

# SPAN-CPT™

## QUICK START GUIDE

GM-14915081 REV 2 May/2012

This guide provides the basic information you need to set up and begin using your SPAN-CPT system.



### BOX CONTENTS

In addition to this quick start guide, the following is provided in your SPAN-CPT package:

- 1 SPAN-CPT (Integrated Receiver and IMU)
- 1 SPAN-CPT interface cable
- 1 CD containing PC Utilities and product documentation
- 1 User Manual postcard for requesting printed manuals

### ADDITIONAL EQUIPMENT REQUIREMENTS

The following additional equipment is needed for a basic setup:

- A Windows®-based PC with an RS-232 or USB port
- A power supply of +9 to +18 V DC
- A quality dual frequency GNSS antenna such as the GPS-702, or GPS-532 for airborne/high speed applications. For L-Band corrections use the GPS-702L antenna
- A TNC to appropriate antenna connector RF cable

### INSTALL THE PC UTILITIES

Before setting up your SPAN-CPT system, install NovAtel's *PC Utilities* on the Windows-based computer that you will use to communicate with it. This computer must have an RS-232 DB-9 or USB port.

1. Start up the computer.

2. Insert the accompanying CD in the CD-ROM drive of the computer.



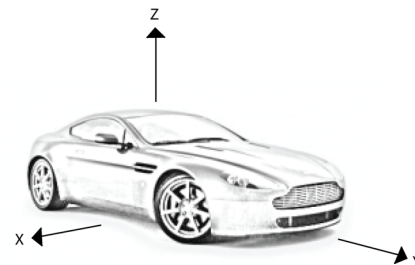
To access and download the most current version of our OEMV PC Utilities, go to the Support page of the NovAtel web site at [www.novatel.com](http://www.novatel.com).

3. Select *Install the OEMV 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.

### SET UP YOUR SPAN-CPT HARDWARE

Complete the following steps to set up and power your SPAN-CPT system.

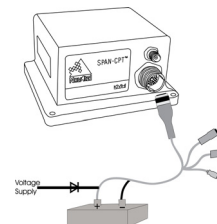
1. Mount the SPAN-CPT enclosure and antenna securely to a vehicle. **For the simplest operation, the Y-axis of the SPAN-CPT should be aligned with the forward axis (direction of travel) of the vehicle. The Z-axis should be pointing up.** Ensure that the GNSS antenna and enclosure cannot move relative to each other. The distance and relative direction between them must be fixed.



2. Connect the SPAN-CPT interface cable to the multi-purpose I/O connector on the SPAN-CPT.



3. Connect the SPAN-CPT USB cable to a computer USB port or connect COM1 of the SPAN-CPT to a computer COM port.
4. Connect the GNSS antenna to the antenna port on the SPAN-CPT using an appropriate antenna cable.
5. Apply power to the SPAN-CPT. It is recommended that you place a back-up battery between the SPAN-CPT and its voltage supply as a power buffer if installed in a vehicle.



### COMMUNICATE WITH THE SPAN-CPT SYSTEM

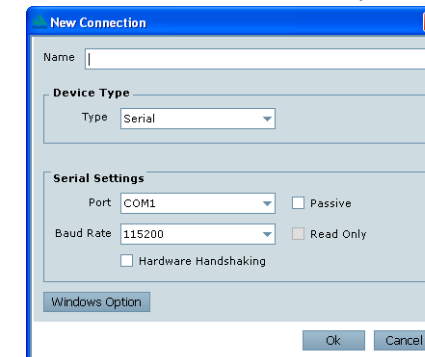
Serial or USB communication can be done using the NovAtel **Connect** software (installed with the PC Utilities) or a standard terminal program, such as Hyperterminal.

To establish a connection to the SPAN-CPT using **Connect**:

1. Launch **Connect** from the *Start* menu folder specified during the installation process. The default location is *Start | All Programs | NovAtel PC Software | NovAtel Connect*.
2. Select *New Connection* from the *Device* menu.

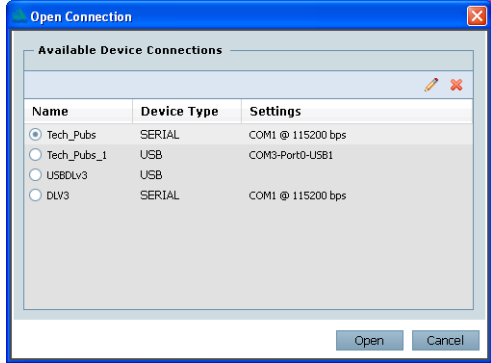


3. Enter a name for the Connection setup.



4. Select *Serial* from the *Type* list.
5. Select the computer port the SPAN-CPT is connected to from the *Port* list.
6. Set the COM port for the receiver to communicate through.
7. Select *115200* from the *Baud Rate* list.
8. Ensure the *Hardware Handshaking* box is not checked.
9. Click the *OK* button to save the new device settings.

10. From the *Device* menu, select *Open Connection*.

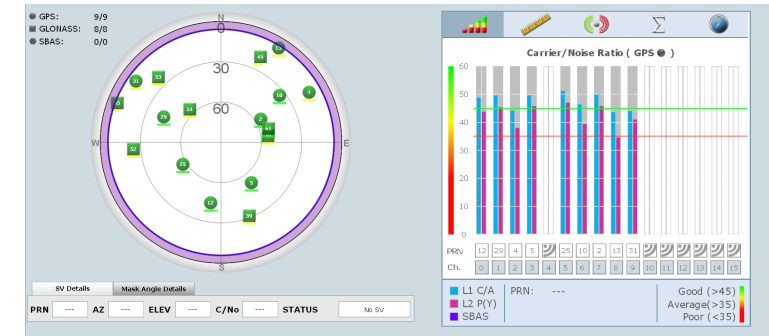


11. Select the new configuration from the *Available Device Connections* area of the *Open* dialog and click the *Open* button.

**Connect** establishes a communication session with the receiver and displays the progress. Once connected, the progress box disappears and several windows open, including the Console window. **Connect** is now ready for use to view status information, enter commands or log data.

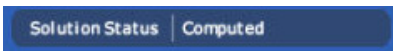
**USING NOVATEL CONNECT**

**Connect** 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 GNSS and geostationary (SBAS) satellites being tracked, select the *Tracking Status Window* from the *View* menu. Select *Help* from the main menu for more details on **Connect**, its windows and features.



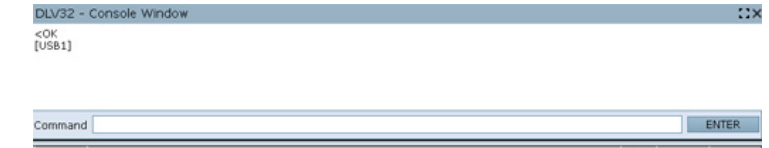
**DETERMINING WHEN THE POSITION IS VALID**

When the receiver has a valid position, the *Solution Status* field in the **Connect Position** window shows *Computed*:



**ENTERING COMMANDS**

The SPAN-CPT uses a comprehensive command interface. Commands can be sent to the receiver using the *Console* window in **Connect**, which is opened from the *View* menu. Enter commands in the text box at the bottom of the *Console* window.



The *OEMV Family Quick Reference Guide*, provided on the CD and available on the NovAtel website, provides comprehensive information about available commands. The *SPAN-CPT User Manual* provides information on a subset of these commands; in particular, the ones commonly used on the SPAN-CPT.

**SAVECONFIG COMMAND**

If you change the configuration of a function and want to save the new settings for your next session, use the SAVECONFIG command.

When using **Connect** to configure your receiver, ensure all of the graphical windows are closed before you issue the SAVECONFIG command.

**CONFIGURE SPAN-CPT USING CONNECT**

Follow these steps to enable INS as part of the SPAN system using the NovAtel **Connect** software utility:

1. Select *Wizards | SPAN Alignment* from the NovAtel Connect toolbar.



This wizard takes you through the steps to complete a coarse or fast alignment and configure the receiver port that is connected to the IMU, to accept IMU data.

**Configuration for Alignment**

The default alignment method for a SPAN-CPT is the fast or kinematic alignment. The fast or kinematic alignment is performed by estimating the attitude from the GNSS velocity vector and injecting it into the SPAN filter as the initial system attitude. For this estimate to be made, the vehicle must move faster than 1.15 m/s.

**CONFIGURE GNSS**

Depending on the accuracy of the solution required, the GNSS can be augmented with a number of correction sources including SBAS, L-Band and RTK (RTCA, RTCM, RTCM V3 and CMR). Refer to the OEMV Installation and Operation Manual / ProPak-V3 Quick Start, for SBAS, L-Band or RTK setup and operation.

## CONFIGURE SPAN-CPT USING THE COMMAND LINE

### MEASURE THE LEVER ARM

Enter the distance from the IMU to the GNSS antenna using the SETIMUTOANTOFFSET command. The offset between the antenna phase centre and the IMU axes must remain constant and be known accurately (m). The X (pitch), Y (roll) and Z (azimuth) directions are clearly marked on the IMU enclosure. The SETIMUTOANTOFFSET parameters are (where the standard deviation fields are optional):

```
x_offset y_offset z_offset [x_stddev] [y_stddev] [z_stddev]
```

For the integrated INS/GNSS system to have the best level of accuracy, the offset should be measured to within a millimetre. Any error in this measurement will show up in the output position. For example, a 10 cm error in measuring this offset will result in at least a 10 cm error in the output. If the system is installed in line with the vehicle, this is the only configuration required.

### LOG SPAN-CPT DATA

Raw GNSS, IMU and navigation data (position, velocity, attitude) are available from the system as ASCII or binary logs.

Data can be collected through **Connect** using the *Logging Control* window, or sent out the IMU COM port to user-supplied data collection software.

For post-processing applications, collect the data shown in the *Data for post-processing* section in this guide.

For real-time applications, the GNSS/INS solution is available through the logs listed in the *SPAN-CPT User Manual* including INSPOS, INSVEL, INSATT and INSPVA. These logs can be collected at rates up to the IMU data rate (100 Hz); however, there are some rate restrictions. Refer to the *Data Collection* section in the *SPAN Operation* chapter of the *SPAN-CPT User Manual*.

## OPERATE THE SPAN-CPT SYSTEM

The system is ready to go once it is powered and the INS and GNSS are configured using the previously shown commands.

Observe the status of the system in the *INS* window of NovAtel **Connect** or in the status field of any of the INS solution logs (for example INSPOS, INSVEL, INSATT and INSPVA).



INS data is available once there is a good GNSS solution. Therefore, an antenna must be connected for the system to function.

The following status stages may be observed:

- The status changes from INS\_INACTIVE to INS\_ALIGNING once the receiver computes a GPS solution.
- The default alignment method for CPT is a kinematic alignment. The INS solution will begin once the vehicle starts to move faster than 1.15 m/s. Alternatively, you can set the attitude of the system manually by using the SETINTAZIMUTH command. See the *SPAN-CPT User Manual* for more details on how to use this command.
- The status changes to INS\_ALIGNMENT\_COMPLETE when alignment is completed. After some motion (stops, starts and turns), the attitude solution converges to within specifications, and the status changes to INS\_SOLUTION\_GOOD.
- The status may occasionally change to INS\_BAD\_GPS\_AGREEMENT. This status indicates that the inertial solution has detected poor quality GNSS positions from the receiver due to limited satellite visibility or high multipath conditions. The inertial filter may choose to disregard this information and wait for the GNSS quality to improve. The solution is still valid during these times, it is simply a warning flag that the GNSS/INS solution is more reliable than the GNSS-only solution.

## DATA FOR POST-PROCESSING

Post-processing requires collection of simultaneous data from the base and rover stations. This includes accurate coordinates of the base station and accurate measurement of the IMU to antenna separation.

Collect the following data for post-processing:

- From the base station
  - RANGECMPB ontime 1
  - RAWEPHEMB onnew
- From the rover station(s)
  - RANGECMPB ontime 1
  - RAWEPHEMB onnew
  - RAWIMUSB onnew
  - BESTLEVERARMB onnew

SPAN-CPT system output is compatible with Inertial Explorer post-processing software from the Waypoint Products Group, NovAtel Inc. Visit our website at [www.novatel.com](http://www.novatel.com) for details.

## Questions or Comments

If you have any questions or comments regarding your SPAN-CPT system, please contact NovAtel Customer Service by:

Email: [support@novatel.com](mailto:support@novatel.com)

Web: [www.novatel.com](http://www.novatel.com)

Phone: 1-800-NOVATEL (U.S. & Canada)  
1-800-668-2835

1-403-295-4900 (International)

Fax: 1-403-295-4901



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