SHIFTBOX MANUAL 3.0

SHIFTBOX: SHB

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1.0 OVERVIEW

The SHIFTBOX program is the user friendly control center for all hydraulic components of the Kotouc Gearboxes range or universally with alternative products. There are numerous features that allows you to adapt the components universally through your ECU or as a complete stand alone product.

1.1 GETTING STARTED

Extract the files from the zip folder „setup“

You must have active connection to the internet.

Run the „CMD setup“ file

Run the file „setup.exe“

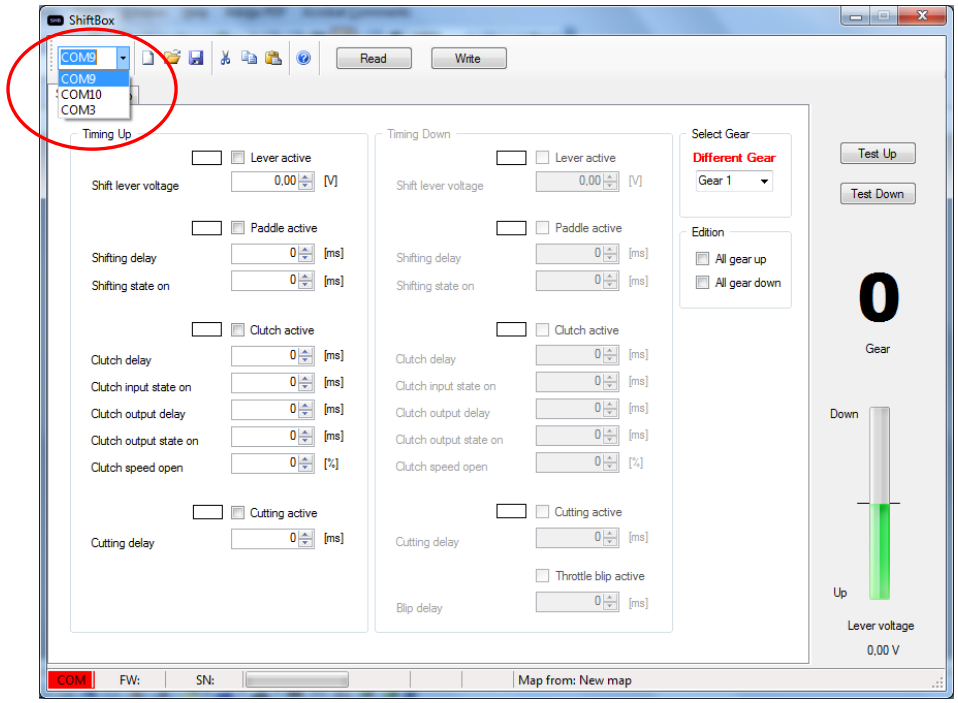
The setup can take between 2-20 minutes depending upon the requirements of your computer.

The SHIFTBOX program will begin immediately upon the completion of the setup.

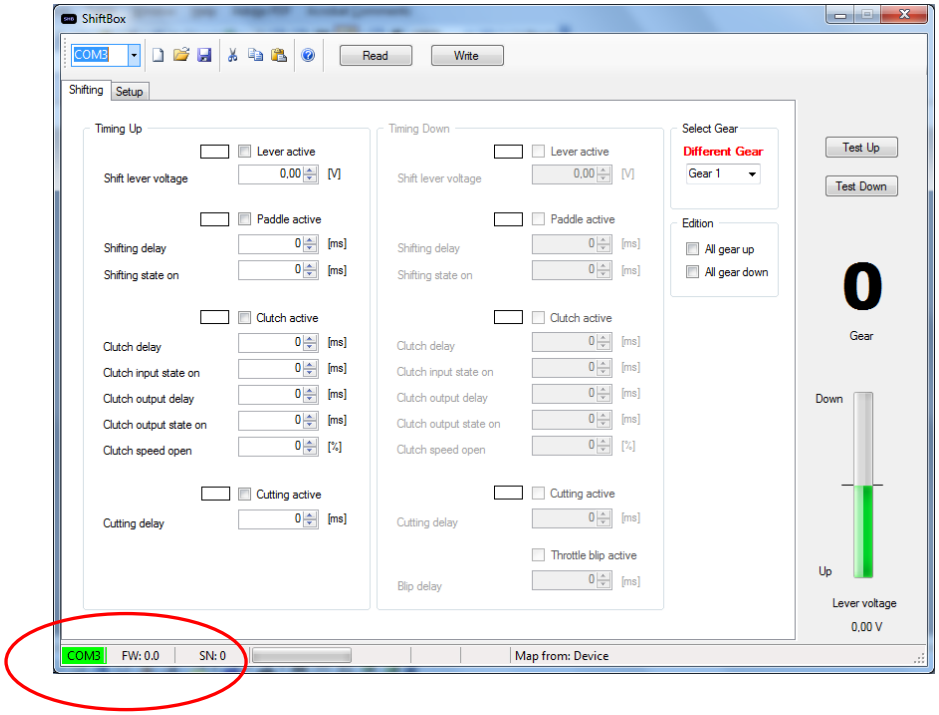
1.2 CONNECTION TO PC

Connection to the PC is via USB to USB cable.

It may be necessary to select to particular COM Port to activate the connection.



After connection is established, you will see the green light and description „map from: device“ along with your allocated serial number.



2.0 SOFTWARE EXPLAINED

The SHIFTBOX software has four main tabs. The SHIFTING tab contains timing specific for each gear separated by upshift and downshift. The SETUP tab are additional universal options for timing along with physical hardware setup. The PUMP tab is specifically for pressure control of the hydraulic unit. The MONITOR tab is a quick summary of all the signals in the SHIFTBOX.

2.1 SHIFTING TAB

This is the main control area of the shifting lever, the hydraulic paddle shifting and the hydraulic clutch unit. Each is explained below.

Timing up: The timing of the components related to upshifting. Gears 1-2, 2-3, 3-4, 4-5, 5-6 (the highest gear programmed in the SHIFTBOX will be inactive)

Timing down: The timing of the components related to downshifting. Gears 6-5, 5-4, 4-3, 3-2, 2-1. (note, gear 1 is inactive on downshift)

Lever Active tick box: Check if you want to use the shift lever as your primary input for the system.

Shift lever voltage: Change the level from the shift lever to where the signal becomes active (force level of push and pull)

Paddle Active tick box: Check if you want to use paddles as your primary input for the system.

Shifting delay: Delay for start of the shift (mechanical push of piston)

Shifting state on: Adjustment for the length of time the mechanical shifting piston must push.

Clutch Active tick box: Check to activate the hydraulic clutch unit.

Clutch Delay: Delay for the start of the clutch unit from input signal (paddle or lever).

Clutch input state on: Adjustment for the length of time the input valve on the clutch unit stays open (delivery of pressure to clutch unit)

Clutch output delay: Adjustment for the delay of when the output valve opens (cluth still engaged)

Clutch output state on: Adjustment for the length of time the output valve is open. Also is the time „Clutch speed open“ modulation is active (release of pressure from clutch unit)

Clutch speed open: Adjustment for the speed of the release of the clutch. 0% fast, 100% slower. Time of this modulation is dependant upon the timing of „Clutch output state on“.

Cutting Active tick box: Check if you want the engine cut signal active

Cutting delay: Adjustment for delaying the engine cut signal

Cutting state on: The length of time the cutting signal is active for

Throttle Blip Active: Check if you want the system to send active signal for throttle blip (downshift only)

Throttle Blip delay: Adjustment for delay of throttle blip signal (downshift only)

Throttle Blip open: Set the % amount of TPS for throttle blip

Throttle Blip state on: The amount of time the signal will remain active

Select map: Option to view between saved maps in thes SHIFTBOX

By Mode check box: Check to automatically default viewed map by potentiometer on MODE wire

Select Gear: Adjustment for viewing each gear timing up and down.

By gearbox tick box: Check for automatically viewing map data corressponding to the current selected gear in the gearbox.

Edition tick boxes: Check for amending up and down timing for all gear at the same time.

2.2 SETUP TAB

The setup tab relates to the control of the hardware inputs and set timings across all gears.

INPUT Signal

Lever reverse: Select to reverse the push/pull signal on the shifting lever

Paddle up reverse: Select to reverse input signal from paddle from - signal to + (must install outside resistor 1000 ohm by wiring diagram)

Paddle down reverse: Select to reverse input signal from paddle from - signal to + (must install outside resistor 1000 ohm by wiring diagram)

Clutch switch reverse: Select to reverse input signal from the action of clutch pedal from - signal to + (must install outside resistor 1000 ohm by wiring diagram)

Brake switch reverse: Adjustment of polarity of brake input

CUTTING

Cutting reverse: Select to reverse output signal for engine cut from + signal to –

All cutting by time: Allows you to program one set time on the output wire for engine cut across all gears. Set time (milliseconds)

All cutting by gearbox: Check to use the gearbox display sensor for the completion of the cut (closed loop)

SHIFTING

Finish shifting by next gear: Selecting this function will finish the mechanical push of the shifting piston as soon as the system recognises the next available gear. This will overwrite any value entered in the „All cutting by time“ field.

Delay finish shifting after next gear: Adjustment to extend the length of time the piston pushes to change gear after the gear has engaged.

0 and R paddle function tick box: Check to activate the down paddle to select neutral and reverse. Hold down paddle for 0.5 seconds to activate shift.

0 and R paddle function only with brake tick box: An additional safety measure to ensure the foot brake is pressed so the downshift paddle in neutral and reverse will function.

CLUTCH assistant

Finish clutch by next gear: Check to start disengagement of the clutch as soon as the next gear has been engaged. If selected, this will take priority to what you set in the field „clutch output delay“

THROTTLE blip

Digital output tick box: Check to send on the throttle blip output wire a diginal on off signal. Can be selected either 0v or 5v idle output.

Analogue output (by TPS input) tick box: Check to send an analogue blip signal on the output wire.

Throttle blip only with brake tick box: Check to ensure only a throttle blip signal is sent once the brake is depressed.

SETTING gear

This feature programs the resistance signal from the display sensor as a set gear in the software. (If using with Programmable LED display, this function must be completed via the white progamming wire to ground as per the alternative manual).

2.3 ADDITIONAL FEATURES

TEST UP / TEST DOWN

You can test the functionality of the system quickly by using these test buttons. All must be prepared correctly and you can test on a table on in the car.

GEAR DISPLAY

The big bold gear display on the right of the program shows the current selected gear inside the gearbox. If you have a different gear seleted on the map, you will see in the select gear section „different gear“ in red font.

LEVER VOLTAGE

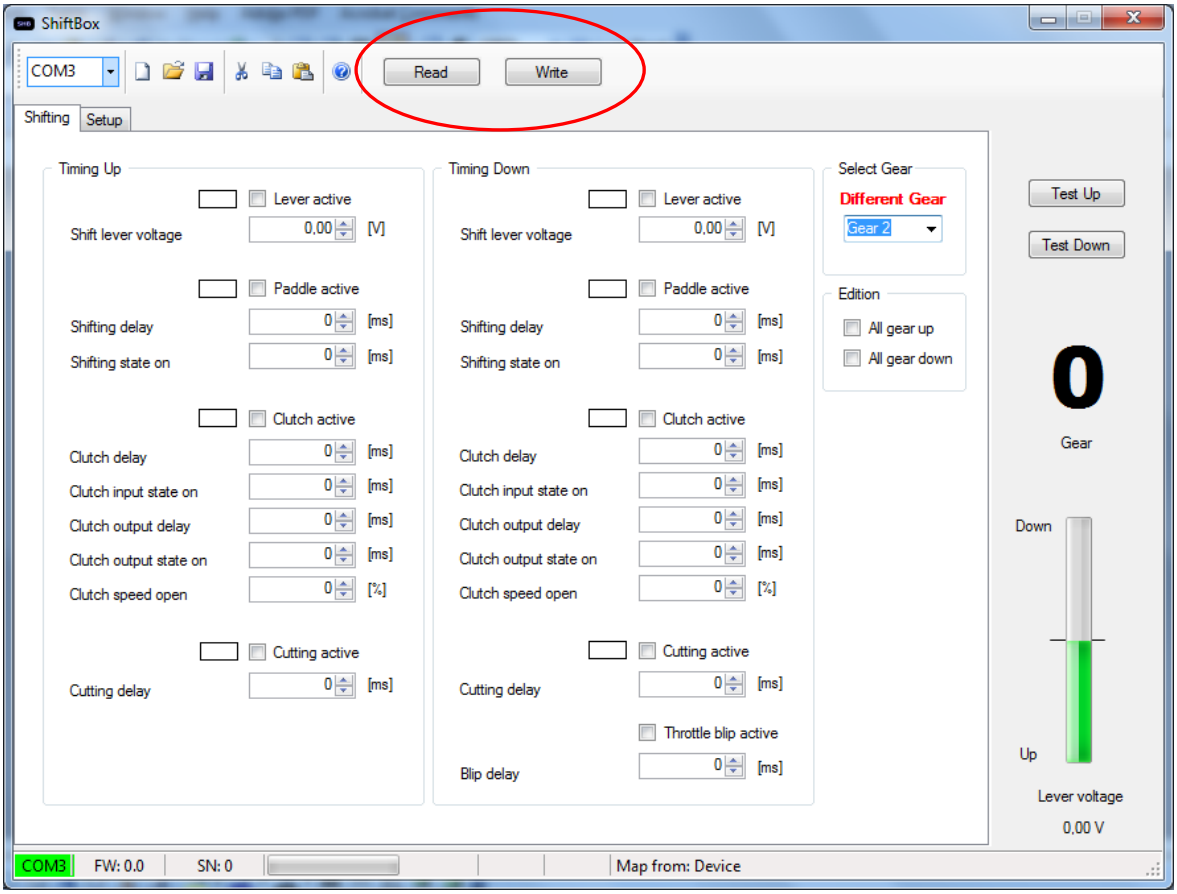
Shows the current voltage level from the connected shift lever. It the lever is pushed or pulled, you will see the change in resistance signal.

3.0 PROGRAMMING AND SAVING

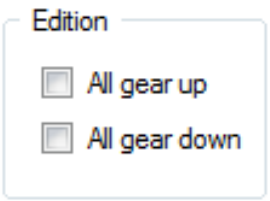
3.1 PROGRAMMING MAPS

You can program maps for the up and down shifts by using the toggle buttons or just by entering a figure in the available box. It is necessary that before changing to the next gear in the software, you must press „WRITE“ to record your changes. If „write“ is not pressed, then no data will be saved.

You can double check that the system has changes recorded by using the „READ“ button. This reads the information programmed into the computer.



To change the gear you want to create mapping for, it is necessary to use the select gear item from the SHIFTING tab. Alternatively, you can make a make across all gears by using the EDITION function.



3.2 SAVING MAPS

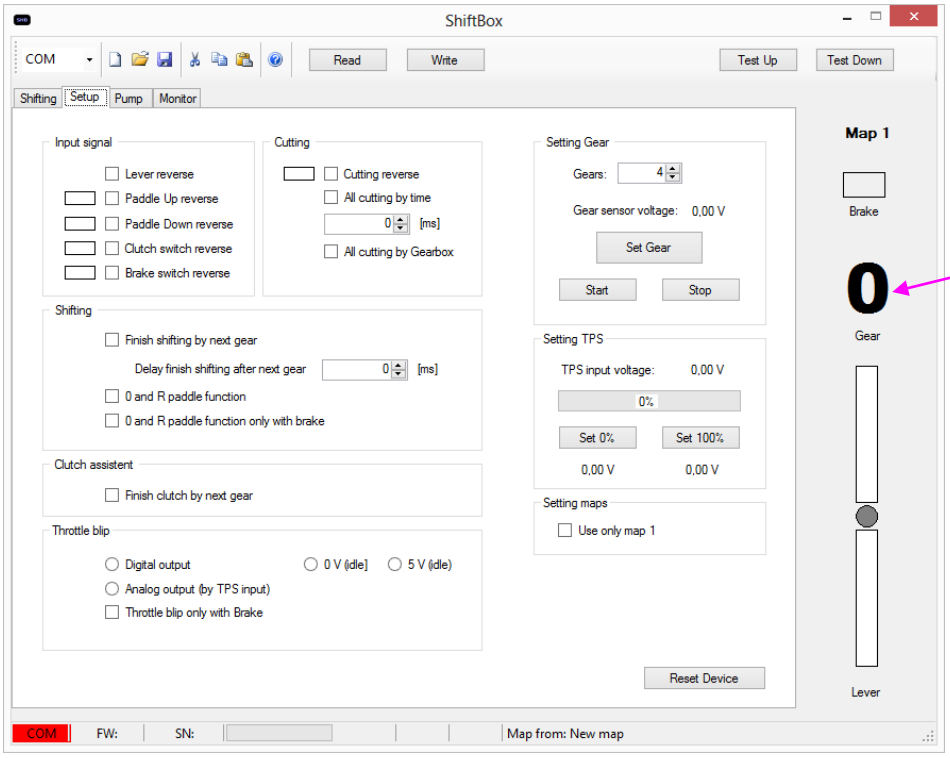
You can save map files and transfer to other cars. The small save button is on the file menu. It is important to note that only information from the SHIFTING tab will be saved in the map. The setup tab options must be programmed to the car.

3.3 PROGRAMMING OF DISPLAY SENSOR

The system cannot recognise what gear has been selected until it has been programmed. Before beginning the program, ensure that the gearbox is in neutral.

On the SETUP tab, the „Setting gear“ field, press start to activate progamming funtion.

Neutral must be saved first. You can see the active gear in bold on the right. Press SET GEAR to record.

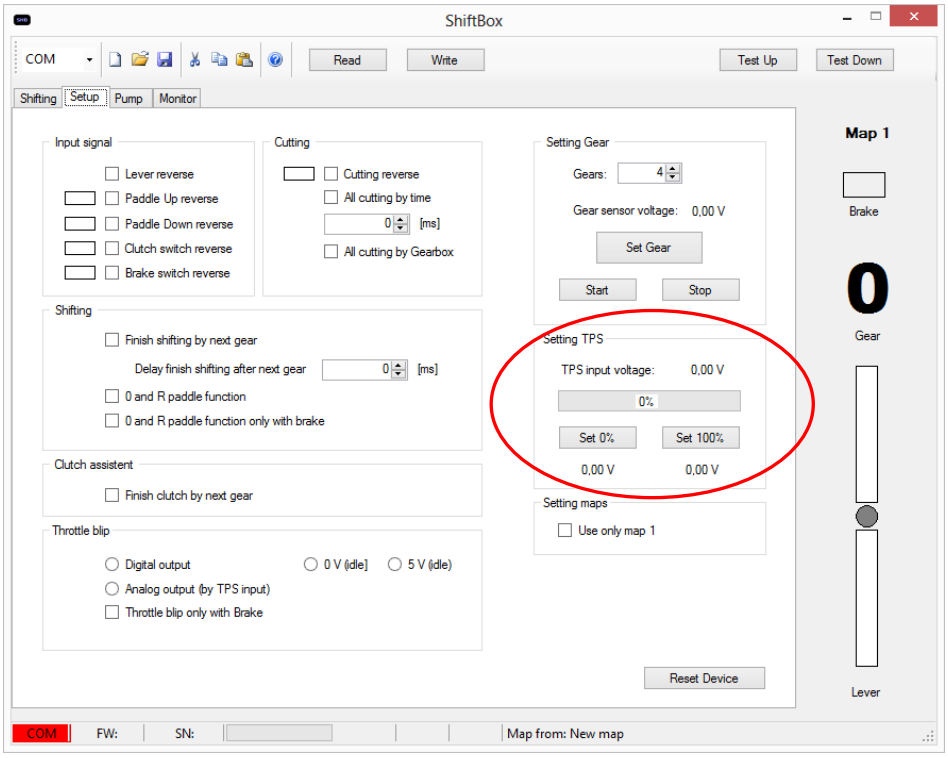


Change the gear on the gearbox and repeat recording each gear by pressing SET GEAR.

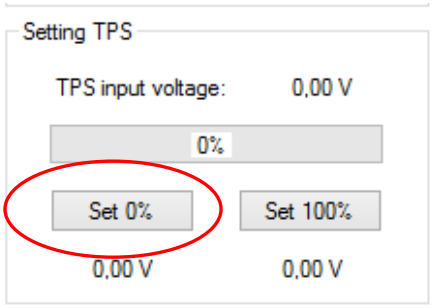
Save gears 6,7,8 and 9 on position of 6. Then select reverse on the gearbox and repeat as normal SET GEAR. After reverse has been recorded, press stop. If you make an error, you can reprogram as may times as you like by once again pressing start.

3.4 PROGRAMMING OF THROTTLE POSITION SENSOR (TPS)

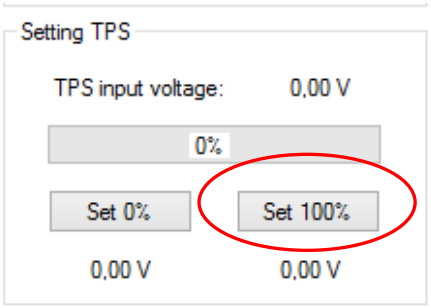
Programming of the TPS sensors in the car is done via the SETUP tab "Setting TPS". If your car has two TPS signals, both are programmed by completing the one process only. It is not necessary to do each TPS signal individually.



When the throttle pedal is not pressed, click "Set 0%".



Press the throttle pedal to the floor in the car, then click "Set 100%".



Both TPS 1 and TPS 2 will save both 0-100% points and will automatically recalculate the TPS position through the points in between.

4.0 ADJUSTMENT OF COMPONENTS

The most important signal is the start signal for which all timing operates from. This is either the voltage level programmed or via the pressing on a paddle.

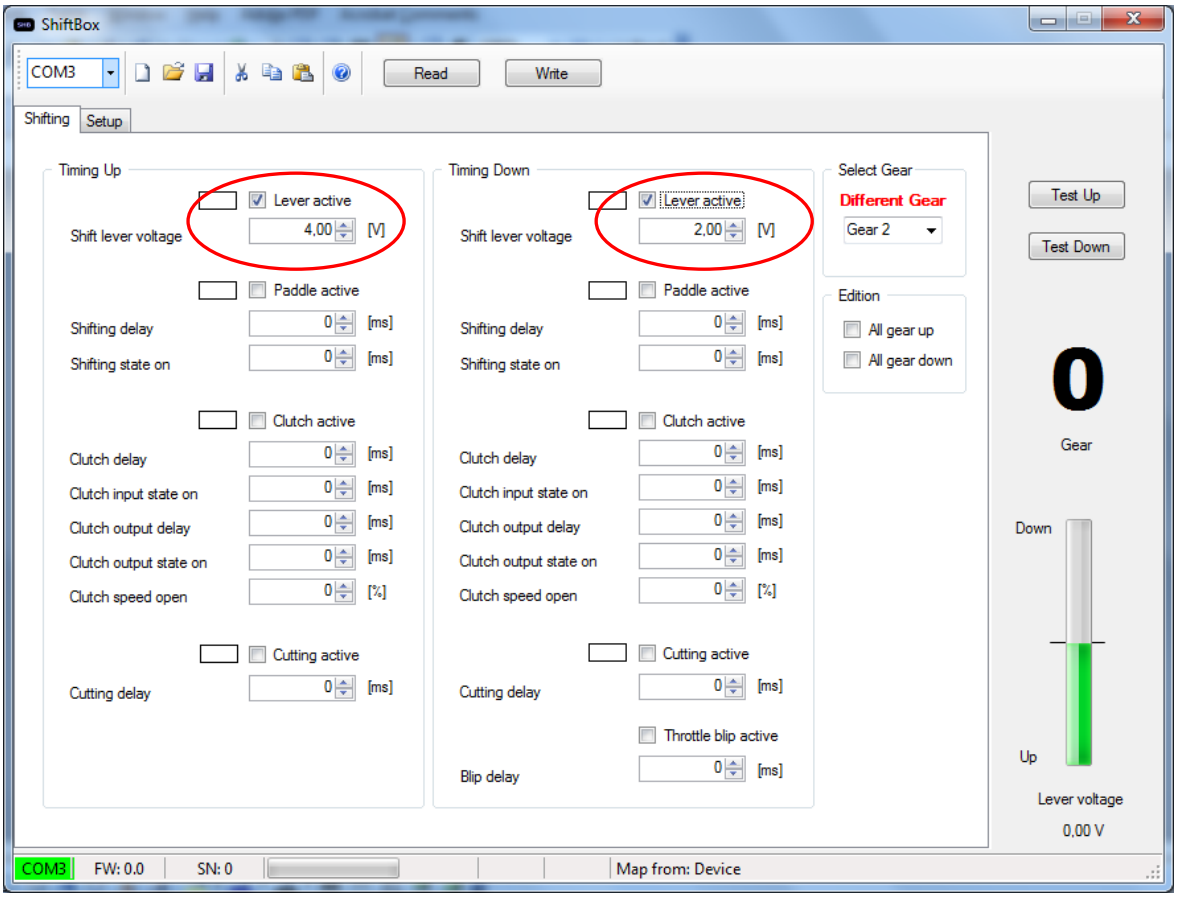
The following items are programmed from the start signal:
Shifting delay
Clutch input state on
Cutting delay
Blip delay

The following items are programmed to follow one after the next
1. Clutch input state on / 2. Clutch output delay / 3. Clutch output state on

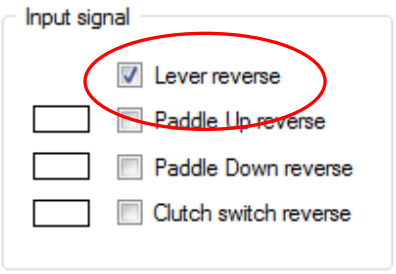
Note: It is possible to have both the lever and paddle shift active, however, there could be interference between the shift lever and paddles that may affect performance. It is recommended if paddles are being used, then the shift lever signal is switched off.

4.1 SHIFTING LEVER

The force delivered to the shift lever for the up and down shift is measured as a voltage signal between 0-5v. Universally, this is the standard output signal for shifting levers. The point at which the signal is active can be adjusted on the SHIFTING tab via the „Shift lever voltage“ field.



Depending upon the lever being used, it may be necessary to reverse the signal. This can be made on the SETUP tab in the INPUT signal section „Lever reverse“

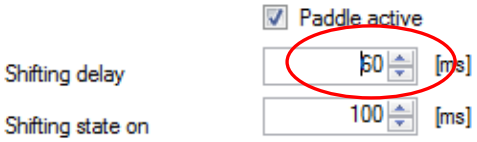


4.2 PADDLE SHIFTING

Connect the paddles to the wires (if supplied) as per the schema. Depending upon the polarity of the paddle signal being used, you can reverse the input signal. On the SETUP tab, choose the „Paddle up reverse and „Paddle down reverse“ tick box.

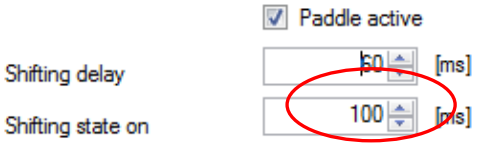
This will reverse the input signal from the paddles from - signal to + signal. You must install outside resistor 1000 ohm as shown by the wiring diagram.

The timing of the start of the shift can be adjusted to suit the hydraulic system being used. There is a mechanical time that must be considered which is the amount of time needed to deliver pressure to the system. You can adjust the time of the delay of the shift (if required) with the „Shifting delay“ feature.

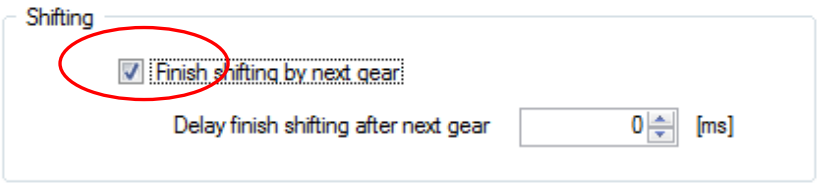


If paring with the clutch unit, you also must consider the timing you have set up.

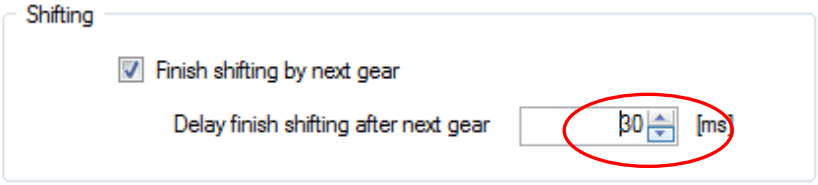
The additional step to program is how long you want the shift to stay on (mechanical push of the selector rod to the transmission). This push is usually delivered by an external piston connected to the shift lever, or via an internal shifting piston in the gearbox. The field „Shifting state on“ is the timing of this.



It is possible that the length of time the piston is pushing can be determined by the gear sensor. Select the option on the SETUP tab „Finish shifting by next gear“.



There is also the additional option to extend the time of the shift after the system has identified the next gear. It can be used as additional security to ensure the gear is firmly engaged.

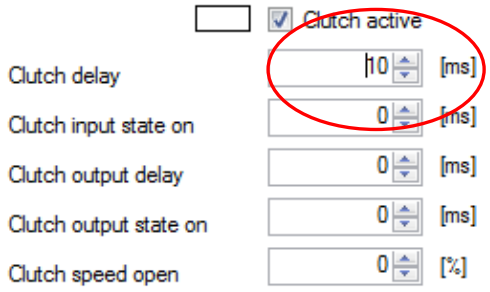


4.3 CLUTCH UNIT

Connect the clutch unit to the wires (if supplied) as per the schema.

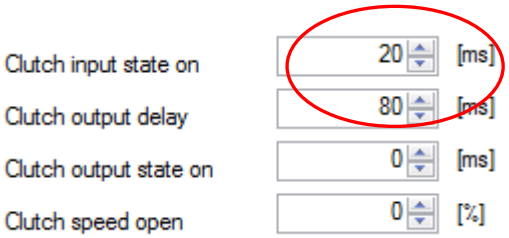
The system is designed to open the clutch in the fastest amount of time possible. Adjustment for the length of time the clutch stays open and the release can be controlled by the operation of the solenoids.

There is the mechanical time that must be considered for delivering pressure to the system. Should you wish to delay the start of when the clutch unit becomes active, adjust „clutch delay“.

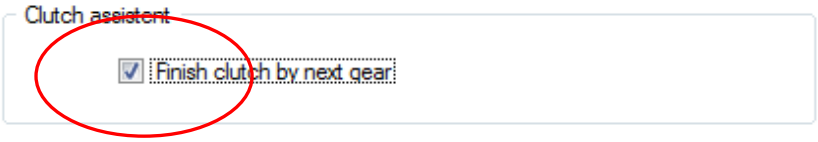


„Clutch input state on“ is the mechanical opening of the input valve. Essentially it is part timing of the amount of time the clutch stays engaged. The additional timing for keeping the clutch engaged is „cluth output delay“. The summation of these two is the total time for engaging the clutch.

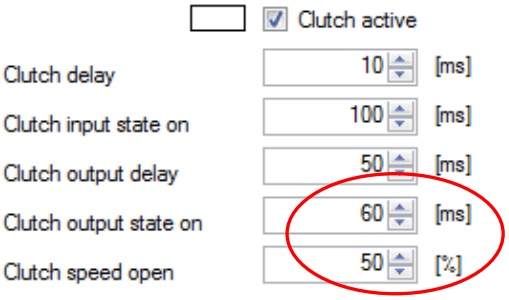
It is possible to control the length of the engagement of the clutch via the software. For example, a short time can be set to open the input valve, thereby limiting the total amount of pressure to the clutch, but keeping the clutch engaged for a longer time with the „clutch output delay“. However, mechanical adjustment of the clutch unit is recommended.



Alternatively, the length of time the clutch can be engaged can be determined by the gear sensor. Select the option on the SETUP tab „Finish clutch by next gear“. Selecting this option will ignore the time set in the „clutch output delay“ field and move the system to the next step for releasing the clutch.



„Clutch output state on“ is the programmed time that the output valve stays open to release the pressure delivered to engage the clutch. The speed of this release can be made by the percentage on the „clutch speed open“ field. 0% being the fastest and 100% the slowest.



There is the possibility that if the „clutch output state on“ is set very short and „cluth speed open“ made very slow, pressure could still be inside the system keeping the clutch engaged. In this case, the system will release the excess pressure automatically at the quickest possible speed and the clutch will disengage.

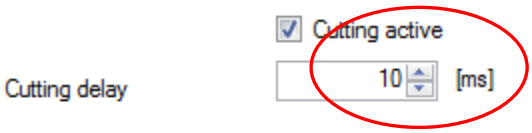
In this case, it is possible to use the two functions as described above to start the release of the clutch slowly, then rapidly.

Note, the pressure of the return of the clutch is determined mechanically by the clutch spring. Also, as all clutches are different, one time does not fit all. It is necessary to tune effectively via software and mechanically. Refer to the alternative „Clutch and Pressure unit manual“ for additional setup if use with the Kotouc Gearboxes Hydraulic Clutch unit.

4.4 CUTTING SIGNAL

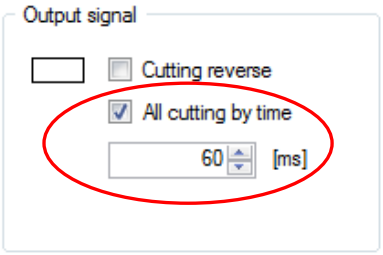
It is possible on both the upshift and downshift to activate a cutting of the engine. The signal for this is active on the wire according to the wiring schema. It is possible that the length of time this signal is active can be according to the shift or according to a set time. It is also possible to adjust the start time of the cut.

To delay the engine cut signal from the start signal (lever or paddle), on the SHIFTING tab, select the „cutting active“ tick box and adjust the „cutting delay“ field.

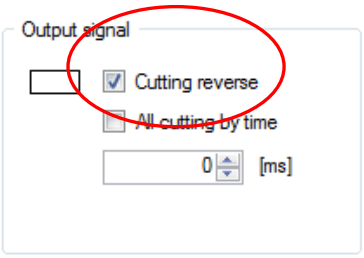


Automatically, the length of the cut is determined by the gear sensor. When the next gear is selected, the engine is again restarted.

To cut the engine for a set time on the SETUP tab, in the OUTPUT SIGNAL section, select „All cutting by time“ and adjust the time that the cutting signal is active on the output wire.



Should you wish to reverse the output signal from + to -, check the „Cutting reverse“ tickbox.

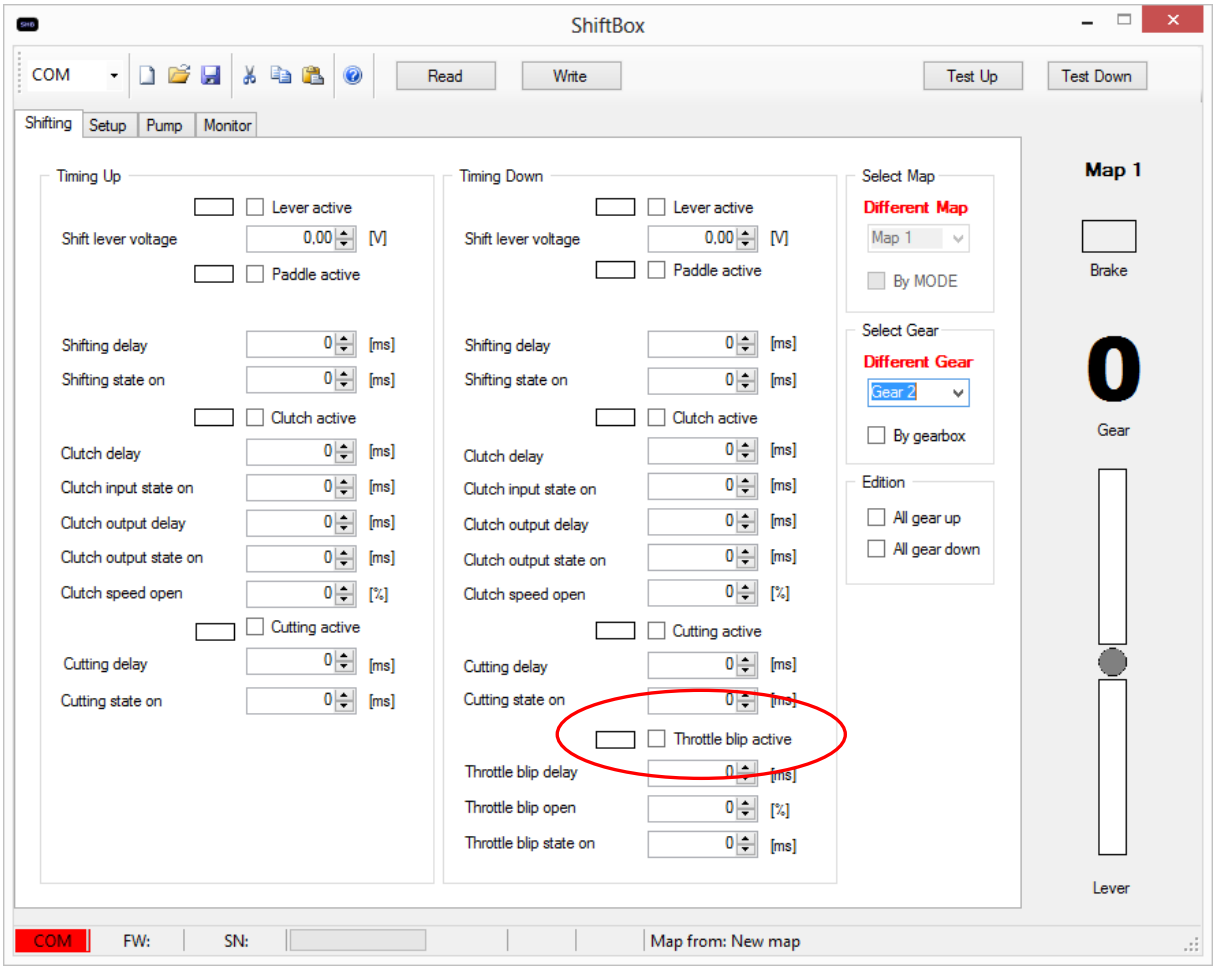


4.5 THROTTLE BLIP SIGNAL

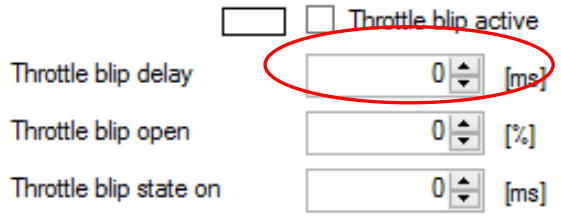
For the throttle blip to function, there must be an active input to the shiftbox from the sensor that is on the throttle pedal. There may be the requirement for one or two TPS inputs. Main signal and checking signal.

The throttle blip signal is possible to activate on the downshift. You can set the start position of the signal, the percentage of throttle to blip and also the length of time that the signal is active on the wire according to the wiring schema. It is possible to blip with a digital or analogue signal.

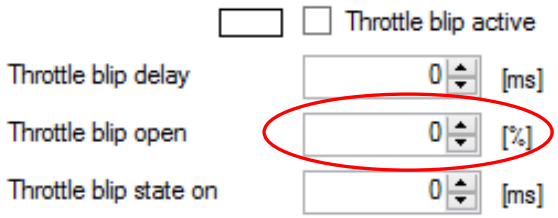
To activate the Throttle Blip signal, on the SHIFTING teb, check the tick box „throttle blip active“ for each gear you want it to be available. Ensure to press WRITE to save your changes.



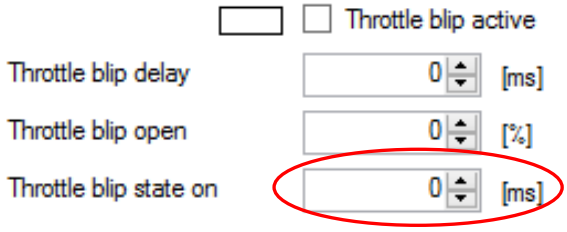
Adjustment for the delay of the signal with the field „Blip delay“.



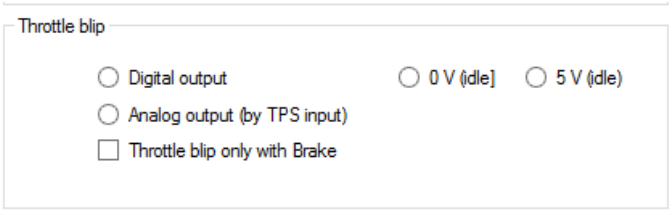
"Throttle blip open" is the adjustment of how intense the throttle blip will be based on the percentage of TPS programmed in the unit.



"Throttle blip state on" is adjustment of length of time that the blip will remain open (milliseconds)

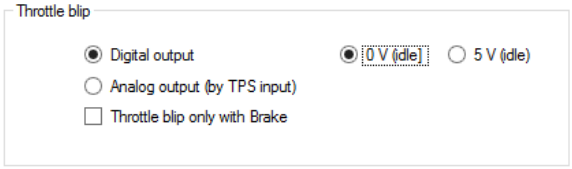


The setup tab has the following options:

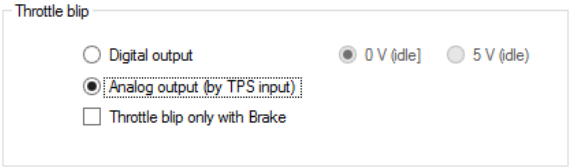


Whether it is necessary to manually pull a cable via a solenoid in an older vehicle, or directly connect to the TPS signal to the engine ECU, it is possible to change the polarity and mode of signal.

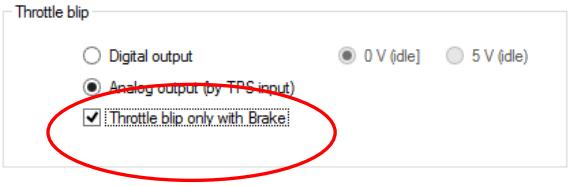
Selecting "digital output" , you can either choose a 0v idle or 5v idle.



Selecting an "Analogue output", the digital option is inactive. Output from the shiftbox will be variable 0-5v as per the original TPS sensor.



Should it be necessary, there is the option to have the throttle blip signal activate on a downshift only if the brake is depressed. For this option, click "Throttle blip only with brake"



APPENDIX A - SHIFTBOX v2 PIN OUT

UTG0128P

A	1.	GROUND
B	2.	GROUND
C	3.	+12V
D	4.	TPS 1 INPUT
E	5.	5V REFERENCE
F	6.	THROTTLE BLIP 1
G	7.	GEAR SENSOR INPUT
H	8.	SHIFTING LEVER INPUT
J	9.	CUTTING OUTPUT
K	10.	PROGRAMME
L	11.	PADDLE UP
M	12.	PADDLE DOWN
N	13.	DISPLAY OUTPUT
P	14.	V1 VALVE HYDRAULICS
R	15.	V3 VALVE HYDRAULICS
S	16.	MAP MODE
T	17.	V4 VALVE HYDRAULICS
U	18.	V5 VALVE HYDRAULICS
V	19.	CLUTCH INPUT
W	20.	RPM INPUT
X	21.	BLOCATION
Y	22.	BRAKE INPUT
Z	23.	ACCUMULATOR PRESSURE INPUT
a	24.	PUMP ON/OFF CONTROL OUTPUT
b	25.	USB (+5V)
c	26.	USB (-D)
d	27.	USB (+D)
e	28.	USB (GND)

UTG0128P

A	1.	TPS IN 2
B	2.	THROTTLE BLIP 2
C	3.	-
D	4.	-
E	5.	-
F	6.	-
G	7.	-
H	8.	-