



WT9000 Series Locator

Installation Guide

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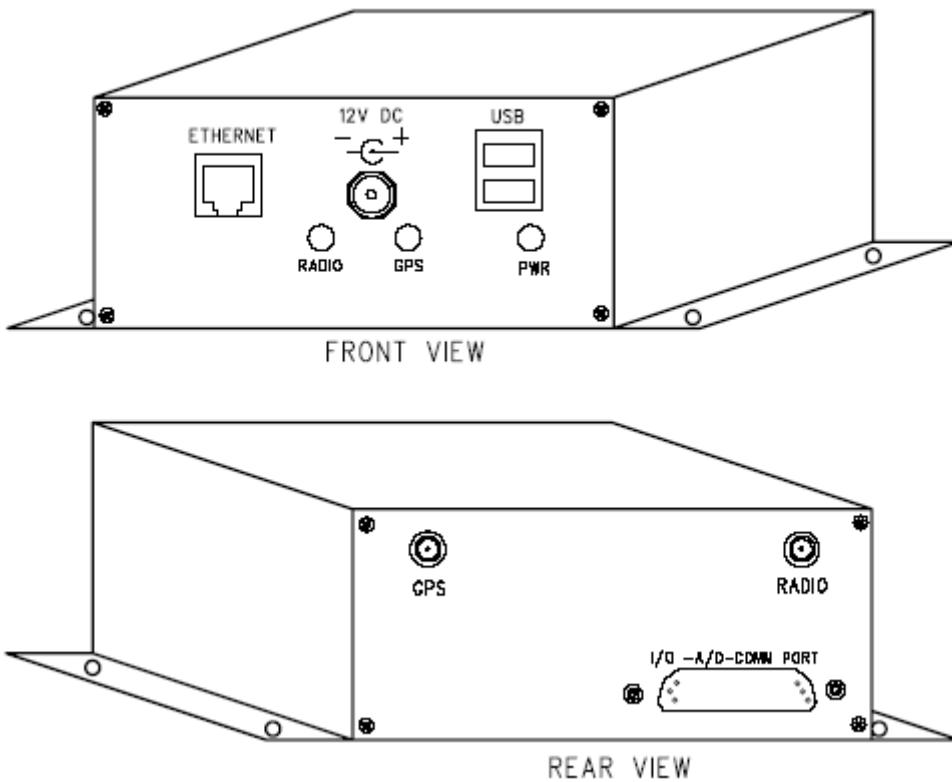
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Introducing the WT9000 Locator

The WT9000 Locator is Webtech Wireless's most powerful and customizable Locator, most commonly used in vehicles with additional systems that require monitoring and/or remote control, such as street sweepers, salt spreaders, and ambulances. As the WT9000's applications are incredibly diverse, the installation procedure varies significantly from vehicle to vehicle. However, the basics of inspecting the Locator, installing the antenna, and wiring the power are common to all installations.

The WT9000 is available in two versions. The WT9000H contains a HGSMA SPA+ modem, whereas the WT9000C contains a CDMAEVDO. The difference in modems enables these two Locators to connect to different networks, but in terms of physical footprint and installation they are identical.



Front Panel Connectors and LEDs

- 12V DC power input from the vehicle.
- 10/100 Base-T Fast Ethernet RJ45 connector Interface
- Dual USB Host Interfaces A and B
Note that only Host B (bottom slot) is available for use
- GPS, RADIO and PWR display LEDs

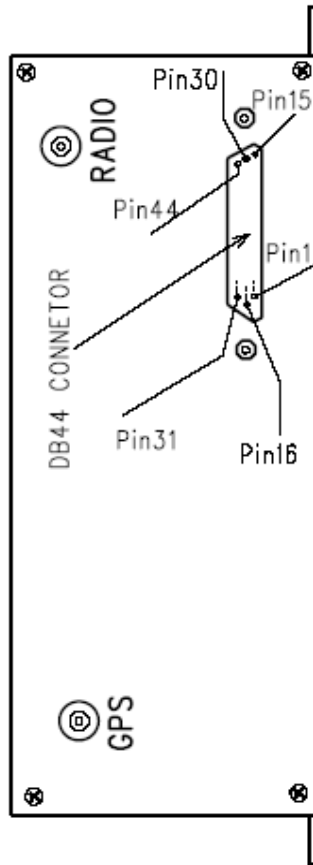


Never leave a cable connected to USB A (the top USB port) as it will cause the Locator to fail installation checks.

Back Panel Connectors and LEDs

- SMA type antenna connector for the wireless RADIO Modem.
- SMA type antenna connector for GPS telemetry reception.
- A 44 pin DB44 Features Port connector. This connector is used for interfaces for monitoring and control of various vehicle system inputs and outputs, and is required for monitoring the vehicle ignition for wake up.
- Recently produced WT9000 units feature a secondary set of GPS, RADIO and PWR display LEDs on the rear panel

DB44 Connector Pin Diagram



Inspecting the Locator

We recommend that you set up and power up the Locator using your own 12VDC bench power supply unit (with current and voltage readings). This will confirm that the Locator is fully operational prior to applying the vehicle's 12VDC power (in case it is faulty or with excessive noise, causing the unit to malfunction).

The bench power supply unit should be capable of providing a minimum 500mA at nominal 12VDC. Both voltage and ampere readings should be available on the bench power supply unit.

Step 1. Connecting the bench power supply

1. Thoroughly inspect the Locator for any visual external damage to the unit during transportation.
2. Before connecting the bench power supply, adjust the supply voltage. Switch ON the bench DC power supply and adjust the voltage to 12VDC nominal.
3. Switch OFF the power supply.
4. Connect the antenna cable marked GPS to the SMA connector marked **GPS** on the back of the Locator.
5. Connect the antenna cable marked AMPS, GSM, or RADIO to the SMA type connector marked **RADIO** on the back of the Locator.
6. Connect the 12VDC bench power supply to the power cable provided.
7. Insert the plug side of the 12VDC power cable provided to the front panel 12VDC input of the Locator.
8. Switch ON the power supply.
9. Immediately check that the current consumption for the AVL Unit is approximately 40mA to 50 mA (note that this will increase later). If the current is abnormally high, then there is possibly a short on the unit and the Locator should be powered down immediately. Re-inspect for any shorts on the setup cable connections first.

Step 2. Verify normal operating conditions:

1. Confirm that the red **PWR** LED is ON.
2. Around 30 to 60 seconds after powering up, the green **GPS** LED should be flashing ON/OFF approximately every second. This indicates that the GPS is receiving vehicle position data and a GPS fix is established.
3. Confirm that the **RADIO** LED remains ON (not flashing). This indicates that the presence of the cellular modem is confirmed. Note this does not, however, necessarily mean that the modem has also successfully been connected to the cellular network.

4. Once the **GPS** and the **RADIO** LEDs are both operational, check that the current consumption. At 12VDC it should vary between 70 mA and 90 mA.
5. Power down the unit and disconnect the bench power supply.

Safety Precautions and Wiring Guidelines

Personal Safety Precautions

- Do not install or operate a Locator in areas where explosive atmospheres may be present.
- Do not install a Locator in any vehicle that is powered by liquefied petroleum gas or governed by petrochemical regulations without additional operational safety precautions being taken.
- Do not install a Locator near life support or other sensitive equipment that may be affected by radio transmissions. If required, consult the equipment manufacturer for guidance.
- During car and truck installations, we recommend that you block vehicle tires to prevent roll-back during installation.
- Consult vehicle manufacturer guidelines regarding disconnecting the vehicle battery or when making supplementary electrical connections.
- Remove or cover any jewellery when working on live electrical systems.

Electrical Wiring Guidelines

Read these guidelines before installing the Locator.

General Guidelines

- Before disconnecting a battery, understand the consequences to that vehicle, e.g. which radio codes need to be available. Also, make sure that you know the reset procedure for airbag systems, ECUs, etc.
- Don't test electrical circuits using a test lamp. Instead, use a high impedance multi-meter with both voltage and resistance ranges.
- Don't tamper with or disconnect the air bag or SRS electrical harness.

Use appropriate pick-up points for power wiring

Don't splice into individual lines going to other electrical devices that exhibit substantial momentary voltage drops. Wires going to heating mirrors or to a vehicle's charging indicator are especially susceptible to this.

If possible, wire to a power bar or suitable common terminal connection point.

+12V wire (white)

- Connect to a continuous +12 V DC supply.
- Make sure that there is uninterrupted power to the Locator when the engine is being started (i.e., make sure that the supply voltage does not fall below 9 V DC). Use a multi-meter to confirm +12 V DC power. Do not use a test lamp.
- Take from the secondary side of the main distribution fuse of the vehicle battery. Do not share a fused supply to any other equipment.
- Fuse the line at source with a 5A fuse to provide protection against shorting of the wiring harness. Note that the Locator is internally protected.

Ground wire (black)

- Always connect directly to a dedicated ground point within the vehicle's electrical system.
- Use a unique ground point.
- When required, create a suitable ground point where no corrosion occurs. A duplicate connection with other systems could cause a build up in contact resistance. Also, note that supply voltage problems can occur, resulting in erratic Locator operation.
- Avoid earth points that also serve engine management ECU, ABS, or air bag systems, etc.

Ignition wire (brown)

It is critical that the ignition wire is connected to the vehicle ignition wire and not connected to the battery

To prevent incorrect operation, make sure that power is not interrupted for more than 5 seconds when the engine is started (supply voltage under 9Vdc).

- Connection to an ignition signal which goes positive +12 V DC when the key is in the **run** position and is removed or goes to ground when the key is in the **off** position.

Make solid connections

Soldering

Soldering is the preferred method for all electrical connections. When soldering, ensure your connections are well soldered, not dry soldered.

Ring Connectors

Ring connectors are ONLY acceptable for a ground point and when connecting to power bars with screws. No other crimp connectors are acceptable.

- Wire should be fully inserted into the connector with insulation intact. Don't leave bare wire exposed.
- If wires are combined, make sure that the connector can handle the resulting gauge.
- Be sure to crimp the connectors properly using the correctly sized crimp tool. Confirm that the physical connection is solid.
- Solder the wire to the crimped connection.
- Use toothed washers when bolting connectors to the vehicle. Make sure that the ground connection is solid and reliable.

Don't use Quick Taps

Vehicle vibrations eventually separate quick-tapped wires from the Locator, causing a lost connection to the unit. Quick taps also cut into the connected wire, reducing the life of the wire and reducing both its voltage and current-handling capabilities.

Insulate connections

Don't leave cut wires exposed. All connections must be properly insulated.

- Check for accidentally cut wires. These can damage vehicle wiring or devices; they can also cause a fire.
- Tape or heat-shrink all wire cuts so there is no risk of shorting or corrosion. If you use tape, secure the tape using a tie wrap so that it cannot come unwrapped.
- If a splice is necessary, strip-away a small portion of the insulation, solder the wires, and reinsulate them using electrical tape.
- Don't leave free connector contacts or pins exposed. Tape or properly terminate all connectors.

Route cables properly

- Never put cabling where it can be stepped on (e.g., under rugs).
- Never wire areas that retain moisture. For example, insulation under a carpet holds water, which means that it can become damp. This makes wiring connections highly susceptible to corrosion.
- Never put cable where either a passenger's or a driver's feet could rest on top of the wires.
- Never run the antenna cables through the vehicle's door to its roof. The vehicle door will eventually sever the cable.
- Wherever possible secure the wiring in the wiring channel that is provided by the vehicle manufacturer. Use split looms and grommets where appropriate.
- Tie wrap and tape cables (or cable tie mounts) to keep secure.

Installing the WT9000

The following describes the equipment that comes with the WT9000 Locator and provides step-by-step installation instructions.

WT9000 Kit Contents

At its most basic, the WT9000 Locator kit contains the following:

- The WT9000 Locator
- DB44 Harness
- Power cable
- GPS/GSM Antenna

Depending on your installation, more cables may be provided for interfacing with specific vehicle systems. Antenna appearance may also change depending on the installation.

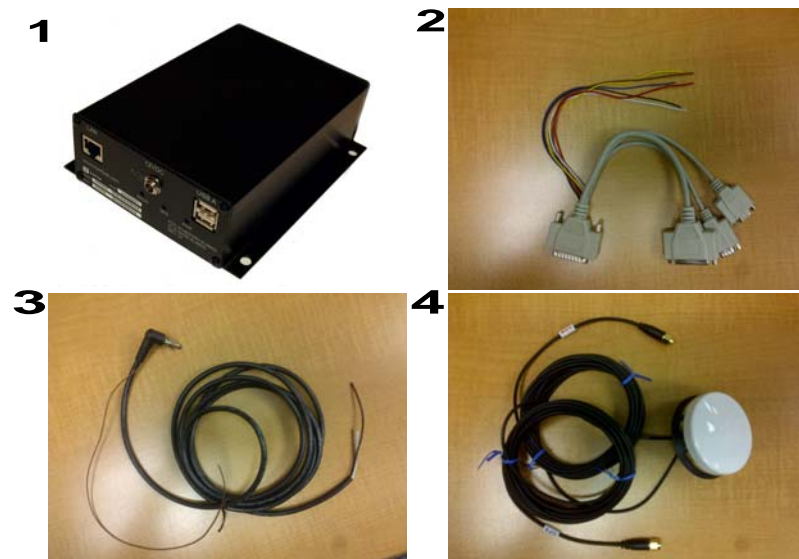


Figure 4-1 (1) WT9000 Locator (2) DB44 Harness(3) Power Cable (4) GPS/GSM antenna

Basic Installation

The following instructions describe how to install the Locator with GPS and GSM connectivity and ignition sensing, but without additional connections to vehicle systems. Additional connections are described later in the manual.



Please read the Safety Precautions and General Guidelines on page 3-6 before installing the WT9000.

For all installations, the last step is applying power to the Locator. Make sure that all cabling has been completed before installing the Locator's fuses.

Step 1. Identify best place to mount the Locator inside the vehicle

For the most part, you may install the Locator in any place where it is likely to be secure, dry, and out of harm's way. You will need to connect to vehicle power and ignition, as well as other systems depending on your installation, so be aware that wherever you will need to run cables to the Locator.

Some good locations for mounting the Locator are:

- Under or behind the dashboard
- Under or behind the steering column
- Under a parcel shelf.
- In or beside the controller box of the vehicle system you are connecting to

Step 2. Mount External Antenna

Proper antenna installation and cabling is critical to optimal operation and performance of the Locator.

1. Find a location to mount the antenna. Ideally, the antenna module (e.g. Dual mode GSM/GPS with either through-hole or magnetic mount) should be mounted securely on the vehicle roof. In general, the guidelines for the mounting location are as follows:
 - A clean mounting surface
 - A ground plane with at least 15 cm. of metal (vehicle chassis) all around, preferably as much away as possible from any other vehicle antenna, vehicle occupants or other electronic equipment
 - A full view (at least 120 degrees) of the open sky to receive GPS data from the satellites. Note that the GPS antenna can receive transmission through glass, fiberglass, and plastics, but not metal. Metallic paint and films may also block the signal, such as a front windscreen with metal heating film.
 - If a through hole mounting antenna module is used, ensure the mounting hole location will not have surface rust or corrosion accumulation over time. Apply silicon sealant to the underside of the antenna around the mounting post as an extra precaution against leaks and corrosion.
2. Secure the antenna to the chosen mounting area.

3. Route antenna cables to the Locator mounting location and secure them using cable ties and mounts where applicable.

Step 3. Wire Locator Power and Ignition Sense

Note: when wiring the Locator power, direct and dedicated positive and negative leads from the vehicle battery are preferred. Use 18 AWG or thicker wire.

1. Connect the Power Cable BROWN wire (specifically, the end extending from the barrel connector) to the DB44 Harness BROWN wire. Solder and insulate the connection.
2. Connect the Power Cable WHITE wire to vehicle power +12V, adding an in-line 5A fuse holder to the connection. Solder and insulate all connections.
3. Connect the Power Cable BLACK wire to battery negative or vehicle ground. Solder and insulate all connections.
Note that if you connect directly to a the vehicle chassis (use a unique and dedicated earth point), ensure the connection is not prone to surface rust or corrosion over time.
4. Connect the Power Cable BROWN wire (the loose end beside the white and black wires, NOT the end extending from the barrel connector) to the vehicle ignition wire, adding an in-line 5A fuse holder to the connection. Solder and insulate all connections.



Make sure that the ignition wire is connected to the vehicle true ignition wire. Use a multimeter to test the vehicle ignition; a true ignition wire reads 12V throughout the crank, but 0V while the ignition is off. Check that the ignition wire voltage remains constant regardless whether the vehicle is in gear or not.

Step 4. Wire Additional Connections

All WT9000 installations have some custom procedures for connecting to systems particular to your fleet's needs, such as wiring into the controls for sirens, salt spreaders, sweepers, or the like. Instructions on how to perform this custom wiring are provided in accompanying documentation. Perform this wiring now.

Step 5. Plug cables into Locator

1. Plug the Power Cable barrel connector into the **+12V DC** port on front of the Locator.
2. Plug the Antenna cable into the Locator. The end of the cable marked **GPS** goes to the port marked **GPS** on the back of the Locator. The end of the cable marked **GSM, AMPS, or RADIO** goes to the port marked **Radio** on the back of the Locator. Ensure the connections are tight and secure.
3. Plug the DB44 Harness 44 pin connector into the DB44 connector on the back of the Locator.

Step 6. Mount the Locator

The Locator may be fixed in place using any method you care to use, but note that it must be mounted securely. The recommended method is to secure the Locator using screws.

- Situate the Locator so that the risk of physically damaging it is minimized (e.g., put it under or behind the dashboard).
- If you're using screws, mount the Locator on the mounting bracket and secure the Locator to the bracket with the tie wraps provided. This ensures that the Locator can not be knocked off the bracket.



Don't do any drilling unless you know exactly what you are drilling into. For example, find out if there are any wires in the area that you are going to drill into.

- You may mount the Locator directly to the vehicle using tie wraps. If you use this method, be sure that you mount the Locator securely, preferably to the vehicle frame or something similarly solid.
- Unless the installation is meant to be covert, try to place the Locator so that the LEDs are visible and the Locator's connectors are accessible.

Step 7. Install Fuses and Power Up the Locator

When power is applied to the Locator, it will power up. After the power management (PM) cycle expires (configurable, but typically 10 minutes), the unit will power down and enter sleep mode. The unit will wake up again when it detects ignition power. When ignition power is removed, the unit will power down after PM cycle.

1. Install the 5A fuses to enable the Locator to power up.
2. Turn on the vehicle ignition to power up the Locator.

Step 8. Visually confirm Locator Operation

1. Confirm that the red **PWR** LED is ON.
2. Around 30 to 60 seconds after powering up, the green **GPS** LED should be flashing ON/OFF approximately every second. This indicates that the GPS is receiving vehicle position data and a GPS fix is established.
3. Confirm that the **RADIO** LED remains ON (not flashing). This indicates that the presence of the cellular modem is confirmed. Note this does not, however, necessarily mean that the modem has also successfully been connected to the cellular network.

If the Locator is not operating as expected

- Inspect the power and antennae cables and ensure they are properly installed.
- Check that the vehicle power supply is nominal 12V DC.
- Ensure that the mounted antennae has access to the open sky.
- If the above checks find no issues and the Locator continues to operate incorrectly, call technical support. See "Contact Information" on page 6-22.

Step 9. Close up panels and clean up installation area

1. Tie back the remaining loose wires (red, black, yellow, blue, white) on the DB44 cable. Don't leave free connector contacts or pins exposed. Tape or properly terminate all connectors.
2. Close up and replace all the vehicle panels removed during installation.
3. Clean up the installation area and throw out any garbage.

DB44 Harness Cable Connections

DB9 COM Port and DB9 DEBUG Port

The DB44 Harness DB9 COM port is a 5 wire RS232 used for interfacing with specific vehicle systems. The active pins are TX, RX, RTS, CTS, and GND.

The DB44 Harness DB9 DEBUG port is a 3 wire RS232 used for Locator diagnostics. The active pins are TX, RX, and GND.

DB25 Connector Inputs

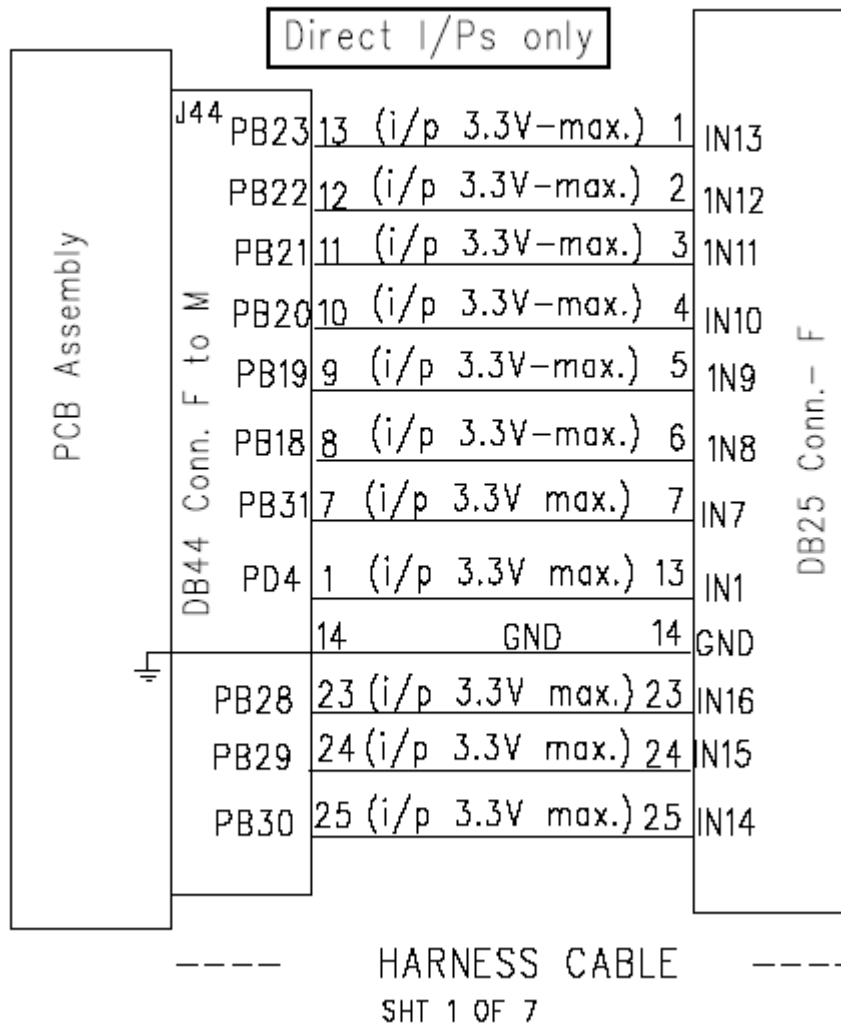
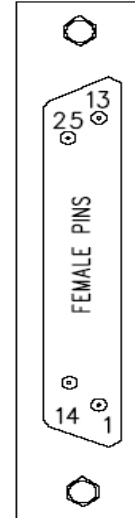
The DB25 connector on the DB44 Harness is the main interface to vehicle systems.

DB25 low-voltage digital inputs

The DB25 connector has 11 low-voltage digital inputs. These inputs are on pins 1, 2, 3, 4, 5, 6, 7, 13, 23, 24, and 25.

- Signal HI: 3.3V
- Signal LO: 0V

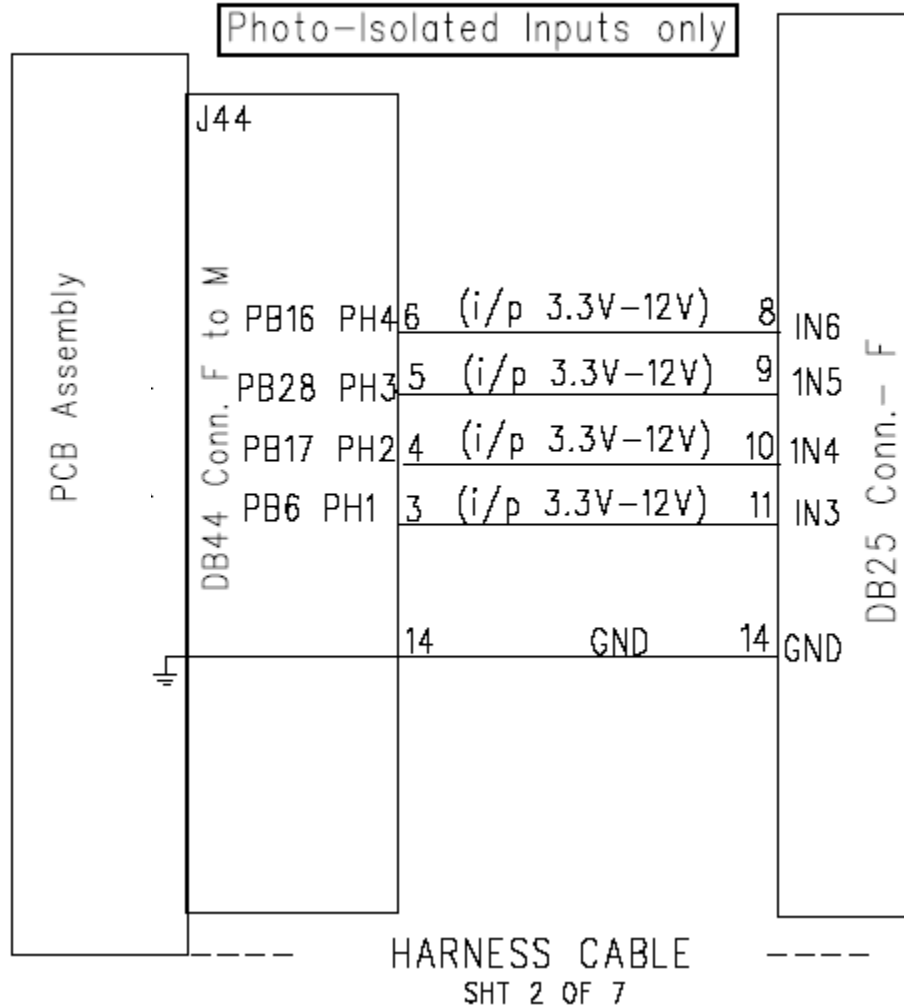
Note: the low-voltage digital HI signal input should not exceed 3.3V.



DB25 high-voltage digital inputs

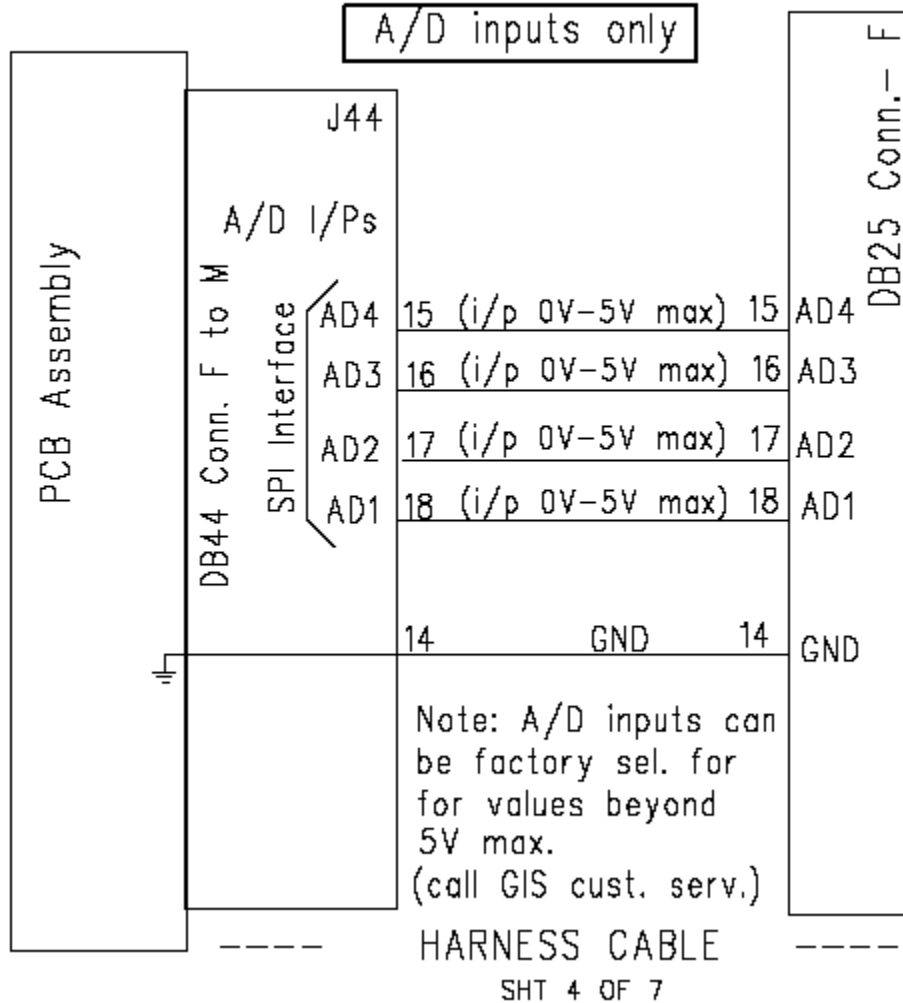
If the digital HI input voltage to be monitored is in excess of 3.3V, then a high-voltage, photo-isolated input should be used. The DB25 connector has four high-voltage photo-isolated digital inputs. These inputs are on pins 8, 9, 10, and 11.

- Signal HI: 3.4-12V
- Signal LO: 0V



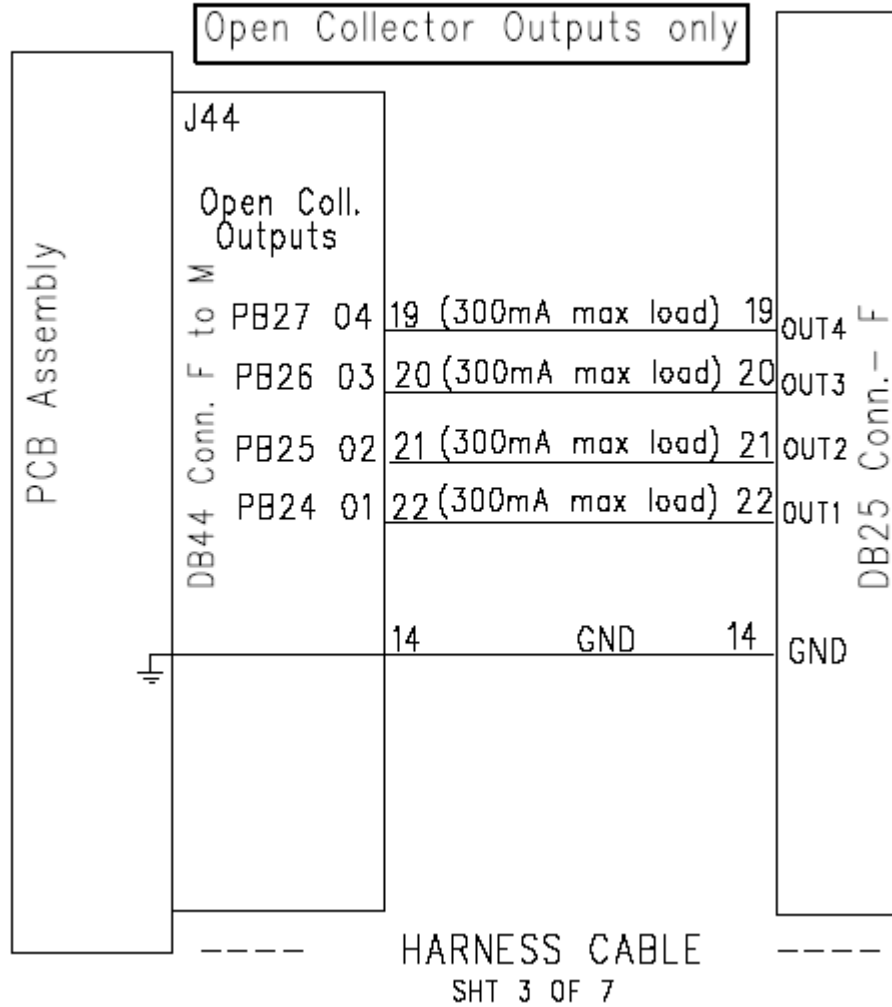
DB25 analogue to digital inputs

Each of the four A/D INPUTS are capable of reading from 0V to 5V analog signal variable voltage level (e.g. automotive analog temperature, pressure voltage status). The AVL will convert the analog values to digital format with 12-bit resolution using a serial SPI protocol interface to the uC.



DB25 outputs

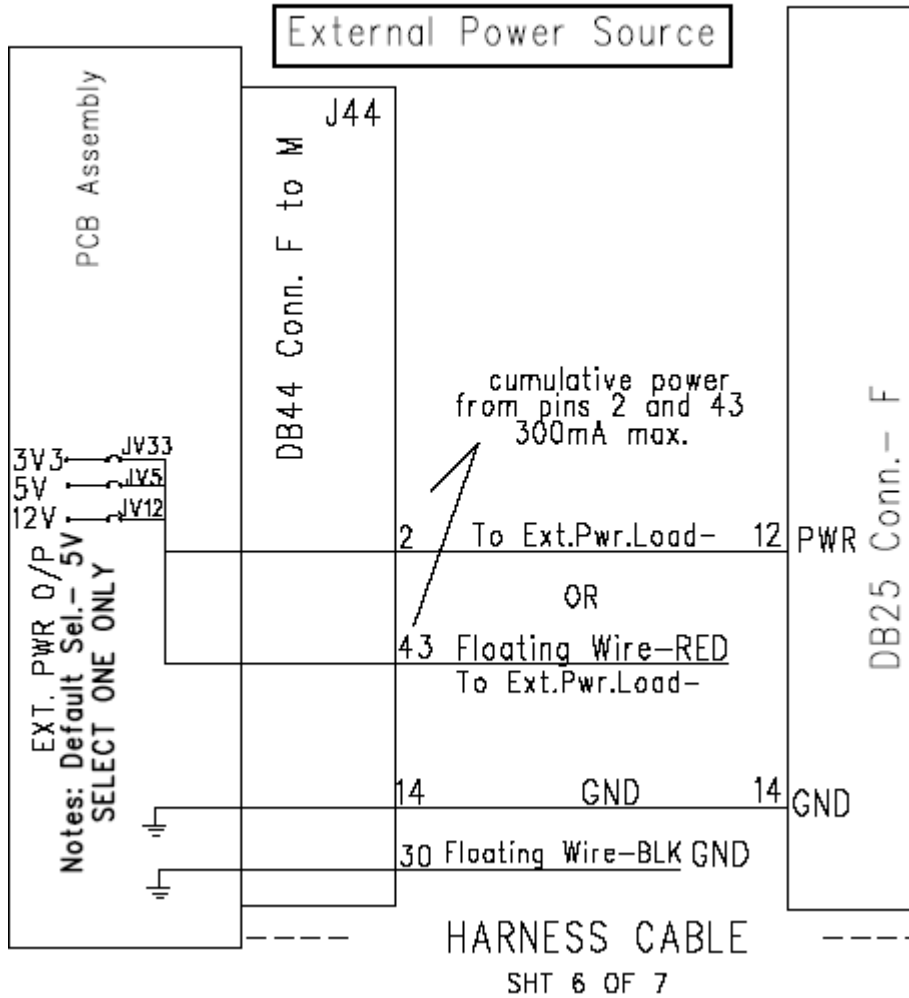
Each of the DB25 Connector's four outputs are open-collector types, capable of driving external pull-up loads (e.g. relay coils, LEDs, etc. at 12V nominal. The maximum draw is 300mA; care should be taken not exceed 300mA for all external loads.



DB25 power and Ground

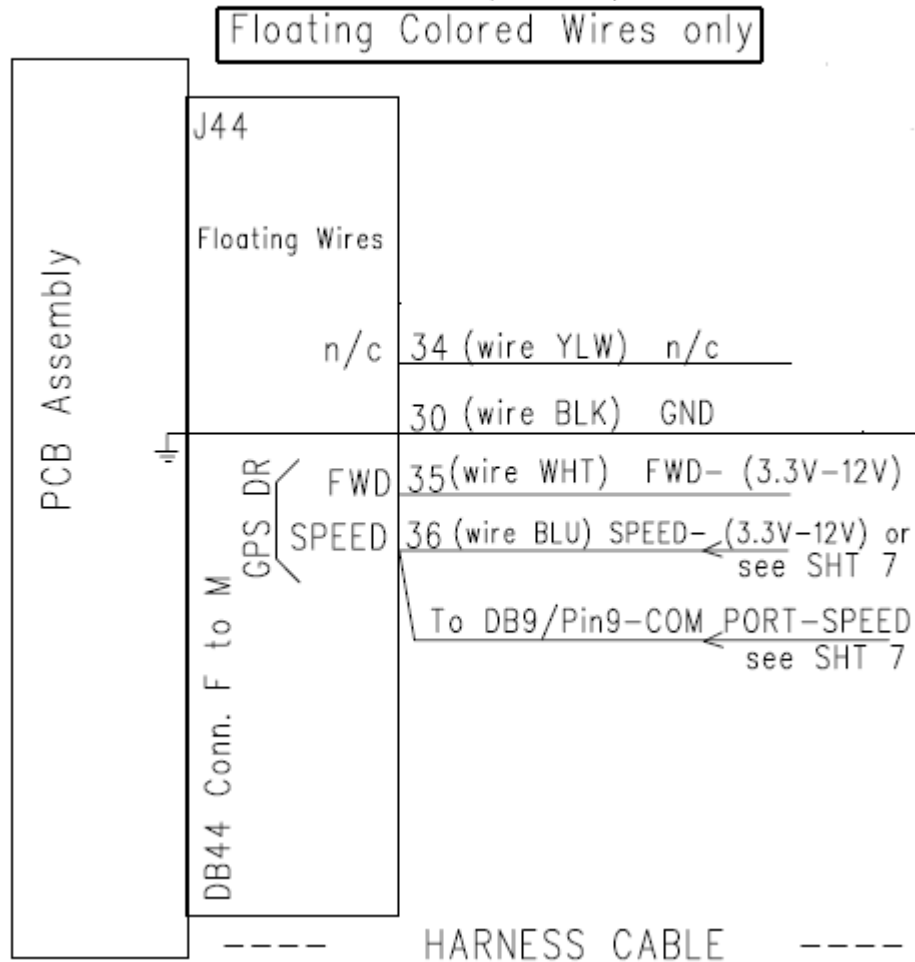
Pin 12 is a power source useful for powering external devices. Selectable power supply of 3.3V, 5V, or 12V DC, the default configuration being 5V. The maximum draw is 300mA; care should be taken not exceed 300mA for all external loads.

Pin 14 is ground.



DB44 Harness Floating Leads

This section describes the functions of the colored wires extending from the DB44 Harness. There are six of these wires: white, black, brown, blue, red, and yellow.



White

DB44 pin 35. **FWD**. Detects forward or reverse vehicle motion. Used for GPS Dead Reckoning (DR) in conjunction with the BLUE wire (SPEED). In the temporary absence of GPS connectivity, a local signal is fed from the vehicle into the GPS module as optional vehicle forward/reverse operation status. This signal initiates a calculation, in conjunction with SPEED signal below, an approximate geographic vehicle location position.

Black

DB44 pin 30. **Ground**. Can be used in conjunction with the RED power source wire or others.

Brown

DB44 pin 27. **Ignition sense**. Detects vehicle ignition. This wire should be connected as part of the basic installation.

Signal HI: 3.3V to 24V

Signal LO: 0V

Blue

DB44 pin 36. **Speed.** An input for vehicle speed. Used for GPS Dead Reckoning (DR) in conjunction with the WHITE wire (FWD). In the temporary absence of GPS Connectivity, a signal is fed from the vehicle into the GPS module as optional vehicle SPEED pulses operation status to initiate, in conjunction with the FWD signal above, an approximate vehicle speed calculation and geographic vehicle location position.

You must ensure the external SPEED signal from the vehicle is within the HI/LO range specified. Any signal level outside this range is not guaranteed.

Signal HI: 3.3V to 12V

Signal LO: 0V

Red

DB pin 43. **Power source.** Used to power external devices. Selectable power supply of 3.3V, 5V, or 12V DC, the default configuration being 5V. The maximum draw is 300mA; care should be taken not exceed 300mA for all external loads.

Yellow

DB pin 34. **Reserved for future use.** Currently, the YELLOW wire may be tied back or cut for all installations.

Contact Information

If you have any questions, please contact Webtech Wireless Technical Support at:

North America and international

All subscribers have access to support Monday to Friday from 06:00 to 17:00 and Saturday 08:00 to 16:30 Pacific Time (UTC -8 and UTC Daylight Saving -7).

Email: support@Webtechwireless.com

Phone: 1-866-945-4568 or 604-419-8163

Europe

European Technical Support personnel are available Monday to Friday, 09:00 to 17:00 Coordinated Universal Time (UTC or Greenwich Mean Time + 00:00 hour).

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