GPSG-1000 Dual RF Channel Operation

Some GPS receivers require 2 GPS channels to be present at the same time for proper GPS signal reception. For example, a dual channel GPS receiver designed for L1 and L2C operation.

This can be accomplished by using two GPSG-1000 units simultaneously in order that the outputs of the units, each operating on a different RF channel, can be combined to provide a single synchronized RF output.

This Application Note defines the procedure to synchronize two GPSG-1000 units and combine the RF channel outputs.



Equipment required for combining and operating two GPSG-1000 signals simultaneously.

Nomenclature	QTY	Part Number (or type)
VIAVI GPSG-1000 w/RF Combiner Firmware ver 1.02 or later and Software ver 2.5.0 or later.	02	VIAVI 87339
26 pin Sub D plug connector	02	Positronic WDD26P2 (example)
Combiner, 3-way, GPSG	01	VIAVI 90948
Cables and adapters to interconnect the GPSG-1000 units and other required equipment	As req	Any coax cables should be 50 Ω impedance, matched in length (±3"), and short as possible (<10'). The 10 MHz reference cable should be <3')
Pulse Generator capable of outputting a 3.3 V pulse with 100 µs pulse width	01	Agilent 33220A (example)
Oscilloscope 500 MHz BW	01	Tektronix TDS3000C (example)

See Figure 1 for equipment interconnection. The interface cables for the AUX connectors on the GPSG-1000 units will be locally fabricated.

Note: The RF Combiner Firmware version may be checked in the following manner:

1. From the Launch Bar select System, then System Configuration.

2. On the System Configuration screen select the Hardware tab from the top edge of the display. This displays all hardware ID and Firmware versions. Find RF Combiner Firmware Version on the list.

Note: The GPSG-1000 Software version may be checked in the following manner:

1. From the Launch Bar select System, then System Update.

2. The GPSG-1000 software version is displayed at the bottom of the System Update screen.

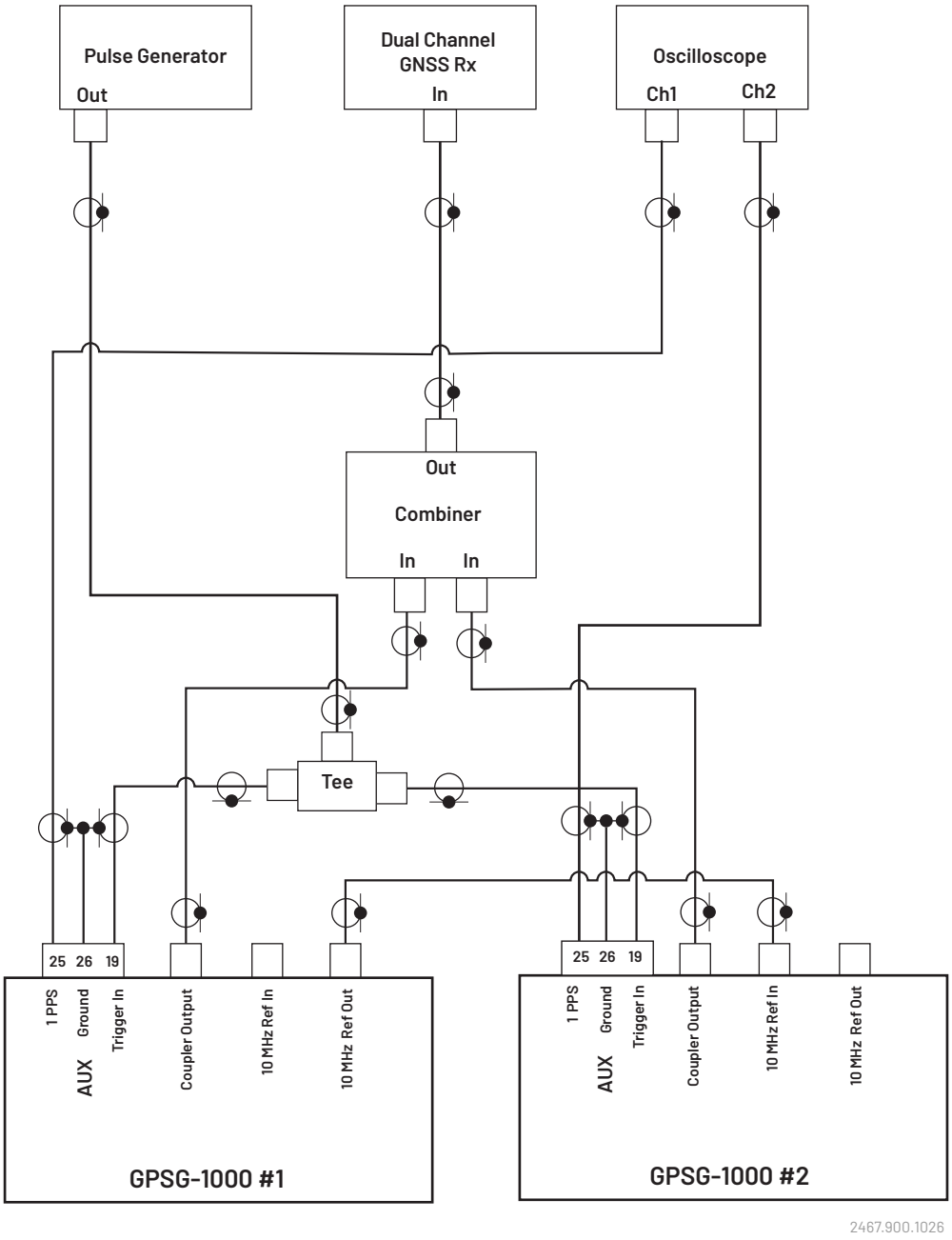


Figure 1

Simulation set up:

1. Both GPSG-1000 units must be using the same almanac data. Please ensure the almanacs are the same for both units before continuing.
2. Set up and connect equipment as per Figure 1. Ensure that the cables used to connect the Pulse Generator to the GPSG-1000 units, and the 1 PPS outputs of the GPSG-1000 units to the Oscilloscope, are equal in length (±3 in.).
3. Set up the Pulse Generator to provide a manually triggered one-time pulse. The pulse should be set up as per Figure 2.

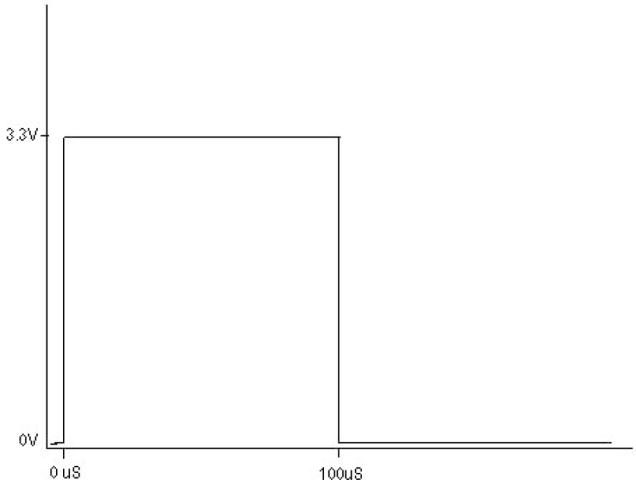


Figure 2

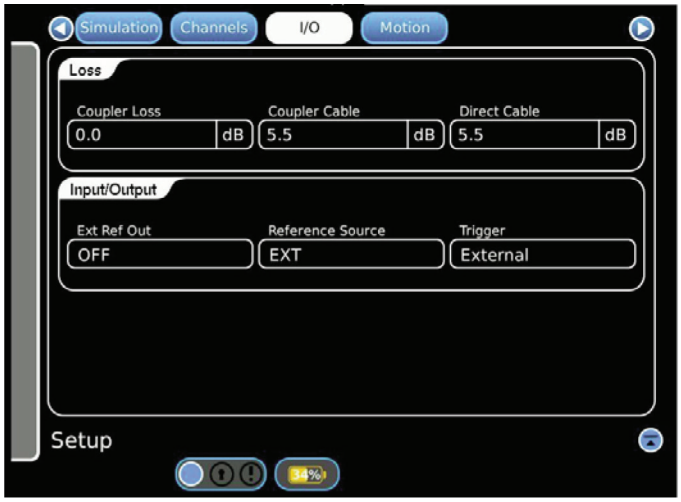


Figure 4

4. On GPSG-1000 #1 Menu Bar select Setup. On the Setup screen at the top row select the I/O tab. Set Ext Ref Out to ON, Reference Source to INT, and Trigger to External. See Figure 3.

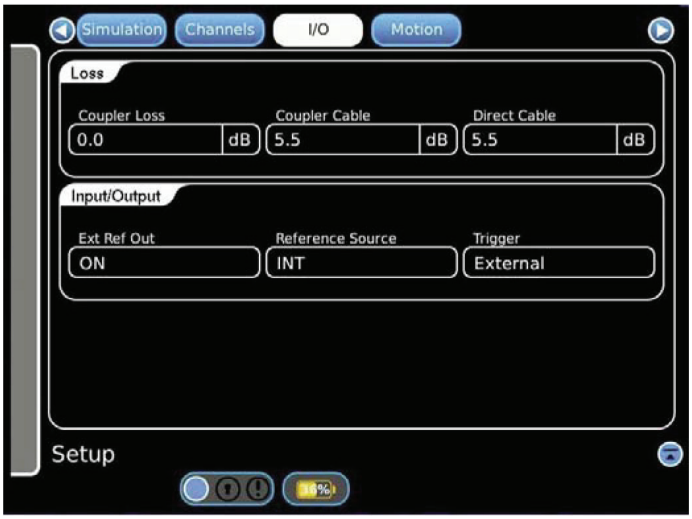


Figure 3

5. On GPSG-1000 #2 Menu Bar select Setup. On the Setup screen at the top row select the I/O tab. Set Ext Ref Out to OFF, Reference Source to EXT, and Trigger to External. See Figure 4.

6. On both GPSG-1000 units Setup screen select the Simulation tab. Set the Simulation Start Time fields to the same values. Set the RF Output, RF Level to the same value. See Figure 5.

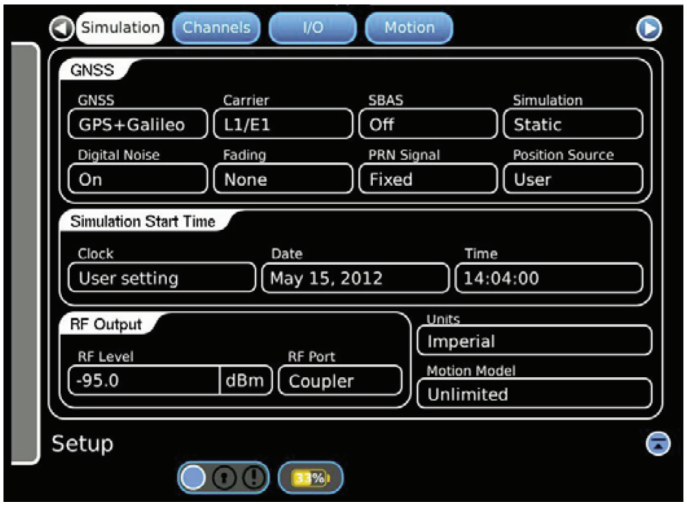


Figure 5

7. On the GPSG-1000 #1 Setup screen in the GNSS fields, set GNSS to GPS+Galileo and Carrier to L1/E1. See Figure 5.

8. On GPSG-1000 #2 Setup Screen in the GNSS fields, set GNSS and Carrier to the other required carrier type and frequency for your multi-channel GPS LRU. See Figure 6.

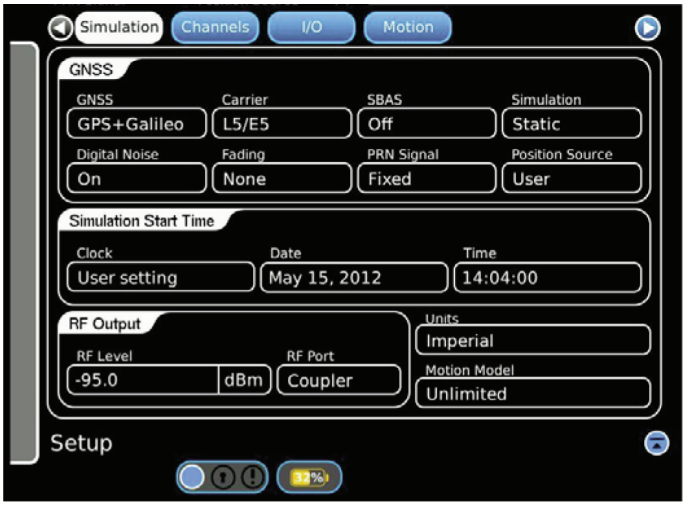


Figure 6

9. On both GPSG-1000 units Menu Bar select Simulation. On the Simulation screen PVT fields set the Latitude, Longitude, and Altitude fields to the same values. See Figure 7.

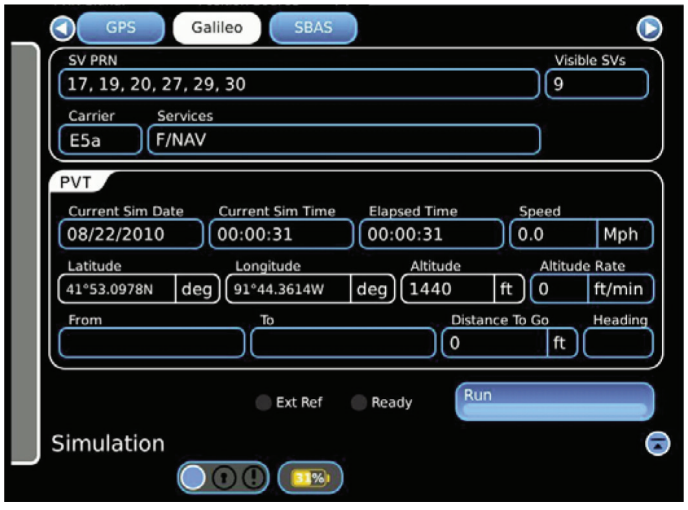


Figure 7

10. On both GPSG-1000 units Simulation screen press the Run switch. You should note that both GPSG-1000 units configure the simulation, but, the time and date data on the Simulation screen should not update. See Figure 8.

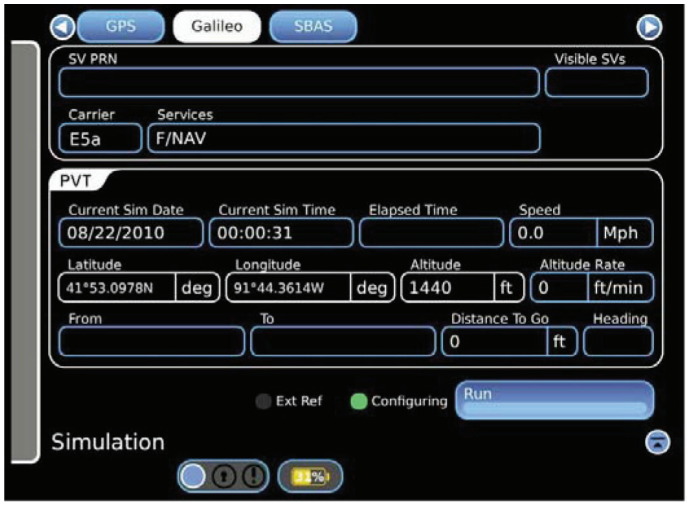


Figure 8

11. Using the Pulse Generator, send a single pulse to trigger the GPSG-1000 units. You should now note that the time and date data on the Simulation screen is updating and match on both units.

End of simulation set up.

Simulation Troubleshooting

If the GPS receiver fails to identify its position after a suitable period for the receiver to acquire the signals, please perform the following troubleshooting steps.

1. Verify the GPSG-1000 units' connections and interface as per Figure 1.

2. Verify both GPSG-1000 units setup as per this Application Note.

3. Set the Oscilloscope, connected as per Figure 1, to measure the leading edges of the 1 PPS signal from both GPSG-1000 units. Note the difference between the points that both 1 PPS signals begin to rise from their 0 VDC states. The time difference should be less than 10 nS.

Note: This step confirms that the GPSG-1000 units are operating in sync. If the time difference exceeds 10 ns, then check the set up and try again.

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