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Automatic Trans. 097

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★ **NEW INFORMATION** since last filming.

Automatic Transmission—Controls, Assembly

Technical Data

Note

For locations of transmission identification codes, see Repair Group 00.

Transmission code letters	AEL	
date of manufacture from to	1-90	
Automatic transmission	097	
Torque converter code letter	LCCA	
Valve body code letters	LAA	
date of manufacture from to	1-90	
Number 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
Application to engine	2.3L 125 kW	
Final drive ratio	3.70	
Gear ratios		
1st gear	2.71	
2nd gear	1.55	
3rd gear	1.00	
4th gear	0.68	
Reverse	2.11	
ATF cooler	integrated in engine radiator	
Vehicle application	Audi 90	

Automatic Transmission—Controls, Assembly

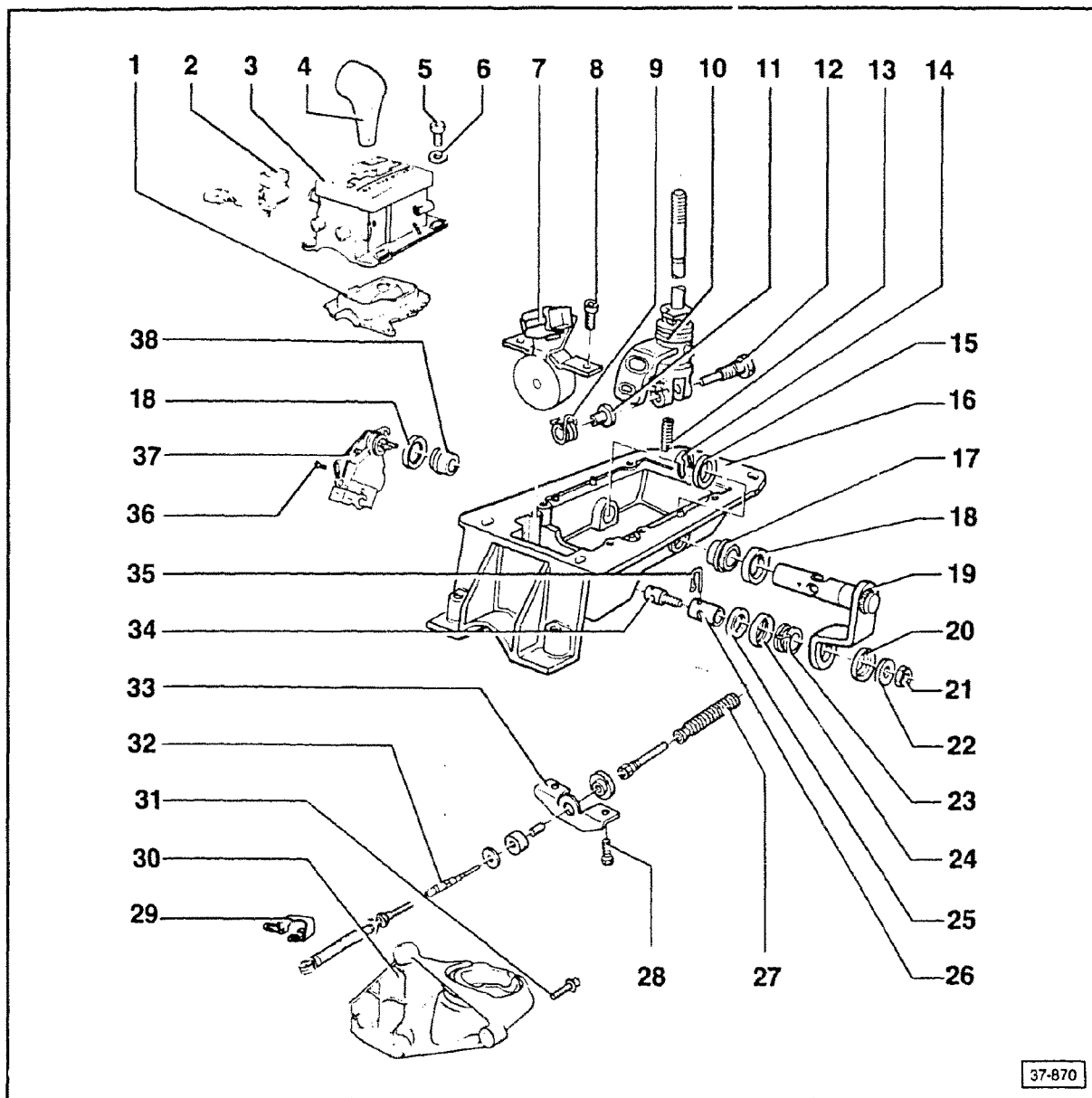
Technical Data

Note

For locations of transmission identification codes, see Repair Group 00.

Transmission code letters	CBU	
date of manufacture from to	1-91	
Automatic transmission	097	
Torque converter code letter	LBCA	
Valve body code letters	LAC	
date of manufacture from to	1-91	
Number of splined plates	inner	outer
Clutch K1	5	4
Clutch K2	5	5
Clutch K3	5	4
Brake B1	6	6
Brake B2	6	7
Application to engine	2.3L 100 kW	
Final drive ratio	3.70	
Gear ratios		
1st gear	2.71	
2nd gear	1.55	
3rd gear	1.00	
4th gear	0.68	
Reverse	2.11	
ATF cooler	integrated in engine radiator	
Vehicle application	Audi 90	

Automatic Transmission – Controls, Assembly



CAUTION

Before working on a running engine, always position 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.

Before repairing any part of electrical system, disconnect battery ground strap.

Note

When repairing the selector lever housing or solenoid switch, the center console must be removed. When repairing the selector mechanism, the heat insulation plate must be removed from underneath, before selector mechanism can be lowered down and removed.

1 — Boot

2 — Program switch (E122)
checking, see Repair Group D3

Automatic Transmission – Controls, Assembly

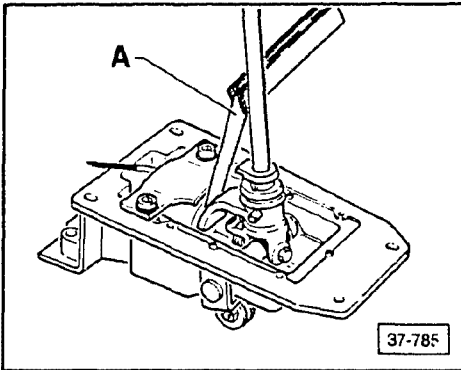
- 3 — **Housing for selector lever**
 - install with **P** toward driving direction
 - install after adjusting solenoid switch, page 37.6
- 4 — **Knob for selector lever**
- 5 — **9 Nm (79.7 in. lb or 91.8 cm kg)**
- 6 — **Washer**
- 7 — **Solenoid for shift lock magnet (N110)**
 - checking, page 37.8
 - adjusting, page 37.6
- 8 — **10 Nm (7 ft lb)**
- 9 — **Torsion spring**
- 10 — **Selector lever**
 - with fork piece to lock lever in **P** or **N** position
- 11 — **Bushing for torsion spring**
- 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**
 - apply sealant, Part No. **AKD 512 001 05**, between mount and body
 - install bolts/washers for mount (tighten to **10 Nm or 7 ft lb**)
- 17 — **Bushing**
- 18 — **Washer**
- 19 — **Shift lever**
- 20 — **Sleeve**
- 21 — **Nut — 20 Nm (15 ft lb)**
- 22 — **Washer**
- 23 — **Bushing**
- 24 — **Sleeve**
- 25 — **Washer**
- 26 — **Collet**
- 27 — **Boot**
 - replace if necessary
 - ensure correct installation to keep moisture from penetrating selector cable
- 28 — **23 Nm (17 ft lb)**
- 29 — **Retaining clip**
- 30 — **Transmission support**
 - with selector lever cable support
- 31 — **40 Nm (30 ft lb)**
- 32 — **Selector cable**
 - with guide and bushing
 - lubricate cable ends lightly before installing
 - do not bend or kink
 - to adjust:
 - shift selector lever to **P**
 - loosen nut on selector lever cable clamp
 - move lever on transmission to **P** (on rear stop)
 - with cable in this tension-free position, tighten nut (item 21) to **20 Nm (15 ft lb)**
 - after adjusting cable, check function of selector lever switch and adjust if necessary
- 33 — **Support bracket for selector lever cable**
- 34 — **Clamping screw**
- 35 — **Clip**
- 36 — **5 Nm (44.3 in. lb or 51.0 cm kg)**
- 37 — **Selector lever switch**
 - aligning, page 37.6
 - installing, page 37.7
 - checking function:
 - engine must start in **N** or **P** only
 - back-up lights must light in **R**
 - if **NO**, turn switch in slots and check function again
- 38 — **Bushing**

Selector lever/cable assembly, disassembling/assembly

Solenoid switch, adjusting

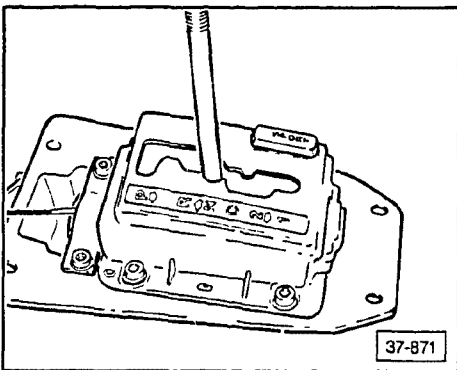
A = 1.0 mm feeler gauge

- position selector lever in R
- insert gauge between selector lever and solenoid switch
- push solenoid switch against gauge and tighten, in this position



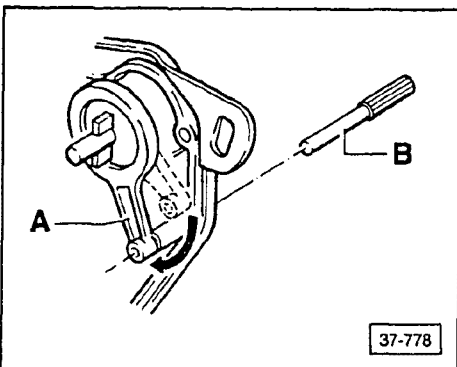
Selector lever housing to shift lever, adjusting

- align lower hole of clevis centrally with solenoid switch and apply voltage to switch
 - solenoid pin locks fork piece
- install gear shift lever housing so that selector lever is against position N on housing
 - from position N, lever must have equal travel between R and D

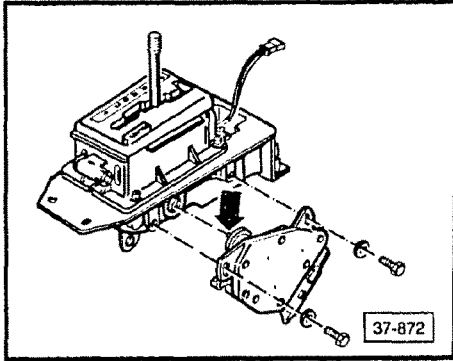


Selector lever switch, aligning

- install lever A with pin or drill bit B (4.0 mm) positioned through hole in housing



Automatic Transmission—Controls, Assembly



Selector lever switch, installing

- shift selector lever to position **N**
- install selector lever switch so operating lug (**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 37.8.

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 **R**, 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.

Shiftlock III

A revised selector linkage with an ignition key lock (Shiftlock III) is being phased into 1991 m.y. vehicle production.

The revised linkage locks the key in the ignition in selector positions **R, N, D, 3, 2** and **1**. The ignition key can only be inserted or removed with the selector in the **P** position. The selector lever cannot be moved out of the **P** position with the key removed.

In cases where the vehicle battery is without a charge, or if the battery is disconnected, the selector lever can still be moved out of the **P** position by placing the key in the "start" position.

The following components of the current system are revised with the introduction of the new Shiftlock III system:

- selector lever bracket
- selector lever
- shiftlock solenoid
- ignition switch

New parts include a lock cable and related components.

Shiftlock III, checking function

- move selector lever to **P** position
- turn key counterclockwise to last position
- remove key
 - selector lever must be locked in **P** position
- insert key and switch ignition **ON**
 - selector lever must be locked in **P** position (solenoid blocking lever)
- depress brake pedal
 - selector lever can be moved to any position (solenoid releases lever)
- move selector lever to **N** position
- release brake pedal
 - selector lever cannot be moved to any other position (solenoid blocking lever)
- depress brake pedal
 - selector lever can be moved to any position (solenoid releases lever)

Note

If the vehicle is moving at a speed over 5 km/h (3 mph) the solenoid must not activate and block the selector lever when it is moved to the **N** position.

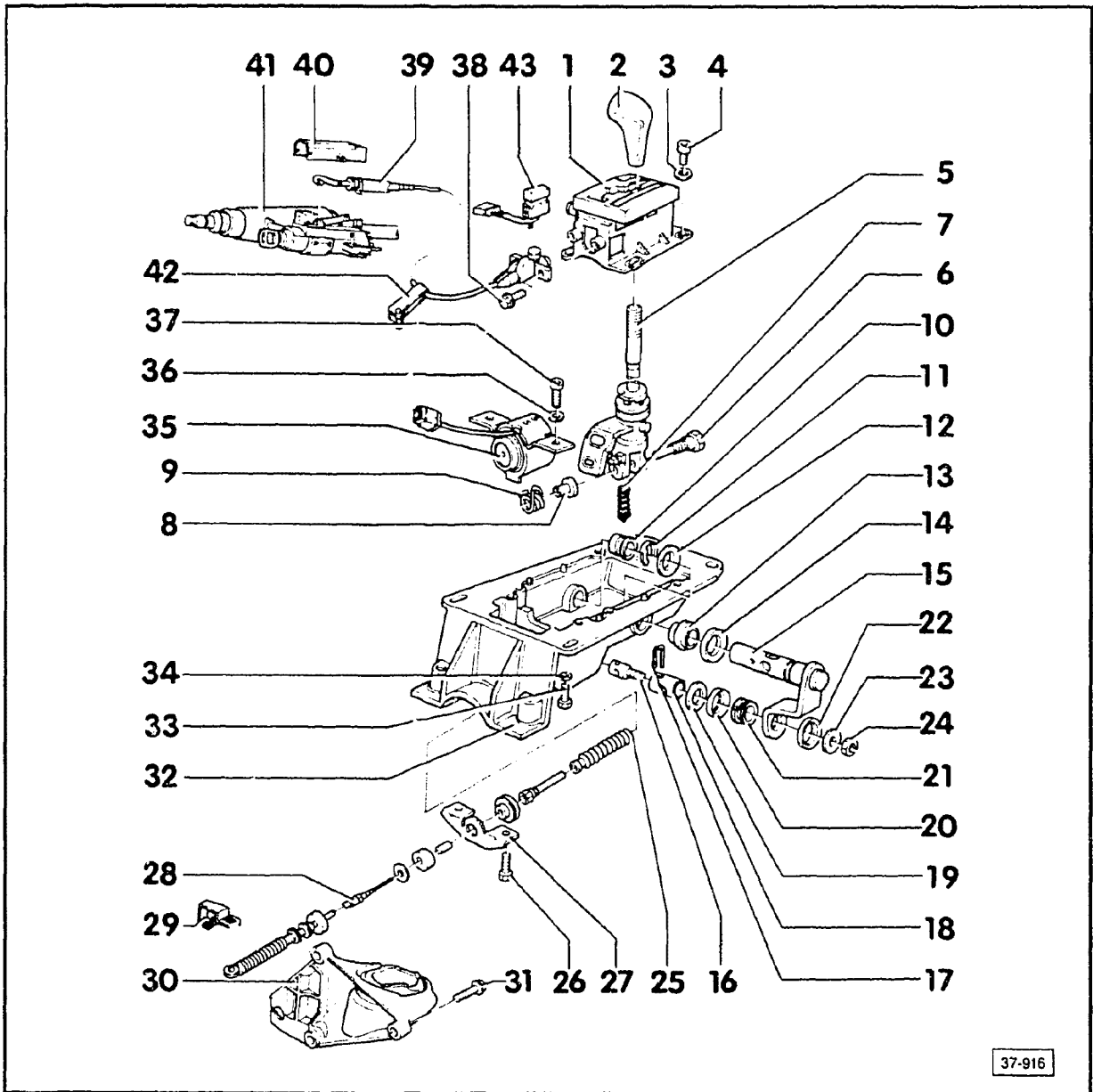
If the vehicle is moving at a speed under 5 km/h (3 mph), which is close to a standstill, the solenoid can activate and block the selector lever approx. one second after it has been shifted into the **N** position.

Additional function checks

- check that vehicle will not start with selector lever in positions **R, D, 3, 2, and 1**
- drive vehicle with cruise control **ON** and move selector lever from **D** to **2**
 - cruise control must not switch **OFF**

THIS FRAME INTENTIONALLY LEFT

BLANK



37-916

Note

If the lock cable is to be replaced, first remove the steering wheel and instrument cluster (see Repair Groups 70 and 94).

To remove the shift linkage lever, first remove the catalytic converter and exhaust system in the tunnel area, remove the heat shield, and then remove linkage from below.

1 — Selector lever housing

- adjusting, page 37.13
- after adjusting, install solenoid for shiftlock
- before removing bracket, disconnect cable

2 — Selector lever handle

3 — Washer

4 — 9 Nm (80 in. lb)

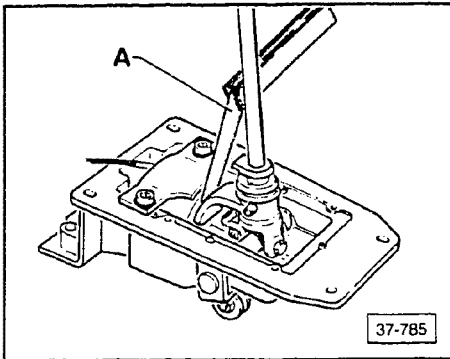
- 5 — **Selector lever**
check dimension between selector lever and solenoid, page 37.13
- 6 — **Guide bolt**
 - 22 Nm (16 ft lb)
 - install after compression spring (7)
- 7 — **Compression spring**
install before guide bolt (6)
- 8 — **Bushing**
for torsion spring (9)
- 9 — **Torsion spring**
- 10 — **Bushing**
- 11 — **Clip**
after installing, insert shift linkage lever
- 12 — **Washer**
- 13 — **Bushing**
- 14 — **Sleeve**
- 15 — **Shift linkage lever**
- 16 — **Lock bolt**
- 17 — **Clip**
- 18 — **Clamping sleeve**
- 19 — **Washer**
- 20 — **Sleeve**
- 21 — **Bushing**
install in shift linkage lever
- 22 — **Sleeve**
- 23 — **Washer**
- 24 — **20 Nm (15 ft lb)**
- 25 — **Boot**
replace if damaged
- 26 — **23 Nm (17 ft lb)**
secure with **AMV 200 000**
- 27 — **Cable support bracket**
install with angled end toward shift linkage
- 28 — **Selector lever cable**
 - with guide and bushing
 - replace cable if boot is damaged
 - tighten cable to supports, **13 Nm (10 ft lb)**
 - do **NOT** kink or bend cable
 - light lubricate ball socket before installation
 - adjusting: place selector lever in **P**, loosen nut on cable clamp, place transmission lever in **P** position (to rear stop), tighten nut to **20 Nm (15 ft lb)**

CAUTION

To prevent the entry of moisture into the cable housing, ensure that the boot is correctly mounted when installing the selector lever cable.

- 29 — **Retaining clip**
remove selector cable before prying off
- 30 — **Support bracket (on transmission)**
with mounting for cable
- 31 — **40 Nm (30 ft lb)**
- 32 — **Shift mount**
seal with **AKD 512 000 05** between mount and body
- 33 — **10 Nm (7 ft lb)**
- 34 — **Washer**
- 35 — **Shiftlock solenoid**
 - push solenoid against shift mount and tighten bolts
 - check dimension between selector lever and solenoid, page 37.13
- 36 — **Washer**
- 37 — **10 Nm (ft lb)**
- 38 — **9 Nm (80 in. lb)**
- 39 — **Lock cable**
 - removing/installing, page 37.14
 - do **NOT** bend
- 40 — **Cover**
- 41 — **Ignition switch**
- 42 — **Clip**
- 43 — **Program switch**
checking, see Repair Manual Group D3

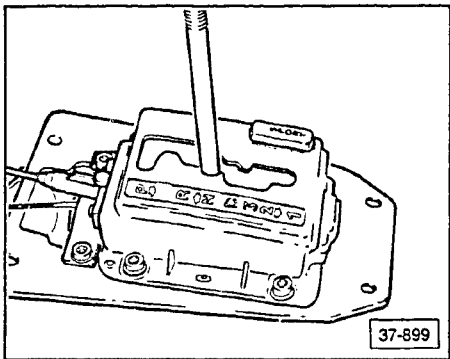
Selector lever to solenoid, checking



- place selector in **R** position
- insert feeler gauge **A** and measure gap between lever and solenoid
 - must be: 0.6 mm to 1.4 mm
(0.024 in. to 0.055 in.)
- move solenoid in slots if adjustment is necessary

Selector lever housing, adjusting

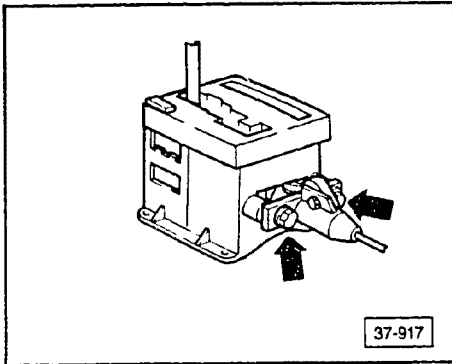
Position housing with selector in **N** position.



Lock cable, removing/installing/adjusting

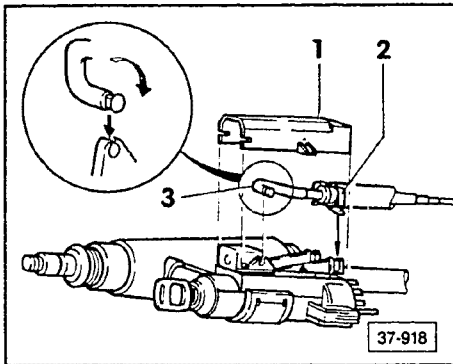
Removing

- remove center console (see Repair Group 70)
- remove steering wheel and instrument cluster (see Repair Groups 48 and 90)
- move selector lever to **N** position
- remove bolt (**arrow**)
- remove cable from selector lever housing



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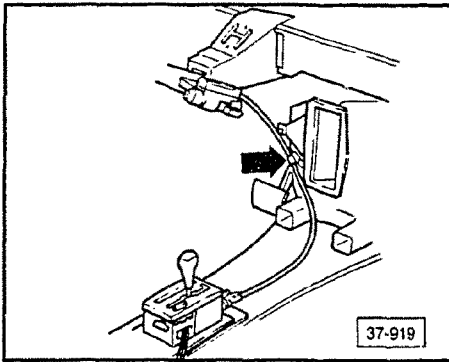
- remove cap **1**
- remove spring clip/cable **2** from steering column switch assembly
- turn lock cable hook **3** approx. 90° and remove from mounting eye on top of ignition switch
- remove lock cable clip at air duct and remove lock cable (see illustration 37-919 on next page)



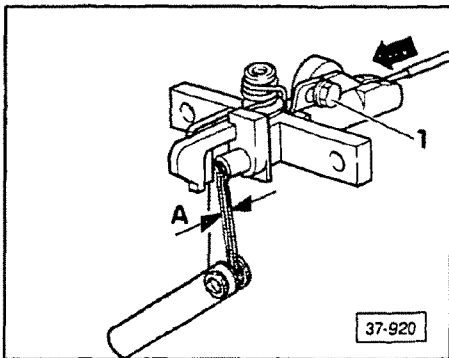
37-918

Installing/adjusting

- insert lock cable hook **3** from top into mounting eye on ignition switch and turn approx. 90°
 - flat sides of hook and mounting eye must align when inserting (see inset)
- insert spring clip/cable **2** securely into holder
- install cover **1** onto ignition switch



- loosen bolt 1
- switch ignition **ON**
- insert feeler gauge between stop and lock pin
 - **A** = 1.5 mm
- adjust lock cable by pushing in direction of arrow so that lock pin pushes against feeler gauge
- tighten bolt 1
- actuate locking cable several times and remeasure dimension with feeler gauge
 - dimension **A** must be: 1.4 to 1.7 mm
- move selector lever to **N** position
- mount lock cable to selector lever bracket



Note

Ensure that the cable is routed kink-free and fastened by the clip (arrow)

Functional check

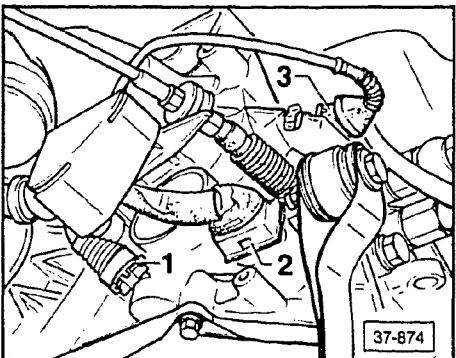
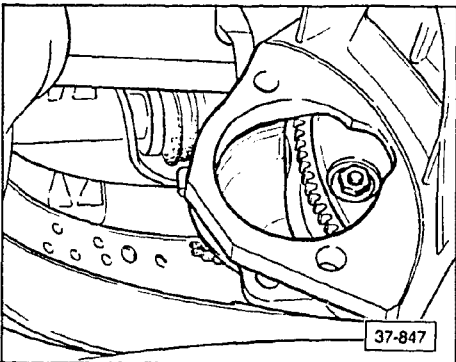
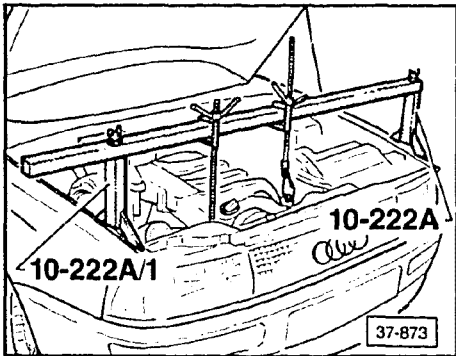
- turn ignition key to **OFF** position
- move selector lever directly to **P** position without shifting to a drive position first
 - ignition key can be removed
- insert key in ignition and switch **ON**
- depress brake pedal and shift selector lever into **D** position
- turn ignition key to **OFF** position
 - ignition key cannot be removed

Transmission, removing/installing

Removing

- disconnect battery ground strap
- disconnect speedometer connector on transmission
- disconnect thermoswitch connector
- remove engine/transmission upper mounting bolts
- disconnect oxygen sensor connector
- disconnect transmission ground strap

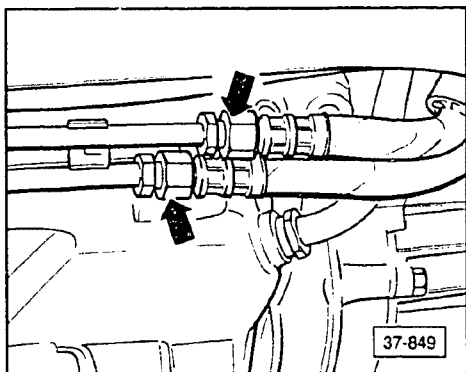
- install engine support assembly, as shown
- remove engine lower cover and mounting
- remove front exhaust pipe
- disconnect axle shafts from transmission
- remove starter bolts
 - position starter aside; secure with wire



- remove torque converter nuts (3)
- remove heat shield for multi-function switch

- disconnect harness connectors 1, 2 and 3
- remove wiring harness clamp from transmission

Automatic Transmission – Controls, Assembly



- disconnect ATF cooler lines/hoses (arrow)
 - plug hoses with seal, Part No. **357 853 586 B**
 - seal 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 **VAG 1383** or suitable transmission jack
- remove transmission support
- remove selector lever retaining clip
 - disconnect cable
- remove engine/transmission lower bolts
- position axle shafts 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 37.4

Tightening torques

Axle shafts to flanges	80 Nm (59 ft lb)
Torque converter to plate	60 Nm (44 ft lb)
Trans to engine (4 cyl)	55 Nm (41 ft lb)
Trans to engine (5 cyl)	see next page
Transmission bracket on transmission	40 Nm (30 ft lb)
Transmission mount on support	110 Nm (81 ft lb)

Engine/transmission, mounting

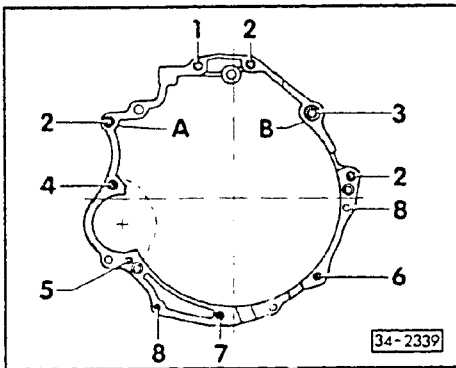
CAUTION

Before installing an engine, be sure that the dowel sleeves are in place (see items **A** and **B** in next two illustrations).

For some replacement transmissions paired with 5-cylinder engines, an offset dowel sleeve (Part No. **012 301 153**) may be required.

When installing a new engine, check for the presence of a bushing in the crankshaft. This bushing must be driven in **first**, before installing the drive plate.

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

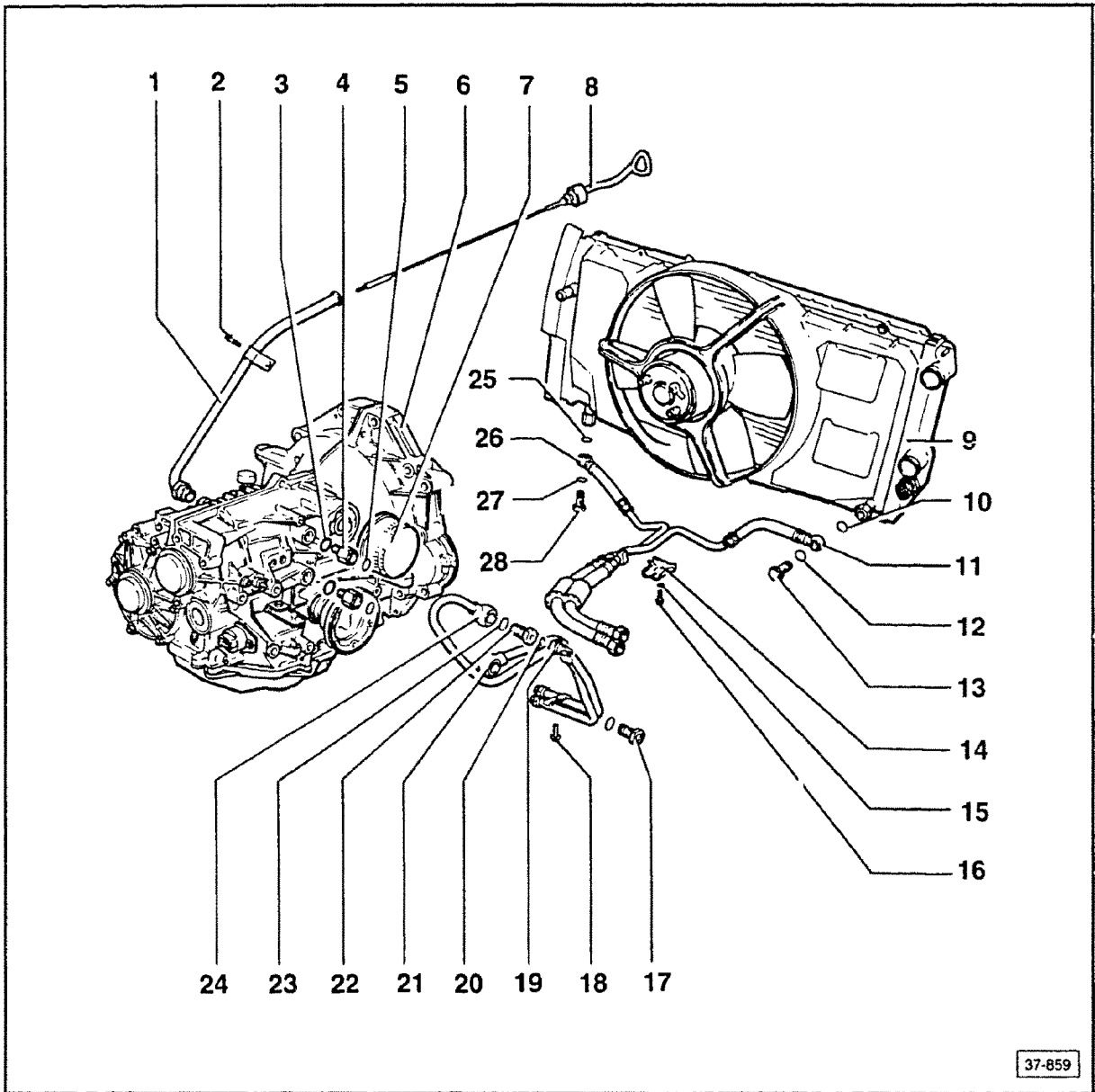


Tightening torques (5-cylinder engines)

Position	Bolt size	Quantity	Nm (ft lb)
1	M12 x 67	1	65 (48)
2	M12 x 80	3	65 (48)
3	M12 x 90	1	65 (48)
4	M12 x 100	1	65 (48)
5	M10 x 120	1	65 (48)
6	M10 x 50	1	45 (33)
7	M10 x 38	1	45 (33)
8	M8 x 40	2	25 (18)

Items **A** and **B** are dowel sleeves for centering.

Automatic Transmission – Controls, Assembly



37-859

- 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 — Washer
always replace
- 6 — Transmission housing

- 7 — ATF filter
discontinued, see ATF filter, removing
- 8 — ATF dipstick
- 9 — Radiator
with integrated ATF radiator
- 10 — Washer
always replace
- 11 — ATF cooler return line
tightening torque at return pipe: 40 Nm (30 ft lb)

- 12 — **Washer**
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 — **Thermoswitch — 15 Nm (11 ft lb)**
- 20 — **Washer**
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 thermoswitch
- 23 — **Washer**
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 — **Washer**
always replace

ATF (automatic transmission fluid), checking/filling

Checking

Note

The transmission fluid level only needs to be checked when diagnosing a suspected transmission problem.

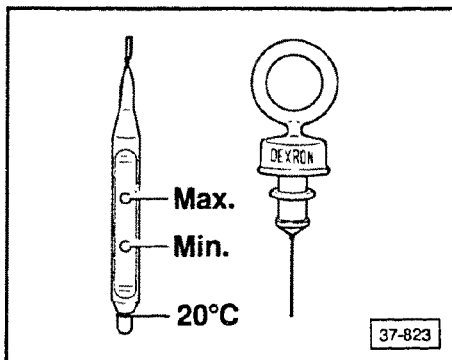
Always check transmission fluid under the following conditions:

- selector lever at **P**
- 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 (60°C/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. Probe **Z417 113 WE** and **VAG 1358** can be used for this purpose
 - if too low, add fluid to specifications

CAUTION

Do **NOT** overfill transmission.

Filling

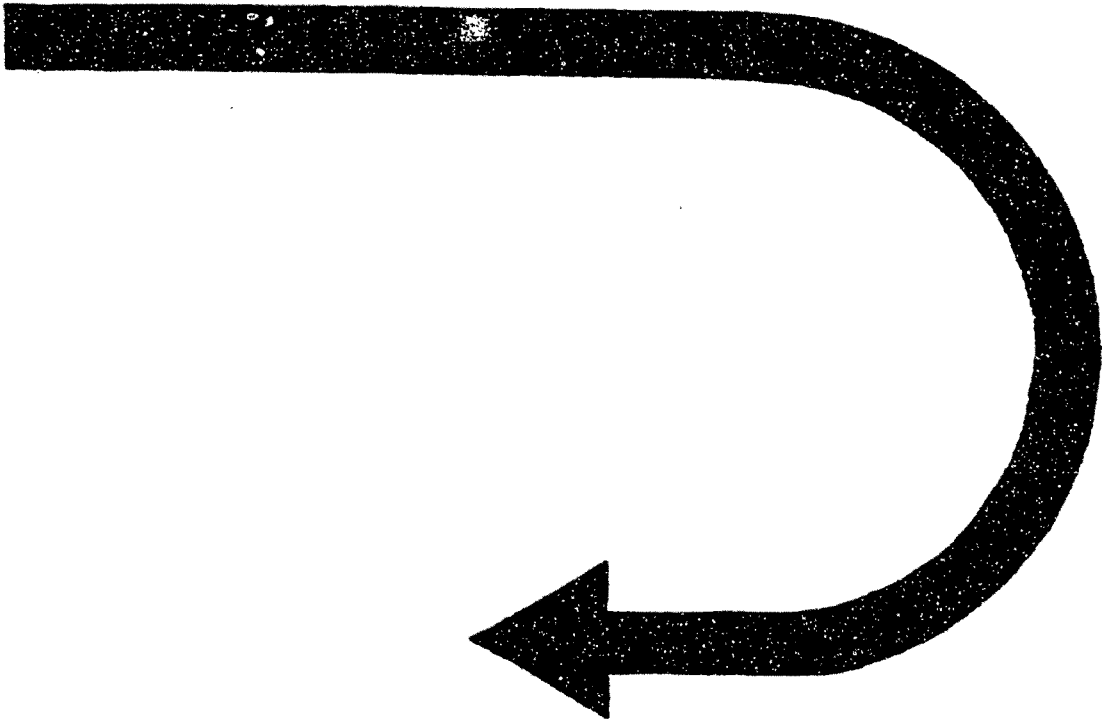
CAUTION

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

CONTINUED IN THE
BEGINNING OF NEXT ROW



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)
AEL	LCCA	2250-2450
CBU	LBCA	2550-2750

- 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.

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: AEL

Shift	Full Throttle		Kickdown	
	ECO mph	Sport mph	ECO mph	Sport mph
1H-2H	17-21	32-36	32-36	32-36
2H-3H	37-41	58-62	58-62	58-62
3H-3M	32-36	42-46	58-62	58-62
3M-4M	85-89	99-102	99-102	99-102
4M-3M	58-55	82-78	99-95	99-95
3M-3H	30-27	35-32	46-42	55-52
3H-2H	31-27	31-27	46-42	55-52
2H-1H	4-1	16-12	30-27	30-27

Transmission code: CBU

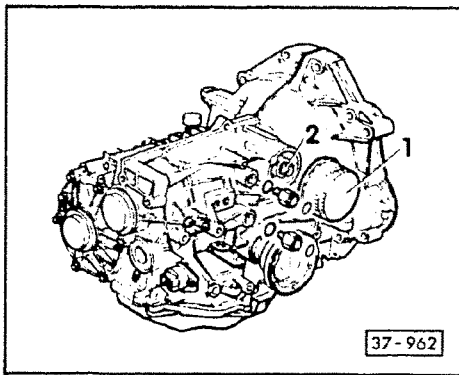
Shift	Full Throttle		Kickdown	
	ECO mph	Sport mph	ECO mph	Sport mph
1H-2H	21-24	29-32	29-32	29-32
2H-3H	39-42	55-59	55-59	55-59
3H-3M	39-42	55-59	55-59	55-59
3M-4M	81-85	88-92	88-92	88-92
4M-3M	58-55	82-78	89-85	89-85
3M-3H	32-28	37-33	55-52	55-52
3H-2H	30-27	30-27	55-52	55-52
2H-1H	7-4	15-11	29-25	29-25

ATF filter, removing

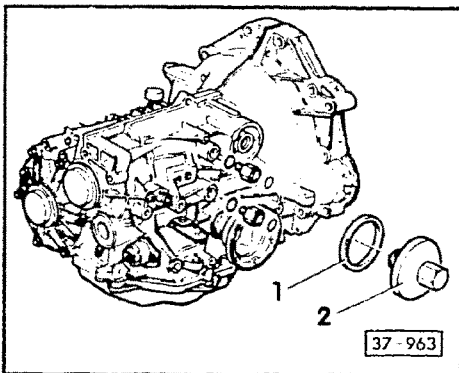
The ATF filter for new transmissions has been discontinued as of February 1991.

The ATF filter must be removed on all current transmissions and the housing sealed with a cover and sealing ring, Part No. 097 409 091 A.

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.