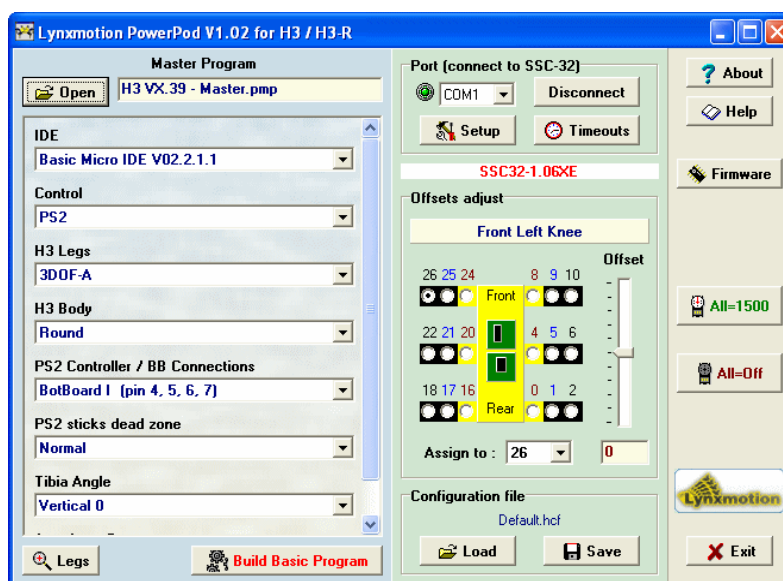


# Lynxmotion PowerPod V1.02

For H3 / H3-R

# Manual



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# Lynxmotion PowerPod V1.02 for H3 / H3-R Manual

## **Safety First!**

Read and understand the documentation associated with any of the tools used in the assembly of these kits. Work in a clean, well lit environment. Work slowly taking breaks often. Plan your work with plenty of extra time to avoid cramming to complete the project at the last minute. Lynxmotion, Inc. has taken every step to ensure the products sold are safe when used in a responsible manner. Therefore, Lynxmotion, Inc. can not be held accountable for irresponsible, careless or reckless behavior of the builder.

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**Robots move without warning, wear eye protection at all times!**

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## 1 - Overview

**PowerPod is free software,  
it works with all H3/H3-R robots with SSC-32 card and Bot Board + BA28 processor.**

### **What does it do?**

The purpose is to easily be able to build a customized Basic program for your H3/H3-R robot.

### **You can :**

- Adjust servo offsets.
- Change pin assignments (which SSC-32 pins are connected to which servo/joint).
- Update the SSC-32 firmware.
- Select Basic program parameters :
  - > Old IDE or the new IDE. (For now only BA28 chip is supported, BA28Pro support is coming soon.)
  - > Control type. (For now choices are PS2, Serial Port or Autonomous.)
  - > Four leg dimensions are selectable. (3DOF-A, 3DOF-B, 3DOF-C, 3DOF-(Old).)
  - > Choose Round or Inline body.
  - > PS2 controller / Bot Board connections (BotBoard I pin 4, 5, 6, 7 or Bot Board II pin 12, 13, 14, 15)
  - > One of three PS2 joystick deadzone settings.
  - > One of four tibia offset angles.
  - > Auto legs down after 1, 3, 5, or 10 seconds, or disabled.

**Offsets, pin assignment, and Basic program parameters are saved as a Configuration file (\*.hcf (H3 /H3-R Configuration File))**

You can save as many Configuration files as you need.

**PowerPod uses a "Master Program" (\*.pmp, PowerPod Master Program) which contains all the Basic code parts.**

If a new "Master Program" version is released, just copy it into the PowerPod installation directory.

This version includes 'Master program' VX.40, take a look at [www.lynxmotion.com](http://www.lynxmotion.com) for updates.

You don't have to update the PowerPod program,

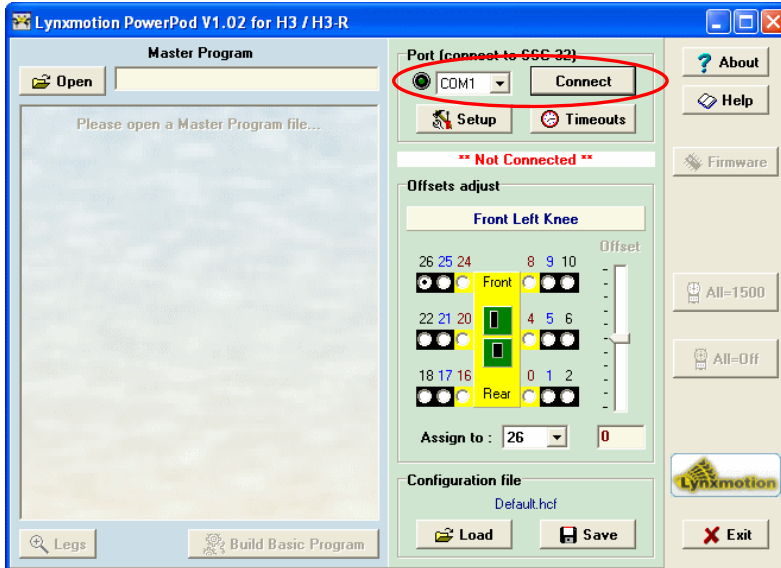
it will automatically recognize new options in the new "Master Program".

**With a "Master Program" and your customized "Configuration file", PowerPod is able to build a Basic Program including your servo offsets, pin assignment, body and leg types, etc...**

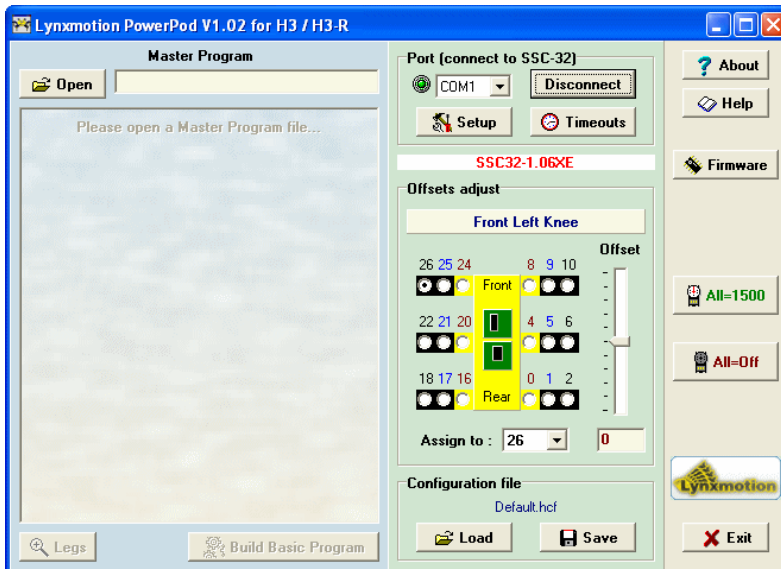
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## 2 - Connecting

Make sure the SSC-32 baud rate is set to 115200 bps and power it on. (See SSC-32 manual for details.)  
Select the correct COM port you're using to connect the SSC-32.  
Click on the 'Connect' button.



If all is correct, the SSC-32 firmware is displayed  
and 'All = 1500', 'All = Off' and 'Firmware' buttons are enabled.



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## 3 - Offsets & pin assignment

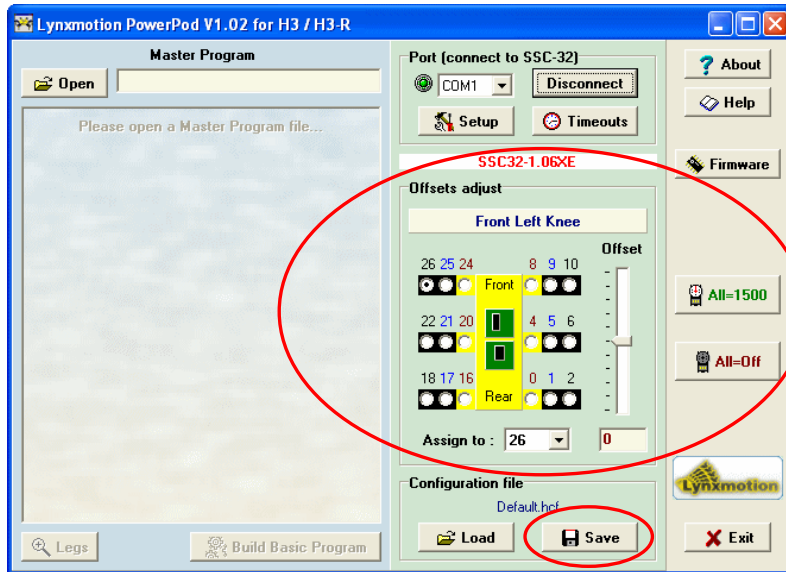
Power on the H3/H3-R servos.

Click on the All = 1500 to enable all the servos and set them to neutral position.

**Warning, legs could move at high speed and pinch some fingers if you aren't careful!**

Select a joint and modify its pin assignment if you haven't connected it according to the H3/H3-R tutorial.

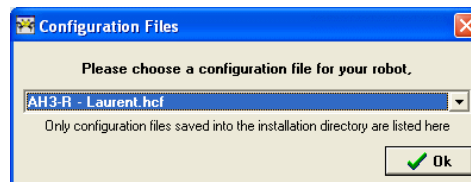
Adjust the servo/joint offsets with the slider to make it perfectly aligned.



Do the same for all joints, then click on the 'save' button.

Use 'Default.hcf' if you're using only one robot or enter another filename.

If you save more than one \*.hcf file in the installation directory, the program will ask you which one to load the next time you run PowerPod.

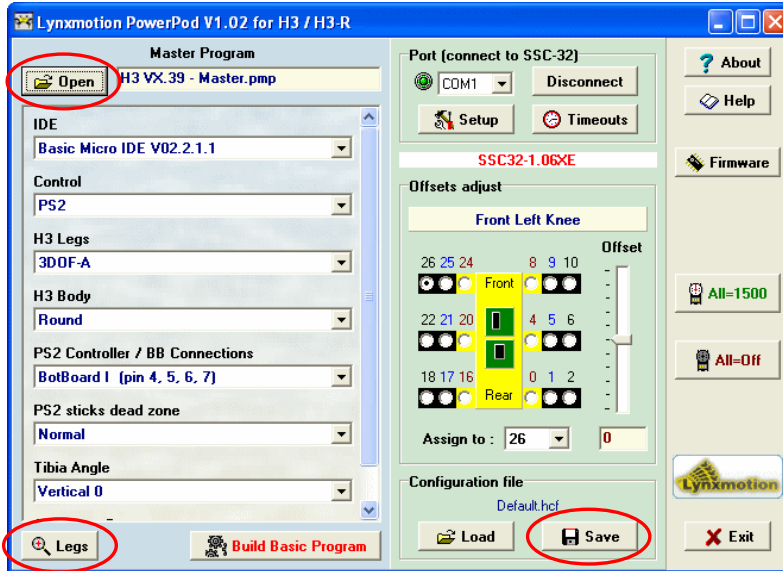


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## 4 - Basic program parameters

Click 'Open' and load the latest 'Master Program' (\*.pmp) that you have saved in the PowerPod installation directory.  
This PowerPod version includes 'Master Program' VX.40

PowerPod will display all selectable features included in the loaded 'Master Program' version.



Choose the IDE you plan to use to program your Basic Atom chip.

Choose kind of control:

- PS2 controller.
- Autonomous allows you to control the robot using internal variables.
- Serial allows you to control the robot via the Bot Board DB9 serial port.

Select the leg type you're using. You can also click on the 'Legs' button, and select the leg type.

Select the Body shape (Inline or Round).

Select the PS2 / BotBoard connections

Choose between 'Small', 'Normal' or 'Large' deadzone for your PS2 joysticks.

Choose the tibia offset angle.

Choose 'Auto legs down' delay.



Then click 'Save' again to update your configuration file.

**\*\*\* Important note about PS2 control \*\*\***

When selecting "BotBoard 1 (pin 4, 5, 6, 7)" the SSC-32 communication cable must be connected on BotBoard pin 15.

When selecting "BotBoard II (pin 12, 13, 14, 15)" the SSC-32 communication cable must be connected on BotBoard pin 8 (as pin 15 is used by the PS2 controller).

**Other control modes use pin 15 to communicate with the SSC-32 card.**

Now you are ready to generate the Basic code, click on 'Build Basic Program' and select a filename (\*.bas). The Basic program includes all your settings, offsets, pin assignment, and parameters for IK / program.

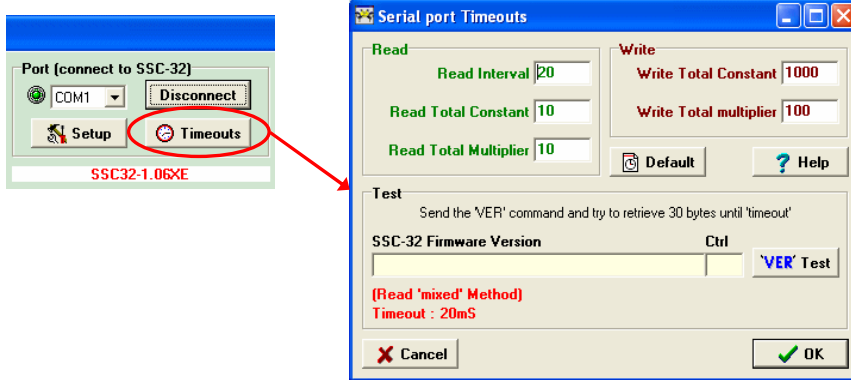
Use Basic Micro IDE to download the Basic Program to your Bot Board / Basic Atom 28 chip.

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## 5 - The 'Timeouts' module

Here, you can change some advanced COM port communication values.

**\*\* Don't change anything if there's no communication problem ! \*\***



If you're using a 'WiPort' and have experienced some communication problems, try to set the 'Read interval' = 25 (no change on other values)  
Some USB to serial cable needs a 'Read interval' values  $\geq 25$  too.

The 'Write' values are not critical, so no need to change them.

Before clicking 'Test', check the 'Timeout : xxmS' value. It's the time you will wait in the worst case. If this value is too big, it could freeze the window for a long time, be careful !

More information with the 'Help' button :

You normally have to specify the number of bytes when reading bytes on the Com port. However, when you don't know how many bytes to read, the timeout value will let you know when the Com port has finished sending data.

Trying to read 4 bytes

1. Total method

2. Interval method

1. Read Total method :

Activated if the "Read Interval" value = 0

- The "Read Total Multiplier" is the value multiplied by the number of bytes requested. The "Read Total Constant" value is the maximum time to wait for all the requested bytes before generating a timeout event.

Timeout value depends on the number of bytes requested

2. Read Interval method :

Activated if the "Read Interval" value is  $> 0$  and Both "Read Total Multiplier" and "Read Total Constant" = 0

- The "Read Interval" value is the maximum time to wait between bytes before generating a timeout event.

Timeout value is the "Read Interval"

3. Read 'mixed' method :

Activated if the "Read Interval" value is  $> 0$  and "Read Total Multiplier" and/or "Read Total Constant"  $> 0$

- The first Timeout value elapsed will end the function.

Timeout value depends on the number of bytes requested and the "Read Interval"

Read Interval method ends faster when you don't know how many bytes to ask for.

For example, when asking for the SSC-32's version string, you don't know how many bytes the SSC-32 card will return, but you know you don't want more than 30 bytes to display.

PowerPod asks for 30 bytes, and the timeout occurs after the last byte is sent (it could be 14, 15, etc...)

So 10mS (default) after the last byte is sent by the SSC-32 card, the Read buffer is cleared to remove unrequested bytes.

If there are some missing bytes, try increasing the "Read Interval" value.  
If it doesn't help, try increasing the "Read Total Multiplier" then "Read Total Constant" slowly.

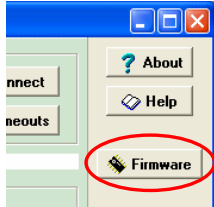
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## 6 - SSC-32 Firmware update.

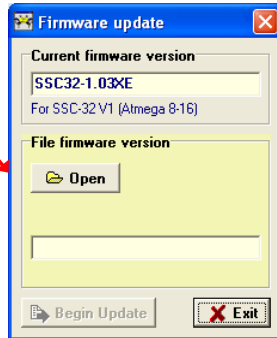
**Don't try to update the SSC-32 firmware if all is working properly and if you don't need to. PowerPod works fine with the "SSC-32-1.06XE" firmware. Be warned that some "specific" firmware may not work with PowerPod.**

Check "SSC-32 Servo Controller" page at [www.lynxmotion.com](http://www.lynxmotion.com) for Firmware update

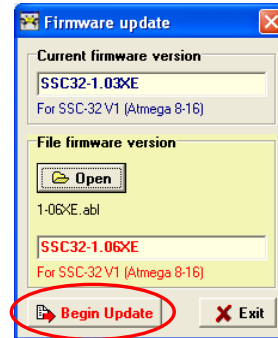
First connect to the SSC-32, then click on the "Firmware" button.



Click on "Open" and browse for the new firmware file (\*.abl).

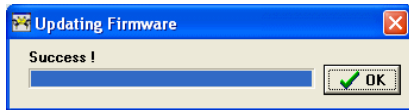


Check the firmware file version and click "Begin Update".



**Don't turn off the SSC-32 card during the firmware update process!**

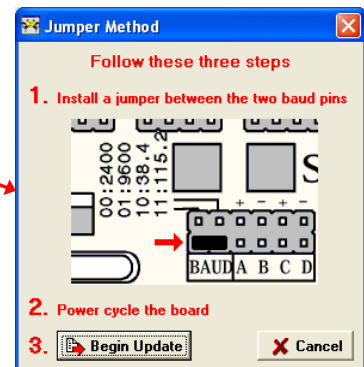
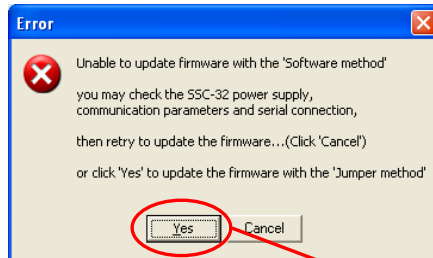
Click "OK" then "Exit".



**If you get errors during the firmware update process, you must try to update the firmware again or the SSC-32 card won't work correctly.**

**Don't close the "Firmware Update" form and don't disconnect (COM Port) from the SSC-32, or you may not be able to reconnect PowerPod to the SSC-32 as the PowerPod program checks to see if the SSC-32 is ok before allowing connections to it.**

**If you can't connect to the SSC-32 because PowerPod is no longer allowing it, go to [www.lynxmotion.com](http://www.lynxmotion.com) and download the free "SSC-32 Lynx terminal" program to update your firmware. (It will connect no matter what).**



**If the card is no longer able to update its firmware using the "Software method", then you can use the "Firmware method", which will force the card to accept the firmware update. Follow the 3 steps described.**

**Don't forget Step 2 : Power cycle the board (off then on) or it won't work.**



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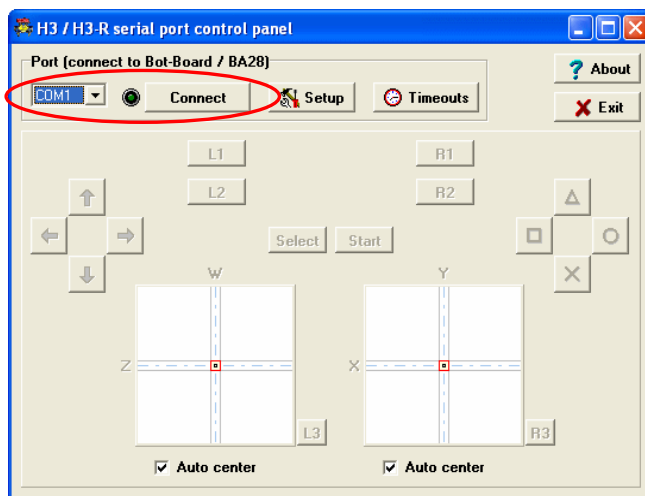
## 7 - PC serial port control panel

This tool allows you to control the H3/H3-R robot via the Bot-Board DB9 COM Port using a PC.

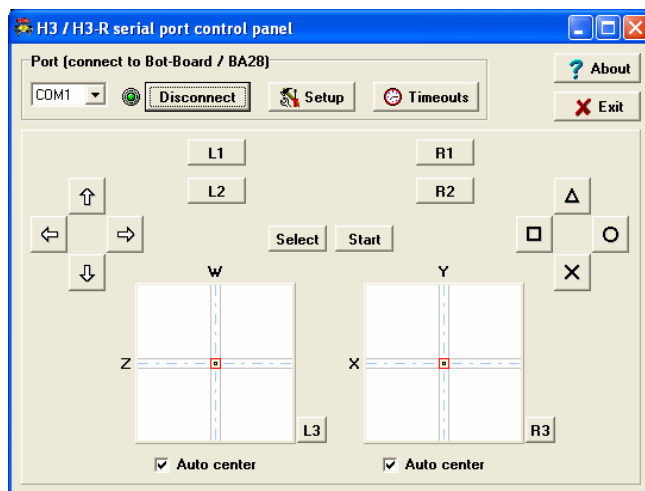
**First, you'll have to generate a Basic program with PowerPod using the "Control->Serial Port" option, then download it to the Basic Atom 28 using the Basic Micro IDE.**

### 7.1 Connecting.

- Connect a serial cable, a USB to serial cable, or a WiPort to the PC and the Bot-Board DB9 COM Port.
- Switch on the H3/H3-R robot.
- Select the correct COM port you're using to connect the Bot-Board/BA28
- Click on the 'Connect' button.



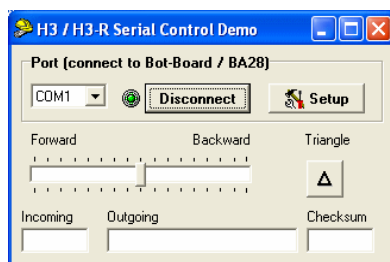
All buttons are enabled, now you can control the robot with the mouse as a virtual PS2 controller.



Button's functions could change according to the Master program you're using, take a look at the Basic program remarks (top of the code), to learn which buttons perform which functions.

Uncheck "Auto center" to let the associated virtual joystick stay in the position you leave it, or it will automatically return to the middle position.

### 7.2 C++ Demo Program.



This little C++ Demo program was made with Borland C++ Builder 6.0. Source code is given "as is", it shows how to communicate with the robot.

- Serial\_H3.exe** is the compiled program, it can't run if PowerPod is not installed (it uses Borland dll)
- Serial\_H3.bpr** is the Borland C++ Builder project file
- Serial\_H3.res** is the resource file (application icon is in here)
- Serial\_H3.cpp** is the application entry
- Params.ini** is a file used to store COM Port parameters
- Invite.dfm** is the main form data (Buttons, ComboBox, CheckBox, ComPort etc...)
- Invite.h** is the main form header
- Invite.cpp** is the main form code (commented)

You can find the ComPort Library for Delphi/C++ Builder here : <http://sourceforge.net/projects/comport/>