

**THE MICROWAVE TRAINER, SYSTEM AND COMPONENTS****1.1 INTRODUCTION**

The Feedback MWT530 is a microwave trainer which enables students to familiarise themselves with the basic waveguide components making up microwave systems. It is an easy-to-use bench-top system which is completely self-contained. It allows students to undertake microwave measurements and investigate the working of components making up the radio frequency transmission sections of microwave radio transmitters and receivers and radar systems.

The trainer and manual provide the means for students to gain a working knowledge of microwaves and their applications and carry out basic microwave systems practical studies. The manual is written in a straightforward, clear style, and the trainer is suitable for technician and degree-level training and study.

**1.2 EQUIPMENT**

The trainer comprises a set of waveguide components and a console which contains the microwave source power supply and bridge and amplifier circuits associated with measuring microwave power and signal strength. The components and source are designed in standard waveguide size WG16 which operates in the X-band range 8.2 to 12.4 GHz, a very important band for microwave radio, satellite communications and radar applications. The source itself operates at a fixed frequency of 10.69 GHz.

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The components shown in their packing-case positions are illustrated in figure 1.1 and the complete list is given below.

## 1.3 SYSTEM COMPONENTS

Quantity	Identity No.	Description
		System waveguide: WG16 (WR90) which has the following specification: Internal dimensions: 0.9" x 0.4" or 22.86 x 10.16 mm H <sub>10</sub> cut-off frequency and wavelength: 6.56 GHz, 45.7 mm Normal operating range: 8.2 to 12.4 GHz
1	P	X-band CW Gunn Oscillator Source Frequency: fixed 10.687 GHz Output power: 10 mW typical; 5mW minimum
2	A	Variable attenuators, resistive vane-central slot type; used to set attenuation level and control power transmission in waveguides. Maximum attenuation at vane setting 0° approx. 36 dB; minimum at 90° less than 1 dB
1	B	Waveguide slotted line, for sampling electric field pattern in waveguide; used with diode-probe detector to measure guide wavelength, vswr and impedance
1	C	Slotted line-probe tuner used as an impedance matching device
1	D	Cavity wavemeter. Circular cross-section cavity wavemeter which resonates in the E <sub>011</sub> mode and designed to measure frequency in the X-band range
1	E	H-plane or shunt Tee waveguide junction; acts as a power divider in the plane containing the incident H (magnetic field)
1	F	Direction coupler: side-wall coupler type with directional coupling property, used to monitor power and measure vswr
1	G	E-plane or series Tee waveguide junction; acts as a power divider in the plane containing the incident E (electric field)

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Quantity	Identity No.	Description
1	H	Hybrid Tee, also known as a 'magic Tee', is a superposition of a shunt and a series Tee junction to form a 4-way junction; used to effect common transmitter/receiver antenna operation and in balanced mixer circuits
2	J	Waveguide-to-coaxial transformer, used to interconnect waveguide to coaxial line and vice-versa
1	K	Resistive termination, a waveguide section containing a taper of lossy material to absorb incident microwave signals; ideally should absorb totally incoming signals without any reflection - it then acts as a matched load
1	L	Thermistor type bolometer, a temperature-sensitive resistor mounted in waveguide and used in conjunction with a Wheatstone bridge network to measure microwave power
1	M	Diode detector in waveguide mount, used to rectify microwave signals for their detection; at low-power levels diode detector output current is directly proportional to the microwave power being detected.
2	N	Horn antenna, an important microwave antenna widely used as a feed to microwave parabolic reflectors in radio, satellite and radar systems, and also as an antenna in its own right
2	R	Short-circuit termination, metal plates used to short-circuit waveguide section; employed in impedance measurements to determine reference planes, also used to measure guide wavelength and crystal detector law in conjunction with slotted line
2	S	Probe detector, diode detector mounted in coaxial section with inner conductor acting as a probe; used in conjunction with slotted line and directional coupler to detect microwave signals (n.b. Letter S not marked on unit)
1		Manual MWT530

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Quantity	Identity No.	Description
1		Length of coaxial cable (approx. length and external diameter 380 mm, 10 mm) with N-type connectors
		Accessories, contained in plastic bags: 2 coaxial cable (approx 3 mm external diameter) with BNC connectors for detector/bolometer connection to console 24 flange coupling plates for interconnecting waveguide components 24 plastic clips (grip feet) 4 44 x 19 mm support plates

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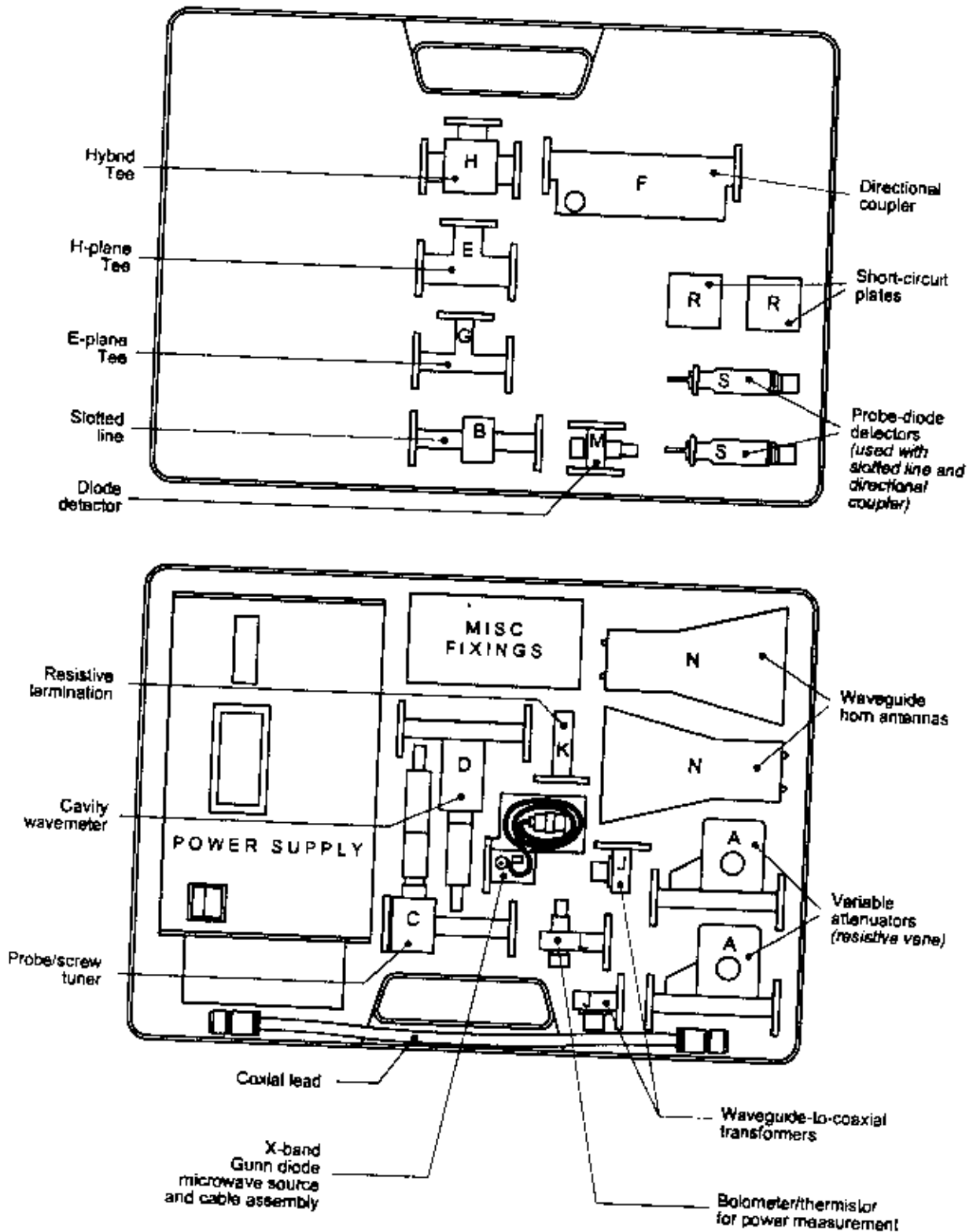


Fig 1.1 System components: case content