

# **Trimble Mobile Solutions TrimFleet DRU Plus TrimFleet APU Installation Instructions**

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## 1. DESCRIPTION

This document contains hardware installation instructions for the TrimFleet DRU Plus and TrimFleet APU. For information on product configuration, refer to the TrimFleet DRU Plus and APU Users Manual.

For DRU Plus installations, 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. PRODUCT OVERVIEW

The TrimFleet DRU Plus and TrimFleet 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 TrimFleet 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

## 3. EXTERNAL DOCUMENTATION

TrimFleet DRU Plus and APU Users Manual

TrimFleet DRU Plus Product Specification

TrimFleet APU Product Specification

TrimFleet DRU Plus and APU Motorola XTL Radio Interface Guide

## 4. 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.

For additional configuration information refer to the TrimFleet DRU Plus and APU Users Manual.

## 5. PARTS LIST

Description	Trimble Part Number	Quantity
TrimFleet DRU Plus OR TrimFleet APU	62275-01  62610-01	1
GPS Antenna Option 1: Bulkhead Mount OEM Antenna 5m Antenna Cable	28367-70  62474	*  *
GPS Antenna Option 2: Mini Magnetic Mount with integrated 3m cable	62512	*
TrimFleet DRU Plus and APU Cable Kit Cable Harness (10') Inline ATO Fuse Holder 16 AWG 1 Amp Fast-Acting Automotive ATO Fuse	59428-00 59190 59859 59860	1 1 2 2

*\*Antennas and antenna cables are not included with kit but are available as separate accessories from TMS.*

## 6. 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 and APU:

- Wire cutters and strippers
- Digital multi-meter
- P2 Phillips screwdriver
- Crimp tool for insulated barrel type connectors
- 4 – Solderless 18-22 AWG barrel type butt connector
- 4 – Solderless 14-16 AWG barrel type butt connector
- 1 – Solderless #10-5/16" 18-22 AWG ring terminal
- 5 – #8X1" pan head Phillips self-drilling screw
- Tie Wraps

## 7. MOUNTING THE DRU PLUS AND APU IN THE VEHICLE

Mount the DRU Plus or APU to the vehicle using four #8x1" mounting screws. The following important guidelines *must* be followed when mounting the unit in the vehicle.

1. The unit must be mounted inside of the vehicle's cab or trunk, away from locations where it will be subjected to excessive heat and moisture. Locations in direct proximity to a heater vent or high vibration areas are not acceptable.
2. Be sure to select a mounting location that permits convenient routing of antenna, serial and power cables. Under-seat mounting is often a good option.
3. In order to ensure proper dead-reckoning operation, the DRU Plus **must** be mounted on a level, horizontal surface with its mounting tabs facing down. See figure 1 below. The APU may be mounted in any orientation.

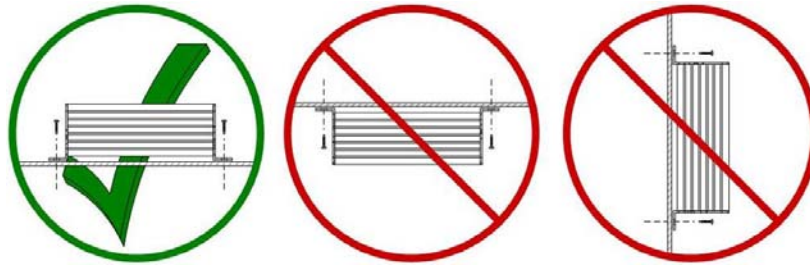


Figure 1 – Proper DRU Plus Orientation (does not apply to APU)

4. The unit must be mounted as securely as possible to avoid vibration or position shift.

## 8. 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.*

**WIRING HARNESS TABLE**

Pin Number	Harness Wire Color	Function	DRU Plus	APU
1	White	Vehicle Ignition	Required	Required
2	Blue	Analog Odometer (VSS) <sup>1</sup>	Option 1	Not Connected <sup>2</sup>
3	Red	Vehicle Constant Power	Required	Required
4	Orange	Digital Odometer (VSS)	Option 2	Not Connected <sup>2</sup>
5	Yellow	Back-up light	Required	Not Connected <sup>2</sup>
6	Black	Ground	Required	Required

<sup>1</sup>**Call Trimble Customer Support before connecting to the analog speed sensor.**

<sup>2</sup>**Unused wires must be properly dressed and insulated.**

Refer to the vehicle's service manual to determine whether the vehicle provides an analog or a digital Vehicle Speed Sensor output. The vehicle's service manual will also provide information as to where you can gain access to this connection point. The output type will determine whether you connect the digital OR the analog<sup>1</sup> inputs of the DRU Plus.

**NOTE:** *Only one of these Vehicle Speed Sensor (VSS) inputs can be used at a time. Make sure the other input is properly insulated and kept from shorts.*

- 1) Connect Pin 6 (Black) to vehicle's chassis using a self-drilling screw and a crimp-on # 8 ring terminal. Make sure that a good electrical connection is made to the chassis. It may be necessary to remove the finish to expose the bare metal of the vehicle's chassis.
- 2) For DRU Plus installations connect Pin 5 (Yellow) 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. *Do not connect this wire when installing APU.*

**NOTE:** *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.*

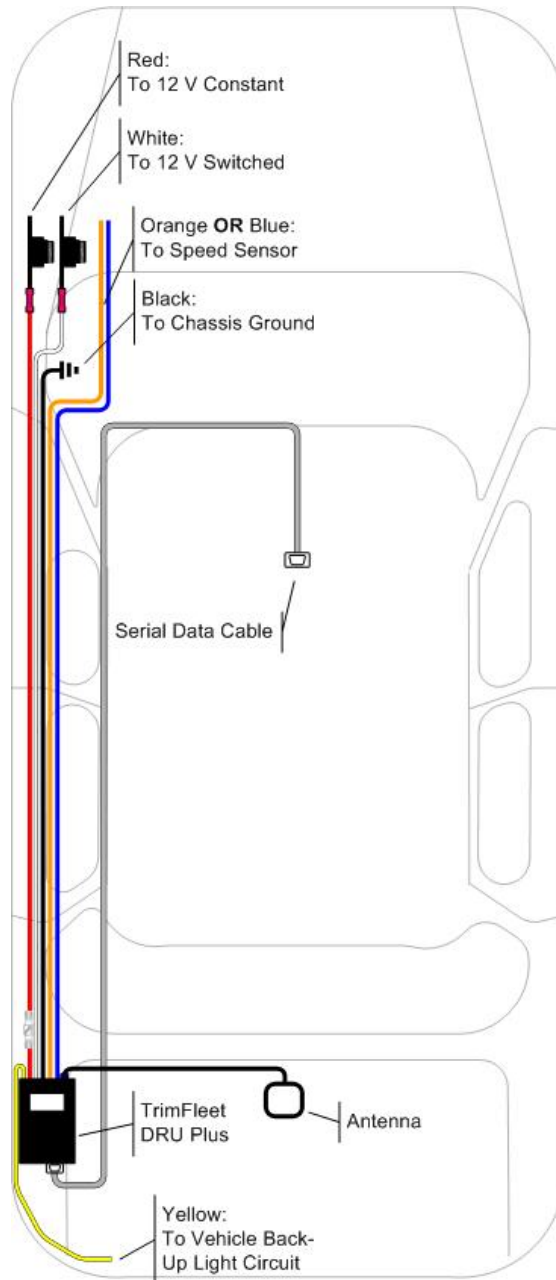
- 3) For DRU Plus installations connect the appropriate odometer input to the vehicle's speed-sensor output. The vehicle's speed-sensor type determines which input to use. A digital speed-sensor output will require connection to the Pin 4 (Orange) input while an analog speed-sensor output will require connection to the Pin 2 (Blue) input<sup>1</sup>. **Use only one of these inputs.** *Do not connect this wire when installing APU.*

**CAUTION:** *Extreme care must be exercised when connecting to the vehicle speed sensor (VSS) signal! The VSS often provides information to ABS, speed control, traction control and other critical vehicle system components. Failure to follow vehicle manufacturer's guidelines for interfacing with this signal may result in the loss of these functions.*

- 4) The Ignition Sense input (Pin 1, White) 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) The Vehicle Power (Pin 3, Red) with the in-line fuse needs to be connected to a point in the vehicle that provides continuous (not switched) battery power. The provided fuse holder and 1 amp blade fuse should be installed in-line close to the power source.

## 9. GPS ANTENNA INSTALLATION

- 1) Select a mounting location that has a clear view of the sky. Please note that performance will be drastically affected by mounting location. For optimum performance, the antenna must be horizontally mounted with an unobstructed view of the sky.
- 2) Mount antenna and route cable towards the unit exercising caution to avoid crushing, cutting or kinking the cable. Dress any additional cable near the unit and connect the Blue FAKRA connector to the unit until the connector latch fully engages.



**Figure 2 – Typical DRU Plus Installation**

## 10. FUNCTIONAL CHECKOUT

### 10.1. GPS Functional Check

- ❑ Start the vehicle and check the LED indicators for status.
- ❑ Confirm that unit's green LED is on. This indicates that the unit is powered up.
- ❑ Check the red LED for the GPS status in the table below.

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

Red LED State	GPS Status
Rapid blinking	GPS antenna is open or shorted
Slow blinking	An insufficient number of satellites have been acquired to provide an accurate position
On continuously	Current position has been computed and the unit is tracking

### 10.2. 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 as described in the Product Overview section. 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) In 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 Users Manual for more information.

## 11. 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 Users Manual.

- 1) Open a session using HyperTerminal on your computer.
- 2) In 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