



MERCEDES BENZ 722.9 PRELIMINARY INFORMATION

Mercedes Benz has produced a new 5th generation electronically controlled gearbox with seven forward and two reverse speeds.

Vehicle Application/Transmission Designation

The W7A 700 is the only model size 722.9 being produced at the time of this written material, a smaller model the W7A 400 will be introduced at a later time.

This transmission is referred to as:

- NAG 2 (Neues Automatische Getriebe 2)
- New Automatic Gearbox 2 or 7G- Tronic

Vehicle Applications:

Select non 4MATIC (2WD) MY 2004 vehicles w/M113 engine.

S340, S/CL/E/SL500

Optional:

SLK (R171-09/04)

Standard Equipment:

- CLS 350 (late 2004)
- E350 (late 2004)
- M Class (W164-2005)
- R Class (W251-2005)
- G Class (X164-2006)

End of production models that will unlikely receive the 722.9 would be W163, R170 & V463.

722.9 for W164/W251/X164 will be equipped with shift by wire (no shifter rod or cable). An electronic control module on the left rear side of the transmission just above the pan rail which operates a shift control valve and it's position is monitored by a position sensor.

The 722.6 (NAG 1 or V) will continue production until approximately MY 2012 and installed in:

- 4 cyl models
- Maybach
- M275 vehicles
- some select manufacturer's contract vehicles

Fluid Type

Newly developed suggested use "only" transmission fluid, referred to as "ATF 3353 with *higher* friction consistency, thermal stability and temperature rating. Can also be used on previous model 722.3/.4/.5/.6 transmissions. No scheduled maintenance required (fill for life) and available at Shell & Fuchs Europe oil suppliers in 1 liter bottles under Mercedes Benz part number **A001 989 45 03 10**.

Electronic Control Components

The Transmission Control Module (Y3/8n4) which is

flash capable, along with the following components:

Eight Solenoids:

- Working Pressure Control Solenoid (Y3/8y1)
- K1 Clutch Solenoid (Y3/8y2)
- K2 Clutch Solenoid (Y3/8y3)
- K3 Clutch Solenoid (Y3/8y4)
- B1 Brake Clutch Solenoid (Y3/8y5)
- B2 Brake Clutch Solenoid (Y3/8y6)
- B3 Brake Clutch Solenoid (Y3/8y7)
- Torque Converter Lock Up Solenoid (Y3/8y8)

Two Oil Floats

- Oil Control Float 1 (31)
- Oil Control Float 2 (32)

Three Speed Sensors

- Turbine RPM Sensor (Y3/8n1)
- Internal RPM Sensor (Y3/8n2)
- Output RPM Sensor (Y3/8n3)

Selection Range Sensor (Y3/8s1)

are all integrated into the valve body assembly.

Shift Strategy

The shift strategy improvements include:

- Shorter computer reaction time by 0.1 second
- Downshifts shortened by up to 0.2 seconds
- Coasting downshifts shortened by 0.4/2.5 seconds
- 37-47 MPH acceleration times shortened by 23-
- 28% (model dependant)
- Fuel consumption reduced by up to 4%
- Noise levels reduced, due to lower engine speed in
- 5th, 6th & 7th gear at constant vehicle speed
- Flexible adaptation to vehicle and engine

Variable Shift Programing

Two basic shift programs can be varied by customer (same as 722.6) using the S/C button on the Electronic Shifter Module (ESM)

"S" (Sport)

1st gear starts

Normal shift points

Reverse gear 1 (-3.416:1)

"C" (Comfort)

2nd gear starts

Earlier up-shifts and later downshifts

Reverse gear 2 (-2.231:1)

Note: Transmission will start in first gear if any of the following conditions apply:

- 1st gear is manually selected
- 3/4 to full throttle acceleration from start
- Cold engine temp (pre catalytic warm up)

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Technical Service Information

PRELIMINARY INFORMATION CONTINUED

Shift Optimal Gear (SOG)

Shift into Optimal Gear software as known in previous models.

Up shifts and downshifts based on driving style and engine load (similar to 722.6)

Shift interlock controlled by Electronic Shifter Module (ESM) same as previous models

Emergency function/Limp-home mode:

There are a variety of failsafe modes; if a solenoid is defective the gear affected is blocked (example solenoid Y3/8y7-B3 clutch is defective: no 1st, 7th or Reverse in "S" mode) If hydraulic fault prevents a gear from engaging then the previous gear will be applied. If the computer defaults while driving, all solenoids will be turned off. Solenoids that are normally open will allow full pressure to selected clutches and the transmission will be in 6th gear. After shifting to "P" oil pressure from K2 solenoid is redirected to B2/BR solenoid via emergency operation valves and the transmission will now achieve 2nd in "D" and Reverse.

Gear Ratio

The gear ratios are achieved with four multi-disc brakes and three multi-disc clutches, no free wheels units (sprags)

There are three planetary gear sets:

Two simple

One Ravigneaux

Power Flow charts

Torque Converter (same used in some 722.6)

Torque converter operates in open or slip mode in all seven forward gears.

Lock up converter is never fully locked.

Converter is open in 1st & 2nd gear if throttle and output shaft speed are in "Zone A"

Converter is in slip-control in all 7 forward gear if throttle and output shaft speed are in "Zone B". Oil feed pressure to the converter is varied depending on the amount of slip.

Open: High flow

Slip Control: Lower flow

Lock up clutch will turn off and transmission will shift to a lower gear at oil temperatures of 140C or higher.

Holds = 4 liters of fluid

Incorporates damper springs integral to lock up clutch to reduce vibration.

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Vehicle Towing

If vehicle must be towed it should be transported by use of a flat bed trailer type of tow truck.

Alternate towing with vehicle drive axle lifted.

If either fore mentioned options are not available a tow bar (preferred) will suffice under the following conditions/limitations:

1. Turn key to position 2
2. Selector lever to "N" position
3. Max. towing speed 31 mph
4. Max. towing distance 31 miles

Note: If towing distance or speed exceeds pre mentioned values damage may occur to transmission.

| Clutch Clearances | no. of disc | 722.9 (mm) | 722.93 (mm) |
|---------------------------|--------------------|---------------|----------------|
| B1 Brake | 3 | 2.0-2.4 | |
| | 4 | 2.2-2.6 | 2.2-2.6 |
| | 5 | | 2.3-2.7 |
| B2 Brake (internal tooth) | 4 | 1.7-2.1 | 1.7-2.1 |
| | 5 | 1.8-2.2 | 1.8-2.2 |
| | (external tooth) 5 | 1.7-2.1 | 1.7-2.1 |
| B3 Brake | 6 | 1.8-2.2 | 1.8-2.2 |
| | 3 | 2.0-2.4 | 2.0-2.4 |
| | 4 | 2.2-2.6 | 2.2-2.6 |
| Br Brake | 5 | 2.3-2.7 | 2.3-2.7 |
| | N/A | 1.0-1.4 | 1.0-1.4 |
| K1 Clutch | 3 | 2.0-2.4 | |
| | 4 | 2.2-2.6 | |
| | 5 | 2.4-2.8 | 2.4-2.8 |
| K2 Clutch | 6 | 2.4-2.8 | |
| | 3 | 1.7-2.1 | |
| | 4 | 1.9-2.3 | |
| K3 Clutch | 5 | 2.1-2.5 | |
| | 6 | 2.2-2.6 | 1.9-2.3 |
| | 7 | | 2.0-2.4 |
| | 8 | | 2.1-2.5 |
| | 3 | | 2.4-2.8 |
| | 4 | 2.2-2.6 | |
| | 5 | 2.4-2.8 | |

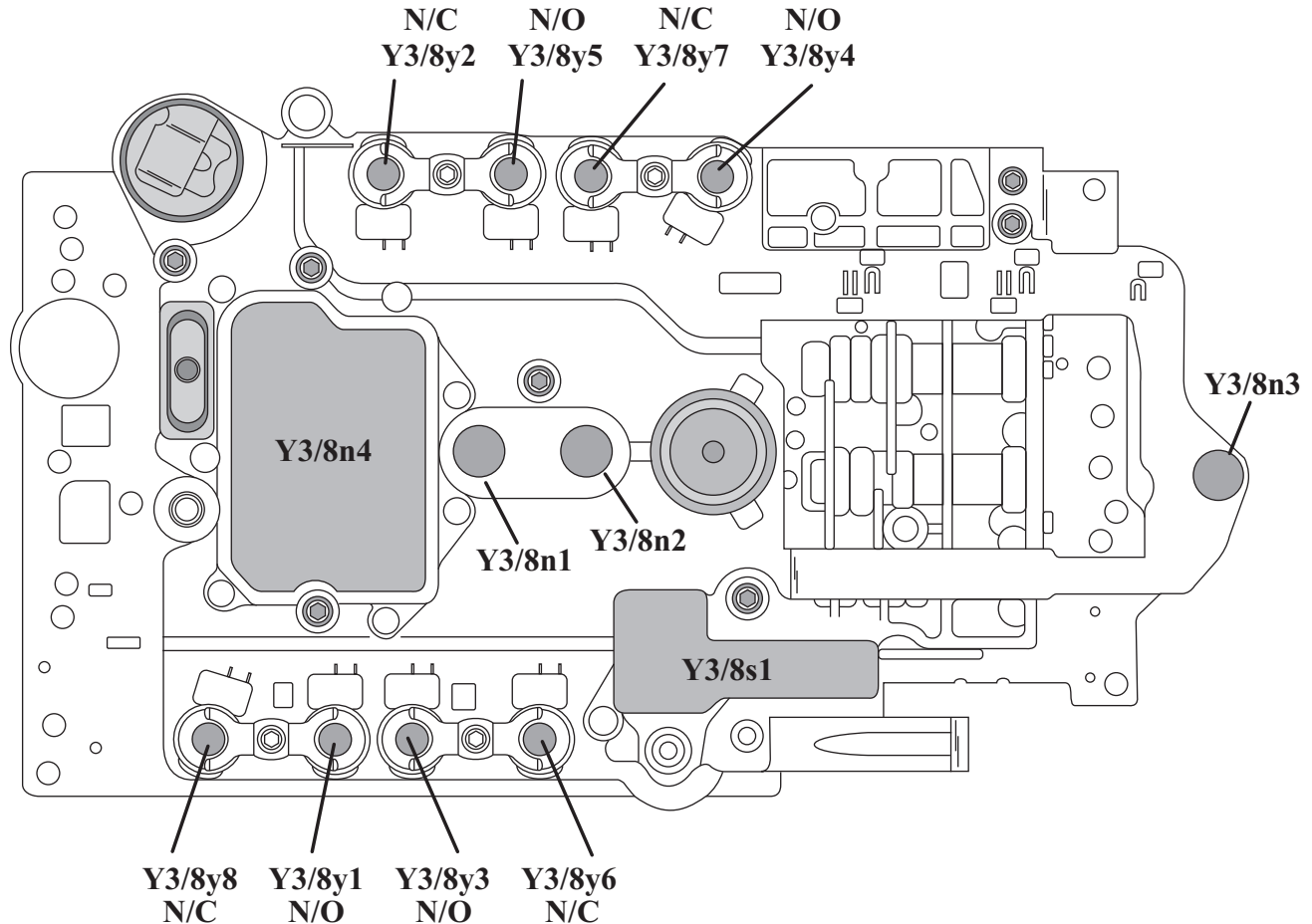
All clutch clearances are measured between the Flange and retainer ring, while applying the amount of hand pressure listed below.

B1 = N 600 B2 = N 1000 B3 = N 600

BR = N/A K1 = N 800 K2 = N 1200

K3 = N 600

Note: B2 Brake multi disc clutches use single sided plates at this point in time other clutch members may use single sided plates at a future date.



Y3/8n1 = Input speed sensor (front)

Y3/8n2 = Internal speed sensor (center)

Y3/8n3 = Output speed sensor (rear/hall affect)

Y3/8n4 = Electrohydraulic Control Module (ECM) (w/internal transmission fluid temp sensor)

Y3/8y1 = Working Pressure (line/normally open: no current max. pressure/high current low pressure)

Y3/8y2 = K1 clutch (normally closed: high current high pressure/no current no pressure)

Y3/8y3 = K2 clutch (line/normally open: no current max. pressure/high current low pressure)

Y3/8y4 = K3 clutch (line/normally open: no current max. pressure/high current low pressure)

Y3/8y5 = B1 brake (line/normally open: no current max. pressure/high current low pressure)

Y3/8y6 = B2 brake (normally closed: high current high pressure/no current no pressure)

Y3/8y7 = B3 brake (normally closed: high current high pressure/no current no pressure)

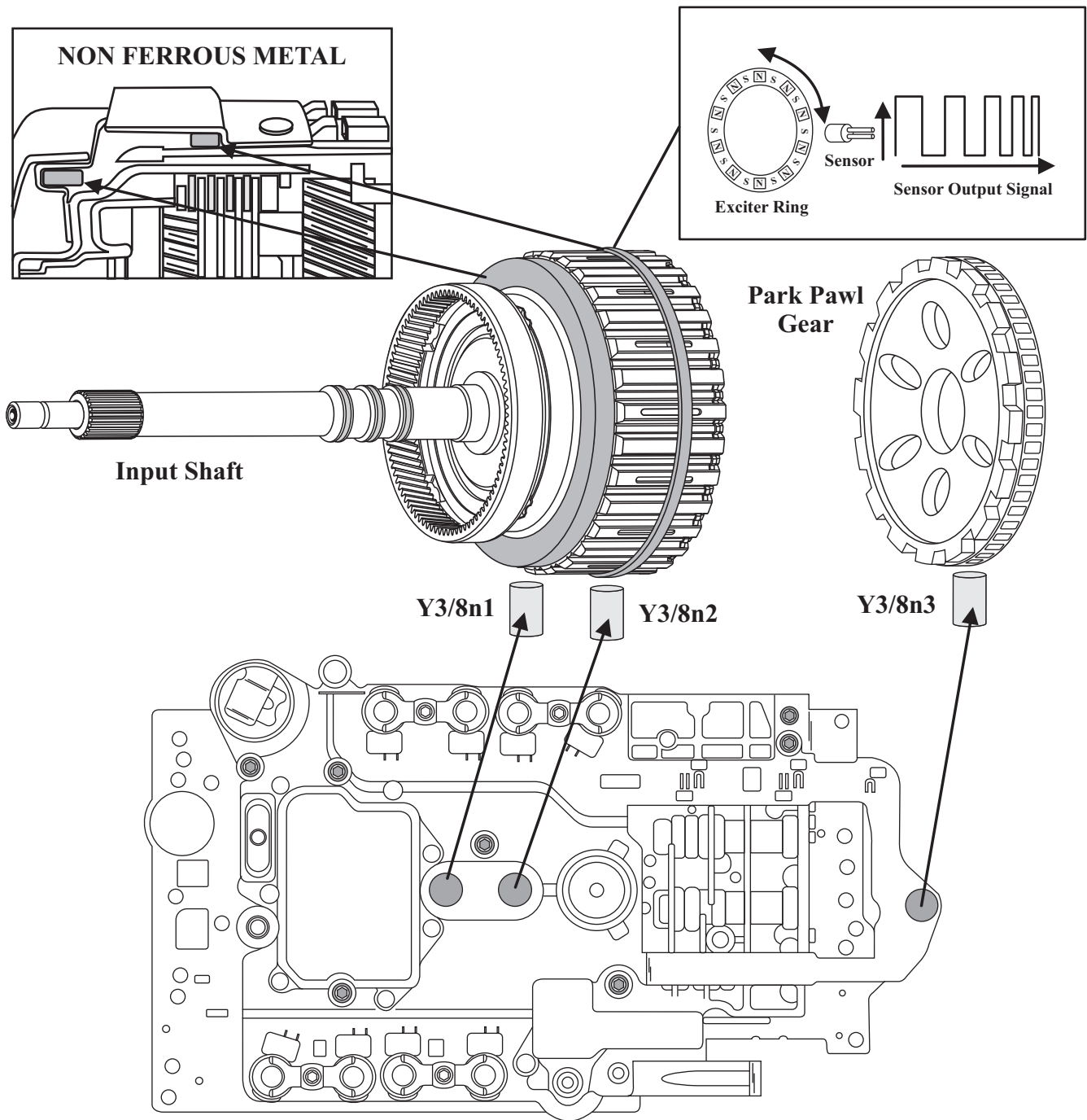
Y3/8y8 = Lock-up (normally closed: high current high pressure/no current no pressure)

Y3/8s1 = Range sensor

Note: Normally open solenoids are used for Limp Mode w/no current to transmission.

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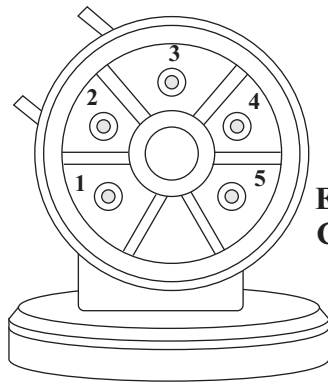
SPEED SENSORS



Front speed sensor Y3/8n1; monitors Turbine speed (input shaft / small ring gear)
 Center speed sensor Y3/8n2 monitors Ravigneaux carrier speed (ring gear of rear planet)
 Rear speed sensor Y3/8n3 monitors Park Pawl gear (exciter ring/2 hall effect)
 Note: Magnets are molded in a plastic ring and secured inside Non Ferrous flanges

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RANGE SENSOR & ELECTRICAL CONNECTOR



ELECTRICAL CONNECTOR

ONLY 5 PINS

(2 round o-rings & 1 square o-ring)

1: CAN C High

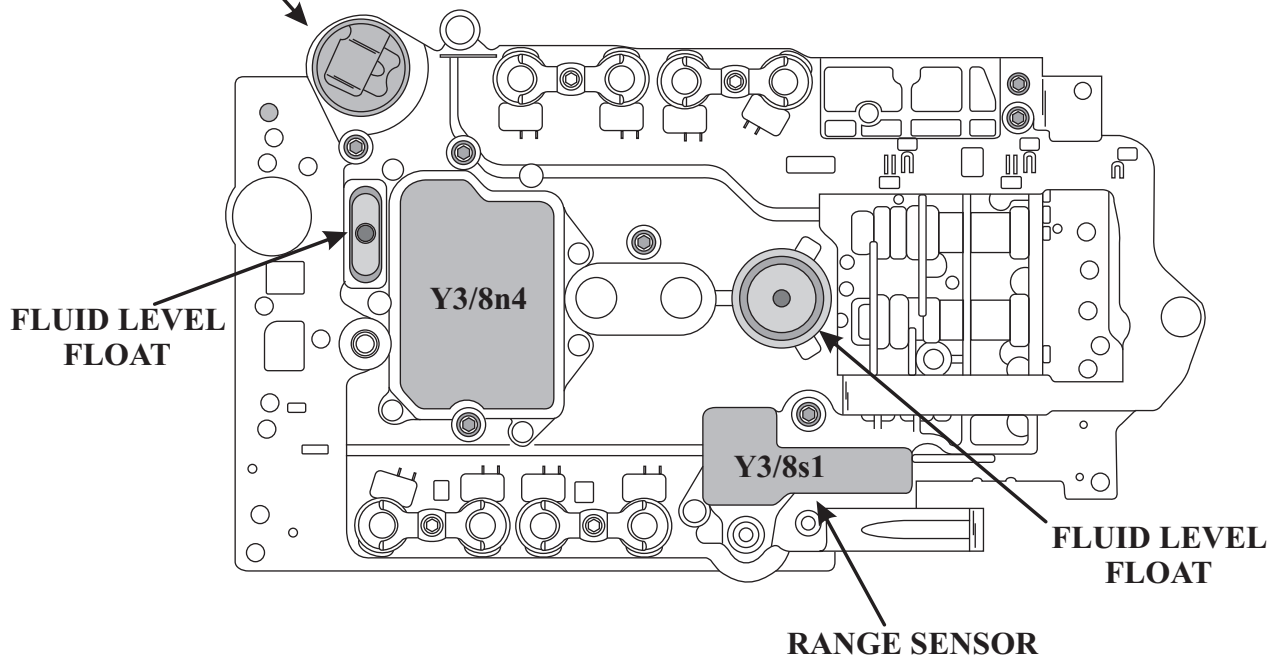
2: CAN C Low

3: According to wire diagram for diagnostics not known yet

4: Circuit 87 (relay & fuse depending on model)

5: Circuit 31

Note: SDS communicates to CGW via CAN-D then to ECM over CAN-C



Y3/8s1 Range sensor: Soldered to ECM ribbon cable / not replaced separately / Permanent Magnetic Linear Contactless Displacement (PLCD) sensor / Permanent magnet on manual valve changes magnetic field and output voltage / if not learned or faulty will cause limp mode.

Fluid Level Floats (2): To prevent oil foaming from gears running in fluid / front one was added due to transmission extended length (41mm) oil sloshes forward during hard stops

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MERCEDES BENZ 722.9 COMPONENT APPLICATION

SHIFT MEMBER APPLICATION & SOLENOID FUNCTION

| Shift Member | B1 | B2* | B3 | BR* | K1 | K2 | K3 |
|----------------|------------|------------|------------|------------|------------|------------|------------|
| Solenoid | Y3/8y5 | Y3/8y6 | Y3/8y7 | Y3/8y6 | Y3/8y2 | Y3/8y3 | Y3/8y4 |
| Solenoid State | Press/Curr | Press/Curr | Press/Curr | Press/Curr | Press/Curr | Press/Curr | Press/Curr |
| Gear Ratio | ↘ | ↗ | ↗ | | ↗ | ↘ | ↘ |
| 1 4.377 | C:Max/P:0 | X/C:V/P:V | X/C:V/P:V | | C:0/P:0 | C:Max/P:0 | X/C:V/P:V |
| 2 2.859 | X/C:V/P:V | X/C:V/P:V | C:0/P:0 | | C:0/P:0 | C:Max/P:0 | X/C:V/P:V |
| 3 1.921 | C:Max/P:0 | X/C:V/P:V | C:0/P:0 | | X/C:V/P:V | C:Max/P:0 | X/C:V/P:V |
| 4 1.368 | C:Max/P:0 | X/C:V/P:V | C:0/P:0 | | X/C:V/P:V | X/C:V/P:V | C:Max/P:0 |
| 5 1.000 | C:Max/P:0 | C:0/P:0 | C:0/P:0 | | X/C:V/P:V | X/C:V/P:V | X/C:V/P:V |
| 6 0.820 | X/C:V/P:V | C:0/P:0 | C:0/P:0 | | C:0/P:0 | X/C:V/P:V | X/C:V/P:V |
| 7 0.728 | C:Max/P:0 | C:0/P:0 | X/C:V/P:V | | C:0/P:0 | X/C:V/P:V | X/C:V/P:V |
| N (1) | C:Max/P:0 | C:0/P:0 | X/C:V/P:V | C:0/P:0 | C:0/P:0 | C:Max/P:0 | X/C:V/P:V |
| N (2) | X/C:V/P:V | C:0/P:0 | C:0/P:0 | C:0/P:0 | C:0/P:0 | C:Max/P:0 | X/C:V/P:V |
| R (1) -3.416 | C:Max/P:0 | See BR | X/C:V/P:V | X/C:V/P:V | C:0/P:0 | C:Max/P:0 | X/C:V/P:V |
| R (2) -2.231 | X/C:V/P:V | See BR | C:0/P:0 | X/C:V/P:V | C:0/P:0 | C:Max/P:0 | X/C:V/P:V |

X = Shift member applied C = Current applied to solenoid P = Pressure from solenoid 0 = Zero
V = Variable M = Maximum

*B2 & BR share the same solenoid the oil is directed to a different clutch members by the selector shift valve

↗ No Current: Zero Pressure

(1): "S" Mode (safe)

↘ No Current: Maximum Pressure

(2): "C" Mode (comfort)

Failsafe while driving all solenoids will be turned off, transmission will shift to 6th gear.

Solenoids for B1, K2 & K3 clutch provide maximum pressure w/o current.

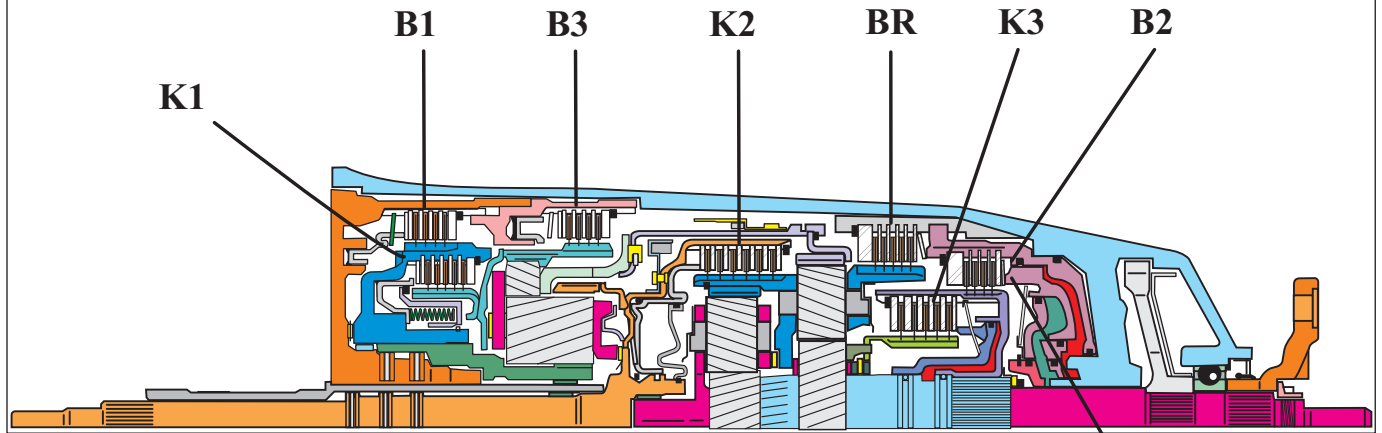
After engaging Park then Drive: only 2nd & Reverse gear are available.

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CLUTCH POSITION & APPLICATION

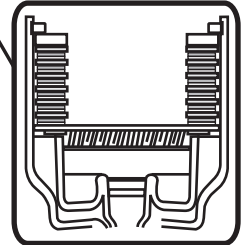


NO FREEWHEEL (SPRAG)

Note: During each shift one clutch is applied as another is released.

B2 Multi Disc Brake use Single Side Plates.

B3 & K3 are applied in "N" only one clutch is needed in any drive gear.



| Gear | Gear Ratio W7A 700 | B1 | B2 | B3 | BR | K1 | K2 | K3 |
|-------|-----------------------|----|----|----|----|----|----|----|
| 1 | 4.377 | | X | X | | | | X |
| 2 | 2.859 | X | X | | | | | X |
| 3 | 1.921 | | X | | | X | | X |
| 4 | 1.368 | | X | | | X | X | |
| 5 | 1.000 | | | | | X | X | X |
| 6 | 0.820 | X | | | | | X | X |
| 7 | 0.728 | | | X | | | X | X |
| N (1) | | | | X | | | | X |
| R (1) | -3.416 | | | X | X | | | X |
| R (2) | -2.231 | X | | | X | | | X |

(1) S Mode (2) C Mode (X) Applied

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MERCEDES BENZ 722.9

SHIFT SEQUENCES

| | B1 | B2 | B3 | K1 | K2 | K3 |
|----------|----|----|----|----|----|----|
| 7th Gear | | | X | | X | X |
| 6th Gear | X | | | | X | X |
| 5th Gear | | | | X | X | X |
| 4th Gear | | X | | X | X | |
| 3rd Gear | | X | | X | | X |
| 2nd Gear | X | X | | | | X |
| 1st Gear | | X | X | | | X |

Release B3

7

Release K2

Apply K1

6

5

Release K2

4

Apply B2

3

Release K1

2

Apply B2

Apply B3

1

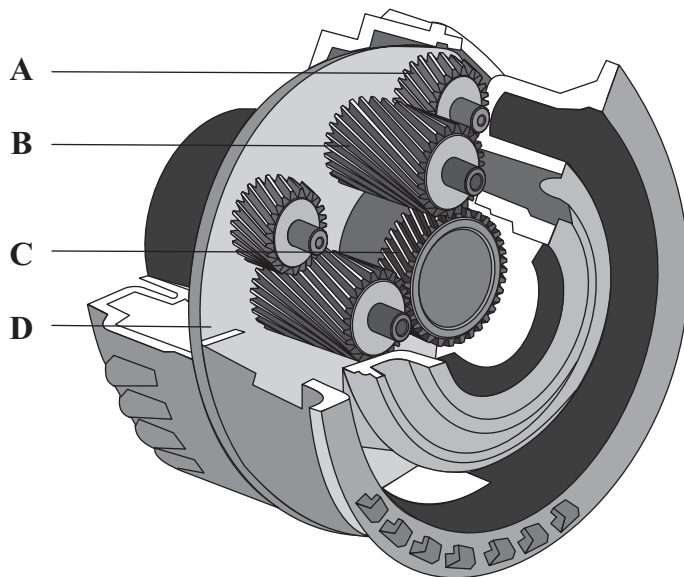
The 722.9 transmission has Sequential shifting (clutch on clutch) in addition to providing a down shift strategy that allows the transmission to skip gears during down shifts as long as one clutch member is released as another is applied.

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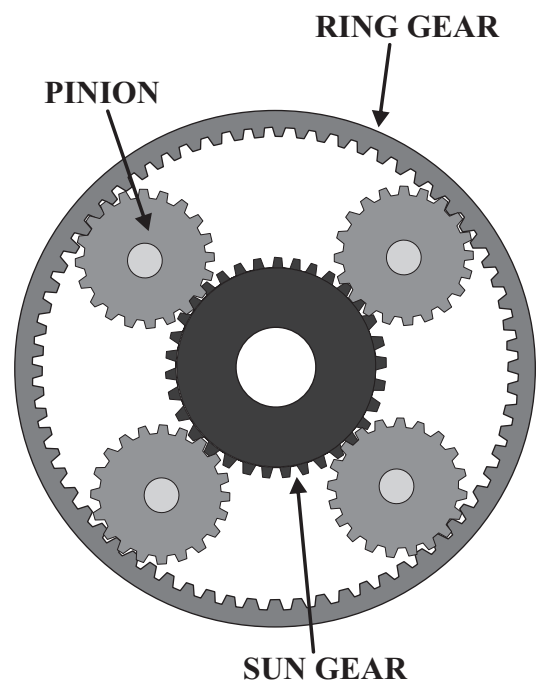
MERCEDES BENZ 722.9 POWER FLOW

1 RAVIGNEAUX & 2 SIMPLE TYPE PLANETARY GEAR SET

RAVIGNEAUX



SIMPLE



- A: Short Planetary Gear** (running on larger ring gear)
- B: Long Planetary Gear** (running on smaller ring gear)
- C: Sun Gear**
- D: Planetary Gear Carrier**

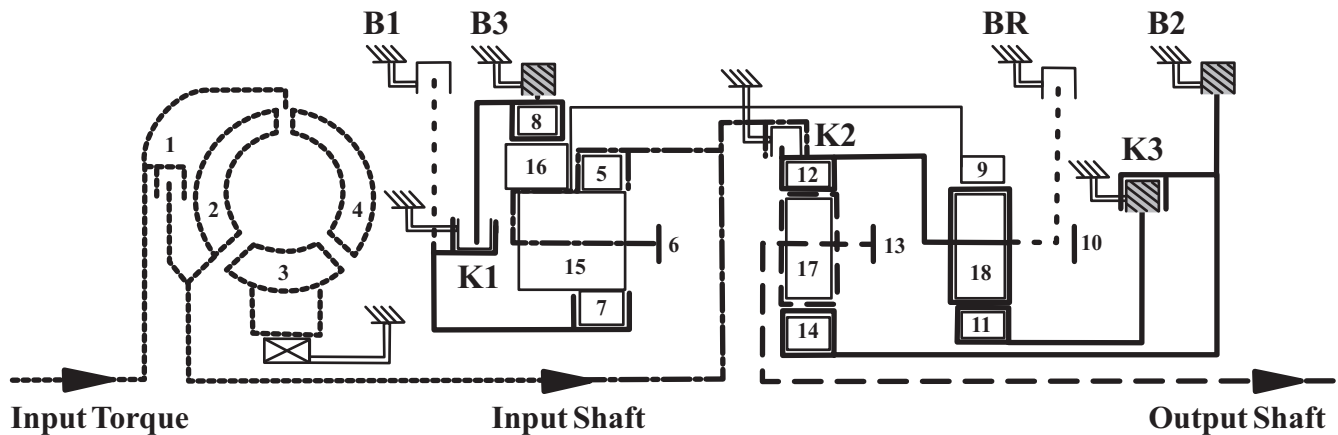
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Technical Service Information

MERCEDES BENZ 722.9

POWER FLOW

Power Flow 1st Gear



The Ravigneaux Planet Small Ring Gear (5) is driven by the Input Shaft. The Long Planet Gears (15) drive the Short Planet Gears (16) to rotate inside the Large Ring Gear (8) held by the B3 Brake Clutch. An increase in torque and reduced rpm is transmitted to the Dual Planet Carrier (6). The Single Rear Planet Ring Gear (9) rotates at the same speed as it is mechanically connected to the Dual Planet Carrier. The Planet Gears (18) rotate around Sun Gear (11) held by the K3 Clutch and rotate Planet Carrier (10). The Single Front Planet Ring Gear (12) is mechanically connected to the Planet Carrier (10) and rotates at the same speed. Planetary Gears (17) rotate around Sun Gear (14) which is held by the B2 Brake Clutch and transfers the increased torque and reduced rotational speed to the Output Shaft through Planet Carrier (13). The Output Shaft rotates with reduced input speed in the direction of engine rotation at a ratio of 4.377.

Ravigneaux gear set:

Short Planet Gears (16)
Long Planet Gears (15)
Small Ring Gear (5)
Dual Planet Carrier (6)
Sun Gear (7)
Large Ring Gear (8)

Front Single Planet Gear Set:

Planetary Gears (17)
Ring Gear (12)
Planet Carrier (13)
Sun Gear (14)

Rear Single Planet Gear Set:

Planetary Gears (18)
Ring Gear (9)
Planet Carrier (10)
Sun Gear (11)

1 Torque Converter Lockup Clutch
2 Turbine Wheel
3 Stator
4 Impeller
5 Small Internal Geared Wheel
6 Dual Planet Carrier
7 Sun Gear
8 Large Internal Geared Wheel
9 Internal Geared Wheel
10 Single Planetary Carrier
11 Sun Gear
12 Internal Geared Wheel

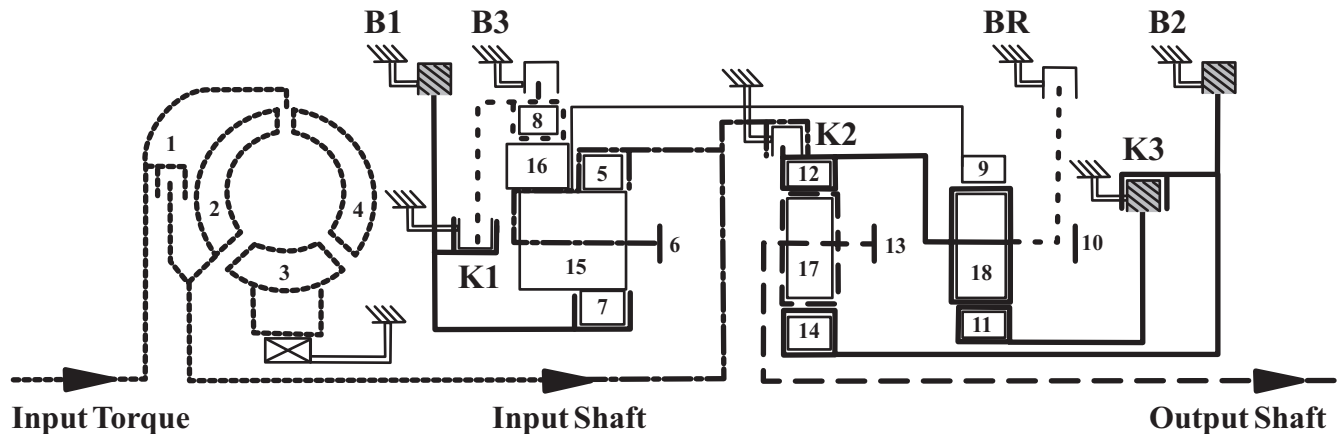
13 Single Planetary Carrier
14 Sun Gear
15 Long Planet gears
16 Planet Gears
17 Planet Gears
BR Multi-Disc Brake (BR)
B1 Multi-Disc Brake (B1)
B2 Multi-Disc Brake (B2)
B3 Multi-Disc Brake (B3)
K1 Multi-Disc Clutch (K1)
K2 Multi-Disc Clutch (K2)
K3 Multi-Disc Clutch (K3)

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POWER FLOW

Power Flow 2nd Gear



The Ravigneaux Planet Small Ring Gear (5) is driven by the Input Shaft. The Long Planet Gears (15) rotate around Sun Gear (7) which is held by the B1 Brake Clutch. An increase in torque and reduced rpm is transmitted to the Dual Planet Carrier (6). The Single Rear Planet Ring Gear (9) rotates at the same speed as it is mechanically connected to the Dual Planet Carrier. The Planet Gears (18) rotate around Sun Gear (11) held by the K3 Clutch and rotate Planet Carrier (10). The Single Front Planet Ring Gear (12) is connected mechanically to the Planet Carrier (10) and rotates at the same speed. Planetary Gears (17) rotate around Sun Gear (14) which is held by the B2 Brake Clutch and transfers the increased torque and reduced rotational speed to the Output Shaft through Planet Carrier (13). The Output Shaft rotates with reduced input speed in the direction of engine rotation at a ratio of 2.859.

Ravigneaux gear set:

Short Planet Gears (16)
Long Planet Gears (15)
Small Ring Gear (5)
Dual Planet Carrier (6)
Sun Gear (7)
Large Ring Gear (8)

Front Single Planet Gear Set:

Planetary Gears (17)
Ring Gear (12)
Planet Carrier (13)
Sun Gear (14)

Rear Single Planet Gear Set:

Planetary Gears (18)
Ring Gear (9)
Planet Carrier (10)
Sun Gear (11)

1 Torque Converter Lockup Clutch
2 Turbine Wheel
3 Stator
4 Impeller
5 Small Internal Geared Wheel
6 Dual Planet Carrier
7 Sun Gear
8 Large Internal Geared Wheel
9 Internal Geared Wheel
10 Single Planetary Carrier
11 Sun Gear
12 Internal Geared Wheel

13 Single Planetary Carrier
14 Sun Gear
15 Long Planet gears
16 Planet Gears
17 Planet Gears
BR Multi-Disc Brake (BR)
B1 Multi-Disc Brake (B1)
B2 Multi-Disc Brake (B2)
B3 Multi-Disc Brake (B3)
K1 Multi-Disc Clutch (K1)
K2 Multi-Disc Clutch (K2)
K3 Multi-Disc Clutch (K3)

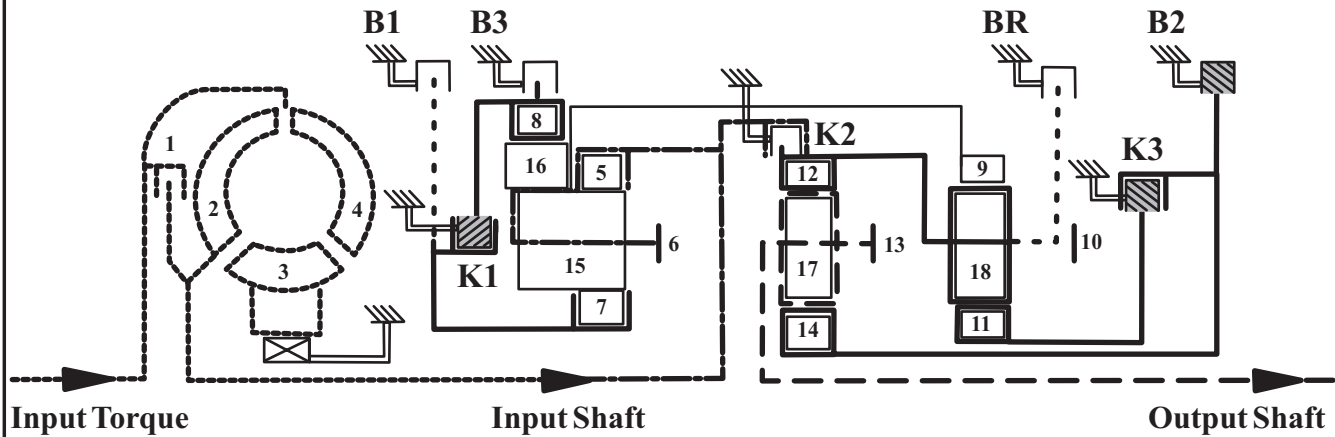
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Technical Service Information

MERCEDES BENZ 722.9

POWER FLOW

Power Flow 3rd Gear



With the K1 Clutch engaged, the Ravigneaux Planetary Gear set components (5, 6, 7, 8, 15 & 16) are locked together and send Input Torque and Input Speed unchanged to Ring Gear (9). The Single Rear Planet Ring Gear (9) drives the Planet Gears (18) to rotate around Sun Gear (11) held by the K3 Clutch and rotate Planet Carrier (10). The Single Front Planet Ring Gear (12) is connected mechanically to the Planet Carrier (10) and rotates at the same speed. Planetary Gears (17) rotate around Sun Gear (14) which is held by the B2 Brake Clutch and transfers the increased torque and reduced rotational speed to the Output Shaft through Planet Carrier (13). The Output Shaft rotates with reduced input speed in the direction of engine rotation at a ratio of 1.921.

Ravigneaux gear set:

Short Planet Gears (16)
Long Planet Gears (15)
Small Ring Gear (5)
Dual Planet Carrier (6)
Sun Gear (7)
Large Ring Gear (8)

Front Single Planet Gear Set:

Planetary Gears (17)
Ring Gear (12)
Planet Carrier (13)
Sun Gear (14)

Rear Single Planet Gear Set:

Planetary Gears (18)
Ring Gear (9)
Planet Carrier (10)
Sun Gear (11)

1 Torque Converter Lockup Clutch
2 Turbine Wheel
3 Stator
4 Impeller
5 Small Internal Geared Wheel
6 Dual Planet Carrier
7 Sun Gear
8 Large Internal Geared Wheel
9 Internal Geared Wheel
10 Single Planetary Carrier
11 Sun Gear
12 Internal Geared Wheel

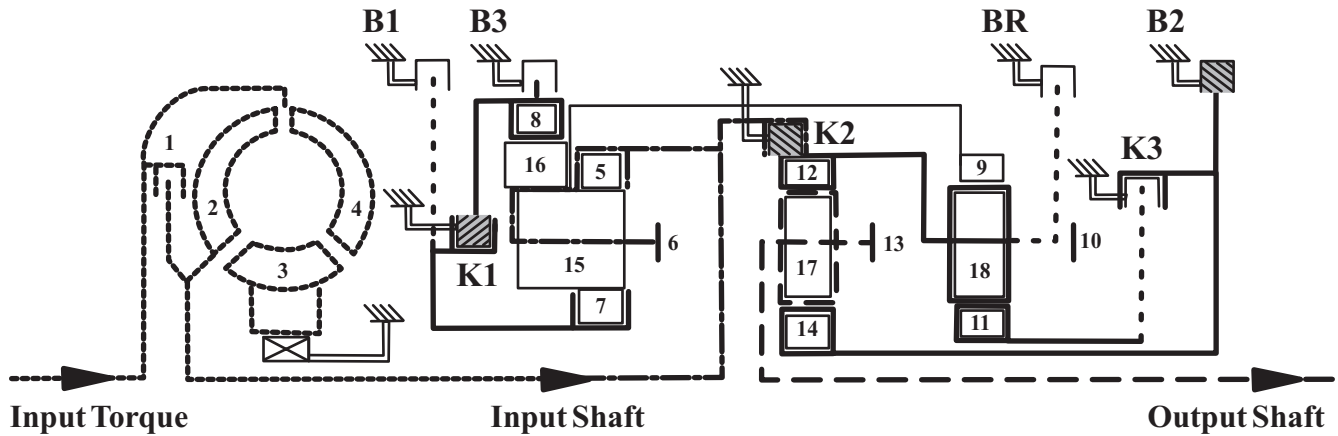
13 Single Planetary Carrier
14 Sun Gear
15 Long Planet gears
16 Planet Gears
17 Planet Gears
BR Multi-Disc Brake (BR)
B1 Multi-Disc Brake (B1)
B2 Multi-Disc Brake (B2)
B3 Multi-Disc Brake (B3)
K1 Multi-Disc Clutch (K1)
K2 Multi-Disc Clutch (K2)
K3 Multi-Disc Clutch (K3)

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MERCEDES BENZ 722.9

POWER FLOW

Power Flow 4th Gear



With the K1 Clutch engaged, the Ravigneaux Planetary Gear set components (5, 6, 7, 8, 15 & 16) are locked together and send Input Torque and Input Speed unchanged to the Ring Gear (9). With the K2 Clutch engaged the Single Rear Planet Ring Gear (9) and Single Front Planet Ring Gear (12) rotate at the same speed. The Single Rear Planetary system is locked and not involved in the gear ratio. The engaged K2 Clutch drives the Single Front Planet Ring Gear (12) at Input Speed. The Planetary Gears (17) rotate around Sun Gear (14) which is held by the B2 Brake Clutch and transfers the increased torque and reduced rotational speed to the Output Shaft through Planet Carrier (13). The Output Shaft rotates with reduced input speed in the direction of engine rotation at a ratio of 1.368.

Ravigneaux gear set:

Short Planet Gears (16)
Long Planet Gears (15)
Small Ring Gear (5)
Dual Planet Carrier (6)
Sun Gear (7)
Large Ring Gear (8)

Front Single Planet Gear Set:

Planetary Gears (17)
Ring Gear (12)
Planet Carrier (13)
Sun Gear (14)

Rear Single Planet Gear Set:

Planetary Gears (18)
Ring Gear (9)
Planet Carrier (10)
Sun Gear (11)

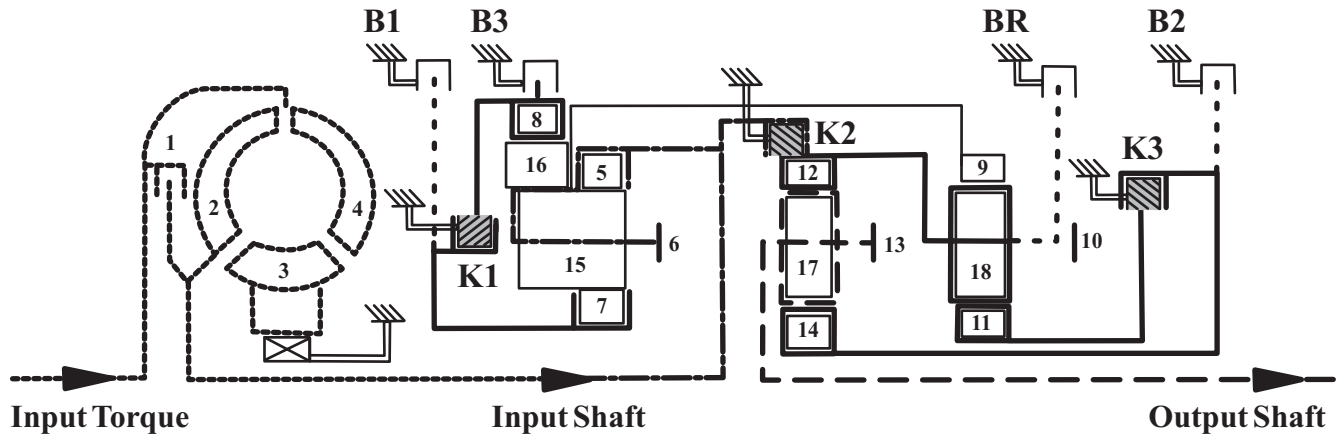
1 Torque Converter Lockup Clutch
2 Turbine Wheel
3 Stator
4 Impeller
5 Small Internal Geared Wheel
6 Dual Planet Carrier
7 Sun Gear
8 Large Internal Geared Wheel
9 Internal Geared Wheel
10 Single Planetary Carrier
11 Sun Gear
12 Internal Geared Wheel

13 Single Planetary Carrier
14 Sun Gear
15 Long Planet gears
16 Planet Gears
17 Planet Gears
BR Multi-Disc Brake (BR)
B1 Multi-Disc Brake (B1)
B2 Multi-Disc Brake (B2)
B3 Multi-Disc Brake (B3)
K1 Multi-Disc Clutch (K1)
K2 Multi-Disc Clutch (K2)
K3 Multi-Disc Clutch (K3)

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MERCEDES BENZ 722.9 POWER FLOW

Power Flow 5th Gear



With the K1, K2 and K3 Clutch engaged, the Power Flow runs from the Input Shaft via the locked Ravigneaux Planetary Gear set components (5, 6, 7, 8, 15 & 16) and the locked Front Single Planetary Gear set (12, 13, 14 & 17) to the Output Shaft and rotate at the same speed as the Input shaft in the direction of engine rotation at a ratio of 1.000.

Ravigneaux gear set:

Short Planet Gears (16)
Long Planet Gears (15)
Small Ring Gear (5)
Dual Planet Carrier (6)
Sun Gear (7)
Large Ring Gear (8)

Front Single Planet Gear Set:

Planetary Gears (17)
Ring Gear (12)
Planet Carrier (13)
Sun Gear (14)

Rear Single Planet Gear Set:

Planetary Gears (18)
Ring Gear (9)
Planet Carrier (10)
Sun Gear (11)

1 Torque Converter Lockup Clutch
2 Turbine Wheel
3 Stator
4 Impeller
5 Small Internal Geared Wheel
6 Dual Planet Carrier
7 Sun Gear
8 Large Internal Geared Wheel
9 Internal Geared Wheel
10 Single Planetary Carrier
11 Sun Gear
12 Internal Geared Wheel

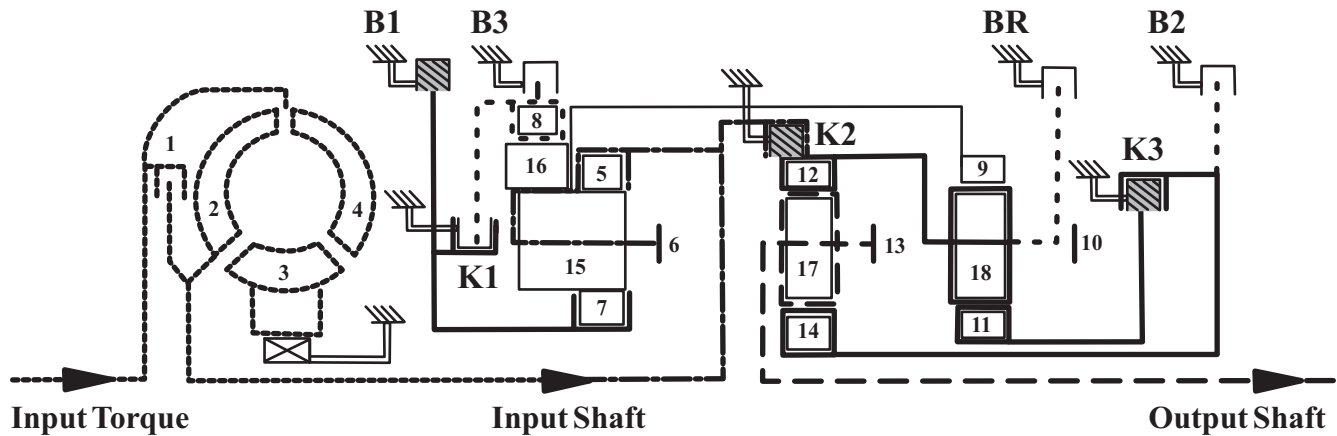
13 Single Planetary Carrier
14 Sun Gear
15 Long Planet gears
16 Planet Gears
17 Planet Gears
BR Multi-Disc Brake (BR)
B1 Multi-Disc Brake (B1)
B2 Multi-Disc Brake (B2)
B3 Multi-Disc Brake (B3)
K1 Multi-Disc Clutch (K1)
K2 Multi-Disc Clutch (K2)
K3 Multi-Disc Clutch (K3)

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MERCEDES BENZ 722.9

POWER FLOW

Power Flow 6th Gear



The Ravigneaux Planet Small Ring Gear (5) is driven by the Input Shaft. The Long Planet Gears (15) rotate around Sun Gear (7) which is held by the B1 Brake Clutch. An increase in torque and reduced rpm is transmitted to the Dual Planet Carrier (6). The Single Rear Planet Ring Gear (9) rotates at the same speed as it is mechanically connected to the Dual Planet Carrier. The Planet Gears (18) rotate Sun Gear (11) which rotates Sun Gear (14) by the engaged K3 Clutch. Input Torque and Input Speed are transmitted to the Single Front Planet Ring Gear (12) by the engaged K2 Clutch. The speed difference between the Sun Gear (14) and Ring Gear (12) produces an increased speed and reduced torque to the Output Shaft through Planet Carrier (13). The Output Shaft rotates with reduced input speed in the direction of engine rotation at a ratio of 0.820.

Ravigneaux gear set:

Short Planet Gears (16)
Long Planet Gears (15)
Small Ring Gear (5)
Dual Planet Carrier (6)
Sun Gear (7)
Large Ring Gear (8)

Front Single Planet Gear Set:

Planetary Gears (17)
Ring Gear (12)
Planet Carrier (13)
Sun Gear (14)

Rear Single Planet Gear Set:

Planetary Gears (18)
Ring Gear (9)
Planet Carrier (10)
Sun Gear (11)

1 Torque Converter Lockup Clutch
2 Turbine Wheel
3 Stator
4 Impeller
5 Small Internal Geared Wheel
6 Dual Planet Carrier
7 Sun Gear
8 Large Internal Geared Wheel
9 Internal Geared Wheel
10 Single Planetary Carrier
11 Sun Gear
12 Internal Geared Wheel

13 Single Planetary Carrier
14 Sun Gear
15 Long Planet gears
16 Planet Gears
17 Planet Gears
BR Multi-Disc Brake (BR)
B1 Multi-Disc Brake (B1)
B2 Multi-Disc Brake (B2)
B3 Multi-Disc Brake (B3)
K1 Multi-Disc Clutch (K1)
K2 Multi-Disc Clutch (K2)
K3 Multi-Disc Clutch (K3)

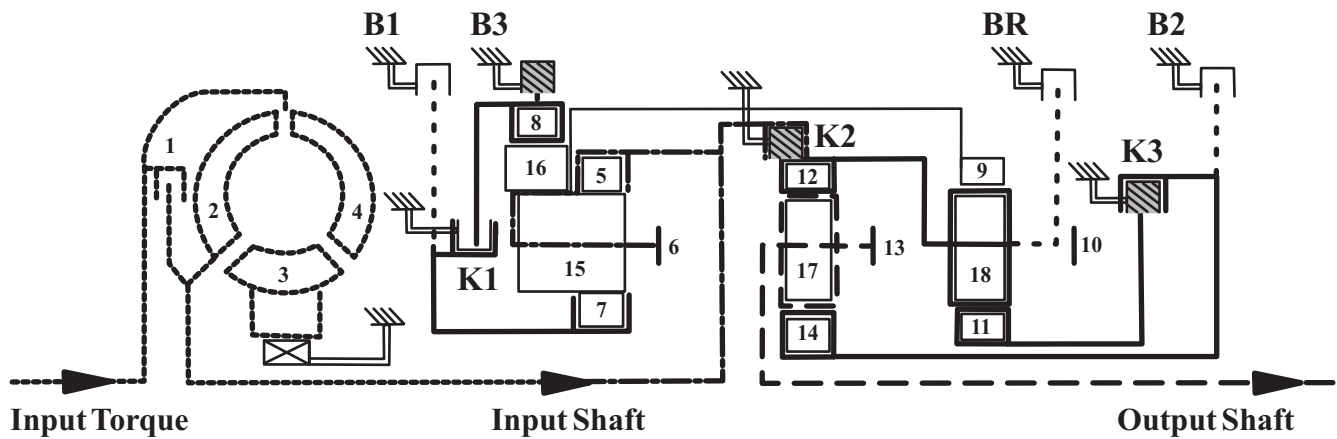
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Technical Service Information

MERCEDES BENZ 722.9

POWER FLOW

Power Flow 7th Gear



The Ravigneaux Planet Small Ring Gear (5) is driven by the Input Shaft. The Long Planet Gears (15) drive the Short Planet Gears (16) to rotate inside the Large Ring Gear that is held by the B3 Brake Clutch. An increase in torque and reduced rpm is transmitted to the Dual Planet Carrier (6). The Single Rear Planet Ring Gear (9) rotates at the same speed as it is mechanically connected to the Dual Planet Carrier. The Planet Gears (18) rotate Sun Gear (11) which in turn rotates Sun Gear (14) by the engaged K3 Clutch. Input Torque and Input Speed are transmitted to the Single Front Planet Ring Gear (12) by the engaged K2 Clutch. The speed difference between the Sun Gear (14) and Ring Gear (12) produces an increased speed and reduced torque to the Output Shaft through Planet Carrier (13). The Output Shaft rotates with reduced input speed in the direction of engine rotation at a ratio of 0.728.

Ravigneaux gear set:

Short Planet Gears (16)
Long Planet Gears (15)
Small Ring Gear (5)
Dual Planet Carrier (6)
Sun Gear (7)
Large Ring Gear (8)

Front Single Planet Gear Set:

Planetary Gears (17)
Ring Gear (12)
Planet Carrier (13)
Sun Gear (14)

Rear Single Planet Gear Set:

Planetary Gears (18)
Ring Gear (9)
Planet Carrier (10)
Sun Gear (11)

1 Torque Converter Lockup Clutch
2 Turbine Wheel
3 Stator
4 Impeller
5 Small Internal Geared Wheel
6 Dual Planet Carrier
7 Sun Gear
8 Large Internal Geared Wheel
9 Internal Geared Wheel
10 Single Planetary Carrier
11 Sun Gear
12 Internal Geared Wheel

13 Single Planetary Carrier
14 Sun Gear
15 Long Planet gears
16 Planet Gears
17 Planet Gears
BR Multi-Disc Brake (BR)
B1 Multi-Disc Brake (B1)
B2 Multi-Disc Brake (B2)
B3 Multi-Disc Brake (B3)
K1 Multi-Disc Clutch (K1)
K2 Multi-Disc Clutch (K2)
K3 Multi-Disc Clutch (K3)

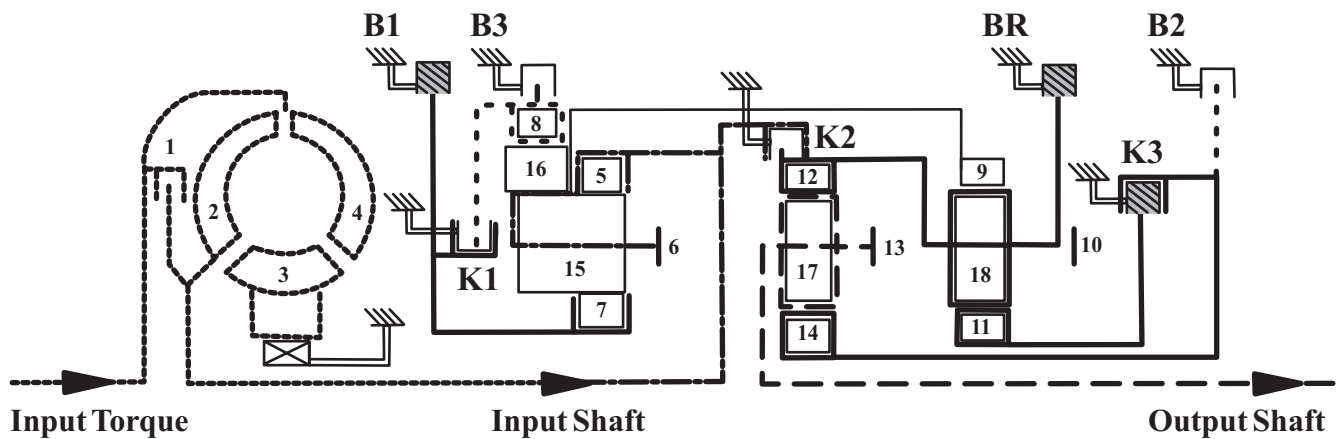
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Technical Service Information

MERCEDES BENZ 722.9

POWER FLOW

Power Flow Reverse Gear In "S" Mode



The Ravigneaux Planet Small Ring Gear (5) is driven by the Input Shaft. The Long Planet Gears (15) rotate around Sun Gear (7) held by the B1 Brake Clutch. An increase in torque and reduced rpm is transmitted to the Dual Planet Carrier (6). The Single Rear Planet Ring Gear (9) rotates at the same speed as it is mechanically connected to the Dual Planet Carrier. The Planet Gears (18) rotate around Sun Gear (11). The rotational direction of the Sun Gear is Reversed by Planet Carrier (10) which is held by the BR Brake Clutch. The applied K3 Clutch connects Sun Gear (14) to Sun Gear (11). This causing both Sun Gears to rotate at the same speed and direction and drive Planet Gears (17). This increases torque and reduces rotational speed to the Output Shaft through Planet Carrier (13). The Output Shaft rotates at a reduced input speed opposite to the direction of engine rotation at a ratio of -3.416

Ravigneaux gear set:

Short Planet Gears (16)
Long Planet Gears (15)
Small Ring Gear (5)
Dual Planet Carrier (6)
Sun Gear (7)
Large Ring Gear (8)

Front Single Planet Gear Set:

Planetary Gears (17)
Ring Gear (12)
Planet Carrier (13)
Sun Gear (14)

Rear Single Planet Gear Set:

Planetary Gears (18)
Ring Gear (9)
Planet Carrier (10)
Sun Gear (11)

1 Torque Converter Lockup Clutch
2 Turbine Wheel
3 Stator
4 Impeller
5 Small Internal Geared Wheel
6 Dual Planet Carrier
7 Sun Gear
8 Large Internal Geared Wheel
9 Internal Geared Wheel
10 Single Planetary Carrier
11 Sun Gear
12 Internal Geared Wheel

13 Single Planetary Carrier
14 Sun Gear
15 Long Planet gears
16 Planet Gears
17 Planet Gears
BR Multi-Disc Brake (BR)
B1 Multi-Disc Brake (B1)
B2 Multi-Disc Brake (B2)
B3 Multi-Disc Brake (B3)
K1 Multi-Disc Clutch (K1)
K2 Multi-Disc Clutch (K2)
K3 Multi-Disc Clutch (K3)

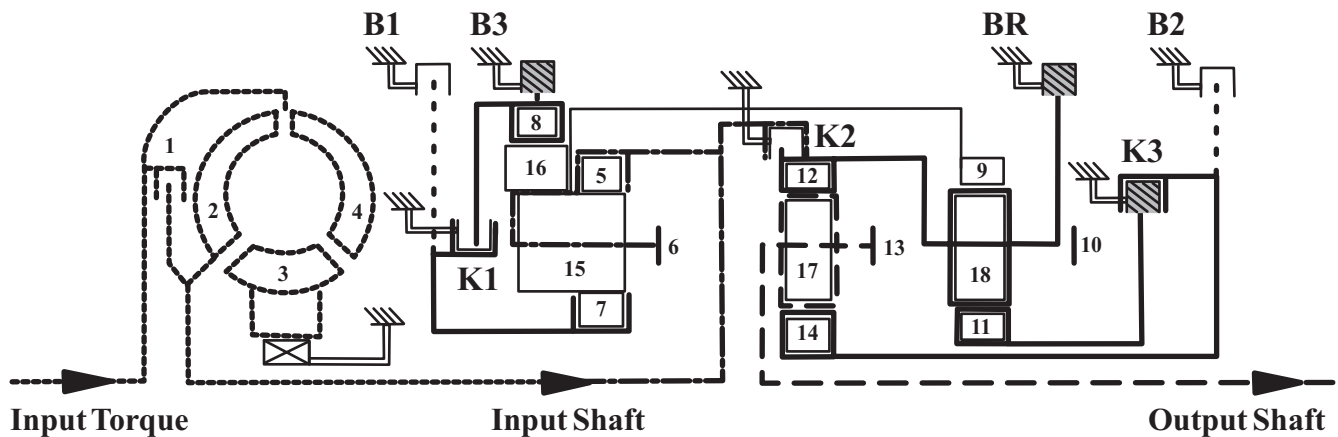
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Technical Service Information

MERCEDES BENZ 722.9

POWER FLOW

Power Flow Reverse Gear In "C" Mode



The Ravigneaux Planet Small Ring Gear (5) is driven by the Input Shaft. The Long Planet Gears (15) drive the Short Planet Gears (16) which rotate inside the Large Ring Gear (8) held by the B3 Brake Clutch. A decrease in rotational speed is transmitted to the Dual Planet Carrier (6). The Single Rear Planet Ring Gear (9) rotates at the same speed as it is mechanically connected to the Dual Planet Carrier. The Planet Gears (18) rotate around Sun Gear (11). The rotational direction of the Sun Gear is Reversed by Planet Carrier (10) which is held by the BR Brake Clutch. The applied K3 Clutch connects Sun Gear (14) to Sun Gear (11). This causing both Sun Gears to rotate at the same speed and direction and drive Planet Gears (17). This increases torque and reduces rotational speed to the Output Shaft through Planet Carrier (13). The Output Shaft rotates at a reduced input speed opposite to the direction of engine rotation at a ratio of -2.231

Ravigneaux gear set:

Short Planet Gears (16)
Long Planet Gears (15)
Small Ring Gear (5)
Dual Planet Carrier (6)
Sun Gear (7)
Large Ring Gear (8)

Front Single Planet Gear Set:

Planetary Gears (17)
Ring Gear (12)
Planet Carrier (13)
Sun Gear (14)

Rear Single Planet Gear Set:

Planetary Gears (18)
Ring Gear (9)
Planet Carrier (10)
Sun Gear (11)

1 Torque Converter Lockup Clutch
2 Turbine Wheel
3 Stator
4 Impeller
5 Small Internal Geared Wheel
6 Dual Planet Carrier
7 Sun Gear
8 Large Internal Geared Wheel
9 Internal Geared Wheel
10 Single Planetary Carrier
11 Sun Gear
12 Internal Geared Wheel

13 Single Planetary Carrier
14 Sun Gear
15 Long Planet gears
16 Planet Gears
17 Planet Gears
BR Multi-Disc Brake (BR)
B1 Multi-Disc Brake (B1)
B2 Multi-Disc Brake (B2)
B3 Multi-Disc Brake (B3)
K1 Multi-Disc Clutch (K1)
K2 Multi-Disc Clutch (K2)
K3 Multi-Disc Clutch (K3)

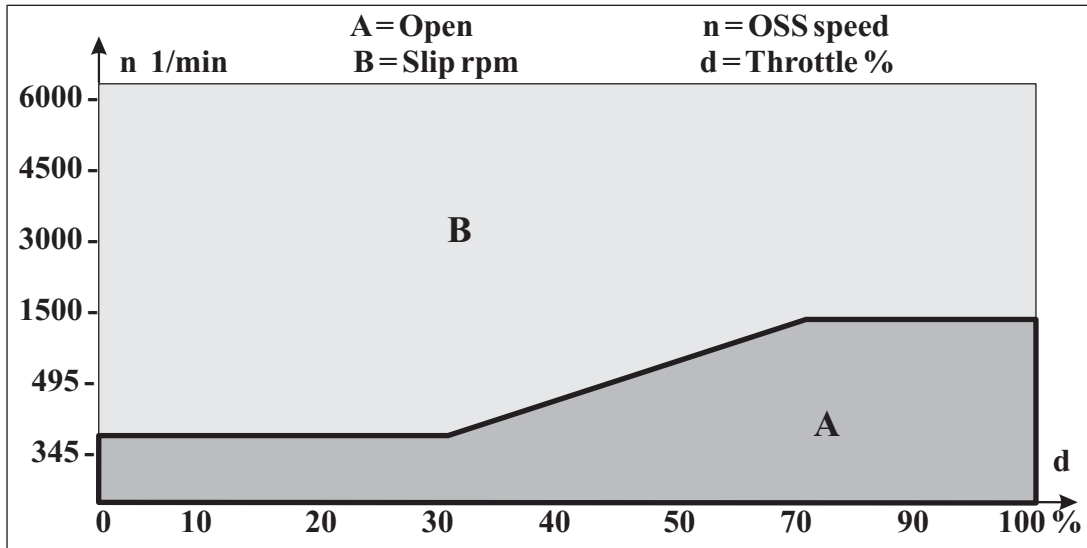
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Technical Service Information

MERCEDES BENZ 722.9

TORQUE CONVERTER CLUTCH STRATEGY



Torque converter slip values vary extremely from stall speed to negative values under deceleration. The Computer will calculate the most optimal slip based on the current driving conditions. The chart below illustrates some examples of converter slip taken with a manufacturers scan tool in a vehicle at 45 mph.

| Driving Condition | Throttle % | Current Gear | Engine Speed | Turbine Speed | Output Shaft Speed | Torque Converter Slip | Converter State |
|-------------------|------------|--------------|--------------|---------------|--------------------|-----------------------|-----------------|
| Cruise | 24 | 6 | 1303 | 1258 | 1533 | 45 | Slipping |
| ½ Throttle | 53 | 3 | 2859 | 2832 | 1471 | 27 | Slipping |
| Kick-Down | 100 | 2 | 4476 | 4338 | 1520 | 138 | Open > Slipping |
| Deceleration | 0 | 6 | 1169 | 1270 | 1524 | -101 | Slipping |

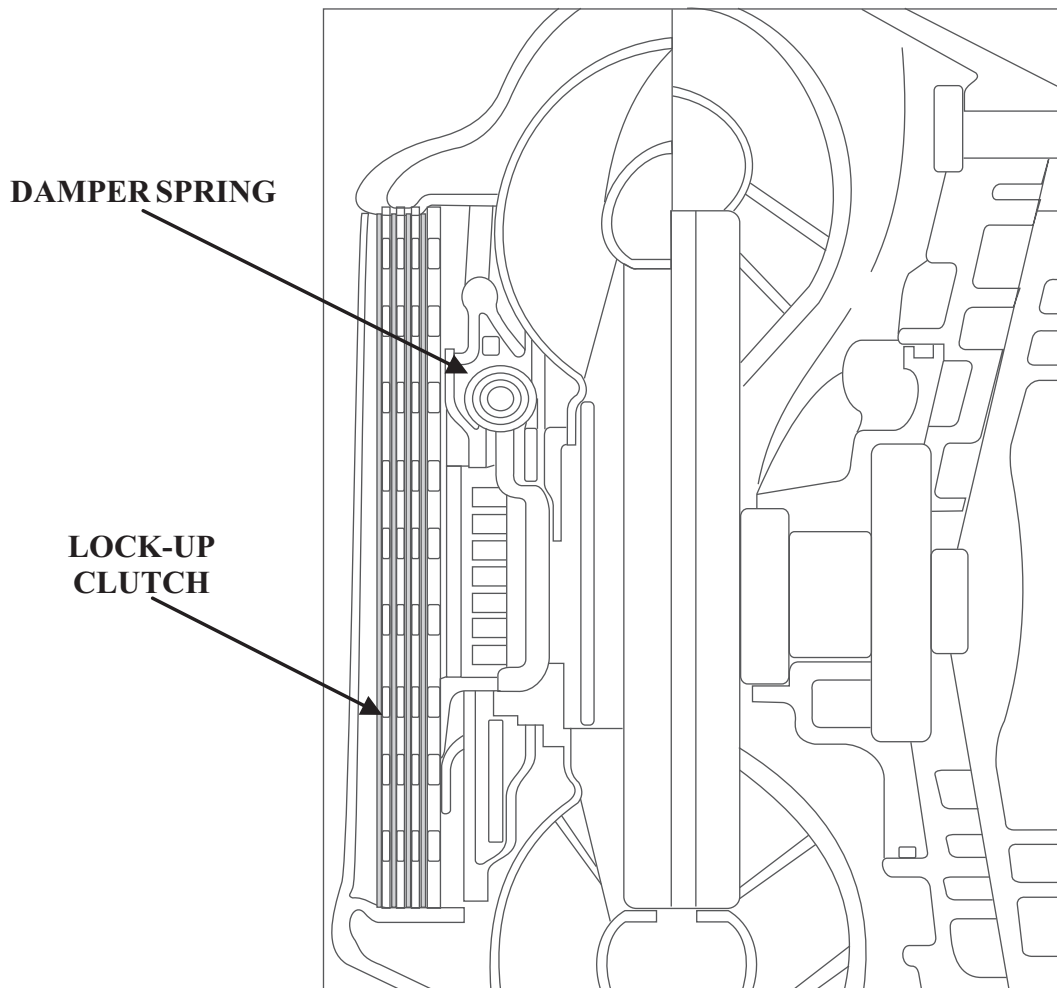
Note: The converter slip figures stated in this chart are to be used as examples only and not as a guideline for diagnosis

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TORQUE CONVERTER CLUTCH STRATEGY

TORQUE CONVERTER

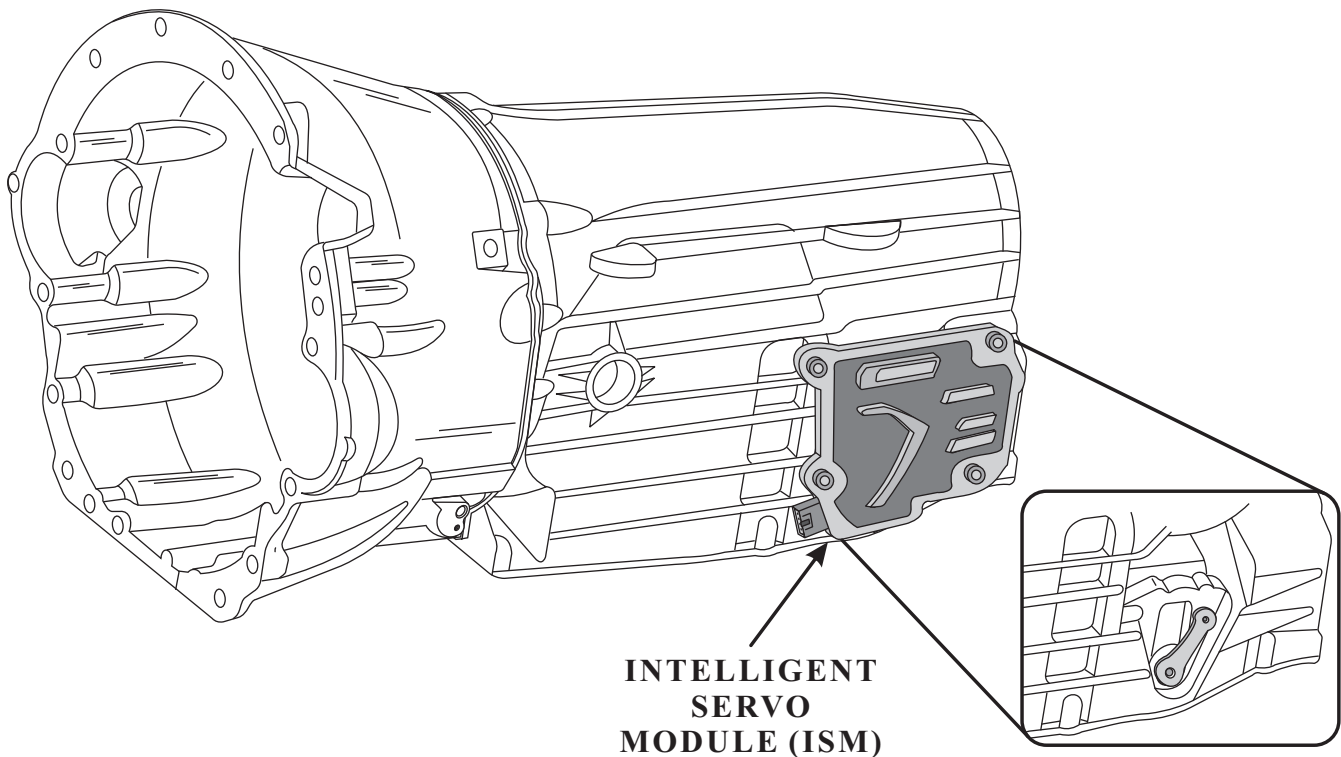
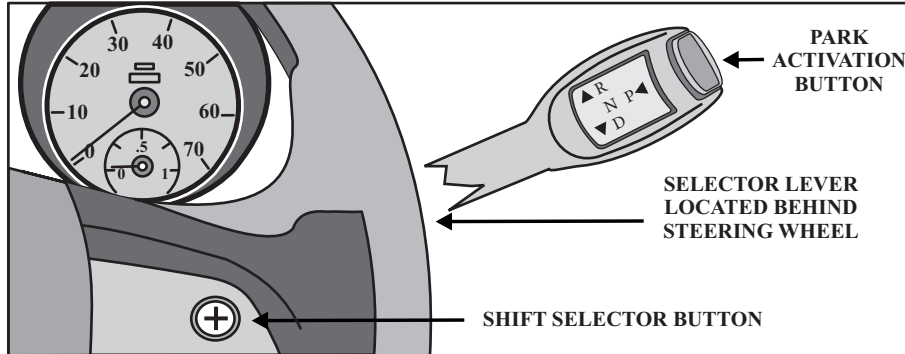


**The Torque Converter used is the same as the 722.6 and holds 4 liters of fluid.
Lock-up can be applied in all seven forward gears and incorporates damper springs integral to the lock-up clutch assembly to help prevent vibration or noise during clutch apply at low engine rpm.**

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MERCEDES BENZ 722.9 SHIFT BY WIRE

Direct Select (no shift rod)

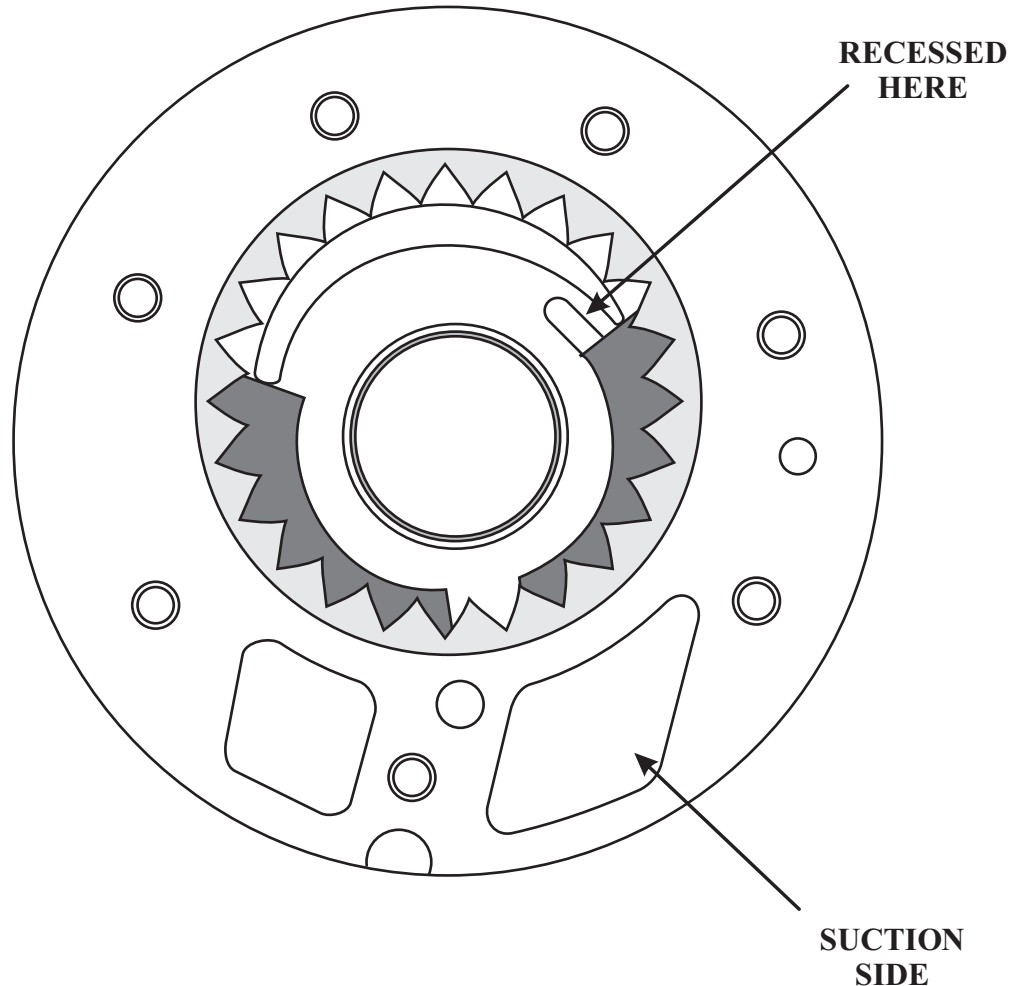


Some late model vehicles with the 722.9 will be equipped with shift by wire, called Direct Select. There is no mechanical connection to a shifter in the passenger compartment. An Intelligent Servo Module (ISM) will be attached to the left rear side of the case just above the pan rail. The module will control and monitor the shift valve lever position. If the vehicle's electrical system fails there is a back up Emergency P-function to release the transmission from park. There is a spare battery found underneath the floor panel on the passenger side of the vehicle to energize to the module in the emergency mode..

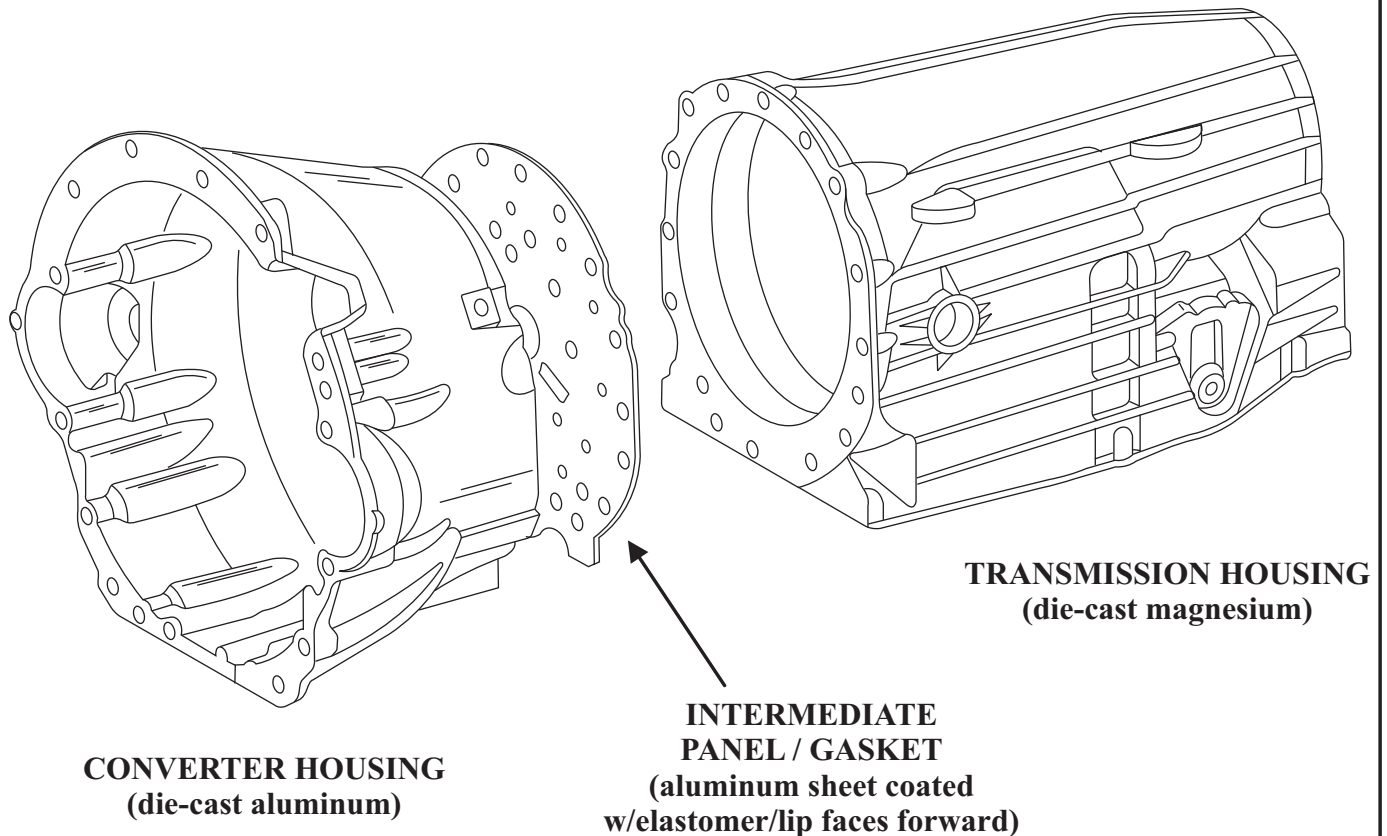
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MERCEDES BENZ 722.9 FRONT PUMP

**CRESCENT TYPE PUMP
(SAME TYPE AS 722.6)**

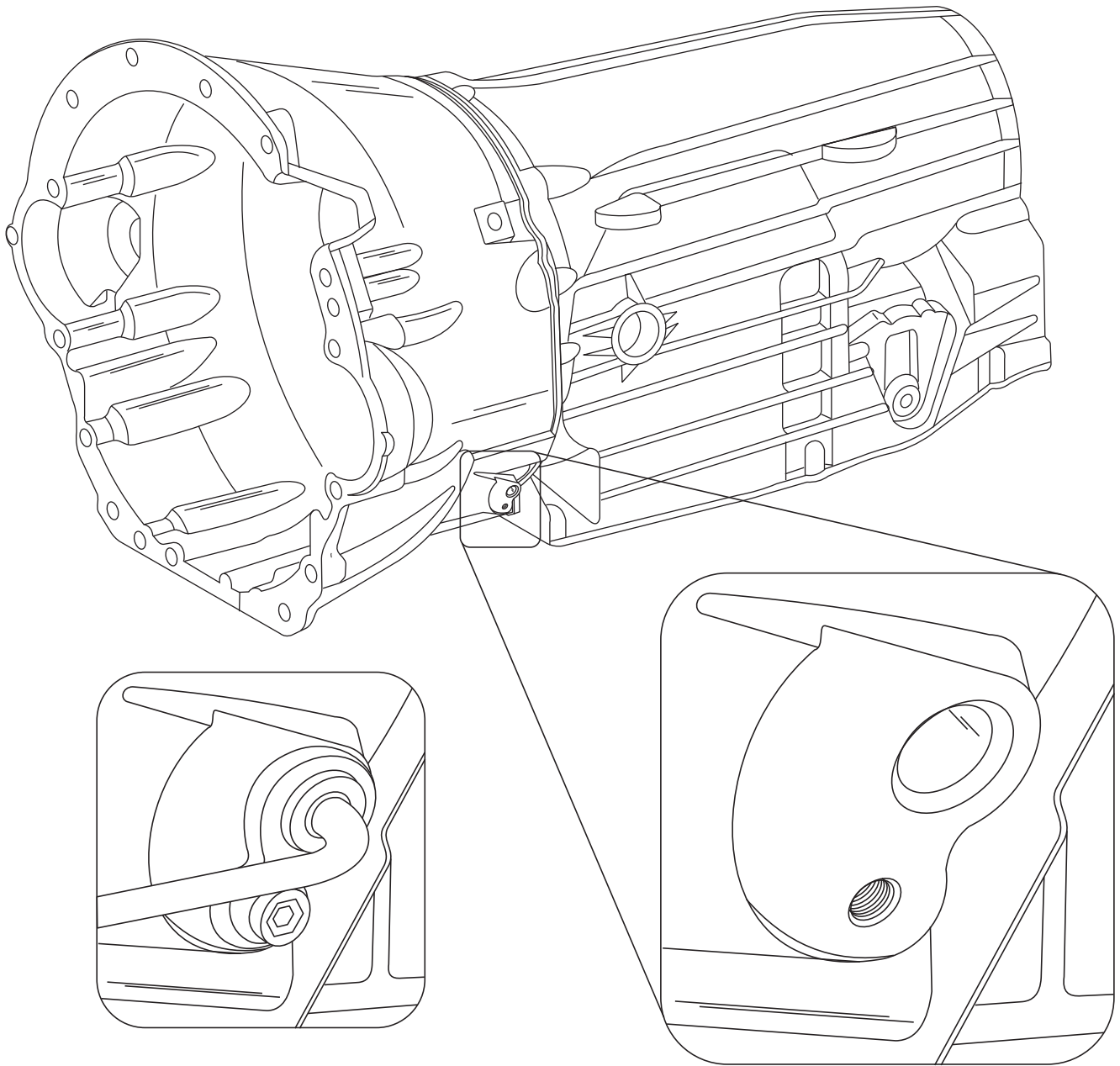


Crescent type pump although the same design as the 722.6 there is an additional recess on the suction side of the pump to help reduce intake noise. This modification expected to be produced on later 722.6 transmissions. Future pump housing and gears may be made out of aluminum in an effort to reduce weight and high temperatures.

MERCEDES BENZ 722.9**CASE COMPONENTS**

Converter housing is die-cast aluminum the transmission housing is die-cast magnesium (reduced weight compared to aluminum 2.5kg/5.5lb). Requires aluminum bolts due to steel bolts having a different expansion rate and corrosion concerns. All aluminum bolts must be replaced if removed. Intermediate panel or gasket made from an aluminum sheet with an elastomer coating. This gasket extends out beyond the sealing surfaces of the converter and transmission housing to prevent water from settling on the transmission housing. Standing water (especially salt water) can corrode magnesium in as little as eight weeks. Gasket lip faces forward and can be reused if there are no signs of damage to the elastomer coating.

MERCEDES BENZ 722.9 COOLER LINE FITTINGS

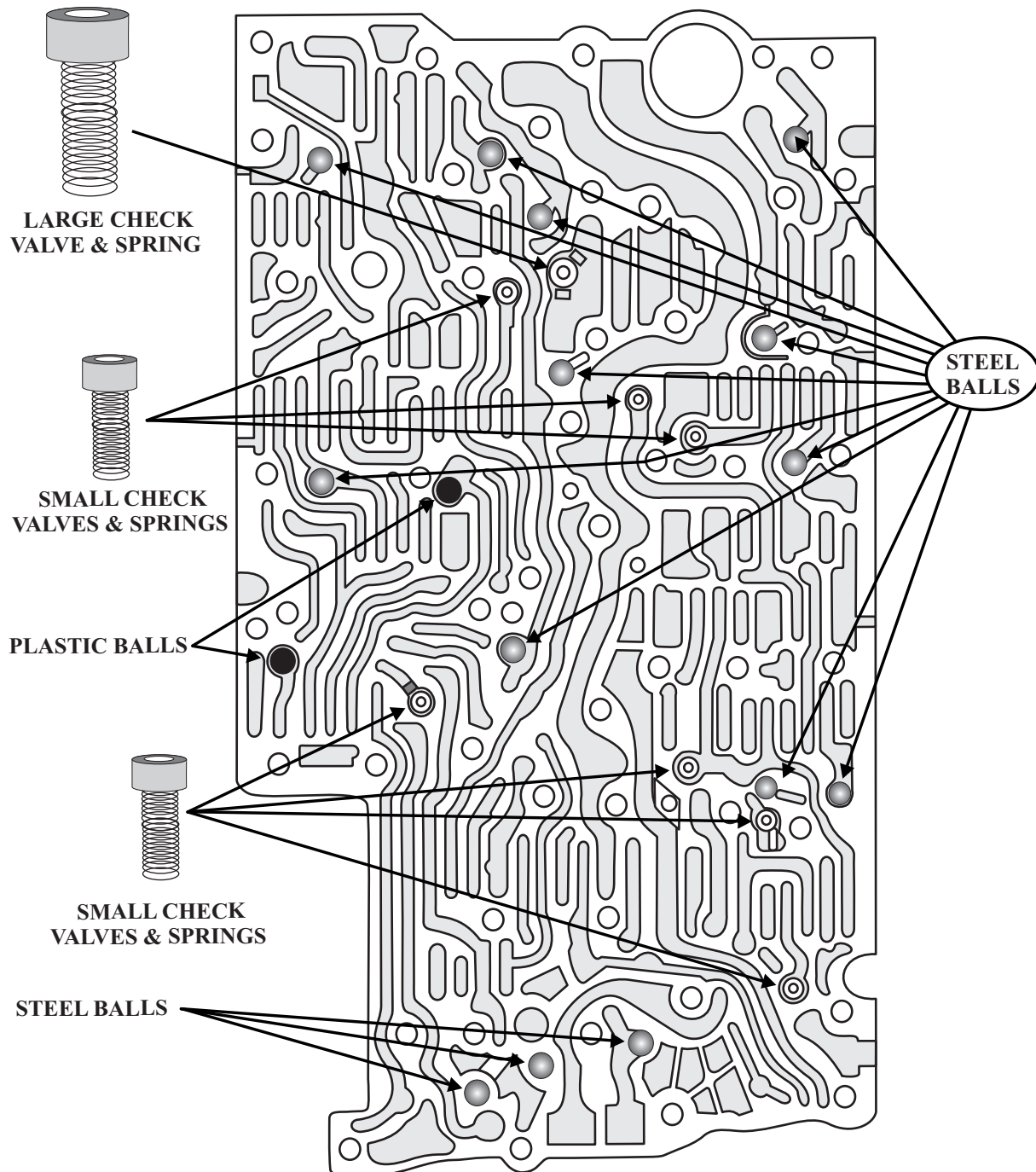


Transmission Cooler Ling Fittings do not have threads or Banjo type fittings. Cooler lines are sealed with rubber “O” rings on push-in type fittings secured with a retaining bolt.

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MERCEDES BENZ 722.9

CHECKBALL & SMALL PARTS LOCATIONS

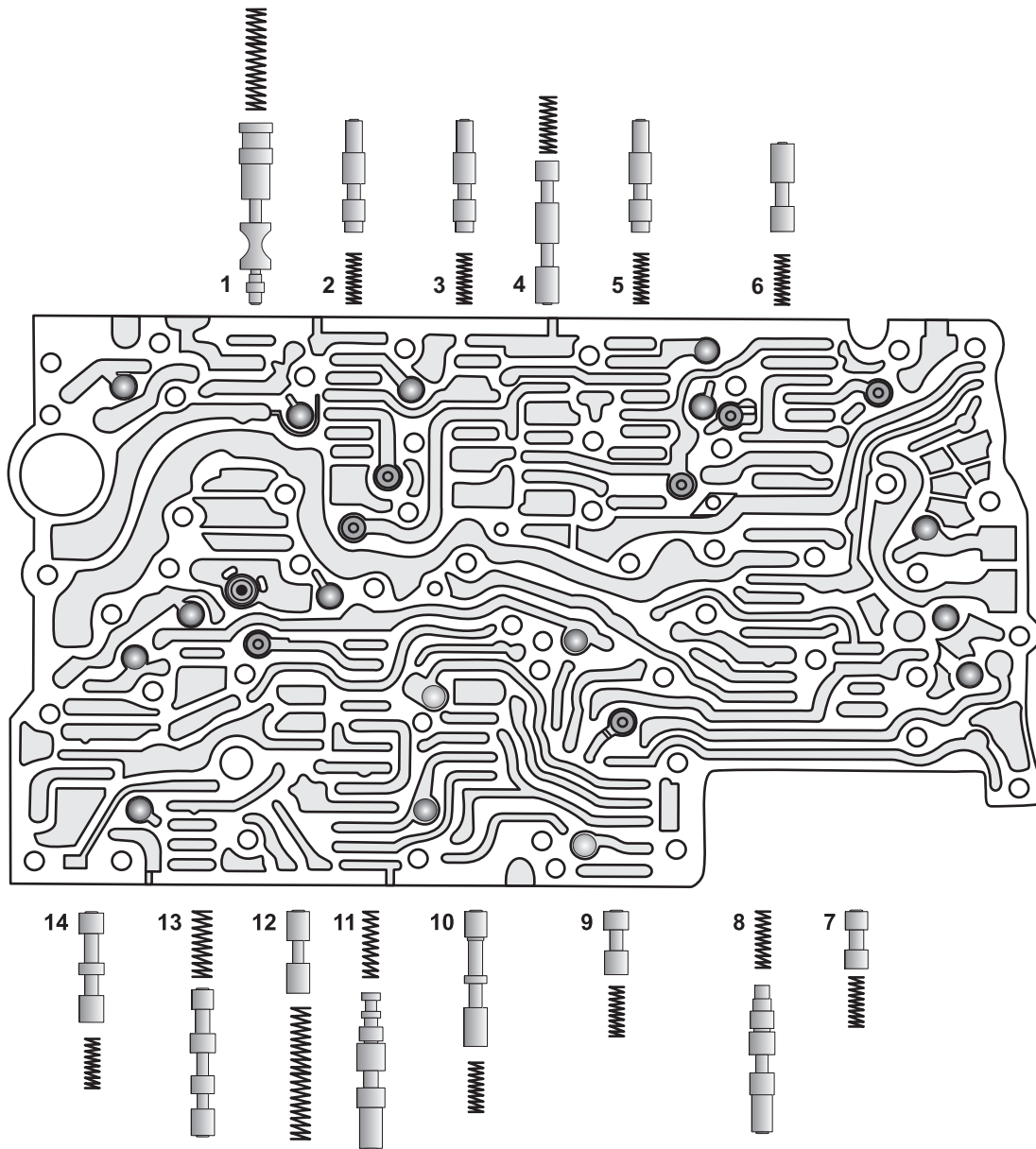


- 14 STEEL CHECK BALLS
- 2 PLASTIC CHECK BALLS
- ⊙ 8 CHECK VALVES

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MERCEDES BENZ 722.9

UPPER VALVE BODY



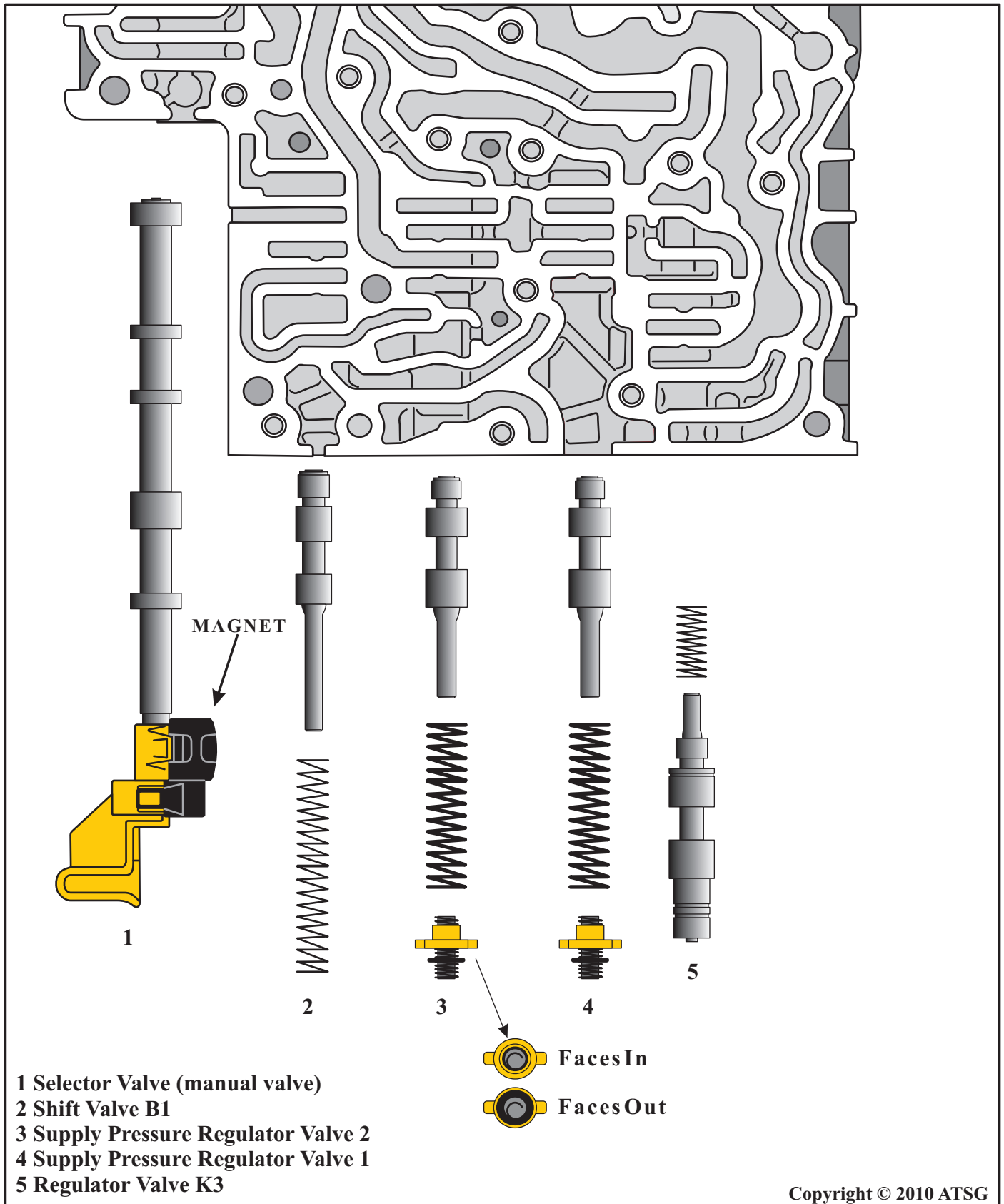
- 1 Working pressure regulating valve
- 2 Regulating valve K1
- 3 Regulating valve B1
- 4 Shift valve B1/B3
- 5 Regulating valve B3
- 6 Shift valve K3
- 7 Shift valve B2-2
- 8 Regulating valve B2/BR

- 9 Shift valve K2
- 10 Limp-home mode shift valve
- 11 Regulating valve K2
- 12 Lubricating pressure regulating valve
- 13 Torque converter lockup valve
- 14 Converter inner pressure regulating valve in torque converter lock up clutch mode

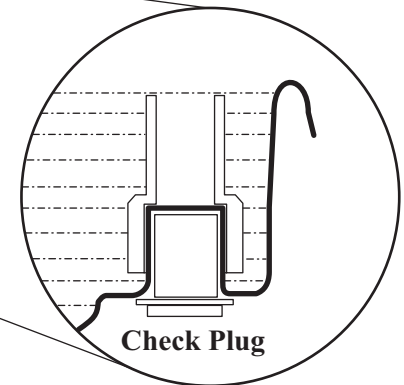
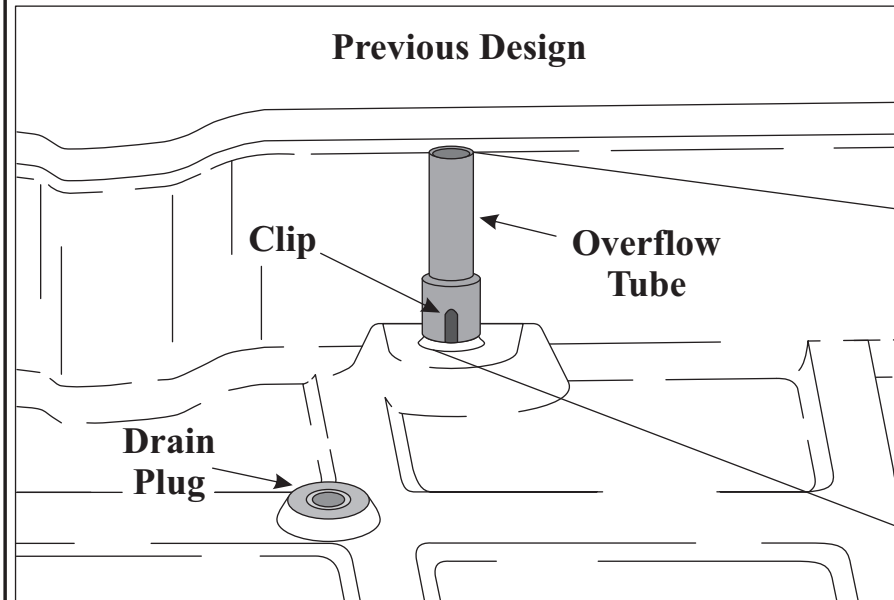
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MERCEDES BENZ 722.9

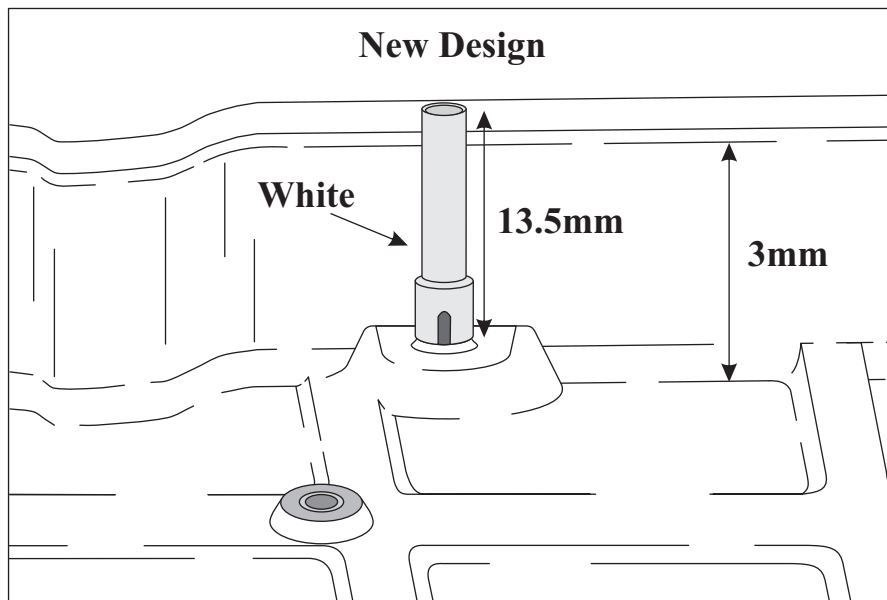
LOWER VALVE BODY



MERCEDES BENZ 722.9 TRANSMISSION OIL PAN & LEVEL CHECK



Clips onto pan



| | Old Pan | New Pan |
|---------------------------|------------|------------|
| Initial Fill Check | | |
| Celsius | 30° | 40° |
| Fahrenheit | 86° | 104° |
| Level Check | | |
| Celsius | 30-35° | 40-45° |
| Fahrenheit | 86-95° | 104-113° |
| Total Fill | 9.5 Liters | 9.7 Liters |

The oil pan has been redesigned there is no longer a filler tube in used on the transmission case it is now filled and fluid level checked through an overflow tube (clips onto pan). This new design pan has also been updated. The overflow tube and overall pan depth have been increased. The updated pan is now 3mm deeper and the overflow tube is 13.5mm longer (can be identified by it's white color) than the previous design. This update now allows an increase of 0.2 liters of fluid compared to the older pan. If the earlier design pan is removed for repairs it is suggested to update to the later design, *Part # 220-270-09-12*.

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