SPAN-IGM™

QUICK START GUIDE

GM-14915114   Rev 2   September 2013

This guide provides the basic information you need to set up and begin using your NovAtel® SPAN-IGM system. For more detailed information about the installation and operation of your SPAN system, refer to the *SPAN-IGM User Manual* (OM-20000141) from our web site at www.novatel.com/support/firmware-software-and-manuals/product-manuals-and-doc-updates/span/.

BOX CONTENTS

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

- **1** SPAN-IGM (integrated receiver and IMU)
- **2** SPAN-IGM interface cables

ADDITIONAL EQUIPMENT REQUIREMENTS

The following additional equipment is needed for a basic setup:

- A power supply of +10 to +30 V DC
- A quality, dual-frequency GNSS antenna such as the GPS-702-GG or ANT-A72GA-TW-N. See the NovAtel website (www.novatel.com/products/gnss-antennas/) for information on a variety of quality antennas available to meet your form factor and performance needs.
- An antenna cable with a TNC male connector at the receiver end, such as NovAtel's GPS-C016 model
- A Windows® based computer with a USB or serial port

SET UP YOUR SPAN HARDWARE

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

1. Mount the SPAN-IGM enclosure and GNSS antenna securely to a vehicle.
   For the simplest operation, align the Y-axis of the SPAN-IGM with the forward axis (direction of travel) of the vehicle. Ensure the Z-axis is 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.

   ⓘ   The X (pitch), Y (roll) and Z (azimuth) directions are marked on the SPAN-IGM.
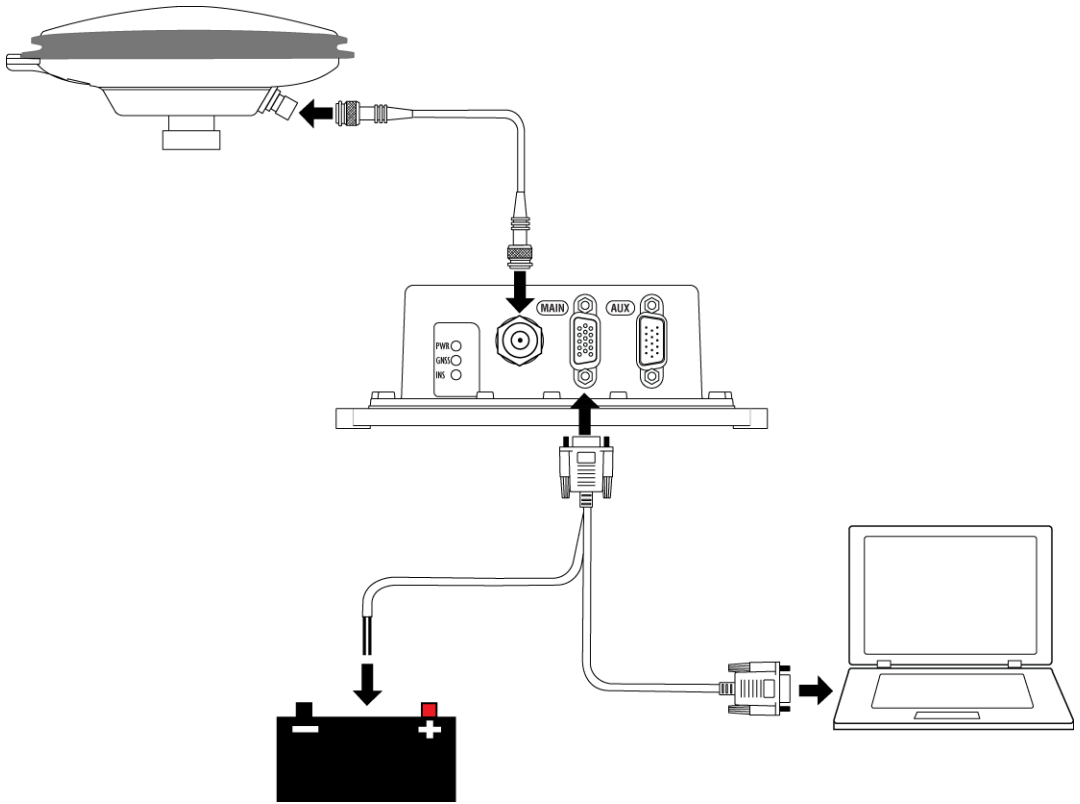
> ⓘ NovAtel interface cables have more connections than are shown in the diagram.
> Additional connections were removed for clarity.

2. Connect the GNSS antenna to the antenna port on the receiver using an appropriate antenna cable.

3. Connect the interface cable (NovAtel part number 01019014) to the *MAIN* port on the SPAN-IGM. This cable provides connections for power, the User serial port and the MIC serial port.

> ⓘ For information about using custom cables, refer to the *SPAN-IGM User Manual (OM-20000141)* available on the NovAtel web site at www.novatel.com/support/firmware-software-and-manuals/product-manuals-and-doc-updates/span/.

4. Connect the interface cable (NovAtel part number 01019015) to the *AUX* port on the SPAN-IGM. This cable provides connections for the USB port, COM3 serial port, wheel sensor input and strobe inputs and outputs.

5. Connect a communication interface from the SPAN-IGM to the computer.
To use a serial interface, connect the *User Port* connector on the *MAIN* port interface cable to the serial port on your computer.
To use a USB interface, connect the USB connector on the *AUX* port interface cable to the USB port on your computer.

6. Connect the power wires on the interface cable (labelled BATT+ and BATT-) to the power supply. The PWR LED lights when the SPAN-IGM is properly powered.

> (i) Be sure to connect the wire labelled BATT+ to the positive side of the power supply and the wire labelled BATT- to the negative side of the power supply.

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.
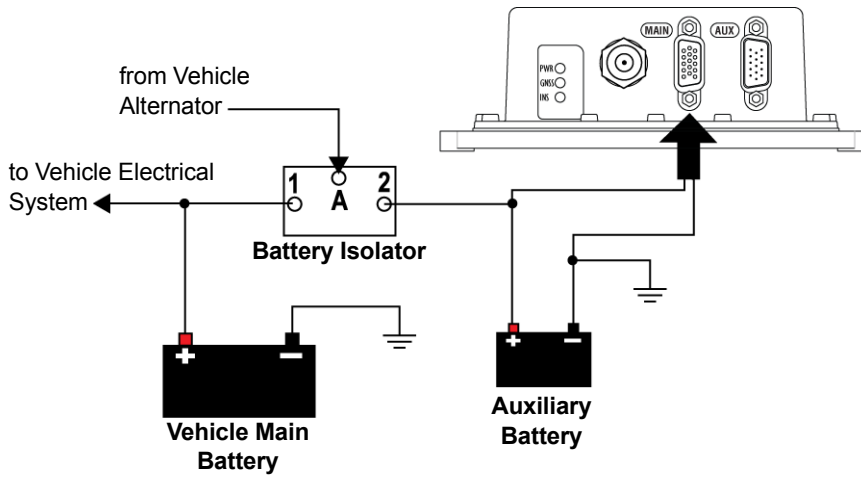
SPAN-IGM LEDS
The LEDs on the SPAN-IGM provide basic receiver status information.

Table 1: SPAN-IGM LEDs

LED	Off	On	Flashing Slow (1Hz)	Flashing Fast (>1Hz)
Power (Red)	No power to unit	Unit is powered on	UNKNOWN or UNSUPPORTED IMU	Programming error
GNSS (Green)	Waiting for GPS time	Time Status FINE or FINESTEERING	Time status COARSE, COARSESTEERING or FREEWHEELING	N/A
INS (Green)	Waiting for GPS time	Connected to IMU	N/A	Bootup or loading firmware

INSTALL THE NOVATEL CONNECT PC UTILITIES

1. Install the NovAtel Connect™ PC Utilities and USB drivers.

> (i) To access and download the most current version of the NovAtel Connect PC Utilities and USB drivers, go to the *Support* page of the NovAtel web site at www.novatel.com/support/firmware-software-and-manuals/.

ESTABLISHING A NEW CONNECTION

The first time you open a connection to communicate with the receiver, complete the following:

1. Launch NovAtel Connect from the Start menu folder specified during the installation process. The default location is Start | All Programs | NovAtel Connect 1.x.x | NovAtel Connect.
2. Select **New Connection** from the Welcome window.
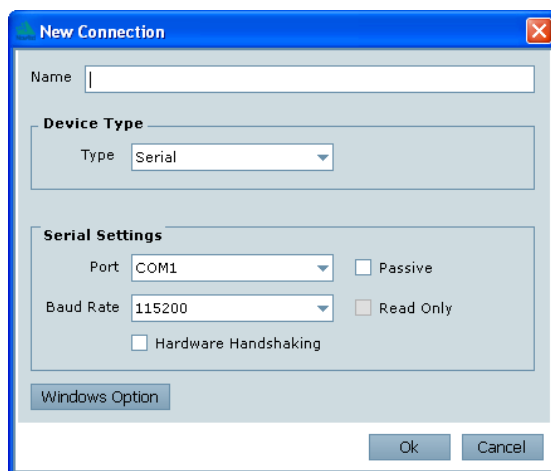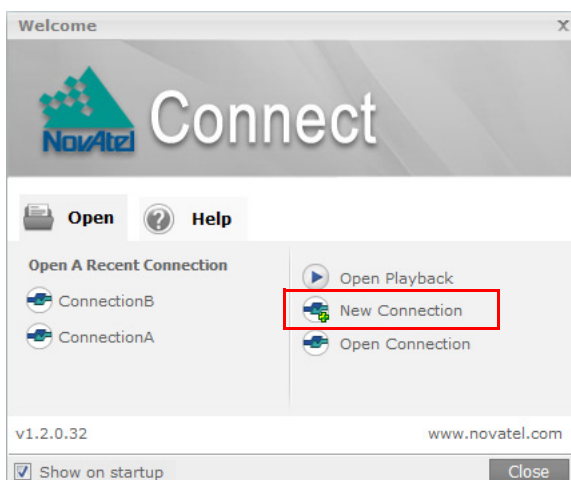
3. Enter a name for the connection.
4. Select **Serial** or **USB** from the **Type** drop down list.
5. Select the computer port the SPAN-IGM is connected to from the **Port** drop down list.
6. If you selected **Serial**, select **115200** from the **Baud Rate** list.
7. If you selected **Serial**, clear the **Hardware Handshaking** check box.
8. Click the **OK** button to save the new connection.
9. Select the connection created for the SPAN-IGM from the Available Device Connections area of the Open Connection window.
10. Click the **Open** button to open SPAN receiver communications.
    As NovAtel Connect establishes the communication session with the receiver, a progress box is displayed.

> (i) Detailed instructions for using NovAtel Connect are available from within the utility Help, the .chm file bundled with the software or from our web site *www.novatel.com/support/firmware-software-and-manuals*.

CONFIGURE THE SPAN SYSTEM

There are two methods to configure the SPAN system:

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

Configure SPAN Manually

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

1. Establish a connection to the SPAN-IGM.

   > (i)   A GNSS antenna must be connected and tracking satellites for operation.

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

   ```
   x_offset y_offset z_offset [x_stdev] [y_stdev] [z_stdev]
   ```
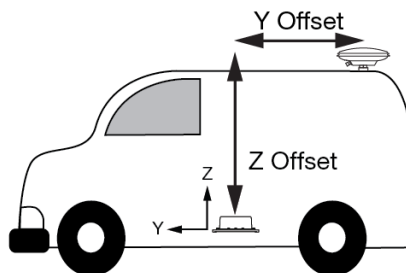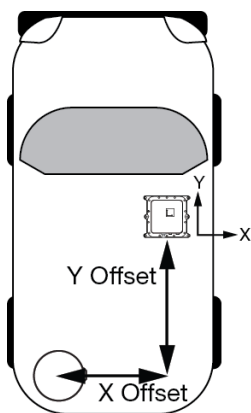

   > (i)   This example assumes a default mounting configuration and shows a -X offset, -Y offset and +Z offset.

   A typical RTK GNSS solution is accurate to a few centimetres. For the integrated INS/GNSS system to have this level of accuracy, the offset must be measured to within one centimetre.

3. Perform a kinematic alignment.
   See the *SPAN-IGM User Manual* (OM-20000141) for more information.

Configure SPAN Using NovAtel Connect

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

1. Start a NovAtel Connect session and establish a connection to the SPAN-IGM.

2. Select Wizards | SPAN Alignment from the NovAtel Connect toolbar. This wizard takes you through the steps to complete an alignment and configure the receiver port to accept IMU data.


Configuration for Alignment

The default alignment method for a SPAN-IGM 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 5 m/s.

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 NovAtel Connect using the *Logging Control Window*, or sent out the receiver COM port to user-supplied data collection software.
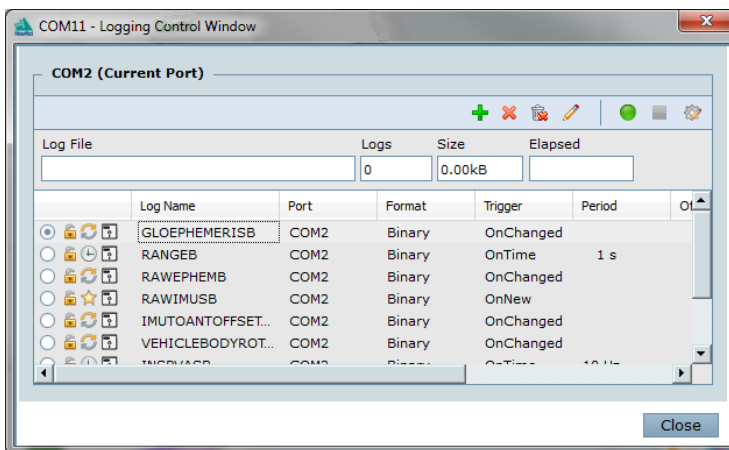
The figure shows the recommended logs for optimal real-time performance.

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 NovAtel Connect *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 there is a good GNSS solution. Therefore, an antenna must be connected for the system to function.

Move the vehicle forward at a speed faster than 5 m/s. The following status stages may be observed:

Table 2: Inertial Solution Status

Binary	ASCII	Description
0	INS_INACTIVE	IMU logs are present, but the alignment routine has not started; INS is inactive.
1	INS_ALIGNING	INS is in alignment mode.
2	INS_HIGH_VARIANCE	The INS solution is in navigation mode but the azimuth solution uncertainty has exceeded the threshold. The default threshold on the SPAN-IGM is 5 degrees. The solution is still valid but you should monitor the solution uncertainty in the INSCOV log. You may encounter this state during times when the GNSS, used to aid the INS, is absent.
3	INS_SOLUTION_GOOD	The INS filter is in navigation mode and the INS solution is good.
6	INS_SOLUTION_FREE	The INS filter is in navigation mode and the GNSS solution is suspected to be in error. This may be due to multipath or limited satellite visibility. The inertial filter has rejected the GNSS position and is waiting for the solution quality to improve.
7	INS_ALIGNMENT_COMPLETE	The INS filter is in navigation mode, but not enough vehicle dynamics have been experienced for the system to be within specifications.
8	DETERMINING_ORIENTATION	INS is determining the IMU axis aligned with gravity.
9	WAITING_INITIALPOS	The INS filter has determined the IMU orientation and is awaiting an initial position estimate to begin the alignment process.

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 ontime 1
    - RAWEPHEMB onchanged
    - GLOEPHEMERISB onchanged (if using GLONASS)
- From the rover station(s)
    - RANGECMPB ontime 1
    - RAWEPHEMB onchanged
    - GLOEPHEMERISB onchanged (if using GLONASS)
    - RAWIMUSXB onnew
    - IMUTOANTOFFSETSB onchanged
    - VEHICLEBODYROTATIONB onchanged

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, 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