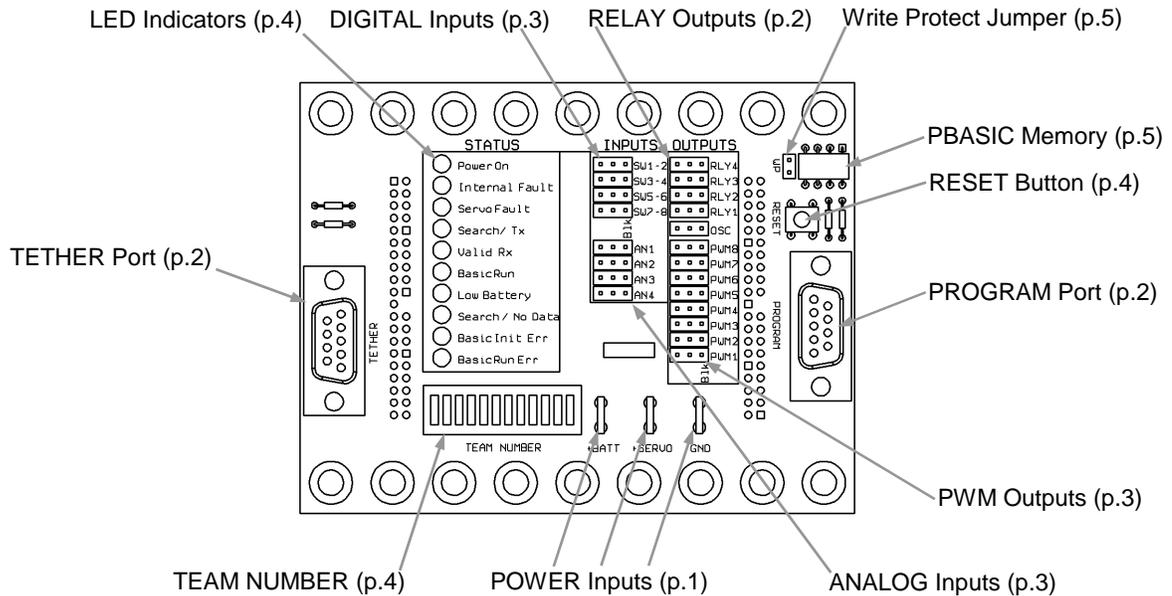


The IFrobotics Isaac16-MB-BB Motherboard is designed to mate with the IFrobotics Isaac16 Robot Controller. The Motherboard provides connectors for power, external devices, switches, and sensors. The Motherboard also has a Tether and Program connector for connecting to an Operator Interface (Tether) or a Computer (Program).

Refer to the Isaac16 System Users Manual for detailed instructions on using this product.

Battery Connection (Nominal): 7.2V to 12V
 Voltage Range (Absolute): 6.2V to 15.0V
 Servo Circuit Breaker: 5.0A Auto Resetting



Pin Header	Left Pin	Center Pin	Right Pin
AN1	+5V Output	Input Signal (0-5V)	Ground
PWM1	PWM Signal Output	+Servo Output	Ground
RLY1	Reverse Output	Forward Output	Ground
SW1-2	Switch 1 Input	Switch 2 Input	Ground

1. POWER Inputs

The +BATT and GND connectors are intended to accept power from a 7.2V to 12V battery (nominal voltage). The current draw for the Isaac16 Robot Controller is typically between 0.75A to 1.5A. The maximum voltage allowable is 15.0V. Exceeding the 15.0V limit will damage internal voltage regulators and will void the warranty. The minimum required voltage is 6.2V.

Use standard female spade type connectors for wiring power to the Motherboard. 16GA wire is recommended to minimize voltage drop to the Isaac16 Robot Controller. The Isaac16 Robot Controller is internally protected from reverse polarity.

The +SERVO connection is used to supply power to the center pin of the PWM outputs. This pin is typically used to power servos or other PWM circuits. You do not need to use this input for Victor 883 speed controllers. The +SERVO connector is directly connected to the center pin on the PWM connectors. Servo power requirements are typically 4.8V to 6.0V. Use a voltage regulator, DC-DC converter, or other source to obtain the correct power required for your application. The power from the +SERVO connector to the center PWM pins is limited to 5 Amps by an onboard current limiting device.

2. PROGRAM Port

The Isaac16 Motherboard has a 9-pin PROGRAM port. The PROGRAM port on the Motherboard is used to change the PBASIC program. The PBASIC program is stored on the PBASIC program memory chip (see Page 5). This port is intended to connect to a PC's serial port for reprogramming the PBASIC program memory chip. Use a DB9 Male-Female Pin-to-Pin cable (maximum length 25 ft.) to connect the PROGRAM port on the Motherboard to a PC serial port.

3. TETHER Port

The Isaac16 Motherboard has a 9-pin TETHER port. The TETHER port is used to make a direct (wireless) connection between an Operator Interface and a Robot Controller. Use a DB9 Male-Female Pin-to-Pin cable (maximum length 25 ft.) to connect the TETHER port on the Motherboard to the TETHER port on the Operator Interface.

4. RELAY Outputs

The Isaac16 Motherboard has four 3-pin RELAY connectors (abbreviated RLY). Refer to Page 1 for RELAY connector pin information. Use a PWM extension cable to connect a Spike to one of the Relay outputs. Be sure to connect the cable so the black wire is on the indicated BLK pin (on the right side of the connector). Each Relay output can be used with a Y-cable to drive two Spikes from the same output. Refer to the Solid-State-Relay Users Manual for information on connecting Solid-State-Relays.

5. PWM Outputs

The Isaac16 Motherboard has eight standard 3-pin PWM connectors. Refer to Page 1 for PWM connector pin information. Use a PWM extension cable to connect a speed controller or servo to one of the PWM output ports. Be sure to connect the cable so the black wire is on the indicated BLK pin (on the right side of the connector). A Y-cable can be used on any PWM output to drive multiple like devices at the same time. You can connect up to three Victor 883 speed controllers to one PWM port. Do not use a PWM Signal Driver in conjunction with the Robot Controller.

The center pin on the PWM connector is connected to the +Servo input. See POWER Input section on page 2 for more information.

6. ANALOG Inputs

The Isaac16-MB-BB Motherboard has four 3-pin ANALOG input connectors (abbreviated AN). Refer to Page 1 for ANALOG connector pin information. Potentiometers and gyros (yaw rate sensors) may be connected to the analog inputs. For wiring 0-5V sensors such as gyros, refer to the sensor manufacturer's data sheet. The ANALOG pin headers are typically wired using 3-wire PWM extension cables.

Potentiometers should be wired per the diagram below. Always use 100k Ω potentiometers.



7. DIGITAL Inputs

The Isaac16-MB-BB Motherboard has four 3-pin DIGITAL input connectors (abbreviated SW). Refer to Page 1 for SWITCH connector pin information. Various switches may be connected to the digital inputs. Wire switches between the desired signal input pin and the ground pin. Switches may be wired individually, in parallel, or in series. The SWITCH pin headers are typically wired using 3-wire PWM extension cables.

8. LED Indicators

The Isaac16-MB-BB Motherboard has the following LED indicators.

Power On	Solid	Input power is ON from +Battery/GND.
Internal Fault	Solid	An internal power fault has occurred. Turn the Isaac16 Robot Controller OFF, disconnect all wiring except the power, and then turn the Isaac16 Robot Controller back ON. If this does not clear the Fault, contact IFRobotics.
Servo Fault	Solid	A +SERVO power fault has occurred. You have exceeded the current limit on one or more of the center PWM pins. This is caused by a non-Victor device. Disconnect PWM devices one at a time until the Servo Fault light is Off.
Search/Tx	Blink	Transmitting data packets to Radio Modem.
Valid Rx	Blink	Receiving data packets with correct Team Number and Channel Number.
Basic Run	Blink	User CPU is running PBASIC code. The PBASIC code has stopped executing if the light is ON Solid or OFF. (This may be disabled in custom PBASIC programs)
Low Battery	Blink	Low battery voltage detected. Replace or recharge battery soon. Low Battery will remain blinking if the voltage ever drops below 7.0V. The Low Battery Blink threshold is user definable in the PBASIC code.
Low Battery	Solid	Low battery voltage detected. Replace or recharge battery now. Low Battery will remain solid if the voltage ever drops below 6.6V.
No Data/Radio	Blink	No data packets received or bad data packets received.
No Data/Radio	Solid	Radio Modem not found.
Basic Init Err	Solid	PBASIC code did not initialize properly with main CPU. Check code.
Basic Run Err	Solid	PBASIC code has no output. Check code or press RESET.

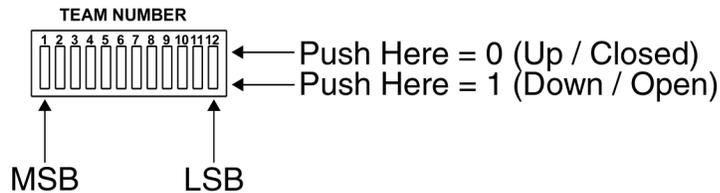
9. RESET Button

The Isaac16-MB-BB Motherboard has a RESET button used to reset the Robot Controller. Pressing RESET performs a complete hardware Reset of the Robot Controller, including the Master, Slave, and BS2SX PBASIC processors. Power Cycling (disconnecting and then reconnecting power) performs the same reset function.

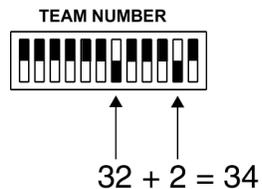
10. TEAM NUMBER

Setting the Team Number on the Isaac16-MB-BB Motherboard requires changing the TEAM NUMBER dipswitch settings. The Team Number is set by changing the switches to match the binary equivalent of your Team Number. The easiest way to set the team number switches is to copy them from the Operator Interface.

The diagram below shows the location of the Most Significant Bit (MSB) and the Least Significant Bit (LSB).



The following diagram is an example of setting the Team Number to 34.



11. PBASIC Memory

The PBASIC program memory chip on the Isaac16-MB-BB Motherboard stores the PBASIC program. This program can be changed by downloading a new program through the PROGRAM port (see Page 2). Refer to the Isaac16 System Users Manual for more information on downloading programs. Be sure the Write Protect jumper is installed before attempting to program (see below).

12. Write Protect Jumper

The Write Protect jumper (labeled WP) on the Isaac16-MB-BB Motherboard is used to allow or disallow writing to the PBASIC program memory chip. The PBASIC program memory chip is located on the Motherboard (see Page 1).

The PBASIC program can be changed when the jumper is installed (Write Protect OFF).
The PBASIC program can not be changed when the jumper is not installed (Write Protect ON).