

# Making Music with your micro:bit

Mr Bit shows you how to take a tune from a music score and enter the notes into a program for the BBC micro:bit.

Whether loud or soft, fast or slow, sad or happy, a tune always has a series of notes, one after another. A note can be high or low in *pitch* or short or long in *duration*. To make music with your micro:bit all you have to do is to put notes in the right order and specify the *pitch* and *duration* of each note.

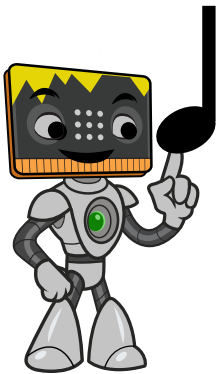
The notes on a music score show all that you need to know about pitch and duration.

**Pitch** is shown by the height of the note on the 5-line stave; with 5 lines and 4 spaces the stave can indicate 9 different notes.

By adding floating notes above and below the stave you can increase this number. Each pitch has a letter as shown here.



**Duration** is shown by the style of the note and its stalk.



The most common note is the **crotchet**, a solid blob with a plain stalk. When a tune has a regular beat, this is the note that shows the beat. Most tunes have between 60 and 120 beats per minute making the duration of a crotchet typically between 1000 milliseconds and 500 milliseconds.

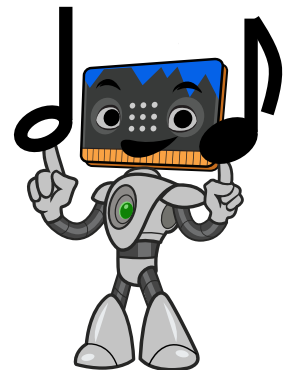
In our example project, as well as having crotchets, the tune has two other types of notes:

**Quaver:** this has half the duration of a crotchet, so 2 quavers last as long as one crotchet.

**Minim:** this has twice the duration of a crotchet, so 2 crotchets last as long as one minim.

The quaver looks like a crotchet with a tail.

The minim looks like a crotchet with a hole in the blob.



## Scientific notation of pitch

Since the letters for notes are used in a repeating cycle, at several different pitches, we need an additional code to give a unique indication of pitch. Scientific notation does this by adding a number to indicate in which octave (sequence of 8 notes) the note occurs. C<sub>4</sub> is middle C on a piano; C<sub>5</sub> is an octave above; C<sub>3</sub> is an octave below. The octave number increases by one every time you go from B to C. *Insight Mr Bit* uses this notation for pitch.

Pitches of notes you can program with *Mr Bit*:

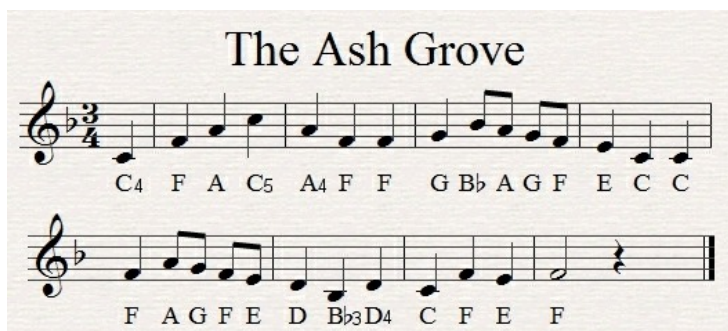


## Example Project

That's enough explanation. Let's get started with a simple tune "The Ash Grove"

### Step 1 - Prepare the tune

To prepare for making your program, the first step is to write underneath the staff the letter name for each note:

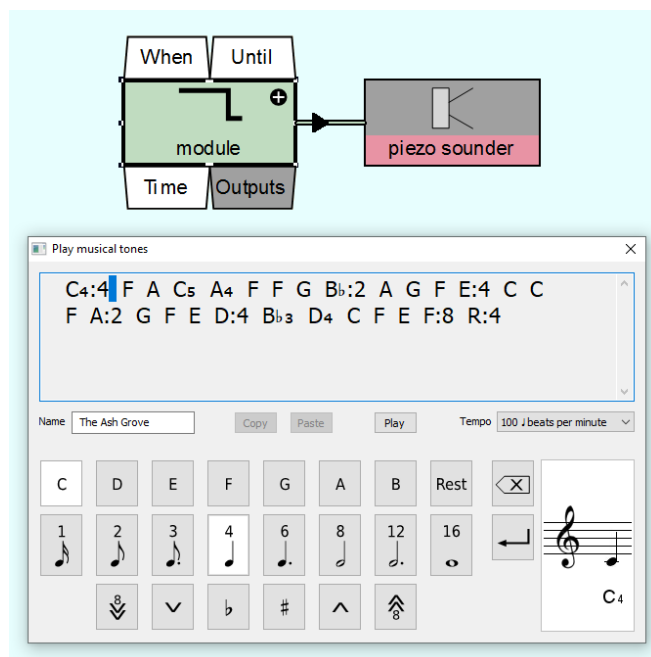


### Step 2 - Select the control blocks

To build and program the control system with *Mr Bit* programming software\*:

- Select a piezo sounder from the list of devices.
- Select a Simple control module.
- Click on the module and drag a link from the OUTPUTS tab to the piezo sounder.

The dialogue for coding the tune now appears.



### Step 3 - Type the tune notation



- Type the letter of the first note (C) to set the pitch.
- Type the crotchet button to set the duration to 4 units.

\* For details visit [www.insight-mrbit.com](http://www.insight-mrbit.com)

- Type the letters for the remaining notes using the rule to set the pitch. When a different duration is needed, type the new note value. When the note is B, type a flat **b** as well.

You can preview your tune by clicking on the 'Play' button.

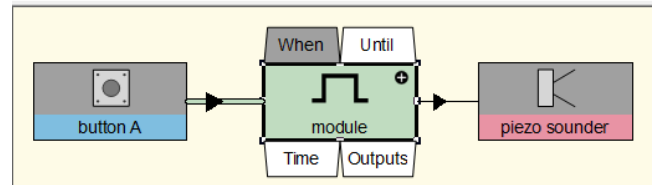
**Mr Bit rule for duration:** The next note will have the same duration, unless you choose a quaver (2 units) or a minim (8 units).

**Mr Bit rule for pitch:** The next note will have the same octave number, unless you choose the up  button or down  button.

## Step 4 - Program button A to start and stop the music

- Click the module to show the editing tabs
- Drag a link from the WHEN tab to the button
- Choose the setting "gets pressed"
- Repeat this for the UNTIL tab.

When button A gets pressed, play "The Ash Grove" on the piezo sounder until button A gets pressed again.

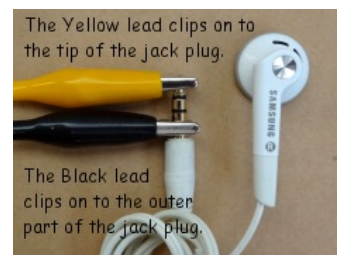


The control program should read:

“When button A gets pressed, play tones on the piezo sounder, until button A gets pressed again.”

## Step 5 - Prepare the micro:bit V1

With micro:bit version 1, to hear the tune, you need to connect an earpiece or headphones to pins GND and P0. You can use crocodile clip leads as shown here.

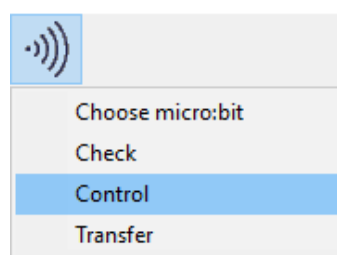


With micro:bit version 2, a speaker is built-in to the micro:bit.

## Step 6 - Select 'Control' mode

You are now ready to play the tune:

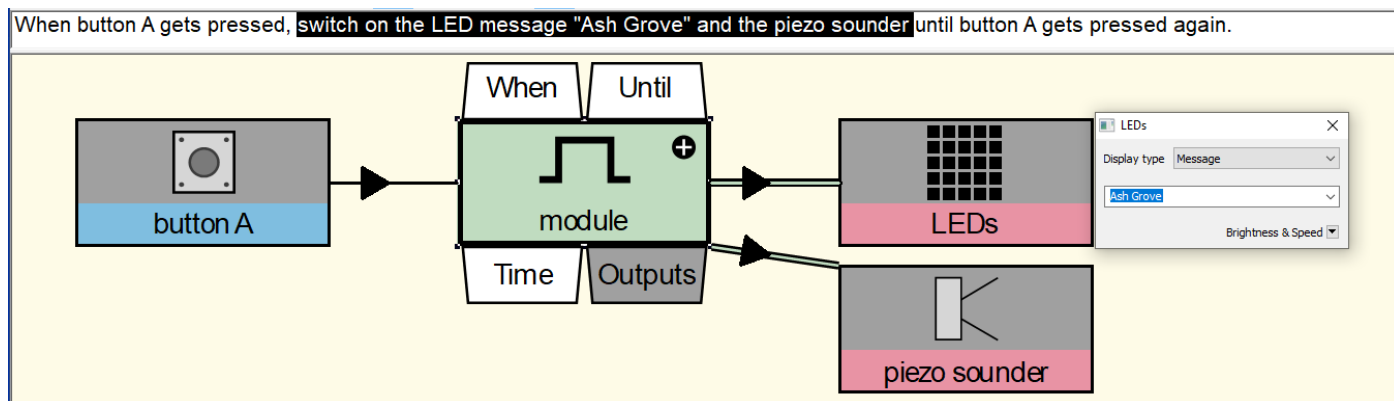
- Connect your micro:bit (USB for PC computers, Bluetooth for iPads.)
- Click the communicate button and select 'Control'.



## Taking it further

You can extend the control system to show the name of the tune on the LEDs while the tune is playing:

- Select a block for the LEDs
- Click the module to show the editing tabs.
- Drag a link from the OUTPUTS tab to the LEDs.
- Select Display type 'Message'
- Type the name of your tune.



## Tunes to try

You can copy these tune codes and paste them directly into the Mr Bit music editor:

### Ash Grove

C<sub>4</sub>:4 F A C<sub>5</sub> A<sub>4</sub> F F G B $\flat$ :2 A G F E:4 C C  
F A:2 G F E D:4 B $\flat$ <sub>3</sub> D<sub>4</sub> C F E F:8 R:4  
R:8 A:2 B $\flat$  C<sub>5</sub>:4 A<sub>4</sub>:2 B $\flat$  C<sub>5</sub> D C:4 B $\flat$ <sub>4</sub> A B $\flat$  G:2 A B $\flat$  C<sub>5</sub>  
B $\flat$ <sub>4</sub>:4 A G A F:2 G A B $\flat$  A:4 G F G C<sub>5</sub> B<sub>4</sub> C<sub>5</sub>:8 R:4

### Frere Jacques

C<sub>4</sub>:4 D E C C D E C  
E F G:8 E:4 F G:8  
G:2 A G F E:4 C G:2 A G F E:4 C  
C G<sub>3</sub> C<sub>4</sub>:8 C:4 G<sub>3</sub> C<sub>4</sub>:8

### Blue Peter (Hornpipe)

C<sub>5</sub>:1 B<sub>4</sub> C<sub>5</sub>:2 C<sub>4</sub> C G:1 F E G C<sub>5</sub> B<sub>4</sub> C<sub>5</sub> E D C  
D:2 D<sub>4</sub> D D:1 C B<sub>3</sub> D<sub>4</sub> G:2 G A:1 B  
C<sub>5</sub> B<sub>4</sub> A G A G F E F E D C C B<sub>3</sub> A G  
A C<sub>4</sub> B<sub>3</sub> D<sub>4</sub> C E D F E:2 C C:4

### Happy Birthday

D<sub>4</sub>:3 D:1 E:4 D G F#:8  
D:3 D:1 E:4 D A G:8  
D:3 D:1 D<sub>5</sub>:4 B<sub>4</sub> G F# E:8  
C<sub>5</sub>:3 C:1 B<sub>4</sub>:4 G A G:8

# Song Sheet - More tunes to try

You can copy these tune codes and paste them directly into the Mr Bit music editor:  
Choose a tempo to suit the tune.

## Merry Christmas

D<sub>4</sub>:4 G G:2 A G F# E:4 E E A A:2 B A G F#:4 D D  
B B:2 C<sub>5</sub> B<sub>4</sub> A G:4 E A D G F# G:8 D:4  
G G G F#:8 F#:4 G F# E D:8 A:4  
B A:2 A G G D<sub>5</sub>:4 D<sub>4</sub> D:2 D E:4 A F# G:8 R:12

## Auld Lang Syne

D<sub>4</sub>:4 G:6 G:2 G:4 B A:6 G:2 A:4 B:2 A G:6 G:2 B:4 D<sub>5</sub> E:12  
G:4 D:6 B<sub>4</sub>:2 B:4 G A:6 G:2 A:4 B:2 A G:6 E:2 E:4 D G:8 R:4  
E<sub>5</sub> D:6 B<sub>4</sub>:2 B:4 G A:6 G:2 A:4 B D<sub>5</sub>:6 B<sub>4</sub>:2 B:4 D<sub>5</sub> E:8 R:4  
E D:6 B<sub>4</sub>:2 B:4 G A:6 G:2 A:4 B:2 A G:6 E:2 E:4 D G:12

## Walking in the Air (Snowman)

A<sub>4</sub>:2 D<sub>5</sub> D C C A<sub>4</sub>:8 A:12 R:2 A D<sub>5</sub> D C C A<sub>4</sub>:6 F:2 G:16 G:12 R:2  
G B<sub>♭</sub> B<sub>♭</sub> A A G:6 D:2 F F E E D:8 D:16  
C<sub>6</sub>2 B<sub>♭</sub><sub>5</sub> C<sub>6</sub>B<sub>♭</sub><sub>5</sub> A:6 G:2 A G A G F:8  
F:2 E F E D:6 C:2 D C D C B<sub>♭</sub><sub>4</sub>8 D F A:16  
D<sub>5</sub>2 D C C A<sub>4</sub>8 A:12 R:2 A D<sub>5</sub>D C C A<sub>4</sub>6 F:2 G:16 G:12 R:2  
G B<sub>♭</sub> B<sub>♭</sub> A A G:6 D:2 F F E E D:8 D:16  
C#:2 D E:12 F:2 G A:12 B:2 C<sub>5</sub>D:8 B<sub>4</sub> G:16  
E<sub>♭</sub>:2 F G:12 A:2 B<sub>♭</sub> C<sub>5</sub>8 A<sub>4</sub> D<sub>5</sub>12 C#:4 A<sub>4</sub>6

## Land of Hope and Glory (Short version)

C<sub>5</sub>:4 C B<sub>4</sub>:2 C<sub>5</sub> D:4 A<sub>4</sub>:8 G  
F:4 F E:2 F G:4 D:12 R:4  
E:8 F#:2 G:4 A:2 D<sub>5</sub>:8 G<sub>4</sub>  
F<sub>5</sub> F:2 E:4 D:2 C:16

## Match of the Day

D<sub>4</sub>:4 G B D<sub>5</sub>:6 B<sub>4</sub>:2 B:4 B B B:8 C<sub>5</sub>:4 D:6 B<sub>4</sub>:2 A:4 B C<sub>5</sub>  
D<sub>4</sub> F# A C<sub>5</sub>:6 A<sub>4</sub>:2 A:4 A A A:8 B:4 C<sub>5</sub>:6 A<sub>4</sub>:2 G:4 A B  
D G B D<sub>5</sub>:6 B<sub>4</sub>:2 B:4 B B B:8 C<sub>5</sub>:4 D:6 B<sub>4</sub>:2 C<sub>5</sub>:4 D E R  
E F# G G:2 F# R F# E:4 G D D E D C:2 B<sub>4</sub> R B A:4 G

## Dr Who (180 bpm)

E<sub>4</sub>:4 E:2 E:4 R:2 E:4 E:2 E:4 R:2  
E:4 E:2 E:4 R:2 G:4 G:2 G:4 R:2  
E:4 E:2 E:4 R:2 B:6 C<sub>6</sub> B<sub>5</sub>:12 B B  
D:6 A<sub>4</sub> B:12 B B B B<sub>5</sub>:6 G B<sub>4</sub>:12  
D<sub>5</sub>:8 R:4 C:2 B<sub>4</sub>:12 B B:16

## Dad's Army (90 bpm)

B<sub>4</sub>:4 D:2 E F#:4 F#:2 G B A B A B A:6 B:2 A G# A B:4 A D:12 R:4 A G:2 F# A:4 G:2 E  
G F# F F#:8 B:4 A:2 G# A:4 B:2 C<sub>5</sub> E D D C# D:6 C:2  
B<sub>4</sub>:4 D:2 E F#:4 F#:2 G B A B A B A:6 F#:2 E D C# C:4 F#<sub>4</sub> G:8

## East Enders (90 bpm)

D<sub>4</sub>:2 E F# G A:4 B G:16 G:2 F# E D D:6 A<sub>3</sub>:2 A:3 D<sub>4</sub> A:2 D:4 E  
D:2 E F# G A:4 B G:16 G:2 F# E D D:6 A<sub>3</sub>:2 F#<sub>4</sub>:3 G A:2 F#:4 E D:16

## Song Sheet - More tunes to try - 2

You can copy these tune codes and paste them directly into the Mr Bit music editor:  
Choose a tempo to suit the tune.

### Star Wars

D4:2 D D G:12 D5 C:2 B4 A G5:12 D:6  
C:2 B4 A G5:12 D:6 C:2 B4 C5 A4:12  
D:4 D:2 G:12 D5 C:2 B4 A G5:12 D:6  
G:2 F D# A#:12 A:6 G G4:2 G G G:6

### Raiders March

E4:3 F:1 G:2 C5:8 R:2 D4:3 E:1 F:8 R:4  
G:3 A:1 B:2 F5:8 R:2 A4:3 B:1 C5:4 D E  
E4:3 F:1 G:2 C5:8 R:2 D:3 E:1 F:8 R:4  
G4:3 G:1 E5:4 D:3 G4:1 E5:4 D:3 G4:1 E5:4 D:3 G4:1 E5:2 D A4 B C5:8 R:4

### Harry Potter (180 bpm)

E4:4 A:6 C5:2 B4:4 A:8 E5:4 D:12 B4 A:6 C5:2 B4:4 G:8 B b :4 E:16 R:4  
E A:6 C5:2 B4:4 A:8 E5:4 G:8 G b :4 F:8 D:4 F:6 E:2 D#:4 D#48 C5:4 A4:16 R:4  
C5 E:8 C:4 E:8 C:4 F:8 E:4 D#:8 D#:4 E:6 C:2 A4 D#:8 E:4 E5:16 R:4  
C E:8 C:4 E:8 C:4 G:8 G b :4 F:8 D:4 F:6 E:2 D#:4 D#48 C5:4 A4:16

### Superman (180 bpm)

G4:6 G:2 D G G:12 C5:6 G4 C:12 G:6 G:2 D G G:12 E5:1 R:4 D:1 D:12 R:6  
G4 G:2 D G G:12 C5:6 G4 C:12 C5:2 C C:4 D:2 D D:6 A b :2 R G C:6  
G4:2 G G C5 R C G:8 R:2 G A:3 G:1 F:2 G:16 R:2  
G4 G G C5 R C G:8 R:2 G A:3 F:1 D:2 A G:16 R:2  
C C C C B:12 G:6 C:2 C C B:12 G:6 C:2 C C A F A C6:12 A5:6 C6:16

### Pink Panther (100 bpm)

D#:4:1 E:4 R:3 F#:1 G:4 R:3 D#:1 E:3 F#:1 G:3 C5:1 B4:3 E:1 G:3 B:1 B b :8 R:3 A:1 G:3 D#:1  
E:4

### Mozart - Eine Kleine (200 bpm)

D4:2 G B D5:4 D D D F#4 F# G G C5 C B4 B A:8 R:2  
D G B D5:4 D D D F#4 F# G G A A F# F# G:8

### Beethoven Für Elise (60 bpm)

E5:1 D# E D# E B4 D5 C A4:2 R:1 C E A B:2 R:1 E G# B C5:2 R:1 E4 E5 D# E D# E B4 D5  
C A4:2 R:1 C E A B:2 R:1 E C5 B4 A:2

### Handel – Hornpipe (200 bpm)

A4:8 D5 E F#:4 D:8 E:4 F# D E A:8 E:4 F# E:2 D E:4 A:8 E:4 F# E:2 D E:4 A4:8 A5:4 A A  
A G:2 F# G:4 G G G G F#:2 E F#:4 A A A A G:2 F# G:4 G G G G:12 A:4 F# E F# G E:12  
D:4 D:16 R:8

### Bach – Prelude (80 bpm)

C4:1 E G C5 E G4 C5 E C4 E G C5 E G4 C5 E  
C4 D A D5 F A4 D5 F C4 D A D5 F A4 D5 F  
B3 D4 G D5 F G4 D5 F B3 D4 G D5 F G4 D5 F  
C4 E G C5 E G4 C5 E C4 E G C5 E G4 C5 E

## Some bits and pieces

You can copy these tune codes and paste them directly into the Mr Bit music editor:  
Choose a tempo to suit the tune.

### HURRY

A4:1 B C5 B4 A:4 A:1 B C5 B4 A:4  
A:2 E5 E♭ E F E E♭ E  
B4:1 C5 D C B4:4 B:1 C5 D C B4:4  
B:2 E5 E♭ E F E E♭ E

### RELAX

G4:2 E C5:8 G4:2 E C5:8  
D:2 C B4 A G F E C C5:8

### DANCE

D5:4 B4:2 G5:4 E:2 D:4 B4:2 G:6 D5:4 B4:2 G5:4 F#:2 E:6 D  
D:4 B4:2 G5:4 E:2 D:4 B4:2 G:6 A:4 D5:2 C# D E D:12  
E:4 F#:2 G F# E C:4 D:2 E D C B4:4 C5:2 D C B4 A:12  
D5:4 B4:2 G5:4 E:2 D:4 B4:2 G:6 D5:4 G:2 F# G A G:12

### WEIRD

C6:1 B5 B♭ A

### BROKEN CHORD

C4:4 E C G E C5 G4:2 E C:4

### SAD TUNE

C4:4 D E♭ :12 G:4 E♭ D C:12  
G:4 A♭ G A♭ :12 C5:4 A♭ 4 F G:8

### HAPPIER TUNE

C5:4 D E:12 G:4 E D C:12  
G:4 A G A:12 C6:4 A5 F G:8

### SCALE

C6:4 B5:2 A G F E D  
C:4 B4:2 A G F E D  
C:8

### BELLS

C6:4 B5 A G F E D C  
C6 A5 F D B G E C  
C6 B5 A G F E D C

### WESTMINSTER

A4:4 F G C:12 C:4 G A F:12  
A:4 F G C:12 C:4 G A F:12  
R A3 R A R A R A