CONTROL TECHNOLOGY CORPORATION

5200 Remote Administration Guide

5200 Remote Administration Guide

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The information in this document is current as of the following Hardware and Firmware revision levels. Some features may not be supported in earlier revisions. See www.ctc-control.com for the availability of firmware updates or contact CTC Technical Support.

Model Number	Hardware Revision	Firmware Revision
5200	All Revisions	>= 5.00.31

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CHAPTER

1

Introduction

This document introduces some of the remote administrative features of the 5200 controller. This includes both FTP and Telnet along with details on how to remotely re-flash any firmware within the controller. It is assumed that the user has read the *Model 5200 Script Language Guide (Document 951-520003)*. If not, it is advised that this manual be kept handy since script commands are executed using Telnet. A general overview of the resident Flash Disk is also provided along with a discussion on how to replace the Quickstep firmware using a serial connection when Ethernet is not available.

For a full graphical browser based interface, it is suggested that WebMON (*WebMON 2.0 User's Guide, Document 951-520012)* be used. WebMON may be executed within an Internet Explorer browser and is written in java. This manual is meant for situations where WebMON type capabilities are required but for some reason access to the resident HTTP web server can not be made or is restricted for security reasons.

Remote Administration Features Overview

With the release of 5200 firmware revision 5.00.31 and above, a number of features are available or have been enhanced. Those relevant to this manual are:

- ***Flash Disk***
  - PC like file structure.
  - Support for multiple flash disks.
  - Virtual directory remapping, allows pseudo-names to be assigned to other directories and disks and mapped as sub-directories on another drive.
  - Automatic mounting of multiple drives for access, UNIX like mount/umount commands.
  - Ability to re-assign root directory to any drive.
  - Support for both FLASH and NV-RAM drives.
  - Structured support and storage for firmware flash updates.
  - Quickstep program storage and dynamic loading.
  - Large Recipe storage area.
  - Accessibility via Quickstep, FTP and/or Telnet
  - Standard disk drive utilities

  - Thermocouple table storage allowing for field updates of newly supported thermocouple devices.
- ***Script language***
  - Powerful commands to initialize registers, load programs, configure the system
  - Executable from within Quickstep
  - Executable from Telnet and FTP command line
  - Executable at power up or reset
  - Executable from within other script files
- ***Remote diagnostics and updates***
  - Remote firmware updates via WebMON, FTP and Telnet. All firmware field upgradeable.
  - Quickstep firmware update via serial port.
  - Module firmware can be stored to flash disk for later updates.
  - Can determine contents of 5200 modules via WebMON or Telnet along with version info.
  - Low level logging and debug functions for CTC remote field support (UDPTerm).
  - Reference the WebMON manual for a full graphical, browser based environment.

CHAPTER

2

FTP and Telnet Connections

The 5200 controller supports remote client connections for FTP and Telnet. These are both industry standard protocols available on most computer platforms. Dependent on firewall settings, these protocols can be used to access a 5200, virtually anywhere in the world.

FTP Server Interface

The File Transfer Protocol FTP is a significant Internet standard for file transfer. The current specification is contained in RFC-959. The 5200 operates as an FTP Server listening on TCP port 21. Both Active and Passive modes are supported to aid in firewall support. A sub-set of the RFC standard is implemented for operation in a control environment, with a minimum file system. As detailed in Section 3, a flash disk is resident within the 5200. The primary means to transfer data to and from the 5200 is via FTP. You can download, delete, or transfer files to and from the controller and have the support of a directory architecture that resembles that found on typical computer systems.

Supported FTP Commands

The following FTP commands are supported by the 5200:

`cd`- Change to a different directory.

`delete`- Delete a file.

`dir` - Displays a directory and the amount of flash memory that is available, used up, or deleted.

`get` - Copies a file from the 5200 to a local directory on your computer. Example: `get filename.ext`

`ls` - Lists files in the current directory. `"ls -l"` is equivalent to the **`dir`** command.

`ls "!<cmd>"` – Invokes a Script Language command.

mget - Copies multiple files from the 5200 to a local directory on your computer. Wild cards are limited to files with the same file extension. For example, `mget *.html` copies all .html files from the 5200's directory to your local directory.

mkdir - Creates a new directory inside the current 5200 directory.

mput - Copies multiple files to the 5200 from a local directory on your PC. Wild cards are limited to files with the same file extension. For example, `mput*.html` copies all .html files from your local directory to the 5200's directory.

put - Copies a file from a local directory on your computer to the 5200. Example: `put filename.ext`

pwd - Displays the current directory on the 5200.

quit - Quit the FTP session.

recv - This command functions the same as **get**.

rmdir - Remove directory.

send - This command functions the same as **put** (only binary file transfers are supported).

Active Connections

In active mode FTP the client connects from a random port (> 1024) to the FTP server's command port, port 21. Then, the client sends the FTP command *PORT* to the FTP server. The *PORT* command tells the server what port on the client to connect back to, from its local port. Typically the server will use port 20 for data connections but if that port is already in use by another session, a free port in the range of 40000 – 40640 is used.

From the server-side firewall's standpoint, to support active mode FTP the following communication channels need to be opened:

- FTP server's port 21 from anywhere (Client initiates connection)
- FTP server's port 21 to ports > 1024 (Server responds to client's control port)
- FTP server's port 20 (or 40000 – 40640, if 20 is in use) to ports > 1024 (Server initiates data connection to client's data port)
- FTP server's port 20 (or 40000 – 40640, if 20 is in use) from ports > 1024 (Client sends ACKs to server's data port)

Passive Connections

In order to resolve the issue of the server initiating the connection to the client a different method for FTP connections was developed. This was known as passive mode, or `PASV`, after the command used by the client to tell the server it is in passive mode. This is the default mode for Internet Explorer.

In passive mode FTP the client initiates both connections to the server, solving the problem of firewalls filtering the incoming data port connection to the client from the server. When opening an FTP connection, the client opens two random ports locally. The first port contacts the server on port 21, control port, but instead of then issuing a *PORT* command and allowing the server to connect back to its data port, the client will issue the *PASV* command. The result of this is that the server then opens a random port (40000 – 40640) and sends a command back to the client instructing it what port the server will be waiting on. The client then initiates the connection to the server to transfer data (in Active mode the Server initiated the connection).

From the server-side firewall's standpoint, to support passive mode FTP the following communication channels need to be opened:

- FTP server's port 21 from anywhere (Client initiates connection)
- FTP server's port 21 to ports > 1024 (Server responds to client's control port)
- FTP server's ports, 40000 – 40640, from anywhere (Client initiates data connection to random port specified by server)
- FTP server's ports, 40000 – 40640, to remote ports > 1024 (Server sends ACKs (and data) to client's data port)

Establishing FTP Connections

FTP is shipped standard with UNIX and Windows products. On Windows systems it is typically invoked from the command line, although graphical interfaces are also available, including Internet Explorer. When invoked from the command line the user will be prompted for a user ID and a password. To start an FTP connection from the command line, simply type the following, substituting the desired controller IP address for the sample given:

```
ftp 12.40.53.200
```

The user will then be prompted for a Username and Password. The default shipping ID/Password is admin/BlueFusion, as shown below (Script Language `set password` command allows the changing of the password):

```
User: admin
Password: BlueFusion
```

Note that in most systems the password will not be echoed to the screen for security reasons. Failure to enter the proper User ID and Password will result in disconnection.

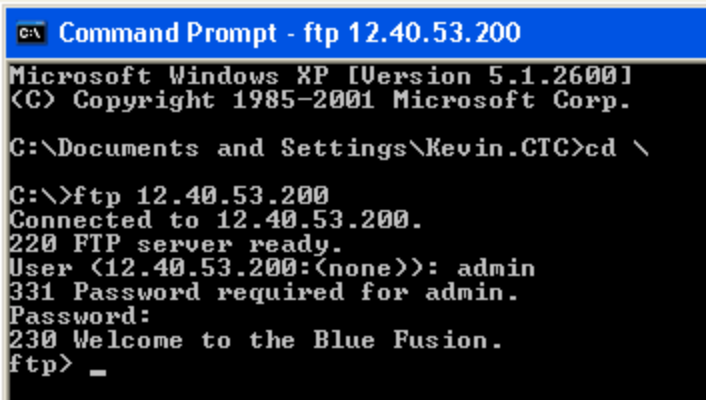


Figure 2.0: Typical FTP Windows command line session

The command line always defaults to Active FTP Connections while Internet Explorer defaults to Passive FTP Connections. If connection problems occur and a firewall is present it is recommended that both versions be tried to verify whether the firewall is blocking the required ports.

FTP can also be run through Microsoft Internet Explorer. The url for an FTP connection to a Blue Fusion controller would be:

ftp://userid:password@ipAddress
Or as an example:
ftp://admin:BlueFusion@12.40.53.201

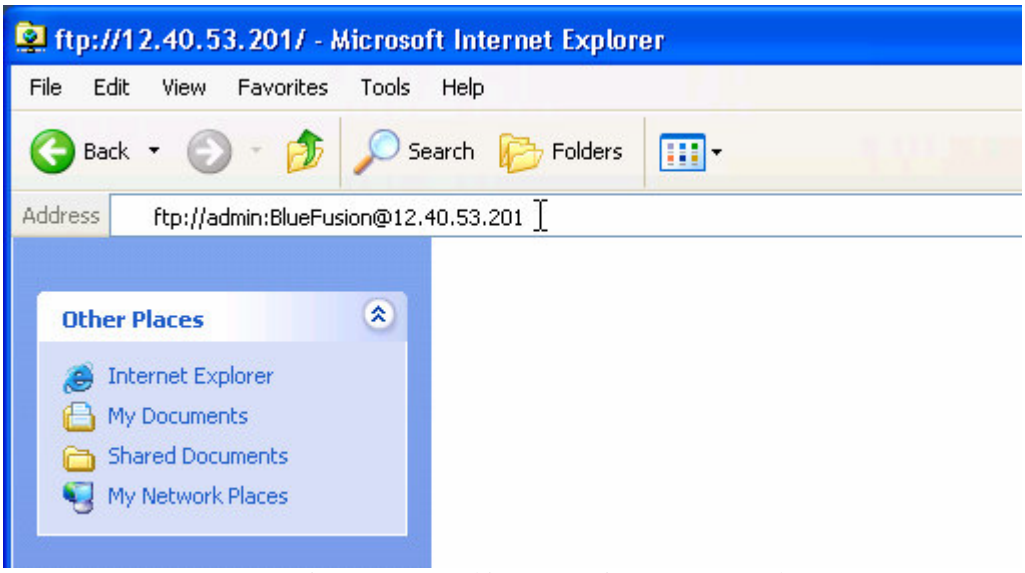


Figure 2.1: Invoking FTP using Internet Explorer

Hitting the <Enter> key would cause FTP access to the 5200:

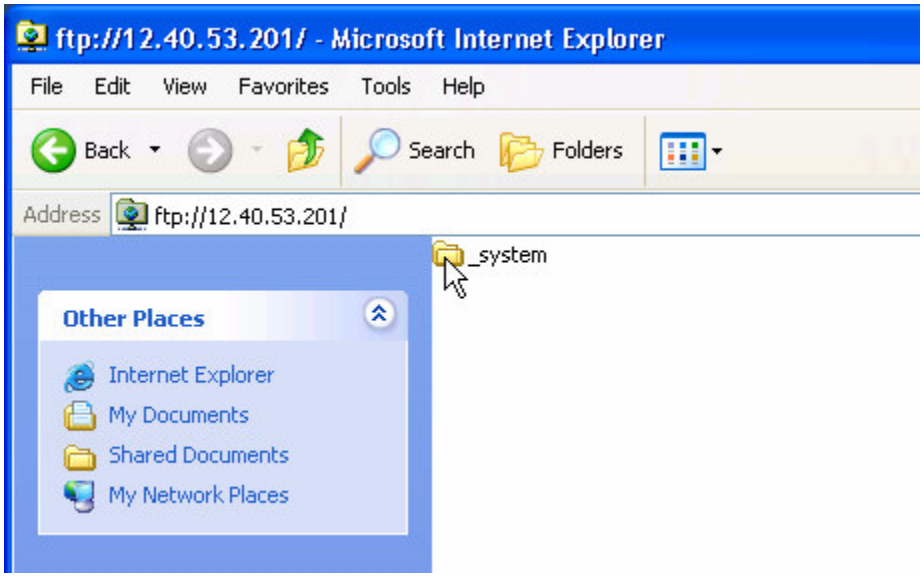


Figure 2.2: Root directory of Blue Fusion after initial connection

Double clicking the `_system` folder would display the lower level folders:

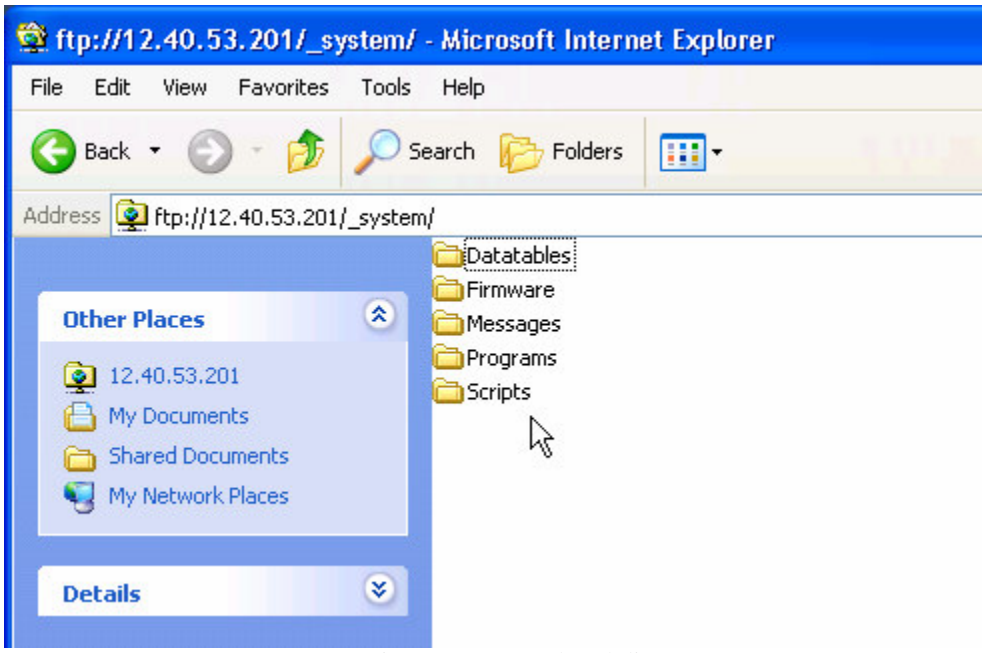


Figure 2.3: Sample subdirectory

To protect your password, it may be best to only enter the user ID as the URL within Microsoft Internet Explorer. Anonymous logons are not accepted. An example using Windows XP appears below.

ftp://userid @ipAddress
or as an example:

ftp://admin @12.40.53.201

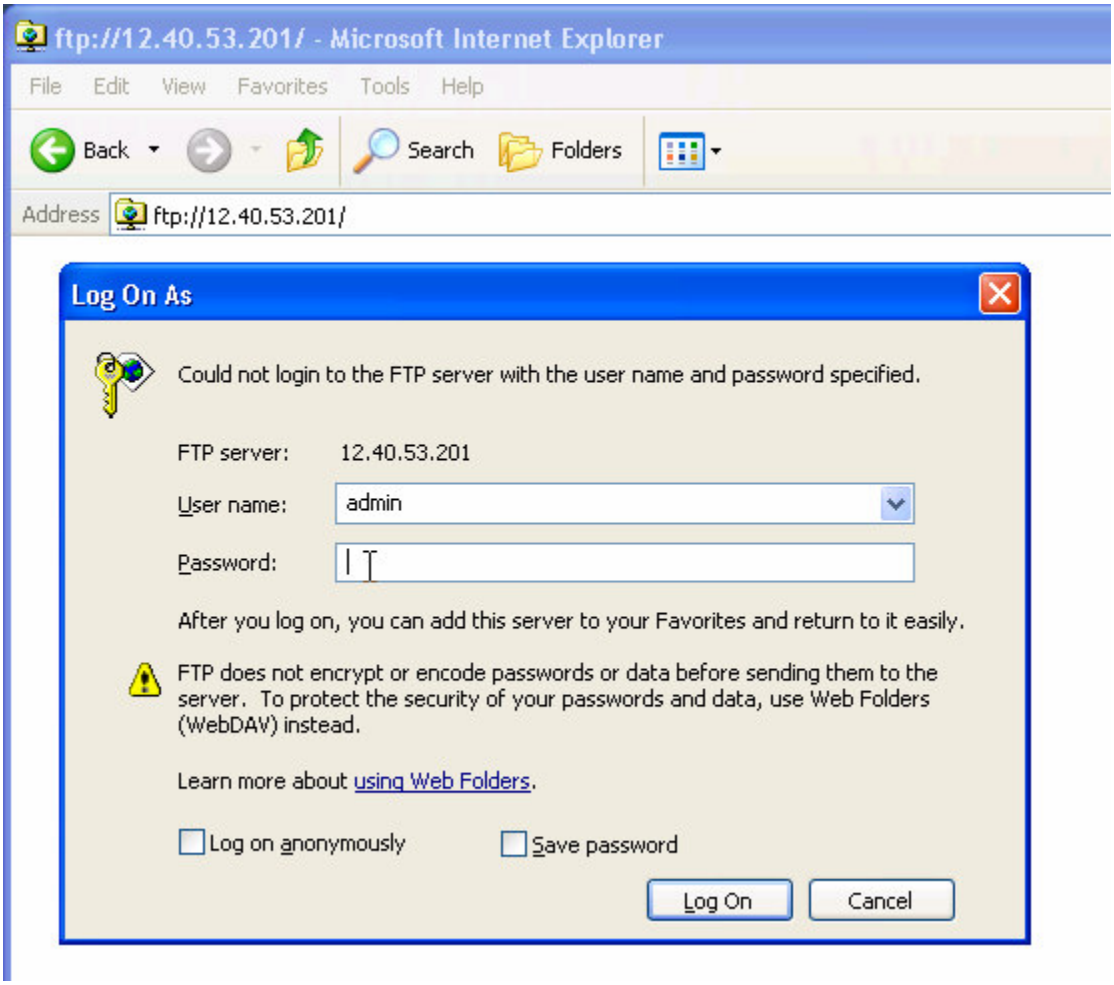
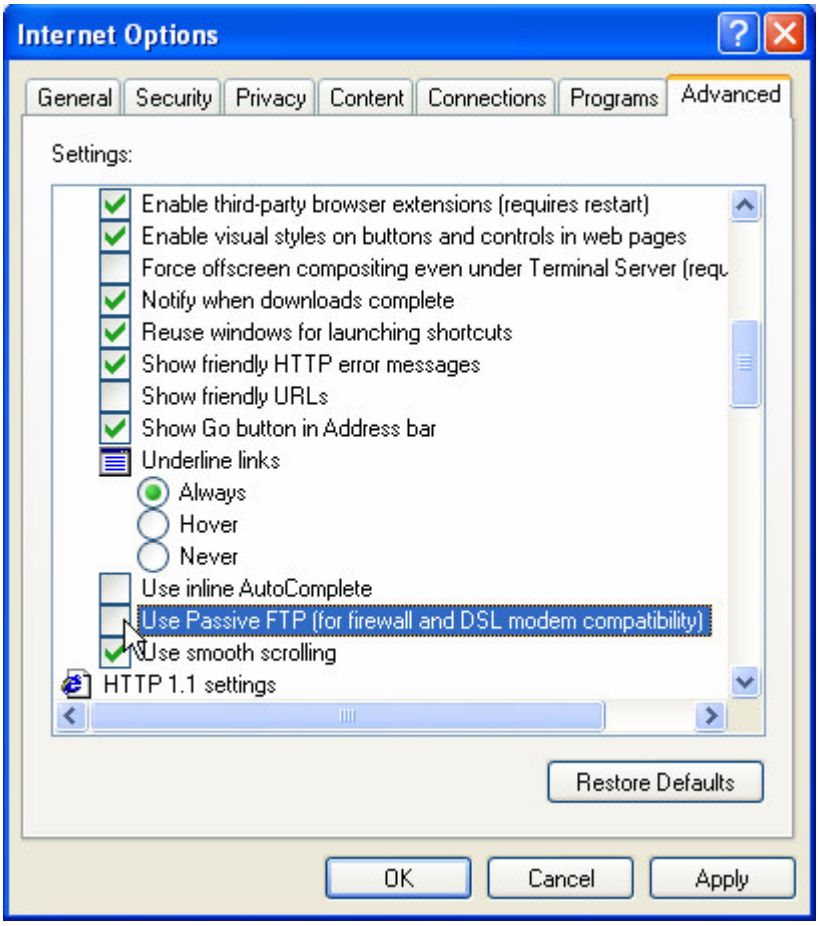


Figure 2.4: Login screen within Internet Explorer

Once connected in Explorer, you can move through the controller's file system the same way as you can your local computer. To copy files from the PC to the controller or controller to the PC, simply drag and drop the file to the target folder. Note that if you drag and drop on top of a folder, it goes into that folder, automatically creating any subfolders. When directed to drag and drop things to the root directory that means on the white space beneath any listed directories, not on top of the _system directory. Files may be dragged and dropped individually, in groups, or even as a full directory tree. Files that already exist will be overwritten.

Should a problem occur and Internet Explorer does not appear to work it may be due to its default of Passive FTP Connections and firewall problems. Internet Explorer can also be configured for Active FTP Connections by accessing the "Internet Options" dialog box, Advanced Tab. Simple de-select the Passive mode which appears in the list:



Telnet Interface

The 5200 supports a full Telnet administrative interface. Telnet is a standard Internet remote login application protocol (RFC-854) which is available on most computer platforms. The 5200 Telnet server listens for connections on the standard port 23. A number of computer interfaces exist, both graphical and command line. Microsoft Windows products ship with a command line interface that can be invoked by typing telnet at a Command Prompt. Available commands may be displayed by typing help. Once invoked:

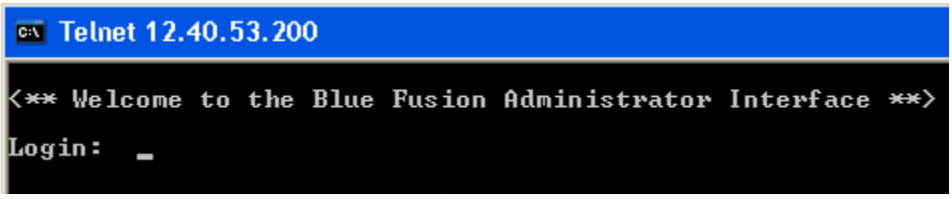


Figure 2.5: Windows Telnet screen

Typically all that is required is typing “telnet” and the ip or dns name of the desired 5200 controller. For example, typing `telnet 12.40.53.200` displays the screen shown below for a 5200 whose ip address is 12.40.53.200:

```
Command Prompt - telnet
Welcome to Microsoft Telnet Client

Escape Character is 'CTRL+]'

Microsoft Telnet> help

Commands may be abbreviated. Supported commands are:

c     - close                    close current connection
d     - display                  display operating parameters
o     - open hostname [port]     connect to hostname (default port 23).
q     - quit                     exit telnet
set   - set                      set options (type 'set ?' for a list)
sen   - send                     send strings to server
st    - status                   print status information
u     - unset                    unset options (type 'unset ?' for a list)
?/h   - help                     print help information
Microsoft Telnet> _
```

Figure 2.6: Telnet login screen for 5200 controller

Graphical Telnet programs are also available. One example is from FoxIT Software, Koala. Another would be WS_FTP from Ipswitch (www.ipswitch.com). The URL for FoxIT Software is:

http://www.foxitsoftware.com/mkt/kt_intro.php

Once a Telnet screen is invoked and User Login and Password (admin/BlueFusion as with FTP) sequence satisfied, numerous commands are available. These commands are detailed in the *5200 Script Language Guide (Document 951-520003)*. Each Script Language command is also accepted within FTP (`ls "!<cmd>"`), Telnet, or as the contents of a script file. Below is the Koala screen showing the "help" screen display:

```
set
*   datatable <filename>    -> Save datatable to /_system/Datatables/<filename>
    date Tuesday, 12/6/2003 8:55:00 -> Set real time clock time/date (24hr)
*   password <password>     -> Set new password to restrict access
    register <####> = <###> -> Set register values
    Examples: set register 13002=0
              set register 13002-13006=0, 20000=5, 20005-20010=12
    reset                   -> Set Quickstep reset System state.
    restart                 -> Set Quickstep restart System state
    running                 -> Set Quickstep running System state
    stop                    -> Set Quickstep restart System state
    throttles               -> Set comm. throttling to control performance
<#####>=<##>                -> same as 'set register'
update
       comm   -> Update 5102 Comm. processor /_system/Firmware/comm.bin
       sticks -> Update all sticks to revision level in /_system/Firmware.
       5130   -> Update 5130 Analog stick with /_system/Firmware/5130.bin
       5140   -> Update 5140 Servo stick with /_system/Firmware/5140.sr
       5150   -> Update 5150 Servo stick with /_system/Firmware/5150.sr

(* = not implemented)
[quit or logout to exit telnet session]

BlueFusion/>
```

Figure 2.7: Telnet graphical screen displaying help commands for 5200 controller

```
12.40.53.200 - KoalaTerm 3.4 - [default.mkt : Connection to 12.40.53.200]
Connection  Edit  View  Window  Print  Transfer

<** Welcome to the Blue Fusion Adminstrator Interface **>

Login:  admin
Password:  **********

BlueFusion/>help
<** Blue Fusion Administrator Help Summary V1.10 **>

[quit or logout to exit telnet session]

cd <directory>          -> Change directory to that specified ../. works to.
delete <filename>       -> Delete a file. <path/filename> also legal.
dir <opt. directory>    -> List all the files in the specified directory.
disable
        debugger        -> Disable debugger commands.
        safe            -> Allow Quickstep tasks to continue execution.
enable
       debugger         -> Enable debugger commands.
       safe             -> Halt Quickstep tasks when complete next step.
format flash            -> Erase flash disk, restoring full space
get
*   datatable <filename>    -> Load dtable /_system/Datatables/<filename>
    date (get optional)     -> Display real time clock time/date
    register <####>         -> Read one or more registers
    register <####> > <filename>-> Read registers and write to output file
    Examples: get register 13002
              get register 13002-13006, 20000, 20005-20010 > script.ini
    status                  -> Get current program state
    throttles               -> Display comm. throttle table
    versions                -> Display all firmware versions and stick info
<#####>                     -> same as 'get register'
mkdir <directory>           -> Make a new directory.
pwd                         -> Display current directory path.
reset                       -> Reset the controller
```

Figure 2.8: Telnet graphical screen displaying help commands for 5200 controller, cont'd

As can be seen from above, there is an extensive assortment of commands. The above does not include the low level debug functions available for advanced users, which are displayed in *Figure 2.9*. Refer to the *5200 Script Language Guide (Document 951-520003)* for more information in this regard.

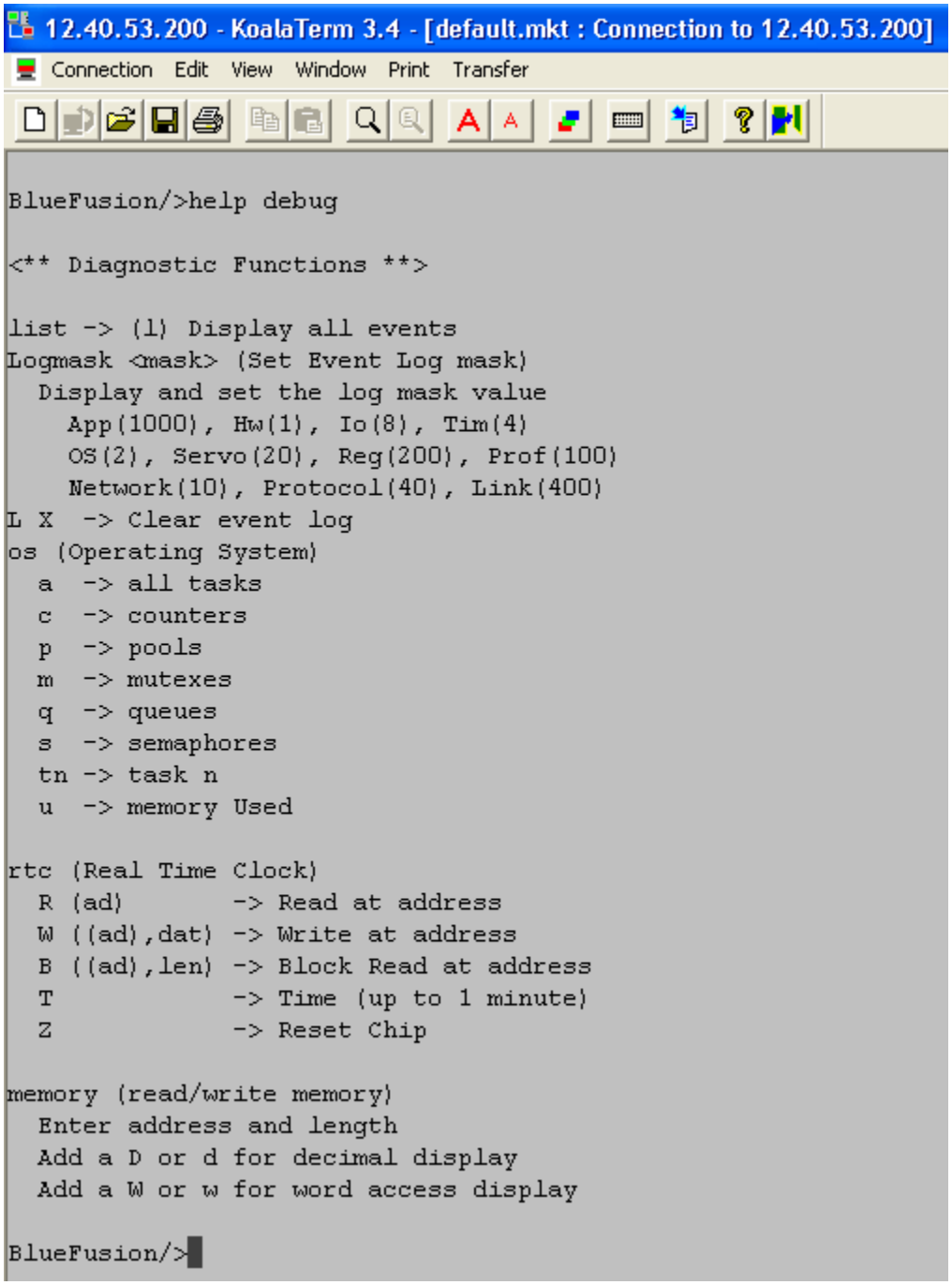


Figure 2.9: Telnet graphical screen displaying low level debug commands

CHAPTER

3

Flash Disk

A standard flash disk, with approximately 900K usable bytes (not including WebMON), is shipped standard on all 5200 products. Optionally, larger flash storage may be purchased, up to 56M. The disk appears much like that of your typical personal computer; in fact, many of the standard commands of MS-DOS™ are available for administration via Telnet. Simplified administration can be done using a number of low cost shareware FTP programs, such as FTP Voyager (11.1 or greater), http://www.ftpvoyager.com. Below is a typical FTP session using a graphical user interface. Internet Explorer may also be used (section 2) and files dragged and dropped as required from your desktop. The benefit of FTP Voyager is you can monitor what is actually occurring should problems occur. Lower left window, figure 3.0 displays status information during file transfers and system commands.

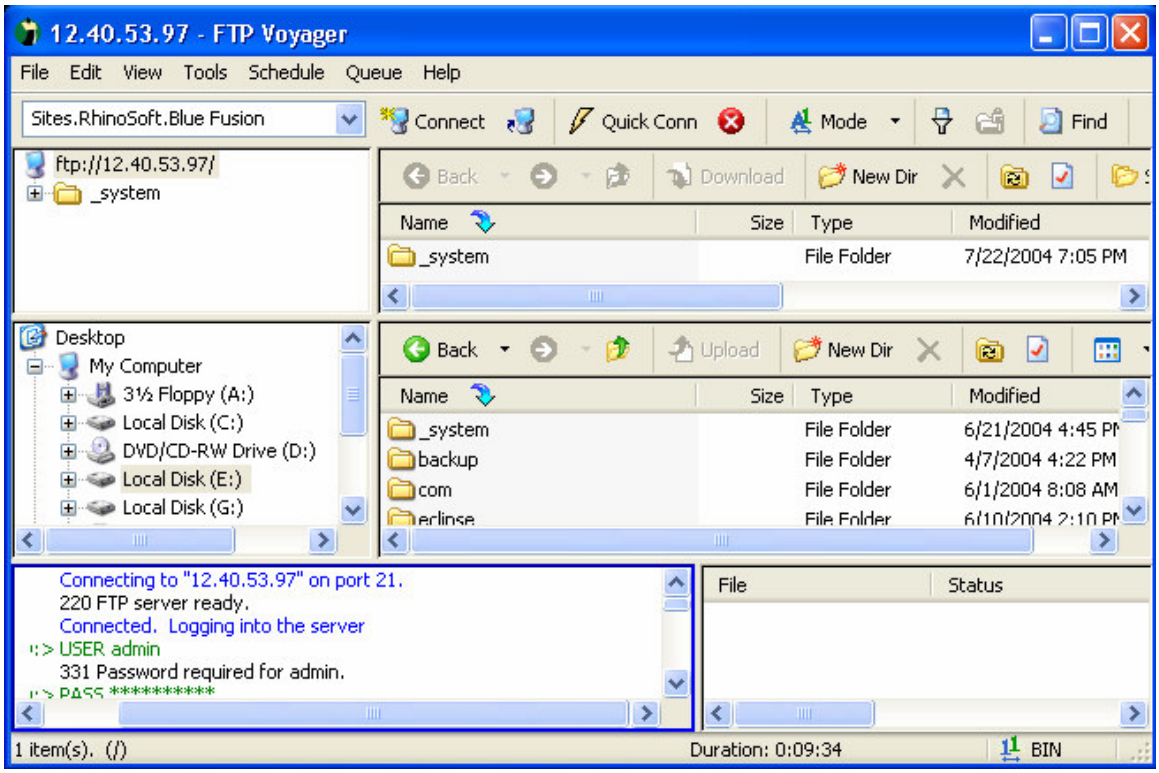


Figure 3.0: Typical FTP graphical session (FTP Voyager)

General usage and configuration is beyond the scope of this document but as a brief introduction, it functions much like a typical PC Windows program where the top two window regions are for the remote 5200 device, the middle two are your local hard disk, and the bottom two are for display only showing current operations, command status and file transfers. Typically the left window region (top two) is for directory tree information and the right two is for sub-directory and file operations, exactly like Windows Explorer. Note that when installing FTP Voyager, do not use PASV mode. You will be prompted for this during and it is the default.

The flash disk is made up of a reserved `_system` directory created at the root of the drive; within this folder are a number of other subdirectories with special functionality.

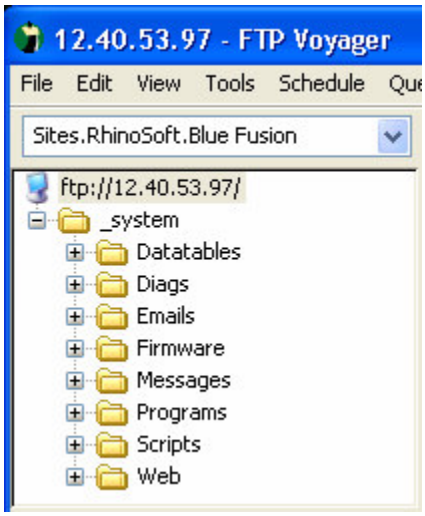


Figure 3.1: Graphical system directory representation

```
ftp> dir
200 PORT command successful.
150 Opening ASCII mode data connection for directory "/_system/"
drw-rw-rw-  1 owner group 000256 JUL 22 19:05 Datatables
drw-rw-rw-  1 owner group 000000 JUL 22 19:05 Diags
drw-rw-rw-  1 owner group 000000 JUL 22 19:05 Emails
drw-rw-rw-  1 owner group 000000 JUL 22 19:05 Firmware
drw-rw-rw-  1 owner group 000000 JUL 22 19:05 Messages
drw-rw-rw-  1 owner group 000000 JUL 22 19:05 Programs
drw-rw-rw-  1 owner group 000000 JUL 22 19:05 Scripts
drw-rw-rw-  1 owner group 000000 JUL 22 19:05 Web
226 Volume:  Capacity - 3839760  Free - 1487040  Deleted - 1256160.
ftp: 439 bytes received in 0.00Seconds 439000.00Kbytes/sec.
ftp> _
```

Figure 3.2: Command line

Sub-Directories:

- `Datatables` – Thermocouple tables (Thermocouples.tbl) reside here and future loadable data tables.

- *Diags* – Diagnostic parameters used by WebMON are stored within this directory. Allows symbolic debugging and the sharing of monitoring information.
- *Emails* – Email (.email) configuration files are located within this directory. WebMON automatically creates and publishes them.
- *Firmware* – All modules, monitor, and communications firmware that are to be loadable using the `update` command must be located here (see Section 4.0).
- *Messages* – The *message.ini* file, for formatted output messages, must be stored here (refer to *5200 Script Language Guide* for details of its use).
- *Programs* – All Quickstep and 'C' loadable User programs (.dso and .sr1 files) should be placed here if they are to be run from scripts or Telnet commands using the `run program qsprog.dso` type command.
- *Scripts* – All system scripts and .ini files except messages should be placed in this sub-directory.
- *Web* – Root directory for the resident HTTP web server is located under this directory. All web pages should be published below this directory, including WebMON, jar files, and CT-HMI.

Disk administrative tasks can be generally done either via FTP or Telnet, supporting the standard `dir`, `cd`, `mkdir`, `rmdir`, `delete`, and `type` commands. Directory references use the forward slash '/', as in UNIX, not the backward slash as in MS-DOS™, in order to be compliant with standard FTP programs. Also note that all filenames are case sensitive and you are limited to 79 characters total for directory and filenames, combined.

When using the FTP graphical approach, right clicking the mouse on the relevant window typically allows you to create your own subdirectories, while dragging and dropping a file to a folder causes a transfer to occur and the file to be stored to the flash disk.

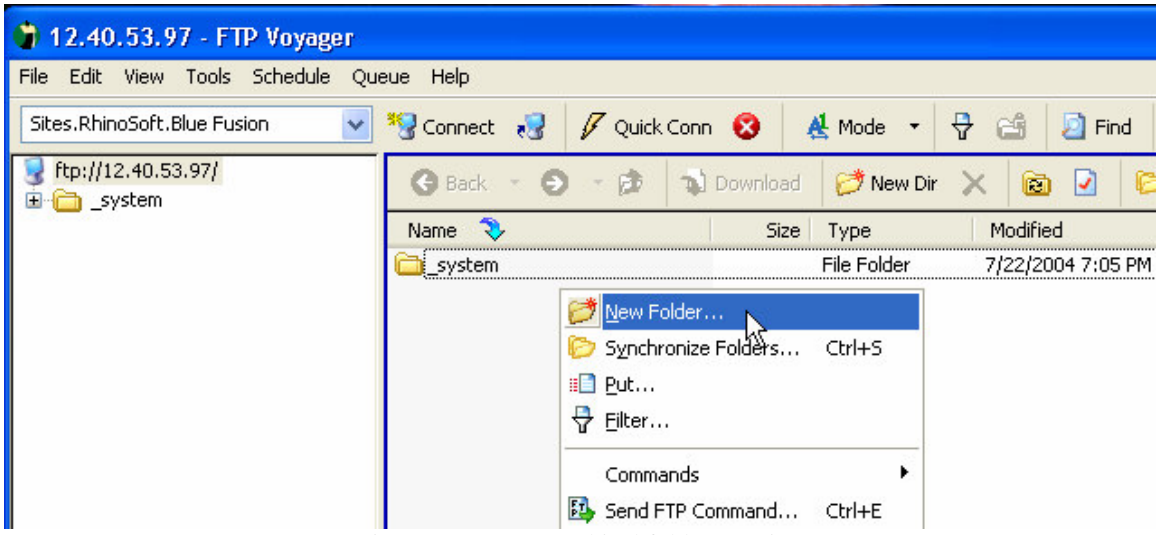


Figure 3.3: FTP graphical folder creation

The only exception to this is dragging and dropping either a firmware update or a Quickstep program (`.dso`, `.sr`, `.sr1`, and `.bin` file extensions), to the root directory "/" will cause that file to be cached in dynamic ram instead of written to the flash disk and then immediately activated upon complete transfer. If it is a Quickstep program, the system will be stopped, the program loaded into non-volatile memory, and restarted with the new program, if a firmware update, `.sr`, `.sr1`, or `.bin` file, the appropriate update will be applied. Refer to the firmware update section for any special system resetting required, since VBIAS is turned off during an update to ensure system safety. A Telnet `reset` command must be initiated to reboot the system properly.

The flash disk must be periodically re-formatted if files are deleted often. Deleted files are marked as deleted but reclaiming their space and erasing flash is typically much too time consuming in a real-time control environment. As such, the Telnet administrative session or a script file can be setup to execute the `format flash` command whenever needed. One nice feature about most graphical FTP programs is they allow for directory synchronization. This means if you keep a backup of your files at the PC you simply have to tell the software to synchronize the folders and all data will be restored after a format. The available disk space may be displayed at any time by using the `dir` command within a Telnet or FTP session. The amount of space consumed by deleted files will also be shown. Refer to *Figure 3.2*, next to the last line where it referenced "Deleted 1256160", which refers to the number of bytes currently wasted by deleted files.

As with anything that is flash based, the technology is limited to the number of write operations you can perform before it is no longer useable. Due to this limitation you should not perform continual writing to flash from within a program. It is really meant to be written to a limited number of times and read as often as you like. Even with this limitation, it is rather large: you typically have up to 100,000 erase cycles before you can expect errors to occur. This should be more than sufficient for any operation. Note that when transferring Quickstep files to the system root directory, no flash write operations occur, the application programs are stored directly to non-volatile, battery backed RAM.

Multiple Disks

The 5200 supports numerous memory options. The base unit consists of a 1 Meg user flash disk (default). The web based WebMON administrative software occupies most of this space. Should the user require more space than is available for their application they can either reformat the drive, thereby deleting WebMON, or purchase additional flash. The main system board supports up to 22 Meg, or up to two memory expansion boards can be installed, each supporting 16 Meg, as well, for a total of 56 Meg, including the base memory.

Utilities are provided within WebMON, as well as Telnet, to manage the mounting of disk drives. The script command "mount" is used to add a drive, "umount" to remove that drive.

Mount Disk

Mount [Address] [Size] [Name]

Address – This is the Hex address the disk is to be created within memory. It must start with '0x' and consist of 8 hex characters following. For example: 0x02000000, specifies the start of the optional 32 bit wide flash disk on the main system board. Reference "System Memory Map" section for available memory. Also, as shown in figure 3.4, the 'm f' Script command show available memory for disks.

Size – Size is the maximum number of bytes, on a 32K boundary, that the disk should occupy. If a 32K boundary is not specified the firmware will ensure the boundary is met before creating. Note that the larger the size the longer the mount command may take to execute since it is sometimes automatically done. About 45 seconds for a 4M drive.

Name – The name of the new drive, preceded by a '/'. To create a new drive called Mydrive the name would be '/Mydrive'. The '/' designates it is mounted off of root, (required). Example: Create a drive using the 1M main memory flash disk components, starting at memory address 0x00100000. This is to be called Mydrive:

```
BlueFusion/>dir
drw-rw-rw-  1 owner group 000256 JAN 01 00:00 _system
Volume:  Capacity - 3839760  Free - 2270640  Deleted - 0452880.

BlueFusion/>enable debug
Debugger Commands enabled.

BlueFusion/>m f

Processing : m (f)
Memory Map from 0x00000000 to 0x08000000
Flash at 0x00000000 to 0x000affff (size 0x000b0000 by 16) * Used
Flash at 0x000b0000 to 0x001fffff (size 0x00150000 by 16)
Flash at 0x02000000 to 0x023fffff (size 0x00400000 by 32)
NVRam at 0x04000000 to 0x04063fff (size 0x00064000 by 32) * Used
NVRam at 0x04064000 to 0x041fffff (size 0x0019c000 by 32)
SDRAM at 0x06000000 to 0x062cbfff (size 0x002cc000 by 32) * Used
SDRAM at 0x062cc000 to 0x06ffffff (size 0x00d34000 by 32)

BlueFusion/>mount 0x00100000 1024000 /Mydrive
SUCCESS: Mount completed, formatting required if new drive.

BlueFusion/>cd Mydrive
SUCCESS: cd command successful.

BlueFusion/Mydrive/>format flash
Formating disk...
SUCCESS: Disk formated successfully.

BlueFusion/Mydrive/>dir
Volume:  Capacity - 0959760  Free - 0959520  Deleted - 0000000.

BlueFusion/Mydrive/>cd /
SUCCESS: cd command successful.

BlueFusion/>dir
drw-rw-rw-  1 owner group 000256 JAN 01 00:00 _system
drw-rw-rw-  1 owner group 959760 JAN 01 00:00 Mydrive
Volume:  Capacity - 3839760  Free - 2270640  Deleted - 0452880.

BlueFusion/>
```

Figure 3.4: Mount disk example

Mount New Root Disk

The standard 5200 is shipped with the root directory being on the small 1M flash area. In larger systems, when additional flash is purchased, it may be desirable to change the root directory location and place it on a larger flash drive. This allows for larger files, and numerous subdirectories, without having to use Virtual Directories.

The procedure for creating a new root disk consists of using the 'umount' command to remove the existing directory and then 'mount' the larger drive, saving the new information by writing a 1 to register 20096. Below shows the removal of the base 1M, existing root drive and the creation of a new root drive. The mount command took about 45 seconds. Always reboot after creating a new root disk prior to other operations:

```
BlueFusion/>umount /
SUCCESS: File system un-mounted, reboot recommended if other

BlueFusion/>mount 0x02000000 4096000 /
SUCCESS: Mount completed, formatting required if new drive.

BlueFusion/>20096 = 1
20096 = 1

BlueFusion/>reset
```

Virtual Directories

Virtual Directories allow the expansion of smaller flash disks. Since the base drive is only 1M in size there may be times when the subdirectory tree can not be changed but more space is required. An example of this would be Web files. They must reside within the /_system/Web sub-directory. Should space become low a virtual directory can be created under /_system/Web, referencing another drive. This allows background disk expansion.

The mapping of directories does not survive power down and must be re-initialized upon power up by placing the required commands within the _startup.ini file, which is executed at power up. Reference the *Model 5200 Script Language Guide (Document 951-520003).*

Mount Virtual Directory

Mount ["Virtual Path"] ["Actual Path"]

"Virtual Path" – The Virtual Path is the path that will be referenced by the accessing host or user, its last node in the directory tree given should not exist. The higher level directories must exist. In other words if the virtual path is "/_system/Web/remapped" then _system and Web must exist but remapped should not as it will be mapped to an actual location by referencing the "Actual Path". **All access must reference root ('/') for the virtual directory (and Actual Path) to function correctly. Additionally, the double quotes are required.**

"Actual Path" – The Actual Path is the path that will be substituted for all Virtual Path references. This path may reside on the same or a different drive regardless of media

type (RAM, SDRAM, or FLASH), or media width (16 or 32 bits). If a mounted drive is being accessed (other than '/') at least a single subdirectory must exist on that drive. The subdirectory does not have to be used nor referenced, just exist.

Example: Create a virtual subdirectory under the /_system/Web subdirectory that reference the new drive /Mydrive created in the previous section. The virtual directory will be called MyProject and it will use the entire /Mydrive storage area.

```
BlueFusion/Mydrive/>cd /_system/Web
SUCCESS: cd command successful.

BlueFusion/_system/Web/>dir
drw-rw-rw-  1 owner group 000256 AUG 09 17:48 CTHMI
drw-rw-rw-  1 owner group 000000 AUG 09 17:48 jar
drw-rw-rw-  1 owner group 000000 AUG 09 17:48 webmon
Volume:  Capacity - 0982800  Free - 0979680  Deleted - 0000000.

BlueFusion/_system/Web/>mount "/_system/Web/MyProject" "/Mydrive"
SUCCESS: mount completed.

BlueFusion/_system/Web/>dir
drw-rw-rw-  1 owner group 000256 AUG 09 17:48 CTHMI
drw-rw-rw-  1 owner group 000000 AUG 09 17:48 jar
drw-rw-rw-  1 owner group 000000 AUG 09 17:48 webmon
drw-rw-rw-  1 lnked group 000000 ??? 01 00:00 MyProject
Volume:  Capacity - 0982800  Free - 0979680  Deleted - 0000000.

BlueFusion/_system/Web/>cd MyProject
MyProject: No such file or directory.

BlueFusion/_system/Web/>cd /_system/Web/MyProject
SUCCESS: cd command successful.

BlueFusion/_system/Web/MyProject/>pwd
"/_system/Web/MyProject/" is the current directory.

BlueFusion/_system/Web/MyProject/>_
```

Figure 3.5: Mount virtual directory MyProject example

In the example, the /_system/Web directory was made the current directory and a list of existing sub-directories was made. Note that MyProject does not exist. The mount command was then executed and another directory run, MyProject now appears. Instead of 'owner', 'lnked' now appears and ??? is listed as the date. Attempting to change to that directory initially fails. As noted previously, all references must be from the root directory, thus including the '/' reference. The command is now done again, referencing the entire path '/_system/Web/MyProject' and that directory now becomes current.

The 'dirmap' command can be used to retrieve a list of directory mappings.

System Memory Map

The advanced 'm f' command is used to detect what memory is present within your controller for use with the 'mount' command. The 'enable debug' command must first be issued followed by the memory map, 'm m' command:

```
BlueFusion/>enable debug
Debugger Commands enabled.

BlueFusion/>m f

Processing : m (f)
Memory Map from 0x00000000 to 0x08000000
Flash at 0x00000000 to 0x000affff (size 0x000b0000 by 16) * Used
Flash at 0x000b0000 to 0x001fffff (size 0x00150000 by 16)
Flash at 0x02000000 to 0x023fffff (size 0x00400000 by 32)
NVRam at 0x04000000 to 0x04063fff (size 0x00064000 by 32) * Used
NVRam at 0x04064000 to 0x041fffff (size 0x0019c000 by 32)
SDRAM at 0x06000000 to 0x062cbfff (size 0x002cc000 by 32) * Used
SDRAM at 0x062cc000 to 0x06ffffff (size 0x00d34000 by 32)

BlueFusion/>
```

A complete memory map of all installed memory within the controller is shown, along with what is being used by the 5200 controller itself (* Used). FLASH, NVRAM and/or SDRAM may be used (NVRAM is battery backed). SDRAM will not survive power down and although available it is not recommended for anything but temporary storage. It is also the area used by 'C' loadable programs. The example above shows numerous areas of memory and has a 4M flash option installed on the main board.

The table below summarizes the address space where memory can be found. Location, reserved areas, and expansion possibilities are listed:

FLASH

Location	*Address Range*	*Max Bytes*	*Bus Width*
Main Board – Boot, default flash disk	0x00000000 to 0x007FFFFF 0x00000000 to 0x001FFFFF (min base unit), 0x00100000 to 0x001FFFFF (min user space) (up to 640 series flash)	8M (first 1M reserved*) *subject to change	16
Main Board – Expansion memory	0x02000000 to 0x02FFFFFF (up to 640 series flash)	16M	32
Top Memory Expansion Board	0x01000000 to 0x017FFFFF (up to 640 series flash)	8M	16
Top Memory Expansion Board	0x03000000 to 0x037FFFFF (up to 320 series flash)	8M	32
Bottom Memory Expansion Board	0x01800000 to 0x017FFFFF (up to 640 series flash)	8M	16
Bottom Memory Expansion Board	0x03800000 to 0x03FFFFFF (up to 320 series flash)	8M	32
Total Maximum		**56M**	

NV-RAM (Battery Backed)

Location	*Address Range*	*Max Bytes*	*Bus Width*
Main Board – Boot, default flash disk	0x04000000 to 0x041FFFFF 0x04100000 to 0x041FFFFF (min user space)	2M (first 1M reserved*) *subject to change	32
Top Memory Expansion Board	0x04400000 to 0x045FFFFF Bank 0	2M	32
Top Memory Expansion Board	0x04600000 to 0x047FFFFF Bank 1	2M	32
Bottom Memory Expansion Board	0x04800000 to 0x049FFFFF Bank 0	2M	16
Bottom Memory Expansion Board	0x04A00000 to 0x04BFFFFF Bank 1	2M	32
Total Maximum		**10M (9M user)**	

SDRAM (Dynamic Memory, volatile at hardware reset and power down)

Location	*Address Range*	*Max Bytes*	*Bus Width*
Main Board – Execution area for firmware and 'C' User programs	0x06000000 to 0x06FFFFFF 0x06000000 to 0x061FFFFF (2M) Program execution area, copied from flash 0x06200000 to 0x062FFFFF (1M) Current Program ram storage and heap 0x06300000 to 0x063FFFFF (1M) Reserved 0x06400000 to 0x06BFFFFF (8M) 'C' Development area 0x06c00000 to 0x06FFFFFF (4M) Available, FTP re-flash area @ 0x06c00000.	16M (8M User)	32
Total Maximum		**16M** **(8M User)**	

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CHAPTER

4

Firmware Updates Overview

Periodically Control Technology will release new Quickstep firmware updates. Typically the updates will be posted to the main web site, www.ctc-control.com, customer download page. These updates can be loaded into the controller either using the COM1 serial port, or preferably, with FTP, over Ethernet. Also, should a problem ever occur during the re-flash operation of the controller, such as loosing power prior to completion, it may be necessary to use the serial port utilities within the resident Bootloader to install the Quickstep Firmware. Although this should never occur, it is Murphy's Law that power may be lost during re-flashing. Since the FTP protocol runs as part of the Quickstep firmware, if this part of flash becomes corrupted only the serial port may be available.

FTP is always the preferred method of updating firmware.

Firmware Distribution

The files for updating a controller, main board Quickstep firmware, are distributed in a zip file called *`5200FullInstall.zip`*. To install this create a temporary subdirectory on one of your hard disks and extract this file to that location. The following files will be present:

`teraterm.zip` Serial terminal emulation program for firmware installation.

`BF5200V######.sr1` Quickstep firmware for flash `where ######` is the revision number. *`LAN5200.sr1`* may be used instead if present. This is the same type of file except that its name does not include revision information.

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CHAPTER

5

Firmware Updates (FTP)

All 5200 Firmware is field upgradeable via an Ethernet FTP connection. This typically consists of transferring either a binary (*.bin*) or S Record (*.sr* and *.sr1*) file to the controller. There are numerous different files available, each to update differing functionality and modules. Filenames used are created as follows and are case sensitive:

[base name] V [revision, ####].[file type extension]

Where *####* is the revision level of the firmware.

BF5200V######.sr1 – Main Quickstep operating environment firmware, typically a 1.9 meg S record file which cannot be stored directly to the flash disk due to its large size. Place only in flash disk root directory for immediate update.

com5200V####.bin – Main board communications controller firmware (Atmel), about 2K binary file.

5130V####.bin – Analog Input Module firmware, about 3K binary file.

5131V####.bin – Analog Input Module firmware, about 3K binary file.

5132V####.bin – Analog Output Module firmware, about 3K binary file.

5140V####.sr – Servo Module firmware, about 350K S Record file.

5150V####.sr – Stepper Module firmware, about 350K S Record file.

mon5200V####.sr – Main board CPU boot monitor file, rarely updated, about 100K S Record file.

File transfers to the root directory of the 5200 file system are temporarily stored in dynamic memory and then immediately begin re-flashing the appropriate module (refer to Section 3.0). Small firmware files can be stored on the flash disk in the */_system/Firmware* sub-directory to allow updating of modules via the Telnet

`update` script command, at any time. Quickstep programs are automatically stopped during re-flash operations and once all firmware is updated a `reset` command must be initiated to re-activate VBIAS and restart the application program.

Note: Upon initiating a firmware update the 5200 S3 LED will provide the following visual feedback:

1. S3 flashes once then turns off during the erase cycle.
2. S2 and S3 rapidly flash at different rates as blocks are programmed.
3. S3 flashes 3 times at completion to signify the flash has been programmed correctly.

Once firmware has been updated and the unit reset, it is best to observe the current revision levels of firmware to confirm that the modules updated are operating properly. This can be done by issuing the telnet `get versions` script command.

As an example, the following shows the process of updating the 5200 main board communications controller chip with a file called *com5200V0109.bin*. There are two approaches. If you are near the unit you may simply invoke an FTP session and send the *com5200V0109.bin* file to the root directory:

```
ftp> dir
200 PORT command successful.
150 Opening ASCII mode data connection for directory "/"
drw-rw-rw-  1 owner group 000256 JAN 01 27:19 _system
226 Volume:  Capacity - 0999424  Free - 0996008  Deleted - 0000000.
ftp: 55 bytes received in 0.01Seconds 5.50Kbytes/sec.
ftp> send c:\5100\com5100V0109.bin
200 PORT command successful.
150 Opening Binary data connection for com5100V0109.bin Flash ROM loading.
226 Programming Complete.
ftp: 1236 bytes sent in 0.00Seconds 1236000.00Kbytes/sec.
ftp>
```

Figure 4.0: Sending com5200V0106.bin to root directory for re-flash via FTP

You will notice the S3 LED rapidly flashing and then stopping. Although the controller is still functional it is typically recommended that either power be cycled or a reset command be initiated prior to use. From FTP this would be `ls "!reset"`. Note the double quotes are required and connection would be lost since the watchdog timer will force a reset.

A better way to do an update is to have the *com5200V0109.bin* (or other image file) stored on the flash disk in the */_system/Firmware* subdirectory. Then invoke Telnet and issue the `update` command. In addition to the flashing S3 LED you will get descriptive feedback during the re-flash process and if an error occurs it will be displayed.

First begin with storing the file to the */_system/Firmware* directory. Using the graphical FTP interface is simply a drag and drop but the command line interface is shown below for more detailed information:

```
ftp> dir
200 PORT command successful.
150 Opening ASCII mode data connection for directory "/_system/Firmware/"
226 Volume:  Capacity - 0999424  Free - 0997716  Deleted - 0000000.
ftp> send com5100V0109.bin
200 PORT command successful.
150 Opening Binary data connection for com5100V0109.bin
226 Transfer complete.
ftp: 1236 bytes sent in 0.00Seconds 1236000.00Kbytes/sec.
ftp> dir
200 PORT command successful.
150 Opening ASCII mode data connection for directory "/_system/Firmware/"
-rw-rw-rw-  1 owner group 001236 MAR 04 00:25 com5100V0109.bin
226 Volume:  Capacity - 0999424  Free - 0996008  Deleted - 0000000.
ftp: 64 bytes received in 0.01Seconds 6.40Kbytes/sec.
ftp>
```

Figure 4.1: Transfering com5200V0106.bin to /_system/Firmware directory

Now invoke a Telnet session and run the `update com5200V01096.bin` command:

```
Command Prompt - telnet 12.40.53.201

<** Welcome to the Blue Fusion Administrator Interface **>

Login:  admin
Password:  **********

BlueFusion/>update com5100V0109.bin
Atmel Communications Re-Programming:
Flashing COMM...
Processor Type 1 found.
Read EEPROM...
Erase Chip...
Write Data...
.............................
Verify Data...
Write back EEPROM settings...
Verify EEPROM...

Programming Complete.

BlueFusion/>
```

Figure 4.2: Updating com5200V0106.bin from Telnet

Note that there will be a several second delay after the "Programming Complete" message and the return of the "BlueFusion>" prompt. This is normal and your S3 LED may flash 3 times during this period. Now re-flash any other firmware you desire, and then enter the 'reset' command, which will cause your connection to be dropped since the unit is essentially rebooted.

When re-flashing the main program, *`BF5200V######.sr1`*, the process is the same as depicted in *Figure 4.0* when using Telnet, or *Figure 4.3* with Internet Explorer. You simply connect to the 5200 via FTP, don't change directories and issue the command `send BF5200V######.sr1`. This assumes the file exists in the directory where you invoked FTP. The file will be transmitted to dynamic RAM with the normal Quickstep program running in the background. Once properly loaded the Quickstep program will be halted and you will see S2 and S3 LED's flicker at a high rate for about 5 seconds as

the file integrity is confirmed, then off for several seconds, flash once, delay, then flash rapidly while re-programming the unit. **DO NOT POWER OFF** during this time period. After about 40 seconds the rapid flashing will stop and the controller will reset itself, and in about 5 seconds the program will restart automatically and you will be back online and operational. No power cycling is needed. Should you lose power during reprogramming or not be able to proceed, refer to chapter 6, Quickstep Firmware Update (Serial).

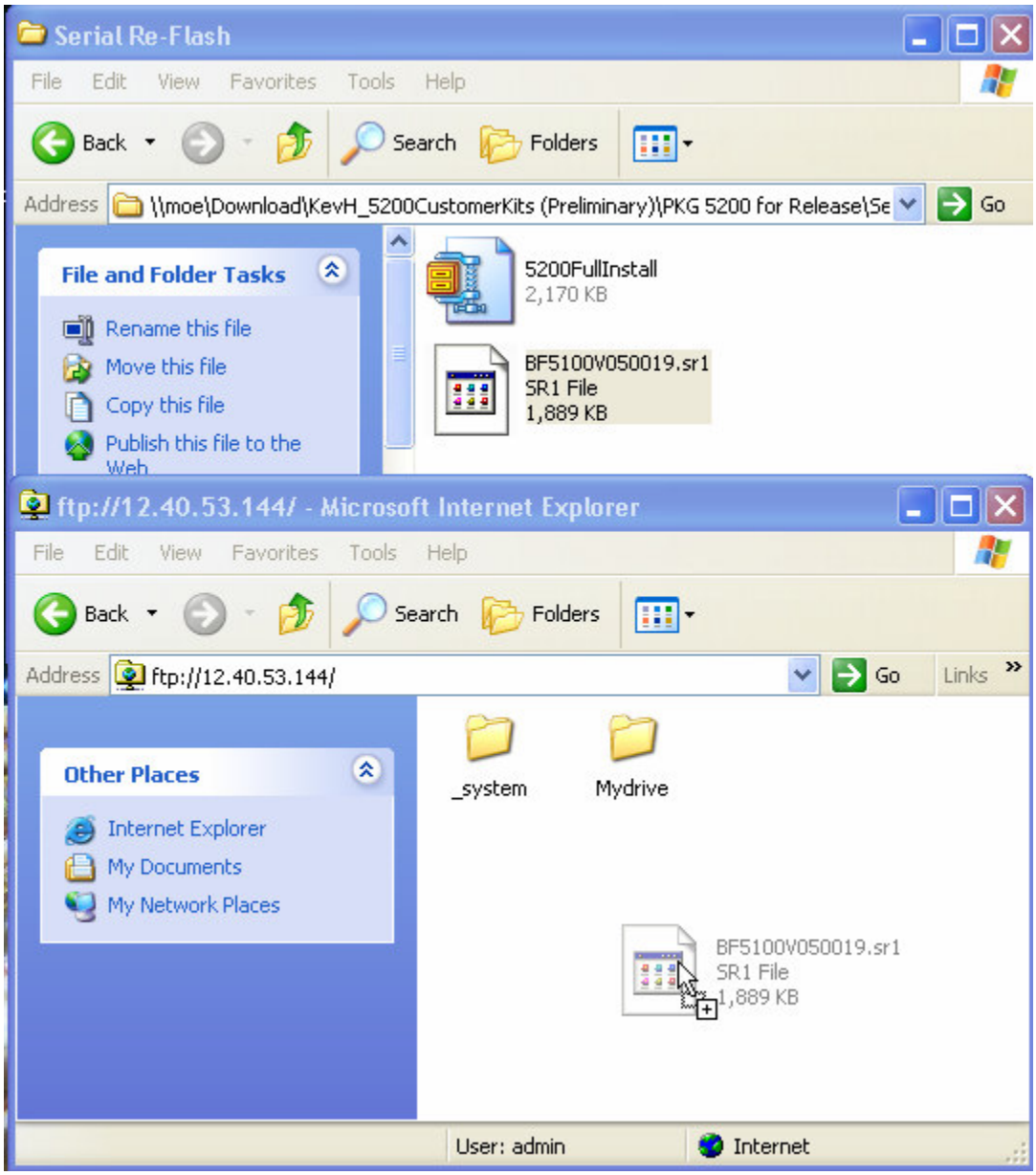

Figure 4.3: Updating main firmware with Internet Explorer, drag and drop.

Any time firmware is replaced within the controller, a backup of the flash disk and any resident Quickstep program should be made, if it does not already exist elsewhere. Although loss is unlikely, it is still possible should power failure occur.

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CHAPTER

6

Firmware Updates (Serial)

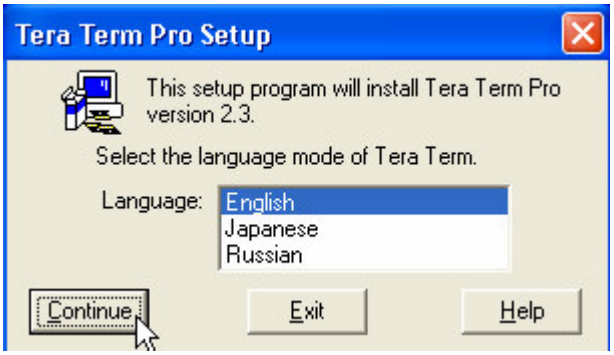
Although FTP is the recommended method to re-flash controllers the Quickstep Firmware can also be re-flashed using serial communications. A simple terminal emulator is used to select the file and send it to the 5200 when it is powered up in a special mode. Chapter 4 introduced the 5200FullInstall.zip file that is available which included the terminal emulator and firmware. This section concentrates on the installation and use of the terminal emulator when connected to the 5200 by a serial port.

Installing Teraterm

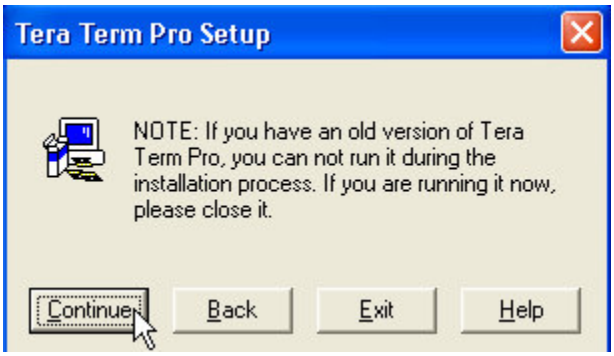
Teraterm is an open source, freely distributed terminal emulation program. Unlike utilities shipped with Windows, such as HyperTerminal, it can communicate at much higher rates of speed. Re-flashing with HyperTerminal would take over an hour, with Teraterm, minutes.

The teraterm.zip file is included in the CTC firmware distribution image or it can be downloaded from its author's web site: http://hp.vector.co.jp/authors/VA002416/teraterm.html

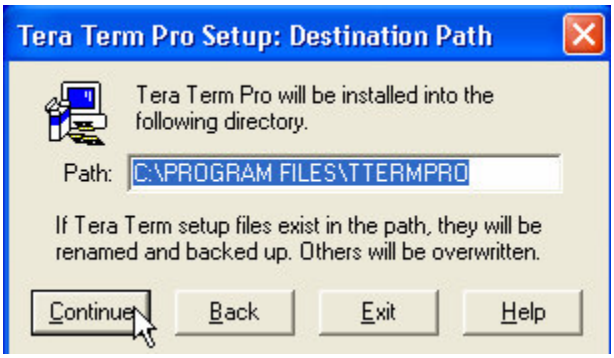
To begin installation the teraterm.zip file should be unzipped to a temporary directory. Begin by double-clicking the 'setup.exe' file. Below will appear, click <Continue>:



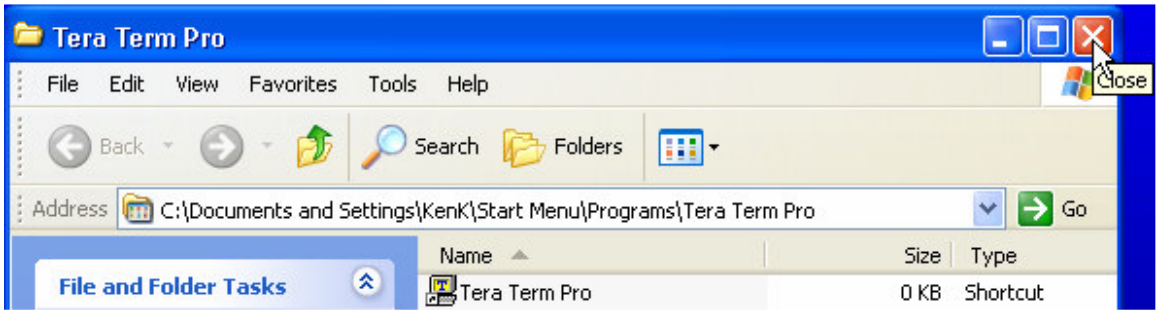
Click <Continue> at the warning about previous versions of TeraTerm. If you have a previous version either un-install it or configure it proper:



Change the installation directory, if desired, click <Continue>:



The files will begin installing and a shortcut will automatically be created. A desktop directory window will also appear, simple click the X box and close it:

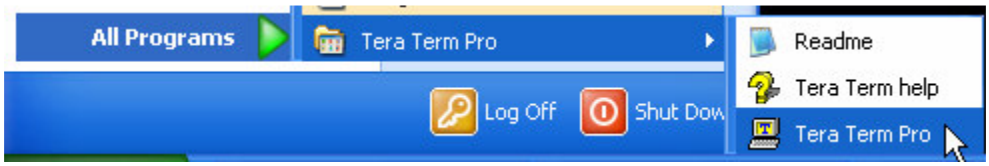


The following screen will appear beneath:

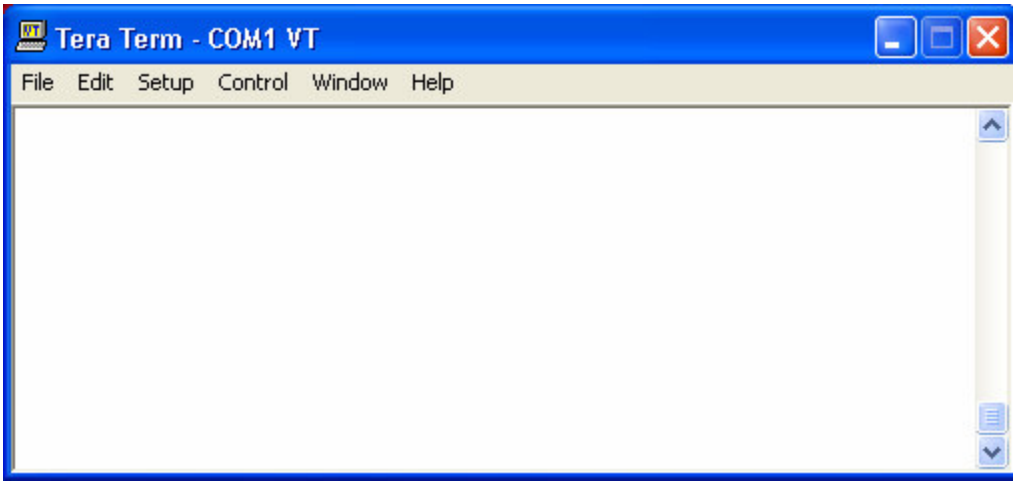
Click <OK>, Teraterm is now installed.

Setting Up Teraterm

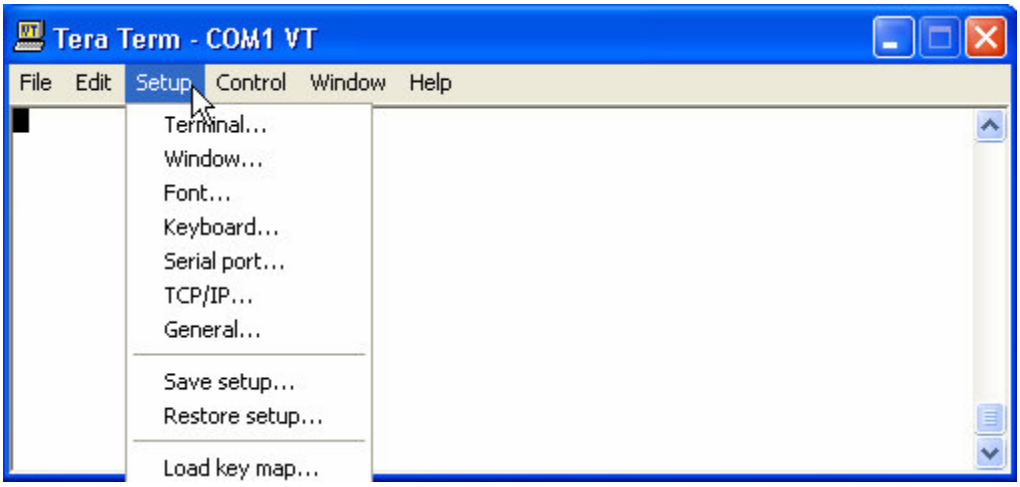
Teraterm can be invoked from the standard All Programs menu:



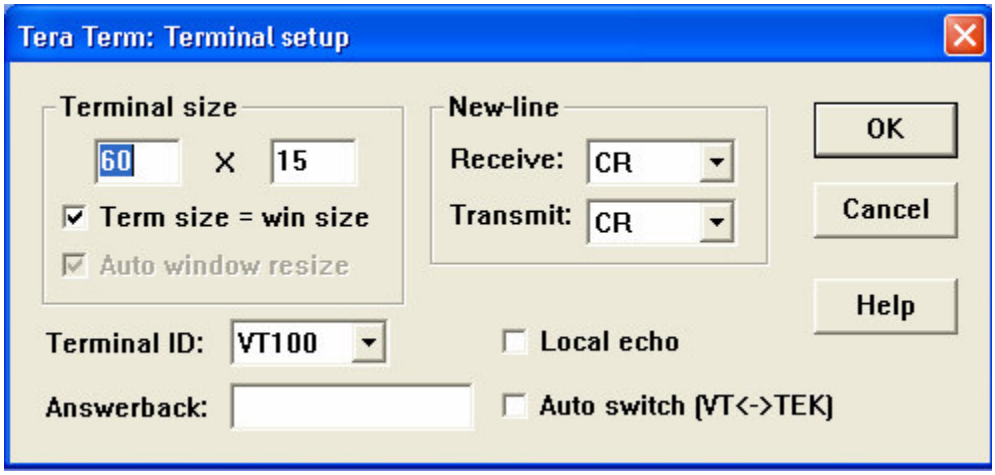
Upon startup the following will appear:



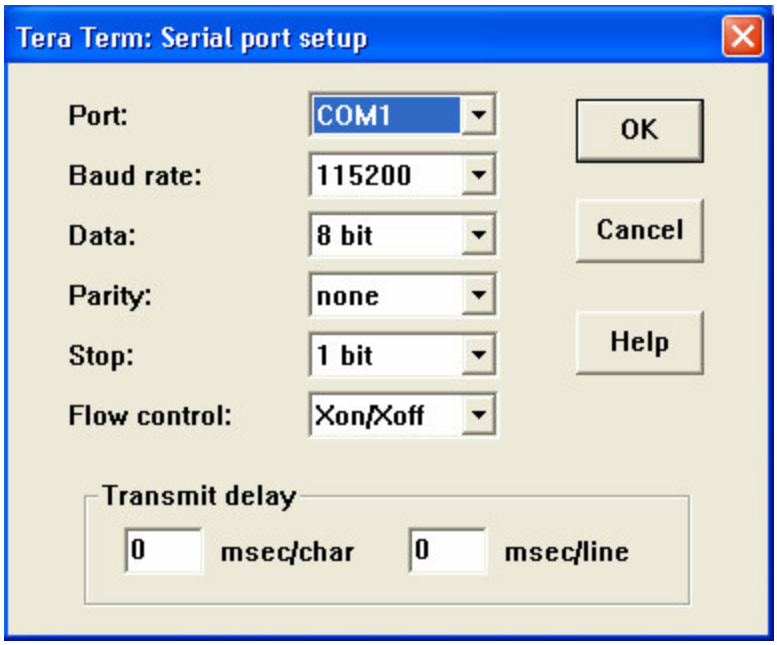
If you are using COM1 and you are using the distributed zip file from CTC then proceed to the File Transfer section. CTC pre-configures the Setup as required by the 5200. For installations that require changes the following are the required setup screens:



Terminal (Terminal size is as desired, New-line is important to verify):

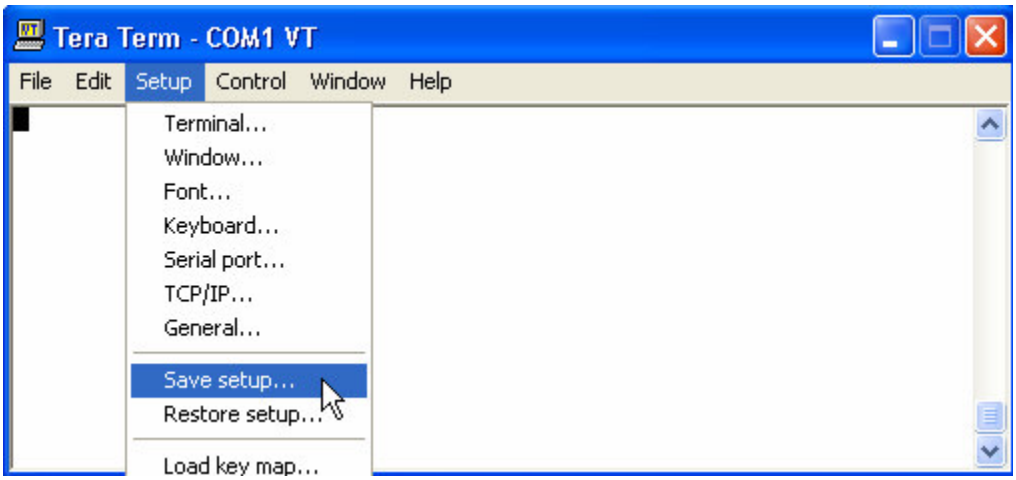


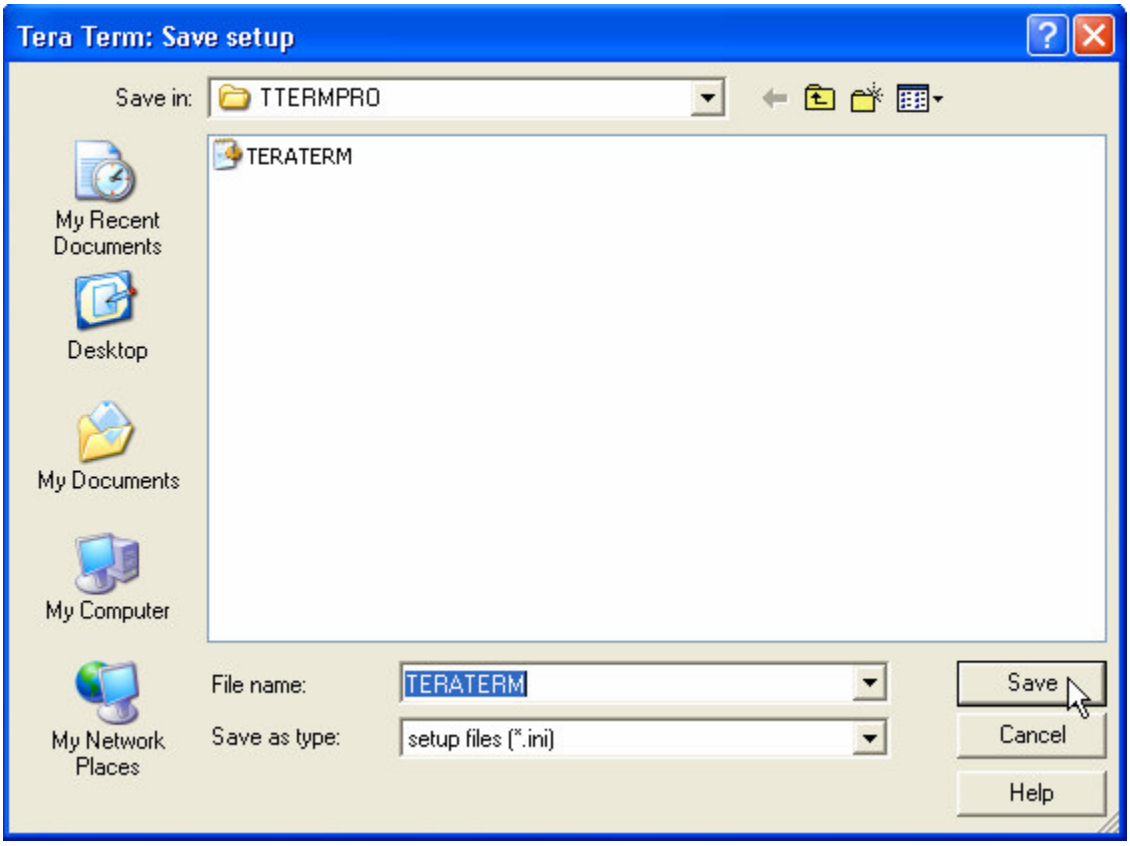
Serial Port (Set Port as required):



General (default port to open when invoked):

Once all parameters are set you should now save them to a configuration file by clicking 'Save Setup':



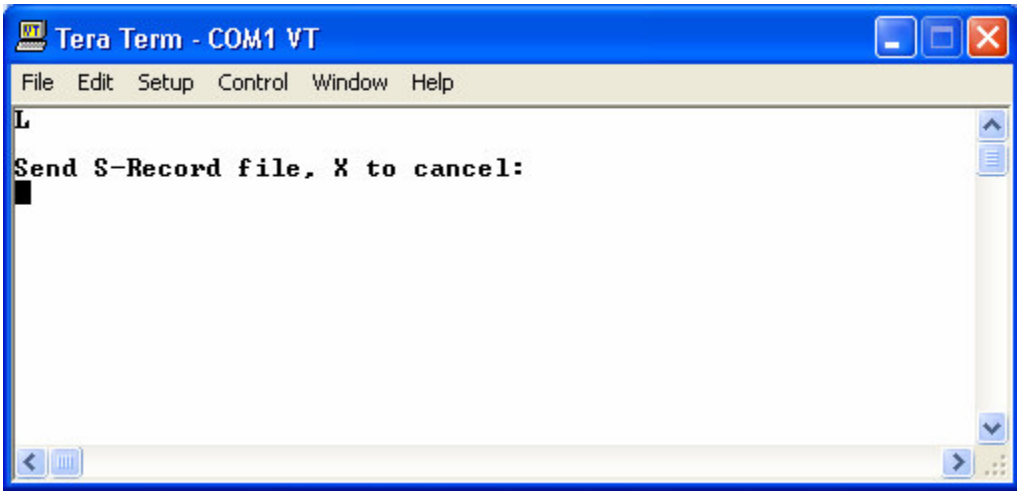


Serial Port Transfer and Re-flash

Make sure the controller is turned off and plug the PC communications port cable into the COM1 connector. You must also connect a loopback plug into the COM2 port that loops the TX line to the RX line. This would be the outer 2 pins on a 4 pin Telco connector, pins 2 and 5 on a 6 pin Telco. The loopback is required since at power-up the bootloader will toggle the TX line and check for a framing error on the RX line. If the error occurs it then knows the plug is in place and it should not attempt to load the Quickstep firmware into SDRAM for execution. It instead enters a special mode that allows for re-flashing via the serial port.

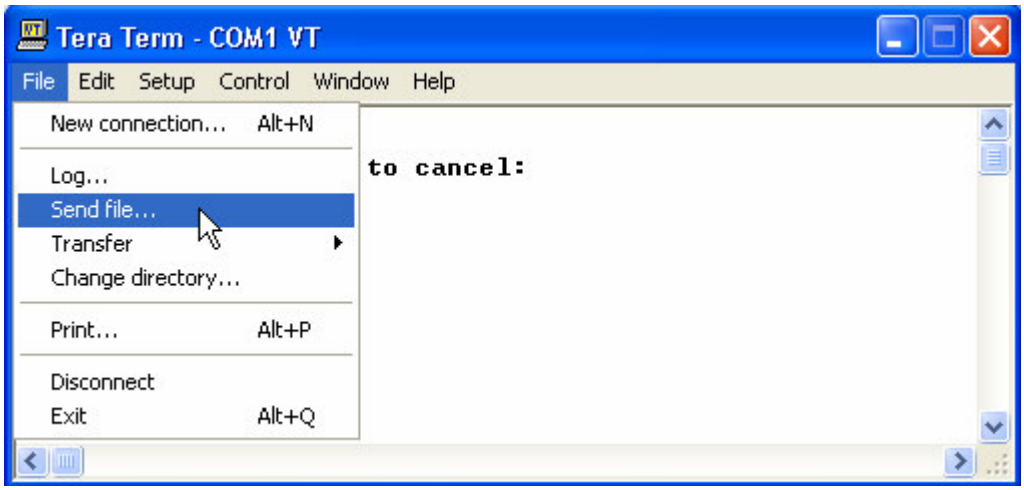
With the loopback plugged into COM2, at initial power-up, LED's Power and S1-S3 will light for a moment, then Power and the S2 LED. The S2 LED will stay on indicating the bootloader is active and ready for commands.

The following should be seen on the Teraterm terminal screen:

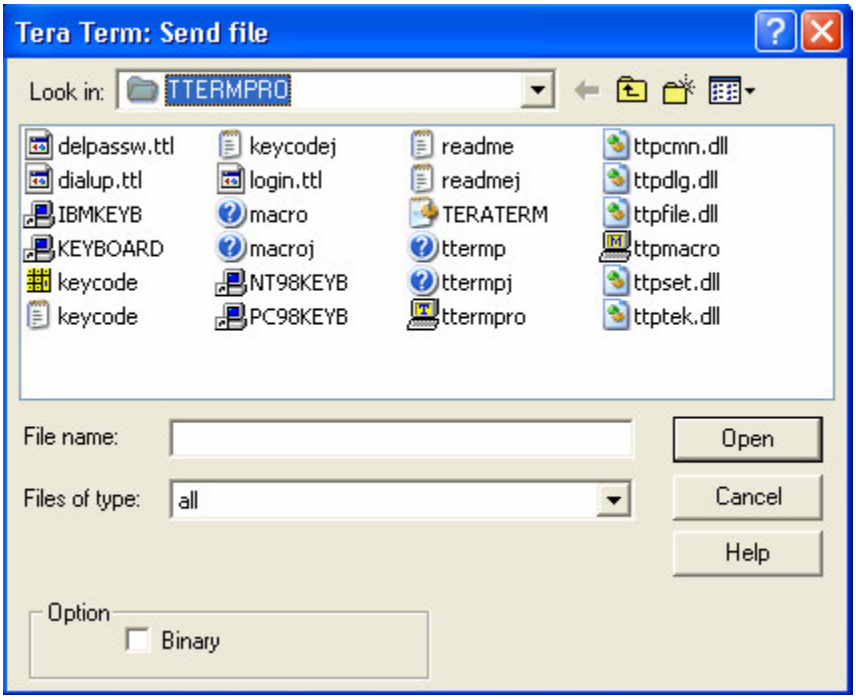


This indicates the 5200 is ready for the transfer. After each line of the Motorola Hex S-Record file is send the 5200 will respond with an X-OFF. Upon re-flashing the specified area an X-ON will occur. This will continue until complete.

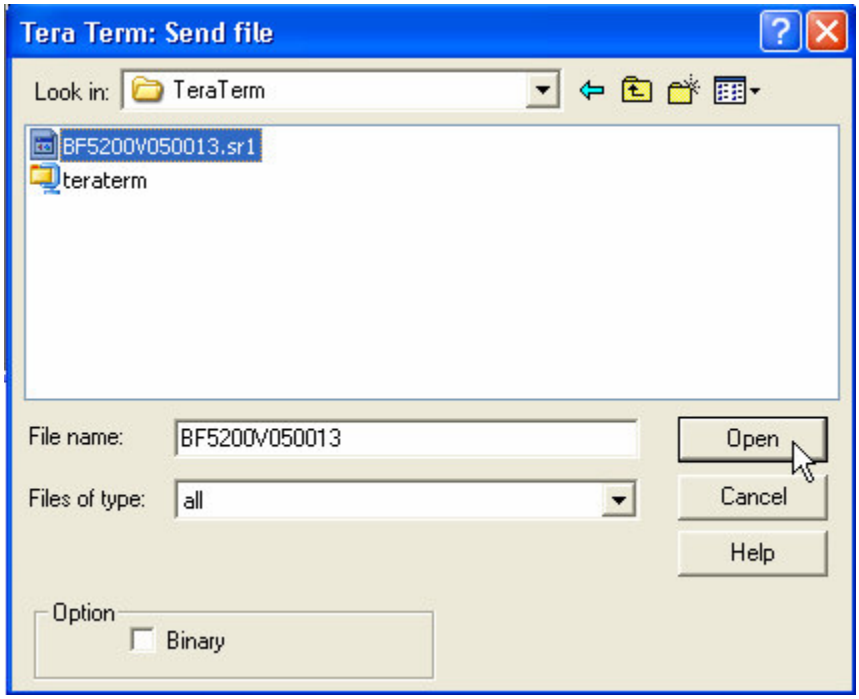
Next select the file to transfer to the controller using the File->Send File menu selection:



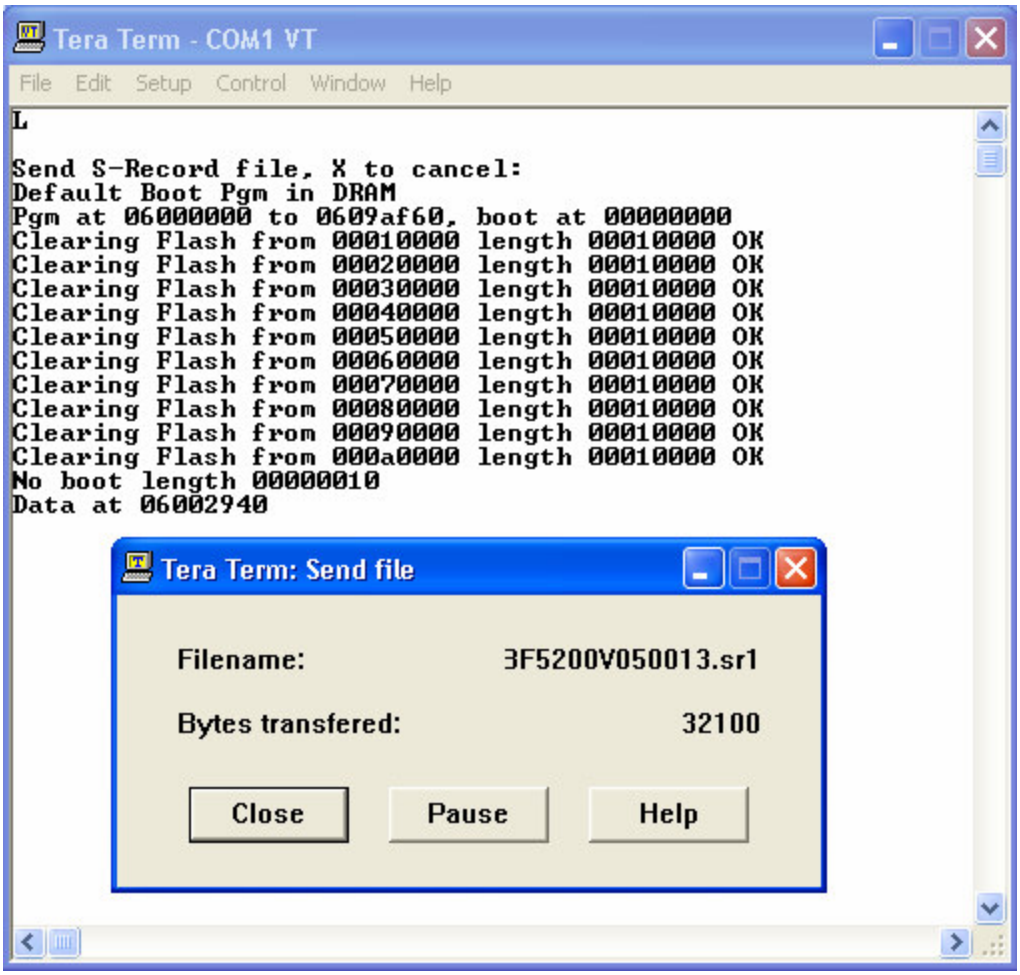
A dialog will appear where you can browse for the 5200 firmware .sr1 file:



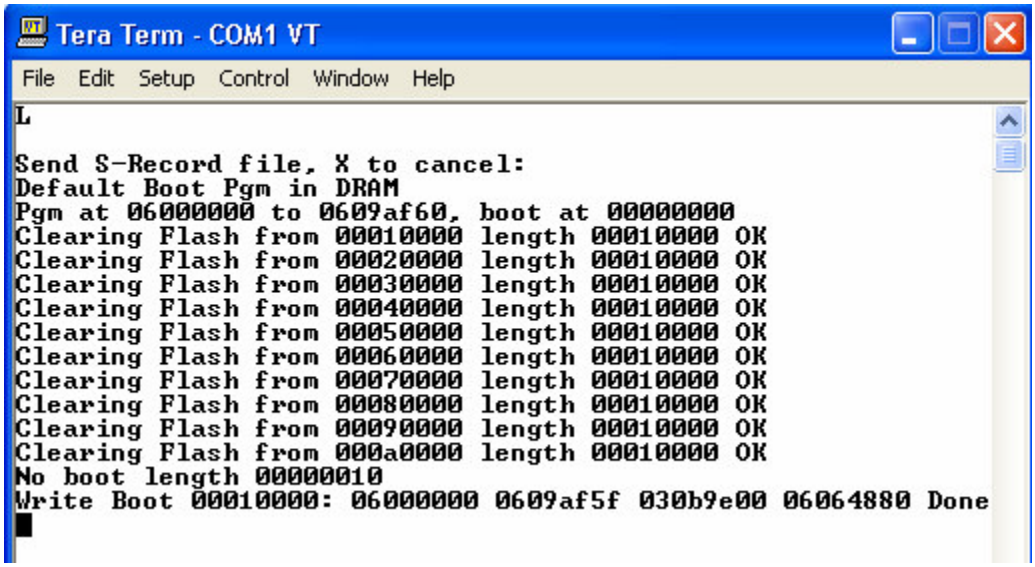
Browse and select the file:



The file will begin transferring and the 5200 will report the information on the Teraterm terminal as it occurs:



The Clearing Flash lines notify you that flash for those blocks has been erased. The 'Data at' refers to each line of data from the file as it is programmed into the flash. Transfer time will depend on your computer, typically a few minutes, with a 1.8M file size. Upon completion the following will appear, with 'Done' at the end of the last line:



The terminal will automatically reboot, remove the loopback plug and cycle power. The 5200 should now be ready for operation but may require some final tasks, such as setting IP address information, etc. Typically any administrative settings, such as IP information, that was within the 5200, prior to Firmware update, should have been restored.

Completion

Now update any analog or motion modules with their proper firmware, via FTP and Telnet if required. The serial port can only update the main Quickstep Firmware. Detailed instructions for this may be found in Chapter 5, Firmware Updates (FTP).

Blank

CHAPTER

7

5200 Setup and Initialization

A 5200 is shipped fully enabled and setup to a factory default. In some instances the default is not that desired since options such as extra memory may be ordered or other special requirements, requiring custom configurations. This section assumes that you have a 5200 with no configuration, reset to factory defaults, and then detail how to map an example larger hard disk, load WebMON and/or CTHMI files, etc. You do not necessarily have to set your 5200 to factory defaults to load new file configurations, this is for example only and you may reference the relevant section as required, skipping those that may not apply.

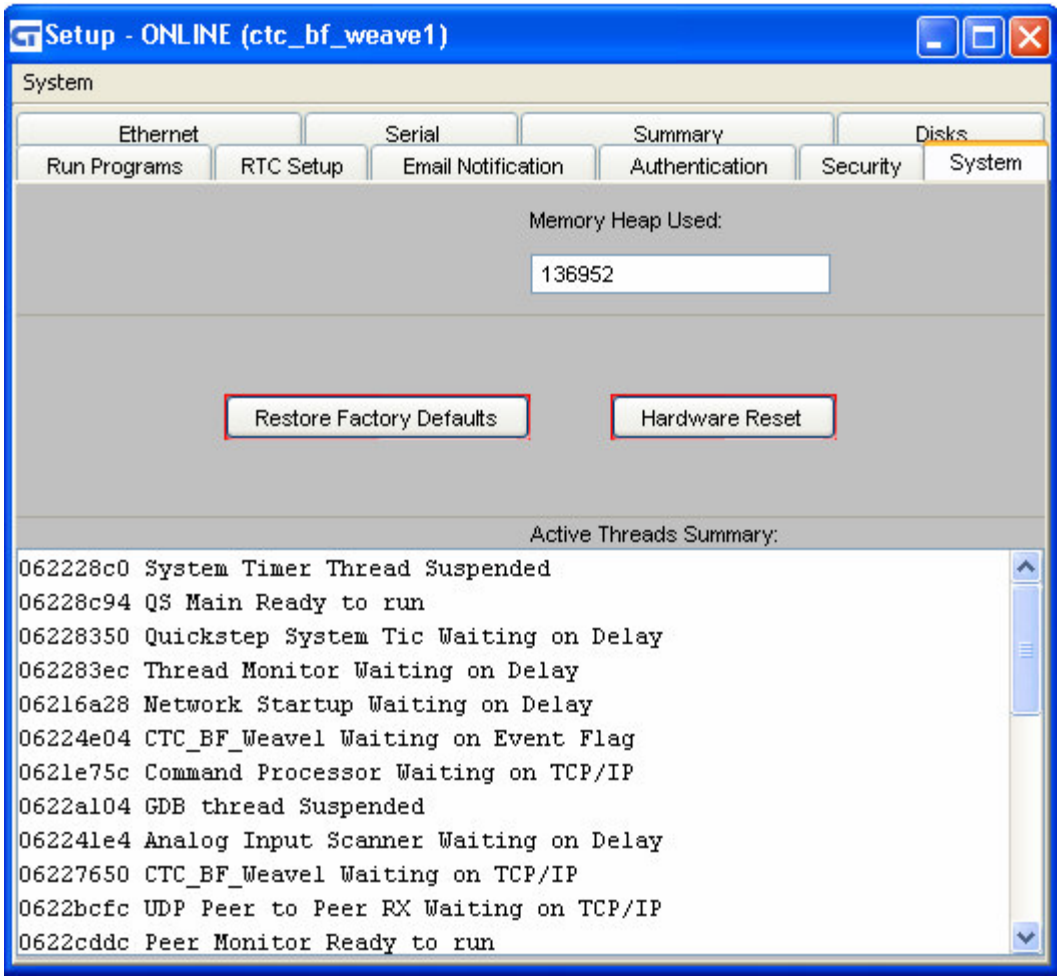
Initial Setup, Factory Defaults

The 5200 may be restored to its initial factory defaults in a number of ways:

1. Write a 1 to register 20097, cycle power on the 5200. Factory defaults are now restored.
2. Use telnet and execute the “set factory defaults” command, cycle power. Factory defaults are now restored.

```
BlueFusion/>set factory defaults
SUCCESS, factory defaults restored, cycle power...

BlueFusion/>_
```

3. Use WebMON, selecting the “Restore Factory Defaults” button within the Setup screen, then cycle power on the controller:



Some of the things that factory defaults will do is delete any _startup.ini file, enable DHCP, clearing out any existing IP information and restore the default Flash disk to being the root drive "/", disabling any other mount information of additional memory devices. Once we have restored factory defaults it is then recommended that the flash disk be formatted, removing all files and setting the disk to a known empty state. This is typically done by telnet since WebMON may not necessarily be installed and if is installed will be erased by the format command:

```
BlueFusion/>dir
drw-rw-rw-  1 owner group 000256 OCT 06 16:37 _system
Volume:  Capacity - 0982800  Free - 0979680  Deleted - 0000000.

BlueFusion/>format flash
Formating disk...
SUCCESS: Disk formated successfully.

BlueFusion/>dir
drw-rw-rw-  1 owner group 000256 OCT 19 19:46 _system
Volume:  Capacity - 0982800  Free - 0979680  Deleted - 0000000.

BlueFusion/>_
```

Note that the initial flash disk is just under 1M in size. If your 5200 was ordered with the default flash disk size or you do not want to make use of the added disk space you may now reference the "Installing WebMON Only" or "Installing CTHMI and WebMON" section, whichever is relevant.

Making Use of Extra Memory (Larger Flash Disks)

There are numerous memory configurations available for a 5200. Additional Flash and RAM may be used to setup larger flash disks than the default 1M shipped with all units. To determine the available memory capacity within your 5200 use the telnet "memory free" command or reference WebMON (if installed, note if disk was formatted it is not presently installed):

Telnet:

```
BlueFusion/>memory free
FLASH 16 Bit 0x000b0000-0x001fffff 1376256 Bytes
FLASH 32 Bit 0x02000000-0x027fffff 8388608 Bytes
NVRAM 32 Bit 0x04064000-0x041fffff 1687552 Bytes
SDRAM 32 Bit 0x062cc000-0x06ffffff 13844480 Bytes
*

BlueFusion/>
```

The above unit contains both NVRAM and FLASH. For flash disk it is best to use FLASH, thus 0x02000000 to 0x027fffff has 8388608 bytes available. Memory areas must be consecutive and part of the same chip set (single line) when mapped to a disk. Chapter 3 discusses the use of memory in more detail, allowing you to create a disk and then map sub-directories within that disk (Virtual Directories) to other memory locations. For this example we will keep it simple and create an 8M root "/" flash disk to replace our standard 1M disk. Although we could reuse the 1M space as a virtual directory, that is beyond the purpose of this section.

Within Telnet issue the following commands:

```
BlueFusion/>umount /
SUCCESS: File system un-mounted, reboot recommended if others

BlueFusion/>mount 0x02000000 8388608 /
SUCCESS: Mount completed, formatting required if new drive.

BlueFusion/>20096=1
20096 = 1

BlueFusion/>reset
```

After the mount command the display will hang for about 3-4 minutes as the disk is automatically formatted. Note that a 1 is written to register 20096 to make sure the information is saved about the mounted drive, and then a reset is issued to reboot the controller.

Now, once reset is complete, telnet back into the controller and check the available space using the dir command, it should be around 7.8M, some space is lost due to formatting overhead:

```
BlueFusion/>dir
drw-rw-rw-  1 owner group 000256 OCT 19 20:03 _system
Volume:  Capacity - 7864080  Free - 7860960  Deleted - 0000000.

BlueFusion/>_
```

You have now successfully made use of the extra memory in your controller. To make further use you may begin adding virtual directories and mounting other flash area's to the root drive as desired, referencing Chapter 3. It is now necessary to either install WebMON or the WebMON/CTHMI combination file set.

Installing WebMON or WebMON/CTHMI

WebMON requires numerous files and is used as a browser based graphical administrative front end for the 5200. CTHMI allows a user to publish their own web pages to a controller, allowing HMI capabilities from within a browser. Only a 5222 may use the CTHMI option and a controller with greater than 1M of flash is required. The base 5200 series, typically with 1M of flash are restricted to using WebMON only and can not run CTHMI files.

The default files required for both types of environments are available on the CTC web site, Customer Care->Downloads:
http://www.ctc-control.com/customer/idxdownloads.asp

5200:

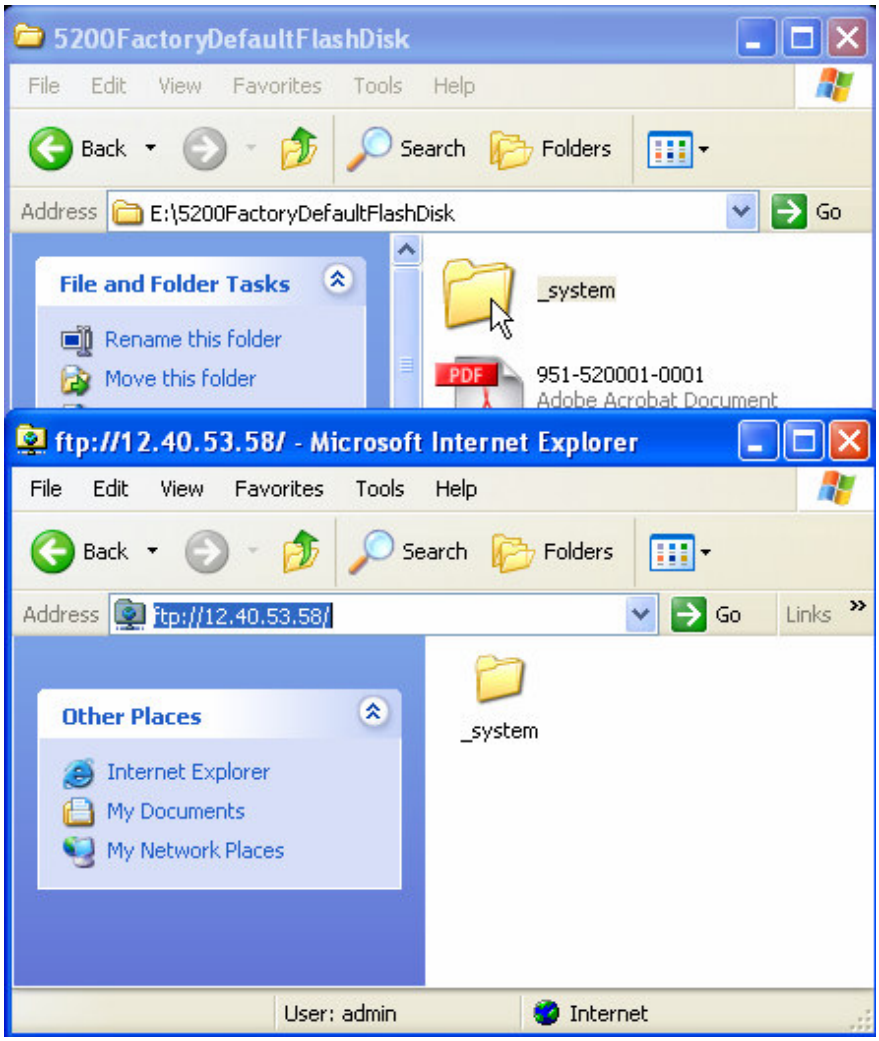
- 5200 Firmware Upgrade (includes firmware and tools for RS-232 updates; Zip file, 2.2MB)
- M1-40A/50A Motion Control Upgrade (Zip file, 333K)
- Module Upgrade Kit (TBD)
- Factory default flash disk contents (no CT HMI; includes latest WebMON, NOT for use with CT HMI; Zip file, 1.2MB)
- Factory default flash disk contents (with CT HMI; includes latest WebMON, for use with CT HMI, 5222 only; Zip file, 1.6MB)

Reference the two "Factory default flash disk contents" links to zipped downloadable files. The first is without CTHMI and the second is with it. Each CTHMI installation is keyed to its serial number, hence installing it on your controller without the option enabled, and it being a 5222 controller, will cause both WebMON and CTHMI not to function. To confirm if the CTHMI option is enabled (5222) you may either view the WebMON Summary tab in Setup, or issue a "get versions" command within telnet:

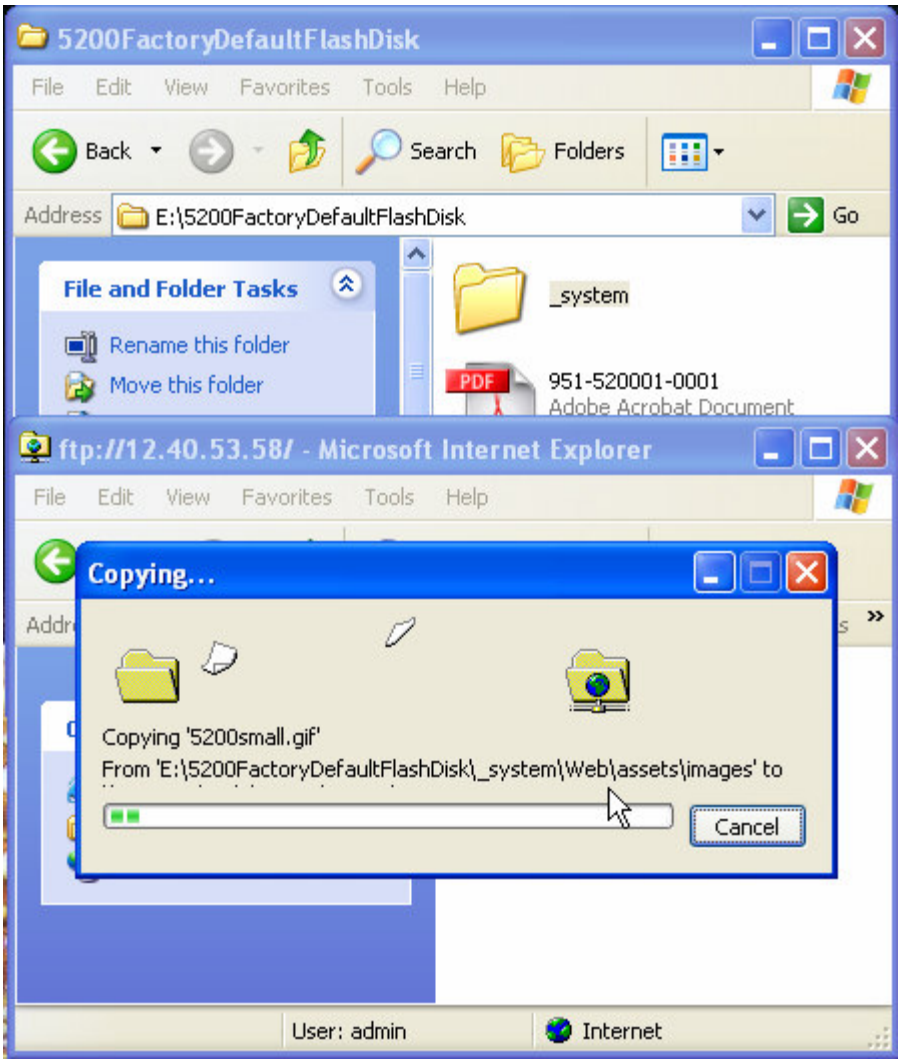
```
BlueFusion/>get versions

*Local 5200 Serial Number = 10069610
  DNS Name: CTC_BF_10069610  DHCP active: NO
  Group Name:
  IP Address = 12.40.53.243 MAC Address = 00C0CB99A66A
  Total:  DIN = 4  DOUT = 0  AIN = 0  AOUT = 0  MOTION = 0
  Base Firmware Revisions:
    Quickstep SH2 Application          V05.02.71
    Quickstep SH2 Monitor              V05.03 B
    CTHMI Disabled
  Slot Firmware Revisions:
    01. Empty                           V00.00
```

The above unit is not enabled for CTHMI since the 11th line from the top lists "CTHMI Disabled". It would say "CTHMI Enabled" if active. If you are suppose to have it enabled, and your unit is a 5222, request the proper key for your unit from Technical Support and issue the commands detailed in the next section, then return here to load the proper Flash Disk Contents.

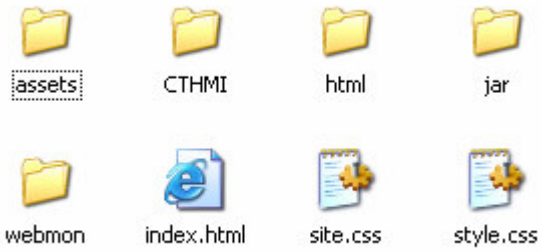
Once the proper files are downloaded and unzipped a "_system" sub-directory will be available. This is the directory that should be dragged and dropped into an FTP session initiated with Internet Explorer. Chapter 2 contains information on how to invoke an Internet Explorer FTP session. With the ftp session in a window and the local PC folder (extracted file) '_system' within another window, drag and drop the PC '_system' folder next to (not on top of) the controller FTP window '_system' directory. The contents will transfer. Sometimes two folders with the name of '_system' will appear. This is a Windows bug, simply hit refresh on the ftp browser to correct the display.



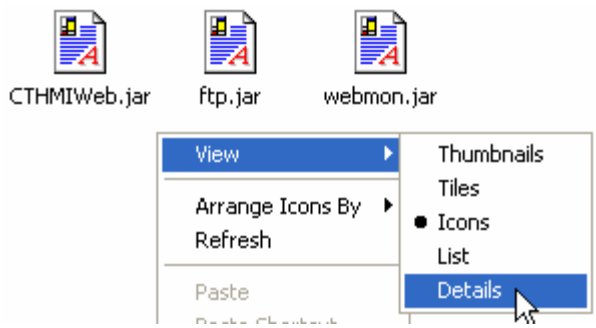
Drag and drop the _system folder next to the ftp _system folder (white portion of screen).



To verify the files copied properly double click the ftp '_system' folder, then the Web folder and it should look like the following:



To determine if the CTHMI version or WebMON only file has been loaded, double click the jar folder, then right click the mouse and change the View to details, obtaining the file sizes:



Detailed View:

CTHMIWeb.jar	53.2 KB	Executable Jar File	10/19/2004 8:35 PM
ftp.jar	42.1 KB	Executable Jar File	10/19/2004 8:35 PM
webmon.jar	375 KB	Executable Jar File	10/19/2004 8:35 PM

A CTHMIWeb.jar file < 300K in size does not contain CTHMI capability. The version above is the standard factory default without CTHMI. You may test operation by entering the IP address of the controller within an Internet Explorer browser, a web page should be invoked, then several seconds later a Java Security dialog box (assuming Java run-time is installed). Refer to the WebMON manual for further details.

Make sure you reset the controller after reflashing the Flash Disk.

Enabling CTHMI with Key Code

CTHMI capability must be part of the original factory order, basically a 5222, and requires > 1M of flash storage. Typically the base unit is shipped with 5M of flash. Although the configuration enabling CTHMI should never be lost, it can be recovered using the following process.

1. Obtain a key code from CTC Technical Support for your controller. Its serial number would be required. For example the key code for serial number "100-73237" would be BF-CTHMI-432040.
2. Issue the following commands via telnet:

```
BlueFusion/>enable CTHMI BF-CTHMI-432040
SUCCESS: CTHMI Mode enabled, write 1 to 20096 to save.

BlueFusion/>20096 = 1
20096 = 1

BlueFusion/>enable CTHMI
SUCCESS: CTHMI Mode is enabled.

BlueFusion/>
```

It is not necessary to reboot the controller. The final command 'enable CTHMI' was to verify that it is truly enabled. You may also use the "get versions" command to verify that CTHMI is enabled:

```
BlueFusion/>get versions

*Local 5200 Serial Number = 10073237
  DNS Name: CTC_BF_10073237  DHCP active: YES
  Group Name:
  IP Address = 12.40.53.5 MAC Address = 00C0CB99B495
  Total:  DIN = 4  DOUT = 0  AIN = 0  AOUT = 0  MOTION = 0
  Base Firmware Revisions:
    Quickstep SH2 Application          V05.00.31
    Quickstep SH2 Monitor              V05.03 B
    CT webHMI Enabled
  Slot Firmware Revisions:
```

Note the 11th line, CT webHMI Enabled.