



**varian**  
palo alto tube division

## TECHNICAL DATA

# 3KM50000PA-2

## KLYSTRON AMPLIFIER

225-400 MHz  
20 kW

### DESCRIPTION

The 3KM50000PA-2 is a three-cavity, externally-tuned klystron amplifier for use in communication systems. This tube delivers a narrowband CW output of 20 kilowatts or more over its tunable frequency range of 225 to 400 megahertz. It includes an integral modulating anode, which provides a convenient means for amplitude or pulse modulation. The external cavities permit an unlimited number of tuning cycles without damaging the vacuum seals. The 3KM50000PA-2 operates within the H-126 R-F Circuit Assembly, which includes the focusing electromagnets, tunable cavities, output load coupler, and an SK-110 Air System Socket.

### MAXIMUM RATINGS<sup>1</sup>

|                                |          |
|--------------------------------|----------|
| Beam Voltage .....             | 23 kVdc  |
| Beam Current .....             | 2.75 Adc |
| Body Current .....             | 250 mAdc |
| Getter Current .....           | 50 Aac   |
| Collector Dissipation .....    | 60 kW    |
| Heater Surge Current .....     | 40 Aac   |
| Focus Electrode Voltage .....  | -500 Vdc |
| Cathode Seal Temperature ..... | 175 °C   |



### GENERAL CHARACTERISTICS<sup>2</sup>

#### ELECTRICAL<sup>3</sup>

|                                 |                |
|---------------------------------|----------------|
| Frequency Range .....           | 225 to 400 MHz |
| Heater Voltage .....            | 7.5 Vac        |
| Heater Current, typical .....   | 20 Aac         |
| Heater Warm-up Time, minimum .. | 5 min          |
| Getter Voltage .....            | 2.25 Vac       |
| Getter Current .....            | 36 Aac         |
| Focusing .....                  | Electromagnet  |

#### PHYSICAL

|                              |                       |
|------------------------------|-----------------------|
| Dimensions .....             | See Outline Drawings  |
| Weight, approximate          |                       |
| 3KM50000PA-2 .....           | 163 lb                |
| H-126 Circuit Assembly ..... | 1940 lb               |
| Mounting Position .....      | Vertical, cathode-up  |
| Cooling <sup>4</sup> .....   | Liquid and Forced Air |
| Connectors .....             | See Outline Drawings  |

#### COOLING

Values are for forced air at sea level and 20 °C air inlet temperature.

|                                            | Air Flow<br>(ft <sup>3</sup> /min) | Pressure Drop<br>(in. -H <sub>2</sub> O) |
|--------------------------------------------|------------------------------------|------------------------------------------|
| Cathode (with SK-110<br>Air System Socket) | 25                                 | 1.0                                      |
| Output Cavity                              | 100                                | 2.0                                      |

#### H-126 RF ASSEMBLY

|                                    |         |
|------------------------------------|---------|
| Prefocus Coil, maximum             |         |
| Voltage .....                      | 25 Vdc  |
| Current .....                      | 2 Adc   |
| Body Coils 1, 2, 3, and 4, maximum |         |
| Voltage .....                      | 40 Vdc  |
| Current .....                      | 20 Adc  |
| Collector Coil, maximum            |         |
| Voltage .....                      | 40 Vdc  |
| Current .....                      | 6.5 Adc |

TYPICAL OPERATING CONDITIONS<sup>2</sup>

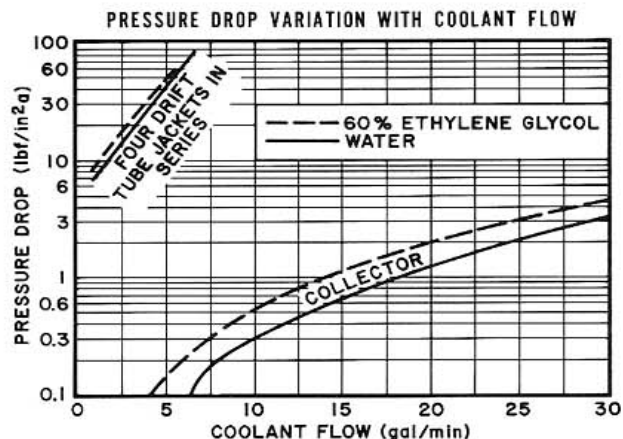
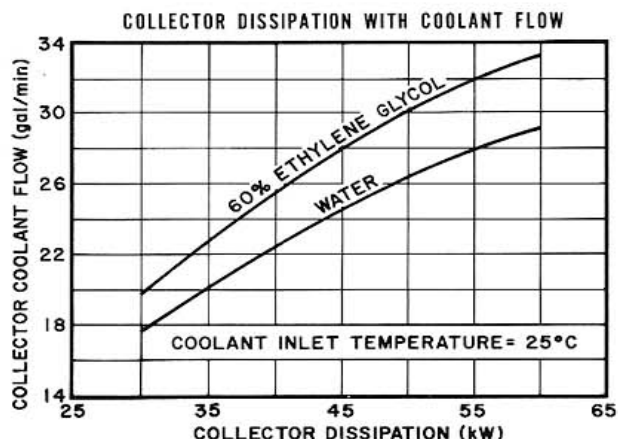
| NARROWBAND TUNED           |      |          |
|----------------------------|------|----------|
| Frequency .....            | 300  | 400 MHz  |
| Output Power .....         | 24.4 | 23.1 kW  |
| Drive Power .....          | 5    | 5 W      |
| Gain .....                 | 36.9 | 36.6 dB  |
| Body Current .....         | 110  | 120 mAdc |
| Beam Voltage .....         | 23   | 23 kVdc  |
| Beam Current .....         | 2.6  | 2.6 Adc  |
| Focus-Electrode Voltage .. | -285 | -285 Vdc |
| Focus-Coil Currents ....   |      |          |
| Prefocus .....             | 0.9  | 0.9 Adc  |
| 1st Body .....             | 10.0 | 10.0 Adc |
| 2nd Body .....             | 12.5 | 12.5 Adc |
| 3rd Body .....             | 15.0 | 15.0 Adc |
| 4th Body .....             | 17.5 | 17.5 Adc |
| Collector .....            | 4.5  | 4.5 Adc  |

## NOTES:

1. 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 not be possible. Equipment design should limit voltage and environmental variations so that the absolute ratings will never be exceeded.
2. Characteristics and operating values are based on performance tests. These figures may change without notice as a result of additional information or product refinement. Varian Associates should be consulted before using this information for final equipment design.
3. To protect against internal arcs, a 10,000-ohm, 100-watt resistor should be connected between the modulating anode and the beam supply.
4. Check the characteristic curves for liquid cooling information. Distilled water is the preferred coolant. However, ethylene glycol and water mixtures up to 60 per cent ethylene glycol may be used. Metals in the circulating system should be close to copper in the galvanic series. For different coolants or operating conditions, contact the nearest Varian Sales Office, or the Palo Alto Tube Division, San Carlos, California for recommendations.

CHARACTERISTIC CURVES<sup>4</sup>

Typical performance values



## OPERATING HAZARDS

Read the following and take all necessary precautions to protect personnel. Safe operating conditions are the responsibility of the equipment designer and the user.

**High Voltage.** This tube operates at voltages which can be deadly. Equipment must be designed so personnel cannot come in contact with operating voltages. Enclose high-voltage circuits and terminals and provide fail-safe interlocking switch circuits to open the primary circuits of the power supply and to discharge high-voltage condensers whenever access is required.

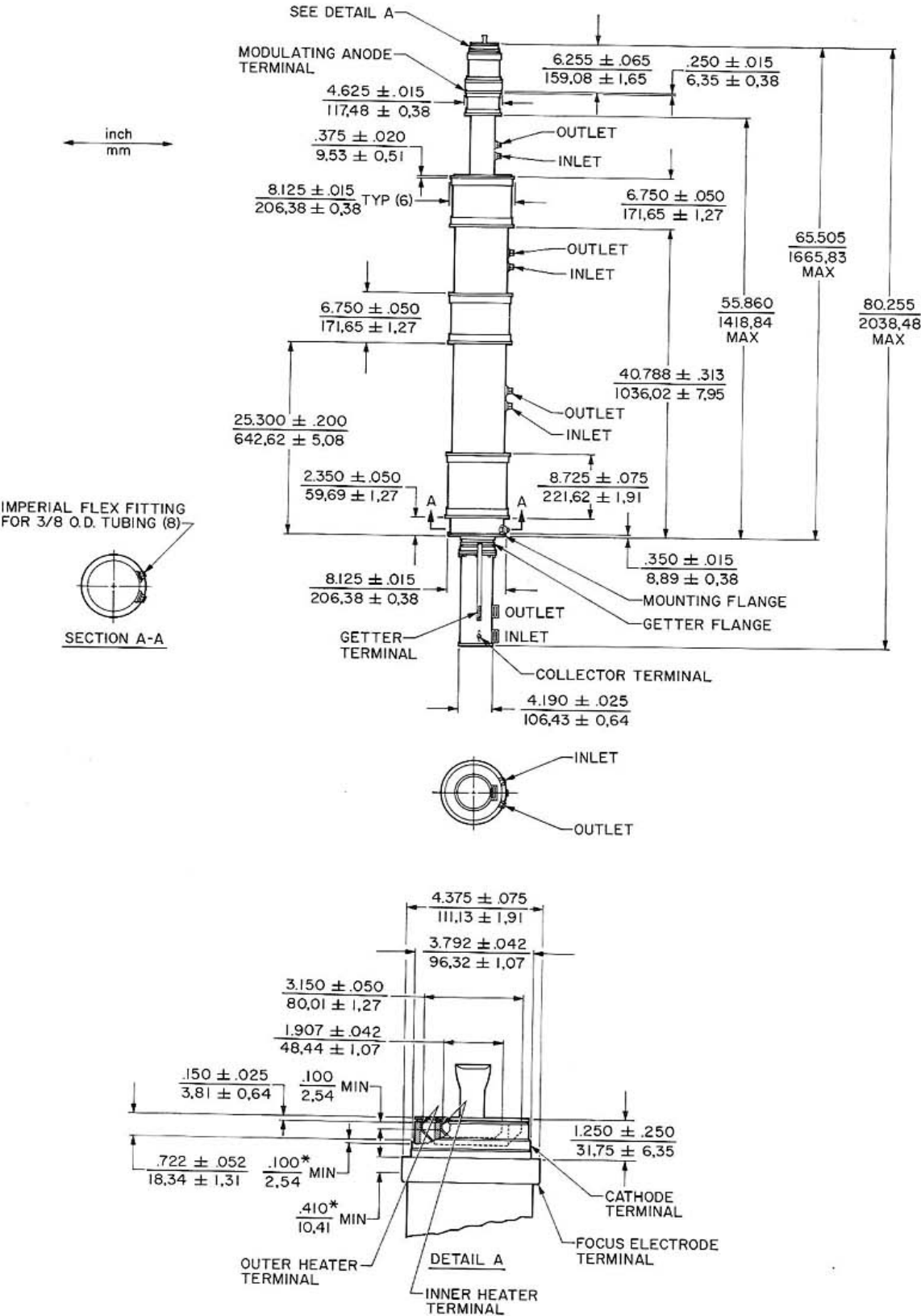
**Microwave Radiation.** Exposure of the human body to microwave radiation in excess of 1 milliwatt per square centimeter is unsafe and can result in blindness or other injury. Personnel must be fully protected from the microwave energy which radiates from this device. All input and output r-f connections, waveguide flanges, and gaskets must be r-f leakproof and

properly engaged. Never operate this device without a microwave-energy-absorbing load attached. Personnel must be prevented from looking into open waveguides or antennas while such a device is energized. (Ref. Proc. IRE, Vol. 49, No. 2, pp. 427-447, Feb. 1961).

**X Rays.** This device may produce X-ray radiation when energized. Operating personnel must be protected by appropriate shielding. Provide adequate X-ray shielding on all sides of this device, as well as the modulator and pulse transformer tanks. X-ray caution signs or labels must be permanently attached to equipment directing operating personnel never to operate this device without X-ray shielding in place.

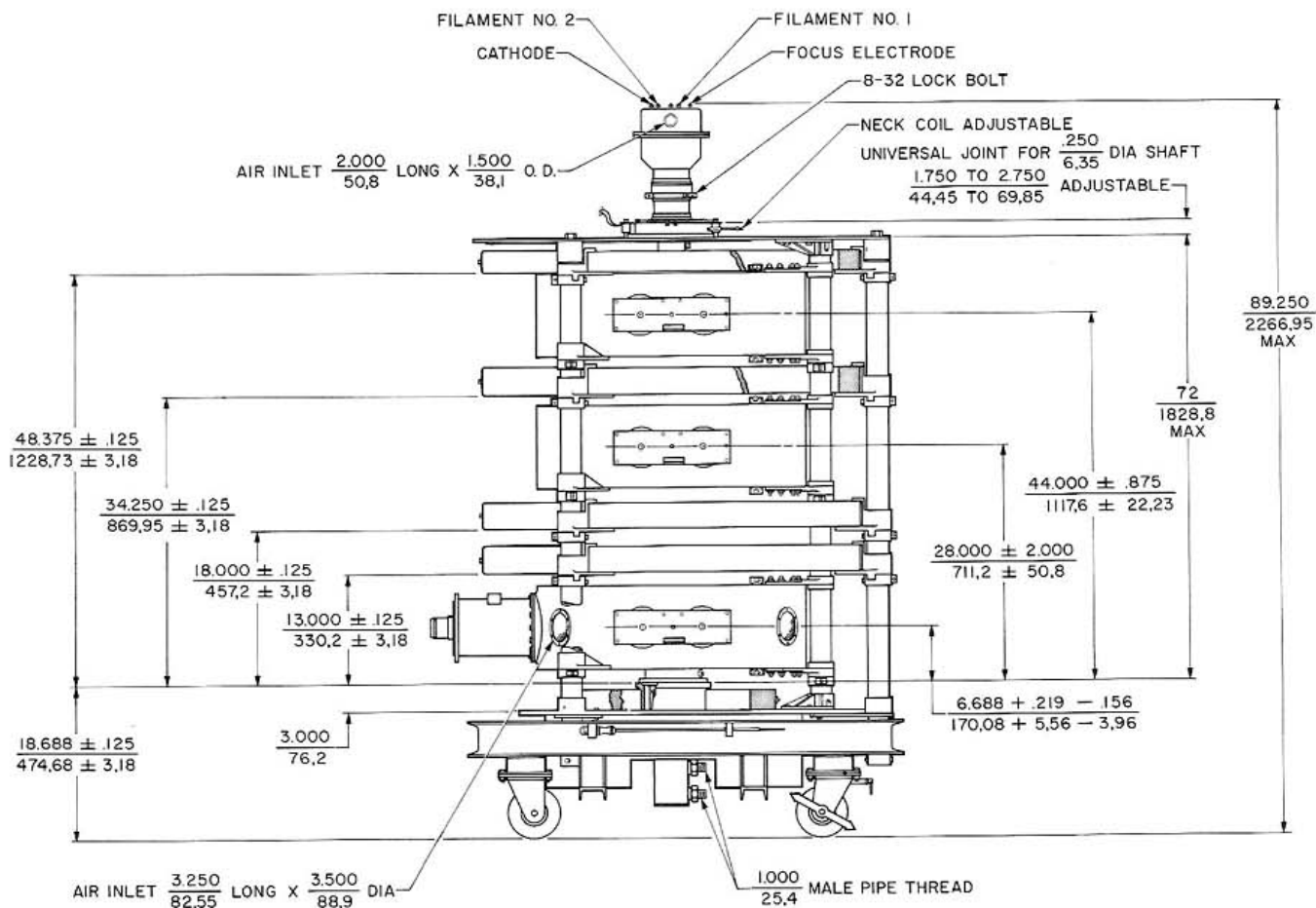
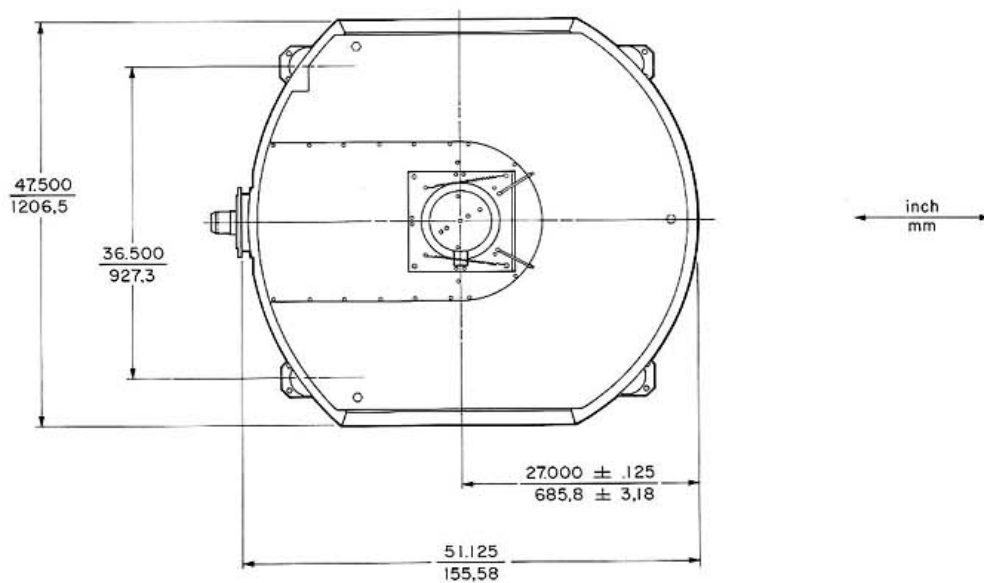
Equipment must be designed to fully safeguard all personnel from these hazards. Labels and caution notices must be provided on equipment and in manuals clearly warning of those hazards which cannot be avoided.

# OUTLINE DRAWING



\* MINIMUM STRAIGHT SURFACE FOR CONTACT

# OUTLINE DRAWING



3KM50,000PA-2 IN H-126 RF ASSEMBLY