



REFLEX KLYSTRON

oscillator
VA-6315
V-153

TENTATIVE DATA SHEET

8.5 - 10.0 kMc
140 mW

APPLICATION

The VA-6315/V-153 is designed for radar applications requiring reliability under rugged service conditions. It will operate from conventional power supplies and with conventional crystal mixers. It will operate at much lower resonator voltages than most local oscillator klystrons, producing adequate power output and electronic tuning range with resonator voltage as low as 150 volts.

FEATURES

Low microphonics . . . Waveguide output . . . Matched load operation without matching sections . . . Rapid warm-up . . . Negligible barometric frequency coefficient . . . Linear reflector voltage tracking . . . Molded leads and base permitting high altitude operation without pressurization.

GENERAL CHARACTERISTICS

MAXIMUM RATINGS

Frequency Range . . . 8.5 to 10.0 kMc	Resonator Voltage 385 volts
Heater Voltage 6.3 volts	Resonator Current 74 mA
Heater Current 1.2 A	Reflector Voltage . . . 0 to -1000 volts

MECHANICAL CHARACTERISTICS

Cathode Oxide coated, unipotential
Maximum Dimensions . . . 3-1/8 x 1-3/4 x 1-7/8 inches
Weight 6 ounces
Output Connector . Bolts to UG-39/U flange or UG-40A/U
choke for 1 x 0.50 x 0.050 inches
waveguide
Base Molded flexible leads
18 inches long
Mounting Position Any
Cooling Convection¹
Tuner Single Screw²
Shock Withstands up to 250 G
Microphonics Less than 500 kc³

from JETEC release #1495, July 11, 1955

VA-6315
V-153

TYPICAL OPERATION

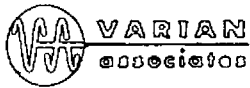
Resonator Voltage	150	300	350	volts
Mode	6-3/4	5-3/4	4-3/4	
Frequency	9.3	9.3	9.3	kMc
Resonator Current	15	42	52	mA
Reflector Voltage	-90	-100	-150	volts
Power Output (VSWR < 1.1)	12	48	140	mW
Electronic tuning range ⁴	28	82	60	Mc
Modulation sensitivity	2.5	1.6	1.2	Mc/volts

NOTES:

1. Forced air cooling required above 10 watts resonator power input.
2. Approximately 2 turns to cover frequency range. Mechanical stops are provided.
3. At resonant peaks, a 10 G audio frequency vibration may produce frequency modulation of as much as 4.0 Mc.
4. Between half-power points.

For further information on electrical characteristics refer to the VA-6314/V-290 Data Sheet.

For further information on mechanical characteristics refer to the VA-6312/V-270 Data Sheet.



SPECIFICATION
TYPE VA-6315/V-153 REFLEX KLYSTRON

Description: Klystron, Integral Cavity, Tuner Waveguide Output

Ratings:	Ef	Ers	Er	Ik	F	Tuner Plate Temp.	Altitude
Absolute	V	Vdc	Vdc	mAdc	mc	°C	Feet
Maximum:	6.3 ± 10%	385	0 to -1000	74	8500 to 10000	200	No limit
Test Cond:	6.3	250	---	---	9300 ± .3%	---	Note 1
Dimensions:	As per Outline		**Cathode: Coated Unipotential				

<u>Ref.</u>	<u>Test</u>	<u>Conditions</u>	<u>Min.</u>	<u>Max.</u>
3.1	Qualification Approval:	Required for JAN markings		
4.5	Holding Period:	t = 168 hours		
4.9.18	*Carton Drop:	(d) Package Group 1 Carton Size N		
---	**Vibration (1):	Power Output: 10G F=50 to 600 cps; t=5 min; Ef=6.3 v	Δ F: 0	4 Mc p-p
---	Vibration (2):	10G; F=60; f=120; Note 2	Ir: 0	10 uAdc
4.9.20.5	**Shock:	Power Output; G=200; Ef=6.3 v; Note 5	Δ F: 0	5 Mc
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	Δ Ik/Ik ---	-15 %
4.10.4.6	Cathode Current:	Er(Mode 5)/max Po	Ik: ---	40 mAdc
4.15.1	Power Output (1):	Er(Mode 5)/max Po; Ef=5.7 v	Po: 30	--- mW
4.15.1	*Power Output (2):	Er(Mode 5)/max Po; F=8500 ± .3% Mc	Po: 10	--- mW

10/21/53
Revised 11/25/53

<u>Ref:</u>	<u>Test</u>	<u>Conditions</u>	<u>Min.</u>	<u>Max.</u>	
4.15.1	*Power Output (3):	Er(Mode 5)/max Po; F=10000 \pm .3% Mc	Po: 30	---	mW
4.15.1	*Power Output (4):	Er(Mode 4)/max Po; Ers=350 v; F=8500 \pm .3% Mc	Po: 50	---	mW
4.15.1	*Power Output (5):	Er(Mode 4)/max Po; Ers=350 v; F=10000 \pm .3% Mc	Po: 100	---	mW
---	*Reflector Voltage(1):	Electronic Tuning Range; Note 8	Er: -70	-127	Vdc
4.10.5.4	*Reflector Voltage(2):	Power Output(1)	Er: -50	-115	Vdc
4.10.5.4	*Reflector Voltage(3):	Power Output(2)	Er: -15	-90	Vdc
4.10.5.4	*Reflector Voltage(4):	Power Output(3)	Er: -70	-160	Vdc
4.10.5.4	*Reflector Voltage(5):	Power Output(4)	Er: -50	-145	Vdc
4.10.5.4	*Reflector Voltage(6)	Power Output(5)	Er: -140	-255	Vdc
4.15.3	*Electronic Tuning Range:	Mode 5; 50% max. Po; Note 6	F: 43	---	Mc
---	*Modulation Sensitivity:	Power Output(1) Ef=6.3 v. $\Delta F = \pm 2.5$ Mc max	Coeff: 1.5	3.0	Mc/v
4.16.5	**Pulling Factor:	Power Output (1); Ef=6.3 v	F: ---	12	Mc
---	**Sink Margin:	Power Output (1); VSWR=2.5; Note 9			
---	**Heater Voltage Coefficient:	Power Output (1); Ef=5.7 to 7.0 v	$\Delta F/\Delta Ef$: ---	6	Mc/v
4.15.5	**Temperature Compensation:	Power Output (1); Ef=6.3 v; TA=+ 20 $^{\circ}$ to + 60 $^{\circ}$ C	Coeff: -.1	.1	Mc/ $^{\circ}$ C
---	**Low Pressure:	Power Output (1); Ef=6.3 v; t=10 sec; Note 7	ΔF : ---	2	Mc

<u>Ref.</u>	<u>Test</u>	<u>Conditions</u>	<u>Min.</u>	<u>Max.</u>	
---	**Residual Frequency Modulation:	Power Output (1); Ef=5.7 to 7.0 Vdc	ΔF: ---	.1	Mc
4.11	Life Test:	Group C	t: 500	---	hrs
4.11.4	Life Test End Point:	Power Output(1) Total Reflector Current; t=5 min	ΔPo/Po: 0 Ir: ---	--20 10	% uA

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: 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.

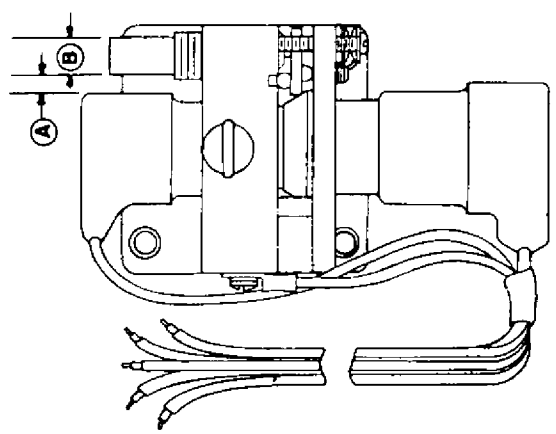
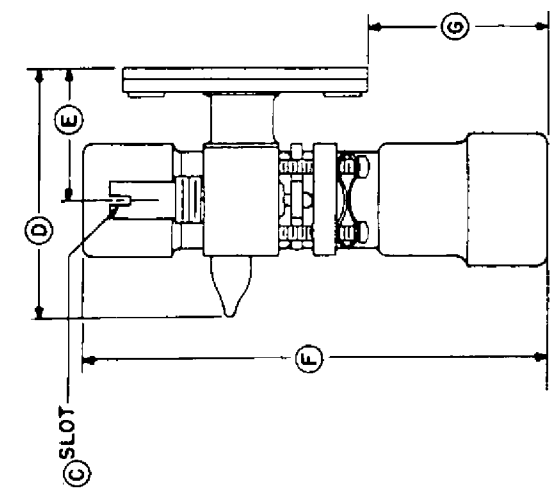
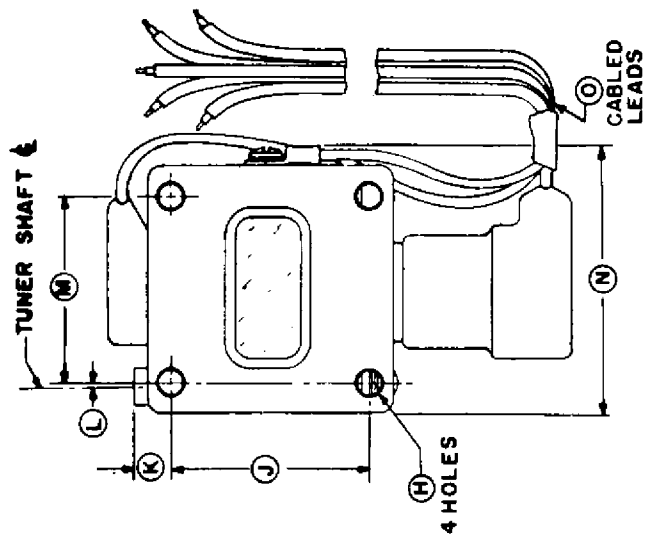
Note 5: The tube shall be given 5 shocks of 1 millisecond duration at specified accelerations in each of 3 planes. The frequency shift in any one plane shall not exceed the value specified after the 5 shocks.

Note 6: The power output shall have no discontinuities between half-power points for either direction of reflector voltage change.

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. in less than the time stated. The resulting frequency change shall not exceed the limit specified within the time specified.

Note 8: Reflector voltage shall be measured at the upper half-power point for this test.

Note 9: There shall be no discontinuity at the maximum power point for any phase of standing wave, when the magnitude of the standing wave is as specified.



CABLE CONNECTIONS

- YELLOW - HEATER
- WHITE - HEATER } INTERNALLY CONNECTED
- GREEN - CATHODE } CONNECTED
- GREY - REFLECTOR
- BROWN - BODY

REF.	DIMENSIONS
**A	.125 NOM.
*B	.250 MAX. .248 MIN.
*C	.050 WIDE X .220 DEEP NOM.
D	1.75 MAX.
*E	.936 MAX. .850 MIN.
*F	3.000 MAX.
**G	1.00 MAX.
*H	219 DIA. NOM. WITH .185 DIA. NOM. REMOVABLE INSERTS
J	1.284 MAX. 1.276 MIN.
**K	.260 MAX.
*L	.070 MAX. .010 MIN.
M	1.224 MAX. 1.216 MIN.
**N	1.875 MAX.
*O	18 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-6315/V-153 REFLEX KLYSTRON