Installation Guide

57436-01 Placer Gold DRU Plus and APU

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Table of Contents

1.0 Description

This document contains hardware installation instructions for the Placer Gold DRU Plus. For information on DRU configuration, refer to the Placer Gold DRU Plus Users manual.

Vehicle specific information regarding Vehicle Speed Sensor type and location as well as detailed back-up light circuit information can be obtained in the vehicle manufacturer's service manual.

2.0 Product Overview

The Placer Gold DRU Plus and Placer Gold APU will operate from 9 volts to 32 volts. Both products have an input for vehicle ignition sense that powers the unit only when the vehicle's engine is running. This input is pulled down internally and must be driven high to be activated. The GPS almanac and ephemeris information stored in RAM is kept alive by using the vehicle's battery when the ignition is off. This allows for a faster time to first GPS position. The GPS receiver will have to re-acquire the satellite information only after power is completely removed from unit.

Both the DRU Plus and APU contain a 12-channel GPS receiver. In addition to this receiver, the DRU Plus has an internal angular-rate sensor module. Because the DRU Plus uses this sensor, the physical orientation of DRU Plus must be in the horizontal position. The DRU Plus has an input for a back-up (reverse) light indicator to determine if the vehicle is in reverse. This input is pulled down internally and must be driven high to be activated. The DRU Plus has separate connections for analog (sine) or digital (pulsed) vehicle speed sensors.

The 12-channel dead reckoning GPS module used in the Placer Gold DRU Plus is self-calibrating. Once installed in a vehicle and driven for a short distance, the unit will automatically self-calibrate from the first GPS 2D measurement onward. The system shall be fully calibrated when:

- GPS is navigating uninterrupted during 60 seconds
- Speed during these 60 seconds is > 8m/s or 18 miles per hour
- 100 right hand turns have been performed

External Documentation

- Placer Gold DRU Plus and APU Users Manual
- Placer Gold DRU Plus Product Specification
- Placer Gold APU Product Specification
- Placer Gold DRU Plus and APU Motorola XTL Radio Interface Guide

Communication Configuration

The default factory communication configuration for the serial ports is as follows:

- The MDT port is configured as a DCE port (female DE-9 receptacle) and is configured to use TAIP protocol at 9600 baud, 8 data bits, 1 stop bit, and no parity. This port may also be referred to as the Communication port.
- The Radio port is configured as a DTE port (female DE-9 receptacle) and is configured to use TAIP protocol at 9600 baud, 8 data bits, 1 stop bit, and no parity.

If a Motorola VRM is used, it must be connected to the Radio Port.

For additional configuration information refer to the Placer Gold DRU Plus and APU Users Manual. For additional radio configuration information refer to the Placer Gold DRU Plus and APU Motorola XTL Radio Interface Guide.

Parts List

Description	Trimble Part Number	Quantity
Placer Gold DRU Plus OR Placer Gold APU	62275-01 62610-01	1
Antenna (Option 1: Hard Mount OEM Antenna) Antenna Cable, 5 M, FAKRA C to TNC	28367-70 62474	0 0
Antenna (Option 2: Mini Magnetic Mount)	62512	0
TrimFleet Cable Install Assembly Including: • Cable Harness • Fuse Holder, ATO style, 16 AWG, sealed • 1 Amp Fast-Acting Automotive blade fuse	59428-00 59190 59859 59860	1 1 2 2

Please note that antennas and antenna cables are not included with kit, but are available as separate accessories from TMS.

Tools and Items Required for Installation

The following tools and hardware are not supplied but may be required for installation of the TrimFleet DRU Plus.

- Wire cutters and strippers
- Digital Multimeter
- Screwdriver, P2 Phillips
- Crimp tool for insulated barrel type connectors
- 4 - Solderless, Barrel type butt connector, 18-22 AWG
- 4 - Solderless, Barrel type butt connector, 14-16 AWG
- 1 - Solderless Ring terminal, #10-5/16", 18-22 AWG
- 5 - Screw, Self drilling, Panhead, Phillips Head # 8 X 1"
- Tie Wraps

Mounting the DRU Plus and APU in the Vehicle

Use #8 x 1" mounting screws to attach the Chassis to the vehicle. Mounting of the DRU Plus must be accomplished with the following items in mind.

- The DRU Plus must be mounted inside of the vehicle cab or trunk, away from locations where it may be subjected to excessive heat, such as direct exposure to sunlight or proximity to a heater vent.
- Be sure to select a mounting location that permits convenient routing of the antenna, serial and power cables. Under seat mounting is often a good option.
- To ensure proper dead reckoning function, the DRU Plus must be mounted on a level, horizontal surface with its mounting tabs facing down.
- The DRU Plus unit must be solidly mounted to avoid vibration or position shift. Cellular Usage (KB) and Aggregate % Satellite Data Used.

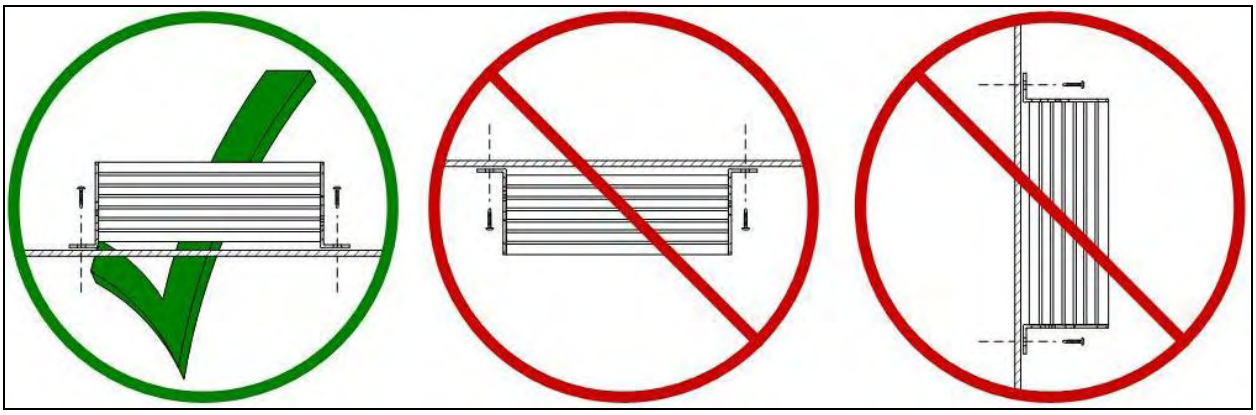

Figure 1: Proper DRU Plus Orientation

Wiring Harness Table

Pin Location	Harness Wire Color	Function
1	White	Vehicle Ignition
2	Blue	Analog Odometer (VSS)
3	Red	Vehicle Constant Power
4	Orange	Digital Odometer (VSS)
5	Yellow	Back-up light
6	Black	Ground

Wiring the DRU Plus and APU

Please see the table below for differences in wiring the DRU Plus and APU. In addition to power and ignition switch connections, the DRU Plus must be connected to the Vehicle Speed Sensor (VSS) and back-up light indicator. Do not connect the VSS and reverse light when installing the APU.

Pin Number	Harness Wire Color	Function	DRU Plus	APU
1	White	Vehicle Ignition	Required	Required
2	Blue	Analog Odometer (VSS)	Option 1	Not Connected Unused wires must be properly dressed and insulated.
3	Red	Vehicle Constant Power	Required	Required

Pin Number	Harness Wire Color	Function	DRU Plus	APU
4	Orange	Digital Odometer (VSS)	Option 1	Not Connected Unused wires must be properly dressed and insulated.
5	Yellow	Back-up light	Required	Not Connected Unused wires must be properly dressed and insulated.
6	Black	Ground	Required	Required

Refer to the vehicle's service manual to determine whether the vehicle provides an analog or a digital Vehicle Speed Sensor output and where you can gain access to this connection point. The output type will determine whether you connect the digital OR the analog inputs of the DRU plus.

Only one of these inputs will be used

1. Connect Pin 6 to vehicle chassis using a self drilling screw and a crimp-on # 8 ring terminal.

2. Connect Pin 5 to vehicle's reverse (back-up) light circuit using a barrel type, solderless connector. This wire must change electrical state from High to Low when gear selector is moved between reverse and any other gear.

The High signal must be greater than 4.1 Volts and Low signal must be less than 3.2 Volts for the DRU to recognize a change in electrical state

3. Connect the appropriate odometer input to the vehicle's speed sensor output. The vehicle's speed sensor type determines which input to use. A digital speed sensor output will require connection to the Pin 4 (orange) input while an analog speed sensor output will require connection to the Pin 2 (blue) input.

4. Pin 1 must be fused with the provided fuse holder and 1 amp fuse, and then connected to a switched power source. This source must provide ~12 Volts only when the ignition key is in the RUN position and 0 volts with the key in the **OFF** position.

5. Pin 3 must be fused with the provided fuse holder and 1 amp fuse, and then connected to a point in the vehicle that provides 12 volts **ALL** the time.

This voltage may be less during engine cranking.

Antenna Installation

1. Select an antenna mounting location. Please note that performance will be drastically affected by mounting location. For optimal performance, the antenna must be horizontally mounted with an unobstructed view of the sky.

2. Mount antenna and route cable towards DRU Plus exercising caution to avoid crushing, cutting or kinking the cable. Dress any additional cable near the DRU Plus and connect the Blue FAKRA connector to the DRU until latch engages fully.

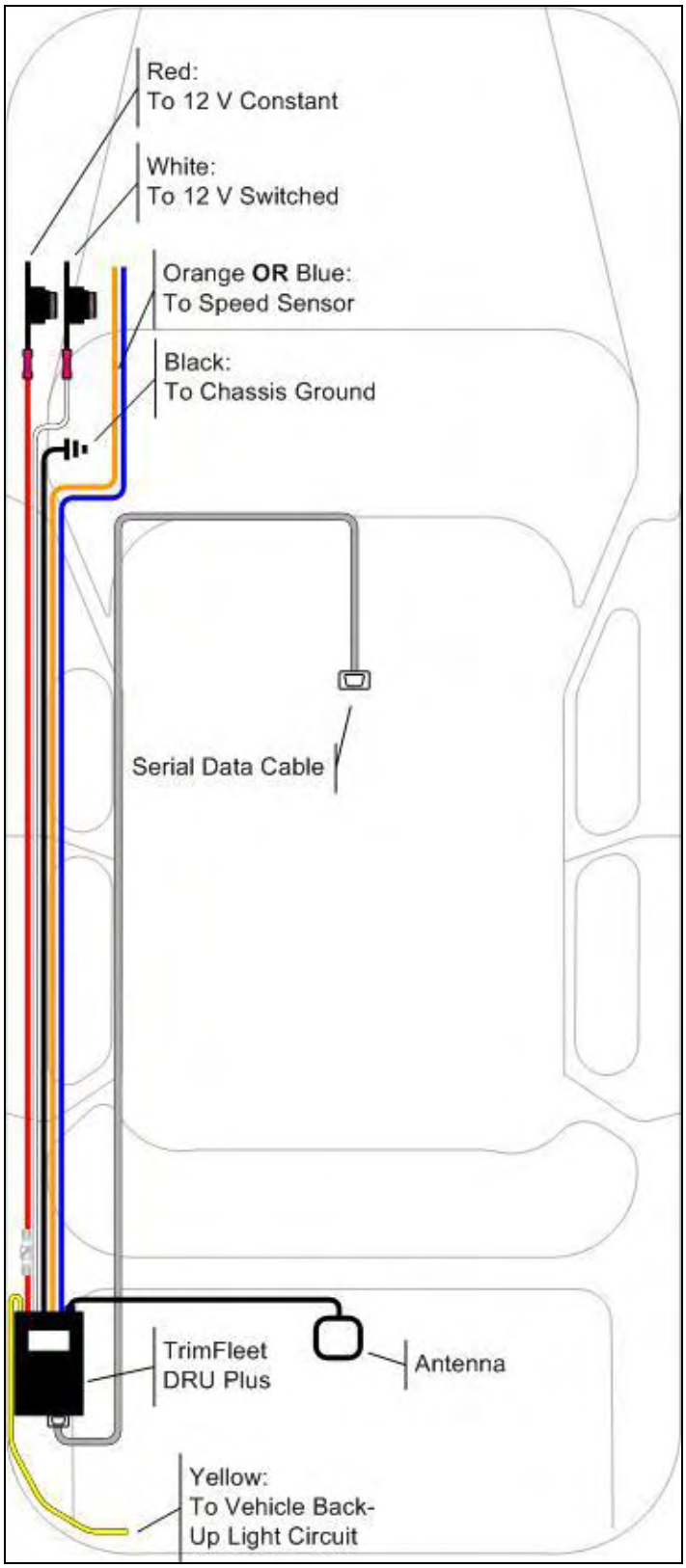

Figure 2: Typical Automobile Installation

Functional Checkout

GPS Functional Check

- Start the vehicle and check the LED indicator status.
- Confirm that the DRU Plus' green LED is lit. This indicates that the DRU Plus is powered up.
- The Red LED indicates GPS status. The table below denotes the meaning of each LED condition.

The ignition must be **ON** for full operation of the device.

Red LED	Operation
Rapid Blink	LED indicates that the GPS antenna is open or shorted.
Slow Blink	Indicates that not enough satellites are locked in to provide an accurate position.
Steady RED	Indicates a current position has been computed.

Quick Dead Reckoning Check (DRU Plus only)

Once a DRU Plus has been installed and has valid GPS information, it will begin to self-calibrate. The unit must be powered up and calibrated with the ignition switch on before checking the dead reckoning function. Perform the following steps to check if the dead reckoning function is working.

1. Open a session using HyperTerminal on your computer.

2. Using the HyperTerminal, configure your computer's serial port for 9600, 8, 1, N with no flow control.

3. Connect your computer's serial port to the unit's MDT port using a straight through serial cable.

4. Disconnect the GPS antenna from the unit.

5. Query the unit for position and velocity information by typing >**QPV**<. The second to the last character of the response string indicates the position source. In dead reckoning mode this character is a 6 or 8. See the User Manual for more information.

Configuring DRU Plus and APU to Output NMEA

The following procedure configures the DRU Plus or APU to output NMEA at 4800 baud on the MDT port. Other configurations may be found by referring to the TrimFleet DRU Plus and APU User Manual.

1. Open a session using HyperTerminal on your computer.

2. Using HyperTerminal, configure your computer's serial port for **9600, 8, 1, N** with no flow control.

3. Connect your computer's serial port to the unit's MDT port using a straight through serial cable. Power up the DRU Plus or APU.

4. Type the following commands (do not type comments in parenthesis):

    a. **SRM;MC_FLAG=TRUE<** (Set map compatibility)

    b. **SPT4800,8,1,N<** (Sets baud rate for mapping application)

5. Re-configure your computer's serial port setting to **4800, 8, 1, N** and then type the following commands:

    c. **SPR;NMEA=FT<** (Enables NMEA output on MDT port)

6. Exit HyperTerminal session.

7. Start your mapping application.