



# *Fleet*LINK<sup>®</sup>

## Fuel Control System

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### Vehicle Information Unit (VIU) Programming Manual

**OPW Fuel Management Systems -  
FleetLINK System and Replacement Parts Warranty Statement**  
Effective May 1, 2004

**FleetLINK System Components**

OPW Fuel Management Systems warrants that all components of the OPW FleetLINK System (excluding Pump, Nozzle and Vehicle components 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 (90 days labor) from the date of installation.

**FleetLINK Pump and Nozzle Components**

OPW Fuel Management Systems warrants all FleetLINK Pump and Nozzle components for ONE YEAR parts, 90 DAYS labor from the date of installation. Pump and Nozzle Components include the Pump Barriers, Nozzle coils and any associated wiring.

**FleetLINK Vehicle Components**

OPW Fuel Management Systems warrants all FleetLINK Vehicle components for ONE YEAR parts ONLY from the date of installation. Vehicle Components include the Vehicle Identification Unit (VIU) and the tank coil.

**Replacement Parts, New and Remanufactured**

OPW Fuel Management Systems warrants all upgrades and replacement parts (new and remanufactured, including Pump, Nozzle and Vehicle components) supplied by OPW Fuel Management Systems to 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.

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, 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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# Your Programmer Can Be Dangerous in Some Environments

## Please Read!



### Important safety information for VIU Programmer users

*Read this section before using your FleetLINK VIU Programmer. All references to the “Handheld” include the VIU Programmer, Programmer Interface, and Antenna Coils. Consult the PDA manual for additional safety information.*

## Radio Frequency (RF) Energy



Your Handheld is a low-power radio transmitter and receiver. When it is ON, it receives and transmits radio frequency (RF) signals.

### Electronic Devices

Most modern electronic equipment is shielded from RF signals. However, some electronic equipment may have insufficient shielding against the RF signals from your Handheld.

### Medical Devices

#### *Pacemakers*

Consult a physician or your pacemaker’s manufacturer if you have any questions regarding the effect of RF signals on your pacemaker. If you have a pacemaker, ensure you are using the Handheld and adapter according to the safety requirements of your pacemaker, including the following:

- Always keep the Handheld more than 20 cm (approximately eight inches) from the pacemaker when the Handheld is ON.
- Do not carry the Handheld in a breast pocket.
- If you have any reason to suspect that interference is taking place, turn your handheld OFF immediately.

#### *Hearing Aids*

Some digital wireless devices interfere with hearing aids. If this happens, contact the hearing aid’s manufacturer to discuss alternatives.

## *Other Medical Devices*

For other personal medical devices, consult the device's manufacturer to see if it is adequately shielded from RF energy. Or ask your physician to help obtain this information.



## *Medical Facilities*

Turn your handheld OFF in health care facilities wherever you see signs prohibiting cell phone or laptop computer use. Hospitals or health care facilities use equipment that may be sensitive to RF energy.

## **Potentially Explosive Atmospheres**



Turn your Handheld OFF when in potentially explosive atmospheres and obey all signs and instructions. Sparks in these areas might cause an explosion or fire resulting in serious injury or death.

Areas with potentially explosive atmospheres are usually marked, and include places like gasoline/petrol stations, bilges and engine rooms in boats, fuel or chemical transfer or storage facilities, areas around vehicles fueled by liquefied gas products like propane or butane, dusty areas like grain silos, and any other area where you are instructed to turn off your vehicle's engine.

## **Vehicles**

NEVER place the FleetLink Handheld near a vehicle fuel fill pipe with the fuel cap removed.

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# About the Vehicle Information Unit (VIU)

## Note

*Installation of the VIU is explained fully in the Vehicle Installation & Service Guide.*

## Overview

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

The VIU stores the following data:

- Fleet code number
- Vehicle number
- User number
- Fuel type
- Odometer readings
- Engine hours
- Pulse factor
- Pulse level

## Parameters Defined

### Fleet Code Number

This is a four-digit number that is unique to your site. The Fleet Code Number is assigned by OPW Fuel Management Systems. You cannot read (or program) a VIU without knowing the VIU Fleet Number.

### Vehicle Number

This is the unique number assigned to a vehicle. Numbers only, no letters! Vehicle Number can range from 0 to 999999999.

### User Number

This is a four-digit “miscellaneous” number, from 0 to 9999. Numbers only, no letters! The number appears in the Card #2 field of a System2 transaction record. It is not required; if you leave the entry blank, “0000” is automatically inserted in the Card #2 field.

### **Fuel Type**

This is a one-digit (1-9) number that IDs the kind of fuel this vehicle requires. This number should match the fuel type numbers programmed in the System2 FSC (please see your System2 Operator Manual for details).

### **Odometer**

This is a seven-digit number representing the vehicle's current odometer reading. You **MUST** install the VIU with this option **ENABLED** (see the *VIU Installation & Service Manual*).

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### **Note**

*For the Odometer and Engine Hours fields, it's crucial you set the Odometer Mode correctly; see page 9.*

### **Engine Hours**

This is a seven-digit number, essentially a clock showing the total hours the engine has run. You **MUST** install the VIU with this option enabled (see the *VIU Installation & Service Manual*). You can run two independent engine hour timers but if you do you cannot use the Odometer field.

### **Pulse Factor**

A four-digit number used by the VIU to convert pulses from the speed sensor into distance traveled.

### **Pulse Level**

A threshold voltage (in mV). The vehicle speed sensor output must exceed this value to be considered a valid signal. Enter a value between 80 mV and 4750 mV. Default is 2480 mV

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### **Note**

*The pulse level may be saved in the VIU with a small differential in mV. This is normal, and won't affect performance.*



## About the VIU Programmer

You use the VIU Programmer (*Figure 1*) to program the FleetLINK Vehicle Identification Unit (VIU) with vehicle-specific information, to confirm your programming, to test VIU functions and to do periodic inspections.

The Programmer consists of the following components:

- **A Palm® OS-based PDA (Personal Digital Assistant).** This is what runs the FleetLINK VIU Programmer software application.
- **A Programmer Interface.** This box allows the PDA to communicate with the FleetLINK VIU. The interface has a clip for attaching it to the belt or pocket of the person doing the programming.
- **A Serial Cable.** Attaches the PDA to the Programmer Interface.
- **Two Programmer Antenna Coils.** Two sizes, to fit most all vehicle fuel inlet pipes. The coil couples electronically to a matching antenna coil mounted on the vehicle's fuel inlet pipe.
- **Installation Software.**
- **This manual.**

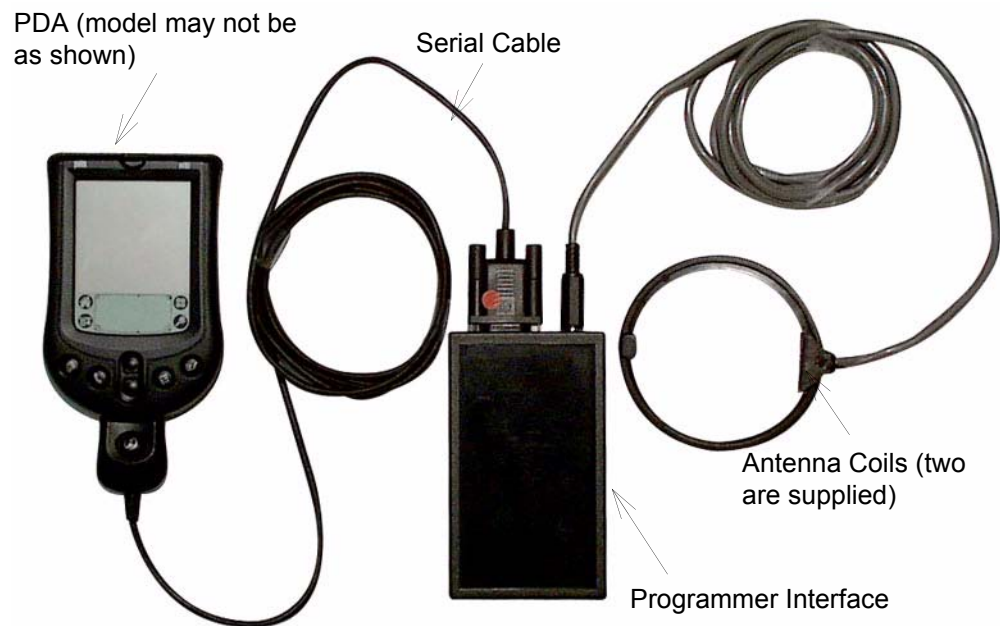


Figure 1: VIU Programmer Overview



# Using the VIU Programmer

## Warning



The VIU Programmer is NOT intrinsically safe! Do not use the Programmer around fuel vapors or other explosive environments. See *page 1* for more details.

Read this before using the VIU Programmer! This section gives you step-by-step instructions - please read them to assure accurate operation.

## Software Installation

1. Follow the PDA instructions to install its PC software, and to create a PDA-to-PC (sync) connection.
2. Install the FleetLINK CD into the PC. Find the file “Fleetlink-Install.prc” in the media provided and launch the application. You’ll now see an Install Tool screen (*Figure 2*) in your windows desktop.

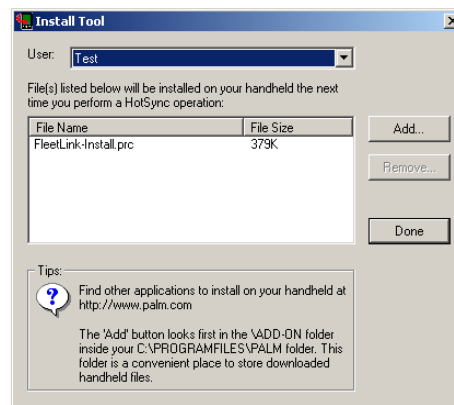


Figure 2: The “Install Tool” Form

3. Synchronize the PDA to your PC to transfer the application to the PDA.
4. After transfer is complete, you’ll find a FleetLINK Installation icon on the Main Menu of your hand-held device (top right). Tap the indicated icon to install the application on the hand-held (bottom right).

5. Tap the FleetLINK icon (the same as the Installation icon).



*Figure 3: FleetLINK Programmer Installation and Operation*

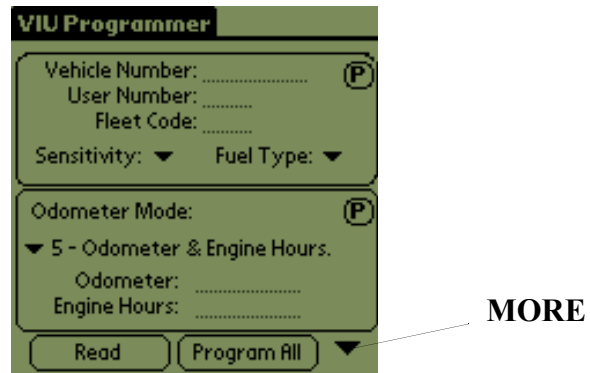
## Note

*The main screen of the FleetLINK application will take a few seconds to show, this is normal.*

# Operating the Software

## Main Menu

After tapping the FleetLINK icon and a brief pause, the Main Menu (*Figure 4*) appears on the PDA screen.



*Figure 4: FleetLINK Programmer Main Menu 1*

There are two areas on the screen, and two buttons. The down arrow (“MORE”) in the lower-right corner opens Main Menu 2 (*Figure 5* on page 10).

The “P”s inside circles are Program buttons. They send only the information associated with them to the VIU. To send everything in the PDA to the VIU at the same time, tap the **Program All** button.

## Main Data Entry Area

See *Figure 4*. See *Parameters Defined* on page 3 to learn more about the field entries.

## Odometer Mode Area

See *Figure 4* on page 9. Lets you choose the odometer mode, and enter an odometer value and/or engine hours.

### Mode Drop-down

- **0** = No odometer
- **1** = Odometer only
- **2\*** = Engine hours only

- 4 = Engine hours only on timer II
- 5 = Odometer and engine hours
- 6\* = Both timers count engine hours (2 independent timers)

**Odometer field** - Enter a value (up to 9999999) here.

**Engine Hours field** - OPTIONAL.

\* In odometer mode 2 and 6, pulse factor must be **5492**. The programmer automatically fills the Pulse Factor field with this value when you choose “2” or “6”.

## The MORE Menu

Tap the DOWN arrow to display another main menu (Figure 5). See page 4 for an explanation of the pulse factor and level fields.

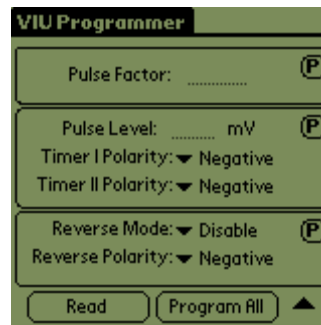


Figure 5: MORE OPTIONS Menu

## Note

*The pulse level may be saved in the VIU with a small differential in mV. This is normal, and won't affect performance.*

**Timer I and II Polarity** - Choose Negative or Positive from the dropdown.

**Reverse Mode** - To prevent pulses generated while a vehicle is driven backwards from reaching the VIU, *enable* this setting. If you want ALL pulses from the speed sensor to reach the VIU, *disable* this.

**Reverse Polarity** - Choose positive or negative for the reverse-mode pulses.

## Read Button

Place the programmer interface's transceiver antenna coil near the vehicle's antenna coil, then tap this button to read the contents of the VIU. For security, you must input the Fleet Code before you can read the VIU's contents.

## Program All Button

Tap this button to send all fields you've programmed in the programmer to the VIU. *The Programmer must be linked to the VIU through the Programmer Interface (see Figure 1 on page 5) before you execute this command.*

## Return to Main Menu Button

Tap the UP arrow to return to the "Main" screen (*Figure 4 on page 9*).

## Drop-down Menus

Tap the PDA's title bar (it says **VIU Programmer**, *Figure 5 on page 10*) to open the menu bar at the top of the screen. The menu bar contains **File**, **Edit**, **Help** and **More...** items.

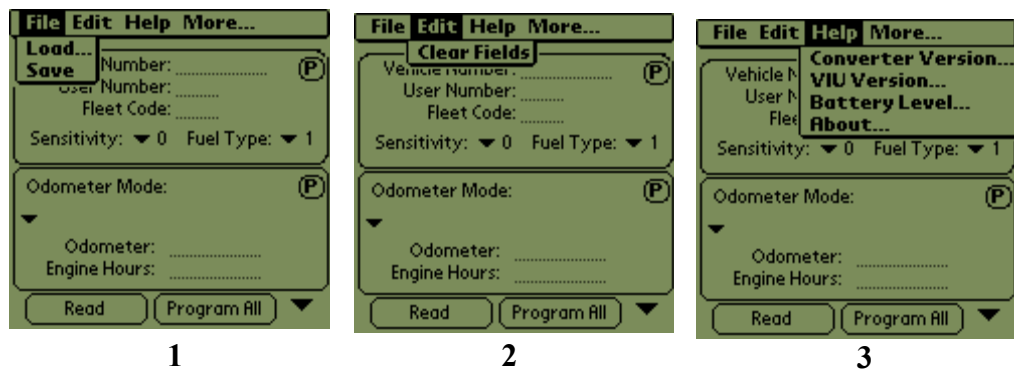
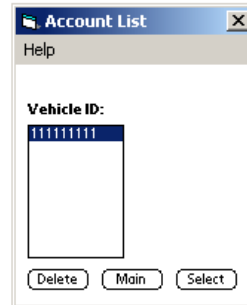


Figure 6: Drop-down Menus

## File

**Load.** This will show the account list screen, *Figure 7*.

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*Figure 7: Account List (File > Load...)*

**Save.** Saves the current Vehicle information to the PDA memory.

## Edit

**Clear Fields.** Select to clear data from all fields in all Programmer screens.

## Help

**Programmer Interface Version.** Displays the version of the firmware inside the Programmer Interface box.

**VIU Version...** Displays the version of the firmware inside the Vehicle Identification Unit.

**Battery Level...** Shows the voltage across the 9V Programmer Interface battery. Use the PDA's battery indicator to check the charge level of the PDA's battery.

**About...** Displays the version of FleetLINK Programmer software that's installed in the PDA.



## Step-by-Step Programming

### Note

*Familiarity with the Palm device is assumed. If you have never used a PDA, read the Palm's manual before you continue with these instructions.*

*Use the PDA handwriting recognition area (Palm) or enable the keyboard to enter the following values.*

1. Turn ON the Programmer and launch the FleetLINK application.
2. Place the Programmer's transceiver antenna coil over the VIU's antenna coil.
3. Make sure the VIU has power and that there's communication.

### Note

*You must enter a valid Fleet Code before you can read a VIU. At this point the Fleet Code should already have been entered.*

4. When you know that the VIU and the Programmer are communicating, enter a Vehicle Number (see page 3 for an explanation).
5. OPTIONAL - Enter a **User Number** (see page 3 for an explanation)
6. Leave **Sensitivity** at "0".
7. Select the **Fuel Type** code (see page 4 for an explanation) in the pull-down.
8. Click the **P** to send information entered to this point to the VIU.
9. Select an **Odometer Mode** from the pull-down list (see *Odometer Mode Area* on page 9 for details). This chooses what units the two timers inside the VIU measure -- time (Engine Hours) or distance (Odometer) or both.
10. Enter current miles in the **Odometer** field (see page 4 for an explanation), and/or current elapsed hours in the **Engine Hours** field.
11. Tap the down arrow (below the Odometer area) to go to the next menu.
12. Enter a **Pulse Factor** (see page 15 for an explanation).
13. Enter **Pulse Level** (see page 4 for an explanation).
14. Set **Timer I** and **Timer II** pulse triggering polarity to Positive.
15. Set **Reverse Mode** - if the vehicle generates speed pulses while driven backwards, choose Enable. If not, choose Disable.
16. If you enabled Reverse Mode, choose the polarity, positive or negative.

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## Note

*To disable the reverse function, set reverse polarity to (+) and disconnect the reverse signal (yellow wire on harness) wire or connect it to ground.*

## In Case of Programming Problems

In case of problems during programming, try some of these suggestions:

- Check the cable connections between the Programmer and the Programmer Interface.
- Make sure the transceiver antenna coils are close enough together.
- Make sure the Programmer's battery is charged (or are fresh batteries, in units without rechargeable batteries).
- Check the Programmer Interface battery level (**HELP > Battery Level...**). Replace the 9V battery if it's weak.
- Check that the Programmer works with a different VIU. If the programmer works, the trouble is with the VIU of the first vehicle. If it doesn't, replace the Programmer.

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# Programming a Pulse Factor

## Calculating an Initial Pulse Factor

Accurate odometer data requires an Initial Pulse Factor and at least one recalibration at a later date.

On vehicles with electronic dashboards, the speed sensor is built into the speedometer. Different vehicle manufacturers use a different number of pulses per mile.

If you don't know pulses per mile, do the following to get a Pulse Factor:

1. Use the Programmer to enter an initial Pulse Factor of "0" into the VIU.
2. Zero the VIU odometer reading with the Programmer.
3. Drive the vehicle slowly for one mile.
4. Read the odometer from the VIU with the Programmer. This is the approximate Pulse Factor to enter into the VIU.

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### Note

*If you cannot obtain a count, try programming a different pulse level into the VIU and measure incoming pulses at low speed with a scope. Set VIU pulse level to one-half the peak pulse amplitude. For example, if the peak pulse amplitude is 1V, set the pulse level to 500 mV.*

## Follow-Up Calibration

For accurate tracking with the vehicle odometer, recalculate the initially programmed pulse factor. The number depends on such variables as transmission ratio, and tire size and condition.

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### Important

*Drive at least 1000 miles before performing this procedure.*

The further you drive before recalibration, the more accurate the new factor will be. After reading the new VIU odometer, calculate the new pulse factor as follows:

$$\text{NEW FACTOR} = \text{OLD FACTOR} \times \frac{\text{NEW VIU} - \text{OLD VIU}}{\text{NEW DASH} - \text{OLD DASH}}$$

- NEW FACTOR** The new, more accurate pulse factor.
- OLD FACTOR** The pulse factor previously stored in the VIU.
- NEW VIU** The new odometer reading from the VIU.
- OLD VIU** The previous odometer reading from the VIU.
- NEW DASH** The new vehicle dashboard odometer reading.
- OLD DASH** The previous vehicle dashboard odometer reading.

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# VIU Maintenance

## Periodic Inspection

### Note

*Make sure the Programmer's battery is charged (if rechargeable) before use. Palm OS has a battery "gauge" on top of the main menu.*

To quickly "self-test" the vehicle information unit sub-system, do the following:

1. Attach the transceiver antenna coil cable to the Programmer Interface.
2. Attach the Programmer's cable to the PDA and the Programmer Interface.
3. Place the Programmer Interface's transceiver antenna coil within two inches (5 cm) of the VIU antenna coil (over the fuel tank inlet). This couples the programmer to the transceiver antenna coil of the VIU.
4. Input the Fleet code and read the VIU. Check that the following readings are correct:
  - Displayed vehicle identity to its nameplate
  - Displayed fleet code/user identity against prescribed parameters
  - Displayed fuel type and grade against vehicle manual
  - When the Odometer Reading option is used, check displayed value against vehicle mileage
  - When Odometer Reading is used, compare displayed calibration factor with value prescribed for this type of vehicle
5. Repeat Steps 1 and 2 above for any additional transceiver antenna coils on the vehicle. Parameters should be identical to those read by positioning programmer antenna coil near or over the first VIU antenna coil.

# Troubleshooting

## Odometer Reading Does Not Change

Use **Read** in the hand-held programmer to monitor odometer reading. Use the appropriate section: *Speed Sensor Included in Installation* or *No Speed Sensor in Installation*.

### *Speed Sensor Included in Installation*

#### **Electronic Speed Sensors**

If the electronic speed sensor has three or four leads, measure the voltage between pin 2 and pin 6 of the 6-pin VIU-2 connector. Correct value is +5V  $\pm$  0.5V. Replace the VIU if voltage is outside this range.

#### **Magnetic Speed Sensors**

### Note

*For magnetic speed sensors, use the Programmer to set Pulse Level to 1500 mV.*

If there is no odometer change, check the wiring to the speed sensor, and the connections on the speed sensor. ALSO -- Check if the sensor is too far from the gear teeth to get a good reading.

If these steps fail to fix the problem, check the speed sensor with a scope as follows:

1. Attach the scope leads to the speed sensor output wires.
2. Set VOLTS/DIV to 2V/division.
3. With driving wheels off the ground, and your foot on the brake, start the vehicle and put it in gear.
4. Release the brake slowly. You should see a low-voltage sine wave on the scope (about 2V p-p).
5. If you determine the speed sensor is defective, replace it with a known good unit. IF you STILL don't get good results, replace the VIU.

#### **Installations Without a Speed Sensor**

1. Check that the signal at the dashboard connection points is correct, according to vehicle manufacturer specification
2. Recalibrate pulse level using the Programmer.
3. Check harness connections.

4. If all else fails, replace the VIU.

## Engine-Hours Reading Does Not Change

1. Use the Programmer to monitor engine-hours reading -- choose an **Odometer Mode** that displays engine hours, then tap the **Read** button.
2. Start, then stop, the vehicle engine. Look for a large voltage difference (up to +5V) between pins 1 and 5 of the 6-pin connector between when the engine is started and stopped.
  - *For first-time installations, make sure wiring is correct (see the Vehicle Service & Installation Manual). If wiring is good, the problem is in the vehicle equipment.*
3. Note the voltage measured between when the engine runs and when it is stopped. Then, use the Programmer to change **Timer Polarity** as follows:
  - *If the voltage is **lower** when the engine is running, set the appropriate Timer Polarity to Negative.*
  - *If the voltage is **higher** when the engine is running, set the appropriate Timer Polarity to Positive.*
4. If after this procedure the engine hours reading does not increase by one approximately every six minutes, replace the VIU unit.

## Odometer Reading Does Not Match Registered Mileage

Typically, this appears as an increase from fueling to fueling, and could be caused by several factors:

### *Pulse Factors*

Reprogram with values specified for this vehicle. See *page 21* for a Vehicle Calibration Factors Form, and *page 15* for instructions how to calibrate.

### *Transmission*

Take into consideration any optional or custom-made transmission gear box that could be installed in this vehicle model.

### *Loose or Defective Speed Sensor*

Inspect and tighten speed sensor and mounting.

### *Defective Vehicle Equipment*

Check the Programmer's (and Programmer Interface) operation on another vehicle. If the Programmer works, the trouble is with the VIU of the first vehicle. Otherwise, replace the Programmer.

### *VIU Cannot be Programmed*

The Programmer, the VIU or something in the vehicle is preventing programming from taking place:

- **Programmer Battery.** Make sure the PDA's battery is fresh or (if it's rechargeable) that it's charged.
- **Programmer Interface Battery.** Check with the **Help > Battery Level** function in the Programmer. Replace with a new alkaline 9V.
- **Cable Connections.** Check the cable between the Programmer and Programmer Interface, and between the Programmer Interface and the antenna coil.
- **Vehicle Battery Voltage** across VIU pins 3 (+) and 6 (-). It should equal the vehicle battery voltage. If it's not, check fuse and troubleshoot the wiring to the pin connector.











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