

EITEL-McCULLOUGH, INC.

SAN BRUNO, CALIFORNIA

1K015XA AND 1K015XG KLYSTRONS • X-BAND OSCILLATORS

The EIMAC 1K015XA and 1K015XG are ruggedized, integral-cavity, X-band, reflex klystrons intended for local oscillator service under conditions of severe shock, vibration or sustained acceleration.

The 1K015X type tubes are available with either coaxial output or waveguide output. The r-f terminal of the 1K015XA is a coaxial connector. For waveguide output, the r-f terminal of the 1K015XG is the Eimac transition section.

GENERAL CHARACTERISTICS

ELECTRICAL

Cathode: Coated Unipotential

Heater Voltage - - - - - 6.3 volts

Heater Current - - - - - 0.80 amperes

► Frequency Range - - - (8400 thru 9600 Mc) 900 Mc

(See paragraph: Mechanical Tuning in Application)

MECHANICAL

High Impact Shock* - - - - - 100 g

Axial Vibration Test (20-2000 cycles)* - - - 10 g

Mounting (See Outline Drawing)	{	1K015XA	{ Three-hole flange and coaxial r - f terminal or
		1K015XG	{ In conjunction with an Eimac transition section mounts directly on a UG-39/U waveguide flange

Connections:

Heater - - - - - White wire at base

Heater and Cathode - - - - - Black wire at base

Resonator - - - - - Shell of tube

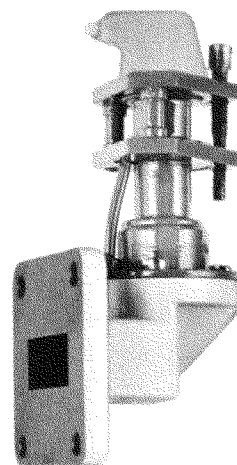
Repeller - - - - - White wire at top

Output (See Outline Drawings)	{	1K015XA: Coaxial fitting, 1K015XG: UG-39/U waveguide flange
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*The shock and vibration tests are applicable to both coaxial and waveguide outputs.



1K015XA
(Coaxial Output)



1K015XG
(Waveguide Output)

Mounting Position	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Any
Cooling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Convection and Radiation
Maximum Over-all Dimensions:																	Coaxial Output Waveguide Output
Length	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2-3/8 inches 3-9/16 inches
Diameter	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1-3/16 inches —
Width	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	— 1-15/32 inches
► Net Weight	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.5 ounces 3.2 ounces
Shipping Weight	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4 ounces 8 ounces

MAXIMUM RATINGS

D-C RESONATOR VOLTAGE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	350 MAX. VOLTS
RESONATOR DISSIPATION	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15 MAX. WATTS
D-C CATHODE CURRENT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50 MAX. MA
D-C REPELLER VOLTAGE																	
Positive Limit	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0 MAX. VOLTS
Negative Limit	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	500 MAX. VOLTS

TYPICAL OPERATION (With flat load)

Mode	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6¾ 7¾ 5¾ 6¾
D-C Resonator Voltage	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	250 250 300 300 volts
D-C Cathode Current	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	36 36 47 47 mA
D-C Repeller Voltage	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-110 -65 -170 -95 volts
Power Output	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	45 30 100 65 mW
Frequency	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9000 9000 9000 9000 Mc/s
Electronic Tuning Range	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40 55 40 60 Mc/s

APPLICATION

Mounting—The 1K015XA is provided with a three-hole base flange for solid mounting directly to the equipment chassis, to an insulating support or to the Eimac transition section to make the 1K015XG. No socket or tube clamp is necessary.

Cooling—No special provisions are ordinarily required for the cooling of the 1K015XA or 1K015XG. The resonator will dissipate 15 watts of power by radiation and convection in ambient temperatures up to 100°C.

Resonator—The resonator of the 1K015XA and 1K015XG is integral with the shell of the tube. For this reason it is often convenient to operate the resonator at chassis potential, with the repeller and cathode at appropriate negative potentials. The coaxial output connection also lends itself to d-c isolation of the resonator from chassis potential. All voltages given in the list of Maximum Ratings and in the Typical Operation data are measured with respect to the cathode of the tube.

Cathode—Heater voltage should be at the rated value of 6.3 volts. Variations should be kept within the range of 5.7 to 6.9 volts. The cathode is internally connected to one side of the heater. If the resonator is operated at chassis potential, the heater transformer must be insulated for the cathode-to-resonator potential.



Repeller—There will be an optimum repeller voltage for any given output frequency, and the range of electronic tuning or frequency modulation under control of the repeller voltage will vary with output frequency and choice of repeller mode. These relations are shown for a typical tube in the accompanying curves.

Repeller voltages must be negative with respect to the cathode at all times.

► **Mechanical Tuning**—Mechanical tuning is accomplished by a single screw with a differential thread. The tuning rate is approximately 100 Mc. per turn. The particular range desired should be specified. Standard tuning range adjustment, unless otherwise specified, will be for 8600 to 9400 Mc.

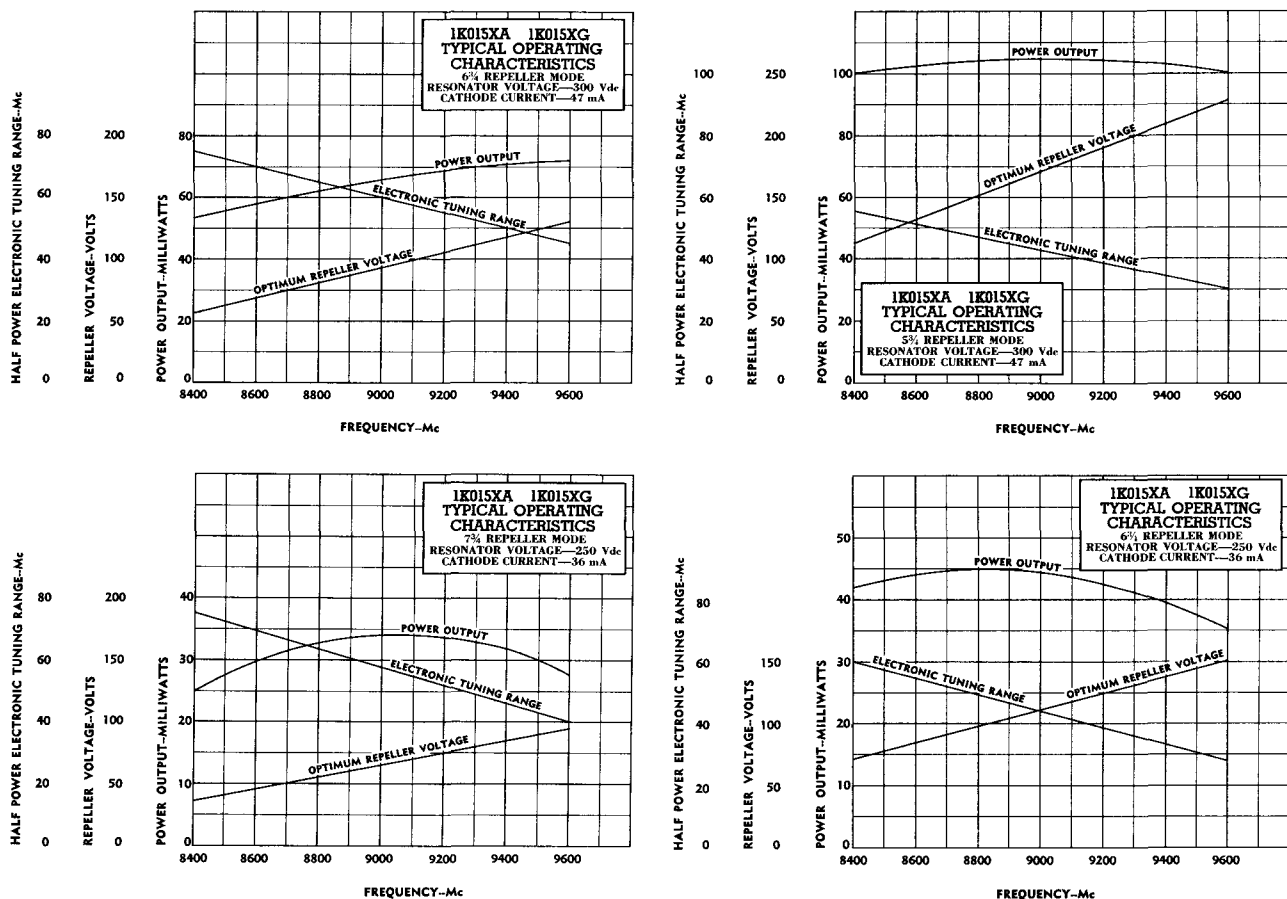
Output—Curves illustrating the variation of power output with operating frequency for a typical tube are shown below. These curves assume a flat load and optimum repeller voltages at all frequencies. With a VSWR mismatch of 2 to 1, the power output will not fall below one-half the indicated power.

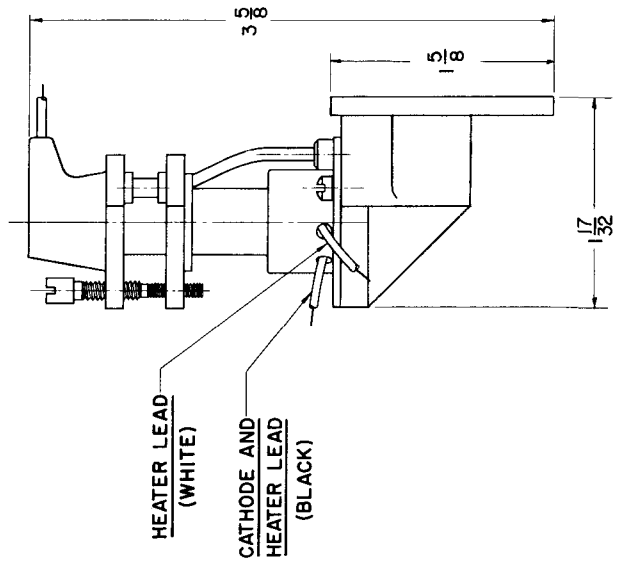
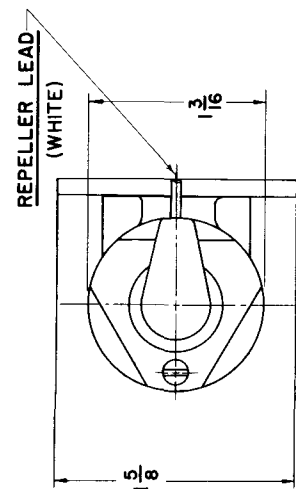
Frequency Stability—Under axial vibration of 10g maximum acceleration, the spectrum width is less than 1.0 Mc. The frequency modulation response to vibration along other axes of the tube is approximately one-half that for the axial direction.

Frequency variations within the range of normal operating temperatures do not exceed ± 0.1 Mc/°C.

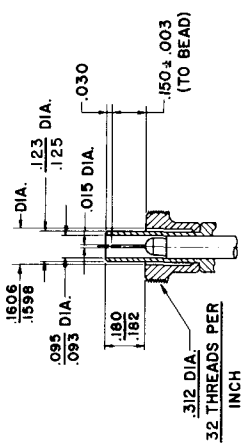
Starting Time—The 1K015XA and 1K015XG will be within ± 10 Mc of operating frequency in less than one minute after applying voltages.

TYPICAL OPERATING CHARACTERISTICS 1K015XA AND 1K015XG

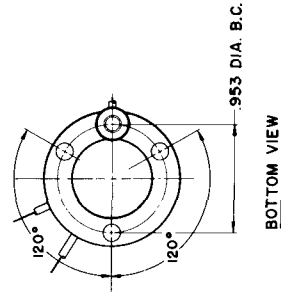
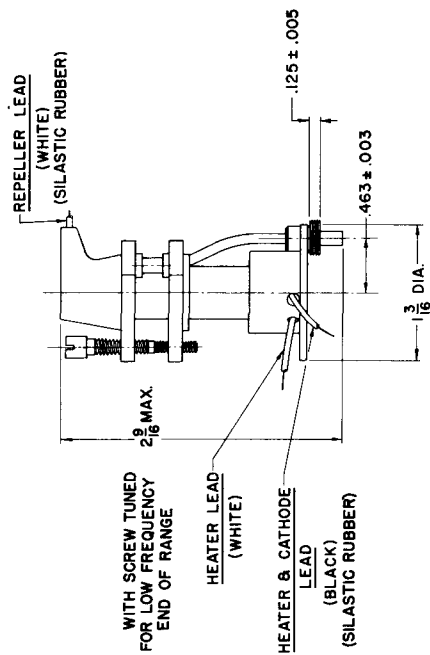




IKO15XG (WAVEGUIDE OUTPUT)



CONNECTOR DETAIL



IKO15XA (COAXIAL OUTPUT)