

# ETIWET PLANT WATERER

WATER, WATER, EVERYWHERE and not a drop to drink runs an old poem, well plants need to quench their thirst as well as humans — and during holiday time most are left to wilt. In the interests of flower power we decided to produce a unit that would refresh the plants that owners could not reach, hence the ETI WET.

The unit consists of a sensor, timer and electric water pump. The sensor is embedded in the soil and when dry the electronics operate the water pump for a preset time — thus infusing the plant with thirst quenching water. When the plant has drunk its fill and the sensor is dry again the cycle repeats. In this way you can soak up the sun in the knowledge that your prize plant is getting its fair share at home.

## Construction And Calibration

The electronics are mounted on the PCB, using a socket for the IC. We used a plastic card filing box for the case and a 5 litre container to hold the water supply. Make sure you drill an extra small hole in the cap of the water container — so that air can replace water when the pump operates.

We used a small 6V pump (see buy lines) but other pumps can be used. For example a pet shop can probably supply small pumps (used in fish tanks) and pumps are available from most car accessory shops (used for windscreen water). If the pump you use needs 12V the battery will need changing — the electronics will work at this higher voltage.

The moisture control and water

**If your plants suffer from a drink problem let our ETI WET look after them when you are away, ensuring that they get their daily dose of life giving liquid.**



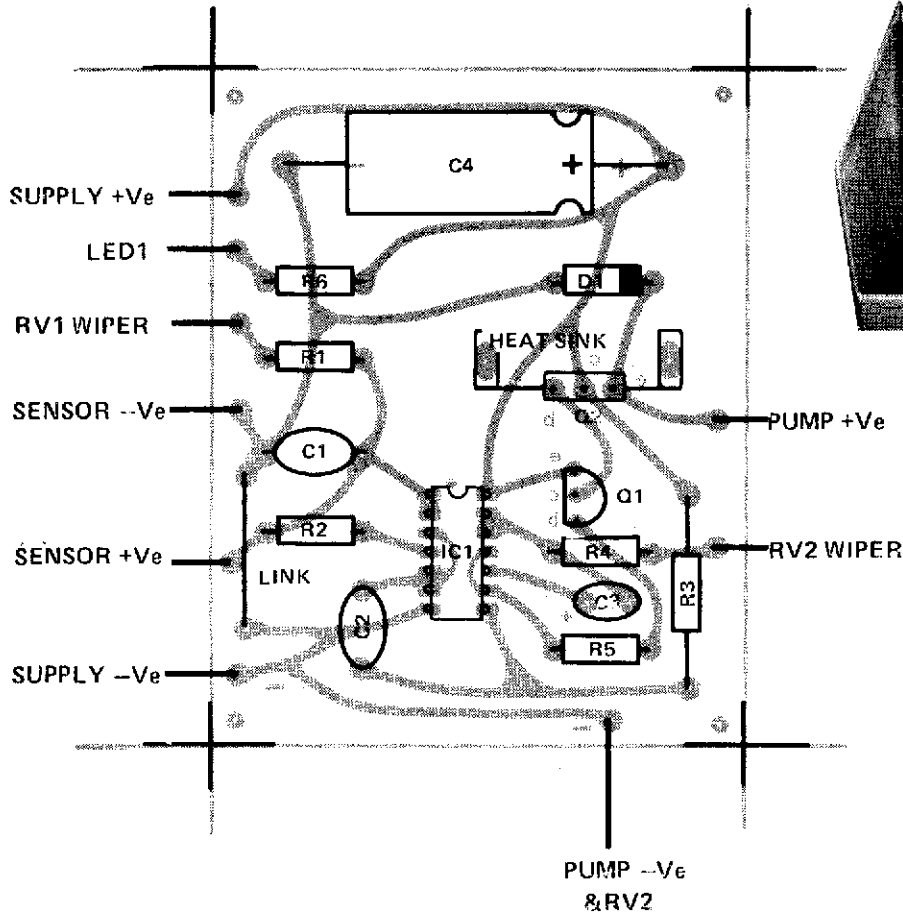
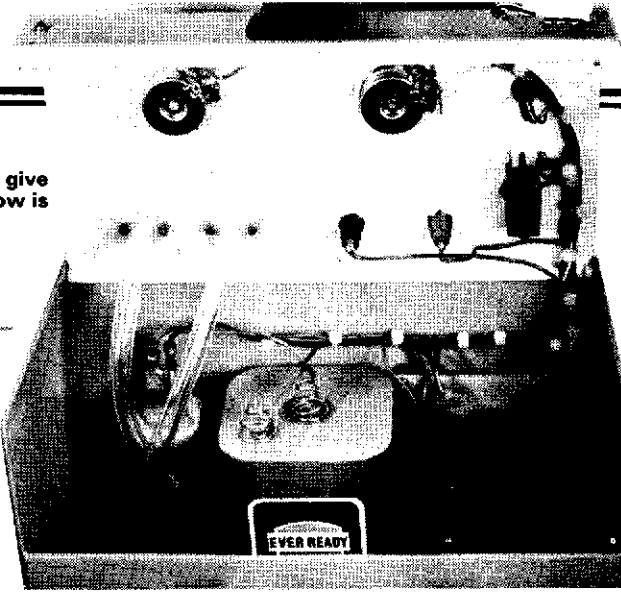
Head on view of the completed prototype, the LED can be left out if you want extended battery life.

flow control need careful setting — to ensure that the plant gets enough water, but not too much. When first switched on the ETI WET will pump water for the time set by the water flow control — use this water to wet

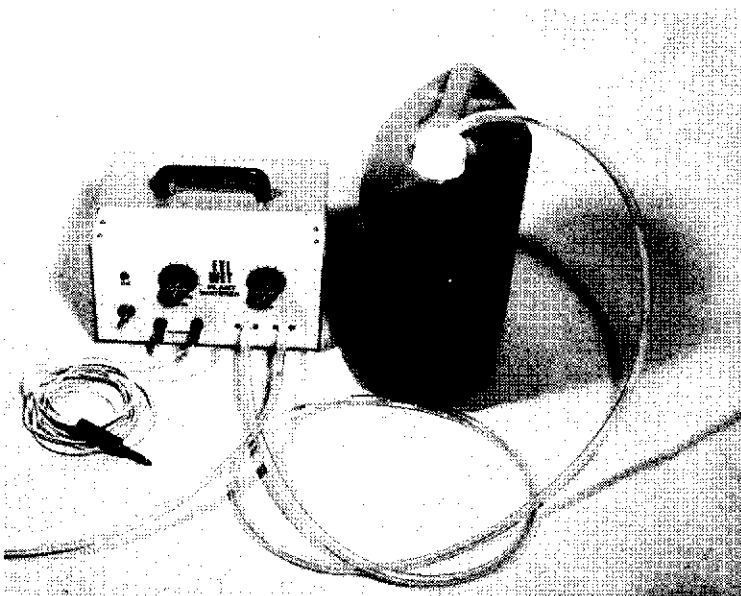
the soil around the plant, with the probe in position.

With a properly watered plant, adjust the moisture control until the ETI WET feeds more water — then reduce the setting.

On the left is an internal shot of our prototype, notice how we used screws to give extra 'bite' to the epoxy holding the tube connections on the front panel. Below is the overlay for the PCB.

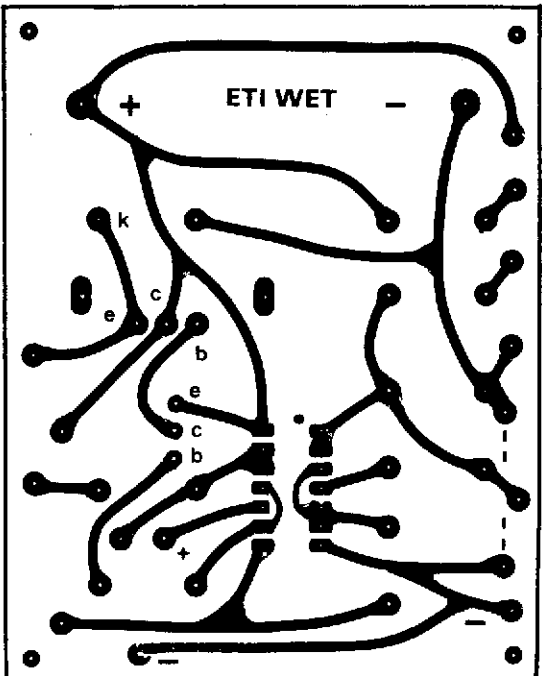


Below is the complete system, the probe used was made from a jack plug. On the right is the PCB shown full size (70mm by 90mm).

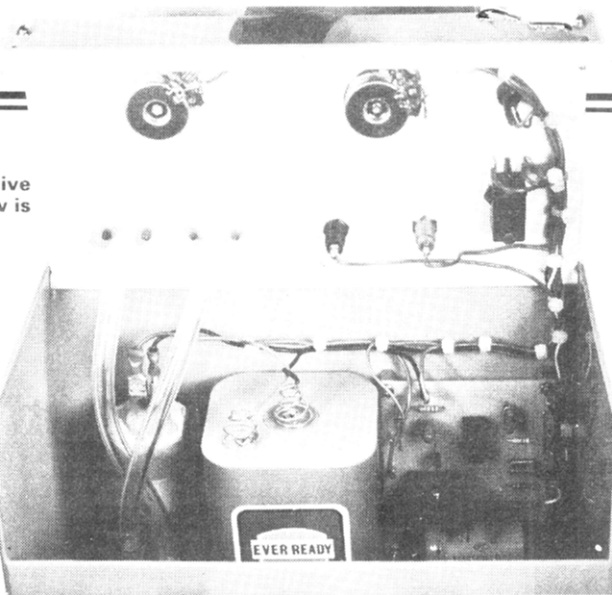


### PARTS LIST

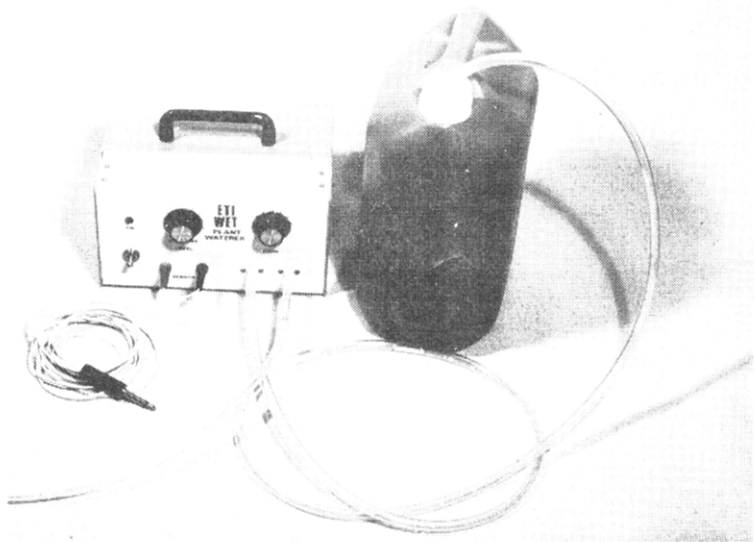
RESISTORS (all 1/4w 5%)	
R1, 3	100k
R2	4M7
R4	47k
R5	22k
R6	470R
POTENTIOMETERS	
RV1	500k linear
RV2	100k linear
CAPACITORS	
C1, 2	100n polycarbonate
C3	100u 10V tantalum
C4	2200u 16V electrolytic
SEMICONDUCTORS	
IC1	CD4011
Q1	BC214L
Q2	BD131
D1	1N914
D2	TIL209
MISCELLANEOUS	
Toggle switch, Battery (PJ996), Box to suit, PCB, water pump, tubing, water container, etc.	

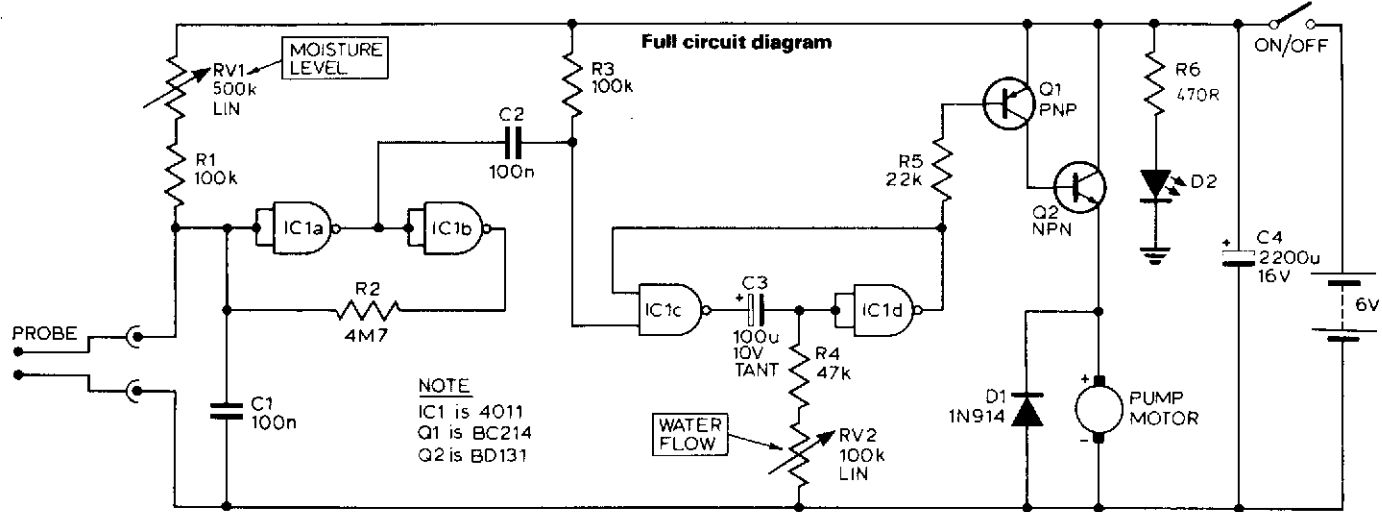


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PARTS LIST





## BUYLINES

The electronic parts for this project should present few problems. Sources for tubing and the connectors include chemical equipment suppliers and your local home brewing shops. The pump we used came from Proops Bros. Ltd, The Hyde Industrial Estate, Edgware Road, Hendon, London NW9 6JS and costs £2.30 inclusive of VAT and postage.

## HOW IT WORKS

The circuit is composed of three main sections: Level sensitive Schmitt trigger, variable time monostable and output driver. The level sensitive Schmitt is formed from IC1a and IC1b with the probe and R1, RV1 forming a potential divider on its input. When the resistance across the probe increases beyond a set value (ie the soil dries), the Schmitt is triggered. C2 feeds a negative going pulse to the monostable when the Schmitt triggers and R2 acts as feedback, to ensure a fast

switching action.

The monostable (IC1c and IC1d) time period is determined by the values of C3 and R4, RV2. When triggered by the Schmitt the monostable turns on Q1, Q2 which drive the water pump. The monostable will only trigger with negative going input pulses, and therefore unless the probe has been shorted (by water) the Schmitt cannot retrigger the monostable. This acts as a fail safe to prevent the plant from drowning!