

GCU8 Manual

Gear Control Unit



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1) FEATURES

1. Can control anything from simple flat-shift to sophisticated paddle shift
2. Drive By Wire Support
3. OEM ECU Support
4. Auto Throttle Blip for clutch-less smooth downshifts
5. Engine protection strategies (prevents engine from over-rev when downshifting)
6. Configurable via USB (no other interface needed)
7. Software included
8. Upgradable firmware
9. Repairable - this is not some Chinese black box you can't repair. We are authors of this electronics and can easily repair the unit in case of any failure. You don't need to buy another one for full price.

2) GCU VERSIONS

There are 3 versions of GCU8 available.

LITE

Full closed-loop flatshift including drive-by-wire or external throttle blip.

Reference: GCU-08-LITE

RACE

Everything LITE has + added logging and 3D table control that allows fine setup for all scenarios.

Reference: GCU-08-RACE

PRO

Everything RACE has + sophisticated paddle shift support.

Reference: GCU-08-PRO

Every GCU8 unit can be unlocked to a higher version. See 4 – UPGRADING GCU VERSION.

Function	GCU PRO	GCU RACE	GCU LITE
Closed-loop up & down shift	X	X	X
Drive by wire support	X	X	X
Aftermarket and OEM ECU support	X	X	X
Load cell flatshift support	X	X	X
Basic coil & fuel torque reduction	X	X	X
Basic throttle blip support	X	X	X
Advanced coil & fuel torque reduction	X	X	
Advanced throttle blip support	X	X	
3D table control for all major parameters	X	X	
Datalogging	X	X	
Shift statistics	X	X	
Air compressor control	X		
Full paddle shift control	X		

3) CONNECTING TO THE GCU

GCU8 has integrated USB-C interface. For Windows 7/10/11, no drivers are needed.

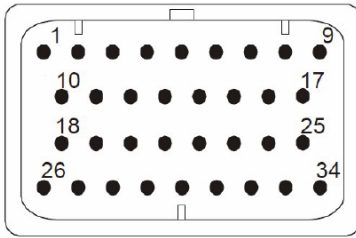
To set it up or configure, use our MME Configurator 2 software. See downloads: <https://www.mme-motorsport.com/en/download>

4) UPGRADING GCU VERSION

If you'd like to upgrade your GCU8 to RACE or PRO version, use Upgrade option, copy paste the Device ID codes and contact us over email at info@mme-motorsport.com or via contact form on our web page.

For firmware and software upgrade, see 15 – Upgrade firmware

5) PINOUT



Connector:
34 Way (Key 1) Super Seal 1.0mm
TE Connectivity 4-1437290-0

Open Barrel Pins: TE-Connectivity 1-1437284-0

Closed Barrel Pins:

<https://www.mme-motorsport.com/en/products/superseal-1-0-solid-contacts>

Pin	Name	Description	Type	Color*
1	12V	12V supply for GCU. Use 10A fuse.	Power input	red 1.0
2	AN_AIR_PRS2	Secondary pressure sensor	Analog input (0-5V)	black/blue
3	AN_LOADCELL	Load cell voltage sensor	Analog input (0-5V)	green
4	AN_DBW_PPS1_OUT	DBW pedal position output 1	Analog output (0-5V)	blue/yellow
5	AN_DBW_PPS2_OUT	DBW pedal position output 2	Analog output (0-5V)	yellow/red
6	SW_EXT_UP	External up-shift request button	Digital input (low when active)	blue/brown
7	OUT_COMP	Compressor output	Digital output (low when active) – max 500mA	brown
8	OUT_BLIP	Throttle blip output	Digital output (low when active) – max 500mA	orange/black
9	COILS_OUT	Power to coils from GCU. 12V must be connected to pin 34.	Power output (max 15 A – connector limit)	yellow 2.5
10	5V	5V output for sensors	5V output (max 100 mA)	orange
11	AN_GEAR_POS	Gear position sensor signal	Analog input 0-5V	blue
12	AN_DBW_PPS1_IN	DBW pedal position input 1	Analog input 0-5V	blue/white
13	AN_DBW_PPS2_IN	DBW pedal position input 2	Analog input 0-5V	yellow/green
14	SW_N_BUTTON	Neutral button	Digital input (low when active)	grey
15	SW_DOWN_BUTTON	Down-shift request button	Digital input (low when active)	violet
16	OUT_CUT	Cut signal output	Digital output (low when active) – max 500mA	white/black

17	OUT_DOWN	Down actuator output	Digital output (low when active) – max 500mA	grey/violet
18	AN_BOTTLE_PRS	Primary pressure sensor	Analog input (0-5V)	yellow
19	FREE			
20	FREE			
21	FREE			
22	SW_EXT_DOWN	External down-shift request button	Digital input (low when active)	blue/green
23	SW_UP_BUTTON	Up-shift request button	Digital input (low when active)	white
24	OUT_ORP	Over-rev output	Digital output (low when active) – max 500mA	violet/brown
25	OUT_UP	Up actuator output	Digital output (low when active) – max 500mA	grey/white
26	GND	Ground		black 1.0
27	FUEL_12V	12V power supply for injector driver	Power input (max 15 A – connector limit)	violet 1.0
28	FUEL_OUT	Power to injectors from GCU. 12V must be connected to pin 27.	Power output (max 15 A – connector limit)	blue 1.0
29	FREE			
30	TACHO IN	RPM signal input	0-12V PWM Input	brown/red
31	SW_CLUTCH_BUTTON	Clutch button input	Digital input (low when active)	red
32	CAN+	CAN High. No termination resistor inside.		pink/green
33	CAN-	CAN Low. No termination resistor inside.		violet/green
34	COILS_12V	12V power supply for coils driver	Power input Power output (max 15 A – connector limit)	white 2.5

* 0.35 mm² unless specified.

6) WIRING – POWER SUPPLY

GCU8 has 2 dedicated pins for powering the unit. Make sure pin 1 – 12V is protected by 10A fuse. This voltage source pin **MUST** be used to power all of the GCU's outputs (up, down actuator, compressor solenoid etc)

Pin	Name	Description	Type	Color
1	12V	12V supply for GCU. Use 10A fuse.	Power input	red 1.0
26	GND	Ground		black 1.0

7) WIRING – DIGITAL INPUTS

Digital inputs are buttons and switches that are activated by connecting the ground to pin. Example of such input is shift buttons (paddles), neutral lock button, clutch button etc. Each input can be inverted inside the software.

Pin	Name	Description	Type	Color
6	SW_EXT_UP	External up-shift request button	Digital input (low when active)	blue/brown
14	SW_N_BUTTON	Neutral button	Digital input (low when active)	grey
15	SW_DOWN_BUTTON	Down-shift request button	Digital input (low when active)	violet
22	SW_EXT_DOWN	External down-shift request button	Digital input (low when active)	blue/green
23	SW_UP_BUTTON	Up-shift request button	Digital input (low when active)	white
31	SW_CLUTCH_BUTTON	Clutch button input	Digital input (low when active)	red

Description of digital inputs:

- **SW_EXT_UP/SW_EXT_DOWN**: external signal indicating that shift will happen (example of such switch is simplified gearshift knob that only has switches or sadev's flatshift switch on the gearbox). When this signal is received (and configured), GCU can do proper closed-loop shift based on this. This can also be used together with paddle shift, so driver can either shift with paddles or by hand (flatshift).
- **SW_N_BUTTON**: neutral button that should be connected to every paddle shift setup and will prevent shifting to neutral from first, or to first from neutral, unless this button is pressed. This is to prevent accidental shifts into gear.
- **SW_UP_BUTTON/SW_DOWN_BUTTON**: only used in paddle shift setup and will tell the GCU that driver want to shift the gear.
- **SW_CLUTCH_BUTTON**: additional safety to prevent driver from shifting to reverse/neutral/first if clutch is not pressed.

8) WIRING – ANALOG INPUTS

Analog inputs are 0-5V positive inputs such as gear position sensor, pedal position, throttle position etc. Voltage must not exceed 5.5V, otherwise input can get damaged. It's recommended to use dedicated 5V GCU supply (Pin 10) to get the best results.

Pin	Name	Description	Type	Color
2	AN_AIR_PRS2	Secondary pressure sensor	Analog input (0-5V)	black/blue
3	AN_LOADCELL	Load cell voltage sensor	Analog input (0-5V)	green
4	AN_DBW_PPS1_OUT	DBW pedal position output 1	Analog output (0-5V)	blue/yellow
5	AN_DBW_PPS2_OUT	DBW pedal position output 2	Analog output (0-5V)	yellow/red
10	5V	5V output for sensors	5V output (max 100 mA)	orange
11	AN_GEAR_POS	Gear position sensor signal	Analog input 0-5V	blue
12	AN_DBW_PPS1_IN	DBW pedal position input 1	Analog input 0-5V	blue/white
13	AN_DBW_PPS2_IN	DBW pedal position input 2	Analog input 0-5V	yellow/green
18	AN_BOTTLE_PRS	Primary pressure sensor	Analog input (0-5V)	yellow

Description of analog inputs:

- **AN_BOTTLE_PRS**: primary pressure sensor, normally from a air reservoir. This sensor is used to control the air compressor to maintain pressure inside the bottle.
- **AN_AIR_PRS2**: secondary pressure sensor for datalogging or telemetry. Example of such sensor is pressure reading after the regulator (inline pressure). MME does supply pressure sensor for both reservoir and after regulator pressure: <https://www.mme-motorsport.com/en/products/pressure-regulator-with-integrated-input-and-output-sensor>
- **AN_GEAR_POS**: gear position sensor for gear detection and closed loop shifting.
- **AN_LOADCELL**: load cell input
- **AN_DBW_PPS1_IN/AN_DBW_PPS2_IN**: pedal position sensor input (from the pedal)
- **AN_DBW_PPS1_OUT/AN_DBW_PPS2_OUT**: pedal position sensor output (to ECU)

9) WIRING – PWM INPUT (RPM)

PWM Input is dedicated 0-12V square signal input is used for RPM signal.

Pin	Name	Description	Type	Color
30	TACHO IN	RPM signal input	0-12V PWM Input	brown/red

0-12V pwm signal from engine ECU to detect engine rpm. Not used if CAN BUS connection (and ECU is supported) is used.

10) WIRING – DIGITAL OUTPUTS

Digital outputs are active low outputs, which means they will activate the ground when active. 12V for each signal must be connected to the same 12V that GCU is powered with. For example, if you're powering solenoid, + signal solenoid should be connected to pin 1, while – signal connects to one of the GCU's outputs.

Max current per output is 500 mA. If you use device that requires more current, external relay should be used (GCU output will then power the relay coils instead of device directly)

Pin	Name	Description	Type	Color
1	12V	12V supply for GCU. Use 10A fuse.	Power input	red 1.0
7	OUT_COMP	Compressor output	Digital output (low when active) – max 500mA	brown
8	OUT_BLIP	Throttle blip output	Digital output (low when active) – max 500mA	orange/black
16	OUT_CUT	Cut signal output	Digital output (low when active) – max 500mA	white/black
17	OUT_DOWN	Down actuator output	Digital output (low when active) – max 500mA	grey/violet
24	OUT_ORP	Over-rev output	Digital output (low when active) – max 500mA	violet/brown
25	OUT_UP	Up actuator output	Digital output (low when active) – max 500mA	grey/white

Description of outputs:

- **OUT_COMP**: signal that controls turning air compressor on/off based on air pressure reading. This is used to maintain constant pressure in the reservoir.
- **OUT_BLIP**: signal that triggers external device (solenoid) or ecu that then applies the throttle. Duration and timings can be controlled inside the software. Not used if integrated drive by wire control (PPS) is used.
- **OUT_CUT**: signal to external device (ecu) that cuts the power to the engine. ECU input should be configured to keep the cut for as long as this signal is active. If integrated ignition and/or fuel is used, this doesn't need to be connected. It can also be used to control external device like a relay that interrupts the power when signal is active.

- **OUT_UP/OUT_DOWN**: signal to external device (solenoid) to activate up or down actuator.
- **OUT_ORP**: signal to external device when engine is above safe rpm for downshift (over-rev protection).
Note that when in paddle shift mode, GCU will not allow the driver to shift down at high rpm. This output should be used with mechanical gearlever to indicate that engine will over-rev if downshift will occur. See <https://www.mme-motorsport.com/en/products/over-rev-protection> for a device that can mechanically protect your gearbox.

11) WIRING – COIL & INJECTOR SUPPLY DRIVER

GCU8 has integrated coil & injector supply driver that can be used to quickly & efficiently interrupt power and reduce engine torque.

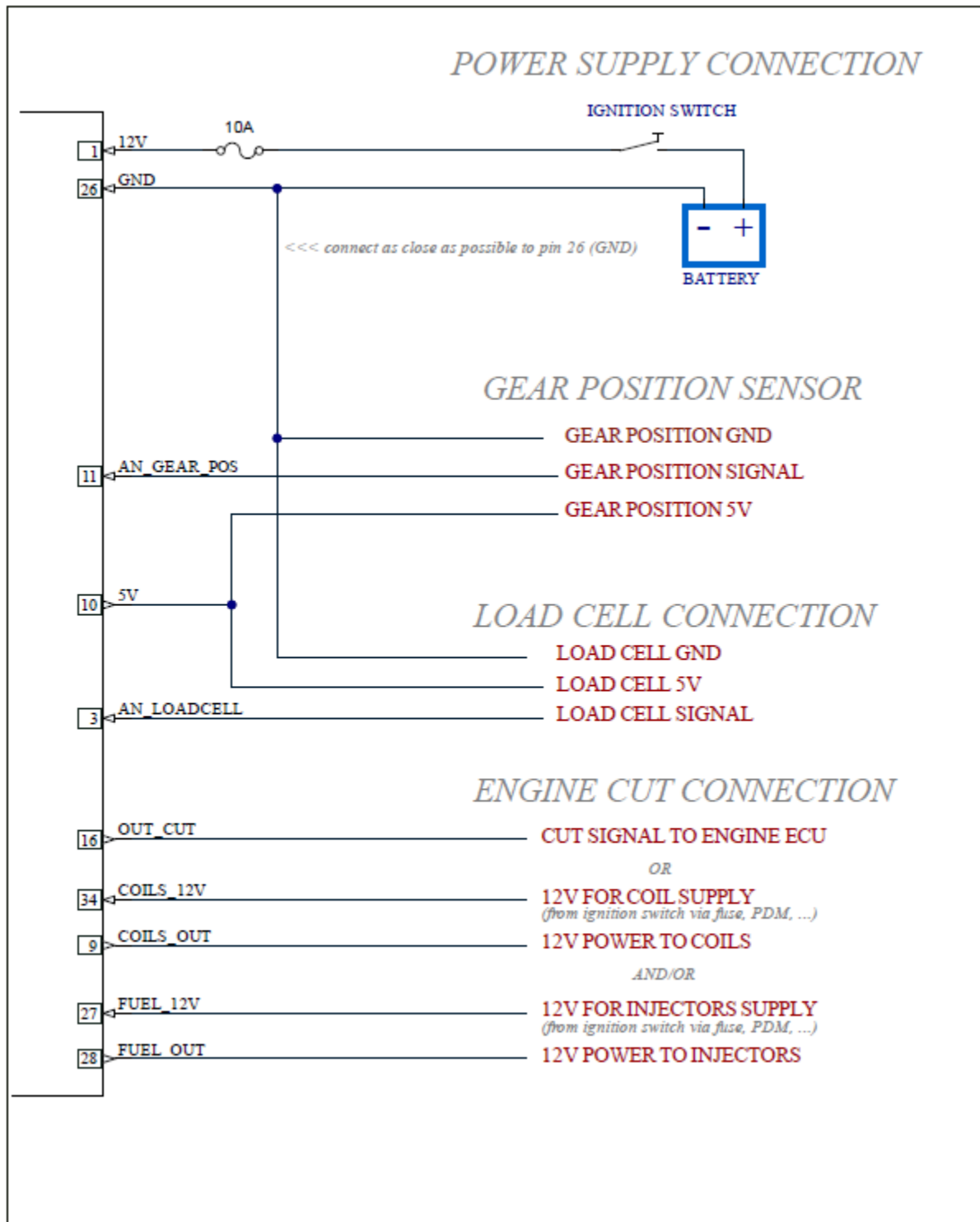
For powering (and interrupting) the coils, you need to wire 12V for coils to pin **34 – COILS_12V**. GCU will then power the coils using this voltage from **COILS_OUT**. **COILS_OUT** should be connected directly to coils. When engine cut is requested, GCU can be configured to interrupt this power supply.

Similarly if you want to add injector cut, use **FUEL_12V** and **FUEL_OUT**.

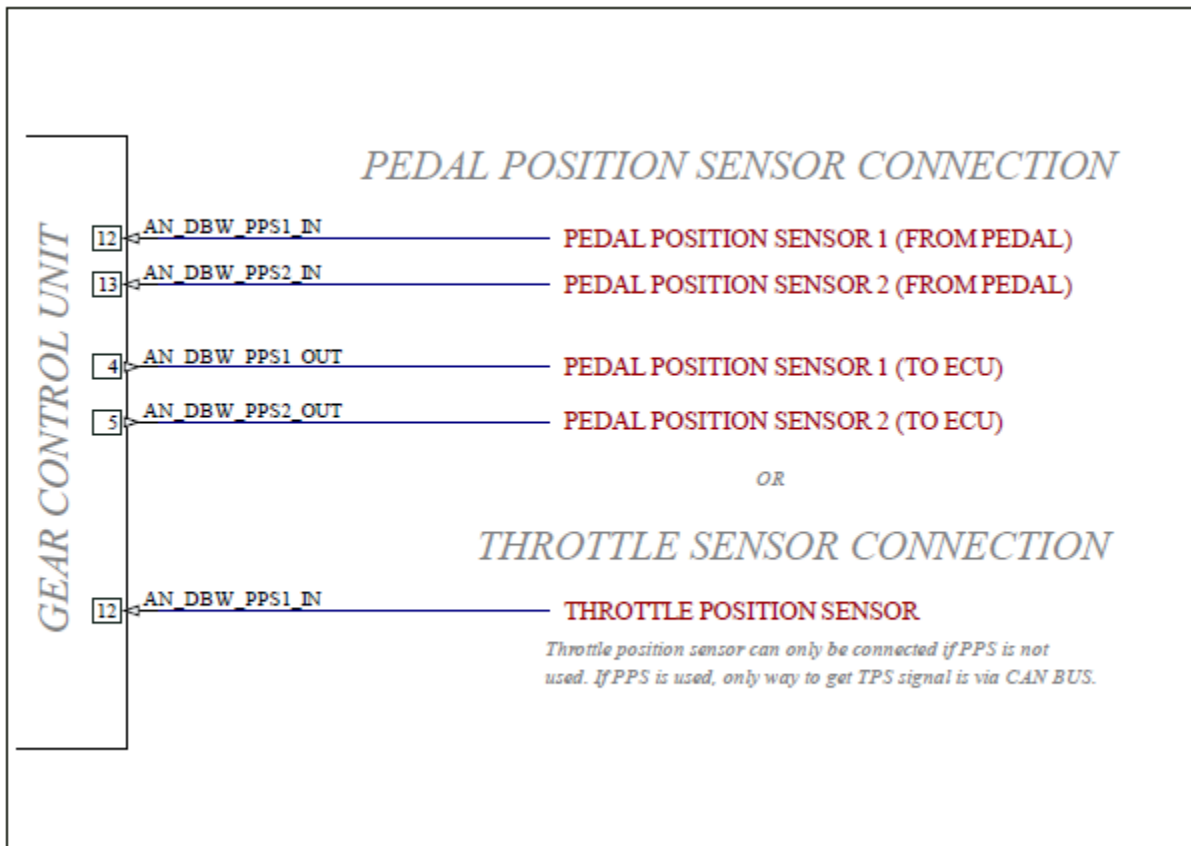
This is only meant for powering and cutting the coils/injectors directly. If you're using engine ECU to do cutting, leave all these pins disconnected and you only need to connect pin **16 - OUT_CUT** to the ECU and configure the input to be active low (12V when inactive, 0V when active). It's also advisable to configure flatshift/cut function inside the ECU to be active for as long as this signal is active. This way GCU can fully control the duration of the cut.

Pin	Name	Description	Type	Color
34	COILS_12V	12V power supply for coils driver	Power input Power output (max 15 A – connector limit)	white 2.5
9	COILS_OUT	Power to coils from GCU. 12V must be connected to pin 34.	Power output (max 15 A – connector limit)	yellow 2.5
27	FUEL_12V	12V power supply for injector driver	Power input (max 15 A – connector limit)	violet 1.0
28	FUEL_OUT	Power to injectors from GCU. 12V must be connected to pin 27.	Power output (max 15 A – connector limit)	blue 1.0

12) WIRING EXAMPLE - FLATSHIFT USING LOAD CELL



13) WIRING EXAMPLE - THROTTLE CONTROL



To use external throttle blip device (solenoid or ECU), use **OUT_BLIP** output - See Paddle shift:

ACTUATORS CONNECTION

14) WIRING EXAMPLE – PADDLE SHIFT

Required connections:

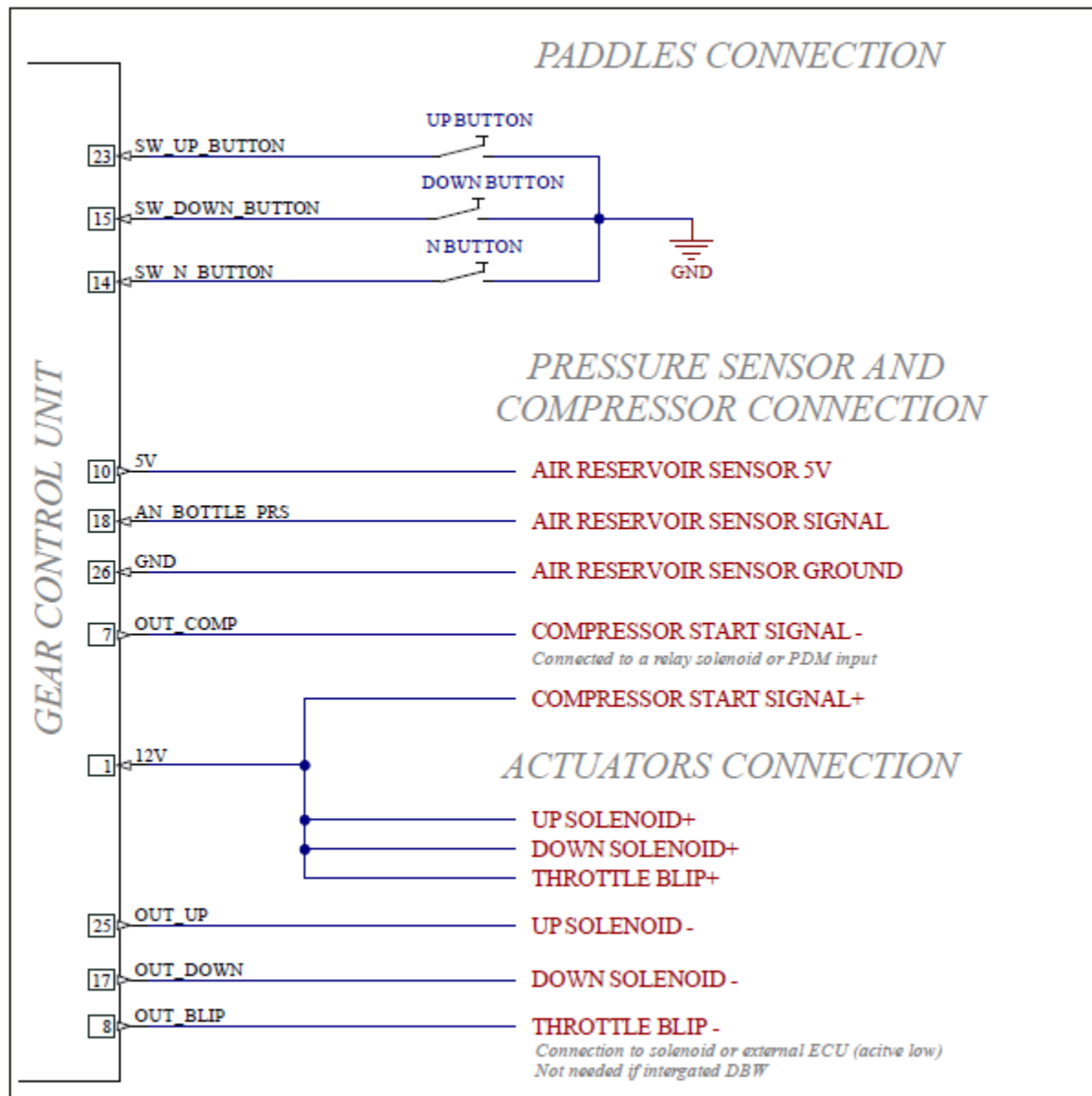
Power supply – see FLATSHIFT USING LOAD CELL: **POWER SUPPLY CONNECTION**

Gear position sensor - see FLATSHIFT USING LOAD CELL: **GEAR POSITION SENSOR**

Engine cut connection - see FLATSHIFT USING LOAD CELL: **ENGINE CUT CONNECTION**

Optional connections:

Throttle connection - see THROTTLE CONTROL: **THROTTLE AND PEDAL POSITION CONNECTION**



15) UPGRADING THE FIRMWARE

Steps to upgrade the firmware:

- Download and run the new software
- Wait for the device to connect and read the settings from the device. Make sure you wait for all the settings to load!
- Save the settings to a file, let's call this file "before.mmec"
- Open upgrade window, click open and select firmware .bin file (that matches the version of the software)
- Click connect to device and turn the device off and on so device is found and is ready to upgrade.
- Once it's connected, click write new firmware and wait for it to finish.
- Turn the device off and on, wait for the settings to finish loading, then open the "before.mmec" file using the file->load settings and send new settings to the GCU.
- Turn the device off/on and enjoy the new firmware 😊