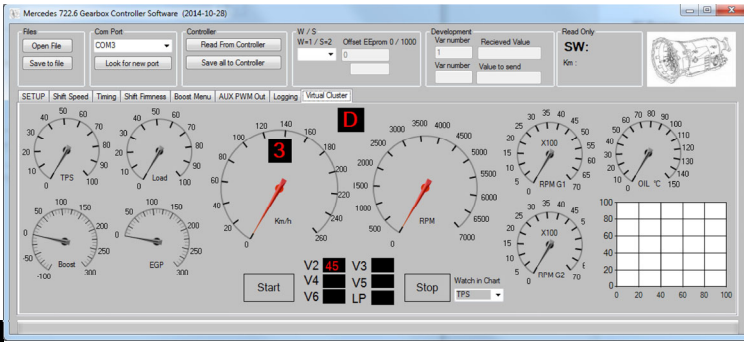**Mercedes Gearbox Controller**
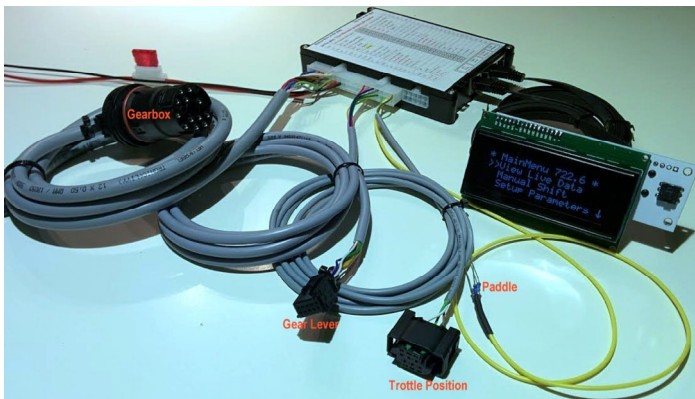**5 speed + Lockup**
Model 722.6
Contact : of@ofgear.dk

This is the standard kit,
Including cabling and plug for gearbox, gear lever, TPS
And a wire with resistors for connecting to paddle shifters

New kit width OLED display (Works as gear indicator and normal display)
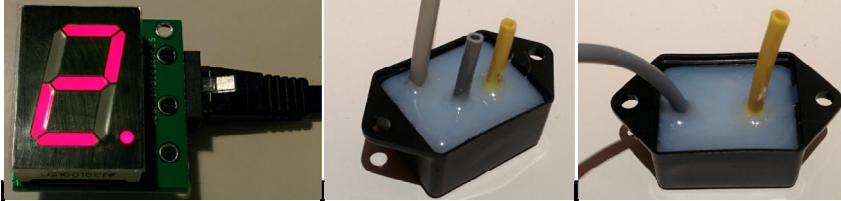

Old kit 4 line text display

Optionel

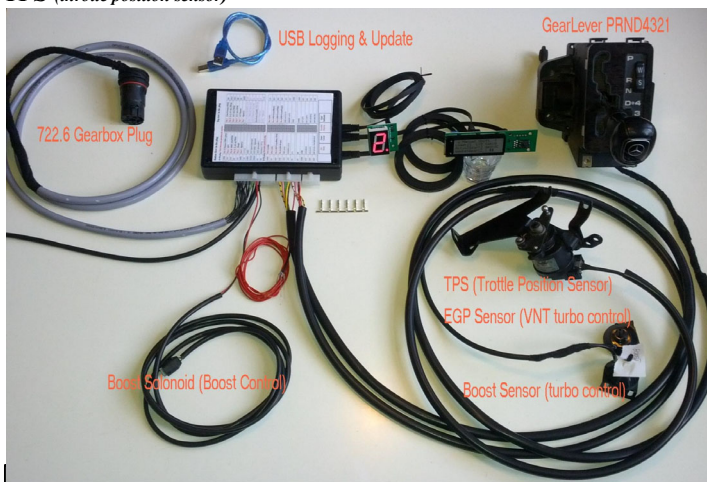*Gearindicator 1"*   *EGP / Boost 3 bar*   *Boost 3 bar*

The pressure sensors are professional type bought from www.Mouser.com, and has a gel over the die to protect from harsh environments, and can measure 3 bar boost/EGP over environmental pressure.

Here it is connected to gear lever and
TPS *(throtle position sensor)*

Boost solenoid / EGP sensor / boost sensor. Only needed if used as boost controller

Getting started / installing the controller

First, connect all plugs.
Gearbox: Connect the large, round, multi-pin plug directly to the gearbox
Gear lever: Connect the rectangular gear level plug to the gear lever.
TPS: Connect the TPS sensor plug to the TPS sensor.
Boost sensor: Connect the boost sensor to the intake manifold,
(Boost sensor is better for Turbo cars, especially if it is late spooling turbos)

Then Connect Power
Black to ground makes sure you have a good connection.
Red to a 12V supply that becomes live when the ignition is switched on. Use an 8 Amp fuse on this wire.

Now before starting the engine, you have to calibrate the TPS (Throttle Position Sensor).
This process teaches the controller about the signal it can expect to receive from the TPS when the throttle pedal is both fully depressed and when it is not depressed at all.

Put the **"W/S"** switch into the W position (if you have the Mercedes Gear Lever)[A1] ,
1.   Turn on the ignition so that the controller is powered up, but do NOT start the engine.
2.   Press the joystick down until **"SETUP"** is shown on the display
3.   Press the joystick right, to enter this menu
4.   Now that you are in the **SETUP** menu, Press the joystick down until **"Setup TPS "** is displayed.
5.   Press Joystick right, to enter this menu.
6.   Now with 0% TPS (throttle pedal not depressed) press the joystick **UP**
7.   Then press the throttle pedal fully (100% TPS) and press the joystick **DOWN**
8.   Put the **"W/S"** switch into the **S** position, and repeat steps 1-8. (Only if you have a W/S switch, otherwise you are done)

Gear Lever
Put the **"W/S"** switch into the **W** position (if you have the Mercedes Gear Lever).
1.   Turn on the ignition so that the controller is powered up, but do NOT start the engine.
2.   Press the joystick down until **"SETUP"** is shown on the display.
3.   Press the joystick right, to enter this menu
4.   Now you are in the **SETUP** menu, press the joystick down until **"Lever Setup"** is displayed.
6.   Press Joystick Right, to enter this menu
7.   If you have the 10 pin plug in the Gear Lever PRND4321. Press Joystick UP or Down to get **"0"**
             If you have no plug for Gear Lever set to "1" (and ignore step 9, unles you have mounted a switch for switch W/S)
8.   Press Joystick Right to save
9.   Put the **"W/S"** switch into the **S** position, and repeat steps 1-8. (Only if you have a W/S switch, otherwise you are done)

Load
For turbocharged diesel engines with a boost sensor, the torque of the engine is calculated as a combination of TPS and boost.
This means if a diesel engine with a peak torque of 750Nm has 250 Nm with no boost, and 100% TPS, the engine is at around 33% torque. When the turbo kicks in and boost pressure is at 2 bars, we then get the remaining 66% torque and peak output of 750 Nm.
For a Gasoline car it is different here we only use TPS, 100% TPS is 100% torque.

"Setup Parameter" -> "Load - TPS Boost"
Diesel cars where boost sensor is mounted set it to 2.5
Gasoline cars 3L (6 cyl) set it to 1.5
Gasoline cars 5L (V8) or more set it to 1
When the number is changed it is saved automatically, no need to press right to save this setting.

"Setup Parameter" -> "Boost Part Load"
Diesel cars where boost sensor is mounted set it to 33
Gasoline cars 6 cyl set it to 1
Gasoline cars V8 or more set it to 1
Here you do have to press right to save after the number is changed to the desired value

Shift Firmness.
When you first drive the car, be take careful notice of how hard the shifts are.
If all shifts are too soft or too hard it can be adjusted with the following setting.
"Shift Firmness" -> "General Firmness"
If shifts are too soft, reduce the number to get harder shifts.
If shifts are too hard, increase the number to get softer shifts.

Please be aware that if shifts are too soft, it can cause a problem where a shift does not complete and it stays in the gear it was in.
A shift that is a little too hard is always better than a shift that is too soft.

External Speed
The best situation is to have the controller connected to an EXTERNAL SPEED SENSOR.
But as many of the old cars do not have one, the controller can work with the speed sensors internal to the gearbox.

"Use int speed/Rpm" *(to decide if you are going to use an External speed sensor or not)*
In software versions > 157 there are two separate menus. One for **"Speed EXT/INT"** and another for **"RPM EXT/INT"**
PUT the **"W/S"** switch in the **W** position
1.   Turn on the ignition, but do NOT start engine.
2.   Press the joystick down until **"SETUP"** is shown on the display.
3.   Press the joystick right, to enter this menu
4.   Now that you are in the **SETUP** menu, Press the joystick down until **"Use int speed/Rpm"** is displayed.
5.   Press the joystick right, to enter this menu
6.   Press the joystick up or down to select **"0, 1 or 2"** as per the list below.
      0   External Speed and RPM sensors are connected
      1   External RPM sensor is connected and internal speed sensor is to be used
      2   No external sensors are connected and both Km/h and Engine RPM is read from internal gearbox sensors.
7.   Press the joystick right to save
8.   PUT the W/S switch in the **S** position, and repeat points 1-7.

An external speed sensor is absolutely preferable, as there is a limitation on the internal speed calculation, since the speed cannot be read while shifting.

After connecting the External speed sensor, run the car slowly (10 km/h) and see what the speed says, in "LiveData" if it is not correct it should be adjusted in the setup menu
"Adjust Ext Speed % "

If you want to get the most out of this controller
You should get an overhauled gearbox, if not you run the risk of getting the engine RPM jumping up during shifts, I have seen this myself, and heard it from others but i have only seen it happen between 3rd and 4th gears. I have not seen this problem on any other shifts.

If you want to shift gear under 100% load I am just preparing you that you can see a jump in RPM between 3rd and 4th gears.
I have it even in my E55AMG box and live with it fine.

I just do not want to be responsible for your gearbox not shifting 100% correctly ;-)

And as much as I hate to say it, here it is…
This product comes with no warranties or guarantees of any kind. Both installation and use of
this system in any vehicle is done at the risk of the owner / operator of the vehicle.
The developer / seller of this system cannot be held responsible for any loss, damages or injury
caused either directly or indirectly by the installation or use of this system. The system is
intended for off road use only. Be advised that the system will produce changes in the
drivability of your vehicle.

Q & A

Q: **Can I find any 722.6 on the yard and it will work?**
A: *As far as I have seen, any 722.6 is OK. The usual problem is that it jumps a little up in RPM between 3-4*

Q: **What gearbox is the best for high power project. 600 Nm or more?**
A: *W5A580 AMG box is one of the strongest.*

Q: **What Year is the best?**
A: *As new as possible they have only got better and better.*

Q: **if I find a W5A580 AMG box, is it then just mount and go?**
A: *Get it as new and low mileage as possible*

Q: **What is the best to do if i want the best of the best?**
A: *Have the gearbox overhauled and have everything gone through; seals in valve body and clutches and have their clearance tightened up beyond Mercedes specs. The best thing to do is to set them up to have about as tight a clearance as possible but not too tight so that they burn from drag.*

Q: **But can I use an old worn out box if i just want 5th gear and lockup not for racing?**
A: *Everybody's requirements are different, but if you let's say run it in manual mode and let off the throttle at every shift, then yes, it is possible, also in automatic mode if it is cruising not racing.*

Q: **My box was working perfectly in the donor car and now it is slipping between 3rd and 4th gear.**
A: *You have to remember that the transmission had torque management, meaning the donar car was limiting power during shift. Because of this, you will never see the state the gearbox really is in, as the clutches get worn out Mercedes adjusts for that by letting the shift take longer, meaning removing momentum from the engine for a longer time.*

Q: **Can a Normal 722.6 from a standaard E300 turbodiesel hold a momentum of 600 Nm?**
A: *Yes it can hold that but shifting under max power is a different case, from my experience the 1->2 is fine and also the 2->3 and 4->5 but we are on the limit here.*

Q: ***The W5A580 does not fit the OM606 what do I do?***
A: *Get the Converter and bellhousing from 722.6 which was originally mounted on OM606 (Diesel Engine 24V)*

Q: **I have an OM606 and I dont want to mess with the bellhousing what should I look for?**
A: *Find a gearbox from a E320 CDI as new as possible, they are built to high momentum. (This information could be wrong as I have heard it does not fit, I will try to find out) (The 320CDI box DOES NOT FIT OM606 unless the bell housing is switched.)*

What I am trying to say is that you should get the gearbox adjusted and looked after before installing if you want a system that is working perfectly.

If you can live width a little slipping when shifting under load, then try to install what you have but that is totally up to you.

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main menu
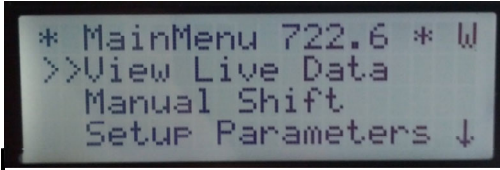
Live Data
Here you get TPS position "Throttle Position Sensor 0 - 100%"
Engine RPM, if taken from inside the gearbox, value is only valid when driving
Km/h taken from inside gearbox or external sensor.
AG : Actual gear used
VG : Wanted gear
OK : if 0 the box controller is waiting, if 1 then it is ok to shift gear, only 1 gear shift / 2 sec
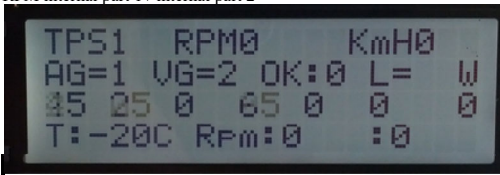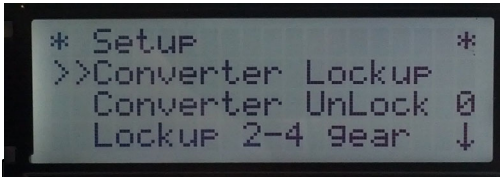L : Gear Lever position P, R, N, D, 4, 3, 2, 1
W : W / S Winter / Sport
Then all the valves, used for problem solving under development, but nice to watch.
T : Temperature inside the box, only valid when in gear
RPM internal part 1 / internal part 2
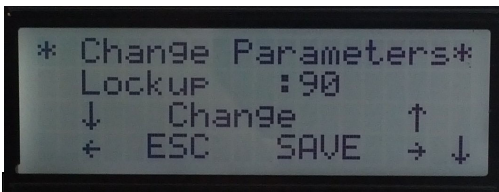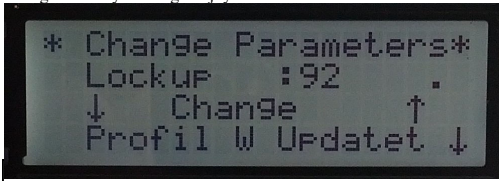

SETUP

When you change a value you have to press the joystick right to use it,
If you want it to be saved permanently, you have to save it to default under the menu called "Userdata/Factory" / "Default W", otherwise your changes will be lost when the controller is turned off.

Change value by moving the joystick UP / Down.

Press the joystick right to save it.

Parameters to change in "SETUP"

"Converter Lockup "

The speed in km/h at which to lock up the torque converter in 5th gear.

"Converter Unlock "

The speed in km/h at which to unlock the torque converter in 5th gear.It must be lower than the lockup setting above.

"Lockup 2-4 gear "[A2]

0 = No, (only lockup in 5th gear)

-1 = Like 1 but do not unlock if TPS goes below 10% (only lockup i 5 gear)

1 = Lockup also in 2 - 4 gear, if you put gear lever in position 4 you will have lockup also in 4 gear, this is useful when pulling heavy uphill.

2= always lockup in 2-5 gear also if the lever is in "D"

From Software 92 and UP

3= Like 2 but also no unlock with no throttle.

4= Like 3 but also shifts gear with locked converter, converter only unlocks if below 30 km/h This is only useful at Racetrack :-)

5 = Special only unlock if speed is below 10 Km/h and lock if in "2" and speed > 10, this is a special setting for an Electrical vehicle (only from ver_140)

6= Lockup over a switch 12V in on (D0 kickdown 12V in), but then you can NOT use kickdown on this input, no soft lockup in this mode as it is for Racing / Drifting (only from ver_143)

7= Lockup if speed bigger then 30 km/hr and locked under shift And it unlocks if TPS > 75% And it unlocks if speed is < 30 km/h Does "NOT" unlock it TPS < 10% (only from ver_170)

8= Lockup if speed bigger then 30 km/hr and locked under shift And it unlocks if TPS > 75% And it unlocks if speed is < 30 km/h Does unlock it TPS < 10% (only from ver_170)

"Setup TPS "

To set up TPS to get exactly 0% when pedal is released and 100% when fully depressed, even if you only supply maybe 4 volts at full throttle. This is very simple you press the throttle to 100% and press the down key, let go of the throttle and press the UP key, thats it, TPS is calibrated, *look at first page for more on this issue*

"LOAD - TPS Boost "

if set to "2" then it means that the Throttle depressed 100% gives 50% Load, Boost gives the rest.
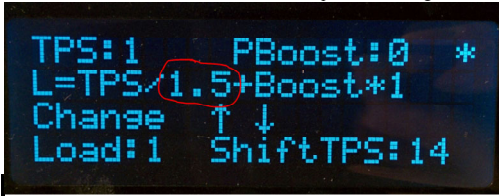
"Boost part load "
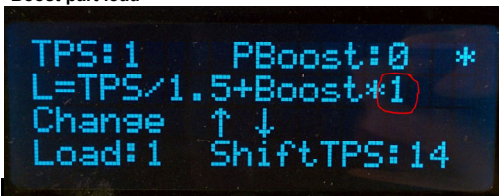
If set to lets say 33

> **{ EXPLAIN**
> Load = TPS / 2 + Boost * 33
> EKS "50 / 2 + 1 * 33 = 25 + 33 = 68% load
> **}**

"Idle RPM   "

Only used in some cases, if components is mounted. and only if there is external RPM-signal as the calculated RPM signal will always be 0 at stationary car. it has to be set higher then 500 RPM, to get an output.

From ver 123

If set to exatly "510" something special will happen it will adjust idle to 800 when Gearoil temp is below 45 deg, and to 650 when hotter.

"Max Boost mbar. " Moved to Boost menu

Only used in some cases, if components is mounted.

"Volt reg +/-   "

Here you can adjust the Voltmeter if not showing correct value.

"Temp reg +/-   "

Here you can adjust the temperature +/- 20 deg this is only to be used if you know it is displayed wrongly.

"Kickdown at %TPS "
if set to 97 then you will have kick-down if TPS > 97 if set to 101 you never get kick-down.
If you set it to 105 Kickdown would be triggered from external 12V source.

"max speed fail   "
There is a safety function not allowing km/h to fall down to fast, should be set to max 20

"Slow upshift   "
      The higher the number the slower upshift, by instant release of throttle, it suppresses unwanted upshifts, when cruising slow around in the city.

"PWM N->D P->R   " Called Garage Shift by Mercedes
IF you have hard shift when shift in to D and R the the number must be higher, too high it will not engage.
Default is 25, but you can make the P/N -> R and P/N -> D softer by higher number try 35, but if it does not engages you have to lower the value, the first 2 times you engage R or D this value is not used, to make shure we have engagement first time.
(only in SW 135 or higher) If it will not engage in D or R set to 15

"PWM 3->4 N-D/P->R   *(only if SW > ver_136)*
The Valve for the 3-4 shift is triggered width a PWM signal when shifting from N->D or P->R this is default 50.
This is to give a smoother engage.
But if you have any problem that it sometimes not engage, set it to "0"

"Adjust ext RPM"
Default is 36, if RPM show too high lower this number, only use if you use external engine RPM
In Software > 157 there is two seperet menu One for

"Speed EXT/INT"
Use internal speed from gearbox, or external speed.

"RPM EXT/INT"
Use internal RPM from gearbox, or external RPM.
The internal RPM will always show 0 if car is stationary, and engine is running as the converter is slipping, this is normal.

"Use int speed/Rpm"
      Use calculated Km/h from the internal parts in the gearbox if set to
      0   Then Contrroller need both RPM and Speed from external source.
      1   then you only need external RPM, Speed is calculated from inside the Gearbox
      2   then both Km/h and Engine RPM is calculated from inside the GearBox
      5   (for speed compare, internal / external to werify rigth gear)
      6   (for speed compare, internal / external to werify rigth gear) + External RPM
      After change save settings and power off and on again, then changes is made

"Temp Line -20deg "
      Adjust the line pressure at cold

"Temp Line 120deg "
      Adjust the line pressure at Hot

"Temp Pres -20deg "
      Adjust the shift pressure at cold

"Temp Pres 120deg "
      Adjust the shift pressure at hot

"delay 3-4   "
Only use if you have problem with slip in 3-4, if you have, start with 5 and 1 up at the time, until it goes away, do not go over 15 then you have a bad box.
(only in SW 120 or higher)
If you set it to exact "-1" the 3 -> 4 shift only happens if TPS is below 45% that is great as you let of the TPS when you want the shift, and it shift smooth.
(only in SW > 150 or higher)
If you set it to "-1 to -9" the 3 -> 4 shift only happens if TPS is below -1 = 10% and -9 = 90% that is great as you let of the TPS when you want the shift, and it shift smooth.

"Reset Km Counter " *(only in SW 128 or higher)*
Press Right   This will reset to Total Km to "0" Km
Press Up   this will add 1000 Km at each press
Press Down   This will subtract 100 Km, that mean you can adjust to a precision of 100 km.

"Lockup Soft / Hard"
1 = hard 30 = soft

"Use Paddle shift "
Use paddles on analog 9,
0 = disable
1 = Read the value for testing
2 = Read the value and activates the horn output
3 = Paddle shift activated
4 = Paddle shift activated, and if in main menu, and paddle is pressed it shift to manual instant, and goes back to auto if you drive very slow in high gear, *(only in SW 95 or higher)*

"EXT Speedadjust "
Used to adjust External speed in % can be used if you change your Rim Size.

"INT Speedadjust "
Used to adjust internal speed in % can be used if you change your Rim Size.

"Time bet shift " = time between shifts
      Used to change the minimum time between shift, if set to 1000 mS then you can shift from 1 to 2 then you have to wait 1 sec to shift 2 to 3,
      This time is also used in automatic mode but here is added 500 mS this means that when the time is set to 1500 mS "Standard " it is 2000 mS in automatic.

"0 point boost   " **Moved to Boost menu**
      where the boost sensor has 0 bar on the 0 - 1024 scale if it is a 3 bar sensor it would propably hav a range from -1,5 bar to 3,5 bar 0 - 5 v and the value here should propably be set to 300.it can be tested on the 2. live data page, where you press right on the live data, you can press right to get the second page. you should adjust until you just see a little boost when engine not running.

"Max boost at 5v " **Moved to Boost menu**
      This is the max boost your sensor can handle. A 3 bar boost sensor has 3 bar at 4,5 volt, 3,5 bar at 5 volt, this value has to be set to 350 "mBar at 5 volt"

"Show on Display at Startup"
  in live data, you can change what to display on line 3
  0 = Normal, just main menu
  1 = Boost menu, Live Data (This is if you just use the controller as Boost Controller. and want to have live data all the time)
  2 = Start up in Manual mode, *(RACEMODE or if you just want Manual all the time.)*
  3 = Live Data

"VNT Boost/EGP" (Moved to Boost menu)
  Boost controller is used
  1, 2, 3, 4 is for VNT Turbos 4 different algorithm to adjust boost
  5 is for Normal Turbo
  6 is for Normal Turbo more aggressive limit
  7 is for Normal Turbo even more aggressive limit
  8,9,.....................
  20 extreme aggressive limit.

"Lever setup"
  0 = MB standard lever
  1 = No lever, N, P and R & D can be detected but not 4-3-2-1
  2 = Special For a special gearbox having a 120 OHM output when in "R" (gives reverseligth output on AUX-3)

"Limit Engine Power under shift" *(Not in this setup menu, but i think you would try to find it here)*
  Under "GeneralBoost" goto Use PWM - AUX-4,
  The following happens for different value

|				
2,	you get instant	200 mS	100% PWM	
3,	you get instant	300 mS	100% PWM	
12	you get 100 mS delayed 200 mS		100% PWM	*(1 is 100mS delay the 2 is 200-100 = 100 mS signal)*
25	you get 200 mS delayed 500 mS		100% PWM	*(2 is 200mS delay the 5 is 500-200 = 300 mS signal)*

  By the way Engine limit only works at TPS > 20% (prevent stop engine at low RPM)

If you want to Limit Power on Mercedes Gasolin car, where before a 722.3 was
From Switch S65 on Gearbox width 1K Ohm resistor Pin 1 and Pin 2 width a relay
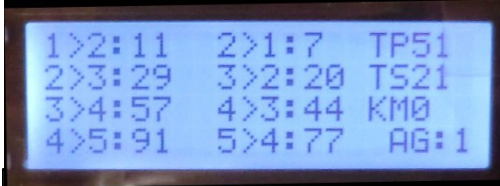

Manual Shift
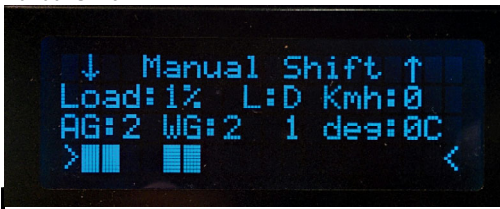
Use the joystick up/down to change gear, 100% manual / or paddle shifters. / or switches connected to a rally type shifter
It is still only possible to change gear one time every 2 sec (Adjustable in setup menu.)
It is only possible to downshift the same as a kickdown would, Safety that you not turn over the engine.

Shift Speeds different gears

Here you can see all UP / DOWN shift at actual TPS,
You can test it by stopping the engine, go to this screen, and press the throttle, to see when it would change at that TPS.

Shift Speeds

Here you can change the value of all shifts

0%	throttle 1-2 called Min	1-2,	Upshift
100%	throttle 1-2 called max	1-2	Upshift
0%	throttle 1-2 called Min	2-1	Downshift
100%	throttle 1-2 called max	2-1	Downshift
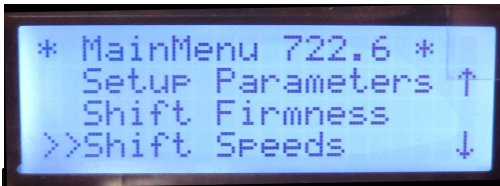
Kickdown ok 2>>1
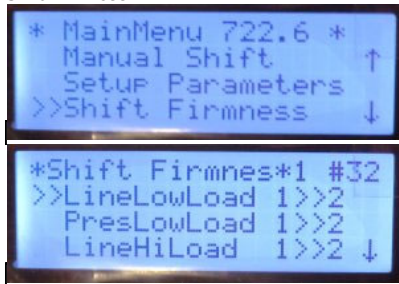If the Speed is lower then this value it is ok to shift down to 1 gear at kickdown

RPM Kickdown 1-2

At this RPM it will make upshift from 1>>2

Kickdown ok RPM
Downshift width Kickdown will only happen if RPM is below this value

Shift Firmness

LineLowLoad 1>>2   Default value = 20   (Higher value = Softer shift at low load)
PresLowLoad 1>>2   Default value = 30   (Higher value = Softer shift at low load)
LineHiLoad 1>>2   Default value = -6   (Higher value = Softer shift at High load)
PresHiLoad 1>>2   Default value = 12   (Higher value = Softer shift at High load)

LineLowLoad 2>>1   Default value = 20
PresLowLoad 2>>1   Default value = 30
LineHiLoad 2>>1   Default value = -6
PresHiLoad 2>>1   Default value = 12

If you find the shift from 1>>2 to hard at very low load.
Then try this
LineLowLoad 1>>2   LineLowLoad = 22
PresLowLoad 1>>2   PresLowLoad = 32
Remember to press the >> key to save the values.
And before shutting the car down remember to save it permanently under "Userdata/Factory (" version 2 saves it automatically.)

And do the same for high load, if you find the shift to hard or too soft.
When this is done and you find that the shift are too soft or too hard at lets say 50% load, you need to change those
    When you have set up nice soft shift and good hard shift. then you can fine tune with number below
    "Load at 25% load"   if you have to soft or too hard shift at 25% load if to hard lower the number
    "Load at 50% load"   same but at 50%
    "Load at 75% load"   same but at 75%

The whole new Shift Firmness MENU (from version 117) *Need to be testet some more*
In this menu you can adjust all shiftfirmness parameters manuelly
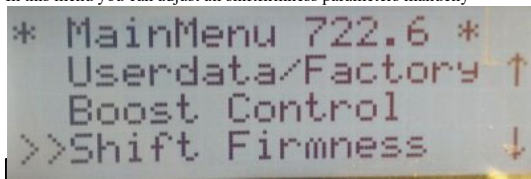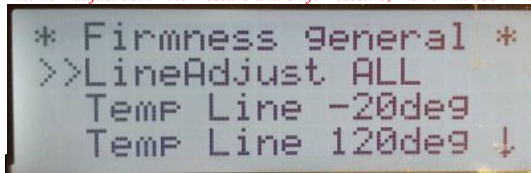

In the gereral Firmness

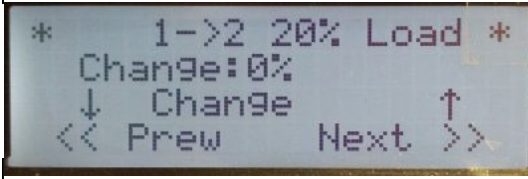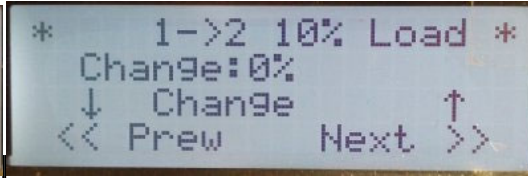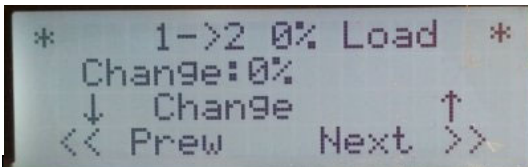You can adjust correction for temperature, and adjust general Linepressure
From ver 139 "LineAdjust" All changed to "Firmness All L=H" L=H means Lower number = harder shift
This now adjust both LinePressure and ShiftPresssure, Lower number = harder shift, higher number = softer shifts.
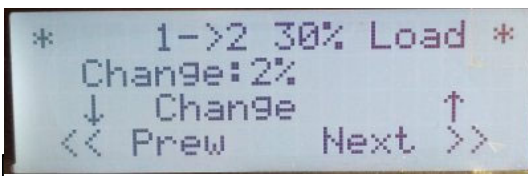

If you want to adjust the hardness for different load, go in here.

```
*       1->2 0% Load    *          *      1->2 10% Load   *
   Change:0%                          Change:0%
   ↓    Change       ↑                ↓    Change       ↑
   << Prew    Next >>                 << Prew    Next >>
```

```
*       1->2 20% Load   *
   Change:0%
   ↓    Change       ↑
   << Prew    Next >>
```

```
*       1->2 30% Load   *
   Change:0%
   ↓    Change       ↑
   << Prew    Next >>
```

If you want the shift to bee a bit harder at 30% load then just adjust, higher number is harder shift, but only at 30% load

```
*       1->2 30% Load   *
   Change:2%
   ↓    Change       ↑
   << Prew    Next >>
```

before you leave this menu it is possible to save changes, it automatically saves in "W" or "S" depending on the switch position.

```
* Change Parameters*
   Save Changes      ↓

   << ESC      Enter >>
```

The last menu in Shift Firmness is the Min / Max at any gear, Just leave it, its fine as it is :-)

```
* Shift Firmness      *
   Firm/Load 4<->3    ↑
   Firm/Load 5<->4
>>Line/Pres MAX/MIN
```

Rate Last Shift MENU (from version 117)
This is the Rate Shift Menu

```
* MainMenu 722.6 *
   Boost Control     ↑
   Shift Firmness
>>Rate last Shift
```
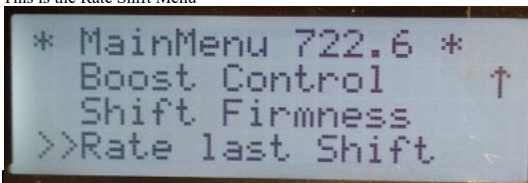
When the gearbox have shifted you see the last shift, and at what load, the shift was done.
On this oicture below it has shiftet from 2->1 at load 1% = no load

```
↑ To Soft     Last:21
↓ To Hard     Load:1
Low :0          AG:1
High:1 Ready
```
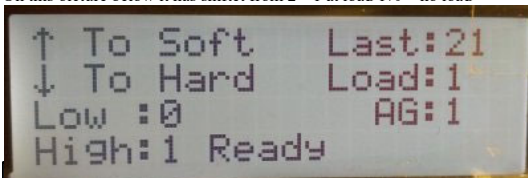
Here i pressed the joystick down, to tell the controller to make it a little more smooth next time.
And the controller reply width "Notet to hard" and it will make it more smooth next time.

```
↑ To Soft     Last:0
↓ To Hard     Load:1
Low :0          AG:1
High:1 Notet to Hard
```

There is 10 different load points, on every shift. and they are different on up and down also.

Gear Lever Connection 10 PIN MB plug to 14 Controller plug

24 Pin Gearbox Plug
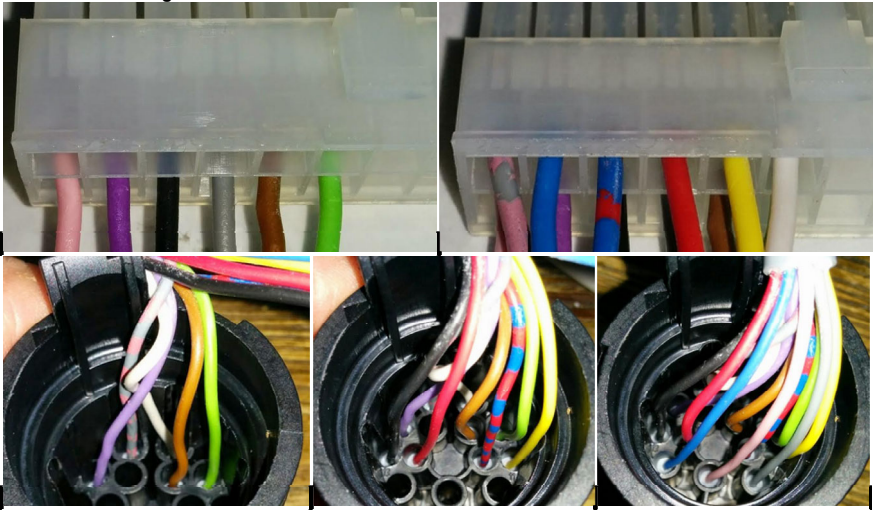
Pinout from Controller
Use 8 Amp fuse on the 12 Volt
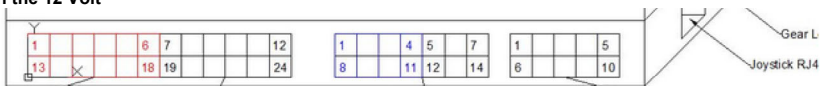
Controller	Gear Plug	Description
1	2	Line Pressure
2	13	1-2,4-5 PWM
3	8	2-3 PWM
4	9	3-4 PWM
5	7	+5V sensor
6	1	Speed 1
13	12	Sensor GND
14	6	12 V
15	10	Shift PWM
16	11	LockUp PWM
17	4	Temp
18	3	Speed 2

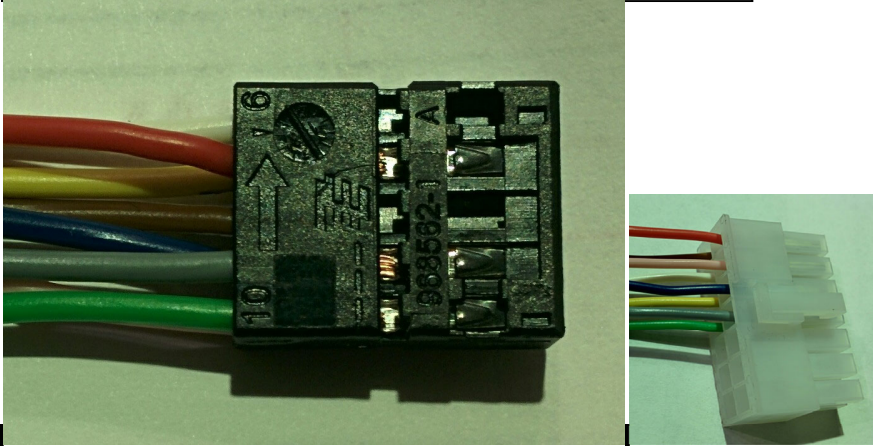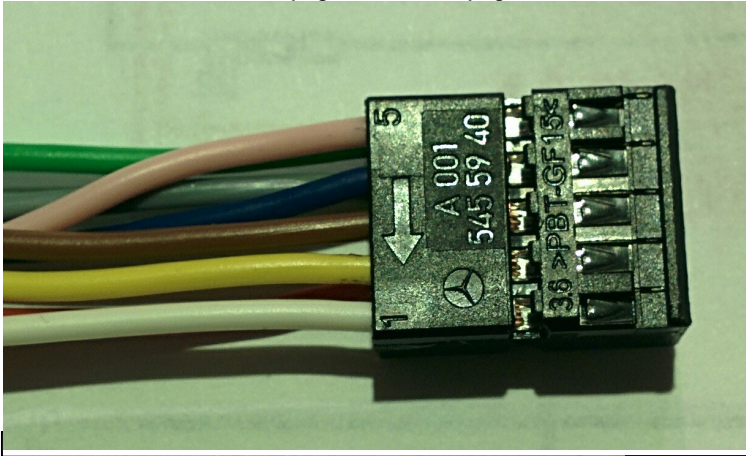| Controller	Description
7	12 V out AUX
8	AUX-1 Boost PWM gnd
9	AUX-3 PWM/gnd
10	horn Paddle PWM gnd
11	AUX-4 PWM/gnd
12	AUX-2 PWM/gnd
19	12V in 8 A fuse
20	GND
21	EXP Speed
22	EXT RPM
23	AUX opto
24	KickDown Opto

Controller	GearLever plug	Description
1	7	12V
2	5	D23 Green/Black
3	4	D25 Green/White
4	9	D29 Green/Purple
8	3	GND
9	1	5V
10	2	D27 Gray/Blue
11	10	D31 Braun

Controller	Description
1	Joystick GND
2	Joystick (UP) 37
3	Joystick (LEFT) 41
4	Joystick (DOWN) 45
5	Joystick (RECHT) 49
6	LCD 5V
7	LCD GND
8	LCD D39 (DAT)
9	LCD D43 (LAT)
10	LCD D47 (CLK) Tacho out

Controller	Sensors	Description
5		EGP A15
6		Boost A13
7		GND sensor
12		TPS A14
13		Paddle A12
14		5V sensor

Boost-Sensor

0-5V
0V
+5V

EGP-Sensor

0-5V
0V
+5V

TPS-Sensor

0-5V
0V
+5V
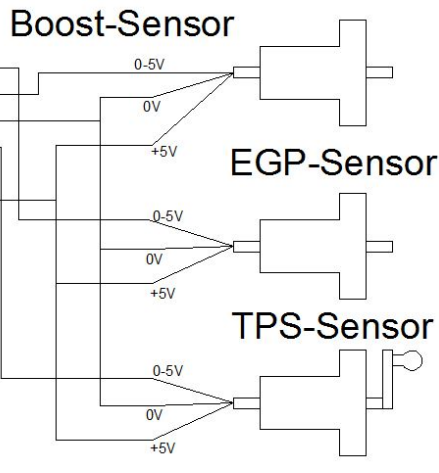
External Parts needed to have a complete working system

Mercedes TPS Sensor from W210 year 1997 - 2002
If you get the TPS sensor from a W210 car it has a plug with 6 wires.
You need the plug and 10 cm of cable.
If you take the plug out you can read on the plug pin 1,2,3,4,5,6
the pin 1 needs to be connected to 5V,
the pin 6 needs to be connected to 0V,
the pin 5 needs to be connected to TPS input,
The last 3 wires from the Sensor is not connected.
MB TPS Sensor plug   **Mountet on an OM606 in a G Class, Mechanically pump**

TPS Sensor MB

When TPS Sensor is mounted, you go into "setup Parameters" then "Setup Tps"
At 0% TPS NO Throttle press the Up key on joystick for 1 sec
 Now press the Throttle full to 100% press DOWN key for 1 sec
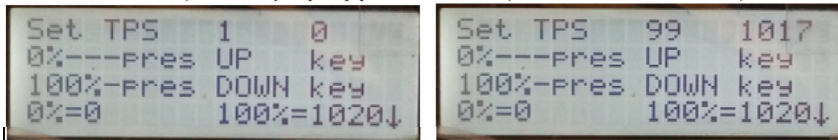
MERCEDES W210 E300 Turbo Diesel Boost Sensor If you need max 1,65 bar = 25 PSI
Then the originally MB boost sensor from a W210 E300 Turbodiesel can be used as it has a standard 0-5 volt output
I have only tested this exact type below
"Boost Control" -> "General Boost" -> "0 point boost"   set it to 305 if this Mercedes sensor is used
"Boost Control" -> "General Boost" -> "Max boost at 5v" set it to 170 if this Mercedes sensor is used
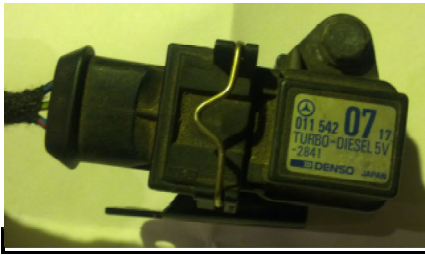
Electrical connection

PIN	description
A	+ 5 Vdc
B	GND
C	Signal OUT

Gear Lever and plug (it has to be the one with a "1" see red square on picture)
And the plug is a 10 pin, and have 8 wire out, thats the Gear Lever we need
If you are in the Marked for a GearLever, be aware that the GB (RHD), ones is also mirrord, compared to the LHD ones, an other thing is that the one from W210 is longer and higher, then the W202, and R129 it is the short that fits the W124 and older G class,

W202 / R129 fits W124   **W210 model Longer and higher then the one on the Left, Do NOT fit W124**
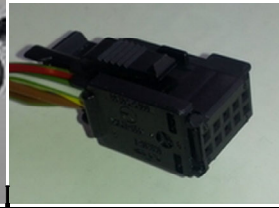
Part number 2022670637
10 Pin plug to on the Wiring harness

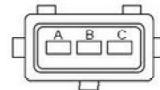**Tiptronic Yes and No**
I can NOT talk to the Tiptronic shifter, if you want to use that, it is fine but you then have no switch for W/S but that can be any switch.
And I can only tell from the gearbox if you are in P/N od RD but that is fine but the function width hold in 4, 3 2, 1, and so on are not working.
If you want to use +/- You have to add some micro switch to switch to ground when you press + or -
and then connect to PADDLE input, thats it.

Reverse Ligth (Those 2 pin it shorted when i R for Reverse Ligth)
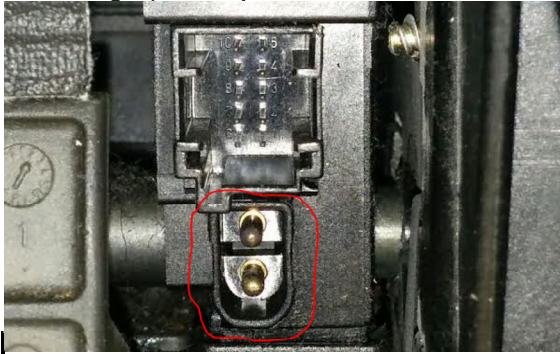
Boost Controller, Parts to use
If you have a Vacuum actuated turbo where you want to use the built in boost Controller you should have one of these.
This is a vacuum valve meaning if it has 100% PWM, there are max vacuum = Wastegate closed, if 0% PWM no vacuum = Wastegate open.
The part is used in Many Mercedes cars from 1997 to 2000 both for boost control and EGR,

It is connected to the two pins marked in red, it does not matter how they are connected as it is a solonoid,
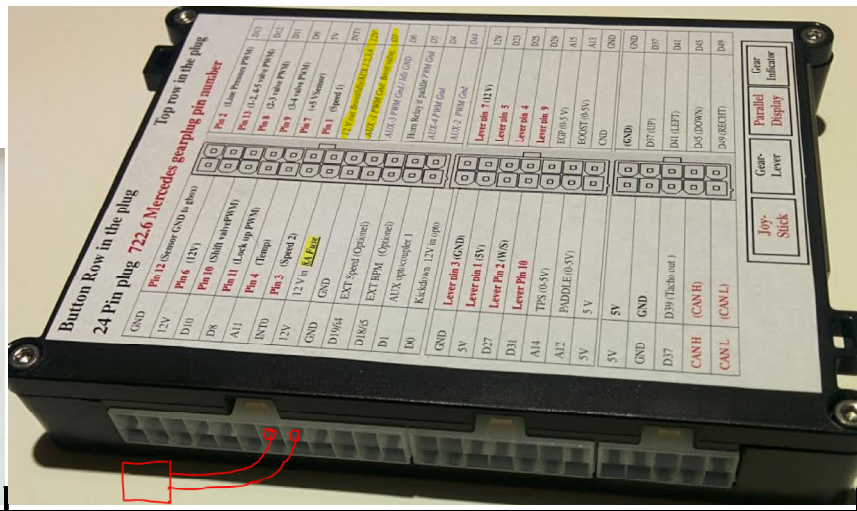
Here we see the Boost screen We have set the Boost to 0,6 bar and the boost is 0,63 thats why you see the PWM out is less then 100% = WasteGate is opening
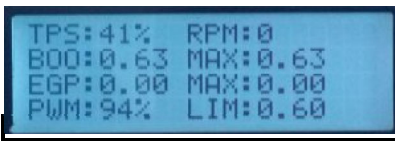
update of firmware Install Driver

(Wery important connect PC to controller when stationary, as the controller restart when connected)

You need to connect the box to you PC,
When connectet go to Device Manager, here the Arduino Mega 2560 (and Port number) should show up.
But only if it can find the rigth driver.
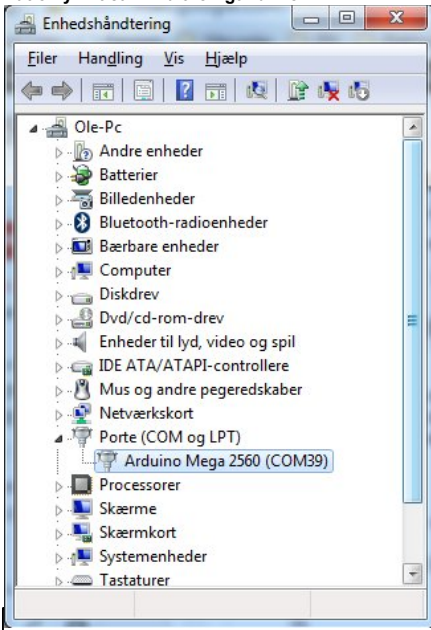
If it cant find the rigth driver, you can download this package
https://drive.google.com/file/d/0B70ZSC6ltshQV2YxMkZzaXdiaWs/view?usp=sharing
 it is quite big, but you can't just download the driver alone.
You will find a directory called "Drivers"

Update Firmware
Program to upload new Firmware
Download this software
http://russemotto.com/xloader/XLoader.zip
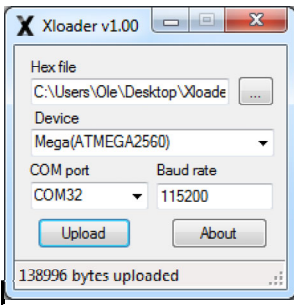
It will look like this
Hex file send **to you, is choosen.**
Device Choose (Mega(ATMEGA2560)
Comport (To find you comport look in Device Manager)
Press Upload and wait until it says uploaded it takes around 60 second

---

Starter Lockout (from version 113)

"Boost Control" -> "General Boost" -> "USE PWM - AUX-2"
If set to "2" then the AUX-2 works as a Starter Lockout, it pulls the output to ground when in P or N
This can drive a relay, witch has 12 Volt on the other side of the coil. (from version 113)
I know it does not make sence this function is hidden in the Boost menu, but as we steal a AUX output from there, thats why.
The starter lockout will work no matter if you don't have the Mercedes Gear Lever og you running without a Gear Lever.
You can not use AUX-2 to other things at the same time.
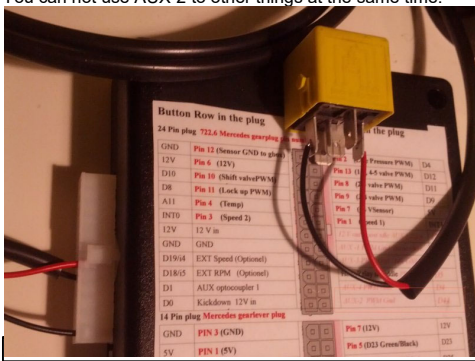
Boost Controller part of the 722.6 controller.

The Boost controller can be used in different ways.
If you want to use Boost Controller
Goto "Boost Control" -> "General boost" -> "VNT Boost/EGP"
The value means the following
0 Boost Controller in PWM mode allow, you to specify PWM depending on boost, see later in this document)
1, 2, 3, 4 is for VNT Turbos 4 different algorithm to adjust boost
5 is for Normal Turbo
6 is for Normal Turbo more aggressive limit
7 is for Normal Turbo even more aggressive limit
8,9,......................
20 extreme aggressive limit

At the bottom we have the Boost Control menu
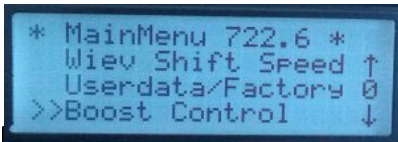
In there is a General Boost, and all the many data points you can change
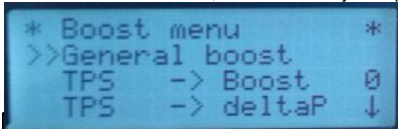
Lets say you have an normal Turbo, just want to open wastegate when boost hits 1 bar
Goto "Boost Control" -> "TPS -> Boost"
Press -> on the joystick.
Here below you have 11 data points for any throttle position, 0.10.20.30....100%
Right key gives you next point, Left gives you previous.
Up key higher value, Down lower value

Check out this YouTybe Video
http://www.youtube.com/watch?v=ULEGavGRavs

```
* Boost at 0% TPS *
Change:1.00 Bar
↓  Change        ↑
<< Prev    Next >>
```



```
* Boost at 10% TPS *
Change:1.00 Bar
↓  Change        ↑
<< Prev    Next >>
```



```
* Boost at 20% TPS *
Change:1.00 Bar
↓  Change        ↑
<< Prev    Next >>
```



```
* Boost at 100% TPS *
Change:1.00 Bar
↓  Change        ↑
<< Prev    Next >>
```
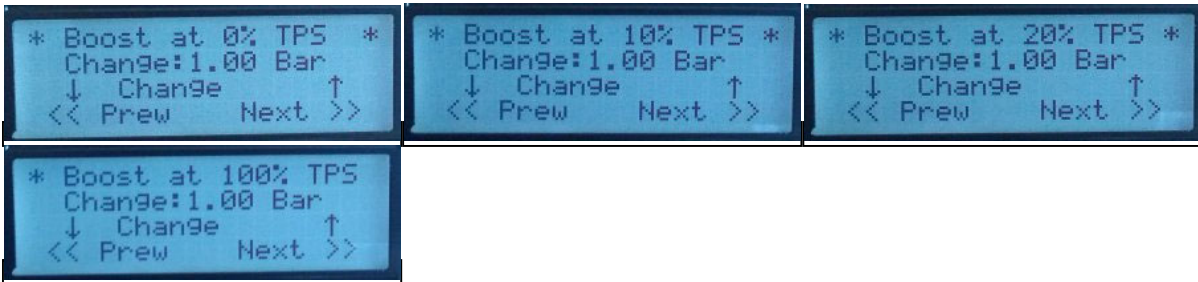
To see what you have programmed you watch the live data in the live data menu.
Here you see that TPS is 41% and the Limit is set to be max 0.6 bar boost = 9 PSI. at that throttle position. But as you see boost are a little higher, that's why the PWM out is not 100% it has started to open the Wastegate on the turbo.


```
TPS:41%   RPM:0
BOO:0.63  MAX:0.63
EGP:0.00  MAX:0.00
PWM:94%   LIM:0.60
```

If you want More Control over what happens, you can specify exactly what PWM signal is sent to the Boost valve.

PWM is Puls width Modulation. if it is 10% that means that yeo have 10% power to the solenoid valve, and wastegate is almost fully open

If PWM is set to 100% the solenoid will make full vacumm and wastegate will close

Goto "Boost Control" -> "General boost" -> *"VNT Boost/EGP" set value to "0"*
Goto "Boost Control" -> "General boost" -> *"Use PWM-1 Boost" set to "1"*
Now the menu has Changed and ready to do PWM.

Goto "Boost Control" -> "EGP-Boost   -> % PWM" set what you want here
Goto "Boost Control" -> "Boost   -> % PWM" set what you want here
Goto "Boost Control" -> "RPM   -> % PWM" set what you want here
Goto "Boost Control" -> "Speed   -> % PWM" set what you want here

The lovest PWM value will be taken from the above and send to Valve
On Picture below you see that the boost limits PWM to 30 %


```
PWM-1  Actual:30%
TPS  :100%      100%
BOOST:1.11       30%
RPM  :0         100%
```
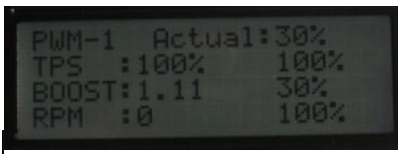
Holset CAN-BUS Control fromSW ver_144
And HW ver 4 the new Smaller SMD board

The Holset HE351VE is a popular VNT turbo, that is why i now support to run this turbo over the CANBUS output.
Goto "Boost Control" -> "General boost" -> "CANBUS" set it to "HOLSET 1" or "HOLSET 2" if set to HOLSET 2 it moves the vanes the other direction.

Goto "Boost Control" -> "General boost" -> "VNT Boost/EGP" set it to "0"
Now Restart the controller 2 times.
The Controller now control the Turbo depending on the settings in
Goto "Boost Control" -> "EGP-Boost   -> % PWM" set what you want here
Goto "Boost Control" -> "Boost   -> % PWM" set what you want here
Goto "Boost Control" -> "RPM   -> % PWM" set what you want here
Goto "Boost Control" -> "Speed   -> % PWM" set what you want here
%PWM is % position of the vnt vanes in this mode.

Connect the Holset, there is 4 wire coming out the Holset controller
RED / Green = 12V
Green / yellow = 0V GND
Yellow = CAN H
Green = CAN L

Picture of my test setup
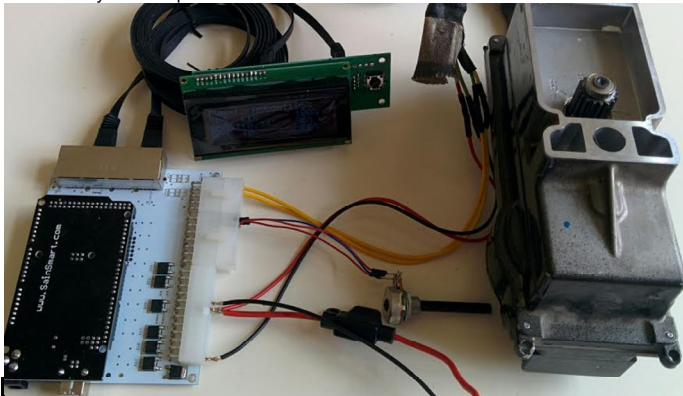
Extra AUX output for other stuff

There are 3 more PWM AUX output,

AUX-2
"General Boost" -> "USE AUX-2"
If Use "USE AUX-2" is set to "1" Then it works this way
The AUX-2 PWM out. takes input from the TPS, EGP, RPM and gives out the lowest of the 3.
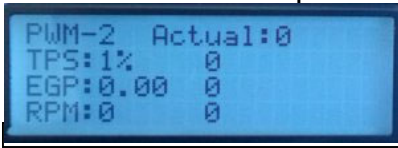
From ver 159 (Start Fan for Gear oil Cooler)
If Use "USE AUX-2" is set to "3" Then it works this way
The AUX-2 PWM out. Takes input from Gear oil temp and Pulse AUX-2 to ground at higher then 90° and releases at 85°

if "USE AUX-2" is set to "2" then it is used as starter lockout. (search for starter lockout)

If "USE AUX-2" is set to "3" then the signal is used to pull the solonoid on the Gearlever, then it can not be moved in to R and P while driving more then 10 km/h (It gives a ground signla, you have to supply 12V to the other side of solenoid)

AUX-3
If "USE AUX-3" is set to "1"
This takes in Analog input 1 in and Boost, RPM, and gives out the lowest PWM of the 3 out
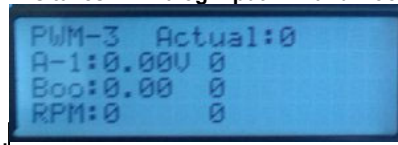
This output is also used for reversing Ligth if Lever is set to "2" and can then not be used for AUX-3

If "USE AUX-3" is set to "3" Then
the signal is used to pull the solonoid on the Gearlever, then it can not be moved in to R and P while driving more then 10 km/h (It gives a ground signla, you have to supply 12V to the other side of solonoid)

If "USE AUX-3" is set to "4" Then it works this way
The AUX-3 PWM out. takes input from Gear oil temp and pulse AUX-3 to ground at higher than 90° and releases at 85°

AUX-4,
Same as previous just another analog input. (if set to 1 it is used depending on A-2,Boost,RPM)
This output can also be used to get a signal out to limit power of engine.
Under "General Boost" go to "Use PWM - AUX-4",
The following happens for different value

|				
1,	it is used depending on A-2,Boost,RPM as AUX, not Pover limit function.			
2,	you get instant	200 mS	100% PWM	
3,	you get instant	300 mS	100% PWM	
12	you get 100 mS delayed 200 mS	100% PWM	*(1 is 100mS delay the 2 is 200-100 = 100 mS signal)*	
25	you get 200 mS delayed 500 mS	100% PWM	*(2 is 200mS delay the 5 is 500-200 = 300 mS signal)*	

By the way Engine limit only works at TPS > 20% (prevent stop engine at low RPM)
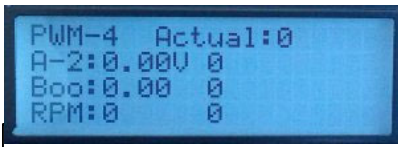
AUX-4 Explanation
Analog in 0-5 volt out = PWM signal 50% means valve on half the time.

0	0,5	1	1,5	2	2,5	3	3,5	4	4,5	5
100	100	100	100	100	100	100	100	90	75	30

Boost in PWM out

0	0,15	0.3	0,45	0,6	0,75	0,9	1,05	1,2	1,35
100	100	100	100	100	100	60	30	0	0

RPM in PWM out

0	500	1000	1500	2000	2500	3000	3500	4000	4500
100	100	100	100	100	100	100	80	60	40

If we have
A-2 = 4,5 Volt <=> 75%,
Boost = 0,9 bar <=> 60%, This is the lowes and 60% PWM is sent to the Valve.
RPM = 3500 <=> 80%,

Just a little more work then 2 X VNT in Compound

EGP-1

Boost-1

PWM-3 : Boost-1 / RPM

PWM-2 : EGP-1 / RPM / TPS

Butterfly-1

Butterfly-2

PWM-1 : TPS / VSS / RPM / EGP-1 / Boost-1

EGP-2

Boost-2

PWM-4 : EGP-2 / Boost-2 / RPM / TPS

This is the Label on the V3 Controller

Button Row in the plug   **Top row in the plug**

24 Pin plug 722.6 Mercedes gearplug pin number

GND	Pin 12 (Sensor GND to gbox)	□ □	Pin 2 (Line Pressure PWM)	D13
12V	Pin 6 (12V)	□ □	Pin 13 (1-2, 4-5 valve PWM)	D12
D10	Pin 10 (Shift valvePWM)	□ □	Pin 8 (2-3 valve PWM)	D11
D8	Pin 11 (Lock up PWM)	□ □	Pin 9 (3-4 valve PWM)	D9
A11	Pin 4 (Temp)	□ □	Pin 7 (+5 VSensor)	5V
INT0	Pin 3 (Speed 2)	□ □	Pin 1 (Speed 1)	INT1
12V	12 V in *8A Fuse*	□ □	*12 V out Boost/idle/AUX 1,2,3,4*	*12V*
GND	GND	□ □	*AUX -1 PWM Gnd Boost valve,*	*D7*
D19/i4	EXT Speed (Optionel)	□ □	*AUX-3 PWM Gnd / Idle GND*	*D6*
D18/i5	EXT RPM (Optionel)	□ □	Horn Relay if paddle *PWM Gnd*	*D5*
D1	AUX optocoupler 1	□ □	*AUX-4 PWM Gnd*	*D4*
D0	Kickdown 12V in opto	□ □	*AUX-2 PWM Gnd*	*D44*
GND	Lever pin 3 (GND)	□ □	Lever pin 7 (12 V)	12V
5V	Lever pin 1 (5V)	□ □	Lever pin 5	D23
D27	Lever Pin 2 (W/S)	□ □	Lever pin 4	D25
D31	Lever Pin 10	□ □	Lever pin 9	D29
A14	TPS (0-5V)	□ □	EGP (0-5 V)	A15
A12	PADDLE (0-5V)	□ □	BOOST (0-5V)	A13
5V	5 V	□ □	GND	GND
5V	5V	□ □	(GND)	GND
GND	GND	□ □	D37 (UP)	D37
D37	D39 (Tacho out)	□ □	D41 (LEFT)	D41
CAN H	(CAN H)	□ □	D45 (DOWN)	D45
CAN L	(CAN L)	□ □	D49 (RECHT)	D49

Joy-Stick	Gear-Lever	Parallel Display	Gear Indicator

Failure Search
Start Fail RPM-1 or **Start Fail RPM-2**
There is a safety feature in the boxes, that locks all shifts if speed is not right,
This can be triggered if put ignition on and start the car instant, Specially if you also gives it a little gas
If you put ignition on and start after 2 sec you will never see it.

N at speed
There is a safety feature in the boxes, that locks all shifts if put in N at speed
Please drive below 5 km/h before put in N

GearOil
It is very important that the gear Oil level is correct in the 722.6 but if you don't have a dipstick here is how you can make you own. as the 722.6 newer has a dipstick from new.
Mercedes Part number : 140589152100
http://autoimport.dk/mercedes_webcatalog/search/?q=KA-6953
http://mbspecialist.com/mercedes_webcatalog/search/?q=KA-6953&search-button.x=0&search-button.y=0
Here is a link to discussion of Oil Level
http://www.benzworld.org/forums/w210-e-class/1565510-w210-homemade-dipstick-722-6-transmission-2.html

SpeedoMeter
Great Link to keep speedo working on old cars from here
http://www.peachparts.com/shopforum/diesel-discussion/308791-380sl-diesel-conversion-project-15.html
FROM the link
But I figured out how to move the internal VR trigger wheel to the driveshaft and keep the tailcone with the manual speedo on the 722.4. Here's a diagram of the strategy. (The full thread on this topic, including images of the proof-of-concept test is here – Mechanical to Electronic Speedometer Conversion)

Different information
Momentum for the 722.6 (W5A580)- 578lb/ft = 800 Nm
i think the strongest automatic 722.6 is the 722.649 this is connected
to the 65 amg and handle 1000nm
722.608 300 td diesel
722.623 some v8 petrols
722.649 e65 amg,s
Gear ratios

Mercedes-Benz Transmissions							
Gear	1	2	3	4	5	R1	R2
5G-TRONIC (W5A330/Small NAG)[2]	3.932	2.408	1.486	1.00	0.83	-3.10	-1.90
5G-TRONIC (W5A580/Large NAG)[3]	3.59	2.19	1.41	1.00	0.83	-3.16	-1.93

Where to find the gearbox

- **1996–1999** **Mercedes-Benz W140**
- **2000-2005** **Mercedes-Benz W220**
- **2006–Present** **Mercedes-Benz W221** **(V12 Models only)**
- **1997-2002** **Mercedes-Benz W210**
- **2002-2004** **Mercedes-Benz W211**
- **1997-2000** **Mercedes-Benz W202**
- **2000-2004** **Mercedes-Benz W203**
- **1998-2005** **Mercedes-Benz W163**
- **1997-2004** **Mercedes-Benz W168**
- **2004–Present** **Mercedes-Benz W169**
- **2005–Present** **Mercedes-Benz B-Class**
- **1998-2005** **Mercedes-Benz R170**
- **1990-2001** **Mercedes-Benz R129**
- **2001–Present** **Mercedes-Benz R230** **(V12 Model and Earlier, up to 2005)**
- **1998-2002** **Mercedes-Benz W208**
- **2003-2005** **Mercedes-Benz W209**
- **2000-2006** **Mercedes-Benz C215** **(V12 Models only)**
- **2007–Present** **Mercedes-Benz C216** **(V12 Models only)**
- **1996–Present** **Mercedes-Benz W463** **(AMG Models only)**
- **2005-2009** **Mercedes-Benz SLR**
- **2002–Present** **Maybach 57 and 62**
- **1998-2002** **Jaguar X308** **(Supercharged models only)**
- **1998-2002** **Jaguar XK (X100)** **(Supercharged models only)**
- **2004–Present** **Ssangyong Rexton**
- **2006–Present** **Ssangyong Kyron**
- **2005–Present** **Ssangyong Rodius**
- **2005-2008** **Dodge Magnum**- **All HEMI applications, all AWD applications and some 3.5L RWD V6 applications, year dependent**
- **2005–Present** **Chrysler 300**- **All HEMI applications, all AWD applications and some 3.5L RWD V6 applications, year dependent All pentastar V6 applications**
- **2006–Present** **Dodge Charger**- **All HEMI applications, all AWD applications and some 3.5L RWD V6 applications, year dependent,All pentastar V6 applications**
- **2008–Present** **Dodge Challenger**- **All HEMI applications, All pentastar V6 applications**
- **2007-2011** **Dodge Nitro**- **4.0L V6 Applications**
- **2006-2010** **Jeep Commander**- **3.7L V6 Applications, 3.0L CRD V6 applications**
- **2005–Present** **Jeep Grand Cherokee**- **3.7L V6 Applications, 3.0L Diesel Applications, SRT8 Applications, all pentastar V6 applications**
- **2011–Present** **Dodge Durango**, **3.6L V6**
- **2011–Present** **Jeep Wrangler**- **2.8L Diesel**
- **2012–Present** **Jeep Wrangler** **3.6L V6**

As much as I hate to say it, here it is…
**This product comes with no warranties or guarantees of any kind. Both installation and use of
this system in any vehicle is done at the risk of the owner / operator of the vehicle. The
developer / seller of this system cannot be held responsible for any loss, damages or injury
caused either directly or indirectly by the installation or use of this system. The system is
intended for off road use only.**
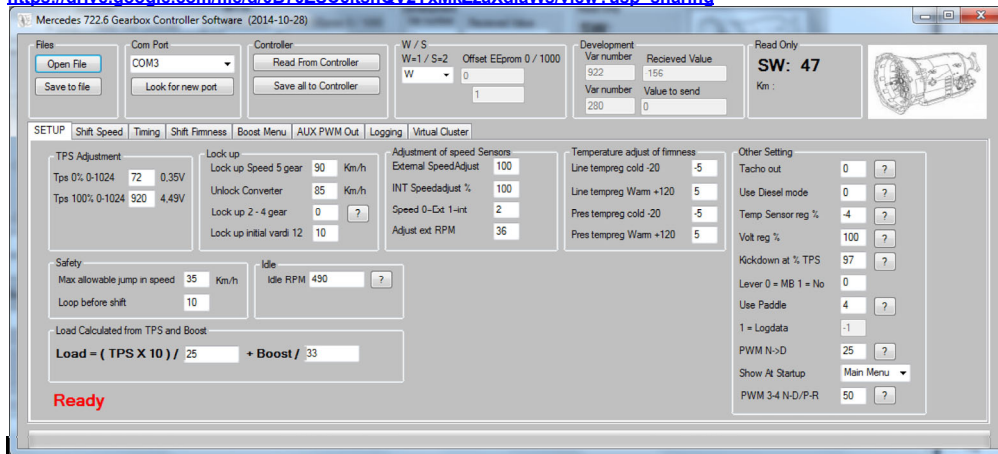

PC Program (This is Beta, not 100% tested)
DO NOT CONNECT AND DISCONNECT USB CABLE WHILE Driving
Get the EXE file direct, and run
https://drive.google.com/file/d/0B70ZSC6ltshQMnpsRm96d09HMGM/view?usp=sharing
Driver for controller
https://drive.google.com/file/d/0B70ZSC6ltshQV2YxMkZzaXdiaWs/view?usp=sharing

Mercedes 722.6 Gearbox Controller Software (2014-10-28)

Panel 1 — Shift Speed

Files: Open File | Save to file
Com Port: COM3 | Look for new port
Controller: Read From Controller | Save all to Controller
W / S: W=1 / S=2: W | Offset EEprom 0 / 1000: 0 | 1
Development: Var number 5000 | Recieved Value 5 | Var number 5000 | Value to send 1
Read Only: SW: 47 | Km :

Tabs: SETUP | Shift Speed | Timing | Shift Firmness | Boost Menu | AUX PWM Out | Logging | Virtual Cluster

Up Shift Speed
MinSpeed 1->2	6	MaxSpeed 1->2	34
MinSpeed 2->3	20	MaxSpeed 2->3	67
MinSpeed 3->4	44	MaxSpeed 3->4	108
MinSpeed 4->5	75	MaxSpeed 4->5	154

Down Shift Speed
MinSpeed 2->1	4	MaxSpeed 2->1	22
MinSpeed 3->2	14	MaxSpeed 3->2	46
MinSpeed 4->3	35	MaxSpeed 4->3	80
MinSpeed 5->4	65	MaxSpeed 5->4	125

Allow Kickdown at this speed
Kickdownspeed 2->1	30
Kickdownspeed 3->2	65
Kickdownspeed 4->3	120
Kickdownspeed 5->4	173

Shift at This RPM when Kickdown
kickdown 1-2	5000
kickdown 2-3	5000
kickdown 3-4	5000
kickdown 4-5	5000
Kickdown ok if RPM <	4000

Shift speed reg
ShiftSpeedRegUp 100
ShiftSpeedRegDown 100

TPS Correction
Shift_TPS_25 6
Shift_TPS_50 20
Shift_TPS_75 55

(Chart: Shift_TPS)

Panel 2 — Timing

Read Only: SW: 47 | Km :
Development: Recieved Value 20

Tabs: SETUP | Shift Speed | Timing | Shift Firmness | Boost Menu | AUX PWM Out | Logging | Virtual Cluster

Shift valve timing
Pressure valve shift time	10
Shift Valve time	8
Line Reg time	10
Time between shifts in manuel	1500

Other times
Lock up Spikes mS	20
Timedelay 3-4 gear	-1
update disp mS	10
TPS Slow Upshift (Ms/1%TPS)	25

Panel 3 — Shift Firmness

Read Only: SW: 47 | Km :
Development: Recieved Value 20

Tabs: SETUP | Shift Speed | Timing | Shift Firmness | Boost Menu | AUX PWM Out | Logging | Virtual Cluster

	Line Low	Line High	Pres Low	Pres High
Shift 1->2	20	-6	10	30
Shift 2->3	20	-6	10	30
Shift 3->4	20	-6	10	30
Shift 4->5	20	-6	10	30
Shift 2->1	20	-6	10	30
Shift 3->2	20	-6	10	30
Shift 4->3	20	-6	10	30
Shift 5->4	20	-6	10	30

LinePresAdjust -3

Chart legend: Firmness-1-2 | Firmness-2-3 | Firmness-3-4 | Firmness-4-5 | Firmness-2-1 | Firmness-3-2 | Firmness-4-3 | Firmness-5-4

Firmness 1->2

0% Load	10% Load	20% Load	30% Load	40% Load	50% Load	60% Load	70% Load	80% Load	90% Load	100% Load
0	0	0	0	0	0	0	0	0	0	0

Refresch Chart

Panel 4 — Logging

Com Port: COM84
W / S: S | Offset EEprom 0 / 1000: 1000 | 2
Development: Recieved Value 100
Read Only: SW: 47 | Km : nan

Tabs: SETUP | Shift Speed | Timing | Shift Firmness | Boost Menu | AUX PWM Out | Logging | Virtual Cluster
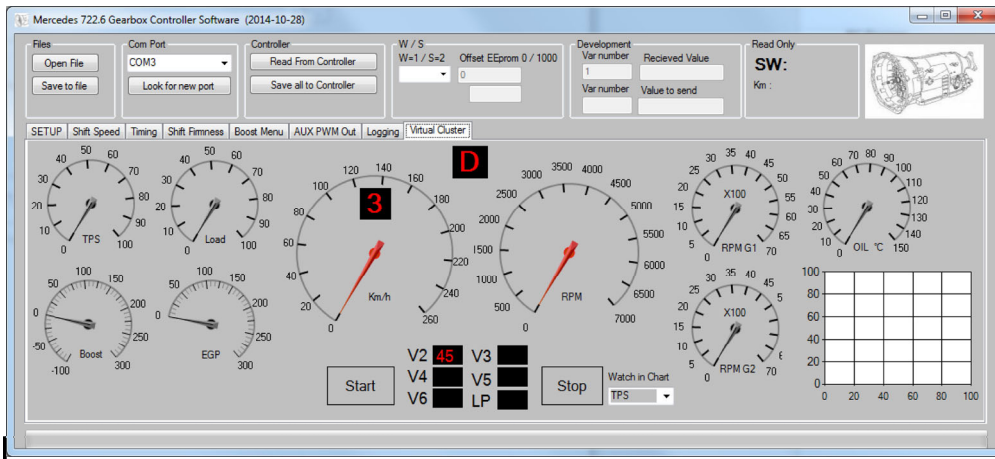
Start/ Stop logging
Start Logging   2 | Stop logging
Log speed 10 | Sample / sec
Log string: 679699,0,0,0,1,0,0,0,51,14,25,0,0,0,0,

Logfile
Where to Log to File | Save to file
C:\log.txt
Line number : 0
Write Line to file

Logging Value
|			
TPS	51	walve_2_PWM	25
Load	67	walve_3_PWM	0
Boost	144	walve_4_PWM	0
EGP	0	walve_5_PWM	0
Speed	0	walve_6_PWM	0
Speed_2	0	Rpm_Engine	0
Speed_int	0	RpmGear1	0
OK_Shift	1	RpmGear2	0
ActualGear	0	Gear Oil Temp	0
WantedGear	0		
GearLever	0		
LP+LS Reg	14		

TPS
Load

Conversion drawing W124
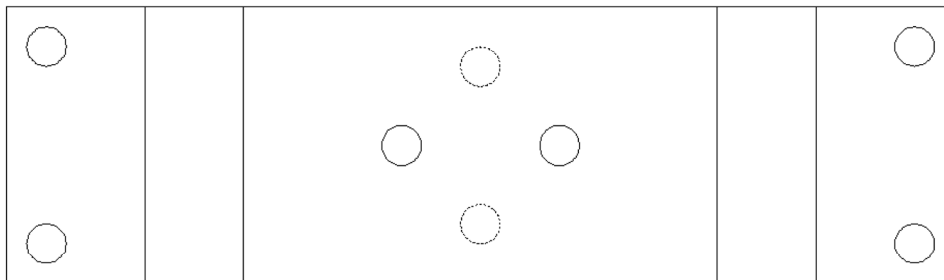
Engine from OM603 to OM606
Gearbox from 722.3 to 722.6
The Propellershaft do not need to be changed or modified, just make sure the Flange fit.
If you have mecanically Tacho you can find a electronic one from W124 (420 or 500) make sure they are eletronic.
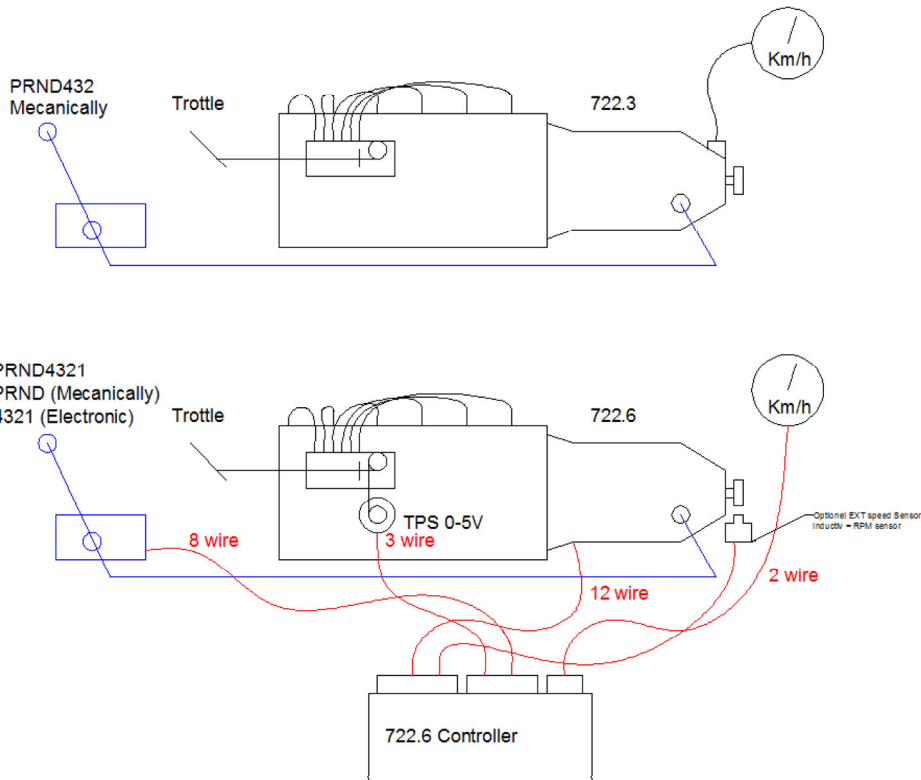
The Crossbare from any W210 can be used but 2 holes has to be drilled.

**Overload protection on W124 gasoline cars, (NOT NEEDED BUT POSSIBLE)**
this controller can also send a signal to the Engine controller
But i have not yet tried it, all info i have found is below here
Please if anyone know how the S65 switch is working, please tell me, what i think is that it is just short the 2 wires but not sure. ?
If it works as i think the S65 simply short 2 wires. ? if it is like that then mount a relay to short, and drive the relay, width the output from controller.

AUX4

86   87

85   30

+12V

PLUG
FROM
722,3
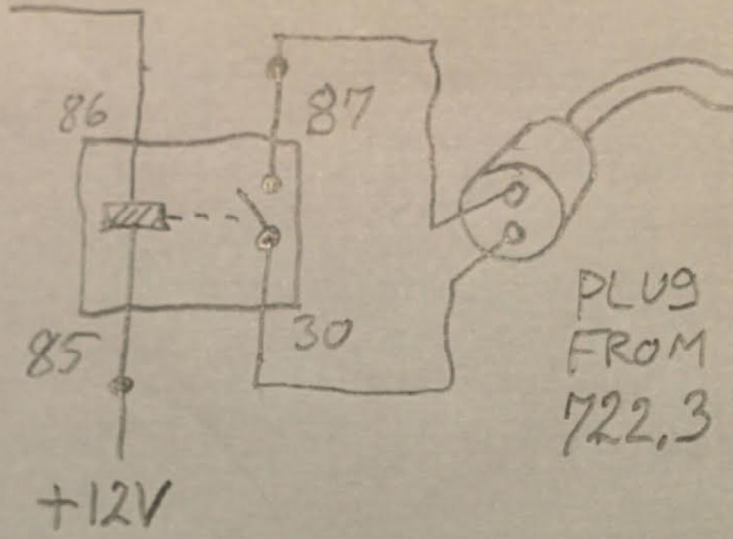
J. Transmission overload protection

General

In order to protect the shift elements or the automatic transmission from excessive thermal stresses during power shifts in the top engine speed range, a transmission overload protection is integrated in the EZL ignition control units. As a result of the transmission overload protection, ignition timing is retarded to 5° CA before TDC for about 400 ms (reduced engine torque) during 1 → 2 and 2 → 3 upshifts (engine 120: 1 → 2, 2 → 3, 3 → 4).
As this retardation of ignition timing during the shifting phase also provides a smoother gearshift, this measure is also used during 3 → 2 full load downshifts (engine 120: 4 → 3 and 3 → 2).

Ignition timing is retarded provided the following conditions are met simultaneously:

- Engine speed >4000/min (reference value)

- Vacuum in intake manifold <300 mbar (reference value)

- Shift signal from transmission overload protection switch, brake band B1 (S65) (engine 120: brake band B1 (S65) or B2 (S65/1)).

The transmission overload protection switch, brake band B1 (S65) (engine 120: brake band B1 (S65) and B2 (S65/1)) is designed as a hydraulic switch and linked to the operating pressure circuit of brake band "B1" and "B2", respectively, of the automatic transmission.
The opening and closing of the transmission overload protection switch, brake band B1 (S65) (engine 120: brake band B1 (S65) and B2 (S65/1)) is detected as a shift signal by the appropriate EZL ignition control unit.
The shift function of the transmission overload protection switch, brake band B1 (S65) is dependent on the working pressure which exists at "B1".
Working pressure <1.8 bar: S65 opened.
Working pressure >1.8 bar: S65 closed.
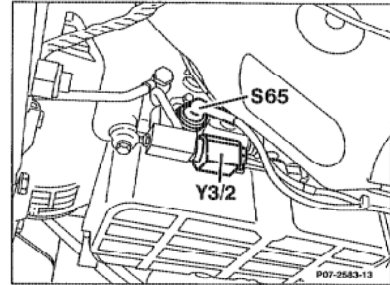
S65   Transmission overload protection switch, brake band B1
Y3/2   Shift point retard solenoid valve
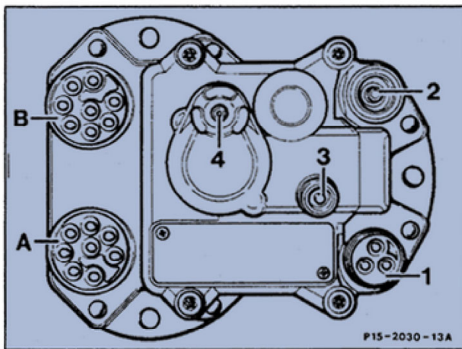
1   3-pole connector, knock sensors
    1 = shared ground
    2 = Knock sensor 2
    3 = Knock sensor 1
2   Coaxial connector for the control wire from the crankshaft position sensor
3   Reference resistor connector (EZL/AKR)
4   Vacuum connection
A   8-pole connector
    1 = Ignition coil circuit 1
    2 = Ground circuit 31
    3 = circuit 15Z
    4 = TN signal
    5 = Data line negative
    6 = 5-speed automatic transmission control unit (N15/1)
    7 = Data line to the CIS-E control unit (N3)
    8 = Blink signal output
B   8-pole connector
    1 = Camshaft position sensor positive
    2 = unused
    3 = Transmission overload protection
    4 = Coolant temperature sensor
    5 = Coolant temperature sensor ground

The EZL/AKR ignition control unit (N1/3) stores one ignition performance map for vehicles with automatic transmission and another for those with manual transmission.

To activate the ignition map for vehicles with automatic transmission, the wire from the EZL/AKR ignition control unit (N1/3) plug B, socket 6 is connected to ground (W3).

In vehicles with manual transmission, this wire ends in the wiring harness.
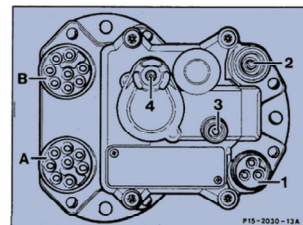
[A1] Is it correct to say that if you don't have the Mercedes gear lever, you can perform steps 1-8 and ignore step 9?
[A2]This section is very confusing to me. Can you explain the default behaviour? Does converter normally lockup if the lever is in positions 1,2,3,4?
Do the speed settings above for lock and unlock only apply to 5th gear?
It seems to me that if you use setting 1 and you are in manual mode and you drive until you are in 4th gear, then take your foot off the throttle, stop and leave the gearbox in 4th, then the converter will still be locked when you stop because TPS<10%. Is that correct?
Are these settings affected by the gear lever position or do they behave the same in auto, manual or gear lever selected gears?