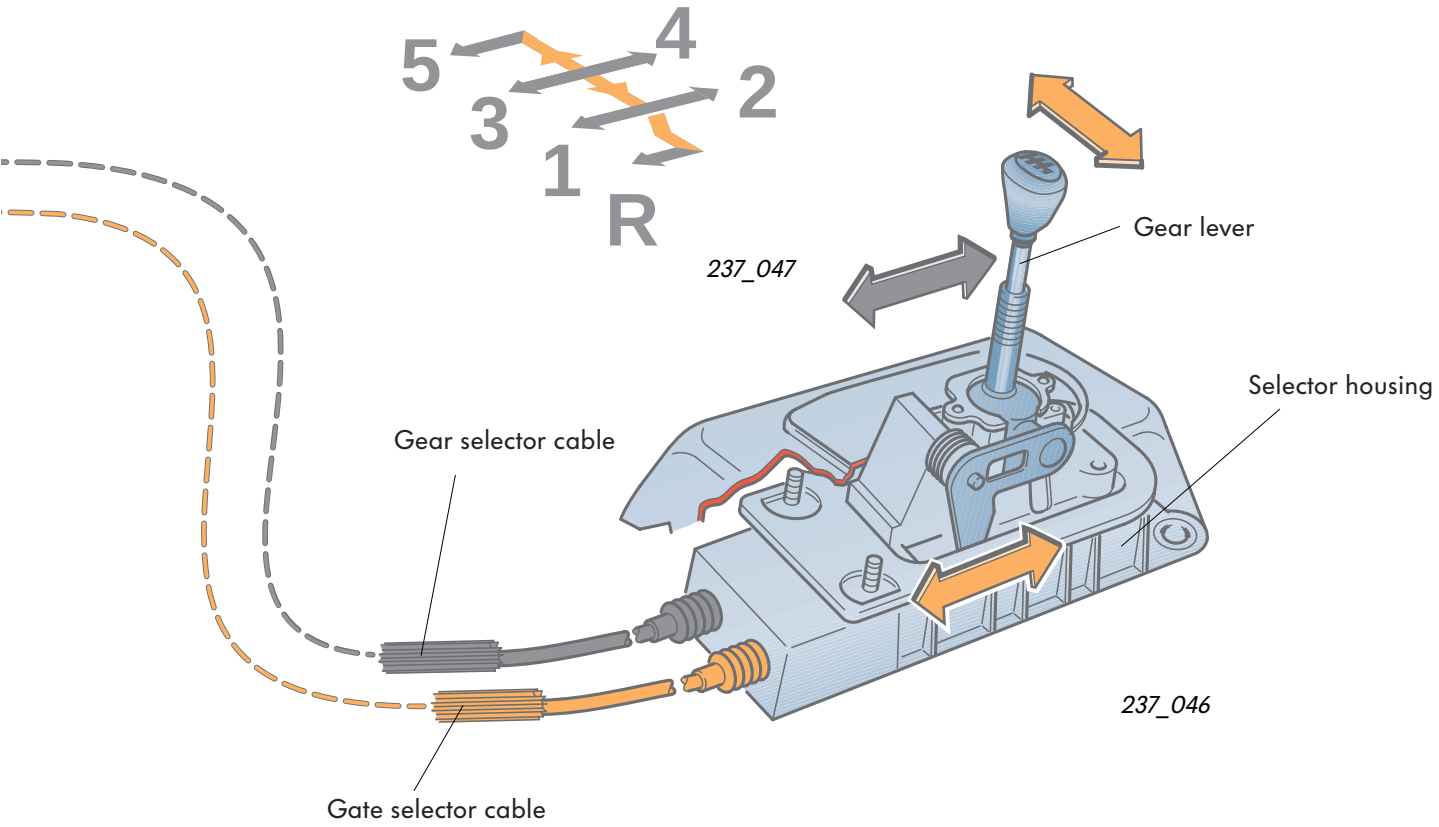
A 4-gate selector mechanism, with reverse gear at the front left, was selected for the new manual gearbox.

The position of the other gears is the same as on the standard gearshift mechanism.



A conventional push lock (page 21) is used as a safeguard against unintentional engagement of reverse gear.

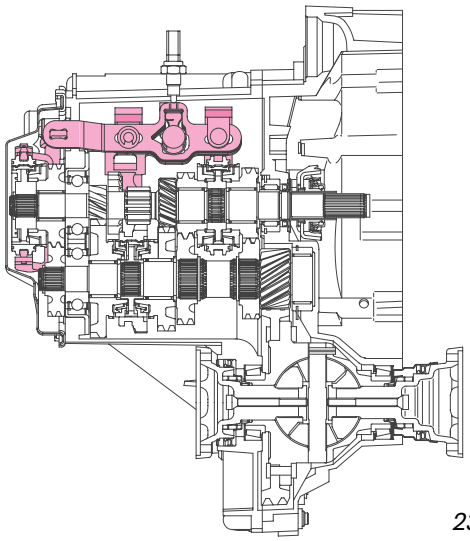
Selector mechanism

Inner gear change mechanism

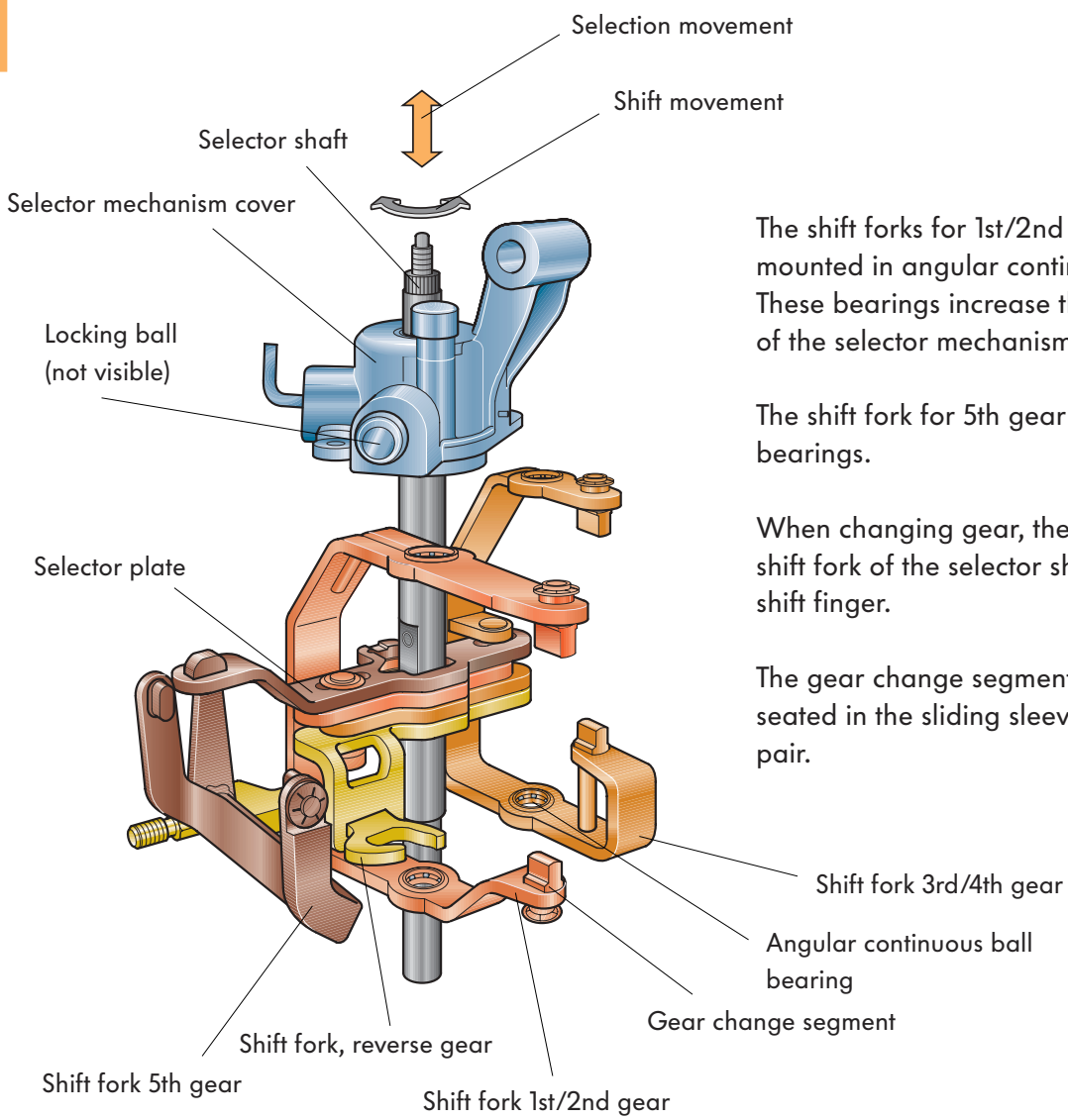
The shift movements are transferred to the gearbox from above.

The selector shaft is located in the selector mechanism cover.
The selector shaft moves axially during selection movements and rotates during shift movements.

Two spring-loaded balls lock the selector shaft in position.



237_044



237_058

The shift forks for 1st/2nd and 3rd/4th gear are mounted in angular continuous ball bearings. These bearings increase the ease of movement of the selector mechanism.

The shift fork for 5th gear has low-friction bearings.

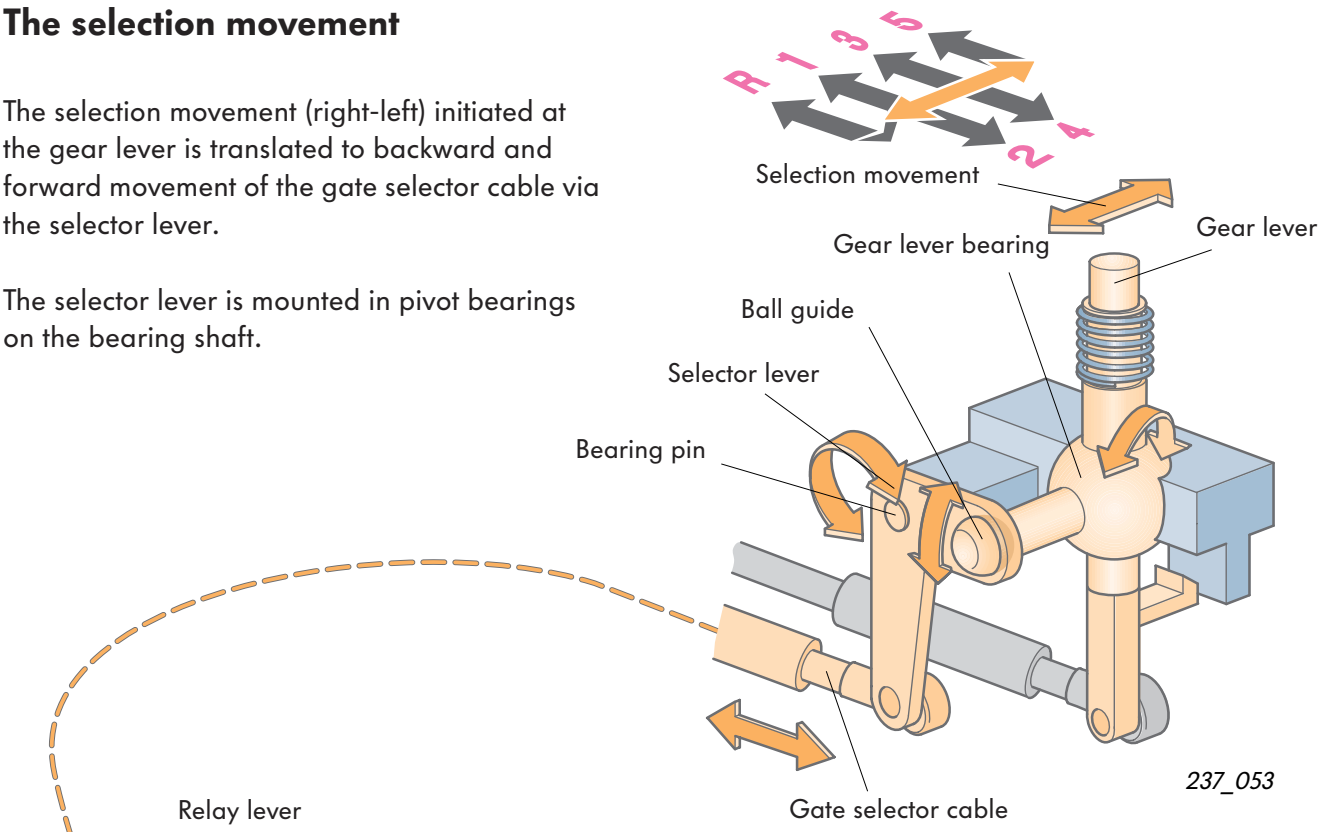
When changing gear, the selector plate and the shift fork of the selector shaft are moved by the shift finger.

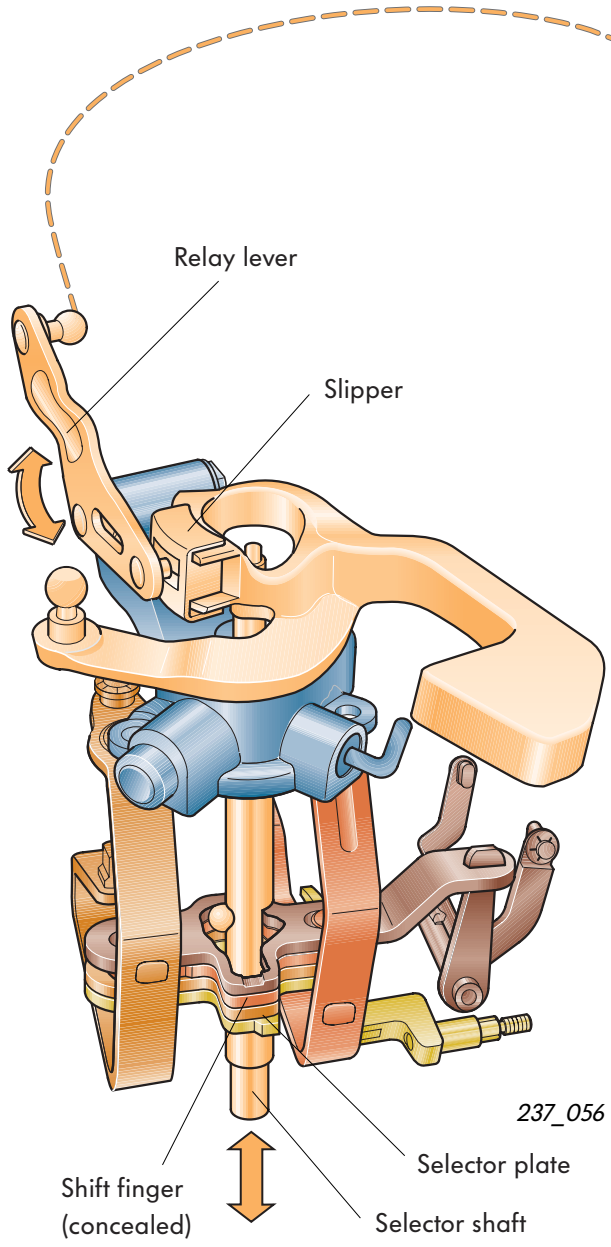
The gear change segments of the shift forks are seated in the sliding sleeve of the relevant gear pair.

The selection movement

The selection movement (right-left) initiated at the gear lever is translated to backward and forward movement of the gate selector cable via the selector lever.

The selector lever is mounted in pivot bearings on the bearing shaft.





The backward and forward movements of the selector cable are translated to an up/down movement of the selector shaft by the outer mechanism on the gearbox.

For this purpose, the gate selector cable is fixed to the relay lever. The relay lever is mounted in pivot bearings and connected non-rigidly to the selector shaft by means of a slipper.

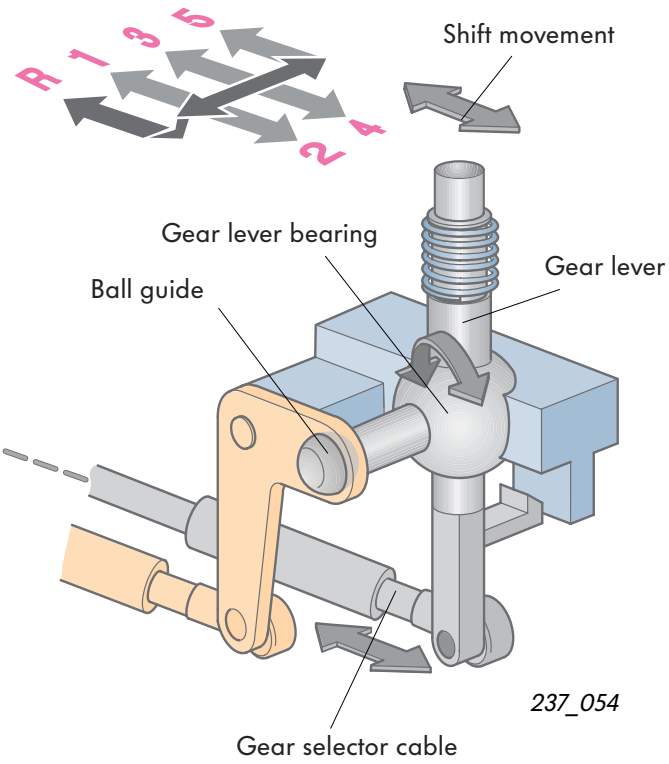
In the gearbox, this up/down movement locates the shift finger on the selector shaft in the relevant selector plate which the selected gear is to be engaged in (1st/2nd gear; 3rd/4th gear; 5th gear or reverse gear).

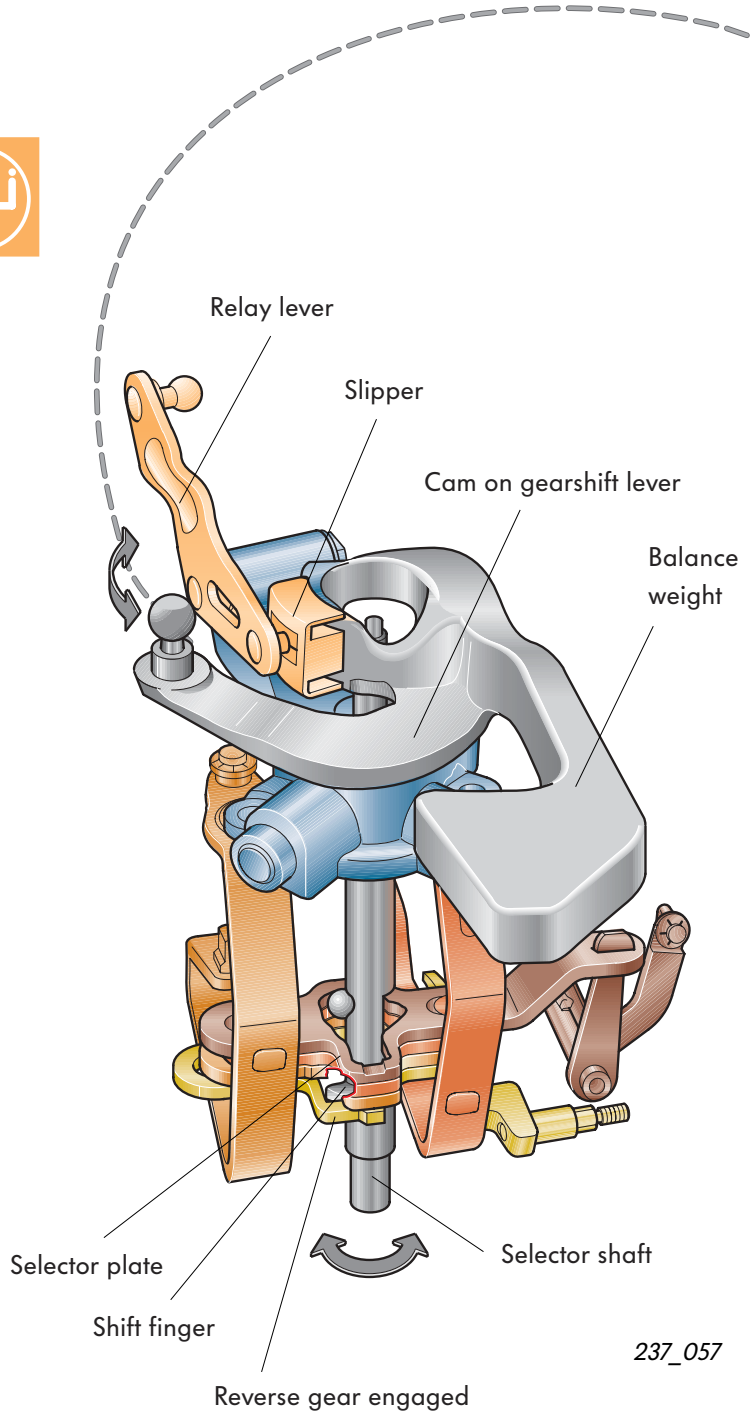
Selector mechanism

The gearshift movement

The direct gear shift movement is transferred via the selector lever guide to the gear selector cable.

If the gear lever is moved forwards or backwards in the direction of the individual gears, the gear selector cable is pulled or pushed in the opposite direction to the selector lever movement.





The forward or reverse movement of the gear selector cable during the gearshift causes the selector shaft to rotate.

The movable slipper keeps the gate selector cable relay lever unchanged in the position selected.

In the gearbox, the shift finger on the selector shaft moves the selector plate during this rotary movement. In turn, the selector shaft drives the shift fork and shifts the gear change sleeve.

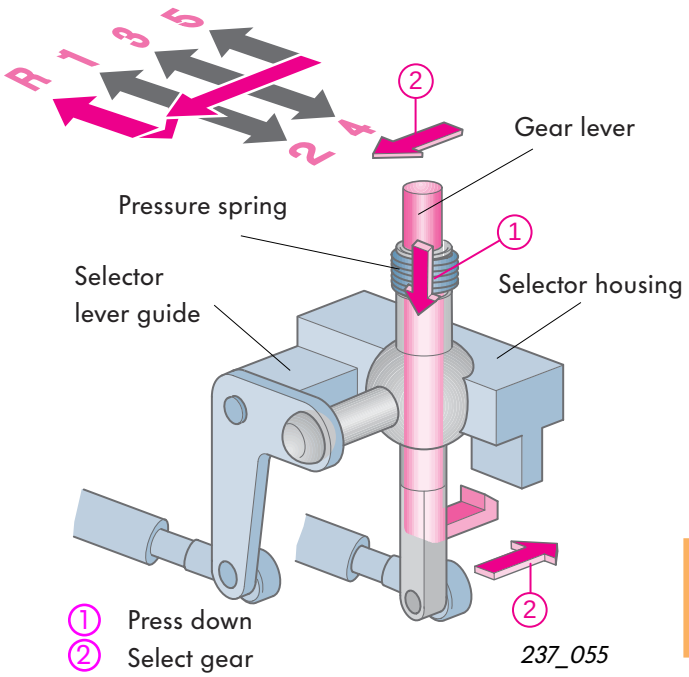
The gear is now engaged.

The reverse gear lock

A push lock serves as a safeguard against unintentional engagement of reverse gear.

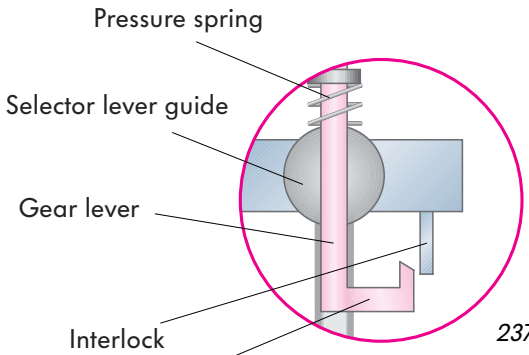
The push lock is integrated in the selector housing.

The driver has to overcome the push lock first before reverse gear can be selected and engaged.

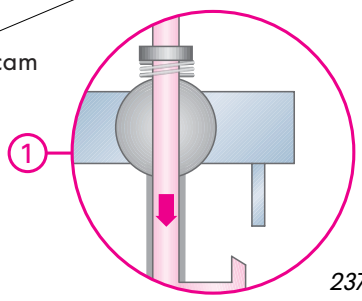


237_055

During a normal selection stroke of the forward gears, the locking cam of the gear lever comes up against the lock (an integral part of the selector housing).

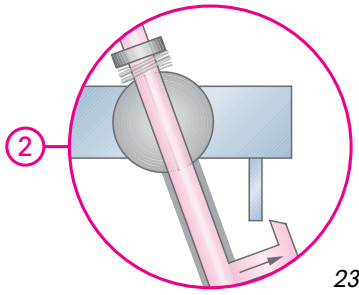


237_059



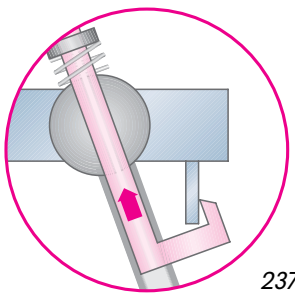
237_060

When the gear lever is pressed down against the pressure spring, it glides downwards through the spherical selector lever guide; the locking cam is now located below the interlock.



237_061

During the reverse gear selection movement that follows, the interlock is bypassed allowing the reverse gear to be selected.



237_062

The pressure spring again pushes up the gear lever in the engaged position and holds it in the reverse position.

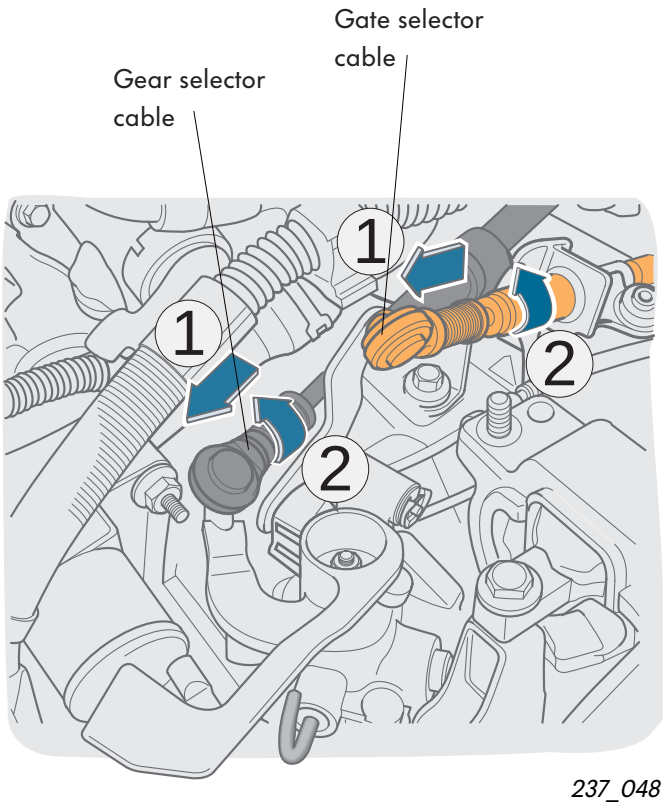
Adjusting the cable-operated gearbox

Adjustment of the cable-operated gearbox has been simplified by an angle piece on the selector mechanism cover and a locating pin for the gear lever.

The adjustment always begins when the gearbox is in the neutral position:

– **To detach the selector cables, follow this procedure:**

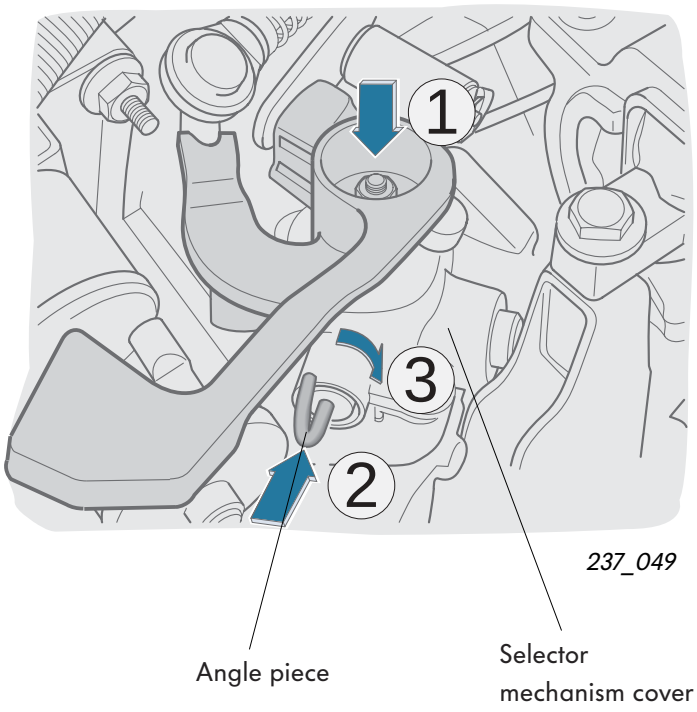
Draw the locking mechanism at the gear selector cable and at the gate selector cable forwards as far as the stop. (1) Afterwards, engage locking mechanism by turning anticlockwise. (2) The selector cables can now be adjusted for length.



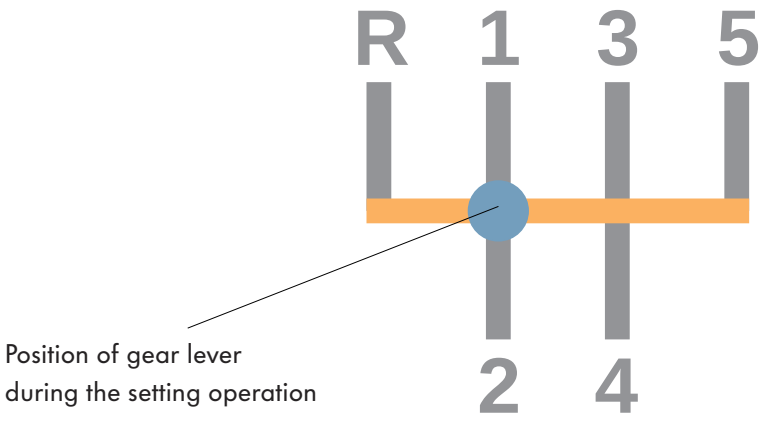
237_048

– **To arrest the selector shaft, follow this procedure:**

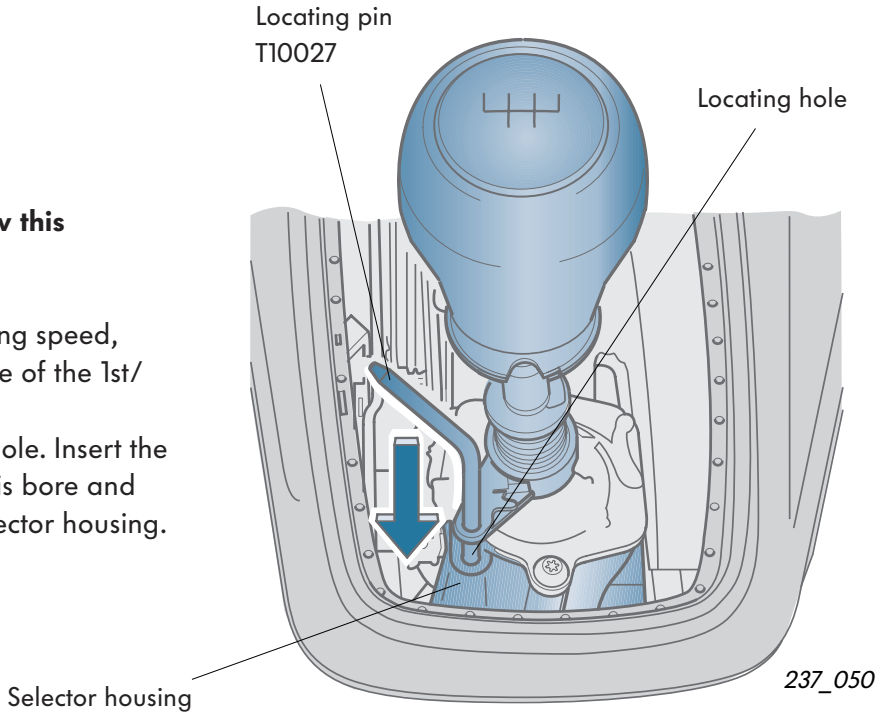
An angle piece which locates the selector shaft is fixed to the selector mechanism cover. To locate the selector shaft, press down the selector shaft by hand in the gate for 1st/2nd gear. When you press down the selector shaft, (1) press the angle piece towards the selector shaft (2) and then rotate in direction of arrow. (3) It engages and locates the selector shaft in this position.



237_049



237_052



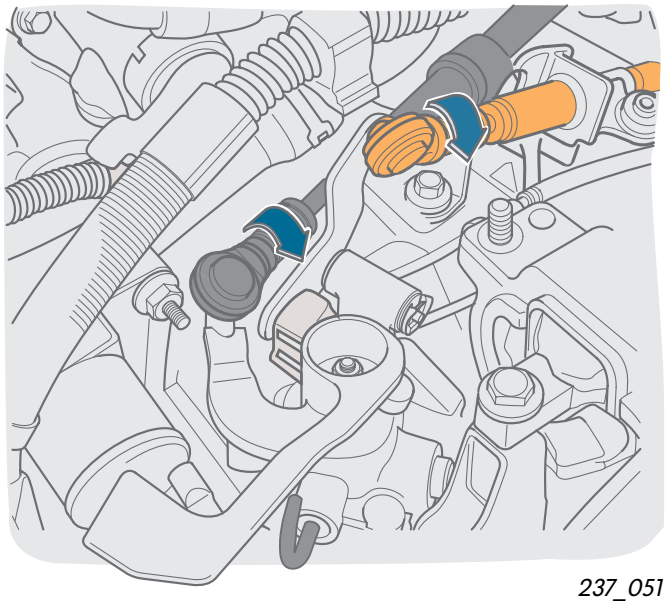
237_050

– **To arrest the gear lever, follow this procedure:**

With the engine running at idling speed, locate the gear lever in the gate of the 1st/2nd gear.
The gear lever has a locating hole. Insert the locating pin T10027 through this bore and into the hole below it in the selector housing.

– **To fix the selector cables in position, follow this procedure:**

The locking mechanism on the gate selector cable and on the gear selector cable can now be turned clockwise.
The spring presses the locking mechanism into the set position and secures it.
Afterwards, detach the angle piece again and pull out the locating pin.
The gear lever should now be in the gate of the 3rd/4th gear, with the engine running at idling speed.



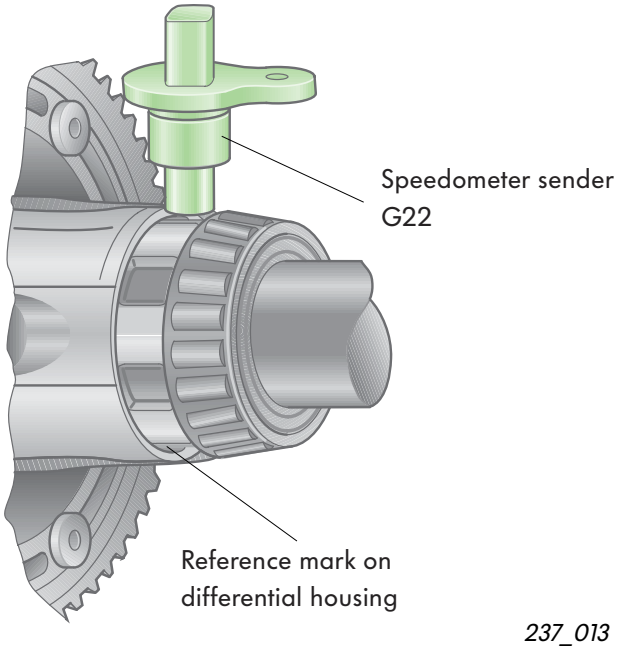
237_051

Sensors

Road speed display

An impulse sender wheel milled in the differential housing generates the signals that speedometer sender G22 requires to determine the actual road speed of the vehicle.

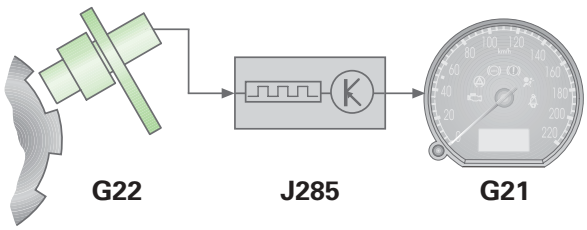
Speedometer sender G22 is inserted in a drill hole in the gearbox housing from the outside.



237_013

The sender operates according to the Hall sender principle. The electrical impulses generated by the sender are transmited to the control unit in the dash panel insert. Here, the signals are conditioned for the actual road speed and mileage display.

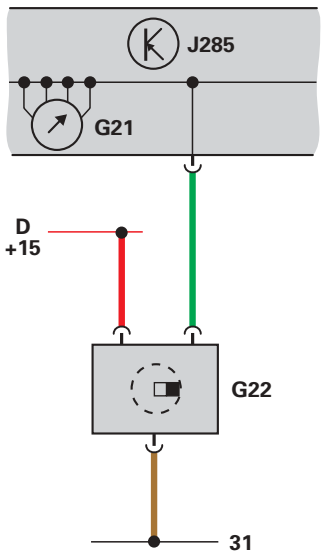
Advantage:
Ultra-high display accuracy, smooth running, temperature resistant.



237_015

Electrical circuit

D +15	Ignition switch, terminal 15
G21	Speedometer
G22	Speedometer sender
J285	Control unit in dash panel insert



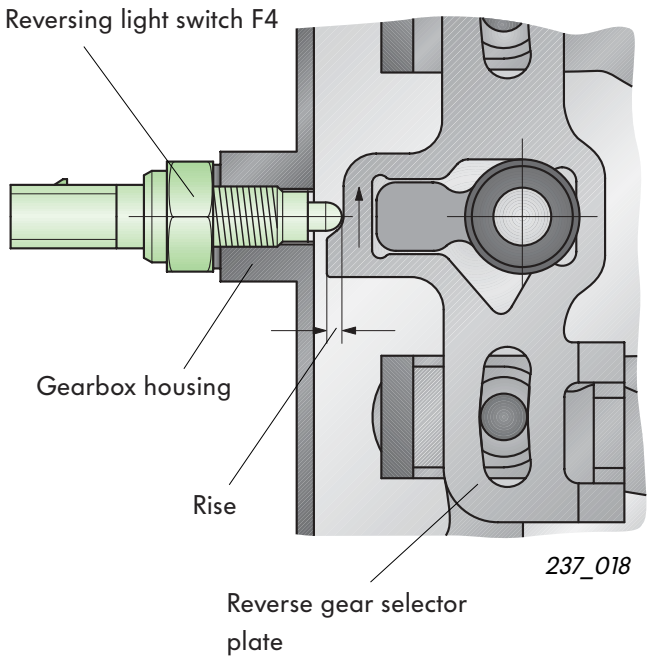
237_014

Reversing light switch F4

The reversing light switch is screwed into in the gearbox housing at the side.

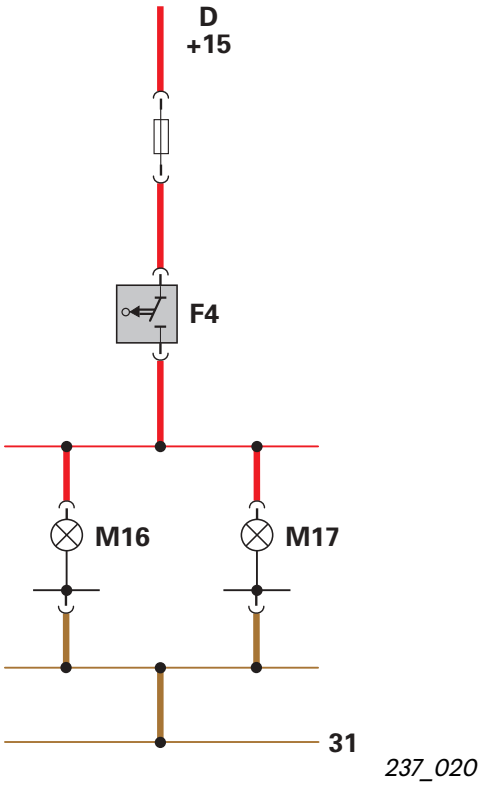
When reverse is engaged, the switch is actuated by a rise on the reverse gear selector plate.

The electrical circuit for the reversing lights is closed.



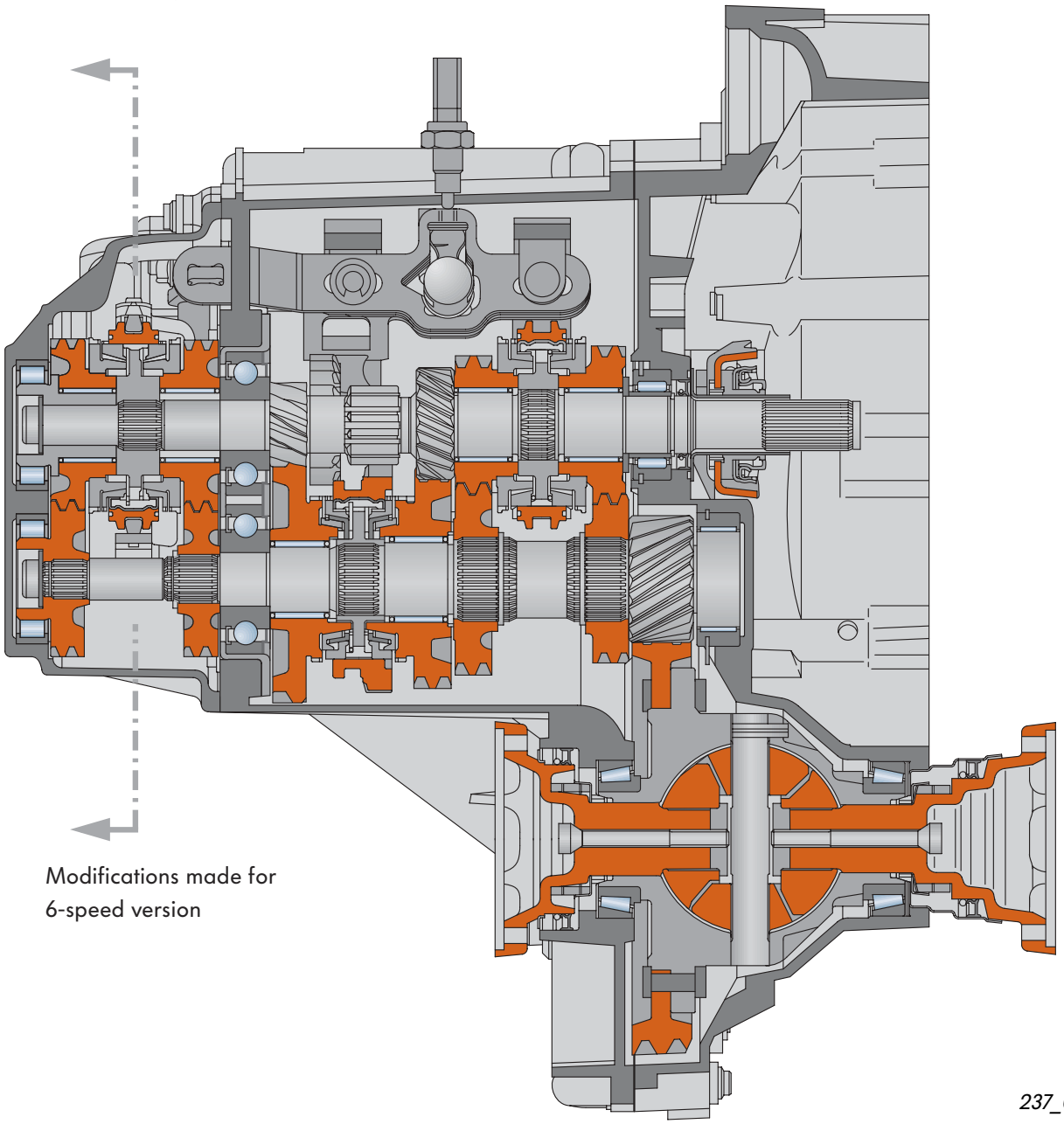
Electrical circuit

D +15	Ignition switch, terminal 15
F4	Reversing light switch
M16	Reversing light bulb, left
M17	Reversing light bulb, right



6-speed version

Gearbox design



Modifications made for
6-speed version

237_001

In principle, the 6-speed gearbox has the same architecture as the 5-speed gearbox.

The gearbox housing cover had to be extended to accomodate the 6th gear, which also involved extending the input and output shafts.

The synchromesh body for the 5th gear was designed so that it can also be used to engage 6th gear.

Modifications to the 5-speed version

The components for the 6th gear are arranged in the gearbox housing cover.

The gearbox housing cover

Also covers the input and output shaft bearings.

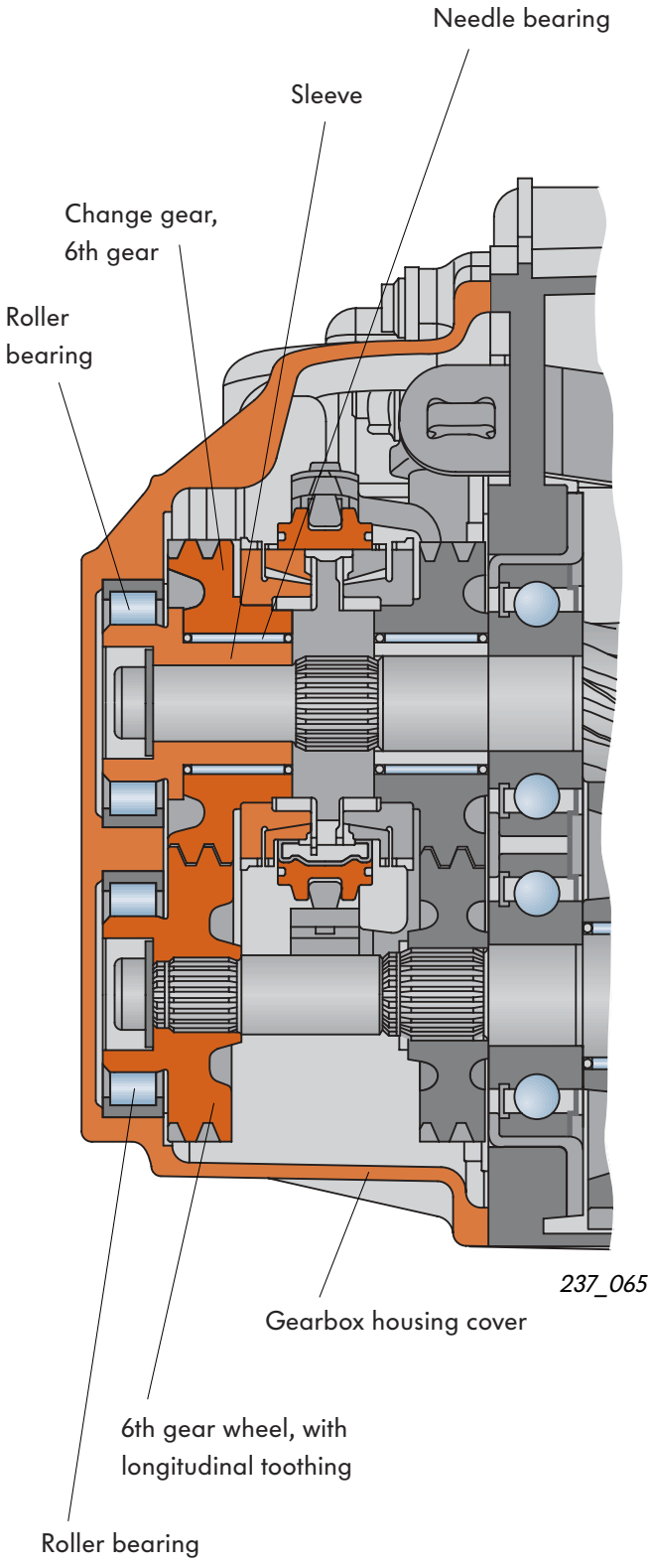
Compared to the 5-speed version manufactured from sheet steel, a magnesium casting was used.

The input and output shafts

Were extended to accomodate the gear wheels and change gears for the 6th gear.

The change gear for the 6th gear runs in needle bearings on a sleeve of the input shaft. The sleeve is also used as a support bearing by the input shaft in the gearbox housing cover.

The gear wheel for the 6th gear is located on the output shaft by means of longitudinal toothing and is mounted, with a collar, in the roller bearing of the gearbox housing cover.

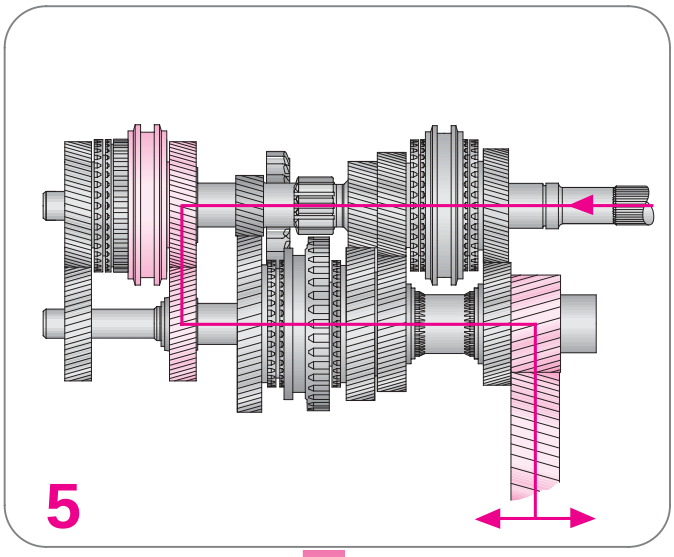


6-speed version

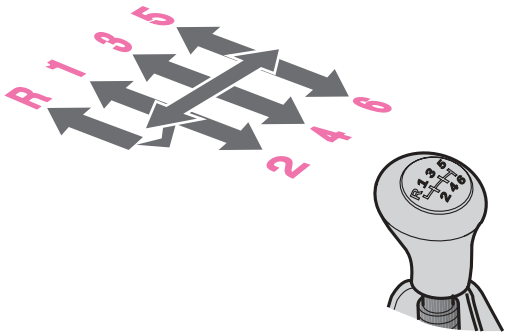
Force path

Engine torque is transferred to the gearbox via the input shaft.

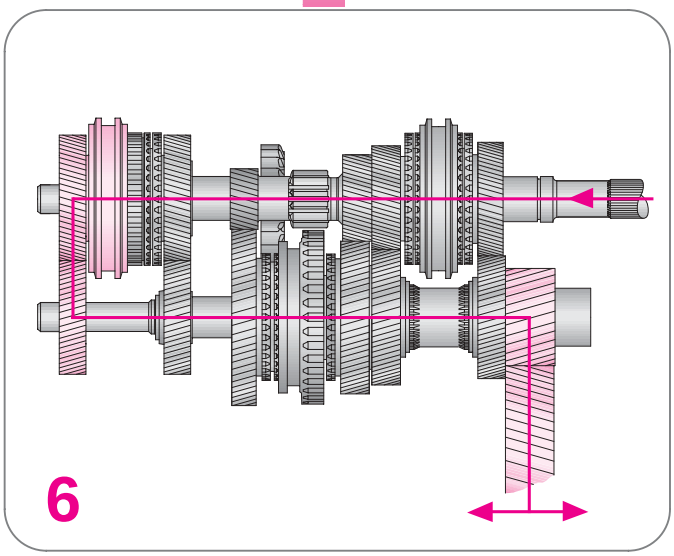
In accordance with the gear selected, engine torque is transferred via the synchromesh body for 5th/6th gear to the output shaft and from here to the differential.



237_025



237_024



237_026

Notes

Test your knowledge

What answers are correct?
Sometime only one answer will be correct.
However, more than one – or all of the answers may also be correct.
Please fill in the gaps.

1. In the 02T manual gearbox, the gear and final drive ratios can be varied to a considerable degree. The advantages are:

   A. Maximum ratio spread.
   B. An optimum compromise between sporty and economical driving modes is possible for all vehicle applications.
   C. It is possible to use the gearbox for different engine capacities and platforms throughout the Group.

2. The gearbox housing is manufactured from magnesium. The advantages are:

   A. Drastic weight savings.
   B. Enhanced vibration and noise comfort.
   C. Considerable savings on cost of materials.

3. A characteristic of the gearbox is its modular design. Name at least three gearbox modules/assemblies

   .....

   .....

   .....

4. The gearbox is equipped with the standard cable-operated transmission. The advantages are:

   A. Low friction losses during operation.
   B. The lateral forces and bending moments acting on the elements of the inner and outer selector mechanisms are kept to a minimum.
   C. Mechanical vibration is isolated from the drive line region.

5. The angle piece on the selector mechanism cover is used to

   A. Fix the selector shaft in a pre-defined position.
   B. Fix the gearshift lever in a pre-defined position.
   C. Simplify adjustment of the standard cable-operated transmission.

6. The range of special tools includes locating pin T10027. It is used to

   A. Fix the gear lever in the gate for 1st/2nd gear.
   B. Lock the selector shaft.
   C. Adjust the gear lever in relation to the selector housing.

7. Road speed is reduced via

   A. Mechanical intermediate steps ... speedometer drive wheel and speedometer drive shaft.
   B. Sensors on the gearbox and wireless transmission to the control unit in the dash panel insert.
   C. Direct engine speed reduction at the differential housing by a Hall sender and subsequent transfer to the control unit in the dash panel insert.

8. The bearing support is a new feature of the transmission shaft bearing.

   A. As a result, the bearings can be exchanged quickly, easily and individually.
   B. After repair work, the bearing support must be replaced completely.
   C. The complete shaft and gear packet of the input and output shafts and the bearing support is pre-assembled as a module.

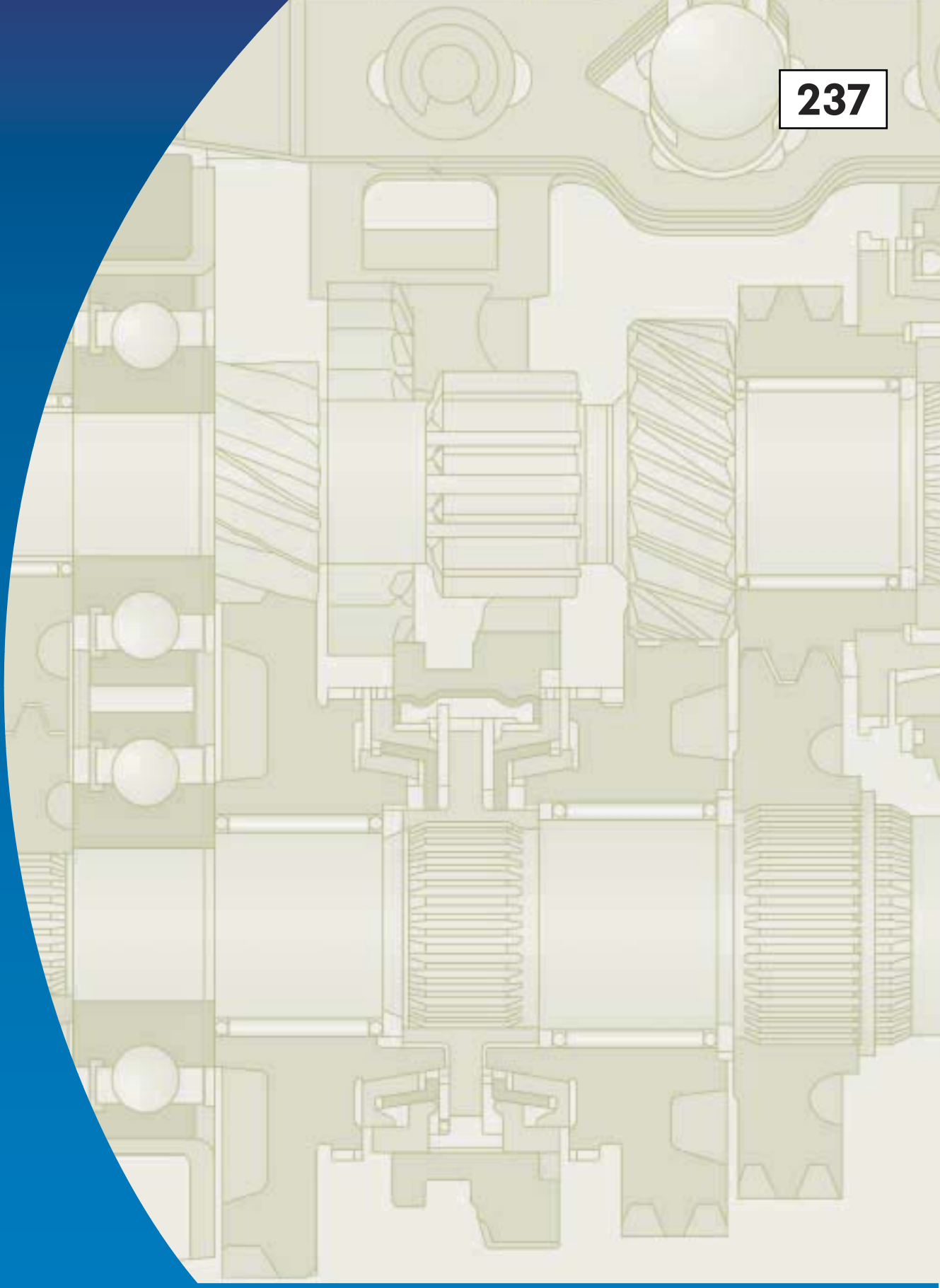
?

Solutions

1. A., B.; 2. A.; 3.Clutch release lever, selector shaft with selector mechanism cover, inner gear change mechanism, bearing support for input and output shafts; 4. C.; 5. A., C.; 6. A., C.; 7. C.; 8. B., C.

Service.

237



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