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EVO: Electrical System - Sub-03B

Indicator / Warning Lights Not Working - Repair

Article #1 is by jbee of the XLForum.

Article #2 is by christophoro of the XLForum.

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Article #1:

Original Thread:

<https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-electrical/sportster-motorcycle-lighting/187199-indicator-warning-lights-not-working?t=1999892>

(All of the following information and the excellent pictures are from **XLForum member jbee** with only minor editing)

Condition Addressed: The indicator lights under the clock (speedo) are not working.

You're likely going to find that water has got into the tell tale instrument cluster and moisture has damaged the circuit board inside. This can cause either all of the lights to stop working as in your case, or just one or two depending on what has been damaged.

If you are still under warranty, the best solution is for a dealer to sort it out.

Sadly this is a situation that has been going on since this LED circuit board style of cluster has been used and for some reason HD still hasn't made it water proof.

If it was me and I was near the end of my warranty or outside of it I would disassembly the housing and carefully apply clear sealant to prevent this problem. Particularly relevant if you're using the bike in all weathers.

Not sure of the price of the sub loom that this cluster is attached to but it's going to be considerably more expensive than the little individual bulbs they used to use years ago.

This instrument cluster operates by the BCM sending a message to the speedometer which in turn provides or removes the ground to the relevant circuit dependant on what function is being used - this

then turns the LED for that particular indicator light on or off, or flashes for the turn signals.

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Both Canbus high & Canbus low (pins 2 & 8 respectively at speedometer) are purely information lines for data messages between all the various modules. When one module sends a message, this message goes to all the other modules on the Canbus circuit but only the modules that see the message as relevant to them accept the information and the others ignore it.

1) So when you hit the left hand turn signal button for example.

2) That left hand module sends a message on the Canbus line saying the equivalent of "left turn button pressed" to all the other modules...right hand switch gear, ECM, BCM, ABS module, speedometer etc.

3) The only module that sees this message as relevant information at that point is the BCM. Even though all the other modules have seen the message, they choose to ignore it.

4) As a result of the message sent from the left switch gear module, the BCM sends traditional 12 volt battery power to the left hand turn signals.

5) At the same time, the BCM then sends a message to the speedometer via the Canbus line specifically saying the equivalent of "turn on and flash the left hand side indicator tell tale light". This message again can be seen by all other modules but again is ignored by them.

6) All of the individual LED's in the instrument tell tale light cluster are continuously receiving constant 12 volt power from the red/orange battery power wire coming up from connector 20. This wire has a solder join so that battery power is also received at the speedometer housing to power its circuits up also.

This is one area worth checking if all the LEDs are out as it could be that the solder join on the battery power wire (pin 6 at connector 20) is broken and then no power is being received at the cluster but the speedo would still work.

All the LEDs are waiting for a return to earth which is provided by the speedometer and it gives that earth to the relevant LED it is being asked to switch on or off. I presume via the ground wire (pin 7 at the speedometer Green/black)

I'm slightly dubious of that last comment as I've been taught that the sensor ground line is 5 volt and this also a green/black wire. But I don't believe the speedo ground is called "sensor ground" even though it shares the same return wire to earth as some of the bikes sensors. However I see this as the only likely return path to earth from the speedometer to the chassis/battery. So there may be some circuitry in the speedometer to convert that 12 volts down, or maybe it doesn't need to. Sadly, I'm lacking of knowledge in that area to confirm 100%.

I've got a couple of these tell tale light clusters at work that have failed and when I get a moment, I'll take some photos to give a better idea of the corrosion that is suffered by the circuit board. Although my time is short just now so please bear with me on that.

Some are worse than others but it seems only a tiny amount in the wrong place is sufficient to cause problems. On a small amount, all the LEDs fail but the most common is the left hand side turn signal LED which I presume suffers because of the bike leaning over on the side stand.

I'll also cut the loom open on one so you can see the actual layout of the wiring coming up from connector 20 and how the wiring links between the speedometer and light cluster. I've got a speedometer that I've taken apart for similar reasons and will photograph that as well.

As for blowing the moisture out, I think it comes down to knowing it is there in the first place. The first time you'll notice is when there is an issue and that seems to be only once the circuit board is water damaged, by which time it's a little to late for most who aren't savvy with electronics. Hence my suggestion to take it apart and try and seal it before problems arise.

I've personally not seen a problem with the boards cracking but never say never. From what I've observed, it seems to me that the assembly of the constituent parts in the tell tale light cluster doesn't take into account the ingress of water.

I'm sure someone with the correct knowledge would be able to salvage the board and bring it back to life as it seems pretty basic but from a workshop labour time perspective versus cost of a new part it isn't justified. I dislike saying that as I'm from a time where you'd repair and fix parts, not just replace them. The days of me boring out 883 cylinders to 1200, building spoked wheels or repairing starters etc can no longer make fiscal sense when a new barrel or 1200 conversion is cheaper to take out of a box.

Battery power is given to each of the LEDS separately from the red/ orange wire coming up from connector 20. It does this internally on the circuit board for the tell tale light cluster. So one red/orange wire is going into the board where it then uses the board to send the power to each LED.

Then each individual LED has a wire coming from the circuit board and going directly into the speedometer at the pin numbers you've mentioned above.

Pin 1 (white/orange) Oil Pressure Light for example which goes into the speedometer should actually be thought of as the earth wire from the LED situated on the circuit board of the tell tale light cluster. However, the last piece of the puzzle is that the final part of the earth circuit's return is controlled by the speedometer which in this instance is waiting to be told by the BCM when to allow this full return path to earth.

This would happen when the oil pressure is low or before engine start and it provides an earth to pin no E3 at the BCM.

When the BCM registers this earth from the pressure switch it then sends a Canbus message to the speedo telling it to allow the circuit to be completed on the oil pressure switch LED by providing a return to chassis ground on the ground wire pin 7 green/black at the speedometer connector. At that point the LED will light up.

After engine start, when oil pressure is increased, the BCM no longer receives that ground from the pressure switch at pin no E3 so it tells the speedo via a CANbus message to stop providing a ground to the white/orange wire coming from the circuit board. As a result the LED no longer has an earth and the light goes out.

So essentially, the speedometer acts as a ground for each of these wires coming from the instrument tell tale light cluster pin 1 oil light pin 4 high beam pin 6 neutral light pin 10 left turn signal pin 12 right turn

signal

But it will only do this once it has received a message from the BCM telling it to do so. The BCM in turn will only send that message once it sees or is told to do so by the relevant circuit being activated.

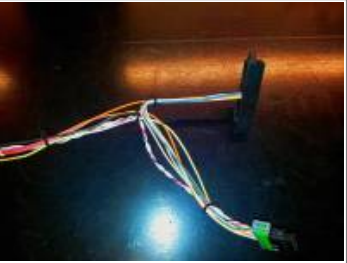
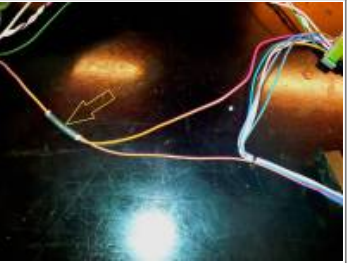
As you can see with my example above, not all of the circuits for the tell tale lights communicate with the BCM via a Canbus message. The other circuit that doesn't and works similar to the oil pressure switch is the neutral light which again provides an earth to the BCM, but this time at pin no D3.

But in all cases, it's the BCM which is telling the speedo via Canbus messages which tell tale light LED to provide an earth to allow completion of the circuit and therefore allow that LED to light up. Or to turn the LED off dependant on the message it is sending on the data line.

The 5 volt sensor ground I mentioned makes no sense. So I'm pretty sure that the ground wire at the speedometer is the return path to allow the LEDs to light.

As far as I'm aware it is a circuit inside the speedometer that closes the ground, rather than the BCM. As you suggest, something akin to a thyristor would likely do the job.

I'll post some images shortly to show what I've often seen when the instrument cluster lights stop working. Of course, it's not saying it's the only reason, but as yet it's by far the most common.

First the speedo loom as it comes on a 2014 and later Canbus model Sportster	Now with the outer conduit removed.....the cable ties were put on by me to keep the shape of the wiring	Wiring separation between speedometer connector and instrument tell tale light cluster	The arrow signifies where there is a solder join on the red/orange 12volt power wire going to both the speedometer connector to power the circuit and also to the light cluster to provide power to the circuit board and LEDs.
			
An exterior view of the light cluster housing. One can see corrosion around the perimeter.		Next, the cover removed.	



Now, the damaged circuit board



Additionally, although quite rare from my experience, is damage within the speedometer itself. this tends to cause all manner of speedo related issues obviously, including the tell tale light cluster not working.

Speedometer disassembled

Circuit board damage inside speedometer



Article #2:

Original Thread:

<https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-electrical/sportster-motorcycle-electrical-and-ignition/197567-fixed-replcement-of-burned-led-in-indicator-light-board?t=2074223>

(All of the following information and the excellent pictures are from **XLForum member christophoro** with only minor editing)

Condition Addressed: What LEDs are used on the indicator light board & how to replace them?

This repair was done on a 2017 XL883N Sportster by XLForum member, christophoro.

Long story short, my Neutral indicator is burned. Tested with a voltmeter, as well as with a big-ass 2000's LED and verified that the circuit and Neutral switch are working fine so instead of forking about \$70 for a

brand new LED strip, im planning on replacing the burned SMD LED with a new one (already removed the burned one)

To all interested, some further Google search yield some results in a Japanese forum. Apparently the SMD LEDs used are the OSG5120641E (G for Green - Red LED would be OSR5120641E)

This is the part: <https://datasheet.octopart.com/OSG5120641E-OptoSupply-datasheet-41595452.pdf>

I believe its a 1206 green LED SMD.

I'll see if i can order some and will do a replacement video/photo-series if anyone is interested in such a replacement

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Success!

I managed to replace the SMD LED on the PCB and now i once again have a fully functional indicator light board. The new LED is even brighter than the one replaced.

As posted above, a LED from the indicator PCB (specifically the Neutral light indicator) went bust. I didnt want to fork \$70 to get a new one because, for one, I would have to butcher it again and go through the whole procedure of extending the wires due to my speedo relocation. But I also enjoy fiddling with these kind of problems; Oh and also because I'm a cheap bastard.

A small foreword: I am no electrician nor certified mechanic. I'm just an average, mechanically inclined dude that likes to break and fix things so my methods are by no means scientifically/procedurally correct but are based mostly on personal experience and trial-and-error.

Also, BEFORE dismantling everything and start desoldering/soldering LED's, make sure you have identified the root cause of the problem. With Neutral LED indicator, the issue could have been either the Neutral light switch, a faulty indicator board/LED and anything in between (pinched cables, short in the circuit etc).

I personally found it easier to start from top-to-bottom; that being exposing the PCB, hook a multimeter to the LED's terminals and check for foul play.

So now that that is out of the way and without further ado, here's the whole procedure:

1. Depending on your setup you will first need to remove the indicator PCB from the speedo mount and disconnect the wire harness in order to be able to work on it. This is easily done by removing the two Philips screws with a small screwdriver located on the under side of the speedo mount (See the parts manual or FSM for the 2017 XL883N).



2. Gently separate the top part of the indicator lights from the harness.

3. With a small flat screwdriver gently pry the white top LED partitioning bit from the black housing. You should have exposed the top part of the PCB after that.



4. At this point and before disconnecting any other plugs, turn key to ignition/run position, take a multimeter and check if voltage is recorded across the Neutral LED. Cross reference it with another working LED.

Voltage across the terminals but no light = bad LED: Congrats! You have ruled out any other fault with the system and identified that the LED is indeed the issue; time to remove the whole harness.

No voltage across the terminals = another issue. Stop reading.

5. To fully remove the harness, you will need to disconnect the speedo plug as well (see manual). You will need to remove the bottom plate of the speedo by unscrewing the two Allen bolts holding it in place (see manual).

6. Go ahead and trace the plug, connecting the harness to the bike, and disconnect that as well.

7. You should now be left with the speedo wire harness on your hands.

8. Next you will need to “push” the board out of its black enclosure. Do NOT try pulling it out. The black cable shielding behind the enclosure is soft enough that you can pinch it an inch or two below the enclosure and push it towards the enclosure so that the PCB pops out of it. The pushing motion will cause the cable shield to fold below the enclosure but the wires inside will push the board out.



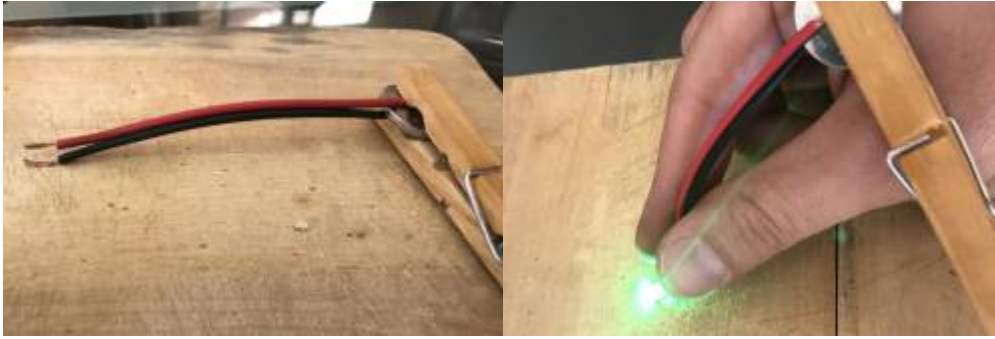
9. Secure the harness and board however you like best so that you can work on it with both hands.

10. This step I found the most difficult due to my lack of soldering skills as well as lack of equipment. Youtube and the Internet is your friend. Search and watch how to desolder a LED SMD from a PCB. Use a soldering iron and tweezers to heat and pull the LED out. Take your time for this. Heat each terminal for a few seconds at a time and pull lightly.



11. Next grab a new OSG5120641E Green led and test it. For the purpose of the test i assembled the scientific instrument shown below; a CR2032 flat battery, two short wires and everything held in place with a clothespin. Touching the LED's terminal should cause it to illuminate. If it does not, try reversing the polarity. LED's are polarity sensitive.





12. Take note from Step 10 above. The LED polarity and the markings on the PCB should match, i.e. lower pointy edge of the 'T' should align with arrow point. In the image below this is clearly indicated; side by side you can see the markings on the PCB and the BACKSIDE of the LED.



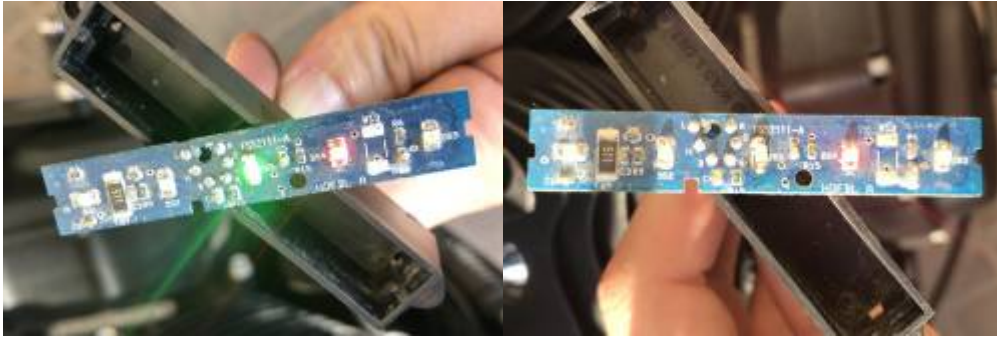
13. Go ahead and solder the LED on the PCB. Again, youtube is your friend on how to do this.



14. Using the makeshift tester tool (see step 11 above) test the LED's terminals after soldering it, to make sure you havent damaged the LED while soldering it.

15. If all checks ok, go plug everything back on the bike (the speedo plug and the main plug harness) but dont tidy up anything just yet. Failure to plug them both first and turning the key to IGNITION second will probably register a "Could not read speedo" error code to pop up and the check engine light to stay on (ask me how i know this).

16. Check that the Neutral light works as expected.



17. If all is ok, go ahead assemble everything back on the harness in reverse order and re-wire the bike as you would finally do. Then pat yourself on the back - You just saved yourself 70 bucks!



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