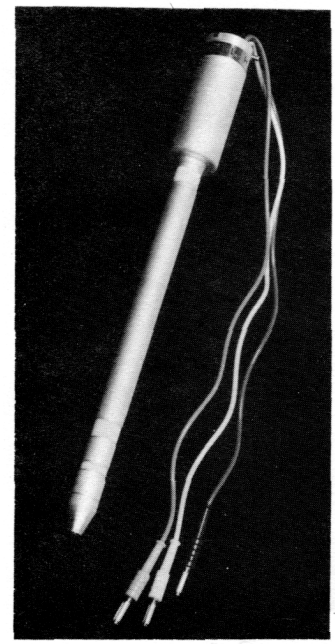
TH 9121 A TRAVELING WAVE TUBE



The TH 9121 A is a traveling wave tube of metal-ceramic construction designed for pulsed wave operation. This power amplifier is designed for S band and can provide a minimum of 30 W in the frequency range of 2700 to 3300 MHz.

Due to its ruggedness, the TH 9121 A is designed to operate under severe environmental conditions.

The R.F. input and output fittings mate with N type coaxial connectors or flat waveguides.

The TH 9121 A requires the use of the TH 19 603 B electromagnet for focusing.

GENERAL CHARACTERISTICS

Electrical

Cathode	unipotential, oxide coated	
Heating	indirect	
Heater voltage (1)	5.8	V
Heater current	1	A
Warm-up time	5	mn
Frequency range	2700 to 3300	MHz

(1) The exact heater voltage is given on the Test Data Sheet of each tube. This voltage is to be observed within ± 5%.

Mechanical

Envelope	ceramic-metal	
Operating position	any	
Cooling	forced-air	
Weight (tube)	300	g
Dimensions	see drawings	
Connections	flexible leads	

ABSOLUTE RATINGS
(non simultaneous)

	min.	max.	
Heater surge current		2	A
Heater voltage	5	6.6	V
Heater current		1.5	A
Warm-up time	300		s
Negative grid bias	- 10	- 100	V
Grid power		300	mW
Beam voltage	2.0	2.6	kV
Helix current, average		5	mA

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	min.	max.	
Cathode current peak		200	mA
Peak grid voltage		150	V
Pulse width		1000	µs
Duty factor		0.1	
Collector temperature		160	°C
Grid bias supply resistance		10	kΩ
Body temperature		70	°C
Cooling air flow	0.5		m^3/mn
Load VSWR		1.5:1	
Focus coil current		2	A
Focus coil voltage		60	V

TYPICAL OPERATION

Beam voltage	2300	V
Cathode current, peak	150	mA
Grid bias	- 20	V
Peak grid voltage	+ 40	V
Pulse width	10	µs
Duty factor	0.1	
Power output, saturated	45	W
Gain at saturated power output	33	dB
Small signal gain	36	dB
Frequency range	2700 - 3300	MHz
Focus applied power	90	W

TH 19603 B FOCUS COIL

Cooling	forced air	
Weight, approximate	12	kg
Dimensions	see drawings	
Power supply connections	pigmy PT 02A84P	
Focus coil voltage	60	V
Focus coil current	2	A

OPERATING INSTRUCTIONS

These operating instructions provide basic information for installing and operating the TH 9121 A pulsed traveling wave tube amplifier. Supplementary information is given in the Test Performance Sheet which contains test results at specific frequencies for individual tube.

I - Protective measures

This tube should be used in equipment which provides protection as described below. In addition, installation and operating precautions should be observed, and ratings should not be exceeded.

- High voltage

Voltages required for operation of this tube are extremely dangerous ; equipment should be designed with protective interlock circuits to make physical contact with these voltages impossible.

- Heater voltage

Heater voltage given on the Test Data Sheet should be applied for at least 5 minutes before applying beam voltage. Heater surge current should never exceed 2 amperes.

- Beam voltage

An overvoltage relay should be provided to limit the beam voltage to 2.6 kV dc. A device should be provided to cut-off the grid voltage and the beam voltage if the helix current exceeds the maximum rating.

- Grid power supply

The grid power supply should present a low impedance to the grid circuit. This will prevent runaway conditions and oscillations in the grid power supply wiring due to the possibility of the grid presenting a negative resistance to the gating circuit.

The grid gate generator should have a protective circuitry to prevent the pulse duration from exceeding 1 ns. In addition, a suitable protective device (e.g. a spark gap) should be provided to limit the potential difference between grid and cathode to a maximum of 150 volts.

II - Absolute ratings

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 allow for voltage and environment variations so that ratings will never be exceeded.

III - Mounting

The tube can be mounted in any position. See the outline drawing page 4 for details.

- Mounting the tube in the TH 19603 B electromagnet.

During handling and storage the electromagnet should be kept at least 10 cm away from all magnetic material and 30 cm away from magnet.

- Unscrew the ring of the magnet.
- Carefully guide the tube into the electromagnet, without any side stress, slightly rotate the tube clockwise, until it is seated properly into its normal operating position.
- Insets of the tube and electromagnet cover should be coincident with the matching slot of the electromagnet.
- Bolt the ring to lock in place the tube and cover.

- Electrical connections

The connections are made by flexible leads, and FRB plugs, type RCA 2F2.

- Heater : brown
- Heater-cathode : yellow
- Grid : green

The R.F. input and output connectors are coaxial type "N" or flat waveguides.

IV - Operation

Check the following conditions before applying voltages to the tube :

- R.F. connectors are connected properly to their mating parts.
- Tube body is grounded by means of the D plug of the electromagnet socket.
- The collector (C plug) is isolated from ground.
- All supplies are connected.
- R.F. load is connected.
- Cooling air is flowing.
- All protective circuits are operating correctly.

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Applications of voltages (see test performance sheet)

1 - Apply focus coils current.

2 - Apply heater and allow at least 5 minutes for cathode warm-up.

3 - Apply beam voltage, step by step, (at least for the first time).

4 - Apply voltage to the grid, and at the same time :

5 - Adjust the electromagnet focusing.

Electromagnet adjustment :

The four setting mechanism are located under a protective plate, upon the electromagnet. Non magnetic tools should be used.

With the gate voltage applied to the grid, adjust the four setting mechanism to obtain minimum helix current for the given value of the collector current.

A first approximate adjustment is obtained with a reduced collector current. Repeat the operation with gradually increased values of the collector current, until the normal operating current is reached.

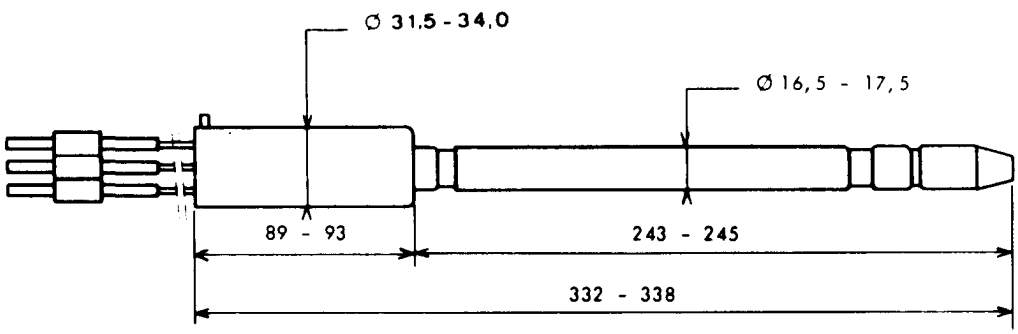
6 - Apply R.F. drive power.

V - Storing precautions

The tube should be handled and stored in its original shipping crate, it should be kept sheltered from bad weather, at ambient temperature and non corrosive atmosphere.

After a six months storage, a periodical check should be performed. The tube is unpacked and tested in the TH 19 603 B electromagnet according to the operating instructions and Test Data Sheet. The performance of the tube should be compared to the values given on the Test Data Sheet of each tube.

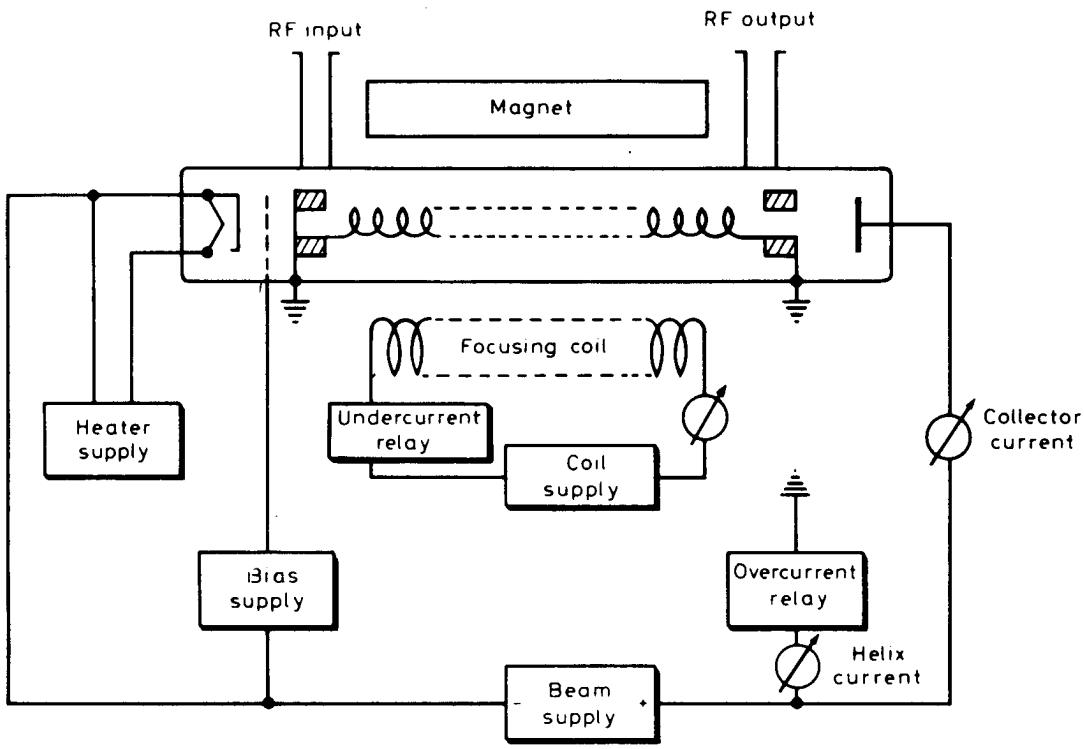
OUTLINE DRAWING



CONNECTIONS	
Brown	Heater
Yellow	Cathode-heater
Green	Grid

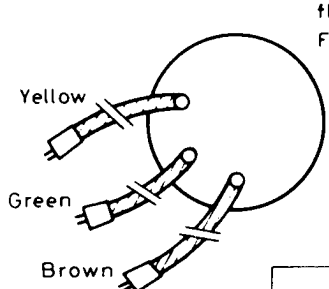
Dimensions in mm

CIRCUIT CONNECTIONS
TUBE AND ELECTROMAGNET

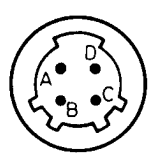


TUBE CONNECTIONS

flexible leads and FRB plugs (RCA 2F2)



FOCALIZER SOCKET
Pygmy PT 02A8 4P



CONNECTIONS	
Brown	Heater
Yellow	Cathode-heater
Green	Grid

A	Focusing coil +
B	Focusing coil -
C	Collector
D	Helix-ground

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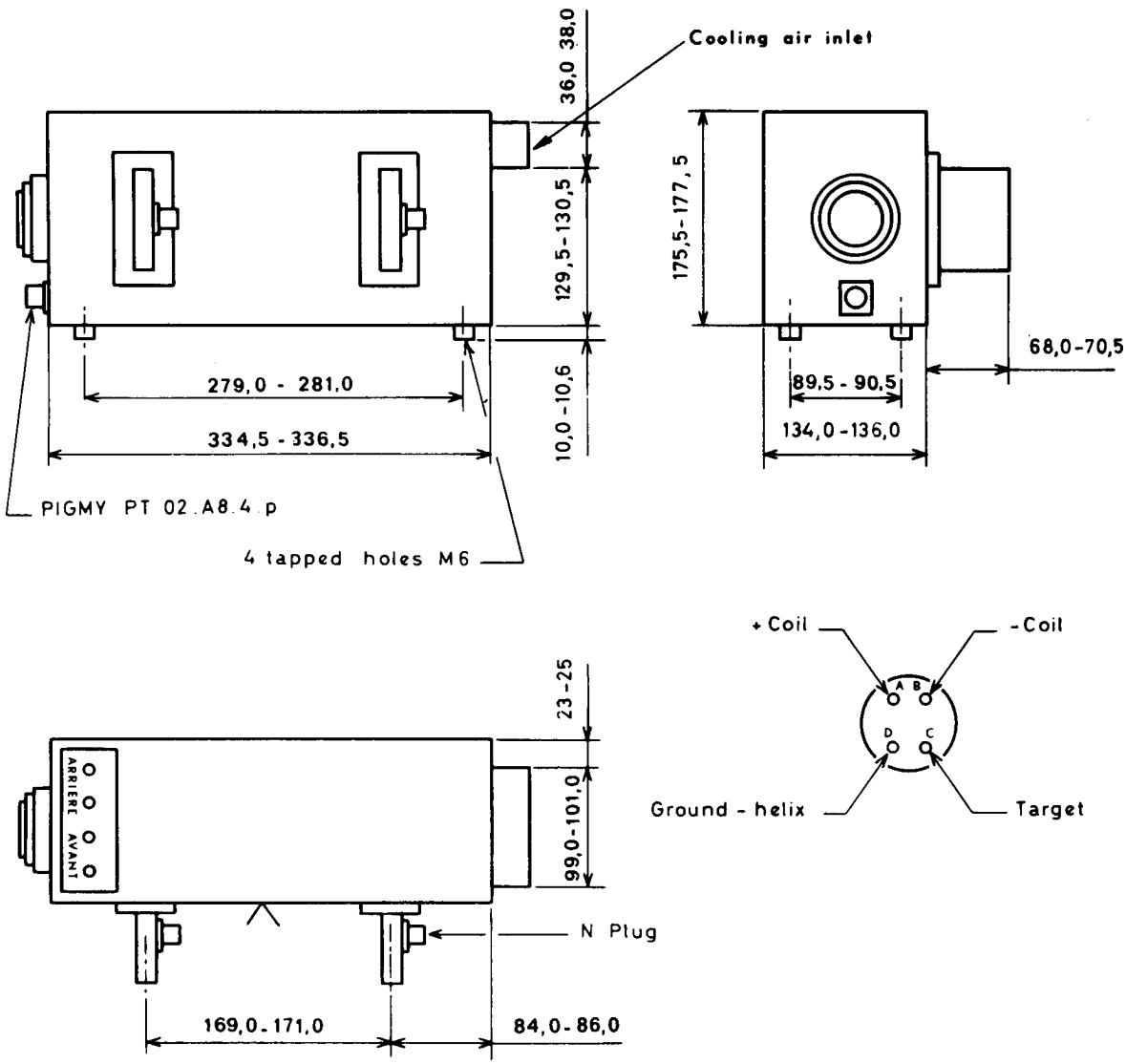
OUTLINE DRAWING

TH 19603 B Electromagnet



Dimensions in mm.