FuelTech

GCM INSTRUCTIONS

USER MANUAL

# 1. Índice

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1. Configuring GCM – Gear Control Management

The Gear Control Manager was developed to control sequential gearboxes with paddle shift activation. The shifting barrel pattern must be R-N-1-2-3-4-5-6 and the shifting actuation can be done by pneumatic solenoids or electric motors.

Enable Gear Control Management function under **Map Options menu (1)**:

- Click Map options;
- Select **Gear Control Management (2)**; Once it's enabled, one click on top of the name to go to the menu.
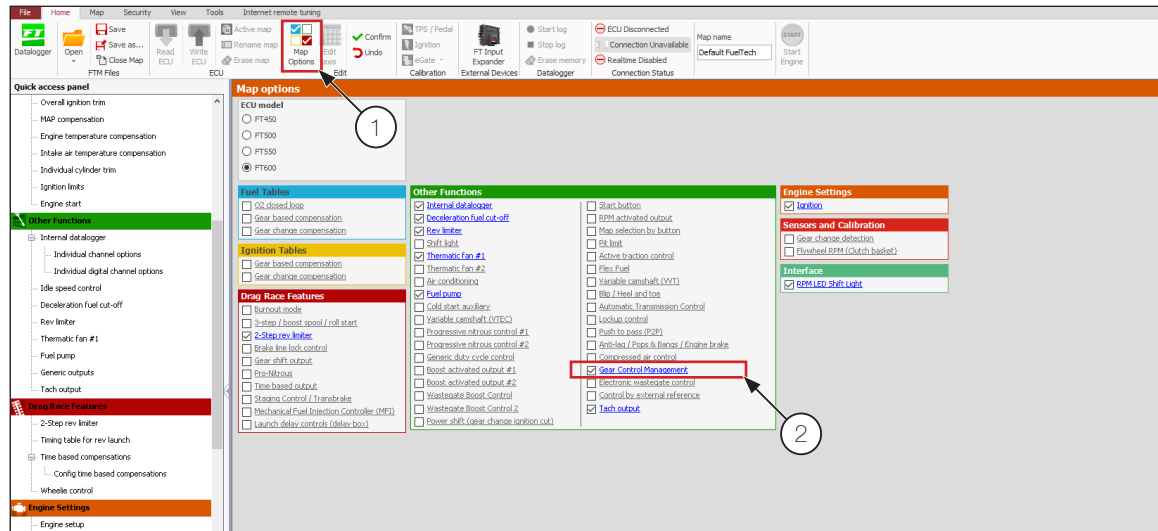
GCM function is divided in 2 different sections: **Upshift (3)** and **Downshift (4)**.

If necessary, it is possible to change the Paddle shift buttons activation mode, follow instructions under section 1.6 of this manual or clicking on **Paddle Shift (5)**.

GCM Configuration
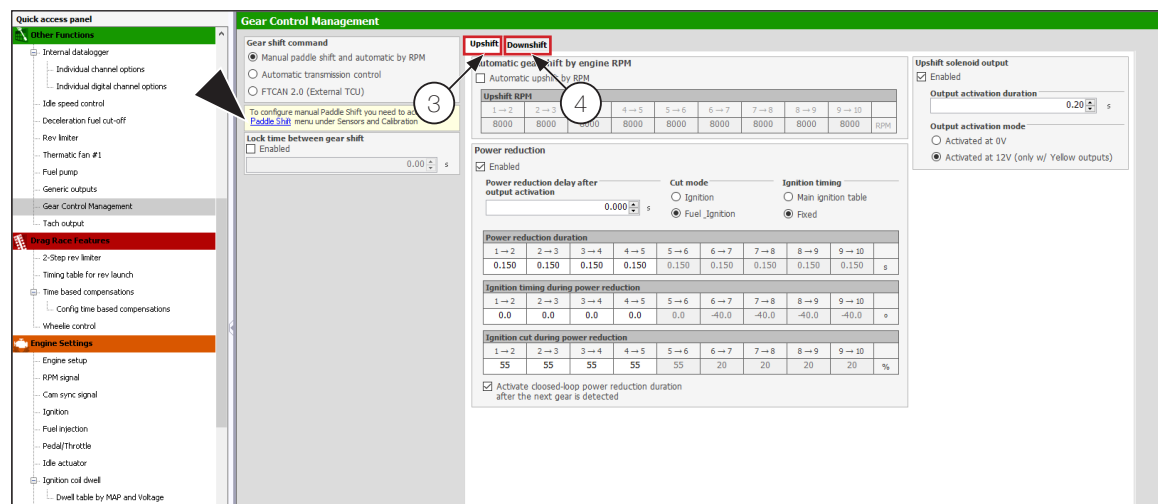
1.1 Upshift

Enable **Power reduction (5)** option to allow gear change under high engine load.

There are different adjusts to reduce power, such as open loop power redutcion duration, absolut ignition timing and ignition cut %.

In order to have shorter power reduction duration is recommended to enable **closed loop power reduction duration after next gear is detected (6)** option. This strategy is based on the analog gear position sensor reading (required for this option), and it's necessary to configure gear positions under Sensors and calibration, Gear change detection menu. This way the ECU will apply the maximum power reduction duration time and if the gear position sensor indicates that the next gear is already in position, the ECU stops the power reduction.

Enable **upshift solenoid output (7)** to send ECU signal to the shift actuator.

1.2 Downshift

Enable **Throttle percentage added on downshift (8)** for throttle blip and to allow gear reduction. Low numbers on Throttle percentage won't rev enough to release the actual gear, high numbers will push the car forward when the next gear engage.

Enable **Downshift solenoid output (9)** to send ECU signal to the shift actuator.

Additional power reduction after gearshift (10) will help to hold the car movement after next gear is engaged.

Downshift protections are important to prevent damages to the gearbox and to the engine. To adjust the maximum RPM for downshift is suggested to calculate RPM drop between gears and subtract it from the engine RPM limiter number.

For more information consult FTManager Help (F1).

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1.3 Inputs configuration

Inputs configuration is made using **Inputs** menu, under **Sensors and calibration**:

11 - Upshift button
12 - Downshift button
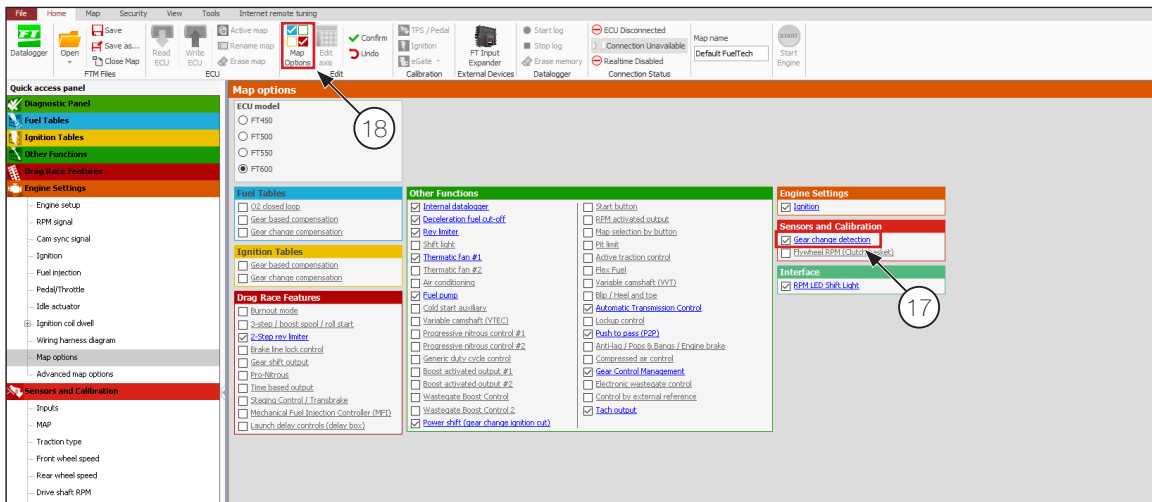13 - Gear position sensor (Analog)
14 - Interlock button
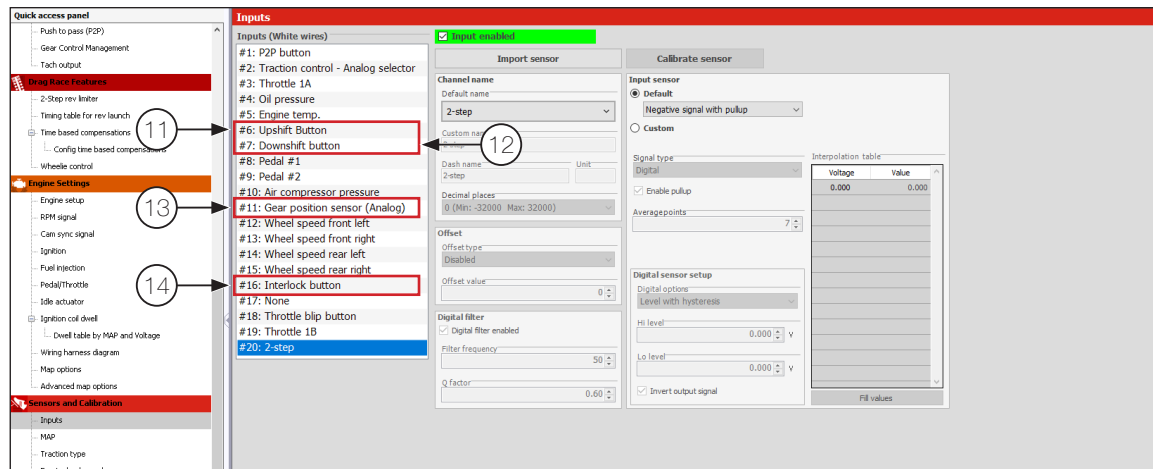
1.4 Outputs configuration

15 - GCM: Upshift solenoid output
16 - GCM: Downshift solenoid output

1.5 Gear change detection configuration

In order to have the GCM working properly it is necessary to enable **Gear change detection (17)**, going to **Map options (18)**:

Once enabled, click on it's name to access the menu.

It must be configured as **Analog sensor (19)** and edit gear position voltage for each gear. It is recommended to configure Next gear detection as Detection window.
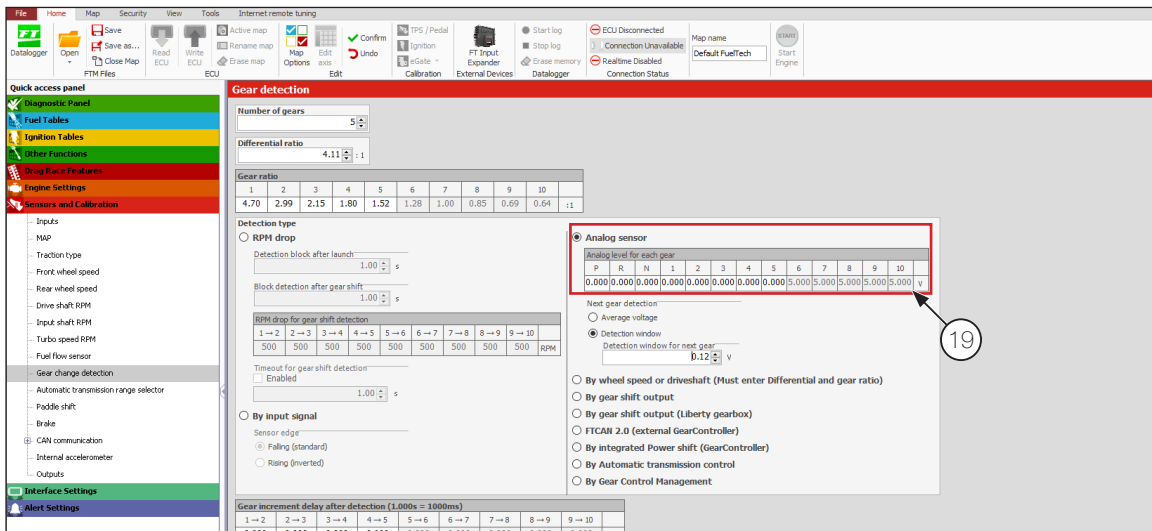

For more information consult FTManager Help (F1).

1.6 Configuring Paddle shift and Interlock bottons activation

In case of need to adjust **Paddle shift** and **Interlock bottons activation mode,** under Sensors and calibration menu there is a specific section named Paddle shift. There are options for ground (0V) or 12V activation.

Interlock button: safety button to change from **Neutral** to **1st** or to **Reverse** or to move from **1st** to **Neutral** or from **Reverse** to **Neutral.** For these situations Interlock button must be pressed along with Upshift or Downshift button (Paddle shifts).
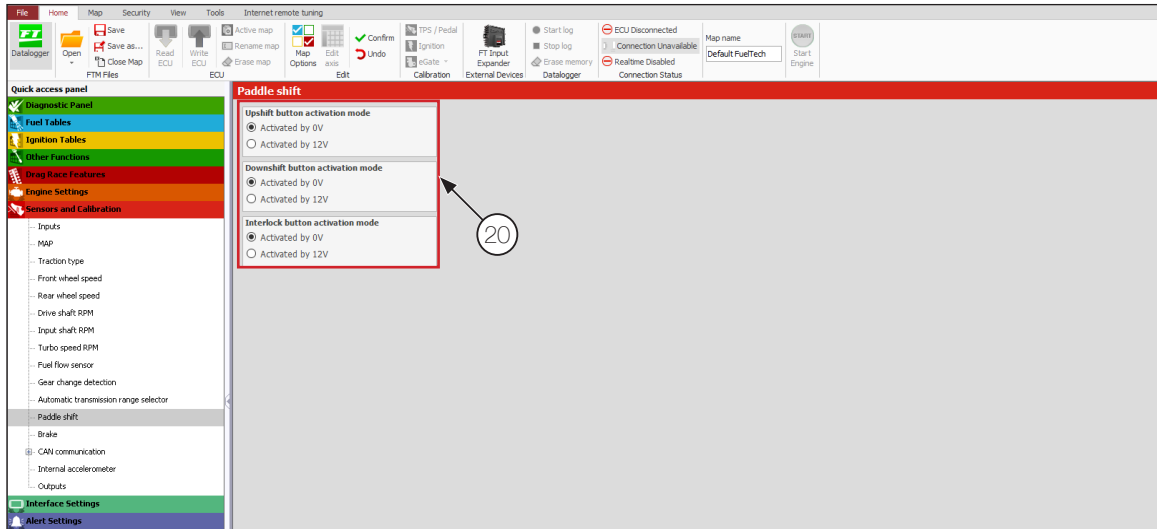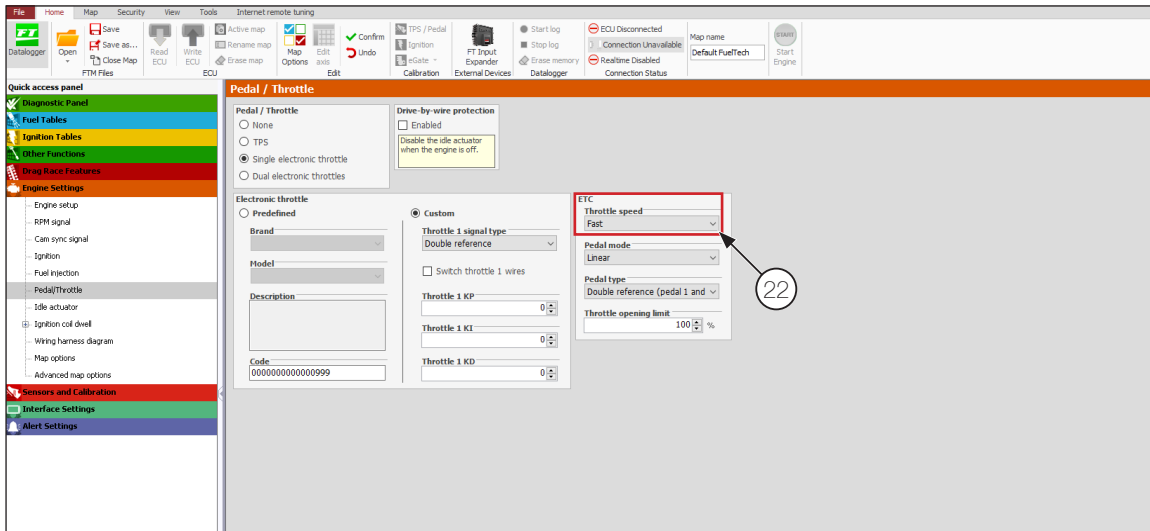

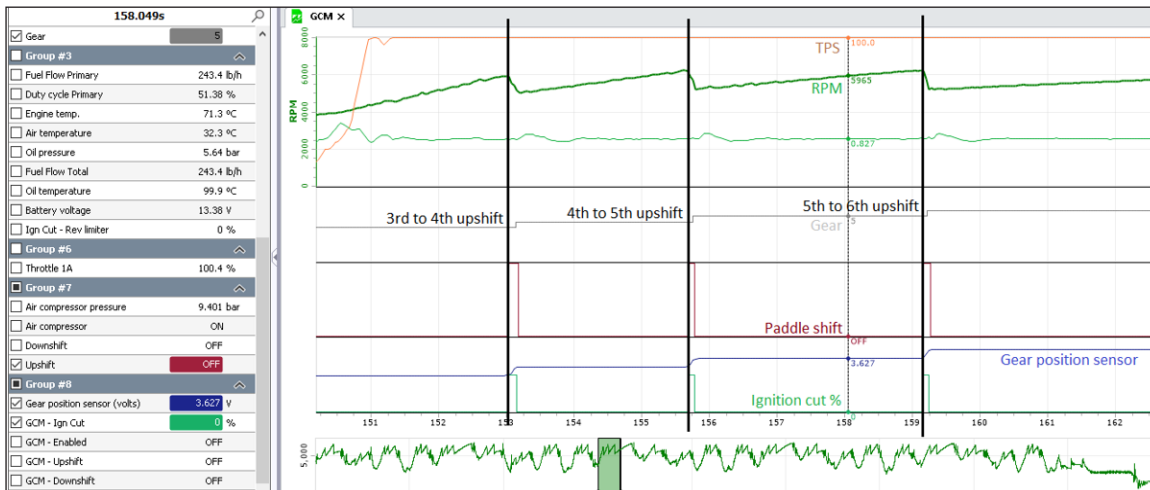Paddle Shift (21) inputs configuration
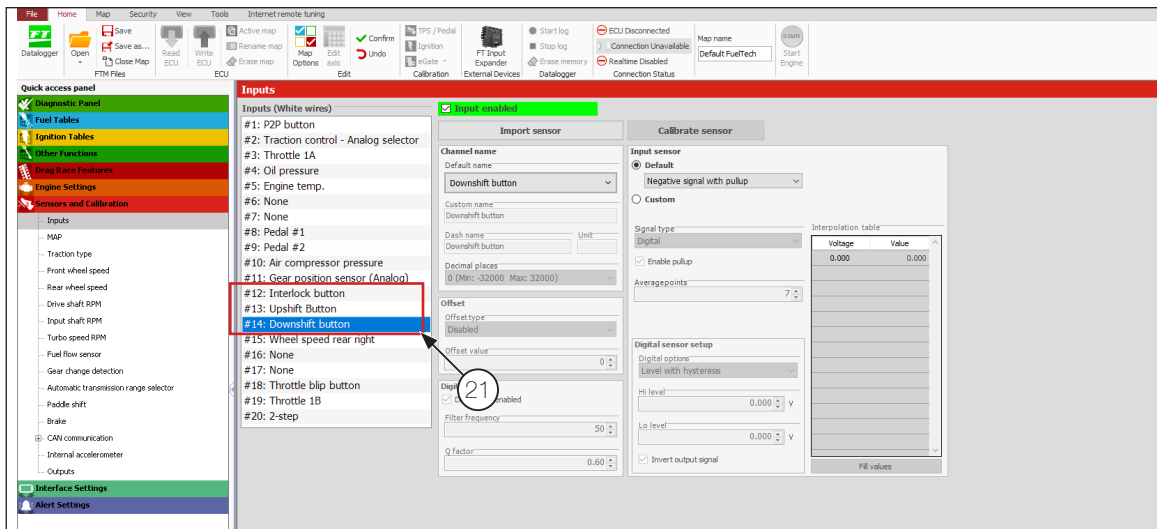
1.7 Throttle speed

It is very importante to configure throttle speed as **Fast (22)** to have the best throttle opening response during downshift blip.

1.8 Logs examples

Upshift log example

Downshift log example
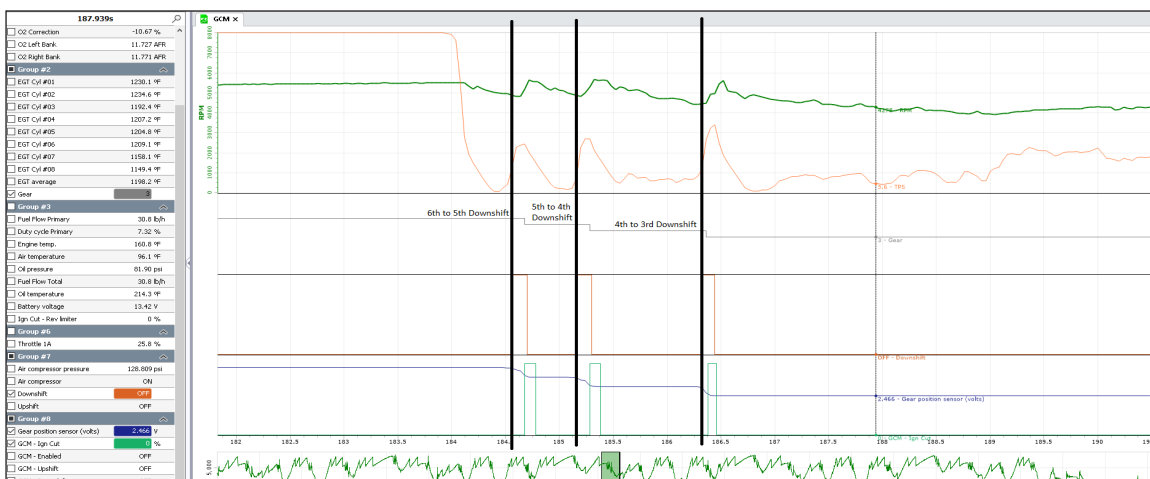
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2. Compressed air control function

Most of the sequential transmission systems are pneumatic activated, so all the line pressure control can be done by FuelTech.

Enable **Compressed air control function (1)** under **Map Options** menu **(2)**:
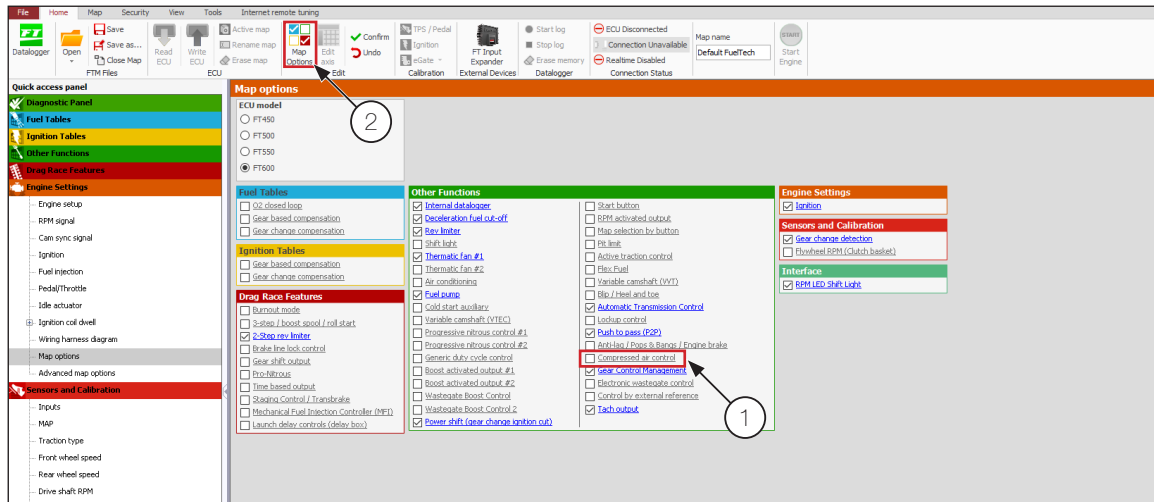
Once enabled, to access it just click on top of the function name.

Configure Turn On and Turn off pressure targets. Time configurations are used in case of sensor malfunction.
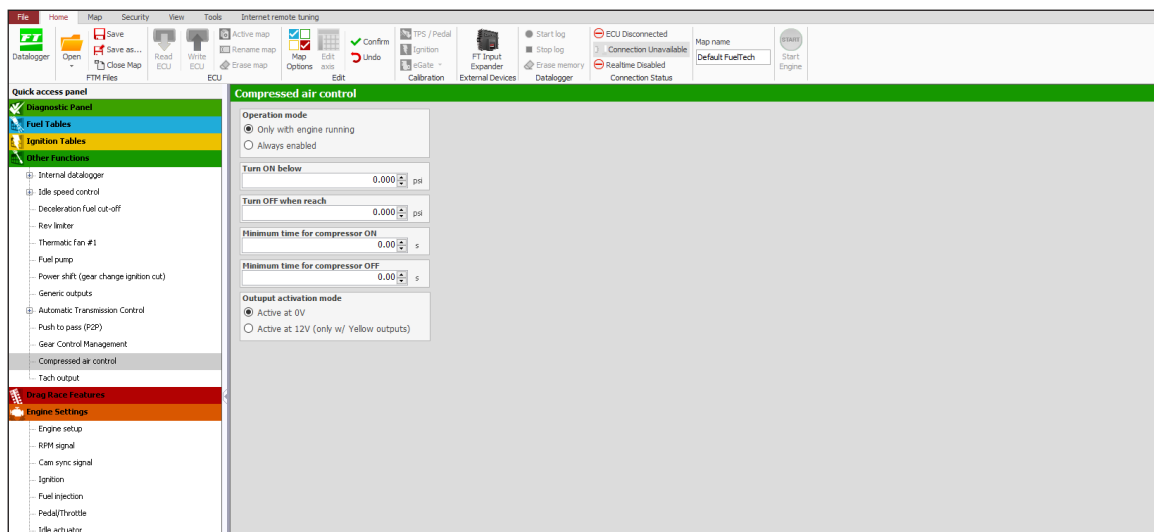
2.1 Input configuration

- Air compressor pressure (3)

2.2 Output configuration

- Air compressor output (4)

For more information consult FTManager Help (F1).

3. Troubleshooting

Diagnosing upshift

Check:

- Upshift channel under diagnostic panel must be ON or changing it's state from OFF to ON when requesting upshift
- Ignition cut % during upshift must be the same as configured in the GCM function menu (check the log)
- When using pneumatic systems: check if line pressure indicated in the analog input Air compressor pressure is under requested numbers for operation
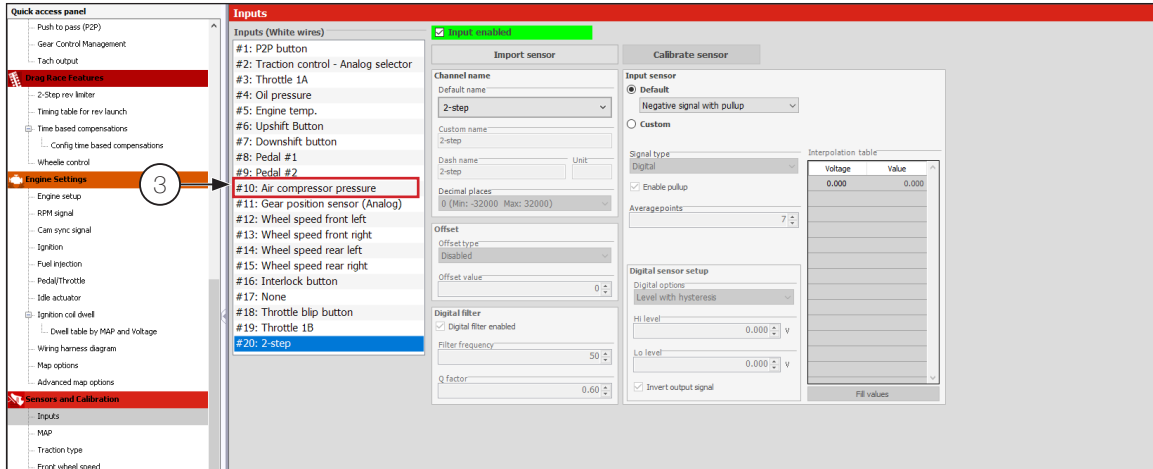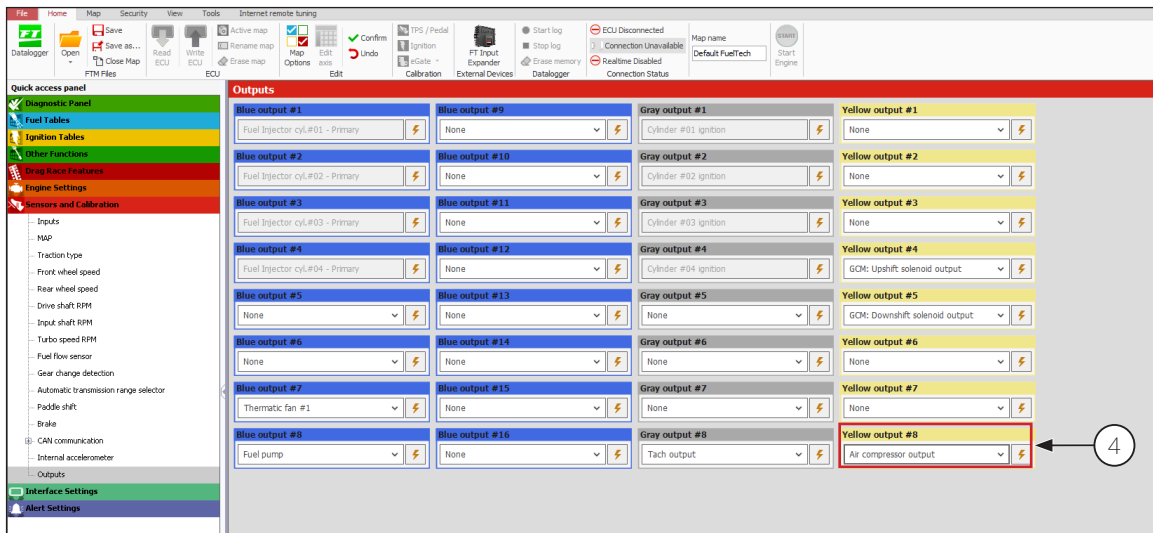- If there is a pressure regulator along the pneumatic line that can be damaged or misregulated
- Solenoid electric activation (pulse) with a probe light
- If the Gear position sensor is reading correctly during upshift (changing voltage reading under diagnostic panel)
- If voltage reading is correctly configured for all the gears. Can be done reading the analog input under diagnostic panel or with a log

Power reduction is too long, engine stays too much time with no power during upshift:

Check:

- If **Closed loop power reduction duration after next gear is detected** option is activated
- If Gear position sensor detects the next gear quickly (check the log)
- Ignition cut %, high numbers can drag down the car. Drop cut % and apply lower ignition timing (0° or less) to take power out

Diagnosing downshift

Check:

- Downshift channel under diagnostic panel must be ON or changing it's state from OFF to ON when requesting downshift
- If Electronic Throttle is realizing blip to rev match. Add extra throttle % can help to disengage actual gear
- GCM Safety configuration (minimum TPS and maximum RPM)
- Disable downshift power reduction
- Acceleration fuel enrichment adjust, low numbers won't allow proper engine reaction to throttle blip
- AFR reading right before blip. Rich or lean numbers make throttle response too slow
- Detection window for next gear (under Sensors and Calibration, Gear Change detection) can be too wide, numbers around 0.1V have good results
- When using pneumatic systems: check if line pressure indicated in the analog input Air compressor pressure is under requested numbers for operation
- If there is a pressure regulator along the pneumatic line that can be damaged or misregulated
- Solenoid electric activation (pulse) with a probe light
- If the Gear position sensor is reading correctly during downshift (changing voltage reading under diagnostic panel)
- Too low engine RPM under load can make downshifts a little bit harder
- Electronic throttle speed configured as Fast
- If voltage reading is correctly configured for all the gears. Can be done reading the analog input under diagnostic panel or with a log
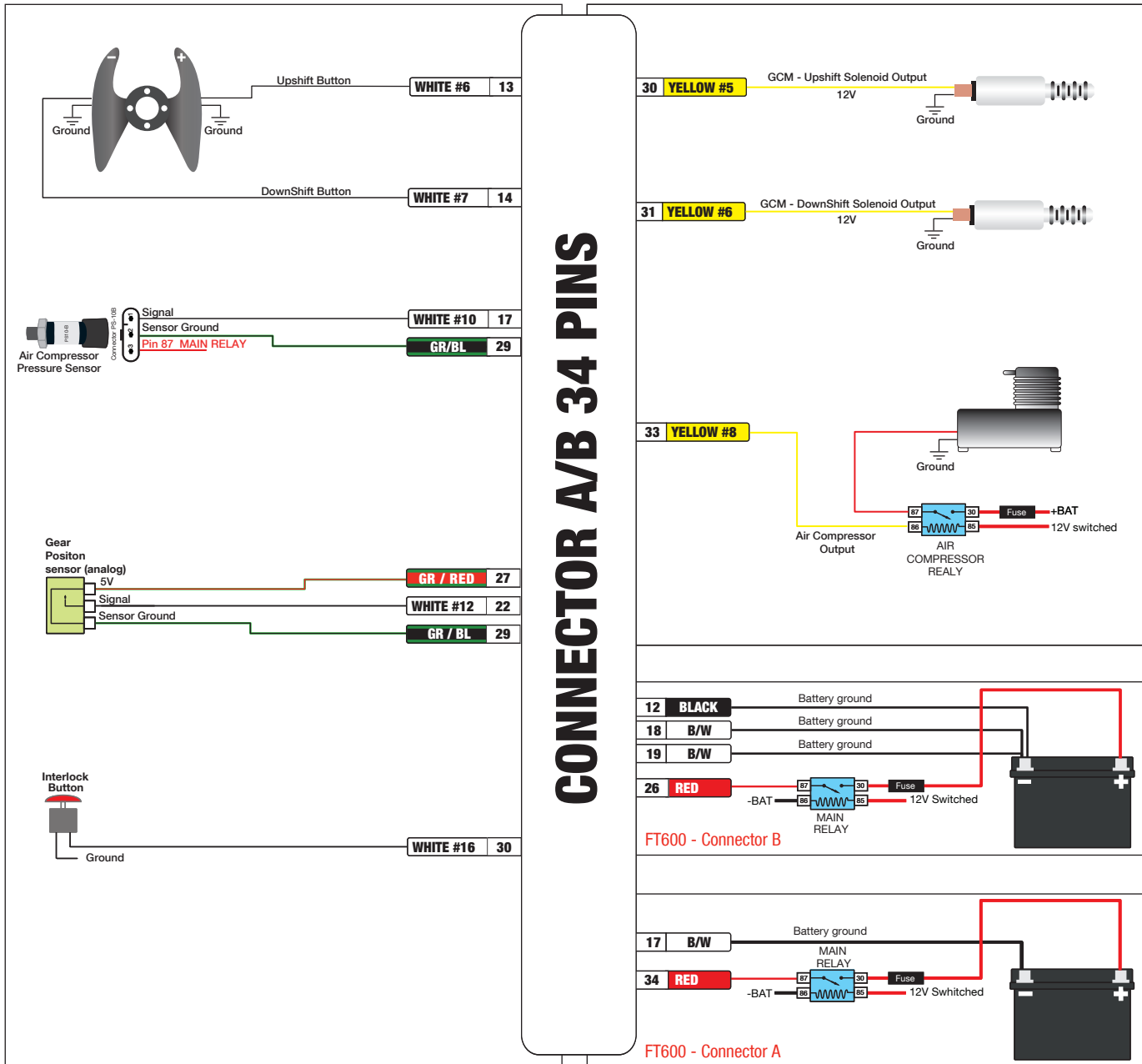
⚠️ **IMPORTANT**

 If all the listed items have been chacked and the problem still remains, there is a possibility of the mechanical levers are not properly regulated, problem in the transmission integrated valves (IVA – when exist) or even some issue inside the gearbox.

4. Electrical Diagram

GCM - Diagram FT600

CONNECTOR A/B 34 PINS

Upshift Button — WHITE #6 | 13
Ground   Ground
DownShift Button — WHITE #7 | 14

Air Compressor Pressure Sensor
Signal — WHITE #10 | 17
Sensor Ground
Pin 87 MAIN RELAY — GR/BL | 29

Gear Positon sensor (analog)
5V — GR / RED | 27
Signal — WHITE #12 | 22
Sensor Ground — GR / BL | 29

Interlock Button
Ground — WHITE #16 | 30

30 | YELLOW #5 — GCM - Upshift Solenoid Output 12V
Ground

31 | YELLOW #6 — GCM - DownShift Solenoid Output 12V
Ground

33 | YELLOW #8
Ground
Air Compressor Output
AIR COMPRESSOR REALY
87 30 Fuse +BAT
86 85 12V switched

12 | BLACK — Battery ground
18 | B/W — Battery ground
19 | B/W — Battery ground
26 | RED
-BAT — 87 30 Fuse 12V Switched
86 85
MAIN RELAY

FT600 - Connector B

17 | B/W — Battery ground
MAIN RELAY
34 | RED
-BAT — 87 30 Fuse 12V Swhitched
86 85

FT600 - Connector A

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POWER FT
ECU