

These ratings represent those of current samples of this type. Refer to the Objective Technical Information sheet for design-objective ratings.

This technical information is proprietary and is furnished only as a service to customers.

ZM-5184

TRAVELING-WAVE TUBE

1 Kilowatt Peak Output
25 db Saturation Gain

Electromagnet

14,000-18,000 Megacycles
Metal-Ceramic

The ZM-5184 is a ruggedized, high-power, gridded, broadband traveling-wave tube for use in the 14,000-to 18,000-megacycle frequency range. It has a saturation gain of 25 decibels with a peak power output of one kilowatt.

The tube is of metal-and-ceramic construction and is supplied as a complete packaged assembly including the tube, solenoid, and r-f connectors. The entire assembly weighs approximately 20 pounds.

The broad bandwidth, high gain, freedom from tuning adjustments, and rugged construction make this tube particularly useful in military systems. Applications include pulse amplification in radar, electronic counter-measures equipment, and similar systems.

GENERAL

Unless otherwise noted voltages are with respect to the anode. Anode and collector are connected to the solenoid housing and the body of the tube. These parts of the tube should be grounded.

ELECTRICAL	Minimum	Bogey	Maximum	
Frequency*	14,000	—	18,000	Megacycles
Heater				
Voltage /	—	6.3	—	Volts
Current	—	0.7	—	Amperes
Focusing Method — Electromagnet				
Saturation Gain	—	25	—	Decibels
Small Signal Gain	—	30	—	Decibels
Saturation Power Output, Peak	—	1.0	—	Kilowatts
Duty Cycle	—	—	0.01	
Pulse Length	—	—	10	Microseconds
Vacuum Ion Pump Voltage	—	-2800	—	Volts
Cutoff Attenuation	35	—	—	Decibels
Waveguide VSWR				
Input	—	—	2.5 to 1	
Output	—	—	2.5 to 1	
Capacitance				
Grid-Cathode	10	15	20	Micromicrofarads
Grid-Anode	5	8	10	Micromicrofarads
MECHANICAL				
Mounting Position — Any				
Over-all Dimensions, approximate				
Length			11.0	Inches
Diameter			5.37	Inches

MECHANICAL (Cont'd)

Connectors

RF Input - UG-419/U

RF Output - UG-419/U

Cathode-Heater, Heater, Grid, Ion Pump -
Flying Leads

Coolant - Wiggins BN20E4 Nipple (mates to
Wiggins BS20D4 socket) or equivalent.

Weight, Tube and Electromagnet, approximate.	20	Pounds
Shock.	50	G
Vibration	15	G
Altitude, Operating.	80,000	Feet Mean Sea Level
Acceleration, Constant, Energized	30	G

THERMAL

Operating Temperature, Ambient	-65 to +100	C
Cooling - Liquid		
Coolant Flow Rate, approximate	1.0	Gallons per Minute
Supply Pressure, maximum	100	Pounds per Square Inch Gage
Coolant Temperature, maximum		
Inlet	100	C
Outlet.	115	C
Coolanol** 45 or equivalent required		

TYPICAL OPERATING CONDITIONS

	Minimum	Bogey	Maximum	
Cathode Voltage $\neq$	-10.8	-10.3	-10.0	Kilovolts
Grid Bias Voltage, with Respect to Cathode	-150	-175	-200	Volts
Grid Pulse Voltage, Total Swing, with Respect to Grid				
Bias Voltage $\neq$	+400	+475	+500	Volts
Peak Cathode Current.	1.6	1.8	2.2	Amperes
Peak Grid Current, Percentage of Peak Cathode Current .	15	18	25	Percent
Electromagnet				
Voltage.	-	50	-	Volts
Current $\neq$	7	8.0	10	Amperes

PERFORMANCE ASSURANCE SPECIFICATIONS

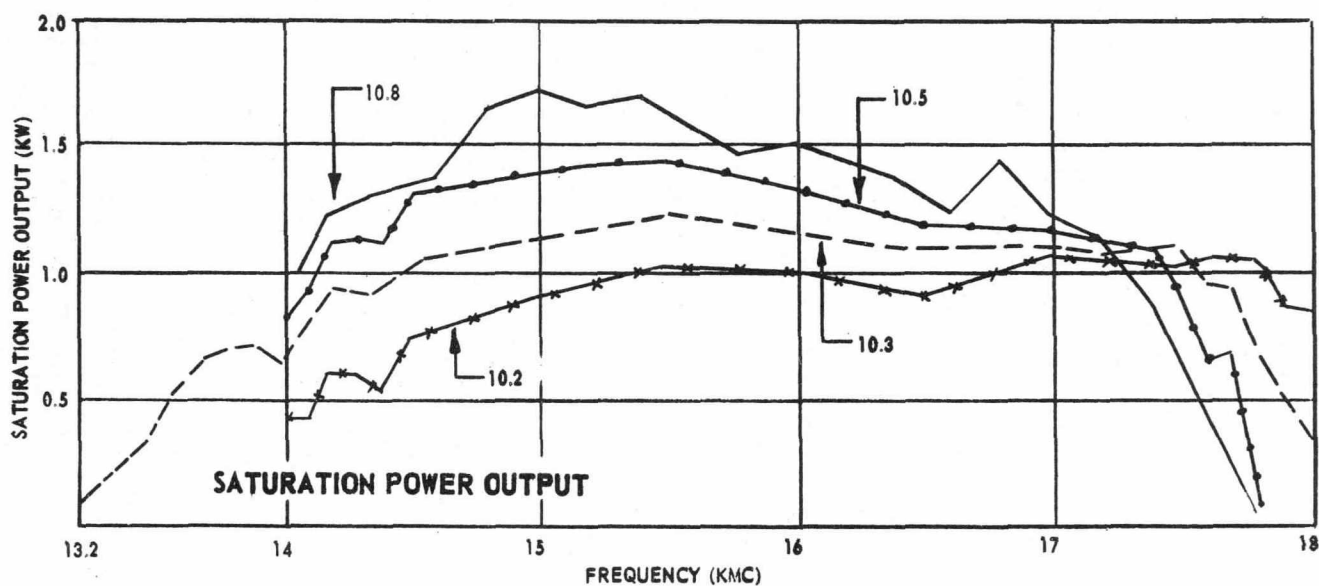
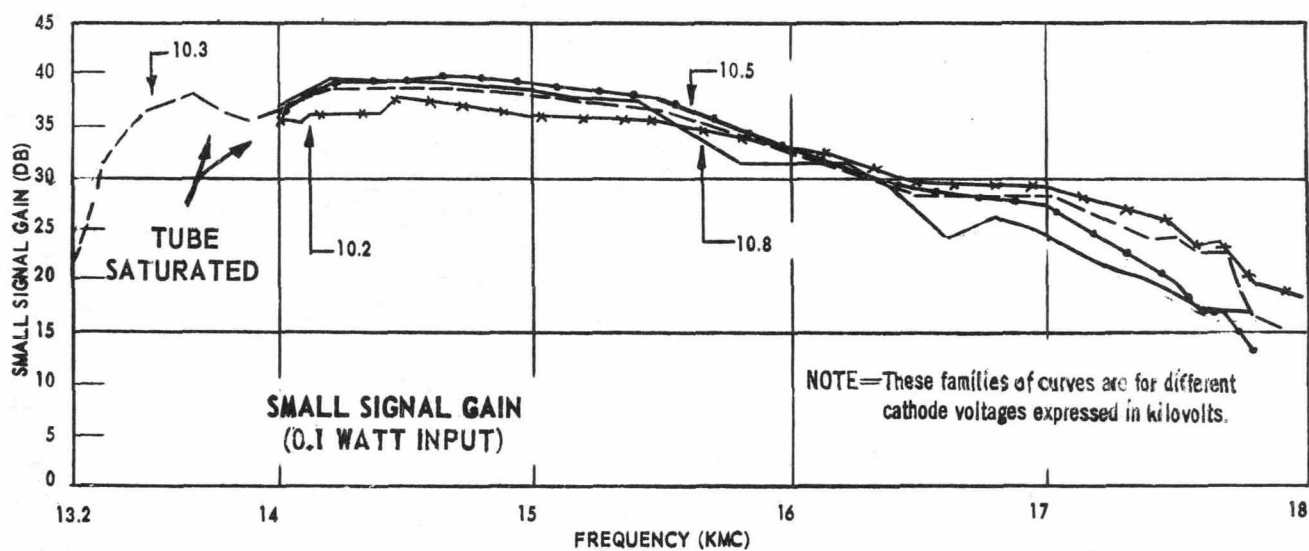
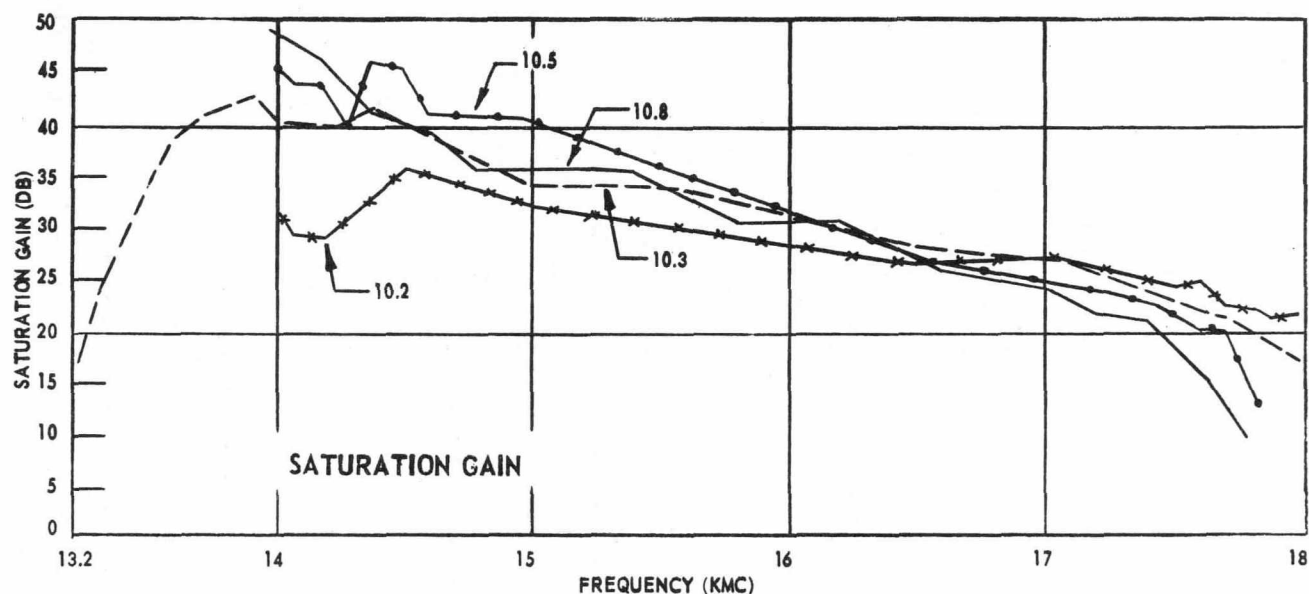
Shock (Energized)	50 G for 11 milliseconds on each of three mutually perpendicular axes.
Vibration (Operating)	0.06 inches double amplitude from 5 to 70 cycles per second and 15 G from 70 to 3000 cycles per second with sweep over 5 to 3000 cycles per second for 100 minutes on each of three mutually perpendicular axes.

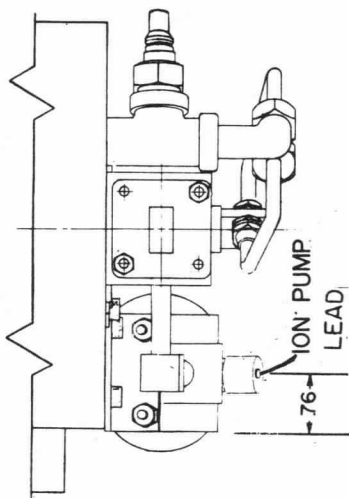
* The power-output and saturation gain curves indicate performance possible at greater bandwidth. Increased performance can be obtained under narrow-band operation. For further information consult your nearest Power Tube Department sales office.

$\neq$ For the bogey performance ratings specified on this data sheet, these parameters should be set at the particular value specified in the instructions accompanying each tube. The value specified will be within the range given above. The specific value of heater voltage should be held within plus or minus four percent.

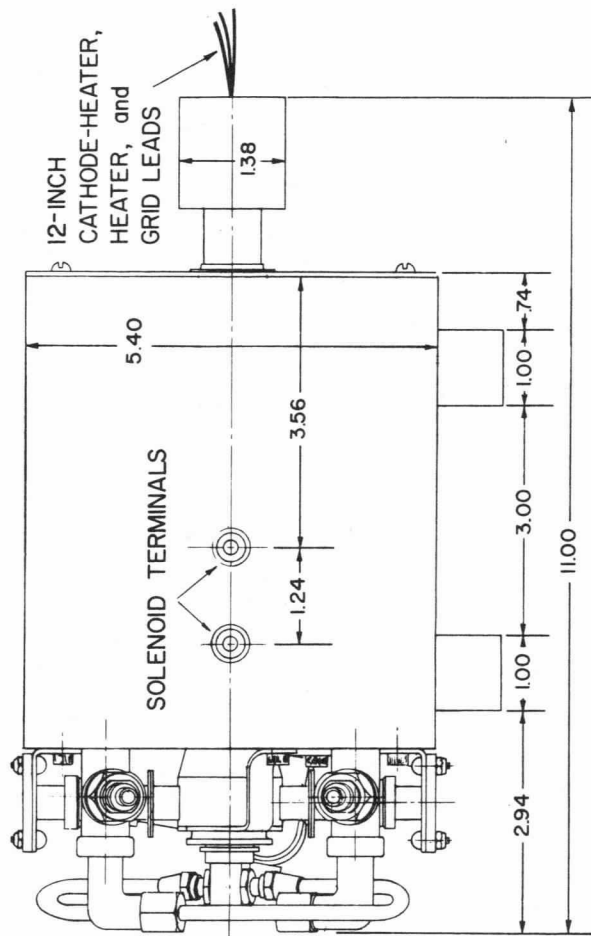
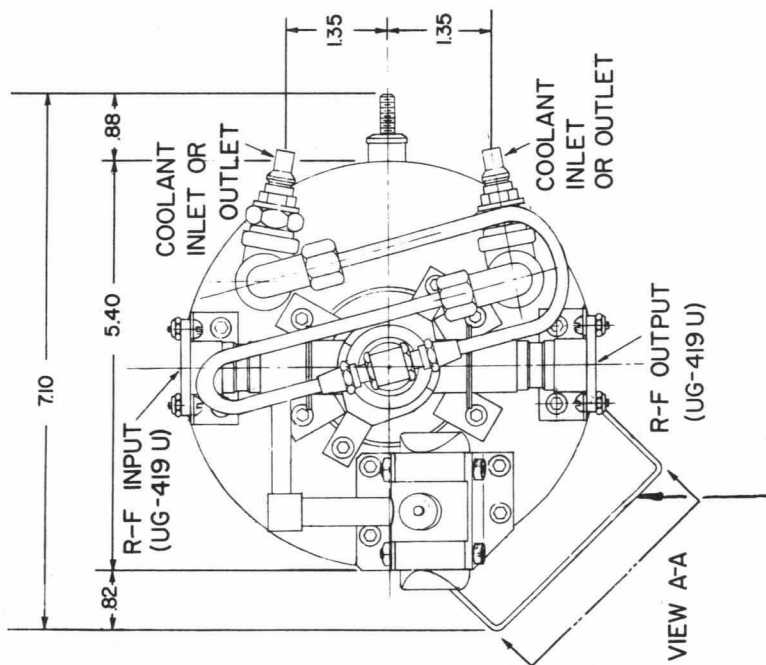
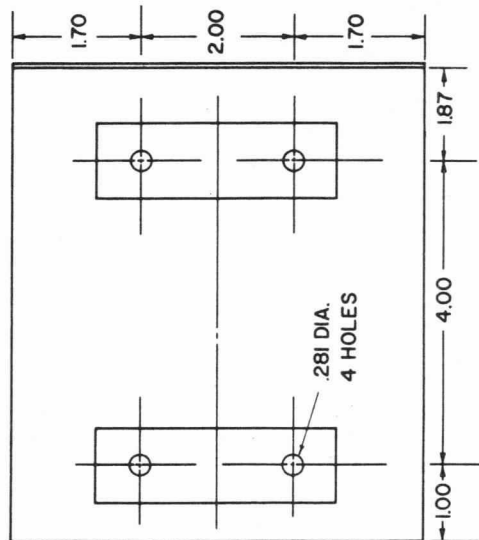
$\neq$ The cathode voltage may be set at various values between -10.8 and -10.0 kilovolts to obtain different power and gain characteristics.

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VIEW A-A



NOTE—THIS BRACKET SHOULD NOT BE USED FOR MOUNTING WHEN THE TUBE IS TO BE SUBJECTED TO SIGNIFICANT VIBRATION, SHOCK, OR ACCELERATION. UNDER SUCH CONDITIONS THE TUBE SHOULD BE SUPPORTED BY APPROPRIATE CLAMPS AROUND THE SOLENOID.

NOTE—THIS IS A SCALE DRAWING AND THE DIMENSIONS ARE APPROXIMATE AND IN INCHES.

Traveling-Wave Tubes

Technical Information

RF PERFORMANCE

Tube Type	Frequency Range (Gc)	Min. Peak Saturated Power Output, (kw)	Maximum Duty	Maximum Pulse Width (μ sec)	Minimum Saturated Gain (db)	Minimum Small Signal Gain (db)
ZM-5184	14-17	0.5	0.01	10	25	30

- HIGH POWER
- K_u -BAND
- E M FOCUSING

FEATURES

high gain
broad bandwidth
electromagnet focusing
metal-ceramic construction
loaded-waveguide circuit
military environments
light weight
grid control

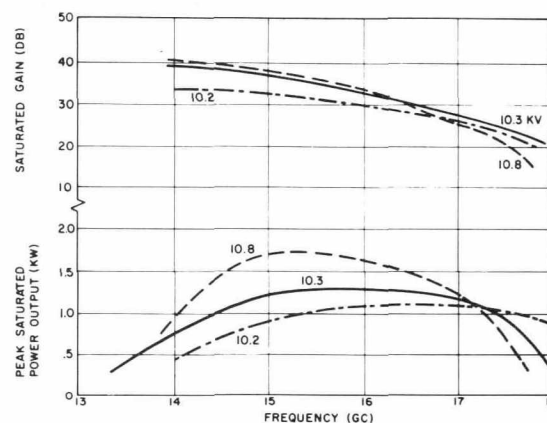
APPLICATIONS

radar
ecm

MECHANICAL & MISCELLANEOUS

VSWR, max
Input 2.5
Output 2.5
Grid to other elements μ f (max) .. 20
Phase shift, deg/1% change
in cathode voltage (max) 35
Weight, lb. 20
Overall length, in. 12
Mounting position Any
Cooling Liquid[#]
Flow rate, gpm. 1.0
Max. supply pressure, psig ... 100
Max. inlet coolant temp., °C.. 100
Max. outlet coolant temp., °C. 115
Connectors
RF input. UG-419/U
RF output UG-419/U
DC Flying leads

TYPICAL CHARACTERISTICS



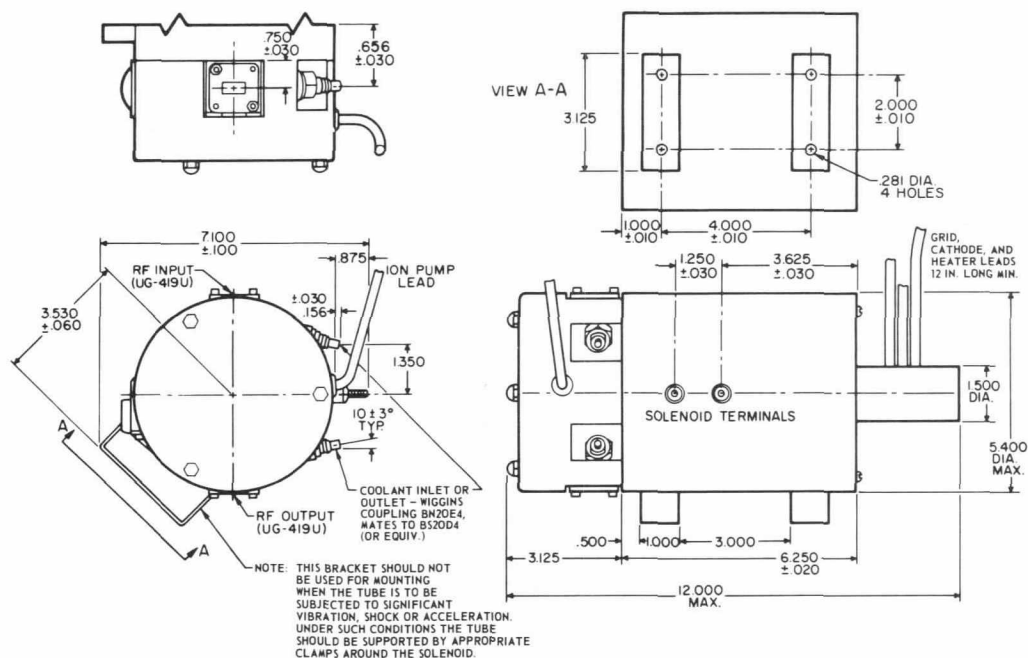
OPERATING CONDITIONS^{* † ‡}

Htr. vac or vdc	6.3
Htr. amp (max)	0.8
Cath. kv dc, with resp. to anode. ...	-10 to -10.8
Peak cath. amp (max)	2.2
Grid-bias vdc, with resp. to cath. ...	-150 to -200
Grid swing vdc, with resp. to grid-bias voltage.	400 to 500
Peak grid amp (max)	0.55
Ion pump vdc	2800
Electromagnet vdc.	50
Electromagnet amp. (max)	10

ENVIRONMENTAL

Shock.	30 G, 11 ms, (energized)	3 axes
Vibration	10 G, 70- (operating)	3000 cps
Acceleration	30 G (no voltages)	
Temp., ambient	-65 to +100°C (operating)	
Altitude.	100,000 ft (operating)	

OUTLINE



NOTES

- # Use Monsanto Coolanol 45 or equivalent.
- * For the performance ratings specified, voltages should be adjusted to values specified by instructions accompanying each tube. These values will be within the ranges given above.
- † The cathode voltage may be set at various values between -10 and -10.8 kv to obtain different power and gain characteristics.
- ‡ The anode and collector are connected to the body of the tube which should be grounded in the normal installation of this tube.

These data are subject to change without notice.