

SPAN-CPT QUICK START GUIDE



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

ADDITIONAL EQUIPMENT REQUIREMENTS

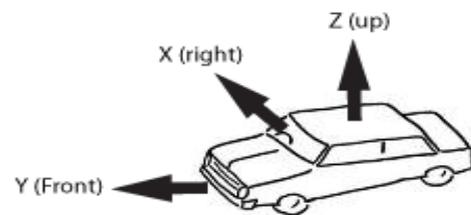
The following additional equipment is needed for a basic setup:

- A Windows-based PC with an RS-232 or USB port
- A power supply of +9 to +18 V DC
- A quality dual frequency GPS 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 connector RF cable

SET UP YOUR SPAN-CPT HARDWARE

Complete the following steps to set up and power your SPAN-CPT system. The example graphics show the connections on the SPAN-CPT.

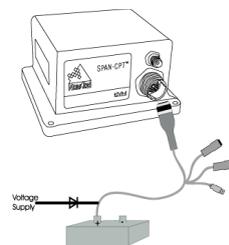
1. Mount the SPAN-CPT enclosure and antenna securely to a vehicle. **For the simplest operation, the Y-axis of CPT should be aligned with the forward axis (direction of travel) of the vehicle. The Z-axis should be pointing up.** Ensure that the GNSS antenna and enclosure cannot move relative to each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



2. Connect COM1 of the SPAN-CPT to a computer/laptop COM port or connect the SPAN-CPT USB cable to a computer/laptop USB port.
3. Connect the GPS antenna to the antenna port on the SPAN-CPT using an appropriate antenna cable.



4. 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. When a vehicle engine is started, power can dip to 9.6 V DC or cut-out to ancillary equipment.



INSTALL THE PC UTILITIES

Once the SPAN-CPT system is connected to the PC, antenna, and power supply, install NovAtel's PC Utilities. The PC utilities provide a graphical user interface for communications with the receiver through a PC. The tools can be used for configuration, monitoring, and data logging.

1. Insert the accompanying CD in the CD-ROM drive of the computer. PC tools can be installed from the CD included by running *setup.exe* in the install directory.

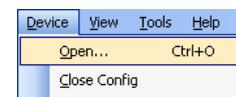
COMMUNICATE WITH THE SPAN-CPT SYSTEM

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

Start **CDU** on your PC to enable communication:

1. Launch **CDU** from the *Start* menu folder specified during the installation process. The default location is *Start | Programs | NovAtel OEMV | NovAtel CDU*.

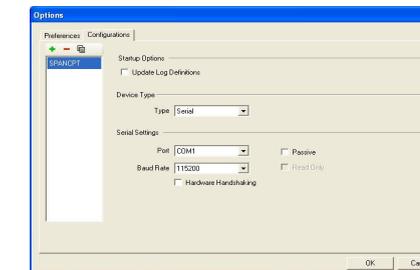
2. Select *Open....* from the *Device* menu.



3. Select the *New...* button in the *Open* dialog box. The *Options | Configuration* dialog opens.

4. Use the button at the top of the configurations selection box to add a new configuration. To delete a configuration, select it from the list and click on the button. To duplicate an existing configuration, click on the button. You can edit any configuration in the list by selecting it.

5. Select *Serial*, from the *Type* list and select the PC/laptop port, that the SPAN-CPT is connected to, from the *Port* list.



6. Select *115200* from the *Baud Rate* list.
7. Uncheck the *Hardware Handshaking* checkbox.
8. Select *OK* to save the new device settings.
9. Select the new configuration from the *Available device configs* area of the *Open* dialog and press the *Open* button to open the configuration.



As **CDU** establishes the communication session with the receiver, it displays a progress box.

10. Select *Tools | Logging Control Window* from the **CDU** main menu to control the receiver's logging to files and serial ports. Refer to **CDU**'s on-line Help for more information.
11. Use the *Console* window to enter commands. See also the *Post-Process Data* section of this guide.

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- ✉ To save the receiver configuration you entered, ensure all windows, except *Console*, are closed in **CDU** and then use the **SAVECONFIG** command.
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CONFIGURE SPAN-CPT WITH CDU

Basic configuration of the SPAN-CPT system will complete automatically. The inertial filter starts once the GPS solution is solved, and finesteering status is reached.

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- ☒ A GPS antenna must be connected and tracking at least 4 satellites for operation to begin.
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SPAN wizard in CDU will graphically take you through this process, or the steps below can be followed to manually configure SPAN-CPT.

The position mode wizard in CDU will walk you through GPS configuration or you can follow the steps below for manual configuration. Depending on the accuracy of the solution required, the GPS can be augmented with a number of correction sources including SBAS, L-Band and RTK (RTCA, RTCM, RTCM V3 and CMR).

CONFIGURE SPAN-CPT WITH COMMAND LINE

MEASURE THE LEVER ARM

Enter the distance from the IMU to the GPS 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_stdev] [y_stdev] [z_stdev]
For the integrated INS/GPS system to have the best level of accuracy, the offset should be measured to within a millimeter. 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.

ENABLING SBAS POSITIONING

SPAN-CPT IMU's are 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) respectively:

SBASCONTROL ENABLE WAAS

SBASCONTROL ENABLE EGNOS

ENABLING L-BAND POSITIONING

L-Band corrections 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 VBS, XP or HP service ([visit http://www.omnistar.com](http://www.omnistar.com)). Have your OmniSTAR serial number ready from the LBANDINFO log). The CDGPS signal is free and available without subscription over North America ([visit http://www.cdgps.com](http://www.cdgps.com)). The ASSIGNLBAND command allows you to set OmniSTAR or CDGPS base station communication parameters. It should include a relevant frequency and data rate. For example:

```
ASSIGNLBANDOMNISTAR1536782000 1200
```

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

```
LBANDSTAT 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 AUTO

LOG SPAN-CPT DATA

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

Data can be collected through CDU 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 near the end of this guide.

For real-time applications, the GPS/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 GPS are configured using the previously shown commands.

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

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- ☒ INS data is available once there is a good GPS solution. Therefore, an antenna must be connected for the system to function.
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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 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 should converge to within specifications, and the status will change 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 GPS 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 GPS quality to improve. The solution is still valid during these times, it is simply a warning flag that the GPS/INS solution is more reliable than the GPS-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
 - RANGECPMB ontime 1
 - RAWEPHEMB onnew
- From the rover station(s)
 - RANGECPMB 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 <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
Web: www.novatel.com
Phone: 1-800-NOVATEL (U.S. & Canada)
403-295-4900 (International)
Fax: 403-295-4901

