SPAN Technology QUICK START GUIDE

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 DL-4plus, ProPak-G2plus or ProPak-LBplus receiver and its Quick Start Guide
• 1 IMU (if you do not already have one)
• 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 (ProPak-G2plus and DL-4plus only)
• 12 V power cable
• 1 CD containing PC Utilities and product documentation

ADDITIONAL EQUIPMENT REQUIRED
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 +12 to +18 VDC (DL-4plus/ProPak-G2plus) or a max. of +15 VDC for the ProPak-LBplus.
• A quality dual frequency GPS antenna such as the GPS-702, or GPS-512 for airborne/high speed applications.
• For L-Band corrections use the GPS-702L antenna. For L-Band corrections use the GPS-702, or GPS-512 for airborne/high speed applications.
• A quality dual frequency GPS antenna such as the GPS-702, or GPS-512 for airborne/high speed applications.
• A TNC to appropriate antenna connector RF cable
• A IMU (if you do not already have one)
• A power supply of +12 to +18 VDC (DL-4plus/ProPak-G2plus) or a max. of +15 VDC for the ProPak-LBplus system

SPAN HARDWARE SET-UP
Complete the following steps to set up and power your SPAN system where the example graphics show the connections on the back of a DL-4plus or ProPak-G2plus receiver:
1. Mount the IMU and antenna securely to a vehicle. Ensure they cannot move due to dynamics and that the distance and relative direction between them is fixed. See also Step 3 in the SPAN IMU Configuration section of this guide.
2. Connect the IMU to the receiver using the IMU cable provided. For the ProPak-LBplus, the IMU cable plugs into the COM3 port. For the DL-4 and ProPak-G2 receivers, the IMU plugs into the port labeled AUX. See also Steps 2 and 3 in the SPAN IMU Configuration section of this guide.
3. Connect COM1 of the receiver to a computer COM port using a null modem cable.
4. Connect the GPS antenna to the COM2 port on the receiver using an appropriate antenna cable.
5. Apply power to the receiver and in the case of the DL-4plus, push its power button to turn it on. It is recommended that a back-up battery is placed between the receiver and its voltage supply to act as a power buffer if installed in a vehicle. When a vehicle engine is started, power can dip to 9.6 VDC or cut-out to ancillary equipment causing the battery to be drained. 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 to both the receiver and the device. Refer to your device’s documentation for information on its connectors and cables. The GPS solution in the figure indicates a MARK/NAV pulse, refer to Volume 2 of the OEM4 User Manual set, from the user device on the right to the DL4plus/I/O port.

COMMUNICATING WITH THE SPAN SYSTEM
Once the receiver is connected to the PC, antenna, and power supply, install NovAtel’s GPS PC Utilities (GPSolution, DL4Tool and Convert). You can find installation instructions in your receiver’s Quick Start Guide. (Alternatively, you can use a terminal emulator program such as HyperTerminal to communicate with the receiver. Refer to Volume 1 of the OEM4 User Manual set for details.)

Start GPSolution4 on your PC to enable communication:
1. In the GPSolution menu, select Device | Open.
2. Select the New... button in the Open dialog box.
3. Enter a name for the new device configuration in the Name field of the New Config dialog box.
4. Select the Settings button.
5. Select the PC serial port the receiver is connected to from the Serial port drop-down list, 57600 from the Baud Rate list and uncheck the Use hardware handshake checkbox.
6. Select OK to save the settings and OK again to close the New Config dialog box and return to the Open dialog.
7. Select your configuration (Name) in the Open dialog and click on the Open button.
8. Select View | Logging Control from the menu to control the GPS/ card’s logging to files and serial ports. (Alternatively, you can use a terminal emulator program such as HyperTerminal to communicate with the receiver. Refer to Volume 1 of the OEM4 User Manual set for details.)
9. Use the Console window to enter commands. See also the Post-Processing section of this guide.

If you have to power down your receiver, ensure that all windows, other than the Console window, are closed in GPSolution and then use the SAFE/CONFIG command.

SPAN IMU CONFIGURATION
You must use COM3 for the ProPaks and AUX for the DL-4 when inputting commands that require a port name. This is true, even if the port is labelled differently.

SPAN ENCLOSURE

<table>
<thead>
<tr>
<th>Port Labela</th>
<th>Port Name for Software a</th>
<th>Port for Software a</th>
</tr>
</thead>
<tbody>
<tr>
<td>DL-4plus</td>
<td>AUX</td>
<td>ProPak-G2plus</td>
</tr>
<tr>
<td>ProPak-LBplus</td>
<td>AUX</td>
<td>ProPak-G2plus</td>
</tr>
<tr>
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<td>AUX</td>
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</tr>
<tr>
<td>ProPak-LBplus</td>
<td>AUX</td>
<td>ProPak-G2plus</td>
</tr>
</tbody>
</table>

a. This is the name given to the port when described in a field of the IMU configuration.

Follow these steps to enable INS as part of the SPAN system:
1. Issue the INTERFACEMODE command to specify the receiver port that is connected to the IMU:

   Receiver Type | INTERFACEMODE Command
   ---------------|-----------------------------
   ProPak-G2plus  | interfaceMode com1
   ProPak-LBplus  | interfaceMode com1
   DL-4plus       | interfaceMode com1

2. Use the SET and CONSOLE commands to set the IMU configuration according to the user device on the right to the IMU. Refer to your device’s documentation for information on its connectors and cables.

3. Enter this command even if the port is labelled AUX on the ProPak-G2plus.
2. Issue the `SETIMUTYPE` command to specify the type of IMU being used:

<table>
<thead>
<tr>
<th>IMU Type</th>
<th>SETIMUTYPE Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>AG11 or AG58</td>
<td><code>setimutype imu_hg1700_ag11</code></td>
</tr>
<tr>
<td>AG17 or AG62</td>
<td><code>setimutype imu_hg1700_ag17</code></td>
</tr>
</tbody>
</table>

Right-click on the INS Window and select `Configure INS` to see the Configure INS dialog.

When you have made your selections in the IMU Type and IMU Port fields, click on the Enable INS button.

Raw IMU data is now available and the INS filter starts.

3. Enter the distance from the IMU to the GPS antenna using the `SETIMUTOANTOFFSET` command. The offset between the two systems shows up directly in the output position. For example, a 10 cm error in recording this offset will result in at least a 10 cm error in the output.

SPAN GPS CONFIGURATION

Depending on the accuracy of the solution required, the GPS can be augmented with a number of correction sources including SBAS, L-Band (ProPak-LB only), and RTK (RTCA, RTCM, RTCM V3 and CMR). Refer to your receiver’s Quick Start Guide or Volume 1 of the OEM4 User Manual to set your receiver model is SBAS- or L-Band-capable. Refer also to Volume 1 of the OEM4 User Manual for details on RTK setup and operation.

SPAN DATA LOGGING

Raw GPS, INS and navigation data (position, velocity, attitude) are available from the system as ASCII or binary logs. These logs can be collected at rates up to 100 Hz. They include the INSPOS, INSVEL, INSATT and INSPVA logs.

For real-time applications, the GPS/INS solution is available through the logs listed in the SPAN System User Manual. For post-processing applications, collect the following data:

- **RANGECMPB ONTIME 1**
- **RAWIMUSA ONNEW**
- **RANGECMBP ONTIME 1**
- **RAWEPHEMB ONNEW**

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- **RANGECMBP ONTIME 1**
- **RAWEPHEMB ONNEW**
- **RAWIMUSB onnew**

SPAN system output is compatible with post-processing software from Waypoint, a NovAtel Precise Positioning Company. Visit their website at www.waypt.com for more details.

QUESTIONS OR COMMENTS

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

- Email: support@novatel.ca
- Web: www.novatel.com
- Phone: 1-800-NOVATEL (U.S. & Canada)
- Fax: 403-295-4901 (International)

SPAN SYSTEM OPERATION

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 GPSolution’s INS window or in the status field of any of the INS solution logs (for example INSPOS, INSVEL, INSATT and INSPVA).

- INS data is available once the system has a good GPS solution
- Therefore an antenna must be connected for the system to function.

Allow the system to be stationary for at least 1 minute after the GPS solution is computed for its initial system alignment. The following status stages may be observed:

- The status changes from **INS_INVALID to INS_ALIGNMENT** once the coarse alignment starts.
- The status changes to **INS_ALIGNMENT_COMPLETE**. The coarse alignment is complete. It normally stays in this state until the system senses motion. Then when the attitude solution converges to within specifications, the status changes to **INS_SOLUTION_GOOD**.
- The system 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/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.

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**