

# **CLUTCH-MATIC UNIVERSAL CLUTCH-PEDAL AID SYSTEM**

## **DO-IT-YOURSELF INSTALLATION & USER MANUAL**

Version: 02  
Date of Issue: 2015. March. 04.  
Model type: MO1

Thank you for purchasing Zodorlex Clutch-matic conversation kit which turns your vehicle manual transmission into semi-automatic transmission that does not change gears automatically, but rather facilitates manual gear changes by dispensing with the need to press a clutch pedal at the same time as changing gears. This removes the need for a clutch pedal which the driver otherwise needs to depress before making a gear change while you can still enjoy the driving experience by shifting the gears hand.

Advantage of the Clutch-matic system:

- reduced driving stress in a heavy traffic environment,
- easy uphill start,
- increased clutch life,
- fuel saving in city usage,
- complete automatic control of clutch,
- transferable from one vehicle to another one,
- left leg free operation,
- can be switched on or off even while driving,
- available for all type of cars and light duty vans,
- crawls like an automatic transmission,
- No engine or gearbox modification,
- easy to use,
- cheaper than automatic transmission equipped vehicle.

We wish you to enjoy the ride on the road with less stress and more fun even in a very heavy traffic environment.

**Important notice:**

Clutch-matic is not able to replace the driver in any circumstances. The Clutch-matic will only relief stress from your left leg by semi-automatic clutch pedal operation. Please pay same attention to driving and traffic whenever you are using the installed Clutch-matic or not.

Before the installation you might want to consult with your vehicle dealer or mechanics in order to get familiar with your vehicle and its functionality.

**PLEASE MAKE SURE THAT THE CURRENTLY INSTALLED VEHICLE'S CLUTCH SYSTEM IS FUNCTIONAL PROPERLY ACCORDING TO THE MANUFACTURER SPECIFICATION. A WEAR OR TEAR OUT CLUTCH SYSTEM MIGHT CAUSE MALFUNCTION OF CLUTCH-MATIC PRODUCT!**

Installation of accessories (such as tempomat, fog lights, Clutch-matic, parking assistants etc.) to a vehicle within the guarantee period might cause termination of factory guarantee. Please consult with your vehicle dealer and guarantee terms and conditions. With the installation of this system you accept automatically without any further written notification that might your factory guarantee terminated and any further damage or loss due to the termination of factory guarantee can not be liable of Clutch-matic manufacturer or its representatives.

The installation of Clutch-matic system requires some extent of electrical and mechanical knowledge therefore for any personal or vehicle damage done during the installation by user due to misinterpretation of this document or lack of mentioned knowledge, the Clutch-matic manufacturer and its representatives can not be responsible.

If you follow the detailed installation instruction, you will not face any part damage. However in case of any uncertainty, please feel free to contact with our technical support or sales representative or any car dealer, repair shop, garage to get proper instruction how to proceed and avoid any installation failures.

**LIMITED WARRANTY**

Zodorlex warrants to the owner of this product that the Zodorlex Clutch-matic is free from defects in design, materials and workmanship for a period of one(1) year or 25 000km whichever is earlier reached from the date of original purchase. If this Clutch-matic system fails to function properly when used as directed under normal conditions, within the one year period or 25 000km whichever is earlier reached, Zodorlex will either repair or replace the product at our option free of charge excluding cost of return to Zodorlex or its representatives and cost of installation or removal from your vehicle. Send the defective product to the manufacturer or its representative with postage prepaid.

The product must be accompanied by a proof of purchase, either a bill of sale, receipted invoice, or other proof that the Clutch-matic system is within the warranty period, Zodorlex will bear the cost of repairing or replacing the product and shipping it back to you excluding customs clearance fees which to be borne by the sender(customer).

Zodorlex reserves the right to refuse warranty service if the above information has been removed or changed after the original purchase of the Product.

If the product is not covered by warranty, regular charges of the manufacturer or of its representative will apply. In this case shipping charges and customs clearance fees to be borne by the sender.

The warranty does not cover any failure of the product due to normal wear and tear, or software or hardware modification or adjustment, acts of God or damage resulting from impact, sand or liquid.

This warranty does not apply to a product that has been damaged as a result of improper installation, maintenance, accidents, improper voltage supply or other misuse. The warranty is also void if the owner repairs or modifies the product in any way. Zodorlex is not liable for any incidental or consequential damages of any nature whatsoever, including but not limited to lost profits or commercial loss with regards to this product. The warranty also excludes any liability other than what is stated above. No other warranties are given.

Always obtain a quotation for service charge, and only after you accept the quoted service charge, instruct the service to proceed the servicing.

**LEGAL RIGHTS VARY FROM COUNTRY TO COUNTRY. SOME COUNTRIES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU. WE ARE NOT IN ANY WAY RESPONSIBLE FOR ANY OUTCOME RESULTING FROM USE OR INSTALLATION.**

**Abbreviation:**

RPM – Revolution per minute

**Introduction, Usage:**

The Zodorlex Clutch-matic system provides relief from manually operating the clutch pedal of vehicles equipped with manual transmissions. This system is designed for drivers who want the convenience of an automatic but wish to retain the ability to operate the clutch manually for more spirited driving. It is also being used by persons with left leg or foot problem to allow driving manual transmission vehicles.

The semi-automatic clutch system operates parallel to the original clutch pedal functionality. At any time the clutch pedal may be used

as if the semi-automatic system were not exist. This can be done independently whether the semi-automatic system is switched on or not. TURN ON Main switch 1 and Main switch 2, turn ignition key ON position. System with short beep indicates stand by and ready to use.

When Clutch-matic system is activated. Pressing the gear shift knob push button will perform the same function like depressing the clutch pedal by left leg. Shift the gear by hand and release the push button. This operation is functional at any time the system is turned on. While driving, normal engine braking is available during deceleration.

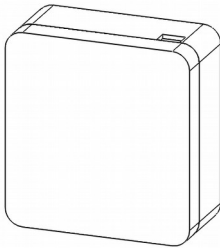
As brakes are applied, the clutch remains engaged until the engine RPM drops to about 1100 (adjustable). Then the clutch is automatically disengaged. When the brake is released, the clutch will begin to engage allowing the vehicle to crawl forward (or reverse depending on gear selection). As the engine RPM increases so does the clutch engagement. At about 1500 RPM(set by control unit), the clutch is fully engaged. Applying RPM quicker causes the clutch to engage quicker. With practice, any driving style is accommodated.

If foot brakes are applied and the vehicle completely stops, the gear shift knob push button is not necessary to be pressed so gear-shift to forward (1st gear) or reverse is possible.

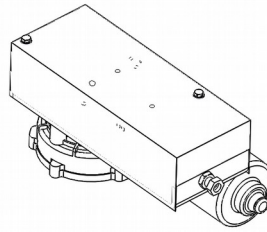
In case of greater slope, additional hand brake usage might be necessary for the safe hill start just like in case of manual clutch usage. In case of downhill start, the clutch will be fully engage after the brakes are fully released and the vehicle starts moving with 10km/h. It remains engaged as described above to provide engine braking.

Please read carefully this manual. This installation manual will drive you through the necessary installation procedure step by step.

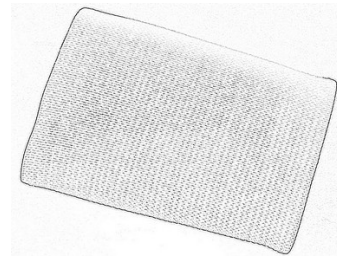
**Identification of Parts:**



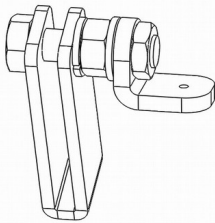
Control Unit (1)



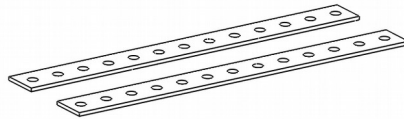
Actuator (2)



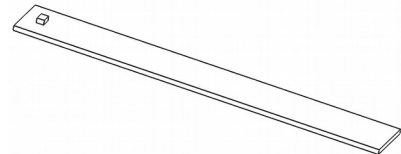
Gear knob strap(3)



Clutch pedal shackle (4)



3x mounting plate (5)



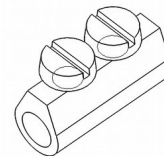
2x sensors (17)



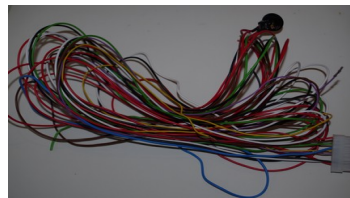
bowden cable(6)



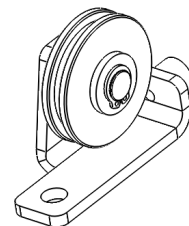
bowden case(7)



tie(9)



Cable harness (10)



Pulley (15)



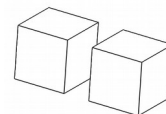
2x Main Switch (11)

- 1x M8x70 bolt
- 2x M8x25 bolt
- 3x M8 nut
- 3x M8 washer
- 2x M6x16 bolt
- 2x M6 nut
- 2x M6 washer

fasteners(12)



Gear knob switch(13)



2x magnets(16)

**Necessary tools and materials:**

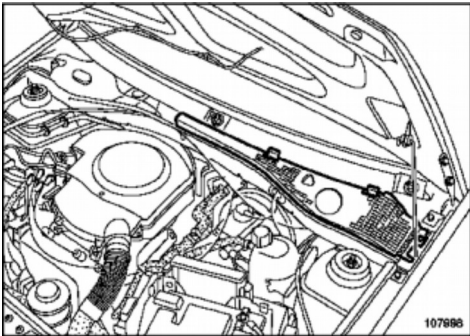
- Soldering station,
- Scalpel or equivalent (wire stripping) to access wires for soldering,
- Shrink tube or tape for wiring insulation,
- Loctite 243,480,326,9466 epoxy
- Wrenches,
- Screwdrivers,
- Vice or pliers upon demand to bend mounting plates(5),
- Voltmeter to measure voltage,
- Drilling machine with diameter 8 mm and 13 mm drills.
- Circular file,
- Measuring tape to measure distance,
- Saw

The installation contains the following major steps:

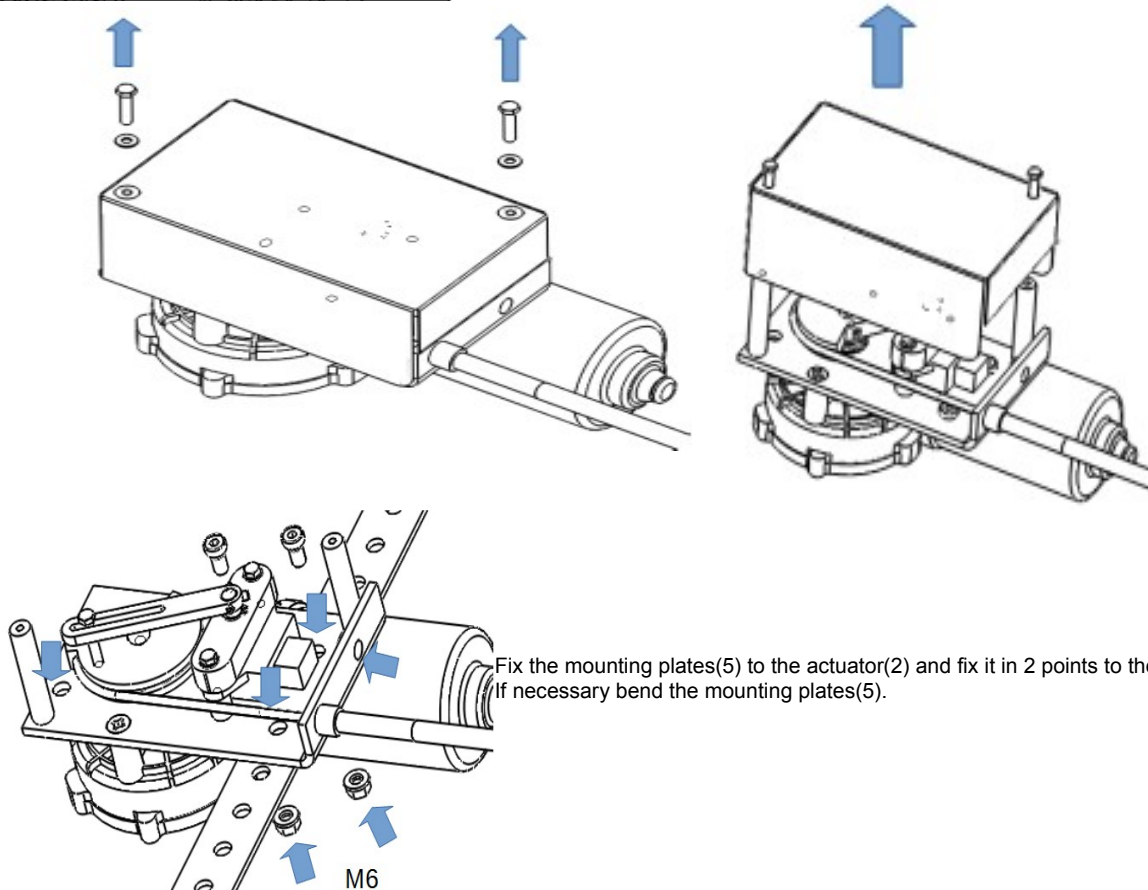
1. Mechanical Installation
2. Electrical Installation
3. Control Unit configuration
4. Workshop commissioning
5. Road testing

**1. Mechanical Installation:**

**Installing the Actuator(2) :**

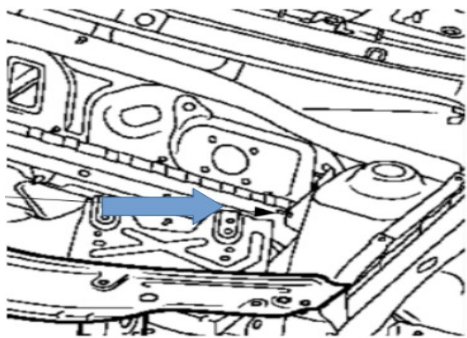
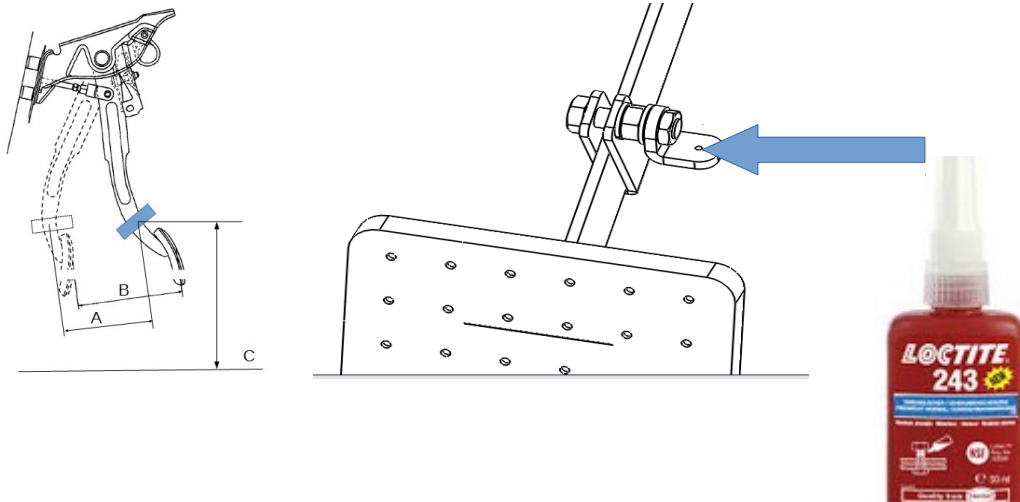


Open the bonnet and find a suitable place for the actuator(2).  
Optionally the actuator can be installed under the front seat in the compartment or in the trunk. In case of actuator installation to the compartment an accompanied noise from the actuator acceptable.

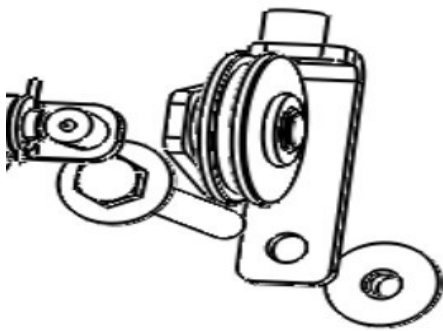


Fix the mounting plates(5) to the actuator(2) and fix it in 2 points to the vehicle.  
If necessary bend the mounting plates(5).

Fix the clutch pedal shackle(4) to the pedal with screws. Place the shackle accordingly: A: 8 cm , B: full travel of pedal C: installation height from the floor. Shackle can be installed on left and right side of the pedal as well.

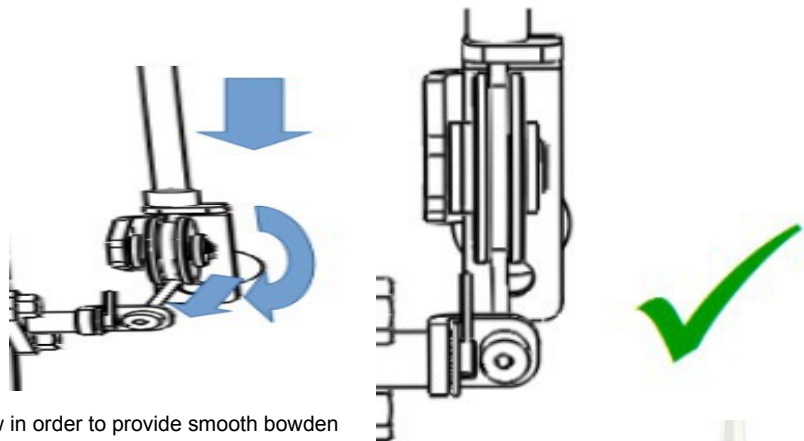


Find a hole on the vehicle firewall to lead through the bowden cable. If necessary drill a diameter 8mm hole on it to lead the bowden assembly through. If the actuator installed on the compartment bowden assembly can be lead under the carpet.



Fix the pulley(15) to the vehicle's floor with M8 bolt.

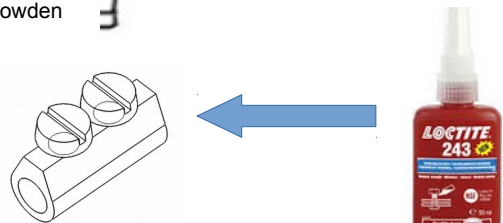
If there is not suitable hole to the fixation, drill a hole on the vehicle to fix it alternatively pop riveted nut (steel) can be used. Important: lead the bowden cable through the pulley as it shown on the figures that way that it shall run on it smoothly A twisted or bent bowden cable installation can lead to early failure of the cable or run out of it during operation. If necessary slightly adjust the clutch pedal shackle(4) to the cable. Alternatively glue pulley(15) to the floor with Loctite 9466.

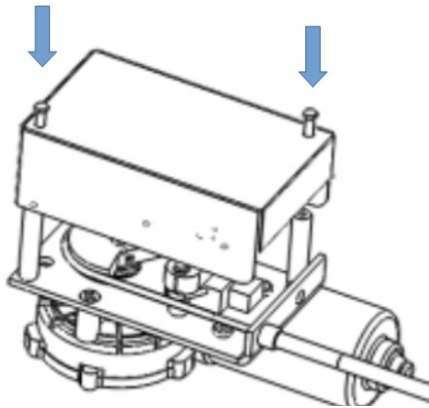


Lead the bowden cable according to the figures:

if necessary cut the length of the M8 bolt with saw in order to provide smooth bowden cable setting.

Fix the bowden end (8) to the bowden cable (6) tighten the screw and secure them with loctite 243

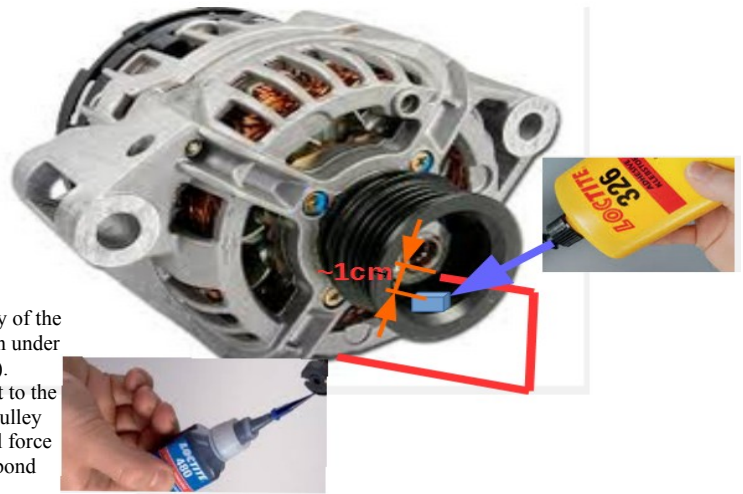




Bowden cable(5) shall not be loose.

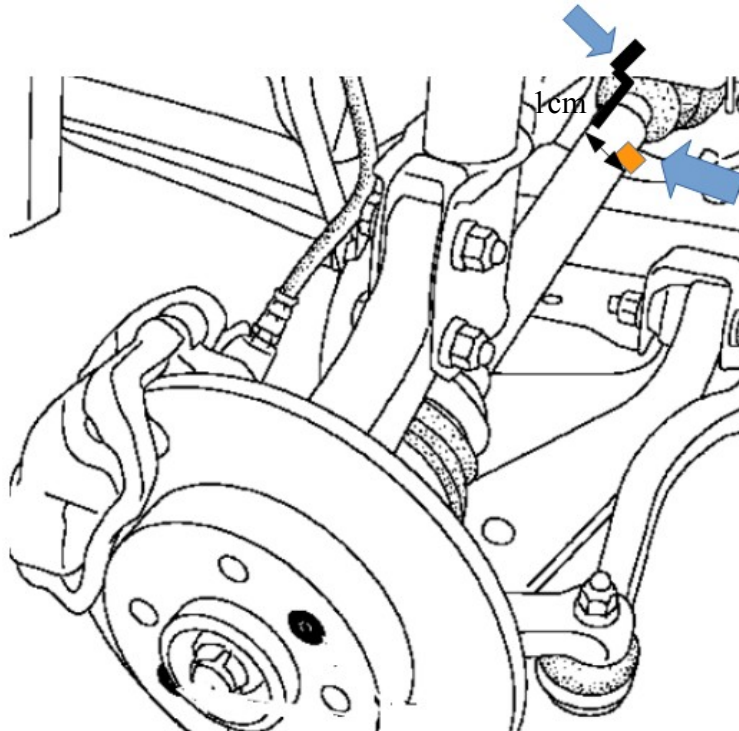
Bend and glue the sensor(17) to the generator case. Loctite 480, Alternatively screw the sensor to the generator or its frame if possible.(vehicle dependent)

**MAGNET COLORED SURFACE SHALL LOOK FOR THE SENSOR COLORED SIDE!!!**



Glue (Loctite 326) the magnet(16) to the pulley of the generator, that it can run under the sensor smoothly(17). Always glue the magnet to the internal surface of the pulley therefore the centrifugal force can not weakening the bond

If there is not place to fix the magnet on the generator pulley alternatively sensor and magnet can be placed in any other pulley on the vehicle's drive belt system. DO NOT install it to the crackshaft pulley!



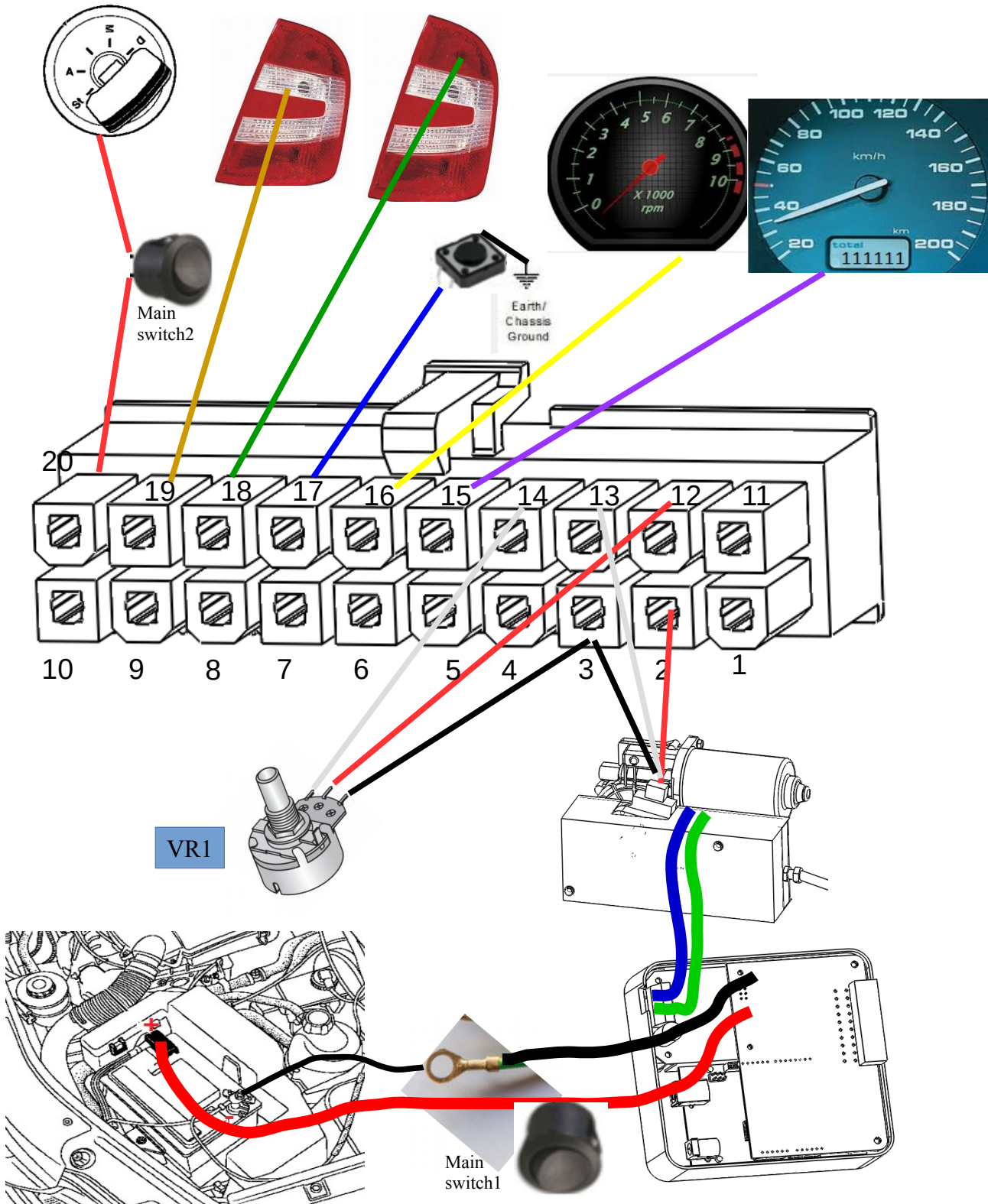
Bend and fix with glue (loctite 480) the sensor(17) to the gearbox housing that way that the magnet(16) (loctite 326) shall be placed on the output shaft. Distance under the sensor to the magnet shall be around 1 cm. If necessary clean the oxide from the output shaft to provide long lasting adhesive connection. If needed put flexible silicon or rubber band to the shaft to secure the magnet position. If applicable screw the sensor to the gear box(vehicle dependent)

**MAGNETS AFTER FIXED TO THEIR FINAL POSITIONS SHALL BE COVERED WITH EPOXY TO AVOID OXIDATION**

## 2. Electrical installation

Use the wiring diagram to wire the system together. If you are unsure regarding to finding a cable ask help of our technical support or find your dealership or car electrician.

### Wiring diagram for cable harness(10)



Recommended to install the cable harness(10) and the control unit(1) to the compartment. In an easily accessible point for the fine tuning.



Lead the actuator (2) red/white/black cables and the red cable from the vehicle accumulator to the compartment through a suitable hole. Alternatively drill a hole for it.

Find a suitable easily accessible place to the main switches(11). Fix the main switches to the dashboard. Lead the red cable of the switch2 to the cable harness (pin20).

Find the ignition ON cable on the vehicle(12V when ignition key turned to ON position) attach the free end of main switch2 to it by soldering or alternatively use the below cable terminal.

How: Take a scalpel or equivalent sharp knife and slightly remove the insulation from the wire around 3 mm long. Solder the cable to the cleared area to have a good solid contact. Insulate the soldered wires with tape or shrink tube.



Branching circuit terminal

Lead the actuator cables (black/white/red wires pin 2,3,13) to the actuator (2)and find the sensor wiring. Solder the wires together according to colour coding. Use shrink tubes for insulation. Black wire can be grounded.

Lead the blue and green cables from the control unit to the actuator's(2) motor and plug them together according to color code. If necessary insulate them with tape.

Lead the generator mounted signal cables (yellow, red, black)to the control unit(pin 16). Attach the cables according to color code. Black wire can be grounded to the vehicle.Red shall get 5V.

Lead the gearbox output shaft sensor cables (purple, red, black) to the control unit(pin15). Attach the cable according to color code. Black wire can be grounded to the vehicle. Red shall get 5V.

Find the brake switch on the vehicle attach the green cable to it(pin18). Alternatively bring the brake light signal from the back brake lights. If the brake light ON this wire shall supply 12V to the control unit otherwise 0V.

Find the reverse switch on the vehicle and attach the brown cable to it(pin19). Reverse switch can be found on the gear box or directly taken from the back lights. (12V)

Find a grounding points on the vehicle. There are plenty in the compartment under the carpet. Attach the black cable to it with nut.

Lead the red cable from the control unit to the accumulator and fix it to the positive pole with nut/bolt.

Fix the gear knob switch(13) to the gear knob. Use tape to position it to get easy access by hand during driving. Pull the gear knob strap(3) to hide it. Lead the cable to the control unit. Fix the black eye cable terminal to the vehicle to get grounding if it has not been attached to the cable harness



Gear shift skirt removal



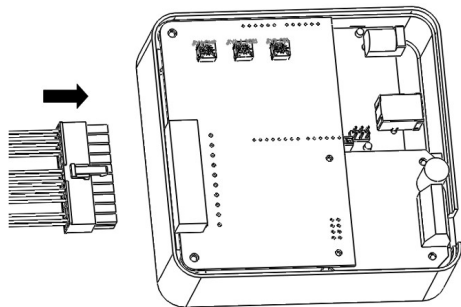
Hiding gear knob switch wiring under the skirt





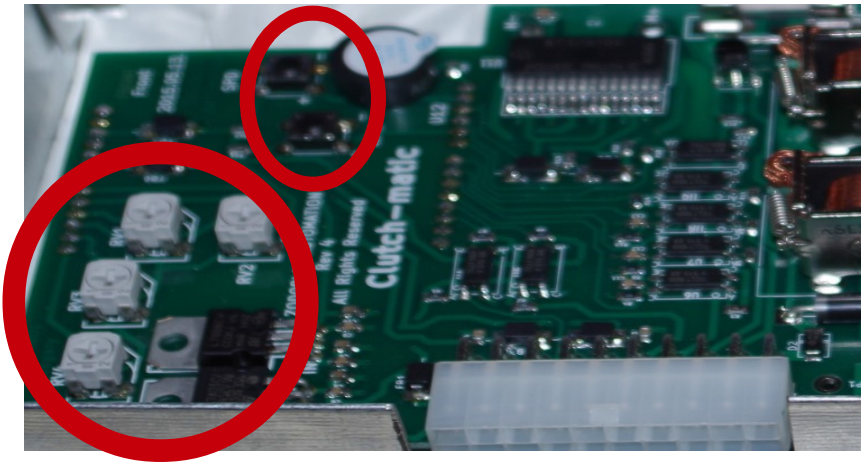
Locate a place to the VR1 potentiometer on the dashboard. It shall be easily accessible during vehicle operation to be adjustable it upon demand. Drill a hole 13 mm and fix it.

Attach the cable harness to the control unit(1)



### 3. Configuration of control unit

Turn the vehicle ignition key to ON. Start the vehicle engine. Turn on the Clutch-matic system with the main switches(11) Short beep indicates the control unit up and running. We supply the Control unit with a pre-configured conditions therefore only the VR1, RV4 and RPM, Speed(SPD) shall be set in the first trial.



VR1 – Mounted on the dashboard set the clutch engagement position. Turning it to Clockwise increasing the engagement. Counter clockwise reduce it.

RV1 - on Control unit adjust the sensitivity of control unit to engine. If the engine idle speed is not so smooth adjust it counterclockwise.

RV2 – Set the clutch engagement speed during start. It shall be adjusted in case of used, wore clutch disc where the discs springs can not provide smooth engagement of the clutch disc. Actually it can be used also to smooth the discs sudden engagements. If the clutch system operates normally e.g. new or not used set it completely counter clockwise. It can be used to fine tune up-hill start if it is too harsh.

RV3 – Set the engagement of RPM. Clockwise reduce the RPM engagement delay while counter clockwise increases it. Small gasoline engines with low torque request greater RPM engagement delay.

RV4 – Set the clutch pedal full pushed in position. Clockwise rotation reduce the clutch pedal travel. Counter clockwise rotation increase the clutch pedal travel. Important: Do not stress the system by setting the clutch pedal travel to large. It can cause damage of the Clutch-matic system.

ATTENTION FOLLOWING TESTS SHOULD BE DONE AWAY FROM TRAFFIC.

Adjustment of RV4 : Turn on the ignition key ON. Set the gear to neutral position. Start the engine. Push the brake pedal. The clutch pedal will move in according to the position of RV4. Set the RV4 counter clockwise until the clutch pedal is close to the full pressed in position. Try gear selection. If it hard. Adjust slightly counter clockwise on RV4 and retry it until the gear selection is smooth and light like in case of foot usage.

Adjustment of RV1: After successful adjustment of RV4 set the VR1 to full counter clockwise position. Start the engine. Push the brake pedal. Select gear 1st. Release the brake pedal. The clutch pedal will move up and stop in a halfway position according to VR1 settings. Vehicle might start crawling smoothly or remain stopped. Turn OFF and then ON the clutch-matic while set the VR1 slightly clockwise. Release the brake pedal. Repeat the process on smooth and plain road to set the desired crawling engagement position.

Push the gear knob switch the clutch pedal should move in then released at the VR1 set position.

#### **RPM SETUP:**

Start the engine and wait until the RPM idle stabilized and the engine warmed up to operating temperature(It is important if the commissioning in WINTER). During idle engine RPM push the RPM button 4 times. Shorter then a longer beep after the 4th press will indicate the idle RPM stored.

### 4. Road Test

For safety, the initial road testing should be done away from traffic. You must become familiar with the dynamics of the Clutch-matic system as you would do it with any new driving experience.

**ZODORLEX AUTOMATION**

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E-mail: [zodorlex@gmail.com](mailto:zodorlex@gmail.com) (Technical support)All Rights Reserved. Property of **ZODORLEX AUTOMATION**

1. Start the engine and wait until the RPM stabilized.

Turn on the Clutch-matic system with the main switches(11).

2. Push the brake pedal and select 1st gear.

3. Release the brake pedal.

4. The vehicle shall start crawling smoothly. If it is too harsh adjust VR1 slightly to counter clockwise. If the vehicle does not move adjust VR1 clockwise to set desired engagement position. If the engagement too harsh it can be fine tuned with RV1 on the circuit board similarly like in case of VR1.

5. Push the acceleration pedal. Vehicle starts moving continuously. If it is too harsh adjust RV2 on circuit board clockwise. If it too slow counterclockwise.

**SPEED SETUP:**

6. Increase the speed (without changing the gear gear) up to 15-20km/h. Push the SPD button 4 times. Short and a long beep indicates the speed signal stored.

6. Push the gear knob switch. Change the gear to 2nd and release the gear knob switch.

7. Drive the vehicle in a desired gear selection above 2000RPM. Push the brake pedal. Let the vehicle completely stopped. The engine will not stop and the clutch pedal will be pressed automatically at around the idle RPM.

8. Stop the vehicle select reverse gear.

9. Release the brake pedal.

10. Vehicle will start crawling smoothly. Pushing acceleration pedal vehicle will speed backward.

11. Stop on a hill side. Select 1<sup>st</sup> or Reverse gear and release the brake pedal. Push the acceleration pedal. Vehicle shall start move up-hill. If the RPM drops suddenly or engine stop adjust RV2 to until the hill start smooth.**CONGRATULATION!****You have now completed the installation and testing of the Clutch-matic system!****Maintenance:**

Check the bowden cable regularly. If there is a sign of wear out or wire cut. Replace it. Make adjustment of pulley and clutch pedal shackle to drive the cable smoothly through on them.

Check the fixation of pulley (15) after the first 100km. In needed re-tighten it.

Check the fixation of pulley(15) after each 10 000km. If needed re-tighten it.

Check the generator and gear box output shaft sensors and magnets. In case of presence of looses secure, re-glue them.

**Troubleshooting:**

Problem	Root cause	Solution
Gear knob switch does not functional	Switch damage, Wiring defect	Check switch and wiring, Fix it or replace it
Gear selection hard or impossible	Clutch pedal stroke too short.	RV4 shall be readjusted counterclockwise. Bowden cable end loosen, Re-tighten it. Re adjust it.
Vehicle does not move after brake pedal released	VR1 does not set correctly	Set VR1(on dashboard) clockwise (TURN ON/OFF)
Vehicle does not accelerate after accelerator pedal pressed.	RPM signal mismatch	Check Presence of sensor, Magnet, Reset Idle RPM with RPM switch (press it 4 times)
Clutch pedal engagement too slow during driving	Speed signal mismatch	Reset Speed signal at 15-20km/h with SPD switch.(press it 4 times) Check presence of sensor and magnet.
Control unit does not start	Loss of power	Check the wiring, Voltage, Switch, check fuse(16A), Check microcontroller contact to main electrical board(Unplug, Plug-in it)
Engine runs long before clutch engagement	RPM signal mismatch	Reset idle RPM, set slightly RV3 clockwise
Actuator does not functional	Loss of power, signal cable	Check wiring,
Bowden cable wear out, broken,	Improper bowden cable leading,	Set on the clutch pedal shackle(4), replace bowden cable diameter: minimum 1,5mm length minimum 2,1m .
Control Unit continuous beep	Motor cable issue, Contact issue	Check motor cabling, missing RPM or Speed reference values, reprogram them with RPM, SPD switches(4 times press)
Clutch pedal stuck in	Loss of power. Bowden cable loss, stuck	Immediately turn OFF the System with the main switches to avoid any damage in your vehicle or in clutch matic system.Stop the vehicle, Check cables, Wires, remove the bowden cable from the clutch pedal shackle to drive further with normal clutch pedal operation by foot.
Cable ran out of the pulley, Pulley on the motor in awkward position	Bowden cable mislead, overrun, motor position misread	Detach the motor cables from the control unit and attach 12V directly to the DC motor(red +12V, Blue GND) Motor will rotate counterclockwise, replacing the polarity on the motor cabling will rotate it clockwise. Check Motor encoder cabling for damage. Check bowden cable for permanenty deformation. If necessary replacing them. Check encoder arm lead screw M4x40mm if it is bent replace it.

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Herewith we declare that Clutch-matic product manufactured by our company is  
according  
the requirements of  
**UN ECE regulation 10.05.2014**

Model Type: M01

Test Report No.:28228536 001 (TÜV Rheinland InterCert Kft )