

Diagnosis – Function Test

General

This section is divided into:

- Checking condition of ATF (Initial evaluation)
- ATF level check
- Replacing ETC control module (N15/3)
- Limp-home mode functions
- Shift points with transmission selector lever in "D"
- Transmission adaption (adaption of the ETC)

Diagnosis – Function Test

Checking condition of ATF (Initial Evaluation)

1. Check ATF level, correct fluid level as necessary (see document: AR27.00-P-0101A in WIS).
2. Review section O.



Prior to performing any repairs, readout the DTC memory from the transmission control module using the HHT (see 12/1).

Visually inspect condition of transmission fluid, additionally see Illustrations on page 11/3 and review S.I. MBNA 27/32, May 1998.

- Contamination (excessively black transmission fluid color, pungent/burnt smell)
- Water in transmission fluid (milky white discoloration, streaked appearance)
- Metal shavings (metal particles, metal pieces)

The initial dosage of the red pigment in the ATF was too low. Since 10/97, the use of a higher dosage of red pigment in the ATF, has resulted in more stable red pigmentation. A purely brown or black coloring of the ATF does not have an effect on the friction value or function of the ATF, therefore, no fault is indicated regarding the ATF color.

ATF fluid which smells burnt points to a slipping Brake/clutch assembly. After finding the cause (loss of ATF, or seized servos etc.) and removing same, replace both the faulty items and the ATF.

Abrasion particles in the ATF:

Due to the relative movement between the transmission components after a short running distance, a fine "vail" of abrasion particles

(gray for aluminum, yellow for brass) can be found in the transmission oil pan.

This "vail" of abrasion does not effect the proper function of the transmission.

If there is however, found in the transmission oil pan, an extremely fine abrasion (graphite residue which when smeared on paper leaves a gray streak) or larger metal shavings (in the millimeter size range) then there is a mechanical fault within the transmission. Based on the complaint, the corresponding components of the transmission or the entire transmission must be replaced. When repairing the transmission, it is important to flush the oil cooler and the transmission hoses afterwards and the replace the ATF with fresh ATF. **Replace the torque converter only if upon draining the ATF, metal shaving are found in the ATF** (see Repair Instructions, Automatic Transmission 722.6).

3. Inspect automatic transmission for external oil leaks
(Determine source of fluid leak and repair).

ATF level check

When checking the ATF level, the temperature must be min. 60° C.

The **current ATF temperature** as part of the ATF level check can only be read out using the HHT, with the transmission selector lever in "R, D, 4, 3, 2, 1".

Replacing ETC control module (N15/3)

Using the HHT, it is possible to send version coding data from the control module to a new transmission control module (with a later part number) being installed

**(valid only for functional software: e 02 → e 03
f 07 → f 08)**

Diagnosis – Function Test

Initial Evaluation Illustrations

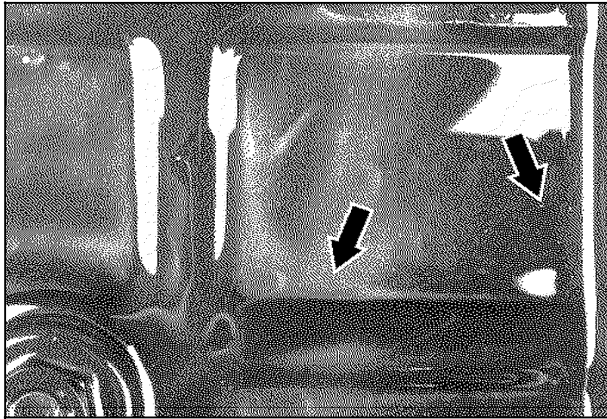


Figure 1

P27.00-2027-01

Extremely fine aluminum and/or brass abrasion particles
Transmission is serviceable!

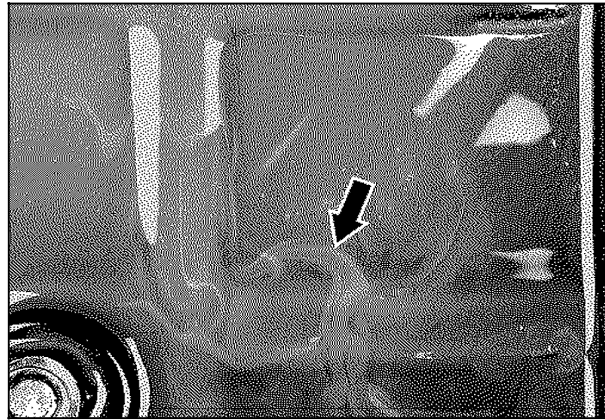


Figure 2

P27.00-2028-01

Extremely fine graphite like abrasion particles
Mechanical damage to transmission

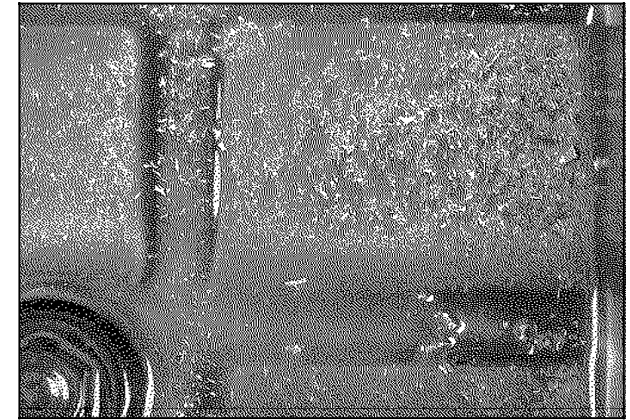


Figure 3

P27.00-2029-01

Large metal shavings, in millimeter size
Mechanical damage to transmission

Note:

Review S.I. MBUSA 27/32, dated May 1998 concerning ATF fluid color as well.

Diagnosis – Function Test

Electrical limp-home mode

In order to prevent damage to the automatic transmission in the event of an **electrical fault**, the gear currently engaged is held and the assigned diagnostic trouble code (DTC) is stored.

The limp-home mode comes into effect with the following procedure:

1. Stop vehicle.
2. Shift transmission selector lever to "P".
3. Shut off engine.
4. Wait at least 10 seconds.
5. Start engine.

After restarting engine, the vehicle can only be driven in 2nd or reverse gear.



The engagement of "N → D" und "N → R" will be very harsh, since the electronic control of the automatic transmission has been turned off.

This type of limp-home mode can only reset by repairing the fault and erasing the DTCs with the Hand-Held Tester (HHT).

Mechanical-hydraulic limp-home mode

In order to prevent damage to the automatic transmission in the event of an **mechanical-hydraulic fault**,

- the transmission shifts into 3rd gear and is held in this gear, or
- the transmission shifts to the last "known good" gear and is held in that gear.



This type of limp-home mode is reset by turning the ignition OFF, and then ON again.

Diagnosis – Function Test



Hints regarding "D" shift points for **passenger vehicles** follow:

Up - downshifts using shift programs ("S", "W")

- Mode selector in "S": Transmission starts in first gear and shifts into first when coasting to a stop.
- Mode selector in "W": Transmission starts in second gear and shifts into second when coasting to a stop. First gear can be attained upon full throttle deployment.
(Caution! During engine warm-up the transmission starts in first gear and coasts to a stop in second gear).
- Shift points are increased: While driving up or down mountain passes, with heavily loaded vehicles, at very high transmission fluid temperatures, with transmission mode switch in "S", also: with abrupt throttle release, and very sporty driving style.



Downshifts using shift program at full throttle with mode selector in "S" (only from gears 5 → 4 and 4 → 3)

- Upon rapid throttle release; an upshift into the next higher gear is prevented and selected only when vehicle has decreased lateral acceleration rates and appropriate handling characteristics. This prevents skidding of the vehicle in curves.
- At full throttle deployment, the downshift occurs at higher speeds.



Downshifts using shift program at kick down with mode selector in "S"

- The kickdown downshift in transmission mode "S" is lower at ATF temperatures < 40 °C

Hints regarding "D" shift points for **Model 163** follow:

Up - downshifts using shift program ("D" shift points)

Transmission starts in first gear and shifts into first when coasting to a stop.

Shift points are increased while driving up or down mountain passes, with heavily loaded vehicles, at very high transmission fluid temperatures, with abrupt throttle release, and very sporty driving style.



Downshifts using shift program at full throttle with gear selector lever in "D" (only from gears 5 → 4 and 4 → 3)

- At full throttle deployment, the downshift occurs at higher speeds.



Downshifts using "kickdown" with gear selector lever in "D"

- The kickdown downshift in transmission is lower at ATF temperatures < 40 °C

2.3 Electronic Automatic Transmission Control (ETC)

722.6

Diagnosis – Function Test

Transmission selector lever "D" shift points					129.063	129.067
Upshift in transmission range 1) 2) 4)	1 2	Full throttle	W	approx. mph. (km/h)	≈ 24 (38)	≈ 33 (53)
			S	approx. mph. (km/h)	≈ 35 (56)	≈ 46 (75)
		Kickdown		approx. mph. (km/h)	≈ 35 (56)	≈ 46 (75)
	2 3	Full throttle	W	approx. mph. (km/h)	≈ 41 (66)	≈ 57 (93)
			S	approx. mph. (km/h)	≈ 56 (91)	≈ 77 (124)
		Kickdown		approx. mph. (km/h)	≈ 56 (91)	≈ 77 (124)
	3 4	Full throttle	W	approx. mph. (km/h)	≈ 69 (111)	≈ 94 (152)
			S	approx. mph. (km/h)	≈ 93 (148)	≈ 119 (193)
		Kickdown		approx. mph. (km/h)	≈ 93 (148)	≈ 119 (193)
	4 5	Full throttle	W	approx. mph. (km/h)	≈ 104 (165)	≈ 131 (213)
			S	approx. mph. (km/h)	≈ 137 (218)	—
		Kickdown		approx. mph. (km/h)	≈ 138 (220)	—

1) Transmission mode switch "S": transmission starts in 1st gear and shifts into 1st gear when coasting to a stop.

2) Transmission mode switch "W": transmission starts in 2nd gear and shifts into 2nd gear when coasting to a stop. 1st gear can be engaged with full throttle.
(**Caution:** during engine warm-up, transmission starts in 1st gear and shifts into 2nd gear when coasting to a stop).

4) Shift points are increased: while driving up or down mountain passes, while driving with a heavily loaded vehicle, at very high transmission fluid temperatures, with transmission mode switch in "S", also: with abrupt throttle release, and very sporty driving style.

Diagnosis – Function Test

Transmission selector lever "D" shift points					129.063	129.067
Downshift in transmission range <small>1) 2) 4) 5)</small>	5 4	Full throttle	W	approx. mph. (km/h)	≈ 90 (144)	≈ 115 (187)
			S	approx. mph. (km/h)	≈ 96 (152) ³⁾	≈ 115 (191) ³⁾
		Kickdown		approx. mph. (km/h)	≈ 132 (210)	—
	4 3	Full throttle	W	approx. mph. (km/h)	≈ 54 (87)	≈ 70 (114)
			S	approx. mph. (km/h)	≈ 58 (94) ³⁾	≈ 75 (122) ³⁾
		Kickdown		approx. mph. (km/h)	≈ 87 (138)	≈ 112 (181)
	3 2	Full throttle	W	approx. mph. (km/h)	≈ 36 (57)	≈ 38 (63)
			S	approx. mph. (km/h)	≈ 39 (62)	≈ 42 (70)
		Kickdown		approx. mph. (km/h)	≈ 51 (80)	≈ 67 (109)
	2 1	Full throttle	W	approx. mph. (km/h)	≈ 11 (17)	≈ 14 (22)
			S	approx. mph. (km/h)	≈ 17 (26)	≈ 17 (26)
		Kickdown		approx. mph. (km/h)	≈ 24 (39)	≈ 32 (52)

- 1) Transmission mode switch "S": transmission starts in 1st gear and shifts into 1st gear when coasting to a stop.
- 2) Transmission mode switch "W": transmission starts in 2nd gear and shifts into 2nd gear when coasting to a stop. 1st gear can be engaged with full throttle.
(**Caution:** during engine warm-up transmission starts in 1st gear and shifts into 2nd gear when coasting to a stop).
- 3) Upon rapid throttle release, an upshift into the next higher gear is prevented and selected only when vehicle has decreased lateral acceleration rates and appropriate handling characteristics. This prevents skidding of the vehicle in curves. When abruptly accelerating, the downshift occurs at a high speed (models 208, 210 only).
- 4) Shift points are increased: while driving up or down mountain passes, with heavily loaded vehicles, at very high transmission fluid temperatures, with transmission mode switch in "S", also: with abrupt throttle release, and very sporty driving style.
- 5) In models 208 and 210, the kickdown downshift in transmission mode "S" is lower at ATF temperatures < 40 °C.

Diagnosis – Function Test

Transmission selector lever "D" shift points					129.068/076	
Upshift in transmission range 1) 2) 4)	1 2	Full throttle	W	approx. mph. (km/h)	≈ 33 (53)	
			S	approx. mph. (km/h)	≈ 46 (75)	
		Kickdown		approx. mph. (km/h)	≈ 46 (75)	
	2 3	Full throttle	W	approx. mph. (km/h)	≈ 57 (93)	
			S	approx. mph. (km/h)	≈ 77 (124)	
		Kickdown		approx. mph. (km/h)	≈ 77 (124)	
	3 4	Full throttle	W	approx. mph. (km/h)	≈ 94 (151)	
			S	approx. mph. (km/h)	≈ 119 (193)	
		Kickdown		approx. mph. (km/h)	≈ 119 (193)	
	4 5	Full throttle	W	approx. mph. (km/h)	≈ 131 (212)	
			S	approx. mph. (km/h)	—	
		Kickdown		approx. mph. (km/h)	—	

1) Transmission mode switch "S": transmission starts in 1st gear and shifts into 1st gear when coasting to a stop.

2) Transmission mode switch "W": transmission starts in 2nd gear and shifts into 2nd gear when coasting to a stop. 1st gear can be engaged with full throttle.
(Caution: during engine warm-up, transmission starts in 1st gear and shifts into 2nd gear when coasting to a stop).

4) Shift points are increased: while driving up or down mountain passes, while driving with a heavily loaded vehicle, at very high transmission fluid temperatures, with transmission mode switch in "S", also: with abrupt throttle release, and very sporty driving style.

Diagnosis – Function Test

Transmission selector lever "D" shift points					129.068/076	
Downshift in transmission range 1) 2) 4) 5)	5 4	Full throttle	W	approx. mph. (km/h)	≈ 114 (186)	
			S	approx. mph. (km/h)	≈ 115 (190) ³⁾	
		Kickdown		approx. mph. (km/h)	—	
	4 3	Full throttle	W	approx. mph. (km/h)	≈ 70 (114)	
			S	approx. mph. (km/h)	≈ 75 (122) ³⁾	
		Kickdown		approx. mph. (km/h)	≈ 112 (180)	
	3 2	Full throttle	W	approx. mph. (km/h)	≈ 38 (63)	
			S	approx. mph. (km/h)	≈ 42 (70)	
		Kickdown		approx. mph. (km/h)	≈ 67 (108)	
	2 1	Full throttle	W	approx. mph. (km/h)	≈ 14 (22)	
			S	approx. mph. (km/h)	≈ 17 (26)	
		Kickdown		approx. mph. (km/h)	≈ 32 (51)	

1) Transmission mode switch "S": transmission starts in 1st gear and shifts into 1st gear when coasting to a stop.

2) Transmission mode switch "W": transmission starts in 2nd gear and shifts into 2nd gear when coasting to a stop. 1st gear can be engaged with full throttle.
(Caution: during engine warm-up transmission starts in 1st gear and shifts into 2nd gear when coasting to a stop).

3) Upon rapid throttle release, an upshift into the next higher gear is prevented and selected only when vehicle has decreased lateral acceleration rates and appropriate handling characteristics. This prevents skidding of the vehicle in curves. When abruptly accelerating, the downshift occurs at a high speed (models 208, 210 only).

4) Shift points are increased: while driving up or down mountain passes, with heavily loaded vehicles, at very high transmission fluid temperatures, with transmission mode switch in "S", also: with abrupt throttle release, and very sporty driving style.

5) In models 208 and 210, the kickdown downshift in transmission mode "S" is lower at ATF temperatures < 40 °C.

Diagnosis – Function Test

Transmission selector lever "D" shift points					140.032/033	140.043
Upshift in transmission range 1) 2) 4)	1 2	Full throttle	W	approx. mph. (km/h)	≈ 24 (39)	≈ 32 (52)
			S	approx. mph. (km/h)	≈ 36 (58)	≈ 46 (74)
		Kickdown		approx. mph. (km/h)	≈ 36 (58)	≈ 46 (74)
	2 3	Full throttle	W	approx. mph. (km/h)	≈ 58 (69)	≈ 57 (92)
			S	approx. mph. (km/h)	≈ 59 (95)	≈ 76 (123)
		Kickdown		approx. mph. (km/h)	≈ 59 (95)	≈ 76 (123)
	3 4	Full throttle	W	approx. mph. (km/h)	≈ 71 (115)	≈ 93 (150)
			S	approx. mph. (km/h)	≈ 95 (154)	≈ 118 (191)
		Kickdown		approx. mph. (km/h)	≈ 95 (154)	≈ 118 (191)
	4 5	Full throttle	W	approx. mph. (km/h)	≈ 106 (172)	≈ 130 (210)
			S	approx. mph. (km/h)	≈ 140 (227)	—
		Kickdown		approx. mph. (km/h)	≈ 141 (228)	—

1) Transmission mode switch "S": transmission starts in 1st gear and shifts into 1st gear when coasting to a stop.

2) Transmission mode switch "W": transmission starts in 2nd gear and shifts into 2nd gear when coasting to a stop. 1st gear can be engaged with full throttle.
(Caution: during engine warm-up, transmission starts in 1st gear and shifts into 2nd gear when coasting to a stop).

4) Shift points are increased: while driving up or down mountain passes, while driving with a heavily loaded vehicle, at very high transmission fluid temperatures, with transmission mode switch in "S", also: with abrupt throttle release, and very sporty driving style.

Diagnosis – Function Test

Transmission selector lever "D" shift points					140.032/033	140.043
Downshift in transmission range <small>1) 2) 4) 5)</small>	5 4	Full throttle	W	approx. mph. (km/h)	≈ 92 (149)	≈ 114 (184)
			S	approx. mph. (km/h)	≈ 98 (158) ³⁾	≈ 116 (189) ³⁾
		Kickdown		approx. mph. (km/h)	≈ 135 (219)	—
	4 3	Full throttle	W	approx. mph. (km/h)	≈ 56 (90)	≈ 70 (113)
			S	approx. mph. (km/h)	≈ 60 (98) ³⁾	≈ 75 (121) ³⁾
		Kickdown		approx. mph. (km/h)	≈ 89 (144)	≈ 110 (179)
	3 2	Full throttle	W	approx. mph. (km/h)	≈ 36 (59)	≈ 39 (63)
			S	approx. mph. (km/h)	≈ 40 (65)	≈ 42 (69)
		Kickdown		approx. mph. (km/h)	≈ 52 (84)	≈ 66 (107)
	2 1	Full throttle	W	approx. mph. (km/h)	≈ 10 (17)	≈ 13 (21)
			S	approx. mph. (km/h)	≈ 17 (28)	≈ 16 (26)
		Kickdown		approx. mph. (km/h)	≈ 25 (40)	≈ 31 (51)

- 1) Transmission mode switch "S": transmission starts in 1st gear and shifts into 1st gear when coasting to a stop.
- 2) Transmission mode switch "W": transmission starts in 2nd gear and shifts into 2nd gear when coasting to a stop. 1st gear can be engaged with full throttle.
(**Caution:** during engine warm-up transmission starts in 1st gear and shifts into 2nd gear when coasting to a stop).
- 3) Upon rapid throttle release, an upshift into the next higher gear is prevented and selected only when vehicle has decreased lateral acceleration rates and appropriate handling characteristics. This prevents skidding of the vehicle in curves. When abruptly accelerating, the downshift occurs at a high speed (models 208, 210 only).
- 4) Shift points are increased: while driving up or down mountain passes, with heavily loaded vehicles, at very high transmission fluid temperatures, with transmission mode switch in "S", also: with abrupt throttle release, and very sporty driving style.
- 5) In models 208 and 210, the kickdown downshift in transmission mode "S" is lower at ATF temperatures < 40 °C.

Diagnosis – Function Test

Transmission selector lever "D" shift points					140.051/070	140.057/076
Upshift in transmission range 1) 2) 4)	1 2	Full throttle	W	approx. mph. (km/h)	≈ 35 (56)	≈ 35 (56)
			S	approx. mph. (km/h)	≈ 49 (79)	≈ 49 (79)
		Kickdown		approx. mph. (km/h)	≈ 49 (79)	≈ 49 (79)
	2 3	Full throttle	W	approx. mph. (km/h)	≈ 60 (98)	≈ 60 (98)
			S	approx. mph. (km/h)	≈ 81 (131)	≈ 81 (131)
		Kickdown		approx. mph. (km/h)	≈ 81 (131)	≈ 81 (131)
	3 4	Full throttle	W	approx. mph. (km/h)	≈ 99 (160)	≈ 99 (160)
			S	approx. mph. (km/h)	≈ 126 (204)	≈ 126 (204)
		Kickdown		approx. mph. (km/h)	≈ 126 (204)	≈ 126 (204)
	4 5	Full throttle	W	approx. mph. (km/h)	≈ 138 (224)	≈ 138 (224)
			S	approx. mph. (km/h)	—	—
		Kickdown		approx. mph. (km/h)	—	—

1) Transmission mode switch "S": transmission starts in 1st gear and shifts into 1st gear when coasting to a stop.

2) Transmission mode switch "W": transmission starts in 2nd gear and shifts into 2nd gear when coasting to a stop. 1st gear can be engaged with full throttle.
(Caution: during engine warm-up, transmission starts in 1st gear and shifts into 2nd gear when coasting to a stop).

4) Shift points are increased: while driving up or down mountain passes, while driving with a heavily loaded vehicle, at very high transmission fluid temperatures, with transmission mode switch in "S", also: with abrupt throttle release, and very sporty driving style.

Diagnosis – Function Test

Transmission selector lever "D" shift points					140.051/070	140.057/076
Downshift in transmission range 1) 2) 4) 5)	5 4	Full throttle	W	approx. mph. (km/h)	≈ 121 (196)	≈ 121 (196)
			S	approx. mph. (km/h)	≈ 125 (201) ³⁾	≈ 125 (201) ³⁾
		Kickdown		approx. mph. (km/h)	—	—
	4 3	Full throttle	W	approx. mph. (km/h)	≈ 74 (120)	≈ 74 (120)
			S	approx. mph. (km/h)	≈ 78 (129) ³⁾	≈ 78 (129) ³⁾
		Kickdown		approx. mph. (km/h)	≈ 117 (190)	≈ 117 (190)
	3 2	Full throttle	W	approx. mph. (km/h)	≈ 41 (67)	≈ 41 (67)
			S	approx. mph. (km/h)	≈ 46 (74)	≈ 46 (74)
		Kickdown		approx. mph. (km/h)	≈ 70 (114)	≈ 70 (114)
	2 1	Full throttle	W	approx. mph. (km/h)	≈ 14 (23)	≈ 14 (23)
			S	approx. mph. (km/h)	≈ 16 (28)	≈ 16 (28)
		Kickdown		approx. mph. (km/h)	≈ 36 (54)	≈ 36 (54)

1) Transmission mode switch "S": transmission starts in 1st gear and shifts into 1st gear when coasting to a stop.

2) Transmission mode switch "W": transmission starts in 2nd gear and shifts into 2nd gear when coasting to a stop. 1st gear can be engaged with full throttle.

(**Caution:** during engine warm-up transmission starts in 1st gear and shifts into 2nd gear when coasting to a stop).

3) Upon rapid throttle release, an upshift into the next higher gear is prevented and selected only when vehicle has decreased lateral acceleration rates and appropriate handling characteristics. This prevents skidding of the vehicle in curves. When abruptly accelerating, the downshift occurs at a high speed (models 208, 210 only).

4) Shift points are increased: while driving up or down mountain passes, with heavily loaded vehicles, at very high transmission fluid temperatures, with transmission mode switch in "S", also: with abrupt throttle release, and very sporty driving style.

5) In models 208 and 210, the kickdown downshift in transmission mode "S" is lower at ATF temperatures < 40 °C.

Diagnosis – Function Test

Transmission selector lever "D" shift points				163.154 up to 01.31.00	163.172 up to 01.31.00
Upshift in transmission range <small>1) 4)</small>	1 2	Full throttle	approx. mph. (km/h)	≈ 35 (56)	≈ 39 (65)
		Kickdown	approx. mph. (km/h)	≈ 35 (56)	≈ 39 (65)
	2 3	Full throttle	approx. mph. (km/h)	≈ 56 (91)	≈ 68 (108)
		Kickdown	approx. mph. (km/h)	≈ 56 (91)	≈ 68 (108)
	3 4	Full throttle	approx. mph. (km/h)	≈ 91 (148)	≈ 105 (168)
		Kickdown	approx. mph. (km/h)	≈ 91 (148)	≈ 105 (168)
	4 5	Full throttle	approx. mph. (km/h)	≈ 111 (179)	≈ 111 (179)
		Kickdown	approx. mph. (km/h)	≈ 136 (220) ⁶⁾	≈ 136 (235) ⁶⁾

1) Transmission starts in 1st gear and shifts into 1st gear when coasting to a stop.

4) Shift points are increased: while driving up or down mountain passes, while driving with a heavily loaded vehicle, at very high transmission fluid temperatures, with transmission mode switch in "S", also: with abrupt throttle release, and very sporty driving style.

6) In theory, as vehicle is limited to maximum top speed of 118 mph.

Diagnosis – Function Test

Transmission selector lever "D" shift points				163.154 up to 01.31.00	163.172 up to 01.31.00
Downshift in transmission range <small>1) 3) 4)</small>	5 4	Full throttle	approx. mph. (km/h)	≈ 94 (152)	≈ 104 (166)
		Kickdown	approx. mph. (km/h)	≈ 110 (176)	≈ 109 (175)
	4 3	Full throttle	approx. mph. (km/h)	≈ 63 (102)	≈ 66 (106)
		Kickdown	approx. mph. (km/h)	≈ 85 (138)	≈ 95 (157)
	3 2	Full throttle	approx. mph. (km/h)	≈ 37 (60)	≈ 37 (61)
		Kickdown	approx. mph. (km/h)	≈ 48 (77)	≈ 58 (94)
	2 1	Full throttle	approx. mph. (km/h)	≈ 17 (28)	≈ 15 (23)
		Kickdown	approx. mph. (km/h)	≈ 23 (38)	≈ 28 (45)

1) Transmission starts in 1st gear and shifts into 1st gear when coasting to a stop.

3) Upon rapid throttle release; an upshift into the next higher gear is prevented and selected only when vehicle has decreased lateral acceleration rates and appropriate handling characteristics. This prevents skidding of the vehicle in curves.

4) Shift points are increased: while driving up or down mountain passes, with heavily loaded vehicles, at very high transmission fluid temperatures, with transmission mode switch in "S", also: with abrupt throttle release, and very sporty driving style.

Diagnosis – Function Test

Transmission selector lever "D" shift points				163.154 as of 02.01.00	163.172 as of 02.01.00
Upshift in transmission range 1) 4)	1 2	Full throttle	approx. mph. (km/h)	≈ 35 (56)	≈ 39 (65)
		Kickdown	approx. mph. (km/h)	≈ 35 (56)	≈ 39 (65)
	2 3	Full throttle	approx. mph. (km/h)	≈ 56 (91)	≈ 68 (108)
		Kickdown	approx. mph. (km/h)	≈ 56 (91)	≈ 68 (108)
	3 4	Full throttle	approx. mph. (km/h)	≈ 91 (148)	≈ 105 (168)
		Kickdown	approx. mph. (km/h)	≈ 91 (148)	≈ 105 (168)
	4 5	Full throttle	approx. mph. (km/h)	≈ 136 (220) ⁶⁾	≈ 136 (235) ⁶⁾
		Kickdown	approx. mph. (km/h)	≈ 136 (220) ⁶⁾	≈ 136 (235) ⁶⁾

1) Transmission starts in 1st gear and shifts into 1st gear when coasting to a stop.

4) Shift points are increased: while driving up or down mountain passes, while driving with a heavily loaded vehicle, at very high transmission fluid temperatures, with transmission mode switch in "S", also: with abrupt throttle release, and very sporty driving style.

6) In theory, as vehicle is limited to maximum top speed of 118 mph.

Diagnosis – Function Test

Transmission selector lever "D" shift points				163.154 as of 02.01.00	163.172 as of 02.01.00
Downshift in transmission range <small>1) 3) 4)</small>	5 4	Full throttle	approx. mph. (km/h)	≈ 94 (152)	≈ 104 (166)
		Kickdown	approx. mph. (km/h)	≈ 131 (211)	≈ 138 (224)
	4 3	Full throttle	approx. mph. (km/h)	≈ 63 (102)	≈ 66 (106)
		Kickdown	approx. mph. (km/h)	≈ 85 (138)	≈ 95 (157)
	3 2	Full throttle	approx. mph. (km/h)	≈ 37 (60)	≈ 37 (61)
		Kickdown	approx. mph. (km/h)	≈ 48 (77)	≈ 58 (94)
	2 1	Full throttle	approx. mph. (km/h)	≈ 17 (28)	≈ 15 (23)
		Kickdown	approx. mph. (km/h)	≈ 23 (38)	≈ 28 (45)

1) Transmission starts in 1st gear and shifts into 1st gear when coasting to a stop.

3) Upon rapid throttle release; an upshift into the next higher gear is prevented and selected only when vehicle has decreased lateral acceleration rates and appropriate handling characteristics. This prevents skidding of the vehicle in curves.

4) Shift points are increased: while driving up or down mountain passes, with heavily loaded vehicles, at very high transmission fluid temperatures, with transmission mode switch in "S", also: with abrupt throttle release, and very sporty driving style.

Diagnosis – Function Test

Transmission selector lever "D" shift points					170.447 (USA)	170.449 (USA)
Upshift in transmission range 1) 2) 4)	1 2	Full throttle	W	approx. mph. (km/h)	≈ 22 (35)	≈ 23 (36)
			S	approx. mph. (km/h)	≈ 33 (52)	≈ 34 (54)
		Kickdown		approx. mph. (km/h)	≈ 33 (52)	≈ 34 (54)
	2 3	Full throttle	W	approx. mph. (km/h)	≈ 38 (61)	≈ 41 (67)
			S	approx. mph. (km/h)	≈ 53 (84)	≈ 54 (88)
		Kickdown		approx. mph. (km/h)	≈ 53 (84)	≈ 54 (88)
	3 4	Full throttle	W	approx. mph. (km/h)	≈ 64 (102)	≈ 72 (118)
			S	approx. mph. (km/h)	≈ 88 (136)	≈ 93 (144)
		Kickdown		approx. mph. (km/h)	≈ 88 (136)	≈ 93 (144)
	4 5	Full throttle	W	approx. mph. (km/h)	≈ 95 (152)	≈ 111 (179)
			S	approx. mph. (km/h)	≈ 126 (202)	≈ 131 (213)
		Kickdown		approx. mph. (km/h)	≈ 126 (202)	≈ 131 (213)

1) Transmission mode switch "S": transmission starts in 1st gear and shifts into 1st gear when coasting to a stop.

2) Transmission mode switch "W": transmission starts in 2nd gear and shifts into 2nd gear when coasting to a stop. 1st gear can be engaged with full throttle.
(**Caution:** during engine warm-up transmission starts in 1st gear and shifts into 2nd gear when coasting to a stop).

4) Shift points are increased: while driving up or down mountain passes, while driving with a heavily loaded vehicle, at very high transmission fluid temperatures, with transmission mode switch in "S", also: with abrupt throttle release, and very sporty driving style.

2.3 Electronic Automatic Transmission Control (ETC)

722.6

Diagnosis – Function Test

Transmission selector lever "D" shift points					170.447 (USA)	170.449 (USA)
Downshift in transmission range 1) 2) 4) 5)	5 4	Full throttle	W	approx. mph. (km/h)	≈ 80 (129)	≈ 90 (139)
			S	approx. mph. (km/h)	≈ 91 (146) ³⁾	≈ 101 (156) ³⁾
		Kickdown		approx. mph. (km/h)	≈ 121 (194)	≈ 126 (203)
	4 3	Full throttle	W	approx. mph. (km/h)	≈ 47 (75)	≈ 48 (78)
			S	approx. mph. (km/h)	≈ 53 (85) ³⁾	≈ 57 (92) ³⁾
		Kickdown		approx. mph. (km/h)	≈ 79 (126)	≈ 87 (134)
	3 2	Full throttle	W	approx. mph. (km/h)	≈ 24 (37)	≈ 25 (39)
			S	approx. mph. (km/h)	≈ 35 (59)	≈ 36 (60)
		Kickdown		approx. mph. (km/h)	≈ 44 (69)	≈ 47 (73)
	2 1	Full throttle	W	approx. mph. (km/h)	≈ 10 (17)	≈ 10 (17)
			S	approx. mph. (km/h)	≈ 16 (25)	≈ 15 (23)
		Kickdown		approx. mph. (km/h)	≈ 19 (30)	≈ 20 (33)

1) Transmission mode switch "S": transmission starts in 1st gear and shifts into 1st gear when coasting to a stop.

2) Transmission mode switch "W": transmission starts in 2nd gear and shifts into 2nd gear when coasting to a stop. 1st gear can be engaged with full throttle.
(**Caution:** during engine warm-up transmission starts in 1st gear and shifts into 2nd gear when coasting to a stop).

4) Shift points are increased: while driving up or down mountain passes, while driving with a heavily loaded vehicle, at very high transmission fluid temperatures, with transmission mode switch in "S", also: with abrupt throttle release, and very sporty driving style.

5) In models 208 and 210, the kickdown downshift in transmission mode "S" is lower at ATF temperatures < 40 °C.

Diagnosis – Function Test

Transmission selector lever "D" shift points					170.465 (USA)	
Upshift in transmission range 1) 2) 4)	1 2	Full throttle	W	approx. mph. (km/h)	≈ 22 (35)	
			S	approx. mph. (km/h)	≈ 34 (54)	
		Kickdown		approx. mph. (km/h)	≈ 34 (54)	
	2 3	Full throttle	W	approx. mph. (km/h)	≈ 41 (66)	
			S	approx. mph. (km/h)	≈ 54 (88)	
		Kickdown		approx. mph. (km/h)	≈ 54 (88)	
	3 4	Full throttle	W	approx. mph. (km/h)	≈ 72 (118)	
			S	approx. mph. (km/h)	≈ 93 (144)	
		Kickdown		approx. mph. (km/h)	≈ 93 (144)	
	4 5	Full throttle	W	approx. mph. (km/h)	≈ 111 (179)	
			S	approx. mph. (km/h)	≈ 131 (213)	
		Kickdown		approx. mph. (km/h)	≈ 131 (213)	

1) Transmission mode switch "S": transmission starts in 1st gear and shifts into 1st gear when coasting to a stop.

2) Transmission mode switch "W": transmission starts in 2nd gear and shifts into 2nd gear when coasting to a stop. 1st gear can be engaged with full throttle.
(**Caution:** during engine warm-up transmission starts in 1st gear and shifts into 2nd gear when coasting to a stop).

4) Shift points are increased: while driving up or down mountain passes, while driving with a heavily loaded vehicle, at very high transmission fluid temperatures, with transmission mode switch in "S", also: with abrupt throttle release, and very sporty driving style.

Diagnosis – Function Test

Transmission selector lever "D" shift points					170.465 (USA)	
Downshift in transmission range 1) 2) 4) 5)	5 4	Full throttle	W	approx. mph. (km/h)	≈ 88 (140)	
			S	approx. mph. (km/h)	≈ 92 (147) ³⁾	
		Kickdown		approx. mph. (km/h)	≈ 128 (205)	
	4 3	Full throttle	W	approx. mph. (km/h)	≈ 55 (93)	
			S	approx. mph. (km/h)	≈ 57 (98) ³⁾	
		Kickdown		approx. mph. (km/h)	≈ 87 (134)	
	3 2	Full throttle	W	approx. mph. (km/h)	≈ 33 (56)	
			S	approx. mph. (km/h)	≈ 35 (59)	
		Kickdown		approx. mph. (km/h)	≈ 47 (71)	
	2 1	Full throttle	W	approx. mph. (km/h)	≈ 10 (16)	
			S	approx. mph. (km/h)	≈ 15 (23)	
		Kickdown		approx. mph. (km/h)	≈ 19 (31)	

1) Transmission mode switch "S": transmission starts in 1st gear and shifts into 1st gear when coasting to a stop.

2) Transmission mode switch "W": transmission starts in 2nd gear and shifts into 2nd gear when coasting to a stop. 1st gear can be engaged with full throttle.
(Caution: during engine warm-up transmission starts in 1st gear and shifts into 2nd gear when coasting to a stop).

4) Shift points are increased: while driving up or down mountain passes, while driving with a heavily loaded vehicle, at very high transmission fluid temperatures, with transmission mode switch in "S", also: with abrupt throttle release, and very sporty driving style.

5) In models 208 and 210, the kickdown downshift in transmission mode "S" is lower at ATF temperatures < 40 °C.

Diagnosis – Function Test

Transmission selector lever "D" shift points					202.023	202.024
Upshift in transmission range 1) 2) 4)	1 2	Full throttle	W	approx. mph. (km/h)	≈ 23 (37)	≈ 22 (35)
			S	approx. mph. (km/h)	≈ 34 (54)	≈ 33 (52)
		Kickdown		approx. mph. (km/h)	≈ 34 (54)	≈ 33 (52)
	2 3	Full throttle	W	approx. mph. (km/h)	≈ 41 (65)	≈ 38 (61)
			S	approx. mph. (km/h)	≈ 55 (88)	≈ 51 (84)
		Kickdown		approx. mph. (km/h)	≈ 55 (88)	≈ 51 (84)
	3 4	Full throttle	W	approx. mph. (km/h)	≈ 69 (110)	≈ 63 (102)
			S	approx. mph. (km/h)	≈ 90 (144)	≈ 82 (136)
		Kickdown		approx. mph. (km/h)	≈ 90 (144)	≈ 82 (136)
	4 5	Full throttle	W	approx. mph. (km/h)	≈ 103 (164)	≈ 94 (152)
			S	approx. mph. (km/h)	≈ 133 (213)	≈ 125 (202)
		Kickdown		approx. mph. (km/h)	≈ 133 (213)	≈ 125 (202)

1) Transmission mode switch "S": transmission starts in 1st gear and shifts into 1st gear when coasting to a stop.

2) Transmission mode switch "W": transmission starts in 2nd gear and shifts into 2nd gear when coasting to a stop. 1st gear can be engaged with full throttle.
(Caution: during engine warm-up transmission starts in 1st gear and shifts into 2nd gear when coasting to a stop).

4) Shift points are increased: while driving up or down mountain passes, while driving with a heavily loaded vehicle, at very high transmission fluid temperatures, with transmission mode switch in "S", also: with abrupt throttle release, and very sporty driving style.

Diagnosis – Function Test

Transmission selector lever "D" shift points					202.023	202.024
Downshift in transmission range <small>1) 2) 4) 5)</small>	5 4	Full throttle	W	approx. mph. (km/h)	≈ 89 (143)	≈ 81 (129)
			S	approx. mph. (km/h)	≈ 94 (151) ³⁾	≈ 92 (146) ³⁾
		Kickdown		approx. mph. (km/h)	≈ 128 (204)	≈ 119 (194)
	4 3	Full throttle	W	approx. mph. (km/h)	≈ 56 (89)	≈ 46 (75)
			S	approx. mph. (km/h)	≈ 59 (94) ³⁾	≈ 54 (85) ³⁾
		Kickdown		approx. mph. (km/h)	≈ 84 (134)	≈ 77 (126)
	3 2	Full throttle	W	approx. mph. (km/h)	≈ 33 (52)	≈ 22 (37)
			S	approx. mph. (km/h)	≈ 38 (61)	≈ 37 (59)
		Kickdown		approx. mph. (km/h)	≈ 49 (78)	≈ 43 (69)
	2 1	Full throttle	W	approx. mph. (km/h)	≈ 10 (17)	≈ 8 (17)
			S	approx. mph. (km/h)	≈ 16 (26)	≈ 15 (25)
		Kickdown		approx. mph. (km/h)	≈ 24 (38)	≈ 19 (30)

- 1) Transmission mode switch "S": transmission starts in 1st gear and shifts into 1st gear when coasting to a stop.
- 2) Transmission mode switch "W": transmission starts in 2nd gear and shifts into 2nd gear when coasting to a stop. 1st gear can be engaged with full throttle.
(**Caution:** during engine warm-up transmission starts in 1st gear and shifts into 2nd gear when coasting to a stop).
- 3) Upon rapid throttle release; an upshift into the next higher gear is prevented and selected only when vehicle has decreased lateral acceleration rates and appropriate handling characteristics. This prevents skidding of the vehicle in curves.
- 4) Shift points are increased: while driving up or down mountain passes, with heavily loaded vehicles, at very high transmission fluid temperatures, with transmission mode switch in "S", also: with abrupt throttle release, and very sporty driving style.
- 5) In models 208 and 210, the kickdown downshift in transmission mode "S" is lower at ATF temperatures < 40 °C.

Diagnosis – Function Test

Transmission selector lever "D" shift points					202.028	202.029
Upshift in transmission range <small>1) 2) 4)</small>	1 2	Full throttle	W	approx. mph. (km/h)	≈ 26 (41)	≈ 24 (39)
			S	approx. mph. (km/h)	≈ 38 (61)	≈ 37 (58)
		Kickdown		approx. mph. (km/h)	≈ 38 (61)	≈ 37 (58)
	2 3	Full throttle	W	approx. mph. (km/h)	≈ 45 (72)	≈ 42 (68)
			S	approx. mph. (km/h)	≈ 62 (100)	≈ 57 (94)
		Kickdown		approx. mph. (km/h)	≈ 62 (100)	≈ 57 (94)
	3 4	Full throttle	W	approx. mph. (km/h)	≈ 75 (121)	≈ 70 (115)
			S	approx. mph. (km/h)	≈ 101 (162)	≈ 95 (153)
		Kickdown		approx. mph. (km/h)	≈ 101 (162)	≈ 95 (153)
	4 5	Full throttle	W	approx. mph. (km/h)	≈ 113 (181)	≈ 106 (170)
			S	approx. mph. (km/h)	≈ 149 (239)	≈ 138 (227)
		Kickdown		approx. mph. (km/h)	≈ 151 (241)	≈ 138 (227)

1) Transmission mode switch "S": transmission starts in 1st gear and shifts into 1st gear when coasting to a stop.

2) Transmission mode switch "W": transmission starts in 2nd gear and shifts into 2nd gear when coasting to a stop. 1st gear can be engaged with full throttle.
(Caution: during engine warm-up transmission starts in 1st gear and shifts into 2nd gear when coasting to a stop).

4) Shift points are increased: while driving up or down mountain passes, while driving with a heavily loaded vehicle, at very high transmission fluid temperatures, with transmission mode switch in "S", also: with abrupt throttle release, and very sporty driving style.

Diagnosis – Function Test

Transmission selector lever "D" shift points					202.028	202.029
Downshift in transmission range 1) 2) 4) 5)	5 4	Full throttle	W	approx. mph. (km/h)	≈ 98 (157)	≈ 91 (148)
			S	approx. mph. (km/h)	≈ 1 04 (167) ³⁾	≈ 95 (157) ³⁾
		Kickdown		approx. mph. (km/h)	≈ 144 (230)	≈ 132 (219)
	4 3	Full throttle	W	approx. mph. (km/h)	≈ 59 (95)	≈ 57 (93)
			S	approx. mph. (km/h)	≈ 64 (103) ³⁾	≈ 64 (105) ³⁾
		Kickdown		approx. mph. (km/h)	≈ 95 (152)	≈ 89 (143)
	3 2	Full throttle	W	approx. mph. (km/h)	≈ 31 (50)	≈ 31 (49)
			S	approx. mph. (km/h)	≈ 31 (50)	≈ 38 (63)
		Kickdown		approx. mph. (km/h)	≈ 55 (88)	≈ 49 (80)
	2 1	Full throttle	W	approx. mph. (km/h)	≈ 11 (18)	≈ 08 (18)
			S	approx. mph. (km/h)	≈ 18 (29)	≈ 15 (25)
		Kickdown		approx. mph. (km/h)	≈ 27 (43)	≈ 24 (39)

1) Transmission mode switch "S": transmission starts in 1st gear and shifts into 1st gear when coasting to a stop.

2) Transmission mode switch "W": transmission starts in 2nd gear and shifts into 2nd gear when coasting to a stop. 1st gear can be engaged with full throttle.

(**Caution:** during engine warm-up transmission starts in 1st gear and shifts into 2nd gear when coasting to a stop).

3) Upon rapid throttle release; an upshift into the next higher gear is prevented and selected only when vehicle has decreased lateral acceleration rates and appropriate handling characteristics. This prevents skidding of the vehicle in curves.

4) Shift points are increased: while driving up or down mountain passes, with heavily loaded vehicles, at very high transmission fluid temperatures, with transmission mode switch in "S", also: with abrupt throttle release, and very sporty driving style.

5) In models 208 and 210, the kickdown downshift in transmission mode "S" is lower at ATF temperatures < 40 °C.

2.3 Electronic Automatic Transmission Control (ETC)

722.6

Diagnosis – Function Test

Transmission selector lever "D" shift points					208.365	208.370
Upshift in transmission range 1) 2) 4)	1 2	Full throttle	W	approx. mph. (km/h)	≈ 24 (39)	≈ 30 (47)
			S	approx. mph. (km/h)	≈ 36 (58)	≈ 42 (67)
		Kickdown		approx. mph. (km/h)	≈ 36 (58)	≈ 42 (67)
	2 3	Full throttle	W	approx. mph. (km/h)	≈ 43 (68)	≈ 51 (83)
			S	approx. mph. (km/h)	≈ 59 (94)	≈ 69 (111)
		Kickdown		approx. mph. (km/h)	≈ 59 (94)	≈ 69 (111)
	3 4	Full throttle	W	approx. mph. (km/h)	≈ 72 (114)	≈ 84 (135)
			S	approx. mph. (km/h)	≈ 96 (153)	≈ 107 (172)
		Kickdown		approx. mph. (km/h)	≈ 96 (153)	≈ 107 (172)
	4 5	Full throttle	W	approx. mph. (km/h)	≈ 106 (170)	≈ 118 (190)
			S	approx. mph. (km/h)	≈ 141 (226)	≈ 150 (242)
		Kickdown		approx. mph. (km/h)	≈ 141 (226)	≈ 150 (242)

1) Transmission mode switch "S": transmission starts in 1st gear and shifts into 1st gear when coasting to a stop.

2) Transmission mode switch "W": transmission starts in 2nd gear and shifts into 2nd gear when coasting to a stop. 1st gear can be engaged with full throttle.
(Caution: during engine warm-up transmission starts in 1st gear and shifts into 2nd gear when coasting to a stop).

4) Shift points are increased: while driving up or down mountain passes, while driving with a heavily loaded vehicle, at very high transmission fluid temperatures, with transmission mode switch in "S", also: with abrupt throttle release, and very sporty driving style.

Diagnosis – Function Test

Transmission selector lever "D" shift points					208.365	208.370
Downshift in transmission range 1) 2) 4) 5)	5 4	Full throttle	W	approx. mph. (km/h)	≈ 92 (147)	≈ 104 (166)
			S	approx. mph. (km/h)	≈ 98 (157) ³⁾	≈ 106 (170) ³⁾
		Kickdown		approx. mph. (km/h)	≈ 136 (218)	≈ 141 (230)
	4 3	Full throttle	W	approx. mph. (km/h)	≈ 56 (92)	≈ 64 (102)
			S	approx. mph. (km/h)	≈ 66 (105) ³⁾	≈ 68 (109) ³⁾
		Kickdown		approx. mph. (km/h)	≈ 89 (142)	≈ 99 (161)
	3 2	Full throttle	W	approx. mph. (km/h)	≈ 31 (49)	≈ 36 (56)
			S	approx. mph. (km/h)	≈ 38 (62)	≈ 39 (63)
		Kickdown		approx. mph. (km/h)	≈ 49 (79)	≈ 61 (97)
	2 1	Full throttle	W	approx. mph. (km/h)	≈ 11 (18)	≈ 12 (19)
			S	approx. mph. (km/h)	≈ 16 (25)	≈ 15 (24)
		Kickdown		approx. mph. (km/h)	≈ 24 (39)	≈ 30 (46)

1) Transmission mode switch "S": transmission starts in 1st gear and shifts into 1st gear when coasting to a stop.

2) Transmission mode switch "W": transmission starts in 2nd gear and shifts into 2nd gear when coasting to a stop. 1st gear can be engaged with full throttle.

(**Caution:** during engine warm-up transmission starts in 1st gear and shifts into 2nd gear when coasting to a stop).

3) Upon rapid throttle release; an upshift into the next higher gear is prevented and selected only when vehicle has decreased lateral acceleration rates and appropriate handling characteristics. This prevents skidding of the vehicle in curves.

4) Shift points are increased: while driving up or down mountain passes, with heavily loaded vehicles, at very high transmission fluid temperatures, with transmission mode switch in "S", also: with abrupt throttle release, and very sporty driving style.

5) In models 208 and 210, the kickdown downshift in transmission mode "S" is lower at ATF temperatures < 40 °C.

Diagnosis – Function Test

Transmission selector lever "D" shift points					210.020	210.025
Upshift in transmission range <small>1) 2) 4)</small>	1 2	Full throttle	W	approx. mph. (km/h)	≈ 18 (29)	≈ 19 (30)
			S	approx. mph. (km/h)	≈ 28 (44)	≈ 29 (45)
		Kickdown		approx. mph. (km/h)	≈ 28 (44)	≈ 29 (45)
	2 3	Full throttle	W	approx. mph. (km/h)	≈ 37 (59)	≈ 33 (54)
			S	approx. mph. (km/h)	≈ 44 (71)	≈ 44 (73)
		Kickdown		approx. mph. (km/h)	≈ 44 (71)	≈ 44 (73)
	3 4	Full throttle	W	approx. mph. (km/h)	≈ 54 (86)	≈ 57 (94)
			S	approx. mph. (km/h)	≈ 73 (116)	≈ 74 (119)
		Kickdown		approx. mph. (km/h)	≈ 73 (116)	≈ 74 (119)
	4 5	Full throttle	W	approx. mph. (km/h)	≈ 80 (128)	≈ 86 (138)
			S	approx. mph. (km/h)	≈ 107 (171)	≈ 109 (176)
		Kickdown		approx. mph. (km/h)	≈ 107 (171)	≈ 109 (176)

1) Transmission mode switch "S": transmission starts in 1st gear and shifts into 1st gear when coasting to a stop.

2) Transmission mode switch "W": transmission starts in 2nd gear and shifts into 2nd gear when coasting to a stop. 1st gear can be engaged with full throttle.
(Caution: during engine warm-up transmission starts in 1st gear and shifts into 2nd gear when coasting to a stop).

4) Shift points are increased: while driving up or down mountain passes, while driving with a heavily loaded vehicle, at very high transmission fluid temperatures, with transmission mode switch in "S", also: with abrupt throttle release, and very sporty driving style.

Diagnosis – Function Test

Transmission selector lever "D" shift points					210.020	210.025
Downshift in transmission range 1) 2) 4) 5)	5 4	Full throttle	W	approx. mph. (km/h)	≈ 70 (113)	≈ 68 (107)
			S	approx. mph. (km/h)	≈ 70 (113) ³⁾	≈ 74 (119) ³⁾
		Kickdown		approx. mph. (km/h)	≈ 103 (164)	≈ 105 (169)
	4 3	Full throttle	W	approx. mph. (km/h)	≈ 43 (68)	≈ 40 (65)
			S	approx. mph. (km/h)	≈ 43 (68) ³⁾	≈ 43 (69) ³⁾
		Kickdown		approx. mph. (km/h)	≈ 68 (109)	≈ 69 (111)
	3 2	Full throttle	W	approx. mph. (km/h)	≈ 28 (45)	≈ 25 (42)
			S	approx. mph. (km/h)	≈ 31 (49)	≈ 32 (47)
		Kickdown		approx. mph. (km/h)	≈ 39 (63)	≈ 38 (61)
	2 1	Full throttle	W	approx. mph. (km/h)	≈ 14 (23)	≈ 11 (17)
			S	approx. mph. (km/h)	≈ 14 (23)	≈ 17 (25)
		Kickdown		approx. mph. (km/h)	≈ 22 (35)	≈ 19 (32)

1) Transmission mode switch "S": transmission starts in 1st gear and shifts into 1st gear when coasting to a stop.

2) Transmission mode switch "W": transmission starts in 2nd gear and shifts into 2nd gear when coasting to a stop. 1st gear can be engaged with full throttle.

(**Caution:** during engine warm-up transmission starts in 1st gear and shifts into 2nd gear when coasting to a stop).

3) Upon rapid throttle release; an upshift into the next higher gear is prevented and selected only when vehicle has decreased lateral acceleration rates and appropriate handling characteristics. This prevents skidding of the vehicle in curves.

4) Shift points are increased: while driving up or down mountain passes, with heavily loaded vehicles, at very high transmission fluid temperatures, with transmission mode switch in "S", also: with abrupt throttle release, and very sporty driving style.

5) In models 208 and 210, the kickdown downshift in transmission mode "S" is lower at ATF temperatures < 40 °C.

Diagnosis – Function Test

Transmission selector lever "D" shift points					210.055	210.065/265
Upshift in transmission range <small>1) 2) 4)</small>	1 2	Full throttle	W	approx. mph. (km/h)	≈ 26 (42)	≈ 25 (40)
			S	approx. mph. (km/h)	≈ 39 (62)	≈ 37 (59)
		Kickdown		approx. mph. (km/h)	≈ 39 (62)	≈ 37 (59)
	2 3	Full throttle	W	approx. mph. (km/h)	≈ 46 (73)	≈ 43 (69)
			S	approx. mph. (km/h)	≈ 63 (101)	≈ 59 (95)
		Kickdown		approx. mph. (km/h)	≈ 63 (101)	≈ 59 (95)
	3 4	Full throttle	W	approx. mph. (km/h)	≈ 77 (123)	≈ 73 (116)
			S	approx. mph. (km/h)	≈ 103 (164)	≈ 97 (155)
		Kickdown		approx. mph. (km/h)	≈ 103 (164)	≈ 97 (155)
	4 5	Full throttle	W	approx. mph. (km/h)	≈ 114 (183)	≈ 108 (172)
			S	approx. mph. (km/h)	≈ 151 (241)	≈ 144 (230)
		Kickdown		approx. mph. (km/h)	≈ 151 (241)	≈ 144 (230)

1) Transmission mode switch "S": transmission starts in 1st gear and shifts into 1st gear when coasting to a stop.

2) Transmission mode switch "W": transmission starts in 2nd gear and shifts into 2nd gear when coasting to a stop. 1st gear can be engaged with full throttle.
(Caution: during engine warm-up transmission starts in 1st gear and shifts into 2nd gear when coasting to a stop).

4) Shift points are increased: while driving up or down mountain passes, while driving with a heavily loaded vehicle, at very high transmission fluid temperatures, with transmission mode switch in "S", also: with abrupt throttle release, and very sporty driving style.

Diagnosis – Function Test

Transmission selector lever "D" shift points					210.055	210.065/265
Downshift in transmission range 1) 2) 4) 5)	5 4	Full throttle	W	approx. mph. (km/h)	≈ 99 (159)	≈ 93 (149)
			S	approx. mph. (km/h)	≈ 105 (169) ³⁾	≈ 99 (159) ³⁾
		Kickdown		approx. mph. (km/h)	≈ 145 (233)	≈ 138 (221)
	4 3	Full throttle	W	approx. mph. (km/h)	≈ 60 (96)	≈ 59 (94)
			S	approx. mph. (km/h)	≈ 65 (104) ³⁾	≈ 66 (106) ³⁾
		Kickdown		approx. mph. (km/h)	≈ 96 (153)	≈ 91 (145)
	3 2	Full throttle	W	approx. mph. (km/h)	≈ 31 (50)	≈ 31 (50)
			S	approx. mph. (km/h)	≈ 31 (50)	≈ 31 (63)
		Kickdown		approx. mph. (km/h)	≈ 56 (89)	≈ 50 (80)
	2 1	Full throttle	W	approx. mph. (km/h)	≈ 11 (18)	≈ 11 (18)
			S	approx. mph. (km/h)	≈ 18 (29)	≈ 16 (25)
		Kickdown		approx. mph. (km/h)	≈ 27 (43)	≈ 25 (40)

- 1) Transmission mode switch "S": transmission starts in 1st gear and shifts into 1st gear when coasting to a stop.
- 2) Transmission mode switch "W": transmission starts in 2nd gear and shifts into 2nd gear when coasting to a stop. 1st gear can be engaged with full throttle.
(**Caution:** during engine warm-up transmission starts in 1st gear and shifts into 2nd gear when coasting to a stop).
- 3) Upon rapid throttle release; an upshift into the next higher gear is prevented and selected only when vehicle has decreased lateral acceleration rates and appropriate handling characteristics. This prevents skidding of the vehicle in curves.
- 4) Shift points are increased: while driving up or down mountain passes, with heavily loaded vehicles, at very high transmission fluid temperatures, with transmission mode switch in "S", also: with abrupt throttle release, and very sporty driving style.
- 5) In models 208 and 210, the kickdown downshift in transmission mode "S" is lower at ATF temperatures < 40 °C.

2.3 Electronic Automatic Transmission Control (ETC)

722.6

Diagnosis – Function Test

Transmission selector lever "D" shift points					210.070 with 722.623/632	210.072
Upshift in transmission range <small>1) 2) 4)</small>	1 2	Full throttle	W	approx. mph. (km/h)	≈ 30 (49)	≈ 31 (49)
			S	approx. mph. (km/h)	≈ 44 (70)	≈ 43 (69)
		Kickdown		approx. mph. (km/h)	≈ 44 (70)	≈ 43 (69)
	2 3	Full throttle	W	approx. mph. (km/h)	≈ 53 (86)	≈ 52 (86)
			S	approx. mph. (km/h)	≈ 70 (115)	≈ 70 (114)
		Kickdown		approx. mph. (km/h)	≈ 70 (115)	≈ 70 (114)
	3 4	Full throttle	W	approx. mph. (km/h)	≈ 86 (140)	≈ 87 (140)
			S	approx. mph. (km/h)	≈ 110 (179)	≈ 111 (178)
		Kickdown		approx. mph. (km/h)	≈ 110 (179)	≈ 111 (178)
	4 5	Full throttle	W	approx. mph. (km/h)	≈ 121 (197)	≈ 123 (196)
			S	approx. mph. (km/h)	—	≈ 155 (250)
		Kickdown		approx. mph. (km/h)	—	≈ 155 (250)

1) Transmission mode switch "S": transmission starts in 1st gear and shifts into 1st gear when coasting to a stop.

2) Transmission mode switch "W": transmission starts in 2nd gear and shifts into 2nd gear when coasting to a stop. 1st gear can be engaged with full throttle.
(Caution: during engine warm-up transmission starts in 1st gear and shifts into 2nd gear when coasting to a stop).

4) Shift points are increased: while driving up or down mountain passes, while driving with a heavily loaded vehicle, at very high transmission fluid temperatures, with transmission mode switch in "S", also: with abrupt throttle release, and very sporty driving style.

Diagnosis – Function Test

Transmission selector lever "D" shift points					210.070 with 722.623/632	210.072
Downshift in transmission range <small>1) 2) 4) 5)</small>	5 4	Full throttle	W	approx. mph. (km/h)	≈ 106 (173)	≈ 107 (172)
			S	approx. mph. (km/h)	≈ 109 (177) ³⁾	≈ 111 (176) ³⁾
		Kickdown		approx. mph. (km/h)	≈ 147 (238)	≈ 138 (238)
	4 3	Full throttle	W	approx. mph. (km/h)	≈ 65 (106)	≈ 64 (105)
			S	approx. mph. (km/h)	≈ 70 (113) ³⁾	≈ 70 (113) ³⁾
		Kickdown		approx. mph. (km/h)	≈ 103 (167)	≈ 102 (167)
	3 2	Full throttle	W	approx. mph. (km/h)	≈ 37 (59)	≈ 37 (58)
			S	approx. mph. (km/h)	≈ 32 (65)	≈ 40 (65)
		Kickdown		approx. mph. (km/h)	≈ 62 (100)	≈ 62 (100)
	2 1	Full throttle	W	approx. mph. (km/h)	≈ 12 (20)	≈ 13 (20)
			S	approx. mph. (km/h)	≈ 15 (24)	≈ 12 (24)
		Kickdown		approx. mph. (km/h)	≈ 30 (48)	≈ 31 (48)

- 1) Transmission mode switch "S": transmission starts in 1st gear and shifts into 1st gear when coasting to a stop.
- 2) Transmission mode switch "W": transmission starts in 2nd gear and shifts into 2nd gear when coasting to a stop. 1st gear can be engaged with full throttle.
(**Caution:** during engine warm-up transmission starts in 1st gear and shifts into 2nd gear when coasting to a stop).
- 3) Upon rapid throttle release; an upshift into the next higher gear is prevented and selected only when vehicle has decreased lateral acceleration rates and appropriate handling characteristics. This prevents skidding of the vehicle in curves.
- 4) Shift points are increased: while driving up or down mountain passes, with heavily loaded vehicles, at very high transmission fluid temperatures, with transmission mode switch in "S", also: with abrupt throttle release, and very sporty driving style.
- 5) In models 208 and 210, the kickdown downshift in transmission mode "S" is lower at ATF temperatures < 40 °C.

Diagnosis – Function Test

Transmission selector lever "D" shift points					210.082/282	210.083/283
Upshift in transmission range <small>1) 2) 4)</small>	1 2	Full throttle	W	approx. mph. (km/h)	≈ 25 (40)	≈ 28 (45)
			S	approx. mph. (km/h)	≈ 37 (59)	≈ 40 (64)
		Kickdown		approx. mph. (km/h)	≈ 37 (59)	≈ 40 (64)
	2 3	Full throttle	W	approx. mph. (km/h)	≈ 43 (69)	≈ 49 (79)
			S	approx. mph. (km/h)	≈ 59 (95)	≈ 66 (106)
		Kickdown		approx. mph. (km/h)	≈ 59 (95)	≈ 66 (106)
	3 4	Full throttle	W	approx. mph. (km/h)	≈ 73 (116)	≈ 79 (129)
			S	approx. mph. (km/h)	≈ 97 (155)	≈ 103 (164)
		Kickdown		approx. mph. (km/h)	≈ 97 (155)	≈ 103 (164)
	4 5	Full throttle	W	approx. mph. (km/h)	≈ 108 (172)	≈ 112 (181)
			S	approx. mph. (km/h)	≈ 144 (230)	≈ 144 (231)
		Kickdown		approx. mph. (km/h)	≈ 144 (230)	≈ 144 (231)

1) Transmission mode switch "S": transmission starts in 1st gear and shifts into 1st gear when coasting to a stop.

2) Transmission mode switch "W": transmission starts in 2nd gear and shifts into 2nd gear when coasting to a stop. 1st gear can be engaged with full throttle.
(Caution: during engine warm-up transmission starts in 1st gear and shifts into 2nd gear when coasting to a stop).

4) Shift points are increased: while driving up or down mountain passes, while driving with a heavily loaded vehicle, at very high transmission fluid temperatures, with transmission mode switch in "S", also: with abrupt throttle release, and very sporty driving style.

Diagnosis – Function Test

Transmission selector lever "D" shift points					210.082/282	210.083/283
Downshift in transmission range <small>1) 2) 4) 5)</small>	5 4	Full throttle	W	approx. mph. (km/h)	≈ 93 (149)	≈ 99 (159)
			S	approx. mph. (km/h)	≈ 99 (159) ³⁾	≈ 102 (163) ³⁾
		Kickdown		approx. mph. (km/h)	≈ 138 (221)	≈ 136 (219)
	4 3	Full throttle	W	approx. mph. (km/h)	≈ 59 (94)	≈ 61 (97)
			S	approx. mph. (km/h)	≈ 66 (106) ³⁾	≈ 66 (104) ³⁾
		Kickdown		approx. mph. (km/h)	≈ 91 (145)	≈ 95 (154)
	3 2	Full throttle	W	approx. mph. (km/h)	≈ 31 (50)	≈ 34 (54)
			S	approx. mph. (km/h)	≈ 39 (63)	≈ 37 (60)
		Kickdown		approx. mph. (km/h)	≈ 50 (80)	≈ 56 (92)
	2 1	Full throttle	W	approx. mph. (km/h)	≈ 11 (18)	≈ 11 (18)
			S	approx. mph. (km/h)	≈ 16 (25)	≈ 14 (23)
		Kickdown		approx. mph. (km/h)	≈ 25 (40)	≈ 27 (44)

- 1) Transmission mode switch "S": transmission starts in 1st gear and shifts into 1st gear when coasting to a stop.
- 2) Transmission mode switch "W": transmission starts in 2nd gear and shifts into 2nd gear when coasting to a stop. 1st gear can be engaged with full throttle.
(**Caution:** during engine warm-up transmission starts in 1st gear and shifts into 2nd gear when coasting to a stop).
- 3) Upon rapid throttle release; an upshift into the next higher gear is prevented and selected only when vehicle has decreased lateral acceleration rates and appropriate handling characteristics. This prevents skidding of the vehicle in curves.
- 4) Shift points are increased: while driving up or down mountain passes, with heavily loaded vehicles, at very high transmission fluid temperatures, with transmission mode switch in "S", also: with abrupt throttle release, and very sporty driving style.
- 5) In models 208 and 210, the kickdown downshift in transmission mode "S" is lower at ATF temperatures < 40 °C.

Diagnosis – Function Test

Transmission adaption (adaption of the ETC)

Definition

Transmission adaption optimizes shift comfort through the automatic matching of data.

In order to compensate for tolerances and wear, there is an automatic matching of:

- Shift time
- Fill time
- Fill pressure
- Activation of torque convertor lock-up clutch

The retrieved data is indicated by the HHT via menu selection 07. The data can also be reset using the HHT.

Thereafter, electronic control of the transmission must be re-adapted to the transmission using the adaption procedure.

Requirements

- ATF temperature must be a min of 60 °C to a max. of 105 °C.
- A/C system OFF.
- Connect HHT to data link connector (X11/4) according to connection diagram (see section 0).

General

There are two possibilities to perform the adaption:

- Perform a test drive, using a second technician to observe the data as indicated by the HHT via menu selection 03, or
- Use a vehicle dynamometer.



Re: engine rpm limit:

It is important not to **exceed** the specified engine RPM during the adaption procedure, as in this case, adaption of the transmission will **not** take place.

Engine Torque Values, see Engine Torque Value Table.

Diagnosis – Function Test

Adaption procedure



During the adaption procedure, it is important to maintain the engine torque values as indicated in the Engine Torque Value Table on the following page.

1. **Following the replacement/swap or repair of a transmission, the following shifts must be newly adapted after resetting the values:**

Acceleration upshifts

- 4 X the 1 → 2 shift
- 4 X the 2 → 3 shift

(Torque values: see Engine Torque Value Table on next page).

Additional note regarding adaption procedure after replacing a transmission:

Print all adaption data as indicated by the HHT and return this data with the returned transmission.

2. **In case of complaints regarding shift quality, the following shifts must be newly adapted:**

Acceleration upshifts

- 4 X the 1 → 2 shift
- 4 X the 2 → 3 shift
- 3 X the 3 → 4 shift
- 3 X the 4 → 5 shift

(Torque values: see Engine Torque Value Table on next page).

Deceleration downshifts (while coasting)

- 3 X the 5 → 4 shift
- 3 X the 4 → 3 shift

(Torque values are not needed for these shifts).

Upon completion of the adaption procedure, allow the engine to idle for an additional 10 minutes. This is necessary, so that all indicated values from the HHT are transmitted completely into the DTC memory of the transmission control module (N15/3). If this does not occur, or if only some of the values are stored in the DTC memory, the transmission must be re-evaluated after a subsequent test drive.

Diagnosis – Function Test

Engine Torque Value Table for Adaption Procedure

	Shift	Count	Torque Engine 104.941 104.991 104.994 104.995	Torque Engine 111.973 111.975	Torque Engine 111.974	Torque Engine 112	Torque Engine 113.940 113.941 113.943 without touch shift	Torque Engine 113.940 113.941 113.943 with touch shift
Acceleration upshift	1 2	4 X	14 - 37 Nm	14 - 37 Nm	14 - 28 Nm	14 - 37 Nm	13 - 40 Nm	10 - 45 Nm
	2 3	4 X	17 - 59 Nm	17 - 59 Nm	17 - 59 Nm	17 - 59 Nm	25 - 50 Nm	22 - 50 Nm
	3 4	3 X	17 - 46 Nm	17 - 46 Nm	17 - 46 Nm	17 - 46 Nm	22 - 70 Nm	22 - 65 Nm
	4 5	3 X	0 - 121 Nm	0 - 121 Nm	0 - 82 Nm	0 - 121 Nm	0 - 110 Nm	22 - 900 Nm
max. engine rpm ¹⁾	—	—	2400 rpm	2400 rpm	2400 rpm	2400 rpm	1800 rpm	1800 rpm

¹⁾ It is important not to **exceed** the required engine rpm during the adaption procedure, as in this case adaption of the transmission will **not** take place.

Diagnosis – Function Test

Engine Torque Value Table for Adaption Procedure

	Shift	Count	Torque Engine 113.960	Torque Engine 119.980/982	Torque Engine 119.981/985	Torque Engine 120	
Acceleration upshift	1 2	4 X	17 - 50 Nm	17 - 50 Nm	13 - 40 Nm	17 - 50 Nm	
	2 3	4 X	29 - 60 Nm	29 - 60 Nm	25 - 50 Nm	29 - 60 Nm	
	3 4	3 X	29 - 80 Nm	29 - 80 Nm	22 - 70 Nm	29 - 80 Nm	
	4 5	3 X	0 - 140 Nm	0 - 140 Nm	0 - 110 Nm	0 - 140 Nm	
max. engine rpm ¹⁾	—	—	1800 rpm	1800 rpm	1800 rpm	1800 rpm	

¹⁾ It is important not to **exceed** the required engine rpm during the adaption procedure, as in this case adaption of the transmission will **not** take place.

Diagnosis – Function Test

Engine Torque Value Table for Adaption Procedure

	Shift	Count	Torque Engine 606.912	Torque Engine 606.962	
Acceleration upshift	1 2	4 X	14 - 28 Nm	14 - 37 Nm	
	2 3	4 X	20 - 55 Nm	20 - 59 Nm	
	3 4	3 X	15 - 54 Nm	20 - 59 Nm	
	4 5	3 X	0 - 81 Nm	0 - 121 Nm	
max. engine rpm ¹⁾	—	—	1800 rpm	1800 rpm	

¹⁾ It is important not to **exceed** the required engine rpm during the adaption procedure, as in this case adaption of the transmission will **not** take place.