



***Fleet*LINK[®]**

Fuel Control System

For use with Petro Vend System2[®] Fuel Management Systems

**Vehicle Information Unit (VIU)
Installation & Service Manual**

OPW Fuel Management Systems - System and Replacement Parts Warranty Statement

Effective September 1, 2002

System and Replacement Parts Warranty

OPW Fuel Management Systems warrants that all OPW Tank Gauge and Petro Vend Fuel Control systems supplied by OPW Fuel Management Systems to the Original Purchaser will be free from defects in material and/or workmanship under normal use and service for a period of 12 months from the date of installation or 15 months from the date of shipment. Additionally, OPW Fuel Management Systems warrants that all upgrades and replacement parts (new and remanufactured) supplied by OPW Fuel Management Systems will be free from defects in material and workmanship under normal use and service for a period of 90 days from the date of installation or for the remainder of the system's original warranty, whichever is greater, as set forth in the first sentence of this statement. The foregoing warranties will not extend to goods subjected to misuse, neglect, accident, or improper installation or maintenance or which have been altered or repaired by anyone other than OPW Fuel Management Systems or its authorized representative.

The buyer's acceptance of delivery of the goods constitutes acceptance of the foregoing warranties and remedies, and all conditions and limitations thereof.

If a claim is made within the warranted time period that any equipment and/or remanufactured part is defective in material or workmanship under normal use and service, such equipment and/or remanufactured part shall be returned to OPW Fuel Management Systems, freight prepaid. If such equipment or remanufactured part is found by OPW Fuel Management Systems in its sole judgment, to be defective in material or workmanship under normal use and service, OPW Fuel Management Systems, shall, at its sole option, repair or replace such equipment and/or remanufactured part (excluding, in all instances, fuses, ink cartridges, batteries, other consumable items, etc.)

The warranties, as set forth above, are made expressly in lieu of all other warranties, either expressed or implied, including, without limitation, warranties of merchantability and fitness for any particular purpose and of all other obligations or liabilities on OPW Fuel Management Systems part. Further, OPW Fuel Management Systems neither assumes, nor authorizes any other person to assume for it, any other liability in connection with the sale of the systems, or any new/replacement part that has been subject to any damage from any act of nature or any *force majeure*.

The term "Original Purchaser" as used in these warranties shall be deemed to mean the authorized OPW Fuel Management Systems distributor to which the system or any new/replacement part was originally sold. These warranties may be assigned by the original purchaser to any of its customers who purchase any OPW Fuel Management Systems systems or new/replacement parts.

The sole liability of OPW Fuel Management Systems, for any breach of warranty, shall be as set forth above. OPW Fuel Management Systems does not warrant against damage caused by accident, abuse, faulty or improper installation or operation. In no event shall manufacturer's liability on any claim for damages arising out of the manufacture, sale, delivery or use of the goods exceed the original purchase price of the goods. In no event shall OPW Fuel Management Systems be liable for any direct, indirect, incidental or consequential damage or loss of product.

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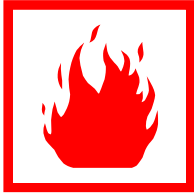
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Warnings



Read these and all warnings and instructions carefully. They are included to help you install and maintain the *FleetLINK* equipment safely in the highly flammable environment of a fueling station.



Disregarding these warnings and instructions might lead to death, serious injury and property loss or damage, to you and others. It is **YOUR** responsibility to install, operate and maintain the equipment according to the instructions appearing in this manual and to conform to all applicable codes, regulations and safety measures. Failure to do so could void all your warranties connected with this equipment.

Explosion Hazard



During installation of harness and/or transceiver loop around fuel tank inlet, and during work in engine compartment, comply with all applicable requirements of the National Fire Protection Association NFPA-30 “Flammable and Combustible Liquids Code”, NFPA-30A Automotive and Marine Service Station Code, federal, state and local codes and any other applicable codes or regulations.

Do not smoke! Do not perform metal work with fuel tank cover removed, or when any fuel leakage is suspected. Do not perform any operation that may impair fuel tank or fuel pipe safety. Use pneumatic (NEVER electric!) tools for metal work inside the hazardous area.

For Driver's Safety



During installation of *FleetLINK* equipment:

- **DO NOT** tamper with vehicle brake and steering systems! This may affect vehicle safety.
- Never attach wires, cables or other parts to steering column, brake system cables and conduits, or to any moving mechanical part.
- Route cables safely and do not allow any looseness.

For Installer's Safety



- When performing work in the engine compartment, **STOP THE VEHICLE ENGINE** to prevent severe injury or death.
- Make sure no one will start engine while any work is in progress. Remove the ignition keys if possible.
- Use only adequately rated, properly approved equipment to elevate vehicles. Observe all safety precautions when working under vehicles.
- **NEVER WORK UNDER A VEHICLE SUPPORTED ONLY BY A TIRE CHANGING JACK.**
- Use tire blocks (chocks) whenever vehicle is parked for installation procedures. Use traffic safety cones to warn other drivers of stationary vehicles.
- Vent exhaust from enclosed areas.

What's In This Book

This manual provides installation, troubleshooting and service instructions for the FleetLINK Vehicle Information Unit subsystem (VIU).

This manual tells you:

- A little about how the overall FleetLINK system works
- How to install the Vehicle Identification Unit (VIU) components onto a passenger car or truck.
- How to install the optional speedometer/odometer transducer on a vehicle (for vehicles without electronic speedometers).
- What a customer does to use the FleetLINK system
- Troubleshooting any problems you may have with the VIU components.

FleetLINK equipment is also supported by the following manuals:

- The ***System2/FleetLINK Integration Manual*** (Petro Vend part number ***M05-01.01A***) explains the Vehicle Identification Terminal (VIT) and how it installs to and works with your existing System2 fuel control system.
- The ***FleetLINK Vehicle Information Unit (VIU) & System2 FSC Programming Manual*** (Petro Vend part number ***M00-017.10***) tells you how to use the hand-held VIU Programmer, provides instructions for periodic inspection of the VIU sub-system, and some tips for troubleshooting and/or repair.
- The ***System2 Card Record Operator's Guide*** (Petro Vend part number ***M41-21.01X***, depending on your particular FSC) explains programming and operation of the System2 Fuel Island Terminal (FIT) and Fuel Site Controller FSC.

About FleetLINK

FleetLINK is an automated vehicle refueling system for organizations with vehicle fleets that have their own refueling facilities, and for fleet servicing stations.

FleetLINK controls and monitors 24-hour refueling of authorized vehicles simply and efficiently, without attendants and without driver intervention.

Optionally, FleetLINK can record both a vehicle's odometer and engine-hours readings when a FleetLINK-equipped vehicle is refueled.

FleetLINK consists of two main sub-systems:

- The Vehicle Information Unit (VIU) subsystem
- The Vehicle Identification Terminal (VIT) subsystem.

The System2 Fuel Site Controller (the FSC, inside the site office) is the data processing device attached to the VIT. The FSC saves the data for all fueling transactions. *Figure 1* shows the two main FleetLINK subsystems and their basic components.

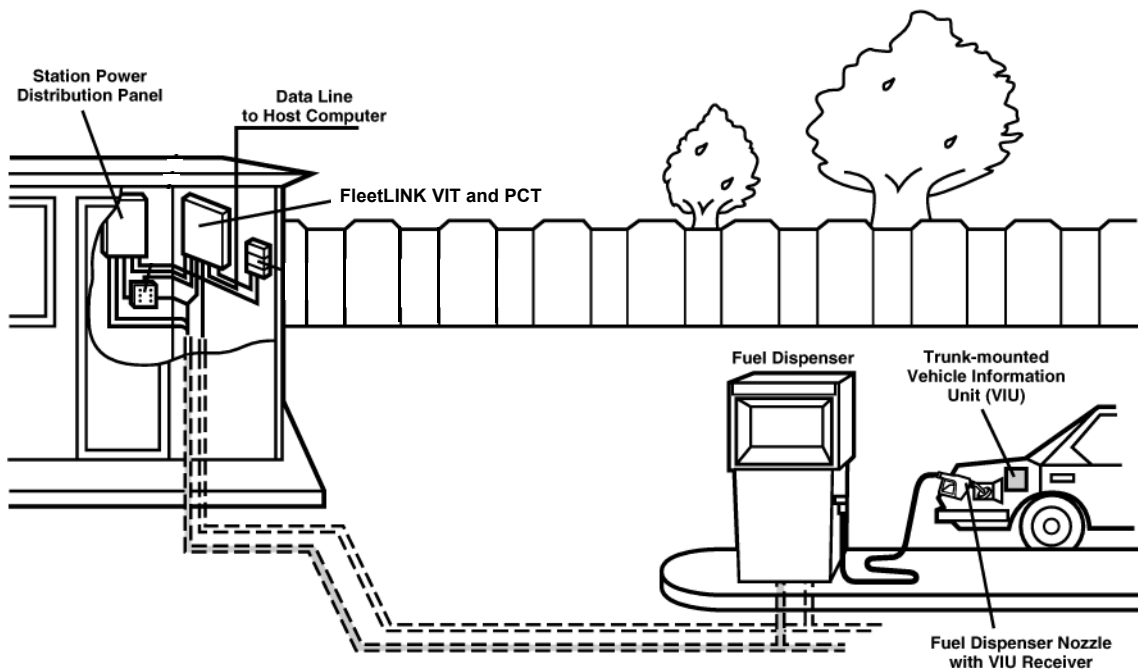


Figure 1: Overall FleetLINK System

Note

Figure 1 does NOT show the System2 portions of the installation. The System2 FIT would be mounted near the fuel dispenser, and the System2 FSC would be inside the building. About the Vehicle Information Unit (VIU)

About the Vehicle Information Unit (VIU)

This manual focuses on installing the VIU in an automobile or a truck.

The VIU is a small vehicle-mounted device that provides information on a vehicle's identity, fuel type and grade, vehicle engine hours and odometer reading (optional). Information from the VIU is transmitted from an antenna coil installed on the fuel tank inlet to a receiving antenna on the pump nozzle.

VIU programming is required whenever a VIU is installed in a vehicle. The programming is done with a small hand-held Programmer, explained fully in the *Vehicle Information Unit (VIU) Programming Manual* (Petro Vend part number **M00-017.10**).

About the Vehicle Identification Terminal (VIT)

The site-based VIT is installed in either the Fuel Island Terminal (FIT) pedestal above the pump control relays, in the indoor Pump Control Terminal (PCT) cabinet or in a special outdoor enclosure.

The VIT can be up to 500 feet from the fuel dispenser. The unit receives data from the VIU through a complementary pair of antenna coils on the fuel filler pipe and nozzle.

The VIT acts as a bridge between the Petro Vend Fuel Site Controller (FSC) and the FleetLINK VIU, sending and receiving data from the two components over twisted-pair wire.

Each VIT can communicate with up to 16 fueling nozzles. Each FSC can communicate with two VITs.

After verifying vehicle identity and authorization from the VIT, the FSC instructs the fuel dispenser to supply the required amount of fuel, of the type and grade indicated by the received data.

The FSC records each refueling transaction, together with relevant information (vehicle identity, system user, station code, date and time of filling, type of fuel, and optionally - vehicle engine-hours or odometer reading).

See the System2 Operator's Manual for more information on the FSC. See the relevant Petro Vend manuals for more information on the PCT or FIT.

Bypassing FleetLINK

Fuel station operators can also manually activate a dispenser to fuel vehicles without a FleetLINK VIU unit. The station operator must send a privileged System2 SET PUMP ON command to the FSC. As you might expect, this option should be limited to more advanced and/or authorized users. After receiving manual authorization, the VIT activates the dispenser in the normal manner.

Dispensers can also be authorized with the hand-held manual authorizer, part number 20-4316.

Recording Transactions

The System2 FSC records each refueling transaction, together with relevant information (vehicle identity or manual authorization, system user, station code, date and time of filling, type and grade of fuel, and optionally - vehicle engine-hours or odometer reading).

See the *System2 Card Record Operator Manual* (Petro Vend part number **M41-21.01X**, depending upon your firmware version) for details on these bookkeeping functions.

Vehicle Information Unit (VIU)

The VIU, described in this section, is installed in all vehicles that are authorized to use the FleetLINK system.

Caution

The VIU must be mounted inside the vehicle.

The VIU is a small vehicle-mounted device that provides vehicle identity, corporation identification, fuel type and grade, vehicle engine-hours and odometer reading (optional). The information is transmitted from an antenna coil on the vehicle's fuel tank fill pipe to a receiving antenna on the pump nozzle.

See Figure 2. The vehicle information sub-system consists of components shown. *Vehicle Information Unit (VIU) & Harness*, the *Transceiver Loop* and an optional *Transducer*.

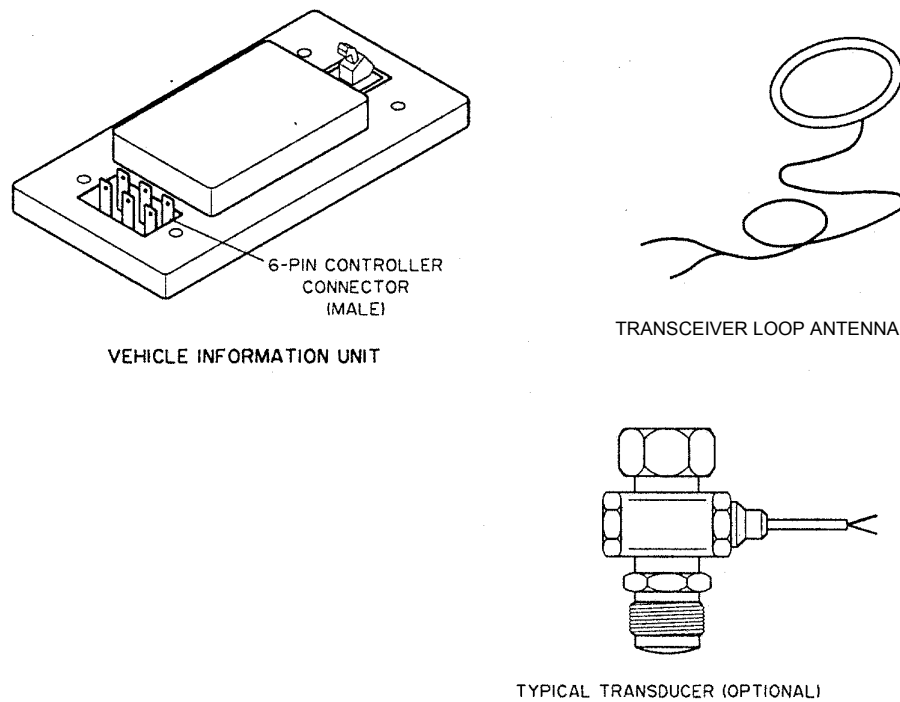


Figure 2: VIU (Vehicle Information Unit) Subsystem Components

The Vehicle Information Unit controller is a small computer which mounts in a vehicle and stores vehicle data. The VIU continuously transmits this information through the transceiver loop antenna.

The VIU is powered by the vehicle battery, and drains less than 30 milliamperes. It operates continuously, even when engine is turned off.

When the VIU is first installed in a vehicle, it must be initialized with the basic parameters of the vehicle in which it is installed (vehicle information, system user identification, type and grade of fuel, initial mileage, etc.).

Fuel Inlet Transceiver Loop Antenna

The transceiver loop is installed around the fuel tank inlet, and connects by means of a short cable to the VIU. The loop transmits and receives information provided by the VIU to and from the pump nozzle “antenna.”

For vehicles having two fuel tanks, a transceiver loop is installed around each tank inlet. The leads from the two loops are then connected in parallel to VIU two-pin connector. To fit various inlet sizes, loops are available in several diameters.

Mechanical Odometer Transducers (Optional)

The transducer is installed on the vehicle speedometer drive, or directly to the transmission speedometer output.

The transducer provides electrical pulses for each shaft revolution. These pulses are fed to the VIU, which calculates the distance traveled by the vehicle, and transmits this information (with other data) to the VIT via the transceiver loop.

Transducers are optional because many vehicles already have electronic speed sensor outputs, and these can be used instead of a transducer. Often, the required pulses can be obtained by connecting to certain points of an electronic dashboard, or cruise control circuits. Contact the manufacturer for details on specific vehicle models.

In addition, the VIU can be programmed to provide “engine-hours” information, by connecting to the ignition switch and totalizing the time the switch is on.

For FleetLINK purposes there are two classes of transducers, electronic and magnetic.

Electronic Transducers

Various types of electronic transducers are available, Hall-effect types being the most common. These transducers always require DC power for their operation, therefore have at least three leads (DC pulse power, pulse output, and ground).

Some electronic transducers also require an external reference voltage, supplied by a fourth lead, that determines the average level of the signal at the pulse output. Complete instructions are packed with the transducer.

Magnetic Transducers

Magnetic transducers are mainly used in tractor-type trucks. There are two types of magnetic transducer: SINGLE (two-wire) and DUAL (four-wire). Magnetic transducers do not require an external power source; rather, they generate their own low-voltage signal which goes directly to the VIU.

Magnetic transducers are not installed on the speedometer drive or the transmission speedometer output. They are threaded into specific ports on the vehicle transmission. Complete instructions come with the transducer.

Pulse Divider (Optional)

You need a pulse divider if your vehicle's electronics produce over 20,000 pulses per mile. The pulse divider is a small plastic enclosure installed in series with the speed sensor wire. The divider requires constant 12 volts D.C., and a ground. Your vehicle's speed sensor wire connects to the pulse divider input, and the VIU pulse wire attaches to the "DIVIDE BY 2" output wire. Complete instructions are included with the pulse divider.

Serial Data Link (Optional)

Many diesel trucks manufactured after 1995 require a serial data link (SDL). The SDL isolates the vehicle engine computer from outside devices and is typically required by the vehicle manufacturer to maintain vehicle warranty. The SDL requires constant 12 volts and a ground. Two wires - "BUSS +" and "BUSS -" -attach to the vehicle's diagnostic connector. The SDL generates a vehicle speed output of 8,000 pulses per mile. Complete instructions are included with the SDL.

Where VIU Components Go In Typical Vehicles

VIU in a Passenger Automobile

Figure 3 shows a typical VIU installation in a passenger automobile by illustrating the location of the VIU sub-system components.

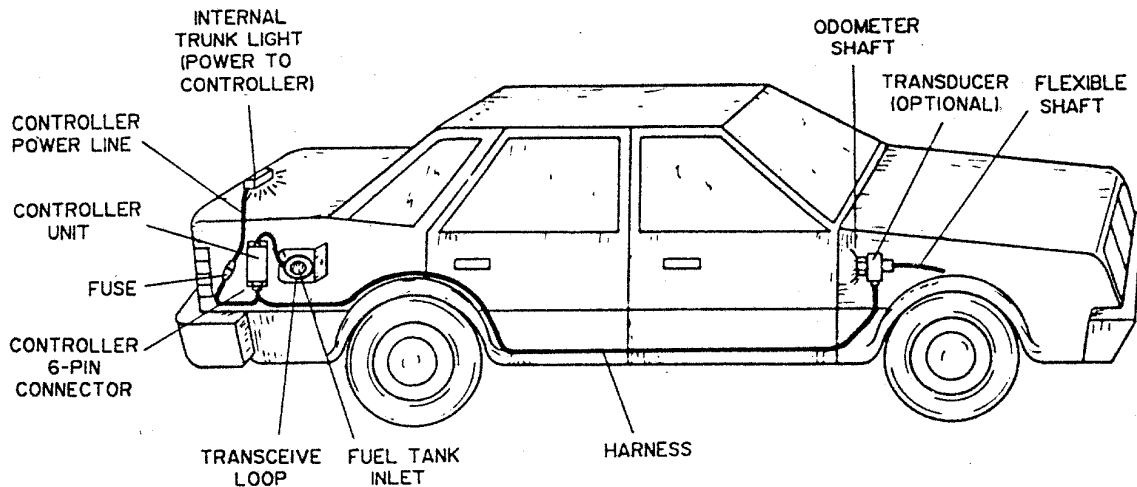


Figure 3: Typical VIU Installation in Passenger Automobile

The VIU is installed in the vehicle trunk or passenger compartment, *at least 3 feet* from the fuel tank inlet. Power for controller operation can be taken from any nearby 12V positive non-accessory (i.e. that is on all the time) battery line, e.g. from a nearby lighting point. The transceiver loop is located over the fuel tank inlet, and its cable is connected to the VIU.

Usually, the transceiver loop is located on the outside of the car and should be visible from the outside when fuel tank cap is removed. Typically, a shielded three-wire section of the harness connects the VIU to the engine compartment. In the engine compartment, the harness is connected to the optional transducer, or to other appropriate connection points at the rear of the dashboard.

The optional transducer is installed on the odometer cable or on the gearbox odometer output, and the flexible cable is connected to its other end.

VIU in a Truck

Figure 4 shows a typical VIU installation in a truck, and illustrates the location of the various sub-system components within a typical truck.

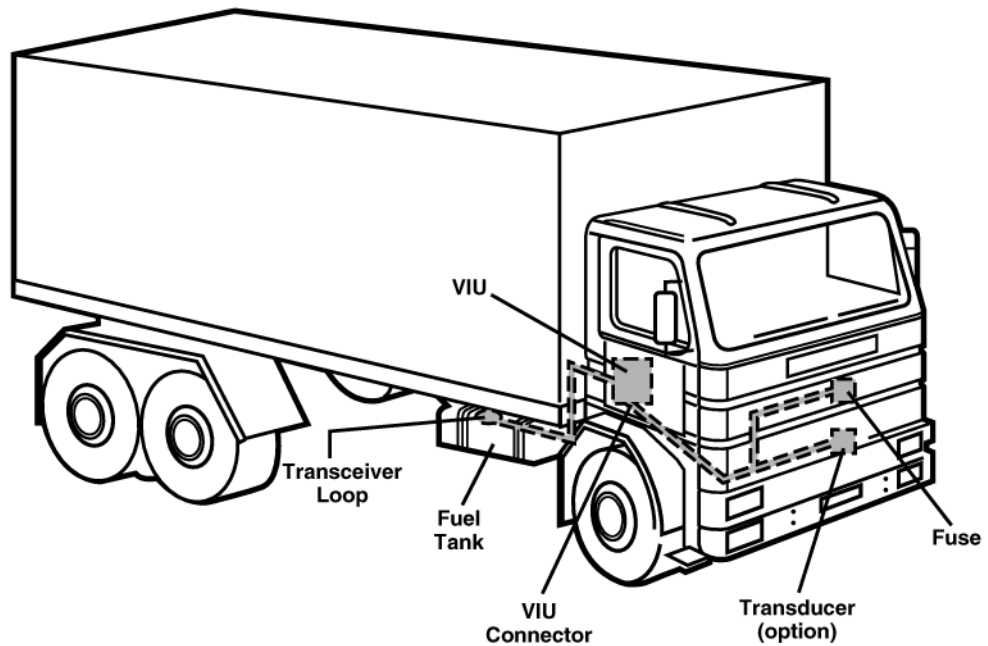


Figure 4: Typical VIU Installation in a Truck

In a truck, the VIU is usually installed behind the driver's seat in the cab. Power for VIU operation can be taken from the truck's fuse panel, usually located under the dashboard.

The transceiver loop is located over the fuel tank inlet and its cable is connected to the VIU. In trucks with two fuel tanks, two transceiver loops are installed, and are connected in parallel to the VIU.

A shielded section of the harness connects the VIU to the engine compartment. In the engine compartment, the harness is connected to a transducer or the transmission speed sensor.

Installing the VIU

This section provides standard installation, programming and start-up instructions for the *FleetLink* VIU sub-system. Installation procedures and requirements depend to some extent on the specific vehicle model. Use the information appearing in this chapter to develop installation plans for each specific vehicle model.

Tools & Instruments You Will Need

The following is needed to install and service the FleetLINK system:

- Open-ended wrench set
- Nuts and washers - small & medium sizes
- Allen wrench set
- Phillips screwdrivers - various sizes
- Regular screwdrivers - various sizes
- Wire cutters - small and regular sizes
- Pliers - long-nose and regular
- Cutting-blade
- Crimping tool
- Fine toothed file (round and flat)
- Small hand saw
- Small hammer
- Digital Multi meter
- Power drill and drill bits
- Test lamp (6-24V)

Explosion Hazard



Installation must be performed by qualified people who are aware of all safety issues.



During installation of harness and/or transceiver loop around fuel tank inlet, and during work in engine compartment, installers **MUST** comply with all applicable requirements of the National Fire Protection Association NFPA-30 “Flammable and Combustible Liquids Code”, NFPA-30A “Automotive and Marine Service Station Code”, federal, state and local codes and any other applicable safety codes and regulations.



Do not smoke! Do not perform metal work with fuel tank cover removed, or when any fuel leakage is suspected, and do not perform any operation that may impair fuel tank or fuel pipe safety. Use pneumatic tools for metal work.

Before You Begin

A typical installation consists of the following steps:

- Determine installation layout
- Transducer installation (if required)
- Route wiring harness from transducer or dashboard to the VIU
- Transceiver loop installation
- VIU installation
- Inspection

Planning the VIU installation

VIU Placement

The VIU must be located inside the vehicle, at least **THREE** feet from the fuel tank inlet. Select a location that protects the VIU, and cables connected to it, from direct impact during normal vehicle operation, and from excessive heat, water, oil and other agents harmful to electronic equipment.

Power to the VIU is provided through the short red wire with the in-line fuse holder. The fuse is rated at 1A, do not replace with any other rating of

fuse. *Figure 5* is a rough template for mounting the controller. Dimensions are approximate. For best results, trace the outline of the actual controller on the mounting surface using the controller itself as the template.

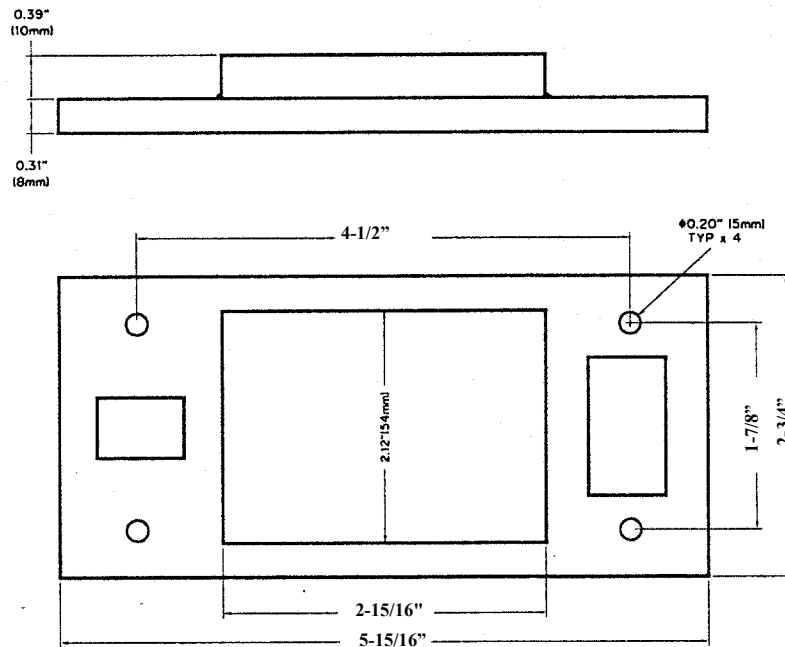


Figure 5: VIU Mounting Template

Figure 9 on page 25 is a VIU sub-system wiring diagram.

Transducer and Wiring Harness Placement

The transducer is *usually* installed on the vehicle odometer shaft, located in the engine compartment or on the gear-box odometer output, and connected by means of a three-wire cable to the VIU.

This wiring harness typically consists of three wires (see *Figure 9* on page 25) running from the engine compartment or transmission gear box to the trunk. The harness should run along the vehicle side on which the fuel tank inlet is located. Whenever feasible, use existing conduit runs; otherwise, attach the harness to chassis supports.

When determining routing, consider slack and be sure to provide sufficient clearance from moving parts, brake or steering system components. Keep the transducer wiring **AT LEAST 4 inches (10 cm)** from ignition wiring, particularly high-voltage cabling like spark plug wires and other secondary ignition cabling.

Never attach the transducer harness to moving parts, to hydraulic or pneumatic lines or to clutch or brake cables.

If the harness is run along the chassis, protect it from objects that may strike vehicle bottom and locate it away from regions where lifts or jacks may be applied.

Finally, keep it away from exhaust pipes. Use a neoprene grommet to protect and secure the harness at the trunk reentry point.

Transceiver Loop Placement

The transceiver loop is placed around the fuel tank inlet, on the outside of the sheet metal. It is held in place with four cable ties -- the "adaptive loops" need no installation hardware. Use an entry hole with a neoprene grommet for the loop cable.

Transceiver loops come in various sizes to fit on most cars and trucks. For vehicles with *two* fuel tanks, two loops are connected in parallel to the two-pin connector

A typical installation for a transceiver loop in a passenger automobile is shown in *Figure 6*.

A typical installation in a truck is shown in *Figure 7* on page 19.

In either vehicle type, be sure the transceiver loop cable shield/common drain wire is grounded properly at the VIU.

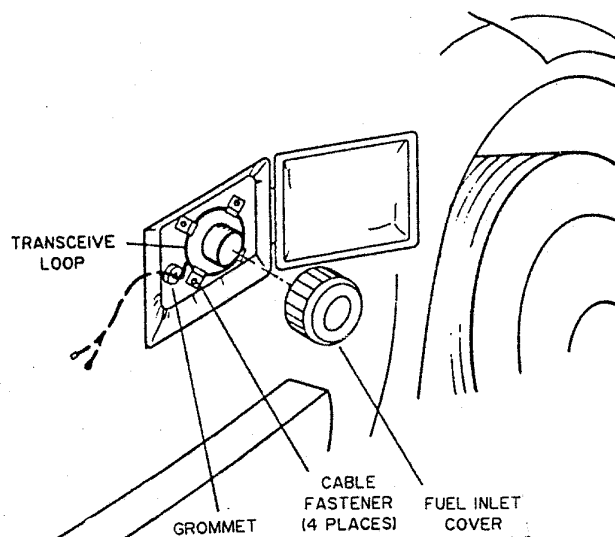


Figure 6: Typical Transceiver Loop Installation -- Passenger Automobile

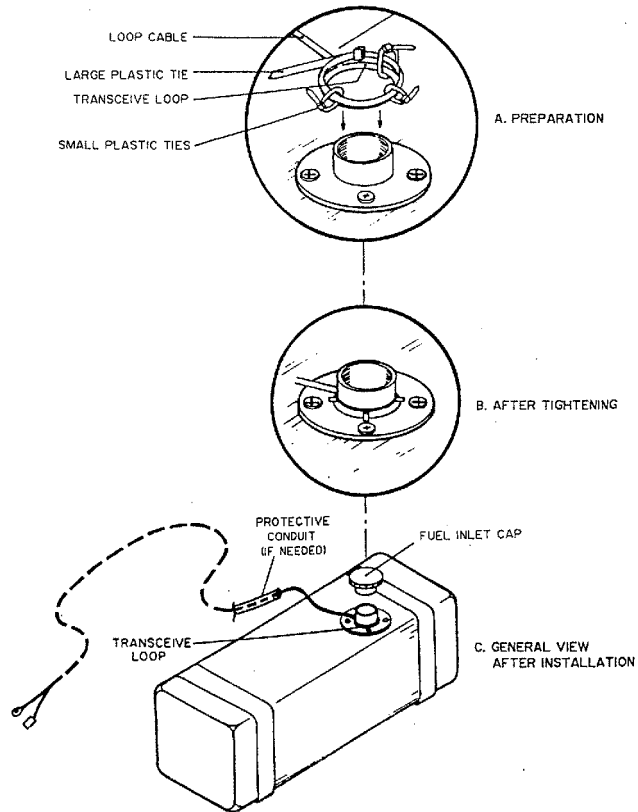


Figure 7: Typical Transceiver Loop Installation -- Trucks

VIU Step-By-Step Installation

Installing the Optional Speed Transducer

On vehicles that have electronic speedometers (usually later year models) or vehicles with cruise controls, a transducer is not required. On such vehicles, an electronic signal indicating mileage is already generated. For these installations, skip this section and go to *Connecting an Existing Vehicle Speed Sensor to the VIU*.

STOP THE VEHICLE ENGINE.

1. Find the connection point for the odometer cable under the dashboard. If under-dash access is difficult, you can install the transducer on the transmission gear-box speedometer output.
2. Disconnect the odometer cable from the selected location. Separate it from the cable entry point by unscrewing the cable.

3. Install the transducer on the shaft, then connect the flexible shaft to the other end of the transducer. Use appropriate adapter and couplings, as supplied in the transducer hook-up kit.
4. Inspect your installation for mechanical integrity and clearances. Be sure the flexible cable is not excessively slack, and does not develop kinks. Proceed to harness installation.
5. Transducer connections are made to the 6-pin controller connector of the VIU -- see *Figure 9* on *page 25*.

Two-lead transducers are always connected as follows:

- Common (GND) lead to PIN 6 (BLACK)
- PULSE OUTPUT lead to PIN 1 (WHITE)

Three-lead transducers are always connected as follows:

- Common (GND) lead to PIN 6 (BLACK)
- PULSE OUTPUT lead to PIN 1 (WHITE)
- Power lead to PIN 2 (RED)

On vehicles that have electronic speedometers (usually later year models) or vehicles with cruise controls, a transducer is not required. On such vehicles, an electronic signal indicating mileage is already generated. The following instructions apply in general.

Connecting an Existing Vehicle Speed Sensor to the VIU

1. STOP THE ENGINE.
2. Find the wire that carries the mileage signal. Usually this wire is connected between vehicle's ECM and speedometer or cruise control unit.
3. Connect the white wire from the vehicle harness (PIN 1) to the mileage signal wire using a tap connector. Make sure that tap connector is crimped all the way and there is a good connection.

Installing the VIU Wiring Harness

The following instructions are generic harness installation instructions. Read the harness placement considerations in *Transducer and Wiring Harness Placement* on page 17.

1. STOP ENGINE.
2. USING A NON-ELECTRIC DRILL, drill a hole for harness entry into the trunk, at a point sufficiently close to intended controller location, but not closer than 3 feet from the fuel tank inlet.

3. Insert a grommet into the hole, and then run the harness through the grommet.
4. Route the wiring harness to the engine compartment or transmission gear box, securing it along its route with wire ties, etc.
5. Attach the harness wiring to either the transducer or your selected dashboard connection points. Use connections approved for use in the auto industry.
6. Inspect your harness installation carefully.

Explosion Hazard!



Installation must be performed by qualified people who are aware of all safety issues.



During installation of harness and/or transceiver loop around fuel tank inlet, and during work in engine compartment, installers MUST comply with all applicable requirements of the National Fire Protection Association NFPA-30 “Flammable and Combustible Liquids Code”, NFPA-30A “Automotive and Marine Service Station Code”, federal, state and local codes and any other applicable safety codes and regulations.



Do not smoke do not perform metal work with fuel tank cover removed, or when any fuel leakage is suspected, and do not perform any operation that may impair fuel tank of fuel pipe safety. Use pneumatic tools for metal work.

Be sure you work in a well-ventilated area.

Installing the Transceiver Loop

To reference item numbers see Figure 8 on page 23.

1. Place the loop (item 7) around fuel tank inlet (3) on the external side of the body sheet metal.

Warning



The fuel tank filler cap must be in place. If you must remove the filler cap, plug the fuel tank inlet with a rubber cork or stopper to prevent a dangerous accumulation of vapors.

Prior to installation, verify that fuel tank inlet is clean and free of any liquid.

2. For each vehicle type, determine the appropriate routing of the cable (9):
 - Thread the cable through a flange hole (8) OR...
 - Route the cable between the flange and the body (11) OR...
3. Thread the cable through a hole to be bored in plastic (10)

Note

In vehicles in which more than one option applies, routing through a flange hole (item 8) is preferred. Otherwise, try to route the cable between the flange and the body (11). If this is not possible, use a screwdriver or a punch to bore a hole in the inlet if the fuel tank housing inlet is made of plastic.

4. Thread the cable through any of the holes (8) in the flange as follows:
 - Use a wrench to unscrew all screws (5) that secure flange (2) to body (1).
 - Place the loop (7) around fuel tank inlet (3).
 - Thread the cable through any of the flange holes (8).
 - Insert neoprene compression gland, or apply RTV sealant around loop cable.

- Using a wrench, torque all screws (5) securing the flange to the body (1) and make sure that the cable fastener (4) holds the transceiver loop (7) in position. Be careful to avoid any stress on the loop..

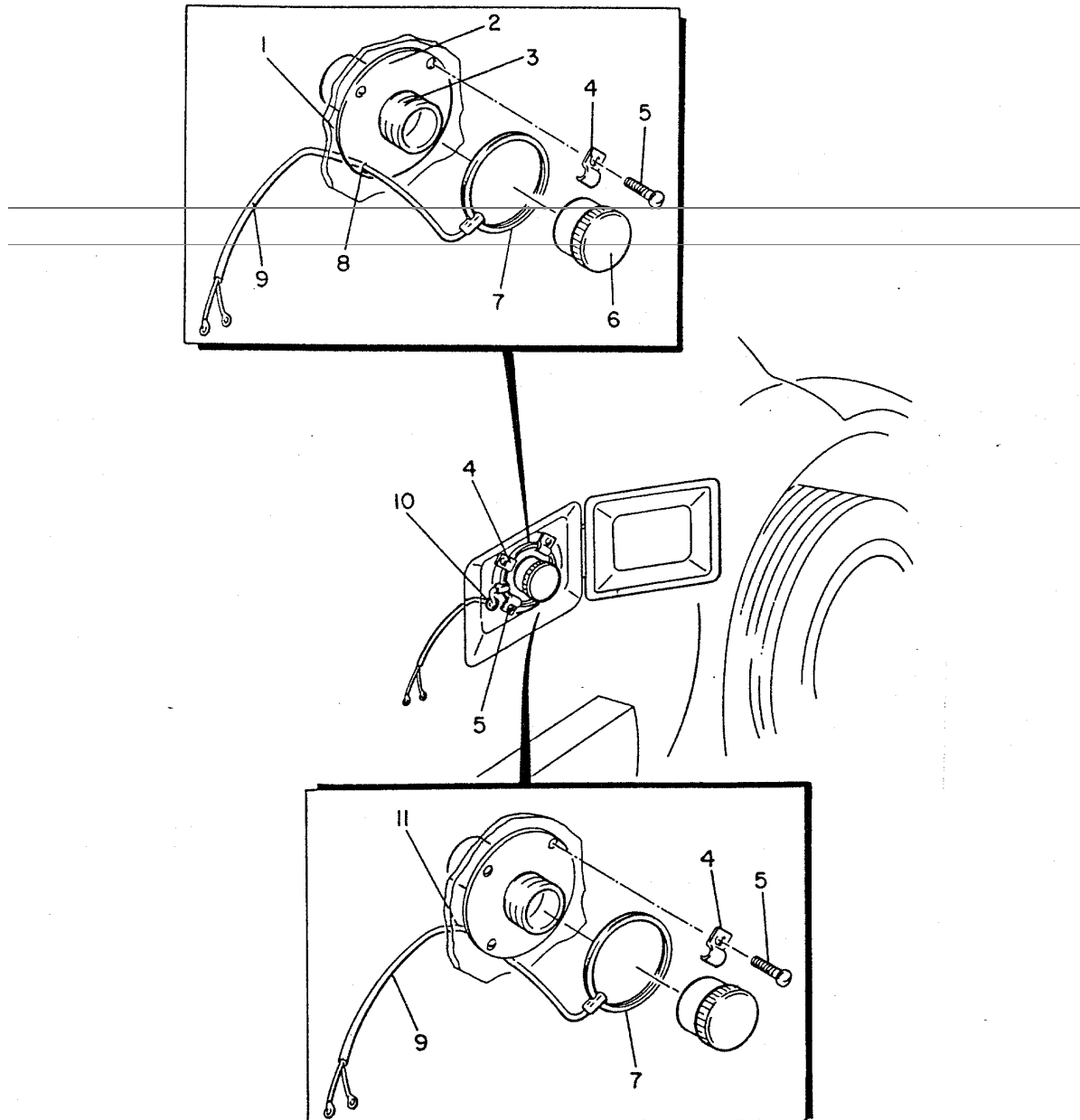


Figure 8: Typical Transceiver Loop Installation -- Automobile

6. Route the cable between the flange (2) and the body (1) as follows:
 - Unscrew all screws (5) that secure flange (2) to body (1).
 - Release the fuel inlet by pulling it out.
 - Carefully thread the cable between the flange (2) and the body (1).
 - Place transceiver loop (7) around fuel tank inlet (3).
 - Using a wrench, torque all screws (5) securing the flange (2) to the body (1) and make sure that the cable fastener (4) holds the transceiver loop (7) in position. Be careful to avoid any stress on the loop.
7. Thread the cable through a hole made in plastic.

Note

This installation method is applicable only if the fuel tank housing inlet is made of plastic. Use a screwdriver or punch to bore a hole in the housing.

8. Using a screwdriver, carefully bore a hole in the housing inlet (10).

Warning



During the hole boring process, be careful not to damage the fuel lines (fuel entry line, fuel vent line and excess fuel line).

9. Insert a neoprene compression gland, or apply RTV sealant around loop cable, and insert the cable through hole.
10. Using a wrench, unscrew all screws (5) that secure flange (2) to body (1).
11. Place transceiver loop (7) around fuel tank inlet (3).
12. Using a wrench, torque all screws (5) securing the flange to the body and make sure that the cable fastener (4) holds the transceiver loop (7) in position. Be careful to avoid any stress on the loop.

Warning



Make sure tank cap is tightly secured so that no fuel can be spilled.

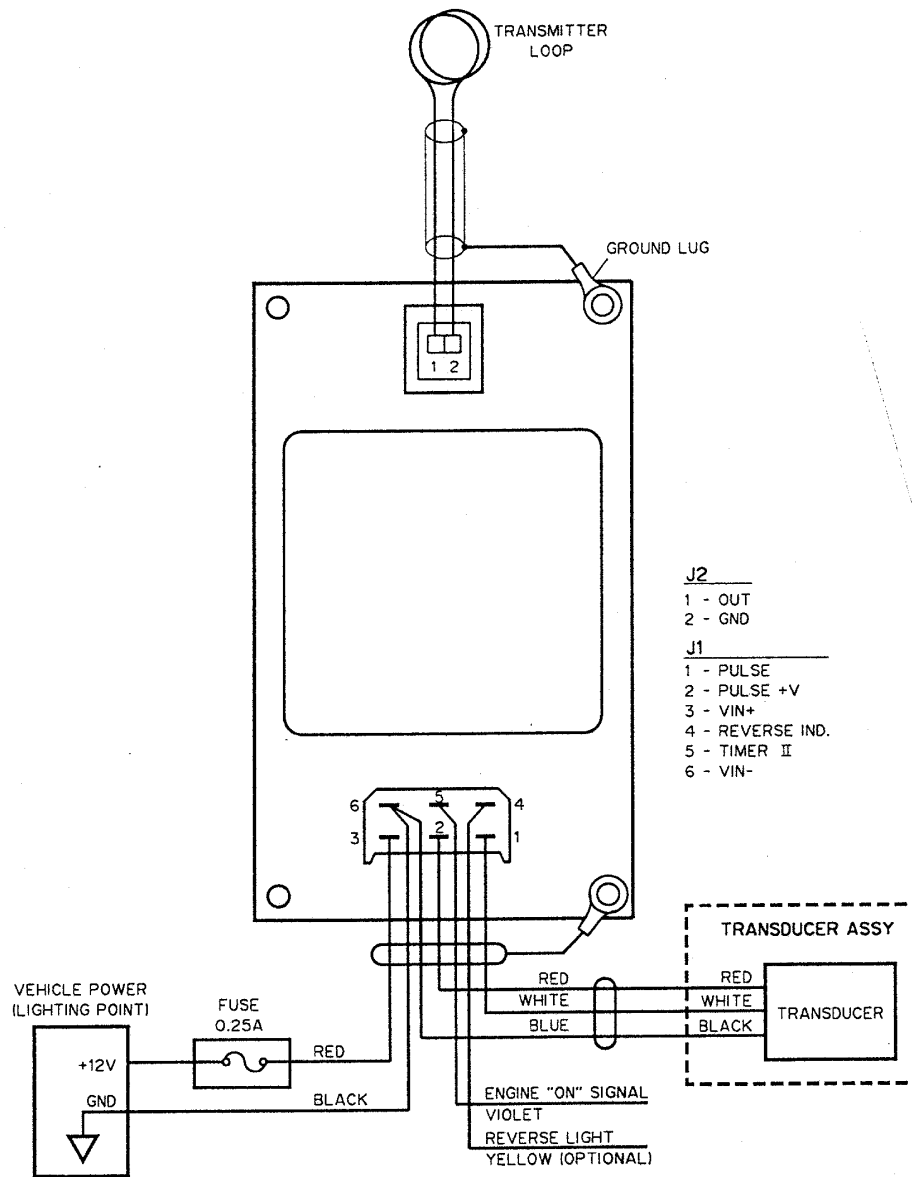


Figure 9: VIU Wiring Diagram

13. Connect the center contact of the loop coaxial cable to the appropriate connector on the VIU.

Installing the VIU

This paragraph provides generic instructions for VIU installation, and the connection of cables to that unit.

1. See *Figure 5 on page 17*, then drill four holes at intended VIU location, at least 3 feet from the fuel tank inlet.
2. Position the VIU in place and fasten it with “blind” (pop) rivets or self-tapping screws.
3. Connect the transceiver loop cable connector to pins 1 and 2 on the VIU. Refer to the drawing on the VIU.
4. Attach the harness connector to the 6-pin connector of the VIU. The vehicle battery is connected via the fuse to position 3 (positive line) and 6 (ground) of the 6-pin VIU connector (*Figure 9 on page 25*).
5. A pair of wires in the harness are power supply wires. One of the pair contains an in line fuse holder. Remove the fuse from the fuse holder and tape it to the fuse holder.
6. Connect the two leads of the power section of the harness to the supply point. Lead with fuse to the positive contact; the other lead ground to the body.
7. Route the loop cable from the loop to the VIU, keeping it away from existing wiring, by attaching it to the vehicle frame with cable ties. Use cable ties to attach loose existing wiring to the frame, away from the transceiver loop cable.
8. Inspect your installation. Return the fuse to its holder after inspection, but before power is to be applied to the system.

**Perform this inspection before power is connected to system.
Make at least the following checks:**

- Check the installation layout by comparing it to the original installation plan.
- Transducer Equipped Systems: Check for tight connection of the flexible odometer shaft and transducer mounting.
- Check your connections from the wiring harness to the transducer or dashboard.
- Check the wiring harness routing and fastening. Specifically, check clearances from moving parts, exhaust components and ignition leads. Make sure harness is not attached to steering column, brake cables, or hydraulic or pneumatic lines.

- Check where the wiring harness enters into the trunk, and also where it connects to the VIU.
- Check the transceiver loop installation. Check the loop location on the external side of vehicle body. Check all the fasteners. Make sure there are no signs of fuel leakage. Test also for fuel vapors which might indicate damage to fuel pipe. Inspect loop cable entry and connection of connector and lug to VIU.
- Make sure tank cap is secured tightly so that no fuel can be spilled.
- Check VIU installation and fastening to mounting surface.

Only after inspection shows VIU to be correctly installed should you insert the fuse back into its fuse holder, and apply power to the VIU sub-system.

After installation, the FleetLINK system is transparent to the station operator and to the customer. Self-service operation is the same, with one exception: transactions performed by authorized vehicles are automatically recorded and charged, therefore, no attendant is required for recording vehicles and supplied fuel volumes, or for accepting payment.

Basic FleetLINK Operation

Most aspects of FleetLINK are transparent to your fueling customers. This is all that the driver has to do:

1. Stop his or her vehicle near a *FleetLINK* equipped dispenser pump.
2. Turn OFF the engine
3. Open the vehicle fuel tank cap.
4. Remove dispensing nozzle from dispenser, and raise the dispenser control lever.
5. Insert the dispenser nozzle into the vehicle fuel tank inlet, wait for authorization, then squeeze handle to start fueling.
6. Like any other dispenser, fuel dispensing stops when the tank is full. Return nozzle to dispenser and close fuel tank cap.
7. Vehicle may now be driven away.

If No Fuel Is Delivered....

- Set dispenser lever to off, then raise lever again.
- Check that the nozzle is *fully* inserted into fuel tank inlet.
- Check with the station personnel (if any are there) to see if the dispenser is working.

If this particular vehicle cannot be refueled at other FleetLINK dispensers, have the station operator check that it is authorized to refuel.

If problem persists, see *In Case of Problems* on page 34.

VIU Maintenance & Service

This section contains information on Tools & Instruments, Periodic Inspection and Troubleshooting/Repair of VIU sub-system.

Explosion Hazard



Maintenance or service must be performed by qualified people who are aware of all safety issues.



During servicing of harness and/or transceiver loop around fuel tank inlet, and during work in engine compartment, installers **MUST** comply with all applicable requirements of the National Fire Protection Association NFPA-30 “Flammable and Combustible Liquids Code”, NFPA-30A “Automotive and Marine Service Station Code”, federal, state and local codes and any other applicable safety codes and regulations.



Do not smoke do not perform metal work with fuel tank cover removed, or when any fuel leakage is suspected, and do not perform any operation that may impair fuel tank or fuel pipe safety. Use pneumatic tools for metal work.

Be sure you work in a well-ventilated area.

Danger

Standard Test equipment is *not* suitable for use in a Hazardous Area. Do not perform any tests within 3 feet from vehicle’s gas tank or when VIU coil is connected to the VIU.

Tools and Test Equipment

No special tools are required for VIU sub-system maintenance and service. A standard tool kit is necessary, the contents of which are listed on *page 15*. Connector repairs are made using standard automotive connector crimping tools.

The test equipment required for VIU sub-system maintenance and service includes:

- Digital multi meter, Fluke 75 or equivalent.
- Oscilloscope. Any oscilloscope model can be used, provided it meets the following minimum requirements:
 - Bandwidth - 10 MHz minimum
 - Input impedance - 1 Mohm minimum
 - Sensitivity - 10 mV/div - 10V/div
 - AC and DC coupling

The purposes of the periodic inspection of VIU installation is to ensure that the various components of the VIU sub-system are in good mechanical and electrical condition and are securely installed. The inspection schedule should take into consideration vehicle mileage, vehicle working environment and climatic conditions. Inspection should be carried out at least once per year.

Inspect the installation as instructed in this section and correct or replace any questionable parts.

Note

An approved plan for FleetLINK VIU installation in the inspected vehicle should be available during inspection, so that installation errors and unauthorized modifications can be detected.

Warnings



- **When performing work in the engine compartment, STOP THE VEHICLE ENGINE to prevent severe injury or death. Make sure no one will start engine while any work is in progress - remove ignition keys if possible.**



- **Use only adequately rated, properly approved equipment to elevate vehicles. Observe all safety precautions when working under vehicles.**
- **NEVER WORK UNDER A VEHICLE SUPPORTED ONLY BY A TIRE CHANGING JACK.**

- **Use tire blocks (chocks) whenever vehicle is parked for installation procedures. Use traffic safety cones to warn other drivers of stationary vehicles.**
- **Vent exhaust from enclosed areas.**

Inspection Procedure

Check VIU installation and fastening to mounting surface:

- Check that the VIU is securely fastened to a flat mounting surface.
- Check that all connector pins are seated firmly, and that wires connected to them are not loose. Check for corrosion on pins.

Check harness routing and fastening:

- Clearances from moving parts, exhaust tubes and ignition leads.
- Harness is NOT attached to steering column, brake cables or hydraulic or pneumatic lines.
- Wire insulation for abrasion, cuts, cracks and other possible damage, especially near fastening points.
- Harness entry into trunk or cab, and connection to VIU.

Check the transceiver loop installation:

- Check the positioning of the loop - it must be on the outside of the body sheet metal. Check the snugness of the wire ties that secure the loop to the body.
- Make sure there are no signs of fuel leakage.
- Test for absence of fuel vapors, which might indicate damage to fuel pipe.
- Inspect loop cable entry and connection of connector and lug to VIU unit.
- When a transducer is included in installation, check for a tight connection of the flexible shaft, and of the transducer mounting. Check connections of the harness to the transducer.

If connections were made to the dashboard or car cruise control circuit, check these connections as well.

Repeat all steps for each loop installed on the vehicle.

In Case of Problems

This section provides procedures that allow trained peoples to repair a malfunctioning VIU sub-system. Repair is performed by isolating the malfunction to one of the sub-system components and replacing the defective component.

Caution

Do not open the VIU box. The box is a sealed protective enclosure which contains delicate microelectronic components. These components will be damaged by incorrect handling. Opening the box will void your warranty

For required tools and test equipment, see *Tools & Instruments You Will Need* on page 15.

Before You Begin Troubleshooting

Before beginning your actual troubleshooting, do the following:

1. Perform a complete visual inspection of the VIU sub-system (*Inspection Procedure* on page 33). Pay particular attention for the following:
 - Mechanical damage
 - Unauthorized modifications or tampering
 - Worn wire insulation
 - Loose connections
 - Torn wires
 - Corrosion.
2. Check the fuse in the VIU harness fuse holder. Remove the fuse from its holder and use the ohmmeter function to check for nearly zero resistance across the fuse.
3. Use a multi meter to measure battery voltage at the point to which VIU power connection is made. Voltage should be between 10 and 14 volts.
4. **FIRST-TIME INSTALLATION PROBLEMS:** Carefully follow each wire and check that it is correctly routed and connected according to the approved installation plan.

Troubleshooting Procedure

This section explains the following common problems, and their likely solutions:

- Fuse Blows Repeatedly
- No Output Signal From Transceiver Loop
- Odometer Reading From VIU Does Not Change
- Engine Hours Reading Does Not Change
- Odometer Reading Does Not Correspond to Registered Mileage
- Programmed Parameters are Lost
- Timed Delay Errors
- Vehicle Cannot Be Refueled
- Two-Tank Vehicle, One Tank Cannot Be Refueled
- Radio Frequency Interference (RFI) Problem
- Vehicle Odometer Does Not Work

Fuse Blows Repeatedly

- Measure vehicle battery voltage at the point where VIU power wiring is connected. Reading should be from 10 to 14 volts. If higher, check vehicle electrical system.
- Check harness wires for exposed conductors. Inspect the pin connector of the harness for damage and possible short-circuits.
- If the problem developed after installing a new VIU sub-system in the vehicle, check power connections (See *Figure 9* on *page 25*).
- If these checks do not reveal the problem, replace the VIU unit.

No Output Signal from Transceiver Loop

- Check ground connection on transceiver loop cable.
- Check resistance of the loop. It should be between 11 and 17 ohms.
- Connect a known good transceiver loop to the two-pin connector on the VIU. If signal appears, the original loop is defective and must be replaced.
- Connect a scope between pin 1 of connector J2 and the VIU body, and monitor the signal. Correct waveform consists of 2 millisecond bursts of data, separated by intervals of up to 6 milliseconds. Signal amplitude should be at least 1 volt peak-to-peak. Compare with the signal generated by a known good VIU in another vehicle.

- Check for battery voltage in the VIU six-pin connector between pin 3 (+10-14V), and pin 6 (GND). If not present, check fuse and wiring to the pin connector.
- Measure voltage between pins 2 and 6 of the VIU six-pin connector. Correct value is $+5V \pm 0.5V$. Replace VIU unit if voltage is outside this range.
- Replace VIU unit if all else fails.

Odometer Reading from VIU Does Not Change

IF TRANSDUCER INCLUDED IN INSTALLATION:

- If transducer has three or four leads, measure voltage between pin 2 and pin 6 of the 6-pin VIU-2 connector. Correct value is $+5V \pm 0.5V$. Replace VIU if voltage is outside this range.
- Remove transducer to get at both ends of its shaft. Ask a helper to manually rotate the transducer shaft. Check for large voltage changes (up to 0 to +5V) between pins 1 (+) and 5 (—) of the connector while shaft is rotated. If there is no change, check wiring to transducer. On first-time installations, check correct wiring to transducer leads. If wiring is good, replace transducer.

INSTALLATION WITHOUT TRANSDUCER:

- Check that the signal at the dashboard connection points is correct, according to vehicle manufacturer specification. Recalibrate pulse level if necessary.
- Check harness connections. Replace VIU if nothing else works.

Engine-Hours Reading Does Not Change

- Start, then stop vehicle engine. Check for a large voltage change (up to +5V) between pins 1 and 5 of the 6-pin connector while engine is started and stopped.
- If there is no change, check for good wiring connections to the VIU. For first time installations, check that wiring is correct. If wiring is good, the problem is in the VIU.

Odometer Reading Does Not Correspond to Registered Mileage

If mileage increases from refueling to refueling, this problem could be caused by several factors. Remember to take into consideration any optional or custom-made transmission gear box that could be installed in this vehicle model.

- Loose transducer: inspect and tighten transducer mounting.
- Defective transducer.
- Defective vehicle equipment.
- Incorrect odometer factor -- see *VIU Programming Manual*.

Programmed Parameters Are Lost

- Check for loose connections. If OK, replace VIU unit.

Timed Delay Errors

- Check for loose connections. If OK, replace VIU unit.

Vehicle Cannot Be Refueled

- If it cannot be fueled at any approved FleetLINK refueling station, check for incorrect programming of any of the following parameters:
- Vehicle identity - check and correct
- Fleet and user codes - try to reprogram using other hand-held programmer.
- Fuel type and grade - check and correct.
- Check LEDs on VIT board
- Possible defective VIU.

Two-tank Vehicle, One tank cannot be filled

- Check ground connection on transceiver loop cable installed on the tank.
- Disconnect transceiver loop of "bad" tank and connect another good loop to the two-pin connector and to VIU body. If signal appears, the original loop is defective and must be replaced.

Radio Frequency Interference (RFI) Problem

- Check ground connection on VIU and transceiver loop cable.
- Check if radio cables are routed near the FleetLINK wiring harnesses. Reroute if necessary.

Vehicle Odometer Does Not Work

- Check for good connection of both ends of transducer shaft.
- Check that transducer is not damaged.
- Remove FleetLINK connection -- if vehicle odometer works, replace the VIU or the transducer.
- If checks listed above do not reveal the source of a problem, the fault is probably not related to the FleetLINK installation. Have the vehicle repaired.

Warning

If a VIU unit is replaced, it must be programmed with the parameters appropriate to the system user operating the vehicle with the replaced VIU.

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