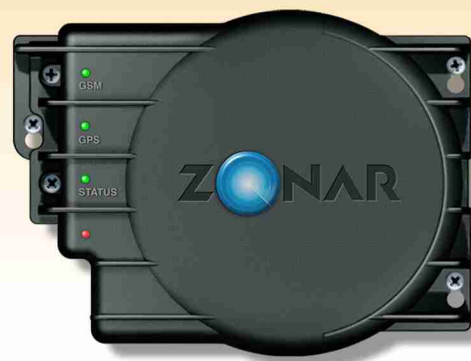




inspect • track • know

Equipment Installation Manual



Zonar Systems Hardware Installation Tips For Professional Installers

Zonar Systems equipment will provide years of reliable service if properly installed and maintained. Zonar equipment is typically installed in heavy vehicle applications and is often subject to extreme temperatures, dust, dirt, vibration, and shock. *Proper installation is the critical first step to equipment longevity and optimal performance.*

This guide is meant to be a *general guideline* for the professional installer and technician. While we attempt to point out the most common installation questions and issues; common sense, good housekeeping procedures, attention to detail, safety adherence, and technical competence of the professional installer is critical for a successful installation.

Please refer to your specific vehicle manufacturer guidelines for the installation of electrical components and wiring.

A professional team of Zonar support technicians and engineers are available to answer your installation questions. Contact Zonar at 1-877-843-3847 or by email at customersupport@zonarsystems.com.

Thank you,

Andre J Horochiwsky
Customer Support Manager – Zonar Systems

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- A.** 2010 RFID Reader (Optional)
- B.** GPS-VM (Vehicle Mount - Optional)
- C.** 2010 RFID Reader installed in GPS-VM (GPS-Vehicle Mount - Optional)
- D.** Zone and Asset Tags (Optional)
- E.** GPS Unit. May be 900MHz or GSM (Cellular) design
- F.** GPS Mounting Plate
- G.** ZPass (Optional)
- H.** GPS Antenna (used on all GPS units)
- I.** Straight Style GSM Antenna Install Vertical only (GSM units only)
- J.** GPS Power Cable
- K.** MiniWing style GSM Antenna Install - Vertical (Optimum) Horizontal (alternate) (GSM Units Only)





Layout

- 1) Mount all equipment in the interior of the vehicle. GPS antenna and RFID tags are the only Zonar components that may be exposed to the outdoor elements.
- 2) Do not install Zonar equipment below windows and doors which open to the vehicles exterior to prevent water damage.
- 3) Lay all components out prior to installation to check for proper cable length and interference issues.
- 4) Avoid mounting equipment in difficult to access areas.
- 5) Avoid mounting equipment in dirty, dusty, or damp areas. (e.g. near floors and entrance ways)



Electrical

- 6) **Consult the vehicles manufacturer for specific installation guidelines. (Highly recommended for Multiplex electrical systems)**
- 7) *All power leads (Red and White leads, GPS-Power Cable) must be connected to the vehicles protected circuitry (e.g. fuse panel, circuit breaker panel, protected circuits). Never electrically connect Zonar equipment to unprotected circuits. (e.g. directly to battery)*
- 8) *It is also required that all power leads (Red and White leads, GPS-Power Cable) be protected with a 3 to 5 amp fuse and inline fuse holder (included) for optimal system protection.*

Drill Holes

- 9) Capture *all* drill chips during drilling operations. Do not allow chips to fall onto equipment, furnishings, etc.
- 10) Deburr all drill holes on both sides of drilled surface. Example deburr tool:
<http://www.grainger.com/Grainger/items/3VB51>
- 11) All drill holes must have a rubber grommet or similar anti-chaffing system installed to protect cable assemblies. (e.g. plastic conduit)
- 12) Seal all penetration drill holes which may pass rain water.

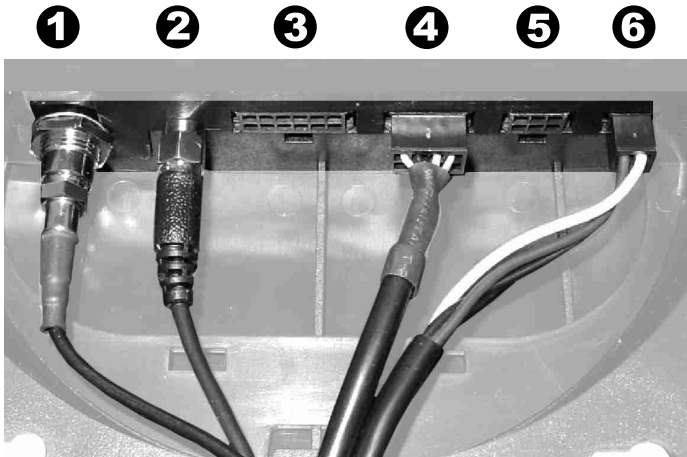
Cable Management

- 13) Strain relief and support all cable installations.
- 14) Avoid sharp bends and tight radius installations of cables.
- 15) Avoid moving components. (e.g. doors, steering shafts, handles, fans, etc.)
- 16) Provide an adequate "Service Loop" i.e. "cable slack" to allow for servicing of equipment.
- 17) Avoid routing cables thru doors, windows, and other pinch points.
- 18) Avoid routing cables in high personnel traffic areas.
- 19) Avoid routing antenna cables near radio and PA equipment.

General Housekeeping

- 20) Capture *all* drill chips during drilling operations. Do not allow drill chips to fall onto electrical equipment, furnishings, heating ducts, etc. Magnets, sticky tape, vacuums, physical barriers, etc. may all be used to accomplish this task.
- 21) Remove excess sealant. Sealant should be debris/contaminant free (e.g. drill chips), consistent, and uniform in appearance. Clip excess wire tie protrusions.

Cable Connections



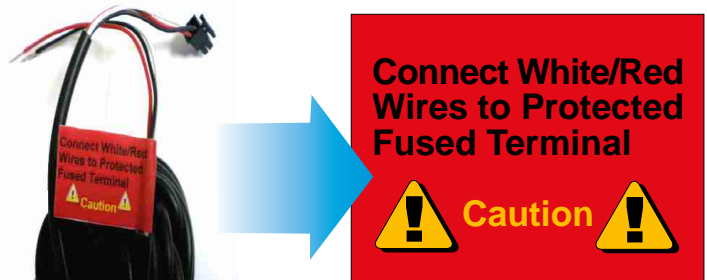
1. GSM (cellular) antenna (GSM units only)
2. GPS antenna (Required)
3. I/O Input (Optional)
4. GPS VM (Vehicle Mount) 8PIN Connector (Optional)
5. Accessory (Optional)
6. GPS 4PIN Power Input (Required)

GPS Power Cable

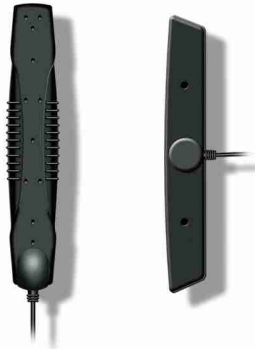


- 1) Follow all General Guidelines as specified on page 4.
- 2) All power leads (Red and White leads, GPS-Power Cable) must be connected to the vehicles protected circuitry (e.g. fuse panel, circuit breaker panel, protected circuits). Never electrically connect Zonar equipment to unprotected circuits. (e.g. directly to battery)
- 3) The White wire must be connected to a power source that is active only when the engine is running or the system cannot track idle time properly.

GPS Power Cable - Continued



- 4) It is also required that all power leads (Red and White leads, GPS-Power Cable) be protected with a 3 to 5 amp fuse and inline fuse holder (included) for optimal system protection.
- 5) Vehicles equipped with "noise kill" switches (late model school buses) – Do Not wire any Zonar equipment to the "noise kill" circuitry.
- 6) Power Bundle wiring – 4 Pin, 3 wires
 - a. Red – Constant DC (+8VDC - +30VDC, dependent on system type)
 - b. Black – Ground
 - c. White – Switched Power
 - i. Ignition Switch = On / Run: +8VDC - +30VDC, dependent on system type
 - ii. Ignition Switch = Off – No Voltage
 - iii. Ignition Switch = ACC
 1. No Voltage – Preferred method of wiring
 2. +8VDC - +30VDC, dependent on system type – Non-preferred method of wiring. This will lead to errors in "idle time" reporting & the STATUS, GPS, and (if equipped) GSM LEDs to be illuminated when the ignition is in the ACC position. Due to certain vehicle manufactures electrical designs it may be necessary to electrically connect the Zonar GPS in this non-preferred manner.



GPS Antenna:

- 1) Follow all General Guidelines as specified on page 4.
- 2) May be magnetically mounted or mounted via optional aluminum plate and screw for non-magnetic surfaces.
- 3) Suggested installation point - centerline of vehicle roof, minimize cable run to prevent wind and carwash damage.
- 4) Ensure a clear antenna view of the open sky.
- 5) Maintain a minimum of 6 inches from any rooftop edge or ledge, see fig. 6-1.
- 6) Drill, Deburr, grommet, weather seal, cable thru hole as required.

GSM MHz Antenna:

- 1) Follow all General Guidelines as specified on page 4.
- 2) Mount on unobstructed interior glass surface (e.g. windshield corner or stationary side window) with a clear view of open sky.
- 3) Do not install on metallic surfaces, or in metallic enclosures.
- 4) Do not block drivers view or mirrors.
- 5) Verify placement acceptability with state DOT / law enforcement prior to installation.
- 6) GSM
 - A) Straight Style – Vertical installation only, see fig. 6-2.
 - B) MiniWing Style – Vertical (Optimum), Horizontal (Alternate)
- 7) Clean and dry the surface before placing the mounting plate. To obtain optimum adhesion, the surface must be clean and dry. The best surface cleaning solvent is an isopropyl alcohol/water mixture. (rubbing alcohol)
- 8) Remove the backing from the peel and stick, see fig. 6-3. Press and hold mounting position for 10 seconds to assure good adhesion.

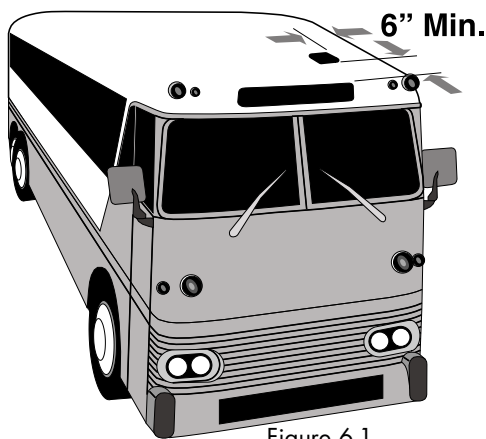


Figure 6-1

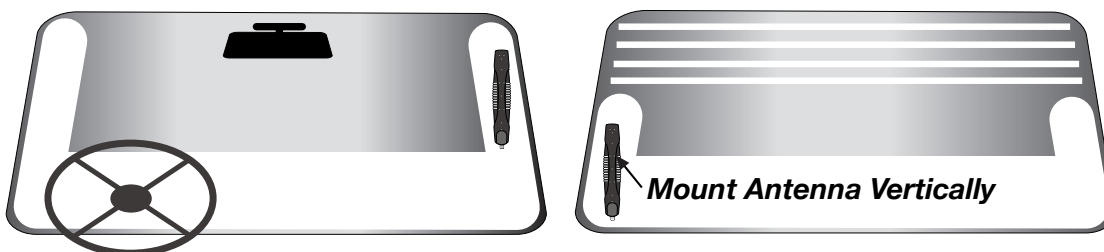


Figure 6-2

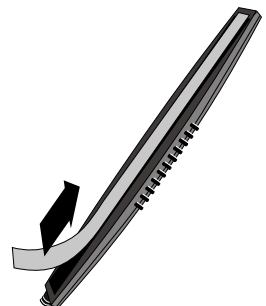
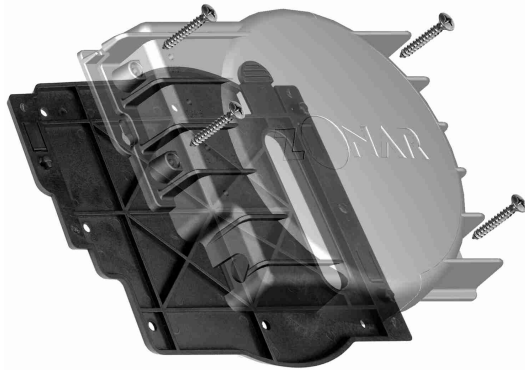


Figure 6-3



GPS Mounting Plate & GPS Unit

- 1) Follow all General Guidelines as specified on page 4.
 - 2) Mount onto interior flat surface large enough to accommodate footprint.
 - 3) Do not install below windows or doors which open to the vehicles exterior to prevent water damage.
 - 4) Avoid mounting equipment in difficult to access areas.
 - 5) Avoid mounting equipment in dirty, dusty, or damp areas. (e.g. near floors and entrance ways)
 - 6) Suggested mounting areas include drivers overhead, drivers console, rear cab wall.
 - 7) Drill, Deburr, grommet cable thru hole as required. (See alternate grommet-less install below)
 - 8) Clean and dry the surface before placing the mounting plate. To obtain optimum adhesion, the surface must be clean and dry. The best surface cleaning solvent is an isopropyl alcohol/water mixture. (rubbing alcohol) - Screw install – Optional.
 - 9) Remove the backing from the peel and stick see fig. 7-1. Press and hold mounting position for 10 seconds to assure good adhesion.
 - 10) Please take note of:
 - GPS ID number (all GPS units) – Found on white sticker on GPS unit.
 - Radio ID number (900 units only) – Found on white sticker on GPS unit.
 - Vehicle or Asset number (e.g. Bus #56)
- Your Zonar Customer Support Representative or Ground Traffic Control administer will need this information.

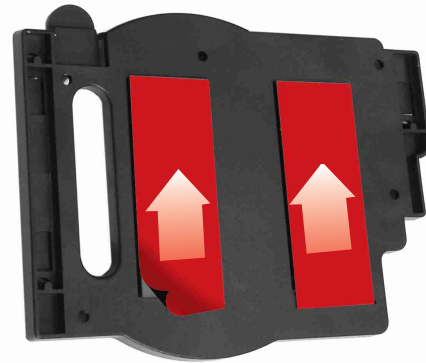
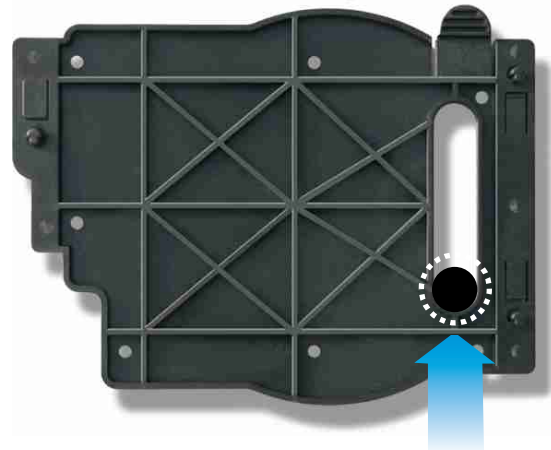
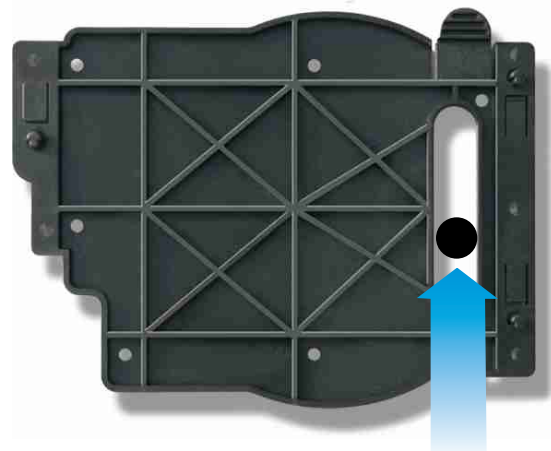


Figure 7-1



Alternate grommet-less acceptable method. Cable assembly's are protected by using Mount Plate as resting surface. Deburr entire bore.

Figure 7-2



*Alternate Grommet - **UNACCEPTABLE** method. Cable assembly's will chafe in bore hole.*

Figure 7-3

GPS VM (Vehicle Mount and 2010)

- 1) Follow all General Guidelines as specified on page 4.
- 2) Mount onto interior flat surface large enough to accommodate footprint.
- 3) Do not install below windows or doors which open to the vehicles exterior to prevent water damage.
- 4) Avoid mounting equipment in difficult to access areas.
- 5) Avoid mounting equipment in dirty, dusty, or damp areas. (e.g. near floors and entrance ways)
- 6) Mount vertically to ensure good electrical connection between 2010 and VM. Ensure 2010 unit can be easily inserted / removed without interference.
- 7) Mount high in vehicle, avoid driver's leg and arm rest areas. This also minimizes the chance of the mount being used as a holder for non Zonar equipment. (e.g. glasses, pens, pencils, etc.)
- 8) Retention (Adhesive or Screw):
 - A) Adhesive install - Clean and dry the surface before placing the mounting plate. To obtain optimum adhesion, the surface must be clean and dry. The best surface cleaning solvent is an isopropyl alcohol/water mixture (rubbing alcohol). Remove the backing from the peel and stick. Press and hold mounting position for 10 seconds to assure good adhesion.
 - B) Screw install – Only use Zonar supplied hardware. Use of non Zonar screws generally leads to interference issues and scratching of the 2010 unit. *Use preventative measures to capture & remove metallic chips that are created during the installation of self-tapping screws. Metallic chips may short the contact pins inside the Vehicle Mount (VM) that mate with the contact pins of the 2010.*

Capture – Insert clean paper towel or clean shop towel dam inside VM when installing self-tapping screws. Carefully remove temporary dam to minimize the possibility of dropping metallic chips into the Vehicle Mount (VM).

Chip removal – After dam removal, follow-up with stick magnet (must be electrically insulated to prevent shorting pins), compressed canned air, or mini-vac to ensure no chips remain.

- 9) Drill, deburr, grommet cable thru hole as required.



Tags

- 1) Follow all General Guidelines as specified on page 4.
- 2) Whenever possible, avoid installing tags in cold / wet / damp / conditions.
- 3) Clean and dry the surface prior to placement. To obtain optimum adhesion, the surface must be clean and dry. The best surface cleaning solvent is an isopropyl alcohol/water mixture (rubbing alcohol). Remove the backing from the peel and stick. Press and hold mounting position for 10 seconds to assure good adhesion.
- 4) Consistency between vehicles is key to a professional installation. If you or the customer are unsure where to place any tag, call a Zonar Customer Service Representative for assistance prior to installation.

System Check

Minimum Requirements - GPS

- 1) At a minimum, the installer must perform a "System Check" to verify proper installation.
- 2) This procedure covers the minimum requirements for a system installer. If at all possible a full and complete checkout using Zonar's Ground Traffic Control website should be performed. Not all installers will have access to this area, check with a Zonar Customer Service representative if in doubt.

3) Turn Key On, within 2 minutes:

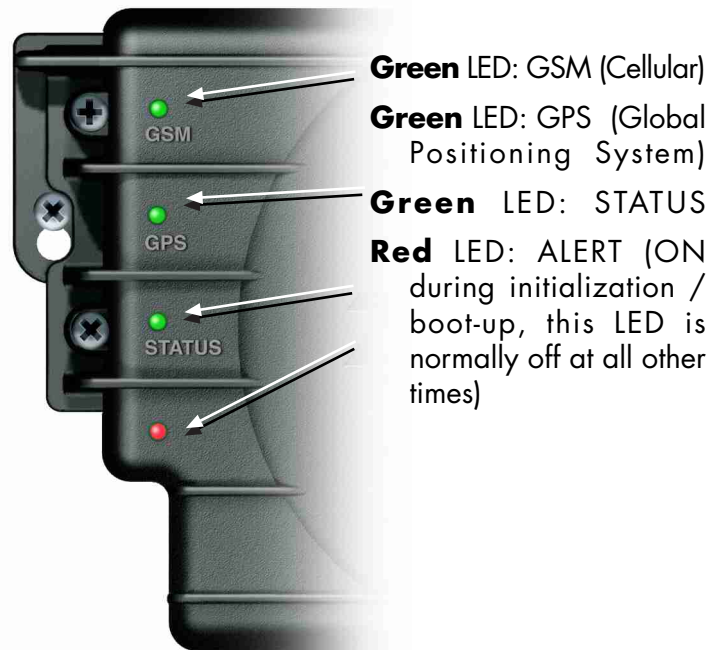
- A) **GSM Green LED:** GSM units—Solid (If blinking, ensure proper GSM antenna connection & clear view to sky). 900MHz units—Off.
- B) **GPS Green LED:** LED should be solid within 2 minutes or less. Blinking indicates acquiring satellites, Solid indicates satellite acquired. GPS antenna must have a clear view to sky.
- C) **STATUS Green LED:** Solid. If blinking, check white lead for proper voltage.
- D) **ALERT Red LED:** Off (Solid or blinking in the event of system failure)

4) Turn Key Off, within 2 minutes:

- A) **GSM Green LED:** Disregard
- B) **GPS Green LED:** Disregard
- C) **STATUS Green LED:** Blinking or off (Solid may indicate a problem, check white lead. Call your Zonar Customer Service Representative if in doubt)
- D) **ALERT Red LED:** Off (Solid or blinking in the event of system failure)

Lighting Identification

(FW 56RC39 & Greater)



System Check - Minimum Requirements - 2010 / GPS Vehicle Mount

- 1) Insert 2010 RFID Reader into GPS-VM (Vehicle Mount).
- 2) Ensure 2010 "Charging" indicator (located below power button on 2010) illuminates Green, a slight delay is normal.

Limited Warranty

Zonar® will provide customer with a replacement for nonconforming hardware or software within a commercially reasonable time after timely notice from customer. Zonar does not represent or warrant that the hardware and software are free of bugs or errors and shall not be liable for any losses (financial or non-financial) occurring as a result of such bugs or errors. No other warranty express or implied, including any warranties of merchantability or particular purpose, is provided for any hardware or software provided pursuant to this contract. Zonar Systems shall not be liable to customer, or any third-party for any general, special, punitive, incidental, indirect or consequential damages, or any loss of profits or business, arising out of this agreement. The terms and conditions of this agreement shall apply to any replacement hardware and software furnished.

CUSTOMER'S SOLE AND EXCLUSIVE REMEDY AND ZONAR'S ENTIRE OBLIGATION UNDER THESE LIMITED WARRANTIES IS TO REPAIR OR REPLACE THE PRODUCTS WITH CONFORMING PRODUCTS SUBJECT TO PROMPT NOTICE FROM LICENSEE OF NON-CONFORMITY AND AT ZONAR'S OPTION IF SUCH ALTERNATIVES ARE NOT FEASIBLE, TO TERMINATE THIS AGREEMENT AND REFUND THE APPLICABLE FEES PAID WITH RESPECT TO SUCH NON-CONFORMING PRODUCT. THIS DISCLAIMER OF WARRANTIES IS AN ESSENTIAL CONDITION OF THE AGREEMENT.



FCC Compliance Statement (Part 15.19)

This device complies with Part 15 of the FCC Rules and with RSS-210 of Industry Canada (IC). Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.



Warning: (Part 15.21)

Changes or modifications not expressly approved by Zonar® Systems could void the user's authority to operate the equipment.



Caution: RF Exposure (OET Bulletin 65)

To comply with FCC RF exposure requirements for mobile transmitting devices, the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20cm (8 Inches) from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. Users and installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.

Use only supplied and approved antenna's. Use of unauthorized antenna's or modifications could impair signal quality, void your warranty and/or result in violation of FCC regulations.



Industry Canada Compliance Statements

"This device has been designed to operate with an antenna having a maximum gain of [5] dB. Antenna having a higher gain is strictly prohibited per regulations of Industry Canada. The required antenna impedance is [50] ohms."

"To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that required for successful communication."

"The installer of this radio equipment must ensure that the antenna is located or pointed such that it does not emit RF field in excess of Health Canada limits for the general population; consult Safety Code 6, obtainable from Health Canada's website, www.hc-sc.gc.ca/rpb"

Important Notice

It is the Owner's sole responsibility to install and use the Zonar products in a manner that will not cause accidents, personal injury or property damage. For the purposes of this notice, "Owner", "you" and "your" means the party (including any person authorized by that party to use and/or install the Product) that has either: (a) purchased the Product; or (b) leased the Product from Zonar Systems, Inc or its related companies. The Owner of this product is solely responsible for observing safe driving practices. The choice, location, and installation of all components of the Product is critical. If installation is not correct, the Product may not perform at its designed potential or specifications. If in doubt, consult your vehicle's manufacturer.

TO THE MAXIMUM PERMITTED BY LAW, ALL REPRESENTATIONS AND WARRANTIES (EXCEPT ANY WHICH MAY NOT LAWFULLY BE EXCLUDED) ARE EXPRESSLY EXCLUDED, INCLUDING WITHOUT PREJUDICE TO THE GENERALITY OF THE FOREGOING, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. TO THE MAXIMUM EXTENT PERMITTED BY LAW, ZONAR DISCLAIMS ALL LIABILITY ARISING OUT OF OR IN CONNECTION WITH THE PRODUCT (INCLUDING ANY USE OF THIS PRODUCT IN A WAY THAT MAY CAUSE ACCIDENTS, DAMAGE OR VIOLATE THE LAW).

System Specifications

EVIRNET™ GPS

- Operating Temp -20C to +70C
- DC Input range, 8.0Vdc to 30.0Vdc

RF (SSR) Transceiver

- Frequency Hopping Spread Spectrum Radio
- 902 MHz to 928 MHz
- 230mW transmit power (Radiated output @ 3 meters)
- -103 dBm Sensitivity
- 53 Hopping Channels
- Range 1500FT Obstructed, 4000FT+ Unobstructed

GPS Receiver

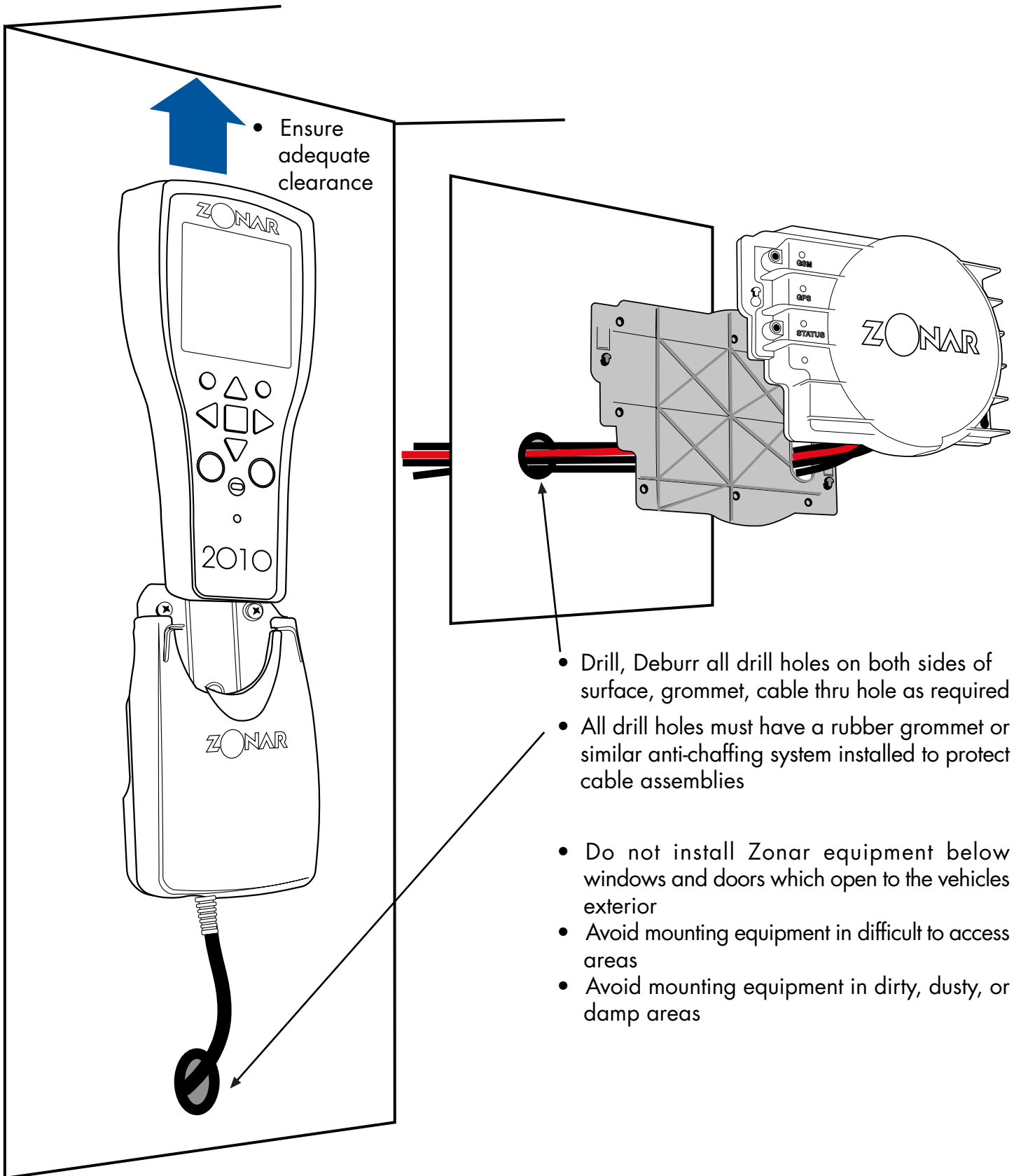
- WAAS Capable
- Very high sensitivity receiver
- Rapid acquisition of satellites
- GPS signal acquisition, tracking and navigation
- On board GPS data storage

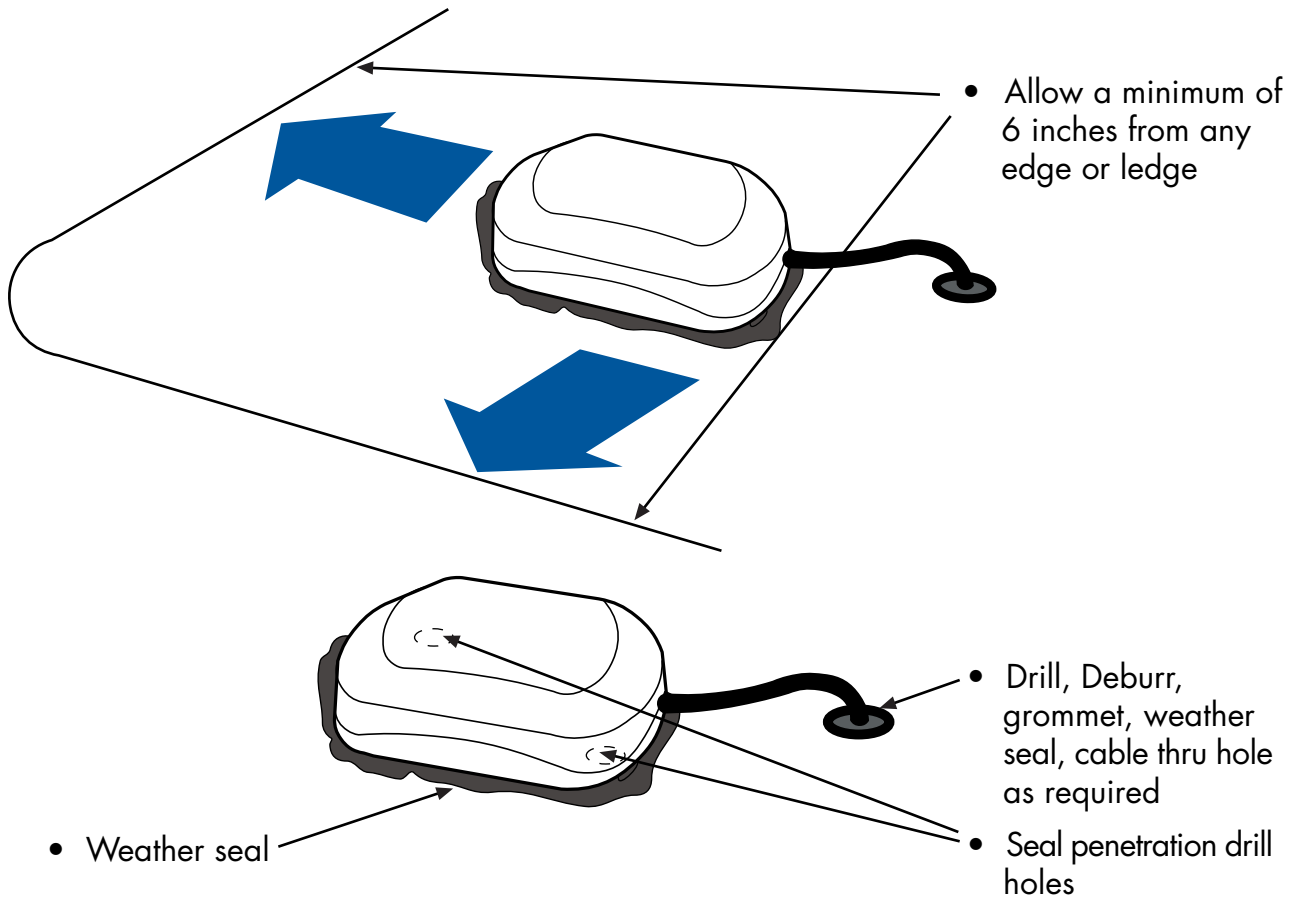
GSM Transceiver

- Quad Band 850/1900 900/1800
- GPRS

Approved Antennas

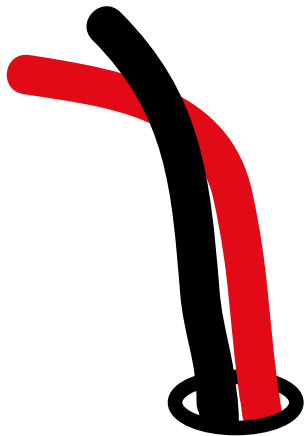
- StarNav TLM-3 GSM Dual Band (Or Equivalent)
- San Jose SM-19 - GPS
- MiniWing GSM 900/1900





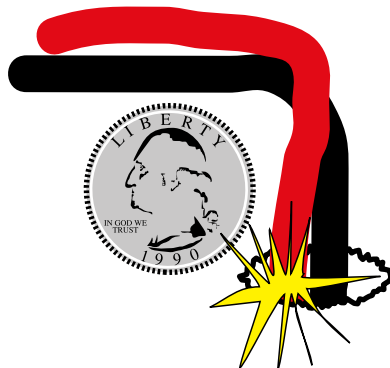
CORRECT

- Bend radius adequate
- Hole has grommet

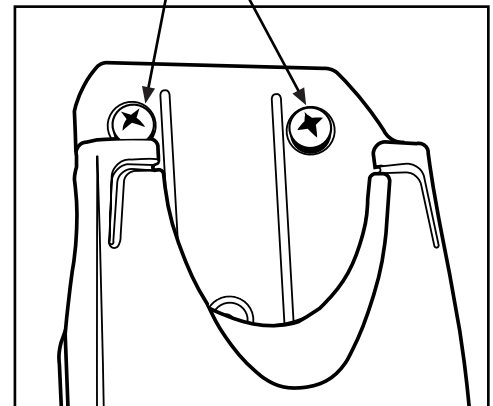


INCORRECT

- Bend radius too tight
- Hole has sharp edges
- Hole has no grommet



- Use supplied screws to prevent scratches to 2010

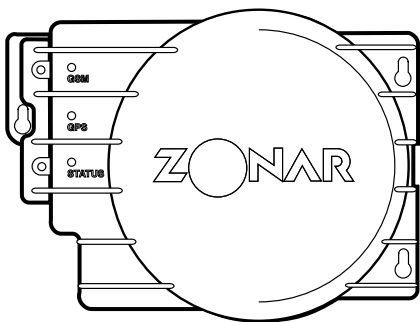


Zonar 18" Discrete IO System

- 5 Inputs (Depending on application, all inputs may not be used)
- 20 AWG Wire Gauge

Pin #

- 1 Black
- 2 Brown
- 3 Orange
- 4 Yellow
- 5 Red



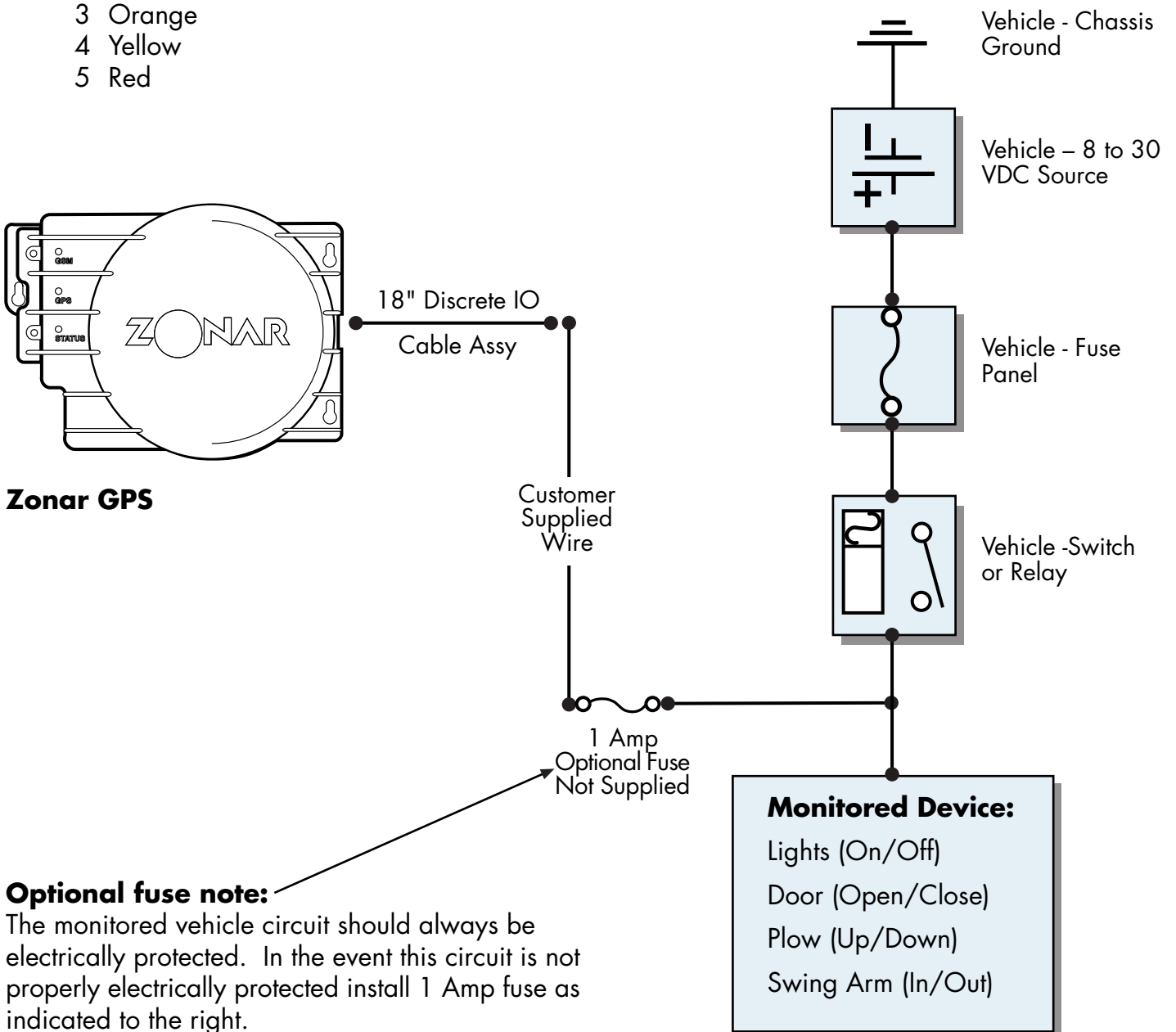
Zonar GPS



Warning

Observe all general and specific warnings in regards to electrical installations on page 4 of this guide.

When in doubt consult the specific vehicles manufacturer for electrical equipment installation instructions.



Optional fuse note:

The monitored vehicle circuit should always be electrically protected. In the event this circuit is not properly electrically protected install 1 Amp fuse as indicated to the right.

