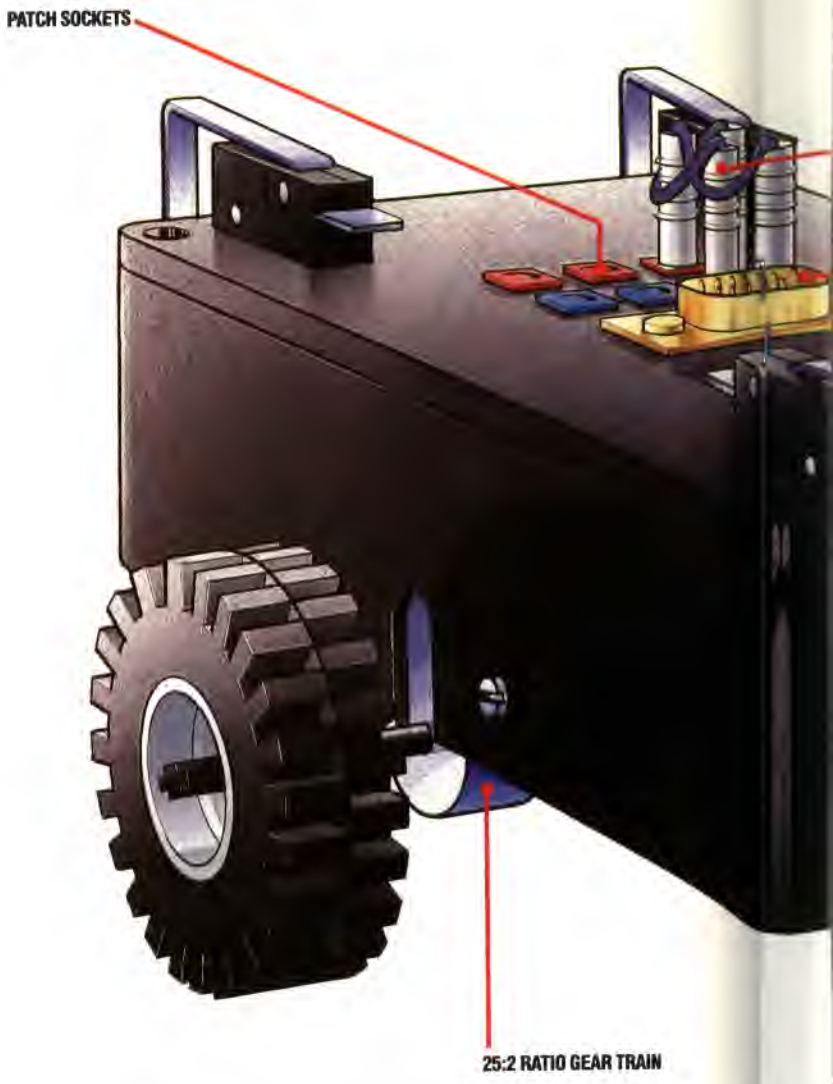
IN THE BEGINNING

In this instalment of Workshop we begin a new project: the construction of an accurately controllable floor robot with proximity and light sensors. In this first section we outline the scheme of the overall project and detail the mechanical construction of the robot body and motor assemblies.

In this new project we shall be constructing and designing software for a floor robot vehicle. The robot will be powered by two stepper motors, driving two wheels through a gearing system. The stepper motors we shall be using can be controlled to turn through discrete steps of 7.5°. Putting the motor drive through a 25:2 ratio gearbox means that the vehicle wheels will be accurately controllable to an axle rotation of 0.6°. As stepper motors operate by turning through a discrete angle each time a pulse is received, they are ideally suited to control by a digital device. We shall be using the computer's user port as our digital control source, allowing us to design simple software to use in conjunction with the robot. In addition to being equipped with stepper motors, the finished robot will have a range of sensors, including proximity sensors and a pair of light sensors to allow the robot to follow a line. As four user port data lines are required to control the vehicle motors, only four more lines are available for inputs from sensors. To allow maximum flexibility, the robot will be fitted with a 'patching' system. This means that different combinations of sensors can be connected to the four available data lines by means of a number of sockets mounted on the robot and the use of short patch leads. For example, one application may require all four proximity sensors, where another might require two proximity sensors and two light sensors. With the patching system the required sensors can be plugged directly into the relevant data input lines.

As accurate control of the robot is possible and sensors are fitted, we shall also be undertaking the design of some sophisticated software to allow the creation of an internal map of the robot's immediate environment. We can then start to investigate the intricacies of route-planning and search strategy algorithms. In this first instalment we start the mechanical construction of the robot. This is reasonably straightforward, involving the drilling and cutting of the plastic box that forms the casing and the chassis of the robot; the positioning of the gear train and d-plug mounting holes must be accurate, but the location of the rocker feet is not critical.



Step One

First cut the required holes in the plastic case that is to house and form the chassis of the completed robot. The diagram shows the position and dimensions of the holes needed. Those in the sides and bottom of the box are to take the protruding axles of the drive wheels. The mounting holes for the motor and gearbox block must be in line with one another across the box. The two holes in the bottom of the box are to take the two feet that balance the robot on its two wheels. The hole in the lid is for the D-type socket into which the connecting lead to the computer will plug. To cut the large holes for the gearbox and axles, remove the majority of the plastic with a hot knife or soldering iron. Then bring the hole up to size neatly with a small file