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EVO: Engine Control - Sub-03b

95-03 VSS / Speedometer / TSM - Various Signals

This is the source thread in the XLForum - https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-electrical/sportster-motorcycle-lighting/175521-self-cancelling-indicator-wiring/page2?t=1883180

Post#9 - IXL2Relax

The Pre-95 speedometer used a mechanical cable to drive it - It had a reed switch (internal) which was activated to ground on each revolution of the cable... The White/Green wire to the TSM was internally (in the TSM) pulled to a high state and the reed switch pulled it to ground.

The TSM did all the calculations internally to determine when to cancel the turn signals. The TSM is called the Turn Signal Canceller in the parts listing because that was the added function it brought to the table from the simple flasher unit used previously.

The 95+ electronic Speedo has more intelligence to interpret the VSS. The TSM part number changed that year as well.

Post#13 - Decman

The Speedo is different for a 883 vs a 1200 in those years 95-03 (maybe other years also) The sensor is timed off the 5th gear teeth in the tranny but the final drive pulley ratio is different. So the speedo has to account for that.

Post#14 - IXL2relax

the part numbers for speedos changed during each of 95/96/97 (and as you said, different between 883 & 1200) while the TSM was the same between 883 & 1200 so the Speedo probably did the signal conversion to create a stanadardized count to the TSM.

Post#16 -

From the Service Manual - TSM (1200 models): Check for voltage on W/G wire in connector [30B] while connected. Meter should alternate between 6-12VDC (from Turn Signal Module) and 0-1VDC when rear wheel is rotated.

For 883 TSM models, the troubleshooting section specifies 9-11VDC with the rear wheel stationary and 3-6VDC when the rear wheel is rotated faster than 3mph.

The TSM (or “Turn Signal Canceller” in the parts manual) is the same part number (68540-96) for all

models, as is the speed sensor, so the 883 speedometer seems to convert the sensor's voltage, but the TSM seems capable of dealing with different input voltage ranges - presumably it's just registering what is effectively an on/off square wave signal.

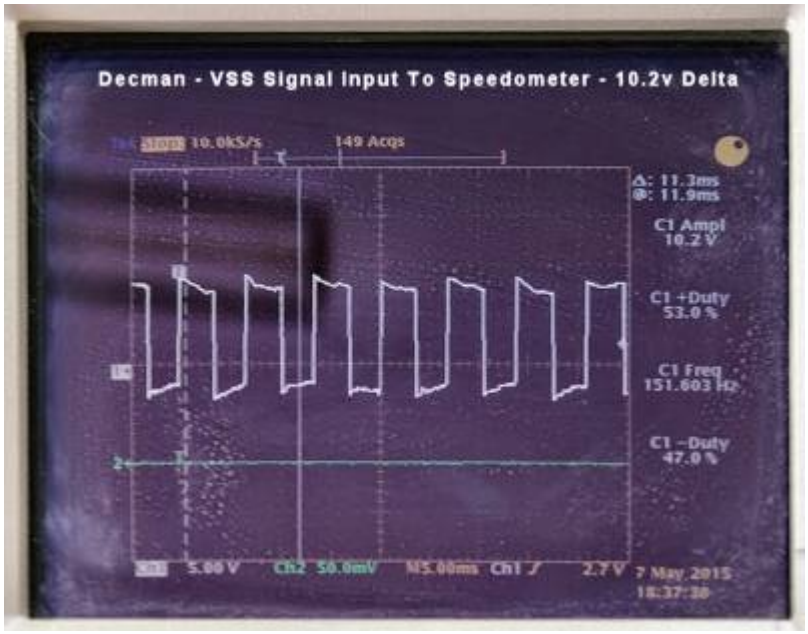
The Speedometer section says (of the VSS signal): Check for voltage on W wire in connector [65B] while connected. Meter should read 6-12VDC when gear tooth absent and 0-1VDC when the gear tooth is present.

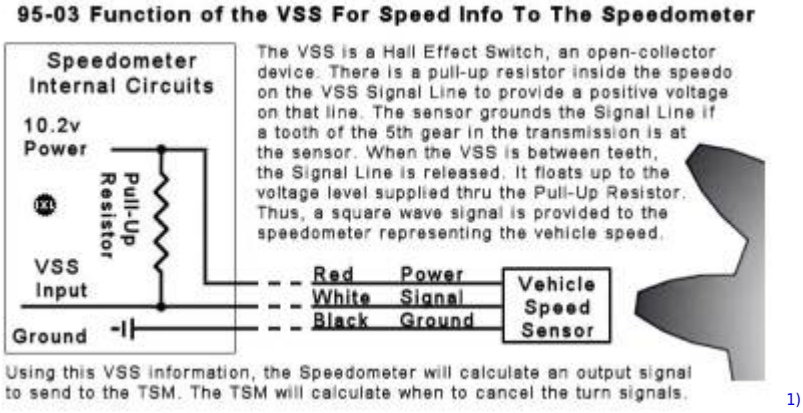
Post#20 - Decman

I had the bike on the lift in first gear with no throttle (idle) so the speed was low and varied some.

The speedo output (WHITE/Green Wire) is a different frequency than the Sensor (WHITE Wire) output by a factor of 7~9 depending on the speed. In another test, the frequencies were 225Hz incoming to the Speedo and 28Hz Outgoing to the TSM.

Also note that the sensor output was 10v and the Speedo output is at 12v.





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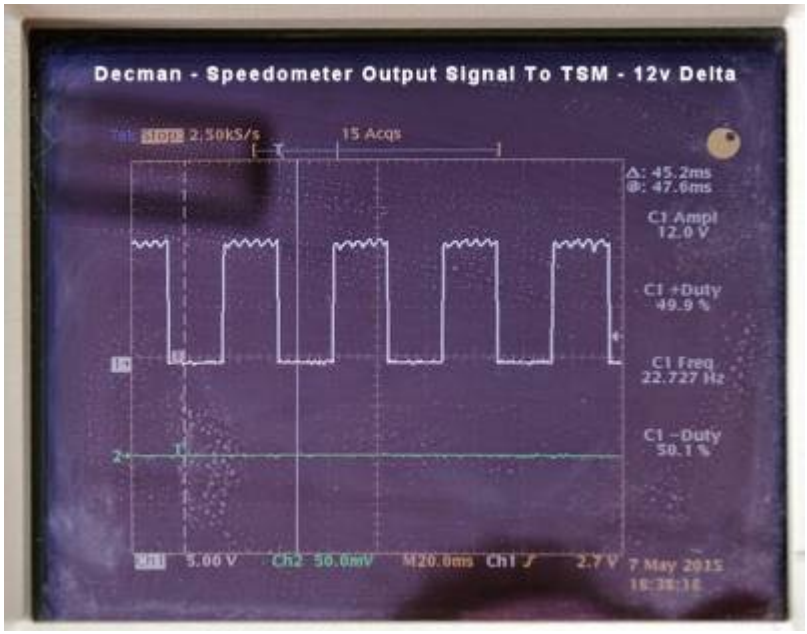

Electronic Explanation of the Vehicle Speed Sensor Function. (Reference XLForum Thread)
The first fact to be considered is that the VSS DOES NOT supply a voltage to the Speedometer. It ONLY GROUNDS the VSS Signal Line, then releases the ground. As RandallM found out in testing the VSS on a breadboard configuration, with no other source of power on the Signal Line, the VSS simply has very low voltage NOISE on the line (not at a tooth) or is at GROUND LEVEL (when at a tooth). Sorry for the caps, but it's important to grasp this concept of ONLY grounding. The circuit is what is typically refered to as Open-Collector, meaning the final component is a transistor that is designed to pull that line to ground, but is not deisgned to supply any voltage on the signal line. The voltage on the RED VSS wire is only to operate the internal components of the VSS and IS NOT used to supply voltage thru the VSS on the signal line. RandallM's test demonstrated that the circuit is Open-Collector - that is, there is no positive voltage coming out of the signal line thru the VSS, despite there being a RED positive voltage wire supplying power to the sensor. The VSS ONLY grounds the signal line - when there is a tooth present to the sensor. Then, when he added the Pull-Up Resistor to his test circuit, the signal wire then provided a square wave output of both positive voltage (thru the pull-up resistor when no tooth was present) and 0v (provided by the VSS when a tooth was present). The Pull-Up Resistor is designed to provide the input of the Speedometer with the necessary positive voltage for the square wave. That Pull-Up Resistor is inside (part of) the speedometer circuitry. When nothing is connected to the speedometer VSS input line, that line is pulled high by that internal resistor, and will stay high if no connection is made. To create the necessary square wave input, the Pull-Up Resistor must supply positive voltage and the incoming VSS Signal wire must supply the grounding when a gear tooth is present. The resistor supplies voltage & the sensor supplies grounding on the signal line.

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See this XLForum Post - https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-electrical/sportster-motorcycle-electrical-and-ignition/4957902-speedo-issues-again/page2#post4958246