

ABOUT THE ROBOT

OPERATING INSTRUCTIONS

The robot will beep twice when power is turned on. The green LED will flash rapidly and then turn off. The red LED will remain on as long as the robot is turned on.

After power is applied, the robot will wait for the user to press its button. The number of presses determines the operating mode (allow roughly half a second between button presses):

1. Follow wall on right.
2. Follow wall on left.
3. Alternate between following wall on right or left. (**Toggle** mode – see below.)

After the user makes a selection, the robot will beep the same number of times to confirm the mode selection. Then the green LED will blink continuously and the robot will start moving.

The robot follows walls and turns to avoid obstacles in front of it. The robot can also be guided manually by placing hands or other objects in front of its sensors. It has infrared object sensors on its sides for wall-following. They have narrow beams. (*Bright sunlight may interfere with these sensors.*) The robot's nose is a sonar and detects objects in front of the robot. It has a wide beam. If the robot is following a wall, it will stop when its button is pressed. It will also make a rude noise. It will beep twice and resume wall-following when the button is pressed again. When the button is pressed again in **Toggle** mode, the robot will turn approximately 180 degrees, switch the side for wall-following and go back in the opposite direction.

HANDLE AND SERVING TRAY

The handle is held in place with a thumb screw. The optional serving tray can be attached to the top of the carrying handle. It fits snugly between the wooden handle and washer. Loosen the thumb screw and remove the handle. Set aside the white spacer and orange spacer bead. The orange spacer bead must be removed to mount the tray. Leave the washer on the bolt and thread the bolt through the tray and then through the handle. Thread the bolt through the spacer and mounting bracket. Replace the thumb screw and tighten it. The robot can carry small *lightweight* items while wall-following. A person can stop the robot by pressing its button and then retrieve the item. The robot can be sent on its way again by pressing the button.

BATTERIES

The long skinny bolt near the handle keeps the hinged face plate in place. Remove the bottom nut and pull up the bolt to release the face plate. It can flip forward for battery access. Use one 9V and 4 AA alkaline batteries. If the red LED looks dim replace the 9V battery. The power pack for the 9V and 4 AA batteries is secured in place with velcro. If necessary, it can be moved slightly to make inserting the batteries easier. Do not attempt to pull out the power pack completely. That might damage or loosen some wiring connections.

ADVANCED MAINTENANCE TASKS

This robot is built from spare parts and uses an old controller for its brain. It's an Acroname BrainStem GP 1.0 (Build 3). It has a few quirks. If the 9V battery gets low, it may lose some important settings. If power is turned on and the robot doesn't beep twice, then the robot may have lost its automatic start-up setting. It may be possible to restore its settings with some software tools. This will get kinda complicated...

1. Install the USB adapter driver (Windows or Mac)

Look for the following file in the **Tools/Windows** folder of the CD that came with the robot:
S27_v2_08_14.zip

It contains Windows drivers for the USB adapter. Unzip the files to a temporary location on your computer. If you plug in the USB cable with its adapter, your computer should ask you if you'd like to install drivers for it. Then supply the location of the driver files. (*I have not tried these steps on a PC so I'm not sure if they'll work exactly as described.*) The USB adapter should appear as a COM port (i.e. COM1, COM2, etc.) in the Windows Device Manager.

If you have a Mac, I think you can just open the **Tools/MacOS/S27_v2_2_16.dmg** file and that will install the drivers, but I forget the exact procedure.

2. (Optional) Install Programmer's Notepad for Windows

Look for the following file in the **Tools/Windows** folder of the CD that came with the robot:
pn2342350_multilang.exe

This is a nice editor for Windows. You can also use Windows Notepad.

3a. Install the BrainStem GP 1.0 Windows software

Look for the following file in the **Tools/Windows** folder of the CD that came with the robot:
GP_win32_i386.zip

It contains Windows software for communicating with the robot. Unzip the files to an appropriate location on your computer (the **C:** folder is a typical place). They will extract to a folder called **acroname**. The **aConsole** program in **acroname/aBinary** is used to configure the robot. It assumes your controller is communicating through COM1. You *might* need to edit the **console.config** file in the **acroname/aBinary** folder so that it uses the proper communication port. NOTE: Windows may be hiding the extension of that file and it may just appear as **console**. Double click it and tell Windows to open it with Notepad, Programmer's Notepad, or some other text editor. Find the portname entry, remove the # and enter a new port, e.g.

portname = COM2

Then save the file.

More information can be found in the online BrainStem reference. Look for the **Console** section and **Console Configuration** subsection:

<http://www.acroname.com/brainstem/ref/ref.html>

A zipped file with a copy of the online reference is also included in the **Docs** folder of the CD.

3b. Install the BrainStem GP 1.0 MacOS software

Look for the following file in the **Tools/MacOS** folder of the CD that came with the robot:
GP_macx_universal.dmg

It contains MacOS software for communicating with the robot. Open the **dmg** package and place the extracted **acroname** folder in the **Applications** folder. The **aConsole** program in **acroname/aBinary** is used to configure the robot. You *will* need to edit the **console.config** file in the **acroname/aBinary** folder so that it uses the proper communication port. The TextEdit application can be used. Finding communication device name is trickier. Go to **Applications/Utilities** and open **Terminal**. Then at the prompt, enter:

```
ls /dev
```

Look for an entry like tty.usbserial-A1016UUU (your system may give the device a different name). In **console.config**, Find the portname entry, remove the # and enter a new device, e.g.

```
portname = tty.usbserial-A1016UUU
```

4. Reconfigure the robot

Plug the USB cable into the computer and the USB adapter onto the 4 pins that have the “Serial” label. It's on the left side. Launch the **aConsole** application. Turn on the robot. With any luck, you'll see an indication of a “heartbeat” and some messages saying the robot has reset.

Enter these two commands in quick succession:

```
> 2 24
```

```
> 2 22 0
```

Enter these commands to restore the automatic start-up setting:

```
> 2 18 15 0
```

```
> 2 19
```

Disconnect the USB cable. Turn off the robot and turn it on again. It should beep twice which indicates that it is working normally. Piece of cake!

5. Reprogram the robot

If the robot is *really* whacked, you may have to download its program again. Copy the files in the **Source** folder of the CD that came with the robot to the **acroname/aUser** folder. Reconnect the robot to the computer and turn it on. Enter these commands in the **aConsole** application:

```
> 2 24
> 2 22 0
> steep "p.tea"
> load "p" 2 0
> 2 18 15 0
> 2 19
```

Disconnect the USB cable. Turn off the robot and turn it on again. It should beep twice which indicates that it is working normally. Hopefully.

If all else fails, or if the above steps seem like a pain, I will try to fix the robot. :-)

WIRING

If some of the internal connectors come undone, they have color-coded wires and silver markings to help reconnect them. Along the top connectors, the “darkest” wires are closest to the black controller board. The connectors are plugged in so they are perpendicular to the controller board. The top of the robot has labeled connection areas for Analog, Digital, and Servo pins.

1. For the Yellow-Red-Black wires with 3-hole connectors, the connector with 1 silver tick mark goes on Analog slot “0” and the connector with 2 silver tick marks goes next to that one.
2. The Blue/Black-Orange-Brown/Black wires with a 4-hole connector (one hole unused) with 1 silver tick mark go on Digital pin “0” and a white wire without a black connector goes next to that Blue/Black wire.
3. The Yellow-White-Brown wires with a 4-hole connector (one hole unused) with 4 silver tick marks go on the fourth set of pins in the Digital connection area.
4. The White-Purple wires with a 4-hole connector (two holes unused) with 5 silver tick marks go on the fifth set of pins in the Digital connection area.
5. For the Orange-Red-Brown wires with 3-hole connectors, the connector with 1 silver tick mark goes on Servo slot “0” and the connector with 2 silver tick marks goes next to that one.

Power connections are on the left of the robot. There is a connector for “Logic Power” and “Servo power.” The Orange-Black wires with 2-hole connectors are power connectors. The connector with an “L” goes on the “Logic Power” pins. The connector with an “S” goes on the “Servo Power” pins. The “L” and “S” face the robot's nose.

ROBOT RE-ENGINEERING

It's *possible* to write a completely new program for the robot and add new sensors. This is a major undertaking. The Acroname website has lots of info about its products and BrainStem controllers:

<http://acroname.com/support.html>

(I used to work at Acroname.)