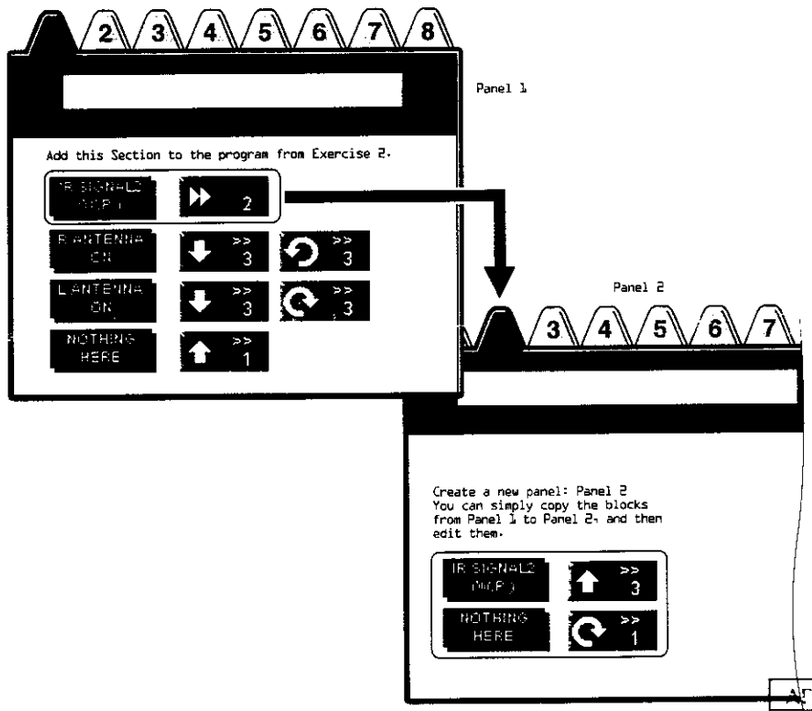
## Exercise 3: Modifying the Program so that the WonderBorg can Pick Up and Follow an Infrared Signal

In this exercise, we're going to modify the program from Exercise 2, so that if the robot detects an infrared signal, it will enter "Following mode (Panel 2)", and start following the infrared signal. This program uses 2 panels.

### Program for Exercise 3




### Panel 1

Panel 1 was created by taking the program from Exercise 2 and augmenting it with a line telling the robot what to do if it detects infrared signal 2 (Way Point). If it detects this particular infrared signal, it is instructed to switch to the program on Panel 2. As a result of the tests you carried out in Exercise 2, your blocks for evasive action may look different from those shown above, but you do not need to alter the figures all over again.

### Panel 2

Panel 2 contains a program for "Following mode", where the robot will follow infrared signal 2 (Way Point). If it detects this particular infrared signal, it is instructed to move forward 3 steps. If there is no sensor reaction, it must then turn one step to the right. In this program, if the robot loses the infrared signal, it will turn round and round, while if it finds it, it will move forward.





### Testing

Before sending the program to the robot and having it executed we are going to prepare to transmit infrared signal 2 (Guide to another robot) from the interface.

SET UP

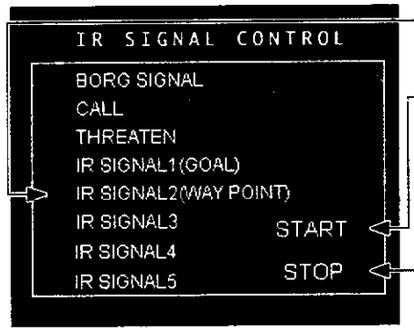
Click the "Set Up" button at the bottom right of the Panel screen, select "infrared signal 2 (Way Point)" from "IR Signal Control" menu on the Set UP screen, then click the "Start" button. The red indicator lamp on the Interface should flash for a short while, then the flashing will stop, and this pattern should be repeated continuously. If this happens, the infrared signal 2 is being transmitted from the interface.

If necessary, you can unplug the cable from the Interface, and place the Interface some distance away from your PC. When you do this, do not switch the Interface's main switch OFF: the infrared signal will stop if you do so.

The range of the infrared signal is shown in the diagram below. Place the robot somewhere inside this range before starting the transmission. If the transmission does not work, move the robot a little closer to the Interface, then try again.

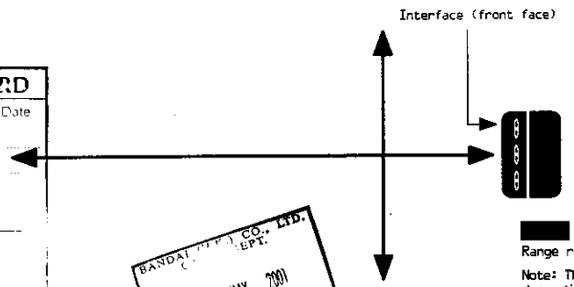
Add space # correction on film

### - How to Transmit an Infrared Signal




1. Select the desired Signal by clicking the name.
2. When you click the "Start" button the infrared signal will be transmitted to the robot.
3. To stop the transmission of the infrared signal, either click the "Stop" button, or start transmitting another signal. The transmission will also stop automatically if you click "Download to WonderBorg" on the Settings screen, if you transmit a program by clicking "Download to WonderBorg" on the Panel screen.

### • The Ranged Reached by the Infrared Signal



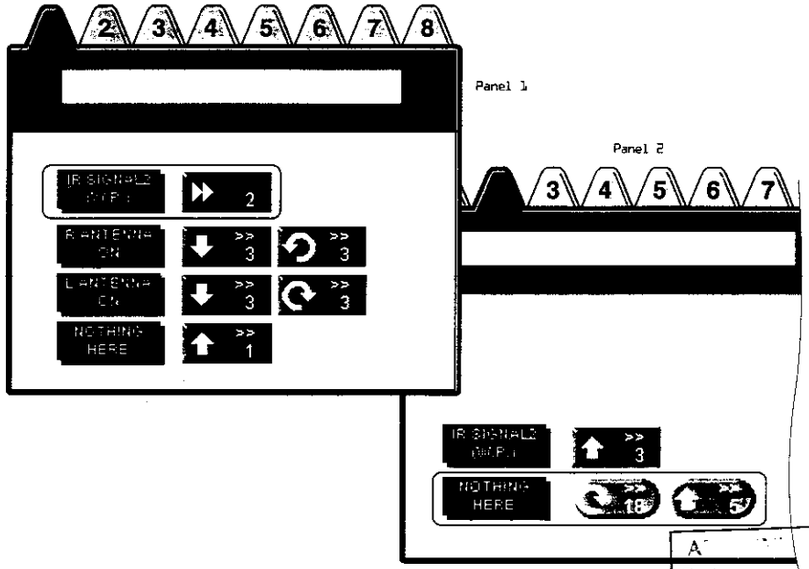

Note: The range may vary depending on the brightness of the surroundings, and other factors.

## Exercise 4: Modifying the Program to Make the WonderBorg Follow an infrared Signal Reliably

In this exercise, we are going to take the program on Panel 2 from Exercise 3, and modify it, using the "interrupt" function, so that the WonderBorg will follow-infrared signal 2 (Way Point) more reliably.

With the program from Exercise 3, when the WonderBorg has detected infrared signal 2 (Way Point) and is walking towards the signal, if an empty can or other obstacle is placed between the robot and the Interface, blocking the signal, then the robot will lose the signal and end up turning round and round on the spot. With this new program, however, the robot moves forward a little each time it more or less completes a full turn if it loses the signal, it should be able to find it again.

In the new program on Panel 2, if there is no sensor reaction, the WonderBorg turns 18 steps to the right, and then goes 5 steps forward. This means that it is repeating a behavior pattern of scanning its surroundings, and then changing its position slightly. The blocks for these actions are green overridable blocks, so if the sensor for infrared signal 2 is triggered while the rotating, it will stop rotation and start walking forward.




## Pre-Programmed Personalities

As a user you may opt to use the three pre-programmed personalities included in the software. These are three completed programs that you can download to your WonderBorg. You may want to try these out initially to become more familiar with programming the WonderBorg.

The Adult personality is the most advanced pre-programmed personality. It uses the full range of its sensors.

The Baby personality does not use as many of its sensors as the adult. It hesitates and makes noises before it advances forward. The baby personality also dances around when it sees darkness (when you put your finger over the light sensor window).

The Dark personality is always looking for a fight. It will stay at a stand still and use a threatening tone to try and challenge other Borgs. It uses a wide range of its senses.



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# Troubleshooting

## Operating Problems

**- If the WonderBorg does not beep when the power is turned ON:**
Check that the motherboard and motor units are properly connected.

**- If nothing happens when the power is switched ON:**
If you have previously opened the motor unit to change the gears, check whether you have done this correctly. Check that the batteries have been inserted, and that they are the right way.

**- If the WonderBorg does not move correctly when you transmit a program:**
Check whether something is blocking the signal between the Interface transmitter and the WonderBorg's infrared receiver. Check that the interface and the robots are far enough apart.

**- If the WonderBorg makes a chirping noise while executing a program, and the stops moving:**
Check whether the robot's leg has been caught somehow. If any of its legs are interfered with while it is executing a program, the WonderBorg will chirp repeatedly.

**- If the WonderBorg's legs start trembling when the power is switched ON:**
This is not a fault: the WonderBorg is performing its initial operation check. Just leave it alone for a short while.

**- If the WonderBorg goes backward when the program says it should to forward:**
Check whether the motherboard and the motor units have been connected the wrong way.

**- If the WonderBorg does not walk properly:**
Check that the legs have been assembled correctly. To make the robot walk efficiently, the legs have to be assembled at the optimum angle. If you are using the legs made of plastic-covered wire, check that they are bent correctly.

**- If the WonderBorg starts executing the program, and then stops after a short while:**
check the batteries. When the batteries are low, the WonderBorg will sometimes come to a standstill when executing a movement at the "low speed" setting. If this is the problem, change the batteries.

**- If the Interface is not showing any reaction:**
Check that the cable is properly connected. Push it in as far as it will go.
Is the port setting correct?
Consult you PC manual and make sure the port selected is the one to which the Interface is connected. Is the interface switched ON? Check that the green indicator lamp is glowing. If the interface is switched ON but the green indicator lamp is not glowing, check that the batteries are inserted the right way.
It can happen that a scrap of plastic from the battery wrapper has gotten stuck over a battery contact, so check for this too.

**- If an error message appears on your PC screen:**
An error message may appear if you select a port other than the one the Interface is connected to. In this case, the message will disappear when you click "OK" on the message dialog window, and you can then select the correct port. In this case, the cursor will turn in to an hourglass shape, but it will still work when you click it. Have you select the correct port? Consult your PC manual and select the port to which the interface is connected.

**- If your PC crashes:**
Restart your PC.
Have you selected the correct port? Consult you PC manual and select the port to which the interface is connected.



TROUBLESHOOTING

## Problems with Program Transmission

- If you transmit a program, and then find that the WonderBorg still behaves as it did before:
The WonderBorg cannot receive a program while the green LED is flashing. Check that the WonderBorg and the Interface are facing one another, and are close enough. If they are too far apart, or if there is an object between them, it will not be possible to transmit the program. The WonderBorg's infrared receiver shouldn't be more than 20cm away from the Interface, and there should be nothing in the way between the two. Is someone using another WonderBorg close by? If so, this may make it impossible to transmit programs to your own WonderBorg. Are you using the robot in an extremely bright location? This can make it impossible to transmit programs to your WonderBorg.

A. If the program is transmitted successfully: the WonderBorg gives a short beep.
B. If the program is not updated: the WonderBorg gives a long beep
C. If a faulty program has been received: the WonderBorg gives three long beeps.

## Problems with Sensors

- If the touch sensors are not reacting properly:
Check whether one of the sensors has come loose from the rubber socket holding it in place. You will need to remove the body shell. If you are using the antennae made of plastic-covered wire, check that they are bent correctly.

- If the infrared sensors are not reacting properly:
Go into the Set Up screen and adjust the sensitivity using the "Infrared sensors" gauge.

- If the Light sensor is not reacting properly:
Adjust the sensitivity using the "Light sensor" gauge on the Set Up screen. When programming, bear in mind that at certain levels of brightness, the WonderBorg cannot distinguish between "Light" and "Dark".

- If the floor sensor' "OFF" reaction is triggered while the WonderBorg is walking:
Check whether the WonderBorg's body is tilted because it has stepped up on some obstacle, or because of the way its legs are bent. Marked tilting of the body can sometimes make the floor sensors lose track of the floor.
If the floor is black (or very dark in color), the floor sensors will be unable to detect the floor.
(Hint: the speed of the flashing green LED indicates the type of floor surface (Light / Dark) as sensed by the WonderBorg - In addition, make good use of the Interrupt function)

- If the floor sensors are not reacting properly:
The performance of the floor sensors may vary slightly from one WonderBorg to another. Go into the Set Up screen and adjust the sensitivity, using the "infrared sensors" gauge. When programming, it should also be kept in mind that at certain "Floor status" settings, the robot may be unable to distinguish between "Floor sensor ON" and "Floor sensor OFF".

- If the infrared sensors and the floor sensors are not working:
If you are using the WonderBorg in a very light or brightly-lit location, the obstacle sensors and floor sensors may not react.

- If the infrared sensors and the floor sensors have become less effective:
Check the batteries: when the batteries run down, the sensors effective range shrinks. If this is the problem, change the batteries.

- If the WonderBorg will no longer move forward (or carry out some other action in question) even though none of the sensors is reacting:
Are the blocks "Nothing Here" and "Advance" (or the other action in question) waiting for a condition specified in a line higher up the panel? If sensor are reacting less effectively than before:
Check whether you have set the number of steps in the command block to more than 2. While the WonderBorg is executing a command block, it cannot react to any other sensor block, so care is needed when the number of spaces in the command block is set to a number higher than 2 (i.e. when a single command block takes some time to execute). If you want a sensor with a higher priority to be able to take effect during the execution of a block involving more than 2 steps, you will need to specify the command block in question as "Interrupt". Again, if you want to speed up the reaction of the sensor even when the command

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1000 N. Butterfield Road, Unit 1023
Vernon Hills, Illinois 60061, U.S.A.

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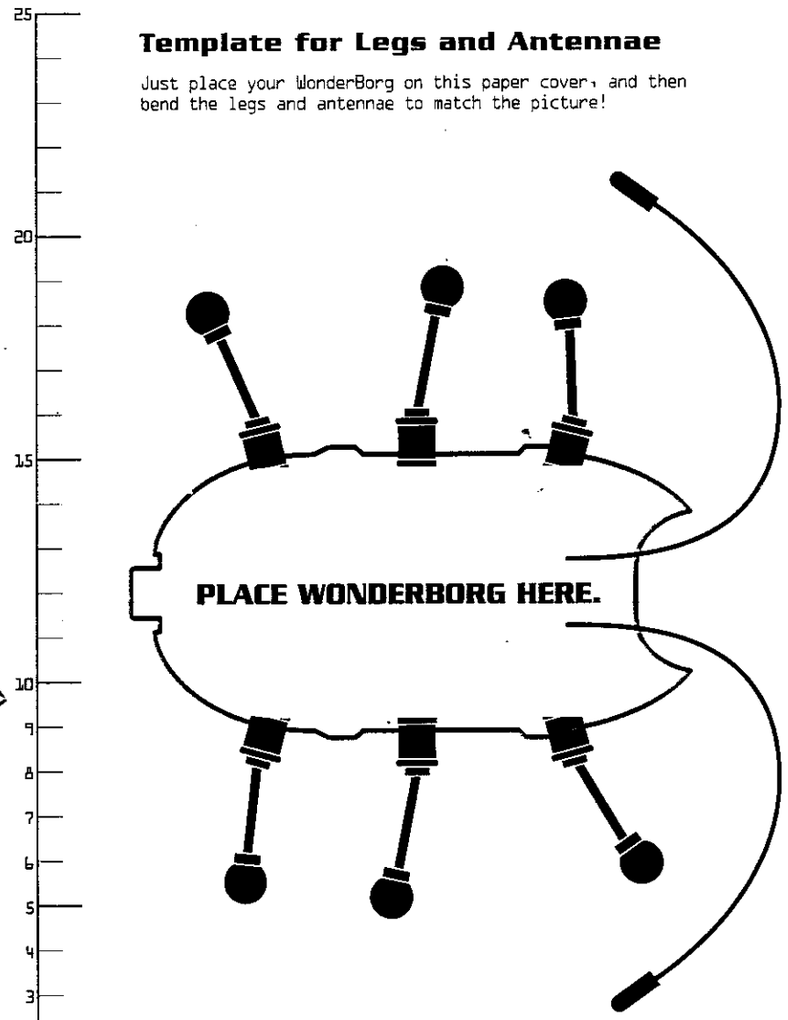
## Template for Legs and Antennae

Just place your WonderBorg on this paper cover, and then bend the legs and antennae to match the picture!




**Note:**

Before adjusting the legs, switch the power ON

# FCC STATEMENT

WonderBorg
Build & Program Your Own Interactive Creature!

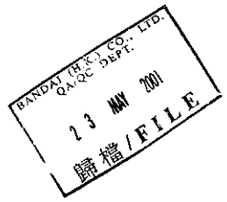
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions :

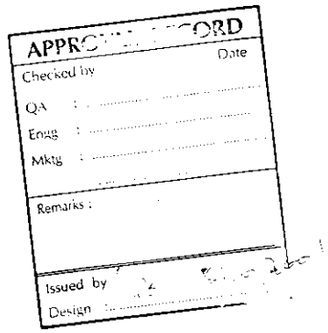
(1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio TV technician for help.



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