

8 speed shift lock solenoid problems

P176C-11 Transmission range selector lock control error – General electrical Failure – circuit short to ground

Background

The shift lock solenoid is a safety lock to prevent the transmission from selecting a drive mode without having the brake pedal applied. It will only lock in Park & Neutral and should never lock in Drive or Reverse.

In the event of a no power condition (ie; flat battery) the 6 speed transmission in the discovery 3 and 4 (as most cars do) have a “shift lock release” to release the shift lock solenoid which enables the gear lever to be moved to the Neutral position, as this lever is connected to the transmission via a physical mechanical cable, it will select Neutral without power.

Unfortunately in the 8 speed transmission there is no physical cable connecting the shift dial to the transmission, the only connection is “electronic data” via the vehicle’s CAN BUS network (with a local network connection to the transmission as a backup). In the event of a no power condition, turning the dial (if you could) wouldn’t do anything.

The Problem

What Land Rover did to overcome this issue was to add a mechanical cable that enables you to shift to Neutral without turning the dial, now this works well if you want to get towed, but what if you DO have power, a good battery, parked on the beach, engine running, tide coming in and the dial is locked in Park (or locked in drive with the engine off) due to a faulty shift lock solenoid. There is the real problem, you can’t select drive as there is no shift lock release (and you can’t start the car if the dial is in Drive even if you pull the Neutral lever).

Quick get me off the beach solution

(tools to keep in the car; T20 Torx driver, Philips Drive)

What we need to do is access the (TCS) transmission Control Switch, the rotary dial bit.

First we need to remove the cup holder and the spill tray below it using the Philips driver (or a small flat blade if that’s all you have).

Open up the centre console lid and start pulling up on the sides of the centre console where the cup holder is, the entire centre section surrounding the TCS should lift up and come free. It will slide backwards away from the dash.



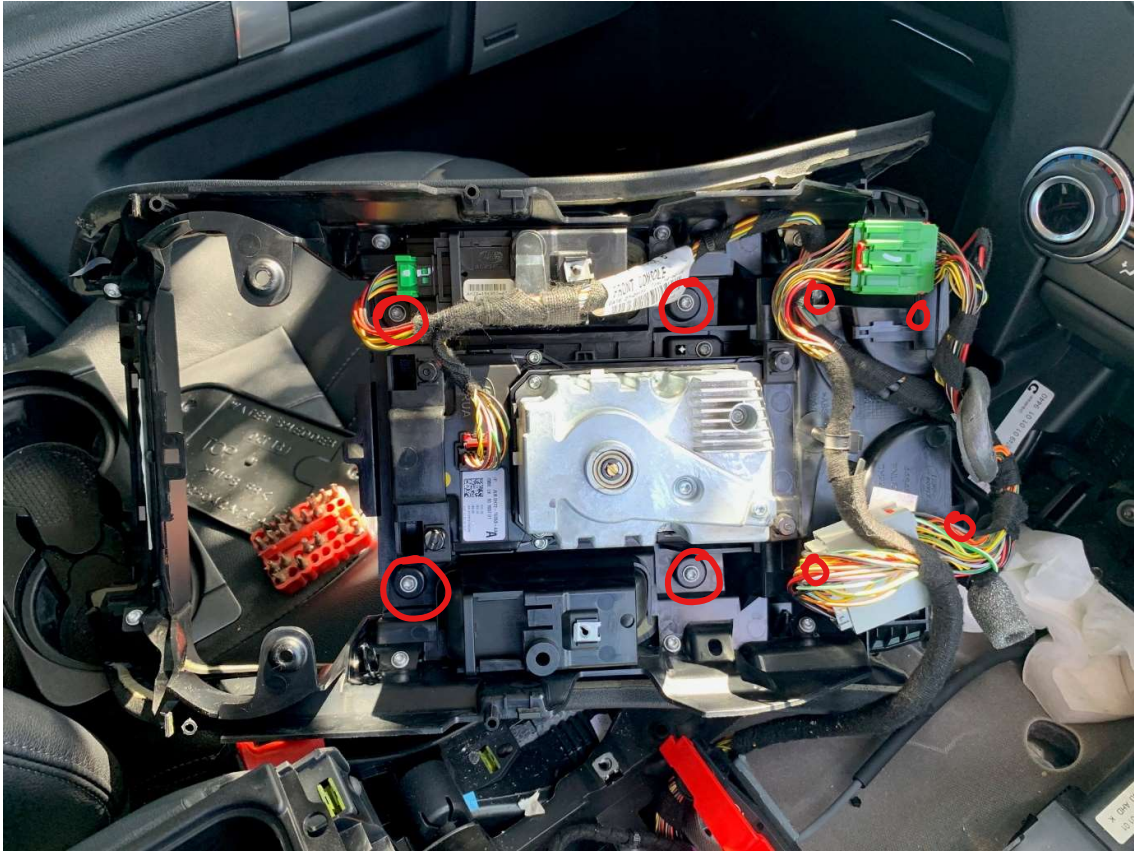
Now the Centre is loose, roll the entire assembly onto the passenger seat, taking care not to stretch the cable harness, I don't recommend disconnecting the main harness as you will get a large number of faults and the dash cluster goes off (you have enough fault codes to deal with already).

Using the T20 Torx Driver undo the 4 screws holding on the plastic trim surrounding the TCS, also onto the 4 screws holding on the Mode selection/height/low range switch panel.

Two of the screws are hidden behind the Gray and Green connectors, if you cannot access these screws simply release the connector from its holder BUT don't disconnect the connection itself.

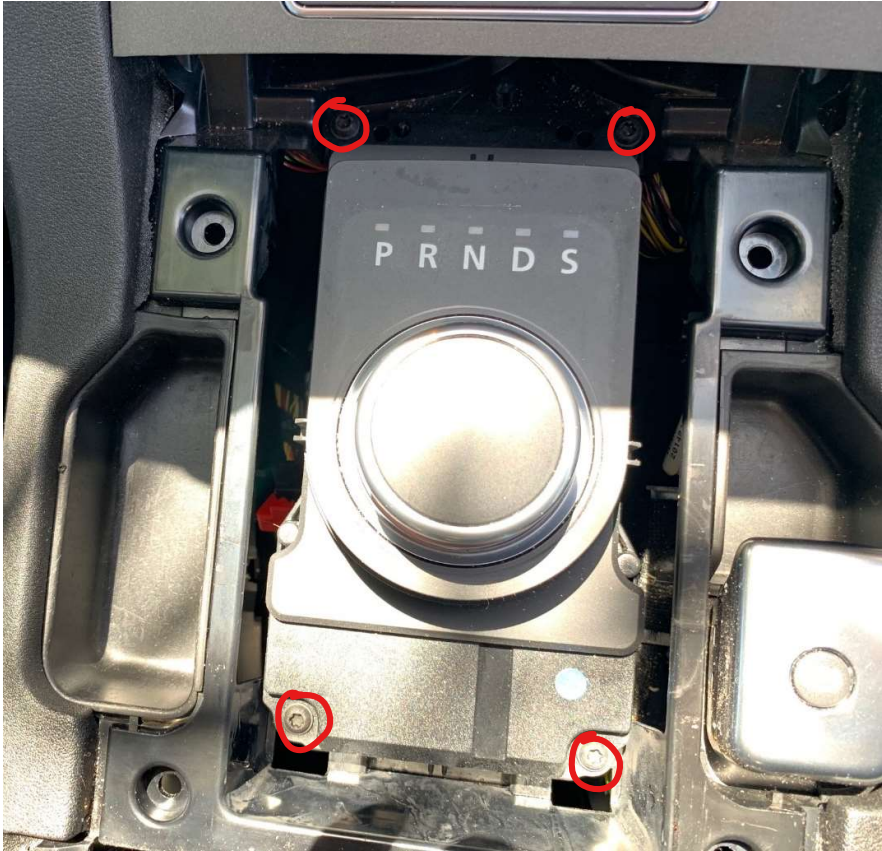
Important Note;

The brass screw at the base of the TSC will raise and lower the rotary dial, it will be very easy to turn, the dial can be used (turned) in the fully lowered AND fully raised position, however do not turn this screw if the dial is not in Park, the dial will attempt to rotate to Park as it is lowered, if your shift lock solenoid is in the locked position (unpowered) and the dial is in anything but Park you will break something.



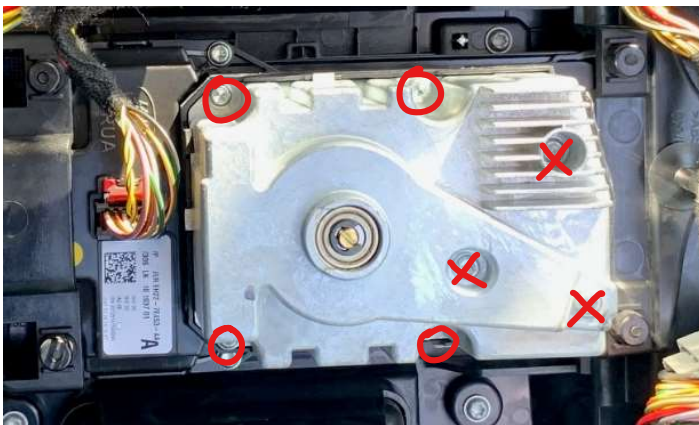
After undoing the 8 screws roll the entire assembly back into its normal position. (Making sure that all electrical connections are still in place)

Carefully remove the plastic surround from the TCS, you can gently lift it up from the cup holder side, part of it will sit under the Mode selection/height/low range switch panel.



Using the T20 Torx driver, remove the 4 screws holding the TCS into the console, you can now lift the TCS out of the console and lay it on its side.

Remove 3 of the 4 screws on the outside edge on the base of the TCS, do not undo the screws in the centre of the unit, they hold the motor and solenoid in place.



You must do the following with the dial in the raised position, if you're in Drive the dial will be raised, if you're in Park raise the dial by turning the brass screw, and be gentle.

The last screw we will use to hold everything together, undo this screw so that the unit is held together but open enough so that you can place a screwdriver into the unit and release the shift lock.

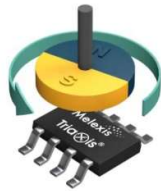
Important Note;

The shift lock is plastic, be gentle. The circuit board doesn't want a short circuit, be careful. I used a screwdriver but you could use something non conductive.

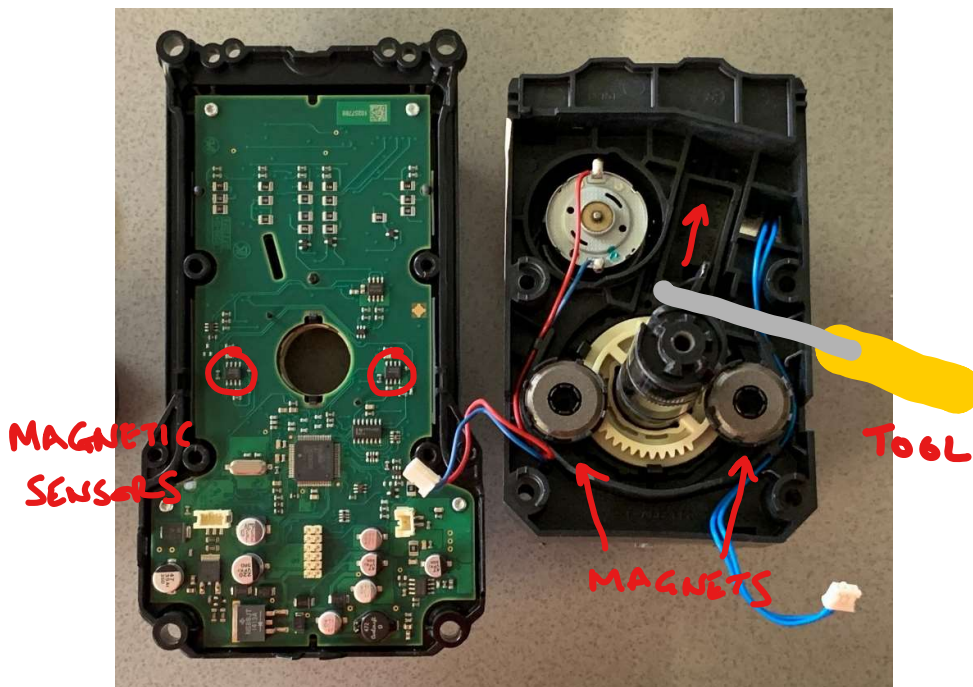
We don't want to open the unit too far because the gear selection circuitry uses magnets and magnometer sensors, opening the unit separates the two, open too far and the chip won't see the change in gear when we turn the dial, or may see an invalid selection.

Applications

- Absolute Contactless Position Sensor
- Steering Wheel Position Sensor
- 3D Joystick Position Sensor



Fully opened view of the TCS (taken during the repair procedure, you don't need to open the unit this far yet)



What we need to do is gently release the shift lock with a screwdriver (or non conductive tool) with one hand and turn the dial with the other hand (if turning to drive or reverse you will still need your foot on the brake pedal (and a working brake light switch))

Once you have made your gear selection, we need to tighten the single screw holding the unit together and if driving some distance I would place the TCS back into its correct location.

An alternative would be to use an elastic band (hair tie, string, zip tie etc) and hold the shift lock open. If you do this you will get a second fault code stating a mechanical failure of the shift lock, and you can only select a drive mode whilst the brake pedal is pressed (working brake switch), turning the dial to drive without the brake pedal results in a flashing D or R on the dash and no drive.

The work around fix

This fix is good for fault finding an intermittent fault and for peace of mind, it involves creating a shift lock lever under the cup holder that will quickly release the shift lock if the solenoid fails, however I don't recommend using this method for long term use (who wants to lift the cup holder for every gear change?). And remember if you have no power using this will not enable you to select Neutral, you will still need to use the red lever for that.

Perform the procedure above to remove the TCS, once the TCS is free, disconnect the TCS cable, you will need to raise the red locking lever/tab to remove the connector, again nothing needs to be forced so don't break anything.

Take the TCS to a clean workbench or kitchen table, the TCS does contain static sensitive circuits so take care not to have any static build up (google that if you need to).

To open the unit fully we will need to remove the black plastic centre cap from the metal dial, the cap is held on with double sided tape, to do this we push a small flat blade screw driver between the edge of the plastic and the metal dial and lever slowly up, I also used a box cutter and pushed the blade into the small gap once it started to lift (be careful if you do), I managed to get this off without any issue but don't worry if you damage the cap as aftermarket replacements are available in a range of colours.

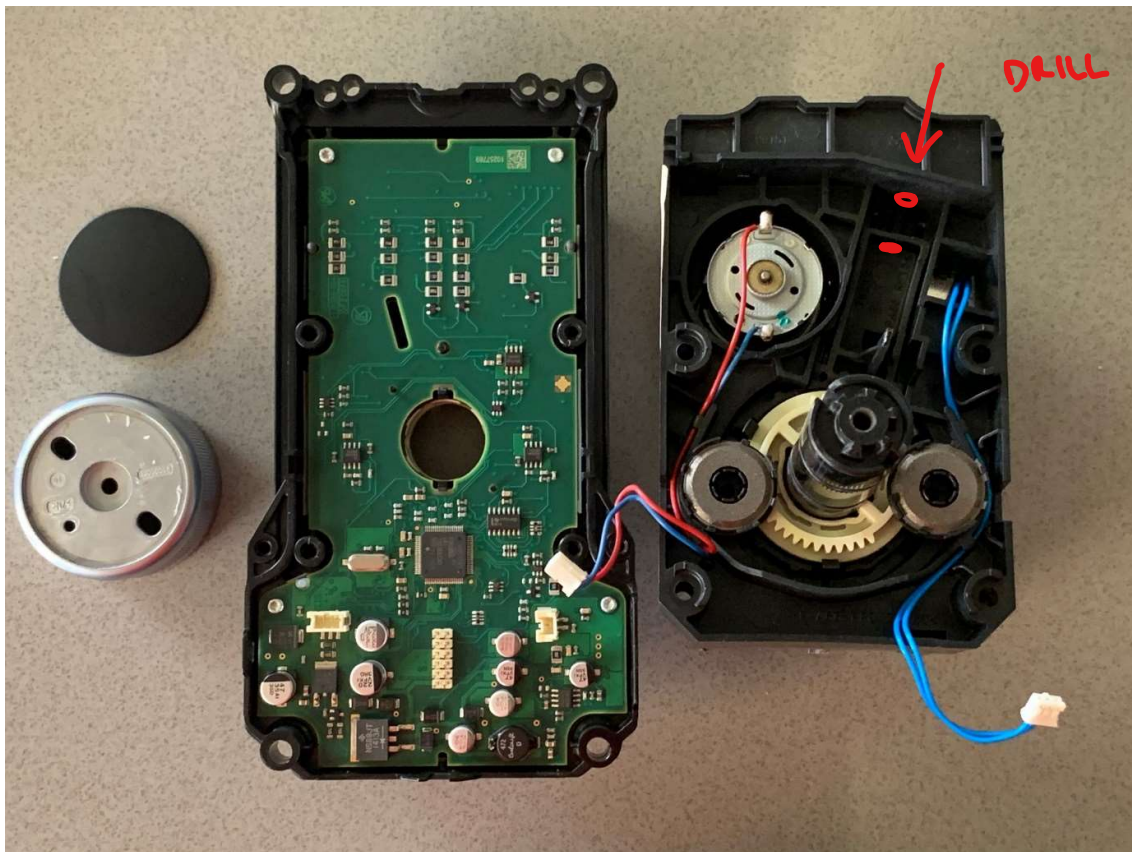


Once the plastic cap is off we can remove the metal dial using a T20 Torx driver.

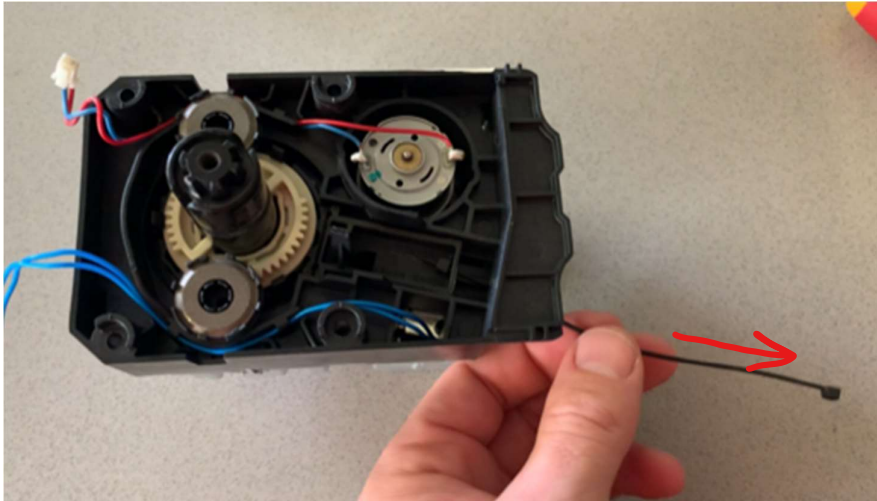
Turn the unit over and remove the 6 T20 Torx screws, 2 hold the plastic cover around the connector, the remaining 4 hold the unit together around the outside edge (don't remove the 3 screws in the centre of the metal section, they hold the motor and solenoid in place)

Remove the plastic cover from around the connector first (taking care not to bend the connector pins), under this cover there are two cables one for the solenoid and one for the drive motor (to raise and lower the dial), disconnect both cables.

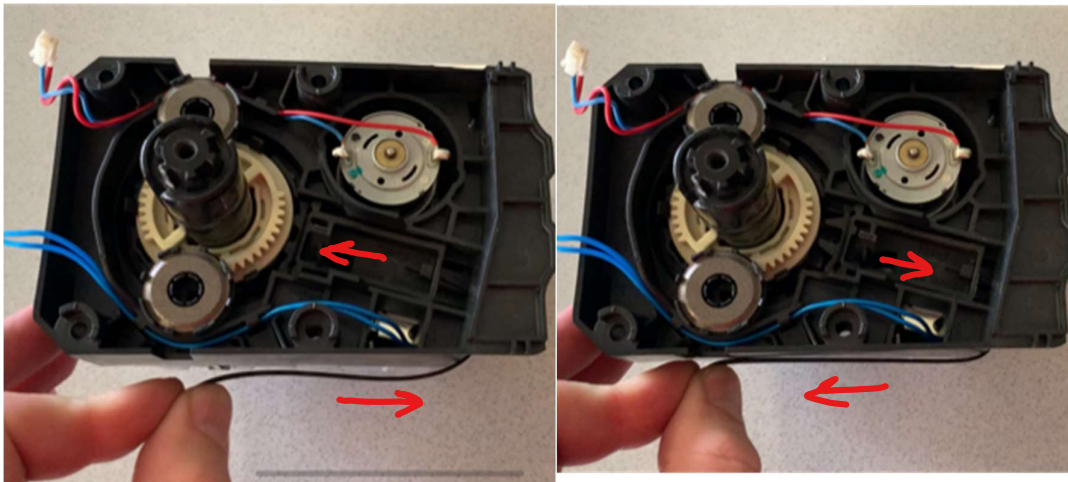
You should now be able to separate the TCS into two halves.



Next we're going to drill a hole into the case and through the end of the plastic locking mechanism, I'm not going to give measurements but you will want the holes to line up and be roughly 3 mm, take your time (measure once and drill twice, or something like that).



Take a long thin zip tie and loop it around a key ring and zip it up (this will be your ring pull), then thread the other end through the hole and connect a second zip tie to this, cut off the excess zip tie and the rest of the second zip tie. The zip tie is flexible enough to loop around and apply pressure on the mechanism when pulled from the cup holder side of the TCS. This is what I used but you can use string or anything similar on hand, just ensure that the mechanism is free to move when no pressure is applied.



Then put everything back together and refit the TCS into the car, feed the zip tie and ring pull around the TCS and into the cup holder area, I used loose zip ties to hold the ring pull in place.

You may have a few extra fault codes from removing the TCS, simply clear these if you have a Diagnostic tool.

The Fix and further testing

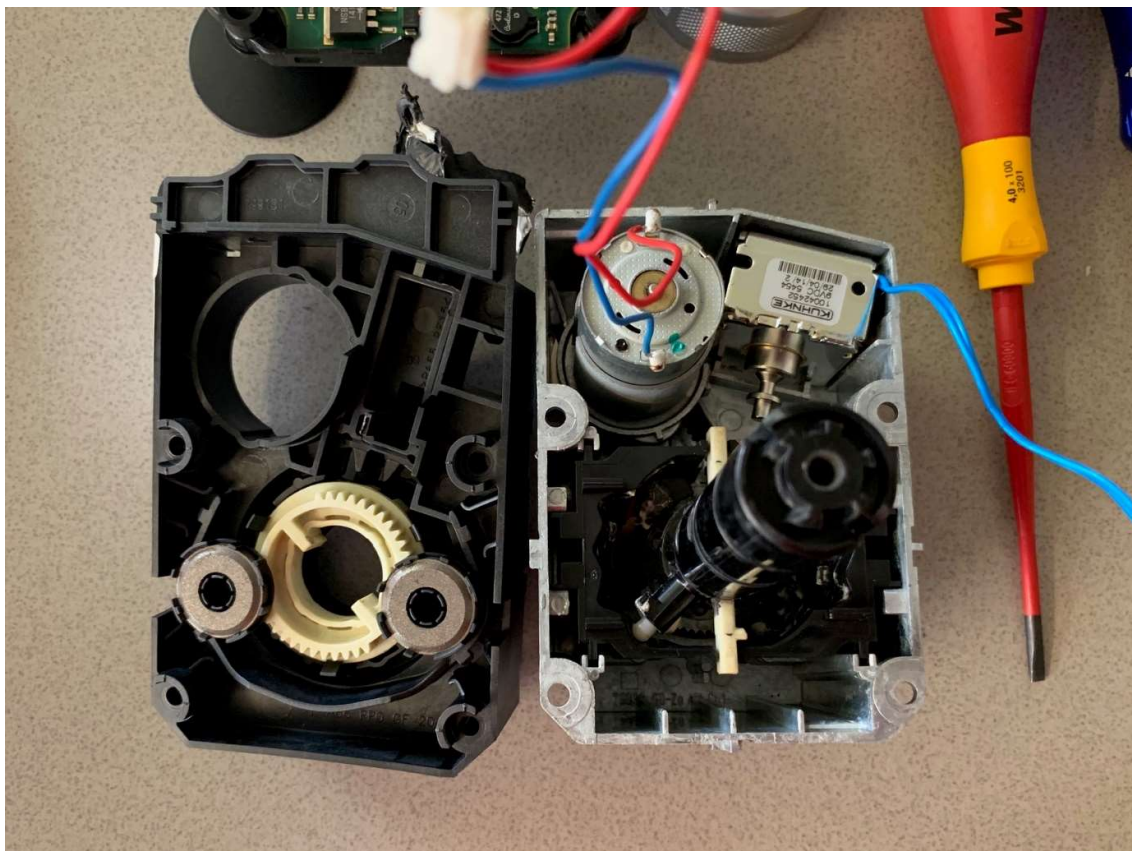
My fault disappeared, I was expecting it to return at some point but I continued to drive on, comfortable that my newly installed shift lock release would keep me going if it did. And a few days later the fault returned.



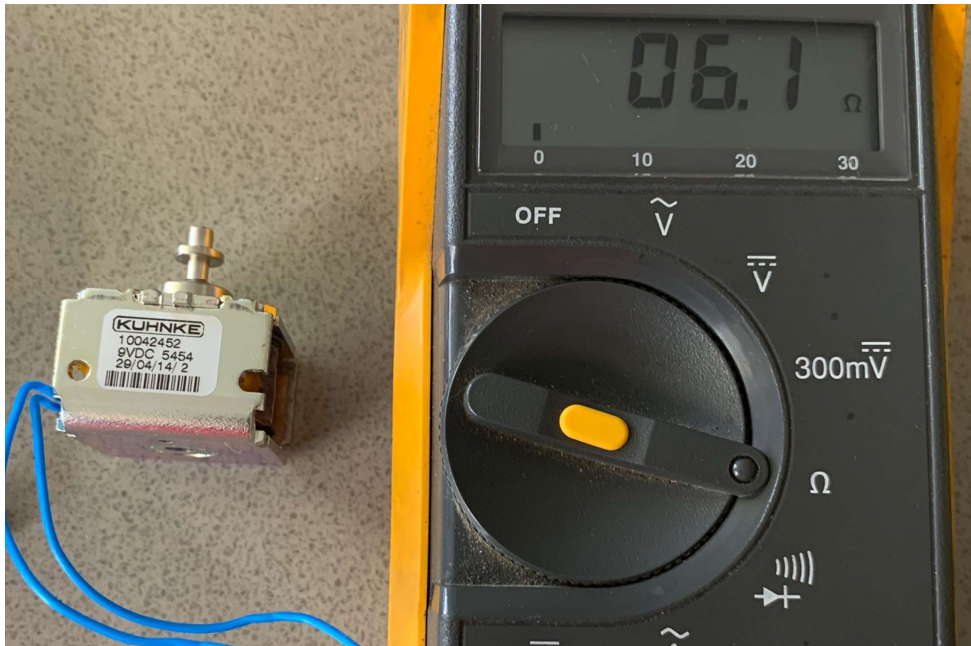
Again remove the TCS and open it up,

Optional Step if you wish to remove the solenoid, it is possible to test without removing it; we will need to remove the silver foil sticky black sticker thing that is attached to the front of the TCS (Alternatively cut through the middle of the foil where the plastic meets the metal). Then you can separate the lower section of the TCS into two (we now have three parts Top - printed circuit, Centre - Magnets and shift lock, & The Lower Metal with the raise / lower motor & shift lock solenoid).

Note; Careful not to pull out the main shaft as parts may fly out and we need them all in to work

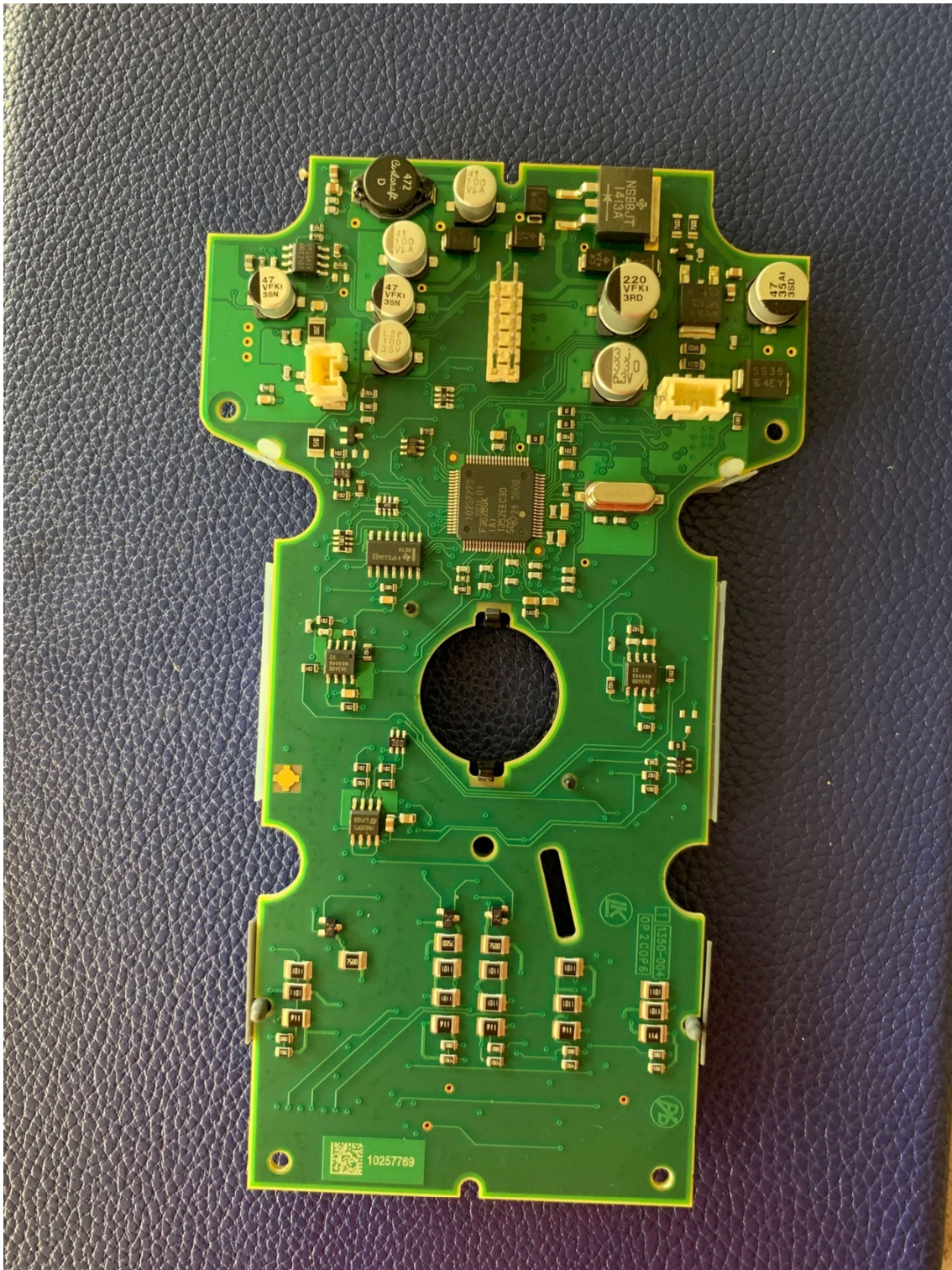


Firstly, I tested the shift lock solenoid itself, It's rated at 9 volts and I measured the resistance at 6.1 Ohms, using a 9 volt battery it was clear that my solenoid works.

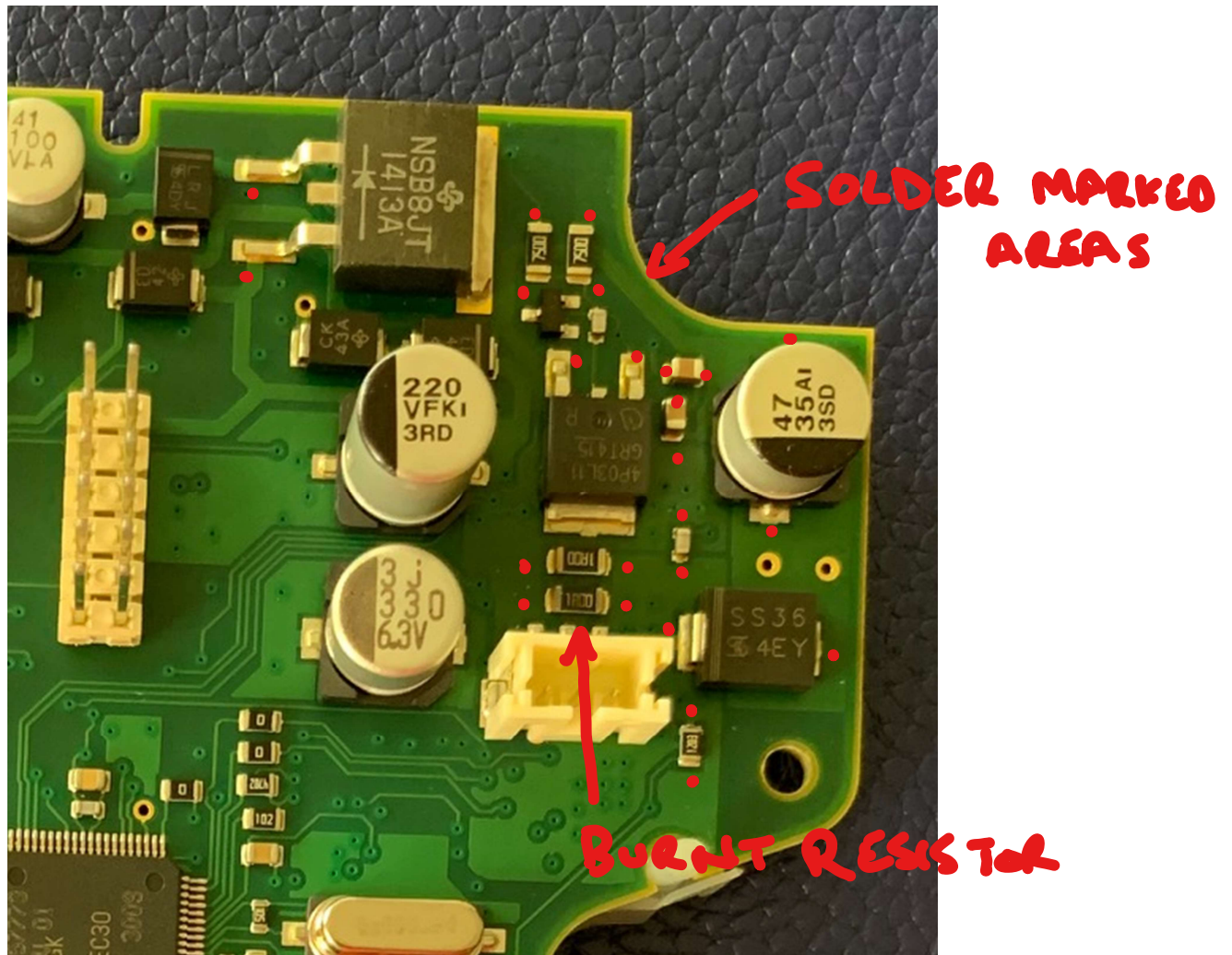


From here I inspected the printed circuit board with a microscope looking for damage or cracked solder joints, I found nothing, everything looked good except for a slight burn mark on a 1 Ohm resistor. I decided to re-solder several components next to the solenoid connector, you will need a

good quality, small tip, high temperature soldering iron (mine was set at 420°C+), most solders used on modern circuits have little or no lead which makes them harder to work with.



Circuit Board



Burned Resistor marked 1R00 and area of interest.

After re soldering, my TCS has worked continuously and I still have my lock release if needed.

Disclaimer

This is what I did for my issue and it worked for me, this will not fix other issues and will not fix a broken transmission, you will void any warranty on this unit by performing this repair, as always you undertake this repair at your own risk.