CENTROID PRODUCTS

CENTROID SENDERS for FUEL SAFE

fsafe.doc

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1. OVERVIEW

Centroid fuel senders work by measuring the capacitance between their concentric 1/2" and 1/8" tubes in the fuel. Electronics in the head convert the capacitance to drive your gauge. There are no moving parts in the sender, which is convenient for a fuel cell application.

Because Fuel Safe's customers often have vintage vehicles, it can be complicated to determine the correct sender output for your gauge. The writeup below discusses that, as well as hookup, calibration, and shortening.

2. WHICH SENDER OUTPUT FOR YOUR GAUGE?

2a. Centroid senders have an electronic output. This keeps an ohmmeter from getting a sensible reading, so an ohms measurement on a Centroid sender wont be helpful. Nor does measuring the internal resistances of the gauge help. A gauge brand _____, vehicle make and date _____, or resistances of the original working float sender at E and F _____ are all potentially useful if there are problems.

2b. All Centroid senders are designed for negative-ground systems. Some older cars have positive-ground, and our senders will not work with them.

2c. We specify our sender outputs in Empty/Full order. Often this operating range is listed on a label on the side of the sender. A typical operating range is 0/90 ohms, meaning 0 ohms at Empty, 90 ohms at Full. What sender operating range do you have _____? To tell if your sender is appropriate for your gauge, here is the method I use: (a) disconnect the Send wire from the sender and turn on power. Which does the needle go to, Empty or Full _____? (b) does this direction match the high ohms direction of your operating range, above? For the 0/90 example, the high ohms (90) are the Full, so your needle should have gone to Full with the Send wire disconnected. For a 76/6 ohm sender, the high ohms (76) are at Empty, so the disconnected but powered reading should go to Empty. If the disconnected reading doesnt go in the same direction as your high ohms, your sender and gauge dont match.

If your disconnected but powered reading doesnt go to *either* end of the scale but remains somewhere in the middle, then the gauge has a problem, or it is a type of gauge that our senders will not work with.

2d. There is a further test you can do to tell whether the sender is likely to be the appropriate one, if the direction is correct: have the Send and Negative wires connected to our sender, but not the Positive (battery) wire. Turn on the power. For "high ohms at Empty", the reading needs to be at or below E ____. For high ohms at Full, the reading needs to be at or above Full _____. If the reading is between E and F _____, your sender and gauge dont match.

3. WIRING THE SENDER

(Note-- if you have a 1965-1970 Mustang with a stock gauge, have Fuel Safe [800-433-6524] send you the 'Mustang regulator' drawing).

3a. CONNECTIONS

Unlike a float, Centroid's electronic senders require battery voltage to run the electronics:
--Negative terminal connects to system ground.
--Send terminal connects to the gauge's Send terminal
--Positive terminal connects to ignition voltage. The sender draws about 0.02A at the Positive terminal--if your positive connection is unfused voltage, be sure to add a 1 amp or smaller fuse (1/4 amp ideal) to the line.

3b. If the sender has an Alarm output, that gets connected to one side of the alarm light, and the far side of the alarm light gets connected to ignition voltage.

3c. Once wired, you should measure approximately +12V between Positive and Negative _____, and a lower positive voltage (not 0) between Send and Negative _____. From Alarm to Negative, assuming you have an Alarm output, you should measure about the same voltage as Pos/Neg if the alarm output is off _____; if the alarm output is on, you would measure about +1 volt _____(if you get neither voltage, check your 3b wiring, above).

4. CALIBRATING THE SENDER

4a. If the sender for some reason needs to be shortened, see item 5, below, before calibrating.

4b. It is ok for the grounded outer tube of the sender to touch things in the tank. The inner tube, which may stick slightly out the bottom of the sender, should not be allowed to touch things, however, nor should the tubing be bent such that the inner tube touches the outer. Otherwise an 'always-Full' reading will result.

4c. If the following calibrations do not seem to be working, you almost certainly have a wiring problem or an incorrect sender (see items 2 and 3, above). All senders are tested good at the factory before shipment. In particular, if the needle is moving backwards from what's described below, you have the wrong sender.

4d. Setting the Full adjustment requires the same type of fuel you will be using in your tank (not water). If filling the tank is inconvenient, a PVC tube with end cap can be your test tank.

4e. SETTING THE EMPTY
(Note: if you have a Smith's gauge, which has a very slow response, have Fuel Safe [800-433-6524] send you the Smith's writeup and follow that for calibration instead).

4e1. This needs to be done in an empty tank or with the sender out of the tank to simulate empty.

4e2. Start with both the Empty and Full adjustments on the sender completely CW, using a *small* screwdriver to avoid damaging the adjustments. They are single-turn adjustments, so dont go past the stops. Your gauge reading should probably then be above Full, or at least above 1/2. _____

4e3. Bring the Empty adjustment slowly CCW until the needle just stops moving downscale. This should be at or below the E mark _____. Then go slightly back upscale and down a few times, "rocking the Empty", to make sure you are right at the point where the needle stops moving down.

4f. SETTING THE FULL
4f1. Put the sender in a full tank of fuel, or in a full PVC tube of fuel.
4f2. Bring the Full adjustment slowly CCW until the needle gets onto the Full mark. (Note: some gauges dont allow the needle to get above the Full mark. If so, bring the reading below the Full mark and then go back upscale until you just reach it. It would be a good idea in this case to "rock the Full" too).
4f3. If you have an alarm output, immerse the sender to the point you want the alarm to come on, and adjust the Alarm adjustment to the where the light turns on/off--leave it in the on state.
4f4. You can test the calibration by raising and lowering the sender in the tank. Then you are done.

5. SHORTENING THE SENDER

5a. If for some reason your sender is too long for your tank, it can be shortened, but only to the lower end of its electronics range. The electronics ranges are: 3-6", 6-12", 12-24", and 24-48". So if you have an 8" sender, that's from the 6-12" range and can be shortened to as little as 6" from flat bottom of head to end of tubing.

5b. To shorten the sender, the outer tube should be cut with a tubing cutter, as found at KMart, etc, or a hardware store. A hacksaw can be used in a pinch but has the problem of producing metal filings.

5c. The inner tube can be nipped off with side cutters. It doesnt matter if the end of the inner tube gets pinched

closed.

5d. A sender must be recalibrated after it is cut.

6. PROBLEMS
If you have technical questions, please fill out the blanks above and fax to me ahead of time, including a fax or email address when possible. I'm good about answering my faxes and emails promptly, and they are a lot less disruptive than calls.

Joel (Centroid engineer)

5V Regulator for 1965-70 Mustang fuel gauge

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Background:

The 1965-'70 Mustangs supply their instruments with a regulated 5 volts. But the voltage is not regulated in the modern sense, such that it is steady 5 volts DC. Instead, the battery voltage is switched on and off quickly so that the average value of the pulsing voltage is 5 volts.

Unfortunately, this pulsing voltage confuses Centroid's capacitive senders. The circuit below can be used to provide a modern regulated 5 volts to the gauge, and thus through the gauge to the sender, which will allow the sender to work correctly.

```
MUSTANG.CDR drawing changes:
2/12/01  Clarify 12V connection.
8/20/99  Add discussion
8/25/99  Add voltmeter checks
8/25/99  Change header to '65-'70
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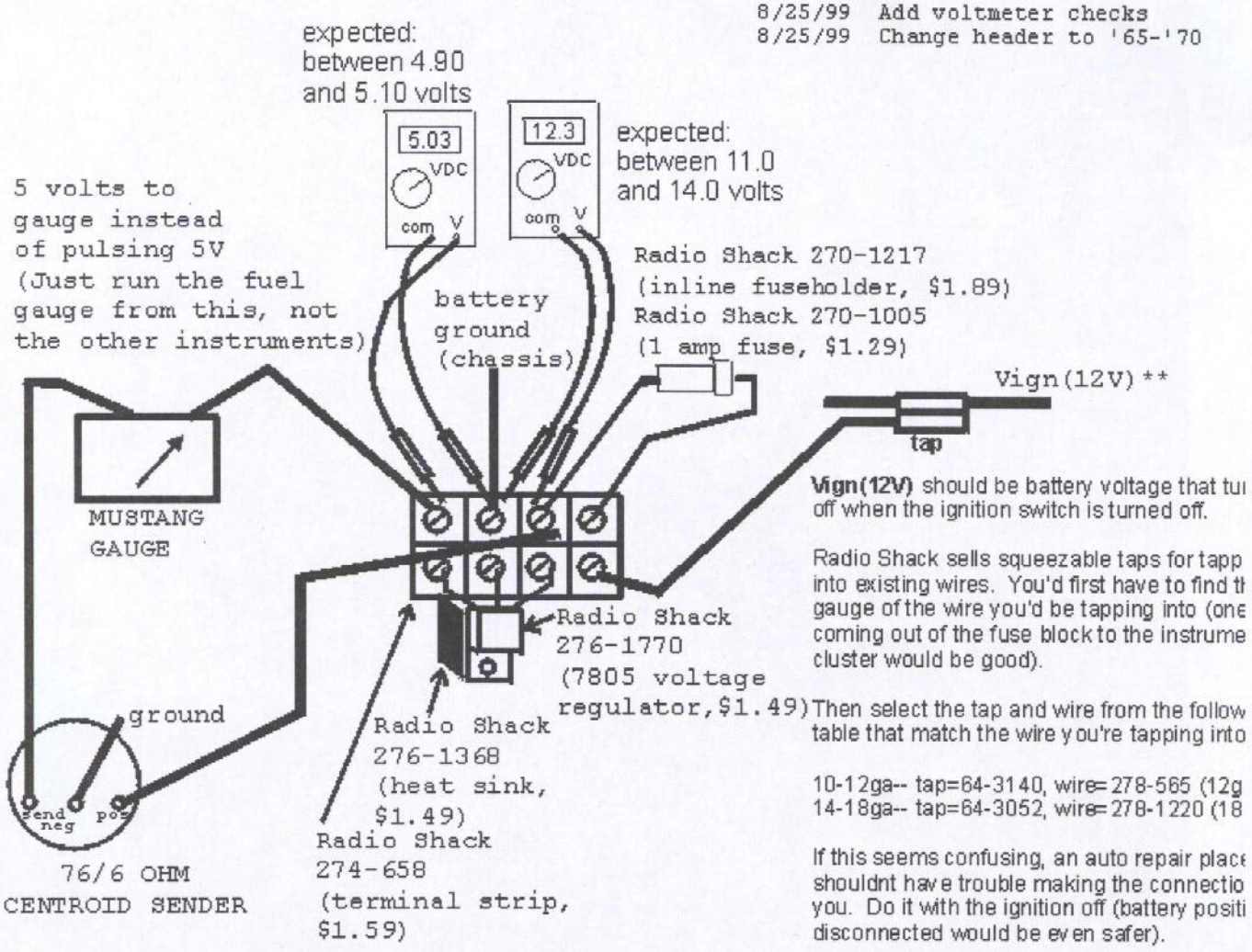

Vign(12V) should be battery voltage that tu off when the ignition switch is turned off.

Radio Shack sells squeezable taps for tapp into existing wires. You'd first have to find th gauge of the wire you'd be tapping into (one coming out of the fuse block to the instrume cluster would be good).

Then select the tap and wire from the follow table that match the wire you're tapping into

10-12ga-- tap=64-3140, wire=278-565 (12g
14-18ga-- tap=64-3052, wire=278-1220 (18

If this seems confusing, an auto repair place shouldnt have trouble making the connectio you. Do it with the ignition off (battery positi disconnected would be even safer).