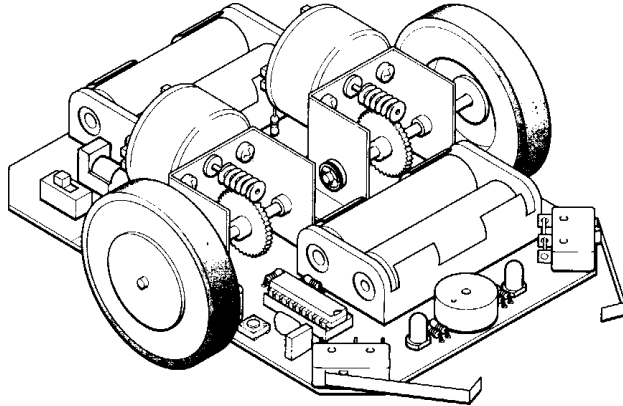


PIC BUGGY SELF-ASSEMBLY KIT

Order Codes:

CHIO07 PIC Buggy self-Assembly Kit



Features

- Centrally located wheels for maximum mobility
- Worm drive gearboxes with solar motors
- Microswitch 'bumpers' for obstacle detection
- LED 'eyes' and piezo sound generator
- Re-programmable PIC16F627 microcontroller
- Simple construction

Also required:

- 4x AA batteries
- Soldering iron and solder
- Side cutters
- Small crosshead screwdriver

Assembly requires soldering and takes approximately 30 minutes

Components:

1	Part-populated PCB chassis	
2	Solar motor and gearbox	
2	Long lever microswitch	
6	Zero-ohm resistor links	- marked with single black line
2	Polythene wheels	- slides onto motor shaft
2	Rubber bands	- for use as tyres on wheels
2	Rubber feet	- stick to bottom of PCB as 'castors'
14	M3 6mm screws	
10	M3 nut	

NOTE: This product is not a toy and should be kept away from small children due to small parts and sharp edges.

Soldering is a hazardous activity and should be carried out under adult supervision in a well-ventilated area.

Assembly Instructions

Tools Required:

- Soldering iron and solder
- Wire cutters or side cutters
- Small crosshead screwdriver

Refer to the diagram and component table on page 1.

1. Using a zero-ohm resistor, connect either LK1, LK1 or LK3 (do not connect more than one). Use LK1 to connect to PIC pin RA1, LK2 to connect the piezo sounder to PIC pin RA4 or LK3 to connect the piezo sounder to PIC pin RBO (Recommended - this is the default connection for the buzzer using the pre-programmed PIC16F627). Retain the resistor off-cuts for later use.
2. Lay the two gearboxes in position. Ensure the red dots (or circular indentations in the plastic next to one of the contacts) on the back of the motors are both facing inwards. If one or both of the dots is facing outwards loosen the motor support screws and turn the motor(s) through 180 degrees. This is important - the buggy will not respond as expected if the dots are not facing inwards!
3. Pass M3 bolts up through the PCB and gearboxes. Tighten into position with M3 nuts. Ensure both gearboxes are 'square' to the PCB.
4. Use four zero-ohm resistors to join the motor contacts to the PCB. Retain the resistor off-cuts for later use.
5. Pass four M3 screws up through the holes at the front corners of the PCB and screw the microswitches into position (on top of the PCB). The screws are tightened directly into the plastic switch housing. The left-hand side is harder to start and it may be useful to slightly open up the holes before commencing (the holes through the switch are conical so that it can be easily removed from the injection moulding machine during manufacture.) Use a pair of pliers to bend the ends of the two microswitch levers as shown in the diagram on page 1.
6. Using wire off-cuts from the resistor legs, solder the microswitch contacts to the PCB.
7. Carefully push the two wheels onto the gearbox shafts, using a gentle turning motion. Take care to ensure the wheels are square on the shaft. Also ensure the wheels are the same distance from the PCB on each side.
8. If available, lubricate the gears with grease or petroleum jelly (e.g. Vaseline').
9. Place the rubber band 'tyres' onto the wheels.
10. Stick the two self-adhesive feet in a central position at the front and back of the PCB to form 'castors'.

Insert four AA batteries (not supplied) and then switch the buggy on using the slide switch.

Initial Testing

The re-programmable PIC16F627 microcontroller supplied is pre-programmed to make the buggy move forward until either switch is hit. It then reverses, spins and moves off in another direction.

- If the buggy fails to operate check;
- All solder joints are good, and there are no accidental solder bridges.
- All polarised components, including the two chips, are correctly inserted.
- The batteries are correctly inserted.
- The PIC16F627 is programmed correctly.

If the buggy moves incorrectly or veers to one side, check

- All solder joints are good, and there are no accidental solder bridges.
- The red dots on the rear of the two motors are both facing inwards.
- The gearboxes rotate freely.
- The gearboxes are both square on the PCB.
- The worm gear is correctly located on the motor shaft.
- The wheels are square and equal distance from the PCB on each side.

Input/Output Configuration			
Microswitch A	RA0	Input 0	The spare microcontroller input/output pins are connected to pads above the microcontroller IC. This enables connection of additional input sensors or output devices as desired
Microswitch B	RA1	Input 1	
Piezo via LK1	RA2		
Piezo via LK2	RA4		
Piezo via LK3	RB0		
LED A	RB1	Output 2	
LED B	RB2	Output 3	
Motor A	RB4/5	Output 4/5	
Motor B	RB6/7	Output 6/7	

Movement

	Switch on (high)	Switch off (low)
Forwards	4 and 6	5 and 7
Reverse	5 and 7	4 and 6
Spin <	4 and 7	5 and 6
Spin >	5 and 6	4 and 7

Other Notes:

- The ICs may be damaged if any power supply other than 6V DC (centre +ve) is applied to the power socket. The power socket automatically 'over-rides' the on-board batteries.
- The L293D motor driver IC is designed to run warm in use - this is normal.
- Alkaline AA cells are recommended for this application.
- If using a PIC16F84A chip, a 4MHz 3 pin ceramic resonator must be soldered to the board in position XI.

Safety

This product is designed as an educational teaching aid. It is not a toy and should not be handled by young children due to sharp edges and small parts.

THIS PRODUCT IS NOT A TOY

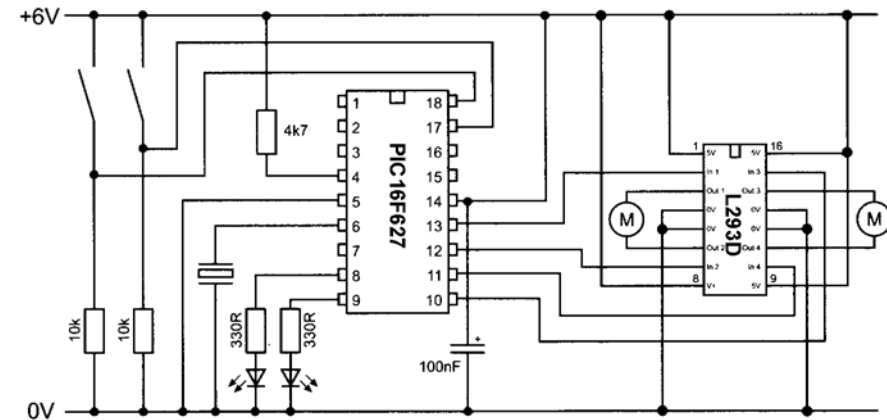
The PIC Robot Buggy has been designed to aid and encourage investigations into the use of PIC microcontrollers.

Full Circuit Diagram

The full circuit diagram is shown below.

The only extra here is a 4k7 pull-up resistor to disable the microcontroller 'RESET' pin.

Note: the resonator is not required for the PIC16F627

**Using the PICBuggy with a PIC16F627 in Matrix Multimedia's PPP download software**

When used with Matrix Multimedia PPP download software set the Configuration word to: 16169.

The Configuration word can be found on the Configuration screen.

Full Circuit for PIC16F84A

The PIC16F84A requires a three-pin 4MHz ceramic resonator (outer legs connected to pins 15, 16, centre leg to 0V) to set the microcontroller clock frequency.

