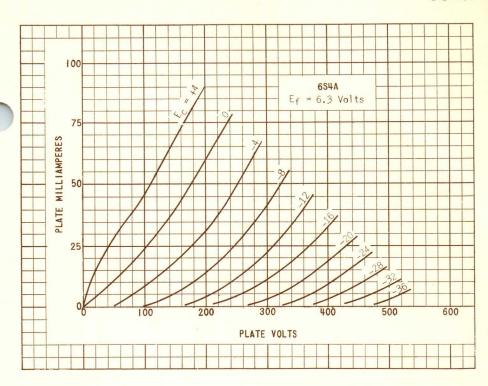
B FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCASTING STATIONS; FEDERAL COMMUNICATIONS COMMISSION". THE DUTY CYCLE OF THE VOLTAGE PULSE NOT TO EXCEED 15≸ PERCENT OF A SCANNING CYCLE.

C IN STAGES OPERATING WITH GRID-LEAK BIAS, AN ADEQUATE CATHODE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

TYPICAL OPERATING CHARACTERISTICS

PLATE VOLTAGE	250	VOLTS
GRID VOLTAGE	-8	VOLTS
PLATE CURRENT	→ 24	MA.
TRANSCONDUCTANCE	4500	µмноs
AMPLIFICATION FACTOR	→ 16.5	
PLATE RESISTANCE (APPROX.)	→ 3700	OHMS
PLATE CURRENT AT Ec =-15 VOLTS	→ 4.0	MA.
GRID VOLTAGE (APPROX.) FOR Ib = 50 μ A.	→ -22	VOLTS

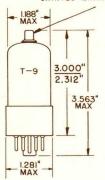
- INDICATES A CHANGE.





TRIPLE DIODE TRIODE



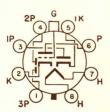


FOR USE

IN AM/FM RECEIVERS

COATED UNIPOTENTIAL CATHODE

ANY MOUNTING POSITION



BOTTOM VIEW

JEDEC 8CB

GLASS BULB

8 PIN OCTAL B8-6

OR

SHORT INTERMEDIATE SHELL

8 PIN OCTAL B8-58

OUTLINE DRAWING

JEDEC 9-23 OR 9-48

THE 6S8GT COMBINES IN ONE ENVELOPE A HIGH-MU TRIODE AND THREE SEPARATE DIODES. ONE OF THE THREE DIODES HAS A SEPARATE CATHODE PERMITTING USE AS A BALANCED DISCRIMINATION OR DETECTOR. IN COMBINATION FM/AM RECEIVERS THIS TUBE PROVIDES THE NECES-SARY ELEMENTS FOR DETECTION OF BOTH TYPES OF SIGNAL WITHOUT NEED FOR ADDITIONAL SWITCHING.

DIRECT INTERELECTRODE CAPACITANCES

WITH EXTERNAL SHIELD 308 CONNECTED TO PIN 2

 GRID TO ANY DIODE PLATE: (G TO P)
 MAX.
 0.005
 pf

 DIODE INPUT: (EACH UNIT): (DP TO H+K)
 APPROX.
 1.0
 pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN CENTER VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS 6.3 VOLTS 300 MA.

MAXIMUM HEATER-CATHODE VOLTAGE 90 VOLTS

LIMITS OF APPLIED VOLTAGE 6.3±0.6 VOLTS

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MAXIMUM RATINGS

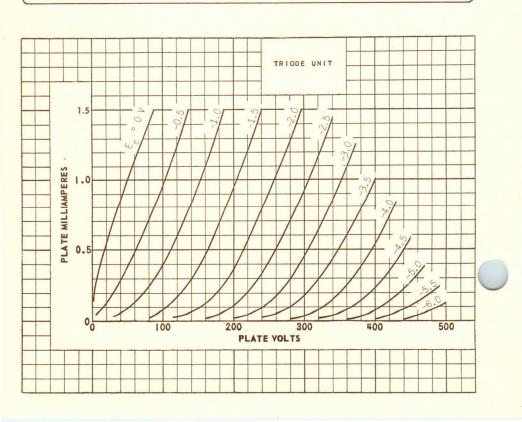
DESIGN CENTER VALUES - SEE EIA STANDARD RS-239

TRIODE PLATE VOLTAGE	300	VOLTS
TRIODE PLATE DISSIPATION	0.5	WATTS
CONTINUOUS DIODE CURRENT, EACH DIODE	1	MA.

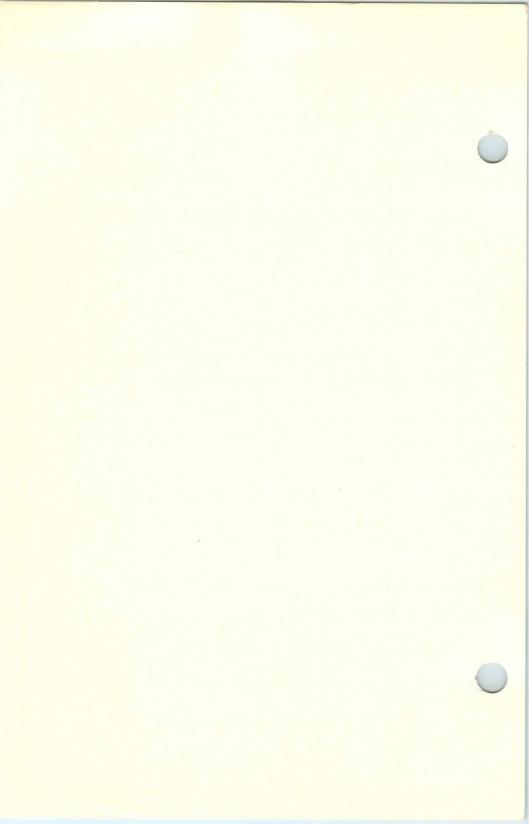
TYPICAL OPERATING CHARACTERISTICS

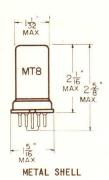
CLASS AT AMPLIFIER

PLATE VOLTAGE	100	250	VOLTS
GRID VOLTAGE	-1.0	-2.0	VOLTS
PLATE CURRENT	0.4	0.9	MA.
TRANSCONDUCTANCE	900	1,100	μ MHOS
AMPLIFICATION FACTOR	100	100	
PLATE RESISTANCE (A FPROX.)	110	91	KOHMS
AVERAGE DIODE CURRENT WITH 10 VOLTS APPLIED			
EACH DIODE	2.5	2.5	MA.









COATED UNIPOTENTIAL CATHODE

HEATER 6.3 VOLTS 0.3 AMP. AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW SMALL WAFER 8 PIN OCTAL 85

THE 6SC7 IS A HIGH AMPLIFICATION FACTOR TWIN TRIODE AMPLIFIER. ITS PRIMARY APPLICATION IS AS A PHASE INVERTER AND AUDIO AMPLIFIER.

DIRECT INTERELECTRODE CAPACITANCES (APPROX.)

GRID TO	PLATE:	(G TO P)	2.0	μμf
INPUT:	G1 TO	(H+K+S)←	2.0	μμf
OUTPUT:	P TO	(H+K+S)←	3.0	uu f

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

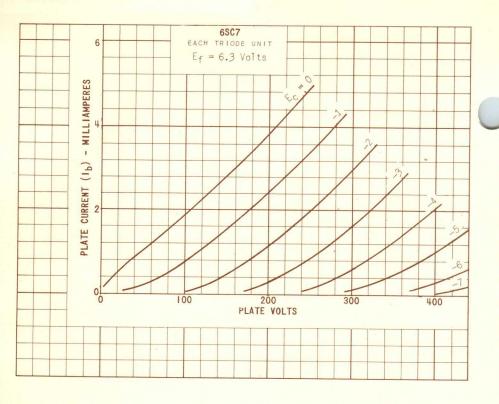
HEATER VOLTAGE	6.3	VOLTS
MAXIMUM HEATER CATHODE VOLTAGE	90	VOLTS
MAXIMUM PLATE VOLTAGE	250	VOLTS

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A7 AMPLIFIER - EACH TRIODE UNIT

HEATER VOLTAGE			6.3	VOLTS
HEATER CURRENT			0.3	AMP.
PLATE VOLTAGE			250	VOLTS
GRID VOLTAGE			-2	VOLTS
AMPLIFICATION FACTOR			70	
PLATE RESISTANCE	-	53	000	OHMS
TRANSCONDUCTANCE		1	325	имноѕ
PLATE CURRENT			2	MA.

→INDICATES A CHANGE.



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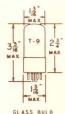
METAL SHELL SMALL WAFER 6 PIN OCTAL BASE 6SF5

HIGH MU TRIODE AMPLIFIER

UNIPOTENTIAL CATHODE

HEATER

6.3 VOLTS 0.3 AMPERE AC OR DC



GLASS BULB INTERMEDIATE 6 PIN OCTAL BASE 6SF5GT



6AB



BOTTOM VIEWS

G-6AB

THE TUNG-SOL 6SF5 AND 6SF5GT ARE GENERAL PURPOSE HIGH MU TRIODES. THEY ARE DESIGNED FOR SERVICE AS HIGH GAIN RESISTANCE COUPLED AMPLIFIERS IN AC AND AC -DC OPERATED RECEIVERS.

RATINGS

HEATER VOLTAGE (AC OR DC)	6.3	VOLTS
HEATER CURRENT	0.3	AMPERE
MAXIMUM PLATE VOLTAGE	300	VOLTS

AVERAGE CHARACTERISTICS

PLATE VOLTAGE	100	250	VOLTS
CONTROL GRID VOLTAGE	-1	-2	VOLTS
PLATE CURRENT	0.4	0.9	MA.
PLATE RESISTANCE	85 000	66 000	OHMS
TRANSCONDUCTANCE	1150	1500	µмноѕ
AMPLIFICATION FACTOR	100	100	

FOR "INTERPRETATION OF RATINGS" REFER TO FRONT OF BOOK.

CONTINUED NEXT PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

ZERO BIAS, RESISTANCE COUPLED, CLASS A1 AMPLIFIER

PLATE SUPPLY VOLTAGE	.100	300	VOLTS
PLATE LOAD RESISTOR	0.25	0.25	ME GOHM
GRID RESISTOR	10	10	MEGOHM
COUPLING CONDENSER	.01 то .005	.01 TO .005	μμ f
GRID RESISTOR FOR FOLLOWING TUBE	.5 TO 1.0	.5 TO 1.0	MEGOHM
EXTERNAL GRID CIRCUIT IMPEDANCE	0 0	0 0	MEGOHM
VOLTAGE GAIN	48 52	66 71	
VOLTAGE OUTPUT (RMS) A	7.0 8.5	44 50	VOLTS

A AT FIVE PER CENT TOTAL HARMONIC DISTORTION

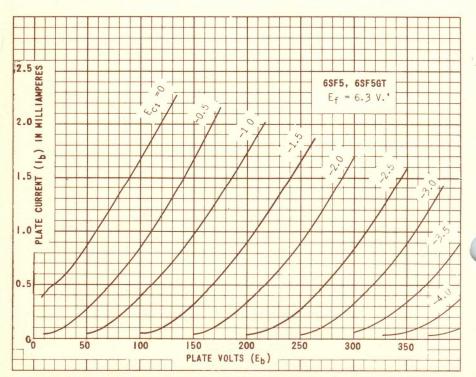


PLATE 1087-1

TUNG-SOL -

T-9 2 3 5 MAX 3 16 MAX 68K7GT

GLASS BULB

PENTODE

COATED UNIPOTENTIAL CATHODE

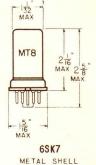
HEATER

6.3 VOLTS 0.3 AMP.

AC OR DC

ANY MOUNTING POSITION





SMALL WAFER 8 PIN OCTAL

8 N

THE 6SK7 AND 6SK7GT ARE TRIPLE GRID VARIABLE MU AMPLIFIERS. THEY ARE DESIGNED FOR USE WITH AVC IN RF AND IF AMPLIFIERS, AND THEY MINIMIZE CROSS MODULATION.

DIRECT INTERELECTRODE CAPACITANCES

	6SK7 ^A	6SK7GTB	
GRID TO PLATE	0.003	0.005	μμ f
INPUT	6.0	6.5	μμf
OUTPUT	7.0	7.5	μμf

APIN %1 CONNECTED TO PIN #5.

RATINGS INTERPRETED ACCORDING TO RMA STANDARD M8-210

HEATER VOLTAGE	6.3	VOLTS
MAXIMUM HEATER CATHODE VOLTAGE	90	VOLTS
MAXIMUM PLATE VOLTAGE	300	VOLTS
MAXIMUM GRID #2 SUPPLY VOLTAGE	300	VOLTS
MAXIMUM GRID #2 VOLTAGE		SEE J5-C4
MAXIMUM POSITIVE DC GRID #1 VOLTAGE	0	VOLTS
MAXIMUM PLATE DISSIPATION	4.0	WATTS
MAXIMUM GRID #2 DISSIPATION	0.4	WATT

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→INDICATES A CHANGE.

*INDICATES AN ADDITION.

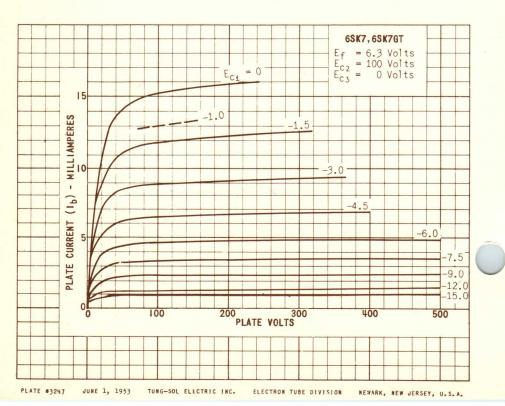
BEXTERNAL SHIELD #308 CONNECTED TO PIN #5.

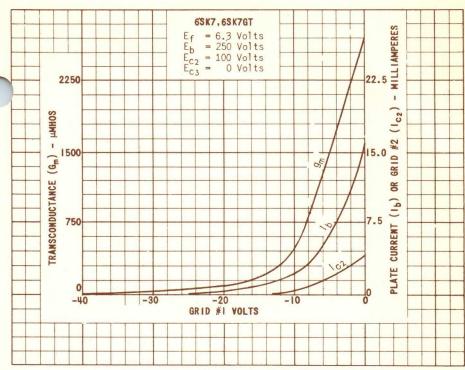
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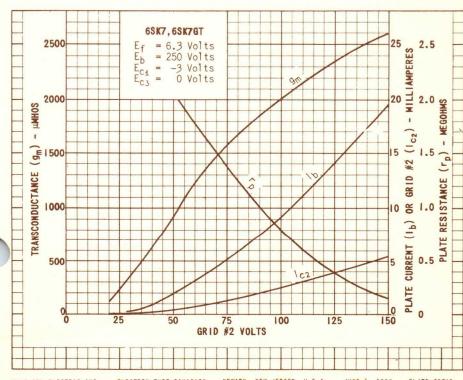
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER

HEATER VOLTAGE	6.3	6.3	VOLTS
HEATER CURRENT	0.3	0.3	AMP.
PLATE VOLTAGE	100	250	VOLTS
GRID #2 VOLTAGE	100	100	VOLTS
GRID #1 VOLTAGE	-1	-3	VOLTS
GRID #3 VOLTAGE PIN #3	CONNECTED T	O PIN #5 AT	SOCKET
PLATE CURRENT	13	9.2	MA.
GRID #2 CURRENT	4.0	2.6	MA -
PLATE RESISTANCE (APPROX.)	0.12	0.8	MEGOHM
TRANSCONDUCTANCE	2 350	2 000	имноѕ
GRID #1 VOLTAGE (APPROX.) FOR Gm = 10 MMHOS	-35	-35	VOLTS







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6SK7, 6SK7GT (12SK7, 12SK7GT)

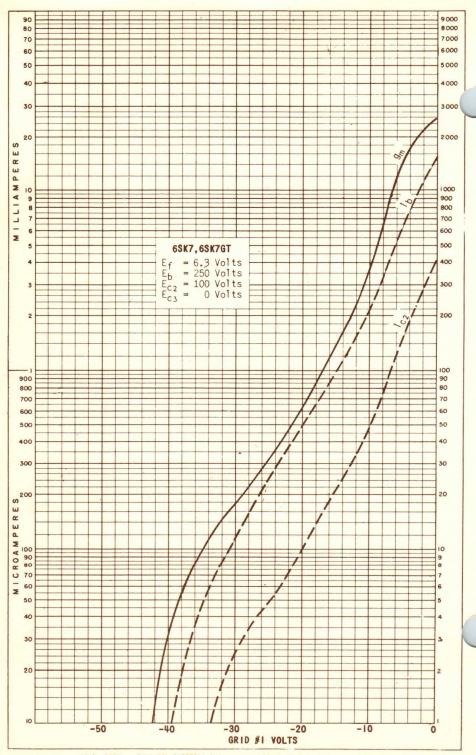
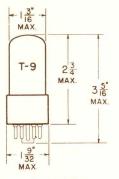


PLATE #3249 JUNE 1, 1953 TUNG-SOL ELECTRIC INC. ELECTROK TUBE DIVISION NEWARK, NEW JERSEY, U.S.A

DOUBLE TRIODE



COATED UNIPOTENTIAL CATHODE

HEATER
6.3 VOLTS 0.30 AMP.
AC OR DC

ANY MOUNTING POSITION

BOTTOM VIEW

INTERMEDIATE SHELL 8 PIN OCTAL

GLASS BULB

THE 6SL7GT COMBINES TWO INDEPENDENT HIGH-MU TRIODES IN ONE ENVELOPE. IT IS DESIGNED PRIMARILY FOR PHASE INVERTER SERVICE.

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER VOLTAGE	6.3	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE	90	VOLTS
MAXIMUM PLATE VOLTAGE	300	VOLTS
MAXIMUM POSITIVE DC GRID #1 VOLTAGE	0	VOLTS
MAXIMUM PLATE DISSIPATION (EACH UNIT)	1	WATT

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER - EACH TRIODE UNIT

HEATER VOLTAGE	6.3	VOLTS
HEATER CURRENT	0.30	AMP.
PLATE VOLTAGE	250	VOLTS
GRID VOLTAGE	-2	VOLTS
PLATE CURRENT	2.3	MA.
PLATE RESISTANCE	44 000	OHMS
TRANSCONDUCTANCE	1 600	имноs
AMPLIFICATION FACTOR	70	

SIMILAR TYPE REFERENCE: Same characteristics as type 7F7. Except for heater ratings, same characteristics as types 12SL7GF and 14F7.

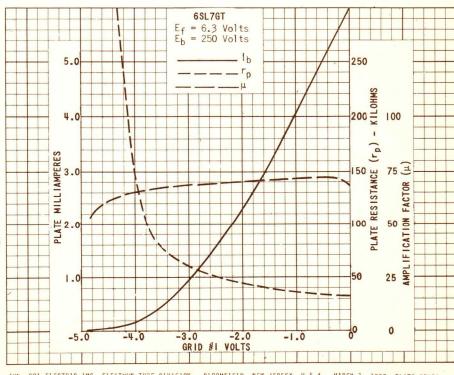
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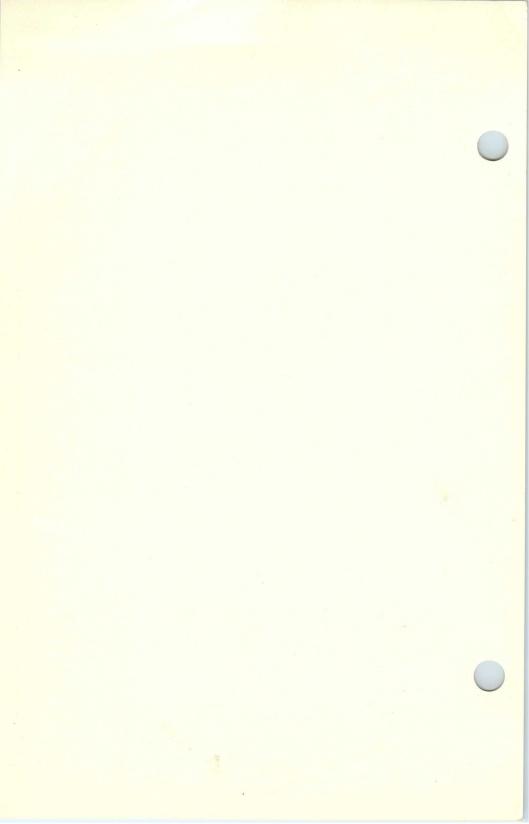
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS - CONT'D.

RESISTANCE COUPLED AMPLIFIER - EACH TRIODE UNIT*

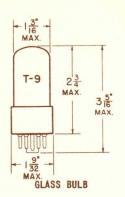
6.3	6.3	VOLTS
0.30	0.30	AMP.
90	250	VOLTS
0	0	VOLTS
200 000	470 000	OHMS
10.0	10.Q	MEGOHMS
0.01	0.01	μf
0.01	0.01	μf
47Q 000	470 000	OHMS
1 000	1 000	OHMS
5	5	PERCENT
8.0	37	VOLTS
34	45	
	0.30 90 0 200 000 10.0 0.01 470 000 1 000 5 8.0	0.30 0.30 90 250 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

^{*}INDICATES AN ADDITION.





DOUBLE TRIODE



COATED UNIPOTENTIAL CATHODE

HEATER

6.3 VOLTS 0.6 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
INTERMEDIATE SHELL
8 PIN OCTAL
88D

THE 6SN7GTB IS A MEDIUM—MU TRIODE INTENDED FOR USE AS A COMBINED VERTICAL OSCILLATOR AND VERTICAL DEFLECTION AMPLIFIER IN 600 MA. SERIES HEATER OPERATED TELEVISION RECEIVERS. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM—UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED. WITH THE EXCEPTION OF CONTROL OF THE HEATER THERMAL CHARACTERISTICS, ITS CHARACTERISTICS ARE IDENTICAL TO THE 6SN7GTA.

DIRECT INTERELECTRODE CAPACITANCES

	TRIODE 1	TRIODE 2	
GRID TO PLATE: G TO P	4.0	3.8	μμ f
INPUT: G TO (H+K)	2.2	2.6	μμf
OUTPUT: P TO (H+K)	0.7	0.7	μμf

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

EACH UNIT

	LASS A1	VERTICAL A DEFLECTION AMPLIFIER	
HEATER VOLTAGE		6.3	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE:			
HEATER NEGATIVE WITH RESPECT TO CATHODE			
TOTAL DC AND PEAK		200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE			
DC		100	VOLTS
TOTAL DC AND PEAK		200	VOLTS
MAXIMUM PLATE VOLTAGE	450	450	VOLTS
MAXIMUM PEAK POSITIVE PLATE VOLTAGE (ABSOLUTE MAXIMUM)		1 500	VOLTS
MAXIMUM PLATE DISSIPATION:			
EACH PLATE	5.0	5.0 ^B	WATTS
BOTH PLATES	7.5	7.5 ^B	WATTS
MAXIMUM PEAK NEGATIVE GRID VOLTAGE		250	VOLTS
MAXIMUM AVERAGE CATHODE CURRENT	20	20	MA.
MAXIMUM PEAK CATHODE CURRENT		7.0	MA.
MAXIMUM GRID CIRCUIT RESISTANCE (CATHODE BIAS)	1.0	2.2	MEGOHMS
HEATER WARM-UP TIME (APPROX.)*		11.0	SECONDS

A FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCASTING STATIONS; FEDERAL COMMUNICATIONS COMMISSION. THE DUTY CYCLE OF THE VOLTAGE PULSE NOT TO EXCEED 15≸ OF A SCANNING CYCLE.

CONTINUED ON FOLLOWING PAGE

B IN STAGES OPERATING WITH GRID-LEAK BIAS, AN ADEQUATE CATHODE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

^{*}HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80\$ OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

TUNG-SOL .

CONTINUED FROM PRECEDING PAGE

RATINGS - CONT'D

KATINGS -	RATINGS - CONT B					
	VERTICAL C DEFLECTION OSCILLATOR	HORIZONTAL ^C DEFLECTION OSCILLATOR				
HEATER VOLTAGE	6.	3	VOLTS			
MAXIMUM HEATER-CATHODE VOLTAGE:						
HEATER NEGATIVE WITH RESPECT TO CATHODE						
TOTAL DC AND PEAK	20	0	VOLTS			
HEATER POSITIVE WITH RESPECT TO CATHODE						
DC	10	0	VOLTS			
TOTAL DC AND PEAK	20	0	VOLTS			
MAXIMUM DC PLATE VOLTAGE	450	450	VOLTS			
MAXIMUM PLATE DISSIPATION:						
EACH PLATE	5.0	5.0	WATTS			
BOTH PLATES	7.5	7.5	WATTS			
MAXIMUM PEAK NEGATIVE GRID VOLTAGE	400	600	VOLTS			
MAXIMUM AVERAGE CATHODE CURRENT	20	20	MA.			
MAXIMUM PEAK CATHODE CURRENT	70	300	MA.			
MAXIMUM GRID CIRCUIT RESISTANCE	2.2	2.2	MEGOHMS			
HEATER WARM-UP TIME (APPROX.)*	11.	0	SECONDS			

CFOR OPERATION IN A 525-LINE, 30-FRAME STATEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCASTING STATIONS; FEDERAL COMMUNICATIONS COMMISSION. THE DUTY CYCLE OF THE VOLTAGE PULSE NOT TO EXCEED 15% OF A SCANNING CYCLE.

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

*CLASS A1 AMPLIFIER - EACH UNIT

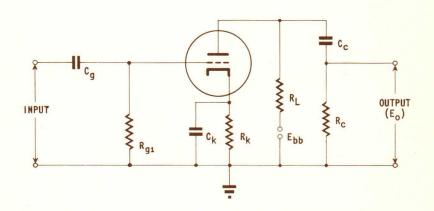
HEATER VOLTAGE	6.3	6.3	VOLTS
HEATER CURRENT	0.6	0.6	AMP.
PLATE VOLTAGE	90	250	VOLTS
GRID VOLTAGE	0	-8	VOLTS
PLATE CURRENT	10	9	MA.
AMPLIFICATION FACTOR	20	20	
PLATE RESISTANCE (APPROX.)	6 700	7 700	OHMS
TRANSCONDUCTANCE	3 000	2 600	MMHOS
PLATE CURRENT AT EC = -12.5 VOLTS		1.3	MA -
GRID VOLTAGE FOR Ib = 10 MA. (APPROX.)	-7.0	-18	VOLTS

^{*}HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH BOW OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

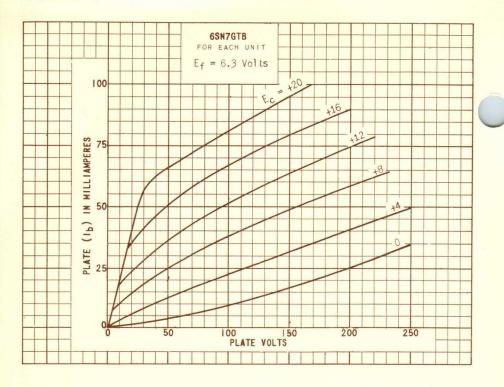
RESISTANCE-COUPLED AMPLIFIER

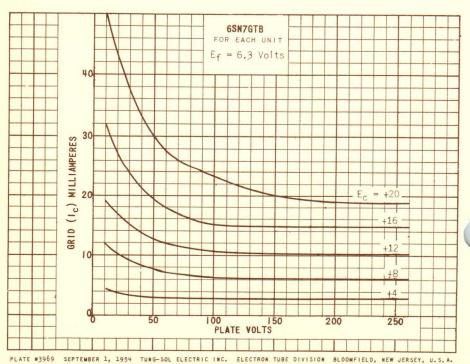
RL Rg1 Rs MEG. MEG. MEG.	Re	E _{bb} = 90 VOLTS		Ebb = 180 VOLTS			Ebb = 300 VOLTS				
	MEG.	Rk	GAIN	Eo	Rk	GAIN	Eo	Rk	GAIN	Eo	
0.10	А	0.10	3300	14	13	2200	14	26	1800	14	40
0.10	А	0.24	3600	14	16	2700	15	33	2200	15	51
0.24	A	0.24	7500	14	16	5100	15	30	4300	15	44
0.24	А	0.51	9100	14	19	6800	15	39	5100	15	54
0.51	A	0.51	13000	14	16	9100	15	30	6800	16	40
0.51	A	1.0	15000	14	19	10000	16.	32	7500	16	45
0.24	10	0.24	0	15	13	- 0	16	33	0	17	46
0.24	10	0.51	0	16	17	0	17	38	0	18	62
0.51	10	0.51	0	16	14	0	18	32	0	18	53
0.51	10	1.0	0	17	18	0	18	41	0	19	68

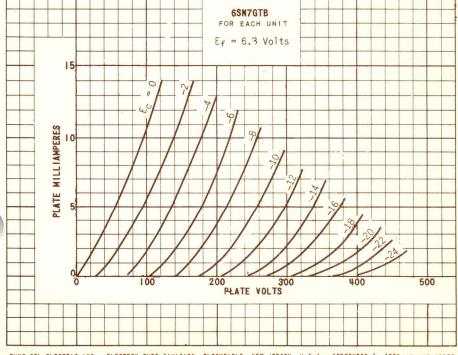
Avalue of R_{g1} is not critical. GAIN MEASURED AT $E_{o}=2.0$ volts RMS output. E_{o} is RMS output for 5% total HARMONIC DISTORTION.

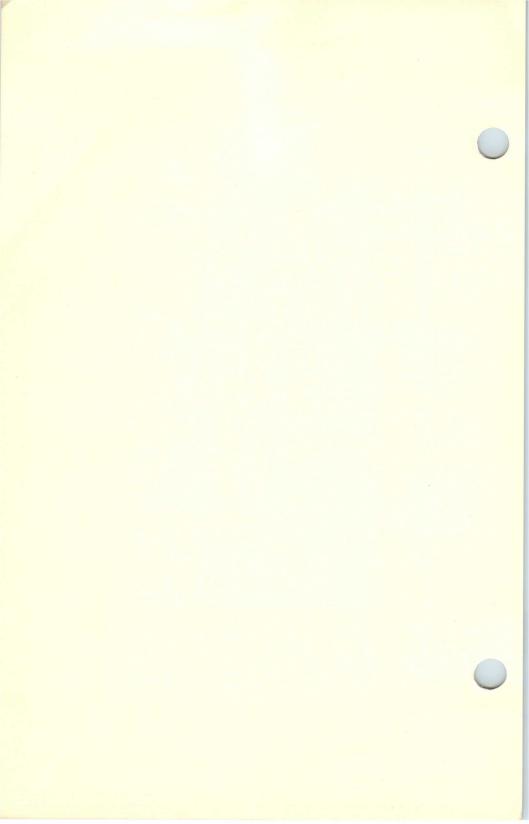


NOTE: COUPLING CAPACITORS CG AND Cc SHOULD BE SE-LECTED TO GIVE DESIRED FREQUENCY RESPONSE. RK SHOULD BE ADEQUATELY BY-PASSED BY CAPACITOR Ck.

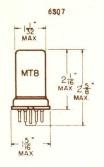








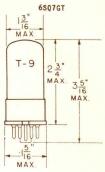
DOUBLE-DIODE TRIODE



COATED UNIPOTENTIAL CATHODE
HEATER

6.3 VOLTS 300 MA.
AC OR DC

ANY MOUNTING POSITION



GLASS BULB



METAL SHELL

BOTTOM VIEW SMALL WAFER 8-PIN OCTAL



SMALL WAFER 8-PIN OCTAL METAL SLEEVE

THE 6SQ7 AND 6SQ7GT COMBINE TWO DIODE UNITS AND A HIGH-MU TRIODE IN A SINGLE ENVELOPE. EACH SECTION USES A COMMON CATHODE. IT IS INTENDED FOR SERVICE AS A COMBINED DETECTOR, AVC SOURCE, AND HIGH GAIN AUDIO AMPLIFIER.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

	6SQ7 ^A	6SQ7GTB	
GRID TO PLATE: (G TO P)	1.6	1.8	μμf
INPUT: G TO (H + K)	3.2	4.2	μμf
OUTPUT: P TO (H + K)	3.0	3.4	μμf

Awith SHELL CONNECTED TO CATHODE.

RATINGS INTERPRETED ACCORDING TO RMA STANDARD M8-210

HEATER VOLTAGE	6.3	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE	90	VOLTS
MAXIMUM PLATE VOLTAGE	300	VOLTS
MINIMUM DIODE CURRENT EACH PLATE WITH 10 VOLTS APPLIED	0.8	MA.
MAXIMUM DIODE CURRENT EACH PLATE FOR CONTINUOUS OPERATION	1.0	MA.

CONTINUED ON FOLLOWING PAGE

Bwith NO EXTERNAL SHIELD.

⁻ INDICATES A CHANGE OR ADDITION.

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER - TRIODE UNIT

HEATER VOLTAGE	6.3	6.3	VOLTS
HEATER CURRENT	300	300	MA.
PLATE VOLTAGE	100	250	VOLTS
GRID VOLTAGE	-1	-2	VOLTS
PLATE CURRENT	0.4	0.9	MA.
PLATE RESISTANCE	110 000	91 000	OHMS
TRANSCONDUCTANCE	900	1 100	имноs
AMPLIFICATION FACTOR	100	100	

DIODE UNITS - TWO

THE TWO DIODE PLATES ARE PLACED AROUND THE CATHODE AND ARE INDEPENDENT OF THE TRIODE UNIT EXCEPT FOR THE COMMON CATHODE.

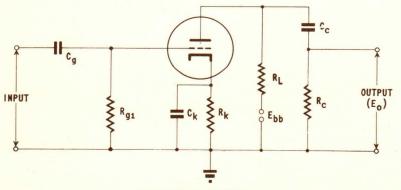
SIMILIAR TYPE REFERENCES: Ratings and characteristics identical to 786.

R ₁	Rgi	Rc	E bb =	= 90 V	OL TS	E _{bb} =	180 V	OL TS	Ebb	= 300	VOLTS
MEG.	MEG.	MEG.	Rk	GAIN	Eo	Rk	GAIN	Eo	Rk	GAIN	Eo
0.10	A	0.10	4300	22	5.0	2400	29	15	2000	31	28
0.10	A	0.24	4700	27	7.0	2700	35	20	2200	38	37
0.24	A	0.24	7500	31	7.5	4300	42	20	3300	46	36
0.24	A	0.51	8200	40	10	4700	50	26	3900	52	50
0.51	A	0.51	13000	39	9.5	7500	53	24	5600	58	47
0.51	A	1.0	15000	43	11	8200	58	31	6200	62	56
0.24	10	0.24		39	4.5		45	19		49	38
0.24	10	0.51		45	6.5		52	24		57	48
0.51	10	0.51		48	7.0		59	22		62	42
0.51	10	1.0		52	8.5		62	25		66	55

AVALUE OF Rgl IS NOT CRITICAL.

GAIN MEASURED AT E = 2.0 VOLTS RMS OUTPUT.

Eo IS RMS OUTPUT FOR 5% TOTAL HARMONIC DISTORTION.

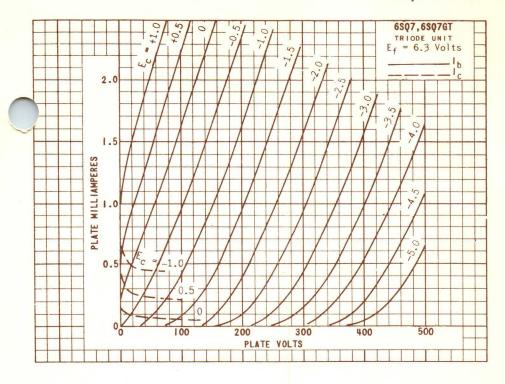


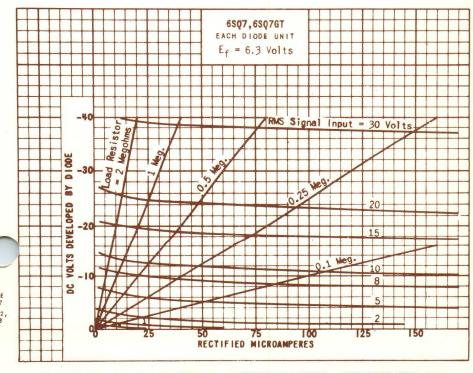
OTE: COUPLING CAPACITORS Cg
AND Cc SHOULD BE SELECTED TO GIVE DESIRED
FREQUENCY RESPONSE. Rk
SHOULD BE ADEQUATELY
3T-PASSED BY CAPACITOR
CL.

- INDICATES A CHANGE OR ADDITION

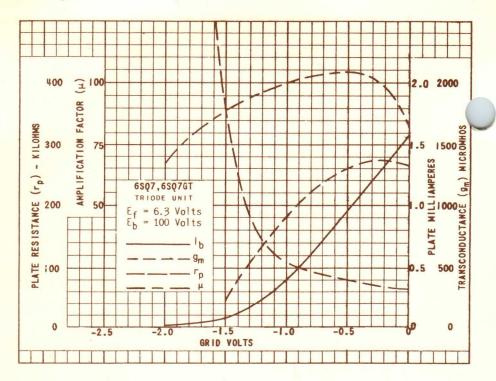
PLATE 1926 DEC. 1, 1947

6SQ7,6SQ7GT





6SQ7,6SQ7GT



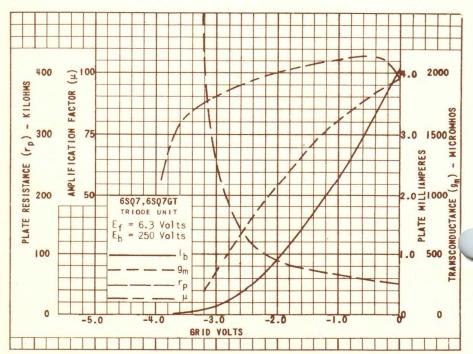


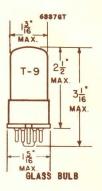
PLATE 1968 FEB. 2, 1948 COATED UNIPOTENTIAL CATHODE

HEATER

6.3 VOLTS 0.15 AMPERE

AC OR DC

ANY MOUNTING POSITION





BOTTOM VIEW SMALL WAFER 8 PIN OCTAL



BOTTOM VIEW SMALL WAFER 8 PIN OCTAL METAL SLEEVE

THE 6SS7 AND 6SS7GT ARE RF PENTODES WHICH HAVE REMOTE PLATE CURRENT CUT-OFF. THEY ARE SUITABLE FOR OPERATING WITH AVC IN RF AND IF AMPLIFIERS. THE USE OF THESE TUBES WILL REDUCE CROSS MODULATION EFFECTS.

RATINGS

INTERPRETED ACCORDING TO RMA STANDARD M8-210

HEATER VOLTAGE	6.3	VOLTS
HEATER CURRENT	0.15	AMP.
MAXIMUM PLATE VOLTAGE	300	VOLTS
MAXIMUM SCREEN VOLTAGE	100	VOLTS
MAXIMUM SCREEN SUPPLY VOLTAGE	300	VOL TS
MINIMUM CONTROL GRID VOLTAGE	0	VOLTS
MAXIMUM PLATE DISSIPATION	2.25	WATTS
MAXIMUM SCREEN DISSIPATION	0.35	WATTS
MAXIMUM HEATER-CATHODE VOLTAGE	90	VOLTS

DIRECT INTERELECTRODE CAPACITANCES

	6887	6337QT	
	WITH SHELL CON- NECTED TO CATHODE	WITH EXTERNAL SHIELD CONNECTED TO CATHODE	
GRID TO PLATE (MAX.)	0.004	0.004	μμf
INPUT	5.5	5	μμf
OUTPUT	7	6	μμf

CONTINUED ON FOLLOWING PAGE

-- INDICATES A CHANGE OR ADDITION.

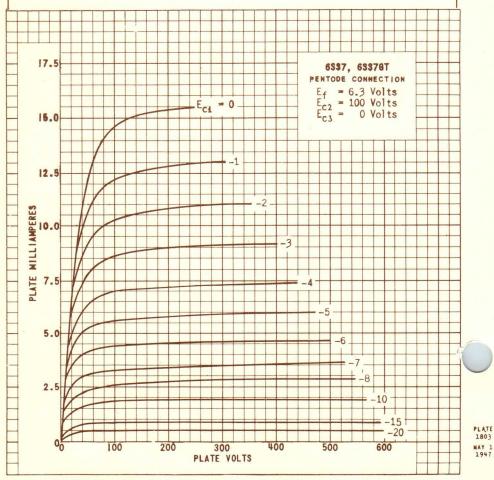
TUNG-SOL -

CONTINUED FROM PRECEDING PAGE

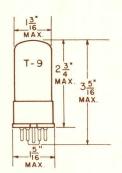
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER

	6337	6337GT	6887 68876T	
PLATE VOLTAGE	100	100	250	VOLTS
SCREEN VOLTAGE	100	100	100	VOLTS
CONTROL GRID VOLTAGE	-1	-1	-3	VOLTS
SUPPRESSOR VOLTAGE	0	0	0	VOLTS
PLATE CURRENT	12.2	12.2	9	MA.
SCREEN CURRENT	3.1	3.1	2	MA.
PLATE RESISTANCE (APPROX.)	0.12	0.12	1	MEGOHM
TRANSCONDUCTANCE GRID VOLTAGE (APPROX.) FOR	1 930	2 200	1 850	имноs
TRANSCONDUCTANCE = 10 MMHOS	-35	-35	-35	VOLTS



HI-MU TWIN TRIODE AMPLIFIER



COATED UNIPOTENTIAL CATHODE

HEATER 6.3 VOLTS 0.3 AMPERE AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

INTERMEDIATE SHELL 8-PIN OCTAL MICANOL

GLASS BULB

THE TYPE 6SU7GTY IS A DOUBLE TRIODE HAVING THE SAME GENERAL CHARACTER-ISTICS AS THE 6SL7GT EXCEPT THAT IT HAS A LOW LOSS PHENOLIC BASE, HAS MINIMUM GAS AND LEAKAGE CURRENTS, AND IS SPECIALLY TESTED FOR PLATE CURRENT BALANCE BETWEEN THE TWO TRIODE UNITS.

RATINGS

INTERPRETED ACCORDING TO RMA STANDARD M8-210

AMPLIFIER - PER UNIT

HEATER VOLTAGE (AC OR DC)	6.3	VOLTS
HEATER CURRENT	0.3	AMP.
MAX. PLATE VOLTAGE	250	VOLTS
MIN. GRID VOLTAGE	0	VOLTS
MAX. PLATE DISSIPATION	1	WAIT
HEATER-CATHODE VOLTAGE	AS LOW AS	POSSIBLE

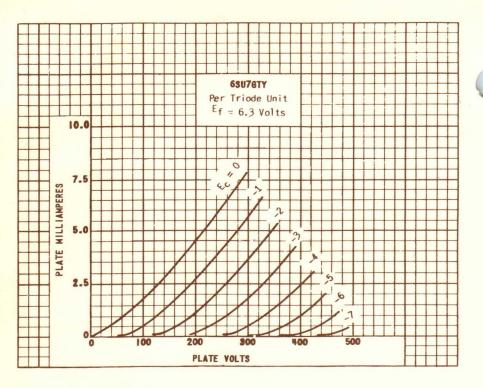
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER - PER UNIT

PLATE VOLTAGE	250	VOLTS
GRID VOLTAGE	-2	VOLTS
PLATE CURRENT	2.3	MA -
PLATE RESISTANCE	44 000	OHMS
TRANSCONDUCTANCE	1600	имноѕ
AMPLIF CATION FACTOR	70	

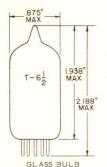
SINILAR TYPE REFERENCE: Same characteristics as types 65L7GT,7F7; except for heater ratings same characteristics as types 12SL7GT,14F7; somewhat similar to types 68C7GT,12SC7GT.

6SU7GTY





TUNG-SOL .



MINIATURE GLASS BUTTON

9 PIN BASE E9-1 OUTLINE DRAWING JEDEC 6-2

TRIPLE-DIODE TRIODE

MINIATURE TYPE

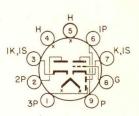
COATEL UN POTENTIAL CATHODES

HEATER

6.3 VOLTS 450 MA.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW BASING DIAGRAM JEDEC 9E

THE 6T8A COMBINES THREE HIGH PERVEANCE DIODES AND A HIGH MU TRIODE IN ONE ENVELOPE, ONE OF THE THREE DIODE PLATES HAS AN INDEPENDENT CATHODE PROVIDING SATISFACTORY OPERATION IN BALANCED LOW IMPEDANCE DETECTOR CIRCUITS. THIS STRUCTURE PERMITS THE CONSTRUCTION OF AM/FM RECEIVERS WITH A MINIMUM OF SWITCHING. THEPMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED.

DIRECT INTERELECTRODE CAPACITANCES

	WITHOUT	SHIELD	
TRIODE GRID TO PLATE	1.7	7.7	pf
TRIODE INPUT	1.0	1.7	pf
TRIODE OUTPUT	1.2	2.4	pf
GRID TO ANY DIODE PLATE (MAX.)	.034	.034	pf
INPUT DIODE 1	3.8	3.8	pf
INPUT DIODE 2	3.8	3.8 ^B	pf
INPUT DIODE 3	3.4	3.6	pf
DIODE 2 CATHODE TO ALL	7.5	8.50	n f

RATINGS

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

HEATER VOLTAGE	0.45	VOLTS
MAXIMUM PLATE VOLTAGE	330	VOLTS
MAXIMUM POSITIVE DC GRID VOLTAGE	0	VOLTS
MAXIMUM PLATE DISSIPATION	1.1	WATTS
MAXIMUM DIGDE CURRENT FOR CONTINUOUS OPERATION (EA.PLATE)	5.5	MA.
MAXIMUM HEATER-CATHODE VOLTAGE		
HEATER NEGATIVE WITH KESPECT TO CATHODE	90	VOLTS
(FOR 6T8A: 100 VOLTS)		
HEATER POSITIVE WITH RESPECT TO CATHODE	90	VOLTS
(FOR 6T8A: 100 VOLTS)		
HEATER WARM-UP TIME (APPROX.) **	11.0	SECONDS

CONTINUED ON FOLLOWING PAGE

TUNG-SOL -

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER

PLATE VOLTAGE	100	250	VOLTS
GRID VOLTAGE	-1	-3	VOLTS
AMPLIFICATION FACTOR	70	70	
PLATE RESISTANCE (APPROX.)	54 000	58 000	OHMS
TRANSCONDUCTANCE	1 300	1 200	имноs
PLATE CURRENT	0.8	1.0	MA.
AVERAGE DIODE CURRENT: (EACH SECTION)			
MEASURED WITH 5 VOLTS DC APPLIED		20	MA -

TRIODE UNIT AS RESISTANCE COUPLED AMPLIFIER

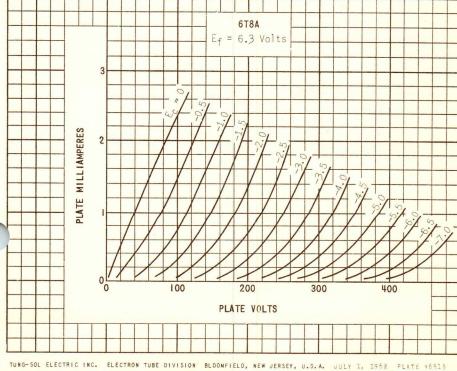
PLATE SUPPLY VOLTAGE	90	VOLTS
CONTROL GRID VOLTAGE	0	VOLTS
PLATE LOAD RESISTOR	220 000	OHMS
CONTROL GRID RESISTOR	10.0	MEGOHMS
INPUT CONDENSER	0.01	μf
OUTPUT CONDENSER	0.01	μf
GRID RESISTOR OF FOLLOWING STAGE	470 000	OHMS
SIGNAL SOURCE IMPEDANCE (MAX.)	1 000	OHMS
DISTORTION	5	PERCENT
CUTPUT VOLTAGE	8.5	VOLTS
VOLTAGE GAIN AT 400 CPS	35	

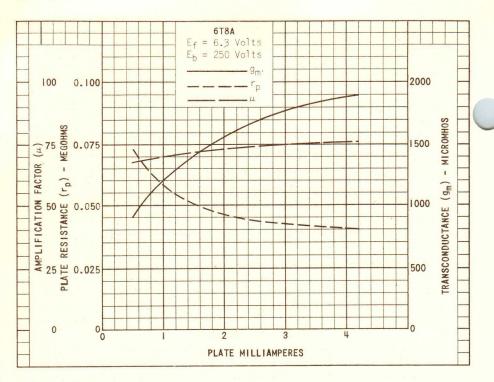
Awith external shield \$315 CONNECTED TO PIN \$7, EXCEPT AS NOTED.

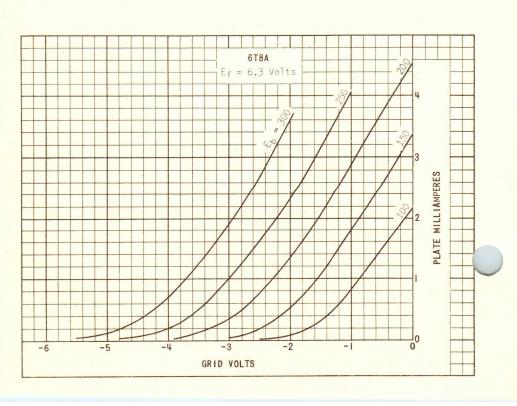
BWITH EXTERNAL SHIELD \$315 CONNECTED TO PIN \$3.

C WITH EXTERNAL SHIELD #315 CONNECTED TO PINS #4 AND #5.

^{**}HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH
80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING
OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING
RESISTANCE.





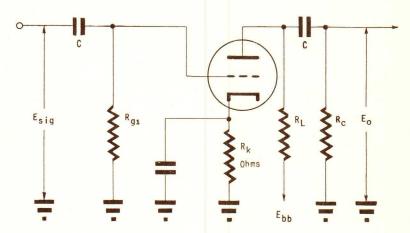


RESISTANCE COUPLED AMPLIFIER

R1	Rg1	Rc	Ebb	= 90 \	OLTS '	Ebb =	180 V	OLTS	Ebb =	300 V	OLTS
MEG.	MEG.	MEG.	Rk	GAIN	Εo	Rk	GAIN	Εo	Rk	GAIN	Εo
0.10	A	0.10	5700	21	7	2400	29	18	1800	33	35
0.10	Α	0.24	6100	26	9	2700	34	23	2000	38	42
0.24	Α	0.24	9100	30	10	4300	40	24	3000	44	43
0.24	Α	0.51	10000	34	13	4700	45	31	3300	49	52
0.51	Α	0.51	15000	37	14	7500	47	28	5600	51	50
0.51	Α	1	16000	40	16	8200	50	35	6200	55	60
0.24	10	0.24		31	5.0		44	19		48	40
0.24	10	0.51		37	1.0		49	25		52	52
0.51	10	0.51	4/44/4	39	7.5		51	22		54	44
0.51	10	1	-	42	10		54	28	State Streets	58	56

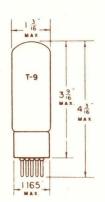
A VALUE OF RG1 IS NOT CRITICAL.

THE TAKEN TO NEAREST RWA VALUE FOR EACH CASE INSTEAD OF ABSOLUTE OPTIMUM VALUE. EO IS RMS OUTPUT AT 5% TOTAL HARMONIC DISTORTION. UAIN MEASURED AT EO \equiv 2.0 VOLTS RMS OUTPUT.



NOTE: COUPLING CAPACITORS (C) SHOULD BE SELECTED TO GIVE DESIRED FREQUENCY RESPONSE. RK SHOULD BE ADEQUATELY BY-PASSED.





CATHODE RAY TUNING INDICATOR

UNIPOTENTIAL CATHODE

HEATER

6.3 VOLTS 0.3 AMPERE AC OR DC

6R

GLASS BULB

BOTTOM VIEW

SMALL 6 PIN BASE

THE TUNG-SOL 6U5/6G5 CONSISTS OF A CIRCULAR FLUORESCENT TARGET WITH AN INDICATING SHADOW CONTROLLED BY AN INTERNALLY CONNECTED REMOTE CUT-OFF TRIODE AMPLIFIER. WHEN THE 6U5/6G5 IS USED AS A TUNING INDICATOR, AVC VOLTAGE IS APPLIED TO THE TRIODE GRID.

RATINGS

MAXIMUM PLATE SUPPLY VOLTAGE	285	VOLTS
MAXIMUM TARGET VOLTAGE	285	VOLTS
MINIMUM TARGET VOLTAGE	100	VOLTS
MAXIMUM PLATE DISSIPATION	1.0	WATT

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

PLATE AND TARGET SUPPLY VOLTAGE	100	200	250	VOLTS
TRIODE GRID VOLTAGE (00 SHADOW ANGLE,)	-8	-18.5	-22	VOLTS
TRIODE GRID VOLTAGE (90° SHADOW ANGLE)	0	0	0	VOLTS
SERIES TRIODE-PLATE RESISTOR	0.5	1	1	ME GOHM
TRIODE PLATE CURRENT (TRIODE GRID V.= 0)	0.19	0.19	0.24	MA.
TARGET CURRENT (TRIODE GRID V.= 0.)	1	3	4	MA.

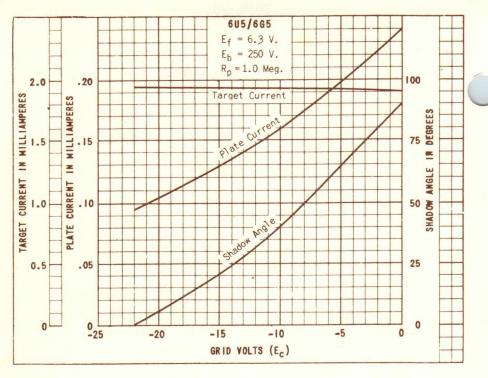
A APPROXIMATE -

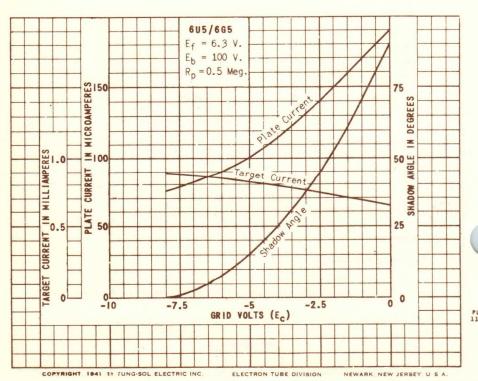
HOTE: THIS DOUBLE BRANDED TUBE, 605/6GD, TAKES THE PLACE OF EITHER THE 605 OR THE 665. IT I IDENTICAL ELECTRICALLY TO BOTH OF THEM. IT IS ALSO USED TO REPLACE TYPES 6T5 AND 6H5.

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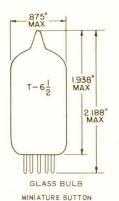
B SUBJECT TO WIDE VARIATIONS.

6U5/6G5





TRIODE PENTODE



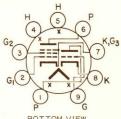
9 PIN BASE E9-1 OUTLINE DRAWING JEDEC 6-2

COATED UNIPOTENTIAL CATHODE

FOR
APPLICATION IN FM

ANY MOUNTING POSITION

OR TV RECEIVERS



BOTTOM VIEW
BASING DIAGRAM
JEDEC 9AE

THE 6U8 COMBINES TWO ELECTRICALLY INDEPENDENT SECTIONS-A TRIODE AND A PENTODE IN THE 9 PIN MINIATURE CONSTRUCTION. BOTH UNITS ARE CAPABLE OF GOOD PERFORMANCE AT THE HIGH FREQUENCIES. THE TUBE MAY BE USED AS A LOCAL OSCILLATOR-PENTODE MIXER IN FM OR TELEVISION RECEIVERS OR IN THE MANY COMBINED FUNCTIONS OF SUCH RECEIVERS.

DIRECT INTERELECTRODE CAPACITANCES

	WITH SHIELD A	WITHOUT SHIELD	
PENTODE GRID 1 TO PENTODE PLATE: (PG1 TO PP) MAX.	→ 0.007	→ 0.015	pf
PENTODE INPUT: PG1 TO (H + PK+PG2+PG3+I.S.)	5.0	5.0	pf
PENTODE OUTPUT: PP TO (H+PK+PG2+PG3+I.S.)	3.5	2.6	pf
PENTODE CATHODE TO HEATER: H TO (PK+PG3+I.S.)	3.0 ^B	3.0	pf
TRIODE GRID TO TRIODE PLATE: (TG TO TP)	1.8	1.8	pf.
TRIODE INPUT: TG TO (TK+H+PK+PG3+J.S.)	2.8	2.8	pf
TRIODE OUTPUT: TP TO (TK+h+PK+PG3+1.5)	2.0	1.5	pf
TRIODE CATHODE TO HEATER (TK TO H)	3.0 B	3.0	pf
PENTODE GRID TO TRIODE PLATE (PG TO TP) (MAX.)	0.20	0.2	pf
PENTODE PLATE TO TRIODE PLATE (PP TO TP) (MAX.)	0.02	0.1	pf

HEATER CHARACTERISTICS AND RATINGS DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS HEATER WARM-UP TIME C	6.3 VOLTS	450 11	MA. SECONDS
HEATER SUPPLY LIMITS: VOLTAGE OPERATION		6.3±0.6	VOLTS
MAXIMUM HEATER CATHODE VOLTAGE: HEATER NEGATIVE WITH RESPECT T			
TOTAL DC AND PEAK HEATER POSITIVE WITH RESPECT TO	CATHODE	200	VOLTS
DC	CAMIODE	100	VOLTS
TOTAL DC AND PEAK		200	VOLTS

TUNG-SOL -

CONTINUED FROM PRECEDING PAGE

→ MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

PENTODE PLATE VOLTAGE	330	VOLTS
TRIODE PLATE VOLTAGE	330	VOLTS
GRID 2 SUPPLY VOLTAGE	330	VOLTS
GRID 2 VOLTAGE	SEE RATING CHART	
PENTODE PLATE DISSIPATION	3.0	WATTS
GRID 2 DISSIPATION: *		
FOR VOLTAGES UP TO 165 VOLTS	0.55	WATTS
FOR VOLTAGES BETWEEN 165 & 330 VOLTS	SEE RATING CHART	
POSITIVE DC GRID 1 VOLTAGE	0	VOLTS
POSITIVE DC TRIODE GRID VOLTAGE	0	VOLTS
TRIODE PLATE DISSIPATION	2.5	WATTS
PENTODE GRID 1 CIRCUIT RESISTANCE:*		
WITH CATHODE BIAS	1.0	MEGOHM
WITH FIXED BIAS	0.5	MEGOHM

TYPICAL OPERATING CHARACTERISTICS

CLASS A AMPLIFIER

TS
TS
TS
S
MHC
TS
S

THE 6U8A CURVES ALSO APPLY FOR THE 6U8.

A EXTERNAL SHIELD,315 CONNECTED TO PIN 4.

B EXTERNAL SHIELD 315 CONNECTED TO PIN 6.

[→] INDICATES A CHANGE.

^{*} INDICATES AN ADDITION.

MINIATURE BUTTON 9 PIN BASE E9-1 OUTLINE DRAWING JEDEC 6-2

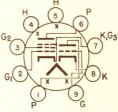
COATED UNIPOTENTIAL CATHODE

FOR

APPLICATION IN FM

OR TV RECEIVERS

ANY MOUNTING POSITION



BOTTOM VIEW BASING DIAGRAM JEDEC 9AE

THE 6U8A COMBINES TWO ELECTRICALLY INDEPENDENT SECTIONS-A TRIODE AND A PENTODE IN THE 9 PIN MINIATURE CONSTRUCTION, BOTH UNITS ARE CAPABLE OF GOOD PERFORMANCE AT THE HIGH FREQUENCIES. THE TUBE MAY BE USED AS A LOCAL OSCILLATOR-PENTODE MIXER IN FM OR TELEVISION RECEIVERS OR IN THE MANY COMBINED FUNCTIONS OF SUCH RECEIVERS. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THATHEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED,

DIRECT INTERELECTRODE CAPACITANCES

	WITH SHIELD A	WITHOUT SHIELD	
PENTODE GRID 1 TO PENTODE PLATE: (PG1 TO PP) MAX.	→ 0.007	→ 0.015	pf
PENTODE INPUT: PG1 TO (H + PK+PG2+PG3+I.S.)	5.0	5.0	pf
PENTODE OUTPUT: PP TO (H+PK+PG2+PG3+I.S.)	3.5	2.6	pf
PENTODE CATHODE TO HEATER: H TO (PK+PG3+I.S.)	3.0 ^B	3.0	pf
TRIODE GRID TO TRIODE PLATE: (TG TO TP)	1.8	1.8	pf
TRIODE INPUT: TG TO (TK+H+PK+PG3+J.S.)	2.8	2.8	pf
TRIODE OUTPUT: TP TO (TK+h+PK+PG3+1.5)	2.0	1.5	pf
TRIODE CATHODE TO HEATER (TK TO H)	3.0 ^B	3.0	pf
PENTODE GRID TO TRIODE PLATE (PG TO TP) (MAX.)	0.20	0.2	pf
PENTODE PLATE TO TRIODE PLATE (PP TO TP) (MAX.)	0.02	0.1	pf

HEATER CHARACTERISTICS AND RATINGS DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS HEATER WARM-UP TIME C	6.3 VOLTS	450 11	MA. SECONDS
HEATER SUPPLY LIMITS: CURRENT OPERATION		450±30	MA.
VOLTAGE OPERATION MAXIMUM HEATER CATHODE VOLTAGE: (E		6.3±0.6	VOLTS
TOTAL DC AND PEAK	CATHODE	200	VOLTS
HEATER POSITIVE WITH RESPECT TO C	CATHODE	100	VOLTS
TOTAL DC AND PEAK		200	VOLTS

CONTINUED FROM PRECEDING PAGE

→ MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

PENTODE PLATE VOLTAGE	330	VOLTS
TRIODE PLATE VOLTAGE	330	VOLTS
GRID 2 SUPPLY VOLTAGE	330	VOLTS
GRID 2 VOLTAGE	SEE RATING CHART	
PENTODE PLATE DISSIPATION	3.0	WATTS
GRID 2 DISSIPATION: *		
FOR VOLTAGES UP TO 165 VOLTS	0.55	WATTS
FOR VOLTAGES BETWEEN 165 & 330 VOLTS	SEE RATING CHART	
POSITIVE DC GRID 1 VOLTAGE	0	VOLTS
POSITIVE DC TRIODE GRID VOLTAGE	0	VOLTS
TRIODE PLATE DISSIPATION	2.5	WATTS
PENTODE GRID 1 CIRCUIT RESISTANCE:*		
WITH CATHODE BIAS	1.0	MEGOHM
WITH FIXED BIAS	0.5	MEGOHM

TYPICAL OPERATING CHARACTERISTICS

CLASS A AMPLIFIER

	TRIODE	PENTODE	
PLATE VOLTAGE	125	125	VOLTS
GRID 2 VOLTAGE		110	VOLTS
GRID 1 VOLTAGE	-1.0	-1.0	VOLTS
TRANSCONDUCTANCE	7500	5000	μ MHOS
PLATE CURRENT	13.5	9.5	MA.
GRID 2 CURRENT		3.5	MA.
PLATE RESISTANCE (APPROX,)		0.2	MEGOHM
AMPLIFICATION FACTOR	40		
GRID 1 VOLTAGE (APPROX.) FOR 1b = 20 µA	-9	- 8	VOLTS
ZERO BIAS TRANSCONDUCTANCE (WITH Eb=100 V; Ec2=70 V)*		5500	μMHOS

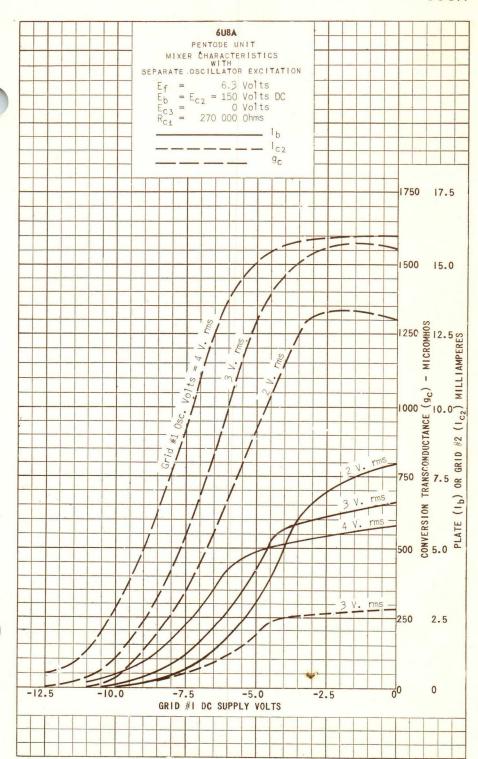
HEATER WARM-UP TIME IS DEPINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE THREE TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

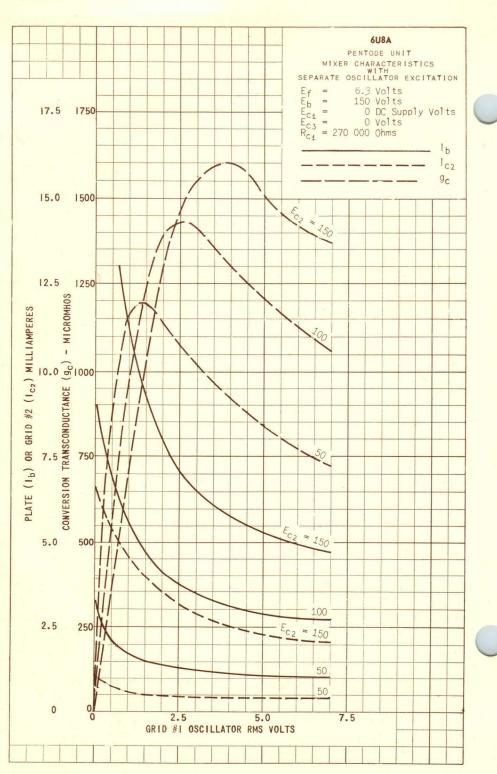
A EXTERNAL SHIELD 315 CONNECTED TO PIN 4.

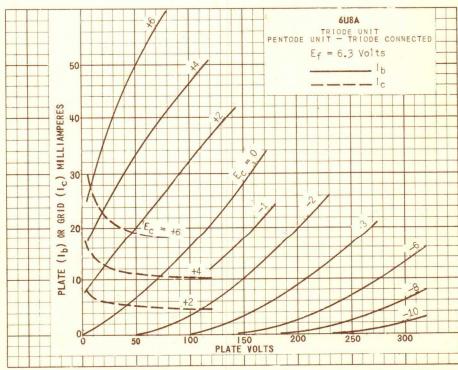
B EXTERNAL SHIELD 315 CONNECTED TO PIN 6.

[→] INDICATES A CHANGE.

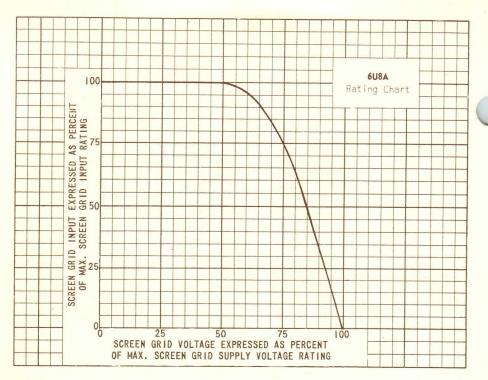
^{*} INDICATES AN ADDITION.

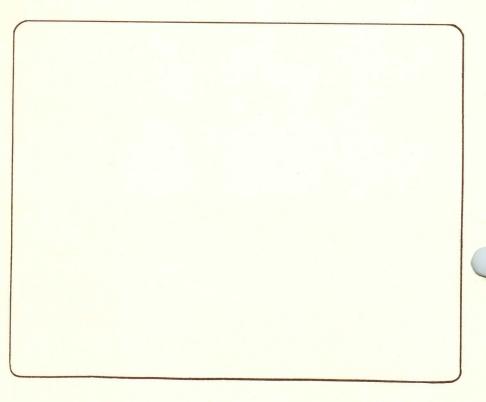






6U8A



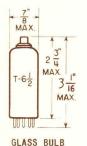


PRINTED IN U. S. A.

TUNG-SOL

DIODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER

6.3 VOLTS 1.75 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
9 PIN BASE
980

THE 6V3A IS A HEATER CATHODE TYPE DIODE, DESIGNED FOR USE AS A DAMPING DIODE IN TELEVISION SWEEP CIRCUITS. IT MAY ALSO BE USED AS A HALF-WAVE RECTIFIER.

DIRECT INTERELECTRODE CAPACITANCES

HEATER TO CATHODE 1.5 MAR

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

DAMPER SERVICEA

HEATER VOLTAGE		6.3	VOLTS
MAXIMUM PEAK HEATER CATHODE VOLTAGE (HEATER NEGATIVE) BC	6	750	VOLTS
MAXIMUM PEAK INVERSE VOLTAGE BC	6	000	VOLTS
MAXIMUM STEADY STATE PEAK CURRENT		600	MA.
MAXIMUM DC OUTPUT CURRENT		135	MA.

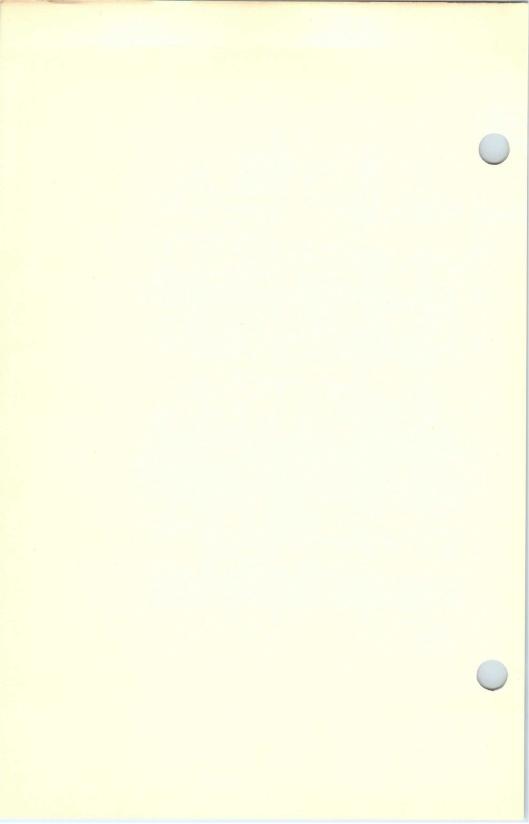
HALE-WAVE RECTIFIER

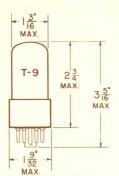
HEATER VOLTAGE	63	VOLTS
MAXIMUM AC PLATE VOLTAGE (RMS)	350	VOLTS
MAXIMUM DC OUTPUT CURRENT	125	MA.
AVERAGE TUBE DROP (AT 150 MA.)	14	VOLTS
FILTER INPUT CAPACITOR	20	µfd.
MINIMUM TOTAL EFFECTIVE PLATE SUPPLY VOLTAGE	145	OHMS

A ABSOLUTE MAXIMUM RATINGS ARE THE LIMITING VALUES ABOVE WHICH THE SERVICEABILITY OF THE TUBE MAY BE IMPAIRED FROM THE VIEWPOINT OF LIFE AND SATISFACTORY PERFORMANCE. THEREFORE, IN ORDER NOT TO EXCEED THESE ABSOLUTE RATINGS, THE EQUIPMENT DESIGNER HAS THE RESPONSIBILITY OF DETERMINING AM AVERAGE DESIGN VALUE FOR EACH RATING BELOW THE ABSOLUTE VALUE OF THAT RATING BY AN AMOUNT SUCH THAT THE ABSOLUTE VALUES WILL NEVER BE EXCEEDED UNDER ANY USUAL CONDITION OF LINE VOLTAGE VARIATION, MANUFACTURING VARIATIONS (INCLUDING COMPONENTS) IN THE EQUIPMENT ITSELF, OR ADJUSTMENTS OF CONTROLS.

Boc component of heater-cathode voltage should not exceed 750 volts with heater negative with respect to cathode.

Cthis rating is applicable where the duration of the voltage pulse does not exceed 15% of ONE scanning cycle or 10 micro-seconds.





COATED UNIPOTENTIAL CATHODE

HEATER 6.3 VOLTS 0.45 AMP. AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

TO PIN OCTAL 7 PIN OCTAL 75

GLASS BULB

THE 6V6GTA IS A BEAM POWER AMPLIFIER DESIGNED FOR SERVICE IN THE OUTPUT STAGE OF 450 Ma. SERIES HEATER OPERATED TV RECEIVERS. IT HAS HIGH POWER SENSITIVITY AND HIGH POWER OUTPUT WITH COMPARATIVELY LOW SUPPLY VOLTAGE. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED. WITH THE EXCEPTION OF HEATER RATINGS, ITS CHARACTERISTICS ARE IDENTICAL TO THE 6V6GT.

DIRECT INTERELECTRODE CAPACITANCES

GRID TO PLATE: (G1 TO P)	0.7	μμ f
INPUT: G1 TO (H+K+G2+G3)	9.0	μμf
OUTPUT: P TO (H+K+G2+G3)	7.5	μμ f

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER VALUES

6.3	VOLTS
100	
200	VOLTS VOLTS
200	VOLTS
315	VOLTS
285	VOLTS
12	WATTS
2	WATTS
0.1	ME GOHM ME GOHM
	100 200 200 315 285 12 2

VERTICAL DEFLECTION AMPLIFIER - TRIODE CONNECTIONAB

HEATER VOLTAGE	6.3	VOLTS
MAXIMUM DC PLATE VOLTAGE	315	VOL TS
MAXIMUM PEAK POSITIVE VOLTAGE (ABSOLUTE MAXIMUM)	1200	VOLTS
MAXIMUM PLATE DISSIPATION ^C	9	WATTS
MAXIMUM PEAK NEGATIVE GRID VOLTAGE	250	VOLTS
MAXIMUM AVERAGE CATHODE CURRENT	35	MA.
MAXIMUM PEAK CATHODE CURRENT	105	MA.
MAXIMUM GRID CIRCUIT RESISTANCE (CATHODE BIAS) HEATER WARM-UP TIME (APPROX.)*	2.2	MEGOHMS
HEATER WARM-UP TIME (APPROX.)*	11.0	SECONDS

Aall values are evaluated on design center system except where absolute maximum is stated.

B-FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCASTING STATIONS; FEDERAL COMMUNICATIONS COMMISSION". THE DUTY CYCLE OF THE VOLTAGE PULSE NOT TO EXCEED 15% OF A SCANNING CYCLE.

C IN STAGES OPERATING WITH GRID-LEAK BIAS, AN ADEQUATE CATHODE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

*HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A AMPLIFIER - SINGLE TUBE

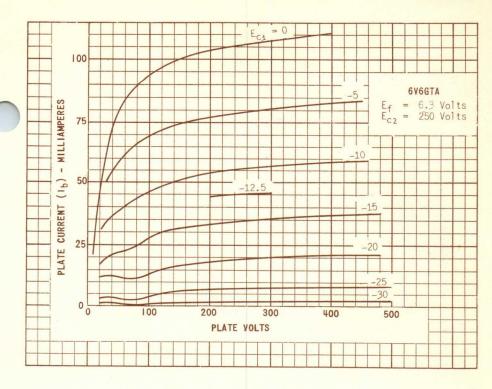
HEATER VOLTAGE	6.3	6.3	6.3	VOLTS
HEATER CURRENT	0.45	0.45	0.45	AMP.
PLATE VOLTAGE	180	250	315	VOLTS
GRID #2 VOLTAGE	180	250	225	VOLTS
GRID #1 VOLTAGE	-8.5	-12.5	-13.0	' VOLTS
PEAK AF GRID #1 VOLTAGE	8.5	12.5	13.0	VOLTS
ZERO-SIGNAL PLATE CURRENT	29	45	34	MA.
MAXIMUM-SIGNAL PLATE CURRENT	30	47	35	MA.
ZERO-SIGNAL GRID #2 CURRENT	3	4.5	2.2	MA.
MAXIMUM-SIGNAL GRID #2 CURRENT	4	7	6	MA.
PLATE RESISTANCE (APPROX.)	50 000	50 000	80 000	OHMS
TRANSCONDUCTANCE	3 700	4 100	3 750	имноs
LOAD RESISTANCE	5 500	5 000	8 500	OHMS
MAXIMUM-SIGNAL POWER OUTPUT	2	4.5	5.5	WATTS
TOTAL HARMONIC DISTORTION (APPROX.)	8	8	12	PERCENT

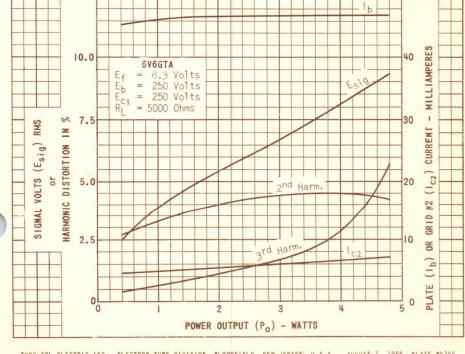
CLASS A1 AMPLIFIER - PUSH-PULL UNLESS OTHERWISE SPECIFIED, VALUES ARE FOR TWO TUBES.

HEATER VOLTAGE	
PLATE VOLTAGE 250 285 VOLTS GRID #2 VOLTAGE 250 285 VOLTS GRID #1 VOLTAGE -15 -19 VOLTS PEAK AF GRID #1 TO GRID #1 VOLTAGE 30 38 VOLTS	
GRID #2 VOLTAGE 250 285 VOLTS GRID #4 VOLTAGE -15 -19 VOLTS PEAK AF GRID #4 TO GRID #4 VOLTAGE 30 38 VOLTS	
GRID #1 VOLTAGE -15 -19 VOLTS PEAK AF GRID #1 TO GRID #1 VOLTAGE 30 38 VOLTS	
PEAK AF GRID #1 TO GRID #1 VOLTAGE 30 38 VOLTS	
ZERO-SIGNAL PLATE CURRENT 70 70 MA.	
MAXIMUM—SIGNAL PLATE CURRENT 79 92 MA.	
ZERO-SIGNAL GRID #2 CURRENT 5 4 MA.	
MAXIMUM-SIGNAL GRID #2 CURRENT 13 13.5 MA.	
PLATE-TO-PLATE LOAD RESISTANCE 10 000 8 000 OHMS	
MAXIMUM—SIGNAL POWER OUTPUT 10 14 WATTS	
TOTAL HARMONIC DISTORTION 5 3.5 PERCENT	Т

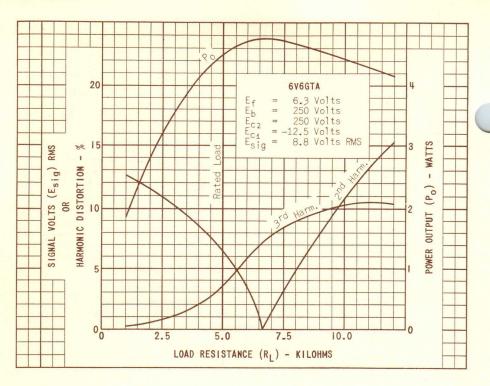
CLASS A1 AMPLIFIER - TRIODE CONNECTION

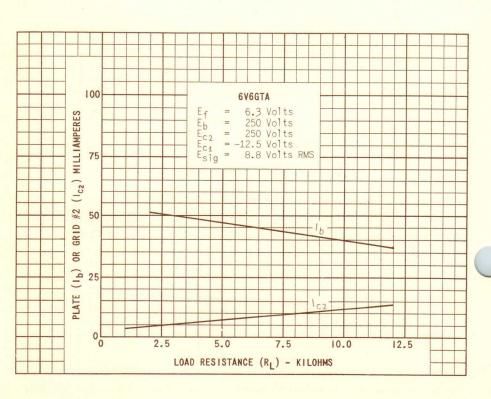
HEATER VOLTAGE	6.3	VOLTS
HEATER CURRENT	0.45	AMP.
PLATE VOLTAGE	250	VOLTS
GRID VOLTAGE	-12.5	VOLTS
PLATE CURRENT	49.5	MA.
TRANSCONDUCTANCE	5 000	имноs
AMPLIFICATION FACTOR	9.8	
PLATE RESISTANCE (APPROX.)	1 960	OHMS
GRID VOLTAGE FOR Ib = 0.5 MA. (APPROX.)	-36	VOLTS



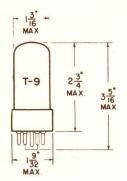


6V6GTA





DIODE



COATED UNIPOTENTIAL CATHODE

HEATER 6.3 VOLTS 1.2 AMP. AC OR DC ANY MOUNTING POSITION



BOTTOM VIEW SHORT INTERMEDIATE 4CG PINS #1,2,4 & 6 SMALL NOT BE USED AS TIE POINTS

GLASS BULB

THE 6W4GT IS A HALF-WAVE HIGH VACUUM RECTIFIER DESIGNED ESPECIALLY FOR USE AS A DAMPING DIODE IN TELEVISION DEFLECTION CIRCUITS. IT CAN ALSO BE USED IN CONVENTIONAL RECTIFIER APPLICATIONS.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

HEATER TO CATHODE: H TO K		7.0	μμf
CATHODE TO PLATE AND HEATER:	K TO (P+H)	13	μμf
PLATE TO CATHODE AND HEATER:	P TO (K+H)	6.0	μμ f

RATINGSA INTERPRETED ACCORDING TO RMA STANDARD M8-210

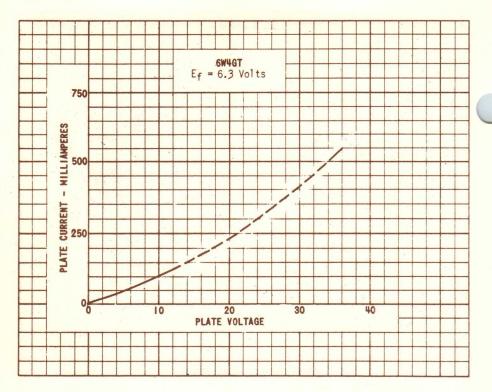
DAMPER DIODE B

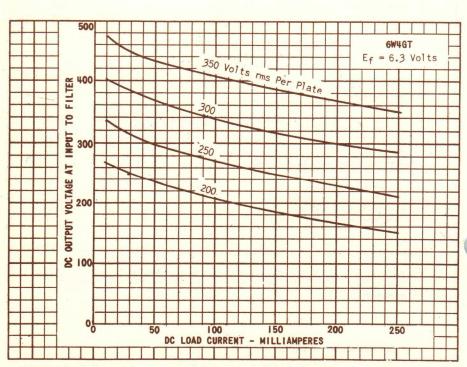
HEATER VOLTAGE	6.3	VOLTS
HEATER CURRENT	1.2	AMP.
MAXIMUM PEAK INVERSE PLATE VOLTAGE (ABSOLUTE MAXIMUM) 3	850	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE: HEATER NEGATIVE WITH RESPECT TO CATHODE (ABSOLUTE MAX.)		
DC	500	VOLTS
TOTAL DC AND PEAK	300	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC	100	VOLTS
TOTAL DC AND PEAK	300	VOLTS
MAXIMUM DC PLATE CURRENT	125	MA -
MAXIMUM PEAK PLATE CURRENT	750	MA.
MAXIMUM PLATE DISSIPATION	3.5	WATTS
TUBE VOLTAGE DROP (WITH TUBE CONDUCTING 250 MA.)	21	VOLTS

ADESIGN CENTER VALUES EXCEPT WHERE ABSOLUTE MAXIMUM IS STATED

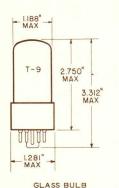
-- INDICATES A CHANGE. MINDICATES AN ADDITION.

B
FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING
PRACTICE FOR TELEVISION STATIONS; FEDERAL COMMUNICATIONS COMMISSION". THE DUTY CYCLE OF THE
HORIZOMTAL VOLTAGE PULSE NOT TO EXCEED 155 OF A SCANNING CYCLE. POWER RECTIFIER OPERATION IS
HOT RECOMMENDED.





BEAM PENTODE



INTERMEDIATE SHELL OCTAL B6-81 OR B7-7 OR SHORT INTERMEDIATE SHELL OCTAL B6-84 OR B7-59 OUTLINE DRAWING JEDEC 9-11 OR 9-41 COATED UNIOPTENTIAL CATHODE

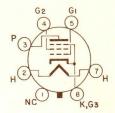
FOR USE AS A VERTICAL

DEFLECTION AMPLIFIER

JN TV RECEIVERS

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW BASING DIAGRAM JEDEC 7AC

THE 6W6GT IS A BEAM PENTODE POWER AMPLIFIER DESIGNED SPECIFICALLY FOR USE AS A VERTICAL SCANNING OUTPUT TUBE IN TELEVISION RECEIVERS.

DIRECT INTERELECTRODE CAPACITANCES WITHOUT EXTERNAL SHIELD

GRID TO PLATE: (G1 TO P)	0.8	pf
INPUT: G1 TO (H+K+G2+G3)	15.0	pf
OUTPUT: P TO (H+K+G2+G3)	9.0	pf

HEATER CHARACTERISTICS AND RATINGS DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS	1200	MA.
HEATER SUPPLY LIMITS:			
VOLTAGE OPERATION		6.3±0.6	VOLTS
CURRENT OPERATION		1200	MA.
MAXIMUM HEATER-CATHODE VOLTAGE:			
HEATER NEGATIVE WITH RESPECT TO	CATHODE		
TOTAL DC AND PEAK		200	VOLTS
HEATER POSITIVE WITH RESPECT TO	CATHODE		
DC		100	VOLTS
TOTAL DC AND PEAK		200	VOLTS

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→ MAXIMUM RATINGS DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

OL ACC AT AMBUTEED

CLASS AT AMPLIFIE	: R	
PLATE VOLTAGE	330	VOLTS
GRID 2 VOLTAGE	165	VOLTS
PLATE DISSIPATION	12	WATTS
GRID 2 DISSIPATION	1.35	WATTS
GRID 1 CIRCUIT RESISTANCE:		
FIXED BIAS	0.1	MEGOHM
CATHODE BIAS	0.5	MEGOHM

VERTICAL DEFLECTION AMPLIFIER A, B

TRIODE CONNECTED 330	PENTODE CONNECTED 330	VOLTS
1200	1500	VOLTS
	165	VOLTS
8.5	8	WATTS
	1.2	WATT
275	275	VOLTS
65	65	MA.
195	195	MA.
2.2	2.2	MEGOHMS
	CONNECTED 330 1200 8.5 275 65 195	330 330 1200 1500 165 8.5 8 1.2 275 275 65 65 195 195

- INDICATES A CHANGE.

TYPICAL OPERATING CHARACTERISTICS

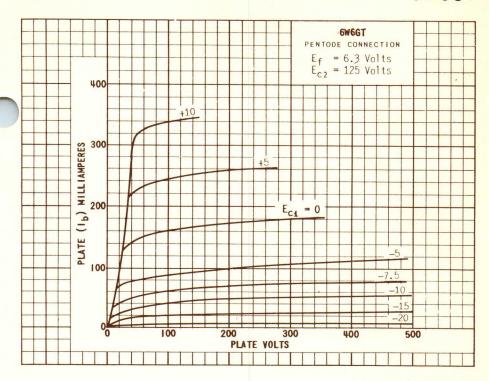
CLASS A1 AMPLIFIER - SINGLE TUBE						
110	200	VOLTS				
110	125	VOLTS				
-7.5		VOLTS				
	180	OHMS				
7.5	8.5	VOLTS				
13,000	28,000	OHMS				
8,000	8,000	μMHOS				
49	46	MA.				
50	47	MA.				
4.0	2.2	MA.				
10	8.5	MA.				
2,000	4,000	OHMS				
10	10	PERCENT				
2.1	3.8	WATTS				
	110 110 -7.5 7.5 13,000 8,000 49 50 4.0 10 2,000	110 200 110 125 -7.5 180 7.5 8.5 13,000 28,000 8,000 8,000 49 46 50 47 4.0 2.2 10 8.5 2,000 4,000 10 10				

TRIODE CONNECTION

PLATE VOLTAGE	225	VOLTS
GRID VOLTAGE	-30	VOLTS
AMPLIFICATION FACTOR	6.2	
PLATE RESISTANCE (APPROX.)	1,600	OHMS
TRANSCONDUCTANCE	3,800	μ MHOS
PLATE CURRENT	22	MA.
GRID VOLTAGE FOR Ib=0.5 MA. (APPROX.)	-42	VOLTS

ATRIODE CONNECTION - GRID #2 TIED TO PLATE.

B FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN 'STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCASTING STATIONS; FEDERAL COMMUNICATIONS COMMISSION'. THE DUTY CYCLE OF THE VOLTAGE PULSE NOT TO EXCEED 15 PERCENT OF A SCANNING CYCLE.



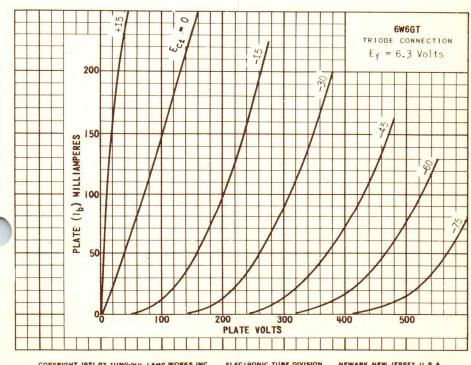
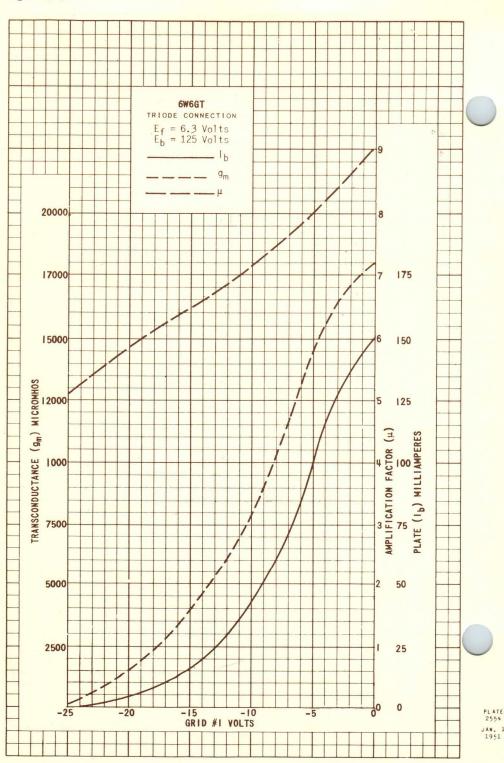
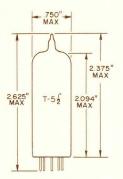


PLATE 2553 JAN. 1 1951



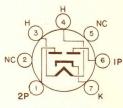
MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

FULL WAVE RECTIFIER

ANY MOUNTING POSITION



BOTTOM VIEW
BASING DIAGRAM
JEDEC 5BS

GLASS BULB
MINIATURE BUTTON
7 PIN BASE E7-1
OUTLINE DRAWING
JEDEC 5-3

THE 6X4 IS A HEATER-CATHODE TYPE POWER RECTIFIER IN THE MINIATURE CONSTRUCTION. ITS LOW VOLTAGE DROP AND SMALL SIZE ADAPT IT TO USE WITH VIBRATOR-TYPE INVERTERS IN AUTOMOBILE RECEIVERS.

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS	600	MA.
TUBE VOLTAGE DROP (MEASURED WITH			
TUBE CONDUCTING 70 MA EACH PLAT	E)	22	VOLTS
HEATER SUPPLY LIMITS:			
WEATER SUPPLY LIMITS: VOLTAGE OPERATION A		6.3±0.6	VOLTS
MAXIMUM HEATER CATHODE VOLTAGE:			
HEATER NEGATIVE WITH RESPECT T	O CATHODE		
DC		450	VOLTS
TOTAL DC AND PEAK		450	VOLTS
HEATER POSITIVE WITH RESPECT T	O CATHODE		
DC		100	VOLTS
TOTAL DC AND PEAK		200	VOLTS

- MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

DESIGN MAXIMUM TALDES - SEE ETA STANDARD	110 2))		
PEAK INVERSE PLATE VOLTAGE		1250	VOLTS
AC PLATE SUPPLY VOLTAGE EACH PLATE (RMS)	SEE CH	ARTI	
DC OUTPUT CURRENT EACH PLATE	SEE CH	ART I	
STEADY STATE PEAK PLATE CURRENT EACH PLATE			
(SEE CHART II)		245	MA.
TRANSIENT PEAK PLATE CURRENT EACH PLATE			
(SEE CHART III)		1.1	AMP.
VIBRATOR OPERATION (MINIMUM DUTY CYCLE OF 75%)			
DC OUTPUT VOLTAGE (AT FILTER INPUT)		350	VOLTS
DC OUTPUT CURRENT EACH PLATE		45	MA.

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TYPICAL OPERATING CHARACTERISTICS

FULL-WAVE RECTIFIER

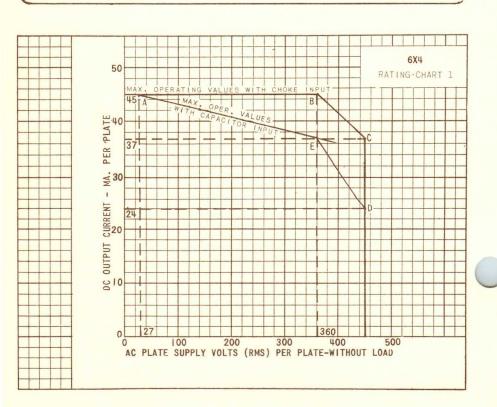
SINE WAVE OPERATION INPUT TO FILTER		VIBRATOR OPERATION INPUT TO FILTER	
CAPACITOR	CHOKE	CAPACITOR	
325	400		VOLTS
10		10	μf
	10		HENRYS
525			OHMS
70	70	70	MA.
310	340	240	VOLTS
	OPERATI INPUT TO F CAPACITOR 325 10 525 70	OPERATION INPUT TO FILTER CAPACITOR CHOKE 325 400 10 10 525 70 70	OPERATION OPERATION INPUT TO FILTER

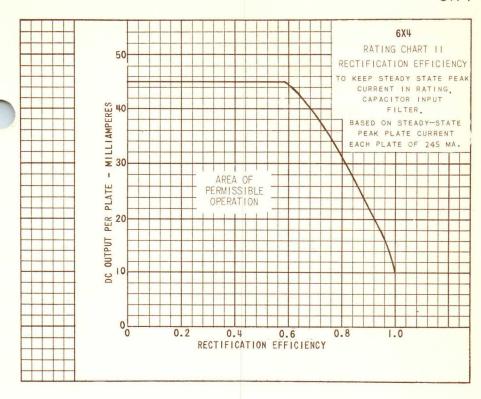
A WHEN USED IN AUTOMOTIVE SERVICE FROM A 6 VOLT BATTERY SOURCE, THE PERMISSIBLE RANGE IN HEATER VOLTAGE IS FROM 5.0 TO 8.0 VOLTS.

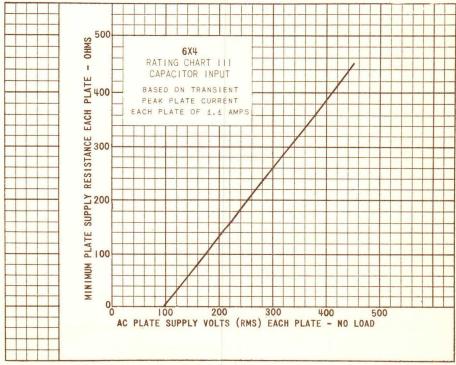
B AC PLATE SUPPLY VOLTAGE IS MEASURED WITHOUT LOAD.

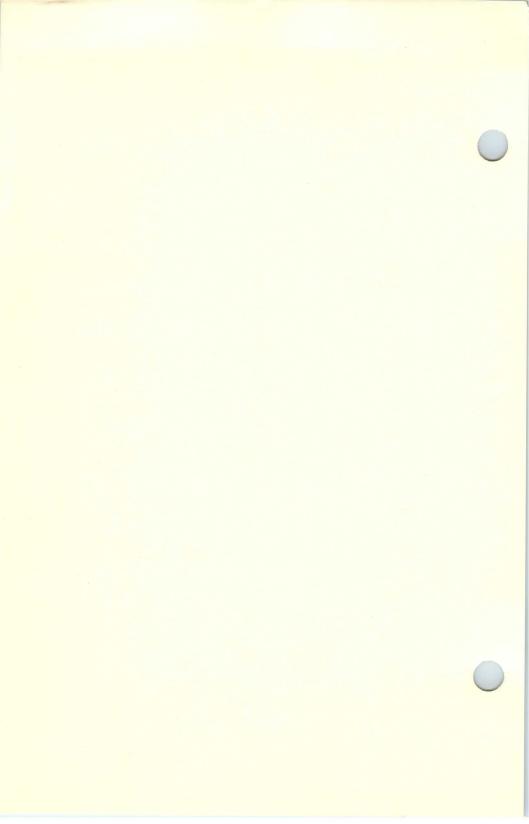
- INDICATES A CHANGE.

SIMILAR TYPE REFERENCE: Except for heater ratings, the $6X_4$ is identical to the $12X_4$.





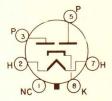




UNIPOTENTIAL CATHODE

T-9 2.750" MAX 3.312" MAX

FOR
RECTIFIER SERVICE IN
BATTERY OPERATED OR
AC RECEIVERS



BOTTOM VIEW
BASING DIAGRAM
JEDEC 6S

GLASS BULB
INTERMEDIATE SHELL
6 PIN OCTAL BASE E6-8
OUTLINE DRAWING
JEDEC 9-11

THE 6X5GT IS DESIGNED FOR SERVICE IN STORAGE BATTERY OR AC OPERATED RECEIVERS.

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS	600	MA.
HEATER SUPPLY LIMITS:			
VOLTAGE OPERATION		6.3±0.6	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE:			
HEATER NEGATIVE WITH RESPECT	TO CATHODE		
DC		450	VOLTS
TOTAL DC AND PEAK		450	VOLTS
HEATER POSITIVE WITH RESPECT	TO CATHODE		
DC		100	VOLTS
TOTAL DC AND PEAK		200	VOLTS

→ MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

PEAK INVERSE PLATE VOLTAGE		1250	VOLTS
STEADY-STATE PEAK PLATE CURRENT	(see rating chart 2)	245	MA.
TRANSIENT PEAK PLATE CURRENT PER PLATE DC OUTPUT CURRENT PER PLATE AC PLATE VOLTAGE PER PLATE (RMS):	(see rating chart 3) (see rating chart 1)	1.1	AMP.
CAPACITOR INPUT CHOKE INPUT	(see rating chart 1)		
VIBRATOR OPERATION (MIN. DUTY CYCLE OF 7: DC OUTPUT VOLTAGE AT FILTER INPUT		350	VOLTS
DC OUTPUT CURRENT PER PLATE		45	MA.

TUNG-SOL -

CONTINUED FROM PRECEDING PAGE

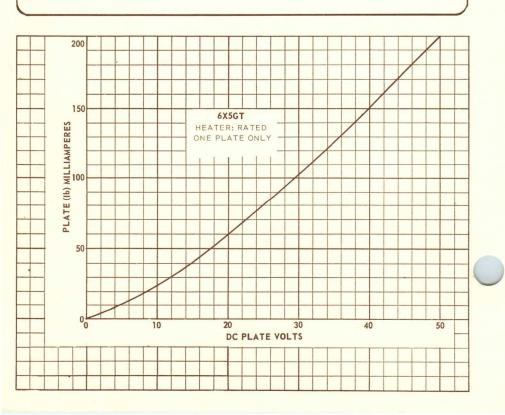
- TYPICAL OPERATING CHARACTERISTICS

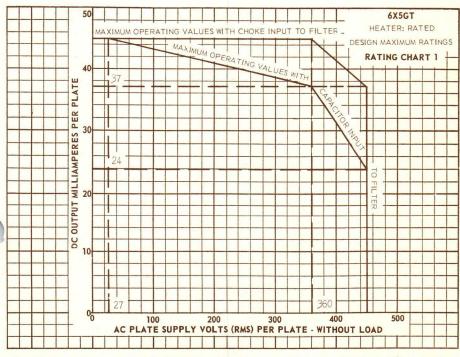
FULL-WAVE RECTIFIER

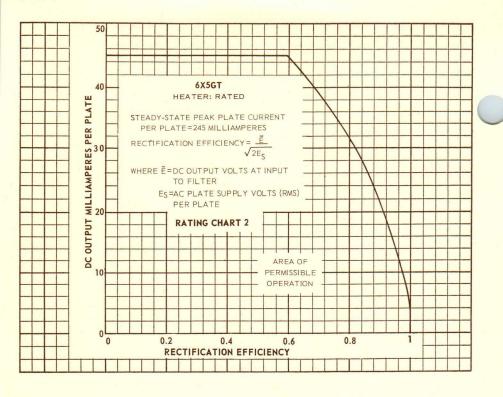
	SINE-WAVE	VIBRATOR	
	OPERATION	OPERATION	
CAPACITOR INPUT TO FILTER:			
AC PLATE VOLTAGE PER PLATE (RMS, NO LOAD)	325		VOLTS
INPUT CAPACITOR	10	10	μf
TOTAL EFFECTIVE PLATE SUPPLY IMPEDANCE			
PER PLATE	525		OHMS
DC OUTPUT CURRENT	70	70	MA.
DC OUTPUT VOLTAGE AT FILTER INPUT (APPROX.)	310	240	VOL TS
CHOKE INPUT TO FILTER:			
AC PLATE VOLTAGE PER PLATE (RMS, NO LOAD)	400		VOLTS
INPUT CHOKE	10		HENRYS
DC OUTPUT CURRENT	70		MA.
-DC OUTPUT VOLTAGE AT FILTER INPUT (APPROX.)	340		VOLTS
TUBE VOLTAGE DROP AT 70 MA. PER PLATE	22		VOLTS

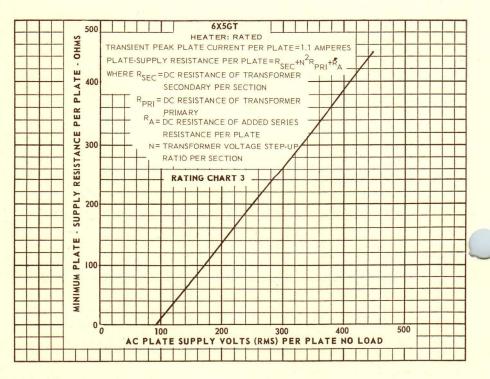
A WHEN THE HEATER IS OPERATED IN AUTOMOTIVE SERVICE FROM A 6-VOLT BATTERY SOURCE, THE PERMISSIBLE RANGE IN HEATER VOLTAGE IS FROM 5.0 TO 8.0 VOLTS.

- INDICATES A CHANGE.

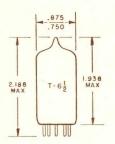








TRIODE PENTODE MINIATURE TYPE



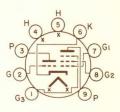
FOR

USE AS A COMBINED OSCILLATOR

AND MIXER TUBE IN T.V. RECEIVERS

COATED UNIPOTENTIAL CATHODE

ANY MOUNTING POSITION



BOTTOM VIEW BASING DIAGRAM JEDEC 9AK

GLASS BULB MINIATURE BUTTON 9 PIN BASE E9-1 OUTLINE DRAWING JEDEC 6-2

THE 6X8 AND 6X8A ARE MULTI-UNIT TUBES USING THE 9 PIN MINIATURE CONSTRUCTION. THEY CONTAIN A MEDIUM-MU TRIODE AND A SHARP-CUTOFF PENTODE IN ONE ENVELOPE. THEY ARE DESIGNED PRIMARILY FOR USE AS COMBINED OSCILLATORS AND MIXER TUBES IN TELEVISION RECEIVERS UTILIZING AN INTERMEDIATE FREQUENCY IN THE ORDER OF 40 MC. THEY ARE ESPECIALLY SUITABLE FOR USE IN AM/FM RECEIVERS. THERMAL CHARACTERISTICS OF THE HEATER OF THE 6X8A ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLEARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED.

DIRECT INTERELECTRODE CAPACITANCES

			S	WITH A		ITHOUT SHIELD	
PENTODE GRID 1 TO PENTODE PLATE: (PG1	TO PF) MA	AX.	0.06		0.09	pf
PENTODE INPUT: PG1 TO (H+K+PG2+PG3)			\rightarrow	4.8	\rightarrow	4.6	pf
PENTODE OUTPUT: PP TO (H+K+PG2+PG3)			\rightarrow	1.6	\rightarrow	0.9	pf
CATHODE TO HEATER: (K TO H)			\rightarrow	6.5B	\rightarrow	6.5	pf
TRIODE GRID TO TRIODE PLATE: (TG TO TP)			\rightarrow	1.5	\longrightarrow	1.5	pf
TRIODE INPUT: TG TO (H+K)			\rightarrow	2.4	\rightarrow	2.0	pf
TRIODE OUTPUT: TP TO (H+K)				1.0		0.5	pf
PENTODE GRID 1 TO TRIODE PLATE (PG1 TC	TP)	MAX.	\rightarrow	0.04	\rightarrow	0.05	pf
PENTODE PLATE TO TRIODE PLATE: (PP TO	TP)	MAX.	\rightarrow	0.008	\rightarrow	0.05	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3	VOLTS		450	MA.
HEATER WARM-UP TIME (FOR 6X8A ONLY)				11	SECONDS
LIMITS OF APPLIED VOLTAGE				6.3±0.6	VOLTS
LIMITS OF SUPPLIED CURRENT (6X8A ONLY)				600 ± 40	MA.
MAXIMUM HEATER-CATHODE VOLTAGE:					
HEATER NEGATIVE WITH RESPECT TO CAT	THODE				
TOTAL DC AND PEAK			\rightarrow	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CAT	HODE				
DC			\rightarrow	100	VOLTS
TOTAL DC AND PEAK			\rightarrow	200	VOLTS

- TUNG-SOL

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

→ DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

PENTODE PLATE VOLTAGE	275	VOLTS
TRIODE PLATE VOLTAGE	275	VOLTS
GRID 2 SUPPLY VOLTAGE	275	VOLTS
GRID 2 VOLTAGE	SEE RATING CHART	
PENTODE PLATE DISSIPATION	2.3	WATTS
TRIODE PLATE DISSIPATION	1.7	WATTS
GRID 2 DISSIPATION - UP TO 138 VOLTS	0.45	WATTS
POSITIVE DC GRID I VOLTAGE	0	VOLTS
POSITIVE DC TRIODE GRID VOLTAGE	0	VOLTS

→ TYPICAL OPERATING CHARACTERISTICS

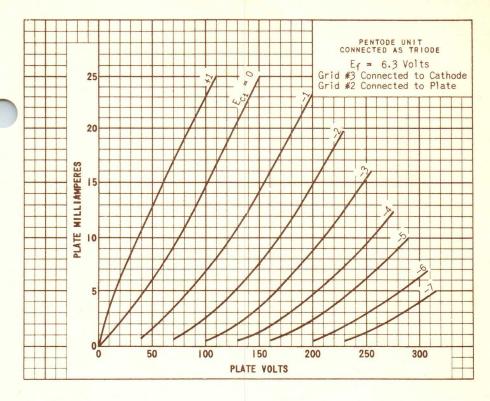
CLASS A1 AMPLIFIER

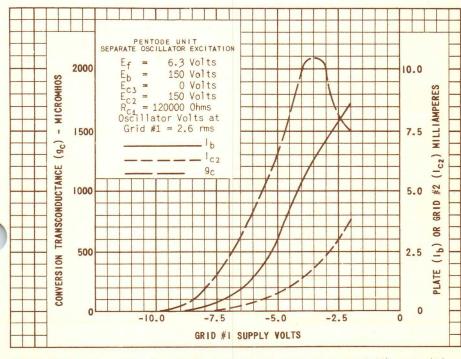
	TRIODE	PENTODE	
PLATE VOLTAGE	125	125	VOLTS
GRID 3 VOLTAGE CONNECTED TO PIN 6 AT	SOCKET		
GRID 2 VOLTAGE		125	VOLTS
GRID 1 VOLTAGE	-1.0	-1.0	VOLTS
PLATE CURRENT	12.0	9.0	MA.
GRID 2 CURRENT		2.2	MA.
TRANSCONDUCTANCE	6,500	5,500	μMHOS
PLATE RESISTANCE APPROX	x. 6,000	300,000	OHMS
AMPLIFICATION FACTOR	40		
GRID 1 VOLTAGE APPROX. FOR 1b = 20 µA.	-7	-6.5	VOLTS
ZERO BIAS TRANSCONDUCTANCE			
WITH Eb = 100 V; Ec2 = 70 V.		5,700	μMHOS

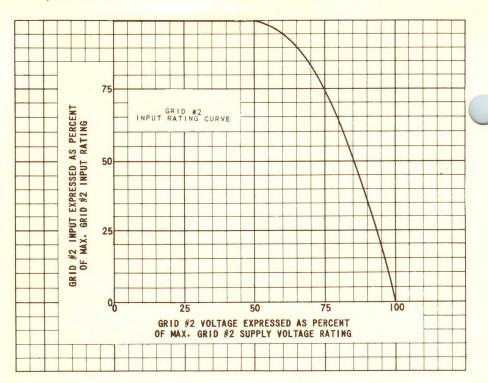
A EXTERNAL SHIELD 315 CONNECTED TO PIN 6.

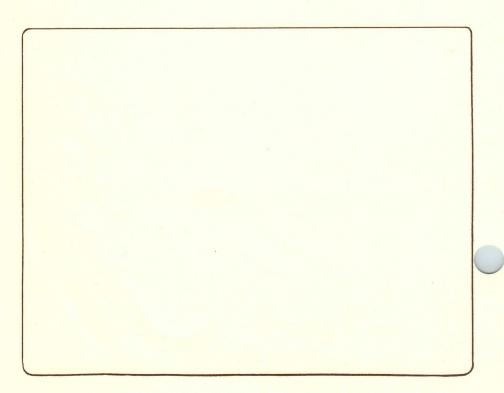
B EXTERNAL SHIELD 315 CONNECTED TO PIN 9.

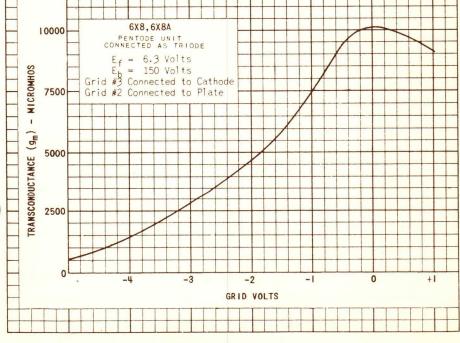
C
HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO
REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT
CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE THREE TIMES THE NOMINAL
HEATER OPERATING RESISTANCE.

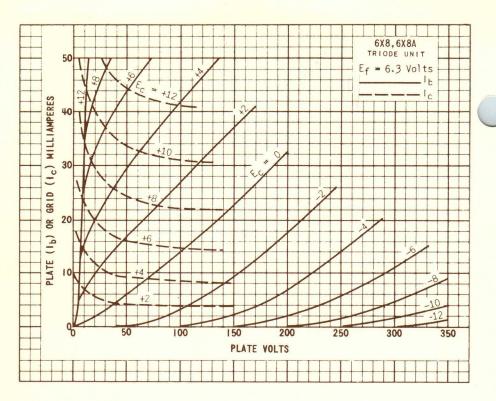


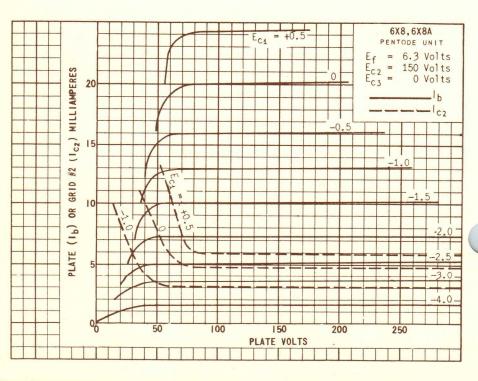




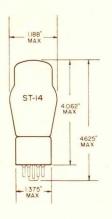








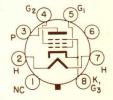
BEAM POWER AMPLIFIER



COATED UNIPOTENTICAL CATHODE

FOR AUDIO OUTPUT STAGES OF RADIO RECEIVERS

ANY MOUNTING POSITION



BOTTOM VIEW

BASING DIAGRAM JEDEC 7AC

GLASS BULB MEDIUM SHELL 7 PIN OCTAL B7-12 JEDEC 14-3

THE 6Y6G IS A BEAM POWER AMPLIFIER HAVING HIGH POWER SENSITIVITY AND HIGH POWER OUTPUT AT COMPARATIVELY LOW DC SUPPLY VOLTAGES.

HEATER CHARACTERISTICS AND RATINGS

DESIGN CENTER VALUES - SEE EIA STANDARD RS-239

6.3 VOLTS	1250	MA.
	6.3±0.6	VOLTS
DDE	180	VOLTS
	DDE	6.3±0.6

MAXIMUM RATINGS

DESIGN CENTER VALUES - SEE EIA STANDARD RS-239

PLATE VOLTAGE	200	VOLTS
GRID #2 SUPPLY VOLTAGE	→ 200	VOLTS
GRID #2 VOLTAGE *	SEE J5-C4	
PLATE DISSIPATION	12.5	WATTS
GRID #2 DISSIPATION	1.75	WATTS
GRID #1 CIRCUIT RESISTANCE *		
FIXED BIAS	0.1	MEGOHM
SELF BIAS	0.5	MEGOHM

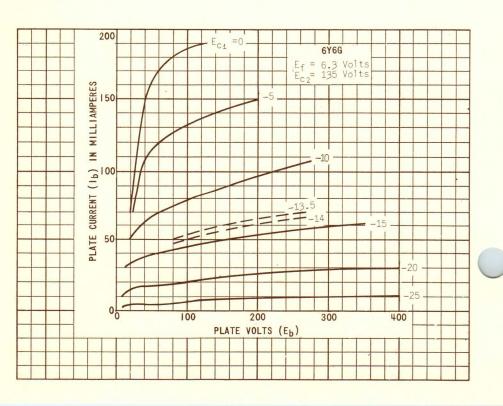
INDICATES A CHANGE.

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TYPICAL OPERATING CHARACTERISTICS

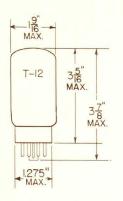
CLASS A1 AMPLIFIER

PLATE VOLTAGE	135	200	VOLTS
GRID #2 VOLTAGE	135	135	VOLTS
GRID #1 VOLTAGE	-13.5	-14	VOLTS
PEAK AF GRID #1 VOLTAGE	13.5	14	VOLTS
PLATE RESISTANCE (APPROX.)	9300	18 300	OHMS
TRANSCONDUCTANCE	7000	7100	имноs
ZERO-SIGNAL PLATE CURRENT	58	61	MA.
MAXIMUM-SIGNAL PLATE CURRENT	60	66	MA.
ZERO-SIGNAL GRID #2 CURRENT	3.5	2.2	MA.
MAXIMUM-SIGNAL GRID #2 CURRENT	11.5	9	MA.
LOAD RESISTANCE	2000	2600	OHMS
TOTAL HARMONIC DISTORTION (APPROX.)	10	10	PERCENT
POWER OUTPUT	3.6	6	WATTS





BEAM PENTODE



COATED UNIPOTENTIAL CATHODE

HEATER 6.3 VOLTS 1.25 AMP. AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
SHORT MEDIUM SHELL
7 PIN OCTAL
75

GLASS BULB

THE 6Y6GA IS A BEAM POWER AMPLIFIER HAVING HIGH POWER SENSITIVITY AND HIGH POWER OUTPUT AT COMPARATIVELY LOW DC SUPPLY VOLTAGES. EXCEPT FOR ITS T-12 ENVELOPE THE 6Y6GA IS IDENTICAL TO THE 6Y6G.

DIRECT INTERELECTRODE CAPACITANCES *

GRID #1 TO PLATE

0.7 pf

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER VOLTAGE	6.3	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE	180	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	180	VOLTS
MAXIMUM PLATE VOLTAGE	200	VOLTS
MAXIMUM GRID #2 SUPPLY VOLTAGE	200	VOLTS
MAXIMUM GRID #2 VOLTAGE	SE	E J5-C4
MAXIMUM PLATE DISSIPATION	12.5	WATTS
MAXIMUM GRID #2 DISSIPATION	1.75	WATTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE:		
FIXED BIAS	0.1	MEGOHM
SELF BIAS	0.5	MEGOHM

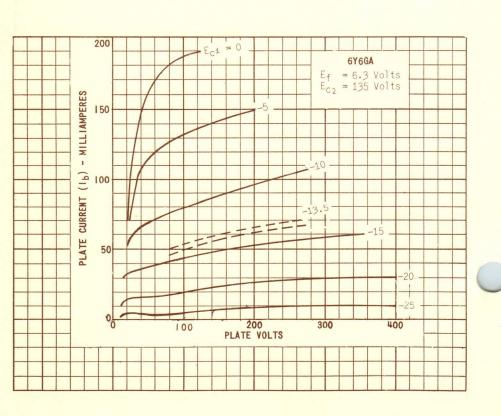
^{*}INDICATES AN ADDITION.

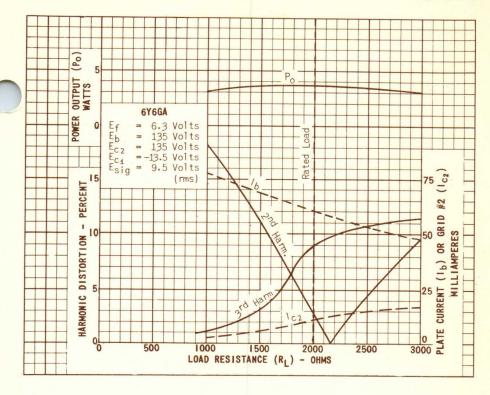
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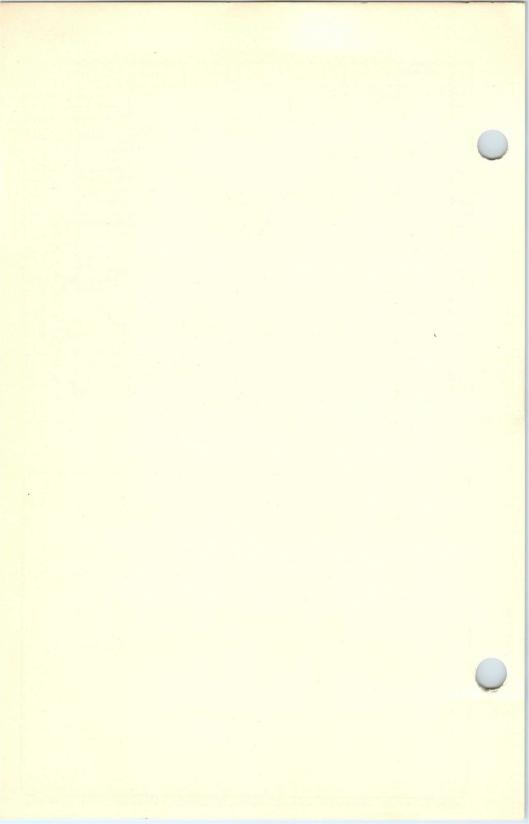
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER

			.0110
			AMP.
PLATE VOLTAGE	135	200	VOLTS
GRID #2 VOLTAGE	135	135	VOLTS
GRID #1 VOLTAGE	-13.5	-14	VOLTS
PEAK AF GRID #1 VOLTAGE	13.5	14	VOLTS
ZERO SIGNAL PLATE CURRENT	58	61	MA.
MAXIMUM SIGNAL PLATE CURRENT	60	66	MA.
ZERO SIGNAL GRID #2 CURRENT	3.5	2.2	MA.
MAXIMUM SIGNAL GRID #2 CURRENT	11.5	9	MA .
TRANSCONDUCTANCE	7 000	7 100	uMHOS
PLATE RESISTANCE (APPROX.)	9 300	18 300	OHMS
LOAD RESISTANCE	2 000	2 600	OHMS
MAXIMUM SIGNAL POWER OUTPUT	3.6	6	WATTS
TOTAL HARMONIC DISTORTION (APPROX.)	10	10	PERCENT

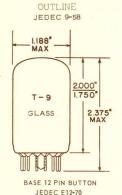






DUAL PENTODE

COMPACTRON



FOR
FM DETECTOR

AND AUDIO APPLICATION
IN T.V. RECEIVERS

2G3 2P | G1 | NC 4 | 9 | IK, IG3 | 2K, IS 2 | H | H

BASING DIAGRAM
JEDEC 12EZ

COATED UNIPOTENTIAL CATHODE

ANY MOUNTING POSTION

BOTTOM VIEW

THE TUNG-SOL 6Y10 IS A 12-PIN T-9 COMPACTRON CONTAINING TWO DISSIMILAR PENTODES. SECTION 1 IS A POWER PENTODE FOR AUDIO APPLICATION. SECTION 2 IS A DUAL CONTROL PENTODE INTENDED FOR USE AS FM DETECTOR IN TV CIRCUITS. ELECTRICALLY, SECTION 1 IS SIMILAR TO TYPE 6GZ5, SECTION 2 IS SIMILAR TO TYPE 6GX6.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

PENTODE 1 - GRID 1 TO PLATE	0.24	pf
INPUT: (G1 TO H + K + I.S. + G2)	7.5	pf.
OUTPUT: (P TO H + K + I.S. + G ₂)	6.0	pf
PENTODE 2 - GRID 1 TO PLATE	0.022	pf
GRID 1 TO ALL (G1 TO H + K + I.S. + G2 + G3 + P)	7.5	pf
GRID 3 TO PLATE	1.5	pf
GRID 3 TO ALL (G to H + K + I.S. + G 1 + G2 + P)	6.5	pf
GRID 1 TO GRID 3	0.15	pf
COUPLING - PLATE TO PLATE	0.075	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM SYSTEM-SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS LIMITS OF APPLIED VOLTAGE - AC OR DC	6.3 VOLTS	0.83 6.3 ± 0.6	AMPS, VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE-BOTH SECTIONS			
HEATER NEGATIVE WITH RESPECT TO CATHODE TOTAL DC AND PEAK		200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE			
DC		100	VOLTS
TOTAL DC AND PEAK		200	VOLTS

- TUNG-SOL -

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

DESIGN MAXIMUM SYSTEM - SEE EIA STANDARD RS-239

	SECTION 1	SECTION 2	
PLATE VOLTAGE	300	300	VOLTS
GRID 2 VOLTAGE	300		VOLTS
GRID 2 SUPPLY VOLTAGE	-	300	VOLTS
POSITIVE DC GRID 3 VOLTAGE	-	25	VOLTS
NEGATIVE DC GRID 3 VOLTAGE	-	100	VOLTS
POSITIVE DC GRID 1 VOLTAGE	0	0	VOLTS
NEGATIVE DC GRID 1 VOLTAGE		50	VOLTS
PLATE DISSIPATION	4.8	1.7	WATTS
GRID 2 DISSIPATION	1.1	SEE CHART	WATTS
UP TO 150 VOLTS	-	1.0	WATTS
CATHODE CURRENT	30	20	MA.
GRID 1 CIRCUIT RESISTANCE			
FIXED BIAS	0.5	0.25	MEGOHMS
SELF BIAS BULB TEMPERATURE	1.0	0.5	MEGOHMS °C

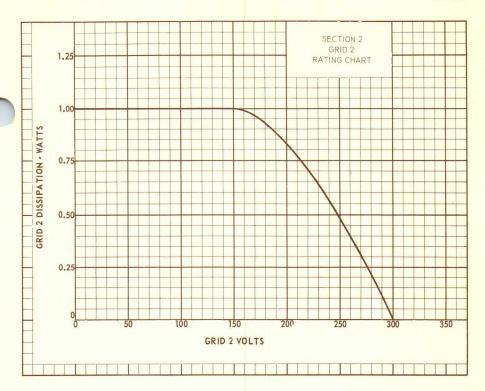
AVERAGE CHARACTERISTICS

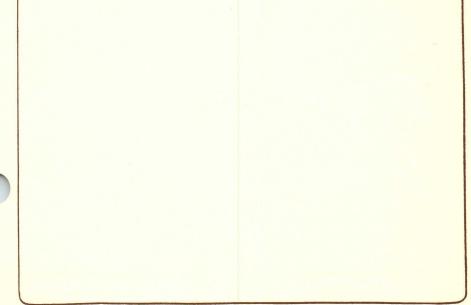
	SECTION 1	SECTION 2	
PLATE VOLTAGE	250	150	VOLTS
GRID 2 VOLTAGE	250	100	VOLTS
GRID 3 VOLTAGE		0	VOLTS
CATHODE RESISTOR	270	180	OHMS
PLATE CURRENT	16	3.7	MA.
GRID 2 CURRENT	2.7	3	MA.
TRANSCONDUCTANCE GRID 1 TO PLATE	8,400	3,700	μMHOS .
GRID 3 TO PLATE	-	600	μMHOS .
PLATE RESISTANCE - APPROX.	0.15	0.14	MEGOHMS
GRID 1 VOLTAGE FOR I $_{\rm b}$ = 20 μ A		-4.5	VOLTS
GRID 3 VOLTAGE FOR Ib = 20 μ A	-	- 7	VOLTS

TYPICAL OPERATION - CLASS AT POWER AMPLIFIER

SECTION 1

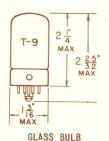
PLATE VOLTAGE	250	250	VOLTS
GRID 2 VOLTAGE	250	250	VOLTS
CATHODE RESISTOR	270	270	OHMS
BYPASSING	NONE	CAPACIT	OR
PEAK AUDIO GRID 1 VOLTAGE	9.8	2.0	VOLTS
LOAD RESISTANCE	15,000	15,000	OHMS
MAXIMUM SIGNAL PLATE CURRENT	16	16	MA.
MAXIMUM SIGNAL GRID 2 CURRENT	5	5	MA.
TOTAL HARMONIC DISTORTION	10	10	%
POWER OUTPUT	1.8	1.1	WATTS







OCTODE



COATED UNIPOTENTIAL CATHODE

HEATER 6.3 VOLTS 150 MA. AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW LOCK-IN 8 PIN BASE 8U

THE 7A8 IS AN OCTODE CONVERTER USING THE LOCK-IN CONSTRUCTION. IT IS DESIGNED FOR USE IN AC, AC/DC AND AUTO RECEIVERS.

DIRECT INTERELECTRODE CAPACITANCES EXTERNAL SHIELD #308 CONNECTED TO PIN #7

MIXER GRID TO PLATE: (G4 TO P) MAX.	0.15	μμf
MIXER GRID TO OSCILLATOR ANODE: (G4 TO G2) MAX.	0.3	μμf
MIXER GRID TO OSCILLATOR GRID: (G4 TO G1) MAX.	0.15	μμf
OSCILLATOR GRID TO OSCILLATOR ANODE: (G4 TO G2)	0.6	μμf
MIXER INPUT: G4 TO (H+K+G1+G2+G3&5+G6+P)	7.5	μμf
MIXER OUTPUT: P TO (H+K+G1+G2+G3&5+G4+G6)	9	muf
OSCILLATOR INPUT: G1 TO (H+K+G4+G3&5+G6+P)	3.8	μμf
OSCILLATOR OUTPUT: G2 TO (H+K+G3&5+G4+G6+P)	3.4	μμf

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER VOLTAGE	6.3	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE	90	VOLTS
MAXIMUM PLATE VOLTAGE	300	VOLTS
MAXIMUM GRIDS #3 AND #5 VOLTAGE	100	VOLTS
MAXIMUM GRIDS #3 AND #5 SUPPLY VOLTAGE	300	VOLTS
MAXIMUM GRID #2 VOLTAGE	200	VOLTS
MAXIMUM GRID #2 SUPPLY VOLTAGE	300	VOLTS
MINIMUM NEGATIVE GRID #4 VOLTAGE	0	VOLTS
MAXIMUM PLATE DISSIPATION	1	WATT
MAXIMUM GRIDS #3 AND #5 DISSIPATION	0.3	WATT
MAXIMUM GRID #2 DISSIPATION	0.75	WATT
MAXIMUM CATHODE CURRENT	13	MA.

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS A

HEATER VOLTAGE	6.3	6.3	VOLTS
HEATER CURRENT	150	150	MA.
PLATE VOLTAGE	100	250	VOLTS
GRIDS #3 AND #5 VOLTAGE	75	100	VOLTS
GRID #2 VOLTAGE B	100	250	VOLTS
GRID #4 VOLTAGE	-3	-3	VOLTS
GRID #1 RESISTOR	50 000	50 000	OHMS
PLATE RESISTANCE (APPROX.)	0.65	0.7	MEGOHM
CONVERSION TRANSCONDUCTANCE	375	550	имноs
PLATE CURRENT	1.8	3	MA -
GRID #3 AND #5 CURRENT	2.7	-3.2	MA.
GRID #2 CURRENT (OSCILLATOR ANODE)	2.8	4.2	MA.
GRID #1 CURRENT (OSCILLATOR GRID)	0.2	0.4	MA.
TOTAL CATHODE CURRENT	7.5	10.8	MA -

A CHARACTERISTICS SHOWN ARE OBTAINED IN THE STANDARD RMA CONVERSION CONDUCTANCE TEST SET WHICH USES SEPARATE EXCITATION. THE CHARACTERISTICS UNDER THESE CONDITIONS CORRESPOND VERY CLOSELY WITH THOSE OBTAINED IN A SELF-EXCITED OSCILLATORY CIRCUIT OPERATING WITH ZERO BIAS.

OSCILLATOR CHARACTERISTICS

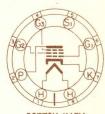
PLATE VOLTAGE	250	VOLTS
GRID #1 VOLTAGE	0	VOLTS
GRID #2 VOLTAGE	180	VOLTS
GRIDS #3 AND #5 VOLTAGE	100	VOLTS
GRID #4 VOLTAGE	0	VOLTS
TRANSCONDUCTANCE BETWEEN GRID #1 AND GRID #2	1 600	имноѕ
AMPLIFICATION FACTOR BETWEEN GRID #1 AND GRID #2	65	
GRID #2 CURRENT (OSCILLATOR ANODE)	10	MA -

Bapplied through a 20,000 ohm dropping resistor.

COATED UNIPOTENTIAL CATHODE

HEATER 6.3 VOLTS 0.8 AMP. AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW LOCK-IN 8 PIN BASE 8 V

GLASS BULB

THE 7AK7 IS A SHARP CUT-OFF PENTODE USING THE LOCK-IN CONSTRUCTION. IT IS DESIGNED AND RATED FOR USE AS A GATING TUBE WITH AN ADDITIONAL CONTROL VOLTAGE ON THE SUPPRESSOR.

DIRECT INTERELECTRODE CAPACITANCES EXTERNAL SHIELD #308 CONNECTED TO PIN #7

GRID TO PLATE: (G4 TO P)	0.7	μμ f
INPUT: G4 TO (H+K+G2+G3&1S)	12	μμf
OUTPUT: P TO (H+K+G2+G3&IS)	9.5	μμf
GRID #3 TO PLATE: (G3 TO P)	4	μμf

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

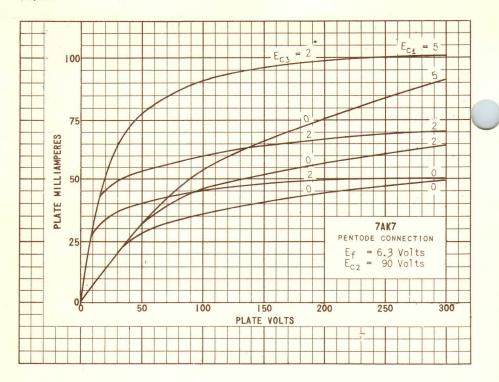
HEATER VOLTAGE	6.3	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE	90	VOLTS
MAXIMUM PLATE VOLTAGE	200	VOLTS
MAXIMUM GRID #2 VOLTAGE	100	VOLTS
MAXIMUM PLATE DISSIPATION	8.5	WATTS
MAXIMUM GRID #2 DISSIPATION	2.5	WATTS
MAXIMUM POSITIVE DC GRID #1 VOLTAGE	50	VOLTS
MAXIMUM POSITIVE DC GRID #3 VOLTAGE	100	VOLTS
MAXIMUM NEGATIVE DC GRID #1 VOLTAGE	-100	VOLTS
MAXIMUM NEGATIVE DC GRID #3 VOLTAGE	-100	VOLTS.

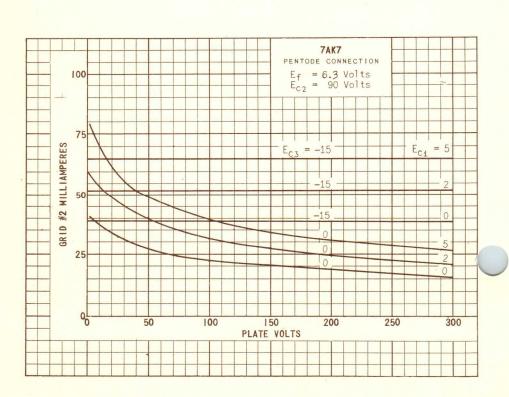
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER

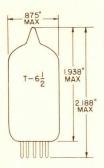
	100			
HEATER VOLTAGE	6.3	6.3	6.3	VOLTS
HEATER CURRENT	0.8	0.8	0.8	AMP .
PLATE VOLTAGE	150	150	150	VOLTS
GRID #2 VOLTAGE	90	90	90	VOLTS
GRID #1 VOLTAGE	0	-11	0	VOLTS
GRID #3 VOLTAGE	0	0	-9.5	VOLTS
TRANSCONDUCTANCE	5 500			имноѕ
PLATE RESISTANCE (APPROX.)	11 500	Select Select Select	2000 Mark 2000	OHMS
PLATE CURRENT (MAX.)	40	2.5 MAX.	2 MAX.	MA.
GRID #2 CURRENT (MAX.)	21	0.45	-►60 MAX.	MA.
GRID #1 VOLTAGE (APPROX.) FOR	-17.5			VOLTS

UNDER GATING OPERATION THE MOMENTARY GRID *2 DISSIPATION MAY APPROXIMATE 4 WATTS PROVIDED THE DISSIPATION AVERAGED OVER ANY 1 SECOND INTERVAL DOES NOT EXCEED THE RATING FOR MAXIMUM GRID *2 DISSIPATION. INDICATES A CHANGE.





TWIN TRIODE



UNIPOTENTIAL CATHODE

FOR
AUDIO FREQUENCY AMPLIFIER
OR COMBINED OSCILLATOR AND
MIXER APPLICATIONS IN
T.V. RECEIVERS

2K 3 7 16 2G 2 8 1K

ANY MOUNTING POSITION

BOTTOM VIEW

BASING DIAGRAM
JEDEC 9A

GLASS BULB

SMALL BUTTON NOVAL

9 PIN BASE E9-1

OUTLINE DRAWING

JEDEC 6-2

THE 7AU7 COMBINES TWO INDEPENDENT MEDIUM-MU INDIRECTLY HEATED CATHODE TYPE TRIODES IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS ADAPTABLE TO APPLICATION EITHER AS
AN AUDIO FREQUENCY AMPLIFIER OR AS A COMBINED OSCILLATOR AND MIXER IN 600 MA. SERIES
HEATER OPERATED TELEVISION RECEIVERS. THERMAL CHARACTERISTICS OF THE HEATER ARE
CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED. WITH THE
EXCEPTION OF HEATER RATINGS AND HEATER WARM-UP TIME IT IS IDENTICAL TO THE 12AU7A.

→ DIRECT INTERELECTRODE CAPACITANCES

	TRIODE UNIT TI	TRIODE UNIT T2	
GRID TO PLATE	1.5	1.5	pf
GRID TO CATHODE	1.6	1.6	pf
PLATE TO CATHODE	0.50	0.35	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS			
HEATER IN SERIES	7.0 VOLTS	300	MA.
HEATER IN PARALLEL	3.5 VOLTS	600	MA.
HEATER WARM-UP TIME (IN PARALLEL)		11	SECONDS
HEATER SUPPLY LIMITS:			
VOLTAGE OPERATION (HEATER IN SERIES)	7.0±0.7	VOLTS
CURRENT OPERATION (HEATER IN PARAL	LEL)	600±40	MA.
MAXIMUM HEATER-CATHODE VOLTAGE:			
HEATER NEGATIVE WITH RESPECT TO CA	THODE		
TOTAL DC AND PEAK		200	VOLTS
HEATER POSITIVE WITH RESPECT TO CAT	HODE		
DC		100	VOLTS
TOTAL DC AND PEAK		200	VOLTS

- TUNG-SOL -

CONTINUED FROM PRECEDING PAGE

→ MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

VALUES ARE	FOR EACH UNIT	VERTICAL	
	CLASS AT	VERTICAL DEFLECTION OSCILLATOR	
PLATE VOLTAGE	330	330	VOLTS
PLATE DISSIPATION:			
EACH PLATE	2.75	2.75	WATTS
BOTH PLATES	5.5	5.5	WATTS
CATHODE CURRENT	22		MA.
PEAK NEGATIVE PULSE GRID VOLTAGE		440	VOLTS
AVERAGE CATHODE CURRENT		22	MA.
PEAK CATHODE CURRENT		66	MA.
MAXIMUM CIRCUIT VALUES: GRID CIRCUIT RESISTANCE: FOR FIXED BIAS, GRID-RESISTOR BIAS,			
OR CATHODE-BIAS OPERATION	2.2	2.2	MEGOHMS
	HORIZONTAL DEFLECTION OSCILLATOR	VERTICAL DEFLECTION AMPLIFIER	
DC PLATE VOLTAGE	330	330	VOLTS
PLATE DISSIPATION			
EACH PLATE	2.75	2.75	WATTS
BOTH PLATES	5.5	5.5	WATTS
PEAK POSITIVE-PULSE PLATE VOLTAGE		1200	VOLTS
PEAK NEGATIVE-PULSE GRID VOLTAGE	660	275	VOLTS
AVERAGE CATHODE CURRENT	22	22	MA.
PEAK CATHODE CURRENT	330	66	MEGOHMS
MAXIMUM CIRCUIT VALUES: GRID CIRCUIT RESISTANCE: FOR FIXED BIAS, GRID-RESISTOR BIAS,	2.2	2.2	MECOLING
OR CATHODE-BIAS OPERATION	2.2	, 2.2	MEGOHMS

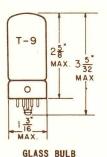
TYPICAL OPERATING CHARACTERISTICS

CLASS A1 AMPLIFIER - EACH UNIT

PLATE VOLTAGE	10	00	250	VOLTS
GRID VOLTAGE	0		-8.5	VOLTS
AMPLIFICATION FACTOR	→ 19	9.5	17	
PLATE RESISTANCE	→ 6	250	7700	OHMS
TRANSCONDUCTANCE	3	100	2200	<i>μ</i> MHOS
PLATE CURRENT	1	1.8	10.5	MA.
GRID VOLTAGE (APPROX.) FOR				
PLATE CURRENT OF 10 MAMP.			-24	VOLTS

HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SEREIS WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

-- INDICATES A CHANGE.



COATED UNIPOTENTIAL CATHODE

HEATER
6.3 VOLTS 450 MA.
AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW LOCK-IN 8 PIN BASE 6AA

THE 7C5 IS A BEAM POWER AMPLIFIER, DESIGNED FOR SERVICE IN THE OUTPUT STAGE OF AC AND STORAGE BATTERY OPERATED RECEIVERS. IT HAS HIGH POWER SENSITIVITY AND HIGH POWER OUTPUT WITH COMPARATIVELY LOW SUPPLY VOLTAGES.

RATINGS INTERPRETED ACCORDING TO RMA STANDARD M8-210

HEATER VOLTAGE	6.3	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE	90	VOLTS
MAXIMUM PLATE VOLTAGE	315	VOLTS
MAXIMUM GRID #2 VOLTAGE	285	VOLTS
MAXIMUM PLATE DISSIPATION	12	WATTS
MAXIMUM GRID #2 DISSIPATION	2	WATTS

TUNG-SOL

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER - SINGLE TUBE

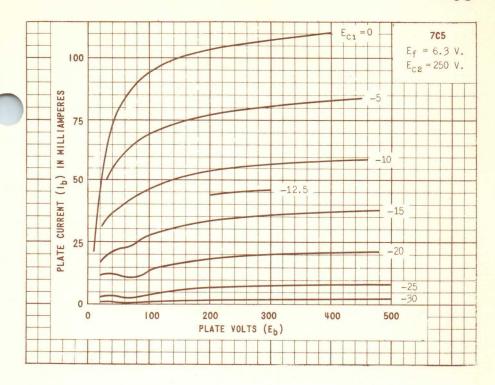
HEATER VOLTAGE	6.3	6.3	6.3	VOLTS	
HEATER CURRENT	450	450	450	MA.	
PLATE VOLTAGE	180	250	315	VOLTS	
GRID #2 VOLTAGE	180	250	225	VOLTS	
GRID #1 VOLTAGEA	-8.5	-12.5	-13	VOLTS	
PEAK AF GRID #1 VOLTAGE	8.5	12.5	13	VOLTS	
ZERO SIGNAL PLATE CURRENT	29	45	34	MA:	
MAXIMUM SIGNAL PLATE CURRENT	30	47	. 35	MA.	
ZERO SIGNAL GRID #2 CURRENT	3	4.5	2.2	MA.	
MAXIMUM SIGNAL GRID #2 CURRENT	4	7	6	MA.	
PLATE RESISTANCE (APPROX.)	58 000	52 000	77 000	OHMS	
TRANSCONDUCTANCE	3 700	4 100	3 750	имноs	
LOAD RESISTANCE	5 500	5 000	8 500	OHMS	
MAXIMUM SIGNAL POWER OUTPUT	2	4.5	5.5	WATTS	
TOTAL HARMONIC DISTORTION (APPROX.)	8	8	12	PERCENT	

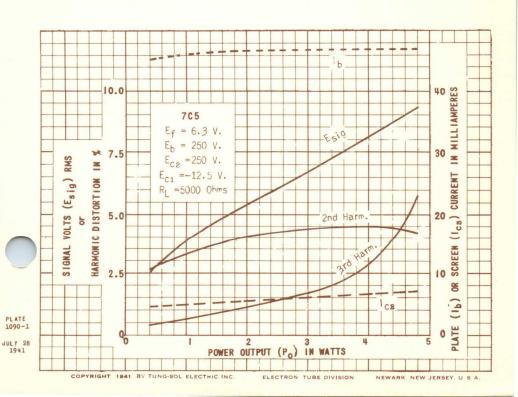
CLASS AB1 PUSH-PULL AMPLIFIER

VALUES ARE FOR TWO TUBES

HEATER VOLTAGE	6.3	6.3	VOLTS
HEATER CURRENT	450	450	MA.
PLATE VOLTAGE	250	285	VOLTS
GRID #2 VOLTAGE	250	285	VOLTS
GRID #1 VOLTAGEA	-15	-19	VOLTS
PEAK AF GRID TO GRID VOLTAGE	30	38	VOLTS
ZERO SIGNAL PLATE CURRENT	70	70	MA.
MAXIMUM SIGNAL PLATE CURRENT	79	92	MA.
ZERO SIGNAL GRID #2 CURRENT	5	4	MA.
MAXIMUM SIGNAL GRID #2 CURRENT	13	13.5	MA.
PLATE TO PLATE LOAD RESISTANCE	10 000	8 000	OHMS
MAXIMUM SIGNAL POWER OUTPUT	10	14	WATTS
TOTAL HARMONIC DISTORTION	5	3.5	PERCENT

AMAXIMUM GRID #1 CIRCUIT RESISTANCE FOR FIXED BIAS = 0.1 MEGOMM.
MAXIMUM GRID #1 CIRCUIT RESISTANCE FOR CATHODE BIAS = 0.5 MEGOMM.





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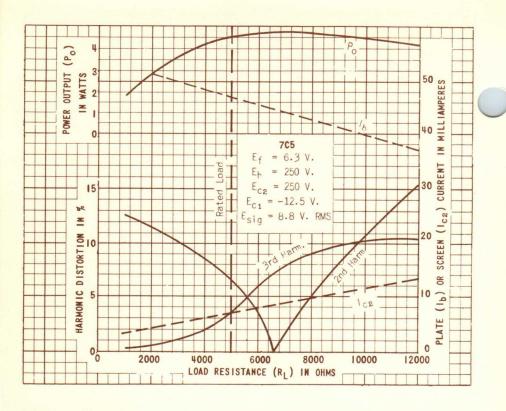
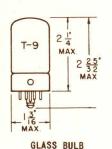


PLATE 1091-1



COATED UNIPOTENTIAL CATHODE

HEATER

6.3 VOLTS 300 MA.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW B PIN BASE

84

THE 7C7 IS A SHARP CUT-OFF GENERAL PURPOSE PENTODE AMPLIFIER.

DIRECT INTERELECTRODE CAPACITANCES WITH RMA SHIELD #308 CONNECTED TO CATHODE

GRID #1 TO PLATE: (G4 TO P)	0.007	μμ f
INPUT: G4 TO (H+K+G2+G3+1S)	6	μμf
OUTPUT: P TO (H+K+G2+G3+1S)	6.5	μμf

RATINGS INTERPRETED ACCORDING TO RMA STANDARD M8-210

HEATER VOLTAGE	6.3	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE	90	VOLTS
MAXIMUM PLATE VOLTAGE	300	VOLTS
MINIMUM GRID #1 VOLTAGE	0	VOLTS
MAXIMUM GRID #2 VOLTAGE	100	VOLTS
MAXIMUM GRID #2 SUPPLY VOLTAGE	300	VOLTS
MAXIMUM PLATE DISSIPATION	1	WATT
MAXIMUM GRID #2 DISSIPATION	0.1	WATT

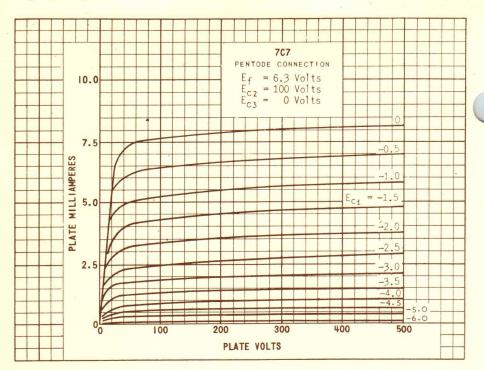
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

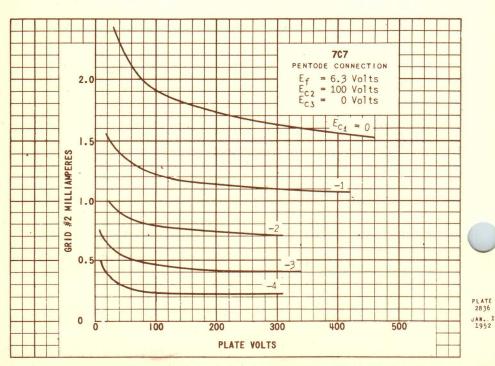
CLASS AT AMPLIFIER

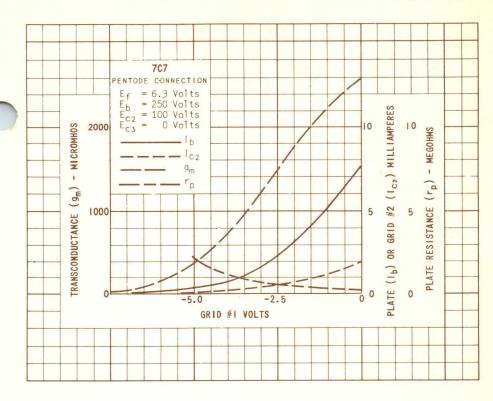
HEATER VOLTAGE				6.3	6.3	VOLTS
HEATER CURRENT				300	300	MA.
PLATE VOLTAGE				100	250	VOLTS
GRID #2 VOLTAGE				100	100	VOLTS
GRID #1 VOLTAGE				-1	-3	VOLTS
SELF-BIAS RESISTO	R			130	1 000	OHMS
GRID #3 VOLTAGE		PINS	#4 AND	#5 CONNECTED	TO PIN #7 A	SOCKET
PLATE CURRENT				5.7	2.2	MA.
GRID #2 CURRENT				1.8	0.7	MA.
PLATE RESISTANCE	(APPROX	.)		0.4	1	MEGOHM
TRANSCONDUCTANCE				2 275	1 575	µмн оѕ
GRID VOLTAGE FOR	CATHODE	CURRENT	CUTOFF	-7	-7	VOLTS

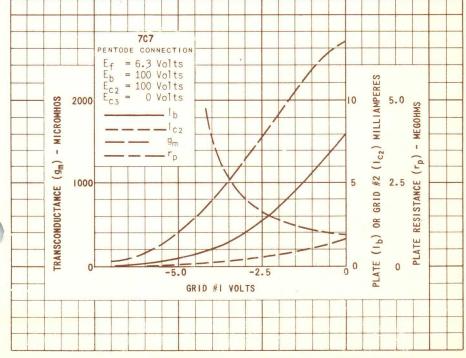
PLATE 2835 JAN. 1 1952

-INDICATES A CHANGE OR ADDITION-



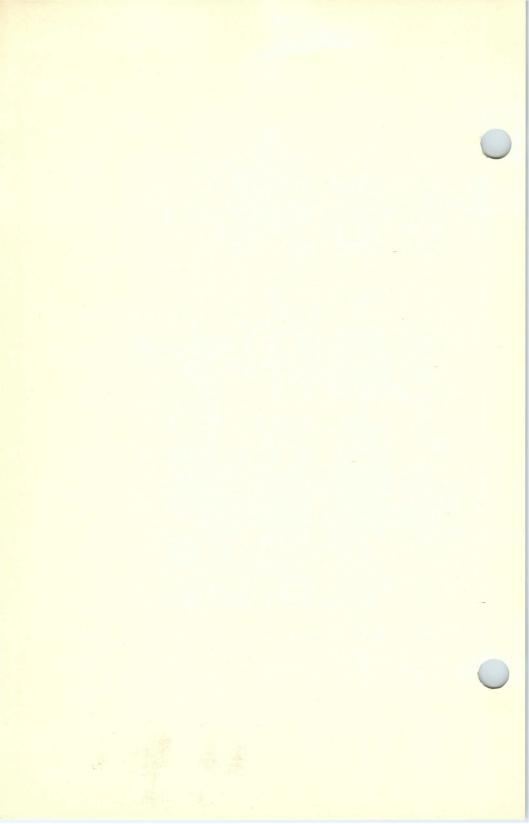




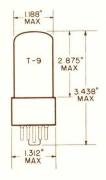


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PLATE 2837 JAN. 1 1952



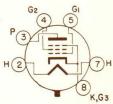
PENTODE



COATED UNIPOTENTIAL CATHODE.

HEATER
7.2 VOLTS 0.6±.04 AMP.
AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
BASING DIAGRAM
JEDEC 7AC

SECONDS

GLASS BULB
INTERMEDIATE-SHELL
6 PIN OCTAL
B6-81 AND B6-84
OUTLINE DRAWING
JEDEC 9-15

THE 7EY6 IS A BEAM POWER PENTODE DESIGNED FOR USE AS THE VERTICAL DEFLECTION AMPLIFIER IN TELEVISION RECEIVERS EMPLOYING 110° DEFLECTION PICTURE TUBES. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

WITHOUT EXTERNAL SHIELD

GRID #1 TO PLATE	0.7	pf
INPUT	8.5	pf
OUTPUT	7.0	r f

RATINGS

INTERPRETED ACCORDING TO DESIGN-MAXIMUM SYSTEM
VERTICAL-DEFLECTION AMPLIFIER SERVICEA

MAXIMUM DC PLATE VOLTAGE	350	VOLTS
MAXIMUM PEAK PULSE PLATE VOLTAGE	2 500	VOLTS
MAXIMUM PEAK NEGATIVE-PULSE GRID #1 VOLTAGE*	250	VOLTS
MAXIMUM SCREEN VOLTAGE	300	VOLTS
MAXIMUM PLATE DISSIPATIONB	11	WATTS
MAXIMUM SCREEN DISSIPATIONB	2.75	WATTS
MAXIMUM DC CATHODE CURRENT	60	MA.
MAXIMUM PEAK CATHODE CURRENT	180	MA.
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC COMPONENT	100	VOLTS
TOTAL DC AND PEAK	200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	200	VOLTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE WITH CATHODE BIAS	2.2	MEGOHMS
MAXIMUM GRID #1 CIRCUIT RESISTANCE WITH FIXED BIAS	1.0	MEGOHMS
MAXIMUM BULB TEMPERATURE AT HOTTEST POINT	200	°C

HEATER WARM-UP TIME (APPROX.)

TUNG-SOL .

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

PLATE VOLTAGE	50	250	VOLTS
SCREEN VOLTAGE	250	250	VOLTS
GRID #1 VOLTAGE	Oc	-17.5	VOLTS
PLATE RESISTANCE (APPROX.)		60 000	OHMS
TRANSCONDUCTANCE		4 400	µмноs
PLATE CURRENT	153	44	MA.
SCREEN CURRENT	21	3.0	MA.
GRID #1 VOLTAGE (APPROX.)		-	
$I_b = 100 \mu AMPS.$		-48	VOLTS

DESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT CONFORM VARIATION, EQUIPMENT CONFORM VARIATION, EQUIPMENT CONFORM VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.

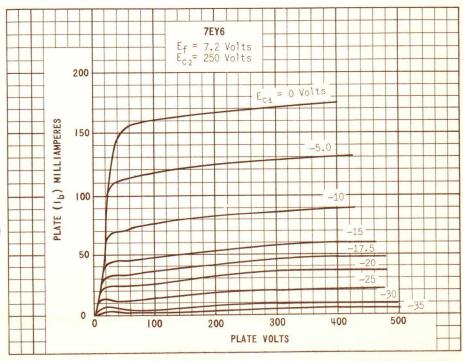
AFOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE.

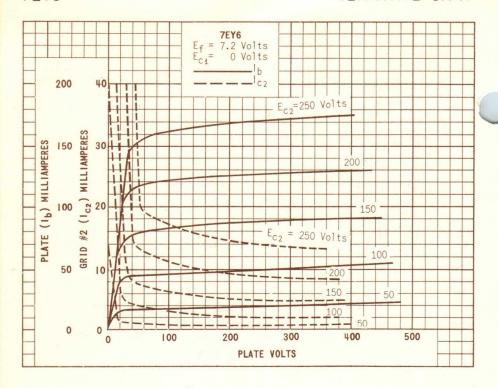
BIN STAGES OPERATING WITH GRID LEAK BIAS, AN ADEQUATE CATHODE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

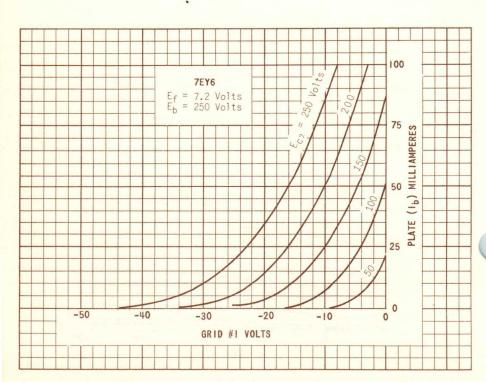
Capplied for short interval (Two seconds maximum) so as not to damage tube.

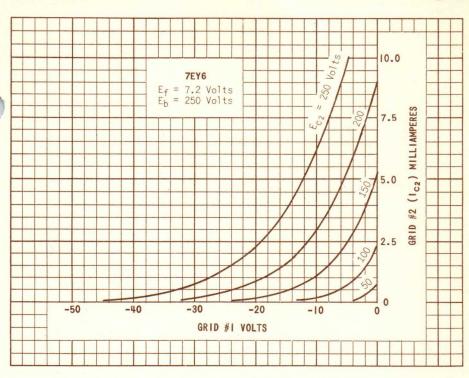
HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THI TUBE MEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING PERISTANCE.

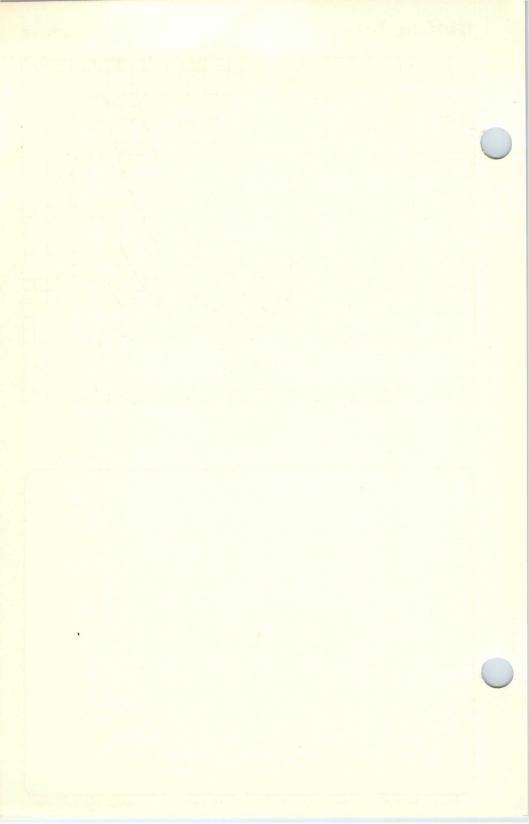
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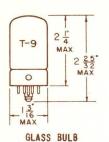












COATED UNIPOTENTIAL CATHODE

HEATER
6.3 VOLTS 300 MA.
AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW LOCK-IN 8 PIN BASE 8AC

THE 7F7 IS A TWIN HIGH-MU TRIODE USING THE LOCK-IN CONSTRUCTION. IT IS DESIGNED FOR USE AS A VOLTAGE AMPLIFIER IN RESISTANCE COUPLED CASCADE OR PHASE INVERTER SERVICE.

DIRECT INTERELECTRODE CAPACITANCES WITH RMA #308 SHIELD CONNECTED TO CATHODE

	TRIODE UNIT 1	TRIODE UNIT 2	
GRID-TO PLATE: (G TO P)	1.6	1.6	μμf
INPUT: G TO (H+K)	2.4	2.4	μμf
OUTPUT: P TO (H+K)	2.0	2.0	μμf
GRID TO GRID: (G TO G) MAX.	0.	2	μμf
PLATE TO PLATE: (P TO P) MAX.	1.	0	μμ f

RATINGS INTERPRETED ACCORDING TO RMA STANDARD M8-210

HEATER VOLTAGE	6.3	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE	90	VOLTS
MAXIMUM PLATE VOLTAGE	300	VOLTS
MINIMUM EXTERNAL GRID BIAS VOLTAGE	0	VOLTS
MAXIMUM PLATE DISSIPATION PER UNIT	1	WATT

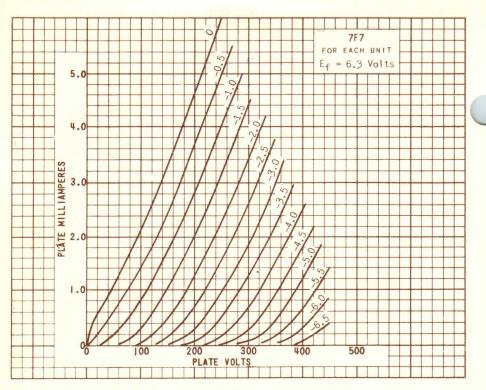
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

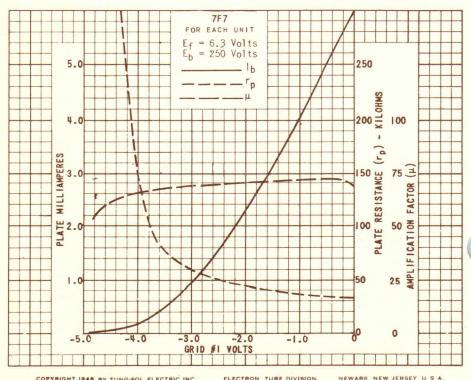
CLASS A1 AMPLIFIER - EACH TRIODE UNIT

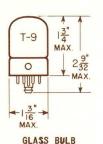
	T AME ET TER EACH TRIOD	C OILI	
HEATER VOLTAGE	6.3	6.3	VOLTS
HEATER CURRENT	300	300	MA -
PLATE VOLTAGE	100	250	VOLTS
GRID VOLTAGE	-1	-2	VOLTS
PLATE CURRENT	0.65	2.3	MA.
PLATE RESISTANCE	62 000	44 000	OHMS
TRANSCONDUCTANCE	1 125	1 600	имноѕ
AMPLIFICATION FACTOR	70	70	

SIMILAR TYPE REFERENCES: Characteristics are identical to type 68176%.









COATED UNIPOTENTIAL CATHODE

HEATER 12.6 VOLTS 150 MA. AC OR DC ANY MOUNTING POSITION



BOTTOM VIEW B PIN BASE 8BW

THE 7F8 COMBINES TWO HIGH TRANSCONDUCTANCE TRIODES IN THE LOCK-IN CONSTRUCTION. IT IS DESIGNED FOR USE AT FREQUENCIES UP TO 300 OR 400 MC. IT MAY ALSO BE USED AS A PUSH-PULL UHF AMPLIFIER AND IS PARTICULARLY WELL ADAPTED FOR USE AS A CONVERTER FOR THE NEW FM AND TELEVISION BANDS BECAUSE OF THE LOW EQUIVALENT NOISE RESISTANCE OBTAINED WITH A TRIODE CONVERTER.

DIRECT INTERELECTRODE CAPACITANCES EXTERNAL SHIELD #308 CONNECTED TO PINS #4 & #5

GRID TO PLATE: (G TO P) EACH SECTION	1.6 ←	μμf
INPUT: G TO (H+K) EACH SECTION	2.8	muf
OUTPUT: P TO (H+K) EACH SECTION	1.4	μμf
GRID TO GRID: (G TO G) MAX.	0.1	muf
PLATE TO PLATE: (P TO P) MAX.	0.5	μμf
HEATER TO CATHODE: (H TO K) EACH SECTION EXTERNAL SHIELD GROUNDED	2.8	μμf

RATINGS

INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

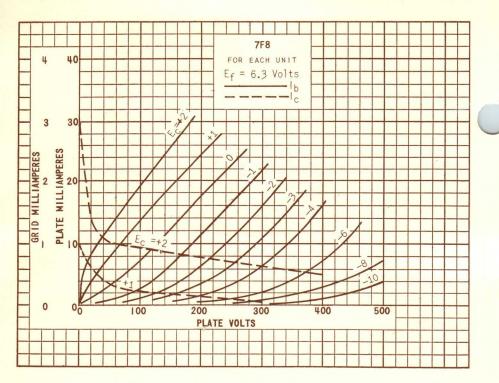
HEATER VOLTAGE	6.3	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE	90	VOLTS
MAXIMUM PLATE VOLTAGE	300	VOLTS
MAXIMUM PLATE DISSIPATION (EACH SECTION)	3.5	WATTS
MAXIMUM TOTAL PLATE DISSIPATION (BOTH SECTIONS)	3.5	WATTS
MAXIMUM GRID CIRCUIT RESISTANCE (CATHODE BIAS)	0.5	MEGOHM
MAXIMUM GRID CIRCUIT RESISTANCE (FIXED BIAS)	0.1	MEGOHM

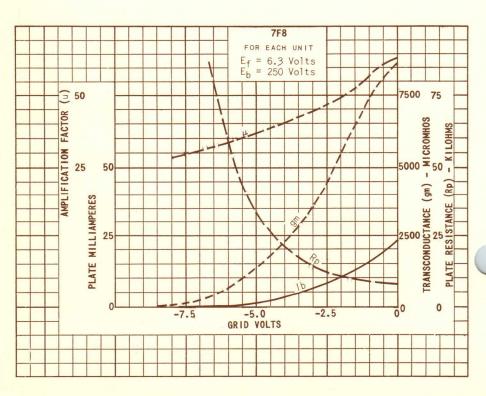
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER - EACH TRIODE UNIT

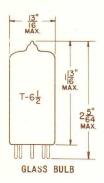
HEATER VOLTAGE (BOTH SECTIONS)	6.3	VOLTS
HEATER CURRENT (BOTH SECTIONS)	300	MA .
PLATE VOLTAGE	250	VOLTS
CATHODE-BIAS RESISTOR	500	OHMS
AMPLIFICATION FACTOR	48	
TRANSCONDUCTANCE	3 300	имноs
PLATE CURRENJ	6	MA .
GRID VOLTAGE (APPROX.) FOR I = 10 MA.	-11	VOLTS

- INDICAJES A CHANGE





MINIATURE TYPE



HEATER 7.2 VOLTS 0.30 AMP. ANY MOUNTING POSITION

THE TRIODE ON PINS 6,7,8 & 9 SHOULD HAVE GROUNDED CATHODE CONNECTION, AND THAT ON PINS 1,2,2 & 3 SHOULD HAVE GROUNDED GRID CONNECTION. IT IS RECOMMENDED THAT PINS 7 & 8 BE STRAPPED.



BOTTOM VIEW MINIATURE 9 PIN BASE

900

THE 7FC7 IS A FRAME GRID DOUBLE TRIODE IN THE 9 PIN MINIATURE CONSTRUC-TION. IT IS INTENDED FOR USE AS A CASCODE AMPLIFIER AT FREQUENCIES UP TO 220 MEGACYCLES PER SECOND. EXCEPT FOR HEATER RATINGS, THE 7FC7 IS IDEN-TICAL TO THE 6FC7.

DIRECT INTERELECTRODE CAPACITANCES

WITH EXTERNAL SHIELD

PLATE #1 TO PLATE #2 (MAX.)	0.015	μμf
GRID #1 TO PLATE #2 (MAX.)	0.005	$\mu\mu$ f
GROUNDED CATHODE SECTION:		
PLATE TO GRID	1.9	μμ f
INPUT	3.8	μμf
OUTPUT	2.5	μμf
GRID TO HEATER (MAX.)	0.3	$\mu\mu$ f
GROUNDED GRID SECTION:		
PLATE TO GRID	4.1	μμf
PLATE TO CATHODE	0.2	μμ f
INPUT	6.3	μμf
OUTPUT TO THE PROPERTY OF THE	4.5	μμ f
CATHODE TO HEATER	2.9	μμ f

RATINGS

INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM EACH SECTION

HEATER VOLTAGE	7.2	VOLTS
MAXIMUM PLATE VOLTAGE	130	VOLTS
MAXIMUM PLATE DISSIPATION	1.8	WATTS
MAXIMUM CATHODE CURRENT	22	MA.
MAXIMUM NEGATIVE GRID VOLTAGE	50	VOLTS
MAXIMUM GRID CIRCUIT RESISTANCE (GROUNDED CATHODE SECT.)	1.0	MEGOHMS
MAXIMUM GRID CIRCUIT RESISTANCE (GROUNDED GRID SECT.)	500	KOHMS
MAXIMUM HEATER TO CATHODE VOLTAGE (RMS)	50	VOLTS
MAXIMUM HEATER TO CATHODE VOLTAGE (HEATER NEGATIVE) A	180	VOLTS

AMAXIMUM DC COMPONENT 130 V.

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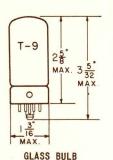
TUMG-SOL

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CHARACTERISTICS

EACH SECTION

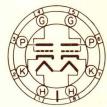
HEATER VOLTAGE	7.2	VOLTS
HEATER CURRENT	0.30	AMP.
PLATE VOLTAGE	90	VOLTS
PLATE CURRENT	15	MA.
GRID VOLTAGE	-1.2	VOLTS
MUTUAL CONDUCTANCE	12 000	µмноs
NOISE FACTOR (IN CASCODE CIRCUIT)	5.5	dB



COATED UNIPOTENTIAL CATHODE

HEATER 6.3 VOLTS 600 MA.

AC OR DC ANY MOUNTING POSITION



BOTTOM VIEW LOCK-IN 8 PIN BASE

8AC

THE 7N7 COMBINES TWO LOW-MU TRIODES IN THE LOCK-IN CONSTRUCTION. IT IS DESIGNED FOR USE EITHER AS A PHASE INVERTER OR AS A VOLTAGE AMPLIFIER.

DIRECT INTERELECTRODE CAPACITANCES WITH RMA SHIELD #308 CONNECTED TO CATHODE

	TRIODE ^A	TRIODE ^B	
GRID TO PLATE: (G TO P)	3	3	μμf
INPUT: G TO (H+K)	3.4	2.9	μμf
OUTPUT: P TO (H+K)	2	2.4	μμf
GRID TO GRID: (1G TO 2G)	0.	4	μμf
PLATE TO PLATE: (1P TO 2P)	0.3	54	μμf
GRID TO PLATE: (1G TO 2P)	0.0	8	μμf
GRID TO PLATE: (2G TO 1P)	0.0	16	μμf

ATRIODE I - CONNECTED TO PINS 5, 6, AND 7.

RATINGS INTERPRETED ACCORDING TO RMA STANDARD M8-210

HEATER VOLTAGE	6.3	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE	90	VOLTS
MAXIMUM PLATE VOLTAGE	300	VOLTS
MINIMUM GRID VOLTAGE	0	VOLTS
MAXIMUM PLATE DISSIPATION (EACH SECTION)	2.5	WATTS

CONTINUED ON FOLLOWING PAGE

>INDICATES A CHANGE OR ADDITION.

BTRIODE II - CONNECTED TO PINS 2, 3, AND 4.

TUNG-SOL

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

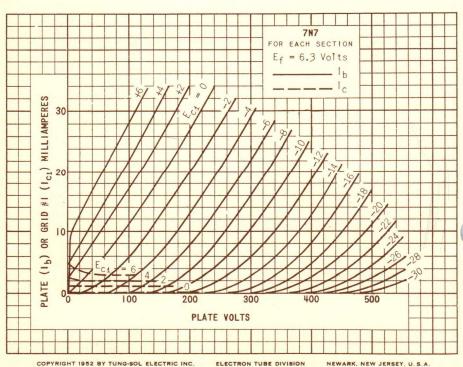
CLASS A1 AMPLIFIER

	1 		
HEATER VOLTAGE	6.3	6.3	VOLTS
HEATER CURRENT	600	600	MA.
PLATE VOLTAGE	90	250	VOLTS
GRID VOLTAGE	0	-8	VOLTS
SELF-BIAS RESISTOR	0	900	OHMS
PLATE CURRENT	10	9	MA.
PLATE RESISTANCE	6 700	7 700	OHMS
TRANSCONDUCTANCE	3 000	2 600	µмноs
AMPLIFICATION FACTOR	20	20	

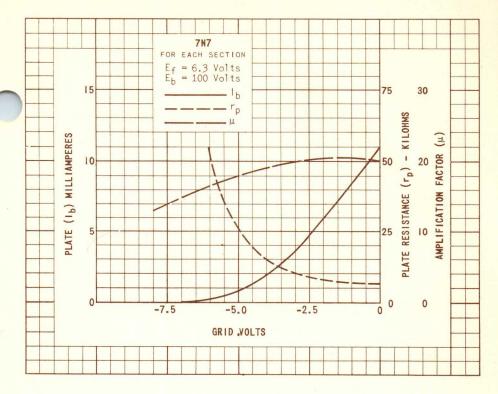
PHASE INVERTER

HEATER VOLTAGE	6.3	6.3	VOLTS
HEATER CURRENT	600	600	MA
PLATE SUPPLY VOLTAGE	100	250	VOLTS
GRID VOLTAGE	-2.25	-5.5	VOLTS
PLATE RESISTOR	30 000	50 000	OHMS
SELF-BIAS RESISTOR	750	1 150	OHMS
MAXIMUM OUTPUT VOLTAGE (RMS)	20	65	VOLTS

-INDICATES A CHANGE OR ADDITION.



2909



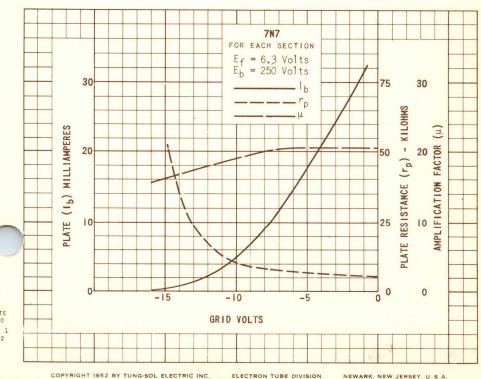
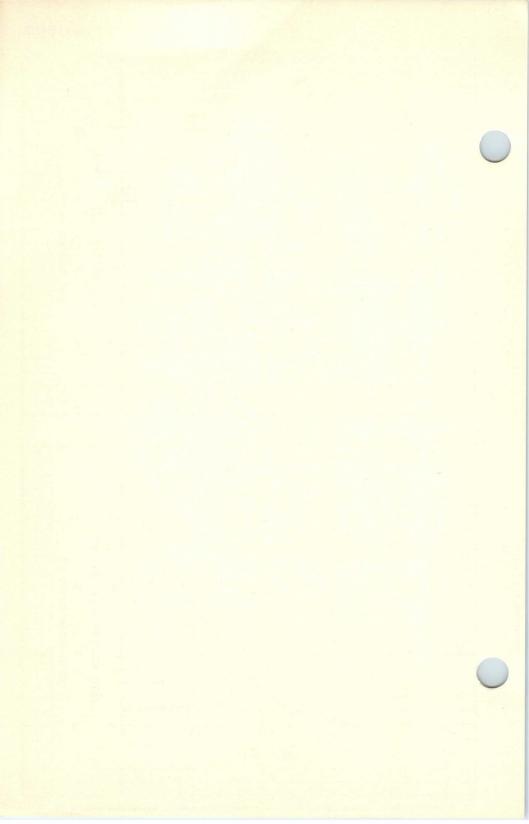


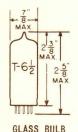
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TRIODE PENTODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE HEATER

8.4 VOLTS 0.45 AMP. AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW MINIATURE BUTTON

9DX

THE 8AU8 AND 8AU8A ARE GENERAL PURPOSE MINIATURE TUBES CONTAINING A SHARP-CUTOFF PENTODE AND A MEDIUM-MU TRIODE IN ONE ENVELOPE. EACH SECTION HAS ITS OWN CATHODE AND IS ELECTRICALLY INDEPENDENT. THEY ARE DESIGNED FOR USE IN 450 MA. SERIES HEATER OPERATED MONOCHROME AND COLOR TELEVISION RECEIVERS. THERMAL CHARACTERISTICS OF THE HEATERS ARE CON-TROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED THEY ARE USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED. THE PENTODE SECTIONS ARE PARTICULARLY SUITED FOR USE AS VIDEO AMPLIFIERS, VIDEO IF AMPLIFIERS, AND SOUND IF AMPLIFIERS. THE TRIODE SECTIONS ARE INTENDED FOR USE AS SYNC AMPLIFIERS, SEPARATORS OR CLIPPERS, OR AS SWEEP OSCILLATORS. THE 8AU8A DIFFERS FROM THE 8AU8 PRIMARILY BY INCORPORATING A CONTROLLED PLATE-KNEE CHARACTERISTIC.

DIRECT INTERELECTRODE CAPACITANCES

	PENTODE	TRIODE	
GRID TO PLATE	0.06 ^A	2.2	uu f
INPUT	7.5	2.6	ии f
OUTPUT	3.4 ^B	0.34	иµ f
PENTODE GRID #1 TO TRIODE PLATE	0.0	06	ии f
TRIODE GRID TO PENTODE PLATE	0.0	22	uu f
PENTODE PLATE TO TRIODE PLATE	0.	12	иµ f

AVALUE FOR 8AU8: 0.044

BVALUE FOR 8AU8: 2.4

CONTINUED ON FOLLOWING PAGE

TUNG-SOL -

CONTINUED FROM PRECEDING PAGE

RATINGS NTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

INTERPRETED ACCORDING TO DESIGN CE	NIER SYSTEM		
	PENTODE	TRIODE	
HEATER VOLTAGE	8.4		VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE:			
HEATER NEGATIVE WITH RESPECT TO CATHODE			
TOTAL DC AND PEAK	200		VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE			
DC	100		VOLTS
TOTAL DC AND PEAK	200		VOLTS
MAXIMUM PLATE VOLTAGE	300	300	VOLTS
MAXIMUM GRID #2 SUPPLY VOLTAGE	300		VOLTS
MAXIMUM GRID #2 VOLTAGE	SEE RATING	CHART	
MAXIMUM POSITIVE DC GRID #1 VOLTAGE	0	0	VOLTS
MAXIMUM PLATE DISSIPATION	3.0	2.5	WATTS
MAXIMUM GRID #2 DISSIPATION	1.0		WATTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE:			
FIXED BIAS	0.25	0.5	MEGOHM
CATHODE BIAS	1.0	1.0	MEGOHM
HEATER WARM-UP TIME (APPROX.) A	11.0		SECONDS

AHEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

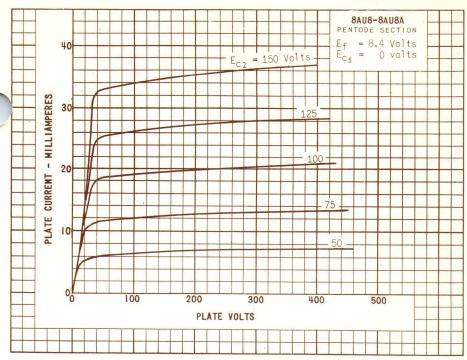
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

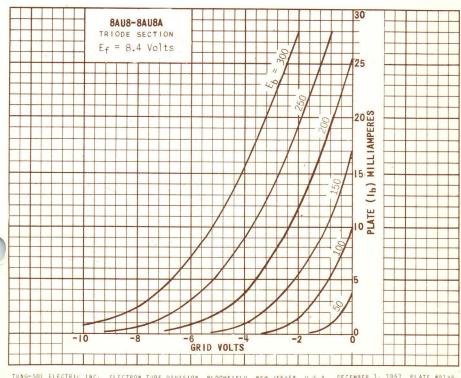
CLASS A1 AMPLIFIER

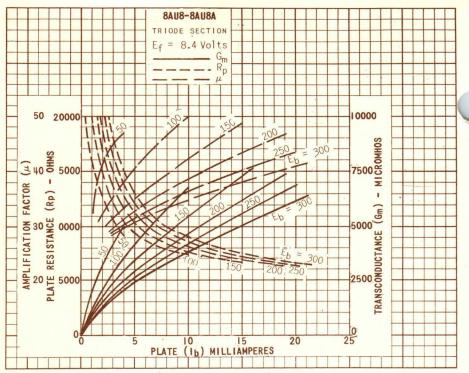
	PENTODE SECTION	SECTION	
HEATER VOLTAGE	8.4	+	VOLTS
HEATER CURRENT	0.45	5	AMP.
PLATE VOLTAGE	200	150	VOLTS
GRID #2 VOLTAGE	125		VOLTS
CATHODE BIAS RESISTOR	82	150	OHMS
AMPLIFICATION FACTOR		40	
PLATE RESISTANCE (APPROX.)	150 000	8 200	OHMS
TRANSCONDUCTANCE	7 000	4 900	MHOS
PLATE CURRENT	15	9.0	MA.
GRID #2 CURRENT	3.4		MA.
GRID #1 VOLTAGE (APPROX.) FOR			
1 b = 100 μΑΜΡ.	-8	-6.5	VCLTS

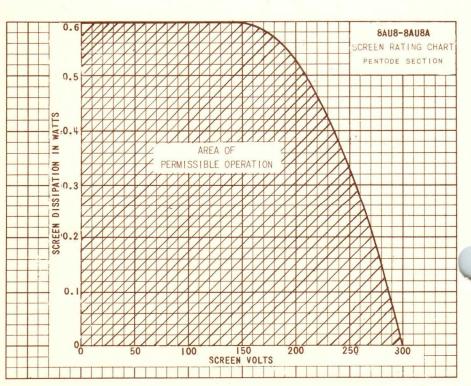
NOTE:

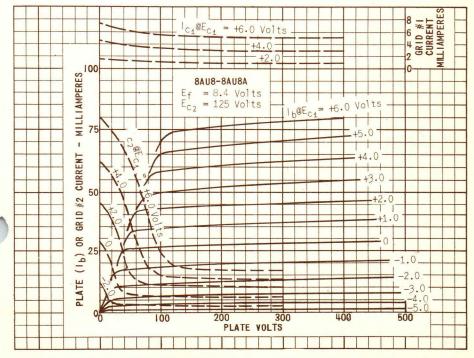
THE TRIODE SECTION OF THE BAUBA MAY BE DIODE-CONNECTED AND EMPLOYED AS A HIGH-PERVEANCE DIODE IN VIDEO-DETECTOR APPLICATIONS. THE DIODE OPERATION CAN BE OBTAINED EITHER WITH THE TRIODE GRID CONNECTED TO THE TRIODE PLATE AND THE COMBINATION OPERATED AS THE PLATE OF THE DIODE, OR WITH THE TRIODE PLATE GROUNDED AND THE TRIODE GRID OPERATED AS THE PLATE OF THE DIODE.

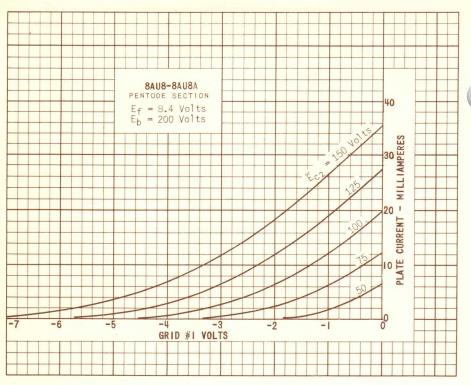


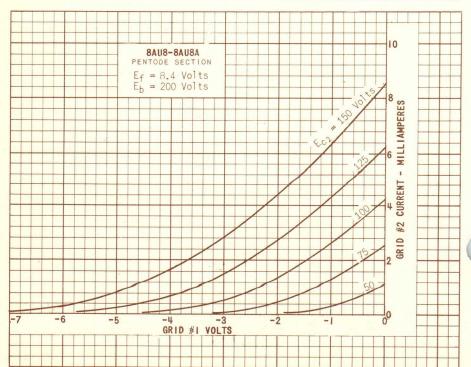


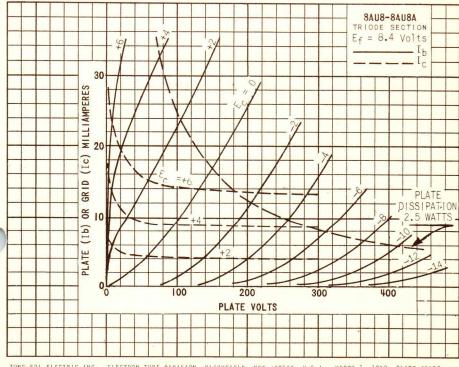




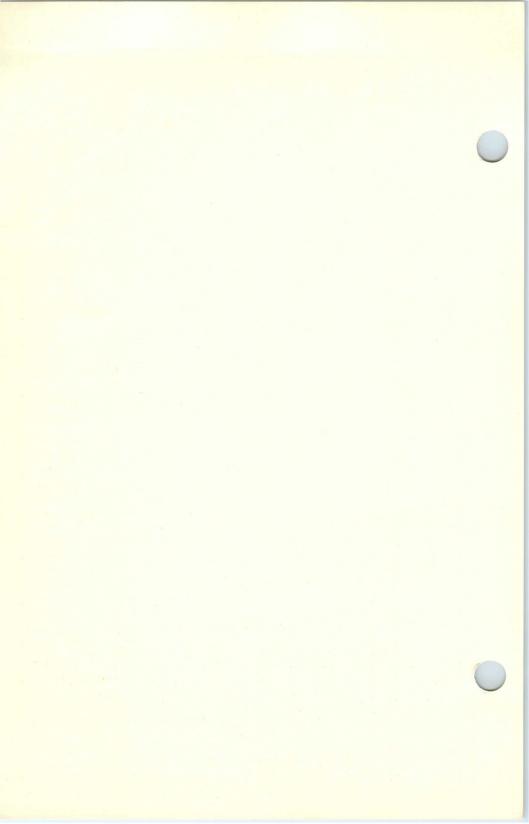


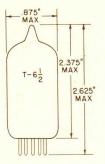






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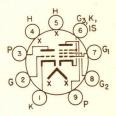
GLASS BULB MINIATURE BUTTON 9 PIN BASE E9-1 OUTLINE DRAWING JEDEC 6-3

COATED UNIPOTENTIAL CATHODE

FOR USE AS A SYNC SEPARATOR

AND VIDEO AMPLIFIER

ANY MOUNTING POSITION



BOTTOM VIEW BASING DIAGRAM JEDEC 9DX

THE 8AW8A IS A SHARP CUT-OFF PENTODE AND A HIGH MU TRIODE FEATURING A CONTROLLED PLATE KNEE CHARACTERISTIC FOR THE PENTODE SECTION, THE TRIODE SECTION MAY BE USED AS A SYNC SEPARATOR WHILE THE PENTODE SECTION IS DESIGNED TO SERVE AS A VIDEO AMPLI-FIER. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED.

DIRECT INTERELECTRODE CAPACITANCES

	WITH A	WITHOUT SHIELD	
PENTODE GRID 1 TO PENTODE PLATE (PG1 TO PP) MAX.	→ 0.05	→ 0.06	pf
PENTODE INPUT: PG TO (H+PG2+PK,G3,I.S.)	10	10	pf
PENTODE OUT PUT: PP TO (H+ PG2+PK, G3, I.S.)	4.5	3.6	pf
TRIODE GRID TO TRIODE PLATE: (TG TO TP)	2.2	2.2	pf
TRIODE INPUT: TG TO (H+TK=PK, PG3, I.S.)	3.4	3.2	pf
TRIODE OUTPUT: TP TO (H+TK-PK, PG3, I.S,)	3.0	1.8	pf
PENTODE GRID 1 TO TRIODE PLATE: (PG1 TO TP) MAX.	.005	.008	pf
PENTODE PLATE TO TRIODE PLATE: (PP TO TP) MAX.	.025	.150	pf

EXTERNAL SHIELD 315 CONNECTED TO PIN 4 AND PIN 5.

CONTINUED ON FOLLOWING PAGE

-INDICATES A CHANGE.

TUNG-SOL

CONTINUED FROM PRECEDING PAGE

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS HEATER WARM-UP TIME B	8.4 VOLTS	450 11	MA. SECONDS
HEATER SUPPLY LIMITS:			
CURRENT OPERATION (SERIES H	EATER OPERATION)	450±30	MA.
MAXIMUM HEATER-CATHODE VOLTAGE	GE:		
HEATER NEGATIVE WITH RESPEC			
TOTAL DC AND PEAK		200	VOLTS
HEATER POSITIVE WITH RESPECT	T TO CATHODE		
DC		100	VOLTS
TOTAL DC AND PEAK		200	VOLTS

MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

	TRIODE	PENTODE	
PLATE VOLTAGE	330	330	VOLTS
GRID 2 VOLTAGE		SEE J5-C4-2	
GRID 2 SUPPLY VOLTAGE		330	VOLTS
PLATE DISSIPATION	1.1	3.75	WATTS
GRID 2 DISSIPATION		1.1	WATTS
POSITIVE DC GRID 1 VOLTAGE	0	0	VOLTS
GRID 1 CIRCUIT RESISTANCE			
FOR CATHODE-BIAS OPERATION	1.0	1.0	MEGOHM
FOR FIXED BIAS OPERATION	0.5	0.25	MEGOHM

TYPICAL OPERATING CHARACTERISTICS

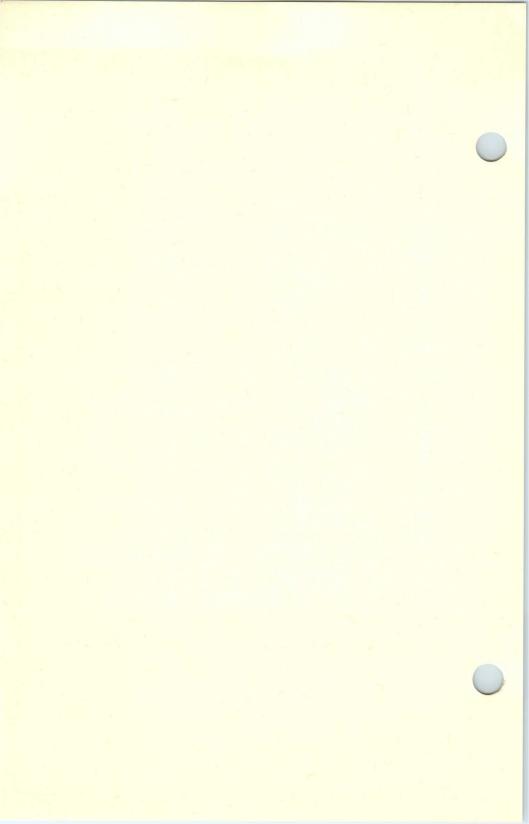
CLASS A1 AMPLIFIER

	TRIODE	PEN	TODE	
PLATE SUPPLY VOLTAGE	200	65	150	VOLTS
GRID 2 SUPPLY VOLTAGE		150	150	VOLTS
GRID 1 VOLTAGE	-2	0		VOLTS
CATHODE BIAS RESISTOR			150	OHMS
AMPLIFICATION FACTOR	70			
PLATE RESISTANCE (APPROX.)			200	KOHMS
TRANSCONDUCTANCE	4000		9500	<i>μ</i> MHOS
PLATE CURRENT	4.0	46	15.0	MA.
GRID 2 CURRENT		15	3.5	MA.
GRID 1 VOLTAGE (APPROX.)				
FOR $1b = 20 \mu A$	-5		-8	VOLTS

HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SEREIS WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

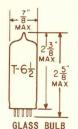
FOR SERIES HEATER OPERATION, THE EQUIPMENT DESIGNER SHALL SO DESIGN THE EQUIPMENT THAT HEATER CURRENT IS AT THE SPECIFIED BOGEY VALUE, WITH HEATER SUPPLY VARIATIONS RESTRICTED TO MAINTAIN HEATER CURRENT WITHIN THE SPECIFIED TOLERANCE.

C
FOR PARALLEL HEATER OPERATION, THE EQUIPMENT DESIGNER SHALL SO DESIGN THE EQUIPMENT THAT
THE HEATER VOLTAGE IS AT THE SPECIFIED BOGEY VALUE, WITH HEATER SUPPLY VARIATIONS RESTRICTED TO MAINTAIN HEATER VOLTAGE WITHIN THE SPECIFIED TOLERANCE.



TUNG-SOL

TRIODE PENTODE



COATED UNIPOTENTIAL CATHODE

HEATER 8.4 VOLTS 0.45 AMP. AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
9 PIN BASE
90X

THE 8BA8A IS A MINIATURE MEDIUM—MU TRIODE AND SHARP CUTOFF PENTODE WHICH HAS A CONTROLLED PLATE KNEE CHARACTERISTIC. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM—UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED.

DIRECT INTERELECTRODE CAPACITANCES WITHOUT SHIELDA TRIODE SHIELD GRID TO PLATE: (G TO P) 2.2 2.2 шиf INPUT: G TO (H + K) 2.7 2.5 U.U. f OUTPUT: P TO (H + K) 1.9 0.4 щиf PENTODE 0.03 0.04 GRID TO PLATE: (G1 TO P) ццf 10.0 10.0 INPUT: G TO (H+K+G2+G3+1.S.) LLLF 4.5 3.6 шиf OUTPUT: P TO (H+K+G2+G3+1.S.) COUPLING PENTODE GRID #1 TO TRIODE PLATE 0.003 0.006 uu f PENTODE PLATE TO TRIODE GRID 0.006 0.016 uu f PENTODE PLATE TO TRIODE PLATE 0.050 0.200 UU f

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER-SYSTEM

	TRIODE	PENTODE	
HEATER VOLTAGE	8.	4	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE:			
HEATER POSITIVE WITH RESPECT TO CATHODE			
DC AND PEAK	20		VOLTS
DC	10	0	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE	-0		
DC AND PEAK	20	0	VOLTS
MAXIMUM PLATE VOLTAGE	300	300	VOLTS
MAXIMUM GRID #2 SUPPLY VOLTAGE		300	VOLTS
MAXIMUM GRID #2 VOLTAGE	SEE RATIN	IG CHART	
MAXIMUM PLATE DISSIPATION	2.0	3.25	WATTS
MAXIMUM GRID #2 DISSIPATION		1.0	WATT
MAXIMUM NEGATIVE GRID #1 VOLTAGE		50	VOLTS
MAXIMUM POSITIVE GRID #1 VOLTAGE	-	0	VOLTS
MAXIMUM GRID #4 CIRCUIT RESISTANCE:			
FIXED BIAS	0.5	0.25	MEGOHM
SELF BIAS	1.0	1.0	MEGOHM
HEATER WARM-UP TIME (APPROX.) B	11	•0	SECONDS

ASHIELD #315 TIED TO CATHODE BASE PIN OF SECTION UNDER TEST.

BHEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

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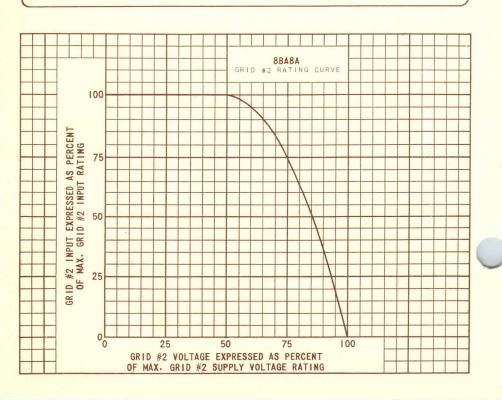
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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

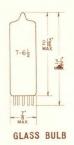
CLASS A1 AMPLIFIER

	TRIODE	PENTODE	
HEATER VOLTAGE		8.4	VOLTS
HEATER CURRENT		0.45	AMP.
PLATE VOLTAGE	200	200	VOLTS
GRID #2 VOLTAGE	-	150	VOLTS
GRID #1 VOLTAGE	-8	0	VOLTS
CATHODE BIAS RESISTOR		180	OHMS
AMPLIFICATION FACTOR	18		
PLATE RESISTANCE (APPROX.)	6 700	400 000	OHMS
TRANSCONDUCTANCE	2 700	9 000	μMHOS.
PLATE CURRENT	8.0	13	MA.
GRID #2 CURRENT		3.5	NIA -
GRID #1 VOLTAGE FOR ID = 10 UA. (APPROX.)	-16	-10	VOLTS
ZERO BIAS: WITH Eb =65V., AND Ec2 =150 V.,	(INSTANT	ANEOUS VALUES)	
PLATE CURRENT		42	MA.
GRID #2 CURRENT		12.5	MA.

SIMILAR TYPE REFERENCE: 6BA8A



PENTODE



COATED UNIPOTENTIAL CATHODE

HEATER

8.0±0.7 VOLTS 0.60 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

SMALL BUTTON 9 PIN BASE 9 C V

THE 8805 IS AN OUTPUT PENTODE DESIGNED FOR USE IN MEDIUM POWER HI-FI AMPLIFIERS.

DIRECT INTERELECTRODE CAPACITANCES

GRID #1 TO ALL ELEMENTS EXCEPT PLATE	10.8	μμ f
PLATE TO ALL OTHER ELEMENTS EXCEPT GRID #1	6.5	μμf
PLATE TO GRID #1	0.5	μμf
GRID #1 TO HEATER	0.25	μμ f

RATINGS

INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER VOLTAGE	8.0±0.7	VOLTS
MAXIMUM PLATE VOLTAGE	300	VOLTS
MAXIMUM PLATE DISSIPATION	12	WATTS
MAXIMUM GRID #2 VOLTAGE	300	VOLTS
MAXIMUM GRID #2 DISSIPATION (ZERO SIGNAL)	2.0	WATTS
MAXIMUM GRID #2 DISSIPATION (MAX. SIGNAL)	4.0	WATTS
MAXIMUM CATHODE CURRENT	65	MA.
MAXIMUM GRID RESISTANCE (CATHODE BIAS)	1.0	MΩ
MAXIMUM GRID RESISTANCE (FIXED BIAS)	300	KΩ
MAXIMUM FILAMENT TO GATHODE VOLTAGE	100	VOLTS

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

PLATE VOLTAGE	250	VOLTS
GRID #2 VOLTAGE	250	VOLTS
PLATE CURRENT	48	MA.
GRID #2 CURRENT	5.5	MA.
GRID #1 VOLTAGE	-7.3	VOLTS
TRANSCONDUCTANCE	11 300	µмноѕ
PLATE RESISTANCE	40	KΩ
AMPLIFICATION FACTOR		
(GRID #4 TO GRID #2)	10 5	

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS - CONT'D.

CLASS A - ONE TUBE

HEATER VOLTAGE	8.0	8.0	8.0	8.0	VOLTS	
HEATER CURRENT	0.60	0.60	0.60	0.60	AMP.	
PLATE VOLTAGE	250	250	250	250	VOLTS	
SCREEN GRID VOLTAGE	250	250	250	210	VOLTS	
PLATE LOAD RESISTANCE	5.2	4.5	7.0	7.0	κΩ	
CATHODE RESISTANCE	135	135	210	160	Ω	
GRID #1 VOLTAGE	-7.3	-7.3	-8.4	-6.4	VOLTS	
PLATE CURRENT (ZERO SIGNAL)	48	48	36	36	MA.	
PLATE CURRENT (MAX. SIGNAL)	49.5	50.6	36.8	36.6	MA.	
GRID #2 CURRENT (ZERO SIGNAL)	5.5	5.5	4.1	3.9	MA.	
GRID #2 CURRENT (MAX. SIGNAL)	10.8	10.0	8.5	7.3	MA.	
INPUT (RMS) SIGNAL VOLTAGE	4.3	4.4	3.5	3.4	VOLTS	
POWER OUTPUT	5.7	5.7	4.2	4.3	WATTS	
TOTAL DISTORTION (MEASURED WITH						
FIXED GRID BIAS)	10	10	10	10	PERCENT	

CLASS AB - TWO TUBES, PUSH-PULL

PLATE VOLTAGE	250	300	VOLTS
GRID #2 VOLTAGE	250	300	VOLTS
COMMON CATHODE RESISTANCE	130	130	Ω
PLATE TO PLATE LOAD RESISTANCE	8.0	8.0	KΩ
PLATE CURRENT (ZERO SIGNAL)	2x31	2×36	MA.
PLATE CURRENT (MAX. SIGNAL)	2×37.5	2×46	MA.
GRID #2 CURRENT (ZERO SIGNAL)	2x3.5	2×4.0	MA.
GRID #2 CURRENT (MAX.SIGNAL)	2x7.5	2×11	MA.
INPUT SIGNAL VOLTAGE (RMS)	8	10	VOLTS
POWER OUTPUT	11	17	WATTS
PERCENT DISTORTION	3.0	4.0	PERCENT

CLASS B - TWO TUBES, PUSH-PULL

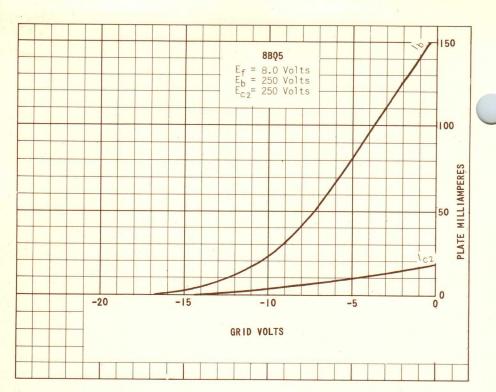
PLATE VOLTAGE	250	300	VOLTS
GRID #2 VOLTAGE	250	300	VOLTS
GRID #1 VOLTAGE	-11.6	-14.7	VOLTS
PLATE TO PLATE LOAD RESISTANCE	8.0	8.0	ĸΩ
PLATE CURRENT (ZERO SIGNAL)	2×10	2×7.5	MA.
PLATE CURRENT (MAX. SIGNAL)	2x37.5	2×46	MA.
GRID #2 CURRENT (ZERO SIGNAL)	2x1.1	2x0.8	MA.
GRID #2 CURRENT (MAX.SIGNAL)	2×7.5	2x11	MA.
INPUT SIGNAL VOLTAGE (RMS)	8	10	VOLTS
POWER OUTPUT	11	17	WATTS
PERCENT DISTORTION	3.0	4.0	PERCENT
GRID #2 CURRENT (MAX.SIGNAL) INPUT SIGNAL VOLTAGE (RMS) POWER OUTPUT	2×7.5 8 11	2×11 10 17	MA. VOLTS WATTS

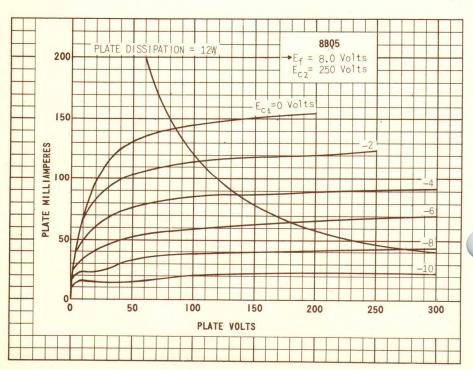
CLASS A - TRIODE OPERATION SCREEN GRID CONNECTED TO PLATE

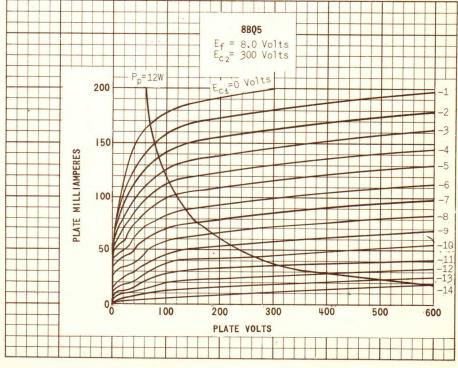
PLATE VOLTAGE	250	VOLTS
COMMON CATHODE RESISTANCE	270	Ω
PLATE LOAD RESISTANCE	3.5	KΩ
PLATE CURRENT (ZERO SIGNAL)	34	MA.
PLATE CURRENT (MAX. SIGNAL)	36	MA.
INPUT SIGNAL VOLTAGE (RMS)	6.7	VOLTS
POWER OUTPUT	1.95	WATTS
PERCENT DISTORTION	9.0	PERCENT

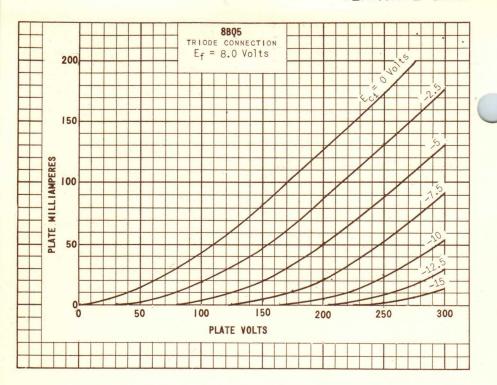
CLASS AB — TRIODE OPERATION TWO TUBES, PUSH-PULL. SCREEN GRID CONNECTED TO PLATE

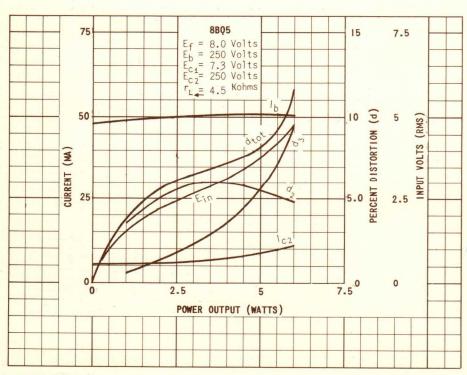
PLATE VOLTAGE	250	300	VOLTS
COMMON CATHODE RESISTANCE	270	270	0
PLATE TO PLATE LOAD RESISTANCE	10	10	κΩ
PLATE CURRENT (ZERO SIGNAL)	2x20	2×24	MA.
PLATE CURRENT (MAX. SIGNAL)	2x21.7	2x26.0	MA.
INPUT SIGNAL VOLTAGE (RMS)	8.3	10	VOLTS
POWER OUTPUT	3.4	5.2	WATTS
PERCENT DISTORTION	2.5	2.5	PERCENT



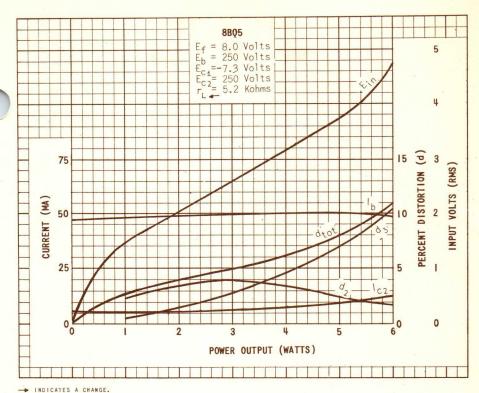




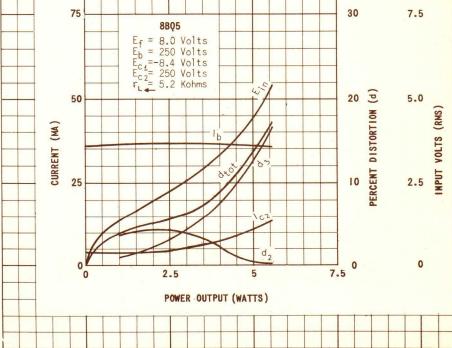


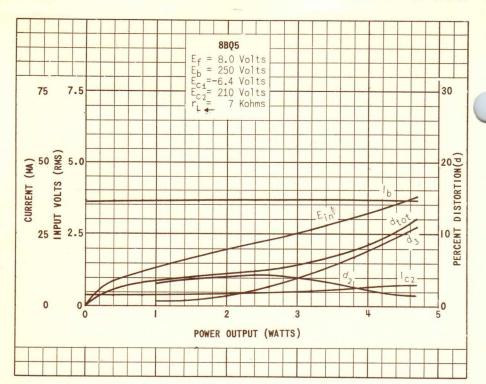


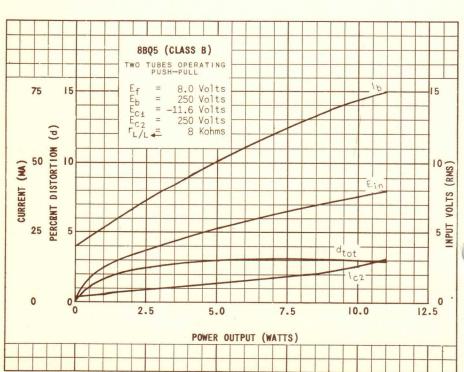


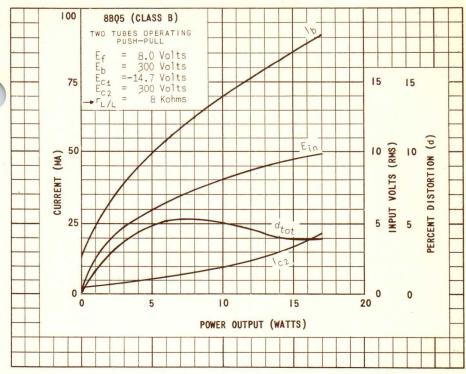






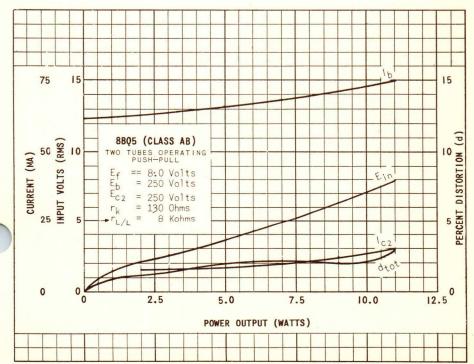




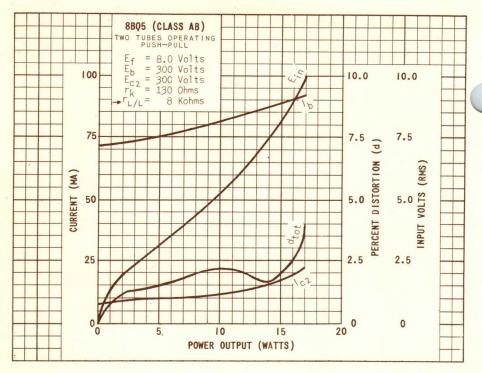


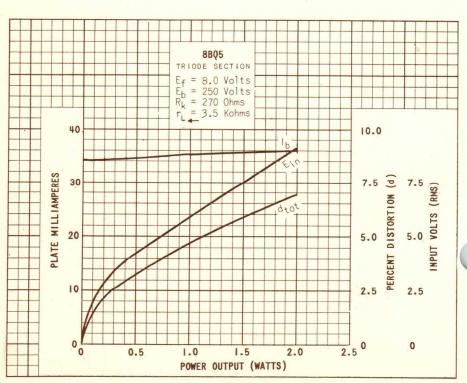
- INDICATES A CHANGE.

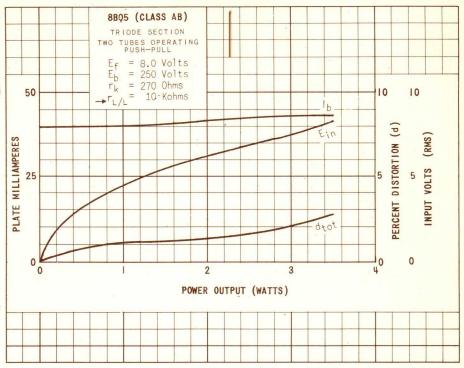
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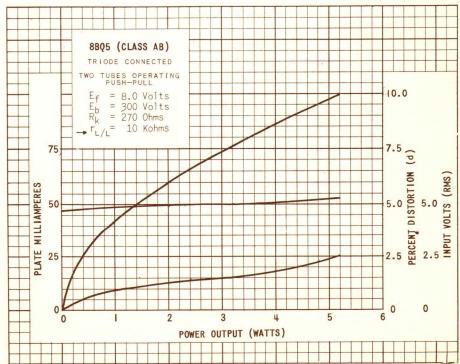
TUNG-SOL ELECTRIC INC. ELECTRON TUBE DIVISION, BLOOMFIELD, NEW JERSEY, U.S.A. APRIL 1, 1959 PLATE #5462



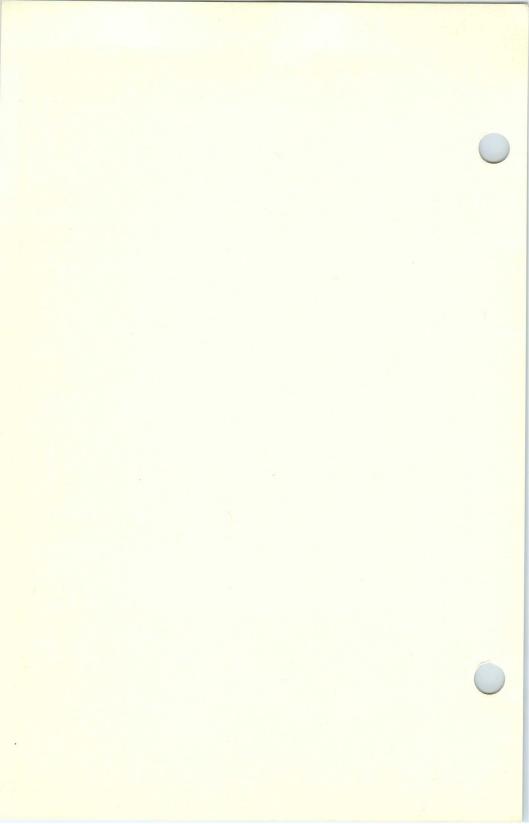








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GLASS BULB

COATED UNIPOTENTIAL CATHODE

HEATER

8.4 VOLTS 0.45 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
SMALL BUTTON NOVAL
9 PIN BASE
9AJ

THE 8CG7 IS A GENERAL PURPOSE, MEDIUM-MU TWIN TRIODE USING THE 9-PIN MINIATURE CONSTRUCTION. IT IS INTENDED PARTICULARLY FOR USE AS A VERTICAL DEFLECTION OSCILLATOR AND HORIZONTAL DEFLECTION OSCILLATOR IN TELEVISION RECEIVERS. IT MAY ALSO BE USED AS A PHASE INVERTER, MULTIVIBRATOR, SYNCHRONIZING SEPARATOR AND AMPLIFIER, AND RESISTANCE COUPLED AMPLIFIER IN ELECTRONIC EQUIPMENT. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED. EXCEPT FOR HEATER RATINGS IT IS IDENTICAL TO THE 6CG7.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

	UNIT 1	UNIT 2	
GRID TO PLATE: G TO P	4.0	4.0	µu f
INPUT: G TO (K+H&IS)	2.3	2.3	uu f
OUTPUT: P TO (K+H&IS)	2.2	2.2	μμ f

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM FACH LINIT

LAOIT	21111	
HEATER VOLTAGE	CLASS A1 AMPLIFIER 8.4	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CAT HEATER POSITIVE WITH RESPECT TO CAT		VOL TS
MAXIMUM PLATE VOLTAGE	300	VOLTS
MAXIMUM GRID VOLTAGE: POSITIVE BIAS VALUE	.0	VOLTS
MAXIMUM PLATE DISSIPATION: EACH PLATE BOTH PLATES (BOTH UNITS OPERATING)	3.5	WATTS WATTS
MAXIMUM CATHODE CURRENT	20	MA.
MAXIMUM GRID CIRCUIT RESISTANCE:		
FIXED BIAS OPERATION HEATER WARM-UP TIME (APPROX.) B	1.0	MEGOHMS SECONDS

ATHE DC COMPONENT MUST NOT EXCEED 100 VOLTS.

BHEATER WARM—UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

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RATINGSC- CONT'D INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

EACH UNIT			
	VERTICAL DEFLECTION OSCILLATOR	HORIZONTAL DEFLECTION OSCILLATOR	
HEATER VOLTAGE	8.	. 4	VOLTS
MAXIMUM PEAK HEATER CATHODE VOLTAGE:			
HEATER NEGATIVE WITH RESPECT TO CATHODE	20		VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	20	00 D	VOLTS
MAXIMUM DC PLATE VOLTAGE	300	300_	VOLTS
MAXIMUM NEGATIVE PULSE GRID VOLTAGE	400E	600F	VOLTS
MAXIMUM CATHODE CURRENT:			
PEAK	70	300	MA.
DC	20	20	MA.
MAXIMUM PLATE DISSIPATION:			
EACH PLATE	3.5	3.5	WATTS
BOTH PLATES (BOTH UNITS OPERATING)	5	5	WATTS
MAXIMUM GRID CIRCUIT RESISTANCE:			
FIXED BIAS, GRID-RESISTOR BIAS OR CATHODE-BIAS OPERATION	2.2	2.2	MEGOHMS
HEATER WARM-UP TIME (APPROX.) G	11	.0	SECONDS

CFOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE CONCERNING TELEVISION BROADCAST STATIONS", FEDERAL COMMUNICATIONS COMMISSION.

D_{THE} DC COMPONENT MUST NOT EXCEED 100 VOLTS.

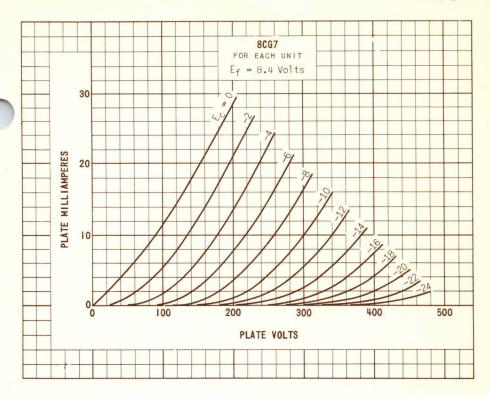
ETHIS RATING IS APPLICABLE WHERE THE DURATION OF THE VOLTAGE PULSE DOES NOT EXCEED 15 PERCENT OF ONE VERTICAL SCANNING CYCLE. IN A 525-LINE, 30-FRAME SYSTEMS 15 PERCENT OF ONE VERTICAL SCANNING CYCLE IS 2-5 MILLISECONDS.

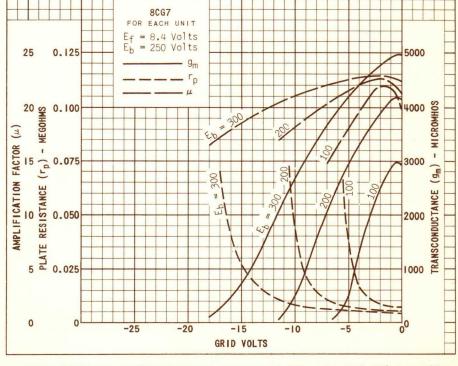
F
THIS RATING IS APPLICABLE WHERE THE DURATION OF THE VOLTAGE PULSE DOES NOT EXCEED 15 PERCENT
OF ONE HORIZONTAL SCANNING CYCLE IN A 525-LINE, 30-FRAME SYSTEM; 15 PERCENT OF ONE HORIZONTAL
SCANNING CYCLE IS 10 MICROSECONDS.

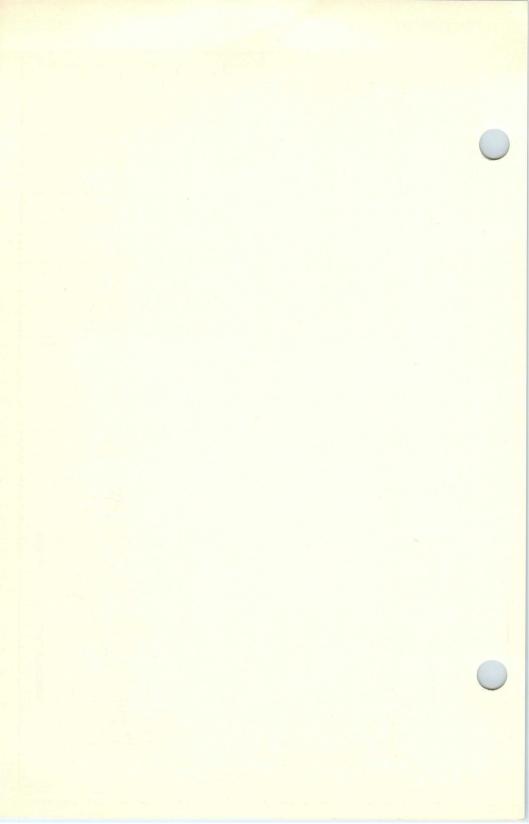
GHEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

FACH	UNIT		
CHOIL	CL	ASS A1	
	AMI	LIFIER	
HEATER VOLTAGE		8.4	VOLTS
HEATER CURRENT	(0.45	AMP.
PLATE VOLTAGE	90	250	VOLTS
GRID VOLTAGE	0	-8	VOLTS
AMPLIFICATION FACTOR	20	20	
PLATE RESISTANCE (APPROX.)	6700	7700	OHMS
TRANSCONDUCTANCE	3000	2600	MHOS
GRID VOLTAGE (APPROX.)			
FOR $I_b = 10 \mu AMP$.	-7	-18	VOLTS
PLATE CURRENT OR GRID VOLTAGE OF -1	2.5 VOLTS	1.3	MA.
PLATE CURRENT	10	9	MA .

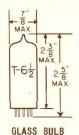






DOUBLE TRIODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODES

HEATER 8.4 VOLTS 0.45 AMP AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
SMALL BUTTON NOVAL
9 PIN BASE

THE 8CM7 IS A MEDIUM-MU DOUBLE TRIODE OF THE 9 PIN MINIATURE TYPE CONTAINING TWO DISSIMILAR TRIODES IN ONE ENVELOPE. IT IS INTENDED FOR USE AS A VERTICAL DEFLECTION AMPLIFIER IN 450 MA. SERIES HEATER OPERATED TELEVISION RECEIVERS. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

	UNIT #1 OSCILLATOR	UNIT #2 AMPLIFIER	
GRID TO PLATE	3.8	3	иµ f
GRID TO CATHODE AND HEATER	2	3.5	μμf
PLATE TO CATHODE AND HEATER	0.5	0.4	ицf

RATINGSA INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM UNIT #1
VERTICAL
DEFLECTION
OSCILLATOR UNIT #2 VERTICAL DEFLECTION AMPLIFIER HEATER VOLTAGE 8.4 VOI TS MAXIMUM PEAK HEATER-CATHODE VOLTAGE:
HEATER NEGATIVE WITH RESPECT TO CATHODE
HEATER POSITIVE WITH RESPECT TO CATHODE 200 200c VOL TS MAXIMUM DC PLATE VOLTAGE 500 500 VOL TS MAXIMUM PEAK POSITIVE PULSE PLATE VOLTAGE (ABSOLUTE MAXIMUM) D 2 200E VOLTS MAXIMUM CATHODE CURRENT: PEAK MA . AVERAGE 15 20 MA. MAXIMUM PLATE DISSIPATION 1.25 5.5 WATTS MAXIMUM GRID CIRCUIT RESISTANCE: CATHODE BIAS 2.5 MEGOHMS FIXED BIAS GRID RESISTOR BIAS MEGOHMS MEGOHMS HEATER WARM-UP TIME (APPROX.) F 11.0 SECONDS

A FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE CONCERNING TELEVISION BROADCAST STATIONS", FEDERAL COMMUNICATIONS COMMISSION.

Bunless OTHERWISE SPECIFIED.

CTHE DC COMPONENT MUST NOT EXCEED 100 VOLTS.

DITHIS RATING IS APPLICABLE WHERE THE DURATION OF THE VOLTAGE PULSE DOES NOT EXCEED 15% OF ONE VERTICAL SCANNING CYCLE IN A 525-LINE, 30-FRAME SYSTEM 15% OF ONE VERTICAL SCANNING CYCLE IS 2.5 MILLISECONDS.

EUNDER NO CIRCUMSTANCES SHOULD THIS ABSOLUTE VALUE BE EXCEEDED.

FHEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

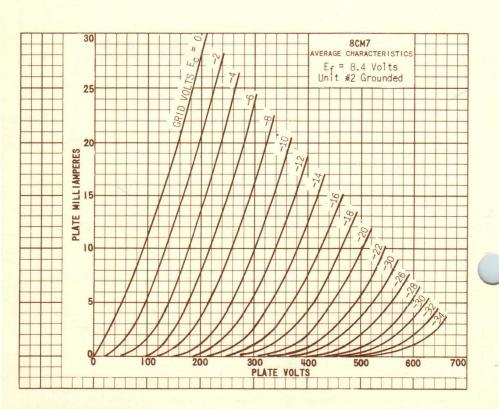
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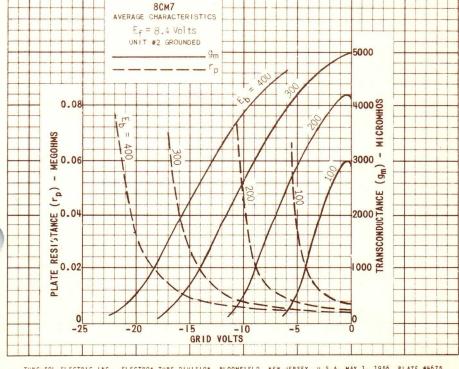
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER

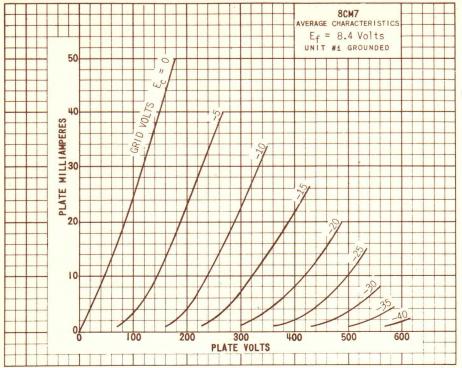
oznos ni minzm	Name of the			
		IT #1 ILLATOR	UNIT #2 AMPLIFIER	
HEATER VOLTAGE		8	. 4	VOLTS
HEATER CURRENT		0.	45	AMP .
PLATE VOLTAGE		200	250	VOLTS
GRID VOLTAGE		-7	-18	VOLTS
AMPLIFICATION FACTOR		21	18	
PLATE RESISTANCE (APPROX.)	10	500	4 100	OHMS
TRANSCONDUCTANCE	2	000	4 400	MHOS
PLATE CURRENT		5	20	MA.
PLATE CURRENT FOR GRID VOLTAGE OF -10 VOLTS		1		MA.
GRID VOLTAGE (APPROX.) FOR Ib = 10 MA.		14		VOLTS

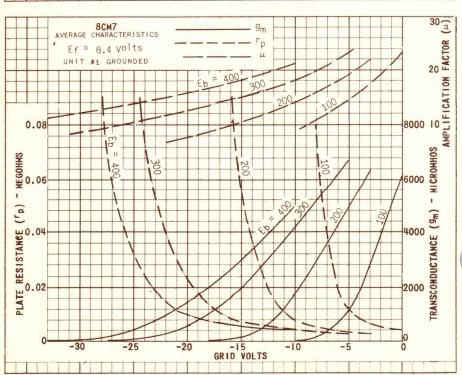
SIMILAR TYPE REFERENCE: Except for heater ratings, the 8CM7 is identical to the 8CM7.





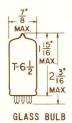
8CM7





DUPLEX-DIODE TRIODE

MINIATURE TYPE



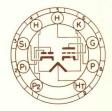
COATED UNIPOTENTIAL CATHODE

SERIES HEATER PARALLEL
8.4 VOLTS 4.2 VOLTS
0.225 AMP. 0.45 AMP.

AC OR DC

ANY MOUNTING POSITION

CONTROL OF HEATER WARM-UP TIME APPLIES ONLY TO PARALLEL CONNECTION.



SMALL BUTTON 9 PIN BASE

THE 8CN7 IS A DUPLEX DIODE HIGH-MU TRIODE IN WHICH SEPARATE CATHODES ARE PROVIDED FOR THE DIODE AND TRIODE SECTIONS. IT IS INTENDED PRIMARILY FOR SERVICE AS A COMBINED HORIZONTAL PHASE DETECTOR AND REACTANCE TUBE IN TELEVISION RECEIVERS. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED. EXCEPT FOR HEATER RATINGS, THE 8CN7 IS IDENTICAL TO THE 6CN7.

DIRECT INTERELELECTRODE CAPACITANCES WITHOUT EXTERNAL SHIELD

TRIODE GRID TO PLATE	1.8	μμ f
TRIODE INPUT	1.5	μμf
TRIODE OUTPUT	0.5	μμ f
GRID TO EACH DIODE PLATE	0.006	µµ f
DIODE #1 PLATE TO DIODE CATHODE AND HEATER	3.6	μμf
DIODE #2 PLATE TO DIODE CATHODE AND HEATER	3.6	μμ f

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER VOLTAGE		8.4	4.2	VOLTS
MAXIMUM PLATE VOLTAGE		300		VOLTS
MAXIMUM POSITIVE DC GRID VO	DLTAGE	0		VOLTS
MAXIMUM PLATE DISSIPATION		1.0		WATTS
MAXIMUM HEATER-CATHODE VOLT	TAGE			
HEATER POSITIVE WITH RESE	PECT TO CATHODE			
DC COMPONENT		100		VOLTS
TOTAL DC AND PEAK		200		VOLTS
HEATER NEGATIVE WITH RESE	PECT TO CATHODE			
TOTAL DC AND PEAK		200		VOLTS
MAXIMUM DIODE CURRENT FOR (CONTINUOUS			
OPERATION, (EACH DIODE)		5.0		MA.
HEATER WARM-UP TIME*		11.0		SECONDS

AHEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

TUNG-SOL .

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER

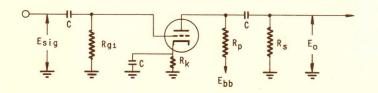
PLATE VOLTAGE PLATE CURRENT	.8.4 0.225	4.2	8.4 0.225	4.2	VOLTS
PLATE VOLTAGE	10	00	2!	50	VOLTS
GRID VOLTAGE	-1.	0	-3	.0	VOLTS
AMPLIFICATION FACTOR	7	70		70	
PLATE RESISTANCE (APPROX.)	54 00	00	58 00	00	OHMS
TRANSCONDUCTANCE	1 30	00	1 20	00	MHOS
PLATE CURRENT	0.	8	1	.0	MA.
AVERAGE DIODE CURRENT (EACH DIODE)					
WITH 5.0 VOLTS DC APPLIED			1	20	MA.

CLASS A RESISTANCE - COUPLED AMPLIFIER

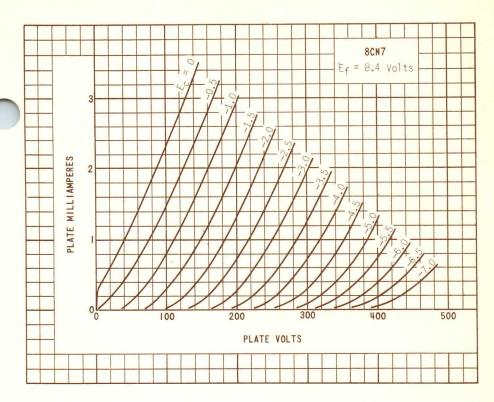
Rp	Rs	Rg1		= 90 V	olts	Ebb =	180	Volts	Ebb =	= 300 \	Volts
Meg.	Meg.	Meg.	Rk	Gain	Eo	Rk	Gain	Eo	Rk	Gain	Eo
0.10	0.10 0.24	0.10	5700 6100	21 26	7.0 9.0	2400 2700	29 34	18 23	1800 2000	33 38	35 42
0.24	0.24 0.51	0.10	9100 10000	30 34	10 13	4300 4700	40 45	24 31	3000 3300	44 49	43 52
0.51 0.51	0.51 1.0		15000 16000	37 40	14 16	7500 8200	47 50	28 35	5600 6200	51 55	50 60
0.24	0.24 0.51	10 10	0	31 37	5.0 7.0	0	44 49	19 25	0	48 52	40 52
0.51 0.51	0.51 1.0	10 10	0	39 42	7.5 10	0	51 54	22 28	0	54 58	44 56

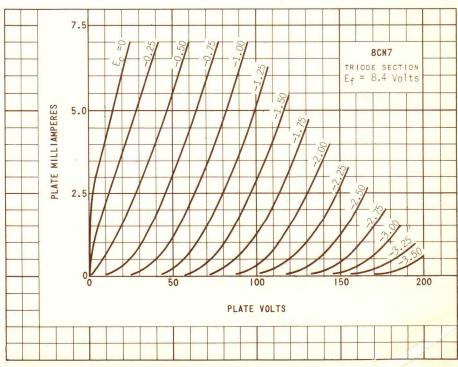
EO IS MAXIMUM RMS VOLTAGE OUTPUT FOR FIVE PERCENT TOTAL HARMONIC DISTORTION. GAIN MEASURED AT $2.0\,$ VOLTS RMS OUTPUT.

FOR ZERO-BIAS DATA, GENERATOR IMPEDANCE IS NEGLIGIBLE.

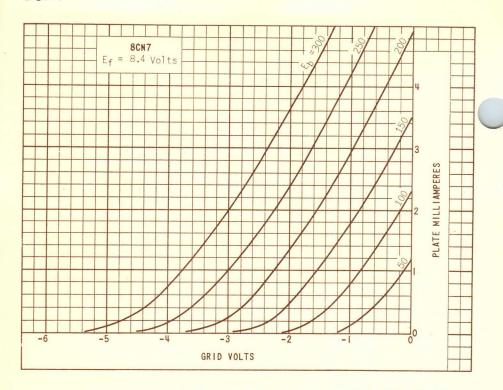


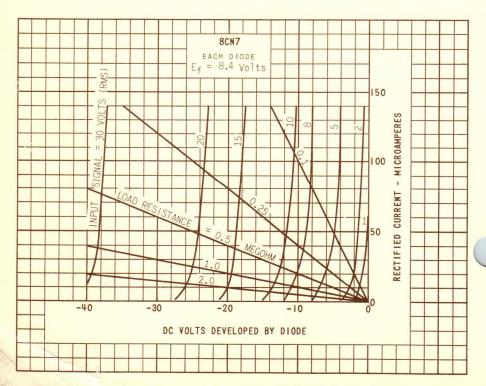
NOTE: COUPLING CAPACHTORS (C) SHOULD BE SELECTED TO GIVE DESIRED FREQUENCY RESPONSE. RK SHOULD BE ADEQUATELY BY-PASSED.

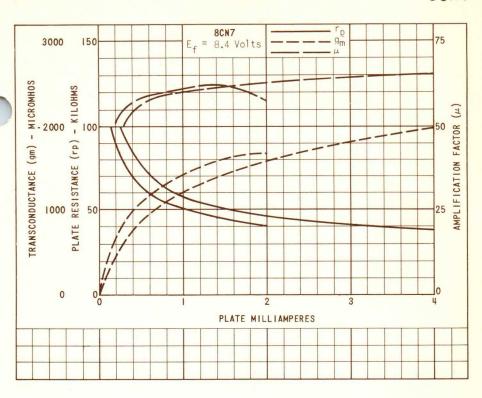


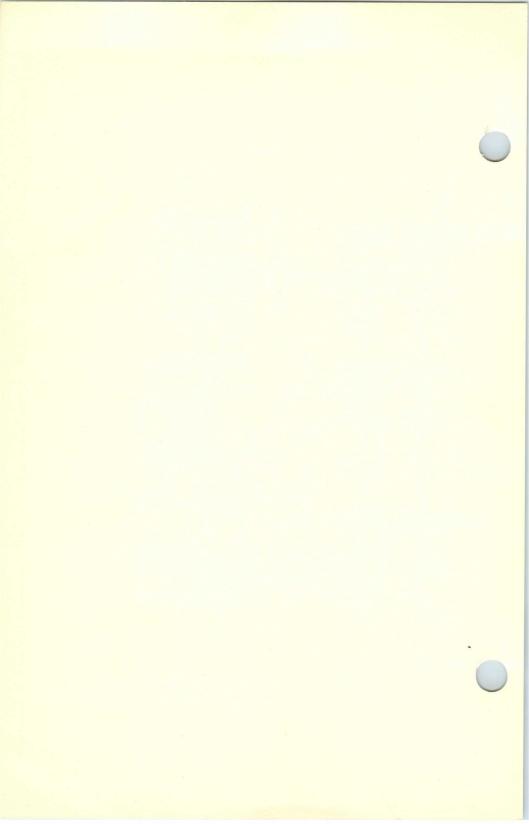


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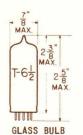






DOUBLE TRIODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER

8.4 VOLTS 0.45 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW SMALL BUTTON 9 PIN BASE 9EF

THE 8CS7 IS A DOUBLE TRIODE IN THE 9 PIN MINIATURE CONSTRUCTION. SECTION #1 IS INTENDED FOR OPERATION AS A VERTICAL DEFLECTION OSCILLATOR AND SECTION #2 AS A VERTICAL DEFLECTION AMPLIFIER. THERMAL CHARACTERISTICS ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED.

DIRECT INTERELECTRODE CAPACITANCES

	TRIODE #1"	TRIODE #2	
GRID TO PLATE (G TO P)	2.6	2.6	uu f
INPUT: G TO (K+H)	1.8	3.0	uu f
OUTPUT: P TO (K+H)	0.5	0.5	μμ f

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

VERTICAL DEFLECTION OSCILLATOR AND AMPLIFIER B

	TRIODE #1A		TRIODE #2	
HEATER VOLTAGE		8.4		VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE				
HEATER NEGATIVE WITH RESPECT TO CATHODE				
TOTAL DC AND PEAK		200		VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE				
DC		100		VOLTS
TOTAL DC AND PEAK		200		VOLTS
MAXIMUM DC PLATE VOLTAGE	500		500	VOLTS
MAXIMUM PEAK POSITIVE PULSE PLATE				
VOLTAGE (ABSOLUTE MAX.)			2 200	VOLTS
MAXIMUM PEAK NEGATIVE PULSE GRID VOLTAGE	400		250	VOLTS
MAXIMUM PLATE DISSIPATION C	1.25		6:5	WATTS
MAXIMUM AVERAGE CATHODE CURRENT	20		30	MA.
MAXIMUM PEAK CATHODE CURRENT	70		105	MA.
MAXIMUM GRID CIRCUIT RESISTANCE	2.2		2.2	MEGOHMS
HEATER WARM-UP TIME D		11		SECONDS

ATRIODE #1 CONNECTS TO PINS #6, #7 AND #8. TRIODE #2 CONNECTS TO PINS #1, #3 AND #9.

B
FOR OPERATION IN A 525 LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCASTING STATIONS: FEDERAL COMMUNICATIONS COMMISSION". THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE.

 $^{^{}m C}$ In stages operating with grid leak bias, an adequate cathode bias resistor or other suitable means is required to protect the tube in absence of excitation.

DHEATER WARN—UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

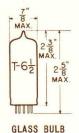
	TRIODE #1 A	TRIODE #2	
HEATER VOLTAGE	8.4	8.4	VOLTS
HEATER CURRENT	0.45	0.45	AMP.
PLATE VOLTAGE	250	250	VOLTS
GRID VOLTAGE	-8.5	-10.5	VOLTS
PLATE CURRENT	10.5	19.0	MA.
TRANSCONDUCTANCE	2 200	4 500	MHOS
AMPLIFICATION FACTOR	17.0	15.5	
PLATE RESISTANCE	7 700	3 450	OHMS
PLATE CURRENT AT E_=-16 VOLTS		3.0	MA.
GRID VOLTAGE FOR IN-104A	-24		VOLTS
GRID VOLTAGE FOR Ib=50µA		-22	VOLTS

ATRIODE #1 CONNECTS TO PINS #6, #7 AND #8. TRIODE #2 CONNECTS TO PINS #1, #3 AND #9.

SIMILAR TYPE REFERENCE: Except for heater ratings the 8CS7 is identical to the 6CS7.

TRIODE-PENTODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER

8.0 VOLTS 0.6 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW SMALL BUTTON 9 PIN BASE 9DX

THE 8CX8 IS A SHARP-CUTOFF PENTODE AND A MEDIUM-MU TRIODE IN THE 9 PIN MINIATURE CONSTRUCTION. THE PENTODE SECTION IS INTENDED PRIMARILY FOR USE AS A VIDEO AMPLIFIER. THE TRIODE SECTION IS SUITABLE FOR A 4.5 MEGACYCLE SOUND IF AMPLIFIER, SWEEP OSCILLATOR, SYNC SEPARATOR, SYNC AMPLIFIER, OR SYNC CLIPPER. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED. EXCEPT FOR HEATER RATINGS AND HEATER WARM-UP TIME THE 8CX8 IS IDENTICAL TO THE 6CX8.

DIRECT INTERELECTRODE CAPACITANCES WITHOUT EXTERNAL SHIELD

PENTODE SECTION:		
GRID #1 TO PLATE	0.06	μμ f
INPUT	9.0	щи f
OUTPUT	4.4	μμ f
TRIODE SECTION:		
GRID TO PLATE	4.4	μμ f
INPUT	2.2	μμf
OUTPUT	0.38	μμ f
PENTODE GRID #1 TO TRIODE PLATE (MAX.)	.005	μμf
TRIODE GRID TO PENTODE PLATE (MAX.)	.018	μμ f
PENTODE PLATE TO TRIODE PLATE (MAX.)	0.17	μμ f

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

	PENTODE SECTION	TRIODE	
HEATER VOLTAGE	8.0	8.0	VOLTS
MAXIMUM PLATE VOLTAGE	330	330	VOLTS
MAXIMUM SCREEN-SUPPLY VOLTAGE	330		VOLTS
MAXIMUM SCREEN VOLTAGE	SEE RATIN	GCHART	
MAXIMUM POSITIVE DC GRID #1 VOLTAGE	0	0	VOLTS
MAXIMUM PLATE DISSIPATION	5.Q	2.0	WATTS
MAXIMUM SCREEN DISSIPATION	1.1		WATTS

CONTINUED FROM PRECEDING PAGE

RATINGS - CONTID INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

	PENTODE SECTION	TRIODE	-
MAXIMUM HEATER-CATHODE VOLTAGE:			
HEATER POSITIVE WITH RESPECT TO CATHODE			
DC COMPONENT	100	100	VOLTS
TOTAL DC AND PEAK	200	200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE			
TOTAL DC AND PEAK	200	200	VOLTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE			
WITH FIXED BIAS	0.25	0.5	MEGOHMS
WITH CATHODE BIAS	1.0	1.0	MEGOHMS
HEATER WARM-UP TIME (APPROX.)*	11	.0	SECONDS

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

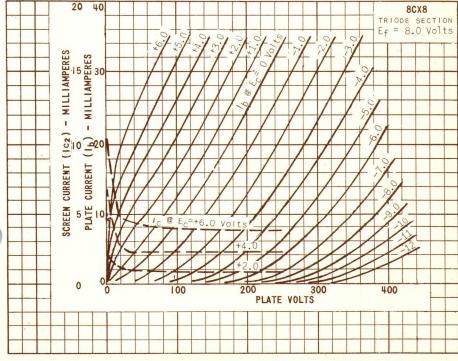
CLASS A1 AMPLIFIER

	PENTODE SECTION		TRIODE SECTION	
HEATER VOLTAGE HEATER CURRENT PLATE VOLTAGE SCREEN VOLTAGE GRID #1 VOLTAGE	8.0 0.6±6% 40 125 0 ^A	8.0 0.6±6% 200 125 	8.0 0.6±6% 150 	VOLTS AMP. VOLTS VOLTS VOLTS
CATHODE-BIAS RESISTOR AMPLIFICATION FACTOR PLATE RESISTANCE (APPROX.) TRANSCONDUCTANCE PLATE CURRENT	 40	68 70 000 10 000 24	150 40 8 700 4 600	OHMS OHMS
SCREEN CURRENT GRID #1 VOLTAGE (APPROX.) Ib = 1004A.	15.5	5.2	-5.0	MA.

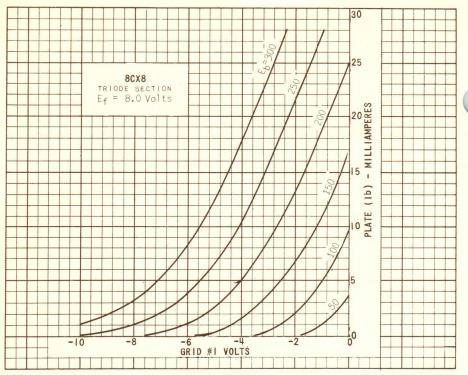
DESIGN-MAXIMUM RATINGS ARE THE LIMITING VALUES EXPRESSED WITH RESPECT TO BOGIE TUBES AT WHICH SATISFACTORY TUBE LIFE CAM BE EXPECTED TO OCCUR. TO OBTAIN SATISFACTORY CIRCUIT PERFORMANCE, THEREFORE, THE EQUIPMENT DESIGNER MUST ESTABLISH THE CIRCUIT DESIGN SO THAT NO DESIGN-MAXIMUM VALUE IS EXCEEDED WITH A BOGIE TUBE UNDER THE WORST PROBABLE OPERATING COMDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, AND ENVIRONMENTAL CONDITIONS.

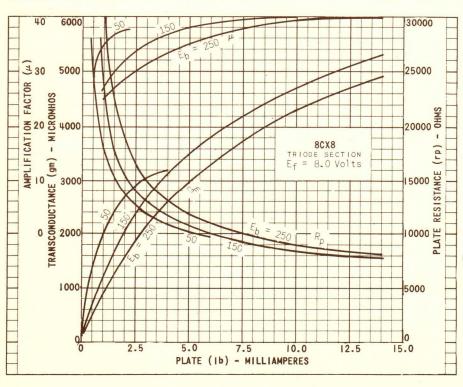
^{*}HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE JO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

Applied for short interval (two seconds maximum) so as not to damage tube.

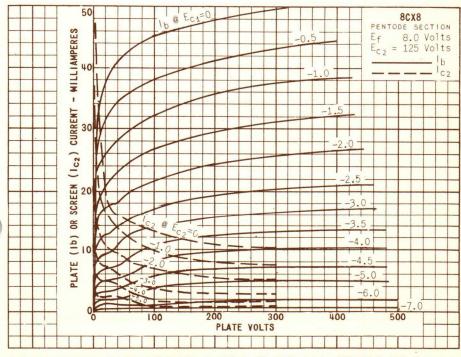


8CX8

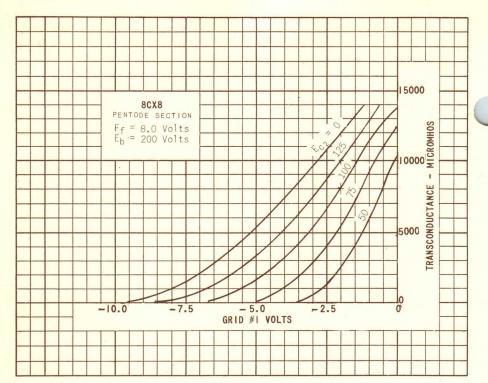


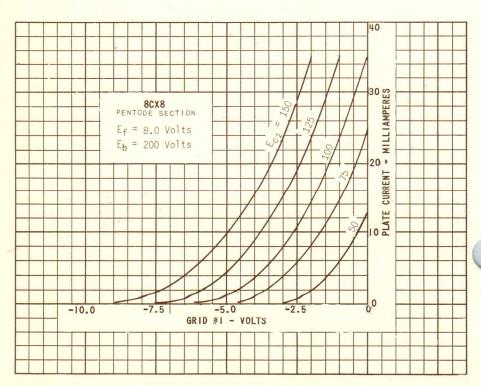


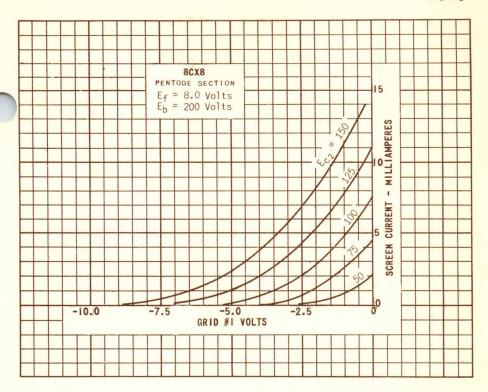
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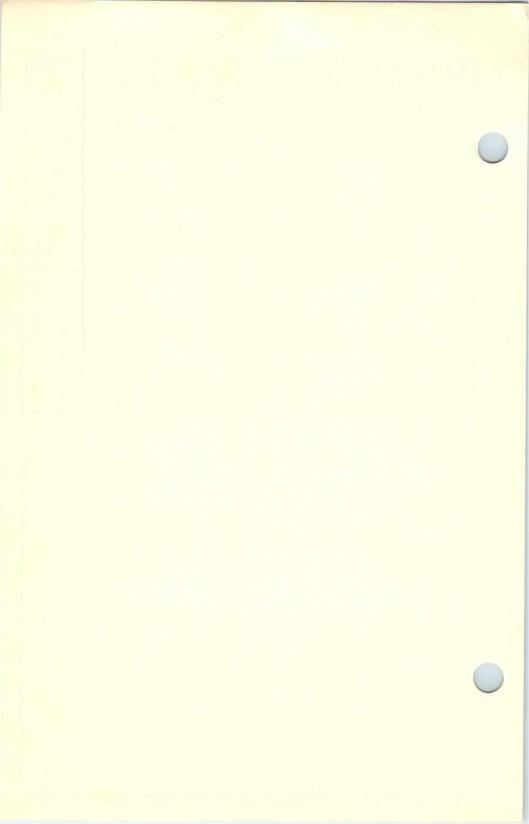


TUNG-SOL ELECTRIC INC. ELECTRON TUBE DIVISION BLOOMFIELD, NEW JERSEY, U.S.A. SEPTEMBER 1, 1957 PLATE #5070





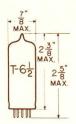




TUNG-SOL .

DOUBLE TRIODE

MINIATURE TYPE

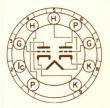


GLASS BULB

COATED UNIPOTENTIAL CATHODE

HEATER
7.9 VOLTS 0.6±6% AMP.
AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

SMALL BUTTON 9 PIN BASE

9LG ◆

THE 8CY7 IS A DISSIMILAR DOUBLE TRIODE IN THE 9 PIN MINIATURE CONSTRUCTION AND IS INTENDED FOR USE AS A COMBINED VERTICAL-DEFLECTION OSCILLATOR AND AMPLIFIER IN TELEVISION RECEIVERS. IN ADDITION, THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED.

DIRECT INTERELECTRODE CAPACITANCES - APPROX. **

	SEC. 1	SEC. 2	
GRID TO PLATE	1.8	4.4	μμ f
INPUT	1.5	5.0	μμ f
OUTPUT	0.30	1.0	μμ f

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

	VERTICAL-B OSCILLATOR SERVICE (SEC. 1)	VERTICAL-B DEFLECTION AMPLIFIER (SEC. 2)	
HEATER VOLTAGE	7.9	7.9	VOLTS
MAXIMUM DC PLATE VOLTAGE	350	350	VOLTS
MAXIMUM PEAK POSITIVE PULSE PLATE VOLTAGE		1 800	VOLTS
MAXIMUM PEAK NEGATIVE GRID VOLTAGE	400	250	VOLTS
MAXIMUM PLATE DISSIPATION	1.0	5.5 ^A	WATTS
MAXIMUM DC CATHODE CURRENT		35	MA.
MAXIMUM DC PEAK CATHODE CURRENT		120	MA.
MAXIMUM HEATER CATHODE VOLTAGE HEATER POSITIVE WITH RESPECT TO CATHODE			
DC COMPONENT	100	100	VOLTS
TOTAL DC AND PEAK HEATER NEGATIVE WITH RESPECT TO CATHODE	200	200	VOLTS
TOTAL DC AND PEAK MAXIMUM GRID CIRCUIT RESISTANCE	200	200	VOLTS
WITH FIXED BIAS	2.2		MEGOHMS
			Design of the second of the se
WITH CATHODE BIAS	2.2	2.2	MEGOHMS
HEATER WARM-UP TIME (APPROX.)*	11	.0	SECONDS

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- INDICATES A CHANGE.

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

	SECTION (OSCILLAT	1 SE	CTION 2 PLIFIER)	
HEATER VOLTAGE HEATER CURRENT PLATE VOLTAGE	7.9 0.6±6% 250	7.9 0.6±6% 60	7.9 0.6±6% 150	VOLTS AMP. VOLTS
GRID VOLTAGE CATHODE—BIAS RESISTOR	-3.0	0	620	VOLTS OHMS
AMPLIFICATION FACTOR PLATE RESISTANCE (APPROX.)	52 000		5.0 920	OHMS
TRANSCONDUCTANCE PLATE CURRENT PLATE CURRENT (APPROX.) E = 30V.	1 300	80	5 400 30 3.5	μMHOS MA. MA.
GRID VOLTAGE (APPROX.) Ib=200 \(\mu\text{A}\). GRID VOLTAGE (APPROX.) Ib=10 \(\mu\text{A}\).	-5.5		-40 	VOLTS VOLTS

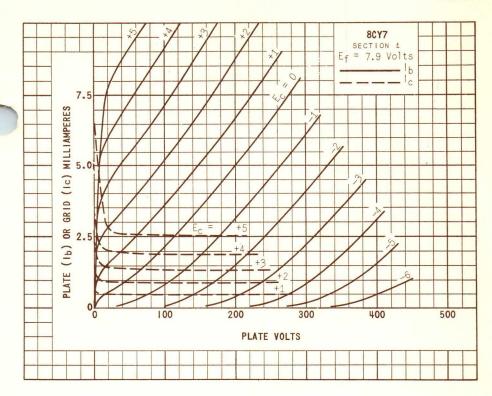
WITHOUT EXTERNAL SHIELD.

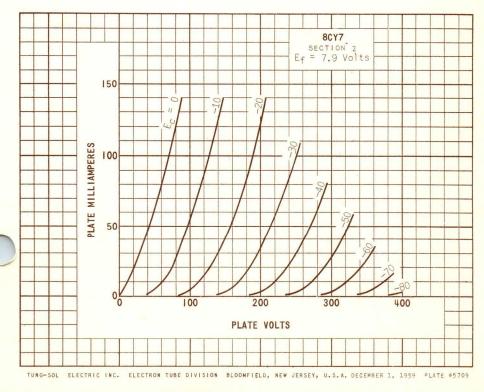
DESIGN-MAXIMUM RATINGS ARE THE LIMITING VALUES EXPRESSED WITH RESPECT TO BOGIE TUBES AT WHICH SATISFACTORY TUBE LIFE CAN BE EXPECTED TO OCCUR. TO OBTAIN SATISFACTORY CIRCUIT PERFORMANCE, THEREFORE, THE EQUIPMENT DESIGNS OF STABLISH THE CIRCUIT DESIGN SO THAT NO DESIGN-MAXIMUM VALUE IS EXCEEDED WITH A BOGIE TUBE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, AND ENVIRONMENTAL CONDITIONS.

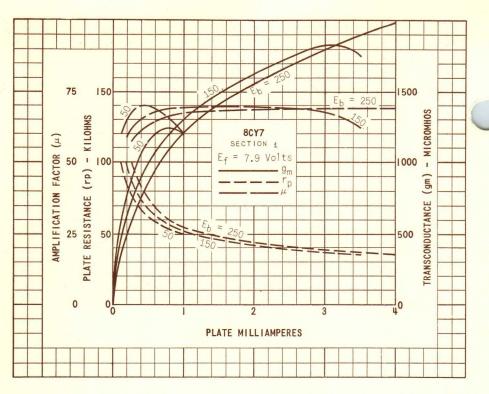
A IN STAGES OPERATING WITH GRID LEAK BIAS, AN ADEQUATE CATHODE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

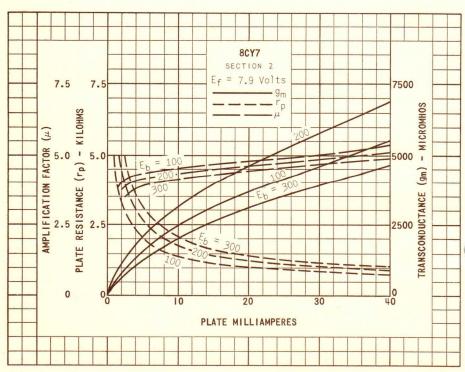
B FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE.

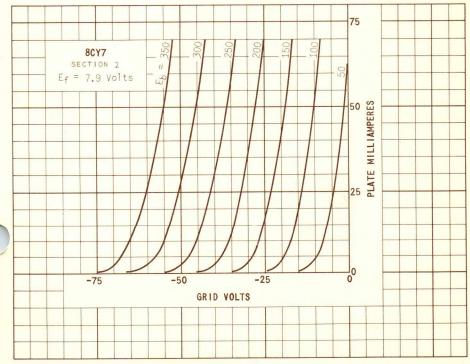
^{*}HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE MOMINAL HEATER OPERATING RESISTANCE.

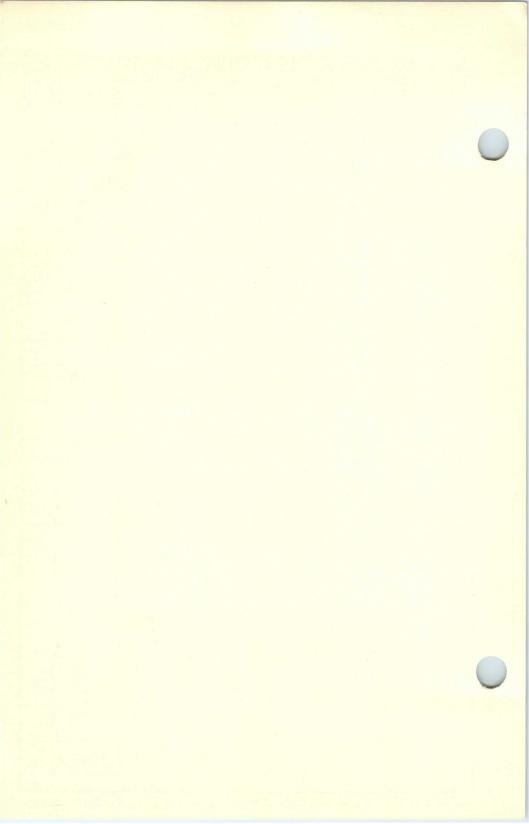






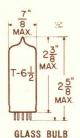






TRIODE PENTODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER

8.0 VOLTS 0.60 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
9 PIN BASE
90x

THE 8EBB IS A HIGH-MU TRIODE AND SHARP CUTOFF PENTODE IN THE 9-PIN MINIATURE CONSTRUCTION. THE TRIODE SECTION IS DESIGNED FOR USE AS A VOLTAGE
AMPLIFIER WHILE THE PENTODE SECTION HAS A CONTROLLED PLATE KNEE CHARACTERISTIC AND IS DESIGNED FOR USE AS A VIDEO AMPLIFIER. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SO THAT HEATER VOLTAGE SURGES
DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER
TYPES WHICH ARE SIMILARLY CONTROLLED. EXCEPT FOR HEATER RATINGS AND
HEATER WARM-UP TIME THE 8BEB IS IDENTICAL TO THE 6EBB.

DIRECT INTERELECTRODE CAPACITANCES

4.4	µµ f
2.4	μμf
0.36	μμ f
0.1	μμf
11	μμf
4.2	μμ f
.018	μμf
.005	uu f
0.17	µµ f
	2.4 0.36 0.1 11 4.2

RATINGS INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM^A

	TRIODE	PENTODE	
HEATER VOLTAGE	8.0	8.0	VOLTS
MAXIMUM PLATE VOLTAGE	330	330	VOLTS
MAXIMUM GRID #2 SUPPLY VOLTAGE		330	VOLTS
MAXIMUM GRJD #2 VOLTAGE			
MAXIMUM POSITIVE GRID #1 VOLTAGE	0	0	VOLTS
MAXIMUM PLATE DISSIPATION	1.0	5.0	WATTS
MAXIMUM GRID #2 DISSIPATION		1.1	WATTS

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RATINGS - CONTID. INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

MAXIMUM HEATER-CATHODE VOLTAGE:			
HEATER NEGATIVE WITH RESPECT TO CATHODE			
TOTAL DC AND PEAK	2	00	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE			
DC	1	00	VOLTS
TOTAL DC AND PEAK	2	00	VOLTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE			
FIXED BIAS	0.5	0.25	MEGOHM
CATHODE BIAS	1.0	1.0	MEGOHM
HEATER WARM-UP TIME* (APPROX.)	11	.0	SECONDS

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

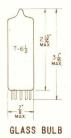
	TRIODE	PENTODE SECTION	
HEATER VOLTAGE	8.0	8.0	VOLTS
HEATER CURRENT	0.60	0.60	AMP.
PLATE VOLTAGE	250	200	VOLTS
GRID #2 VOLTAGE		125	VOLTS
GRID #1 VOLTAGE	-2		VOLTS
CATHODE BIAS RESISTOR		68	OHMS
PLATE CURRENT	2	25	MA.
GRID #2 CURRENT		7	MA.
TRANSCONDUCTANCE	2 700	12 500	MHOS
AMPLIFICATION FACTOR	100		
PLATE RESISTANCE (APPROX.)	37 000	75 000	OHMS
GRID #4 VOLTAGE FOR Ib= 100 HA (APPROX.)		-9	VOLTS
GRID #1 VOLTAGE FOR Ib= 20 A (APPROX.)	-5		

PLATE KNEE CHARACTERISTICS - INSTANTANEOUS VALUES

Eb = 45 VOLTS, Ec2 = 125 VOLTS AND Ec1 = O VOLTS		
PLATE CURRENT	40	MA.
GRID #2 CURRENT	15	MA.

DESIGN-MAXIMUM RATINGS ARELIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING RONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT HE NO DESIGN—MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, QUIPMENT COMPONENT VARIATION, EQUIPMENT CONFORM VARIATION, EQUIPMENT CONFORM VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.

*HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80⊈ OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.



UNIPOTENTIAL CATHODE HEATER 8.4 VOLTS 0.6 AMP. AC OR DC ANY MOUNTING POSITION



BOTTOM VIEW SMALL-BUTTON NOVAL
9 PIN BASE 9HN

THE 8EM5 IS A BEAM POWER PENTODE IN THE 9 PIN MINIATURE CONSTRUCTION AND IS INTENDED FOR USE AS THE VERTICAL DEFLECTION AMPLIFIER IN HIGH-EF-FICIENCY DEFLECTION CIRCUITS OF TV RECEIVERS WHICH USE PICTURE TUBES WITH A 110° DIAGONAL DEFLECTION ANGLE. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TUBES WHICH ARE SIMILARLY CONTROLLED. WITH THE EXCEPTION OF HEATER RATINGS AND HEATER WARM-UP TIME, THE 8EM5 IS IDENTICAL TO THE 6EM5.

DIRECT INTERELECTRODE CAPACITANCES WITHOUT EXTERNAL SHIELD

GRID #1 TO PLATE	0.7	μμ f
GRID #1 TO CATHODE & G3, G2, AND. HEATER	10	μμf
PLATE TO CATHODE & G3, G2, AND HEATER	5.1	μμf

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM VERTICAL DEFLECTION AMPLIFIER

HEATER VOLTAGE	8.4	VOLTS
MAXIMUM PLATE VOLTAGE:		
DC	315	VOLTS
PEAK POSITIVE PULSE (ABS. MAX.) B	2 200 ^c	VOLTS
MAXIMUM GRID #2 VOLTAGE	285	VOLTS
MAXIMUM PEAK NEGATIVE-PULSE GRID #1 VOLTAGE	-250	VOLTS
MAXIMUM CATHODE CURRENT:		
PEAK	210	MA.
AVERAGE	60	MA.
MAXIMUM PLATE DISSIPATION	10	WATTS
MAXIMUM GRID #2 INPUT	1.5	WATTS
MAXIMUM PEAK HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	200 ^D	VOLTS
MAXIMUM BULB TEMPERATURE (AT HOTTEST POINT)	250	°C
MAXIMUM CIRCUIT VALUES:		
GRID #1 CIRCUIT RESISTANCE:		
FOR FIXED-BIAS OPERATION	2.2	MEGOHMS
FOR CATHODE-BIAS OPERATION	2.2	MEGOHMS
HEATER WARM-UP TIME (APPROX.)*	11.0	SECONDS

CONTINUED FROM PRECEEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS CLASS A_1 AMPLIFIER

HEATER VOLTAGE	8.4	8.4	VOLTS
HEATER CURRENT	0.6	0.6	AMP.
PLATE VOLTAGE	60	250	VOLTS
GRID #2 (SCREEN-GRID) VOLTAGE	250	250	VOLTS
GRID #1 (CONTROL-GRID) VOLTAGE	0	-18	VOLTS
MU-FACTOR, GRID #1 TO GRID #2		8.7	
TRANSCONDUCTANCE	-	5100	<i>µмно</i> ѕ
PLATE CURRENT	180 ^E	40	MA.
GRID #2 CURRENT	30E	3	MA.
PLATE RESISTANCE (APPROX.)		50 000	OHMS
GRID #4 VOLTAGE FOR PLATE CURRENT O. 2 MA.		-37	

OINDICATES AN ADDITION.

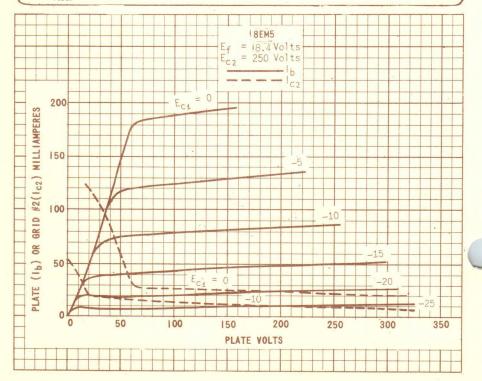
*HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE MEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

Bor operation in a 525-line, 30-frame system as described in "standards of good engineering practice for television broadcast stations: feberal communications commission", the duty cycle of the voltage pulse must not exceed 15% of one scanning cycle.

Cunder no circumstances should this absolute value be exceeded.

DTHE DC COMPONENT MUST NOT EXCEED 100 VOLTS

ETHESE VALUES CAN BE MEASURED BY A METHOD INVOLVING A RE-CURRENT WAVEFORM SUCH THAT THE PLATE DISSIPATION AND GRID #2 INPUT WILL, BE KEPT WITHIN RATINGS IN ORDER TO PREVENT DAMAGE TO THE TUBE.



DUO-DIODE PENTODE

MINIATURE TYPE

2.375" T-6½ 2.625" MAX

GLASS BULB
SMALL BUTTON
9 PIN BASE E9-1
OUTLINE DRAWING
JEDEC 6-3

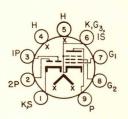
COATED UNIPOTENTIAL CATHODE

HEATER

8.0 VOLTS 0.60 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW BASING DIAGRAM JEDEC 9LT

THE 8ET7 IS A DUO-DIODE SHARP-CUTOFF PENTODE IN THE 9 PIN MINIATURE CONSTRUCTION. THE TUBE IS DESIGNED PRIMARILY FOR USE AS A COMBINED VIDEO AMPLIFIER AND HORIZONTAL PHASE DETECTOR IN TELEVISION RECEIVERS.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

PENTODE SECTION

GPID #1 TO PLATE, MAX.	0.1	pf
INPUT: G1 TO (H+Pk+G3, I.S.+G2 Dk,DSh)	10	pf
OUTPUT: P TO (H+Pk+G3, I.S.+G2 Dk,DSh)	4.2.	pf

DIODE SECTION (EACH DIODE)

DIODE PLATE TO	(h+Dk, Dsh+Pk, G3, I.S.)	1.5	pf
DIODE CATHODE;	DIODE SHIELD TO (h+Dp+Pk, G3, I.S)	7.5	pf

COUPLING

PENTODE	GRID #	1 TO	DIODE PLA	TE (EACH	DIODE) (MAX)	.005	pf
PENTODE	PLATE	TO DI	ODE PLATE	(EACH D	IODE) (MAX.)	.02	pf

RATINGS

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

HEATER VOLTAGE	8.0	VOLTS
MAXIMUM PLATE VOLTAGE	330	VOLTS
MAXIMUM #2 SUPPLY VOLTAGE	330	VOLTS
MAXIMUM #2 VOLTAGE	SEE RATING CHART	
MAXIMUM POSITIVE GRID #1 VOLTAGE	0	VOLTS
MAXIMUM PLATE DISSIPATION	5.0	WATTS
MAXIMUM GRID #2 DISSIPATION	1.1	WATT
MAXIMUM GRID #1 CIRCUIT RESISTANCE:		
CATHODE BIAS	0.25	MEGOHMS
FIXED BIAS	0.1	MEGOHMS
MAXIMUM HEATER-CATHODE VOLTAGE: HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE DC	100	VOLTS
TOTAL DC AND PEAK	200	VOLTS
HEATER WARM-UP TIME (APPROX)*	11.0	SECONDS

TUNG-SOL -

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

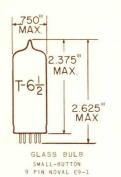
PENTODE - CLASS AT AMPLIFIER

HEATER VOLTAGE	8.0	VOLTS
HEATER CURRENT	0.60	AMP.
PLATE VOLTAGE	200	VOLTS
GRID #2 VOLTAGE	150	VOLTS
CATHODE BIAS RESISTOR	100	OHMS
PLATE CURRENT	25	MA.
GRID #2 CURRENT	5:5	MA.
TRANSCONDUCTANCE	11 500	имноѕ
PLATE RESISTANCE (APPROX.)	60 000	OHMS
EC1 FOR $1b = 100 \mu A$ (APPROX.)	-10	VOLTS
AVERAGE DIODE CURRENT WITH 10 VOLTS	10	
DC APPLIED (EACH DIODE)	1.5	MA.
INSTANTANEOUS PLATE KNEE VALUES		
Eb =60V, Ec2 =150, AND Ec1 =0 V;		
16 = 55 MA AND 102 = 18 MA.		

DESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND INFOURDED LIFE NO DESIGN—MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.

^{*}HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

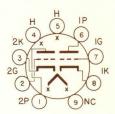
TWIN TRIODE



OUTLINE DRAWING JEDEC 6-3 COATED UNIPOTENTIAL CATHODE

FOR SERIES STRING OPERATION
IN TELEVISION RECEIVERS

ANY MOUNTING POSITION



BOTTOM VIEW

BASING DIAGRAM
JEDEC 9LP

THE 8FQ7 IS A GENERAL PURPOSE, MEDIUM-MU TWIN TRIODE IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS INTENDED PRIMARILY FOR USE AS A VERTICAL-DEFLECTION OSCILLATOR AND HORIZONTAL-DEFLECTION OSCILLATOR IN TELEVISION RECEIVERS. THE 8FQ7 MAY ALSO BE USED IN PHASE-INVERTER, MULTIVIBRATOR, SYNC-SEPARATOR, SYNC-AMPLIFIER, AND IN RESISTANCE-COUPLED AF AMPLIFIER CIRCUITS OF ELECTRONIC EQUIPMENT.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

WITHOUT EXTERNAL SHIELD

	UNIT #1	UNIT #2	
GRID TO PLATE	3.6	3.8	pf
GRID TO CATHODE AND HEATER	2.4	2.4	pf
PLATE TO CATHODE AND HEATER	0.34	0.26	pf
PLATE OF UNIT #1 TO PLATE OF UNIT #2	1.	0	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIUMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS 8.4 VOLTS 450 MA.

HEATER SUPPLY LIMITS:

CURRENT OPERATION 450±27 MA.

MAXIMUM PEAK HEATER-CATHODE VOLTAGE:

HEATER NEGATIVE WITH RESPECT TO CATHODE 200 VOLTS

HEATER POSITIVE WITH RESPECT TO CATHODE 200 VOLTS

HEATER WARM—UP TIME (APPROX.)* 11 SECONDS

• THE DC COMPONENT MUST NOT EXCEED 100 VOLTS.

HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH BOS OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

- TUNG-SOL

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MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

CLASS A₁ AMPLIFIER

VALUES ARE FOR EACH UNIT

PLATE VOLTAGE	330	VOLTS
GRID VOLTAGE:		
POSITIVE-BIAS VALUE	0	VOLTS
CATHODE CURRENT	22	MA.
PLATE DISSIPATION:		
EITHER PLATE	4	WATTS
BOTH PLATES (BOTH UNITS OPERATING)	5.7	WATTS
MAX. CIRCUIT VALUES:		
GRID-CIRCUIT RESISTANCE:		
FOR FIXED -BIAS OPERATION	1	MEGOHM

HORIZONTAL-DEFLECTION OSCILLATOR B

DC PLATE VOLTAGE	330	VOLTS
PEAK NEGATIVE—PULSE GRID VOLTAGE ^C CATHODE CURRENT:	660	VOLTS
PEAK	330	MA.
DC	22	MA.
PLATE DISSIPATION:		
EITHER PLATE	4	WATTS
BOTH PLATES (BOTH UNITS OPERATING)	5.7	WATTS
MAX. CIRCUIT VALUES:		
GRID-CIRCUIT RESISTANCE	2.2	MEGOHM

VERTICAL-DEFLECTION OSCILLATOR B

DC PLATE VOLTAGE	330	VOLTS
PEAK NEGATIVE-PULSE GRID VOLTAGE D	440	VOLTS
CATHODE CURRENT:		
PEAK	77	MA.
DC	22	MA.
PLATE DISSIPATION:		
EITHER PLATE	4	WATTS
BOTH PLATES (BOTH UNITS OPERATING	5.7	WATTS
MAX. CIRCUIT VALUES:		
GRID-CIRCUIT RESISTANCE	2.2	MEGOHMS

CHARACTERISTICS

CLASS A1 AMPLIFIER

PLATE VOLTAGE	90	250	VOLTS
GRID VOLTAGE	0	-8	VOLTS
AMPLIFICATION FACTOR	20	20	
PLATE RESISTANCE (APPROX.)	6700	7700	OHMS
TRANSCONDUCTANCE	3000	2600	µмноs
PLATE CURRENT	10	9	MA.
PLATE CURRENT FOR GRID VOLTS =-12.5		1.3	MA.
GRID VOLTAGE (APPROX.) FOR PLATE μ A=10	-7	-18	VOLTS

NOTES

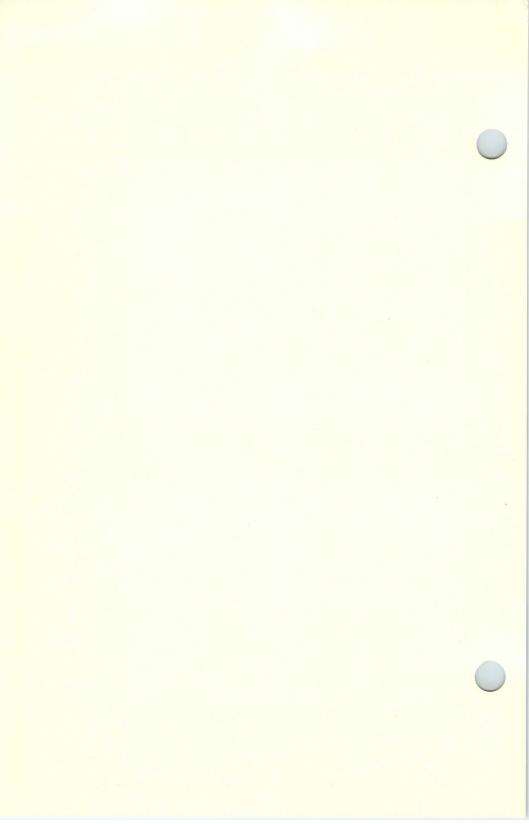
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B FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE CONCERNING TELEVISION BROADCAST STATIONS." FEDERAL COMMUNICATIONS COMMISSION.

CTHIS RATING IS APPLICABLE WHERE THE DURATION OF THE VOLTAGE PULSE DOES NOT EXCEED 15 PER CENT OF ONE HORIZONTAL SCANNING CYCLE. IN A 525-LINE, 30-FRAME SYSTEM, 15 PER CENT OF ONE HORIZONTAL SCANNING CYCLE IS 10 MICROSECONDS.

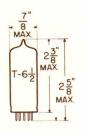
D_THIS RATING IS APPLICABLE WHERE THE DURATION OF THE VOLTAGE PULSE DORS NOT EXCEED 15 PER CENT
OF ONE VERTICAL SCANNING CYCLE. IN A 525-LINE, 30-FRAME SYSTEM, 15 PER CENT OF ONE VERTICAL
SCANNING CYCLE IS 2.5 MILLISECONDS.

SIMILAR TYPE REFERENCE: Except for heater ratings, the 8FQ7 is identical to the 6FQ7.



TRIODE PENTODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER

8.0 VOLTS 0.6 AMP.

ANY MOUNTING POSITION



BOTTOM VIEW

9 PIN BASE

9DX

μμf

μμf

μμf

 $\mu\mu f$

.018

.005

0.17

GLASS BULB

THE 8GN8 IS A HIGH MU TRIODE AND A SHARP CUTOFF PENTODE IN THE 9 PIN MINIATURE CONSTRUCTION. THE TRIODE SECTION IS DESIGNED FOR USE AS A VOLTAGE AMPLIFIER OR SYNC-SEPARATOR. THE PENTODE SECTION IS DESIGNED FOR VIDEO AMPLIFIER SERVICE FEATURING A CONTROLLED PLATE KNEE CHARACTERISTIC. EXCEPT FOR HEATER RATINGS AND HEATER WARM-UP TIME, THE 8GN8 IS IDENTICAL TO THE 6GN8.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

TRIODE SECTION

GRID TO PLATE

COUPLING

TRIODE GRID TO PENTODE PLATE (MAX.)

PENTODE GRID #1 TO TRIODE PLATE (MAX.)

PENTODE PLATE TO TRIODE PLATE (MAX.)

INPUT: G TO (H+K)	2.4	μμf
	2.4	
OUTPUT: P TO (H+K)	0.36	μμf
PENTODE SECTION		
TENTOSE SECTION		
GRID #1 TO PLATE (MAX.)	0.1	μμf
INPUT: G1 TO (H+K+G2+G3+I.S.)	11	μμf
OUTPUT: P TO (H+K+G2+G3+1.S.)	4.2	
001101.1 10 (111110210311.3.)	4.2	$\mu\mu f$

RATINGS

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

	TRIODE SECTION	PENTODE SECTION	
HEATER VOLTAGE	8.0		VOLTS
MAXIMUM PLATE VOLTAGE	330	330	VOLTS
MAXIMUM GRID #2 SUPPLY VOLTAGE		330	VOLTS

TUNG-SOL -

CONTINUED FROM PRECEDING PAGE

RATINGS - CONT'D. INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM^A

	TRIODE	PENTODE	
HEATER VOLTAGE		B.O NG CHART	VOLTS
MAXIMUM GRID #2 VOLTAGE MAXIMUM POSITIVE GRID #1 VOLTAGE	0	0	VOLTS
MAXIMUM PLATE DISSIPATION MAXIMUM GRID #2 DISSIPATION	1.0	5.0	WATTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE: FIXED BIAS	0.5	0.25	мЕСОНМ
CATHODE BIAS MAXIMUM HEATER-CATHODE VOLTAGE:	1.0	1.0	мЕСОНМ
HEATER NEGATIVE WITH RESPECT TO CATHODE TOTAL DC AND PEAK	2	00	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE DC	1	00	VOLTS
TOTAL DC AND PEAK HEATER WARM UP TIME*	2	00	VOLTS
The Country of the co	1.1	.0	SECONDS

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

	TRIODE	PENTODE	
	SECTION	SECTION	
WEATER VOLTAGE			
HEATER VOLTAGE	8.		VOLTS
HEATER CURRENT	0.	6	AMP.
PLATE VOLTAGE	250	200	VOLTS
GRID #2 VOLTAGE		150	VOLTS
GRID #1 VOLTAGE	-2		VOLTS
CATHODE BIAS RESISTOR		100	OHMS
PLATE CURRENT	2	25	MA.
GRID #2 CURRENT		5.5	MA.
TRANSCONDUCTANCE	2700	11500	μMHOS
AMPLIFICATION FACTOR	100		
PLATE RESISTANCE	37000	60000	OHMS
Ec1 FOR $Ib = 100 \mu A$ (APPROX.)		-10	VOLTS
Ec1 FOR Ib = $20 \mu A$ (APPROX.)	-5		VOLTS

INSTANTANEOUS PLATE KNEE CHARACTERISTICS

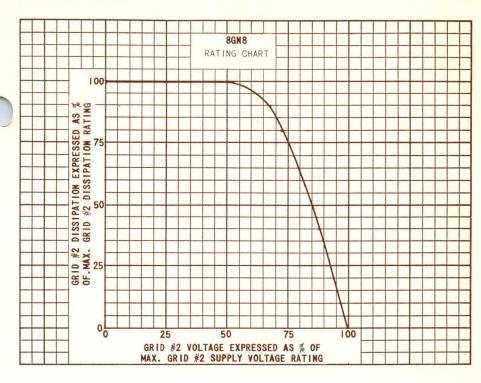
PENTODE SECTION

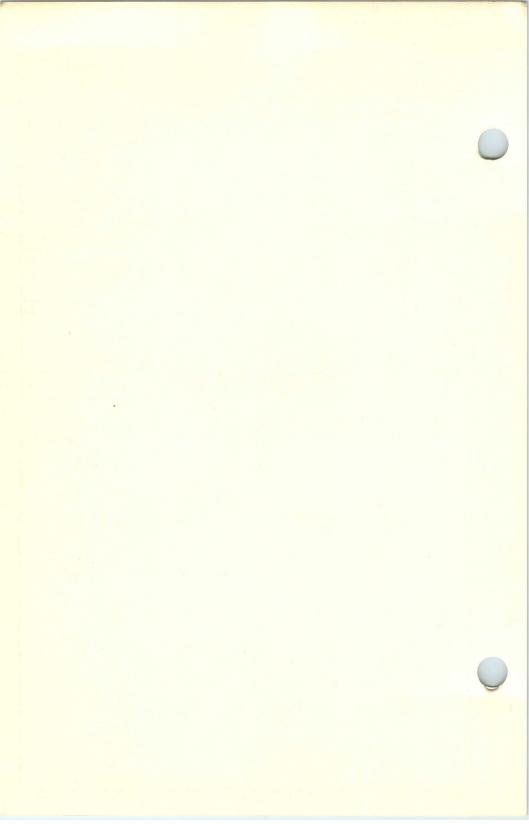
Eb = 60 VOLTS, Ec2 = 150 VOLTS AND Ec1 = 0 VOLTS Ib = 55 MA AND Ic2 = 18 MA.

- * HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VALUE AFTER APPLYING FOUR (4) TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE EQUAL TO THREE (3) TIMES RATED HEATER VOLTAGE DIVIDED BY RATED HEATER CURRENT.
- A- DESIGN MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS.

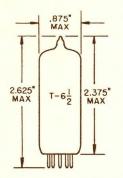
THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDD ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS.

THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT LIFE NO DESIGN MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.





TRIODE PENTODE MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

FOR COMBINED VIDEO AMPLIFIER AND GENERAL PURPOSE T.V. APPLICATIONS

ANY MOUNTING POSITION

BOTTOM VIEW BASING DIAGRAM JEDEC 9DX

GLASS BULB MINIATURE BUTTON 9 PIN BASE E9-1 OUT LINE DRAWING JEDEC 6-3

THE 8JV8 IS A TRIODE PENTODE IN THE 9 PIN MINIATURE CONSTRUCTION. THE TRIODE SECTION IS DESIGNED FOR USE IN SOUND IF, KEYED A.G.C., SYNC-SEPARATION, SYNC-AMPLIFICATION OR NOISE SUPPRESSION CURCUITS; THE PENTODE SECTION IS DESIGNED FOR USE AS A VIDEO AMP-LIFIER. THE HEATER MAY BE OPERATED FROM A TRANSFORMER OR IN A SERIES STRING.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

TRIODE:		
GRID TO PLATE: Tg TO Tp	2.2	pf
INPUT: Tg TO (h+Tk+Pk, Pg3, i.s.)	3.0	pf
OUTPUT: Tp TO (h+Tk+Pk, Pg3, i.s.)	2.0	pf
PENTODE:		
GRID 1 TO PLATE: Pg 1 to Pp (MAX)	0.08	pf
INPUT: Pg1 TO (h+Pg2+Pk, Pg3, i.s.)	8.0	pf
OUTPUT: Pp TO (h+Pg2+Pk, Pg3, i.s.)	3.2	pf
COUPLING:		
PENTODE GRID 1 TO TRIODE PLATE:		
Pg1 TO Tp (MAX.)	0.012	pf
PENTODE PLATE TO TRIODE PLATE:		
Pp TO Tp (MAX.)	0.24	pf

TUNG-SOL -

CONTINUED FROM PRECEDING PAGE

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM SYSTEM - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS HEATER WARM-UP TIME	8.5 VOLTS	450 11	MA. SECONDS
LIMITS OF SUPPLIED CURRENT MAXIMUM HEATER-CATHODE VOLTAGE	- BOTH SECTIONS	450 ± 30	MA.
HEATER NEGATIVE WITH RESPECT TOTAL DC AND PEAK		200	VOLTS
HEATER POSITIVE WITH RESPECT TO DC TOTAL DC AND PEAK	O CATHODE	100	VOLTS VOLTS

MAXIMUM RATINGS

DESIGN MAXIMUM SYSTEM - SEE EIA STANDARD RS-239

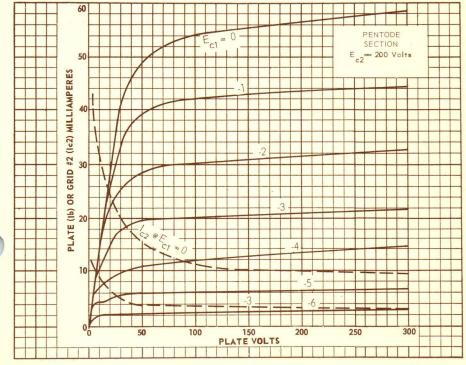
	TRIODE	PENTODE	
PLATE VOLTAGE	330	330	VOLTS
PLATE DISSIPATION	1.1	4.0	WATTS
GRID 2 VOLTAGE	****	330	VOLTS
GRID 2 DISSIPATION		1.7	WATTS
NEGATIVE GRID 1 VOLTAGE	50	50	VOLTS
POSITIVE GRID 1 VOLTAGE	0	0	VOLTS
GRID 1 CIRCUIT RESISTANCE:			
FOR CATHODE-BIAS OPERATION	1.0	1.0	MEGOHMS
FOR FIXED BIAS OPERATION	0.5	0.25	MEGOHM

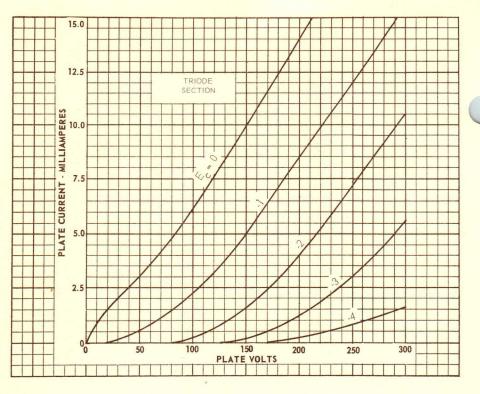
AVERAGE CHARACTERISTICS

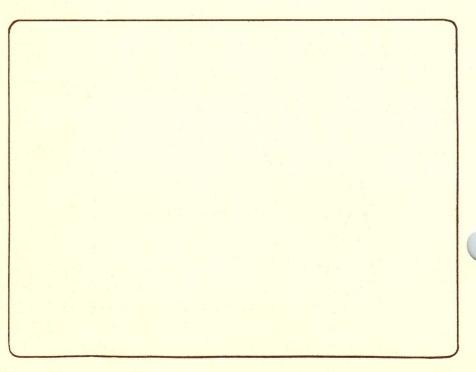
	TRIODE	PENTOD	E	
PLATE VOLTAGE	200	125	200	VOLTS
GRID 2 VOLTAGE		125	200	VOLTS
GRID 1 VOLTAGE	-2.0	-1.0	-2.9	VOLTS
PLATE CURRENT	4	22	22	MA.
GRID 2 CURRENT		4	4	MA.
TRANSCONDUCTANCE	4,000	11,500	10,700	MHOS
PLATE RESISTANCE - APPROX.	17.5	100	150	KOHMS
AMPLIFICATION FACTOR	70			
GRID 1 VOLTAGE FOR Ib=20µA (APPROX.)	-5	-5.5	-9	VOLTS

KNEE CHARACTERISTICS Ecl = 0 INSTANTANEOUSLY

PLATE VOLTAGE		40	60	VOLTS
GRID 2 VOLTAGE		125	200	VOLTS
PLATE CURRENT		28	51	MA.
GRID 2 CURRENT	****	9	14	MA.



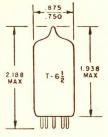




TUNG-SOL .

TRIODE-PENTODE

MINIATURE TYPE



GLASS BULB MINIATURE BUTTON 9 PIN BASE E9-1 OUTLINE DRAWING JEDEC 6-2 FOR
FREQUENCY CHANGER
APPLICATIONS IN T.V. RECEIVERS

COATED UNIPOTENTIAL CATHODE

ANY MOUNTING POSITION

> BOTTOM VIEW BASING DIAGRAM JEDEC 9 AE

THE 9A8 IS A TRIODE-PENTODE IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED FOR USE AS A FREQUENCY CHANGER IN TELEVISION RECEIVERS.

DIRECT INTERELECTRODE CAPACITANCES

	TRIODE SECTION	PENTODE SECTION	
PLATE TO GRID 1		MAX. 0.025	pf
PLATE TO GRID	1.5		pf
INPUT	2.5	5.5	pf
OUTPUT	1.8	3.8	pf

HEATER CHARACTERISTICS AND RATINGS

AVERAGE CHARACTERISTICS	9.0 VOLTS	300	MA
LIMITS OF SUPPLIED CURRENT		300 ± 20	MA
HEATER-CATHODE VOLTAGE		100	VOLTS

- TUNG-SOL -

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

DESIGN CENTER VALUES - SEE EIA STANDARD RS-239

	TRIODE SECTION	PENTODE SECTION	
PLATE VOLTS	250	250	VOLTS
PLATE DISSIPATION	1.5	1.7	WATTS
GRID CIRCUIT RESISTANCE	0.5		MEGOHM
GRID 2 VOLTAGE AT 1k = 14 MA		175	VOLTS
GRID 2 VOLTAGE AT 1k < 10 MA		200	VOLTS
GRID 2 VOLTAGE WITHOUT CURRENT		550	VOLTS
GRID 2 DISSIPATION AT Pp > 1.2 WATTS		0.5	WATT
CATHODE CURRENT	14	14	MA.
GRID 1 CIRCUIT RESISTANCE-AUTOMATIC BIAS		1	MEGOHM
GRID 1 CIRCUIT RESISTANCE-FIXED BIAS		0.5	MEGOHM

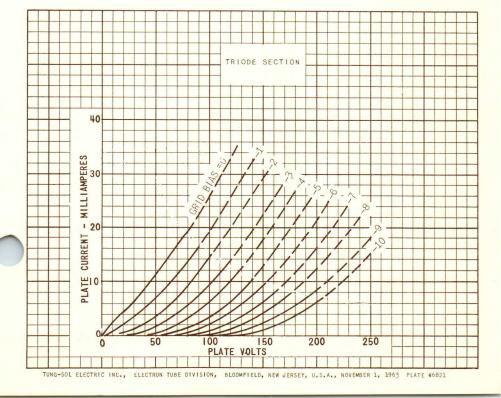
TYPICAL CHARACTERISTICS

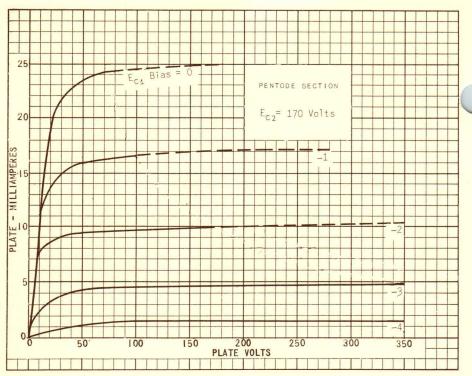
	TRIODE	PENTODE SECTION	
PLATE VOLTAGE	100	170	VOLTS
GRID 2 VOLTAGE		170	VOLTS
GRID 1 VOLTAGE	-2	-2	VOLTS
PLATE CURRENT	14	10	MA
GRID 2 CURRENT		2.8	MA
TRANSCONDUCTANCE	5,000	6,200	μMHOS.
TRIODE AMPLIFICATION FACTOR	20	47	
PLATE RESISTANCE		0.4	MEGOHM
INPUT RESISTANCE AT 50 Mc/s		10,000	OHMS
EQUIVALENT NOISE RESISTANCE		1,500	OHMS

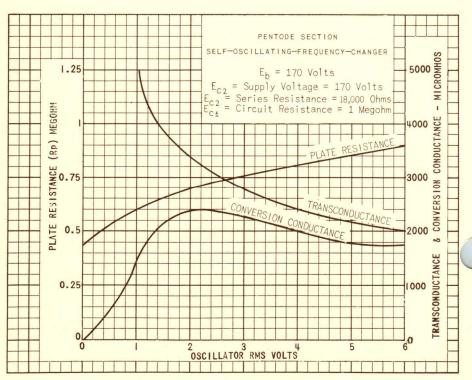
OPERATING CHARACTERISTICS

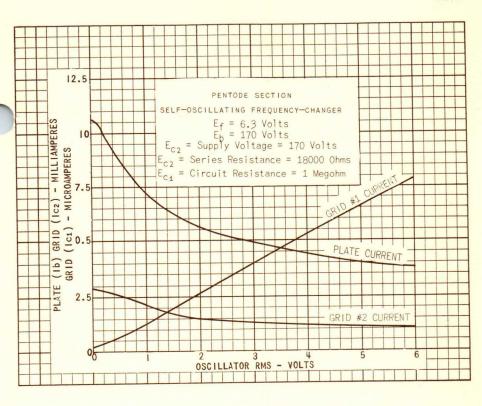
FOR USE AS A MIXER

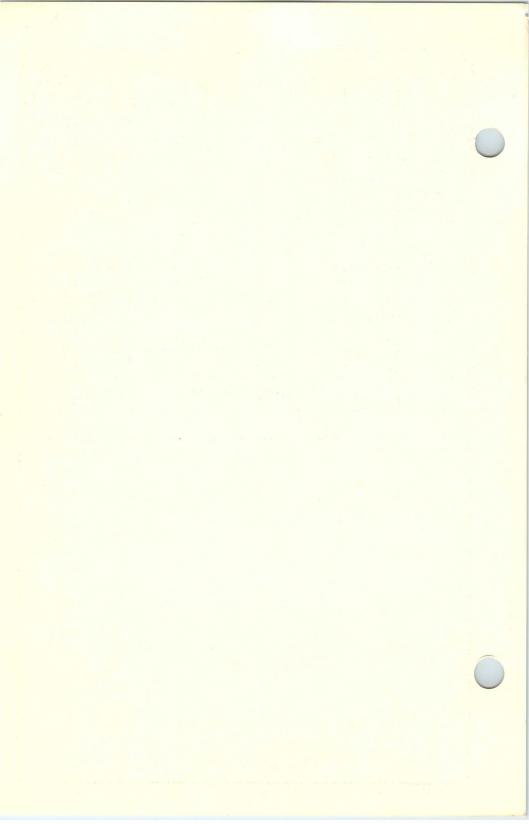
PLATE VOLTAGE	170	170	VOLTS
GRID 2 VOLTAGE	170	170	VOLTS
GRID 1 CIRCUIT RESISTANCE	0.1	0.1	MEGOHM
CATHODE RESISTOR	330	820	OHMS
OSCILLATOR VOLTAGE	3.5	3.5	VOLTS RMS
PLATE CURRENT	6.5	5.2	MA
GRID 2 CURRENT	2.0	1.5	MA
GRID 1 CURRENT	25	0	μΔ
CONVERSION CONDUCTANCE	2,200	2,100	μ MHOS
PLATE RESISTANCE	0.8	0.87	MEGOHM



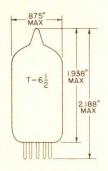








TWIN TRIODE



UNIPOTENTIAL CATHODE

FOR
AUDIO FREQUENCY AMPLIFIER
OR COMBINED OSCILLATOR AND
MIXER APPLICATIONS IN
T.V. RECEIVERS

2K 3 7 16 2G 2 8 1K

ANY MOUNTING POSITION

BOTTOM VIEW
BASING DIAGRAM
JEDEC 9A

GLASS BULB

SMALL BUTTON NOVAL

9 PIN BASE E9-1

OUTLINE DRAWING

JEDEC 6-2

THE 9AU7 COMBINES TWO INDEPENDENT MEDIUM-MU INDIRECTLY HEATED CATHODE TYPE TRIODES IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS ADAPTABLE TO APPLICATION EITHER AS
AN AUDIO FREQUENCY AMPLIFIER OR AS A COMBINED OSCILLATOR AND MIXER IN 450 MA. SERIES
HEATER OPERATED TELEVISION RECEIVERS. THERMAL CHARACTERISTICS OF THE HEATER ARE
CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED. WITH THE
EXCEPTION OF HEATER RATINGS AND HEATER WARM-UP TIME IT IS IDENTICAL TO THE 12AU7A.

→ DIRECT INTERELECTRODE CAPACITANCES

	TRIODE UNIT T ₁	TRIODE UNIT T2	
GRID TO PLATE	1.5	1.5	pf
GRID TO CATHODE	1.6	1.6	pf
PLATE TO CATHODE	0.50	0.35	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS			
HEATER IN SERIES	9.4 VOLTS	225	MA.
HEATER IN PARALLEL	4.7 VOLTS	450	MA.
HEATER WARM-UP TIME (AVG.) (IN PARALLEL)		11	SECONDS
HEATER SUPPLY LIMITS:			
VOLTAGE OPERATION (IN SERIES)		9.4±0.9	VOLTS
CURRENT OPERATION (IN PARALLEL)		450±30	MA.
MAXIMUM HEATER-CATHODE VOLTAGE:			
HEATER NEGATIVE WITH RESPECT TO CA	ATHODE		
TOTAL DC AND PEAK		200	VOLTS
HEATER POSITIVE WITH RESPECT TO CA	THODE		
DC		100	VOLTS
TOTAL DC AND PEAK		200	VOLTS

- TUNG-SOL .

CONTINUED FROM PRECEDING PAGE

→ MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

DESIGN MAXIMUM VALU	JES - SEE EIA STANDARDR	5-239	
VALUES ARE FOR EACH UNIT			
	CLASS A1 AMPLIFIER	DEFLECTION	
PLATE VOLTAGE	330	330	VOLTS
PLATE DISSIPATION:			
EACH PLATE	2.75	2.75	WATTS
BOTH PLATES	5.5	5.5	WATTS
CATHODE CURRENT	22		MA.
PEAK NEGATIVE PULSE GRID VOLTAGE		440	VOLTS
AVERAGE CATHODE CURRENT		22	MA.
PEAK CATHODE CURRENT		66	MA.
MAXIMUM CIRCUIT VALUES:			
GRID CIRCUIT RESISTANCE:			
FOR FIXED BIAS, GRID-RESISTOR BIAS,			
OR CATHODE-BIAS OPERATION	2.2	2.2	MEGOHMS
	HORIZONTAL DEFLECTION OSCILLATOR	VERTICAL DEFLECTION AMPLIFIER	
DC PLATE VOLTAGE	330	330	VOLTS
PLATE DISSIPATION			
EACH PLATE	2.75	2.75	WATTS
BOTH PLATES	5.5	5.5	WATTS
PEAK POSITIVE-PULSE PLATE VOLTAGE		1200	VOLTS
PEAK NEGATIVE-PULSE GRID VOLTAGE	660	275	VOLTS
AVERAGE CATHODE CURRENT	22	22	MA.
PEAK CATHODE CURRENT	330	66	MEGOHMS
MAXIMUM CIRCUIT VALUES: GRID CIRCUIT RESISTANCE: FOR FIXED BIAS, GRID-RESISTOR BIAS,			
OR CATHODE-BIAS OPERATION	2.2	2.2	MEGOHMS

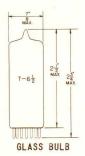
TYPICAL OPERATING CHARACTERISTICS

CLASS A1 AMPLIFIER - EACH UNIT

PLATE VOLTAGE		100	250	VOLTS
GRID VOLTAGE		0	-8.5	VOLTS
AMPLIFICATION FACTOR	-	19.5	17	
PLATE RESISTANCE		6250	7700	OHMS
TRANSCONDUCTANCE		3100	2200	μMHOS.
PLATE CURRENT		11.8	10.5	MA.
GRID VOLTAGE (APPROX:) FOR				
PLATE CURRENT OF 10 µAMP.			-24	VOLTS

HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SEREIS WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

- INDICATES-A CHANGE.



COATED UNIPOTNETIAL CATHODE

HEATER

9.0 VOLTS 0.60 AMP.

AC OR DC

ANY MOUNTING POSITION



MINIATURE 9 PIN BASE

THE 9DZ8 IS A HIGH-MU TRIODE, POWER PENTODE IN THE MINIATURE 9 PIN CONSTRUCTION. IT IS DESIGNED AS A TWO STAGE AUDIO FREQUENCY AMPLIFIER WHERE THE PLATE SUPPLY VOLTAGE IS OBTAINED FROM A SINGLE HALF-WAVE RECTIFIER DIRECTLY FROM THE 120 VOLT AC LINE.

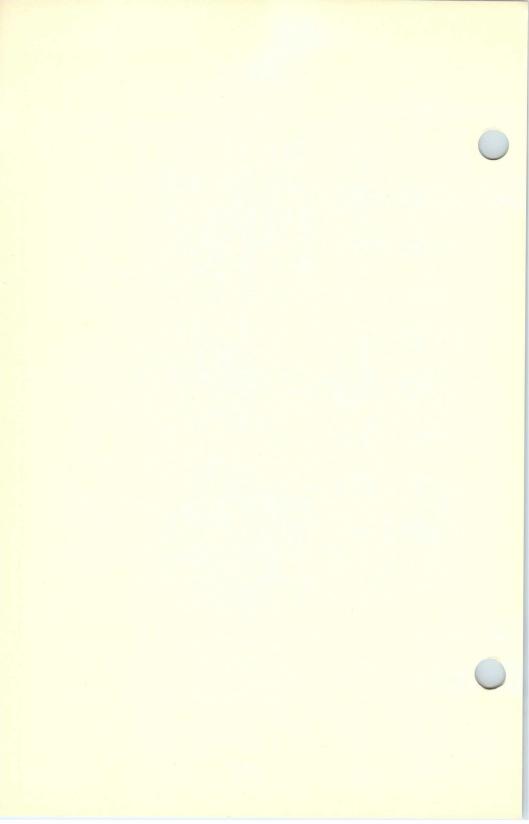
RATINGS
INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

	TRIODE	PENTODE	
HEATER VOLTAGE	9.	.0	VOLTS
MAXIMUM PLATE VOLTAGE	150	150	VOLTS
MAXIMUM PLATE DISSIPATION	. 75	6.5	WATTS
MAXIMUM GRID (2) VOLTAGE		135	VOLTS
MAXIMUM GRID (2) DISSIPATION		1.5	WATTS
MAXIMUM DC HEATER-CATHODE POTENTIAL	110	110	VOLTS
MAXIMUM GRID CIRCUIT RESISTANCE	5.0	0.5	MEGOHMS
MAXIMUM CATHODE CURRENT	5.0	60.0	MA.
MAXIMUM HEATER-CATHODE VOLTAGE:			
HEATER NEGATIVE WITH RESPECT TO CATHODE	20	00	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	20	00	VOLTS

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

	TRIODE	PENTODE	
HEATER VOLTAGE	9.0	C	VOLTS
HEATER CURRENT	0.60	0	AMP.
PLATE VOLTAGE	120	_ 145	VOLTS
GRID #2 VOLTAGE		120	VOLTS
GRID #1 VOLTAGE	0	0	VOLTS
CATHODE RESISTOR	1500	180	OHMS
PLATE CURRENT	0.8	45	MA.
GRID #2 CURRENT-	-	6	MA.
TRANSCONDUCTANCE	1400	7500	µмноs
LOAD RESISTANCE		2500	OHMS
GRID CUTOFF VOLTAGE FOR 204A	-2.5		VOLTS
AMPLIFICATION FACTOR	100		
POWER OUTPUT		2.0	WATTS

SIMILAR TYPE REFERENCE: Except for heater ratings the 9DZ8 is identical to the 6DZ8, 12DZ8, 18DZ8, and the 35DZ8,



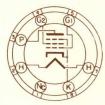
GLASS BULB

COATED UNIPOTENTIAL CATHODE

HEATER

9.4 VOLTS 0.6 AMP. AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

INTERMEDIATE SHELL 8 PIN BASE

75

THE 9EF6 IS A BEAM POWER PENTODE DESIGNED FOR USE AS A VERTICAL DEFLECTION AMPLIFIER IN WIDE ANGLE TELEVISION RECEIVERS. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED.

DIRECT INTERELECTRODE CAPACITANCES

GRID #1 TO PLATE	0.8	μμf
GRID #1 TO CATHODE GRID #3, GRID #2, HEATER	11.5	μμf
PLATE TO CATHODE GRID #3, GRID #2, HEATER	9.0	μμf

RATINGS

INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

VERTICAL DEFLECTION AMPLIFIER - PENTODE CONNECTED

HEATER VOLTAGE	9.4	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER POSITIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	200	VOLTS
DC	100	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	200	VOLTS
MAXIMUM PLATE VOLTAGE	250	VOLTS
MAXIMUM GRID #2 VOLTAGE	250	VOLTS
MAXIMUM PEAK POSITIVE PULSE PLATE VOLTAGE (ABS. MAX.)	2 000	VOLTS
MAXIMUM PLATE DISSIPATION	10	WATTS
MAXIMUM PEAK NEGATIVE PULSE GRID #1 VOLTAGE	250	VOLTS
MAXIMUM GRID #2 DISSIPATION	2.0	WATTS
MAXIMUM AVERAGE CATHODE CURRENT	60	MA.
MAXIMUM PEAK CATHODE CURRENT	180	MA.
MAXIMUM GRID #1 CIRCUIT RESISTANCE (Rk=100 OHMS MIN.)	2.2	MEGOHMS
HEATER WARM-UP TIME (APPROX.)*	11.0	SECONDS

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

HEATER VOLTAGE	9.4	VOLTS
HEATER CURRENT	0.6	AMP.
PLATE VOLTAGE	250	VOLTS
GRID #2 VOLTAGE	250	VOLTS
GRID #4 VOLTAGE	-18	VOLTS
PLATE CURRENT	50	MA.
GRID #2 CURRENT	2	MA -
TRANSCONDUCTANCE	5 000	μMH0s
GRID #1 VOLTAGE (APPROX.) FOR Ib=1 MA.	-40	VOLTS
PLATE CURRENT FOR Eb= 75V, Ec2=250V, Ec1 =0 C	170	MA.
SCREEN CURRENT Eb= 75V, Ec2=250V, Ec1 =0 C	17	MA

SIMILAR TYPE REFERENCE:

Except for heater ratings, and heater warm-up time the 9EF6 is identical to the 6EF6.

Except for heater ratings, it is identical to the 12EF6.

ATHE DURATION OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING SYSTEM WHICH IS 2-5 MILLISECONDS IN A 525-LINE, 30-FRAME.

BIN THE CASE OF GRID RESISTOR BIAS SOME PROTECTION IS NECESSARY FOR THE TUBE IN THE NO DRIVE CONDITIONS.

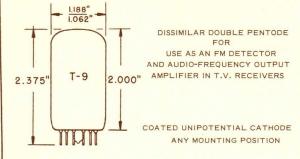
CINSTANTANEOUS VALUES.

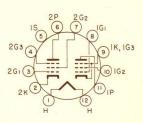
^{*}HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

TUNG-SOL .

DOUBLE PENTODE

COMPACTRON





GLASS BULB BUTTON 12 PIN BASE E12-70 OUTLINE DRAWING JEDEC 9-58 BOTTOM VIEW BASING DIAGRAM JEDEC 12BU

THE 10AL11 IS A SHARP-CUTOFF, DUAL-CONTROL PENTODE AND A POWER PENTODE IN A T-9 COMPACTRON CONSTRUCTION. THE DUAL-CONTROL PENTODE (SECTION 2) IS INTENDED FOR USE AS AN FM DETECTOR AND THE POWER PENTODE (SECTION 1) AS AN AUDIO-FREQUENCY OUTPUT AMPLIFIER IN TELEVISION RECEIVERS.

DIRECT INTERELECTRODE CAPACITANCES

SECTION 1		
GRID 1 TO PLATE: (IG1TO IP)	0.26	pf
INPUT: IG1 TO (H+ IK + IG2 + IG3 + I.S.)	11	pf
OUTPUT: IP TO (H + IK + IG2 + IG3 + I.S.)	12	pf
SECTION 2		
GRID 1 TO PLATE: (2G1 TO 2P)	0.034	pf
GRID 3 TO PLATE: (2 G3 TO 2P)	3,2	pf
GRID 1 TO ALL EXCEPT PLATE: 2G1TO		
(H + 2K + 2G2 + 2G3 + 1.S.)	6.5	pf
GRID 3 TO ALL: 2 _{G3} TO (H+2K+2G1+2G2+2P+1.S.)	7.5	pf
GRID 1 TO GRID 3: (2 G1 TO 2G3)	0.24	pf
PLATE TO PLATE: (1P TO 2P)	0.12	pf

CONTINUED FROM PRECEDING PAGE

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	9.8 VOLTS	600	MA.
HEATER WARM-UP TIME		11	SECONDS
LIMITS OF SUPPLIED CURRENT		600 ± 40	MA.
HEATER-CATHODE VOLTAGE	SECTION 1	SECTION 2	
HEATER POSITIVE WITH RESPECT TO CATHODE			
DC COMPONENT	100	100	VOLTS
TOTAL DC AND PEAK	200	200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE			
TOTAL DC AND PEAK	200	200	VOLTS

MAXIMUM RATINGS DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

	SECTION 1	SECTION 2	
PLATE VOLTAGE	275	330	VOLTS
GRID 2 VOLTAGE	275	RATING CHART	VOLTS
GRID 2 SUPPLY VOLTAGE		330	VOLTS
GRID 3 (SUPPESSOR) VOLTAGE		28	VOLTS
POSITIVE DC GRID 1 VOLTAGE		0	VOLTS
PLATE DISSIPATION	10	1.7	WATTS
GRID 2 DISSIPATION	2.0	1.1	WATTS
GRID 1 CIRCUIT RESISTANCE			
WITH FIXED BIAS	0.25		MEGOHMS
WITH CATHODE BIAS	0.5		MEGOHMS

CHARACTERISTICS AND TYPICAL OPERATION

SECTION 1

PLATE VOLTAGE		250	VOLTS
GRID 2 VOLTAGE		250	VOLTS
GRID 1 VOLTAGE		-8.0	VOLTS
PEAK AF GRID 1 VOLTAGE		8.0	VOLTS
ZERO-SIGNAL PLATE CURRENT		35	MA.
MAXIMUM-SIGNAL PLATE CURRENT		39	MA.
ZERO-SIGNAL GRID 2 CURRENT		2.5	MA.
MAXIMUM SIGNAL GRID 2 CURRENT		7.0	MA.
MAXIMUM-SIGNAL POWER OUTPUT		4.2	WATTS
TRANSCONDUCTANCE		6,500	MICROMHOS
PLATE RESISTANCE	Approx.	100,000	OHMS
LOAD RESISTANCE		5,000	OHMS
TOTAL HARMONIC DISTORTION	Approx.	10	PERCENT

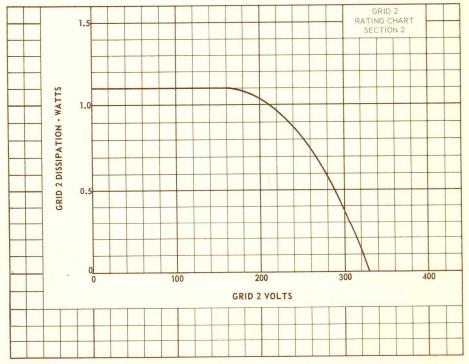
AVERAGE CHARACTERISTICS - SECTION 2

PLATE VOLTAGE		150	VOLTS
GRID 2 VOLTAGE		100	VOLTS
GRID 3 VOLTAGE		0	VOLTS
CATHODE-BIAS RESISTOR		560	OHMS
PLATE CURRENT		1.3	MA.
GRID 2 CURRENT		2.1	MA.
GRID 1 TRANSCONDUCTANCE		1,000	MICROMHOS
GRID 3 TRANSCONDUCTANCE		400	MICROMHOS
PLATE RESISTANCE	Approx.	0.15	MEGOHMS
GRID 1 VOLTAGE FOR IL = 30 µA	Approx.	-4.5	VOLTS

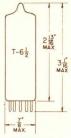
GRID 3 VOLTAGE FOR $I_b = 50 \mu A$

Approx. -4.5

VOLTS







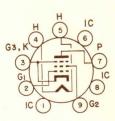
GLASS BULB
MINIATURE BUTTON
9 PIN BASE E9-1

OUTLINE DRAWING JEDEC 6-4 COATED UNIPOTENTIAL CATHODE

HEATER

10.6° VOLTS 0.45° AMP.

ANY MOUNTING POSITION



BOTTOM VIEW BASING DIAGRAM JEDEC 9CV

THE 10805 IS AN OUTPUT PENTODE DESIGNED FOR APPLICATION IN MEDIUM POWER HI-FI AMPLIFIERS. A PAIR OF TUBES IN CLASS AB, PUSH-PULL CONVENTIONAL OPERATION YIELDS AN OUTPUT OF UP TO 17 WATTS AT 4% DISTORTION (WITHOUT FEEDBACK). IN SINGLE-ENDED OPERATION A POWER OUTPUT OF 5.7 WATTS CAN BE OBTAINED. EXCEPT FOR HEATER CHARACTERISTICS AND HEATER WARM-UP TIME, THE 10805 IS IDENTICAL TO THE 6805.

DIRECT INTERELECTRODE CAPACITANCES

GRID #1 TO ALL OTHER ELEMENTS	10.8	pf
PLATE TO ALL OTHER ELEMENTS	6.5	pf
PLATE TO GRID #1 (MAX.)	0.5	pf
GRID #1 TO HEATER (MAX.)	0.25	pf

RATINGS

INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER CURRENT'	450±30	MA.
MAXIMUM PLATE VOLTAGEA	300	VOLTS
MAXIMUM PLATE VOLTAGE WITHOUT PLATE CURRENT	550	VOLTS
MAXIMUM PLATE DISSIPATIONA	12	WATTS
MAXIMUM GRID #2 VOLTAGE A	300	VOLTS
MAXIMUM GRID #2 VOLTAGE WITHOUT CURRENT	550	VOLTS
MAXIMUM GRID #2 DISSIPATION	2	WATTS
MAXIMUM GRID #2 PEAK DISSIPATION	4	WATTS
MAXIMUM NEGATIVE GRID #1 VOLTAGE	100	VOLTS
MAXIMUM GRID CURRENT STARTING POINT		
MAXIMUM GRID #1 VOLTAGE WHEN GRID #1		
CURRENT IS O. 3 HAMP.	-1.3	VOLTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE WITH		
AUTOMATIC BIAS	1	MEGOHM
MAXIMUM GRID #1 CIRCUIT RESISTANCE WITH		
FIXED BIAS	0.3	MEGOHM
MAXIMUM CATHODE CURRENT	65	MA.
MAXIMUM VOLTAGE BETWEEN HEATER AND CATHODE	100	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE		
HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	100	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	100	
TOTAL DC AND PEAK	100	VOLTS
HEATER WARM-UP TIME*	11	SECONDS

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A, ONE TUBE

PLATE VOLTAGE GRID #2 VOLTAGE GRID #1 BIAS CATHODE RESISTOR PLATE LOAD RESISTANCE			250 250 -7.3 135 5200			VOLTS VOLTS VOLTS OHMS OHMS
INPUT A.F. VOLTAGE (RMS) PLATE CURRENT GRID #2 CURRENT TRANSCONDUCTANCE PLATE RESISTANCE AMPLIFICATION FACTOR OF GRID #2 WITH RESPECT	0 48 5.5 11300 38000	0.3	3.4	4.3 49.5 10.8 	4.7 49.2 11.6	VOLTS MA. MA. μMHOS OHMS
TO GRID #1 MAX. SIGNAL POWER OUTPUTB TOTAL HARMONIC DISTORTIONB SECOND HARMONICB THIRD HARMONICB	19 0 	0.05	4.5 6.8 3.0 5.8	5.7 10 2.0 9.5	6.0 ^c	WATTS PERCENT PERCENT PERCENT
PLATE VOLTAGE GRID #2 VOLTAGE GRID #1 BIAS CATHODE RESISTOR PLATE LOAD RESISTANCE			250 250 -7.3 135 4500			VOLTS VOLTS VOLTS OHMS
INPUT A.F. VOLTAGE (RMS) PLATE CURRENT GRID #2 CURRENT TRANSCONDUCTANCE PLATE RESISTANCE AMPLIFICATION FACTOR OF GRID #2 WITH RESPECT	0 48 5.5 11300 38000	0.3	3.5	4.4 50.6 10 	4.8 50.5 11 	MA. MA. MHOS OHMS
TO GRID #1 MAX. SIGNAL POWER OUTPUT ^B TOTAL HARMONIC DISTORTION ^B SECOND HARMONIC ^B THIRD HARMONIC ^B	19 0 	0.05	4.5 7.5 5.7 4.5	5.7 10 5.0 8	6.0°	WATTS PERCENT PERCENT PERCENT
PLATE VOLTAGE GRID #2 VOLTAGE GRID #1 BIAS CATHODE RESISTOR PLATE LOAD RESISTANCE			250 250 -8.4 210 7000			VOLTS VOLTS VOLTS OHMS
INPUT A.F. VOLTAGE(RMS) PLATE CURRENT GRID #2 CURRENT TRANSCONDUCTANCE PLATE RESISTANCE AMPLIFICATION FACTOR OF	36 4.1 10000 40000	0.3		3.5 36.8 8.5 	5.5 36 14.6	VOLTS MA. MA. μΜΗΟS OHMS
GRID #2 WITH RESPECT TO GRID #1 MAX. SIGNAL POWER OUTPUT ^B TOTAL HARMONIC DISTORTION ^B SECOND HARMONIC ^B THIRD HARMONIC ^B	19 0 	0.05		4.2 10 1.7 8.7	5.6c	WATTS PERCENT PERCENT PERCENT

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS - cont'd.

CLASS A, ONE TUBE - CONT'D.

PLATE VOLTAGE GRID #2 VOLTAGE GRID #1 BIAS CATHODE RESISTOR		2: -6:	50 10 .4 60		VOLTS VOLTS VOLTS OHMS	
PLATE LOAD RESISTANCE		700			OHMS	
INPUT A.F. VOLTAGE(RMS.) PLATE CURRENT GRID #2 CURRENT TRANSCONDUCTANCE PLATE RESISTANCE AMPLIFICATION FACTOR OF GRID #2 WITH RESPECT TO	0 36 3.9 10400 40000	0.3	3.4 36.6 7.3 	3.8 36.5 8.0	VOLTS MA. MA. μMHOS OHMS	
GRID #1 MAX. SIGNAL POWER OUTPUT B TOTAL HARMONIC DISTORTION B SECOND HARMONIC B THIRD HARMONIC B	19 0	0.05	4.3 .10 1.8 9.3	4.7 ^c	OHMS WATTS PERCENT PERCENT PERCENT	
	CLASS B,	TWO TUBES				
PLATE VOLTAGE GRID #2 VOLTAGE GRID #1 BIAS LOAD RESISTANCE, PLATE TO PLATE		250 .250 -11.6	300 _300 -14.7 8000		VOLTS VOLTS VOLTS	
INPUT A.F. VOLTAGE (RMS) PLATE CURRENT GRID \$2 CURRENT	2x10 2x1.	0 8 0 2×37.5	0 2×7.5 2×0.8	10 2x46 2x11	VOLTS MA. MA.	

CLASS AB, TWO TUBES

11

17 WATTS 4 PERCENT

PERCENTS

MAX. SIGNAL POWER OUTPUT

TOTAL HARMONIC DISTORTION

PLATE VOLTAGE	2	50	300		VOLTS
GRID #2 VOLTAGE	2	50	300		VOLTS
COMMON CATHODE RESISTOR	1	30	130		OHMS
LOAD RESISTANCE,					
PLATE TO PLATE	80	00	8000)	OHMS
			_		
INPUT A.F. VOLTAGE (RMS)	0	8	0	10	VOLTS
PLATE CURRENT	2×31	2x37.5	2×36	2×46	MA.
GRID #2 CURRENT	2×3.5	2x7.5	2×4	2x11	MA.
MAX. SIGNAL POWER OUTPUT	0	11	0	17	WATTS
TOTAL HARMONIC DISTORTION		3		4	PERCEN

TUNG-SOL .

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS - cont'd.

CLASS A IN TRIODE CONNECTION (GRID #2 CONNECTED TO PLATE)

PLATE VOLTAGE	250	VOLTS
CATHODE RESISTOR	270	OHMS
PLATE LOAD RESISTANCE	3500	OHMS
ZERO-SIGNAL PLATE CURRENT	34	MA.
INPUT A.F. VOLTAGE (RMS)	6.7	VOLTS
MAX. SIGNAL PLATE CURRENT	36	MA.
MAX. SIGNAL POWER OUTPUT	1.95	WATTS
TOTAL HARMONIC DISTORTION	9	PERCENTS
INPUT A.F. VOLTAGE AT A POWER OUTPUT OF 50 MWATTS (RMS)	1.0	VOLT

CLASS AB, TWO TUBES IN TRIODE CONNECTION

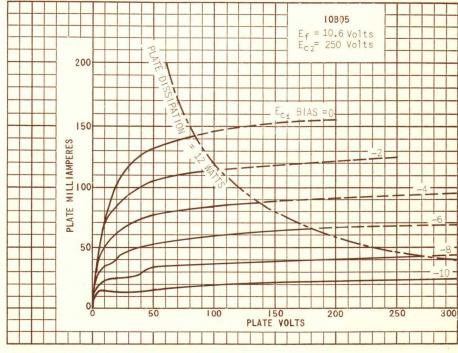
(GRID #2 CONNECTED TO PLATES)

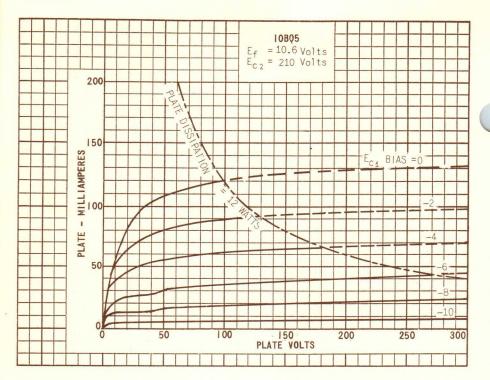
PLATE VOLTAGE	250	300	VOLTS
COMMON CATHODE RESISTOR	270	270	OHMS
LOAD RESISTANCE (PLATE TO PLATE)	10 000	10 000	OHMS
ZERO-SIGNAL PLATE CURRENT	2×20	2x24	MA.
INPUT A.F. VOLTAGE (RMS)	8.3	10	VOLTS
MAX. SIGNAL PLATE CURRENT	2×21.7	2x26	MA.
MAX. SIGNAL POWER OUTPUT	3.4	5.2	WATTS
TOTAL HARMONIC DISTORTION	2.5	2.5	PERCENTS
INPUT A.F. VOLTAGE AT A POWER			
OUTPUT OF 50 MWATTS (RMS.)	0.95	0.9	VOLTS

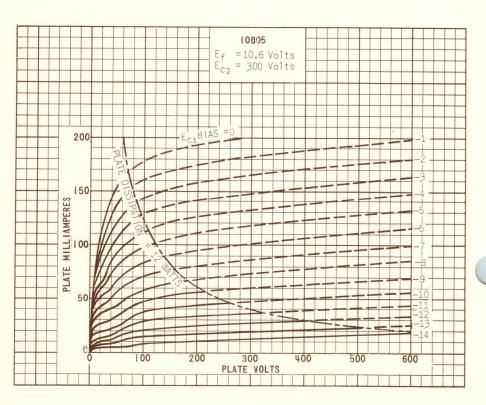
Awhen the heater and positive voltages are obtained from a storage battery by means of a vibrator, the max. Values of the plate and grid *2 voltages are 250 volts and that of the plate dissipation 9 watts.

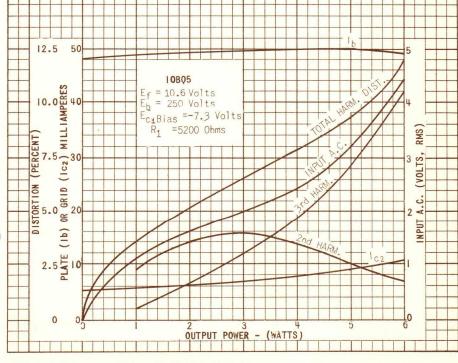
BMEASURED WITH FIXED BIAS.

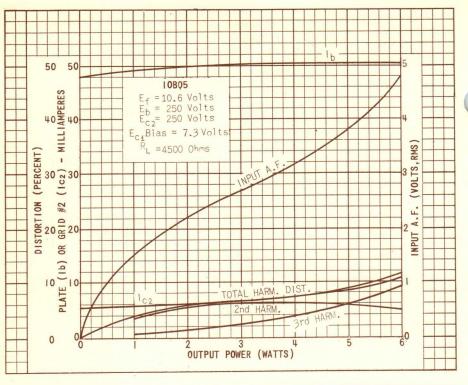
CPOWER OUTPUT AT START OF POSITIVE GRID CURRENT.

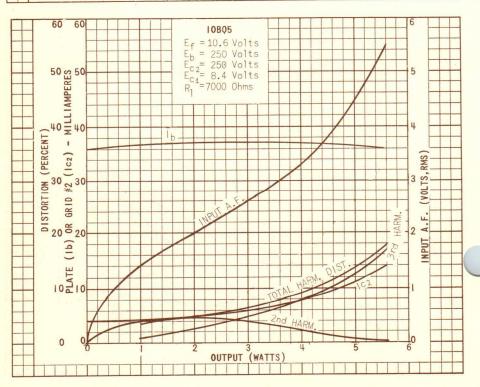


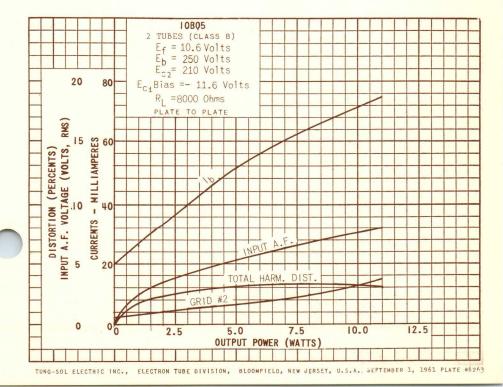




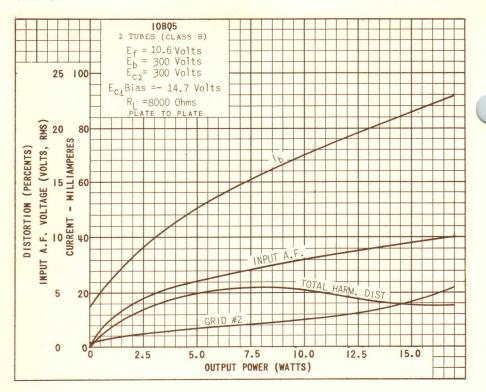


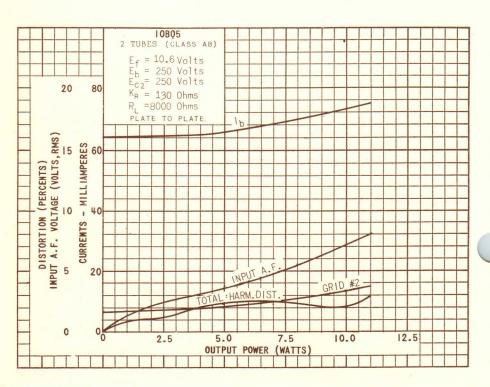


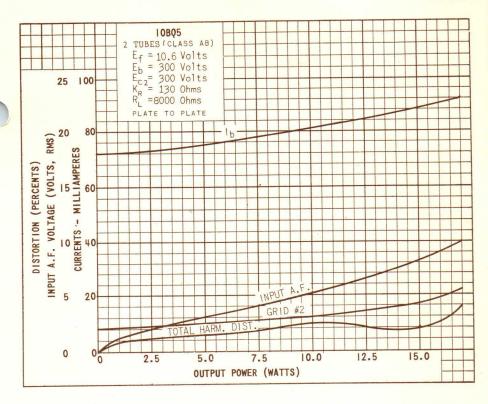


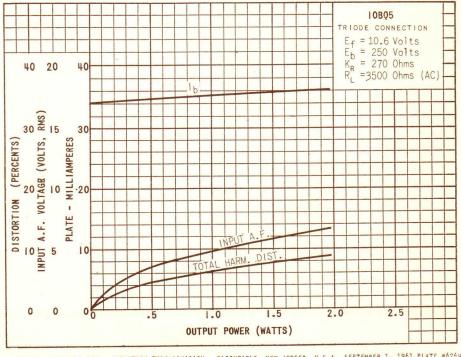


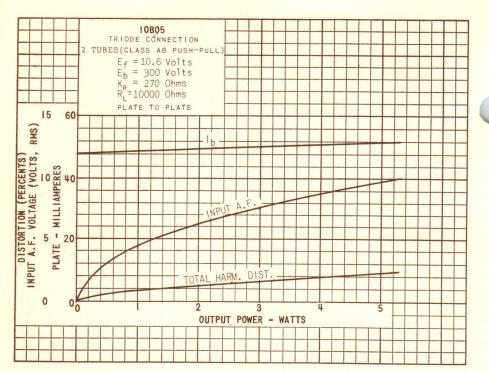
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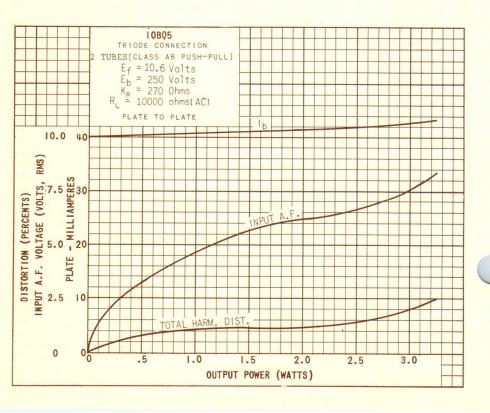






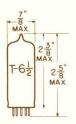






TUNG-SOL .

DOUBLE TRIODE MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER

10.5 VOLTS 0.6 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
9 PIN BASE
9EF

THE 10DA7 IS A MINIATURE 9-PIN DOUBLE TRIODE WITH DISSIMILAR SECTIONS. ONE IS A MEDIUM-MU TRIODE INTENDED FOR VERTICAL OSCILLATOR SERVICE; THE OTHER IS A LOW-MU TRIODE WITH HIGH PLATE DISSIPATION FOR VERTICAL AMPLIFIER SERVICE. THE 10DA7, THEREFORE, COMBINES THE FUNCTION OF OSCILLATOR AND HIGH CURRENT OUTPUT AMPLIFIER FOR VERTICAL SWEEP OF LARGE 90° PICTURE TUBES.

DIRECT INTERELECTRODE CAPACITANCES

	SECTION #1	SECTION #2	
GRID TO PLATE: G1 TO P	2.3	6.9	μμ f
INPUT: GA TO K+H	2.0	5.5	μμ f
OUTPUT: P TO K+H	0.415	0.82	$\mu\mu$ f

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER VOLTAGE		10.5	VOLTS
MAXIMUM PLATE VOLTAGE	300	500	VOLTS
MAXIMUM PLATE VOLTAGE, PEAK			
POSITIVE PULSE*		1800	VOLTS
MAXIMUM CONTROL-GRID VOLTAGE,			
PEAK NEGATIVE PULSE*	-400	-400	VOLTS
MAXIMUM CONTROL-GRID VOLTAGE, NEG., DC	-50	-50	VOLTS
MAXIMUM PLATE DISSIPATION	2.0	6.0	WATTS
MAXIMUM CATHODE CURRENT	20	40	MA.
MAXIMUM CONTROL-GRID CIRCUIT RESISTANCE			
SELF BIAS		2.2	ME GOHMS.
HEATER WARM-UP TIME (APPROX.)		11.0	SECONDS
MAXIMUM HEATER CATHODE VOLTAGE:			
HEATER NEGATIVE WITH RESPECT TO CATHODE		200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODER	3	200	VOLTS
HEATER WARM-UP TIME (APPROX.) A		11.0	SECONDS

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

SECTION #1 SECTION #2

HEATER VOLTAGE	10	VOLTS	
HEATER CURRENT	0.6		VOLTS
PLATE VOLTAGE	250	150	VOLTS
CONTROL-GRID VOLTAGE	-8	-17.5	VOLTS
PLATE RESISTANCE (APPROX.)	7700	1100	OHMS
TRANSCONDUCTANCE	2600	5700	MMHOS
AMPLIFICATION FACTOR	20	6.3	
PLATE CURRENT	9.0	40	MA.
CONTROL-GRID VOLTAGE (APPROX.)			
FOR 1b = 0.5 MA.		-42	VOLTS
CONTROL-GRID VOLTAGE (APPROX.)			
FOR gm = 30 μ MHOS AND Ib = 50 μ A	-16.5		VOLTS
ZERO BIAS PLATE CURRENT			
FOR Eb = 60 VOLTS		80	MA.

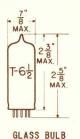
SIMILAR TYPE REFERENCE: Except for heater ratings and heater warm-up time the 10AD7 is identical to the 6AD7.

^{*}FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING
PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE
OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE.

A MEATER WARM—UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE MEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

B DC COMPONENT MUST NOT EXCEED 100 VOLTS MAX.

DOUBLE TRIODE MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER

9.7 VOLTS 0.6 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
9 PIN BASE
9HF

THE 10DE7 IS A MINIATURE DOUBLE TRIODE IN THE 9-PIN MINIATURE CONSTRUCTION. SECTION #1 IS INTENDED FOR USE AS A VERTICAL DEFLECTION OSCILLATOR HAVING MEDIUM MU AND SECTION #2 IS INTENDED FOR USE AS A VERTICAL DEFLECTION AMPLIFIER WITH LOW MU. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED. EXCEPT FOR HEATER RATINGS, THE 10DE7 IS IDENTICAL TO THE 13DE7.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

GRID TO PLATE: (G TO P)	4.0	8.5	µµ f
INPUT: G TO (H+K)	2.2	5.5	μμf
OUTPUT: P TO (H+K)	0.52	1.0	μμf

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM VERTICAL DEFLECTION OSCILLATOR AND AMPLIFIER^A

	TRIODE #1	TRIODE #2	
HEATER VOLTAGE	9.7	9.7 ←	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE B			
HEATER NEGATIVE WITH RESPECT TO CATHODE			
TOTAL DC AND PEAK		200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE			
DC		100	VOLTS
TOTAL DC AND PEAK		200	VOLTS
MAXIMUM DC PLATE VOLTAGE	330	275	
MAXIMUM PEAK POSITIVE PULSE PLATE VOLTAGE (ABS. MAX.)		1500 ←	VOLTS
MAXIMUM PEAK NEGATIVE PULSE GRID VOLTAGE	400	250	VOLTS
MAXIMUM PLATE DISSIPATIONC	1.5	7.0	WATTS
MAXIMUM AVERAGE CATHODE CURRENT	22	50	MA.
MAXIMUM PEAK CATHODE CURRENT	77	175	MA.
MAXIMUM GRID CIRCUIT RESISTANCE			
SELF BIAS	2.2	2.2	MEGOHMS
HEATER WARM-UP TIME (APPROX.)*	1	1.0	SECONDS
CONTINUED ON FOLLOWING	PAGE		

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

	TRIODE #1	TRIODE #2	
HEATER VOLTAGE		9.7	VOLTS
HEATER CURRENT		0.6	AMP.
PLATE VOLTAGE	250	150	VOLTS
GRID #1 VOLTAGE	-11	-17.5	VOLTS
PLATE CURRENT	5.5	35	MA.
TRANSCONDUCTANCE	2000	6500	μMH0S
AMPLIFICATION FACTOR	17.5	6.0	
PLATE RESISTANCE (APPROX.)	8750	925	
GRID VOLTAGE FOR ID = 10 HA	-20		VOLTS
GRID VOLTAGE FOR ID = 50 MA		-44	VOLTS
PLATE CURRENT AT EC =-24 Vdc		10	MA.
ZERO BIAS PLATE CURRENT			
Eb = 60V; Ec = 0 (INSTIANTANEOUS VALUES)		80	MA.

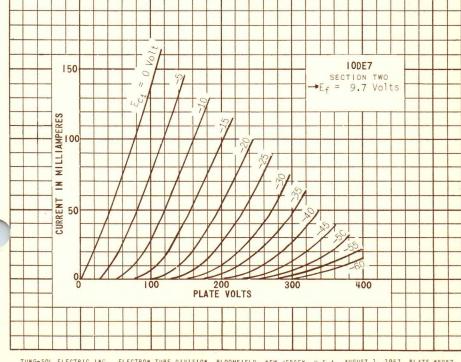
- INDICATES A CHANGE.

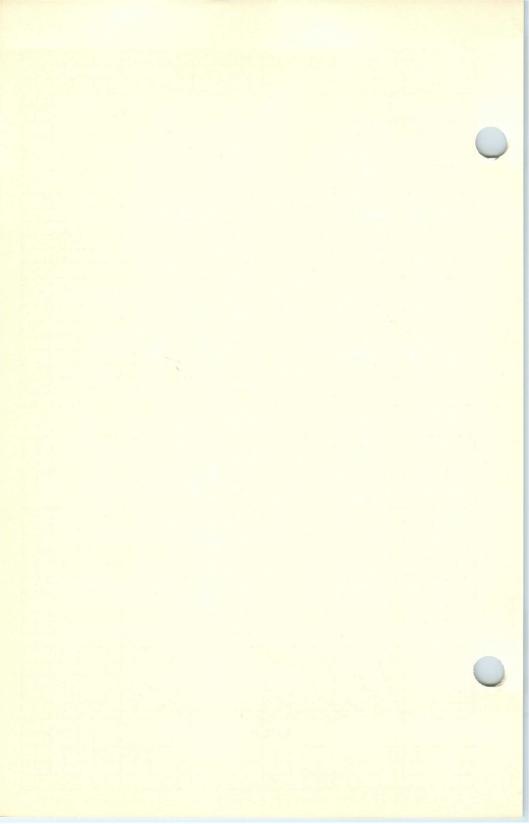
FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE.

B
DESIGN-MAXIMUM RATINGS ARE THE LIMITING VALUES EXPRESSED WITH RESPECT TO BOGIE TUBES AT WHICH
SATISFACTORY TUBE LIFE CAN BE EXPECTED TO OCCUR. TO OBTAIN SATISFACTORY CIRCUIT PERFORMANCE,
THEREFORE, THE EQUIPMENT DESIGNER MUST ESTABLISH THE CIRCUIT DESIGN SO THAT NO DESIGN-MAXIMUM
VALUE IS EXCEEDED WITH A BOGIE TUBE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT
TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD
VARIATION, AND ENVIRONMENTAL CONDITIONS.

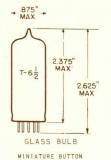
CIN STAGES OPERATING WITH GRID LEAK BIAS, AN ADEQUATE CATHODE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

^{*}HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80\$ OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.





DOUBLE TRIODE MINIATURE TYPE

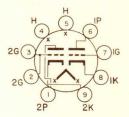


9 PIN BASE E9-1 OUTLINE DRAWING JEDEC 6-3 COATED UNIPOTENTIAL CATHODE

9.7 VOLTS 600 MA.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW BASING DIAGRAM JEDEC 9HF

THE 10DR7 IS A DOUBLE TRIODE WITH DISSIMILAR SECTION IN THE 9 PIN MINIATURE CONSTRUCTION, SECTION #1 HAS A HIGH MU AND IS INTENDED FOR USE AS A VERTICAL DEFLECTION OSCILLATOR, SECTION #2 HAS A LOW MU AND IS DESIGNED FOR USE AS A VERTICAL DEFLECTION AMPLIFIER. SECTION #2 OF THE 10DR7 IS IDENTICAL TO SECTION #2 OF THE 6DE7, THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TUBES WHICH ARE SIMILARLY CONTROLLED.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

GRID TO PLATE: (G TO P) 4.5 8.5 pf
INPUT: G TO (H+K) 2.2 5.5 pf
OUTPUT: P TO (H+K) 0.34 1.0 pf

RATINGS

DESIGN CENTER VALUES - SEE EIA STANDARD RS-239
VERTICAL DEFLECTION OSCILLATOR AND AMPLIFIER^A

	TRIODE #1	TRIODE #2	
MAXIMUM HEATER-CATHODE VOLTAGEB			
HEATER NEGATIVE WITH RESPECT TO CATHODE			
TOTAL DC AND PEAK	2	00	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE			
DC	1	00	VOLTS
TOTAL DC AND PEAK	2	00	VOLTS
MAXIMUM DC PLATE VOLTAGE	330	275	
MAXIMUM PEAK POSITIVE PULSE PLATE VOLTAGE (ABS. MAX.)		1500	VOLTS
MAXIMUM PEAK NEGATIVE PULSE GRID VOLTAGE	400	250	VOLTS
MAXIMUM PLATE DISSIPATIONC	1.0	7.0	WATTS
MAXIMUM AVERAGE CATHODE CURRENT	20	50	MA.
MAXIMUM PEAK CATHODE CURRENT	70	175	MA.
MAXIMUM GRID CIRCUIT RESISTANCE			
SELF BIAS	2.2	2.2	MEGOHMS
HEATER WARM-UP TIME (APPROX.)	11.	O	SECONDS

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

TRIODE #1 TRIODE #2

PLATE VOLTAGE	250	150	VOLTS
GRID #1 VOLTAGE	-3	-17.5	VOLTS
PLATE CURRENT	1.4	35	MA.
TRANSCONDUCTANCE	1600	6500	MHOS
AMPLIFICATION FACTOR	€4 ←	6.0	
PLATE RESISTANCE (APPROX.)	40 000	925	
GRID VOLTAGE FOR Ib = 10 MA	5.5		VOLTS
GRID VOLTAGE FOR Ib = 50 MA		-44	VOLTS
PLATE CURRENT AT Ec =-24 Vdc		10	MA.
ZERO BIAS PLATE CURRENT			
Eb = 60V; Ec = 0 (INSTANTANEOUS VALUES)		80	MA.

- INDICATES A CHANGE.

SIMILAR TYPE REFERENCE: Except for heater ratings, and heater warm-up time, the 10DR7 is identical to the 6DR7.

A FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE.

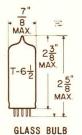
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DESIGN-MAXIMUM RATINGS ARE THE LIMITING VALUES EXPRESSED WITH RESPECT TO BOGIE TUBES AT WHICH
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THEREFORE, THE EQUIPMENT DESIGNER MUST ESTABLISH THE CIRCUIT DESIGN SO THAT NO DESIGN-MAXIMUM
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TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD
VARIATION. AND ENVIRONMENTAL CONDITIONS.

 $^{^{}m C}$ IN STAGES OPERATING WITH GRID LEAK BIAS, AN ADEQUATE CATHODE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

DHEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

TRIODE PENTODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER

10.5 VOLTS 0.45 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
9 PIN BASE

THE 10EBS IS A HIGH-MU TRIODE AND SHARP CUTOFF PENTODE IN THE 9-PIN MINI-ATURE CONSTRUCTION. THE TRIODE SECTION IS DESIGNED FOR USE AS A VOLTAGE AMPLIFIER WHILE THE PENTODE SECTION HAS A CONTROLLED PLATE KNEE CHARACTERISTIC AND IS DESIGNED FOR USE AS A VIDEO AMPLIFIER. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SO THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED. EXCEPT FOR HEATER RATINGS AND HEATER WARM-UP TIME THE 10EBS IS IDENTICAL TO THE 6EBS.

DIRECT INTERELECTRODE CAPACITANCES

TRIODE SECTION:		
GRID TO PLATE	4.4	μμ f
INPUT: G TO (H + K)	2.4	μμf
OUTPUT: P TO(H + K)	0.36	μμf
PENTODE SECTION:		
GRID #1 TO PLATE (MAX.)	0.1	uu f
INPUT: G ₁ TO (H+K+G ₂ +G ₃ +I.S.)	11	μμf
OUTPUT: \vec{P} TO $(H+K+G_2^2+G_3^2+I.S.)$	4.2	µµ f
COUPLING:		
TRIODE GRID TO PENTODE PLATE (MAX.)	.018	μμ f
PENTODE GRID #1 TO TRIODE PLATE (MAX.)	.005	μμ f
PENTODE PLATE TO TRIODE PLATE (MAX.)	0.17	μμ f

RATINGS INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM^A

	TRIODE	PENTODE SECTION	
HEATER VOLTAGE	10.5	10.5	VOLTS
MAXIMUM PLATE VOLTAGE	330	330	VOLTS
MAXIMUM GRID #2 SUPPLY VOLTAGE		330	VOLTS
MAXIMUM GRID #2 VOLTAGE			
MAXIMUM POSITIVE GRID #1 VOLTAGE	0	0	VOLTS
MAXIMUM PLATE DISSIPATION	1.0	5.0	WATTS
MAXIMUM GRID #2 DISSIPATION		1.1	WATTS

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RATINGS - CONT'D. INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

MAXIMUM HEATER-CATHODE VOLTAGE:			
HEATER NEGATIVE WITH RESPECT TO CATHODE			
TOTAL DC AND PEAK	200		VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE			
DC	100		VOLTS
TOTAL DC AND PEAK	200		VOLTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE			
FIXED BIAS	0.5	0.25	MEGOHM
CATHODE BIAS	1.0	1.0	MEGOHM
HEATER WARM-UP TIME* (APPROX.)	11.0		SECONDS

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

	TRIODE	PENTODE	
HEATER VOLTAGE	10.5	10.5	VOLTS
HEATER CURRENT	0.45	0.45	AMP.
PLATE VOLTAGE	250	200	VOLTS
GRID #2 VOLTAGE		125	VOLTS
GRID #1 VOLTAGE	-2		VOLTS
CATHODE BIAS RESISTOR		68	OHMS
PLATE CURRENT	2	25	MA.
GRID #2 CURRENT		7	MA.
TRANSCONDUCTANCE	2 7.00	12 500	MHOS
AMPLIFICATION FACTOR	100		
PLATE RESISTANCE (APPROX.)	37 000	75 000	OHMS
GRID #1 VOLTAGE FOR Ib= 100 HA (APPROX.)		-9	VOLTS
GRID #1 VOLTAGE FOR Ib= 20 A (APPROX.)	-5		

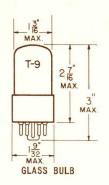
PLATE KNEE CHARACTERISTICS - INSTANTANEOUS VALUES

Eb = 45 VOLTS, Ec2 = 125 VOLTS AND Ec4 = O VOLTS		
PLATE CURRENT	40	MA.
GRID #2 CURRENT	15	MA.

DESIGN-MAXIMUM RATINGS ARELIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHARACTER STORM OF THE STRONG THAT INITIALLY AND THROUGHOUT LIFE NO DESIGNS OF THAT INITIALLY AND THROUGHOUT LIFE NO DESIGNS OF THAT INITIALLY AND THROUGHOUT LIFE NO DESIGN AND WALLE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT CONFORM TY VARIATION,

^{*}HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80⊈ OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

DOUBLE TRIODE

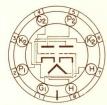


COATED UNIPOTENTIAL CATHODE

HEATER

9.7 VOLTS 0.60 AMP.

ANY MOUNTING POSITION



BOTTOM VIEW

SHORT INTERMEDIATE SHELL

8 PIN BASE 8 B D

THE 10EG7 IS A DISSIMILAR DOUBLE TRIODE INTENDED FOR USE IN TELEVISION RECEIVERS EMPLOYING SERIES STRING HEATERS. SECTION #1 IS DESIGNED FOR USE AS A VERTICAL DEFLECTION OSCILLATOR; SECTION #2 IS DESIGNED FOR USE AS A VERTICAL DEFLECTION AMPLIFIER.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

	SECT. #1	SECT. #2	
GRID TO PLATE	4.4	9.5	μμ f
INPUT: G TO (H + K)	2.2	7.0	μμ f
OUTPUT: P TO (H + K)	0.6	1.6	μμ f

RATINGS

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

VERTICAL DEFLECTION OSCILLATOR AND AMPLIFIER B

	SECT. #1 OSCILLATOR		SECT. #2	
HEATER VOLTAGE		9.7		VOLTS
MAXIMUM PLATE VOLTAGE	330		330	VOLTS
MAXIMUM PEAK POSITIVE PULSE PLATE VOLTA	GE		1500	VOLTS
MAXIMUM PEAK NEGATIVE PULSE GRID VOLTAG	E 400		250	VOLTS
MAXIMUM PLATE DISSIPATIONC	1.5		10	WATTS
MAXIMUM AVERAGE CATHODE CURRENT	22		50	MA.
MAXIMUM PEAK CATHODE CURRENT	77		175	MA.
MAXIMUM GRID CIRCUIT RESISTANCE;				
SELF BIAS	2.2		2.2	MEGOHMS
MAXIMUM HEATER-CATHODE VOLTAGE:				
HEATER NEGATIVE WITH RESPECT TO CATHO	DE			
TOTAL DC AND PEAK		200		VOLTS
HEATER POSITIVE WITH RESPECT TO CATHO	DE	3.00		
DC		100		VOLTS
TOTAL DC AND PEAK		200		VOLTS
HEATER WARM-UP TIME (APPROX.)*		11.0		SECONDS

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

	SECT. #1D	SECT. #	2 D
HEATER VOLTAGE	9	.7	VOLTS
HEATER CURRENT	0.	60	AMP.
PLATE VOLTAGE	250	150	VOLTS
GRID #1 VOLTAGE	-11	-17.5	VOLTS
PLATE CURRENT	5.5	45	MA.
TRANSCONDUCTANCE	2000	7500	µмноs
AMPLIFICATION FACTOR	17.5	6.0	
PLATE RESISTANCE (APPROX.)	8750	800	OHMS
E_c FOR $Ib = 10 \mu A$ (APPROX.)	-20		VOLTS
E_C FOR $I_b = 100 \mu A (APPROX.)$		-40	VOLTS
Ib AT Ec =-25 Vdc		8	MA.
Ib WITH Eb = 60 V AND Ec =OV		95	MA.

DESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND INFRODENDIT LIFE NO DESIGN—MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE "UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT CONFORM TVARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.

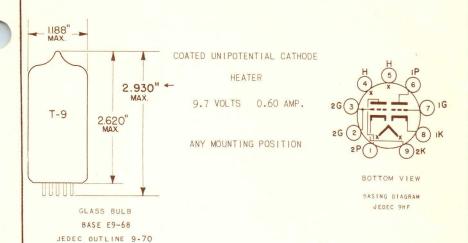
BFOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15≸ OF ONE SCANNING CYCLE.

CIN STAGES OPERATING WITH GRID LEAK BIAS, AN ADEQUATE CATHODE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

D_{SECTION} *1 CONNECTS TO PINS 4, 5, & 6. SECTION *2 CONNECTS TO PINS 1, 2, & 3.

^{*}HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

DOUBLE TRIODE



THE 10EW7 IS A DISSIMILAR DOUBLE TRIODE UTILIZING THE 9T9 BULB AND PIN CONFIGURATION. THE TUBE IS DESIGNED TO SERVE AS A COMBINED VERTICAL DEFLECTION OSCILLATOR AND AMPLIFIER. EXCEPT FOR HEATER CHARACTERISTICS AND HEATER WARM-UP TIME, THE 10EW7 IS IDENTICAL TO THE 6EW7.

THE 9T9 DESIGN UTILIZES A T-9 (1 1/8" DIA.) BULB BASED TO FIT MOST STANDARD 9 PIN MINIATURE SOCKETS.

DIRECT INTERELECTRODE CAPACITANCES WITHOUT EXTERNAL SHIELD

	SECT. #1	SECT. 2	
GRID TO PLATE	4.2	9.0	µµ f
INPUT: G TO (H+K)	2.2	7.0	μμ f
OUTPUT: P TO (H+K)	0.4	1.2	μμ f

RATINGS

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM B
VERTICAL DEFLECTION OSCILLATOR AND AMPLIFIER C

	SECT. #1 OSCILLATOR D	SECT. #2 AMPLIFIER	D
HEATER VOLTAGE	9.	7	VOLTS
MAXIMUM PLATE VOLTAGE	330	330	VOLTS
MAXIMUM PEAK POSITIVE PULSE PLATE VOLTAGE		1500	VOLTS
MAXIMUM PEAK NEGATIVE PULSE GRID VOLTAGE	400	250	VOLTS
MAXIMUM PLATE DISSIPATION E	1.5	10	WATTS
MAXIMUM AVERAGE CATHODE CURRENT	22	50	MA.
MAXIMUM PEAK CATHODE CURRENT	77	175	MA.
MAXIMUM GRID CIRCUIT RESISTANCE:			
SELF BIAS	2.2	2.2	MEGOHMS

- INDICATES A CHANGE.

CONTINUED FROM PRECEDING PAGE

RATINGS - CONT'D.
INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM B

VERTICAL DEFLECTION OSCILLATOR AND AMPLIFIERC

MAXIMUM HEATER-CATHODE VOLTAGE:

HEATER NEGATIVE WITH RESPECT TO CATHODE

TOTAL DC AND PEAK

HEATER POSITIVE WITH RESPECT TO CATHODE

DC

TOTAL DC AND PEAK

HEATER WARM-UP TIME (APPROX.)*

200

VOLTS

11.0 SECONDS

*HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VULIAGE ACKNOSS THE HEATER TO REACH 80⊈ OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING DESISTANCE.

AVERAGE CHARACTERISTICS

SECT. #1D SECT. #2D

HEATER VOLTAGE 9.7 VOLTS HEATER CURRENTA AMP. PLATE VOLTAGE 150 VOLTS GRID #1 VOLTAGE -11 -17.5VOLTS PLATE CURRENT 5.5 45 MA. TRANSCONDUCTANCE MHOS AMPLIFICATION FACTOR 17.5 6.0 PLATE RESISTANCE (APPROX.) 8750 800 OHMS $E_{\rm C}$ FOR $I_{\rm b}$ = 10 μ A (APPROX.) $E_{\rm C}$ FOR $I_{\rm b}$ = 100 μ A (APPROX.) VOLTS -20-40 VOLTS I_b AT E_c =-25 VDC I_b WITH E_b =60 V AND E_c =0 V 8 MA. (INSTANTANEOUS VALUES) 95 MA.

AFOR SERIES HEATER OPERATION, EQUIPMENT SHOULD BE SO DESIGNED SO THAT AT NORMAL SUPPLY VOLTAGE BOGEY TUBES WILL OPERATE AT THIS VALUE OF HEATER CURRENT.

POSSIGN-MAXIMUM RATINGS ARELIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT ITER NO DESIGN-MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT COMPONENT VARIATION,

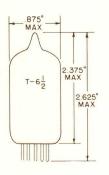
C FOR OPERATION IN A 525+LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCASTING STATIONS; FEDERAL COMMUNICATIONS COMMISSION". THE DUTY CYCLE OF THE VOLTAGE PULSE NOT TO EXCEED 15 PERCENT OF A SCANNING CYCLE.

DSECTION *1 CONNECTS TO PINS 6, 7 AND 8. SECTION *2 CONNECTS TO PINS 1, 2, 3 AND 9.

IN STAGES OPERATING WITH GRID LEAK BIAS, AN ADEQUATE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

TRIODE PENTODE

MINIATURE TYPE

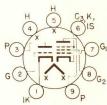


COATED UNIPOTENTIAL CATHODE

FOR

VIDEO AMPLIFIER SERVICE

ANY MOUNTING POSITION



BOTTOM VIEW
BASING DIAGRAM
JEDEC 9DX

GLASS BULB
MINIATURE BUTTON
9 PIN BASE E9-1

OUTLINE DRAWING
JEDEC 6-3

THE 10GN8 IS A HIGH MU TRIODE AND A SHARP CUTOFF PENTODE IN THE 9 PIN MINIATURE CONSTRUCTION. THE TRIODE SECTION IS DESIGNED FOR USE AS A VOLTAGE AMPLIFIER OR SYNC-SEPARATOR. THE PENTODE SECTION IS DESIGNED FOR VIDEO AMPLIFIER SERVICE FEATURING A CONTROLLED PLATE KNEE CHARACTERISTIC. EXCEPT FOR HEATER RATINGS AND HEATER WARM-UP TIME, THE 10GN8 IS IDENTICAL TO THE 6GN8 AND THE 8GN8.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

TRIODE SECTION

4.4	pf
2.4	pf
0.36	pf
	2.4

PENTODE SECTION

GRID #1 TO PLATE (MAX)	0.1	of
INPUT: G1 TO (H+K+G2+G3+I.S.)	11 p	of
OUTPUT: P TO (H+K+G2+G3+I.S.)	4.2 F	of

COUPLING

TRIODE GRID TO PENTODE PLATE (MAX.)	.018	pf
PENTODE GRID #1 TO TRIODE PLATE (MAX.)	.005	pf
PENTODE PLATE TO TRIODE PLATE (MAX.)	0.17	pf

CONTINUED FROM PRECEDING PAGE

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES -- SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	10.5	VOLTS	450	MA.
HEATER WARM-UP TIME A			11	SECONDS
HEATER SUPPLY LIMITS:				
CURRENT OPERATION (AC OR DC)			450 ± 25	MA.
MAXIMUM HEATER CATHODE VOLTAGE:				
HEATER NEGATIVE WITH RESPECT TO C	CATHODE			
TOTAL DC AND PEAK			200	VOLTS
HEATER POSITIVE WITH RESPECT TO CA	ATHODE			
DC			100	VOLTS
TOTAL DC AND PEAK			200	VOLTS

MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

	TRIODE	PENTODE	
PLATE VOLTAGE	330	330	VOLTS
GRID #2 SUPPLY VOLTAGE		330	VOLTS
GRID #2 VOLTAGE	SEE RATIN	G CHART	
POSITIVE GRID #1 VOLTAGE	0	0	VOLTS
PLATE DISSIPATION	1.0	5.0	WATTS
GRID #2 DISSIPATION		1.1	WATTS
GRID #1 CIRCUIT RESISTANCE:			
FIXED BIAS	0.5	0.25	MEGOHM
CATHODE BIAS	1.0	1.0	MEGOHM

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

	TRIODE SECTION			
PLATE VOLTAGE	250	200	VOLTS	
GRID #2 VOLTAGE		150	VOLTS	
GRID #1 VOLTAGE	-2		VOLTS	
CATHODE BIAS RESISTOR		100	OHMS	
PLATE CURRENT	2	25	MA.	
GRID #2 CURRENT		5.5	MA.	
TRANSCONDUCTANCE	2700	11500	μMHOS	
AMPLIFICATION FACTOR	100		,	
PLATE RESISTANCE	37000	60000	OHMS	
Ec1 FOR $1b = 100 \mu A (APPROX.)$		-10	VOLTS	
Ec1 FOR Ib = 20 μA (APPROX.)	-5		VOLTS	

INSTANTANEOUS PLATE KNEE CHARACTERISTICS

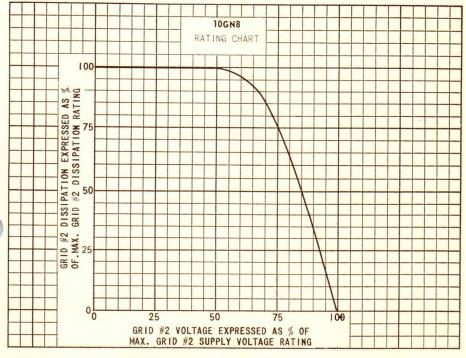
PENTODE SECTION

Eb = 60 VOLTS, Ec2 = 150 VOLTS AND Ec1 = 0 VOLTS Ib = 55 MA AND Ic2 = 18 MA.

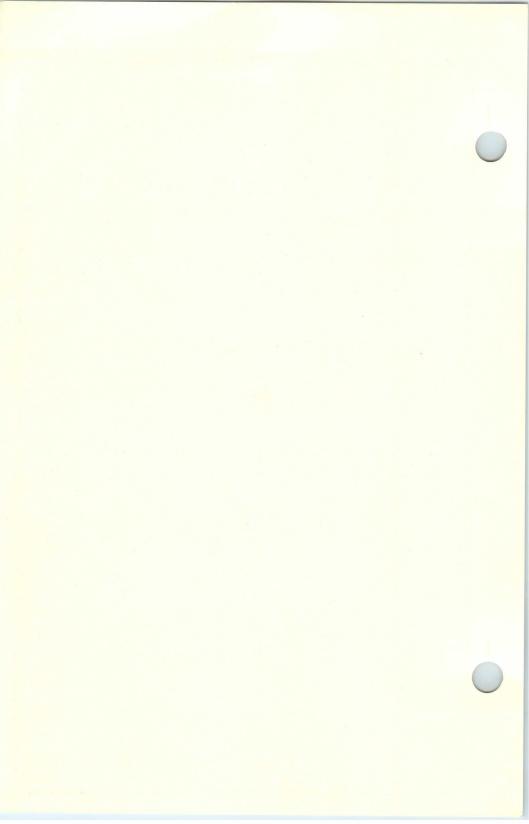
A. DESIGN MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS.

THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDD ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS.

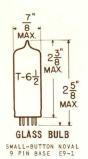
THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT LIFE NO DESIGN MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.



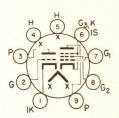
RINTED IN U. S. A.



MINIATURE TYPE



UNIPOTENTIAL CATHODE HEATER 10.5 VOLTS 0.45±.03 AMP. AC OR DC ANY MOUNTING POSITION



BOTTOM VIEW BASING DIAGRAM JEDEC 9DX

3.5

2.8

pf

THE 10HF8 IS A HIGH-MU TRIODE AND A SHARP-CUTOFF PENTODE IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS INTENDED FOR USE IN COLOR AND BLACK-AND-WHITE TELEVISION RECEIVERS.

THE PENTODE UNIT IS ESPECIALLY USEFUL AS A VIDEO OUTPUT AMPLIFIER AND THE TRIODE UNIT IS USEFUL IN VOLTAGE-AMPLIFIER APPLICATIONS SUCH AS SYNC-SEPARATOR, SYNC-CLIPPER AND PHASE-INVERTER CIRCUITS.

EXCEPT FOR HEATER RATINGS AND HEATER WARM-UP TIME, THE 10HF8 IS IDENTICAL TO THE 6HF8.

DIRECT INTERELECTRODE CAPACITANCES

TRIODE UNIT:

GRID TO TRIODE CATHODE, PK, G3, I.S. & H.

PLATE TO TRIODE CATHODE, PK,G3,I.S. & H.

GRID TO PLATE

		r
PENTODE UNIT:		
GRID #1 TO PLATE (MAX.)	0.1	pf
GRID #1 TO K, I.S., G3, G2 &H	10	pf
PLATE TO K, I.S., G3, G2 & H.	4.2	pf
TRIONE GRID TO PENTODE PLATE (MAY.)	nf

RATINGS

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM CLASS A1 AMPLIFIER

	TRIODE		PENTODE	
HEATER VOLTAGE		10.5		VOLTS
MAXIMUM PLATE VOLTAGE	330		330	
MAXIMUM GRID #2 SUPPLY VOLTAGE			330	VOLTS
MAXIMUM GRID #2 (SCREEN-GRID) VOLTAGE		SEE	INPUT	
MAXIMUM GRID #1 (CONTROL-GRID) VOLTAGE:				
POSITIVE-BIAS VALUE	0		0	VOLTS

CONTINUED FROM PRECEDING PAGE

RATINGS - CONT'D. INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

CLASS A1 AMPLIFIER

	TRIODE	PENTODE	
MAXIMUM PLATE DISSIPATION	1	5	WATTS
MAXIMUM GRID #2 INPUT			
FOR GRID #2 VOLTAGES UP TO 165 V.		1.1	WATTS
FOR GRID #2 VOLTAGES BETWEEN			
165 AND 330 VOLTS	S E E R A T I N G	INPUT	
MAXIMUM PEAK HEATER-CATHODE VOLTAGE:			
HEATER NEGATIVE WITH RESPECT TO CATHOD	E 200	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHOD	E 200 ^A	200 ^A	VOLTS
HEATER WARM-UP TIME (AVERAGE)	11		SECONDS

ATHE DC COMPONENT MUST NOT EXCEED 100 VOLTS.

CHARACTERISTICS

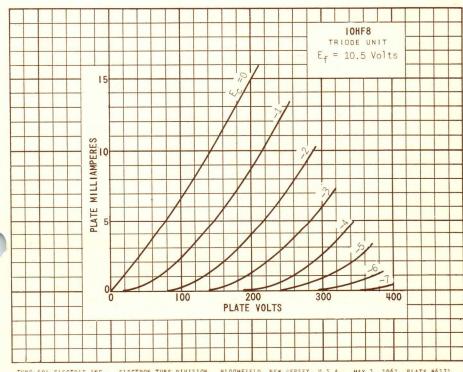
CLASS A1 AMPLIFIER

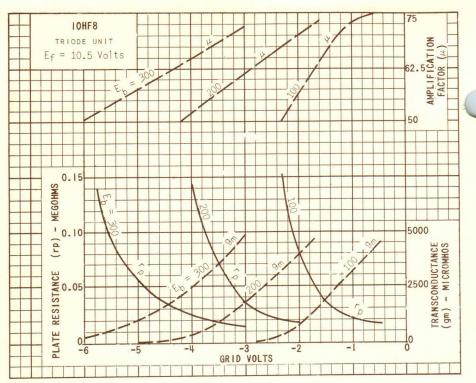
	TRIODE	PENTO		
PLATE-SUPPLY VOLTAGE	200	45	200	VOLTS
GRID #2 SUPPLY VOLTAGE		125	125	VOLTS
GRID #1 VOLTAGE	-2	0		VOLTS
CATHODE RESISTOR			68	OHMS
AMPLIFICATION FACTOR	70			
PLATE RESISTANCE (APPROX.)	17500	75	5000	OHMS
TRANSCONDUCTANCE	4000	12	2500	µмноѕ
PLATE CURRENT	4	40B	25	MA.
GRID #2 CURRENT		15 ^B	7	MA.
GRID #1 VOLTAGE (APPROX.)				
FOR PLATE CURRENT OF 100 HA			-9	VOLTS
GRID #1 VOLTAGE (APPROX.)				
FOR PLATE CURRENT OF 20 HA	-6			VOLTS

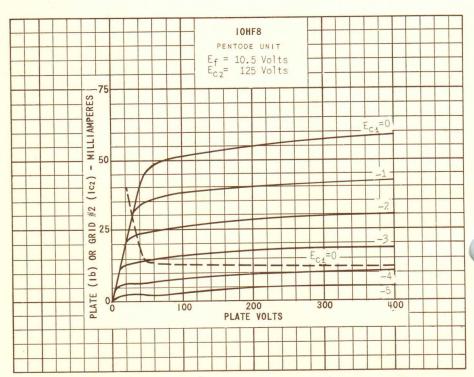
MAXIMUM CIRCUIT VALUES

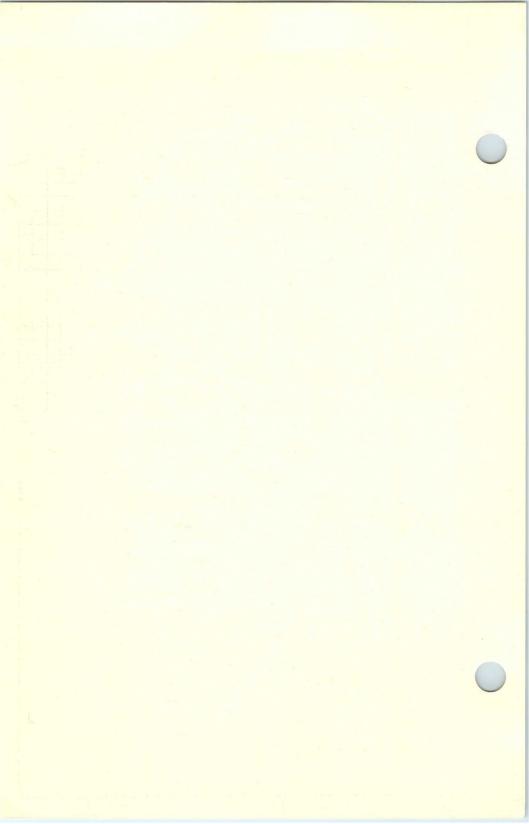
TRIODE	PENTODE	
1.0	1.0	MEGOHM
0.5	0.25	MEGOHM
	1.0	1.0 1.0

BTHESE VALUES CAN BE MEASURED BY A METHOD INVOLVING A RECURRENT WAVEFORM SUCH THAT PLATE DISSI-PATION AND GRID *2 INPUT WILL BE KEPT WITHIN RATINGS IN ORDER TO PREVENT DAMAGE TO THE TUBE.

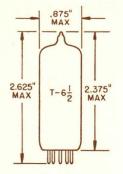








MINIATURE TYPE



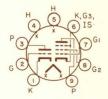
FOR COLOR

AND BLACK-AND-WHITE

T.V. RECEIVERS

COATED UNIPOTENTIAL CATHODE

ANY MOUNTING POSITION



BOTTOM VIEW BASING DIAGRAM JEDEC 9DX

GLASS BULB SMALL BUTTON 9 PIN BASE E9-1 OUTLINE DRAWING JEDEC 6-3

THE 10JA8 IS A HIGH-MU TRIODE AND A PENTODE IN THE 9 PIN MINIATURE CONSTRUCTION. THE TRIODE UNIT IS DESIGNED FOR SERVICE AS A SYNC SEPARATOR, SYNC CLIPPER AND PHASE INVERTER WHILE THE PENTODE UNIT IS DESIGNED FOR OPERATION AS A VIDEO AMPLIFIER. EXCEPT FOR HEATER RATINGS AND CHARACTERISTICS, THE 10JA8 IS IDENTICAL TO THE 6JA8.

DIRECT INTERELECTRODE CAPACITANCES

TRIODE

PENTODE

WITHOUT EXTERNAL SHIELD

		UNII	UNII	
GRID 1 TO PLATE		4.6	MAX. 0.1	pf
INPUT		2.6	11	pf
OUTPUT		2.6	4.4	pf
COUPLING:				
PENTODE GRID1 TO TRIODE PLATE	MAX.	0.005		pf
PENTODE PLATE TO TRIODE GRID	MAX.	0.018		pf
PENTODE PLATE TO TRIODEPLATE	MAX.	0.17		pf

CONTINUED FROM PRECEDING PAGE

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES -SEE EIA STANDARD RS-239

AVERAGE CHARACTERICTICS HEATER WARM-UP TIME LIMITS OF SUPPLIED CURRENT	10.5 VOLTS APPROX. 450 ± 30	450 11	MA. SECONDS MA.
HEATER-CATHODE VOLTAGE: HEATER NEGATIVE WITH RESPECT TO CATHODE	TRIODE UNIT	PENTODE	
TOTAL DC AND PEAK	200	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE			
DC COMPONENT	100	100	VOLTS
TOTAL DC AND PEAK	200	200	VOLTS

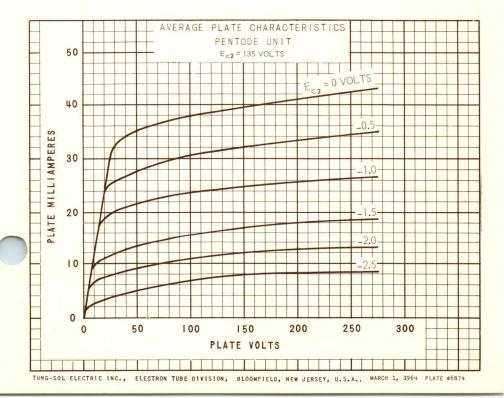
MAXIMUM RATINGS

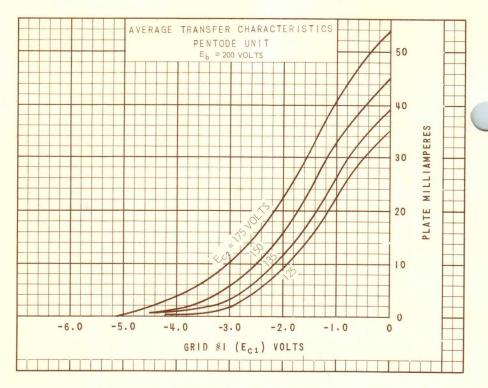
DESIGN MAXIMUM RATINGS-SEE EIA STANDARD RS-239

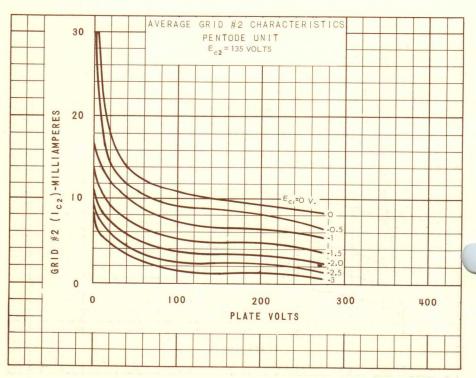
PLATE VOLTAGE	TRIODE UNIT 300	PENTODE UNIT 300	VOLTS
GRID2 SUPPLY VOLTAGE GRID2 VOLTAGE		330 SEE RATING CHART	VOLTS
PLATE DISSIPATION	1	5	WATTS
GRID 2 DISSIPATION		1.5	WATTS
POSITIVE GRID 1 BIAS VOLTAGE	0	0	VOLTS
GRID I CIRCUIT RESISTANCE			
FIXED BIAS	0.5	0.25	MEGOHM
CATHODE RESISTOR BIAS	1.0	1.0	MEGOHM

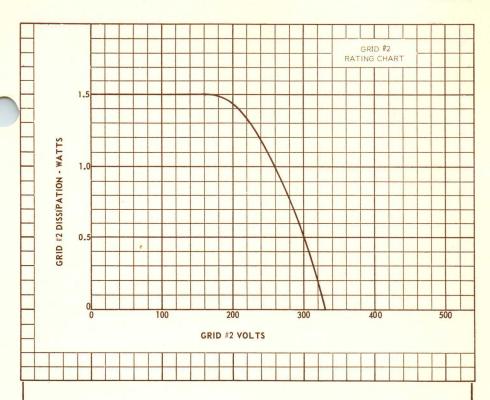
CHARACTERISTICS AND TYPICAL OPERATION

PLATE VOLTAGE 135 200 VOLTS GRID VOLTAGE -2 -2 VOLTS PLATE CURRENT 1 3.5 MA. TRANSCONDUCTANCE 1,550 3,700 μMHOS AMPLIFICATION FACTOR 60 70 PLATE RESISTANCE 39,000 19,000 OHMS GRID 1 VOLTAGE FOR I _b = 10 μ A -4.8 -7 VOLTS PENTODE UNIT: VOLTS VOLTS VOLTS GRID 2 VOLTAGE 135 135 135 VOLTS GRID 1 VOLTAGE 0 -1.5 -1.5 VOLTS GRID 1 VOLTAGE 32 17 18 MA. GRID 2 CURRENT 14 4.2 4 MA. TRANCONDUCTANCE - 12,600 14,000 μMHOS PLATE RESISTANCE - 66,000 70,000 OHMS	TRIODE UNIT:				
PLATE CURRENT 1 3.5 MA. TRANSCONDUCTANCE 1,550 3,700 μMHOS AMPLIFICATION FACTOR 60 70 PLATE RESISTANCE 39,000 19,000 OHMS GRID 1 VOLTAGE FOR I _b = 10 μ A -4.8 -7 VOLTS PENTODE UNIT: PLATE VOLTAGE 30 135 200 VOLTS GRID 2 VOLTAGE 135 135 135 VOLTS GRID 1 VOLTAGE 0 -1.5 -1.5 VOLTS GRID 1 VOLTAGE 0 -1.5 -1.5 VOLTS GRID 1 VOLTAGE 0 -1.5 -1.5 VOLTS GRID 2 CURRENT 32 17 18 MA. GRID 2 CURRENT 14 4.2 4 MA. TRANCONDUCTANCE - 12,600 14,000 μMHOS PLATE RESISTANCE - 66,000 70,000 OHMS	PLATE VOLTAGE		135	200	VOLTS
TRANSCONDUCTANCE 1,550 3,700 μMHOS AMPLIFICATION FACTOR 60 70 PLATE RESISTANCE 39,000 19,000 OHMS GRID 1 VOLTAGE FOR I _b = 10 μ A -4.8 -7 VOLTS PENTODE UNIT: PLATE VOLTAGE 30 135 200 VOLTS GRID 2 VOLTAGE 135 135 135 VOLTS GRID 1 VOLTAGE 0 -1.5 -1.5 VOLTS GRID 1 VOLTAGE 0 -1.5 -1.5 VOLTS GRID 2 CURRENT 32 17 18 MA. GRID 2 CURRENT 14 4.2 4 MA. TRANCONDUCTANCE - 12,600 14,000 μMHOS PLATE RESISTANCE - 66,000 70,000 OHMS	GRID VOLTAGE		-2	-2	VOLTS
AMPLIFICATION FACTOR 60 70 PLATE RESISTANCE 39,000 19,000 OHMS GRID 1 VOLTAGE FOR I _b = 10 μ A -4.8 -7 VOLTS PENTODE UNIT: PLATE VOLTAGE 30 135 200 VOLTS GRID 2 VOLTAGE 135 135 135 VOLTS GRID 1 VOLTAGE 0 -1.5 -1.5 VOLTS GRID 1 VOLTAGE 0 -1.5 -1.5 VOLTS GRID 2 CURRENT 32 17 18 MA. GRID 2 CURRENT 14 4.2 4 MA. TRANCONDUCTANCE - 12,600 14,000 μMHOS PLATE RESISTANCE - 66,000 70,000 OHMS	PLATE CURRENT		1	3.5	MA.
PLATE RESISTANCE 39,000 19,000 OHMS GRID 1 VOLTAGE FOR I _b = 10 μ A -4.8 -7 VOLTS PENTODE UNIT: PLATE VOLTAGE 30 135 200 VOLTS GRID 2 VOLTAGE 135 135 135 VOLTS GRID 1 VOLTAGE 0 -1.5 -1.5 VOLTS GRID 1 VOLTAGE 0 -1.5 -1.5 VOLTS GRID 2 CURRENT 32 17 18 MA. GRID 2 CURRENT 14 4.2 4 MA. TRANCONDUCTANCE - 12,600 14,000 μMHOS PLATE RESISTANCE - 66,000 70,000 OHMS	TRANSCONDUCTANCE		1,550	3,700	μMHOS
GRID 1 VOLTAGE FOR I _b = 10 μ A -4.8 -7 VOLTS PENTODE UNIT: PLATE VOLTAGE 30 135 200 VOLTS GRID 2 VOLTAGE 135 135 135 VOLTS GRID 1 VOLTAGE 0 -1.5 -1.5 VOLTS GRID 1 VOLTAGE 32 17 18 MA. GRID 2 CURRENT 32 17 18 MA. GRID 2 CURRENT 14 4.2 4 MA. TRANCONDUCTANCE - 12,600 14,000 μMHOS PLATE RESISTANCE - 66,000 70,000 OHMS	AMPLIFICATION FACTOR		60	70	
PENTODE UNIT: PLATE VOLTAGE 30 135 200 VOLTS GRID 2 VOLTAGE 135 135 135 VOLTS GRID 1 VOLTAGE 0 -1.5 -1.5 VOLTS PLATE CURRENT 32 17 18 MA. GRID 2 CURRENT 14 4.2 4 MA. TRANCONDUCTANCE - 12,600 14,000 μMHOS PLATE RESISTANCE - 66,000 70,000 OHMS	PLATE RESISTANCE		39,000	19,000	OHMS
PENTODE UNIT: PLATE VOLTAGE 30 135 200 VOLTS GRID 2 VOLTAGE 135 135 135 VOLTS GRID 1 VOLTAGE 0 -1.5 -1.5 VOLTS PLATE CURRENT 32 17 18 MA. GRID 2 CURRENT 14 4.2 4 MA. TRANCONDUCTANCE - 12,600 14,000 μMHOS PLATE RESISTANCE - 66,000 70,000 OHMS					
PLATE VOLTAGE 30 135 200 VOLTS GRID 2 VOLTAGE 135 135 135 VOLTS GRID1 VOLTAGE 0 -1.5 -1.5 VOLTS PLATE CURRENT 32 17 18 MA. GRID 2 CURRENT 14 4.2 4 MA. TRANCONDUCTANCE - 12,600 14,000 μMHOS PLATE RESISTANCE - 66,000 70,000 OHMS	GRID 1 VOLTAGE FOR Ib = 10 4 A		-4.8	-7	VOLTS
GRID 2 VOLTAGE 135 135 135 VOLTS-GRID1 VOLTAGE GRID1 VOLTAGE 0 -1.5 -1.5 VOLTS-VOLTS PLATE CURRENT 32 17 18 MA. GRID 2 CURRENT 14 4.2 4 MA. TRANCONDUCTANCE - 12,600 14,000 μMHOS PLATE RESISTANCE - 66,000 70,000 OHMS	PENTODE UNIT:				
GRIDI VOLTAGE 0 -1.5 VOLTS PLATE CURRENT 32 17 18 MA. GRID 2 CURRENT 14 4.2 4 MA. TRANCONDUCTANCE - 12,600 14,000 μMHOS PLATE RESISTANCE - 66,000 70,000 OHMS	PLATE VOLTAGE	30	135	200	VOLTS
PLATE CURRENT 32 17 18 MA. GRI D 2 CURRENT 14 4.2 4 MA. TRANCONDUCTANCE - 12,600 14,000 μMHOS PLATE RESISTANCE - 66,000 70,000 OHMS	GRID 2 VOLTAGE	135	135	135	VOLTS-
GRI D 2 CURRENT 14 4.2 4 MA. TRANCONDUCTANCE - 12,600 14,000 μMHOS PLATE RESISTANCE - 66,000 70,000 OHMS	GRID1 VOLTAGE	0	-1.5	-1.5	VOLTS
TRANCONDUCTANCE - 12,600 14,000 μΜΗΟS PLATE RESISTANCE - 66,000 70,000 OHMS	PLATE CURRENT	32	17	18	MA.
PLATE RESISTANCE - 66,000 70,000 OHMS	GRID 2 CURRENT	14	4.2	4	MA.
	TRANCONDUCTANCE	•	12,600	14,000	μ MHOS
GRID I VOLTAGE FOR I _b = 10 μ A5 VOLTS	PLATE RESISTANCE	•	66,000	70,000	OHMS
	GRID 1 VOLTAGE FOR I = 10 µA	-	-5	-5	VOLTS





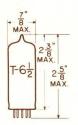






DOUBLE TRIODE

MINIATURE TYPE



GLASS BULB

COATED UNIPOTENTIAL CATHODE

HEATER
11.0 VOLTS 0.45±6% AMP.
AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

SMALL BUTTON

9EF

THE 11CY7 IS A DISSIMILAR DOUBLE TRIODE IN THE 9 PIN MINIATURE CONSTRUCTION AND ISINTENDED FOR USE AS A COMBINED VERTICAL—DEFLECTION OSCILLATOR AND AMPLIFIER IN TELEVISION RECEIVERS. IN ADDITION, THERMAL CHARACTER—ISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM—UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED.

DIRECT INTERELECTRODE CAPACITANCES - APPROX. **

	SEC. I	SEC. Z	
GRID TO PLATE	1.8	4.4	μμ f
INPUT	1.5	5.0	μμ f
OUTPUT	0.30	1.0	μμ f

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

	VERTICAL-B OSCILLATOR SERVICE (SEC. 1)	VERTICAL-B DEFLECTION AMPLIFIER (SEC. 2)	
HEATER VOLTAGE	11.0	11.0	VOLTS
MAXIMUM DC PLATE VOLTAGE	350	350	VOLTS
MAXIMUM PEAK POSITIVE PULSE PLATE VOLTAGE		1 800	VOLTS
MAXIMUM PEAK NEGATIVE GRID VOLTAGE	400	250	VOLTS
MAXIMUM PLATE DISSIPATION	1.0	5.5 ^A	WATTS
MAXIMUM DC CATHODE CURRENT		35	MA.
MAXIMUM DC PEAK CATHODE CURRENT		120	MA.
MAXIMUM HEATER CATHODE VOLTAGE HEATER POSITIVE WITH RESPECT TO CATHODE			
DC COMPONENT	100	100	VOLTS
TOTAL DC AND PEAK	200	200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE			
TOTAL DC AND PEAK	200	200	VOLTS
MAXIMUM GRID CIRCUIT RESISTANCE			
WITH FIXED BIAS	2.2		MEGOHMS
WITH CATHODE BIAS	2.2	2.2	MEGOHMS
HEATER WARM-UP TIME (APPROX.)*	11	.0	SECONDS

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

	SECTION 1	SEC (AMP	TION 2 LIFIER)	
HEATER VOLTAGE	11.0	11.0	11.0	VOLTS
HEATER CURRENT	0.45	0.45	0.45	AMP.
PLATE VOLTAGE	250	60	150	VOLTS
GRID VOLTAGE	-3.0	0		VOLTS
CATHODE-BIAS RESISTOR			620	OHMS
AMPLIFICATION FACTOR	68		5.0	
PLATE RESISTANCE (APPROX.)	52 000		920	OHMS
TRANSCONDUCTANCE	1 300		5 400	µмноѕ
PLATE CURRENT	1.2	80	30	MA .
PLATE CURRENT (APPROX.) E = -30V.			3.5	MA.
GRID VOLTAGE (APPROX.) Ib=200 HA.			-40	VOLTS
GRID VOLTAGE (APPROX.) Ib=10 MA.	-5.5			VOLTS

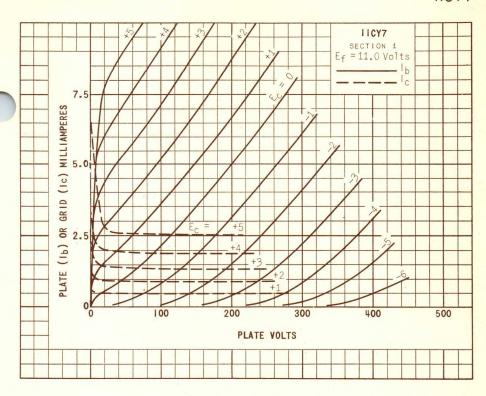
DESIGN-MAXIMUM RATINGS ARE THE LIMITING VALUES EXPRESSED WITH RESPECT TO BOGIE TUBES AT WHICH SATISFACTORY TUBE LIFE CAN BE EXPECTED TO OCCUR. TO OBTAIN SATISFACTORY CIRCUIT PERFORMANCE, THEREFORE, THE EQUIPMENT DESIGNER MUST ESTABLISH THE CIRCUIT DESIGN SO THAT NO DESIGN-MAXIMUM VALUE IS EXCEEDED WITH A BOGIE TUBE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, AND ENVIRONMENTAL CONDITIONS.

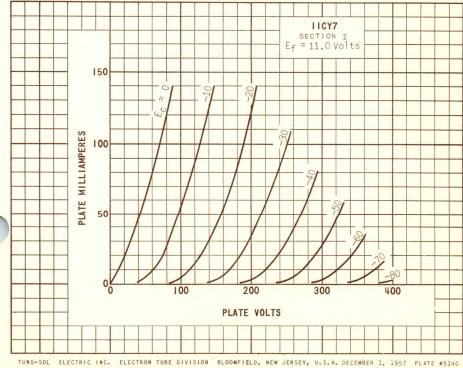
WITHOUT EXTERNAL SHIELD.

A IN STAGES OPERATING WITH GRID LEAK BIAS, AN ADEQUATE CATHODE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

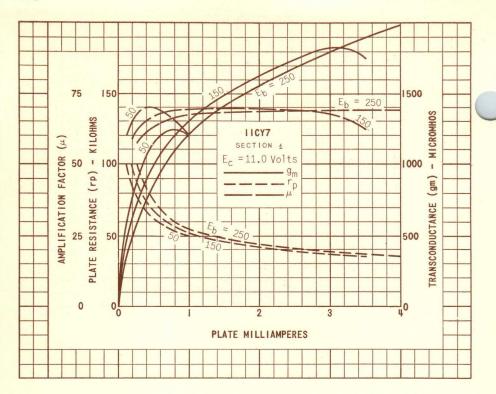
B FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOODENGINEERING PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE.

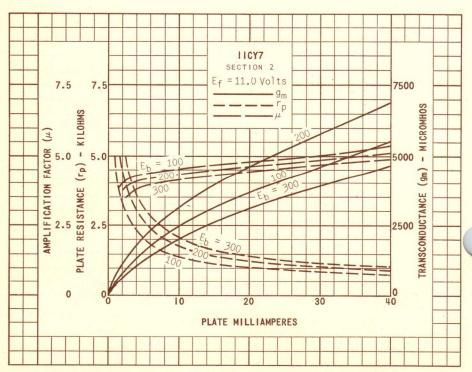
^{*}HEATER WARM—UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE MOMINAL HEATER OPERATING RESISTANCE.

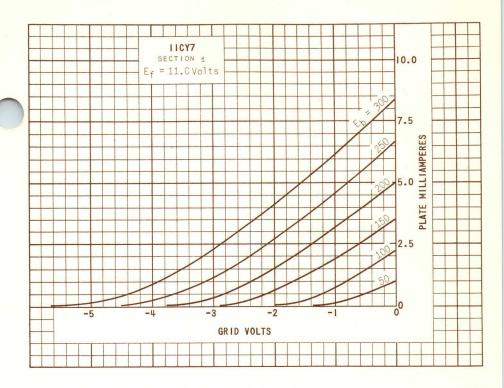


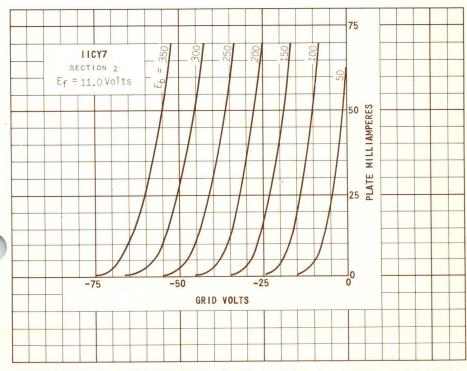


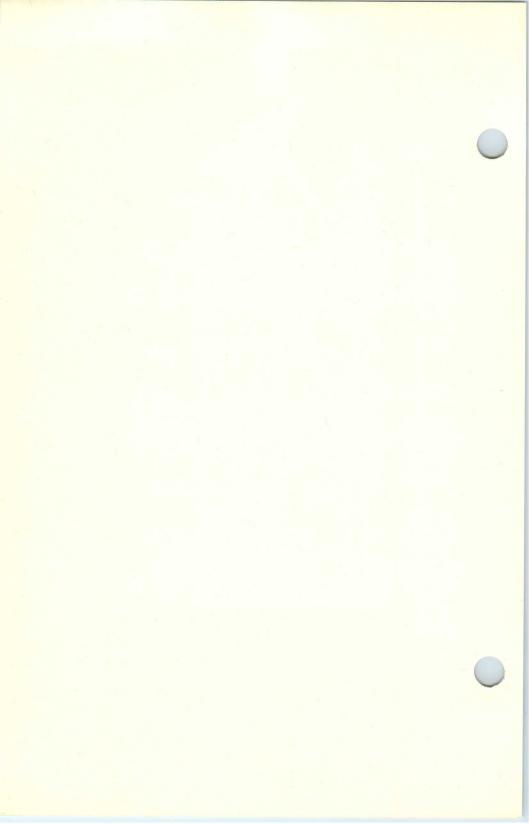
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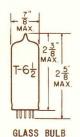




TUNG-SOL .

BEAM PENTODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER 12.6 VOLTSA 0.2 AMP. AC OR DC

ANY MOUNTING POSITION

BOTTOM VIEW MINIATURE BUTTON 9 PIN BASE

250

THE 12AB5 IS A BEAM POWER TUBE USING THE 9 PIN MINIATURE CONSTRUCTION DESIGNED FOR USE AS AN AUDIO POWER AMPLIFIER IN AUTOMOBILE RADIO SERVICE WHERE THE POWER SOURCE IS A 12 VOLT BATTERY.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

GRID TO PLATE: G TO P	0.7	μμf
INPUT: G4 TO (H+K+G2&G3)	8.0	uu f
OUTPUT: P TO (H+K+G2&G3)	8.5	ии f

RATINGS

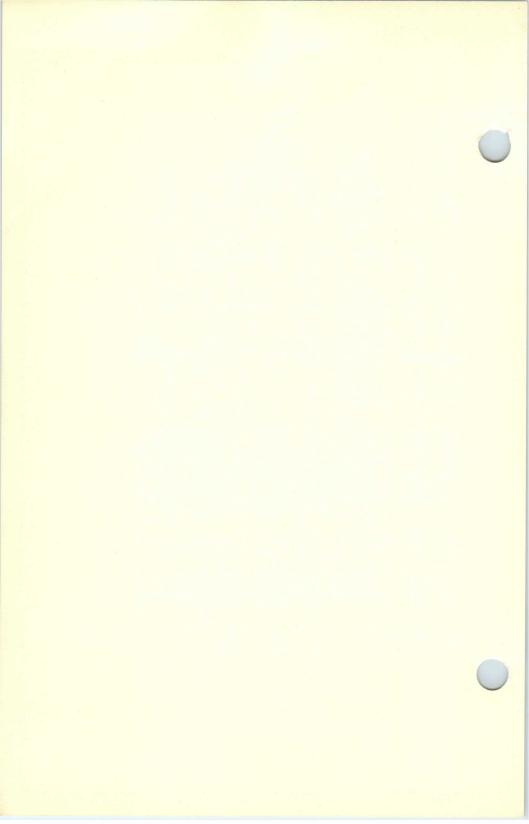
INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

CLASS AT AMPLIFIER		
HEATER VOLTAGE	12.6	VOLTS
MAXIMUM HEATER—CATHODE VOLTAGE: NEGATIVE (DC) POSITIVE (DC)	200 100	VOLTS VOLTS
MAXIMUM PLATE VOLTAGE	315	VOLTS
MAXIMUM GRID #2 VOLTAGE	285	VOLTS
MAXIMUM PLATE DISSIPATION	12	WATTS
MAXIMUM GRID #2 DISSIPATION	2	WATTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE: FIXED BIAS CATHODE BIAS	0.1	ME GOHM ME GOHM
MAXIMUM BULB TEMPERATURE	250	°C.

OPERATING CONDITIONS AND CHARACTERISTICSA

CLASS A3 AMPLIFIER	- SINGLE TUBE		
HEATER VOLTAGEA	12.6	12.6	VOLTS
HEATER CURRENT	0.2	0.2	AMP.
PLATE VOLTAGE	250	250	VOLTS
GRID #2 VOLTAGE	200	250	VOLTS
GRID #1 VOLTAGE	-	-12.5	VOLTS
CATHODE BIAS RESISTOR	270	-	OHMS
PEAK AF GRID #1 VOLTAGE	10.5	12.5	VOLTS
ZERG-SIGNAL PLATE CURRENT	33.5	45	MA.
MAXIMUM SIGNAL PLATE CURRENT	36.0	47	MA.
ZERO-SIGNAL GRID #2 CURRENT	1.6	4.5	MA.
MAXIMUM SIGNAL GRID #2 CURRENT	3.2	7.0	MA .
PLATE RESISTANCE		50	KILOHMS
TRANSCONDUCTANCE	4 000	4 100	MMHOS
LOAD RESISTANCE	6 000	5 000	OHMS
POWER OUTPUT (MAXIMUM SIGNAL)	3.3	4.5	WATTS
TOTAL HARMONIC DISTORTION	12	8	PERCENT

ATHIS TUBE IS INTENDED TO BE USED IN AUTOMOTIVE SERVICE FROM A NOMINAL 12 VOLT BATTERY SOURCE-THE HEATER IS THEREFORE DESIGNED TO OPERATE OVER THE 10.0 TO 15.9 VOLTAGE RANGE ENCOUNTERED IN THIS SERVICE. THE MAXIMUM RATINGS OF THE TUBE PROVIDE FOR AN ADEQUATE SAFETY FACTOR SUCH THAT THE TUBE WILL WITHSTAND THE WIDE VARIATION IN SUPPLY VOLTAGES.



PENTODE

MINIATURE TYPE

3.4 MAX T-5½ MAX 2½ MAX

GLASS BULB

COATED UNIPOTENTIAL CATHODE

* HEATER

12.6 VOLTS 0.15 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

MINIATURE BUTTON 7 PIN BASE

7BK

THE 12AC6 IS A REMOTE CUT-OFF PENTODE WITH A UNIPOTENTIAL CATHODE IN THE 7-PIN MINIATURE CONSTRUCTION. IT IS INTENDED FOR USE AS AN RF OR IF AMPLIFIER WHERE THE HEATER, PLATE AND SCREEN GRID POTENTIALS ARE OBTAINED DIRECTLY FROM AN AUTOMOTIVE BATTERY.

DIRECT INTERELECTRODE CAPACITANCES

	SHIELD	SHIELD #316
GRID TO PLATE:	0.005	0.004 μμ f
INPUT:	4.3	4.3 µµf
OUTPUT:	5.0	5.0 μμ :

RATINGS

INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER VOLTAGE	12.6	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE	±30	VOLTS
MAXIMUM PLATE VOLTAGE	30	VOLTS
MAXIMUM GRID #2 VOLTAGE	30	VOLTS
MAXIMUM CATHODE CURRENT	20	MA.
MAXIMUM GRID #4 CIRCUIT RESISTANCE	10	MEGOHMS

^{*}THIS TUBE IS INTENDED TO BE USED IN AUTOMOTIVE SERVICE FROM A NOMINAL 12 VOLT BATTERY SOURCE.
THE HEATER IS THEREFORE DESIGNED TO OPERATE OVER THE 10.0 TO 15.9 VOLTAGE RANGE ENCOUNTERED
IN THIS SERVICE. THE MAXIMUM RATINGS OF THE TUBE PROVIDE FOR AN ADEQUATE SAFETY FACTOR SUCH
THAT THE TUBE WILL WITHSTAND THE WIDE VARIATION IN SUPPLY VOLTAGES.

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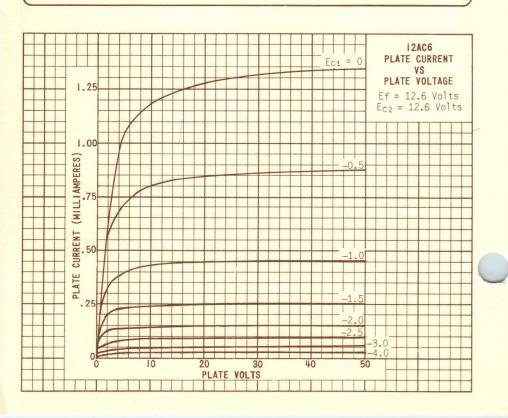
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

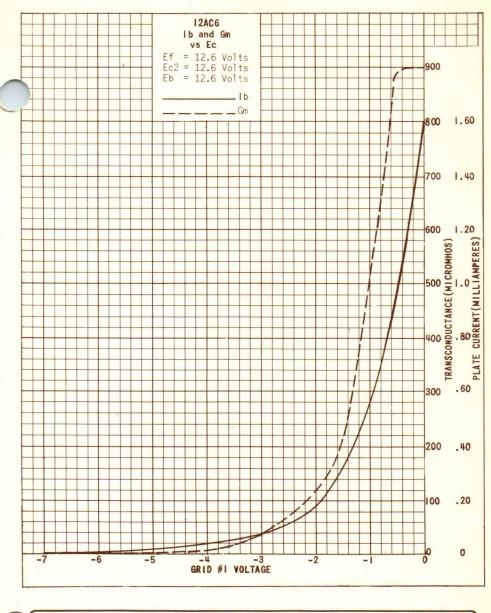
CLASS A1 AMPLIFIER

HEATER VOLTAGE	12.6	VOLTS
HEATER CURRENT	0.15	AMP.
PLATE VOLTAGE	12.6	VOLTS
GRID #3 VOLTAGE (CONNECTED TO CATHODE AT SOCKET)	0	VOLTS
GRID #2 VOLTAGE	12.6	VOLTS
GRID #1 VOLTAGE*	0	VOLTS
PLATE CURRENT	550	MAMPS
GRID #2 CURRENT	200	HAMPS
PLATE RESISTANCE	-5	MEGOHM
TRANSCONDUCTANCE	730	μMH0S
GRID #1 VOLTAGE (APPROX.)		
FOR $G_m^A = 10 \mu MHOS E_{C3} = 0$	-5.2	VOLTS
FOR Gm A = 10 MHOS Ec1 =0*	-3.7	VOLTS

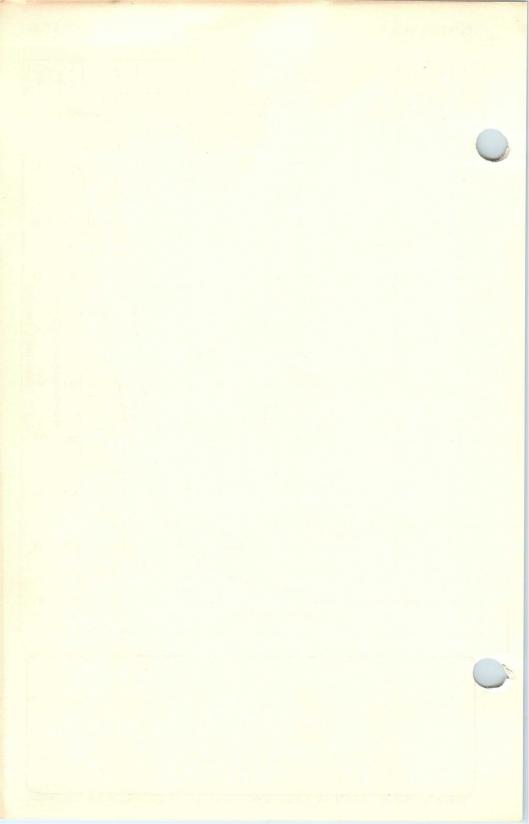
^{*} GRID *1 RESISTANCE = 2.2 MEGOHMS.

A FROM GRID #1 TO PLATE.



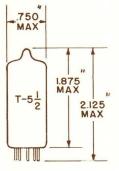


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HEPTODE

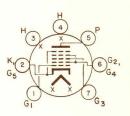
MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

FOR AUTOMATIVE RADIO RECEIVER SERVICE

ANY MOUNTING POSITION



BOTTOM VIEW

BASING DIAGRAM

JEDEC 7CH

GLASS BULB

MINIATURE BUTTON
7 PIN BASE E7-1

OUTLINE DRAWING

THE 12ADÓ IS A PENTAGRID CONVERTER WITH A UNIPOTENTIAL CATHODE IN THE 7-PIN MINIATURE CONSTRUCTION. IT IS INTENDED AS A COMBINED OSCILLATOR AND MIXER IN SUPERHETERODYNE RECEIVERS WHERE THE HEATER, PLATE AND SCREEN GRID POTENTIALS ARE OBTAINED DIRECTLY FROM AN AUTOMOTIVE BATTERY.

→ DIRECT INTERELECTRODE CAPACITANCES

f
f
f
f
f
f
f

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239 AVERAGE CHARACTERISTICS 12.6 VOLTS 150 MA. HEATER SUPPLY LIMITS: VOLTAGE OPERATION 10.0 - 15.9VOLTS MAXIMUM HEATER CATHODE VOLTAGE: HEATER NEGATIVE WITH RESPECT TO CATHODE TOTAL DC AND PEAK 16 VOLTS HEATER POSITIVE WITH RESPECT TO CATHODE 16 VOLTS TOTAL DC AND PEAK

AEXTERNAL SHIELD #316 CONNECTED TO CATHODE.

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

→ 16	VOLTS
→ 16	VOLTS
→ 16	VOLTS
→ 16	VOLTS
0	VOLTS
20	MA.
10	MEGOHMS
	→ 16 → 16 → 16 0 20

→ TYPICAL OPERATING CHARACTERISTICS

CONVERTER - SEPARATE EXCITATION

PLATE VOLTAGE	10.6	12.6	14.6	VOLTS
GRID #3 VOLTAGE	0	0	0	VOLTS
GRID #2 & #4 VOLTAGE	10.6	12.6	14.6	VOLTS
GRID #1 VOLTAGE PEAK TO PEAK	4.5	4.5	4.5	VOLTS
GRID #1 RESISTANCE	33000	33000	33000	OHMS
GRID #3 RESISTANCE	2.2	2.2	2.2	MEGOHMS
PLATE RESISTANCE (APPROX.)	0.50	0.40	0.20	MEGOHMS
GRID #1 CURRENT (APPROX.)		60		μ A.
CONVERSION TRANSCONDUCTANCE		320		µмноs
PLATE CURRENT		350		μA
CATHODE CURRENT		1600		μA
GRID #3 VOLTAGE FOR GC =54MHOS (APPRO	(x.)	-3.0		VOLTS
GRID #3 VOLTAGE				
FOR GC =0.5 µMHOS (APPROX.)		-4.0		VOLTS

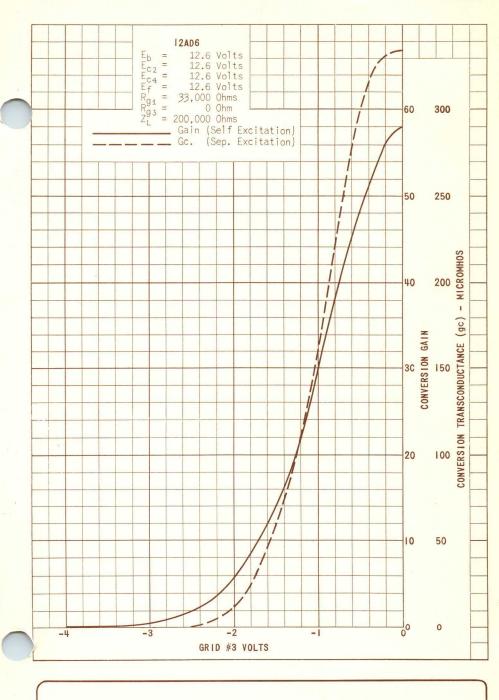
→ OSCILLATOR CHARACTERISTICS - NOT OSCILLATING

GRID #3 VOLTAGE	0	VOLTS
GRID #1 VOLTAGE (OSCILLATOR GRID)	0	VOLTS
GRID #2 & #4 CONNECTED TO PLATE	12.6	VOLTS
TRANSCONDUCTANCE BETWEEN GRID #1, #2 & #4		
CONNECTED TO PLATE	3600	имноs
AMPLIFICATION FACTOR BETWEEN GRID #1, #2		
AND 4 CONNECTED TO PLATE	9.4	
CATHODE CURRENT	4.5	MA.
GRID #1 VOLTAGE (APPROX.) FOR Ib = 10 μ A.	-3.7	VOLTS

A EXTERNAL SHIELD *316 CONNECTED TO CATHODE.

THE EQUIPMENT DESIGNER SHALL SO DESIGN THE EQUIPMENT THAT THE FILAMENT VOLTAGE IS CENTERED AT THE SPECIFIED BOGEY VALUE. FILAMENT SUPPLY VARIATIONS SHALL BE RESTRICTED TO MAINTAIN FILAMENT VOLTAGE WITHIN THE SPECIFIED TO LERANCE. FOR LONGEST LIFE IT IS RECOMMENDED THAT THE HEATER BE OPERATED WITHIN THE RANGE OF 11 TO 14 VOLTS.

PRINTED IN U. S. A.



TUNG-SOL ELECTRIC INC. ELECTRON TUBE DIVISION BLOOMFIELD, NEW JERSEY, U.S.A. APRIL 1, 1956 PLATE #4624



3

GLASS BULB

TUNG-SOL -

DOUBLE-DIODE TRIODE

MINIATURE TYPE

COATED UNIPOTENTIAL CATHODE

HEATER
178
12.6 VOLTS 0.15 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
7 PIN BASE
78T

THE 12AE6 IS A COMBINED DOUBLE DETECTOR DIODE AND MEDIUM MU TRIODE WITH A COMMON UNIPOTENTIAL CATHODE IN THE 7-PIN MINIATURE CONSTRUCTION. THE TRIODE SECTION IS INTENDED FOR USE AS AN AF VOLTAGE AMPLIFIER WHERE THE HEATER AND PLATE POTENTIALS ARE OBTAINED DIRECTLY FROM AN AUTOMOTIVE BATTERY.

DIRECT INTERELECTRODE CAPACITANCES

	WITHOUT SHIELD		
GRID TO PLATE: (G TO P)	2.0 μμ		
INPUT: G TO (H+K)	1.8 μμ		
OUTPUT: P TO (H+K)	1.1 μμ		
DIODE TO DIODE	٠9 μμ		

RATINGS

INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER VOLTAGE*	12.6	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE	±30	VOLTS
MAXIMUM PLATE VOLTAGE	30	VOLTS
MAXIMUM CATHODE CURRENT	20	MA.
MAXIMUM AVERAGE DIODE CURRENT	1	MA.
MAXIMUM GRID CIRCUIT RESISTANCE	10	MEGOHMS

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS AT AMPLIFIER - TRIODE UNIT

HEATER VOLTAGE	-	12.6	VOLTS
HEATER CURRENT		0.15	AMP.
PLATE VOLTAGE		12.6	VOLTS
GRID VOLTAGE		0	VOLTS
PLATE CURRENT		750	MAMPS
PLATE RESISTANCE		15 000	OHMS
TRANSCONDUCTANCE		1 000	µмноs
AMPLIFICATION FACTOR		15	

^{*}THIS TUBE IS INTENDED TO BE USED IN AUTOMOTIVE SERVICE FROM A NOMINAL 12 VOLT BATTERY SOURCE.
THE HEATER IS THEREFORE DESIGNED TO OPERATE OVER THE 10.0 TO 15.9 VOLTAGE RANGE ENCOUNTERED
IN THIS SERVICE. THE MAXIMUM RATINGS OF THE TUBE PROVIDE FOR AN ADEQUATE SAFETY FACTOR SUCH
THAT THE TUBE WILL WITHSTAND THE WIDE VARIATION IN SUPPLY VOLTAGES.

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS - CONT'D DIODE UNITS - TWO

AVERAGE DIODE CURRENT WITH

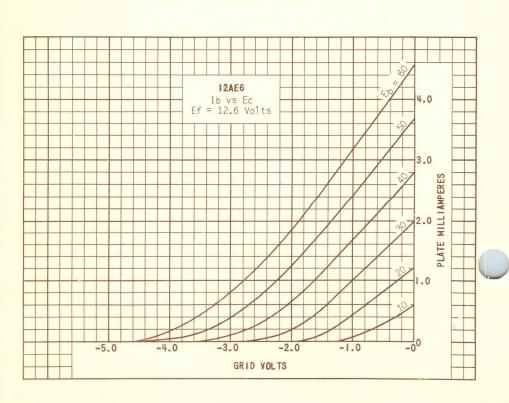
10 VOLTS APPLIED (EACH DIODE)

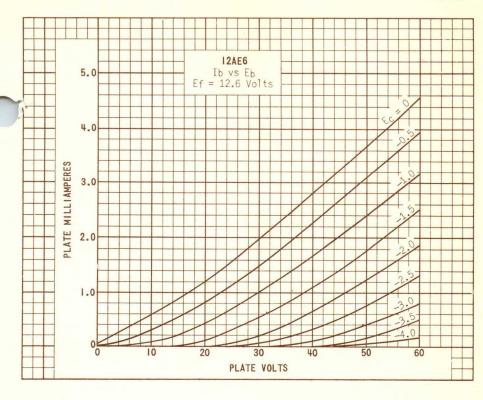
2.0 MA.

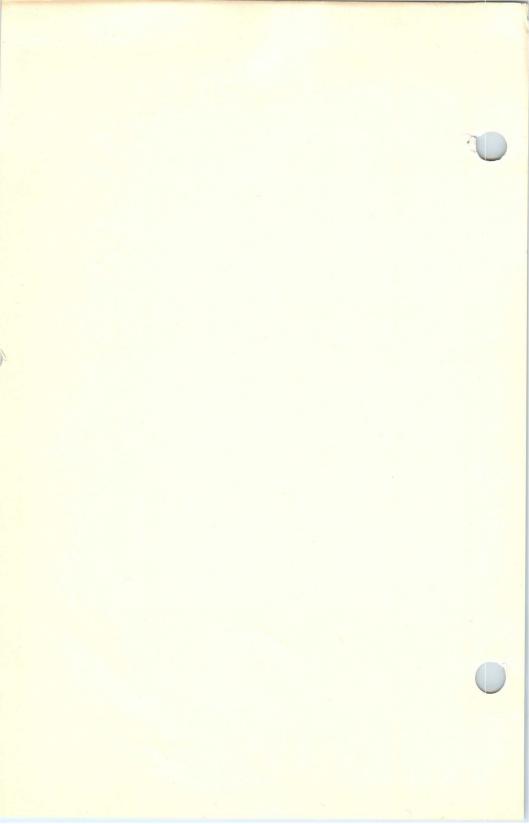
RESISTANCE COUPLED AMPLIFIER - TRIODE UNIT

PLATE SUPPLY VOLTAGE	14.4	VOLTS
CONTROL GRID VOLTAGE	0	VOLTS
PLATE LOAD RESISTOR	470 000	OHMS
CONTROL GRID RESISTOR	2.2	MEGOHMS
INPUT CONDENSER	0.01	μf
OUTPUT CONDENSER	0.01	μf
GRID RESISTOR OF FOLLOWING STAGE	2.2	MEGOHMS
SIGNAL SOURCE IMPEDANCE (MAX.)	1 000	OHMS
VOLTAGE GAIN AT 400 CPS**	10	

^{**} MEASURED AT AN OUTPUT VOLTAGE OF 1 VOLT RMS.







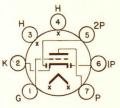
FOR

AF VOLTAGE AMPLIFIER

SERVICE

COATED UNIPOTENTIAL CATHODE

ANY MOUNTING POSITION



BOTTOM VIEW BASING DIAGRAM JEDEC 7BT

GLASS BULB MINIATURE BUTTON 7 PIN BASE E7-1

OUTLINE DRAWING JEDEC 5-2

T-5 1

1.875 MAX

2.125' MAX

THE 12AE6A IS A COMBINED DOUBLE DETECTOR DIODE AND MEDIUM MU TRIODE WITH A COMMON UNIPOTENTIAL CATHODE IN THE 7 PIN MINIATURE CONSTRUCTION. THE TRIODE SECTION IS INTENDED FOR USE AS AN AF VOLTAGE AMPLIFIER INTO A LOW IMPEDANCE LOAD WHERE THE HEATER AND PLATE POTENTIALS ARE OBTAINED DIRECTLY FROM AN AUTOMOTIVE BATTERY.

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS 12.6 150 VOLTS MA HEATER SUPPLY LIMITS: APPLIED VOLTAGE 10 TO 15.9 VOLTS MAXIMUM HEATER-CATHODE VOLTAGE: ±30 VOLTS

MAXIMUM RATINGS

DESIGN CENTER VALUES - SEE EIA STANDARD RS-239

PLATE VOLTAGE 30 VOLTS CATHODE CURRENT 20 MA. AVERAGE DIODE CURRENT MA. GRID CIRCUIT RESISTANCE MEGOHMS

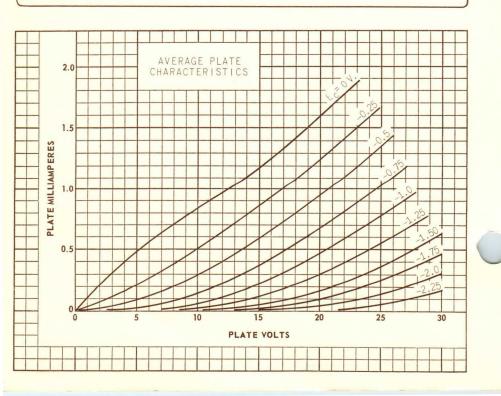
TUNG-SOL .

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TYPICAL OPERATING CHARACTERISTICS

CLASS A1 AMPLIFIER - TRIODE UNIT

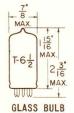
HEATER POTENTIAL	12.6	12.6	VOLTS
PLATE POTENTIAL	12.6	12.6	VOLTS
GRID POTENTIAL	0		VOLTS
GRID RESISTOR	0	10	MEGOHMS
PLATE CURRENT	1.0	0.32	MA.
TRANSCONDUCTANCE	1,300	715	MHOS
PLATE RESISTANCE	13	20	KILOHMS
AMPLIFIER FACTOR	16.7	14.3	
DIODE UNITS - TWO			
AVERAGE DIODE CURRENT WITH 10 VOI	_TS		
APPLIED (EACH DIODE)		2.0	MA.



TUNG-SOL .

DOUBLE TRIODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE
HEATER

12.6 VOLTS 0.45±10% AMR

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

SMALL BUTTON 9 PIN BASE

9 A

THE 12AE7 IS A MINIATURE LCW-MU DISSIMILAR DOUBLE TRIODE IN THE 9 PIN MINIATURE CONSTRUCTION AND IS INTENDED FOR USE AS A DRIVER TUBE FOR THE AUDIO OUTPUT STAGE OF HYBRID AUTOMOBILE RADIOS.

DIRECT INTERELECTRODE CAPACITANCES WITHOUT EXTERNAL SHIELD

	TRIODE #1	TRIODE #2	
GRID TO PLATE	3.9	3.4	μμf
INPUT	4.7	4.2	μμf
OUTPUT	0.75	0.85	μμf

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER VOLTAGE	12.6	VOLTS
MAXIMUM PLATE VOLTAGE	16.0	VOLTS
MAXIMUM POSITIVE DC GRID VOLTAGE	0	VOLTS
MAXIMUM PLATE DISSIPATION	1.0	WATT
MAXIMUM GRID CIRCUIT RESISTANCE	1.5	MEGOHMS
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE	16.0	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	16.0	VOLTS

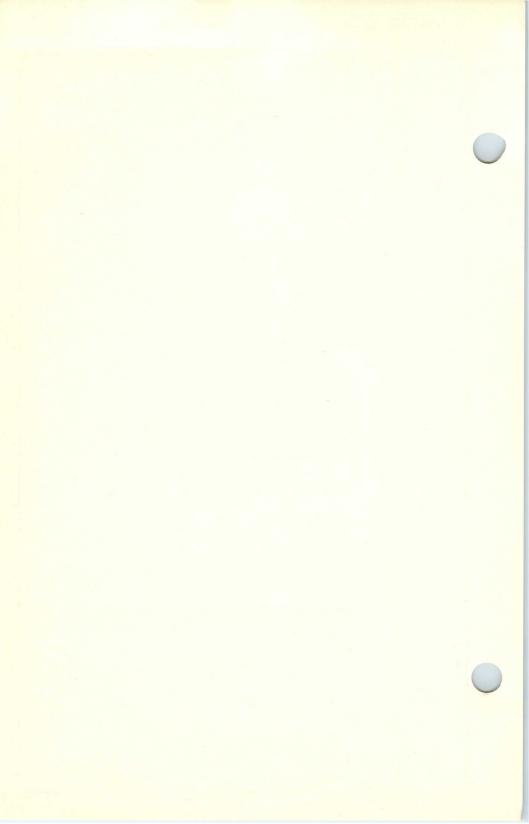
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

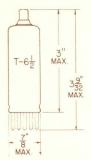
TRIODE #1

TRIODE #2

HEATER VOLTAGE	12.6 0.45±10%		VOLTS
HEATER CURRENT			AMP.
PLATE VOLTAGE (EACH TRIODE)	12.6	12.6	VOLTS
GRID LEAK RESISTOR	1.5	1.0	MEGOHM
PLATE CURRENT	1.9	7.5	MA.
TRANSCONDUCTANCE	4000	6500	µмноѕ
AMPLIFICATION FACTOR	13.0	6.4	
DI ATE DECISIONE	Z150	005	OHNC

ARATINGS APPLY TO EACH SECTION UNLESS OTHERWISE STATED.





GLASS BULB SKIRTED MINIATURE

DIODE

MINIATURE TYPE

UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 0.6±6% AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW SMALL-BUTTON 9 PIN NOVAL 9 CB

THE 12AF3 IS A SINGLE INDIRECTLY—HEATED DIODE INTENDED FOR USE IN HOR—IZONTAL FREQUENCY DAMPER SERVICE TELEVISION RECEIVERS. IT IS DESIGNED TO WITHSTAND HIGH VOLTAGE PULSES OF LINE FREQUENCY BETWEEN CATHODE AND BOTH HEATER AND PLATE ELEMENTS SUCH AS NORMALLY ENCOUNTERED IN "DIRECT DRIVE" CIRCUITS.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

HEATER TO CATHODE	E H TO K				2.8	pepe f
CATHODE TO PLATE	AND HEATER	K	TO	(P + H)	9.0	μμ f
PLATE TO CATHODE	AND HEATER	P	TO	(K + H)	6.0	μμ f

RATINGS A INTERPRETED ACCORDING TO DESIGN-MAXIMUM SYSTEM BC

HEATER VOLTAGE	12.0	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE		
DC	1000	VOLTS
TOTAL DC AND PEAK	4500	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC	100	VOLTS
TOTAL DC AND PEAK	300	VOLTS
MAXIMUM PEAK INVERSE PLATE VOLTAGE	4500	VOLTS
MAXIMUM DC PLATE CURRENT	185	MA.
MAXIMUM STEADY STATE PAEK PLATE CURRENT	750	MA.
MAXIMUM PLATE DISSIPATION	6.0	WATTS
MAXIMUM BULB TEMPERATURE	210	°C
HEATER WARM-UP TIME*	11.0	SECONDS

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AVERAGE CHARACTERISTICS

TUBE VOLTAGE DROP

(WITH TUBE CONDUCTING PLATE GURRENT = 340 MA.)

30 VOLTS

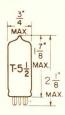
*HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

AFOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE CUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 154 OF ONE SCANNING CYCLE.

Bunless otherwise stated.

CDESIGN-MAXIMUM RATINGS ARE THE LIMITING VALUES EXPRESSED WITH RESPECT TO BOGIE TUBES AT WHICH SATISFACTORY TUBE LIFE CAN BE EXPECTED TO OCCUR. TO OBTAIN SATISFACTORY CIRCUIT PERFORMANCE, THEREFORE, THE EQUIPMENT DESIGNER MUST EXTABLISH THE CIRCUIT DESIGN SO INTHAT NO DESIGN-MAXIMUM VALUE IS EXCEEDED WITH A BOGIE TUBE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, AND ENVIRONMENTAL CONDITIONS.

PENTODE



MINIATURE TYPE

COATED UNIPOTENTIAL CATHODE

HEATER

12.6* VOLTS 0.15 AMP.

AC OR DC

H P Go

GLASS BULB

ANY MOUNTING POSITION

BOTTOM VIEW
MINIATURE BUTTON
7 PIN BASE
78K

THE 12AF6 IS A MINIATURE PENTODE INTENDED FOR USE AS A RADIO-FREQUENCY OR INTERMEDIATE-FREQUENCY AMPLIFIER IN AUTOMOBILE RADIO RECEIVERS. THE TUBE IS SPECIALLY DESIGNED TO OPERATE WITH PLATE AND SCREEN VOLTAGES SUPPLIED DIRECTLY FROM A 12-VOLT STORAGE BATTERY.

DIRECT INTERELECTRODE CAPACITANCES

GRID #1 TO PLATE, (MAX.)	0.006	μμ f
INPUT	5.5	μμ f
OUTPUT	4.8	μμf
RATINGS		
INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM		
HEATER VOLTAGE	12.6	VOLTS
MAXIMUM PLATE VOLTAGE	16	VOLTS
MAXIMUM SCREEN VOLTAGE	16	VOLTS
MAXIMUM POSITIVE DC GRID #1 VOLTAGE	0	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE		
HEATER POSITIVE WITH RESPECT TO CATHODE	16	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE	16	VOLTS
MAXIMUM GRID #4 CIRCUIT RESISTANCE	2.2	MEGOHMS

*WHEN USED IN AUTOMOTIVE SERVICE FROM A 12-VOLT SOURCE, UNDER NO CIRCUMSTANCES SHOULD THE HEATER VOLTAGE BE LESS THAN 10.0 VOLTS OR MORE THAN 15.9 VOLTS. THESE EXTREME VARIATIONS IN HEATER VOLTAGE MAY BE TOLERATED FOR SHORT PERIODS; HOWEVER, OPERATION AT OR HEAR THESE ABSOLUTE LIMITS IN HEATER VOLTAGE RECESSARILY INVOLVES SACRIFICE IN PERFORMANCE AT LOW HEATER VOLTAGE AND IN LIFE EXPECTANCY AT HIGH HEATER VOLTAGE. EQUIPMENT RELIABILITY CAN BE SIGNIFICANTLY INCREASED WITH IMPROVED SUPPLY-VOLTAGE REGULATION.

DESIGN-MAXIMUM RATINGS ARE THE LIMITING VALUES EXPRESSED WITH RESPECT TO BOGIE TUBES AT WHICH SATISFACTORY TUBE LIFE CAN BE EXPECTED TO OCCUR. TO OBTAIN SATISFACTORY CIRCUIT PERFORMANCE, THEREFORE, THE EQUIPMENT DESIGNER MUST ESTABLISH THE CIRCUIT DESIGN SO THAT NO DESIGN-MAXIMUM VALUE IS EXCEDED WITH A BOGIE TUBE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, AND ENVIRONMENTAL CONDITIONS.

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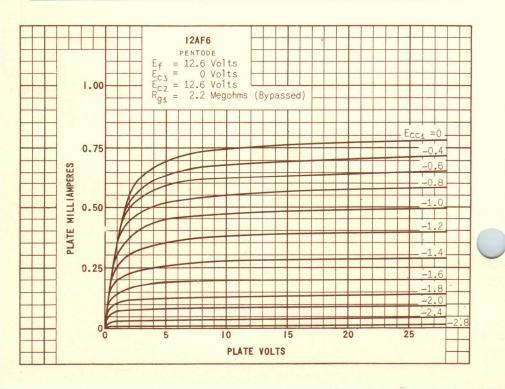
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER

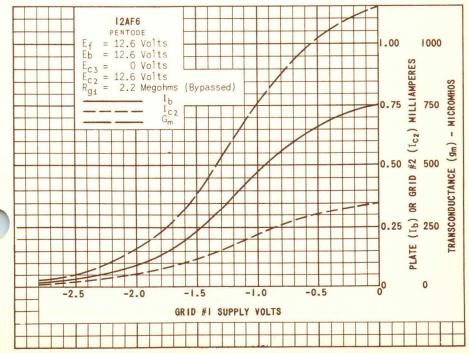
HEATER VOLTAGE	12.6	VOLTS
HEATER CURRENT	0.15	AMP.
PLATE VOLTAGE	12.6	VOLTS
SUPPRESSOR VOLTAGE	0	VOLTS
SCREEN VOLTAGE	12.6	VOLTS
GRID #4 SUPPLY VOLTAGE	0	VOLTS
GRID #4 RESISTOR (BYPASSED)	2.2	MEGOHMS
PLATE RESISTANCE (APPROX.)	→ 0.35	MEGOHMS
TRANSCONDUCTANCE	→ 1500	μMHOS
PLATE CURRENT	→ 1.1	MA.
SCREEN CURRENT	→ 0.45	MA.
GRID #4 VOLTAGE (APPROX.) Gm =40 \(\mu\)MHOS	-2.7	VOLTS
GRID #4 VOLTAGE (APPROX.) MEASURED *		
WITH GRID #4 TIED TO GRID #3,		
$R_{\rm G1} = 0$, $G_{\rm m} = 10 \mu \rm MHOS$	-3.5	VOLTS
91		

* INDICATES AN ADDITION.

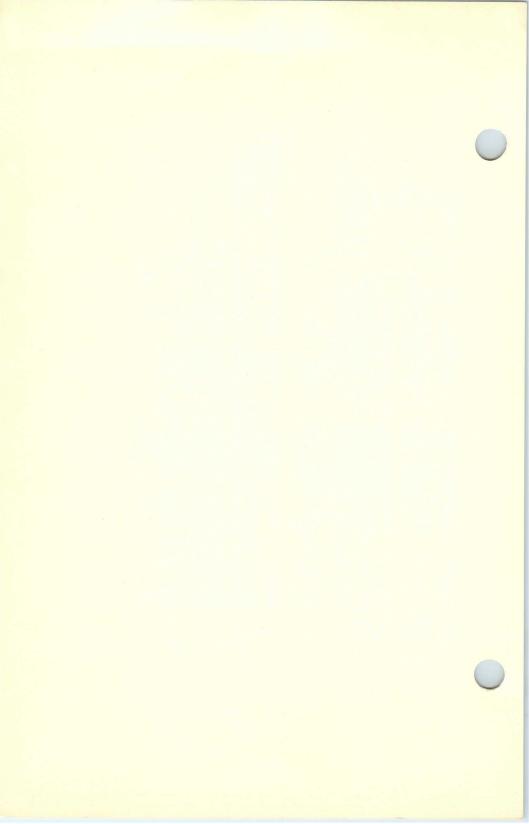
- INDICATES A CHANGE.



PRINTED IN U. S. A.



TUNG-SOL ELECTRIC INC. ELECTRON TUBE DIVISION BLOOMFIELD, NEW JERSEY, U.S.A. APRIL 1, 1956 PLATE #4628



TUNG-SOL .

HEPTODE



MAX

MINIATURE TYPE

COATED UNIPOTENTIAL CATHODE

HEATER

12.6* VOLTS 0.15 AMP.

AC OR DC

ANY MOUNTING POSITION

BOTTOM VIEW

MINIATURE BUTTON 7 PIN BASE

7CH

GLASS BULB

THE 12AGÓ IS A MINIATURE HEPTODE INTENDED PRIMARILY TO PERFORM THE COM-BINED FUNCTIONS OF MIXER AND OSCILLATOR IN AUTOMOBILE RADIO RECEIVERS. THE TUBE IS SPECIFICALLY DESIGNED TO OPERATE WITH PLATE AND SCREEN VOLTAGES SUPPLIED DIRECTLY FROM A 12-VOLT STORAGE BATTERY.

DIRECT INTERELECTRODE CAPACITANCES WITHOUT EXTERNAL SHIELD

GRID #3 TO ALL	6.5	μμ f
PLATE TO ALL	7.5	щи f
GRID #1 TO ALL	5.5	μμ f
CATHODE TO ALL EXCEPT GRID #1	18	μμ f
GRID #3 TO PLATE (MAX.)	0.28	μμ f
GRID #1 TO GRID #3 (MAX.)	0.17	μμ f
GRID #1 TO PLATE (MAX.)	0.065	μμ f
GRID #1 TO CATHODE	2.8	μμ f

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER VOLTAGE	12.6	VOLTS
MAXIMUM PLATE VOLTAGE	16	VOLTS
MAXIMUM SCREEN VOLTAGE	16	VOLTS
MAXIMUM POSITIVE DC GRID #3 VOLTAGE	0	VOLTS
MAXIMUM DC GRID #4 CURRENT	0.2	MA.
MAXIMUM GRID #3 CIRCUIT RESISTANCE	2.2	MEGOHMS

DESIGN-MAXIMUM RATINGS ARE THE LIMITING VALUES EXPRESSED WITH RESPECT TO BOGIE TUBES AT WHICH SATISFACTORY TUBE LIFE CAN BE EXPECTED TO OCCUR. TO OBTAIN SATISFACTORY CIRCUIT PERFORMANCE, THEREFORE, THE EQUIPMENT DESIGNER MUST ESTABLISH THE CIRCUIT DESIGN SO THAT NO DESIGN-MAXIMUM VALUE IS EXCEEDED WITH A BOGIE TUBE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, AND ENVIRONMENTAL CONDITIONS.

^{**}WHEN USED IN AUTOMOTIVE SERVICE FROM A 12-VOLT SOURCE, UNDER NO CIRCUMSTANCES SHOULD THE
HEATER VOLTAGE BE LESS THAN 10.0 VOLTS OR MORE THAN 15.9 VOLTS. THESE EXTREME VARIATIONS IN
HEATER VOLTAGE MAY BE TOLERAFED FOR SHORT PERIODS; HOWEVER, OPERATION AT OR NEAR THESE
ABSOLUTE LIMITS IN HEATER VOLTAGE RECESABILLY INVOLVES SACRIFICE IN PERFORMANCE AT LOW HEATER
VOLTAGE AND IN LIFE EXPECTANCY AT HIGH HEATER VOLTAGE. EQUIPMENT RELIABILITY CAN BE SIGNIFICANTLY INCREASED WITH IMPROVED SUPPLY-VOLTAGE REQULATION.

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS CONVERTER SERVICE A

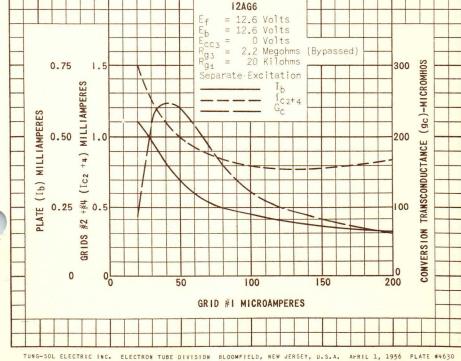
12.6	VOLTS
0.15	AMP.
12.6	VOLTS
12.6	VOLTS
0	VOLTS
2.2	MEGOHMS
0.85	VOLTS
20 000	OHMS
300	μMHOS.
0.55	MA.
1.4	MA.
0.050	MA.
-2.0	VOLTS
	0.15 12.6 12.6 0 2.2 0.85 20 000 300 0.55 1.4

OSCILLATOR CHARACTERISTICS, NOT OSCILLATING

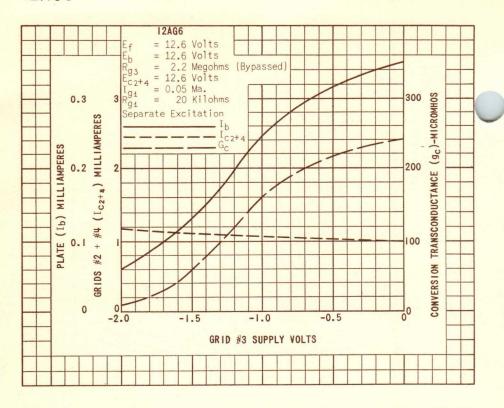
HEATER VOLTAGE HEATER CURRENT PLATE VOLTAGE	12.6 0.15 12.6	VOLTS AMP. VOLTS
SCREEN-CONNECTED TO PLATE		
GRID #3 VOLTAGE	0	VOLTS
GRID #1 VOLTAGE	0	VOLTS
AMPLIFICATION FACTOR ^B	9.0	
TRANSCONDUCTANCEB	3-400	μMHOS.
CATHODE CURRENT	4.2	MA.
GRID #1 VOLTAGE (APPROX.) Ib=10 HAMPS	-4	VOLTS
GRID #1 VOLTAGE (APPROX.) Ib=10 HAMPS	-4	VOLTS

A CHARACTERISTICS SHOWN ARE OBTAINED IN THE STANDARD RETMA 60-CYCLE CONVERSION TRANSCONDUCTANCE TEST SET EXCEPT THAT THE APPLIED GRID-NUMBER 3 SIGNAL VOLTAGE HAS BEEN REDUCED FROM 1.0 VOLT PEAK-TO-PEAK TO 0.1 VOLT PEAK-TO-PEAK.

BETWEEN GRID-NUMBER 1 AND GRIDS NUMBER 2 AND 4 CONNECTED TO PLATE.

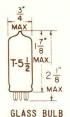


12AG6



DOUBLE-DIODE TRIODE

MINIATURE TYPE



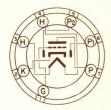
COATED UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 0.15 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
7 PIN BASE
78T

THE 12AJÓ IS A COMBINED DOUBLE DIODE DETECTOR AND HIGH MU TRIODE WITH A COMMON UNIPOTENTIAL CATHODE IN THE 7-PIN MINIATURE CONSTRUCTION. THE TRIODE SECTION IS INTENDED FOR USE AS AN AF VOLTAGE AMPLIFIER WHERE THE HEATER AND PLATE POTENTIALS ARE OBTAINED DIRECTLY FROM AN AUTOMOTIVE BATTERY.

DIRECT INTERELECTRODE CAPACITANCES

	SHIELD	
GRID TO PLATE: (G TO P)	2.0	µµ f
INPUT: G TO (H + K)	2.2	щи f
OUTPUT: P TO (H+K)	0.8	μμ f
DIODE TO DIODE	.9	$\mu\mu$ f

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER VOLTAGE	12.6	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE	±30	VOLTS
MAXIMUM PLATE VOLTAGE	30	VOLTS
MAXIMUM CATHODE CURRENT	20	MA.
MAXIMUM AVERAGE DIODE CURRENT	1	MA.
MAXIMUM GRID CIRCUIT RESISTANCE	10	MEGOHMS

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER - TRIODE UNIT

HEATER VOLTAGE	12.6	VOLTS
HEATER CURRENT	0.15	AMP.
PLATE VOLTAGE	12.6	VOLTS
GRID VOLTAGE	0	VOLTS
PLATE CURRENT	750	HAMPS
PLATE RESISTANCE	45 000	OHMS
TRANSCONDUCTANCE	1 200	μMHOS.
AMPLIFICATION FACTOR	. 55	

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS - CONT'D

DIODE UNITS - TWO

AVERAGE DIODE CURRENT WITH

10 VOLTS APPLIED (EACH DIODE)

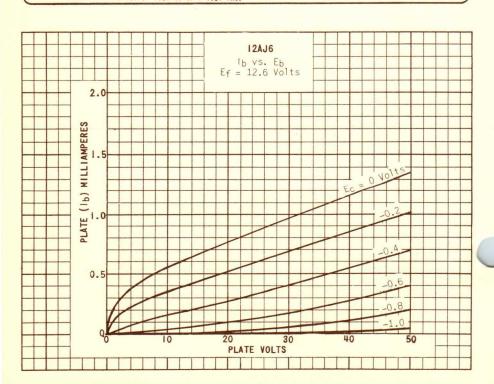
2.0 MA.

RESISTANCE COUPLED AMPLIFIER - TRIODE UNIT

12.6	VOLTS
0.15	AMP.
12.6	VOLTS
0	VOLTS
1.0	MEGOHMS
1.0	MEGOHMS
0.02	μf
0.01	μf
2.0	MEGOHMS
16	
	0.15 12.6 0 1.0 1.0 0.02 0.01 2.0

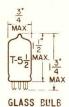
THIS TUBE IS INTENDED TO BE USED IN AUTOMOTIVE SERVICE FROM A NOMINAL 12 VOLT BATTERY SOURCE. THE MEATER 45 THEREFORE DESIGNED TO OPERATE OVER THE 10.0 TO 15.9 VOLTAGE RANGE ENCOUNTERED IN THIS SERVICE. THE MAXIMUM RATINGS OF THE TUBE PROVIDE FOR AN ADEQUATE SAFETY FACTOR SUCH THAT THE TUBE WILL WITHSTAND THE WIDE VARIATION IN SUPPLY VOLTAGES.

^{**} MEASURED AT AN OUTPUT VOLTAGE OF 1 VOLT RMS.



DOUBLE DIODE

MINIATURE TYPE



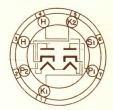
COATED UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 0.15 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

MINIATURE BUTTON 7 PIN BASE 68T

THE 12AL5 COMBINES TWO INDEPENDENT DIODE UNITS IN THE 7 PIN MINIATURE CONSTRUCTION. ITS HIGH PERVEANCE PERMITS HIGH EFFICIENCY IN EITHER FM OR AM DETECTOR SERVICE.

DIRECT INTERELECTRODE CAPACITANCES

	WITHOUT	SHIELDA	
PLATE INPUT: P TO (H+K+IS) EACH UNIT	2.5	3.2	uuf
COUPLING: 1P TO 2P (MAX.)	0.068	0.025	uu f
CATHODE INPUT: K TO (P+H+IS) EACH UNIT	3.4	3.6	uuf

AEXTERNAL SHIELD #316 CONNECTED TO PIN #6.

RATINGS INTERPRETED ACCORDING TO RMA STANDARD M8-210

HEATER VOLTAGE	12.6	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE	330	VOLTS
MAXIMUM PEAK INVERSE VOLTAGE	330	VOLTS
MAXIMUM AC PLATE VOLTAGE (EACH PLATE) RMS	117	VOLTS
MAXIMUM STEADY STATE PEAK PLATE CURRENT (EACH PLATE)	54	MA -
MAXIMUM DC OUTPUT CURRENT (EACH PLATE)	9	MA -
MINIMUM TOTAL EFFECTIVE PLATE SUPPLY IMPEDANCE (EACH PLATE)	300	онмѕ

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

HALF-WAVE RECTIFIER

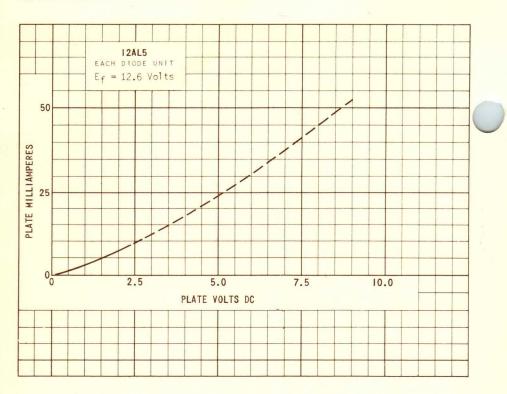
HEATER VOLTAGE	12.6	VOLTS
HEATER CURRENT	0.15	AMP.
AVERAGE DIODE CURRENT (EACH UNIT) AT 10 VOLTS DC	60	MA.

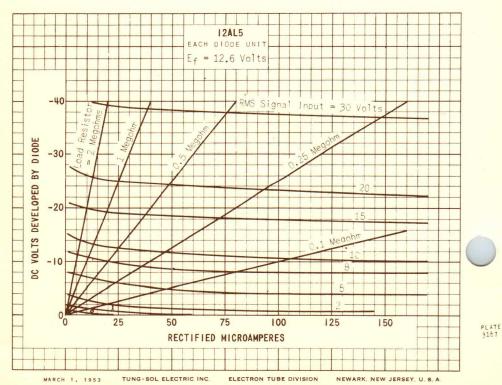
THE RESONANT FREQUENCY OF EACH UNIT OF THE 12ALS IS 700 MC. (APPROX.)

PLATE 3166

-INDICATES A CHANGE OR ADDITION.

12AL5(6AL5)





2.625"

MAX.

COATED UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 0.55 AMP.

AC OR DC

ANY MOUNTING POSITION

GLASS BULB

MINIATURE BUTTON
9 PIN BASE E9-1

OUTLINE DRAWING JEDEC 6-3 BOTTOM VIEW

BASING DIAGRAM
JEDEC 9GS

THE 12AL8 IS A COMBINED MEDIUM-MU TRIODE AND SPACE-CHARGE GRID TETRODE WITH INDEPENDENT UNIPOTENTIAL CATHODES IN THE 9-PIN MINIATURE CONSTRUCTION. THE TRIODE SECTION IS INTENDED FOR USE AS DETECTOR OR VOLTAGE AMPLIFIER AND THE TETRODE SECTION IS INTENDED FOR USE AS A POWER AMPLIFIER WHÈRE THE HEATER, PLATE AND SPACE-CHARGE GRID POTENTIALS ARE OBTAINED DIRECTLY FROM AN AUTOMOTIVE BATTERY.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

TRIODE INPUT: (G TO K + H)	1.8	pf
TRIODE OUTPUT: (P TO K + H)	0.4	pf
TRIODE GRID TO PLATE	5.7	pf
TETRODE INPUT: (G2 TO G4 + K+H)	→ 12	pf
TETRODE OUTPUT: (P TO G1 + K+H)	1.6	pf
TETRODE GRID TO PLATE	→ 12	pf
COUPLING: (TETRODE GRID #2 TO TRIODE GRID #1) (MAX.)	0.1	pf

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER VOLTAGE	12.6	VOLTS
MAXIMUM TETRODE PLATE VOLTAGE	30	VOLTS
MAXIMUM POSITIVE TETRODE GRID #1 VOLTAGE	16	VOLTS
MAXIMUM NEGATIVE TETRODE GRID #2 VOLTAGE	20	VOLTS
MAXIMUM TETRODE GRID #2 CIRCUIT RESISTANCE	10	MEGOHMS
MAXIMUM TRIODE PLATE VOLTAGE	30	VOLTS
MAXIMUM TRIODE CATHODE CURRENT	20	MA.
MAXIMUM TRIODE GRID CIRCUIT RESISTANCE	10	MEGOHMS
MAXIMUM HEATER-CATHODE VOLTAGE	±30	VOLTS

^{*}THIS TUBE IS INTENDED TO BE USED IN AUTOMOTIVE SERVICE FROM A MOMINAL 12 VOLT BATTERY SOURCE.
THE HEATER IS THEREFORE DESIGNED TO OPFRATE OVER THE 10.0 TO 15.9 VOLTAGE RANGE ENCOUNTERED
IN THIS SERVICE. THE MAXIMUM RATINGS OF THE TUBE PROVIDE FOR AN ADEQUATE SAFETY FACTOR SUCH
THAT THE TUBE WILL WITHSTAND THE WIDE VARIATION IN SUPPLY VOLTAGES.

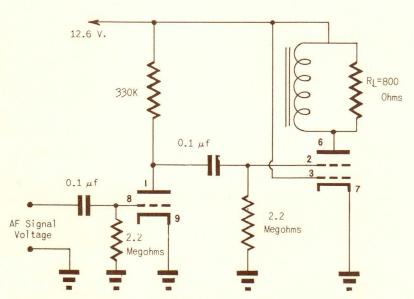
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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS CLASS A_1 AMPLIFIER — SINGLE TUBE

	TRIODE		TETRODE	
HEATER VOLTAGE		12.6		VOLTS
HEATER CURRENT		0.55		AMP.
PLATE VOLTAGE	12.6		12.6	VOLTS
GRID #1 (SPACE-CHARGE GRID	VOLTAGE		12.6	VOLTS
CONTROL GRID VOLTAGE	-0.9 ^A		-0.5 ^A	VOLTS
PLATE CURRENT	0.5		40	MA.
GRID #1 (SPACE-CHARGE GRID)	CURRENT		75	MA.
PLATE RESISTANCE	13 000		480	OHMS
AMPLIFICATION FACTOR	13		7.2 ^C	
TRANSCONDUCTANCE	1 000		15 000°	имноs

RESISTANCE-COUPLED AMPLIFIER-SINGLE TUBE (SEE CIRCUIT)

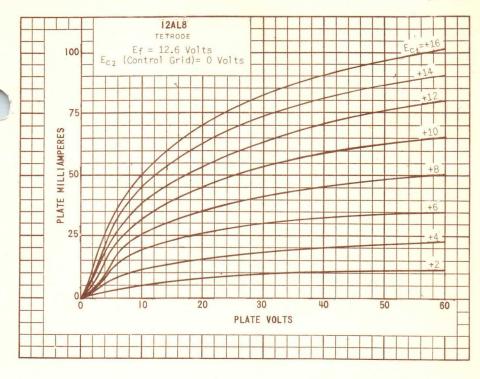
PLATE (SPACE-CHARGE GRID & HEATER) SUPPLY VOLTAGE	12.6	VOLTS
AF SIGNAL VOLTAGE	.18	VOLTS
PLATE CURRENT (TETRODE)	8.0B	MA.
GRID #1 (SPACE-CHARGE GRID) CURRENT	75	MA.
LOAD RESISTANCE (TETRODE)	800	OHMS
TOTAL HARMONIC DISTORTION	10	PERCENT
POWER OUTPUT	40	MW.

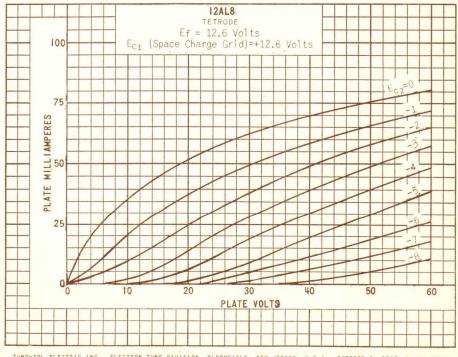


AVERAGE BIAS DEVELOPED ACROSS A 2.2 MEGOHM GRID RESISTOR.

BZERO SIGNAL PLATE CURRENT IS APPROXIMATELY 40 MA BECAUSE BIAS IS OBTAINED BY GRID \$2 RECTI-FICATION.

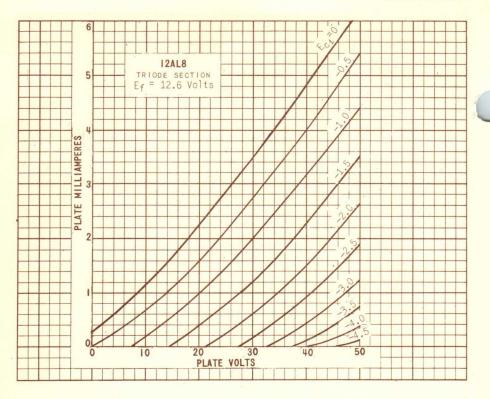
CFROM GRID #2 TO PLATE.

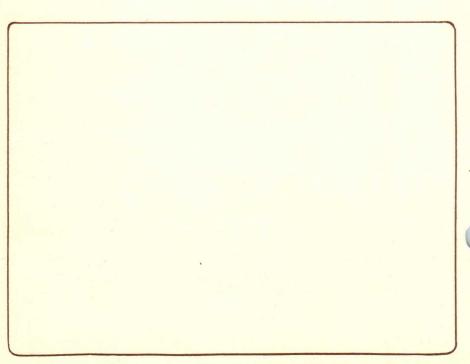




12AL8

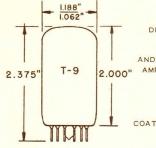
TENTATIVE DATE





DOUBLE PENTODE

COMPACTRON

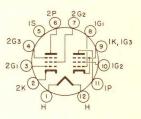


DISSIMILAR DOUBLE PENTODE

USE AS AN FM DETECTOR
AND AUDIO-FREQUENCY OUTPUT
AMPLIFIER IN T.V. RECEIVERS

COATED UNIPOTENTIAL CATHODE

ANY MOUNTING POSITION



BOTTOM VIEW BASING DIAGRAM JEDEC 12BU

GLASS BULB
BUTTON 12 PIN
BASE E12-70
OUTLINE DRAWING
JEDEC 9-58

THE 12AL11 IS A SHARP-CUTOFF, DUAL-CONTROL PENTODE (SECTION 2) AND A POWER PENTODE (SECTION 1) IN THE 12 PIN COMPACTRON CONSTRUCTION. THE DUAL-CONTROL PENTODE IS INTENDED FOR USE AS AN FM DETECTOR AND THE POWER PENTODE AS AN AUDIO-FREQUENCY OUTPUT AMPLIFIER IN T.V. RECEIVERS.

DIRECT INTERELECTRODE CAPACITANCES

SECTION 1		
GRID 1 TO PLATE: (IG1TO IP)	0.26	pf
INPUT: IG1 TO (H+ IK + IG2 + IG3 + I.S.)	11	pf
OUTPUT: IP TO (H + IK + IG2 + IG3 + I.S.)	12	pf
SECTION 2		
GRID 1 TO PLATE: (2G1 TO 2P)	0.034	pf
GRID 3 TO PLATE: (2 G3 TO 2P)	3.2	pf
GRID 1 TO ALL EXCEPT PLATE: 2G1TO		
(H + 2K + 2G2 + 2G3 + I.S.)	6.5	pf
GRID 3 TO ALL: 2 _{G3} TO (H+2K+2G1+2G2+2P+1.S.)	7.5	pf
GRID 1 TO GRID 3: (2 G1 TO 2G3)	0.24	pf
PLATE TO PLATE: (1P TO 2P)	0.12	pf

CONTINUED FROM PRECEDING PAGE

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	12.6 VOLTS	450	MA.
HEATER WARM-UP TIME		11	SECONDS
LIMITS OF SUPPLIED CURRENT		450 + 00	
LIMITS OF SUFFLIED CURRENT		450 ± 30	MA.
HEATER-CATHODE VOLTAGE	SECTION 1	SECTION 2	
HEATER POSITIVE WITH RESPECT TO CATHODE			
DC COMPONENT	100	100	VOLTS
TOTAL DC AND PEAK	200	200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE			
TOTAL DC AND PEAK	200	200	VOLTS

MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

	SECTION 1	SECTION 2	
PLATE VOLTAGE	275	330	VOLTS
GRID 2 VOLTAGE	275	RATING CHART	VOLTS
GRID 2 SUPPLY VOLTAGE		330	VOLTS
GRID 3 (SUPPESSOR) VOLTAGE		28	VOLTS
POSITIVE DC GRID 1 VOLTAGE		0	VOLTS
PLATE DISSIPATION	10	1.7	WATTS
GRID 2 DISSIPATION	2.0	1,1	WATTS
GRID 1 CIRCUIT RESISTANCE			
WITH FIXED BIAS	0.25		MEGOHMS
WITH CATHODE BIAS	0.5		MEGOHMS

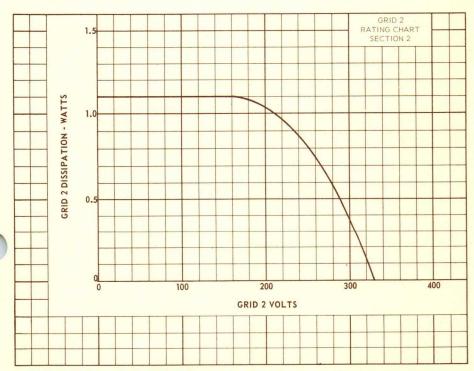
CHARACTERISTICS AND TYPICAL OPERATION

SECTION 1

PLATE VOLTAGE		250	VOLTS
GRID 2 VOLTAGE		250	VOLTS
GRID 1 VOLTAGE		-8.0	VOLTS
PEAK AF GRID I VOLTAGE		8.0	VOLTS
ZERO-SIGNAL PLATE CURRENT		35	MA.
MAXIMUM-SIGNAL PLATE CURRENT		39	MA.
ZERO-SIGNAL GRID 2 CURRENT		2.5	MA.
MAXIMUM SIGNAL GRID 2 CURRENT		7.0	MA.
MAXIMUM-SIGNAL POWER OUTPUT		4.2	WATTS
TRANSCONDUCTANCE		6,500	MICROMHOS
PLATE RESISTANCE	Approx.	100,000	OHMS
LOAD RESISTANCE		5,000	OHMS
TOTAL HARMONIC DISTORTION	Approx.	10	PERCENT

AVERAGE CHARACTERISTICS - SECTION 2

PLATE VOLTAGE 150 VOLTS GRID 2 VOLTAGE 100 VOLTS GRID 3 VOLTAGE 0 VOLTS CATHODE-BIAS RESISTOR 560 OHMS PLATE CURRENT 1.3 MA. **GRID 2 CURRENT** 2.1 GRID 1 TRANSCONDUCTANCE 1,000 MICROMHOS GRID 3 TRANSCONDUCTANCE 400 MICROMHOS PLATE RESISTANCE Approx. 0.15 MEGOHMS GRID 1 VOLTAGE FOR 16 = 30 MA Approx. -4.5 VOLTS GRID 3 VOLTAGE FOR $I_b = 50 \mu A$ Approx. -4.5 VOLTS





BEAM PENTODE

MINIATURE TYPE

COATED UNIPOTENTIAL CATHODE

3" -

 $2\frac{3}{8}$

T-5 MAX

GLASS BULB

2 5

MAX

MAX.

HEATER

12.6 VOLTS 0.225 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
7 PIN BASE
782

THE 12A05 IS A BEAM POWER AMPLIFIER USING THE MINIATURE CONSTRUCTION. IT IS DESIGNED FOR SERVICE IN AC AND STORAGE BATTERY OPERATED RECEIVERS WHERE HIGH POWER SENSITIVITY AND HIGH POWER OUTPUT IS DESIRED.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

GRID #1 TO PLATE	0.35	ши f
INPUT	8.3	μμ f
OUTPUT	8.2	HH f

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER VOLTAGE	CLASS A1 AMPLIFIER 12.6	CLASS AB1 AMPLIFIER	VOLTS
MAXIMUM PEAK HEATER-CATHODE VOLTAGE: HEATER NEGATIVE WITH RESPECT TO CATHODE TOTAL DC AND PEAK HEATER POSITIVE WITH RESPECT TO CATHODE DC TOTAL DC AND PEAK	100) ←	VOLTS VOLTS VOLTS
MAXIMUM PLATE VOLTAGE	250	250	VOLTS
MAXIMUM GRID #2 VOLTAGE	250	250	VOLTS
MAXIMUM PLATE DISSIPATION	12	12	WATTS
MAXIMUM GRID #2 INPUT	2	2	WATTS
MAXIMUM BULB TEMPERATURE (AT HOTTEST POINT ON BULB SURFACE) A	250	250	° c
MAXIMUM GRID #1 CIRCUIT RESISTANCE: FIXED BIAS OPERATION CATHODE BIAS OPERATION	0.1	0.1BC 0.5BC	ME GOHMS ME GOHMS

AHIGH AMBIENT TEMPERATURE AND SHIELDING MAY NECESSITATE A REDUCTION IN OPERATING DISSIPATION-WHEN TUBE SHIELDS ARE USED, IT IS ADVISABLE TO PAINT THE INSIDE AND OUTSIDE SURFACES OF THE TUBE SHIELD A DULL BLACK AND TO PROVIDE VENTILATION SLOTS TO REDUCE OPERATING TEMPERATURE.

- INDICATES A CHANGE.

BIF THE GRID #1 CIRCUIT RESISTANCE IS COMMON TO TWO TUBES, THE INDICATED MAXIMUM VALUES PER TUBE SHOULD BE HALVED.

Cthe type of input coupling used should not introduce too much resistance in the grid 1 circuit. Transformer or impedance-coupling devices are recommended.

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

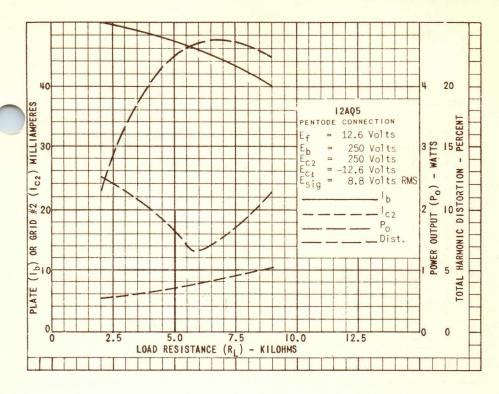
CLASS AT AMPLIFIER

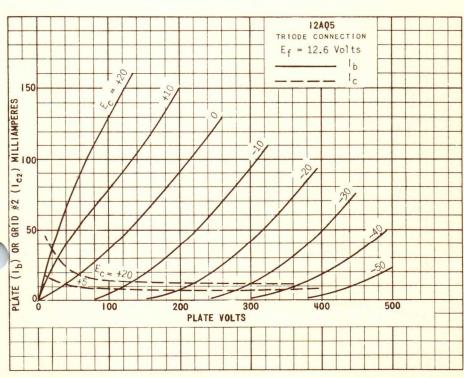
	7. See . 1. 1		
HEATER VOLTAGE	12.6	12.6	VOLTS
HEATER CURRENT	0.225	0.225	AMP.
PLATE VOLTAGE	180	250	VOLTS
GRID #2 VOLTAGE	180	250	VOLTS
GRID #1 VOLTAGE	-8.5	-12.5	VOLTS
PEAK AF GRID #1 VOLTAGE	8.5	12.5	VOLTS
ZERO-SIGNAL PLATE CURRENT	29	45	MA.
MAXIMUM SIGNAL PLATE CURRENT	30	47	MA.
ZERO-SIGNAL GRID #2 CURRENT (APPROX.)	3	4.5	MA.
MAXIMUM SIGNAL GRID #2 CURRENT (APPROX.)	4	7	MA.
PLATE RESISTANCE (APPROX.)	58 000	52 0.00	OHMS
TRANSCONDUCTANCE	3 700	4 100	MMHOS
LOAD RESISTANCE	5 500	5 000	OHMS
TOTAL HARMONIC DISTORTION	8	8	PERCENT
MAXIMUM SIGNAL POWER OUTPUT	2.0	4.5	WATTS

CLASS AB1 AMPLIFIER VALUES ARE FOR TWO TUBES UNLESS OTHERWISE SPECIFIED

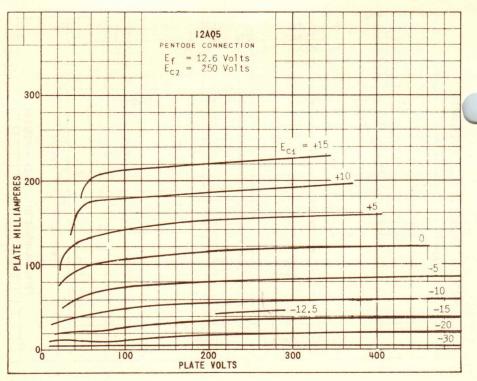
HEATER VOLTAGE	12.6	VOLTS
HEATER CURRENT	0.225	AMP.
PLATE VOLTAGE	250	VOLTS
GRID #2 VOLTAGE	250	VOLTS
GRID #1 VOLTAGE ^C	-15	VOLTS
PEAK AF GRID #1 TO GRID #1 VOLTAGE	30	VOLTS
ZERO-SIGNAL PLATE CURRENT	70	MA.
MAXIMUM SIGNAL PLATE CURRENT	79	MA.
ZERO-SIGNAL GRID #2 CURRENT (APPROX.)	5	MA.
MAXIMUM SIGNAL GRID #2 CURRENT (APPROX.)	13	MA.
PLATE RESISTANCE (EACH TUBE) APPROX.	60 000	OHMS
TRANSCONDUCTANCE (EACH TUBE)	3 750	MMHOS
EFFECTIVE PLATE-TO-PLATE LOAD RESISTANCE	10 000	OHMS
TOTAL HARMONIC DISTORTION	5	PERCENT
MAXIMUM SIGNAL POWER OUTPUT	10	WATTS

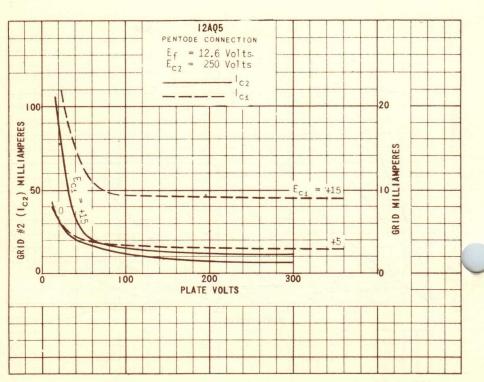
CTHE TYPE OF INPUT COUPLING USED SHOULD NOT INTRODUCE TOO MUCH RESISTANCE IN THE GRID \$1 CIRCUIT, TRANSFORMER OR IMPEDANCE COUPLING DEVICES ARE RECOMMENDED.





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PENTODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 0 0.4 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

MINIATURE BUTTON 7 PIN BASE 7 C V

THE 12AS5 IS A HEATER-CATHODE, BEAM PENTODE POWER AMPLIFIER IN THE 7 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED FOR USE AS AN OUTPUT TUBE IN AUTO-MOBILE AND AC OPERATED RECEIVERS. EXCEPT FOR HEATER CHARACTERISTICS, THE 12AS5 IS IDENTICAL TO THE 6AS5.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

WITHOUT EXTERNAL SHIELD

GRID #1 TO PLATE: (G1 TO P)	0.6	щи f
INPUT: G1 TO (H+K+G2+G3)	12	μμ f
OUTPUT: P TO (H+K+G2+G3)	6.2	μμ f

RATINGS

INTERPRETED ACCORDING TO DESIGN CENTER MAXIMUM SYSTEM

HEATER VOLTAGE	12.6	VOLTS
MAXIMUM PLATE VOLTAGE	150	VOLTS
MAXIMUM GRID #2 SUPPLY VOLTAGE	150	VOLTS
MAXIMUM GRID #2 VOLTAGE	SEE GRID #2 RATING CURVE	
MAXIMUM PLATE DISSIPATION	5.5	WATTS
MAXIMUM GRID #2 DISSIPATION	1.0	WATT
MAXIMUM GRID #1 CIRCUIT RESISTANCE:		
FIXED BIAS	0.1	MEGOHM
SELF BIAS	0.5	MEGOHM
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE	11	
TOTAL DC AND PEAK	90	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	90	VOLTS

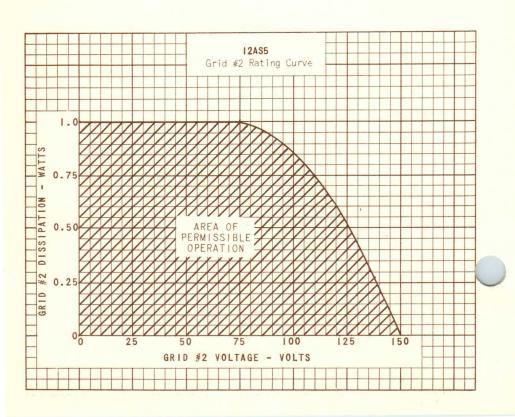
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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

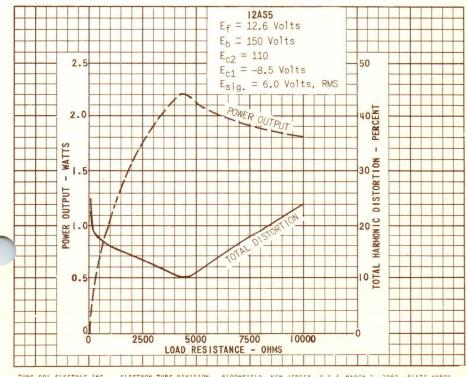
CLASS A1 AMPLIFIER

	HEATER VOLTAGE	12.6	VOLTS
	HEATER CURRENT	0.4	VOLTS
	PLATE VOLTAGE	150	VOLTS
	GRID #2 VOLTAGE	110	VOLTS
	GRID #1 VOLTAGE A	-8.5	VOLTS
	PEAK AF GRID #1 VOLTAGE	8.5	VOLTS
	ZERO-SIGNAL PLATE CURRENT	35	MA.
	MAX. SIGNAL PLATE CURRENT	36	MA.
	ZERO-SIGNAL GRID #2 CURRENT (APPROX.)	2	MA.
	MAXSIGNAL GRID #2 CURRENT (APPROX.)	6.5	MA.
	TRANSCONDUCTANCE	5600	µмноѕ
	LOAD RESISTANCE	4500	OHMS
	TOTAL HARMONIC DISTORTION	10	PERCENT
1	MAXSIGNAL POWER OUTPUT	2.2	WATTS

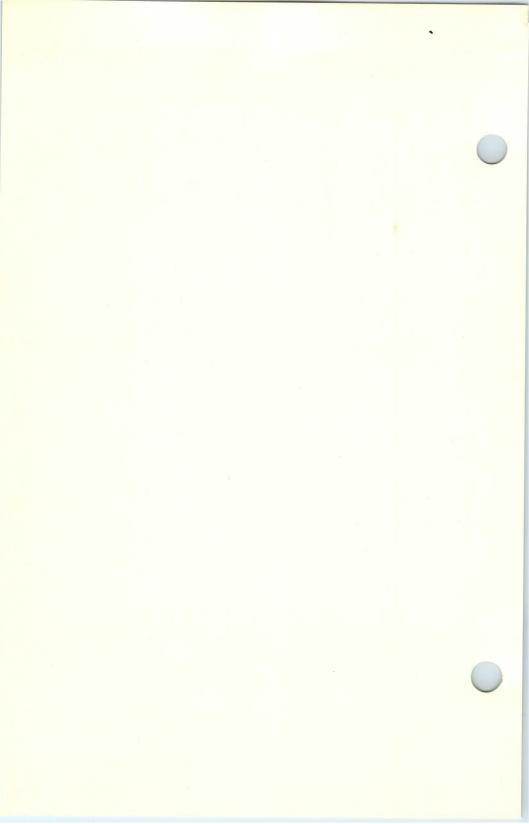
Aunder Max. RATED CONDITIONS THE DC RESISTANCE OF THE GRID #1 CIRCUIT SHOULD NOT EXCEED 0.1 MEG. FOR FIXED BIAS OPERATION OR 0.5 MEG. FOR CATHODE BIAS OPERATION.

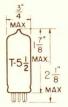


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TUNG-SOL ELECTRIC INC., ELECTRON TUBE DIVISION, BLOOMFIELD, NEW JERSEY, U.S.A. MARCH 1, 1960 PLATE #5804



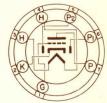


GLASS BULB

COATED UNIPOTENTIAL CATHODE

HEATER 12.6 VOLTS 0.15 AMP. AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW MINIATURE BUTTON 7 PIN BASE 78T

THE 12ATÓ IS A COMBINED HIGH-MU VOLTAGE AMPLIFIER AND DOUBLE-DIODE DETECTOR USING THE 7 PIN MINIATURE CONSTRUCTION. IT IS INTENDED TO PROVIDE OUTPUT VOLTAGE ADEQUATE FOR FULL POWER OUTPUT OF MOST BEAM POWER TUBES.

DIRECT INTERELECTRODE CAPACITANCES

	SHIELDA	SHIELD	
GRID TO PLATE: (G TO TRIODE PLATE)	2.0	2.0	umf
INPUT: G TO (H+K)	2.2	2.2	uuf
OUTPUT: P TO (H+K)	1.2	0.8	μμf
COUPLING: #2 DIODE PLATE TO GRID (MAX.)	0.04	0.04	μμf
COUPLING: #1 DIODE PLATE TO GRID (MAX.)*		0.07	μμ f
#2 DIODE PLATE TO HEATER AND CATHODE *		0.95	μμ f
#1 DIODE PLATE TO HEATER AND CATHODE *		0.66	muf

A EXTERNAL SHIELD *316 CONNECTED TO CATHODE.

RATINGS

INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER VOLTAGE	12.6	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE	90	VOLTS
MAXIMUM PLATE VOLTAGE	300	VOLTS
MAXIMUM PLATE DISSIPATION	0.5	WATT
MAXIMUM POSITIVE DC GRID #1 VOLTAGE	0	VOLTS
MAXIMUM DIODE CURRENT (EACH UNIT) FOR CONTINOUS OPERATION	1.0	MA.

*INDICATES AN ADDITION.

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER

HEATER VOLTAGE	12.6	12.6	VOLTS
HEATER CURRENT	0.15	0.15	AMP.
PLATE VOLTAGE	100	250	VOLTS
GRID #1 VOLTAGE	-1	-3	VOLTS
PLATE RESISTANCE	54 000	58 000	OHMS
AMPLIFICATION FACTOR	70	70	
TRANSCONDUCTANCE	1 300	1 200	имноs
PLATE CURRENT	0.8	1.0	MA.
AVERAGE DIODE CURRENT (EACH UNIT)			
AT 10 VOLTS DC	2.0	2.0	MA.

RESISTANCE COUPLED AMPLIFIER

TRIODE UNIT

HEATER VOLTAGE	12.6	12.6	VOLTS
PLATE SUPPLY VOLTAGE	90	250	VOLTS
CONTROL VOLTAGE	0	0	VOLTS
PLATE LOAD RESISTOR	220 000	470 000	OHMS
CONTROL GRID RESISTOR	10.0	10.0	MEGOHMS
INPUT CONDENSER	0.01	0.01	μf
OUTPUT CONDENSER	0.01	0.01	μf
GRID RESISTOR OF FOLLOWING STAGE	470 000	470 000	OHMS
SIGNAL SOURCE IMPEDANCE (MAX.)	1 000	1 000	OHMS
DISTORTION	5	5	PERCENT
OUTPUT VOLTAGE	8	34	VOLTS
VOLTAGE GAIN AT 400 CPS.	35	46	

COATED UNIPOTENTIAL CATHODES

HEATER

SERIES 12.6 VOLTS 150 MA. PARALLEL 6.3 VOLTS 300 MA.

AC OR DC

GLASS BULB

FOR 12.6 VOLT OPERATION APPLY HEATER VOLTAGE BETWEEN PINS #4 AND #5. FOR 6.3 VOLT OPERATION APPLY HEATER VOLTAGE BETWEEN PIN #9 AND PINS #4 AND #5 CONNECTED TOGETHER.

ANY MOUNTING POSITION



BOTTOM VIEW SMALL BUTTON 9 PIN BASE

THE 12AT7 COMBINES TWO HIGH TRANSCONDUCTANCE TRIODES IN A 9 PIN MINIATURE CONSTRUCTION. ITS LOW CAPACITANCE AND HIGH RATIO OF PLATE CURRENT TO TRANSCONDUCTANCE ADAPT IT TO USE AS A HIGH FREQUENCY COMBINED OSCILLATOR AND MIXER OR AS A GROUNDED GRID RADIO FREQUENCY AMPLIFIER.

DIRECT INTERELECTRODE CAPACITANCES

	SHIELD	SHIELD #316	
INPUT: G TO (H+K) (EACH SECTION)	2.2	2.2	uuf
OUTPUT: P TO (H+K) (SECTION #1)	0.5	1.2	uuf
(SECTION #2)	0.4	1.5	uuf
GRID TO PLATE: (G TO P) (EACH SECTION)	1.5	1.5	иµf
HEATER TO CATHODE: (H TO K) (EACH SECTION)	2.4	2.4	uuf

GROUNDED GRID	SHIELD	SHIELD #316B	
INPUT: K TO (H+G) (EACH SECTION)	4.6	4.6	μμf
OUTPUT: P TO (H+G) (EACH SECTION)	1.8	2.6	μμf
PLATE TO CATHODE (P TO K) (EACH SECTION)	0.2	0.2	μμf

A CONNECTED TO CATHODE OF SECTION UNDER TEST.

RATINGS

INTERPRETED ACCORDING TO RMA STANDARD M8-210

EACH TRIODE UNIT

HEATER VOLTAGE	12.6	6.3	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE	90		VOLTS
MAXIMUM PLATE VOLTAGE	300		VOLTS
MAXIMUM NEGATIVE DC GRID VOLTAGE	-50		VOLTS
MAXIMUM PLATE DISSIPATION	2.5		WATTS

CONTINUED ON FOLLOWING PAGE

PLATE 2569 FEB. 1 1951

CONNECTED TO GRID OF SECTION UNDER TEST.

INDICATES A CHANGE OR ADDITION.

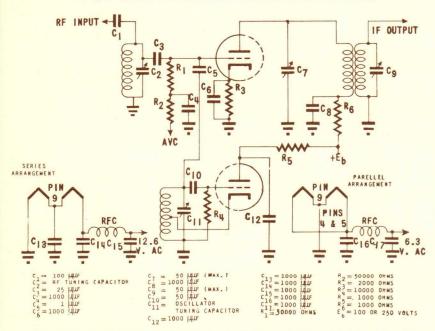
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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER - EACH TRIODE UNIT

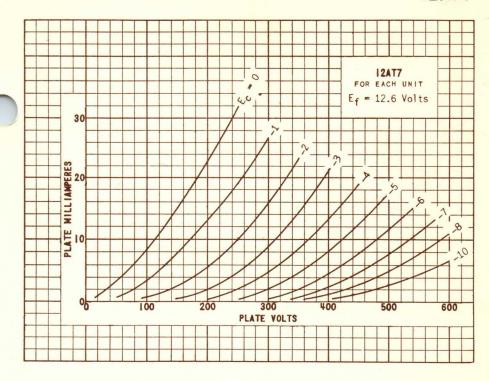
	-				
HEATER VOLTAGE	12.6	6.3	12.6	6.3	VOLTS
HEATER CURRENT	150	300	150	300	MA.
PLATE VOLTAGE		100		250	VOLTS
CATHODE BIAS RESISTOR		270		200	OHMS
PLATE CURRENT		3.7		10	MA.
PLATE RESISTANCE	15	000	10	900	OHMS
TRANSCONDUCTANCE	4	000	5	500	имноs
AMPLIFICATION FACTOR		60		60	
GRID VOLTAGE (APPROX.) FOR I = 10 µA.		-5		-12	VOLTS

TYPICAL CIRCUIT FOR CONVERTER OPERATION AT 100 MEGACYCLES



OSCILLATOR VOLTAGE APPLIED TO MIXER SHOULD BE JUST SUFFICIENT TO CAUSE GRID CURRENT TO FLOW IN THE MIXER SECTION.

PLATE 2570 FEB. 1 1951



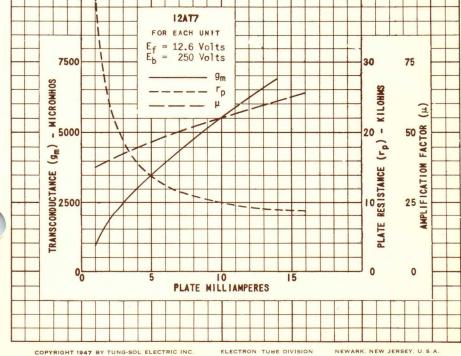
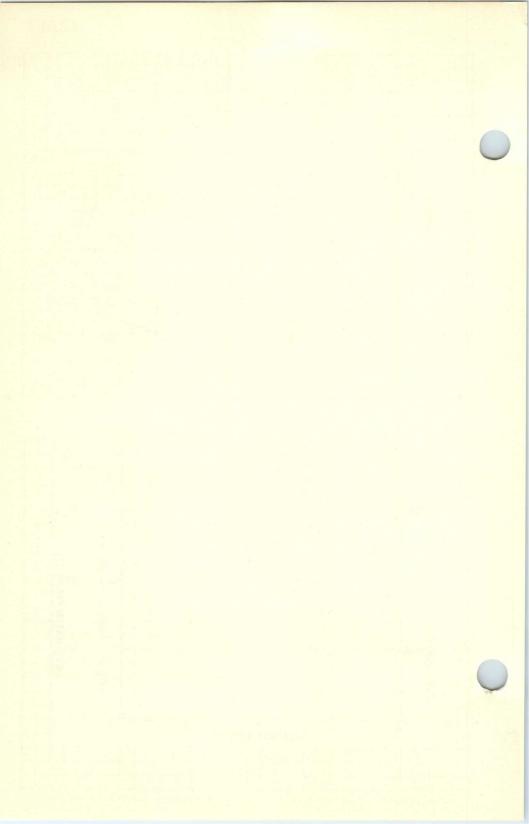
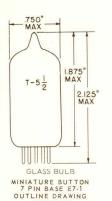


PLATE 1894 OCT. 1, 1947





JEDEC 5-2

PENTODE

MINIATURE TYPE

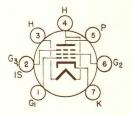
COATED UNIPOTENTIAL CATHODE

HEATER

12.6±1.3 VOLTS 150 MA.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW BASING DIAGRAM JEDEC 7BK

THE 12AU6 IS A PENTODE AMPLIFIER HAVING A SHARP CUT-OFF CONTROL CHARAC-TERISTIC USING THE MINIATURE CONSTRUCTION. WITH HIGH TRANSCONDUCTANCE, LOW GRID-PLATE CAPACITANCE, IT IS INTENDED FOR SERVICE AS EITHER AN RF OR AF AMPLIFIER.

DIRECT INTERELECTRODE CAPACITANCES

PENTODE CONNECTION:	SHIELD	SHIELD	
GRID TO PLATE: (G1 TO P) MAX.	.0035	.0035	pf
INPUT: G_1 TO (H+K+ G_2 + G_3 &IS)	5.5	5.5	pf
OUTPUT: P TO (H+K+G2+G3&IS)	5	5	pf
TRIODE CONNECTION: GRID TO PLATE: G4 TO (P+G2+G3&IS)	2.6	2.6	pf
INPUT: G, TO (H+K)	3.2	3.2	pf
OUTPUT: (P+G2+G3&1S) TO (H+K)	9.5	1.7	pf

A SHIELD #316 CONNECTED TO PIN #7.

→ MAXIMUM RATINGS
DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

FRIODE PENTODE CONNECTION CONNECTION

MAXIMUM HEATER-CATHODE VOLTAGE:			
HEATER NEGATIVE WITH RESPECT TO CATHODE	200	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	200	200	VOLTS
MAXIMUM PLATE VOLTAGE	275	330	VOLTS
MAXIMUM GRID #2 SUPPLY VOLTAGE		330	VOLTS
MAXIMUM GRID #2 VOLTAGE		SEE J5-C4-2	
MAXIMUM GRID #3 VOLTAGE PIN #2 CONNECTED TO:	PLATE	CATHUDE	
MAXIMUM PLATE DISSIPATION	3.5	3.5	WATTS
MAXIMUM GRID #2 DISSIPATION MAXIMUM GRID #2 INPUT:*			WATTS VOLTS
FOR GRID #2 VOLTAGES UP TO 165 VOLTS		0.75	WATT
FOR GRID #2 VOLTAGES BETWEEN 165 VOLTS AND 330 VOLTS *		SEE J5-	04-2
MAXIMUM POSITIVE DC GRID #1 VOLTAGE	0	0	VOLTS

- INDICATES A CHANGE.

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER - PENTODE CONNECTION

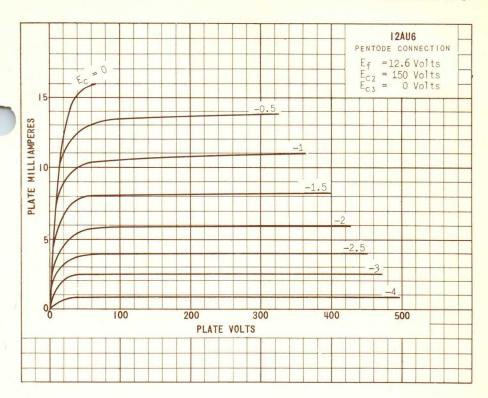
PLATE VOLTAGE	100	250	250	VULTS
GRID #2 VOLTAGE	100	125	150	VOLTS
CATHODE BIAS RESISTOR	150	100	68	OHMS
GRID #3 VOLTAGE	PIN #2	CONNECTED	TO PIN #7	AT SOCKET
TRANSCONDUCTANCE	3 900	4 500	5 200	имноѕ
PLATE CURRENT	5	7.6	10.6	MA.
GRID #2 CURRENT	2.1	3	4.3	MA.
PLATE RESISTANCE (APPROX.)	0.5	1.5	1	MEGOHMS
GRID #1 VOLTAGE (APPROX.)	-11 0	5 5	6 5	
FOR 1 = 10 MA.	-4.2	-5.5	-6.5	VOLTS

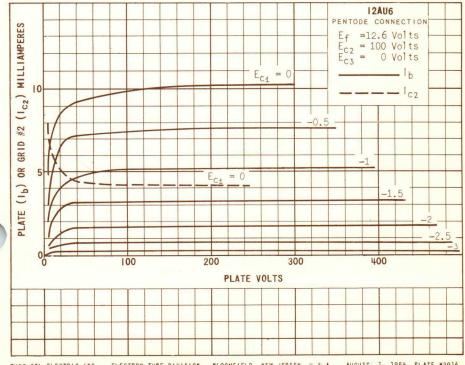
CLASS A₁ AMPLIFIER - TRIODE CONNECTION^C

PLATE VOLTAGE	250	VOLTS
GRID #2 VOLTAGE	PLATE	
CATHODE RESISTOR	330	OHMS
GRID #3 VOLTAGE	PLATE	
TRANSCONDUCTANCE	4 800	LMHOS
PLATE CURRENT	12.2	MA.
AMPLIFICATION FACTOR	36	

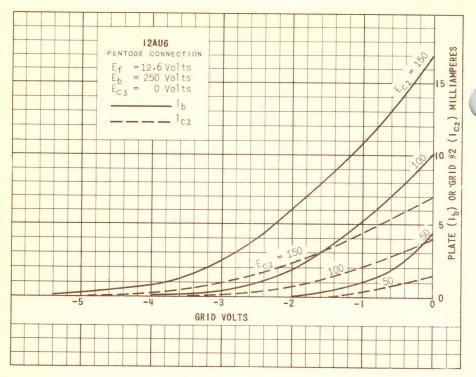
 ${
m C}_{
m TRIODE}$ CONNECTION: GRID \$2 AND GRID \$3 CONNECTED TO PLATE.

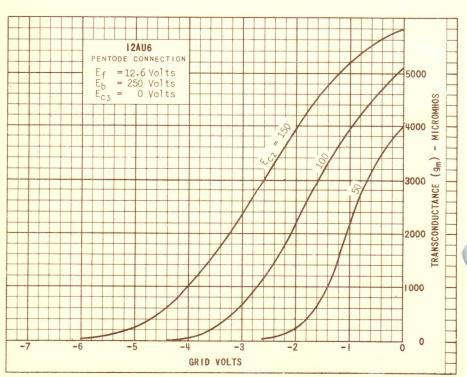
THE DC COMPONENT MUST NOT EXCEED 100 VOLTS.





12AU6 (6AU6)





.875 1938 T-6-MAX 2.188" MAX

GLASS BULB SMALL BUTTON 9 PIN BASE E9-1 OUTLINE DRAWING JEDEC 6-2

TWIN TRIODE

MINIATURE TYPE

COATED UNIPOTENTIAL CATHODE

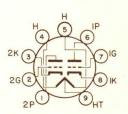
HEATER

SERIES 12.6 VOLTS 0.15 AMP.

PARALLEL 6.3 VOLTS 0.3 AMP.

AC OR DC

FOR 12.6 VOLT OPERATION APPLY HEATER VOLTAGE BETWEEN PINS 84 AND 85. FOR 0.3 VOLT OPERATION APPLY HEATER VOLTAGE BETWEEN PIN 89 AND PINS 84 AND #5 CONNECTED TOGETHER.



BOTTOM VIEW BASING DIAGRAM JEDEC 9A

THE 12AU7 COMBINES TWO INDEPENDENT MEDIUM-MU INDIRECTLY HEATED CATHODE TYPE TRIODE'S IN THE SMALL 9 PIN BUTTON CONSTRUCTION. IT IS ADAPTABLE TO APPLICATION EITHER AS AN AUDIO FREQUENCY AMPLIFIER OR AS COMBINED OSCILLATOR AND MIXER.

DIRECT INTERELECTRODE CAPACITANCES

TRIODE UNIT 1	SHIELDA	SHIELD	
GRID TO PLATE: (G TO P)	1.5	1.5	pf
INPUT: G TO (H+K)	1.8	1.6	pf
OUTPUT: P TO (H+K)	2.0	0.40	pf
TRIODE UNIT 2			
GRID TO PLATE: (G TO P)	1.5	1.5	pf
INPUT: G TO (H+K)	1.8	1.6	pf
OUTPUT: P TO (H+K)	2.0	0.32	pf

AEXTERNAL SHIELD #315 CONNECTED TO CATHODE OF UNIT UNDER TEST.

RATINGS

INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

EACH TRIONE UNIT

EACH TRIODE UNI	1		
	CLASS A1 B	VERTICALB DEFLECTION AMPLIFIER	
MAXIMUM HEATER—CATHODE VOLTAGE: HEATER NEGATIVE WITH RESPECT TO CATHODE; TOTAL DC AND PEAK	200	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE: DC TOTAL DC AND PEAK	100 200	100 200	VOLTS VOLTS
MAXIMUM PLATE VOLTAGE MAXIMUM PEAK POSITIVE PLATE VOLTAGE	300	300	VOLTS
(ABSOLUTE MAXIMUM) MAXIMUM PLATE DISSIPATION: C EACH PLATE	2.75	1200	VOLTS
BOTH PLATES MAXIMUM PEAK NEGATIVE GRID VOLTAGE	5.5	5.5 250	WATTS VOLTS
MAXIMUM CATHODE CURRENT MAXIMUM PEAK CATHODE CURRENT	20	60	MA.
MAXIMUM GRID CIRCUIT RESISTANCE FIXED BIAS OPERATION CATHODE BIAS OPERATION	0.25	2.2	ME GOHMS

BFOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCASTING STATIONS; FEDERAL COMMUNICATIONS COMMISSION". THE DUTY CYCLE OF THE VOLTAGE PULSE NOT TO EXCEED 15 PERCENT OF A SCANNING CYCLE.

 $c_{
m IN}$ stages operating with grid-leak bias, an adequate cathode bias resistor or other suitable means is required to protect the tube in the absence of excitation.

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RATINGS (CONT'D)

EACH TRIODE UNIT

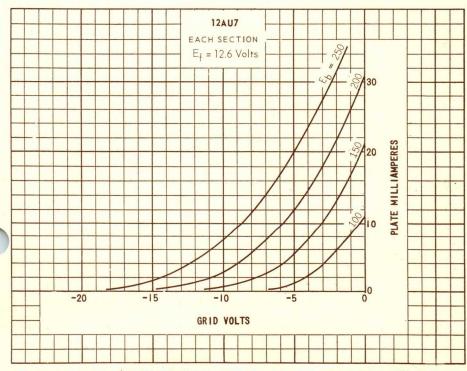
	VERTICAL ^D DEFLECTION OSCILLATOR	HORIZONTAL DEFLECTION OSCILLATOR	
MAXIMUM HEATER—CATHODE VOLTAGE: HEATER NEGATIVE WITH RESPECT TO CATHODE: TOTAL DC AND PEAK	200	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE: DC TOTAL DC AND PEAK	100	100	VOLTS VOLTS
MAXIMUM DC PLATE VOLTAGE	300	300	VOLTS
MAXIMUM PLATE DISSIPATION: EACH PLATE BOTH PLATES	2.75	2.75 5.5	WATTS
MAXIMUM PEAK NEGATIVE GRID VOLTAGE	400	600	VOLTS
MAXIMUM AVERAGE CATHODE CURRENT	20	20	MA.
MAXIMUM PEAK CATHODE CURRENT	60	300	MA -
MAXIMUM GRID CIRCUIT RESISTANCE	2.2	2.2	MEGOHMS

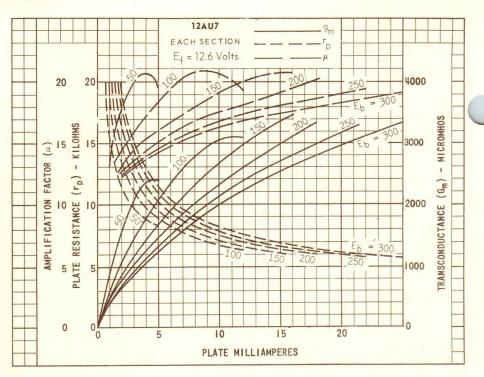
D FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCASTING STATIONS; FEDERAL COMMUNICATIONS COMMISSION". THE DUTY CYCLE OF THE VOLTAGE PULSE NOT TO EXCEED 15 PERCENT OF A SCANNING CYCLE.

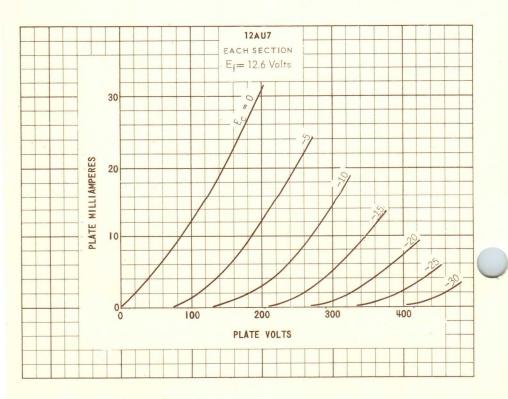
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER - EACH TRIODE UNIT

PLATE VOLTAGE	100	250	VOLTS
GRID VOLTAGE	0	-8.5	VOLTS
PLATE CURRENT	11.8	10.5	MA.
PLATE RESISTANCE (APPROX.)	6 500	7 700	OHMS
TRANSCONDUCTANCE	3 100	2 200	MHOS
AMPLIFICATION FACTOR	20	17	
GRID VOLTAGE FOR I = 10 MA. (APPROX.)		- 24	VOLTS







RESISTANCE COUPLED AMPLIFIER

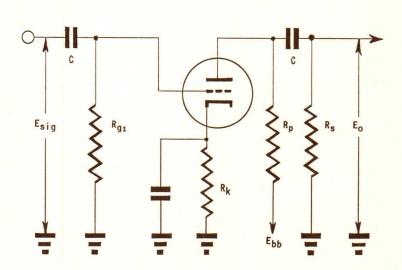
EACH SECTION

Rp	Rs	R _{g1}	Ebb	= 90 VO	LTS	Ebb =	180 VO	LTS	Ebb =	300 VO	LTS
MEG.	MEG.	MEG.	Rk	GAIN	Eo	Rk	GAIN	Eo	Rk	GAIN	Ęο
0.10	0.10	0.10	3300	14	13	2200	14	26	1800	14	40
0.10	0.24	0.10	3600	14	16	2700	15	33	2200	15	51
0.24	0.24	0.10	7500	14	16	5100	15	30	4300	15	44
0.24	0.51	0.10	9100	14	19	6800	15	39	5100	15	54
0.51	0.51	0.10	13000	14	16	9100	15	30	6800	16	4.0
0.51	1.0	0.10	15000	14	19	10000	16	32	7500	16	45
0.24	0.24	10	0	15	13	0	. 16	33	0	17	46
0.24	0.51	10	0	16	17	0	1.7	38	0	18	62
0.51	0.51	10	0	16	14	0	18	32	0	18	53
0.51	1.0	10	0	17	18	0	18	41	0	19	68

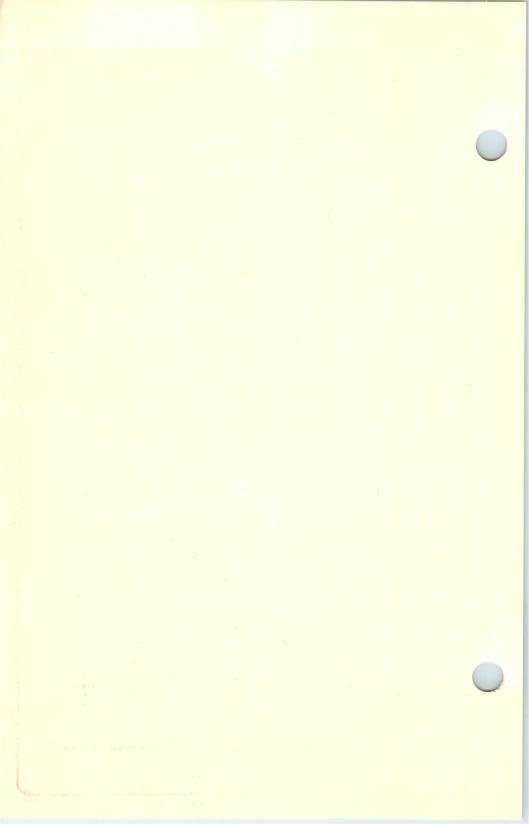
NOTES: 1. E. IS MAXIMUM RMS VOLTAGE OUTPUT FOR FIVE PERCENT (5%) TOTAL HARMONIC DISTORTION.

2. GAIN MEASURED AT 2.0 VOLTS RMS OUTPUT.

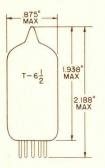
3. FOR ZERO-BIAS DATA, GENERATOR IMPEDANCE 15 NEGLICIBLE.



MOTES: COUPLING CAPACITORS (C) SHOULD BE SELECTED TO GIVE DESIRED FREQUENCY RESPONSE-

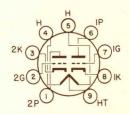


TWIN TRIODE



UNIPOTENTIAL CATHODE

FOR
AUDIO FREQUENCY AMPLIFIER
OR COMBINED OSCILLATOR AND
MIXER APPLICATIONS IN
T.V. RECEIVERS



ANY MOUNTING POSITION

BOTTOM VIEW

BASING DIAGRAM
JEDEC 9A

GLASS BULB

SMALL BUTTON NOVAL

9 PIN BASE E9-1

OUTLINE DRAWING

JEDEC 6-2

THE 12AU7A COMBINES TWO INDEPENDENT MEDIUM-MU INDIRECTLY HEATED CATHODE TYPE TRI-ODES IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS ADAPTABLE TO APPLICATION EITHER AS AN AUDIO FREQUENCY AMPLIFIER OR AS A COMBINED OSCILLATOR AND MIXER. EXCEPT FOR HEATER RATINGS IT IS IDENTICAL TO THE 7AU7 AND THE 9AU7.

→ DIRECT INTERELECTRODE CAPACITANCES

	TRIODE UNIT T1	TRIODE UNIT T2	
GRID TO PLATE	1.5	1.5	pf
GRID TO CATHODE	1.6	1.6	pf
PLATE TO CATHODE	0.50	0.35	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS			
HEATER IN SERIES	12.6 VOLTS	150	MA.
HEATER IN PARALLEL	6.3 VOLTS	300	MA.
HEATER SUPPLY LIMITS:			
VOLTAGE OPERATION			
HEATER IN SERIES		12.6±1.3	VOLTS
HEATER IN PARALLEL		6.3±0.6	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE:			
HEATER NEGATIVE WITH RESPEC	T TO CATHODE		
TOTAL DC AND PEAK		200	VOLTS
HEATER POSITIVE WITH RESPECT	TO CATHODE		
DC		100	VOLTS
TOTAL DC AND PEAK		200	VOLTS

CONTINUED FROM PRECEDING PAGE

→ MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

VALUES ARE FO		VERTICAL	
	CLASS A1	VERTICAL DEFLECTION OSCILLATOR	
PLATE VOLTAGE	330	330	VOLTS
PLATE DISSIPATION:			
EACH PLATE	2.75	2.75	WATTS
BOTH PLATES	5.5	5.5	WATTS
CATHODE CURRENT	22		MA.
PEAK NEGATIVE PULSE GRID VOLTAGE		440	VOLTS
AVERAGE CATHODE CURRENT		22	MA.
PEAK CATHODE CURRENT		66	MA.
MAXIMUM CIRCUIT VALUES:			
GRID CIRCUIT RESISTANCE:			
FOR FIXED BIAS, GRID-RESISTOR BIAS,			
OR CATHODE-BIAS OPERATION	2.2	2.2	MEGOHMS
	HORIZONTAL DEFLECTION	VERTICAL	
	OSCILLATOR	AMPLIFIER	
DC PLATE VOLTAGE	330	330	VOLTS
PLATE DISSIPATION			
EACH PLATE	2.75	2.75	WATTS
BOTH PLATES	5.5	5.5	WATTS
20111120			
PEAK POSITIVE-PULSE PLATE VOLTAGE		1200	VOLTS
	660	1200 275	VOLTS VOLTS
PEAK POSITIVE-PULSE PLATE VOLTAGE	660 22		
PEAK POSITIVE-PULSE PLATE VOLTAGE PEAK NEGATIVE-PULSE GRID VOLTAGE		275	VOLTS
PEAK POSITIVE-PULSE PLATE VOLTAGE PEAK NEGATIVE-PULSE GRID VOLTAGE AVERAGE CATHODE CURRENT PEAK CATHODE CURRENT MAXIMUM CIRCUIT VALUES:	22	275 22	VOLTS MA.
PEAK POSITIVE-PULSE PLATE VOLTAGE PEAK NEGATIVE-PULSE GRID VOLTAGE AVERAGE CATHODE CURRENT PEAK CATHODE CURRENT MAXIMUM CIRCUIT VALUES: GRID CIRCUIT RESISTANCE:	22	275 22	VOLTS MA.
PEAK POSITIVE-PULSE PLATE VOLTAGE PEAK NEGATIVE-PULSE GRID VOLTAGE AVERAGE CATHODE CURRENT PEAK CATHODE CURRENT MAXIMUM CIRCUIT VALUES:	22	275 22	VOLTS MA.
PEAK POSITIVE-PULSE PLATE VOLTAGE PEAK NEGATIVE-PULSE GRID VOLTAGE AVERAGE CATHODE CURRENT PEAK CATHODE CURRENT MAXIMUM CIRCUIT VALUES: GRID CIRCUIT RESISTANCE:	22	275 22	VOLTS MA.
PEAK POSITIVE-PULSE PLATE VOLTAGE PEAK NEGATIVE-PULSE GRID VOLTAGE AVERAGE CATHODE CURRENT PEAK CATHODE CURRENT MAXIMUM CIRCUIT VALUES: GRID CIRCUIT RESISTANCE: FOR FIXED BIAS, GRID-RESISTOR BIAS,	22 330	275 22 66	VOLTS MA. MEGOHMS

TYPICAL OPERATING CHARACTERISTICS

CLASS A1 AMPLIFIER - EACH UNIT

PLATE VOLTAGE	100	250	VOLTS
GRID VOLTAGE	0	-8.5	VOLTS
AMPLIFICATION FACTOR	→ 19.5	17	
PLATE RESISTANCE	→ 6250	7700	OHMS
TRANSCONDUCTANCE	3100	2200	μ MHOS
PLATE CURRENT	11.8	10.5	MA.
GRID VOLTAGE (APPROX.) FOR			
PLATE CURRENT OF 10 µAMP.		-24	VOLTS

TRIODE PENTODE

MINIATURE TYPE

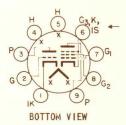


CCATED UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS * 0.300±0.030 AMPS. AC OR DC

ANY MOUNTING POSITION



BASING DIAGRAM

GLASS BULB MINIATURE BUTTON 9 PIN BASE E9-1

OUTLINE DRAWING JEDEC 6-3

THE 12AUS IS A SHARP-CUTOFF PENTODE AND MEDIUM-MU TRIODE IN THE 9 PIN MINIATURE CONSTRUCTION. EACH SECTION HAS ITS OWN CATHODE AND IS ELECTRICALLY INDEPENDENT. IT IS DESIGNED FOR USE IN MONOCHROME AND COLOR TELE-VISION RECEIVERS. THE PENTODE SECTION IS PARTICULARLY SUITED FOR USE AS A VIDEO AMPLIFIER, VIDEO IF AMPLIFIER, AND SOUND IF AMPLIFIER. THE TRIODE SECTION IS INTENDED FOR USE AS A SYNC AMPLIFIER, SEPARATOR OR CLIPPER, OR AS A SWEEP OSCILLATOR.

EXCEPT FOR HEATER RATINGS, THE 12AU8 IS IDENTICAL TO THE 6AU8.

DIRECT INTERELECTRODE CAPACITANCES

	PENTODE SECTION	SECTION	
GRID TO PLATE INPUT OUTPUT	0.044 7.5 2.4	2.2 2.6 0.34	pf pf pf
PENTODE GRID #1 TO TRIODE PLATE TRIODE GRID TO PENTODE PLATE PENTODE PLATE TO TRIODE PLATE	0.0		pf pf pf

*AT 0.300 AMPERES.

→ INDICATES A CHANGE.

CONTINUED FROM PRECEDING PAGE

RATINGS
INTERPRETED ACCURDING TO DESIGN MAXIMUM SYSTEM

	PENTODE TRIODE SECTION	
HEATER VOLTAGE	12.5	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC	100	VCLTS
TOTAL DC AND PEAK	200	VOLTS
MAXIMUM PLATE VOLTAGE	300 300	VOLTS
MAXIMUM GRID #2 SUPPLY VOLTAGE	300	VOLTS
MAXIMUM GRID #2 VOLTAGE	SEE RATING CHART	
MAXIMUM POSITIVE DC GRID #1 VOLTAGE	0 0	VOLTS
MAXIMUM PLATE DISSIPATION	3.0 2.5	WATTS
MAXIMUM GRID #2 DISSIPATION	1.0	WATTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE:		
FIXED BIAS	0.25 0.5	MEGOHM
CATHODE BIAS	1.0 1.0	MEGOHM
HEATER WARM-UP TIME (APPROX.) A	11.0	SECONDS

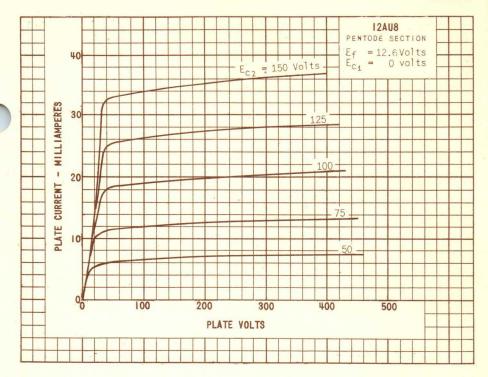
AHEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

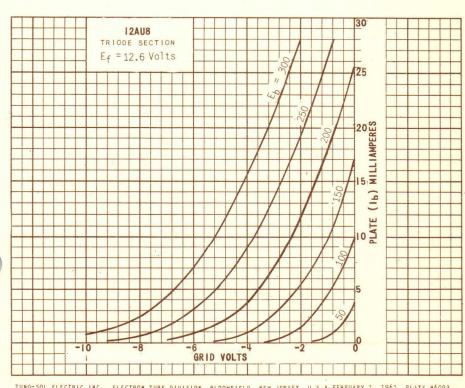
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

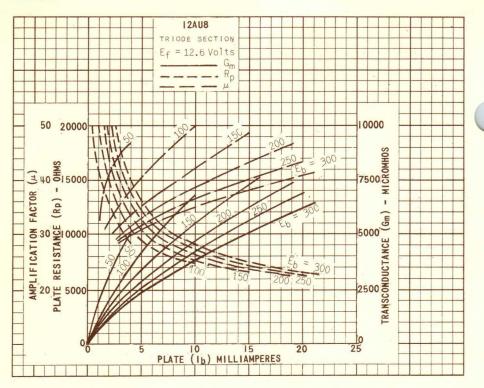
CLASS A1 AMPLIFIER

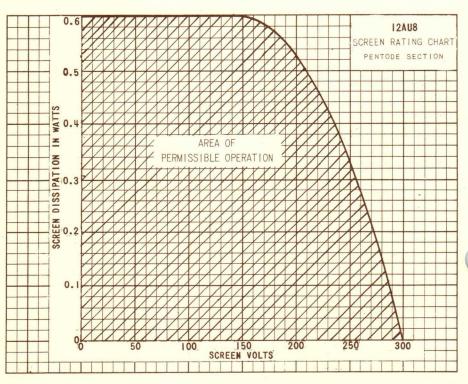
1	PENTODE	TRIODE	
PLATE VOLTAGE	200	150	VOLTS
GRID #2 VOLTAGE	125		VOLTS
CATHODE BIAS RESISTOR	82	150	OHMS
AMPLIFICATION FACTOR		40	
PLATE RESISTANCE (APPROX.)	150 000	8 200	OHMS
TRANSCONDUCTANCE	7 000	4 900	MMHOS
PLATE CURRENT	15	9.0	MA -
GRID #2 CURRENT	3.4		MA.
GRID *1 VOLTAGE (APPROX.) FOR 1 b = 100 μΑΜΡ.	-8	-6.5	VGLTS

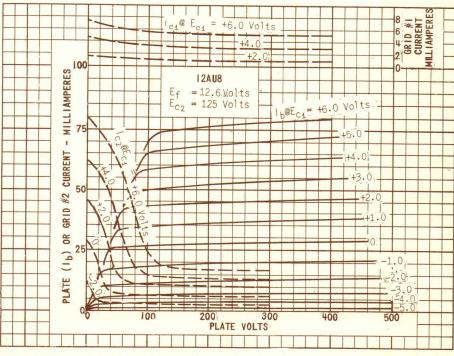
DESIGN-MAXIMUM RATINGS ARE THE LIMITING VALUES EXPRESSED WITH RESPECT TO BOGIE TUBES AT WHICH SATISFACTORY TUBE LIFE CAN BE EXPECTED TO OCCUR. TO OBTAIN SATISSACTORY CIRCUIT PERFORMANCE, THEREFORE, THE EQUIPMENT DESIGNER MUST ESTABLISH THE CIRCUIT DESIGN SO THAT NO DESIGN-MAXIMUM VALUE IS EXCEEDED WITH A BOGIE TUBE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, AND ENVIRONMENTAL CONDITIONS.

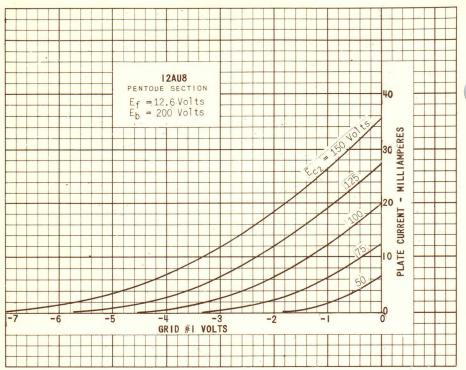


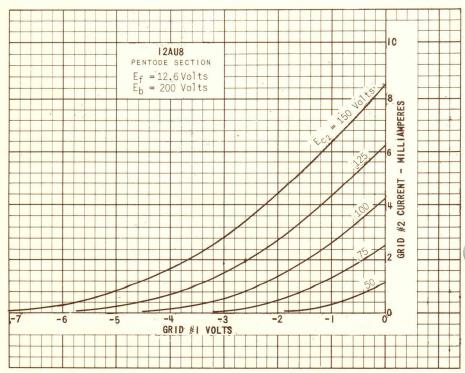


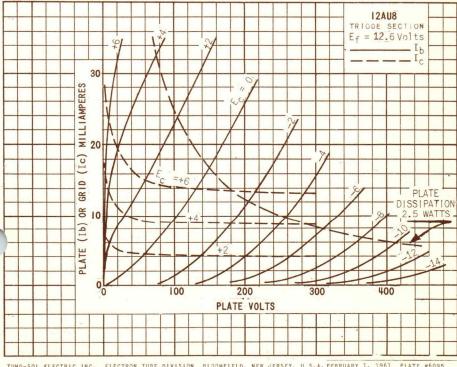


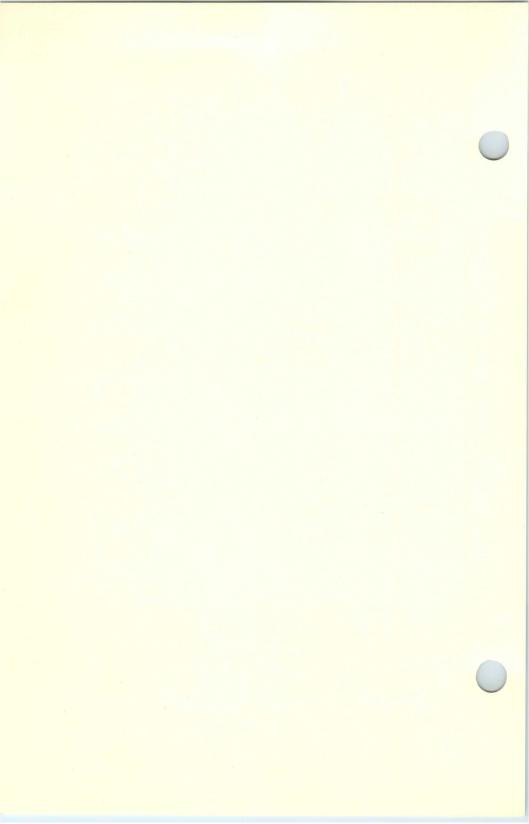




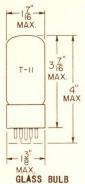








PENTODE



COATED UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 0.6 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

SHORT MEDIUM SHELL 6 PIN OCTAL

6 CK

GLASS BULB
THE MAX. DIAMETER
OF THE T-12 BULB IS
1.9/16"

THE 12AV5GA IS A BEAM PENTODE USING EITHER A T-11 OR T-12 BULB. IT IS DESIGNED FOR USE AS A HORIZONTAL-DEFLECTION AMPLIFIER IN 600 MA. SERIES HEATER OPERATED TELEVISION RECEIVERS. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

WITH NO EXTERNAL SHIELD		
GRID #1 TO PLATE	0.5	μμ f
INPUT	14	μμf
OUTPUT	7.0	uµ f
RATINGS		
INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM		
HORIZONTAL DEFLECTION AMPLIFIER B		
HEATER VOLTAGE	12.6	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE: HEATER POSITIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	200	VOLTS
DC	100	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE TOTAL DC AND PEAK	200	VOLTS
MAXIMUM DC PLATE-SUPPLY VOLTAGE (BOOST + POWER SUPPLY)	550	VOLTS
MAXIMUM PEAK POSITIVE PULSE PLATE VOLTAGE (ABSOLUTE MAX.)	0	VOLTS
MAXIMUM PEAK NEGATIVE PULSE PLATE VOLTAGE	1 250	VOLTS
MAXIMUM GRID #2 VOLTAGE	175	VOLTS
MAXIMUM PEAK NEGATIVE GRID #1 VOLTAGE	300	VOLTS
MAXIMUM PLATE DISSIPATIOND	11	WATTS
MAXIMUM GRID #2 DISSIPATION	2.5	WATTS
MAXIMUM DC CATHODE CURRENT	110	MA.
MAXIMUM PEAK CATHODE CURRENT	400	MA -
MAXIMUM GRID #1 CIRCUIT RESISTANCE	0.47	MEGOHM
MAXIMUM BULB TEMPERATURE (AT HOTTEST POINT)	210	°C
HEATER WARM-UP TIME (APPROX.)*	11.0	SECONDS

AUNLESS OTHERWISE SPECIFIED.

B
FOR OPERATION IN A 525-LINE, 30-FRAME TELEVISION SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD
ENGINEERING PRACTICE CONCERNING TELEVISION BROADCAST STATIONS," FEDERAL COMMUNICATIONS
COMMISSION. THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15 PERCENT OF ONE SCANNING
CYCLE.

CTHIS VALUE MUST NOT BE EXCEEDED.

DIN STAGES OPERATING WITH GRID LEAK BIAS, AN ADEQUATE CATHODE-BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

^{*}HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80\$ OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATION RESISTANCE.

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

HEATER VOLTAGE	VOLTS
HEATER VOLTAGE	
HEATER CURRENT 0.6	AMP.
PLATE VOLTAGE 60 250	VOLTS
GRID ¥2 VOLTAGE	VOLTS
GRID #4 VOLTAGE 0E -22.5	VOLTS
PLATE RESISTANCE (APPROX.) 14 500 ←	OHMS
TRANSCONDUCTANCE 5 900 ←	LMHOS
PLATE CURRENT 260 ← 57 ←	MA.
GRID #2 CURRENT 26 ← 2.1	MA.
GRID #4 VOLTAGE (APPROX.)	
FOR I _b = 1.0 MA43*	VOLTS
TRIODE AMPLIFICATION FACTOR 4.3	

EAPPLIED FOR VERY SHORT INTERVAL SO AS NOT TO DAMAGE TUBE.

SIMILAR TYPE REFERENCE: Except for heater characteristics, the 12AV $_5$ GA is identical to the 6AV $_5$ GA, 17AV $_5$ GA & the 25AV $_5$ GA.

- INDIÇATES A CHANGE.

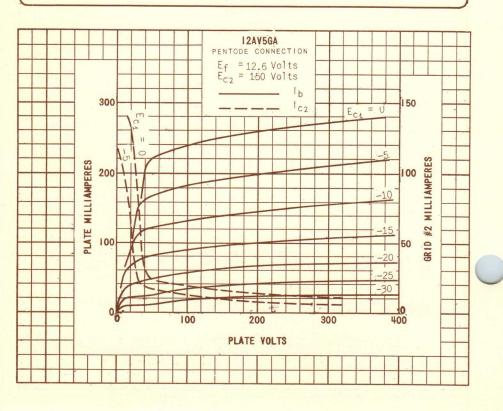
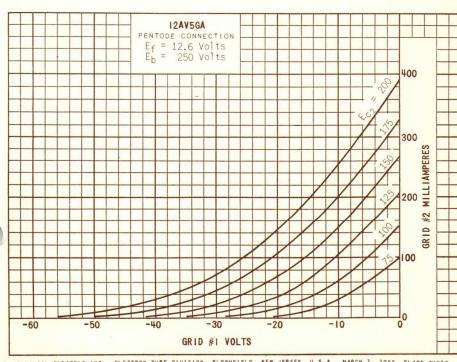
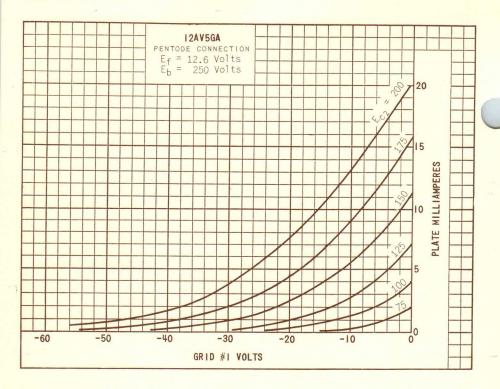
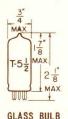


Figure connection (screen fied to plate) with $\rm e_b$ = $\rm e_{c2}$ =150 volts and $\rm e_{c1}$ = -22.5 volts





DOUBLE-DIODE TRIODE



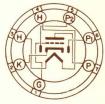
COATED UNIPOTENTIAL CATHODE

HEATER

12.6±10% VOLTS 0.15 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
7 PIN BASE
78T

THE 12AV6 COMBINES A HIGH-MU TRIODE AND TWO INDEPENDENT DIODE UNITS IN THE 7 PIN MINIATURE CONSTRUCTION. IT PERMITS A SINGLE TUBE TO FUNCTION AS DETECTOR, AVC RECTIFIER, AND AUDIO AMPLIFIER. COUPLING BETWEEN THE DIODE AND TRIODE SECTIONS IS MINIMIZED BY THE USE OF INTERNAL SHIELDING.

DIRECT INTERELECTRODE CAPACITANCES

	SHIELDA	WITHOUT	
GRID TO PLATE: (G TO P)	2	2	uuf
INPUT: G TO (H+K)	2.2	2.2	μμf
OUTPUT: P TO (H+K)	1.2	0.8	μμf
COUPLING: #2 DIODE PLATE TO GRID (MAX.)	0.04	0.04	μμf

AEXTERNAL SHIELD #316 CONNECTED TO PIN #2.

RATINGS ← INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

MAXIMUM DIODE CURRENT EACH UNIT FOR CONTINUOUS OPERAT	ION 1	MA.
MAXIMUM POSITIVE DC GRID #1 VOLTAGE	Q	VOLTS
MAXIMUM PLATE DISSIPATION	0.55	WATT
DC COMPONENT	100	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE	200	VOLTS
MAXIMUM PEAK HEATER-CATHODE VOLTAGE:		
MAXIMUM PLATE VOLTAGE	330	VOLTS
HEATER VOLTAGE	12.6±10%	VOLTS

- INDICATES A CHANGE.

TUMS-SOL

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A3 AMPLIFIER

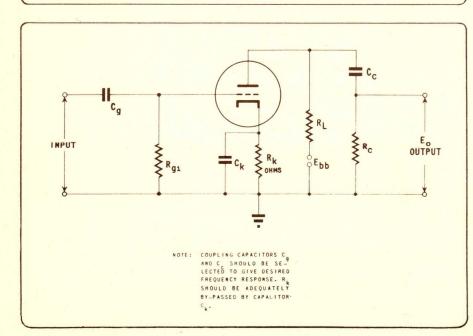
PLATE VOLTAGE	100	250	VOLTS
GRID #1 VOLTAGE	-1	-2	VOLTS
PLATE RESISTANCE	80 000	62 500	OHMS
AMPLIFICATION FACTOR	100	100	
TRANSCONDUCTANCE	1 250	1 600	µмноs
PLATE CURRENT	0.5	1.2	MA.
AVERAGE DIODE CURRENT AT 10 VOLTS DC (EACH UNIT)	2.0	2.0	MA.

RESISTANCE COUPLED AMPLIFIER

TRIODE UNIT

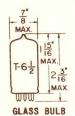
PLATE SUPPLY VOLTAGE	90	250	VOLTS
CONTROL GRID VOLTAGE	0	0	VOLTS
PLATE LOAD RESISTOR	220 000	470 000	OHMS
CONTROL GRID RESISTOR	10.0	10.Q	MEGOHMS
INPUT CONDENSER	0.01	0.01	μf
OUTPUT CONDENSER	0.01	0.01	μf
GRID RESISTOR OF FOLLOWING STAGE	470 000	470 000	OHMS
SIGNAL SOURCE IMPEDANCE (MAX.)	1 000	1 000	OHMS
DISTORTION	5	5	PERCENT
QUTPUT VOLTAGE	5.5	30	VOLTS
VOLTAGE GAIN AT 400 CPS	42	63	

-INDICATES A CHANGE OR ADDITION.



COATED UNIPOTENTIAL CATHODE

HEATER



SERIES 12.6 VOLTS 225 MA.

PARALLEL 6.3 VOLTS 450 MA.

AC OR DC

FOR 12.6 VOLT OPERATION APPLY HEATER VOLTAGE BETWEEN PINS #4 AND #5. FOR 6.3 VOLT OPERATION APPLY HEATER VOLTAGE BETWEEN PIN #9 AND PINS #4 AND #5 CONNECTED TOGETHER.

ANY MOUNTING POSITION



BOTTOM VIEW MINIATURE BUTTON 9 PIN BASE 9 A

THE 12AV7 COMBINES TWO INDEPENDENT MEDIUM-MU TRIODES USING THE 9 PIN MINIATURE CONSTRUCTION. IT IS ADAPTABLE TO APPLICATION EITHER AS AN AF AMPLIFIER OR AS COMBINED OSCILLATOR AND MIXER.

DIRECT INTERELECTRODE CAPACITANCES

	SHIELD	WITH SHIELD #316	
GRID TO PLATE: (G TO P) EACH SECTION	1.9	1.9	μμf
INPUT: G TO (H+K) EACH SECTION	3.1	3.2	μμf
OUTPUT: P TO (H+K) SECTION #1	0.5	1.3	μμ f μμ f
SECTION #2	0.4	1.6	
HEATER TO CATHODE: (H TO K) EACH SECTION	3.8	4	μμf
GROUNDED GRID			
PLATE TO CATHODE: (P TO K) EACH SECTION	0.24	0.23	μμf
INPUT: K TO (H+G) EACH SECTION	6.9	7	μμf
OUTPUT: P TO (H+G) SECTION #4	2	2.8	μμf
SECTION #2	2	3.2	μμf

RATINGS INTERPRETED ACCORDING TO RMA STANDARD M8-210

EACH TRIODE UNIT

HEATER VOLTAGE	6.3	12.6 VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE	90	VOLTS
MAXIMUM PLATE VOLTAGE	300	VOLTS
MAXIMUM NEGATIVE DC GRID VOLTAGE	-50	VOLTS
MAXIMUM PLATE DISSIPATION	2.7	WATTS

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER - EACH TRIODE UNIT

HEATER VOLTAGE HEATER CURRENT	6.3	12.6	6.3	12.6	VOLTS MA:
PLATE VOLTAGE	4,50	100	1,50	150	VOLTS
PLATE CURRENT		120		56 18	OHMS MA.
PLATE RESISTANCE TRANSCONDUCTANCE		100		800 500	OHMS LIMHOS
AMPLIFICATION FACTOR		37		41	,=
FOR Ib = 10 MA.		-9		-12	VOLTS

PLATE 2740 SEPT. 1 1951

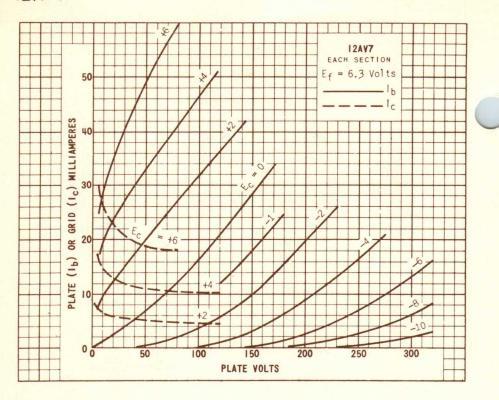
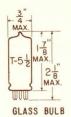


PLATE 2741 SEPT. 1 1951

PENTODE

MINIATURE TYPE



HEATER

12.6 VOLTS 150 MA.
AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
7 PIN BASE

THE 12AW6 IS A MINIATURE TYPE OF PENTODE HAVING A SHARP CUT-OFF CHARACTERISTIC AND A HIGH VALUE OF TRANSCONDUCTANCE. IN COMPACT, LIGHT-WEIGHT EQUIPMENT IT IS USEFUL AS AN RE AMPLIFIER UP TO ABOUT 400 MEGACYCLES, AND AS A HIGH-FREQUENCY, INTERMEDIATE AMPLIFIER. IT HAS LOW INPUT AND OUTPUT CAPACITANCES AND A SEPARATE SUPPRESSOR CONNECTION ALL OF WHICH CONTRIBUTE TO ITS HIGH FREQUENCY PERFORMANCE. THE 12AW6 IS ELECTRICALLY EQUIVALENT TO TYPE 6AG5.

DIRECT INTERELECTRODE CAPACITANCES

GRID TO PLATE: (G4 TO P) MAX.	0.025	puf
INPUT: G TO (H+K+G2+G3&IS)	6.5	μμf
OUTPUT: P TO (H+K+G2+G3&IS)	1.5	μμf

RATINGS INTERPRETED ACCORDING TO RMA STANDARD M8-210

CONNECTIONA	CONNECTION	
12.6	12.6	VOLTS
90	90	VOLTS
300	300	VOLTS
	150	VOLTS
	300	VOLTS
50	50	VOLTS
0	0	VOLTS
2.5	2	WATTS
	0.5	WATT
	12.6 90 300 —— 50 0	12.6 12.6 90 90 300 150 300 50 0 0 2.5 2

AGRID #2 TIED TO PLATE AND GRID #3 TIED TO CATHODE.

PLATE 1912 NOV. 1, 1947

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER - PENTODE CONNECTION

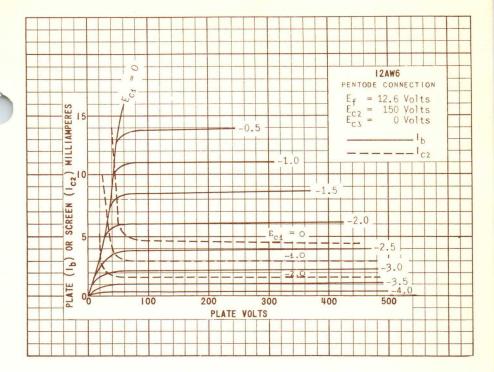
	1						
HEATER VOLTAGE		12.6	12.6	12.6		VOLTS	
HEATER CURRENT		150	150	150		MA.	
PLATE VOLTAGE		100	125	250		VOLTS	
GRID #3 VOLTAGE			CONNECTED	TO CATHODE	AT	SOCKET	
GRID #2 VOLTAGE		100	125	150		VOLTS	
CATHODE BIAS RESI	STOR	100	100	200		OHMS	
PLATE RESISTANCE	(APPROX.)	0.3	0.5	0.8		MEGOHM	
TRANSCONDUCTANCE		4 750	5 100	5 000		имноѕ	
PLATE CURRENT		5.5	7.2	7		MA.	
GRID #2 CURRENT		1.6	2.1	2		MA.	
GRID #1 VOLTAGE (FOR ID = 10 MA.		-5	-6	-8		VOLTS	

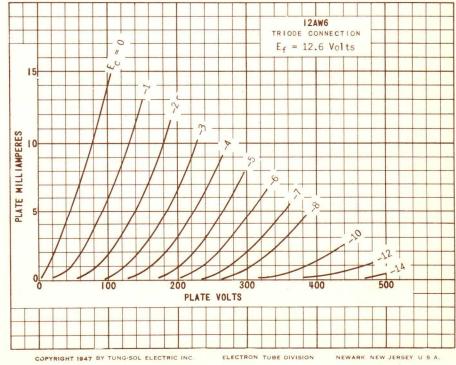
CLASS A1 AMPLIFIER - TRIODE CONNECTION

UEATER MALTINE	10 6	10 6	
HEATER VOLTAGE	12.6	12.6	VOLTS
HEATER CURRENT	150	150	MA.
PLATE VOLTAGE	180	250	VOLTS
CATHODE BIAS RESISTOR	350	825	OHMS
PLATE RESISTANCE	7 900	11 000	OHMS
TRANSCONDUCTANCE	5 700	3 800	имноѕ
AMPLIFICATION FACTOR	45	42	
PLATE CURRENT	7.0	5.5	MA.

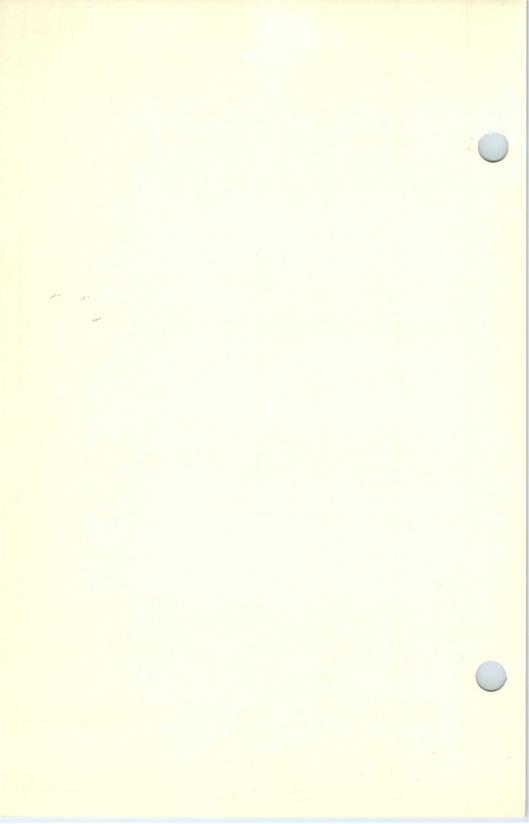
SIMILIAR TYPE REFERENCE: Ratings and characteristics identical to 6AG5.

PLATE 1913 10V. 1, 1947



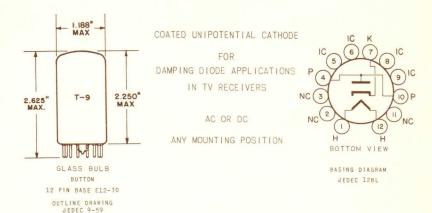


1914 HOV. 1, 1947



DIODE

COMPACTRON



THE 12AX3 IS A HEATER-CATHODE SINGLE DIODE IN THE COMPACT 12 PIN, T-9 CONSTRUCTION. IT IS SPECIFICALLY DESIGNED FOR USE AS A DAMPING DIODE IN T.V. RECEIVERS. EXCEPT FOR HEATER CHARACTERISTICS AND HEATER WARM-UP TIME, THE 12AX3 IS IDENTICAL TO THE 6AX3.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

CATHODE TO PLATE A	AND HEATER:	K	TO	(P+H)	7.5	pf
PLATE TO CATHODE A	ND HEATER:	P	TO	(K+H	5.5	pf
HEATER TO CATHODE:	(H TO K)				2.8	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	12.6 VOLTS	600	MA.
HEATER SUPPLY LIMITS: CURRENT OPERATION A		600±40	MA.
MAXIMUM HEATER-CATHODE	VOLTAGE:		
HEATER NEGATIVE WITH	RESPECT TO CATHODE		
DC COMPONENT		900	VOLTS
TOTAL DC AND PEAK		5000	VOLTS
HEATER POSITIVE WITH	RESPECT TO CATHODE		
DC COMPONENT		100	VOLTS
TOTAL DC AND PEAK		300	VOLTS
HEATER WARM-UP TIME		11	SECONDS

ATHE EQUIPMENT DESIGNER SHALL DESIGN THE EQUIPMENT SO THAT THE HEATER VOLTAGE IS CENTERED AT THE SPECIFIED BOGEV VALUE, WITH HEATER SUPPLY VARIATIONS RESTRICTED TO MAINTAIN HEATER VOLTAGE WITHIN THE SPECIFIED TOLERANCE.

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS^B DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

TV DAMPER SERVICE

PEAK INVERSE PLATE VOLTAGE	5000	VOLTS
PLATE DISSIPATION	5.3	WATTS
STEADY-STATE PEAK PLATE CURRENT	1000	MA.
DC OUTPUT	165	MA.

AVERAGE CHARACTERISTICS

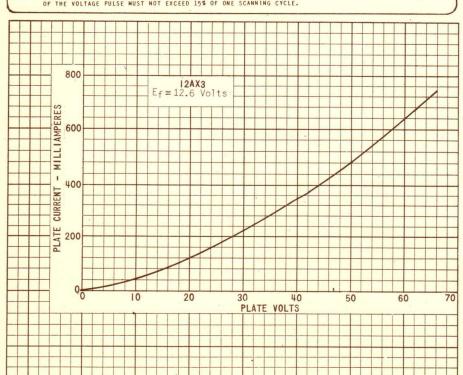
TUBE VOLTAGE DROP

Ib = 250 MILLIAMPERES DC

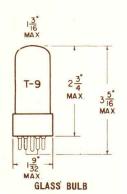
32 VOLTS

*HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

BFOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE.



DIODE

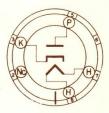


COATED UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 0.6±6% AMP. AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
INTERMEDIATE—SHELL
5 PIN OCTAL
40G

THE 12AX4GTB IS A HEATER-CATHODE-TYPE SINGLE D'ODE INTENDED FOR USE AS THE DAMPING DIODE IN THE HORIZONTAL-DEFLECTION CIRCUIT OF TELEVISION RECEIVERS. IT IS PARTICULARLY USEFUL IN AUTOTRANSFORMER DEFLECTION SYSTEMS IN WHICH HIGH PULSE VOLTAGES ARE APPLIED TO THE CATHODE OF THE DAMPER TUBE.

EXCEPT FOR HEATER RATINGS, THE 12AX4GTB IS IDENTICAL TO THE 6AX4GTB AND ← IS UNILATERALLY INTERCHANGEABLE WITH THE 12AX4GTA.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

CATHODE TO PLATE AND HEATER	8.5	ии f
PLATE TO CATHODE AND HEATER	5.0	щи f
HEATER TO CATHODE	4.0	щи f

RATINGS INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

TV DAMPER SERVICE

HEATER VOLTAGE	12.6	VOLTS
MAXIMUM PEAK INVERSE PLATE VOLTAGE	5000	VOLTS
MAXIMUM PLATE DISSIPATION	5.3	WATTS
MAXIMUM STEADY-STATE PEAK PLATE CURRENT	1000	MA.
MAXIMUM DC OUTPUT CURRENT	165	MA.
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC COMPONENT	100	VOLTS
TOTAL DC AND PEAK	300	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE		
DC COMPONENT	900	VOLTS
TOTAL DC AND PEAK	5000	VOLTS
HEATER WARM-UP TIME (APPROX.)*	73.0	
HEATER WARM OF TIME (AFFROX.)	11.0	SECONDS

-INDICATES A CHANGE

PRINTED IN U. S. A.

*HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

AVERAGE CHARACTERISTICS

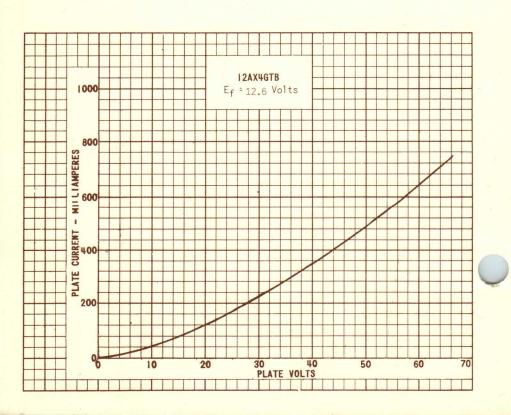
HEATER VOLTAGE 12.6 VOLTS HEATER CURRENT 0.6 \pm 6% AMP. TUBE VOLTAGE DROP I_b=250 MA. DC 32 VOLTS

NOTE:

OPERATION OF THIS TUBE AS A POWER RECTIFIER IS NOT RECOMMENDED.

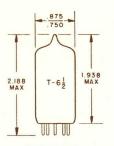
AFOR OPERATION IN A 523-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCAST STATIONS. FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 154 OF ONE SCANNING CYCLE.

DESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHMOSES IN DEFINITION OF THE DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND HROUGHOUT LIFE NO DESIGN-MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST-PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT COMPONENT VARIATION,



TWIN TRIODE

FOR



HIGH VOLTAGE GAIN AND

LOW HEATER POWER APPLICATIONS

2K 3 7 16 2C 2 8 K

COATED UNIPOTENTIAL CATHODE

ANY MOUNTING POSITION

BOTTOM VIEW

JEDEC 9A

GLASS BULB

SMALL BUTTON
9 PIN NOVAL E9-1
OUTLINE DRAWING
JEDEC 6-2

THE 12AX7A COMBINES TWO COMPLETELY INDEPENDENT HIGH-MU TRIODES IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS ADAPTABLE TO APPLICATIONS WHERE HIGH VOLTAGE GAIN AND LOW HEATER POWER ARE THE IMPORTANT CONSIDERATIONS, AND IS SUITABLE FOR USE IN MODERN HIGH GAIN AUDIO AMPLIFIERS AND MODERN TELEVISION CIRCUITS WHERE LOW HUM AND LOW MICROPHONIC NOISE IS REQUIRED. THE CENTER TAPPED HEATER CONNECTION PERMITS OPERATION FROM EITHER A 6.3 VOLT OR 12.6 VOLT SUPPLY AND IN 300 MA. OR 150 MA. SERIES HEATER SERVICE.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

	TRIODE UNIT 1	TRIODE UNIT 2	
GRID TO PLATE	1.7	1.7	pf
GRID TO CATHODE	1.6	1.6	pf
PLATE TO CATHODE	0.46	0.34	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

4 AND 5	9 AND 4+5	
12.6 150	6.3 300	VOLTS MA.
11		SECONDS
12.6 ±1.3 150±10	6.3 ±0.6 300 ± 20	VOLTS MA.
HODE ODE	200 200 A	VOLTS VOLTS
	12.6 150 11 12.6 ±1.3 150±10	12.6 6.3 150 300 11 12.6 ±1.3 6.3 ±0.6 150 ± 10 300 ± 20

ATHE DC COMPONENT MUST NOT EXCEET 100 VOLTS.

- TUNG-SOL -

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

VALUES ARE FOR EACH UNIT

PLATE VOLTAGE	330	VOLTS
PLATE DISSIPATION	1.2	WATT
GRID VOLTAGE		
NEGATIVE BIAS VALUE	55	VOLTS
POSITIVE BIAS VALUE	0	VOLTS

CHARACTERISTICS

CLASS A1 AMPLIFIER

PLATE VOLTAGE	100	250	VOLTS
GRID VOLTAGE	-1	-2	VOLTS
PLATE CURRENT	0.5	1.2	MA.
AMPLIFICATION FACTOR	100	100	VOLTS
TRANSCONDUCTANCE	1,250	1,600	μMHOS
PLATE RESISTANCE	80,000	62,500	OHMS
AMPLIFICATION FACTOR TRANSCONDUCTANCE	100 1,250	100 1,600	VOLTS μMHOS

EQUIVALENT NOISE AND HUM VOLTAGE, AVERAGE, RMS

1.8 MV.

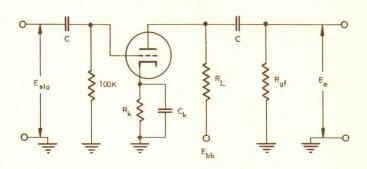
EACH TRIODE SECTION MEASURED IN "TRUE RMS" UNITS UNDER THE FOLLOWING CONDITIONS: HEATER (PARALLEL ARRANGEMENT) VOLTAGE OF 6.3 VOLTS AC; CENTER TAP OF HEATER TRANSFORMER GROUNDED; PLATE SUPPLY VOLTAGE, 250 VOLTS DC; PLATE LOAD RESISTOR, 100,000 OHMS; CATHODE RESISTOR, 2,700 OHMS BYPASSED BY 100 μ F CAPACITOR; GRID RESISTOR, 0 OHMS; AND AMPLIFIER COVERING FREQUENCY RANGE BETWEEN 25 AND 10,000 CPS. EQUIVALENT VOLTAGE REFERENCED TO GRID.

RESISTANCE COUPLED AMPLIFIER

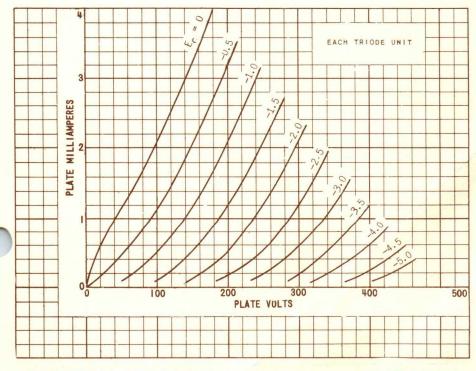
Rp	Rs	Rg1	Ebb	= 90 V	OLTS	Ерр	= 180 \	OLTS	Ebb	= 300	VOLTS
MEG.	ME G.	ME G.	Rk	GAIN	Eo	Rk	GAIN	Eo	Rk	GAIN	Eo
0.10	0.10	0.1	1700 2000	31 38	5.0	1000 1100	40 46	15 20	760 900	43 50	30 40
0.24	0.24 0.51	0.1	3500 3900	43 49	6.5 8.6	2000 2300	54 59	18 24	1600 1800	58 64	37 47
0.51	0.51 1.0	0.1	7100 7800	50 53	7.4 9.1	4300 4800	62 64	19 24	3100 3600	66 69	39 46
0.24	0.24 0.51	10 10	0	37 44	3.9 5.4	0	53 60	15 19	0	62 67	32 41
0.51	0.51	10 10	0	44 49	5.0 6.4	0	61 66	17 21	0	69 71	35 41

EO IS MAXIMUM RMS VOLTAGE OUTPUT FOR FIVE PERCENT TOTAL HARMONIC DISTORTION-GAIN MEASURED AT 2.0 VOLTS RMS OUTPUT.

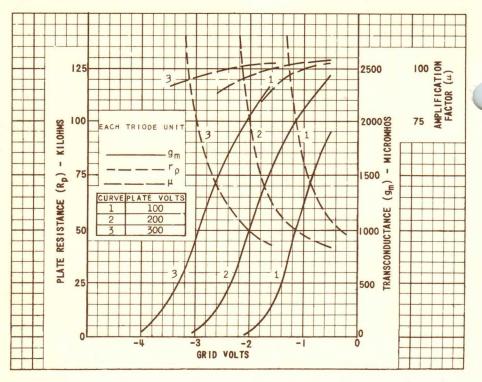
FOR ZERO-BIAS DATA, GENERATOR IMPEDANCE IS NEGLIGIBLE.

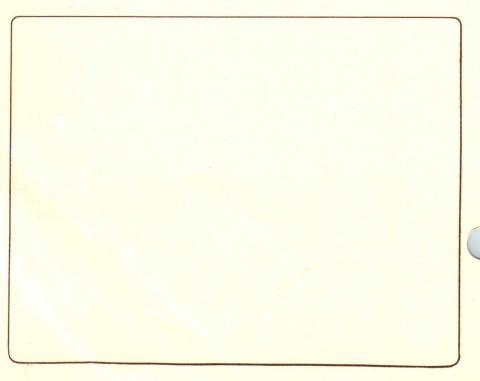


COUPLING CAPACITORS (C) SHOULD BE SELECTED TO GIVE DESIRED FREQUENCY RESPONSE. Rk SHOULD BE ADEQUATELY BY-PASSED.



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DOUBLE TRIODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER

SERIES 12.6 VOLTS WUU 150 MA.

PARALLEL 6.3 VOLTS 300 MA.

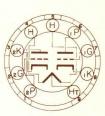
GLASS BULB

AC OR DC

FOR 12.6 VOLT OPERATION APPLY HEATER VOLTAGE BETWEEN PINS #4 AND #5. FOR 6.3 VOLT OPERATION APPLY HEATER VOLTAGE BETWEEN PINS #4 AND #5 CONNECTED TOGETHER.

WHEN OPERATING FROM AN AC HEATER SUP-PLY, DO NOT USE THE 12.6 VOLT CONNEC-TION IF LOW-HUM CAPABILITIES ARE TO BE REALIZED.

ANY MOUNTING POSITION



BOTTOM VIEW SMALL BUTTON 9 PIN BASE 9 A

THE 12AY7 COMBINES TWO INDEPENDENT MEDIUM-MU INDIRECTLY HEATED CATHODE TYPE TRIODES IN THE SMALL 9 PIN BUTTON MINIATURE CONSTRUCTION. IT IS IN-TENDED FOR USE IN HIGH GAIN AUDIO AMPLIFIER SERVICE WHERE PARTICULAR ATTENTION IS PAID TO MICROPHONICS, HUM, AND OTHER SOURCES OF INTERNAL NOISE.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

	EACH UNIT		
GRID TO PLATE: (G TO P)	1.3	uuf	
INPUT: G TO (H+K)	1.3	μμf	
OUTPUT: P TO (H+K)	0.6	μμf	

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

EACH TRIODE UNIT

HEATER VOLTAGE	12.6	6.3	VOLTS
MAXIMUM DC HEATER-CATHODE VOLTAGE	9	0	VOLTS
MAXIMUM PLATE DISSIPATION	1.	5	WATTS
MAXIMUM CATHODE CURRENT	1	C	MA.

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A AMPLIFIER

EACH	RIODE UNIT	
12.6	6.3	VOLTS
150	300	MA.
	250	VOLTS
	-4	VOLTS
	3	MA.
1	750	MHOS
	44	
25	000	OHMS
	12.6 150	150 300 250 -4 3 1 750

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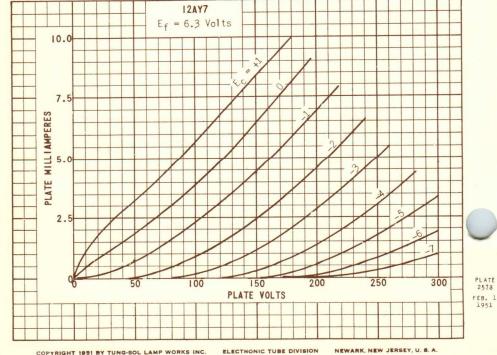
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

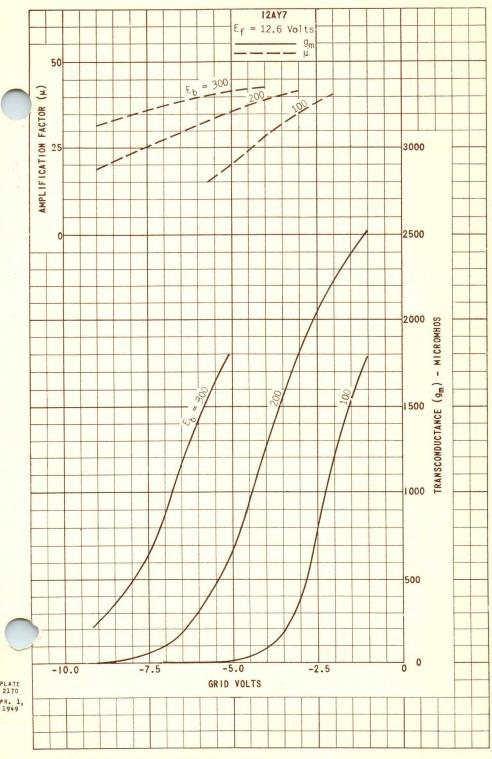
LOW LEVEL AMPLIFIER SERVICE

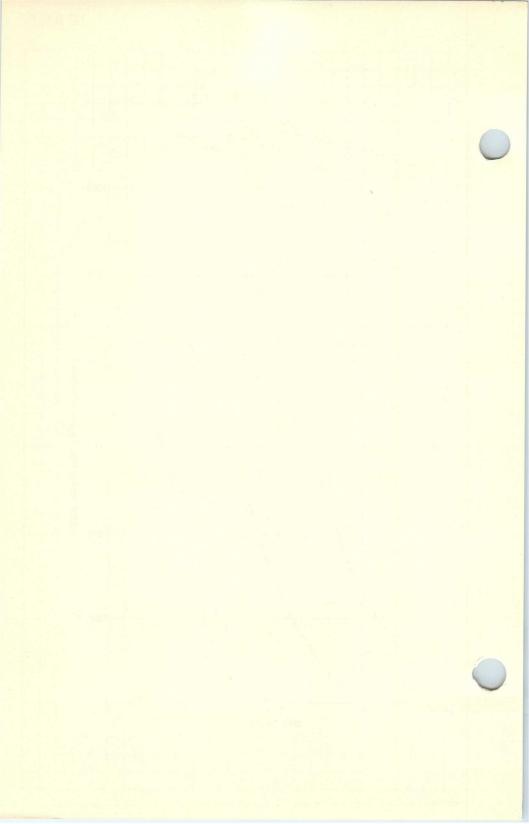
	EACH TRIODE SECTION	
HEATER VOLTAGEA	6.3	VOLTS
HEATER CURRENT	300	MA.
HEATER SUPPLY VOLTAGE	150	VOLTS
PLATE LOAD RESISTOR	20 000	OHMS
CATHODE RESISTOR	2 700	OHMS
CATHODE CAPACITOR	40	μf
GRID RESISTOR	0.1	MEGOHM
VOLTAGE GAIN	12.5	

APIN NUMBER 9 CONNECTED TO NEGATIVE B SUPPLY.

→ INDICATES A CHANGE OR ADDITION

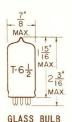






DOUBLE TRIODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER

 SERIES
 PARALLEL

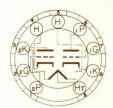
 12.6 VOLTS
 6.3 VOLTS

 225 MA.
 450 MA.

AC OR DC

FOR 12.6 VOLT OPERATION APPLY HEATER VOLTAGE BETWEEN PINS *4 AND *5. FOR 6.3 VOLT OPERATION APPLY HEATER VOLTAGE BETWEEN PIN *9 AND PINS *4 AND *5 CONNECTED TOGETHER.

ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
9 PIN BASE
94

THE 12AZ7 COMBINES TWO INDEPENDENT MEDIUM—MU TRIODES IN THE 9 PIN MINIATURE CONSTRUCTION: IT IS ADAPTABLE TO APPLICATION EITHER AS AN AF AMPLIFIER OR AS COMBINED OSCILLATOR AND MIXER.

DIRECT INTERELECTRODE CAPACITANCES

	WITHOUT WITH SHIELD SHIELD #315 A	
GRID TO PLATE: (G TO P) EACH SECTION	2.0 1.9 μμ1	
INPUT: G TO (H+K) EACH SECTION	2.6 - 2.8 - µµi	-
OUTPUT: P TO (H+K) SECTION #1	0.44 - 1.4 - µµ1	
SECTION #2	0.36 1.6 uu f	

Awith Internal shield *315 connected to cathode of section under test.

RATINGS

INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

EACH TRIODE UNIT

			VOLTS.
HEATER VOLTAGE	12.6	6.3	VOLTS
MAXIMUM PLATE VOLTAGE	300		VOLTS
MAXIMUM NEGATIVE DC GRID VOLTAGE	-50)	VOLTS
MAXIMUM PLATE DISSIPATION	2.5	5	WATTS

- TUNG-SOL -

CONTINUED FROM PRECEDING PAGE

RATINGS -CONT D. INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

EACH TRIODE UNIT

MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC	100	VOLTS
TOTAL DC AND PEAK	200	VOLTS
MAXIMUM GRID-CIRCUIT RESISTANCE:*		
FOR CATHODE-BIAS OPERATION	1.0	MEGOHMS
FOR FIXED BIAS OPERATION	0.25	MEGOHMS

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER - EACH TRIODE UNIT

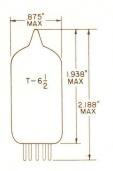
HEATER VOLTAGE	6.3	12.6	6.3	12.6	VOLTS
HEATER CURRENT	450	225	450	225	MA.
PLATE VOLTAGE		100		250	VOLTS
CATHODE BIAS RESISTOR		270		200	OHMS
PLATE CURRENT		3.7		10	MA.
PLATE RESISTANCE	15	000	10	900	OHMS
TRANSCONDUCTANCE	4	000	5	500	имноѕ
AMPLIFICATION FACTOR		60		60	
GRID VOLTAGE (APPROX.) FOR Ib = 10 MA.		-5		-12	VOLTS

^{*} INDICATES AN ADDITION.

⁻INDICATES A CHANGE.

DOUBLE TRIODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

FOR AUDIO AMPLIFIER OR

COMBINED OSCILLATOR-MIXER

APPLICATIONS

2K 3 | P | 7 | 1G | 8 | 1K | 2P | 9 | HT

ANY MOUNTING POSITION

BOTTOM VIEW

BASING DIAGRAM
JEDEC 9A

GLASS BULB

SMALL BUTTON MINIATURE
9 PIN BASE E9-1
OUTLINE DRAWING
JEDEC 6-2

THE 12AZ7A COMBINES TWO INDEPENDENT MEDIUM-MU TRIODES IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS ADAPTABLE FOR APPLICATIONS AS AN AUDIO AMPLIFIER OR AS A COMBINED OSCILLATOR-MIXER IN VHF TELEVISION TUNERS.

DIRECT INTERELECTRODE CAPACITANCES

	WITH A SHIELD	WITHOUT	
GRID TO PLATE: (G TO P) EACH SECTION	1.9	2.0	pf
INPUT: G TO (H+K) EACH SECTION	2.8	2.6	pf
OUTPUT: P TO (H+K) TRIODE 1	1.4	0.44	pf
OUTPUT: P TO (H+K) TRIODE 2	1.6	0.36	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AI	ERAGE CHARACTERISTICS			
	HEATER IN SERIES	12.6 VOLTS	225	MA.
	HEATER IN PARALLEL	6.3 VOLTS	450	MA.
HE	ATER WARM-UP TIME B		11	SECONDS
HE	ATER SUPPLY LIMITS:			
	VOLTAGE OPERATION (HEATER I	N SERIES)	12.6±1.3	VOLTS
	CURRENT OPERATION (HEATER I	N PARALLEL)	450±30	MA.
MA	XIMUM HEATER-CATHODE VOLTAGE	:		
	HEATER NEGATIVE WITH RESPEC	CT TO CATHODE		
	TOTAL DC AND PEAK		200	VOLTS
	HEATER POSITIVE WITH RESPEC	T TO CATHODE		
	DC		100	VOLTS
	TOTAL DC AND PEAK		200	VOLTS

TUNG-SOL .

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

PLATE VOLTAGE	330	VOLTS
NEGATIVE DC GRID VOLTAGE	55	VOLTS
PLATE DISSIPATION (EACH SECTION)	2.5	WATTS
TOTAL PLATE DISSIPATION	5.0	WATTS
GRID CIRCUIT RESISTANCE:		
FIXED BIAS	0.25	MEGOHM
SELF BIAS	1.0	MEGOHM

TYPICAL OPERATING CHARACTERISTICS

CLASS A1 AMPLIFIER

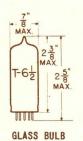
PLATE VOLTAGE	100	250	VOLTS
CATHODE BIAS RESISTOR	270	200	OHMS
PLATE CURRENT	3.7	10	MA.
TRANSCONDUCTANCE	4,000	5,500	μ MHOS
AMPLIFICATION FACTOR	60	60	
PLATE RESISTANCE (APPROX.)	15,000	10,900	OHMS
GRID VOL TAGE (APPROX.)			
FOR Ib=10 MA. PLATE CURRENT	-5	-12	VOLTS

B
HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER HEATER OPERATING RESISTANCE.

A WITH EXTERNAL SHIELD 315 CONNECTED TO CATHODE OF SECTION UNDER TEST.

TRIODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE HEATER

SERIES 12.6 VOLTS 0.3 AMP.

PARALLEL 6.3 VOLTS 0.6 AMP.

AC OR DC

ANY MOUNTING POSITION

CONTROL OF HEATER CHARACTERISTICS
APPLIES ONLY TO 600 MA. HEATER
COMMECTION.



BOTTOM VIEW
MINIATURE BUTTON
9 PIN BASE
9AG

THE 1284A IS A LOW-MU, HIGH PERVEANCE TRIODE USING THE 9 PIN MINIATURE CONSTRUCTION AND HAS BEEN DESIGNED FOR USE IN 600 MA. SERIES HEATER OPERATED RECEIVERS. IT IS INTENDED FOR USE AS A VERTICAL DEFLECTION AMPLIFIER IN TELEVISION RECEIVERS AND OTHER APPLICATION WHERE HIGH PEAK CURRENTS MUST BE DEVELOPED WITH LOW SUPPLY VOLTAGES. THERMAL CHARACTERISTICS OF THE HEATER HAVE BEEN CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED. WITH THE EXCEPTION OF CONTROL OF THE HEATER THERMAL CHARACTERISTICS, ITS CHARACTERISTICS ARE IDENTICAL TO THE 1284.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

GRID TO PLATE: G TO P	4.8	иµ f
INPUT: G TO (H+K)	5.0	ши f
OUTPUT: P TO (H+K)	1.5	ии f

RATINGS

MATINGS			
INTERPRETED ACCORDING TO DESIGN	CLASS A1	VERTICAL A DEFLECTION AMPLIFIER	
HEATER VOLTAGE (PARALLEL CONNECTION)	6.3	6.3	VOLTS
MAXIMUM HEATER—CATHODE VOLTAGE: HEATER NEGATIVE WITH RESPECT TO CATHODE TOTAL DC AND PEAK	200	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE DC TOTAL DC AND PEAK	100	100	VOLTS VOLTS
MAXIMUM PLATE VOLTAGE	550	550	VOLTS
MAXIMUM PEAK POSITIVE PLATE VOLTAGE (ABSOLUTE MAXIMUM)		1000	VOLTS
MAXIMUM PLATE DISSIPATION	5.5	5.5 B	WATTS
MAXIMUM PEAK NEGATIVE GRID VOLTAGE		250	VOLTS
MAXIMUM AVERAGE CATHODE CURRENT		30	MA.
MAXIMUM PEAK CATHODE CURRENT		105	MA.
MAXIMUM GRID CIRCUIT RESISTANCE: FIXED BLAS CATHODE BLAS	0.47	2.2	MEGOHM MEGOHMS
HEATER WARM-UP TIME (APPROX.)*	11		SECONDS

A FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCASTING STATIONS; FEDERAL COMMUNICATIONS COMMISSION". THE DUTY CYCLE OF THE VOLTAGE PULSE NOT TO EXCEED 15 PERCENT OF A SCANNING CYCLE.

BIN STAGES OPERATING WITH GRID-LEAK BIAS, AN ADEQUATE CATHODE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

^{*}HEATER WARM—UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80\$ OF ITS RATEO VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER

HEATER VOLTAGE (PARALLEL CONNECTION)	6.3	VOLTS
HEATER CURRENT	0.6	AMP.
PLATE VOLTAGE	150	VOLTS
GRID VOLTAGE	-17.5	VOLTS
PLATE CURRENT	34	MA.
AMPLIFICATION FACTOR	6.5	
PLATE RESISTANCE (APPROX.)	1 030	OHMS
TRANSCONDUCTANCE	6 300	µмноs
PLATE CURRENT $E_C = -23$ VOLTS	9.6	MA.
GRID VOLTAGE (APPROX.) FOR I = 200 MA.	-32	VOLTS

PENTODE

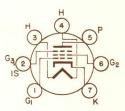
MINIATURE TYPE
COATED UNIPOTENTIAL CATHODE



GLASS BULB
MINIATURE BUTTON
7 PIN BASE E7-1
OUTLINE DRAWING
JEDEC 5-2

HEATER
12.6±1.3 VOLTS 0.15 AMP.
AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

BASING DIAGRAM

JEDEC 78K

THE 12BAG IS A PENTODE AMPLIFIER HAVING REMOTE CONTROL GRID CHARACTERISTIC AND UTILIZING THE MINIATURE CONSTRUCTION. AS AN RF AMPLIFIER IT IS CHARACTERIZED BY HIGH TRANSCONDUCTANCE AND LOW GRID-PLATE CAPACITANCE.

DIRECT INTERELECTRODE CAPACITANCES

	WITH SHIELDA	WITHOUT SHIELD	
GRID TO PLATE: G, TO P (MAX.)	0.0035	0.0035	uu f
INPUT: G, TO (H+K+G2+G3&IS)	5.5	5.5	μμf
OUTPUT: P TO (H+K+G2+G3&IS)	5.5	5	uu f

AEXTERNAL SHIELD #316 CONNECTED TO PIN #7.

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

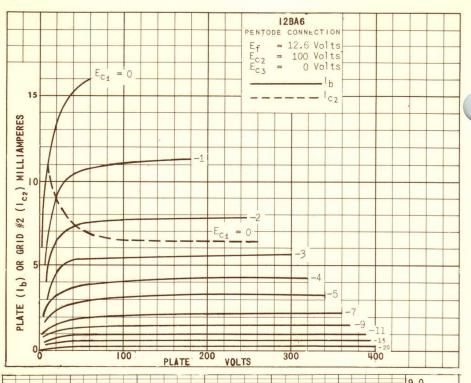
MAXIMUM PEAK HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	200°	VOLTS
MAXIMUM PLATE VOLTAGE	330	VOLTS
MAXIMUM GRID #2 SUPPLY VOLTAGE	330	VOLTS
MAXIMUM GRID #2 VOLTAGE	SEE J5-C4	
MAXIMUM GRID #3 VOLTAGE PIN #2 CONNECTED TO PIN #	#7 AT SOCKET	
MAXIMUM POSITIVE DC GRID #1 VOLTAGE	O	VOLTS
MAXIMUM NEGATIVE DC GRID #1 VOLTAGE	-55	VOLTS
MAXIMUM PLATE DISSIPATION	3.4	WATTS
MAXIMUM GRID #2 DISSIPATION:		
FOR VOLTAGES UP TO 165 VOLTS	0.7	WATT
FOR VOLTAGES BETWEEN 165 & 330 VOLTS	SEE J5-C4	

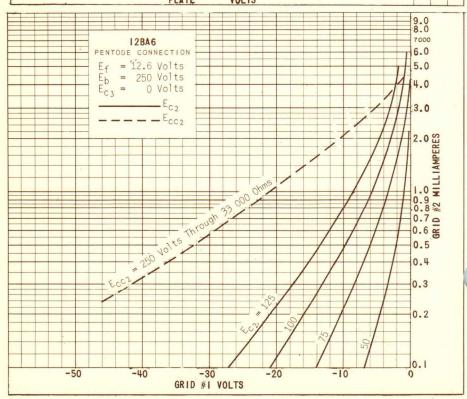
THE DC COMPONENT MUST NOT EXCEED 100 VOLTS.

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER

PLATE VOLTAGE	100	250	VOLTS
GRID #3 VOLTAGE	0	0	VOLTS
GRID #2 VOLTAGE	100	100	VOLTS
CATHODE BIAS RESISTOR	68	68	OHMS
PLATE RESISTANCE (APPROX.)	0.25	1.0	MEGOHM
TRANSCONDUCTANCE	4 300	4 400	MHOS
PLATE CURRENT	10.8	11	MA .
GRID #2 CURRENT	4.4	4.2	MA.
GRID #1 VOLTAGE (APPROX.) FOR Gm = 40 MMHOS	-20	-20	VOLTS
→INDICATES A CHANGE.			





HEPTODE

MINIATURE TYPE

GLASS BULB

UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 150 MA.
AC OR DC

ANY MOUNTING POSITION



SMALL BUTTON 9 PIN BASE

THE 12BA7 IS A CATHODE TYPE HIGH GAIN PENTAGRID CONVERTER IN THE SMALL 9-PIN BUTTON CONSTRUCTION. IT IS DESIGNED FOR SERVICE AS A COMBINED LOCAL OSCILLATOR AND MIXER AT HIGH FREQUENCIES, ESPECIALLY IN THE FM BROADCAST BAND.

DIRECT INTERELECTRODE CAPACITANCES WITH NO EXTERNAL SHIELD

GRID #3 TO PLATE: (G3 TO P) MAX.	0.19	μμf
GRID \$1 TO GRID \$3: (G4 TO G3) MAX.	0.1	μμf
GRID #1 TO PLATE: (G1 TO P) MAX.	0.05	μμf
GRID #1 TO CATHODE: (G1 TO K)	3.3	μμf
GRID #1 TO ALL EXCEPT CATHODE:		
G1 TO (H&G2&G4+G3+G5+P+IS)	3.4	μμf
CATHODE TO ALL EXCEPT GRID #1:		
K TO (H+G2&G4+G3+G5+P+IS)	4	μμf
RF INPUT: G3 TO (H+K+G4+G2&G4+G5+P+IS)	9.5	μμf
OSCILLATOR INPUT: G4 TO (H+K+G2&G4+G3+G5+P+IS)	6.7	μμf
MIXER OUTPUT: P TO (H+K+G1+G2&G4+G3+G5+IS)	8.3	μμf

RATINGS INTERPRETED ACCORDING TO RMA STANDARD M8-210

HEATER VOLTAGE	12.6	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE	90	VOLTS
MAXIMUM PLATE VOLTAGE	300	VOLTS
MAXIMUM GRIDS #2 & #4 VOLTAGE	100	VOLTS
MAXIMUM GRIDS #2 & #4 SUPPLY VOLTAGE	300	VOLTS
MAXIMUM NEGATIVE GRID #3 VOLTAGE	100	VOLTS
MAXIMUM POSITIVE GRID #3 VOLTAGE	0	VOLTS
MAXIMUM GRID #5 & INTERNAL SHIELD VOLTAGEA	0	VOLTS
MAXIMUM PLATE DISSIPATION	2	WATTS
MAXIMUM GRIDS #2 & #4 DISSIPATION	1.5	WATTS
MAXIMUM CATHODE CURRENT	22	MA .

A INTERNAL SHIELD (PINS \$6 AND \$8) CONNECTED DIRECTLY TO GROUND.

CONTINUED ON FOLLOWING PAGE

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2086 OCT. 1, 1948

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CONVERTER SERVICE — SEPARATE EXCITATION THE CHARACTERISTICS SHOWN WITH SEPARATE EXCITATION CORRESPOND VERY CLOSELY WITH THOSE OBTAINED IN A SELF-EXCITED OSCILLATOR CIRCUIT OPERATING WITH ZERO BIAS.

12.6	12.6	VOLTS
150	150	MA.
100	250	VOLTS
100	100	VOLTS
-1	-1	VOLTS
CONNEC	TED DIRECTLY	TO GROUND
20 000	20 000	OHMS
0.5	1	ME GOHM
900	950	имно ѕ
3.6	3.8	MA .
10.2	10	MA.
0.35	0.35	MA .
14.2	14.2	MA .
3.5	3.5	имно ѕ
	150 100 100 -1 connec 20 000 0.5 900 3.6 10.2 0.35 14.2	150 150 100 250 100 100 -1 -1 CONNECTED DIRECTLY 20 000 20 000 0.5 1 900 950 3.6 3.8 10.2 10 0.35 0.35 14.2 14.2

A INTERNAL SHIELD (PINS #6 AND #8) CONNECTED DIRECTLY TO GROUND.

OSCILLATOR TRANSCONDUCTANCE

GRID #3 VOLTAGE	0	VOLTS
GRID #1 VOLTAGE	0	VOLTS
GRIDS #2 & #4 CONNECTED TO PLATE	100	VOLTS
PLATE CURRENT	32	MA.
TRANSCONDUCTANCE BETWEEN GRID #1 & GRIDS#2 & #4		
CONNECTED TO PLATE	8 000	имноѕ
AMPLIFICATION FACTOR	16.5	

SIMILAR TYPE REFERENCE: Except for heater ratings similar to 65B7Y.

PLATE 2087 OCT. 1, 1948

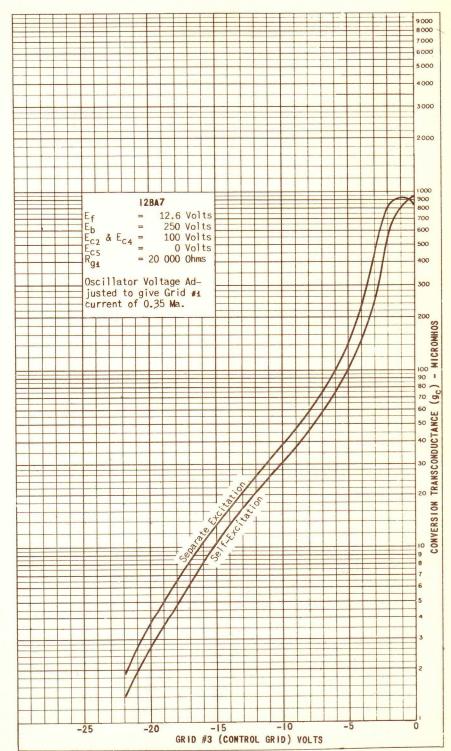
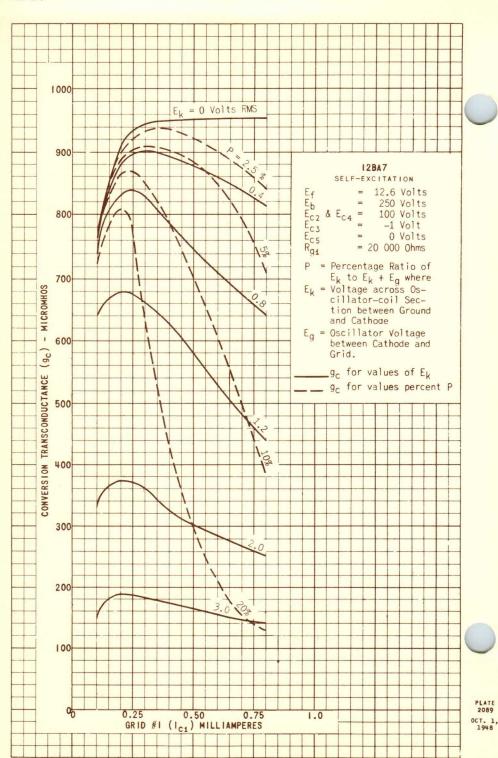
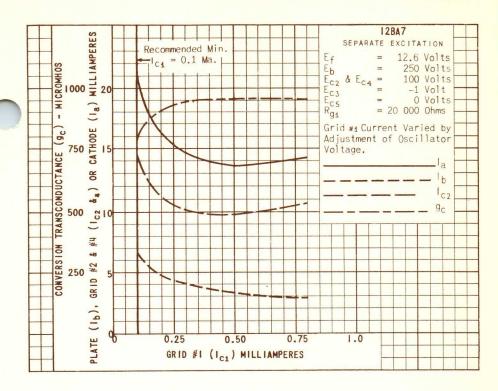


PLATE 2088 OCT. 1, 1948

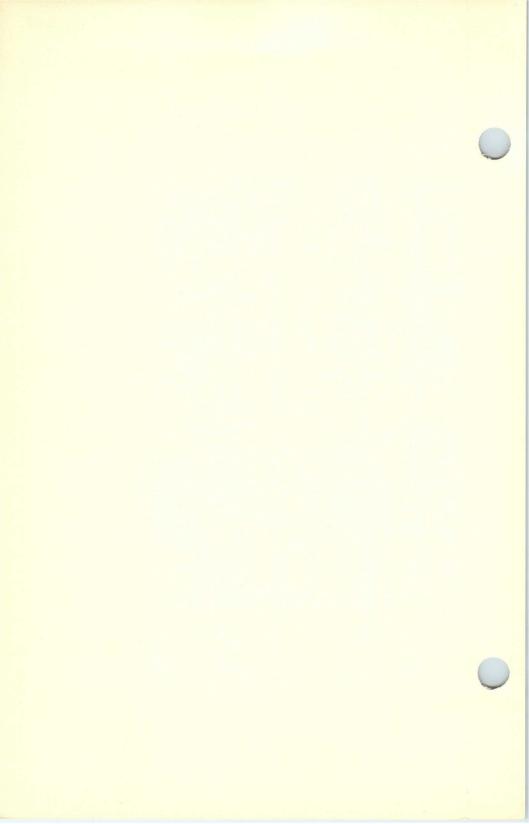
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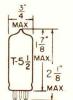




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PLATE 2090 OCT. 1, 1948





GLASS BULB

HEATER 12.6 VOLTS 0.15AMP. AC OR DC

ANY MOUNTING POSITION

BOTTOM VIEW MINIATURE BUTTON 7 PIN BASE 78K

THE 12BD6 IS A MINIATURE REMOTE-CUTOFF PENTODE DESIGNED FOR USE AS A RADIO-FREQUENCY OR INTERMEDIATE-FREQUENCY AMPLIFIER.

DIRECT INTERELECTRODE CAPACITANCES

	WITH	SHIELD	
GRID TO PLATE (MAX.)	0.005	0.004	μμf
INPUT	4.3	4.3	μμf
OUTPUT	5.0	5.0	μμf

RATINGS
INTERPRETED ACCORDING TO RMA STANDARD M8-210

DESIGN CENTER VALUES

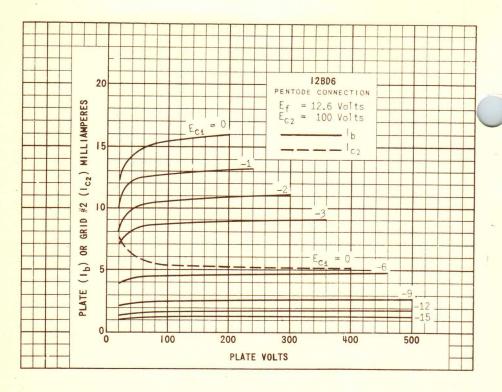
12.6	VOLTS
90 90	VOLTS VOLTS
300	VOLTS
125	VOLTS
3.0	WATTS
0.4	WATT
14	MA.
	90 90 300 125 3.0 0.4

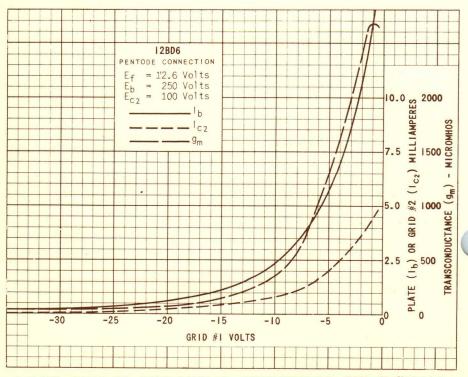
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER

HEATER VOLTAGE	12.6	12.6	12.6	VOLTS
HEATER CURRENT	0.15	0.15	0.15	AMP.
PLATE VOLTAGE	100	125	250	VOLTS
GRID #3 VOLTAGE	CON	NECTED TO	CATHODE	AT SOCKET
GRID #2 VOLTAGE	100	125	100	VOLTS
GRID #1 VOLTAGE	-1	-3	-3	VOLTS
PLATE CURRENT	13	13	9	MA.
GRID #2 CURRENT	5	5	3.0	MA.
PLATE RESISTANCE	0.15	0.18	0.8	MEGOHM
TRANSCONDUCTANCE	2 550	2 350	2 000	имноs
GRID VOLTAGE (APPROX.) FOR $G_m = 10 \mu MHOS$	-35	-45	-35	VOLTS

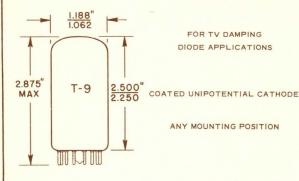
-INDICATES A CHANGE. *INDICATES AN ADDITION.

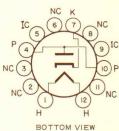




DIODE

COMPACTRON





BOTTOM VIEW

BASING DIAGRAM
JEDEC 12GA ←
SOCKET TERMINALS 5.6,8 AND 9
SHOULD NOT BE USED AS TIE POINTS.
IT IS FURTHER RECOMMENDED THAT
THE SOCKET CLIPS FOR
THESE PINS BE REMOVED.

12 PIN BASE E12-70 OUTLINE DRAWING JEDEC 9-60

GLASS BULB

THE 12BE3 IS A COMPACTRON, SINGLE HEATER-CATHODE TYPE DIODE INTENDED FOR SERVICE AS THE DAMPING DIODE IN THE HORIZONTAL DEFLECTION CIRCUIT OF TELEVISION RECEIVERS.

EXCEPT FOR HEATER CHARACTERISTICS AND RATINGS, THE 12BE3 IS IDENTICAL TO THE 6BE3 AND THE 17BE3.

DIRECT INTERELECTRODE CAPACITANCES - APPROX. WITHOUT EXTERNAL SHIELD

CATHODE TO PLATE AND HEATER: K TO (P + H)	10	pf
PLATE TO CATHODE AND HEATER: P TO (K + H)	8.0	pf
HEATER TO CATHODE: (H TO K)	3.4	pf

HEATER CHARACTERISTICS AND RATINGS DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	12.6 VOLTS	600	MA
HEATER WARM-UP TIME		11	SECONDS
HEATER SUPPLY LIMITS:			
CURRENT OPERATION		600 ± 40	MA
MAXIMUM HEATER-CATHODE VOLT	AGE:		
HEATER NEGATIVE WITH RESP	PECT TO CATHODE		
DC COMPONENT		900	VOLTS
TOTAL DC AND PEAK		5000	VOLTS
HEATER POSITIVE WITH RESPE	ECT TO CATHODE		
DC COMPONENT		100	VOLTS
TOTAL DC AND PEAK		300	VOLTS

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

DESIGN MAXIMUM VALUES B- SEE EIA STANDARD RS-239

TV DAMPER SERVICE

PEAK INVERSE PLATE VOLTAGE	5000	VOLTS
PLATE DISSIPATION	6.5	WATTS
STEADY STATE PEAK PLATE CURRENT	1200	MA
DC OUTPUT CURRENT	200	MA

AVERAGE CHARACTERISTICS

TUBE VOLTAGE DROP, 16 = 350 MA. DC	25	VOLTS
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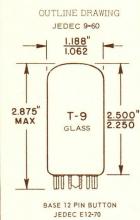
Δ

HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE THREE TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

В

FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN 'STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCASTING STATIONS; FEDERAL COMMUNICATIONS COMMISSION'. THE DUTY CYCLE OF THE VOLTAGE PULSE NOT TO EXCEED 15 PERCENT OF A SCANNING CYCLE.

DIODE



COMPACTRON

FOR TV DAMPING

DIODE APPLICATIONS

COATED UNIPOTENTIAL CATHODE

ANY MOUNTING POSITION

NC 6 7 NC IC 8 9 4 NC (3 10)P 11 NC 12 H

BASING DIAGRAM

JEDEC 12GA

BOTTOM VIEW

BASING DIAGRAM JEDEC 12GA SOCKET TERMINALS 5,6,8 AND 9 SHOULD NOT BE USED AS TIE POINTS.
IT IS FURTHER RECOMMENDED THAT THE SOCKET CLIPS FOR THESE PINS BE REMOVED.

THE 12BE3A IS A COMPACTRON, SINGLE HEATER-CATHODE TYPE DIODE INTENDED FOR SERVICE AS THE DAMPING DIODE IN THE HORIZONTAL DEFLECTION CIRCUIT OF TELEVISION RECEIVERS. EXCEPT FOR HEATER CHARACTERISTICS AND RATINGS, THE 12BE3A IS IDENTICAL TO THE 6BE3A AND THE 17BE3A. THE VOLTAGE DROP OF THIS TYPE IS LOWER THAN THAT OF THE 12BE3.

DIRECT INTERELECTRODE CAPACITANCES - APPROX. WITHOUT EXTERNAL SHIELD

CATHODE TO PLATE AND HEATER: K TO (P + H)	10	pf
PLATE TO CATHODE AND HEATER: P TO (K + H)	8.0	pf
HEATER TO CATHODE: (H TO K)	3 1	n.f

HEATER CHARACTERISTICS AND RATINGS DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	12.6	VOLTS	600	MA
HEATER WARM-UP TIME SEE BELOW			. 11	SECONDS
HEATER SUPPLY LIMITS:				
CURRENT OPERATION			600 ± 40	MA
MAXIMUM HEATER-CATHODE VOLTAGE:				
HEATER NEGATIVE WITH RESPECT	TO CATHODE			
DC COMPONENT			900	VOLTS
TOTAL DC AND PEAK			5000	VOLTS
HEATER POSITIVE WITH RESPECT T	O CATHODE			
DC COMPONENT			100	VOLTS
TOTAL DC AND PEAK			300	VOL TS

HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE

TUNG-SOL -

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

TV DAMPER SERVICE SEE BELOW

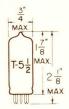
PEAK INVERSE PLATE VOLTAGE	5000	VOLTS
PLATE DISSIPATION	6.5	WATTS
STEADY STATE PEAK PLATE CURRENT	1200	MA
DC OUTPUT CURRENT	200	MA

FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN 'STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCASTING STATIONS; FEDERAL COMMUNICATIONS COMMISSION'. THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15 PERCENT OF ONE SCANNING CYCLE.

AVERAGE CHARACTERISTICS

TUBE VOLTAGE DROP, 16 = 350 MA. DC

22.5 VOLTS



HEATER 12.6±10% VOLTS 0.15 AMP. AC OR .DC

COATED UNIPOTENTIAL CATHODE

ANY MOUNTING POSITION

BOTTOM VIEW MINIATURE BUTTON 7 PIN BASE 7 CH

GLASS BULB

THE 12BE6 IS A PENTAGRID CONVERTER USING THE 7 PIN MINIATURE CONSTRUCTION. IT IS INTENDED FOR SERVICE AS A COMBINED OSCILLATOR AND MIXER IN SUPERHETERODYNE RECEIVERS.

DIRECT INTERELECTRODE CAPACITANCES

	SHIELD ^A	SHIELD	
MIXER GRID TO PLATE: (G3 TO P) MAX.	0.25	0.30	ulif
MIXER GRID TO OSCILLATOR GRID; (G3 TO	G1) MAX. 0.15	0.15	uuf
RF INPUT: G3 TO (H+K+G1+G2&4+G5+P)	7.0	7.0	uu f
OSCILLATOR INPUT: G1 TO (H+K+G2&4+G3+	5.5 5.5	5.5	uu f
MIXER OUTPUT: P TO (H+K+G1+G2&4+G3+G5	13	8.0	uuf
OSCILLATOR GRID TO CATHODE: (G4 TO K+	3.0	3.0	uuf
OSCILLATOR OUTPUT: K TO (H+G2&4+G3+P)	20	15	uu f
OSCILLATOR GRID TO PLATE: (G1 TO P) MA	0.05	0.1	muf

AEXTERNAL SHIELD \$316 CONNECTED TO PIN \$2.

RATINGS -INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

HEATER VOLTAGE	12.6±10%	VOLTS
MAXIMUM PEAK HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	200°	VOLTS
MAXIMUM PLATE VOLTAGE	330	VOLTS
MAXIMUM GRIDS #2 AND #4 VOLTAGE	110	VOLTS
MAXIMUM GRIDS #2 AND #4 SUPPLY VOLTAGE	330	VOLTS
MAXIMUM NEGATIVE DC GRID #3 VOLTAGE	-55	VOLTS
MAXIMUM POSITIVE DC GRID #3 VOLTAGE	0	VOLTS
MAXIMUM PLATE DISSIPATION	1.1	WATT
MAXIMUM GRIDS #2 AND #4 DISSIPATION	1.1	WATT
MAXIMUM CATHODE CURRENT	15.5	MA.

CTHE DC COMPONENT MUST NOT EXCEED 100 VOLTS.

INDICATES A CHANGE.

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CONVERTER SERVICE - SEPARATE EXCITATIONB

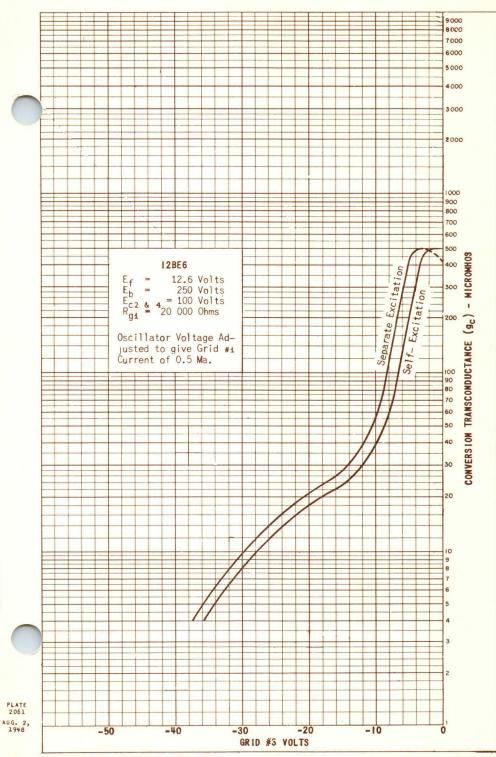
HEATER VOLTAGE	12.	6±10%	VOLTS
HEATER CURRENT		0.15	AMP.
PLATE VOLTAGE	100	250	VOLTS
GRID #3 VOLTAGE	-1.5	-1.5	VOLTS
GRIDS #2 AND #4 VOLTAGE	100	100	VOLTS
GRID #1 VOLTAGE (OSCILLATOR GRID) RMS	10	10	VOLTS
GRID #1 RESISTANCE (OSCILLATOR GRID)	20 000	20 000	OHMS
PLATE RESISTANCE (APPROX.)	0.4	1.0	ME GOHMS
GRID #1 CURRENT (OSCILLATOR GRID)	0.5	0.5	MA.
CONVERSION TRANSCONDUCTANCE	455	475	MHOS
PLATE CURRENT	2.6	2.9	MA.
GRIDS #2 AND #4 CURRENT	7.0	6.8	MA.
CATHODE CURRENT	10.1	10.2	MA.
GRID #3 VOLTAGE FOR GC = 10 MMHOS (APPROX.)	-30	-30	VOLTS
GRID #3 VOLTAGE FOR GC = 100 MMHOS (APPROX.)	-6	-6	VOLTS

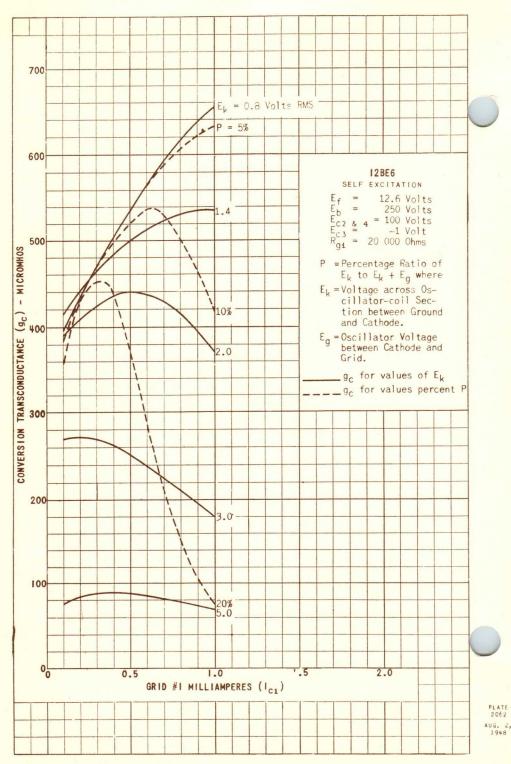
B CHARACTERISTICS SHOWN ARE OBTAINED IN THE STANDARD RMA CONVERSION CONDUCTANCE TEST SET WHICH USES SEPARATE EXCITATION. THE CHARACTERISTICS UNDER THESE CONDITIONS CORRESPOND VERY CLOSELY WITH THOSE OBTAINED IN A SELF-EXCITED OSCILLATORY CIRCUIT OPERATING WITH ZERO BIAS.

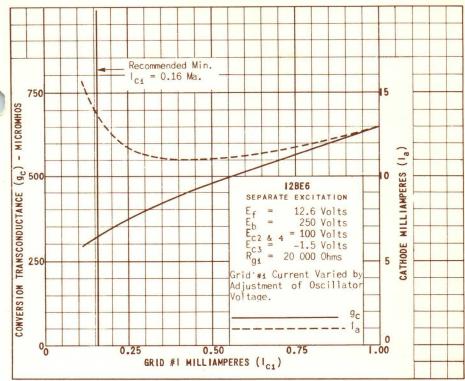
OSCILLATOR CHARACTERISTICS

GRID #3 VOLTAGE	0	VOLTS
GRID #1 VOLTAGE (OSCILLATOR GRID)	0	VOLTS
GRIDS #2 AND #4 CONNECTED TO PLATE	100	VOLTS
TRANSCONDUCTANCE BETWEEN GRID #1 AND GRIDS #2 AND #4 CONNECTED TO PLATE	7 250	имноs
AMPLIFICATION FACTOR BETWEEN GRID #1 AND GRIDS #2 AND #4 CONNECTED TO PLATE	20	
CATHODE CURRENT	25	MA.
GRID #1 VOLTAGE (APPROX.) FOR Ib = 10 MA	-11	VOLTS

SIMILAR TYPE REFERENCE: Except for heater ratings, the 12BE6 is identical to the 6BE6.







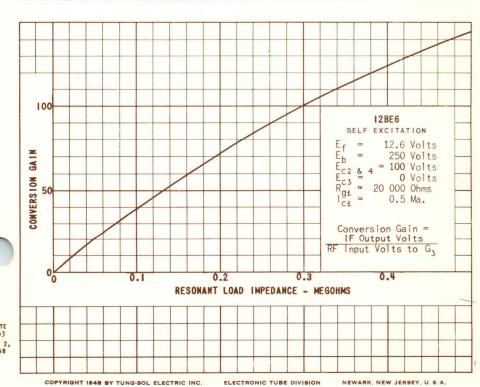
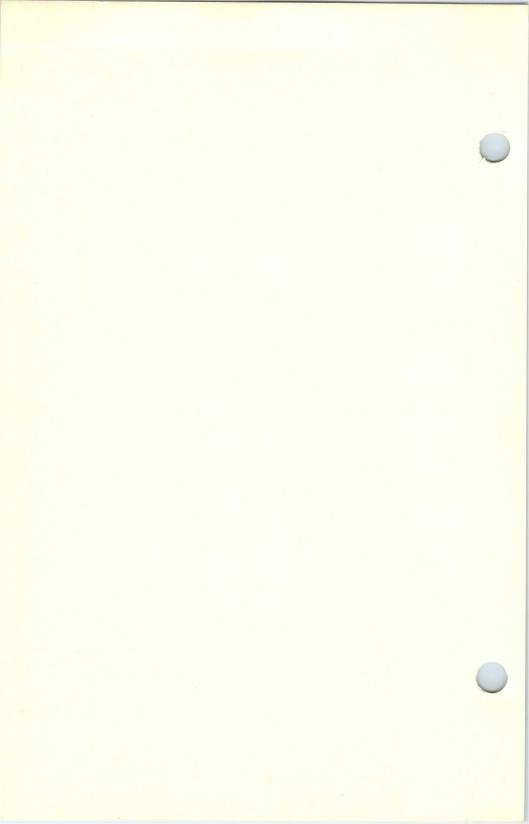


PLATE 2063 AUG. 2,

ELECTRONIC TUBE DIVISION

NEWARK, NEW JERSEY, U.S.A.



OUTLINE DRAWING JEDEC 5-2

DOUBLE-DIODE TRIODE

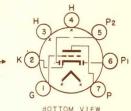
COATED UNIPOTENTIAL CATHODE

VOLTAGE AMPLIFIER

AND

DETECTOR

ANY MOUNTING POSITION



BOTTOM VIEW BASING DIAGRAM JEDEC 7BT

THE 12BF6 IS A COMBINED LOW-MU VOLTAGE AMPLIFIER AND DOUBLE-DIODE DETECTOR USING THE 7 PIN MINIATURE CONSTRUCTION. THE LOW AMPLIFICATION FACTOR OF THE TRIODE PERMITS LARGE VALUES OF OUTPUT SIGNAL WITH LOW DISTORTION.

DIRECT INTERELECTRODE CAPACITANCES

		SHIELD	SHIELD	
	TRIODE SECTION:			
GR	ID TO PLATE: (G TO TP)	1.9	1.9	pf
	PUT: G TO (H+K)	1.8	1.9	pf
	TPUT: TP TO (H+K)	0.7	1.2	pf
	DIODE SECTION:			
#1	DIODE PLATE TO GRID: (1DP TO G) MAX.	0.07	0.06	pf
#2	DIODE PLATE TO GRID: (2DP TO G) MAX.	0.06	0.05	pf
#2	DIODE PLATE TO HEATER AND CATHODE	0.95		pf
#1	DIODE PLATE TO HEATER AND CATHODE	0.66		pf
	WELTER AWARD ATTOLOTIC			
	HEATER CHARACTERISTIC			
		12.6 VOLTS	7.70	
Δ V	EDAGE CHARACTERISTICS	IZ-D VOLTS	150	MA.

AVERAGE CHARACTERISTICS 12.6 VOLTS 150 MA. HEATER SUPPLY LIMITS: VOLTAGE OPERATION 12.6±1.3 VOLTS

CURRENT OPERATION 150±15 MA.

MAXIMUM PEAK HEATER—CATHODE VOLTAGE:

HEATER NEGATIVE WITH RESPECT TO CATHODE 90 VOLTS

HEATER POSITIVE WITH RESPECT TO CATHODE 90 VOLTS

AEXTERNAL SHIELD 316 CONNECTED TO PIN*2.

⁻ INDICATES A CHANGE.

- TUNG-SOL -

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MAXIMUM RATINGS

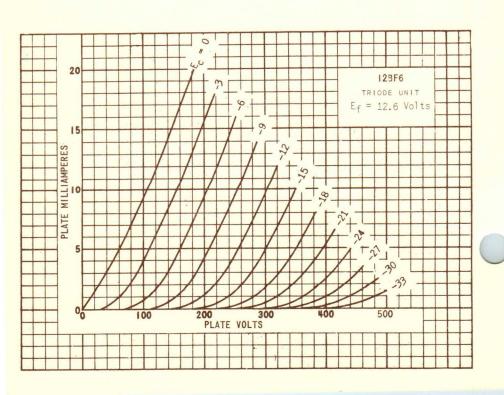
DESIGN CENTER VALUES - SEE EIA STANDARD RS-239

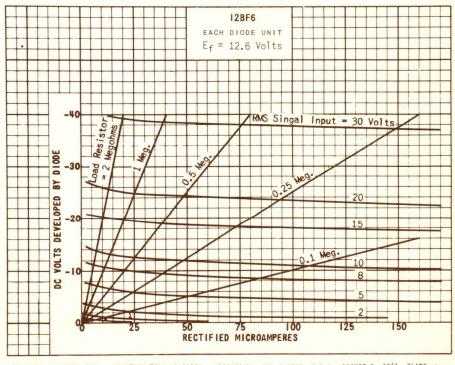
PLATE VOLTAGE	300	VOLTS
PLATE DISSIPATION	2.5	WATTS
AVERAGE DIODE CURRENT EACH UNIT FOR		
CONTINUOUS OPERATION	1.0	MA.

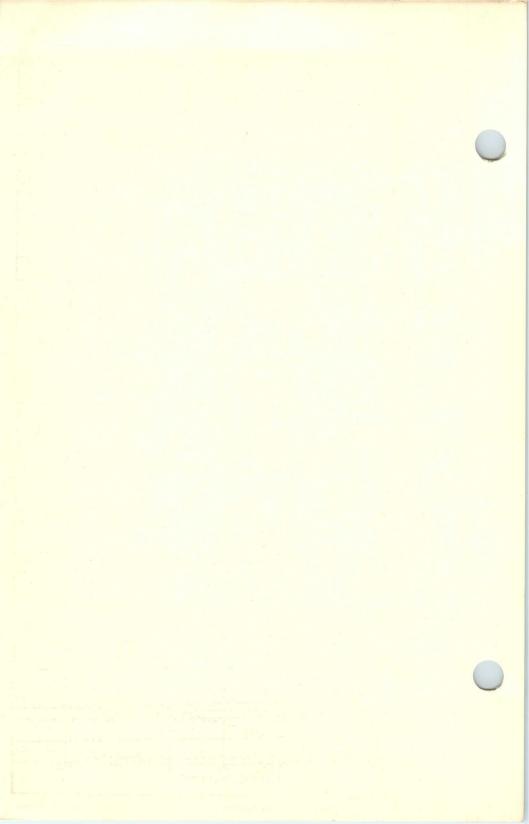
TYPICAL OPERATING CHARACTERISTICS

CLASS A1 AMPLIFIER

±		
PLATE VOLTAGE	250	VOLTS
GRID VOLTAGE	-9	VOLTS
PLATE RESISTANCE	8500	OHMS
TRANSCONDUCTANCE	1900	μMH0S
AMPLIFICATION FACTOR	16	
PLATE CURRENT	9.5	MA.
LOAD RESISTANCE	10000	OHMS
TOTAL HARMONIC DISTORTION	6.5	PERCENT
POWER OUTPUT	300	MW.
DIODE CURRENT EACH PLATE WITH 10 VOLTS DC APPLIED	(MIN.) 0.8	MA.

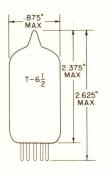






TUNG-SOL

DOUBLE TRIODE



FOR USE AS A VERTICAL
DEFLECTION SWEEP GENERATOR
AND DEFLECTION AMPLIFIER IN
T.V. RECEIVERS

2K 3 7 1G 2G 2 8 1K

ANY MOUNTING POSITION

BOTTOM VIEW
BASING DIAGRAM
JEDEC 9A

GLASS BULB
MINIATURE BUTTON
9PIN BASE E9-1
OUTLINE DRAWING
JEDEC 6-3

THE 12BH7A COMBINES TWO INDEPENDENT SEMI-HIGH PERVEANCE, MEDIUM-MU TRIODES IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS SUITABLE FOR USE AS A VERTICAL DEFLECTION SWEEP GENERATOR AND DEFLECTION AMPLIFIER IN 600 MA. SERIES HEATER OPERATED TELEVISION RECEIVERS WHICH USE PICTURE TUBES WITH WIDE DEFLECTION ANGLES. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED.

DIRECT INTERELECTRODE CAPACITANCES

	WITH A SHIELD	WITHOUT SHIELD	
TRIODE UNIT 1			
GRID TO PLATE: G TO P	2.4	→ 2.6	pf
INPUT: G TO (H+K)	3.3	→ 3.2	pf
OUTPUT: P TO (H+K)	2.0	→ 0.5	pf
TRIODE UNIT 2			
GRID TO PLATE: G TO P	2.4	→ 2.6	pf
INPUT: G TO (H+K)	3.3	→ 3.2	pf
OUTPUT: P TO (H+K)	2.0	0.4	pf
COUPLING: #1 PLATE TO #2 PLATE		→ 0.8	pf
	C	0.6	

 $^{^{}m A}$ with shield #315 connected to cathode of unit under test.

- TUNG-SOL .

CONTINUED FROM PRECEDING PAGE

HEATER CHARACTERISTICS AND RATINGS

DESING MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS WITH HEATER CONNECTION	PARALLEL	SERIES	
USING BASE PINS	9 & 4 + 5	4 & 5	
HEATER SECTIONS			
VOLTAGE	6.3	12.6	VOLTS
CURRENT	600	300	MA.
HEATER WARM-UP TIME	11'	11	SECONDS
HEATER SUPPLY LIMTS:			
VOLTAGE OPERATION	6.3+0.6	12.6+1.3	VOLTS
CURRENT OPERATION	600+40	300+20	MA.
MAXIMUM HEATER CATHODE VOLTAGE			
HEATER NEGATIVE WITH RESPECT	TO CATHODE		
DC AND PEAK	200		VOLTS
HEATER POSITIVE WITH RESPECT T	O CATHODE		
DC	100		VOLTS
DC AND PEAK	200		VOLTS

- MAXIMUM RATINGS

DESIGN CENTER VALUES - SEE EIA STANDARD RS-239

VALUES ARE FOR EACH UNIT	CLASS A1 AMPLIFIER	VER. DEF. B AMPLIFIER (VALUES ARE FOR EACH UNIT)	
DC PLATE VOLTAGE	300	450	VOLTS
PEAK POSITIVE PULSE PLATE VOLTAGE	2010	1500 (ABS. MAX.)	VOLTS
PEAK NEGATIVE PULSE GRID VOLTAGE		250	VOLTS
NEGATIVE DC GRID VOLTAGE	-50		VOLTS
CATHODE CURRENT	20		MA.
AVERAGE CATHODE CURRENT		20	MA.
PEAK CATHODE CURRENT		70	MA.
PLATE DISSIPATION:			
EACH PLATE	3.5 (EA. UNIT)	3.5°C	WATTS
BOTH PLATES	70 (EA. UNIT)	7.0 ^C	WATTS
GRID CIRCUIT RESISTANCE:			
CATHODE BIAS	1.0	2.2	MEGOHMS
FIXED BIAS	0.25		мЕСОНМ

VALUES ARE FOR EACH UNIT

	VER. DEF. B OS CILLATOR *	DEF. OSC. *	
DC PLATE VOLTAGE PEAK NEGATIVE GRID VOLTAGE	450 400	450	VOLTS
AVERAGE CATHODE CURRENT	20	600 20	VOLTS MA.
PEAK CATHODE CURRENT PLATE DISSIPATION	70	300	MA.
EACH PLATE	3.5	3.5	WATTS
BOTH PLATES GRID CIRCUIT RESISTANCE: FIXED BIAS GRID-RESISTOR, OR	7.0	7.0	WATTS
CATHODE BIAS	2.2	2.2	MEGOHMS

^{*} INDICATES AN ADDITION.

⁻ NDICATES A CHANGE.

TUNG-SOL -

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

EACH UNIT*

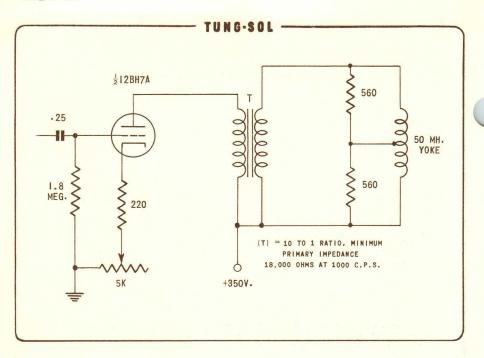
PLATE RESISTANCE (APPROX.)	5300	OHMS
PLATE CURRENT FOR GRID VOLTAGE OF -14 VOLTS	4	MA.
GRID VOLTAGE (APPROX.) FOR PLATE CURRENT OF		
50 μA AT 250 VOLTS	-23	VOLTS

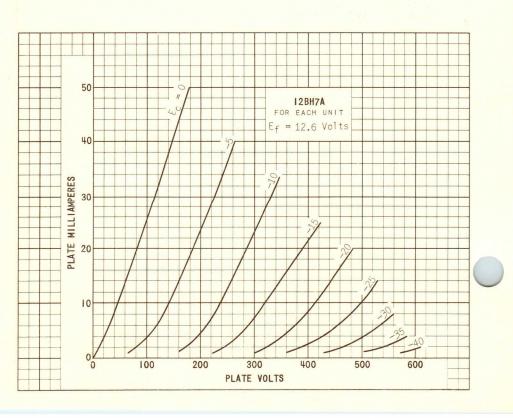
CLASS A1 AMPLIFIER

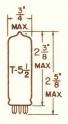
PLATE VOLTAGE	250	VOLTS
GRID VOLTAGE	-10.5	VOLTS
AMPLIFICATION FACTOR	17	
TRANSCONDUCTANCE (EACH UNIT)	3100	μMHOS
PLATE CURRENT (EACH UNIT)	11.5	MA.
GRID VOLTAGE (APPROX.) FOR		
$I_b = 50 \mu A$ AT $E_b = 150$ (EACH UNIT)	-17	VOLTS

BFOR OPERATION IN A 525-LINE 30-FRAME SYSTEM AS DESCRIBED IN 'STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCASTING STATIONS; FEDERAL COMMUNICATIONS COMMISSION'. THE DUTY CYCLE OF THE VOLTAGE PULSE NOT TO EXCEED 15 PERCENT OF A SCANNING CYCLE.

GIN STAGES OPERATING WITH GRID-LEAK BIAS, AN ADEQUATE CATHODE-BIAS RESISTOR OR OTHER SUITALLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.







GLASS BULB

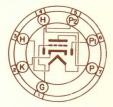
COATED UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 150 MA.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
7 PIN BASE
78T

THE 12BK6 IS A HIGH-MU DOUBLE DIODE TRIODE USING THE 7 PIN MINIATURE CONSTRUCTION. THE HIGH PERVEANCE DIODES GIVE GOOD RECTIFICATION EFFICIENCY AT LOW SIGNALS AND THE DIODE SHIELDING REDUCES UNDESIRABLE AUDIO COUPLING BETWEEN DIODES AND TRIODE.

DIRECT INTERELECTRODE CAPACITANCES

									SHIELD	SHIELDA	
DIODE	#1	OR	DIODE	#2 TO CATHODE:	(1P	OR	2P	TO K)	1	1	uµf
DIODE	#1	TO	GRID:	(1P TO G)					0.013	0.01	μμf

AWITH RMA SHIELD #316 CONNECTED TO CATHODE.

RATINGS INTERPRETED ACCORDING TO RMA STANDARD M8-210

HEATER VOLTAGE	12.6	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE	90	VOLTS
MAXIMUM PLATE VOLTAGE	300	VOLTS
MAXIMUM POSITIVE DC GRID VOLTAGE	0	VOLTS
AVERAGE DIODE CURRENT EACH PLATE WITH 10 VOLTS DC APPLIED	4	MA.
MAXIMUM DIODE CURRENT EACH PLATE FOR CONTINUOUS OPERATION	1	MA.

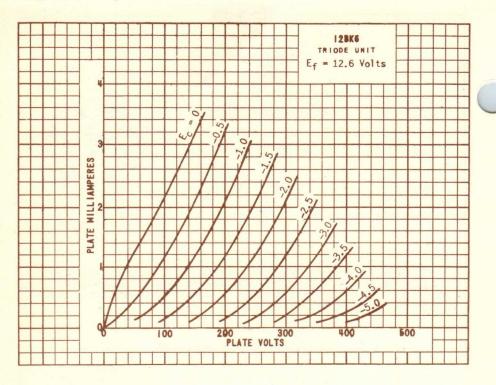
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER

HEATER VOLTAGE	12.6	12.6	VOLTS
HEATER CURRENT	150	150	MA .
PLATE VOLTAGE	100	250	VOLTS
GRID VOLTAGE	-1	-2	VOLTS
PLATE CURRENT	0.5	1.2	MA.
PLATE RESISTANCE	80 000	62 500	OHMS
TRANSCONDUCTANCE	1 250	1 600	MHOS
AMPLIFICATION FACTOR	100	100	

PLATE 2338 FEB. 1 1950

12BK6 (6BK6,26BK6)



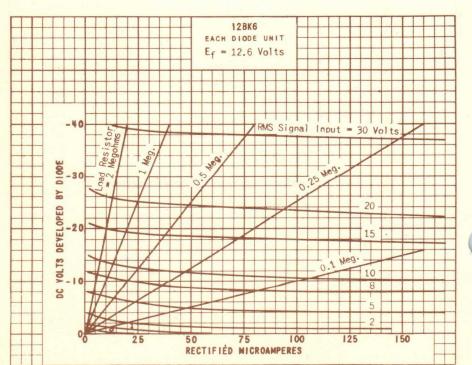
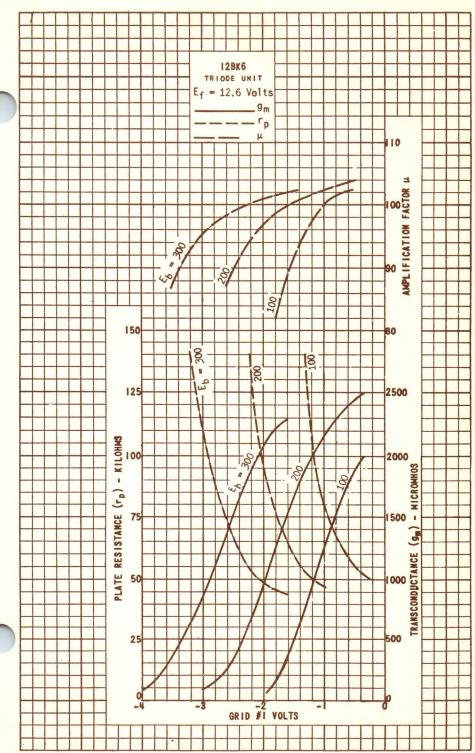


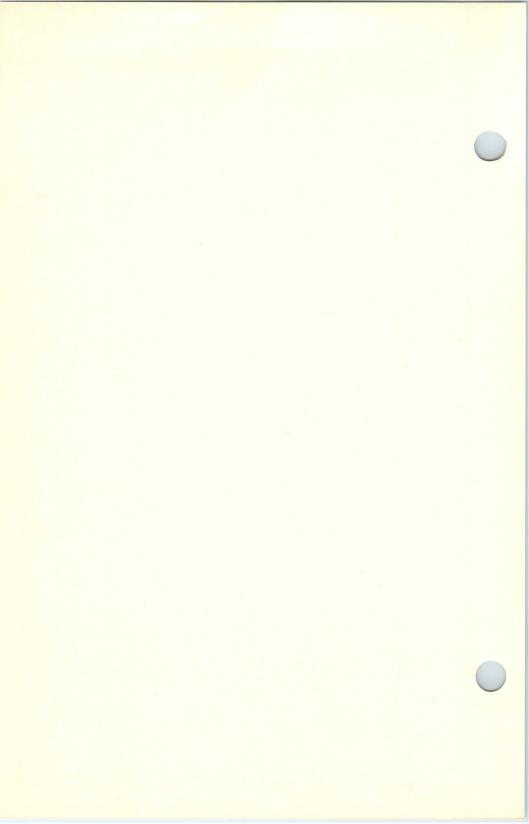
PLATE 2339 FEB. 1 1950

(6ВК6,26ВК6) 12ВК6



PRINTEB IN U. S. A.

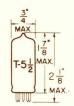
PLATE 2340 FEB. 1 1950



TUNG-SOL

PENTODE

MINIATURE TYPE



GLASS BULB

MINIATURE BUTTON

7 PIN BASE ET-1

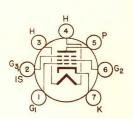
OUTLINE DRAWING JEDEC 5-2 COATED UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 0.15 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW BASING DIAGRAM JEDEC 78K

THE 12BL6 IS A REMOTE CUT-OFF PENTODE WITH A UNIPOTENTIAL CATHODE IN THE 7-PIN MINIATURE CONSTRUCTION. IT IS INTENDED FOR USE AS AN RF OR IF AMPLIFIER WHERE THE HEATER, PLATE AND SCREEN GRID POTENTIALS ARE OBTAINED DIRECTLY FROM AN AUTOMOTIVE BATTERY.

DIRECT INTERELECTRODE CAPACITANCES

SHIELD #			
0.006	pf		
5.5	pf		
4.8	pf		
	SHIELD ⊕ 0.006 5.5		

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

MAXIMUM HEATER-CATHODE VOLTAGE	±30	VOLTS
MAXIMUM PLATE VOLTAGE	30	VOLTS
MAXIMUM GRID #2 VOLTAGE	30	VOLTS
MAXIMUM CATHODE CURRENT	20	MA.
MAXIMUM GRID #1 CIRCUIT RESISTANCE	10	MEGOHMS

THIS TUBE IS INTENDED TO BE USED IN AUTOMOTIVE SERVICE FROM A NOMINAL 12 VOLT BATTERY SOURCE. THE HEATER IS THEREFORE DESIGNED TO OPERATE OVER THE 10.0 TO 15.9 VOLTAGE RANGE ENCOUNTERED IN THIS SERVICE. THE MAXIMUM RATINGS OF THE TUBE PROVIDE FOR AN ADEQUATE SAFETY FACTOR SUCH THAT THE TUBE WILL WITHSTAND THE WIDE VARIATION IN SUPPLY VOLTAGES.

⊕WITH SHIELD #316.

INDICATES A CHANGE.

TUNG-SOL -

CONTINUED FROM PRECEDING PAGE

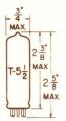
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

PLATE VOLTAGE	12.6	VOLTS
GRID #3 VOLTAGE*	0	VOLTS
GRID #2 VOLTAGE	12.6	VOLTS
GRID #1 VOLTAGE A	-0.65	VOLTS
PLATE CURRENT	1 350	MAMPS
GRID #2 CURRENT	500	MAMPS
PLATE RESISTANCE (APPROX.)	.5	MEGOHM
TRANSCONDUCTANCE	1 350	μMH0S
GRID #1 VOLTAGE (APPROX.)		
FOR $G_m^B = 10 \mu MHOS$	-6.0	VOLTS
GRID #1 & #3 VOLTAGE (APPROX.)		
FOR $G_m^B = 10 \mu MHOS$	-5.0	VOLTS

A AVERAGE CONTACT POTENTIAL DEVELOPED ACROSS A 2.2 MEGOHM GRID RESISTOR.

B FROM GRID #1 TO PLATE.

^{*}CONNECTED TO CATHODE AT SOCKET.

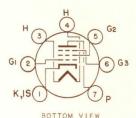


GLASS BULB MINIATURE BUTTON 7 PIN BASE E7-1 OUTLINE DRAWING JEDEC 5-3

AVERAGE CHARACTERISTICS

COATED UNIPOTENTIAL CATHODE GATED-BEAM DISCRIMINATOR FOR FM AND INTERCARRIER TELEVISION RECEIVERS

ANY MOUNTING POSITION



BASING DIAGRAM JEDEC 7DF

THE 12BN6 IS A GATED BEAM DISCRIMINATOR TUBE USING THE MINIATURE CON-STRUCTION. IT IS DESIGNED TO PERFORM THE COMBINED OPERATION OF DETECTOR AND AUDIO-VOLTAGE AMPLIFIER IN FM RECEIVERS. A UNIQUE DESIGN, MAKING USE OF THE ELECTROSTATIC BEAM DEFLECTION PRINCIPLE, RESULTS IN VERY EFFICIENT LIMITING AS WELL AS PROVIDING FOR FM DETECTOR AND AMPLIFICATION.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT, EXTERNAL SHIELD

GRID	#1	TO	ALL	4.2	pf
GRID	#3	TO	ALL	3.3	pf
GRID	#1	TO	GRID #3 (MAX.)	0.004	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

12.6 VOLTS

150

MA.

HEATER SUPPLY LIMITS:		
CURRENT OPERATION	150±15	MA.
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC	100	VOLTS
TOTAL DC AND PEAK	200	VOLTS
HEATER WARM-UP TIME (APPROX.)*	11	SECONDS

*HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLITING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE MOMINAL HEATER OPERATING RESISTANCE.

TUNG-SOL .

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS -

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

PLATE SUPPLY VOLTAGE	330	VOLTS
GRID VOLTAGE	110	VOLTS
PEAK POSITIVE LIMITER-GRID VOLTAGE	60	VOLTS
DC CATHODE CURRENT	13	MA.

TYPICAL OPERATING CHARACTERISTICS -

LIMITER-DISCRIMINATOR SERVICE

INPUT-SIGNAL CENTER FREQUENCY FREQUENCY DEVIATION	10.7 ±75	10.7 ±75	4.5 ±25	MEGACYCLES KCYCLES
PLATE-SUPPLY VOLTAGE	85	285	270	VOLTS
PLATE VOLTAGE	63	122	121	VOLTS
ACCELERATOR VOLTAGE	55	100	100	VOLTS
		200	200-400	
CATHODE-BIAS RESISTOR	200-400	200-400	200-400	OHMS
(VARIABLE) A				
PLATE LOAD RESISTOR	85000	330000	330000	OHMS
PLATE LINEARITY RESISTOR	470	1500	1000	OHMS
INTEGRATING CAPACITOR	0.002	0.001	0.001	μf
COUPLING CAPACITOR	0.25	0.01	0.25	μf
MINIMUM SIGNAL VOLTAGE FOR	~		>	
LIMITING ACTION, RMS B	1.25	1.25	1.25	VOLTS
DC PLATE CURRENT	0.25	0.49	0.44	MA.
ACCELERATOR CURRENT	4.1	9.8	10	MA.
INPUT SIGNAL LEVEL FOR	7.1	5.0		
AM REJECTION ADJUSTMENTA	1.25	2.0	2.0	VOLTS
	31	20	25	DECIBELS
The file of the fi				
AM REJECTION AT Esig=3.0V., RMS	30	-29	-30	DECIBELS
TOTAL HARMONIC DISTORTION	2.0	.1.6	1.8	PERCENT
PEAK AUDIO OUTPUT VOLTAGE	6.0	16.6	16.8	VOLTS

ATHE CATHODE RESISTOR SHOULD BE ADJUSTED FOR MAXIMUM AM REJECTION IN THE OUTPUT OF LIMITER-DISCRIMINATOR STAGE AT THE SPECIFIED SIGNAL LEVEL. AM REJECTION IS MEASURED WITH AN APPLIED SIGNAL CONTAINING 30-PERCENT AMPLITUDE MODULATION AND 30-PERCENT FREQUENCY MODULATION.

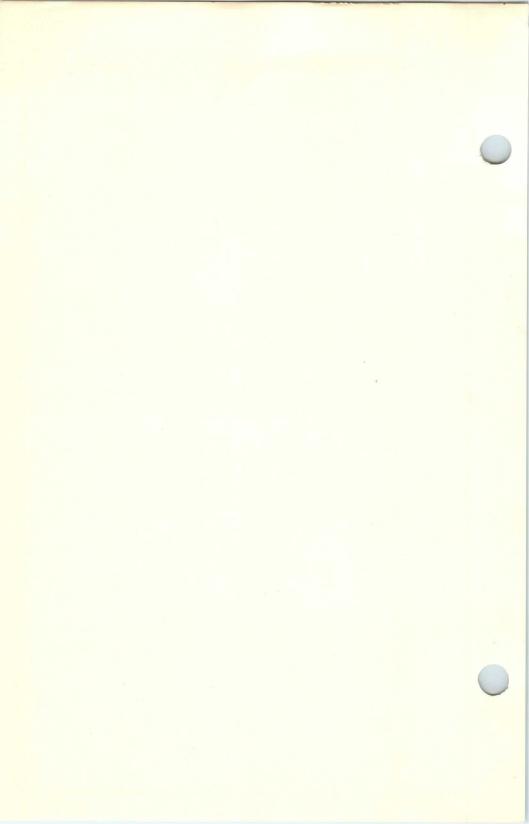
ADEQUATE SHIELDING BETWEEN COMPONENTS OF THE LIMITER GRID AND THE QUADRATURE GRID MUST BE USED TO INSURE PROPER PHASING OF THE VOLTAGE DEVELOPED ON THE QUADRATURE GRID.

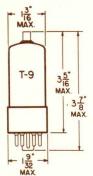
STANDARD DE-EMPHASEIS REQUIREMENTS FOR FM ARE INCLUDED.

THE Q OF THE QUADRATURE GRID CIRCUIT SHOULD BE HIGH ENOUGH TO DEVELOP A MINIMUM OF 4 VOLTS (RMS) SIGNAL WITH 2 VOLTS (RMS) OF THE CENTER-FREQUENCY SIGNAL APPLIED TO THE LIMITER GRID. IT IS RECOMMENDED THAT THE COIL BE SHUNTED BY A MINIMUM OF 10 11/16. THE CAPACITANCE MAY BE COMPOSED OF TUBE INPUT CAPACITANCE, STRAY CAPACITANCE, AND DISTRIBUTED CAPACITANCE, AS WELL AS PHYSICAL CAPACITANCE.

BAT SIGNAL LEVELS ABOVE SPECIFIED VALUE, LIMITING IS WITHIN ±2 DECIBELS.





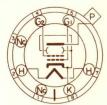


COATED UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 0.6 AMP. AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

7 PIN OCTAL

GLASS BULB

THE 12BQ6GT IS A BEAM PENTODE DESIGNED FOR USE IN 600 MA, SERIES HEATER OPERATED RECEIVERS. IT IS SPECIFICALLY INTENDED FOR USE AS A HORIZONTAL DEFLECTION AMPLIFIER IN TELEVISION RECEIVERS USING MAGNETIC DEFLECTION. THE PLATE IS BROUGHT OUT TO A TOP CAP FOR ISOLATION OF THE HIGH VOLTAGE AND CONVENIENCE IN A CIRCUIT LAYOUT. ITS ELECTRICAL CHARACTERISTICS ARE SUCH AS TO PROVIDE GOOD PERFORMANCE WHERE THE SUPPLY VOLTAGES ARE LIMITED. THERMAL CHARACTERISTICS OF THE HEATER HAVE BEEN CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TUBES WHICH ARE SIMILARLY CONTROLLED. EXCEPT FOR HEATER RATINGS, IT IS IDENTICAL TO THE 6BQ6GT.

DIRECT INTERELECTRODE CAPACITANCES

GRID #1 TO PLATE: (G, TO P)	0.6	μμ f
INPUT: G_A TO $(H+K+G_2+BP)$	15	μμf
OUTPUT: P TO (H+K+G2+BP)	7.5	uuf

RATINGS

INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HORIZONTAL DEFLECTION AMPLIFIERA

HEATER VOLTAGE	12.6	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE: TOTAL DC AND PEAK	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE:		
DC	100	VOLTS
TOTAL DC AND PEAK	200	VOLTS
MAXIMUM DC PLATE SUPPLY VOLTAGE (BOOST + POWER SUPPLY)	550	VOLTS
MAXIMUM PEAK POSITIVE PLATE VOLTAGE (ABSOLUTE MAXIMUM)	5 500	VOLTS
MAXIMUM PEAK NEGATIVE PLATE VOLTAGE	1 250	VOLTS
MAXIMUM PLATE DISSIPATION B	11	WATTS
MAXIMUM PEAK NEGATIVE GRID #1 VOLTAGE	300	VOLTS
MAXIMUM DC GRID #2 VOLTAGE	175	VOLTS
MAXIMUM GRID #2 DISSIPATION	2.5	WATTS
MAXIMUM AVERAGE CATHODE CURRENT	110	MA.
MAXIMUM PEAK CATHODE CURRENT	400	MA.
MAXIMUM GRID #4 CIRCUIT RESISTANCE	0.47	MEGOHM
MAXIMUM BULB TEMPERATURE (AT HOTTEST POINT)	2200	CENTIGRADE
HEATER WARM-UP TIME (APPROX.)*	11.0	SECONDS
Δ		

AFOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCASTING STATIONS; FEDERAL COMMUNICATIONS COMMISSION". THE DUTY CYCLE OF THE VOLTAGE PULSE NOT TO EXCENT OF A SCANNING CYCLE OF

BIN STAGES OPERATING WITH GRID-LEAK BIAS, AN ADEQUATE CATHODE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

*HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 ITHES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING

TUNG-SOL -

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER

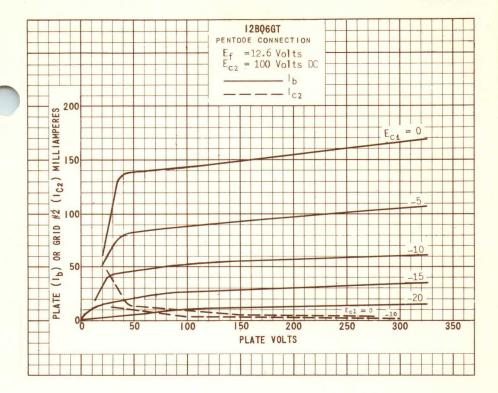
1		
HEATER VOLTAGE	12.6	VOLTS
HEATER CURRENT	0.6	AMP.
PENTODE CONNECTION: C		
PLATE CURRENT	55	MA.
GRID #2 CURRENT	2.1	MA.
TRANSCONDUCTANCE	5 500	имноѕ
PLATE RESISTANCE	20 000	OHMS
ZERO-BIAS: D		
PLATE CURRENT	225	MA.
GRID #2 CURRENT	25	MA.
CUT-OFF: E		
GRID #1 VOLTAGE (APPROX.)	-46	VOLTS
TRIODE AMPLIFICATION FACTOR F	4.3	
$C_{\text{WITH Eb}} = 250 \text{VOLTS}$, $E_{\text{C2}} = 150 \text{VOLTS}$ AND $E_{\text{C1}} = -22.5 \text{VOLTS}$.		

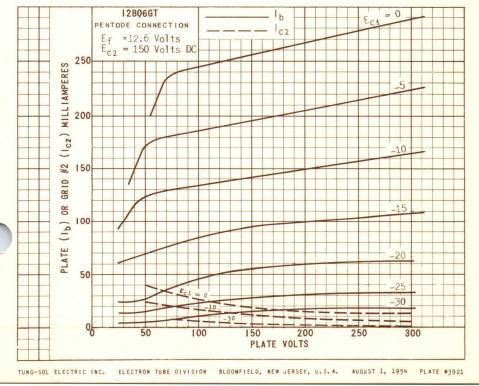
 $D_{\text{WITH E}_{b}} = 60 \text{ VOLTS AND E}_{C2} = 150 \text{ VOLTS}.$

INDICATES A CHANGE OR ADDITION.

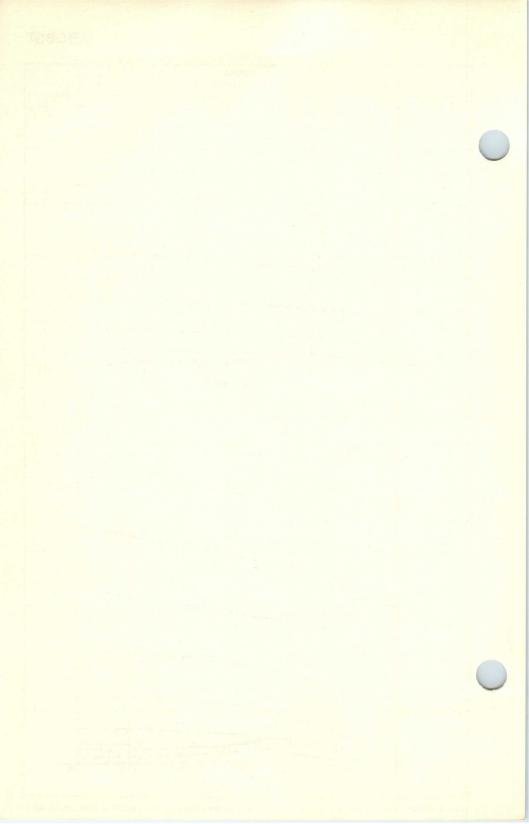
 $[\]rm E_{FOR~I\,b} = 1$ ma. WITH $\rm E_b = 250$ VOLTS and $\rm E_{C2} = 150$ VOLTS

 $F_{\text{WITH E}_{\text{b}}} = E_{\text{C2}} = 150 \text{ VOLTS AND E}_{\text{C1}} = -22.5 \text{ VOLTS.}$



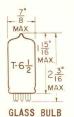


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DOUBLE DIODE TRIODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER

SERIES 12.6 VOLTS 0.225 AMP. 0.45 AMP.

PARALLEL 6.3 VOLTS

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW MINIATURE BUTTON 9 PIN BASE

THE 12BR7 CONTAINS TWO HIGH PERVEANCE DIODES AND A MEDIUM-MU TRIODE IN ONE ENVELOPE USING THE 9 PIN MINIATURE CONSTRUCTION. THE DIODES HAVE A COMMON CATHODE WHICH IS INDEPENDENT OF THE TRIODE CATHODE.

DIRECT INTERELECTRODE CAPACITANCES WITH SHIELD #315

TRIODE INPUT: G TO (H+K)	2.8	uu f
TRIODE OUTPUT: P TO (H+K)	1.0	ии f
GRID TO PLATE: G TO P	1.9	ии f
DIODE INPUT: D TO (K+H) EACH DIODE	2.0	uu f

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

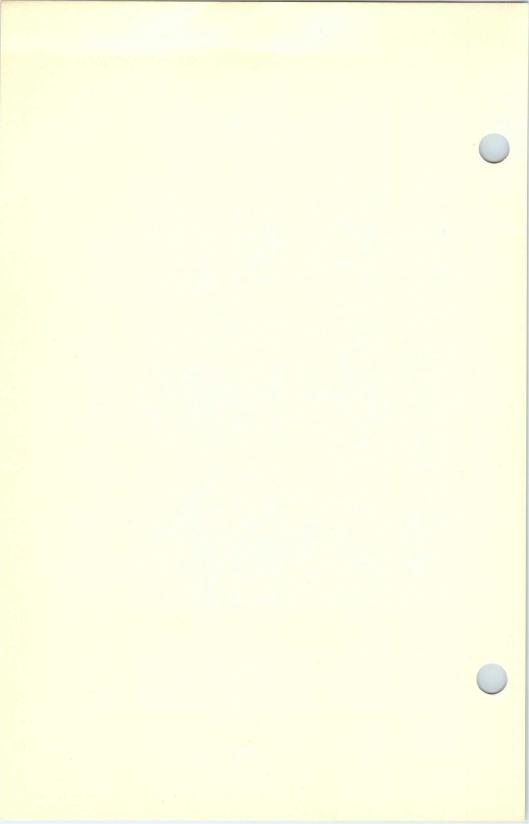
HEATER VOLTAGE	12.6 6	.3 VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE		
DC AND PEAK	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC	100	VOLTS
DC AND PEAK	200	VOLTS
MAXIMUM NEGATIVE DC GRID VOLTAGE	-50	VOLTS
MAXIMUM PLATE VOLTAGE	300	VOLTS
MAXIMUM PLATE DISSIPATION	2.5	WATTS
MAXIMUM PEAK INVERSE DIODE VOLTAGE	300	VOLTS
MAXIMUM PEAK DIODE CURRENT	60	MA.

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER - TRIODE SECTION

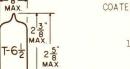
HEATER VOLTAGE HEATER CURRENT	12.6	6.3	12.6	6.3	VOLTS
PLATE VOLTAGE		100		250	VOLTS
CATHODE BIAS RESISTOR		270		200	OHMS
PLATE CURRENT		3.7		10	MA.
PLATE RESISTANCE	15	000	10	900	OHMS
TRANSCONDUCTANCE	4	000	5	500	MHOS
AMPLIFICATION FACTOR		60		60	
GRID VOLTAGE (APPROX.) FOR I	b = 10 цА.	-5		-12	VOLTS
	DIODE SECTIO	N			

AVERAGE DIODE CURRENT WITH 5 Vdc APPLIED (EACH SECTION) 17 MA.



DOUBLE DIODE

MINIATURE TYPE



GLASS BULB

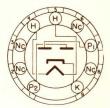
COATED UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 450 MA.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
9 PIN BASE
900

THE 12BW4 IS A MINIATURE CATHODE TYPE FULL WAVE RECTIFIER FEATURING RELATIVELY HIGH OUTPUT CURRENT CAPABILITIES. EXCEPT FOR HEATER RATINGS IT IS IDENTICAL TO THE 6BW4.

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM RECTIFIER SERVICE

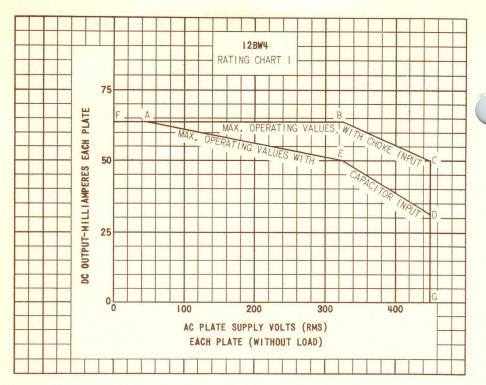
HEATER VOLTAGE	12.6	VOLTS
MAXIMUM PEAK INVERSE PLATE VOLTAGE	1275	VOLTS
MAXIMUM AC PLATE SUPPLY VOLTAGE EACH PLATE (RMS) (SEE RATING CHART #1)	450	VOLTS
MAXIMUM DC OUTPUT CURRENT SEE RATING	CHART #1	
MAXIMUM STEADY STATE PEAK PLATE CURRENT EACH PLATE (SEE RATING CHART #2)	350	MA.
MAXIMUM TRANSIENT PEAK PLATE CURRENT EACH PLATE (SEE RATING CHART #3)	2.0	AMP.
MAXIMUM HEATER CATHODE VOLTAGE:	450	VOL TS

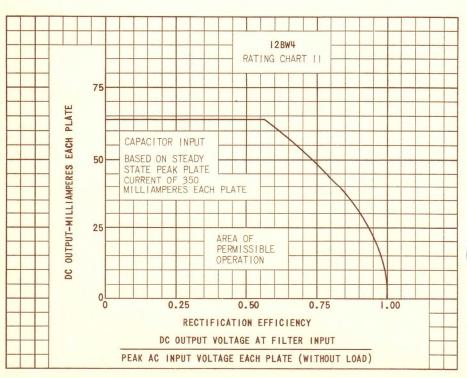
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

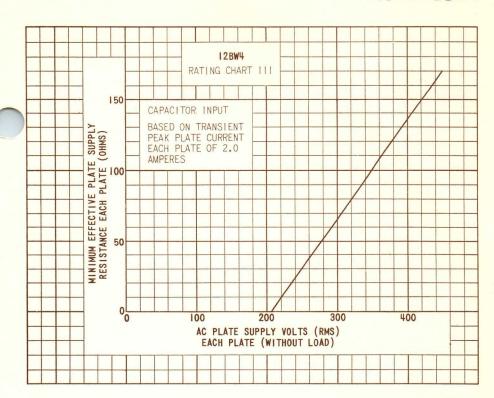
FULL WAVE RECTIFIER

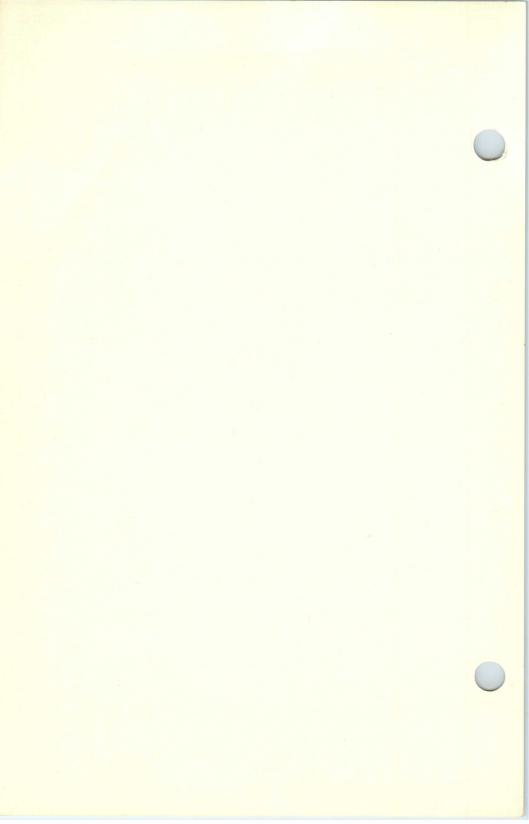
	CAPACITOR INPUT FILTER	CHOKE INPUT FILTER	
HEATER VOLTAGE	12.6	12.6	VOLTS
HEATER CURRENT	450	450	MA.
AC PLATE SUPPLY VOLTAGE EACH PLATE (RMS) A	325	450	VOLTS
FILTER INPUT CAPACITOR	40	-	μf
FILTER INPUT CHOKE -		10	HENRYS
EFFECTIVE PLATE SUPPLY RESISTANCE EACH PLATE	82	-	OHMS
DC OUTPUT CURRENT	100	100	MA.
DC OUTPUT VOLTAGE AT FILTER INPUT	330	360	VOLTS
TUBE VOLTAGE DROP TUBE CONDUCTING: 100 MA. EACH PLATE	40	40	VOLTS

AAC PLATE VOLTAGE IS MEASURED WITHOUT LOAD.





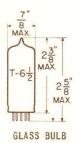




- TUNG-SOL

PENTODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 0.15 AMP.

AC OR DC

ANY MOUNTING POSITION



9 A Q

THE 12BX6 IS A PENTODE IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED FOR USE AS AN R.F., I.F. OR A VIDEO AMPLIFIER OR MIXER IN TELEVISION RECEIVERS. EXCEPT FOR HEATER RATINGS, THE 12BX6 IS IDENTICAL TO THE 3BX6.

DIRECT INTERELECTRODE CAPACITANCES

GRID #1 TO ALL OTHER ELEMENTS EXCEPT ANODE	7.5	μμ f
PLATE TO ALL OTHER ELEMENTS EXCEPT GRID #1	3.3	μμf
PLATE TO GRID #1 (MAX.)	0.007	μμ f
PLATE TO CATHODE (MAX.)	0.012	μμ f
GRID #2 TO ALL OTHER ELEMENTS	5.4	μμ f
GRID #2 TO GRID #1	2.6	$\mu\mu$ f
GRID #1 TO HEATER (MAX.)	0.15	μμf
CATHODE TO HEATER	5	HH f

RATINGS

INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER VOLTAGE	12.6	VOLTS
MAXIMUM PLATE VOLTAGE WITHOUT CURRENT	550	VOLTS
MAXIMUM PLATE VOLTAGE	250	VOLTS
MAXIMUM PLATE DISSIPATION	2.5	WATTS
MAXIMUM GRID #2 VOLTAGE WITH COLD CATHODE	550	VOLTS
MAXIMUM GRID #2 VOLTAGE	250	VOLTS
MAXIMUM GRID #2 DISSIPATION	0.7	WATTS
MAXIMUM GRID #2 DISSIPATION AT PLATE DISSIPATION < 1.8 WATTS	0.9	WATTS
MAXIMUM CATHODE CURRENT	15	MAMPS
MAXIMUM GRID #4 CIRCUIT RESISTANCE	1	MEGOHM
MAXIMUM VOLTAGE BETWEEN CATHODE AND HEATER	150	VOLTS
MAXIMUM CIRCUIT RESISTANCE BETWEEN CATHODE AND HEATER 2	0 000	OHMS

TUNG-SOL

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

R.F. AMPLIFIER

HEATER VOLTAGE	12.6	12.6	12.6	VOLTS	
HEATER CURRENT	0.15	0.15	0.15	AMP.	
PLATE VOLTAGE	170	200	250	VOLTS	
GRID #3 VOLTAGE	0	0	0	VOLT	
GRID #2 VOLTAGE	170	200	250	VOLTS	
GRID #1 VOLTAGE	-2.0	-2.55	-3.5	VOLTS	
PLATE CURRENT	10	10	10	MAMPS	
GRID #2 CURRENT	2.5	2.6	2.8	MAMPS	
TRANSCONDUCTANCE	7400	7100	6800	имноs	
PLATE RESISTANCE	0.5	0.55	0.65	MEGOHM	
AMPLIFICATION FACTOR OF					
GRID #2 WITH RESPECT TO GRID #1	50	50	50		
EQUIVALENT NOISE RESISTANCE	1000	1100	1200	OHMS	
INPUT RESISTANCE AT FREQUENCY =					
50 MC (PIN 1 CONNECTED TO PIN 3)	10 000	12 000	15 000	OHMS	

OBSERVATION

WHEN USING THE 12BXÉ AS VIDEO AMPLIFIER THE AMPLIFICATION BETWEEN THE INPUT GRID OF THE 12BXÉ AND THE INPUT OF THE CATHODE RAY TUBE SHOULD NOT EXCEED A VALUE OF 25, IN ORDER TO PREVENT MICROPHONIC EFFECT.

AMD.3AF



9 PIN BASE E9-1 OUTLINE DRAWING JEDEC 6-3

PENTODE

MINIATURE TYPE

COATED UNIPOTENTIAL CATHODE

HEATER

SERIES 12.6±1.3 VOLTS 300 MA PARALLEL 6.3 VOLTS 600±40 MA.

AC OR DC
ANY MOUNTING POSITION

FOR 12.6 VOLT OPERATION APPLY HEATER VOLTAGE BETWEEN PINS \$5 AND \$4. FOR 6.3 VOLT OPERATION APPLY HEATER VOLTAGE BETWEEN PIN \$6 AND PINS \$4 AND \$5 CONNECTED TOGETHER.
CONTROL OF HEATER CHARACTERISTICS APPLIES ONLY TO 500 MA. HEATER CONNECTION.

BOTTOM VIEW

BASING DIAGRAM
JEDEC 9BF

THE 12BY7A IS A HIGH TRANSCONDUCTANCE PENTODE USING THE 9-PIN MINIATURE CONSTRUCTION. IT IS DESIGNED FOR SERVICE AS A VIDEO AMPLIFIER WHERE THE PLATE SUPPLY VOLTAGES IS LOW AND LARGE OUTPUT VOLTAGES ARE REQUIRED WITH LOW VALUE OF PLATE LOAD RESISTORS. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED.

DIRECT INTERELECTRODE CAPACITANCES

GRID #1	TO	PLATE: G1 TO P	0.063	pf
INPUT:	G1	TO $(H+K+G_2+G_3&IS)$	10.2	pf
OUTPUT:	P	TO $(H+K+G_2+G_3&IS)$	3.5	pf

RATINGS INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC	100	VOLTS
TOTAL DC AND PEAK	200	VOLTS
MAXIMUM PLATE SUPPLY VOLTAGE	→ 330	VOLTS
MAXIMUM NEGATIVE DC GRID #1 VOLTAGE	→ 55	VOLTS
MAXIMUM POSITIVE DC GRID #1 VOLTAGE	0	VOLTS
MAXIMUM GRID #3 VOLTAGE	U	VOLTS
MAXIMUM GRID #2 VOLTAGE	→ 190	VOLTS
MAXIMUM PLATE DISSIPATION	→ 6.5	WATTS
MAXIMUM GRID #2 DISSIPATION	→ 1.2	WATTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE:	0.25	MEGOHM
MAFIXED BIAS OPERATION	0.25	MEGOHM
CATHODE BIAS OPERATION	1	MEGOHM
HEATER WARM-UP TIME (APPROX.).	11.0	SECONDS

AHEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

- INDICATES A CHANGE.

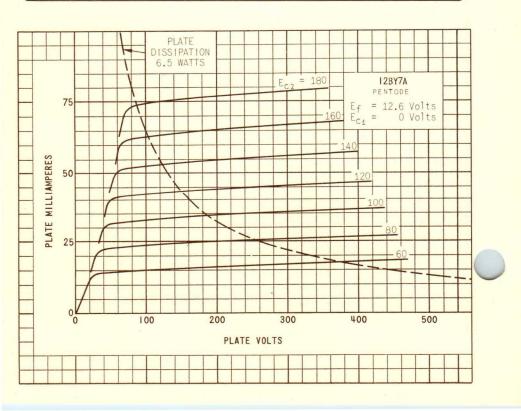
- TUNG-SOL .

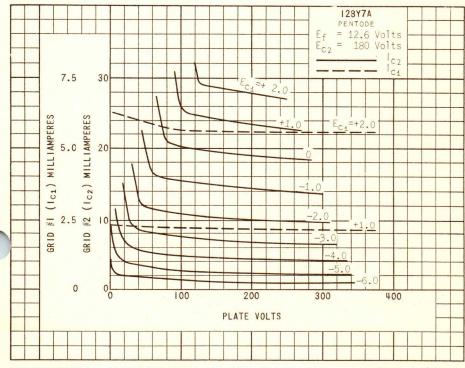
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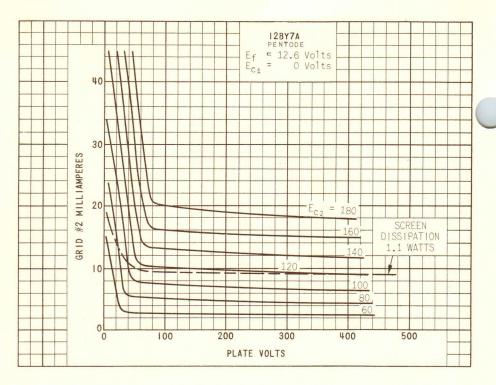
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

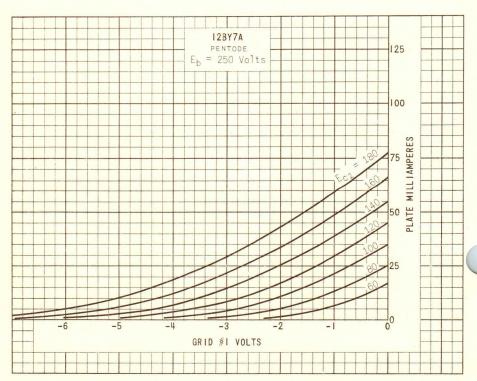
CLASS A7 AMPLIFIER

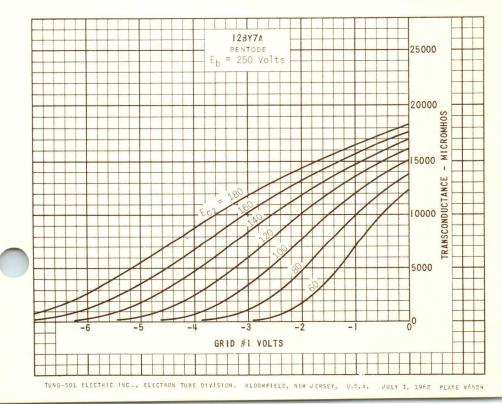
PLATE VOLTAGE	250	VOLTS
GRID #2 VOLTAGE	180	VOLTS
CATHODE RESISTOR	100	OHMS
PLATE CURRENT	26	MA.
GRID #2 CURRENT	5.7	MA.
PLATE RESISTANCE	93 000	OHMS
TRANSCONDUCTANCE	11 000	μMH0S
AMPLIFICATION FACTOR	1 035	
GRID #1 VOLTAGE FOR Ib = 20 MA.	11.6	VOLTS
TRIODE AMPLIFICATION FACTOR	28.5	



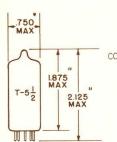












GLASS BULB

MINIATURE BUTTON

7 PIN BASE E7-1

OUTLINE DRAWING JEDEC 5-2

PENTODE

MINIATURE TYPE

COATED UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 0.15 AMP.
AC OR DC

ANY MOUNTING POSITION

H 3 5 P 6 G2

BOTTOM VIEW BASING DIAGRAM JEDEC 7CM

THE 12BZ6 IS A HIGH TRANSCONDUCTANCE, SEMI-REMOTE CUT-OFF, PENTODE AMPLIFIER. IT IS DESIGNED FOR SERVICE AS AN AUTOMATIC GAIN CONTROLLED IF → AMPLIFIER IN 150 MA. SERIES HEATER OPERATED TELEVISION RECEIVERS. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED. WITH THE EXCEPTION OF HEATER RATINGS, ITS CHARACTERISTICS ARE IDENTICAL TO THE 6BZ6.

DIRECT INTERELECTRODE CAPACITANCES

	WITH SHIELD	SHIELD	
GRID TO PLATE: G, TO P (MAX.)	.015	.025	pf
INPUT: G4 TO (H+K+G2+G3+1S)	7.0	7.0	pf
OUTPUT: P TO (H+K+G2+G3+1S)	3.0	2.0	pf

AEXTERNAL SHIELD #316 CONNECTED TO CATHODE AT SOCKET.

RATINGS B

HEATER VOLTAGE	12.6	VOLTS
MAXIMUM HEATER CATHODE VOLTAGE: HEATER NEGATIVE WITH RESPECT TO CATHODE TOTAL DC AND PEAK	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE DC TOTAL DC AND PEAK	100 200	VOLTS VOLTS
MAXIMUM PLATE VOLTAGE	330	VOLTS
MAXIMUM GRID #2 VOLTAGE	SEE RATING	CURVE
MAXIMUM PLATE DISSIPATION	2.3	WATTS
MAXIMUM GRID #2 DISSIPATION	0.55	WATT
MAXIMUM GRID #2 SUPPLY VOLTAGE	330	VOLTS
MAXIMUM POSITIVE DC GRID #1 VOLTAGE	0	VOLTS

-- INDICATES A CHANGE.

TUNG-SOL -

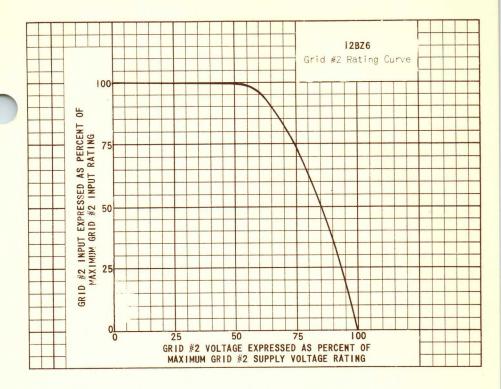
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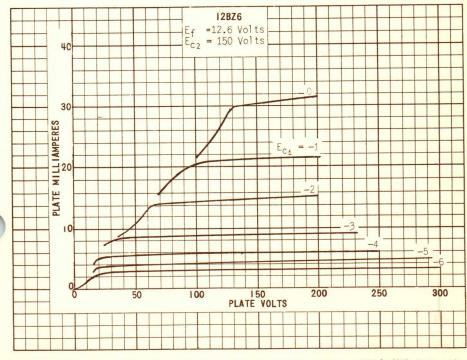
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER

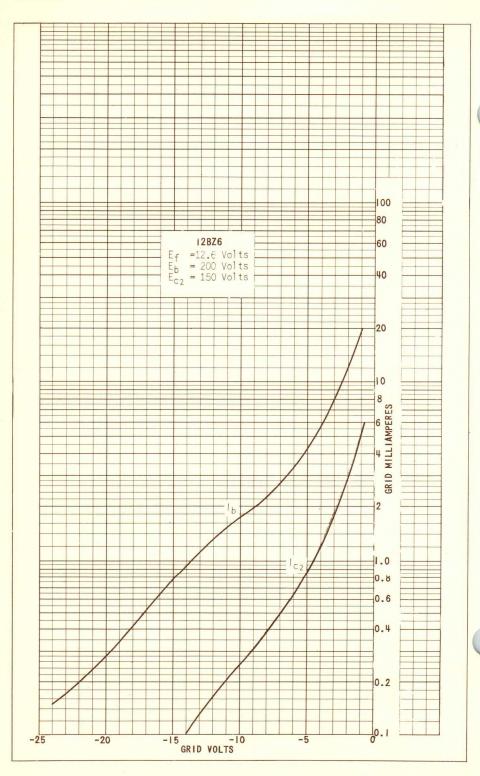
PLATE VOLTAGE	125		VOLTS.
GRID #2 VOLTAGE	125		VOLTS
GR HD #3 VOLTAGE PIN #7 CONNECTED	TO PIN #2	AT S	OCKET
CATHODE BIAS RESISTOR	56		OHMS
PLATE RESISTANCE (APPROX.)	0.26		MEGOHM
TRANSCONDUCTANCE	8 000		MHOS
PLATE CURRENT	14		MA.
GRID #2 CURRENT	3.6		MA.
GRID #1 VOLTAGE (APPROX.) FOR Gm = 50 MMHOS	-19		VOLTS
TRANSCONDUCTANCE (Ec1=-4.5 V., Rk=0)	700		μMHOS.

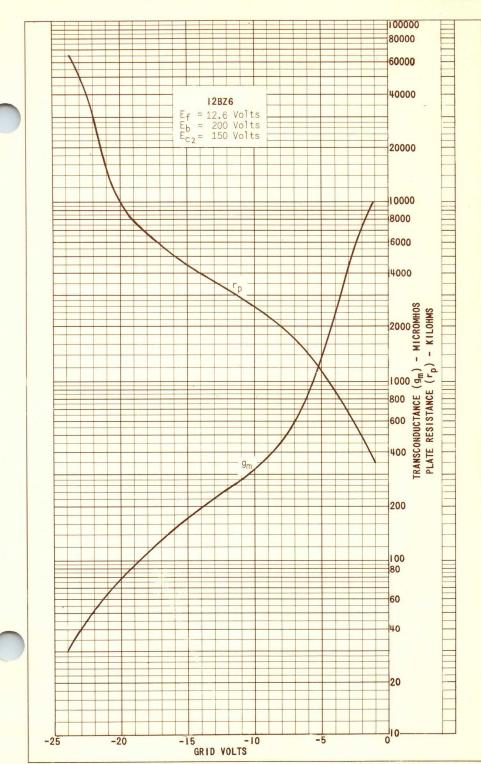
B
DESIGN MAXIMUM RATINGS ARE THE LIMITING VALUES EXPRESSED WITH RESPECT TO BOGIE TUBES AT WHICH
SATISFACTORY TUBE LIFE CAN BE EXPECTED TO OCCUR IN THE TYPES OF SERVICE FOR WHICH THE TUBE IS
RATED. THEREFORE, THE EQUIPMENT DESIGNER MUST ESTABLISH THE CIRCUIT DESIGN SO THAT INITIALLY
AND THROUGHOUT EQUIPMENT LIFE NO DESIGN MAXIMUM VALUE IS EXCEDED WITH A BOGIE TUBE UNDER THE
WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, AND ENVIRONMENTAL CONDITIONS.



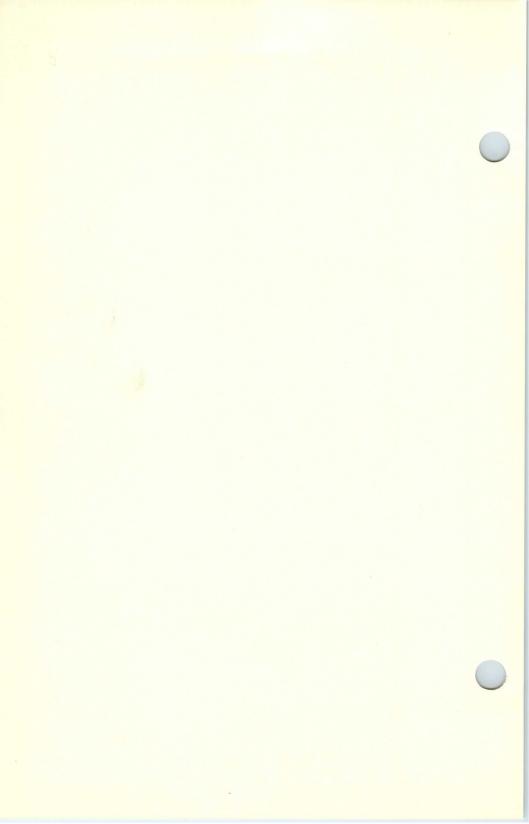


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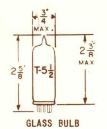




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BEAM PENTODE
MINIATURE TYPE



GRID #1 TO PLATE

INPUT

COATED UNIPOTENTIAL CATHODE
HEATER

12.6 VOLTS 0.6±6% AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
7 PIN BASE
7CV

0.6

13.0

8.5

ии f

циf

ии f

THE 12C5 IS A BEAM POWER AMPLIFIER USING THE 7 PIN MINIATURE CONSTRUCTION. BECAUSE OF ITS HIGH POWER SENSITIVITY AT LOW PLATE-SCREEN VOLTAGE IT IS PARTICULARLY ADAPTABLE TO AC/DC RECEIVER APPLICATIONS IN 600 MA. SERIES HEATER OPERATED TELEVISION RECEIVERS. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED. EXCEPT FOR HEATER RATINGS AND HEATER WARM-UP TIME IT IS IDENTICAL TO THE 50C5.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

RATINGS		
INTERPRETED ACCORDING TO DESIGN CENTER SYSTE	м	
HEATER VOLTAGE	12.6	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	200←	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC	100	VOLTS
TOTAL DC AND PEAK	200	VOLTS
MAXIMUM PLATE VOLTAGE	135	VOLTS
MAXIMUM GRID #2 VOLTAGE	117	VOLTS
MAXIMUM PLATE DISSIPATION	6←	WATTS
MAXIMUM GRID #2 DISSIPATION	1.25	WATTS
MAXIMUM POSITIVE DC GRID #4 VOLTAGE	0*	VOLTS
MAXIMUM GRID #4 CIRCUIT RESISTANCE:		
CATHODE BIAS	0.5	MEGOHM
FIXED BIAS	0.1	MEGOHM
MAXIMUM BULB TEMPERATURE		
(AT HOTTEST POINT ON BULB SURFACE)	220 -	°C
HEATER WARM-UP TIME (APPROX.)B	11.0	SECONDS

BHEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

INDICATES A CHANGE.

^{*} INDICATES AN ADDITION

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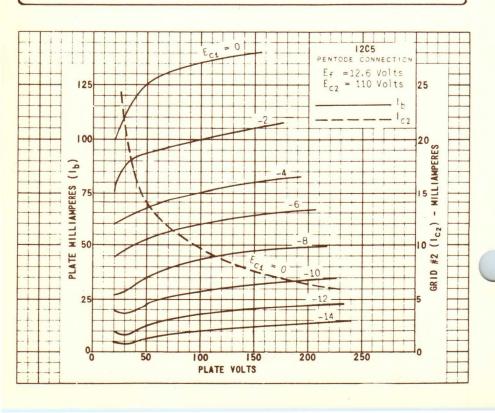
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

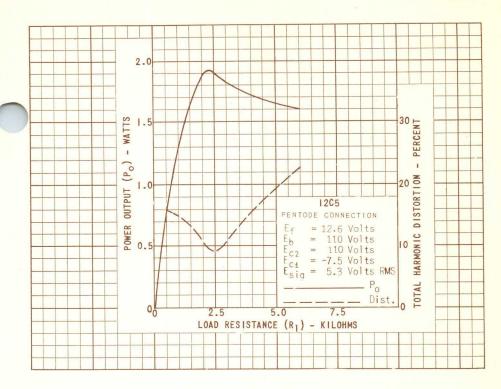
CLASS A1 AMPLIFIER - AF POWER AMPLIFIER

HEATER VOLTAGE	12.6	VOLTS
HEATER CURRENT	0.6	AMP.
PLATE VOLTAGE	120 ←	VOLTS
GRID #2 VOLTAGE	110	VOLTS
GRID #1 VOLTAGE (CONTROL GRID)	-8 ←	VOLTS
PEAK AF GRID #1 VOLTAGE	8 ←	VOLTS
PLATE RESISTANCE (APPROX.)	10 000	OHMS
TRANSCONDUCTANCE	7 500	имноs
ZERO-SIGNAL PLATE CURRENT	49	MA.
MAXIMUM SIGNAL PLATE CURRENT	50	MA.
ZERO-SIGNAL GRID #2 CURRENT	4	MA.
MAXIMUM SIGNAL GRID #2 CURRENT	8.5	MA.
LOAD RESISTANCE	2 500	OHMS
TOTAL HARMONIC DISTORTION	10 ←	PERCENT
MAXIMUM SIGNAL POWER OUTPUT	2.3 ←	WATTS

ALL ELECTRICAL DATA FOR TYPE 1205 ARE IDENTICAL WITH THOSE OF TYPE 12005.

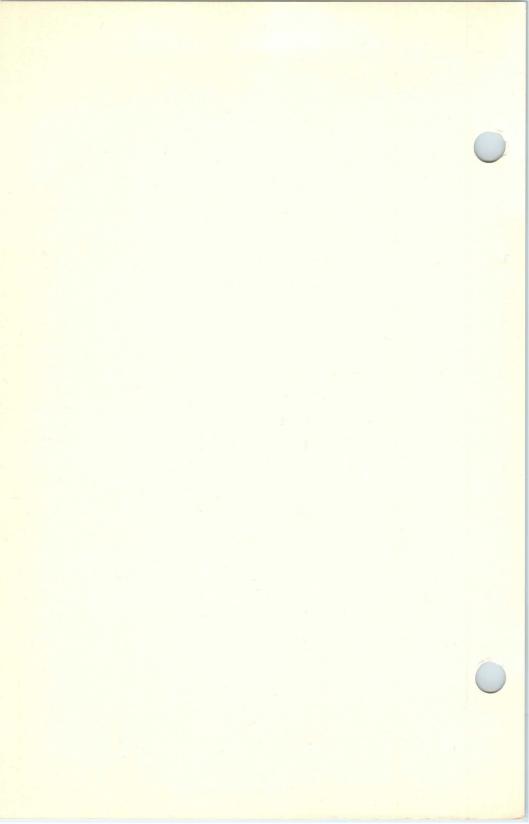
ALL ELECTRICAL DATA EXCEPT HEATER CHARACTERISTICS ARE IDENTICAL WITH THOSE OF TYPES 1205, 2505, 5085, AND 5005.





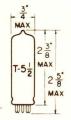
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PLATE 554-3



PENTODE

MINIATURE TYPE



GLASS BULB

COATED UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 0.6 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

MINIATURE BUTTON 7 PIN BASE

7 C V

THE 12CA5 IS A BEAM PENTODE USING THE 7 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED FOR USE IN THE AUDIO-FREQUENCY POWER OUTPUT STAGE OF 600 MA. SERIES HEATER OPERATED TELEVISION AND RADIO RECEIVERS. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED. IT FEATURES HIGH SENSITIVITY AT RELATIVELY LOW PLATE AND SCREEN VOLTAGES. WITH EXCEPTION OF HEATER RATINGS, ITS CHARACTERISTICS ARE IDENTICAL TO THE 6CA5.

DIRECT INTERELECTRODE CAPACITANCES WITH NO EXTERNAL SHIELD

GRID #1 TO PLATE	0.5	μμf
INPUT	15	μμf
OUTPUT	9	μμf

RATINGS

INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER VOLTAGE	12.6	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER POSITIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	200	VOLTS
DC	100	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	300 -	VOLTS
MAXIMUM PLATE VOLTAGE	130	VOLTS
MAXIMUM GRID #2 VOLTAGE	130	VOLTS
MAXIMUM POSITIVE DC GRID #1 VOLTAGE	0	VOLTS
MAXIMUM PLATE DISSIPATION	5.0	WATTS
MAXIMUM GRID #2 DISSIPATION	1.4	WATTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE:		
FIXED BIAS	0.1	MEGOHM
CATHODE BIAS	0.5	MEGOHM
BULB TEMPERATURE AT HOTTEST POINT	180	°C
HEATER WARM-UP TIME (APPROX.)*	11.0	SECONDS

*
HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH
80≴ OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING
OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING
RESISTANCE.

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- INDICATES A CHANGE.

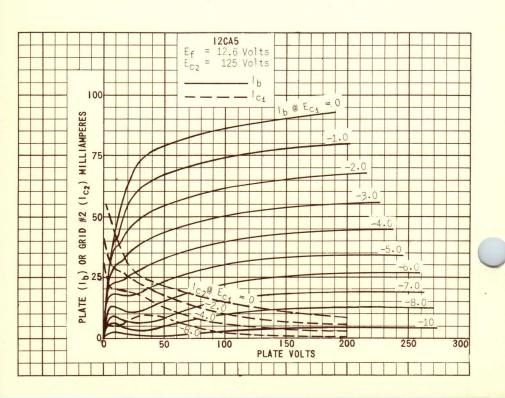
TUNG-SOL -

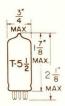
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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER

HEATER VOLTAGE		12.6	VOLTS
HEATER CURRENT		0.6	AMP.
PLATE VOLTAGE	110	125	VOLTS
GRID #2 VOLTAGE	110	125	VOLTS
GRID #1 VOLTAGE	-4.0	-4.5	VOLTS
PEAK AF GRID #1 VOLTAGE	4.0	4.5	VOLTS
PLATE RESISTANCE (APPROX.)	16 000	15 000	OHMS
TRANSCONDUCTANCE	8 100	9 200	MMHOS
ZERO-SIGNAL PLATE CURRENT	32	37	MA.
MAXIMUM SIGNAL PLATE CURRENT (APPRO	x.) 31	36	MA.
ZERO-SJGNAL GRID #2 CURRENT	3.5	4.0	MA.
MAXIMUM SIGNAL GRID #2 CURRENT (APP	ROX.) 7.5	11	MA.
LOAD RESISTANCE	3 500	4 500	OHMS
TOTAL HARMONIC DISTORTION (APPROX.)	5.	6	PERCENT
MAXIMUM SIGNAL POWER OUTPUT	1.1	1.5	WATTS





COATED UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 0.15 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
7 PIN BASE

GLASS BULB

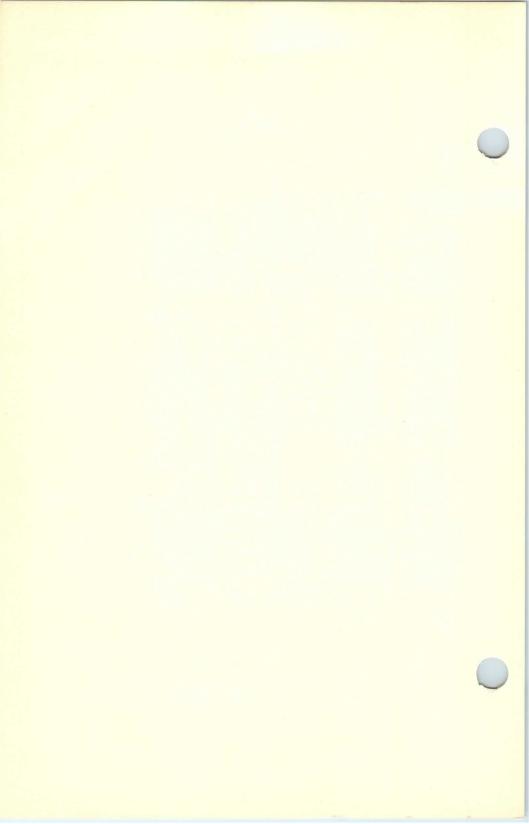
THE 12CR6 IS A COMBINED SINGLE DETECTOR DIODE AND REMOTE CUT-OFF PENTODE WITH A COMMON CATHODE IN THE 7 PIN MINIATURE CONSTRUCTION. THE PENTODE SECTION IS INTENDED FOR USE AS AN AUDIO AMPLIFIER IN WHICH AVC VOLTAGE IS APPLIED TO THE CONTROL GRID FOR IMPROVED OVERALL RECEIVER AVC.

RATINGS
INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER VOLTAGE	12.6	VOLTS
MAXIMUM PLATE VOLTAGE	300	VOLTS
MAXIMUM POSITIVE DC GRID #1 VOLTAGE	0	VOLTS
MAXIMUM GRID #2 VOLTAGE	150	VOLTS
MAXIMUM PLATE DISSIPATION	2.5	WATTS
MAXIMUM GRID #2 DISSIPATION	0.3	WATT
MAXIMUM GRID #1 CIRCUIT RESISTANCE	1	MEGOHM
MINIMUM DIODE CURRENT WITH 10 VOLTS DC APPLIED	2	MA.
MAXIMUM HEATER-CATHODE VOLTAGE	100	VOLTS

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

HEATER VOLTAGE	12.6	VOLTS
HEATER CURRENT	0.15	AMP.
PLATE VOLTAGE	250	VOLTS
GRID #2 VOLTAGE	100	VOLTS
GRID #1 VOLTAGE	-2	VOLTS
PLATE CURRENT	9.6	MA .
GRID #2 CURRENT	2.6	MA .
TRANSCONDUCTANCE	2 200	μMH0S
PLATE RESISTANCE (APPROX.)	0.8	MEGOHM
GRID #1 VOLTAGE (APPROX.) FOR G = 10 MHOS	-32	VOLTS



7 PIN BASE E7-1 OUTLINE DRAWING JEDEC 6-3

BEAM PENTODE

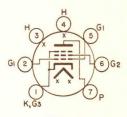
MINIATURE TYPE

COATED UNIPOTENTIAL CATHODE

HEATER

12.6±1.3. VOLTS 600 MA. AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW BASING DIAGRAM JEDEC 7CV

THE 12CU5 IS A MINIATURE BEAM POWER PENTODE INTENDED FOR USE IN THE AUDIO OUTPUT STAGE OF TELEVISION RECEIVERS. HIGH POWER SENSITIVITY AND HIGH EFFICIENCY AT LOW PLATE AND SCREEN VOLTAGES ENABLE THE 12CU5 TO PROVIDE RELATIVELY HIGH POWER OUTPUT. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

GRID #1 TO PLATE	0.6	pf
GRID #1 TO CATHODE & GRID #3, HEATER, AND GRID #2	13.0	pf
PLATE TO CATHODE & GRID #3, HEATER, AND GRID #2	8.5	pf

RATINGS INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM CLASS A7 AMPLIFIER

MAXIMUM PEAK HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE A	200	VOLTS
MAXIMUM PLATE VOLTAGE	150	VOLTS
MAXIMUM GRID #2 (SCREEN) VOLTAGE	130	VOLTS
MAXIMUM GRID #1 (CONTROL-GRID) VOLTAGE:		
POSITIVE BIAS VALUE	0	VOLTS
MAXIMUM PLATE DISSIPATION	7	WATTS
MAXIMUM GRID #2 INPUT	1.4	WATTS
MAXIMUM BULB TEMPERATURE		
(AT HOTTEST POINT ON BULB SURFACE)	220	°C
HEATER WARM-UP TIME (AVERAGE)*	11	SECONDS

*
HEATER WARM—UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH
BOS OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING
OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING
RESISTANCE.

DC COMPONENT MUST NOT EXCEED 100 VOLTS.

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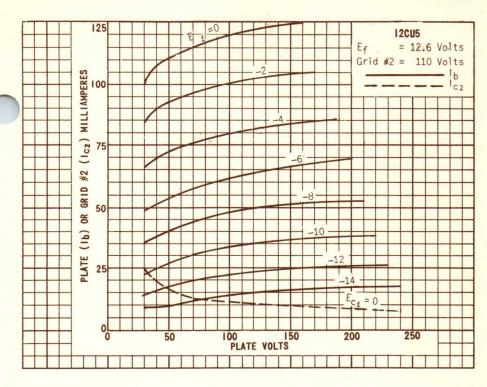
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

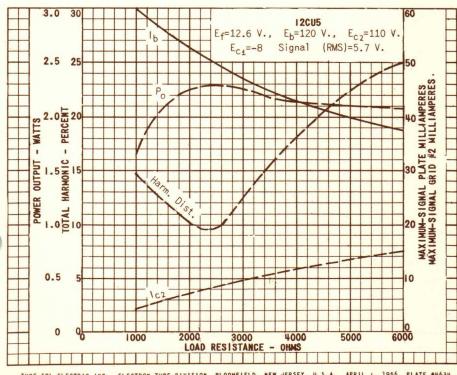
CLASS A1 AMPLIFIER

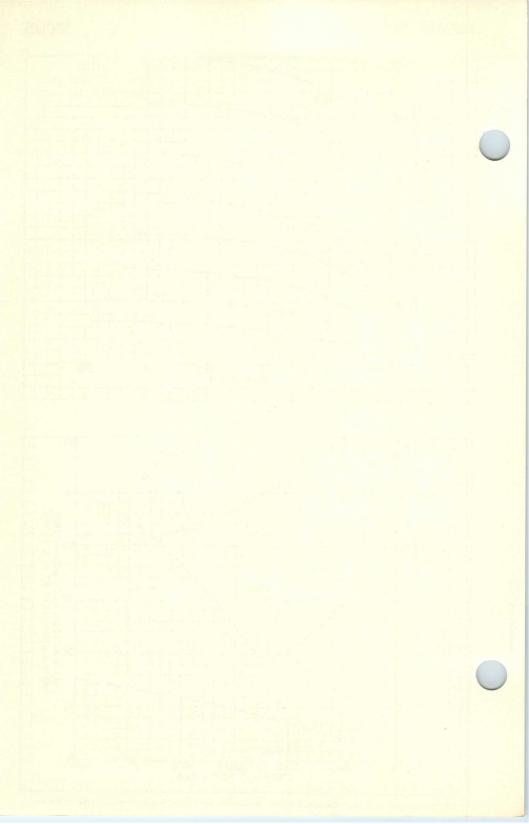
PLATE VOLTAGE	120	VOLTS
GRID #2 VOLTAGE	110	VOLTS
GRID #1 VOLTAGE	-8	VOLTS
PEAK AF GRID #1 VOLTAGE	8	VOLTS
ZERO-SIGNAL PLATE CURRENT	49	MA.
MAXIMUM-SIGNAL PLATE CURRENT	50	MA.
ZERO-SIGNAL GRID #2 CURRENT	4	MA.
MAXIMUM-SIGNAL GRID #2 CURRENT	8.5	MA.
PLATE RESISTANCE (APPROX.)	10 000	OHMS
TRANSCONDUCTANCE	7 500	μMHOS.
LOAD RESISTANCE	2 500	OHMS
TOTAL HARMONIC DISTORTION	10	PERCENT
SIGNAL POWER OUTPUT (MAX.)	2.3	WATTS

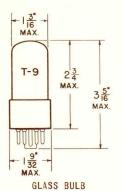
MAXIMUM CIRCUIT VALUES

GRID #1 CIRCUIT RESISTANCE:		
FOR FIXED-BIAS OPERATION (MAX.)	0.1	MEGOHM
FOR CATHODE-BIAS OPERATION (MAX.)	0.5	MEGOHM









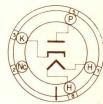
UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 0.60±0.040 AMP.

ANY MOUNTING POSITION

Asocket PINS 1, 2, 4 & 6 MUST NOT BE USED AS TIE POINTS.



BOTTOM VIEW A
INTERMEDIATE SHELL
5 PIN OCTAL

4 C G

THE 12D4A IS A SINGLE INDIRECTLY—HEATED DIODE INTENDED FOR USE IN TELE—VISION HORIZONTAL FREQUENCY DAMPER SERVICE. IT IS DESIGNED TO WITHSTAND HIGH VOLTAGE PULSES BETWEEN CATHODE AND BOTH HEATER AND PLATE ELEMENTS SUCH AS NORMALLY ENCOUNTERED IN "DIRECT DRIVE" CIRCUITS.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

HEATER TO CATHODE: H TO K	3.0	μμ f
CATHODE TO PLATE AND HEATER: K TO (P+ H)	9.0	μμ f
PLATE TO CATHODE AND HEATER: P TO (K +H)	7.0	μμ f

RATINGS INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM^B

HEATER VOLTAGE ^C	12.6	VOLTS
MAXIMUM PEAK INVERSE PLATE VOLTAGE	5000	VOLTS
MAXIMUM DC PLATE CURRENT	185	MA.
MAXIMUM STEADY STATE PEAK PLATE CURRENT	900	MA.
MAXIMUM PLATE DISSIPATION	8.0	WATTS
MAXIMUM HEATER-CATHODE VOLTAGED		
HEATER NEGATIVE WITH RESPECT TO CATHODE		
DC	1000	VOLTS
TOTAL DC AND PEAK	5000	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC	100	VOLTS
TOTAL DC AND PEAK	300	VOLTS
HEATER WARM-UP TIME (ARROW)*	11 0	CECONDO

AVERAGE CHARACTERISTICS

HEATER VOLTAGE		12.6	VOLTS
HEATER CURRENT		0.60±0.040	AMP.
TUBE VOLTAGE DROP (WITH TUBE CONDUCTIN	G PLATE CURRENT 340 MA.)	30	VOLTS

B

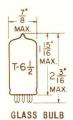
DESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT LIFE NO DESIGN—MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT CONFORMENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.

CONTINUED FROM PRECEDING PAGE

- CTHE EQUIPMENT DESIGNER SHALL SO DESIGN THE EQUIPMENT THAT THE HEATER CURRENT IS AT THE SPECIFIED BOGIE VALUE. HEATER SUPPLY VARIATIONS SHOULD BE RESTRICTED SO THAT THE HEATER CURRENT WILL BE MAINTAINED WITHIN THE SPECIFIED TOLERANCE.
- DFOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF G OD ENGINEERING PRACTICE FOR TELEVISION BROAD AST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE.
- *
 HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH
 BO\$ OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING
 OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING
 RESISTANCE.

DIODE-PENTODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 0.200 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
9 PIN BASE

THE 12DE8 IS A COMBINED REMOTE CUT-OFF PENTODE AND DIODE WITH INDEPENDENT UNIPOTENTIAL CATHODES IN THE 9-PIN MINIATURE CONSTRUCTION. THE PENTODE SECTION IS INTENDED FOR USE AS AN RF OR IF AMPLIFIER WHERE THE HEATER, PLATE AND SCREEN GRID POTENTIALS ARE OBTAINED DIRECTLY FROM AN AUTO-MOTIVE BATTERY.

DIRECT INTERELECTRODE CAPACITANCES

	SHIELD	
PENTODE GRID #1 TO PLATE: (MAX.)	.006	μμ f
PENTODE INPUT:	5.5	μμ f
PENTODE OUTPUT:	5.7	μμ f
DIODE INPUT:	3.7	μμ f
DIODE OUTPUT:	5.7	μμ f
COUPLING (DIODE PLATE TO PENTODE GRID (MAX.)	.018	μμ f
COUPLING (DIODE PLATE TO PENTODE PLATE (MAX.)	.012	uu f
COUPLING (DIODE CATHODE TO PENTODE GRID (MAX.)	. 1.3	μμ f.
COUPLING (DIODE CATHODE TO PENTODE PLATE (MAX.)	.0016	uu f

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER VOLTAGE A	12.6	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE	±30	VOLTS
MAXIMUM PLATE VOLTAGE	30	VOLTS
MAXIMUM GRID #2 VOLTAGE	30	VOLTS
MAXIMUM CATHODE CURRENT	20	MA.
MAXIMUM GRID #1 CIRCUIT RESISTANCE	10	ME GOHMS
MAXIMUM AVERAGE DIODE CURRENT	_ 5	MA.

ATHIS TUBE IS INTENDED TO BE USED IN AUTOMOTIVE SERVICE FROM A NOMINAL 12 VOLT DATTERY SOURCE. THE HEATER IS THEREFORE DESIGNED TO OPERATE OVER THE 10.0 TO 15.9 VOLTAGE RANGE ENCOUNTERED IN THIS SERVICE. THE MAXIMUM RATINGS OF THE TUBE PROVIDE FOR AN ADEQUATE SAFETY FACTOR SUCH THAT THE TUBE WILL WITHSTAND THE WIDE VARIATION IN SUPPLY VOLTAGES.

- TUNG-SOL -

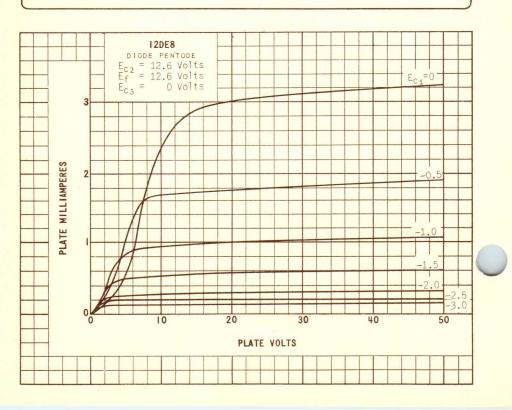
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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

HEATER VOLTAGE	12.6	VOLTS
HEATER CURRENT	0.200	AMP.
PLATE VOLTAGE	12.6	VOLTS
GRID #3 VOLTAGE B	0	VOLTS
GRID #2 VOLTAGE	12.6	VOLTS
GRID #1 VOLTAGE	80 ^c	VOLTS
PLATE CURRENT	1 300	HAMPS
GRID #2 CURRENT	500	HAMPS
PLATE RESISTANCE (APPROX.)	• 3	MEGOHM
TRANSCONDUCTANCED	1 500	µмноs
GRID #1 VOLTAGE (APPROX.)		
FOR GmD =10 MMHOS	-6.0	VOLTS
DIODE CURRENT WITH 5 VOLTS APPLIED	20	MA.
AND CONTROL OF THE CO		

Caverage BIAS DEVELOPED ACROSS A 2.2 MEGOHM GRID RESISTOR.

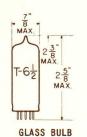
B CONNECTED TO CATHODE AT SOCKET.



DFROM GRID #1 TO PLATE.

TUNG-SOL -

DOUBLE DIODE



COATED UNIPOTENTIAL CATHODE

HEATER

SERIES 12.6 VOLTS 0.45 AMP. PARALLEL 6.3 VOLTS 0.9 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
9 PIN BASE
985

THE 12DF5 IS A DOUBLE DIODE FULL WAVE RECTIFIER IN THE 9-PIN MINIATURE CONSTRUCTION. IT HAS A CENTER-TAPPED HEATER, SEPARATE CATHODE CONNECTIONS, AND RELATIVELY HIGH OUTPUT CURRENT CAPABILITIES.

RATINGS

RECTIFIER SERVICE

HEATER VOLTAGE	12.6	6.3 vo	OLTS
MAXIMUM PEAK INVERSE PLATE VOLTAGE	1275	VC	DLTS
MAXIMUM AC PLATE SUPPLY VOLTAGE,			
(EACH PLATE RMS.) (SEE RATING CHART #1)	450	V	DLTS
MAXIMUM DC OUTPUT CURRENT	SEE RATING (CHART #1	
MAXIMUM STEADY STATE PEAK PLATE CURRENT			
(EACH PLATE) (SEE RATING CHART #2)	350	MA	4 -
MAXIMUM TRANSIENT PEAK PLATE CURRENT			
(EACH PLATE) (SEE RATING CHART #3)	2.0	AN	MP.
MAXIMUM AC HEATER CATHODE VOLTAGE (RMS)	225	VC	DLTS
MAXIMUM DC HEATER-CATHODE VOLTAGE			
HEATER NEGATIVE WITH RESPECT TO CATHODE	450	VC	DLTS

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

AVERAGE CHARACTERISTICS

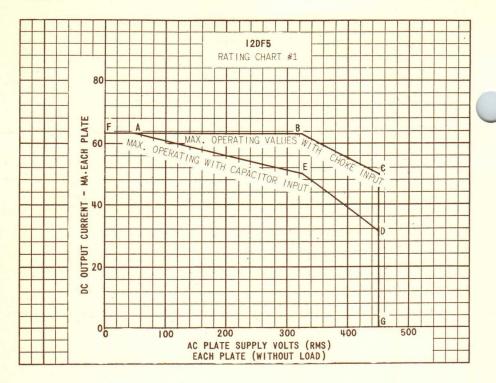
HEATER VOLTAGE	12.6	6.3	VOLTS
HEATER CURRENT	0.45	0.9	AMP.
TUBE VOLTAGE DROP			
TUBE CONDUCTING: 100 MA. EACH PLATE	L	10	VOLTS

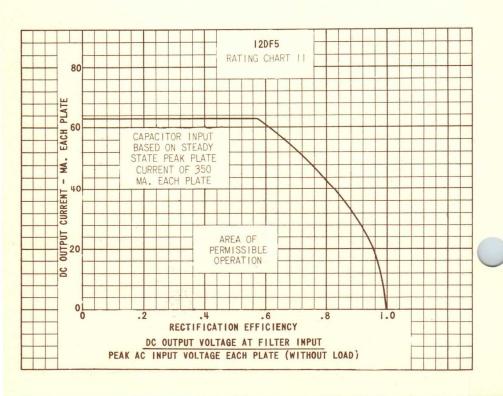
TYPICAL OPERATION - FULL WAVE RECTIFIER

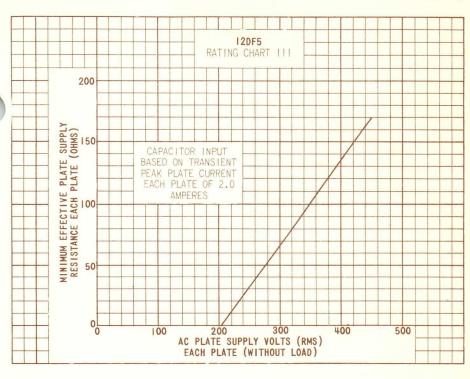
	CAPACITOR	CHOKE	
HEATER VOLTAGE	12.6	6.3	VOLTS
HEATER CURRENT	0.45	0.9	AMP.
AC PLATE SUPPLY VOLTAGE (EACH PLATE) (RMS) A	325	450	VOLTS
FILTER INPUT CONDENSER	40		μf
FILTER INPUT CHOKE		10	HENRYS
EFFECTIVE PLATE SUPPLY RESISTANCE (EA.PLATE)	82		OHMS
DC OUTPUT CURRENT AT FILTER	100	100	MA .
DC OUTPUT VOLTAGE AT FILTER	330	360	VOLTS
		-	

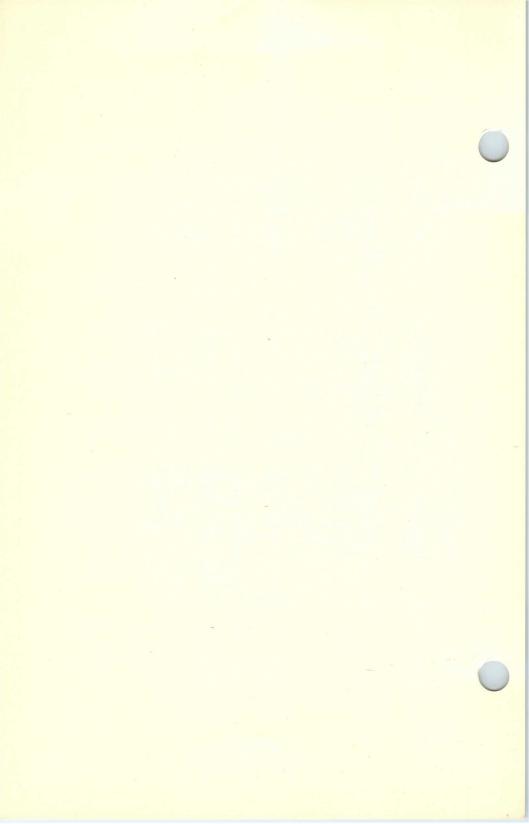
AC PLATE VOLTAGE IS MEASURED WITHOUT LOAD.

12DF5









TUNG-SOL .

TWIN TRIODE MINIATURE TYPE

COATED UNIPOTENTIAL CATHODE

HEATER

7" 8 15" 15" 16 MAX 2 3" 2 3" MAX MAX

GLASS BULB

SERIES 12.6 VOLTS 0.15 AMP. PARALLEL 6.3 VOLTS 0.3 AMP.

AC OR DC

FOR 12-6 VOLT OPERATION APPLY HEATER VOLTAGE BETWEENPINS #4 AND #5. FOR 6.3 VOLT OPERATION APPLY HEATER VOLTAGE BETWEEN PIN #9 AND PINS #4 AND #5 CONNECTED TOGETHER.

ANY MOUNTING POSITION



SMALL BUTTON 9 PIN BASE

THE 12DF7 IS A 9 PIN MINIATURE TWIN TRIODE DESIGNED FOR SERVICE AS A LOW LEVEL INPUT VOLTAGE AMPLIFIER FOR TAPE RECORDERS AND HIGH QUALLTY AUDIO PREAMPLIFIERS. THE 12DF7 IS A LOW MICROPHONICS VERSION OF THE 12AX7 AND MAY BE USED AS A REPLACEMENT FOR THAT TYPE.

DIRECT INTERELECTRODE CAPACITANCES

	SEC. #1	SEC. #2	
GRID TO PLATE	1.4	1.4	щи f
INPUT	1.6	1.6	щиf
ОИТРИТ	0.4	0.3	uu f
			$\mu\mu$ f

RATINGS

INTERPRETED ACCORDING TO DESIGN CENTER VALUES

EACH SECTION

HEATER VOLTAGE	12.6 6.3	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE	180	VOLTS
MAXIMUM PLATE VOLTAGE	300	VOLTS
MAXIMUM POSITIVE DC GRID VOLTAGE	0	VOLTS
MAXIMUM NEGATIVE DC GRID VOLTAGE	-50	VOLTS
MAXIMUM PLATE DISSIPATION	1	WATT

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

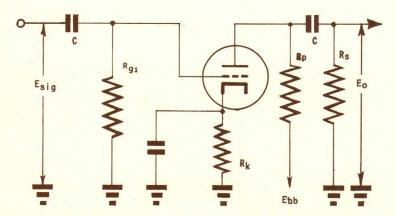
CLASS A1 AMPLIFIER - EACH SECTION

HEATER VOLTAGE HEATER CURRENT	12.6 6.3 0.15 0.3	12.6 6.3 0.15 0.3	VOLTS
PLATE VOLTAGE	100	250	VOLTS
GRID VOLTAGE	-1	-2	VOLTS
AMPLIFICATION FACTOR	100	100	
PLATE RESISTANCE	70 000	55 000	OHMS
TRANSCONDUCTANCE	1 250	1 600	MHOS
PLATE CURRENT	0.5	1.2	MA.

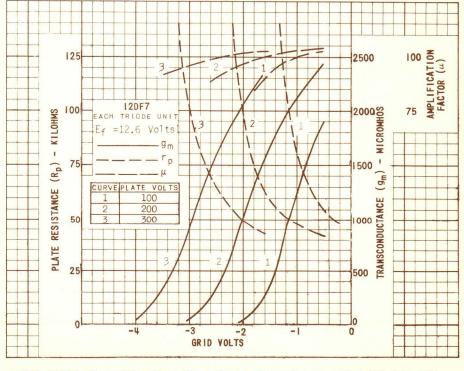
RESISTANCE COUPLED AMPLIFIER

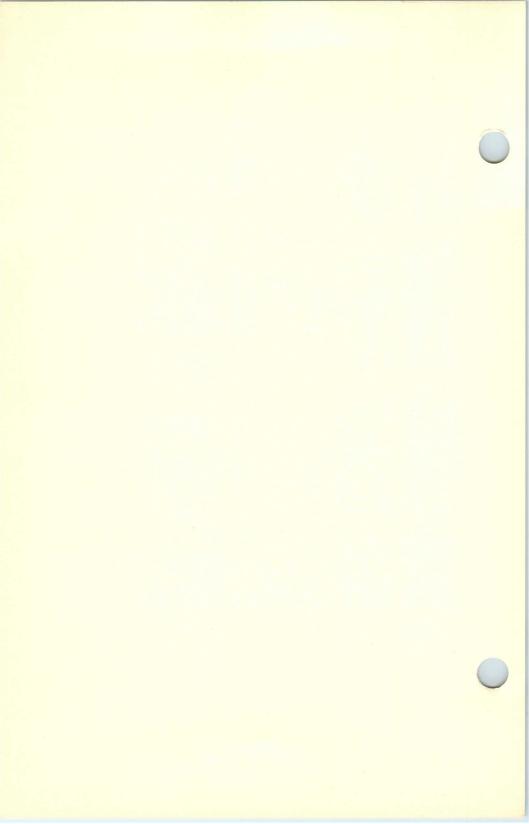
Rp	RS	Rg1	Ebb	= 90 V	OLTS	Ерр	= 180 \	OLTS	Ebb	= 300	VOLTS
MEG.	MEG.	MEG.	Rk	GAIN	Eo	R _k *	GAIN	Eo	Rk	GAIN	Eo
0.10	0.10	0.1	1700 2000	31 38	5.0 6.9	1000 1100	40 46	15 20	760 900	43 50	30 40
0.24	0.24 0.51	0.1	3500 3900	43 49	6.5 8.6	2000 2300	54 59	18 24	1600 1800	58 64	37 47
0.51 0.51	0.51	0.1	7100 7800	50 53	7.4 9.1	4300 4800	62 64	19 24	3100 3600	66 69	39 46
0.24	0.24 0.51	10 10	0	37 44	3.9 5.4	0	53 60	15 19	0	62 67	32 41
0.51 0.51	0.51	10 10	0	44 49	5.0 6.4	00	61 66	17 21	0	69 71	35 41

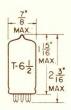
EO IS MAXIMUM RMS VOLTAGE OUTPUT FOR FIVE PERCENT TOTAL HARMONIC DISTORTION.
GAIN MEASURED AT 2.0 VOLTS RMS OUTPUT.
FOR ZERO-BIAS DATA, GENERATOR IMPEDANCE IS NEGLIGIBLE.



NOTE: COUPLING CAPACITORS (C) SHOULD BE SELECTED TO GIVE DESIRED FREQUENCY RESPONSE. RK SHOULD BE ADEQUATELY BY-PASSED.







COATED UNIPOTENTIAL CATHODE

HEATER 12.6 VOLTS 0.50 AMP. AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW MINIATURE BUTTON

917

GLASS BULB

THE 12DK7 IS A COMBINED DETECTOR, AVC DIODE, AND A TETRODE WITH A COMMON UNIPOTENTIAL CATHODE IN THE 9-PIN MINIATURE CONSTRUCTION. THE TETRODE SECTION IS INTENDED FOR USE AS A POWER AMPLIFIER WHERE THE HEATER, PLATE, AND SCREEN GRID POTENTIALS ARE OBTAINED DIRECTLY FROM AN AUTOMOTIVE BATTERY.

> RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER VOLTAGE	12.6	VOLTS
MAXIMUM PLATE VOLTAGE (TETRODE)	30	VOLTS
MAXIMUM GRID #2 VOLTAGE	30	VOLTS
MAXIMUM PLATE DISSIPATION	0.5	WATTS
MAXIMUM GRID #4 CIRCUIT RESISTANCE	15	MEGOHMS
MAXIMUM HEATER CATHODE VOLTAGE	±30	VOLTS
MAXIMUM PLATE CURRENT	10	MA.

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CHARACTERISTICS - CLASS A1 AMPLIFIER

HEATER VOLTAGE	12.6	VOLTS
HEATER CURRENT	0.50	AMP.
PLATE VOLTAGE (TETRODE)	12.6	VOLTS
GRID #2 VOLTAGE	12.6	VOLTS
HEATER VOLTAGE	12.6	VOLTS
GRID #1 RESISTOR (BYPASSED)	2.2	MEGOHMS
PLATE CURRENT	6.0	MA.
GRID #2 CURRENT	1.0	MA.
TRANSCONDUCTANCE	5 000	μMHOS
PLATE RESISTANCE	4 000	OHMS
DIODE CURRENT WITH 10 VOLTS APPLIED	1.0	MA.

THIS TUBE IS INTENDED TO BE USED IN AUTOMOTIVE SERVICE FROM A NOMINAL 12 VOLT BATTERY SOURCE. THE MEATER IS THEREFORE DESIGNED TO OPERATE OVER THE 10.0 TO 15.9 VOLTAGE RANGE ENCOUNTERED IN THIS SERVICE. THE MAXIMUM RATINGS OF THE TUBE PROVIDE FOR AN ADEQUATE SAFETY FACTER SUCH THAT THE TUBE WILL WITHSTAND THE WIDE VARIATION IN SUPPLY VOLTAGES.

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS - CONT'D.

TYPICAL OPERATION - CLASS A AMPLIFIER

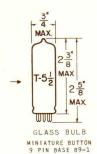
HEATER VOLTAGE	12.6	VOLTS
HEATER CURRENT	0.50	AMP.
PLATE VOLTAGE (TETRODE)	12.6	VOLTS
GRID #2 VOLTAGE	12.6	VOLTS
GRID #1 VOLTAGE A		
GRID #1 SIGNAL VOLTAGE	1.0	VRMS
SIGNAL SOURCE RESISTANCE	200 000	OHMS
LOAD RESISTANCE	3 500	OHMS
SIGNAL PLATE CURRENT (MAX.)	2.5	MA.
SIGNAL GRID #2 CURRENT POWER OUTPUT (MAX.)	10	Mw.
TOTAL HARMONIC DISTORTION	10	PERCENT

A OBTAINED BY GRID #1 RECTIFICATION WITH A 15 MEGOHM GRID RESISTOR. THE ZERO SIGNAL PLATE CURRENT IS APPROX. 6.0 MA.

TUNG-SOL .

DOUBLE DIODE-TETRODE

MINIATURE TYPE



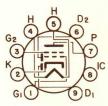
OUTLINE DRAWING

JEDEC 6-3

COATED UNIPOTENTIAL CATHODE
HEATER

12.6 VOLTS 0.50 AMP. AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

BASING DIAGRAM
JEDEC 9NZ

THE 12DK7 IS A COMBINED DETECTOR, AVC DIODE, AND A TETRODE WITH A COMMON UNIPOTENTIAL CATHODE IN THE 9-PIN MINIATURE CONSTRUCTION. THE TETRODE SECTION IS INTENDED FOR USE AS A POWER AMPLIFIER WHERE THE HEATER, PLATE, AND SCREEN GRID POTENTIALS ARE OBTAINED DIRECTLY FROM AN AUTOMOTIVE BATTERY.

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

12.6	VOLTS
30	VOLTS
30	VOLTS
0.5	WATTS
15	MEGOHMS
±30	VOLTS
10	MA.
	30 30 0.5 15 ±30

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CHARACTERISTICS - CLASS A1 AMPLIFIER

HEATER VOLTAGE	12.6	VOLTS
HEATER CURRENT	0.50	AMP.
PLATE VOLTAGE (TETRODE)	12.6	VOLTS
GRID #2 VOLTAGE	12.6	VOLTS
HEATER VOLTAGE	12.6	VOLTS
GRID #1 RESISTOR (BYPASSED)	2.2	MEGOHMS
PLATE CURRENT	6.0	MA.
GRID #2 CURRENT	1.0	MA.
TRANSCONDUCTANCE	5 000	μMHOS
PLATE PESISTANCE	4 000	OHMS
DIODE CURRENT WITH 40 VOLTS APPLIED	1.0	MA.

THIS TUBE IS INTENDED TO BE USED IN AUTOMOTIVE SERVICE FROM A NOMINAL 12 VOLT BATTERY SOURCE. THE HEATER IS THEREFORE DESIGNED TO OPERATE OVER THE 10.0 TO 15.9 VOLTAGE RANGE ENCOUNTERED IN THIS SERVICE. THE MAXIMUM RATINGS OF THE TUBE PROVIDE FOR AN ADEQUATE SAFETY FACTER SUCH THAT THE TUBE WILL WITHSTAND THE WIDE VARIATION IN SUPPLY VOLTAGES.

- INDICATES A CHANGE.

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS - CONT 'D.

TYPICAL OPERATION - CLASS A1 AMPLIFIER

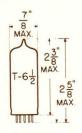
12.6	VOLTS
0.50	AMP.
12.6	VOLTS
12.6	VOLTS
1.0	VRMS
200 000	OHMS
3 500	OHMS
2.5	MA.
10	Mw.
10	PERCENT
	0.50 12.6 12.6 1.0 200 000 3 500 2.5 10

A OBTAINED BY GRID #1 RECTIFICATION WITH A 15 MEGOHM GRID RESISTOR. THE ZERO SIGNAL PLATE CURRENT IS APPROX. 6.0 MA.

TUNG-SOL .

TWIN-DIODE TETRODE

MINIATURE TYPE



GLASS BULB

COATED UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 0.55 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
9 PIN BASE

QHR

THE 12DL8 IS A COMBINED TWIN-DIODE AND SPACE-CHARGE GRID TETRODE WITH INDEPENDENT UNIPOTENTIAL CATHODES IN THE 9-PIN MINIATURE CONSTRUCTION. THE DIODE SECTION IS INTENDED FOR USE AS DETECTOR AND THE TETRODE SECTION IS INTENDED FOR USE AS POWER AMPLIFIER WHERE THE HEATER PLATE, AND SPACE-CHARGE GRID POTENTIALS ARE OBTAINED DIRECTLY FROM AN AUTO-MOTIVE BATTERY.

DIRECT INTERELECTRODE CAPACITANCES

#1 DIODE INPUT: (#1 Pd TO Kd+H)	1.6	μμ f
#2 DIODE INPUT: (#2 Pd TO Kd+H)	1.6	щи f
#1 DIODE TO #2 DIODE (#1 Pd TO #2 Pd)	.03	μμ f
TETRODE INPUT: (G2 TO G1+K+H)	12	μμ f
TETRODE OUTPUT: (P TO G1+K+H)	1.3	щи f
TETRODE GRID #2 TO PLATE	14	μμ f
COUPLING: (#1 DIODE PLATE TO TETRODE GRID #2) (MAX.)	.02	μμ f
(#2 DIODE TO TETRODE GRID #2) (MAX.)	.006	µµ f

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER VOLTAGEA	12.6	VOLTS
MAXIMUM TETRODE PLATE VOLTAGE	30	VOLTS
MAXIMUM POSITIVE TETRODE GRID #1 VOLTAGE (ABS. MAX.)	16	VOLTS
MAXIMUM NEGATIVE TETRODE GRID #2 VOLTAGE	20	VOLTS
MAXIMUM TETRODE GRID #2 CIRCUIT RESISTANCE	10	MEGOHMS
MAXIMUM AVERAGE DIODE CURRENT	5	MA.
MAXIMUM HEATER-CATHODE VOLTAGE	±30	VOLTS

ATHIS TUBE IS INTENDED TO BE USED IN AUTOMOTIVE SERVICE FROM A NOMINAL 12 VOLT BATTERY SOURCE. THE HEATER IS THEREFORE DESIGNED TO OPERATE OVER THE 10.0 TO 19.9 VOLTAGE RANGE ENCOUNTERED IN THIS SERVICE. THE MAXIMUM RATINGS OF THE TUBE PROVIDE FOR AN ADEQUATE SAFETY FACTOR SUCH THAT THE TUBE WILL WITHSTAND THE WIDE VARIATION IN SUPPLY VOLTAGES.

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER - SINGLE TUBE

HEATER VOLTAGE	12.6	VOLTS
HEATER CURRENT	0.55	AMPL
PLATE VOLTAGE	12.6	VOLTS
GRID #2 (CONTROL GRID) VOLTAGE B	-0.5	VOLTS
GRID #1 (SPACE-CHARGE GRID) VOLTAGE	12.6	VOLTS
PLATE CURRENT	40	MA.
GRID #1 (SPACE-CHARGE GRID) CURRENT	75	MA.
PLATE RESISTANCE	480	OHMS
AMPLIFICATION FACTOR ^C	7.2	
TRANSCONDUCTANCEC	15 000	μMHOS.

DIODE UNITS - TWO

DIODE CURRENT WITH 10.0 VOLTS APPLIED (EACH DIODE) 3 MA.

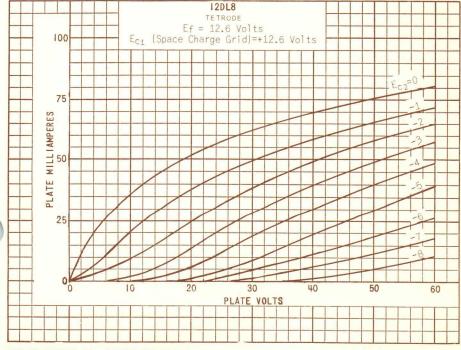
TYPICAL OPERATION CLASS A1 AMPLIFIER - SINGLE TUBE

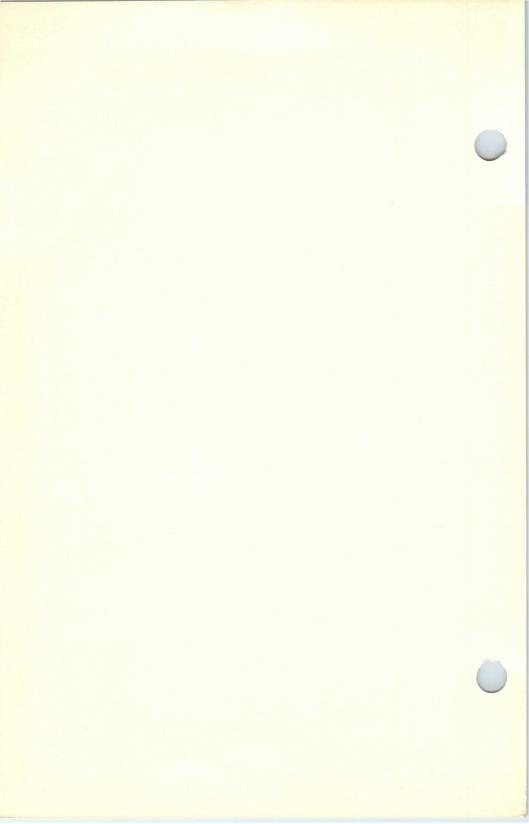
PLATE VOLTAGE	12.6	VOLTS
GRID #2 (CONTROL GRID) VOLTAGED	-2.0	VOLTS
GRID #1 (SPACE-CHARGE GRID) VOLTAGE	12.6	VOLTS
PEAK AF GRID #2 VOLTAGE	2.5	VOLTS
AF SIGNAL SOURCE RESISTANCE	100 000	OHMS
LOAD RESISTANCE	800	OHMS
PLATE CURRENT	8.0	MA.
GRID #1 (SPACE-CHARGE GRID) CURRENT	75	MA.
POWER OUTPUT	40	MW.
TOTAL HARMONIC DISTORTION (MAX.)	10	PERCENT

BAVERAGE BIAS DEVELOPED ACROSS A 2.2 MEGOHM RESISTOR.

CFROM GRID #2 TO PLATE.

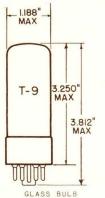
Dobtained across a 2.2 megohm resistor by Grid #2 rectification in which case the Zero Signal PLATE CURRENT IS APPROXIMATELY 40 MA.





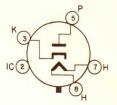
TUNG-SOL -

DIODE



UNIPOTENTIAL CATHODE FOR DAMPER SERVICE IN TELEVISION RECEIVERS

ANY MOUNTING POSITION



BOTTOM VIEW BASING DIAGRAM JEDEC 4CG

600

MA -

SHORT INTERMEDIATE SHELL 5 PIN OCTAL WITH EXTERNAL BARRIERS B5 - 85 OUTLINE DRAWING JEDEC 9-44

AVERAGE CHARACTERISTICS

THE 12DM4 IS A HALF-WAVE VACUUM RECTIFIER EMPLOYING A T-9 ENVELOPE. IT IS DESIGNED SPECIFICALLY FOR USE AS A DAMPER DIODE IN HORIZONTAL-DEFLECTION CIRCUITS OF BLACK-AND-WHITE TELEVISION RECEIVERS. EXCEPT FOR HEATER CHARACTERISTICS AND HEATER WARM-UP TIME, THE 12DM4 IS IDENTICAL TO THE 6DM4 AND THE 17DM4.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

WITHOUT EXTERNAL SHIELD

8.5 PLATE TO HEATER AND CATHODE pf CATHODE TO HEATER AND PLATE 11.5 pf HEATER TO CATHODE pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

12.6 VOLTS

HEATER SUPPLY LIMITS: 600±36 MA. VOLTAGE OPERATION MAXIMUM PEAK HEATER CATHODE VOLTAGE: 5000A HEATER NEGATIVE WITH RESPECT TO CATHODE VOLTS 300B HEATER, POSITIVE WITH RESPECT TO CATHODE VOLTS

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

DESIGN MAXIUM VALUES - SEE EIA STANDARD RS-239

DAMPER SERVICE

PEAK INVERSE PLATE VOLTAGE	5000 ^D	VOLTS
PEAK PLATE CURRENT	1100	MA.
DC PLATE CURRENT	175	MA.
PLATE DISSIPATION	6.5	WATTS

CHARACTERISTICS

TUBE VOLTAGE DROP FOR	PLATE CUR	RENT OF		
400 MA. APPROXIMATE			35	VOLTS

ATHE DC COMPONENT MUST NOT EXCEED 900 VOLTS.

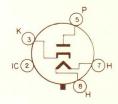
B THE DC COMPONENT MUST NOT EXCEED 100 VOLTS.

DFOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE 15% OF ONE HORIZONTAL SCANNING CYCLE IS 10 MICROSCOODS.)

FOR DAMPER SERVICE IN TELEVISION RECEIVERS

COATED UNIPOTENTIAL CATHODE

ANY MOUNTING POSITION



BOTTO M VIEW

BASING DIAGRAM

SOCKET TERMINALS 1,2,4 & 6, SHOULD NOT BE USED AS TIE POINTS.

GLASS BULB

SHORT INTERMEDIATE SHELL 5 PIN OCTAL BASE B5-85 OUTLINE DRAWING JEDEC 9-44

THE 12DM4A IS AN INDIRECTLY-HEATED HALF-WAVE RECTIFIER EMPLOYING A T-9 ENVELOPE. IT IS DESIGNED SPECIFICALLY FOR USE AS A DAMPER DIODE IN HORIZONTAL DEFLECTION CIRCUITS OF TELEVISION RECEIVERS.

EXCEPT FOR HEATER CHARACTERISICS AND RATINGS, THE 12DM4A I SIDENTICAL TO THE 6DM4A AND THE 17DM4A.

ALSO, THE 12DM4A IS IDENTICAL TO THE 12DM4 EXCEPT FOR HIGHER PLATE CURRENT RATINGS.

DIRECT INTERELECTRODE CAPACITANCES

HEATER TO CATHODE	4	pf
PLATE TO CATHODE	8.5	pf
CATHODE TO PLATE AND HEATER	11.5	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	12.6	VOLTS	600	MA.
HEATER WARM-UP TIMEA			11	SECONDS
HEATER SUPPLY LIMITS:				
CURRENT OPERATION			600 ± 40	MA.
MAXIMUM HEATER-CATHODE VOLTAGE:				
HEATER NEGATIVE WITH RESPECT TO CAT	HODE		900	VOLTS
TOTAL DC AND PEAK			5000	VOLTS
HEATER POSITIVE WITH RESPECT TO CATE	HODE		100	
TOTAL DC AND PEAK			300	VOLTS

A

HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE THREE TIMES THE NOMINAL HEATER OPERATING RESISTANCE

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

DAMPER SERVICE B

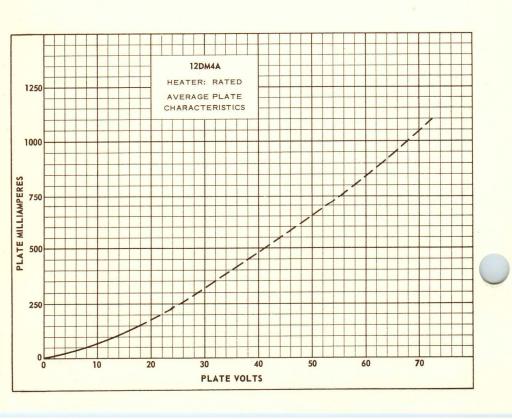
PEAK INVERSE VOLTAGE	5000	VOLTS
PEAK PLATE CURRENT	1200	MA.
DC PLATE CURRENT	200	MA.
PLATE DISSIPATION	6.5	WATTS

CHARACTERISTICS

VOLTAGE DROP AT Ib = 400 MA. 35 VOLTS

B

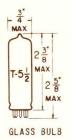
FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN 'STANDARDS OF GOOD ENGINEERING
PRACTICE FOR TELEVISION BROADCASTING STATIONS; FEDERAL COMMUNICATIONS COMMISSION'. THE DUTY
CYCLE OF THE VOLTAGE PULSE NOT TO EXCEED 15 PERCENT OF A SCANNING CYCLE.



TUNG-SOL .

PENTODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 0.45 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
7 PIN BASE
7CV

THE 12DM5 IS A BEAM POWER PENTODE IN THE 7-PIN MINIATURE CONSTRUCTION AND IS INTENDED FOR APPLICATION AS AN AUDIO POWER OUTPUT TUBE IN TELE-VISION RECEIVERS. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED.

DIRECT INTERELECTRODE CAPACITANCES

GRID TO PLATE: G1 TO P 0.55 μμ f
INPUT: G1 TO K+H+G1+B.P. 13 μμ f
OUTPUT: P TO K+H+G2+B.P. 9 μμ f

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER VOLTAGE	12.6	VOLTS
MAXIMUM PLATE VOLTAGE	135	VOLTS
MAXIMUM GRID #2 VOLTAGE	117	VOLTS
MAXIMUM PLATE DISSIPATION	5.5	WATTS
MAXIMUM GRID #2 DISSIPATION	1.25	WATTS
MAXIMUM GRID CIRCUIT RESISTANCE		
FIXED BIAS	0.1	MEGOHMS
CATHODE BIAS	0.5	MEGOHMS
MAXIMUM PEAK HEATER-CATHODE VOLTAGE		
HEATER NEGATIVE WITH RESPECT TO CATHODE	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE A	200	VOLTS
MAXIMUM BULB TEMPERATURE (AT HOTTEST POINT)	250	°C
HEATER WARM-UP TIME (APPROX.)*	11.0	SECONDS

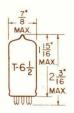
ADC COMPONENT MUST NOT EXCEED 100 VOLTS MAX.

^{*}HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

HEATER VOLTAGE	12.6	VOLTS
HEATER CURRENT	0.45	AMP.
PLATE VOLTAGE	110	VOLTS
GRID #2 (SCREEN) VOLTAGE	110	VOLTS
GRID #1 (CONTROL-GRID) VOLTAGE	7.5	VOLTS
PLATE RESISTANCE (APPROX.)	14 000	OHMS
TRANSCONDUCTANCE	7 500	μMH0S
GRID #1 INPUT VOLTAGE, PEAK AF	7.5	VOLTS
PLATE CURRENT, ZERO SIGNAL	49	MA.
PLATE CURRENT, MAXIMUM SIGNAL	50	MA.
GRID #2 CURRENT, ZERO SIGNAL	4.0	MA.
GRID #2 CURRENT, MAXIMUM SIGNAL	8.5	MA.
LOAD RESISTANCE IMPEDANCE	2 500	OHMS
TOTAL HARMONIC DISTORTION (APPROX.)	9	PERCENT
POWER OUTPUT, MAXIMUM SIGNAL	1.9	WATTS



HEATER
SERIES PARALLEL
12.6 VOLTS 6.3 VOLTS
0.13 AMP. 0.26 AMP.

AC OR DC

ANY MOUNTING POSITION



MINIATURE 9 PIN BASE

9 A

GLASS BULB

THE 12DM7 IS A LOW-HUM HIGH-MU DUOTRIODE IN THE 9 PIN MINIATURE CONSTRUCTION. ITS HIGH AMPLIFICATION AND LOW-HUM MAKES THE 12DM7 PARTICULARLY ADAPTED FOR APPLICATION IN LOW LEVEL STAGES OF HIGH-FIDELITY, AMPLIFIERS AND OTHER AUDIO EQUIPMENT.

DIRECT INTERELECTRODE CAPACITANCES

	SEC. #1	SEC. #2	
GRID TO PLATE: G1 TO P	1.7	1.7	μμf
INPUT: G1 TO K+H	1.6	1.6	μμf
OUTPUT: P TO K+H	0.46	0.34	μμ f

RATINGS

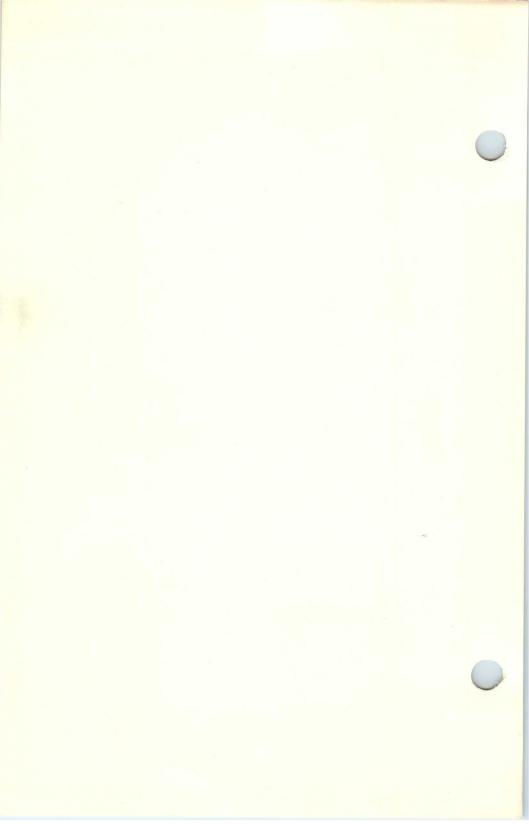
INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM EACH SECTION

HEATER VOLTAGE	12.6	6.3	VOLTS
MAXIMUM PLATE VOLTAGE	331	0	VOLTS
MAXIMUM CONTROL GRID VOLTAGE, NEGATIVE -CC	51	0	VOLTS
MAXIMUM CONTROL GRID VOLTAGE, POSITIVE -DC		0	VOLTS
MAXIMUM PLATE DISSIPATION	1.	1	WATTS
MAXIMUM PEAK HEATER-CATHODE VOLTAGE:			
HEATER NEGATIVE TO CATHODE	180	180	VOLTS
HEATER BOSITIVE TO CATHORE	180	180	VOLTS

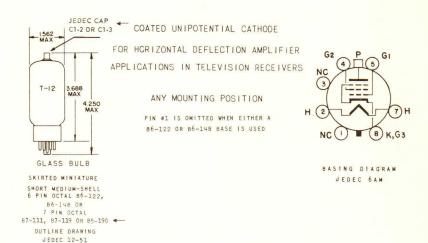
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A AMPLIFIER

HEATER VOLTAGE		12.6	6.3	VOLTS
HEATER CURRENT		0.13	0.26	AMP.
PLATE VOLTAGE	100	250		VOLTS
CONTROL GRID VOLTAGE	-1	-2		VOLTS
PLATE RESISTANCE (APPROX.)	80	62.5		K OHMS
TRANSCONDUCTANCE	1250	1600		μMHOS
AMPLIFICATION FACTOR	100	100		
PLATE CURRENT	0.5	1.2		MA.
CICNAL-TO-NOISE-PATION IN 63DB R-C AMP		57db		DOWN



BEAM PENTODE



THE 12D06A IS A HIGH-PERVEANCE BEAM POWER PENTODE DESIGNED FOR USE AS A HORIZONTAL DEFLECTION AMPLIFIER TUBE IN HIGH EFFICIENCY DEFLECTION CIRCUITS OF TELEVISION RECEIVERS. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TUBES WHICH ARE SIMILARLY CONTROLLED. EXCEPT FOR THE CONTROLLED HEATER WARM-UP TIME AND HEATER RATINGS THE 12D06A IS IDENTICAL TO THE 6D06A.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

WITHOUT EXTERNAL SHIELD

GRID TO PLATE (G TO P)	0.5	pf
INPUT: (G1 TO H+K, BP + G2)	15.0	pf
OUTPUT: (P TO H+K, BP + B2)	7.0	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	12.6 VOLTS	600	MA
HEATER SUPPLY LIMITS:			
CURRENT OPERATION		600±40	MA.
MAXIMUM HEATER-CATHODE VOLTAGE:			
HEATER POSITIVE WITH RESPECT TO	CATHODE		
DC		100	VOLTS
TOTAL DC AND PEAK		200	VOLTS
HEATER NEGATIVE WITH RESPECT TO	CATHODE		
TOTAL DC AND PEAK		200	VOLTS
HEATER WARM-UP TIME. APPROX.			SECOND

-INDICATES A CHANGE.

TUNG-SOL .

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239
HORIZONTAL DEFLECTION AMPLIFIER A

PLATE SUPPLY VOLTAGE, DC (BOOST+DC POWER SUPPLY)	770	VOLTS
PLATE VOLTAGE, PEAK PULSE, POSITIVE	6000	VOLTS
PLATE VOLTAGE, PEAK PULSE, NEGATIVE	1500	VOLTS
PLATE DISSIPATION, B	18	WATTS
GRID #1 VOLTAGE, PEAK PULSE, NEGATIVE	330	VOLTS
GRID #2 VOLTAGE, DC	220	VOLTS
GRID #2 DISSIPATION	3.6	WATTS
CATHODE CURRENT, AVERAGE	155	MA.
CATHODE CURRENT, PEAK	540	MA.
GRID #1 CIRCUIT RESISTANCE, B	1.0	MEGOHM
BULB TEMPERATURE, (AT HOTTEST POINT)	220	°C

AVERAGE CHARACTERISTICS

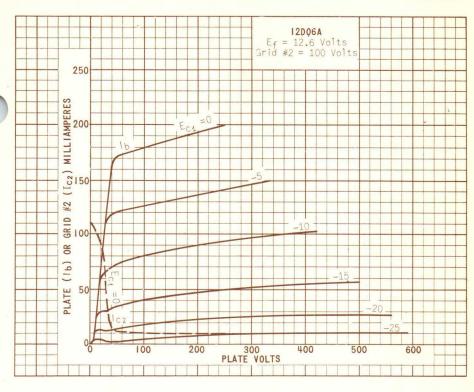
PENTODE OPERATION: Eb = 250V, Ec2 = 150V, Ec1=-22.5V.		
PLATE CURRENT	55	MA.
GRID #2 CURRENT	1.5	MA.
TRANSCONDUCTANCE	6600	µмноs
PLATE RESISTANCE, APPROX.	20,000	OHMS
ZERO BIAS: Eb = 60V, Ec2 = 150V. (INSTANTANEOUS VALUES)	
PLATE CURRENT	315	MA.
GRID #2 CURRENT	25	MA.
CUTOFF: Ib = 1 MA, Eb = 250 V, Ec2 = 150 V.		
GRID #1 VOLTAGE, APPROX.	-40	VOLTS
CUTOFF: Ib = 1 Ma, Eb = 5000 V, Ec2 = 150 V.		
GRID #1 VOLTAGE, APPROX.	-100	VOLTS
TRIODE MU: Eb = Ec2 = 150 V, Ec1 =-22.5 V.	4.5	

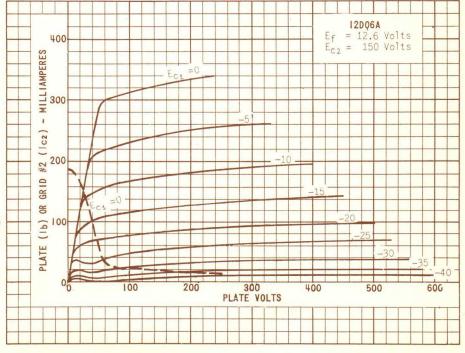
- INDICATES A CHANGE.

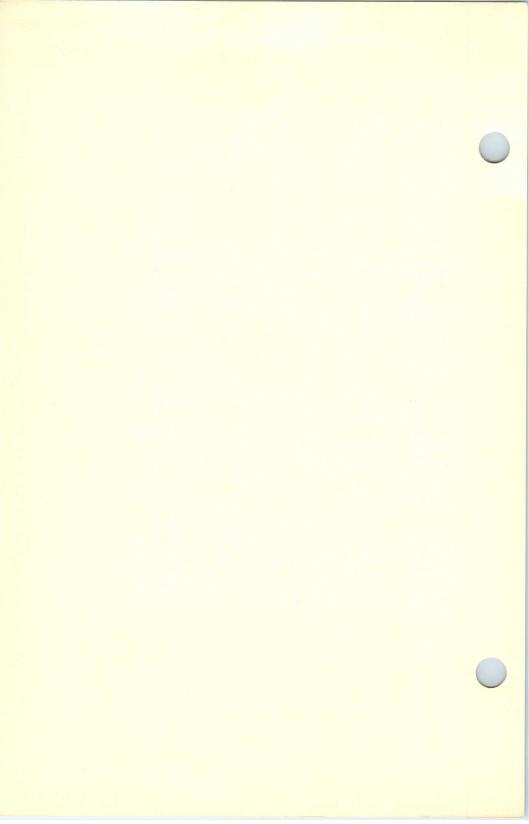
A FOR OPERATION IN A 525-line, 30-frame system as described in "standards of good engineering practice for television broadcast stations: federal communications commission", the duty cycle of the voltage pulse must not exceed 15% of one scanning cycle.

B IN STAGES OPERATING WITH GRID LEAK BIAS, AN ADEQUATE CATHODE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

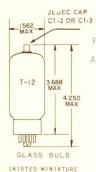
^{*}HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH BO\$ OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.







BEAM PENTODE



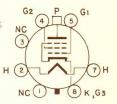
SHORT MEDIUM-SHELL
6 PIN OCTAL 86-122,
86-148 OR
7 PIN OCTAL
87-111, 87-119 OR 85-190
UTLINE DRAWING
JEPEC 10-11

COATED UNIPOTENTIAL CATHODE

FOR HORIZONTAL DEFLECTION AMPLIFIER APPLICATIONS IN TELEVISION RECEIVERS

ANY MOUNTING POSITION

PIN #1 IS OMITTED WHEN EITHER A B6-122 OR B6-148 BASE IS USED



BASING DIAGRAM
JEDEC 6AM

THE 12DQ6B IS A BEAM POWER PENTODE PRIMARILY DESIGNED FOR USE AS THE HORIZONTAL-DEFLECTION AMPLIFIER IN TELEVISION RECEIVERS. ITS HIGH ZEROBIAS PLATE CURRENT AT LOW PLATE AND SCREEN VOLTAGES MAKES THE TUBE WELL SUITED FOR USE IN RECEIVERS THAT OPERATE AT LOW PLATE-SUPPLY VOLTAGES. EXCEPT FOR HEATER RATINGS AND HEATER WARM-UP TIME, THE 12DQ6B IS IDENTICAL TO THE 6D06B.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

WITHOUT EXTERNAL SHIELD

GRID TO PLATE (G TO P)	0.5	pf
INPUT: (G1 TO H+K, BP + G2)	15.0	pf
OUTPUT: (P TO H+K, BP + B2)	7.0	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	12.6 VOLTS	600	MA
HEATER SUPPLY LIMITS:			
CURRENT OPERATION		600±40	MA.
MAXIMUM HEATER-CATHODE VOLTAGE:			
HEATER POSITIVE WITH RESPECT TO CATHOD	E		
DC		100	VOLTS
TOTAL DC AND PEAK		200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHOD	E		
TOTAL DC AND PEAK		200	VOLTS
*			
HEATER WARM-UP TIME, APPROX.			SECONDS

-- INDICATES A CHANGE.

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE ETA STANDARD RS-239
HORIZONTAL DEFLECTION AMPLIFIER^A

PLATE SUPPLY VOLTAGE, DC (BOOST+DC POWER SUPPLY)	770	VOLTS
PLATE VOLTAGE, PEAK PULSE, POSITIVE	6500	VOLTS
PLATE VOLTAGE, PEAK PULSE, NEGATIVE	1500	VOLTS
PLATE DISSIPATION, B	18	WATTS
GRID #1 VOLTAGE, PEAK PULSE, NEGATIVE	330	VOLTS
GRID #2 VOLTAGE, DC	220	VOLTS
GRID #2 DISSIPATION	3.6	WATTS
CATHODE CURRENT, AVERAGE	175	MA.
CATHODE CURRENT, PEAK	610	MA.
GRID #4 CIRCUIT RESISTANCE, B	1.0	MEGOHM
BULB TEMPERATURE, (AT HOTTEST POINT)	220	°C

AVERAGE CHARACTERISTICS

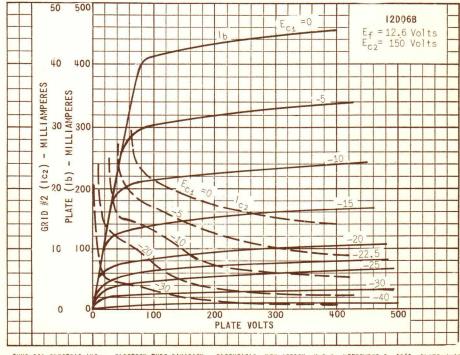
PENTODE OPERATION: Eb = 250V, Ec2 = 150V, Ec1=-22.5V.		
PLATE CURRENT	65	MA.
GRID #2 CURRENT	1.8	MA.
TRANSCONDUCTANCE	7300	µмноѕ
PLATE RESISTANCE, APPROX.	18,000	OHMS
ZERO BIAS: Eb = 60V, Ec2 = 150V. (INSTANTANEOUS VALU	ES)	
PLATE CURRENT	345	MA.
GRID #2 CURRENT	27	MA.
CUTOFF: Ib = 1 MA, Eb = 250 V, Ec2 = 150 V.		
GRID #1 VOLTAGE, APPROX.	-42	VOLTS
CUTOFF: Ib = 1 Ma, Eb = 5000 V, Ec2 = 150 V.		
GRID #1 VOLTAGE, APPROX.	-100	VOLTS
TRIODE MU: Eb = Ec2 = 450 V, Ec4 =-22.5 V.	4.4	

- INDICATES A CHANGE.

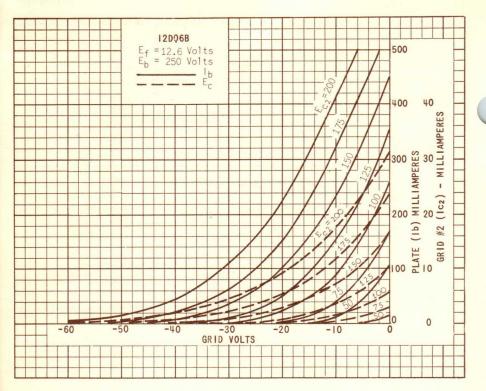
A FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE.

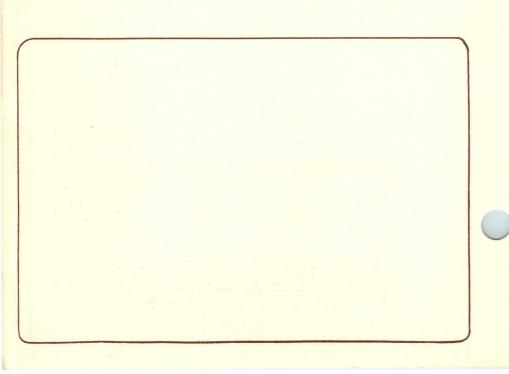
B IN JAGES OPERATING WITH GRID LEAK BIAS, AN ADEQUATE CATHODE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

^{*}HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH BO\$ OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

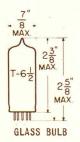


12DQ6B





PENTODE MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER

SERIES PARALLEL

12.6±10% VOLTS 6. 0.3 AMP. 0.6

6.3 VOLTS 0.6±6% AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW SMALL BUTTON 9 PIN BASE 98 F

THE 12DQ7 IS A BEAM POWER PENTODE IN THE 9 PIN MINIATURE CONSTRUCTION AND IS DESIGNED FOR USE AS THE VIDEO OUTPUT AMPLIFIER IN TELEVISION RECEIVERS. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED.

DIRECT INTERELECTRODE CAPACITANCES WITHOUT EXTERNAL SHIELD

GRID #1 TO PLATE (MAX.)	0.1	μμf
INPUT	10.0	μμf
OUTPUT	3.8	μμ f

RATINGS INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

HEATER VOLTAGE	12.6±10% 6.	3 VOLTS
MAXIMUM PLATE VOLTAGE	33	0 VOLTS
MAXIMUM SCREEN-SUPPLY VOLTAGE	33	O VOLTS
MAXIMUM SCREEN VOLTAGE	SEE SCREEN RATING CHA	RT
MAXIMUM POSITIVE DC GRID #1 VOLTAGE		O VOLTS
MAXIMUM PLATE DISSIPATION	6.	5 WATTS
MAXIMUM SCREEN DISSIPATION	1.	l WATTS
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER POSITIVE WITH RESPECT TO CAT	HODE	
DC COMPONENT	10	
TOTAL DC AND PEAK	20	O. VOLTS
HEATER NEGATIVE WITH RESPECT TO CAT	HODE	
TOTAL DC AND PEAK	20	0 VOLTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE:		
WITH FIXED BIAS	0.2	5 MEGOHMS
WITH CATHODE BIAS	1.	O MEGOHMS
HEATER WARM-UP TIME (APPROX.)*	11.	O SECONDS

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

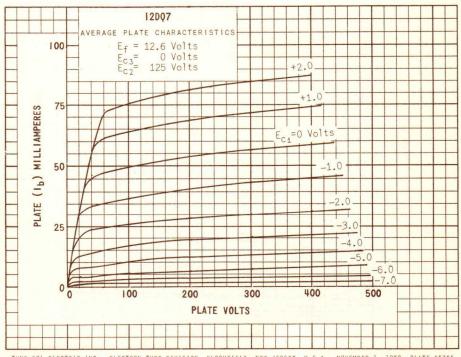
CLASS A1 AMPLIFIER

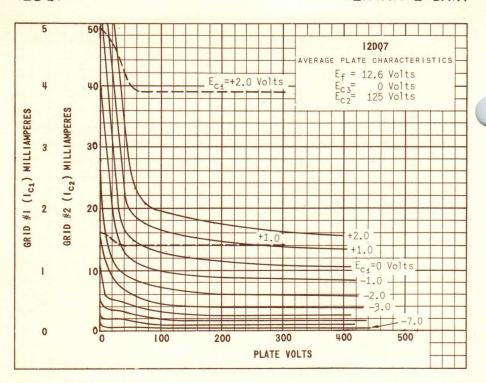
HEATER VOLTAGE HEATER CURRENT	12.		6.3 VOLTS
PLATE VOLTAGE	40	0.3 0.6	±6% AMP. VOLTS
SUPPRESSOR SCREEN VOLTAGE	CONNECTED TO		
GRID #1 VOLTAGE	125 0 ^A	125	VOLTS VOLTS
CATHODE BNAS RESISTOR		68	OHMS
PLATE RESISTANCE, (APPROX.) TRANSCONDUCTANCE		53 000 10 500	OHMS
PLATE CURRENT	45	26	μMHOS MA.
SCREEN CURRENT GRID #1 VOLTAGE (APPROX.)	16	5.6	MA.
$I_b = 100 \mu AMPS.$		-9	VOLTS

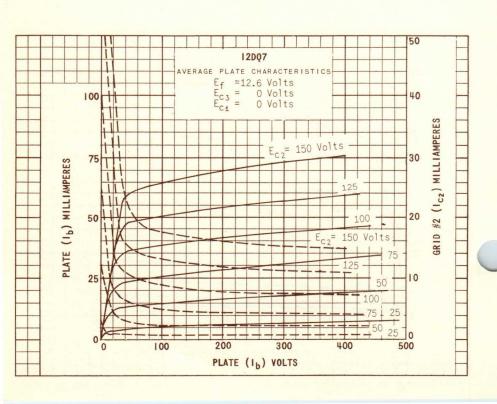
AAPPLIED FOR SHORT INTERVAL (TWO SECONDS MAXIMUM) SO AS NOT TO DAMAGE TUBE.

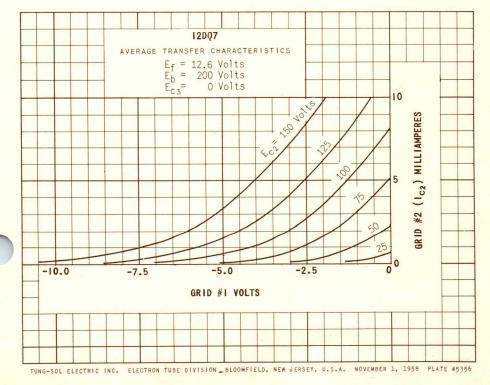
DESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND INFOURDED THE MORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.

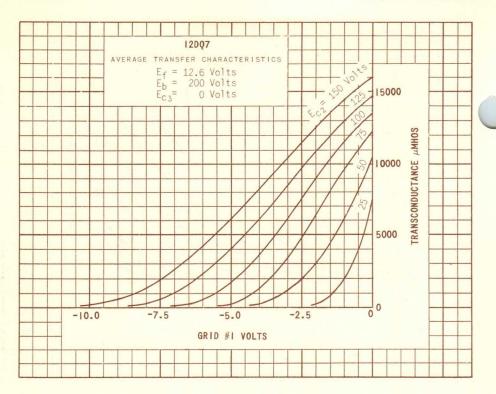
^{*}HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE MEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

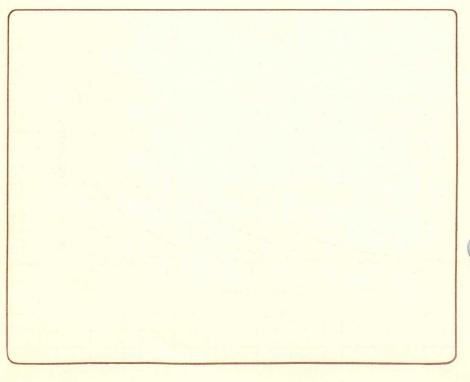






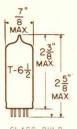






TWIN DIODE-TETRODE

MINIATURE TYPE



GLASS BULB

SMALL-BUTTON NOVAL
9 PIN BASE E9-1

OUTLINE DRAWING
JEDEC 6-3

UNIPOTENTIAL CATHODE

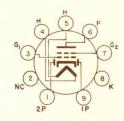
HEATER

12.6 VOLTS 0.4 AMP.

AC OR DC

ANY MOUNTING POSITION

SPACE CHARGE GRID TETRODE



BOTTOM VIEW
BASING DIAGRAM
JEDEC 9JU

THE 12DS7 IS A TWIN DIODE-POWER TETRODE IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS INTENDED FOR USE IN AUTOMOBILE RECEIVERS WHERE THE TUBE AND TRANSISTOR ELECTRODE VOLTAGES ARE OBTAINED DIRECTLY FROM A 12 VOLT BATTERY. IN THIS APPLICATION THE DIODE UNITS ARE BSED FOR AM SIGNAL DETECTION AND AUTOMATIC VOLUME CONTROL. THE TETRODE UNIT IS USED AS THE DRIVER FOR THE TRANSISTORIZED AF POWER OUTPUT STAGE.

DIRECT INTERELECTRODE CAPACITANCES WITHOUT EXTERNAL SHIELD

TETRODE UNIT:

GRID #2 TO PLATE	→ 13	pf
GRID #2 TO GRID #1, HEATER & CATHODE	→ 13	pf
PLATE TO GRID #1, HEATER & CATHODE	→ 2.4	pf
DIODE UNITS:		
DIODE PLATE #1 TO DIODE CATHODE & HEATER	0.5	pf
DIODE PLATE #2, TO DIODE CATHODE & HEATER	0.5	pf
DIODE PLATE #1, TO DIODE PLATE #2	0.1	pf
TETRODE GRID #2 TO DIODE PLATE #1 (MAX.)	→ 0.3	pf
TETRODE GRID #2 TO DIODE PLATE #2 (MAX.)	→ 0.3	pf

RATINGS

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM
TETRODE UNIT - AUDIO DRIVER SERVICE

HEATER VOLTAGEA	12.6	VOLTS
MAXIMUM PLATE VOLTAGE	16	VOLTS
MAXIMUM GRID #2 (CONTROL-GRID) VOLTAGE		
NEGATIVE BIAS VALUE	16	VOLTS
MAXIMUM GRID #1 (SPACE-CHARGE-GRID) VOLTAGE	16	VOLTS
MAXIMUM PEAK HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE	16	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	16	VOLTS

INDICATES A CHANGE.

CONTINUED FROM PRECEDING PAGE

RATINGS - CONT'D

DIODE UNITS - TWO VALUES ARE FOR EACH UNIT

HEATER VOLTAGE A	12.6	VOLTS
MAXIMUM PLATE CURRENT	5	MA.
MAXIMUM PEAK HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE	16	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	16	VOLTS

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER

MEATER VOLTAGE	12.6	VOLTS
HEATER CURRENT	0.4	AMP.
PLATE VOLTAGE	12.6	VOLTS
GRID #2 (CONTROL-GRID) VOLTAGE:		
DEVELOPED ACROSS A 2.2 MEGOHM RESISTOR	-0.5	VOLTS
GRID #1 (SPACE-CHARGE-GRID) VOLTAGE	12.6	VOLTS
PLATE RESISTANCE (APPROX.)	→ 500	OHMS
AMPLIFICATION FACTOR, GRID #2 TO PLATE	→ 8	
TRANSCONDUCTANCE, GRID #2 TO PLATE	→ 16 000	MHOS
PLATE CURRENT	→ 35	MA.
GRID #1 CURRENT	75	MA.

TYPICAL OPERATION TETRODE UNIT - AUDIO DRIVER SERVICE

PLATE SUPPLY VOLTAGE	→ 11.2	VOLTS
PLATE VOLTAGE B		
GRID #1 SUPPLY VOLTAGE	→ 11.2	VOLTS
GRID #2 SUPPLY VOLTAGE	0	VOLTS
GRID #2 RESISTOR	1.8	MEGOHMS
CATHODE RESISTOR	18	OHMS
PEAK AF GRID #2 SUPPLY VOLTAGE (APPROX.):		
FROM 3.3 MEGOHM SIGNAL SOURCE	→ 4.25	VOLTS
PLATE CURRENT:		
ZERO SIGNAL (APPROX.)	→ 20	MA.
INDICATED-SIGNAL	→ 7	MA.
GRID #1 CURRENT	→ 58	MA.
LOAD RESISTANCE	1250	OHMS
TOTAL HARMONIC DISTORTION (AT POWER OUTPUT OF 2.5 MW)	→ 5	PERCENT
INDICATED-SIGNAL POWER OUTPUT	→ 8	MW.

WITH 12.6 VOLTS ON HEATER AND GRID \$2 VOLTAGE OBTAINED BY A GRID \$2 RESISTOR.

THIS TUBE IS INTENDED TO BE USED IN AUTOMOTIVE SERVICE FROM A NOMINAL 12 VOLT BATTERY SOURCE. THE MEATER IS THEREFORE DESIGNED TO OPERATE OVER THE 10.0 TO 15.9 VOLTAGE RANGE ENCOUNTERED IN THIS SERVICE. THE MAXIMUM RATINGS OF THE TUBE PROVIDE FOR AN ADEQUATE SAFETY FACTOR SUCH THAT THE TUBE WILL WITHSTAND THE WIDE VARIATION IN SUPPLY VOLTAGES.

BOBTAINED FROM INDICATED PLATE SUPPLY THROUGH SERIES 100 HENRY CHOKE HAVING DC RESISTANCE OF 150

TYPICAL OPERATION

12.6	VOLTS
12.6	VOLTS
→ -1.6	VOLTS
2.5	VOLTS
→ 35	· MA .
	MA.
→ 80	MA.
→700	OHMS
10	PERCENT
	MW.
.))	
10	MEGOHMS
	12.6 → -1.6 2.5 → 35 → 15 → 80

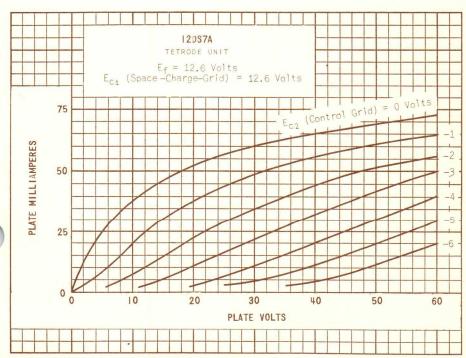
CHARACTERISTICS

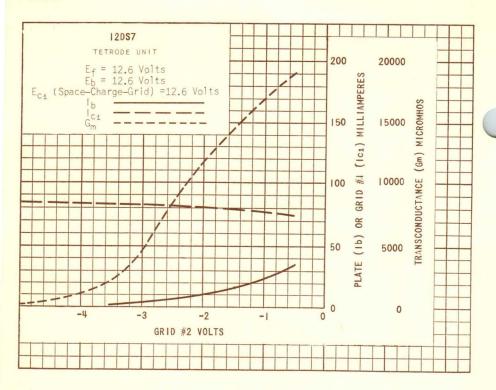
DIODE UNITS - TWO VALUES ARE FOR EACH UNIT

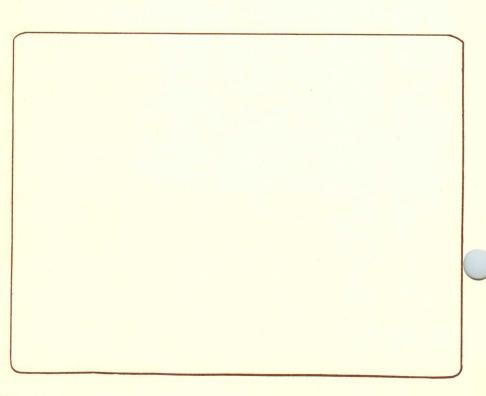
PLATE CURRENT FOR PLATE VOLTS = 10

3 MA.

--- INDICATES A CHANGE.

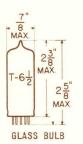






TUNG-SOL .

TWIN DIODE-TETRODE MINIATURE TYPE



UNIPOTENTIAL CATHODE
HEATER

12.6 VOLTS 0.4 AMP.
AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
SMALL-BUTTON NOVAL
9 PIN BASE
9JU

13.8

μμf

THE 12DS7A IS A TWIN DIODE AND A HIGH PERVEANCE POWER TETRODE OF THE SPACE—CHARGE—GRID TYPE IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS INTENDED FOR USE IN "HYBRID" AUTOMOBILE RECEIVERS IN WHICH TUBE AND TRANSISTOR ELECTRODE VOLTAGES ARE OBTAINED DIRECTLY FROM A 6-ALL STORAGE BATTERY.

DIRECT INTERELECTRODE CAPACITANCES WITHOUT EXTERNAL SHIELD

TETRODE UNIT: GRID #2 TO PLATE

GRID #2 TO GRID #1, HEATER & CATHODE	12.7	μμ f
PLATE TO GRID #1, HEATER & CATHODE	2.2	μμ f
DIODE UNITS:		
DIODE PLATE #1 TO DIODE CATHODE & HEATER	0.5	μμf
DIODE PLATE #2, TO DIODE CATHODE & HEATER	0.5	μμ f
DIODE PLATE #1, TO DIODE PLATE #2	0.1	μμ f
TETRODE GRID #2 TO DIODE PLATE #1	0.3	μμ f
TETRODE GRID #2 TO DIODE PLATE #2	0.3	μμ f

RATINGS

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM
TETRODE UNIT - AUDIO DRIVER SERVICE

HEATER VOLTAGE A MAXIMUM PLATE VOLTAGE	12.6 16	VOLTS VOLTS
MAXIMUM GRID #2 (CONTROL-GRID) VOLTAGE NEGATIVE BIAS VALUE MAXIMUM GRID #1 (SPACE-CHARGE-GRID) VOLTAGE	-16 16	VOLTS VOLTS
MAXIMUM PEAK HEATER-CATHODE VOLTAGE: HEATER NEGATIVE WITH RESPECT TO CATHODE HEATER POSITIVE WITH RESPECT TO CATHODE	16 16	VOLTS VOLTS

CONTINUED FROM PRECEDING PAGE

RATINGS - CONT'D INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

DIODE UNITS - TWO VALUES ARE FOR EACH UNIT

HEATER VOLTAGEA	12.6	VOLTS
MAXIMUM PLATE CURRENT	5	MA.
MAXIMUM PEAK HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE	16	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	16	VOLTS

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER

HEATER VOLTAGEA	12.6	VOLTS
HEATER CURRENT	0.4	AMP.
PLATE VOLTAGE	12.6	VOLTS
GRID #2 (CONTROL-GRID) VOLTAGE:		
DEVELOPED ACROSS A 2.2 MEGOHM RESISTOR	-0.5	VOLTS
GRID #1 (SPACE-CHARGE-GRID) VOLTAGE	12.6	VOLTS
PLATE RESISTANCE (APPROX.)	500	OHMS
AMPLIFICATION FACTOR, GRID #2 TO PLATE	9.1	
TRANSCONDUCTANCE, GRID #2 TO PLATE	19 000	MMHOS
PLATE CURRENT	35	MA.
GRID #1 CURRENT	75	MA.

TYPICAL OPERATION

AS DRIVER FOR

TRANSISTORIZED AF POWER-OUTPUT STAGE

PLATE SUPPLY VOLTAGE	11.2	VOLTS
PLATE VOLTAGE	11.2	VOLIS
	11.2	VOLTS
GRID #1 SUPPLY VOLTAGE	11.2	VOLIS
GRID #2 SUPPLY VOLTAGE	0	VOLTS
GRID #2 RESISTOR	1.8	MEGOHMS
CATHODE RESISTOR	18	OHMS
PEAK AF GRID #2 SUPPLY VOLTAGE (APPROX.):		
FROM 3.3 MEGOHM SIGNAL SOURCE	4.25	VOLTS
PLATE CURRENT:		
ZERO SIGNAL (APPROX.)	20	MA.
INDICATED SIGNAL	7	MA.
GRID #1 CURRENT	58	MA.
LOAD RESISTANCE	1250	OHMS
TOTAL HARMONIC DISTORTION (AT POWER OUTPUT OF 2.5 MW)	5	PERCENT
INDICATED SIGNAL POWER OUTPUT	10	MW.

THIS TUBE IS INTENDED TO BE USED IN AUTOMOTIVE SERVICE FROM A NOMINAL 12 VOLT BATTERY SOURCE. THE MEATER IS THEREFORE DESIGNED TO OPERATE OVER THE 10.0 TO 15.9 VOLTAGE RANGE ENCOUNTERED IN THIS SERVICE. THE MAXIMUM RATINGS OF THE TUBE PROVIDE FOR AN ADEQUATE SAFETY FACTOR SUCH THAT THE TUBE WILL WITHSTAND THE WIDE VARIATION IN SUPPLY VOLTAGES.

BOBTAINED FROM INDICATED PLATE SUPPLY THROUGH SERIES 100 HENRY CHOKE HAVING DC RESISTANCE OF 150 OHMS.

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS - CONTID.

TYPICAL OPERATION

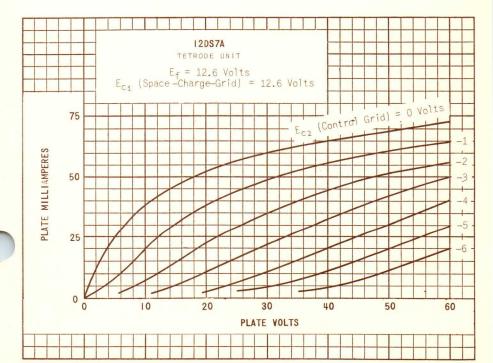
PLATE VOLTAGE	12.6	VOLTS.
GRID #1 VOLTAGE	12.6	VOLTS
GRID #2 VOLTAGE:		
OBTAINED BY RECTIFICATION THROUGH A 2.2 MEGOHM RESISTOR	-2.5	VOLTS
PEAK AF GRID #2 VOLTAGE (APPROX.):		
FROM O. 22 MEGOHM SIGNAL SOURCE	2.5	VOLTS
PLATE CURRENT:		
ZERO SIGNAL (APPROX.)	35	MA.
MAXIMUM SIGNAL	11	MA.
GRID #1 CURRENT	80	MA.
LOAD RESISTANCE	700	OHMS
TOTAL HARMONIC DISTORTION	10	PERCENT
MAX. SIGNAL POWER OUTPUT	45	MW.
MAXIMUM CIRCUIT VALUES:		
GRID #2 CIRCUIT RESISTANCE	10	MEGOHMS

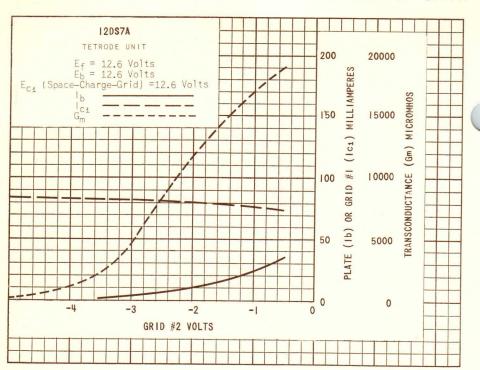
CHARACTERISTICS

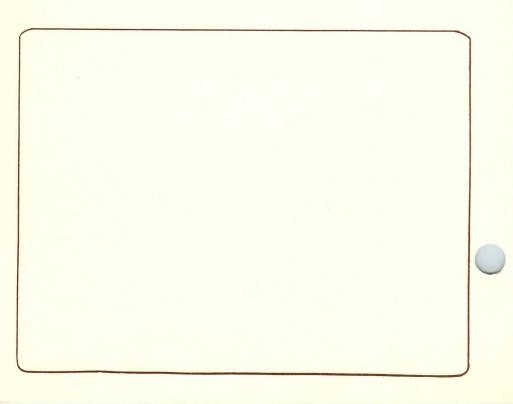
DIODE UNITS - TWO VALUES ARE FOR EACH UNIT

FLATE CURRENT FOR PLATE VOLTS = 10

3 MA.



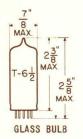




TUNG-SOL .

BEAM-POWER PENTODE

MINIATURE TYPE



GRID #1 TO PLATE

INPUT

OUTPUT

COATED UNIPOTENTIAL CATHODE
HEATER

12.6 VOLTS 0.60±6% AMP. AC OR DC

ANY MOUNTING POSITION



MINIATURE SMALL-BUTTON 9 PIN BASE 9HN

0.57

12.5

4.9

μμf

щеf

THE 12DT5-IS A BEAM POWER PENTODE IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED FOR SERVICE AS A VERTICAL DEFLECTION OUTPUT AMPLIFIER IN TELEVISION RECEIVERS UTILIZING A 110° DEFLECTION ANGLE PICTURE TUBE AND A B+ SUPPLY VOLTAGE OF 250 VOLTS. IT HAS HIGH ZERO BIAS PLATE CURRENT AND A HIGH PLATE CURRENT TO GRID #2 CURRENT RATIO. IN ADDITION, THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED. EXCEPT FOR HEATER RATINGS AND WARM-UP TIME, THE 12DT5 IS IDENTICAL TO THE 6DT5.

DIRECT INTERECECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

RATINGSA		
INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM		
VERTICAL DEFLECTION SERVICEB		
DEFLECTING 110° PICTURE TUBE		
HEATER VOLTAGE	12.6	VOLTS
MAXIMUM PLATE VOLTAGE	315	VOLTS
MAXIMUM PEAK POSITIVE PULSE PLATE VOLTAGE (ABS. MAX.)	2 200	VOLTS
MAXIMUM GRID #2 VOLTAGE	285	VOLTS
MAXIMUM PEAK NEGATIVE PULSE GRID #1 VOLTAGE	-250	VOLTS
MAXIMUM PLATE DISSIPATION ^C	9.0	WATTS
MAXIMUM GRID #2 DISSIPATION	2.0	WATTS
MAXIMUM CATHODE CURRENT:		
AVERAGE	55	MA.
PEAK	190	MA.
MAXIMUM HEATER POSITIVE OR NEGATIVE WITH RESPECT TO *		
CATHODE (TOTAL DC AND PEAK)	200	VOLTS
MAXIMUM GRID #1 CIRCUIT VALUES		
FIXED BIAS	-0.5	MEGOHM
CATHODE BIAS	1.0	MEGOHM
HEATER WARM-UP TIME (APPROX.)*	11.0	SECONDS
CONTINUED ON FOLLOWING PAGE		

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

HEATER VOLTAGE	12.6	12.6	12.6	VOLTS
HEATER CURRENT	0.60±6%	0.60±6% 0	0.60±6%	AMP.
PLATE VOLTAGE	60	80 🛧	- 250	VOLTS
GRID #2 (SCREEN) VOLTAGE	150	250	250	VOLTS
GRID #1 VOLTAGE	OE	OE	-16.5	VOLTS
TRANSCONDUCTANCE			6 200	μMH0S
PLATE CURRENT	→ 95	195.F	44	MA.
GRID #2 CURRENT	→ 8.5	19 ^F	1.5	MA.
GRID #1 CUTOFF VOLTAGE G			-35	VOLTS

A DESIGN-MAXIMUM RATINGS ARE THE LIMITING VALUES EXPRESSED WITH RESPECT TO BOGIE TUBES AT WHICH SATISFACTORY TUBE LIFE CAN BE EXPECTED TO OCCUR. TO OBTAIN SATISFACTORY CIRCUIT PERFORMANCE, THEREFORE, THE EQUIPMENT DESIGNE MUST ESTABLISH THE CIRCUIT DESIGN SO THAT NO DESIGNE-MAXIMUM VALUE IS EXCEEDED WITH A BOGIE TUBE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, AND ENVIRONMENTAL CONDITIONS.

B-FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE.

C IN STAGES OPERATING WITH GRID LEAK BIAS, AN ADEQUATE CATHODE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

E APPLIED FOR SHORT INTERVAL (MAXIMUM OF 2 SECONDS) SO AS NOT TO DAMAGE TUBE.

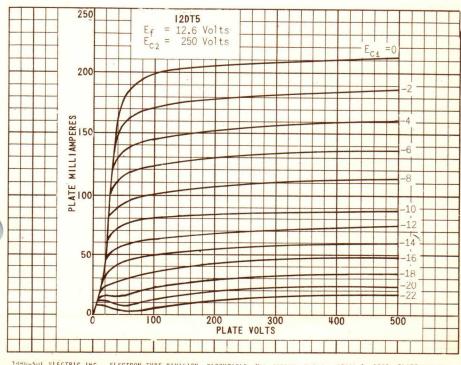
F_THESE VALUES CAN BE MEASURED BY A METHOD INVOLVING A RE-CURRENT WAVEFORM SUCH THAT THE PLATE DISSIPATION AND GRID #2 INPUT WILL BE KEPT WITHIN RATINGS IN ORDER TO PREVENT DAMAGE TO THE TUBE.

GFOR PLATE CURRENT OF 100 HAMPERES.

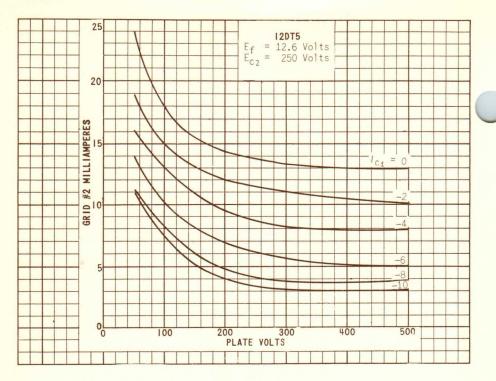
^{*}HEATER WARM—UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80⊈ OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATBR OPERATING RESISTANCE.

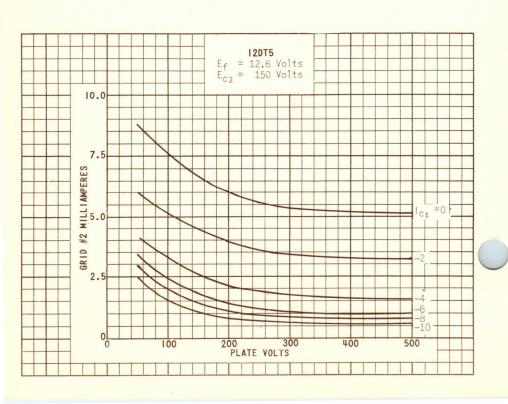
DC COMPONENT MUST NOT EXCEED 100 VOLTS.

⁻ INDICATES A CHANGE.

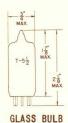


PRINTED IN U. S. A.





PENTODE



MINIATURE TYPE

UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 0.15 AMPS.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

SMALL-BUTTON MINIATURE
7 PIN BASE

7EN

THE 12DT6 IS A SHARP CUTOFF PENTODE IN THE 7 PIN MINIATURE CONSTRUCTION. IT IS INTENDED FOR USE AS AN FM DETECTOR IN TELEVISION RECEIVERS. DESIGNED SO THAT GRID #1 AND GRID #3 CAN EACH BE USED AS INDEPENDENT SHARP CUTOFF CONTROL ELECTRODES, THE TUBE MAY ALSO BE USED IN DELAY CIRCUITS, GAIN-CONTROLLED AMPLIFIER CIRCUITS, AND MIXER CIRCUITS. WITH THE EXCEPTION OF HEATER WARM-UP TIME AND HEATER CHARACTERISTICS, IT IS IDENTICAL TO THE 6DT6.

DIRECT INTERELECTRODE CAPACITANCES — APPROX. WITH EXTERNAL SHIELD, *316, CONNECTED TO CATHODE

GRID #1 TO PLATE	0.02	uu f
GRID #1 TO GRID #3	0.1	иµ f
GRID #3 TO ALL OTHER ELECTRODES	6.1	μμf
GRID #1 TO GRID #2, GRID #3, HEATER,		
AND INTERNAL SHIELD AND CATHODE	5.8	μμf
GRID #3 TO PLATE	1.4	иµ f

RATINGS INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

FM DETECTOR SERVICE

HEATER VOL.TAGE	12.6	VOLTS
MAXIMUM PLATE VOLTAGE	330	VOLTS
MAXIMUM GRID #3 (SUPPRESSOR) VOLTAGE	28	VOLTS
MAXIMUM GRID #2 SUPPLY VOLTAGE	330	VOLTS
MAXIMUM GRID #2 (SCREEN) VOLTAGE	SEE RATING	CHART
MAXIMUM GRID #1 (CONTROL-GRID) VOLTAGE:		
POSITIVE BIAS VALUE	0	VOLTS
MAXIMUM PLATE DISSIPATION	1.7	WATTS
MAXIMUM GRID #2 INPUT:		
FOR GRID #2 VOLTAGES UP TO 165 VOLTS	1.1	WATTS
FOR GRID #2 VOLTAGES BETWEEN 165 AND 330 VOLTS	SEE RATING	CHART
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE	100	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	100 ^A	VOLTS
HEATER WARM-UP TIME (APPROX.) *	11	SECONDS

ATHE DC COMPONENT MUST NOT EXCEED 100 VOLTS.

K HEATER WARM—UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED MEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER

HEATER VOLTAGE	12.F	VOLTS
HEATER CURRENT	0.15	AMP.
PLATE SUPPLY VOLTAGE	150	VOLTS
GRID #3 SUPPLY VOLTAGE	0	VOLTS
GRID #2 SUPPLY VOLTAGE	100	VOLTS
CATHODE-BIAS RESISTOR	560	OHMS
PLATE RESISTANCE (APPROX.)	0.15	MEGOHM
TRANSCONDUCTANCE:		
GRID #1 TO PLATE	800	MMHOS
GRID #3 TO PLATE	515	MHOS
GRID #1 VOLTAGE (APPROX.) FOR PLATE CURRENT OF 10 HAMP	-4.5	VOLTS
GRID #3 VOLTAGE (APPROX.) FOR PLATE CURRENT OF 10 HAMP	-3.5	VOLTS
PLATE CURRENT	1.1	MA.
GRID #2 CURRENT	2.1	MA.

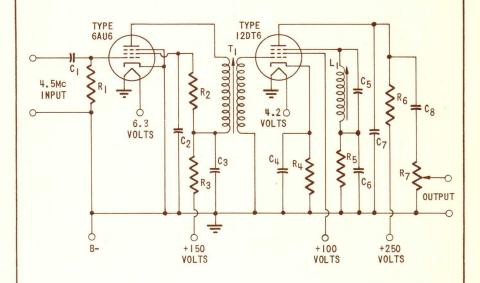
TYPICAL OPERATION IN THE ACCOMPANYING LOCKED-OSCILLATOR, QUADRATURE-GRID FM DETECTOR CIRCUIT AT A CARRIER FREQUENCY OF 4.5 MC:

AT A CARRIER FREQUENCY	AT A CARRIER FREQUENCY OF 4.5 MC:						
INPUT SIGNAL TO GRID OF DRIVER TUBE	15	200	500	MV RMS			
PLATE SUPPLY VOLTAGE	250	250	250	VOLTS			
GRID #3 VOLTAGE (OBTAINED FROM							
A 560000-OHM RESISTOR)	-5		-6.4	VOLTS			
GRID #2 SUPPLY VOLTAGE		100		VOLTS			
CATHODE-BIAS RESISTOR	560		560				
PLATE LOAD RESISTOR		0.27		MEGOHM			
PLATE CURRENT	0.23			MA.			
GRID #2 CURRENT		5.5		MA.			
GRID #1 CURRENT	0.013	0.6	0.8	MA.			
BANDWIDTH:							
FOR A TOTAL HARMONIC DISTORTION	C-	7.00	220				
OF 10 PERCENT	65			KC			
AM REJECTION (APPROX.) B	33	29	28	DB			
AUDIO OUTPUT VOLTAGE (RMS, APPROX.):							
WITH ± 7.5-KC DEVIATION FROM MEAN VALUE OF 4.5 MC		6 =	7 5				
WITH + 25-KC DEVIATION FROM	5.5	0.5	7.5	VOLIS			
MEAN VALUE OF 4.5 MC	17	21	23	VOLTS			
TOTAL HARMONIC DISTORTION:							
WITH + 25-KC DEVIATION FROM	-						
MEAN VALUE OF 4.5 MC	2	3	4	PERCENT			
SENSITIVITY:							
WITH ±7.5-KC DEVIATION FROM				1			
MEAN VALUE OF 4.5 MC			5°	MILLIVOLTS			
WITH +25-KC DEVIATION FROM			7-0				
MEAN VALUE OF 4.5 MC			15 ^c	MILLIVOLTS			
MAXIMUM CIRCUIT VALUES:							
GRID #1 CIRCUIT RESISTANCE:							
FOR FIXED-BIAS OPERATION			ATTACA TO A STATE OF THE PARTY	MEGOHM			
FOR CATHODE-BIAS OPERATION			0.5	MEGOHM			

B RATIO OF THE AUDIO OUTPUT VOLTAGE PRODUCED BY 30-PERCENT AMPLITUDE MODULATION OF THE 4.5-MC CARRIER FREQUENCY TO THE AUDIO OUTPUT PRODUCED BY \$\frac{4}{25}-KC DEVIATION FROM THE 4.5-MC CARRIER FREQUENCY, WITH A MODULATING FREQUENCY OF 400 CPS IN 60TH CASES.

C SIGNAL LEVEL AT WHICH DETECTOR CIRCUIT WILL HANDLE THE INDICATED DEVIATION IN FREQUENCY FROM THE MEAN VALUE OF 4.5 MC, BEFORE DISTORTION OCCURS.

LOCKED-OSCILLATOR, QUADRATURE-GRID DETECTOR CIRCUIT UTILIZING TYPE 12DT6



C1: 4744, 400 VOLTS C2 C3:0.014f, 400 VOLTS C4: 0.01µf, 200 VOLTS 1844 f, 200 VOLTS c 5: c6: 0.054f, 200 VOLTS

100 TO 1000µµf, 0.014f, 400 VOLTS

SLUG-TUNED INDUCTOR WITH Q OF 50 AND TUNEABLE TO 4.5-MC. L₁:

R₁: 100000 OHMS, 0.5 WATT R₂: 12000 OHMS, 0.5 WATT R 2:

1000 OHMS, 0.5 WATT 560 OHMS, 0.5 WATT R4:

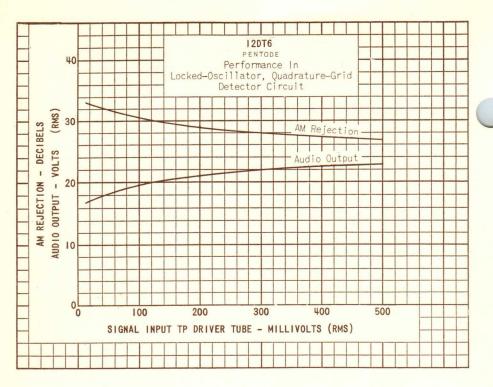
560000 OHMS, 0.5 WATT

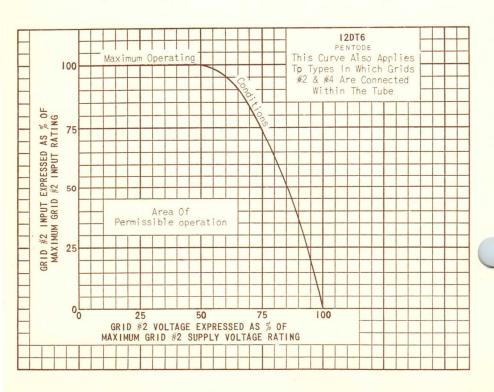
R6: 270000 OHMS, 0.5 WATT

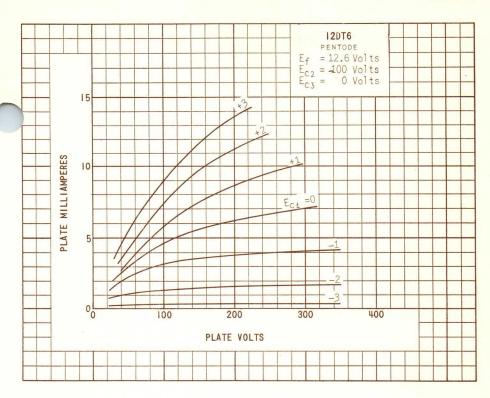
R7: 0.5 MEGOHM POTENTIOMETER

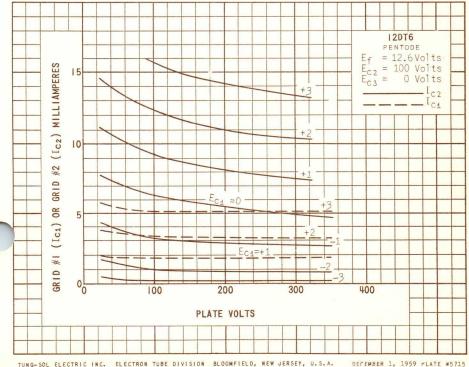
SLUG-TUNED, BIFILAR WOUND IF TRANSFORMER WITH RATIO OF 1:1.5, Q>60, AND TUNEABLE TO 4.5-MC WITH TUBE AND WIRING CAPACITANCE.

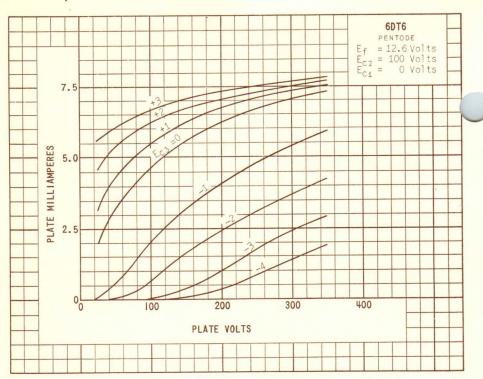
12DT6 TENTATIVE DATA

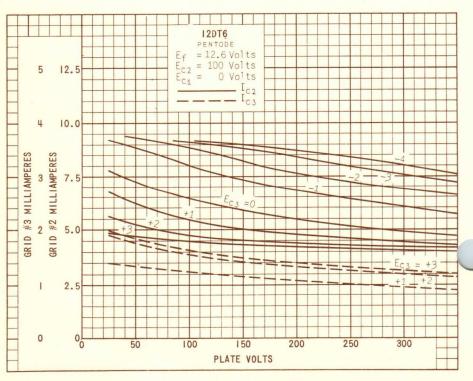


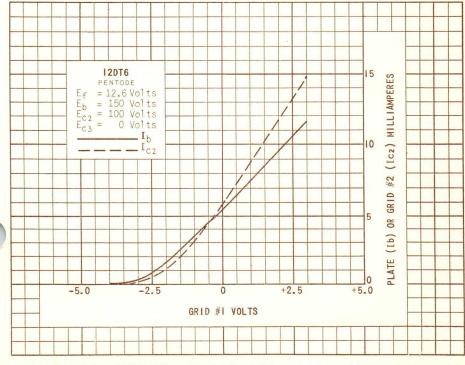




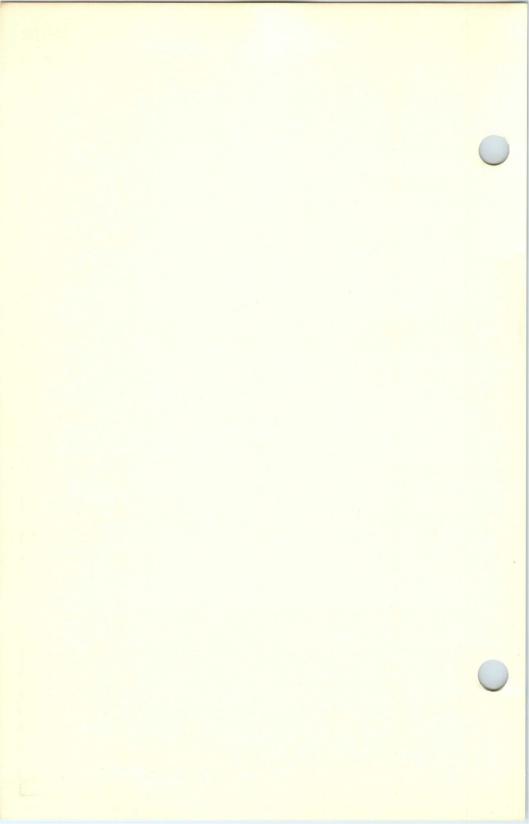




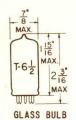




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MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER

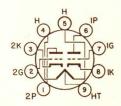
SERIES PARALLEL

12.6 VOLTS 6.3 VOLTS

0.15 AMPS. 0.3 AMPS.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

MINIATURE BUTTON
9 PIN BASE

THE 12DT7 IS A HEATER-CATHODE TYPE HIGH-MU DOUBLE TRIODE IN THE 9 PIN MINIATURE CONSTRUCTION AND IS DESIGNED FOR USE AS A RESISTANCE-COUPLED VOLTAGE AMPLIFIER IN CRITICAL AUDIO DESIGNS WHERE LOW NOISE AND HUM ARE OF PRIMARY CONSIDERATION. IN OTHER RESPECTS IT IS SIMILAR TO TYPE 12AX7.

DIRECT INTERELECTRODE CAPACITANCES

	UNIT #1	UNIT #2	
GRID TO PLATE	1.7	1.7	μμf
INPUT	1.6	1.6	щи f
OUTPUT	0.46	0.34	μμf

RATINGS

INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM EACH UNIT

HEATER VOLTAGE	6.3/12.6	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE:		VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC	100	VOLTS
TOTAL DC AND PEAK	180	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	180	VOLTS
MAXIMUM PLATE VOLTAGE	300	VOLTS
MAXIMUM GRID VOLTAGE:		
NEGATIVE - BIAS VALUE	50	VOLTS
POSITIVE - BIAS VALUE	0	VOLTS
MAXIMUM PLATE DISSIPATION	1	WATT
MAXIMUM PEAK HEATER-CATHODE VOLTAGE	180	VOLTS

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER

HEATER VOLTAGE			6.3/12.6			VOLTS
HEATER CURRENT			0.3/0.15			AMPS.
PLATE VOLTAGE		100			250	VOLTS
GRID VOLTAGE		-1			-2	VOLTS
AMPLIFICATION FACTOR		OOF			100	
PLATE RESISTANCE	80	000		62	500	OHMS
TRANSCONDUCTANCE	1	250		1	600	имноs
PLATE CURRENT		0.5			1.2	MA.

BALLISTIC NOISE LEVEL - EACH UNIT

AVERAGE VALUE	+5	DB
PLATE SUPPLY	250	VOLTS
PLATE LOAD RESISTOR	220	KILOHMS
CATHODE RESISTOR	3 000	OHMS
CATHODE BY-PASS CAPACITOR	100	μf
GRID RESISTOR	20	KI LOHMS

AMPLIFIER COVERING FREQUENCY RANGE OF 30 TO 12,000 CPS. ±2db: FOR A SENSITIVITY OF 20mV IN, FOR 50mw OUT: EQUIVALENT TO 17 db: USING A HAND MALLET PER MIL-E-1C PAR. 4-10.3 AND PAR. 4-10.3.5.

EQUIVALENT NOISE AND HUM VOLTAGE

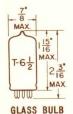
AVERAGE VALUE	-46	DB
PLATE SUPPLY	100	VOLTS
PLATE LOAD RESISTOR	110	KILOHMS
CATHODE RESISTOR (UNBYPASSED)	2 400	OHMS
CDID DESISTOR	0	OHMS

AMPLIFIER FREQUENCY RESPONSE ± 0.5 db 20 TO 30,000 CPS € 1 WATT OUT GAIN 110 db.

- INDICATES A CHANGE

TWIN TRIODE

MINIATURE TYPE



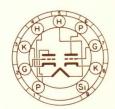
COATED UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 0.15 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW SMALL-BUTTON 9-PIN NOVAL

THE 12DT8 IS A GENERAL-PURPOSE HIGH-MU TWIN TRIODE OF THE 9-PIN MINIATURE TYPE INTENDED FOR USE AS AN RF AMPLIFIER AND AS A COMBINED OSCILLATOR-MIXER IN FM TUNERS. THIS TUBE IS ALSO USEFUL IN A WIDE VARIETY OF APPLICATIONS IN RADIO AND TELEVISION RECEIVERS.

DIRECT INTERELECTRODE CAPACTANCES - APPROX.

	UNIT #1	UNIT #2	
GRID-DRIVE OPERATION: A			
GRID TO PLATE	1.6	1.6	μμ f
GRID TO CATHODE, HEATER & 1.S.	2.7	2.7	μμf
PLATE TO CATHODE, HEATER & I.S.	1.6	1.6	μμ f
HEATER TO CATHODE	3.0	3.0	µµ f
CATHODE-DRIVE OPERATION: B			
CATHODE TO GRID, HEATER, & I.S.		5.3	μμ f
PLATE TO GRID, HEATER, & 1.S.		2.8	μμf

RATINGS

INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM
CLASS AT AMPLIFIER
FACH UNIT

EACH ONT		
HEATER VOLTAGE	12.6	VOLTS
MAXIMUM PLATE VOLTAGE	300	VOLTS
MAX'IMUM GRID VOLTAGE:		
NEGATIVE BIAS VALUE	50	VOLTS
MAXIMUM PLATE DISSIPATION	2.5	WATTS
MAXIMUM PEAK HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE	200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	200°	VOLTS
MAXIMUM GRID-CIRCUIT RESISTANCE:		
FOR FIXED-BIAS OPERATION	0.25	MEGOHM
FOR CATHODE-BIAS OPERATION	1	MEGOHM

Awith external shield, \$315 Connected to cathode of unit under test.

Bwith external shield, #315, connected to grid of unit under test.

CDC COMPONENT MUST NOT EXCEED 100 VOLTS.

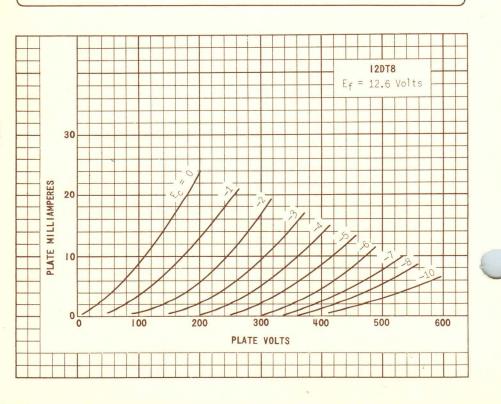
TUNG-SOL .

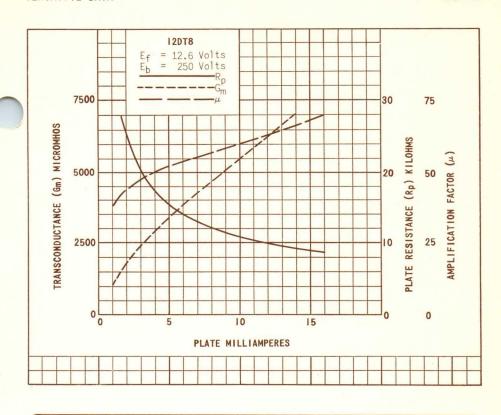
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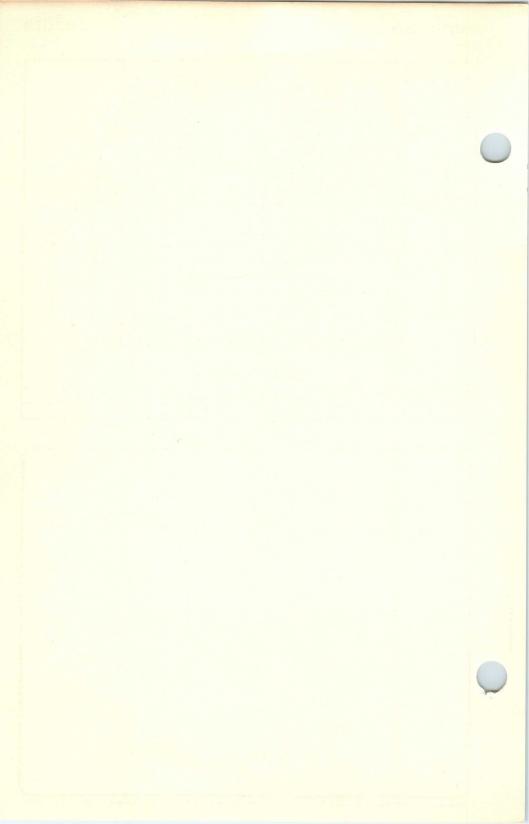
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A₁ AMPLIFIER EACH UNIT

HEATER VOLTAGE	12.6	12.6	VOLTS
HEATER CURRENT	0.15	0.15	AMP.
PLATE-SUPPLY VOLTAGE	100	250	VOLTS
CATHODE-BIAS RESISTOR	270	200	OHMS
AMPLIFICATION FACTOR	60	60	
PLATE RESISTANCE (APPROX.)	15 000	10 900	OHMS
TRANSCONDUCTANCE	4 000	5 500	μMH0S
PLATE CURRENT	3.7	10	MA -
GRID VOLTAGE (APPROX.) FOR PLATE			
CURRENT OF 10 HA.	-5	-12	VOLTS

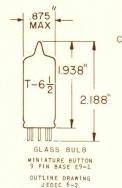






DUO-DIODE TETRODE

MINIATURE TYPE



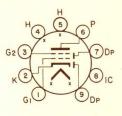
COATED UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 0.250 AMP. ←

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
BASING DIAGRAM

THE 12DU7 IS A DUO - DIODE, TETRODE IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED FOR USE AS A COMBINED DETECTOR, AVC RECTIFIER AND AUDIO POWER AMPLIFIER DRIVER IN APPLICATIONS WHERE THE HEATER, PLATE, AND SCREEN VOLTAGES ARE GBTAINED DIRECTLY FROM AN AUTOMOTIVE STORAGE BATTERY.

DIRECT INTERELECTRODE CAPACITANCES WITHOUT EXTERNAL SHIELD

TETRODE SECTION:

GRID #1 TO PLATE	0.6	pf
INPUT: G1 TO (H+TK+G2)	11	pf
OUTPUT: P TO (H+TK+G2)	3.6	pf
GRID #1 TO DIODE PLATE #1 (MAX.)	0.22	pf
GRID #1 TO DIODE PLATE #2 (MAX.)	0.12	pf

RATINGS INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE	16	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	16	VOLTS
MAXIMUM PLATE VOLTAGE	16	VOLTS
MAXIMUM GRID #2 VOLTAGE	16	VOLTS
MAXIMUM GRID #1 RESISTANCE	10	MEGOHMS
MAXIMUM AVERAGE DIODE CURRENT (EACH DIODE)	1.0	MA.

THIS TUBE IS INTENDED TO BE USED IN AUTOMOTIVE SERVICE FROM A NOMINAL 12 VOLT BATTERY SOURCE. THE MEATER IS THEREFORE DESIGNED TO OPERATE OVER THE 10.0 TO 15.9 VOLTAGE RANGE ENCOUNTERED IN THIS SERVICE. THE MAXIMUM RATINGS OF THE TUBE PROVIDE FOR AN ADEQUATE SAFETY FACTOR SUCH THAT THE TUBE WILL WITHSTAND THE WIDE VARIATION IN SUPPLY VOLTAGES.

__INDICATES A CHANGE

TUNG-SOL -

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

PLATE VOLTAGE	12.6	VOLTS
GRID #2 VOLTAGE	12.6	VOLTS
GRID #1 RESISTOR C	2.2	MEGOHMS
AF GRID VOLTAGE (RMS)	1.6	VOLTS
PLATE CURRENT	12	MA.
GRID #2 CURRENT	1.5	MA.
TRANSCONDUCTANCE	6 200	µмноs
PLATE RESISTANCE (APPROX.)	6 000	OHMS
LOAD RESISTANCE	2 700	OHMS
MAXIMUM SIGNAL POWER OUTPUT	25	MW.
TOTAL HARMONIC DISTORTION	10	PERCENT
AVERAGE DIODE CURRENT WITH 10V. DC APPLIED, (EA. DIODE)	1.3	MA.

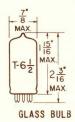
DESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING REPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT LIFE NO DESIGN—MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING COMDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.

CAVERAGE CONTACT POTENTIAL BIAS DEVELOPED ACROSS SPECIFIED GRID RESISTOR.

TUNG-SOL .

DOUBLE DIODE TRIODE

MINIATURE TYPE



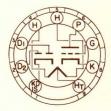
COATED UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 0.15 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW MINIATURE BUTTON 9 PIN BASE

9 J Y

THE 12DV7 IS A DOUBLE DIODE, MEDIUM-MU TRIODE IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS INTENDED FOR USE AS A SECOND DETECTOR AUDIO AMPLIFIER IN APPLICATIONS WHERE THE HEATER AND PLATE VOLTAGES ARE OBTAINED DIRECTLY FROM AN AUTOMOTIVE STORAGE BATTERY.

DIRECT INTERELECTRODE CAPACITANCES WITHOUT EXTERNAL SHIELD

GRID TO PLATE	1.6	μμ f
INPUT: G TO (H TK)	1.3	μμ f
OUTPUT: P TO (H TK)	0.38	μμ f
DIODE PLATE #1 TO GRID (MAX.)	0.005	ии f
DIODE PLATE #2 TO GRID (MAX.)	0.005	µµ f
D'IODE PLATE #1 TO		- Common
DIODE PLATE #2 (MAX.)	0.17	циf

RATINGS INTERPRETED ACCORDING TO DESIGN MAXIMUM VALUES A

REATER VOLTAGE B	12.6	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE	16	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	16	VOLTS
MAXIMUM PLATE VOLTAGE	16	VOLTS
MAXIMUM CATHODE CURRENT	20	MA.
MAXIMUM GRID CIRCUIT RESISTANCE	10	MEGOHMS
MAXIMUM AVERAGE DIODE CURRENT (EACH DIODE)	1.0	MA.

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS AT AMPLIFIER

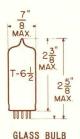
HEATER VOLTAGE	12.6	VCLTS
PLATE VOLTAGE	12.6	VOLTS
GRID VOLTAGE ^C		
GRID RESISTOR	2.2	MEGOHMS
PLATE CURRENT	400	μA
TRANSCONDUCTANCE	750	µмноs
AMPLIFICATION FACTOR	14	
PLATE RESISTANCE	19 000	OHMS
EC FOR Ib = 10 μ A. (APPROX.)	-2	VOLTS
AVERAGE DIODE CURRENT WITH 10 VOLTS		
APPLIED (EACH DIODE)D	1.3	MA.

THIS TUBE IS INTENDED TO BE USED IN AUTOMOTIVE SERVICE FROM A NOMINAL 12 VOLT BATTERY SOURCE. THE MEATER IS THEREFORE DESIGNED TO OPERATE OVER THE 10.0 TO 15.9 VOLTAGE RANGE ENCOUNTERED IN THIS SERVICE. THE MAXIMUM RATINGS OF THE TUBE PROVIDE FOR AN ADEQUATE SAFETY FACTOR SUCH THAT THE TUBE WILL WITHSTAMD THE WIDE VARIATION IN SUPPLY VOLTAGET.

Caverage contact Potential bias developed across specified grid resistor.

DTEST CONDITION ONLY.

DESIGN-MAXIMUM RATINGS ARELIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT ITE NO DESIGN-MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING COMDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.



COATED UNIPOTENTIAL CATHODE

HEATER 12.6 VOLTS 0.375 AMP. AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW SMALL BUTTON 9 PIN BASE

9HR

THE 12DV8 IS A DUPLEX-DIODE, SPACE-CHARGE-GRID TETRODE IN THE 9-PIN MINIATURE CONSTRUCTION. IT IS INTENDED FOR USE AS A COMBINED DETECTOR, AVC RECTIFIER, AND TRANSISTOR DRIVER. THE TETRODE SECTION IS SPECIALLY DESIGNED TO OPERATE WITH ITS PLATE AND SPACE-CHARGE-GRID VOLTAGES SUPPLIED DIRECTLY FROM A 12 VOLT STORAGE BATTERY.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

TETRODE GRID #2 TO PLATE	12	µµ f
TETRODE INPUT	9.0	μμf
TETRODE OUTPUT	1.0	μμ f
TETRODE GRID #2 TO ANY DIODE PLATE (MAX.)	0.015	μμf
DIODE #1 INPUT	1.7	μμ f
DIODE #2 INPUT	1.6	μμf
DIODE #1 PLATE TO DIODE #2 PLATE (MAX.)	0.10	uu f

RATINGS

INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER VOLTAGE	12.6 ^A	VOLTS
MAXIMUM PLATE VOLTAGE	16	VOLTS
MAXIMUM NEGATIVE CONTROL-GRID VOLTAGE	16	VOLTS
MAXIMUM SPACE-CHARGE-GRID VOLTAGE	16	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE		
HEATER POSITIVE WITH RESPECT TO CATHODE	16	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE	16	VOLTS
MAXIMUM CONTROL-GRID CIRCUIT RESISTANCE	10	MEGOHMS
MAXIMUM DIODE CURRENT FOR CONTINUOUS OPERATION (EA.DIO	DE) 5.0	MA.

A WHEN USED IN AUTOMOTIVE SERVICE FROM A 12-VOLT SOURCE, UNDER NO CIRCUMSTANCES SHOULD THE HEATER VOLTAGE BE LESS THAN 10.0 VOLTS OR MORE THAN 15.9 VOLTS. THESE EXTREME VARIATIONS IN HEATER VOLTAGE MAY BE TOLERATED FOR SHORT PERIODS: HOWEVER, OPERATION AT OR NEAR THESE ABSOLUTE LIMITS IN HEATER VOLTAGE RECESSARILY INVOLVES SACRIFICE IN PERFORMANCE AT LOW HEATER VOLTAGE AND IN LIFE EXPECTANCY AT HIGH HEATER VOLTAGE. EQUIPMENT RELIABILITY CAN BE SIGNIFICANTLY INCREASED WITH IMPROVED SUPPLY-VOLTAGE REGULATION.

TUNG-SOL .

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

AVERAGE CHARACTERISTICS

HEATER VOLTAGE	12.6	VOLTS
HEATER CURRENT	0.375	AMP.
PLATE VOLTAGE	12.6	VOLTS
CATHODE RESISTOR	18	OHMS
CONTROL GRID RESISTOR	4.7	ME GOHMS
SPACE-CHARGE-GRID VOLTAGE	12.6	VOLTS
AMPLIFICATION FACTOR B	7.6	
PLATE RESISTANCE (APPROX.)	900	OHMS
TRANSCONDUCTANCE	8 500	µмноѕ
PLATE CURRENT	9.0	MA.
SPACE-CHARGE-GRID CURRENT	53	MA.
AVERAGE DIODE CURRENT (EACH DIODE)		
WITH 10 VOLTS DC APPLIED	3.0	· MA .

CLASS A AMPLIFIER

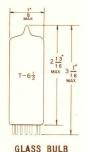
HEATER VOLTAGE	12.6	VOLTS
HEATER CURRENT	0.375	AMP.
PLATE VOLTAGE	12.6	VOLTS
CATHODE RESISTOR	18	OHMS
CONTROL-GRID RESISTOR	4.7	ME GOHMS
SPACE-CHARGE-GRID VOLTAGE	12.6	VOLTS
PEAK AF CONTROL-GRID VOLTAGE	1.2	VOLTS
AF SIGNAL SOURCE RESISTANCE	300 000	OHMS
MAXIMUM SIGNAL PLATE CURRENT	6.8	MA.
SPACE-CHARGE-GRID CURRENT	54	MA.
LOAD RESISTANCE	1 250	OHMS
TOTAL HARMONIC DISTORTION (APPROX.)	3	PERCENT
POWER OUTPUT	5	MW.

DESIGN-MAXIMUM RATINGS ARE THE LIMITING VALUES EXPRESSED WITH RESPECT TO BOGIE TUBES AT WHICH SATISFACTORY TUBE LIFE CAN BE EXPECTED TO OCCUR. TO OBTAIN SATISFACTORY CIRCUIT PERFORMANCE, THEREFORE, THE EQUIPMENT DESIGNER MUST ESSTABLISH THE CIRCUIT DESIGN SO THAT NO DESIGN-MAXIMUM VALUE IS EXCEDED WITH A BOGIE TUBE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, AND ENVIRONMENTAL CONDITIONS.

BCONTROL GRID TO PLATE.

BEAM POWER PENTODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE
HEATER

12.6 VOLTS 0.6 AMP. AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW SMALL BUTTON 9 PIN BASE 9 CK

THE 12DW5 IS A BEAM POWER PENTODE IN THE 9 PIN MINIATURE CONSTRUCTION IT IS DESIGNED PRIMARILY FOR VERTICAL DEFLECTION AMPLIFIER, SERVICE IN TELE-VISION RECEIVERS EMPLOYING 110° DEFLECTION SYSTEMS. IT HAS A HIGH ZERO BIAS PLATE CURRENT AND IS DESIGNED TO OPERATE AT RELATIVELY LOW B SUPPLY VOLTAGES. IN ADDITION, THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED. EXCEPT FOR HEATER RATINGS AND HEATER WARM-UP TIME THE 12DW5 IS IDENTICAL TO THE 6DW5.

DIRECT INTERELECTRODE CAPACITANCES

GRID TO PLATE: (G1 TO P)	0.5	μμ f
INPUT: (G1 TO H+K)	14	μμ f
OUTPUT: (P TO H+K)	9	μμ f

RATINGS A
INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM
VERTICAL DEFLECTION AMPLIFIERB

(PENTODE CONNECTED)

HEATER VOLTAGE	12.6	VOLTS
MAXIMUM DC PLATE VOLTAGE	330	VOLTS
MAXIMUM DC GRID #2 VOLTAGE	220	VOLTS
MAXIMUM PEAK POSITIVE PULSE PLATE VOLTAGE (ABS. MAX.)	2 200	VOLTS
MAXIMUM PEAK NEGATIVE PULSE GRID VOLTAGE	250	VOLTS
MAXIMUM PLATE DISSIPATIONC	11	WATTS
MAXIMUM GRID #2 DISSIPATIONC	2.5	WATTS
MAXIMUM AVERAGE CATHODE CURRENT	65	MA.
MAXIMUM PEAK CATHODE CURRENT	225	MA.
MAXIMUM GRID CIRCUIT RESISTANCE:		
SELF BIAS	2.2	MEGOHMS

CONTINUED FROM PRECEDING PAGE

RATINGS - CONT'D. INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM VERTICAL DEFLECTION AMPLIFIER^B (PENTODE CONNECTED)

MAXIMUM HEATER-CATHODE VOLTAGE HEATER NEGATIVE WITH RESPECT TO CATHODE TOTAL DC AND PEAK 200 200 VOLTS HEATER POSITIVE WITH RESPECT TO CATHODE 100 100 VOLTS TOTAL DC AND PEAK 200 VOLTS HEATER WARM-UP TIME (APPROX.)D 11.0 SECONDS

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

VERTICAL DEFLECTION AMPLIFIER^B
(PENTODE CONNECTED)

(FENTODE CONNECTED)

HEATER VOLTAGE	12.6	VOLTS
HEATER CURRENT	0.6	AMP.
PLATE VOLTAGE	200	VOLTS
GRID #1 VOLTAGE	-22.5	VOLTS
GRID #2 VOLTAGE	150	VOLTS
PLATE CURRENT	55	MA.
GRID #2 CURRENT	2.0	MA -
TRANSCONDUCTANCE	5 500	μ MHOS
PLATE RESISTANCE (APPROX.)	5 000	OHMS
GRID VOLTAGE FOR Ib = 0.1 MA.	-55	VOLTS
ZERO BIAS WITH Eb =60VDC; Ec1 =0; Ec2 =150VDC (INSTANTANE	OUS VAL	UES)
PLATE CURRENT	260	MA -
GRID #2 CURRENT	20	MA.
TRIODE AMPLIFICATION FACTOR WITH Eb =Ec2=150 V; Ec1=-22.5	4.3	

A DESIGN-MAXIMUM RATINGS ARE THE LIMITING VALUES EXPRESSED WITH RESPECT TO BOGIE TUBES AT WHICH SATISFACTORY TUBE LIFE CAN BE EXPECTED TO OCCUR. TO OBTAIN SATISFACTORY CIRCUIT PERFORMANCE, THEREFORE, THE EQUIPMENT DESIGNER MUST ESTABLISH THE CIRCUIT DESIGN SO IGNEM AND VALUE IS EXCEEDED WITH A BOGIE TUBE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, AND ENVIRONMENTAL CONDITIONS.

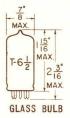
B FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE.

C IN STAGES OPERATING WITH GRID LEAK BIAS, AN ADEQUATE CATHODE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

DHEATER WARM—UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.

- TUNG-SOL

DOUBLE TRIODE
MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

SERIES PARALLEL
12.6 VOLTS 6.3 VOLTS
0.15 AMP. 0.30 AMP.
AC OR DC
ANY MOUNTING POSITION



SMALL BUTTON 9 PIN BASE

9 A

THE 12DW7 IS A DISSIMILAR DOUBLE TRIODE IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS ESPECIALLY SUITABLE FOR APPLICATIONS REQUIRING A HIGH GAIN VOLTAGE AMPLIFIER AND A CATHODYNE TYPE PHASE—INVERTER.

DIRECT INTERELECTRODE CAPACITANCES

	SECTION #1		SECTION #2 A		
	WITH B	WITHOUT	WITH B	WITHOUT	
GRID TO PLATE	1.7	1.7	1.5	1.5	μμf
INPUT: G TO (H + K)	1.8	1.6	1.8	1.7	μμf
OUTPUT: P TO(H + K)	2.0	0.44	2.4	0.4	μμf

RATINGS

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM C

	SECTION	#1	SECTION #2	
HEATER VOLTAGE (SERIES)		12.6		VOLTS
HEATER VOLTAGE (PARALLEL)		6.3		VOLTS
MAXIMUM PLATE VOLTAGE	330		330	VOLTS
MAXIMUM PLATE DISSIPATION	1.2		3.3	WATT
MAXIMUM CATHODE CURRENT			22	MA.
MAXIMUM POSITIVE DC GRID VOLTAGE	0			VOLTS
MAXIMUM NEGATIVE DC GRID VOLTAGE	55		:	VOLTS
MAXIMUM GRID CIRCUIT RESISTANCE:				
FIXED BIAS			0.25	MEGOHM
SELF BIAS			1.0	MEGOHM
MAXIMUM HEATER-CATHODE VOLTAGE:				
HEATER NEGATIVE WITH RESPECT TO CATHODE				
TOTAL DC AND PEAK		200		VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE				
D.C.		100		VOLTS
TOTAL DC AND PEAK		200		VOLTS
TOTAL OF THE STATE				

TUNG-SOL -

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER

	SECT	ION #1	SECT	ION #2	
HEATER VOLTAGE (SERIES) HEATER VOLTAGE (PARALLEL) HEATER CURRENT (SERIES)			12.6 6.3 0.15		
HEATER CURRENT (PARALLEL)			0.30		
PLATE VOLTAGE	100	250	100	250	VOLTS
GRID VOLTAGE	-1	-2	0	-8.5	VOLTS
PLATE CURRENT	0.5	1.2	11.8	10.5	MA.
TRANSCONDUCTANCE	1250	1600	3100	2200	μMHOS.
AMPLIFICATION FACTOR	100	100	20	17	
PLATE RESISTANCE	80000	62500	6500	7700	OHMS
Ec1 FOR Ib=10 μAMPS.				-24	VOLTS

DESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOSEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE, MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABLILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND HAROUGHOUT LIFE NO DESIGN-MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOSEY DEVICE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT COMPONENT VARIATION,

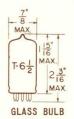
ASECTION #1 CONNECTS TO PINS 6, 7, AND 8. SECTION #2 CONNECTS TO PINS 1, 2, AND 3.

BEXTERNAL SHIELD *315 CONNECTED TO CATHODE OF SECTION UNDER TEST.

- TUNG-SOL -

DIODE-DISSIMILAR DUO-TRIODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE
HEATER

12.6 VOLTS 0.45 AMP.
AC OR DC
ANY MOUNTING POSITION



BOTTOM VIEW

SMALL BUTTON MINIATURE
9 PIN BASE
9 C

THE 12DW8 IS A DIODE-DISSIMILAR DUO-TRIODE DESIGNED TO FUNCTION AS A COMBINED SECOND DETECTOR, FIRST AUDIO STAGE, AND TRANSISTOR DRIVER STAGE IN 12 VOLT HYBRID AUTOMOBILE RADIOS. TRIODE #1 IS THE FIRST AUDIO STAGE, TRIODE #2 IS THE DRIVER.

DIRECT INTERELECTRODE CAPACITANCES

	WITH A	WITHOUT	
TRIODE #1:			
GRID TO PLATE (G TO P)	1.8	1.8	HHL f
INPUT: G TO (H+K)	2.9	1.6	μμ f
OUTPUT: P TO (H+K)	1.4	0.7	μμf
DIODE PLATE TO TRIODE #1 GRID (MAX.)	0.4	0.4	μμ f
TRIODE #2:			
GRID TO PLATE (G TO P)	3.5	3.2	μμf
INPUT: G TO (H+K)	4.4	4.4	HHL F
OUTPUT: P TO (H+K)	2.1	0.7	μμ f

Awith external shield *315 CONNECTED TO PIN *8.

RATINGS INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM TRIODE TRIODE DIODE HEATER VOLTAGE 12.6 12.6 12.6 VOLTS MAXIMUM DC HEATER-CATHODE VOLTAGE: HEATER NEGATIVE WITH RESPECT TO CATHODE 16.0 16.0 16.0 VOLTS HEATER POSITIVE WITH RESPECT TO CATHODE 16.0 16.0 VOLTS 16.0 MAXIMUM PLATE VOLTAGE 16.0 16.0 VOLTS 0 MAXIMUM POSITIVE DC GRID VOLTAGE 0 VOLTS 0.5 MAXIMUM PLATE DISSIPATION 0.5 0.5 WATTS MAXIMUM GRID CIRCUIT RESISTANCE 1.5 1.5 MEGOHM

TUNG-SOL -

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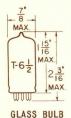
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

	TRIODE #1	TRIODE #2	DIODE	
HEATER VOLTAGE	12.6	12.6	12.6	VOLTS
HEATER CURRENT	0.45	0.45	0.45	AMP.
PLATE SUPPLY VOLTAGE	12.6	12.6		VOLTS
TRANSCONDUCTANCE	2700	6500		μмнο
AMPLIFICATION FACTOR	9.5	6.4		
PLATE CURRENT	1.9	7.5		MA.
AVERAGE DIODE CURRENT @ 10 V.			20	MA.
GRID VOLTAGE	0	0		VOLTS
GRID RESISTOR	1.5	1.0		MEGOHMS
PLATE VOLTAGE DROPPING RESISTOR	100	100		OHMS

DESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT LIFE NO DESIGN-MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.

TRIODE TETRODE

MINIATURE TYPE



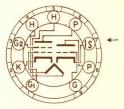
COATED UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 0.35 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
9 PIN BASE
9JD

THE 12DY8 IS A SHARP CUTOFF TRIODE TETRODE IN THE 9-PIN MINIATURE CONSTRUCTION. THE TETRODE SECTION IS DESIGNED FOR RELAY SERVICE IN "SIGNAL—SEEKER" APPLICATIONS WHILE THE TRIODE SECTION IS DESIGNED FOR GENERAL PURPOSE USE. THE 12DY8 IS DESIGNED FOR OPERATION WHERE THE PLATE AND SCREEN VOLTAGES ARE OBTAINED DIRECTLY FROM A 12 VOLT AUTOMOTIVE STORAGE BATTERY.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

	TRIODE	TETRODE	
GRID TO PLATE:	1.5	0.74	$\mu\mu$ f
INPUT;	2.0	11	μμ f
OUTPUT:	2.0 ←	3.0	μμ f

RATINGS INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM A

	TRIODE	TETRODE	
HEATER VOLTAGEB	12.6	12.6	VOLTS
MAXIMUM PLATE VOLTAGE	16	16	VOLTS
MAXIMUM GRID #2 VOLTAGE		16	VOLTS
MAXIMUM GRID #1 RESISTANCE	10	10	MEGOHMS
MAXIMUM HEATER-CATHODE VOLTAGE		16	VOLTS

ADESIGN-MAXIMUM RATINGS ARELIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEBILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT HE NO DESIGN-MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.

- INDICATES A CHANGE.

TUNG-SOL -

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

	TRIODE	TETRODE	
HEATER VOLTAGE	12.6	12.6	VOLTS
HEATER CURRENT	0.35	0.35	AMP.
PLATE VOLTAGE	12.6	12.6	VOLTS
GRID #1 VOLTAGE	0	(NOTE C)	VOLTS
GRID #2 VOLTAGE		12.6	VOLTS
GRID #1 RESISTOR		2.2	MEGOHMS
TRANSCONDUCTANCE	2000	6000	µмноs
AMPLIFICATION FACTOR	20		
PLATE RESISTANCE (APPROX.)	10000	5000	OHMS
PLATE CURRENT	1.2	14	MA.
SCREEN CURRENT		2	MA.
GRID VOLTAGE FOR $I_b = 10 \mu ADC$	-2.0		VOLTS
GRID VOLTAGE FOR $I_b = 20 \mu ADC$		-9.0	VOLTS

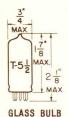
TYPICAL OPERATION TETRODE SECTION - RELAY SERVICE

HEATER VOLTAGE	10.0	15.0	VOLTS
PLATE SUPPLY VOLTAGE	10.0	15.0	VOLTS
GRID #2 VOLTAGE	10.0	15.0	VOLTS
GRID #1 VOLTAGE	(NOTE C)	-6.0	VOLTS
GRID #1 RESISTOR	10	0	MEGOHMS
PLATE LOAD RESISTOR	700	700	OHMS
PLATE CURRENT	(MIN.) 5.0	(MAX.) 3.0	MA.

BTHIS TUBE IS INTENDED TO BE USED IN AUTOMOTIVE SERVICE FROM A NOMINAL 12 VOLT BATTERY SOURCE.
THE HEATER IS THEREFORE DESIGNED TO OPERATE OVER THE 10.0 TO 15.9 VOLTAGE RANGE ENCOUNTERED IN
THIS SERVICE. THE MAXIMUM RATINGS OF THE TUBE PROVIDE FOR AN ADEQUATE SAFETY FACTOR SUCH THAT
THE TUBE WILL WITHSTAND THE WIDE VARIATION IN SUPPLY VOLTAGES.

CCONTACT POTENTIAL BIAS DEVELOPED ACROSS SPECIFIED GRID RESISTOR..

PENTODE MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER
12.6 VOLTS 0.190 AMP.
AC OR DC
ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
7 PIN BASE

7.8 K

THE 12DZ6 IS A PENTODE IN THE 7-PIN MINIATURE CONSTRUCTION. IT IS INTENDED FOR USE AS AN RF AMPLIFIER IN AUTOMOBILE RADIO RECEIVERS AND IS DESIGNED TO OPERATE WITH ITS PLATE AND SCREEN VOLTAGES SUPPLIED DIRECTLY FROM A 12 VOLT STORAGE BATTERY.

DIRECT INTERELECTRODE CAPACITANCES WITHOUT EXTERNAL SHIELD

GRID #1 TO PLATE (MAX.)	0.05 ←	μμ f
INPUT	9.5	μμ f
OUTPUT	4.0	$\mu\mu f$

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER VOLTAGE	12.6 ^A	VOLTS
MAXIMUM PLATE VOLTAGE	16	VOLTS
MAXIMUM SCREEN VOLTAGE	16	VOLTS
MAXIMUM POSITIVE DC GRID #1 VOLTAGE	0	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE		
HEATER POSITIVE WITH RESPECT TO CATHODE	16	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE	16	VOLTS
MAXIMUM GRID #4 CIRCUIT RESISTANCE	10	MEGOHMS
MAXIMUM GRID #3 CIRCUIT RESISTANCE *	10	MEGOHMS

A WHEN USED IN AUTOMOTIVE SERVICE FROM A 12-VOLT SOURCE, UNDER NO CIRCUMSTANCES SHOULD THE HEATER VOLTAGE BE LESS THAN 10.0 VOLTS OR MORE THAN 15.9 VOLTS. THESE EXTREME VARIATIONS IN HEATER VOLTAGE MAY BE TOLERATED FOR SHORT PERIODS: HOWEVER, OPERATION AT OR NEAR THESE ASSOLUTE LIMITS IN HEATER VOLTAGE NECESSARILY INVOLVES SACRIFICE IN PERFORMANCE AT LOW HEATER VOLTAGE AND IN LIFE EXPECTANCY AT HIGH HEATER VOLTAGE. EQUIPMENT RELIABILITY CAN BE SIGNIFICANTLY INCREASED WITH IMPROVED SUPPLY-VOLTAGE REGULATION.

DESIGN-MAXIMUM RATINGS ARE THE LIMITING VALUES EXPRESSED WITH RESPECT TO BOGIE TUBES AT WHICH SATISFACTORY URCULIT PERFORMANCE, THEREFORE, THE EQUIPMENT DESIGNER MUST ESTABLISH THE CIRCUIT DESIGN SO THAT NO DESIGN-MAXIMUM VALUE IS EXCECDED WITH A BOGIE TUBE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT COMPONENT VARIATION, AND ENVIRONMENTAL CONDITIONS.

- TUNG-SOL -

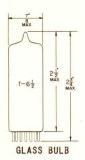
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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER

HEATER VOLTAGE	12.6	VOLTS
HEATER CURRENT	0.190 -	AMP.
PLATE VOLTAGE	12.6	VOLTS
SUPPRESSOR VOLTAGE	0	VOLTS
SCREEN VOLTAGE	12.6	VOLTS
GRID #4 SUPPLY VOLTAGE	0	VOLTS
GRID #4 RESISTOR (BYPASSED)	10	MEGOHMS
PLATE RESISTANCE (APPROX.)	25 000	OHMS
TRANSCONDUCTANCE	3 800	μMHOS.
PLATE CURRENT	4.5	MA.
SCREEN CURRENT	2.2	MA.
GRIDS #1 & #3 SUPPLY VOLTAGE (APPROX.) (GRID #1 TO PLATE)		
$G_m = 10 \mu MHOS^*$	-10	VOLTS
GRID #3 RESISTOR (BYPASSED)*	10	MEGOHMS

- INDICATES A CHANGE.



COATED UNIPOTNETIAL CATHODE
HEATER

12.0 VOLTS 0.45 AMP.
AC OR DC

ANY MOUNTING POSITION



MINIATURE 9 PIN BASE

THE 12DZ8 S A HIGH-MU TRIODE, POWER PENTODE IN THE MINIATURE 9 PIN CONSTRUCTION. IT IS DESIGNED AS A TWO STAGE AUDIO FREQUENCY AMPLIFIER WHERE THE PLATE SUPPLY VOLTAGE IS OBTAINED FROM A SINGLE HALF-WAVE RECTIFIER DIRECTLY FROM THE 120 VOLT AC LINE.

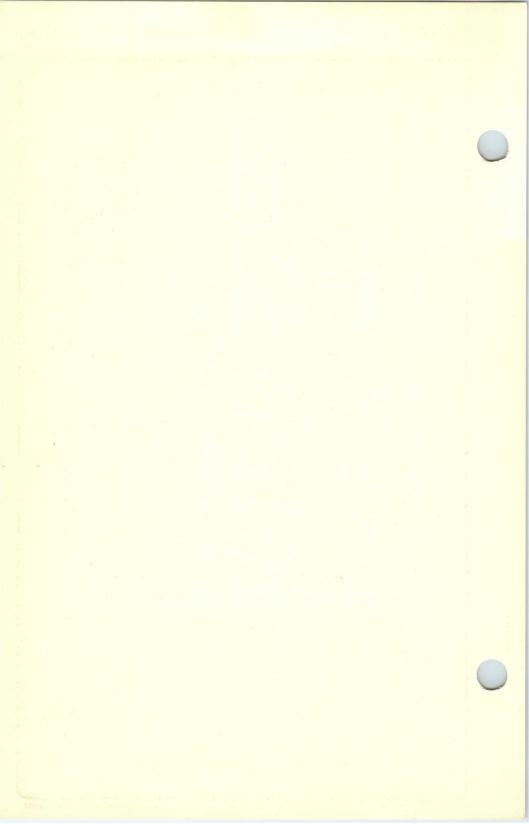
RATINGS
INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

	TRIODE	PENTODE	
HEATER VOLTAGE	12.0)	VOLTS
MAXIMUM PLATE VOLTAGE	150	150	VOLTS
MAXIMUM PLATE DISSIPATION	.75	6.5	WATTS
MAXIMUM GRID (2) VOLTAGE		135	VOLTS '
MAXIMUM GRID (2) DISSIPATION		1.5	WATTS
MAXIMUM DC HEATER-CATHODE POTENTIAL	110	110	VOLTS
MAXIMUM GRID CIRCUIT RESISTANCE	5.0	0.5	MEGOHMS
MAXIMUM CATHODE CURRENT	5.0	60.0	MA.
MAXIMUM HEATER-CATHODE VOLTAGE:			
HEATER NEGATIVE WITH RESPECT TO CATHODE	200		VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	200		VOLTS

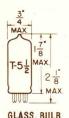
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

	TRIODE	PENTODE	
HEATER VOLTAGE	12		VOLTS
HEATER CURRENT	0.	45	AMP.
PLATE VOLTAGE	120 -	145	VOLTS
GRID #2 VOLTAGE		120	VOLTS
GRID #1 VOLTAGE	0	0	VOLTS
CATHODE RESISTOR	1500	180	OHMS
PLATE CURRENT	0.8	45	MA.
GRID #2 CURRENT		6	MA.
TRANSCONDUCTANCE	1400	7500	µмноs
LOAD RESISTANCE		2500	OHMS
GRID CUTOFF VOLTAGE FOR 204A	-2.5		VOLTS
AMPLIFICATION FACTOR	100		
POWER OUTPUT		2.0	WATTS

SIMILAR TYPE REFERENCE: Except for heater ratings the 12DZ8 is identical to the 6DZ8, 9DZ8, 18DZ8, and the 35DZ8.



PENTODE MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER
12.6 VOLTS 0.190 AMP.
AC OR DC
ANY MOUNTING POSITION



BOTTOM VIEW

MINIATURE BUTTON 7 PIN BASE 7.8K

THE 12EAG IS A PENTODE IN THE 7-PIN MINIATURE CONSTRUCTION. IT IS INTENDED FOR USE AS AN RF AMPLIFIER IN AUTOMOBILE RADIO RECEIVERS AND IS DESIGNED TO OPERATE WITH ITS PLATE AND SCREEN VOLTAGES SUPPLIED DIRECTLY FROM A 12 VOLT STORAGE BATTERY.

DIRECT INTERELECTRODE CAPACITANCES

GRID #1 TO PLATE (MAX.)	0.04	μμ f
INPUT	11	μμf
OUTPUT	4.0	μμ f

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER VOLTAGE	12.6 ^A	VOLTS
MAXIMUM PLATE VOLTAGE	16	VOLTS
MAXIMUM SCREEN VOLTAGE	16	VOLTS
MAXIMUM POSITIVE DC GRID #1 VOLTAGE	0	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE		
HEATER POSITIVE WITH RESPECT TO CATHODE	16	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE	16	VOLTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE	10	MEGOHMS
MAXIMUM GRID #3 CIRCUIT RESISTANCE *	10	MEGOHMS

A WHEN USED IN AUTOMOTIVE SERVICE FROM A 12-VOLT SOURCE, UNDER NO CIRCUMSTANCES SHOULD THE HEATER VOLTAGE BE LESS THAN 10.0 VOLTS OR MORE THAN 15.9 VOLTS. THESE EXTREME VARIATIONS IN HEATER VOLTAGE MAY BE TOLERATED FOR SHORT PERIODS: HOWEVER, OPERATION AT OR NEAR THESE ABSOLUTE LIMITS IN HEATER VOLTAGE NECESSARILY INVOLVES SACRIFICE IN PERFORMANCE AT LOW HEATER VOLTAGE AND IN LIFE EXPECTANCY AT HIGH HEATER VOLTAGE. EQUIPMENT RELIABILITY CAN BE SIGNIFICANTLY INCREASED WITH IMPROVED SUPPLY-VOLTAGE REGULATION.

DESIGN-MAXIMUM RATINGS ARE THE LIMITING VALUES EXPRESSED WITH RESPECT TO BOGIE TUBES AT WHICH SATISFACTORY TUBE LIFE CAN BE EXPECTED TO OCCUR. TO OBTAIN SATISFACTORY CIRCUIT PERFORMANCE, THEREFORE, THE EQUIPMENT DESIGNER MUST ESTABLISH THE CIRCUIT DESIGN SO THAT NO DESIGN-MAXIMUM VALUE IS EXCEEDED WITH A BOGIE TUBE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, AND ENVIRONMENTAL CONDITIONS.

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER

HEATER VOLTAGE	12.6	VOLTS
HEATER CURRENT	0.190 ←	AMP.
PLATE VOLTAGE	12.6	VOLTS
SUPPRESSOR VOLTAGE	0	VOLTS
SCREEN VOLTAGE	12.6	VOLTS
GRID #1 RESISTOR (BYPASSED)	10	MEGOHMS
PLATE RESISTANCE (APPROX.)	32 000	OHMS
TRANSCONDUCTANCE	3 800	MHOS
PLATE CURRENT	3.2	MA.
SCREEN CURRENT	1.4	MA.
GRID #1 VOLTAGE (APPROX.)		
$I_b = 10 \mu AMP$.	-3.4	VOLTS
		MEGOHMS

- INDICATES A CHANGE.

TRIODE PENTODE



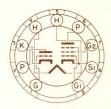
GLASS BULB

COATED UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS .225 AMP.

AC OR DC



BOTTOM VIEW
MINIATURE BUTTON
9 PIN BASE

9FA

THE 12EC8 IS A MEDIUM-MU TRIODE AND SHARP CUTOFF PENTODE IN THE 9-PIN MINIATURE CONSTRUCTION. IT IS INTENDED FOR USE AS A COMBINED VHF OSCILLATOR AND MIXER IN APPLICATIONS WHERE THE HEATER, GRID #2 AND PLATE POTENTIALS ARE SUPPLIED DIRECTLY FROM A 12 VOLT AUTOMOTIVE STORAGE BATTERY.

DIRECT INTERELECTRODE CAPACITANCES

TRIODE SECTION:		
GRID TO PLATE	1.7	щи f
INPUT:TG TO (H + K)	2.6	щи f
OUTPUT: P TO(H + K)	0.4	uu f
HEATER TO CATHODE	2.6	μμ f
PENTODE SECTION:		
GRID #1 TO PLATE (MAX.)	0.02	µµ f
INPUT: G, TO (H+K+G2+G3+1.5.)	4.6	µµ €
OUTPUT: P TO (H+K+G2+G2+1.S.)	2.6	uu f
HEATER TO CATHODE	2.6	ии f

RATINGS INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM B

	TRIODE	PENTODE	
HEATER VOLTAGE ^A	12.6	12.6	VOLTS
MAXIMUM PLATE VOLTAGE	16	16	VOLTS
MAXIMUM GRID #2 VOLTAGE		16	VOLTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE	1.0	1.0	MEGOHM
MAXIMUM HEATER-CATHODE VOLTAGE:			
HEATER NEGATIVE WITH RESPECT TO CATHODE	1.	6	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	1	6	VOLTS

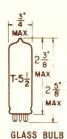
ATHIS TUBE IS INTENDED TO BE USED IN AUTOMOTIVE SERVICE FROM A MOMINAL 12 VOLT BATTERY SOURCE.
THE HEATER IS THEREFORE DESIGNED TO OPERATE OVER THE 10.0 TO 15.9 VOLTAGE RANGE ENCOUNTERED IN
THIS SERVICE. THE MAXIMUM RATINGS OF THE TUBE PROVIDE FOR AN ADEQUATE SAFETY FACTOR SUCH THAT
THE TUBE WILL WITHSTAND THE WIDE VARIATION IN SUPPLY VOLTAGES.

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

HEATER VOLTAGE	12.6	12.6	VOLTS
HEATER CURRENT	. 225	.225	AMP.
PLATE SUPPLY VOLTAGE	12.6	12.6	VOLTS
GRID #2 VOLTAGE		12.6	VOLTS
GRID #1 VOLTAGE	0	0	
GRID #1 RESISTOR	4 700	33 000	OHMS
PLATE CURRENT	2.4	0.66	MA.
GRID #2 CURRENT		0.28	MA.
TRANSCONDUCTANCE	4 700	2 000	имноs
AMPLIFICATION FACTOR	25		
PLATE RESISTANCE (APPROX.)	6 000	750 000	OHMS
GRID #1 VOLTAGE FOR I = 10 MA (APPROX.)	-2.2	-1.6	VOLTS

BOESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THOUGHOUTH LIFE NO DESIGN-MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.



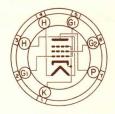
COATED UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 0.45 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

THE 12ED5 IS A BEAM POWER PENTODE IN THE 7-PIN MINIATURE CONSTRUCTION AND IS DESIGNED FOR SERVICE AS AN AUDIO OUTPUT AMPLIFIER. THERMAL CHAR-ACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

GRID #1 TO PLATE	0.26	pu f
INPUT: G1 TO (H+K+G2+G3)	14	μμf
OUTPUT: P TO $(H^+K^+G_2^-+G_3^-)$	8.5	$\mu\mu$ f

RATINGS INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM A

HEATER VOLTAGE	12.6	VOLTS
MAXIMUM PLATE VOLTAGE	150	VOLTS
MAXIMUM GRID #2 VOLTAGE	150	VOLTS
MAXIMUM PLATE DISSIPATION	6.25	WATTS
MAXIMUM GRID #2 DISSIPATION	1.5	WATTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE:		
FIXED BIAS	0.1	MEGOHM
CATHODE BIAS	0.5	MEGOHM
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE		
DC	200	VOLTS
TOTAL DC AND PEAK	300	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC	100	VOLTS
TOTAL DC AND PEAK	200	VOLTS
HEATER WARM-UP TIME (APPROX.)*	11.0	SECONDS

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER

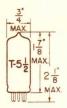
HEATER VOLTAGE	12.6	12.6	VOLTS
HEATER CURRENT	0.45	0.45	AMP.
PLATE VOLTAGE	110	125	VOLTS
GRID #2 VOLTAGE	.110	125	VOLTS
GRID #1 VOLTAGE	-4.0	-4.5	VOLTS
PEAK AF GRID #1 VOLTAGE	4.0	4.5	VOLTS
ZERO-SIGNAL PLATE CURRENT	32	37	MA.
MAXIMUM-SIGNAL PLATE CURRENT	31	36	MA.
ZERO-SIGNAL GRID #2 CURRENT	4.0	7.0	MA.
MAXIMUM-SIGNAL GRID #2 CURRENT	8.0	11	MA.
TRANSCONDUCTANCE	8 100	8 500	µмноs
PLATE RESISTANCE (APPROX.)	14 000	14 000	OHMS
LOAD RESISTANCE	4 500	4 500	OHMS
MAXIMUM-SIGNAL POWER OUTPUT	1.1	1.5	WATTS
TOTAL HARMONIC DISTORTION (APPROX.)	5	5	PERCENT

^{*}HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH
80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING
OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING
RESISTANCE.

ADESIGN-MAXIMUM RATINGS ARELIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEBILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT ITE NO DESIGN-MAXIMM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING CONDITIONS WIH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT COMPONENT VARIATION,

HEPTODE

MINIATURE TYPE



GLASS BULB

COATED UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 0.15 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
7 PIN BASE

THE 12EG6 IS A DUAL CONTROL HEPTODE WITH A UNIPOTENTIAL CATHODE IN THE 7-PIN MINIATURE CONSTRUCTION. IT IS INTENDED AS AN RE AMPLIFIER IN SUPERHETERODYNE RECEIVERS WHERE THE HEATER, PLATE AND SCREEN GRID POTENTIALS ARE OBTAINED DIRECTLY FROM AN AUTOMOTIVE BATTERY. THE DESIGN OF THIS TYPE PERMITS THE APPLICATION OF AVC CONTROL VOLTAGE TO TWO CONTROL GRIDS THEREBY REDUCING BACK BIASING OF THE AVC LINE WITH LARGE RE SIGNALS.

DIRECT INTERELECTRODE CAPACITANCES

	SHIELD	
MIXER GRID TO PLATE: (G3 TO P) MAX.	0.25	μμ f
MIXER GRID TO OSCILLATOR GRID: (G3 TO G1) MAX.	0.15	μμf
RF INPUT: G3 TO (H+K+G1+G2&4+G5+P)	6.5	μμ f
OSCILLATOR INPUT: GA TO (H+K+G4+G244+G3+G5)	5.7	μμ f
MIXER OUTPUT: P TO (H+K+G++G2&4+G3+G5)	12	μμ f
OSCILLATOR GRID TO CATHODE: (G, TO K+G5)	3.2	μμf
OSCILLATOR OUTPUT: K TO (H+G2&4+G3+P)	23	μμf
OSCILLATOR GRID TO PLATE: (G, TO P) MAX.	0.04	μμ f

RATINGSB

INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER YOLTAGE	12.6	VOLTS
HEATER CURRENT	0.15	AMP.
MAXIMUM HEATER-CATHODE VOLTAGE	±30	VOLTS
MAXIMUM PLATE VOLTAGE	30	VOLTS
MAXIMUM GRIDS #2 & #4 VOLTAGE	30	VOLTS
MAXIMUM GRIDS #2 & #4 SUPPLY VOLTAGE	30	VOLTS
MAXIMUM NEGATIVE DC GRID #3 VOLTAGE	30	VOLTS
MAXIMUM POSITIVE DC GRID #3 VOLTAGE	0	VOLTS
MAXIMUM CATHODE CURRENT	20	MA.
MAXIMUM GRID #3 CIRCUIT RESISTANCE	10	MEGOHMS

AEXTERNAL SHIELD #316 CONNECTED TO PIN #2.

BTHIS TUBE IS INTENDED TO BE USED IN AUTOMOTIVE SERVICE FROM A NOMINAL 12 VOLT BATTERY SOURCE.
THE HEATER IS THEREFORE DESIGNED TO OPERATE OVER THE 10.0 TO 15.9 VOLTAGE RANGE ENCOUNTERED
IN THIS SERVICE. THE MAXIMUM RATINGS, OF THE TUBE PROVIDE FOR AN ADEQUATE SAFETY FACTOR SUCH
THAT THE TUBE WILL WITHSTAND THE WIDS VARIATION IN SUPPLY VOLTAGES.

TUNG-SOL -

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERASTICS

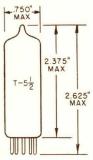
HEPTODE CONNECTED

HEATER VOLTAGE	12.6	VOLTS
HEATER CURRENT	0.15	AMP.
PLATE VOLTAGE	12.6	VOLTS
GRIDS #2 & #4 VOLTAGE	12.6	VOLTS
GRID #3 VOLTAGE	-0.8 ^c	VOLTS
GRID #1 VOLTAGE	-0.8 ^D	VOLTS
PLATE CURRENT	400	HAMPS
SCREEN CURRENT	2 400	HAMPS
TRANSCONDUCTANCE	800	µмноs
PLATE RESISTANCE (APPROX.)	0.15	MEGOHMS
GRID #3 VOLTAGE C AND GRID #1 VOLTAGE (APPROX.)		
FOR GmE = 10 MMHOS	-3.0	VOLTS

CPROVIDED BY GRID #1 VOLTAGE THROUGH A SUITABLE GRID #3 RESISTOR.

Dayerage Blas Developed across a 2.2 megohm grid resistor.

E FROM GRID #3 TO PLATE.

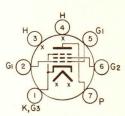


GLASS BULB SMALL-BUTTON MINIATURE 7 PIN BASE E7-1 OUTLINE DRAWING JEDEC 5-3

FOR USE IN AUDIO OUTPUT STAGES OF RADIO AND TV RECEIVERS AND PHONOGRAPHS

UNIPOTENTIAL CATHODE

ANY MOUNTING POSITION



BOTTOM VIEW BASING DIAGRAM JEDEC 7CV

THE 12EH5 IS A POWER PENTODE IN THE 7 PIN MINIATURE CONSTRUCTION. IT HAS BEEN SPECIFI-CALLY DESIGNED FOR USE IN THE AUDIO OUTPUT STAGE OF RADIO AND TELEVISION RECEIVERS AND PHONOGRAPHS. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED. EXCEPT FOR HEATER RATINGS, HEATER WARM-UP TIME AND HIGHER HEATER-CATHODE VOLTAGE RATINGS, IT IS IDENTICAL TO THE 6EH5, 25EH5 AND 50EH5.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

WITHOUT EXTERNAL SHIELD

GRID 1 TO PLATE	0.65	pf
GRID 1 TO CATHODE & GRID 3, HEATER & GRID 2	17	pf
PLATE TO CATHODE & GRID 3, HEATER & GRID 2	9	pf

HEATER CHARACTERISTICS AND RATINGS DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	12.6	VOLTS	600	MA.
HEATER WARM-UP TIME A			11	SECONDS
HEATER SUPPLY LIMITS:				
CURRENT OPERATION			600 ± 40	MA.
MAXIMUM PEAK HEATER-CATHODE VO	LTAGE:			
HEATER NEGATIVE WITH RESPEC	T TO CATHODE		300	VOLTS
HEATER POSITIVE WITH RESPECT	TO CATHODE		200 B	VOLTS

THE DC COMPONENT MUST NOT EXCEED 100 VOLTS.

TUNG-SOL .

MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AMPLIFIER

PLATE VOLTAGE	→ 150	VOLTS
GRID 2 (SCREEN-GRID) VOLTAGE	→ 130	VOLTS
PLATE DISSIPATION	→ 5.5	WATTS
GRID 2 INPUT	→ 2	WATTS
BULB TEMPERATURE (AT HOTTEST POINT ON BULB SURFACE)	220	°C
GRID 1 CIRCUIT RESISTANCE:		
FOR FIXED-BIAS OPERATION	0.1	MEGOHM
FOR CATHODE-BIAS OPERATION	0.5	MEGOHM

TYPICAL OPERATING CHARACTERISTICS

CLASS A1 AMPLIFIER

PLATE SUPPLY VOLTAGE	110	VOLTS
GRID 2 SUPPLY VOLTAGE	115	VOLTS
CATHODE RESISTOR	62	OHMS
PEAK AF GRID 1 VOLTAGE	3	VOLTS
ZERO-SIGNAL PLATE CURRENT	42	MA.
SIGNAL PLATE CURRENT (MAX.)	42	MA.
ZERO-SIGNAL GRID 2 CURRENT	11.5	MA.
SIGNAL GRID 2 CURRENT (MAX.)	14.5	MA.
TRANSCONDUCTANCE	14,600	μ MHOS
PLATE RESISTANCE (APPROX.)	11,000	OHMS
LOAD RESISTANCE	3,000	OHMS
TOTAL HARMONIC DISTORTION	7	PERCENT
SIGNAL POWER OUTPUT (MAX.)	1.4	WATTS

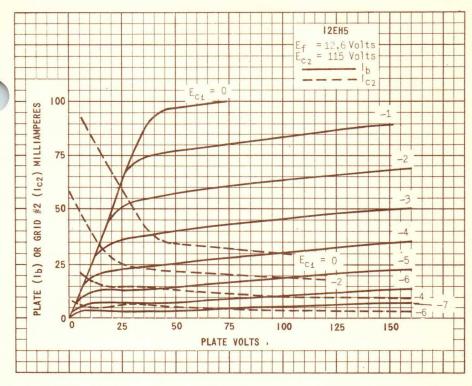
PUSH-PULL AF POWER AMPLIFIER - CLASS AB1 VALUES ARE FOR TWO TUBES

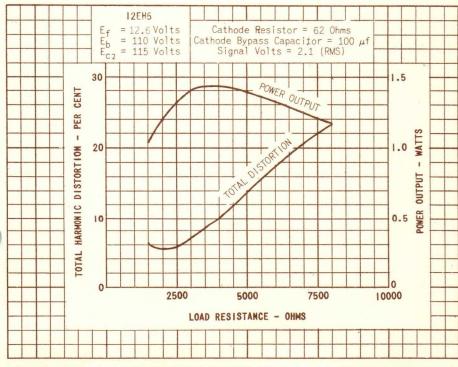
PLATE SUPPLY VOLTAGE	140	VOLTS
GRID 2 SUPPLY VOLTAGE	120	VOLTS
CATHODE RESISTOR	68	OHMS
PEAK AF GRID 1 TO GRID 1 VOLTAGE	9.4	VOLTS
ZERO-SIGNAL PLATE CURRENT	47	MA.
MAX. SIGNAL PLATE CURRENT	51	MA.
ZERO-SIGNAL GRID 2 CURRENT	11	MA.
MAXSIGNAL GRID 2 CURRENT	17.7	MA.
EFFECTIVE LOAD RESISTANCE (PLATE TO PLATE)	6000	OHMS
TO TAL HARMONIC DISTORTION	5	PERCENT
MAXSIGNAL POWER OUTPUT	3.8	WATTS.

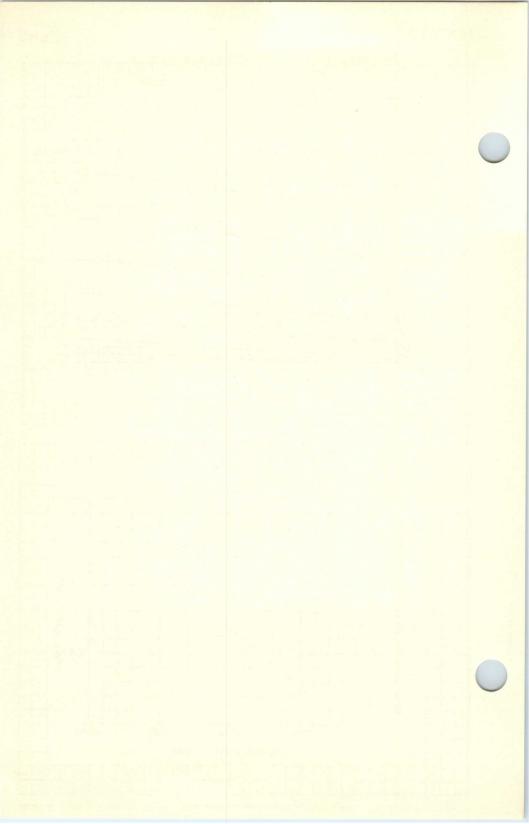
→ INDICATES A CHANGE.

A

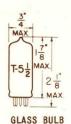
HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE THREE TIMES THE NOMINAL HEATER OPERATING RESISTANCE.







PENTODE MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER
12.6 VOLTS 0.190 AMP.
AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
7 PIN BASE
78K

THE 12EK6 IS A SHARP CUTOFF PENTODE IN THE 7 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED FOR USE AS A VHF, RF OR IF AMPLIFIER IN APPLICATIONS WHERE THE HEATER, PLATE AND GRID #2 POTENTIALS ARE SUPPLIED DIRECTLY FROM A 12 VOLT AUTOMOTIVE STORAGE BATTERY.

DIRECT' INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

GRID TO PLATE (MAX.)	0.036 ←	µµ f
INPUT: G1 TO (H+K+G2+G3)	10	μμf
OUTPUT: P TO (H+K+G2+G3)	5.0 ←	μμf

RATINGS INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM A

HEATER VOLTAGE B	12.6	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER NEGATIVE WITH RESPECT TO CATHODE	16	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	16	VOLTS
MAXIMUM PLATE VOLTAGE	16	VOLTS
MAXIMUM GRID #2 VOLTAGE	16	VOLTS
MAXIMUM POSITIVE DC GRID #4 VOLTAGE	0	VOLTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE	10	MEGOHMS

A DESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MAYNEACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT LIFE NO DESIGN-MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.

BTHIS TUBE IS INTENDED TO BE USED IN AUTOMOTIVE SERVICE FROM A NOMINAL 12 VOLT BATTERY SOURCE. THE HEATER IS THEREFORE DESIGNED TO OPERATE OVER THE 10.0 TO 15.9 VOLTAGE RANGE ENCOUNTERED IN THIS SERVICE. THE MAXIMUM RATINGS OF THE TUBE PROVIDE FOR AN ADEQUATE SAFETY FACTOR SUCH THAT THE TUBE WILL WITHSTAND THE WIDE VARIATION IN SUPPLY VOLTAGES.

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

HEATER VOLTAGE	12.6	VOLTS
HEATER CURRENT	0.2	AMP.
PLATE VOLTAGE	12.6	VOLTS
GRID #2 VOLTAGE	12.6	VOLTS
GRID #1 VOLTAGE C		
GRID #1 RESISTOR	2.2	MEGOHMS
PLATE CURRENT	4.0	MA.
GRID #2 CURRENT	1.7←	MA.
TRANSCONDUCTANCE	4 200	µмноѕ
PLATE RESISTANCE (APPROX.)	50 000 ←	OHMS
GRID #1 VOLTAGE FOR ID = 10 HA	- 3.8←	VOLTS

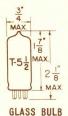
Caverage contact potential bias developed across specified grid resistor.

⁻ INDICATES A CHANGE.

TUNG-SOL .

DOUBLE DIODE TRIODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE
HEATER

12.6 VOLTS 0.15 AMP.
AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
7 PIN BASE

7FB

THE 12EL6 IS A DOUBLE DIODE, HIGH-MU TRIODE IN THE 7 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED FOR USE PRIMARILY AS A SECOND DETECTOR AUDIO AMPLIFIER IN OPERATION WHERE THE HEATER AND PLATE VOLTAGE ARE SUPPLIED DIRECTLY FROM A 12 VOLT AUTOMOTIVE STORAGE BATTERY.

DIRECT INTERELECTRODE CAPACITANCES WITHOUT EXTERNAL SHIELD

GRID TO PLATE	1.8	μμf
INPUT: G TO (H+K)	2.2	μμf
OUTPUT: P TO (H+K)	1.0	μμ f
DIODE PLATE TO DIODE PLATE	1.0	μμ f

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER VOLTAGEA	12.6	VOLTS
MAXIMUM PLATE VOLTAGE	30	VOLTS
MAXIMUM CATHODE CURRENT	20	MA.
MAXIMUM GRID CIRCUIT RESISTANCE	10	MEGOHMS
MAXIMUM AVERAGE DIODE CURRENT	1.0	MA.
MAXIMUM HEATER-CATHODE VOLTAGE		
HEATER NEGATIVE WITH RESPECT TO CATHODE	30	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE	30	VOLTS

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A1 AMPLIFIER

HEATER VOLTAGE	12.6	VOLTS
HEATER CURRENT	Q.15	AMP.
PLATE VOLTAGE	12.6	VOLTS
GRID VOLTAGE	0	VOLTS
PLATE CURRENT	750	μΑ.
TRANSCONDUCTANCE	1 200	µмноѕ
AMPLIFICATION FACTOR	55	
PLATE RESISTANCE	45 000	OHMS
AVERAGE DIODE CURRENT WITH 10 VOLTS		
APPLIED (EACH DIODE)B	2.0	MA.

TUNG-SOL -

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS - CONT'D.

RESISTANCE COUPLED AMPLIFIER

HEATER VOLTAGE HEATER CURRENT PLATE SUPPLY VOLTAGE GRID VOLTAGE ^C	12.6 0.15 12.6	VOLTS AMPL VOLTS
GRID RESISTOR	1.0	MEGOHM
PLATE LOAD RESISTOR	1.0	MEGOHM
INPUT CAPACITOR	0.02	μf
OUTPUT CAPACITOR	0.01	μf
GRID RESISTOR OF FOLLOWING STAGE	2.0	MEGOHMS
VOLTAGE GAIN AT 400 CPSD	16	

ATHIS TUBE IS INTENDED TO BE USED IN AUTOMOTIVE SERVICE FROM A NOMINAL 12 VOLT BATTERY SOURCE. THE HEATER IS THEREFORE DESIGNED TO OPERATE OVER THE 10.0 TO 15.9 VOLTAGE RANGE ENCOUNTERED IN THIS SERVICE. THE MAXIMUM RATINGS OF THE TUBE PROVIDE FOR AN ADEQUATE SAFETY FACTOR SUCH THAT THE TUBE WILL WITHSTAND THE WIDE VARIATION IN SUPPLY VOLTAGES.

BTEST CONDITION ONLY.

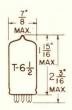
CONTACT POTENTIAL DEVELOPED ACROSS SPECIFIED GRID RESISTOR.

DMEASURED AT AN OUTPUT VOLTAGE OF 1.0 VOLT RMS.

TUMG-SOL

DIODE TETRODE

MINIATURE TYPE



GLASS BULB

COATED UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 0.50 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
9 PIN BASE

9HV

THE 12EM6 IS A COMBINED DETECTOR DIODE AND A TETRODE WITH A COMMON UNI-POTENTIAL CATHODE IN THE 9 PIN MINIATURE CONSTRUCTION. THE TETRODE SECTION IS INTENDED FOR USE AS A POWER AMPLIFIER WHERE THE HEATER, PLATE, AND SCREEN GRID POTENTIALS ARE OBTAINED DIRECTLY FROM AN AUTOMOTIVE BATTERY.

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER VOLTAGE	12.6	VOLTS
MAXIMUM PLATE VOLTAGE (TETRODE)	30	VOLTS
MAXIMUM GRID #2 VOLTAGE	30	VOLTS
MAXIMUM PLATE DISSIPATION	0.5	WATTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE	15	MEGOHMS
MAXIMUM HEATER CATHODE VOLTAGE	±30	VOLTS
MAXIMUM DETECTOR PLATE CURRENT	10	MA.

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CHARACTERISTICS - CLASS AT AMPLIFIER

HEATER VOLTAGE	12.6	VOLTS
HEATER CURRENT	0.50	AMP.
PLATE VOLTAGE (TETRODE)	12.6	VOLTS
GRID #2 VOLTAGE	12.6	VOLTS
HEATER VOLTAGE	12.6	VOLTS
GRID #1 RESISTOR (BYPASSED)	2.2	MEGOHMS
PLATE CURRENT	6.0	MA.
GRID #2 CURRENT	1.0	MA.
TRANSCONDUCTANCE	5 000	μMH0s
PLATE RESISTANCE	4 000	OHMS
DIODE CURRENT WITH 40 VOLTS APPLIED	1.0	MA.

THIS TUBE IS INTENDED TO BE USED IN AUTOMOTIVE SERVICE FROM A NOMINAL 12 VOLT BATTERY SOURCE. THE HEATER IS THEREFORE DESIGNED TO OPERATE OVER THE 10.0 TO 15.9 VOLTAGE RANGE ENCOUNTERED IN THIS SERVICE. THE MAXIMUM RATINGS OF THE TUBE PROVIDE FOR AN ADEQUATE SAFETY FACTER SUCH THAT THE TUBE WILL WITHSTAND THE WIDE VARIATION IN SUPPLY VOLTAGES.

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS - CONT'D.

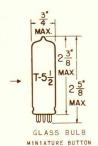
TYPICAL OPERATION - CLASS A1 AMPLIFIER

HEATER VOLTAGE	12.6	VOLTS
HEATER CURRENT	0.50	AMP.
PLATE VOLTAGE (TETRODE)	12.6	VOLTS
GRID #2 VOLTAGE	12.6	VOLTS
GRID #1 VOLTAGE A		
AF GRID #1 VOLTAGE	1.0	VRMS
AF SIGNAL SOURCE RESISTANCE	200 000	OHMS
LOAD RESISTANCE	3 500	OHMS
PLATE CURRENT	2.5	MA.
POWER OUTPUT	10	Mw.
TOTAL HARMONIC DISTORTION	10	PERCENT

A OBTAINED BY GRID *1 RECTIFICATION WITH A 15 MEGOHM GRID RESISTOR. THE ZERO SIGNAL PLATE CURRENT IS APPROX. 6.0 MA.

TUNG-SOL .

DIODE TETRODE MINIATURE TYPE



9 PIN BASE B9-1

OUTLINE DRAWING

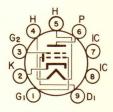
COATED UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 0.50 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

BASING DIAGRAM JEDEC 9HV

THE 12EM6 IS A COMBINED DETECTOR DIODE AND A TETRODE WITH A COMMON UNIPOTENTIAL CATHODE IN THE 9 PIN MINIATURE CONSTRUCTION. THE TETRODE SECTION IS INTENDED FOR USE AS A POWER AMPLIFIER WHERE THE HEATER, PLATE, AND SCREEN GRID POTENTIALS ARE OBTAINED DIRECTLY FROM AN AUTOMOTIVE BATTERY.

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER VOLTAGE	12.6	VOLTS
MAXIMUM PLATE VOLTAGE (TETRODE)	30	VOLTS
MAXIMUM GRID #2 VOLTAGE	30	VOLTS
MAXIMUM PLATE DISSIPATION	0.5	WATTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE	15	MEGOHMS
MAXIMUM HEATER CATHODE VOLTAGE	±30	VOLTS
MAXIMUM TETRODE PLATE CURRENT←	10	MA.

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CHARACTERISTICS - CLASS AT AMPLIFIER

	7000	
HEATER VOLTAGE	12.6	VOLTS
HEATER CURRENT	0.50	AMP.
PLATE VOLTAGE (TETRODE)	12.6	VOLTS
GRID #2 VOLTAGE	12.6	VOLTS
HEATER VOLTAGE	12.6	VOLTS
GRID #1 RESISTOR (BYPASSED)	2.2	MEGOHMS
PLATE CURRENT	6.0	MA.
GRID #2 CURRENT	1.0	MA.
TRANSCONDUCTANCE	5 000	µмноs
PLATE RESISTANCE	4 000	OHMS
DIODE CURRENT WITH 10 VOLTS APPLIED	1.0	MA.

THIS TUBE IS INTENDED TO BE USED IN AUTOMOTIVE SERVICE FROM A NOMINAL 12 VOLT BATTERY SOURCE. THE HEATER IS THEREFORE DESIGNED TO OPERATE OVER THE 10.0 TO 15.9 VOLTAGE RANGE ENCOUNTERED IN THIS SERVICE. THE MAXIMUM RATINGS OF THE TUBE PROVIDE FOR AN ADEQUATE SAFETY FACTER SUCH THAT THE TUBE WILL WITHSTAND THE WIDE VARIATION IN SUPPLY VOLTAGES.

- INDICATES A CHANGE.

TUNG-SOL -

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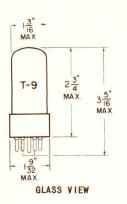
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS - CONT'D.

TYPICAL OPERATION - CLASS A1 AMPLIFIER

12.6	VOLTS
0.50	AMP.
12.6	VOLTS
12.6	VOLTS
1.0	VRMS
200 000	OHMS
3 500	OHMS
2.5	MA.
10	MW.
10	PERCENT
	0.50 12.6 12.6 1.0 200 000 3 500 2.5 10

A OBTAINED BY GRID *1 RECTIFICATION WITH A 15 MEGOHM GRID RESISTOR. THE ZERO SIGNAL PLATE CURRENT IS APPROX. 6.0 MA.

BEAM POWER PENTODE



COATED UNIPOTENTIAL CATHODE

ANY MOUNTING POSITION

BOTTOM VIEW
SHORT INTERMEDIATE SHELL
8 PIN OCTAL
75

THE 12ENG IS A BEAM POWER PENTODE DESIGNED FOR USE AS A VERTICAL DEFLECTION AMPLIFIER IN TELEVISION RECEIVERS SWEEP CIRCUITS. THERMAL CHARACTERISTICS OF THE HEATER ARE CONTROLLED SUCH THAT HEATER VOLTAGE SURGES DURING THE WARM-UP CYCLE ARE MINIMIZED PROVIDED IT IS USED WITH OTHER TYPES WHICH ARE SIMILARLY CONTROLLED.

DIRECT INTERELECTRODE CAPACITANCES

GRID TO PLATE	0.65	μμ f
INPUT	14	μμ f
OUTPUT	8.0	μμ f

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM VERTICAL DEFLECTION AMPLIFIER SERVICE A

	TRIODE CONNECTION B	PENTODE	
HEATER VOLTAGE	12.6	12.6	VOLTS
MAXIMUM DC PLATE VOLTAGE	300	300	VOLTS
MAXIMUM PEAK POSITIVE PULSE PLATE VOLTAGE	1200	1200	VOLTS
MAXIMUM PLATE DISSIPATION ^C	7.5	7.0	WATTS
MAXIMUM PEAK NEGATIVE GRID #1 VOLTAGE	250	250	VOLTS
MAXIMUM DC GRID #2 VOLTAGE		150	VOLTS
MAXIMUM GRID #2 DISSIPATION		1.25	WATTS
MAXIMUM AVERAGE CATHODE CURRENT	50	50	MA.
MAXIMUM PEAK CATHODE CURRENT	175	175	MA.
MAXIMUM GRID #1 CIRCUIT RESISTANCE	2.2	2.2	MEGOHMS
MAXIMUM HEATER-CATHODE VOLTAGE			
HEATER POSITIVE WITH RESPECT TO CATHODE			
DC COMPONENT	1	00	VOLTS
TOTAL DC & PEAK	2	00	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE			
DC COMPONENT	2	00	VOLTS
TOTAL DC & PEAK	-3	00	VOLTS
HEATER WARM-UP TIME (APPROX.)*	11	.0	SECONDS

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

VERTICAL DEFLECTION AMPLIFIER SERVICEA

HEATER VOLTAGE		12.6	VOLTS
HEATER CURRENT	0.	6±6%	AMP.
PLATE VOLTAGE	50	200	VOLTS
GRID #2 VOLTAGE	110	110	VOLTS
GRID #1 VOLTAGE	OD	-9.5	VOLTS
PLATE CURRENT	135	50	MA -
GRID #2 CURRENT	18	2.2	MA.
PLATE RESISTANCE		28 000	OHMS
TRANSCONDUCTANCE		8 000	MMHOS
GRID #1 CUTOFF VOLTAGE (APPROX.)		-35	VOLTS

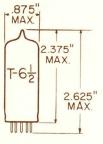
A FOR OPERATION IN A 525-LINE, 30-FRAME SYSTEM AS DESCRIBED IN "STANDARDS OF GOOD ENGINEERING PRACTICE FOR TELEVISION BROADCAST STATIONS: FEDERAL COMMUNICATIONS COMMISSION", THE DUTY CYCLE OF THE VOLTAGE PULSE MUST NOT EXCEED 15% OF ONE SCANNING CYCLE.

BWITH GRID #2 TIED TO PLATE.

CIN STAGES OPERATING WITH GRID LEAK BIAS, AN ADEQUATE CATHODE BIAS RESISTOR OR OTHER SUITABLE MEANS IS REQUIRED TO PROTECT THE TUBE IN THE ABSENCE OF EXCITATION.

Dapplied for short interval (2 seconds maximum) so as not to damage the tube.

^{*}HEATER WARM-UP TIME IS DEFINED AS THE TIME REQUIRED FOR THE VOLTAGE ACROSS THE HEATER TO REACH 80% OF ITS RATED VOLTAGE AFTER APPLYING 4 TIMES RATED HEATER VOLTAGE TO A CIRCUIT CONSISTING OF THE TUBE HEATER IN SERIES WITH A RESISTANCE OF VALUE 3 TIMES THE NOMINAL HEATER OPERATING RESISTANCE.



UNIPOTENTIAL CATHODE FOR AM AND AM/FM BROADCAST RECEIVERS

8)2P

JEDEC 9LQ

GLASS BULB SMALL BUTTON 9 PIN NOVAL E9-1

OUTLINE DRAWING JEDEC 6-3

ANY MOUNTING POSITION BOTTOM VIEW BASING DIAGRAM

THE 12EQ7 IS ADIODE AND A REMOTE-CUTOFF PENTODE WITH A COMMON CATHODE OF THE 9 PIN MINIATURE TYPE ESPECIALLY DESIGNED FOR USE AS COMBINED IF-AMPLIFIER AND AM-DETECTOR TUBES IN AM AND AM/FM BROADCAST RECEIVERS. THE PENTODE UNIT MAY ALSO BE USED AS AN RF-OR IF-AMPLIFIER TUBE; THE DIODE UNIT MAY BE USED FOR AUTOMATIC VOLUME CONTROL OR DETECTION.

DIRECT INTERELECTRODE CAPACITANCES WITHOUT EXTERNAL SHIELD

GRID #1 TO PLATE (MAX.)	.002	pf
GRID #1 TO K, H, G2, G3, & I.S.	5.5	pf
PLATE TO K, H, G2, G3, & 1.S.	5.0	pf
GRID #1 TO DIODE PLATE (MAX.)	0.0015	pf
PENTODE PLATE TO DIODE PLATE	.095	pf

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS 12.	.6 VOLTS 150	MA.
HEATER SUPPLY LIMITS: VOLTAGE OPERATION	12.6±1.3	VOLTS
MAXIMUM PEAK HEATER CATHODE VOLTAGE: HEATER NEGATIVE WITH RESPECT TO CATHODE HEATER POSITIVE WITH RESPECT TO CATHODE	200 200 ^A	VOLTS VOLTS

ATHE DC COMPONENT MUST NOT EXCEED 100 VOLTS.

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MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

CLASS A1 AMPLIFIER-PENTODE UNIT

PLATE VOLTAGE	300	VOLTS
GRID #3 VOLTAGE:		
POSITIVE VALUE	300	VOLTS
NEGATIVE VALUE	300	VOLTS
GRID #2 SUPPLY VOLTAGE	300	VOLTS
GRID #2 VOLTAGE SEE RATING	CHART	
GRID #1 VOLTAGE:		
POSITIVE BIAS VALUE	0	VOLTS
NEGATIVE BIAS VALUE	50	VOLTS
PLATE DISSIPATION	3	WATTS
GRID #3 INPUT	0.2	WATT
GRID #2 INPUT:		
FOR GRID #2 VOLTAGES UP TO 150 VOLTS	0.6	WATT
FOR GRID #2 VOLTAGES BETWEEN		
150 & 300 VOLTS SEE RATING	CHART	
BULB TEMPERATURE (AT HOTTEST POINT ON BULB SURFACE)	150	°C
DIODE UNIT		
PLATE CURRENT	1.0	MA.

TYPICAL OPERATING CHARACTERISTICS

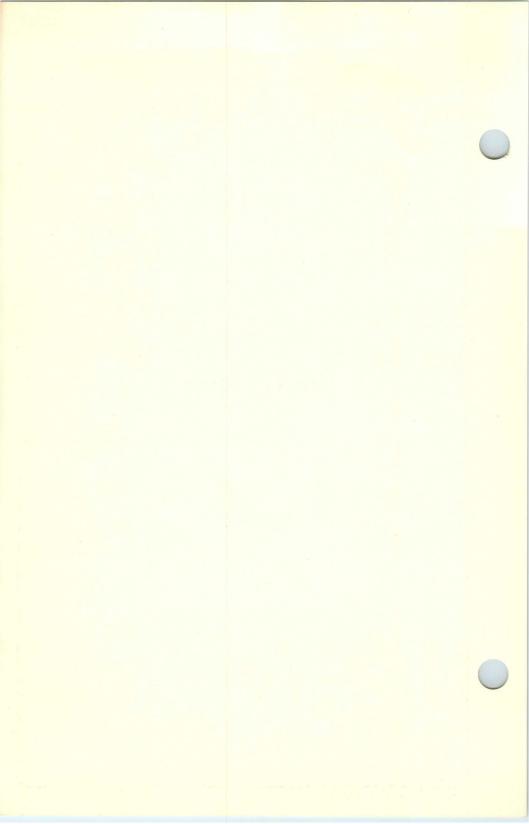
CLASS A1 AMPLIFIER

PENTODE UNIT

PLATE VOLTAGE			100	VOLTS
GRID #3	CONNECT TO	CATHODE	AT SOCKET	
INTERNAL SHIELD	CONNECT TO	CATHODE	AT SOCKET	
GRID #2 VOLTAGE			100	VOLTS
GRID #1 SUPPLY VOLTAGE			0	VOLT
GRID #1 RESISTOR (BYPASSED)			2.2	MEGOHMS
TRANSCONDUCTANCE			3800	µмноs
PLATE RESISTANCE (APPROX.)			0.25	MEGOHM
PLATE CURRENT			9	MA.
GRID #2 CURRENT			3.5	MA.
GRID #1 VOLTAGE (APPROX.) FOR				
TRANSCONDUCTANCE OF 40 MMHOS			-20	VOLTS

DIODE UNIT - AVERAGE CHARACTERISTICS

PLATE VOLTAGE	10	VOLTS
PLATE CURRENT	2	MA.



PENTODE

MINIATURE TYPE

T-5½ MAX 2 ½ 8

GLASS BULB

HEATER

12.6 VOLTS .175 AMP.

COATED UNIPOTENTIAL CATHODE

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
7 PIN BASE

THE 12EZ6 IS A SHARP CUTOFF PENTODE WITH A UNIPCTENTIAL CATHODE IN THE 7 PIN MINIATURE CONSTRUCTION. IT IS INTENDED FOR USE AS AN RF OR IF AMPLIFIER WHERE THE HEATER, PLATE AND SCREEN GRID POTENTIALS ARE OBTAINED DIRECTLY FROM AN AUTOMOTIVE BATTERY.

DIRECT INTERELECTRODE CAPACITANCES

GRID TO PLATE (MAX.)	.008	$\mu\mu$ f
INPUT:	7.8	μμf
OUTPUT:	5.5	μμ f

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER VOLTAGE	12.6	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE	±30	VOLTS
MAXIMUM PLATE VOLTAGE	30	VOLTS
MAXIMUM GRID #2 VOLTAGE	30	VOLTS
MAXIMUM CATHODE CURRENT	10	MA.
MAXIMUM GRID #1 CIRCUIT RESISTANCE	10	MEGOHMS

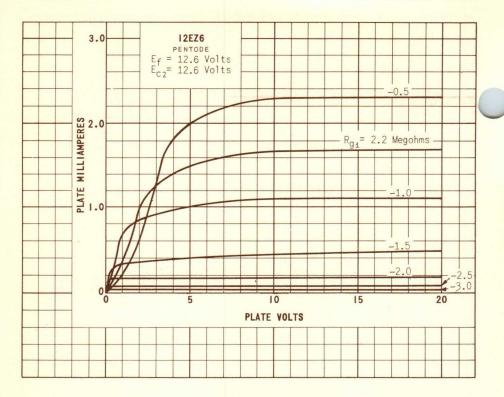
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS CLASS A1 AMPLIFIER

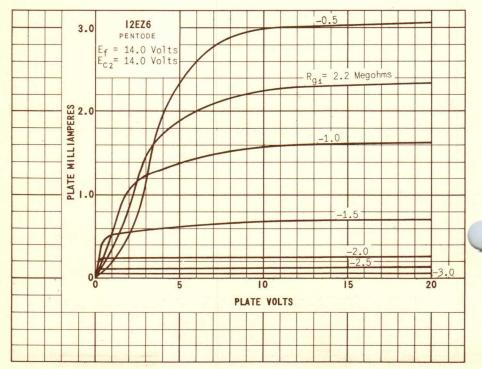
HEATER VOLTAGE	12.6	14.0	VOLTS
HEATER CURRENT	.175	.175	AMP.
PLATE VOLTAGE	12.6	14.0	VOLTS
GRID #3 VOLTAGE B	0	0	VOLTS
GRID #2 VOLTAGE	12.6	14.0	VOLTS
GRID #1 VOLTAGE	-0.7	-0.8^{D}	
PLATE CURRENT	1.9	2.3	MA.
GRID #2 CURRENT	0.7	0.85	MA.
PLATE RESISTANCE	0.40	0.30	MEGOHMS
TRANSCONDUCTANCE C	2700	3000	MMHOS
GRID #1 VOLTAGE FOR Ib=50 MMHOS	-2.6	-2.8	VOLTS
GRID #4 & GRID #3 VOLTAGE FOR G_=30 MMHOS	-2.8	-3.0	VOLTS

A THIS TUBE IS INTENDED TO BE USED IN AUTOMOTIVE SERVICE FROM A NOMINAL 12 VOLT BATTERY SOURCE. THE HEATER IS THEREFORE DESIGNED TO OPERATE OVER THE 10.0 TO 15.9 VOLTAGE RANGE ENCOUNTERED IN THIS SERVICE. THE MAXIMUM RATINGS OF THE TUBE PROVIDE FOR AN ADEQUATE SAFETY FACTOR SUCH THAT THE TUBE WILL WITHSTAND THE WIDE VARIATION IN SUPPLY VOLTAGES.

BCONNECTED TO CATHODE AT SOCKET. CFROM GRID #1 TO PLATE.

DAVERAGE BIAS DEVELOPED ACROSS A 2.2 MEGOHM GRID RESISTOR.





7"

MAX

MAX. T-6 =

GLASS BULB

2 3

MAX

TUNG-SOL -

DOUBLE-DIODE-PENTODE

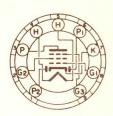
MINIATURE TYPE

COATED UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 0.15 AMP. AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW MINIATURE BUTTON 9 PIN BASE QFH

THE 12F8 IS A COMBINED DOUBLE DETECTOR DIODE AND REMOTE CUT-OFF PENTODE WITH A COMMON UNIPOTENTIAL CATHODE IN THE 9 PIN MINIATURE CONSTRUCTION. THE PENTODE SECTION IS INTENDED FOR USE AS AN AF VOLTAGE AMPLIFIER WHERE THE HEATER, PLATE AND SCREEN GRID POTENTIALS ARE OBTAINED DIRECTLY FROM AN AUTOMOTIVE BATTERY. THE DESIGN OF THIS TYPE PERMITS THE APPLICATION AF AVC VOLTAGE TO THE CONTROL GRID THEREBY IMPROVING OVERALL RECEIVER AVC.

DIRECT INTERELECTRODE CAPACITANCES

INPUT: (G4 TO G2+G3+H+K)	4.5	µµ f
OUTPUT: (P TO G2+G3+H+K)	3.0	µµ f
GRID TO PLATE: (G4 TO P)	.06	µµ f
DIODE TO DIODE	0.3	µµ f

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER VOLTAGE	12.6	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE	±30	VOLTS
MAXIMUM PLATE VOLTAGE	30	VOLTS
MAXIMUM GRID #2 VOLTAGE	30	VOLTS
MAXIMUM POSITIVE DC GRID #4 VOLTAGE	O	VOLTS
MAXIMUM GRID #4 CIRCUIT RESISTANCE	10.0	MEGOHMS
MAXIMUM AVERAGE DIODE CURRENT	1	MA.

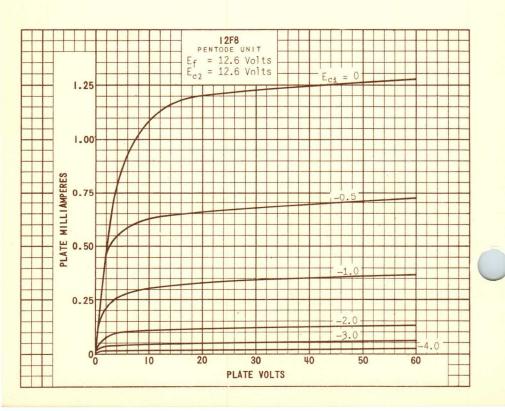
THIS TUBE IS INTENDED TO BE USED IN AUTOMOTIVE SERVICE FROM A NOMINAL 12 VOLT BATTERY SOURCE. THE MEATER IS THEREFORE DESIGNED TO OPERATE OVER THE 10.0 TO 15.9 VOLTAGE RANGE ENCOUNTERED IN THIS SERVICE. THE MAXIMUM RATINGS OF THE TUBE PROVIDE FOR AN ADEQUATE SAFETY FACTOR SUCH THAT THE TUBE WILL WITHSTAND THE WIDE VARIATION IN SUPPLY VOLTAGES.

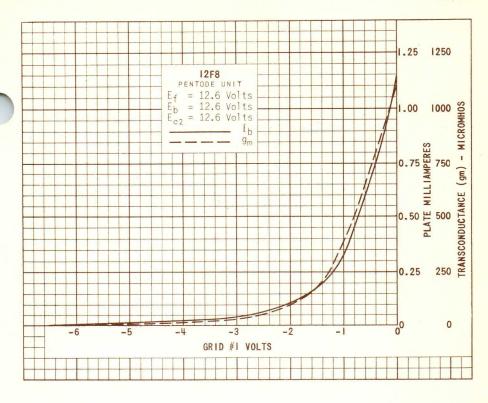
- TUNG-SOL -

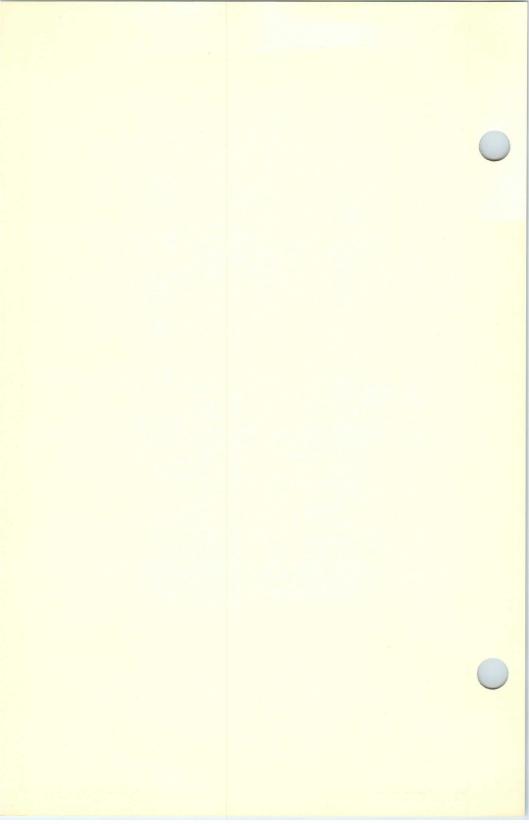
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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

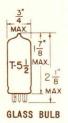
HEATER VOLTAGE	12.6	VOLTS
HEATER CURRENT	0.15	AMP.
PLATE VOLTAGE	12.6	VOLTS
GRID #2 VOLTAGE	12.6	VOLTS
GRID #1 VOLTAGE	0	VOLTS
PLATE CURRENT	1.0	MA.
GRID #2 CURRENT	0.38	MA.
TRANSCONDUCTANCE	1000	μMHOS.
PLATE RESISTANCE (APPROX.)	.33	MEGOHM
GRID #1 VOLTAGE (APPROX.) FOR Gm =10 MMHOS	-5	VOLTS
AVERAGE DIODE CURRENT WITH 10 VOLTS DC APPLIED.	2	MA.







HEPTODE MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 0.15 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
7 PIN BASE
7CH

THE 12AF6 IS A PENTAGRID CONVERTER WITH A UNIPOTENTIAL CATHODE IN THE 7 PIN MINIATURE CONSTRUCTION. IT IS INTENDED AS A COMBINED OSCILLATOR AND MIXER IN SUPERHETERODYNE RECEIVERS WHERE THE HEATER, PLATE AND SCREEN GRID POTENTIALS ARE OBTAINED DIRECTLY FROM AN AUTOMOTIVE BATTERY.

DIRECT INTERELECTRODE CAPACITANCES WITH EXTERNAL SHIELD #316 CONNECTED TO PIN #2

MIXER GRID TO PLATE: (G3 TO P) MAX.	0.25	μμ f
MIXER GRID TO OSCILLATOR GRID: (G3 TO G1) MAX.	0.15	μμf
RF INPUT: G3 TO (H+K+G1+G2&4+G5+P)	7.2	μμf
OSCILLATOR INPUT: G1 TO (H+K+G1+G2&4+G3+G5)	7.2	μμf
MIXER OUTPUT: P TO (H+K+G1+G2&4+G3+G5)	12.0	μμf
OSCILLATOR GRID TO CATHODE: (G1 TO K+G5)	5.0	μμf
OSCILLATOR OUTPUT: K TO (H+G2&4+G3+P)	20	μμf
OSCILLATOR GRID TO PLATE: (G1 TO P) MAX.	.05	mu f

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

MAXIMUM HEATER-CATHODE VOLTAGE	±30	VOLTS
MAXIMUM PLATE VOLTAGE	30	VOLTS
MAXIMUM GRIDS #2 & #4 VOLTAGE	30	VOLTS
MAXIMUM GRIDS #2 & #4 SUPPLY VOLTAGE	30	VOLTS
MAXIMUM NEGATIVE DC GRID #3 VOLTAGE	30	VOLTS
MAXIMUM POSITIVE DC GRID #3 VOLTAGE	0	VOLTS
MAXIMUM CATHODE CURRENT	20	MA.
MAXIMUM GRID #3 CIRCUIT RESISTANCE	10	MEGOHMS

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CONVERTER SERVICE - SELF EXCITATION A

HEATER VOLTAGE	12.6	VOLTS
PLATE VOLTAGE	12.6	VOLTS
GRID #3 VOLTAGE	Q.50B	VOLTS
GRIDS #2 & #4 VOLTAGE	12.6	VOLTS
GRID #1 VOLTAGE (OSCILLATOR GRID) RMS	2.5	VOLTS
GRID #4 RESISTANCE (OSCILLATOR GRID)	33 000	OHMS
PLATE RESISTANCE (APPROX.)	0.8	MEGOHMS
GRID #1 CURRENT (OSCILLATOR GRID)	60	μA
CONVERSION TRANSCONDUCTANCE	320	имноs
PLATE CURRENT	450	μA
GRIDS #2 & #4 CURRENT	1 000	μA
CATHODE CURRENT	1 500	μA
GRID #3 VOLTAGE FOR G = 5 MMHOS (APPROX.)	-3.5	VOLTS
GRID #3 VOLTAGE FOR G = 20 µMHOS (APPROX.).	-3.0	VOLTS

CONVERTER SERVICE - EXTERNAL EXCITATION

HEATER VOLTAGE	12.6	VOLTS
GRID #3 VOLTAGE	0	VOLTS
GRID #1 VOLTAGE (OSCILLATOR GRID) RMS	0.85	VOLTS
GRIDS #2 & #4 CONNECTED TO PLATE	12.6	VOLTS
CONVERSION TRANSCONDUCTANCE	300	MHOS
CATHODE CURRENT	1 900	MA
GRIDS #2 & #4 CURRENT	1 200	μA
PLATE CURRENT	670	MA
GRID #1 CURRENT	45	μA
GRID #3 VOLTAGE FOR $G_C = 10 \mu MHOS$	-3.2	

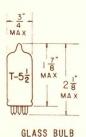
OSCILLATOR CHARACTERISTICS - NOT OSCILLATING

GRID #3 VOLTAGE	0	VOLTS
GRID #1 VOLTAGE (OSCILLATOR GRID)	0	VOLTS
GRID #2 & #4 CONNECTED TO PLATE	12.6	VOLTS
TRANSCONDUCTANCE BETWEEN GRID #1 & GRID #2 & #4 CONNECTED TO PLATE	4 000	µмноѕ
AMPLIFICATION FACTOR BETWEEN GRID #1 &		
GRID #2 & #4 CONNECTED TO PLATE	9	
CATHODE CURRENT	4.5	MA.
GRID #1 VOLTAGE (APPROX.)		
FOR $I_b = 10 \mu A$.	-3.5	VOLTS

^{*}THIS TUBE IS INTENDED TO BE USED IN AUTOMOTIVE SERVICE FROM A NOMINAL 12 VOLT BATTERY SOURCE.
THE HEATER IS THEREFORE DESIGNED TO OPERATE OVER THE 10.0 TO 15.9 VOLTAGE RANGE ENCOUNTERED IN
THIS SERVICE. THE MAXIMUM RATINGS OF THE TUBE PROVIDE FOR AN ADEQUATE SAFETY FACTOR SUCH THAT
THE TUBE WILL WITHSTAND THE WIDE VARIATION IN SUPPLY VOLTAGES.

 $^{^{}m A}_{
m SCREEN}$ feedback. $^{
m G}_{
m 2-4}$ to cathode voltage approximately 13% of $^{
m G}_{
m 1}$ to cathode voltage.

BAVERAGE CONTACT POTENTIAL DEVELOPED ACROSS A 2.2 MEGOHM GRID RESISTOR.



COATED UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 0.15 AMP.
AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

SMALL—BUTTON MINIATURE 7 PIN BASE 7BT

THE 12FK6 IS A TWIN DIODE, LOW-MU TRIODE IN THE 7 PIN MINIATURE CONSTRUCTION. THE DIODE SECTION PERFORMS THE FUNCTIONS OF DETECTION AND AVC WHILE THE TRIODE SECTION IS INTENDED FOR USE AS THE FIRST AF AMPLIFIER. THE TUBE IS DESIGNED FOR USE WHERE THE PLATE AND GRID POTENTIALS ARE OBTAINED DIRECTLY FROM AN AUTOMOTIVE STORAGE BATTERY.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

WITHOUT EXTERNAL SHIELD

TRIODE GRID TO TRIODE PLATE	1.6	μμ f
TRIODE GRID TO CATHODE AND HEATER	1.8	μμ f
TRIODE PLATE TO CATHODE AND HEATER	0.7	μμf
PLATE OF DIODE UNIT #1 TO PLATE OF DIODE UNIT #2	0.9	μμ f

RATINGS INTERPRETED ACCORDING TO DESIGN-CENTER SYSTEM

	DIODE	TRIODE	
HEATER VOLTAGEA		12.6	VOLTS
MAXIMUM PLATE VOLTAGE		16	VOLTS
MAXIMUM GRID VOLTAGE:			
POSITIVE VALUE		0	VOLTS
NEGATIVE VALUE		16	VOLTS
MAXIMUM PEAK HEATER-CATHODE VOLTAGE:			
HEATER NEGATIVE WITH RESPECT TO CATHODE		16	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE		16	VOLTS
MAXIMUM PLATE CURRENT (EACH UNIT)	1		MA.
MAXIMUM CIRCUIT VALUES:			
GRID-CIRCUIT RESISTANCE		10	MEGOHMS

THIS TUBE IS INIENDED TO BE USED IN AUTOMOTIVE SERVICE FROM A NOMINAL 12 VOLT BATTERY SOURCE. IHE HEATER IS THEREFORE DESIGNED TO OPERATE OVER THE 10.0 TO 15.9 VOLTAGE RANGE ENCOUNTERED IN THIS SERVICE. THE MAXIMUM RATINGS OF THE TUBE PROVIDE FOR AN ADEQUATE SAFETY FACTOR SUCH THAT THE TUBE WILL WITHSTAND THE WIDE VARIATION IN SUPPLY VOLTAGES.

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

	DIODE	TRIODE	
HEATER VOLTAGE	12.6	12.6	VOLTS
HEATER CURRENT	0.15	0.15	AMP.
PLATE VOLTAGE	10 ^B	12.6	VOLTS
GRID-SUPPLY VOLTAGE		0	VOLTS
GRID RESISTOR (BYPASSED)		2.2	MEGOHMS
AMPLIFICATION FACTOR		7.4	
PLATE RESISTANCE (APPROX.)		6 200	OHMS
TRANSCONDUCTANCE		1 200	µмноѕ
PLATE CURRENT	2 ⁸	1.3	MA.
PLATE CURRENT (APPROX.) FOR			
GRID BIAS OF -3 VOLTS		0.08	MA.

BEACH UNIT.

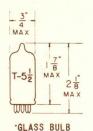
OPERATION OF HEATERS IN SERIES WITH OTHER HEATERS IS NOT RECOMMENDED.

DESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY ELECTRON DEVICE OF A SPECIFIED TYPE AS DEFINED BY 115 PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE DEVICE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE DEVICE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN DEVICE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT LIFE NO DESIGN-MAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY DEVICE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY-VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.

- TUNG-SOL

DOUBLE-DIODE TRIODE

MINIATURE TYPE



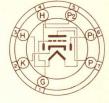
COATED UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 0.15 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
7 PIN BASE
78T

THE 12FM6 IS A DOUBLE DETECTOR DIODE AND MEDIUM MU TRIODE IN THE 7 PIN MINIATURE CONSTRUCTION. THE TWO SECTIONS HAVE A COMMON UNIPOTENTIAL CATHODE. THE TRIODE SECTION IS INTENDED FOR USE AS AN AF VOLTAGE AMPLIFIER INTO A LOW IMPEDANCE LOAD WHERE THE PLATE AND HEATER POTENTIALS ARE OBTAINED DIRECTELY FROM AN AUTOMOTIVE BATTERY.

DIRECT INTERELECTRODE CAPACITANCES WITHOUT EXTERNAL SHIELD

GRID TO PLATE: (G TO P)	1.7 μμ f
INPUT: G TO (H + K)	2.7 µµf
OUTPUT: P TO (H + K)	1.7 μμ f
DIODE TO DIODE	1.1 μμ f

RATINGS

INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

HEATER VOLTAGE	12.6	VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE	±30	VOLTS
MAXIMUM PLATE VOLTAGE	30	VOLTS
MAXIMUM CATHODE CURRENT	20	MA.
MAXIMUM AVERAGE DIODE CURRENT	1	MA.
MAXIMUM GRID CIRCUIT RESISTANCE	10	MEGOHMS

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

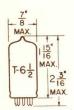
CLASS A, AMPLIFIER - TRIODE UNIT

HEATER VOLTAGE	12.6	12.6	VOLTS
HEATER CURRENT	0.15	0.15	AMP.
HEATER POTENTIAL	12.6	12.6	VOLTS
PLATE POTENTIAL	12.6	12.6	VOLTS
GRID POTENTIAL	0		VOLTS
GRID RESISTOR	0	2.2	MEGOHMS
PLATE CURRENT	1.8	1.0	MA.
TRANSCONDUCTANCE	2400	1300	µмноѕ
PLATE RESISTANCE	5600	7700	OHMS
AMPLIFICATION FACTOR	13.5	10	
DIODE UNITS - TWO			
AVERAGE DIODE CURRENT WITH			
10 VOLTS APPLIED (EACH DIODE)		2.0	MA.

TUNG-SOL .

TWIN DOUBLE-PLATE TRIODE

MINIATURE TYPE



COATED UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 0.15 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

9KT

GLASS BULB

THE 12FQ8 IS A TWIN DOUBLE-PLATE TRIODE IN THE 9 PIN MINIATURE CONSTRUCTION. EACH SECTION HAS A GRID AND TWO PLATES BROUGHT OUT TO A SEPARATE PIN.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

INPUT , EACH SECTION	1.7	$\mu\mu f$
OUTPUT:		
PLATE #1 (SECTION 1)	0.34	$\mu\mu f$
PLATE #2 (SECTION 1)	0.24	μμf
PLATE #1 (SECTION 2)	0.30	μμf
PLATE #2 (SECTION 2)	0.18	$\mu\mu f$
GRID TO PLATE:		
SECTION 1- GRID TO PLATE #1	0.9	μμf
GRID TO PLATE #2	0.9	$\mu\mu f$
SECTION 2 GRID TO PLATE #1	0.9	$\mu\mu f$
GRID TO PLATE #2	0.9	μμέ
PLATE TO PLATE, EACH SECTION	→0.7	μμξ
PLATE #1 (SECTION 1) TO PLATE #1 (SECTION 2)	0.4	μμf

RATINGS

INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM EACH SECTION

HEATER VOLTAGE	12.6	VOLTS
MAXIMUM PLATE VO LTAGE	330	VOLTS
MAXIMUM POSITIVE DC GRID VOLTAGE	0	VOLTS
MAXIMUM PLATE DISSIPATION, EACH PLATE	0.5	WATTS
MAXIMUM HEATER-CATHODE VOLTAGE:		
HEATER POSITIVE WITH RESPECT TO CATHODE		
DC COMPONENT	100	VOLTS
TOTAL DC AND PEAK	200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE		
TOTAL DC AND PEAK	200	VOLTS

- INDICATES A CHANGE.

TUNG-SOL .

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

EACH SECTION

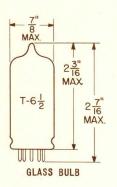
HEATER VOLTAGE	12.6	VOLTS
HEATER CURRENT	0.15	AMP.
PLATE VOLTAGE	250	VOLTS
GRID VOLTAGE	-1.5	VOLTS
AMPLIFICATION FACTOR, GRID TO EACH PLATEA	95	
PLATE RESISTANCE, (APPROX.) EACH PLATEA	76000	OHMS
TRANSCONDUCTANCE, GRID TO EACH PLATE A	1250	μMHOS
PLATE CURRENT, EACH PLATE A	1.5	MA.

A OTHER PLATE OF SAME SECTION GROUNDED.

DESIGN-MAXIMUM RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY TUBE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER THE WORST PROBABLE CONDITIONS. THE TUBE MANUFACTURER CHOOSES THESE VALUES TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE TUBE, TAKING RESPONSIBILITY FOR THE EFFECTS OF CHANGES IN OPERATING CONDITIONS DUE TO VARIATIONS IN TUBE CHARACTERISTICS. THE EQUIPMENT MANUFACTURER SHOULD DESIGN SO THAT INITIALLY AND THROUGHOUT LIFE NO DESIGNMAXIMUM VALUE FOR THE INTENDED SERVICE IS EXCEEDED WITH A BOGEY TUBE UNDER THE WORST PROBABLE OPERATING CONDITIONS WITH RESPECT TO SUPPLY VOLTAGE VARIATION, EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, AND ENVIRONMENTAL CONDITIONS.

TUNG-SOL -

PENTODE-TRIODE-DIODE MINIATURE TYPE

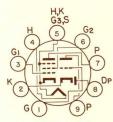


COATED UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 0.32 AMP.

ANY MOUNTING POSITION



BOTTOM VIEW
MINIATURE BUTTON
9 PIN BASE
9 KU

THE 12FR8 IS A PENTODE, TRIODE, DIODE, IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS INTENDED FOR SERVICE AS AN IF AMPLIFIER, AF AMPLIFIER AND SECOND DETECTOR IN RECEIVERS WHERE THE HEATER, PLATE AND SCREEN GRID POTENTIALS ARE OBTAINED DIRECTLY FROM AN AUTOMOTIVE BATTERY.

DIRECT INTERELECTRODE CAPACITANCES WITHOUT EXTERNAL SHIELD

PENTODE GRID #1 TO PLATE (MAX.)	.015	$\mu\mu$ f
PENTODE INPUT	8.5	$\mu\mu f$
PENTODE OUTPUT	5.5	μμf
TRIODE GRID TO PLATE	1.7	μμf
TRIODE INPUT	2.6	$\mu\mu$ f
TRIODE OUTPUT	2.0	μμ f
COUPLING, PENTODE GRID #1 TO TRIODE GRID (MAX.)	.012	μμ f
COUPLING, PENTODE GRID #1 TO DIODE PLATE (MAX.)	.004	μμf
COUPLING, TRIODE GRID TO DIODE PLATE (MAX.)	.17	$\mu\mu$ f
COUPLING, TRIODE PLATE TO DIODE PLATE	.8	μμ f

RATINGS

INTERPRETED ACCORDING

MILEN WELLD WCCOMPING TO DESIGN CENTER SISTEM									
		PENTODE	TRIODE	DIODE					
HEATER	VOLTAGEA	12.6	5	12.6	VOLTS				
MAXIMU	M HEATER-CATHODE VOLTAGE		±16		VOLTS				
MAXIMU	M PLATE VOLTAGE	16	16		VOLTS				
MAXIMU	M GRIDS #2 & #4 VOLTAGE	16			VOLTS				
MAXIMU	M GRIDS #2 & #4 SUPPLY VOLTAGE	16			VOLTS				
MAXIMU	M PENTODE GRID CIRCUIT RESISTANCE	10			MEGOHMS				
MAXIMU	M TRIODE GRID CIRCUIT RESISTANCE		10		MEGOHMS				
MAXIMU	M PLATE CURRENT			5	MA.				

THIS TUBE IS INTENDED TO BE USED IN AUTOMOTIVE SERVICE FROM A NOMINAL 12 VOLT BATTERY SOURCE. THE MEATER IS, THEREFORE DESIGNED TO OPERATE OVER THE 10.0 TO 15.9 VOLTAGE RANGE ENCOUNTERED IN THIS SERVICE. THE MAXIMUM RATINGS OF THE TUBE PROVIDE FOR AN ADEQUATE SAFETY FACTOR SUCH THAT THE TUBE WILL WITHSTAMD THE WIDE VARIATION IN SUPPLY VOLTAGES.

TUNG-SOL -

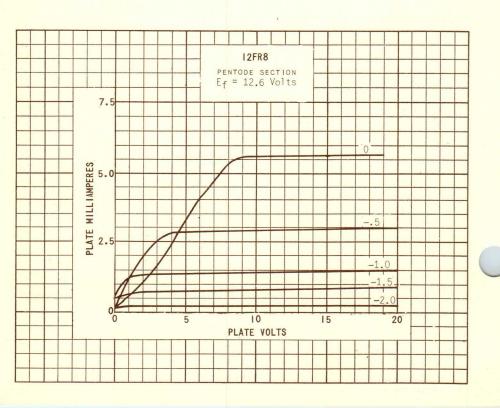
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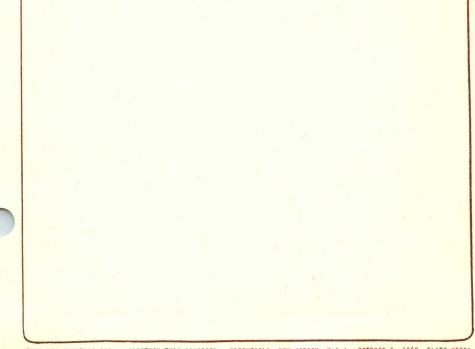
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

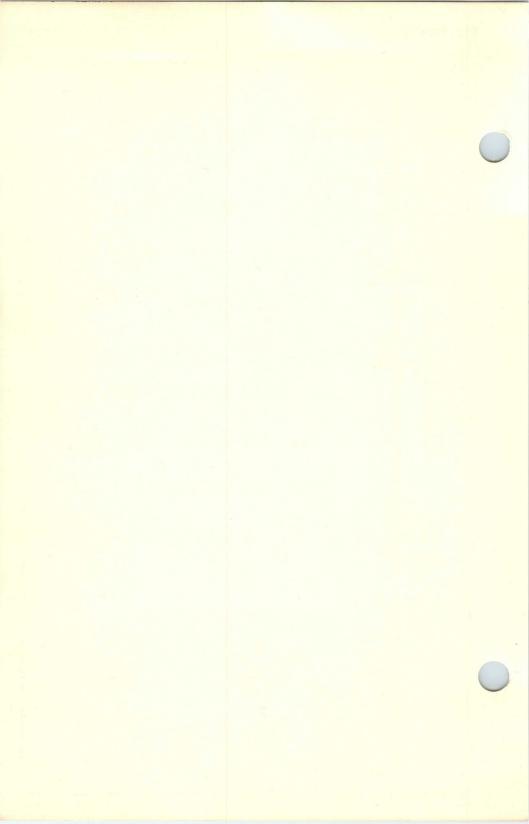
		PENTODE	TRIODE	DIODEB	
HEATER VOLTAGE		12.	6 12.	.6	VOLTS
HEATER CURRENT		0.3	2 0.3	32	AMP.
PLATE VOLTAGE		12.6	12.6	10	VOLTS
GRID #2 VOLTAGE		12.6			VOLTS
GRID #1 VOLTAGE		-0.8 ^c	-0.6 ^c	-	VOLTS
PLATE CURRENT		1.9	1.0	2	MA.
SCREEN CURRENT		. 7			MA.
TRANSCONDUCTANCE		2700	1200		µмноѕ
PLATE RESISTANCE (APPROX.)		.40			MEGOHMS
AMPLIFICATION FACTOR			10		
GRID #1 VOLTAGE FOR					
TRANSCONDUCTANCE = 30 µMHOS		-2.8			VOLTS
GRID VOLTAGE FOR PLATE CURRENT OF	10/LA	-	-3.5		VOLTS

BAVERAGE CHARACTERISTICS.

CAVERAGE BIAS DEVELOPED ACROSS A 2.2 MEGOHM GRID RESISTOR.



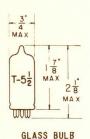




TUNG-SOL

DUO-DIODE-TRIODE

MINIATURE TYPE



AVERAGE DIODE CURRENT

WITH 10 VOLTS APPLIED (EA. DIODE)

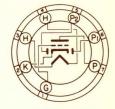
COATED UNIPOTENTIAL CATHODE

HEATER

12.6 VOLTS 0.15 AMP.

AC OR DC

ANY MOUNTING POSITION



BOTTOM VIEW

MINFATURE 7 PIN BASE

7 B T

THE 12FT6 IS A DUO-DIODE-TRIODE IN THE 7 PIN MINIATURE CONSTRUCTION. IT IS INTENDED FOR USE AS THE SECOND DETECTOR AND AUDIO DRIVER AMPLIFIER IN HYBRID (TUBE AND TRANSISTOR) AUTOMOBILE RADIO RECEIVERS THAT OPERATE WITH "A" AND "B" SUPPLY DIRECTLY FROM A 12-VOLT STORAGE BATTERY.

DIRECT INTERELECTRODE CAPACITANCES

GRID TO PLATE	2.0	µµ f
INPUT	1.8	μμ f
OUTPUT	1.1	щи f
DIODE 1 TO DIODE 2	0.9	μμ f

RATINGS INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

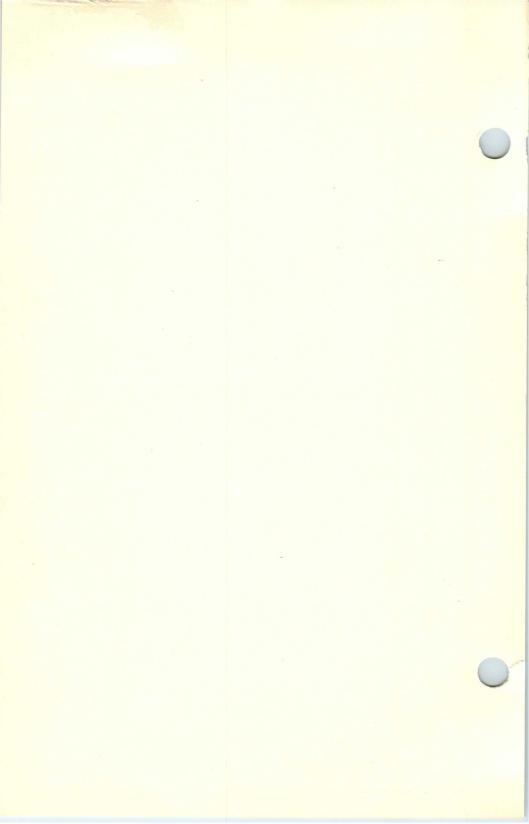
HEATER VOLTAGE	12.6	VOLTS
MAXIMUM PLATE VOLTAGE	30	VOLTS
MAXIMUM CATHODE CURRENT	20	MA.
MAXIMUM AVERAGE DIODE CURRENT	1	MA.
MAXIMUM GRID #1 RESISTANCE	10	MEGOHMS
MAXIMUM PEAK HEATER TO CATHODE VOLTAGE	±30	VOLTS

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS CLASS A AMPLIFIER

TRIODE UNIT HEATER VOLTAGE 12.6 VOLTS HEATER CURRENT 0.15 AMP. PLATE VOLTAGE 12.6 12.6 VOLTS GRID #1 VOLTAGE VOLTS 2.2 GRID #1 CIRCUIT RESISTANCE MEGOHM' PLATE RESISTANCE (APPROX.) 7600 13 000 OHMS TRANSCONDUCTANCE 1900 1 000 **MHOS** AMPLIFICATION FACTOR 15.0 14.0 PLATE CURRENT 0.6 MA. DIODE UNITS

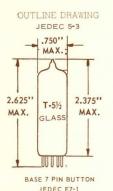
THIS TUBE IS INTENDED TO BE USED IN AUTOMOTIVE SERVICE FROM A NOMINAL 12 VOLT BATTERY SOURCE. THE MEATER IS THEREFORE DESIGNED TO OPERATE OVER THE 10.0 TO 15.9 VOLTAGE RANGE ENCOUNTERED IN THIS SERVICE. THE MAXIMUM RATINGS OF THE TUBE PROVIDE FOR AN ADEQUATE SAFETY FACTOR SUCH THAT THE TUBE WILL WITHSTAND THE WIDE VARIATION IN SUPPLY VOLTAGES.

3.0



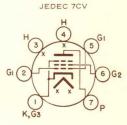
BEAM PENTODE

MINIATURE TYPE



AUDIO OUTPUT PENTODE
HIGH POWER SENSITIVITY

COATED UNIPOTENTIAL CATHODE ANY MOUNTING POSITION



BASING DIAGRAM

BOTTOM VIEW

THE 12FX5 IS A BEAM POWER PENTODE USING THE 7 PIN MINIATURE CONSTRUCTION. BECAUSE OF ITS HIGH POWER SENSITIVITY ATLOW PLATE-SCREEN VOLTAGE, IT IS PARTICULARLY ADAPTABLE TO RECORD PLAYER APPLICATIONS.

DIRECT INTERELECTRODE CAPACITANCES - APPROX.

WITHOUT EXTERNAL SHIELD

HEATER CHARACTERISTICS AND RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	12.6	VOLTS	450	MA.
HEATER WARM-UP TIME			1.1	SEC.
LIMITS OF SUPPLIED CURRENT - AC OR DC			450 ± 30	MA
MAXIMUM HEATER - CATHODE VOLTAGE:				
HEATER NEGATIVE WITH RESPECT TO CATHODE				
TOTAL DC AND PEAK			200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE				
DC COMPONENT			100	VOLTS
TOTAL DC AND PEAK			200	VOLTS

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MAXIMUM RATINGS

DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

PLATE VOLTAGE	150	VOLTS
GRID #2 VOLTAGE	130	VOLTS
POSITIVE DC GRID #1 VOLTAGE	0	VOLTS
PLATE DISSIPATION	5.5	WATTS
GRID #2 DISSIPATION	2	WATTS
GRID #1 CIRCUIT RESISTANCE:		
FIXED BIAS	0.1	MEGOHM
CATHODE BIAS	0.5	MEGOHM
BULB TEMPERATURE		
(AT HOTTEST POINT ON BULB SURFACE)	225	° C

CHARACTERISTICS

PLATE VOLTAGE	110	VOLTS
GRID 2 VOLTAGE	115	VOLTS
CATHODE BIAS RESISTOR	62	OHMS
PLATE CURRENT	36	MA
GRID 2 CURRENT	10	MA
TRANSCONDUCTANCE	13,500	μMHOS
PLATE RESISTANCE - APPROX.	17,500	OHMS

TYPICAL OPERATING CONDITIONS

CLASS A AMPLIFIER

PLATE VOLTAGE	110	VOLTS
GRID #2 VOLTAGE	115	VOLTS
CATHODE BIAS RESISTOR - BY PASSED	62	OHMS
PEAK AF GRID #1 VOLTAGE	3	VOLTS
MAXIMUM SIGNAL PLATE CURRENT	35	MA
MAXIMUM SIGNAL GRID #2 CURRENT	12	MA
LOAD RESISTANCE	3,000	OHMS
TOTAL HARMONIC DISTORTION	8	PERCENT
MAXIMUM SIGNAL POWER OUTPUT	1.3	WATTS

GLASS BULB

MAX.

COATED UNIPOTENTIAL CATHODES-(2)

HEATER

12.6 VOLTS 0.27 AMP.



BOTTOM VIEW
MINIATURE BUTTON
9 PIN BASE

9 K V

THE 12FX8 IS A TRIODE AND HEPTODE IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS INTENDED FOR SERVICE IN SUPERHETERODYNE RECEIVERS AS A TRIODE READLIFIER AND FREQUENCY CONVERTER WHERE THE PLATE, HEATER AND SCREEN POTENTIALS ARE OBTAINED DIRECTLY FROM AN AUTOMOTIVE BATTERY.

DIRECT INTERELECTRODE CAPACITANCES

HEPTODE:	SHIELD	
MIXER GRID TO PLATE (G3 TO P) (MAX.)	0.28	µµ f
MIXER GRID TO OSCILLATOR GRID (G3 TO G1) (MAX.)	0.12	μμ f
RF INPUT (G3 TO H+K+G1+G2, 4+G5+P)	6.0	uu f
MIXER OUTPUT (P TO H+K+G1+G2, 4+G5)	5.0	$\mu\mu$ f
OSCILLATOR INPUT (G1 TO H+K+G2, 4+G3+G5)	5.0	μμ f
OSCILLATOR GRID TO CATHODE (G1 TO K)	3.0	μμ f
OSCILLATOR OUTPUT (K TO H+G2, 4+G3+P)	17	Mus
OSCILLATOR GRID TO PLATE (G1 TO P) (MAX.)	0.16	$\mu\mu$ f
TRIODE:		
GRID TO PLATE	1.3	μμf
INPUT	2.2	μμf
OUTPUT	0.25	μμ f
COUPLING:		
	0.1	
TRIODE GRID TO MIXER GRID (MAX.)	.01	μμf
TRIODE PLATE TO MIXER GRID (MAX.)	0.18	μμ f
TRIODE PLATE TO HEPTODE PLATE (MAX.)	0.20	μμ f

RATINGS

	INTERPRETED ACCORDING TO DESIGN CEN	VIER STSIEM	
HEATER	VOLTAGE ^A	12.6	VOLTS
MAXIMUM	HEATER-CATHODE VOLTAGE	±16	VOLTS
MAXIMUM	HEPTODE PLATE VOLTAGE	16	VOLTS
	TRIODE PLATE VOLTAGE	16	VOLTS
	GRIDS #2 & #4 VOLTAGE	16	VOLTS
	GRIDS #2 & #4 SUPPLY VOLTAGE	16	VOLTS
	NEGATIVE DC GRID #3 VOLTAGE	16	VOLTS
	POSITIVE GRID #3 VOLTAGE	0	VOLTS
	GRID #3 CIRCUIT RESISTANCE	10	MEGOHMS
	TRIODE GRID CIRCUIT RESISTANCE	10	MEGOHMS

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

	HEPTODE	TRIODE	
HEATER VOLTAGE	12.	6	VOLTS
PLATE VOLTAGE	12.6	12.6	VOLTS
GRID VOLTAGE		8 ^B	VOLTS
GRID #1 VOLTAGE (OSCILLATOR GRID)	1.6		VOLTS
GRID #2 & #4 VOLTAGE (SCREEN GRID)	12.6		VOLTS
GRID #3 VOLTAGE (SIGNAL GRID)	.5 ^B		VOLTS
PLATE RESISTANCE	•5	-	MEGOHM
TRANSCONDUCTANCE		1400	MMHOS
PLATE CURRENT	290	1300	µ A
GRID #2 CURRENT	1250		MA
CONVERSION TRANSCONDUCTANCE	300		MHOS
AMPLIFICATION FACTOR		10	
GRID VOLTAGE FOR In OF 1044 (APPROX.)	man were near man	-3.2	VOLTS
GRID #3 VOLTAGE FOR CONVERSION TRANS-			
CONDUCTANCE OF 10 µMHOS (APPROX.)	-3.0		VOLTS

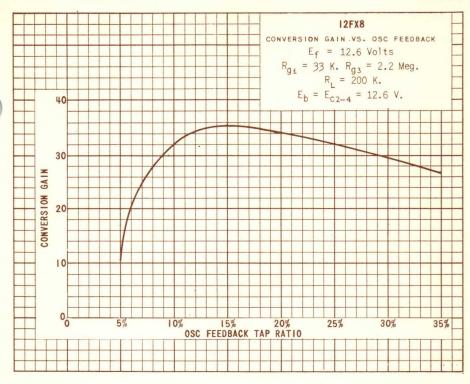
HEPTODE OSCILLATOR CHARACTERISTICS - NOT OSCILLATING

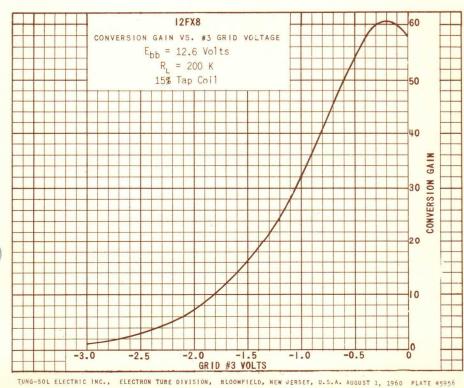
GRID #3 VOLTAGE	0	VOLTS
GRID #4 VOLTAGE (OSCILLATOR GRID)	0	VOLTS
GRIDS #2 & #4 CONNECTED TO PLATE	12.6	VOLTS
TRANSCONDUCTANCE BETWEEN GRID #1 & GRIDS #2 & #4		
CONNECTED TO PLATE	3600	µмноs
AMPLIFICATION FACTOR BETWEEN GRID #1 &		
GRIDS #2 & #4 CONNECTED TO PLATE	9.0	
CATHODE CURRENT	4.4	MA-
GRID #1 VOLTAGE (APPROX.) FOR Ib = 10 MA	-4.5	VOLTS

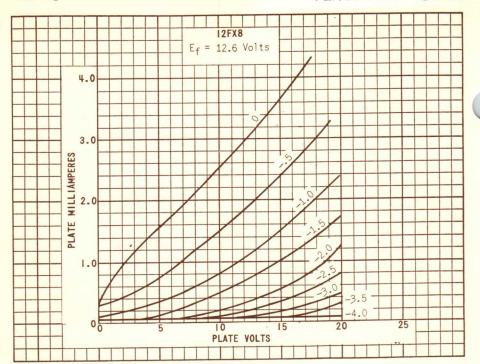
A
THIS TUBE IS INTENDED TO BE USED IN AUTOMOTIVE SERVICE FROM A NOMINAL 12 VOLT BATTERY SOURCE.
THE HEATER IS THEREFORE DESIGNED TO OPERATE OVER THE 10.0 TO 15.9 VOLTAGE RANGE ENCOUNTERED
IN THIS SERVICE. THE MAXIMUM RATINGS OF THE TUBE PROVIDE FOR AN ADEQUATE SAFETY FACTOR SUCH
THAT THE TUBE WILL WITHSTAND THE WIDE VARIATION IN SUPPLY VOLTAGES.

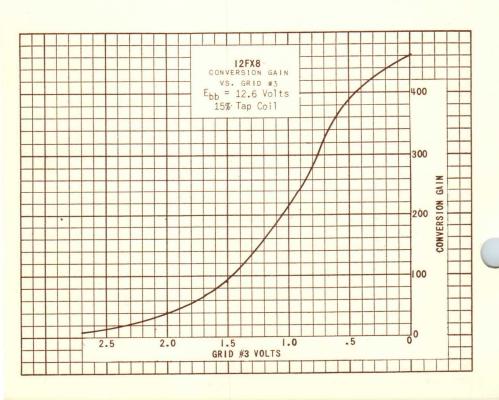
BAVERAGE BIAS DEVELOPED ACROSS 2.2 MEGOHM GRID RESISTOR.

CONVERTER SERVICE-SELF EXCITATION, SCREEN FEED BACK. OSCILLATOR GRID RESISTOR 33,000 OHMS.



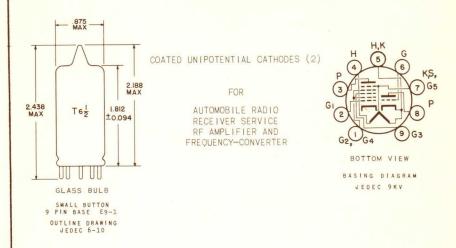






TRIODE - HEPTODE

MINIATURE TYPE



THE 12FX8A IS A MINIATURE TRIODE—HEPTODE DESIGNED FOR USE IN AUTOMOBILE RADIO RECEIVER SERVICE WHERE PLATE AND SCREEN VOLTAGES ARE SUPPLIED DIRECTLY FROM A 12-VOLT STORAGE BATTERY. THE TRIODE SECTION IS INTENDED FOR RFAMPLIFIER USE AND THE HEPTODE SECTION FOR FREQUENCY—CONVERTER USE. THE 12FX8A IS UNILATERALLY INTERCHANGEABLE WITH THE 12FX8 AND DIFFERS ONLY IN HAVING AN ADDITIONAL CONTROL ON THE CONVERSION—CONDUCTANCE CUTOFF CHARACTERISTIC OF THE HEPTODE.

DIRECT INTERELECTRODE CAPACITANCES

WITHOUT EXTERNAL SHIELD

HEPTODE

GRID #3 TO PLATE: (HG3 TO HP) MAX.	0.28	pf
GRID #3 TO GRID #1: (HG3 TO HG1), MAX.	0.12	pf
RF INPUT: HG3 TO (H+TK+HK+HG1+HG2, 4+HG5+HP+1.S.)	6.0	pf
OSCILLATOR INPUT: HG1 TO (H+TK+HK+HG2, 4+HG3+HG5+		
HP+1.S.)	5.0	pf
MIXER OUTPUT: HP TO (H+TK+HK+HG1+HG2, 4+HG3+HG5+1.S.)	5.0	pf
GRID #1 TO CATHODE: HG1 TO (HK+HG5+1.S.)	3.0	pf
OSCILLATOR OUTPUT: HK TO (H+TK+HG2, 4+HG3+HP)	17	pf
GRID #1 TO PLATE: (HG1 TO HP) MAX.	0.16	pf
TRIODE		
GRID TO PLATE: (TG TO TP)	1.3	pf
INPUT: TG TO (TK+H)	2.2	pf
OUTPUT: TP TO (TK+H)	0.25	pf
TRIODE GRID TO HEPTODE GRID #3: (TG TO HG3), MAX.	0.01	pf
TRIODE PLATE TO HEPTODE GRID #3: (TP TO HG3), MAX.	0.18	pf
TRIODE PLATE TO HEPTODE PLATE: (TP TO HP) MAX.	0.20	pf

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HEATER CHARACTERISTICS AND RATINGS DESIGN MAXIMUM VALUES - SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS

12.6 VOLTS

270

MA.

HEATER SUPPLY LIMITS:

WHEN USED IN AUTOMOBILE SERVICE FROM A 12-VOLT SOURCE, UNDER NO CIRCUMSTANCES SHOULD THE HEATER VOLTAGE BE LESS THAN 10.0 VOLTS OR MORE THAN 15.9 VOLTS. THESE EXTREME VARIATIONS IN HEATER VOLTAGE MAYBE TOLERATED FOR SHORT PERIODS; HOWEVER OPERATION AT OR NEAR THESE ABSOLUTE LIMITS IN HEATER VOLTAGE ENCESSARILY INVOLVES SACRIFICE IN PERFORMANCE AT LOW HEATER VOLTAGE AND IN LIFE EXPECTANCE AT HIGH HEATER VOLTAGE. EQUIPMENT RELIBBILITY CAN BE SIGNIFICANTLY INCREASED WITH IMPROVED SUPPLY-VOLTAGE REGULATION.

MAXIMUM HEATER-CATHODE VOLTAGE

HEATER POSITIVE WITH RESPECT TO CATHODE 16 VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE 16 VOLTS

MAXIMUM RATINGS

DESIGN CENTER VALUES - SEE EIA STANDARD RS-239

HEPTODE PLATE VOLTAGE	16	VOLTS
HEPTODE SCREEN-SUPPLY VOLTAGE	16	VOLTS
HEPTODE SCREEN VOLTAGE	16	VOLTS
HEPTODE POSITIVE DC GRID #3 VOLTAGE	0	VOLTS
HEPTODE NEGATIVE DC GRID #3 VOLTAGE	16	VOLTS
TRIODE PLATE VOLTAGE	16	VOLTS
HEPTODE GRID #3 CIRCUIT RESISTANCE	10	MEGOHMS
TRIODE GRID-CIRCUIT RESISTANCE	10	MEGOHMS

DESIGN-CENTER RATINGS ARE LIMITING VALUES OF OPERATING AND ENVIRONMENTAL CONDITIONS APPLICABLE TO A BOGEY TUBE OF A SPECIFIED TYPE AS DEFINED BY ITS PUBLISHED DATA, AND SHOULD NOT BE EXCEEDED UNDER NORMAL CONDITIONS. THESE VALUES ARE CHOSEN BY THE TUBE MANUFACTURE TO PROVIDE ACCEPTABLE SERVICEABILITY OF THE TUBE IN AVERAGE APPLICATIONS, TAKING RESPONSIBILITY FOR EQUIPMENT COMPONENT VARIATION, EQUIPMENT CONTROL ADJUSTMENT, LOAD VARIATION, SIGNAL VARIATION, ENVIRONMENTAL CONDITIONS, AND VARIATIONS IN THE CHARACTERISTICS OF ALL TUBES. THE QUIPMENT MANUFACTURES SHOULD DESIGN SO THAT INITIALLY NO DESIGN-CENTER VALUE FOR THE INTENDED SERVICE IS EXCÉCDED WITH A BOGEY TUBE IN EQUIPMENT MODES AND A STATED NORMAL SUPPLY-VOLTAGE.

TYPICAL OPERATING CHARACTERISTICS

AVERAGE CHARACTERISTICS

	HEPTODEA	TRIODE	
PLATE VOLTAGE	12.6	12.6	VOLTS
SCREEN VOLTAGE	12.6		VOLTS
GRID #3 VOLTAGE	0.5 ^B		VOLTS
GRID #3 RESISTANCE	2.2		MEGOHMS
GRID #1 VOLTAGE, RMS	1.6		VOLTS
GRID #1 RESISTANCE	0.033	2.2	MEGOHMS
GRID VOLTAGE		0.8 ^c	VOLTS
PLATE RESISTANCE, APPROX.	0.5		MEGOHMS
CONVERSION TRANSCONDUCTANCE	300		MICROMHOS
TRANSCONDUCTANCE		1400	MICROMHOS
AMPLIFICATION FACTOR		10	
PLATE CURRENT	0.29	1.3	MA.
SCREEN CURRENT	1.25		MA.
GRID #3 VOLTAGE, APPROX.			
$GC = 10 \mu MHOS$	-3.0		VOLTS
$Gc = 1.0 \mu MHOS$	-8.0		VOLTS
GRID VOLTAGE, APPROX.			
1b = 10 μAMPS.		-3.2	VOLTS
	TELEFOR DESCRIPTION OF THE PROPERTY OF THE PRO		

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TYPICAL OPERATING CHARACTERISTICS - CONT'D.

HEPTODE OSCILLATOR CHARACTERISTICS (NOT OSCILLATING)

12.6	VOLTS
0	VOLTS
0	VOLTS
9	
3600	µмноs
4.4	MA.
-4.5	VOLTS
	0 0 9 3600 4.4

ASELF-EXCITED CONVERTER SERVICE.

B_{VOLTAGE} DEVELOPED ACROSS 2.2 MEGOHM GRID *3 RESISTOR.

CVOLTAGE DEVELOPED ACROSS 2.2 MEGOHM GRID RESISTOR.

DBETWEEN GRID #1 AND GRIDS #2 & 4 CONNECTED TO PLATE.

