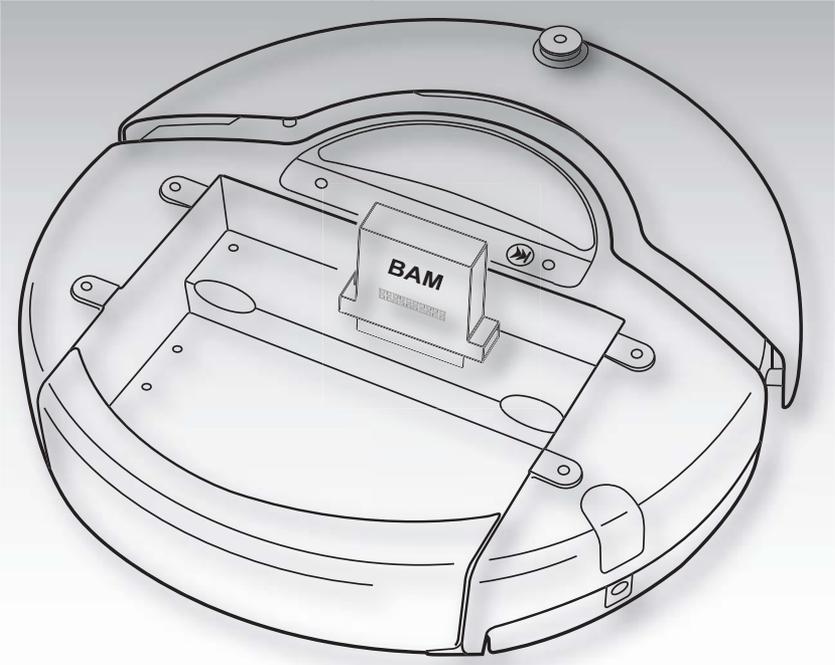


BAM for the iRobot® Create™

Owner's Manual



Element Direct
www.elementdirect.com

FCC Notice

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.

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.

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.

Caution: Exposure to Radio Frequency Radiation

The radiated output power of this device is below the FCC radio frequency exposure limits based on human proximity to the antenna shall not be less than 1.8cm (3/4 inch) during normal operation.

90-Day Limited Warranty

Element Direct warranties its products against defects in materials and workmanship for a period of 90 days. If you discover a defect, Element Direct will, at its option, repair the product, replace the product, or refund the purchase price. Please contact the retailer you purchased the product from to start a warranty claim.

Disclaimer

The warranty does not apply if the product has been altered, modified, or damaged. Element Direct makes no other warranty of any kind, expressed or implied, including any warranty of merchantability, fitness of the product for any particular purpose even if that purpose is known to Element Direct, or any warranty relating to patents, trademarks, copyrights, or other intellectual property. Element Direct shall not be liable for any injury, loss, damage, or loss of profits resulting from the handling or use of the product shipped.

Specifications

Power Supply	5.0 Vdc / 100mA (max)
Operating Temperature	0 to 50° C
Storage Temperature	-20 to 60° C
Humidity	0 to 80% RH
Internal Antenna	Multilayer Chip, Peak Gain 0.5dBi
Dimensions	55x55x16 mm

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Introduction

The Element Direct BAM (short for Bluetooth Adapter Module) enables wireless control of the iRobot® Create™ robot from a Windows, Macintosh, or Linux PC. The BAM connects to the Create's cargo bay port – without any extra wires or cables. The BAM provides a virtual serial port connection between a Bluetooth host and Create. A PC can communicate with Create in the same way it would as if it were attached with a serial cable. The BAM gives a user complete wireless control of Create. It also exposes Create's programmable IO, making it easy to connect additional hardware.

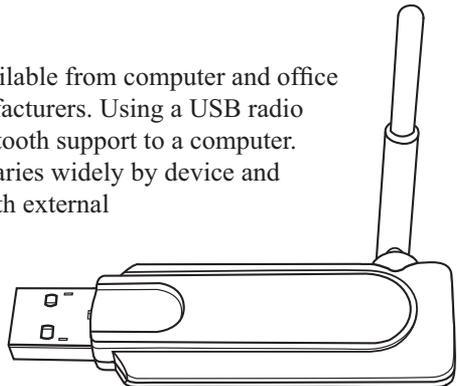
Bluetooth is a communications system intended to replace the cables connecting electronic devices. Unlike WiFi and other wireless systems, Bluetooth is both a low-power and a low-cost option, making it ideal for use with iRobot Create. Bluetooth operates in the unlicensed ISM band at 2.4 GHz and employs a frequency hopping radio to combat interference from other RF sources.

About BAM

The BAM is a Class 1 (high power) Bluetooth device. It is capable of communicating with a Bluetooth-enabled host, such as a desktop PC, laptop, or PDA. There are two basic types of Bluetooth hardware: Bluetooth hosts and Bluetooth devices. A laptop PC is an example of a Bluetooth host. A wireless mouse, wireless printer, and the BAM are all examples of Bluetooth devices. In order to connect to the BAM, you must have a computer which can act as a Bluetooth host. Please consult your computer's documentation to determine whether it is a Bluetooth-enabled host.

- Windows desktop PCs generally require an external USB Bluetooth radio.
- Laptops may have an internal radio or require an add-on USB Bluetooth radio.
- Apple Macintoshes often have Bluetooth built-in.
- PDAs may be a Bluetooth host already, or they may require an add-on card.

Bluetooth USB radios are readily available from computer and office supply stores from a variety of manufacturers. Using a USB radio is often the simplest way to add Bluetooth support to a computer. The operational range of the radios varies widely by device and manufacturer. Class 1 USB radios with external antennas tend to have the best range. Element Direct has a high-performance radio available for purchase on our web site and from our distributors (Element Direct P/N 10566).



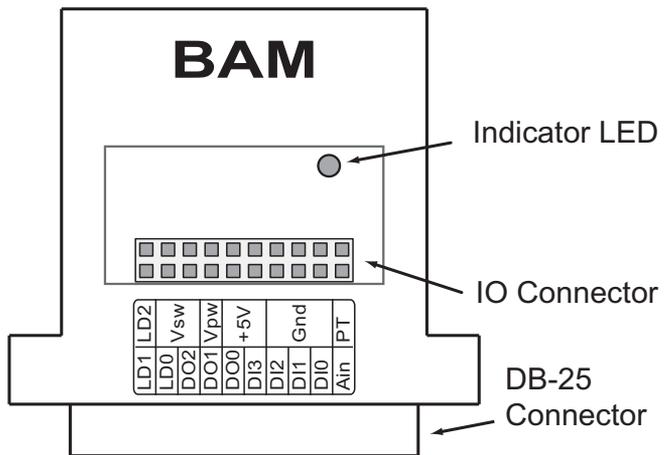
In addition to being a Bluetooth host, the adapter's software driver must also support SPP (Serial Port Profile), which is one of the many Bluetooth profiles specified by the Bluetooth standard. Almost all Bluetooth USB adapters support SPP, but users should check the radio's specifications prior to purchase.

BAM Features

The BAM appears to the host computer or PDA as a Bluetooth Serial Port. It provides a virtual serial cable connection between the host and Create. From the host's perspective, Create is connected to a wired serial port, and the host can communicate and control Create through the iRobot Open Interface as if Create were attached to the host with its included RS-232 serial cable.

The BAM has an IO Connector which enables users to add their own hardware to Create.

The DB-25 connector on the bottom edge of the BAM plugs directly into the Create's Cargo Bay Connector.



Indicator LED

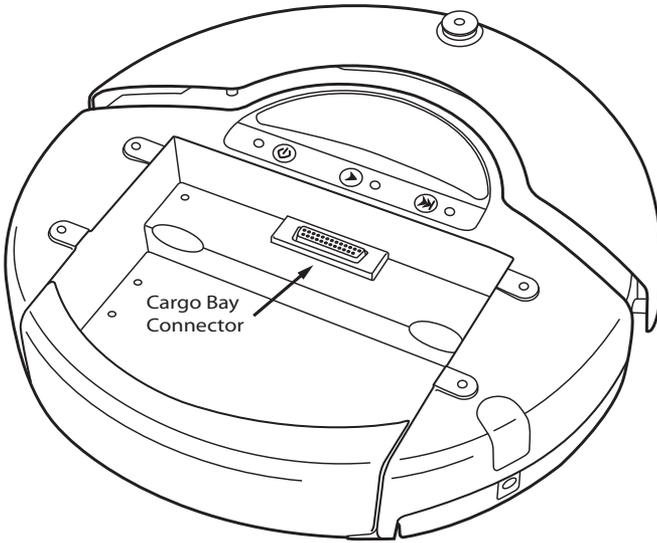
A red indicator LED displays the BAM's current state. It provides a simple method to determine whether the BAM is connected or disconnected to the host.

- When Create and BAM are first powered on, the LED will flash 26 times quickly.
- When the BAM is connected to a Bluetooth host, the LED will flash once per second.
- When the BAM is disconnected from a host, the LED flashes once every 3 seconds.

Create Installation

To install the BAM in your Create, follow these simple directions:

1. Turn Create's power off.
2. Plug the BAM into the Cargo Bay Connector.



3. Turn Create's power back on.

The indicator LED on the BAM will flash 26 times on power-up, indicating that it has been successfully installed. If the LED does not flash when you turn on Create, check that the battery pack is firmly seated and that the battery is fresh.

Bluetooth Serial Port Setup

The Bluetooth host must be set up for use with a Bluetooth Serial Port. Generic host set-up instructions are given below. Consult the documentation which came with your Bluetooth radio for specific set-up instructions. In addition, Element Direct's web site (www.elementdirect.com) offers several tutorials for popular Bluetooth software packages.

Host Set-up

1. Search for a new Bluetooth device by starting *Device Discovery* in the host software.
2. The BAM will appear in the software with the name Element Serial.
3. Choose *Pair Device* using the passcode of 0000.
4. Select *Refresh Services* to display the services which the BAM offers.
5. An option of connecting the BAM as a Bluetooth Serial Port or SPP should now be available. Select it and make a note of the communications port to which the BAM is mapped. You will need the COM Port name to configure the serial port on your computer (see below).

Bluetooth Host Settings

Device Name: Element Serial

Bluetooth PIN Code / Passcode: 0000

Services Supported: SPP (Serial Port Profile)

Serial Communications

After the host software maps the BAM connection to a COM Port on the host computer, the port can be opened with a terminal program or your own custom software. The settings for opening the port are shown below.

Serial Port Settings

Baud: 57,600 bps

Parity: None

Data Bits: 8

Stop Bits: 1

Hardware Flow Control: None

Software Flow Control: None

With the BAM installed and the port open, it is possible to communicate with the Create as if it were directly connected to the host with a serial cable.

BAM IO Connector

The BAM's IO Connector exposes the power and user-programmable IO pins from Create's Cargo Bay connector. The connector offers users a convenient way to add hardware such as sensors and actuators to Create.

IO Connector Pinning

The table below shows the pin out for the IO Connector. The CB column indicates the pin on Create's Cargo Bay Connector which corresponds to the BAM's connector pin.

CB	Function	BAM		BAM	Function	CB	
23	Low Side Driver 1	LD1	□	□	LD2	Low Side Driver 2	24
22	Low Side Driver 0	LD0	□	□	Vsw	Switched Battery Voltage	10, 11 & 12
20	Digital Output 2	DO2	□	□			
7	Digital Output 1	DO1	□	□	Vpw	Battery Voltage	9
19	Digital Output 0	DO0	□	□	+5V	Switched 5V	8
6	Digital Input 3	DI3	□	□			
18	Digital Input 2	DI2	□	□	Gnd	Ground	14, 16, 21 & 25
5	Digital Input 1	DI1	□	□			
17	Digital Input 0	DI0	□	□			
4	Analog Input	AIN	□	□	PT	Power Toggle	3

IO Connector Interfacing

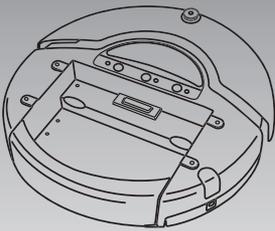
The IO Connector is an industry-standard 2x10 female pin header with 0.1" (2.54mm) centers. The connector will accept a 22-gauge solid copper wire for easy connection to a bread board or a male pin header.

The iRobot Create Open Interface Specification gives the complete technical details for interfacing to the Cargo Bay Connector's IO and control signals. The specification can be downloaded from the iRobot web site at www.irobot.com.

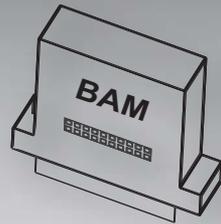
Customer Support

If you have questions or comments about your BAM, please contact Element Direct by visiting our web site at www.elementdirect.com. A user support forum, additional documentation, and other tips are available there.

Element Direct offers a complete Bluetooth connection for the Create.



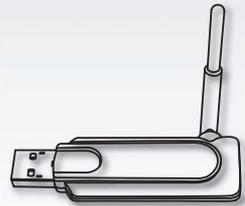
Create Robot



Bluetooth Adapter Module
Element P/N 10542B



Windows, Macintosh
or Linux Computer



USB Radio
Element P/N 10566



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