Section 2 Installation

CAUTION

Before performing any of the following procedures be sure the engine is turned off. Insure that the engine cannot be started while work is in progress. When installing the VDC, do not tamper with the brake or steering systems or attach wires or cables to the steering column, brake system cable or any moving mechanical parts.

2.1 Defining the Installation Layout

When considering the installation layout for the VDC, four basic areas must be considered:

1. The National Fire Protection Agency (NFPA) code.

1.1. Practical considerations within the jurisdiction of this code

FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE

Location	NEC Class 1, Group D Division	Extent of Classified Area
Tank Vehicle and Tank Car* Loading through open dome	1	Within 3 feet of edge of dome, extending in all directions.
	2	Area between 3 feet and 15 feet from edge of dome, extending in all directions.
Loading through bottom connections with atmospheric venting	1	Within 3 feet of point of venting to atmosphere extending in all directions.
	2	Area between 3 feet and 15 feet from point of venting to atmosphere, extending in all directions. Also up to 18 inches above grade within a horizontal radius of 10 feet from point of loading connection.

FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE (CONTINUED)

Location	NEC Class 1, Group D Division	Extent of Classified Area
Loading through closed dome with atmospheric venting	1	Within 3 feet of open end of vent, extending in all directions.
	2	Area between 3 feet and 15 feet from open end of vent, extending in all directions. Also within 3 feet of edge of dome, extending in all directions.
Loading through closed dome with vapor control	2	Within 3 feet of point of connection of both fill and vapor lines, extending in all directions.
Bottom loading with vapor control. Any bottom unloading	2	Within 3 feet of point of connections extending in all directions. Also up to 18 inches above grade within horizontal radius of 10 feet from point of connection.

* When classifying extent of area, consideration shall be given to fact that tank cars or tank vehicles may be spotted at varying points. Therefore, the extremities of the loading or unloading positions shall be used.

1.2. Locate the VDC in a non-hazardous area **at least 3 feet from the fuel tank,** protected from excessive electrical interference within the vehicle.
Note: When applicable, European CENELEC installation requirements must be adhered to. The system diagram for CENELEC installation is included in Appendix 5.4.

2. The odometer transducer types
   - Vehicles with electromechanical odometer/speedometers
   - Vehicles with an electronic odometer/speedometer

   For odometer wiring details, refer to Appendix 5.2 and 5.3

3. The Engine "ON" Hours connection

4. The transmitter coil (T-Ring) and it's cable routing

2.2 Tools & Parts Required

Installation of the VDC requires the following tools and parts:

Electric Drill	Rubber grommet assortment*
Crimp tool	Ring terminal assortment*
Screwdriver	Butt connector assortment*
Pliers	Heat Shrink Tube*
Heat gun or mini-butane torch	Self-drilling screws*
2 Conductor shielded Cable*	Convoluted Tube*

* These parts are supplied with the VDC installation kit, Scully Part Numbers 09302 and 09305. Installation Kit 09302 is for use with the VDC Scully Part Number 001403 (VDC without connectors). Installation Kit 09035 is for use with the VDC Scully Part number 001402 (VDC with connectors). All kit terminals and connectors contain corrosion protection gel. One tube (2 oz.) of corrosion preventive compound for electrical contacts is provided with the kit for any connections that do not have protection gel.

2.3 VDC Mounting Location

Select a suitable location for the VDC, preferably where wiring connections are protected from excessive heat, water, oil, or other agents which could be harmful to electronic components. The VDC is designed to withstand vibrations in road transport. However, it should not be subjected to any mechanical impact. Sufficient room should be left around the installation area to connect wires to the VDC. Prepare the surface by cleaning away all dirt and oil where the unit is to be mounted, **make sure it is at least 3 feet from the fuel tank inlet**. Mount the VDC using self-drilling screws at two diagonal outer holes. VDC installation kit is supplied with self-drilling screws, however, drilling pilot holes might be required on some installation.

Good power and ground connections are critical for proper VDC operation. If extra wire is needed to reach the battery post, use the 2 conductor shielded cable. The VDC black wire must be grounded to the negative battery post. The VDC case is isolated from its electronic circuit, therefore the chassis does not provide a reference ground. Cut the drain wire on battery connection end and ground the drain wire at the VDC end. The VDC red wire is connected to constant HOT (battery voltage) and must be from a constant power source. For negative ground vehicles, you can use one of the existing VDC mounting holes as the drain wire ground point, as long as it is mounted on a metal surface with a good chassis ground.

2.4 Odometer Transducer Location

2.4.1 Electronic Odometer/Speedometer

The optional odometer/speedometer transducer is a device that converts mechanical rotation to electronic pulses so that the VDC can calculate mileage. Vehicles with an electronic odometer/speedometer or an electronic dashboard already have electronic sensor. This sensor is usually found where the transmission or transaxle connects to the drive shaft. For such vehicles, connect the two wires from the VDC harness (white and black/white) to the odometer/speedometer cable. The vehicle speed sensor should be wired to the VDC with correct polarity to guarantee that the high to low transition occurs on the "clean" side of the sine wave (see ***Figure 1***). If the connection is made with wrong polarity, reverse the connection.

Starting from the VDC, run the white and black/white harness wires to where the electronic sensor is located. Crimp harness wires to sensor wires by using one of the following recommended methods.

CAUTION

When routing wires or cables, it is important to keep away from any moving parts, and any parts that generate excessive heat, or areas that may impede safety. Keep away from drive shafts, fan blades, belts, adjustable steering column, foot pedals, radiator, and exhaust system.

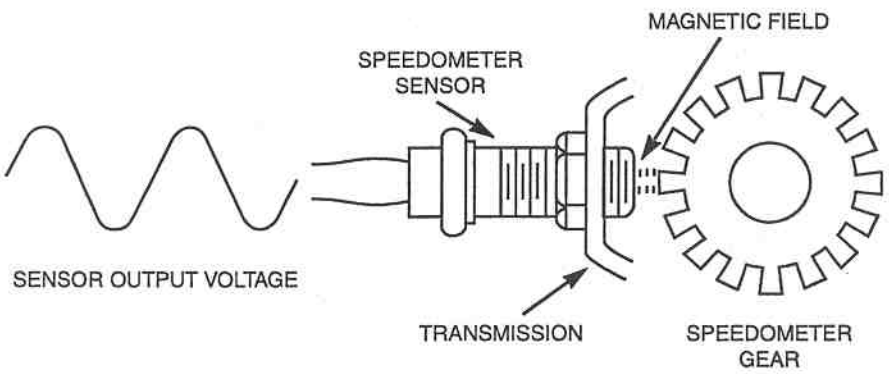

Figure 1 – **Speed Sensor**

Method A: **Using MOISTURE-RESISTANT Tap Connector.**

1. Open hinged side wall. Place unstripped sensor wire inside run channel and close hinge sidewall to 90° position to keep the sensor wire in place. The connector is gel-filled for corrosion protection.
2. Insert unstripped VDC white wire completely into tap port.
3. Hold pliers perpendicular to the wire and make the connection by crimping the u-contact down flush with the top of the insulator.
4. Close cover until securely latched.

> ***Important***
>
> *It is strongly recommended to cover all connections with moisture resistant tape.*

Using the above procedure crimp the VDC black/white wires to the other sensor wire (Stagger the connection point).

Cover connections with 6 inches of convoluted tubing.

Recommended Connector: *3M® Scotchlok® 804 MOISTURE-RESISTANT Tap Connector.*

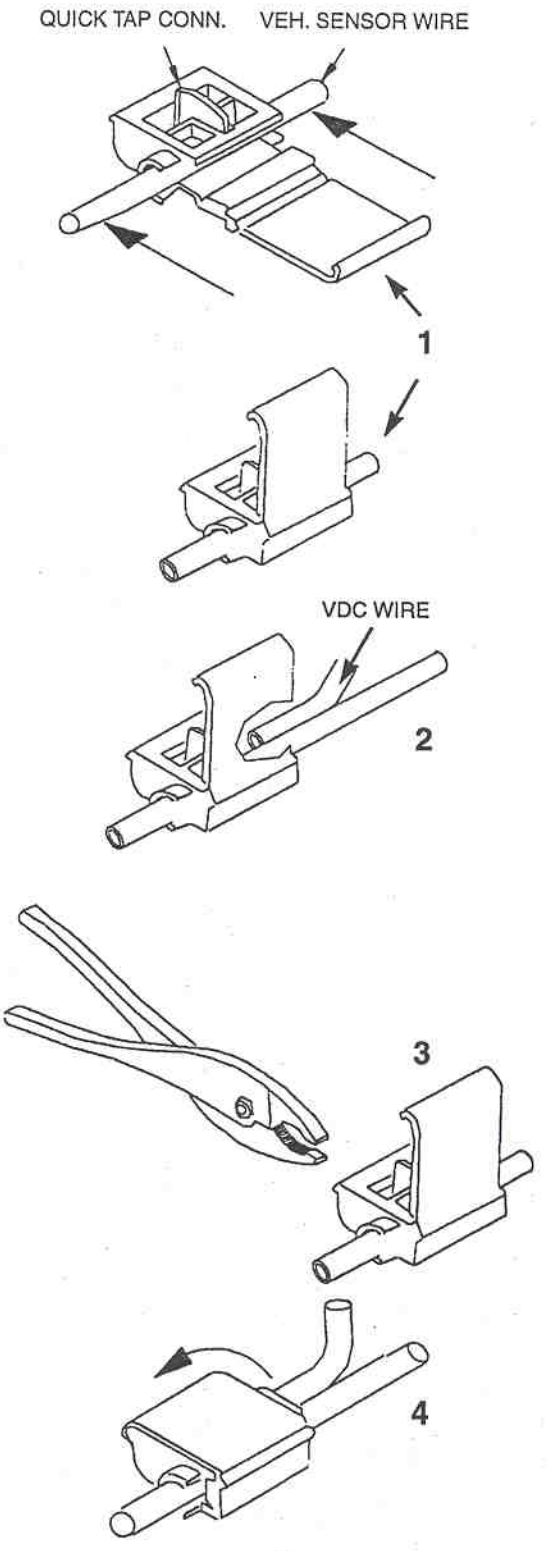

Figure 2 – **Method A**

Method B: **Using MOISTURE-RESISTANT Butt Connector.**

1. Cut the sensor wire and strip off about 1/4" of insulation from each end.
2. Cut and place 1.5" of self sealing heat shrink tube over one end of sensor wire.
3. Strip off 1/4" of insulation from the VDC white wire. Twist the stripped VDC wire together with one of the sensor wire.
4. Crimp a butt splice connector onto the twisted wires. Crimp the other side of the connector onto the other stripped sensor wire.
5. Place the heat shrink tube over the butt connector.
6. Use a heat gun, or mini-butane torch to shrink and seal the tubing. Shrink the tubing to form a moisture-tight seal around the wire when heated.
7. Use the above procedure to crimp the VDC black/white wires to the other sensor wire (stagger the connection).

WARNING

When heating the shrink connector, make sure it is positioned at least 3 feet from fuel lines or batteries, in order to avoid an explosion.

Cover harness wires with 6 inches of convoluted tubing. Using cable ties, secure the harness wires to the chassis supports. Be sure to leave some slack and provide sufficient clearance from any moving parts, brake or steering components. Leave at least 4 inches of clearance from any ignition system wiring or hot surfaces. Do not attach the wires to any moving parts, pneumatic or hydraulic lines or to clutch to brake cables. If the wires must be run along the chassis, it must be routed away from exhaust pipes, and it must be protected from any object which could strike it.

Recommended Connector: *3M Scotchlok MNG18CMX MOISTURE-RESISTANT Butt Connector.*

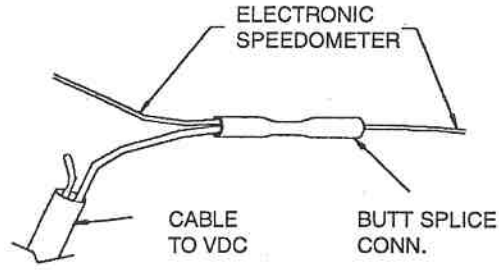

Figure 3 – **Method B**

2.4.2 Electro-Mechanical Odometer/Speedometer

The optional odometer transducer is connected to the VDC via a three-wire cable which is supplied in 12 foot length. The transducer is installed on the vehicle odometer shaft, or directly to a gear box odometer output.

To install the odometer transducer remove the existing odometer/speedometer drive cable. Select the proper odometer key or keys for the vehicle being installed. Attach the appropriate end of the odometer/speedometer cable back onto the odometer transducer per the manufacturer instructions. Insure the flexible cable does not have excessive slack or kinks. Periodically grease any fittings per manufacturer's instructions. The transducer cable runs from the transmission gearbox to the VDC. Connect Transducer red to VDC red/white, white to white and black to black/white wires using Method B. Secure the cable to the chassis supports. Cover any exposed cables with convoluted tubing provided in the installation kit. Be sure to leave some slack and provide sufficient clearance from any ignition system wiring or hot surfaces. Do not attach the cable to any moving parts, pneumatic or hydraulic lines or to clutch or brake cables. If the cable must be run along the chassis, it must be routed away from exhaust pipes, and it must be protected from any object which could strike it. Use rubber grommets to secure and protect the cable.

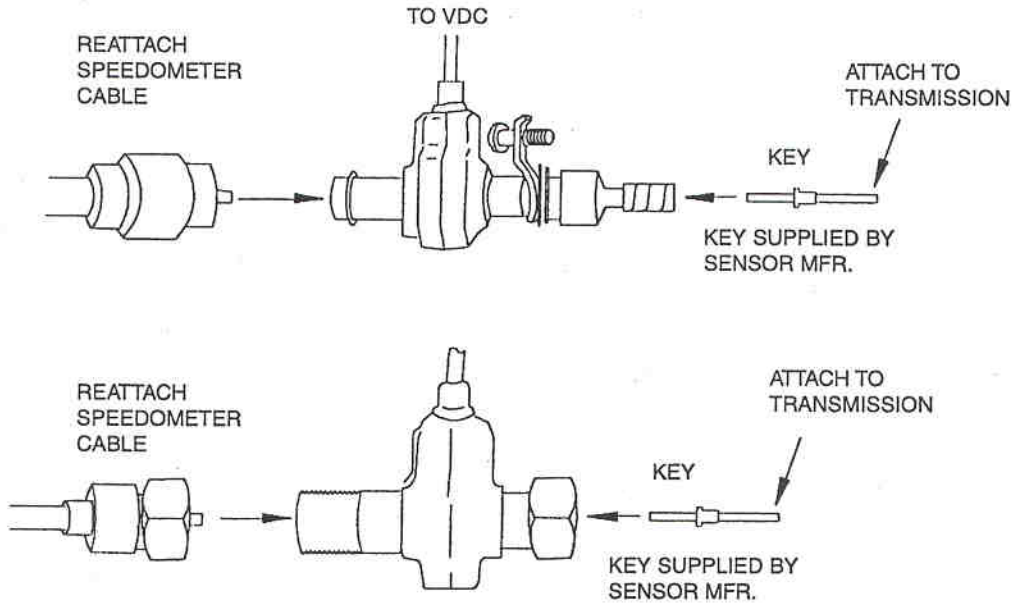

Figure 4 – **After Market Transducer**

2.5 Engine Hours Connection

For the VDC to record engine hours, VDC's yellow wire must be connected to a point in the vehicle that provides HOT (battery voltage) signal while the engine is ON or running, and OFF (zero voltage) when the engine is off. Check the vehicle's wiring diagram to determine the best connection point. Suggested connection points are an existing hour meter, the positive side of the oil pressure switch, or the switched side of ignition key. Verify that the connection point is one where the battery voltage is present when the ignition switch is on, and is open or grounded when the switch is off. Follow one of the recommended Methods A or B, to make your connections.

2.6 Transmitter Coil (T-Ring) Mounting

WARNING

When performing any work around the fuel tank inlet be sure to comply with all applicable federal, state, local and other applicable codes and regulations as well as the requirements of NFPA-30 "Flammable and Combustible Liquids Code". When applicable, European CENELEC requirements must be complied with. Do not smoke or perform any metal work with the fuel tank cover removed, or when fuel vapor is present. Do not perform any operation which may impair the fuel tank or fuel pipe safety. Use only pneumatic tools for metal work.

The VCOMM packets are sent electromagnetically from the VDC through a transmitter coil (T-Ring) on the fuel tank inlet, to a receiving coil on the refueling nozzle (N-Ring). One T-Ring should be installed around each fuel tank inlet with the mounting ears down (two T-Rings per VDC maximum). The T-Ring should be positioned as close to the fuel tank opening as possible, preferably within four inches due to Nozzle Ring (N-Ring) sensitivity. Two sizes of T-Rings are available; 2.7" ID and 4.7" ID. The 2.7" ID T-Ring fits most passenger cars, light trucks, and buses with 2-1/2" fill pipe. The 4.7" ID T-Ring fits truck saddle tanks with 4-1/2" fill pipe. T-Rings have a thin flexible flange inside a rigid outer ring that keeps them in place on the fuel tank. They are supplied with approximately 12 inches of wire and must be extended using the coil harness and/or two conductor shield cable Scully part number 000766. Use Method B - Using MOISTURE-RESISTANT Butt Connectors to make your connections.

CAUTION

When routing the T-Ring wires, be sure to keep it at least 2 inches from any other wires in order to preserve the intrinsic wiring requirements.

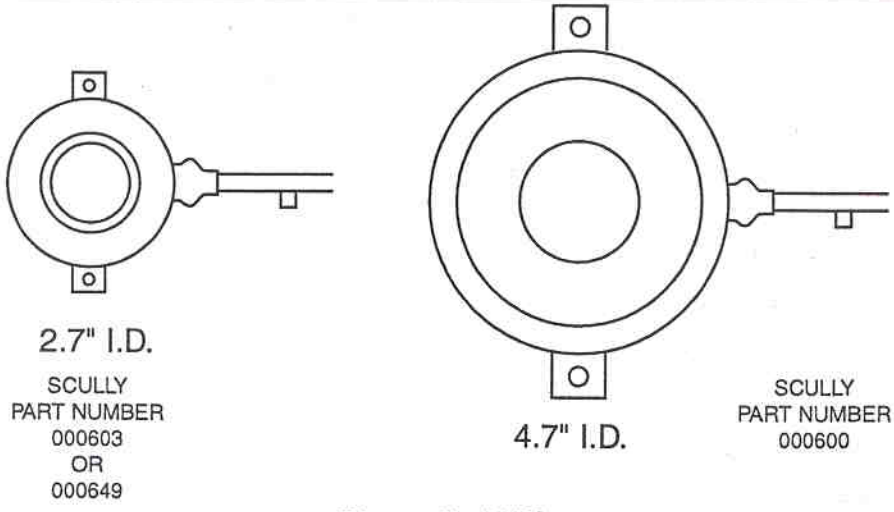

Figure 5 – **T-Rings**

Before beginning the installation, have the fuel pipe repaired or replaced if it shows any signs of leakage or excessive wear. Check to make sure that the fuel inlet cover fits tightly. Position the T-Ring around the fuel tank inlet and check to make sure that there is sufficient room to remove and replace the fuel inlet cover. The T-Rings are designed to be held in place by fitting the diaphragm over the fuel tank inlet neck. In cases where the coil mounting ears are unused, and interfere with proper fit, the ears may be removed. Be careful not to cut into any wires within the coil.

The mounting ears provide an alternate method of attachment. External threaded adhesive studs (Click Bond CS series) should be positioned to accept the mounting ears. Since power tools can not be used in a Class I, Division I location, use of studs is strongly recommended. Please consult Click Bond (702) 885-8000 for your specific application. If drilling a hole is absolutely needed, you must remove the shroud and take it to a safe place to drill hole, then re-attach the shroud.

Cover the T-ring wires and connections with a 12 inch piece of convoluted tubing. Add a cable tie at the neck of the T-Ring to keep tubing in place.

2.7 Optional Harness Assembly

The optional harness assembly is provided to reduce the installation time. The harness contains weatherproof connectors with suitable length of wires for a typical vehicle installation. VDC T-Ring wiring is provided via a short harness and must be extended using the coil harness and two conductor shield cable Scully part number 000766. T-Ring wiring should run along the vehicle side on which the fuel tank inlet is located. T-Ring harness should have a minimum clearance of 2" from all other wires and the harnesses.

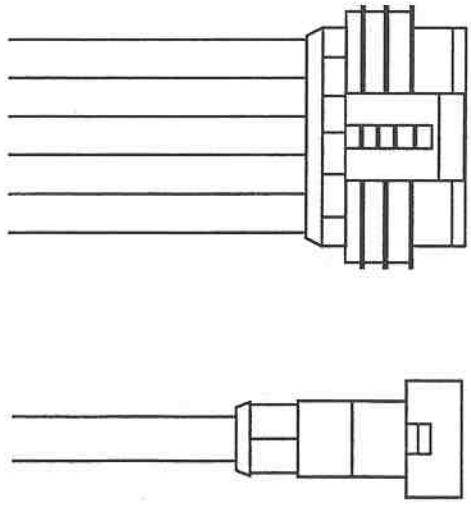

Figure 5 – **VDC harness assembly**

2.8 Final Inspection

Verify that all work has been completed according to your installation plan, and is in agreement with the National Fire Protection Association NFPA-30 "Flammable and Combustible Liquids Code", federal, state and local and any other applicable codes and regulations. Where applicable, adherence to European CENELEC requirements must be verified. Conduct a visual inspection to make sure all wires are secure and well protected. Do not attach any VDC cable to any moving parts, pneumatic or hydraulic lines or to clutch or brake cables.

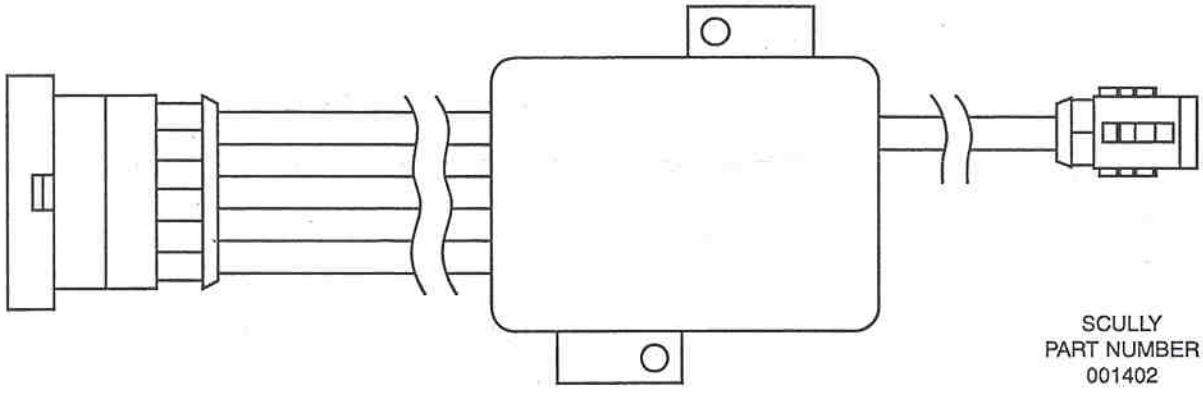

Figure 6 – **VDC with weatherproof connectors**