



INSIDE JOB

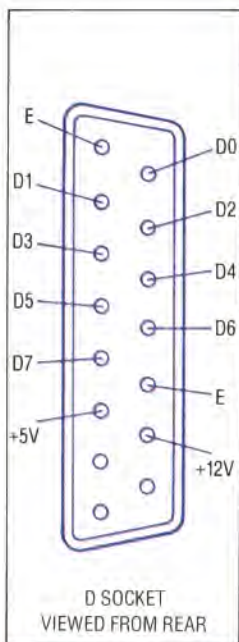
Now that we have mounted the motors and built the motor driver circuit board for our robot, we are in a position to connect the motors and D plugs mounted on the robot body to the circuit board and build a simple interface to the computer's user port. We shall also write a program to test the robot as constructed so far.

Plug Connections

The user port plug diagrams show the connections for each type of plug. BBC Micro owners should use a 20-way ribbon cable and a snap-fit 20-way IDC socket. Noting the connections at the free end of the cable, the 11 wires required should be stripped, tinned, and matched to the connections on the interface board.

Commodore 64 owners should use a 24-way edge connector and a short length of 12-way ribbon cable. Note the connections to the plug and match these carefully to the connections on the interface board. As it is possible to insert this edge connector either way up it is important that the top of the plug be marked in some way.

Having made these connections we are now in a position to plug our interface cable into the robot and our user port. A 12v DC power supply should also be plugged in to the 2.1mm socket provided on the interface board



Bit Parts

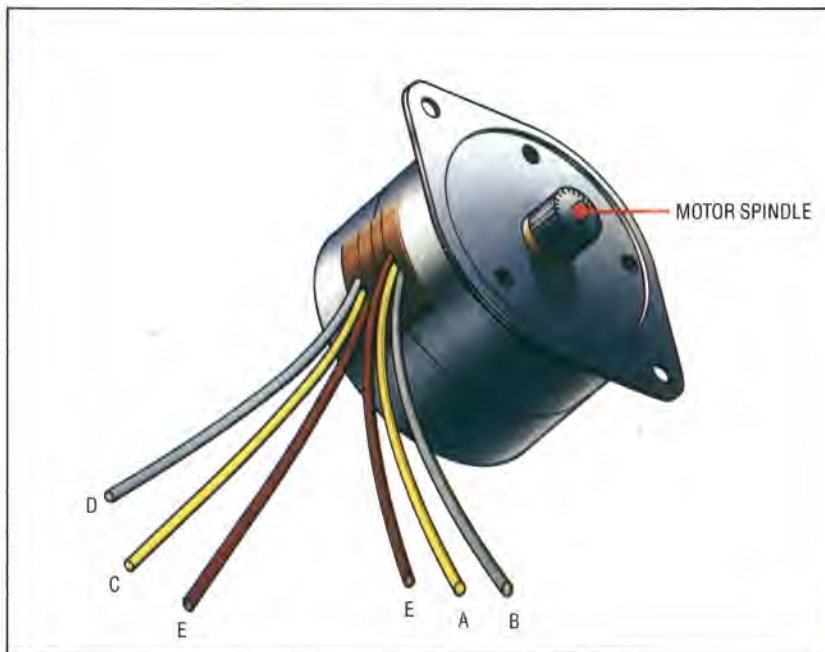
Now that the first phase of construction is complete we can write a short program to control the robot from the keyboard. Bits 0 to 3 of the user port data register control the motors. Bit 0 is the reset bit, normally set to 1; bits 1 and 2 control the right- and left-hand motor directions respectively. Bit 3 is the pulse bit that triggers the motors to turn through another step. The program uses the T, B, F and H keys to control direction and a repetitive loop to pulse the motors

```
1000 REM **** BBC ROBOT CONTROLLER ****
1010 DDR=&FE62:DATREG=&FE60:DDR=15:REM LINES 0-3 OUTPUT
1020 PROCinitialise:REPEAT
1030 AS=INKEY$(1):IF AS<" " THEN PROCtest_keyboard
1040 PROCpulse(10)
1050 UNTIL AS="X":?DATREG=0:END
1060 DEF PROCinitialise
1070 forwards=4:backwards=2:left=6:right=8
1080 dir=forwards:?DATREG=dir+1:ENDPROC
1100 DEF PROCpulse(m)
1110 FOR c=1 TO m
1120 ?DATREG=(?DATREG OR 8):PROCdelay(2)
1130 ?DATREG=(?DATREG AND 247):PROCdelay(2)
1140 NEXT c:ENDPROC
1150 DEF PROCdelay(n)
1160 FOR I=1 TO n:NEXT I
1170 ENDPROC
1180 DEF PROCtest_keyboard
1190 IF AS="T" THEN dir=forwards
1200 IF AS="B" THEN dir=backwards
1210 IF AS="F" THEN dir=left
1220 IF AS="H" THEN dir=right
1230 ?DATREG=(?DATREG AND 249)OR dir)
1240 ENDPROC
```

```
10 REM **** CBM 64 ROBOT CONTROLLER ****
20 DDR=56579:DATREG=56577:POKEDDR,15
30 GOSUB1000:REM INITIALISE
40 GETA$:IFA$<" " THEN GOSUB3000:REM KEYS
50 M=10:GOSUB1500:REM PULSE
60 IFA$<"X" THEN 40
70 POKEDATREG,0:END
1000 REM **** INITIALISE S/R ****
1010 FW=4:BW=2:LF=6:RT=0
1020 DR=FW+POKEDATREG,DR+1:RETURN
1500 REM **** PULSE S/R ****
1510 FOR C=1 TO M
1520 POKEDATREG,(PEEK(DATREG)OR8):GOSUB2000:REM DELAY
1530 POKEDATREG,(PEEK(DATREG)AND247)+GOSUB2000:REM DELAY
1540 NEXT C:RETURN
2000 REM ****DELAY S/R ****
2010 FOR I=1 TO N:NEXT I:RETURN
3000 REM **** KEYBOARD TEST S/R ****
3010 IF AS="T" THEN DR=FW
3020 IF AS="B" THEN DR=BW
3030 IF AS="F" THEN DR=LF
3040 IF AS="H" THEN DR=RT
3050 POKEDATREG,(PEEK(DATREG)AND249)ORDR)
3060 RETURN
```

Missing Links

In order to connect the motors and D plug to the circuit board you will need to refer back to the illustration of the circuit board on page 837. This diagram shows where to solder the relevant wires to the board. Taking the motor connections first: each motor has six wires emerging from the motor housing. Take care to note that the wires emerge in two groups of three from the motor case. Each group of three wires has a yellow and grey pair and a single red wire. The yellow and grey pair labelled 'A' and 'B' emerge from the housing nearest the motor spindle as shown in the diagram. By relating these letters to the lettered connections for each motor on the circuit board diagram, solder each wire in place on the board



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