# REGISTRATION DATA
# WESTERN ELECTRIC 5795 MAGNETRON

## DESCRIPTION

The 5795 is an integral magnet type tunable magnetron intended for service as a pulsed oscillator capable of operating over a frequency range of 3100 to 3500 megacycles per second. The peak power output is approximately 1000 kilowatts and the tube is forced-air cooled.

## GENERAL ELECTRICAL DATA

| | |
|---|---|
| Pre-heat Heater Voltage . . . . . . . | 107± 7 volts |
| Pre-heat Heater Current (at 107 volts) . | 3.65± 0.35 amperes |
| Minimum Pre-heat Time . . . . . . . | 600 secs |
| Heater Cold Resistance . . . . . . . | 3.2 ohms |

## RATINGS, Absolute Values

| | |
|---|---|
| Heater Voltage (Maximum) . . . . . . . . . . | 120 volts |
| Pre-heat Time (Minimum) . . . . . . . | 240 seconds |
| Heater Surge Current (Maximum) . . . . . . . | 17 amperes |
| Peak Anode Voltage (Maximum) . . . . . . . | 50 kilovolts |
| Peak Anode Current (Maximum) . . . . . . . | 50 amperes |
| Average Power Input (Maximum) . . . . . . . | 5 kilowatts |
| Duty Cycle (Maximum) . . . . . . . . . . | .0022 |
| Pulse Duration (Maximum) . . . . . . . . . . | 1.5 µsec. |
| Rate of Rise of Anode Voltage (Maximum) . . . . | 220 kv/µsec. |
| Anode Temperature (Maximum) . . . . . . . | 110° C |

## GENERAL MECHANICAL DATA

| | |
|---|---|
| Recommended Mounting Position . . . . . . . | Output vertical facing up. |
| Net Weight . . . . . . . . . . . . . . . . | 65 pounds |
| Coupling Between Tube and Load . . . . . . . | Waveguide Flange |
| Input Connection . . . . . . . . . . . . | See Footnote A |
| Output Connection . . . . . . . . . . . . | See Footnote B |

The output section is coupled to RG-48/U waveguide by means of the choke coupling shown on Fig. 9.

from JEDEC release #870B, Jan. 25, 1960

Note A: The coaxial input connector shall utilize a heater shunt capacitor in close proximity to the cathode input terminal so as to minimize voltage surges which could damage the heater. The input connector must have provision for cooling the cathode with an air flow of 4-3/4" ± 1/2 c.f.m.

Note B: Provision should be made externally and in close proximity to the magnetron output window for an "arc quencher", which should be wired into the appropriate voltage supply and relay circuitry, so that an arc across the output window, caused by R.F. voltage breakdown in the waveguide load, can be extinguished by automatically turning off the applied pulse voltage momentarily. The effect of the quencher is to protect the output window from "suck in" when such an arc is permitted to run.

TYPICAL OPERATING CONDITIONS

| | Ef V | If A | Ib mA | epy kv | Pi Kw | Du | tp µsec. | rrv kv/µs |
|---|---|---|---|---|---|---|---|---|
| #1 | 40 | 2.5 | 90 | 45 | 4.0 | .002 | 1.33 | 150 |
| #2 | 65 | 2.7 | 60 | 45 | 2.6 | .00133 | 1.33 | 150 |

The data on lines #1 and #2, shown under "Typical Operation" caption above, each constitute a satisfactory set of simultaneous operating conditions. Fig. 2 shows typical satisfactory pulse shapes for these, observed when using a Line Type Modulator.

COOLING DATA

For any ambient temperature to a maximum of 50° C. and any anode dissipation to a maximum of 2250 watts, the tube shall be cooled with forced air as follows:

| Locations | Air-flow |
|---|---|
| Body | 300 c.f.m. min. through fins |
| Cathode | 4-3/4 ± 1/2 c.f.m. |
| Tuning Head | 6 ± 1/2 c.f.m. |
| Output Window | 1-1/2 c.f.m. |

OPERATING DATA

These data are embodied in the following set of figures. A family of curves are shown which represents the spread in range of the tube as manufactured. Data involving VSWR have been carried beyond the 1.5 test value for information purposes only.

Figure 3 This is a plot of required filament current and anode cooling air versus applied average anode power input.

Figure 4 This is a plot of tuning dial readings versus frequency. It is assumed that thermal equilibrium has been obtained at each of the calibrated points.

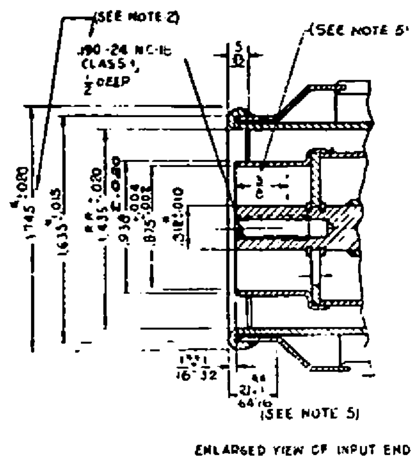
Figure 5 This is a plot of both applied peak anode voltage and overall operating efficiency versus peak anode current. The recommended operating range of voltage, current and efficiency are indicated as a guide within which satisfactory operation is expected. These data were taken at 3300 mc. The spread for lower frequencies will decrease and will increase for higher frequencies.

Figure 6 This is a plot of percent of power output change, from matched load conditions, one can obtain by varying the phase of a 1.5 and a 2.0 VSWR from sink to anti-sink.

The nominal match curve is obtained relative to the frequency tuning band by equating the output at each frequency point against the power output at 3100 mc. Therefore, the change due to load mismatch and phase is that difference between the nominal line and the appropriate sink or anti-sink line at any associated frequency point.

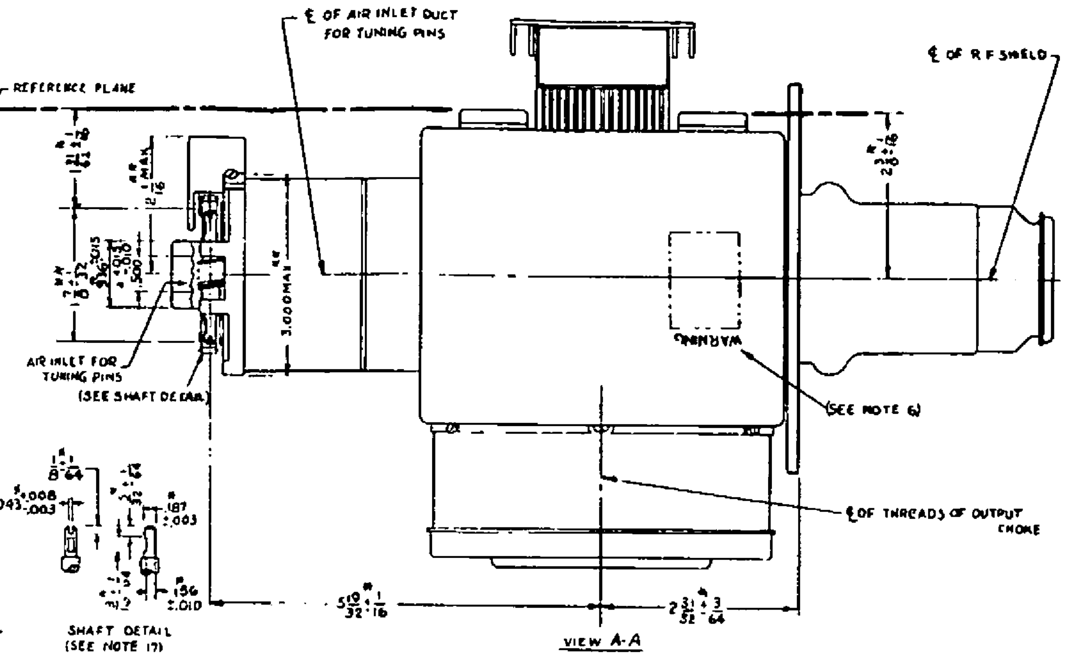
Figure 7 This is a plot of frequency pulling relative to VSWR and represents the greatest variations wherever encountered in the full frequency tuning band.

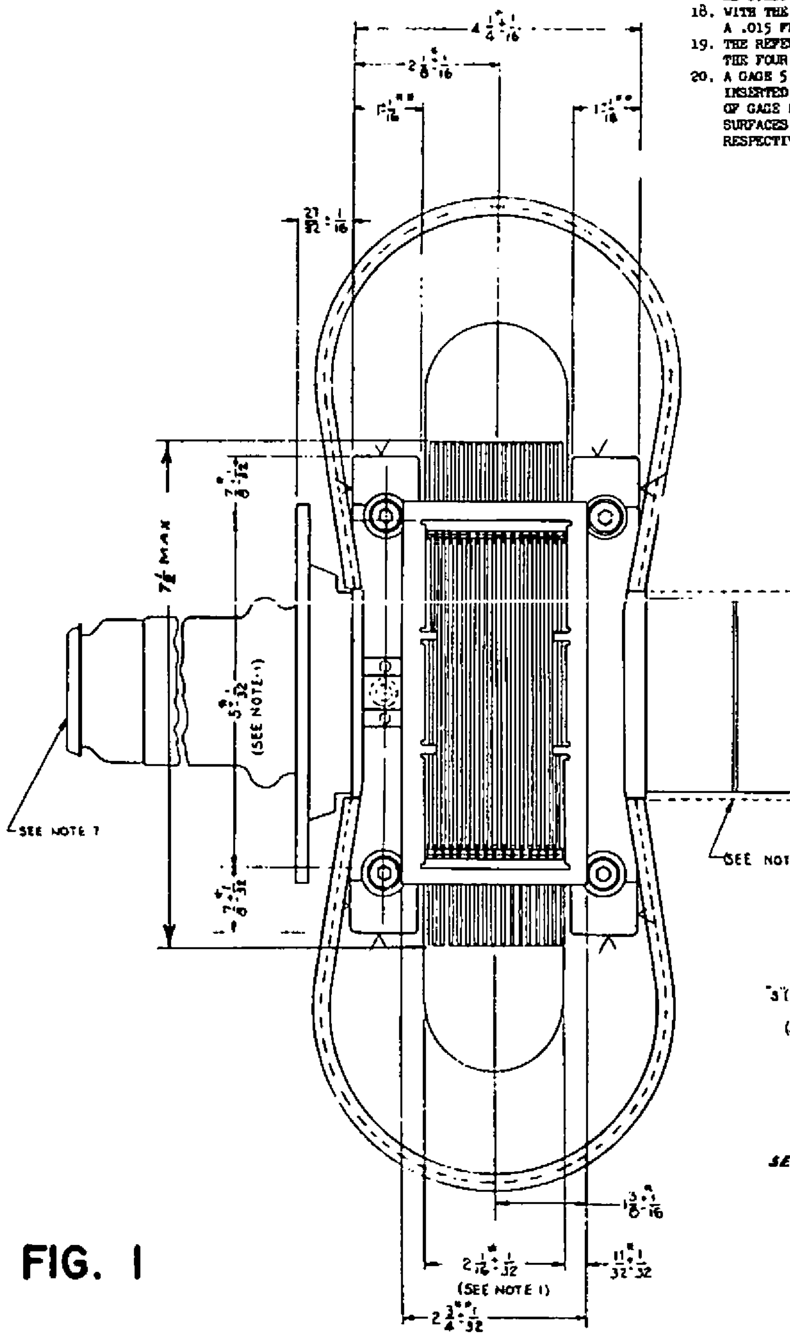
Figure 8 This is a plot of long line relationships versus line length for the specific case of 10 mc pulling which is the maximum specification limit.

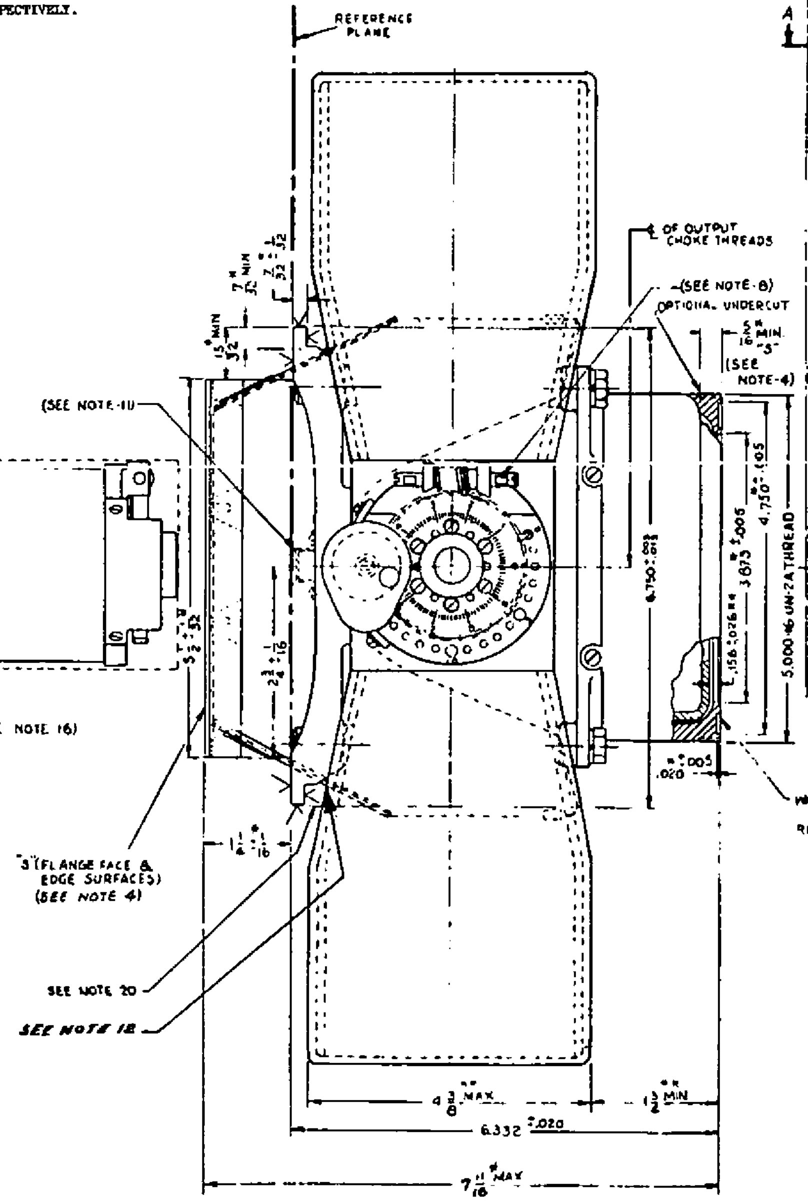



NOTES:

1. DIMENSIONS OF COOLING FIN AIR INLET DUCT.
2. THE .190-24 THREAD AND 1.745 DIAMETERS TO BE CONCENTRIC WITHIN 020.
3. DIMENSIONS WITHOUT LIMITS ARE NOMINAL AND ARE FOR EQUIPMENT DESIGN PURPOSES ONLY AND NEED NOT BE CHECKED.
4. ALL METAL SURFACES COVERED BY GRAY FINISH EXCEPT THOSE MARKED "S" OR THOSE MARKED √(FINISHED SURFACE).
5. NO CLAMPING MEANS TO BEAR BEYOND THIS DEPTH.
6. WARNING
   MAINTAIN MINIMUM CLEARANCE OF 2" BETWEEN THIS MAGNET AND MAGNETIC MATERIALS (MAGNETS, STEEL TOOLS, PLATES, ETC.)
7. THE OPENING OF THE WAVEGUIDE SHALL BE ENCLOSED BY THE DUST COVER WHEN TUBE IS NOT IN USE.
8. THE TUNING MECHANISM SHALL OPERATE SMOOTHLY OVER THE ENTIRE MECHANICAL RANGE WHEN SUBJECTED TO A TORQUE OF 1-1/2 IN. POUNDS APPLIED AT THE DRIVE SHAFT. IN EQUIPMENT, A TORQUE NO LESS THAN 1-1/2 IN. POUNDS AND NO MORE THAN 2-1/2 IN. POUNDS SHALL BE APPLIED AT THE DRIVE SHAFT. THE GEAR AND WORM THREADS MUST BE KEPT FREE FROM CORROSION, PAINT AND OTHER IMPERFECTIONS.
9. FREQUENCY INCREASES WHEN DRIVE SHAFT IS ROTATED IN THE DIRECTION SHOWN.
10. THE INPUT END OF THE TUBE SHALL FALL WITHIN THE VOLUME LIMITED BY THREE ADJACENT CONCENTRIC CYLINDERS A, B AND C OF THE DIMENSIONS SHOWN, WITH THE AXIS OF THE CYLINDERS PERPENDICULAR TO SURFACE "D".
11. TUBULATION COVER SHALL NOT EXTEND BEYOND REFERENCE PLANE.
12. THE COOLING FINS SHALL NOT INTERFERE WITH A GAGE 7/32 X 7/32 X 5 INCHES WHEN THE GAGE IS POSITIONED AGAINST THE TOPS AND BACKS OF THE TIE STRAP FEET.
13. DIMENSIONS WITH A SINGLE ASTERISK (*) DENOTE DESIGN TEST. DIMENSIONS WITH A DOUBLE ASTERISK (**) DENOTE QUALIFICATION APPROVAL.
14. WARNING
    HANDLE TUBE BY MAGNETS ONLY. FORCE APPLIED TO OTHER PARTS MAY CAUSE DAMAGE.
15. THE OPENING OF THE INPUT END SHALL BE ENCLOSED BY THE DUST COVER WHEN NOT IN USE.
16. PROTECTIVE BAG OVER TUNING HEAD MUST BE REMOVED BEFORE TUBE IS USED.
17. MINIMUM CLEARANCE BETWEEN ENDS OF DRIVE SHAFT AND TUNING HEAD BRACKET SHALL BE 0.110 INCHES.
18. WITH THE TUBE RESTING ON A PLANE SURFACE COINCIDENT WITH THE REFERENCE PLANE, A .015 FEELER GAGE SHALL NOT ENTER BETWEEN TIE STRAP FEET AND REFERENCE PLANE.
19. THE REFERENCE PLANE SHALL BE DEFINED AS THE PLANE ESTABLISHED BY ANY THREE OF THE FOUR MAGNET TIE STRAP FEET.
20. A GAGE 5" WIDE HAVING A CROSS SECTION AS SHOWN SHALL BE CAPABLE OF BEING INSERTED IN SPACE BETWEEN TIE STRAP FEET AND MAGNET WITH REFERENCE PLANE "A" OF GAGE PARALLEL TO THE REFERENCE PLANE THRU THE TIE STRAP FEET AND WITH SURFACES C AND D OF GAGE RESTING AGAINST EDGE AND TOP OF TIE STRAP FEET RESPECTIVELY.





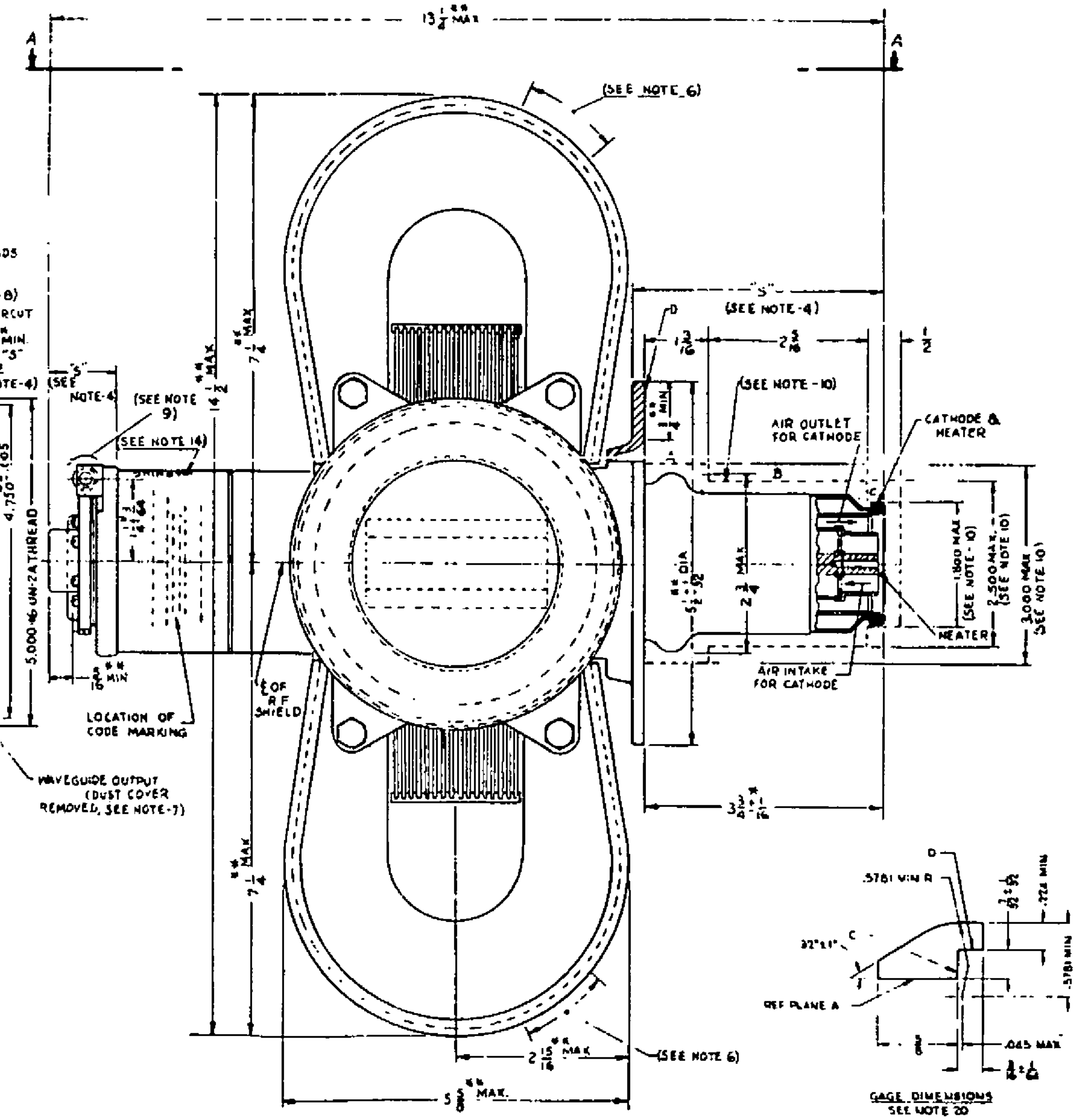
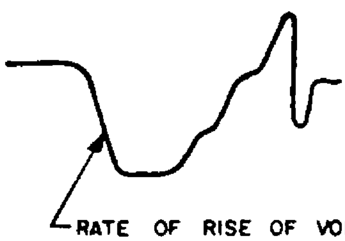



FIG. 1

## TYPICAL 5795 PULSES

ANODE VOLTAGE | ANODE CURRENT

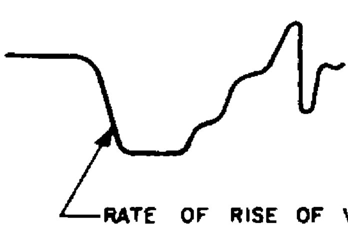
### TYPICAL OPERATION #1



RATE OF RISE OF VOLTAGE
= 150 kv/μs

PULSE WIDTH = 1.33 μs

### TYPICAL OPERATION #2



RATE OF RISE OF VOLTAGE
= 150 kv/μs

PULSE WIDTH = 1.33 μs

FIG. 2

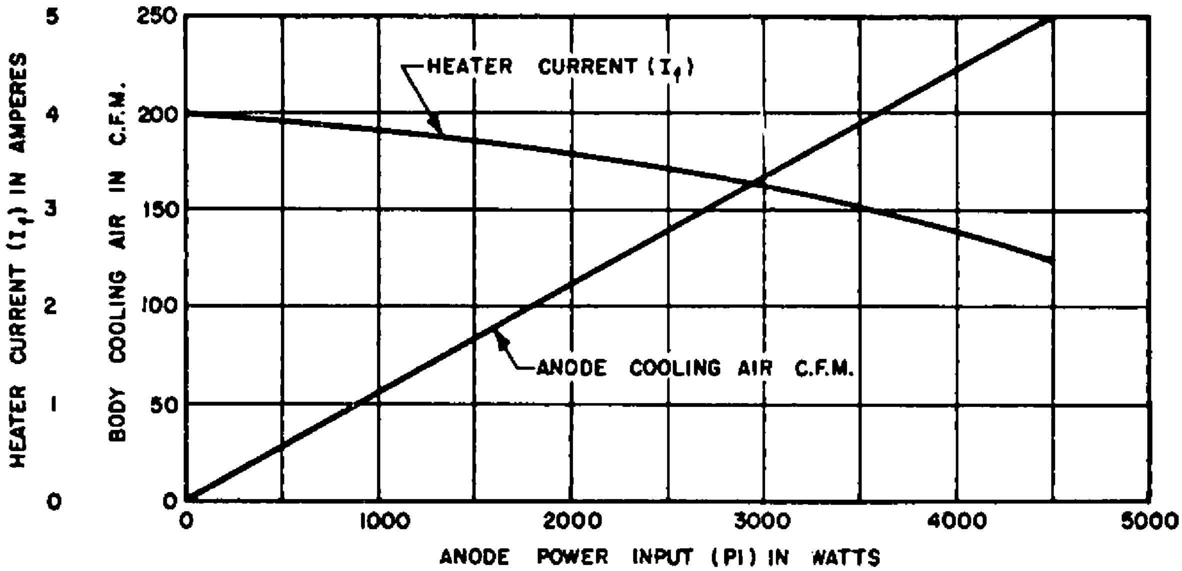



FIG. 3

Note: The air cooling information plotted in Figure 3 above is based on a maximum rise in magnetron body temperature of 60°C above a maximum ambient of 50°C with an anode dissipation of 2250 watts.

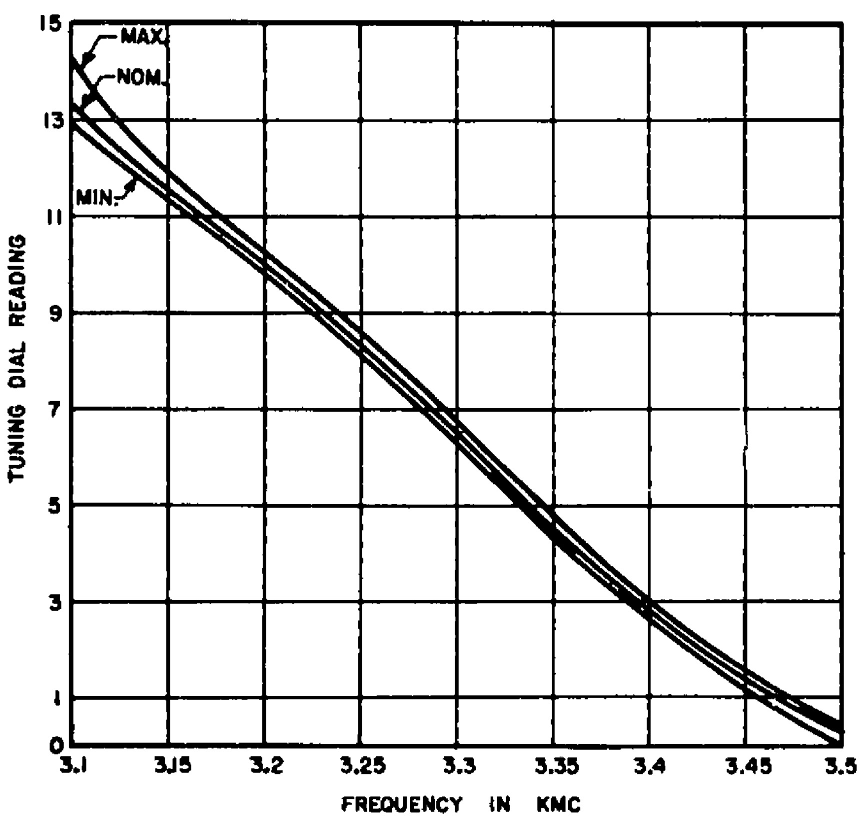



FIG. 4

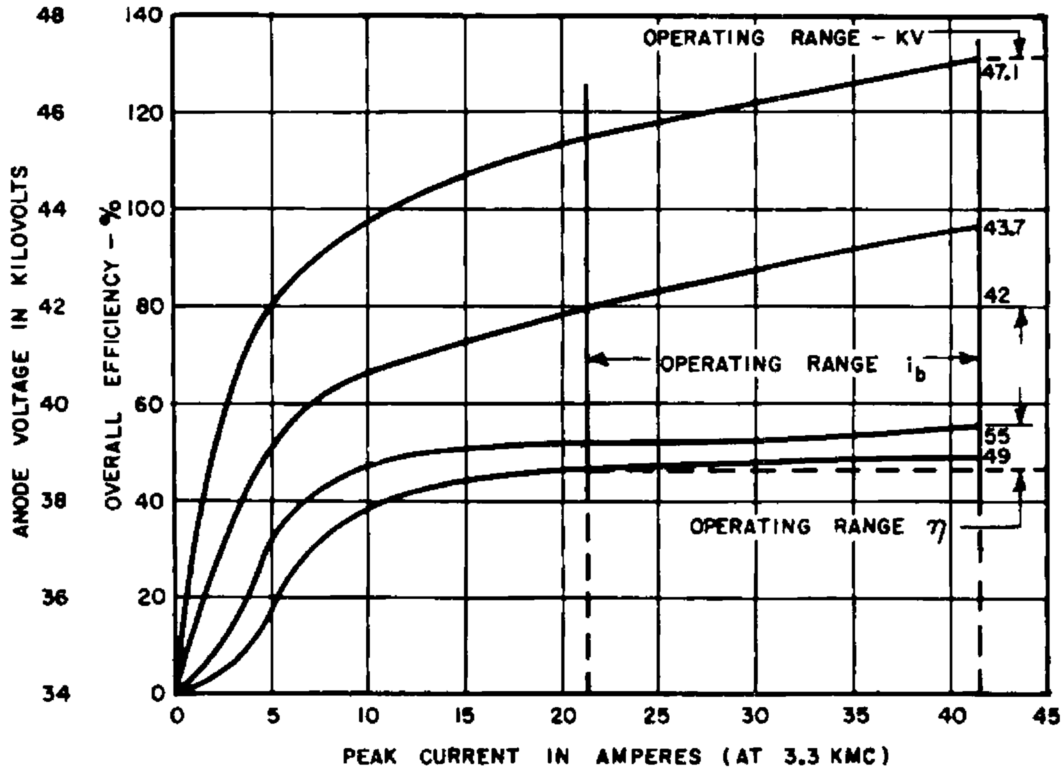

OPERATING RANGE - KV
47.1
43.7
42
OPERATING RANGE $i_b$
55
49
OPERATING RANGE $\eta$
ANODE VOLTAGE IN KILOVOLTS
OVERALL EFFICIENCY - %
PEAK CURRENT IN AMPERES (AT 3.3 KMC)

FIG. 5

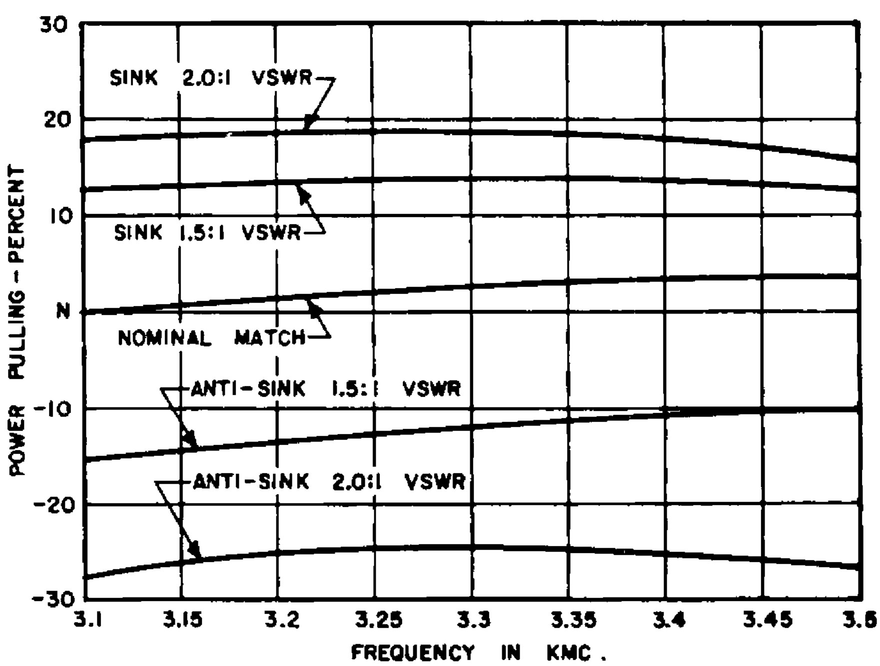

SINK 2.0:1 VSWR
SINK 1.5:1 VSWR
NOMINAL MATCH
ANTI-SINK 1.5:1 VSWR
ANTI-SINK 2.0:1 VSWR
POWER PULLING - PERCENT
FREQUENCY IN KMC.

FIG. 6

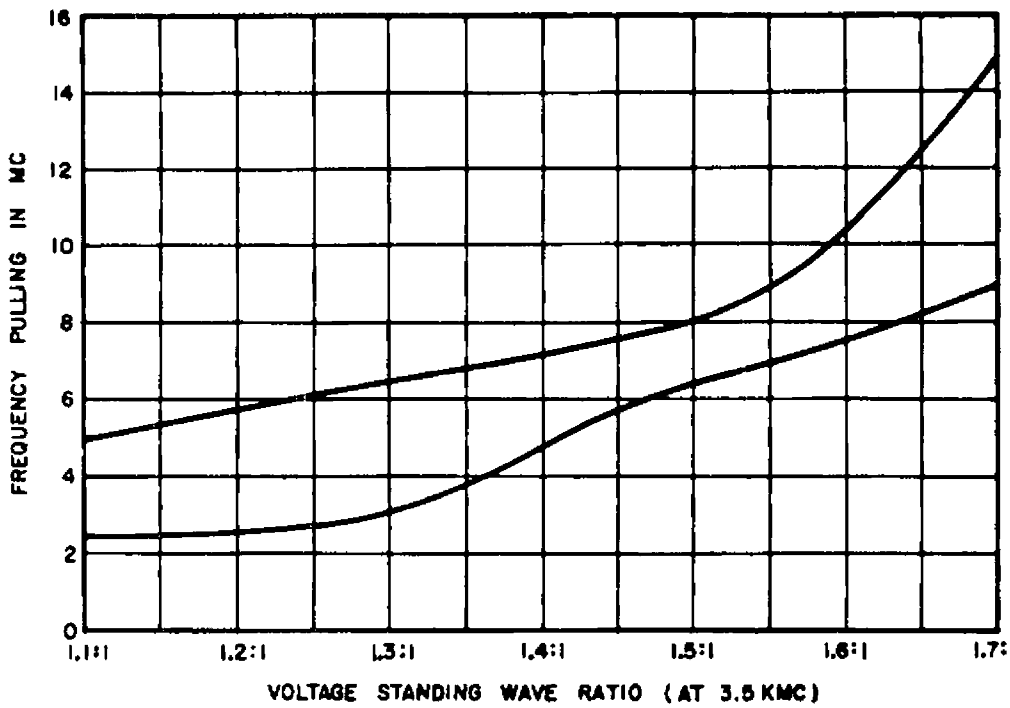

FREQUENCY PULLING IN MC
0
2
4
6
8
10
12
14
16
1.1:1
1.2:1
1.3:1
1.4:1
1.5:1
1.6:1
1.7:1
VOLTAGE STANDING WAVE RATIO (AT 3.5 KMC)

FIG. 7

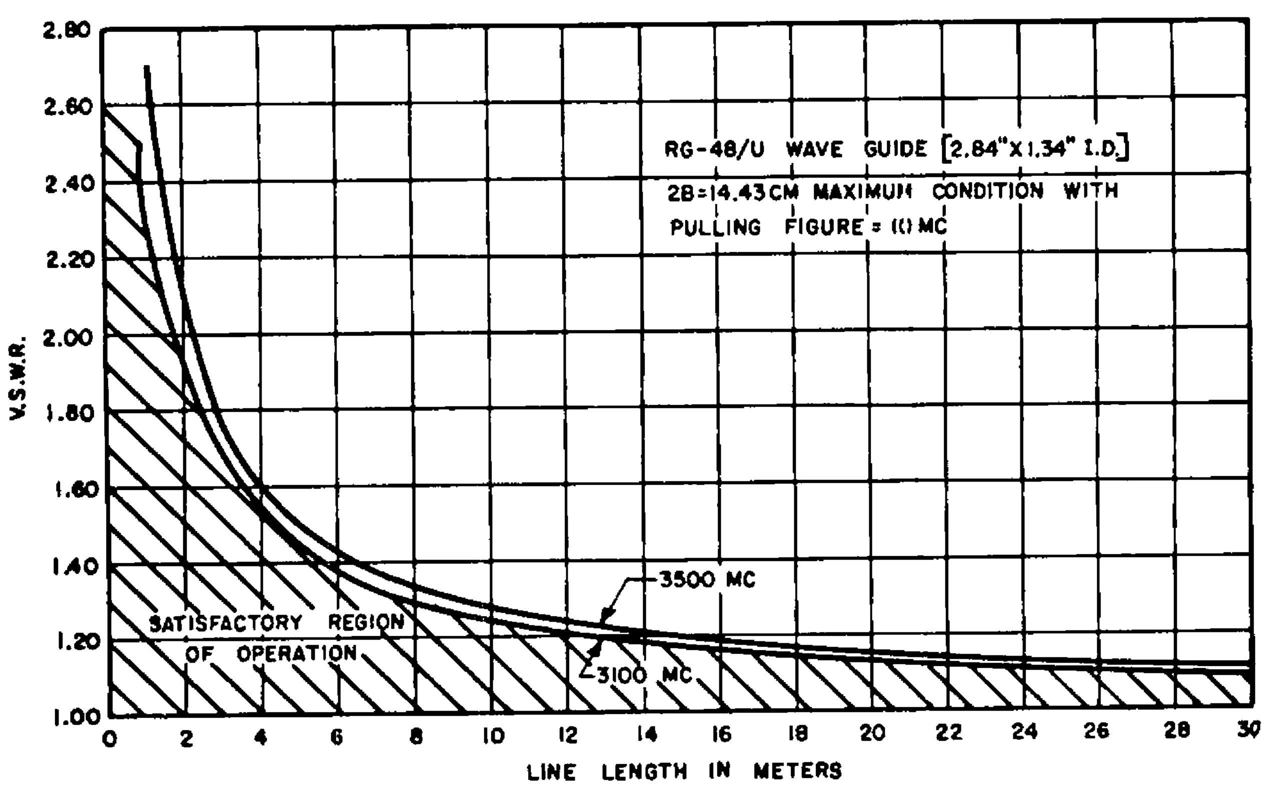
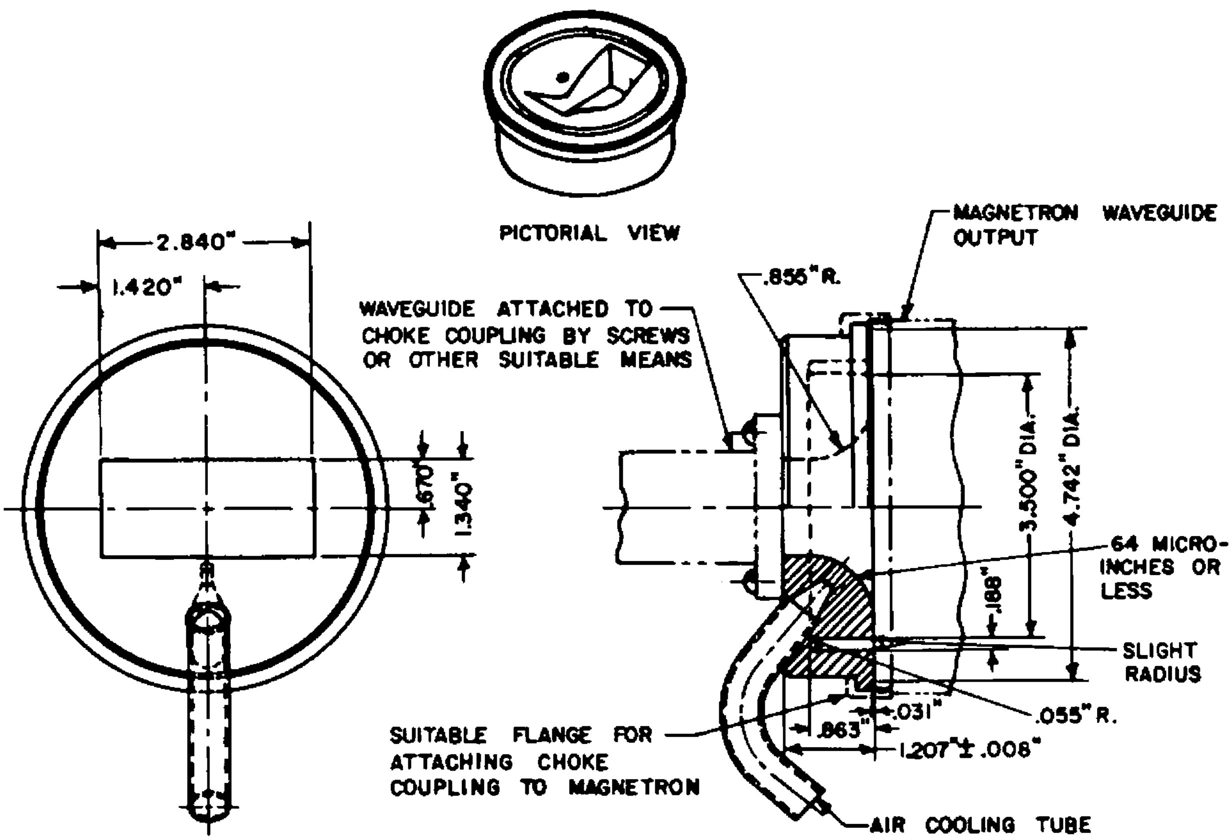

V.S.W.R.
1.00
1.20
1.40
1.60
1.80
2.00
2.20
2.40
2.60
2.80
RG-48/U WAVE GUIDE [2.84"X1.34" I.D.]
2B=14.43CM MAXIMUM CONDITION WITH
PULLING FIGURE = 10 MC
3500 MC
3100 MC
SATISFACTORY REGION
OF OPERATION
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
LINE LENGTH IN METERS

FIG. 8




CHOKE COUPLING

FIG. 9