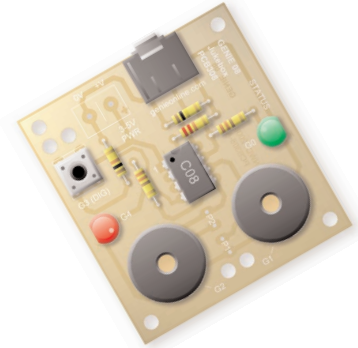# GENIE 08 Jukebox Kit (PCB308)

GENIE

Welcome to the GENIE microcontroller system!

Have fun with 2-channel stereo music. You can also create a disco effect by flashing two LED outputs in time with the music!

Battery connects here (red wire to '+V', black wire to '0V'). You can feed the wires through the two of the larger strain-relief holes to the left.

Download socket (the cable plugs in here so that the GENIE microcontroller can talk to the computer)

Battery power must be between 3 volts and 5 volts...

...that's 2 or 3 AA-sized batteries!

Push switch on input **G3**

8-pin GENIE micro-controller (the magic bit!)

Red LED, controlled by output signal **G4**

Green LED, controlled by output signal **G0**

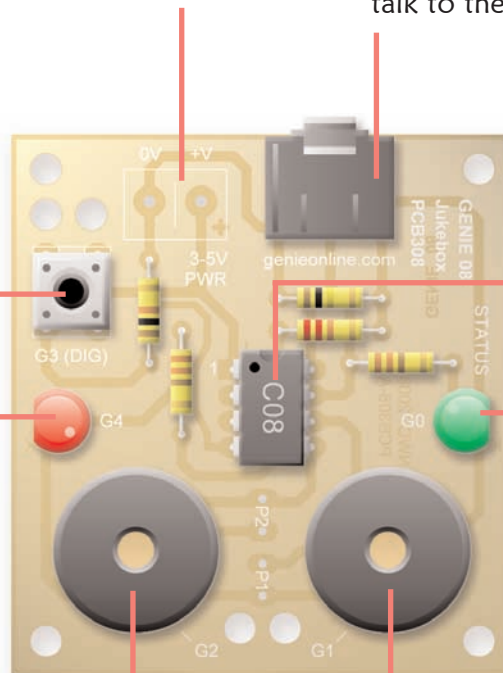*For better quality sound and music, why not consider the GENIE 14 Audio Kit?*

'LED' is short for 'Light Emitting Diode'

Sounder, controlled by output signal **G2**

Sounder, controlled by output signal **G1**

NEW WAVE CONCEPTS

Switch on the soldering iron. It will only take a few minutes for the iron to reach operating temperature. Once the soldering iron is hot, clean the soldering iron tip with a moist sponge.

Melt some solder at the chamfered end of the soldering iron tip. This is called 'tinning' and it will aid the flow of solder from the soldering iron to the copper track on the printed circuit board and component pins.

Take care when using a hot soldering iron!

Magic Ingredients!

This is what you will need:

Component	Quantity
8-pin GENIE microcontroller	1
GENIE 08 jukebox board (PCB308)	1
Download (3.5mm stereo) socket	1
8-pin DIL socket	1
Battery clip	1
3 x AA battery holder	1
6 x 6mm switch	1
Piezo sounder	2
Green LED	1
Red LED	1
330 ohm resistor *(orange, orange, brown, gold)*	2
10k ohm resistor *(brown, black, orange, gold)*	1
22k ohm resistor *(red, red, orange, gold)*	1
100k ohm resistor *(brown, black, yellow, gold)*	1

Fit each component onto the board. When fitting components such as resistors, you should use long-nosed pliers to bend the legs through 90 degrees. This will make them easier to fit.

Some of the components need to be fitted the correct way around:

- The 8-pin GENIE microcontroller should be positioned so that the notch points towards the download socket and the dot next to pin 1 is at the same corner as the '1' shown on the board.

- The LEDs should be fitted so that the flat edges on the LEDs line up with the flat edges shown on the board.

To solder a pin, hold the soldering iron onto the board for a few seconds, then quickly touch the tip with a small amount of solder.

When using uncased sounders, you should solder the sounders to the two points marked P1 (for the right-hand sounder) and P2 (for the left-hand sounder) respectively.

You should always remember to replace the soldering iron back into the stand after soldering and repeat cleaning the tip of the iron with the moist sponge before the start of each soldering operation.

Finally, cut off any excess wire or component legs for a tidy finish.
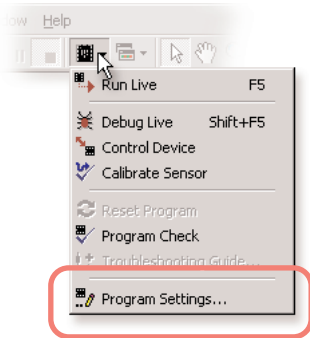
For your project to work, you need to tell the GENIE microcontroller what it should do.

This involves writing a sequence of commands in a **flowchart**. Your flowchart is then sent down the cable and stored on the GENIE chip. By changing the flowchart, you can vary how the GENIE behaves.
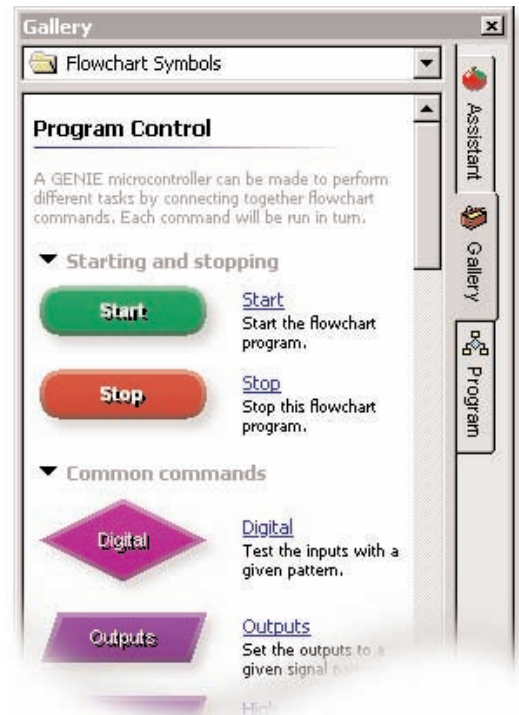
First of all, you need to tell GENIE which type of chip you are using. To do this, click on the **Microcontroller** button on the toolbar and choose **Program Settings**.
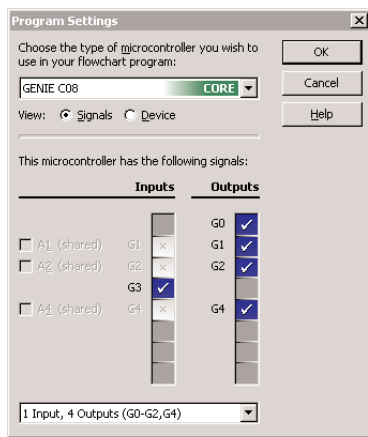
Select an 8-pin **GENIE** chip.

In the same window, choose the '**1 Input, 4 Outputs (G0-G2, G4)**' setting to tell GENIE which inputs and outputs you need. Click on **OK** when you are ready.

Available Signals

These are the **input** and **output** signals available in your flowchart:

Input	Description
G3	Push switch

Output	Description
G0	Green (right) LED
G1	Right sounder
G2	Left sounder
G4	Red (left) LED

You can now decide which commands you want your GENIE to perform. To do this, drag commands from the **Gallery**.

See the next worksheet for flowchart ideas.

NEW WAVE CONCEPTS

Playing a stereo tune

GENIE microcontrollers can play musical tunes in which more than one notes plays at the same time. These are known as **stereo** tunes.

Use the **TUNE** command to play a musical tune.

First, double-click on the TUNE command and select the select the '**Stereo**' option. Next, choose the tune you wish to play from the **Tune** list (tip: you can click Play to listen to it!).
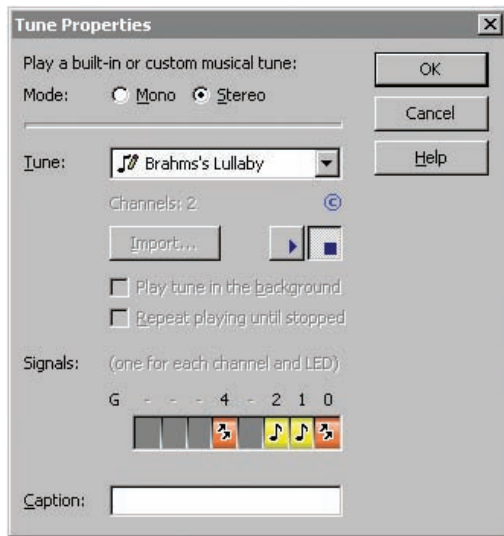
Finally, you need to choose two outputs for music and one for each LED. To do this, click on signals **1** and **2** until the yellow note icon appears. Next, click on signals **0** and **4** until the orange LED icon appears.

When placed in a flowchart, it could look like:
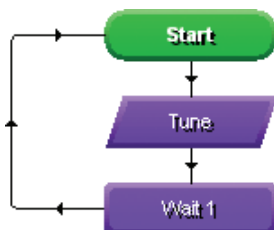

Responding to the push switch

Some types of input signal, such as push switches, can only be either on or off. These are known as **digital** signals.

Use the **DIGITAL** command to respond to a digital signals.

The DIGITAL command allows you to make a decision based on whether a digital signal is either on (pressed) or off (not pressed).

When a digital signal is on, it has the value '1' whereas when it is off, it has the value '0'.

Double-click on the command to select which digital inputs you wish to check. GENIE will follow the 'Y' (yes) path when the digital signal matches the chosen pattern, otherwise it will follow the 'N' (no) path.
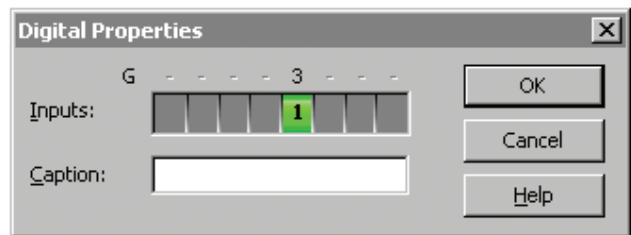
The above pattern will test if the push switch on digital input G3 is on (pressed). You can see below how to use this to command play a tune whenever the switch is pressed:
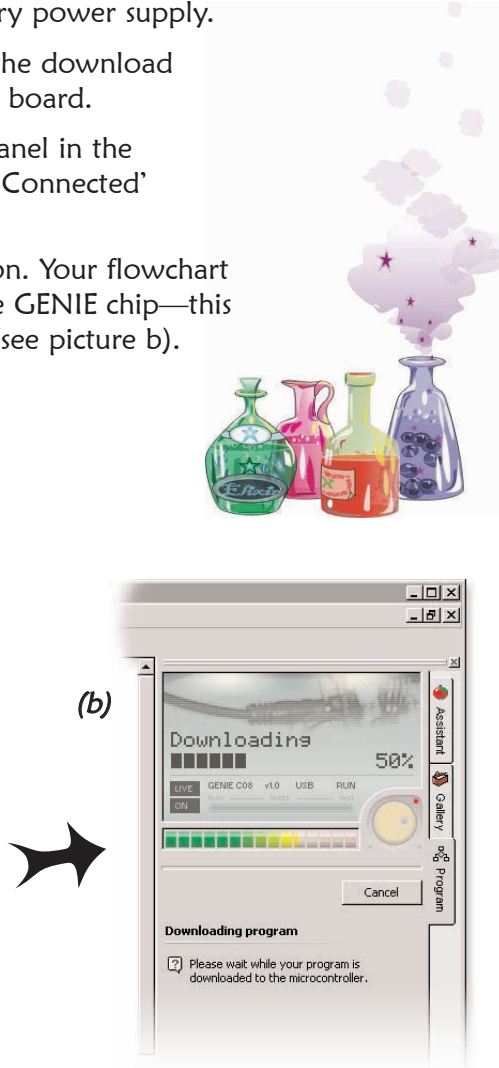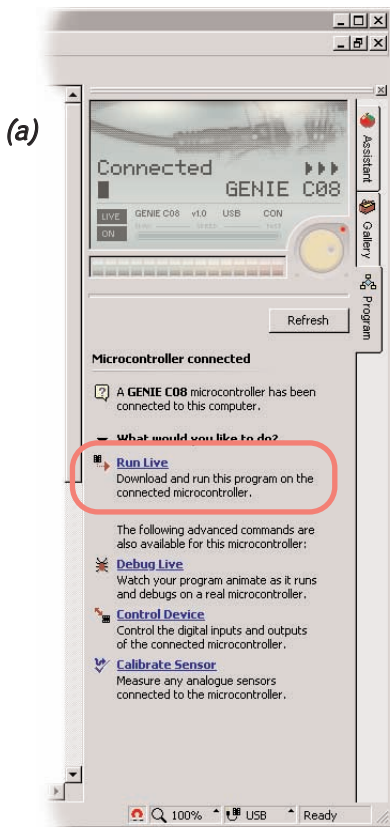
NEW WAVE CONCEPTS
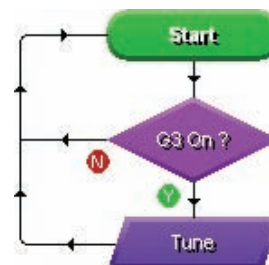
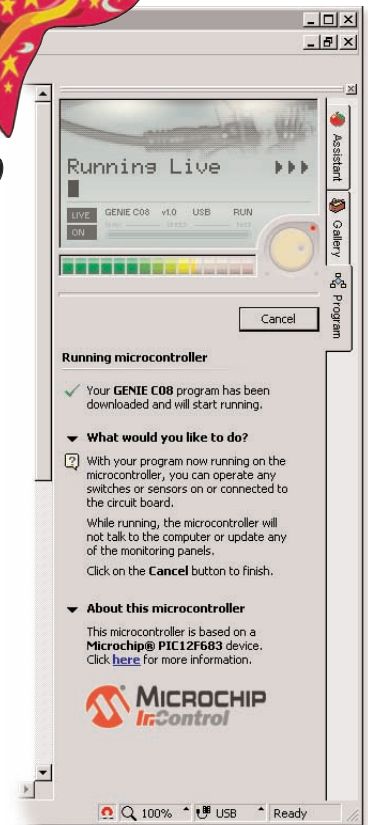Once you have written your flowchart program, you need to store it on the GENIE chip. Here's how you do it:

1. Wire-up the built GENIE circuit board and connect up a suitable battery power supply.

2. Plug the GENIE cable into the download socket on the GENIE circuit board.

3. Once done, the **Program** panel in the software will then show a 'Connected' message (see picture a).

4. Click on the **Run Live** option. Your flowchart will be transferred onto the GENIE chip—this is known as **downloading** (see picture b).

(c)

Running microcontroller

✓ Your **GENIE C08** program has been downloaded and will start running.

▼ **What would you like to do?**

With your program now running on the microcontroller, you can operate any switches or sensors on or connected to the circuit board.

While running, the microcontroller will not talk to the computer or update any of the monitoring panels.

Click on the **Cancel** button to finish.

▼ **About this microcontroller**

This microcontroller is based on a **Microchip® PIC12F683** device. Click **here** for more information.

MICROCHIP In·Control

(a)

Microcontroller connected

A **GENIE C08** microcontroller has been connected to this computer.

▼ What would you like to do?

Run Live
Download and run this program on the connected microcontroller.

The following advanced commands are also available for this microcontroller:

Debug Live
Watch your program animate as it runs and debugs on a real microcontroller.

Control Device
Control the digital inputs and outputs of the connected microcontroller.

Calibrate Sensor
Measure any analogue sensors connected to the microcontroller.

(b)

Downloading program

Please wait while your program is downloaded to the microcontroller.

As soon as the program has been downloaded you will see the above screen (c) and GENIE will start running your flowchart.

Your GENIE project is now ready to go! You can disconnect the cable and use your GENIE board away from the computer.

The green status LED on the jukebox kit will flash as the download takes place.

It tells you everything is OK!

✓ Finished!

NWC NEW WAVE CONCEPTS

If you are unable to connect to a GENIE microcontroller or download a program, you should go through the following troubleshooting hints and tips.

A   Run the GENIE troubleshooting tool

The GENIE troubleshooter will automatically check your cable and software to ensure that the computer can access the GENIE cable.

To run the GENIE troubleshooter, choose **Troubleshoot GENIE...** from the **Help** menu of the Circuit Wizard or GENIE software.

If that option is not shown in your version of the software, you can download it separately from **www.genieonline.com/cable**.

Step through the on-screen instructions.
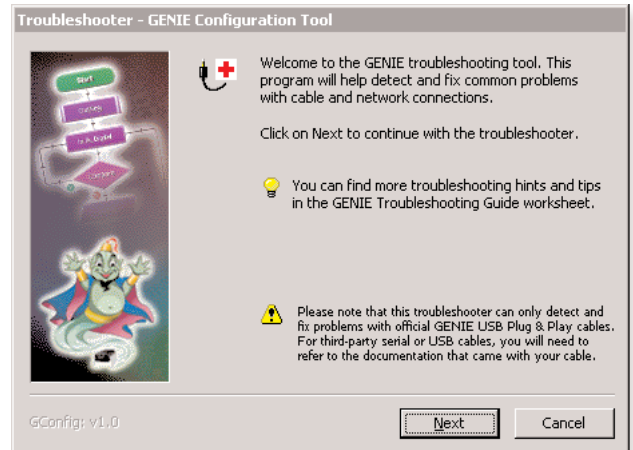
B   Step through the following checklist of common problems

Cable

• Circuit Wizard, GENIE Design Studio and the GENIE Programming Editor software all check and report problems involving the cable. If given, follow through on the on-screen advice.

• Unplug the cable, wait a few seconds and then plug it back in. Windows can occasionally fail to detect that a cable has been inserted.

Power

• Check that the voltage of the battery is sufficient. For this board, the battery voltage should be in the range of 3 volts to 5 volts.

• Check the voltage level across the power connections (+V and 0V) on the board. This can identify if there is a problem with the battery clip or battery holder. Ensure that the wiring has not become loose and the batteries are properly seated in the holder.

Circuit

• Try plugging the cable into another GENIE board if you have one available. When powering up this circuit, the green STATUS LED should flash once (when properly connected it will flash repeatedly).

• Try with another GENIE microcontroller if possible.

• Visually inspect the board for bad solder joints or cases where soldering has incorrectly bridged pins together. Note that for the download socket, the two left-most pins should be connected together, as should the two right-most pins.

For more troubleshooting hints and tips, please read the separate **GENIE Troubleshooting Guide**.
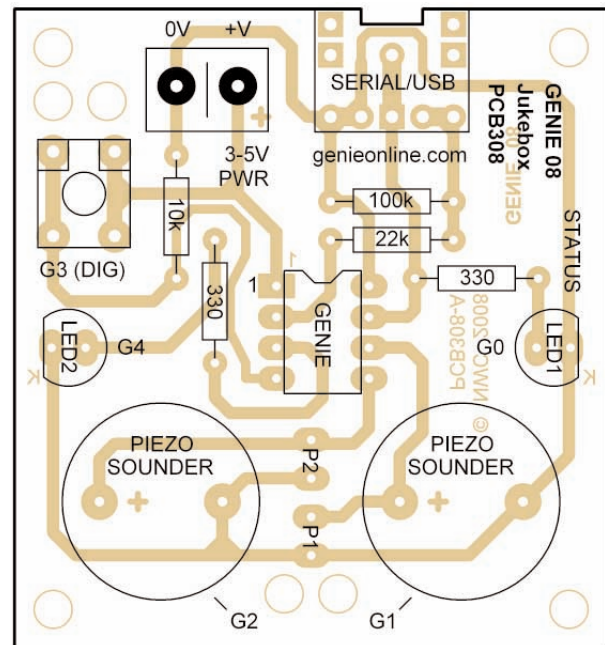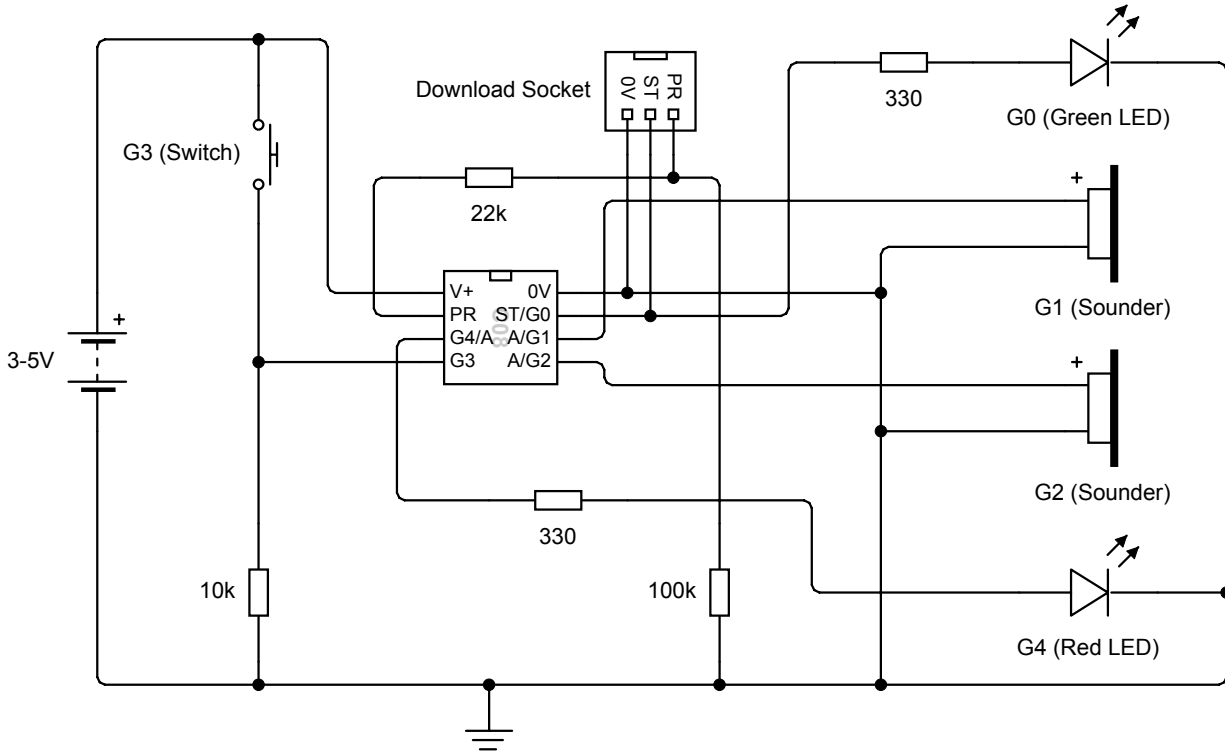
GENIE 08 Jukebox Kit (PCB308)

*The technical bit... it's only needed if you want to learn more!*

This is the **circuit diagram**. It shows how all of the components in the circuit are connected. You can compare it to the layout of the components on the actual circuit board (shown below it).

Physical dimensions and mounting 8

The diagram below shows the physical dimensions of the printed circuit board (PCB). This information is important to know when you are embedding the circuit into another project or container.
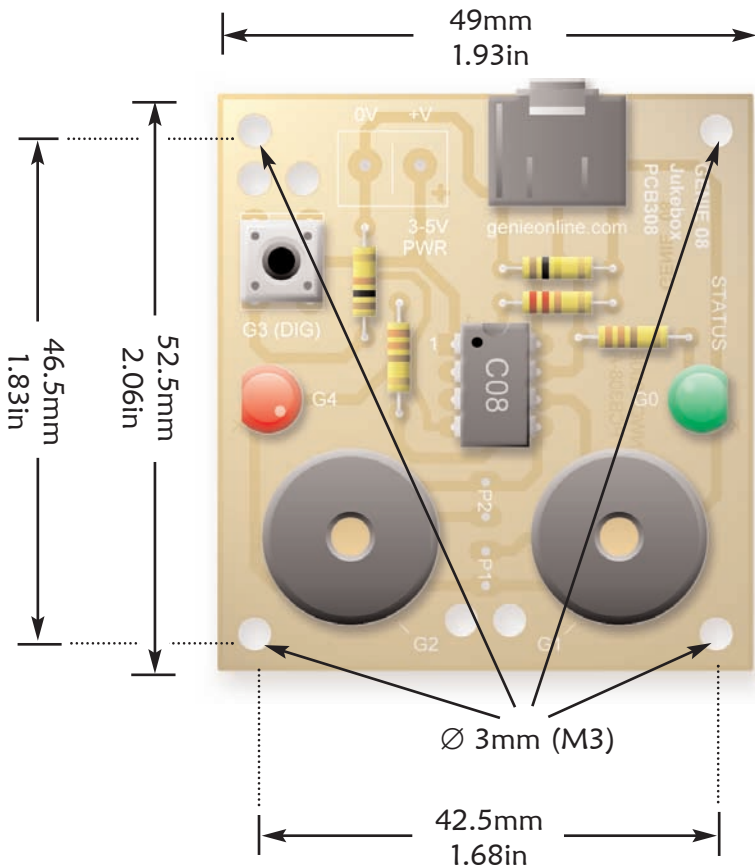
Height

The PCB's height including components, legs and soldering, is approximately 15mm (0.6in).

Mounting

The four large holes in the corners of the PCB (indicated by the arrows) are designed for mounting. They have a diameter of 3mm, suitable for use with M3-sized screws.

The two large holes located at the top-left of the PCB are of the same size but are instead intended to act as strain-relief holes for an off-board battery clip.

If using uncased piezo sounders, you can use the two large holes located at the centre-bottom of the PCB for the component wires.