Connecting to a WiFi Network Using Survey Pro

- Create a "Net" receiver profile for your receiver.
- Go to **Manage Instruments** and select this receiver profile.
- Tap on the ⚙ button corresponding to this receiver profile.
- Open the **Modem** tab.
- Select **Internal Wi-Fi** in the **Data Modem** scroll-down list. Survey Pro lists the detected local WiFi networks. You may use the **Refresh** button to update the list of available networks (tapping on this button starts a new WiFi scan).
- In the list, tap and hold down the name of the chosen WiFi network, then select **Connect** from the pop-up menu.
- Enter the WiFi key specific to this network and check on **Connect to this network automatically when available**.
- Tap ✅ and let the receiver connect to the WiFi network.
- Tap ✅ and proceed with step 2 in the General Procedure.

Appendix

Spectra Loader Software Utility

Use Spectra *Spectra Loader* software to:
1. Upgrade the receiver firmware
2. Install new firmware options
3. Validate CenterPoint RTX subscription.
4. Read the warranty expiration date of a GNSS receiver.

Installing Spectra Loader

Spectra Loader can be downloaded from:

https://spectrageospatial.com/sp85-gnss-receiver/
(See SUPPORT section.)

The install file is an exe file. Simply double-click on this file to start installation. Follow the instructions on the screen to complete the installation.

Getting Started With Spectra Loader

Spectra Loader will use either a serial (RS232), Bluetooth or USB connection to communicate with the receiver. USB is recommended
1. Connect your computer to the SP85 using a USB connection.
2. Run Spectra Loader on your computer.
3. Select the computer's port ID used to communicate with the receiver. This port ID should correspond to the computer's USB port.

    NOTE: An easy way to identify which port ID on your computer is the USB port is to run Spectra Loader first without the USB connection and read the list of available ports in Spectra Loader. After restoring the USB connection with the receiver, check that list again. An extra port ID will then be listed, being the one assigned to the USB port. Select that port. (You don't need to define a baud rate for a USB port.)
4. To upgrade receiver firmware, install a new firmware option or validate a CenterPoint RTX subscription, see sub-sections below.
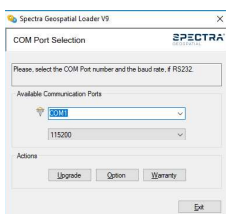
90

Upgrading Receiver Firmware

Firmware upgrades will be downloadable from the Spectra Geospatial website in the form of compressed ".tar" files. The name of the ".tar" file, as well as the step-by step upgrade procedure will be given in the accompanying *Release Note*.

Completing a firmware upgrade procedure will take up to 10 minutes. For this reason, it must be run with the receiver powered from either a properly charged internal battery or using an external power source.

Unless otherwise specified in the *Release Note* attached to the upgrade package, follow the instructions below to complete the upgrade of your receiver:

1. Follow the first three steps described in *Getting Started With Spectra Loader on page 90*.
2. Click **Upgrade**. Wait until Spectra Loader has detected the receiver.
3. Browse your computer in search of the upgrade file.
4. Select the file and click **Open**. Spectra Loader then provides information on the currently installed firmware, the new firmware as well as the current state of the battery (if the internal battery is used).

    This should tell you if you can run the upgrade with the battery, or rather use a fresh one or an external power supply.

5. When you are ready, click on the **Update** button.
6. Let the receiver proceed with the upgrade (a status window is displayed showing a progress bar). **Take care not to turn off the receiver while the upgrade is in progress**.

7. After successful completion of the upgrade, click **Close** to close the status window. Check that the new firmware is now installed (version and date displayed in the Spectra Loader main window).

8. Click **Close** again, then **Exit** to quit Spectra Loader.

Other Receiver Firmware Upgrade Method Just Using a Properly Formatted SD Card (64 MB minimum in size):

1. Check that the SD card used for the upgrade is not write-protected and then insert it into your computer.

2. Using a file browser, copy the ".tar" file to the root directory of the SD card. Make sure there is only one ".tar" file present on the SD card. Delete those not used.

3. Remove the SD card from the computer.

4. Make sure the receiver you want to upgrade is OFF and ready for upgrade (i.e. one sufficiently charged battery present or external AC/DC power block connected and on).

5. Insert the SD card now containing the upgrade file into the receiver.

6. Hold down [icon] and then press [icon] for about 2 to 3 seconds. After about 10 seconds, the Spectra Geospatial logo shown on the screen is replaced with the "**Uploading mode**" message, meaning that the upgrade procedure has now started.

7. Let the receiver proceed with the upgrade. **Take care not to turn off the receiver while the upgrade is in progress**.

   The receiver screen will display successively:

   Uploading mode
   Upgrading Firmware
   Start Upgrade
   Step 1/9
   Step 2/9
   Step 3/9
   Step 4/9
   Step 5/9
   Rebooting
   <Blank>
   Updating System
   {Spectra Geospatial logo}
   Upgrading Firmware
   Start Upgrade
   Step 6/9
   Step 7/9
   Step 8/9

```
Step 9/9
Rebooting
<Blank>
{Spectra Geospatial logo}
{Normal receiver startup}
```

8. Remove the SD card from the receiver.

9. Check that the new firmware is installed (read the second line on the Receiver Identification Screen).

Installing a Firmware Option

Before you start this procedure, make sure you have received an email from Spectra Geospatial containing the POPN corresponding to the firmware option you have purchased.
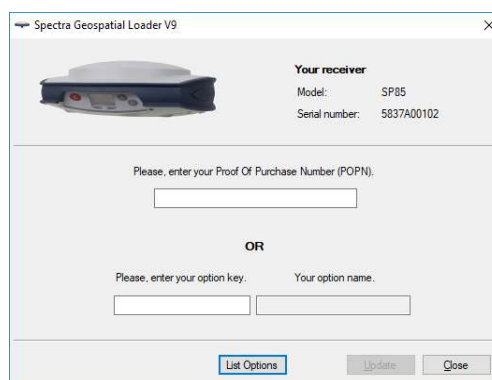
NOTE : Your computer needs an Internet connection to install a firmware option using a POPN.

With the POPN now in your possession, do the following to install a new firmware option:

*   Follow the first three steps described in *Getting Started With Spectra Loader on page 90*.

*   Click **Option**. Wait until Spectra Loader has detected the receiver.

    Spectra Loader then displays the serial number of your receiver and prompts you to enter the POPN.

    (There is an alternate method to activate a firmware option, which is to enter the option key – provided by Spectra Geospatial – corresponding to the desired firmware option, and to specify that option in the nearby field. This method may be used by Spectra Tech Support for maintenance or troubleshooting purposes.)

- Enter the POPN and then click on **Update**. Let the receiver proceed with the installation of the firmware option (a status window is displayed showing a progress bar). **Take care not to turn off the receiver while the installation is in progress**.
- After successful completion of the installation, you may use the **List Options** button to check that the newly installed option is now in the list of installed options. Then click **Close** to close the list of options.
- Click **Close** again, then **Exit** to quit Spectra Loader.

Activating a CenterPoint RTX Subscription

After you have purchased a CenterPoint RTX subscription, *Trimble Positioning Services* will email you an activation code.

Use the same procedure as the one used to install a firmware option (see *Installing a Firmware Option on page 93*; the available RTX subscriptions are listed as firmware options). The only difference is that no POPN is provided for this procedure. Just enter the code provided by *Trimble Positioning Services* and specify the type of subscription you purchased before you click **Update**.

NOTE: SP85 only supports CenterPoint RTX.

Reading Receiver Warranty Expiration Date

Spectra Loader can be used to query the Spectra Geospatial database for the warranty expiration date of your GNSS receiver. (After a receiver warranty has expired, remember receiver firmware upgrades are no longer free of charge.)

You don't need to have your receiver connected to *Spectra Loader* to read its warranty expiration date. Just enter its type and serial number and *Spectra Loader* will return this information to you, provided there is an active Internet connection on your computer, and your receiver is known to the database.

- Run *Spectra Loader* on your computer.
- Click on **Warranty**.
- Select the type of your receiver and enter its serial number.

- Click on **Compute**. *Spectra Loader* returns the warranty expiration date in a field underneath the **Compute** button.

  Additionally, *Spectra Loader* generates a proprietary command that you can run in your receiver if you want to be sure your receiver has the correct warranty expiration date in memory. Carefully write down this command

NOTE: When upgrading the receiver firmware using a computer with an Internet connection, be aware Spectra Loader will at the same time automatically check the warranty expiration date of your receiver. Spectra Loader will ask you if it can update this date if it is found wrong.

Spectra File Manager Software Utility

Spectra File Manager allows you to copy "log" files and G-files directly from the receiver's internal memory to the desired folder on your office computer.

Additionally you can delete any G-file or "log" file from the receiver's internal memory.

G-files are GNSS raw data files in proprietary format (ATOM). "Log" files are editable text files listing all the operations performed by the receiver in one day.

Spectra File Manager is available from the Spectra Geospatial website as an exe file (*SPFileManagerSetup.exe*) through the link below:

https://spectrageospatial.com/sp85-gnss-receiver/
(See SUPPORT section)

Installing Spectra File Manager

Spectra File Manager is very easy to install:

- Download the exe file from the Spectra Geospatial website (use above link).
- Double-click on the exe file to complete the installation.

Connecting SP85 to your Computer

There are different ways of communicating with the receiver:

- **Through Bluetooth**.
- **Through an RS232 line**, using port A on the receiver, and a DB9 or USB socket, on computer side (see illustration below). The default speed for port A on receiver side is 115200 Bd.

*: All these items are part of the Office Power Kit P/N 94336 (option).

The Office Power Kit required for this serial connection is designed to let you power the receiver from an AC outlet rather than from the receiver battery (see illustration above).

When applied to the receiver's DC input, the external power source has priority over the internal battery, which means the battery can be left safely inside the receiver (it won't be drained).

IMPORTANT: Be sure you align the red markings (a red dot on the connector, a red line on the socket) before pushing the Lemo connector in. Conversely, when it's time to disconnect the Lemo connector, please use the attached metal strap to pull the connector out.

- **Through USB**. Connect the SP85 to the computer via the USB-to Mini Universal cable provided.

  The first time you make this connection, the required USB driver will be installed automatically on the computer to make that connection possible.

  When using the receiver's USB port, you can still use the previous setup to power the receiver through its DC input (in this case, you don't need to connect the DB9 connector of the Power/Data cable to the computer).

  In this setup, you can alternately replace the Power/Data cable (P/N 59044-10) from the Office Power Kit with cable P/N 95715 from the Field Power Kit (option). See diagram below.
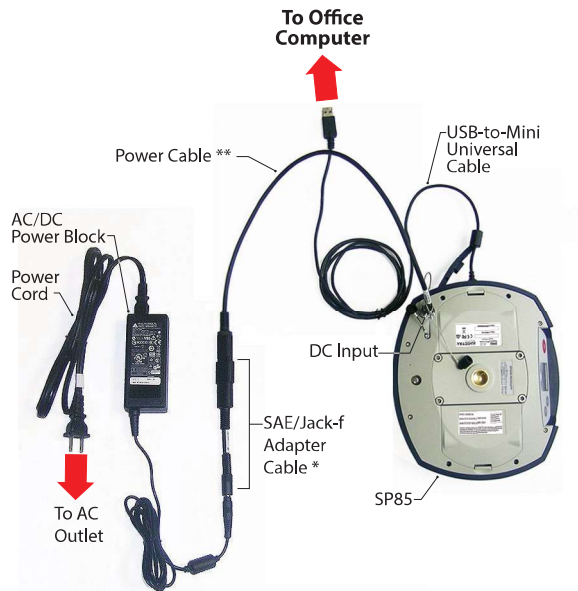

*: This item is part of the Office Power Kit P/N 94336 (option).
**: This item is part of the Field Power Kit P/N 94335 (option)

IMPORTANT: After removing the USB cable, and before going back to the field with your receiver, please place the protection flap back on the USB connector.

Getting Started With Spectra File Manager

Double-click on . The *Spectra File Manager* window which then appears is detailed below.
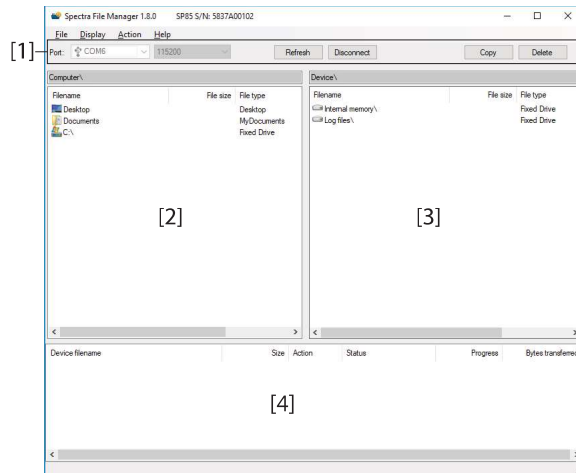
[1]: Spectra File Manager toolbar. This toolbar consists of the following items:

- **Port** and baud rate scroll-down lists: Let you choose which serial port is used on computer side for the connection with the receiver (baud rate only makes sense when an RS232 serial line is used). Use 115200 Bd to communicate with SP85.

- **Connect / Refresh** button: **Connect** allows you to activate the connection between the computer and the receiver via the chosen serial line.

    When the connection is established, the button is changed into **Refresh**, which allows you to update the content of the two *Spectra File Manager* panes (**[2]** and **[3]** described below)

- **Disconnect** button: Allows you to deactivate the connection currently established between the computer and the receiver.

- **Copy** button: Copies the file(s) selected in pane **[3]** to pane **[2]**. In pane **[2]**, you have to open the folder where to copy to before clicking on the **Copy** button.

  NOTE: Copied files have different creation dates and times compared to those of their respective original files. The new dates and times are those corresponding to when the files were copied.

- **Delete** button: Deletes the files currently selected in pane **[2]** or **[3]**.

[2]: Pane showing the content of the currently open folder on computer side.

[3]: Pane showing the content of the currently open folder on receiver side. The receiver's root folder contains two to four sub-folders:

- **Internal memory**: Lists all G-files recorded by the receiver in its internal memory
- **Log files**: Contains log files (one per day). Each log file lists all the actions performed by the receiver in one day.
- **SD Card**, if one is currently inserted in the receiver.
- **USB key**, if one is currently connected to the receiver.

To open a folder, double-click on it. To go back to the parent folder, click on ...

[4]: Pane showing copy/delete operations in progress, and all those completed since the connection with the receiver was established. This pane is cleared at the beginning of each new working session of *Spectra File Manager*.

Establishing a Connection with the Receiver

- Set up the physical connection (RS232 or USB as explained in *Connecting SP85 to your Computer on page 96*)
- Turn on the receiver.
- Launch *Spectra File Manager* on your computer. This opens the *Spectra File Manager* window.
- For an RS232 connection, first edit the line settings (default baud rate for receiver is 115200 Bd) then click on the **Connect** button. For a USB connection, select the right COM port (see also the Note in *Getting Started With Spectra Loader on page 90*) and then click on the **Connect** button.

  As a result, the pane on the right-hand side of the window lists the two or three folders that can be seen on the receiver.

Copying Files to the Office Computer

- In the right-hand side of the window, double-click on the sub-folder containing the files you want to copy to the computer.

  (If needed, click on to go back to the parent folder and open another sub-folder.)
- In the left-hand side of the window, browse your computer to the folder where to copy the files (recipient folder).
- In the right-hand side of the window, highlight the file(s) you want to copy.
- Click on the **Copy** button. Files are then copied, as requested. The lower part of the screen provides reports information on the copy operations in progress.

Deleting Files from the Receiver

- In the right-hand side of the window, double-click on the sub-folder containing the files you want to delete from the receiver.

  (If needed, click on to go back to the parent folder and open another sub-folder.)
- Still in the right-hand side of the window, highlight the file(s) you want to delete.
- Click on the **Delete** button. Files are then deleted. The lower part of the screen provides reports information on the delete operations in progress.

Restoring Factory Settings

This is done by pressing simultaneously the three front panel buttons (Power + Scroll + Log). All factory settings are restored, except the following, which are kept unchanged:

- GSM
    - PIN code
    - APN
    - Login
    - Password
    - Network

- Bluetooth
    - PIN code
    - Receiver's Bluetooth name

- WiFi
    - IP
    - Mask
    - Gateway
    - DNS1, DNS2

- Anti-Theft & startup protections
    - Current states (enabled or disabled)
    - Password
    - Anti-Theft position
    - Last position computed
    - Phone numbers and email addresses programmed to receive alerts in case of theft.

- E-mail settings.

Restoring factory settings is not allowed in any of the following cases:

- Anti-theft protection is active
- Startup protection is active
- A validity period is active (whether still in progress or over). (Validity periods are designed to let users work with the receiver in a predefined configuration and for a limited period of time.)

Alerts The table below lists some of the level-1 and level-2 alerts you should know.

All indicate problems that can be remedied without external support. The ANTI-THEFT ALARM is a special one as it requires that you take the necessary steps to get your receiver back. These are left to your own initiative.

#	Alert	Remedy	Level
30	No SIM card detected	Insert SIM card, or replace (silent) SIM card.	2
41	Memory full	Free memory space before doing anything else.	1
42	SD card removed while file opened	File may not have been closed correctly and so the file may be lost. Insert the SD card back and start a new recording sequence. Data will be recorded in a new file. Remember you shouldn't remove the SD card while it's being used.	2
49	Radio power not allowed	May happen when the UHF option is used as a transmitter and the internal temperature does not allow the initially requested power to be radiated. Full power will be restored when the internal temperature allows it.	2
58	Low battery	Receiver's last battery going low. Insert fresh batteries.	1
59	Low voltage	External power source going low. Change external power source.	1
82	Not enough space left	Free memory space before doing anything else.	2
88	WARRANTY END DATE	Your receiver's warranty for major free firmware upgrades has expired.	1
96	ANTI-THEFT ALARM	Theft detected: • Take the necessary steps based on the notifications received via email or SMS. • If it's a false alarm due to misuse of the anti-theft protection (you are standing next to the receiver), use your data collector to deactivate the Anti-Theft protection and stop the alarm.	1
99	SIM card locked	Take the necessary steps to unlock the SIM card, then try again.	1
103	No SD card detected	Insert SD card, or replace (silent) SD card.	2
104	UPGRADE FAILED	Resume upgrade procedure from the beginning.	1

If the receiver reports some other alerts, these may result only from temporary problems (e.g. from the configuration or operation of the modem, WiFi, network, UHF option, etc.).

Acknowledge the alert from the receiver front panel, make the necessary corrections (if required) and check that everything goes back to normal afterwards.

If the problem persists, please contact Technical Support.

Technical Specifications

GNSS Characteristics

- 600 GNSS channels
  - GPS L1 C/A, L1P (Y), L2C, L2P (Y), L5
  - GLONASS L1 C/A, L1P, L2 C/A, L2P, L3
  - BeiDou (phase 2) B1, B2
  - Galileo E1, E5a, E5b
  - QZSS L1 C/A, L1C, L2C, L5
  - IRNSS L5
  - SBAS L1C/A, L5 (WAAS, EGNOS, MSAS, GAGAN, SDCM)
  - L-Band MMS

- Patented Z-Blade technology for optimal GNSS performance:
  - Full utilization of signals from all 7 GNSS systems (GPS, GLONASS, BeiDou, Galileo, QZSS, SBAS and IRNSS)
  - Enhanced GNSS-centric algorithm: Fully independent GNSS signal tracking and optimal data processing, including GPS-only, GLONASS-only, Galileo-only or BeiDou-only solution (Autonomous to full RTK)

- Fast Search engine for quick acquisition and re-acquisition of GNSS signals.
- SBAS ranging for using SBAS code & carrier observations and orbits in RTK processing
- Patented Strobe™ Correlator for reduced GNSS multi-path
- Up to 20 Hz real-time raw data (code & carrier and position output)
- Supported data formats: ATOM, CMR, CMR+, RTCM 2.1, 2.2, 2.3, 3.0, 3.1 and 3.2 (including MSM), CMRx and sCMRx (rover only)
- NMEA 0183 messages output

Real-Time Accuracy (RMS)
(1) (2)

SBAS (WAAS/EGNOS/MSAS/GAGAN):
- Horizontal: < 50 cm (1.64 ft)
- Vertical: < 85 cm (2.79 ft)

Real-Time DGPS Position:
- Horizontal: 25 cm (0.82 ft) + 1 ppm
- Vertical: 50 cm (1.64 ft) + 1 ppm

Real-Time Kinematic Position (RTK):
- Horizontal: 8 mm (0.026 ft) + 1 ppm
- Vertical: 15 mm (0.049 ft) + 1 ppm

Network RTK (8):
- Horizontal: 8 mm (0.026 ft) + 0.5 ppm
- Vertical: 15 mm (0.049 ft) + 0.5 ppm

Real-Time Performance
- Instant-RTK® initialization
    - Typically 2 seconds for baselines less than 20 km
    - Reliability: up to 99.9%
- RTK initialization range: over 40 km

Post-Processing Accuracy (RMS)
(1)(2)

Static & Fast Static:
- Horizontal: 3 mm (0.118") + 0.5 ppm
- Vertical: 5 mm (0.196") + 0.5 ppm

High-precision Static (3):
- Horizontal: 3 mm (0.118") + 0.1 ppm
- Vertical: 3.5 mm (0.137") + 0.4 ppm

Data Logging Characteristics
Recording Interval: 0.05 - 999 seconds

Physical Characteristics
- Size: 22.2 x 19.4 x 7.5 cm (8.7 x 7.6 x 3.0")
- Weight:
  (alone, without battery): 1.17 kg (2.57 lb)
  With two batteries: 1.3 kg
  With two batteries and UHF radio: 1.40 kg
- User interface: Graphical PMOLED display; Web UI (accessible via WiFi) for easy configuration, operation, status reading and data transfer.

- I/O interface:
  - RS232 serial link
  - USB 2.0/UART
  - Bluetooth 5.0 Dual Mode
  - WiFi (802.11 b/g/n)
  - 3.5G quad-band GSM (850/900/1800/1900 MHz)/penta-band UMTS module (800/850/900/1900/2100 MHz)

- Memory:
  - 4 GB internal memory NAND Flash (3.5 GB user data)
  - Over 2 years of 15 sec. raw GNSS data from 14 satellites
  - Removable SD/SDHC memory card (up to 32 GB)

- Operation:
  - RTK rover & base
  - RTK network rover: VRS, FKP, MAC
  - NTRIP, Direct IP
  - CSD mode
  - Post-processing
  - RTK Bridge
  - UHF repeater
  - UHF networking
  - Trimble RTX (satellite and cellular/IP)

- Environmental characteristics:
  - Operating temperature: -40° to +65°C (-40° to +149°F) (4) (5)(6)
  - Charging batteries left inside the receiver using an external power source: The ambient temperature should not exceed +40°C (104°F)
  - Storage temperature: -40° to +85°C (-40° to +185°F)(7)
  - Humidity: 100% condensing
  - IP67 waterproof, sealed against sand and dust
  - Drop: 2 m pole drop on concrete
  - Shock: ETS300 019
  - Vibration: MIL-STD-810F

- Power characteristics:
    - 2 Li-Ion hot-swappable batteries, 41.4 Wh (2 x 7.4 V, 2800 mAh)
    - Battery life time with two batteries: 10 hrs (GNSS On, and GSM or UHF Rx On)
    - External DC power: 9-28 V

(1) Accuracy and TTFF specifications may be affected by atmospheric conditions, signal multipath, satellite geometry and corrections availability and quality.
(2) Performance values assume minimum of five satellites, following the procedures recommended in the product manual. High multipath areas, high PDOP values and periods of severe atmospheric conditions may degrade performance.
(3) Long baselines, long occupations, precise ephemeris used
(4) At very low temperatures, the UHF module should not be used in the transmitter mode.
(5) At very high temperatures, an external battery may be required.
(6) With the UHF module (optional kit) used as a transmitter and radiating 2 W of RF power, the operating temperature range is limited to -40° to +55°C (-40° to +131°F).
(7) Without batteries. Batteries can be stored up to +70°C.
(8) Network RTK PPM values are referenced to the closest physical base station.

Standard & Optional System Components

See *SP85 Packout on page 2*.

Data Collectors and Software

The following options are available for use with SP85.

Data collectors:

- ST10 tablet
- Ranger 7
- Ranger 3
- T41
- MobileMapper 20
- MobileMapper 50

Field software:

- Survey Pro
- Survey Mobile (Android)
- SPace control app for 3rd party devices (Android)

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