MultiConnect™ BT

Serial-to-Bluetooth® Adapter

MTS2BTA
MTS2BTA-R

User Guide

MultiTech® Systems

MultiConnect BT
Serial-to-Bluetooth Adapter
MTS2BTA and MTS2BTA-R
User Guide
S000370B Rev. B

Copyright

Revision	Date	Description
A	03/31/05	Initial release.
B	12/10/07	Update for Bluetooth protocol version 2.0. Updated the Power Specifications.

Trademarks

World Headquarters

Multi-Tech Systems, Inc.
2205 Woodale Drive
Mounds View, Minnesota 55112 U.S.A.
(763) 785-3500 or (800) 328-9717
Fax (763) 785-9874
http://www.multitech.com

Technical Support

Country	By Email	By Phone
Europe, Middle East, Africa	support@multitech.co.uk	(44) 118 959 7774
U.S., Canada, all others	support@multitech.com	800-972-2439 or 763-717-5863

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Chapter 1 – Description and Specifications

Product Description

The MultiConnect BT Serial-to-Bluetooth adapter utilizes Bluetooth technology to provide a secure, standards-based wireless connection between a host and a peripheral device. Providing wireless data transfer up to 100 meters, it completely eliminates the need for serial cable connections.

General Safety

The adapter is designed and intended to be used in either fixed or mobile applications. In the "Fixed" application, the device is physically secured at one location and not easily moved to another location. In the "Mobile" application, the device may be regularly moved to different locations.

Caution! Maintain a separation distance of at least 20 cm (8 inches) between the transmitter's antenna and the body of the user or nearby persons. The adapter is not designed for, nor intended to be, used in applications within 20 cm (8 inches) of the body of the user. Such uses are strictly prohibited.

Radio Frequency Interference

Avoid possible radio frequency (RF) interference by carefully following the safety guidelines below.

- Switch OFF the Adapter when in an aircraft. The use of cellular telephones in aircraft is illegal. It may endanger the operation of the aircraft and/or disrupt the cellular network. Failure to observe this instruction may lead to suspension or denial of cellular telephone services to the offender, legal action, or both.
- Switch OFF the Adapter in the vicinity of gasoline or diesel-fuel pumps or before filling a vehicle with fuel.
- Switch OFF the Adapter in hospitals and any other place where medical equipment may be in use.
- Respect restrictions on the use of radio equipment in fuel depots, chemical plants, or where blasting operations are in progress.
- There may be a hazard associated with the operation of your Adapter in the vicinity of inadequately protected personal medical devices such as hearing aids and pacemakers. Consult the manufacturers of the medical device to determine if it is adequately protected.
- Operation of the Adapter in the vicinity of other electronic equipment may cause interference if the equipment is inadequately protected. Observe any warning signs and manufacturers' recommendations.

Vehicle Safety

- Do not use your Adapter while driving.
- Respect national regulations on the use of cellular telephones in vehicles. Road safety always comes first.
- If incorrectly installed in a vehicle, the operation of adapter could interfere with the correct functioning of vehicle electronics. To avoid such problems, be sure that the installation has been performed by qualified personnel. Verification of the protection of vehicle electronics should be part of the installation.
- The use of an alert device to operate a vehicle's lights or horn on public roads is not permitted.

Handling Precautions

All devices must be handled with certain precautions to avoid damage due to the accumulation of static charge. Although input protection circuitry has been incorporated into the devices to minimize the effect of this static buildup, proper precautions should be taken to avoid exposure to electrostatic discharge during handing and operation.

Maintenance of the Serial-to-Bluetooth Adapter

Your adapter is the product of advanced engineering, design and craftsmanship and should be treated with care. The suggestions below will help you to enjoy this product for many years.

- Do not expose the adapter to any extreme environment where the temperature or humidity is high.
- Do not attempt to disassemble the adapter. There are no user serviceable parts inside.
- Do not expose the adapter to water, rain or spilled beverages. It is not waterproof.
- Do not abuse your adapter by dropping, knocking, or violently shaking it. Rough handling can damage it.
- Do not place the adapter alongside computer discs, credit or travel cards, or other magnetic media. The information contained on discs or cards may be affected by the phone.
- The use of accessories not authorized by Multi-Tech or not compliant with Multi-Tech's accessory specifications may invalidate the warranty of the MultiConnect Adapter.
- In the unlikely event of a fault in the adapter, contact Multi-Tech Technical Support.

Product Build Options

Product	Description	Region
MTS2BTA	Serial-to-Bluetooth Adapter (Externally Powered)	Global
MTS2BTA-R	Serial-to-Bluetooth Adapter (Powered through Pin 6 of an RS-232 Cable)	Global

Shipping Package Contents

MTS2BTA (Externally Powered)

- One Serial-to-Bluetooth Adapter
- One antenna
- One mounting bracket
- One power supply
- A set of four self-adhesive plastic feet
- One printed Quick Start Guide
- One MultiConnect CD containing the adapter drivers, User Guide, Quick Start Guide, AT Commands Reference Guide, Global Wizard software, and a link to Adobe Acrobat Reader.

MTS2BTA-R (Powered by Pin 6 of an RS-232 Cable)

- One Serial-to-Bluetooth Adapter
- One antenna
- One mounting bracket
- A set of four self-adhesive plastic feet
- One printed Quick Start Guide
- One MultiConnect CD containing the adapter drivers, User Guide, Quick Start Guide, AT Commands Reference Guide, Global Wizard software, and Acrobat Reader.

AT Commands and Setup Examples

AT commands for this Adapter are published in a separate Reference Guide included on the product CD and posted on the Multi-Tech Web site.

This command guide includes setup examples and repeater examples.

Technical Specifications

Category	Description
Standards	Class 1 Bluetooth V2.0 compliant. **Notes:** Bluetooth protocol V2.0: circuit board I/O pin 7 now controls flow control. Previously, in V1.2, the circuit board I/O pin 3 controlled flow control. V2.0 now supports multi-point connections.
Serial Interface	Supports speeds from 1200bps to 230Kbps
Data Format	**For Serial Interface -** Asynchronous, 8-N-1, Default is 9600bps
Flow Control	Hardware flow control
Modes of Operation	Inquiry, Idle, Data, Fast Data, Park, Sniff, Command, Master, Slave
Device Profiles	Serial Port (SPP), Dial-up Network (DUN)
Buffer	**Serial** 50 bytes **RF** 50-byte RX buffer
Dimensions	4.3" w x 2.4" h x 0.94" d (11 cm x 6.1 cm x 2.4 cm)
Weight	4.2 oz. (120 g)
Power Requirements	**MTS2BTA:** 100mA typical/250mA maximum @ 9VDC **MTS2BTA-R:** 86mA typical/200mA maximum @ 5VDC, 42mA typical/100mA maximum @ 10VDC, 29mA typical/68mA maximum @ 15VDC, 23mA typical/54mA maximum @ 20VDC, 19mA typical/45mA maximum @ 25VDC
Operating Temperature	+32° to +120° F (0° to +50° C)
Humidity	25-85% noncondensing
Voltage	9VDC to 25VDC
Certifications	***CE Mark*** ***EMC:*** FCC Part 15 Class B Canada (Class B) FCC Part 15.247:2004 (Subpart C) EN 55022 EN 55024 EN 300 328 EN 301 489-1 V1.4.1 EN 301 489-17 **Safety:** cUL UL 60950 EN 60950
Intelligent Features	Supports multi-point connections Operating System Independent AT Command software interface LED driver outputs for visual monitoring Auto connect Low power consumption Secure and robust communication link. • FHSS (Frequent Hopping Spread Spectrum) • 128-bit encryption; 10 alphanumeric Personal Identification Number (PIN) • Error correction schemes for guaranteed packet delivery
Warranty	Two Years

RF Interface

Radio Characteristics

Frequency	2402 – 2480MHz
Modulation	FHSS/GFSK
Channel Intervals	1MHz
Number of Channels	79CH
Transmission Rate	721Kbps
RF Receive Sensitivity	-80dBm typical
RF Range	Class 1 - 100 meters (330 feet)

Default Power Up Settings

AT Command Response Form = Long Form
Bluetooth Service Profile = Serial Port Profile {SPP}
Device Role = Slave
Baud Rate = 9600bps
Data Bits = 8 bits
Parity = None
Stop bits = 1 bit
Hardware Flow Control RTS/CTS = Enabled
Power Mode = Never go into deep sleep mode
Country Code = North America and Europe
Name of Device (local name) = Serial-to-Bluetooth Adapter
My Radio Status = 1,0 {slave, disconnected}
Service Name = COM0
Power up default ATSW24 settings = 0,0,0,0 {long response, no authentication, no auto SCO connect, no minor}
Power up default ATSW25 settings = 0,1,0,0 {slave, data, allow data to pass, SPP}
Major & Minor Class Of Device (COD) = 00000000 {undefined}
Security PIN and Encryption = Disabled

Default PIN = "default" *caps sensitive*

> **Important Security PIN Note:**
> Do not forget your PIN. Write it down. If you forget it, there is no way it can be retrieved from the device or the software. You will have to buy a new Bluetooth device and start over.

Page Scan Interval = 0x400 {2560msec.}
Page Scan Window = 0x200 {11msec.}
Inquiry Scan Interval = 0x400 {2560msec.}
Inquiry Scan Window = 0x200 {11msec.}
Timeout Connection Parameters

Inquiry = 60 seconds
Slave Connect = 60 seconds
Master Connect = 60 seconds
ATDM idle mode = 60 seconds
ATDM Master Mode = indefinitely (need to perform **ATUCL** to cancel last command)
Timeout for loss of Bluetooth connection = 4 seconds

LED Indicators

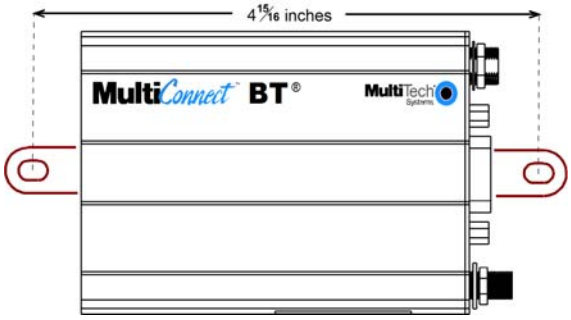
LED	Description
TD	**Transmit Data.** This LED is lit when adapter is transmitting data to another adapter.
RD	**Receive Data.** This LED is lit when the adapter is receiving data from another adapter.
CD	**Carrier Detect.** This LED is lit when the adapter detects a valid carrier signal from another adapter. It is on when the adapter is communicating with the other adapter and off when the link is broken.
TR	**Terminal Ready.** (Also called Data Terminal Ready.) This LED indicates the PC is turned on and ready to communicate. This LED is lit when a data communications program initializes the adapter. It goes off when the communications program disconnects the COM port. When it goes off, a connected adapter will disconnect.
PWR	**Power.** This LED Indicates the presence of DC power when lit.

Chapter 2 – Installation and Cabling

Attaching the MultiConnect Adapter to a Fixed Location

The Serial-to-Bluetooth Adapter is design to be used on the desktop or to be panel-mounted. To attach the bracket for panel-mounting, following these steps:

1. Typically, the adapter is mounted against a flat surface with two mounting screws. Drill the mounting holes at the desired location. The mounting holes must be separated by 4 -15/16 inches center-to-center.



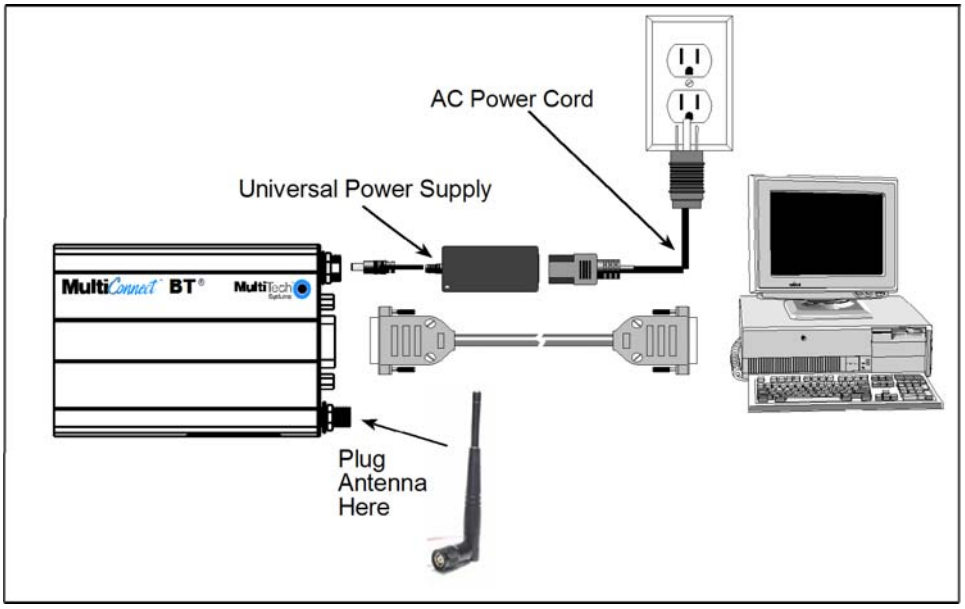
2. To attach the mounting bracket, slide it into the corresponding slot on the back of the MultiConnect chassis.

3. Attach the adapter to the surface with two screws.

Making the Connections

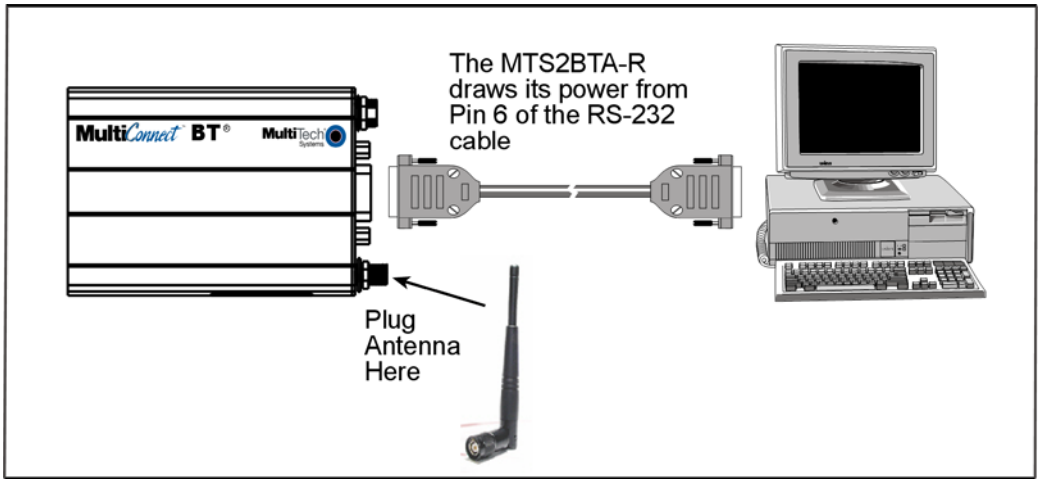
Directions for the MTS2BTA (Externally Powered)

Turn off your PC. Place the adapter in a convenient location. Connect it to your PC's serial port and plug in the power.



Directions for the MTS2BTA-R (Powered through Pin 6 of an RS-232 Cable)

Turn off your PC. Place the adapter in a convenient location. Then connect it to your PC's serial port. The MTS2BT-R draws its power from the RS-232 cable's Pin 6.

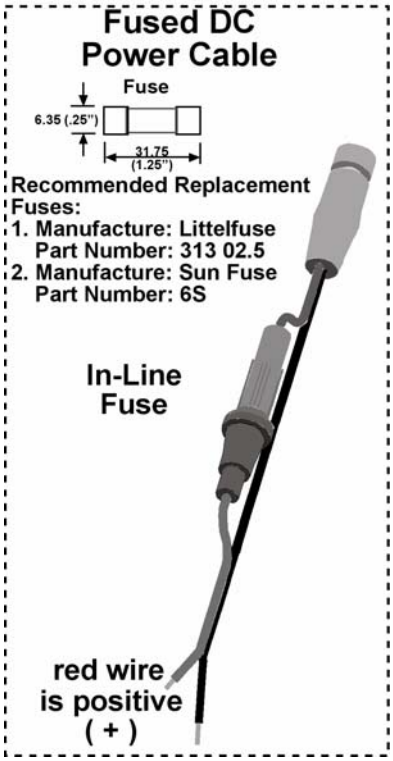


Optional – Direct DC Power Connection for Use with the MTS2BTA

- Connect a fused DC power cable into the power connector on the MultiModem.
- Then attach the two wires at the other end of the fused cable to a DC fuse/terminal block on a vehicle in which you are mounting the MultiModem.
- Connect the red wire to the "+" positive and the black wire to the "–" negative. Be sure the GND connection is correct.

Note: For automotive application: according to the type of application, you can use permanent "+" or key-switched "+". Connect the power supply to its source (for example, in a mobile situation, to the vehicle's DC fuse/terminal block).

Warning: Over-voltage protection is provided on the device. To ensure complete protection, you may want to add additional filtering to the DC input.



Chapter 3 – AT Commands and Configuration Examples

AT Command Reference Guide

AT commands for the Serial-to-Bluetooth Adapter are published in a separate Reference Guide included on the product CD and posted on the Multi-Tech Web site.

Using AT Commands

Default Settings / Changing Configuration

Parameters, such as the *Bluetooth* Name, Service Name, Class of Device and Serial Port settings can be viewed and configured. This can be done locally through the serial port UART or from a remote *Bluetooth* RF link. To configure the MultiConnect Bluetooth Adapter, the device must be in command mode by issuing **+++**. While in command mode, the adapter will accept ASCII bytes as commands.

The communications settings should match the settings used when the adapter connects. For example, the defaults are:

9600bps
8 bits
No Parity
1 stop bit
Hardware flow control enabled.

If you change these parameters, you have the option to store them permanently in the non-volatile memory.

Run your favorite terminal emulator, HyperTerminal, or other program.

- Type **AT** on your screen and follow it with a carriage return **<cr>**. You should see "**OK**" returned to you. This will verify that your cable and communications settings are correct. When the adapter is not connected to another *Bluetooth* device, you can type the AT commands directly into the UART; e.g., you do not have to type **+++** to change from data mode to command mode.
- Now you can enter any of the AT commands discussed in the following sections. Follow these commands by **<cr>**. Valid commands will return an "**OK**" or a valid response. Invalid commands will reply **ERROR**.
- To return to data mode, type **ATMD**. You can now pass or receive data from a remote connected *Bluetooth* device.

Notes:

- If you change communications parameter settings, remember to change your terminal or emulator communications settings to correspond to the newly created parameter settings.
- AT commands will not echo back to the terminal.

Setting Parameters

This section covers how to send AT commands at the PC connected to a Bluetooth Adapter to query and set parameters for Bluetooth communication.

Example of a Master Discovery/Connection Sequence

From Power Up and No Connection

1. Verify local device is Master in Data Mode.
   Sent: ATSi,7 <cr>
   Reply: <cr_lf>1,1,0,0<cr_lf>
2. If not Master, set to Master and Data Mode.
   Sent: ATSW25,1,1,0,0 <cr>
   Reply: <cr_lf>OK<cr_lf>
3. Perform an Inquiry to obtain ***BT_Addresses*** (unless it is already known).
   Sent: ATUCL // Clears radio state
   Reply: <cr_lf>OK<cr_lf>
   Sent: ATDI,1,00000000 {Class of Device}<cr> // Looks for only one Bluetooth device
   Reply: <cr_lf>00A0961F2023,00000104,MTS2BTA<cr_lf>DONE<cr_lf>
   CONNECT <cr_lf>
4. Perform a Master Connect over SPP using the ***BT_Address.***
   Sent: ATDM, 00A0961F2023,1101<cr> // SPP connection
   Reply: <cr_lf>CONNECT**,**00A0961F008F <cr_lf> // Returns Slave BT address radios is in data mode
5. Place radio into Fast Data Mode.
   Sent: +++<cr> // Places Radio in Command Mode
   Reply: <cr_lf>OK<cr_lf>
   Sent: ATMF<cr> // Places radio in Fast Data Mode
   Reply: <cr_lf>OK<cr_lf>
6. Send Data.

Note: Sending Commands from the Slave When the Slave Connects in Fast Data Mode (ATSW25/or issuing ATMF)

All valid AT commands sent through the Slave's UART will be interpreted and responded by the Master as if it were the local Slave radio. Basically, in this configuration from the Slave end, you can obtain status and configure the remote Master radio. This is a unique feature that may be useful in some applications, but it can be confusing if you think you are talking to the Slave.

To Get Out of Data Mode and Check Status

1. Delay at least 50 milliseconds; this could be less or more.
2. Perform a Set Command Mode.
   Sent: +++<cr>
   Reply: <cr_lf>OK<cr_lf>
3. Delay at least 50 milliseconds.
4. Check Status, perform a Disconnect …
   Sent: AT<cr>
   Reply: <cr_lf>OK<cr_lf>

Note about Being Connected in Fast Data Mode

If connected in Fast Data Mode, it is necessary to reset the master or slave to break the connection.

Example of a Slave Command Sequence

From Power Up:

1. Check and verify Communication to Slave.
   Sent: AT<cr>
   Reply: <cr_lf>OK<cr_lf>
2. Get information on Slave Bluetooth address.
   Sent: ATSI,1<cr>
   Reply: 12-digit address
   <cr_lf>OK<cr_lf>
3. Set Slave to automatically connect in Fast Data Mode and SPP on Bluetooth connection.
   Sent : ATSW25,0,0,0,0 <cr>
   Reply:<cr_lf>OK<cr_lf>
4. Either cycle power or send ATURST.

Note: This command sequence assumes the radio is set to factory defaults that allow it to automatically come up and be ready to connect as a Slave from a Master request.

Test Procedures Using AT Commands

The following testing procedures can be used with the MTS2BTA and the MTS2BTA-R.

1. Connect serial cable from computer to DB9 connector of each MTS2BTA, then attach antenna and power. Do this for both master and slave Bluetooth adapters.
2. Use terminal emulator like HyperTerminal or ZOC to communicate to Bluetooth socket modem using AT command set. Set baud rate to 9600bps. If MTS2BTA has label with different baud rate then set emulator to match with this baud rate.
3. If necessary, can retrieve address from Bluetooth module being tested.
   Sent: ATSI,1<cr>
   Reply: OK<cr_lf>
   Reply: <cr_lf>12-digit address <cr_lf>OK<cr_lf>
4. Issue these AT commands at slave Bluetooth device to prepare for wireless connection and transfer data between modules.
   - How to set to Slave and Fast Data Mode.
     Sent: ATSW25,0,0,0,0 <cr>
     Reply: OK<cr_lf>
   - How to set to DUN or SPP on channel 0.
     Sent: ATSSNC,0,com0,1101 (for SPP)<cr> or
     ATSSNC,0,com0,1103 (for DUN)<cr>
     Reply: OK<cr_lf>
   - Reset slave Bluetooth device.
     Sent: ATURST <cr> // Resets radio, wait 5 seconds
     Reply: OK<cr_lf>
5. Issue these AT commands at master Bluetooth device to generate a wireless connection and transfer data between modules.
   - How to set to Master and Fast Data Mode.
     Sent: ATSW25,1,0,0,0 <cr>
     Reply: OK<cr_lf>
   - How to set to DUN or SPP on channel 0.
     Sent: ATSSNC,0,com0,1101 (for SPP)<cr> or
     ATSSNC,0,com0,1103 (for DUN)<cr>
     Reply: OK<cr_lf>
   - Perform an Inquiry to detect BT_Address (unless already known) of slave Bluetooth device.
     Sent: ATURST <cr> // Resets radio, wait 5 seconds
     Reply: OK<cr_lf>
     Sent: ATDI,1,00000000 {Class of Device} <cr> // Looks for only one Bluetooth device
     Reply: OK<cr_lf> // Search completed when DONE appears
     Reply: <cr_lf>00A0961F2023,00000104,MTS2BTA<cr_lf>
     Reply: <cr_lf>DONE<cr_lf>
   - Perform a Master Connect over SPP using the BT_Address.
     Sent: ATDM, 00A0961F2023,1101<cr> // SPP connection
     Reply: OK<cr_lf>
     Reply:<cr_lf>CONNECT,00A0961F008F <cr_lf> // Returns Slave BT address; in data mode
   - Or perform a Master Connect over DUN using the BT_Address.
     Sent: ATDM, 00A0961F2023,1103<cr> // DUN connection
     Reply: OK<cr_lf>
     Reply:<cr_lf>CONNECT,00A0961F008F <cr_lf> // Returns Slave BT address; in data mode
   - Send and receive Data by transferring file or holding down key on keyboard.

Disabling Flow Control Using AT Commands

Protocol Change:

For Bluetooth protocol V2.0, the circuit board I/O pin 7 now controls flow control.

Previous Protocol V1.2	*New Protocol V2.0*
ATSW22,3,x,x	ATSW22,7,x,x
ATSW23,3,x,x	ATSW23,7,x,x

Disabling Flow Control Using Protocol V.2.0:

Using a terminal screen with flow control enabled, issue commands to turn off flow control.

Sent : ATSW22,7,1,0 <cr> // Set PIO7 as output and do not store in flash
Reply: OK<cr_lf>
Sent : ATSW23,7,1,0<cr> // Set PIO7 output high and do not store in flash
Reply: OK<cr_lf>

To store the setting in flash:

Sent : ATSW22,7,1,1 <cr> // Set PIO7 as output and store in flash
Reply: OK<cr_lf>
Sent : ATSW23,7,1,1<cr> // Set PIO7 output high and store in flash
Reply: OK<cr_lf>

Now you can communicate with the Bluetooth device with flow control turned off.

Configuring to Use DTR for Resetting the MTS2BTA Using AT Commands

Using a terminal screen, issue commands so when DTR goes off the adapter is reset.

Sent : ATSW22,6,1,0 <cr> // Set PIO6 as output and do not store in flash
Reply: OK<cr_lf>
Sent : ATSW23,6,0,0<cr> // Set PIO6 output low and do not store in flash
Reply: OK<cr_lf>

To store the setting in flash:

Sent : ATSW22,6,1,1 <cr> // Set PIO6 as output and store in flash
Reply: OK<cr_lf>
Sent : ATSW23,6,0,1<cr> // Set PIO6 output low and store in flash
Reply: OK<cr_lf>

Now you can communicate with the Bluetooth device. When the serial connection is terminated (DTR goes off), the Bluetooth adapter will reset.

Other Examples

See the Bluetooth AT Commands Reference Guide for other examples:

- Multipoint Example Using the SocketWireless MTS2BTSMI or the Bluetooth Adapter MT2BTA – One Slave and Four Master Devices.
- Multipoint Example Using the SocketWireless MTS2BTSMI or the Bluetooth Adapter MT2BTA – One Master and Four Slave Devices.
- Repeater Example Using the SocketWireless MTS2BTSMI or the Bluetooth Adapter MT2BTA.

Chapter 4 – Peripheral Devices

Antenna System

Antenna Requirements

Frequency Range	2.4-2.5 GHz
Impedance	50 ohm nominal
VSWR	<2.0:1
Gain	2 dBi
Radiation	Omni
Polarization	Vertical
Wave	Dipole ½ Wave
Connector	Reverse Polarity SMA Plug

Bluetooth Antenna Available from Multi-Tech:

Part Number	Description
ANBT-1HRA	Hinged Right Angle 2.5 GHz ½ Wave Reverse Polarity Antenna

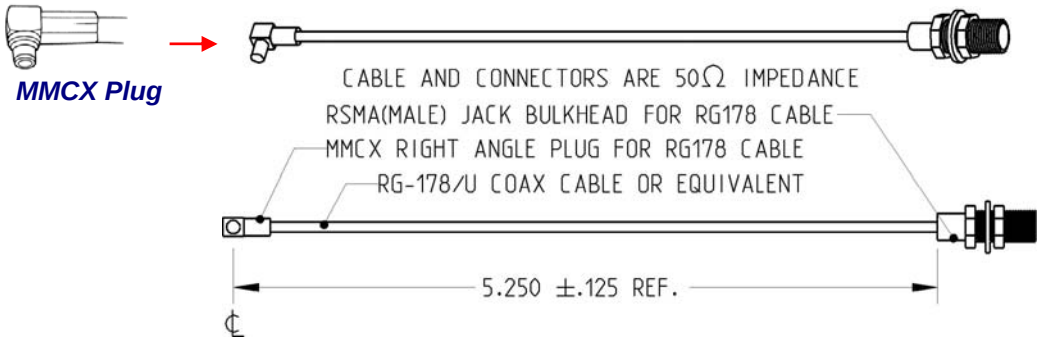
Bluetooth antennas also can be ordered from the following manufacturers. For the manufacturers listed without specific part numbers, be sure to select the antenna that meets the requirements listed above.

http://nearson.com (part number S131AH-2450S)
http://www.ead-ltd.com
http://www.centurion.com
http://www.mobilemark.com
http://woken.com

Antenna Cable

An optional 6" antenna cable (SMA Jack to MMCX Plug) can be ordered from **Multi-Tech Systems, Inc.**

Part Number	Description
CARSMA-MMCX-1	Reverse SMA to MMCS COAX 6 inch cable (Single Pack)



Antenna Cable – SMA Jack to MMCX Plug

Approved Antenna Cable Parts

GC Protronics	20930C
Samtec	ASP-116785-01
Coax Cable	RG-178/U

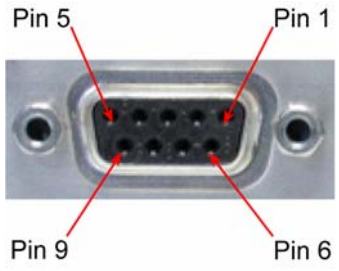
Pin Assignments for the Serial Port

Female End of the Multi-Tech Adapter

The following tables explain the Multi-Tech Adapter pin functions.

External Power	
Signal	IN/OUT
Pin 1 CD	O
Pin 2 TX	O
Pin 3 RX	I
Pin 4 DTR	I
Pin 5 GND	--
Pin 6 DSR	O
Pin 7 CTS	I
Pin 8 RTS	O
Pin 9 RI	O

Multi-Tech Adapter Female Connector



Powered Through Pin 6	
Signal	IN/OUT
Pin 1 CD	O
Pin 2 TX	O
Pin 3 RX	I
Pin 4 DTR	I
Pin 5 GND	--
Pin 6*	Power
Pin 7 CTS	I
Pin 8 RTS	O
Pin 9 RI	O

Warning:
When supplying power to the RS-232 connector of the adapter, make sure the power does not feed the DTE device.

Appendix A – Regulatory Compliance Statements

Waste Electrical and Electronic Equipment Statement

Note to OEMs: The statement is included for your information and may be used in the documentation of your final product applications.

WEEE Directive

The WEEE directive places an obligation on EU-based manufacturers, distributors, retailers, and importers to take-back electronics products at the end of their useful life. A sister Directive, ROHS (Restriction of Hazardous Substances) complements the WEEE Directive by banning the presence of specific hazardous substances in the products at the design phase. The WEEE Directive covers all Multi-Tech products imported into the EU as of August 13, 2005. EU-based manufacturers, distributors, retailers and importers are obliged to finance the costs of recovery from municipal collection points, reuse, and recycling of specified percentages per the WEEE requirements.

Instructions for Disposal of WEEE by Users in the European Union

The symbol shown below is on the product or on its packaging, which indicates that this product must not be disposed of with other waste. Instead, it is the user's responsibility to dispose of their waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service or where you purchased the product.

July, 2005

Information on HS/TS Substances According to Chinese Standards

In accordance with China's Administrative Measures on the Control of Pollution Caused by Electronic Information Products (EIP) # 39, also known as China RoHS, the following information is provided regarding the names and concentration levels of Toxic Substances (TS) or Hazardous Substances (HS) which may be contained in Multi-Tech Systems Inc. products relative to the EIP standards set by China's Ministry of Information Industry (MII).

Name of the Component	Hazardous/Toxic Substance/Elements					
	Lead (PB)	Mercury (Hg)	Cadmium (CD)	Hexavalent Chromium (CR6+)	Polybrominated Biphenyl (PBB)	Polybrominated Diphenyl Ether (PBDE)
Printed Circuit Boards	O	O	O	O	O	O
Resistors	X	O	O	O	O	O
Capacitors	X	O	O	O	O	O
Ferrite Beads	O	O	O	O	O	O
Relays/Opticals	O	O	O	O+	O	O
ICs	O	O	O	O	O	O
Diodes/ Transistors	O	O	O	O	O	O
Oscillators and Crystals	X	O	O	O	O	O
Regulator	O	O	O	O	O	O
Voltage Sensor	O	O	O	O	O	O
Transformer	O	O	O	O	O	O
Speaker	O	O	O	O	O	O
Connectors	O	O	O	O	O	O
LEDs	O	O	O	O	O	O
Screws, Nuts, and other Hardware	X	O	O	O	O	O
AC-DC Power Supplies	O	O	O	O	O	O
Software / Documentation CDs	O	O	O	O	O	O
Booklets and Paperwork	O	O	O	O	O	O
Chassis	O	O	O	O	O	O

X Represents that the concentration of such hazardous/toxic substance in all the units of homogeneous material of such component is higher than the SJ/Txxx-2006 Requirements for Concentration Limits.

O Represents that no such substances are used or that the concentration is within the aforementioned limits.

Information on HS/TS Substances According to Chinese Standards (in Chinese)

依照中国标准的有毒有害物质信息

根据中华人民共和国信息产业部 (MII) 制定的电子信息产品 (EIP) 标准－中华人民共和国《电子信息产品污染控制管理办法》（第 39 号），也称作中国 RoHS，下表列出了 Multi-Tech Systems, Inc. 产品中可能含有的有毒物质（TS）或有害物质 (HS) 的名称及含量水平方面的信息。

成分名称	有害/有毒物质/元素					
	铅 (PB)	汞 (Hg)	镉 (CD)	六价铬 (CR6+)	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印刷电路板	O	O	O	O	O	O
电阻器	X	O	O	O	O	O
电容器	X	O	O	O	O	O
铁氧体磁环	O	O	O	O	O	O
继电器/光学部件	O	O	O	O	O	O
IC	O	O	O	O	O	O
二极管/晶体管	O	O	O	O	O	O
振荡器和晶振	X	O	O	O	O	O
调节器	O	O	O	O	O	O
电压传感器	O	O	O	O	O	O
变压器	O	O	O	O	O	O
扬声器	O	O	O	O	O	O
连接器	O	O	O	O	O	O
LED	O	O	O	O	O	O
螺丝、螺母以及其它五金件	X	O	O	O	O	O
交流-直流电源	O	O	O	O	O	O
软件/文档 CD	O	O	O	O	O	O
手册和纸页	O	O	O	O	O	O
底盘	O	O	O	O	O	O

X 表示所有使用类似材料的设备中有害/有毒物质的含量水平高于 SJ/Txxx-2006 限量要求。

O 表示不含该物质或者该物质的含量水平在上述限量要求之内。

Appendix B – Warranty and Repairs Policy

Multi-Tech Warranty Statement

Multi-Tech Systems, Inc., (hereafter "MTS") warrants that its products will be free from defects in material or workmanship for a period of two, five, or ten years (depending on model) from date of purchase, or if proof of purchase is not provided, two, five, or ten years (depending on model) from date of shipment.

MTS MAKES NO OTHER WARRANTY, EXPRESS OR IMPLIED, AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED.

This warranty does not apply to any products which have been damaged by lightning storms, water, or power surges or which have been neglected, altered, abused, used for a purpose other than the one for which they were manufactured, repaired by Customer or any party without MTS's written authorization, or used in any manner inconsistent with MTS's instructions.

MTS's entire obligation under this warranty shall be limited (at MTS's option) to repair or replacement of any products which prove to be defective within the warranty period or, at MTS's option, issuance of a refund of the purchase price. Defective products must be returned by Customer to MTS's factory — transportation prepaid.

MTS WILL NOT BE LIABLE FOR CONSEQUENTIAL DAMAGES, AND UNDER NO CIRCUMSTANCES WILL ITS LIABILITY EXCEED THE PRICE FOR DEFECTIVE PRODUCTS.

Repair Procedures for U.S. and Canadian Customers

In the event that service is required, products may be shipped, freight prepaid, to our Mounds View, Minnesota factory:

Multi-Tech Systems, Inc.
2205 Woodale Drive
Mounds View, MN 55112 U.S.A.
Attn: Repairs, Serial # _____

A Returned Materials Authorization (RMA) is not required. Return shipping charges (surface) will be paid by MTS to destinations in U.S. and Canada.

Please include, inside the shipping box, a description of the problem, a return shipping address (must have street address, not P.O. Box), and your telephone number. If the product is out of warranty, a payment in advance is required. Acceptable means of payment include credit card, wire transfer or a check in U.S. dollars drawn on a U.S. Bank.

For out of warranty repair charges, go to COMPANY/Policies/warranty/

Extended two-year overnight replacement service agreements are available for selected products. Please call MTS customer service at (888) 288-5470 or visit our web site at /PARTNERS/Programs/overnight_replacement/ for details on rates and coverages.

Please direct your questions regarding technical matters, product configuration, verification that the product is defective, etc., to our Technical Support department at (800) 972-2439 or email support@multitech.com. Please direct your questions regarding repair expediting, receiving, shipping, billing, etc., to our Repair Accounting department at (800) 328-9717 or (763) 717-5631, or email mtsrepair@multitech.com.

Repairs for damages caused by lightning storms, water, power surges, incorrect installation, physical abuse, or user-caused damages are billed on a time-plus-materials basis.

Repair Procedures for International Customers

(Outside U.S.A. and Canada)

Your original point-of-purchase Reseller may offer the quickest and most economical repair option for your Multi-Tech product. You may also contact any Multi-Tech sales office for information about the nearest distributor or other repair service for your Multi-Tech product. The Multi-Tech sales office directory is available at www.multitech.com/PARTNERS/Channels/offices/

In the event that factory service is required, products may be shipped, freight prepaid to our Mounds View, Minnesota factory. Recommended international shipment methods are via Federal Express, UPS or DHL courier services, or by airmail parcel post; shipments made by any other method will be refused. Please include, inside the shipping box, a description of the problem, a return shipping address (must have street address, not P.O. Box), and your telephone number. If the product is out of warranty, a payment in advance is required. Acceptable means of payment include credit card, wire transfer or a check in U.S. dollars drawn on a U.S. Bank. Repaired units shall be shipped freight collect, unless other arrangements are made in advance.

Please direct your questions regarding technical matters, product configuration, verification that the product is defective, etc., to our Technical Support department nearest you or email support@multitech.com. When calling the U.S., please direct your questions regarding repair expediting, receiving, shipping, billing, etc., to our Repair Accounting department at +(763) 717-5631 in the U.S.A., or email mtsrepair@multitech.com.

Repairs for damages caused by lightning storms, water, power surges, incorrect installation, physical abuse, or user-caused damages are billed on a time-plus-materials basis.

Repair Procedures for International Distributors

International distributors should contact their MTS International sales representative for information about the repair of Multi-Tech product(s).

Please direct your questions regarding technical matters, product configuration, verification that the product is defective, etc., to our International Technical Support department at +(763)717-5863. When calling the U.S., please direct your questions regarding repair expediting, receiving, shipping, billing, etc., to our Repair Accounting department at +(763) 717-5631 in the U.S.A. or email mtsrepair@multitech.com.

Repairs for damages caused by lightning storms, water, power surges, incorrect installation, physical abuse, or user-caused damages are billed on a time-plus-materials basis.

Replacement Parts

SupplyNet, Inc. can supply you with replacement power supplies, cables, and connectors for selected Multi-Tech products. You can place an order with SupplyNet via mail, phone, fax, or the Internet at the following addresses:

Mail:	SupplyNet, Inc. 614 Corporate Way Valley Cottage, NY 10989
Phone:	800 826-0279
Fax:	914 267-2420
Email:	*info@thesupplynet.com*
Internet:	http://www.thesupplynet.com

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