

MT5600BR-V92

Intelligent Data/Fax Rack Mounted Modem

User Guide



MultiModem®II User Guide

MT5600BR-V.92

P/N S000392A Revision A

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Record of Revisions

<i>Revision</i>	<i>Date</i>	<i>Description</i>
A	04/14/06	Manual released.

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Patents

This device is covered by one or more of the following patents: 6,031,867; 6,012,113; 6,009,082; 5,905,794; 5,864,560; 5,815,567; 5,815,503; 5,812,534; 5,809,068; 5,790,532; 5,764,628; 5,764,627; 5,754,589; 5,724,356; 5,673,268; 5,673,257; 5,644,594; 5,628,030; 5,619,508; 5,617,423; 5,600,649; 5,592,586; 5,577,041; 5,574,725; 5,559,793; 5,546,448; 5,546,395; 5,535,204; 5,500,859; 5,471,470; 5,463,616; 5,453,986; 5,452,289; 5,450,425; 5,355,365; 5,309,562; 5,301,274. Other patents pending.

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Contents

Chapter 1 - Introduction	5
Product Description	5
General features	5
LED Indicators	6
Technical Specifications	7
Chapter 2 - Installation	9
Safety Warnings	9
Card Cage	9
Serial Cable	9
Telephone Line	9
PC Board Controls	10
DIP-Switch Settings	10
OOS (Busy Out) Toggle Switch	12
Out of Service/Test Jumper	12
Dial-Up and Leased Lines	12
Installation	13
Chapter 3 - Configuration	14
Configuring Your Software	14
Configuring Software for Your Modem	14
PC Initialization Strings	14
Changing Default Parameters	15
Macintosh Initialization	15
Chapter 4 - AT Commands	16
Fax Commands	16
Chapter 5 - Warranty and Repairs	17
Multi-Tech Warranty Statement	17
Repair Procedures for U.S. and Canadian Customers	17
Repair Procedures for International Customers	18
Repair Procedures for International Distributors	18
Replacement Parts	18
Appendix A - Regulatory Compliance	19
FCC Part 68 Telecom	19
FCC Part 15	20
Fax Branding Statement	20
Canadian Limitations Notice	20
Industry Canada	21
EMC, Safety, and R&TTE Directive Compliance	21
International Modem Restrictions	21
New Zealand Telecom Warning Notice	21

Appendix B - Updating Your Modem's Firmware 23
 Introduction 23
 Upgrade Overview 23
Appendix C - ASCII Conversion Chart 26
Appendix D – Waste Electrical and 27
Electronic Equipment (WEEE) 27
Index 28

Chapter 1 - Introduction

Congratulations on your purchase of the MultiModem® II intelligent data/fax modem, model MT5600BR-V92. You have acquired one of the finest internal data/fax modems available today from one of the world's oldest modem manufacturers: Multi-Tech Systems, Inc. This User Guide will help you to install, configure, test, and use your modem.

Product Description

The MT5600BR-V92 incorporates ITU-T V.92 protocol which provides quick connections, downstream transmissions at speeds up to 56K bps*, and upstream transmissions at speeds up to 48K bps when connected to V.92-compatible Internet service providers. Transmissions between the MT5600BR-V92 and other client modems are limited to 33.6K bps, as are upstream transmissions to non-V.92-compatible ISPs and downstream transmissions that are converted more than once on the telephone network.

Fax Communications: Supports Class 1, 1.0, and Class 2 faxing at 14.4K bps.

Features: Modem features include automatic fallback to slower speeds in noisy line conditions, and fall forward to faster speeds as conditions improve. Can autodial, redial, pulse (rotary) and touch-tone dial. Detects dial tones and busy signals for reliable call-progress detection. Compatible with the standard AT command set used by most communication programs.

NOTE:

* Though this modem is capable of 56K bps download performance, line impairments, public telephone infrastructure, and other external technological factors currently prevent maximum 56K bps connections.

General features

- Supports V.92/56K download speeds and 48K upload speeds when connecting with V.92 server
- Automatic fallback to slower speeds in noisy line conditions, and fall forward to faster speeds as conditions improve.
- Serial port data rates adjustable to 115.2K bps
- ITU V.42 LAP-M and MNP Class 3 and 4 error correction
- ITU V.42bis (4-to-1), ITU V.44bis (6-to-1), and MNP 5 (2-to-1) data compression
- Automatic disabling of compression when transferring already compressed files
- Autodial, redial, pulse (rotary), and touch-tone dial
- Dial tone and busy signal detection for reliable call-progress detection
- Distinctive ring support to route data or fax calls on a single phone line
- FlashROM upgradable (customer upgradable in a Windows environment)
- Compatibility with the standard AT command set used by most communication programs
- Nonvolatile memory for storage of customized modem parameters and ten telephone numbers

Fax

- Responds to Class 1, 1.0, and Class 2 fax commands, enabling it to exchange editable and encrypted faxes with other Windows computers
- Sends and receives faxes from your computer at 14,400 bps, 9600 bps, 7200 bps, 4800 bps, 2400 bps, or 300 bps

LED Indicators

The MT5600BR-V92 has ten LED diagnostic indicators.



- RCV** - This LED blinks when data is being received, on for a space, off for a mark. The state of this RCV LED matches that of the RCV circuit on Pin 3 of the RS232C/V.24 interface.
- XMT** - This LED blinks when data is being transmitted, on for a space, off for a mark. The state of this LED matches that of the XMT circuit on Pin 2 of the RS232C/V.24 interface.
- CO** - This LED lights when a valid carrier tone has been detected.
- 56** - This LED is lit when the modem connects using V.92 protocol. The actual connection speed depends on ISP server capabilities and line conditions.
- 33.6** - This LED is lit when the modem is connected at 33,600 bps. Note that when both 33 and 14 LEDs light, modem is in 16,800 to 33,600bps mode of operation.
- 14.4** - This LED is lit when the modem is connected at 14,400 bps.
- OH** - This LED is lit when the phone line is “*off hook*”. This occurs when the modem is dialing, on line, or answering a call. The LED also flashes when the modem is pulse dialing in the Command Mode.
- DTR** - When the DTR LED is lit, the modem is permitted to answer an incoming call. When DTR goes off, a connected modem disconnects if dependent on DTR. The state of this DTR LED matches that of the DTR circuit on Pin 20 of the RS232C/V.24 interface.
- RI** - This LED is lit during the ringing interval as an incoming call is received.
- ERR** - When the ERR LED is flashing, the leased line is down and the modem is in self-test mode has failed. When ERR LED is on, this indicates the modem is in an out of service (**OOS**) state. When the modem is out of service, it is busy to incoming calls.

Technical Specifications

Your MT5600BR-V92 data/fax modem meets the specifications listed below:

Model Number	MT5600BR-V92
Server-to-Client Data Rates	V.90 speeds when accessing a V.90 or V.92 server (actual speed depends on server capabilities and line conditions)*
Client-to-Server Data Rates	Up to 50Kbps when accessing a V.92 server (actual speed depends on server capabilities and line conditions); other wise, the same as client-to-client data lines.
Client-to-Client Data Rates	33600,31200, 28800, 26400, 24000, 21600, 19200, 16800, 14400, 12000, 9600, 7200, 4800, 2400, 1200, 0-300 bps
Fax Data Rates	14400, 12000, 9600, 7200, 4800, 2400, 1200, 0-300 bps
Data Format	Serial, binary, asynchronous, synchronous
Modem Compatibility	ITU-T V.92, V.90, V.34 enhanced, V.34, V.34bis, V.32, V.22bis, V.22; Bell 212A and 103; ITU-T V.21; V.42, V.42bis, V.44, V.25bis
Fax Compatibility	T.4, T30, V.21, V.27ter, V.29, V.34, V.17; TIA/EIA 578 Class 1, 1.0, 2, TR29.2
Video Compatibility	ITU-T V.80 for H.34 video conferencing
Error Correction	ITU-T V.42 (LAP-M or MNP 4)
Data Compression	ITU-T V.44 (6:1 throughput), V.42bis (4:1 throughput), MNP 5 (2:1 throughput)
Speed Detection	Automatic speed detection and switching between available speeds
Speed Conversion	Serial port data rates adjustable to 300; 1200; 2400; 4800; 9600; 19,200; 38,400; 57,600; 115,200 bps
Mode of Operation	Full duplex data over dial-up line, 2-wire and 4-wire lease line; automatic or manual dialing, automatic or manual answer
Flow Control	XON/XOFF (software), RTS/CTS (hardware)
Intelligent Features	Full AT command compatible, redial, repeat dial, pulse or tone dial, dial pauses, auto answer, adaptive answer; EIA extended automode; adaptive line probing; automatic symbol and carrier frequency during start-up, retrain and rate renegotiation, DTMF detection, call status display, auto-parity and data rate selections, keyboard-controlled modem options, non-volatile memory, quick-connect startup

*Though these modems are capable of 56K bps download performance, line impairments, public telephone infrastructure and other external technological factors currently prevent maximum 56K bps connections.

Command Buffer	60 Characters
Transmission Level	-11 dBm (dial-up), -15dBm (lease line); dBm level selectable with DIP-Switch #3 in lease line setting
Frequency Stability	±0.01%
Receiver Sensitivity	-43 dBm under worst-case conditions
AGC Dynamic Range	43 dB
Interface	EIA RS232C/ITU-TSS V.24
Diagnostics	Power-on Self Test and Local analog loop
Environmental	Temperature range 0°–50°C (32°–120°F); humidity range 20–90% (non-condensing)
Storage Temperature	-10° to +85°C (14°- 185° F)
Dimensions	10½ wide x 5½ long
Weight	8 oz
Operating Systems	Tested for use with Windows 98, NT, 2000, XP, 2003 Server and Linux (2.2.x kernel)
Limited Warranty	10 years

Chapter 2 - Installation

Safety Warnings

- Use this product only with UL- and CUL-listed computers (U.S.A.)
- To reduce the risk of fire, use only UL-listed 26 AWG (.41mm) or larger telephone wiring.
- Never install telephone wiring during a lightning storm.
- Never install a telephone jack in a wet location unless the jack is specifically designed for wet locations.
- Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.
- Avoid using a telephone during an electrical storm; there is a risk of electrical shock from lightning.
- Do not use a telephone in the vicinity of a gas leak.
- The telephone cord is to be disconnected before accessing the inside of the equipment.

Card Cage

The MT5600BR-V92 is designed to mount in the Multi-Tech Systems' modem rack. This rack is an EIA-standard 19-inch wide by 7-inch high rack, and mounts in any standard computer cabinet. The rack has a sixteen modem slot capacity, redundant power supply capability, sixteen 25-pin (female) connectors for RS232C/V.24 interface and sixteen RJ11 back-plane connectors for phone line interface.

Serial Cable

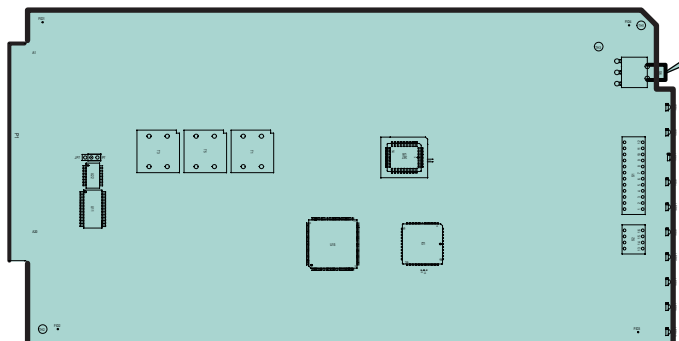
You must provide a serial cable to connect each corresponding MT5600BR-V92 to your computer. The cable must have a DB-25 male interface into the modem rack.

Telephone Line

The MT5600BR-V92 uses one RJ11 jack per corresponding modem slot to connect to the telephone line. One end of the RJ11 cable provided with the modem connects the rack's RJ11 connector (located on the back plane of the modem rack) and the other end connects to the phone-company-provided RJ11 or RJ11W modular phone jack.

PC Board Controls

The MT5600BR-V92 is designed on a single printed circuit board. This board contains sixteen DIP-Switches. There is a two-position "Out of Service" (OOS) toggle switch that extends from the front of the modem circuit card. There is also a two-position TEST/OOS berg jumper located towards the back and center of the card.



The sixteen DIP-Switches and berg jumper control various modem options or set default values for the MT5600BR-V92 Command mode. There is a difference in how several of the switches operate depending on whether you are in synchronous or asynchronous mode (DIP-Switch #12).

Most communications software packages have installation procedures of their own, which call for certain modem DIP-Switch settings. If you are using such a package, follow the software's instructions.

DIP-Switch Settings

The vast majority of installations are similar, with the MT5600BR-V92 being used to dial up a remote installation where the call is automatically answered. The factory default DIP-Switch settings are based on this assumption. The following is a brief description and summary of the MT5600BR-V92's DIP-Switch options:

Switch	Function	Position	Effect
#1	DTR Forced/ DTR from Interface *	UP* DOWN	DTR dependent on interface DTR forced ON at all times
#2	Flow Control &E4* (Async/Dial-Up/Leased Line)	UP* DOWN	Hardware flow control Software flow control
#2	SDLC*/BSC (Sync)	UP* DOWN	SDLC mode BSC mode
#3	Result Codes Enabled* (Async Dial-up)	UP DOWN*	Q1 Disable Responses Q0 Enable Responses
#3	DbM Transmit -15dB/-11dB* (Async/Sync/Leased Line)	UP DOWN*	Lease Line transmits at -11dB
#4	No affect in async		
#4	AS/400 Mode Disabled* (Sync Dial-Up/Leased Line)	UP* DOWN	AS/400 Mode OFF AS/400 Mode ON
#5	Auto-Answer Enabled* (Async/Sync/Dial-Up)	UP* DOWN	Enable Auto Answer Disable Auto Answer

* Factory default setting.

Switch	Function	Position	Effect
#5	Answer/Originate* (Async/Sync/Leased Line)	UP* DOWN	Answer Mode Originate Mode
#6	Max-Throughput Enabled* (Async/Dial-Up/Leased)	UP* DOWN	Modem set-up to operate at highest efficiency level
#6	Slave Clock Disabled* (Sync/Dial-Up/Leased)	UP* DOWN	Slave Clocking OFF Slave Clocking ON
#7	RTS/Normal/Forced* (Sync/Async/Dial/Leased)	UP DOWN*	RTS dependent on interface RTS forced ON
#8	Command Mode Enabled* (Sync/Async/Dial/Leased)	UP DOWN*	Disable Command Mode Enabled Command Mode
#9	No affect		
#10	Dial-Up*/Leased-Line	UP* DOWN	Dial-Up Operation Lease Line Operation
#11	No affect in async		
#11	Internal*/External Clocking (Synchronous)	UP DOWN*	External Clock Internal Clock
#12	Sync/Async Mode*	UP DOWN*	Sync Operation Async Operation

Dip Switch Settings #13 - 16

Switch	Position	Effect
13/14	UP/UP*	V.92 Operation (Default)
13/14	DOWN/UP	V.34 Operation
13/14	UP/DOWN	V.32b Operation
13/14	DOWN/DOWN	V.22b Operation
#15	UP*	CD/DSR from Interface
#15	DOWN	CD/DSR Forced On
#16	UP	2-Wire Operation
#16	DOWN	4-Wire Operation

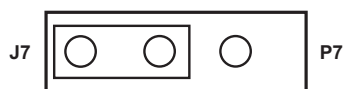
* Factory default setting

OOS (Busy Out) Toggle Switch

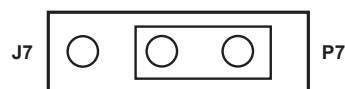
The MT5600BR-V92 contains a two-position OOS switch on the front panel. This switch can be used to create a “*busy out*” (OOS) condition for the modem (i.e., take the modem off-hook). To place a modem in the Busy condition, move the OOS toggle switch to the (BUSY) position. The modem then goes off-hook, its OOS and OH LEDs light, and incoming calls to this modem get a busy signal. If you suspect a problem with a particular modem, you can use the BUSY switch to have an optional device (such as a “*hunt group*”) that looks for a non-busy line to perform a “*roll over*” to the next available modem while you check the status of the Busy modem.

Out of Service/Test Jumper

When the MT5600BR-V92 is Out Of Service (OOS), it is busy to incoming calls. In the Test (default) setting, the modem drives pin 25 high when the modem is in Test mode. In the OOS (optional) setting, the computer or terminal forces pin 25 high and puts the modem in a busy condition. Note that jumper (shorting) plugs are not shipped with the MT5600BR-V92, but is provided by Multi-Tech’s Tech Support group on request.



Test Setting (Factory Default)



OOS Setting (Optional)

Dial-Up and Leased Lines

Connection to the phone system is made via **RJ11** type jacks such as an RJ11C or RJ11W. It can also be connected to an analog RJ41 or an RJ45S jack, but would not use these jack's digital dB-level programming features. The MT5600BR-V92 is designed to transmit at a permissive level of -11dB.

To connect the modem to the phone lines, one end of the RJ11 cable that is provided with the modem plugs into the RJ11 connector located on the back plane of the modem rack and the other end into the phone-company-provided RJ11 or RJ11W modular phone jack. Make sure that DIP-Switch #10 is in the UP position (default) when in dial-up mode.

Although the majority of installations involves dial-up lines, the MT5600BR-V92 also connects to two-wire leased lines (sometimes referred to as dedicated, private, or 3002 lines) and four-wire lease lines.

To connect the modem to leased lines, first determine the type of line termination provided by the phone company. Most phone companies provide a terminal block with a pair of screws. Some provide a conventional RJ11 type of connector. If the RJ11 connector is used, you can use the same cable that you use for dial-up connection. If the screw terminal type connector is used, you may need to order the #CA167 cable from Multi-Tech Systems.

For a lease line connection, make two DIP-Switch setting changes on the modem's PC board. The first involves placing DIP-Switch #10 in the DOWN position (changes the modem from dial-up to leased line operation). The second DIP-Switch change requires that one of the two modems on the leased line circuit is set to “*originate*”, and the other is set to “*answer*”. To do this, change the setting of DIP-Switch #5. When you changed the DIP-Switch #10 setting, you also changed the function of DIP-Switch #5. Now the UP position selects answer mode while the DOWN position selects originate mode. Place DIP-Switch #5 in the UP position on one of the two modems, and on the other modem, place Switch #5 DOWN. It doesn't matter which is which, just so you have local and remote modems in opposite modes.

Installation

Perform the following procedure to install modem cards into the CC1600 rack. The installation process involves:

1. Verify that the **DIP-Switch settings** conform to your application (dial-up or lease line).
2. Slide a modem card into one of sixteen available modem slots. Start by inserting a modem into the left-most channel (slot #1) of the rack. The toggle switch should be at the bottom of the card, with the component side of the card facing the right. The modem's gold edge connector is offset so that the modem cannot be inserted incorrectly. Continue installing modem cards as necessary.
3. Connect one end of an RS232C Cable to the appropriate modem slot (DB25/25-pin connector-female) at the rear of rack. The other end of the RS232C cable is connected to the serial port of the computer.

Note: Any cables connected to the computer must be shielded to reduce interference.

4. Plug one end of the RJ11 cable provided with the modem into the rack's RJ11 connector (located on the back plane of the modem rack) and the other end into the phone-company-provided RJ11 or RJ11W modular phone jack.
5. Verify the remote modem's current configuration settings with your MT5600BR-V92 in terms of data compression, error correction, transmission rate, etc. (Refer to Chapter 4 for AT commands).
6. Make sure modem and computer/terminal serial port baud rates are adjusted.
7. Proceed to Chapter 3 of this manual, or to your data communications software manual for modem configuration.

Chapter 3 - Configuration

Configuring Your Software

Communications software must be configured to work with your modem, your computer, and the remote system it is calling. Fortunately, most communications programs make the process easy by providing a default *initialization string* for your modem as well as defaults for most of the other required parameters.

Configuring Software for Your Modem

Because remote computers may have different connection requirements such as speed, number of bits, parity, log-on sequences, etc., communications software is typically configured by *sessions*, each session having a unique configuration for a given connection (e.g., to an FTP site or commercial online service). Most communications programs, however, have a separate modem configuration menu because modem configurations rarely change from session to session.

The most important configuration is the modem *initialization string*. This is a sequence of commands the software uses to configure the modem when the communications software is loaded or when a session begins. Always begin the initialization string with the *Attention* command **AT**, then follow it with the modem reset command, **&F**. Issuing a reset command before other commands ensures that you are starting with a known state.

The rest of the commands in the initialization string depend on the capabilities of the modem and what you want it to do. Some older communications programs require you to create the initialization string by yourself. Most modern communications programs, however, provide you with a ready-made initialization string that is automatically selected when you choose your modem model from a list. It is a poor idea to use an initialization string intended for another modem, especially one from another manufacturer, because modem capabilities and command implementations vary from modem to modem. However, if your MT5600BR-V92 does not appear on a modem list, you may use the MultiModemII initialization string.

PC Initialization Strings

We recommend the following initialization string for a MT5600BR-V92 connected to a PC-compatible computer:

```
AT &F X4 S0=0 ^M
```

This string resets the MT5600BR-V92 to the factory default settings, selects extended result codes with *NO DIAL TONE* and *BUSY*, and turns off auto-answer. **^M** must end every string sent to the modem from software. It is the ASCII code for the RETURN key on most keyboards, and the default code for the carriage return character in the MT5600BR-V92 and most communications programs. The carriage return character is defined in the MT5600BR-V92 in S-register **S3**; if you change it, you must also change the carriage return character code used in your communications software. If you send a command directly to the modem in terminal mode rather than indirectly through communications software, you must end the command string by pressing the RETURN key (<CR>) instead of adding **^M** to the string.

Changing Default Parameters

The default values for the other parameters in modem configuration menus rarely need changing. They typically include the dialing prefix (**ATDT** for touch-tone service and **ATDP** for rotary service), the dialing suffix (**^M**), the hang-up string (**+++**) "Response" then (**ATH0^M**), and response messages (*RING, NO CARRIER, BUSY*, etc.). Communications software with a host mode might also include an auto-answer string (**AT S0=1^M**).

Macintosh Initialization

Macintosh computers cannot use RTS/CTS hardware flow control without a serial cable wired for hardware control. The Macintosh 128 and 512 models cannot use RTS/CTS flow control at all. For those Macintoshes turn off the default RTS/CTS hardware flow control, turn on XON/XOFF flow control, and ignore DTR:

AT &F X4 &k4 &D0 ^M

For hardware flow control, use the following initialization string:

AT &F X4 &K3 &D0 ^M

Add **S0=0** to both strings to disable auto-answer if the MT5600BR-V92 is on a voice line.

You can store the initialization string in nonvolatile memory. With your communications software open and connected to the modem's COM port, type the initialization string in the terminal window, substituting a carriage return for **^M**. To store the string, enter

AT &W0 <CR>.

Now you can initialize your modem with the following simple string:

AT Z ^M

Chapter 4 - AT Commands

A complete AT Commands, S-Registers, and Result Codes Reference Guide can be found on the MT5600BR-V92 CD and on the Multi-Tech Web site.

Fax Commands

Fax commands resemble AT commands, but are more complicated to use. Because of this, we recommend that you use a fax program to send and receive faxes rather than attempting to control the modem directly. Developers who need to know the fax commands for the MT5600BR-V92 can find Fax Class 1 and Fax Class 2 Reference Guides on the MT5600BR-V92 CD as well as the Multi-Tech Web site.

Chapter 5 - Warranty and Repairs

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), your telephone number, and if the product is out of warranty, a check or purchase order for repair charges.

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 [COMPANY/Programs/overnight_replacement](#) for details on rates and coverage's.

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 http://www.multitech.com/COMPANY/contact_us/

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), your telephone number, and if the product is out of warranty, a check in U.S. dollars drawn on a U.S. bank or your company's purchase order for repair charges. 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 the Multi-Tech products.

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>

Appendix A - Regulatory Compliance

FCC Part 68 Telecom

1. This equipment complies with part 68 of the Federal Communications Commission Rules. On the outside surface of this equipment is a label that contains, among other information, the FCC registration number. This information must be provided to the telephone company.
2. The suitable USOC jack (Universal Service Order Code connecting arrangement) for this equipment is shown below. If applicable, the facility interface codes (FIC) and service order codes (SOC) are shown.
3. An FCC-compliant telephone cord and modular plug is provided with this equipment. This equipment is designed to be connected to the telephone network or premises wiring using a compatible modular jack that is Part 68 compliant. See installation instructions for details.
4. The ringer equivalence number (REN) is used to determine the number of devices that may be connected to the telephone line. Excessive RENs on the telephone line may result in the device not ringing in response to an incoming call. In most, but not all, areas the sum of the RENs should not exceed 5.0. To be certain of the number of devices that may be connected to the line, as determined by the total RENs, contact the local telephone company.
5. If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice is not practical, the telephone company will notify you as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.
6. The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the operation of the equipment. If this happens, the telephone company will provide advance notice in order for you to make necessary modifications in order to maintain uninterrupted service.
7. If trouble is experienced with this equipment (the model of which is indicated below) please contact Multi-Tech Systems, Inc. at the address shown below for details of how to have repairs made. If the trouble is causing harm to the telephone network, the telephone company may request you remove the equipment from the network until the problem is resolved.
8. No repairs are to be made by you. Repairs are to be made only by Multi-Tech Systems or its licensees. Unauthorized repairs void registration and warranty.
9. This equipment should not be used on party lines or coin lines.
10. If so required, this equipment is hearing-aid compatible.
11. Manufacturing information:

Manufacturer:	Multi-Tech Systems, Inc.
Trade Name	MultiModem® II
Model Number:	MT5600BR-V92
FCC Registration No:	AU7USA32234--M5-E
Ringer Equivalence No:	0.4B
Modular Jack (USOC):	RJ11C
Service Center in USA:	Multi-Tech Systems, Inc. 2205 Woodale Drive Mounds View, MN 55112 U.S.A.

FCC Part 15

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.
- Plug 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.

This device complies with Part 15 of the FCC rules. Operation of this device is subject to the following conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference that may cause undesired operation.

WARNING: 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.

Fax Branding Statement

The Telephone Consumer Protection Act of 1991 makes it unlawful for any person to use a computer or other electronic device, including fax machines, to send any message unless such message clearly contains the following information:

- Date and time the message is sent
- Identification of the business or other entity, or other individual sending the message
- Telephone number of the sending machine or such business, other entity, or individual

This information is to appear in a margin at the top or bottom of each transmitted page or on the first page of the transmission. (Adding this information in the margin is referred to as *fax branding*.)

Since any number of fax software packages can be used with this product, the user must refer to the fax software manual for setup details. Typically the fax branding information must be entered via the configuration menu of the software.

Canadian Limitations Notice

Notice: The ringer equivalence number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the ringer equivalence numbers of all the devices does not exceed 5.

Notice: The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational, and safety requirements. The Industry Canada label does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations. Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment or equipment malfunctions may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Caution: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

Industry Canada

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement Canadien sur le matériel brouilleur.



EMC, Safety, and R&TTE Directive Compliance

The CE mark is affixed to this product to confirm compliance with the following European Community Directives:

- Council Directive 89/336/EEC of 3 May 1989 on the approximation of the laws of Member States relating to electromagnetic compatibility;
and
- Council Directive 73/23/EEC of 19 February 1973 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits;
and
- Council Directive 1999/5/EC of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity.

International Modem Restrictions

Some dialing and answering defaults and restrictions may vary for international modems. Changing settings may cause a modem to become non-compliant with the national telecom requirements in specific countries. Also note that some software packages may have features or lack restrictions that may cause the modem to become non-compliant.

New Zealand Telecom Warning Notice

- (1) The grant of a Telepermit for any item of terminal equipment indicates only that Telecom has accepted that the item complies with minimum conditions for connection to its network. It indicates no endorsement of the product by Telecom, nor does it provide any sort of warranty. Above all, it provides no assurance that any item will work correctly in all respects with another item of

Telepermitted equipment of a different make or model, nor does it imply that any product is compatible with all of Telecom's network services.

This equipment is not capable under all operating conditions of correct operation at the higher speed which it is designated. 33.6 kbps and 56 kbps connections are likely to be restricted to lower bit rates when connected to some PSTN implementations. Telecom will accept no responsibility should difficulties arise in such circumstances.

- (2) Immediately disconnect this equipment should it become physically damaged, and arrange for its disposal or repair.
- (3) This modem shall not be used in any manner which could constitute a nuisance to other Telecom customers.
- (4) This device is equipped with pulse dialing, while the Telecom standard is DTMF tone dialing. There is no guarantee that Telecom lines will always continue to support pulse dialing.

Use of pulse dialing, when this equipment is connected to the same line as other equipment, may give rise to 'bell tinkle' or noise and may also cause a false answer condition. Should such problems occur, the user should NOT contact the Telecom Faults Service.

The preferred method of dialing is to use DTMF tones, as this is faster than pulse (decadic) dialing and is readily available on almost all New Zealand telephone exchanges.

- (5) Warning Notice: No '111' or other calls can be made from this device during a mains power failure.
- (6) This equipment may not provide for the effective hand-over of a call to another device connected to the same line.
- (7) Some parameters required for compliance with Telecom's Telepermit requirements are dependent on the equipment (PC) associated with this device. The associated equipment shall be set to operate within the following limits for compliance with Telecom's Specifications:

For repeat calls to the same number:

- There shall be no more than 10 call attempts to the same number within any 30 minute period for any single manual call initiation, and
- The equipment shall go on-hook for a period of not less than 30 seconds between the end of one attempt and the beginning of the next attempt.

For automatic calls to different numbers:

- The equipment shall be set to ensure that automatic calls to different numbers are spaced such that there is no less than 5 seconds between the end of one call attempt and the beginning of another.

- (8) For correct operation, total of the RN's of all devices connected to a single line at any time should not exceed 5.

South African Statement

This modem must be used in conjunction with an approved surge protection device.

Other

The above country-specific examples do not cover all countries with specific regulations; they are included to show you how each country may differ. If you have trouble determining your own country's requirements, check with Multi-Tech's Technical Support for assistance.

Appendix B - Upgrading the Firmware

Introduction

Your modem is controlled by semi-permanent software, called *firmware*, which is stored in flash memory. Firmware is nonvolatile; that is, it remains stored in memory when the modem is turned off. However, it can be changed by either the manufacturer or the user as bugs are fixed or new features are added.

Since the firmware in your modem is stored in flash memory, you can upgrade it yourself in a few minutes by using the following procedures.

Upgrade Overview

The upgrade procedure consists of the following steps, which are described in greater detail in the following sections.

1. Identify the model number and firmware version of your modem.
2. Identify the current version of the firmware at the Multi-Tech Web site. If your modem already has the current firmware, there is no need to update it.
3. Download the upgrade file for your modem.
4. Extract the firmware .HEX file and the appropriate flash upgrade program from the file you downloaded.
5. Document and clear your stored parameters.
6. Upgrade the modem's firmware using the .HEX file and the flash upgrade program.
7. Restore your parameters.

Step 1 - Identify the Modem Firmware

You must know the model number and firmware version of your Multi-Tech modem to know whether or not you should update it.

1. Run your favorite terminal program. If you are using Windows, you can use HyperTerminal.
2. In the program's terminal window, type **AT&F**. Even if you cannot see the **AT&F** command on your screen, be sure to type it completely, and then press Enter. If the modem does not respond with *OK*, repeat the **AT&F** command.
3. Now type **ATi3**, press Enter and record your results. The firmware version should appear first in the response, which should look similar to the following:

```
ACF3_V1.702a_V90_P21_FSH
```


Step 2 - Identify the Current Firmware Version

Identify the current version of the firmware at the Multi-Tech Web site. If your modem already has the current firmware, there is no need to update it.

1. Using your favorite Web browser, go to <http://www.multitech.com/support/MultiModemII/firmware.asp>.
2. Scroll down the table to your modem model number.
3. Look at the firmware version number for your modem.
4. If the firmware version number matches the firmware version number found in “Step 1: Identify the Modem Firmware,” your modem has the current firmware version, and does not need to be updated.
5. If the firmware version number is greater than the firmware version number found in “Step 1: Identify the Modem Firmware,” your modem has an older firmware version. Continue with “Step 3: Download the Upgrade File.”

Warning: The first digit of the new firmware must match the first digit of the old firmware, or the modem may not work properly; e.g., if your current firmware version is 4.16, replace it only with 4.xx firmware, not 6.xx firmware.

Step 3 - Download the Upgrade File

1. If you are not already at the MultiModemII Firmware page of the Multi-Tech Web site, follow the procedure in “Step 2: Identify the Current Firmware.”
2. Download the upgrade file for your modem by clicking its name, and save the file in a temporary folder on your hard disk.
3. In the same section of the Web page, click the Flash Wizard utility for your operating system to download it, and save it in the same folder.

Step 4 - Extract the Upgrade Files

1. Install the Flash Wizard utility by double-clicking the file name in Windows Explorer.
2. Extract the upgrade files by double-clicking the file name. The extracted files include a .HEX file, which contains the upgrade data, and a Readme file.
3. Copy the upgrade .HEX file into the Flash Wizard folder, which, in a default installation, is at C:\Program Files\MultiTech Systems\Firmware Wizard\.

Step 5 - Clear Your Stored Parameters

Before you flash your modem, you should record the parameters that are currently stored in it, so you can reprogram it after flashing. After you have recorded them, send the **AT&F** command to the the modem to clear the stored parameters.

1. Run your favorite terminal program. If you are using Windows 98, Windows NT, Windows 2000, or XP you can use HyperTerminal.
2. In the program's terminal window, type **AT&V** and press Enter to list your modem's current parameters.
3. Record your parameters by saving the screens and sending them to your printer.
4. Type **AT&F** and press Enter to clear your stored parameters and reset your modem to factory default.
5. Close the terminal program.

Step 6 - Upgrade the Modem's Firmware

Before you begin the following procedure, read the README.TXT file extracted from the upgrade archive file. Note the file name for the boot code (e.g., F35ALOAD.S37) and the file name for the new firmware (e.g., BKQG300G.HEX).

WARNING: Never install an older version of firmware over a newer version. Doing this WILL DESTROY THE FLASH PROM! If the flash PROM is destroyed, the modem must be sent in for repair.

1. Run Flash Wizard by double-clicking its icon or file name, or by selecting it from the Start menu. The **Identifying Devices** dialog box is displayed as Flash Wizard locates and identifies the devices connected to your system.

Note: If the message *ERROR: No valid devices detected* is displayed, verify that the modem is turned on and that all cables are correctly and securely attached.

2. Click the modem to be upgraded, and then click **Next** to proceed.
3. Select the port to be upgraded from the **Port** list, select the appropriate .HEX file from the **Hex File** list, and then click **Next** to continue.

Note: Do not use FLASHLDR.HEX. This file is used internally by Flash Wizard.

4. The **Progress** dialog box appears, showing a status bar that indicates the progress of the upgrade.

Caution: Any disruption of the program during this stage of the upgrade can cause your modem to become inoperable. Wait for the **Next** button to become active before proceeding.

5. When the flash upgrade is complete, the message *Programming Complete* appears. Click **Next** to continue.
6. The **Results** dialog box appears next. Click **Finish** to exit Flash Wizard.

Step 7 - Restore Your Parameters

Your modem has been updated. You can now open your terminal program to reprogram your modem parameters or to confirm the update by typing **AT!3** in the terminal window and pressing Enter.

Appendix C - ASCII Conversion Chart

CTRL CODE	HEX	DEC	CODE	HEX	DEC	CODE	HEX	DEC	CODE	HEX	DEC	
@	NUL	00	0	SP	20	32	@	40	64	`	60	96
A	SOH	01	1	!	21	33	A	41	65	a	61	97
B	STX	02	2	"	22	34	B	42	66	b	62	98
C	ETX	03	3	#	23	35	C	43	67	c	63	99
D	EOT	04	4	\$	24	36	D	44	68	d	64	100
E	ENQ	05	5	%	25	37	E	45	69	e	65	101
F	ACK	06	6	&	26	38	F	46	70	f	66	102
G	BEL	07	7	'	27	39	G	47	71	g	67	103
H	BS	08	8	(	28	40	H	48	72	h	68	104
I	HT	09	9	)	29	41	I	49	73	i	69	105
J	LF	0A	10	*	2A	42	J	4A	74	j	6A	106
K	VT	0B	11	+	2B	43	K	4B	75	k	6B	107
L	FF	0C	12	,	2C	44	L	4C	76	l	6C	108
M	CR	0D	13	-	2D	45	M	4D	77	m	6D	109
N	SO	0E	14	.	2E	46	N	4E	78	n	6E	110
O	SI	0F	15	/	2F	47	O	4F	79	o	6F	111
P	DLE	10	16	0	30	48	P	50	80	p	70	112
Q	DC1	11	17	1	31	49	Q	51	81	q	71	113
R	DC2	12	18	2	32	50	R	52	82	r	72	114
S	DC3	13	19	3	33	51	S	53	83	s	73	115
T	DC4	14	20	4	34	52	T	54	84	t	74	116
U	NAK	15	21	5	35	53	U	55	85	u	75	117
V	SYN	16	22	6	36	54	V	56	86	v	76	118
W	ETB	17	23	7	37	55	W	57	87	w	77	119
X	CAN	18	24	8	38	56	X	58	88	x	78	120
Y	EM	19	25	9	39	57	Y	59	89	y	79	121
Z	SUB	1A	26	:	3A	58	Z	5A	90	z	7A	122
[	ESC	1B	27	;	3B	59	[	5B	91	{	7B	123
\	FS	1C	28	<	3C	60	\	5C	92	|	7C	124
]	GS	1D	29	=	3D	61	]	5D	93	}	7D	125
^	RS	1E	30	>	3E	62	^	5E	94	~	7E	126
_	US	1F	31	?	3F	63	_	5F	95	DEL	7F	127

NUL	Null, or all zeros	VT	Vertical Tab	SYN	Sync.
SOH	Start of Header	FF	Form Feed	ETB	End Transmission Block
STX	Start of Text	CR	Carriage Return	CAN	Cancel
ETX	End of Text	SO	Shift Out	EM	End of Medium
EOT	End of Transmission	SI	Shift In	SUB	Substitute
ENQ	Enquiry	DLE	Data Link Escape	ESC	Escape
ACK	Acknowledge	DC1	Device Control 1	S	File Separator
BEL	Bell or Alarm	DC2	Device Control 2	GS	Group Separator
BS	Backspace	DC3	Device Control 3	RS	Record Separator
HT	Horizontal Tab	DC4	Device Control 4	US	Unit Separator
LF	Line Feed	NAK	Negative Acknowledge	DEL	Delete

Appendix D – Waste Electrical and Electronic Equipment (WEEE)

The WEEE directive places an obligation on manufacturers, distributors and retailers 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 being sold into the EU as of August 13, 2005. Manufacturers, distributors and retailers 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 the user's 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 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 the seller from whom you purchased the product.



Index

Symbols

33.6K bps 5

A

ASCII code 14
 ASCII Conversion Chart 26
 AT 14
 Auto-answer 14, 15

B

Busy Out 12

C

Canadian regulations 20–27
 Class 1.0 7
 Class 2.1 fax 5
 Command string 14
 Commands
 Attention code 14
 Modem reset 14
 CTS signal 15

D

Data Rates 7
 Data Rates (modem) 7
 Datacomm software 14
 Configuration 14
 DIP-Switch options 10
 DTR signal 15

F

Fax Commands 16
 FCC regulations 19–27
 Features
 Fax 5
 Firmware updating 23
 Flash Wizard utility 23
 Flow control 15

I

Industry Canada regulations 20–27
 Initialization strings 14, 15
 Macintosh 15
 PC-compatible 14
 Installation 11

ITU-T 7
 ITU-T “Super” Group 3 7
 ITU-T V.21 7
 ITU-T V.34 fax 5
 ITU-T V.42 7
 ITU-T V.44 7
 ITU-T V.80 7
 ITU-T V.92 protocol 5

M

Macintosh computer 15
 Model Numbers 7

O

Ordering Replacement Parts 18

P

Pacing 15
 Parameters 14, 15
 Changing defaults 15
 Parity 14
 PC Board Controls 10

R

Regulatory Compliance 19–27
 Replacement Parts 18
 Result codes 14
 Return character 14
 RTS signal 15
 RTS/CTS 7

S

S-Registers
 S3 14
 safety 9
 Serial cable 15
 servicing your modem 19
 Sessions 14
 Super G3 5

T

TIA/EIA 578 Class 1,2 7
 TR29.2 7

V

V.17 7
 V.22 7
 V.22bis 7
 V.27ter 7
 V.29 7
 V.3 7

V.32 7
V.34 7
V.34 enhanced 7
V.34bis 7
V.42 7
V.42bis 7
V.44 7
V.90 7
V.92 7

W

warranty 19

X

XON/XOFF 7, 15