



varian
palo alto tube division

TECHNICAL DATA

**VA-946C
VA-947C
VA-948C**

**CW KLYSTRON AMPLIFIERS
470-890 MHz**

DESCRIPTION

VA-946C, VA-947C, and VA-948C are five-cavity, vapor-cooled klystrons for use as final amplifier tubes in both visual and aural sections of UHF-TV transmitters. When used in the visual socket, each tube will deliver peak-of-sync output of up to 32.5 kilowatts over its tunable range. These three klystrons cover the frequency range of 470 to 890 megahertz in three consecutive segments. Gain is at least 45 dB at peak-of-sync with very low drive power. The modulating anode enables each tube to operate also in the aural section of the transmitter at reduced output level using the same beam supply as the visual section. Each tube uses an electromagnet for focusing and is self-centering in its magnet. Installation is simplified by rollers on the tube body which engage tracks in the electromagnet.

FEATURES

High Power --

Up to 32.5 kW peak-of-sync visual output and 7 kW aural output for reliable, long-life performance.

High Gain --

Gain of at least 45 dB produces an output of 32.5 kW with less than 1 W of drive power.

Ample Bandwidth --

One-dB bandwidth is at least 8 MHz over the tuning range. Output power will not vary more than ± 0.5 dB over the range of -1 MHz to +5 MHz from visual carrier frequency and over the power levels from white to black.

Vapor Cooling --

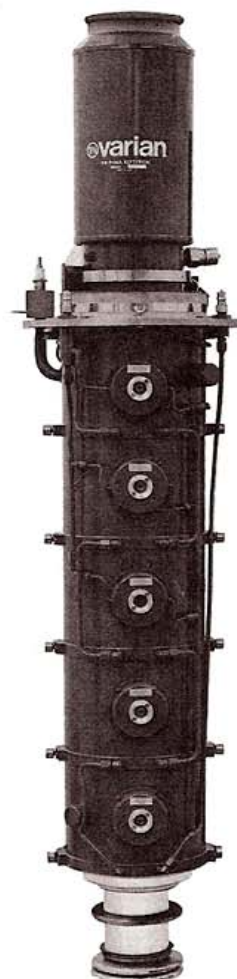
Reduces equipment size, noise, and cost.

Simple Installation and Operation --

Each tube can be furnished factory tuned to a specified frequency if desired, but is tunable over its entire frequency range. The electromagnet operates from a single power supply. Installing the tube is made easy by rollers on the tube which mate with channels in the electromagnet.

Long Life --

Rugged impregnated cathode and an integral VacIon[®] pump, to maintain a high vacuum, assure long tube life.



GENERAL CHARACTERISTICS¹

ELECTRICAL

Frequency Range	470 to 890 MHz
VA-946C	470 to 566 MHz
VA-947C	566 to 698 MHz
VA-948C	694 to 890 MHz
Heater Voltage	7.0 to 7.7 V
Heater Current, typ	17 A
Heater Warm-up Time, min	5 min
Focusing	Electromagnet

PHYSICAL

Dimensions	See Outline Drawing
Weight, approx	350 lb
Mounting Position	Cathode Down
Cooling	Water Vapor and Forced Air
Collector Water Flow, min	1.5 gal/min
Body Water Flow, min	2.0 gal/min
Body Pressure Drop,	
at min flow, max	40 lbf/in ²
Inlet Temperature, max ⁵	70 °C
Air Flow, free delivery	50 ft ³ /min

OPERATING CONDITIONS AND RATINGS^{1,2}

	Typical Operation	Maximum Ratings
Frequency, visual	519	--- MHz
Output, saturated	37.5	--- kW
Output, peak of sync	32.5	--- kW
Input	105	--- kW
Drive Power, peak-of-sync	600	--- mW
Gain, peak-of-sync	48	--- dB
Efficiency, saturated	35.6	--- %
Efficiency, peak-of-sync	30.8	--- %
Bandwidth, 1-dB	8	--- MHz
Beam Voltage	19.5	21 kVdc
Beam Current	5.4	6.1 Adc
Body Current	50	150 mAdc
Modulating Anode Voltage	19.5	21 kVdc
Modulating Anode Current	1.5	10 mAdc
Focusing Current	28	32 Adc
Load VSWR	< 1.1:1	1.5:1
Collector Temperature ⁴	105	145 °C

ELECTROMAGNET, VA-1953B, VA-1954A, VA-1955A

Total Power, max	
Voltage	145 Vdc
Current	32 Adc
Dimensions	20.25 dia x 39 in
Weight, max	650 lb

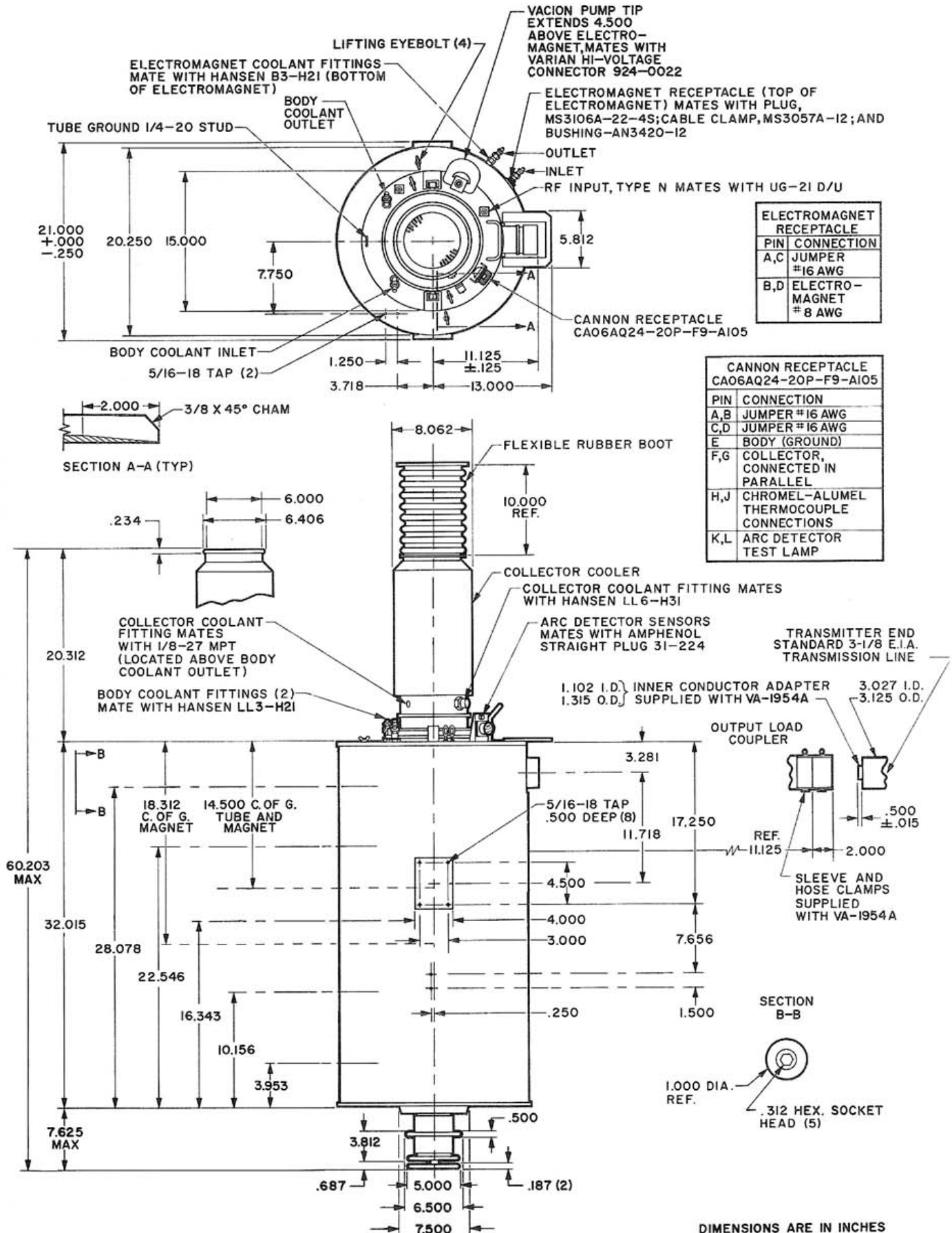
Cooling	
Water Flow, min	2.0 gal/min
Inlet Temperature, max	70 °C
Pressure Drop,	
at min flow, max	35 lbf/in ²

NOTES:

1. Characteristic and operating values are based on performance tests. These figures may be changed without notice as a result of additional data or product refinement. Consult Varian before using this information for final equipment design.
2. Ratings should not be exceeded under continuous or transient conditions. A single rating may be the limitation and simultaneous operation at more than one rating may damage the tube. Equipment design should limit voltage and environmental variations so that the ratings will never be exceeded.
3. Typical operation assumes an 85% peak-of-sync/power ratio. Other ratios can be used depending upon the degree of linearity required.
4. The collector temperature is monitored by the chromel-alumel thermocouple attached to each tube at the point indicated on the outline drawing.
5. For optimum performance, the water inlet temperature should be maintained within 5 °C of the coolest practical value.

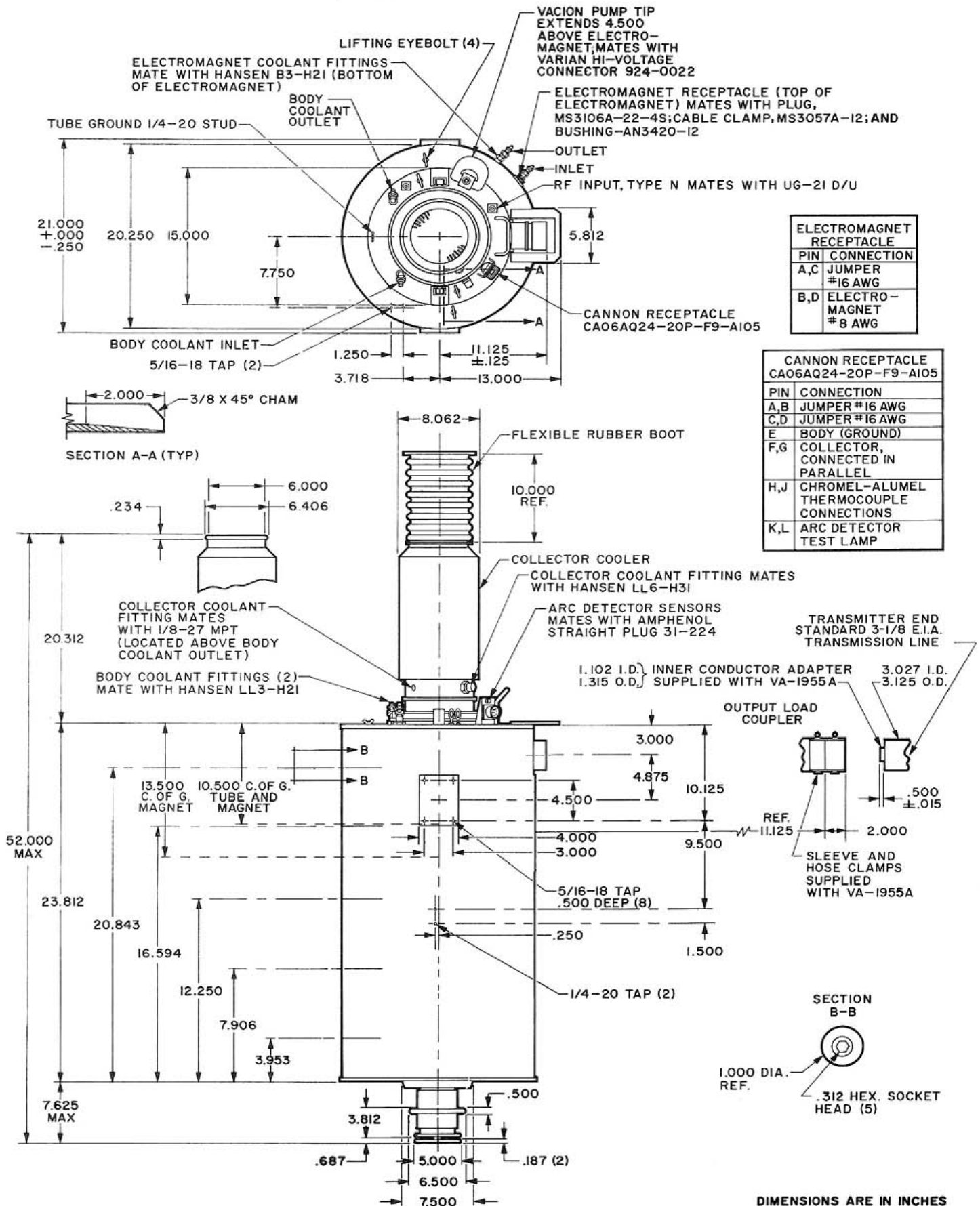


OUTLINE DRAWING
VA-947C IN VA-1954A ELECTROMAGNET



OUTLINE DRAWING VA-948C IN VA-1955A ELECTROMAGNET

VA-946C, VA-947C, VA-948C



DIMENSIONS ARE IN INCHES