

SPECIFICATION - RM-133⁶
 X-BAND COAXIAL CAVITY MAGNETRON
 75 KW PEAK POWER
 FREQUENCY STABLE AND SETABLE
 INTEGRAL MAGNET. FORCED AIR COOLED

DATE PRINTED

SEE ASSEMBLY

RM-133⁶

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SPECIFICATION

RELMAG, INC.
 1240 HIGHWAY 1, WATSONVILLE, CALIFORNIA 95076



MATERIAL

SCALE

DIR:

CH:

8 11-75

RM-133

1.0 DESCRIPTION

X-band Coaxial Cavity Magnetron. 75 Kilowatts peak power.
Fixed frequency 9315 MHz \pm 5. Integral Magnet, Forced
Air Cooling.

2.0 ABSOLUTE RATINGS

Parameter	If Surge	Heater Volt	Tpc	Duty Cycle	Anode Temp	Cathode Temp	Alt	VSWR
Units	Amps	Volts	μ sec	Ratio	$^{\circ}$ C	$^{\circ}$ C	ft	Ratio
Maximum	6.0	15.5	6.0	.0013	150	175	55,000	1.3:1
Minimum	---	---	---	---	---	---	Note	---

3.0 DEPENDENT RATINGS

Parameter	Ef	If	Tk	Tpc	Eb	Ib	TSRV
Units	V	A	Secs	μ secs	V	A	Kv/ μ sec
Maximum	14.5	1.5	--	6.0	13,500	12.5	---
Minimum	13.5	---	180	5.5	12,500	---	.10

4.0 PHYSICAL CHARACTERISTICS

- 4.1 Dimensions - See RM-106-1
- 4.2 Mounting Position - Any
- 4.3 Support - Mounting Plate. See RM-106-1
- 4.4 Cooling - Forced Air
- 4.5 Coupling - Waveguide. See RM-103-1
- 4.6 Weight - 8 lbs max.
- 4.7 Specification References - Mil Std 1311A

5.0 ELECTRICAL REQUIREMENTS

5.1 Oscillation Conditions

Ref 4304 - Tpc 5.75 μ sec. .25
Duty Cycle .0012

Ref 4305 - Av Current 14.4 ma
TSRV .100 μ sec max

5.2 OPERATING CONDITIONS

Ref	Test	Conditions	Symbol	Limits		Units
				Min	Max	
	Holding Period	Non-Operate	---	168		Hrs
	Dimensions	Per Outline RM-103-1				
1301	Heater Current	Ef=14.0 V Note 1	If	1.25	1.5	Amps
	Heater Current Warm Standby & Operate	Ef=10.5 V Note 1	If		1.15	Amps
1369	Heater Warm Up Time	Ef=14.0 V	Tk	180		Secs
4306	Pulse Volt	Osc 1	epy	12.5	13.5	Kv
4218	Frequency	Osc 1	f	9310	9380	MHz
4307	Power Output	Osc 1	Po	78		Watts
4310	Pulling Fig	VSWR=1.3:1	Δf		5.0	MHz
4311	Pushing Factor	lb=10%	Δf		1.0	MHz/Amp
4315	Stability	Osc 1	M.P.		.25	%
4308	Minor Lobes	Osc 1				
4308	Bandwidth	lb=10-13A Osc 1	Ratio F	8.0	$\frac{2.5}{Tpc}$	Db MHz
6.0	QUALIFICATION TESTS					
	Temp Coefficient	Osc 1 T= -40°C +55°C	Δf		.250	MHz/°C
	Vibration	10-55Hz = 3g 55-1000Hz 1.5 g	Δf		1	MHz
	Shock	10 ms @ 10g	Δf		1	MHz
1026	High Temp Op	+71°C	MP	--	.25	%
1026	Low Temp Op	-40°C	MP	--	.25	%
7.0	LIFE TEST					
	Life Test	Osc 1	T	2000		Hrs
	End Points					
4250	Power Output	Osc	Po	66		Watts
4308	Minor Lobes		Ratio		6.0	Db
4315	Stability		MP		1.0	%
4218	Frequency		f	9310	9320	MHz

- 8.1 Prior to the application of high voltage, the cathode shall be heated to the required initial operation temperature. This may be done by applying 14.0 volts $\pm 5\%$ for 180 seconds.
- 8.2 The time of steepest rise of voltage (TSRV) shall be expressed as the time between the 20 and 85 percent points on a line defining the steepest tangent to the leading edge of the voltage pulse above 50 percent amplitude. Any capacitance in the viewing circuit shall not exceed 6.0 PF.
- 8.3 Input capacitance shall be measured between the cathode terminal and a mounting plate $\frac{1}{4}$ inch thick with the minimum cut-out required to flush mount the tube.
- 8.4 TA is the operating ambient temperature.
- 8.5 The temperature is to be measured at the point indicated on the outline drawing. Figure 1.
- 8.6 Since pulse width and duty cycle are inter-related, care must be exercised that the duty cycle is correct if other than nominal pulse width is used.
- 8.7 Unless otherwise specified, tests shall be made at standard room ambient conditions.
- 8.8 With the magnetron in the "warm-stdby" mode it shall be possible to apply full pulse power after only a 30 second application of the "warm-up" filament voltage (14.0 volts $\pm 5\%$). Filament voltage will automatically return to its normal "operate" value 10.5 V $\pm 5\%$ upon the application of full pulse power.
- 8.9 During an interruption of the 115V 400 cycle primary power of T seconds, when T has any value from 10 sec. to 50 sec. the magnetron shall perform normally when the filament is reheated for $1\frac{1}{2}T$ seconds at 14.0 volts $\pm 5\%$ prior to reapplication of full pulse power.
- 8.10 Operating temperature test consists of the following:
Low Temperature Operation: Soak tube in ambient temperature of -50°C for 30 minutes. Stabilize tube temperature in ambient temperature of -40°C . Both conditions are non-operate. After stabilization at -40°C operate for 15 minutes.

High Temperature Operation: Non-operate, soak 30 minutes at ambient temperature of 71°C, operate 30 minutes at ambient temperature of 71°C, then operate 2 hours at 55°C ambient.

- 8.11 The average microwave stray radiation power from the magnetron cathode stem shall not exceed 2.0 milliwatts as measured with any standard pickup horn and a microwave power meter. The horn shall be directed as close as possible to that part of the cathode stem which is leaking the greatest power.

Rm 136

- Input power (peak)
- Input power (mean) (see note 3)
- Duty cycle
- Pulse duration
- Rate of rise of voltage pulse (see note 4)
- Anode temperature (see note 5)
- V.S.W.R. at the output coupler

TYPICAL OPERATION

Operational Conditions

	1	2	
Heater voltage	11.0	11.0	✓
Anode current (peak)	16.0	16.0	a
Pulse duration	5.0	2.35	us
Pulse repetition rate	200	425	PPS
Rate of rise of voltage pulse	100	100	KV/us

Typical Performances

Anode voltage (peak)	12.5	13.5	KV
Output power (peak)	50.0	73.0	KW
Output power (mean)	65.0	95.0	W

TEST CONDITIONS AND LIMITS

The magnetron is tested to comply with the following electrical specification

Test Conditions

- Heater voltage (for test)
- Anode current (mean)
- Duty Cycle
- Pulse duration (see note 6)
- V.S.W.R. at the output coupler
- Rate of rise of voltage pulse (see note 4)

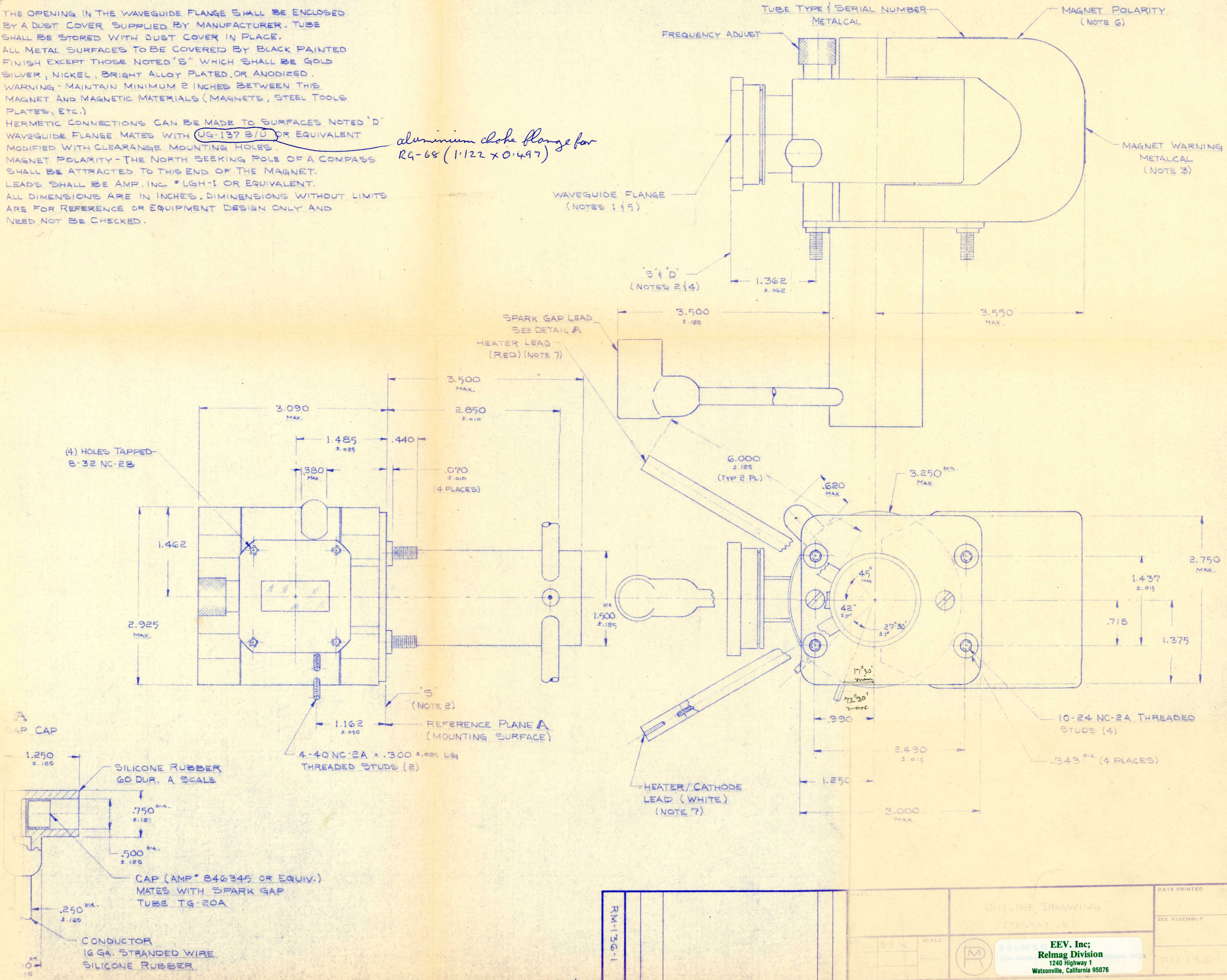
Limits

- Anode voltage (peak)
- Output power (mean)
- Frequency (see note 7)
- R.F. bandwidth at 1/2 power
- Frequency pulling (v.s.w.r. not less than 1.5:1)
- Stability (see note 8)
- Cold impedance
- Heater current
- Temperature coefficient of frequency

NOTE:

- 1) THE OPENING IN THE WAVEGUIDE FLANGE SHALL BE ENCLOSED BY A DUST COVER SUPPLIED BY MANUFACTURER. TUBE SHALL BE STORED WITH DUST COVER IN PLACE.
- 2) ALL METAL SURFACES TO BE COVERED BY BLACK PAINTED FINISH EXCEPT THOSE NOTED "S" WHICH SHALL BE GOLD SILVER, NICKEL, BRIGHT ALLOY PLATED, OR ANODIZED.
- 3) WARNING - MAINTAIN MINIMUM 2 INCHES BETWEEN THIS MAGNET AND MAGNETIC MATERIALS (MAGNETS, STEEL TOOLS PLATES, ETC.)
- 4) HERMETIC CONNECTIONS CAN BE MADE TO SURFACES NOTED "D"
- 5) WAVEGUIDE FLANGE MATES WITH UG-137 B/D OR EQUIVALENT MODIFIED WITH CLEARANCE MOUNTING HOLES.
- 6) MAGNET POLARITY - THE NORTH SEEKING POLE OF A COMPASS SHALL BE ATTRACTED TO THIS END OF THE MAGNET.
- 7) LEADS SHALL BE AMP, INC. #LGH-1 OR EQUIVALENT.
- 8) ALL DIMENSIONS ARE IN INCHES. DIMENSIONS WITHOUT LIMITS ARE FOR REFERENCE OR EQUIPMENT DESIGN ONLY AND NEED NOT BE CHECKED.

aluminium clove flange for R4-68 (1.122 x 0.497)



RM-136-1	OUTLINE DRAWING (TENTATIVE)		DATE PRINTED
	SCALE	SEE ASSEMBLY	
E.E.V. Inc; Relmag Division 1240 Highway 1 Watsonville, California 95076		RM-136-1	