

Detecting Extrasolar Planets (An Investigative Simulation of Detection by Transit) – Technician’s Guide

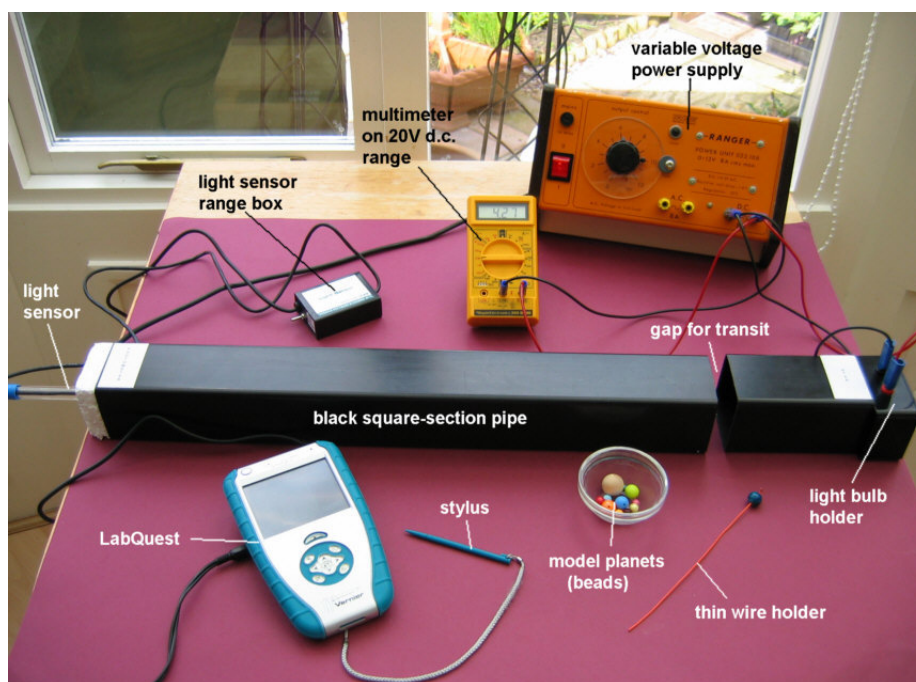


Figure 1 Setup of simulation for detection of extrasolar planets

Equipment required

Vernier LabQuest and associated power adapter/charger

Vernier Light Sensor LS-BTA

2 red leads terminated by 4mm plugs 17-0378 (Rapid)

2 black leads terminated by 4mm plugs 17-0377 (Rapid)

1 voltmeter/multimeter on 20V d.c. range

1 variable voltage d.c. supply

Lamp Holder box (see construction details)

2m length black 65mm square section Marley Rainwater downpipe RPE3BX (B&Q or other DIY)

1 reel single core connecting wire 01-0325 (Rapid)

Expanded polystyrene packing material

Mixed beads of various sizes from c.1.5cm down to 4mm 06-0940 (Rapid)
ruler

Cut the downpipe into two sections, one of length 54cm and the other 12cm. Mark one end of the longer length with a label 'Photometer' and one end of the shorter length with a label 'Star'.

Cut a piece of the expanded polystyrene to fit inside the downpipe and cut a section out of its centre to fit the Vernier Light Sensor as shown in Figure 3 overleaf.

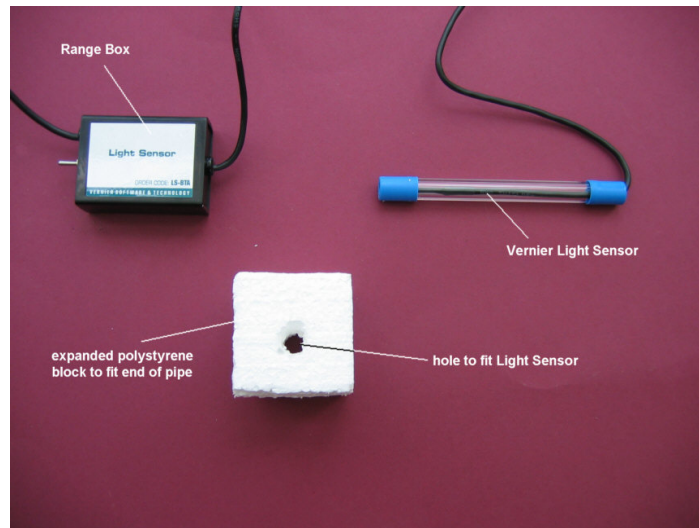


Figure 3 (a) Expanded polystyrene cut to size and shape and (b) with Light Sensor

Construction details for Lamp Holder box

- 1 ABS box 79x62x39mm MB1 (Maplin)
- 1 dichroic lamp holder VJ11 (Maplin)
- 1 dichroic lamp 12V 20W red QL90X (Maplin)
- 1 dichroic lamp 12V 20W blue QL91Y (Maplin)
- 1 dichroic lamp 12V 20W yellow* QL92A (Maplin)
- 1 4mm red socket 17-1935 (Rapid)
- 1 4mm black socket 17-1920 (Rapid)
- 2 nuts and bolts

*optional

Drill two holes in the box to take the 4mm sockets, two to take the nuts and bolts with which to mount the lamp holder, and a further two to allow the connecting wires from the lamp holder to pass through the wall of the box. Fit the red and black 4mm sockets in place. Bolt the lamp holder in place and solder its connecting wires to the 4mm sockets. Screw the lid in place and label it with 'Light Bulb Holder 12V max'.

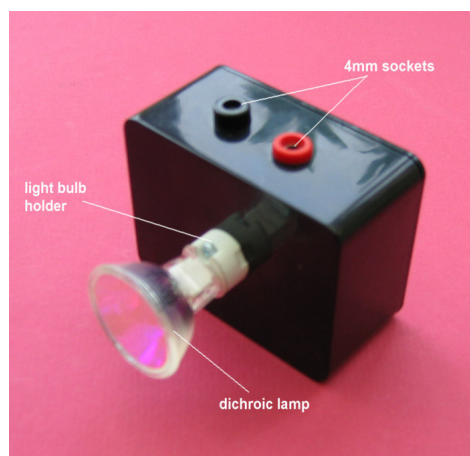


Figure 2 Light Bulb Holder

Sort out five or so spherical beads of diameters from 1.5cm to 4mm and place in shallow dish or plastic bag. Cut a 10cm length of wire and bend final 0.5cm so that, when fitted with a bead, the latter will be held in place.

Suppliers

Maplin Electronics*
Freepost NEA 9437
Barnsley S73 0BR
Tel: 0870 429 6000
Web: www.maplin.co.uk

Rapid Electronics Limited
Severalls Lane
Colchester
Essex CO4 5JS
Tel: 01206 751166
E-mail: sales@rapidelec.co.uk
Web: www.rapidelectronics.co.uk

*This company has lots of stores around the UK.

Key setup details

Sensor: Vernier Light Sensor
Channel: 1
Sampling time: 0.01s and 1s
Sampling duration: 10s
Graph mode

Bulbs: at least red and blue
Voltages for bulbs: 4.5V and 7.0V d.c.