Latch board fault indication led for driver dashboard

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State of fault indicator LED should be inverted state of Relay, the relay corresponds to.
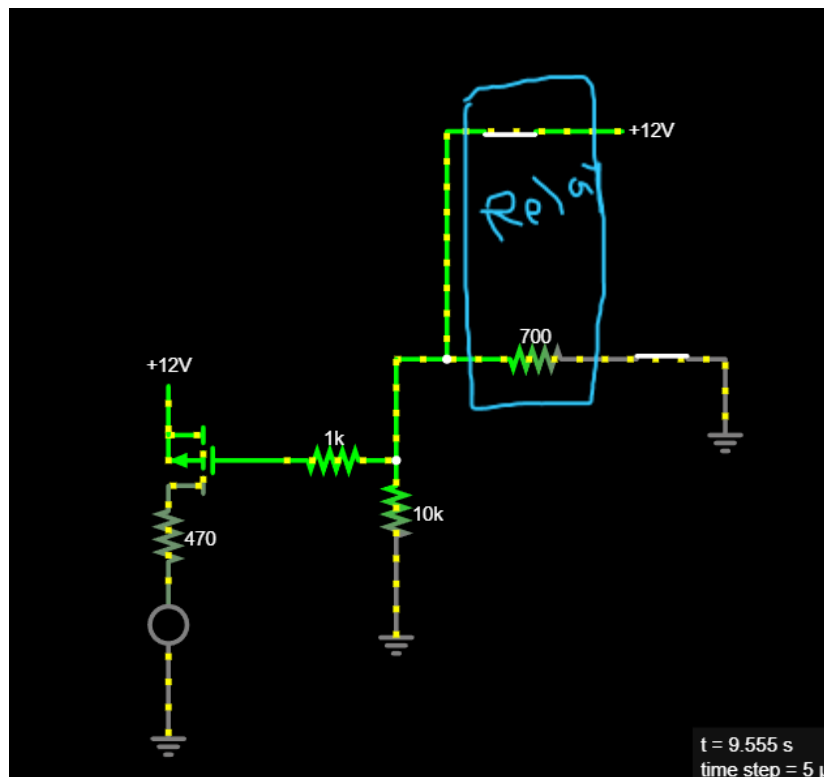
Fault Line	RELAY	LED INDICATOR FOR DRIVER
GROUND	CLOSED	OFF
FLOATING	OPEN	ON
GROUND	OPEN (needs to be reset by driver)	ON

Note open means no current goes through relay
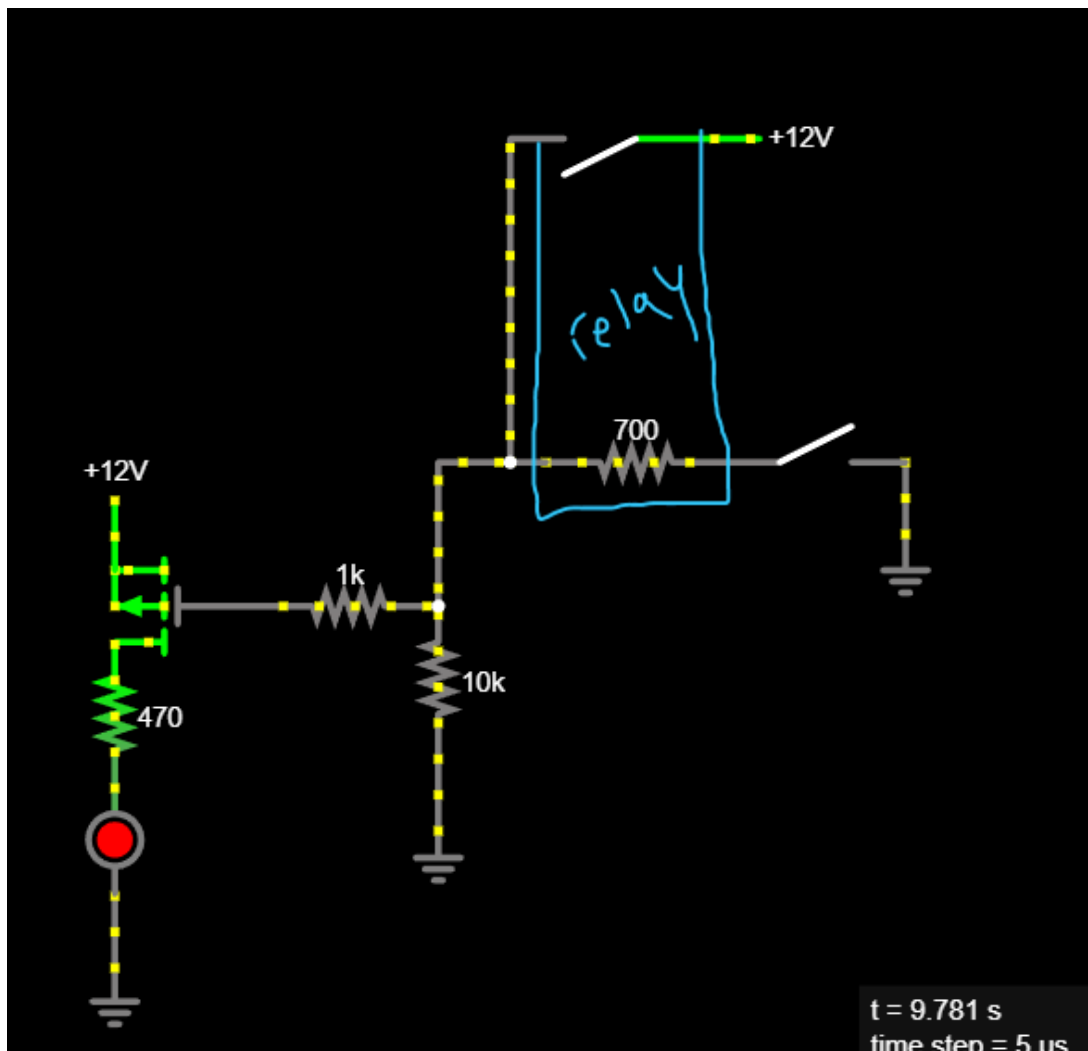
Closed means current goes through relay

For example if BMS Relay is opened meaning there is fault in BMS, the led should light turn on and indicate error. LED Should be kept on until the relay is back in closed state.

Example: Case 1 Relay is in closed state (no fault) fault line is grounded

Uses a P MOSFET gate of which is connected through relay node right before the coil pin, in this scenario pulled up high same as Source causing MOSFET to be off and thus LED to be off

Case 2 Relay is open Meaning fault has happened. Relay will be opened and no current will go through until fault is resolved and the reset button is pressed.

The P MOSFET is connected to node of relay which is floating and will have no potential when relay is opened. Meaning P MOSFET will be turned on and current will go from source to drain. The LED indicator will turn on to indicate that the relay is off.

Note that 1k resistor is connected to ground of MOSFETS to prevent static electricity build up since gate of MOSFETS is sensitive to overvoltage and can break down easily.
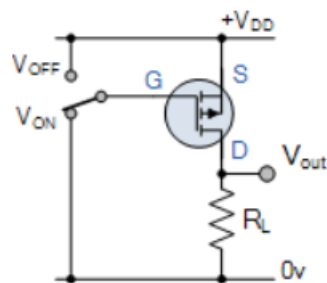
Note that 10k resistor acts as a pull-down resistor when node is floating in order to discharge the gate of MOSFET

Operation of P MOSFETS

P MOSEFTES are used to switch loads on the high side of the (source connected to +Vdd)

If gate = Vdd then MOSFET is off

If gate != Vdd then MOSFET is on

**P-channel
MOSFET Switch**

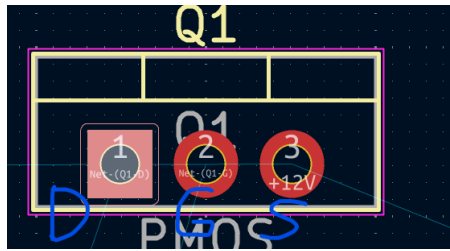We will use IRF9540 P MOSFET (thus if we need to drive bigger loads like big lights on dashboard we have headroom)

- **VDS (Drain–Source): −100 V (Max voltage difference between drain and source)**
- **VGS (Gate–Source): ±20 V (Max voltage difference between gate and source)**
- **ID (Continuous Drain Current): −19 A** (at Tc = 25 °C)

In our case Vgs = 20v means that at 12v connected to source the gate has to be at 2 volts or lower for MOSFET to be fully on
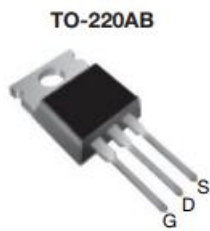
That is another reason use a pull-down resistor at the gate of source on p MOSFET (to create 0 v) means MOSFET is fully on

At Vgs = 0v (no voltage difference between gate and source mosfet is open) no current flow

Note that on the board need to double check that pins of MOSFET footprint match up with the pin ordering of the specific pins on the IRF9540

 footprint on the board

 footprint of the IRF9540 THEY DONT MATCH! NEED TO Change on the footprint on the board to match

Do this by going to schematic symbol editor and re editing what number pin gate and drain match too

Gate should go to pin 1

Drain should go to pin 2

PCB LAYOUT CHECKLIST

YES - MOSFETS CONNECTED CORRECTLY

YES - Relays connected correctly

YES - Parts close to the ones that they should be close too

YES - Holes made

YES – Wired