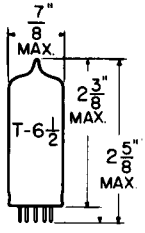
TUNG-SOL

TWIN DIODE-TETRODE

MINIATURE TYPE



GLASS BULB

SMALL-BUTTON NOVAL 9 PIN BASE E9-1

OUTLINE DRAWING JEDEC 6-3

UNIPOTENTIAL CATHODE

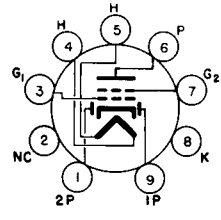
HEATER

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 USED 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 VOLTAGE[A]	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.

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RATINGS - CONT'D
INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

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 A_1 AMPLIFIER

HEATER VOLTAGE[A]	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	μMHOS
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.

[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.

[B] OBTAINED FROM INDICATED PLATE SUPPLY THROUGH SERIES 100 HENRY CHOKE HAVING DC RESISTANCE OF 150 OHMS.

→ INDICATES A CHANGE

CONTINUED ON FOLLOWING PAGE

TUNG-SOL

CONTINUED FROM PRECEDING PAGE

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS - CONT'D.

TYPICAL OPERATION

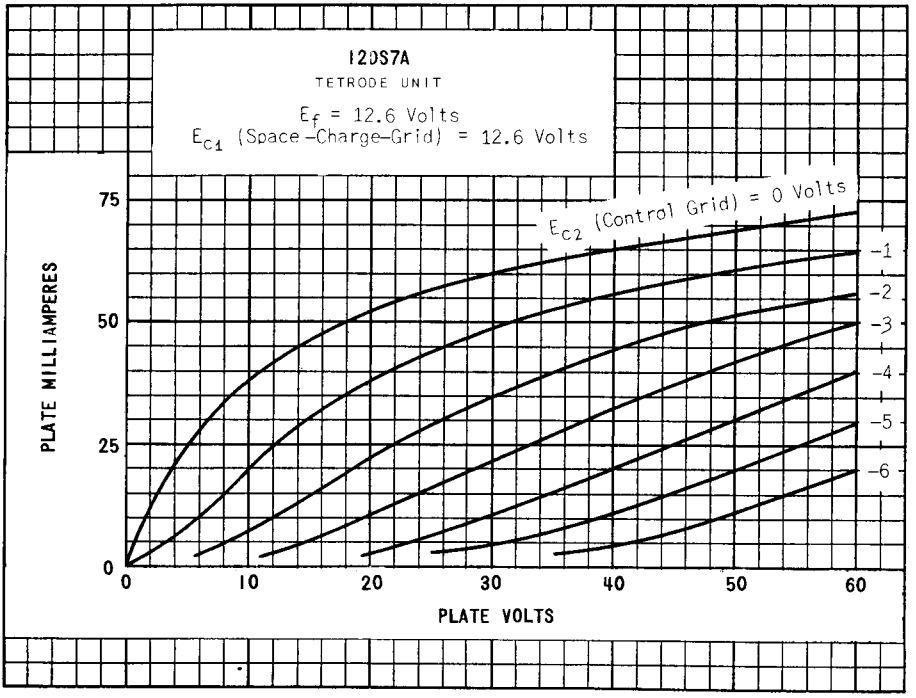
PLATE VOLTAGE		12.6	VOLTS
GRID #1 VOLTAGE		12.6	VOLTS
GRID #2 VOLTAGE:			
OBTAINED BY RECTIFICATION THROUGH A 2.2 MEGOHM RESISTOR	→	-1.6	VOLTS
PEAK AF GRID #2 SUPPLY VOLTAGE (APPROX.):			
FROM 0.22 MEGOHM SIGNAL SOURCE ←		2.5	VOLTS
PLATE CURRENT:			
ZERO SIGNAL (APPROX.)	→	35	MA.
MAXIMUM SIGNAL	→	15	MA.
GRID #1 CURRENT	→	80	MA.
LOAD RESISTANCE	→	700	OHMS
TOTAL HARMONIC DISTORTION		10	PERCENT
MAX. SIGNAL POWER OUTPUT	→	35	MW.
MAXIMUM CIRCUIT VALUES:			
GRID #2 CIRCUIT RESISTANCE		10	MEGOHMS

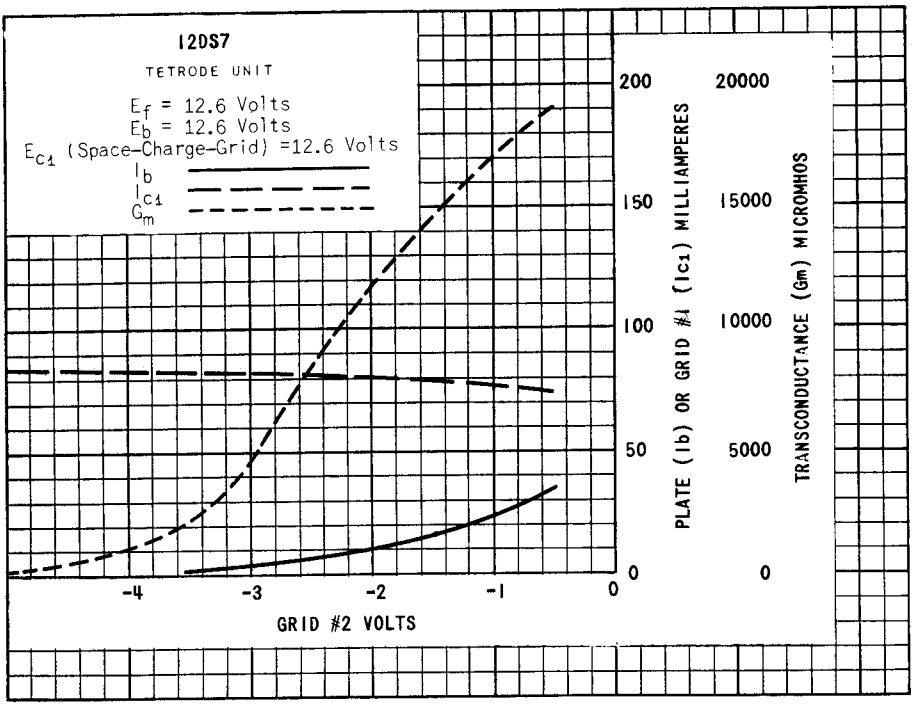
CHARACTERISTICS

DIODE UNITS - TWO
VALUES ARE FOR EACH UNIT

PLATE CURRENT FOR PLATE VOLTS = 10		3	MA.

→INDICATES A CHANGE.




12DS7
TETRODE UNIT
E_f = 12.6 Volts
E_b = 12.6 Volts
E_{c1} (Space-Charge-Grid) =12.6 Volts
I_b
I_{c1}
G_m
200
150
100
50
0
20000
15000
10000
5000
0
PLATE (I_b) OR GRID #1 (I_{c1}) MILLIAMPERES
TRANSCONDUCTANCE (Gm) MICROMHOS
-4
-3
-2
-1
0
GRID #2 VOLTS