



Vehicle Tracking & Control Unit VTCU-EV Installation & Users Guide

Rev 2.1

PROPRIETARY INFORMATION NOTICE

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Read Me First

The information in this guide pertains to installation of the MobileAria VTCU and related components into Verizon service vans and trucks.

Note: *The work that is required to install VTCU main unit and its accessories in all Verizon service vehicles could require some slight variances with installation procedure from vehicle to vehicle. It is assumed that the installation technicians will employ their expertise borne from past service experience, if and when the need should arise.*


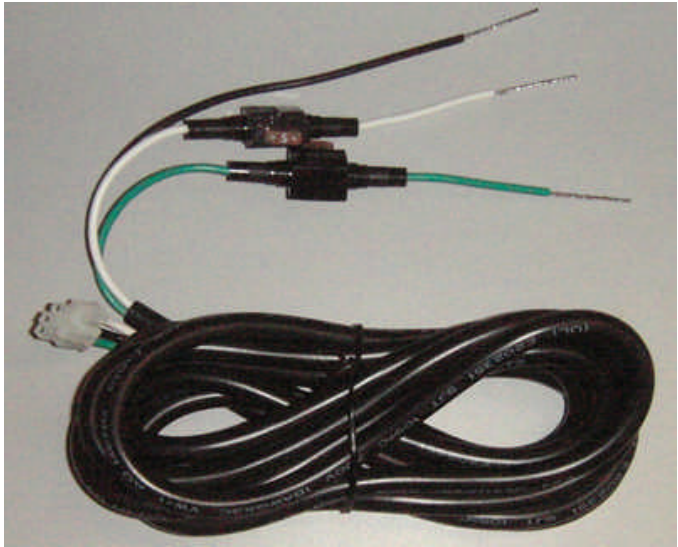
CAUTION: If there are any protruding bolt or screw threads, or other potentially hazardous altered conditions (HACs) resulting from the installation of this hardware, these HACs must be covered by protective material that will serve to protect anyone from incurring physical injury from these HACs.


CAUTION: Unauthorized modifications or changes not expressly permitted by the manufacturer could void compliance with regulatory rules, and thereby your authority to use this device.

- **WARNING (EMI):** The antenna used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

Parts List

Kit Part Number – **VTCU-KIT-EV-03A** includes the following:

Qty	Part Name	Part Number	Part Picture
1	VTCU	VTCU-KIT-EV-02	
1	Ethernet Cable & dashboard mounting receptacle, 10'	VTCU-PC-01	
1	Power Cable, 10'	VTCU-CP-01	

Qty	Part Name	Part Number	Part Picture
1	CDMA / GPS / WiFi Tri-band Antenna	VTCU-AT-01	
1	EVDO Diversity Antenna	VTCU-AD-01	
1	Polycarbonate cover	VTCU-CE-01	
1	Mounting kit: Screws, anti-tamper seal, alcohol prep-pad, sticky pads, cable ties	VTCU-KIT-M-01	

System Diagram

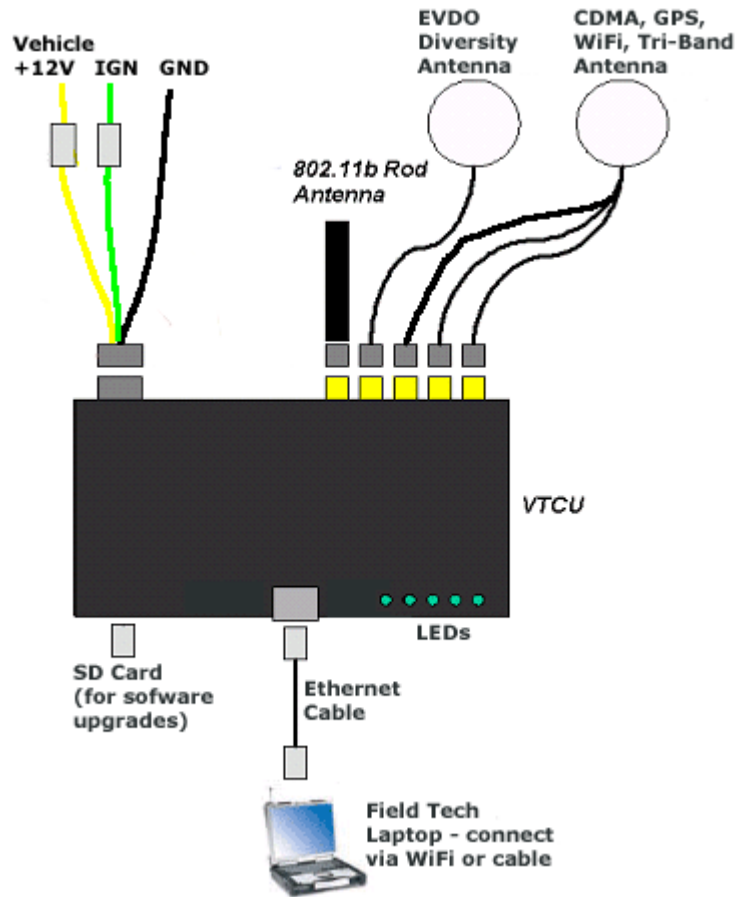


Figure 1: VTCU System Diagram

Product Features

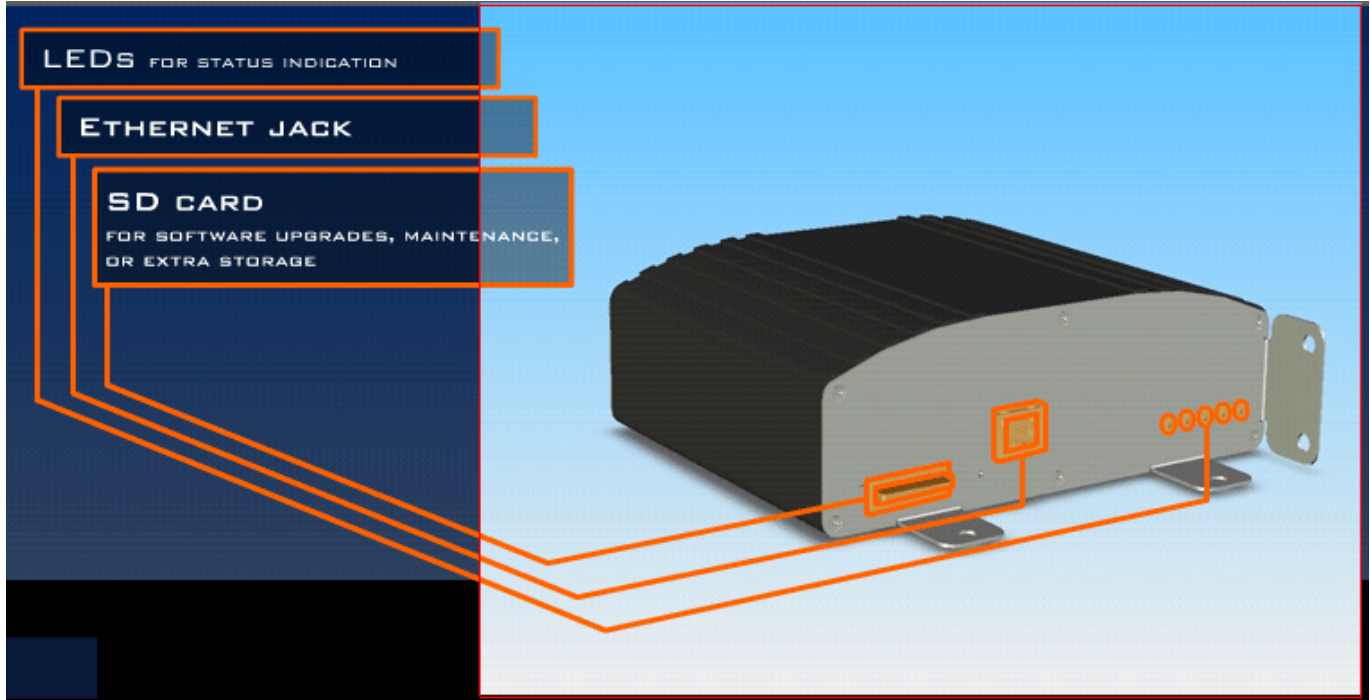


Figure 2: Front of VTCU

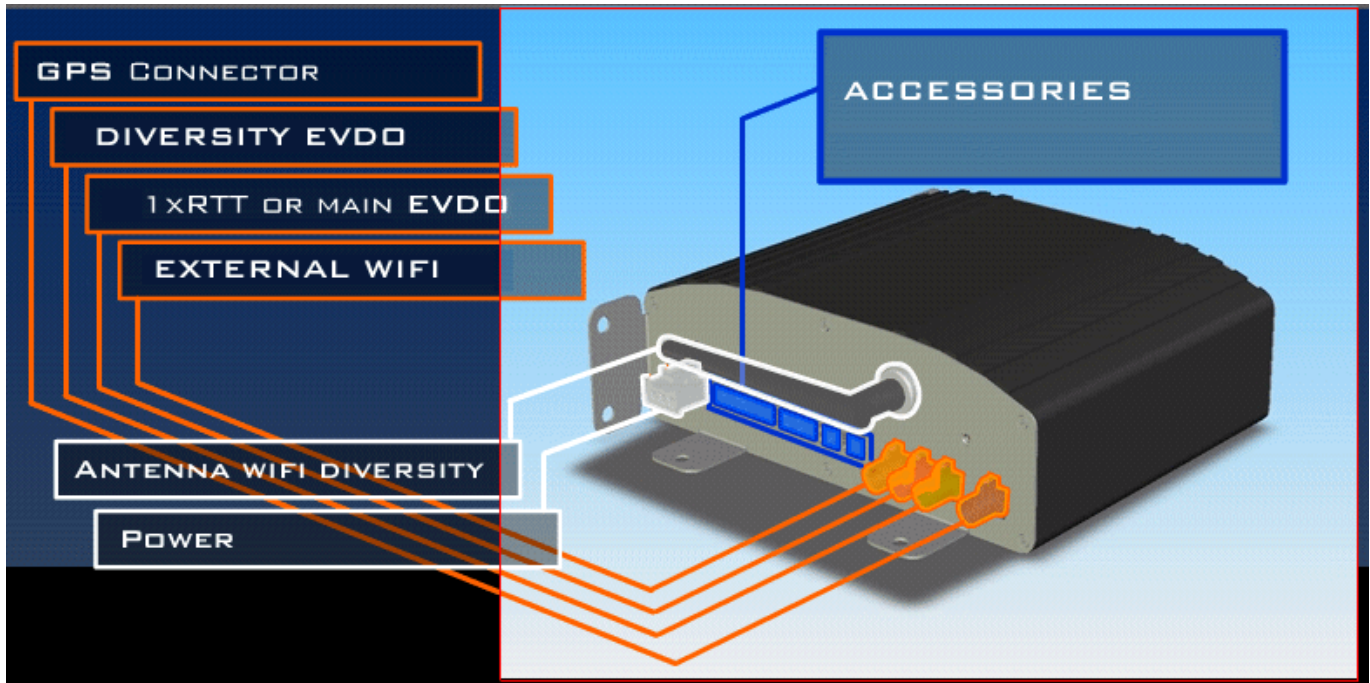


Figure 3: Back of VTCU

Required Tools List

1. Voltmeter
2. Flashlight or headlamp
3. Utility Knife
4. Selection of automotive fuses (in case fuse gets blown during installation)
5. Manual Phillips and slot head screwdrivers for all sizes
6. Cordless Drill / Driver with charged batteries
7. Regular selection of drill bits
8. Universal drill bit for reaming 5/8" hole in the roof for mounting antennas
9. Wire stripper, dikes
10. Pliers
11. Electrical tape
12. Tie wraps
13. Cigarette lighter to 120 volts inverter
14. Butane Soldering iron, solder
15. Silicone glue or tar tape
16. WiFi-enabled laptop computer with charged batteries
17. In-vehicle power adapter for laptop

General Installation Procedures

General installation procedures begin with the following requirements:

- a) **Material Control:** The installer is responsible for maintaining and updating the installation schedule and reporting deviations to the MobileAria project manager.
- b) **Customer Contact:** The installer may contact the site. The installer must contact the Verizon site one day prior to installation and then again on the day the installations begin so that the on site contact is prepared for the arrival of the installation team.
- c) **Equipment Inventory:** The installer is responsible for complete field inventory of equipment both MobileAria and installer provided. Serial numbers and equipment quantities must be reconciled per Documentation Section. The crew will be equipped with adequate tools, instruments and installer provided material.
- d) **Vehicle Inventory:** The installer is responsible for vehicle inventory reconciliation. Review Master Installation schedule and verify with actual garage data.
- e) **Reporting:** The installer will provide a daily installation status report by email. Schedule issues, exceptions, shortages, equipment and vehicle reconciliation will be reviewed with the MobileAria project manager on a daily basis.

Pre-Installation Procedures

- Work hours are from 5:00 PM to 7:00 AM, Monday through Sunday. These work hours will be coordinated prior to arrival on site.
- Coordinate with MobileAria and Verizon for convenient installation start times at each site.
- The installer will require that all sites be notified that the potential exists for late night and Saturday access.
- On day prior to arriving on site, the installer will call the site to confirm directions. During this call, confirm the following:
 - Time of arrival
 - Vehicles available
 - Earliest time for site access
 - Have the boxes of equipment arrived
 - Keys for the vehicles will be available
 - Access to the building will be available
- Upon arriving at the site, make contact with the on site contact and inform him/her of the plan. The discussion should include:
 - Estimated time of completion
 - Estimated time for sign off
 - Location of AC outlets, restrooms
 - Location of Equipment Room
- Verify vehicles to be installed are on site and those that are not on site
- Remove the equipment from boxes and note any damaged equipment and inventory

Equipment Reconciliation

- Requirements: Upon arrival on site the installer will:
 - Reconcile the MobileAria Packing List against the actual equipment
 - Reconcile available vehicle inventory against planned inventory
 - Record all serial numbers of equipment applied to vehicles using supplied and developed Installation Data Collection program
 - *If there are any discrepancies, the installer will notify MobileAria or the installer will be responsible for all equipment lost during the rollout. It is imperative that all discrepancies are brought to MobileAria's attention immediately.*
- Daily rollup report for previous day's installations that consists of vehicles installed, matching product serial numbers and any comments on product or installation issues.

Pre-Installation Vehicle Inspection

- The initial inspection of all vehicles must assess the overall condition of the vehicles and identify problems, damages or special situations. The initial inspection should be conducted with the Verizon on site contact and be forwarded to the attention of the Velociti Project Manager and MobileAria Project Manager.
- At a minimum the installer will:
 - Visually inspect each vehicle to verify vehicle number and type against the site plan
 - Identify the installation type
 - Note any driver-installed equipment that would interfere with the installation of system components (Stereo equipment, CB Radio, Cell Phone, note pad holder, cup holder, etc)
 - Note any damage to the vehicle
 - Note if there are any installation issues with specific vehicles. Notify the on site contact immediately of all issues uncovered in the initial inspection
 - Confirm that the ignition key is with the vehicle
- All installs should conform to the specifications of the Install Document
- If an issue such as those listed above requires a non-standard installation (or if a Verizon driver or on site contact requests an install location different from the standard) it must be approved.
 - The on-site contact cannot approve this change; only the Verizon, MobileAria and Velociti project managers can make this call
 - Note the change in the installation data and installation documentation and obtain sign off by the on site contact before making any modifications to the vehicle
 - If there are any difficulties in resolving an issue or obtaining approval, the installer must contact the MobileAria Project Manager
 - After the completion of the non-standard installation a picture of the install will be taken and noted with the vehicles number

Electrical Inspection

- The electrical inspection is required to assess condition of the vehicles electrical system prior to any installation modification. The effort will identify pre-existing problems and confirm that the vehicle can support operation of the system.
- General vehicle electrical inspection procedures are as follows:
 - All tests pass as long as the pre-test agrees with the post-test
 - Connect a digital multi-meter (DVM) to a +12 VDC test point at the main lug, terminal strip or fuse block
 - Turn on headlights and left directional signals. Walk around vehicle to confirm the lights are operational.
 - Turn on right directional signals and high beams. Walk around vehicle to confirm the lights are operational.
 - Turn off all lights. Turn on ignition. Note DVM reading.
 - Start vehicle. Note rise in DVM reading to confirm charging.
 - Test wipers. Turn off ignition and shutdown vehicle

Installation Instructions – Service Vans

The VTCU hardware installation procedure is presented in the following basic stages:

1. Installing the VTCU unit
2. Installing the GPS/CDMA and WiFi/802.11b antenna assembly
3. Installing the power cabling
4. Installing the ethernet cable and receptacle



Figure 4: Verizon Service Van

Step 1: Installing VTCU

Mount the VTCU main unit behind the drivers' seat in the van with four (4) self-tapping 12 x 3/4" screws at least fifteen inches (15") from the van floor.

The VTCU should be oriented so that the LEDs are facing the driver's door and the connectors / wiring facing the interior of the vehicle.

Note: Allow enough free clearance between the VTCU main unit and the floor, to allow space for some storage. Position the VTCU on the partition as to not restrict the full rearward slide extension of the drivers' seat, allowing the top of the seat to clear the unit. Allow enough side clearance to accommodate easier installation of cables and antennas to the VTCU.



Figure 5: VTCU Location - Van

Step 2: Install CDMA / GPS Combo and WiFi Antennas

The basic requirement scenario for installation is graphically shown in *Figure 6: Minimum Clearance for GPS Antenna*. Ensure that the antenna has as close to a 90° line-of-sight view of the sky as is possible. Stay away from any close tall metallic objects, as far as that is feasible. Verify that a straight line set at 45° degrees from the plane of the truck rooftop is clearing all surrounding metallic structures 360° in all directions. In other words, imagine an inverted 90° cone of unobstructed clearance with its vertex touching the antenna.

The two antennas must be **positioned at least 18” away** from the driver’s head. The two antennas must be kept 12” apart.

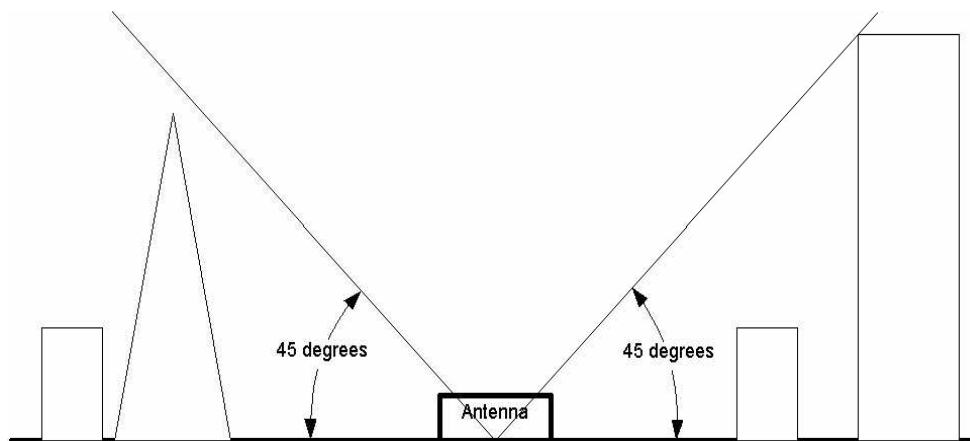


Figure 6: Minimum Clearance for GPS Antenna

NOTE: DO NOT PUT ALL YOUR WEIGHT ON THE ROOF OF THE TRUCK. You may inadvertently put dents in the roof. Stand on the edges of the doorway, or on top of the cowling of the hood.

Procedure:

1. Drill a 1/2” diameter hole through the roof for each. Use existing mounting holes, if available, from previous GPS installations. Otherwise, start by drilling a small pilot hole, then use a universal drill bit to slowly enlarge the hole until the antenna connector can fit through. Clean the roof area where the antenna will mount to get a good seal. Use tar tape or silicone around the hole to ensure water tightness. Seat the antenna through the hole, making sure the black rubber gasket seals the entire perimeter.

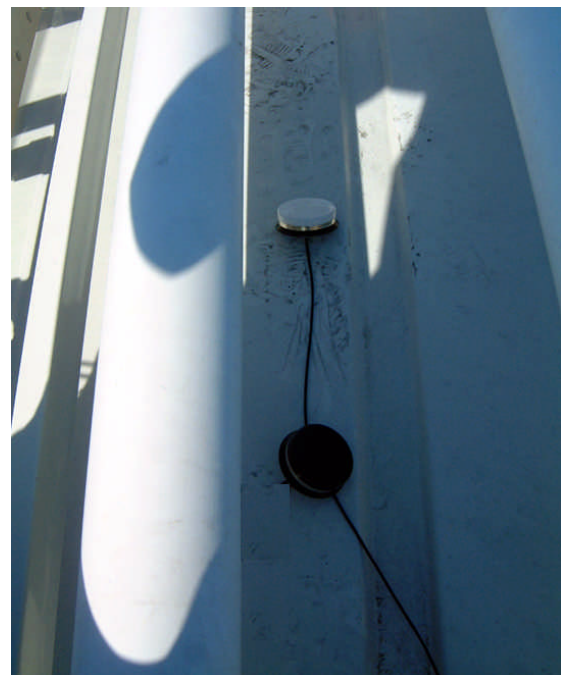


Figure 7: Antennas on the Roof



Figure 8: Vehicle-side of antenna mount



Figure 9: Route cable along driver-side A-pillar

2. Tighten the lock nut on the underside. Use a drop of removable “blue” Loctite when tightening.
3. Use black split loom to consolidate the wires in the interior of the vehicle, as needed. Secure the interior wiring with sticky tab cable guides and ccable ties, as needed.
4. Attach the antenna connectors to the VTCU box.
5. Route the antenna cable along the driver side A-pillar.

NOTE: Tape the antenna cable out of the way before covering back the A-pillar to prevent pinching of the cable by the screws. To verify that the cable is not pinched after covering the A-pillar, pull on one end of the cable and you should feel a tug on the other end.

Step 3: Connect Power

1. Connect the power input to the BATTERY+ and IGNITION wires under the dashboard. Attach the GROUND wire with the zip screw (grounding screw, # 8 x 1/2”, stainless steel machine) to a metal grounding point convenient for servicing, under the dashboard. Use an existing power connection from previous GPS system installations if possible. If not, Solder the connections using the following procedures:
 - a. Carefully strip a small section of each wire (the battery, ignition, and ground wires) found in their respective locations under the dashboard in the vehicle.
 - b. Strip about an inch of insulation off the end of each like wire of the VTCU unit.
 - c. Insert the end of each VTCU wire through each corresponding vehicle wire, and wrap the end around the vehicle wire.
 - d. Solder the connection

- e. Wrap the connections with electrician tape, and then cinch a cable tie tightly around each connection, directly over the connection point.
2. Note that in the system diagram, the ignition wire is shown colored red, the battery wire is shown colored yellow, and the ground wire is shown colored in black, for ease of identification. **Actual colors of ignition and battery wires may vary, depending on make / model of vehicle.**

Step 4: Install Ethernet Receptacle

1. Remove floorboard panel on the driver side.
2. Run the power harness cable and the Ethernet cable from the unit to under the steering column along this route.
3. Drill a hole in the dash area above the driver's right knee. Mount the Ethernet receptacle and connect the Ethernet cable.



Figure 10: Driver side floorboard



Figure 11: Drill hole for ethernet receptacle

Installation Instructions – Bucket Trucks

The VTCU hardware installation procedure is presented in the following basic stages:

1. Installing the VTCU unit
2. Installing the GPS/CDMA and WiFi/802.11b antenna assembly
3. Installing the power cabling
4. Installing the ethernet cable and receptacle



Figure 12: Verizon Bucket Truck

Step 1: Installing VTCU

Mount the VTCU main unit behind the drivers' seat in the truck with four (4) self-tapping 12 x 1 1/2" hex head screws into the floor of the truck cab. Be sure to allow enough free space on all sides of the VTCU box to facilitate ease of wire installation and servicing.

The VTCU should be oriented so that the LEDs are facing the driver's door and the connectors / wiring facing the interior of the vehicle.

Note: Allow enough free clearance between the VTCU main unit and the floor, to allow space for some storage. Position the VTCU on the partition as to not restrict the full rearward slide extension of the drivers' seat, allowing the top of the seat to clear the unit. Allow enough side clearance to accommodate easier installation of cables and antennas to the VTCU.



Figure 13: VTCU Location - Truck

Step 2: Install CDMA / GPS Combo and WiFi Antennas

The basic requirement scenario for installation is graphically shown in *Figure 6: Minimum Clearance for GPS Antenna*. Ensure that the antenna has as close to a 90x line-of-sight view of the sky as is possible. Stay away from any close tall metallic objects, as far as that is feasible. Verify that a straight line set at 45x degrees from the plane of the truck rooftop is clearing all surrounding metallic structures 360x in all directions. In other words, imagine an inverted 90x cone of unobstructed clearance with its vertex touching the antenna.

The two antennas must be **positioned at least 18” away** from the driver’s head. The two antennas must be kept 12” apart.

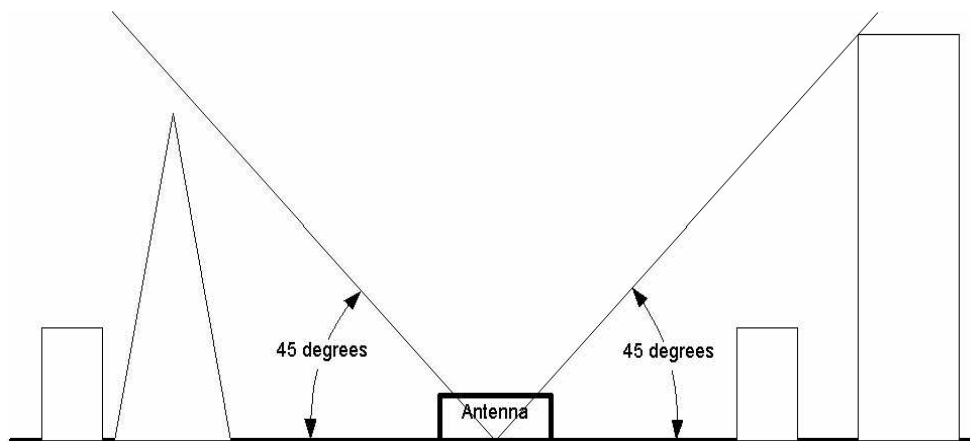


Figure 14: Minimum Clearance for GPS Antenna

NOTE: DO NOT PUT ALL YOUR WEIGHT ON THE ROOF OF THE TRUCK. You may inadvertently put dents in the roof. Stand on the edges of the doorway, or on top of the cowling of the hood.

Procedure:

6. Drill a 1/2” diameter hole through the roof for each. Use existing mounting holes, if available, from previous GPS installations. Otherwise, start by drilling a small pilot hole, then use a universal drill bit to slowly enlarge the hole until the antenna connector can fit through. Clean the roof area where the antenna will mount to get a good seal. Use tar tape or silicone around the hole to ensure water tightness. Seat the antenna through the hole, making sure the black rubber gasket seals the entire perimeter.

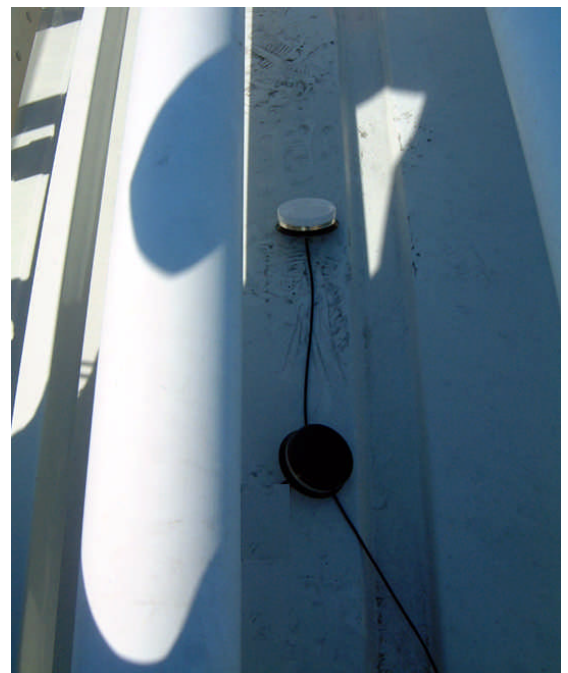


Figure 15: Antennas on the Roof



Figure 16: Vehicle-side of antenna mount



Figure 17: Route cable along driver-side A-pillar

7. Tighten the lock nut on the underside. Use a drop of removable “blue” Loctite when tightening.
8. Use black split loom to consolidate the wires in the interior of the vehicle, as needed. Secure the interior wiring with sticky tab cable guides and ccable ties, as needed.
9. Attach the antenna connectors to the VTCU box.
10. Route the antenna cable along the driver side A-pillar.

NOTE: Tape the antenna cable out of the way before covering back the A-pillar to prevent pinching of the cable by the screws. To verify that the cable is not pinched after covering the A-pillar, pull on one end of the cable and you should feel a tug on the other end.

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3. Connect the power input to the BATTERY+ and IGNITION wires under the dashboard. Attach the GROUND wire with the zip screw (grounding screw, # 8 x 1/2”, stainless steel machine) to a metal grounding point convenient for servicing, under the dashboard. Use an existing power connection from previous GPS system installations if possible. If not, Solder the connections using the following procedures:
 - a. Carefully strip a small section of each wire (the battery, ignition, and ground wires) found in their respective locations under the dashboard in the vehicle.
 - b. Strip about an inch of insulation off the end of each like wire of the VTCU unit.
 - c. Insert the end of each VTCU wire through each corresponding vehicle wire, and wrap the end around the vehicle wire.
 - d. Solder the connection

- e. Wrap the connections with electrician tape, and then cinch a cable tie tightly around each connection, directly over the connection point.
4. Note that in the system diagram, the ignition wire is shown colored red, the battery wire is shown colored yellow, and the ground wire is shown colored in black, for ease of identification. **Actual colors of ignition and battery wires may vary, depending on make / model of vehicle.**

Step 4: Install Ethernet Receptacle

4. Remove floorboard panel on the driver side.
5. Run the power harness cable and the Ethernet cable from the unit to under the steering column along this route.
6. Drill a hole in the dash area above the driver's right knee. Mount the Ethernet receptacle and connect the Ethernet cable.



Figure 18: Driver side floorboard



Figure 19: Drill hole for ethernet receptacle

Self-Diagnostic and Provisioning Program

At the end of the physical installation, the installer shall launch a self-diagnostic and provisioning program to make the unit “live”. The installer shall follow the following steps:

1. Connect a laptop to the VTCU via Ethernet cable
2. Open a MS DOS prompt console window on the laptop by Start > Run... > “cmd”
3. At the DOS prompt, type “telnet 192.168.1.1”
4. Username is “admin” and Password is “verizon”, if prompted
5. At the next prompt, type “loco provision”. This will launch the software program
6. Follow instructions in the software program:
 - a. Toggle vehicle ignition key off and on
 - b. Enter valid vehicle ID. This entry will be communicated to and validated in real-time by MobileAria’s backend server
 - c. Enter odometer value
 - d. Verify VTCU is transmitting a WiFi SSID in the format of “vzvan_<vehicle_id>”. To perform verification, run a software WiFi sniffer program on the laptop such as NetStumbler.
7. After successfully running through the provisioning steps, the unit will reboot itself.

The self-diagnostic and provisioning program performs a number of other “behind-the-scenes” checks that do not require human intervention, including getting a GPS fix, getting the WiFi SSID and WPA key, and verifying client-to-server communication. After completion, the unit will be “hardened” and will require a special SD card to perform telnet operations.

Installation Checklist

Vehicle Number: _____

VTCU Serial Number: _____

- The VTCU has been installed and secured behind the driver's seat.
- Polycarbonate cover has been installed and secured. Tamper seals have been placed
- Both antennas have been installed in the position that offers as close to 90 degrees line of sight view of the sky as is practically possible. The two antennas are 18" apart and 18" away from the driver's head
- Ethernet cable receptacle has been installed in the dashboard
- BATTERY, IGNITION, and GROUND wires have been connected to the vehicle by soldering and covering with electrical tape
- Self-diagnostic and provisioning program has been completed