



Tech Articles

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WATCH THOSE GAUGES

In this segment we will explore how the various gauges in the Fiero instrument panel operate. These consist of the speedometer, tachometer, voltmeter, oil pressure gauge, temperature gauge and fuel gauge. While the basic dash instrument cluster design remained the same throughout Fiero production, many small variations occurred from year to year and on different trim levels.

Speedometer

Perhaps the gauge that is most consulted is the speedometer. When the Fiero was introduced in 1984 it had an 85 mph speedometer, as did most cars of the era. This was left over from the 55mph national speed limit days of the 1970's. The Fiero does not drive the speedometer with a cable but rather from an electrical magnetic vehicle speed sensor (VSS) on the transmission (Image 1). The VSS shaft rotates making a sine wave voltage signal at 4,000 pulses per mile. To remove it, unplug the electrical connector, remove the one attachment bolt on manuals or a clip on automatics and pull the sensor out. There is an O ring on the sensor that sometimes leaks. Replace it if the sensor is removed. You will see a small plastic drive gear on the end. These do fail sometimes and are easy to replace. If the drive gear inside the transmission fails, changing that, especially on manual transmissions, is the opposite of easy. To compensate for different size tires and gear ratios the VSS drive gears were made in four different types or tooth counts and drive gears in three types or tooth counts to vary the output speed ratio slightly. These are identified by different colors as listed on charts in the 22P parts catalog group 4.337. On '85-'88 4-cylinder Isuzu 5-speeds, the speed sensor is also the lubricant level dipstick with High-Low marks visible with the sensor removed.

The signal made by the VSS is fed to the instrument circuit board, not to the computer as is more common in many other cars, where circuitry in the board converts the sine wave to a square voltage wave to drive the speedometer and two step motors. One motor drives the odometer and the other the trip odometer (Image 2). The gear teeth on the odometer drive motor can be damaged if you reset the trip odometer while the car is moving. To not be susceptible to normal system voltage fluctuations, the speedometer has two magnetic windings that play "tug-of-war" with each other to position the speedometer needle. If either of these is weak or bad, the needle will read too high or too low, or will stay at the same speed. If the needle doesn't move it may just be slipping on the shaft. The needle center is slit so that when pushed onto the shaft it has a light press fit. After years of use, it can loosen and slip or even fall off. Lightly squeeze the center hole tighter and press it back on. If the cruise control works, but the speedometer does not, the speedometer or circuit board are likely faulty. Sometimes the connection is poor on the push in spring clips behind the speedometer. If none of the gauges work, check the fuse for the gauges, which is the third fuse down on the left side of the fuse panel.

The '84 Fiero speedometer is different from later years in that the cruise control operation is controlled inside the speedometer rather than with a separate control module as in all '85-'86 models, a module in '87-'88 V6 or the ECM in '87-'88 4-cylinders. All '85 and later speedometers are operationally interchangeable but don't look the same. The '84-'86 gauges are front lit and can be hard to read in the dark. The '87-'88 gauges are backlit and easier to read. If installing a used speedometer head you can keep the original odometer reading by snapping out the number drums and switching them. A 120 mph speedometer was introduced with the '86 GT; in '87 with the V6 SE and in '88 with the Formula. This is a direct swap for the 85 mph unit except for '84 models.

Tachometer

There are two basic Fiero tachometers: one for 4-cylinder models and one for 6-cylinder models. They are easily differentiated by the RPM range and red line on the face. 4-cylinders have 6,000 rpm max with 4500 rpm redline and 6-cylinders have a 6500 rpm max with a 6,000 rpm redline. The same front lit/back lit change took place in '87 as noted above. The '84 tachometer is peculiar in that it also houses the voltmeter. In addition, the '84 unit is the only year that has a "Charge" light, which shares a red square with the low oil pressure light (Image 3). The '85-'88 4-cylinders models have the oil pressure gauge in place of the '84's voltmeter (Image 4). The 6-cylinder tachometers have nothing but the tachometer, as both the oil gauge and voltmeter moved into a housing above the radio (Image 5).

The tachometer is like many other GM units of the era in that with age they begin to indicate rpm that are too high, by as much as twice or more than actual rpm. This is because a resistor used to calibrate the tach reading deteriorates. This resistor is located between pins 4 and 10 on the circuit board. You can replace this resistor if you know the correct value or install an adjustable potentiometer to make calibration even more accurate. A detailed description of this repair is available on the web. Another common Fiero tach problem is the tach filter. When this fails the tach reading becomes erratic or quits completely. The filter is located near the

ignition coil. GM no longer offers this part; however Rodney Dickman makes a replacement (see Rodneydickman.com).

Voltmeter

Every Fiero has a low voltage warning light. All '84 Fieros and all 6-cylinders also have a voltmeter. The voltmeter reads the electrical system voltage. Turning the key on will show battery voltage (12-12.5V) and after startup the charging system voltage (13.5-14.5V but varies with load). These have very few problems except the occasional corroded or loose connection, etc.

Oil Pressure Gauge

An oil pressure gauge is used on all '85-'88 cars. It is in the tach for '85-'88 4-cylinders and in a housing above the radio in 6-cylinder cars. '86-'88 6-cylinders also have a low oil pressure light. 1984 cars have only a light. If you have any problem here it is likely an inaccurate gauge reading. Eight-five through '88 sender unit readings sometimes seem to jump up and down. A good oil pressure sender will have 0 ohms at 0psi and 90 ohms at full scale. Unplug the sender plug and the gauge should go over full scale. Ground the center wires in the plug and the gauge should go to 0. If it does, replace the sender unit. All 6-cylinder cars have an oil sender problem addressed in a service bulletin. Water gets into the sender through a small hole on the end. Repair on '85-'87 cars involves installing a shield (pt# 10096127) over the sender. Some people just put a dab of RTV over the hole. On '88 cars the sender has no hole but should be relocated from the end of the long metal tube toward the top of the engine to the hole just above the oil filter after having removed the long tube. Some report the '88 sender is more reliable than '85-'87, but to put it on a non-'88, the wire plug must also be changed. Fuel pump power also runs through the oil pressure sender which is a marginal design at best so be sure to use a good quality replacement part.

Temperature Gauge

The temperature gauge is paired with the fuel gauge in the center of the instrument cluster. It has a few problems. The sensor on the 4-cylinder is on top of the cylinder head behind the thermostat housing, and on the 6-cylinder it is located at the left end of the head under the ignition coil. The two metal terminal ends at the sender corrode or break. Repair plugs are available. The part numbers are: #25036628 for '84, 25036809 for '85-'88 4-cylinder and all 6-cylinders. Often however, only the plastic end is bad. Rodney Dickman sells this repair end for only about \$3.00. Another problem is the temp gauge needle sticking at the full hot peg or falling off. This is from the needle slamming against the peg every time the engine is started. This is caused by a GM wiring glitch that puts full 12 volt "bulb test" voltage not only to the bulbs in the instrument cluster but also to the temp gauge. With a simple wiring correction this can be made to send the "bulb test" voltage to the temperature light instead. Unplug the wires at the temp sender by depressing the lock, carefully remove both wire ends from inside the plastic plug, switch their positions and reinsert them. Now remove the upper cover behind the instrument cluster. You must swap two wires here also. On the left side (horizontal) wiring plug to the instrument panel find terminal 11 marked on the plug. It is on the top row and the second position in from the outside. On the right side (vertical) plug find position 13 on the plug for '85-'88. It is on the outside row fourth from the bottom. For '84's this is position 6 on connector 206 on the right side. Remove the two wires from the connectors and switch them. You may have to add wire to get them to fit. Your temp gauge should now gently rise instead of slamming to full hot after starting.

Fuel Gauge

The fuel gauge itself seldom fails, but the sender unit in the tank sometimes does, as it lives in a pretty tough environment. Surrounded by and soaked in gasoline vapors and moisture, the resistance coil windings and insulation fail over time causing erratic and inaccurate readings. Some say this is aggravated by alcohol in more modern fuel. This usually results in no fuel gauge reading at all or more often the gauge showing a higher reading than actual. A common problem is the gauge not going below ¼ tank reading and running out of gas. I never trust a Fiero fuel gauge. When I see ¼ tank remaining, I fill it up. The resistance of the sender should vary from 0-90 ohms. To change the sender you must remove the gas tank. This will be the topic next time. Until then, watch those gauges!

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