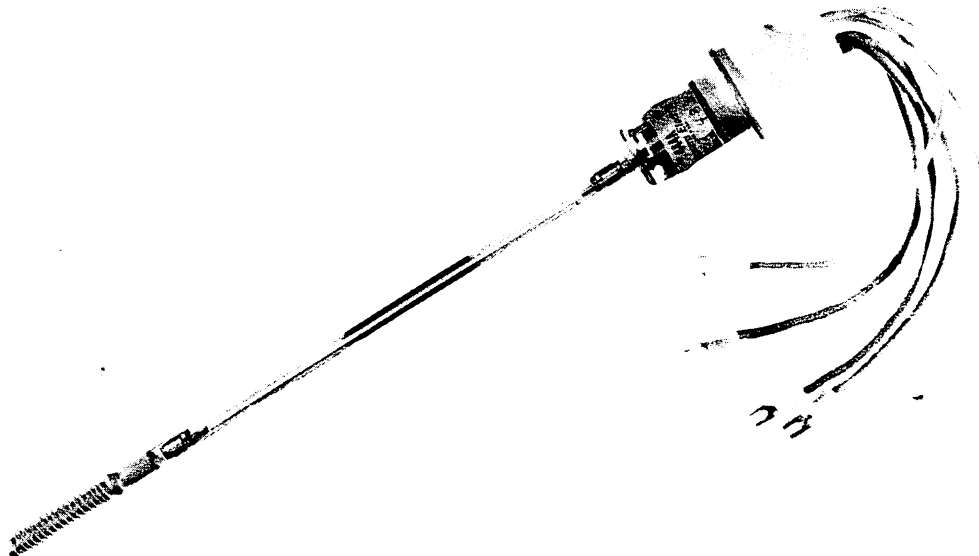


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ELECTRON TUBE DATA SHEET  
WESTERN ELECTRIC 444A ELECTRON TUBE



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DESCRIPTION

The 444A tube is a medium power helix-type traveling wave amplifier for application in the 6000 megacycle frequency region. It is intended primarily for operation as a transmitting amplifier in the repeater stations of long-distance radio relay stations.

CHARACTERISTICS

Heater Voltage . . . . .	6.3 volts
Heater Current . . . . .	0.92 amp.
Accelerator Anode Voltage . . . . .	2700 volts
Helix Voltage . . . . .	2400 volts
Collector Voltage . . . . .	1200 volts
Power Output . . . . . (Min.)	5 watts

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File: Microwave Type Section  
Data Sheet Issue 1, 8-60

GENERAL CHARACTERISTICS (Notes 1 & 2)

ELECTRICAL DATA

Heater Voltage . . . . .	6.3 volts
Heater Current . . . . .	.092 ampere
Acceleration Anode Voltage (Note 3). . . . .	2700 volts
Accelerator Anode Current. . . . . (Max.)	0.60 milliampere
Helix Voltage (Note 4) . . . . .	2400 volts
Helix Current. . . . . (Max.)	0.4 milliampere
Collector Voltage. . . . .	1200 volts
Power Output . . . . . (Min.)	5.0 watts
Gain at 5 watts (37 dbm) Output. . . . .	32.5 db
Noise Figure . . . . . (Max.)	30 db
Gain Variation (Note 5). . . . .	.20 db
Input Match (Note 6) . . . . . (Min.)	21 db
Output Match (Note 6). . . . . (Min.)	11 db
Spurious Noise (Note 7). . . . . (Max.)	10 db

MECHANICAL DATA

Cathode. . . . .	Unipotential
Mounting Position. . . . .	Any
External Leads . . . . .	5" Flexible with lugs

MAXIMUM RATINGS, Absolute System

Heater Voltage . . . . .	6.6 volts
Accelerator Anode Voltage. . . . .	3000 volts
Anode Current. . . . .	2.0 milliamperes
Anode Power. . . . .	2.5 watts
Helix Voltage. . . . .	2700 volts
Helix Current. . . . .	2.0 milliamperes
Helix Power. . . . .	2.5 watts
Collector Voltage. . . . .	2000 volts
Cathode Current. . . . .	50 milliamperes
Collector Power. . . . .	80 watts
Heater Cathode Voltage . . . . .	± 45 volts
Bulb Temperature . . . . .	125°C
Collector Temperature (requires forced-air . . .	150°C
cooling. See Operating precautions - Paragraph A	
Page 4 ).	

TYPICAL OPERATING DATA (Notes 1 & 2)

Heater Voltage . . . . .	6.3 volts
Accelerator Anode Voltage (Note 3) . . . . .	2700 volts
Helix Voltage (Note 4) . . . . .	2400 volts
Collector Voltage . . . . .	1200 volts
Accelerator Anode Current. . . . .	0.2 milliamperes
Helix Intercept Current. . . . .	0.2 milliamperes
Collector Current . . . . .	40 milliamperes
Power Output . . . . .	5 watts
Gain . . . . .	32 db
Gain Variation With Frequency Change (Note 5). . . . .	0.15 db
Noise Figure . . . . .	28.5 db
Input Match (Note 6) . . . . .	23 db
Output Match (Note 6). . . . .	19 db
Spurious Noise (Note 7). . . . .	5 db

Note 1: Operated in a straight-field permanent magnetic circuit, using WR 159 wave guide coupling, with the following magnetic characteristics: (a) a straight field of 580 gauss minimum which tapers off to 20 gauss nominal at the cathode location (b) a cross field, in the wave guide region, of 1.2 gauss maximum in each of two orthogonal planes (c) a cross field, between wave guides, of 1.7 gauss maximum in each of two orthogonal planes.

Note 2: Operated with the input frequency being swept over the range of 5925 to 6425 mc.

Note 3: Adjusted for collector current of 40 milliamperes.

Note 4: Adjusted for maximum gain while the output power is maintained at 5 watts.

Note 5: Measured over the 50 mc segment of the 5925 - 6425 mc band having the greatest gain variation.

Note 6: The match is measured on the basis of return loss, i.e. the amount by which a reflected signal is down from an incident signal, expressed in decibels. The values given are at the points of minimum return loss in the frequency band of 5925 to 6425 mc with match adjusted to it's best position for the entire band. The match is measured with the tube in its maximum gain condition per Note 4.

Note 7: Spurious noise includes all wide-band or narrow-band spikes. For this test the tube input is single frequency (not swept). The limit given is the level above the normal tube thermal noise output, when thermal noise and spurious noise are measured simultaneously in a bandwidth of 2500 cycles, the 2500 cycle bandwidth being examined over the frequency range of 0.3 to 10 mc away from the driver frequency.

OPERATING PRECAUTIONS

- (a) The tube should not be operated without cooling air on the collector terminal. The required air flow will depend on the physical configuration of the housing surrounding the collector.
- (b) The operating voltages are arranged to facilitate the flow of positive ions toward the collector rather than toward the cathode. Therefore, for optimum cathode life the accelerator anode voltage should be maintained at least 25 volts above the helix voltage. However, this voltage condition is violated initially when putting the tube into operation. The sequence of voltage application should be - heater, collector, helix and anode. The reverse order is used when terminating operation of the tube.
- (c) For optimum tube life the current to the helix should be maintained at the minimum value obtainable.

TYPICAL OPERATION RANGE FOR 100 MC BANDWIDTH

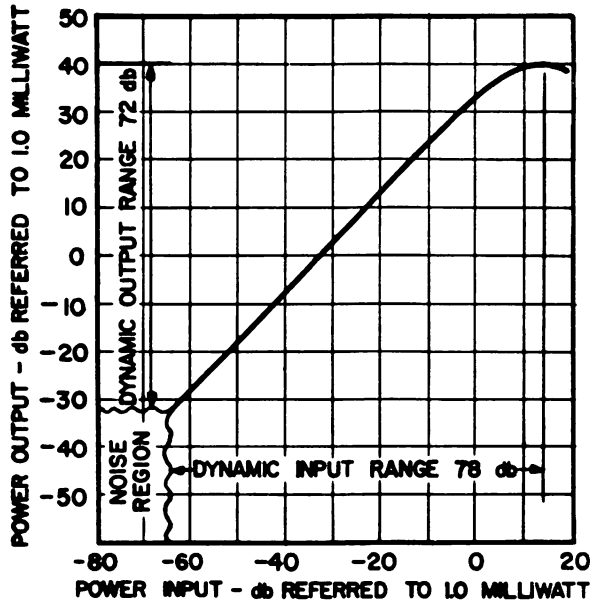


FIG 1

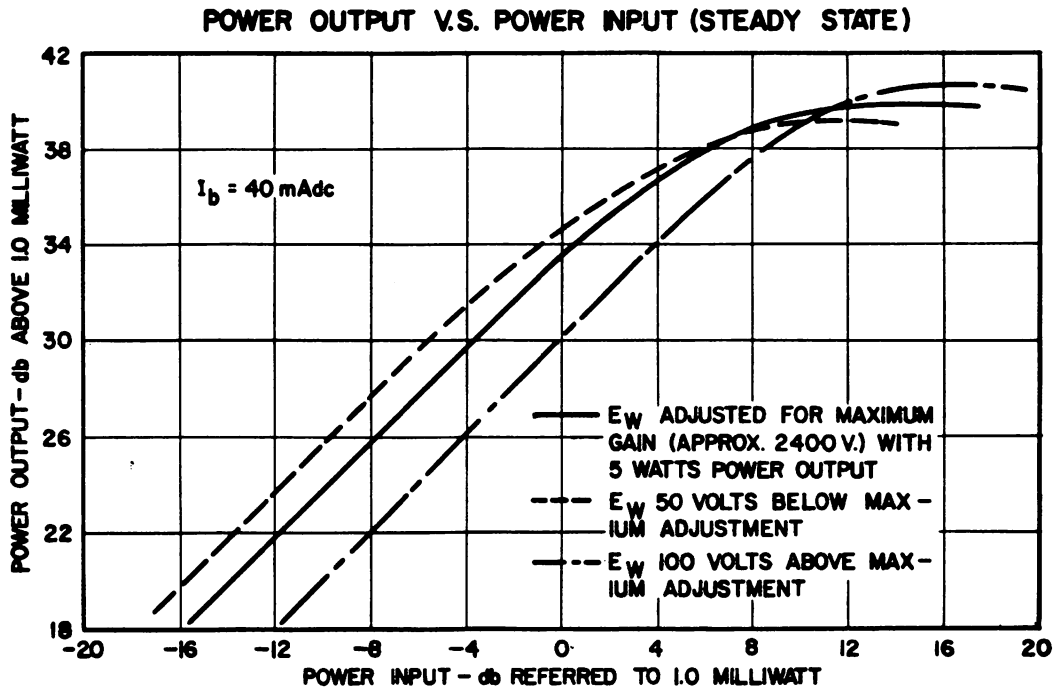


FIG. 2

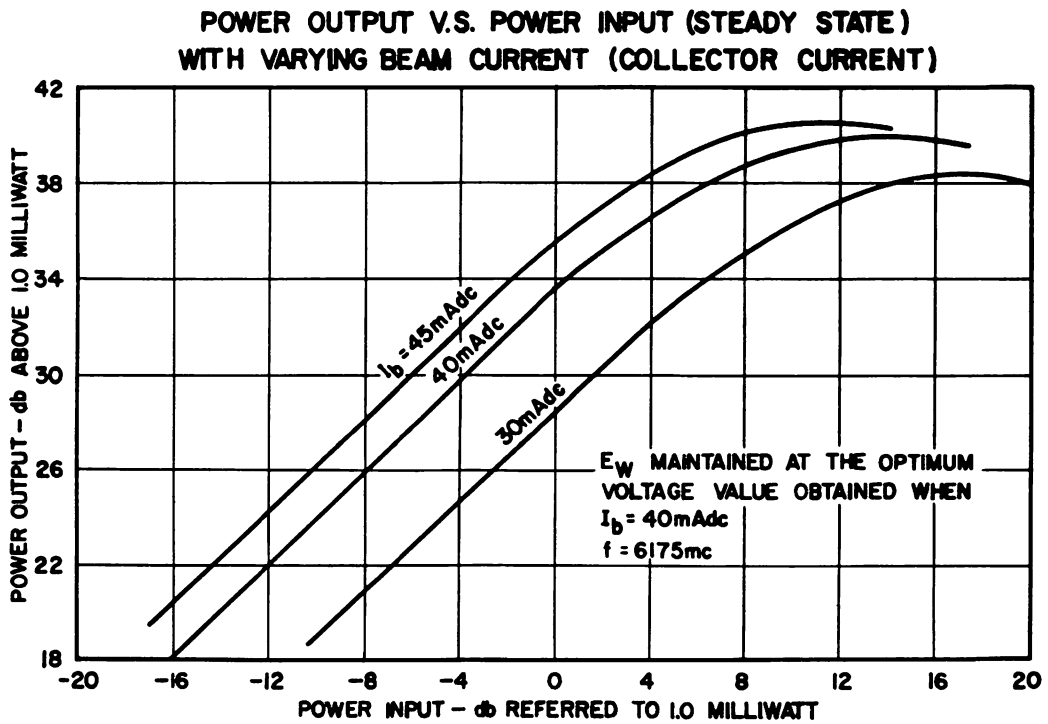
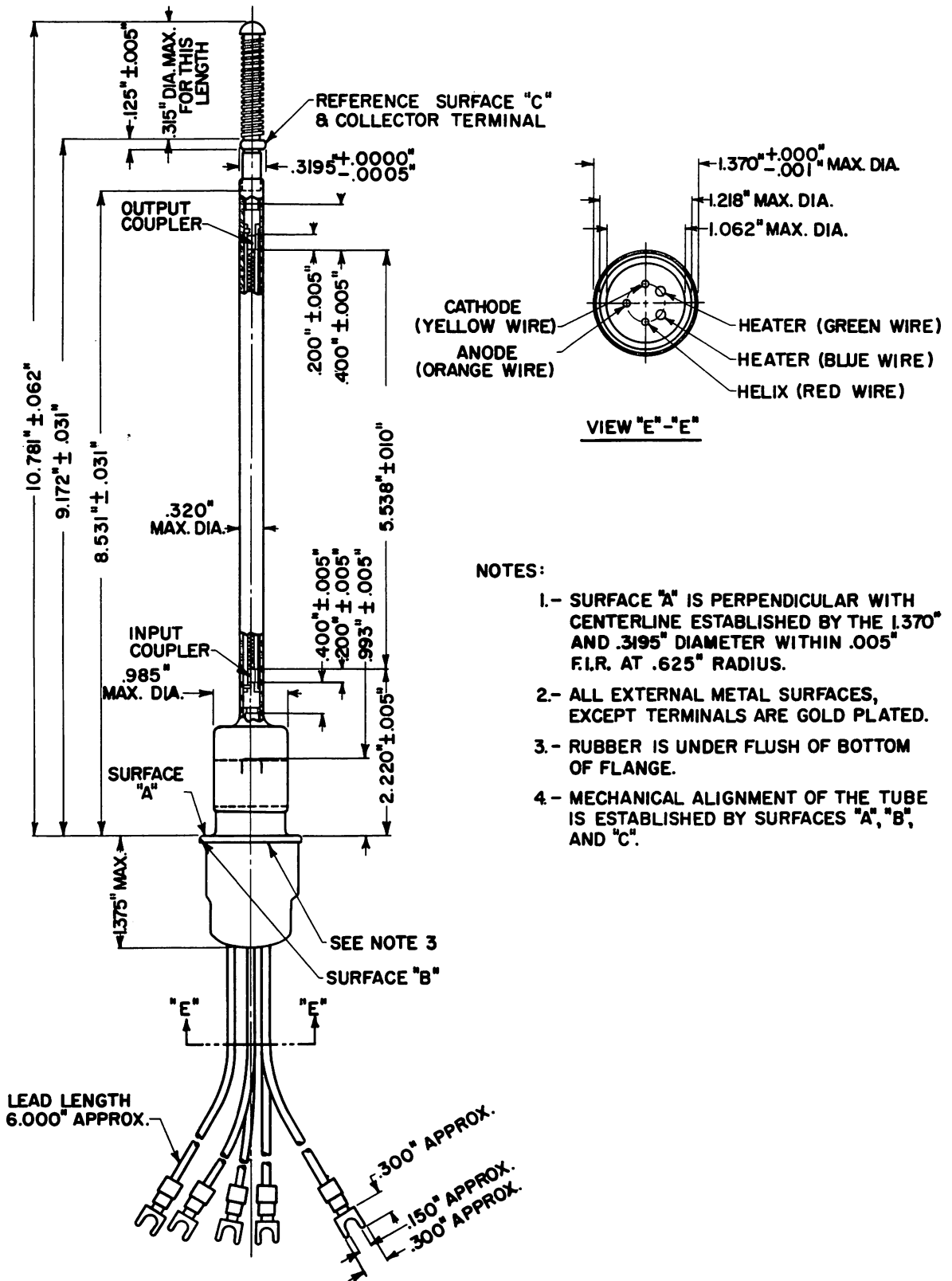


FIG. 3



- NOTES:
- 1.- SURFACE "A" IS PERPENDICULAR WITH CENTERLINE ESTABLISHED BY THE  $1.370''$  AND  $.3195''$  DIAMETER WITHIN  $.005''$  F.I.R. AT  $.625''$  RADIUS.
  - 2.- ALL EXTERNAL METAL SURFACES, EXCEPT TERMINALS ARE GOLD PLATED.
  - 3.- RUBBER IS UNDER FLUSH OF BOTTOM OF FLANGE.
  - 4.- MECHANICAL ALIGNMENT OF THE TUBE IS ESTABLISHED BY SURFACES "A", "B", AND "C".

A development of Bell Telephone Laboratories, the research laboratories of the American Telephone and Telegraph Company and the Western Electric Company.