TOPCON

B125

Hardware

Maintenance Guide

B125
Maintenance Guide

Part Number 1020443-01

Rev A

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Preface

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Thank you for purchasing this Topcon product. The materials available in this Manual (the "Manual") have been prepared by Topcon Positioning Systems, Inc. ("TPS") for owners of Topcon products, and are designed to assist owners with the use of the receiver and its use is subject to these terms and conditions (the "Terms and Conditions").

Please read the terms and conditions carefully.

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Miscellaneous

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About This Guide

The material in this document describes how to maintain the B125 OEM GNSS board using GRIL commands and TRU software.

Manual Conventions

This manual uses the following conventions:

Convention	Description	Example
Bold	Menu, or drop-down menu selection	**File ▸ Exit** (Click the **File** menu and click **Exit**)
	Name of a dialog box or screen	From the **Connection** screen...
	Button or key commands	Click **Finish**.
Mono	User supplied text or variable	Type guest, and click **Enter.**
Italic	Reference to another manual or help document	Refer to the *GRIL Reference Manual*.

Further information to note about system configuration, maintenance, or setup.

Supplementary information that can have an adverse affect on system operation, system performance, data integrity, measurements, or personal safety.

Notification that an action has the potential to result in system damage, loss of data, loss of warranty, or personal injury.

Intended Audience and Qualification

This guide is intended for system engineers, system designers, and programmers who are integrating the B125 board to their products to achieve GNSS positioning capabilities.

It is highly recommended that installation, commissioning, use, and maintenance of the B125 board is preformed by personnel trained in electronics.

Supported Hardware and Firmware Versions

Maintenance procedures given in this guide correspond to the following hardware revisions and firmware versions:

- B125 board hardware revision 4.6.
- GNSS firmware version 5.1p1
  The configuration procedures and sample outputs in this guide are based on the functionality of the B125 running firmware 5.1p1. Your board might function differently depending on the firmware version you are running.

Additional Documentation

The following documentation can be useful while working with the B125 board:

- *B125 Hardware Integration Guide* (1008514-01) – describes the features, hardware components, installation, operation, and specifications of the B125 board.

- *GRIL Reference Manual* (27-040004-01) – contains an exhaustive description of the GNSS Receiver Interface Language (GRIL) used to communicate and control a TPS receiver, including the B125.
- *TRU Help* – explains how to install, set up, and use the TRU software on desktop computers and hand-held controllers.

Revision History

Revision	Date (yyyy-mmm-dd)	Changes
A	2017-Mar-30	Initial release of the guide.

Getting Technical Assistance

Should you have any questions about the B125 or experience any problems with this board, contact Topcon OEM Solutions technical support for immediate and comprehensive assistance.

> Do not attempt to repair equipment yourself. Doing so will void your warranty and may damage the hardware.

Check This First!

Before contacting Topcon OEM Solutions technical support, check the following:

- Check all external board connections carefully to ensure correct and secure connections. Double check for worn or defective cables.
- Check all power sources to ensure their correct operation.
- Check that the most current software is downloaded onto the computer and that the most current firmware is loaded into the board. Check the Topcon TotalCare support website for the latest updates.
- Check that the desired OAF options are enabled in the board.

Then, try the following:

- Reset the board using TRU (**Tools ▸ Reset Receiver**) or a GRIL command (set,/par/reset,yes).
- Restore default settings using TRU (**Tools ▸ Reset Parameters**) or a GRIL command (init,/setup/).
- Clear the NVRAM using TRU (**Tools ▸ Factory Reset**) or a GRIL command (init,/dev/nvm/a).

If the problem persists, see the following section for contact information.

Contacting Technical Support

If the troubleshooting hints and tips in this guide fail to remedy the problem, contact Topcon OEM Solutions technical support.

E-mail

To contact Topcon OEM Solutions technical support via e-mail, use the oemsupport@topcon.com electronic mail address.

When e-mailing TPS technical support, provide the following information for better, faster service:

1. The board model and configuration settings. This information can be retrieved using TRU ▸ **Information ▸ Save to File**. Save the receiver's output to a text file. Attach this file to the email and submit it to Topcon OEM Solutions technical support.
2. The system/hardware specifications for the computer running TRU or a custom application; such as, operating system and version, memory and storage capacity, processor speed, etc.
3. The symptoms and/or error codes/messages that precede and follow the problem.

4. The activities being tried when the problem occurs. If possible, include the exact steps being taken up to when the error message or other problem occurs.
5. How regularly the problem occurs.

Generally, an OEM Solutions technical support representative will reply within 8 business hours or less, depending on the severity of the problem.

Website

The Topcon Positioning Systems website provides current information about Topcon's line of OEM products. For more information about OEM products, visit www.topconpositioning.com/oem.

Maintaining the B125

The following procedures are maintenance actions used to make sure that the B125 is ready for operation at all times. Perform these procedures regularly and carefully so that you get the best out of your board.

This chapter covers the following procedures:

- accessing the board on page 1 and sending the GRIL commands on page 1
- displaying the board's firmware version on page 4
- displaying antenna circuit condition on page 5
- restoring the default settings on page 5
- performing a hardware reset on page 6
- clearing the NVRAM on page 6
- generating a complete listing of board's parameters on page 7
- using Universal Break Sequence on page 7
- understanding and managing Option Authorization Files on page 8
- updating firmware on page 9

Accessing the Board

The TPS OEM boards use the GNSS Receiver Interface Language (GRIL) to manage the various board parameters for optimum performance.

GRIL works by sending instructions, called commands, to the board. When you want to request an action or result from the board, you send commands to the board where they are parsed and executed by the command interpreter. In response to the executed commands, the board performs the requested action(s) and usually generates message(s) to report results.

For sending the commands to and receiving reply messages from the board, you can use a terminal program of your choice, including:

- TRU – Topcon's hardware configuration software, which allows you to control and monitor the board's behavior via the graphical interface (GI) or the GRIL commands. It is available for installation on desktop computers and hand-held controllers. See Quick-Start to Run the B125 Installed on the Evaluation Board of the B125 Hardware Integration Guide to understand how to connect to the B125 using TRU.
- third-party programs, e.g., HyperTerminal and PuTTY.
- user-written applications.

Sending Commands and Viewing Responses Using TRU

Background

The following procedures will show you how to work with Terminal in TRU. The **Terminal** window provides an interface to manually send commands to a connected board and view the responses. For a complete list of commands and messages the B125 board supports, refer to the GRIL Reference Manual.

Typical Use

To send the commands to the board and view the responses.

To run scripts.

Procedure

The following procedure will show you how to configure the B125 using the GRIL commands from the **Terminal** window of the TRU software.

1. Connect the board and computer, start TRU on your computer, and establish a TRU connection with the board as described in Quick-Start to Run the B125 Installed on the Evaluation Board of the B125 Hardware Integration Guide.

2. On the main screen, click **Terminal**. The dialog box appears.
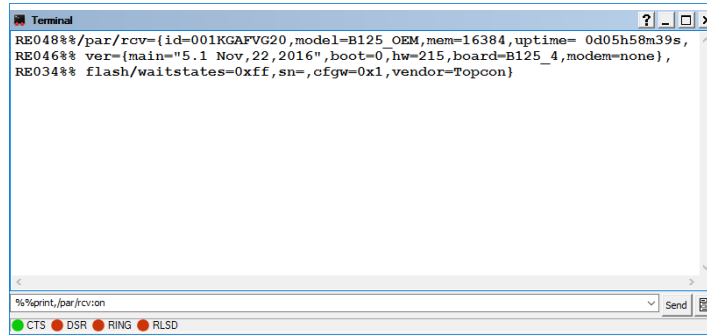
3. Type in the desired command in the command line and then click **Send** or hit **Enter** on the keyboard. TRU will send the entered command to the board and will show you the board's reply in the main window.

Before sending a command to the B125, make sure you know what it does. See the GRIL Reference Manual for the commands and messages available in the B125.

To close *Terminal*, click the **Close** button ☒.

Configuring Network Interface

The B125 provides an Ethernet interface for a TCP/IP network connectivity. To access the board through a TCP/IP network, you need to assign an IP address to the Ethernet interface on the B125. Use a serial port connection to configure the IP address and other network settings of the board as described in Quick-Start to Run the B125 Installed on the Evaluation Board of the B125 Hardware Integration Guide.

Configuring a TCP Server

The TCP server in the B125 provides access for users to control, monitor, and transfer data remotely over a TCP/IP network. The B125 can accept up to 10 users at the same time. That means, for example, that one user is obtaining raw data files while the other user is reviewing the settings for troubleshooting.

1. Establish a serial port connection to the board as described in Quick-Start to Run the B125 Installed on the Evaluation Board of the B125 Hardware Integration Guide.

2. Specify the network settings of the B125. Each board ships with a unique hardware Media Access Control (MAC) address and with a factory-specified default IP address of 192.168.2.2, which can be invalid for your network addressing scheme. Each board must have a valid IPv4 address and subnet mask to communicate on the network. Use manual or automatic IP configuration.
   - Manual IP configuration

GRIL Command/TRU Controls	Description
%%set,/par/net/ip/addr,xxxx.xxxx.xxxx.xxxx Receiver Settings>Network (Ethernet)> IP Address	The IP address for the board. The default is 192.168.2.2. Example: %%set,/par/net/ip/addr,173.26.75.231.
%%set,/par/net/ip/mask,xxxx.xxxx.xxxx.xxxx Receiver Settings>Network (Ethernet)> IP Mask	The subnet mask for the board. The default is 255.255.255.192. Example: %%set,/par/net/ip/mask,255.255.254.0.
%%set,/par/net/ip/gw,xxxx.xxxx.xxxx.xxxx Receiver Settings>Network (Ethernet)> Gateway	The gateway address for the board. The default is 192.168.2.1. Example: %%set,/par/net/ip/gw,173.26.75.1. Set it to all zeros if the board will only communicate with devices on the same subnet.

- Automatic IP configuration (DHCP)
  %%set,/par/net/ip/dhcp,on

3. Specify the settings for the TCP server. Enter a TCP port number for each raw TCP port; the board's TCP server will listen for client connections on that raw ports with specified port numbers. Connection to the TCP server on each raw TCP port requires authentication (i.e., it is password-protected) by default. You can disable an authentication prompt for each raw TCP port separately with the corresponding command. The other TCP server settings include connection timeout and No Delay mode.

GRIL Command/TRU Controls	Description
%%set,/par/net/tcp/<a|b|c|d|e|f|g|h|i|j>/port,xxxxx Ports>TCP>Double-click>TCP Settings>TCP Port	The TCP port number for the corresponding raw TCP port. The default is 8002. Example: %%set,/par/net/tcp/b/port,23 instructs the TCP server to listen for Telnet-like connections on raw TCP port b and port number 23.
%%set,/par/net/tcp/<a|b|c|d|e|f|g|h|i|>/noauth,on|off Ports>TCP>Double-click>TCP Settings>Enable authentication	Authentication request for the specified raw TCP port. The on value disables authentication request and provides unprotected access (no password required) on the specified raw TCP ports so that the TCP server is ready to communicate immediately after a client connects to the server. If the authentication request is enabled with the off value (i.e., the board is password-protected), a client can access the server after entering the correct login and password.
%%set,/par/net/passwd,x...x Receiver Settings>Network (TCP)>Password	Password. For security reasons, it is recommended to protect access to your TCP server using password. If the password is specified and the authentication request is enabled in the previous command, the clients have to enter the password to access the TCP server. The default is an automatically generated name. The password is case sensitive and may contain up to 15 alphanumeric characters. Example: %%set,/par/net/passwd,"Admin"
%%set,/par/net/tcp/idle,0...3600 Receiver Settings>Network (TCP)>Timeout	Connection timeout. Specify the amount of time, in seconds, the TCP server will wait for data before terminating TCP connections. With a zero value, the TCP connections will remain open until the TCP keepalive feature of the TCP/IP stack in the operating system detects that the connections are broken. The default is 120 seconds. Example: %%set,/par/net/tcp/idle,300 instructs the TCP server to terminate the TCP connections after 5 minutes of no communications.
%%set,/par/net/tcp/nodelay,on|off	No Delay mode. This command configures Nagle's algorithm. This algorithm is enabled (i.e., set to off) by default. For time-sensitive applications, disable the algorithm by sending the command %%set,/par/net/tcp/nodelay,on.

4. After you configure the network and TCP server settings, reset the board to activate them. You can do this by one of the following methods:

- Sending the command %%set,/par/reset,yes.

- Powering cycle the board.

- Clearing the NVRAM.

Once the settings are activated, the B125 stores them in the permanent area of NVRAM allowing them to leave intact after you clear the NVRAM or reset all parameters to default.

Configuring an FTP server

An onboard FTP server provides a mean to transfer files between an SD card in the B125 and other devices on the network using FTP. Up to ten simultaneous connections to the FTP server are supported.

1. Establish a serial port connection to the board as described in Quick-Start to Run the B125 Installed on the Evaluation Board of the B125 Hardware Integration Guide.
2. Specify the network settings of the B125 as described at step 2 in "Configuring a TCP Server" on page 2.

3. Specify the setting for the FTP server. You need to enter a TCP port number; the board's FTP server will listen for FTP client connections on that port. The other FTP server settings include connection timeout, username, and password.

GRIL Command/TRU Controls	Description
%%set,/par/net/ftp/port,x...x Receiver Settings>Network (FTP)>FTP Port	TCP port number. The default is 21. Example: %%set,/par/net/ftp/port,21 instructs the FTP server to listen for FTP connections on port 21.
%%set,/par/net/ftp/timeout,1...2^{31}-1 Receiver Settings>Network (FTP)>Timeout	Connection timeout. Specify the amount of time, in seconds, the FTP server will wait for data before terminating FTP connections. The default is 600 seconds. Example: %%set,/par/net/ftp/timeout,300 instructs the FTP server to terminate the FTP connections after 5 minutes of no communications.
%%set,/par/net/ftp/login,xxxx.xxxx.xxxx.xxxx Receiver Settings>Network (FTP)>Login	Username. Specify the username required by the FTP server for a client to connect. The default is "topcon". The username is case sensitive and can contain up to 31 alphanumeric characters. Example: %%set,/par/net/ftp/login,"FTPclient1".
%%set,/par/net/ftp/passwd,x...x Receiver Settings>Network (FTP)>Password	Password. For security reasons, it is recommended to protect access to your FTP server using password. If the password is specified, the clients have to enter it to access the FTP server. The default is "topcon". The password is case sensitive and can contain up to 15 alphanumeric characters. Example: %%set,/par/net/ftp/passwd,"Admin"

4. After you configure the FTP server settings, reset the board to activate them. You can do this by one of the following methods:

- Sending the command %%set,/par/reset,yes.
- Powering cycle the board.
- Clearing the NVRAM.

> Once the settings are activated, the B125 stores them in the permanent area of NVRAM allowing them to leave intact after you clear the NVRAM or reset all parameters to default.

Displaying Firmware Version

Background

Each B125 board contains firmware, which controls and executes all operations in the board. All B125 boards in your project must be loaded with the same firmware version. Use the latest firmware version to ensure your board(s) have the most recent updates. If a new version of the firmware is released, you can load new firmware to the board using TRU. For details, see "Updating Firmware" on page 9.

Typical Use

You may need to know the firmware version of the B125 board in certain situation, such as troubleshooting with TPS technical support or determining which new firmware to upload.

Procedure

Display the firmware version currently running on the board.

```
%%print,/par/rcv/ver/main
```

Displaying Antenna Circuit Condition

Background

The B125 board incorporates antenna detection circuitry, which senses the amount of current supplied to the antenna's LNA. This circuitry indicates one of the two conditions:

- not overloaded – the antenna draws normal current or is not connected to the board.
- overload – the antenna draws current higher than expected. This condition occurs when the B125 board is subjected to a load (i.e., antenna) larger than it was designed for. It could also be reported when a short circuit occurs in the antenna, antenna cable, or the board.
  When an overload condition is detected, the board maintains a constant, safe level of output current until the overload condition is removed. For overcurrent values used to trigger the overload condition, see Board Specifications in the B125 Hardware Integration Guide.

Typical Use

To verify that the antenna is connected securely and draws normal amount of current.

Procedure

Check the current delivered to the antenna.

```
%%print,/par/ant/rcv/dc
```

> ⓘ Continuous monitoring of this command is a prudent maintenance practice to ensure your board and antenna system function properly.

Restoring Default Settings

Background

Most of the parameters in the B125 have default values, which you may change as needed for your particular application. You can always return the board to a known operating condition by restoring its default configuration.

Typical Use

To return the board to a known operating condition.

To avert any configuration conflicts.

Procedure

This command causes the board to reset the settings stored in the non-volatile memory to the factory defaults and then to reboot.

```
init,/setup/
```

Performing Hardware Reset

Background

You can reset the B125 without returning any configured settings to their default values. It may become necessary to reset the B125 to apply certain settings which require a hardware reset or as part of troubleshooting.

Typical Use

To apply certain settings which require a hardware reset.

Procedure

Reset the board.

```
%%set,/par/reset,yes
```

Clearing the NVRAM

Background

The board's Non-Volatile Random Access Memory (NVRAM) holds data required for satellite tracking, such as ephemeris data and position. The NVRAM also keeps the current board's settings, such as active antenna input, elevation masks, etc.

After clearing the NVRAM, your board will require around 15 minutes to collect new ephemerides and almanacs.

Clearing the NVRAM of your board will also reset the GRIL parameters to factory default settings.

Typical Use

To eliminate communication or tracking problems.

After loading firmware.

Procedure

You can clear the NVRAM in a number of ways.

- To clear the NVRAM using GRIL, send the command `%%init,/dev/nvm/a`.
- To clear the NVRAM using TRU, click **Tools ▸ Factory Reset** and then **Yes** to complete the procedure.
- To clear the NVRAM using the MINTER on the evaluation board:
  a. Press the power key (SW101) to turn off the board.
  b. Press and hold the **FN** (SW103) key.
  c. Press and hold the power key for about one second. Release the power key while continuing to hold the **FN** key.
  d. Wait until the STAT and REC LEDs are green.
  e. Wait until the STAT and REC LEDs blink orange.
  f. Release the **FN** key while the STAT and REC LEDs blink orange.

Generating List of Receiver Settings

Background

Sometimes problems with the B125 may be caused by using inappropriate or wrong configuration settings. Topcon support personnel may ask you to generate a file with the current board settings to check their values.

Typical Use

To troubleshoot any configuration problems.

Procedure

1. Generate the list of board settings.
   ```
   %%print,/par:on
   ```
2. Copy the output to a text file. Give the file a name and save it in the location you want on your computer.
3. Using an email program, submit the file to TPS technical support along with an explanation of the problem you are experiencing.

Unlocking a Port with Universal Break Sequence

Background

The UBS is useful when you are unable to connect to your board over serial or network interfaces. You have attempted to connect using the desired port and the board does not answer the requests. In a majority of cases the board's port is not actually locked up. It may simply be in an input mode that is preventing it from recognizing the GRIL commands. Sending the UBS to this port will return it back to command mode and will make it available for commands and connection.

Typical Use

To fix an unresponsive serial port.

Procedure

Enable the board to recognize the UBS.

```
%%set,/par/dev/cfg/ubs/mode,on
```

Create and send a UBS through the unresponsive port to return it to command mode from whatever mode it was before.
With default UBS parameters, the UBS will be a sequence of 128 bytes having a decimal value of unity. You can change UBS symbols and length using the GRIL parameters `/par/dev/cfg/ubs/char` and `/par/dev/cfg/ubs/len`. For details, see the GRIL Reference Manual.

Understanding and Managing Option Authorization File

Background

Topcon offers a very comprehensive set of receiver features that allows you to enable only the desired functionality within the available budget. As your needs grow, you can purchase additional features and capacities to maximize your investment and ensure future scalability. For example, you can increase the maximum position update rate on your B125 from 1 Hz to 50 Hz by loading the _POS option with a 50 Hz value using an Option Authorization File (OAF).

The B125 board typically ships with an OAF as per initial purchase of the board configuration. There are several upgrade options available with the board that can extend the board's functionality to better suit your job requirement.

Contact you Topcon dealer or a representative for a complete listing of available options and pricing information.

Options are stored in a NAND type of flash memory of the board and, once loaded, persist through power cycles, resets, clearing of NVRAM, firmware upgrades, and configuration changes. The options are unique to the receiver or OEM board and are not transferable.

Typical Use

To load an OAF with new capabilities.

To check the current status of the options.

Procedure

Loading an OAF

Use TRU to load the options to the B125.

1. Connect the board and computer, start TRU on your computer, and establish a TRU connection with the board as described in Quick-Start to Run the B125 Installed on the Evaluation Board of the B125 Hardware Integration Guide.
2. Click the **Options** icon in the main screen. The **Receiver Options** screen displays.
3. Right-click in the **Receiver Options** screen, and select **Upload OAF**.
4. Navigate to the location of the new OAF.
5. Select the appropriate OAF, and click **Open**.
6. Click **Upload the File to the Receive**r to start loading the file.
7. Click **Yes** at the prompt to reset the B125 and to put new options into operation.

Viewing an OAF

Use TRU to view and check the options in the B125.

1. Connect the board and computer, start TRU on your computer, and establish a TRU connection with the board as described in Quick-Start to Run the B125 Installed on the Evaluation Board of the B125 Hardware Integration Guide.
2. Click the **Options** icon in the main screen. The **Receiver Options** screen displays the following information:
   - Friendly Name – displays a name for the option in a user-friendly manner
   - Option ID – displays a name for the option in a GRIL convention (available in the Detailed view only)
   - Current – displays the currently effective value of the option
   - Permanent – displays if the option is purchased or not
   - Leased – displays if the option is leased or not
   - Exp. Date – displays the date the option will be disabled, if applicable (available in the Detailed view only)

Updating Firmware

Background

Topcon regularly releases firmware updates and patches. Generally, an update provides a major firmware revision that offers new features, enhancements and extended functionality. In between major revisions, patches provide bug fixes and adjust performance issues. Updating board firmware to the latest release version should be an integral part of your ongoing maintenance activities. With boards running current firmware you take advantage of the latest features, enhancements, and reliability improvements.

This procedure will help you take a smooth firmware update of your B125 board.

Carefully read the entire update procedure before you start the firmware update for the board.

Typical Use

To update the B125 to the latest firmware release.

Procedure

Obtaining Firmware Image File

You can download the firmware from myTopcon.

Before you begin downloading firmware update, ensure that you have a myTopcon account. To obtain the account, complete the registration form at the myTopcon website. Then register your B125 board here.

Once registered, go to https://www.topconpositioning.com/support/updates/B125 and download the firmware for your board.

Firmware File Naming Conventions

The following format is used for naming the firmware files: `timage_gnssFW<version>_<rcvname>.tfi`, where

- `timage` – stands for Topcon image
- `gnssFW` – shows that the firmware is designed for GNSS hardware
- `version` – shows the firmware version
- `rcvname` – identifies that the firmware is designed for the B125 OEM board
- `*.tfi` – stands for Topcon firmware image

For example, the image file for firmware 5.1p1 will be `timage_gnssFW5_1p1_b125.tfi`.

Preparing SD Card

After downloading the firmware, you need to transfer it to an SD card. The receiver will then use the firmware file on the SD card to update the current version of firmware. The SD card must meet the following requirements:

- Partition – primary. You can check and create a primary partition on the SD card in Windows using third-party disk management utilities.

> Do not use Disk Management of Windows OS to create the primary partition on the SD card.

- Format – FAT32.
- Security – read/write enabled.
- Capacity – you do not need to have a clean SD card. Make sure however that the SD card has about 200 Mbytes of free memory to store the firmware and log files.

- Directory and folder structures – create a folder **b125.update** in the root directory of the SD card to store the firmware for your board. Do not create folders for firmware files in any subdirectory, such as H:\GNSS_firmware\b125.update or I:\New_firmware\OEM\b125.update, etc. The B125 will not find the firmware in a subdirectory and the update will not start.

Copying Firmware to SD Card

You can use different methods to copy a firmware file to the SD card.

If the B125 is at your desk connected to a computer, you only need to use a standard procedure of operating system for copying files between drives.

1. Insert the SD card into an SD card slot on your computer.
2. On the SD card, create a folder **b125.update** in the root directory to store the firmware for your board.
3. Locate the downloaded firmware file on your Windows computer and transfer the firmware file from the computer to the **b125.update** folder on the SD card using Windows Explorer or any other file utility.

If the B125 is at a remote location and you have access to it via Ethernet, you can use an FTP client or TRU to copy the firmware file to the SD card connected to the B125.
To copy the firmware using the FTP client, take the following steps:

1. Configure the network settings of the B125 as described in step 2 of "Configuring a TCP Server" on page 2.
2. Configure the FTP server in the B125 as described in "Configuring an FTP server" on page 3.
3. Run an FTP client. You can use any FTP client of your choice. This procedure describes the most widely used FTP client, FileZilla. The settings in other FTP clients would be similar.
   Specify Host, Username, and Password of the FTP server on the B125. Click Quickconnect.
4. Once connected, navigate to your local folder with the firmware via Local site and to the **b125.update** folder on the B125 via Remote site. Select the firmware file, right-click and select Upload.
5. Wait until FileZilla transfers the firmware file to the B125. Monitor the transfer progress in the Queued files tab.
6. After the firmware file is transferred successfully, you will see it in the **b125.update** folder on the B125.
7. Follow instructions in "Starting Update Using a Command or FN Key" on page 11 to initiate the firmware update.

If you have TRU and a remote B125 on a TCP/IP network, you can copy the firmware to the SD card and then start the update with TRU running in **Firmware Loading** mode. See "Starting Update Using TRU in Firmware Loading Mode" on page 11 for how to do this.
You can place any number of firmware files having different versions of firmware for the B125 to the **b125.update** folder. The B125 will use the firmware file that was last copied to the folder.

Updating Firmware

Before you start the firmware update, there are a few things to be aware of. Check them out in the following topic.

Reviewing Update Considerations

Topcon makes every effort to ensure that the firmware update process is easy, smooth, and reliable. However, on rare occasions the firmware update may fail. If you encounter any of the issues during the update, see "Troubleshooting" on page 12. It is also desirable to have someone physically available at the board in case any interaction is required.

- Make sure a permanent power source is connected and supplies enough power to run the B125 during the entire update procedure.
- The firmware update causes temporary outages in the following board services until the firmware update is complete: the file system and Ethernet interface.
- The update procedure can take up to 12 minutes to complete. Ensure that you schedule a time for the board to be out of commission.
- Do not send any commands, except `%%print,/par/dev/core/1:on`, to the board during the firmware update.
- Do not remove the SD card from the board until a firmware update is complete.

Starting Update Using a Command or FN Key

Make sure the firmware file is copied to the SD card, which is connected to the B125.

You can start the firmware update procedure by using the command `set,update,yes`, or by using the **FN** key.

Send the command `set,update,yes` to initiate the firmware update. Immediately after you send this command, the B125 starts a shutdown procedure, then restarts, and enters firmware update mode. While in this mode, the firmware loader begins updating the firmware image in the flash memory on the B125.

During the update stage, use the command `%%print,/par/dev/core/1:on` to display the progress of the firmware update. This command can only be sent through a serial port connection.

To initiate the firmware update using the **FN** key, take the following steps:
1. Turn off the B125.
2. While holding down the **FN** key, turn on the B125 using the power key.
3. Release the **FN** key within 5 seconds to enter firmware update mode. Holding down the **FN** key for more than 5 seconds, instructs the B125 to exit firmware update mode and to clear the NVRAM.

Starting Update Using TRU in Firmware Loading Mode

To copy and then update the firmware with TRU running in **Firmware Loading** mode, take the following steps:
1. Connect the B125 to TRU using a serial connection as described in Quick-Start to Run the B125 Installed on the Evaluation Board of the B125 Hardware Integration Guide.
2. Configure the network settings of the B125 as described in step 2 of "Configuring a TCP Server" on page 2.
3. In TRU, select **Device ▸ Application Mode ▸ Firmware Loading**.
4. Select **Device ▸ Connect**. In **Connect Using**, select **Network**. In **Device Name**, select your board from the list on the **My Network Devices** window. You can add, edit, and delete the receivers in the list using a pop-up menu, which appears when you right-click somewhere within the window.
5. Click **Connect**. Once a network connection is established, you will see the name and IP address of the B125 in the status bar at the bottom of the window.
6. Click the **Firmware Loading** icon. The **Select Device** window appears. Make sure the **Device Type** is set to Receiver, then click **Next**.
7. Check the board details on the **Information** window and then click **Next**.
8. On the **Select Files** window, navigate to the location of the firmware file. Select the file and click **Next**.
9. TRU will start transferring the firmware file to the SD card. After the firmware file is transferred successfully, a prompt will appear informing you that the firmware update is in progress. Wait for about 12 minutes before attempting to connect to the board using Ethernet.

Monitoring Update

You can monitor the firmware update progress by sending the command `%%print,/par/dev/core/1:on` periodically using a serial port connection only.

The command shows the following operating conditions for the B125 core no.1.

Table 1.

Mode	State	Reply Example
• normal – the firmware is in normal mode of operation. • update – the firmware is in update mode. • stop – the CPU is stopped. • unknown – information about firmware mode is unavailable or unknown.	• run – the firmware is running. • boot – the firmware is booting. • init – the firmware is initializing. • ready – the firmware is ready for an update • check – the firmware is checking an update. • update<1...7> – the firmware is updating an appropriate firmware block. • stop – the CPU is stopped. • shutdown – the shutdown is in progress. • unknown – firmware state is unavailable or unknown	• The firmware is in update mode and is booting the firmware. `RE02A%%/par/dev/core/1={mode=normal,state=boot}` • The firmware is in update mode and is updating the firmware, `RE01F%%/par/dev/core/1={mode=update,state=update2}`

Completing Update

Once the `%%print,/par/dev/core/1:on` command shows `{mode=normal,state=run}`, the firmware update is complete.

View and verify the updated firmware version by sending the command `%%print,/par/rcv/ver/main`.

Troubleshooting

During the firmware update, the board generates two log files in the **b125.update** folder on the SD card.

Should a firmware update fail for any reason, locate these files and submit them to TPS technical support for analysis.

Here are the details about the files:

- upgrade.stamp – a text file that contains the ID's of boards which were updated from the SD card.
- updatefrmerror.log – a text file that contains information about each operation performed by the firmware loader during the update.

Reverting to Previous Firmware

If you need to revert to the previously installed firmware version, follow steps in "Updating Firmware" on page 9.

Make sure the previous firmware file to which you are going to revert is last copied to the **b125.update** folder. For example, if you revert to firmware 5.0 for the B125, the file with this firmware must be last copied to the **b125.update** folder.

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