

**UNILAB<sup>®</sup>**

**Microwave Apparatus**

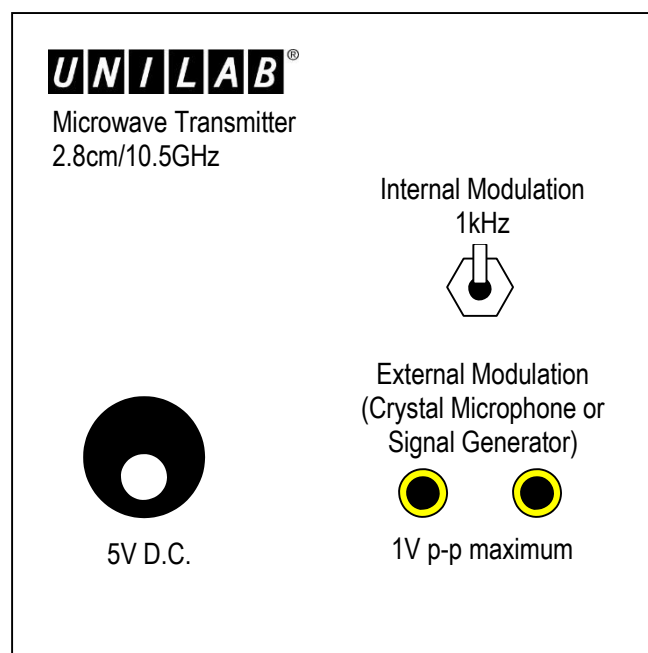
**NFU 441**

## Transmitter Unit (Tx)

The Tx unit transmits polarised microwaves with a wavelength of 2.8cm, thus with a frequency of 10.5GHz. To turn it on, connect the 5V plug top power supply to the mains, and the jack into the 5V d.c. input of the Tx.

The Tx features a 1 kHz internal modulator. This is on when the switch on the back is in the up position.

The Tx can also be modulated by an external signal, such as a crystal microphone or signal generator. The input signal must not exceed a peak to peak voltage of 1V, so the amplitude of a sine wave, for example, must be 0.5V maximum. To enable this, the source of the signal must be plugged into the yellow sockets, with the switch in the down position. If there is no signal generator connected but the switch is in the down position, then the Tx will emit unmodulated microwaves. If desired, this can be used to turn off modulation.



Back of the Tx unit

version 16.09

## Receiver Unit (Rx)

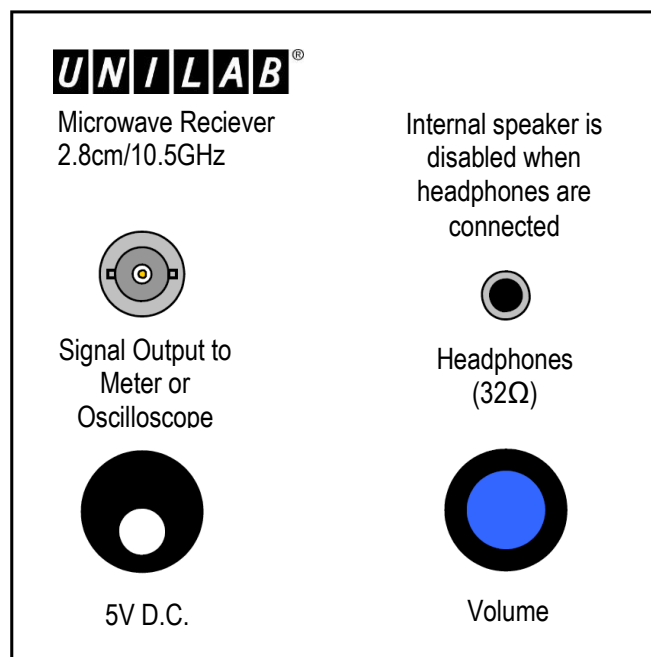
The Rx unit, detects polarised microwaves with a wavelength of 2.8cm, thus with a frequency of 10.5GHz, as produced by the Tx. To turn it on, connect the 5V plug top power supply to the mains, and the jack into the 5V d.c. input of the receiver.

The Rx features a demodulator and an internal speaker. If the received microwaves are modulated, then this signal will be played through the speaker. For example, if the 1 kHz internal modulator is enabled on the Tx unit, and this signal is received by the Rx, then the internal speaker will emit a 1 kHz tone. The amplitude of this will depend on the signal strength and the volume setting.

A 3.5mm headphone socket is provided on the back on the receiver. If headphones are plugged into this socket, then the internal speaker is disabled. This allows multiple experiments to be carried out in a room without the sounds interfering. Use any standard headphones as supplied with personal music players.

The volume control controls either the internal speaker volume, or that of the headphones if plugged in. The volume increases as this is rotated clockwise. The internal speaker can be turned off if desired, by rotating the volume control fully anticlockwise.

A BNC socket is provided for connection to an oscilloscope to observe any received signal. Alternatively, this could be connected to a basic voltmeter to indicate the strength of the signal received. The output voltage from this is typically 2 to 4V at a range of 17cm. An analogue meter is recommended to observe gradual changes in signal strength.



Back of the Rx unit

version 16.09

## Probe Receiver Unit (PRx)

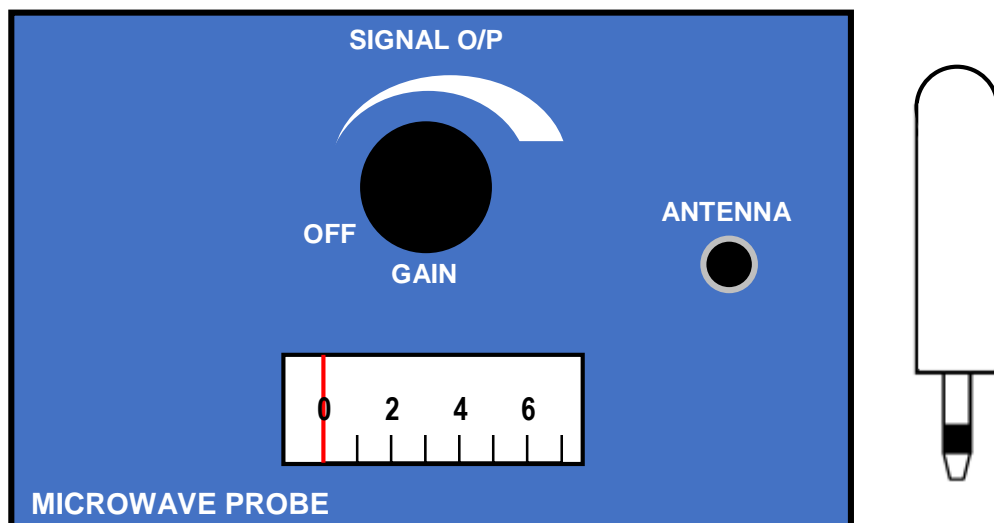
(Please note this is not included with all kits, and may be purchased separately)

The PRx is intended for more precise measurement of field strength, and features a near point detector.

Output is via an inbuilt moving coil meter, which is backlit when turned on. The unit also features a BNC output for connecting to a loud speaker via an amplifier, or to a larger voltmeter, oscilloscope or datalogger.

On the front panel are a 3.5mm socket, into which the probe is plugged, and a gain control knob. When the gain control is turned fully anticlockwise, it clicks off.

The unit is powered by an internal 9V PP3 battery, available separately. To install the battery, simply remove the sliding panel on the back, attach the battery to the internal clip, insert the battery into the space and replace the cover.



## Accessories

Included accessories are three aluminium reflectors, which act like mirrors. A hardboard reflector, which partially reflects signal and partially transmits, and a polarisation grill. Pairs of feet are provided for each reflector to help them stand up.

version 16.09

## Ratings

## Warnings

For your safety, this product should be used in accordance with these instructions, otherwise the protection provided may be impaired.

## EMC:

This equipment is Class A according to the EMC standard EN 55011 and is intended for use in a non-domestic environment only.

**Do not open or remove covers or panels.** Repairs and service may only be carried out by our repair agent, otherwise the warranty may be void.

Use only the 3-core mains cable supplied with the unit. If the mains cable is replaced, the rating of the replacement must be the same or better than the original.

The unit must be earthed at all times. The unit is earthed/grounded through the 3-core mains lead, so no additional earth connection is required.

Always position the power supply so that it can be disconnected from the mains, if an emergency arises.

This unit is intended for use in DRY conditions. Avoid spillage of water and other liquids on to the unit. If spillage occurs, disconnect the mains supply.

There is no specific requirement for insulation of external circuits as they cannot become hazardous live, as a result of connection to this unit. Limit the length of any connecting leads to 3 metres.

## Periodic testing:

Check the mains lead and plugs at both ends for any damage.

Periodically check the earth bonding and insulation, by performing a Portable Appliance Test (PAT). Most schools and local authorities have a regular schedule for such testing.

Check the action of the electronic cutout, by short circuiting the power supply output (check dc and ac outputs separately) using a short 4mm plug lead.

Check that the fuse in the mains plug (5A recommended) and the two fuses (active and spare) in the IEC socket on the back panel are all of the correct rating.

## Disposal of Waste Electrical and Electronic Equipment (WEEE)



### Do not dispose of this product with household waste

- For the proper treatment, recovery and recycling please take this product to an appropriate collection point.
- If you are unsure where this is, contact your Local Authority
- By disposing of this product correctly you will be providing positive help to the environment.

### Warranty, repairs and spare parts:

The Microwave Apparatus is guaranteed for a period of one year from the date of delivery to the customer. This warranty does not apply to defects resulting from the action of a user such as misuse, improper wiring, any operations outside of its specification, improper maintenance or repair, or unauthorized modification.

Our liability is limited to repair or replacement of the product. Any failure during the warranty period should be referred to Customer Services.

In the event of a fault, apart from replacing the instrument fuse in the IEC socket, the power supply should be referred to the Philip Harris recommended repair agent.

Please contact Customer Services or [techsupport@philipharris.co.uk](mailto:techsupport@philipharris.co.uk) for advice

### Instructions for authorized service technicians:

Ensure that any replaceable mains cord is of the correct rating.

Ensure that all earth conductors and protective earth bonding is maintained after service work.

Please refer to the detailed service procedures, safe servicing and continued safety – contact [techsupport@philipharris.co.uk](mailto:techsupport@philipharris.co.uk) for advice.

For any manufacturer specific parts please refer to our recommended repairer.

Please refer to product specific risks that may affect service personnel, the protective measures and verification of the safe state after repair.

### Supplier details:

Philip Harris Education, 2 Gregory Street, Hyde, Cheshire SK14 4RH

Orders and Information Tel: 0845 120 4521

Fax: 0800 138 8881

Repairs Tel: 0845 120 3211

E-mail: [techsupport@philipharris.co.uk](mailto:techsupport@philipharris.co.uk)

Website: [www.philipharris.co.uk](http://www.philipharris.co.uk)

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