

Radiotron Type 12AX7

High-Mu Twin-Triode Amplifier

(Reprinted by courtesy of Radio Corporation of America)

Radiotron type 12AX7 is a heater-cathode type of high-mu, twin-triode amplifier featuring a small glass envelope with integral button 9-pin base, separate terminals for each cathode, and a mid-tapped heater to permit operation from either a 6.3- or 12.6-volt supply.

Having characteristics which are similar to those of the larger types 6SL7-GT and 12SL7-GT, the 12AX7 like these types is useful in many diversified applications including phase inverters, multi-vibrators, and numerous industrial control devices where high voltage gain and low heater power are important design factors. In such equipment, the 12AX7 can be used to advantage because of its compact size, its separate cathode terminals, and its economical consumption of heater power at either of the two voltages.

GENERAL DATA

Electrical:

Heater, for Unipotential Cathodes:

Heater Arrangement	Series	Parallel	
Voltage (a.c. or d.c.)	12.6	6.3	volts
Current	0.15	0.3	ampere

Direct Interelectrode Capacitances:^o

	Triode		
	Unit T ₁	Unit T ₂	
Grid to Plate	1.7	1.7	μF
Grid to Cathode	1.6	1.6	μF
Plate to Cathode	0.46	0.34	μF

Mechanical:

Mounting Position	Any		
Maximum Overall Length	2 $\frac{3}{16}$ "		
Maximum Seated Length	1 $\frac{5}{16}$ "		
Length from Base Seat to Bulb Top (excluding tip)	1 $\frac{9}{16}$ " ± $\frac{3}{32}$ "		

Maximum Diameter	7"
Bulb	T-6 $\frac{1}{2}$
Base	Small-Button Noval 9-Pin

Socket connections:

Pin 1	— Plate (Triode No. 2)
Pin 2	— Grid (Triode No. 2)
Pin 3	— Cathode (Triode No. 2)
Pin 4	— Heater
Pin 5	— Heater
Pin 6	— Plate (Triode No. 1)
Pin 7	— Grid (Triode No. 1)
Pin 8	— Cathode (Triode No. 1)
Pin 9	— Heater Mid-Tap

CLASS A₁ AMPLIFIER

Values are for each unit

Maximum Ratings, Design-Centre Values:

Plate Voltage	300 max.	volts
Plate Dissipation	1 max.	watt
Grid Voltage:		
Negative bias value	50 max.	volts
Positive bias value	0 max.	volts
Peak Heater-Cathode Voltage:		
Heater negative with respect to cathode	180 max.	volts
Heater positive with respect to cathode	180 max.	volts

Characteristics:

Plate Voltage	100	250	volts
Grid Voltage	-1	-2	volts
Amplification Factor	100	100	
Plate Resistance	80000	62500	ohms
Transconductance	1250	1600	micromhos
Plate Current	0.5	1.2	mA

Typical Operation—Resistance-Coupled Amplifier:

Plate-Supply Voltage	90			180			300			volts
	0.1	0.22	0.47	0.1	0.22	0.47	0.1	0.22	0.47	
Plate Load Resistor	0.1	0.22	0.47	0.1	0.22	0.47	0.1	0.22	0.47	megohm
Grid Resistor (of following stage)	0.22	0.47	1.0	0.22	0.47	1.0	0.22	0.47	1.0	megohm
Cathode Resistor	4700	7400	13000	2000	3500	6700	1500	2800	5200	ohms
Cathode Bypass Capacitor ^o	2.4	1.4	0.8	3.5	2.1	1.1	4.0	2.3	1.3	μF
Blocking Capacitor ^o	0.013	0.006	0.003	0.013	0.006	0.003	0.013	0.006	0.003	μF
Peak Output Voltage [▲]	6	9	11	25	34	39	57	69	77	volts
Voltage Gain	35#	45##	52‡	47▲	59▲	66▲	52▲	65▲	73▲	

^o With no external shield.

At an output voltage of 2 volts r.m.s.

‡ At an output voltage of 4 volts r.m.s.

• The cathode by-pass capacitors and blocking capacitors have been chosen to give output voltages at 100 c/s (f_1) which are equal to 0.8 of the mid-frequency value. For any other value of (f_1), multiply the values of cathode by-pass and blocking capacitors by $100/f_1$.

At an output voltage of 3 volts r.m.s.

▲ At an output voltage of 5 volts r.m.s.

■ This peak output voltage is obtained across the grid resistor of the following stage at any frequency within the flat region of the output vs. frequency curve, and is for the condition where the signal level is adequate to swing the grid of the resistance-coupled amplifier valve itself to the point where its grid starts to draw current.