

VIPER®

210V GPS TRACKING INSTALLATION GUIDE

driven to excel
Directed®
ELECTRONICS, INC.

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INS210V 06-05

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Responsibility

Directed assumes no responsibility or liability for the improper installation, operation or maintenance of GPS 210 Series Onboard, including, without limitation, the installation or removal thereof by personnel who have not successfully completed the GPS 210 Series Installation Training and Certification program.

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Introduction

Satellites are in a 12-hour orbit at 12,000 miles above the earth. There are 24 satellites in the system and generally there are at least 5 satellites orbiting overhead at any one time. The GPS 210 Series relies on the signal from multiple satellites to determine its location on earth. The satellite signal is received via the combination GPS / Cellular antenna supplied with the GPS 210 Series. This antenna must be installed in a location with an unobstructed view to the outside of the vehicle to receive signals from these satellites. This network covers virtually the entire population of U.S, Canada, and Mexico that is within reach of a cellular network.

General Safety

This installation manual covers the installation of the GPS 210 Series. This manual is for the professional and novice installer and should be used to ensure a safe and functional install of the GPS 210 Series. The following information should be noted with respect to operating the GPS 210 Series in various environments, since the cellular transceiver component works through RF (Radio Frequency).

Vehicles Equipped with AirBags

- DO NOT place objects, including communication equipment, in the area over the airbag or in the air bag deployment area.
- If the communications equipment is improperly installed and the airbag inflates, this could cause serious injury.
- Contact the vehicle manufacturer's corporate headquarters, if necessary, for specific airbag information for the vehicle.
- DO NOT run cables under the area reserved for the driver's feet.

Damage to equipment

- DO NOT install components that have been dropped, even if they appear to be functional.
- Internal damage is likely to occur.

Basic Tools Needed for Installation

- Metric and standard socket set
- Screwdriver set
- Side cutters, wire cutters
- Knife or box cutter
- Wire strippers
- Hand Crimper for insulated terminals
- Pliers
- Electrical tape
- Automotive upholstery or trim remover
- Flashlight or trouble light
- Cordless drill with accessories
- Assorted common bit set
- Palm with Palm Serial Cable
- Digital Multimeter (recommended), or 12 volt test light

It is strongly recommended that a Digital Multimeter be used when probing electrical systems in the vehicle to avoid any damage to computers or airbag systems.

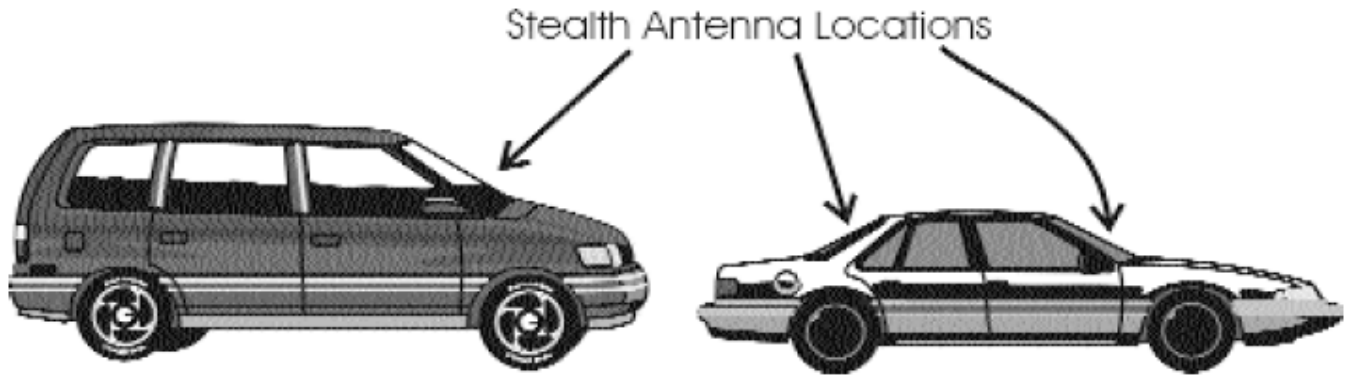
Antenna

Antenna location is critical to the operation of the system. The antenna provided is a combined GPS/RF antenna. The GPS/RF combined antenna must be mounted flat with the GPS receiver facing up (square portion on antenna). The antenna does not require a ground plane to function properly.



Stealth Antenna Mounting

The best location for a stealth installation is beneath the rear speaker deck panel or below the front window concealed in the dash of the vehicle. The GPS/RF combination antenna will work best if it has a clear view to the sky and as much of the horizon as possible. Any metallic objects between the antenna and the satellites will degrade the signal and reduce the overall performance.



- The GPS signals will travel through the clear glass but will be reduced if the window has any metallic coating or tint applied.
- The antenna must be mounted securely so that it does not become a projectile in an accident or move during normal operation.

The GPS 210 Series Device

The GPS 210 Series may be installed in any type of 12-volt vehicle. The unit should be mounted so it will not be exposed to damage from people or objects. The GPS 210 Series has four mounting holes. Use nylon tie straps to firmly mount the GPS 210 Series. Some examples of mounting locations include under the dash above the knee bolster, under the centre console, side kick panel and behind the glove compartment. The backup battery should be mounted in the same manner, close to the GPS 210 Series.



Connecting the Power Harness

Main Harness

Orange	12 Volts Constant
Green	12 Volts Constant
Blue	12 Volts Ignition
Black (X2)	Ground
Green/Yellow	Test (not used)

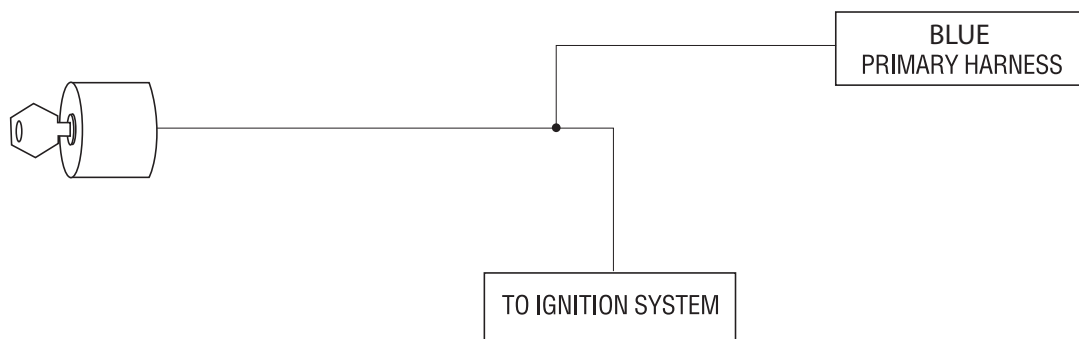
The following wires require connection to the vehicle wiring harness.

- Constant Power Wires (orange and green) +12VDC when the key is removed from the ignition.

Note: There are two fuses inline.

- 5 amp fuse for constant power

- Ignition Sense Wire (Blue) +12VDC when the key is in the “Run/On” position only.
- Ground Wire (Black) to a metal surface on the vehicle frame or kick panel.
- A good ground connection must be established for the GPS 210 Series to operate properly. Resistance to ground is the main cause of failure.
- Ensure the location you choose for your ground connection is made of metal, not plastic.
- Scrape away any paint on the vehicle ground to make a clean mounting surface.



Feature Module

The GPS 210 Series uses a feature module to control external features such as:

- Starter Disable, Door Unlock, and Alarm trigger notification.



Wiring Color Coding

Starter Disable

- Black (key)
- White (motor)

Unlock

- Blue (switchable polarity)

Alarm

- Brown (12 volt positive siren input)

Not Used

- Orange

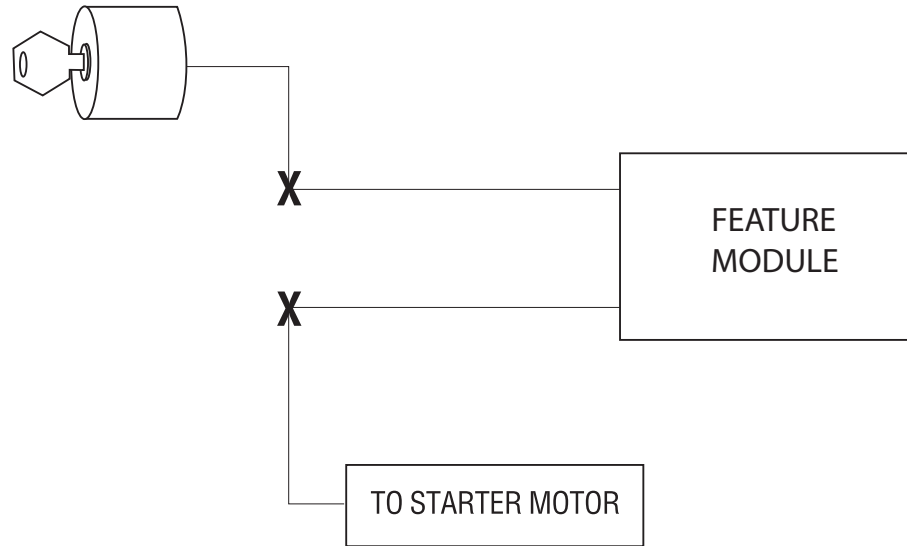
Connecting the Starter Disable Feature

The Started Disable feature requires connecting the starter wire through the Feature Module. The Feature Module has a internal starter disable relay.

The wire harness containing the starter wire may be located on either side of the steering column.

Using a Digital Multimeter probe the wire you suspect to be the starter wire. This wire will have a +12VDC present only when the ignition switch is in the (ENGINE CRANKING) position.

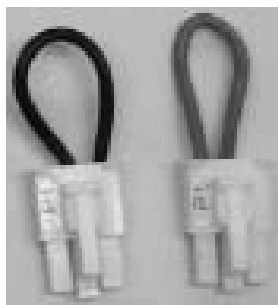
1. Cut the starter wire in a location that allows easy access to both ends for stripping and adding a crimp connector. Strip each end with wire strippers.
2. Place the key in the ignition switch and rotate to the start position. If the correct wire has been cut the motor will not crank.
3. Using a crimper, crimp the connector onto one the wire; crimp another connector to the other end.
4. Attach the Feature Module to the Black and White 10-guage wires.



Connecting the Door Unlock Feature

Refer to *TechTip Doc 1041* for information regarding door lock interface wiring. This document can be obtained from: www.directechs.com, DirectFax 800-999-1329, or Technical Support 800-753-0800.

The feature module can produce a positive or negative unlock output. The GPS210 comes with 2 jumpers (see illustration below), one Red and one Black. When the Red jumper is plugged in the feature module will produce a positive unlock output. When the Black jumper is plugged in the feature module will produce a negative unlock output.



Connecting the Alarm Feature

The GPS 210 Series can connect to most vehicle's alarm system to detect when the alarm system is triggered.

The "Alarm wire" (BROWN) connects to the 12 V positive siren trigger. When the Alarm is triggered the GPS210 will send an alert to notify the user that the alarm has been triggered.

Powering the GPS 210 Series

In order for the GPS 210 Series to function properly, it needs to be connected in the following sequence.

Connection Sequence



1. When power, ignition, and ground as well as the wired features from the feature module have been connected plug the feature module into the main wiring harness.



2. Connect the two coax cables from the combination GPS/RF antenna to the GPS 210 Series. Twist on firmly with your fingers. Do NOT tighten with any tools as overtightening can cause damage to the main board.



3. Plug the main harness into the GPS 210 Series.



4. Plug the back-up battery into the main wiring harness.

NOTE: The GPS 210 Series should now be powered. There is a LED on the GPS 210 Series that should now be flashing Red, refer to the section labeled *Troubleshooting*.

GPS 210 Series Installation Testing

Validation of the installation and performance of the GPS 210 Series can only be performed using a Palm with Application Software designed specifically for GPS 210 Series.

When the Palm is connected to the GPS 210 Series, the installer can:

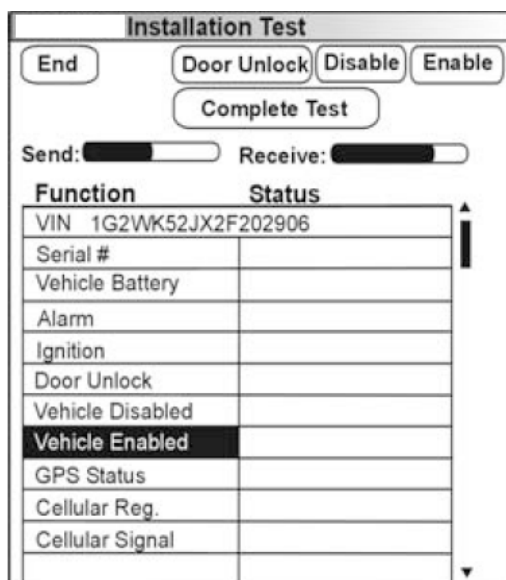
- Verify the wiring harness is installed properly.
- Test wired features such as door unlock, starter disable, arm and alarm
- Verify the GPS 210 Series is receiving satellite information in order to obtain a GPS fix.
- Perform a final connection test on the GPS 210 Series network to ensure performance.

Starting the GPS 210 Series Application on the Palm



1. The GPS 210 Series program is automatic. To begin, tap the GPS 210 Series  icon in the Applications Launcher of the Palm.

Record Vehicle VIN

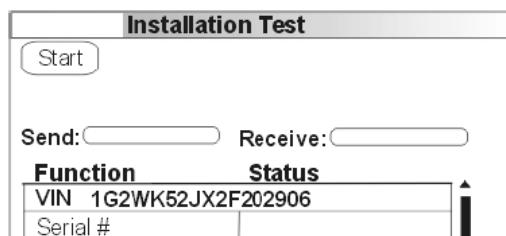


Function	Status
VIN	1G2WK52JX2F202906
Serial #	
Vehicle Battery	
Alarm	
Ignition	
Door Unlock	
Vehicle Disabled	
Vehicle Enabled	
GPS Status	
Cellular Reg.	
Cellular Signal	

2. Tap the VIN status column with the Palm stylus.

Scan the vehicle VIN into the Palm, or input the information manually if a scanner is not available.

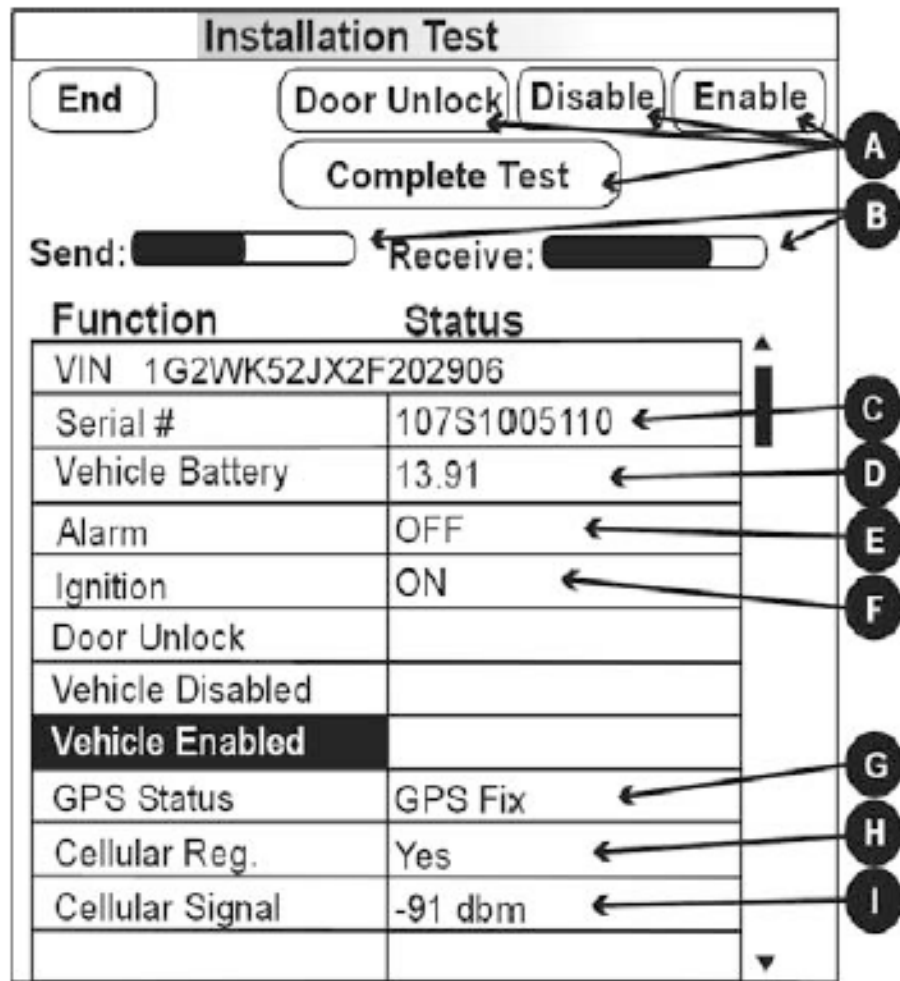
NOTE: VIN information is critical to the registration process. An invalid VIN will cause the complete test process to fail.



Function	Status
VIN	1G2WK52JX2F202906
Serial #	

3. Tap the **Start** icon to initiate communications between the Palm and GPS 210 Series. This icon will change to **End**.

210 Status



The following appear on the screen:

- A. **Door Unlock**, **Disable**, **Enable**, and **Complete Test** icons.
- B. **Send** and **Receive** progress bars scroll to indicate the Palm is communicating with the GPS 210 Series.
- C. The **Serial #** of the GPS 210 Series. Verify this number with the Serial # of the GPS 210 Series.

- D. **Vehicle Battery** voltage.
- E. **Alarm** state ON or OFF.
- F. **Ignition** state ON or OFF.
- G. **GPS Status** state GPS Fix or No GPS Fix.
- H. **Cellular Reg** will indicate if service has been acquired, Yes or No.
- I. **Cellular Signal** strength (dbm value).

Installation Test

This test verifies correct installation of the wiring harness, to ensure proper operation of the GPS 210 Series and Wired Features.

Ignition Test

Vehicle Battery	13.4
Ignition	ON

1. Start the vehicle, or ensure the engine is running. "Vehicle Battery" status should read "12.0" or higher. "Ignition" status should read "ON"

Vehicle Battery	13.4
Ignition	OFF

2. Turn the engine "OFF" and remove the keys. "Vehicle Battery" status should remain "12.0" or higher. "Ignition" status should read "OFF".

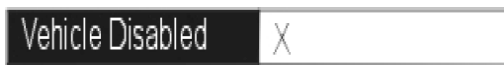
Note: If an error message appears during this test, refer to the section labeled "Troubleshooting".

Door Unlock Test (if option available)



1. Tap the **Door Unlock** icon. The doors should unlock, and a “X” should appear on the screen. The GPS 210 produces a double pulse unlock output, to accomodate newer vehicles that require a double pulse to unlock.

Starter Disable Test (if option available)



1. With the engine running, tap the **Disable** icon. The vehicle should be disabled, and a “X” should appear on the screen.

The column should be highlighted.

NOTE: The vehicle should be disabled, and the engine should still be running. If the engine turned off when disabled, the wrong wire was used for the Disable feature.

2. Turn ignition “OFF”, and restart the vehicle. The engine should NOT start.

NOTE: If The engine starts, refer to the section labeled “Troubleshooting”.

Vehicle Enabled	X
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3. Tap the **Enable** icon. The vehicle should be enabled, and a “X” should appear on the screen. Attempt to start the vehicle, the engine should start.

The column should be highlighted.

Alarm Test (if option available)

Alarm Status	OFF
--------------	-----

1. Alarm Status should read “OFF”.

2. Remove the keys from the ignition. Close all doors and arm the vehicle. (locking the vehicle, or arming with the remote control).

Alarm Status	ON
--------------	----

3. Open one of the doors to the vehicle and the alarm should sound. Alarm Status should read “ON”.

Alarm Status	OFF
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4. Disarm the alarm. Alarm Status should read “OFF”.

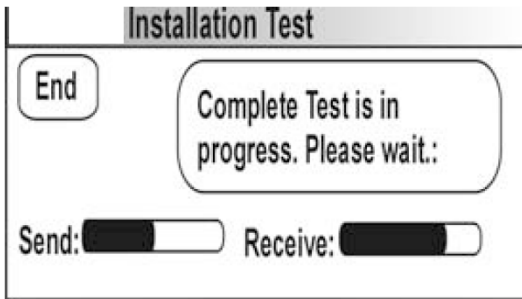
Communications Test

This test verifies communication between the GPS 210 Series and the OnLine System. The test will only be successful and error free if the following pre-requisites have been met:

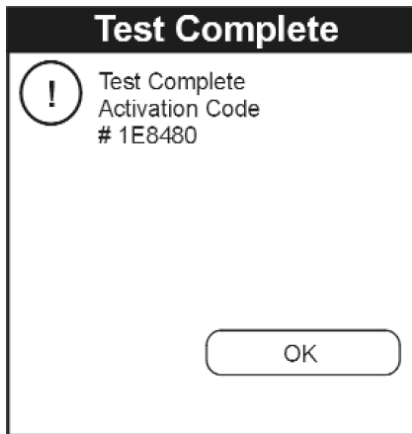
- The GPS 210 Series has achieved a GPS Fix.
- The GPS 210 Series has registered on the cellular network and has sufficient cellular strength.

GPS Status	GPS Fix
Cellular Reg.	Yes

1. The GPS 210 Series should receive a Cellular Registration when powered and a GPS Fix within 5 minutes.



2. Tap the **Complete Test** icon. This should initiate a final connection test on the GPS 210 Series OnLine System to ensure performance.



3. A message window should appear, with an Activation Code to verify the test was successful.

Testing should now be complete.

Note: You can now release the vehicle to the customer. The customer now needs to go to www.vipergps.com and register the vehicle.

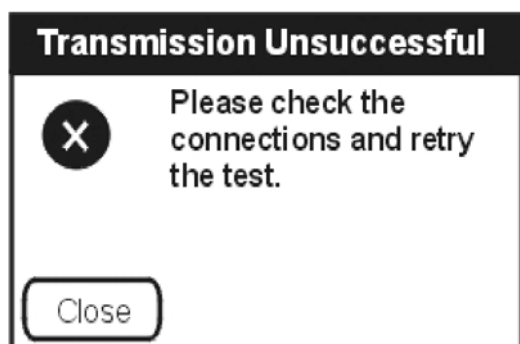
Troubleshooting

This section provides detailed instructions to assist in identifying the root cause of issues related to the GPS 210 Series or associated accessories. If you are unable to identify the root cause of the problem after following the steps in sequence, contact GPS 210 Series Technical Support at 1-800-753-0800.

- The GPS 210 Series equipment has no serviceable parts.
- Service is based solely on the substitution method; a faulty unit is replaced by a working one.

The following lists potential issues that may be encountered when testing the OnBoard equipment, and provides recommendations on resolution.

Transmission Unsuccessful message on Palm:



When the Start button is pressed on the Palm, the Palm attempts to communicate with the GPS 210 Series. This message occurs if the Palm is not connected to the GPS 210 Series, or the GPS 210 Series is not powered. The most common problem is related to the wiring harness power connections. If this message appears when the ignition key is turned off (during the ignition test), the most common cause is the ORANGE and GREEN wires are reversed with the BLUE wire. Ensure vehicle is running with a charged battery.

	Possible Cause	Action Required
i.	Palm not connected to the GPS 210 Series.	Verify the Palm is connected to the 4 pin connector on the wiring harness of the GPS 210 Series via the serial cable and the interface module.
ii.	No power to the GPS 210 Series.	The ORANGE and GREEN power wire must be connected to a constant power source which has +12VDC with the ignition key removed. Check the fuses on the ORANGE and GREEN power cable. With a meter, verify there is 12 volts on the ORANGE and GREEN wires at the fuse. Meter the wire in the vehicle for power.
iii.	Poor ground connection.	The Black wire must be attached to a good ground source. Use a bare (unpainted) metal surface of the vehicle, and ensure the metal is attached to the body. Meter your resistance to ground.
iv.	Orange/Green and Blue power wires reversed.	Use a meter to verify the ORANGE and GREEN wires have constant power, and the BLUE wire has power in the key in the ignition with the engine running.

No GPS Fix message on Palm:



This message occurs if the “Complete Test” icon is tapped without obtaining a GPS Fix. The vehicle must be running and have a clear view of the sky in order to get a GPS Fix. The GPS 210 Series should get a GPS Fix in less than 5 minutes.

	Possible Cause	Action Required
i.	Vehicle inside building or near obstructions.	Move the vehicle to a new location that does not have obstacles directly in front of the vehicle or directly overhead. Move vehicle 50 ft from any building or trees.
ii.	Antenna buried too deep under metal, or upside down.	The GPS module must point up. Try using another temporary antenna in a different location. If this antenna works, reconnect the original antenna. If it doesn't work, relocate or replace antenna.
iii.	Aftermarket tinting may contain metal flakes.	Relocate the antenna to an area where there is no window tint.

No Wireless Network message on Palm:

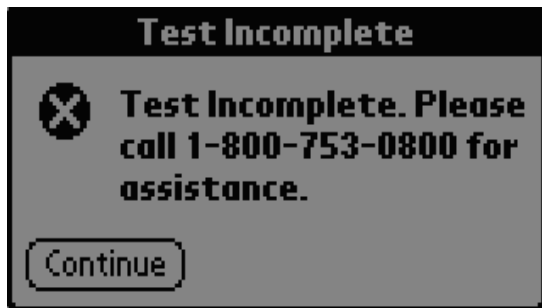


This message occurs if the GPS 210 Series has not registered on the cellular network, or if the signal is too weak. There needs to be a local wireless network in the area for the GPS 210 Series to register.

	Possible Cause	Action Required
i.	Antenna connector loose or not connected.	Ensure the antenna is connected to the GPS 210 Series and the connector is tight.
ii.	Antenna may have physical damage.	If there are any cracks in the cable, the antenna may be shorted and may not work. If the antenna itself has a crack or severe physical damage, it may be defective. Try a new antenna.
iii.	No wireless coverage.	If this is the first installation in this area, verify there is wireless service. Installation tests may need to be performed in another location where there is cellular coverage.



Test Incomplete message on Palm:



This message occurs if the communication test between the GPS 210 Series and GPS 210 Series fails. The purpose of the “Complete Test” function on the Palm is to initiate a communication test between the GPS 210 Series and GPS 210 Series. This test validates that the device is communicating properly.

	Possible Cause	Action Required
i.	Poor wireless coverage.	Retry the “Complete Test”, if this occurs again contact GPS 210 Series Technical Support at 1-800-753-0800.

Vehicle engine shuts off when “Disabled”:

If the vehicle engine shuts off when the “Vehicle Disabled” feature is selected, the Ignition wire has been chosen instead of the Starter wire for the “Starter Disable” feature. If the correct wire has been chosen, the vehicle engine should remain running when the “Disable” icon is tapped on the Palm.

Starter Disable relay buzzes or chatters:

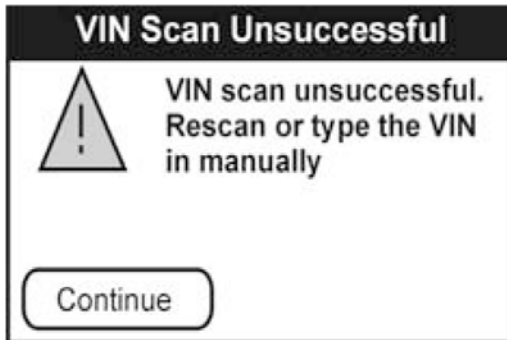
The “Starter Disable” relay will buzz or chatter if the BLACK and WHITE starter disable wires are reversed. When installing the starter disable feature, make sure that the BLACK wire is connected to the key side (power) and the WHITE wire is connected to the starter side (no power).

Vehicle engine will not start:

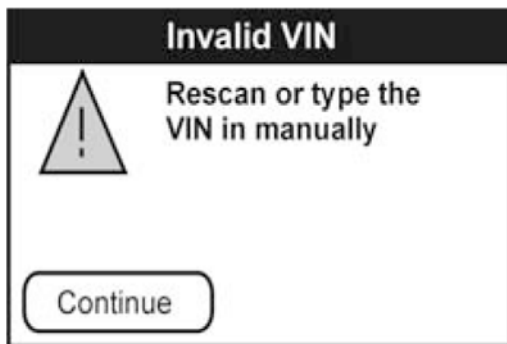
If the vehicle engine cranks over, or the starter solenoid makes a clicking sound, the issue is normally related to the vehicle and not the GPS 210 Series product.

	Possible Cause	Action Required
i.	Device is in a “Disabled” state	Remove power from the GPS 210 Series. Try to start the vehicle. If the engine starts, power up the device and enable it by tapping the “Enable” icon on the Palm.
ii.	Starter wires not connected properly.	Check the BLACK and WHITE “Started Disable” wires and ensure that the connections are solid.
iii.	Defective Feature Module	Unplug the wiring harness from the “Feature Module”. Start the engine. If the vehicle does not start, replace the “Feature Module”. Once the vehicle starts, move to step iv.
iv.	Red and Blue power wires reversed.	Plug the wiring harness into the Feature Module and unplug the GPS 210 Series. Start the vehicle engine. If the vehicle does not start, replace the wiring harness. If the vehicle engine starts, plug in the GPS 210 Series. If the vehicle does not start, and the GPS 210 Series was enabled using the Palm, replace the GPS 210 Series.

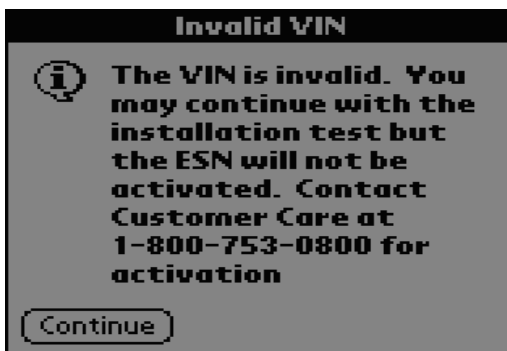
VIN Messages:



This message occurs if the scan tool does not read the bar code. Retry the scan or type the VIN in manually.



This message occurs if the VIN has not been properly entered. Verify the VIN on the vehicle with the VIN on the Palm. If VIN is correctly entered, contact GPS 210 Series Technical Support at 1-800-753-0800.



This message occurs if the VIN is not recognized by GPS 210 Series in the VIN database. You may continue with the installation test but the Serial # will not be activated. Contact GPS 210 Series Technical Support at 1-800-753-0800 for activation.

LED Operation:

Bi-Colored LED

Each GPS 210 Series is equipped with one bi-colored LED.

Blinking LED Color

- **Blinking Green:** Microburst and Cellular Service are available.
- **Blinking Orange:** Cellular Service, but not Microburst Service is available.
- **Blinking Red:** Neither Cellular Service nor Microburst Service is available.

Blinking LED Timing:

- **Off for 1 second:** GPS Module is powered and signal is Valid, Cell Module is powered.
- **Off for 5 second:** GPS Module is powered and signal is Invalid, Cell Module is powered.
- **Off for 10 seconds:** GPS Module is turned off, Cell Module is powered.
- **Off for 21 seconds:** GPS Module is powered and signal is Valid, Cell Module is turned off.
- **Off for 25 seconds:** GPS Module is powered and signal is Invalid, Cell Module is turned off.
- **Off for 30 seconds:** GPS Module is turned off, Cell Module is turned off.

Wireless Coverage Area:

Wireless technology is required to access the GPS 210 Series. GPS 210 Series utilizes the broadest coverage area networks.

There are areas within North America that have not yet been included in the wireless coverage area. If a vehicle travels out of coverage, or is in a poor coverage area, communication with that vehicle is unavailable until it returns to the coverage zone. From time to time, poor coverage areas (“holes”) occur even in fully developed areas, thereby limiting system performance.

Wireless Network Service Problem:

Wireless network service problems may affect the communications link between the vehicle and GPS 210 Series OnLine. Service problems include, service interruptions and network congestion, a busy network, or cellular roaming issues.

GPS Drift, Urban Canyon:

GPS is a satellite based positioning system providing the greatest coverage available, but there are still some circumstances that can hinder the performance of the system. The GPS antenna must have a direct line of sight to the satellites. If the path is blocked or obstructed by underground parking lots, or the shadow of tall buildings, it can affect the GPS receiver. What typically occurs in this case is the system will recognize that it is not receiving a clear GPS signal, and will report the last known clear location of that vehicle.

Tampering with the Unit - Human Intervention:

If the unit is tampered with - antennas (GPS or cellular) or wires disconnected, or the unit completely removed, the functionality of the system will be jeopardized. However, steps can be taken to prevent this from occurring. Upon installation, the components should be hidden, making the system difficult to detect and tamper with.

Defective Units:

All GPS 210 Series are tested at the Directed facility prior to being shipped and installed. The GPS 210 Series has a built-in diagnostic test that initiates each time the unit is powered on. If the GPS 210 Series detects an irregularity, it has the ability to send notification of the problem and the vehicle's location, (if power and a communication link are present) so that the situation can be rectified immediately.

