

Music Turtle

Turtles can react to their environment by reacting to colors used on the page background. In this project you create a turtle that can play a song as it moves across different patches of color.

Remember: if you must leave your project before you've completed all the steps, jump directly to the last step to review how to save your project.

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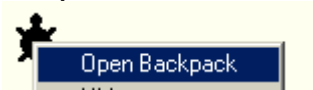
Step 1: Turtle rules and instructions

In order to create a music turtle, you first need a turtle.

Hatch a new turtle.



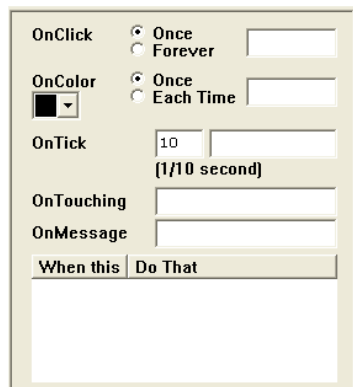
Right-click on the turtle and select **Open Backpack**.



Select the Rules tab.

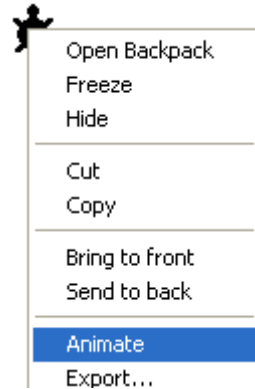


The Rules tab looks like this:



In this tab, you can write instructions (rules) that the turtle runs if a specific event occurs. For example, if you click on a turtle (the event) it follows the instruction for OnClick, if there is one.

Leave the turtle's backpack open and right-click on the turtle. In the menu that appears, select **Animate** and watch your turtle go!



The following instruction is automatically added to the instruction for OnClick in the turtle's backpack.

```
forward 5 wait 1
```

This instruction tells the turtle to move forward 5 steps and then wait for one tenth of a second.

In MicroWorlds EX, every word is interpreted as a request to do something. There are some words, like `forward` and `wait`, that MicroWorlds EX already knows about because they are built in.

To run, both `forward` and `wait` need additional information – an input. `Forward` needs to know how far forward to move. `wait` needs to know how many tenths of a second to wait. The input for both `forward` and `wait` is a number.

The OnClick section of the Rules tab should look like this (use arrow keys to scroll, if you cannot see all of the text or drag the side of the backpack to make it wider):



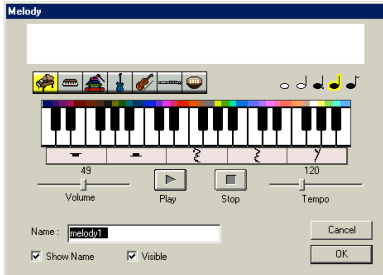
Do It has been set to `Forever`. Click on the turtle and it runs the instruction over and over, forever – or, at least until you click on the turtle again to stop it.

Step 2: Adding music

Click on the Melody icon in the Toolbar.



The Melody editor appears.



Select an instrument



Then click on middle C. (It's highlighted in the picture below, although it is not highlighted in MicroWorlds.)



In the Name field, name the melody MiddleC. (Write the name as all one word. It's simpler).



Click OK

A melody icon appears on your page. Click it and it plays the melody.

Step 3: Turtle rules for colors

You can write an instruction rule that the turtle follows if its center point goes over a specific background color.

Turn the turtle so it's pointing towards the right-hand side of the screen.



Click on the Painting/Clipart pallet button on the Toolbar:



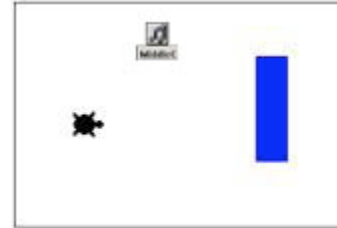
Select the filled rectangle tool.



Choose a color, for example, blue.

Draw a small rectangle in front of the turtle you just hatched.

At this point your project may look something like this:



Click on the Regular Pointer in the Toolbar.



Go back to the turtle's backpack, select the Rules tab and you see the following:

Click on the drop-down color list

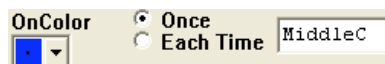


Select the color you used to draw the rectangle on the page (in this example, blue). It should appear in the color box next to the OnColor instruction field.

In the onColor instruction field, type the following instruction:

MiddleC

Set Do It to Once.



Click on the down arrow next to the drop-down list and a tiny dot appears on the color you programmed. This is a reminder that this color contains an instruction for the turtle.

Click on the turtle. What happens when the turtle crosses the rectangle?

The turtle should have played a note when it moved across the rectangle. The turtle detects a color when its center crosses that color, and then it runs the instruction you gave it.

The onColor event in the turtle's backpack lets you program a set of instructions that occur when that turtle touches any part of the background drawn using that color. These instructions work for every shade of the color, everywhere it appears on the page

Step 4: Adding notes

Now use the melody editor to add more notes.

Open the melody editor. Click on the note D (highlighted below).



Name the melody D.

Name :

Click OK

Continue up the scale. Create an E melody, an F melody, a G melody, an A melody, a B melody, and a C2 melody (C2 is the C above middle C) using the notes labeled in the picture below.



Step 5: Programming more colors

Next, program 8 more colors, one color for each note-melody you just made. For example, program red to play the D melody, program lime green to play the E melody, and so on.

If you can't remember which color plays which note, create a small chart on your MicroWorlds EX page using small filled rectangles you draw with the Painting tools and text boxes. In this example, the text boxes are set to transparent mode.

Your chart might look like this

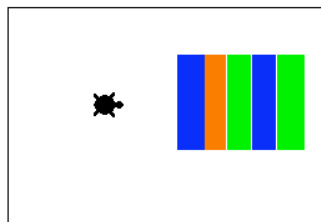


Step 6: Draw a song

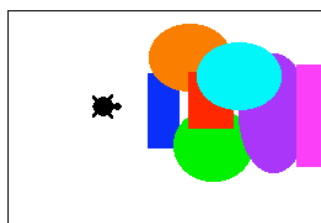
Now that you have the notes, create a colorful background and let the turtle play some music!

Open the Painting tools and select the filled rectangle tool again.

Use all different colors to fill your screen with a design.



Or use other Painting tools:



Remember, all the shades of a color use the same rule.

Now, let your turtle move across the screen and listen to the song it plays! (Make sure your computer has the Sound turned on !)

Try different designs and see if they have different sounds. Try some repeating patterns and leaving blank spaces between colors. What happens?

Can you use these notes and pauses to "draw" a song? (You may want to just click on the melody icons to figure out a song before drawing it.)

Click the grid icon in the Toolbar to keep the Grid on if you want even blocks of colors lined up straight on the grid for your song.

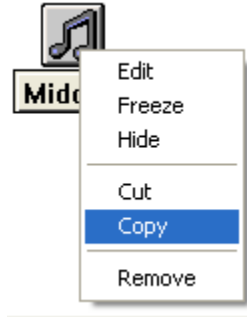


Look at the picture of a simple song. What do you see? Play it backwards, too.

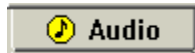
Step 7: Send your turtle to another project

You can send your turtle from this project to another project you created. First, you must make sure the turtle has all the “stuff” it needs. The turtle needs all the melodies you created in its backpack before it begins its travels.

Select all the melody icons by dragging across them with the mouse or by pressing CTRL and clicking on each of them. Then select **Copy** in the popup menu.

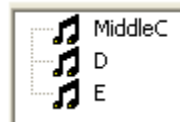


Click on the Audio tab of the turtle’s backpack.



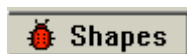
Right-click in the Audio tab and select **Paste**.

Make sure you imported all of the melodies you created (D, E, F, G, A, B, C2). Then delete the melody icons on the page.



Send a song, too. If there was a background design that you created that played a nice song, select it using the Selector tool in the Painting palette and place it in the turtle’s Shapes tab.

First, select the Shapes tab of the turtle’s backpack.

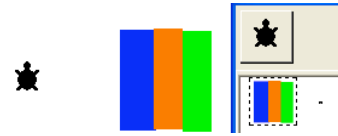


Then click on the Selector tool in the Painting palette.



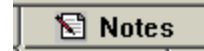
Drag the mouse across all of the background you want to copy. Right-click on the selected area and select **Copy** in the popup menu.

Finally, right-click on an empty shape in the turtle’s Shapes tab and select **Paste** in the popup menu. Your “song” graphic should appear as a shape.



Step 8: Add a (non-musical) note

Select the Notes tab in the turtle’s backpack



Write a note describing what the music turtle can do, which songs it knows, and when you created it. You may even want to write some instructions for yourself, such as:

- 1) Set the turtle to the shape in the Shapes tab and stamp the shape on the page. Then set the turtle back to its original (turtle) shape.
- 2) Click on the turtle to get it to start moving. It should be facing the stamped shape.

Step 9: Time to travel

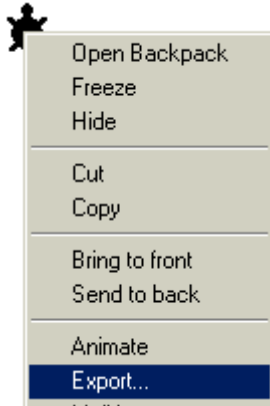
First, open the turtle’s backpack and select the State tab.



Click the Edit button next to the turtle’s name. Give the turtle a meaningful, one-word name, such as Maestro. (Names should always be one word only.)

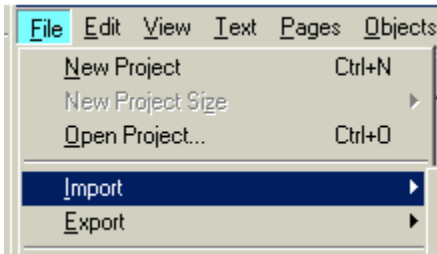
The Export Turtle option saves the turtle – not the project - as a special file (with an .mwa extension) on whatever disk you choose to save it.

Right-click on the turtle. Select **Export...**

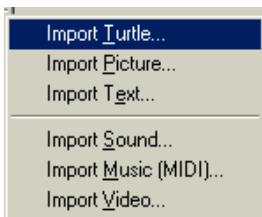


The Export Turtle dialog opens. Choose the appropriate directory and click Save. The turtle is saved as an .mwa file using the name you gave your turtle, for example:
maestro.mwa

To use this turtle in another project, select **Import** in the File menu.



Then select **Import Turtle....** In the submenu:



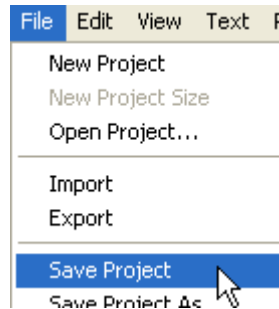
A browser dialog box opens. Locate the turtle file (the .mwa file) by browsing on your computer.

Select the file and click Open. The turtle appears on the page.

It's a good idea to save all of your exported turtles in one directory so you'll know where to look the next time you want to use one of them.

Step 10: Save your work

If you also want to save your project (always a good idea), choose **Save Project** in the **File** menu:



In the Save dialog box, choose the appropriate directory, give a name to your project and click **Save**.