We have designed this Dalek as an exercise for a well-equipped school, using the resources and facilities of several departments—woodwork, metalwork, art and so on. It could also be built at home—but only by someone with considerable ‘do-it-yourself’ experience.

You do not need to be a professional to build a Dalek, but you will need some basic skills, precision, common sense and, above all, enthusiasm! You will need the use of some machinery, such as a woodworking lathe and a band or jig-saw. Don’t follow our instructions too slavishly; do not be afraid to improvise.

For clarity, we have divided the Dalek into five sections: 1 is the head—and this needs a full week to complete; 2 is the neck; 3 is the shoulders; 4 the body; 5 the base.

The head could adequately be made from reinforced papier mâché instead of the more complex fibreglass. If you do decide to use fibreglass, exercise extreme care in the process: barrier cream should always be used to protect your hands and the fibreglass should only be handled in a well-ventilated area. Fumes can be unpleasant and dangerous in a confined space. Note well, too, that the accelerator and catalyst used must not be mixed together. That could be dangerous.

To make sure that this Dalek design works, we asked the Technical Sixth Formers of Highbury Grove School, London N5, to produce a Dalek as a feasibility study. With help from their staff, they produced the magnificent black-and-orange specimen (below) in two weeks, at a cost of £12.

These are the basic materials required to build a Dalek:

- 12 lb bag modelling clay
- 28 lb bag moulding clay
- 1 roll 500 mm bandage
- 28 lbs fast-setting potter’s plaster
- 3 sq yd hessian scrim
- 3 pint shellac
- 1 tin car wax polish
- 1 pint PVA release agent
- 2 oz accelerator
- 2 oz catalyst
- Strips of glass matt
- 2 lbs gelcoat resin
- 6 lbs layup resin
- Acetone
- Soap and water
- 1 tub barrier cream
- Sink plunger
- 2 car parking lights (for flashing lights on head)
- 2 6V o.s amp bulbs and holders
- 6 volt battery

- 1.5 mm ply
- 1 sheet 5 ft x 5 ft
- 6 mm ply
- 4 sheets 5 ft x 5 ft
- 9 mm ply
- 1 sheet 8 ft x 4 ft
- 15 mm ply
- 1 sheet 10 ft x 4 ft
- 12 mm wooden dowel
- 27 mm wooden dowel
- 2 wooden balls 95 mm diameter

- 24 polystyrene balls
- 1.370 mm diameter
- 6 ball bearings 6 mm
- 30 gauge fine aluminium mesh
- 24 gauge large aluminium mesh (2 strips) 655 mm x 180 mm
- Aluminium 1425 mm x 150 mm
- and two strips 651 mm x 10 mm
- Soft aluminium 40 mm x 170 mm
- Ribbed rubber flooring foam strip
- 36 mm aluminium or plastic tube 455 mm
- 40 mm aluminium or plastic tube 615 mm
- 3 mm steel rod 315 mm
- 15 mm rod 270 mm
- Brass shim strip
- Aluminium angle
- Ribbed rubber flooring foam strip
- 3 plastic rotating castors
- Perspex 2 mm x 80 mm x 80 mm
- 2 brass rings (internal diameter 28 mm, cut to 10 mm long)
- Screws, nuts, bolts, snap rivets,
- Fast-drying enamel paint

*Approximate total cost: £15*
SECTION 1: HEAD

1 MAKING A FORMER
Take a suitable sheet of ply. Cut and shape to make a former. Using fiberglass, attach to 15 mm metal rod.

2 SHAPING THE CLAY
Build up soft clay on the base to approximate shape of the head. Pack the centre with paper or polystyrene to save clay. Spin the former round to scrape off the excess clay. Remove the former, leaving the rod in position.

3 MAKING THE MOULD
Cut plaster-bandage into strips of 500 x 800 mm each. Dip in water and lay over clay to 5 mm thickness. Allow 3 or 4 minutes to set. Next, mix plaster (see opposite for method). Then build up the mould thickness to 25 mm, reinforced with alternating layers of plaster and hessian scrim. Press two wooden supports into outer layer of plaster while it is still wet. Bind with strips of hessian scrim. When dry, this makes a stand for the mould.

4 MIXING THE PLASTER
Fill a plastic bucket with 50-80 mm of water. Gently sprinkle in plaster until it forms a peak above the water line. Stir gently with hands. The mixture is ready when it does not run off the stick.

5 MAKING THE FIBREGLASS DOME
Paint the inside of the mould with shellac and allow to dry. Apply three coats of wax car polish. Allow 2 or 3 minutes to dry. Protect hands with barrier cream. Using a soft cloth or sponge, apply layer of release agent. Shinewell to give a good surface. Mix gel coat: 1 gallon resin with accelerators, approximately 5% weight of the resin, and catalyst, approximately 5% of resin weight. But add accelerator and catalyst to gel coat separately. Do not mix them together. Paint on with brush. Allow to go hard. Mix layup resin with accelerator and catalyst. Clean brush in acetone. Wash hands in soap and water. Apply strips of glass mat to the mould and paint with resin. Continue this layering process until approximately 4 mm thick, or 3 layers of glass. Use a paint brush to punch out all the trapped air bubbles from the mat fibres. When fibreglass is hard enough to cut, trim off the ragged edges with a sharp knife. Then allow it to 'cure' fully for about 24 hours in a warm room. Finally, remove from mould.
8 FIXING THE ANTENNA
Cut an opening 140 mm long, 34 mm wide, in the head.
Take two pieces of 9 mm ply and cut to shapes shown below.
Fix into inside of head with screws.
Fix antenna into position with 65 mm nut and bolt.

Sand to shape to fit inside of head.

Drill disc and insert 12 mm dowel. Attach cord and pass through tube, below.

9 MAKING THE HEAD TURN
From a sheet of 9 mm ply cut a disc 480 mm diameter (A) and another disc 480 mm diameter (D). From a sheet of 3 mm hardboard cut a disc 340 mm diameter (B). From that disc, cut an inner disc 340 mm diameter, (C). Drill 6 evenly spaced 6 mm holes right through ring (to hold 6 mm diameter ball bearings). Assemble as below and screw dome to (A).

Drill 8 mm diameter hole.

Cut arcs to allow turning handle to move through 45°.

SECTION 2: NECK
10 MAKING THE RINGS
From a sheet of 15 mm ply, cut 3 rings as shown below. Drill 8 evenly spaced 13 mm diameter holes. PCD 530 mm. Insert 8 wooden dowels, 12 mm diameter, 235 mm long. Cut ends to same angle as inside of dome.

11 MAKING THE MESH CYLINDER
From a sheet of 15 mm ply, cut 2 discs 480 mm diameter. Cut 8 softwood struts 10 x 25 x 275 mm and assemble with discs as in diagram.

From a sheet of fine aluminum mesh cut a piece 275 x 1470 mm. Wrap mesh round entire structure and pin.

Fit the rings over the mesh cylinder.
Screw part D of Section 1 onto this surface.

SECTION 3: SHOULDERS
12 MAKING THE INNER SHELL
From a sheet of 9 mm ply, cut a disc 550 mm diameter. Cut a hole in this 400 mm diameter (A).

Also cut out shape (B) with a hole in it 500 mm in diameter. Attach these two pieces with 4 struts using same method as Section 2, 11.
See over for shapes of struts.
15 MAKING THE ARM
Cut a piece of 40mm diameter aluminium tube to 615mm long. Drill hole through 95mm diameter solid wooden ball and insert tube securely. Cut a piece of 36mm diameter aluminium tube 775mm long. Plug one end with wood and screw sink plunger on to this.

13 MAKING THE MESH COLLAR
From a sheet of aluminium, cut 2 strips 651 x 10 mm. Join at front and back with a piece of soft aluminium 40 x 170 mm and clamp. From a sheet of large aluminium mesh, cut 2 strips 655 x 180 mm. This fits over aluminium belt...

and is held in position with 16 vertical strips of 3mm ply 50mm x 215mm and 6 vertical strips of 3mm ply 50mm x 125mm, all anchored with pop rivets.

The aluminium belt and the aluminium mesh are separated from the inner shell by a block of wood 20mm thick, 40mm x 40mm, and fixed through to the shell with nuts and bolts.

14 MAKING THE ALUMINIUM SKIRT
From a sheet of aluminium, cut 2 shapes shown opposite. Fix to inner shell using same method as for mesh collar — Section 3, 43.

16 MAKING THE EXTERMINATOR
Cut a piece of 26mm diameter aluminium tube to 455mm long. Drill a hole in identical wooden ball and insert tube as shown in Section 3, 15. Fix 2 brass rings in position as shown. Cut 8 equal lengths of 3mm steel rod to 315mm long. Bend 10mm at each end of each to a right angle. Arrange at equal intervals around the rings and braze — don't solder.

Take 4 identical pieces of brass shim 100mm long, 10mm wide. Roll them tightly round a pencil so that they will spring open when pushed out of the tube. Using fine tacks or tape, attach these to one end of the wooden dowel.
MAKING THE ARM AND THE EXTERMINATOR MOVE
On a sheet of 15mm ply, cut a piece 300mm x 157mm (front panel). Cut a hole in the 90mm diameter one side, chamfered to 97mm diameter on the other. On a sheet of 6mm ply, cut one piece 250mm x 157mm (side panel), and one 122mm x 157mm (top panel). Pin and glue these together to form a solid box as shown below.

19 ASSEMBLY
From a sheet of 15mm ply, cut these shapes and assemble as in 3, 12.

20 CLADDING
Clad frame with 11 panels of 6mm ply.

21 DECORATING
THE PANELS
Cut in half 24 polystyrene (or similar) balls of 100 mm diameter, and glue to panels 4 to each, except for panel X, which has 8.

SECTION 5: BASE
22 MAKING THE RUBBER SKIRT
Cut a strip of thin black rubber to encircle the platform. Screw into position with aluminium angle.

Assemble the Dalek, screwing the sections together. All that paint it (see these colour schemes in our photograph, pages 3 to 39).

Now you've seen how to make a Dalek yourself, turn overleaf and read how the behind-the-scenes professionals bring Dr Who to screen.