Westinghouse

7794

January 1, 1961

TUNABLE MAGNETRON TYPE 7794

The 7794 is a C band 5 watt CW magnetron. It is designed for AM modulated communications, telemetering and relay systems requiring high average power with good bandwidth. In pulse code modulation systems peak powers up to 10 watts are available. In amplitude modulated systems one hundred percent modulation of a five watt carrier is permitted. With 100% modulation incidental FM is less than 10 megacycles. The rugged light weight design permits use on airborne systems where shock and vibration are severe.

The 7794 uses a multivaned anode structure and an oxide coated unipotential cathode. It contains a capacitive tuning element which can be adjusted by means of a differential screw to a desired frequency in the range 4200-4400 Mc. The integral magnets are enclosed in steel shells which serve to shield the magnetron from stray magnetic field effects.

The 7794 is also most satisfactory for laboratory use as its tuning system permits precise and repeatable frequencies settings any where in the range. Its signal is readily sensed when tube is amplitude modulated. The power output is high enough for standing wave measurements or research into off-resonance spurious behavior.

ELECTRICAL:

Cathode	Coated Unipotential	
Heater:		
Voltage (Note 1)	6.3	Volts
Current	0.6 ± 10%	Ampere
Warm-Up Time (Note 2)	40	Seconds

MECHANICAL:

Max. Overall Length	3.750	Inches
Max. Diameter (Excluding Turminals)	1.656	Inches
Connectors:		
Output	BNC Connector Jack JAN UG-89/U	
Operating Voltages	Special 8-Pin In-Line Plug	
Cooling	Unrestricted Air Convection	
Ambient Temperature	−55°C to +70°C	
Shell Temperature	35°C max. above ambient	
Vibration and Shock (Note 3)	Ruggedized	
Operating Position (Note 4)	Any	
Net Weight	0.9 Pounds	

Life: 500 hours of C.W. operation at maximum power with correspondingly longer usefulness at lower duty cycle or power.

from JEDEC release #3219, April 10, 1961

TYPICAL OPERATION: Continuous Wave Oscillator

(Load VSWR 2.0 Max.)	Min.	Typical	Max.	
Heater Voltage (Note 1)	5.7	6.3	7.0	Volts
Heater Current	0.54	0.60	0.66	Amperes
Cathode Voltage	−250	−425	−450	Volts
Cathode Current	10	30	60	Ma.
Power Output	0.5	4.5	5	Watts
Frequency	4200	--	4400	Megacycles
Pulling Figure for VSWR of 1.5	--	--	4.0	Megacycles

TYPICAL OPERATION: Pulsed Applications

(Load VSWR 2.0 Max.)				
Heater Voltage (Note 1)	5.7	6.3	7.0	Volts
Heater Current	0.54	0.60	0.66	Amperes
Peak Cathode Voltage	−250	−450	−500	Volts
Peak Current	10	60	100	Ma.
Peak Power	0.5	5.0	10.0	Watts
Duty Cycle (Note 5)	0.001	0.5	1.0	

TYPICAL OPERATION: Amplitude Modulation

(Load VSWR 2.0 Max.)				
Heater Voltage (Note 1)	5.7	6.3	7.0	Volts
Heater Current	0.54	0.60	0.66	Amperes
Cathode Center Voltage	−300	−350	−400	Volts
Cathode Current (average)	15	30	60	Ma.
Modulation Frequency	--	10^3	10^6	Cycles/Sec.
Modulation Amplitude (Note 6)	--	--	100%	

1: Operation of heater with direct current will be necessary in most cases to minimize frequency modulation at alternating current supply frequencies. A.C. operation is permissible in some applications. The heater should be connected to the cathode through 1 megohm of resistance.

2: Cathode voltage and heater voltage can be applied simultaneously, but power will not be available at full rating in less than 40 seconds.

3: The tube has been tested to the limit of hammer tests. Special vibration problems encountered should be referred to the nearest Westinghouse Electronic Tube salesman or Westinghouse Electronic Tube Division, Elmira, N.Y.

4: The tube connectors do not provide mechanical support. Non-magnetic clamps should be used to support the shell. Typical application supports the tube with its principle axis horizontal.

5: A typical application uses square wave modulation, but pulse widths less than 1.0 microseconds have been demonstrated to be useful.

6: The amplitude of modulation voltage is related to cathode center voltage. In general, the difference between 230 volts and the operating center voltage is the amplitude needed for 100% sine wave modulation.

Operating Recommendations

Maximum Ratings:

The maximum ratings must not be exceeded if performance characteristics are to be maintained. It does not necessarily follow that all maximum ratings can be applied simultaneously.

Magnetic Field Precautions:

While the steel shell enclosing the integral permanent magnets serves as an effective magnetic shield, it still is possible to affect the operating point of the tube if brought within strong A.C. field regions. Ferromagnetic materials should not be used for mounting brackets. Magnets should be kept at least one inch from the tube. Turning the screws in either end cover can affect the magnetic field and make the tube inoperative.

Handling Precautions:

This tube is exceptionally rugged and can take extreme shock conditions and any normal handling without special precaution except that the output section can be bent by strong pressure. It is advised that the tube be cradled in the inner part of its shipping container when on the bench, because this is designed to keep the tube away from ferromagnetic surfaces or contact with other tubes.

Tuning:

The tube is delivered with frequency set and locked at the center of its tuning range. Loosening the locking nut permits rotation of the tuning screw in either direction. An approximate tuning curve is shown in Figure 1. Tuning is achieved by motion of

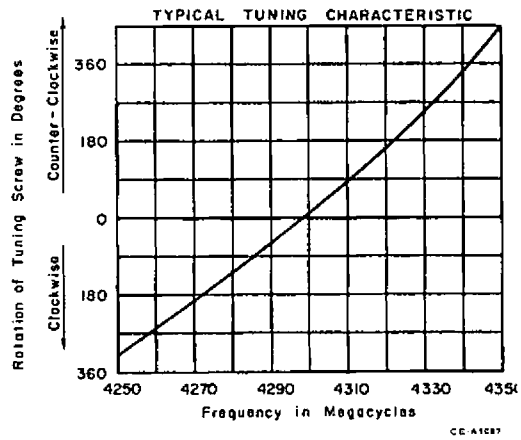

FIGURE 1

a capacitive element inside the vacuum enclosure. The differential screw system permits precise and repeatable settings. The locking nut permits close settings to be maintained in systems where vibration is extreme. The thermal stability variation of frequency with change in ambient temperature is shown in Figure 2. The reference value is the frequency

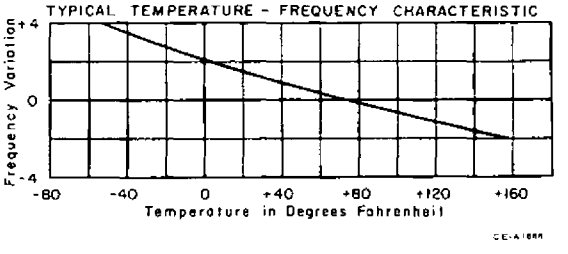

FIGURE 2

after 20 minutes stabilization at room temperature. During this interval, frequency may show a drift of about −5 Mc.

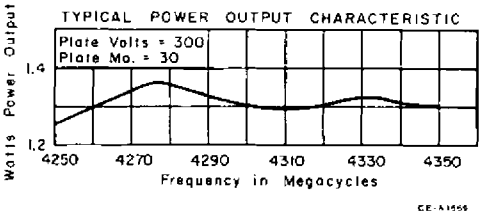

FIGURE 3

Power Uniformity:

When operated as a C.W. oscillator at a current of 30 ma., the power output remains constant within ± 0.1 watt, as shown in Figure 3.

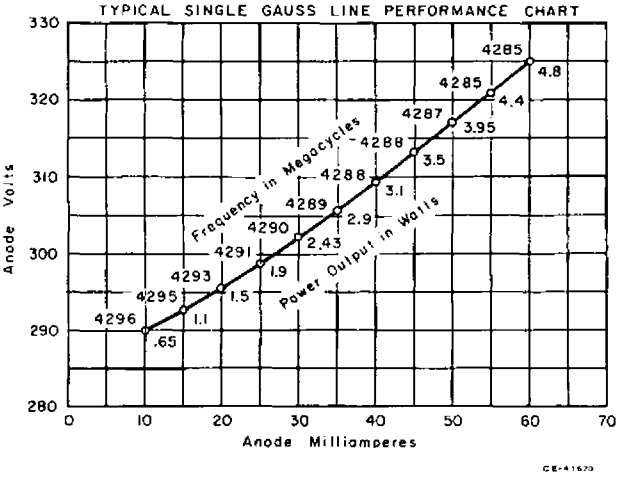

FIGURE 4

Performance:

A single gauss-line performance chart for a typical tube is shown in Figure 4 for a locked frequency setting of the tube. This shows the FM tuning probable with amplitude modulation. Higher or lower magnetic field settings are possible to meet specific requirements. Application problems should be referred to the nearest Westinghouse Electronic Tube salesman or Westinghouse Electronic Tube Division, Elmira, N.Y.

PIN#	CONNECTION
1	NO CONNECTION
2	NO CONNECTION
3	NO CONNECTION
4	NO CONNECTION
5	ANODE (GROUND)
6	HEATER
7	CATHODE
8	HEATER