LMU-26xx™ Install Guide

CalAmp Corp.
13645 Dulles Technology Drive, Herndon, VA 20171
Phone: 703. 262.0500
Fax: 703.262.0380
www.calamp.com

Document: MBUD-0199v4.0
April 2015

CalAmp | LMU-26xx™ Install Guide

Revision History:			
Version #	**Revision Date**	**Author**	**Details**
1.0	3/2/2011	Marketing	Baseline release
1.1	5/7/2011	Marketing	Unit information revised
1.2	3/27/2012	Product	Instruction for install in weather exposed environments
2.0	4/24/2013	ABP	Revised style and device name.
3.0	1/30/2014	ABP	Added Buzzer, LED, jPOD and vPOD instructions.
3.1	2/10/14	ABP	Updated P/N for standard wiring harness
3.2	8/11/2014	Allen Frederick	Added sections 3.1 & 3.2 showing various wiring harness and accessories. Updated installation instructions for JPOD and VPOD. Added instructions for new JPOD/VPOD wiring harness 5C261.
3.3	11/4/2014	Product	Revised and updated jPOD and vPOD Added Privacy switch wiring
3.4	12/12/2014	Product	Clarify wiring of harnesses
3.5	1/22/2015	EAF	Clarify wiring of the Jpod/buzzer combination
3.6	1/23/2015	EAF	Remove red/black wire connection on Jpod install
3.7	1/23/2015	EAF	Remove the white wire to ignition requirement when using vPOD; reinstate wiring the white wire to red wire.
3.8	1/28/2015	EAF	Remove privacy section.
3.9	3/5/3015	Product	Added Privacy Switch instructions
4.0	04/01/2015	Product	Updated Privacy Switch P/N to 134798.
4.1	4/15/16	Product	Added Key Reader installation instructions.

TABLE OF CONTENTS

LIST OF FIGURES

1 REGULATORY INFORMATION

1.1 HUMAN EXPOSURE COMPLIANCE STATEMENT

Pursuant to 47 CFR § 24.52 of the FCC Rules and Regulations, personal communications services (PCS) equipment is subject to the radio frequency radiation exposure requirements specified in § 1.1307(b), § 2.1091 and § 2.1093, as appropriate.

CalAmp certifies that it has determined that the LMU-26xx complies with the RF hazard requirements applicable to broadband PCS equipment operating under the authority of 47 CFR Part 24, Subpart E of the FCC Rules and Regulations. This determination is dependent upon installation, operation and use of the equipment in accordance with all instructions provided.

The LMU-26xx is designed for and intended to be used in fixed and mobile applications. “Fixed” means that the device is physically secured at one location and is not able to be easily moved to another location. “Mobile” means that the device is designed to be used in other than fixed locations and generally in such a way that a separation distance of at least 20 cm is normally maintained between the transmitter’s antenna and the body of the user or nearby persons. The LMU-26xx is not designed for or intended to be used in portable applications (within 20 cm of the body of the user) and such uses are strictly prohibited.

To ensure that the LMU-26xx complies with current FCC regulations limiting both maximum RF output power and human exposure to radio frequency radiation, a separation distance of at least 20 cm must be maintained between the unit’s antenna and the body of the user and any nearby persons at all times and in all applications and uses. Additionally, in mobile applications, maximum antenna gain must not exceed 3 dBi.

1.2 HARDWARE PRECAUTIONS

Electrical Over-Stress (EOS)
The LMU-26xx GPS receiver can be damaged if exposed to an RF level that exceeds its maximum input rating. Such exposure can happen if a nearby source transmits an RF signal at sufficiently high level to cause damage.

Storage and Shipping
One potential source of EOS is proximity of one LMU-26xx GPS Antenna to another LMU-26xx GSM Antenna. Should one of the units be in a transmit mode, the potential exists for the other unit to become damaged. Therefore, any LMU-26xx should be kept at least four inches apart from any active LMU-26xx or any other active high power RF transmitter with power greater than 1 Watt.

2 INTRODUCTION

The LMU-26xx Install Guide provides important electrical safety and radio-frequency compliance information, environmental specifications and installation procedures for the CalAmp LMU-26xx and optional serial cables.

2.1 GUIDE PREREQUISITES

In order to limit the size and scope of this guide, the following assumptions have been made about the user:

- Working knowledge of GPS concepts and terminology.
- Experience with installing equipment in vehicles.

3 LMU-26XX OVERVIEW

The CalAmp LMU-26xx is an integrated Cellular/GPS communications device for use in-vehicle tracking. It provides communications for vehicle position and operating information as part of an overall vehicle tracking solution. It is installed within the vehicle in order to provide this information, and is wired into and powered by the vehicle's power supply.

The device features integrated cellular and GPS antennas in order to provide the vehicle with a compact and full-function platform for capturing vehicle position and operational information and transmitting it for use by dispatchers and other back-office personnel.

Figure 1: CalAmp LMU-26xx Device

3.1 AVAILABLE WIRING HARNESS

The LMU-26xx works with three available wiring harnesses: 5C908, 5C260 and the 5C261.

The 5C908 wiring harness ships with the LMU-26xx device. This harness requires hard wiring of the power, ground and ignition wire. The 5C908 wiring harness works with either the Garmin device, jPOD or vPOD, but only one of these.

The 5C260 wiring harness is an optional cable and gives you the most flexibility:

1. If you have a vPOD or jPOD, do not perform a hard wire install for the red/black power wires. Power will come from the vPOD/jPOD
2. For vPOD: Tape the red/black wires so that they are out of the way. Wire the white wire to the vPOD white wire.
3. For jPOD: We recommend that you wire the white wire to the ignition line on the vehicle, in the event the jPOD does not report ignition. The jPOD will attempt to get ignition sensing from the Jbus before reverting to the ignition wire. If you are using a buzzer, you must also wire the red wire to the white wire.
4. For a Garmin device: Perform a hard wire install as normal.
5. If you do not have the vPOD/jPOD, perform a hard wire it as normal.

The 5C261 MUST be used with a vPOD or jPOD or the LMU device will not have power.

1. For vPOD: Wire the white wire to the vPOD white wire.
2. For jPOD: We recommend that you wire the white wire to the ignition line on the vehicle, in the event the jPOD does not report ignition. The jPOD will attempt to get ignition sensing from the Jbus before reverting to the ignition wire.

Wire Harness P/N	Description	No JPOD or VPOD	Only One			Key Fob	Buzzer	Switch/LED
			JPOD	vPOD	Garmin			
5C908	Power Harness supplied with device	OK	OK	OK	OK	NR	NR	NR
5C260	Accessory Power Harness	OK	OK*	OK*	OK	OK	OK	OK
5C261	Quick Install Power Harness – Must have vPOD or jPOD	n/a	OK*	OK*	n/a	OK	OK	OK

* For Installations using vPOD or jPOD, the 5C261 optional cable is recommended for an easier install.
n/a - indicates that this combination is not applicable and cannot be done
NR –It is possible to splice wires together and make this combination work, it is not recommended.

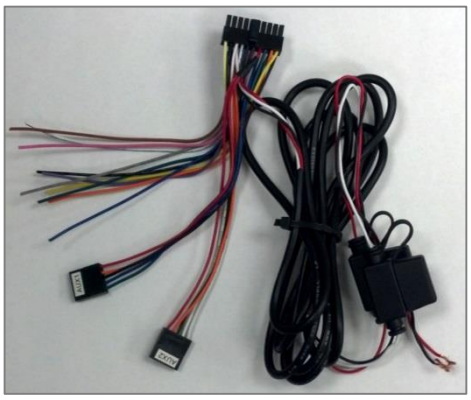


Figure 3: P/N 5C908

Figure 2: P/N 5C260

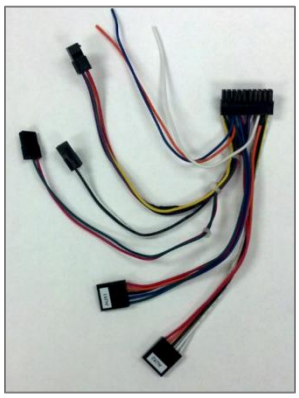


Figure 4: P/N 5C261

3.2 ACCESSORIES

Accessories	Description
4C764	Cable Assy, Switch/LED
4C765	Cable Assy, Buzzer
134798	Privacy Switch
133337-5	DB9 Serial Cable (typically used on Aux1 serial port)
133688	Garmin Serial Cable (Aux2 serial port)
133917-VPOD	Accessory, vPOD (Aux2 serial port)
134152-JPOD	Accessory, jPOD (Aux2 serial port)
5C909-2	jPOD Y Cable (connects D9 pin DIN connector on vehicle to the jPOD 9 pin port)
8973002002	6-pin j1708 Y Cable (substitute for the 6C909-2 cable in older vehicles)
8973002001	9 PIN Jbus J1936 TO 6 PIN J1708 Adapter Cable (Converts a 6 pin J1708 connector vehicle to 9 pin ready for use with 5C909-2 cable.

3.3 ENVIRONMENTAL SPECIFICATIONS

The LMU-26xx is designed to operate in environments typically encountered by fleet vehicles, including wide temperature extremes, voltage transients and potential interference from other vehicle equipment.

To ensure proper operation in such an environment, the LMU-26xx was subjected to standard tests defined by the Society of Automotive Engineers (SAE). The specific tests included temperature, shock, vibration and EMI/EMC. These tests were performed by independent labs and documented in a detailed test report. In accordance with Appendix A of SAE J1113 Part 1, the Unit is considered a "Functional Status Class B, Performance Region II" system that requires Threat Level 3 Testing.

The following shows the environmental conditions the LMU-26xx is designed to operate in and the relevant SAE tests that were performed. No formal altitude tests were conducted.

Size	4.0" long x 2.0" wide x 0.85" high 10.2 cm long x 5.1 cm wide x 2.2 cm high
Weight	2.61 ounces / 75g (external antenna) 3.0 ounces / 85g (internal antenna)
Operating Temperature	-30° C to 75° C
Storage Temperature	-40° C to 85° C
Humidity	0% to 95% relative humidity, non-condensing
Shock and Vibration	SAE Test: SAE J1455 Compliant Mil Standard 202G and 810F Compliant Ground vehicle environment with associated shock and vibration
Electromagnetic Compatibility (EMC/EMI)	SAE Test: SAE J1113 Parts 2, 12, 21 and 41 Compliant FCC Part 15B Compliant Industry Canada Compliant EMC compliant for a ground vehicle environment
Operating Voltage Range	6 – 32VDC
Power Consumption	Active Standby :70mA at 12VDC Sleep on Network (SMS): 10mA Sleep on Network (GPRS): 20mA Deep Sleep: 3mA
GPS	50 channel (with SBAS, DGPS) GPS Receiver 2m CEP (with SA off) -160 dBm tracking sensitivity
Communications (Comm)	Quad Band Class 12 GPRS Modem 850 MHz (Class 4) – 2W 900 MHz (Class 4) – 2W 1800 MHz (Class 1) – 1W 1900 MHz (Class 1) -1 W GPRS Packet Data (UDP) SMS
RoHS Compliant	

4 PRE-INSTALLATION CONSIDERATIONS

The installation of the LMU-26xx and its antennas can have a major impact on device performance. It is recommended that installers be familiar with the installation of GPS and cellular devices and are comfortable in a vehicle environment.

4.1 PLAN THE INSTALLATION

Verify Power, Ground and Ignition. Be sure to check each source (power, ground and ignition) to ensure that the proper signaling exists. This is typically accomplished with a multi-meter.

Before drilling any holes or running any wires, decide where each hardware component will be installed (LMU-26xx, antennas, peripherals, etc.). Verify that all cables running to the LMU-26xx will not be bent or constricted. Verify that the LMU-26xx install location is free from direct exposure to the elements (e.g., sun, heat, rain, moisture etc.).

Be advised that an installation that violates the environmental specifications of the LMU-26xx will void the warranty.

The best way to ensure a trouble-free installation is to consider your options and make appropriate decisions before you start. Review the vehicle and determine the best install approach for the LMU-26xx for the following purposes:

- Accurate data gathering and simulation of how customers actually use your solution.
- Ongoing monitoring and maintenance of LMU-26xx equipment
- Accidental or intentional alteration of the equipment or cable connections.

4.2 SIZE AND PLACEMENT OF LMU-26XX

When planning device installation in a vehicle, take in account the dimensions of the LMU-26xx before actual installation. Typical installations place the LMU-26xx under the vehicle dashboard, or in the A Pillar. Verify that you can access to the device, as under some circumstances it may be necessary to add additional wiring or connections to the LMU-26xx.

Refer to Section 3.3: Environmental Specifications for the exact measurements and specifications of the LMU-26xx.

- Verify the LMU-26xx will fit before drilling any holes or running cable.
- Ensure that all cables running to the LMU-26xx will not be bent or constricted. Damage to the cables may impede the LMU-26xx's performance.
- Verify that the installation point will not violate any of the LMU-26xx's environmental specification. Improper installation of the LMU-26xx may void the warranty.

4.3 PROTECTION FROM HEAT

We recommend that you do not place the LMU-26xx in an unusually warm location such as directly near heater vents, hot engine components or in direct sunlight.

Refer to Section3.3: Environmental Specifications for the maximum temperature tolerated by the LMU-26xx.

4.4 VISIBILITY OF DIAGNOSTIC LEDS

Status LED lights on the front of the LMU-26xx provide valuable information about the operation of the device. When feasible, attempt to install the LMU-26xx in such a way that the lights are visible with reasonable ease.

You may find it useful to be able to view the LEDs periodically to make sure that the LMU-26xx is operating properly. If you encounter a problem or poor performance with the LMU-26xx, you may need to read the LEDs to troubleshoot the issue. If you cannot resolve the issue, you will need to provide the LED information to the CalAmp Customer Support Team.

Refer to Section 5.7.2: Status LEDs for information on how to interpret the lights.

4.5 CABLE LENGTH

The harness cables, which are provided for connecting to the LMU-26xx to the vehicle or other auxiliary device, should be used at the length provided. Do not cut cables. Instead, coil any excess cable length, making sure not to crimp or flatten the cables.

Figure 5: Coil Excess Cable

4.6 MOISTURE AND WEATHER PROTECTION

The LMU-26xx is not a weatherproof device and must be kept dry. The mounting location should be inside the passenger compartment of the vehicle safe from physical damage and where it is not exposed to moisture or water. In a typical inside-vehicle installation, this is not a common concern; however, avoid installing the device below the vehicle's cup holders, or where rain might easily splash into the compartment when a door is opened.

If the LMU-26xx is installed in a vehicle with a cab exposed to the weather, additional protection is required to avoid damage to the device, which could void the warranty. There are numerous alternatives for protecting the device. You can purchase a waterproof NEMA enclosure at many electrical distributors or consider using using the CalAmp TTU-2820.

4.7 PREVENTING ACCIDENTAL OR UNAUTHORIZED MODIFICATION

If you anticipate that fleet drivers or others might tamper with the devices once installed, take steps to ensure that it is not easy to disconnect the wiring or remove the device from its power source. A tamper resistant installation couples a zip-tie secured around the device with a tamper seal applied to protect against potential interference and to deter intentional tampering. When the tamper seal is removed, the seal self-destructs to indicate removal and leaves behind a dot-pattern residue on the device.

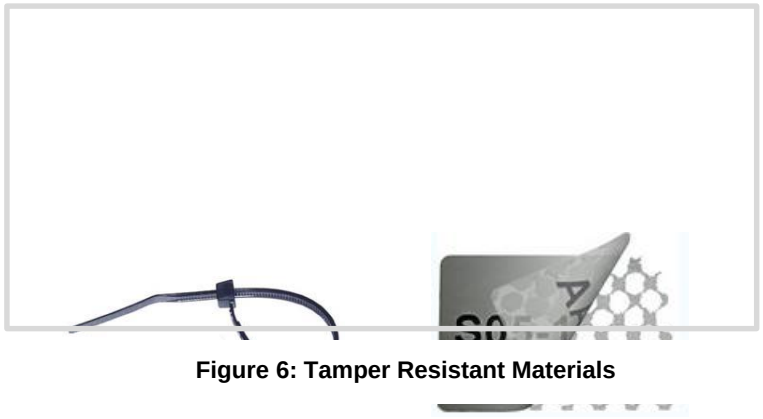


Figure 6: Tamper Resistant Materials

5 LMU-26XX INSTALLATION

Installing the LMU-26xx is not difficult, but you must consider the variables involved, such as the vehicle type and location of existing equipment. Installation time can vary depending upon the installer's experience and the vehicle design. The average time for installation is approximately 45 minutes. A single individual can perform most installation operations. CalAmp offers an installation training program or can supply a list of recommended installation vendors in your area.

Prior to beginning the installation, verify that you have the parts and tools necessary to complete the installation. Additionally, read entire installation procedure before beginning. Some of the procedures require a choice between several installation options.

To install the LMU-26xx:

3. Select location for mounting the device and install it.

- For ease of installation, the LMU-26xx has internal GPS and Cellular antennas. Assess cable routes while considering placement.

4. Install the power, ignition, and ground connections.
5. Install optional buzzer and/or LED button.
6. Install optional I/O connections.
7. Install optional serial cables.
8. Secure all cables to rigid mounts with cable restraints.
9. Verify operation of the LMU-26xx.

5.1 SELECT THE LOCATION FOR THE LMU-26XX AND INSTALL IT

Determine the desired mounting location. The most common locations are under the dash or on the front windshield. We recommend under the dash.

For an exposed location, refer to Section 5.1.2: Installation in an Exposed Area.

When determining mounting location, the primary consideration is GPS satellite visibility by the device. The required installation orientation of the LMU-26xx is label side up. The label should face the sky or toward windshield.

Note: When performing installation tasks requiring the operation of power, follow recommended safety procedures, including use of safety eye-wear. In addition, avoid drilling through wires, mounted fixtures or equipment.

5.1.1 UNDER DASH INSTALLATION

If the LMU-26xx is mounted under the dashboard of the vehicle (Figure 7), ensure the device is mounted with the “label side” facing up. Do not install the device where it will be obstructed by metal components. Common install locations are in the void above the glove box (if no airbag present) or above the vents.

You may need to remove part of the dash facing for access. Typically, the dash facing is attached with just clips. Do not use excessive force wedging the device into a location under the dash. Use the provided ‘re-closable fastener tape’ to attach the device to the underside of the dash as described in the steps below.

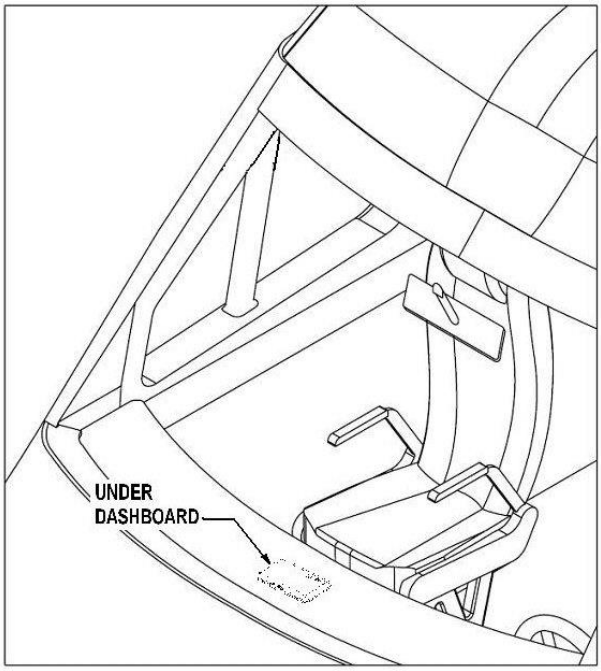


Figure 7: LMU-26xx Under Dash Mount

1. Under dash mounting may or may not require the use of the re-closable fastener tape. If the tape is required, follow instructions below:
    - Clean and prepare the mounting surface and the device before attaching the provided re-closable fastener tape.
    - One at a time, remove the backing from two pieces of the re-closable fastener tape.
    - Firmly press on the sticky-side of the re-closable fastener tape onto the device on both sides of the device, front or back of device depending on installation requirements (Figure 8).

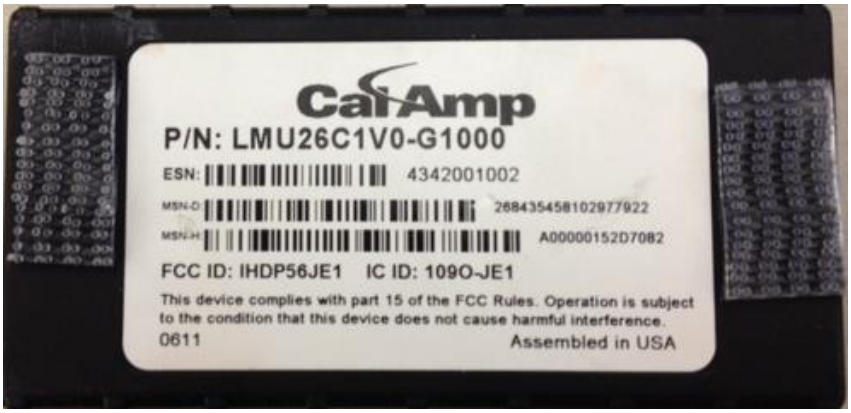


Figure 8: Re-closable Fastener Tape on LMU-26xx

- Press the other pieces of re-closable fastener tape, bumpy sides together, onto the device. Do not remove backing (Figure 9).

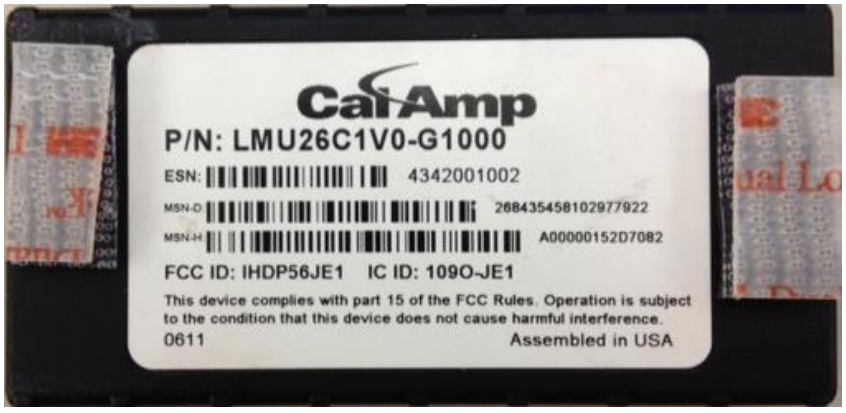


Figure 9: Re-closable Fastener Tape - Prior to Mounting

2. Depending on install location, you may need to attach the wiring harnessed to the device prior to installation. After the wiring harness is inserted into the device, gently pull on the connector to ensure the harness is locked in place.
3. Remove the backing from the re-closable fastener tape.
4. Firmly press the device with the re-closable fastener tape onto the mounting surface in the previously selected and cleaned location, wait several seconds before releasing pressure.

5. Route the power cable to the source of 12 Volts continuous and 12 Volts ignition switched.
    - Refer to Section 5.2: Install Power Connections for detailed instructions on installing the power cable.
6. Carefully remove any panels required for access as needed. Ensure there are no sharp edges that may abrade the wire. Use a suitable means to protect the cable from the sharp edge to eliminate possible wear or reroute the wire if possible.
7. If applicable, connect Buzzer and/or Switch with LED Cables.
    - Refer to Section 5.3: Optional Buzzer Assembly Cable instructions and/or Section 5.4: Optional Switch with LED Cable instructions.
8. If applicable, route the I/O Cable to the source of the I/O signals.
    - Refer to Section 5.5: Connect Optional Inputs for detailed instructions on installing the I/O Cable.
9. If applicable, connect the optional serial cables (e.g., NMEA or Garmin).
    - Refer to Section 5.6: Install Optional Serial Cables for detailed instructions on install the serial cables.
10. Follow the steps outlined in Section 5.5: Verify LMU-26xx Operations to verify successful installation.

5.1.2 INSTALLATION IN EXPOSED AREA

If the LMU-26xx is installed in a vehicle with an open cab exposed to the weather, a NEMA rated enclosure suitable for the application must be used to seal out moisture. A recommended alternative is a TTU-2820 sealed device available from CalAmp.

5.2 INSTALL POWER CONNECTIONS

The LMU-26xx requires a continuous 12 Volts and an ignition switched 12 Volt signal to operate correctly.

For Harness 5C908 and 5C260, the LMU-26xx power leads with in line fuses are supplied as part of the wiring harness. For harness 5C261, the power and ground are an integral part of the harness, but **must be** installed with the vPOD or jPOD. See the Available Wiring Harness Section for more information on harnesses.

Figure 10: LMU-26xx Standard Wiring Harness (P/N: 5C908)

If hard wiring the device, the LMU-26xx power cable has 3 wires: 12 Volts continuous, 12 Volts ignition switched, and ground.

- All power connections must be insulated with electrical tape.
- Use care to prevent accidentally shorting any connections. Power Connections should meet aftermarket electronics industry installation practices.
- **Power connections, both Constant and Ignition, must be fused using the supplied in line 3A fuses and holders.**
- All power connections must be made using manufacturer approved methods for adding accessories to vehicles.

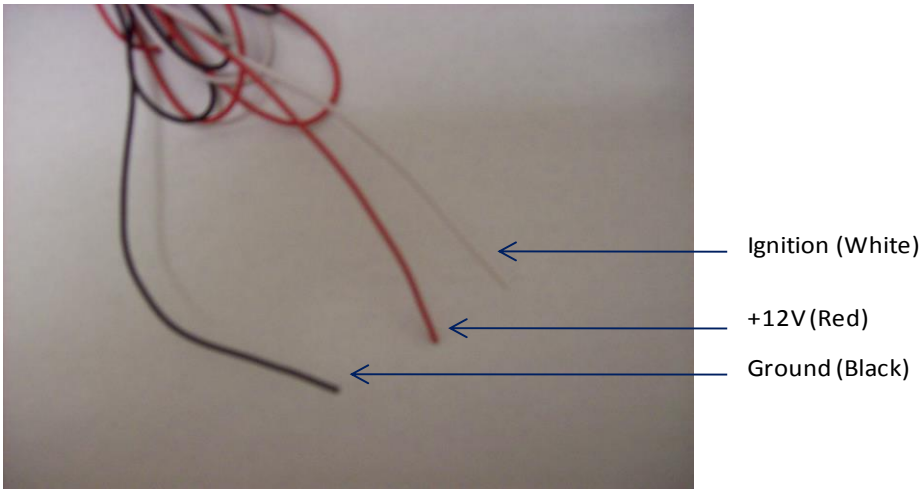


Figure 11: Power Leads

The connection method must be applied to all installations:

1. Install a ring connector on the Ground wire (Black) as shown below.

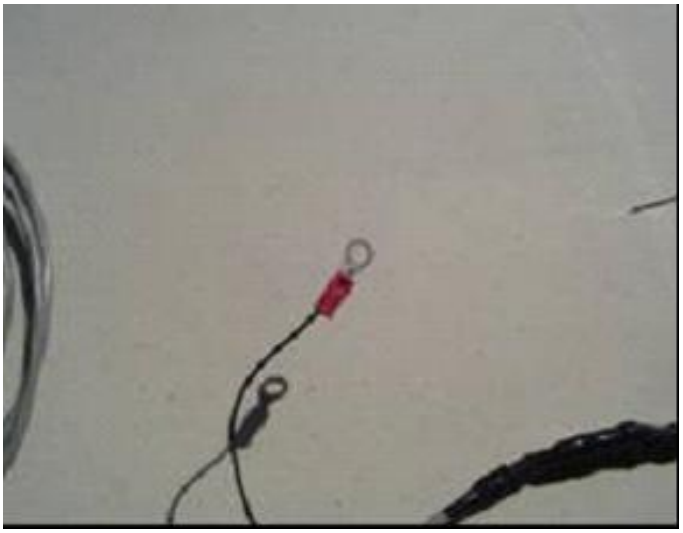


Figure 12: Ring Connector on Ground Wire

2. Select a common grounding point and connect the negative, grounding-wire lead (black lead) to its ground, the negative battery lead can be used.

- The common ground is through the vehicle's chassis and connected using a Ring Terminal, Star Washer and a ½-inch self-tapping screw or using a provided vehicle ground under the dash.

Figure 13: Ground Connection

3. Identify the main harness for the vehicle's key. Use a DVOM (Multimeter) or test light to verify the constant +12VDC and Ignition sense wires.

- Ignition sensor wire refers to a Key controlled power source that has +12VDC in both the Run and Start positions. Under no circumstance will the "Accessory Position" produce +12VDC on the Ignition sensor wire.

Figure 14: Main Vehicle Wire Harness

4. Remove insulation from the correct factory ignition wires using T-Strippers. Use care to remove only the insulation. Do not damage any of the strands. Using a pick or multi-meter probe, separate the strands.

Figure 15: Ignition Wires

5. Wrap the Fuse Holder Lead.
    - Strip about 1½" to 2"of insulation from the Fuse Holder lead. Feed the exposed fuse holder lead through the hole in the factory wire. Pinch the factory wire back together and wrap the fuse lead around source wire at least 3 times.

Figure 16: Wrapped Fuse Lead

6. Insulate and secure the power connections:
   - Using electrical tape insulate the power connection.
   - To ensure a tamper resistant connection, apply zip-ties over the tape at the connection point and apply Torque Seal to the zip-ties.

Figure 17: Applied Torque Seal

5.2.1 SECURE ALL CABLES

Verify that all cables are secured with proper connections to components. Coil and secure loose or excess cable and ensure that it is out of the way of normal vehicle operations. Additionally, verify that cables are not stretched and do not rub on vehicle components, which could cause unexpected wear.

Figure 18: Secured Cables

5.3 OPTIONAL KEYFOB READER ASSEMBLY CABLE

The LMU-26xx can be used to provide a connection to an in-cab KeyFob Reader enabling drivers to automatically assign themselves to the vehicle in FleetOutlook. Each driver is assigned a key fob, and each vehicle is equipped with a key fob reader. Drivers must present their assigned key fob at the start of each trip. Additionally, in the event a driver does not present a key fob, the optional buzzer will begin chirping after vehicle ignition on.

Note: To install the KeyFob Assembly Cable with the LMU-26xx, you must order the Power Accessory Cable P/N 5C260 or 5C261 – See Section 3.1 "Available Wiring Harness".

To Connect the KeyFob Assembly Cable:

1. Locate a spot on the right side of the steering column near the ignition cylinder that will allow you to drill a 7/16^{ths} hole to mount the Key Reader. Be sure to leave room to feed the cables behind the panel and to be able to attach the Key Reader locking clip.

Figure 19: Add Caption

2. Drill a 7/16^{ths} hole in the panel.
3. Feed the 2-pin molex connector end through the hold, gently feed the cables all the way through and seat the Key Reader against the panel.
4. Feed the locking clip over the 2-pin molex, up the cables and attach to the back of the Key Reader to securely attach.

Figure 20: Key Reader and locking clip secured to panel

5. Plug in the 2-pin connector on the KeyFob Assembly Cable to the 2-pin connector (Black and White/Blue wires) on the LMU26xx Power Accessory cable: (P/N:5C260 or 5C261 – See Section 3.1 “Available Wiring Harness”).
6. Properly secure all wires.

5.4 OPTIONAL BUZZER ASSEMBLY CABLE

The LMU-26xx can be used to provide a connection to an in-cab buzzer to provide driver behavior feedback for specific conditions, such as hard braking, hard acceleration and exceeding a defined speed threshold. You must connect the Buzzer Assembly Cable (P/N 4C765) to the LMU-26xx Power Accessory Cable (P/N 5C260 or 5C261) and mount the buzzer to a metal or plastic surface of the vehicle. This cable can be used in combination with the Switch with LED Button Cable (P/N 4C764).

Note: To install the Buzzer Assembly Cable with the LMU-26xx, you must order the Power Accessory Cable P/N 5C260 or 5C261 – See Section 3.1 “Available Wiring Harness”.

To Connect the Buzzer Assembly Cable:

1. Plug in the 3-pin connector on the Buzzer Assembly Cable to the 3-pin connector on the LMU26xx Power Accessory cable: (P/N:5C260 or 5C261 – See Section 3.1 “Available Wiring Harness”).

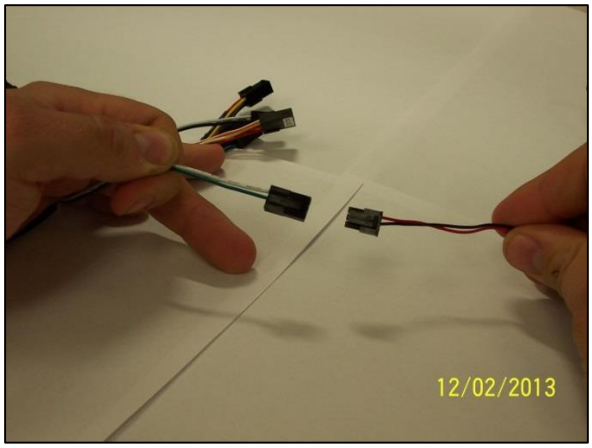
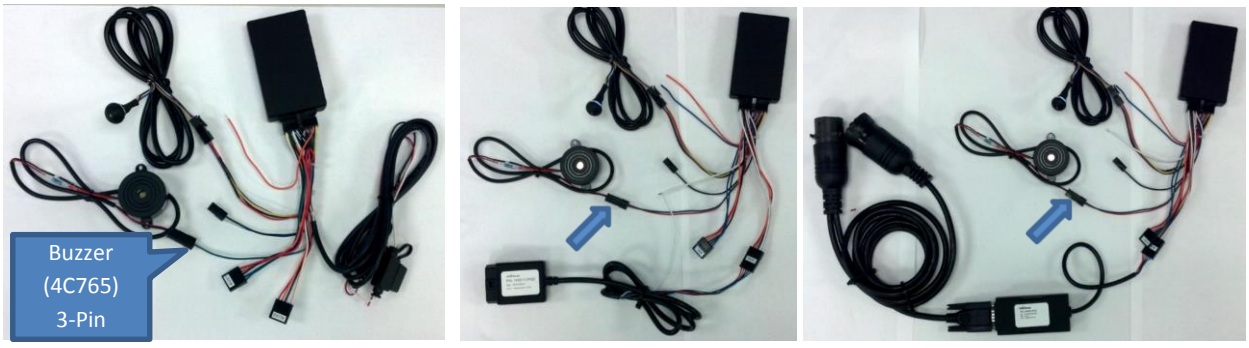


Figure 21: Connect Buzzer Assembly to the LMU-26xx Power Accessory Cable 5C260 or 5C261

2. Mount the buzzer using zip-ties to the secured wiring harness or surface of the vehicle.

- You reduce the buzzer noise level by applying heavy tape over the buzzer opening or reduce even further by wrapping the buzzer in high density foam or plastic.



Harness 5C260 Standard Harness 5C261 with vPOD Harness 5C261 with jPOD

Figure 22: LMU-26xx Buzzer Assembly Connected

5.5 OPTIONAL PRIVACY SWITCH KIT

The LMU-26xx can be used to provide a connection to an in-cab privacy switch to allow drivers to turn off location services and tracking functions while using a vehicle for personal activity. The Privacy Switch Kit (P/N 134798) works with any of the LMU-26xx wiring harnesses and includes a mounting bracket to prevent permanent damage to the visible surface on the dashboard.

Before starting, review the installation requirements for:

- Switch Placement
- Wire length requirements

To Install the Privacy Switch:

1. Prepare wiring:

a. Cut the 6-foot white wire into two lengths (White Wire 1 & White Wire 2) based on the installation requirements.

b. Cut the 2-foot black wire into two lengths (Black Wire 1 & Black Wire 2) based on the installation requirements.

c. Strip approximately ¼" of insulation off the ends of all the wires.

2. Switch and Bracket Assembly:

a. Insert the Rocker Switch into the Switch Bracket (Figure 23).

Figure 23: Insert Rocker Switch into Switch Bracket

3. Ground wire connections:

a. Splice and crimp together Black Wire 1 and the main ground wire from the LMU-26xx sheath.

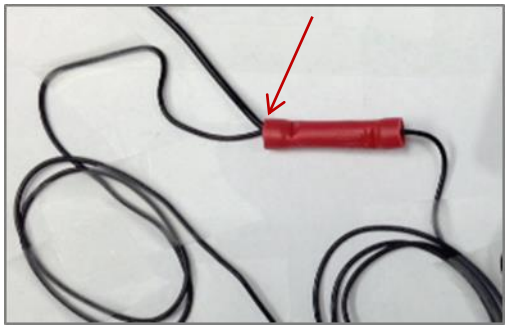


Figure 24: Ground Wire Connections: Step A

b. Splice and crimp a Slide On Female Terminal to the other end of the Black Wire 1.

Figure 25: Ground Wire Connections: Step B

c. Splice and crimp Black Wire 2 to the other end of the splice.

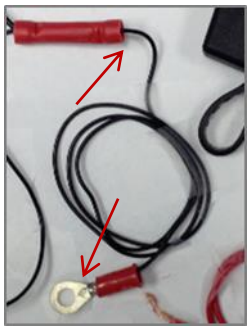


Figure 26: Ground Wire Connections: Steps C and D

d. Splice and crimp a Ring Terminal to the end of the Black Wire 2.

4. Wire Ignition and Reporting connections:

   a. Splice and crimp White Wire 1 to the white wire from the LMU-26xx cable fuse holder.

   b. Splice and crimp the Status Reporting Blue Fly Wire coming from the LMU-26xx cable.

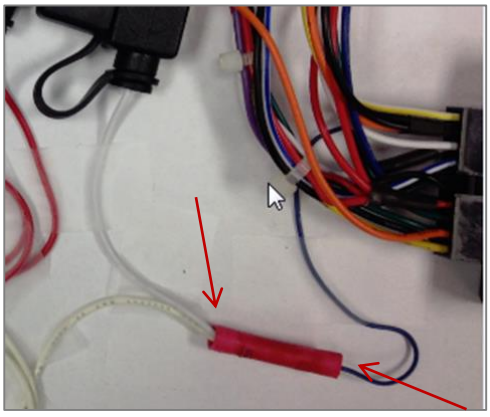


Figure 27: Ignition and Reporting Connections: Step A and B

c. Splice and crimp a Slide On Female Terminal to the other end of the White Wire 1.

Figure 28: Ignition and Reporting Connections: Step C

d. Splice and crimp a Slide On Female Terminal to White Wire 2.

Figure 29: Ignition and Reporting Connections: Step D

5. Connection to the switch:

   a. Slide the Female Terminals onto the switch contacts.

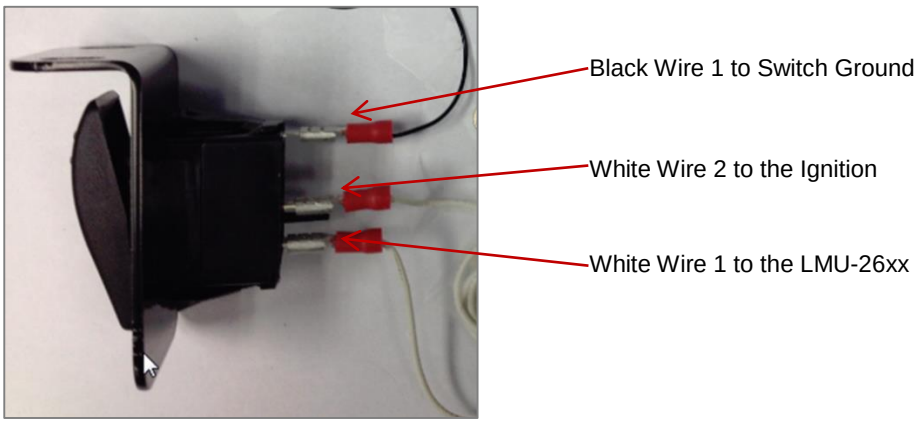


Figure 30: Connection to Switch

5.6 OPTIONAL SWITCH WITH LED CABLE WITH BUZZER

The LMU-26xx can be used to provide a connection to an LED light to provide driver behavior feedback for specific conditions, such as hard braking, hard acceleration and exceeding a defined speed threshold. You must connect the Switch with LED Cable (P/N 4C764) to the LMU-26xx Power Accessory Cable (P/N 5C260 or 5C261) and mount the LED light on the dashboard. The Switch with LED Button Cable can be used in combination with the Buzzer Assembly Cable (P/N 4C765).

Note: To install the Switch/LED Cable with the LMU-26xx, you must order the Power Accessory Cable (P/N 5C260 or 5C261 – See Section 3.1 "Available Wiring Harness"), which is sold separately.

To Install the LED Button Switch:

1. Determine best placement for LED button on dashboard, and then drill a ½" hole in the dashboard.
2. Remove the nut and washer from the cable, and then feed the wire through the hole until the LED button is seated in place.
3. Feed the washer and nut up the cable and secure to the back of the LED button in place.

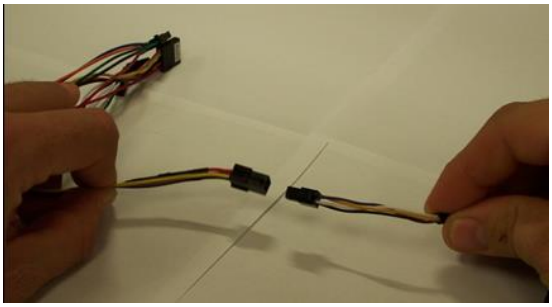
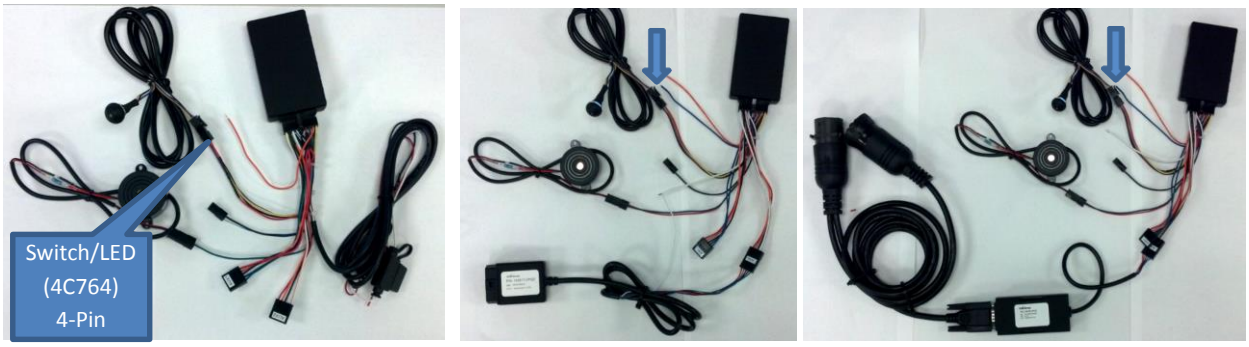


Figure 31: Connect Switch with LED cable to LMU-26xx Power Accessory Cable

4. Plug the 4-pin square connector on the Switch with LED Cable in the 4-pin square connector on the LMU-26xx Power Accessory Cable (5C260 or 5C261).
5. As an option to drilling a hole in the dashboard, you can purchase a mounting bracket to secure the LED button in place, such as P/N 55205K2 available from www.McMaster.com.



Harness 5C260 Standard Harness 5C261 with VPOD Harness 5C261 with JPOD

Figure 32: LMU-26xx Switch/LED Assembly Connected

5.7 CONNECT OPTIONAL INPUTS

The LMU-26xx wiring harness comes populated with 4-digital input leads. Use these leads to monitor status changes for a particular auxiliary device. For example, a boom switch or Power Take Off (PTO). You can extend these leads using a splice butt and the appropriate length 22AWG wire commonly available at an automotive parts store or Home Depot.

Standard Wiring Harness (P/N 5C908) Inputs:	Buzzer/LED Wiring Harness Inputs (P/N 5C260 and 5C261)
Input 1 – Pin 3 (Blue)	Input 1 – Pin 3 (Blue)
Input 2 – Pin 12 (Orange)	Input 2 – Pin 12 (Orange)
Input 3 – Pin 6 (Violet)	
Input 4 – Pin 7 (Grey)	

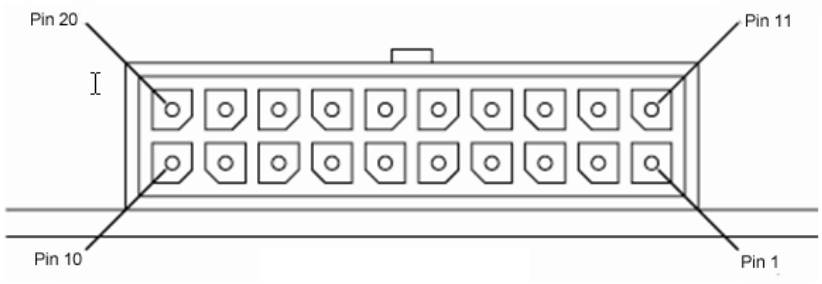


Figure 33: LMU-26xx Connectors

5.8 INSTALL OPTIONAL SERIAL CABLES

The LMU-26xx Power Accessory Cables have two serial ports: AUX1 and AUX2. Each wiring harness comes with both ports pinned out to individual 5-pin Molex pigtail connectors.

.

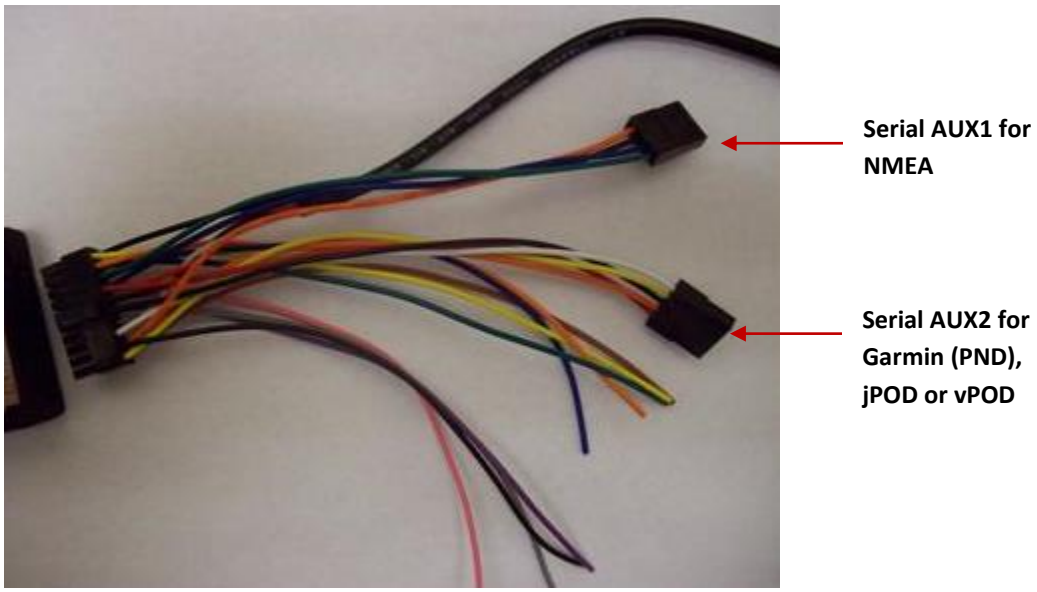


Figure 34: LMU-26xx Standard Wiring Harness and Connectors

IMPORTANT: The wire colors used on the vPOD and jPOD are confusing in this application. The colors match those of the AUX1 port on the harness, however the devices actually go to AUX2 port.

5.8.1 SERIAL/HOST/AUX 1

The Serial AUX1 port provides a standard serial NMEA stream to an in-vehicle computing device, such as a laptop. This port is identified by the blue and green wires pinned to one of the Molex connectors. In order for the LMU-26xx to provide NMEA, you must install the CalAmp DB9 Cable (P/N 133337-5). This cable comes with the correct Molex connector mate.

To Install the DB9 Cable via AUX1 Serial Port:

1. Connect the DB9 Cable to the LMU-26xx AUX1 serial port, and then connect the DB9 serial connector to an available serial port on the laptop (Figure 35).

- Choose the appropriate COM port on the laptop device. If there is no available serial port, use a serial to USB adapter (Figure 36). These are readily available for purchase either online or in retail electronic product stores.

2. Secure the DB9 connection by wrapping it with electrical tape. If the LMU-26xx is powered up, NMEA will begin working without further configuration.

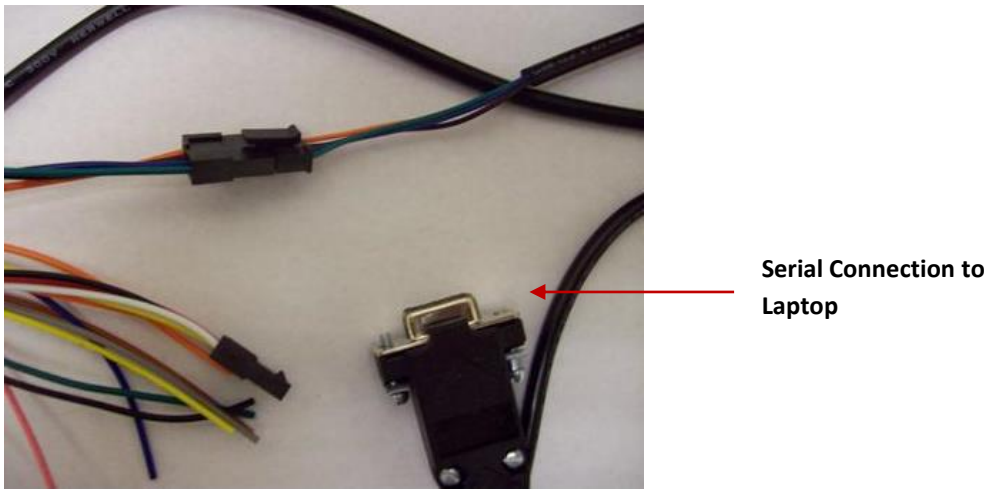


Figure 35: LMU-26xx DB9 Serial Connection

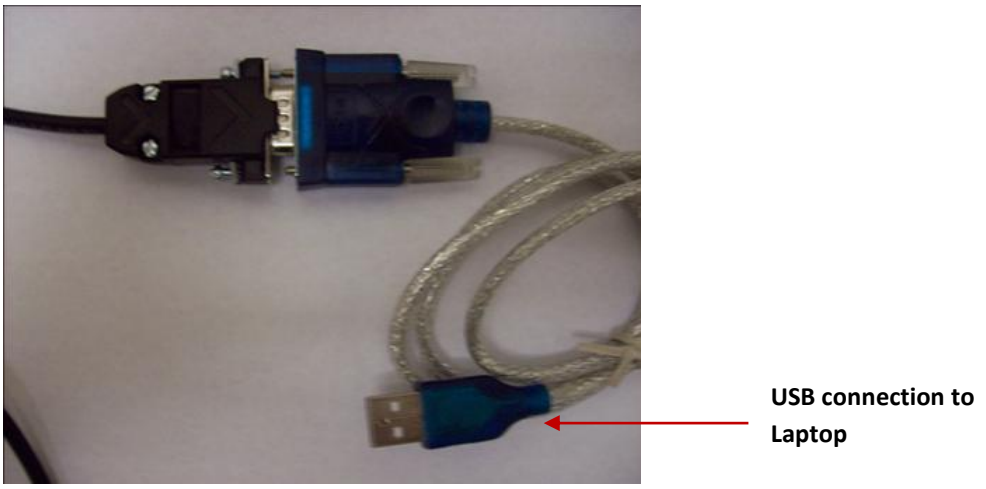


Figure 36: LMU-26xx DB9 Serial Connection

5.8.2 SERIAL/AUX 2 – GARMIN SERIAL CABLE

The Serial/AUX2 port can be used to provide a connection to a CalAmp certified Garmin Personal Navigation Device (PND). You must install the Garmin Serial Cable (P/N 133688) to establish the connection between the LMU-26xx and the Garmin PND. This cable comes with the correct Molex connector mate.

To Install the Garmin Cable via AUX2 Serial Port:

1. Connect the Garmin Serial Cable's 5-pin serial to the LMU-26xx AUX2 serial port.

- You can identify the LMU-26xx AUX2 serial port by the white/orange and white/yellow wires pinned to one of the Molex connectors.

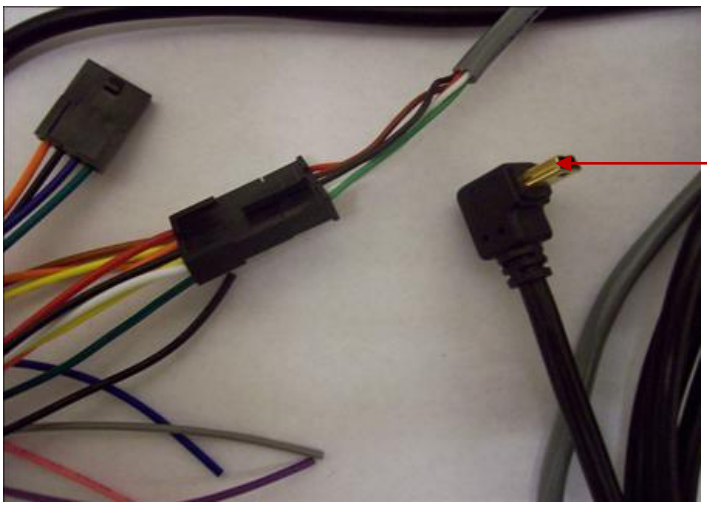


Figure 37: LMU-26xx and Garmin PND Cable Connection

2. Connect the Garmin Serial Cable to the certified Garmin PND.
3. If the LMU-26xx is powered on, communications between the LMU-26xx and the Garmin PND will begin working without further configuration.

5.8.3 SERIAL/AUX2 – jPOD ADAPTER AND jPOD CABLE

The Serial/AUX2 port provides a connection to the vehicle's diagnostic port to read and report heavy-duty engine condition and performance data, such as engine temperature and fault codes. You must install the jPOD Adapter (P/N 134152) and jPOD Cable (5C909-2) to access the vehicle bus data. The cable typically is made up of a 9-Pin Deutsch connector to a male DE-15 connector.

Figure 38: jPOD Adapter (PN: 134152) and jPOD Cable (PN: 5C909-2)

Jbus 1939 has a 9 pin DIN connector and is the more common Jbus connector you will find for more recent vehicles. If you are installing on an older vehicle, you may find an J1708, 6 pin connector. The two cables below will allow you to wire the jPOD to a 6 pin connector. Either replace the 5C909-2 Cable with a 6 pin 8973002002 cable, or use the 6 pin to 9 pin adapter cable 8973002001 to bridge between the 8 pin port and the 9 pin 5C990-2 cable.

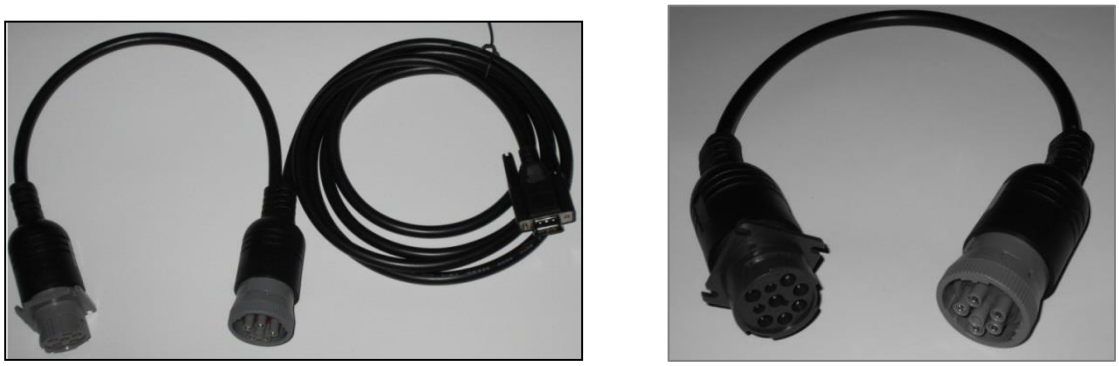


Figure 39: 6-pin j1708 Cable. (PN: 8973002002) and 9 PIN JBUS J1936 TO 6 PIN J1708 ADAPTER CABLE (PN:8973002001)

To Install the jPOD Adapter and jPOD Cable via AUX2 Serial Port:

1. Contact Customer Support, select the Installation option (#1), and then request the Over-the-Air (OTA) LMU-26xx device update before installing the jPOD Adapter and jPOD Cable.

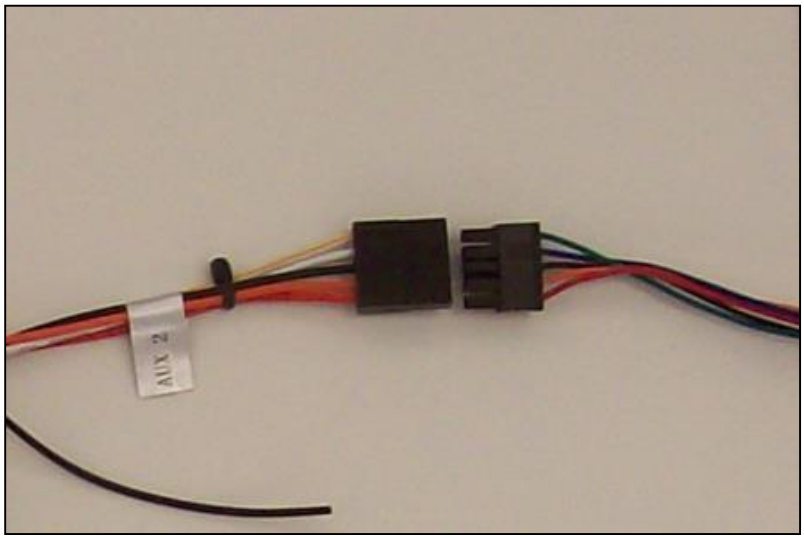


Figure 40: AUX2 Connection

2. Connect the jPOD Adapter's 5-pin serial to the LMU-26xx AUX2 connector of wiring harness 5C260 or 5C261, see section 3.1 "Available Wiring Harness".

- You can identify the LMU-26xx AUX2 serial port by the white/orange and white/yellow wires pinned to one of the Molex connectors. **Note the AUX1 port will have wire colors matching the jPOD, but this is coincidental and should be ignored.**
- Depending on your cable, you will install power, ground and ignition accordingly.
- 5C908 – Wire the power, ground and ignition according to instructions in 5.2 Install Power Connections.

3. 5C260 – Do not install the Power and Ground (Red/Black) cables. Wrap the end with tape and tape them to the harness so they are out of the way. **If you are installing a buzzer in the vehicle, you must connect the white wire to the red wire.**

- 5C261 – There are no power or ground wires, as this gets power from the Jbus device.

Figure 41: Connect jPOD Cable and jPOD Adapter Using Serial Connector

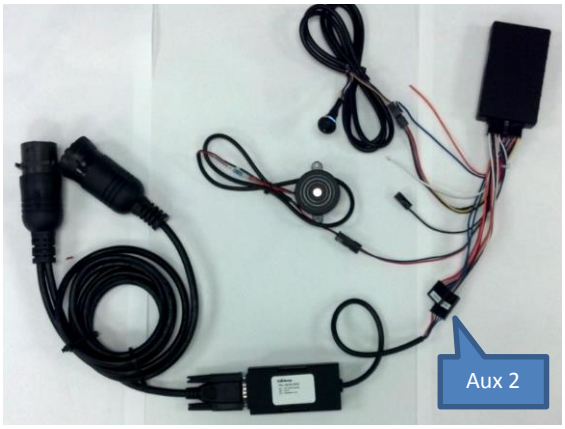
4. Detach the vehicle's existing Jbus port by removing the retaining screws (save screws for next step). If the vehicle has a 6 pin DIN connector, either use the 8973002002 Y cable instead of the 5C909-2 9 pin Jbus cable, OR use the 6 pin to 9 pin adapter cable 8973002001.

5. Using the retaining screws, attach the jPOD Adapter in place of the vehicle's Jbus port.

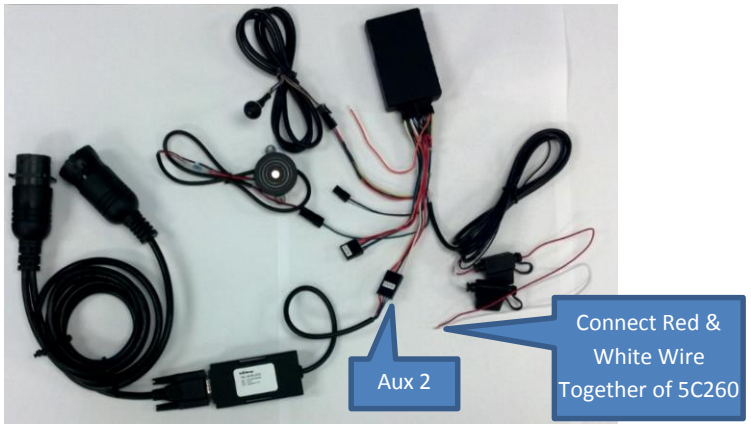
6. Plug the Jbus male connector of the jPOD Cable into the jPOD Adapter seated in the vehicle's OBD-II port.

7. Connect the jPOD Cable to the serial connector of the jPOD Adapter.

8. Ensure that all cables are secured with proper connections to the components. Coil and secure loose or excess cable, and ensure it is out of the way of normal vehicle operations. Verify that cables are not stretched and do not rub on vehicle components, which could cause unexpected wear.



LMU-26xx with 5C261 Cable and jPOD Assembly



LMU-26xx with 5C260 Cable and jPOD Assembly

Figure 42: LMU-26xx and jPOD Assembly

5.8.4 SERIAL/AUX 2 – vPOD ADAPTER

The vPOD Adapter (133917-VPOD) enables the LMU-26xx device to connect to the vehicle bus data. This cable reports on-board diagnostic computer data (Diagnostic Trouble Codes – DTCs), fuel efficiency reporting, true speed, true ignition-on and true odometer values. The vPOD supplies power to the LMU-26xx when connected to the vehicle's OBD-II port so wiring harness 5C261 is the preferred harness for a cleaner install. vPOD white wire is the "Ignition" wire and is used to provide true ignition by connecting it to the white wire of harness 5C261, 5C260 or 5C908.

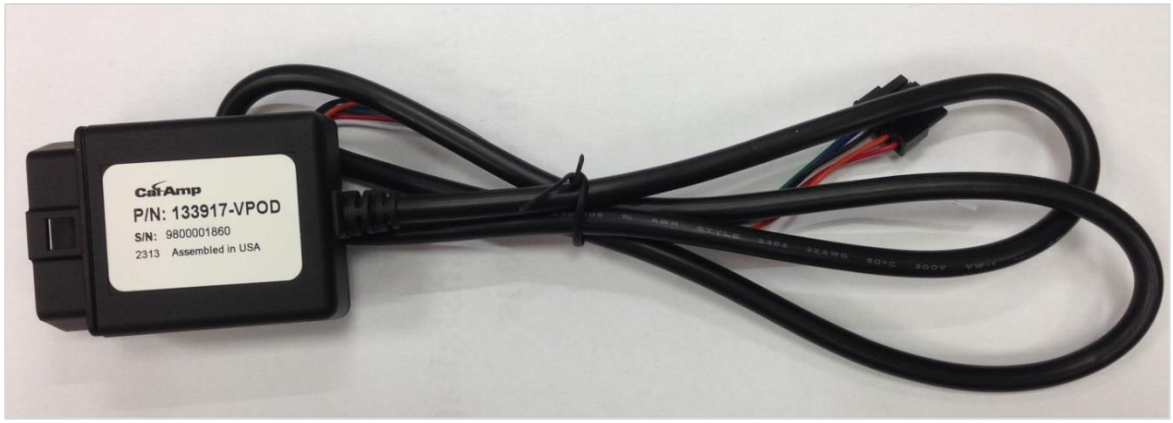


Figure 43: vPOD Adapter (133917-VPOD)

5.8.4.1 Install vPOD VIA AUX2 SERIAL PORT

1. Contact Customer Support, select the Installation option (#1), and then request the Over-the-Air (OTA) LMU-26xx device update before installing the vPOD Adapter.

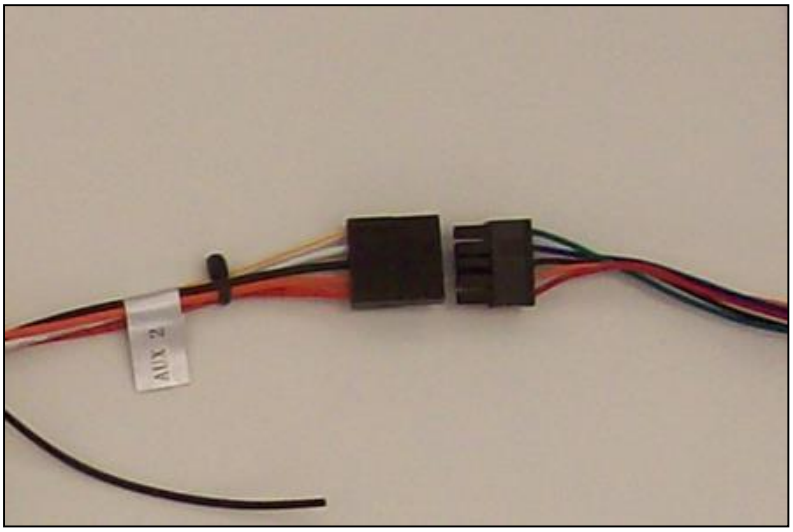


Figure 44: AUX2 Connection

2. Connect the vPOD Adapter's 5-pin serial connector to the LMU-26xx AUX2 connector of wiring harness 5C908, 5C260 or 5C261, see section 3.1 "Available Wiring Harness" (Figure 36).

3. You can identify the LMU-26xx AUX2 serial port by the white/orange and white/yellow wires pinned to one of the Molex connectors. All 3 Wiring Harness options have the AUX2 connector. **Note the AUX1 port will have wire colors matching the jPOD, but this is coincidental and should be ignored.**

4. Ignition sense Connection

    a. Connect the LMU-26xx White Ignition Wire of 5C260 or 5C261 to the vPOD Adapter's (133917-VPOD) White Ignition Wire using a Butt Splicer (**Figure 45**):

        i. Strip the Ignition Wire of the vPOD Adapter, place in one end of the Butt Splice and then crimp the end.

        ii. Strip the Ignition Wire of the LMU-26xx device wire harness 5C260 or 5C261, place in the other end of the Butt Splice and then crimp the end.

    b. Insulate and secure the power connections:

        i. Using electrical tape insulate the power connection.

        ii. To ensure a tamper resistant connection, apply wire ties over the tape at the connection point and torque seal applied to the wire ties.

iii. Use care to prevent accidentally shorting any connections. Power Connections should meet aftermarket electronics industry installation practices

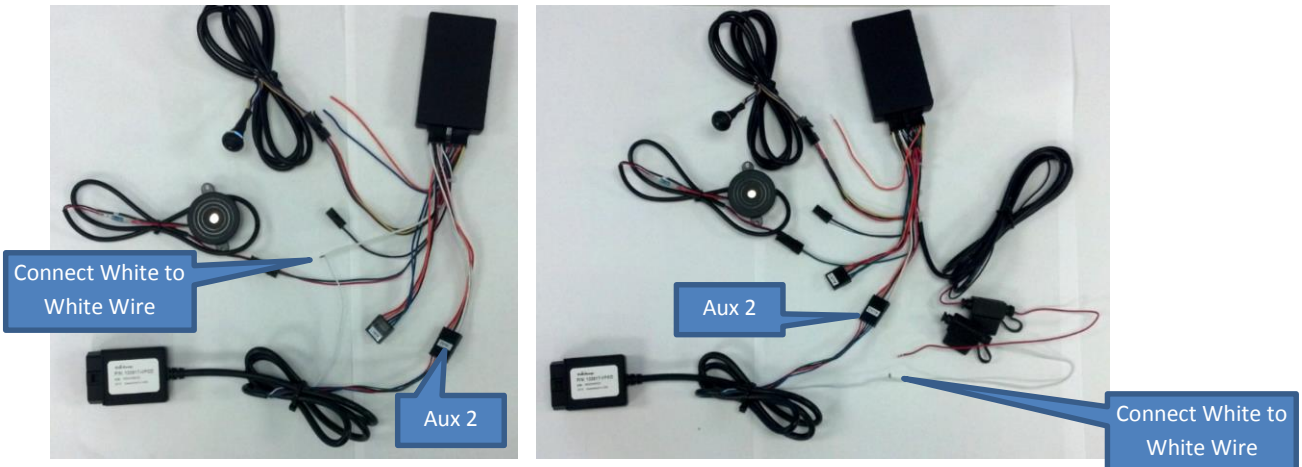


Figure 45: vPOD With Harness 5C261 or vPOD With Harness 5C260 or 5C908

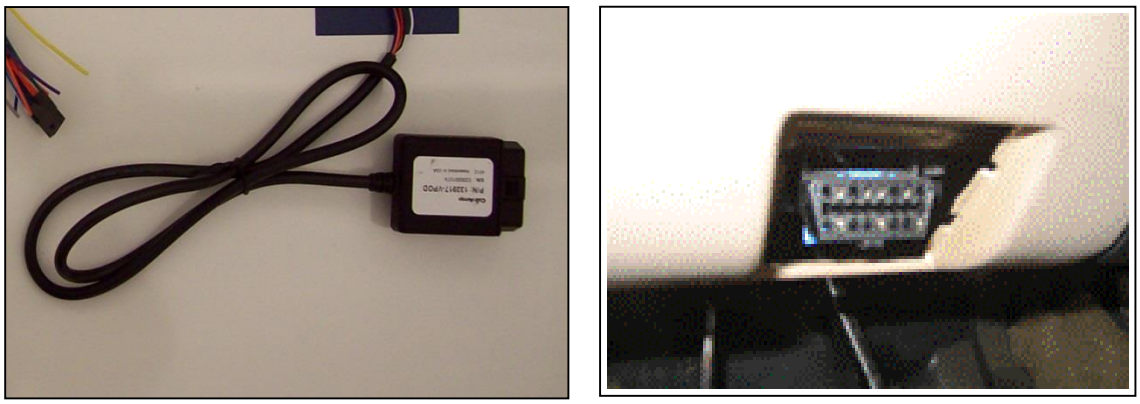


Figure 46: vPOD Adapter and Vehicle OBD-II Port

1. Plug the vPOD Adapter directly into the vehicle's OBD-II port (Figure 46).
   - The vehicle's OBD-II port is located within three feet of the steering column. Consult the vehicle owner's manual if you have trouble finding the port.
2. Ensure that all cables are secured with proper connections to components. Coil and secure loose or excess cable, and ensure it is out of the way of normal vehicle operations. Verify that cables are not stretched and do not rub on vehicle components, which could cause unexpected wear.

5.8.5 SECURE ALL CABLES

Verify that all cables are secured with proper connections to components. Coil and secure loose or excess cable and ensure that it is out of the way of normal vehicle operations. Additionally, verify that cables are not stretched and do not rub on vehicle components, which could cause unexpected wear.

5.9 VERIFY LMU-26XX OPERATIONS

Installers should verify that the GPS and communications functions of the LMU-26xx are working properly before departing the installation site. Installation is complete and successful when you have tested the three sections listed below against the device:

- **5.2.3 COMM VERIFICATION**
- **5.2.4 GPS VERIFICATION**
- **5.2.5 INBOUND VERIFICATION**

5.9.2 STATUS LEDS

The LMU-26xx is equipped with two Status LEDs: one for COMM (wireless network status) and one for GPS. The LEDs use the following blink patterns to indicate service:

LED #1 (Comm LED - Orange) Definitions

Condition	LED 1
Modem Off	Off
Comm On - Searching	Slow Blinking
Network Available	Fast Blinking
Registered but no Inbound Acknowledgement	Alternates from Solid to Fast Blink every 1s
Registered and Received Inbound Acknowledgement	Solid

LED #2 (GPS LED - Green) Definitions

Condition	LED 2
GPS Off	Off
GPS On	Slow Blinking
GPS Time Sync	Fast Blinking
GPS Fix	Solid

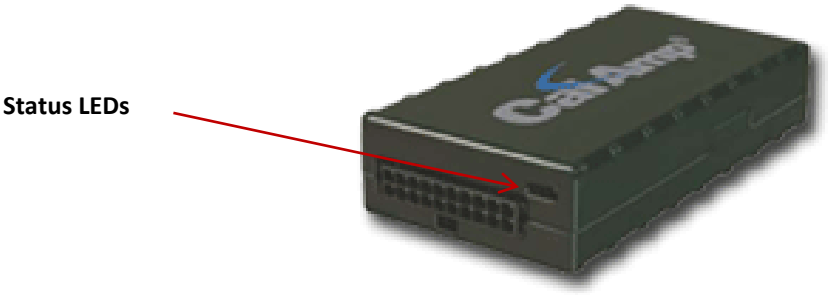


Figure 47: Location of Status LEDs

5.9.3 COMM VERIFICATION

Installers should first verify that the device has acquired a cellular signal and has registered to the wireless network before completing installation. If this LED is solid, then the device has registered to the network and established a data session. Acquiring the wireless network and establishing communication can take several minutes.

5.9.4 GPS VERIFICATION

Next, verify that the GPS receiver is seeing enough satellites to obtain a valid GPS position. If the green LED is solid, then the device has found GPS service.

5.9.5 INBOUND VERIFICATION

Lastly, verify is that the device is sending data to the correct server. This is a two-step process and requires a user to be logged in FleetOutlook. First, force the device to send in an Ignition On event by turning the ignition key to the forward position. Second, open the breadcrumb detail for the corresponding vehicle in FleetOutlook. If the device is reporting properly, you should see an Ignition On event on the Tracking | Breadcrumb Detail tab.

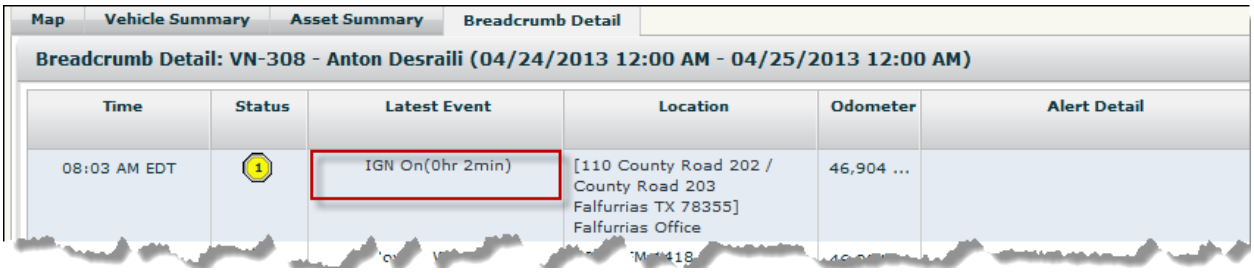


Figure 48: FleetOutlook Reporting Verification

5.10 GUIDELINES FOR TROUBLESHOOTING COMMON PROBLEMS

The most common problems with the LMU-26xx installations are power connections and installation location. The following table outlines potential problems with the LMU-26xx installation and suggestions to resolve the issues.

Note: If you cannot resolve the problem, request a Return Material Authorization (RMA) by calling 1.866.456.7522.

Symptom	Suggestions
No COMM or GPS LED's	▪ Recheck power connections. Be sure the red wire is connected to constant +12V. ▪ Be sure the inline fuse holders contain fuses.
COMM LED continues to blink beyond an acceptable amount of time.	▪ Note the device ESN and IMEI numbers on the device label. Call 1-866-456-7522 to verify the unit has been activated on the cellular network.
GPS LED is mostly off, but blinks on.	▪ Verify the device has good visibility of the sky. If metal objects shadow the device, the device may have difficulty acquiring a valid position fix or work intermittently. ▪ Verify the device is installed with the "label-side up" facing towards the sky.

6 DE-INSTALLATION INSTRUCTIONS

Follow the instructions below for field de-installation of the LMU-26xx.

4. Identify the location of the installed device.

5. If re-closable fastener tape holds the LMU-26xx in position, remove the LMU-26xx from the vehicle by separating the re-closable fastener tape.

6. If necessary, cut any zip-ties and discard.

- To install a new device, you will need new zip-ties.

7. Disconnect the primary 20-pin wiring harness from the device.

8. Ensure the wiring harness is in an available position for new device installation.

7 WARRANTY

CalAmp Corp. warrants that upon shipment to Customer from supplier's facility and for the Warranty Period, hereinafter defined, the Equipment shall be free from defective materials and faulty workmanship and capable of accessing the Service ("Good Working Order"). The warranty provided herein shall not apply to (i) hardware normally consumed in operation such as fuses, cables, or mounting brackets, (ii) defects which, due to no fault of CalAmp Corp, are the result of improper use or maintenance of the Equipment, (iii) improper operation of the Equipment used with other equipment, (iv) Equipment which, due to no fault of CalAmp, has been subjected to any kind of detrimental exposure or has been involved in any accident, fire, explosion, Act of God, or any other cause not attributable to CalAmp, (v) any Equipment which has been altered or repaired by any party other than CalAmp without CalAmp's prior consent, (vi) any Equipment sealed against the weather whereby the seal has been broken without CalAmp's prior consent, or (vii) any Equipment hardware or software, including any revisions provided by CalAmp, which has been improperly stored, installed or implemented. Customer shall de-install and return (unless otherwise directed by CalAmp) the failed Equipment to CalAmp. CalAmp shall return the Equipment, or a new or reconditioned unit, at CalAmp's option, free of charge to Customer via best way ground, unless otherwise specified by Customer (with additional costs thereof to Customer's account), during the one year from shipment ("Warranty Period"). CalAmp's warranty obligation is limited to restoring the Equipment to Good Working Order. The repaired or replacement Equipment is warranted for the remainder of the original Warranty Period.

APPENDIX A – LMU-26XX ACCESSORY CABLES AND PIGTAIL WIRING INSTRUCTIONS

PRIMARY CONNECTOR

The LMU-26xx uses a Male (pin) Molex Micro-Fit 3.0TM Dual Row, 20 circuit header to receive power, ground and supply input and output signals. The pin out is as follows:

Wire	Signal Name	Description	Color	Input or Output	Usage
1	GND	Ground	Black (22 AWG)	Ground	AUX1
2	OUT-0	Output 0 –Started Disable Relay Driver	Green (22 AWG)	Output	Not Used
3	IN-1	Input 1 – Digital Input	Blue	Input	Optional
4	TXD	Host TxD	Blue	Input	AUX1
5	ADC-1	Analog to Digital Input 1	Pink	Input	Not Used
6	IN-3	Input 3 – Digital Input	Violet	Input	Optional
7	IN-4	Input 4 – Digital Input	Grey	Input	Optional
8	IN-0	Input 0	White	Ignition Input	Required
9	V_{DD}	VDD Reference Output (20-25mA Max)	Orange (22 AWG)	Output	AUX1/AUX2
10	OUT-1/BOOT	Output 1 – Digital Output (Open Collector)/BOOT Input	Brown (22 AWG)	Input/Output	Not Used
11	OUT-2	Output – 2 Digital Output (Open Collector)	Yellow (22 AWG)	Output	Not Used
12	IN-2	Input 2 – Digital Input	Orange (22 AWG)	Input	Optional
13	RxD	Host RxD	Green (22 AWG)	Output	AUX1
14	V_{CC}	Primary Power Input	Red (20 AWG)	Power	Required
15	GND	Primary Ground	Black (20 AWG)	Ground	Required
16	1BB-GND	1 Bit Bus Ground	Black (22 AWG)	Ground	Not Used
17	1BB-D	1-Bit Bus Data	White/Blue	Input/Output	Not Used
18	AUX-TxD	Aux Port – Transmit Data	White/Orange	Input	AUX2

Wire	Signal Name	Description	Color	Input or Output	Usage
19	AUX- GND	Aux Port - Ground	Black	Ground	AUX2
20	AUX-RxD	Aux Port – Receive Data	White/Yellow	Output	AUX2

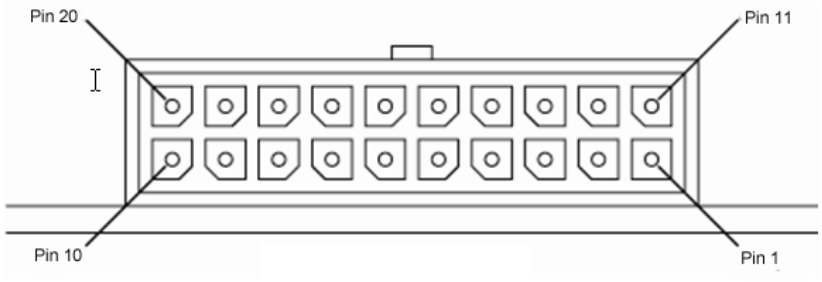


Figure 49: LMU-26xx Connectors

LMU-26XX – FULL I/0 WIRING HARNESS – P/N 5C908

This harness provides the complete set of I/O connectors including fused Power and Ignition lines.

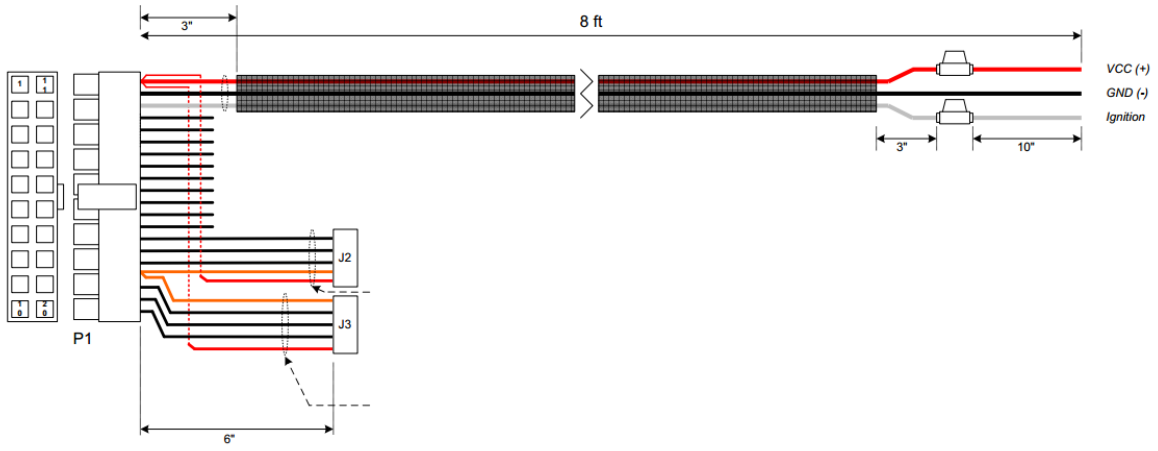


Figure 50: Full I/O Wiring Harness

LMU-26XX - SERIAL ADAPTER

Two additional parts are required to add a host serial adapter to the LMU-26xx:

- **Part Number 133360:** Serial Pigtail Adapter. This is connected to 5C908 to provide a connection for the Serial Adapter itself.
- **Part Number 133337-5:** Serial Adapter.

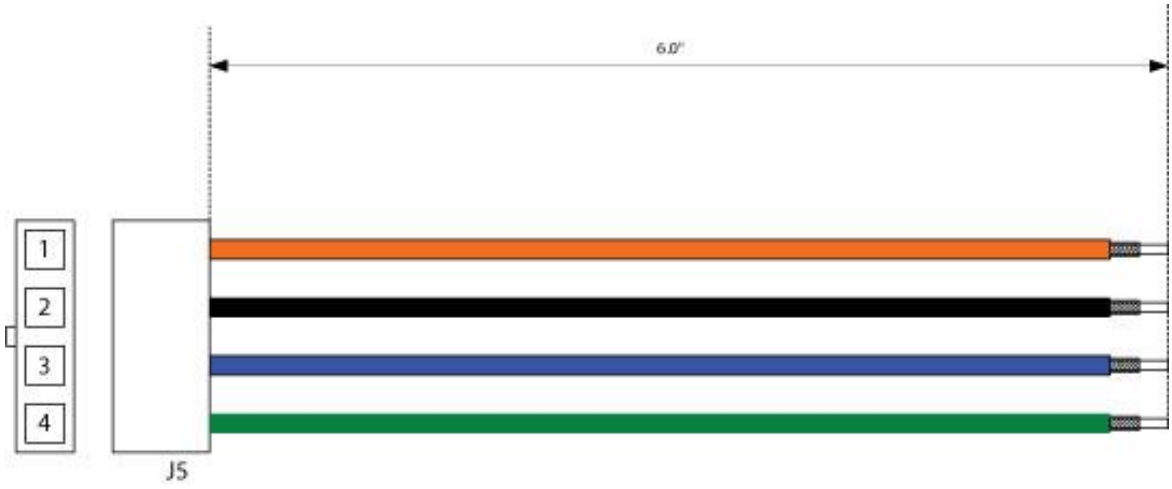


Figure 51: LMU-26xx Serial Pigtail Adapter

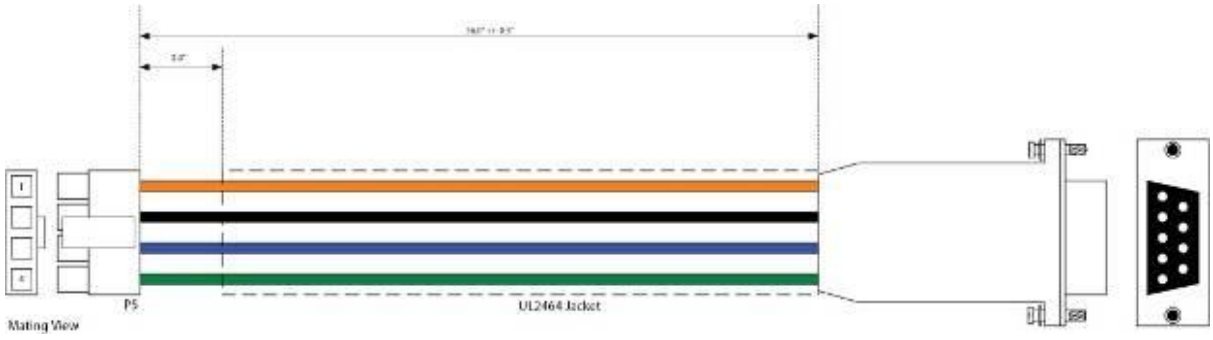


Figure 52: LMU-26xx DB9 Serial Cable

7.1 BUZZER AND CABLE ASSEMBLY – P/N 4C765

This cable is used to connect an in-cab buzzer to the LMU-26xx. The ground wire must be connected to the desired output line on the LMU-26xx. The power wire of the buzzer must be installed to the main power line for the LMU-26xx. When the LMU-26xx sets the output to ground the buzzer will sound.

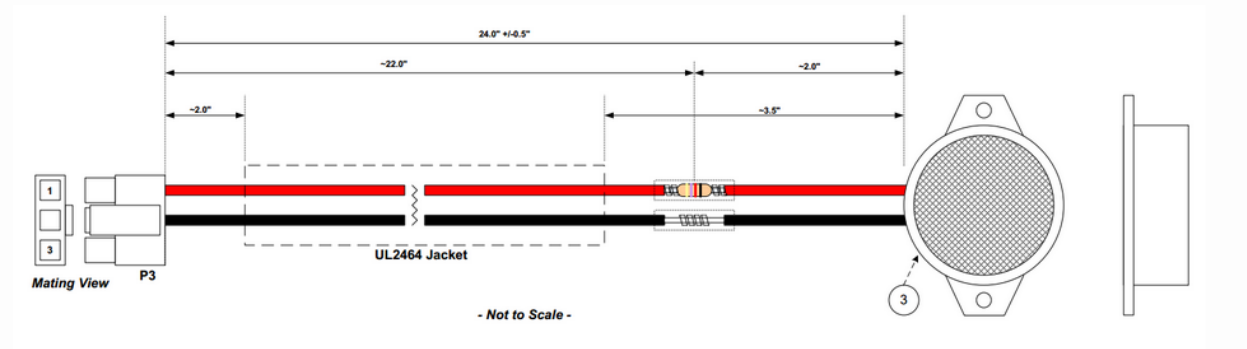


Figure 53: Buzzer and Cable Assembly

7.2 GARMIN TO 5-PIN SERIAL CABLE – P/N 133688

This cable is used to connect a certified Garmin PND to the LMU-26xx.The Garmin 5-pin connector plugs into the serial AUX2 cable on the LMU-26xx. The Garmin connector must be plugged into the back of the certified Garmin PND.

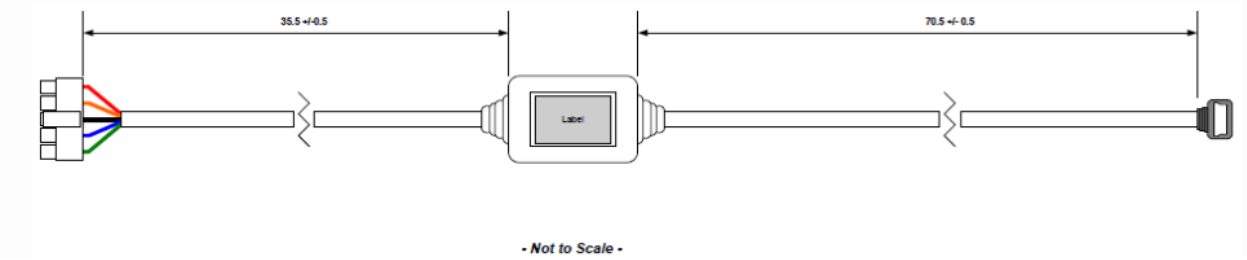


Figure 54: Garmin to 5-Pin Serial Cable

7.3 jPOD ADAPTER – P/N 134152-JPOD

The jPOD Adapter connects to the jPOD Cable, enabling the LMU-26xx to report vehicle diagnostic data. The jPOD Adapter must be installed with the jPOD Cable (P/N 5C909).

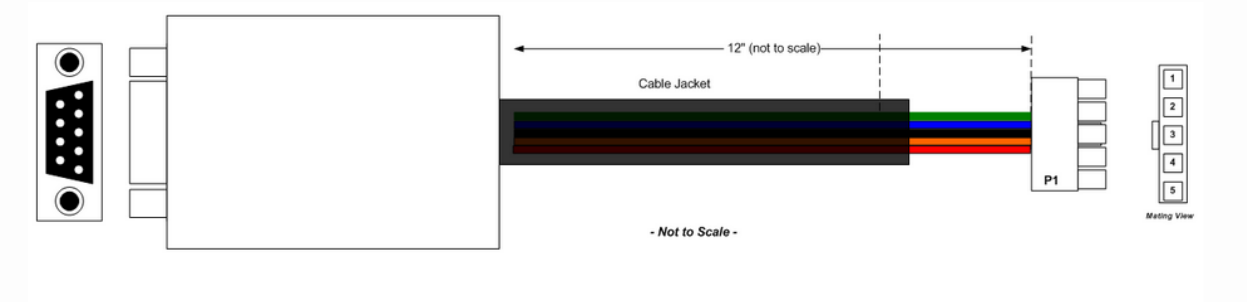


Figure 55: jPOD Adapter

7.4 vPOD 5-PIN SERIAL OBD-II ADAPTER – P/N 133917

The vPOD Connector enables the LMU-26xx to read the OBD-II information from the vehicle, and can be used to provide the LMU-26xx with power, ground and ignition, in a quick installation.

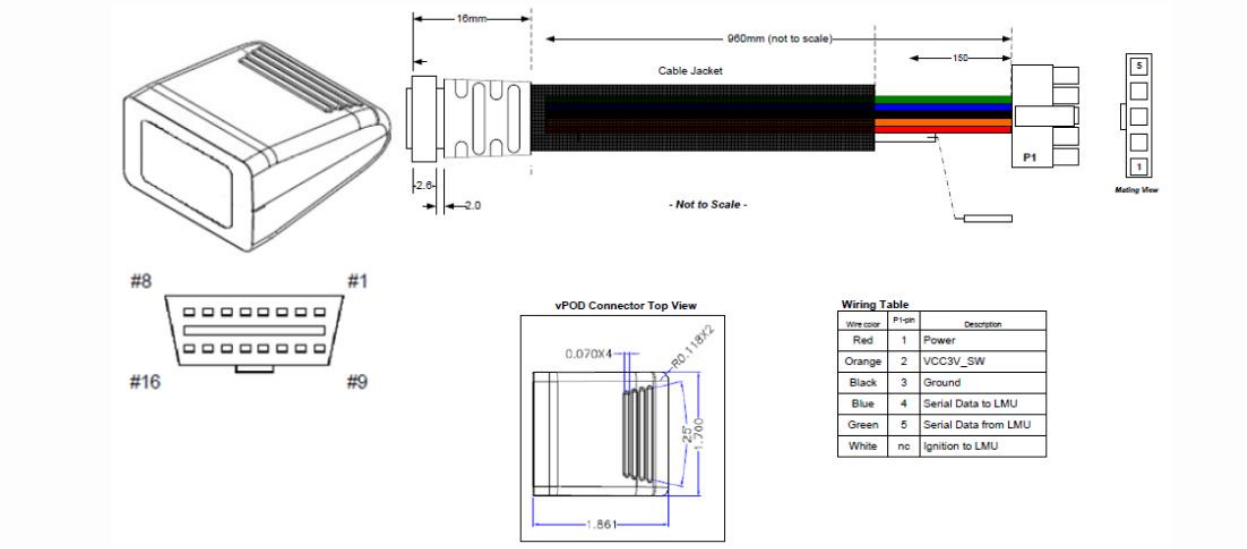


Figure 56: vPOD 5-Pin Serial OBD-II Adapter

8 CUSTOMER SUPPORT CONTACT INFORMATION

CalAmp's Customer Support team stands beside you to ensure any concerns you have with any element of your solution – application, hardware or operations – are addressed quickly and completely.

- U.S.-based 24x7x365 via toll-free number or email.
- Fully trained representatives with multiple tiers of escalation.
- E-mail acknowledgment and status visibility of your issue 100% of the time.

Contacting Customer Support	
Phone:	866.456.7522 – Select #1 for Installation Support
Support Email:	solutionsupport@calamp.com