DPS6 Introduction

Presented by:
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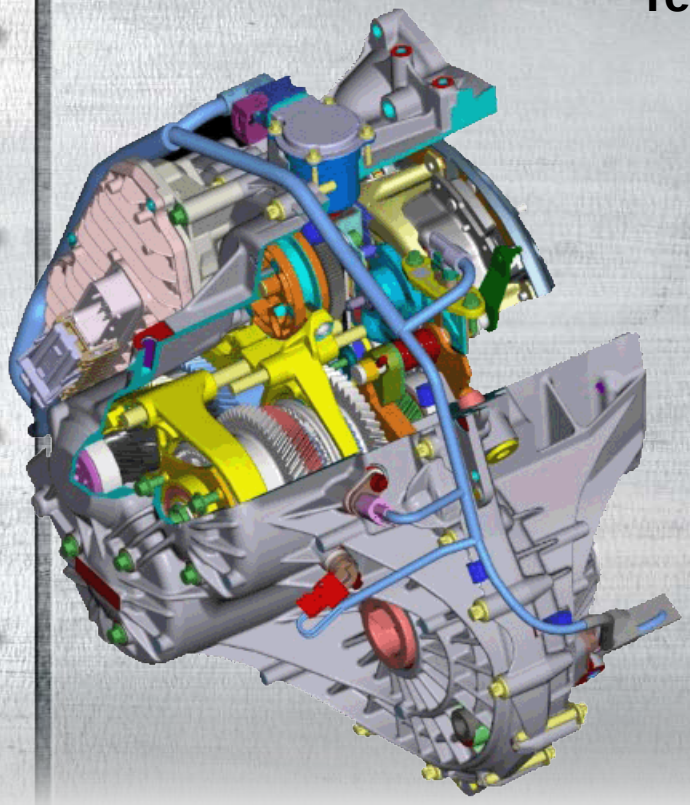

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DPS6 Introduction

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DPS6 Introduction

Webinar Schedule

ATRA Webinar Schedule		Description
Feb 10/11	Lineartronic CVT	Introduction
Feb 24/25	ZF8HP	Introduction
March 10/11	DPS6	Introduction
March 24/25	Honda 6	Rebuild
April 7/8	8L90	Introduction
April 21/22	CFT30	Rebuild
May 5/6	948TE	Introduction
May 19/20	Lineartronic CVT	Rebuild
June 2/3	ZF8HP	Rebuild
June 23/24	6R140	Introduction
July 7/8	DPS6	Internal Operation
July 21/22	U660	Introduction and Rebuild
Aug 4/5	8L90	Internal
Aug 18/19	01J	Problems & Fixes
Sept 1/2	948TE	Internal
Sept 15/16	5R110W	Problems & Fixes
Sept 29/30	Lineartronic CVT	Problems & Fixes
Oct 13/14	6R140	Problems & Fixes


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DPS6 Introduction

Applications

2011-2015 Fiesta

2012-2015 Focus

2012-2014 EcoSport (Global)

DPS6 Introduction

Applications

2012-2014 B-Max (Global)

2014 C-Max (Global)

Transmission Description

- The transmission operates without interruption of the propulsive force, a main disadvantage of automated manual transmissions. Even compared with the most modern automatic transmissions, its higher efficiency is clearly noticeable.
- As with conventional manual transmissions, the gear ratios are accommodated inside the transmission in the form of gear pairs on input and output shafts. The input shaft is split into two parts and comprises the hollow shaft and the core shaft.
- The dry clutches, which are electronically controlled and mechanically actuated on this transmission, have been arranged in a parallel layout in order to save space. This has achieved a compact transmission design.
- The external gearshift mechanism has been carried over from the automatic transmissions.

The main features of this transmission are:

- Front transverse installation
- Two-part aluminum housing
- 6 gears plus reverse gear
- Dry clutch with travel-controlled wear adjustment
- Two-part input shaft
- Two output shafts with different transmission ratios for the final drive
- Electro-mechanically actuated clutch and gearshift system
- Suitable for use in hybrid vehicles

DPS6 Introduction

Common characteristics of the DPS6 transmission.

Common sounds a driver may notice are:

Double clicking metal sounds. These noises can likely be heard while driving on very smooth surfaces during a 1-2 upshift or a 3-2-1 coast down. The sounds occur with every gear engagement, but generally cannot be heard over the background engine, road and wind noises at higher speeds. Most noticeable if the windows are down and the radio is off, these sounds are of the shift forks moving and the synchronizers engaging a gear (similar to a manual transmission). These shifting sounds are part of normal operation.

Coast down whine. A slight gear whine while slowing or coasting is normal

Clicking sounds after the engine is turned off. As the vehicle is powered down, the transmission will cycle the clutches to the released position so it is ready for a safe restart of the engine. This is part of normal operation. Clicking sounds from the transmission immediately after the engine is turned off are normal.

Low speed grinding. A slight grinding noise may be heard at about 2 mph. This noise is more evident during “trailer-hitching” events. This noise is caused by a normal bearing rotation and does not affect the durability of the transmission.

Common characteristics of the DPS6 transmission (continued).
Common sounds a driver may notice are:

Reverse gear whine. Some DPS6 transmissions will exhibit gear whine in reverse. The level of whine has been significantly reduced in later build vehicles, but can still be detected to some level. This is characteristic of many manual transmissions, and is not a defect or a situation in which a repair should be attempted

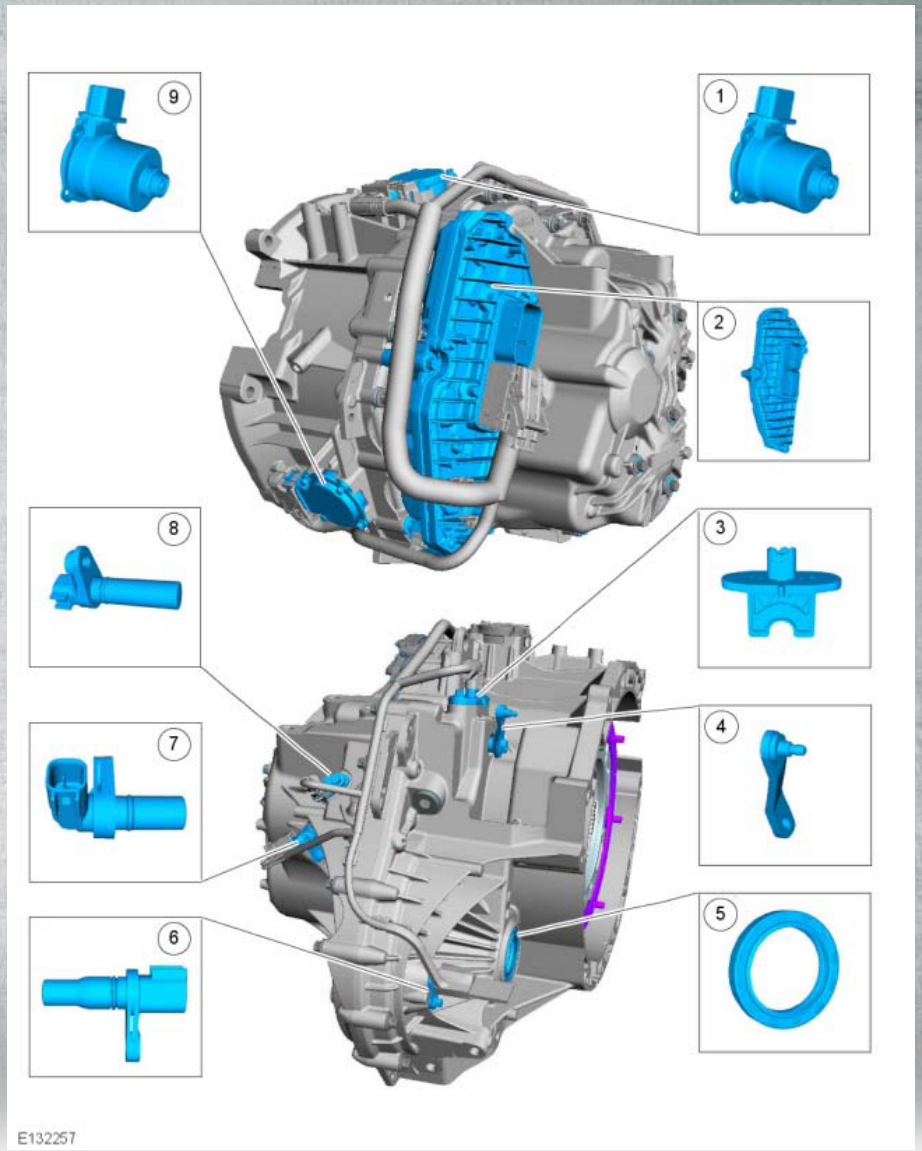
"Green" clutch break-in period. New, replacement, and reset clutches are "green" and require a break in period before shift event quality is maximized. During the break-in period, green clutches may exhibit:

A rattle noise similar to a loose catalytic converter shield. This noise is commonly heard after light throttle 1-2, 2-3 or 3-4 upshifts. This rattle noise will diminish greatly as the clutch completes the break-in.

A take-off shudder/launch (shaky vs. smooth).

A harsh-shift feel during the first few cold shifts before the transmission reaches operating temperature.

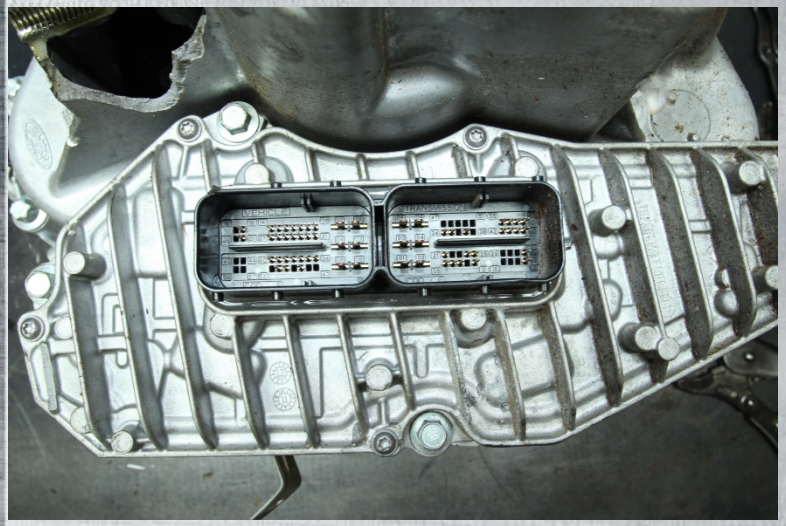
DPS 6 External Components



DPS 6 External Components (continued)

	External Components Description
1	DC clutch actuator motor 1 Comments: Actuates the 1st, 3rd and 5th gear via an electromechanical lever actuator
2	TCM
3	Transmission Range Sensor
4	Gearshift Shaft
5	Halfshaft Seal
6	Output Speed Sensor
7	Input Speed Sensor 1 (Hollow Shaft)
8	Input Speed Sensor 1 (Core Shaft)
9	DC clutch actuator motor 2 Comments: Actuates the 2nd, 4th and 6th gear as well as reverse gear via an electromechanical lever actuator

The TCM



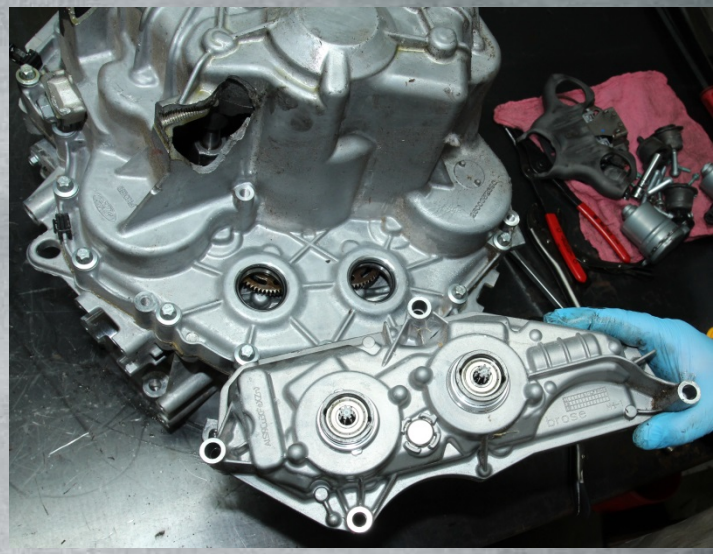
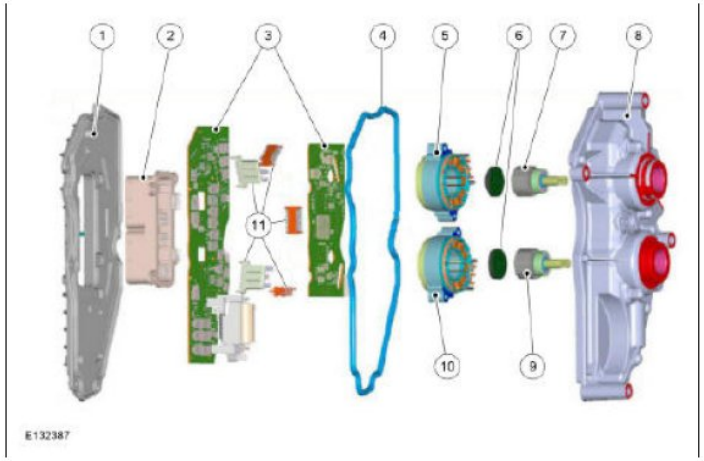


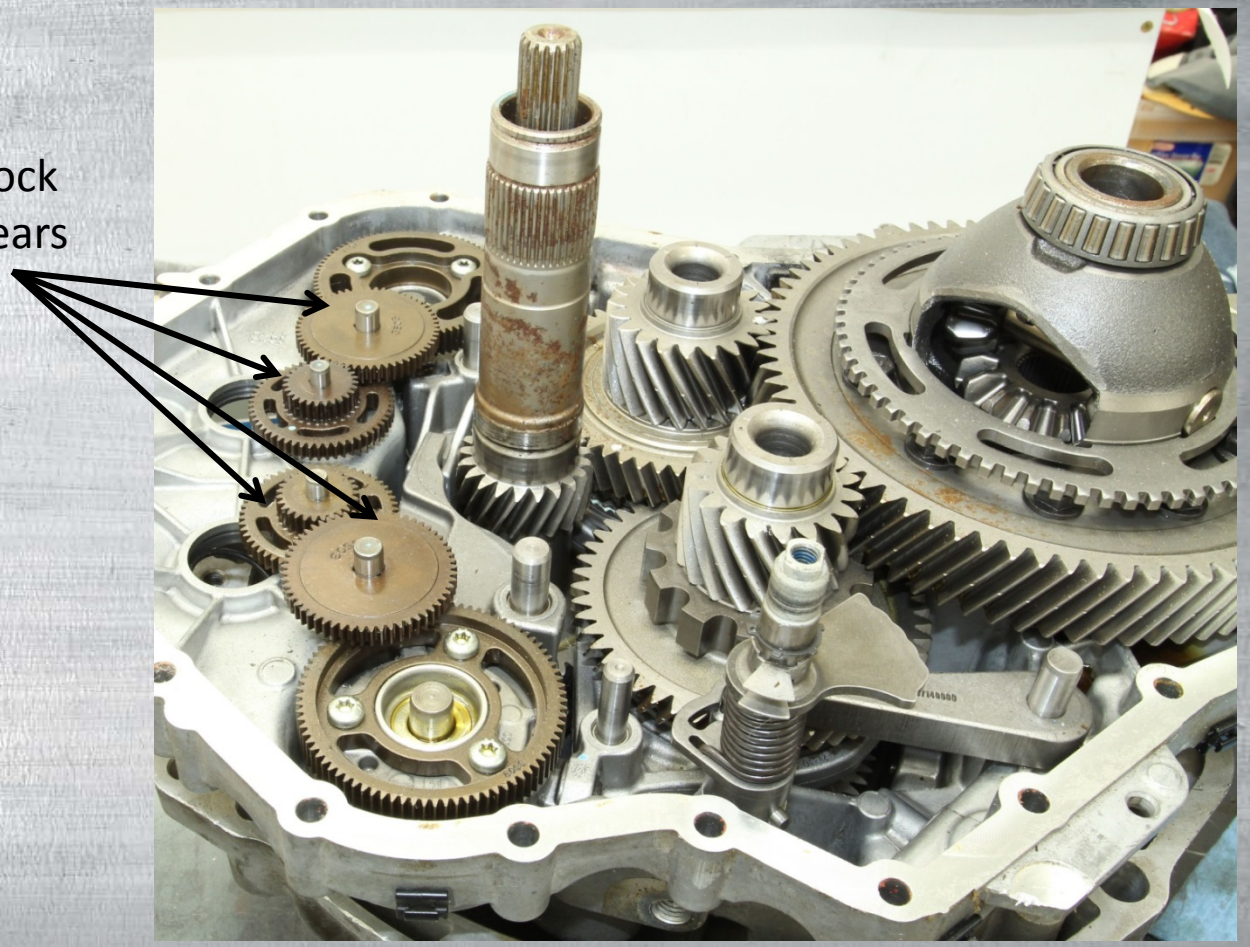
Fig 1: Exploded View Of TCM



DPS6 Introduction

Shift Motors

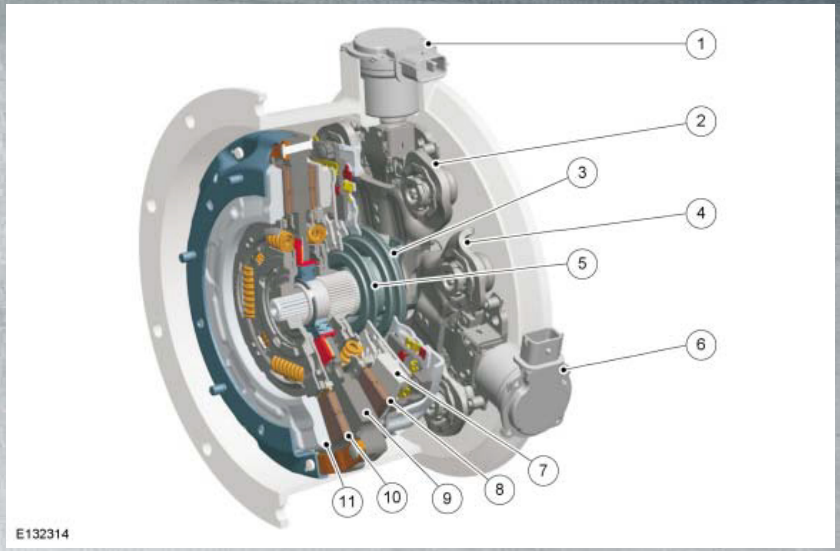
Two electric motors are used to shift the gears in the transaxle, one motor for gears 1-3-5 and one motor for gears R-2-4-6. The gear shifting is made by two shift drums connected to shift motor pinion via two clock gears. The max shifting force is 337 ft-lb. The motors are integrated in the TCM and work independently of each other.



These gears combine to provide a 61.44 to 1 ratio. This means, for every one revolution of the shift drum, the brushless motor rotates 61.44 times. This ratio provides the torque — up to 330 pound-feet — needed to make the shifts happen swiftly and smoothly.

DPS6 Introduction

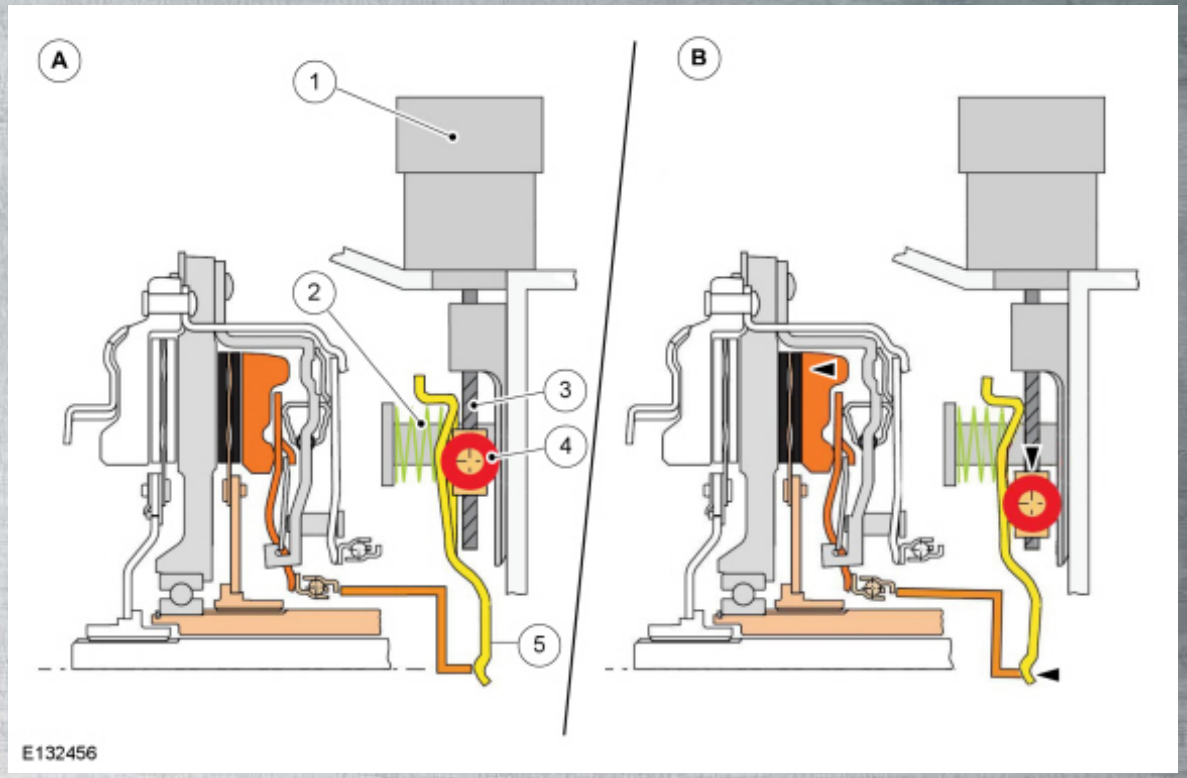
Dual Clutch Description and Operation



Dual Clutch Components	
1	DC clutch actuator motor 1 Comments: Actuates the clutch for 1st, 3rd and 5th gear via the electromechanical lever actuator 1
2	Electro-mechanical lever actuator 1
3	Engaging disc with engaging bearing 1 Comments: Actuates the pressure plate for the 1st, 3rd and 5th gear (input shaft (core shaft))
4	Electro-mechanical lever actuator 2
5	Engaging disc with engaging bearing 2 Comments: Actuates the pressure plate for the 2nd, 4th, 6th gear and reverse gear (input shaft (hollow shaft))
6	DC clutch actuator motor 2 Comments: Actuates the clutch for 2nd, 4th and 6th gear as well as the reverse gear via the electromechanical lever actuator 2
7	Pressure plate 2
8	Clutch disc 2
9	Driving disc
10	Clutch disc 1
11	Pressure plate 1

DPS6 Introduction

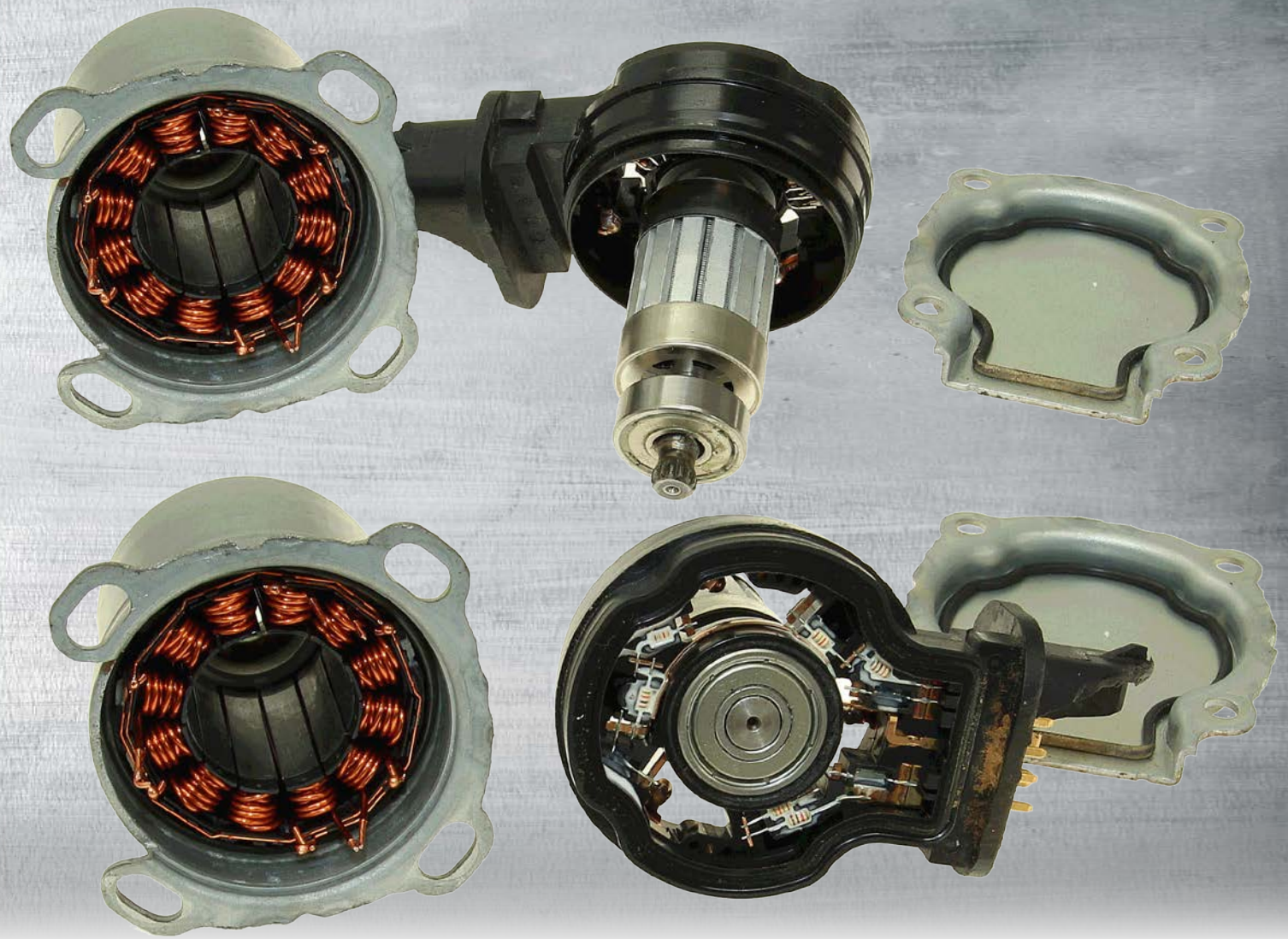
Dual Clutch Description and Operation



Electromechanical lever Actuator	
1	Brushless DC motor
2	Pressure Spring
3	Ball screw drive
4	Rollers
5	Engagement lever

DPS6 Introduction

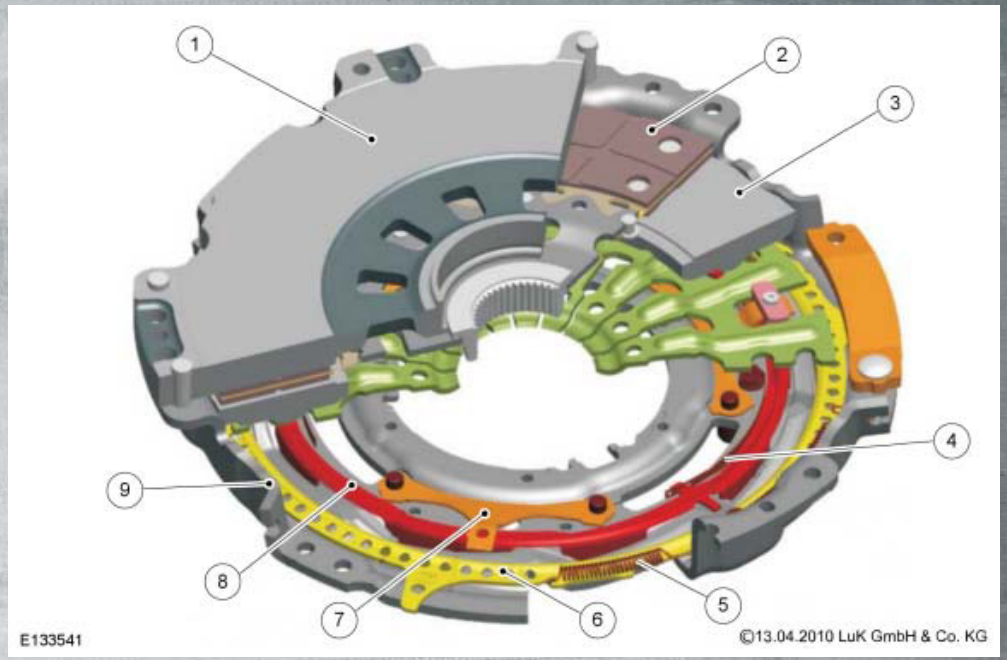
Clutch Actuator Motor



DPS6 Introduction

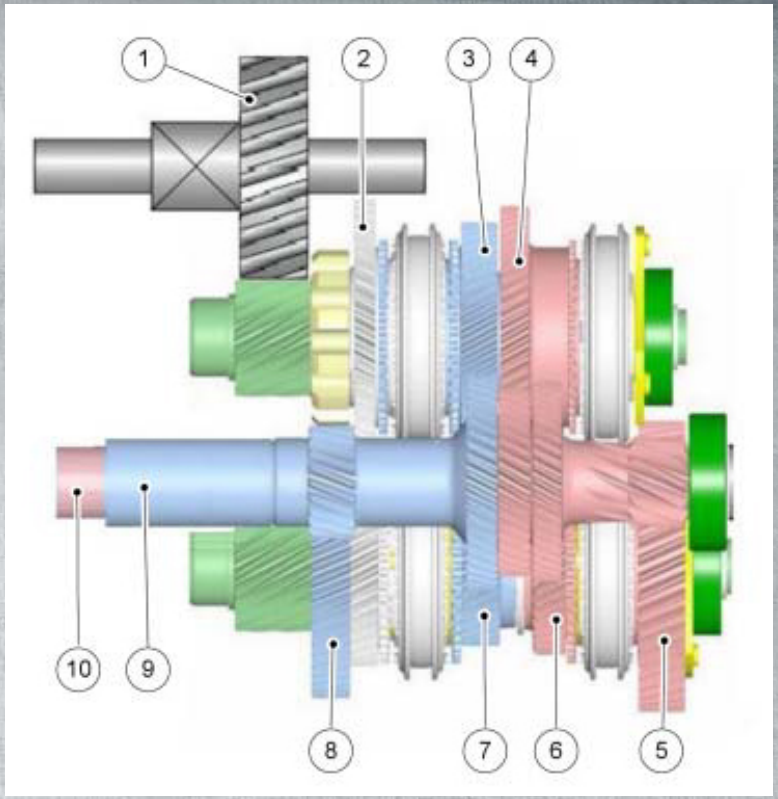
Self Adjusting mechanism

The adjustment of the clutch is triggered if - as a result of wear to the clutch lining - the lever spring for generating a specific contact pressure is pressed through further in the direction towards the engine. As a result of the additional travel, the clamping spring lifts off the ramp ring. As a result of the pre-loaded adjustment roller spring, the ramp ring is rotated on the ramp until the clearance between the clamping spring and the ramp ring has been compensated for. If the clutch is then fully opened (i.e. disengaged) again as a result of a gearshift process, the lever spring moves into a new position due to the rotation of the ramp ring, and this creates an air gap between the lever spring and the adjustment ramp ring. As a result of the adjustment ramp ring, which is also spring-loaded, it is then rotated until it abuts against the lever spring. The adjustment process is then complete.



	Description
1	Driving disc
2	Clutch disc 2
3	Pressure plate 2
4	Adjustment roller spring
5	Adjustment tension spring
6	Adjustment ramp ring
7	Clamping spring
8	Ramp ring
9	Clutch cover

POWERFLOW
Gear train
Component
Identification

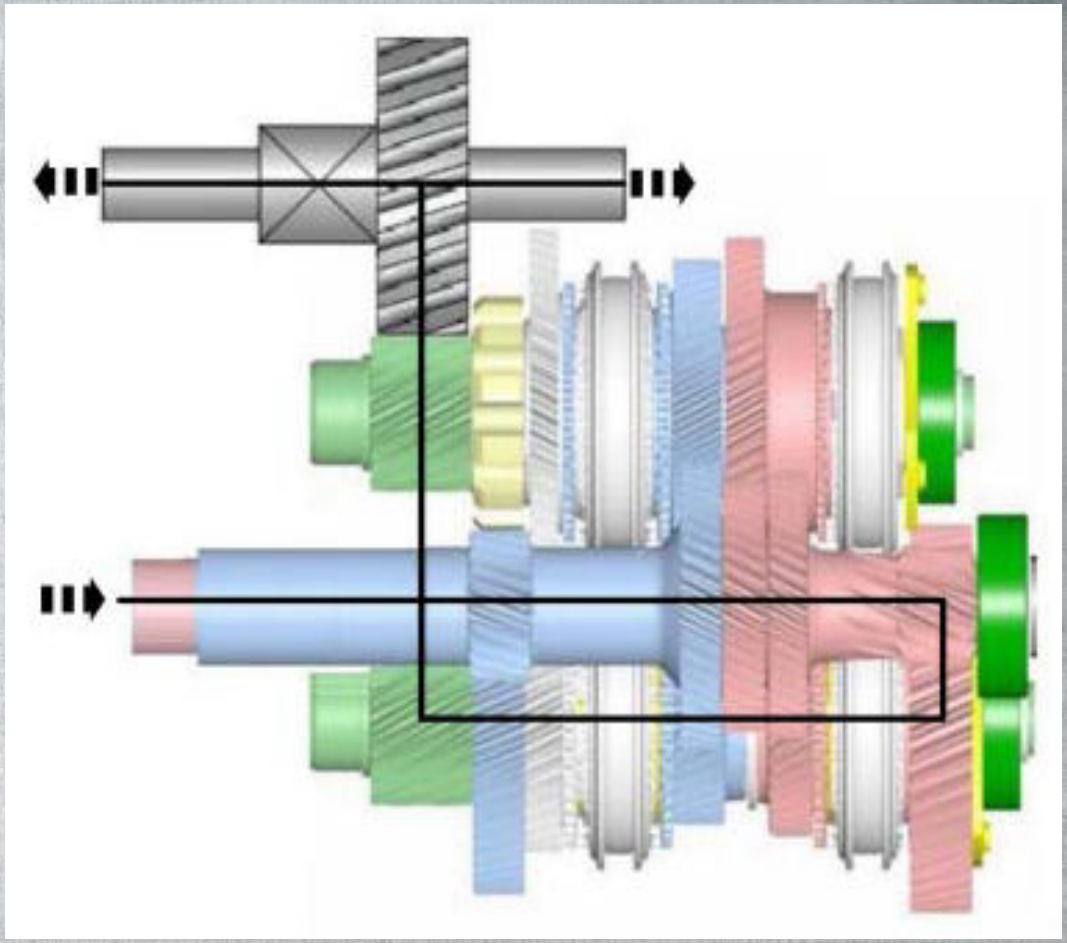


Geartrain Components	
1	Differential
2	Reverse Gear
3	4th Gear
4	3rd Gear
5	1st Gear
6	5th Gear
7	6th Gear
8	2nd Gear
9	Input Shaft (hollow)
10	Input Shaft (core shaft)

DPS6 Introduction

POWERFLOW (continued)

First Gear

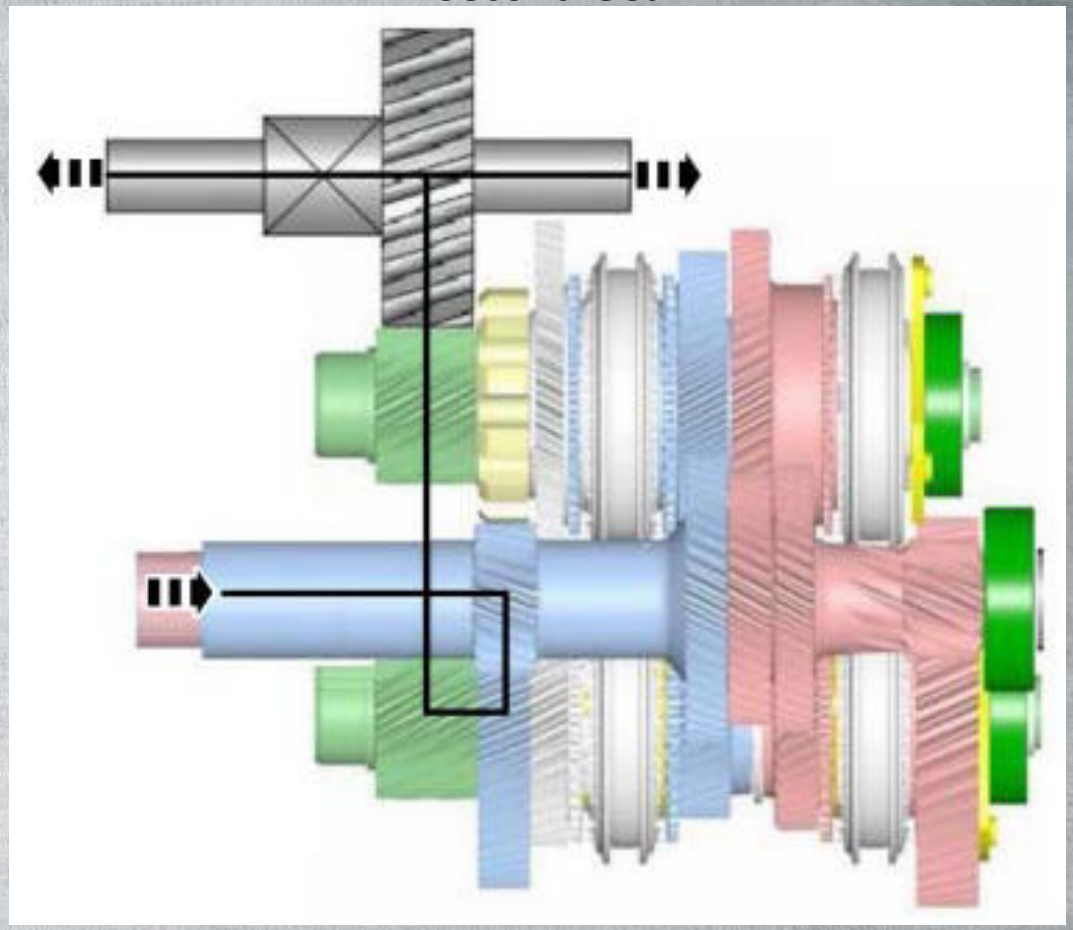


The torque is passed into the double clutch via the drive plate. From there, the torque is transferred via the driving disc, pressure plate 1 and clutch disc 1 onto the input shaft (core shaft). The input shaft (core shaft) transmits the torque to the first gear of the output shaft (1st, 2nd, 5th and 6th gear). The torque is transmitted to the differential via the output pinion.

DPS6 Introduction

POWERFLOW (continued)

Second Gear

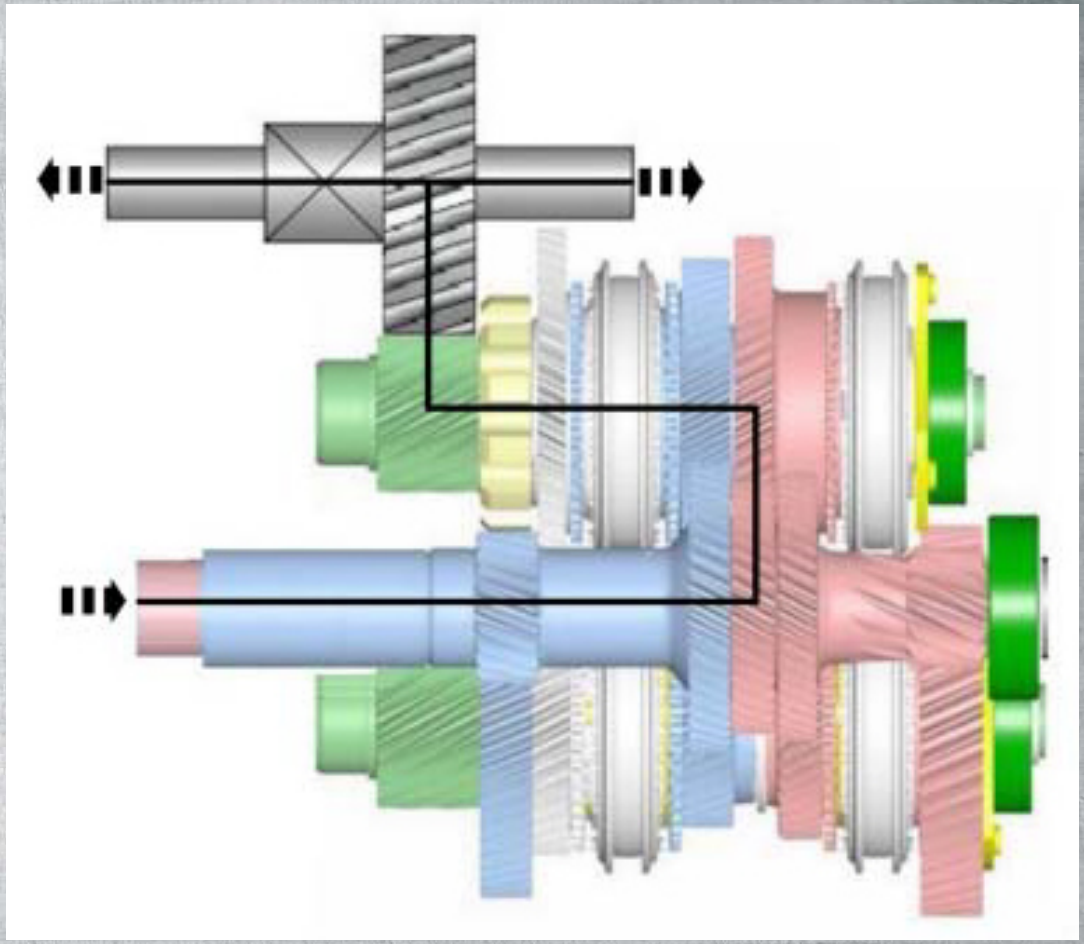


The torque is fed into the double clutch via the drive plate. From there, the torque is transferred via the driving disc, pressure plate 2 and clutch disc 2 onto the input shaft (hollow shaft). The input shaft (hollow shaft) transmits the torque to the second gear of the output shaft (1st, 2nd, 5th and 6th gear). The torque is transmitted to the differential via the output pinion.

DPS6 Introduction

POWERFLOW (continued)

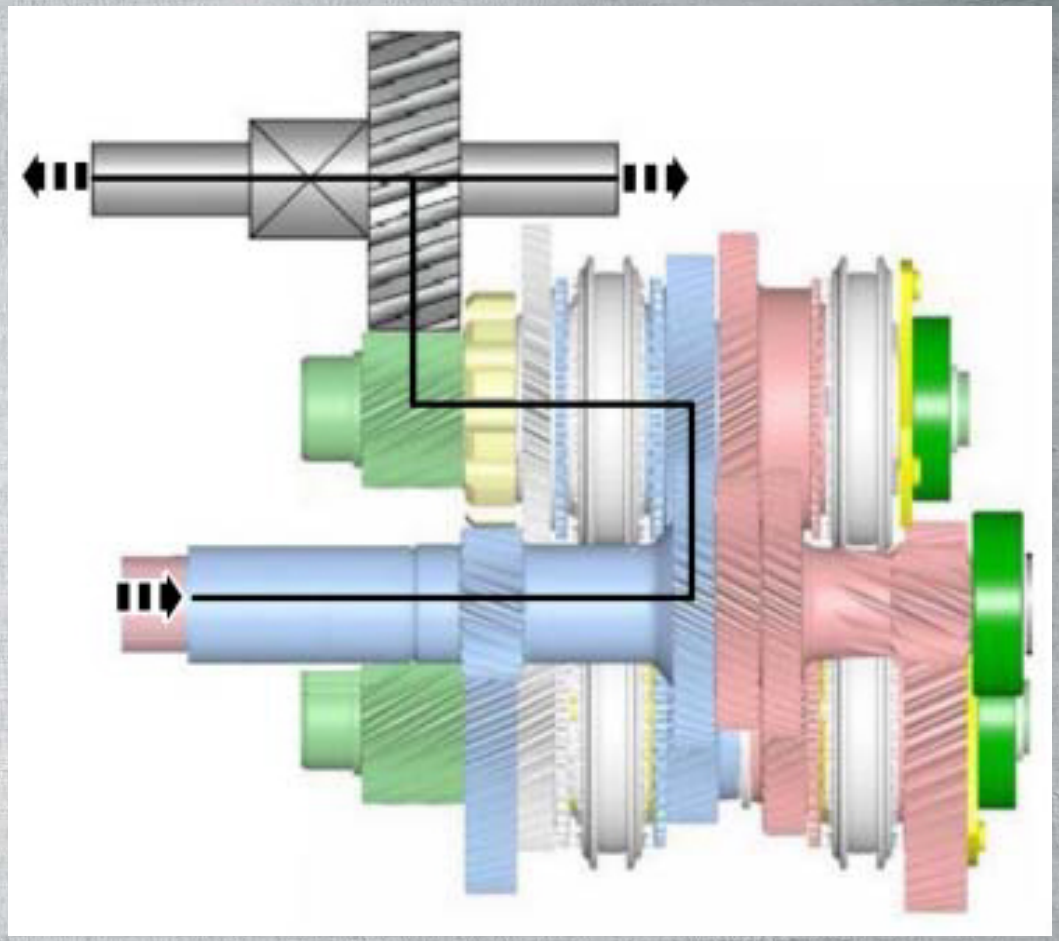
Third Gear



The torque is fed into the double clutch via the drive plate. From there, the torque is transferred via the driving disc, pressure plate 1 and clutch disc 1 onto the input shaft (core shaft). The input shaft (core shaft) transmits the torque to the third gear of the output shaft (3rd, 4th and reverse gear). The torque is transmitted to the differential via the output pinion.

POWERFLOW (continued)

Fourth Gear

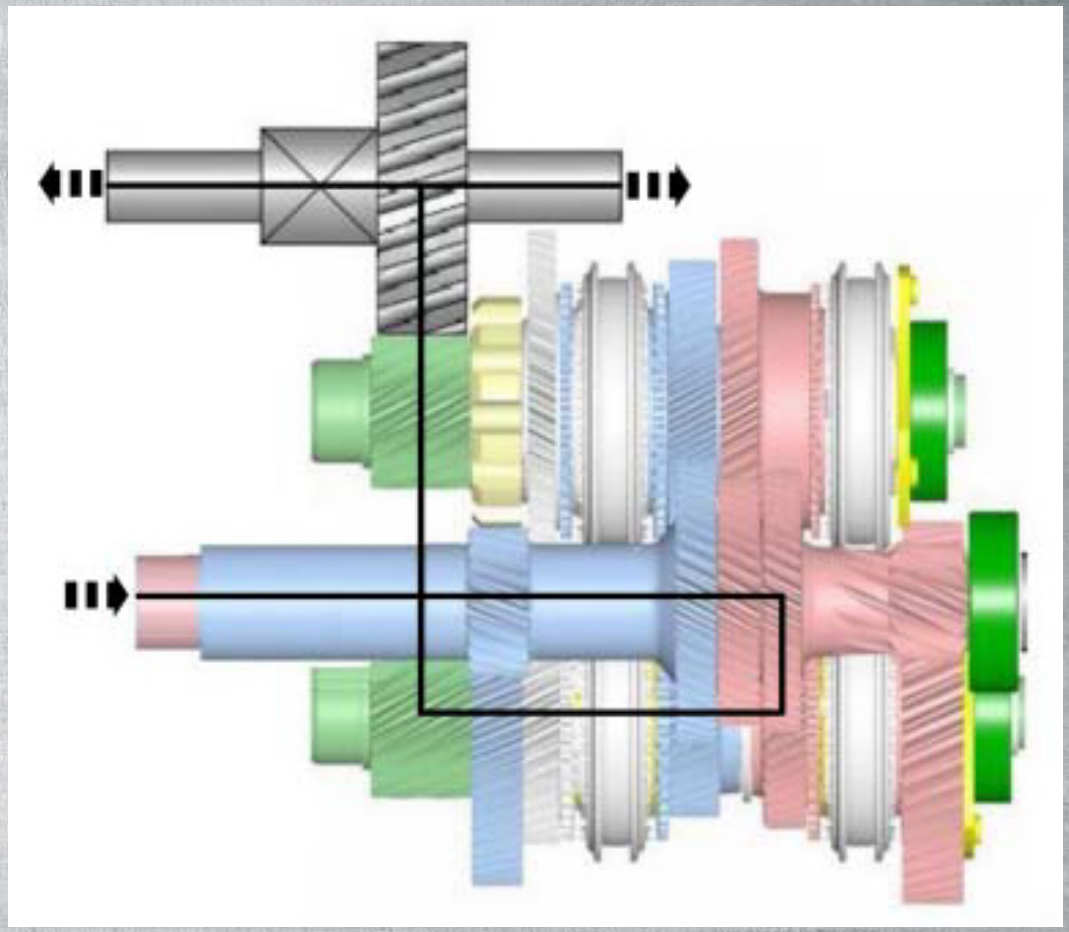


The torque is fed into the double clutch via the drive plate. From there, the torque is transferred via the driving disc, pressure plate 2 and clutch disc 2 onto the input shaft (hollow shaft). The input shaft (hollow shaft) transmits the torque to the fourth gear of the output shaft (3rd, 4th and reverse gear). The torque is transmitted to the differential via the output pinion.

DPS6 Introduction

POWERFLOW (continued)

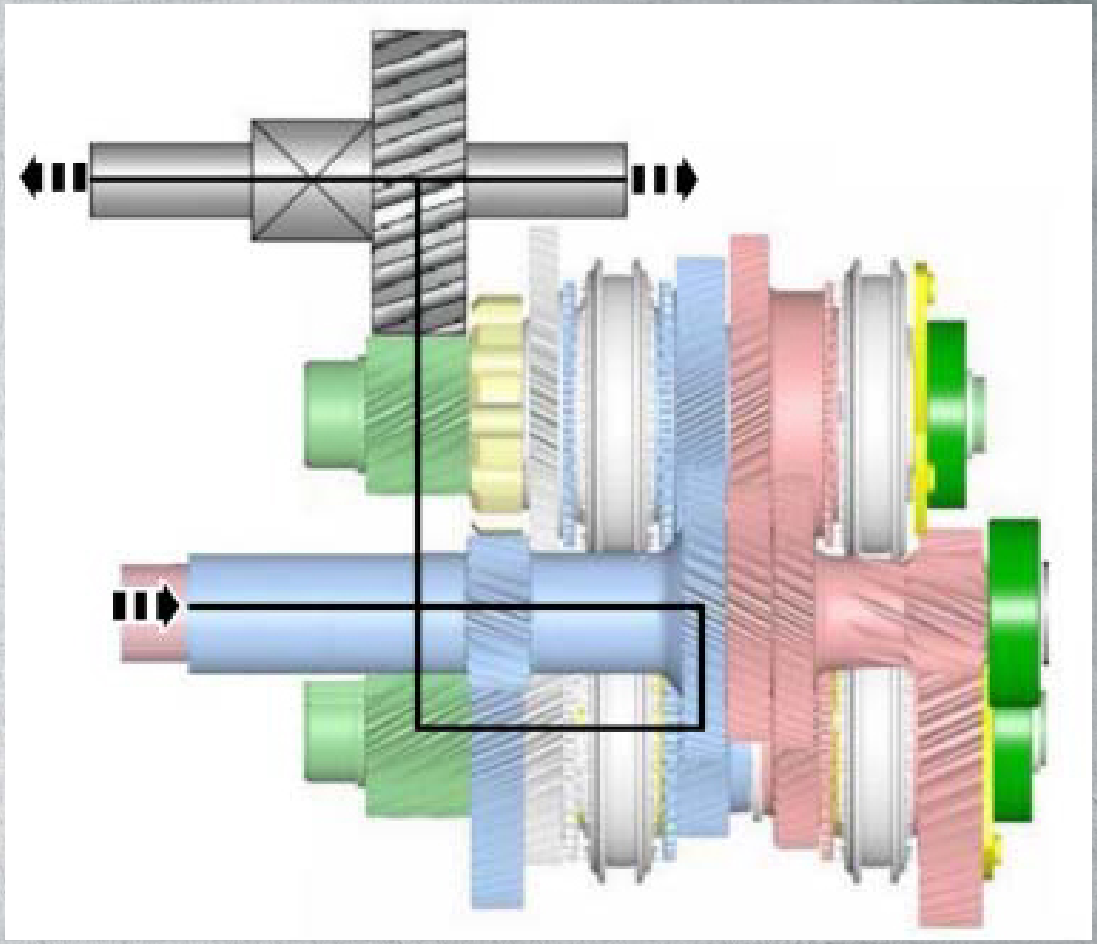
Fifth Gear



The torque is fed into the double clutch via the drive plate. From there, the torque is transferred via the driving disc, pressure plate 1 and clutch disc 1 onto the input shaft (core shaft). The input shaft (core shaft) transmits the torque to the fifth gear of the output shaft (1st, 2nd, 5th and 6th gear). The torque is transmitted to the differential via the output pinion.

POWERFLOW (continued)

Sixth Gear

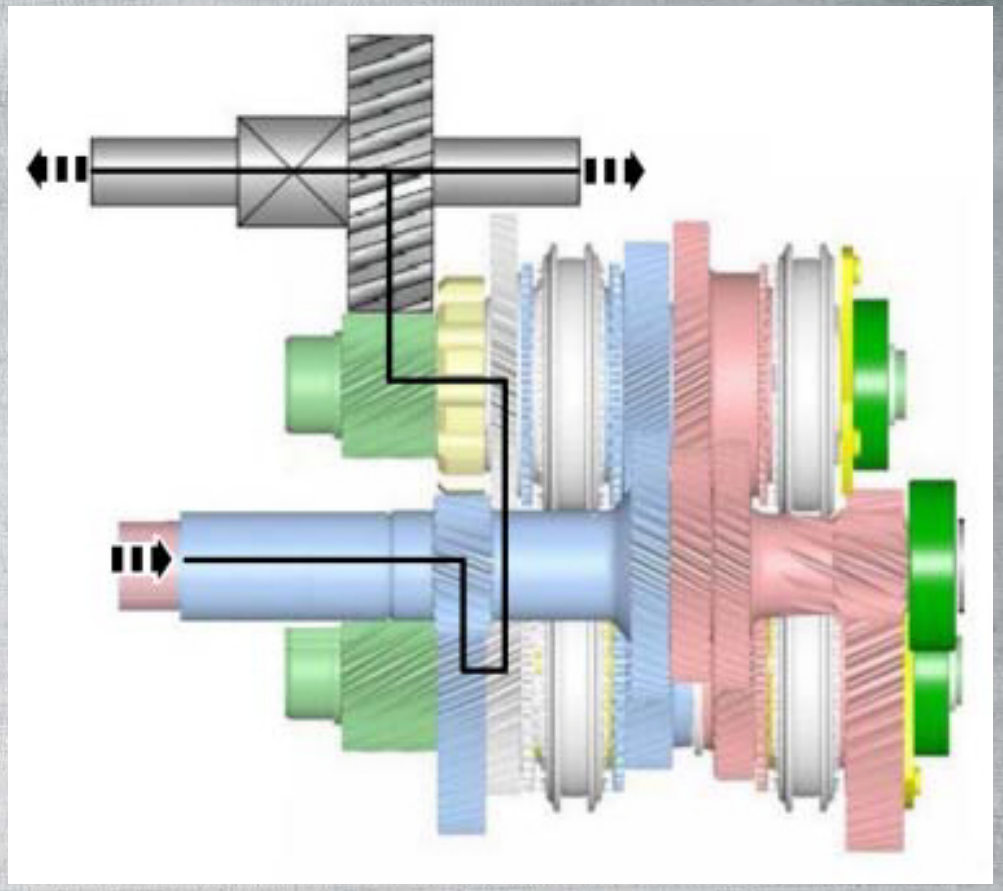


The torque is fed into the double clutch via the drive plate. From there, the torque is transferred via the driving disc, pressure plate 2 and clutch disc 2 onto the input shaft (hollow shaft). The input shaft (hollow shaft) transmits the torque to the sixth gear of the output shaft (1st, 2nd, 5th and 6th gear). The torque is transmitted to the differential via the output pinion.

DPS6 Introduction

POWERFLOW (continued)

Reverse Gear



The torque is fed into the double clutch via the drive plate. From there, the torque is transferred via the driving disc, pressure plate 2 and clutch disc 2 onto the input shaft (hollow shaft). The input shaft (hollow shaft) transmits the torque to the second gear of the output shaft (1st, 2nd, 5th and 6th gear). The gear wheel for the 2nd gear has a fixed connection to the intermediate gear, The intermediate gear transmits the torque to the reverse gear wheel of the output shaft (3rd, 4th and reverse gear). The torque is transmitted to the differential via the output pinion.

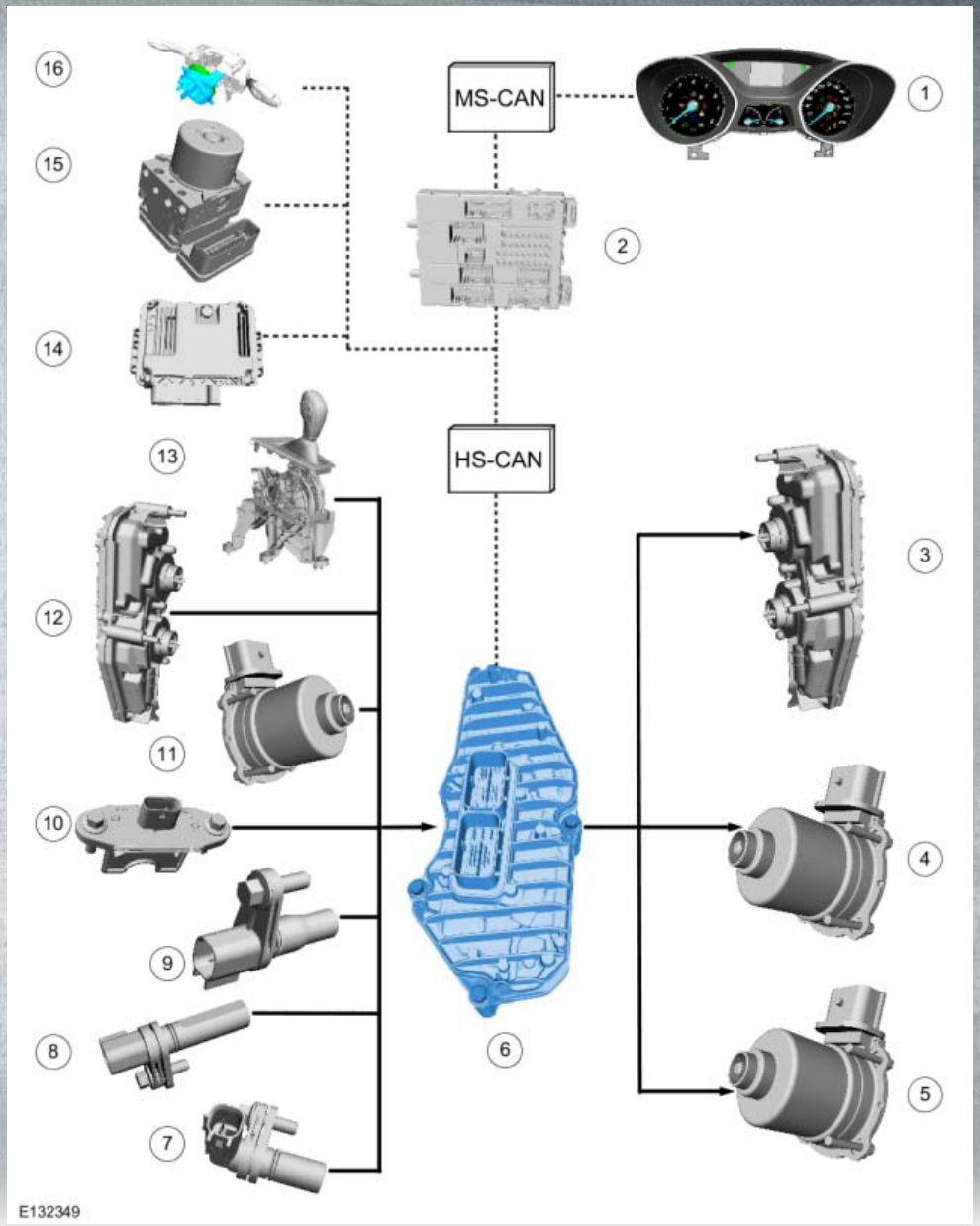
DPS6 Introduction

Shift Mechanism Identification

Shift Mechanism Identification	
1	Gear selector drum 2 with spur gear
2	Selector fork - reverse gear/4th gear
3	Selector fork - 3rd gear
4	Selector fork - 1st/5th gear
5	Gear selector drum 1 with spur gear
6	Shift slot
7	Lower cam
8	Selector fork - 2nd/6th gear
9	Sliding block
10	Upper cam

DPS6 Introduction

Inputs & outputs



DPS6 Introduction

Inputs and Outputs	
1	Instrument Cluster
2	BCM
3	Electric motors in the TCM (actuates the shift forks)
4	DC clutch actuator motor 1
5	DC clutch actuator motor 2
6	TCM
7	ISS sensor 1 of the input shaft (core shaft)
8	ISS sensor 2 of the input shaft (hollow shaft)
9	OSS
10	TR Sensor
11	Hall sensors of the DC clutch actuator motor 1 and 2
12	Hall sensors of the electric shift motors in the TCM
13	Select shift switch
14	PCM
15	ABS
16	Steering wheel rotation sensor

DPS6 Introduction

Special Tools are definitely a must have!

Leaking front seal is the #1 issue with these units right now

Removal tool

Install tool

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