Company Confidential

TVG-660

- The TVG-660, which operates on the Vodafone UK GSM network.
- The TVG-660 must be installed as per the guidelines in this specification guide.
- The TVG-660 is an in-vehicle unit that acquires location specific information through GPS and then transmits the location information to Trimble servers via a wireless network.
- The TVG-660 also has fully integrated on-board vehicle diagnostics capabilities (EOBD J1979, J1939, etc.). The TVG-660 can also operate in tracking-only mode, if no vehicle diagnostics are available.

TVG-660 Aerial

- The TVG-660 two-piece aerial is used commonly when the customer does not want any holes drilled into the vehicle.
- The TVG-660 aerial is a two-piece aerial that is mounted inside of the vehicle.
- The GPS portion of the aerial must be securely mounted on the dashboard with a full 360 degree view of the sky.
- The wireless portion of the TVG-660 aerial has an adhesive backing and is mounted covertly inside of the vehicle; commonly inside of the passenger's a-pillar or inside of the dash.

The wireless portion of the TVG-660 aerial.

The GPS portion of the TVG-660 aerial.

Aerial Installation

- For the system to operate properly, the antenna must be positioned properly. This is the most critical point to ensure accurate location information.
- The GPS aerial must be mounted so that it always has a **clear view of the sky** to receive information from the satellites.
- Must be mounted at **least 12” away** from any transmitting antenna (E.g., Radio, Cellular)
- The GPS aerial **must not be obstructed by any metallic objects**.

Aerial Installation Advisories

TVG-660 Power Connections

The TVG-660 system requires 3 connections to the vehicle's electrical system:

1. **Constant +12VDC** Power connects to the **RED wire** of the power harness.
   - Refers to a power source wire that always supplies +12 to 24VDC.
2. **Ignition Power** connects to the **WHITE wire** of the power harness.
   - Refers to a Key controlled power source that has +12 to 24VDC in both the Run and Start positions.
   - Under no circumstance will the key controlled "Accessory Position" produce an ignition on or run time event.
3. **Ground (-12VDC)** connects to the **BLACK wire** of the power harness.
   - Sourced through the vehicle's chassis and connected using a Ring Terminal, Star Washer and a ½-inch self tapping screw.
   - If available, it is also acceptable to utilise either a stud or a bolt that is attached directly to the frame.

- All power connections must be made by using one of the two approved installation methods as outlined in this guide.
- All power connections must be insulated with 3M Super 33+ electrical tape.
- All power connections must be fused within 8" of the source connection (add-a-line fuse tap and 3 amp ATC fuses provided within the installation kit).
- Power Connections will meet aftermarket electronics industry installation practices.
- No power connections must be made "wire to wire", unless instructed by customer fleet.

Diagnostic and Power Connections, EOBD

The TVG-660 utilises several different vehicle-specific power/diagnostic connectors. There is also a generic connector available for instances in which there is no vehicle-specific connector available.

The main power harness provides the TVG-660 with +12v constant power and earth from the vehicle's diagnostic connector. An additional lead must be run to the vehicle's fuse-block for a true ignition sense via a fuse holder and a 3a fuse.

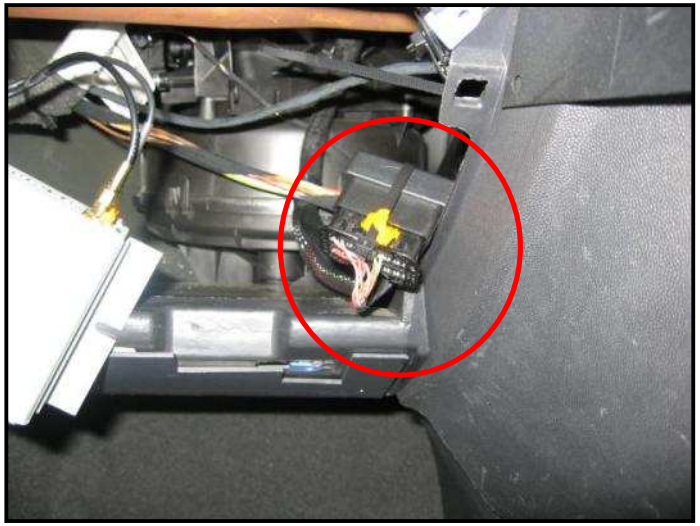
The true ignition connection is made via a add-a-line fuse tap to the fuse box, as direct wire-to-wire connections are not allowable.

Vehicle-specific harness for a Volkswagen Caddy.

Generic connector for vehicles.

Diagnostic and Power Connections, EOBD continued

- The main TVG-660 power/diagnostics connector replaces the vehicle's diagnostic with a Y-adaptor, as shown at top right and bottom right.
- The ignition lead is run to the fuse box, as shown at bottom. With a add-a-line fuse tap and a 3a fuse.



Y-adaptor installed in vehicle.

Fuse box for ignition sense.

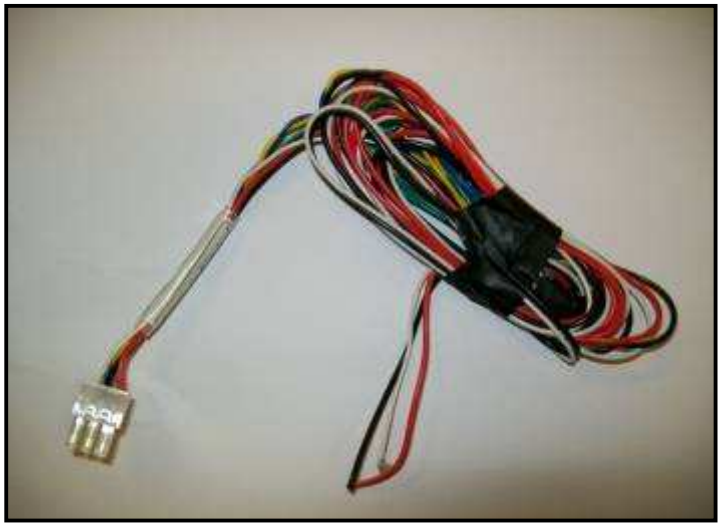
EOBD port installed in vehicle.

Diagnostic and Power Connections, Non-EOBD

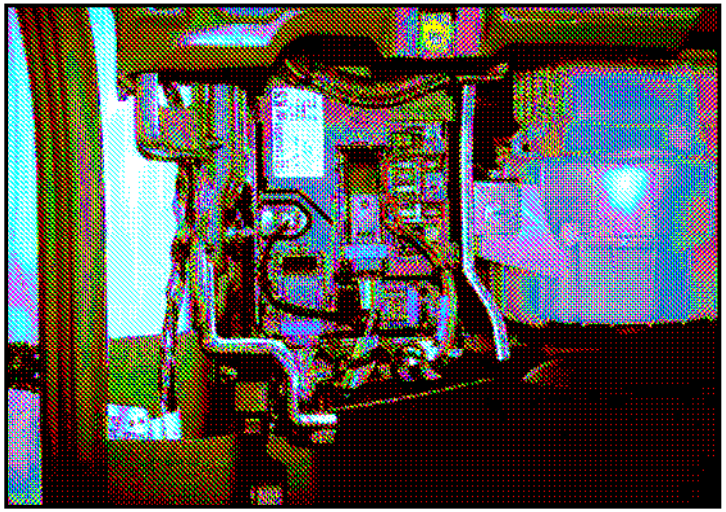
- If the vehicle is not equipped with a compatible EOBD interface, the generic tracking only harness will be utilised. The TVG-660 will function in a tracking-only mode.

- The power connections in this instance will need to be hardwired directly to the vehicles main power harness. Only the following leads from the generic harness will be utilised:
  - Red: +12vdc constant
  - White: +12vdc true ignition
  - Black: Chassis earth

- All of the power connections must be made with a add-a-line fuse taps and 3a fuses.



Generic harness.



Power connections showing fusetaps.

TVG-660 Testing and Configuration

Confirmation of GPS lock and wireless connection must be made by viewing the status lights on the TVG-660.

- **The PWR LED is permanently lit**: The TVG-660 is powered up.
- **LED 1 is permanently lit green**: The TVG-660 is operating normally. The LED is red when the TVG-660 is initialising. Note: during initial installation or if battery power is interrupted it may take a few minutes for this LED to illuminate.
- **LED 2 is permanently lit green**: The TVG-660 has established a GPRS connection. The LED is red while the TVG-660 is initialising the modem hardware.
- **LED 3 is permanently lit green**: The TVG-660 has established a GPS lock. The LED is orange while attempting to get GPS lock. Note: This led will only illuminate if ignition is turned on and the engine is running. If ignition is off the led will be extinguished.
- **LED 4 is permanently lit green:** Ignition has been turned on and the TVG-660 has established diagnostic communication. The LED is red when an ignition signal has been detected but the TVG-660 is waiting for diagnostics.

In normal operation, with good GPRS reception and the ignition turned off, both LED1 and LED2 should be lit green. When the ignition is turned on and the engine running, LED4 will illuminate green and LED3 will be orange to indicate GPS lock is being acquired. After a few minutes, LED3 should illuminate green to indicate GPS lock has been established.

Tamper Proofing Requirements

The complete system and installation must be sealed after a successful system Test. (TVG 660 self test) Provided in the installation parts kit is a tube of Orange Torque Seal for each installation.

Torque Seal must be applied to the following areas:

1.The Power Connections at the 12V constant, ignition sense, and ground screw:

- Diagnostic has 12V constant & ground found at Y-adaptor with ignition sense at fuse block, picture #1 & #2.
- Non-diagnostics has 12V constant and ignition sense at fuse block with ground elsewhere, picture #3 & #4.

2.Power harness and Antenna connections on the *TVG-660*, picture #5.

1.Diagnostics at Y-adaptor

2.Diagnostics at ignition source

3.Non-Diagnostics

4. Non-Diagnostics

5.TVG

TVG-660 Installation

- The TVG-660 must be mounted in a secure and hidden location away from the driver's side of the vehicle to deter driver tampering.
- When mounting the TVG-660, find a suitable location that will not interfere with the safe operation of the vehicle (e.g., braking, clutch operation, or other electronic equipment).
- The TVG-660 must be secured in the vehicle. Use tie wraps, screws, nut/bolts or double sided tape to properly secure unit.
- The TVG-660 must be mounted at least 18" away from any transmitting antenna (E.g., Radio)
- **Do Not** Mount the TVG-660 :
  - To Air Lines or any vehicle cabling
  - In direct exposure to the elements
  - In excessive heat areas (exhaust Manifolds, etc.)
  - In excessive cold areas (refrigeration units)
  - In high vibration areas (engine compartments, transmission)
  - Near corrosive fluids and gases (acids, petroleum)
  - In direct exposure to water (the TVG-660 is not waterproof)
  - In areas where excessive dust is present

TVG-660 Typical Installation Locations

The TVG-660 must be mounted to a secure location using self-tapping screws or nuts and bolts. Zip ties or double-sided tape cannot be utilized as the sole mounting method.

Take care to secure the diagnostic and power cables are secure and do not interfere with the steering column. All excess cabling is to be neatly bundled and stored behind the dash panel and secured to a dash brace, adjacent to the TVG.

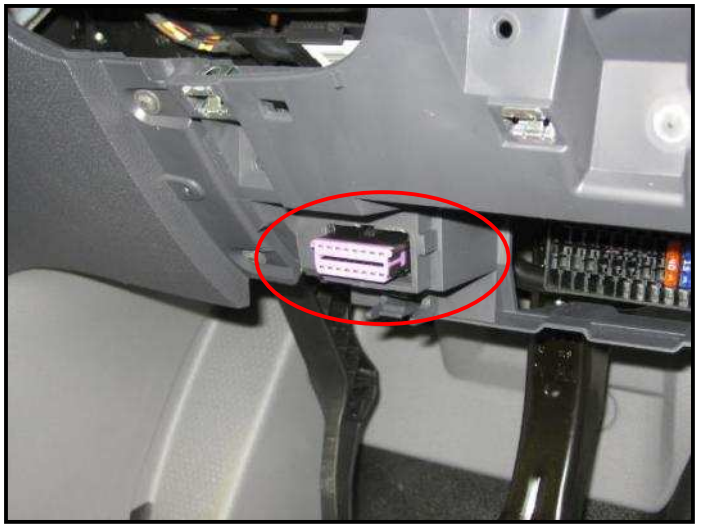
Precautions: When mounting on the driver's side of the vehicle, it is **extremely** important to ensure that the TVG-660 is secure and cannot interfere with the safe operation of the vehicle.

TVG-660 Diagnostic Cable Installation and Locations

The J1962 (OBD-II) port is generally located on the lower dash of the driver's side of the vehicle. It is generally attached with a pair of screws or clips (right).

The factory connector is unmounted, and the factory connector is then connected to the Trimble Y-adaptor. The other end of the adaptor is secured to the factory connector location (bottom).

The factory connector is secured above the mounting location (as shown below), and the data cable is routed to the TVG-660 mounting location.



For questions and / or updates to this guide please contact:

Ted Fletcher

+44 (0)7970 992 918

Ted_Fletcher@trimble.com

Legal Information

Trimble reserves the right to make changes at any time, in order to improve the reliability, function or design of its devices, products or services and to supply the best devices, products and services possible. Trimble devices, products and services are protected under one or more of the following U.S. Patents: 5,477,228; 5,694,594; 5,959,577; 5,990,827; 6,459,988; 6,529,159; 6,552,682; 6,594,576; 6,664,922; 6,578,005; 5,963,911; 6,862,524; 6,795,017; 6,882,313; 6,867,733; 6,832,140; 6,922,566 and numerous other patents and patents pending in jurisdictions worldwide. Trimble does not represent that the devices, products or services shown or described herein are free from patent infringement or from any other third party right. Trimble assumes no obligation to correct any errors contained herein or to advise any user of liability for the accuracy or correctness of any engineering software support or assistance provided to a user.

The Trimble devices, products and services are dependent on the coverage and calling areas of wireless networks owned and operated by third parties. Coverage and calling areas are approximate and may not cover significant portions of the United States. Actual coverage and operation of the devices, products and services depend on a variety of factors, including without limitation: system availability and capacity; system and equipment upgrades, repairs, maintenance, modifications and relocation; user equipment; terrain; signal strength; structural conditions; weather and atmospheric conditions; availability of power; governmental regulations; suspected fraudulent activities; acts of God and other conditions beyond the reasonable control of Trimble. Trimble will not be responsible for limits in coverage or performance degradation due to any such conditions. The user acknowledges that coverage and calling areas may be interrupted, halted or curtailed or the quality of the transmission may be diminished at any time.

The devices, products and services are dependent upon the availability of the Internet, which is owned and operated by and accessed through third parties. Trimble assumes no responsibility for improper storage of data or information, or delivery of messages. The user assumes the entire risk in downloading or otherwise accessing any data, information, files or other materials obtained from the Trimble and/or @Road web site, even if the user has paid for or otherwise been provided virus protection services from Trimble.

The Trimble devices, products and services and any modifications, alterations, additions or changes to the devices, products or services are not fault tolerant and are not designed, manufactured or intended for use in life support, emergency, mission-critical or other ultra-hazardous activities ("High Risk Activities"). Trimble specifically disclaims any express or implied warranty of fitness for such High Risk Activities. Use of a Trimble device, product or services in any application without the written consent of Trimble is prohibited. All customer information is governed by the Trimble Privacy Policy located on the Trimble web site at www.road.com.

Notice of Liability. The information in this manual is distributed on an "As Is" basis, without warranty, and was current at the time of publication. While precautions have been taken in the preparation of the manual, Trimble will not have any liability to any person or entity with respect to any loss or damage caused or alleged to be caused directly or indirectly by the instructions contained in this manual or by the software or hardware products described in it.

Privacy and Use. This product is intended to monitor and make available information concerning the vehicle's activities. It is the customer's sole responsibility to ensure that its use complies with any applicable laws and regulations. It is the customer's responsibility to develop and communicate policies concerning use of the application prior to implementing the product. Customers are urged to consult with their own legal counsel in connection with the particular use to which the customer puts the product and the potential implications from that use.