



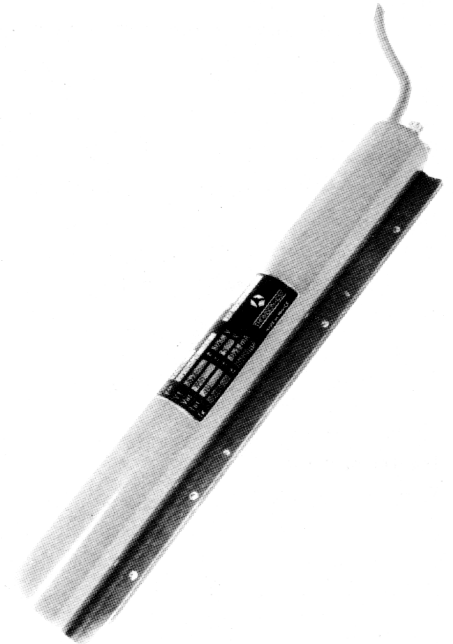
F4156 TRAVELING WAVE TUBE

The F4156 is a wide band, low noise, high gain, traveling wave tube which provides a saturated power output of 0.6 to 20 mW, from 11 to 18 GHz.

The typical noise figure is 14 dB and the small signal gain at least 39 dB.

The F4156 features periodic permanent magnet focusing, small size, light weight. Specifically intended for military airborne applications, an all ceramic and metal construction makes it highly rugged and ensures satisfactory operation under the most severe environmental conditions.

The F4156 traveling wave tube incorporates a voltage distributing network preset at the factory for optimum combination of noise figure and gain. Furthermore, power supply voltage requirements are reduced to heater voltage and high voltage.



GENERAL CHARACTERISTICS

Electrical	min.	avg.	max.	
Heater voltage	-	6.3	-	V
Heater current	0.3	-	0.8	A
High voltage supply	-	1500	-	V
Current supply	3.5	-	-	mA
Small signal gain (1)	0.6	-	20	dB
Insertion loss	70	-	-	dB
Input VSWR (2)	-	-	2 : 1	
Output VSWR (2)	-	-	2.2 : 1	
Stray magnetic field at 2 m	-	-	4	γ

(1) For $P_i = -45$ dBm

(2) Tube not supplied.

Mechanical

RF connections
Supply connections
Operating position
Weight

ATI coaxial socket, mini-ultra ref : 2008
DEUTSCH connector RSM 07.12.14.P.A.520E
any
1.5 kg


ABSOLUTE RATINGS
 (non simultaneous)

	min.	max.	
Heater voltage	6.2	6.4	V
High voltage supply			
- for the rated performances	1490	1510	V
- for tube life	1400	1600	V
Peak input power (3)	-	1	kW
Average input power	-	0.1	W
Warm-up time	120	-	s
Ambient temperature	-55	+110	°C
Depression	3	-	bar

(3) with pulse duration $\leq 50 \mu\text{s}$.

TYPICAL OPERATION

Heater voltage		6.3	V	
Heater current		0.42	A	
High voltage supply		1500	V	
Current supply		3	mA	
Cathode current		430	μA	
Collector current		420	μA	
Frequency	11	15	18	GHz
Noise figure	15.3	13.2	13.2	dB
Small signal gain (4)	38	40	36	dB
Saturated power output	12	5.4	1.4	mW
Input VSWR	1.4 : 1	1.3 : 1	1.8 : 1	
Output VSWR	1.4 : 1	1.6 : 1	2.0 : 1	

(4) For $P_i = -45 \text{ dBm}$

OPERATING INSTRUCTION
Electro-magnet

The F4156 is focused by an integral periodic permanent magnet. Before applying voltages, check that environmental magnetic field is less than 10 gauss, if not, tube performances are not guaranteed.

Helix grounding

After installation, the tube helix should be connected to ground by means of a DC short or a crystal rectifier.

Application of voltages

Before applying voltages, check that high voltage and heater voltage delivered by the supply unit are within the specified values indicated on the tube label. The meters used for this control should present an isolation from ground of at least 2000 V and accuracy of at least $\pm 1 \%$.

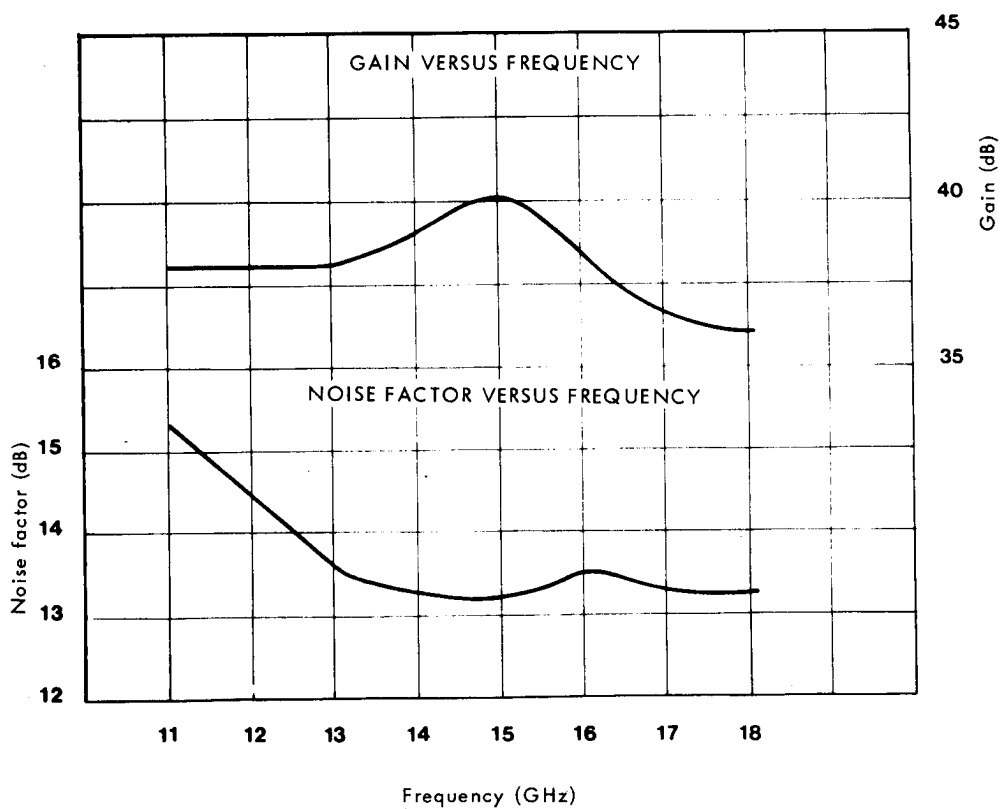
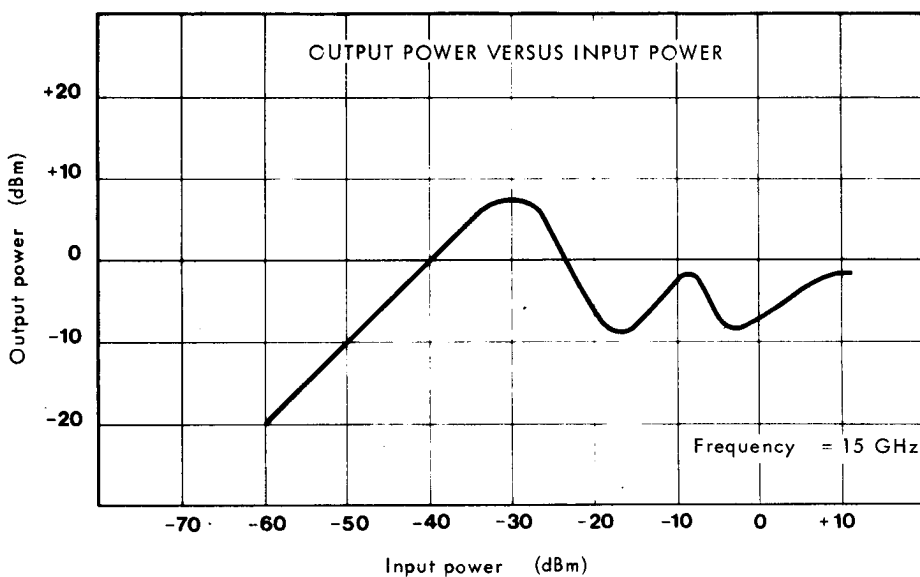
After applying heater voltage wait two minutes before applying the high voltage. A micro-ammeter connected according to the diagram given page 3 indicates if the tube is operating correctly, with respect to the values specified on the tube label. This meter should feature : full scale deviation : 1000 μA - internal resistance $\leq 1000 \Omega$ - isolation : 2000 V dc operating voltage.

Input power

The tube helix can be damaged if the input power (peak and average values) exceeds the limits given in the paragraph "Absolute Ratings".

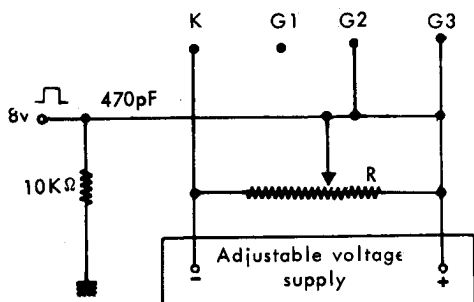
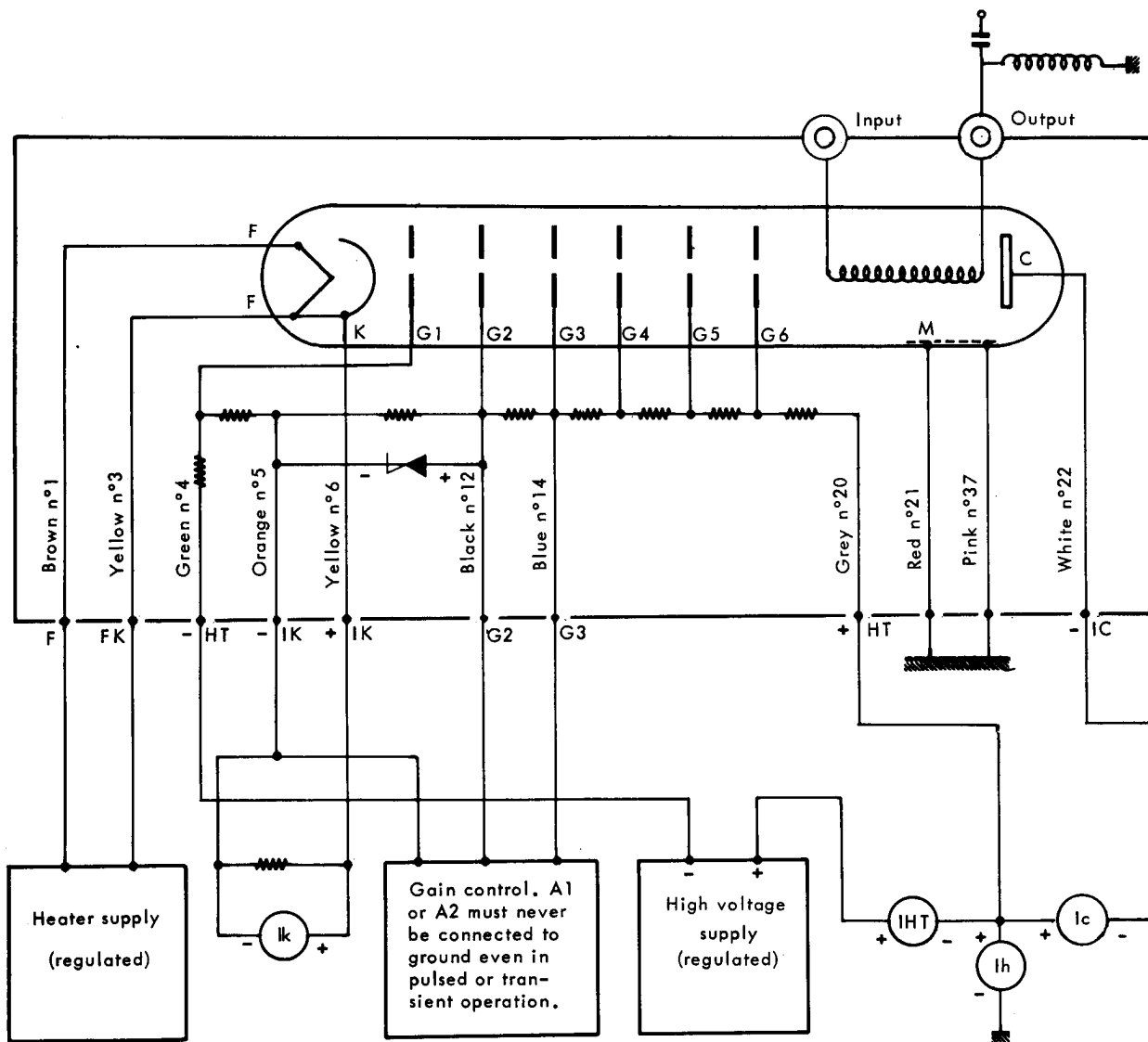


CHARACTERISTIC CURVES





SUPPLY DIAGRAM

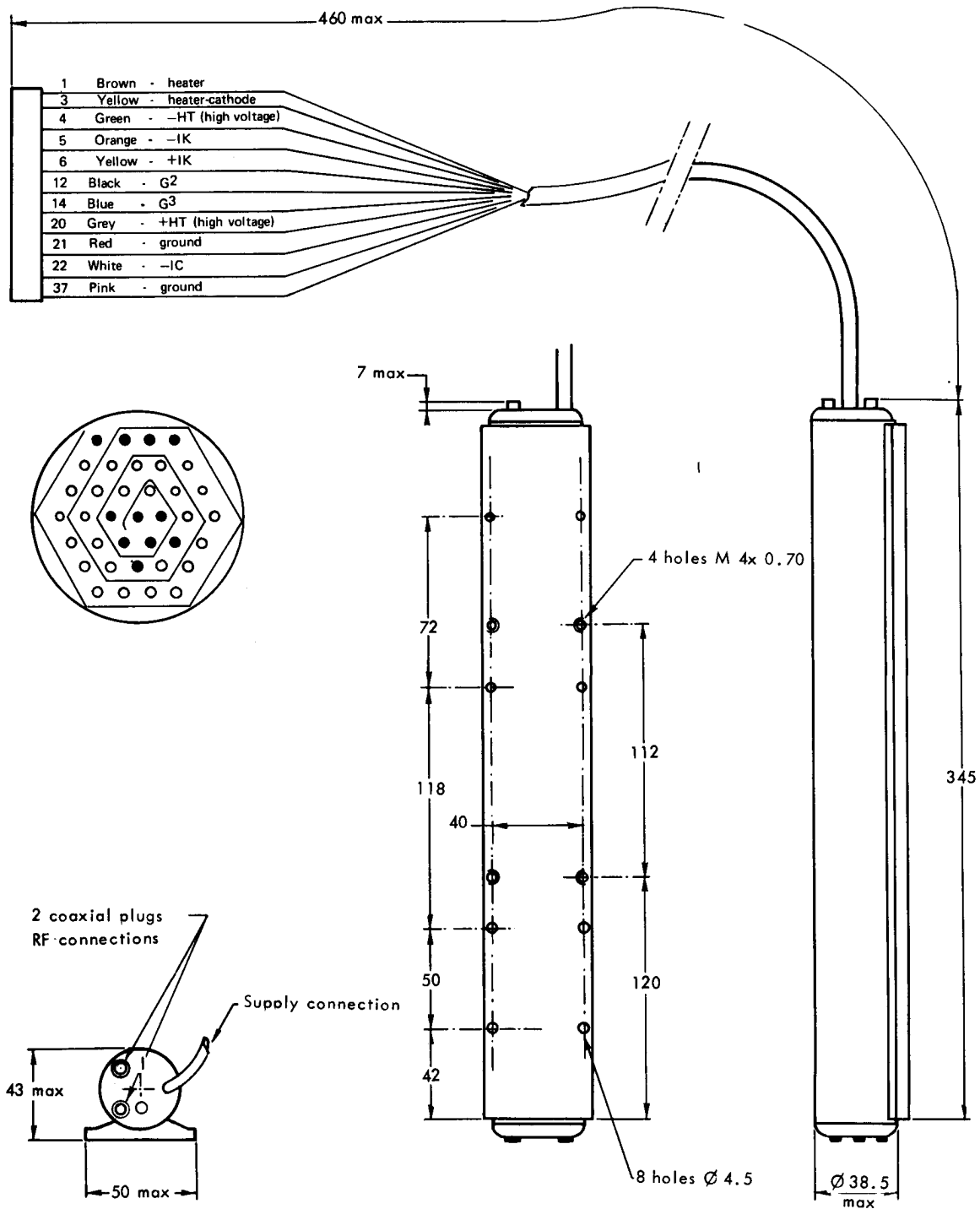


PULSE OPERATION

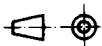
- The control pulse is applied to G2 through the 470pF capacitor..
- The TWT cut off conditions are G2 and G3 voltage decreased to 0 volt in a constant ratio fixed by R and given by the nominal values.



OUTLINE DRAWING



Dimensions in mm.





THOMSON-CSF

GROUPEMENT TUBES ET ELECTRONIQUES