NOTE: DO NOT DISCARD the Parts List from the Instruction Bulletin. Place the Parts List in the appropriate place in your machine manual for future reference. Retaining the Parts List will make it easier to reorder individual parts and will save you the cost of ordering an entire kit.

NOTE: Numbers in parenthesis ( ) are reference numbers for parts listed in Bill of Materials.

Installation Instructions for Kit number 760145

SYNOPSIS / PROBLEM:

This kit contains the parts needed to install a Speedometer kit on the model 830 sweeper. Please follow step-by-step instructions.

SPECIAL TOOLS / CONSIDERATIONS: None

(Estimated time to complete: **2** hours)

INSTALLATION:
(Refer to FIG. 1, 2 and 3)

FOR SAFETY: Before leaving or servicing machine, stop on level surface and set parking brake. Then turn off machine and remove key.

1. Disconnect battery cables from machine.

⚠️ **WARNING: Always disconnect battery cables from machine before working on electrical components.**

2. Locate and remove the plug for the magnetic pickup on the left, front side of the front axle, just ahead of the propel pump.

3. Be sure the tapped hole is clean. Look into the tapped hole with a light to be sure the top of a gear tooth is lined up in the hole.

4. Locate the magnetic pickup (2) in this kit. Run the two jam nuts all the way back to the shrink tubing. Coat the threads with a thread sealant (Loctite PST or equal).

5. Screw the magnetic pickup (2) into the threads in the housing until it makes contact with the gear tooth.

6. Back the magnetic pickup (2) out of the housing, away from the gear tooth, 1/4 to 1/2 turn. **This is very critical-**–if the pickup is to far away--it will not function, if is to close--the gear tooth will shear off the magnet.

7. When the magnetic pickup is properly positioned--lock the jam nuts.

8. Route the wiring harness (8) in the cab. The yellow and blue wires with the weatherpak connector are routed out the bottom of the cab and down to the magnetic pickup. The white wire is spliced to # 63 white at the FU-8 in the fuse box. The black wire is attached to the ground terminal of the cigarette lighter with 13K. The yellow wire is spliced to the yellow # 32A at terminal 87 of relay M6.

9. Use the dimensions in FIG. 2 to mark and drill two .203 in. mount holes in the dash mounted sun visor.

10. Use the dimensions in FIG. 3 to mark and drill one .625 in. hole on the left side of the dash panel.

11. Route the harness (8) through the .625 hole drilled in the previous step. Install the grommet (1) in the .625 in. hole.

12. Route the wires into the speedometer cup weldment (4). Install the grommet (3) into the wire access hole in the cup.

13. Mount the speedometer gauge (7) in the cup weldment (4).

14. Mount the cup (4) and speedometer (7) on the dash sun visor. Use the speedometer strip behind the sun visor.

15. Reconnect the battery and turn on the key. Program the speedometer calibration using the enclosed instructions. Set the pulses at 119,470 mph (74,237 Km). Instructions on how to use the trip meter are enclosed starting on page 5.
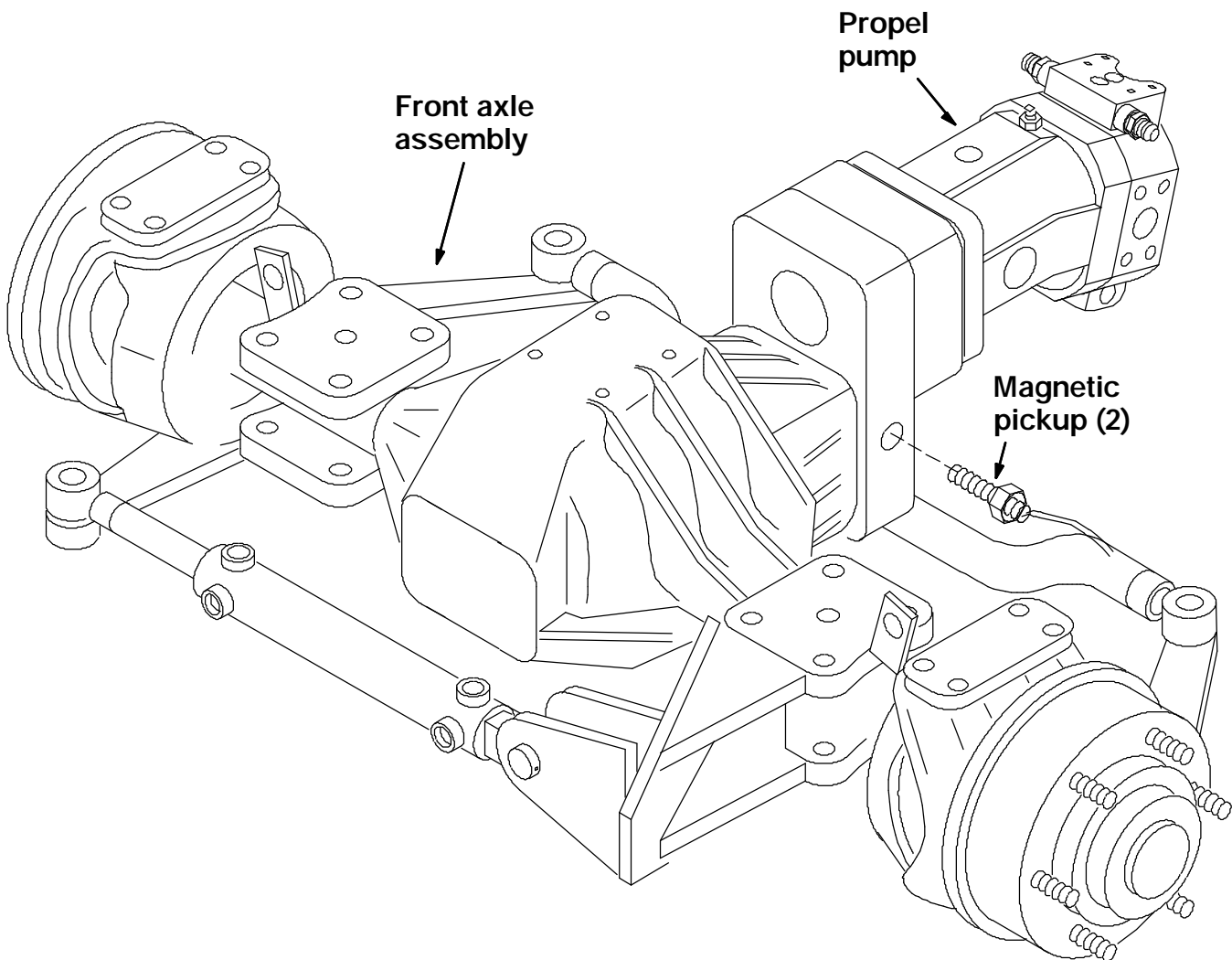

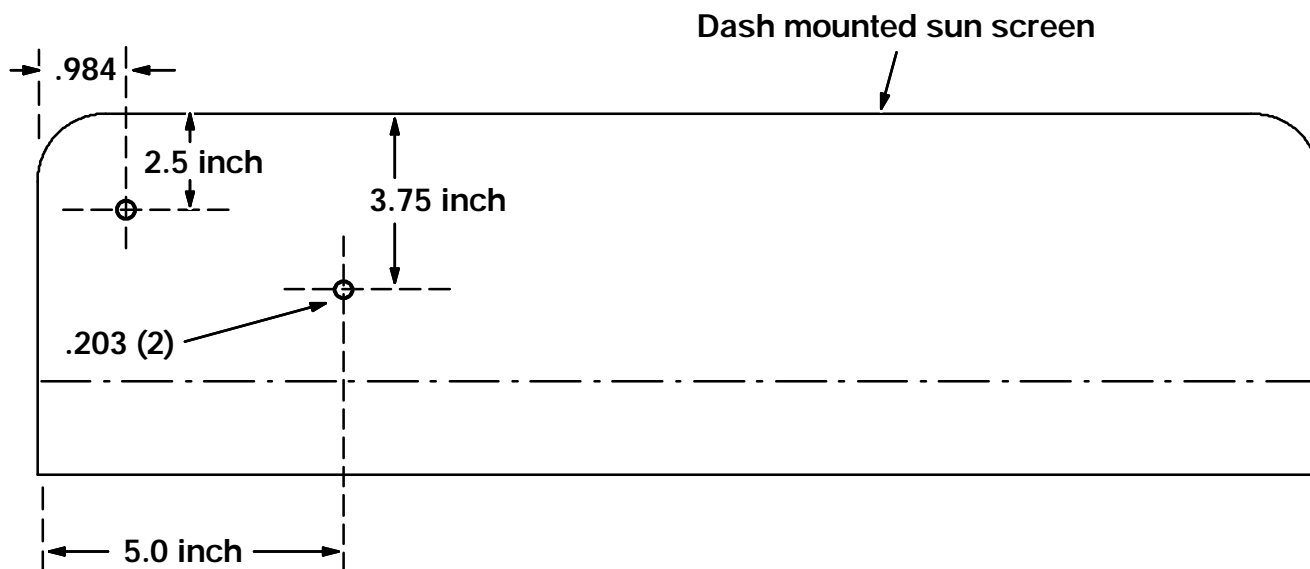**FIG. 1 – Front Axle And Magnetic Pickup Assembly**

.984

2.5 inch

3.75 inch

Dash mounted sun screen

.203 (2)

5.0 inch

FIG. 2 – Dash Sun Screen Hole Location

Drill .625 inch
hole here

Dash sun
screen
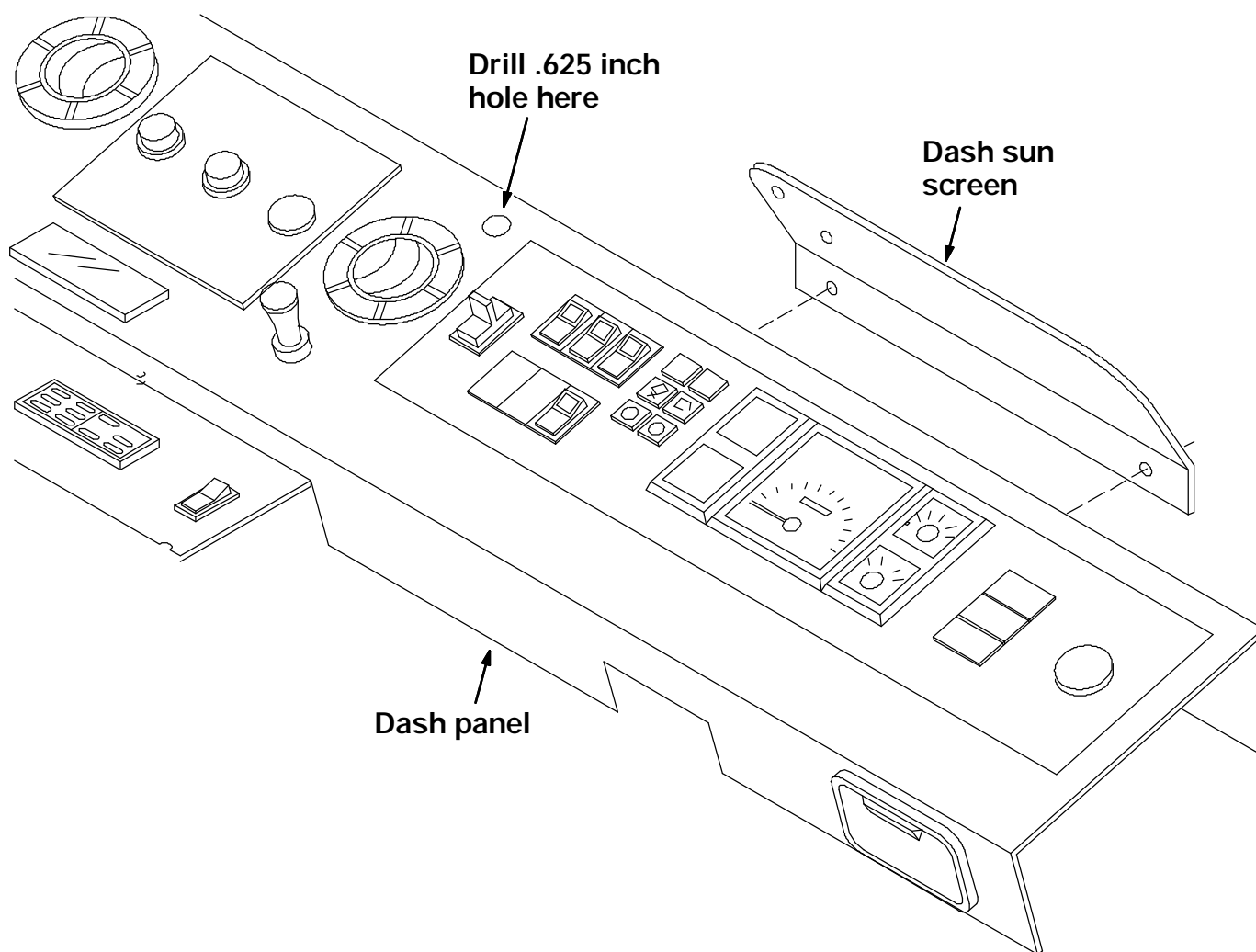
Dash panel

FIG. 3 – Dash Panel Hole Location

Electronic VDO gauge
119,470 pulses/mile
74,237 pulses/km

M6 #87   32 Yel

FU-8
63 wht   63 wht

Amp Connector
Pin #7
Yel

Amp Connector
Pin #8
Blu

Amp Connector Pin #4

Magnetic pickup (2)

8 7 6 5

4 3 2 1

Back of speedometer
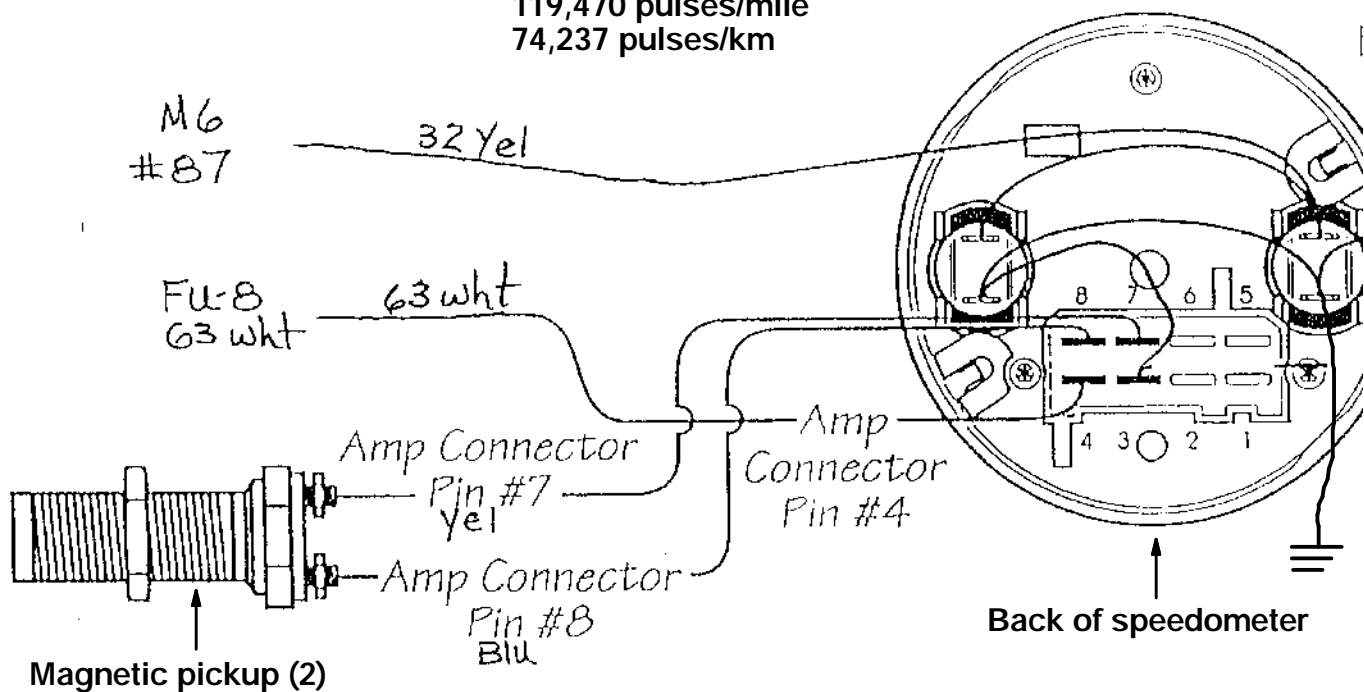
FIG. 4 – Speedometer Wiring

BILL OF MATERIALS FOR SPEEDOMETER KIT 760145

Ref.	TENNANT Part No.	Description	Qty.
1	10632-20	Rubber grommet, .38id	1
2	59946	Magnetic pickup	1
3	59999	Rubber grommet, .44id	1
4	761546	Speedometer cup weldment	1
5	761550	Speedometer strip	1
6	761584	Stud mounting kit	1
7	761585	Speedometer, 0-45 mph	1
8	762597	Speedometer harness	1

Item	Description	Quantity
1.	Speedometer	1
2.	Mounting Nut	1
3.	Light Socket	2
4.	Standard 12-volt U.S. Light Bulb	2
5.	Installation/Operation Instructions	1

❶   ❷   ❸   ❹   ❺
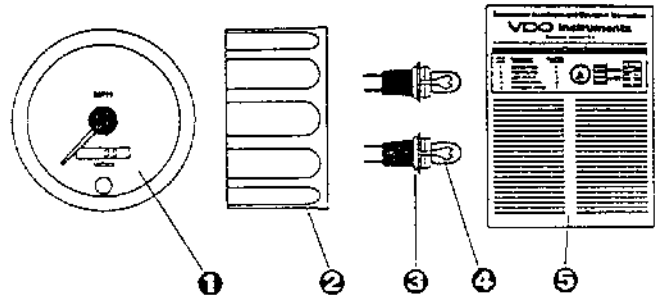
Tools and Additional Materials Needed for Installation:

Hole saw or jigsaw (may not be needed)
AMP connector (AMP Housing #925276 and
AMP Terminal #42100-1) / or / ¼" Spade Terminals
Miscellaneous electrical connectors
Philips and/or flathead screwdriver
Pliers and/or wrenches
Crimping tool and/or soldering iron (may not be needed)

> CAUTION: Read these instructions thoroughly before making installation. Do not deviate from assembly or wiring instructions. Always disconnect battery ground before making any electrical connections. If in doubt, please contact your dealer or VDO Instruments at (540) 665-2428.

General Information

The VDO Speedometers featured in this installation manual are available in two diameters: 3 ⅛" (80 mm); and 3 ⅜" (85 mm). The speedometers are also available with different dial faces (MPH, Km/h or MPH–Km/h). These instructions describe the installation, wiring, calibration and operation of all VDO Programmable Speedometers with an LCD display.

Incorporated into each speedometer is the latest VDO microprocessor technology for measuring speed and distance. These instruments can be used in Original Equipment Manufacturer applications as well as in aftermarket installations.

Each speedometer's analog display clearly shows the rate of speed the vehicle is travelling as measured in miles per hour, kilometers per hour, or both.

Additional functions, like accumulated distance, trip distance, "HELP," and calibration can be viewed on the speedometer's LCD display.

VDO Speedometers featured in this series can be calibrated in any of three ways:

- ■ Automatic calibration (calibration, speed and distance): **AUTOCL**
- ■ Manual calibration if you know the necessary calibration values: **PULSE**
- ■ Calibration using a reference value or line adjustment: **ADJUST**

Finally, these speedometers can be used with *inductive* and *hall-effect* speed sensors.
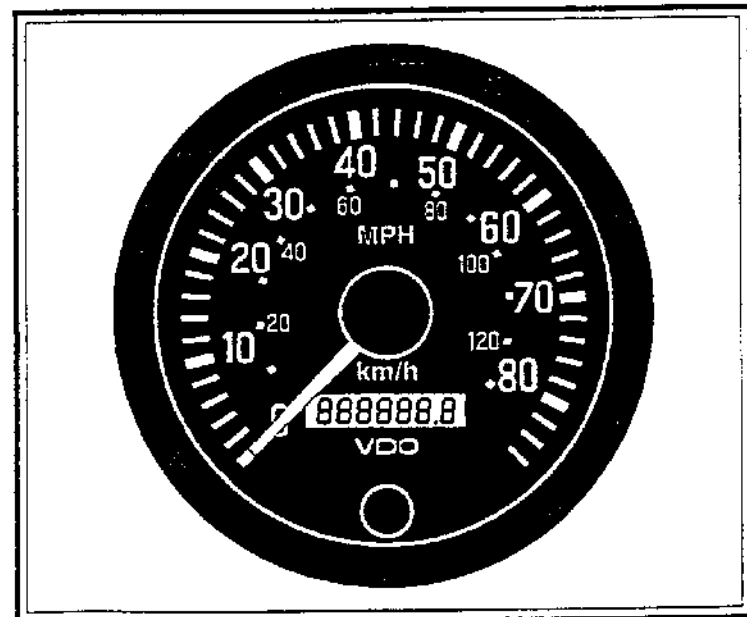

Diagram A
Both the 80 and 85mm *Speedometers with LCD Display* feature auto-calibration

Part #0 515 010 279 Rev. 12/95

eter with a 12-volt sensor in a system with 24-volt line voltage, attach the wire from AMP connector pin #2 to the sensor's +12 volt input wire. REMEMBER, *only do this in a system with 24-volt line voltage and 12 volt sensor!*)

4b. If you are using an inductive speed sensor, connect one terminal to AMP connector pin #7. Connect the other terminal to AMP connector pin #8.

4c. If you are using an electronic transmission, connect its speed signal wire to AMP connector pin #8.

5. Crimp a spade connector onto a short piece of wire, and attach the connector to a terminal on one of the supplied lamp sockets. This lamp socket will be referred to as Socket A.

6. Crimp the other end of the short piece of wire, along with a second piece of wire (long enough to reach the light switch) into another spade connector. Attach this connector to a terminal on the remaining lamp socket, which will be referred to as Socket B.

7. Run the other end of the longer wire to the light switch, and solder it to the positive side of the switch [or cut the positive wire to the switch, and splice both sides of the cut wire to the wire from the speedometer light sockets. Use a butt splice or other appropriate connector].

8. Crimp a spade connector onto a short piece of wire, and attach the connector to the remaining terminal on Socket A.

9. Crimp the other end of the short piece of wire, along with a second piece of wire (long enough to reach the ground connection on the light switch) into another spade connector. Attach this connector to the remaining terminal on Socket B.

10. Run the other end of the longer wire to the ground side of the light switch, and solder it [or cut the ground wire to the switch, and splice both sides of the cut wire to this wire from the speedometer light sockets. Use a butt splice or other appropriate connector].

11. Reconnect the battery and turn on the ignition to make sure the speedometer is working. Every time you turn on the ignition, the speedometer will do an automatic self-test. During this self-test, the pointer moves over the whole scale range, and the LCD display shows the word "TEST." After the test is completed, the display will reveal either the trip distance or the total distance, depending on which one was selected when the
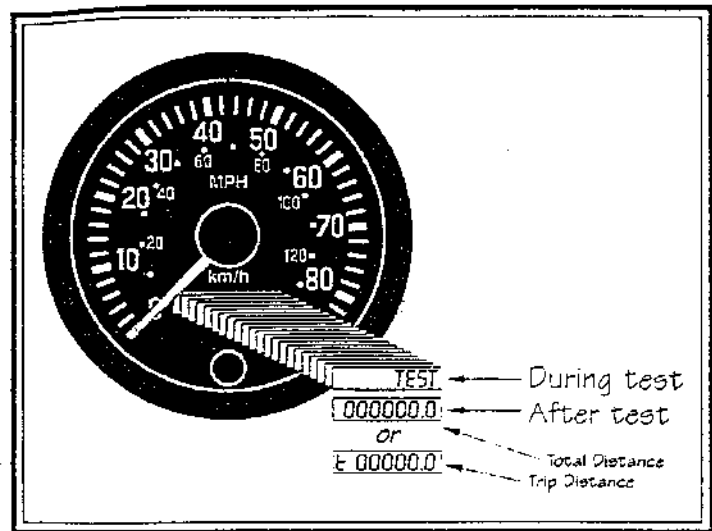

Diagram E
The LCD on the speedometer will show this display during, then after the self-test.

ignition was turned off. Since this is the first time power has been applied to the instrument, the reading will be 000000, or 0000.0. If everything is working properly, the installation is complete. If it isn't, re-check your wiring.

III. Calibrating the Speedometer

Calibration of the VDO *Speedometer with LCD Display* is a relatively simple procedure, and can be accomplished in any of three ways:

- Automatic calibration when driving on a road with the exact distance of 1 mile clearly defined; or on a dynomometer...

- By the input of the known pulse-per-mile (kilometer) for the vehicle and sensor being used with the speedometer...

- Using a reference point for adjustment or fine tuning.

You gain access to the calibration functions by pressing the button on the front of the speedometer and holding it in while you turn on the ignition. As you continue to hold in the button, the display will change...scrolling through the three calibration methods and stopping on each one for about two seconds.

The display lists the auto-calibrate mode as **AUTOCL**; the pulse-per-mile mode as **PULSE**; and the reference/fine-tune mode as **ADJUST**. When you see the method you wish to use, let go of the button and that function will be enabled. See Diagram F on the next page.
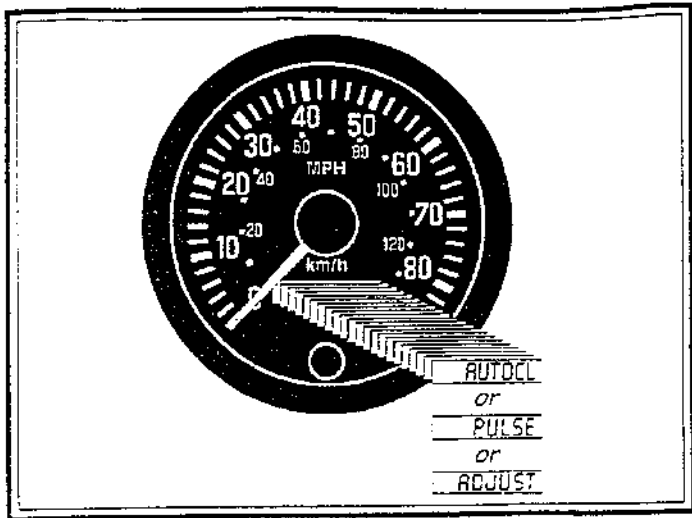
Diagram F
Calibration modes as displayed on the Speedometer's LCD

1. Autocalibration (**AUTOCL**)

The auto-calibration function can be used successfully only on: ❶ A test road with the distance of one mile accurately designated or ❷ A dynomometer.

To use the autocalibrate mode:

1. Press the button on the front of the speedometer, hold it in, and start the engine. Release the button when the display reads, "**AUTOCL.**"

2. After three seconds, the word "**BUTTON**" will show on the display. When you are ready to begin your calibration run, press the button again. The display will now begin flashing the word "**START**."

3. Now drive the reference distance of one mile (or 1 kilometer). *NOTE: As you drive this distance, the speedometer needle will not register or move. This is a normal occurrence during the autocalibration process.*

4. When you have gone *exactly* one mile, press the button again. If the electronic impulse rate detected by the speedometer's microprocessor is within the calibration range limits of 500 to 399,999, the rate will be shown on the LCD display. For example, your reading might be "P16000 ≙ Calibration Range 16000). Such a display indicates that the impulse rate detected during the reference mile you drove exactly matches the microprocessor's programmed rate for 1 mile. That means the speedometer is now perfectly calibrated to provide the most accurate display possible of both speed and distance. The speedometer finishes its autocalibration by moving the pointer through a full sweep, then back down to zero.

However, if the speedometer detects any kind of error during your run, the LCD will display the following mes-

sage: "**P00.**" This means no useable impulse was detected. In this case, simply turn off the ignition, and start the process again.

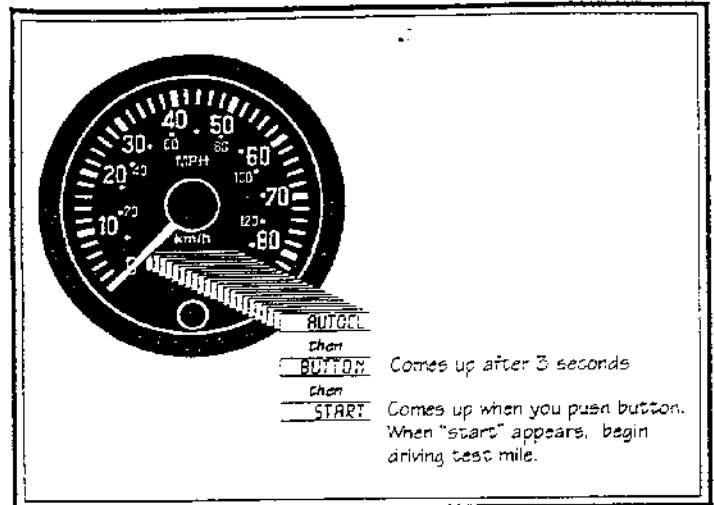**NOTE: During the auto-calibration run, the pointer on the speedometer will not operate.**

Diagram G
LCD Sequences as they appear during Automatic Calibration

2. Manual Calibration with a known value (**PULSE**)

If you known the exact calibration value for the vehicle and type of sensor you are using (pulse-per-mile or pulse-per-kilometer), you may use that value to manually calibrate the speedometer.

To calibrate your VDO Speedometer manually:

1. Press and hold in the button on the front of the speedometer as you start the engine. Hold in the button until
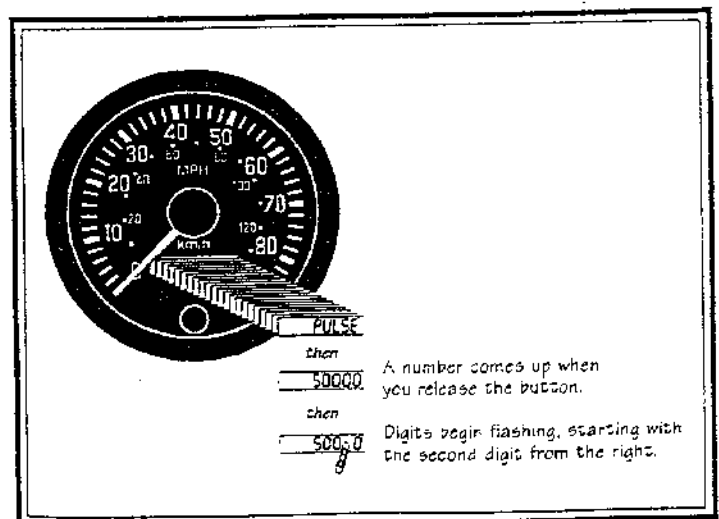

Diagram H
LCD Sequences as they appear during Manual Calibration

the word "**PULSE**" is displayed on the LCD readout.

2. As soon as you see the word "**PULSE**," release the button. After a few seconds, the display will start flashing a series of numbers (factory default setting) that you can change to represent the correct calibration impulse value. For example, a number like 50000 will show on the display, with each digit flashing in turn, except for the last digit on the right, which is fixed: first, the second 0 from the right; then the third 0 from the right; then, the next 0; and finally, the 5.

3. As each number flashes, press the button to change it until the correct digit appears (that is, the number you wish to input).

For example, let's say the number that represents the correct calibration value for your vehicle and sensor is "43850." When you begin the manual calibration process, the LCD displays a default value. Each digit, except the one farthest to the right, will flash, in turn, from right to left. Wait until the second digit from the right starts to flash again. When it does, press the button to start cycling through the numbers available for this digit. When the number "5" appears, release the button.

At this point, the number "5" is set, and the digit to its immediate left begins to flash — the middle digit. Press the button again, and hold it until the number "5" appears. Release the button. Now, the second digit from the left begins to flash. Again, hold in the button until the number "3" appears. When it does, all but the leftmost digit are set. Repeat the process to set the "4" and the value in our example is set. The value "43850" should be displayed on the LCD readout.

4. When you are satisfied you have properly entered the correct calibration value — when that value is displayed on the LCD readout — take your finger off the button and wait. After a few seconds, the value you have entered will be downloaded into the speedometer's microprocessor, and the speedometer will revert back to normal operating mode. At this point, the manual calibration process is complete.

In the future, you can use this method to update the calibration value stored in the computer should it ever become necessary. This function also allows you to manually adjust the calibration value after you perform the automatic calibration process.

3. Manual Calibration (Fine Tuning) (**ADJUST**)

You can fine-tune the calibration of the speedometer's analog display (the pointer showing miles-per-hour or kilometers-per-hour) by using speed test equipment and

the "**ADJUST**" function on the LCD readout. The pointer can be repositioned anywhere within the calibration range of the speedometer.
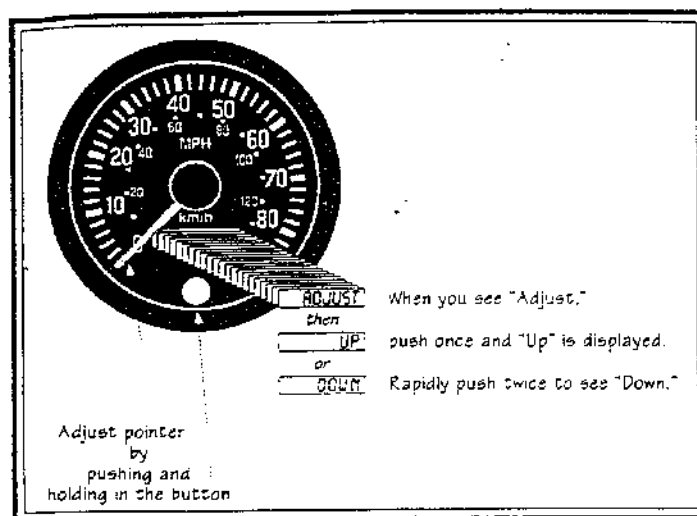

Diagram I
Calibration of the analog (pointer) display on the speedometer

To manually calibrate the pointer on the analog display:

1. Press and hold in the button on the speedometer as you turn on the ignition and start the engine. Hold in the button until the word "**ADJUST**" shows up. When it does, release the button.

2. Press the button once, and the word "UP" will be displayed on the LCD readout. Press it twice, in rapid succession, and the word "DOWN" will be displayed. So if you need an upward calibration of the pointer, press the button once. If you need a downward calibration of the pointer, press the button twice in rapid succession.

3. When either "UP" or "DOWN" is showing, press the button again, and hold it in. If you hold the button in for just a short time, the pointer will move slowly either upwards or downwards, depending on which mode you selected. This allows for a very accurate adjustment of the pointer. Holding the button in for a longer period of time makes the pointer move faster.

4. When you have repositioned the pointer where you want it, release the button and wait. If no further adjustments are made within one minute, the speedometer will revert back to the normal operating mode.

NOTE: If you move the pointer past the upper limit of the calibration range, the LCD display will flash and you will only be able to adjust the pointer downward. If you move the pointer past the lower limit of the calibration range, the LCD display will also flash, and you will only be able to adjust the pointer upward.

IV. Operating the Speedometer

When the speedometer is in the normal operating mode, the LCD readout acts as an odometer, allowing you to display either total miles driven, or trip distance. Total mileage is counted up to 999,999.9 miles. Trip distance is counted up to 99,999.9 miles.

To display either Total Mileage or Trip Distance:

1. Quickly press the button. If the *Total Mileage* had been showing on the LCD readout, it will change to *Trip Distance* when you push the button. If the *Trip Distance* had been showing, the display will change to reveal *Total Mileage*.

To reset the odometer Trip Distance display to zero:

1. Push and hold in the button for about two seconds. The odometer will reset to 0.0 miles. Be aware that pushing and holding in the button will reset *Trip Distance* to zero regardless of which display is currently showing on the LCD readout — *Trip Distance* or *Total Mileage*.
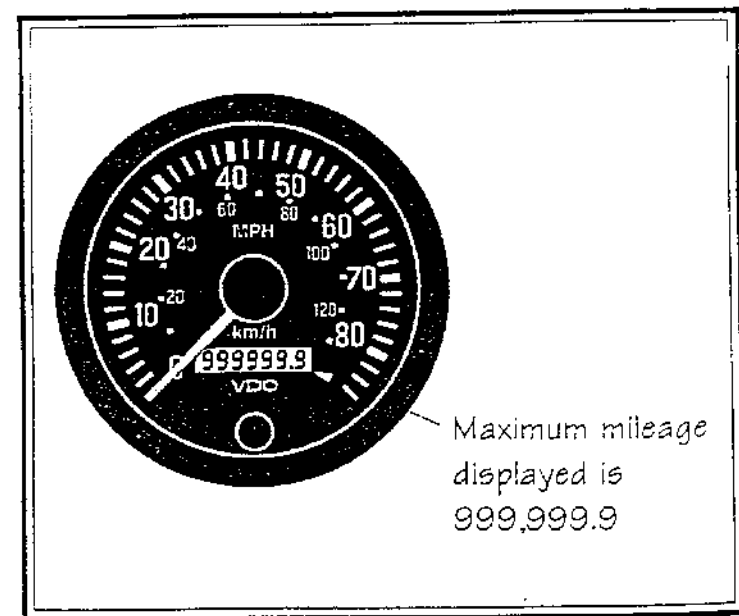

"ϲ" is displayed when TRIP DISTANCE function is selected. Maximum mileage displayed is 99,999.9

Diagram K
The LCD display showing Trip Distance

Maximum mileage displayed is 999,999.9

Diagram J
The LCD display showing Total Mileage

TECHNICAL DATA

Operating voltage:	10.8 – 32 Volts
Operating current:	< 100 mA (< 600 mA with light)
Operating temperature:	–4° F to 158° F (-20° C to 70° C)
Protection:	IP65 (Front) Ozone and UV resistant housing
Dimensions— Depth: Diameter:	3.6" (91 mm) 3 ⅛" (80 mm) 3 ⅜" (85 mm
Illumination:	Backlit / Frontlit dial and display
Calibration range:	500 to 399,999 pulses per mile or kilometer