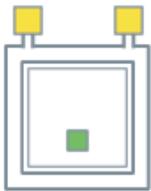
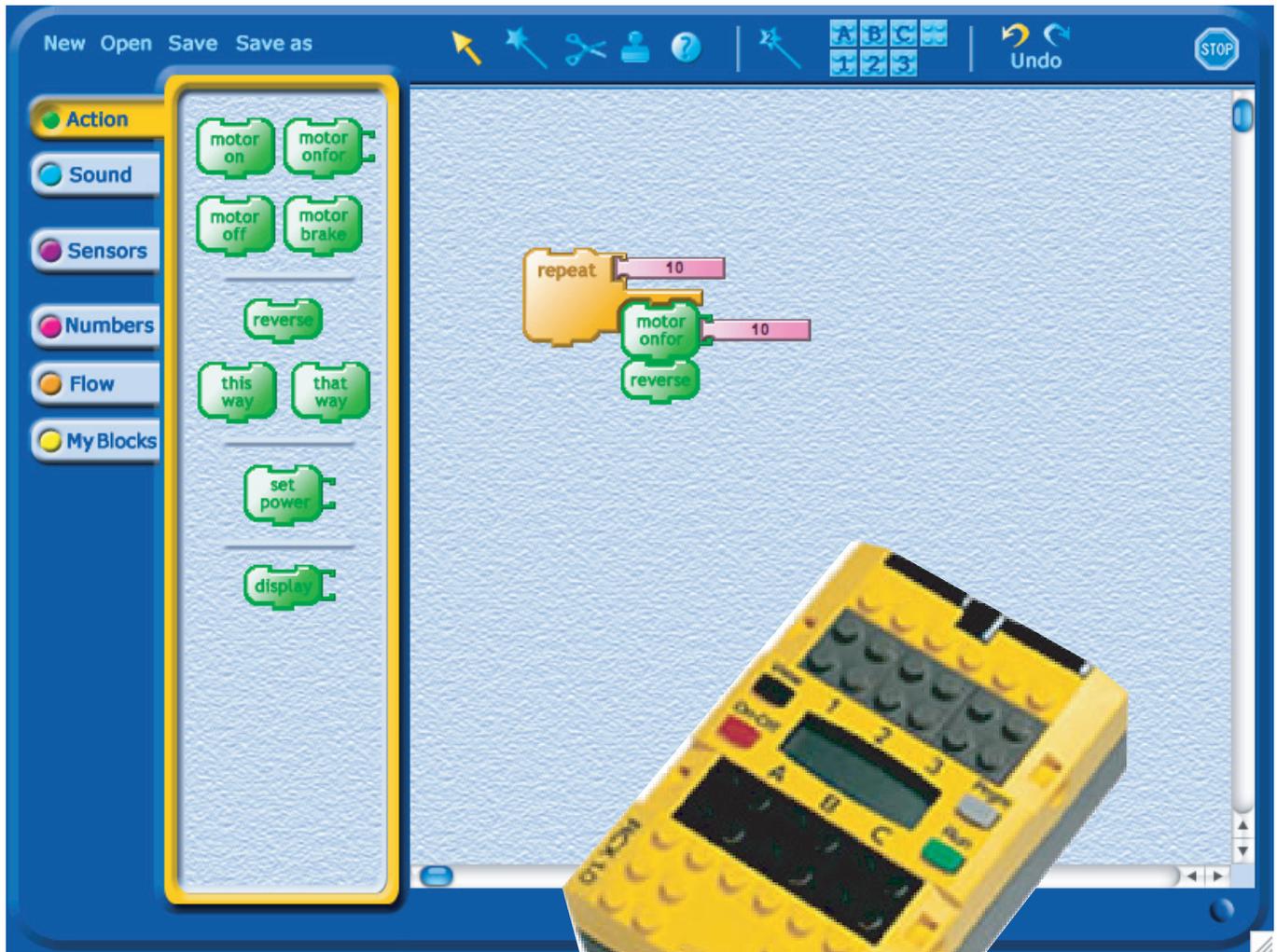


# RCX<sup>®</sup> PicoBlocks



The Playful Invention Company  
Version 1.0 RCX<sup>®</sup> PicoBlocks software

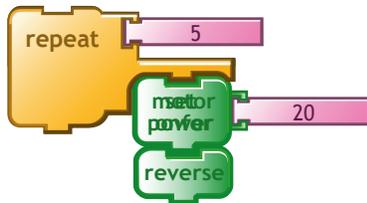
[www.playfulinvention.com/rcx](http://www.playfulinvention.com/rcx)

## Getting Started

# RCX® PicoBlocks Overview



With PicoBlocks, you create programs by snapping graphical blocks together into stacks.

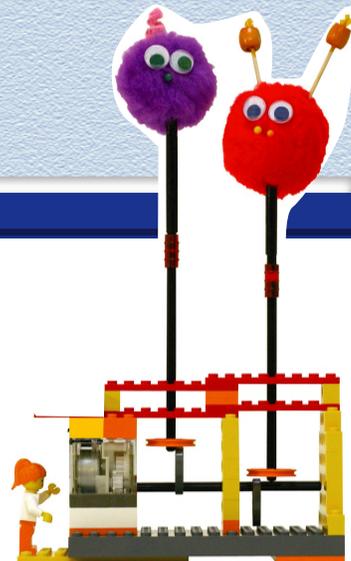


The different shapes of the blocks give guidance on how to build a working program, making it easy for beginners to get started using the RCX® brick.

A fully functional version of RCX® PicoBlocks is available at [www.playfulinvention.com/rcx](http://www.playfulinvention.com/rcx)

**RCX® PicoBlocks** is a programming language designed for programming your RCX® brick, the programmable LEGO® brick that serves as the brain in your LEGO® MINDSTORMS® Robotics Invention System.

For more about the LEGO MINDSTORMS RCX, see [MINDSTORMS.LEGO.com/eng/default\\_ris.asp](http://MINDSTORMS.LEGO.com/eng/default_ris.asp)



LEGO, the LEGO logo, RCX, MINDSTORMS, the MINDSTORMS logo, and the knob configuration are trademarks of the LEGO Group. Used here with special permission.

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# RCX<sup>®</sup> PicoBlocks Setup

## Step 1: Setting up your Computer and RCX<sup>®</sup> PicoBlocks Software

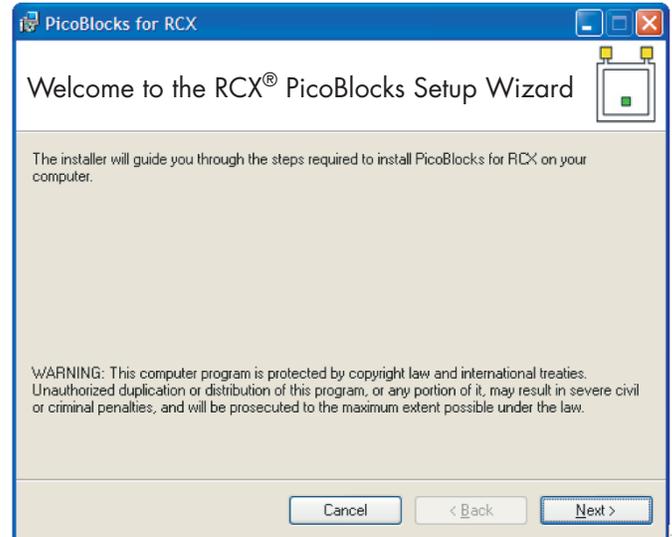
### Minimum Computer Requirements:

Windows XP

### Minimum Display Resolution:

1024 x 768

You should use a computer that you have already successfully used with RCX<sup>®</sup> software or ROBOLABTM. This will insure that the necessary drivers for the LEGO<sup>®</sup> Tower have been installed. (If you do not have access to such a computer, please see [www.playfulinvention.com/rcx/setup](http://www.playfulinvention.com/rcx/setup).)



- Download the RCX<sup>®</sup> PicoBlocks software from [www.playfulinvention.com/rcx](http://www.playfulinvention.com/rcx)
- Follow the instructions to install PicoBlocks software.

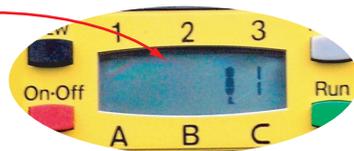
[Note: If the installation program does not start up automatically, locate and run the file named RCXPicoBlocksInstaller.msi]

## Step 2: Turn on Your RCX<sup>®</sup>

Press the **On-Off** button on your RCX<sup>®</sup> to turn it on. You should hear two beeps and the RCX's screen should look like this:

If nothing happens when you press the On-Off button, you may need new batteries.

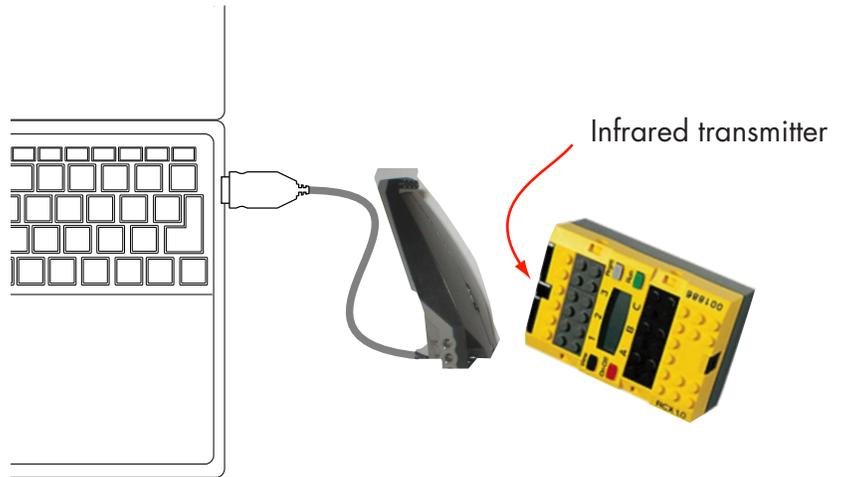
If the screen looks like this, you need to install the RCX<sup>®</sup> firmware. See the section on "Re-installing the RCX<sup>®</sup> Firmware" below.



# RCX<sup>®</sup> PicoBlocks Setup

## Step 3: Connect the LEGO<sup>®</sup> Tower

Connect one end of the cable to the LEGO<sup>®</sup> Tower, and the other end to a USB port on your computer.



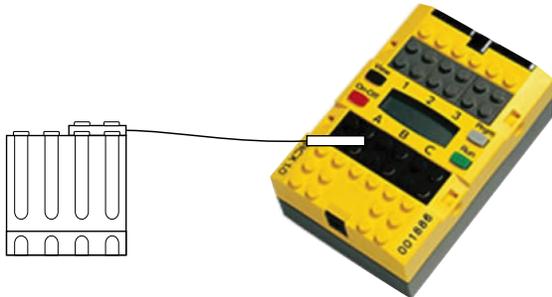
[Note: If you have an older LEGO<sup>®</sup> Tower that connects to a computer's serial port instead of a USB port, see [www.playfulinvention.com/rcx/setup](http://www.playfulinvention.com/rcx/setup)]

Make sure the "infrared transmitter" side of the RCX<sup>®</sup> brick is pointing toward the LEGO<sup>®</sup> Tower, as shown in the figure above.

# RCX<sup>®</sup> PicoBlocks Setup

## Step 4: Test it!

1



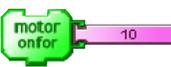
Connect a LEGO<sup>®</sup> motor to any of the three motor ports on the RCX<sup>®</sup> brick.

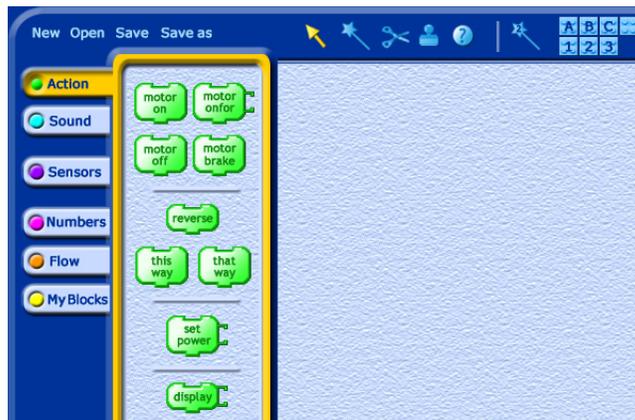
2

Start the RCX<sup>®</sup> PicoBlocks software by clicking on the shortcut icon that has been placed on your desktop.

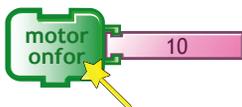


3

Drag  into the PicoBlocks workspace.

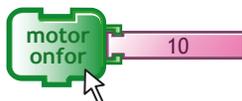


4



Click with the magic wand to turn the motor on for 1 second (10 ticks = 1 second).

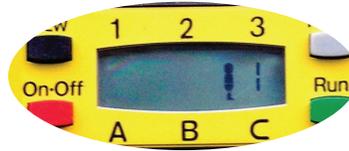
Here's a shortcut: You can also double-click to send your program to the RCX<sup>®</sup>.



# RCX® PicoBlocks Setup

## Re-installing the RCX® Firmware

If the screen looks like this when you turn on the RCX® brick, you need to install the RCX® firmware.



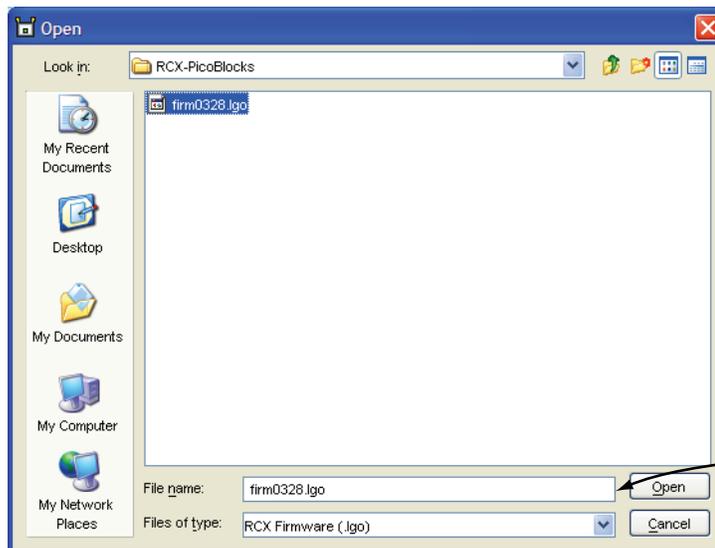
The LEGO® RCX® firmware needs to be reinstalled every time you change batteries on the RCX® brick. If you need to, you can download the firmware from within RCX® PicoBlocks by following these steps:

1

Turn on the RCX® brick and point it towards the LEGO® Tower.

2

Use the PicoBlocks “Open” menu to open the file called firm0328.lgo. The firmware download should begin at this point.



Note: If you can't find the firm0328.lgo file, make sure the “Files of Type” box is correctly set.

3

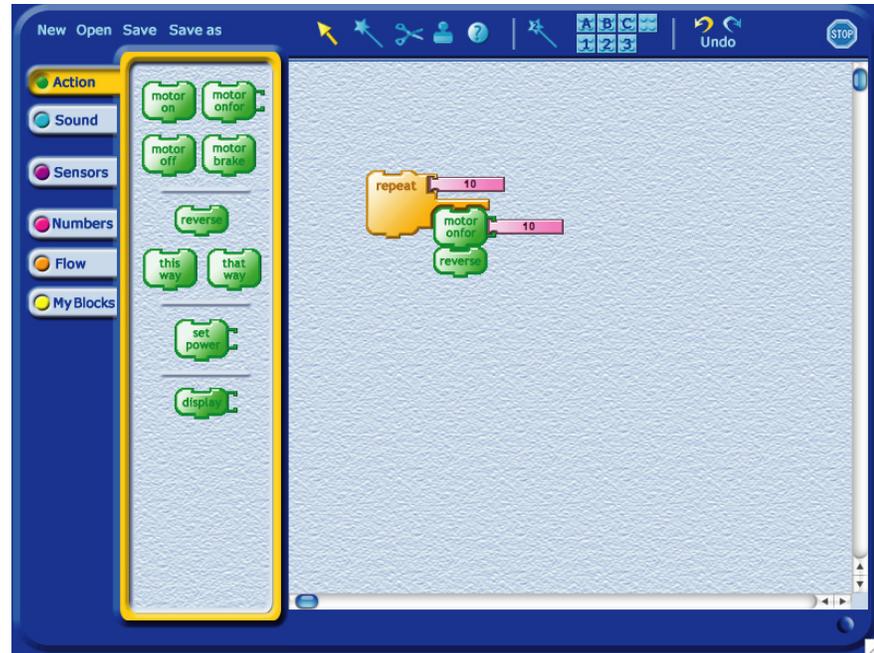
As the firmware download proceeds you should see a steadily increasing number on the RCX® display. The download takes about 4 minutes and should end when the displayed number reaches about 4000. (You also can follow the progress at the bottom of the PicoBlocks window.)

If the download is successful, the RCX® brick will beep.

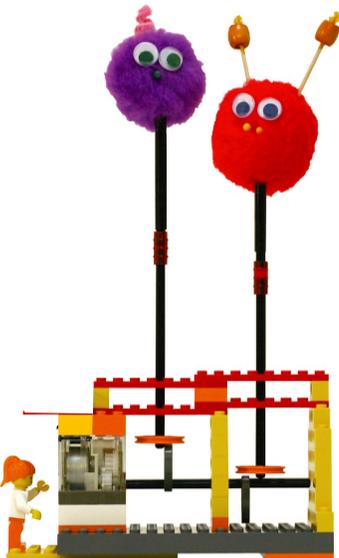
# Getting Started with Motion, Sensors, and Sounds

With PicoBlocks, you create programs by dragging out graphical blocks and snapping them together into stacks.

Click on the Tabs to get different categories of blocks.

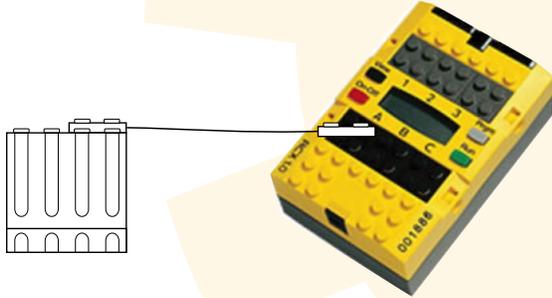


The next few pages will help you get started using RCX<sup>®</sup> PicoBlocks to make your creations move, make sounds, and sense the world around them.



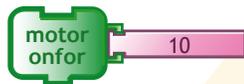
# Motion

1



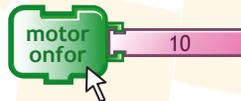
Connect a LEGO® motor to port A on the RCX® brick.

2



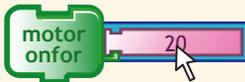
Drag out a motor onfor block. Click with the magic wand to turn the motor on for 1 second. (10 ticks = 1 second)

Here's a shortcut: You can also double-click to send your program to the RCX® brick.

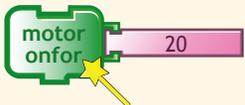


3

Want to change the amount of time the motor is on for?

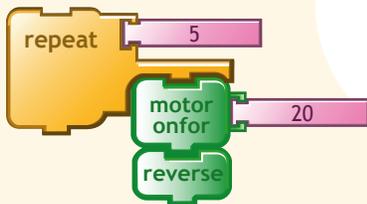


Click the number using the **arrow**, and then **type** 20.



Click with the **wand** to turn the motor on for 2 seconds.

4



Tell the RCX® brick to **repeat** this five times:

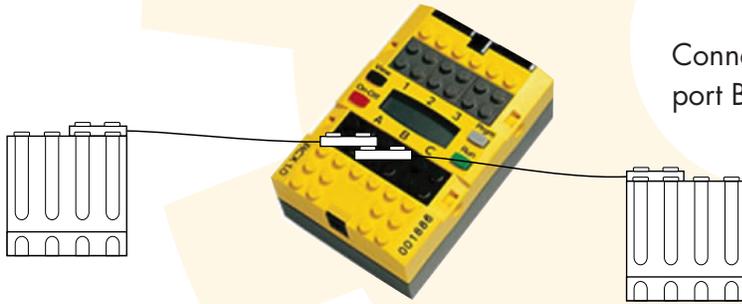
- turn motor on for 2 seconds,
- reverse direction

The RCX® brick will remember the last thing it did, even if you turn it off. To start this program again, push the RCX's **Run** button.

You don't need to be at a computer for this to work.

# Motion

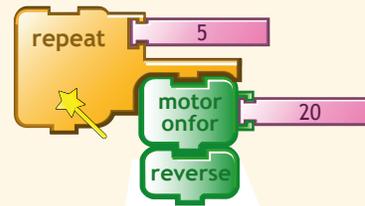
5



Connect a second LEGO® motor to motor port B on the RCX® brick .

6

Notice that with this program, both motors do the same thing.



7

Use the Tags tool when you want to tell the two motors to do different things.



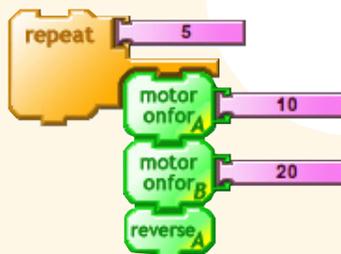
The motor ports on the RCX® brick are labelled A, B, and C. If you want to send a command to a particular motor port, then you need to “tag” the block with the appropriate letter.



To tag a motor block, click on the appropriate letter in the Tags tool, then click on the block that you want to tag.

To untag a block, click on the unlabelled square in the Tags tool, then click on the block that you want to untag.

8



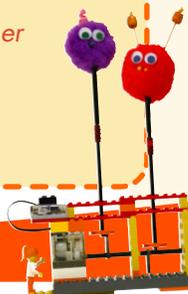
Motor A turns on for one second....

then Motor B turns on for two seconds.

Only Motor A reverses direction the next time around.

*You can use the motor to make moving sculptures, interactive puppets, and other creative contraptions.*

*See [www.picocricket.com/motion](http://www.picocricket.com/motion) for some ideas.*

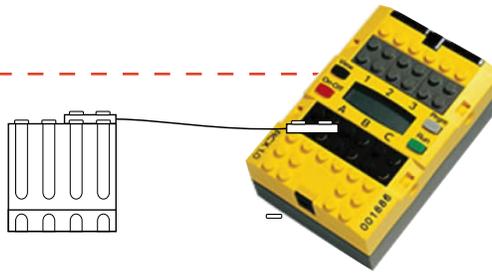


To remove a tag from a block, click unlabelled square of the Tags tool and then click on the block.

# Sensors

1

Connect a LEGO® motor to any of the three motor ports on the RCX® brick.



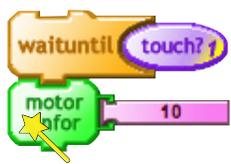
2

Plug a touch sensor into port 1.



3

With this program, the motor won't turn on until you press the touch sensor.



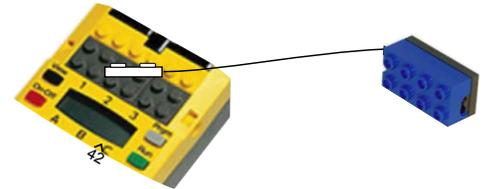
Make sure the "tag" on the touch? block matches the port number. You can use the Tag tool to change the tag.



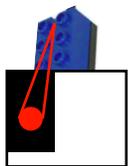
Tag Tool

4

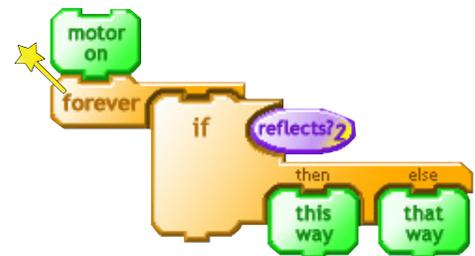
Now plug a reflection sensor into port 2. The reflection sensor sends out a beam of red light and measures how much of it reflects from from a nearby surface.



5



Aim the reflection sensor at a piece of paper that has some parts that are white and other parts that are black. With this program, the motor will spin one way when the reflection sensor is over a white part and it will spin the other way when it is over a black part.



6

You can use the RCX® brick's **View** button to see a live view of the sensor readings. Just press the View button until the arrow is located under the sensor port you wish to view.



7

With this program, the motor won't turn on until the amount of reflected light is big enough.



Change this number to control how much reflected light is needed to turn the motor on.

# Sound

1



Drag out a playsound block. Click with the magic wand to send to the RCX® brick.

2



Click the arrows (or use the slider) to choose a different sound.

3



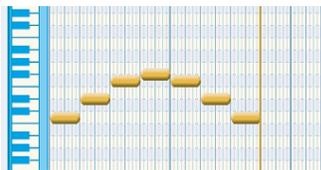
Click with the magic wand to hear the new sound.

4

melodies

Click the melodies button to open the melody editor.

5



Use the piano keys (or click directly in the editor) to create a melody.

6



Click the the play button to hear your melody.

7



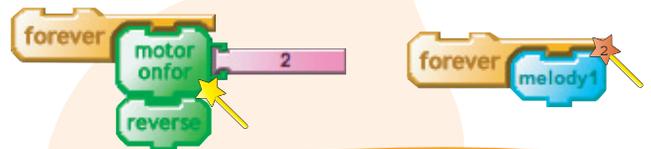
Click OK. Your melody will turn into a block.

8

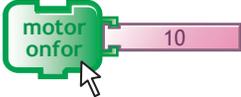


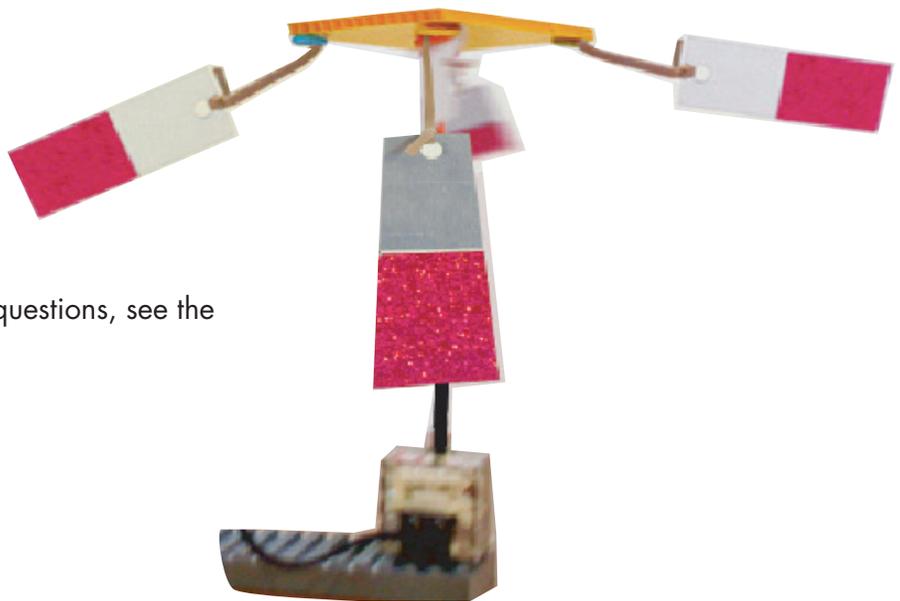
Drag out your new melody block. Click with the magic wand to play the melody.

Want your melody to play at the same time some-  
things else is happening? Click one stack with ,  
click the other with .



# Tips + Tricks

- Here's a shortcut: Double-click to send your program to the RCX<sup>®</sup> brick.
- The RCX<sup>®</sup> brick will remember the last thing it did, even if you turn it off. To start a program again, push the brick's **run** button.
- If you push the RCX<sup>®</sup> brick's **run** button while a program is running, it will stop the program.
- Want to find out what a block does? Select  from the toolbar, then click on the block.
- To make two stacks run at the same time, click one stack with , click the other with .
- If you get the error message "The Tower cannot find the RCX," make sure the RCX<sup>®</sup> brick is turned on, and the Tower and RCX<sup>®</sup> brick are facing each other.
- To get rid of blocks, just drag them off the workspace.
- For answers to some frequently asked questions, see the FAQ at [www.playfulinvention.com/rcx](http://www.playfulinvention.com/rcx)



# About PiCO

RCX® PicoBlocks was developed by The Playful Invention Company (PICO).

PICO develops new technologies and activities that engage children in creative learning experiences. PICO products are based on research and ideas from the Lifelong Kindergarten group at the MIT Media Lab. The Lifelong Kindergarten group collaborated with the LEGO Company on the development of LEGO® MINDSTORMS® robotics kits, now used by millions of kids around the world to build and program their own robots.

[www.playfulinvention.com/rcx](http://www.playfulinvention.com/rcx)



The PicoBlocks programming environment was originally developed for use with the PicoCricket Kit, a new breed of construction kit that is being sold by The Playful Invention Company.

The PicoCricket Kit is similar to the MINDSTORMS® robotics kits. But while MINDSTORMS® is designed especially for making robots, the PicoCricket Kit is designed for making artistic creations with lights, sound, music, and motion.

For more information about the PicoCricket Kit, see [www.picocricket.com](http://www.picocricket.com)

