TUNG-SOL

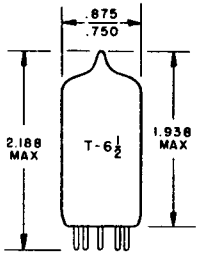
TWIN TRIODE

MINIATURE TYPE

FOR

HIGH VOLTAGE GAIN AND

LOW HEATER POWER APPLICATIONS

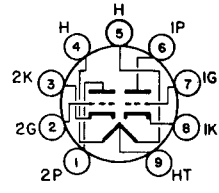


GLASS BULB

SMALL BUTTON
9 PIN NOVAL E9-1
OUTLINE DRAWING
JEDEC 6-2

COATED UNIPOTENTIAL CATHODE

ANY MOUNTING POSITION



BOTTOM VIEW

BASING DIAGRAM
JEDEC 9A

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

SUPPLY CONNECTED TO PINS	4 AND 5	9 AND 4+5	
AVERAGE VALUES - VOLTAGE	12.6	6.3	VOLTS
CURRENT	150	300	MA.
HEATER WARM-UP TIME [A]	11		SECONDS
LIMITS OF APPLIED HEATER VOLTAGE	12.6 ±1.3	6.3 ±0.6	VOLTS
LIMITS OF SUPPLIED CURRENT	150 ± 10	300 ± 20	MA.
MAXIMUM PEAK HEATER-CATHODE VOLTAGE:			
HEATER NEGATIVE WITH RESPECT TO CATHODE		200	VOLTS
HEATER POSITIVE WITH RESPECT TO CATHODE		200 [A]	VOLTS

[A] THE DC COMPONENT MUST NOT EXCEET 100 VOLTS.

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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
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 μF CAPACITOR; GRID RESISTOR, 0 OHMS; AND AMPLIFIER COVERING FREQUENCY RANGE BETWEEN 25 AND 10,000 CPS. EQUIVALENT VOLTAGE REFERENCED TO GRID.

RESISTANCE COUPLED AMPLIFIER

R_p MEG.	R_S MEG.	R_{g1} MEG.	E_{bb} = 90 VOLTS			E_{bb} = 180 VOLTS			E_{bb} = 300 VOLTS		
			R_k	GAIN	E_o	R_k	GAIN	E_o	R_k	GAIN	E_o
0.10	0.10	0.1	1700	31	5.0	1000	40	15	760	43	30
0.10	0.24	0.1	2000	38	6.9	1100	46	20	900	50	40
0.24	0.24	0.1	3500	43	6.5	2000	54	18	1600	58	37
0.24	0.51	0.1	3900	49	8.6	2300	59	24	1800	64	47
0.51	0.51	0.1	7100	50	7.4	4300	62	19	3100	66	39
0.51	1.0	0.1	7800	53	9.1	4800	64	24	3600	69	46
0.24	0.24	10	0	37	3.9	0	53	15	0	62	32
0.24	0.51	10	0	44	5.4	0	60	19	0	67	41
0.51	0.51	10	0	44	5.0	0	61	17	0	69	35
0.51	1.0	10	0	49	6.4	0	66	21	0	71	41

E_o 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.

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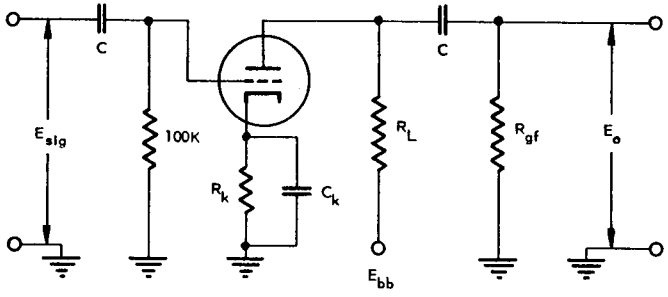
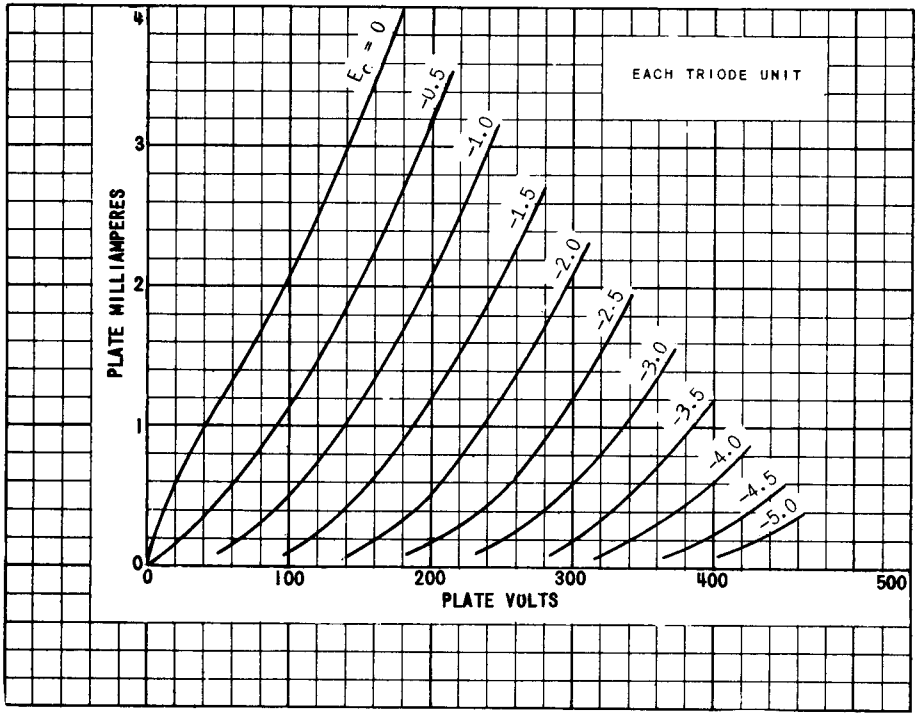
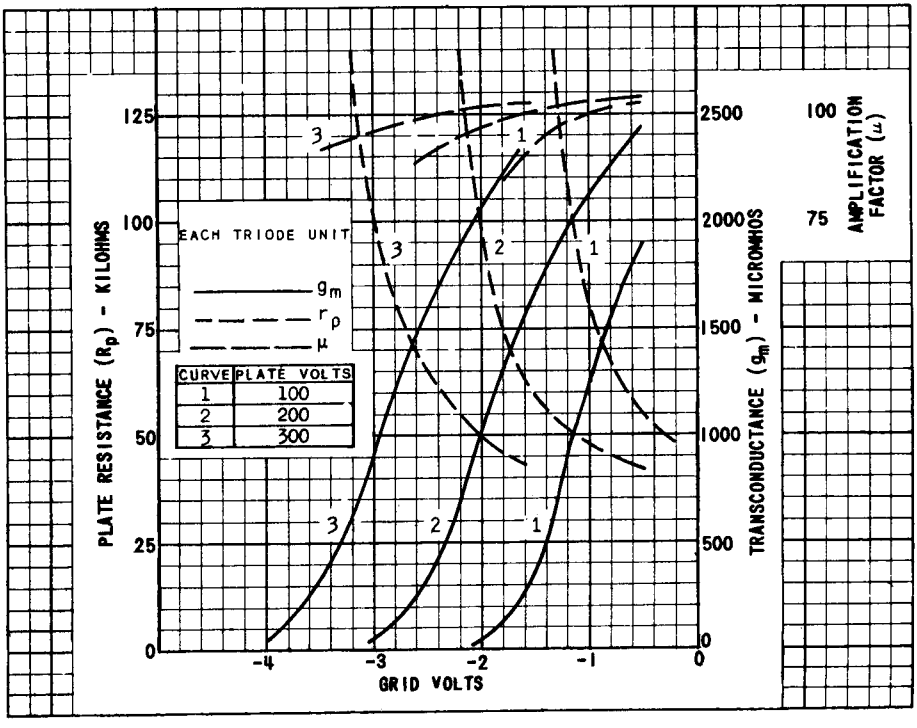


COUPLING CAPACITORS (C) SHOULD BE SELECTED TO GIVE DESIRED FREQUENCY RESPONSE. R_k SHOULD BE ADEQUATELY BY-PASSED.



12AX7A


EACH TRIODE UNIT
g_m
r_p
μ
CURVE | PLATE VOLTS
1 | 100
2 | 200
3 | 300
PLATE RESISTANCE (R_p) - KILOHMS
125
100
75
50
25
0
TRANSCONDUCTANCE (g_m) - MICROMHOS
2500
2000
1500
1000
500
0
AMPLIFICATION FACTOR (μ)
100
75
-4
-3
-2
-1
0
GRID VOLTS