VOLVO

Service Manual

Fault tracing **Design**

Repair **Function**

Maintenance

Section 1 (17)

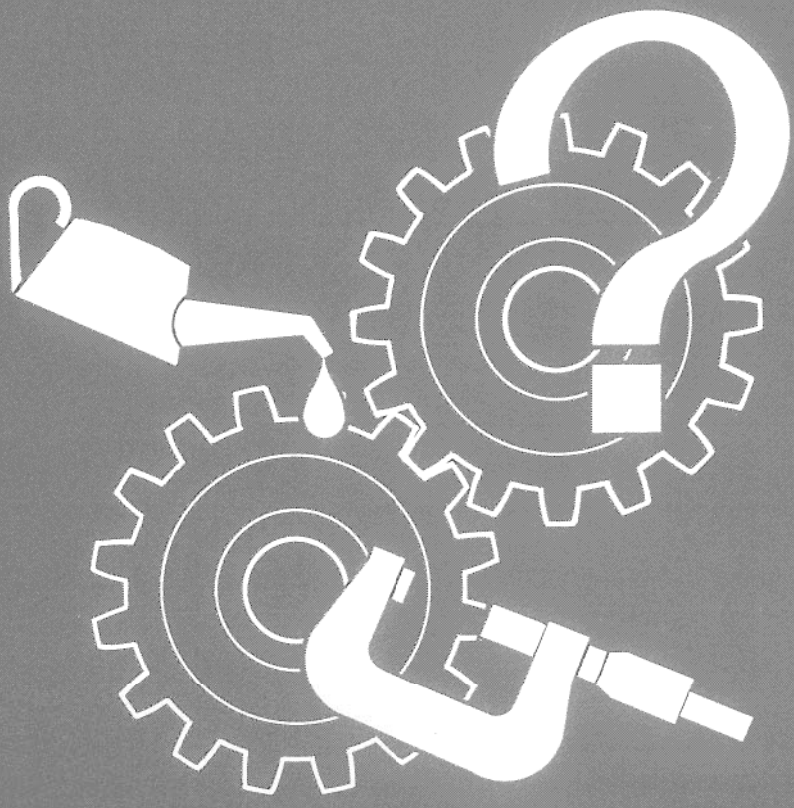
Volvo
Service programme

240, 400
700/900, 850

1991–1995

TP 1702032

BOOK 2



Volvo Car Corporation

Contents

Changes made up to and including May 1994
Any changes made after this date are not included here. Refer if necessary to the service bulletins.

Volvos are sold in versions adapted for different markets. These adaptations may depend on many factors including legal, taxation and market requirements.

This manual may therefore show illustrations and text which do not apply to cars in your country.

Order no.: **TP 1702032**
This book replaces:
Section 1(17) Volvo Service programme, book 2, 1991-93, TP number 31939/2

VOLVO
Volvo Car Corporation
Göteborg, Sweden

Service Bulletin Cars

940/960/S90/V90 1992-

SECTION	GROUP	NO.	YEAR	MONTH
2	23	0016	1997	12

Affected cars: SRS

Replacing fuel filter, additional instruction

Background: To avoid affecting the car electrical system when replacing fuel filter, the warning text below is supplied.

Instruction: This Service Bulletin applies to **Service Manual. Section 1 (17). Fault-tracing, repair, maintenance. 240, 400, 700/900, 850. 1991-1995. TP 1702032.**

The label should be stuck in at the beginning of the section **B11 - Fuel filter**.

Then this Service Bulletin should be discarded.

Warning ! Ensure that the ignition key is not in the ignition switch when replacing the fuel filter.

Service personnel: Please circulate, read and initial

Service Manager	Parts Manager	Workshop Manager		Workshop Foreman		Service Technicians						

EN

VOLVO

900

Service Bulletin

Fault tracing

Repairs

Maintenance

SECTION	GROUP	NO.
3	31	901

DATE
December 1996

RE:
Maintaining electrolyte level

940, 960

Page 3 in this Service Bulletin contains a label that should be stuck into the relevant book. After that the page should be removed from the Service Bulletin and discarded.

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

Maintaining electrolyte level

Background: The decal on the top of the cover of Volvo batteries contains the text "maintenance free". This does **not** mean that the battery is completely "maintenance free". The text on the decal indicates that the battery meets DIN standards for that category of battery.

All Volvo batteries must be maintained.

If maintenance is not carried out and the electrolyte level in each cell is lower that 10 mm below the maximum mark for a prolonged period, the bridges between the lead plates may corrode (especially in hot climates) which can cause an open-circuit. This will shorten the battery service life.

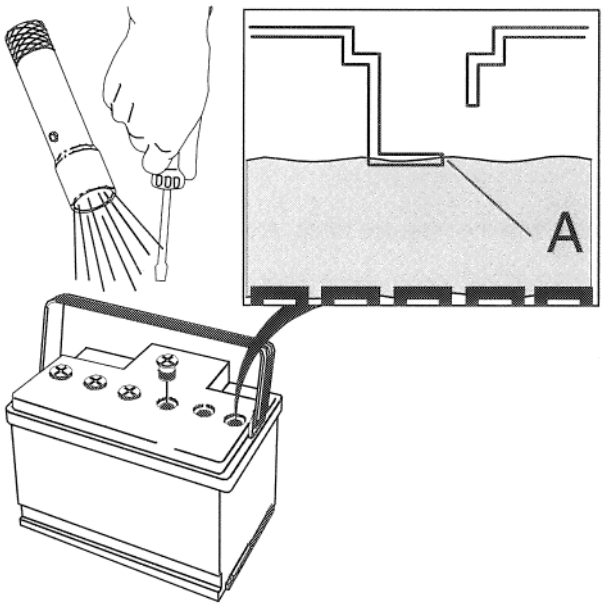
The owners manual maintenance section for model year 1997 has been updated from January 1997. A decal without the text "maintenance free", has been introduced from the following chassis numbers:

Chassis no.:	944	from	240332-
	945	from	202051-
	964	from	113777-
	965	from	042031-

Service personnel: Please circulate, read and initial

Service Manager	Parts Manager	Workshop Manager	Workshop Foreman	Service Technicians

EN



3100057A

Checking electrolyte level

Check the level in the battery at least every six months or after 15,000 Km (ordinary service interval).
Always check the electrolyte level after charging the battery.
Top up to the maximum mark (A) with distilled or deionized water. Each cell has its own maximum mark (A).
Never use tap water.

- Remove battery plugs with a screwdriver.
- Check the level in all the battery cells. Use a flashlight.
- Top up to the maximum mark (A) with distilled or deionized water.

Note! Do not fill above the maximum mark (A).
This may cause the electrolyte to leak.

- Install plugs.
  Never switch gray plugs (with a gas release filter) with black sealed plugs.
- Tighten plugs thoroughly.

Warning!

Remember that the battery contains **oxyhydrogen** which is **very explosive**.
A naked flame of smoking near the battery can cause it to explode causing personal injury and damage to the car.

The battery also contains **sulfuric acid**, which can cause **serious corrosive damage**.
If electrolyte comes into contact with your eyes, skin or clothes, flush with large quantities of water. If the acid has splashed into your eyes contact a doctor immediately.

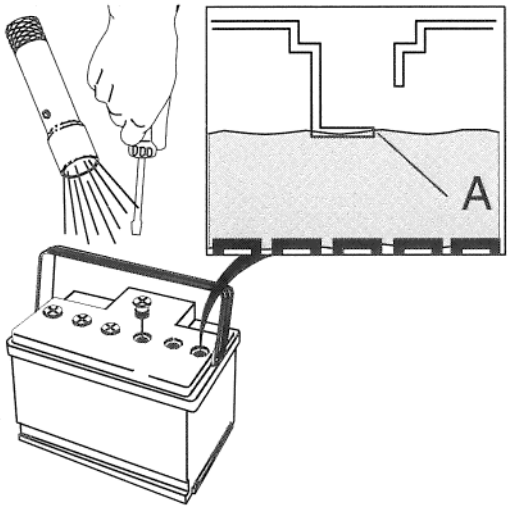
VST	Operation No.	Description	Defect code
	31111-3	Checking and adjusting battery electrolyte level	10, 27, 43,50

Stick this label so that it covers section "D7 - Battery" at the bottom of the Manual:
Volvo service programme 1991-1996, 240, 400, 700/900, 850. TP1702032.
Do not cover the page number!

D7 - Battery

Checking electrolyte level/battery mounting

All



3100057A

- Remove battery plugs with a screwdriver.
- Check the level (A) in all the battery cells. Use a flashlight.
- Top up to the maximum mark (A) with distilled or deionized water.
  Never use tap water.

Always check the electrolyte level after charging the battery.

Note! Do not fill above the maximum mark (A).
This may cause the electrolyte to leak.

- Install plugs. Tighten plugs thoroughly.
  Never switch gray plugs (with a gas release filter) with black sealed plugs.
- Clean battery terminals (do not remove cable terminals) and lubricate with petroleum jelly.
- Check that battery is secured. Tighten mounting screw if necessary.

VOLVO
Volvo Car Corporation
Göteborg, Sweden

Service Bulletin Cars

SECTION	GROUP	NO.	DATE
3	38	813	June 1996

Resetting (putting out) service reminder indicator (SRI)
800

Resetting (putting out) Service reminder indicator (SRI)

Stick in the labels from pages 2, 3 and 4 in this Service Bulletin into pages 96, 97, 98 and on the blank page which should be called 99 in Service Manual TP 1702032:

Volvo
Service program
240, 400
700/900, 850

1991-1995

Stick the labels from pages 5 and 6 in this Service Bulletin into pages 16 and 17 in Service Manual TP 3501031:

Section 3(35-38)
Lighting, instruments and other electrical components
850 1992-

Note! The labels on pages 3 and 4 in this Service Bulletin are divided horizontally in the middle of the page to make them easier to position when they are stuck in. The labels should cover the entire page but **not the page number**.

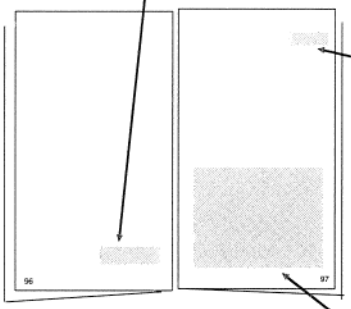
Service personnel: Please circulate, read and initial

Service Manager	Parts Manager	Workshop Manager		Workshop Foreman		Service Technicians						

Stick this label onto **page 96 at the bottom on the right** between section "Diagnostic unit check function 4" and "With Volvo Diagnostic Key" so that the label covers "Reset Service reminder indicator (SRI)" and the box underneath it.

Resetting (putting out) service reminder indicator (SRI) service points.

VDO (Odometer **below** needle).

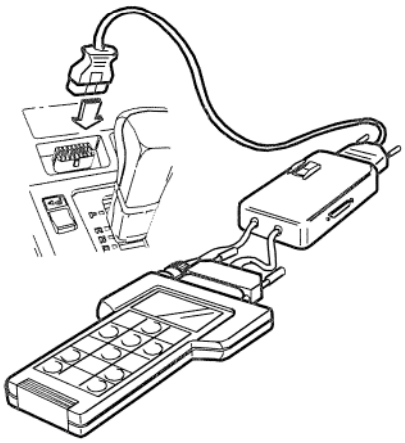


Stick this label onto **page 97 at the top right** so that it covers "Volvo service program" and "D21 Power antenna".

Volvo service program

D20 - service reminder indicator (SRI)

Stick this label onto **page 97 at the bottom** so that it covers "Reset SRL with the Volvo Scan Tool (ST)" and "D21 - Power antenna" but **do not cover page number**!



3500073A

With Volvo Scan Tool (ST) (from model year 1996)

- Ignition on.
- Connect Volvo Scan Tool (ST) to the data link connector (DLC).
- Power up the Volvo scan tool (ST).

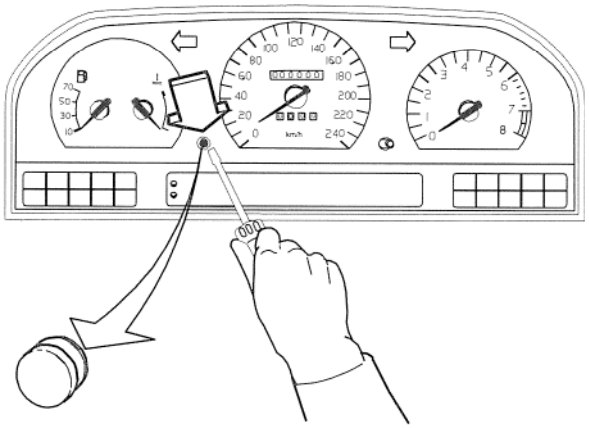
The screen displays: SELF TEST OK

- Select: LANGUAGE
- Press: ENTER
- Select: 800 SERIES
- Press: ENTER
- Select: SERVICE
- Press: ENTER
- Select: RESET SRI
- Press: EXIT:

Stick the label on the next page onto page 98 and the label from page 4 onto the following page in the Service Manual.

Volvo service program

D21 - Power antenna

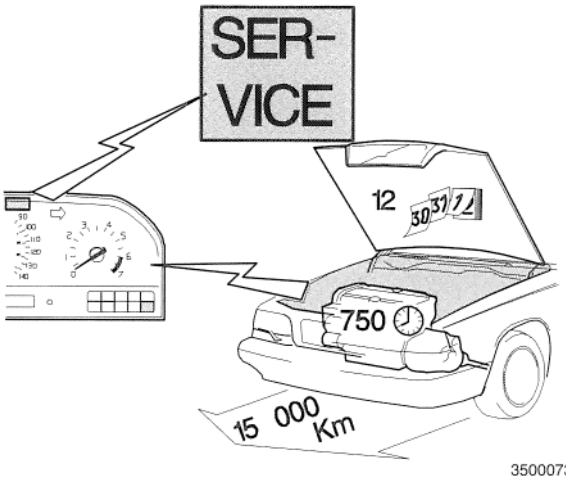


3500073A

Yazaki (Odometer **above** needle).

The service reminder indicator (SRI) is lit for two minutes each time the engine is started until it is reset after the next service. Reset the service reminder indicator (SRI) directly in the Yazaki instrument as follows:

Resetting the service reminder indicator (SRI).
- remove rubber plug without scratching the glass.
- press in button as far as it will go.
- install plug.



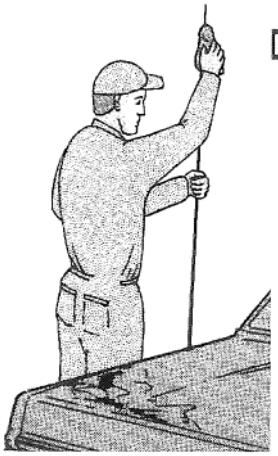
3500073A

VDO and Yazaki

The service reminder indicator (SRI) is lit when one of the following factory set service intervals is reached:

VDO	not USA/CDN	15,000 km/10,000miles 750 operating hours 12 calendar months
VDO	USA/CDN (cars **without** turbocharger (TC))	15,000 km/10,000 miles 750 operating hours 12 calendar months
VDO	USA/CDN (cars **with** turbocharger (TC))	7,500 km/5,000 miles 500 operating hours 12 calendar months
Yazaki		15,000 km/10,000 miles

240, 400, 700, 940/960, 850



S145047

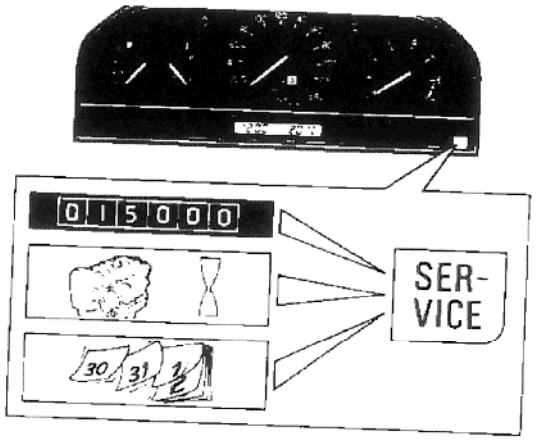
D21 - Power antenna

Clean antenna as follows:
- Raise antenna fully.
- Spray antenna mast with CRC-556 or similar.
- Dry off antenna.
- Respray antenna mast.
- Raise and lower antenna three times.
- Dry off antenna.

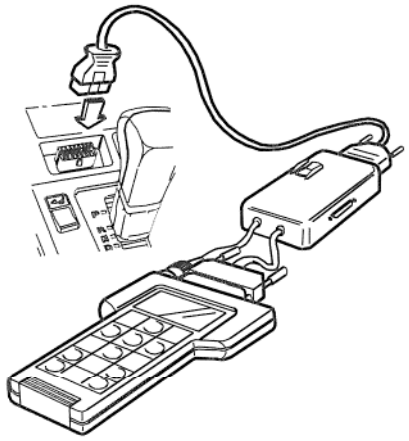
Alphabetical index

Stick this label **at the bottom of page 16** in Service Manual **TP3501031**

Combined instrument panel service reminder indicators (SRI)



3500073A



3500073A

Resetting (putting out) service reminder indicator (SRI)

The service reminder indicator (SRI) is lit for two minutes each time the engine is started until it is reset after the next service.

VDO (Odometer **below** needle).

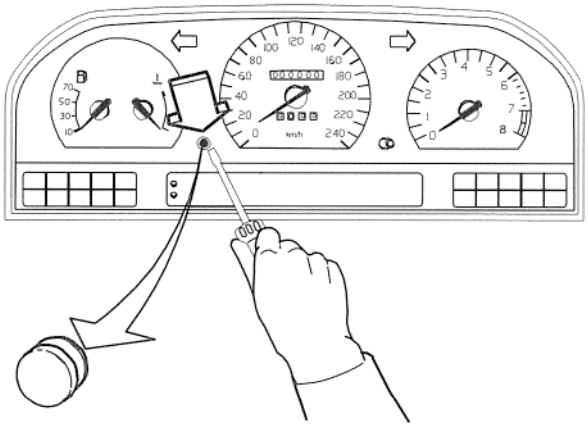
With Volvo Scan Tool (ST) (from model year 1996)

- Ignition on.
- Connect Volvo Scan Tool (ST) to the data link connector (DLC).
- Power up the Volvo Scan Tool (ST).

The screen displays: SELF TEST OK

- Select: LANGUAGE
- Press: ENTER
- Select: 800 SERIES
- Press: ENTER
- Select: SERVICE
- Press: ENTER
- Select: RESET SRI
- Press: EXIT

Stick this label at the top of page 17 in Service Manual TP3501031.

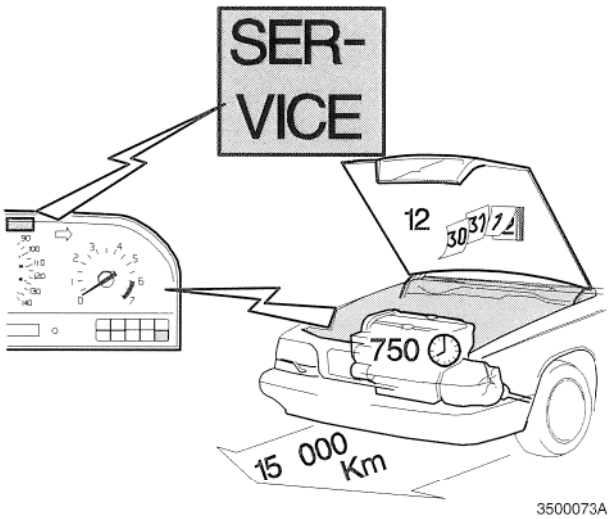


3500073A

Yazaki (Odometer **above** needle).

Reset the service reminder indicator (SRI) directly in the Yazaki instrument as follows:

Resetting the service reminder indicator (SRI).
- remove rubber plug without scratching the glass.
- press in button as far as it will go.
- install plug.



3500073A

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VDO	USA/CDN (cars **with** turbocharger (TC))	7,500 km/5,000 miles 500 operating hours 12 calendar months
Yazaki		15,000 km/10,000 miles

VOLVO

900

Service Bulletin

Fault tracing

Repairs

Maintenance

SECTI	ON	GR
1	17	911X

OUP
July 1995

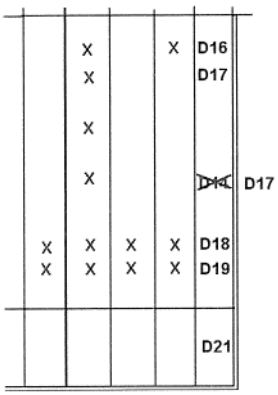
NO.
Corrections to Service Manual
900

Corrections to Service Manual

Parts of Service Manual Section 1(17) Volvo Service Program 240, 400, 700/900, 850 1991-1996 TP 1701033 *Book 1* and Service Manual Section 1(17) Volvo Service Program 240, 400, 700/900, 850 1991-1995 TP 1702032 *Book 2*, need alteration.

NOTE! Does not apply to TP 1707032 *Book 1* (1000 km interval). A separate Service Bulletin will be issued at a later date.

Please alter the text and stick the stickers in the Service Manuals as follows. Then discard this Service Bulletin.



(TP 1701033) ***Book 1***

Page 24, right column in table.

Cross out "D14" and write in "D17" as illustrated.

B 16 F, B18 K/KP/EP/FP/U, B 20 F/~~U~~
D19T

(TP 1702032) ***Book 2***

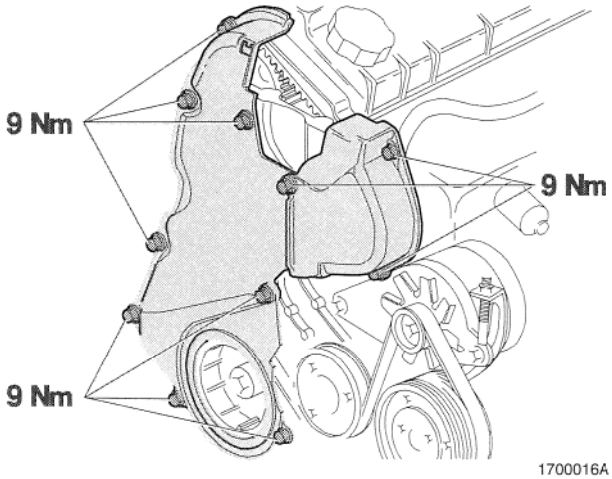
Page 10, next to illustration at the top of the page.

Cross out "U" and write in "D19T" as illustrated.

1700036S

ENGLISH

Page 68, stick over the entire page.



1700016A

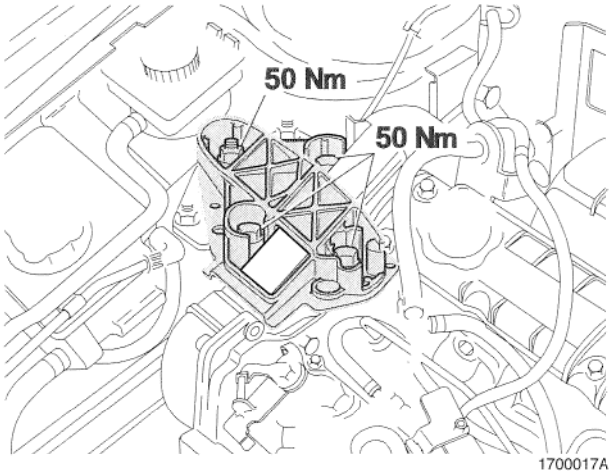
Install timing gear covers.

Install upper timing gear cover and four screws.

Install fuel pump drive wheel cover and three screws.

Tighten all screws.

Tightening torque: **9 Nm (6.7 ft.lbs).**



1700017A

Install engine mounting.

Install mounting.

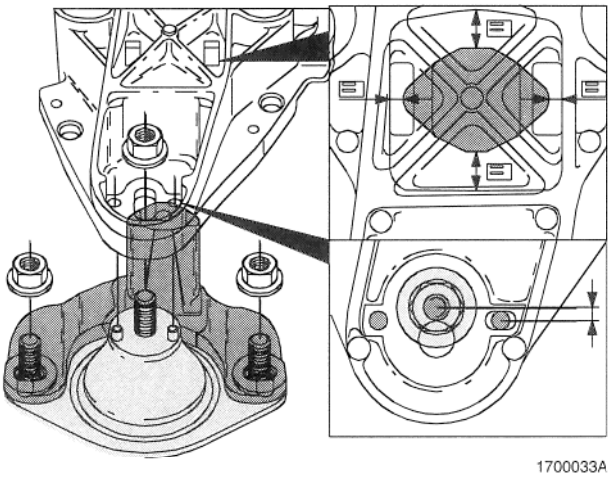
Install and tighten three screws.

Tightening torque: **50 Nm (37 ft.lbs).**

Install and tighten nut.

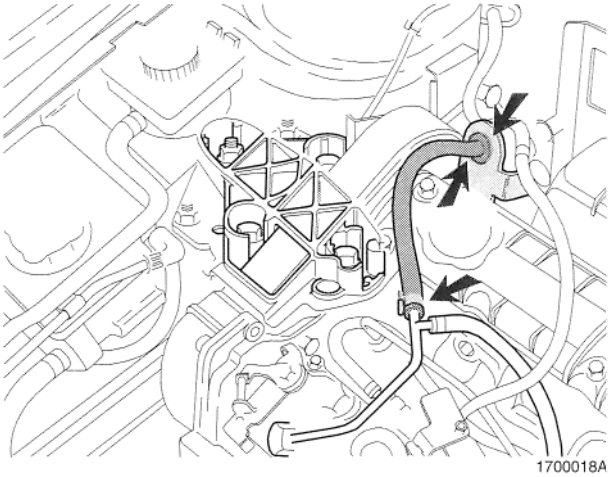
Tightening torque: **50 Nm (37 ft.lbs).**

Remove lifting yokes 999 **5006** and 999 **5383** and lifting hooks 999 **5115.**


1700033A

Check/adjust installation.

Adjust by undoing the two nuts or the centre nut.


1700018A

Connect fuel pump return line.

Reinstall:

- rubber ring in lifting eye.
- return line through lifting eye.
- a new clamp ring on the return line.

Connect return line to fuel pump pipe and tighten clamp ring.

Foreword

This is how the Volvo Service programme, book 2, is structured

The Volvo Service programme, book 2, is a supplement to the Volvo Service Programme, book 1. Both books deal with all Volvo passenger cars of model years 1991 - 1995. This manual deals with inspections at maintenance service, detailed in the same sequence as in book 1. After each inspection point in book 1 there is a designation - A1, A2, B1, B2. These codes refer to the designations under which the inspection points are described in this manual - book 2.

Under each designation the work descriptions are divided per model series, engine variant etc. where required. E.g.

B 200, 230

200, 700, 940/960

On the next page there is a register based on the inspection point designations.

At the back of the manual there is an alphabetical index.

List of contents

The designation is stated after each inspection point in the maintenance service, book 1.

VOLVO
Volvo Car Corporation
Göteborg, Sweden

Service Bulletin Cars

SECTION	GROUP	NO.	DATE
3	38	810X	Nov. -94

Additions to Service Manuals
800

Additions to Service Manuals

When working on or replacing the fuel level sender involving disassembly of the sender, the same degree of precision and care is required as when working on or replacing the fuel pump.

The Service Manual **TP 3501031 Section 3 (35-38), Lighting, Instruments and other electrical components 850 1992-** must therefore be updated with the information in the Service Manual for Engine Management Systems.

Service Manual **TP 1702032, Section** 1 **(17), Volvo Service program Book 2, 240, 400, 700/900, 850, 1991-1995** is to be updated with a new method for changing the oil in the automatic transmission.

The part number for the fuel pump gasket is incorrect and must be changed in the three manuals for the engine management system, Section 2 (23, 28). With a pen, cross out the reference P/N **3531426-9** and write instead P/N **3501323-4**. The following pages in these manuals require correction:

TP 31992/2, LH3.2 and EZ 129K, page 270, operation *UD6.*

TP 2304011, Fenix 5.2, page 248, operation *TD6.*

TP 2301011, Motronic 4.3, page 387, operation *TD6.*

After sticking in the lables and changing the part number references please discard this Service Bulletin.

Service personnel: Please circulate, read and initial

Service Manager	Parts Manager	Workshop Manager		Workshop Foreman		Service Technicians						

ENGLISH

(TP 1701032) ***Book 1***

Page 25, bottom of second column, stick over text: "Carry out at 5000 km. See figure page 28".

"Carry out at 5000 km. Does not apply to year model 1996.

(TP 1702032) ***Book 2***

Page 15, stick in after text:
"Tightening torque ZF **15 Nm (11 ft. lbs)**
CVT **30 Nm (22 ft. lbs)** "

ZF 4 H P 14Q : NOTE! Oil should be changed twice. The second change should take place after a 5 km test drive .

(TP 1702032) ***Book 2***

Page 96 , text for upper illustration.

Bonnet - lubricate
- hinges (does not apply to 800 series year model 1994-)
- bonnet latch
- safety catches

(TP 1702032) ***Book 2***

Page 96 , text next to middle illustration

Doors - lubricate
- hinges (does not apply to 400/800)
- door stops (does not apply to 800 series year model 1994-)
- lock lugs
- locks
- rear door bearing rivets (850)

(TP 1702032) ***Book 2***

Page 97, bottom half of page after text:
"Resetting is complete and the service lamp is turned off."

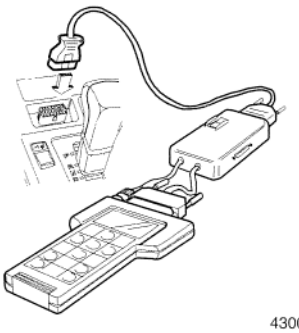
Reset SRL with the Volvo Scan Tool (ST)

850

Ignition on.

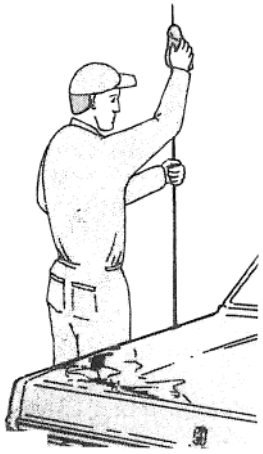
Connect Volvo Scan Tool (ST) to OBD2 socket.

From year model 1996



4300708A

1. Switch on
2. Window displays: SELF TEST OK
3. Select: LANGUAGE
4. Press: ENTER
5. Select: 800 SERIES
6. Press: ENTER
7. Select: SERVICE
8. Press: ENTER
9. Select: RESET SRL
10. Press: EXIT



4300708A

D21 - Power antenna
clean

240, 400, 700, 940/960, 850

Clean antenna as follows:

1. Raise antenna.

2. Spray antenna mast with CRC-556 or similar.

3. Wipe antenna.

4. Respray antenna mast.

5. Raise and lower antenna three times.

6. Wipe antenna.

TP 3501031

Page 223,
immediately after Paragraph *NB4.*

NB5

Unscrew the plastic nut on the fuel sender.
Use special tool 999 5486.
Only the nut is to be unscrewed.

- Lift up the fuel level sender.
  At the same time feed out the cable.
- Remove the seal.

IMPORTANT!
Replace the nut on the neck of the tank otherwise the pipe riser will expand, making it difficult to replace the nut later.

Verify fuel level sender function as described in chapter: Fault tracing

NB6

- Reassemble in the reverse order. Use a new, dry gasket. Check carefully that it is correctly positioned.
- Lubricate with a thin layer of vaseline on the upper flat surfaces on the inside and the outer narrow edge.
- Lubricate the upper edge of the rubber seal so that it does not stick to the nut.
- Position the fuel level sender so that the cable to the sender is turned to the left.
- Tighten the nut.

TP 1702032

Page 43,
furthest down.

ZF 4 HP 14 Q and CVT

NOTE! The greatest care is to be observed when filling up with oil.

Filling with oil

Slowly fill with 3 litres of oil through the dipstick pipe.
Overfilling the transmission can result in the oil being ejected and leakage.
Do not check the oil level immediately after filling.
The oil in the filler pipe that has not run down into the sump can give a false indication on the markings on the dipstick.

Test drive the car for approx. 5 km so that the oil is distributed in the automatic transmission.

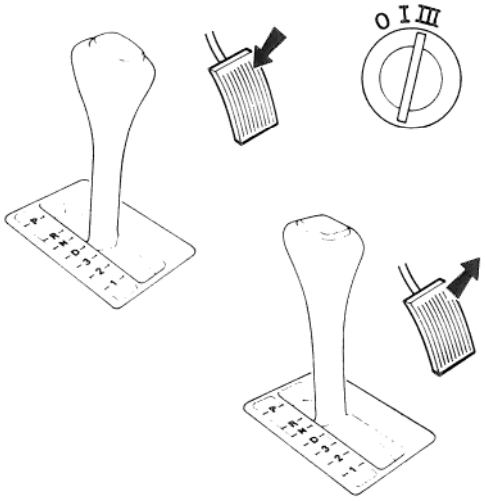
Change the transmission oil a second time.

Use the procedures described above.

A1 - Automatic gearbox selector lever

inspect

400



S43239

Check the start inhibitor switch/reverse lamp switch

Check that the engine can only be started when the gear selector lever is in **P** or **N**, and that the reversing lights are on when the lever is in R.

Important! Gearbox oil should be at the right level and operating temperature.

Move the lever to D and maintain pressure on the brake pedal.

Turn the ignition key to the starting position and keep it there.

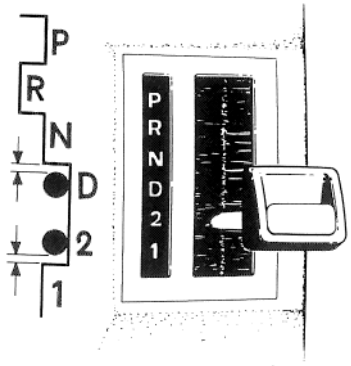
Slowly move the lever to N until the engine starts.

Release the brake pedal and check if the car creeps forward.

Repeat the test, this time with the lever already in R at the start of the test.

The car should not creep in either test.

240: AW 70/71



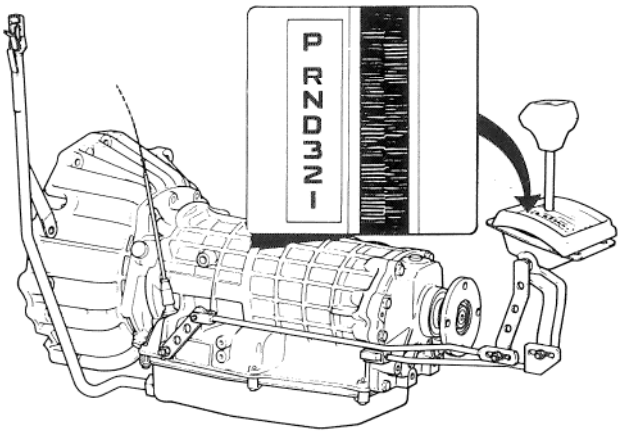
S119 219

Check the gearshift control

It should only be possible to start the engine in **P** and **N.**

The reversing light should come on in R.

Play in the shift from D to N should be **greater than or equal to** the play in the shift from 2 to 1.



S137 449

700/940: AW70/71/72, ZF 4 HP 22

Check the gearshift control

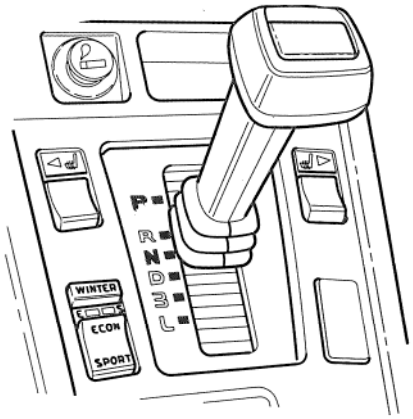
It should only be possible to start the engine in **P** and **N. Note!** On cars with an electronic start inhibitor, the gear selector lever should be able to be moved from P only when the engine is on and the brake pedal is pressed.

The reversing light should come on in R.

The gear selector lever should be vertical in P.

Play in the movement from D to N should be **noticeable and less than or equal to:**

- play in movement from 3 to 2 (ZF)
- play in movement from 2 to 1 (AW)



S152 584

AW 30-43, AW 50-42

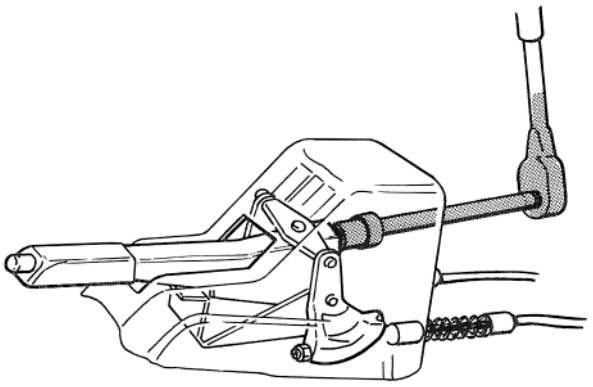
Check the gearshift control

It should only be possible to start the engine in P and N.

A2- Parking brake

check/adjust

All



S118 529

Drive the car into the workshop bay with the parking brake slightly engaged (pull up handbrake lever until resistance is felt, plus one additional notch). Drive max. 400 metres (max. speed 40 km/h) with the lever in this position!

Check brake performance

Full brake effect should be attained at:

2-8 notches for the 200, 700, 940/960, 850

max. 7 notches for the 400

Check that the catch functions and that the warning lamp in the central instrument goes on and off as necessary.

Adjustment of parking brake

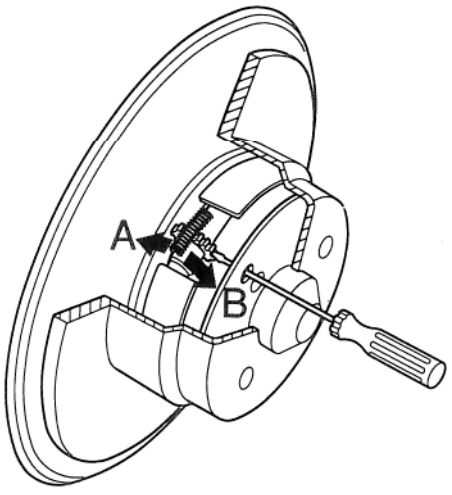
240/260, 700, 940/960:

Adjust inside the car

850

Adjustment should always be performed first at the wheels, as follows:

Adjust the brake linings by rotating the link in the brake drum with a screwdriver. **Rotate the link until the wheels lock, then release 5 notches.** If full braking effect is not attained at 2-8 notches, adjustment should be made at the lever inside the car.



17 00004A

400

Returning the parking brake

If fitted, remove the heat shield on the exhaust pipe.

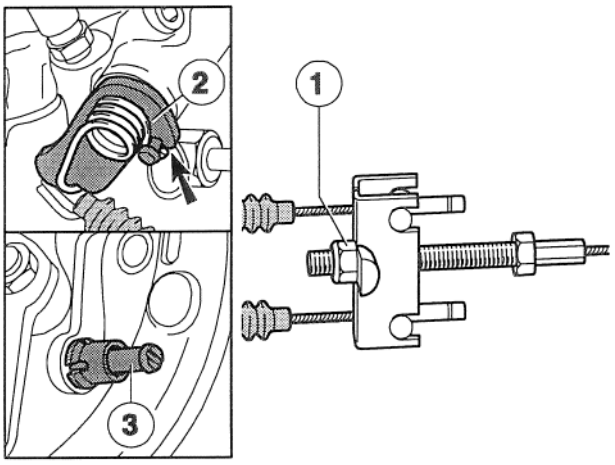
Undo adjustment nut (1) until the wires are slack. Use an extended socket (1159202-9 or 9986916-6) on the B 20 F.

Disc brakes:

– Check that the lever (2) on the brake caliper rests against the stoppers on both wheels. If not, adjust the brake mechanism. (See service manual for brakes, ops. D1 and D5).

Drum brakes:

– Press the brake pedal firmly at least 20 times to ensure maximum setting for the automatic adjustment mechanism.



1700028A

Adjusting the parking brake

Disc brakes:

– Turn the adjustment nut (1) in until the lever (2) lies against the stops on both wheels.

Drum brakes:

– Screw in the adjustment nut (1) until the lug (3) can rotate freely.

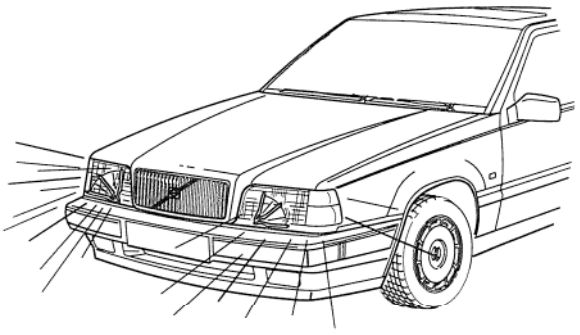
A3 - Exterior lighting

Check

All

Check that all exterior lighting functions properly.

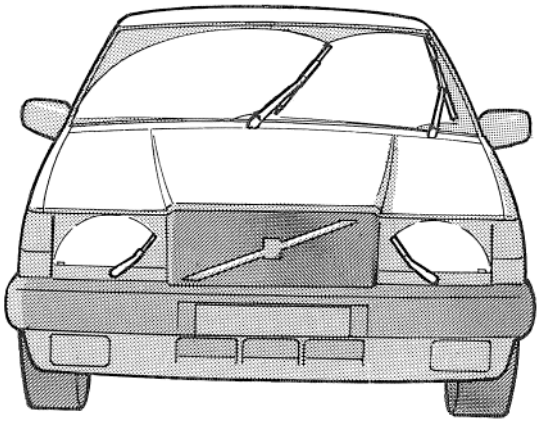
Check that the glass lenses are undamaged and seal properly.



S152 577

A4 - Windscreen and headlamp wash/wipe

Check/adjust



S142 312

All

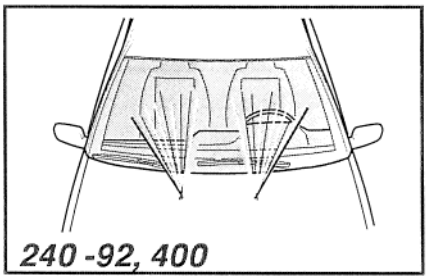
Wipers - check

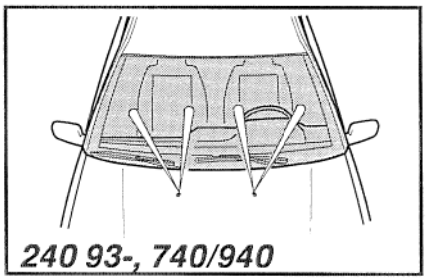
- that the various speeds function, including the intermittent wipe facility.
- setting and stop position
- tailgate wiper
- headlamp wiper function and stop position

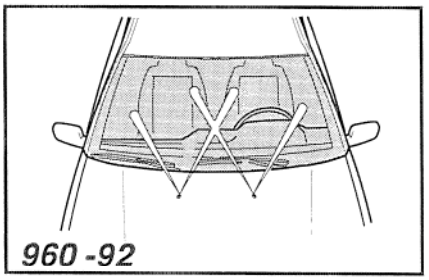
Adjust if necessary.

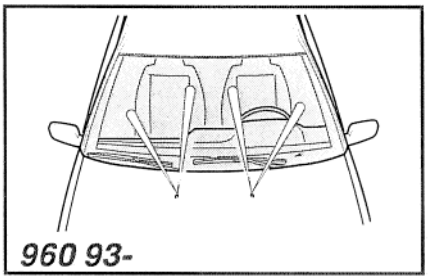
Check the windscreen washers

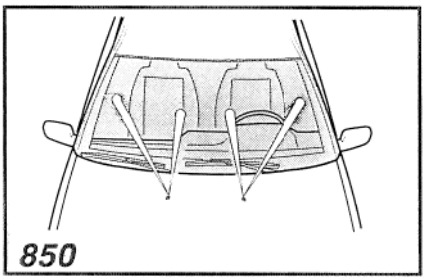
Adjust the washer nozzles as in the illustrations. Check the tailgate window washer too.

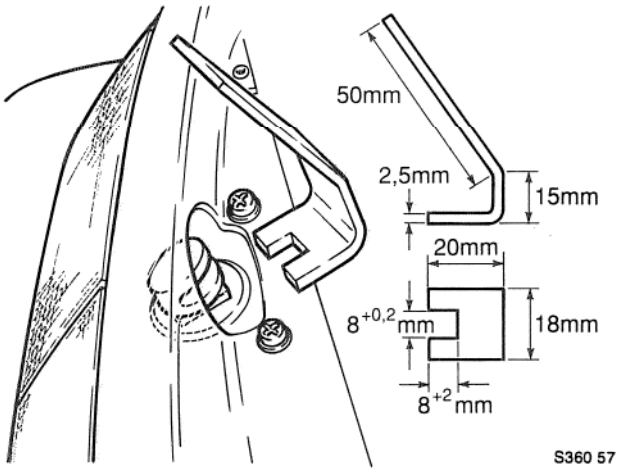












S360 57

Check the headlamp washers

If necessary, adjust the nozzles with a 0.6 mm thick piece of piano wire. Do not use a needle. **Note!** 400 - see below!

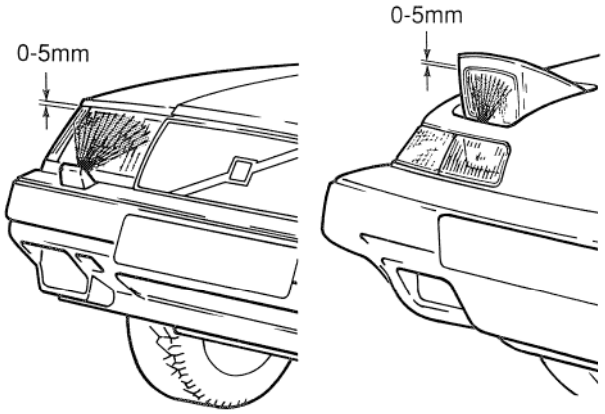
400

Auxiliary tools

The illustration shows an auxiliary tool which can easily be made in the workshop for adjustment of the headlamp washers on the 400.

Insert the tool in the washer nozzle under-section.

Note! Never use the nozzle opening for adjustment. This may damage the nozzle and result in a faulty spray pattern.



S360 58

Adjustment

Adjust the nozzles so that the jet of washer fluid strikes the headlamp glass 0-5 mm from the upper edge of the glass.

Turn the washer nozzles to the side with the auxiliary tool so that the spray pattern is symmetrical on the right and left sides.

Note!

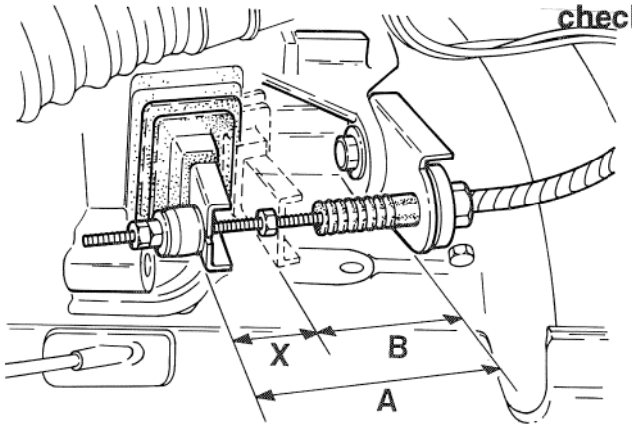
480: In order to test the washer system, the headlamp main beam must be switched on and off for every operation. The system sprays twice in sequence, with an interval of 5 seconds.

440/460: The washer system only functions when the headlamp main beam is switched on. The system sprays washer fluid with a 5-second interval.

A5 - Clutch

check/adjust

400



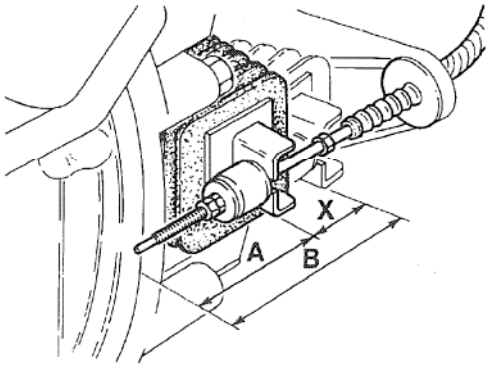
S41095

With extended release fork

Measure the distance **(A)** between the fork and the bracket without touching the clutch pedal.

Measure the distance **(B)** between the fork and the bracket with the clutch pedal pressed to the floor.

Adjust the fork's stroke **(X)** with the adjustment nut so that distance **A - B = 30±1 mm.**



S41094

Without extended release fork

Measure the distance (**A**) between the fork and the engine-gearbox contact area without pressing the clutch pedal.

Measure the distance (**B**) between the release fork and the engine-gearbox contact area with the clutch pedal pressed to the floor.

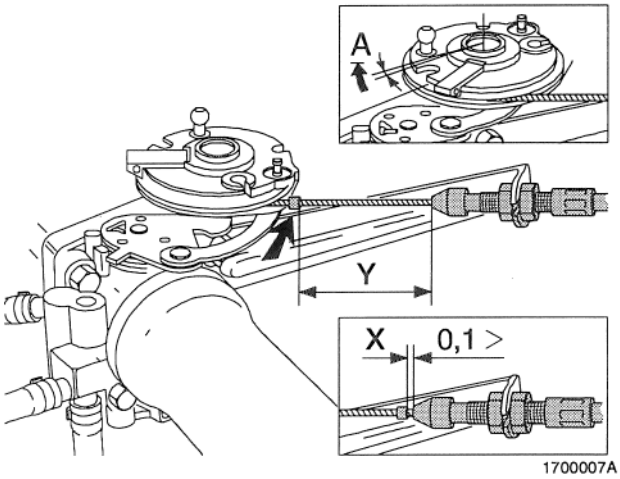
Note: Use a pedal hook here.

Adjust stroke (**X**) for the release fork with the help of the adjustment nut so that distance **B-A** is **22 mm ± 1 mm.**

A6 - Kickdown wire

check/adjust

ZF 4 HP 14 Q



1700007A

Check the kickdown wire's setting

Check that the throttle functions properly.

Delete the play in the throttle control cam by rotating it clockwise a few mm, see illustration A. (**only applies to the B 20**)

Check the distance (dimension **X**) between the wire sheath end and the wire stopper.

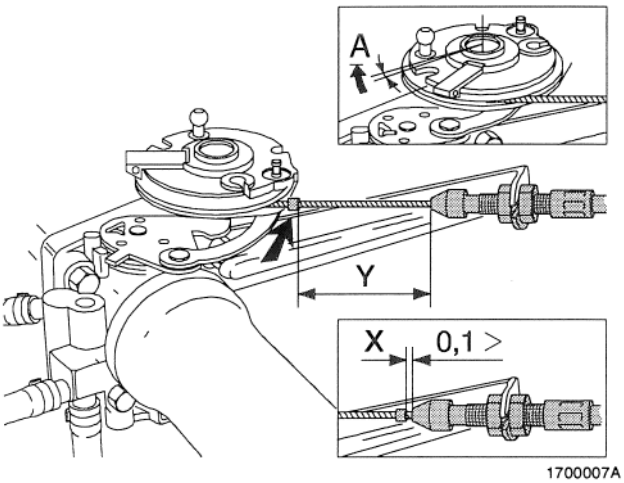
Min. distance 0.1 mm.

If necessary, adjust with the sheath so that the correct distance is obtained.

Turn the throttle control until a slight resistance is felt (kickdown-setting). Recheck the distance between the wire sheath end and the wire stopper (dimension **Y**).

Correct distance: 39 mm + dimension X .

If necessary, adjust with the sheath until the correct play is obtained.



1700007A

Kickdown wire, adjustment

Remove the wire stopper from the wire.

Warning! Be careful not to damage the wire.

Attach a new wire stopper loosely to the wire. Turn the throttle control in its middle position.
Delete the play in the throttle control cam by turning it clockwise a few mm, see figure A. (**applies only to the B 20**)

Attach the wire stopper (press it in lightly) **1 mm** (B 18) or **4 mm** (B 20) from the outer end of the sheath (dimension **X**).

Turn the throttle control until a slight resistance is felt (kickdown setting). Keep the throttle control in this position.

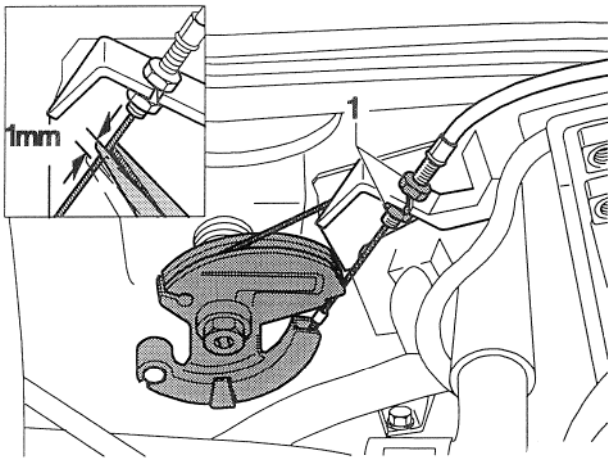
Measure the distance (dimension **Y**) from the wire stopper to the sheath end.

Correct distance: 39.5 mm + dimension X.
Tolerance ± 0.5 mm.

If the correct distance cannot be achieved, adjust with the sheath or move the wire stopper.

Clamp the wire stopper into its end position. Release the throttle control.

Note! Check that the wire stopper does not strike the pulley.

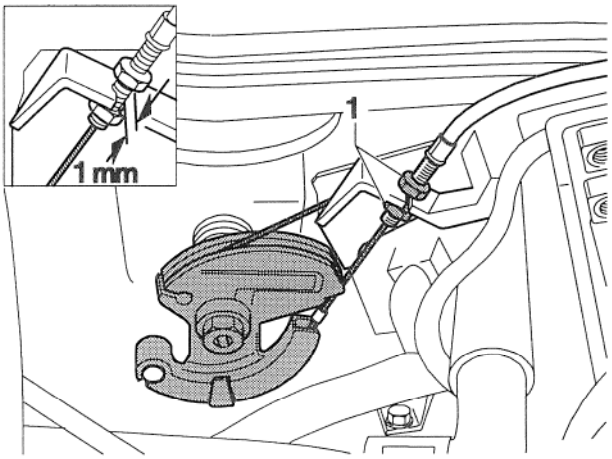


1700025

CVT

Check the setting of the kickdown wire

Turn the pulley to the full-throttle stopper.
In this position it should be possible to pull the wire out a further **1 mm (A)**.



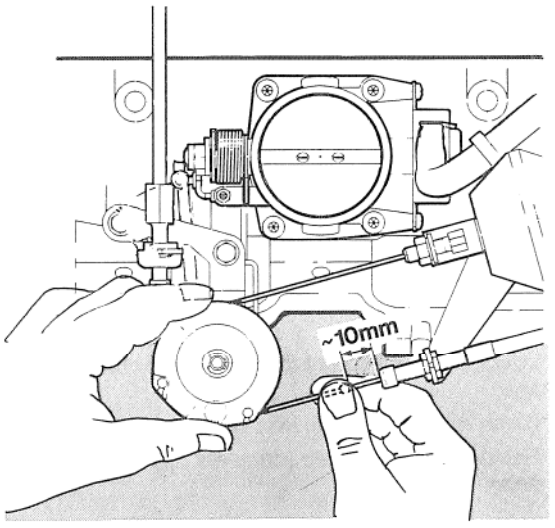
1700026

Kickdown wire, adjustment

Undo the two lock nuts (1),

Turn the pulley to the full-throttle stopper and tension the wire by pulling on the sheath's adjustment socket.
Note! Do not pull on the sheath itself.
Adjust the upper lock nut to obtain a play of **1 mm (B)** between the attachment and the nut.

Tighten the lower nut (**5 Nm**).
Lock the nuts in place with a coat of paint.



S146587

BW55, AW55/70/71, ZF 4 HP 22

Check that the wire is tensioned in the idling setting, without pulling against the pulley, and that it is located securely in the pulley groove, running smoothly in the sheath.

Check: Pull the wire out about 10 mm and release it suddenly. A metallic clicking noise should be heard from the throttle cam, when it reaches the standby setting.

Wire too firmly tensioned: No clicking sound.

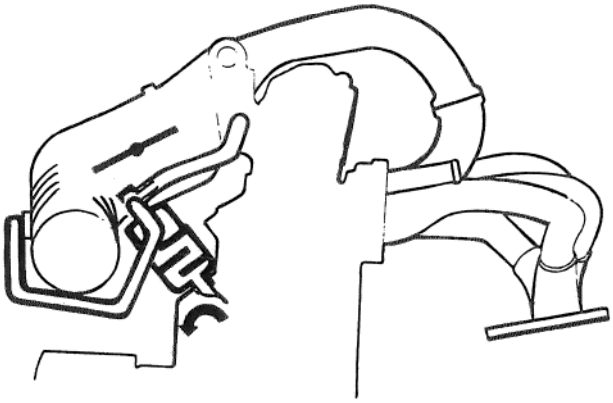
Slack wire: No kickdown function.

Adjustment: Adjust with the wire tensioner.

A7 - Crankcase ventilation

clean

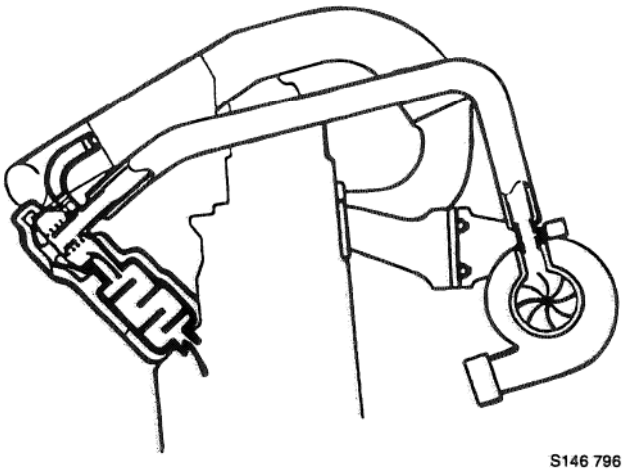
Note! Winter operation and short driving distances can result in the formation of ice in the flame trap. This may in extreme cases result in destroyed crankcase gaskets. It is therefore important to clean the flame trap thoroughly.



S146795

B 16 F, B18 K/KP/EP/FP/U, B 20 F/U

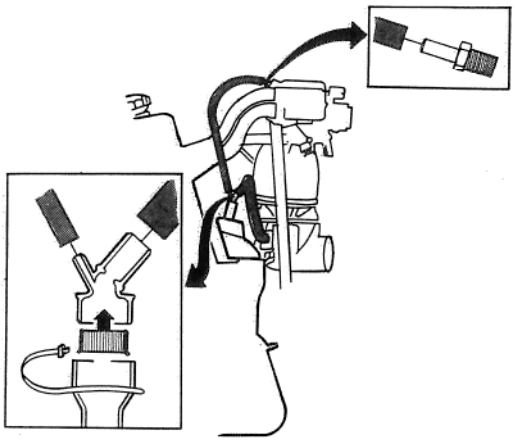
- Clean/check the hose
- Clean the connection



S146 796

B 18 FT, FTM

- Clean/check the hose
- Clean the connection

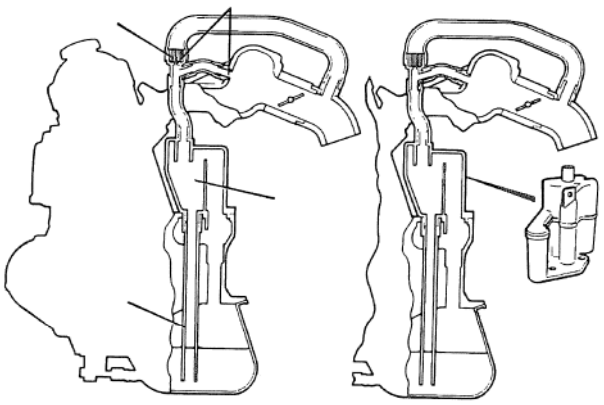


S138 449

B 200-230

- Check the condition of the hoses and check for blockage.
- Clean the nipple in the inlet manifold.
- Replace the flame trap (does not apply to turbo models).

The flame trap should be positioned in the T-piece.

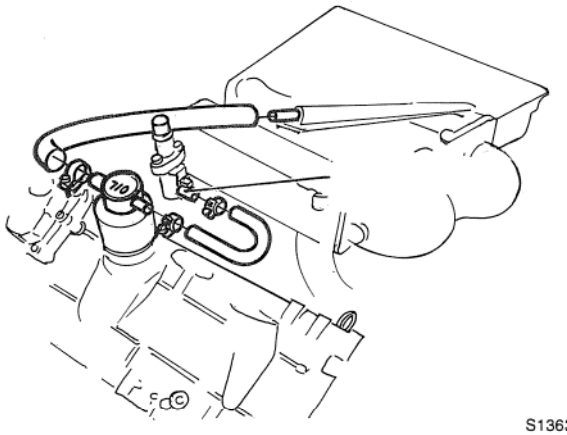


S143 595

B 204/234

- Check the condition of the hoses and check for blockage.
- Clean the nipple in the inlet manifold.
- Replace the flame trap (does not apply to turbo models).

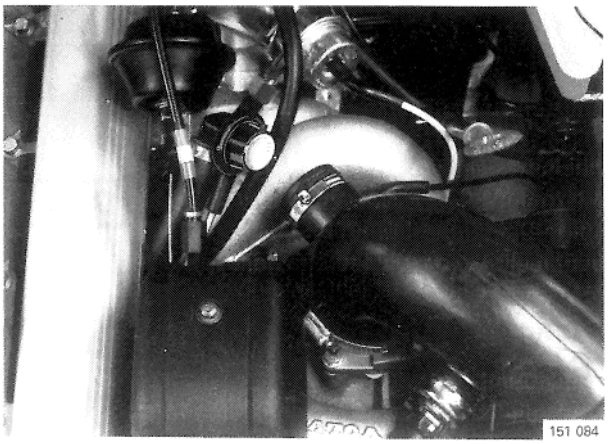
The flame trap should be positioned in the T-piece.



S136341

B 280

- Clean/check the hoses
- Clean the calibrated nipple
- Clean the oil filler cap, if necessary change the strainer in the cap.



S151 084

B 6244/6254/6304

- Rotate the flame trap casing about 15 mm to the left (bayonet catch).
- Pull out the flame trap and remove the oil filler cap.
- Blow-clean the hoses down towards the crankcase ventilation.
- Insert a new flame trap in the inlet hose and rotate the flame trap outer casing back to its original position.

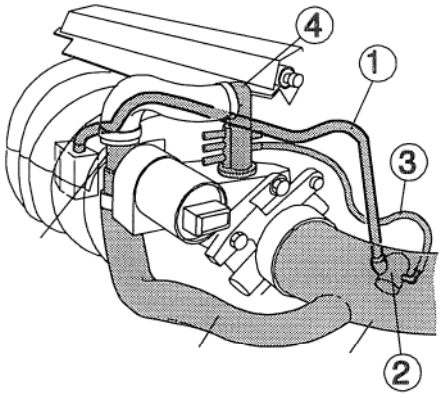
B 5202/ 5204/5234/5252/5254

Remove the cover above the throttle pulley

Undo the hose clamp holding the inlet hose to the air filter housing.

Remove the hose from the air filter housing and bend it forward somewhat.

Remove the oil filler cap



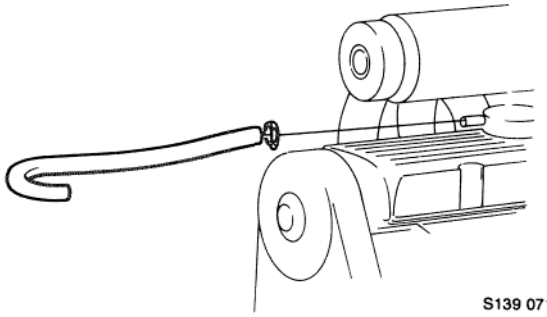
2500134A

Clean the crankcase ventilation / replace the flame trap

Remove the flame trap by rotating it about 15 mm to the left (bayonet catch).

Clean the flame barrier casing (**2**) after the flame trap has been removed. Blow-clean the hoses (**1&3**).
Clean the multi-nipple (**4**) inlets and outlets.
(does not apply to M/Y 1995)
Note! The nipple on the small hose (**3**) has a calibrated hole with a diameter of **2.5 mm**. (Use a drill for cleaning)

Important!
Do not disconnect the hoses from the flame trap's outer casing. The positioning of the hoses can affect the function of the throttle control.



S139 071

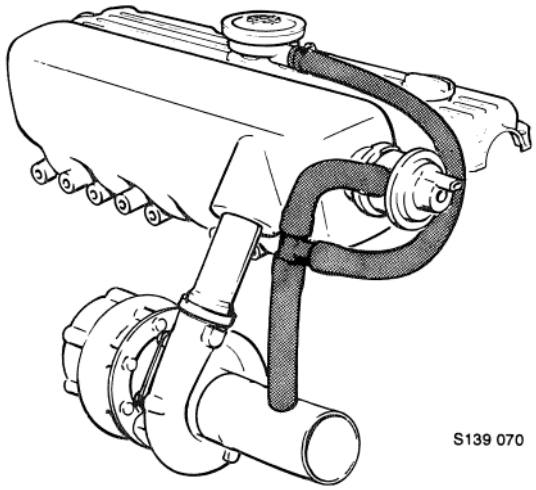
Fit a new flame trap

Fit a new flame trap with its outer casing in the inlet hose.

Refit all the other parts.

D 24

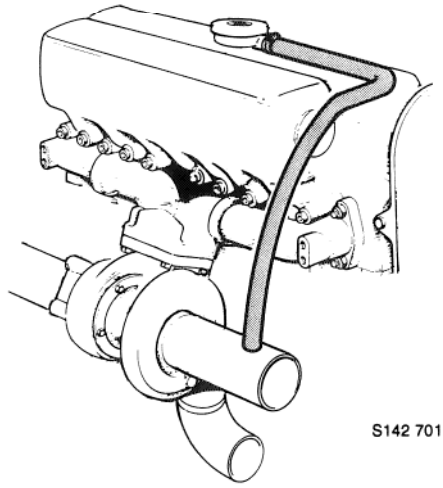
- Clean/check the hose
- Clean the nipple



S139 070

D 24 T

- Clean/check the hoses
- Clean the nipple



S142 701

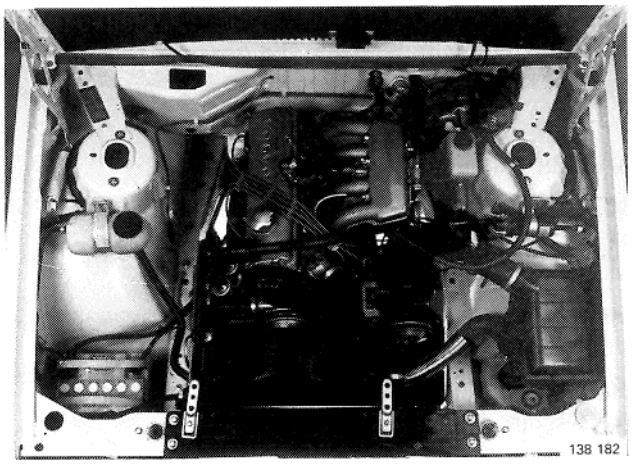
D 24 TIC

- Clean/check the hoses
- Clean the nipple

A8 - Engine

check for signs of leakage (from above)

All



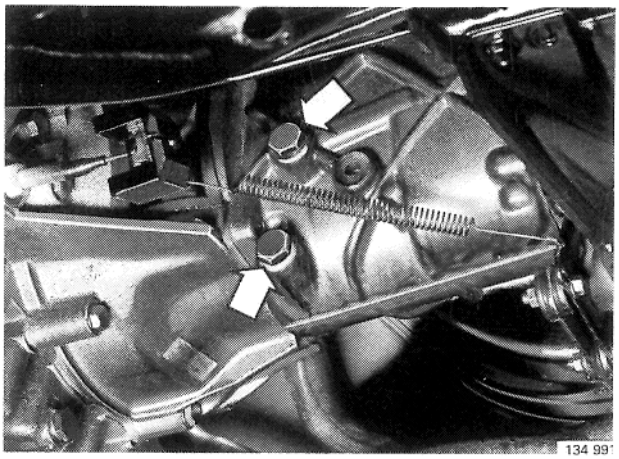
S 138 182

Check that there is no visible oil leakage and that the **fuel lines, coolant lines, vacuum hoses and crankcase ventilation hoses** are correctly fitted and are completely tight, with no leakage whatsoever.

B1 - Engine/gearbox

check for leakage (from underneath)

All



S134 991

Check that there is no leakage from the engine or gearbox. **If there is leakage from the gearbox, the oil level should be checked and the gearbox topped up if necessary.**

Oil quality (manual gearbox):

200, 700, 940/960
M 45/46/47: ATF-oil, type F or G.
M 90: Volvo P/N 11 61 423-7

400 (gearbox/final drive):
Volvo P/N 33 43 922-5.

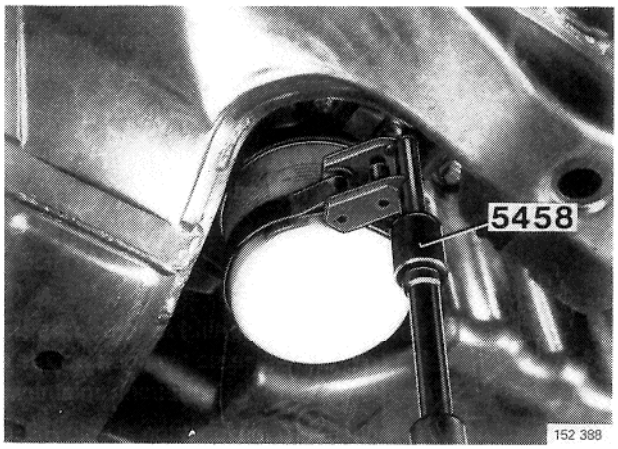
850 (gearbox/final drive):
Volvo synthetic gearbox oil 11 61 423-7

Note! Always use new gaskets!

Note! On automatic gearboxes, oil level inspection and topping up if necessary are carried out later in the programme - **D5 Automatic gearbox - top up oil.**

B2 - Drain engine oil and replace oil filter

All



S152 388

Drain engine oil

Remove the drain plug. Remove the drain plug.

Replace the washer.

Refit the drain plug and tighten.

Tightening torque
400: 22 Nm
740/940: 65 Nm
960: 40 Nm
800: 35 Nm

Replace the oil filter

Remove the filter with the filter removal tool 999 **2903** (**850**: Use tool 999 **5458** for removal of the oil filter).

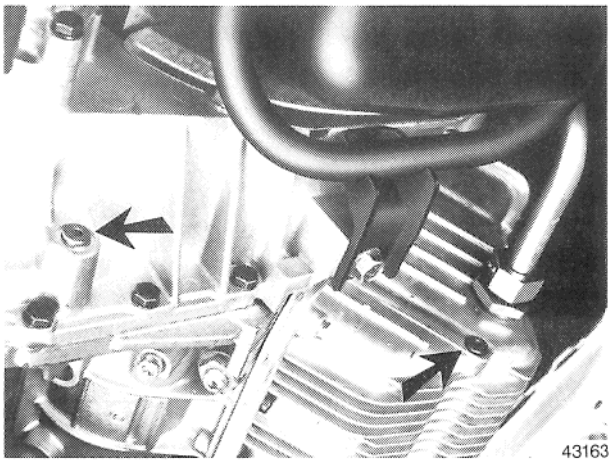
Insert the new filter and hand-tighten.
(see the instructions on the filter).

B3 - Automatic gearbox

drain the oil

(Topping-up; see D5)

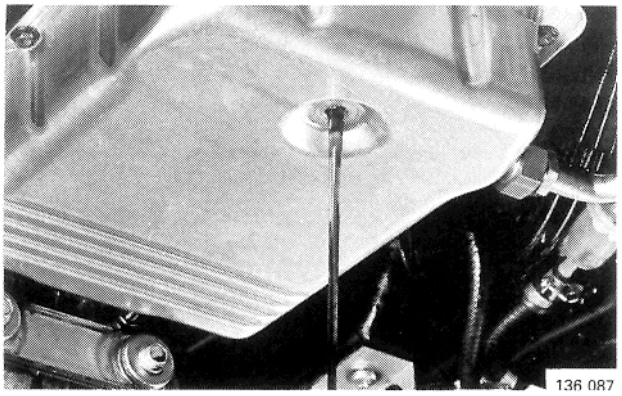
200, 400, 700/940/960


43163

AW 50-42 (850) and AW 30-43 (960): Oil change every 75,000 km only for cars in taxi traffic and cars which spend a large proportion of their operational life towing trailers/caravans.

400: Remove the drain plug in the oil sump. On the ZF, also the plug in the differential housing.
Drain the oil.
Refit the drain plugs.
Always use new gaskets.
Tightening torque: ZF **15 Nm**
CVT **30 Nm**

AW 70/71/72, ZF 4 HP 22: Remove the drain plug and drain the oil. Refit the drain plug.


136 087

Warning!
The oil may be very hot if the car has been driven recently.

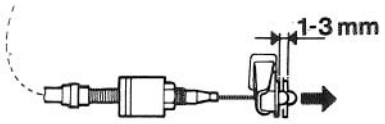
Refit and tighten the plugs. Tightening torque **15 Nm**.

Always use new gaskets.

B4 - Clutch

check/adjust

240



S134 721

Check/adjust the clutch play

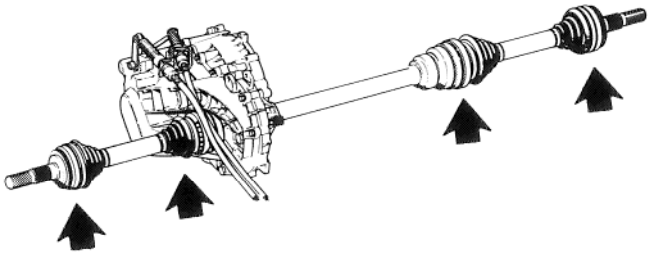
Press the fork rearwards.

Play **1-3 mm**. Adjust at the release fork.

B5 - Driveshafts

check play/wear

400, 800



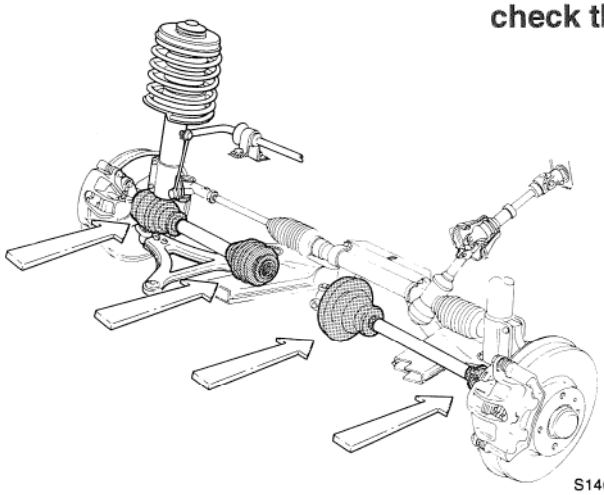
S152 591

Check that there is no abnormal wear in the CV joints.

B6 - Driveshafts

check the rubber bellows

400, 800



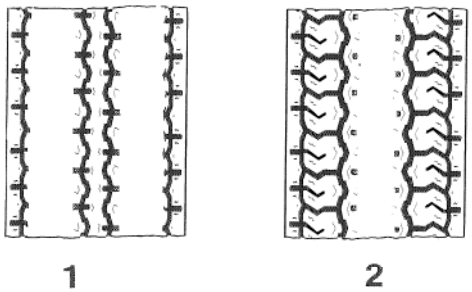
S146 810

Check that the rubber bellows seal completely and that they are undamaged.

B7 - Tyres

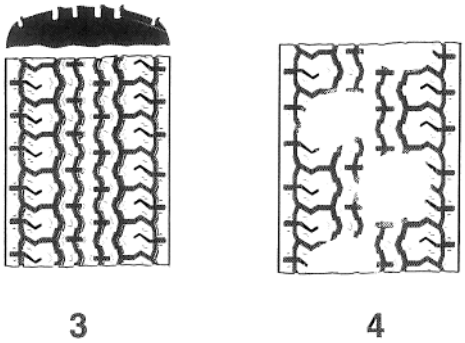
check

All



1 2

S54 981



3 4

S54 982 S54 983

Check:

- tread depth
- wear pattern (indication of imbalance, faulty camber, toe-in or wrong inflation pressure)
- that the type of tyre is the same on both wheels (Radial-cross-ply)

For studded tyres, check that all the tyres are studded.

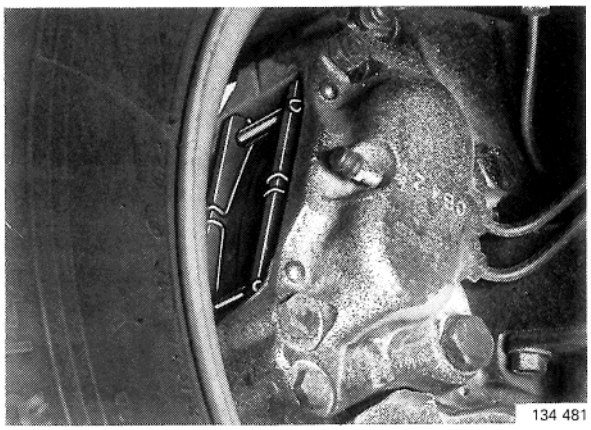
1. **Tyre inflation pressure too low**
2. **Tyre inflation pressure too high**
3. **Wrong toe-in**
4. **Imbalance**

B8 - Brake linings

check

(Always check both the front and rear brake linings!)

Front brake linings


134 481

240, 400

Use a mirror

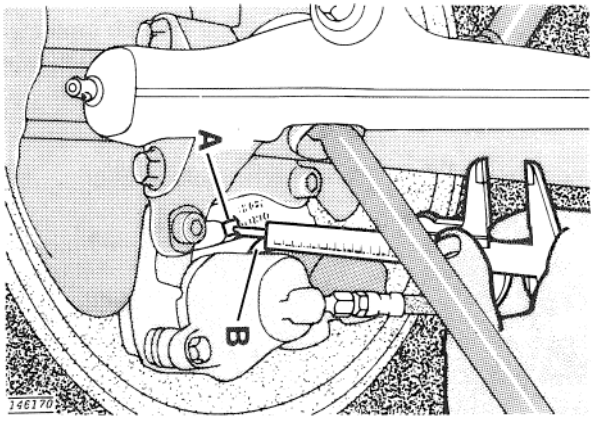
Minimum lining thickness:

240 . . . . . 3 mm
400 . . . . . 2 mm

If the lining thickness is close to these values, the workshop should recommend that they are replaced soon.

Check that there is no leakage at the brake caliper or connections.

If there is any uncertainty about lining thickness, the wheels must be removed.



S146 170

700

Place an extended slide gauge between points **A** and **B**. The distance should not exceed **35 mm** with brake discs of normal wear.

Check that there is no leakage at the brake caliper or connections.

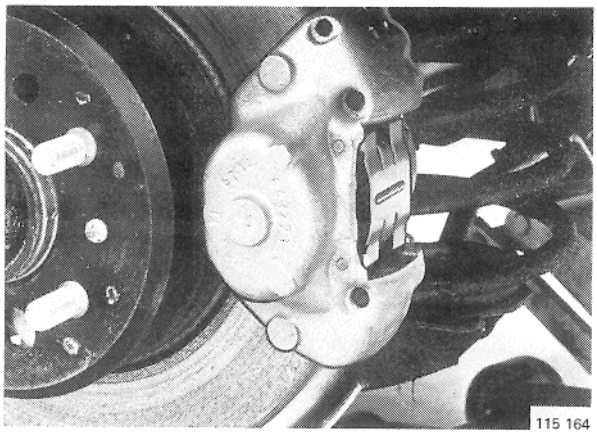
152 586

800

Place an extended slide gauge between **A** and **B**. The distance should not exceed **35 mm** with brake discs of normal wear.

Check that there is no leakage at the brake caliper or connections.

Rear brake linings


115 164

400

With rear disc brakes

Minimum lining thickness: **2 mm**

If lining thickness is close to this value, the owner should be advised to replace the linings soon.

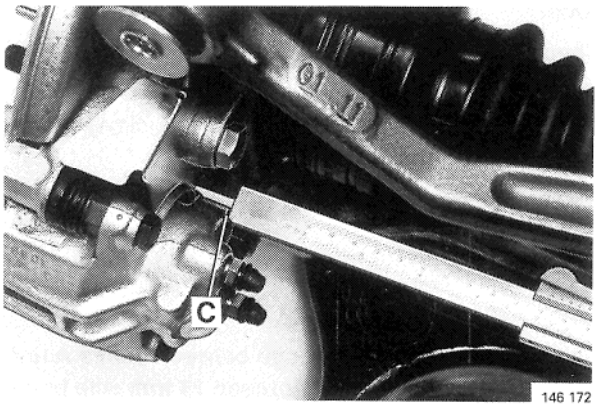
Check that there is no leakage at the brake caliper or connections.

240, 740, 940, 850

Min. lining thickness: **2 mm**

If lining thickness is close to this value, the owner should be advised to replace the linings soon.

Check that there is no leakage at the brake caliper or connections.

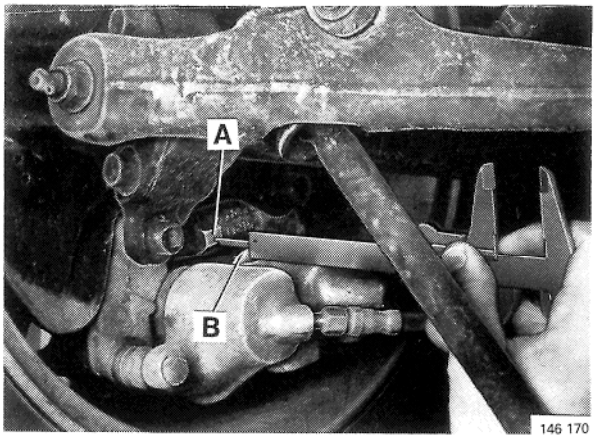


146 172

760/780, 960

Place a slide gauge between point C and the protective plate plane between the attachment lugs of the bearing housing and caliper holder.

Maximum permitted dimension with brake discs of normal wear: **25 mm.**



146 170

All

For replacement of brake linings:

Check the brake disc thickness

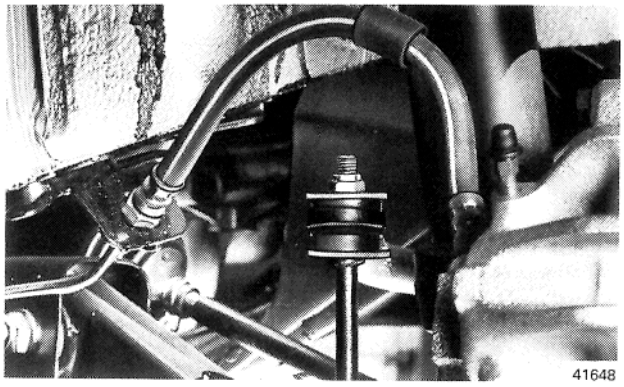
Measure the brake disc thickness. The value is not to be less than the minimum specified in the table.

Min. thickness A–B (mm)	200, 700, 940/960	400	800
Front, solid disc	11.0	10.35	-
Front, ventilated disc	20.0	19.3	23.0
Rear	8.4	7.5	8.4

B9 - Brake hoses

check leakage/damage

All



41648

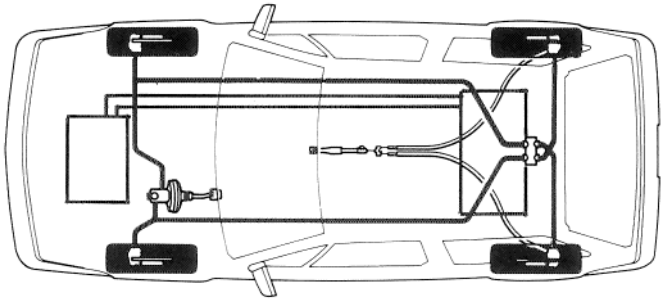
Check that the brake hoses

- do not leak
- are firmly attached at their anchorage points
- are not chafed
- are not in contact with sharp corners or other surfaces which can cause chafing or wear
- that there is no abnormal leakage from the shock absorbers

B10 - Brake and fuel lines

check leakage/damage

All



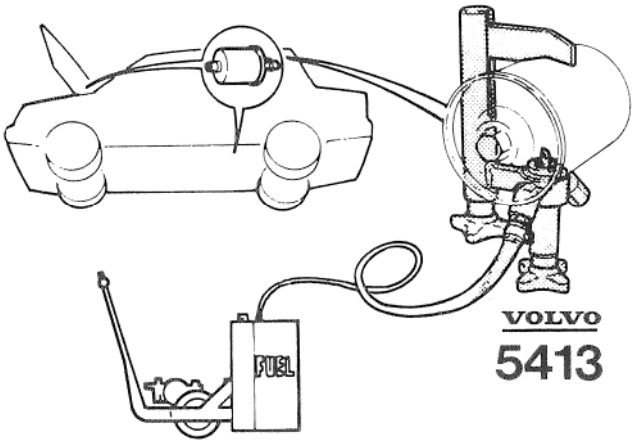
S152 576

Check

- for leakage
- that all the brake and fuel lines are correctly clamped and are undamaged
- that the pipes are not in contact with any sharp edges
- the handbrake wires and attachments

B11 - Fuel filter

replace



S148 811

240, 400, 700, 940/960

Petrol engines

240, 700, 940/960: The fuel filter is located on a bracket beside the fuel pump under the car. **Note!** On the 240 with the B 230 E engine, it is located in the engine compartment.

400 injection engines: The fuel filter is located to the right of the fuel tank.

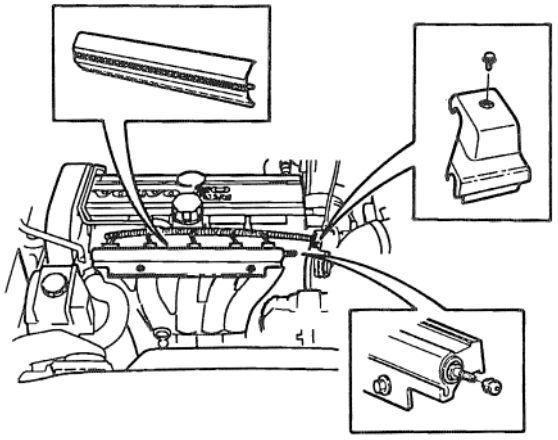
Connect the puncturing tool and fluid suction pump

Undo the filter from the bracket. Clean the connections. Connect puncturing tool 999 **5413**. Connect the hose from the puncturing tool to the fuel suction unit (981 **2270, 2273 and 2282**). This method is described in detail in service bulletin 2-23-713.

Drain the fuel.

Insert a new fuel filter.

The direction of flow is marked with an arrow on the fuel filter.



S151143

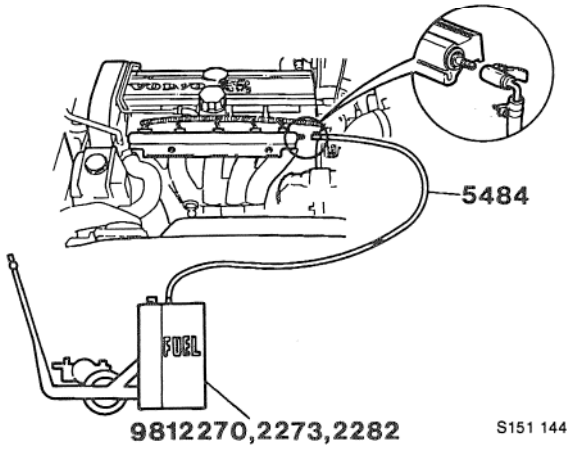
800

Empty the fuel system

Remove:

- the cover above the throttle control pulley
- the cover over the fuel distribution pipe
- the cover for the valve on the fuel distribution pipe.

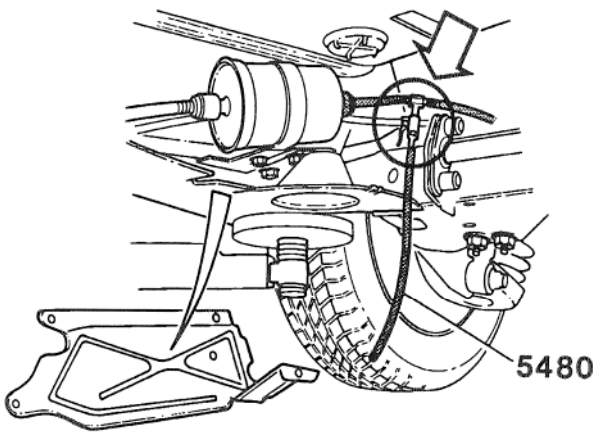
Connect tool 999 **5484** hose/nipple to the fuel suction unit 981 **2270, 2273 and 2282**. Start the suction pump.



S151 144

Connect the nipple from the suction pump to the valve on the distribution pipe.

Raise the car.



S151 145

Remove:

– the cover above the fuel filter (previous version)

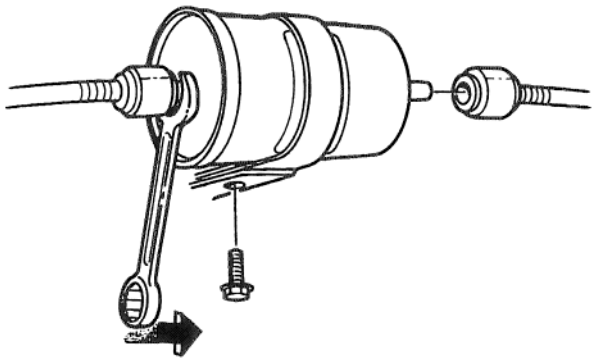
– the cover for the valve beside the fuel filter

Connect tool 999 **5480** nipple to the valve ahead of the fuel filter.

Drainage of the system takes about 2 minutes.

Reinstall the equipment in the reverse order.

Important!
Do not forget to refit the covers above the valves.



S151 146

Replace the fuel filter

Undo the quick-release couplings from the fuel filter with the help of a 17 mm wrench by pushing the sleeves to the rear.

Undo the screw which retains the clamp around the filter.

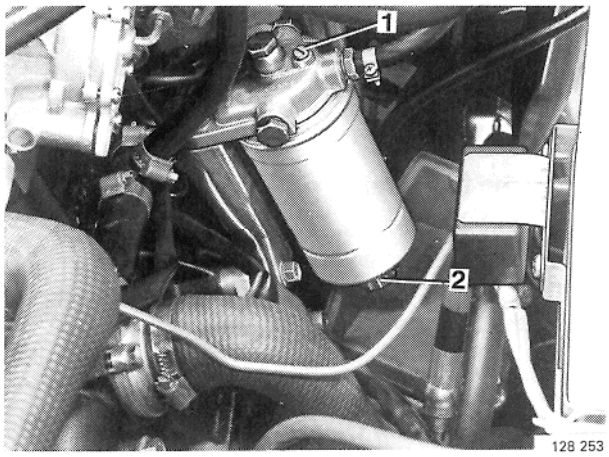
Replace the filter.

Refit in reverse order.

B12 - Fuel filter

drain water

D 24



128 253

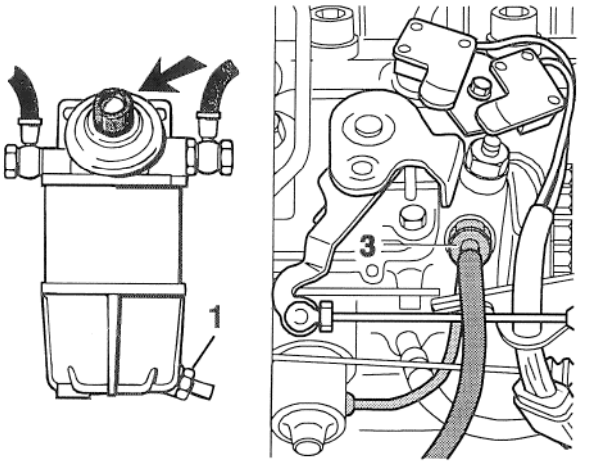
Drain water

Undo the bleeder screw (1) a few turns.

Undo the drain screw (**2**). Tighten the screw when clean fuel comes through.

Tighten the bleeder screw.

D 19 T



1700021A

Drain the water

Place a container below the filter. Connect a hose to the drain screw (1) and let it hang down into the container.

Open the bleeder screw (**3**) on the fuel pump.

Undo the bleeder screw (1) and tighten it again when clean fuel comes through.

Bleed the system

Move the hose to the air screw (**3**) on the fuel pump.

Use the filter's manual pump to pump fuel until clean fuel comes through the air screw.

Shut the air screw and remove the hose.

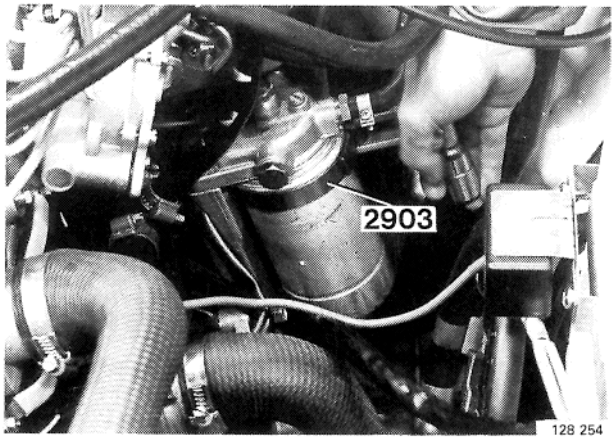
Pump a few more times until a slight resistance is felt.

Start the engine and check that there is no leakage.

B13 - Fuel filter

replace

D 24



128 254

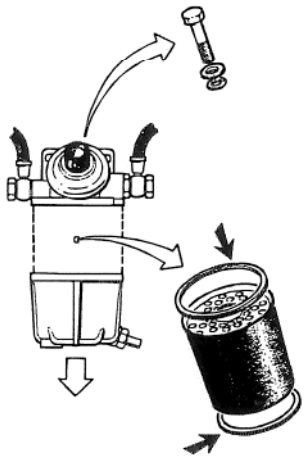
Replace the fuel filter

Use tool **2903**

For fitting: Apply diesel oil to the rubber seal. Tighten by hand until the seal is properly in place. Tighten additionally one 1/4 turn.

Start the engine and check for leakage.

D 19 T


1700020A

Replace the fuel filter

Drain the fuel as per B 12.
Tighten the drain plug and remove the hose.
Undo the centre screw and remove the filter housing and its insert. Remove the insert. Clean the components.

Lubricate the O-rings with diesel oil
(**Note!** always use new O-rings).
Fit all the O-rings.

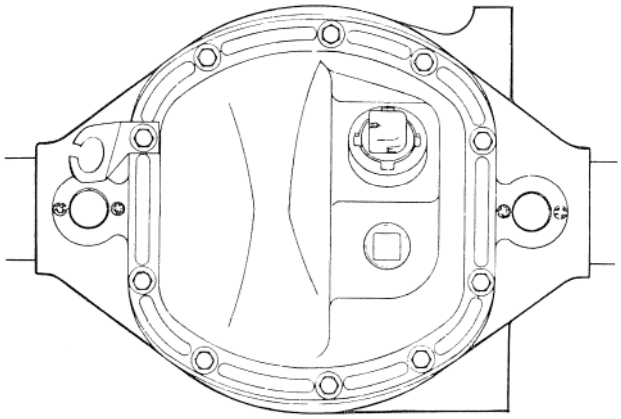
Place the new insert in the filter housing and tighten the housing with the help of the centre screw.
Torque: 10 Nm.

Bleed the system as per B 12.

B14 - Final drive

Check for leakage - oil level

240, 700, 940/960



S141 022

Check that there is no leakage from the final drive. If there is any leakage, the oil level **must** be checked and the final drive topped up if necessary.

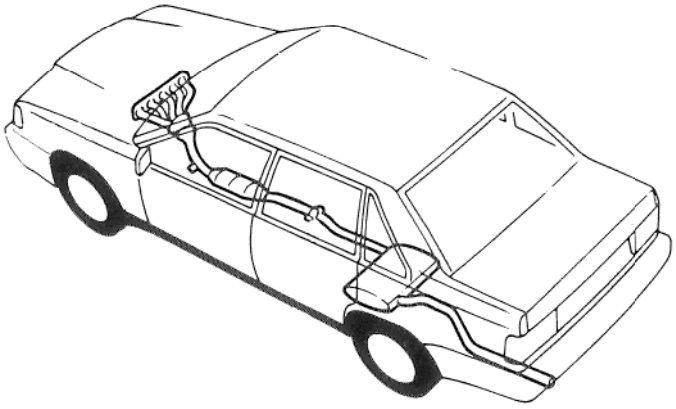
Top up with oil quality API-GL-5 (MIL-L-2105 B or C), rec.: Volvo's final drive oil, P/N 11 61 329-6 (0.5 litres).

Note! Fit a new seal.

B15 - Exhaust system

check

All



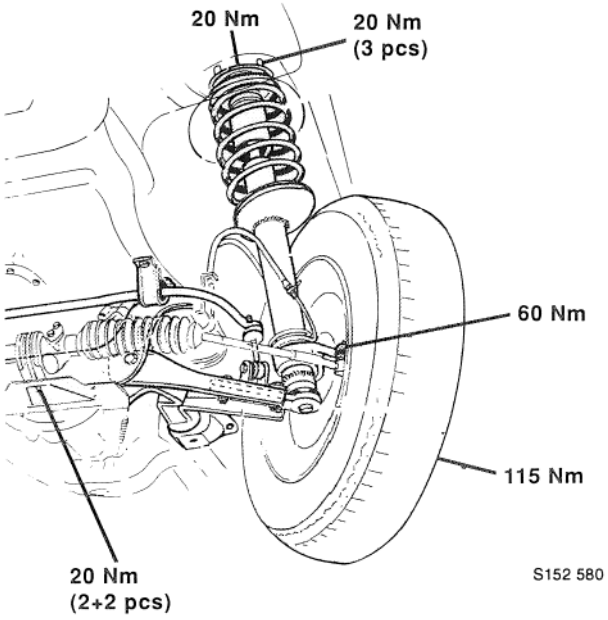
S152 583

Check from underneath

- Leakage
- Attachment
- Condition

C1 - Steering system/front suspension

Tighten the bolts



200

Only at 15,000 km

Front suspension - check/tighten

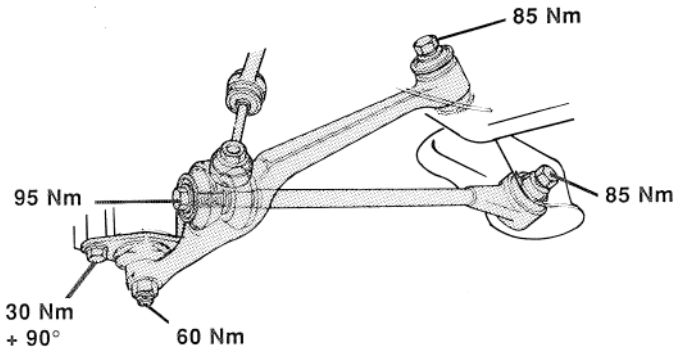
If necessary, remove the protecting plate.

Check/tighten the front suspension, steering gear and engine mounting bolts.

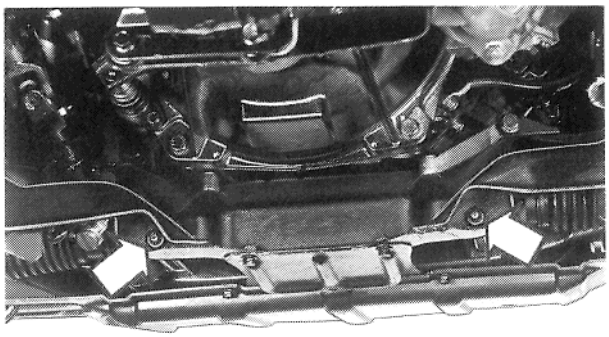
Note! This illustration should be regarded as a guide for subsequent tightening of bolts to the correct torque.

700, 940/960

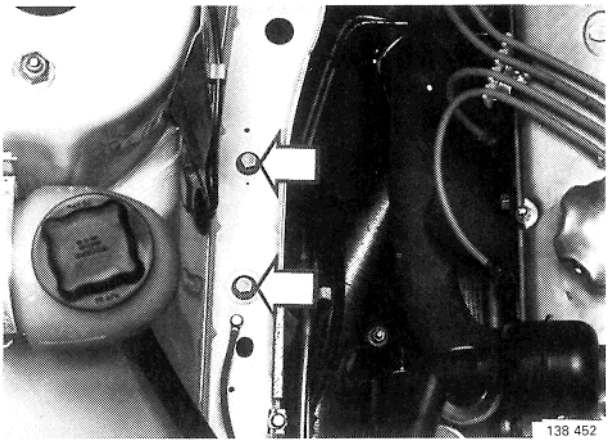
Only at 15,000 km



Control arm, control arm stay and steering gear - tighten



Tighten the steering gear nuts to: **44 Nm** (4.4 kpm).

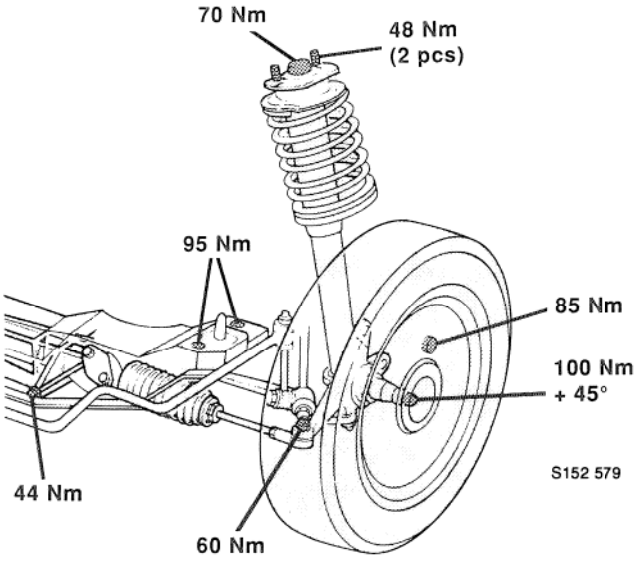


Bolts for front axle member - tighten

Tighten the bolts to:

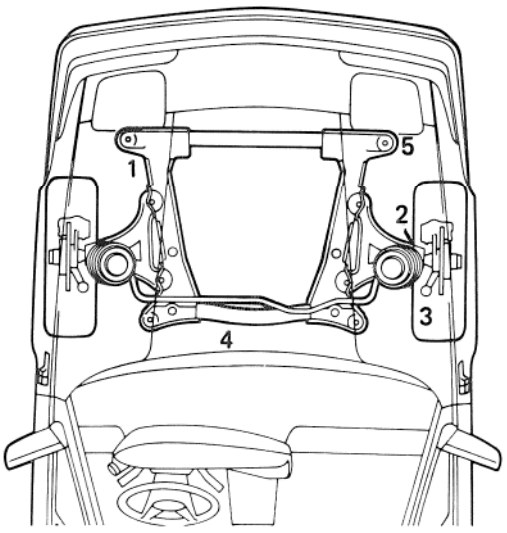
Torque: **95 Nm** (9.5 kpm).

Note! Torque figures given in the figures should be regarded as a guide for subsequent tightening of bolts to the correct torque when necessary.



400

Only at 15,000 km



Front suspension

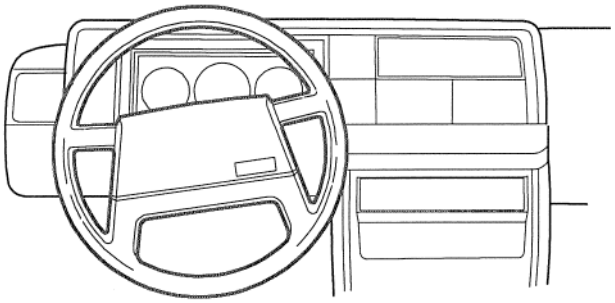
1. Control arms (4 pcs.)	80 Nm
2. Ball joints (2 pcs.)	75 Nm
3. Steering rod joints (2 pcs.)	55 Nm
4. Steering shaft anchorages (4 pcs.)	27 Nm
5. Subframe (4 pcs.)	90 Nm

Note! The torque figures in the illustrations should be regarded as a guide for subsequent tightening of bolts to the correct torque, if necessary.

C2 - Steering system/front suspension

check for wear

All



85 00347A

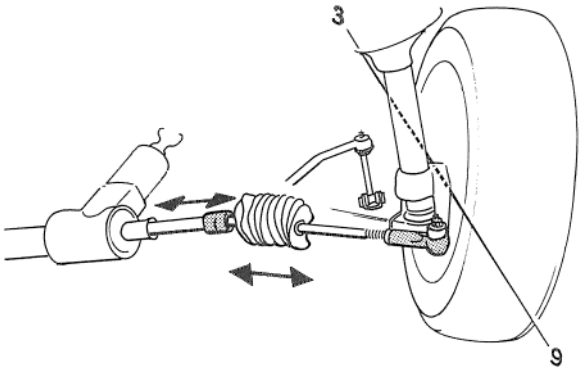
Steering gear - check

With the wheels on the floor:

Turn the steering wheel and check for play in the straight-ahead position.

With the wheels lifted off the floor:

Check for stiffness in the steering by turning the steering wheel full lock left and right.



S118 560

Steering rod ends - check for play

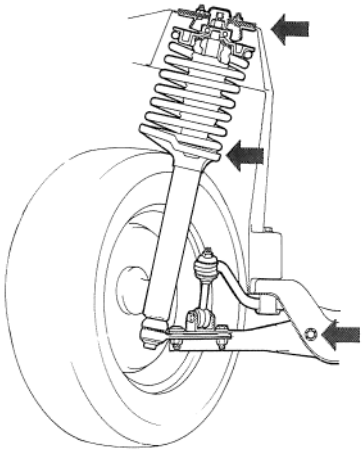
Jerk the wheel at 3 and 9 o'clock (wheel straight ahead).

Radial play max. **0.5 mm.**

Rack and inner steering joint - check axial play

Jerk the wheel at 3 and 9 o'clock.

Max. play in rack:
200, 700, 940/960.....2.0 mm
400 .....0.5 mm
Max. play, inner steering joint:
200, 700, 940/960.....1.0 mm
400 .....0.5 mm

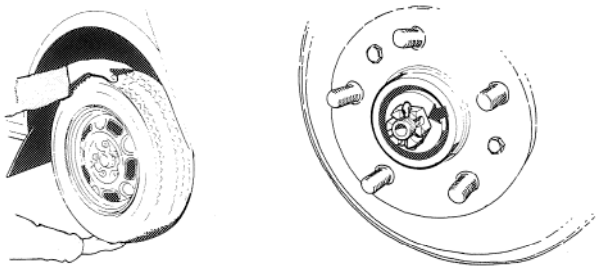


S118 564

Spring strut and anchorage - check for play

Turn the wheel to max. lock.

Jerk the wheel at 6 o'clock and check:
- control arm bushings
- shock absorber rod
- upper spring strut anchorage.

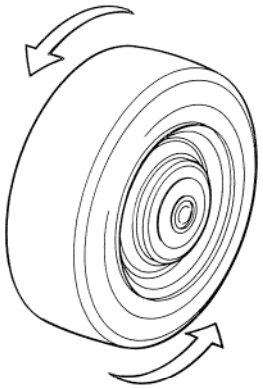


S129 111

Wheel bearings - check for play (only 240)

Grip the wheel at 6 o'clock and check for play. Adjust if necessary.

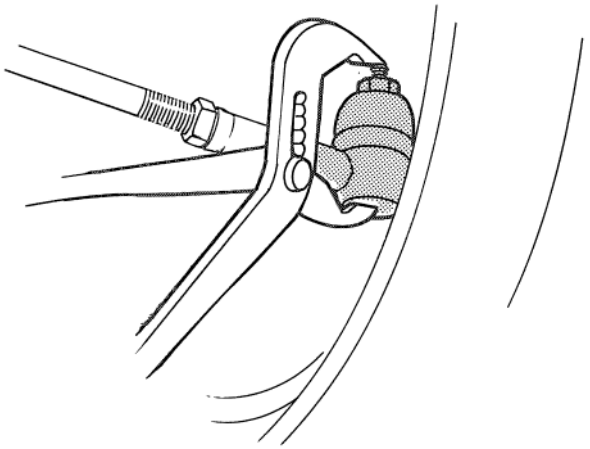
Adjustment: Remove the wheel hub cover. Fit a new nut and tighten to **5 Nm**. Turn the nut back **90°**. Lock the nut. Refit the cover.



S118 561

Wheel bearings - check for abnormal noise

Note! Poorly fitting wheel bearings may result in abnormal noise.



S118 555

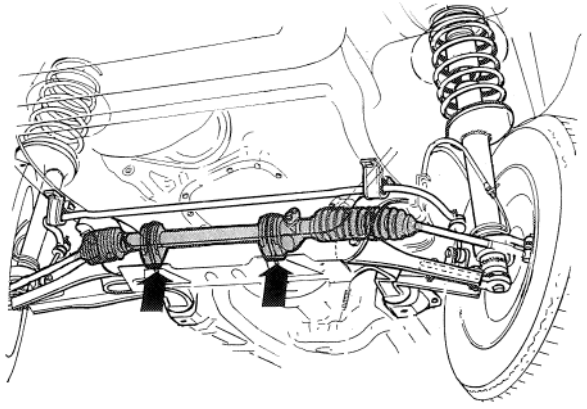
Steering rod - check

- rubber gaiters
- that the nuts are locked
- steering rods (damage)
- that there are no signs of wear. (Rotate the rod around its own axis)
- axial play (squeeze the joints with a pair of adjustable pliers).

Max. play:	axial	radial
All	1 mm	0.5 mm

The following faults should be rectified immediately:

- damaged rubber gaiter
- damaged steering rod
- worn steering joints.



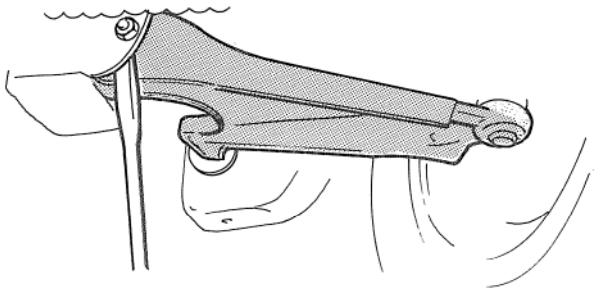
S118 563

Steering gear - check anchorage

Remove the protective plate.

Check that the steering gear is properly anchored by trying to move it by hand.

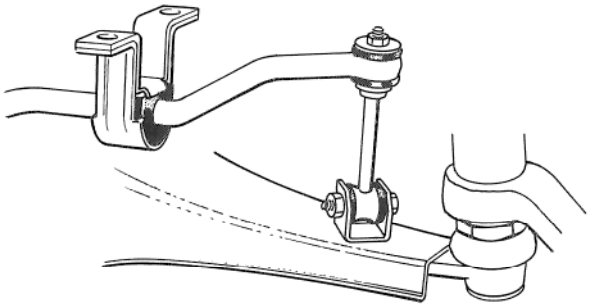
Steering gear rubber gaiters - check for damage



S118 566

Control arms, control arm bushings, check

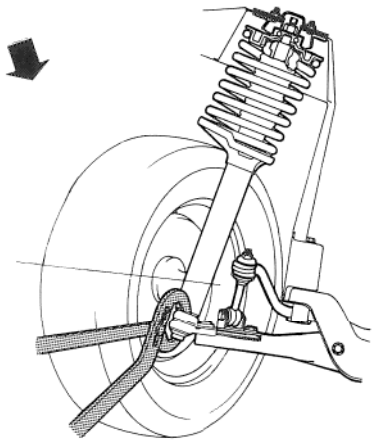
- play
- damage



S118 567

Anti-roll bar, reaction rod - check

- attachments
- rubber bushings



S118 564b

Ball joints - check

Check with the car resting on its wheels:

- play in the ball joint
- rubber gaiter. Damaged gaiters should be replaced immediately.

Axial play max. **1 mm**.

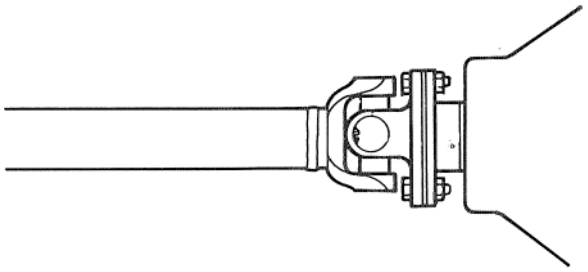
Radial play max. **0.5 mm**.

Shock absorbers - check operation.

C3 - Propeller shaft and support bearings

check

240, 700, 940/960



S143 582

Check

- that the bolts for the spider and flanges are properly tightened
- spider (wear)
- support bearing and holder for play
- that the bellows are not damaged and are correctly fitted

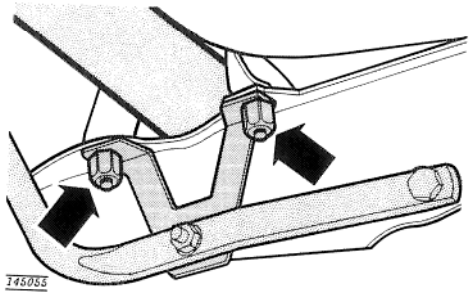
C4 - Rear suspension

Check/tighten the bolts

200, 700, 940/960

Only at 15,000 km

*(**Note!** 960 M/Y 1995 not to be check/tightened)*



S145 055

Rear suspension - check/tighten

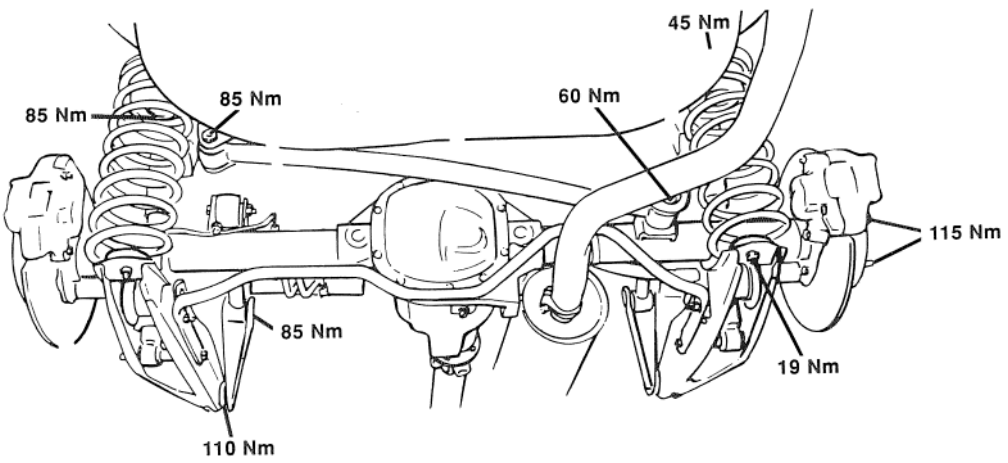
To be check/tightened on the 700, 940/960:

Support arm nuts. Tighten to **45 Nm** (4.5 kpm)

Check/tighten the attachment of the support arms, torque rods, anti-roll bar and shock absorbers.

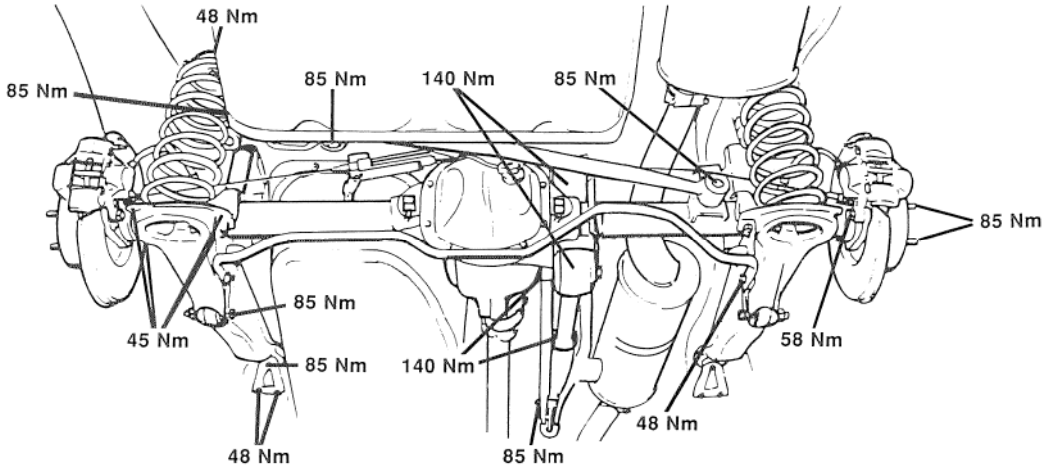
Note! The figures should be regarded as a guide for subsequent tightening of the bolts to the correct torque, if necessary.

240



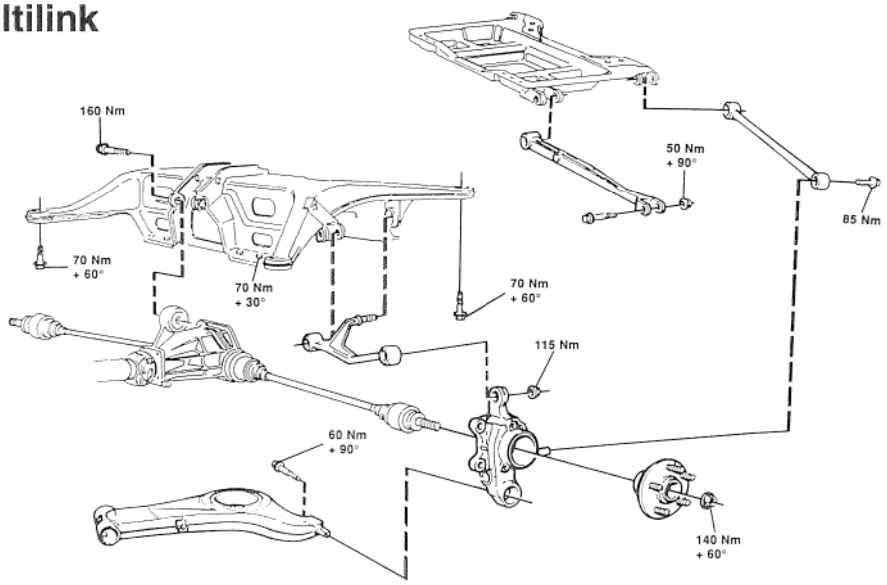
S152 590

700, 940/960 with live rear axle



6500217S

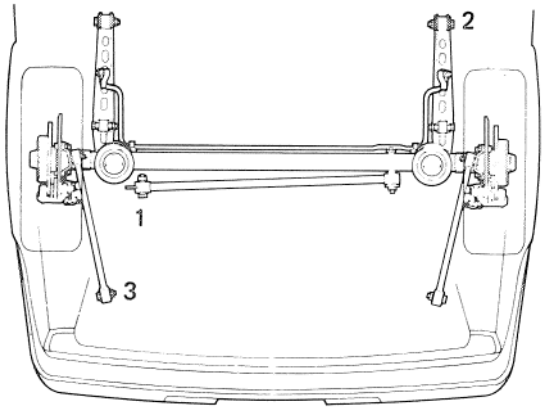
960 with multilink



6500017S

400

Only at 15,000 km



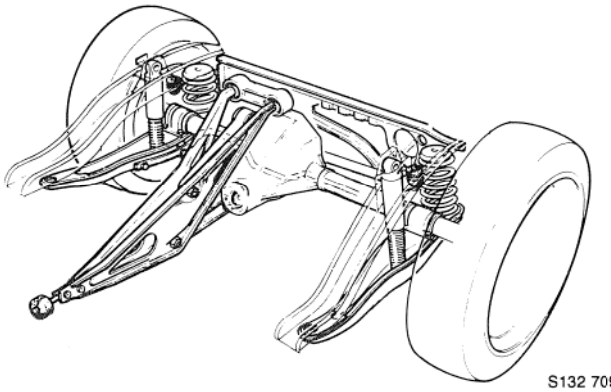
S152 581

Check-tighten

1. Panhard rod bolt, rear axle (1 pc.)	100 Nm
2. Panhard rod bolt, body (1 pc.)	75 Nm
3. Control arm bolts (4 pcs.)	52 Nm
4. Torque rod bolts (4 pcs.)	40 Nm

C5 - Rear suspension

check for wear



S132 709

All

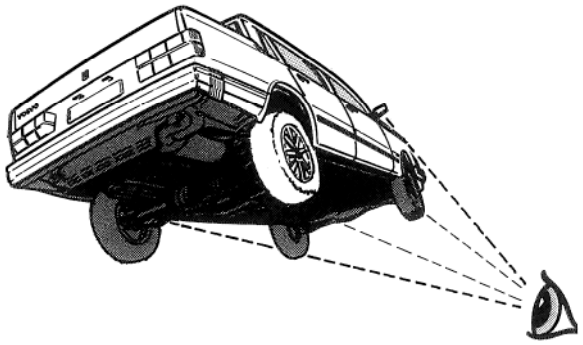
Use a crowbar to check the attachment of:

- the support arms
- torque rods
- Panhard rod
- anti-roll bar

Check the mounting and condition of the springs and shock absorbers.

C6 - Corrosion protection/paintwork

check



S139 091

All

Check:

- paintwork
- that no load-bearing components are corrosion-damaged
- that underseal has not been scraped away or otherwise removed

Note! Markets with corrosion warranty: Inspection after 3 and 6 years, see service bulletins in section 1(18).

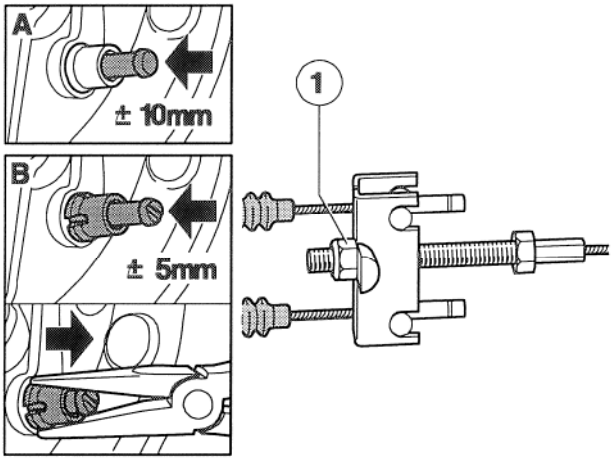
C7- Drum brakes rear

check

400

Remove the brake drums.

Remove the wheel. Remove the recessed screw from the brake drum. Knock the brake drum loose from its position and remove the drum. If necessary, push back the brake shoes with a screwdriver inserted into the inspection hole in the protecting plate.



1700027A

Resetting the parking brake

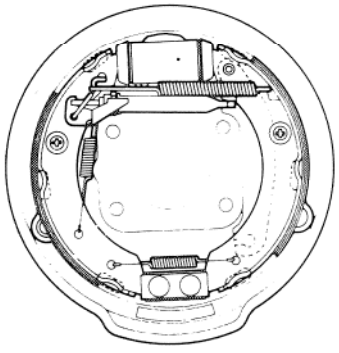
(*only done if the brake drum cannot be removed as above*).

Pull the parking brake lever tight so that the pin at the rear of the protecting plate can be pushed in as necessary. Pull out the pin as below:

- Type **A**, white (early model): press in the pin about **10 mm**. Spin out the socket together with the pin.
- Type **B**, black (later model): press in the pin about **5 mm**.
  Press the tabs against each other with a pair of pliers and remove the socket together with the pin.

Note:

Tighten the lock nut (**1**) if the pin cannot be pressed in sufficiently. Release the parking brake and press back the lock nut as far as possible.



S152 587

Check

- possible leakage from the brake cylinders
- position of the adjustment mechanism
- brake lining wear
- brake drum wear

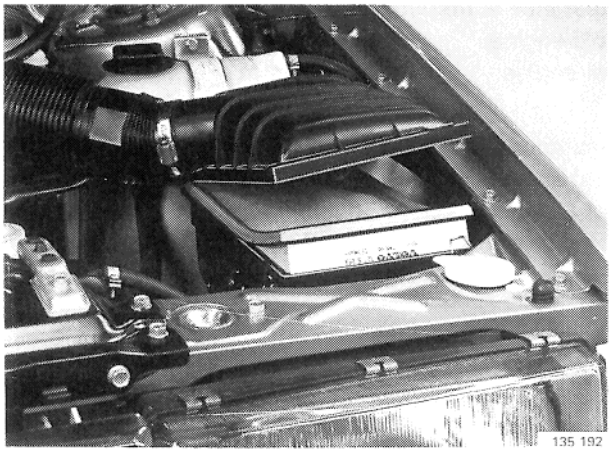
If the brake linings are worn to near **1 mm** thickness, the car owner must be informed that the linings will have to be replaced in the very near future.

Brake drum inner diameter, **max. 204.7 mm**

Inner diameter after machining, **max. 204.2 mm**

D1 - Air filter

replace


135 192

All

Remove the cover from the air filter housing. Remove the air filter. If necessary, clean the bottom of the filter housing.

Insert the new filter and refit the cover.

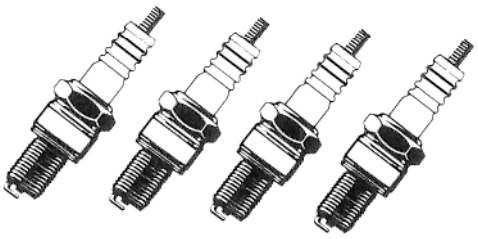
850: Replace the filter for the control unit box

Undo the quick-release fasteners and remove the air duct from the anchorage on the front member. Replace the filter and refit the air duct.

If the car is driven in adverse conditions, e.g. frequently on abnormally sandy or unpaved roads, the filter should be replaced more often.

D2 - Spark plugs

replace


S139 011

Tightening torques for spark plugs, Nm (kpm)

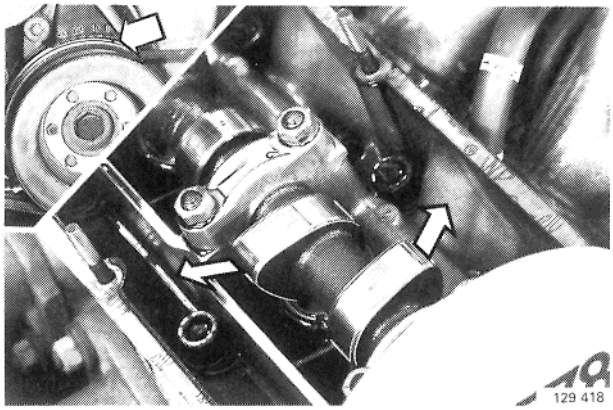
B 16/18/20	25 (2.5)
B 200/230	25 (2.5)
B 204/234	25 (2.5)
B 280	12 (1.2)
B 5204/5254, B 5202/5252	25 (2.5)
B 5204/5234 T	25 (2.5)
B 6254/6304	25 (2.5)

Electrode gap, spark plugs

400	0.8-0.9 mm
Others	0.7-0.8 mm

D3 - Valves

check/adjust


129 418

B 200-230

*Special tool 999 **5022 - 5026***

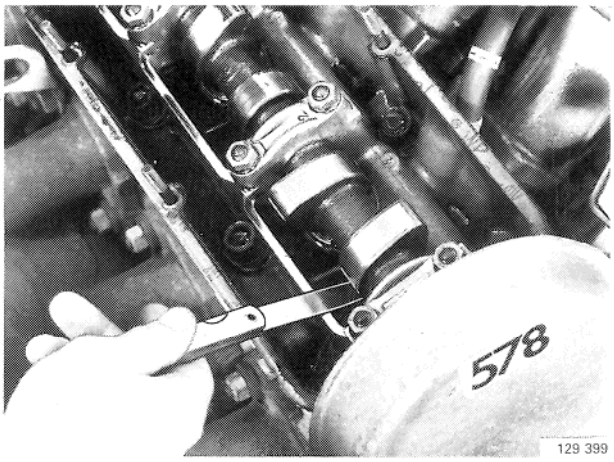
1

Undo the valve cover and remove it

Set the camshaft to TDC - combustion for cyl. 1

The cams for cyl. 1 should be offset upwards and the pulley ignition marking should be at 0.

Note! Always rotate the crankshaft's centre bolt.



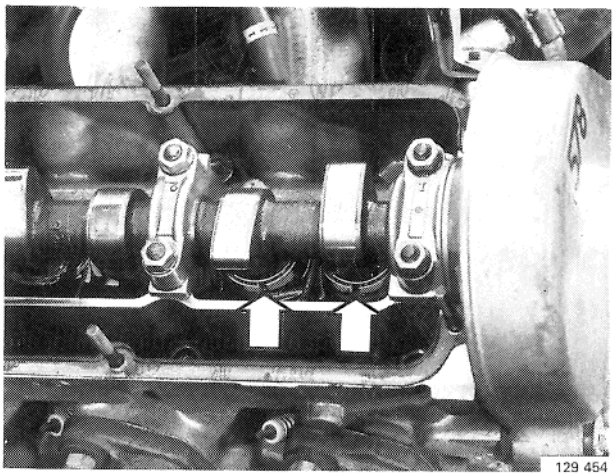
129 399

2

Measure and note the valve clearance for cyl. 1

Clearance at **inspection:**
Cold engine: **0.30-0.40 mm**
Hot engine: **0.35-0.45 mm**

Clearance at **adjustment:**
Cold engine: **0.35 mm**
Hot engine: **0.40 mm**
Same clearance for inlet and exhaust.


129 454

For wrong clearance (3-6):

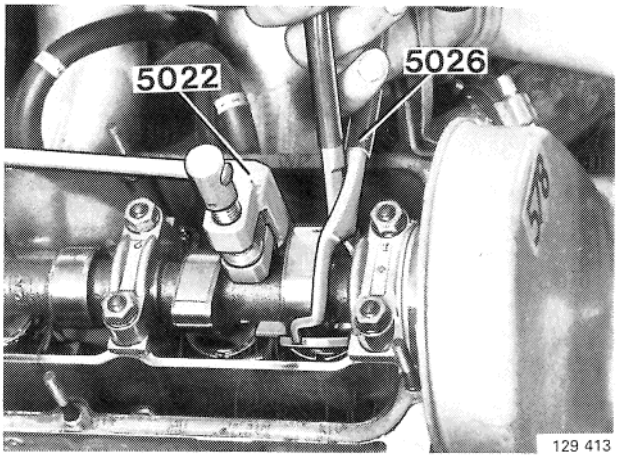
3

Turn the engine about another 1/4 revolution

Piston should NOT be at TDC when adjusting valves, otherwise valves may strike the piston when the tappets are pressed down.

Turn the tappet

The grooves should be at right angles to the camshaft's longitudinal direction.

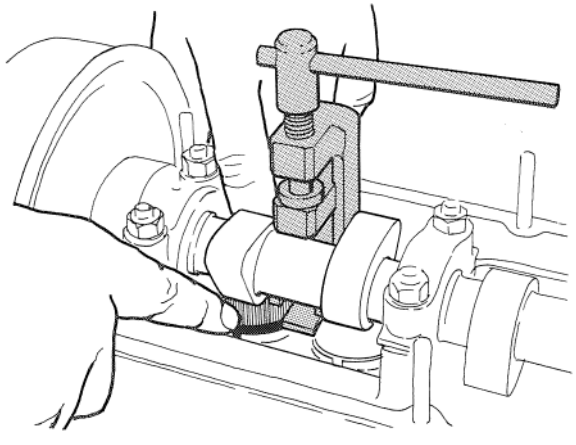


129 413

4

Press the tappet down with tool 999 5022. Remove the washer with 999 5026

The groove in the tappet should be located above the edge so that the washer is accessible with a pair of pliers.


S120 779

5

Measure the washer's thickness with a micrometer

Calculate the thickness of the washer to be used

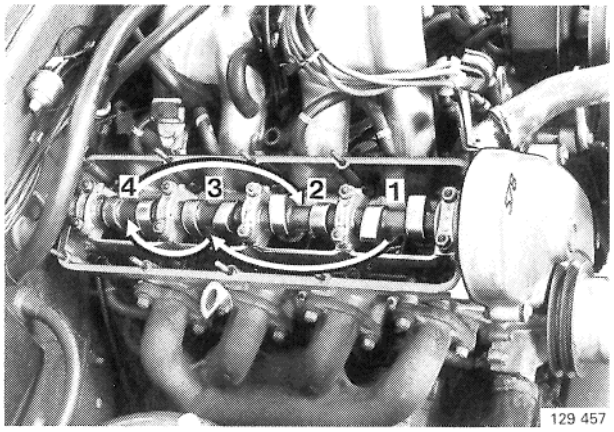
Example:

Measured play: 0.25 mm. Correct play: 0.40 mm. Difference in play -0.15 mm.

Measured thickness of existing washer: 3.80 mm. Correct thickness of new washer: 3.80-0.15=3.65 mm.

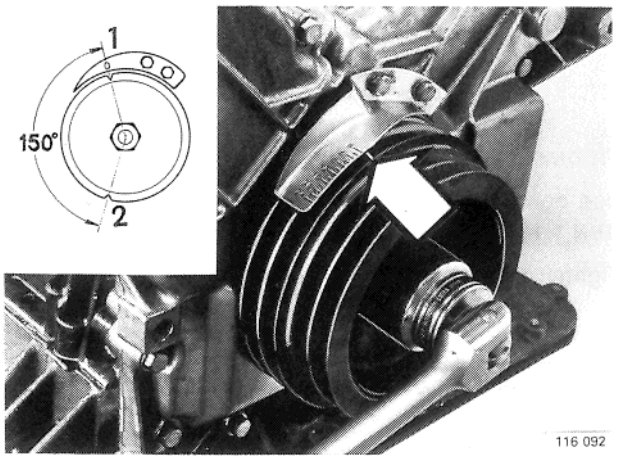
Use only new washers.

Available in thicknesses 3.30-4.50 mm in increments of 0.05 mm.

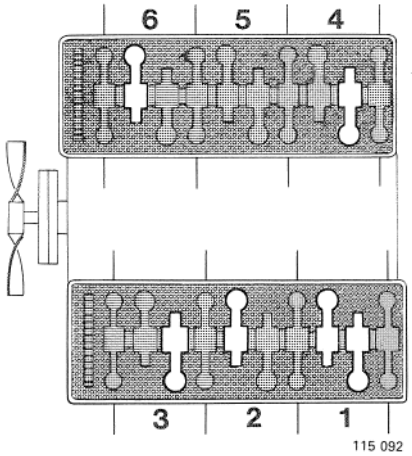


129 457

131 414



116 092



115 092 S115 092

6

Lubricate and fit the new washer

Note! The washer should be fitted with the marking facing down.

Remove press tool 999 **5022**.

7

Check and if necessary adjust valve clearance for the other cylinders in sequence 3,4,2

8

Turn the engine over a few revolutions with the starter motor

Then check the clearance again. Adjust if necessary.

9

Fit the valve cover.

Use a new gasket.

10

Fit new hoses and ignition cables.

Refit all other parts which were removed.

B280

1

Remove the valve covers

Rotate the crankshaft to ignition position for cylinder 1

36 mm socket.

Marking 1 on the pulley should be opposite the 0-marking on the timing plate. Both the rocker arms for cylinder 1 should have adequate play.

Note! There are two marks on the pulley, 1 = TDC cyl. 1 and 2 = TDC cyl. 6.

2

Check/adjust valve clearance

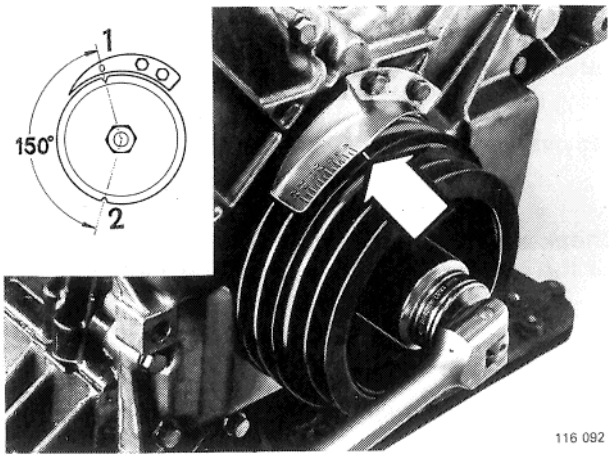
In the set position, the following valves are checked:

Inlet: cylinders 1,2 and 4
Exhaust: cylinders 1,3 and 6

Valve clearance (mm)

Inlet valve	cold engine	0.10-0.15
	hot engine	0.15-0.20
Exhaust valve	cold engine	0.25-0.30
	hot engine	0.30-0.35

3

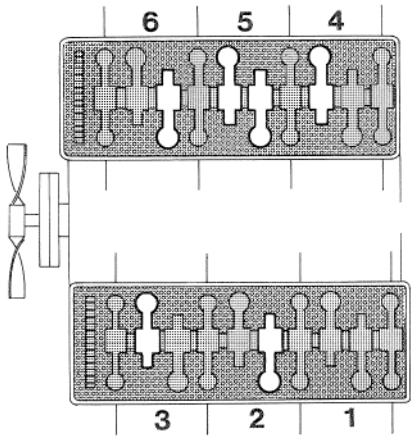


116 092

Rotate the crankshaft one revolution to gas exchange cylinder 1

Marking 1 should be opposite the O-mark. The rocker arms for cylinder 1 should balance.

4



S115 093

Check/adjust valve clearance

At the set position, the following valves should be checked:

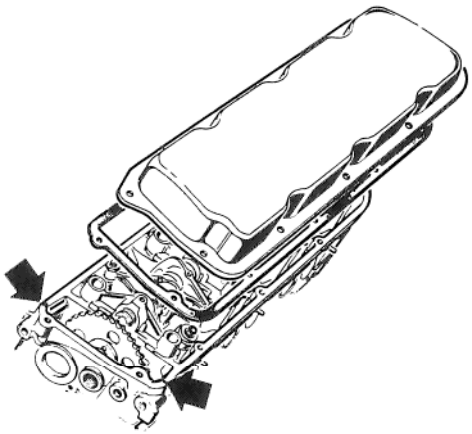
Inlet: cylinders 3,5 and 6

Exhaust: cylinders 2,4 and 5

5

Clean the sealing surfaces of the valve covers and cylinder heads

6



S135 034

Fit new gaskets and valve covers

Use new gaskets. Fix the gaskets with sealing agent (P/N 1 161 026-8) applied at a few points.

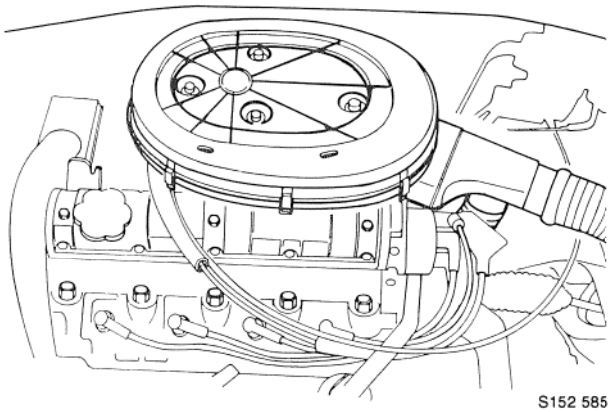
Tighten **10-15 Nm** (1.0-1.5 kpm).

T-joint between the valve cover, cylinder block and timing gear casing.
To ensure that the joint is entirely sealed, apply a thin string of silicon (P/N 11 61 231-4) above the joint.
Note! Do not apply too much silicon, because of the risk that silicon may enter the lubrication system and clog the oil ducts.

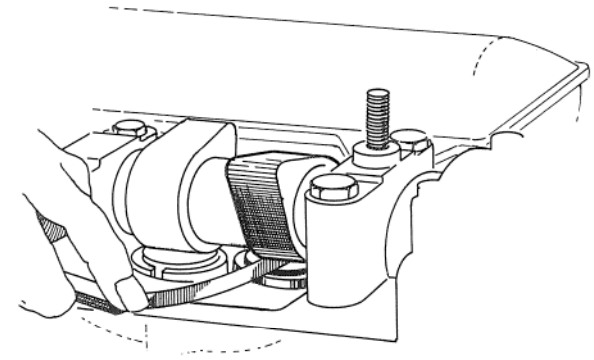
7

Refit the other parts which were disassembled

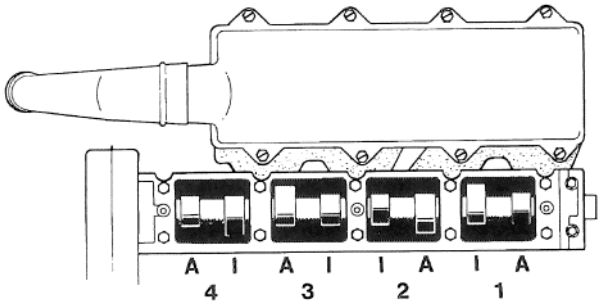
Use a new O-ring (gasket) for the vacuum pump, if fitted. Ensure that the pump shaft is at the upper side of the camshaft.



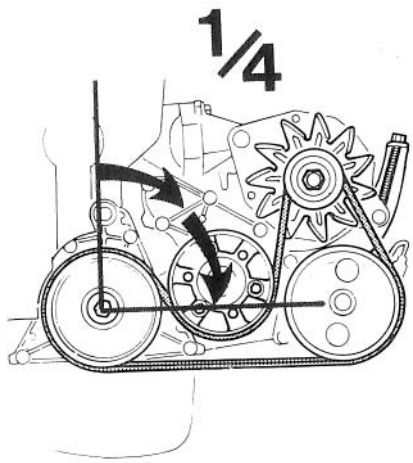
S152 585



S139 069



S139 067



S152 573

B 16, B 18, B 20, D 19 T

Special tool 5989

Note!
The valves can only be checked/tightened when the engine is cold.

1

Remove the valve cover

B18 K/KP/U, B 20: Remove the air cleaner.

B 16 F, B18 EP/FP/FT, B 20 F: Remove the inlet manifold bolts and the screw at the front of the cylinder head.
Remove the manifold and valve cover.

2

Set cylinder no. 1 at TDC

Note! Cylinder no. 1 is closest to the flywheel.

Always use the crankshaft centre bolt to rotate the crankshaft.

Both the cams on cylinder 1 should point offset upwards.

3

Check valve clearance for cylinder no. 1

Inlet valve	0.15-0.25 mm
Exhaust valve	0.35-0.45 mm
Exhaust valve (turbo)	0.45-0.55 mm

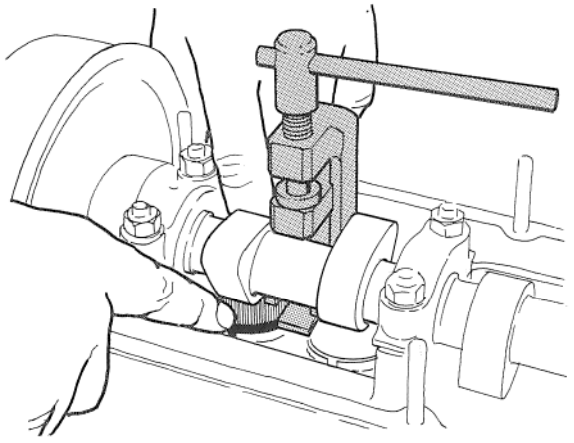
I = inlet valve
A = exhaust valve

If adjustment is necessary (steps 4-9)

4

Rotate the crankshaft another 1/4 revolution

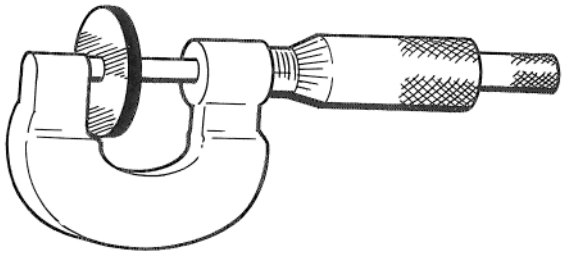
The piston should not be at TDC when valve clearance is adjusted, since the valves may otherwise strike the pistons when the tappets are pressed downwards.



S120 779

Press the tappets downwards with tool 999 5989 and remove the shims

Turn the tappets to the correct position, the grooves run slightly inwards.
Press on the tappets with tool **5989.**
Remove the shims.



S133 478

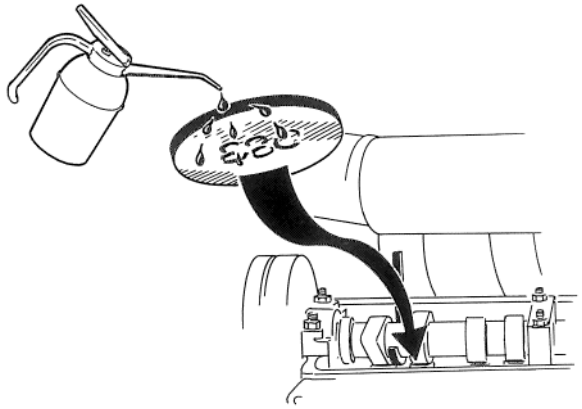
Calculate the thickness of the shim to be used

Adjustment

B 16, B18 without turbo, B 20	
Inlet valve	0.20-0.25 mm
Exhaust valve	0.40-0.45 mm
Turbo engine	
Inlet valve	0.20-0.25 mm
Exhaust valve	0.50-0.55 mm

Measure shim thickness with a micrometer and calculate the thickness of the shim which is required.

Carburettor engines:
Remove the fuel pump for adjustment of cylinder no. 4.



S128 162

Fit a new shim and remove tool 999 5989

Lubricate the shim and check that the assembly mark faces downwards towards the tappet.

Note! Always use new shims. Available in thicknesses from 3.25 mm to 4.25 mm in increments of 0.05 mm, and in thicknesses 4.30, 4.40 and 4.50 mm

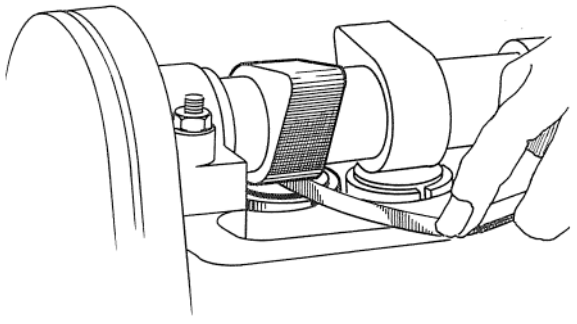
Rotate the crankshaft 1 3/4 revolution and check valve clearance again.

Check/adjust valve clearance for the remaining cylinders

Check valve clearance in the following sequence:

1-3-4-2.

Important! Do not forget to rotate the crankshaft a further 1/4 revolution before valve adjustment.



S128 156

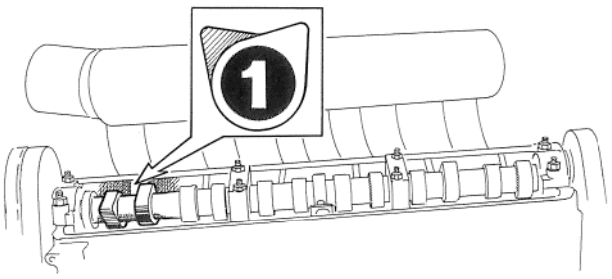
Refit the valve cover

Fit new gaskets. Apply sealing agent at the four corners (Volvo P/N 11 61 231-4)

B18 K/KP/U: Fit the fuel pump and air cleaner.
B 16 F, B18 EP/FP/FT, B 20 F: Fit the manifold. Tightening torque: **12 Nm.**

D24

*Special tool 999 **5188, 5195, 5196***



S128 155

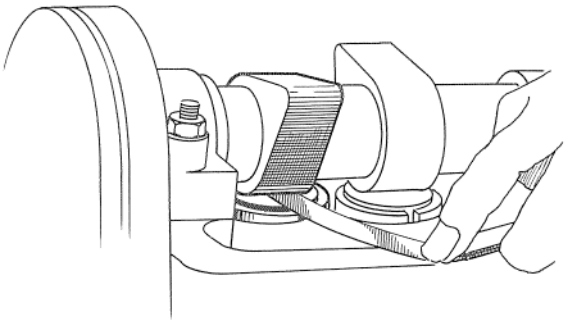
1

Set cylinder no. 1 at TDC - injection

Remove the valve cover

Always turn the vibration damper's centre screw, 27 mm socket tool 999 **5188** if necessary.

Both cams on the camshaft for cylinder 1 should point offset upwards.



S128 156

2

Check the valve clearance for cylinder no. 1

The following values are permitted at inspection:

Cold engine

Inlet ..... 0.15-0.35 mm

Exhaust ..... 0.35-0.45 mm

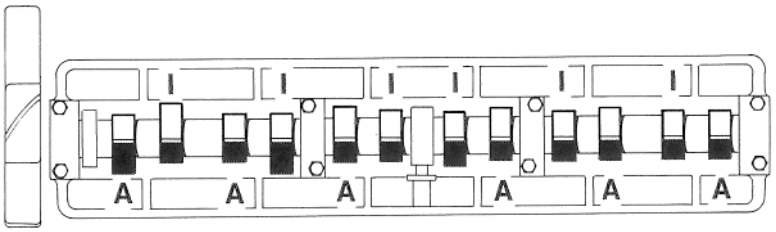
Hot engine

Inlet ..... 0.20-0.30 mm

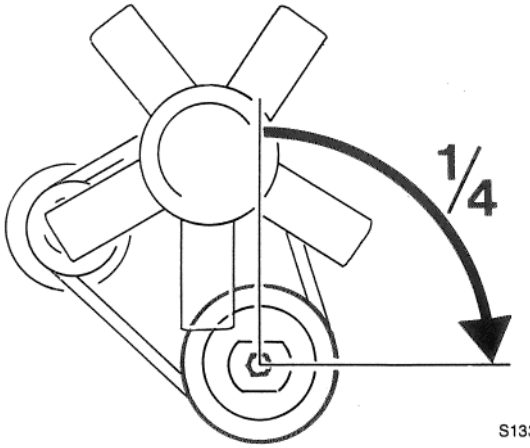
Exhaust ..... 0.40-0.50 mm

I = inlet valves

A = exhaust valves



S128 157



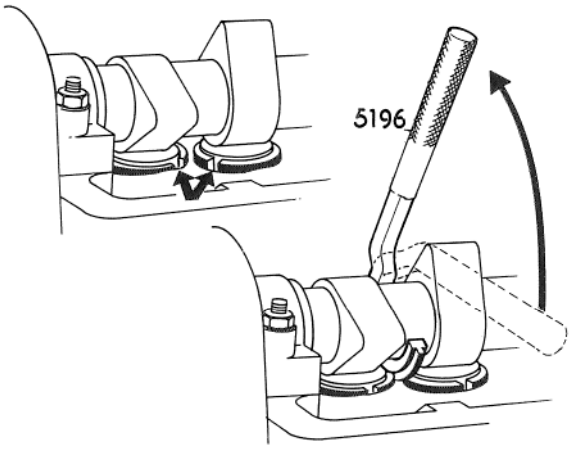
S133 522

If clearance is incorrect (steps 3-8):

3

Rotate the engine another approx. 1/4 revolution

When adjusting the clearance, the piston should not be at TDC, otherwise the valves may strike the pistons when the tappets are pressed downwards.



S128 159

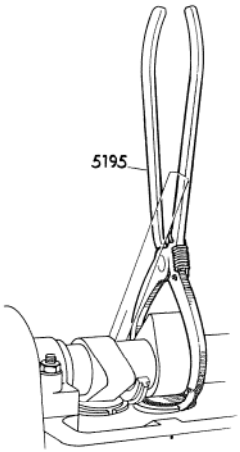
4

Press the tappets

Turn the tappets to the correct position, the grooves should point somewhat inwards.

Press the tappets downwards with tool 999 **5196**. The grooves in the tappets should be over the edge, so that the washer is accessible with a pair of pliers.

5

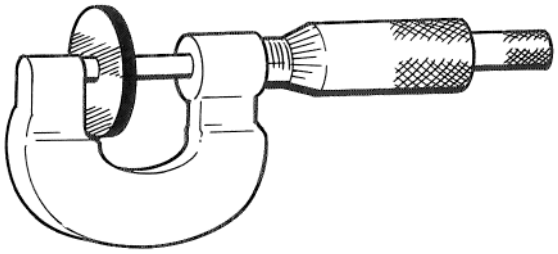


S128 160

Lift off the washer

User pliers 999 **5195**.

6



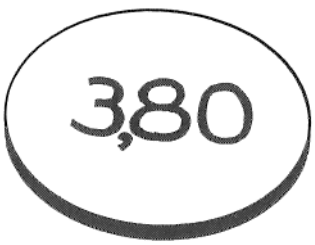
S133 478

Calculate the thickness of the washer which gives the correct clearance

The following data applies for setting:

Cold engine	mm
Inlet	0.20
Exhaust	0.40
Hot engine	
Inlet	0.25
Exhaust	0.45

Measure the thickness of the old washer with a micrometer. Calculate the thickness of the washer which is to be used.

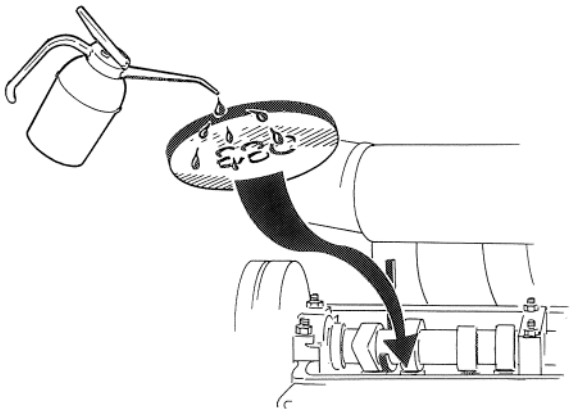


S133 479

Examples:

If the valve clearance is 0.20 mm and the required valve clearance is 0.25 mm, the existing washer should be replaced with one which is 0.05 mm thinner.

Use only new washers. They are available in thicknesses from 3.00-4.25 mm in increments of 0.05 mm.



S128 162

7

Fit the new washer and remove the tools

The washer should be lubricated and placed with the marking facing downwards, towards the tappet.

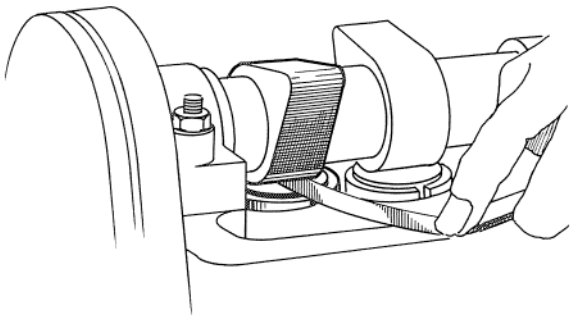
8

Check/adjust the valve clearance for the other cylinders

Check/adjust the valves in the following sequence:

1-5-3-6-2-4.

Important! Do not forget to rotate the crankshaft a further approx. 1/4 revolution before valve clearance is adjusted.



S128 156

9

Recheck valve clearance for all the cylinders

Turn the engine a few revolutions prior to checking.

10

Fit the valve cover

Use new gaskets if necessary.

D4 - Fill engine oil

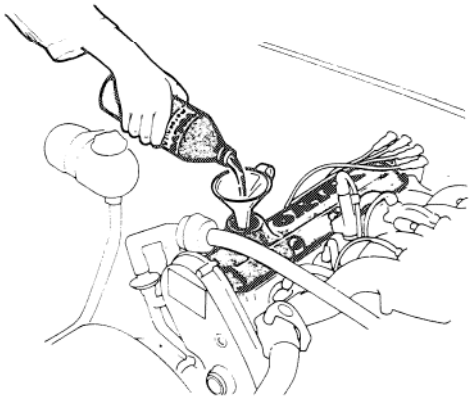
Oil quality

Engine type	Acc. to API-Service	Acc. to CCMC	Oil change interval
Petrol turbo engines	-------	min. class G5	15,000 km
Other petrol engines	min. class SG[1)]	min. class G4	15,000 km
Diesel engines	min. class CD[2)]	min. class D4	7,500 km[3)]

1) Oils with designation SG/CD meet this requirement.

2) Oils with designation SF/CD and SG/CD meet this requirement.

3) On all D 24 variants and D 19 T engine oil shall be changed every 7,500 km. Engine oil **and oil filter** every 15,000 km.



S144 538

200/700/900/800		400		
Engine	Litres	Model year	Engine	Litres
B 200/230	3.85	–1992	All	5.3
B 204/234	4.00	1993	All *	5.0
B 5202/5252	5.30	1994–	B 16, B 18	4.6
B 5204/5234/5254	5.30		B 20	5.7
B 280	6.00		D 19 T	5.0
B &244/6254/6304	5.75	* Chassis no. 401000– (440/460) & 585000– (480): 4.6 litres.		
D 24	6.00			

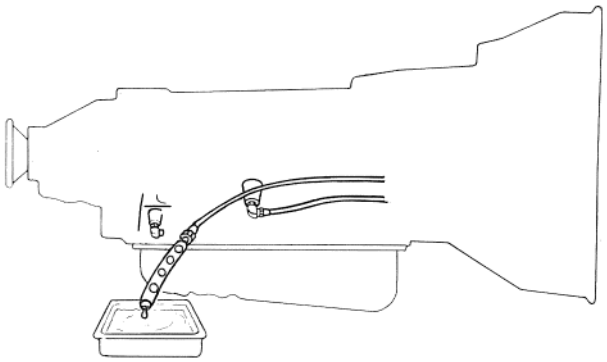
D5 - Automatic gearbox

fill oil

AW 70/71/72

Undo the rear connection for the oil cooler pipe

Connect a transparent plastic hose to the pipe

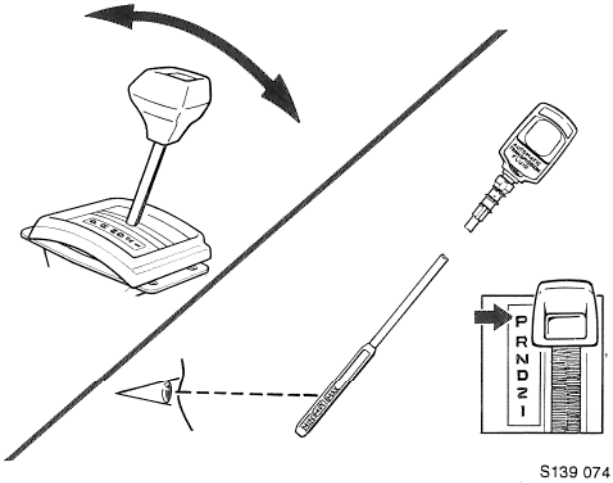


S139 060

Fill about 2 litres of oil

1. Start the engine and let it run at idle speed.
2. Switch off the engine when air bubbles appear in the hose.
3. Fill about 2 litres of oil

Repeat steps 1 and 2 once. Reattach the pipe to the gearbox.



S139 074

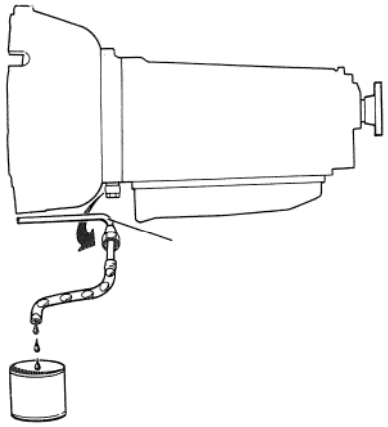
Fill about 2 litres of oil

Start the engine and let it run at idle speed
Move the gear selector lever between the different settings

Move the gear selector lever to P, wait 2 minutes, then check the oil level.

Top up if necessary.

ZF 4 HP 22



S139 061

Remove the lower return pipe from the oil cooler on the gearbox.

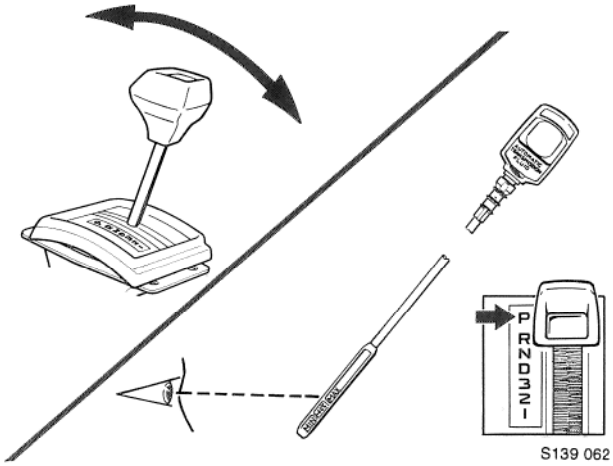
Connect a transparent plastic hose to the return pipe

Fill about 2.5 litres of oil (Dexron II D).

1. Start the engine and let it run at idling speed.
2. Switch off the engine when air bubbles appear in the hose.
3. Fill 2.5 litres of oil

Repeat steps 1 and 2 once and step 3 once.

Connect the return pipe to the gearbox.



S139 062

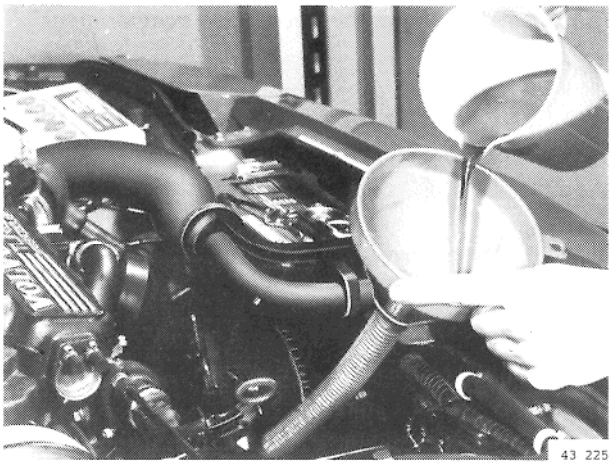
Fill about 2.5 litres of oil

Start the engine and let it run at idling speed. Move the gear selector lever between the various settings.

Check the oil level with the selector lever in P

Top up if necessary.

ZF 4 HP 14 Q and CVT



43 225

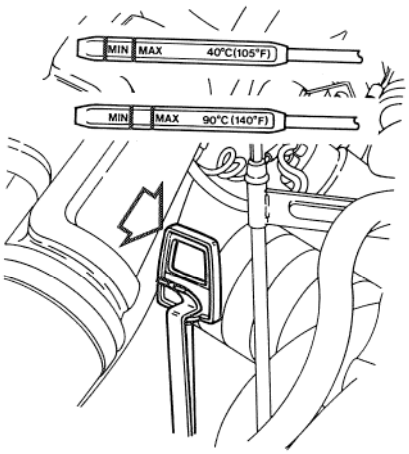
Warning! Top up oil with considerable care

Fill oil

Fill slowly through the dipstick tube. If too much oil is filled, the excess may be pressed out, resulting in leakage. Do not check the oil level immediately after filling. The oil in the pipe must have sufficient time to flow down into the sump, which means that a hasty level check may be incorrect.

Note! The engine must run at idling speed with the gear selector lever is P before the correct oil level can be read off. If engine speed is increased while the level is too low, the oil will be whipped up into a foam and the wrong level will be registered.
The oil level on CVT cars should be measured when the gearbox has attained normal operating temperature.

Oil capacity, CVT = **3.8 l.**
ZF = **3.3 l.**



S43 217

Move the gear lever back and forth between the various gear positions, and keep it in each position for at least 2 or 3 seconds. Select P and wait 2 minutes. Check the oil level.

Check the oil level

Wipe the dipstick with a nylon rag, chamois leather or a rag which does not fluff.

Insert the dipstick correctly (i.e. with the side marked "warm/cold" facing the gearbox).

The ZF unit has two measurement ranges: **A = cold oil**
B = hot oil

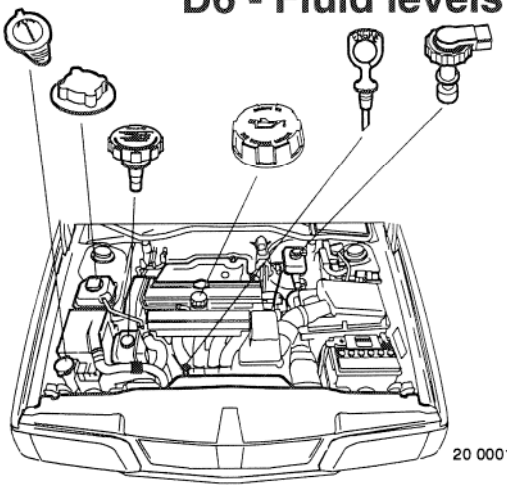
Pull up the dipstick after 4 seconds and read the level. The difference between max. and min. is: **ZF, 0.3 l**
CVT, 0.6 l

Top up if necessary with Volvo oil:
ZF P/N 33 44 208-8
CVT P/N 33 44 959-6

D6 - Fluid levels - engine compartment

check/adjust

All



20 00017A

Check the fluid levels in the

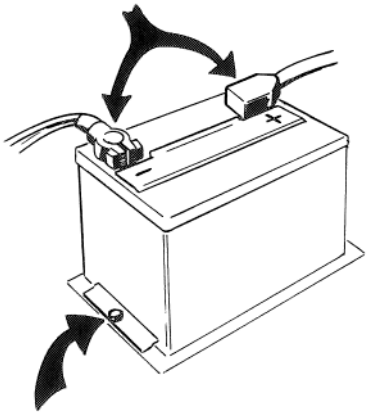
- cooling system, top up if necessary with **Genuine Volvo coolant,** mixed with clean water (50/50)
- brake fluid reservoir. Quality **DOT 4+**
- reservoir for power steering oil. If necessary, top up with **ATF-oil, type F or G**
- washer fluid reservoir.

The illustration shows the 850 engine compartment.

D7 - Battery

check level/anchorage

All



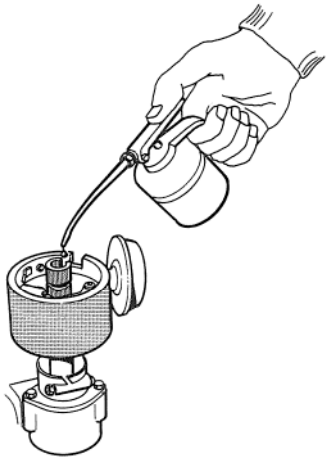
S118 583

Check that there is sufficient battery acid in all the battery cells. Top up if necessary with distilled water. Check that the battery is properly anchored and connected.

Clean the battery terminals (do not disconnect the cables) and apply vaseline to them.

D8 - Distributor

lubricate



S118 677

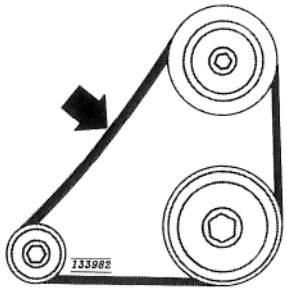
B 200-230 E in the 240

Lubricate the distributor shaft sparingly (1-2 drops of oil)

D9 - Auxiliary unit belts

check/adjust

Applies to engines which do not have multi-tooth belts



S133 982

Check belt tension.

It should be possible to press the middle of the belt about 5-10 mm.

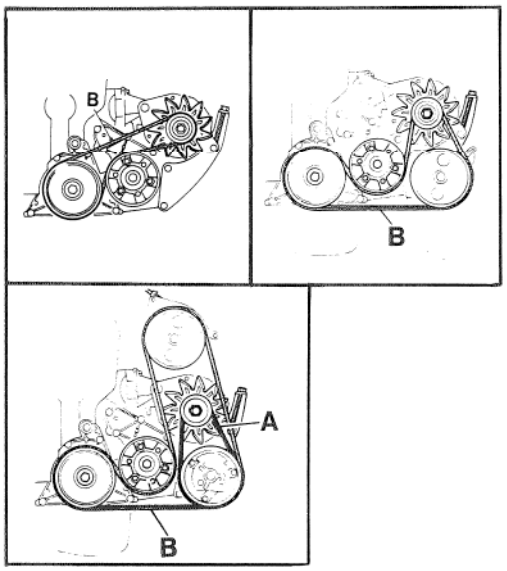
If necessary, adjust by changing the position of the alternator.

B 16, B 18, B 20, D 19 T

3-track belt

Check belt tension with gauge 115 9660

Measure at **A**.



S152 575

6-track belt

Check belt tension with special tools 999 5434 and 999 5436

Measure at **B**.

Remove the right-hand protecting cover for measuring under **B**.

Engine type	Check min. value*	Adjustment "run-in" belt	Adjustment new belt
3-track belt Tool 115 9660			
	20 kg	30-35 kg	45-50 kg
6-track belt Tool 999 5434/999 5436			
Basic version	4.5 mm	4 mm	3-4 mm
Single option	3.5 mm	3 mm	2-3 mm
Double option	3.5 mm	3 mm	2-3 mm
D 19 T	4.5 mm	3 mm	2-3 mm

* If belt tension has dropped below the control value, the tension shall be adjusted to the nominal value for a "run-in" belt.

D10 - Auxiliary drive belt

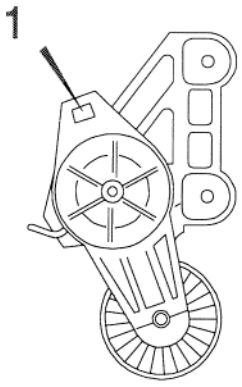
grease the belt tensioner/replace belt

As of model year 1995, the belt tensioner is a maintenance-free unit

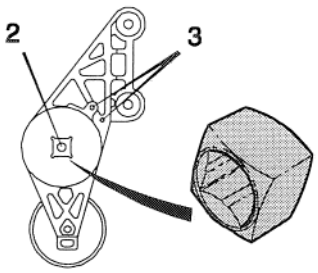
(Grease the belt tensioner every 45,000 km, fit a new belt every 90,000 km)

B 5202/5204/5234/5252/5254

1



2100271A



2100272A

Remove the auxiliary drive belt

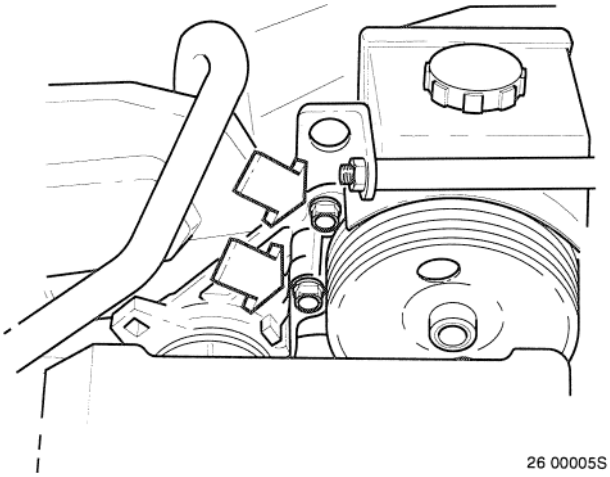
Use an articulated wrench with a 3/8" socket (**1**) in the belt tensioner to loosen the belt.

On the 1995 model, use tool 999 **5547** in the belt tensioner's centre (**2**).

Lock the belt tensioner in its service setting with a lock pin in the holes (**3**) when they are above one another.

Remove the belt.

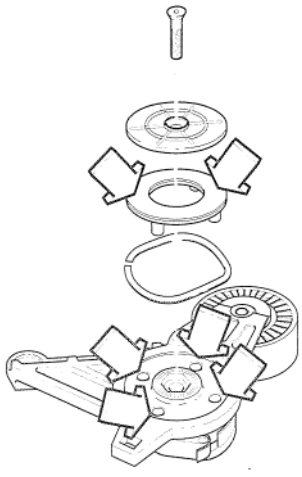
2



26 00005S

Remove the belt tensioner

Undo the belt tensioner's two screws and remove the tensioner.



26 00001S

3

Grease the automatic tensioner pulley

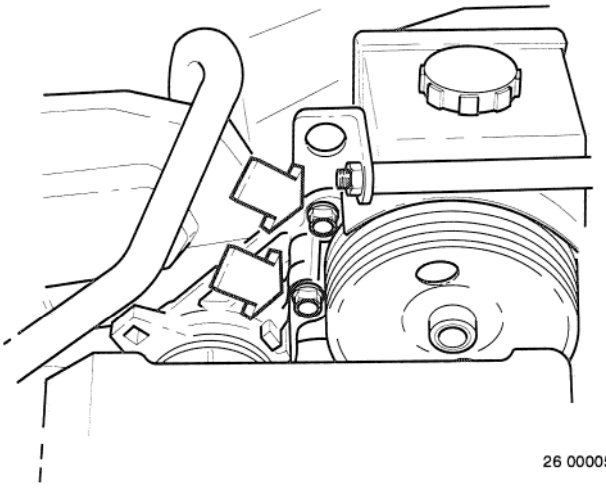
(not M/Y 1995)

Undo the pulley's centre screw and dismantle as in the figure.

Apply grease, P/N 11 61 246-2 (50 g) or 11 61 247-0 (500 g) between the friction plate and cover, and in the four holes used for the spring (marked by arrows).

Reassemble the belt tensioner. Torque-tighten the centre screw to **20 Nm.**

4

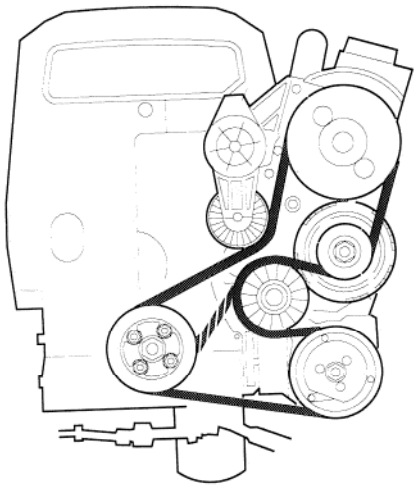


26 00005S

Refit the belt tensioner

Torque-tighten to **20 Nm.**

5



26 00002S

Fit the belt

New! A new belt every 90,000 km!

Loop the belt around the crankshaft.

Then loop it around the A/C compressor, idler pulley, alternator and servo pump (the dotted line shows the belt path if no A/C is fitted).

Tighten the belt tensioner using the articulated wrench and fit the belt into place.

Check its operation.

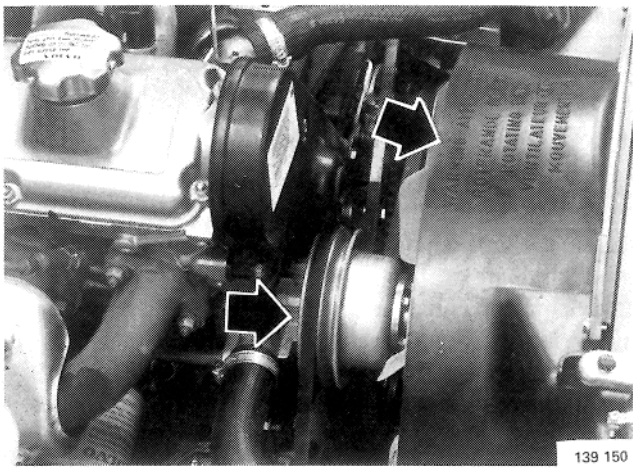
D11 - Camshaft belt

replace

B 200-230

Special tool: 5284

1



139 150

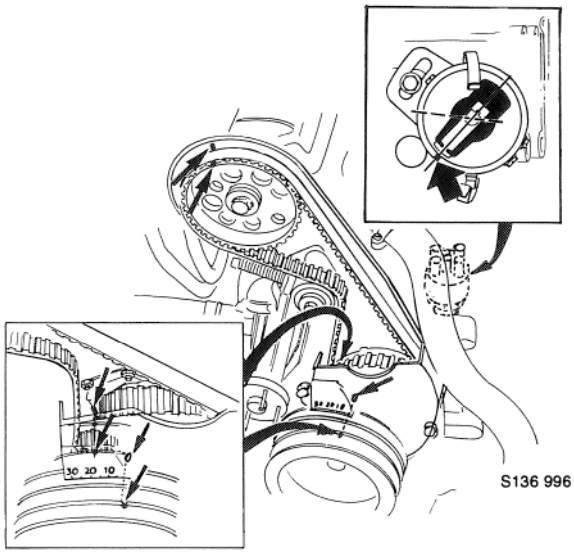
Remove

- fan
- clamp for pre-heating hose under fan shroud (variant)
- fan shroud

Remove the drive belts and coolant pump pulley

- undo the adjustment screws
- remove all the drive belts
- remove the pulley

Remove the upper timing gear casing



S136 996

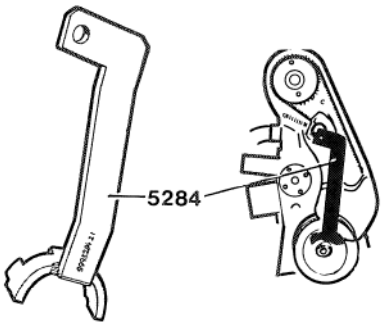
2

Adjust the camshaft - crankshaft acc. to the markings

Rotate the crankshaft clockwise with the centre screw. Position the camshaft so that the marking on the pulley is opposite the marking on the inner tooth belt cover and the crankshaft marking is opposite 0 on the cover.

Engines with the distributor at the front edge of the engine block: remove the distributor cap and check that the rotor is aligned with the marking.

3



S136 976

Remove the vibration damper

Remove the nut and washer from the belt tensioner. Use counterhold 999 **5284**.

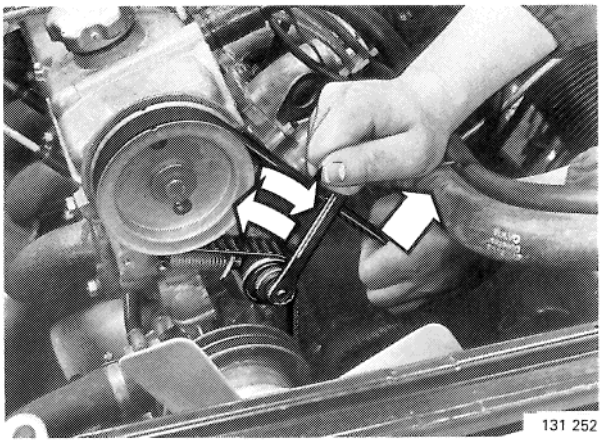
Secure it with the nut.

Remove the vibration damper screw. Remove counterhold 999 **5284**.

Check, adjust the 0-marking.

Remove the vibration damper.

4


131 252

Remove the lower timing gear casing.

5

Remove the camshaft belt

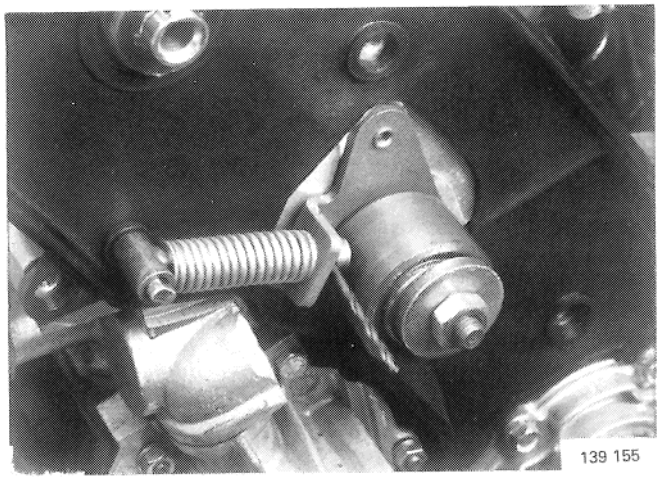
Undo the belt tensioner's nut about 1 revolution.

Pull out the pulley so that the pulley tensioner is compressed.

Tighten the nut once again.

> **Note!** The pistons may strike the valves if the crankshaft or camshaft are rotated when the timing gear belt is removed.

Remove the camshaft belt.


139 155

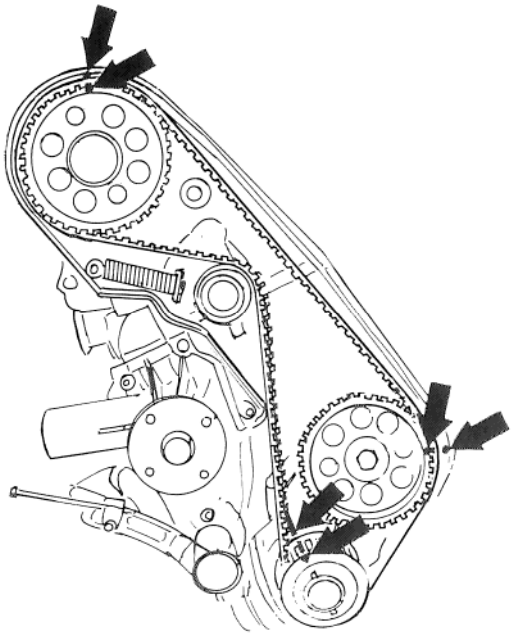
6

Check the belt tensioner

Rotate the tension pulley and listen for abnormal noise from the bearing.
Check that the contact surface with the belt is free from scratches and rubber residue.
Check that the belt tensioner slides smoothly around its guide pin, that the contact surface against the block is clean.

After cleaning, lubricate with:
P/N 11 61 246 (50g) or 11 61 247 (500g).

7



S141 194

Check the basic setting

Fit the new timing gear belt

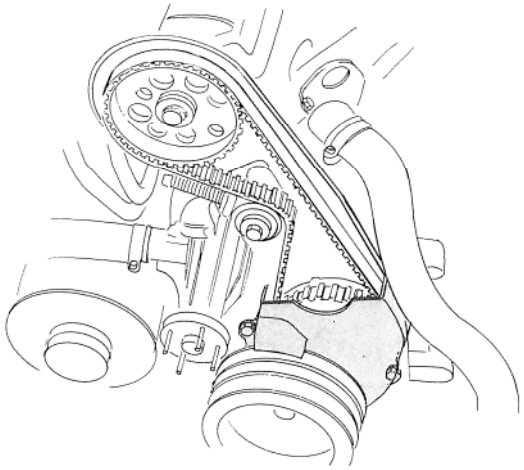
Important! Do not rotate the crankshaft or camshaft, or else the pistons may strike the valves.

- Align the tooth belt pulley with the marking.
- Thread the belt around the crankshaft and intermediate shaft. The two markings on the belt should be opposite the crankshaft marking.
- Tension the belt and thread it over the camshaft and belt tensioner.
- Check that the belt is properly in place and that the pulley markings are aligned with the engine markings.

Tension the timing belt

- Undo the belt tensioner nut approx. 1 revolution.
- The belt tensioner's spring will tension the belt.
- Retighten the nut.

8



S136 981

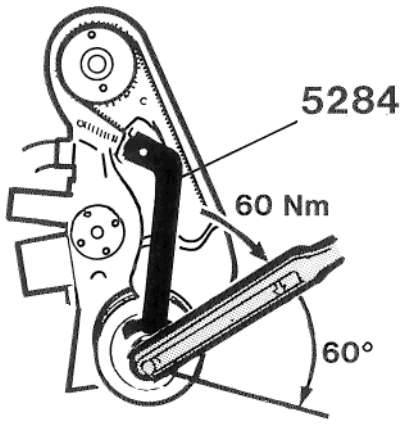
Refit

– the lower timing gear casing
– the vibration damper
Check that the guide plate is correctly positioned.

Important! The vibration damper only fits in one position. There is a lug on the crankshaft gear which fits into the vibration damper.

Refit the crankshaft bolt and washer.

9



S136 973

Tighten the vibration damper

Remove the nut and washer from the belt tensioner.

Use counterhold 999 **5284**. Fix it in position with the nut.

Tighten the crankshaft bolt:

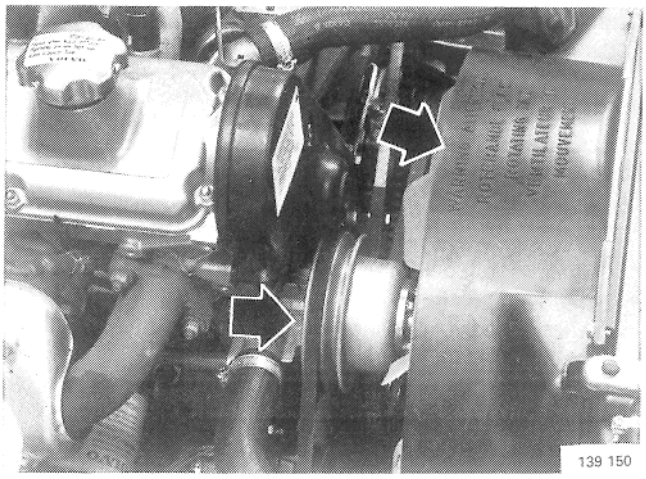
Stage 1 60 Nm (6 kpm)
Stage 2 angle-tighten 60 (use protractor 999 **5098**)

Use counterhold 999 **5284**.

Fit the washer and nut on the belt tensioner.

Tighten the nut.

10


139 150

Refit

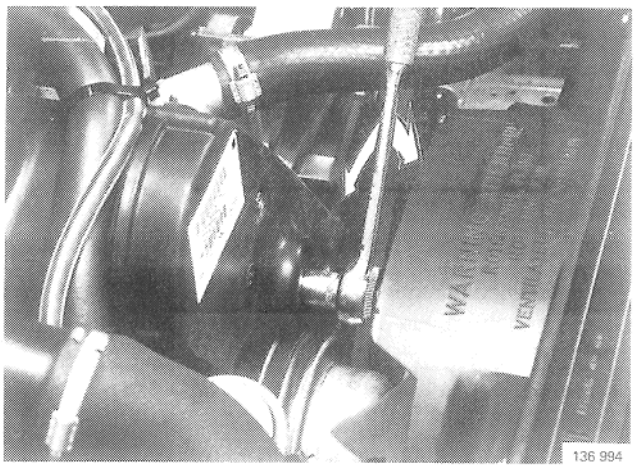
- the upper timing gear casing
- coolant pump pulley
- drive belts (loose)
- fan shroud
- pre-heating hose holder
- fan

Tension the drive belts

When correctly tensioned, the belt should be able to be pressed down 5-10 mm using normal thumb pressure.

11

Start the engine and run it until the thermostat opens. Switch off the engine.

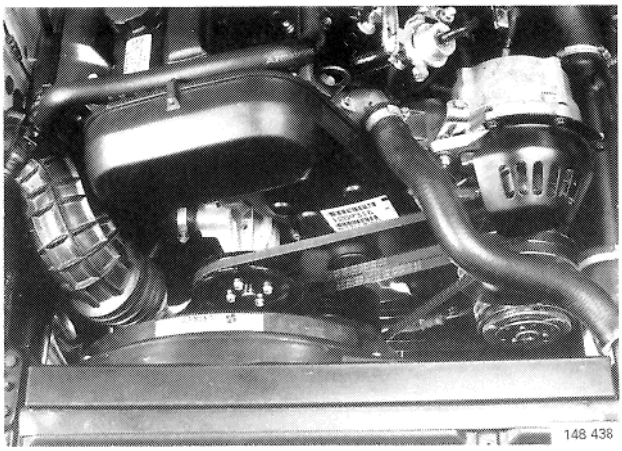

136 994

12

Tension the camshaft belt

- Remove the rubber plug in the timing gear casing.
- Turn the engine over to TDC.
- Undo the belt tensioner nut approx. 1 revolution.
- The belt tensioner spring will tension the belt.
- Tighten the nut once again.
- Refit the plug in the timing gear casing.

Retighten belt tension after 15,000 km (see op. D12)


148 438

B 204/234

Special tool: 5416, 998 8500

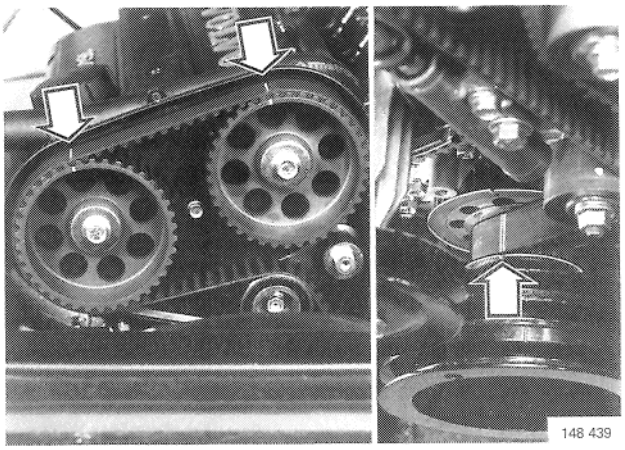
(Including replacement of balance shaft pulley and greasing of tension pulley)

1

Remove:

- alternator drive belt
- drive belts for servo pump and A/C (if fitted)
- the three timing gear casings
- splash guard under the engine

2


148 439

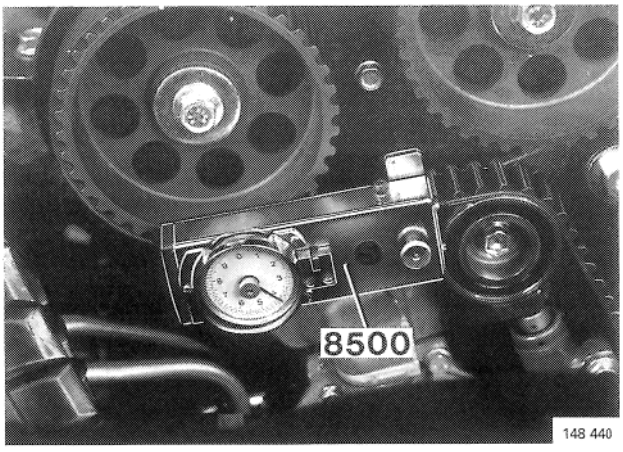
Adjust camshafts - crankshaft according to marking

Adjust engine to TDC for cylinder 1.

Check that the marking on the camshaft pulley is opposite the marking on the inner timing gear casing.

Check that the marking on the crankshaft's belt-guidance pulley is opposite the TDC marking on the engine block.

3



148 440

Measure the belt tension

Wait 5 minutes after adjustment of the camshaft belt.

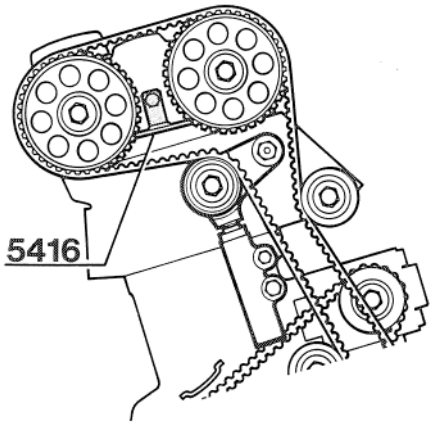
Place measurement instrument 998 **8500** between the output axle's belt pulley and the tensioner pulley.

Read the value.

Belt tension should be between **3.5 - 4.6** units.

If the correct value is **not** obtained, the tensioner **must be replaced.**

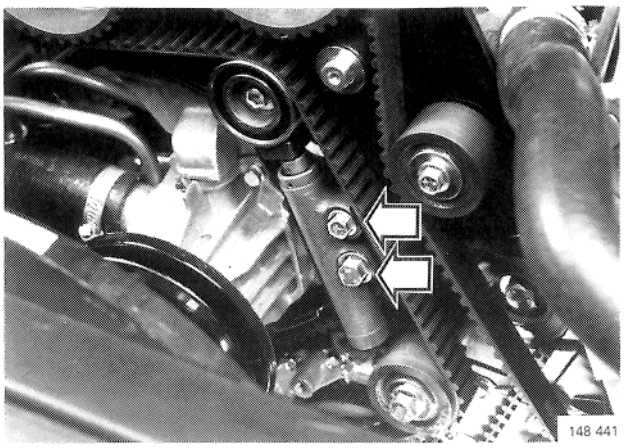
4



S148 444

Secure the camshaft gear

Use holder 999 **5416**.


148 441

Removing the camshaft belt

5

Remove the camshaft belt

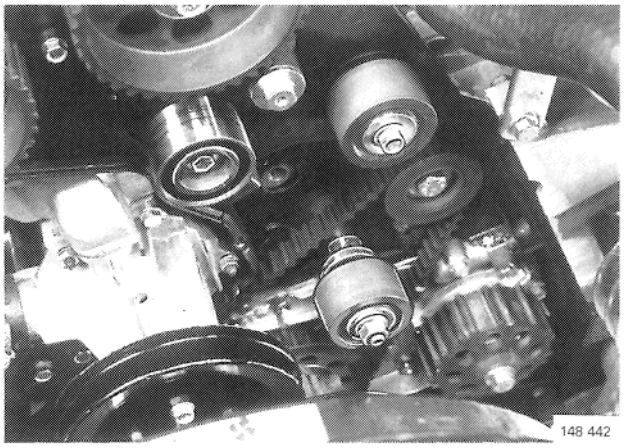
Remove the tensioner's upper screw (M8).

Undo the lower screw (M10).

Rotate the tensioner until the screw is freed.

Remove the lower screw.

Remove the camshaft belt.


148 442

6

Check the tension and idler pulleys

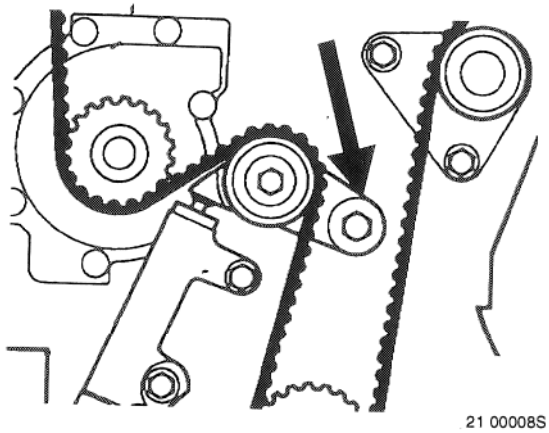
Rotate the idler pulleys and listen for abnormal noise in the bearings. Check that the pulley surfaces against the belt are clean and smooth.

Check the tension pulley lever and the idler pulley attachment.

Tension pulley lever, torque **40 Nm**

Idler pulleys, torque **25 Nm**

7


21 00008S

Greasing the bushing

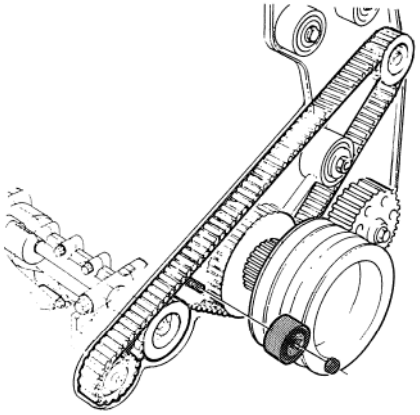
Remove:

- the tension pulley's lever screw
- the tension pulley
- the socket behind the screw

Grease the surfaces of the lever's bushing, the screw and socket with grease, P/N 11 61 246-2 (50 g) or 11 61 247-0 (500 g).

Refit:

- the socket
- the tension pulley
- the screw for the tension pulley; torque-tighten to **39 ±5 Nm**



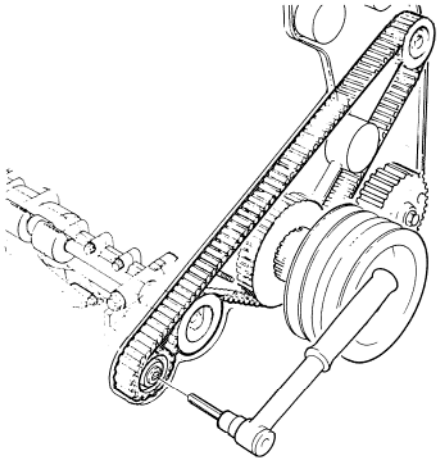
S144 874

Removal of the balance shaft belt

8

Remove the balance shaft belt's idler pulley

Check that the pulley surfaces and bearings are fault-free.

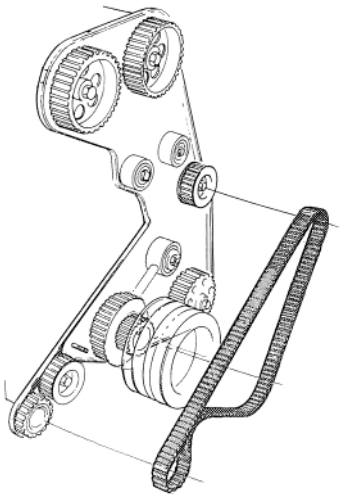


S144 875

9

Undo the balance shaft belt tension pulley

Undo the lock screw.



S144 876

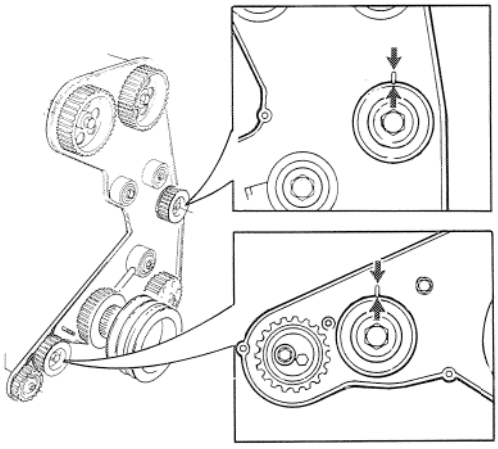
10

Remove the balance shaft belt

Pull the belt off the tensioner pulley and balance shaft pulley.

Pull the belt out under the crankshaft gear.

Check the tensioner pulley bearings and look for signs of oil leakage at the shaft seals.



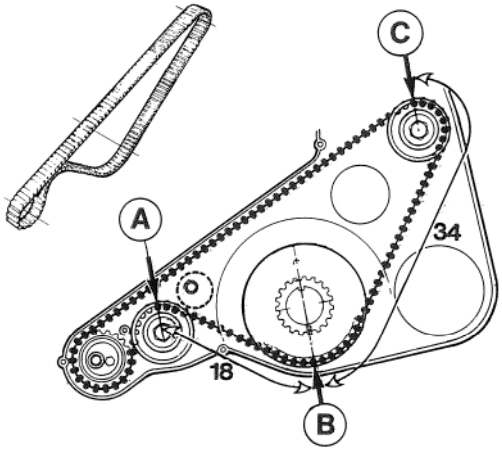
S144 877

11

Check the balance shaft and crankshaft markings

Check the balance shaft markings to ensure that they are opposite the marking on the inner timing gear casing.

Check that the crankshaft is opposite the TDC marking on the engine block.



S144 878

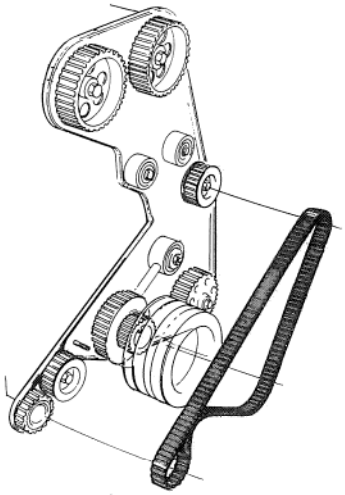
Fitting of balance shaft belt

12

The balance shaft belt's three markings

A. Balance shaft, right side (white dot).
B. Crankshaft lower marking (blue dot).
C. Balance shaft, left side (white dot).

A - B = 18 teeth
B - C = 34 teeth



S144 876

13

Fit the balance shaft belt

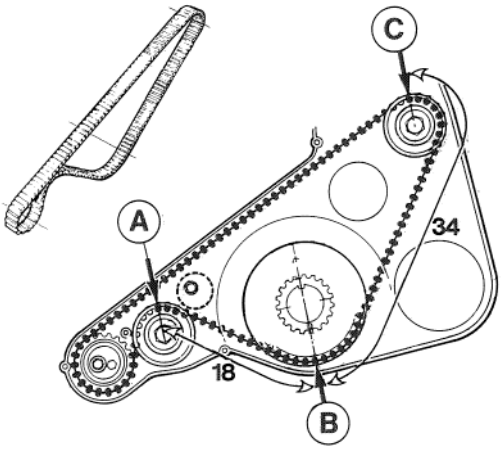
Carefully insert the belt **under** the crankshaft gear.

Check that the belt's blue dot (marking B) is opposite the TDC marking on the guide plate, on the lower section of the crankshaft.

Thread the belt **around** the left (upper) balance shaft so that the C-mark is opposite the balance shaft gear marking.

Thread the belt **on** the right (lower) balance shaft, so that the A-mark is opposite the balance shaft gear marking.

Thread the belt **around** the tensioner pulley.

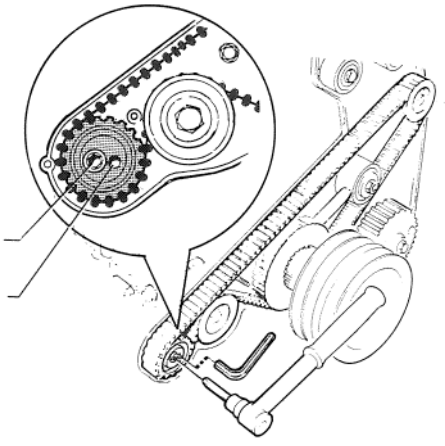


S144 878

14

Check the balance shaft and crankshaft markings

Check that they are still correct.



S144 879

15

Tighten the tensioner pulley

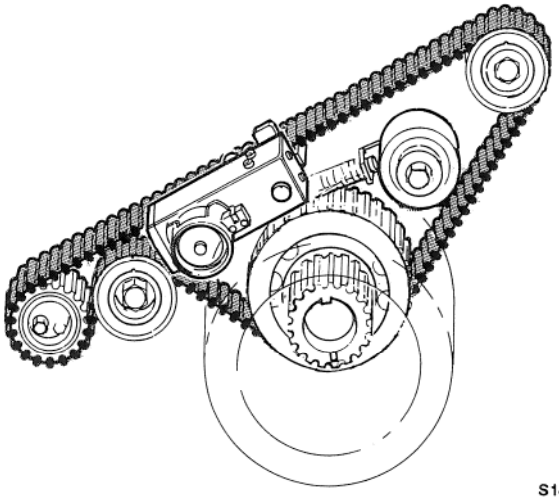
Tension the belt using a hexagonal key in the adjustment hole (**1**) of the pulley.

Rotate the crankshaft a few degrees to each side of the TDC marking.

Position the crankshaft at TDC.

The pulley's adjustment hole should be **just under** the 3 o'clock position when the lock screw is tightened.

Tighten the lock screw (**2**) to **40 Nm**. Use a hexagonal key to **counterhold** the adjustment hole (**1**).



S144 880

16

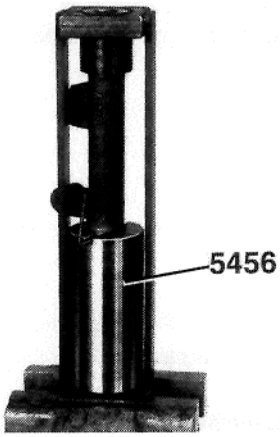
Check the belt tension

Use measuring instrument 998 **8500**.

Measure at the belt above the position of the removed idler pulley. Belt tension **should now** be between **1-4** units.

Note! If belt tension is outside the above range, the tension pulley should be loosened and step 15 should be repeated.

Fitting the camshaft belt



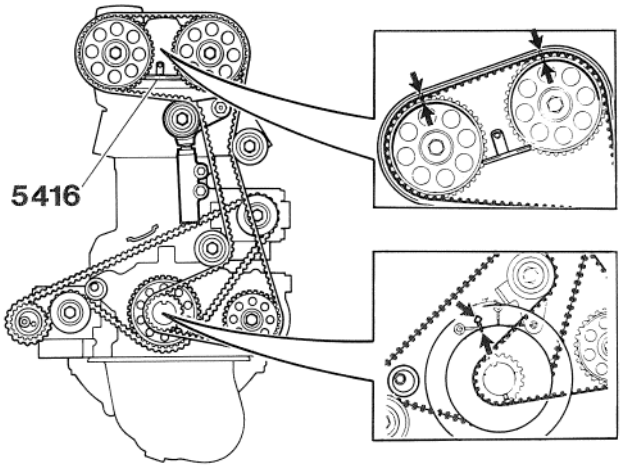
151 566

17

Lock the tensioner element

Check that there is no visible leakage.

Press together the tensioner with tool 999 **5456**. Place the tensioner in the tool and tighten the tool's centre nut. Wait unit compression is completed and then insert a lock pin (diam. 2 mm) in the piston.



18

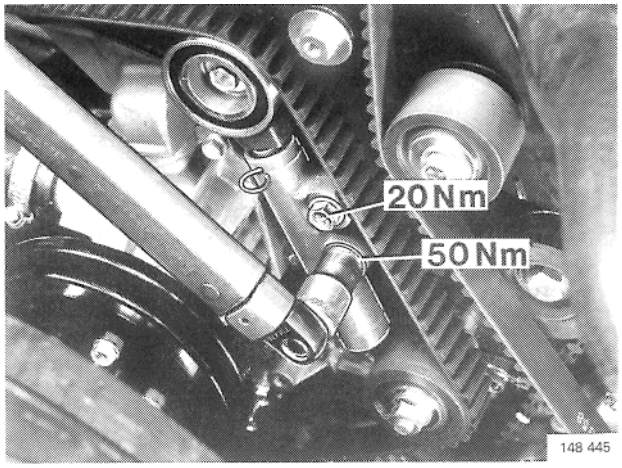
Fit the camshaft belt

Place the belt's twin-stripe marking opposite the marking on the guide plate, on the **upper side** of the crankshaft.

Place the belt around the crankshaft gear and over the tension pulley, and then over the right idler pulley.

Place the belt over the camshaft gears. The belt's two single markings **must** match the camshaft gear markings.

Thread the belt around the left idler pulley and press the belt over the tension pulley.



148 445

19

Fit the tensioner

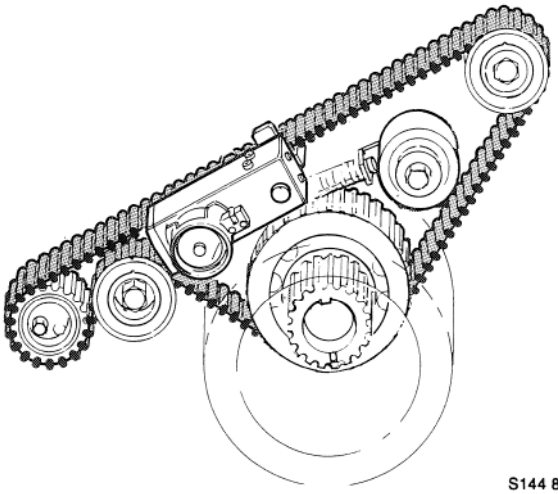
Insert the tensioner screws.

Torque: M8 = **20 Nm**, M 10 = **50 Nm.**

Pull the lock pun out of the tensioner.

Remove holder 999 **5416**.

Rotate the crankshaft 2 revolutions and check that the markings on the crankshaft and camshaft gears still match.



S144 880

20

Check/adjust balance shaft tension

Use gauge 998 **8500**. Measure on the belt above the location of the removed idler pulley.

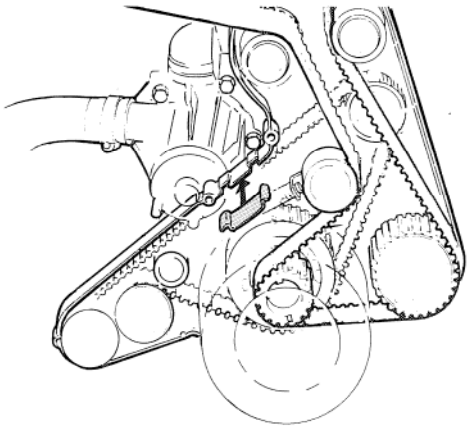
Belt tension shall be **3.8±0.2** units at **20°C.**

If tension is too low: Adjust by turning the tensioner pulley clockwise.

> **Note!** The tensioner pulley may only be turned clockwise. Only small movements are required.

If tension is too high: Carry out steps 15-16.

Turn the crankshaft one revolution. Check/adjust the newly set values.

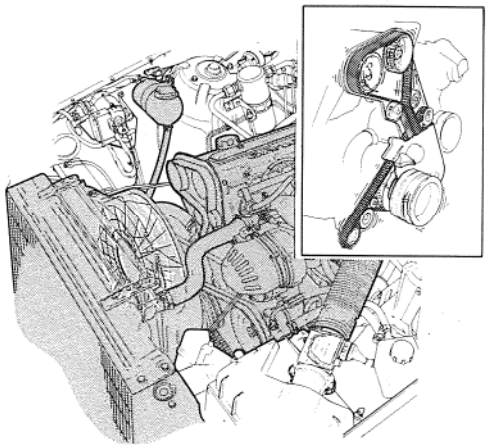


S144 884

21

Install:

- guide plate (check that it is in place)
- middle timing gear casing
- fan shroud
- tie strips for the heater hose
- radiator fan and pulley
- all the drive belts



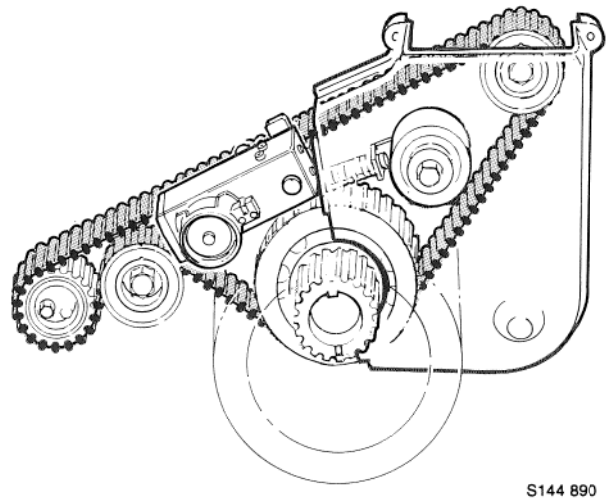
S144 885

22

Run the engine to operating temperature

Run the engine until the thermostat opens. Switch off the engine.

> **Caution!** Remember that timing gear casings (**1**) and (**2**) have not yet been fitted at this point.



S144 890

Check/adjust balance shaft belt tension after thermostat opens

23

Check belt tension

Use gauge **999 8500**

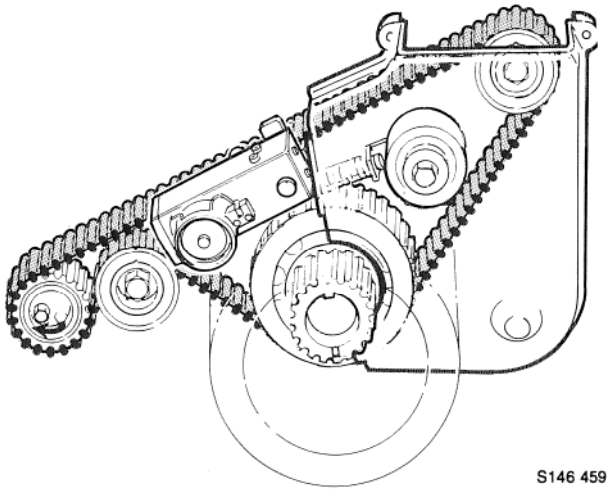
Place the gauge above the location of the removed idler pulley.

Tension should be between **4.9 ± 0.2** units.

If belt tension is correct, proceed to steps **27-29**.

If belt tension is too low, proceed to steps **24-26**.

If belt tension is too high, repeat steps **15-16**, and adjust as per steps **24-26**.



S146 459

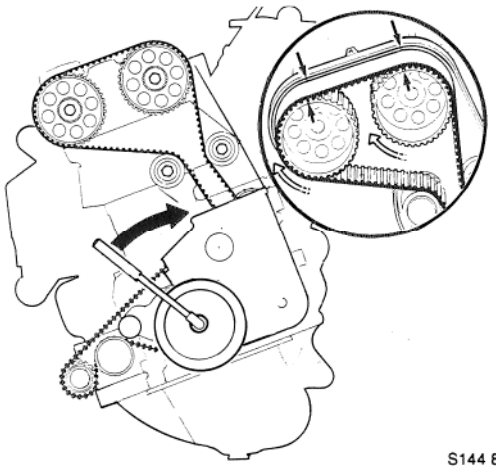
24

Turn the crankshaft clockwise and read the gauge

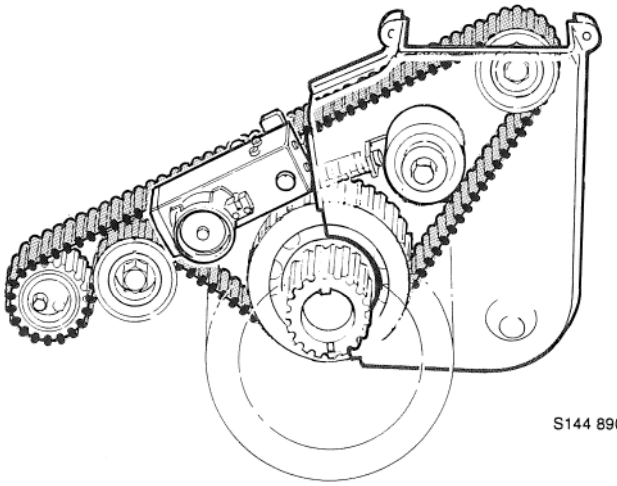
Note! The tensioner pulley may only be rotated clockwise. Only small movements are required.

25

Turn the crankshaft clockwise one revolution



S144 868

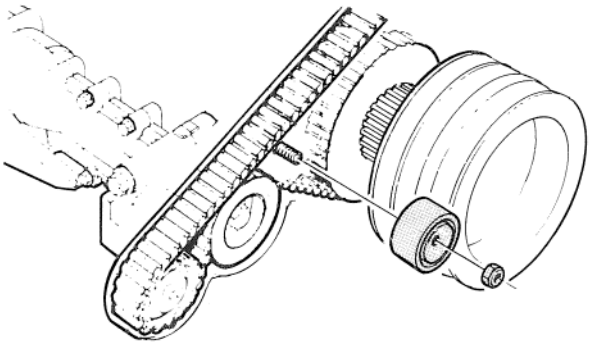


S144 890

26

Check belt tension

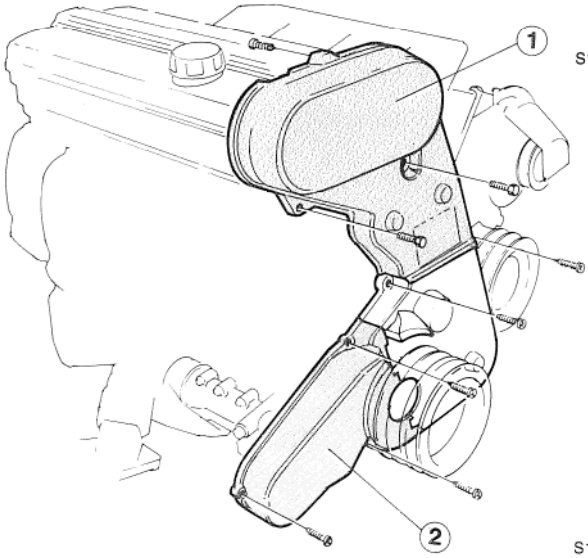
Belt tension should now be within the prescribed range **4.9 ± 0.2**.



27

Install idler pulley

Ensure the pulley is properly seated



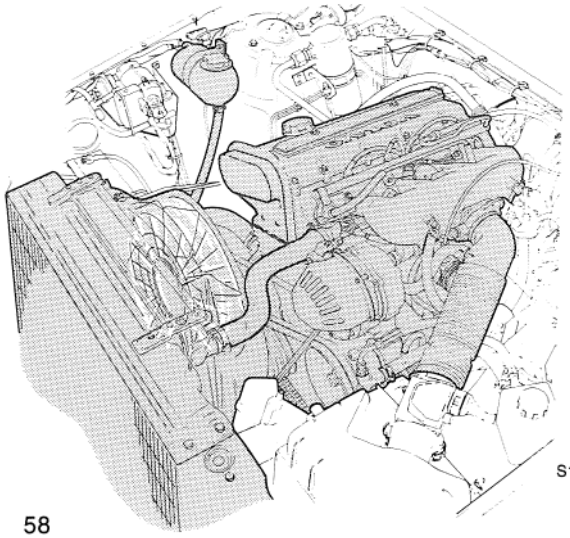
S144 892

S144 893

28

Install:

- the lower timing gear casing (2)
- the upper timing gear casing (1)

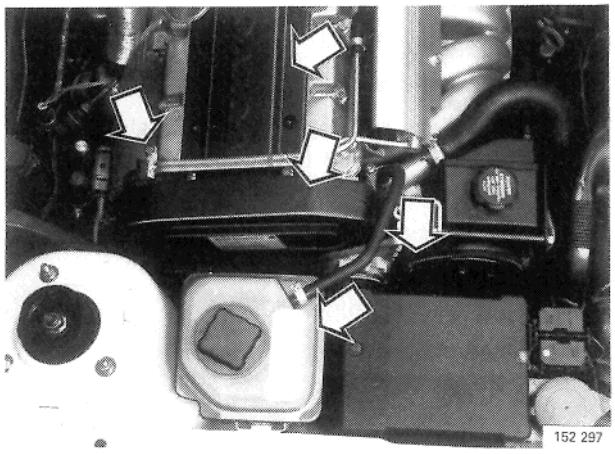


S144 867

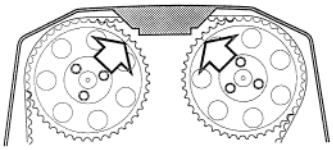
29

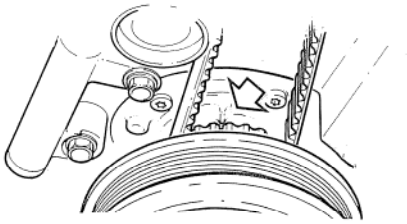
Test operation

Test-run the engine.

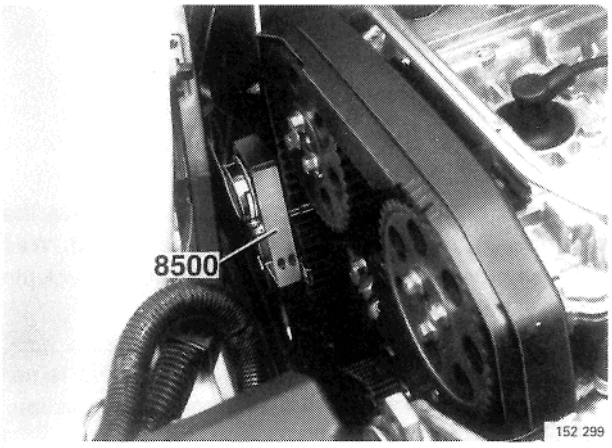


152 297

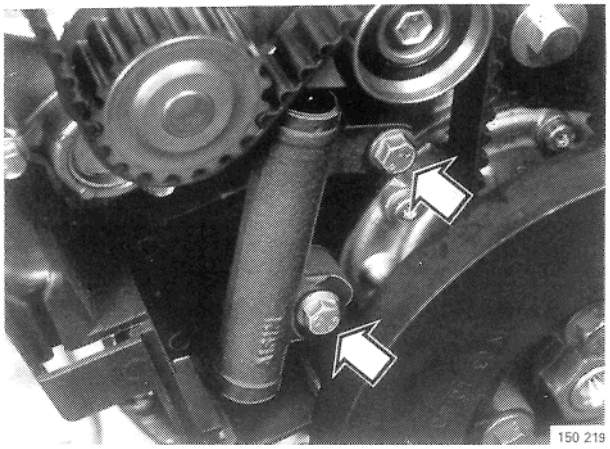




s 152 298B



152 299



150 219

B 5202/5204/5234/5252/5254

Special tool: 998 8500, 999 5456

(Including greasing the tension pulley)

1

Remove:

- the spark plug cover
- the two fuel pipe clamps
- lift up the expansion tank and place it above the engine
- the front timing gear cover
- the auxiliary unit belt
- the lower belt casing

2

Align the camshafts/crankshaft according to the marking

Remove the right front wheel and undo the wheel arch liner somewhat.

Remove the vibration damper protecting plate.

Turn the crankshaft clockwise until the markings, camshaft gear and inner timing gear cover and the crankshaft, pulley/oil-pump housing match.

3

Check the belt tension

Wait 5 minutes after adjustment of the timing gear belt.

Place gauge 998 **8500** between the output axle pulley and the coolant pump.

Read the value with the help of a mirror; the gauge **may not** be removed before the reading is completed.

Belt tension should be within

21 mm belt ..... **3.5-4.6** units
23 mm belt, 4 valve ..... **2.5-4.0** units
23 mm belt, 2 valve ..... **2.7-4.2** units

If the recommended value is **not** obtained, the tensioner **must** replaced.

4

Remove the camshaft belt

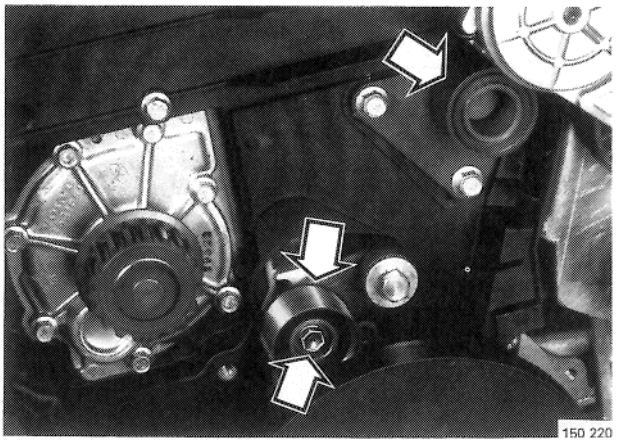
Remove the tensioner's upper screw.

Undo the lower screw.

Turn the tensioner so that the pulley rotates freely.

Remove:

- the lower screw.
- the tensioner.
- the upper timing gear casing.
- the camshaft belt.


150 220

5

Check the tensioner and idler pulleys

Rotate the pulleys and listen for abnormal noise from the bearings. Check that the pulley contact surfaces with the belts are clean and smooth.

Check that the tensioner pulley lever has not seized in its bearing. Check the idler pulley attachment.

Tension pulley lever, torque **40 Nm**.

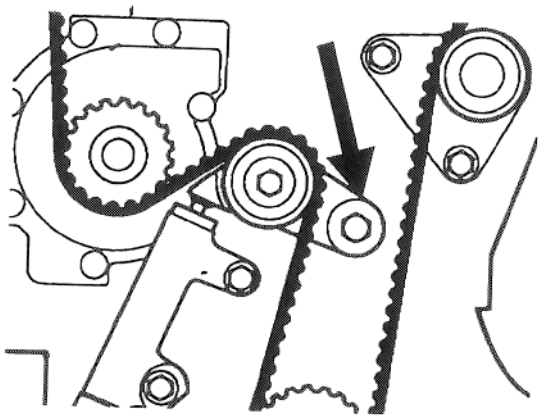
Idler pulley, torque **25 Nm**.

6

Greasing the bushing

Remove:

- the tension pulley lever's screw
- the tension pulley
- the socket behind the screw


21 00008S

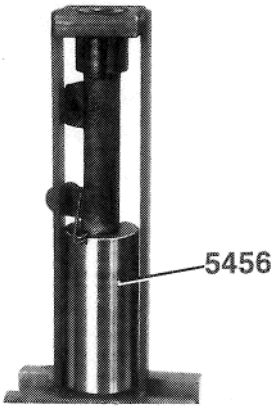
Grease the surfaces of the lever's bushing, screw and socket with grease, P/N 11 61 246-2 (50 g) or 11 61 247-0 (500 g).

Refit:

- the socket
- the tension pulley
- the tension pulley lever's screw; torque-tighten to **40 Nm.**

7

Lock the tensioner



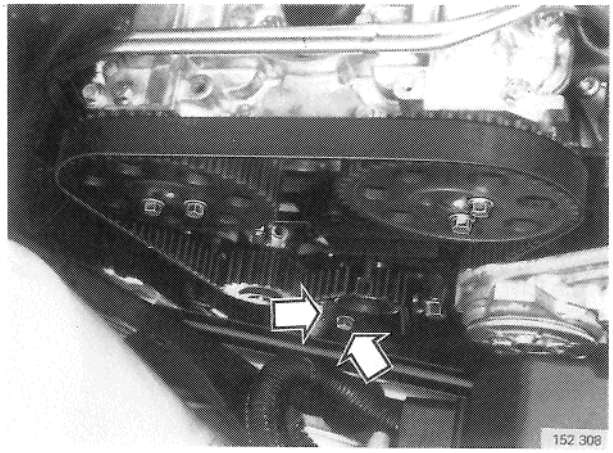
S151 566

Check that there is no visible leakage.

Remove the plastic washer on the piston.

Compress the tensioner with tool 999 **5456.** Place the tensioner in the tool and tighten the centre nut. Wait until compression is complete and then insert a lock pin (diam. 2 mm) in the piston.

> **Note!** If there is any visible leakage or if there is no resistance upon compression, or if compression is impossible, the tensioner **must** be replaced.


152 308

8

Fit the new camshaft belt

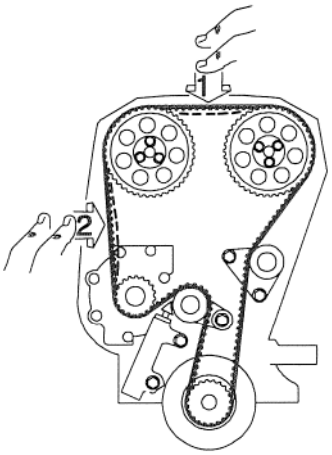
Insert the tensioner screws.
Tighten to **25 Nm.**

Thread the belt around the crankshaft and right idler pulley.

Thread the belt over the camshaft gears.

Thread the belt around the coolant pump and press the belt over the tension pulley.

9

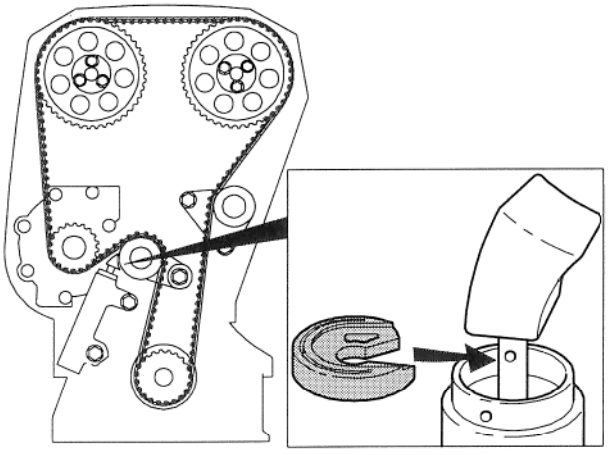


S152 297B

Rotate the crankshaft through two revolutions

Pull out the lock pin from the tensioner.

Press **hard** or hit the belt with a plastic mallet **twice** in the direction of arrow (**1**) and **twice** in the direction of arrow (**2**).



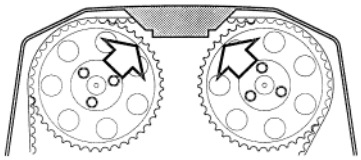
2100284A

Fit a **new** plastic washer on the piston.

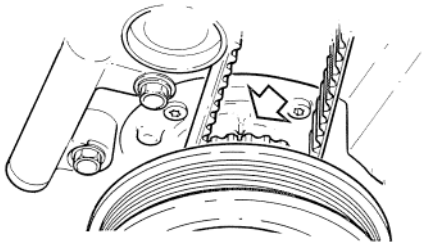
Make sure that the washer is centred on the piston and tensioner housing.

> **Note!** Check that the correct side of the washer faces upwards. See the illustration. The recessed side should face up.

Fit the upper timing gear casing.



Rotate the crankshaft two revolutions and check that the markings on the crankshaft and camshaft pulleys match.

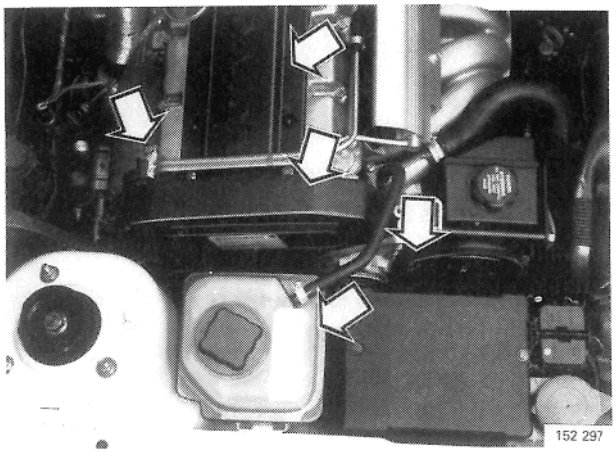


S152 298

10

Refit:

- the two clamps for the fuel pipes
- the front timing gear cover
- the auxiliary unit belt
- the spark plug cover
- the expansion tank
- the lower belt casing
- the inner wheel arch liner
- the wheel



152 297

Check operation

Test-run the engine.

D12 - Camshaft belt/auxiliary unit belt

replace

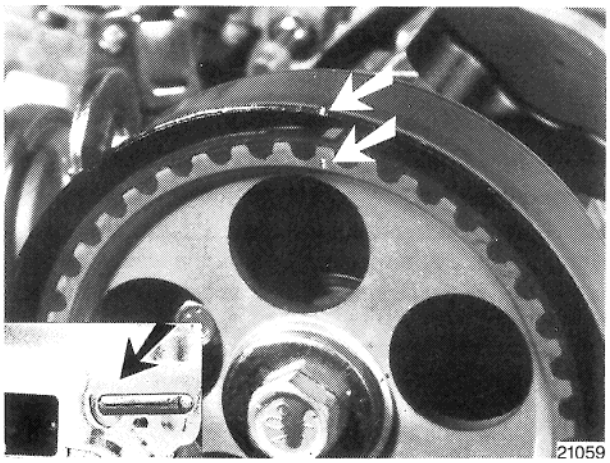
B 16, B 18, B 20

Special tools 999 5434, 999 5435, 999 5436, 115 9660

1

Remove:

- right side protecting plate
- power steering pump cover
- auxiliary unit drive belts after the power steering and/or alternator has/have been loosened.
- Remove the camshaft belt cover.



2

Remove the camshaft belt

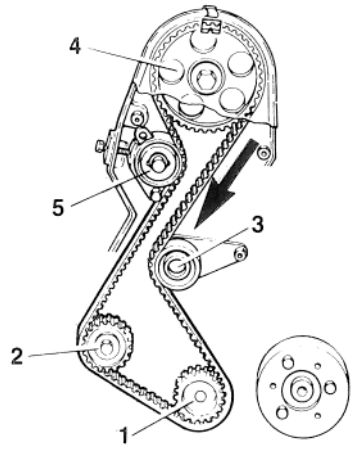
Rotate the crankshaft so that cylinder no. 1 is at TDC and the markings on the flywheel/bell housing and camshaft belt cover/cam gear are opposite each other.

Remove the plug at the bottom right beside the oil dipstick and insert an 8 mm lock pin in the hole in the crankcase.

Check that the crankshaft cannot be rotated.

Remove the crankshaft pulley and vibration damper.

Remove the belt cover and make a mark on the edge opposite the mark on the camshaft gear. Undo the belt tensioner. Remove the belt. Begin at the tensioner.



S146 803

3

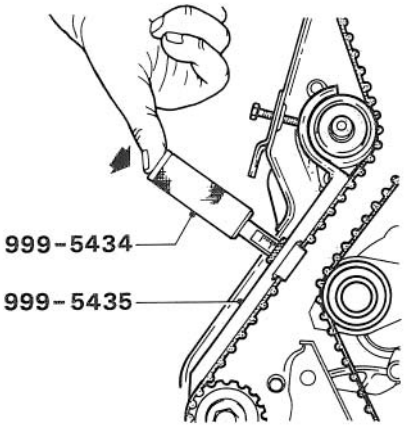
Fit the camshaft belt

Check that the lock pin is in place. Place the belt so that the mark is opposite the marks on the crankshaft and camshaft gear.

Observe the following when fitting:

the belt's direction of movement (see the arrow);

the sequence in which the belt is to be fitted to the gears (see fig.)



S21 069

4

Adjust the camshaft belt

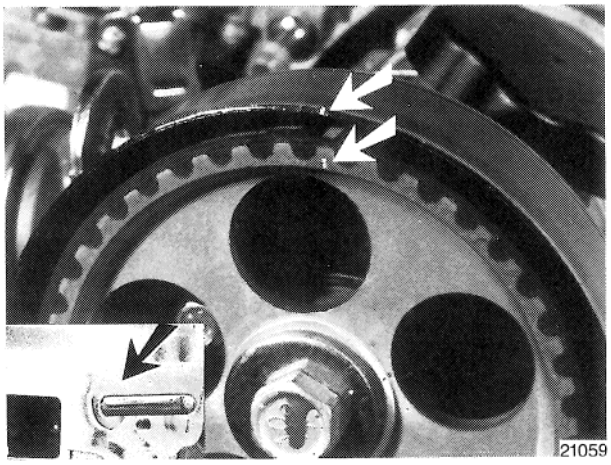
Tension the belt with the help of an M6 screw.

Use special tools 999 **5434** and **5435**.

Correct tension: **7.5 mm** (cold belt).

Tighten the tensioner's lock nut.
Tightening torque: **50 Nm.**

5



Check that the belt is correctly fitted

Remove the special tool.

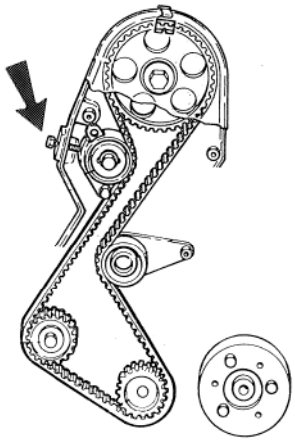
Remove the lock pin.

Turn the crankshaft two full revolutions in the correct direction of rotation.

Rotate the crankshaft to the TDC position (insert the lock pin) and check that the mark on the camshaft gear is opposite the mark on the edge of the belt cover.

Remove the lock pin and refit the plug.

6



Check camshaft belt tension

Use special tools 999 **5434** and **5435** to check the tension: **7.5 mm**.

Remove the tensioner screw.

7

Fit:

- camshaft belt cover
- crankshaft pulley
- auxiliary unit drive belt
- drive belt for power steering and air conditioning (where fitted).

Check/adjust the auxiliary unit belts: see inspection point D9.

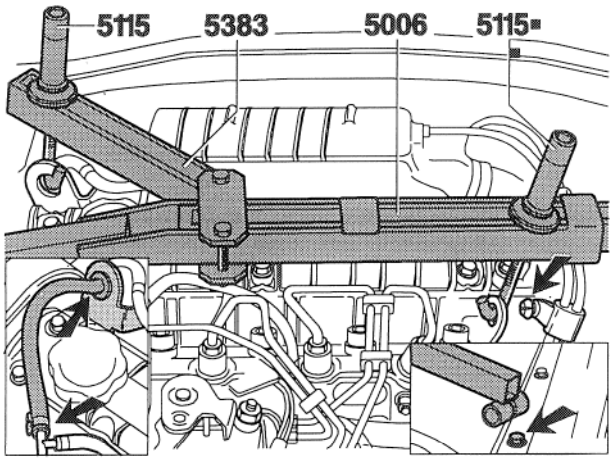
D 19 T

Fit a new timing gear belt/and Poly V-belt

Special tools 999 5006, 999 5115, 999 5383, 999 5434, 999 5506

Remove:

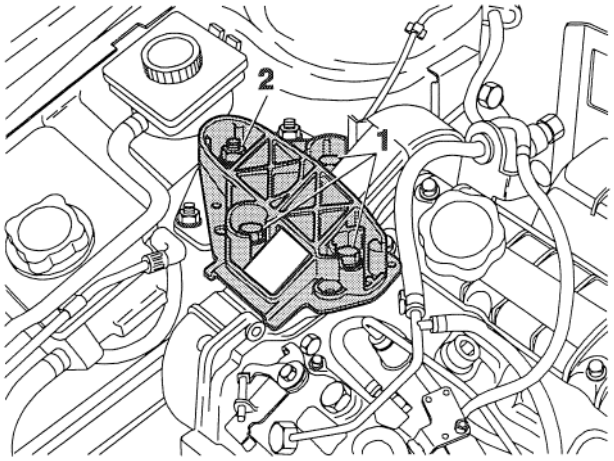
- the lower cover plate for the Poly V-belt
- Poly V-belt from the alternator/coolant pump



1700008A

Fit the lifting eyelet and its lift hooks.

Place a flannel under the fuel return pipe.
Remove fuel return pipe at the fuel pump's pipe and remove it from the lifting eyelet beside the timing gear end.
Remove the rubber gaiter.
Remove the screw at the left front wing (**A**).
Place lifting eyelet 999 **5006** above the engine and insert hook 999 **5115** into the eyelet.
Place support unit 999 **5383** and lifting eyelet 999 **5115** in the eyelet.



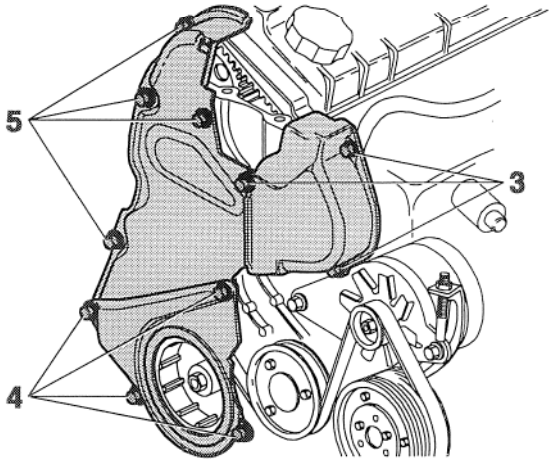
1700009A

Lower the engine mounting at the timing gear.

Remove the three screws (**1**) and nut (**2**) and remove the mounting.

Remove the fuel filter from the housing bracket.

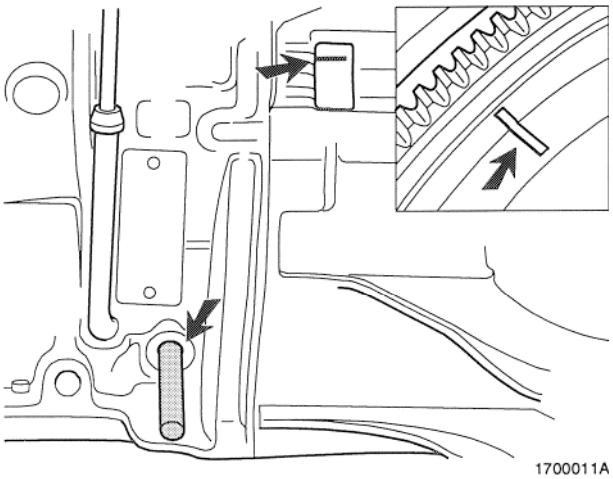
Remove the two nuts.



1700010A

Remove the timing gear housings.

Remove the three screws (**3**) and dismantle the timing cover from the fuel pump's gear. Remove the four screws (**5**) and dismantle the upper timing gear cover.

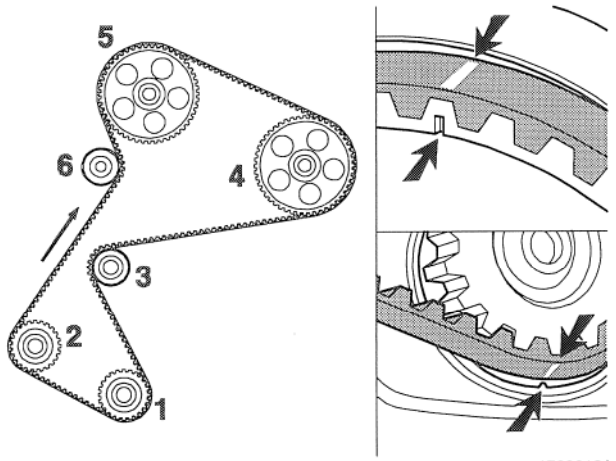

1700011A

Remove the timing belt

Rotate the crankshaft clockwise until cyl. no. 1 (flywheel side) is above the TDC injection point so that the following markings match:

- flywheel - bell housing
- rear protecting plate - camshaft gear

Etch a mark on the injection pump's mounting bracket opposite the mark on the injection pump's drive gear.
Remove the plug from the threaded hole to the right of the oil dipstick. Insert an 8 mm thick drill bit through the hole.
Check that the drill locks the crankshaft.
Remove the crankshaft pulley.
Undo the tensioner pulley.
Remove the drive belt.
Clean and check the drive gears.

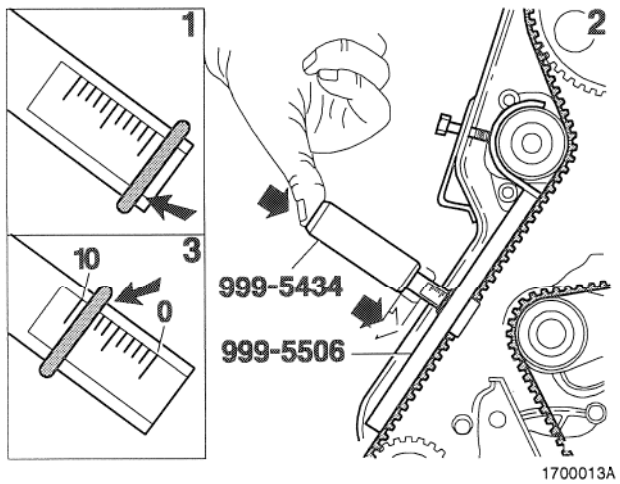


1700012A

Fit the timing belt.

Check that the drill bit in the crankshaft has not shifted.
Fit the timing belt.
The markings on the belt should match the marks on the crankshaft/injection pump gear.
Note! Observe the following when fitting the belt:

- the belt's direction of rotation (arrows on the belt)
- the sequence in which the belt is to be fitted over the various gears (follow the numbers in the figure).
- the tension pulley must be completely non-tensioned so as to avoid damaging the belt.



1700013A

Adjusting the timing belt

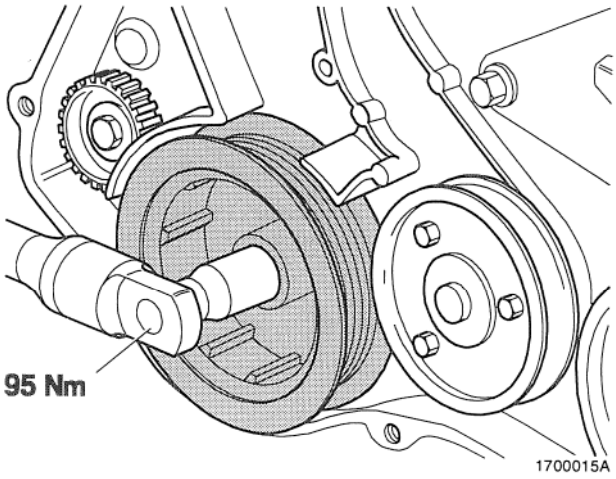
Tighten an M6 screw to adjust the position of the tension pulley.
Apply special tool 999 **5506** to the belt and the tension pulley.
Slide the O-ring on gauge 999 **5434** below the graded scale (**1**).
Place gauge 999 **5434** in the hole in 999 **5506** and press the tool as in the illustration **2**.
The depth of pressure can be felt with the thumb.
The correct pressure is obtained when the measuring needle is at the same height as the top of the gauge.
Carefully withdraw gauge 999 **5506** and read the belt tension (in mm).

Adjust belt tension correctly using the M6 screw. Reference value for checking and adjusting (cold engine): **7.5 mm**.

Tighten the tension pulley's lock nut to **50 Nm**.

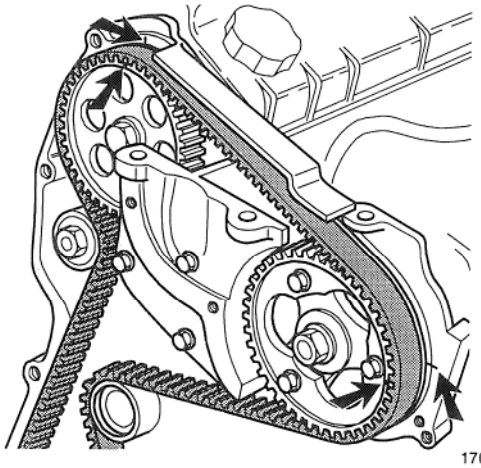
Check that the marks on the timing belt match the marks on

- crankshaft / injection pump gear
- crankshaft gear



Fit the crankshaft pulley

Fit the crankshaft pulley.
Clean the centre screw.
Apply locking fluid and tighten the screw to **95 Nm.**



Check that the crankshaft pulley is correctly fitted.

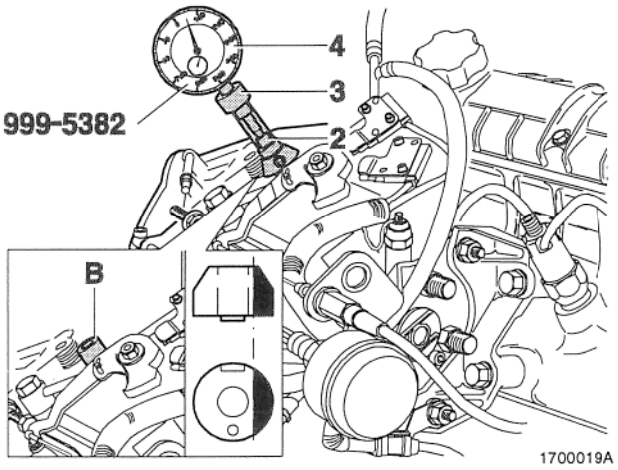
Remove tool 999 **5434**. Remove the drill bit.
Rotate the crankshaft two full revolutions (clockwise).
Stop in the TDC position and reinsert the drill bit.

Check that the marks on the timing gear cover and injection pump mounting bracket match the marks on the camshaft/injection pump's gears.

Check belt tension.

Remove the M6 screw
Check-tighten belt tension and adjust if necessary (see the section on adjusting the timing belt on the previous page)

Check/adjust injection pump.

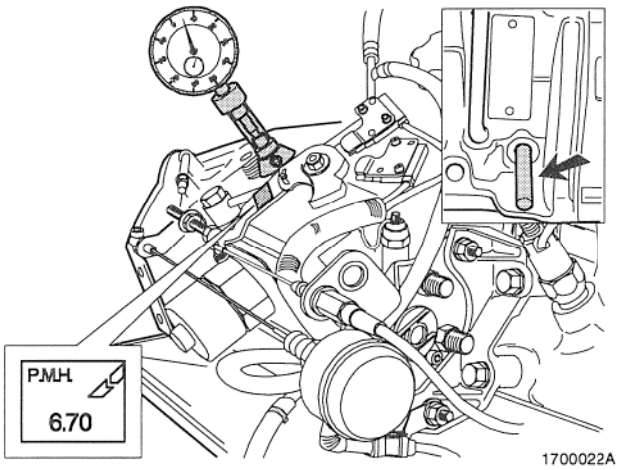


Fit the gauge to the injection pump.

If necessary, remove 6 mm of material from the gauge 999 **5382** (see the figure)

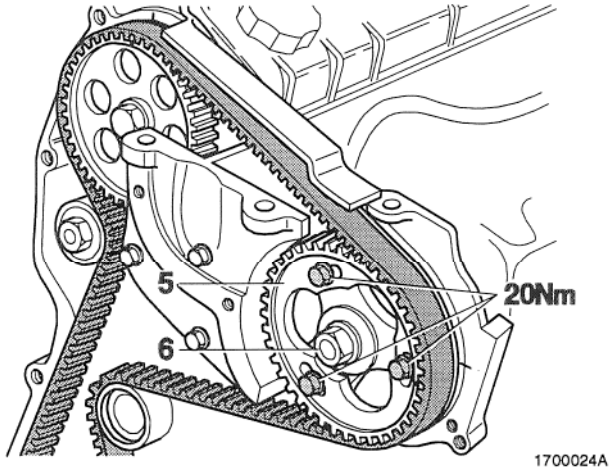
Remove the drill bit and rotate the crankshaft 3/4 revolution clockwise.
Fit gauge 999 **5382**:
- remove the plug (**B**) and insert the pin (**2**), which belongs to the special tool.
- fit and tighten the holder (**3**).
- fit the dial gauge (**4**) and insert it at least 0.2 mm.

Tighten the gauge and reset it to zero.



Check/adjust injection.

Rotate the crankshaft clockwise until the needle on the gauge shows **5.00**.
Press the drill bit in and rotate the crankshaft clockwise until the drill slips into the recess in the crankshaft.
Read the gauge.
The reference value is found on the pump's inspection arm.
Tolerance 0.02 mm.

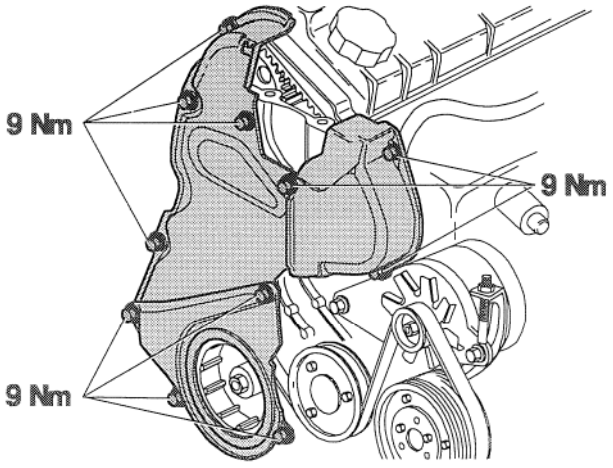


If the correct value is not obtained, undo the pump gear's three screws (**5**); the pump's drive shaft (**6**) is rotated until the correct value is appears on the dial.
Tighten the three screws to **20 Nm**.

Check the setting once more.

Remove the gauge.

Remove tool 999 **5382** together with the dial and pin.
Refit the plug with a new gasket. Tighten to **20 Nm**.
Fit the oil filler cap.



1700016A

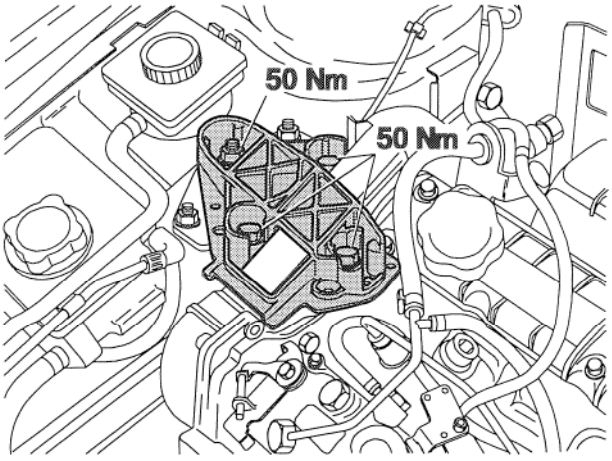
Fit the timing covers.

Fit the upper timing cover and the four screws.
Fit the fuel pump's gear casing and the three screws.
Tighten all the screws.
Tightening torque: **9 Nm**.

Refit the engine mounting.

Fit the mounting.
Fit and tighten the three screws.
Tightening torque: **50 Nm**.
Fit and tighten the nut.
Tightening torque: **50 Nm**.
Remove lifting eyelet 999 **5006** and 999 **5383** together with the hooks 999 **5115**.

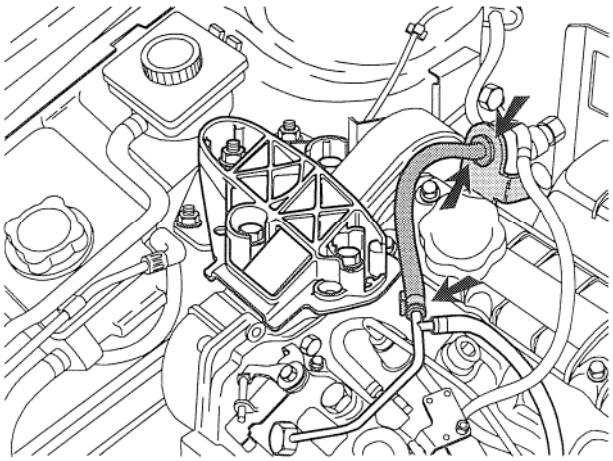
Check the fitting and adjust if necessary.



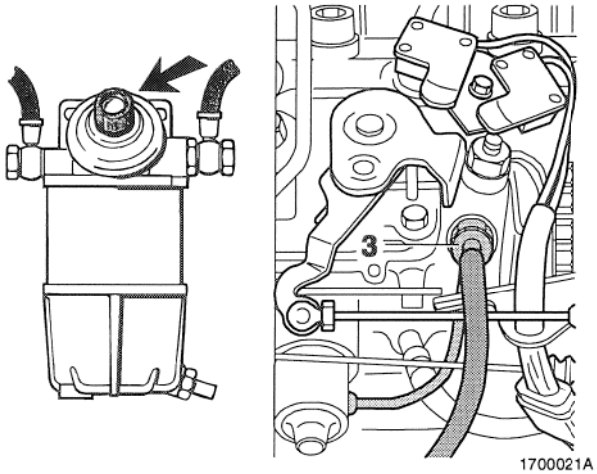
1700017A

Connect the fuel pump's return pipe.

Fit:
– the rubber ring in the lifting eyelet
– the return pipe through the lifting eyelet
– a new clamp on the return pipe
Connect the return pipe to the fuel pump's pipe and tighten the clamp.



1700018A



Bleed the fuel system.

Place a container under the pump. Connect a hose to the bleeder screw (**3**) and let it hang down into the container.

Open the bleeder screw.

Use the filter's manual pump build up pressure until clean fuel appears via the bleeder screw.

Shut the bleeder screw and remove the hose.

Pump a few more times until a slight resistance is felt.

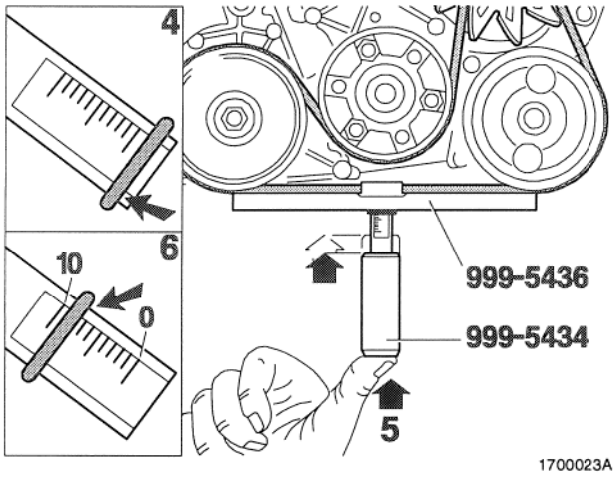
Fit the Poly V-belt on the alternator/coolant pump.

Check/adjust the drive belt (Poly V-belt)

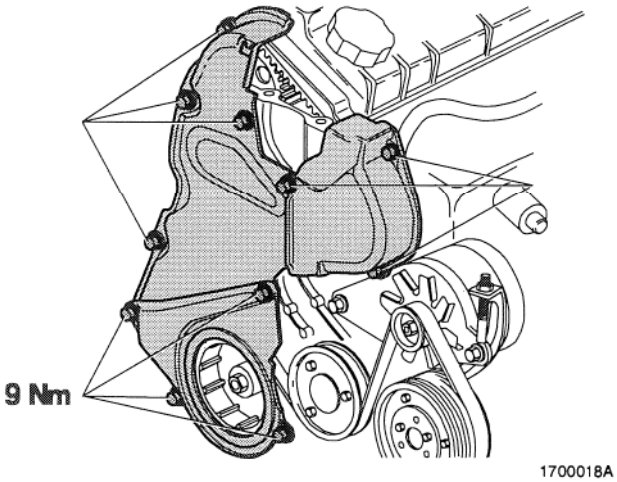
Fit tools 999 **5434** and 999 **5436** to the belt.
Thread the gauge's O-ring below the graded scale (**4**).
Fit the gauge and press it as far in as shown in the figure (**5**).
The depth of this pressure can be felt with the thumb.

The correct length is obtained when the needle is flush with the top of the gauge.

Carefully remove the gauge and read the belt tension (**6**).



Inspection max. value	Adjustment "run-in" belt	Adjustment new belt
4.5 mm	4 mm	3 - 4 mm

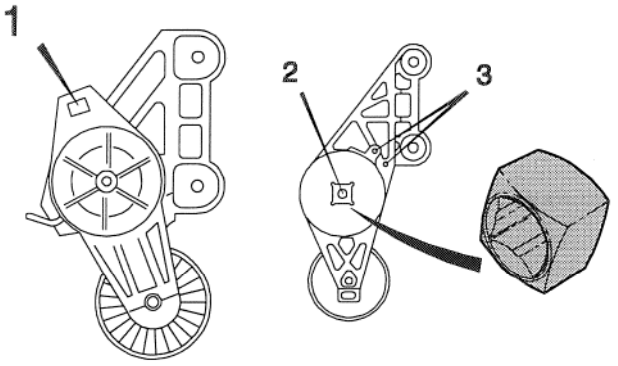


Fit:
- the lower cover plate and tighten to **9 Nm**
- side protector

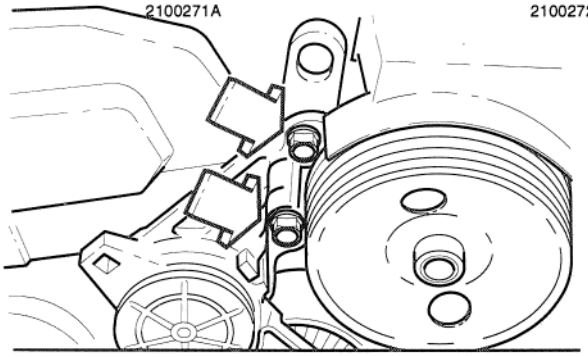
Fit:
- fuel filter
- the two nuts and tighten them
- Start and check

B 6244/6254/6304

Special tool: 998 8500



2100271A



2100272A

Removal of auxiliary unit belt incl. greasing of belt tensioner

As of model year 1994, the belt tensioner is maintenance-free

1

Remove the auxiliary unit belt

Remove the belt. Use an articulated wrench with a 3/8" socket (**1**) to loosen the belt.

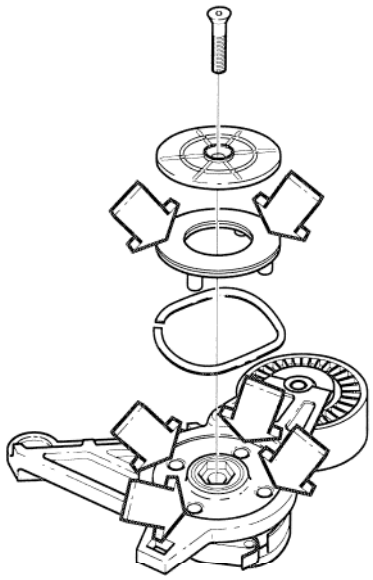
As of M/Y 1994, use tool 999 **5547** in the belt tensioner's centre (**2**).

Lock the belt tensioner in the service setting by inserting a lock pin in the holes (**3**) when they are above each other.
Remove the belt.

2

Remove the belt tensioner

Undo the belt tensioner's two screws and remove the tensioner.



26 00004A

3

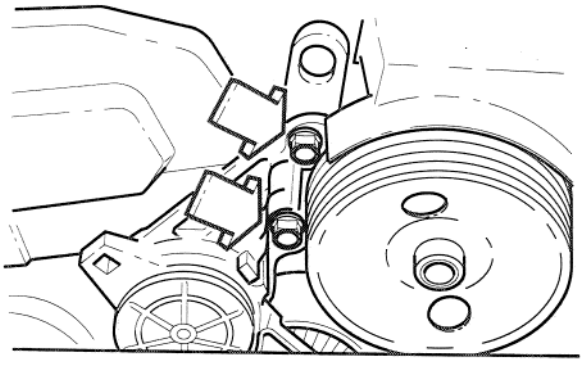
Grease the automatic tensioner pulley

Undo the tensioner's centre screw and dismantle as in the figure.

Apply grease P/N 11 61 246-2 (50 g) or 11 61 247-0 (500 g) between the friction plate and cover, and in the four holes used for the spring (marked by arrows).

Reassemble the belt tensioner. Torque-tighten the belt tensioner. Torque-tighten the centre screw to **20 Nm**.

26 00001A

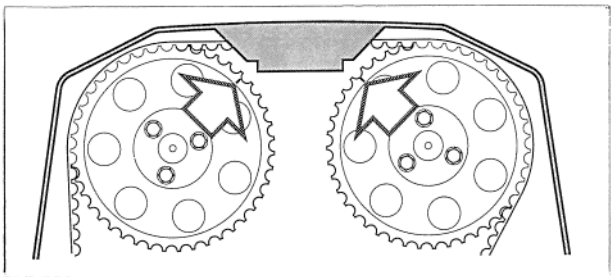


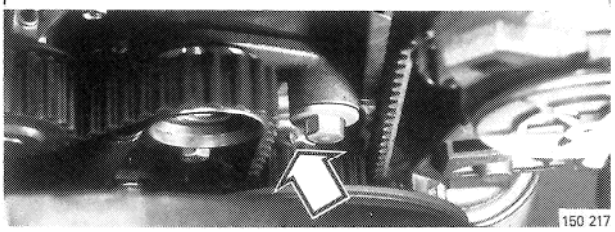
4

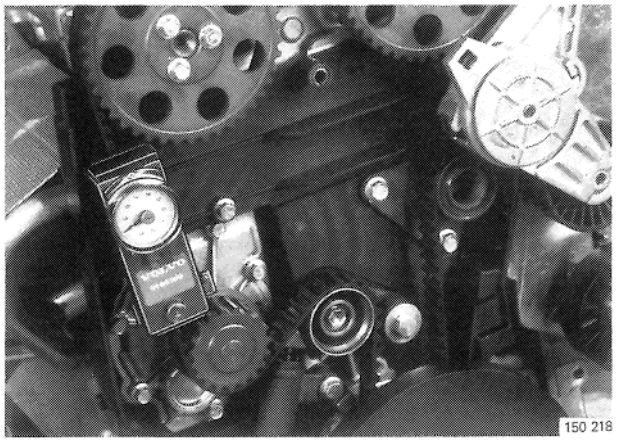
Refit the belt tensioner

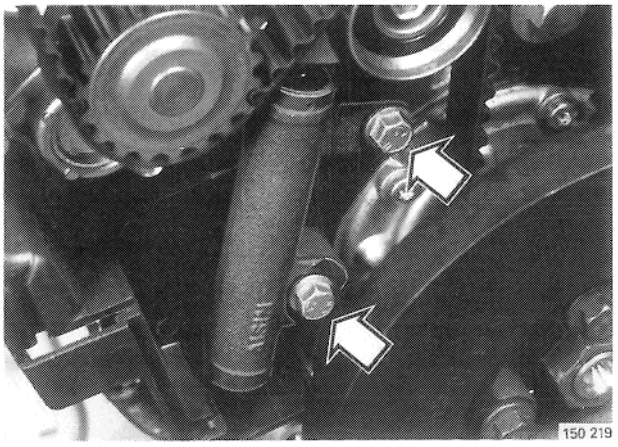
Torque-tighten to **20 Nm**.

26 00004A









Replacing the camshaft felt incl. greasing the tension pulley

5

Remove:

- the front timing gear casing
- the splash guard under the engine
- the vibration damper shield
- ignition cable cover

6

Set the camshaft/crankshaft acc. to the markings

Rotate the crankshaft clockwise until the markings on the camshaft pulley and inner timing gear cover and the markings on the crankshaft pulley/oil pump housing match.

Remove the upper timing gear cover.

7

Measure belt tension

Wait for 5 minutes after adjustment of the camshaft belt.

Place gauge 998 **8500** between the output shaft pulley and the coolant pump.

Read the value.

Belt tension should be between:

21 mm belt	3.5 - 4.6 units
23 mm belt	3.0 - 4.0 units
28 mm belt	2.5 - 3.5 units

If the specified value is **not** obtained, the tensioner unit **must** be replaced.

Remove the camshaft belt

Loosen and remove the tension unit's upper screw.

Undo the lower screw.

Rotate the tension unit so that the screw is released.

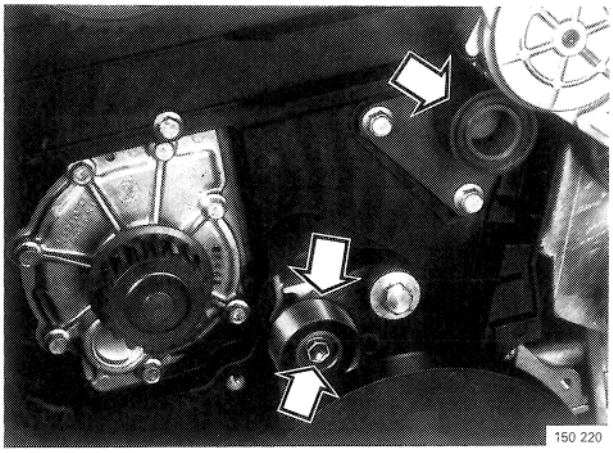
Remove the lower screw.

Remove the tension unit.

Remove the camshaft belt.

Do not rotate the camshafts or crankshaft when the timing gear belt has been removed.

9


150 220

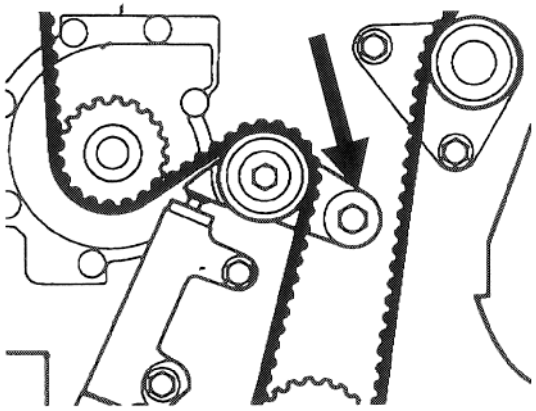
Check the tensioner and idler pulleys

Rotate the pulleys and listen for abnormal noise from the bearings. Check that the pulley surfaces facing the belt are clean and smooth.

Check the tension pulley lever and the idler pulley's attachment. Tension pulley lever, torque **40 Nm**.

Idler pulley, torque **25 Nm**.

10


21 00008S

Grease the bushing

Remove:

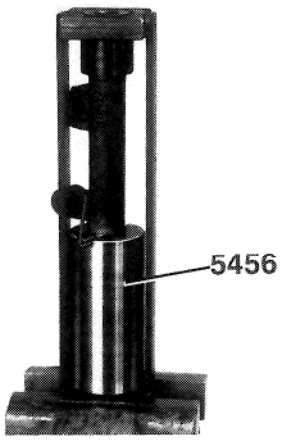
- the tension pulley lever's screw
- the tension pulley
- the socket behind the screw
-

Grease the surfaces of the lever's bushing, screw and socket with grease, P/N 11 61 246-2 (50 g) or 11 61 247-0 (500 g).

Fit:

- the socket
- the tension pulley
- the tension pulley lever's screw; torque-tighten to **39±5 Nm.**

11



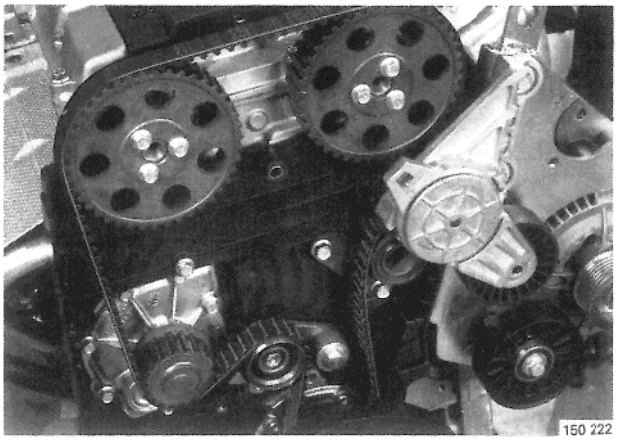
151 566

Lock the tensioner

Check that there is no visible leakage.

Compress the tensioner with tool 999 **5456.** Place the tension unit in the tool and screw the tool's centre nut to the end. Wait until compression is complete and insert a lock pin (Ø 2 mm) in the piston.

Note! If there is any visible leakage or if no resistance is felt during compression, or if compression is impossible, the tensioner **must** be replaced.


150 222

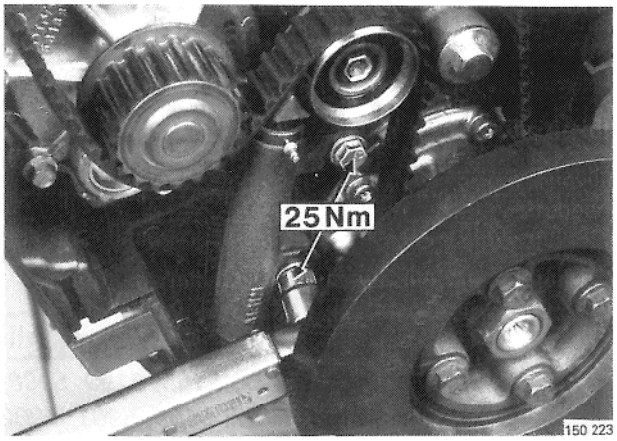
12

Fit the camshaft belt

Thread the belt around the crankshaft and right idler pulley.

Thread the belt over the camshaft pulleys.

Thread the belt around the coolant pump and press it over the tensioning pulley.



150 223

13

Fit the tensioner

Fit the tensioner's screws, torque **25 Nm.**

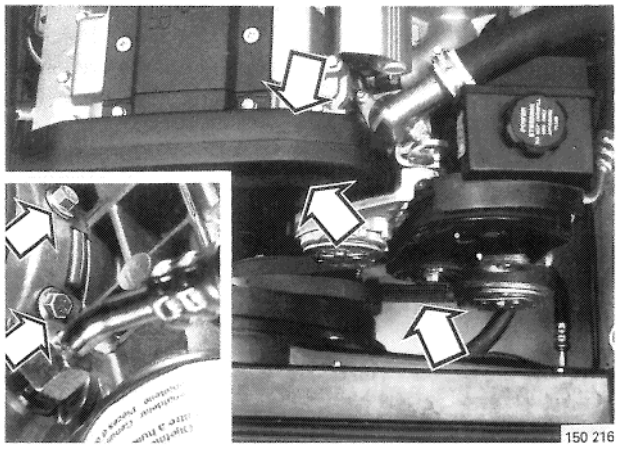
Pull out the lock pin from the tensioner.

Press **firmly** or hit the belt with a rubber mallet **twice** in the direction of arrow (**1**) and **twice** in the direction of arrow (**2**).

Fit the upper timing gear cover.

Fit the upper timing gear cover.

Rotate the crankshaft two revolutions and check that the markings on the crankshaft and camshaft pulleys match.


150 216

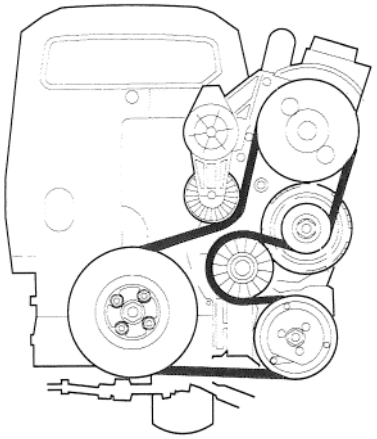
14

Fit:

- ignition cable cover
- front timing gear casing
- vibration damper shield
- splash-guard under the engine

Perform a function test

Test run the engine.


26 00003A

Fit the auxiliary unit belt

Note! New belt every 90,000 km!

Thread the belt around the crankshaft.

Then around the A/C compressor, idler pulley, alternator and servo pump.

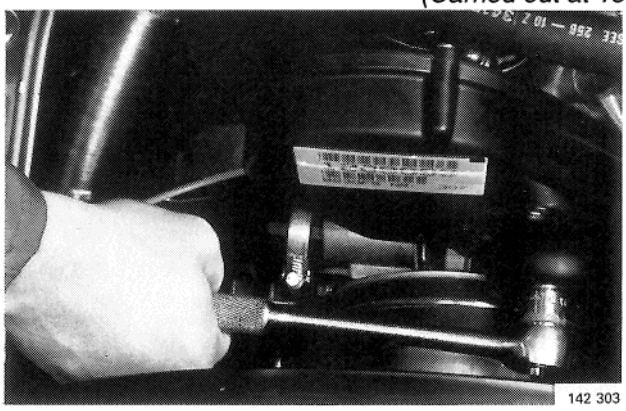
Tighten the belt tensioner with the articulated wrench and position the belt.

Check its operation.

D13 - Camshaft

adjust

(Carried out at 15,000 km and 90,000 km)


142 303

B 200/230

Adjust the camshaft belt

At an engine temperature of 40C (hand-hot engine)

Rotate the crankshaft clockwise to TDC (22 mm socket).

Remove the rubber plug in the timing gear cover. Undo the tensioning pulley nut 1 - 1.5 turns (17 mm socket).

Tighten the nut. Refit the rubber plug.

D14 - Camshaft, pump belt and idler pulley

replace

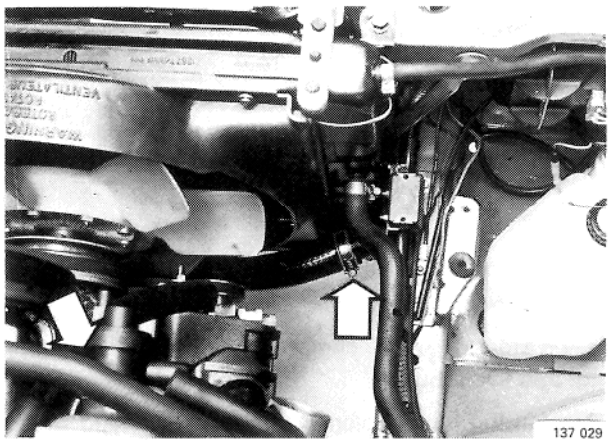
(Both camshaft and pump belt)

All

Special tools: 999... 5187, 5188, 5190, 5193, 5194, 5197, 5199, 5201, 5202

Important! The engine may only be turned over manually with the vibration damper. When the timing belt has been removed, neither the crankshaft nor the camshaft may be rotated, otherwise the valves may strike the piston and cause damage.

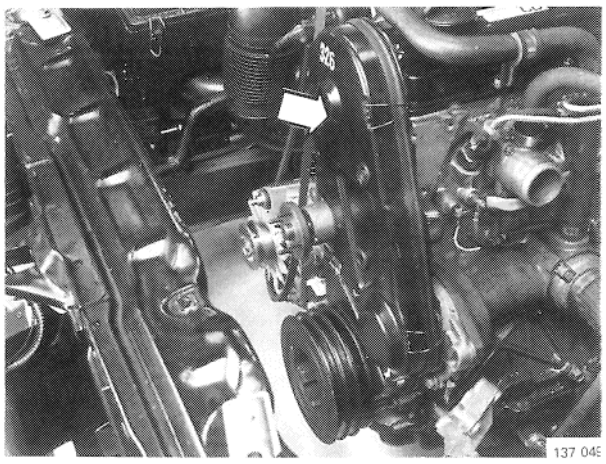
D 24 S/T/TIC


137 029

Disconnect the earth lead from the battery and the splash-guard under the engine.

Drain the coolant

Remove the expansion tank cover.



D 24 S/T/TIC

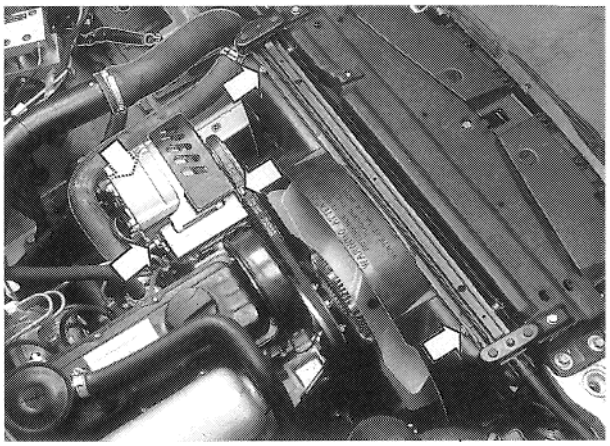
Remove the alternator

Undo the servo pump with its bracket and let it hang loosely.

Automatic: Disconnect the oil cooling pipes from the radiator

Remove:

- radiator fan and pulley
- radiator (D24 TIC: let the intercooler remain in position)
- drive belts
- valve cover
- timing belt covers front and rear

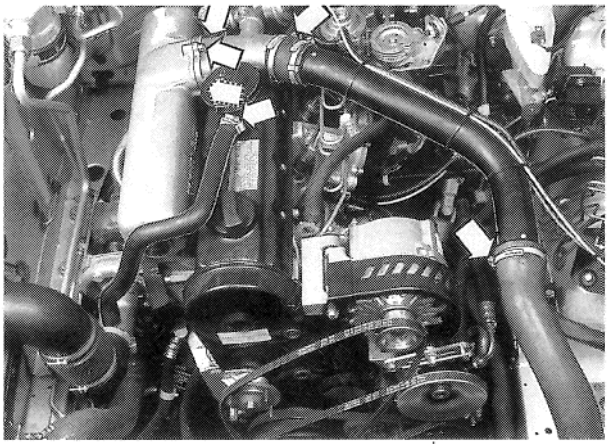


2100049S

D 24 TIC (EGR)

Remove:

- alternator belt
- fan shroud
- radiator fan with spacer and pulley



2100050S

Remove:

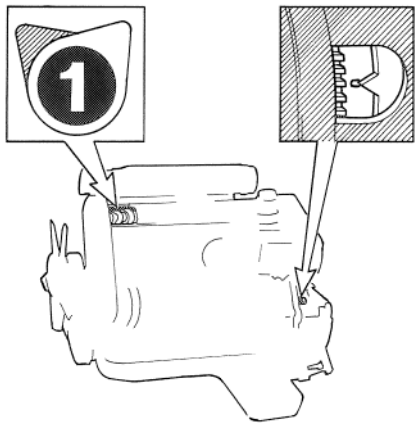
- left hose from the intercooler
- A/C belt if fitted
- inlet manifold extension with EGR pipe
- crankcase ventilation hose from valve cover

2100051S

Remove:

- valve cover
- upper (front) timing gear cover
- fuel pump belt cover

All

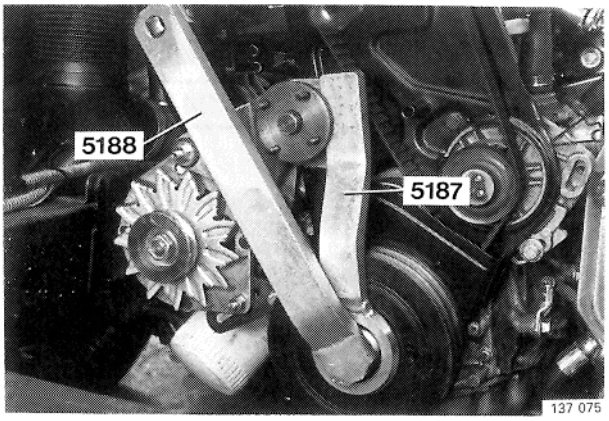


S128 163

Set cyl. no. 1 at TDC injection

Turn the crankshaft with the vibration damper's centre bolt **27 mm** socket or tool 999 **5188**).

The two cams for cyl. 1 should point offset upwards, parallel with the plane. The flywheel 0-marking should be opposite the marking on the flywheel cover.

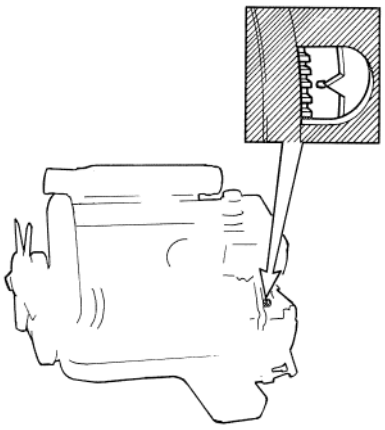


137 075

Remove the vibration damper's centre bolt

Use counterhold 999 **5187**, socket 999 **5188** and draw-bar handle to under the bolt.

It may be necessary to turn the engine a little to get the counterhold to fit securely against the fan bearing.

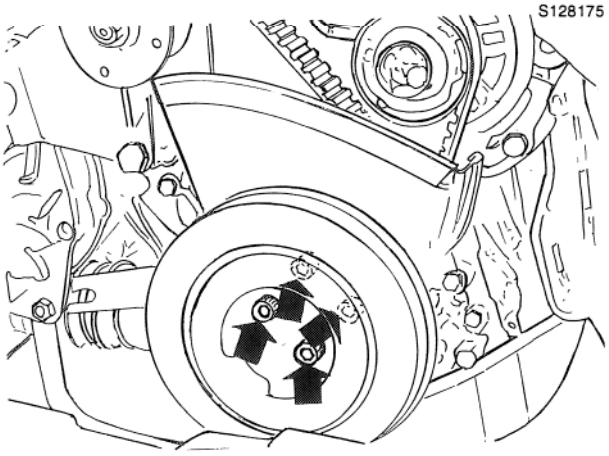


Check that cyl. 1 is at TDC for injection

The flywheel 0-mark should be opposite the mark on the flywheel cover.

Adjust if necessary, use counterhold 999 **5187** to turn the crankshaft.

S128175



S128 228

Remove the vibration damper and lower timing gear cover

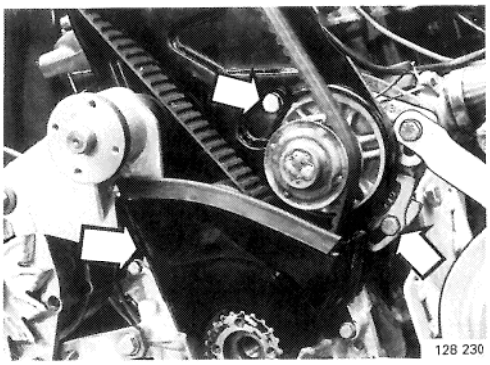
Remove the four hexagonal screws, 6 mm.

Withdraw the vibration damper.

Remove the lower timing gear cover.

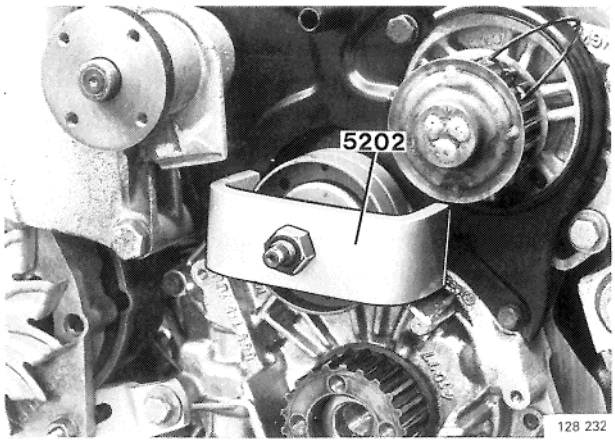
Note! The vibration damper and crankshaft gear may sometimes stick together. Knock them apart if necessary.

D 24 S/T/TIC


128 230

Remove the camshaft belt

Undo the coolant pump's attachment screws and loosen the belt. Remove the belt.



128 232

Remove the idler pulley

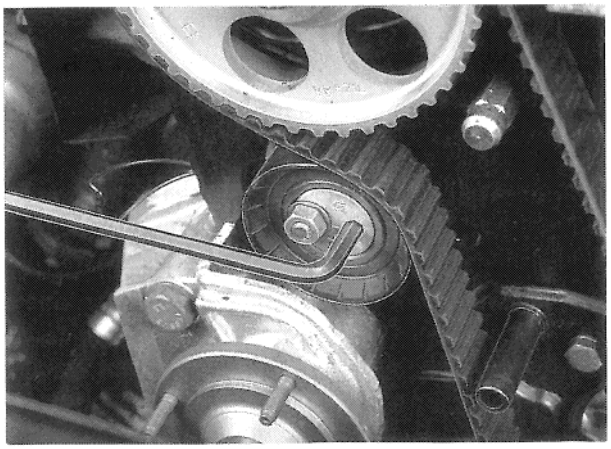
The idler pulley should always be replaced when replacing the drive belt (timing gear belt)

Remove the centre bolt.

Pull out the idler pulley. Use puller 999 **5202**.

Tap the new idler pulley into place. Ensure that it is straight. Fit the centre bolt.

D 24 TIC (EGR)


2100053S

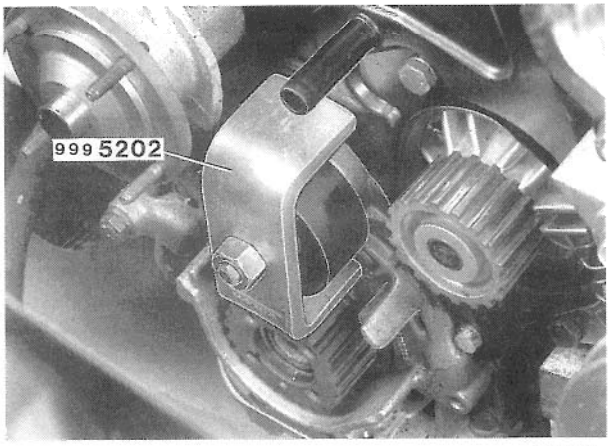
Remove camshaft belt

Undo the tension pulley nut and rotate the pulley as far from the belt as possible, then lock the pulley in this position.

Remove camshaft belt.

Check tension pulley: Rotate the pulley and listen for abnormal sounds from the bearing. Check that the pulley's surface facing the belt is clean and smooth.

When changing the tension pulley: Check carefully that the spring is correctly positioned. Tension it with the hexagon spanner and fix the pulley with the nut.



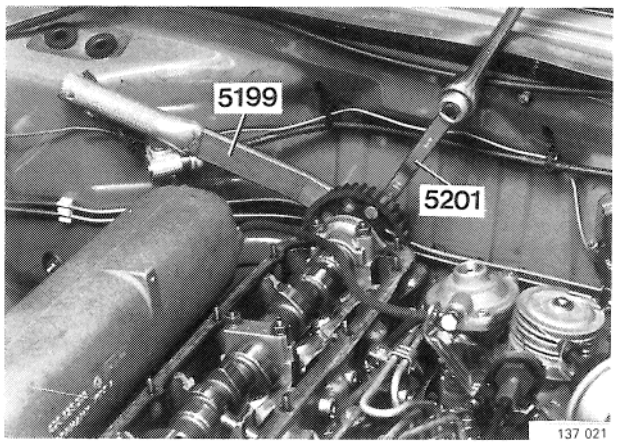
2100054S

Check the idler pulley

Rotate the idler pulley and listen for noise from the bearing. Check that the idler's surface against the belt is clean and smooth.

When changing the idler pulley: Remove the centre bolt and pull out the idler pulley. Use puller 999 **5202**.

Tap the new idler pulley into place, ensuring that it is positioned correctly. Fit the centre bolt, torque **25 Nm**.



All

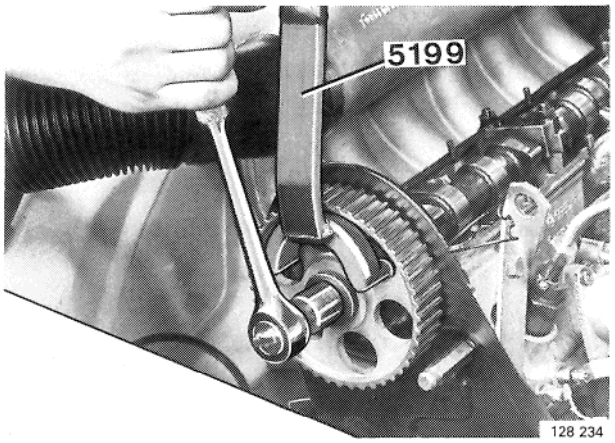
Remove the fuel pump belt and rear camshaft gear

Undo the pump bracket's attachment screws until the belt is slackened. Tighten one screw so that the pump remains in the upper position.

Remove the fuel pump belt.

Remove the camshaft gear. Use counterhold 999 **5199** and socket 999 **5201**.

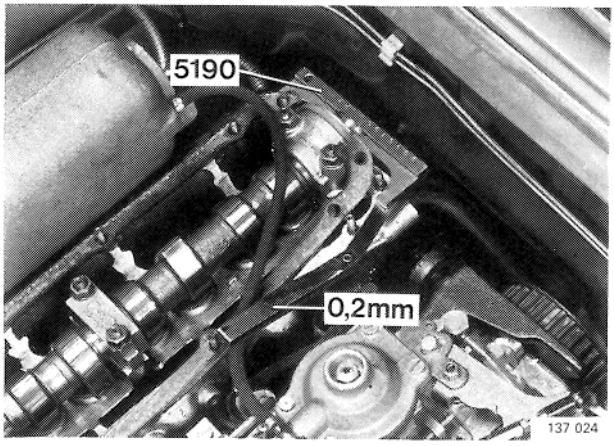
Note! Take care to ensure that the camshaft is not rotated.



Remove the front camshaft pulley

Use counterhold 999 **5199**.

Tap the pulley so that it comes away from the camshaft cone.

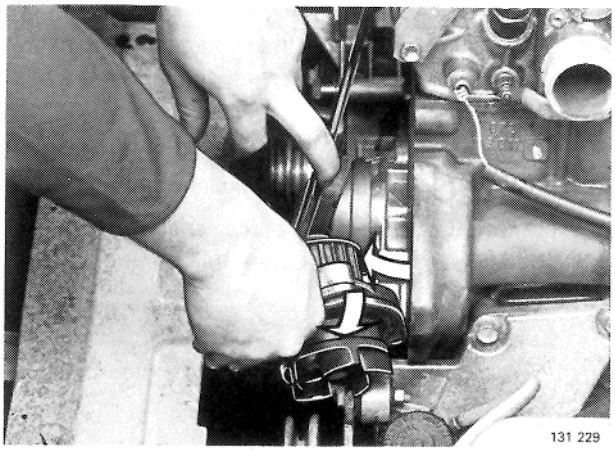


Lock the camshaft in the 0 position

Lift up the valve cover gasket.

Insert gauge 999 **5190** into the groove at the rear of the camshaft. Place a feeler gauge, **0.2 mm**, under the instrument's left side.

The feeler gauge is used to compensate for tolerances in the timing gear.



D 24 S/T/TIC

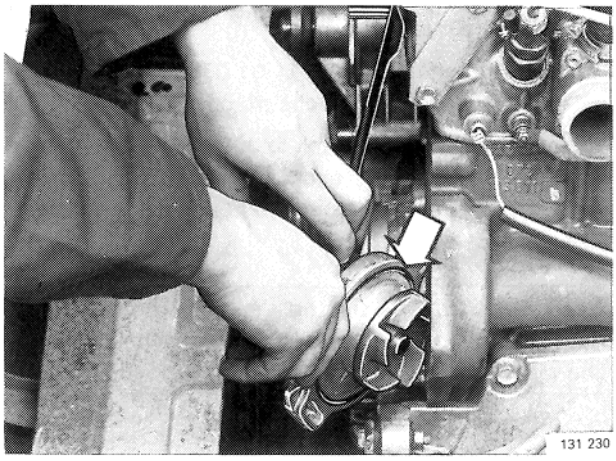
Replace the O-ring on the coolant pump

Remove the coolant pump.

Remove the splash guard and coolant pump's attachment screws.

Pull the guard away and remove the pump. Make sure the guard does not crack.

Remove the O-ring


131 230

Clean

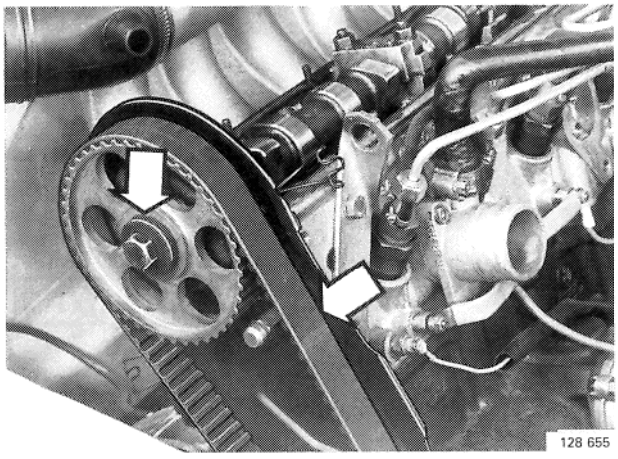
Clean the contact surface between the pump and the cylinder block. Wipe away all coolant from the cylinder block, pulley etc.

Lubricate a new O-ring with grease and fit it to the pump

Do not use Permatex or any other sealing agent.

Apply a thin layer of grease to the pump's contact surface.
Pull out the splash guard and fit the pump in place.
Loosely fit the pump's attachment screws.
Fit the splash guard screws.

All

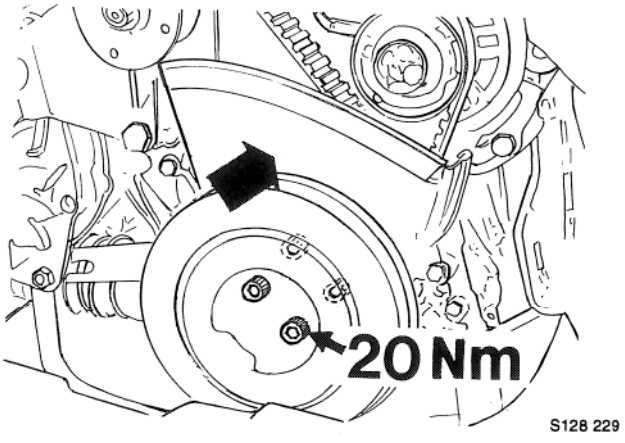

128 655

Fit the camshaft belt and front camshaft pulley

Ensure that the belt is properly located on the teeth of all the pulleys.

Tighten the front camshaft pulley's centre screw by hand; it should be possible to rotate the shaft.

D 24 TIC (EGR): Undo the tension pulley nut so that it moves freely.

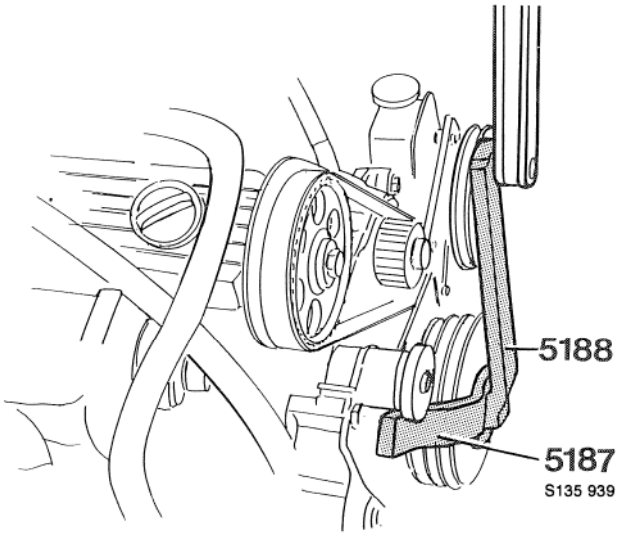


S128 229

Fit the lower timing gear cover and vibration damper

The vibration damper only fits in one position. On the crankshaft gear, there is a pin which is to fit into the vibration damper.

Fit and tighten the hexagonal screws (6 mm) to **20 Nm** (2.0 kpm).

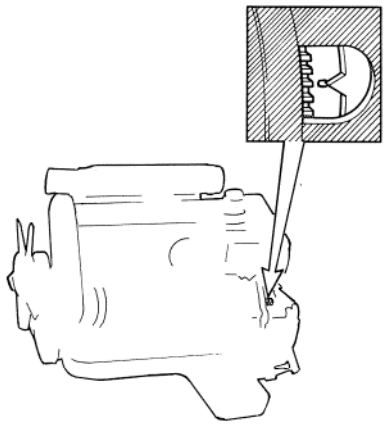


Fit the centre bolt

Apply sealing agent (P/N nr 11 61 056-5) to the centre bolt's thread and the contact surface.

Fit and tighten the centre bolt to **350 Nm** (35 kpm). Use counterhold 999 **5187**, socket 999 **5188** and torque wrench. The counterhold should fit against the fan bearing.

Note! The **350 Nm** value only applies when tool 999 **5188** is used. In addition, the torque wrench must be in line with tool 999 **5188**.

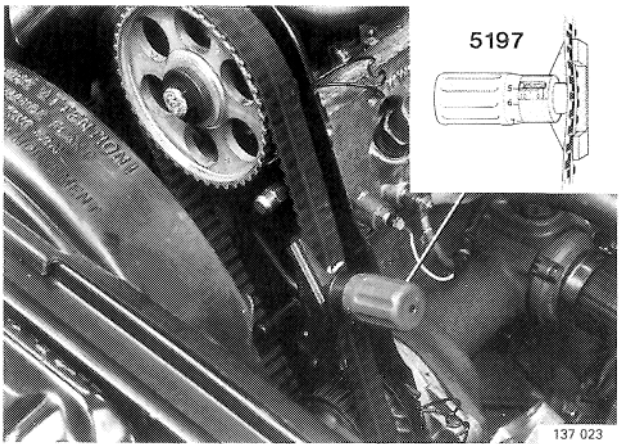


Check that cyl. 1 is at TDC injection

The flywheel 0-marking should be opposite the flywheel cover's marking.

Adjust if necessary.

D 24 S/T/TIC



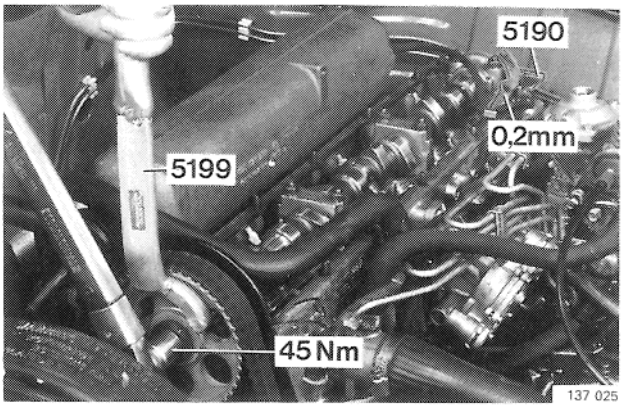
Tension the camshaft belt

Belt tension is adjusted at the coolant pump.

Use tool 999 **5197** to check belt tension.

Thread the tool over the belt and set it at **12.5 units**. Tension the belt until the mark on the piston is at the edge of the tool socket.

Now apply firm hand pressure to the belt and check/adjust belt tension once again.

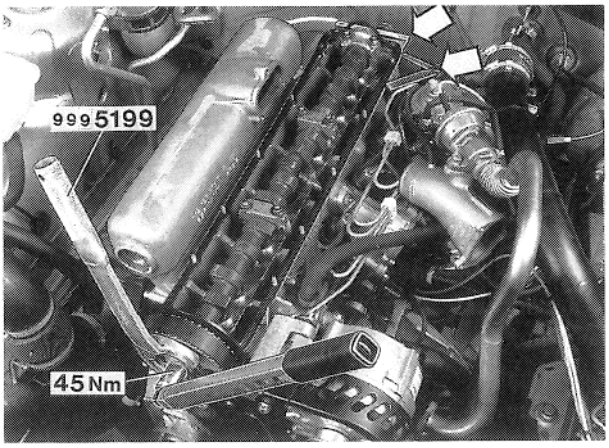


Tighten the front camshaft pulley and then remove fixture 999 5190

Use counterhold 999 **5199**. Take care to ensure that neither the camshaft nor the pulley rotates.

Tighten the centre bolt to **45 Nm** (4.5 kpm).

Remove gauge 999 **5190** and the feeler gauge.



S135 939

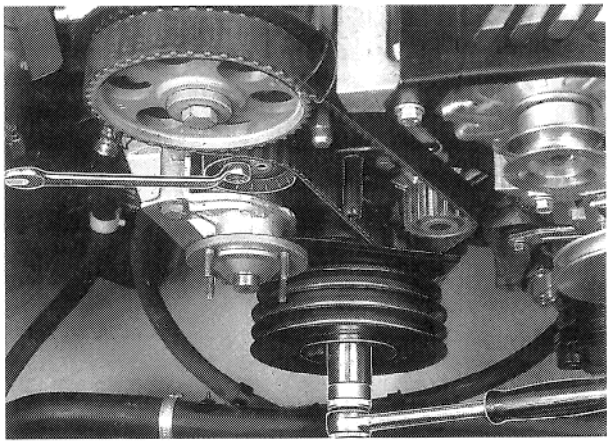
D 24 TIC (EGR)

Tighten the front camshaft pulley and then remove fixture 999 5190

Use counterhold 999 **5199**. Take care to ensure that neither the camshaft nor the pulley rotates.

Tighten the centre bolt to **100 Nm** (10 kpm).

Remove gauge 999 **5190** and the feeler gauge.



S128 175

Tension the camshaft belt

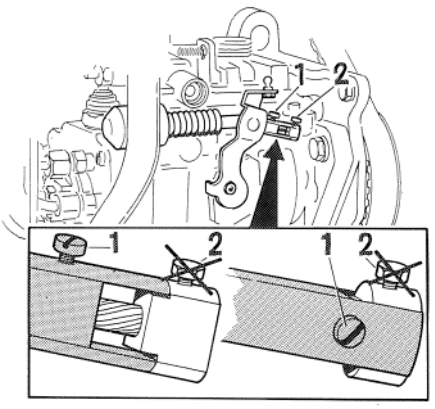
Turn the crankshaft 2 revolutions clockwise, with loose tension pulley. Lock the tension pulley without allowing the crankshaft to stop, just before TDC is reached on the second revolution.

Tighten the tension pulley nut to **15 Nm**.

Check belt tension with tool 999 **5197** between the camshaft and idler pulley.

Belt tension should be between **12-13 units**; if necessary, adjust with the help of the tension pulley.

All



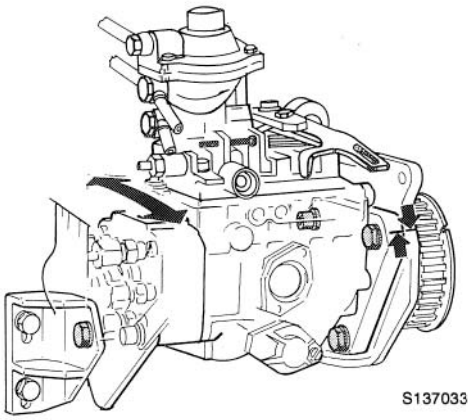
S128169

Release the cold-start mechanism

Undo screw 1. Press the lever forwards and turn the socket 90.

Note! Do not touch screw 2. If this screw is loosened, the cold-start mechanism must be reset.

Press the lever backwards against the stop.

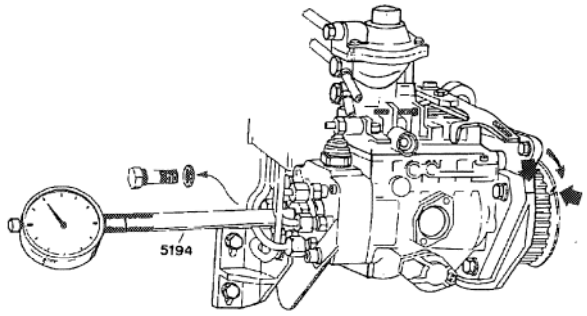


S137033

Basic installation of the injection pump

Undo the pump's attachment screws (the inner screw is a hexagonal 6 mm screw). Rotate the pump so that the markings on the pump and the pump bracket match.

Tighten the attachment screws.

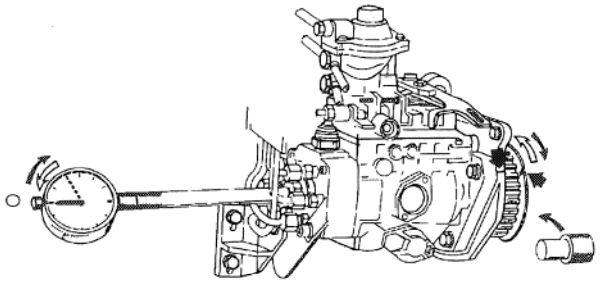


S137055

Fit and reset the dial gauge

Unscrew the plug from the pump's distributor unit.

Fit retainer 999 **5194** and dial gauge (measurement range min. 0-3 mm). Set the gauge at approx. **2 mm** pre-tension.



S137058

Lock the pump pulley in position in position for cyl. 1 injection

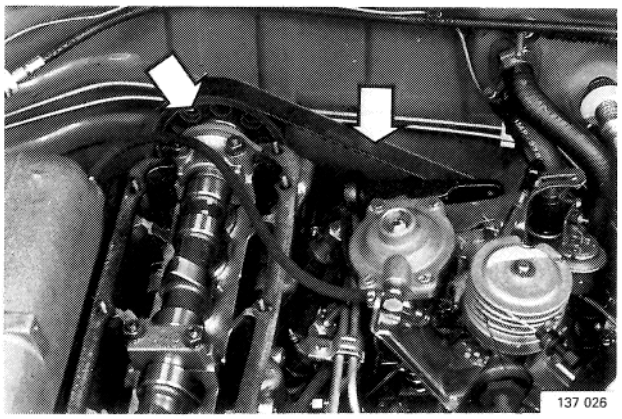
Rotate the pump pulley in the normal direction of rotation (clockwise viewed from the front) until the markings on the pump pulley and pump bracket match.

Then rotate the pump pulley somewhat against the normal direction of rotation until the dial shows the lowest reading.

Reset the gauge.

Rotate the pump pulley back in the normal direction of rotation so that the markings on the pump pulley and pump bracket match.

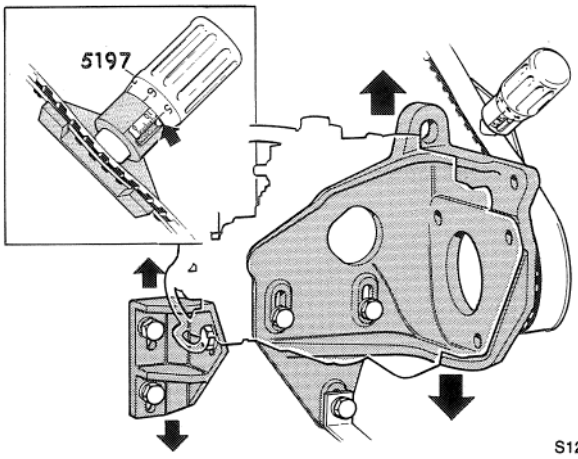
Lock the pump pulley in this position with mandrel 999 **5193**.
(The mandrel is inserted through a hole in the pump pulley into one of the pump bracket holes.)



137 026

Fit the rear camshaft pulley and pump belt

Tighten the centre bolt by hand, the pulley should be able to be rotated at the camshaft.



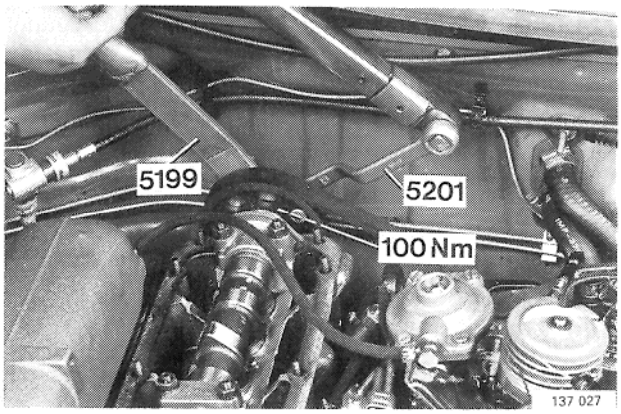
S128168

Tighten the pump belt

Belt tension is adjusted with the pump brackets.

Use tool 999 **5197** to check belt tension. Thread the gauge over the belt and set it at **12.5 units**.

Tension the belt until the mark on the piston is at the edge of the gauge.
Tighten the pump bracket's attachment screws.
Apply firm hand pressure to the belt.
Check/adjust the belt tension once again.



Adjust the pump and tighten the rear camshaft pulley

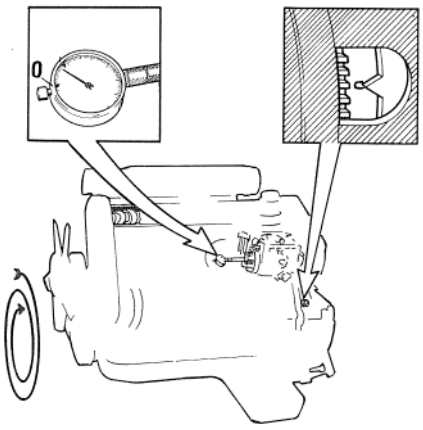
Position counterhold 999 **5199,** socket 999 **5201** and a torque wrench. The torque wrench should be positioned perpendicular to 999 **5201**, otherwise the wrong tightening torque will result.

Rotate the camshaft pulley slowly with counterhold 999 **5199** in the normal direction of rotation, until the dial shows:

D 24 . . . . . **0.70 mm**
D 24 T . . . . . **0.75 mm**
D 24 TIC . . . . . **0.90 mm**
D 24 TIC (EGR) . . . . . **0.95 mm**

Keep the camshaft pulley in this position. Tighten the centre bolt to **100 Nm** (10 kpm). Take care that neither the camshaft nor the pulley change position.

Remove mandrel 999 5193 from the pulley



S128173

Check pump setting

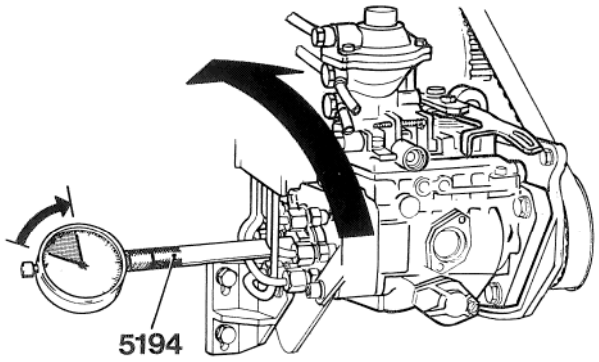
Turn the crankshaft until it is once again at cyl. 1 TDC injection. If the engine is turned too much, it must first be returned approx. 1/4 revolution and then to the 0 mark, otherwise the adjustment will be incorrect.

The dial should now show:

D 24 . . . . . **0.65-0.73 mm**
D 24 T . . . . . **0.72-0.80 mm**
D 24 TIC . . . . . **0.87-0.95 mm**
D 24 TIC (EGR) . . . . . **0.92-1.00 mm**

If the value is correct:
Continue with "**Remove dial gauge.....**"

If the value is incorrect:
Adjust according to the following instructions.



S135991

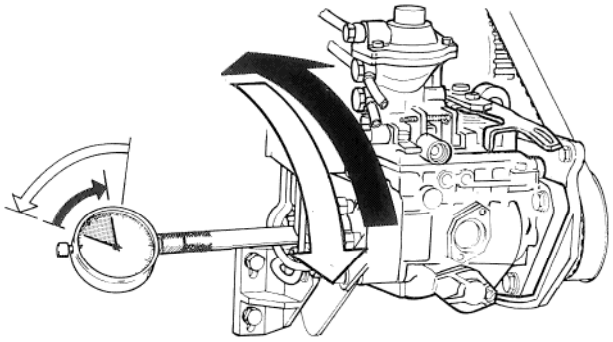
Adjustment of pump setting:

Adjustment values:

D 24	**0.70 mm**
D 24 T	**0.75 mm**
D 24 TIC	**0.90 mm**
D 24 TIC (EGR)	**0.95 mm**

If the value is less than the adjustment value:

Undo the pump's attachment screws and turn the pump inwards to the adjustment value. Tighten the attachment screws and repeat the check of the pump setting.



S136058

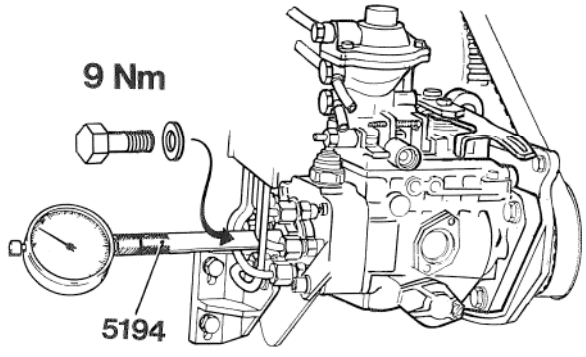
If the value is greater than the adjustment value:

Undo the pump's attachment screws. Rotate the pump first outwards until the gauge shows approx.

D 24	**0.60 mm**
D 24 T	**0.65 mm**
D 24 TIC	**0.80 mm**
D 24 TIC (EGR)	**0.85 mm**

Then rotate the pump inwards to the adjustment value. Tighten the attachment screws and check the pump adjustment once again.

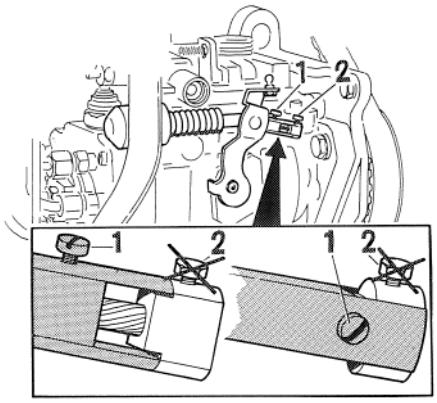
Important! Under no circumstances whatsoever should the pump be subjected to impacts or knocks since this affects the unit and results in faulty adjustment.



S135992

Remove the dial gauge and retainer 999 5194.

Refit the plug with a new seal.
Torque **9 Nm** (0.9 kpm).



Connect the cold-start unit

Press the lever forwards and turn the socket 90.

Tighten screw 1.

Note! Do not touch screw 2. If this screw is loosened, the cold-start unit will have to be readjusted.

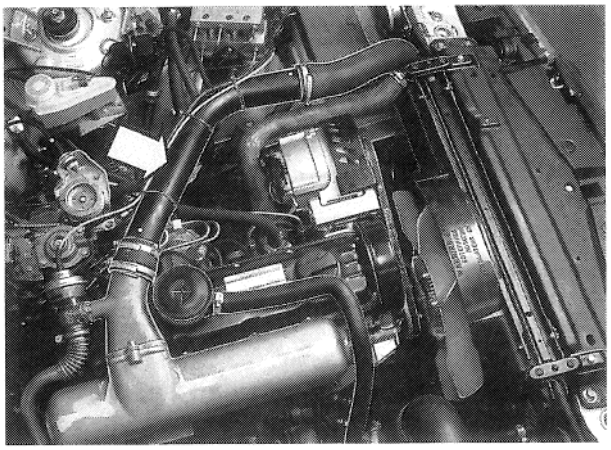
S128 169

Fit the valve cover

Use new gaskets if necessary.

Fit the timing gear covers (front and rear)

Use new gaskets if necessary.

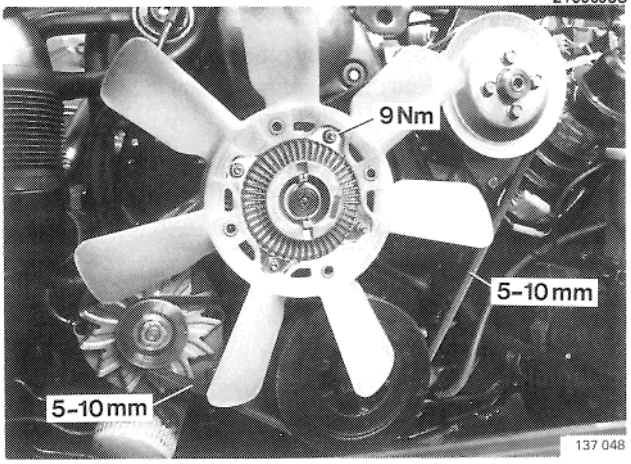


D 24 TIC (EGR)

Fit:

- all the drive belts
- radiator fan with pulley
- inlet manifold extension with EGR pipe
- hoses to intercooler

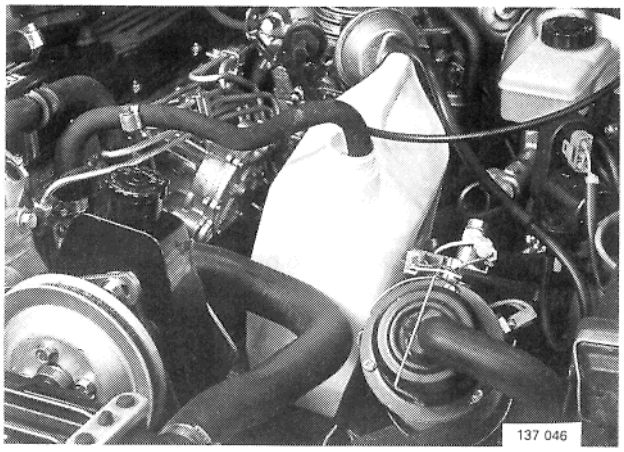
2100093S



D 24 S/T/TIC

Fit:

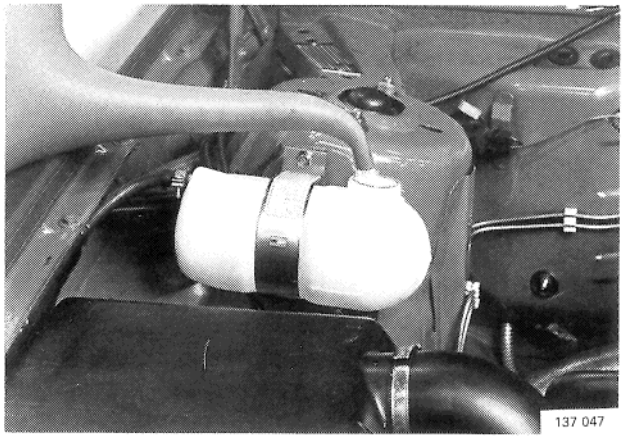
- the drive belts. Tension them until they can be pressed down 5-10 mm in the middle
- radiator (TIC: complete with intercooler)
- radiator fan with pulley
- automatic: Fit the oil cooler pipes from the radiator
- servo pump with bracket
- alternator


137 046

Prepare bleeding of the cooling system

Remove the upper hose from the cold-start unit. Place a container under the hose. Hold the hose mouth roughly level with the top of the expansion tank.

With this method, the cooling system is bled quickly and all air pockets are eliminated.


137 047

Fill coolant

Volume: with manual gearbox approx. 11 litres (11.7 litres with tropical radiator)
with automatic gearbox approx. 10 litres (11.6 litres with tropical radiator)

Use only **Genuine Volvo coolant**

Cars with CU: Set the heater control to full heat. The function selector should not be on Max.

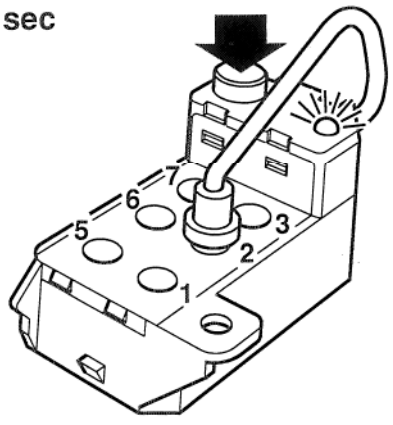
Cars with ACC: Set the function selector to OFF.

Start the engine and operate at raised idle speed for 5 minutes. Fill coolant during this period. Attach the hose to the cold-start unit. Top up the expansion tank **all the way to the top** (above max.) and fit the cap.

D15 - System check

Fenix engine diagnosis B 16 F, B18 EP, FP, U, B 20 F

1x 0,5 – 1sec



S23 259

Attach selector cable to position 2 of the diagnosis socket.

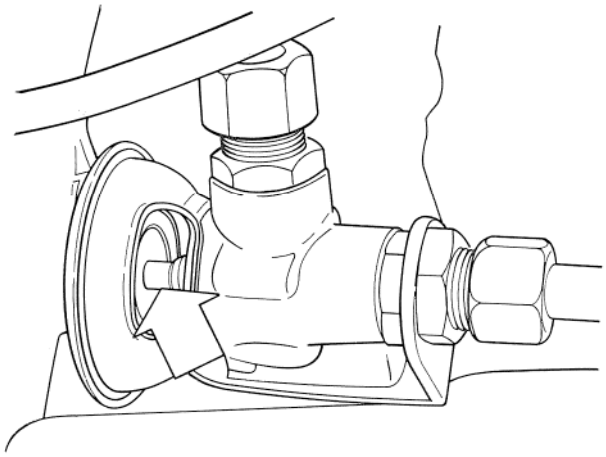
Read test function 1:

Test function 1 is activated by pressing the button once. Code 1.1.1 indicates that there is no fault in the system.

D16 - Exhaust gas recirculation (EGR)

check the function

D 24 T Austria



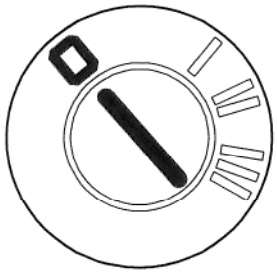
S41 650

Check the function

Check that the valve opens and shuts when the engine speed rises.

Note! The valve opens only when the engine is warm and engine speed exceeds idling speed.

All



30 00037A

Checking the EGR valve

- Ignition off
- Connect the yellow hose to the EGR valve
- Remove the yellow hose from the EGR converter
- Start the engine
- Pump up a vacuum (max. 30 kPa).

If vacuum drops:
- replace the EGR valve.

If the engine runs unevenly at idling speed:
- EGR valve OK.

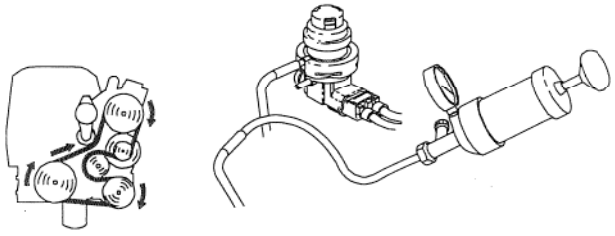
If the engine runs smoothly at idling speed:
- Check that the EGR pipe is not blocked.
- Clean the pipe if necessary
- If the EGR pipe is OK, test with a new EGR valve.

The engine should run unevenly when the vacuum pump shows negative pressure.

Three alternatives are possible as below:

1 The engine runs unevenly when the vacuum pump shows negative pressure but the vacuum pump loses vacuum:

- Test with a new EGR valve.



23 000251A

2 The engine runs smoothly at idling speed when the vacuum pump shows negative pressure and the vacuum pump maintains vacuum:

- Check that the EGR pipe is not blocked. Clean if necessary. If the EGR pipe is OK, test with a new EGR valve.

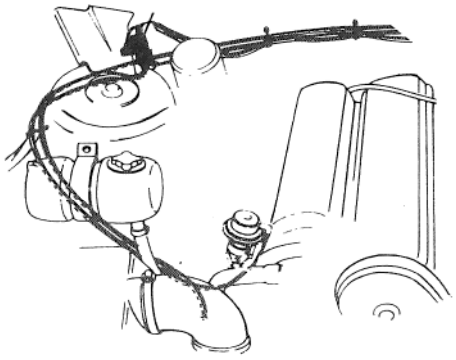
3 The engine runs unevenly at idling speed when the vacuum pump shows negative pressure and the vacuum pump maintains vacuum:

- the EGR system is OK.

D17 - Exhaust gas recirculation (EGR)

clean

D 24 T Austria



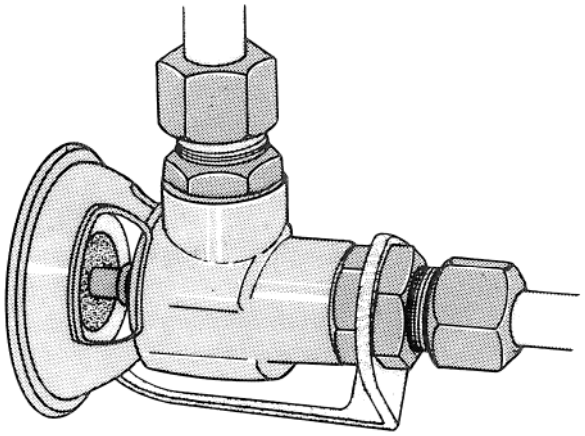
S152 574

Clean

Remove and clean both the valve and the pipe.

Tap away any soot deposits; ensure that the valve and pipe are clean before refitting.

B 230 FD



S149 211

Clean

Remove:

- the air hoses
- EGR valve with temperature sensor
- pipe connectors

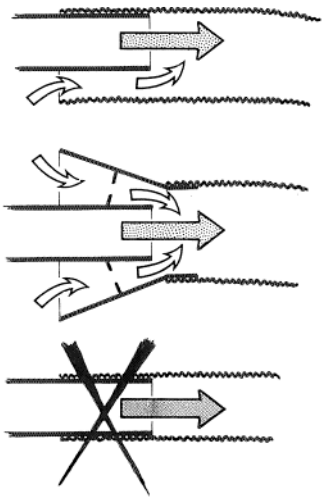
Tap away any soot deposits; ensure that the valve and pipe are clean before refitting.

Refit the parts.

D18 - Idling speed - CO-content

Checking of idling speed and carbon monoxide content (CO) is generally not necessary for cars equipped with catalytic converters and Lambda-sonds.

Read this before checking/adjusting



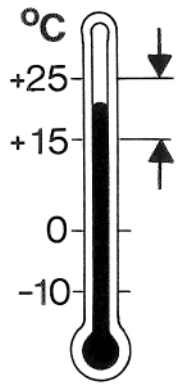
S132 083

Exhaust evacuation. Connection of CO gauge

Use an exhaust hose with open connector. If the exhaust evacuation is too strong, there is a risk of faulty measurement results.

The CO gauge probe should penetrate about 480 mm into the exhaust pipe. If the probe does not penetrate sufficiently, there is a risk that the exhaust gas may be diluted with fresh air, thus producing a faulty measurement result.

Note! On cars with a catalytic converter, the CO is measured ahead of the catalyst.



S132 641

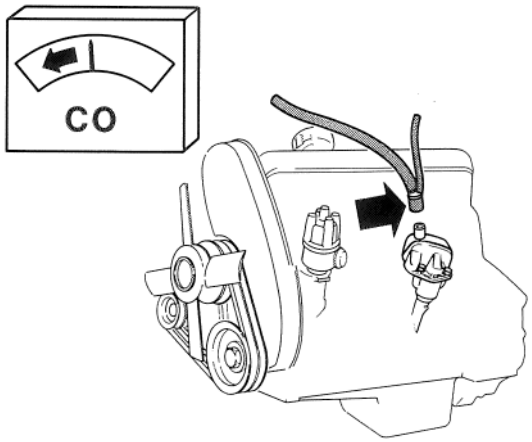
Temperature

Checking/adjustment of CO-content should be performed at room temperature (between +15°C and +25°C) and:

- on carburettor engines: within 3 minutes after the coolant thermostat has opened
- on injection engines: at the earliest 5 minutes after the coolant thermostat has opened.
- the electric fan, if fitted, should not have started.

Prior to every reading or if the check/adjustment has not been able to be performed within 3 minutes (carburettor engines)

- Raise engine speed briefly to approx. 25 r/s (1500 r/min) so that cold fuel enters the carburettor.
- Observe the time factor.



S137 421

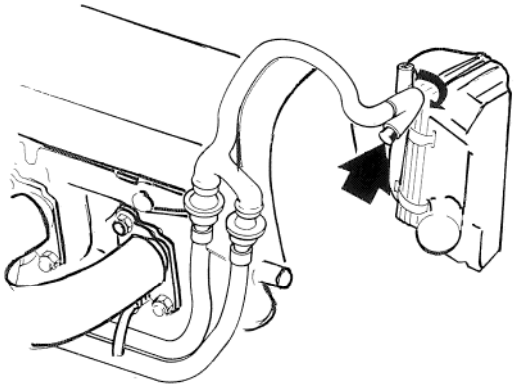
If CO-content is too high

If the car is driven a lot in city traffic (repeated starts, idling), there may be a certain dilution of fuel with engine oil. Crankcase gases may thus influence the CO content and result in faulty adjustment.

Check the CO-content with disconnected crankcase ventilation.

In normal cases, the CO-content drops somewhat when crankcase ventilation is disconnected.

If the CO-content drops considerably, this is an indication that engine oil is diluted with the fuel. The engine oil should be changed.



S134 791

The Pulsair system

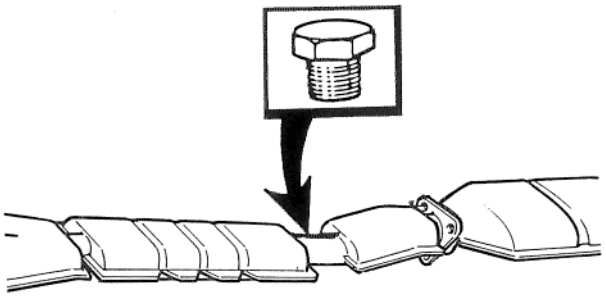
The Pulsair system, if fitted, should be disconnected and plugged for checking/adjustment of the CO-content. CO-content should not be checked/adjusted with the Pulsair system connected.

F engines (with catalytic converter)

On catalytic converter equipped engines, the CO-content and idling speed do not normally need to be checked. The new adaptive electronic control systems ensure that CO and idling values remain within the specified tolerances.

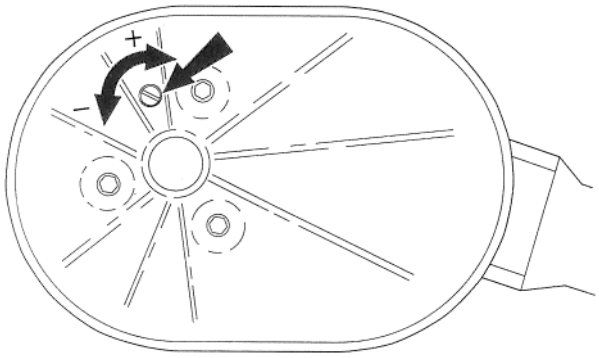
Faulty values may be an indication of a fault in one of the systems. Measurement of the CO-content is performed ahead of the catalytic converter by removing a plug in the front exhaust pipe. On the B280F there is a plug for each row of cylinders.

The Lambdasond should always be disconnected when a CO meter is used.



S142 700

B 18 K, KP

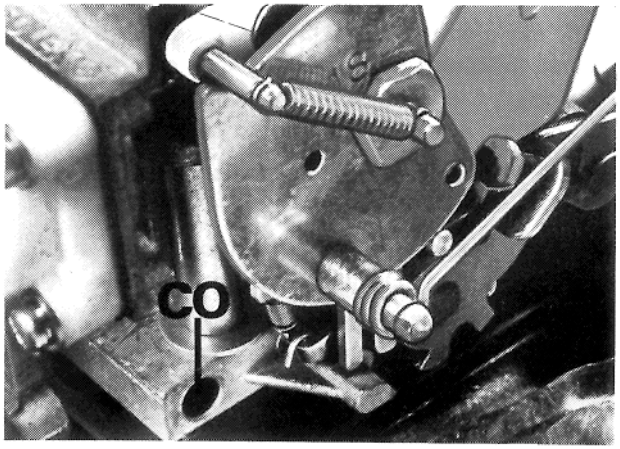


S146 809

Idling speed, checking/adjustment

Correct idling speed:
cars without A/C: 14.2 r/s (850 r/m).
cars with A/C: 15.0 r/s (900 r/m) (A/C shut off).
Adjust the idling speed by turning the screw in the air cleaner cover.

Important!
Check the float chamber ventilation after idling speed has been adjusted.



S142 343

CO-content, checking/adjustment

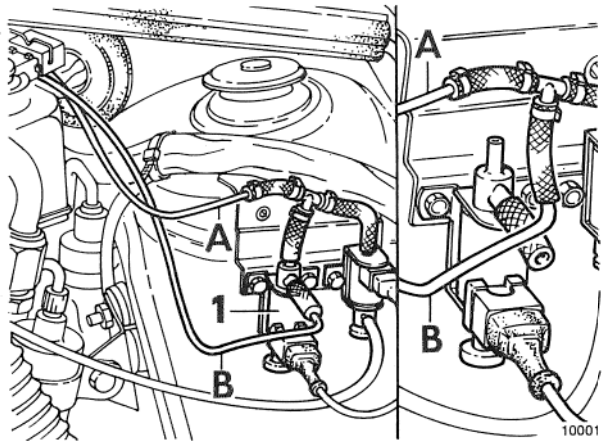
Checking: **0.5-2.5%**

Adjustment: **1.5 %**

Note: The electric radiator fan should not start during adjustment of the CO-content.

Fit a new seal after adjustment.

Adjust idling speed after the CO-content has been adjusted.



10001S

Check/adjust automatic engine speed compensator

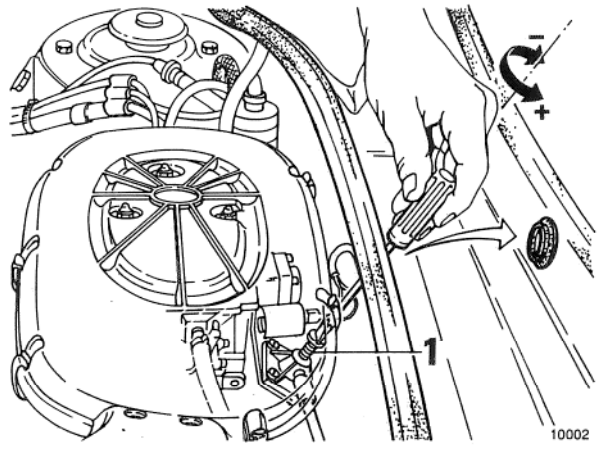
Check:

Disconnect the hoses (**A**) and (**B**) from the electric three-way valve (**1**) and connect them together.

Note! do not disconnect any other connections.

Run the engine for about 10 seconds to stabilise the engine speed.
Engine speed should now be **1375 - 1425 r/m**.

If any other engine speed is registered, adjust as follows.

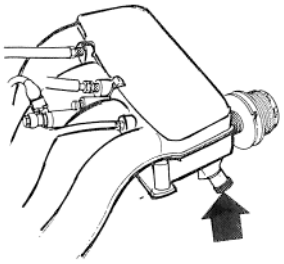


10002S

Adjustment:

Remove the rubber plug (**2**).
Adjust engine speed to **1400 r/m** with adjustment screw (**3**) on the vacuum unit.
Refit the rubber plug.
Connect the hoses to their respective connectors on the three-way valve.

B200-230 E

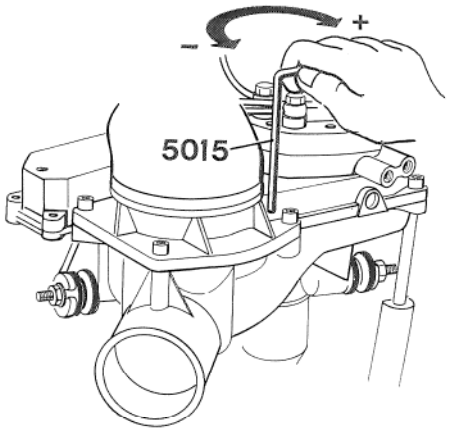


Pre-set idling speed

Hot engine. Correct idling speed: **15.0 r/s** (900 r/min).

Check/adjust CO-content

S134 790



Hot engine and idling speed.

Use tool **5015**.

After each adjustment, the engine should be revved briefly before the meter is read. **Note!** First remove tool **5015** otherwise the meter lever may be damaged.

- **Anti-clockwise** turn (left) **reduces** CO-content
- **Clockwise** turn (right) **increases** CO-content

Sealing, CO adjustment screw

Legal requirement on certain markets.

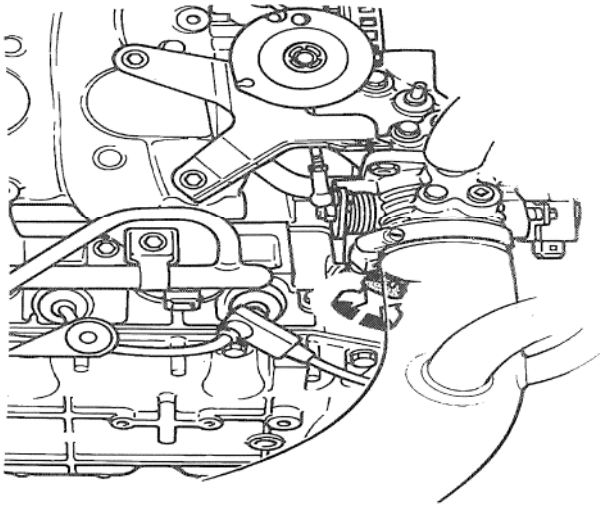
Remove the plug with an awl or similar tool. Press in a new plug after adjustment.

S119 834

Connect the hose to Pulsair

Check/adjust idling speed

B 280 E



S142 493

Pulsair system if fitted, is disconnected.

Connect the test socket to earth

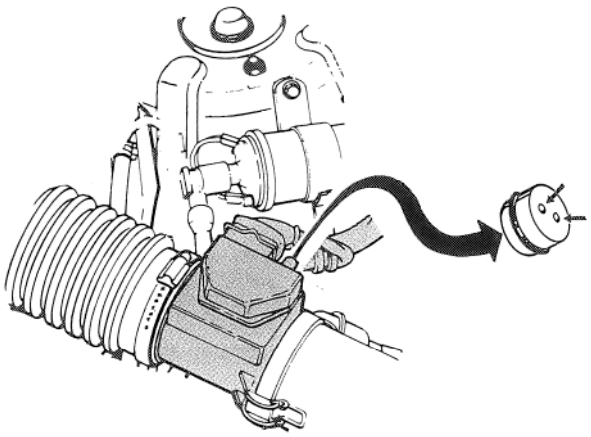
Adjust idling speed

Use the idle screw to adjust idling speed to **11.7 r/s** (700 r/min).

Remove the earth cable from the test socket. Engine speed should now rise to **12.5 r/s** (750 r/min).

Check/adjust CO-content

Nominal value: **0.5-2.0%**



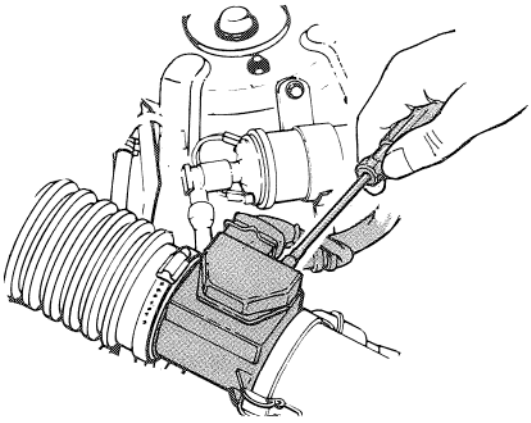
S142 491

For adjustment:

Remove the seal:

Engine switched off. Drill two holes in the plug. Drill diameter 2 mm.

Withdraw the plug with circlip pliers. Start the engine.



S142 492

Adjustment value: **1.0%**

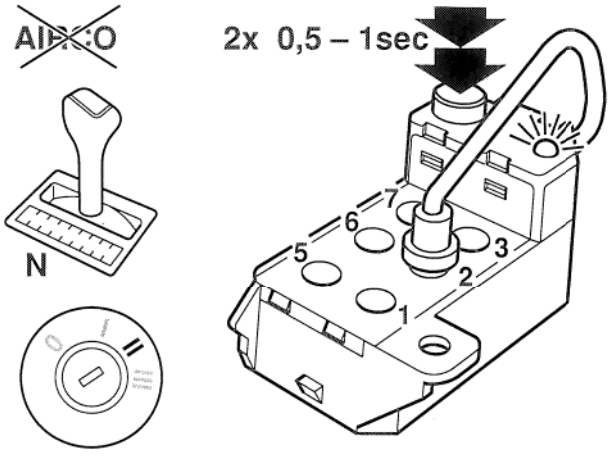
Rotate the adjustment screw

- anti-clockwise to reduce the CO-content
- clockwise to increase the CO-content

Seal the adjustment screw

Use a new plug. Tap it into place.

B 18 EP, B 18 U (M), B 20 F (M) without Lambdasond



23 296

Switch off air conditioning.

Move the gear selector lever to N on cars with automatic gearbox.

Check idling speed and adjust the basic setting (only B 18 EP)

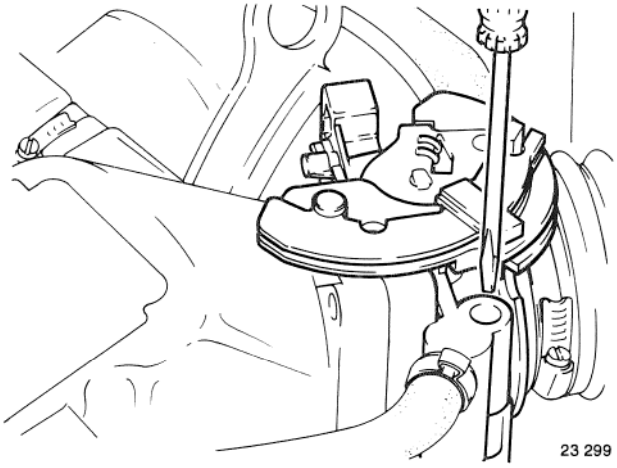
Set the selector cable to position 2.

Start the engine.

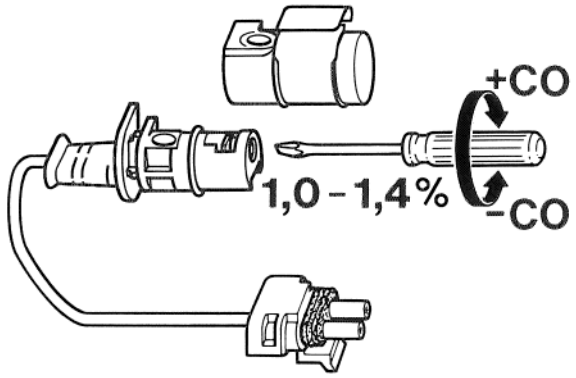
Activate test function 2 by pressing the button twice, 0.5-1 secs. each time.

The LED will flash rapidly.

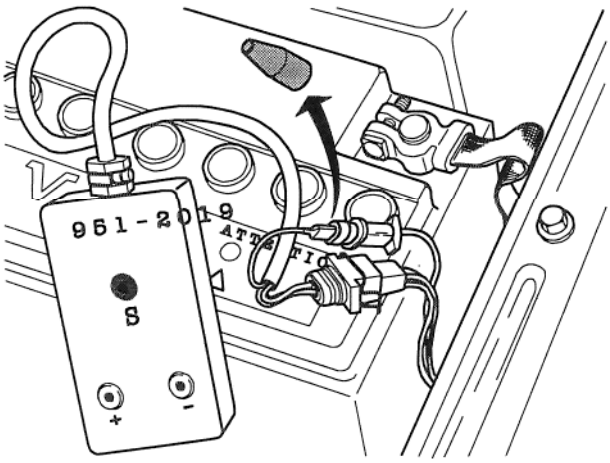
Idling speed should now be as follows:
B18EP . . . . . **14.2 r/s** (850 r/m)



23 299



23 052



1700029A

Adjust if necessary with the adjustment screw on the throttle valve housing.

Reset **test function 2** by pressing the button once, 0.5-1 secs.

Remove the selector cable.

Idling speed should now be as above.

Checking/adjustment of CO-content (B 18 EP)

The CO-content is measured in the exhaust tailpipe Should be adjusted with a hot engine and all current consumers switched off (incl. radiator fan);

CO-content:

- for adjustment: **1.2 - 1.4 %**
- for checking, without EVAP: **1.0 - 1.4 %**
  with EVAP: **0.8 - 3.0 %**

Checking/adjustment of CO-content (B 18 UM, B 20 EP)

Checking CO:

Move the gear selector lever to N on cars with an automatic gearbox.
Switch off the A/C and all current consumers apart from the daylight running lamps.
Measure CO content in the exhaust tailpipe. The radiator fan should not be on during this test.

CO-content at inspection:

B 18 U (M)	1.0 - 1.5 %
B 20 F (M)	0.5 - 1.5 %

Adjusting CO-content

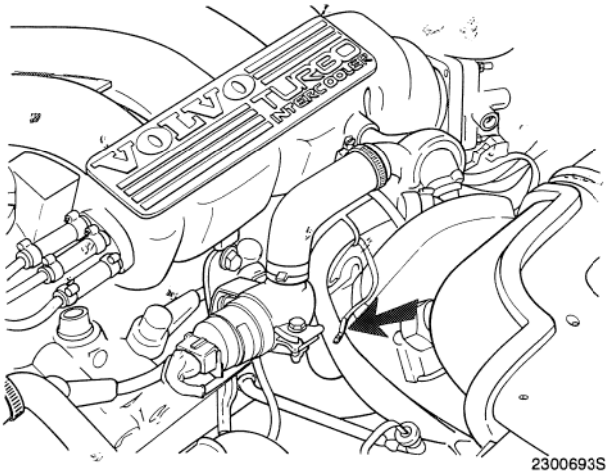
Switch off the engine and wait for at least 20 seconds.
Remove the seal and connect tool 951 **2019** to the connectors (between the engine and monitor)
Start the engine.
Press button **S**.
Read the CO level.
Adjust CO with the + and - buttons
- CO too high: press the - button
- CO too low: press the + button
- Adjustment value **1.5 %**

The CO level will continue to rise/fall after buttons + and - have been pressed.
Press button **S** when the required level is reached.
Switch off the engine and wait for at least 20 seconds.
This gives the control unit time to enter the new value into system memory.

Remove tool **951 2019** and seal the connectors once again.

B18 FT/FTM without Lambdasond

Switch off the air conditioner. Move the gear selector lever to N on cars with an automatic gearbox.



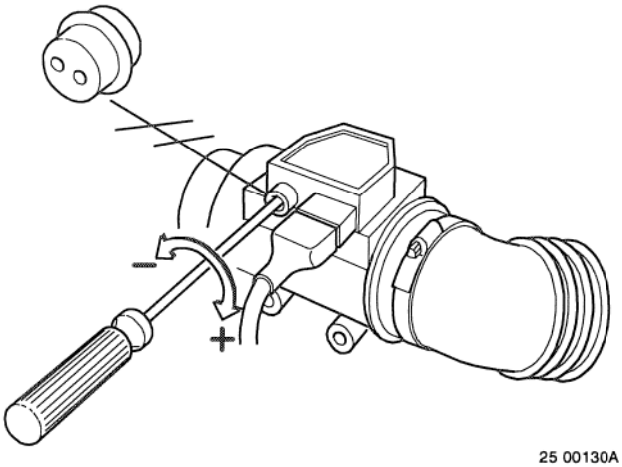
2300693S

Check/adjust the idling speed

Set the idle control valve to the nominal value by earthing the cable which is beside the valve at the front of the engine. Switch off the air conditioner. Idling speed should now be **11.7 r/s** (700 r/m); adjust if necessary via the screw on the throttle valve housing.

Remove the earth connector from the test socket.

The idling speed should now rise to **14.2 r/s** (850 r/m).



25 00130A

Checking/adjustment of the CO-content

Important!
The screw for adjustment of CO-content acts on a potentiometer and can be rotated max. 15 revs.

Insert the CO-meter's probe.

Remove the screw's seal. Adjust the CO-content via the adjustment screw.

Turn anti-clockwise for lower CO-content.
Turn clockwise for higher CO-content.

Seal the screw.

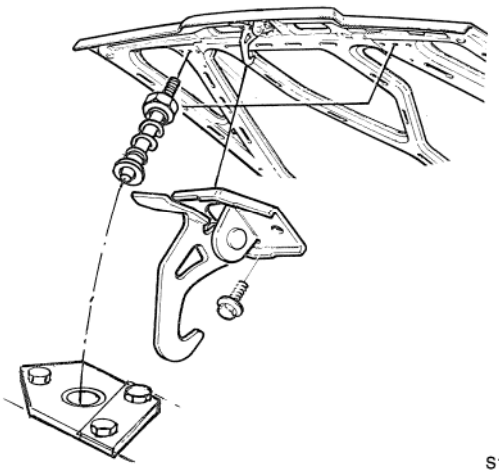
Checking: **0.4-0.8%**

Adjustment: **0.7%**

D19 - Doors, bonnet

lubricate hinges, bonnet lock

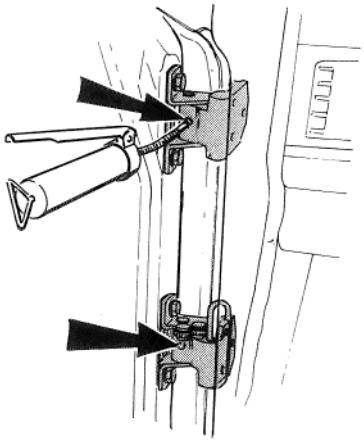
All



S134 156

Bonnet - lubricate

- hinges
- bonnet lock
- safety catch



S118 557

Doors - lubricate

- hinges (does not apply to the 400)
- door stops
- lock lugs
- locks
- bearings on rear doors (850)

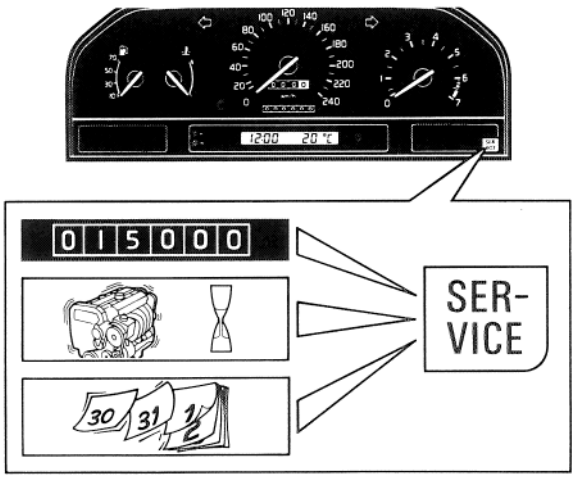
Tailgate - lubricate

- lock (480)

D20 - Service reminder

resetting

850



S152 098

Diagnostic unit check function 4

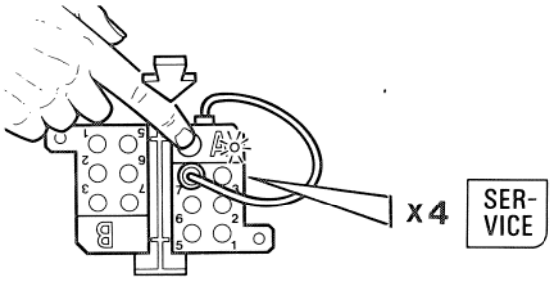
Check function 4 in the control unit's diagnostic system is used to reset information which is stored for the purpose of activating the service reminder lamp. This service function shall be reset at every service.

Resetting the service reminder

Applies only to **VDO** instruments. With odometer below the needle.

With Volvo Diagnostic Key

See service manual section 3(35-38) Lighting, Instrumentation and Other Electrical Equipment, 850 1992-, page 32.



10 00004A

Manually

Ignition on.

Select position **7** at diagnostic socket **A**.

Press 4 times, briefly but distinctly. You are now in check function 4.

Registration

When the LED shows a steady glow, the system is ready to accept the code.

Code	Clear text	Remarks
1-5-1	Reset service counter	Service lamp off

Press the first number (the key once) while the LED is still glowing.

Do not press the second figure (press the key five times) until the LED glows steadily again.

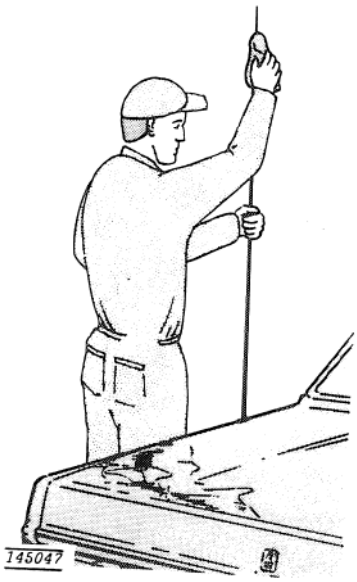
Repeat the procedure for the third number (press the key once).

Wait for a response from the control unit, whereby the LED flashes rapidly a couple of times. Resetting is complete and the service lamp is turned off.

D21 - Power antenna

clean

240, 400, 700, 940/960, 850



S145 047

Clean the antenna as follows:

1. Raise the antenna
2. Spray the antenna rod with CRC 5-56 or similar lubricant
3. Wipe the antenna dry
4. Spray the antenna rod once more
5. Raise and lower the antenna three times in succession
6. Wipe the antenna dry

Alphabetical index

Comments

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From
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Publication:.....

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Section:..... Page..... TP No.....

Suggestion/Reason:

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If you have any suggestions or comments about this manual make a copy of this page, write down your comments and send to us.

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English