

Technical Manual

911 Carrera (996)

Technical Information

Repair

Contents:

Group 3

Transmission, automatic transmission

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Foreword

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Supplement Overview

Supplement	Edition	Topic	Article number
	05/1997	Basic edition	
0	05/1997	Basic edition	WKD483721
4	09/1997	General supplement	WKD483721.04
5	12/1997	General supplement	WKD483721.05
8	03/1998	General supplement	WKD483721.08
9	05/1998	General supplement	WKD483721.09
18	11/1998	General supplement	WKD483721.18
21	01/1999	General supplement	WKD483721.21
22	02/1999	General supplement	WKD483721.22
26	04/1999	General supplement	WKD483721.26
35	10/1999	General supplement	WKD483721.35
44	11/2000	General supplement	WKD483721.44

Use

The workshop documentation for the 911 Carrera (1996) model has the designation

- "911 Carrera (1996)" Technical Manual- and contains Technical Information as well as instructions on repairs.

The integration of the technical information published in the "911 Carrera (1996)" Technical Manual with the instructions on repairs provides the user with a complex reference work that combines into one book associated or cross-referenced material of relevance to workshops and originating from various information media.

The "911 Carrera (1996)" Technical Manual consists of 15 folders, subdivided into the following Groups

- ◆ 0 Entire vehicle - General
- ◆ 0 Diagnosis, 1 Engine, part 1 (up to Repair Group 45)
- ◆ 0 Diagnosis, 1 Engine, part 2 (up to Repair Group 69)
- ◆ 1 Engine, part 1 (up to Repair Group 13)
- ◆ 1 Engine, part 2 (as of Repair Group 15)
- ◆ 2 Fuel, exhaust, engine electronics
- ◆ 3 Transmission, manual transmission
- ◆ 3 Transmission, automatic transmission
- ◆ 4 Running gear
- ◆ 5 Body
- ◆ 6 Body equipment, exterior
- ◆ 7 Body equipment, interior
- ◆ 8 / 9 Air conditioning / Electrics
- ◆ 9 Circuit diagrams, part 1 (up to and including '99 model)
- ◆ 9 Circuit diagrams, part 2 (as of and including '00 model)

The two folders with Group 0 are to be regarded as one folder; i.e. file the "Technical Information" notices only in the folder "Group 0 Diagnosis, part 1" **-up to Repair Group 45-**.

The second folder Group 0 Diagnosis, part 2 **-as of Repair Group 69-** includes the further Repair Groups belonging to Group 0.

The two folders with Group 1 are to be regarded as one folder; i.e. file the "Technical Information" only in front of the repair descriptions in the folder Group 1 – Engine, part 1 **-up to Repair Group 13-**.

The second folder Group 1 Diagnosis, part 2 **-as of Repair Group 15-** includes the further Repair Groups belonging to Group 0.

The two folders with Group 9 are to be regarded as one folder; i.e. file the "Technical Information" notices only in the folder Group 9 Circuit diagrams, part 1 **-up to '99 model-**.

The second folder Group 9 Circuit diagrams, part 2 **-as of '00 model-** includes the further Repair Groups belonging to Group 9.

The "Boxster (986)" Technical Manual has the same structure in each folder, with the following breakdown for all Groups:

Title page: "Boxster (986)" Technical Manual

> Foreword

Title page: "Technical information"

> Table of contents, Technical information> Technical information

Title page: "Repair"

> Repair Groups: overview> Table of contents, repairs> General / technical data> Instructions on repairs

As can be seen from the breakdown, the published Technical Information is in the front part of each folder – numbered according to the Groups. The Table of Contents assigned to each Group will be periodically updated.

Following the Technical Information, separated by a title page, the instructions on repairs – assigned according to the Groups or broken down into Repair Groups – are included in the folders.

The instructions on repairs will be extended and updated by means of supplements.



Note!

Sheets that already exist in the "911 Carrera (996)" Technical Manual and are updated or revised and thereby exchanged by a supplement are designated in the footer with the supplement number corresponding to the current version: e.g. "Printed in Germany - 2,- 2000"



Note!

Due to a system modification in the Technical Literature production, the following procedures have changed in model year 2000!

- 1 - The previous record sheet in the folder "O-General" and the supplement contents sheet -red sheet- have been omitted. A supplement overview now appears separately in each folder. The new supplement contents sheet can be destroyed after the supplement is filed in the folder.



Note!

The supplement overview sheet is replaced with the relevant supplement in the corresponding folder and must no longer be maintained by hand.

- 2 - The page numbering in the new and the replaced chapters are no longer continuous. Each new chapter is now given an additional chapter number followed by the page number e.g.-2 Page 11 ⇒ Rep. Gr. 0; General
- 3 - The old page numbering still applies to existing chapters and those that are not replaced.

Foreword

This manual contains Technical Information as well as instructions on repairs for Porsche vehicles. It is intended for the sole use of workshops belonging to Porsche AG.

The descriptions form the basis for professional and correct maintenance and repair work. The content of the work procedures described is based on the level of training of a fitter who has completed vocational training and has a sound knowledge of the product. This level of knowledge is necessary in order to carry out the work described.

Warning notes

The warning notes and safety instructions are classified by the respective signalling word (Danger, Warning, Caution) beside the warning symbol.



Warns against death or very serious injury which will certainly occur if the instructions are not observed.



Warns against death or very serious injury which may occur if the instructions are not observed.



Warns against minor injury or damage to property if the instructions are not observed.

To prevent injury and restricted operating and traffic safety of the vehicle, or damage to the vehicle as the result of incorrect work, read these instructions carefully and observe them without fail.

It is not possible for Porsche AG to give a detailed evaluation of all danger situations for the persons carrying out the work. It is therefore imperative that all persons carrying out repair and maintenance work on Porsche vehicles use their specialist knowledge to ensure that their own safety is not at risk and the procedure chosen will not have any negative effects on the vehicle - especially with regard to safety.

It is therefore expressly specified that all work involved in the work procedures described should be carried out only in accordance with the valid guidelines and regulations of the local authorities responsible with respect to health and accident prevention and environmen-

tal protection, and in compliance with the legal requirements of individual countries.

Notes

Notes contain advisory information related to the work procedure which makes the fitter's work easier. The following pictogram indicates this information:



Note!

Contains advisory information which makes the work procedure easier.

Due to the continuous development and improvement of our vehicles, there may be discrepancies between the actual technical status of the vehicles and the work descriptions. Any existing deviations are corrected by means of supplements, and the scope of the descriptions is extended with supplements.

Porsche AG retains the right to implement changes at any time and without prior notice.

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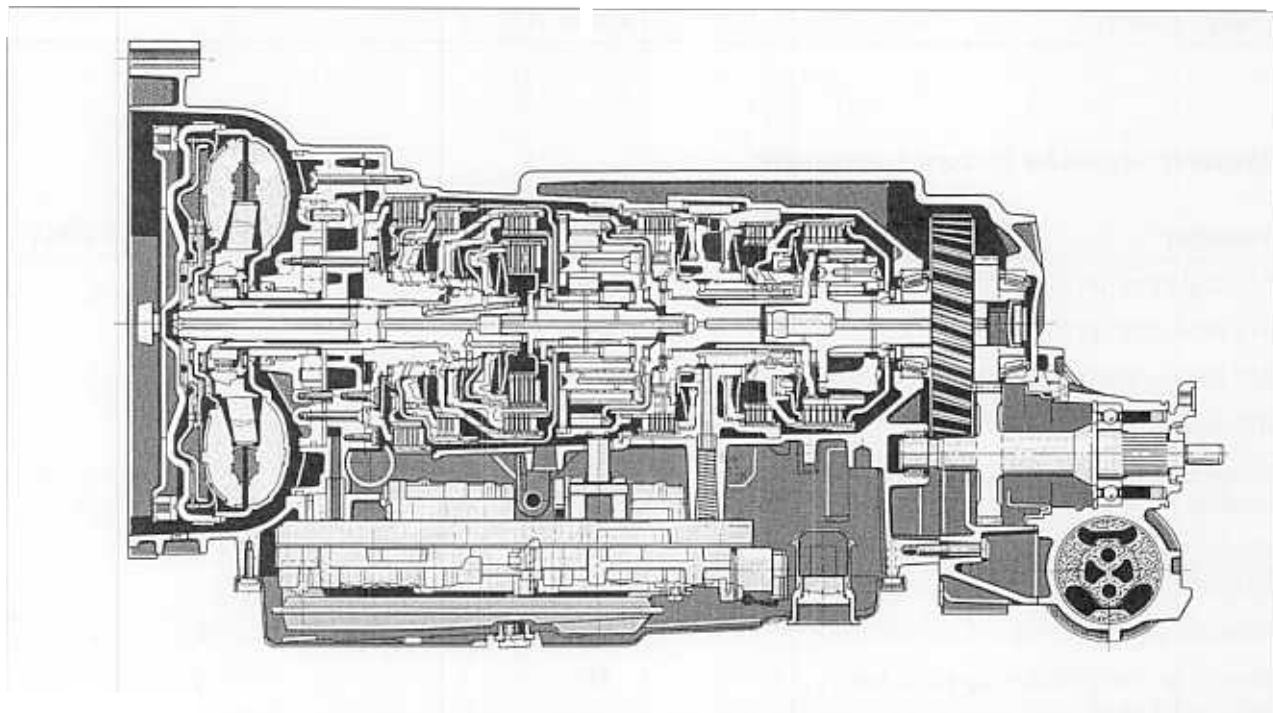
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Technical data

5-speed Tiptronic transmission A96/30



Type	Code letter	Equipment	Installed in	Model year
A96/30		5-speed	911 Carrera 4 (996)	1999

Tiptronic transmission

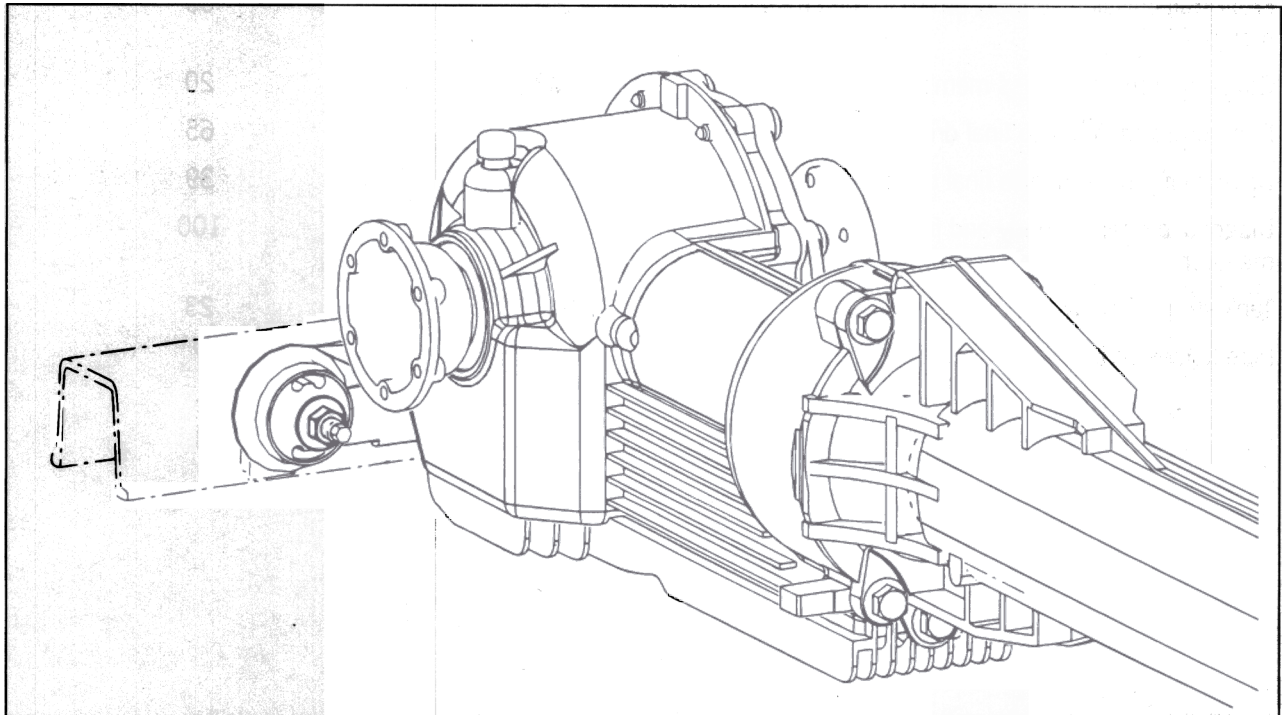
General data	Tiptronic transmission A 96/30
Transmission ratios	
Spur gear	1.03
1. gear	3.67
2. gear	2.00
3. gear	1.41
4. gear	1.00
5. gear	0.74
Reverse gear	4.10
Final drive	Bevel gear drive

General data	Tiptronic transmission A 96/30
Transmission ratio, final drive	9 : 32 = 3.555
Filling capacity, rear wheel drive	0.9 l
Automatic section: new filling (with torque converter)	approx. 9.5 l
Change quantity	approx. 4.0 l

Tightening torques for Tiptronic transmission

Location	Thread	Tightening torque Nm (ftlb.)
ATF drain plug on ATF pan	M30	80
ATF drain plug on ATF pan	M16	40
ATF pan on transmission housing	M6	10
ATF filter on hydraulic control unit	M5	6
Hydraulic control unit on transmission housing	M6	8
Sensor for transmission input speed on hydraulic control unit	M6	6
Solenoid valves on hydraulic control unit	M5	6
Sensor for transmission speed on transmission housing	M6	6
Multi-function switch on transmission housing	M6	8
Short flanged shaft to differential	M8	25
Cover for final drive on transmission housing	M8	23
Screw plug on cover for final drive	M18	30
Mounting saddle for long flanged shaft to transmission housing	M8	23
Housing for spur-gear on transmission housing	M8	23
Cardan flange on transmission	M20	100 ^{a)}
Drive shaft on transmission flange	M10	45

^{a)} Counter collar nut with 170 Nm (126 ftlb), loosen again and tighten to 120 Nm (89 Nm) ⇒ Rep. Gr. 39 82 19; Install and remove sealing ring for cardan flange.

Front wheel drive Z 96.00

Type	Code letter	Equipment	Installed in	Model year
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General data		Front-axle final drive Z 96.00	
Transmission ratio, final drive ($Z2 : Z1 = i$)		31 : 9 = 3,44	
Final drive		Bevel gear drive without hypoid offset	
Filling capacity		approx. 1.5 l	

Front-axle drive tightening torques

Location	Thread	Tightening torque Nm (ftlb.)
Screw plug, oil drainage and oil filling		28
Cover on final drive		25
Long-neck tube on final drive		25
Drive shaft on final drive		39
Rear transmission support on transmission mount		65
Rear transmission support on body		65

Technical data

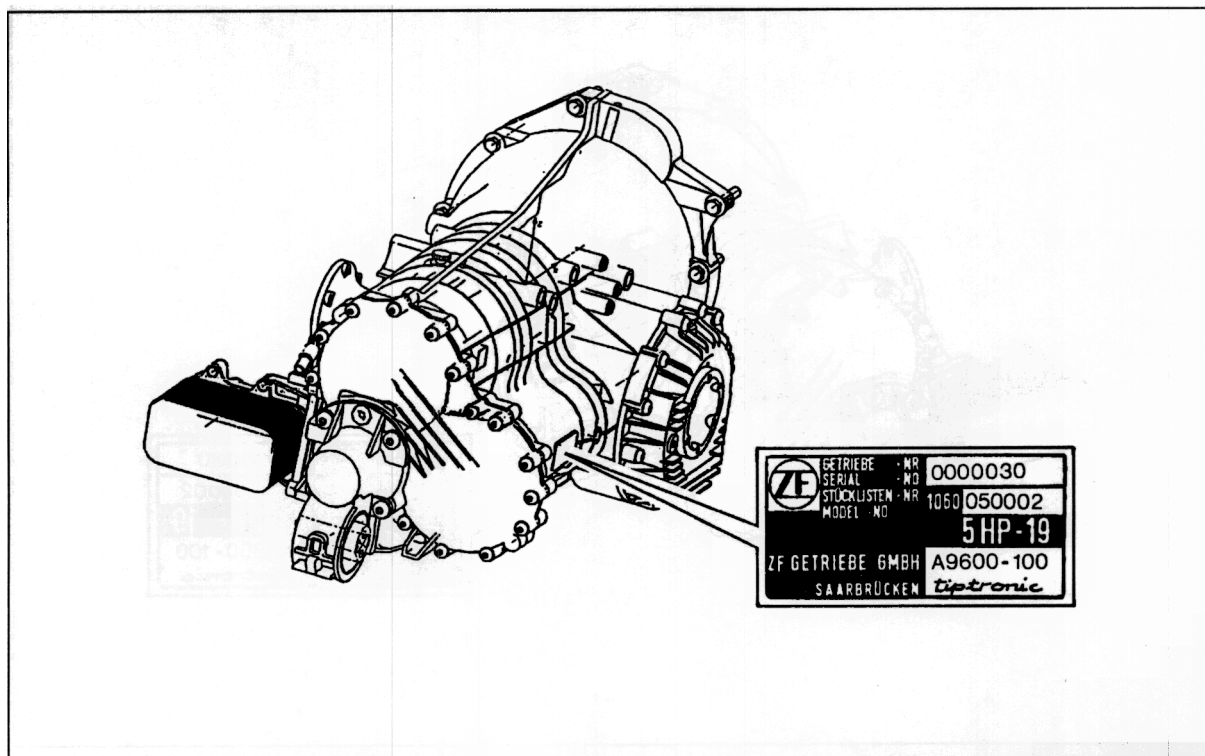
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Location	Thread	Tightening torque Nm (ftlb.)
Front transmission support on front-axle cross member		65
Studs on front-axle cross member	M8	20
Front cross member to final drive	M10	65
Drive shafts on front-axle final drive	M8	39
Diagonal braces on body and front-axle cross member	M12	100
Tank strap on body	M8 x 40	23
Pipe holder on transmission support	M6	7

3 Technical data (Tiptronic transmission A96)

5-speed Tiptronic transmission A96

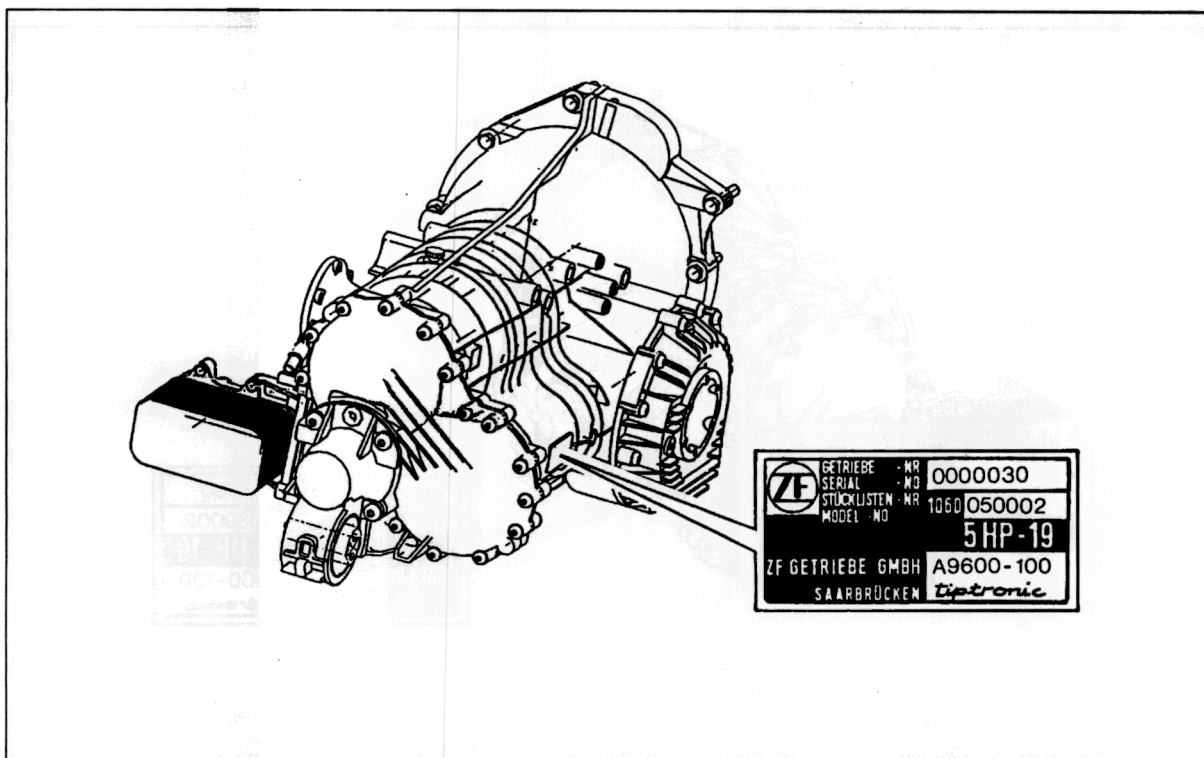


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Type	Code letter	Equipment	Installed in	Model year
G 96/00 - 100		5-speed	911 Carrera (1996)	1998

Technical data

Identification of Tiptronic transmission

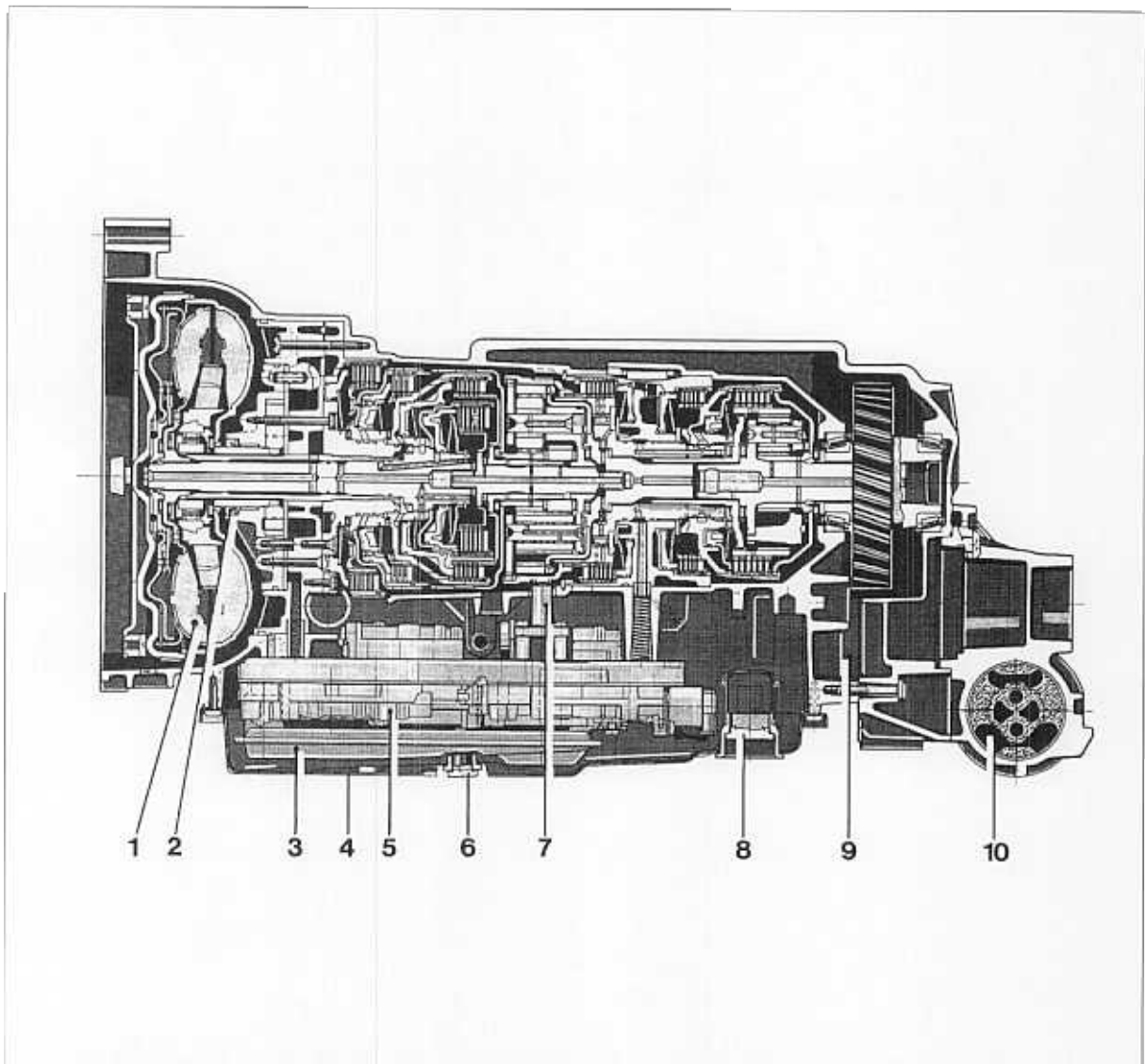


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Technical data

General data	Transmission A96/00
Type	Fully automatic 5-speed planetary gear set (Tiptronic)
Transmission ratio	
Spur gear	1.03
1st gear	3.67
2nd gear	2.00
3rd gear	1.41
4th gear	1.00
5th gear	0.74
Reverse gear	4.10
Final drive	Bevel gear drive
Final drive (without spur gear)	$9 : 32 \text{ i} = 3.555$
Stall speed	2300... 2700
Filling capacity of rear wheel drive	0.9 l
Automatic section:	
New filling (with converter)	Approximately 9.5 l
Change quantity	approx. 4.0 l

Technical data



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- | | |
|---------------------------------------|-------------------------------------|
| 1 – Torque converter | 6 – ATF drain plug |
| 2 – Sealing ring for torque converter | 7 – Transmission input speed sensor |
| 3 – ATF filter | 8 – ATF filler screw |
| 4 – ATF pan | 9 – Gasket for spur gear |
| 5 – Hydraulic control unit | 10 – Transmission bearing |

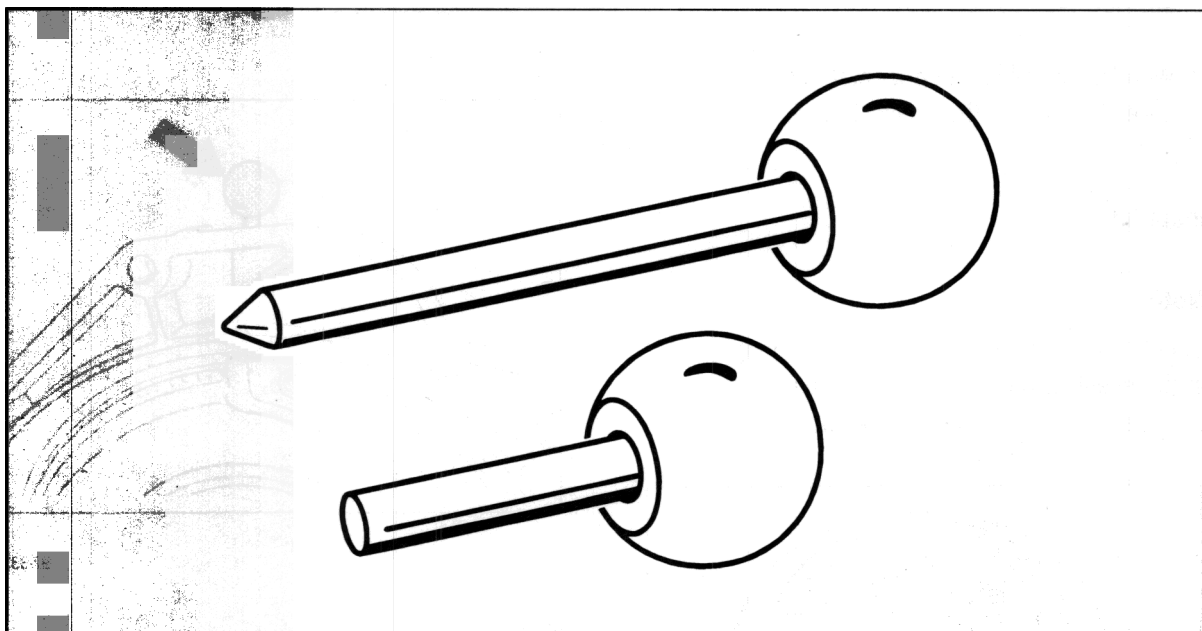
Technical data**Tightening torques for Tiptronic transmission**

Location	Thread	Tightening torque Nm (ftlb.)
ATF filler screw to ATF pan	M30	80 (59)
ATF drain plug to ATF pan	M16	40 (29)
ATF pan to transmission housing	M6	10 (7)
ATF filter to hydraulic control unit	M5	6 (4)
Hydraulic control unit to transmission housing	M6	8 (6)
Sensor for transmission input speed to hydraulic control unit	M6	6 (4)
Solenoid valves to hydraulic control unit	M5	6 (4)
Sensor for transmission speed to transmission housing	M6	6 (4)
Multi-function switch to transmission housing	M6	8 (6)
Short flanged shaft to differential	M8	25 (18)
Cover for final drive on transmission housing	M8	23 (17)
Plug to cover for final drive	M18	30 (22)
Mounting saddle for long flanged shaft to transmission housing	M8	23 (17)

Location	Thread	Tightening torque Nm (ftlb.)
Housing for spur gear to transmission housing	M8	23 (17)
Converter to drive plate	M8	39 Nm (29)

32 50 19 Removing and installing torque converter

Tools



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Item	Designation	Special tool	Explanation
	Fixing pin	9595/1	

Notes on removal and installation

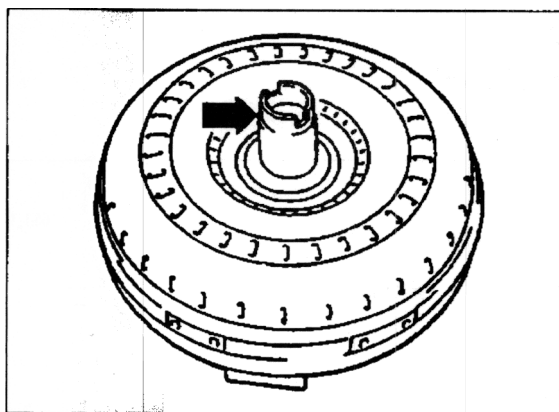
Removal

1. Remove multi-fuction switch (refer to service No. 37 35 19).
2. With transmission in horizontal position, carefully remove the converter.
2. Hold the converter in installation position with special tool 9595/1 (long).

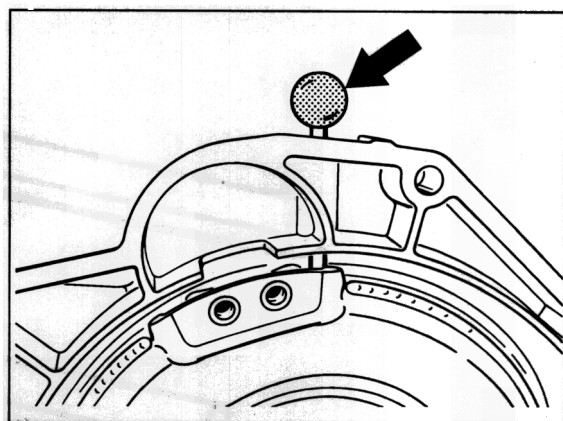
Installation

Note

Check converter hub for traces of scoring. In the event of damage or faults, the complete converter must be replaced.



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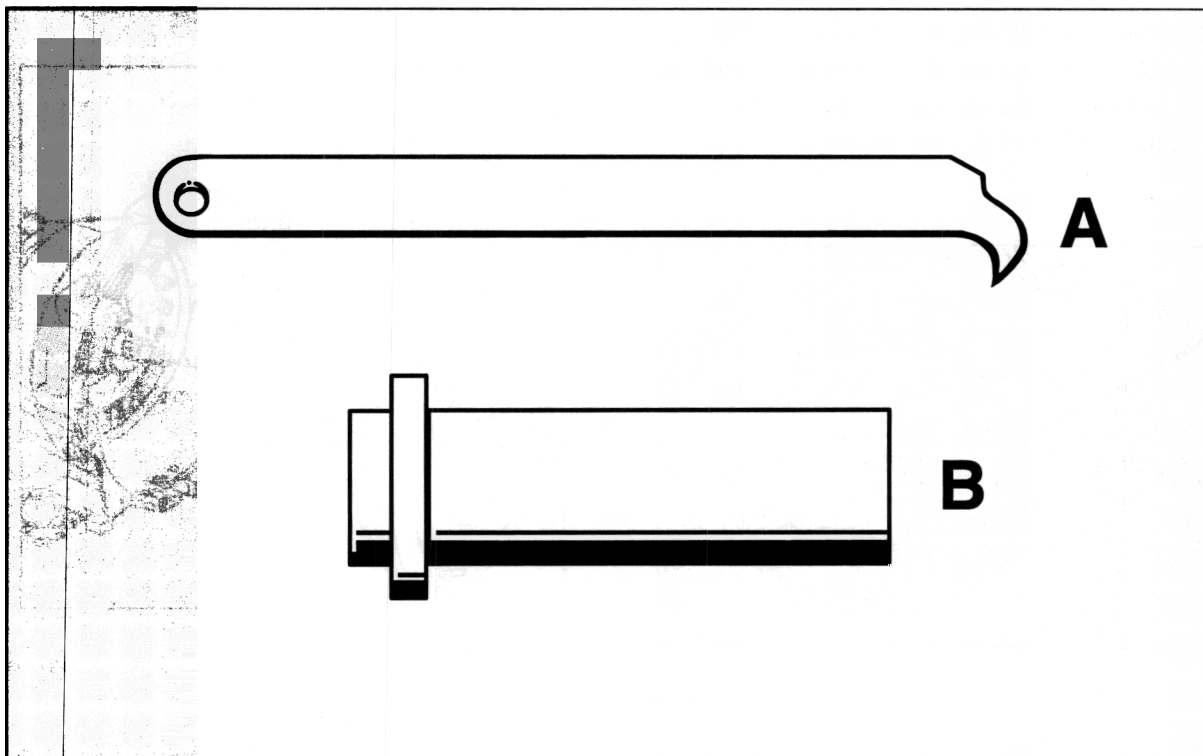
Note

If the installed position of the converter is incorrect, the ATF pump can be destroyed when the transmission is flange-mounted to the engine.

1. Carefully push converter onto transmission shaft as far as the first stop. Then press converter by hand into the converter bell housing and turn it until the recess in the converter hub engages in the driver of the impeller and the converter perceptibly slides inward.

32 47 19 Removing and installing torque-converter sealing ring

Tool



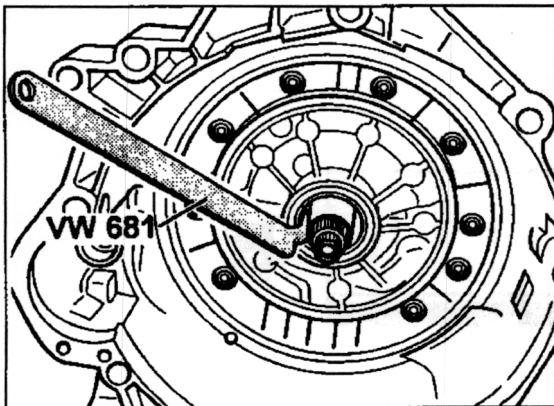
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Item	Designation	Special tool	Explanation
A	Hook	VW 681	
B	Assembly sleeve	3295	

Notes on removal and installation

Removal

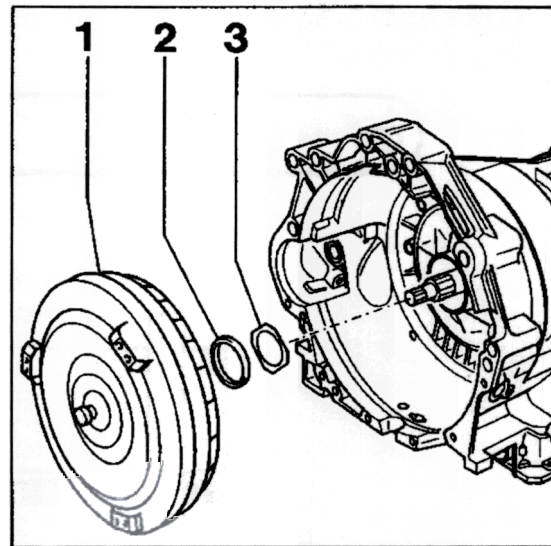
1. Remove transmission and converter.
2. Remove sealing ring with special tool **VW 681**. Place the special tool directly behind the sealing lip of the sealing ring so that the mounting-face ring is not damaged.



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Installation

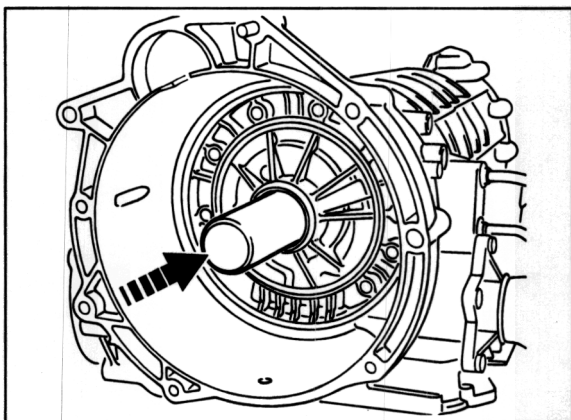
1. Replace mounting-face ring if damaged



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- 1 - Torque converter
 - 2 - Sealing ring
 - 3 - Mounting-face ring
2. Thinly coat circumference and sealing lip of sealing ring with Vaseline and drive sealing ring home as far as the mounting face with special tool **3295**.

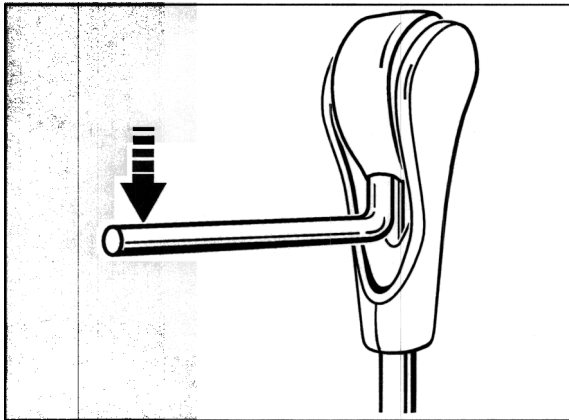




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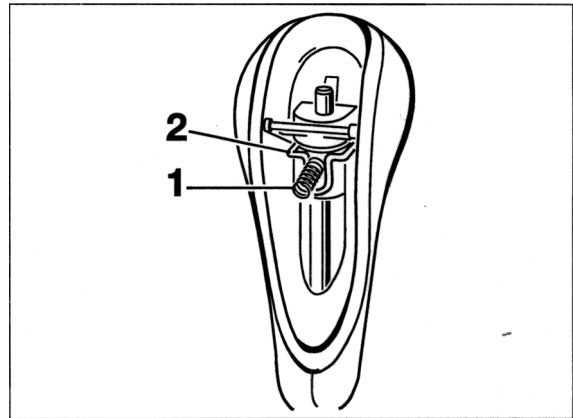
37 04 19 Removing and installing selector knob**Removal**

1. Lever off locking button with an angled pipe.
The locking button must be pressed so that the pipe section can be inserted between the shift lever and the locking button. To do this, turn the ignition key to "1" position.



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2. Remove the compression spring and spring clip and pull off the selector knob.



- 1 – Compression spring
(conical as of 12.10.98)
2 – Spring clip

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Installation

1. Assemble the selector knob with spring clip, compression spring and locking button.

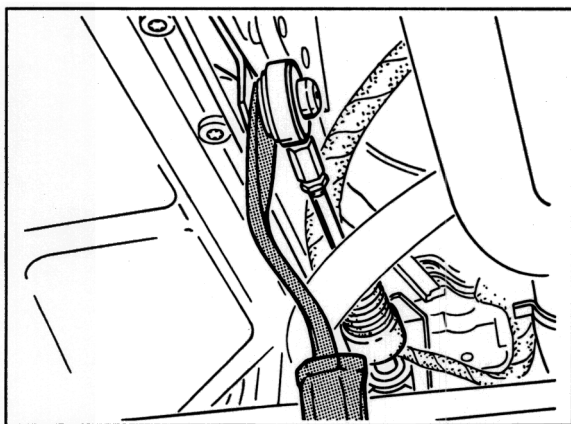
Note

Fit conical compression spring with the small diameter facing the guide peg.

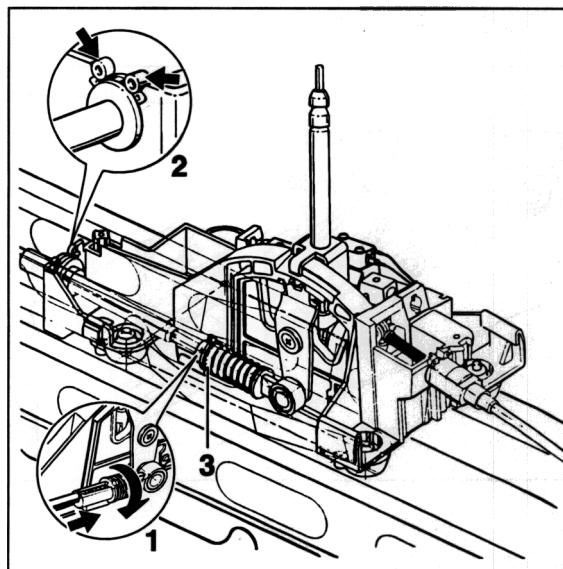
2. Press the complete selector knob onto the shift lever until it bottoms.
3. Check the function of the locking button.

37 15 15 Adjusting selector lever cable (basic adjustment)

1. Move selector lever to "P" position.
2. Lever off cable on transmission lever using a commercially available removal tool (refer to Technical Equipment Manual, Chapter 2.4, No. 21).



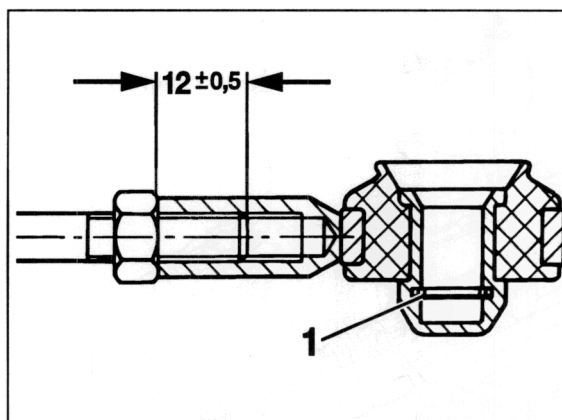
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4. Check installation dimension of the end piece
It must be 12 ± 0.5 mm.

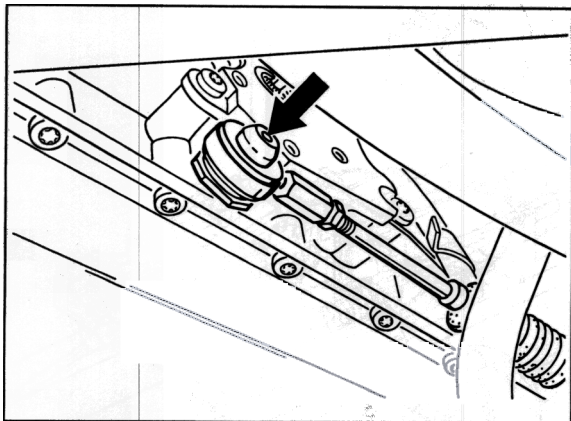
3. Disengage cable at adjuster. To do this, slide the locking sleeve (1) forward and turn it clockwise to removal position.



1 – Snap ring

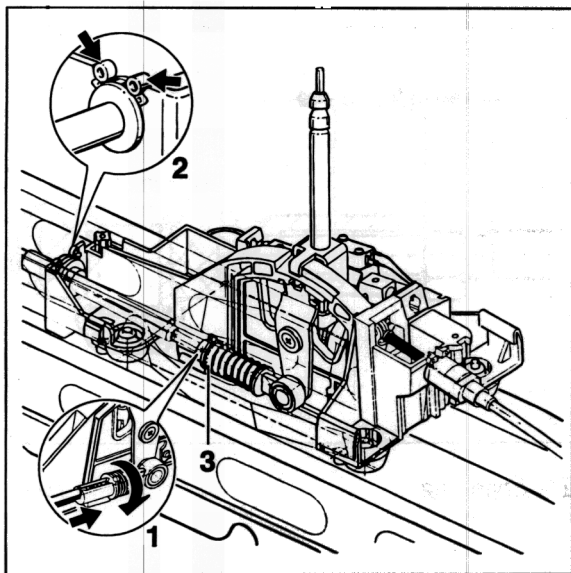
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5. Press end piece onto the transmission lever using a pair of pliers.



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6. Engage cable on the selector support into the open adjuster (1) and close the adjuster (3). The locking sleeve must move to the end position automatically.



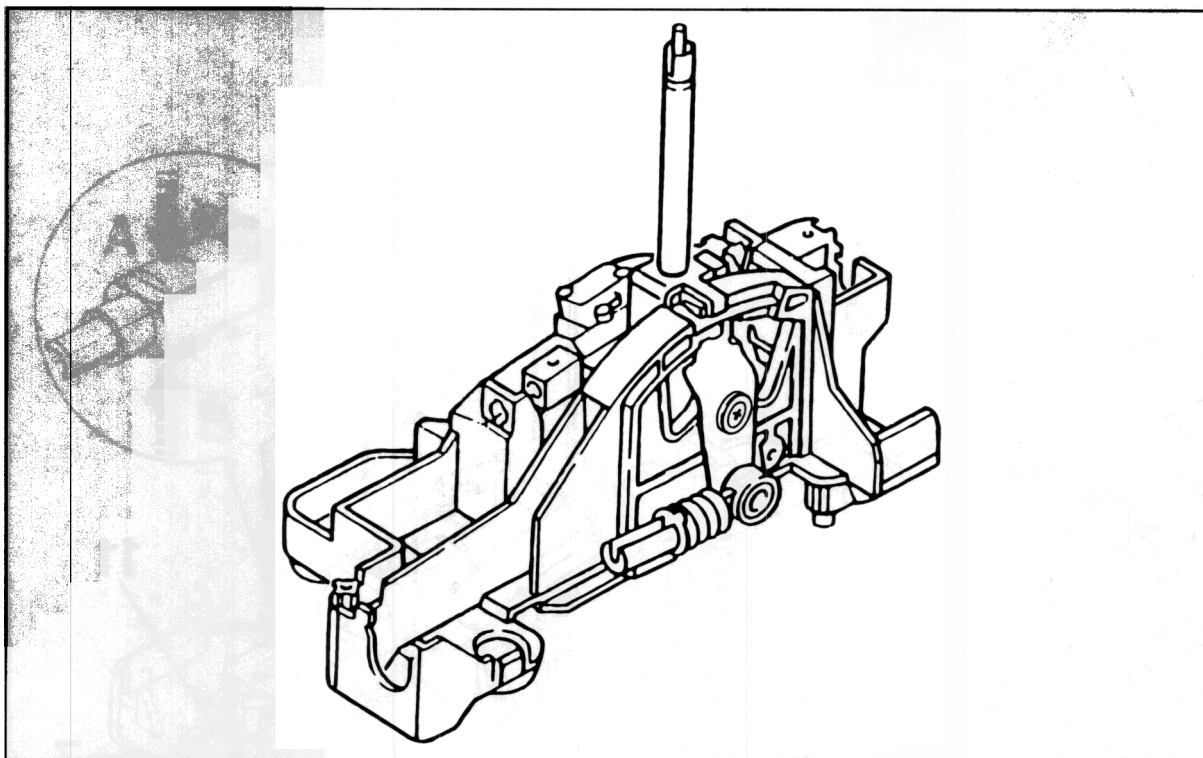
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7. Check adjustment. To do this, select all gears and check whether the gear is indicated in the right-hand instrument cluster. Also change gates from "D" to "M". A straight movement must be possible without catching.

Note

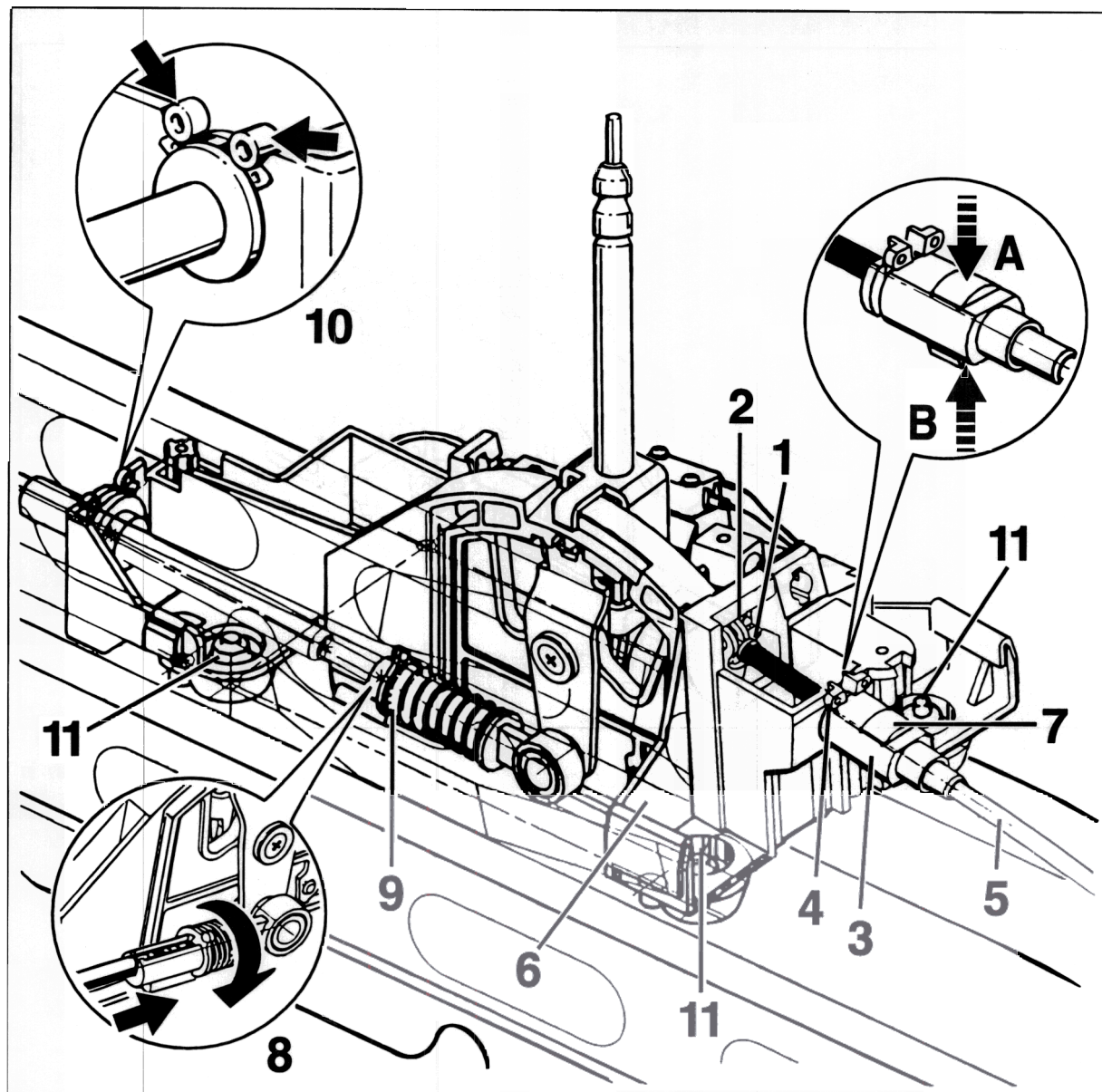
Minor corrections can be made on the cable end piece.

37 08 19 Removing and installing selector support



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Removing and installing selector support



549_97

- 1 – Cable nipple
- 2 – Keylock lever
- 3 – Adjuster
- 4 – Retaining clip
- 5 – Cable sleeve
- 6 – Selector support
- 7 – Locking button
 - A = Close adjuster
 - B = Open adjuster
- 8 – Adjuster (open)
- 9 – Adjuster (closed)
- 10 – Retaining clip
- 11 – Hexagon nut

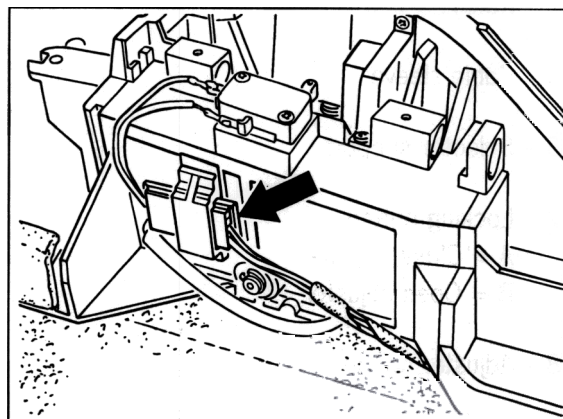
Removing and installing selector support

Removal

1. Remove selector knob (refer to Service No. 37 04 19).
2. Remove centre console (refer to Service No. 68 17 19).
3. Move selector lever to position "D".
4. Disengage keylock cable:
 - Open adjuster (3) by pressing the unlocking button (7).
 - Press the retaining clip (4) together and carefully pull the adjuster (3) upward out of the support bracket.
 - Disengage cable nipple (1) on the keylock lever (2).
5. Disengaging selector lever cable:
 - Slide the locking sleeve of the adjuster forward and turn it clockwise to removal position (8).

Press the retaining clip (10) together and carefully pull the cable upward out of the support bracket.

6. Disconnect plug connection.



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7. Unscrew fastening nuts (11).

Installation

Install in reverse order, observing the following points:

1. Tighten fastening nuts (11) to **10 Nm (7.5 ftlb.)**.
2. Fastening selector lever cable:
 - Press the cable into the support bracket until the retaining clip engages in the housing (10).
 - Press cable into the open adjuster (8) and close the adjuster (9). The locking sleeve must move to the end position automatically (9).

3. Fastening keylock cable:

Note

Adjust the keylock cable only with the selector knob **fitted**.

- Install selector knob (refer to Service No. 37 04 19).
- Turn ignition key to position "1" (ignition on) and move selector lever to position "D".
- Open adjuster (3).
- Engage cable nipple (1) on the keylock lever (2).
- Press housing for adjuster (3) into the support bracket until the retaining clip (4) engages.
- Move selector lever to position "P" and turn ignition key to position "0" (removal position).
- Press cable sleeve (5) toward the selector support.
- Release cable and press locking button (7) until it engages.

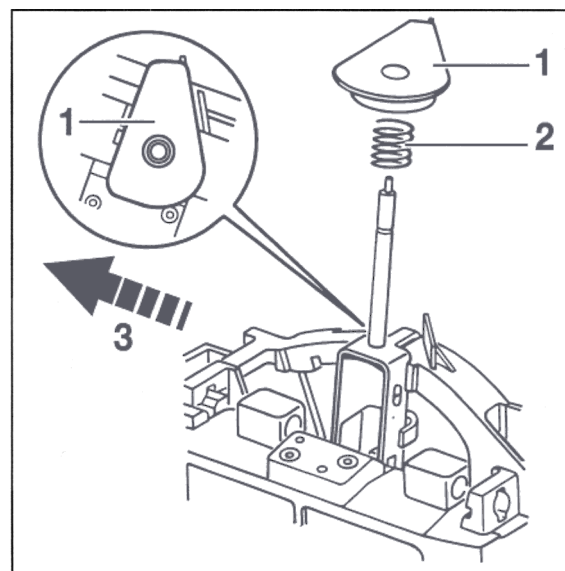
4. Check keylock function:

Turn ignition key to position "1" (ignition on).

- Move selector lever from position "P" to "D" and turn ignition key counterclockwise. The removal position must not be reached.
- Release ignition key again and engage selector lever position "P". In this position, it must be possible to remove the ignition key and the locking button must be locked.

5. Remove selector knob once more.

6. Fit rotary valve in correct position and install centre console.

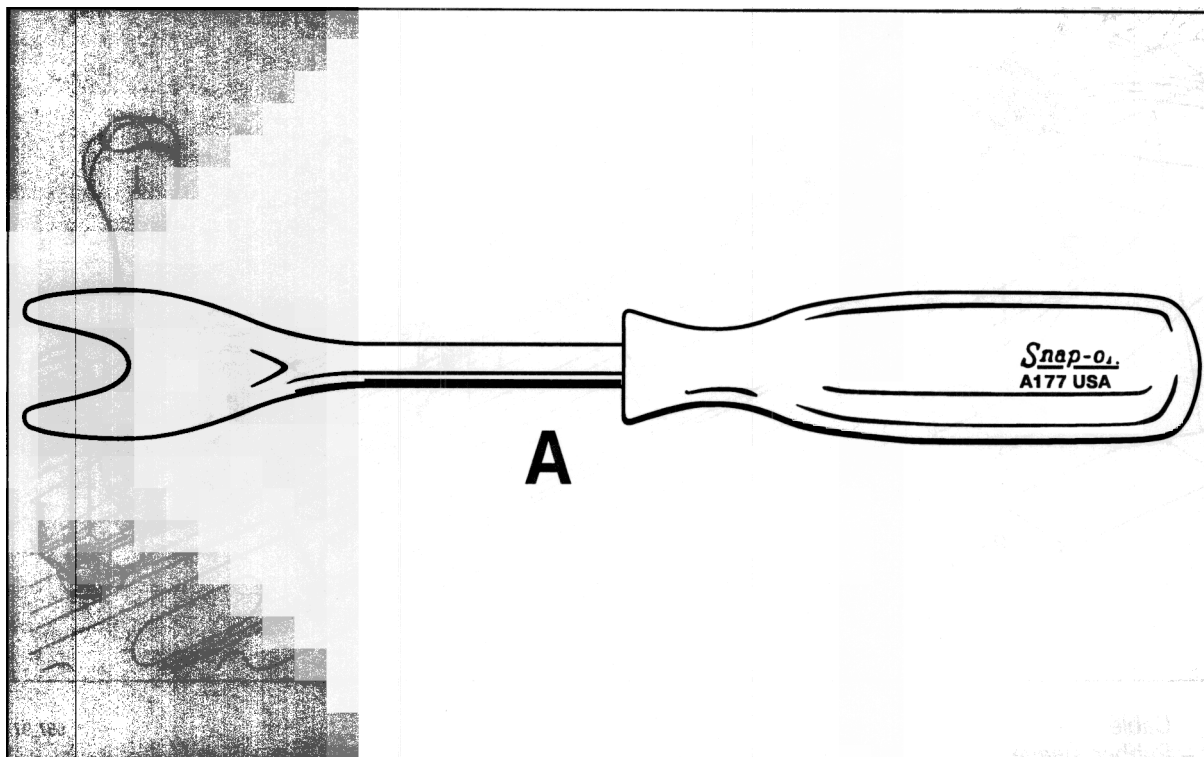


- 1 – Rotary valve
- 2 – Spring
- 3 – Direction of travel

541_97

37 15 19 Removing and installing selector lever cable

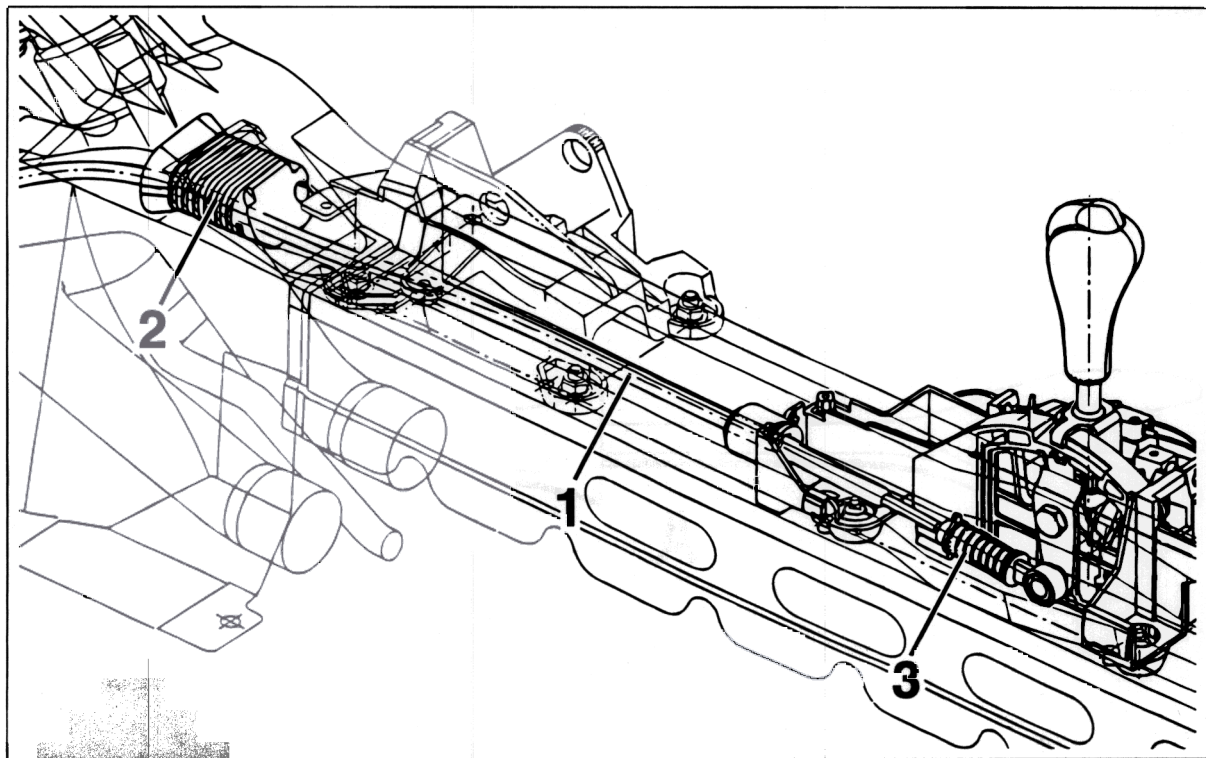
Tools



97 - 342

Item	Designation	Special tool	Explanation
A	Removal tool		commercially available (refer to Technical Equipment Manual, Chapter 2.4, No. 21).

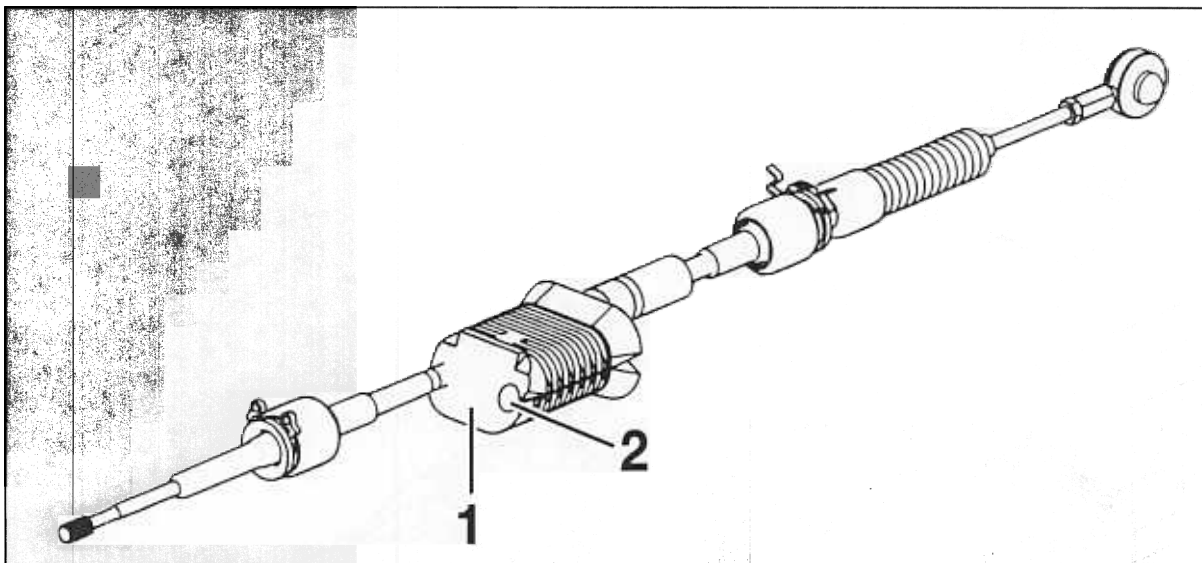
Removing and installing selector lever cable



- 1 - Cable
- 2 - Rubber sleeve
- 3 - Adjuster

557_97

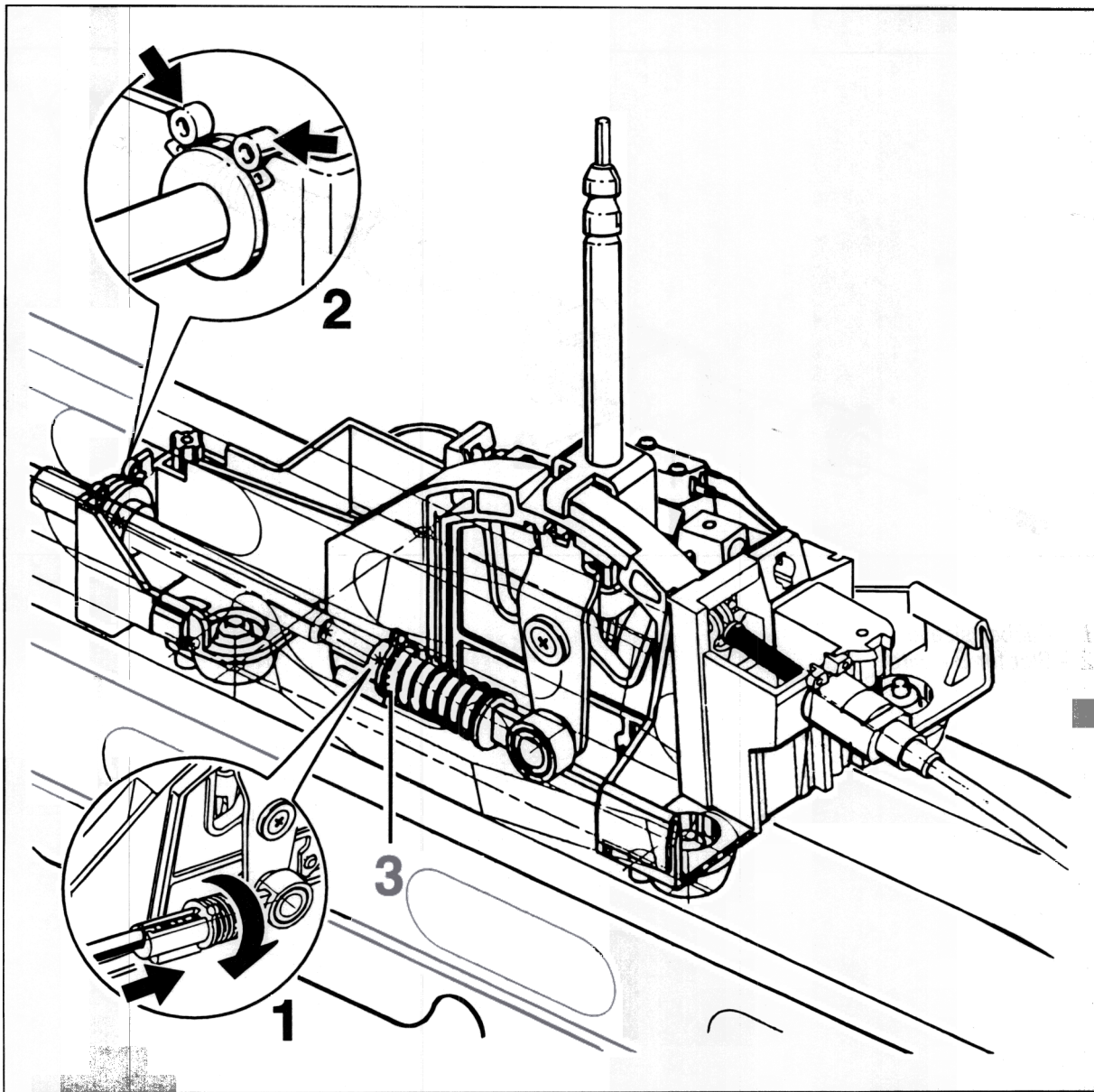
Removing and installing selector lever cable



- 1 – Rubber sleeve
- 2 – Slot for B+ wire

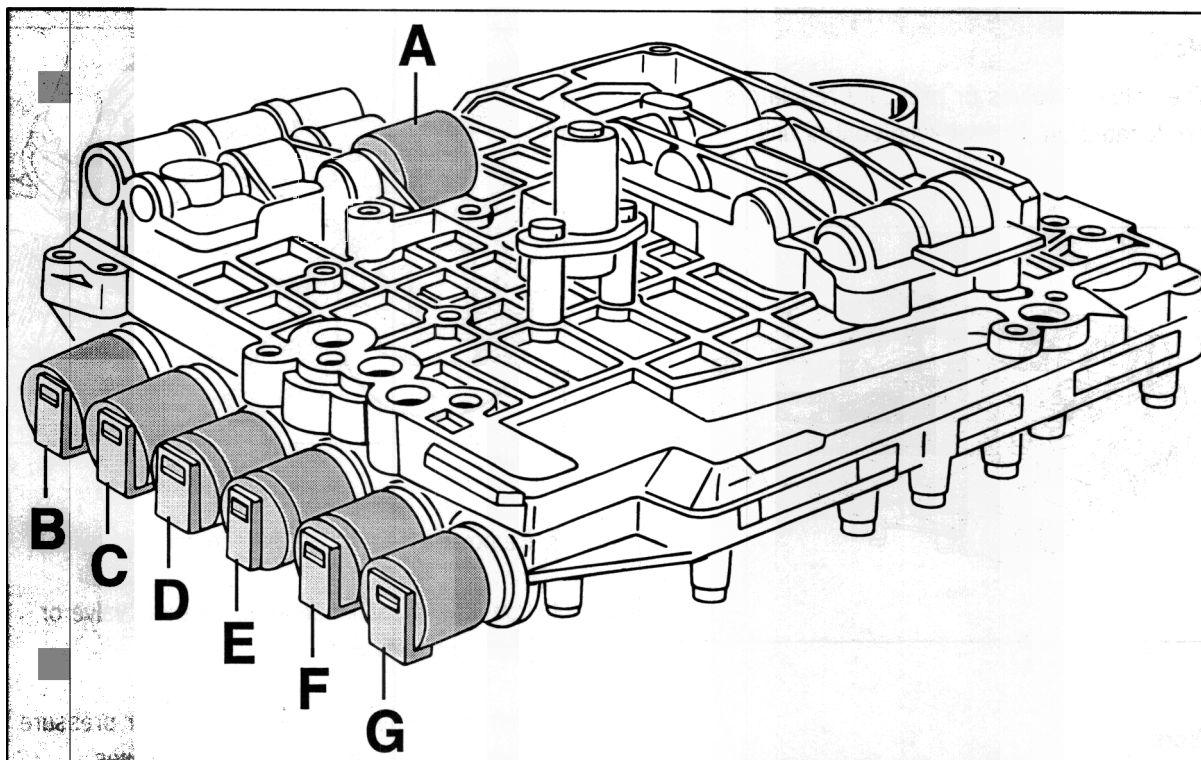
545_97

Removing and installing selector lever cable



407 - 97

38 89 19 Removing and installing solenoid valves and pressure regulators



051_98

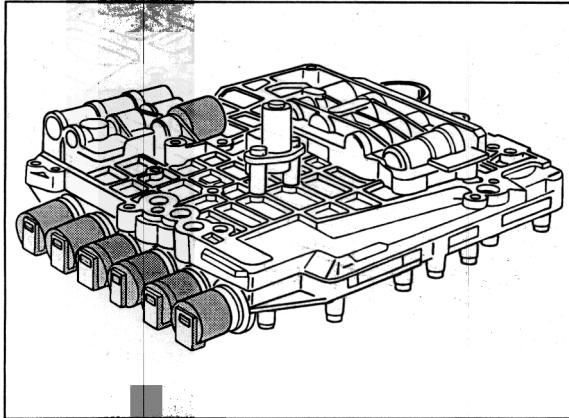
- A – Pressure regulator 1
- B – Solenoid valve 3
- C – Solenoid valve 2
- D – Pressure regulator 3
- E – Pressure regulator 4
- F – Pressure regulator 2
- G – Solenoid valve 1

Removing and installing solenoid valves and pressure regulators

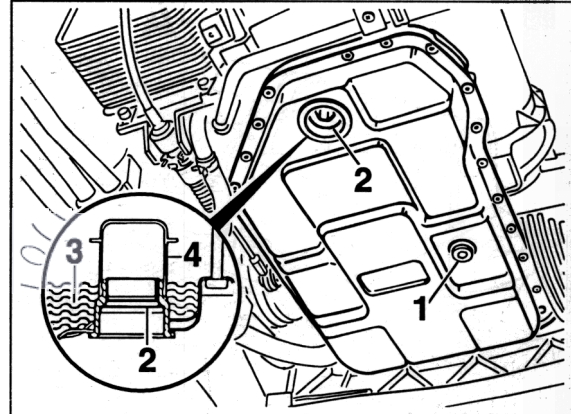
Removal

Note

The solenoid valves or pressure regulators are located on the hydraulic control unit.



052_98



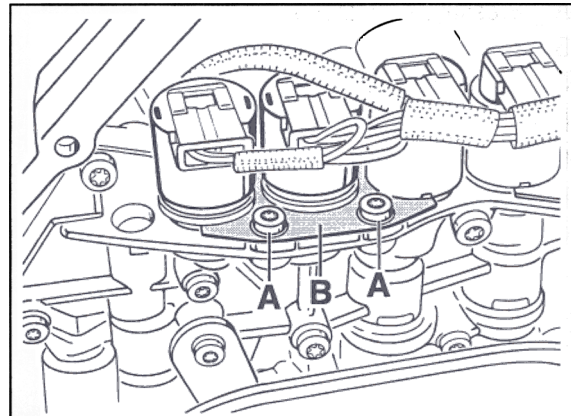
187_97

3. Remove ATF pan (loosen screws crosswise).
4. Pull off plug connection on solenoid valve or pressure regulator.
5. Remove holder of solenoid valves or pressure regulators and take out solenoid valves.

Note

Without ATF do **not** start the engine and do not tow the vehicle.

1. Place oil collection pan under the transmission.
2. Unscrew ATF drain screw (1) and drain ATF.



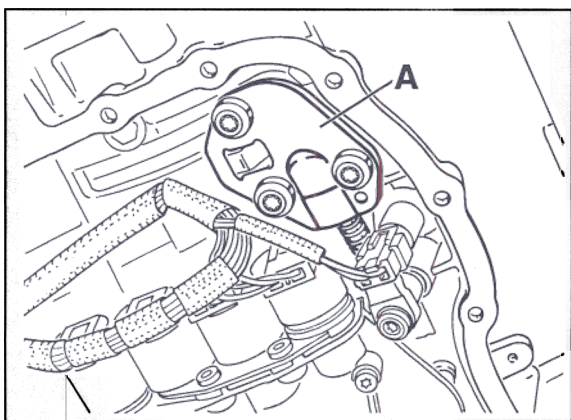
A – Fastening screws
B – Holder

047_98

Note

The hydraulic control unit must be removed in order to take out pressure regulator 1 (refer to Service No. 38 77 19).

To remove solenoid valve 1, the guide plate for the parking lock mechanism must be removed.



A – Guide plate

053_98

Installation

Install in reverse order, observing the following points:

Note

Since 11/9/98, transmissions with a modified pressure regulator have been installed. It is essential to note correct allocation during repair work (see Parts Catalogue).

1. Thinly coat toroidal sealing rings for the pressure regulators with Vaseline.
2. Do **not** tighten fastening screws for the parking lock mechanism guide plate with the selector lever in position "P".

3. Clean ATF pan and the four solenoids.

4. Lay all four solenoids in the seams of the ATF pan. Ensure that they are lying flat with their entire surface on the ATF pan.

5. Replace gasket for ATF pan.

6. Tighten screws of the ATF pan in diagonally opposite sequence in several stages.

7. Top up ATF
(refer to Service No 37 02 55).

Tightening torques:

Holder for solenoid valves on hydraulic control unit	=	5 Nm (3.7 ftlb.)
--	---	------------------

Guide plate for parking lock mechanism on transmission housing	=	23 Nm (17 ftlb.)
--	---	------------------

ATF pan on transmission housing	=	10 Nm (7.5 ftlb.)
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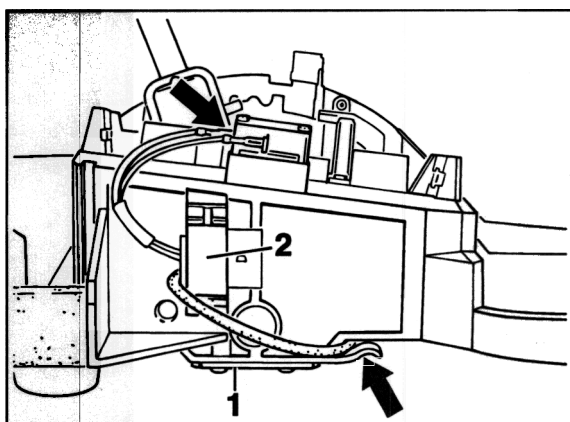
Drain plug on ATF pan	=	40 Nm (30 ftlb.)
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ATF filler screw on ATF pan	=	80 Nm (59 ftlb.)
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37 87 19 Removing and installing shiftlock solenoid

Removal

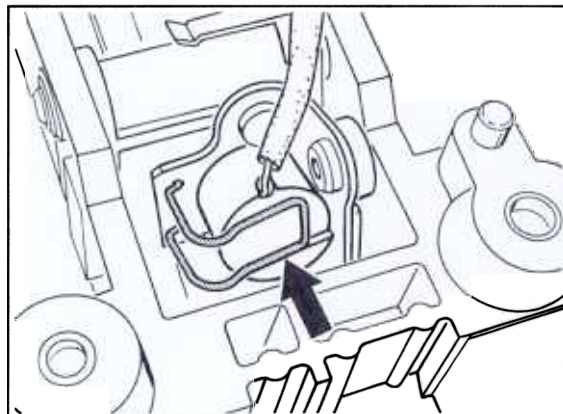
1. Remove centre console
(refer to Service No. 68 17 19).
2. Remove and install selector support
(refer to Service No. 37 08 19).
3. Remove cover plate on selector lever support.
4. Pull off cable on manual switch, unclip holder for plug connection and remove cable from the cable guides.



1 – Cover plate
2 – Holder for plug connection

420 - 97

5. Pull solenoid holding clip only far enough away to permit the solenoid can be removed.
Do not overstretch the holding clip.

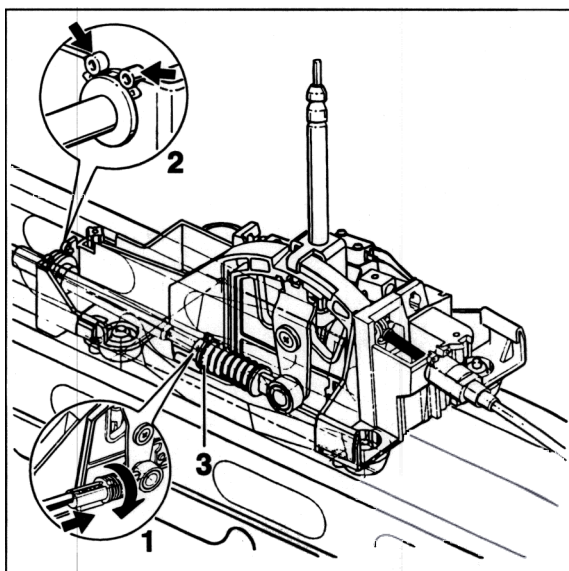


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Installation

1. Fit solenoid in correct position and properly route cable underneath the cable guides (see Figure at left).
2. Plug cable onto manual switch according to wiring diagram and fasten plug connection with holder on the selector support.

11. Move selector lever to position "P", engage cable into the open adjuster (1) and close the adjuster (3). The locking sleeve must move to the end position automatically.



407_97

Tightening torques:

Parking brake console to body (M8) = 23 Nm (17 ftlb.)

Transmission support to body (M10) = 65 Nm (48 ftlb.)

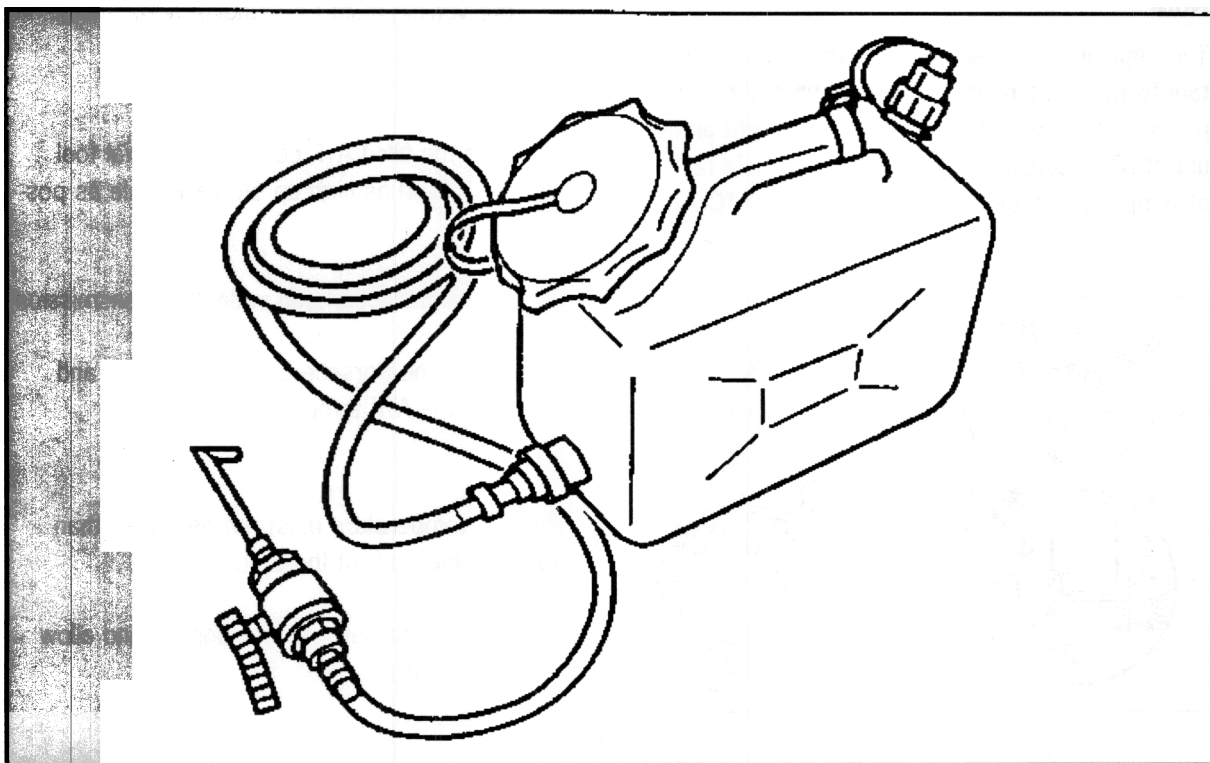
Transmission support/transmission carrier to transmission bearing (M10) = 65 Nm (48 ftlb.)

Cross member to carrier side member (M10) = 65 Nm (48 ftlb.)

12. Check adjustment of selector lever cable (refer to Service No. 37 15 15).
13. Adjust parking brake (refer to Service No. 46 83 16).
14. Install centre console (refer to Service No. 68 17 19).
15. Install selector knob (refer to Service No. 37 04 19).
16. Fit underbody panels (middle and rear).

37 02 35 Checking and topping up the ATF

Tools



23596

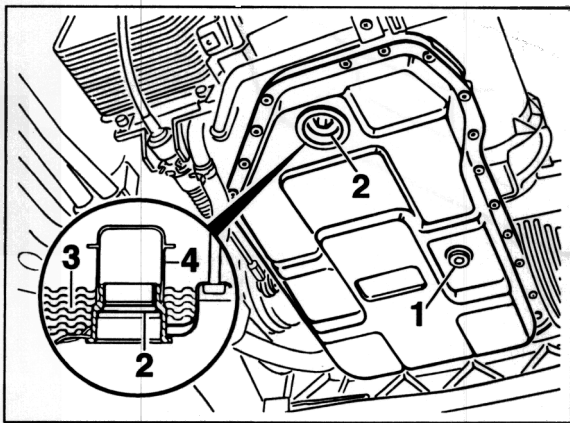
Item	Designation	Special tool	Explanation
	ATF filling system	V.A.G 1924	

Checking and topping up the ATF

Top up only with ATF approved by Porsche.
See Parts Catalogue.

Note

The stipulated fluid level (3) is extremely important to perfect functioning of the automatic transmission. It is correct if there is still a slight amount of ATF escaping at the filler screw hole (2) at temperatures between **30 °C and 40 °C**.



97-187

The air-conditioning system and the heater must be switched off.

The vehicle must be standing horizontally.

1. Attach the filled ATF container (special tool V.A.G 1924) as high up on the vehicle as possible.
2. Place oil collection pan under the transmission.
3. Connect the Porsche System Tester 2 and call up the ATF temperature.

Note

The ATF temperature must not be higher than 40 °C at the start of the test.

4. Move selector lever to position "P" and allow engine to idle.

Testing conditions:

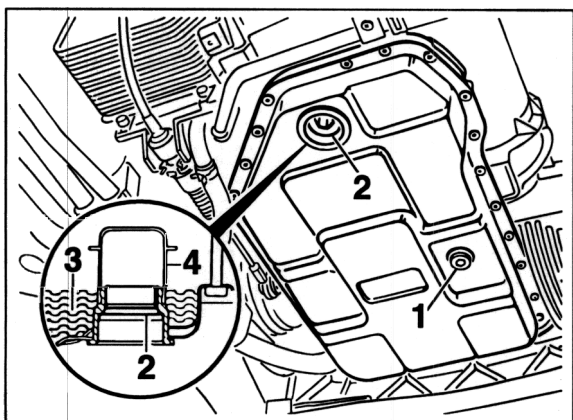
- The transmission must not be in the reduced driving program.

The ATF temperature **must** be between 30 °C and 45 °C.

An ATC inspection at an insufficient ATF temperature causes over-filling and an inspection at an excessive ATF temperature causes insufficient filling

Selector lever in position "P" and engine idling.

5. **Put on protective goggles** and unscrew the ATF filler screw (2). If ATF escapes from the filler screw hole (2) and if the ATF temperature is 30 °C...40 °C, the ATF level is in order.



97-187

Note

The filler hook must be carefully inserted into one of the openings of the ATF guard cap (4) on the filler hole. When doing so, do not move the filler hook upwards, since the oil guard cap (4) can spring off upwards.

6. Screw in the ATF filler screw with a new sealing ring and tighten it with **80 Nm (59 ftlb.)**.

Note

The filler screw must be closed no later than when an ATF temperature of 45 °C is reached.

7. If no ATF escapes from the filler screw (2) even though approx. 40 °C has been reached, the ATF must be topped up.
8. Top up with ATF with the special tool **V.A.G 1924** until surplus ATF runs out at the hole (2).

37 02 55 Changing ATF

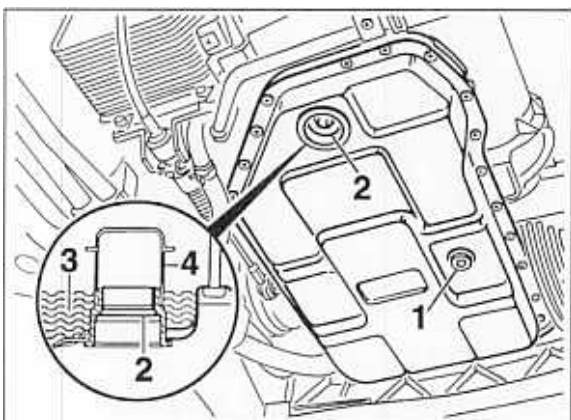
Filling capacity: approx. 9.5

Change quantity: approx. 4.0

Note

Use only ATF approved by Porsche. See Parts Catalogue.

1. Place oil collection pan under the transmission.
2. Unscrew ATF drain screw (1) and drain ATF.



97-187

5. Move selector lever to position "P" and allow engine to idle.

6. With engine running, top up ATF again until excess ATF emerges from the bore of the ATF filler screw (2).

7. With the brake pedal pressed, change through all selector lever positions, remaining in each position for approx. 10 s.

8. Check the ATF level again and top up if necessary.

Note

All instructions and test conditions for "Checking and topping up ATF" must be observed.

Note

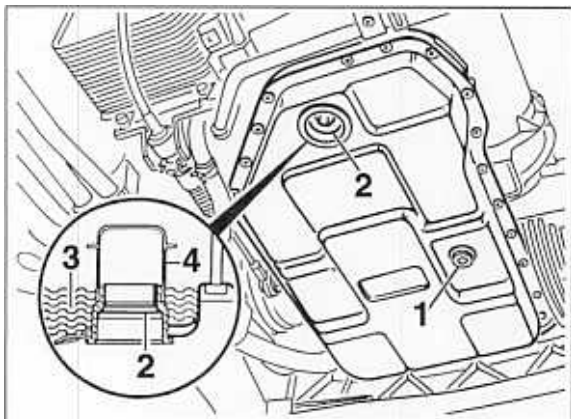
Without ATF, the engine must not be started and the vehicle must not be towed.

3. Replace sealing ring for ATF drain plug (1) and tighten plug to **40 Nm (30 ftlb.)**.
4. Unscrew the ATF filler screw (2) and fill up with ATF until surplus ATF escapes at the hole of the ATF filler screw.

37 58 19 Removing and installing ATF filter

Removal

1. Place oil collection pan under the transmission.
2. Unscrew ATF drain screw (1) and drain ATF.
4. Remove ATF filter.

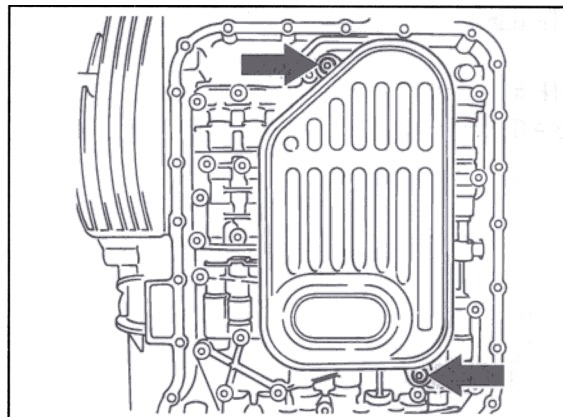


97-187

Note

Without ATF, the engine must not be started and the vehicle must not be towed.

3. Remove ATF pan (loosen screws crosswise).



97-283

Installation

1. Thinly coat gasket on the suction collar of the ATF filter with Vaseline and install filter.
2. Clean ATF pan.
3. Clean all four magnets and place them in the seams of the ATF pan (they must lie flat over their entire surface).
4. Fit ATF pan with new seal. Tighten the screws crosswise in several stages.
5. Replace sealing ring for ATF drain plug and tighten plug to **40 Nm (30 ftlb.)**.
6. Fill in ATF (refer to Service No. 37 02 35).

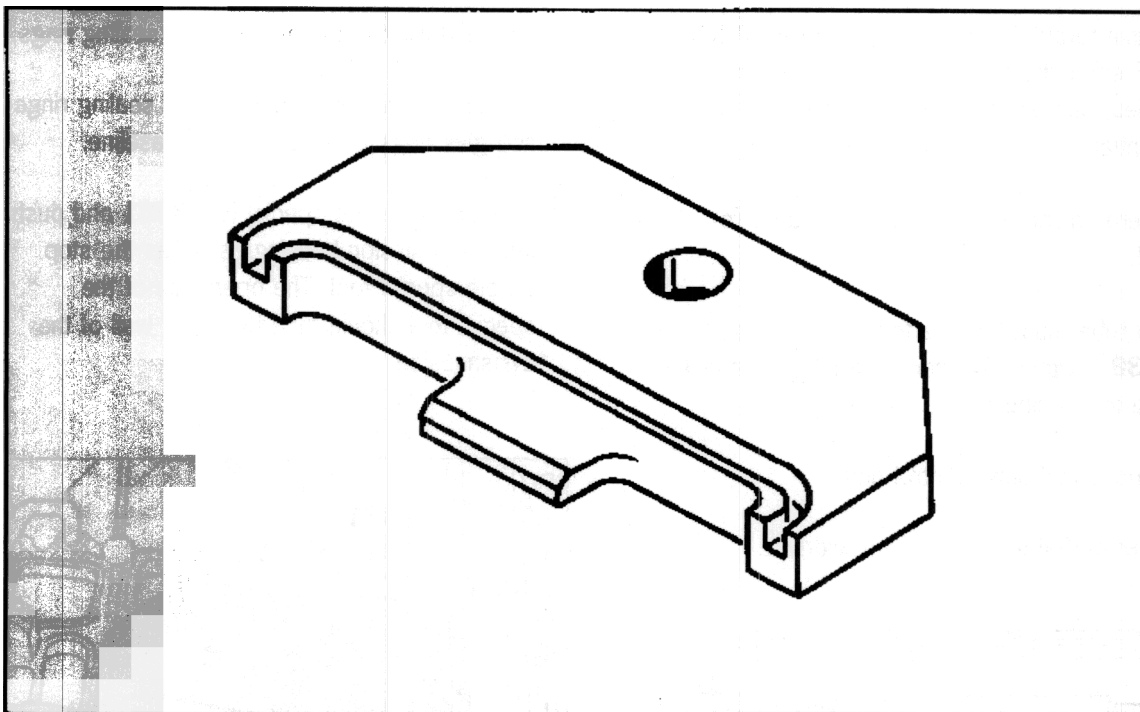
Tightening torques:

Drain plug to ATF pan = 40 Nm (30 ftlb.)

ATF filter to hydraulic control unit
= 6 Nm (4.5 ftlb.)

ATF pan to transmission = 10 Nm (7.5 ftlb.)

ATF filler screw
to ATF pan = 80 Nm (59 ftlb.)

37 64 19 Removing and installing inner oil tube**Tools**

261-96

Item	Designation	Special tool	Explanation
	Insertion aid	3381	

Notes on removal and installation

Removal

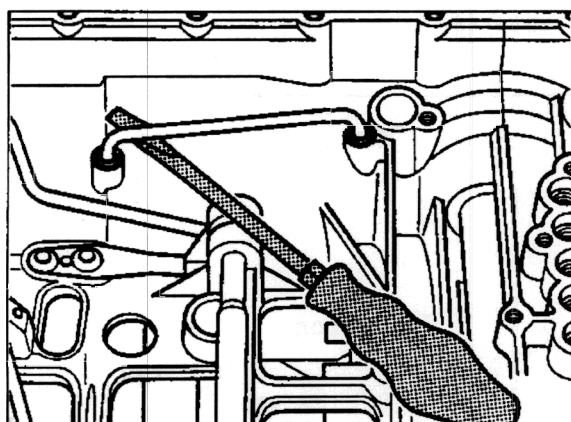
Notes

Defective toroidal sealing rings at inner oil tube let ATF enter the differential, which becomes overfilled, and oil emerges from the vent of the differential.

In general, a removed oil tube should be replaced.

The oil tube must be inserted only with special tool **3381**. Otherwise there is a danger of leakage due to bending of the oil tube.

1. Remove hydraulic control unit.
2. Lever out oil tube with a screwdriver.



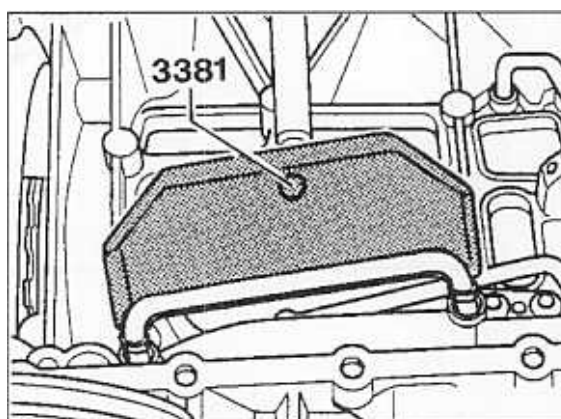
258-96

Installation

Note

Always replace oil tube and toroidal sealing rings.

1. Provide oil tube with new toroidal sealing rings and give rings a thin coating of Vaseline.
2. Insert oil tube into special tool **3381** and push into transmission housing as far as the stop on the special tool. The open side of the special tool should face the outer wall of the transmission.



259-96

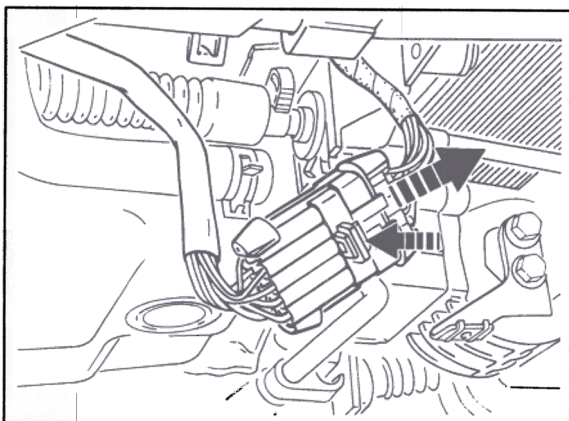
Note

Do not tilt oil tube. Drive in both tube ends equally.

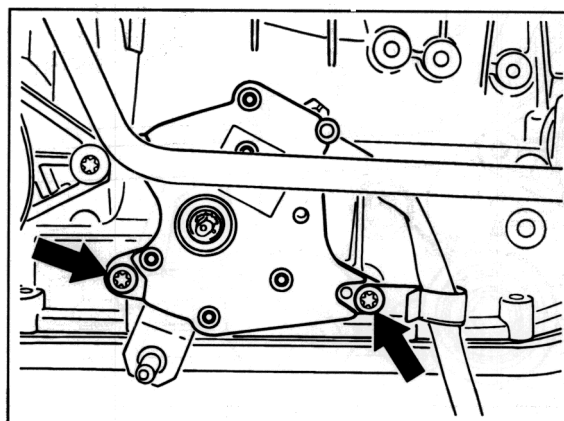
37 31 19 Removing and installing multi-function switch

Removal

1. Unclip, release and disconnect cable connection to the multi-function switch.
3. Unscrew fastening screws and pull switch off the selector shaft.

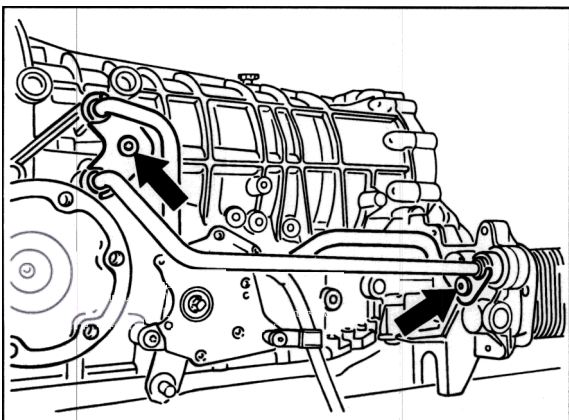


97-260



97-184

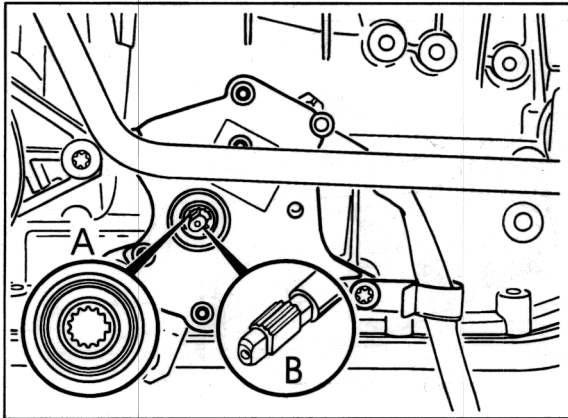
2. Remove ATF line. Collect emerging ATF at the same time.



97-183

Installation

1. Put multi-function switch on the selector shaft.
The flat point on the serrations in the switch "A" must lie against the flat point on the selector shaft "B".



97-184-1

Note

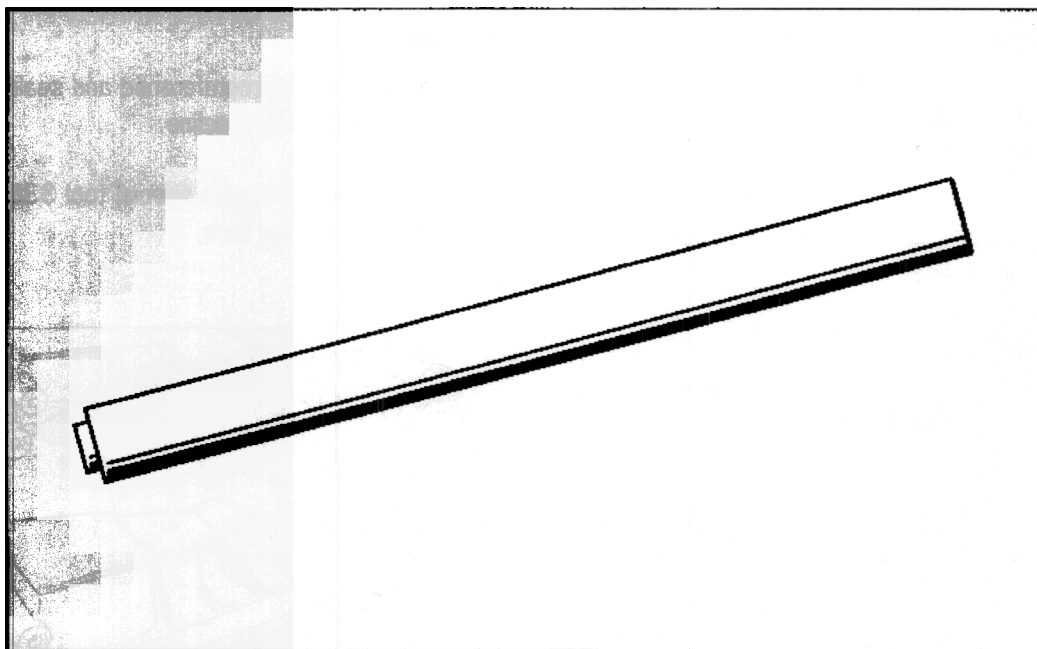
Place multi-function switch on the selector shaft.
Do not tilt or use force: you may damage the switch contacts.

2. Turn switch until the fitting bore on the switch housing can be put on the dowel pin on the transmission housing.
3. Replace sealing rings for ATF line and install ATF line.

Tightening torques:

Multi-function switch to
transmission housing (M6) = 8 Nm (6.0 ftlb.)

Bracket for ATF lines to
transmission housing (M6) = 23 Nm (17 ftlb.)

37 33 19 Removing and installing sealing ring for selector shaft**Tools**

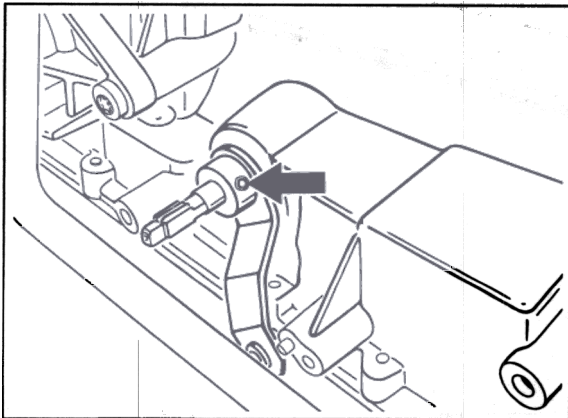
33096

Item	Designation	Special tool	Explanation
	Mandrel	3385	

Removing and installing sealing ring for selector shaft

Removal

1. Remove multi-function switch console (refer to Service No. 37 31 19).
2. Disengage selector lever cable at transmission selector lever.
3. Drive out roll pin (1) until the selector lever can be pulled off from the shaft.

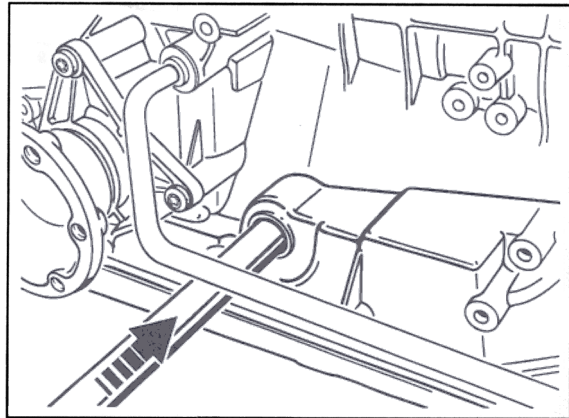


97-178

4. Pierce sealing ring with small screwdriver and pull out.

Installation

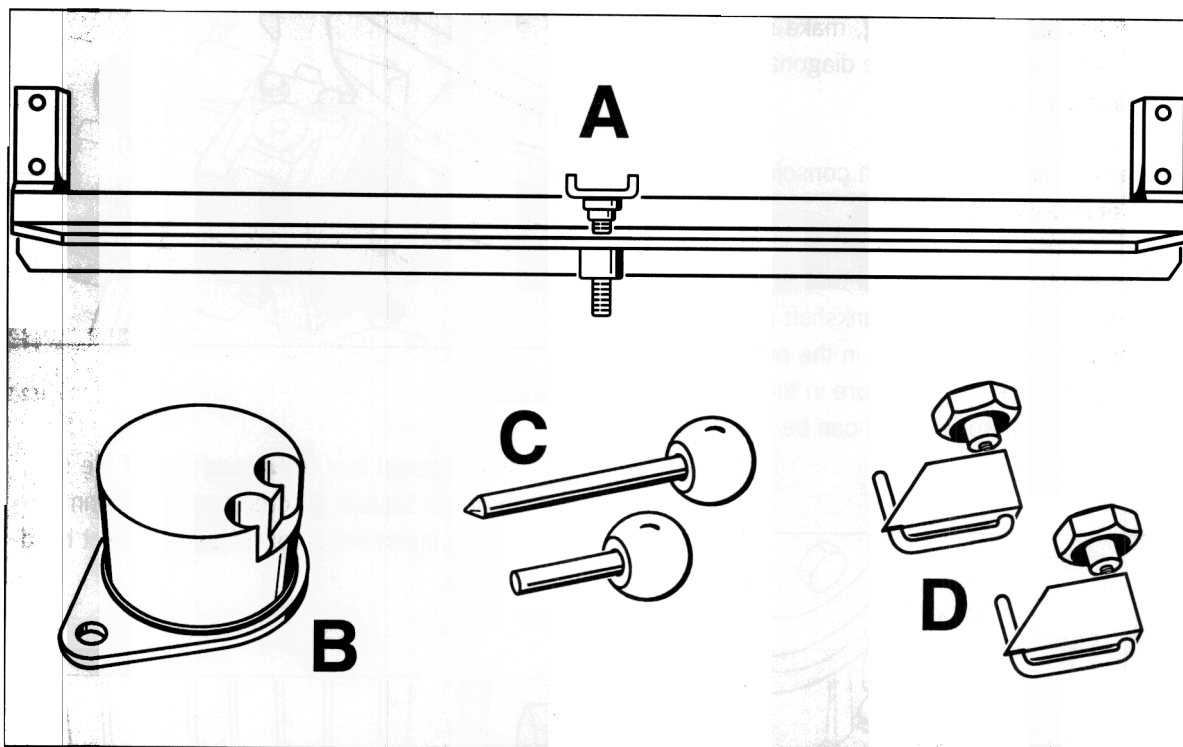
1. Thinly coat outer circumference and sealing lip of sealing ring with Vaseline.
2. Drive in sealing ring with special tool **3385** as far as the mounting face.



97-179

37 35 19 Removing and installing Tiptronic transmission A 96/00

Tools



311_97

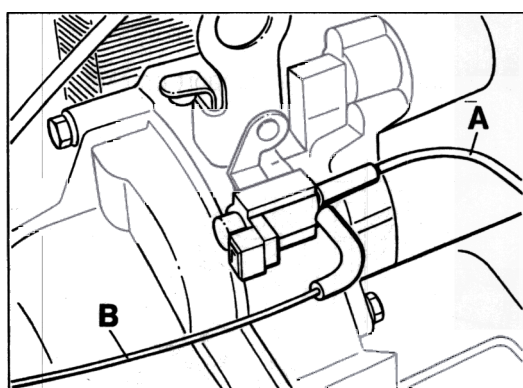
Item	Designation	Special tool	Explanation
A	Retaining device	9624/1	
B	Assembly aid	9596	
C	Fixing pin	9595/1	
D	Hose clamp	3094	

Note

For the remaining four fastening screws, remove special tool **9595/1**, rotate crankshaft through a further 120° in each case (to pulley marking U4, U5 or U6) and fix again.

7. Remove underbody covers (centre and rear) and side covers (rear left and right).

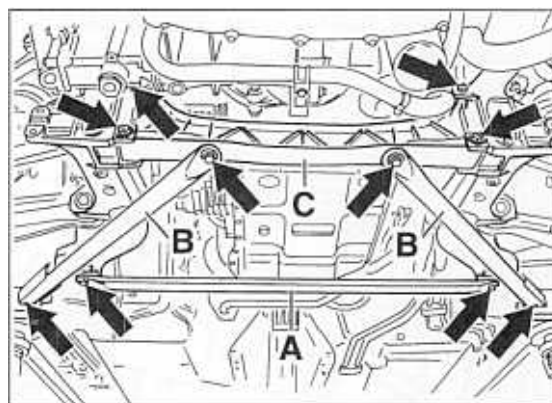
8. Pull off vacuum pipe (B) at switch-over valve.



304_97

9. Unscrew stabilizer at the side parts of the rear-axle support.

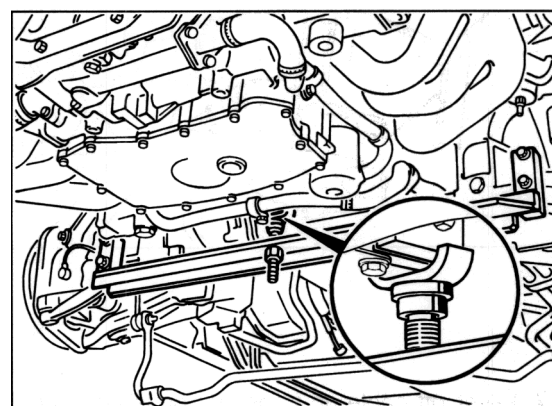
10. Remove cross member (A), diagonal braces (B) and rear-axle support (C).



336_97

12. Unscrew the lower fastening screws on the transmission bell housing.

13. Secure the engine in installation position with holding device. To do this, fasten special tool **9624/1** with four screws and turn the thrust screw until the pressure disc is in contact with the crankcase.



97-132

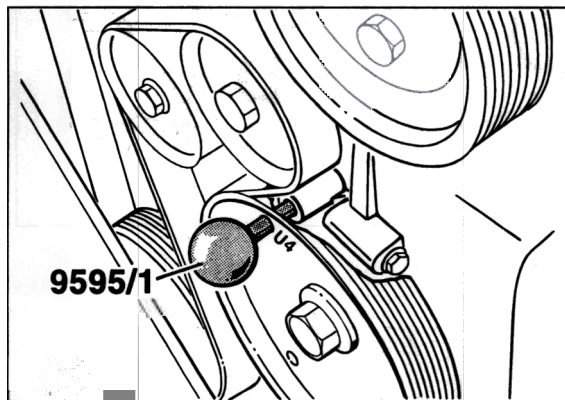
14. Uncouple drive shafts on the transmission side.

15. Place collection pan under the transmission.

Removing and installing Tiptronic transmission A 96/00

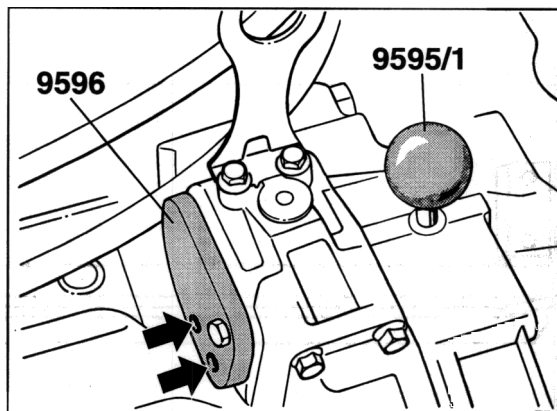
Removal

1. Disconnect battery.
2. Lift the vehicle. When lifting, make sure that the fastening screws of the diagonal braces are accessible.
3. Remove multi-fuction switch console (refer to **Service No. 27 60 19**).
4. Fix crankshaft using special tool **9595/1** (short). To do this, turn crankshaft until one of the bores U4, U5 or U6 in the pulley is aligned with the centring bore in the crankcase and special tool can be inserted.



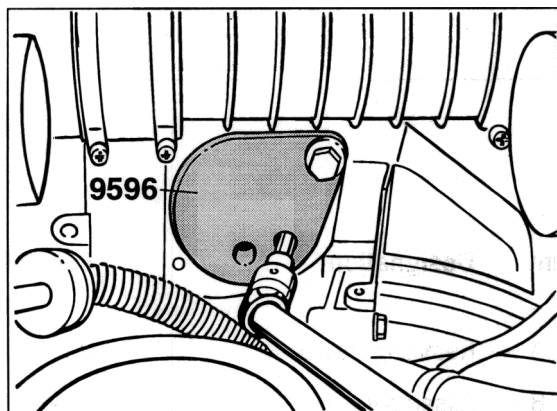
151_96

5. Hold the converter in installation position with special tool **9595/1** (long).



152_96

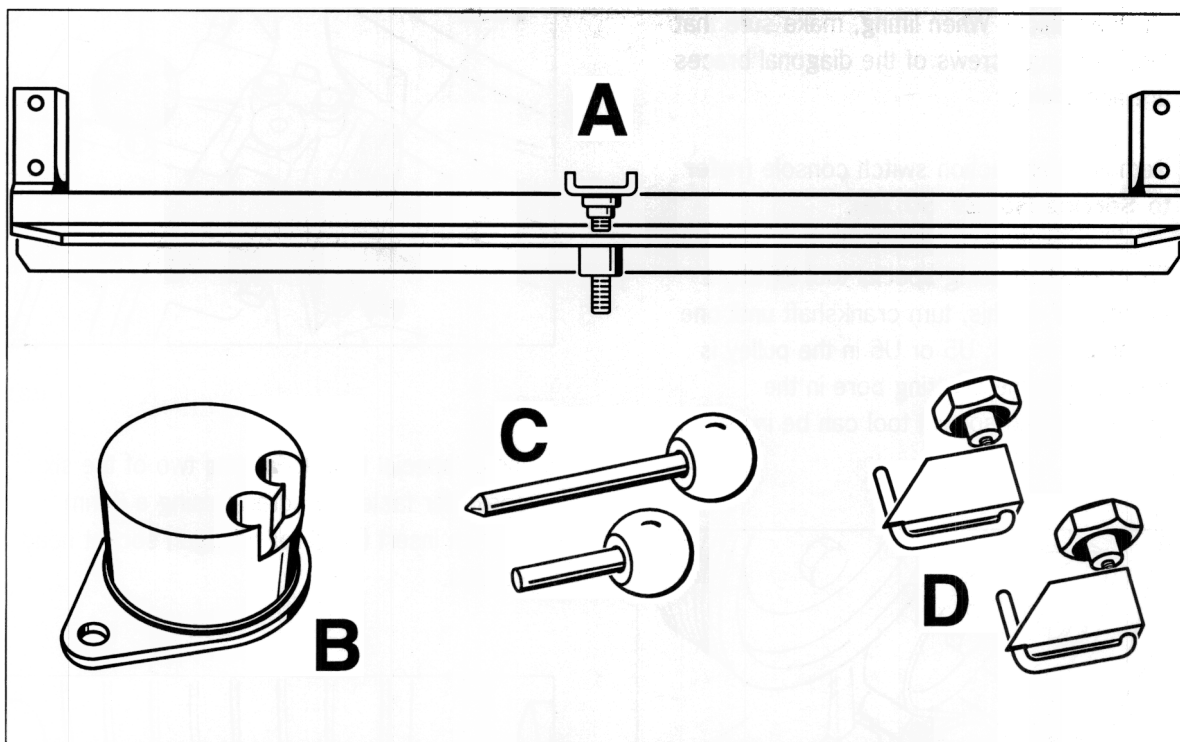
6. Install special tool **9596** and two of the six converter fastening screws using a 6-mm wrench insert (long) for hexagon socket head screws.



305_97

37 35 19 Removing and installing Tiptronic transmission A 96/00

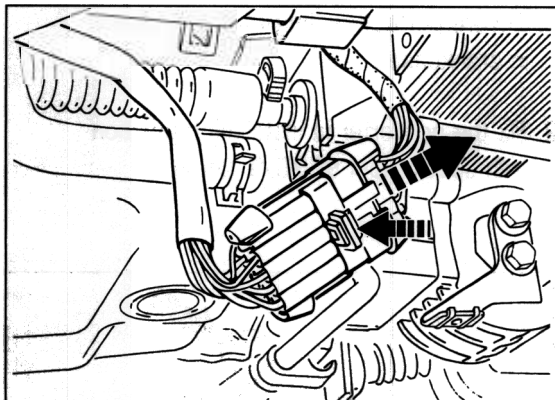
Tools



311_97

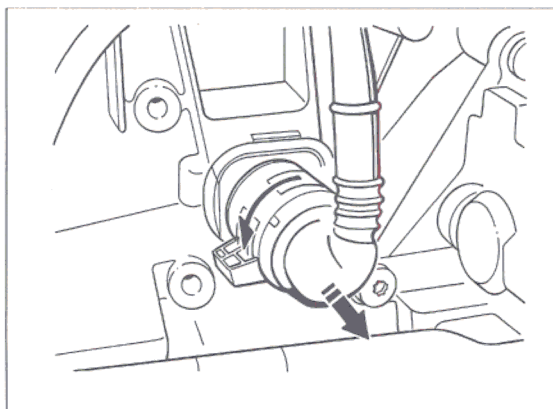
Item	Designation	Special tool	Explanation
A	Retaining device	9624/1	
B	Assembly aid	9596	
C	Fixing pin	9595/1	
D	Hose clamp	3094	

19. Disengage plug connection for multi-function switch and disconnect.



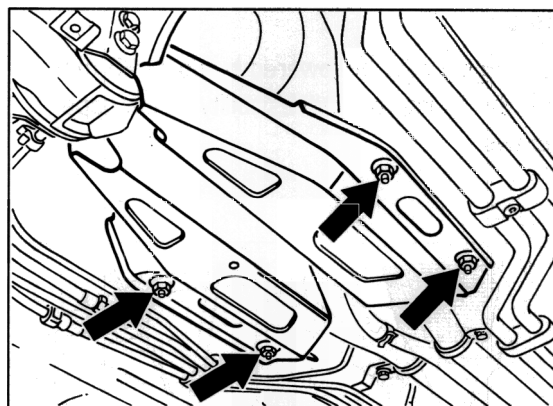
97-260

20. Disconnect plug from transmission socket.
To do this, turn round plug (bayonet lock) counterclockwise and pull it off.

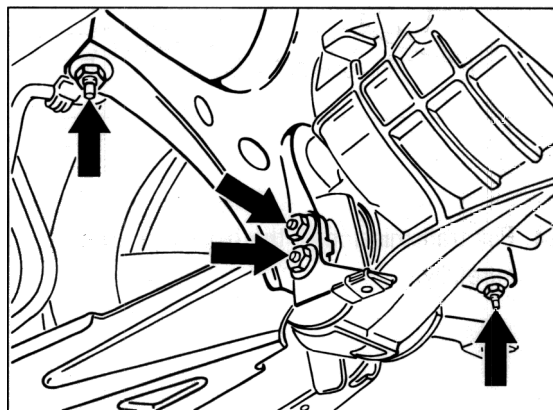


224_97

21. Place transmission jack under the transmission and fasten fixing strap.
22. Remove transmission holder and transmission support.



97-122

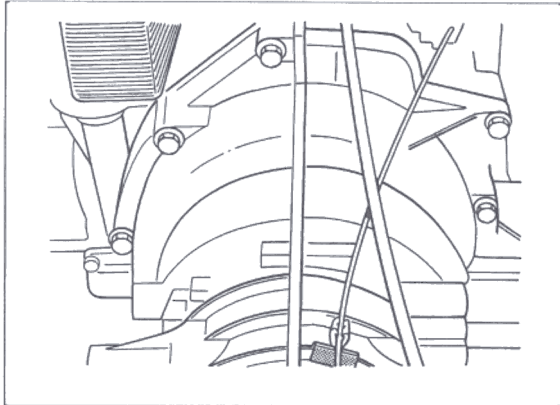


97-123

23. Unscrew transmission/engine fastening screws. To do this, use a long 3/8 inch extension.

Note

The engine may be lowered by up to 25 mm in order to improve accessibility to the upper screws.



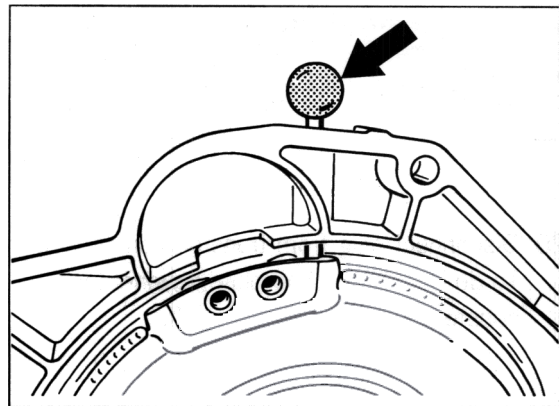
348_97

24. Pull transmission to the front and lower it carefully.

Installation

Installation is performed in reverse order, taking the following points into account.

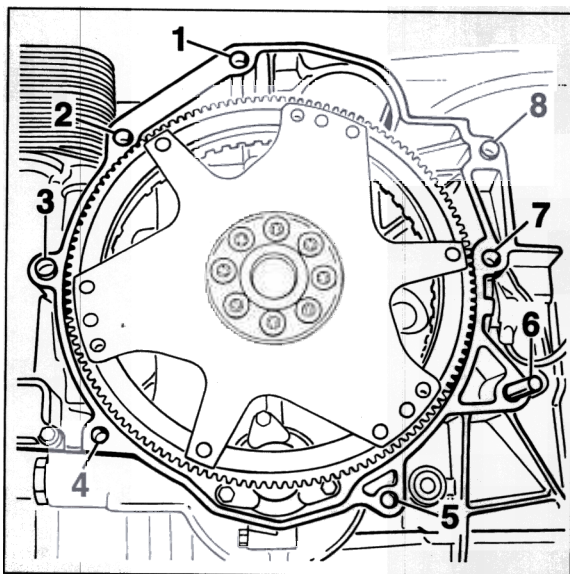
1. Ensure perfect seating of dowel sleeves in crankcase.
2. Fix the converter in installation position with special tool **9595/1** (long).



97-333

3. Grease converter bearing journal with a thin coat of Olista Longtime 3 EP (available as spare part).

4. Carefully move transmission in and fasten to engine.



306_97

No.	Screw/nut	Nm (ftlb.)
1	M12 x 70	85 (63)
2	M12 x 100	85 (63)
3	M12 x 100	85 (63)
4*	M10 x 50	45 (33)
5	M10 x 50	45 (33)
6**	M12	85 (63)
7	M12 x 70	85 (63)
8	M12 x 70	85 (63)

Multiple-tooth nut

*Hexagon nut

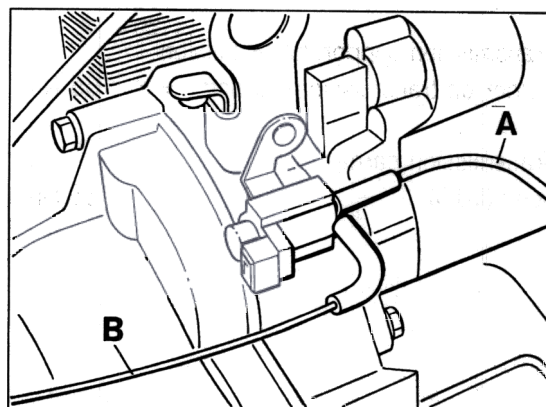
(fastening point omitted as of 5.5.98)

5. Remove fixing pins (special tool **9595/1**).

6. Push vacuum pipe onto switch-over valve.

Note

The two vacuum pipes must not be confused. Otherwise, transmission cooling will be inadequate.



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A – from vacuum reservoir

B – to shut-off valve on transmission

7. Press end piece of selector lever cable onto the transmission lever using a pair of pliers. The end piece must be felt to engage.
8. Check adjustment of selector lever cable (**refer to Service No. 37 15 15**).
9. Check engine coolant level (**refer to Service No. 19 38 17**).

Tightening torques:

Converter on drive
plate (M8) = 39 Nm (29 ftlb.)

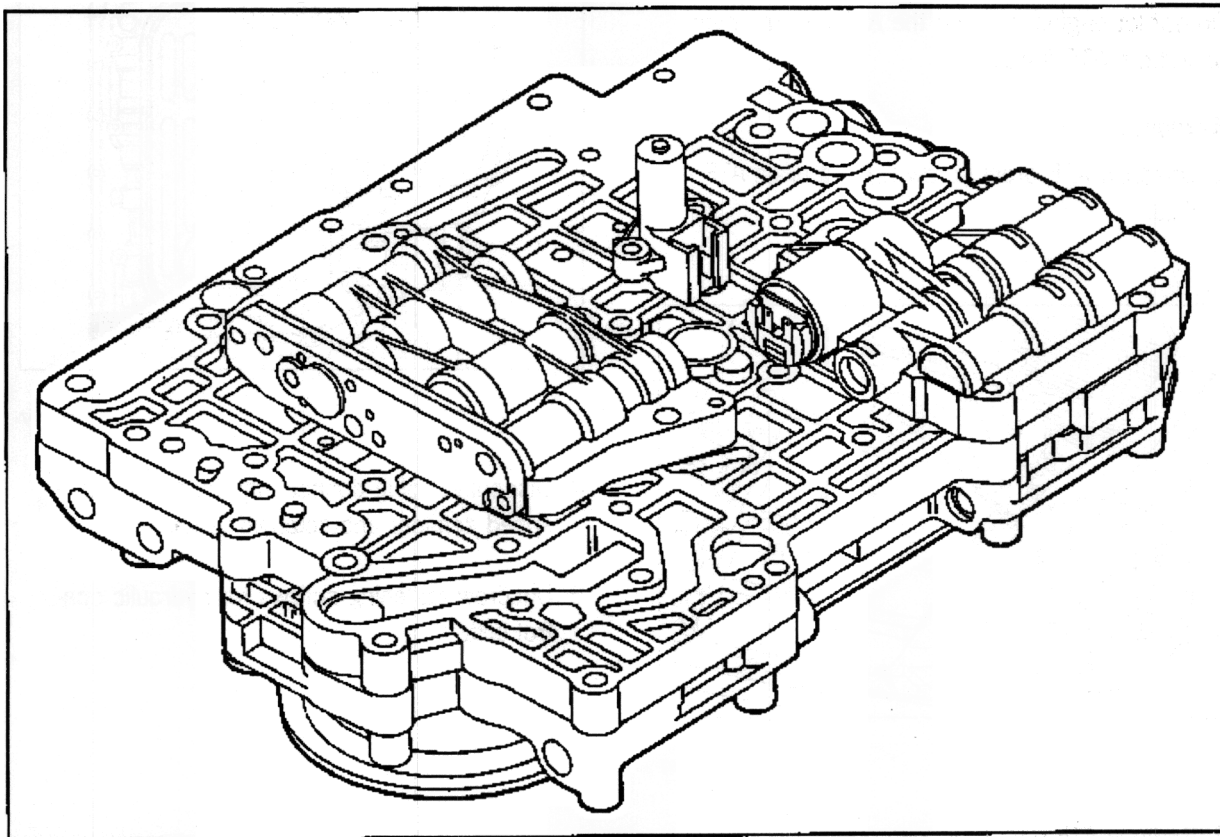
Drive shaft on transmission
flange (M10) = 81 Nm (60 ftlb.)

Transmission support on
body (M10) = 65 Nm (48 ftlb.)

Transmission support/transmission
carrier on transmission bearing = 65 Nm (48 ftlb.)

Transmission carrier on
body (M10) = 65 Nm (48 ftlb.)

38 77 19 Removing and installing hydraulic control unit



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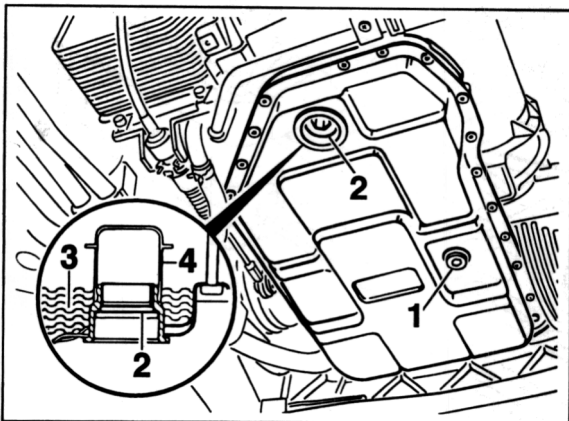
Removing and installing hydraulic control unit

Note

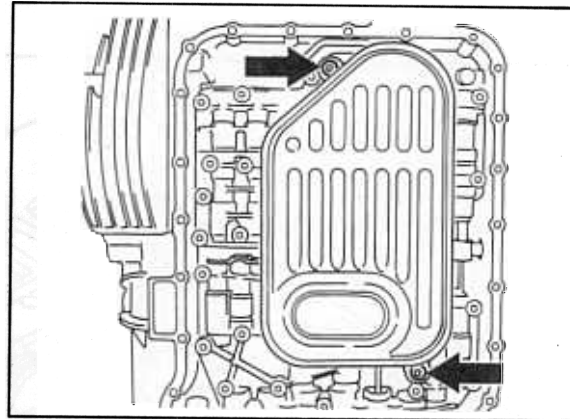
Do not let engine run with the ATF pan removed or without ATF filling.

Removal

1. Unscrew ATF drain screw (1) and drain ATF fluid.



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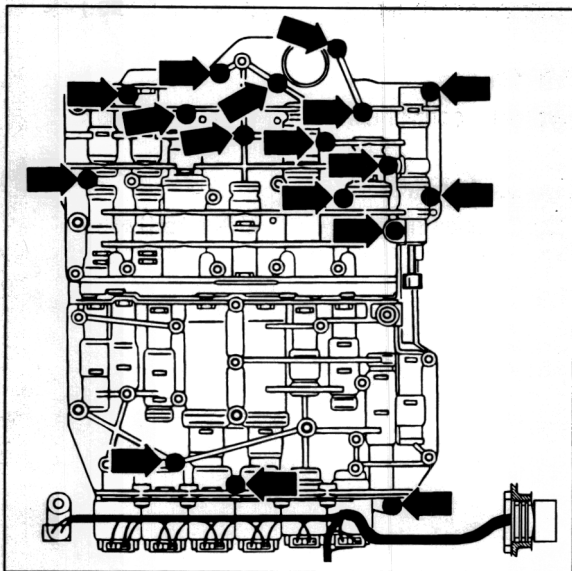
4. Disconnect plug connections for transmission speed sensors and solenoid valves.
5. Unscrew fastening screws for hydraulic control unit.

2. Remove ATF pan. (Loosen screws in diagonally opposite sequence).

3. Remove ATF filter

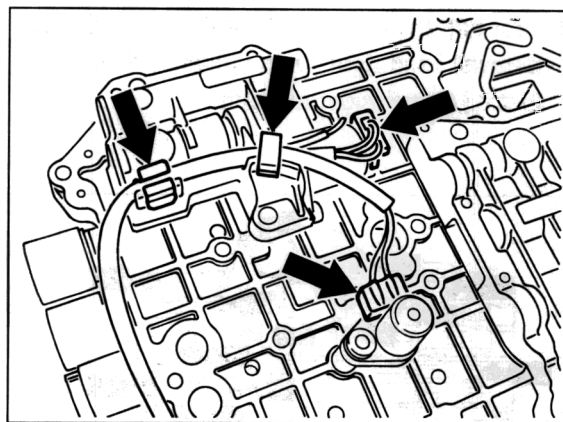
Note

Only the marked screws may be unscrewed.
The function of the hydraulic control unit can be **impaired** if other screws are loosened.



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6. Disconnect plug connections from the pressure regulator and sensor for transmission input speed at the rear of the hydraulic control unit and detach the cables at the housing.



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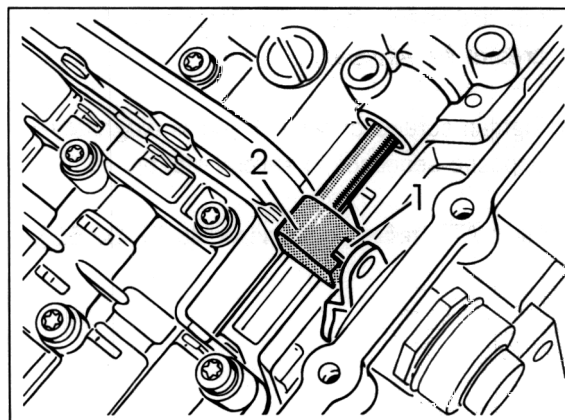
Installation

Install in reverse order, observing the following points:

Note

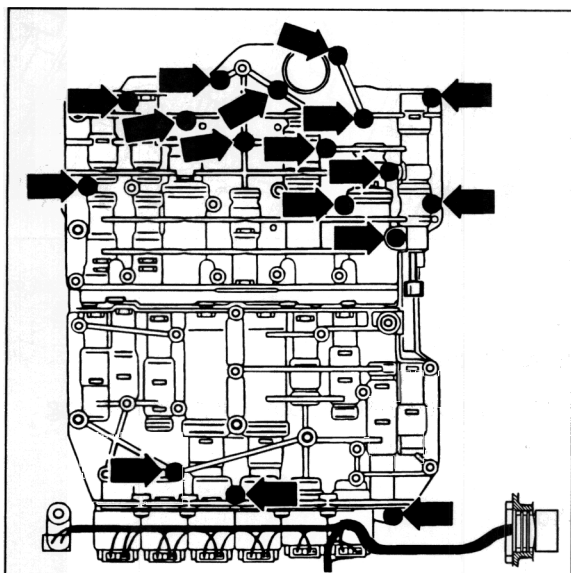
Always pay attention to the allocation when replacing the hydraulic control unit
(refer to the parts catalogue).

1. Carefully put on hydraulic control unit and insert the pin of the detent disc (1) into the groove of the selector valve (2).



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2. First tighten screws for hydraulic control unit (arrows) hand tight. Then tighten to **8 Nm** (6 ftlb.) from inside outwards.



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Tightening torques:

Drain plug on ATF pan	40 Nm (30 ftlb.)
ATF pan on transmission housing	10 Nm (7.5 ftlb.)
ATF filter on hydraulic control unit	6 Nm (4.5 ftlb.)
Hydraulic control unit on transmission housing	8 Nm (6.0 ftlb.)

3. Thinly coat gasket on the suction collar of the ATF filter with Vaseline and install filter.
4. Replace gasket for ATF pan.
5. Clean all four magnets in the beads of the ATF pan and ensure there is contact over the full area of the ATF pan.
6. Tighten screws of the ATF pan in diagonally opposite sequence in several stages.
7. Fill in ATF (refer to Service No 37 02 55).

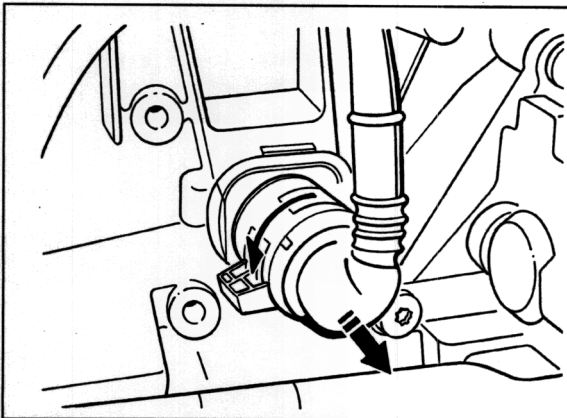
38 18 19 Removing and installing wiring harness

Note

The ATF temperature sensor is integrated in the transmission wiring harness. If damaged, the complete transmission wiring harness must be replaced.

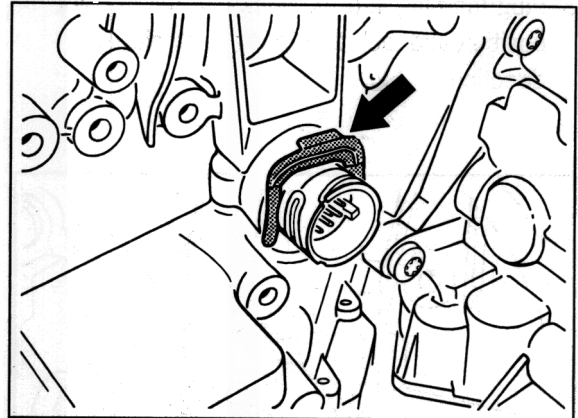
Removal

1. Disconnect plug for transmission socket. To do this, turn plug anticlockwise and pull off.



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2. Remove retaining clip.

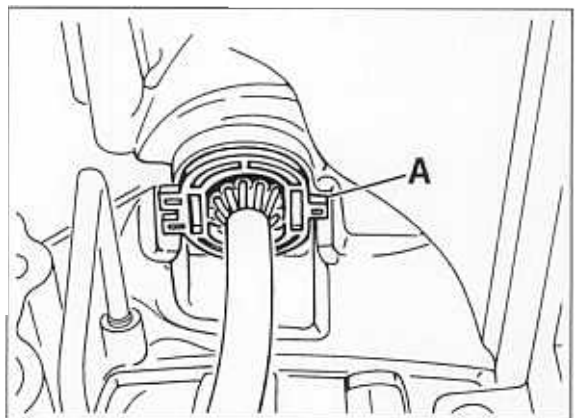


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3. Remove hydraulic control unit (see Page 38 - A1) and remove with wiring harness.

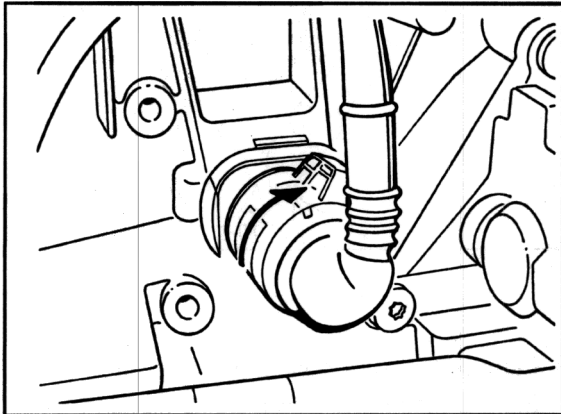
Installation

1. Replace sealing rings for socket, coat thinly with Vaseline and insert wiring harness socket in correct position. Lug "A" must point towards the spur gear.



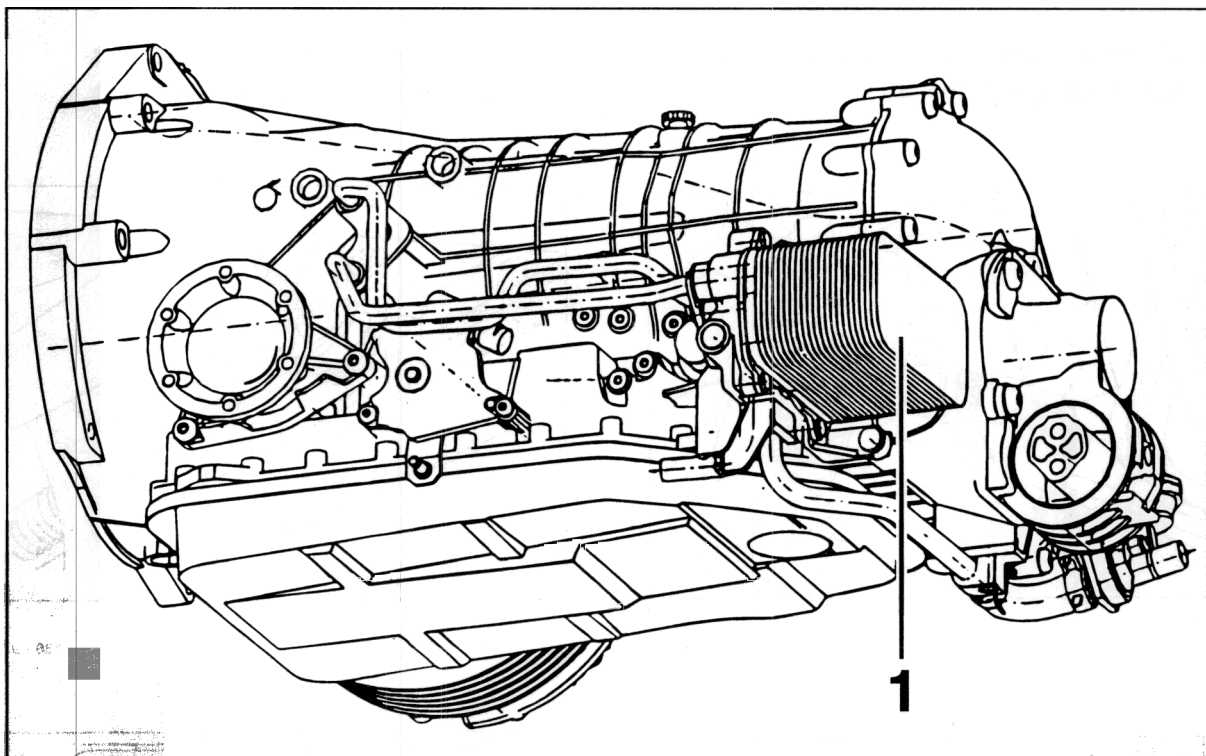
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2. Fit the retaining clip.
3. Plug the plug into the socket in the correct position and lock by turning in clockwise direction.



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38 60 19 Removing and installing ATF cooler



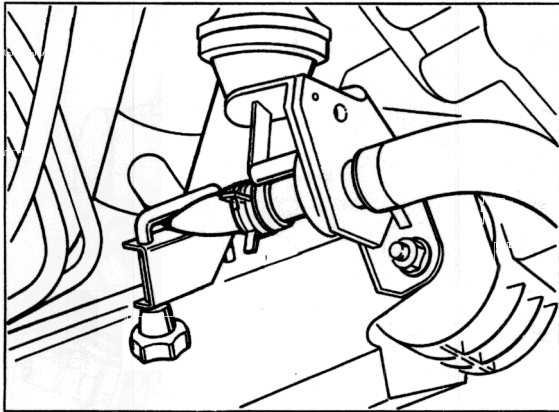
1 – ATF cooler

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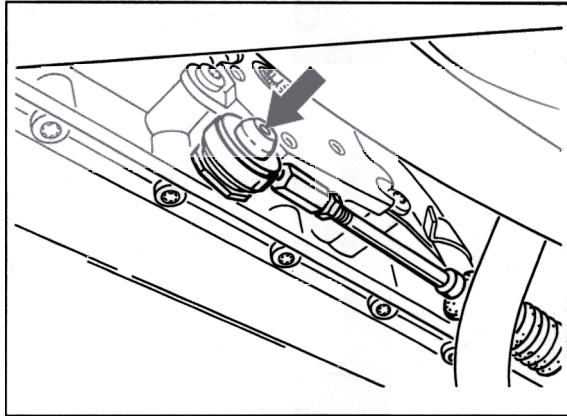
38 60 19 Removing and installing ATF cooler

Removal

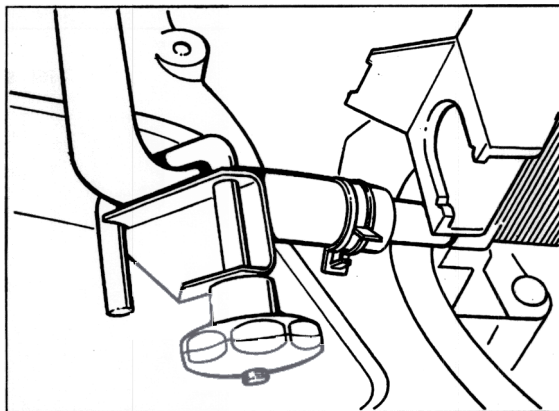
1. Clamp shut coolant hoses (flow and return sides) with special tool **3094**.
2. Detach selector lever cable at the transmission lever and at the cooler bracket.



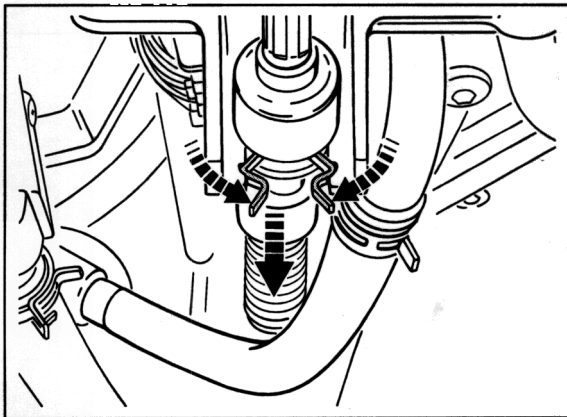
292 - 97



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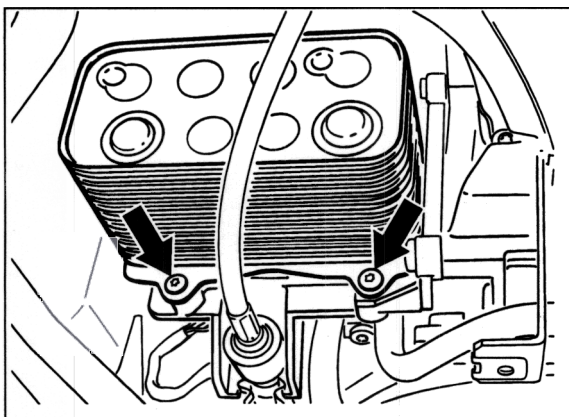


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3. Place oil collection pan under the transmission.
4. Unscrew fastening screws (4 ea.) for ATF cooler with a Torx T30 screwdriver. Use 1/4" tools to facilitate assembly.



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Installation

1. Replace toroidal sealing rings.
2. Check coolant level (see Repair Group 19).

Tightening torques:

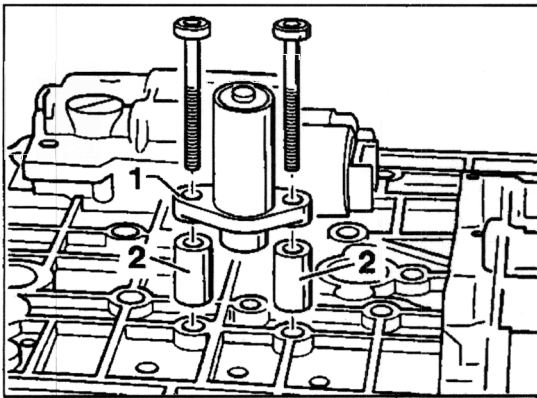
ATF cooler to port
plate (M6) = 10 Nm (7.5 ftlb.)

38 17 19 Removing and installing sensor for transmission input speed**Note**

Do not reuse speed sensors that have been dropped (permanent magnet breaks).

Removal

1. Remove hydraulic control unit (see Page 38 - A1).
2. Remove sensor.



- 1 = Sensor
2 = Spacer sleeves (height 20 mm)

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Installation

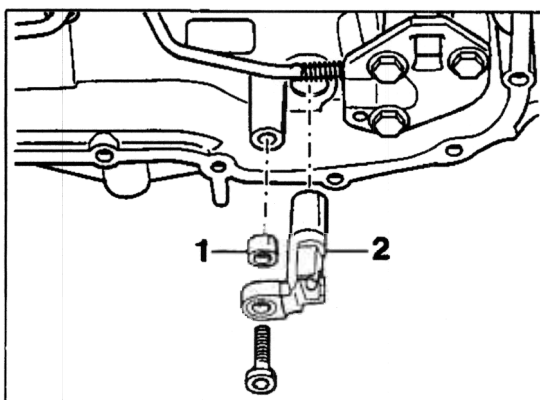
1. Using the two spacer sleeves, install sensor and tighten fastening screws to **6 Nm** (4 ftlb.).

38 17 19 Removing and installing sensor for transmission speed**Note**

Do not reuse speed sensors that have been dropped (permanent magnet breaks).

Removal

1. Remove ATF pan.
2. Remove sensor.



1 = Spacer sleeve (height 8 mm)
2 = Sensor

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Installation

1. Using the spacer sleeve, install sensor and tighten fastening screw to **6 Nm** (4 ftlb.).

39 90 55 Changing transmission oil in final drive

Filling capacity: 0.9 l

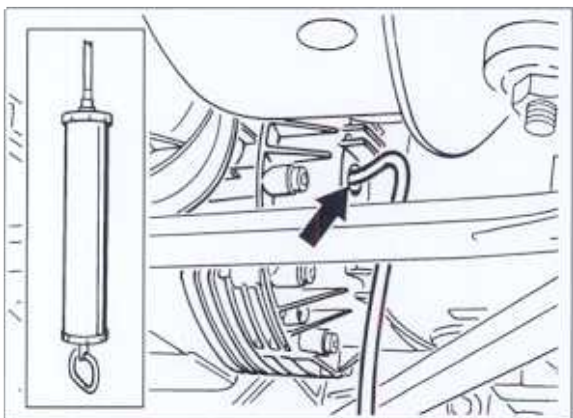
Note

Use only oils approved by Porsche. See Parts Catalogue.

Note

There is no oil drain plug on the final drive.

1. Unscrew the oil filler plug and remove oil by suction using a suitable hand pump while the transmission is warm from operation.



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2. Fill with **0.9 l** transmission oil using special tool **V.A.G 1924**.

Note

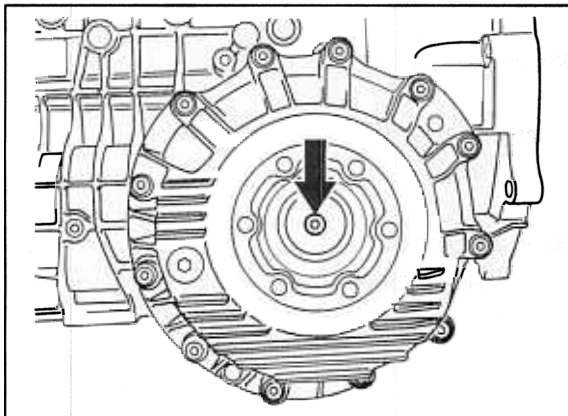
Filling must be carried out **very** slowly because there is a baffle plate in the cover of the final drive.

3. Replace sealing ring for oil filler plug and tighten to **30 Nm** (22 ftlb.).

39 09 19 Removing and installing differential

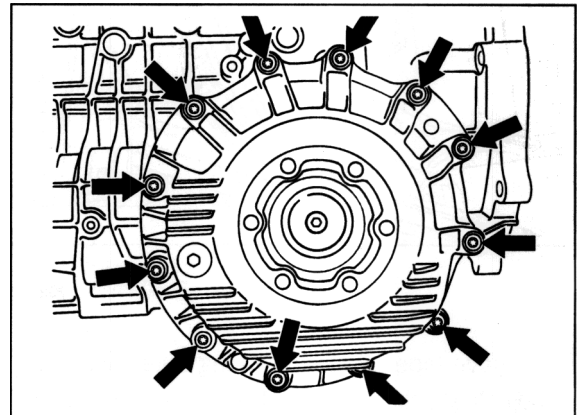
Removal

1. Remove left rear wheel.
2. Remove diagonal braces and rear axle carrier.
3. Uncouple left drive shaft on the transmission side.
4. Remove left connecting rod for stabilizer.
5. Place oil collection pan under the transmission.
6. Unscrew fastening screw for flanged shaft and pull out flange.



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7. Unscrew fastening screws for cover and remove cover.



231/1 - 97

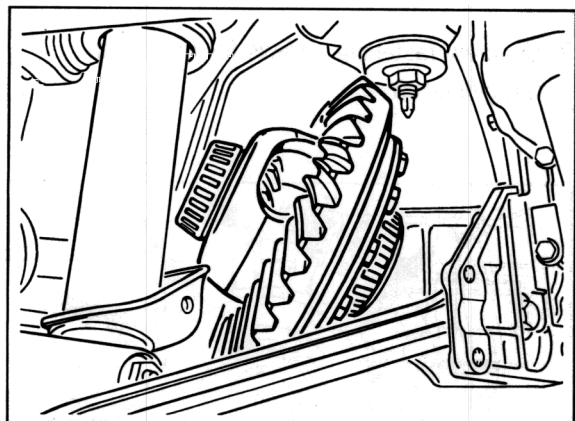
Note

Do not lose the tapered roller bearing outer ring and adjusting shim.

The adjusting shim is calibrated and cannot be replaced by another shim.



8. Remove differential.



232 - 97

9. Remove tapered roller bearing outer ring and adjusting shim from the transmission housing.

Note

The adjusting shim is calibrated and cannot be replaced by another shim.

Installation

1. Fit new toroidal sealing ring untwisted and coat with transmission oil.
2. Fit cover and tighten in diagonally opposite sequence in several stages.
3. Add transmission oil for final drive (see Page 39 - A1).

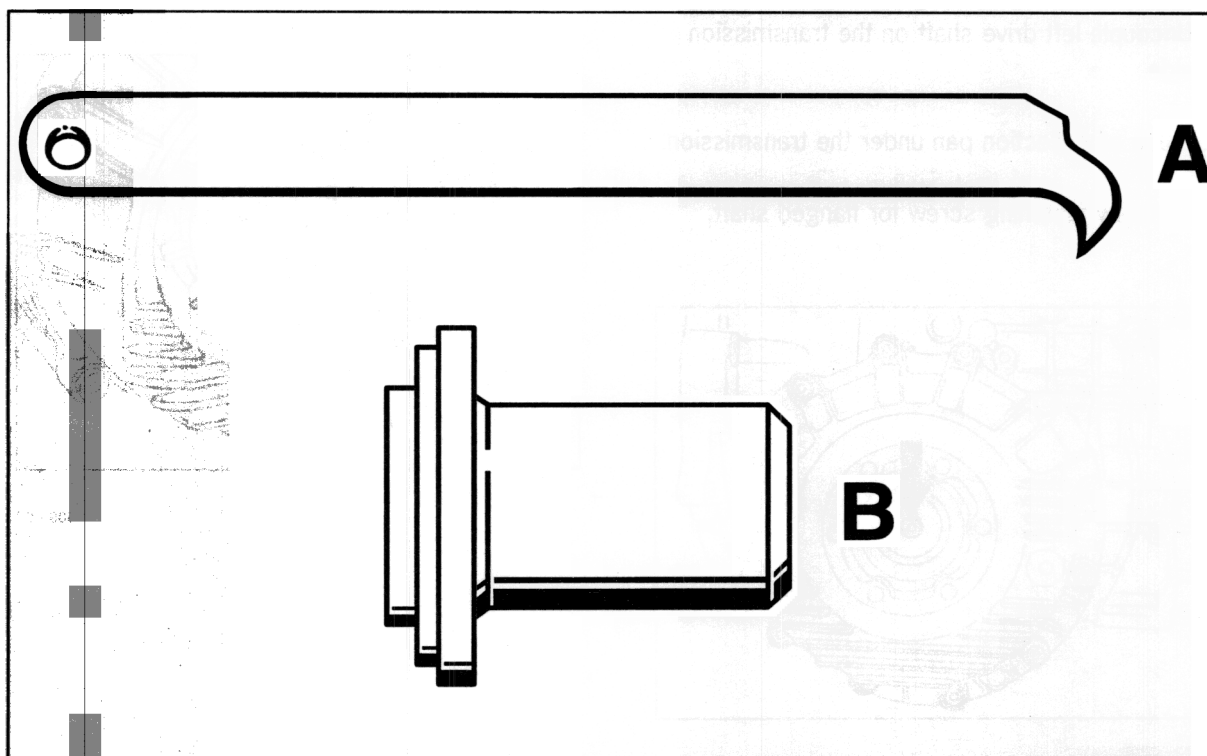
Tightening torques:

Diagonal braces to body (M10)	=	65 Nm (48 ftlb.)
Diagonal braces to cross member (M12)	=	100 Nm (74 ftlb.)
Diagonal braces carrier side member (nut)	=	23 Nm (17 ftlb.)
Short flanged shaft to transmission (M8)	=	25 Nm (18 ftlb.)
Cover for final drive to transmission (M8)	=	23 Nm (17 ftlb.)
Drive shaft to transmission flange (M10)	=	81 (60 ftlb.)
Wheel to wheel hub	=	130 Nm (96 ftlb.)
Connecting rod to spring strut	=	46 Nm (34 ftlb.)
Rear axle carrier to carrier side member (M12)	=	100 Nm (74 ftlb.)



39 22 19 Removing and installing sealing ring for short flanged shaft

Tool



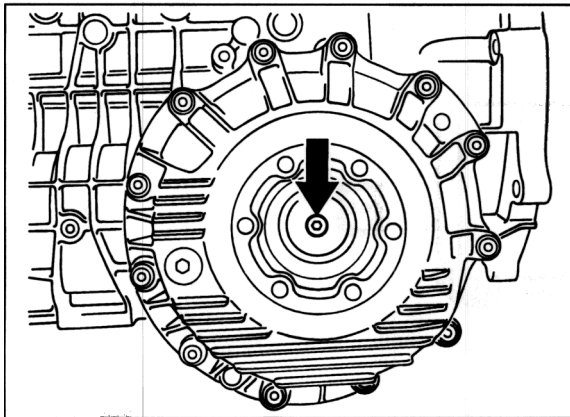
341 - 97

Item	Designation	Special tool	Explanation
A	Hook	VW 681	
B	Pressure piece	3384	

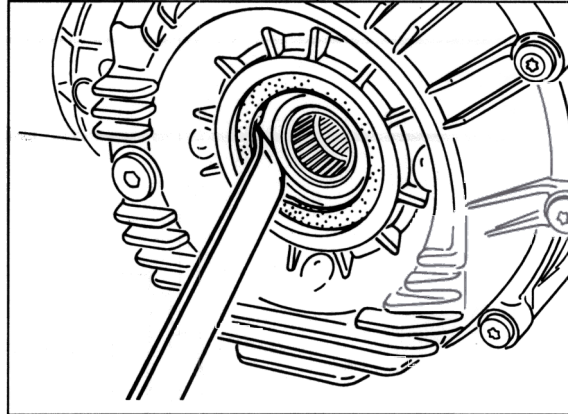
Removing and installing sealing ring for short flanged shaft

Removal

1. Remove left rear wheel.
2. Uncouple left drive shaft on the transmission side.
3. Place oil collection pan under the transmission.
4. Unscrew fastening screw for flanged shaft.
6. Remove sealing ring with special tool **VW 681**.



231 - 97

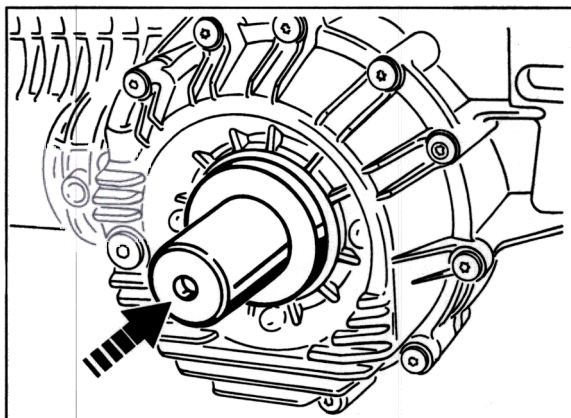


309 - 97

5. Pull out flanged shaft.

Installation

1. Thinly coat sealing lip and outer circumference of sealing ring with Vaseline and insert sealing ring with special tool **3384** up to the stop.



310 - 97

Note

The sealing ring must fit in the housing at the same depth all round.

2. Check the transmission oil in the final drive and top up if necessary (see Page - A1).

39 25 19 Removing and installing long flanged shaft

Removal

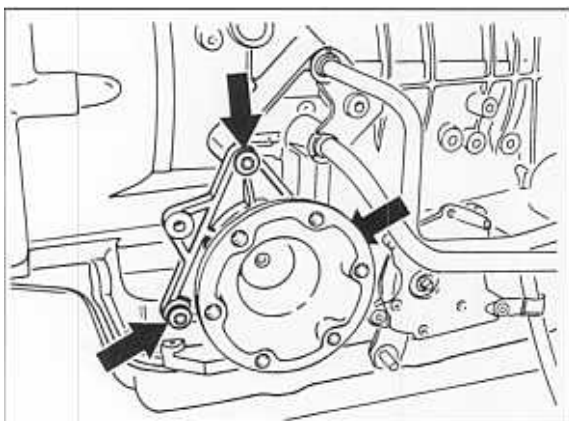
1. Remove right rear wheel.
2. Drain rear-axle oil (see Page 39 - A1).

Note

Suction removal of the oil prevents rear-axle oil entering the ATF.

This would cause malfunctions of the hydraulic transmission control system.

3. Uncouple right drive shaft on the transmission side.
4. Unscrew three fastening screws for the mounting saddle.

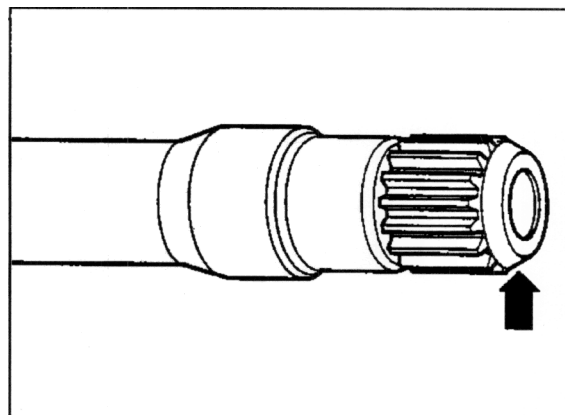


233 - 97

5. Carefully pull out flanged shaft.

Installation

1. Replace square sealing ring in mounting saddle.
2. Check flanged shaft for burrs and sharp edges on the transmission end of the shaft (arrow) and deburr if necessary.



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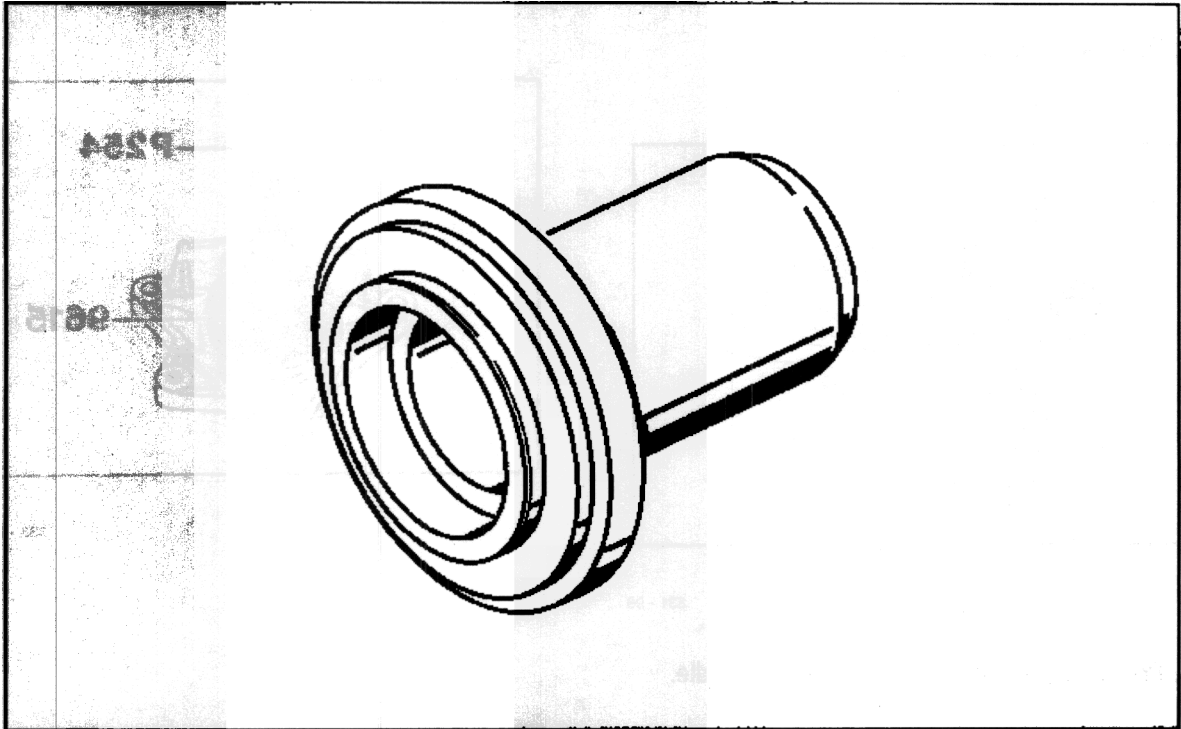
3. Carefully insert flanged shaft into the transmission.

Note

While being inserted, the flanged shaft must be carefully guided with the hand in order to prevent damage to the double sealing ring in the transmission.

4. Refill rear-axle oil.

= 130 Nm (96 ftlb.)

39 22 19 Removing and installing sealing ring for long flanged shaft**Tool**

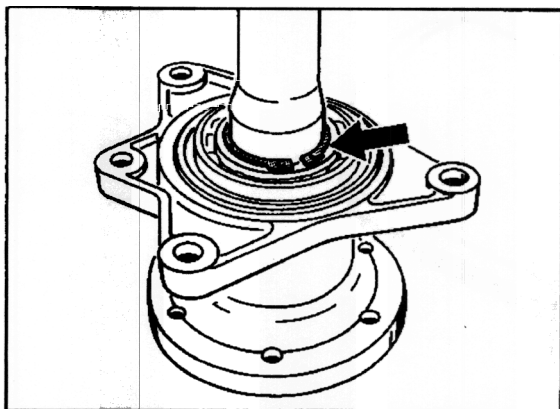
335 - 96

Item	Designation	Special tool	Explanation
A	Pressure piece	9615	
B	Pull-in tool and extractor	P254	

Removing and installing sealing ring for long flanged shaft

Removal

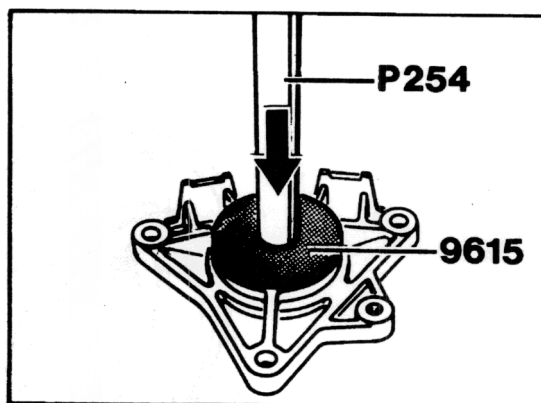
1. Remove long flanged shaft
(see Page 39 - A17).
2. Remove snap ring for ball bearing.



331 - 96

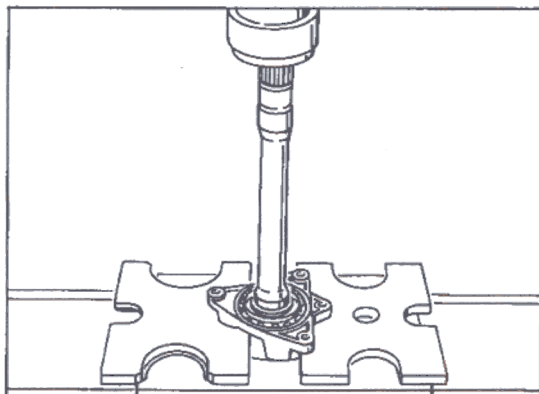
Installation

1. Push new sealing ring up to the stop with special tool **9615**.



333 - 96

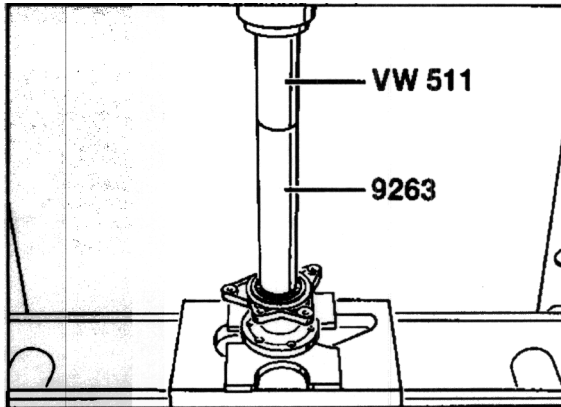
3. Press flanged shaft out of mounting saddle.



332 - 96

4. Lever sealing ring out of mounting saddle with large screwdriver.

2. Press mounting saddle with ball bearing onto flanged shaft.

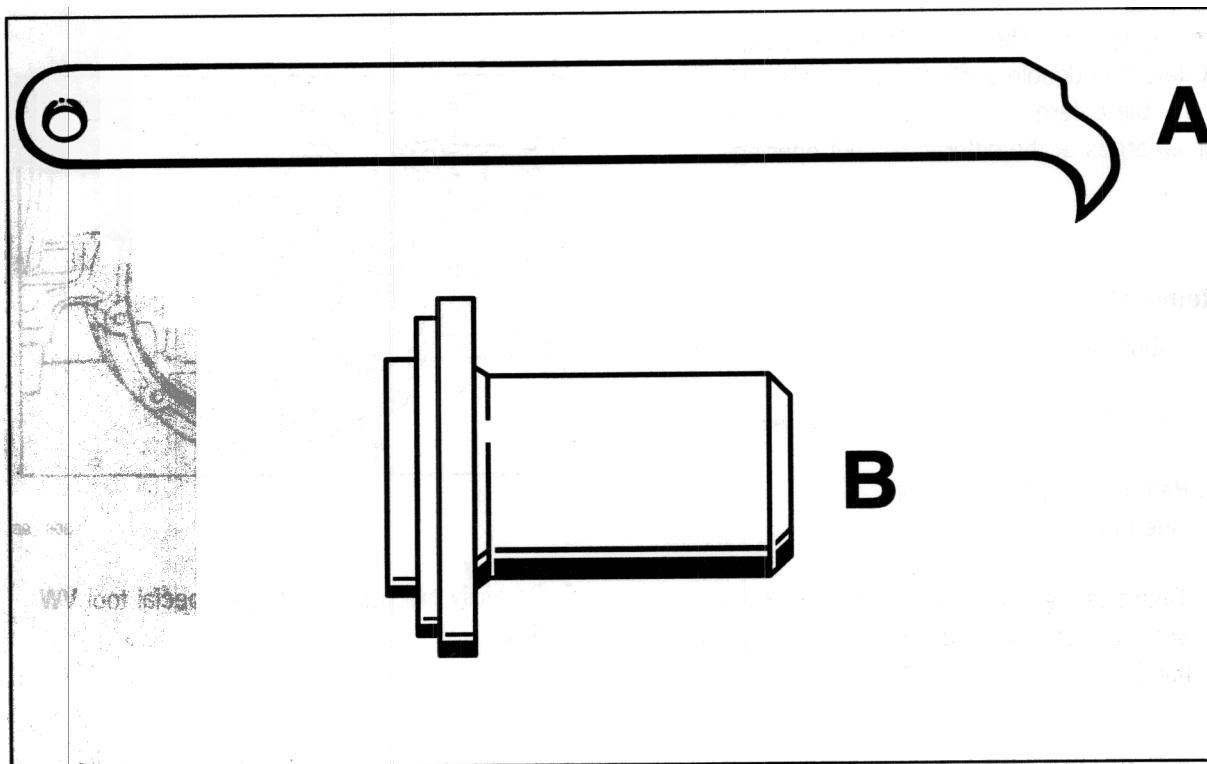


334 - 96

3. Insert snap ring.
4. Install flanged shaft, check the transmission oil in the final drive and top up if necessary (see Page 39 - A1).

39 15 19 Removing and installing final drive/transmission housing double sealing ring

Tool



343 - 97

Item	Designation	Special tool	Explanation
A	Hook	VW 681	
B	Pressure piece	3383	

Removing and installing final drive/transmission housing double sealing ring

Note

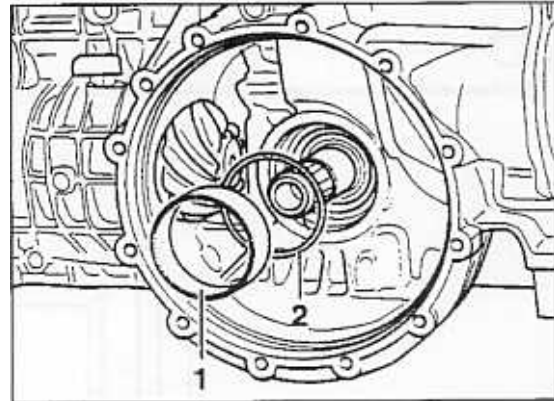
A defective double sealing ring allows ATF or transmission oil to escape via the middle vent opening of the shaft seal (between the two sealing lips) into the converter bell housing. A defective double sealing ring can also let ATF enter the differential. The latter is overfilled, and oil emerges at the differential vent opening.

Removal

1. Unbolt rear wheels.
2. Remove differential (see Page 39 - A3).
3. Remove long flanged shaft (see Page 39 - A9).
4. Take bearing outer race (1) and adjusting shim (2) out of the transmission housing by hand.

Note

The adjusting shim is calibrated and cannot be exchanged for a different shim.

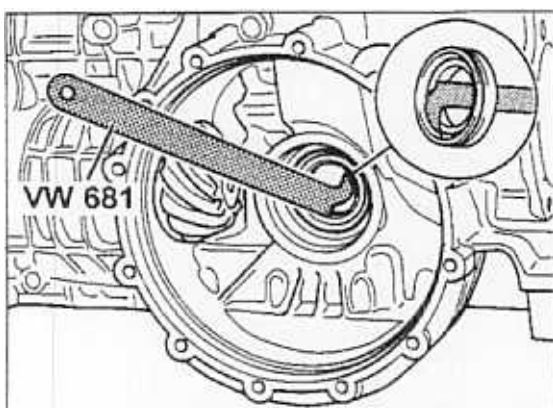


306 - 96

5. Carefully pull out gasket with special tool **VW 681**.

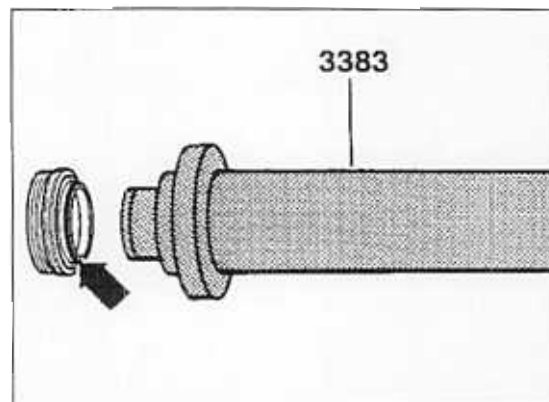
Note

Special tool **VW 681** must be applied behind the two sealing lips of the sealing ring. Do not apply to the outer circumference of the sealing ring, since otherwise the contact area in the transmission housing will be damaged. While levering it out, guide lever carefully.



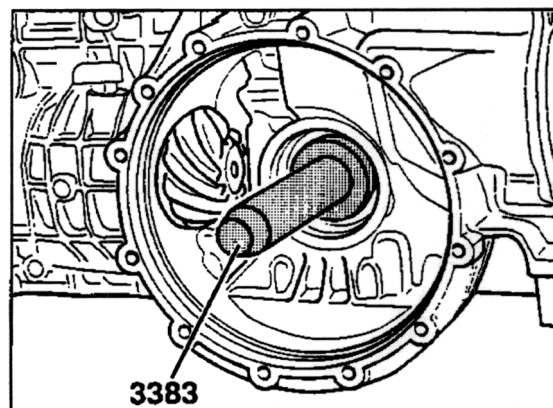
307 - 96

3. Push sealing ring onto the special tool so that the projecting sealing lip (arrow) faces the special tool.



308 - 96

4. Drive sealing ring in to the stop with special tool **3383**.



309 - 96

Installation

1. Check seat of sealing ring in transmission housing for damage.
2. Thinly coat outer circumference and sealing lip of sealing ring with Vaseline.

Technical Manual

911 Carrera 4 (996)

Repair

Group 3

Automatic transmission

3 Automatic transmission

3 Transmission

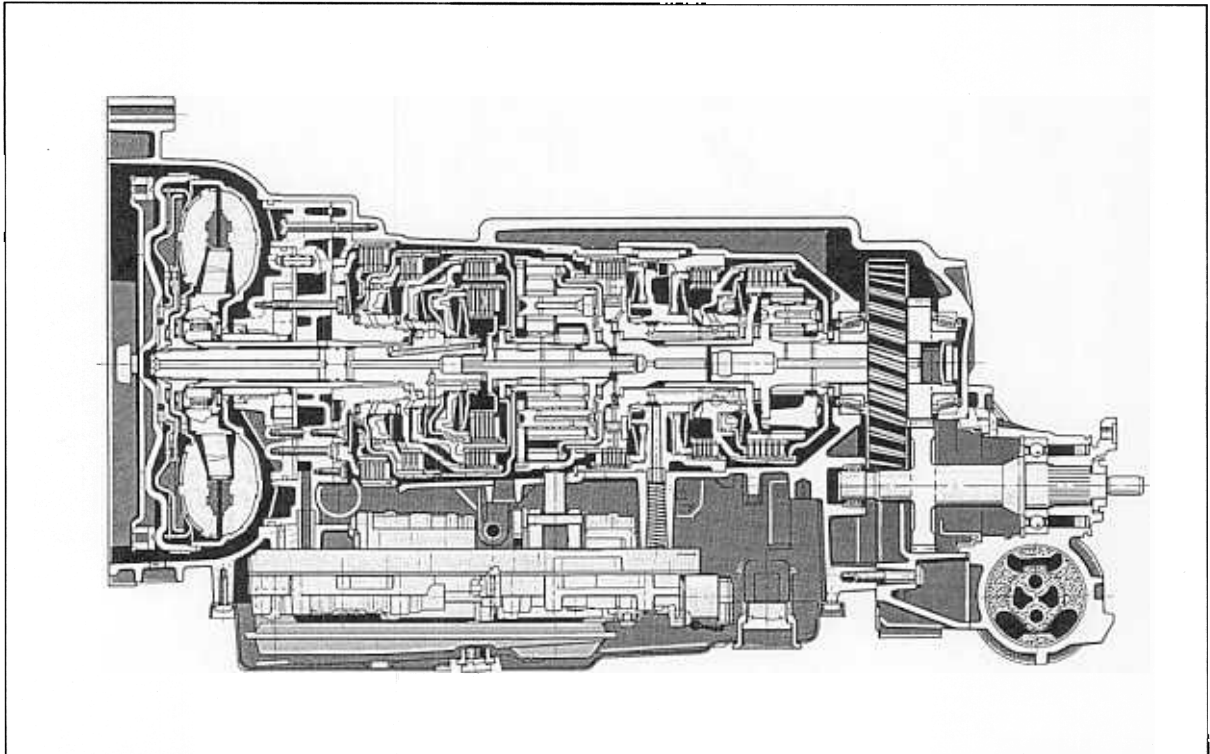
3 Technical data 3 - A201

39 Final drive – Differential, differential lock

39 82 19 Removing and installing sealing ring for cardan flange 39 - A209

3 Technical data (Tiptronic transmission A96/30)

5-speed Tiptronic transmission A96/30



302_98

Type	Code letter	Equipment	Installed in	Model year
A96/30		5-speed	911 Carrera 4 (1996)	1999

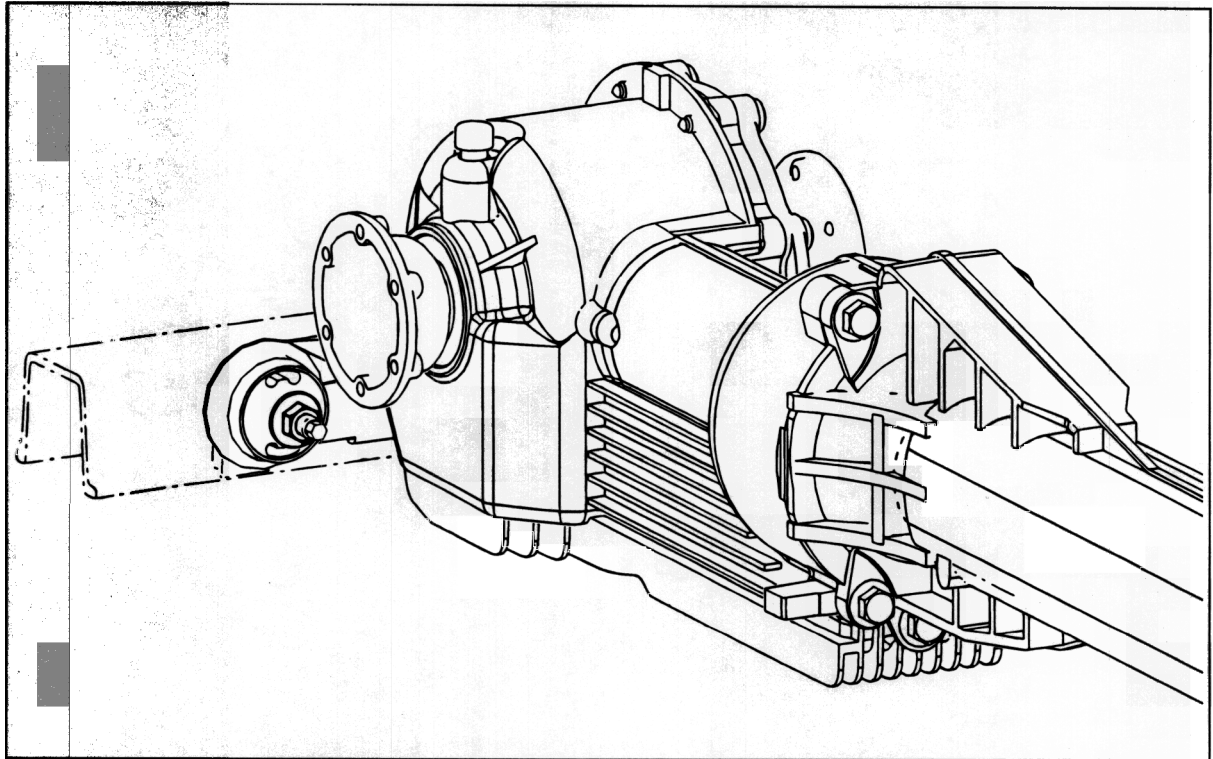
Technical data (Tiptronic transmission A96/30)

General data	Transmission A96/30
Type	Fully automatic 5-speed planetary gear set (Tiptronic/four-wheel drive)
Transmission ratio	
Spur gear	1.03
1st gear	3.67
2nd gear	2.00
3rd gear	1.41
4th gear	1.00
5th gear	0.74
Reverse gear	4.10
Final drive	Bevel gear drive
Final drive ratio	19 : 32 i = 3.555
Stall speed	2300 ... 2700
Filling capacity rear wheel drive	0.9 l
Automatic section: New filling (with converter)	approx. 9.5 l
Change quantity	approx. 4.0 l

Technical data (Tiptronic transmission A96/30)**Tightening torques for Tiptronic transmission A96/30**

Location	Thread	Tightening torque Nm (ftlb.)
ATF filler screw to ATF pan	M30	80 (59)
ATF drain plug to ATF pan	M16	40 (29)
ATF pan to transmission housing	M6	10 (7.5)
ATF filter to hydraulic control unit	M5	6 (4.5)
Hydraulic control unit to transmission housing	M6	8 (6)
Sensor for transmission input speed to hydraulic control unit	M6	6 (4.5)
Solenoid valves to hydraulic control unit	M5	6 (4.5)
Sensor for transmission speed to transmission housing	M6	6 (4.5)
Multi-function switch to transmission housing	M6	8 (6)
Short flanged shaft to differential	M8	25 (18)
Cover for final drive on transmission housing	M8	23 (17)
Plug to cover for final drive	M18	30 (22)
Mounting saddle for long flanged shaft to transmission housing	M8	23 (17)

Location	Thread	Tightening torque Nm (ftlb.)
Housing for spur gear to transmission housing	M8	23 (17)
Converter to drive plate	M8	39 (29)
Cardan flange to transmission	M20	100 (74)

3 Technical data (Tiptronic transmission A96/30)**Final drive Z96/00**

278_98

Type	Code letter	Equipment	Installed in	Model year
Z96/00			911 Carrera 4 (996) world-wide	1999

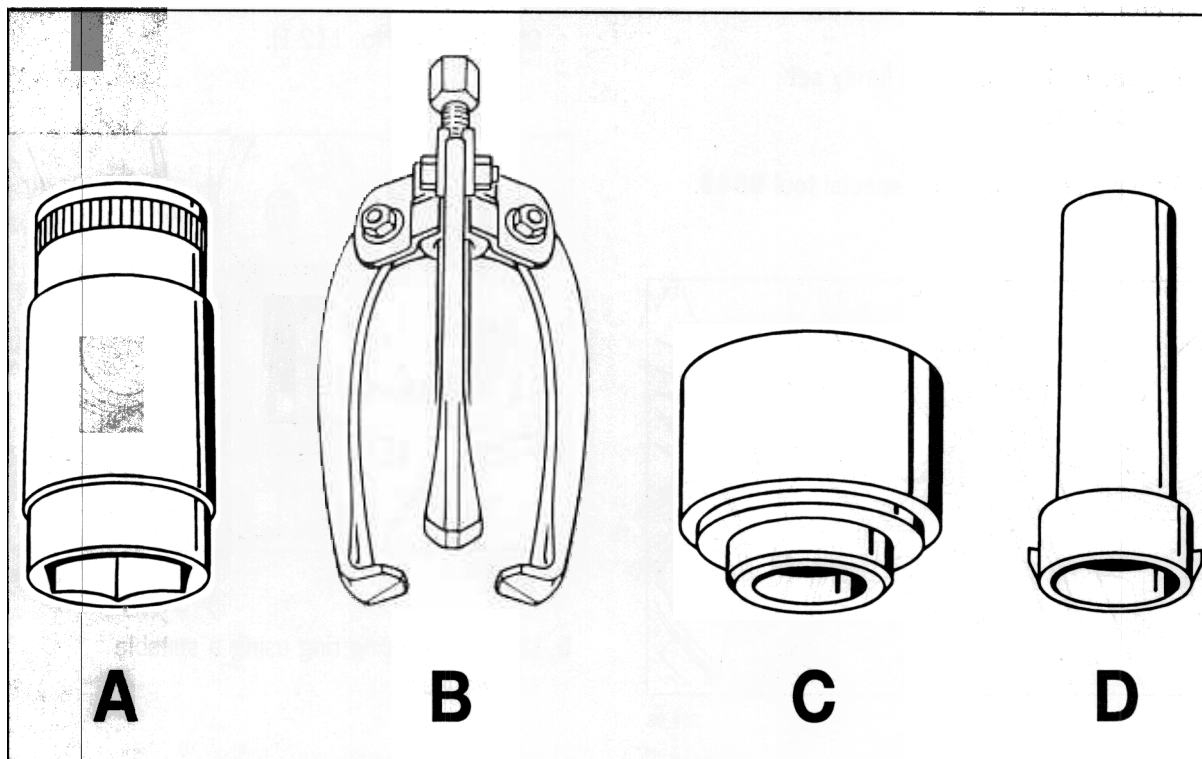
General data	Front-axle final drive Z96/00
Transmission ratio, final drives ($Z_2 : Z_1 = i$)	$31 : 9 = 3.444$
Final drive	Bevel gear drive without hypoid offset
Capacity	approx. 1.5

Technical data (Tiptronic transmission A96/30)**Tightening torques, final drive Z96/00**

Location	Thread	Tightening torque Nm (ftlb.)
Screw plug, oil drainage and oil filling	M18	28 (21)
Lid on final drive	M8	25 (19)
Long-neck tube on final drive	M8	25 (19)
Drive shaft on final drive	M8	39 (29)
Rear transmission support on transmission mount	M10 x 90	65 (48)
Rear transmission support on body	M10	65 (48)
Front transmission support on front-axle cross member	M10	65 (48)
Stud on front-axle cross member	M8	20 (15)
Front transmission support on final drive	M10	65 (48)

39 82 19 Removing and installing sealing ring for cardan flange

Tools



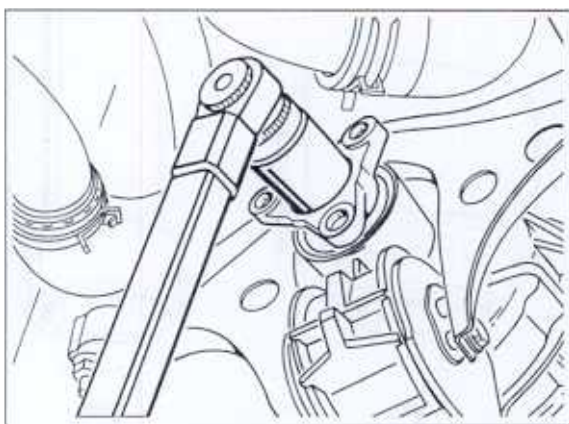
446_98

Item	Designation	Special tool	Explanation
A	Socket wrench insert	9643	
B	Three-arm puller		Commercially available (refer to Technical Equipment Manual, Chapter 2.4, No. 112-1)
C	Pressure piece	9641	
D	Caulker	9640	

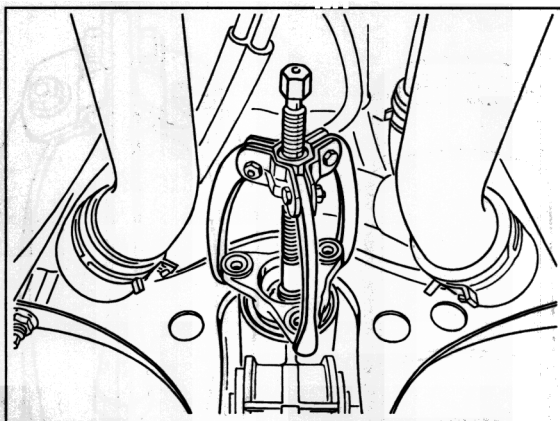
Removing and installing sealing ring for cardan flange

Removal

1. Remove cardan shaft
(refer to Serv. No. 39 02 19).
2. Engage parking lock and firmly set the hand brake.
3. Remove collar nut using special tool **9643**.
4. Pull off the cardan flange with a three-arm puller (refer to Workshop Equipment Manual, Chapter 2.4, No. 112-1).



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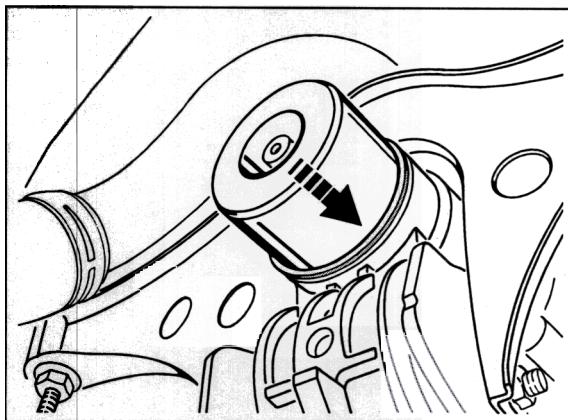


265_98

5. Lever out sealing ring using a suitable screwdriver.

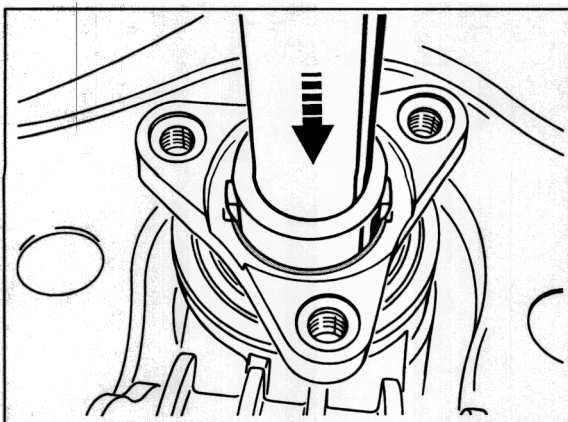
Installation

1. Drive in sealing ring with special tool **9641** as far as the mounting face.



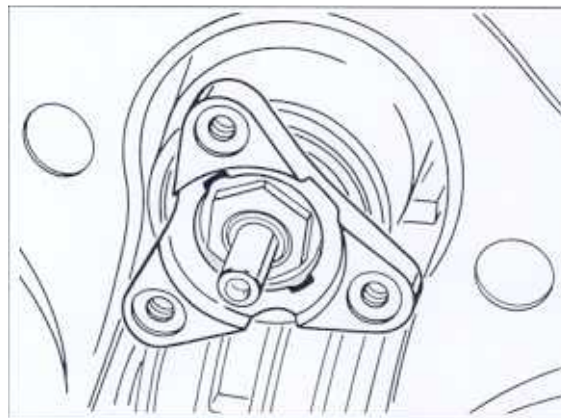
438_98

2. Push cardan flange onto the splines of the transmission shaft and tighten the collar nut to **100 Nm (74 ftlb.)**.
3. Push the tab washer over the hexagon of the collar nut and caulk in the correct position using special tool **9640**.



440_984

4. Ensure that the tab washer is perfectly secure.



Note

Cardan flanges **without** tab washers have also been installed. In this version, the collar nut is secured against turning using fluid screw locking lacquer.

During repair work, it is essential to degrease the thread with cleaning agent (e.g. Loctite quick cleaner), wet the thread with "**Loctite 243**" and tighten the collar nut to **100 Nm (74 ftlb.)**.

5. Install cardan shaft.