

THE BMW 3 SERIES SEDAN.

DIY PADDLE SHIFT RETROFIT

BMW EfficientDynamics
Less emissions. More driving pleasure.

MoKOrx

Paddle Shifter DIY Description

Installation instructions for steering wheel paddle shifters and wirings needed to connect paddle shifters to FEM (Front Electronic Module) on BMW F20, F30, and other applicable model. It also guides you to code the required code to activate paddle shift. The paddle shift part number for F20/F30 sport steering wheel or m sport is provided as well.





Brief component description:
Shift paddle left and shift paddle right

In addition to the sequential gear selection with the selector lever, the gears can also be selected using the 2 shift paddles on the steering wheel.

- Upshift: Pull the right shift paddle briefly
- Downshift: Pull the left shift paddle briefly

Functional description

Depending on the series and bus connection of the steering column switch cluster (SZL), the signals from the shift paddles are transmitted as follows:

The button signals and thereby the gearshift request are not processed in the steering column switch cluster but only conveyed.

The resistance-encoded signals are transmitted to the front electronic module (FEM) using direct lines. The central gateway module (ZGM) is integrated in the Front Electronic Module (FEM). It is seen as a control unit within the control unit, as the central gateway module (ZGM) acts as a self-sufficient control unit within the Front Electronic Module (FEM).

The electronic transmission control (EGS) receives the message through a bus signal on the PT-CAN.

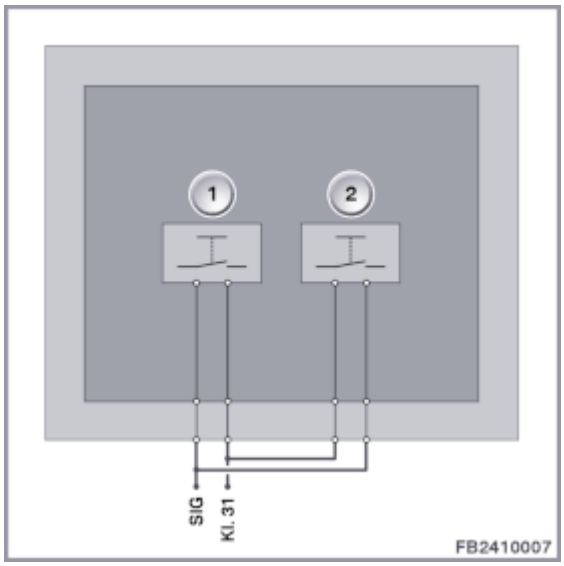
If the rocker switches are used to make a shift in selector-lever position D (D stands for Drive = Automatic transmission), the automatic gearbox switches to manual mode. If no gear is shifted within a time span of 6 seconds or there particularly high acceleration, the automatic gearbox returns to the automatic mode.



Item	Explanation	Item	Explanation
1	Left shift paddle: Downshift - pull briefly	2	Right shift paddle: Upshift - pull briefly

Structure and inner electrical connection

Each shift paddle has a 2-pin plug connection. The signals are resistant-encoded.



Item	Explanation	Item	Explanation
1	Left shift paddle (downshift)	2	Right shift paddle (upshift)

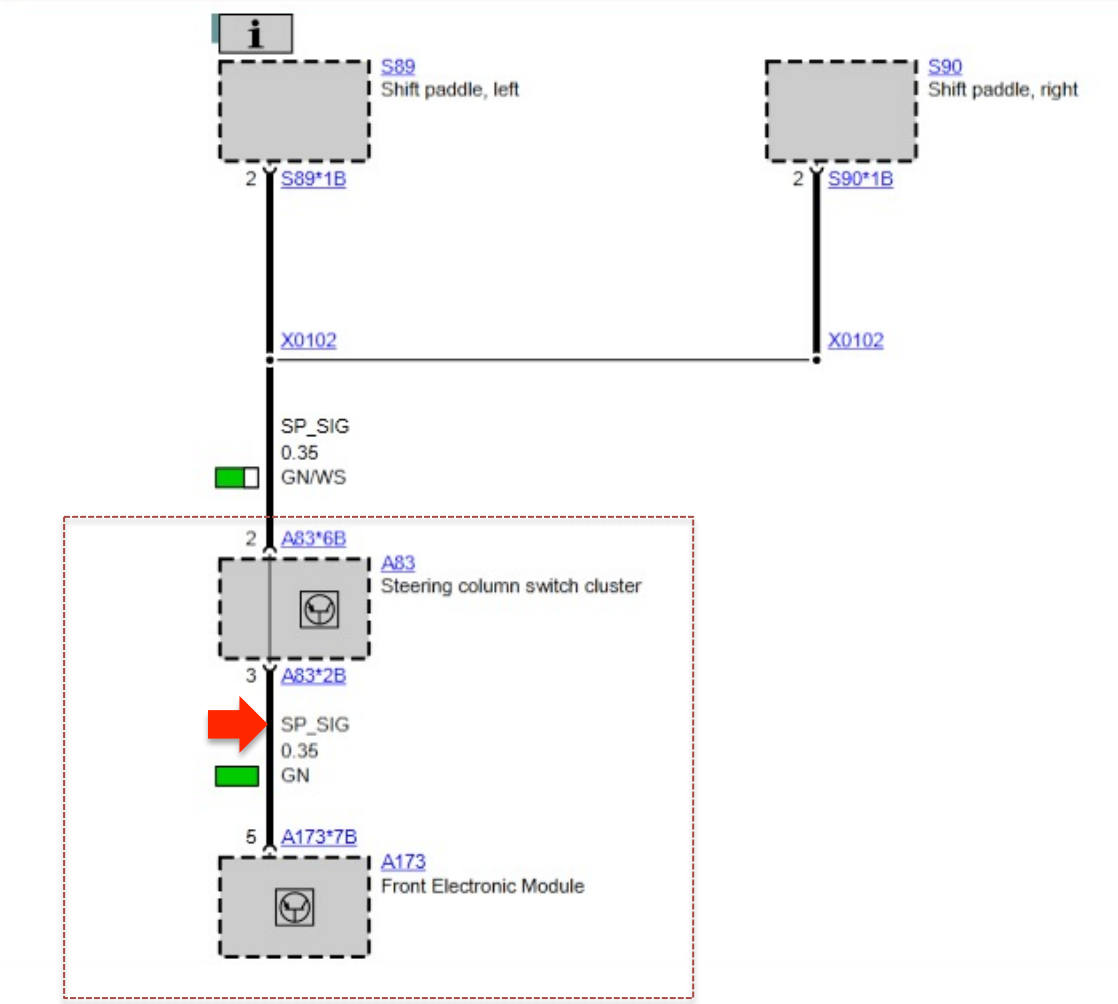
Pin assignments

Pin	Explanation
SIG	Signal line (upshift or shift down)
Kl. 31	Grounding cable

Nominal values

Wiring Diagram for Paddle Shift

Note that one wire is missing for most F20 and F30 car which sends a dedicate paddle shift signal from SZL (steering column) to FEM (front electronic module). The required wire is indicating by red arrow.



Part required:

1. BMW OEM Steering paddle shifters and screws

Sport leather steering wheel



No.	Description	Supp.	Qty	From	Up To	Part Number	Price	Notes
i	For vehicles with Sport automatic transmission	S2TBA=Yes						
01	Set of shift paddles		1			61319242983		
02	Saucer-head screw	4X14MM	2			32306769431	$0.70	



PN: 61319242983

OR





PN: 61317847210

Note that m-sport paddle shifter may have different resistance value which the CAN-BUS use to identify the unit. You may have to modify the resistors to work properly. The symptom of the wrong resister is – shifter shit up instead of down and the + shifter does not work. Some people just swops the circuit from normal shifter to m-sport shifter.

2. Pins for connect FEM (Front Electronics Module) to SZL (steering wheel column switches)

BMW PN: 61130005197 (Bushing contact) need 2 units.





3. Wiring harness for paddle shifts and other multi-function switches

BMW PN: 32306854769





Tools required:

1. Flat head screw driver
2. Torx screwdriver T10, T20



1. Block wrench 7, 8, 10, and 16 mm
2. Computer with esys installed
3. OBD/Ethernet cable



4. Electrical wire awg 22 approximately 2.5 meters.
5. Cloth fabric electrical tape



Installation Instruction for Paddle Shifters:

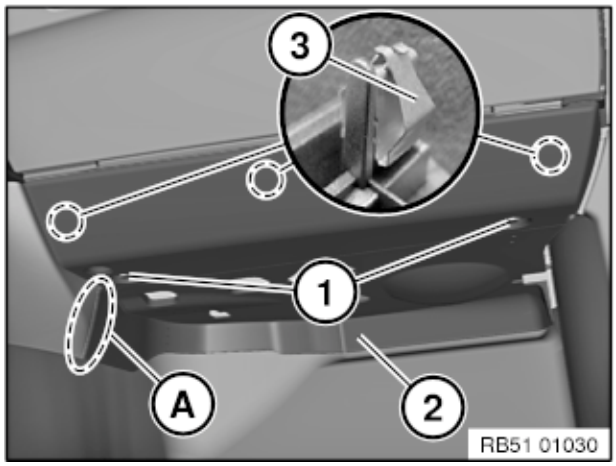
There are two ways to remove air bag. I recommend to remove air bag using the below method as it is easier plus it will not leave any mark on the steering wheel. This method is from YouTube as the link here http://www.youtube.com/watch?v=sRnxGSAHNNY . The BMW method is in the appendix, if you desire to do that way.



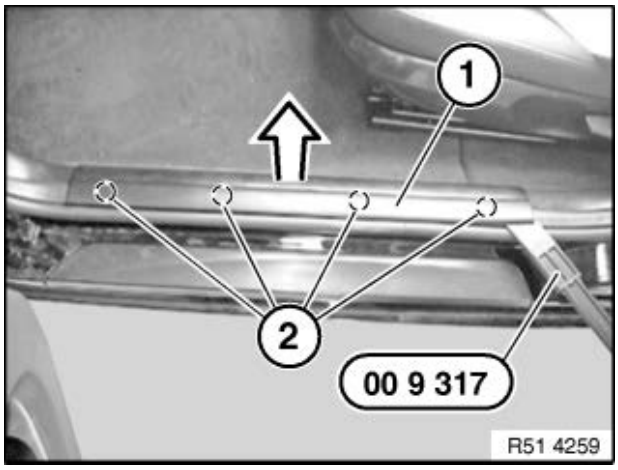
Disconnect negative battery terminal.

Loosen nut (1).
Important!
Do not under any circumstances use force to pull off negative terminal.

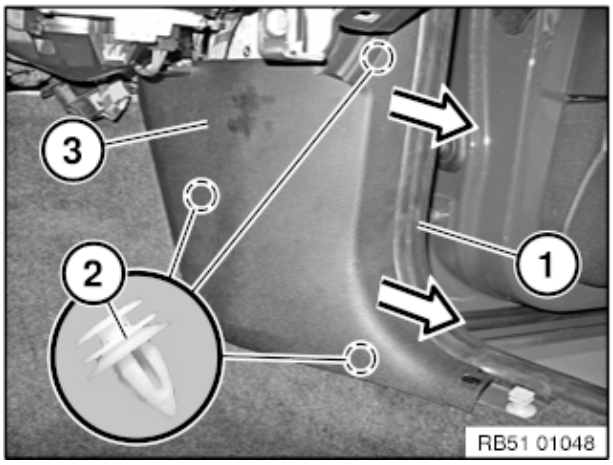
Pull off battery earth lead with IBS in an upwards direction, place to one side and secure.



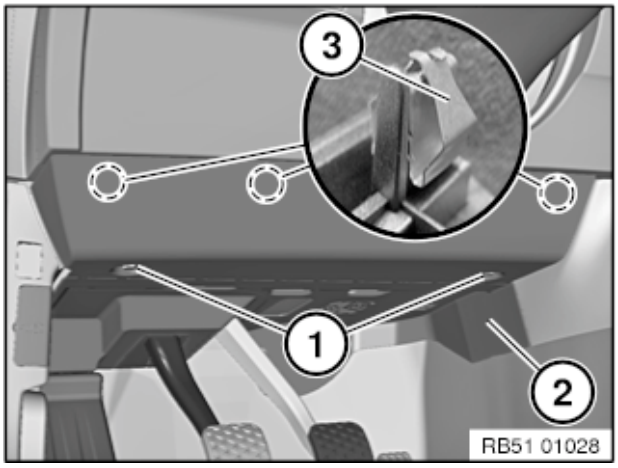
Remove trim panel under glove box
See Appendix IV



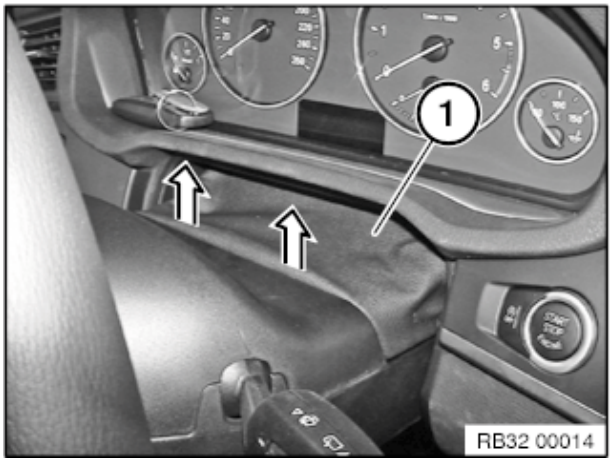
Remove door sill on passenger side
See Appendix V



Remove passenger side kick panel
See Appendix VI

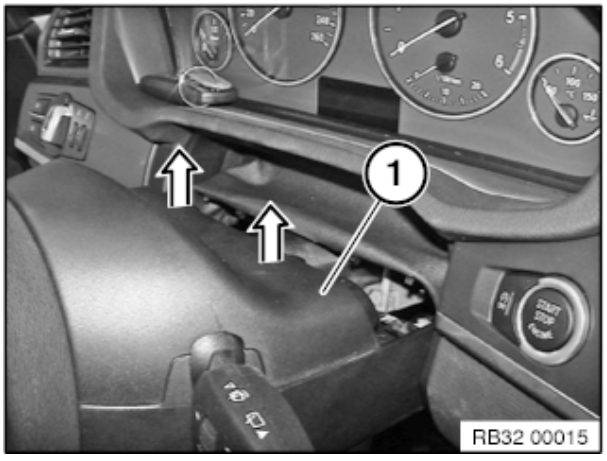


Remove trim panel for pedal mechanism
See Appendix VII

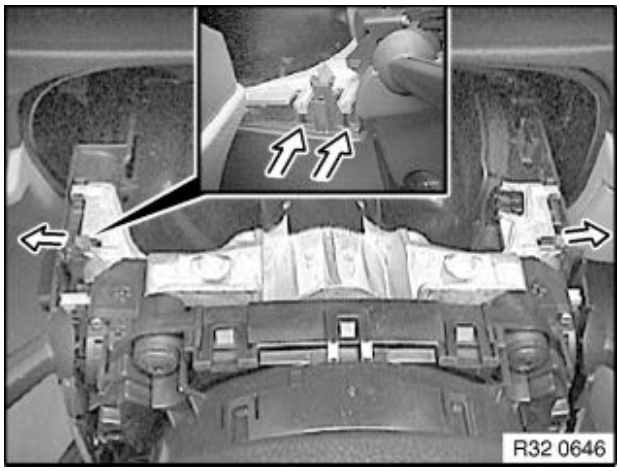


Removing upper section of steering column shroud

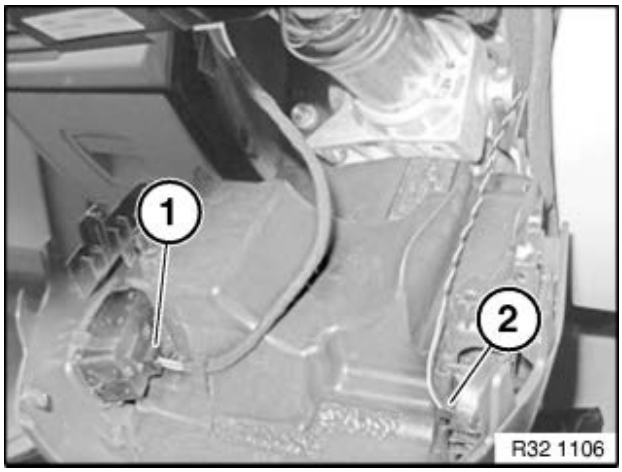
Move steering column in "bottom" and "extended" position.
Pull steering column gap cover up carefully and clip out gap cover.



Pull steering column shroud (1) up.
Clip steering column gap cover (1) out of steering column shroud upper section.
Important!
Risk of damage!
Carefully pull steering column shroud upper section (1) upward at rear and clip out.



Press retaining lugs outwards a little and unclip steering column shroud downwards.
Installation note:
Align steering column shroud by means of retaining lugs to steering column and press up as far as it will go.
Press steering column shroud on both sides together a little and then press upwards completely until retaining lugs snap into place.
Check installation position, correct if necessary.

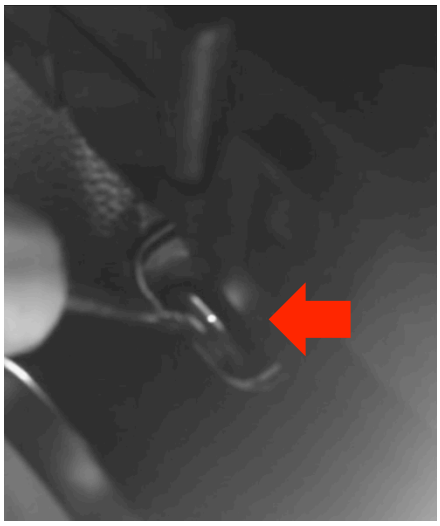


Tilt steering column shroud in downward direction.
If necessary, unlock plug connection (1) on steering column adjustment switch and (2) emergency starting aerial and disconnect.
Remove lower section of steering column shroud.

It is easier to remove the antenna from the shroud than pull the connector!

Turn steering 90 degrees to as illustrated





Look back to the steering wheel from behind underneath steering column for the air bag hook as the picture below and use flat head screwdriver to pry the hook and pull the air bag up on same side. Once the air bag is release continuing on the other side above the steering column to get the air bag release from both hooks. After remove airbag turns steering back to normal position.

See Appendix III

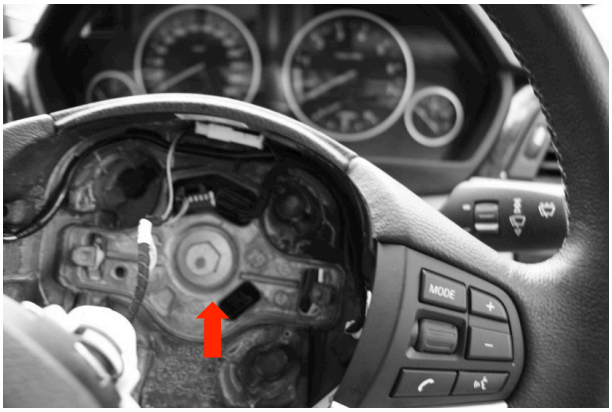


Warning!
Danger of injury!
The airbag unit may only be set down with the airbag itself facing up.



Disconnect airbag and multifunction steering switch electrical connectors from the steering wheel.

Remove the air bag and put it in an open space with BMW logo facing up.



Turn steering wheel back to zero degree position. Remove the steering wheel. It is hold down by one 16 mm bolt.



Important!
Move wheels into straight-ahead position and do not alter this position during the repair work.
Do not under any circumstances turn the steering column switch cluster when the steering wheel is removed.



Remove the steering column cluster (SZL). It is hold down by four nuts. Unplug all connectors from the back of SZL.

See Appendix VIII



Additional pin requires at SZL (Steering column cluster)

a. Find connector A83*2B and remove the housing
b. Locate slot on A83*2B Pin#3 (see appendix)
c. Insert connector pin 61130005197 to A83*2B Pin#3 make sure that it seat properly

Install A83*2B housing back to the connector

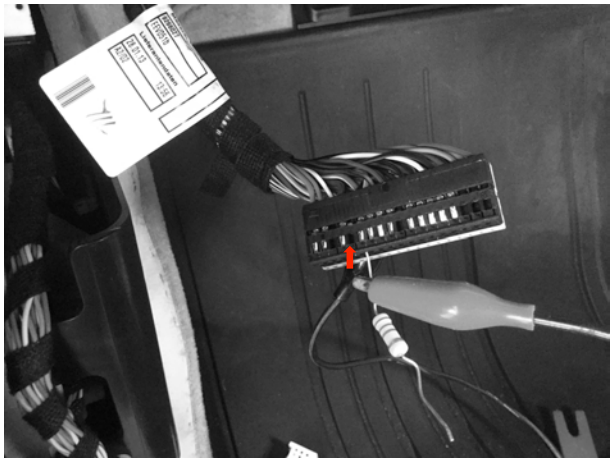
See Appendix I & II



Additional pin requires at FEM (Front Electronic Module)

Find connector A173*7B and remove the housing

See Appendix I

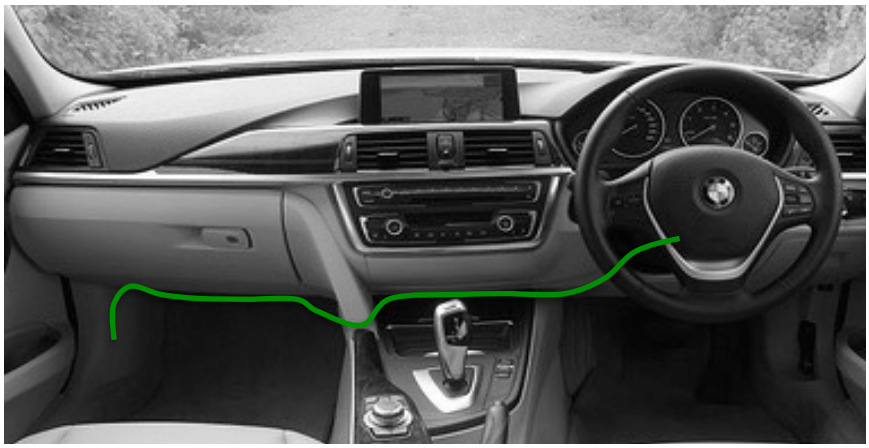


Locate slot on A173*7B Pin#5 (see Appendix I)

Insert connector pin 61130005197 to A83*2B Pin#3 make sure that it seat properly

Install A173*7B housing back to the connector

See Appendix I & II



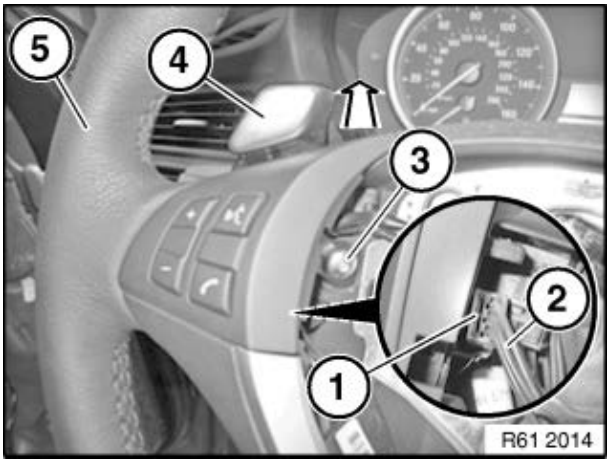
Route wire from SZL to FEM use cloth fabric tape to preserve the look of original wiring harness.

Connect the wire to connectors A173*7B and A83*2B wires

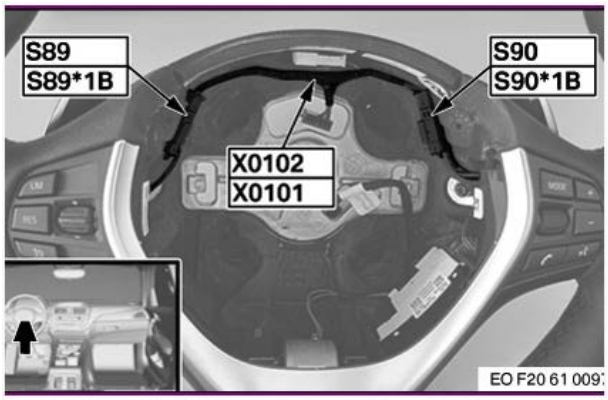


The sport steering wheel 255 has two types. One with pre-cut/drill holes for paddle shift installation. The other you will need to cut and drill holes to install paddle shifts. See pictures for reference of pre cut OEM.

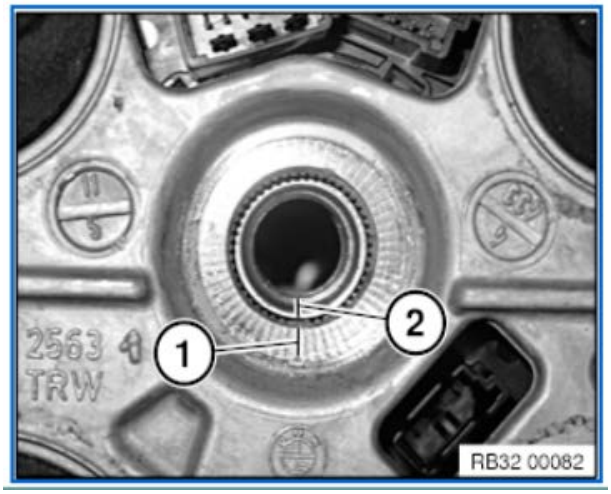
See Appendix X for mounting hole preparation



Make sure shift paddle for automatic transmission (4) is correctly seated on steering wheel (5)
Make sure wiring harness (2) is laid exactly.



Route the new wiring harness with paddle shifters connectors neatly.



Reinstall the steering wheel back to the steering column.

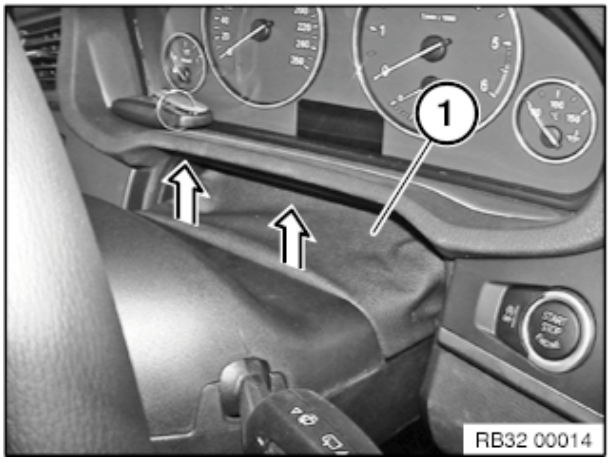
Note that there are alignment marks on both the column and the wheel (1 and 2)

Reinstall the bolt and tighten to specific torque requirement.



Reconnect the connectors for multifunction switch and air bag and install air bag back by pushing it in until you hear a snap.

Check to make sure that air bag is secured firmly and press the horn button to check that there is nothing blocking the movement.



Assemble back the steering column shroud and aerial.

Reinstall the steering gap cover.



Move steering column to the normal driving position.



Reconnect negative terminal. There might be a small spark; that is normal.

Prolong disconnect of battery may generate check control fault.

"Increased battery discharge when stationary. Electrical consumers were temporarily switched off"

Just drive to fully charge the battery. It should go out after two charge cycles.

Press start and check the followings:



Illumination lights on multifunction steering switch

Check the audio control, horn

Check for any fault from the instrument panel. Should be none!

Check wiper and turn signal operation



Start coding
See Coding section for detail

Coding:

Before you do this coding you must already know how to do coding, please search Google on how to do or where to get the esys software/cable. I only let you know the step and ECU to do FA/VO coding or FDL coding.

Steps in coding paddle shift function only without 2TB

1. Launch esys and connect to your car
2. Select expert mode
3. Read and activate FA
4. Read SVT
5. Go to FEMBODY (CAFD 794)
6. Read CAFD
7. Edit CAFD at
    a. FEBBODY
        i. 3190 PADDLE_VERBAUT from nicht aktiv to **aktiv**
    b. Save
8. Select expert mode and coding
9. Code FDL
10. Disconnect esys and turn off the car

Steps in coding to get paddle shift and sport+ (2TB Sport Auto Transmission)

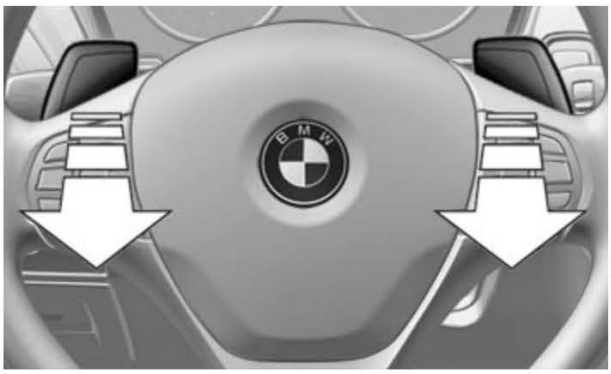
11. Launch esys and connect to your car
12. Select expert mode
13. Read and activate FA
14. Change FA from 205 to 2TB
15. Calculate FP and save
16. VO code
    a. FEM_BODY
    b. ICM
    c. KOMBI
    d. EGS
17. Disconnect esys and turn off the car
18. Reset your car time as coding KOMBI reset time to default 00:00

FA and VO code 2TB will have Sport+ and Sport Automatic Transmission



Testing:

1. Start the car
2. Put the transmission to “D” and continue to press the brake pedal
3. To check gearshift by paddle shifters and monitor the gear indicator on instrument panel, just initiate the paddle pull. The transmission can be in any mode (D, DS, or manual). The gear position indicator should indicate correctly per the input from paddle shifter + or -.
4. **You all set! Consult owner manual for full detail of paddle shifters procedure and precaution (see below).**



Shift paddles on steering wheel enable fast gearshifting without taking hands off steering wheel.

- Change up: pull right shift paddle briefly.
- Change down: pull left shift paddle briefly.
- Change down to lowest possible gear: give left shift paddle a long pull.

Gear changes are only done with the suitable engine and travel speed, for example, there is no change down with too high an engine speed.

The gear selected appears briefly on the instrument cluster, followed by the gear currently in use.

If you switch gear with the shift paddles whilst in automatic mode, the vehicle switches to manual shift mode briefly.

If selector lever remains in selector lever position D, change to automatic operation is possible:

- Give right shift paddle a long pull.

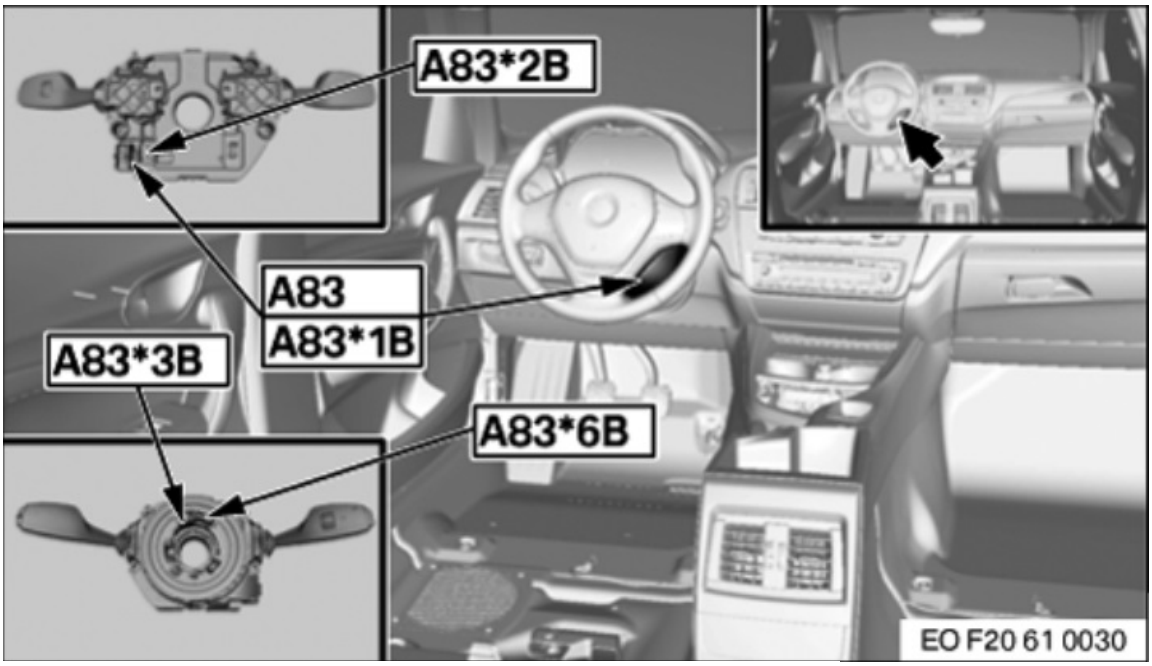
Or

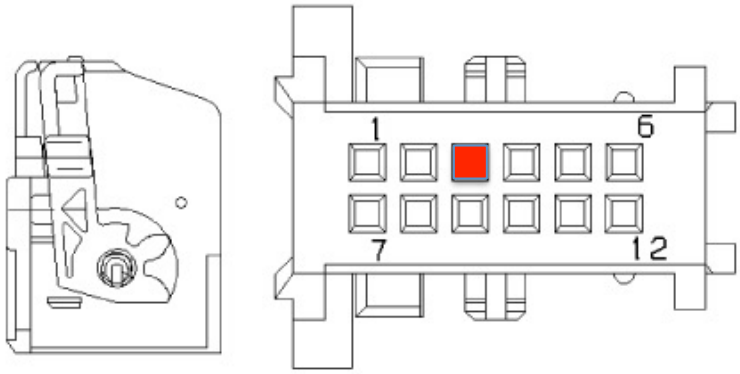
- In addition to briefly pulling right shift paddle, briefly pull left shift paddle.

System reverts to automatic operation from manual operation after a certain period of time without acceleration or gearshifts using shift paddles.

Appendix

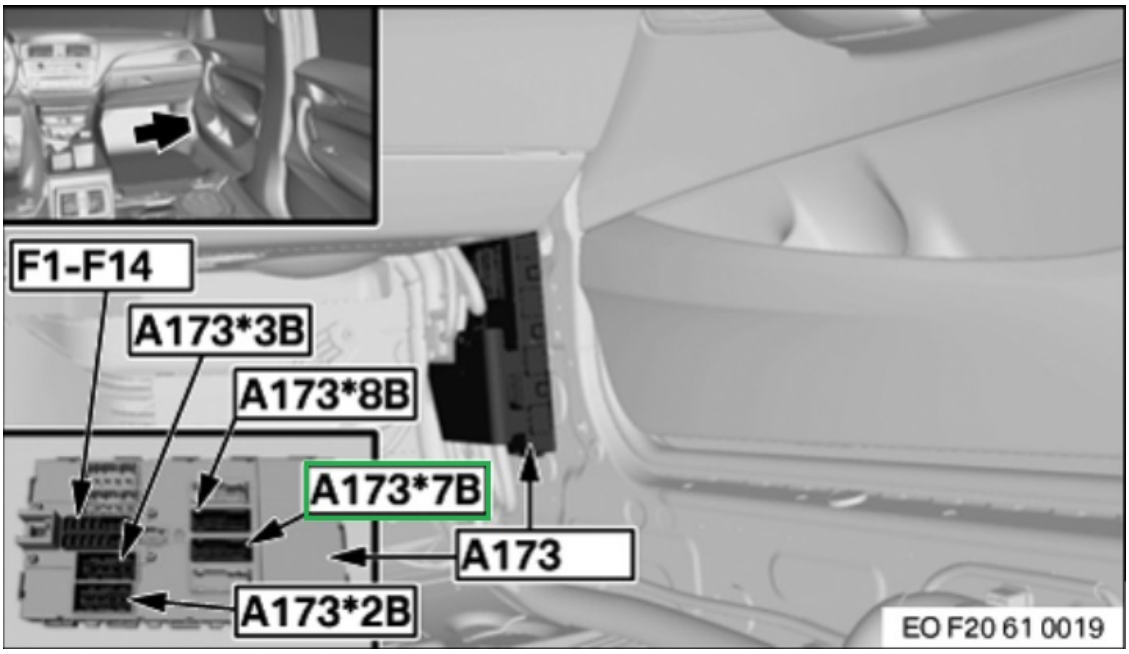
Appendix I: Connectors and pin assignments A83*2B & A173*7B





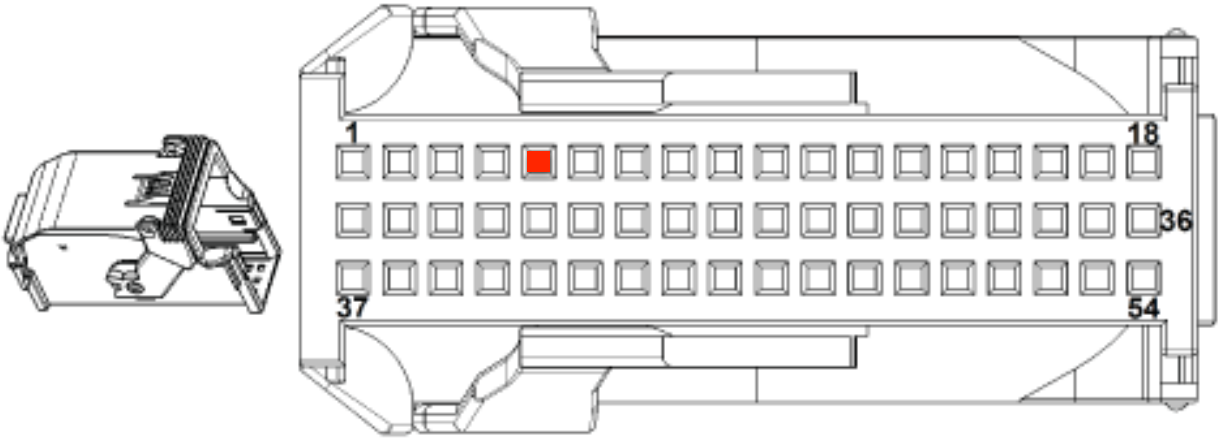
Pin assignments at plug connector A83*2B

Pin	Type	Description /Signal type	Connection /Measuring information
1	--	Not used	
2	--	Not used	
3	A	Signal Shift paddles	Front Electronic Module
4	--	Not used	
5	--	Not used	
6	--	Not used	
7	M	Ground	Front Electronic Module
8	--	Not used	
9	E	Power supply, terminal 30F	Fuse F10
10	--	Not used	
11	E/A	LIN bus signal	Front Electronic Module
12	E/A	LIN bus signal	Front Electronic Module



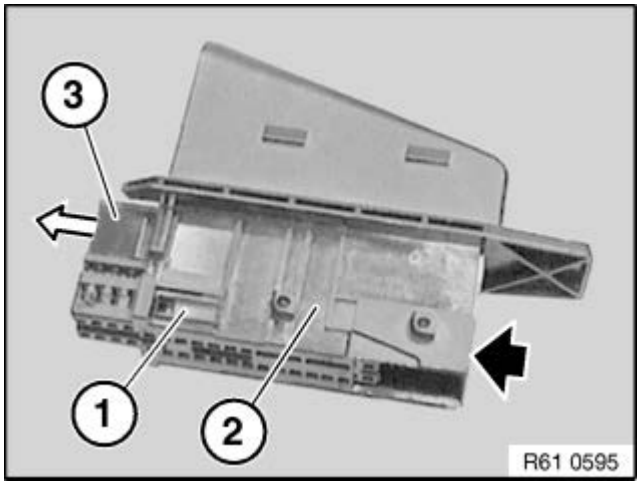
Pin assignment for A173*7B

Pin	Type	Description /Signal type	Connection /Measuring information
1	A	Power supply, terminal 30F	Heating/air conditioning system
2	A	Locator lighting	Heating/air conditioning system
3	--	Not used	
4	M	Ground	Heating/air conditioning system
5	E	Signal Shift paddles	Steering column switch cluster
6	M	Ground	Steering column switch cluster
7	A	Power supply, terminal 30F	Steering column switch cluster
8	E/A	LIN bus signal	Steering column switch cluster
9	E/A	LIN bus signal	Steering column switch cluster
10	M	Ground	Steering column switch cluster
11	M	Ground	Electric steering lock
12	A	Supply, terminal 30	Electric steering lock

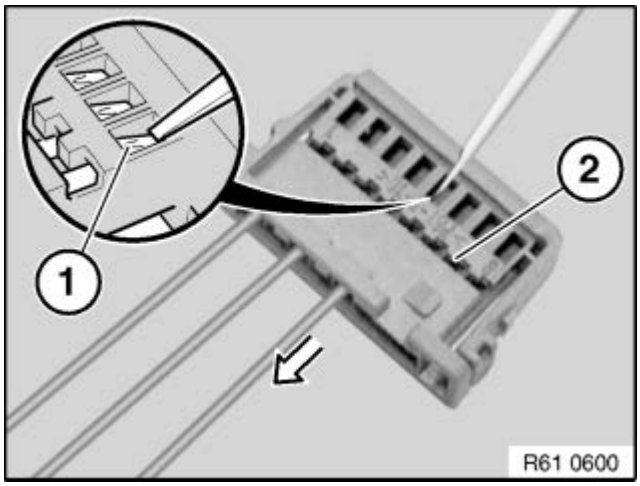


Appendix II:

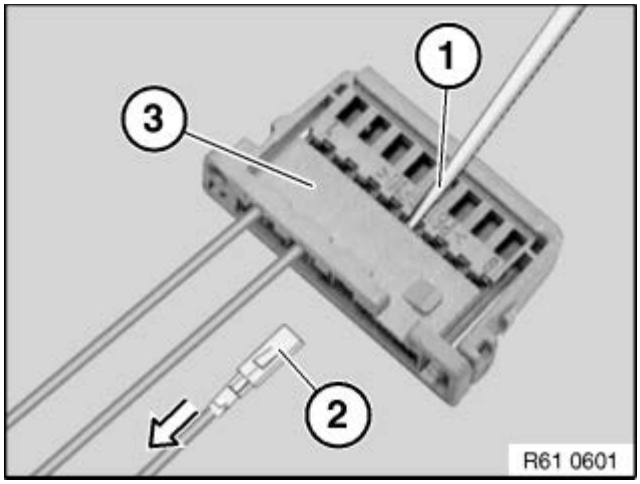
Connector housing and connector pin removal and installation



Socket housing:
Raise lock (1) on housing (2).
Push contact carrier (3) out of housing (2).
Note:
Pushing out the contact carrier releases the secondary locks of the socket contacts.



Hold down retaining hook (1) of socket contact in opening of contact carrier with a small screwdriver. Pull wire with socket contact in direction of arrow as far as secondary lock (2).



Hold down retaining hook in secondary lock (1) again and pull cable with socket contact (2) completely out of contact carrier (3).

Appendix III:

Removing and installing/replacing airbag unit



Warning!
Observe the following instructions to avoid any risk of injury by the airbag unit.

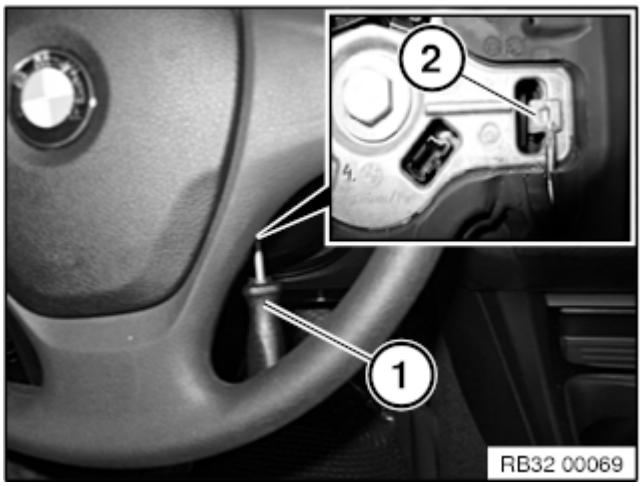
- Comply with safety regulations for handling components with gas generators.
- Do not exert any force on the airbag unit.
- Use only specified tools for releasing the airbag unit.

Note: Incorrect handling may result in triggering of the airbag unit and thereby cause serious injury.

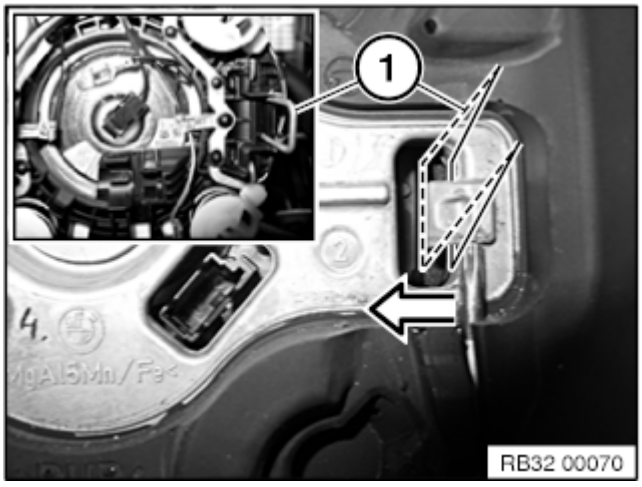


Necessary preliminary tasks:

- Disconnect battery earth lead



Insert Torx screwdriver T20 (1) vertically into the concealed opening until limit position (2) can be felt. Pull Torx screwdriver (1) approx. 2-3 mm out of opening. Press screwdriver handle towards middle of steering wheel and simultaneously slide into opening to position Torx screwdriver behind retaining spring bracket (refer to graphic below)

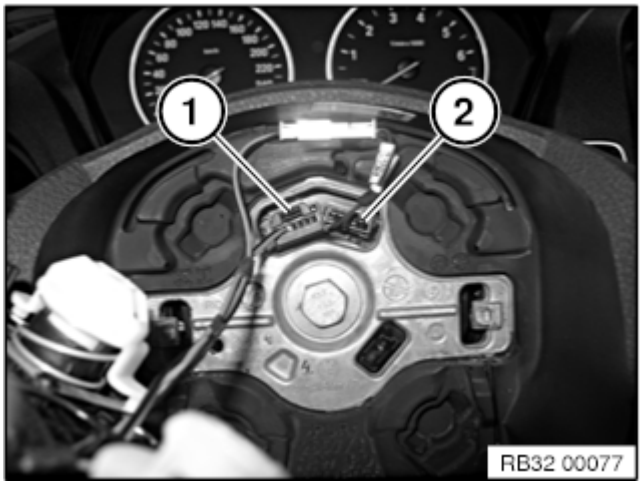


Press retaining spring bracket (1) of airbag unit inwards and simultaneously pull airbag unit upwards until it unlocks.
Repeat procedure on other side.
Installation note:
Snap airbag unit with uniform pressing force plane-parallel in direction of steering column shaft into steering wheel.

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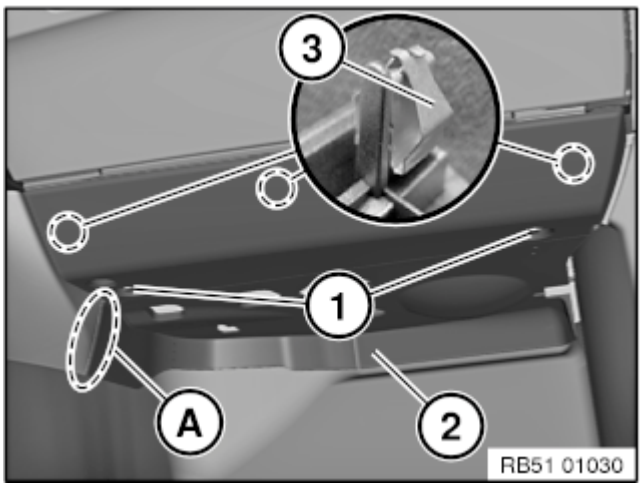
Warning!
Danger of injury!
The airbag unit may only be set down with the airbag itself facing up



Tilt airbag unit forwards.
Disconnect plug connections (1) and remove airbag unit.
Installation note:
Make sure electrical leads are correctly positioned.

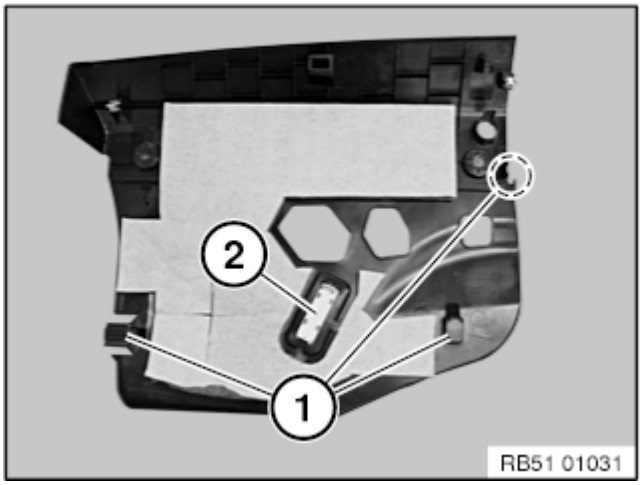
Appendix IV:

Removing and installing instrument panel trim under glove box



Unfasten screw connection (1).
Note:
Version with knee airbag: Unscrew nuts (1).

Tightening torque 51 45 9AZ.
Release trim panel (2) at clamps (3).
Feed out trim panel (2) in area (A) toward the bottom.
Lower trim panel (2) slightly and disconnect plug connections behind it.
Installation note:
Feed in trim panel (2) in area (A) correctly behind the center console.
Clamps (3) must not be damaged.

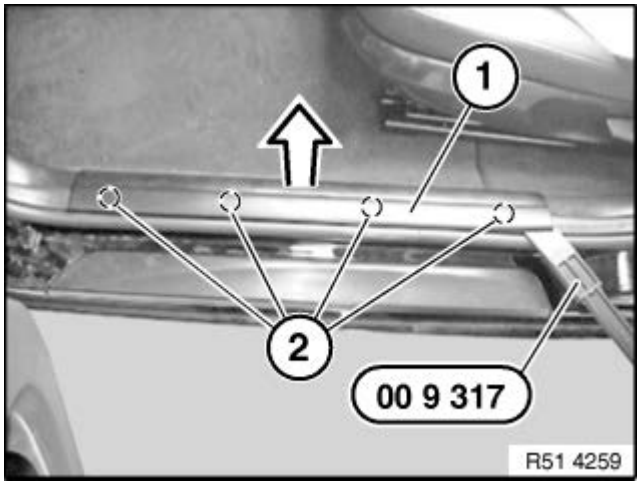


Installation note:
Guides (1) must not be damaged or missing.
Feed guides (1) correctly into the corresponding holders on the vehicle.

Replacement (depending on version):
Remount foot well light (2).
Remount power socket.

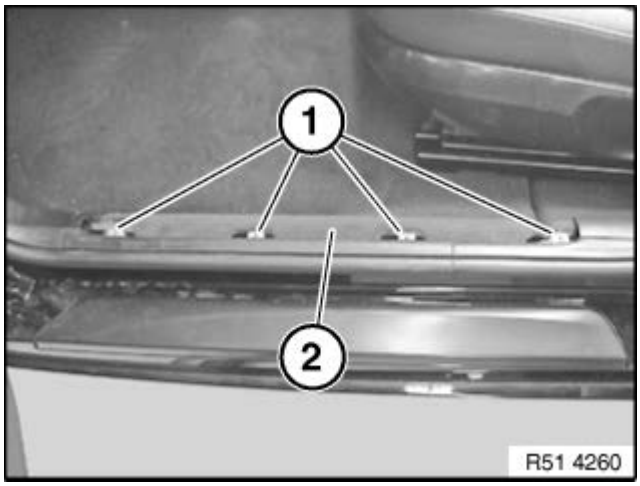
Appendix V:

Removing and installing front door sill

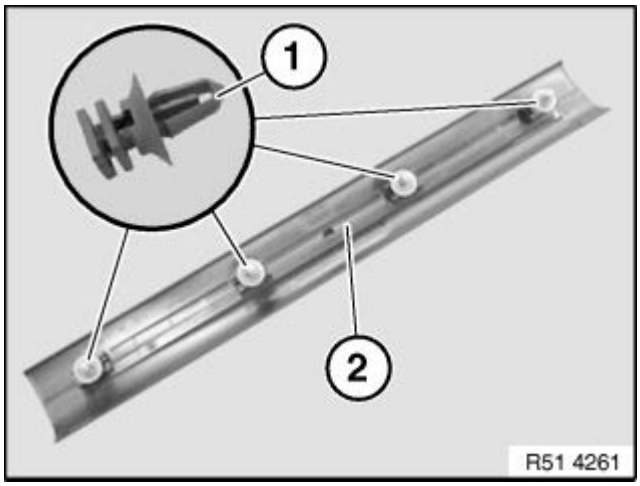


Important!
Do not raise doorsill cover strip (1) over entire length simultaneously.

Unclip rear doorsill cover strip (1) from clips (2) starting from the rear with special tool 00 9 317.

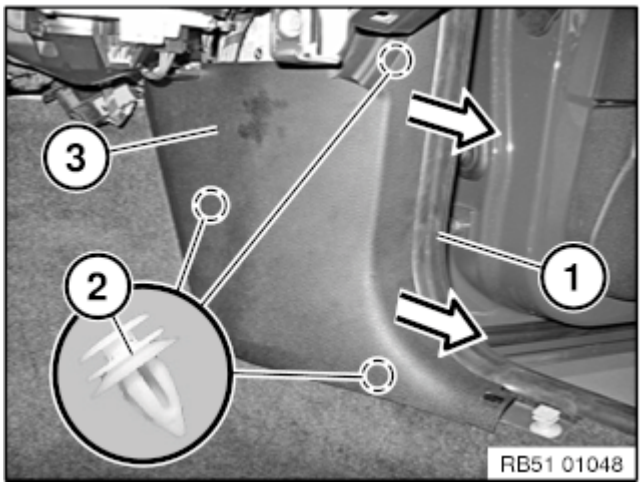


If necessary lift clip (1) from floor panel (2) and clip on doorsill cover strip.

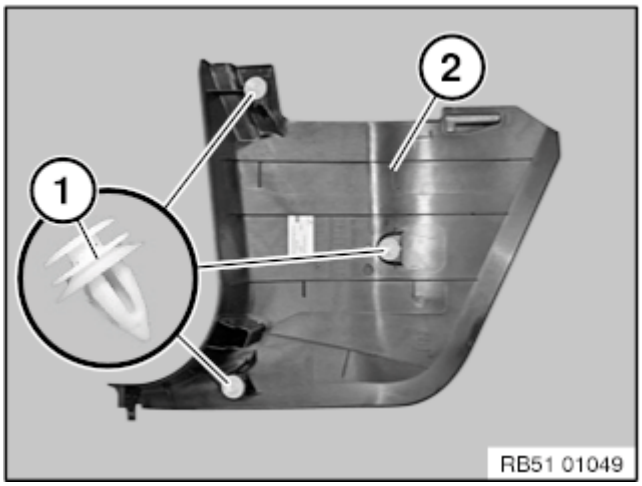


Appendix VI:

Removing and installing side trim panel, foot well, on A-pillar



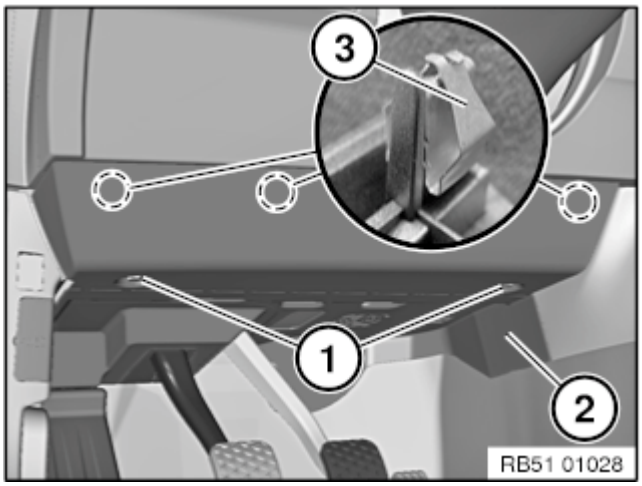
Detach edge protection (1) in area of side trim panel (3).
Pull side trim panel (3) off clips (2) in direction of arrow.
Loosen clips (2) from body and insert in side trim panel (3).
Installation note:
Make sure edge protection (1) is correctly seated.



Installation note:
Clips (1) for side trim panel (2) must not be damaged.

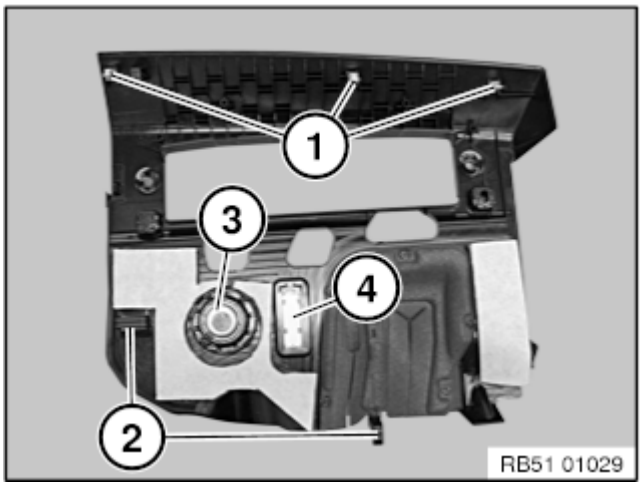
Appendix VII:

Removing and installing trim panel for pedal mechanism



Release screw connection (1).
Note:
Version with knee airbag: Unscrew nuts (1).

Tightening torque 51 45 8AZ.
Release trim panel (2) at clamps (3).
Lower trim panel (2) slightly and disconnect plug connections behind.



Installation note:
Clamps (1) and guides (2) must not be damaged.
Feed guides (2) correctly into the corresponding holder in the vehicle.

Replacement (depending on version):

- Remount speaker for hands-free system (3)
- Remount foot well light (4)

Appendix VIII:

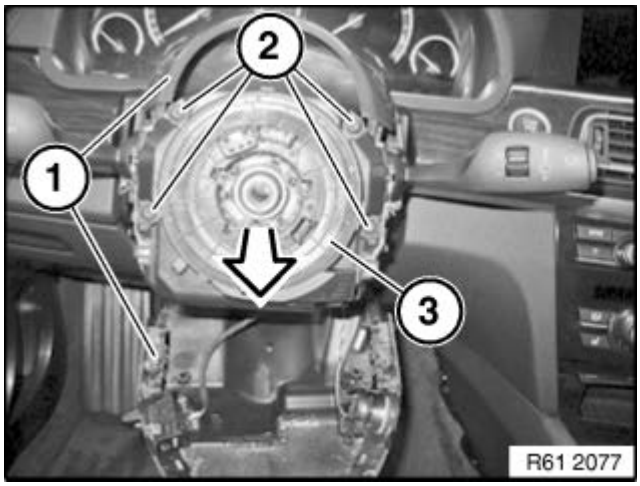
Removing and installing steering column switch cluster

Important!
Move wheels into straight-ahead position and do not alter this position during the repair work.
Do not under any circumstances turn the steering column switch cluster when the steering wheel is removed.

Necessary preliminary tasks:

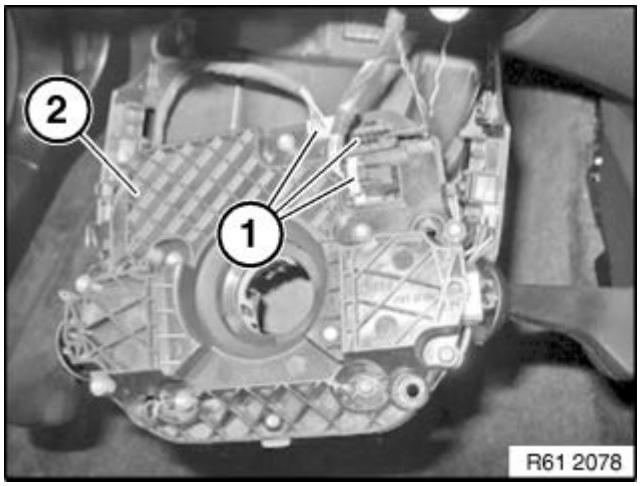
- Remove steering wheel

Release screw connection (1).
Note:
Version with knee airbag: Unscrew nuts (1).



Unclip steering column shroud upper and lower sections (1).
Unfasten screws (2).
Tightening torque 61 31 3AZ.
Remove steering column switch cluster (3) in direction of arrow.

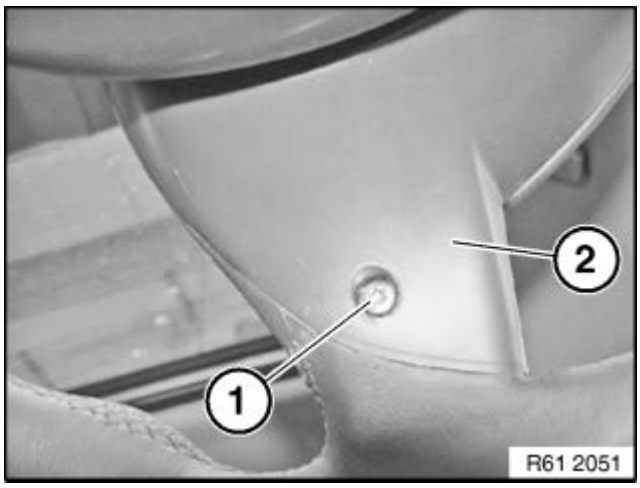
Tightening torque 51 45 8AZ.
Release trim panel (2) at clamps (3).
Lower trim panel (2) slightly and disconnect plug connections behind.



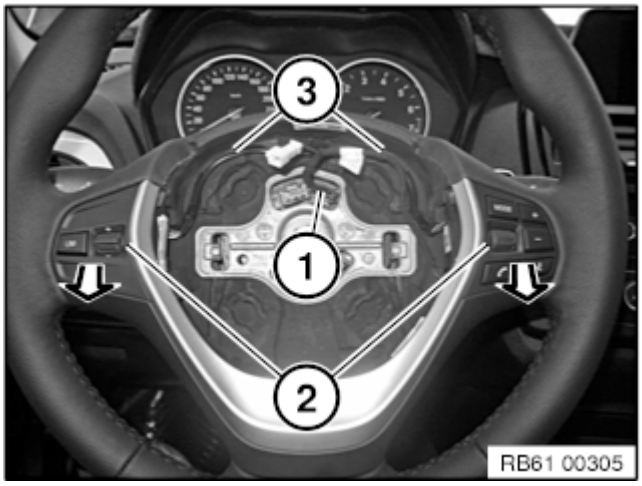
Disconnect plug connection (1).
Remove steering column switch cluster (2).

Appendix VIIII:

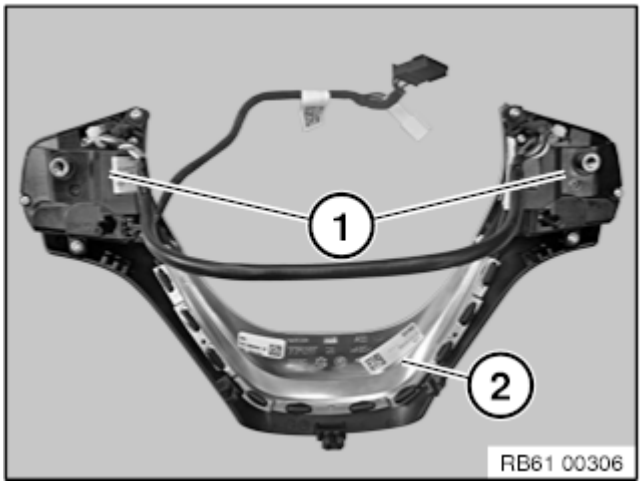
Removing and installing both multifunction steering wheel switches



Release screws (1) on left/right on back of steering wheel (2).

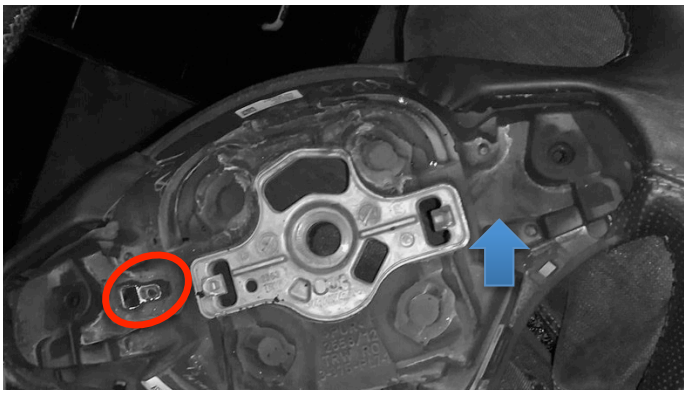


Disconnect plug connection (1).
Remove both multifunction steering wheel switches (2) together with cover from steering wheel in direction of arrow.
Installation note:
Make sure multifunction steering wheel switch (2) is fitted correctly.
Make sure electrical wiring (3) is correctly routed.



Remove switch of multifunction steering wheel (1) from cover (2).
Installation note:
Make sure electrical wiring is correctly routed.

Appendix X: Paddle Shifters Mounting hole preparations



Cut the rubber to reveal holes for mounting screw and wiring pass thru. The red area rubber has been removed. The arrow indicates the other side where rubber needs



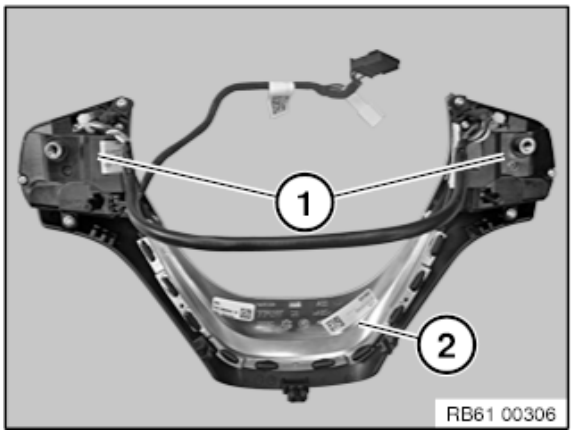
Closer look at the area after rubber has been removed



Picture of the precut paddle shifter mounting from OEM



Cut steering wheel leather to create area for mounting paddle shifters. One for left hand side and one for right hand side.



Install the new harness with paddle shift connector to multi function switch assembly

Install multi-function switch back to the steering wheel



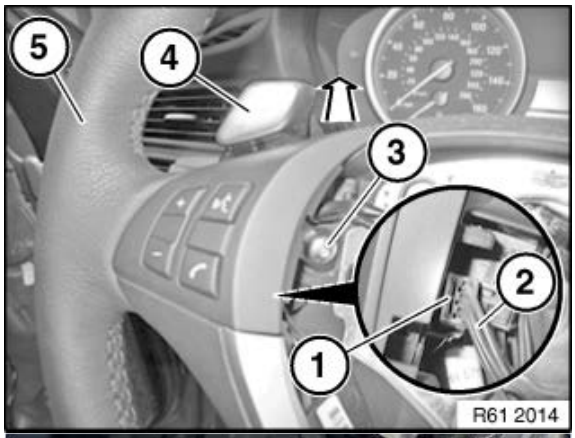
Before install a used paddle shift checks the followings:

Measure resistant when press the paddle. On the positive paddle, **the resistant should read approx.**

The resistant should not be the same on both paddle, should not be zero, and should not show open when press the paddle.

I loss the note when took the measurement, below is from my memory. It may not be correct.

+ Positive paddle = 180Ω
- Negative paddle = 480Ω



Disconnect plug connection (1).
Release screw (3).
Feed out wiring harness (2) and remove shift paddle for automatic transmission (4) in direction of arrow from steering wheel (5).
Installation note:
Make sure shift paddle for automatic transmission (4) is correctly seated on steering wheel (5)
Make sure wiring harness (2) is laid exactly.



Route the new wiring harness with paddle shifters connectors as shown.

Connector pin exposure should not expose to the outside of rubber area.