from JETEC release #1495, July 11, 1955

VARIAN associates

REFLEX KLYSTRON

DATA SHEET

oscillator

VA-6311

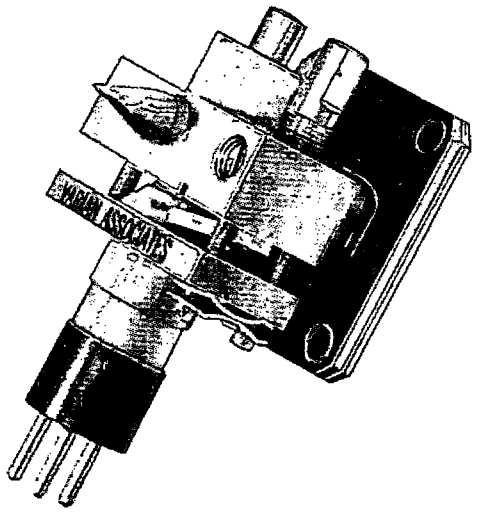
V-261

8.5 - 10.0 kMc

125 mW

APPLICATION

The VA-6311/V-261 is intended for radar application particularly under rugged service conditions. It will operate from conventional power supplies and with conventional crystal mixers, greatly increasing the ruggedness and reliability of any radar system to which it may be applied. It will produce adequate power output and electronic tuning range with resonator voltage as low as 200 volts.



FEATURES

Low microphonics . . . Negligible barometric frequency coefficient . . . Matched load operation without matching sections . . . Waveguide output . . . Linear reflector voltage tracking . . . Rapid warm-up . . . Removable inserts in flange holes simplify insulation when required.

GENERAL CHARACTERISTICS

Frequency Range	8.5 to 10 kMc
Heater Voltage	6.3 volts
Heater Current	1.2 A

MAXIMUM RATINGS

Resonator Voltage	350 volts
Resonator Current	42 mA
Reflector Voltage	0 to −1000 volts

MECHANICAL CHARACTERISTICS

Cathode	Oxide coated, unipotential
Maximum Dimensions	3⅛ x 1¼ x 1¼ in.
Weight	6 oz
Output Connector	Bolts to UG-39/U flange or UG-40A/U choke for 1 x 0.50 x 0.050 in. waveguide
Base	Pee-wee, 3-pin (A3-1)
Top Cap	Miniature (C1-4)
Mounting Position	Any
Cooling	Convection [1]
Tuner	Single screw tuner [2]
Tuning Torque (starting)	<60 in.-oz
Shock	Withstands up to 250 G [3]
Microphonics	Less than 500 kc [4]

ELECTRICAL CHARACTERISTICS

Operation between 8500 and 10,000 Mc, matched load, Ef = 6.3 volts

Resonator Voltage = 300 volts Mode = 5¾

	Min.	*Avg.*	*Max.*	
Resonator Current	20	28	32	mA
Reflector Voltage	−85	---	−225	volts
Power Output	25	70	---	mW
Electronic Tuning Range [5]	30	40	---	Mc
Modulation Sensitivity	---	1.5	---	Mc/V
Temperature Coefficient	0	−60	−200	kc/°C
Warm-Up Time [6]	---	15	---	sec

NOTES:

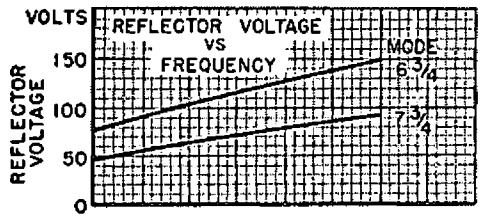
1. Forced-air cooling required above 10 watts resonator power input.
2. Approximately 2 turns to cover frequency range. Positive mechanical stops are provided.
3. A 200 G shock of 10 milliseconds duration produces a permanent frequency change of the order of 2 Mc.
4. At resonant peaks a 10 G audio-frequency vibration may produce frequency modulation of as much as 4 Mc.
5. Between half-power points.
6. Before oscillation begins.

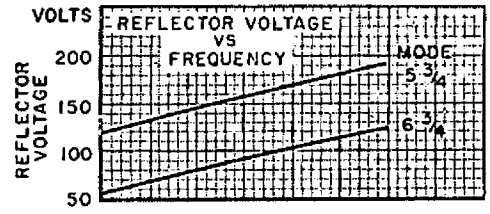
Additional operation and application information available upon request.

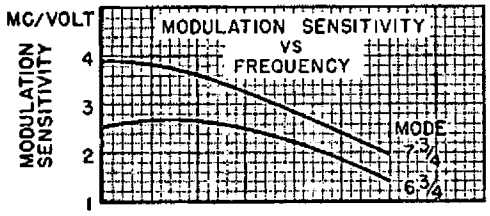
VA-6311 / V-261

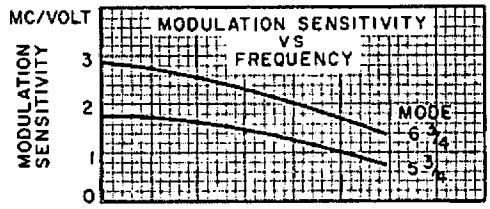
ALL CURVES ARE TYPICAL DATA

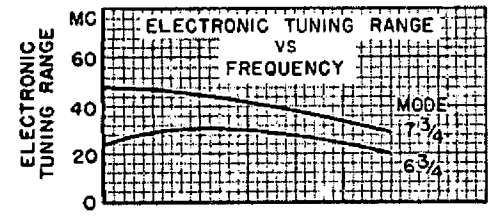
RESONATOR VOLTAGE = 200 V VSWR <1.1 RESONATOR VOLTAGE = 300 V

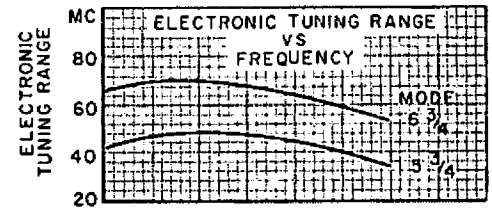


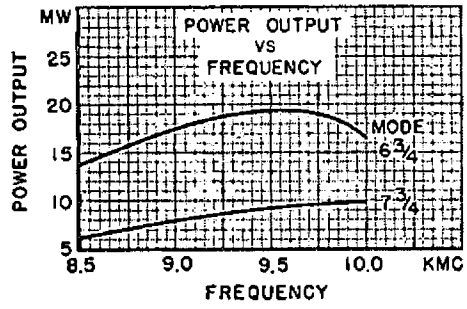




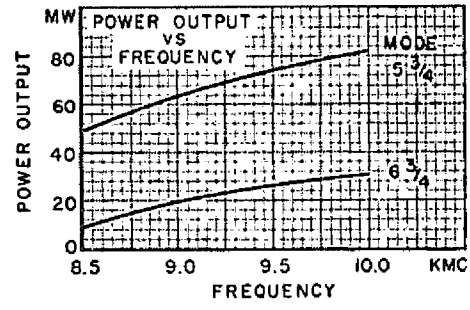




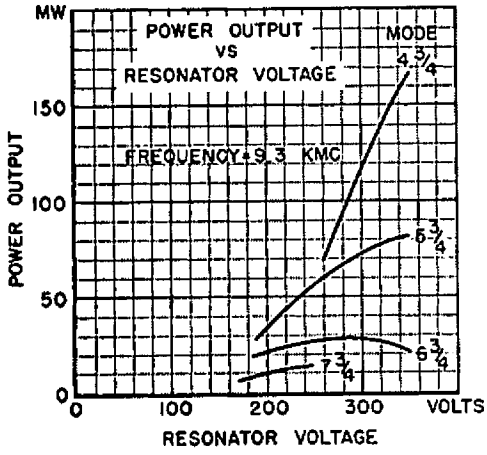


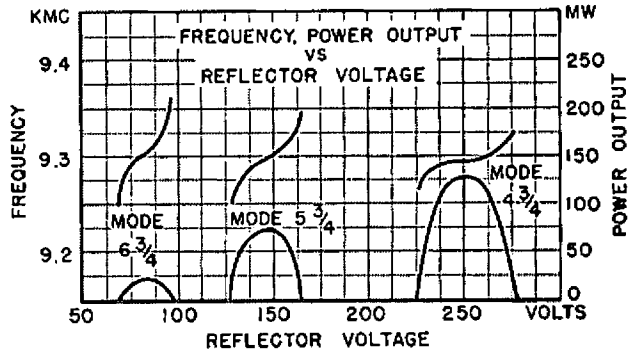


E_{RS} = 200 VOLTS

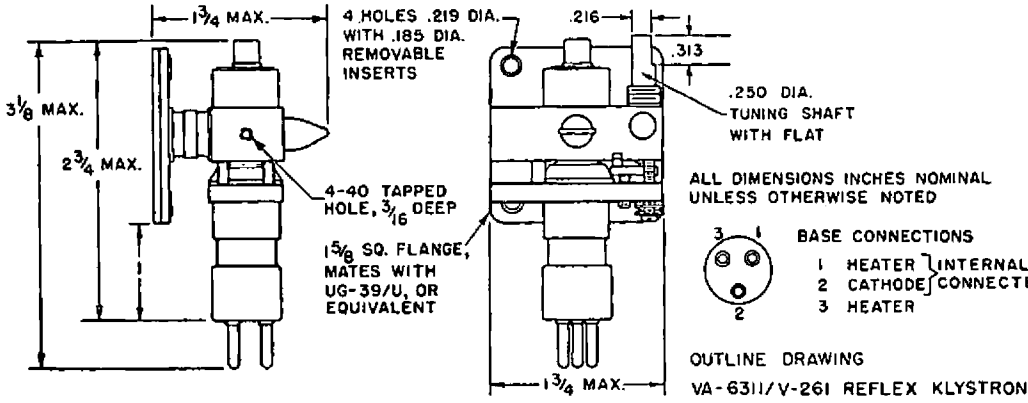


E_{RS} = 300 VOLTS





E_{RS} = 300 VOLTS



Pub. 79A Printed in U.S.A. 5M155

VARIAN associates

SPECIFICATION

TYPE VA-6311/V-261 REFLEX KLYSTRON

Description: Klystron, Integral Cavity, Tuner, Waveguide Output

Ratings:	Ef	Ers	Er	Ik	Tuner Plate Temp	
Absolute Maximum:	V 6.3 ± 10%	Vdc 350	Vdc 0 to -1000	mAdc 42	°C 200	
Test Cond:	6.3	300	-55 to -225	--	--	Note 1

Dimensions: As per outline **Cathode: Coated Unipotential

Ref.	Test	Conditions		Min	Max.	
3.1	Qualification Approval:	Required for JAN markings				
4.5	Holding Period:	t=168 hours				
4.9.5.1	*Torque:					
4.9.18	*Carton Drop:					
4.9.19	**Vibration(1):	Power Output(1) 10G; F=50 to 1000 cps				
4.9.19	Vibration(2):	10 G; f=60; t=120 Note 2	Ir:	0	10	uAdc
4.9.19	*Shock:	Power Output(1); G=200				
4.10.8	*Heater Current:		If:	1.08	1.32	A
4.10.6.7.1	/Total Reflector Current:	Notes 3 & 4	Ir:	--	3	uAdc
4.10.1.1	/Emission:	Ef=5.7; Note 4	ΔIk/Ik:	--	-15	%
4.10.4.6	Cathode Current:	Er(Mode 5)/max Po F=10,000 ± .3% Mc	Ik:	20	32	mAdc
4.10.7.3.2	Tunable Frequency:		F:	8,500	10,000	Mc
4.15.1	Power Output(1):	Er(Mode 5)/max Po F=8500 ± .3% Mc	Po:	25	--	mW
4.15.1	Power Output(2):	Er(Mode 5)/max Po F=10,000 ± .3% Mc	Po:	25	--	mW

Ref.	Test	Conditions		Min.	Max.	
4.10.5.4	Reflector Voltage(1):	Power Output(1)	Er:	-85	-135	Vdc
4.10.5.4	*Reflector Voltage(2):	Power Output(2)	Er:	-160	-225	Vdc
4.15.3	*Electronic Tuning Range:	Mode 5; 50% max Po F=8500 to 10,000 Mc Note 5	ΔF:	30	--	Mc
4.15.5	**Temperature Compensation:	Power Output(1) T = -10 to +40°C	Coeff:	--	.20	Mc/°C
--	**Residual Frequency Modulation:	Power Output(2) Ef=5.7 to 7.0 Vdc	ΔF:	--	.1	Mc
4.11	Life Test:	Power Output(1)	t:	500	--	hrs
4.11.4	Life Test End Point:		ΔPo/Po:	0	-20	%

References are to paragraphs in "Military Specifications for Electron Tubes MIL-E-1B".

Note 1: All oscillation tests except vibration test shall be made with the tube rigidly connected to a UG39/U flange or appropriate RG52/U waveguide equipment and the load VSWR for the tube shall be less than 1.1. Forced air cooling is required for power inputs above 10 watts. Temperature of base and cap should not exceed 120°C.

Note 2: The reflector current shall be recorded with a Brush Model BL202 recorder or equivalent. There shall be no reflector current bursts greater than the limit shown.

Note 3: After two minutes with all voltages applied, total reflector current shall not exceed the specified limits.

Note 4: The tube shall not be oscillating during the test.

Note 5: The power output shall have no discontinuities between half-power points for either direction of reflector voltage change.

Ref.	Test	Conditions		Min.	Max.	
--	**Mechanical Tuning Rate:	Test Cond; F=8500 to 10,000 Mc ΔF/Δtuner degrees		1.8	3	Mc/°
4.11	Life Test:	Group C; Test Cond.	t:	500	--	hrs
4.11.4	Life Test End Point:	Test Cond; Reflector Current; t=5 min	ΔPo/Po:	0	-20	%
			Ir:	—	10	uAdc

References are to paragraphs in "Military Specifications for Electron Tubes MIL-E-1B".

Note 1: All oscillation tests except vibration test shall be made with the tube rigidly connected to a UG39/U flange on appropriate RG52/U waveguide equipment and the load VSWR for the tube shall be less than 1.1 Forced air cooling is required for power inputs above 10 watts.

Note 2: The reflector current shall be recorded with a Brush Model BL202 recorder or equivalent. There shall be no reflector current bursts greater than the limit shown.

Note 3: The tube shall be given 5 shocks in each of 3 planes. The frequency shift, after shock in any one plane, shall not exceed the value specified.

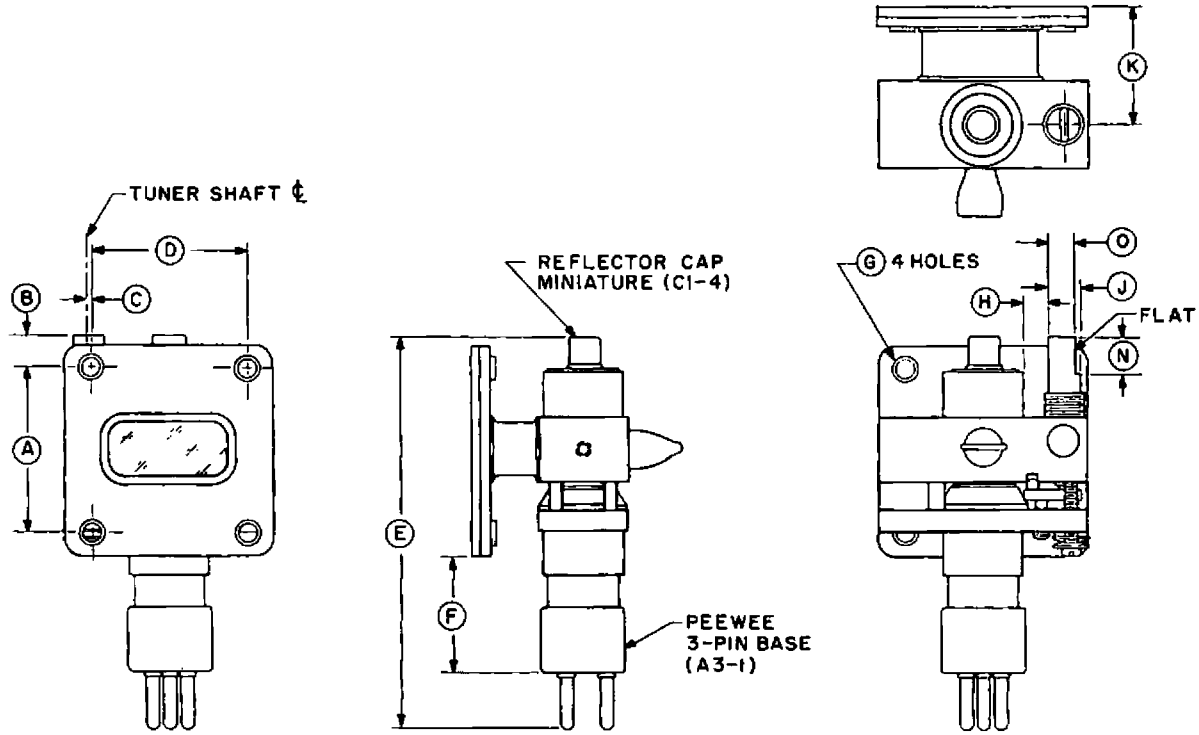
Note 4: After two minutes with all voltages applied, total reflector current shall not exceed the specified limits.

Note 5: The tube shall not be oscillating during the test.

Note 6: Superimposing sufficient 60 cycle ac voltage on the direct reflector voltage to suppress oscillations on the ends of the sweep, the mode curve shall be observed on an oscilloscope whose amplifier has minimum bandpass of 0.1 Mc. The ratio of power output at the point of maximum hysteresis to maximum power output shall not exceed the value specified.

Note 7: The frequency shall be stabilized at a pressure of 70 mm of Hg. The pressure shall be increased to 760 mm of Hg and the frequency at 760 mm of Hg read within the time specified. The resulting frequency change shall not exceed the limit specified.

Note 8: Superimposing sufficient 60 cycle ac voltage on the direct reflector voltage to suppress oscillations on the ends of the sweep, the mode curve shall be observed on an oscilloscope whose amplifier has minimum bandpass of 0.1 Mc. With a standing wave introducer inserted, there shall be no discontinuities at the maximum power point for any phase of the standing wave. If the center of the mode is distorted, a wavemeter pip should not disappear for any interval of the mode center as the wavemeter is tuned to check for a frequency discontinuity.



BASE CONNECTIONS

PIN 1* HEATER
PIN 2* CATHODE
PIN 3 HEATER

*PINS 1 & 2 ARE INTERNALLY CONNECTED

REF.	DIMENSIONS
A	1.284 MAX. 1.276 MIN.
**B	.187 NOM.
*C	.070 MAX. .010 MIN.
D	1.224 MAX. 1.216 MIN.
*E	3.125 MAX.
**F	1.00 MAX.
*G	.219 DIA.NOM.WITH .185 DIA.NOM. REMOVABLE INSERTS
**H	.160 MIN.
*J	.250 MAX. .248 MIN.
*K	.936 MAX. .850 MIN.
**L	1.75 MAX.
M	1.813 MAX.
*N	.313 NOM.
*O	.216 NOM.

NOTE: Eyelet-type inserts in the flange mounting holes are 0.219 O.D., 0.185 I.D., nominal, and are easily removable from rear of flange. With inserts in place, the mounting holes provide clearance for #8 screws. With inserts removed, the mounting holes permit use of insulating bushings where d-c isolation between tube flange and waveguide system is desired.

SPECIFICATION DRAWING VA-6311/V-261 REFLEX KLYSTRON

DWG. 2618
6-17-53