**Things that go Boom!**

Caution! Read this quick start guide completely before wiring and applying power to the board! Errors in wiring can damage the Bot-Board, Hybrid microcontroller, and any attached peripherals.

Caution! Never reverse the power coming into the board. Make sure the black wire goes to (-) ground, and the red wire goes to (+) Vlogic, or Vservo. Never connect peripherals when the board is powered on.

Caution! The onboard regulator can provide 250mA total. This includes the Hybrid microcontroller chip, the onboard LEDs, and any attached peripherals. Drawing too much current can cause the regulator to overheat.

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1. **Three LEDs and Push Buttons (SUI) Simple User Interface.**
   - Three LEDs (Red, Green, Yellow) are used to indicate the status of the board. The Red LED indicates the power is active, the Green LED indicates the board is ready, and the Yellow LED indicates an error.
   - Three push buttons are available for user interaction.

2. **Play Station 2 Controller cable port for BS2 or SUI enable.**
   - This port is for connecting a Sony Playstation controller to use as a robot controller. This port is specific to the Basic Stamp 2, as it has an inverter built into the Clock signal. When using this port connect the PS2 cable as shown to the right. The Sony and Madcatz units we tested only required a 1K pullup on Pin 4, which is built into the board. Other brands may require a pullup on Pin 7, not included. When using the Atom or Atom-Pro you use the I/O bus, Pins 4 thru 7, as it does not use the inverter on the Clock line. Note, some wireless units will require the green wire be connected to 7.5vdc.

3. **5vdc 500mA Low Dropout Reg.**
   - The Low Dropout regulator will provide 5vdc out with as little as 5.5vdc coming in. This is important when operating your robot from a battery. It can accept a maximum of 9vdc in. The regulator is rated for 500mA, but we are de-rating it to 250mA to prevent the regulator from getting too hot.

4. **Power Input (7.2-9vdc) Servo Motor Power Input (4.8-7.2vdc) Shorting bar allows one battery to power the electronics and the servos.**
   - Shorting bars allow servos and logic power to be connected to analog inputs.

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1. **10 DB9 Port for Programming**
   - DB9 Port for Programming

2. **9 Speaker Enable**
   - Three LED sand Pushbuttons (SUI) Simple User Interface.

3. **2 24/28 pin socket for a Hybrid IC Micro such as BASIC Atom, Atom Pro, BS2, BS2-E, OOPic-C, BASICK24, or any BS2 variant.**
   - Shorting bars allow servo or logic voltage to be connected to center row of I/O bus in groups of four.

4. **Reset Button.**

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**Chip I/O | PB/LED**

<table>
<thead>
<tr>
<th>Chip I/O</th>
<th>PS2 cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin 4 DAT Brown</td>
<td><strong>+</strong> Yellow</td>
</tr>
<tr>
<td>Pin 5 CMD Orange</td>
<td><strong>-</strong> Black</td>
</tr>
<tr>
<td>Pin 6 ATT Blue</td>
<td><strong>+</strong> 7.2 Green</td>
</tr>
<tr>
<td>Pin 7 CLK Black</td>
<td><strong>+</strong> 7.2 Green</td>
</tr>
<tr>
<td>5vdc</td>
<td><strong>-</strong> Black</td>
</tr>
</tbody>
</table>

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This is a Power Good LED. When you have successfully applied power to the onboard regulator the green LED will turn on.
5 This is the Electronics Power Input. It is also referred to as the Logic Voltage, or VL. This input is normally used with a 9vdc battery connector to provide power to the Hybrid IC and anything connected to the 5vdc lines on the board. This input is used to isolate the logic from the Servo Power Input.

6 This is the Servo Motor Power Input. It is also referred to as VS. It can be 4.8vdc to 7.2vdc. However, some micro servos will not tolerate more than 6vdc. This input is used to provide power for the servos only, or to provide power to both logic and servos (see 7).

7 This allows you to power the Servos and Logic from the same battery. It simply connects the VS input to the VL input. Caution, when using this option do not use the VL input.

8 This allows the VL and/or VS inputs to be connected to two of the Atom-28's analog inputs through a 4:1 voltage divider. For example, if the battery voltage were 9vdc the analog input would see 2.25vdc.

9 This shorting bar enables the onboard speaker. To use the speaker, send the appropriate sound generating command to Pin 9. Note, the I/O pin does not drive the speaker directly, it just turns on a buffer transistor.

10 Simply plug a straight-through M/F DB9 cable from this plug to a free 9 pin serial port on your PC for downloading programs and receiving debug info.

11 This Pushbutton will reset the micro when pressed. This can be useful for starting a different program depending on which Pushbutton is pressed.

12 This is where you plug in the Hybrid microcontroller. This can be an Atom, Atom-Pro, any Basic Stamp 2, the OOPic-C, BASICX-24, etc.

13 This is where you configure the I/O bus center row to use VL (+5vdc from the onboard regulator) or VS (direct from the Servo Power Input). This is done in banks of four I/O pins. Caution, applying the servo voltage to this row with a 5vdc peripheral installed will cause damage to the peripheral.

14 This is where you connect servos, motor controllers, sensors, etc. to the microcontroller. Use caution when connecting anything to the I/O bus. Never connect anything while the power is on.

**Shorting Bar Jumper and Connectors at a glance**

<table>
<thead>
<tr>
<th>Applies +5vdc to the I/O bus.</th>
<th>Applies VS to the I/O bus.</th>
<th>Applies VS and VL to analog inputs 0 and 1.</th>
<th>Enables the LEDs and Pushbuttons.</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Example servo connection." /></td>
<td><img src="image" alt="PlayStation 2 cable for Basic Atom." /></td>
<td><img src="image" alt="PlayStation 2 cable for Basic Stamp 2." /></td>
<td><img src="image" alt="Diagram" /></td>
</tr>
</tbody>
</table>

Yellow Red Black | Yellow Black | Yellow Black |  |
Hexapod 2 - (optional L5/6 Arm) RC Wiring Diagram

Sony PS2 Cable

GP2D12

Bot Board / Basic Atom 28

SSC-32 I/O-L5/6 Arm

08 Base Rotate
09 Shoulder
24 Elbow
25 Wrist
26 Gripper
27 Wrist Rotate

SSC-32 I/O-H2 Leg

00 Right Rear V
01 Right Rear H
02 Right Center V
03 Right Center H
04 Right Front V
05 Right Front H
16 Left Rear V
17 Left Rear H
18 Left Center V
19 Left Center H
20 Left Front V
21 Left Front H

ABB I/O PS2 Cable

Pin 4 DAT Brown
Pin 5 CMD Orange
Pin 6 ATT Blue
Pin 7 CLK Black
+SrvPwr +7.2 Green
5vdc + Yellow
GND - Black

*Required to enable vibrating motors inside the controller, or for some wireless units.

Master Power on
 off

Battery Quick Connect

7.2vdc 1600mAh NiMH Battery Pack
The bumper switches can be added as illustrated. The 10k pullup resistor will ensure the I/O pin will read as a high when the snap switch is not pushed in. The I/O pin will read a low when the bumper switch is pushed in.
Note, these servos are specifically designed for continuous rotation. The servo will turn full speed (clockwise) when given a 2.0mS pulse. It will turn full speed (counter-clockwise) when given a 1.0mS pulse. Generally the servo will stop when given a 1.5mS pulse. The stop value can be anywhere from 1.48mS to 1.55mS. Note, the exact stop value for each servo may not be exactly the same, but the dead band will be at least 15uS. For example if the stop value is 1.50mS then the dead band will be at least 1.43mS to 1.57mS.
4 Wheel Rover Wiring Diagram

**IRPD**

- BLUE (L) = I/O 12
- VIOLET (R) = I/O 13
- YELLOW (S) = I/O 14
- RED = +5VDC
- BLACK = GROUND

**Bot Board**

- Mini-ABB
- IR Interfacing
- Servo Power
- Battery Quick Connect
- Electronics Power

**Serial LCD (optional)**

- LynxMotion, Inc.
- Serial Display
- BLACK = GROUND
- RED = +5VDC
- YELLOW = I/O 15

**7.2vdc 1600mAh NiMH Battery Pack**

- Left Pair
- Right Pair

**Left Pair**

- Servo Power on
- Battery Quick Connect

**Right Pair**

- Servo Power off
4WD Rover Wiring Diagram

Bot Board
- Mini-ABB
- 7.2vdc 1600mAh NiMH Battery Pack

Scorpion
- Electronics Power on/off
- Motor Power on/off
- Left Side A
- Right Side A
- Left Side B
- Right Side B

GP2D12 (left)
GP2D12 (right)
GP2D12 (rear)

Battery Quick Connect