

**EITEL-McCULLOUGH, INC.**  
SAN CARLOS, CALIFORNIA

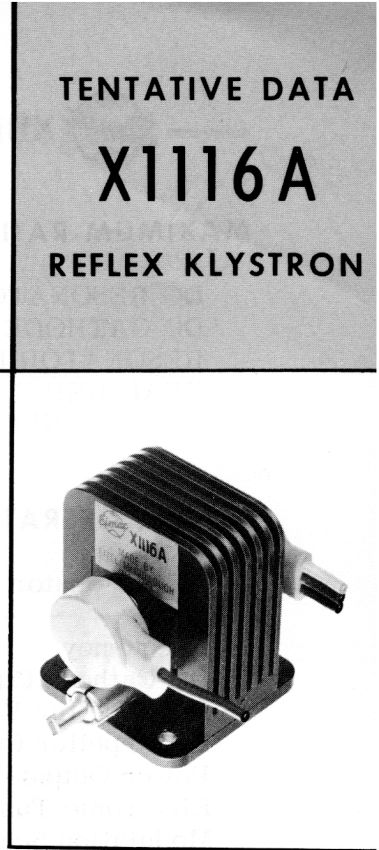
TENTATIVE DATA

**X1116A**

REFLEX KLYSTRON

The Eimac X1116A is a ceramic and metal, conduction-cooled reflex klystron designed for transmitter/local oscillator service in 11.7 - 12.2 Gc. microwave relay equipments. This tube provides a minimum output power of 100 mW and is tunable across the entire 500 Mc. band. High power output and good power/frequency stability also make the X1116A a good choice for parametric amplifier pump applications.

The X1116A features low-noise gridless gun optics and is warranted for 1000 hours life.



**GENERAL CHARACTERISTICS**

**ELECTRICAL**

Cathode:	Unipotential, oxide coated		
	Warm-up time	- - - - -	30 seconds
Heater:	Voltage	- - - - -	6.3 volts
	Current	- - - - -	0.8 ampere
	Typical Output Power (Load VSWR 1.15:1)	- - - - -	100 milliwatts
	Frequency Range	- - - - -	11,700 to 12,200 megacycles

**MECHANICAL**

Operating Position	- - - - -	Any
Mounting	- - - - -	WR-75 Waveguide Flange
Cooling	- - - - -	Conduction
Electrical Connections	- - - - -	Flexible Leads
RF Output Coupling	- - - - -	WR-75 Waveguide
Net Weight	- - - - -	4 ounces
Shipping Weight (Approximate)	- - - - -	2 pounds
Maximum Overall Dimensions:		
Height	- - - - -	1.8 inches
Width	- - - - -	1.5 inches
Length	- - - - -	2.5 inches

**ENVIRONMENTAL**

Maximum Ambient Temperature	- - - - -	150° C
Maximum Altitude	- - - - -	No limit
Maximum Non-operating Shock (11 ms duration)	- - - - -	40 g
Maximum Operating Shock* (11 ms duration)	- - - - -	40 g
Maximum Operating Vibration** (20 to 2000 cps)	- - - - -	10 g

\*Based on a permanent frequency shift after drop of 2 megacycles.  
\*\*Based on a maximum peak-to-peak frequency deviation of 250 kilocycles.

**MAXIMUM RATINGS**

DC RESONATOR VOLTAGE*	- - - - -	500	MAX. VOLTS
DC CATHODE CURRENT	- - - - -	60	MAX. MA
RESONATOR DISSIPATION	- - - - -	30	MAX. WATTS
PEAK REPELLER VOLTAGE*			
NEGATIVE WITH RESPECT TO CATHODE	- - - -	(25	MAX. VOLTS)
	- - - -	(500	MAX. VOLTS)

**TYPICAL OPERATION (Load VSWR less than 1.15 to 1)**

DC Resonator Voltage*	- - - - -	400	volts
Mode	- - - - -		4-3/4
Frequency	- - - - -	11.950	megacycles
DC Cathode Current	- - - - -	40	milliamperes
DC Repeller Voltage*	- - - - -	-200	volts
DC Repeller Current	- - - - -	1	microampere
Power Output	- - - - -	150	milliwatts
Electronic Tuning (3 db bandwidth)	- - - - -	30	megacycles
Modulation Sensitivity ( $E_r = \pm 3$ volts)	- - - - -	2.0	Mc/volt
Peak-to-peak FM Deviation (10 g. 20 - 2000 cps)	- - - - -	250	kilocycles
Residual FM	- - - - -	50	kilocycles

\*All voltages referred to cathode.

**APPLICATION**

**Cooling:** At sea level this tube will not require forced air cooling when operated at its maximum rated dissipation with an ambient temperature less than 125° Centigrade. The waveguide flange connection will normally provide the required heat sink for conduction cooling. If an insulator is used between the tube and waveguide for DC isolation, forced air cooling may be required to maintain the ceramic-to-metal seal temperatures below the maximum rating of 150° Centigrade.

**Resonator:** The resonator of the X1116A is integral with the body of the klystron. For this reason it is often convenient to operate the resonator at chassis potential, with the repeller and cathode at appropriate negative potentials.

**Cathode:** The heater voltage should be maintained within  $\pm 5\%$  of the rated value of 6.3 volts if variations in performance are to be minimized and the best tube life obtained.

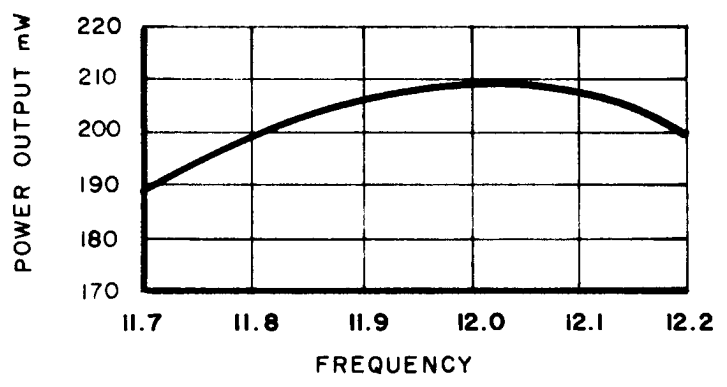
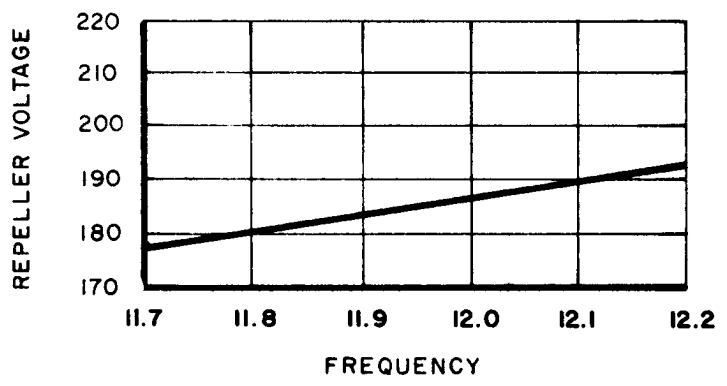
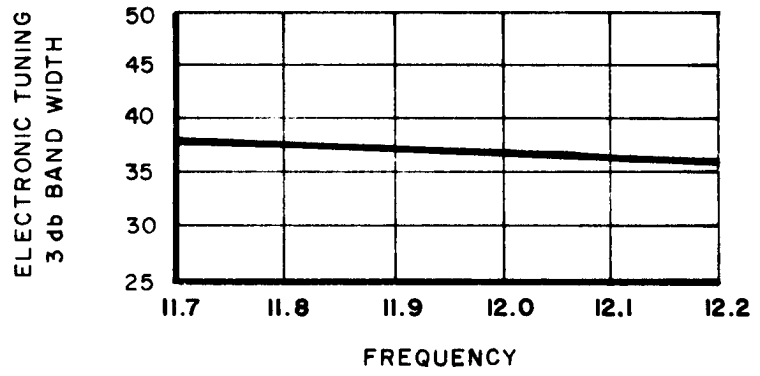
The heater and cathode of the X1116A are internally connected. When the resonator of this tube is operated at chassis potential, the heater transformer must be insulated for the cathode-to-resonator voltage.

**Mechanical Tuning:** In the X1116A a fixed-tuned inner cavity is closely coupled through a ceramic window to a secondary cavity outside the vacuum. Mechanical tuning is accomplished by a capacitive slug in the secondary cavity with a tuning rate of approximately 150 megacycles per turn. This design allows repeated tuner cycling without damaging the vacuum seals. The maximum tuner torque is 40 inch-ounces.

A clockwise rotation of the tuner will produce a decrease in frequency.

**X1116A OPERATING CHARACTERISTICS**

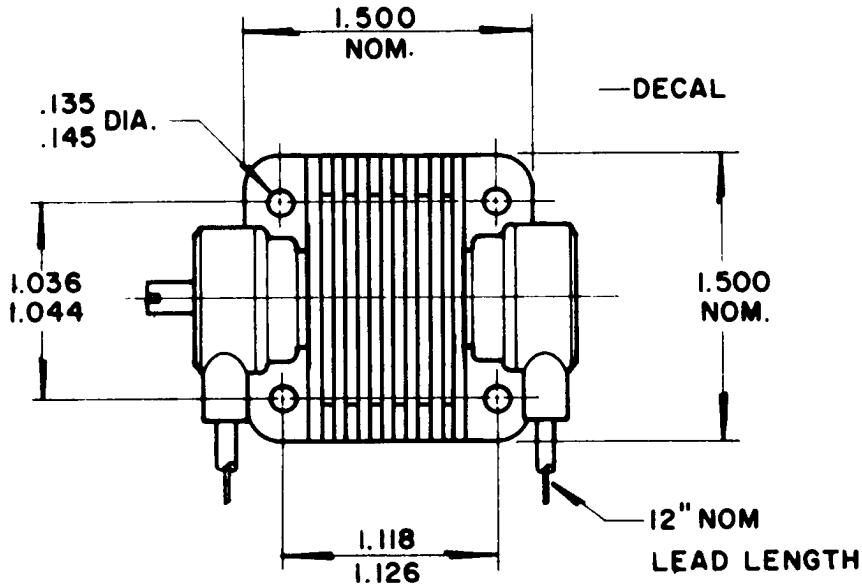
Ers = 400 V.  
 $5\frac{3}{4}$  MODE





XIII16A

# XIII16A



## CONNECTIONS

REPELLER - RED

HEATER - WHITE

\* CATHODE - BLACK

\* HEATER - BLACK

\* INTERNALLY CONNECTED

