Technical Bulletin # 1259

Transmission: *722.6*
Subject: *Introduction*
Application: *Mercedes, Chrysler*
Issue Date: *June, 2009*

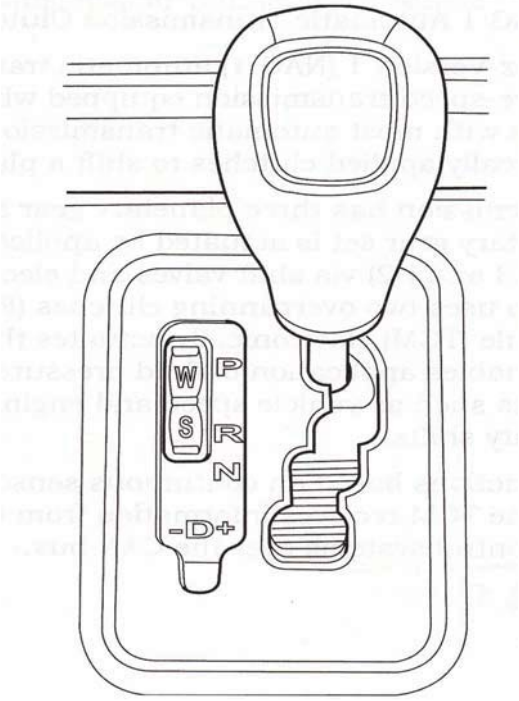
722.6

Introduction

In 1997, Mercedes installed in the E-class its electronically-controlled model 722.6 5-speed automatic transmission that first saw duty in 1996 in the V8-powered W140 S-class models. The 722.6 transmission is now used in a number of Daimler-Chrysler vehicles.



Copyright © 2009 ATRA. All Rights Reserved.



"Touch" Shifter Transmission Ranges		
Shift Lever Position	Gear Selection	Description
P		Parking and starting position
R	Reverse	Reverse gear, Standard mode, Winter mode, and default reverse
N		Neutral and starting position. No transmission of power. The vehicle can be moved freely. Allows starting engine with the vehicle in motion.
D	D	Shifts 1,2,3,4,5. TCC is available in 3rd, 4th, and 5th gear.
D – (1 time)	4	Shifts 1,2,3,4, engine braking available
D – (2 times)	3	Shifts 1,2,3, engine braking available
D – (3 times)	2	Shifts 1,2, engine braking available
D – (4 times)	1	First gear only, maximum engine braking

Copyright © 2009 ATRA. All Rights Reserved.

Daimler-Chrysler has many different shifter part numbers but there are only two basic types that a driver would notice. One is a common shifter like all other cars and the second one is the "Touch" shifter as shown. When the shifter is in the D range the shifter will also move side to side. If you push the shifter handle side-ways toward the driver, or to the Minus sign, (-) for a moment the transmission will down shift to the next lowest range. If you push the shifter side ways away from the driver, or to the Plus sign, (+) it will up shift to the next highest gear. The shifter can be used this way for sporty manual shifting. If you want it to go back to full automatic shifting, push the shifter sideways away from the driver and hold it for at least one second.

On most Daimler-Chrysler vehicles the Transmission Control Module will not let the engine RPM exceed a safe operating speed so it may up shift to a higher gear than the driver has selected. Also it may prevent or delay a down shift that has been requested by the driver if a safe engine RPM will be exceeded.

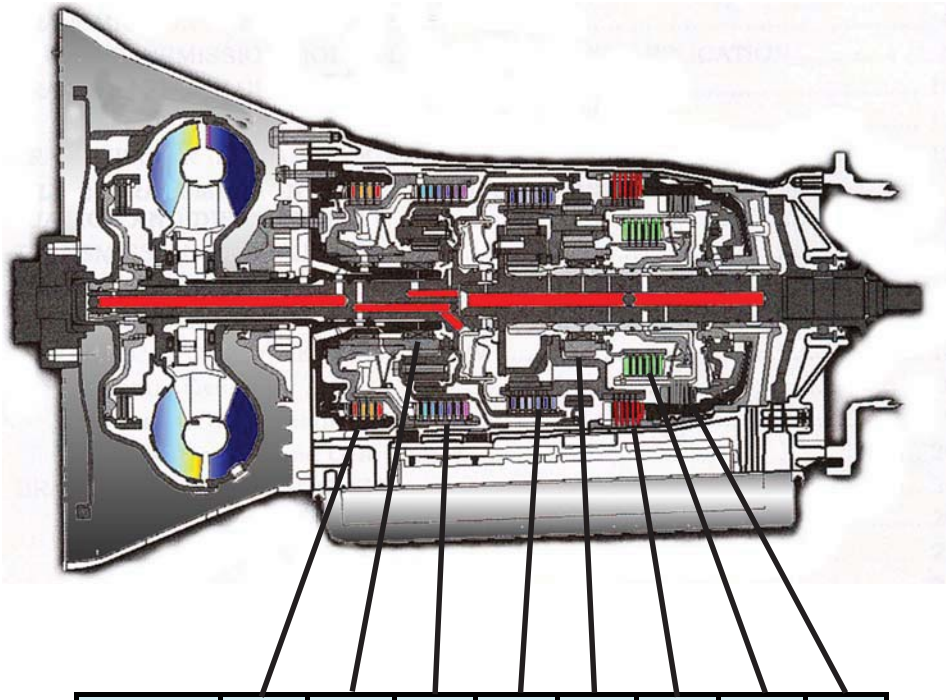
The shifter shown on the opposite page has a Standard Mode/Winter Mode switch. (Not all shifters will have a mode switch). In the Standard Mode all shifts will be normal. The Winter Mode is for better traction on slippery roads in both forward and reverse, it will take off in second gear and will shift earlier. It will also take off in a higher ratio reverse than in the Standard Mode.

Gear Range	Ratio W5A580 W5J400 W5A380	Ratio W5A330
First	3.59	3.95
Second	2.19	2.423
Third	1.41	1.486
Fourth	1	1
Fifth	0.83	0.833
Reverse	3.16	3.147
Reverse 4X4 low or Winter mode	1.93	1.93

Copyright © 2009 ATRA. All Rights Reserved.

Component Application

The Mercedes 722.6 uses six multi-plate clutches and two sprags (freewheels) to achieve its five forward and two reverse ranges (standard and winter modes). The following chart shows which elements are used for each gear.



Gear	B1	F1	K1	K2	F2	B3	K3	B2
1	X(1)	X			X		X(1)	X
2(2)			X		X		X(1)	X
3			X	X				X
4			X	X			X	
5	X	X(1)		X			X	
N	X						X	
R	X(1)	X				X	X	
R(2)			X			X	X	

(1) For engine braking
(2) When in 4X4 low (if equipped) or Winter mode (if equipped)

Copyright © 2009 ATRA. All Rights Reserved.

Solenoid Overview

The Mercedes 722.6 transmission uses six solenoids on the valve body to control transmission operation; three shift solenoids, a converter clutch solenoid, a pressure control solenoid, and a shift pressure control solenoid. Mercedes uses terms for their solenoids that may not relate to an obvious function. The three shift solenoids: the 1-2/4-5 shift, 2-3 shift, and 3-4 shift solenoids are obvious. However, the lock up solenoid is referred to as a PWM solenoid, the pressure control solenoid is referred to as the modulating pressure regulator solenoid. The shift pressure control solenoid is somewhat unique and we'll cover its function later.

Solenoid Operation

The modulating pressure regulating solenoid controls line rise by raising pressure to the spring side of the pressure regulator. This is a standard function like most all computer-controlled transmissions. It also controls oil to three other valves.

The PWM solenoid is also a fairly standard solenoid in that it controls converter clutch operation.

Where the Mercedes transmission is radically different in solenoid operation is with the shift solenoids. Because each shift releases one clutch while applying another, timing is very important so you don't get a flare or bind-up during the shift "transition". Each shift solenoid uses a bank of four valves to control the shift transitions. These valves are called:

1. Command Valve
2. Holding Pressure Shift Valve
3. Shift Pressure Shift Valve
4. Pressure Overlap Control Valve

Copyright © 2009 ATRA. All Rights Reserved.

Keep in mind that each shift solenoid uses four of these valves, so in total there are 12 valves that control all of the shift transitions.

The basic operation of these four valves is the same for each shift. To initiate a shift transition the computer turns on one of the shift solenoids. For example, for a 1-2 shift the computer turns on the 1-2/4-5 shift solenoid. This strokes the command valve and *initiates* a shift "transition". The other three valve control the release rate of the B1 brake and the apply rate of the K1 clutch. Once the transition is complete, the 1-2/4-5 shift solenoid is turned off. To make a 2-1 down shift the computer again turns on the 1-2/4-5 shift solenoid to initiate a transition. In this case, since the transmission is in second gear the transmission transitions back to first gear.

For a shift from second to third the 2-3 shift solenoid is energized to initiate the transition. And just like to 1-2 shift, once the transition is complete the solenoid is turned off. For a 3-2 downshift, the 2-3 shift solenoid goes through this cycle again. Each shift works in this fashion.

During each transition apply pressure is controlled by the shifting pressure control solenoid. The release rate is controlled, in part, by the modulating pressure regulator solenoid. These two solenoids work together to control the overlap for each shift transition.

Copyright © 2009 ATRA. All Rights Reserved.

Solenoid Application Chart						
Gear	1-2 /4-5 Shift Solenoid	2-3 Shift Solenoid	3-4 Shift Solenoid	Modulating Pressure Control Solenoid	Shift Pressure Control Solenoid	TCC Pressure Control Solenoid
Park			Modulate	Regulate	Regulate	
P-to-R			Modulate	Modulate	Modulate	
Reverse				Regulate	On	
R-to-N			Modulate	Regulate	Modulate	
Neutral			Modulate	Regulate	Regulate	
N-to-D (1^{st})			Modulate	Regulate	Modulate	
1^{st}				Modulate	On	
1^{st} to 2^{nd}	Modulate			Modulate	Modulate	
2^{nd}				Modulate	On	
2^{nd} to 3^{rd}		Modulate		Modulate	Modulate	
3^{rd}				Modulate	On	Modulate
3^{rd} to 4^{th}			Modulate	Modulate	Modulate	Modulate
4^{th}				Modulate	On	Modulate
4^{th} to 5^{th}	Modulate			Modulate	Modulate	Modulate
5^{th}				Modulate	On	Modulate
5^{th} to 4th	Modulate			Modulate	Modulate	
4^{th}				Modulate	On	
4^{th} to 3rd			Modulate	Modulate	Modulate	
3^{rd}				Modulate	On	
3^{rd} to 2nd		Modulate		Modulate	Modulate	
2^{nd}				Modulate	On	
2^{nd} to 1^{st}	Modulate			Modulate	Modulate	
1^{st}				Modulate	On	
1^{st} to N			Modulate	Regulate	Regulate	
Neutral			Modulate	Regulate	Regulate	
N to R			Modulate	Regulate	Modulate	
Reverse				Modulate	On	
R to P			Modulate	Regulate	Regulate	
Park			Modulate	Regulate	Regulate	

The shift solenoids are off electrically when the transmission is in any gear.
The shift solenoid is on for 1.5 seconds when shifting.
ON =Regulated line pressure
Regulate = Constant Pressure
Modulate = Pulse Width Modulated (PWM)

Copyright © 2009 ATRA. All Rights Reserved.

The Torque Converter Clutch (TCC) is hydraulically operated and electronically controlled. The TCC consists of a piston and friction discs that provide a mechanical link between the impeller and turbine. When pressure is applied to the rear of the TCC piston, TCC engagement is obtained. The torque converter clutch is never fully engaged. The TCC when engaged, is always slipping at a rate of somewhere between 5% and 95%. This reduces excess heat build-up, engine vibration and pulse transmission through the torque converter and improves fuel economy.

TCC operation can be activated in 3rd, 4th or 5th gear ranges, depending on transmission model, application, shift lever position, transmission temperature and other factors.

The hub of the torque converter housing drives the transmission oil pump at engine speed.

NOTE: Don't be fooled by the dis-coloration of the torque converter, a blueish tint color is normal. When the factory furnace brazes the fins in the torque converter, the color of the metal takes on the look of a failed or burnt converter. Do NOT replace the converter on its look alone without a proper test to verify a failure.



Copyright © 2009 ATRA. All Rights Reserved.

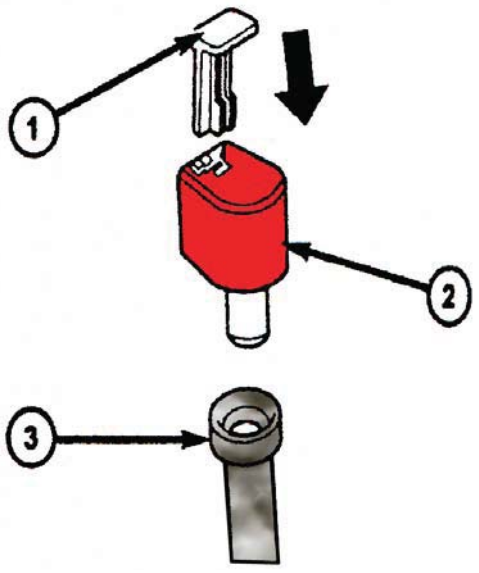
Transmission fluid serves a number of purposes including application of hydraulics, lubrication, cooling, cleaning and seal conditioning. Transmission shift quality, heat dissipation and Transmission Control Module (TCM) calibration all dictate the type of transmission fluid that is used. Transmission fluids are similar but have different characteristics such as viscosity and the additives in the fluid, which is why there will be different fluids used in Crossfire, Sprinter and 300C. Drain and refill the transmission fluid at the recommended service interval of 80,000 miles. Most other models are life time fill.

The transmission has varying capacities depending on vehicle application. Transmission fluid capacity includes the transmission, the torque converter and the transmission fluid cooler.

The fill tube in Sprinter, Crossfire, Jaguar, and Mercedes vehicles is sealed from the factory and requires a special service dipstick tool (#8863A) to check the fluid level. A special cap is used for sealing the transmission dipstick tube. When the locking pin is removed it will break off. The locking pin part number is A 140 991 00 55 when ordered from a Mercedes dealer. The 300C (LX) requires a special service dipstick tool (9336). Grand Cherokee (WJ) comes equipped with a dipstick.

Dipstick tools are availible from miller tools for Chrysler vehicles.

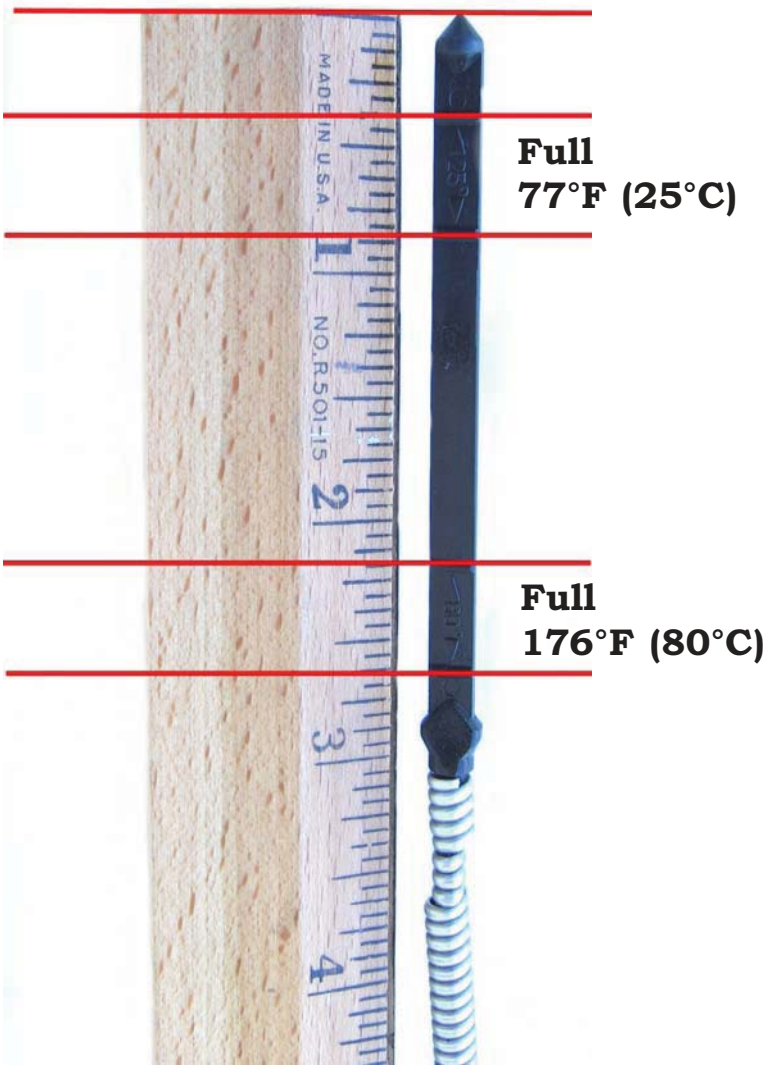
Dipsticks are also availible from Mercedes under part number 140 589 15 21 00



1. **Locking Pin**
2. **Fill Tube Cap**
3. **Fill Tube**

Copyright © 2009 ATRA. All Rights Reserved.

When checking the fluid level, always check it in the Park position.



Copyright © 2009 ATRA. All Rights Reserved.

For ALL Mercedes and Chrysler Sprinter and Crossfire applications



Part#
A 001 989 07 03
Meets Spec 236.10

For ALL Jeep and other Crysler applications (EXCEPT Sprinter and Crossfire)



Chrysler Part#
05013457AA
(Type 9602)

Copyright © 2009 ATRA. All Rights Reserved.