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

**BOX CONTENTS**

In addition to this Quick Start Guide, the following is provided in your SPAN package:

- 1 ProPak-V3 receiver and its Quick Start Guide
- 1 IMU (see the IMU Type column in Table 1 of this guide)
- 1 IMU to receiver interface cable
- 2 serial cables (1 straight through and 1 null modem)
- 1 I/O cable
- 1 DB9 to USB cable
- 2-12 V power cables (1 for receiver and 1 for IMU)
- 1 I/O 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 DB9 or USB port
- A power supply of +9 to +18 V DC (ProPak-V3)
- A separate power supply of +12 to +28 V DC for IMU
- 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 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 into the CD-ROM drive of the computer.

**SET UP YOUR SPAN HARDWARE**

1. Mount the IMU and antenna securely to a vehicle. For the simplest operation, align the Y-axis of the IMU with the forward axis (direction of travel) of the vehicle. Ensure the Z-axis is pointing up.
2. Connect the IMU to the receiver using the IMU cable provided. The cable plugs into the ProPak-V3 port labelled AUX (for the IMU-FSAS, also plug its cable into the ProPak’s I/O port).
3. Connect COM1 of the receiver to a computer COM port using a null modem cable.
4. Connect the GNSS antenna to the antenna port on the receiver using an appropriate antenna cable.
5. Apply power to the IMU and then to the receiver. It is recommended that you place a back-up battery between the receiver 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 causing the receiver and/or IMU to lose lock and calibration settings.
6. You may also have a user point device such as video equipment. Connect the device to the receiver’s I/O port using a cable that is compatible with both the receiver and the device. Refer to your device’s documentation for information on its connectors and cables. The arrow along the cable in the figure indicates a MARKIN pulse from the user device on the right to the ProPak-V3 I/O port (refer to the OEMV Family Firmware Reference Manual).

**COMMUNICATE WITH THE SPAN 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 receiver 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 or USB from the Type list.

5. Select the computer port the SPAN receiver is connected to from the Port list.

6. If you selected Serial, select 115200 from the Baud Rate list.

7. If you selected Serial, ensure the Hardware Handshaking check box is cleared.

8. Click the OK button to save the new device settings.

9. From the Device menu select Open Connection.

10. Select the new configuration from the Available Device Connections area of the Open Connection window.

11. Select the Open button to open SPAN receiver communications.

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 progress position of the receiver.

**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 system 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.

**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.

**CONFIGURE THE SPAN SYSTEM**

There are two methods to configure the SPAN system:

- **Configure SPAN Manually**
- **Configure SPAN Using Connect**

**Configure SPAN Manually**

Follow these steps to enable INS as part of the SPAN system using software commands:

1. Issue the INTERFACEMODE command to specify the receiver port connected to the IMU (see Table 1).

2. Issue the SETIMUTOANTOFFSET command to specify the type of IMU (see Table 1).

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

**TABLE 1: Enable INS Commands**

<table>
<thead>
<tr>
<th>IMU Type</th>
<th>INTERFACEMODE</th>
<th>SETIMUTYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>LN-200</td>
<td>comximuimoff</td>
<td>imu_hi200</td>
</tr>
<tr>
<td>IMU-FSAS</td>
<td>comximuimoff</td>
<td>imu_fas20</td>
</tr>
<tr>
<td>HG1700</td>
<td>comximuimoff</td>
<td>imu_hg1700_ag11, imu_hg1700_ag17, imu_hg1700_ag82</td>
</tr>
<tr>
<td>HG1900</td>
<td>comximuimoff</td>
<td>imu_hp1900_ca29, imu_hp1900_ca50</td>
</tr>
<tr>
<td>HG1930</td>
<td>comximuimoff</td>
<td>imu_hp1930_aq91, imu_hp1930_aq50</td>
</tr>
<tr>
<td>Landmark IMU</td>
<td>comximuimoff</td>
<td>imu_ladatator_landmark20</td>
</tr>
</tbody>
</table>

**A GNSS antenna must be connected and tracking satellites for operation.**

3. 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. 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]
1. Select using the "Follow these steps to enable INS as part of the SPAN system.

Configure SPAN Using Connect

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

1. Select "SPAN Alignment from the Connect toolbar. This wizard takes you through the steps to complete a coarse or fast alignment, select the type of IMU and configure the receiver to IMU port to accept IMU data.

Configure GNS

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 V3 and CMR). Refer to the OEMV Installation and Operation Manual / ProPak-V3 Quick Start, for SBAS, L-Band or RTCM setup and operation.

LOG SPAN 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 receiver COM port to user-supplied data collection software.

For post-processing applications, collect the data shown in the Post-Process Data section of this guide.

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

OPERATE THE SPAN 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 Connect/INS Window or in the status field of any of the INS solution logs (for example INSPOS, INSSVEL, INSSATT and INSPVA).

If performing a static alignment, allow the system to be stationary for at least 1 minute after the GNSS solution is computed for its initial system alignment. If performing a kinematic alignment, move the vehicle forward at a speed faster than 1.15 m/s. The following status stages may be observed:

- The status changes from INS_INACTIVE to INS_ALIGNING once the alignment starts.
- The status changes to INS_ALIGNMENT_COMPLETE when the alignment is complete. 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.

POST-PROCESS DATA

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 on time 1
  - RAWEPHEMB onnew
  - RAWIMUSB onnew
  - BESTLEVERARMB onnew
- From the rover station(s)
  - RANGECMPB on time 1
  - RAWEPHEMB onnew
  - RAWIMUSB onnew
  - BESTLEVERARMB onnew

SPAN system output is compatible with Inertial Explorer post-processing software from the Waypoint Products Group, NovAtel Inc. Visit our website at www.novatel.com for details.

QUESTIONS OR COMMENTS

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

Email: support@novatel.com
Web: 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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