VDO® North America

Speedometer Installation and Operation Instructions
for Programmable Speedometers with LCD Display

INSTRUCTIONS FOR THE INSTALLATION AND OPERATION OF THE PROGRAMMABLE SPEEDOMETER ARE CONTAINED HEREIN. USE IS RESTRICTED TO 12-VOLT OR 24-VOLT NEGATIVE GROUND ELECTRICAL SYSTEMS.

CAUTION!!!

These instructions contain information about gauges of different sizes. *You must determine the size of your gauge before cutting any holes!*

Tools and Materials Needed For Installation:

Hole saw or jigsaw (may not be needed)
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)

Parts List

Item	Description	Quantity
1.	Speedometer	1
2.	Lamp Socket (Push in, wedge-type)	2
3.	Light Bulb (12-volt / G.E. #158 or equivalent)	2
4.	VDO Spin-Lok™ Mounting Clamp	1
5.	Installation/Operation Instructions	1

General Information

The VDO Programmable Speedometers featured in this installation manual are available in three diameters: 3⅛" (80 mm); 3⅜" (85 mm), and 4" (100 mm). The speedometers are also available with different dial faces: (MPH, Km/h or MPH–Km/h).

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

VDO Programmable Speedometers can be used with *inductive*, *hall-effect, reed* and on manual transmissions, with *OEM sensors.* Use with electronic transmissions requires the speedometer be hooked up to the electronic transmission control box. Intermittent shifting may occur when connecting directly to OEM sensors *in electronic transmissions.*

These instructions describe the installation, wiring, calibration and operation of all VDO Programmable Speedometers with LCD display.

CAUTION; Read these instructions thoroughly before installing the speedometer. Do not deviate from assembly or wiring instructions. Always disconnect the battery ground before making any electrical connections. If in doubt, please contact your dealer or VDO North America at **(800)265-1818**.

Sensor Installation

The speed sensor necessary to provide the signal to your new VDO Speedometer is not included. This sensor is available from your auto parts dealer. (Part numbers for VDO Hall Effect Sensors are: 340 011; 340 012; 340 013; and 340 014. The VDO Generator Sensor is Part # 340 001. VDO's Inductive Sensor is Part # 340 020 or 340 021.)

I. Mounting the Speedometer

1. Refer to Diagram B for dimensions. The 3⅛" (80 mm) speedometer requires a hole diameter of 3⅛" (80mm); the 3⅜" (85 mm) speedometer requires a hole diameter of about 3⅜" (85 mm); and the 4" (100 mm) speedometer requires a hole diameter of about 4" (100 mm). If you are mounting the speedometer into an existing panel, remember that the panel cannot be more than ¾" (20 mm) thick. Minimum mounting depth is 3⁹⁄₁₆" (91mm).

2. Careful measuring is a must for proper mounting of your speedometer. An improperly placed hole would be a costly mistake, so measure everything twice. *REMEMBER: THERE ARE NO SECOND CHANCES ONCE YOU HAVE MADE YOUR HOLE! MEASURE TWICE... CUT ONCE!*

3. Cut the hole. If you do not have a hole saw the exact size needed, use the closest **SMALLER** size, and carefully widen the hole with a half-round file or other similar device.

4. Place the speedometer in the opening and secure it with the supplied VDO Spin-Lok clamp as shown in Diagram C. You may also mount the speedometer with a VDO mounting bracket and nuts [*optional – must be purchased separately; they are available from your VDO dealer*].

II. Wiring the Speedometer

1. Prepare insulated ¼" spade terminals for use with the speedometer. Make sure all wires are long enough to reach the necessary positive and negative terminals and any wires from the sensor.

2. Connect the wire from pin #4 to a switched +12 volt or +24 volt source. A switched +12 or 24 volt wire can be found coming from the ignition switch. Follow this wire to a junction, and attach the wire from the speedometer. Refer to Diagram D for the proper wiring of the speedometer.

3. Attach the wire from pin #3 to a ground (negative) source. One such source can always be found where the battery is attached to the metal frame of the vehicle. Use an appropriate electrical connector to ground this wire.

4a. If you are using a hall effect speed sensor, attach the three hall effect sensor wires to the speedometer head as follows:

    a) **RED** to Terminal #2;
    b) **BLACK** to be piggy-backed to Terminal #3 and on to a suitable ground;
    c) the **OFF-WHITE** wire to a butt-splice with two wires coming out of the butt-splice going to Terminals #6 and #8.

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

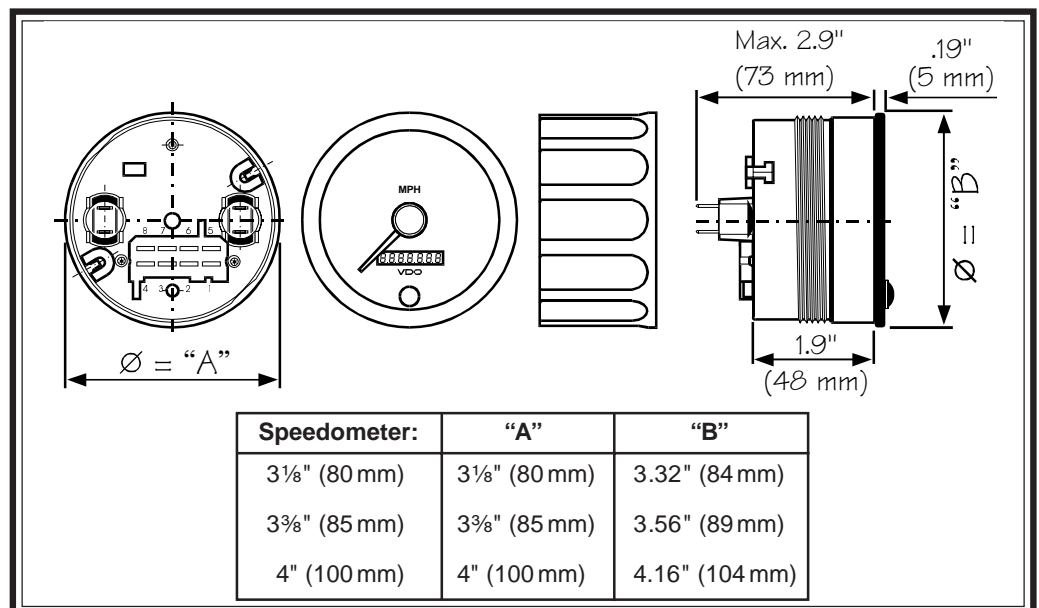4c. If you are using an electronic transmission, connect its speed signal wire to pin #8.

Diagram A
All *VDO Programmable Speedometers with LCD Display*
feature auto-calibration

Max. 2.9" (73 mm)   .19" (5 mm)

1.9" (48 mm)

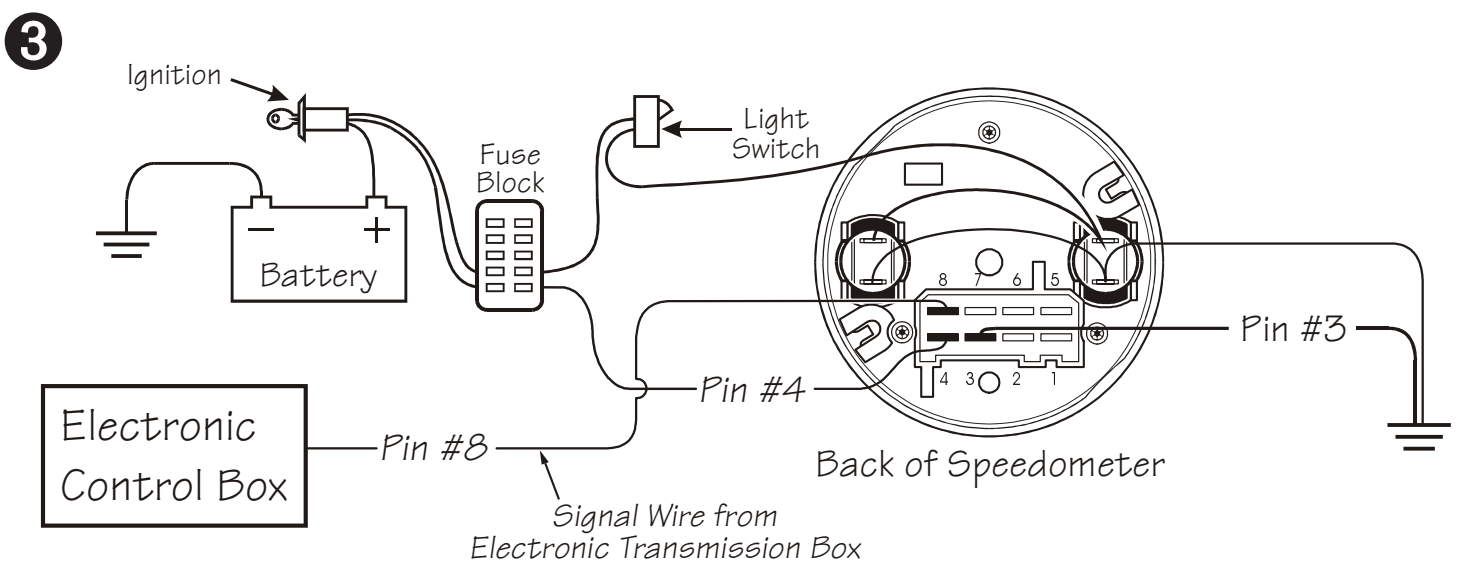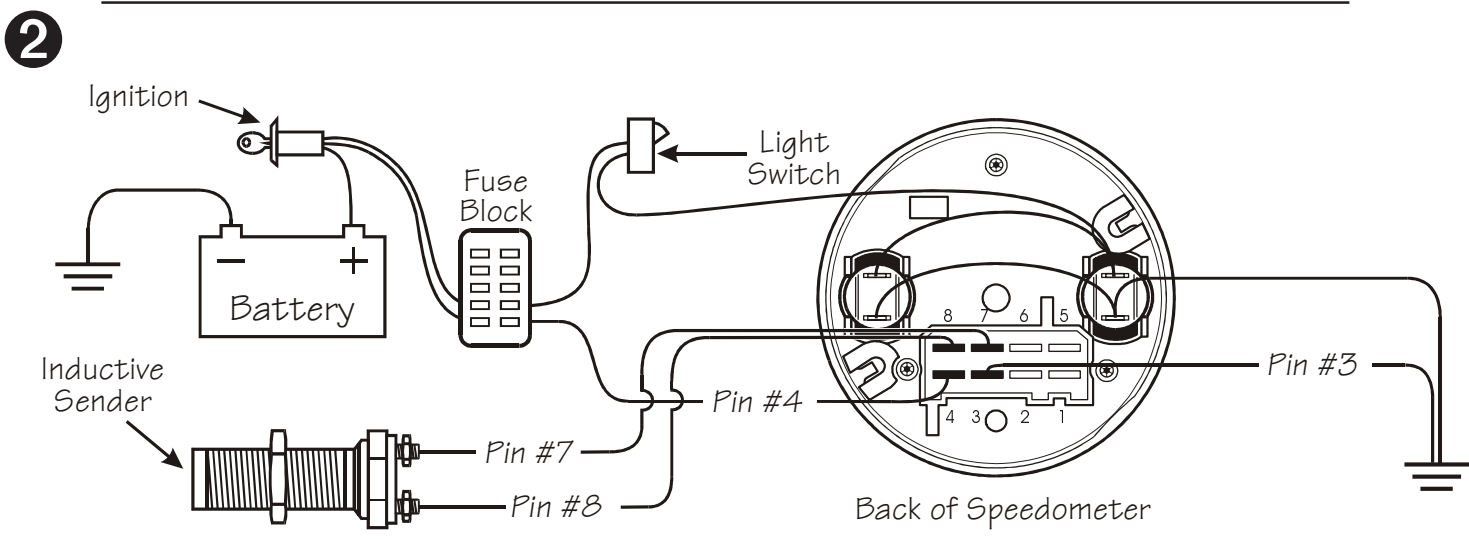| Speedometer:	"A"	"B"
3⅛" (80 mm)	3⅛" (80 mm)	3.32" (84 mm)
3⅜" (85 mm)	3⅜" (85 mm)	3.56" (89 mm)
4" (100 mm)	4" (100 mm)	4.16" (104 mm)

Diagram B
VDO Programmable Speedometer Dimensional Drawings

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Ignition

Fuse Block

Light Switch

Butt Splice

Battery

Off-White Wire to Pins #6 & #8

Pin #4

8 7 6 5

4 3 2 1

Pin #3

Black Sensor Wire to Pin #3

Back of Speedometer

Hall-Effect Sensor

Red Sensor Wire to Pin #2

❷

Ignition

Fuse Block

Light Switch

Battery

Inductive Sender

Pin #7

Pin #8

Pin #4

8 7 6 5

4 3 2 1

Pin #3

Back of Speedometer

❸

Ignition

Fuse Block

Light Switch

Battery

Electronic Control Box

Pin #8

Pin #4

8 7 6 5

4 3 2 1

Pin #3

Back of Speedometer

Signal Wire from Electronic Transmission Box

Diagram D
Proper wiring of the speedometer with: ❶ Hall-Effect sensors; ❷ Inductive sensors; or ❸ Electronic transmissions
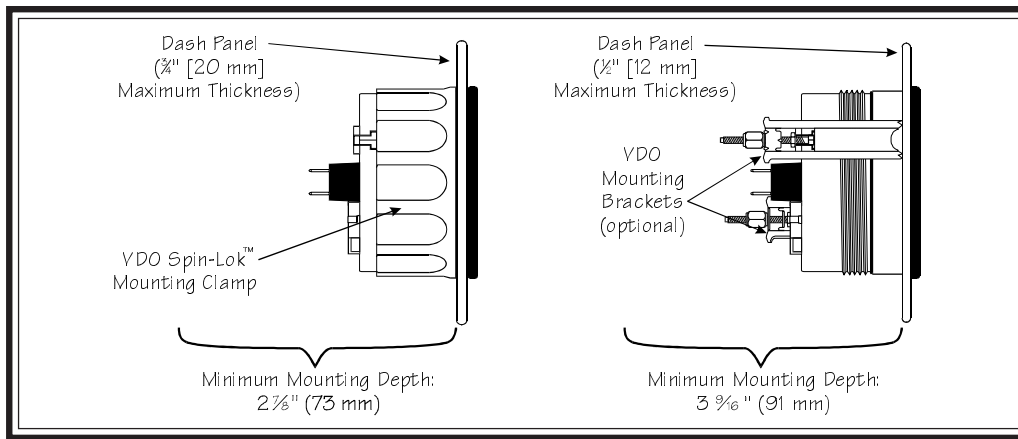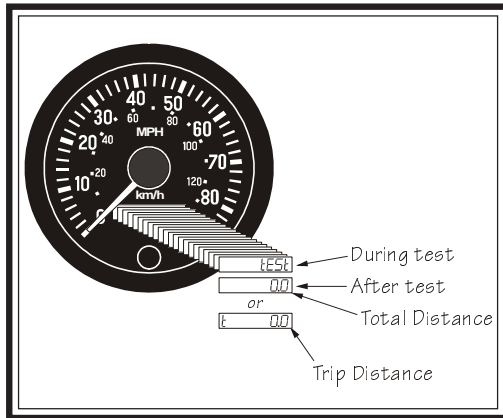
Diagram C
Proper mounting of the VDO Speedometer

❸

5. For wiring of the lights, see Diagram D.

6. Reconnect the battery and turn on the ignition to make sure the speedometer is working. When 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 ignition was turned off. Since this is the first time power has been applied to the instrument, the reading will be ▢ 0.0 , or ▢ t 0.0 . If everything is working properly, the installation is complete. If it isn't, re-check your wiring.
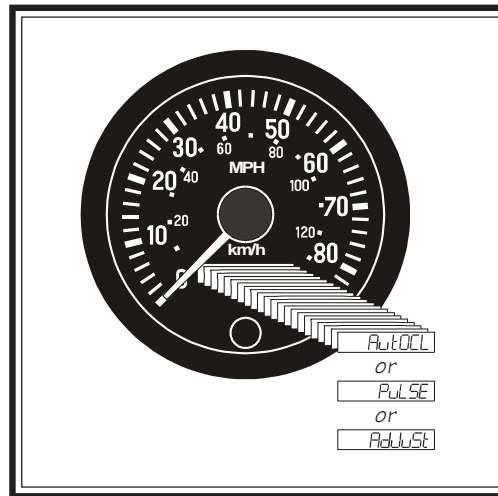

Diagram E
The LCD on the speedometer will show this display during, then after the self-test.

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.

Diagram F
Calibration modes as displayed on the Speedometer's LCD

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.

1. Autocalibration (AutOCL)

The auto-calibration function can be used successfully only on: ❶ A 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. Drive the reference distance of one mile (or 1 kilometer). **NOTE: As you drive this distance, the speedometer needle will not register or move.** <u>This is a normal occurrence during the autocalibration process</u>.

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 message: " F 0.0 ". This means no useable impulse was detected. In this case, simply turn off the ignition, and start the process again.

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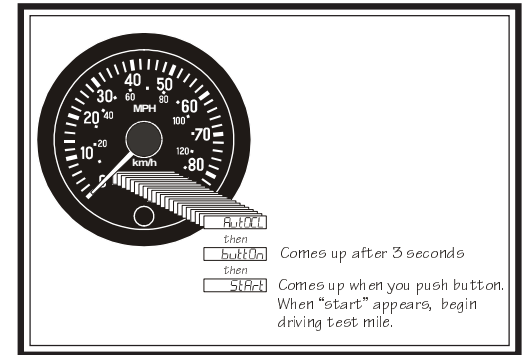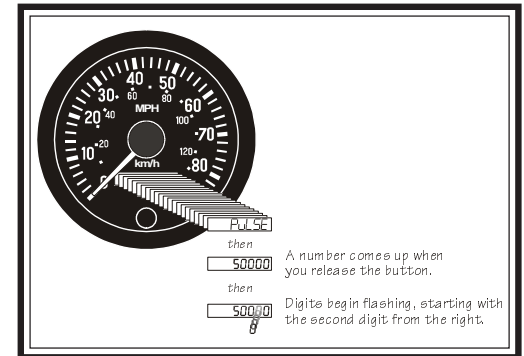

Diagram G
LCD Sequences as they appear during Automatic Calibration

2. Manual Calibration with a known value (PuLSE)

If you know 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 turn on the ignition. Hold in the button until the word " PuLSE " is displayed on the LCD readout.

Diagram H
LCD Sequences as they appear during Manual Calibration

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.