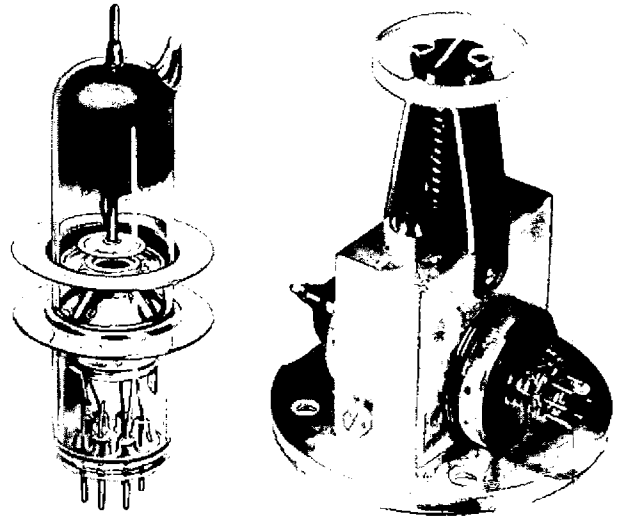


The type 6811 is a microwave oscillator of the single cavity reflex type, designed with an external cavity for pulse and CW operation within the frequency range 2,500 to 5,000 Mc/s. The tube is provided with a control grid in front of the cathode which makes the tube suitable for pulse operation. The output power in pulsed operation is 1 watt.

In CW operation the output power is about 0.1 watt.

The type is designed for use both as transmitting tube and as local oscillator in a microwave relay system.

It is built up on a 7-pin miniature base and needs no special aircooling arrangements. Special attention has been given to longlife performance.



GENERAL PRECAUTIONS

As the control grid of the tube has a positive potential with respect to the cathode, the grid voltage should never be applied prior to the resonator voltage. In pulsed operation with 800 volts resonator voltage the control grid should have a negative bias of about 10 volts.

ELECTRICAL CHARACTERISTICS

Frequency range with suitable cavities	2500-5000	Mc/s
Frequency change with temperature	0.6	Mc/°C
Frequency change from start of cold tube until cont. working conditions are reached	Below 20	Mc/s
Frequency change with resonator voltage	0.1	Mc/volt

HEATER RATINGS

Heater Voltage	6.3 ± 5%	volts
Heater Current	0.6	amps

CAPACITANCES

Control Grid to Cathode	3	uuF
Control Grid to Resonator	3	uuF

MAXIMUM RATINGS IN PULSED OPERATION

Resonator Voltage DC	825	volts
Resonator Current (pulse value)	100	milliamps
Control Grid Voltage (pulse value)	+ 25	volts
Control Grid Current (pulse value)	20	milliamps
Reflector Voltage DC	Max. - 700	volts
	Min. - 50	volts
Duty Cycle at above ratings	1/10	
Average Power Input	9	watts
Heater - Cathode Voltage	90	volts
Bulb Temperature	90	°C

REFLEX KLYSTRON

VELOCITY VARIATION OSCILLATOR



MAXIMUM RATINGS IN CW OPERATION

Resonator Voltage	375	volts
Resonator Current	30	milliamps
Control Grid Voltage	+ 12	volts
Control Grid Current	5	milliamps
Reflector Voltage	Max. - 700	volts
	Min. - 10	volts
Heater - Cathode Voltage	90	volts
Bulb Temperature	90	°C

TYPICAL OPERATION. FREQUENCY 4000 Mc/s. PULSED OPERATION

Resonator Voltage DC	800	volts
Resonator Current (pulse value)	70	milliamps
Control Grid Bias for Cutoff	- 10	volts
Control Grid Voltage (pulse value)	25	volts
Control Grid Current (pulse value)	10	milliamps
Reflector Transit Mode	2 3/4	
Reflector Voltage	- 150	volts
Power Output (pulse value)	1	watt
Electronic Tuning (to half power points)	30	Mc/s
Modulation Sensitivity	Min. 0.4	Mc/volt
Control Grid Resistance	2000	ohms

TYPICAL OPERATION. FREQUENCY 4000 Mc/s. CW OPERATION

Resonator Voltage	350	volts
Resonator Current	22	milliamps
Control Grid Voltage	5-10	volts
Control Grid Current	3.5	milliamps
Reflector Transit Mode	3 3/4	
Reflector Voltage	- 100	volts
Power Output	0.09	watt
Electronic Tuning (to half power points)	20	Mc/s
Modulation Sensitivity	Min. 0.5 *	Mc/volt
Control Grid Resistance	2000	ohms

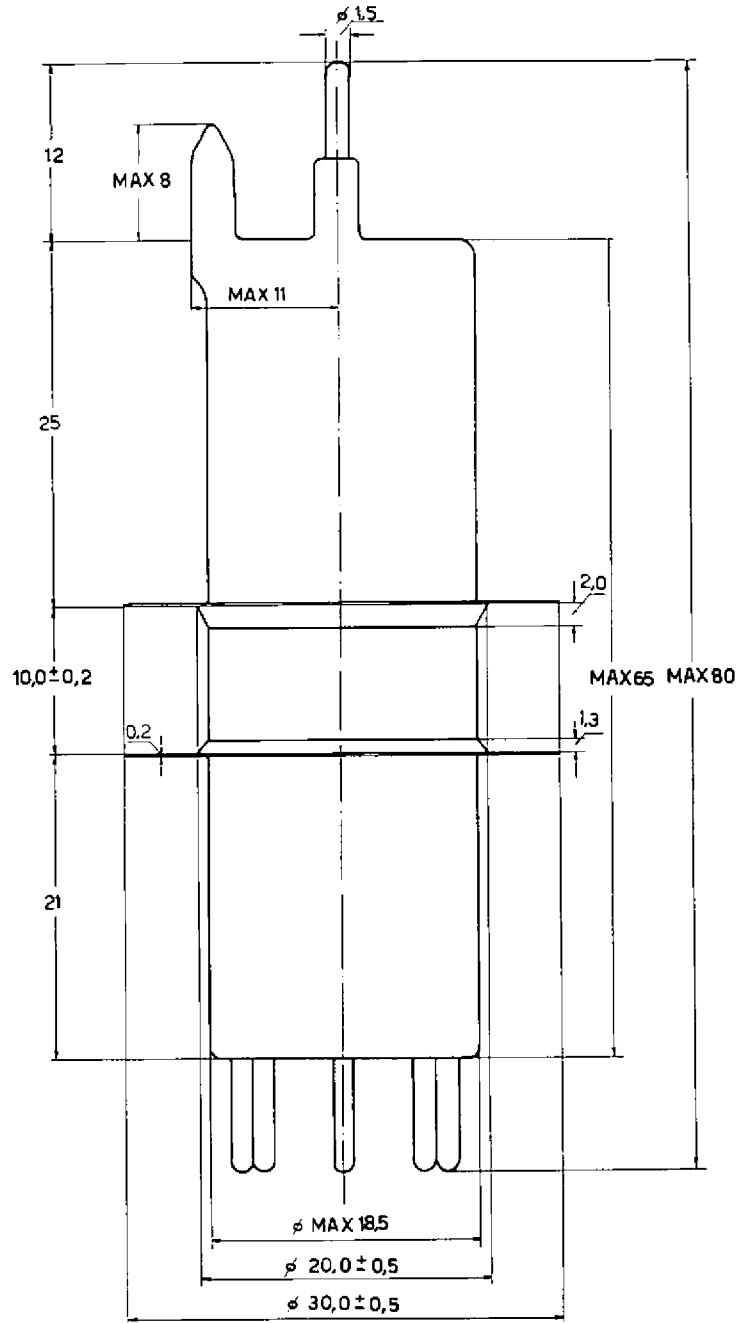
MECHANICAL CHARACTERISTICS

Base: Small Glass Button Miniature 7-pin

Pin No	Connected to	Pin No	Connected to
1	Control Grid	5	Heater
2	Cathode	6	No Connection
3	Heater	7	Cathode
4	Cathode	Reflector to be connected to pin on top of tube.	

Mounting Position:	Any
Resonator:	External with inductive tuning
Bulb:	Glass
Overall Dimensions:	See Outline Drawing
Cooling:	Freely Circulating Air

* Defined as the ratio between frequency change and change in reflector voltage when this is varied between half power points.



ALL DIMENSIONS ARE GIVEN IN MILLIMETERS

FIG. 1

AVERAGE CHARACTERISTICS

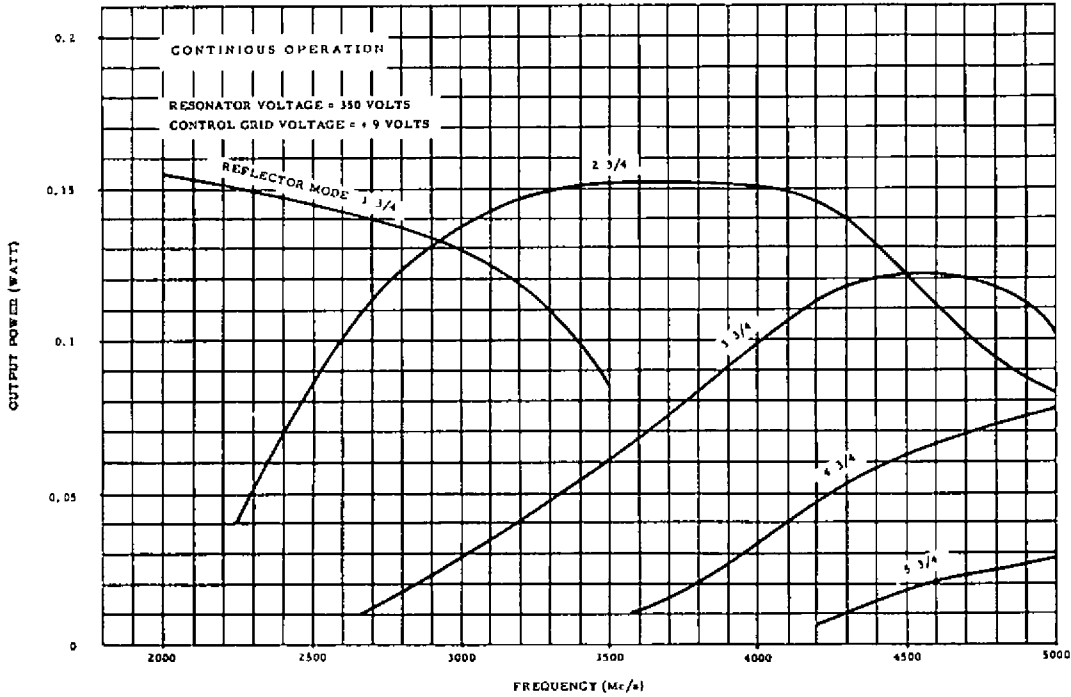


FIG. 2

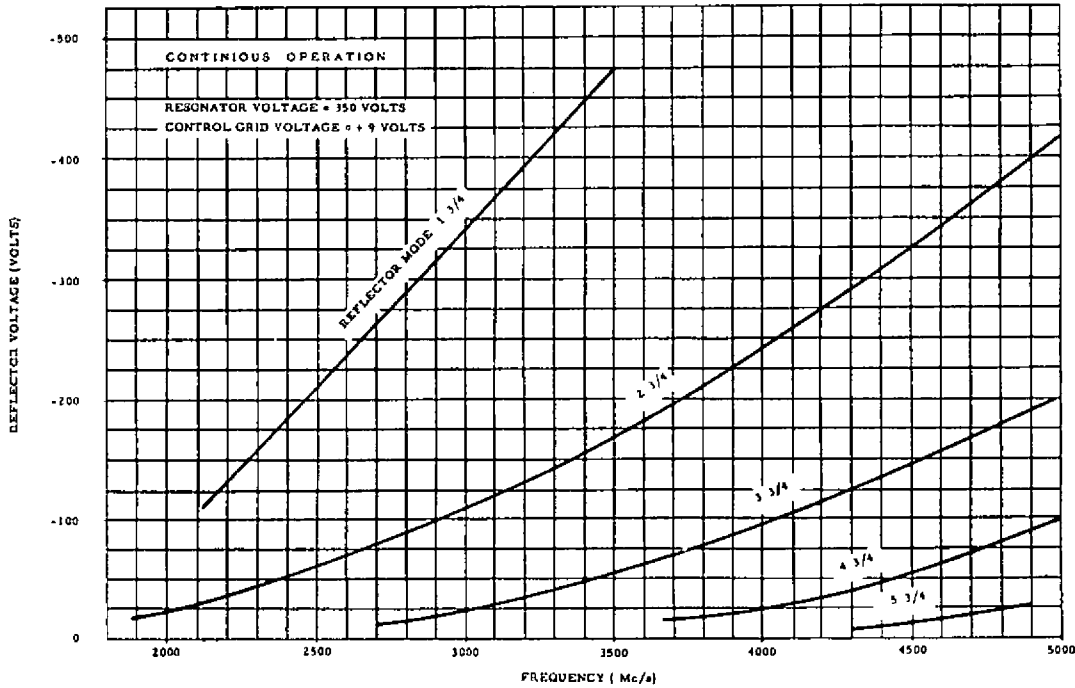


FIG. 3

AVERAGE CHARACTERISTICS

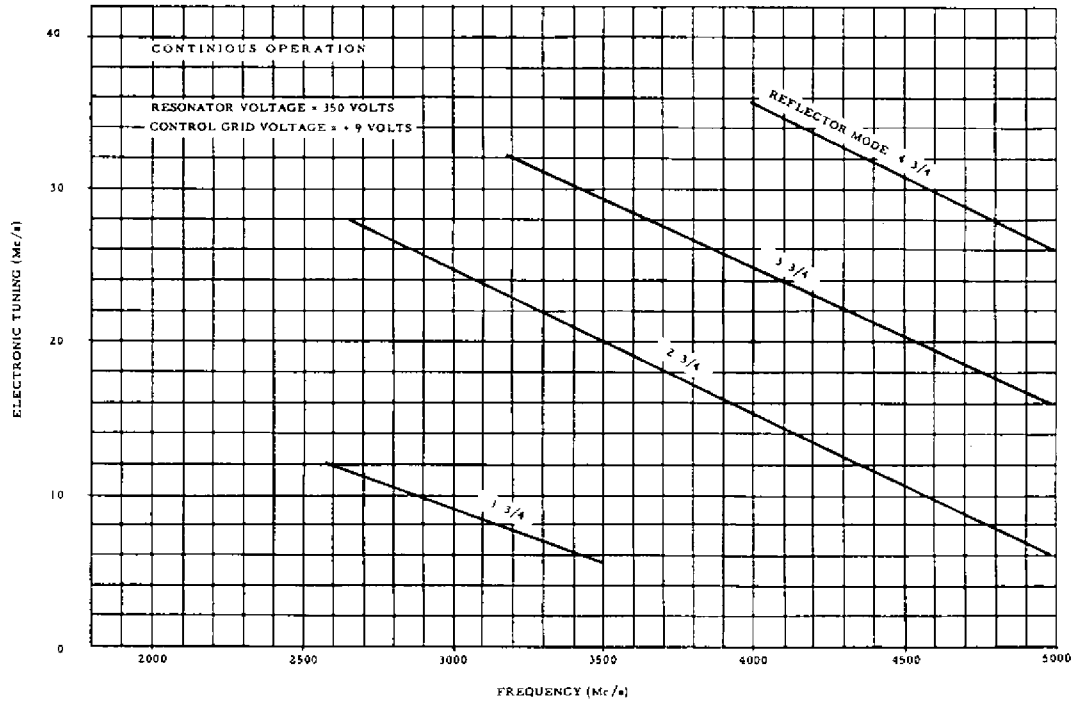


FIG. 4

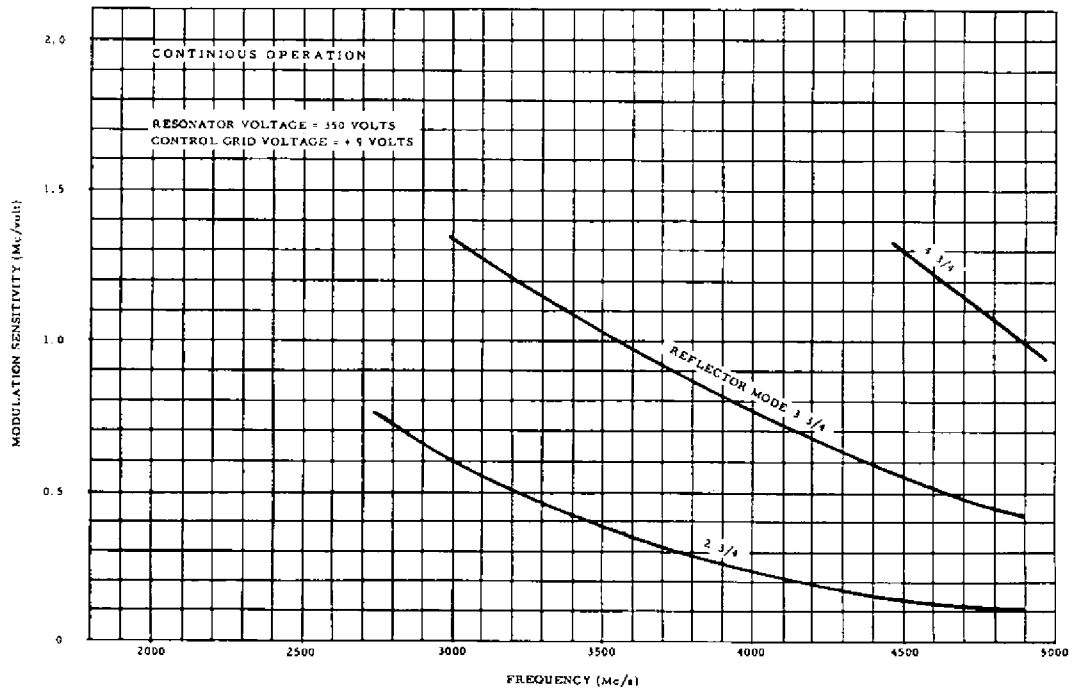


FIG. 5

AVERAGE CHARACTERISTICS

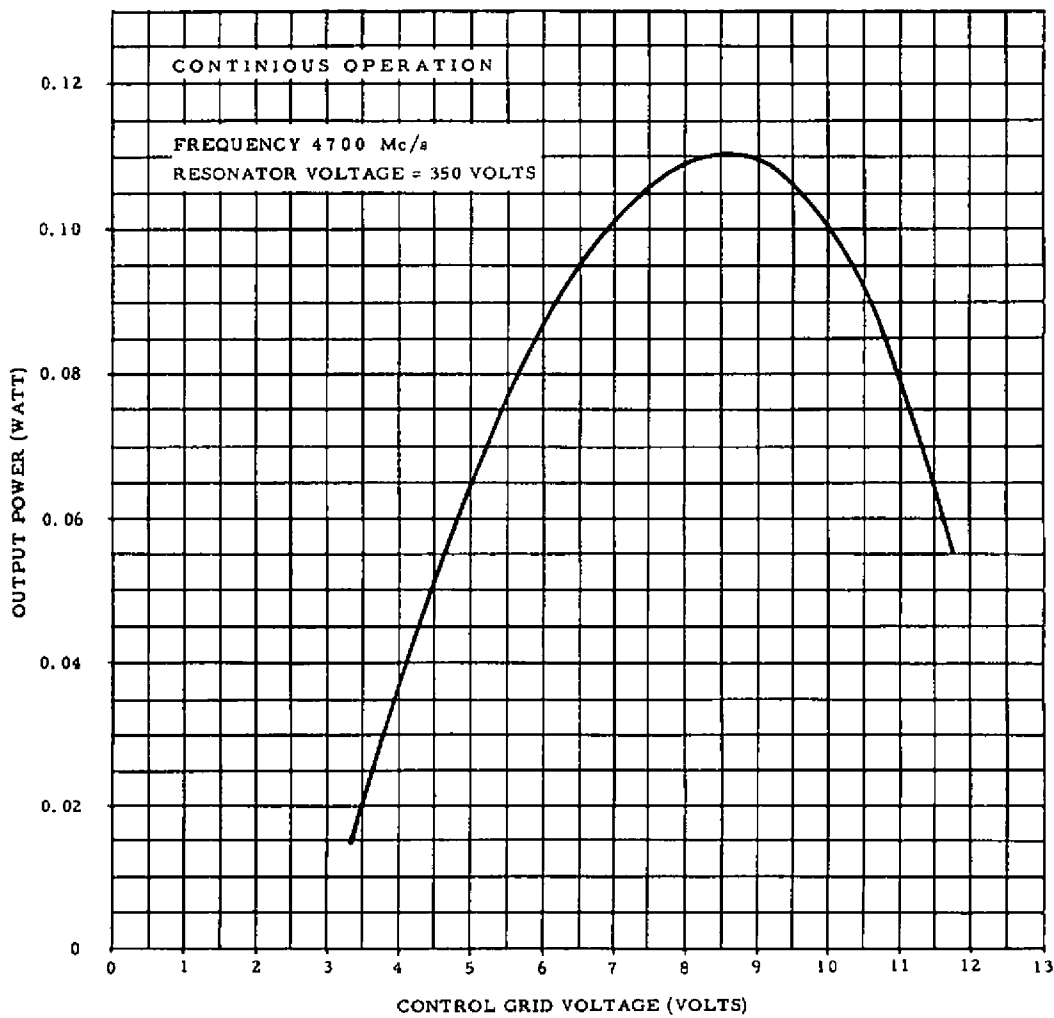


FIG. 6

AVERAGE CHARACTERISTICS

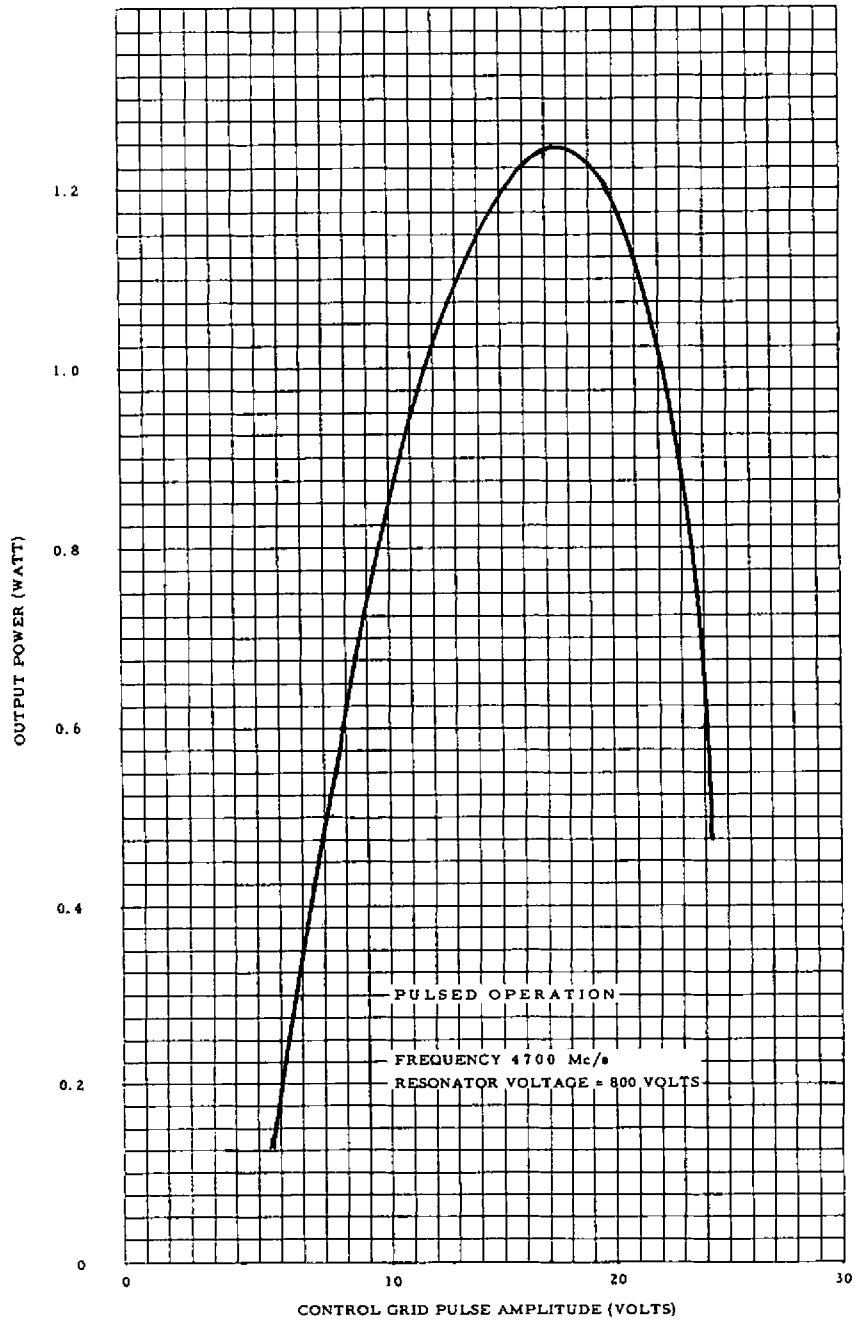


FIG. 7

AVERAGE CHARACTERISTICS

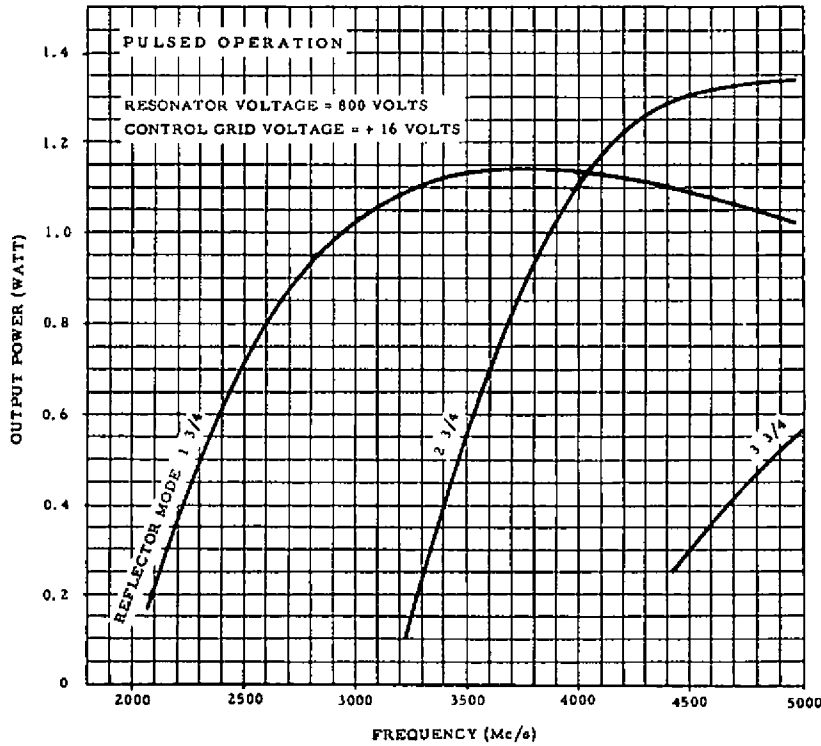


FIG. 8

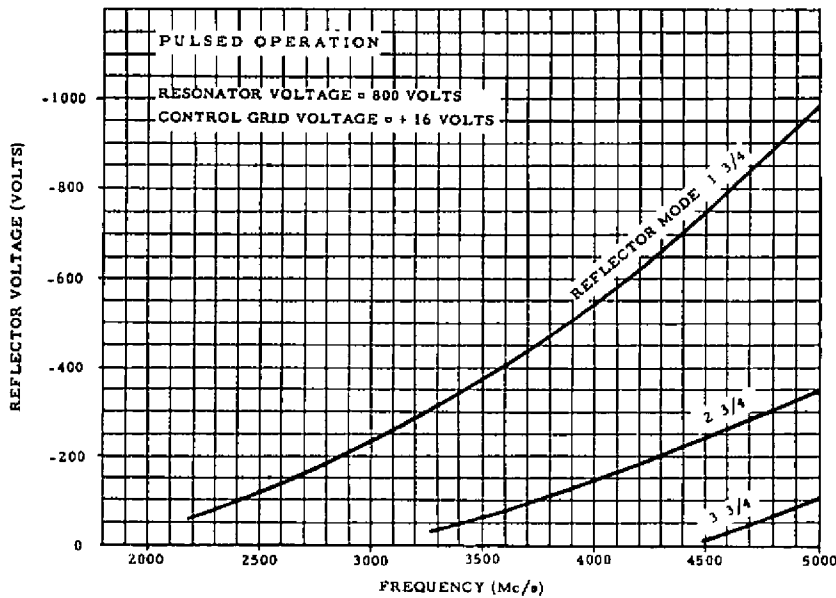


FIG. 9

AVERAGE CHARACTERISTICS

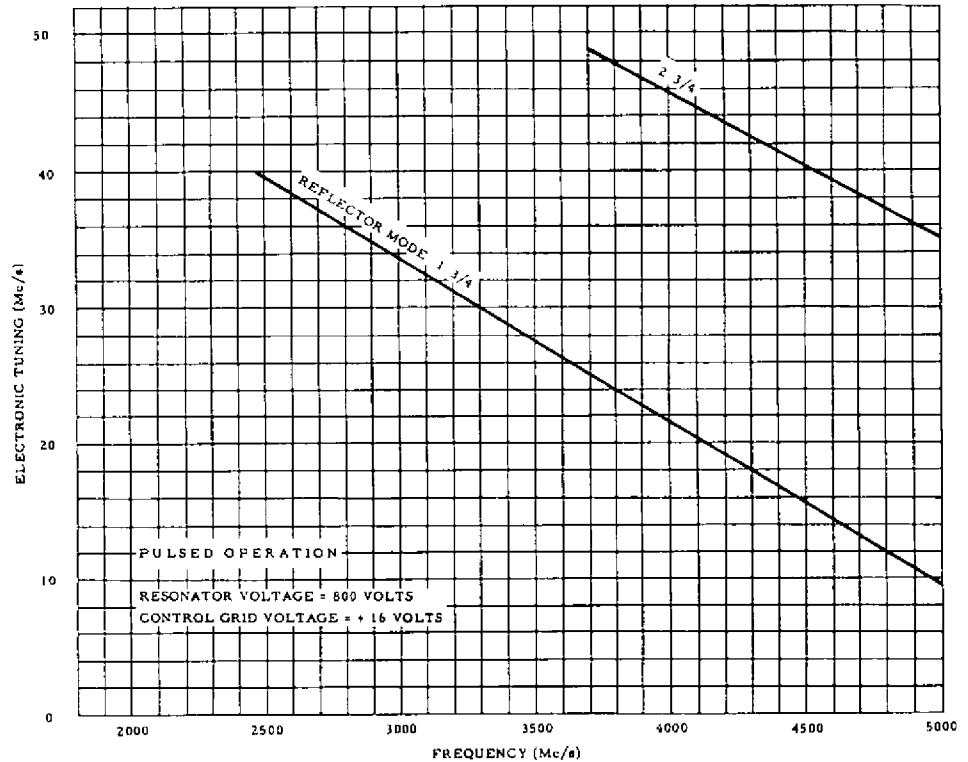


FIG. 10

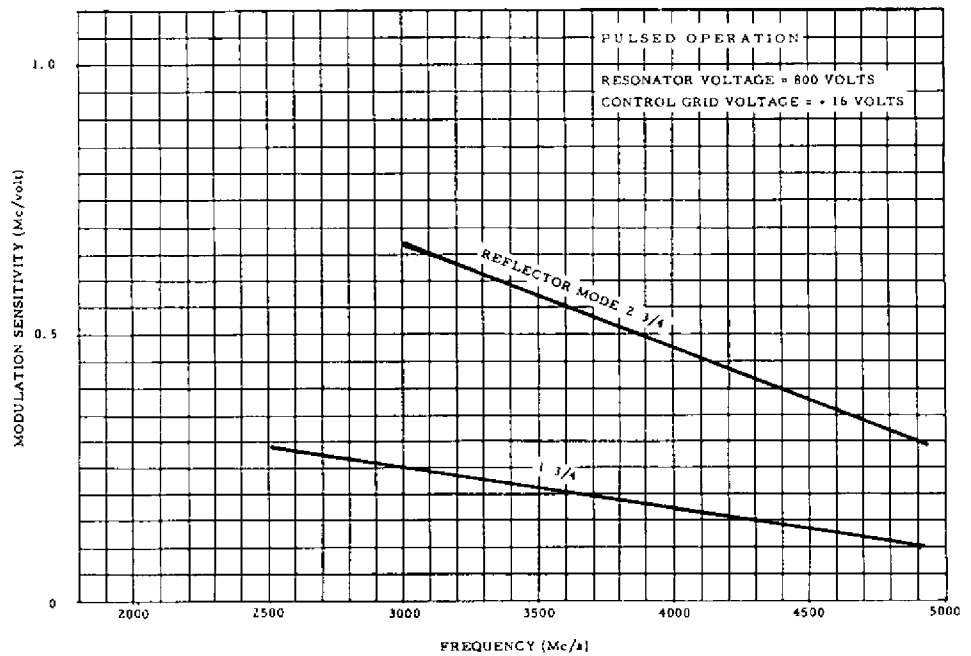


FIG. 11

AVERAGE CHARACTERISTICS

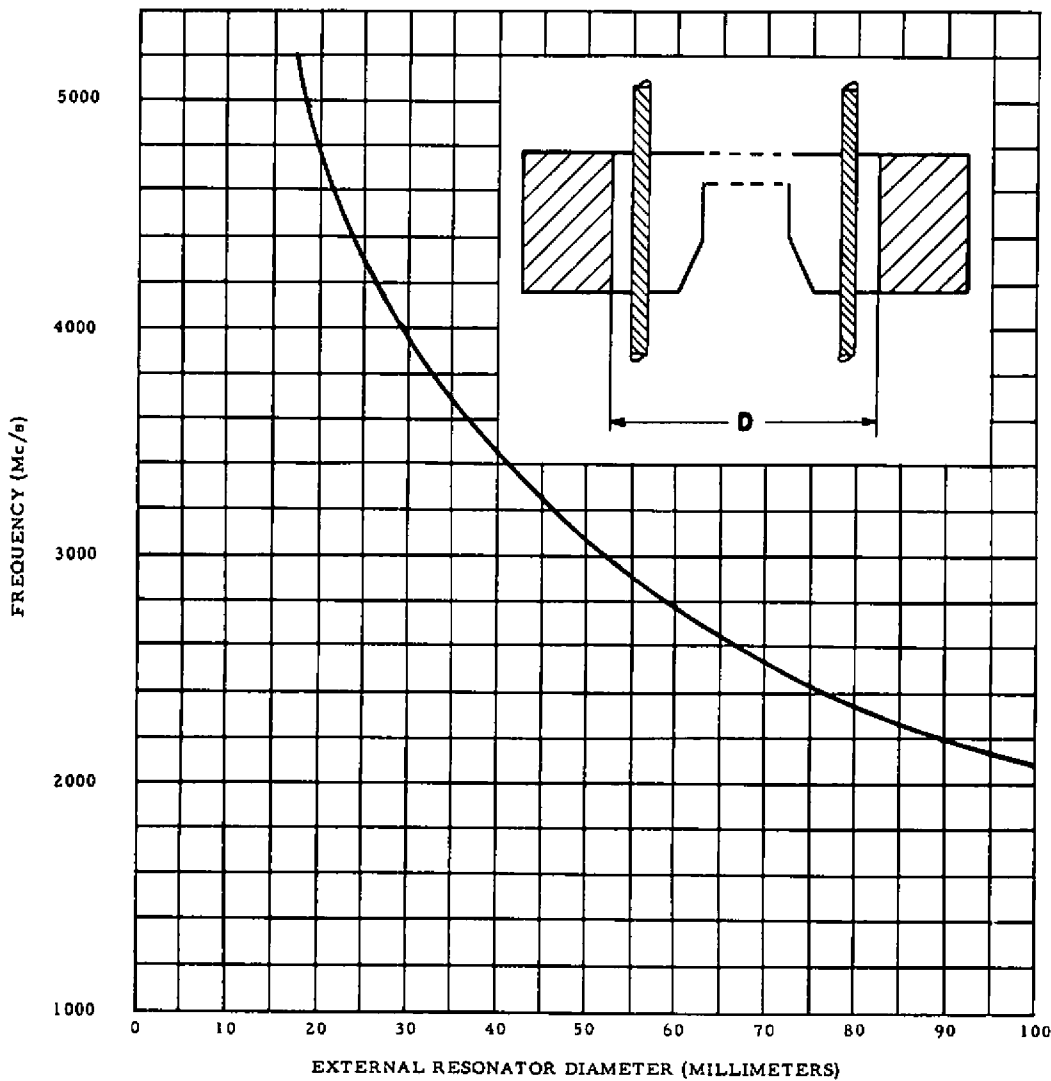


FIG. 12

TECHNICAL INFORMATION

CATHODE

The resonator of the 6811 can be either operated at ground potential with the cathode negative by the amount of the resonator potential or at resonator potential with the cathode grounded. Cathode lead and heater are brought out separately. The heater cathode voltage may not exceed 90 volts. The cathode can of course be externally connected to the heater. In all cases, where the resonator is at ground potential, the heater transformer must be insulated to withstand the maximum resonator voltage. In applications, where the resonator has a positive potential with respect to ground it has to be insulated from the waveguide system and protections must be made against the resonator voltage.

GRID

In the 6811 the control grid is operating at a positive potential. Positive grid voltage should never be applied before the resonator voltage, otherwise damage of the grid and the cathode may be the result. In pulsed operation at 800 volts resonator voltage the grid should have a negative bias of about 10 volts. In pulsed condition the average power input may not exceed 9 watts and at 800 volts resonator voltage the maximum duty cycle is 1/10.

CAVITY

The cavity of the 6811 is of the external type and the mechanical tuning has to be inductive. The dimensions of the 0.2 mms copper disks are seen on the outline drawing. These disks have to be tightly pressed against the resonator ring. The output coupling can be made either through an iris or a loop. In a following curve the inside diameter of the resonator for a certain frequency is given.

The tube needs no special aircooling arrangements except under extraordinary conditions. An inductive tuning can be arranged in the resonator and the tube can easily be tuned over 500 Mc range with the same resonator. Suggestions concerning the construction of the resonator can be given by the manufacturer.

ELECTRONIC TUNING

The frequency may be tuned by varying the reflector voltage. The maximum power output for a fixed mechanical tuner position will be obtained at only one reflector value. The electronic tuning range is defined in the following way:

The mechanical tuning and the reflector voltage are mutually adjusted for a maximum power output at a given frequency. If then the reflector voltage is varied above and below the value for maximum power output so that the power output is reduced to one half - the frequency change between the half power values is defined as electronic tuning range. The amount of the electronic tuning and the linearity of its variation with reflector voltage is dependent upon the type of load used and the coupling to the load. The electronic tuning also depends on the reflector transit mode of operation.

MODES OF OPERATION

Oscillations may be obtained in a given tube for several combinations of resonator and reflector voltages at a particular frequency. The regions where oscillations occur within the reflector voltage range are referred to as reflector modes, e.g. $1 \frac{3}{4}$, $2 \frac{3}{4}$ and $3 \frac{3}{4}$. The curves show characteristics of the output power and reflector voltages for different reflector modes. The electronic tuning range increases with the reflector mode number whereas the output power decreases.

LIFE

The reflex klystron 6811 has been designed for longlife performance and lifetests of the tube have exceeded 10,000 hours.