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097 4-speed Automatic

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Fault	Remedy
oil pump defective	check pump for wear; replace if necessary
throttle control not properly adjusted	adjust throttle control
sticking control valve	disassemble and clean valve body; check valves for free movement

transmission code letters REH

Torque converter code	Stall speed range in RPM
Q	2835-3085

transmission code letters REE

Torque converter code	Stall speed range in RPM
N	3100-3350

CAUTION

Do not continue stall speed test longer than time required to read tachometer. Maximum stall speed test time is 5 seconds. Wait at least 20 seconds before repeating test.

Stall speed, checking

- check stall speed only if vehicle exhibits poor performance or poor acceleration. Before measuring stall speed, check that the correct torque converter is installed.

Note

The stall speed decreases as height above sea level increases (approximately 125 RPM per 3000 feet).

- connect tachometer, **VW 1367**
- engage parking brake
- start and warm engine
- hold foot brake firmly, put selector lever in **D** and depress accelerator briefly to full throttle
- check that engine runs within stall speed range

Automatic Transmission – Controls, Assembly

Transmission identification

Note

The 4-speed automatic transmission 097 (code AEK) is used with the 5-cylinder 2.3L engine (code NF) in the Audi 100.

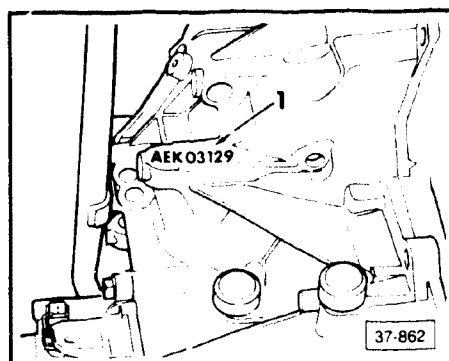
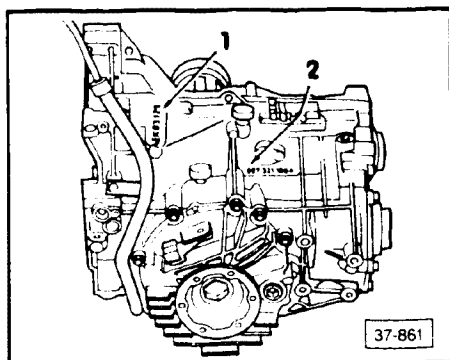
Identification codes, locations

1 = transmission code letters and manufacture date

Note

Transmission code letters also appear on vehicle data stickers.

2 = transmission type number



Transmission code letters and manufacture date

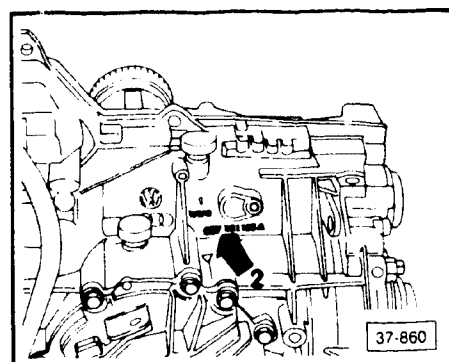
- location (arrow 1)

Example:

AEK	03	12	9
code	day	month	year (89)

Transmission type number

- location (arrow 2)
- type 097



Automatic Transmission – Controls, Assembly

Lubricant capacities

Transmission

Capacities	Transmission	Transmission type
Dry fill	5.4 liters (5.7 qt)	097
Refill (oil change)	Approximately 3 liters (3.17 qt)	
Lubricant	ATF — Dexron	

Final drive

Capacities	Final drive	Transmission type
Dry fill	1.0 liter (1.06 qt)	097
Refill (oil change)	Check oil level at 15,000 mile intervals	
Lubricant	Gear oil G50 (synthetic oil) SAE 75 W 90	

Automatic Transmission – Controls, Assembly

Technical data

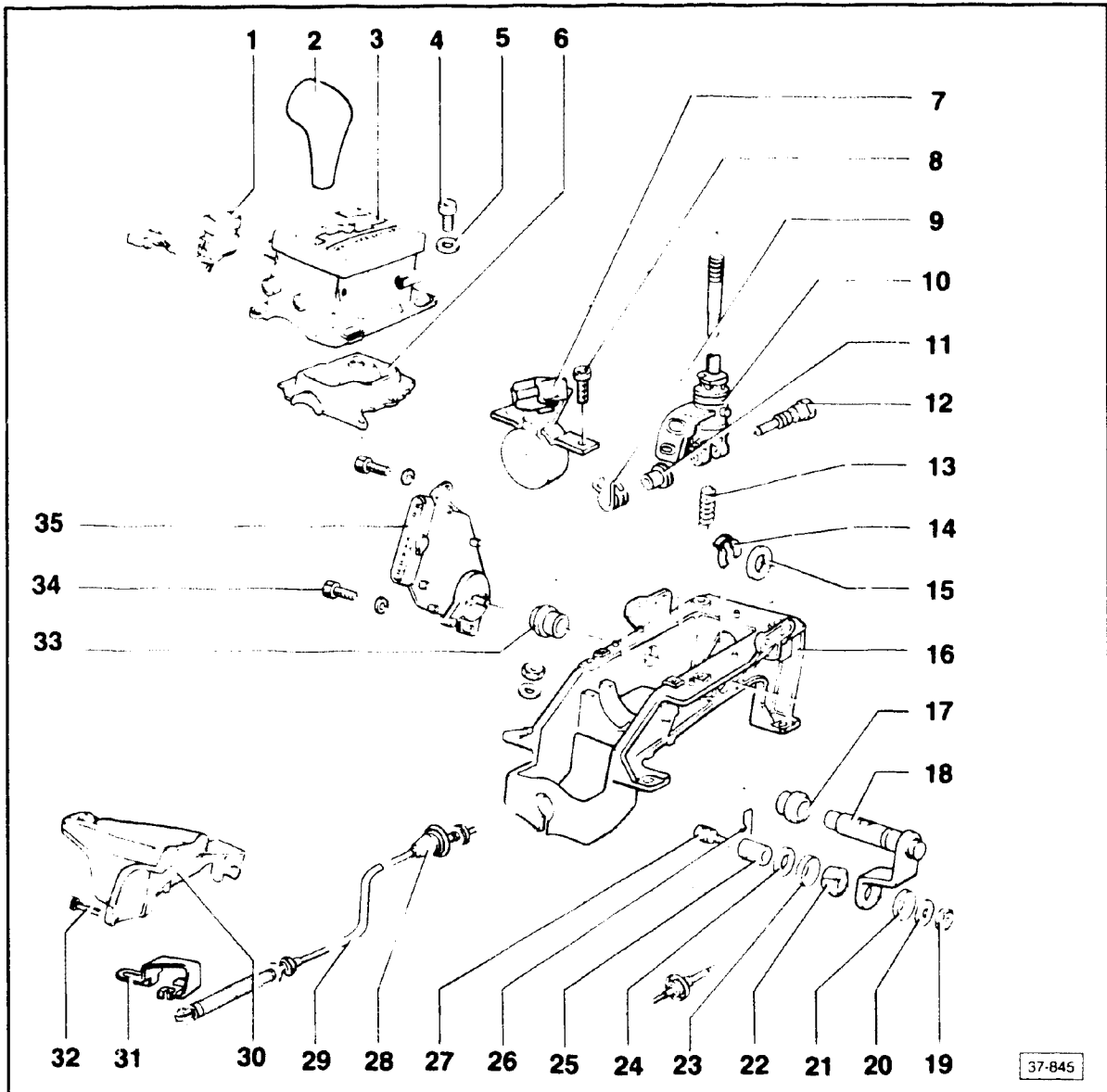
Transmission		
Code letters	AEK	
Manufacture date	12-89	
Transmission type	097	
Torque converter		
Code letters	LCCA	
Manufacture date	12-89	
Valve body		
Code letters	LAA	
Manufacture date	12-89	
No. of splined plates	inner	outer
Clutch K1	5	4
Clutch K2	5	5
Clutch K3	5	4
Brake B1	6	6
Brake B2	6	5
Engine application.		
Type	Audi 100	
Engine	2.3L (100 kW)	
Transmission ratios		
1st gear	2.714	
2nd gear	1.551	
3rd gear	1.000	
4th gear	0.679	
Reverse gear	2.111	
Intermediate drive — ratio	1.279	
Input gear — no. of teeth	68	
Output gear — no. of teeth	87	
Final drive — ratio	3.909	
Driveshaft — no. of teeth	11	
Final drive gear — no. of teeth	43	
Drive flange shaft — flange diameter	130 mm	
ATF cooler	integrated into engine radiator assembly	

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Automatic Transmission – Controls, Assembly



CAUTION

Before working on a running engine, always place selector lever at P and apply parking brake. Before shifting out of P or N with engine running, apply brake pedal to deactivate shift lock magnet.

Note

Prior to repair work on the shift control assembly, the center console (see Repair Manual Group 70) and the rear heater air duct must be disassembled.

- 1 — Program switch (E122)
- 2 — Selector lever knob
- 3 — Selector lever housing
 - install with P toward driving direction
 - install after adjusting solenoid switch
- 4 — 9 Nm (80 in. lb or 92 cm kg)
- 5 — Washer
- 6 — Boot
- 7 — Solenoid switch/shift lock magnet (N110)
checking function, page 37.34

Automatic Transmission – Controls, Assembly

- 8 — 10 Nm (7 ft lb)
- 9 — Torsion spring
- 10 — Selector lever
 - with fork piece for lever in **P** or **N** position
- 11 — Bushing
- 12 — Guide pin
 - install after installing compression spring
- 13 — Compression spring
 - install on selector lever before installing guide pin
- 14 — Clip
- 15 — Washer
- 16 — Mount
- 17 — Bushing
- 18 — Gearshift lever
- 19 — 20 Nm (14 ft lb)
- 20 — Washer
- 21 — Sleeve
- 22 — Bushing
- 23 — Sleeve
- 24 — Washer
- 25 — Collet
- 26 — Spring pin
- 27 — Clamping bolt
- 28 — Grommet for selector cable
 - replace if damaged
 - seat correctly
- 29 — Selector lever cable
 - with guide and bushing
 - do not kink or bend
 - lubricate cable ends lightly before installing
 - tighten cable on support to **13 Nm (9 ft lb)**
 - check guide tube for tight fit
 - install bolts on supports using Part No. **AMV 2000 000**
 - to adjust:
 - shift selector lever to **P**
 - move lever on transmission to **P** (i.e., up to stop toward rear)
 - with cable in tension-free position, tighten cable clamp nut to **20 Nm (14 ft lb)**
 - after adjusting cable, check function of selector lever switch and if necessary, adjust
- 30 — Support
- 31 — Clip
 - remove selector cable before prying off
- 32 — 40 Nm (29 ft lb)
- 33 — Bushing
- 34 — 5 Nm (44 in. lb or 51 cm kg)
- 35 — Selector lever switch
 - installing, page 37.33
 - checking function:
 - engine must start with selector lever in **P** or **N**
 - back-up lights must light with selector lever in **R**. If **NO**, turn selector lever switch in slots and check function again

Note

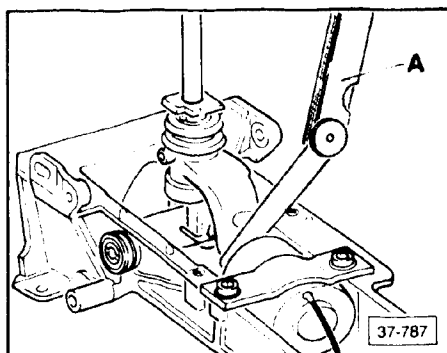
Boot for selector cable must be seated to prevent humidity from penetrating cable. Check boot cable for damage and replace as necessary.

30 — Support

- 31 — Clip
 - remove selector cable before prying off

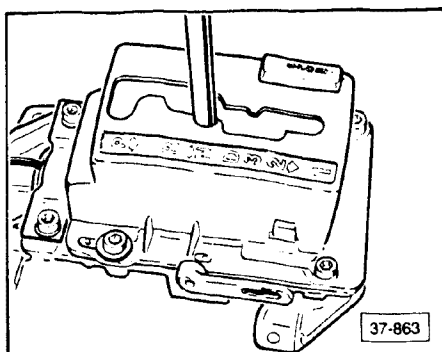
Automatic Transmission – Controls Assembly

Selector lever/cable assembly, disassembling/assembling



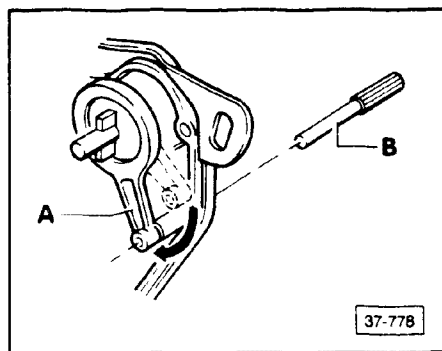
Solenoid switch, adjusting

- place gauge **A**, 1.0 mm thick, between selector lever and solenoid switch
- with selector lever in **R** position, push solenoid switch against gauge and tighten to 10 Nm (7 ft lb)



Selector lever housing to shift lever, adjusting

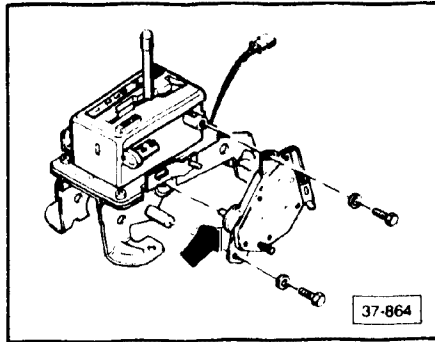
- after installing solenoid switch, center lower bore of fork piece and supply voltage to switch
 - solenoid pin locks fork piece
- install gearshift lever housing so selector lever is in position **N**, relative to housing



Selector lever switch, locking

- install lever **A** with pin or drill bit **B** (4.0 mm or 0.16 in. diameter) through housing bore

Automatic Transmission – Controls Assembly



Selector lever switch, installing

- shift selector lever to position **N**
- install selector lever switch so mount (**arrow**) locks into lever shaft
- tighten mounting bolts to 5 Nm (44 in. lb or 51 cm kg)
- remove pin or drill bit

Note

After installing lever switch, check for correct functioning. See page 37.34.

Automatic Shift Lock, checking function

- shift selector lever to **P** and turn ignition **ON**
 - brake pedal not depressed
 - = selector lever locked; cannot be shifted out of **P**
 - brake pedal depressed
 - = selector lever can be shifted out of **P** position
- shift selector lever to **N** and turn ignition **ON**
 - brake pedal not depressed
 - = selector lever locked; cannot be shifted out of **N**
 - brake pedal depressed
 - = selector lever can be shifted out of **N**

Note

At speeds over 5 km/h (3.7 mph) and when shifting to **N**, the selector lever must not lock. The lever must allow shifting to a driving position without depressing the brake pedal.

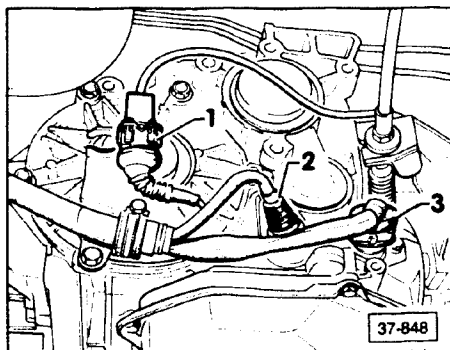
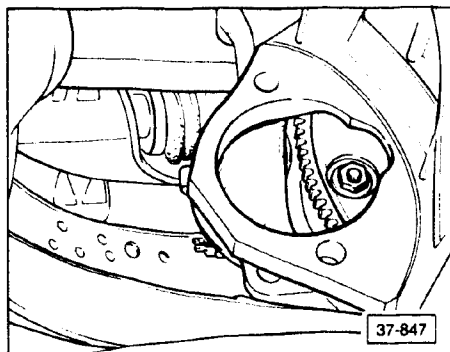
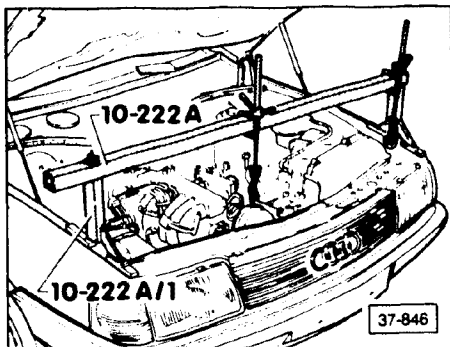
At speeds under 5 km/h (3.7 mph) and when shifting to **N**, the selector lever must not lock until after one (1) second has elapsed. The selector lever then cannot be shifted until the brake pedal is depressed.

Automatic Transmission – Controls, Assembly

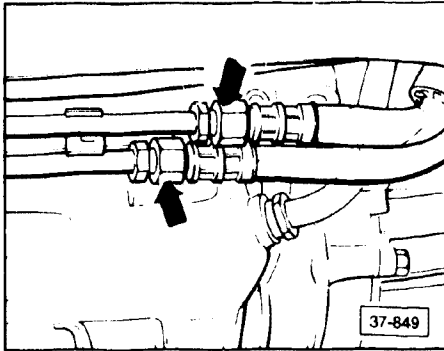
Transmission, removing/installing

Removing

- disconnect battery ground strap
- disconnect speedometer connector on transmission
- disconnect thermostatic connector
- remove engine/transmission upper mounting bolts
- disconnect transmission ground strap
- install engine support assembly **10-222 A** and **10-222 A/1**
- remove front exhaust pipe
- disconnect oxygen sensor connector
- remove catalytic converter
- disconnect driveshaft from transmission
- remove cover plate for transmission support, right side
- remove starter
 - position aside; secure with wire
- unfasten torque converter (3 nuts)
- remove transmission support, right side
- remove heat shield for multi-function switch
- remove harness connectors **1, 2, 3**, if present
- remove selector lever cable retaining clip
 - disconnect cable



Automatic Transmission – Controls, Assembly



- disconnect ATF cooler hoses/lines (**arrows**)
 - plug hoses with seal,
Part No. **357 853 586B**
 - plug pipes with rubber cap,
Part No. **055 121 324**

CAUTION

Part numbers are for reference only.
Always check with your Parts
Department for latest information.

- support transmission with **V.A.G. 1383** or
suitable transmission jack
- remove transmission support, left side
- remove engine/transmission lower bolts
- position driveshaft to the rear
- separate transmission from engine
- lower transmission carefully
 - secure torque converter to prevent it
from falling

Installing

Note

Proceed in reverse order of removal and note
the following:

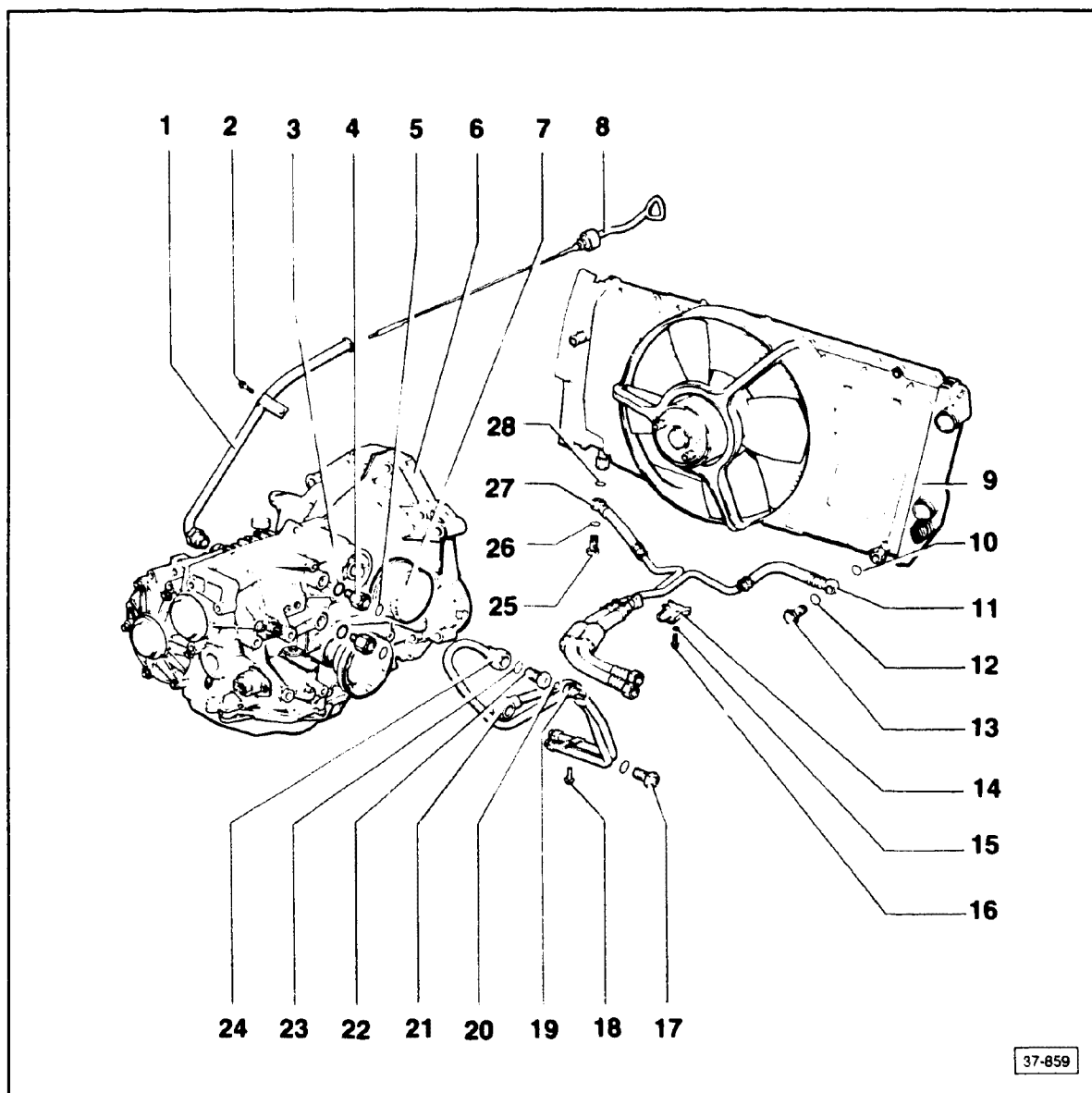
- be sure guide sleeves are aligned correctly,
during installation
- check selector lever cable
 - adjust if necessary. See page 37.31

Tightening torques

Axle shaft to flange	80 Nm (59 ft lb)
Torque converter to plate	60 Nm (44 ft lb)
Transmission to engine	55 Nm (41 ft lb)
Transmission bracket on transmission	40 Nm (30 ft lb)
Transmission mount on support	60 Nm (44 ft lb)

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Automatic Transmission – Controls, Assembly



- 1 — ATF filler tube
tightening torque at oil pan: 80 Nm (60 ft lb)
- 2 — 10 Nm (7 ft lb)
- 3 — O-ring
always replace
- 4 — Line nut — 60 Nm (44 ft lb)
- 5 — O-ring
always replace
- 6 — Transmission housing

- 7 — ATF filter
can also be replaced with engine installed
- 8 — ATF dipstick
- 9 — Radiator for engine coolant
with integrated ATF radiator
- 10 — O-ring
always replace
- 11 — ATF cooler return line
tightening torque at return pipe: 40 Nm (30 ft lb)

Automatic Transmission – Controls, Assembly

- 12 — **O-ring**
always replace
- 13 — **Banjo bolt — 40 Nm (30 ft lb)**
- 14 — **Retaining clamp**
- 15 — **Washer**
- 16 — **10 Nm (7 ft lb)**
- 17 — **Banjo bolt — 30 Nm (22 ft lb)**
- 18 — **10 Nm (7 ft lb)**
- 19 — **Thermostat — 15 Nm (11 ft lb)**
- 20 — **O-ring**
always replace
- 21 — **Feed pipe**
tightening torque at feed line: **40 Nm (30 ft lb)**
- 22 — **Banjo bolt — 30 Nm (22 ft lb)**
with opening for thermostat
- 23 — **O-ring**
always replace
- 24 — **ATF cooler return pipe**
tightening torque at return line: **40 Nm (30 ft lb)**
- 25 — **Banjo bolt — 40 Nm (30 ft lb)**
- 26 — **O-ring**
always replace
- 27 — **ATF cooler feed line**
tightening torque at feed pipe: **40 Nm (30 ft lb)**
- 28 — **O-ring**
always replace

ATF (automatic transmission fluid), checking/filling

Checking

Note

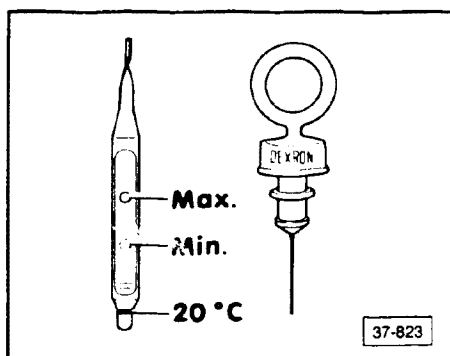
Always check transmission fluid under the following conditions:

- selector lever in PARK
- engine idling

CAUTION

Vehicle must be on level surface during ATF check.

Use only lint-free cloth when wiping dipstick.



- check ATF initially, when engine is cold
 - fluid level must be up to 20°C (68°F) mark
- bring ATF to operating temperature (approximately 60°C or 140°F)
 - drive approximately 10 km from a cold start to reach operating temperature
 - measure operating temperature using **VAG 1551**
- check ATF dipstick again. Level must be between **Max.** and **Min.** marks
 - if too high, drain fluid to specifications
 - if too low, add fluid to specifications

CAUTION

Do **NOT** overfill transmission with ATF.

Automatic Transmission – Case, Gears, Shaft

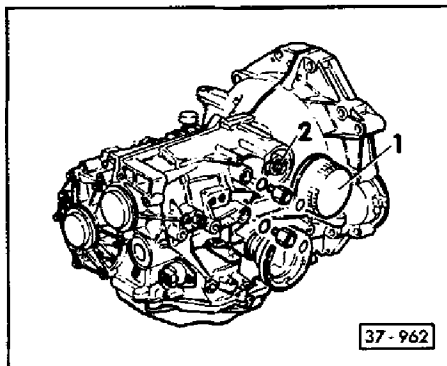
Filling

CAUTION

Only use ATF with the designation "DEXRON." Do NOT use lubricant additives.

Use only lint-free cloth when wiping dipstick.

- remove transmission dipstick and insert funnel into filler tube
- add ATF
 - during initial filling, add 3 liters
- start engine
 - select all lever positions with vehicle stationary
- check ATF level

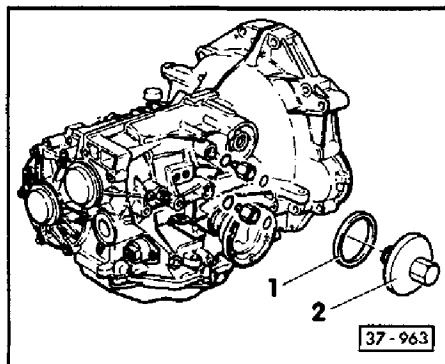


ATF filter, removing

The ATF filter for new transmissions has been discontinued as of February 1991.

Remove the ATF filter from all current transmissions during normal maintenance service.

- remove ATF filter 1 and threaded sleeve 2



- coat flat sealing ring 1 with ATF
- install cover 2 with flat sealing ring 1 and torque to 25 Nm (18 ft lb)
- check ATF level (see Repair Group 37 in Repair Manual)
- check transmission for leaks

CAUTION

Part numbers are for reference only. Always check with your Parts Department for latest information.

Stall speed, checking

Check stall speed only if vehicle exhibits poor performance or poor acceleration.

Before measuring stall speed, check that the correct torque converter is installed.

Note

The stall speed decreases as height above sea level increases (approximately 125 RPM per 325 feet)

- connect tachometer **VW 1367**
- engage parking brake
- start and warm engine
- hold foot brake firmly, put selector lever in **D** and depress accelerator briefly to full throttle
- check that engine runs within stall speed range

Transmission code	Torque converter code	Stall speed (RPM)
AEK	LCCA	2200-2400

- if not within range, following are possible causes:
 - stall speed too high:
 - K1 clutch slipping
 - or
 - one-way clutch slipping
 - stall speed up to 200 RPM too low: check engine adjustments
 - stall speed over 200 RPM too low: torque converter is defective

CAUTION

Do not continue stall speed test longer than time required to read tachometer. Maximum stall speed test time is 5 seconds. Wait at least 20 seconds before repeating test.

Automatic Transmission – Controls, Assembly

Shift points, checking

If the transmission seems to shift to the next gear too early or too late, check the shifting points with those specified in the chart.

The observed shift points must fall within the mph range specified in the chart.

H hydraulic shift

M mechanical shift

Determine the cause of any deviations in the shifting points by using the transmission self-diagnosis, Repair Group **D3**.

Transmission code: AEK

Shift	Full Throttle		Kickdown	
	ECO mph	Sport mph	ECO mph	Sport mph
1H-2H	16-20	26-30	27-30	27-30
2H-3H	34-37	49-53	49-53	49-53
3H-3M	34-37	49-53	49-53	49-53
3M-4M	73-76	83-86	84-88	84-88
4M-3M	51-47	71-68	85-81	85-81
3M-3H	29-25	32-29	29-25	48-44
3H-2H	30-27	30-27	40-36	48-44
2H-1H	4-1	14-10	29-25	29-25