SMART-V1/SMART-V1G ANTENNA™

QUICK START GUIDE

This guide provides the basic information you need to set up and begin using your new SMART-V1 or SMART-V1G. For more detailed information on the installation and operation of your receiver, please refer to the OEMV user manuals. The manuals and their latest updates may be found on our website at:

http://www.novatel.com/support/docupdates.htm

SMART-V1/V1G BOX CONTENTS

Accompanying this quick start guide, the following are also provided with your SMART-V1/V1G:

- 1 CD containing:
  - An installation program for NovAtel's Control and Display Unit (**CDU**) graphical user interface software
  - Product documentation, including user manuals
- 1 User Manuals postcard for requesting printed manuals

SMART-V1/V1G OPTIONAL CABLES

- The SMART-V1 is availble with a USB, CAN or RS-422 multi-connector cable (these have 7 open ends, see *Table 1*, or have no connectors, that is, all open-ended):
  - USB (18-pin connector to 2 serial DB-9 connectors, 1 USB connector)
  - CAN (18-pin connector to 2 serial DB-9 connectors, 1 CAN DB-9 connector)
  - RS-422 (18-pin connector to 3 serial DB-9 connectors)
- The SMART-V1G is available with the USB cable above.

✉ The multi-cables are also available without any connectors but with all their wires open-ended.

Table 1: Multi-Cables Bare Tagged Wire Colors

Color	Function	Color	Function
Red	PWR	Green	Digital GND
Orange	PWR2	Brown	GND2
Blue	T SIG *(PPS)*	Black	GND
Yellow	Reserved		

## ADDITIONAL EQUIPMENT REQUIRED

The additional equipment listed below is required for a basic setup:

- A Windows-based PC with an RS-232 DB-9 port
- A power supply and connection (+9 to +28 V DC)
- One of the optional cables detailed in the *SMART-V1/V1G Optional Cables* section earlier in this guide

SETTING UP YOUR SMART-V1/V1G

Complete the steps below to connect and power your receiver.

1. Mount the SMART-V1/V1G on a secure, stable structure with an unobstructed view of the sky.
2. Connect the SMART-V1/V1G to a serial port on the PC.


USB or CAN to PC

COM2   COM1
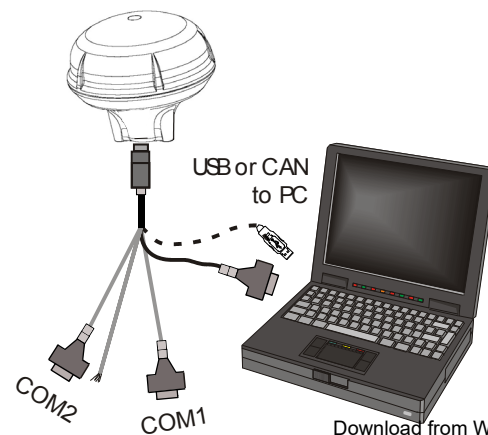
3. When connecting power to the SMART-V1 or SMART-V1G, it is recommended that you use a battery source. In this case, it is **important** that you tie together the bare wires tagged as GND2 (brown) and GND (black) to the battery's negative terminal. Tie the bare wires tagged as PWR (red) and PWR2 (orange) to the battery's positive terminal.

Guidelines for grounded and floating installations are shown in the following diagrams.

Chassis Ground Application
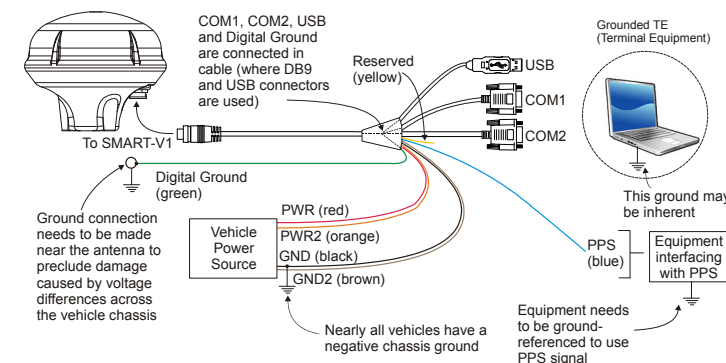
Floating TE Application
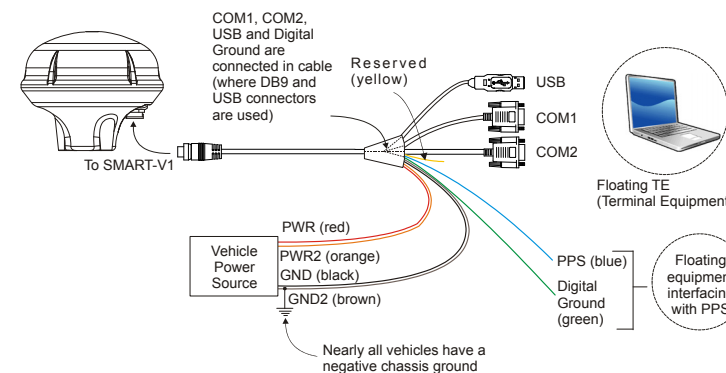
⚠ *WARNING:* *If you do not use a battery, you must tie together the bare wires tagged as GND2 (brown), GND (black) and DIGGND (green) to the DC power supply's negative ground connector. Failure to tie the appropriate grounds, as explained in this section, may result in your SMART-V1/V1G becoming permanently damaged and void your warranty.*

Normally when a vehicle engine is started, power can dip to around 9.6 VDC or even cut-out to ancillary equipment.

INSTALLING THE PC UTILITIES

Once the SMART-V1/V1G is connected to the PC and power supply, install NovAtel's PC Utilities.

1. Start up the PC.
2. Insert the accompanying CD in the CD-ROM drive of the computer.
3. Select *Install the OEMV GPS PC Utilities* from the window that is automatically displayed. If the window does not automatically open when the CD is inserted, select *Run* from the *Start* menu and select the *Browse* button to locate *Setup.exe* on the CD drive.
4. Install the PC Utilities by advancing through the steps provided in the *NovAtel GPS PC Utilities* setup program.

ESTABLISHING RECEIVER COMMUNICATION

To open a serial port to communicate with the receiver, complete the following.
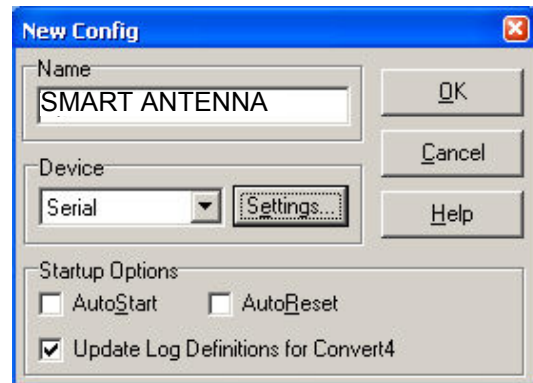
1. Launch **CDU** from the *Start* menu folder specified during the installation process. The default location is *Start | Programs | NovAtel OEMV | OEMV PC Software*.

2. Select *Open....* from the *Device* menu.
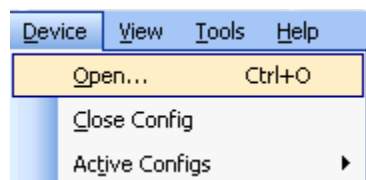
3. Select the *New...* button in the *Open* dialog box.

4. Enter a name for the new device configuration in the *Name* field of the *New Config* dialog box.

5. Select the *Settings* button.

6. Select the PC serial port the SMART-V1/V1G is connected to from the *PC Port* drop-down list.

7. Select *57600* from the *Baud Rate* list.

8. Uncheck the *Use hardware handshaking* checkbox.

9. Select *OK* to save the settings.
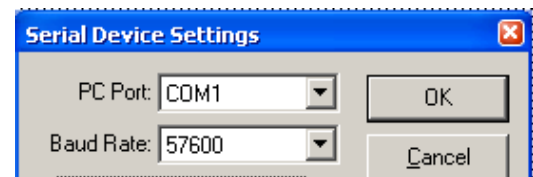
10. Select the *OK* button to close the *New Config* dialog box and create the new device configuration.

11. Select the new configuration from the *Available device configs* list in the *Open* dialog box.

12. Select the *Open* button to open communications with the SMART-V1/V1G.

As **CDU** establishes the communication session with the receiver, a progress box is displayed.

Once **CDU** is connected, the progress box disappears and several windows open, including the Console window. **CDU** is now ready to be used to view status information, enter commands, or log data.

USING CDU

CDU provides access to key information about your receiver and its position. The information is displayed in windows accessed from the *View* menu. For example, select *Position Window* from the *View* menu to display the position solution of the receiver. To show details of the GPS and geostationary (SBAS) satellites being tracked, select the *GPS Tracking Status Window* from the *View* menu. Select *Help* from the main menu for more details on **CDU**, its windows and features.
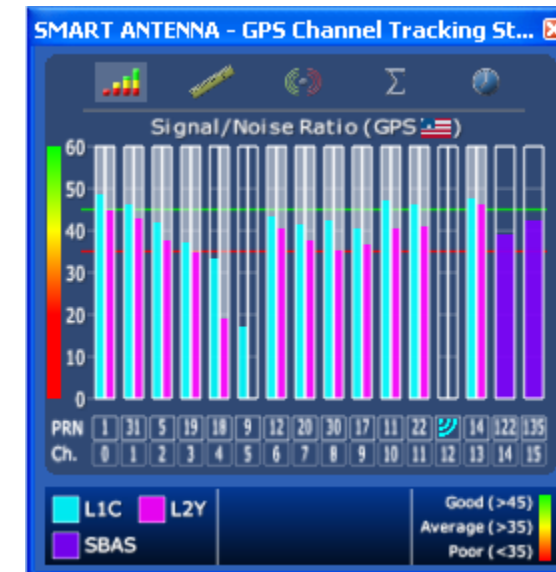
DETERMINING WHEN THE POSITION IS VALID

When the receiver has a valid position, the *Solution Status* field in **CDU**'s *Position* window shows *Computed.*

Solution Status	Computed

ENTERING COMMANDS

The SMART-V1/V1G uses a comprehensive command interface. Commands can be sent to the receiver using the *Console* window in **CDU**, which is opened from the *View* menu. Enter commands in the text box at the bottom of the *Console* window.
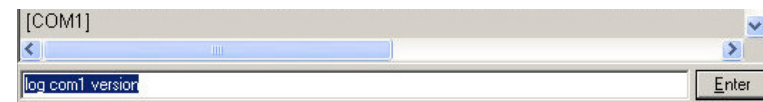
The following information is important when entering commands:

- Commands can be entered in three formats:
  - ASCII (log bestposa)
  - Abbreviated ASCII (log bestpos)
  - Binary (log bestposb).

  Abbreviated ASCII is the best format to use when you wish to work with the receiver directly. For data collection, use ASCII or Binary.

- Press *Enter* to send the command string to the receiver.
- The commands are not case sensitive.

The *OEMV Family Quick Reference Guide* provided with the receiver lists the available commands and the parameters they use for the *Abbreviated ASCII* format.

LOGGING DATA

An extensive collection of logs has been created to capture the data your SMART-V1/V1G receives and processes. These logs can be directed to a SMART-V1/V1G port (COM1, COM2 or USB) and can be automatically generated when new or changed data becomes available or at regular intervals. The available logs are listed in the *OEMV Family Quick Reference Guide*.

To log data, use the `LOG` command. For example, to log the pseudorange position to COM 2 every 30 seconds, enter the following:

```
LOG COM2 PSRPOS ONTIME 30
```

Logs can be generated in one of three formats: ASCII, Abbreviated ASCII, or Binary. Refer to the *OEMV Family Firmware Reference Manual (OM-20000094)* for information on the `LOG` command, specifying the output format, and the detailed contents of each log.

If you prefer, **CDU** provides a graphical interface for configuring data logging. Select *Logging Control Window* from the *Tools* menu. In the *Logging Control* window, you can select which logs to capture and choose to which ports to send the data. In addition, you can specify a file in which to save the data.
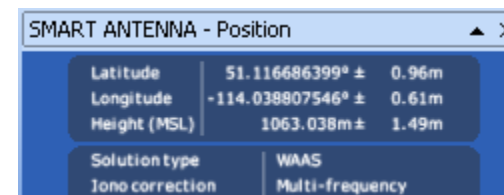

ENABLING SBAS POSITIONING

SMART-V1/V1G models are also capable of SBAS positioning. This positioning mode is enabled using the `SBASCONTROL` command. The following commands are typically used to enable WAAS (North America) and EGNOS (Europe) systems:

```
SBASCONTROL ENABLE WAAS

SBASCONTROL ENABLE EGNOS
```

Once enabled, the *Position Type* field shown in **CDU**'s *Position* window should change from *Single* to *WAAS* and you may see SBAS satellites in the *Constellation window*.

ENABLING L-BAND POSITIONING

L-Band equipped receivers allow you to achieve sub-meter accuracy. To use this positioning mode, you must enable L-band tracking to the Canada-Wide Differential GPS (CDGPS) or OmniSTAR signal. A subscription to OmniSTAR is required to use the OmniSTAR service (visit http://www.omnistar.com and have your receiver's serial number ready). The CDGPS signal is free and available without subscription over North America (visit http://www.cdgps.com).

The ASSIGNLBAND command allows you to set OmniSTAR or CDGPS base station communication parameters and to start tracking L-Band satellites. It should include a relevant frequency and data rate. The frequency assignment can be made in Hz or KHz. For example:

Hz: `assignlband omnistar 1536782000 1200`

KHz: `assignlband omnistar 1536782 1200`

A value entered in Hz is rounded to the nearest 500 Hz.

To confirm you are tracking an L-Band signal, log the L-Band status information by entering: `log lbandstat`. For example, if you are receiving CDGPS, the fifth field after the header should be 00c2:

```
lbandstata com1 0 43.5 finesteering 1295
149951.671 00000000 976f 34461;
1547546977 46.18 4541.0 0.00 00c2 00f0 ...
```

To specify the correction source, use the PSRDIFFSOURCE command as shown in the examples below:

```
PSRDIFFSOURCE OMNISSTAR      or,
PSRDIFFSOURCE CDGPS
```

otherwise it is left at the default `AUTOMATIC`.

✉ Refer to the *OEMV Family Firmware Reference Manual* for more details on individual L-Band or SBAS commands and logs.

REAL-TIME KINEMATIC (RTK) POSITIONING

Corrections can be transmitted from a base station to a rover station to improve position accuracy. The base station is the GNSS receiver which is acting as the stationary reference. It has a known position and transmits correction messages to the rover station. The rover station is the GNSS receiver which does not know its exact position and can receive correction messages from a base station to calculate differential GNSS positions.

In most cases you need to provide a data link between the base station and rover station (two NovAtel receivers) in order to receive corrections. SBAS and L-Band corrections can be accomplished with one receiver and are exceptions to the base/rover concept. Generally a link capable of data throughput at a rate of 9600 bits per second, and less than 4.0 s latency, is recommended.

Once your base and rover are set up, you can configure them for RTCM, RTCMV3 or CMR corrections. An RTCM example follows (replace the latitude, longitude and height coordinates shown in the FIX command line with those of your base):

Base

```
interfacemode com2 none rtcm off
fix position 51.11358042 -114.04358013 1059.4105
log com2 rtcm3 ontime 10
log com2 rtcm22 ontime 10 1
log com2 rtcm1819 ontime 1
log com2 rtcm1 ontime 5
```

Rover

```
interfacemode com2 rtcm none off
```

RT-20, with AdVance RTK, is a real-time kinematic software product developed by NovAtel. Optimal RTK performance is achieved when both the base and rovers are NovAtel products. However, AdVance RTK will operate with equipment from other manufacturers when using RTCM messaging.

RT-20 is supported by GPS-only and GPS+GLONASS models. Also, RT-20 with GPS+GLONASS provides faster convergence.

✉ Refer to the GPGST log's usage box in the *OEMV Firmware Reference Manual* for a definition of RMS and other statistics.

USING THE CAN BUS

A CAN Bus is a serial bus that provides services for processes, data and network management. There is a CAN Bus capable model of the SMART-V1 with its own multi-cable. CAN Bus functionality is controlled through NovAtel's optional API software available through Customer Service. The API header file (*.h), in the API folder after installation, includes documentation on using the CAN Bus.

POST PROCESSING

Post-mission data processing refers to when the GPS data collected by the receiver is processed after the entire data-collection session is complete.

OEMV-based output is compatible with post-processing software from the Waypoint Products Group, NovAtel Inc. For details, visit our website at:

http://www.novatel.com/products/waypoint_pps.htm

QUESTIONS OR COMMENTS

If you have any questions or comments regarding your SMART-V1 or SMART-V1G please contact NovAtel using one of these methods:

Email: support@novatel.com

Web: www.novatel.com

Phone: 1-800-NOVATEL (U.S. & Canada)
403-295-4900 (International)

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