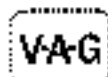


Workshop Manual Audi 100 1983 ▶, Audi 200 1984 ▶

Engine Code letters	2E								
Booklet	5 Cylinder F. I. engine (4 valve), mechanics								

Edition 05.83



V.A.G Service.

Repair Group Index to Workshop Manual Audi 100 1983 ▶, Audi 200 1984 ▶

Engine
Code letters

3B

Booklet

5 Cylinder F.I. engine (4 valve), mechanics
Edition 05.89

Please note, the technical supplements given here start at page 88

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13 Crankshaft group	2
15 Cylinder head, valve gear	
17 Lubrication	4
19 Cooling	
20 Fuel supply system	
21 Exhaust gas turbocharging	3
26 Exhaust system	

Technical information should always be available to all foremen and mechanics, but also compliance with the instructions given is essential to ensure vehicle roadworthiness and safety. In addition, the normal safety precautions to be observed when working on motor vehicles are also applicable.

The Workshop Manual is only intended for use within the V.A.G Organisation, and passing on the third parties is not permitted.

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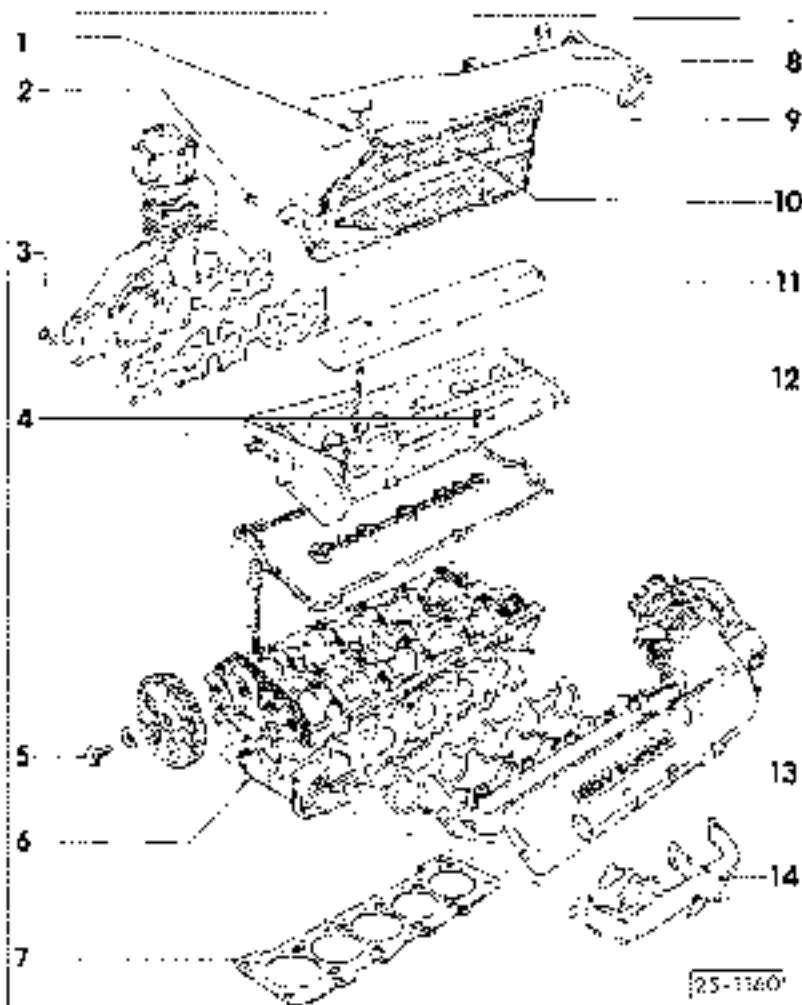
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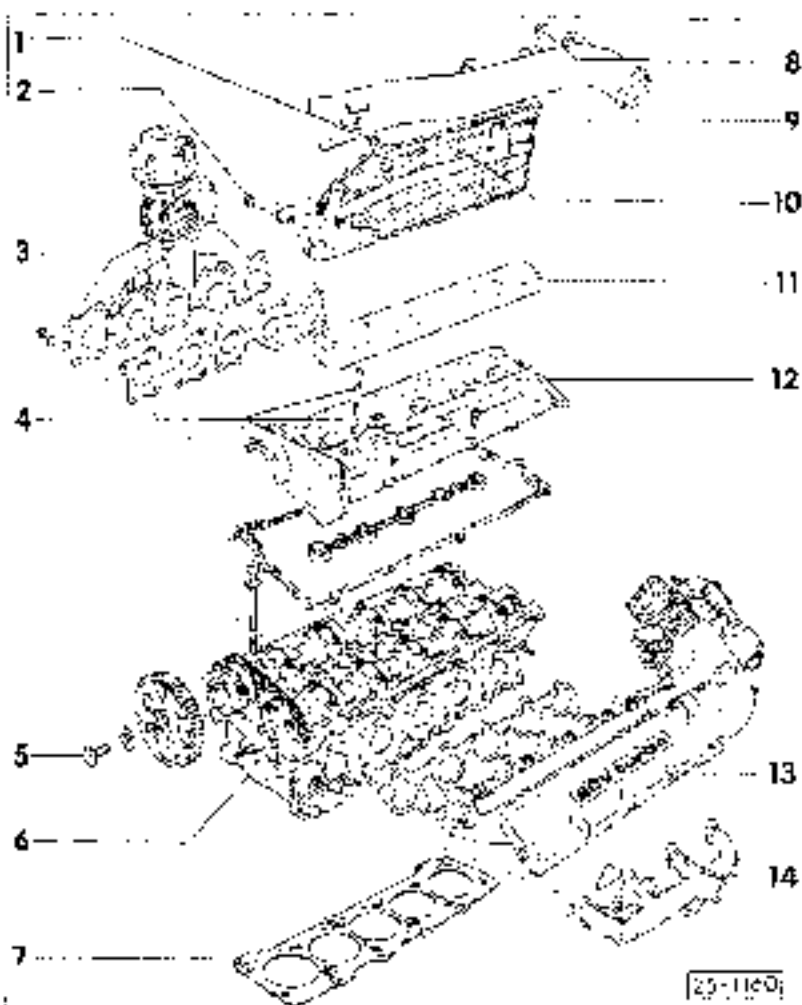
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- Lubricator (1000)

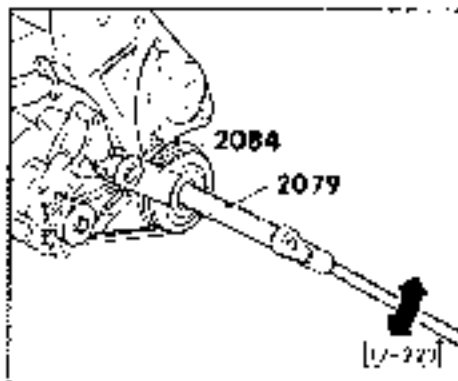
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- 1. Head
- 2. Head
- 3. Washer
- 4. Nut
- 5. Washer
- 6. Washer
- 7. Washer
- 8. Washer
- 9. Washer
- 10. Washer
- 11. Washer
- 12. Washer
- 13. Washer
- 14. Washer



- 1. Head
- 2. Head
- 3. Washer
- 4. Nut
- 5. Washer
- 6. Washer
- 7. Washer
- 8. Washer
- 9. Washer
- 10. Washer
- 11. Washer
- 12. Washer
- 13. Washer
- 14. Washer



→ Fig. 1: Removing and installing distributor cap

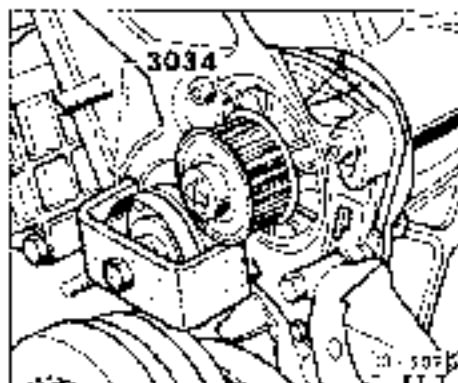
Tighten cap torque 25 Nm.

Use special tools 2073 and 2074.

- Then remove and install spark plug on both sides with anti-rotation circlip (11-228 for 02).

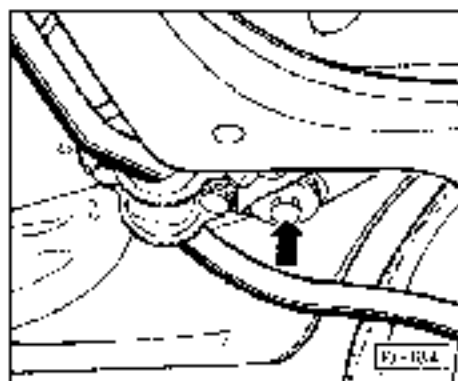
Caution

Be extremely careful when using tools 2073 and 2074 and make sure not to scratch the engine cylinder during this operation.



→ Fig. 2: Removing roller pulley (type 02)

11-3



→ Fig. 3: Removing and installing nut

Caution

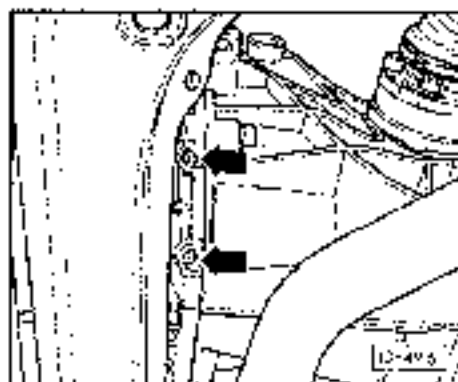
The nut frame will suddenly drop when loose.

- To remove nut frame, use the nut to hold the nut on the rollers.

Caution

Remove the nut with care when re-installing.

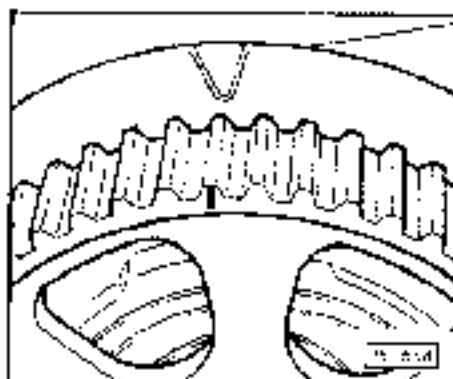
- During re-fitting the two separate rollers must be tightened to 20 Nm and further tightened a quarter turn.



→ Fig. 4

There are two screws in the flywheel end of the nut (see arrows). The bolts pass through these screws and the hexagon screw must be fit.

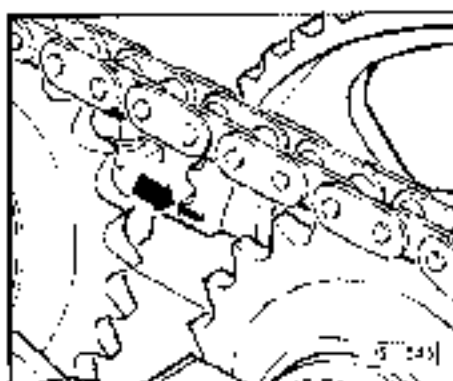
- When installing the nut tighten it by 1/4 to 1/2 turn and then tighten 20 Nm for 10 Nm and 20 Nm for 20 Nm.



NOTE: LINE TOOL - 2.89.1

Cylinder head cover to the

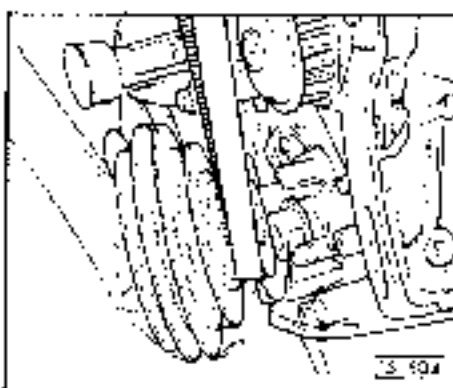
- Make no contact between test align with arrow on top cover head cover.



Cylinder head cover to the

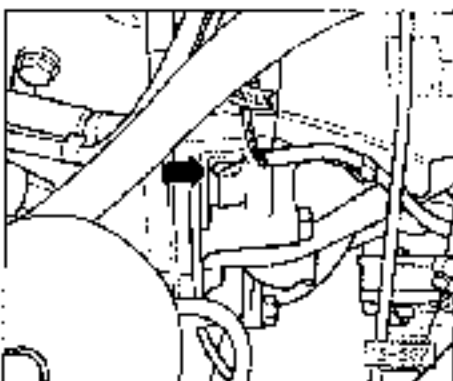
- Make no contact top test with align with upper edge of cylinder head.

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- The toothed belt is checked for correct speed and should operate under conditions of 100% to 140% 10-1.

Caution
When adjusting clearance depth, the toothed belt must not become twisted between the air pump and turbine shafts.

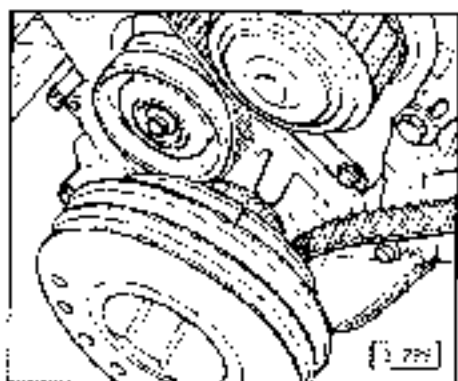


- Set pressure to 100

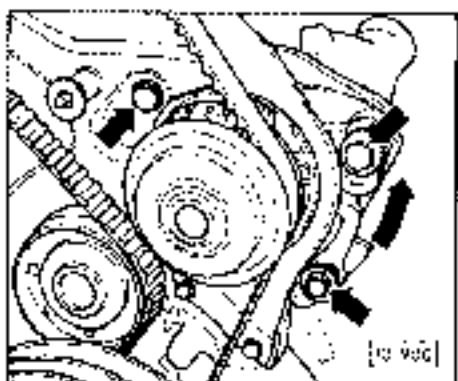
with engine in stop

- Stop the engine by 10% to avoid air filter housing.

138

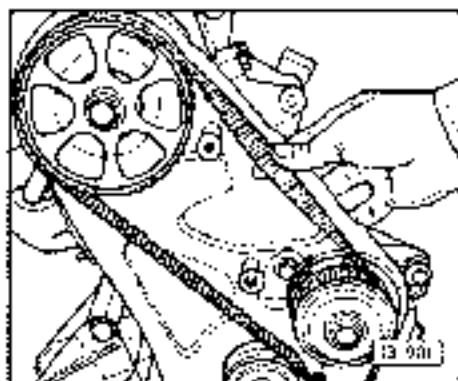


- get on the way
- **check the belt** for correct diameter and adjustment, check for
 - correct size (correct belt length)
- correct size (correct belt length)
- correct size (correct belt length)
- correct size (correct belt length)
- correct size (correct belt length)

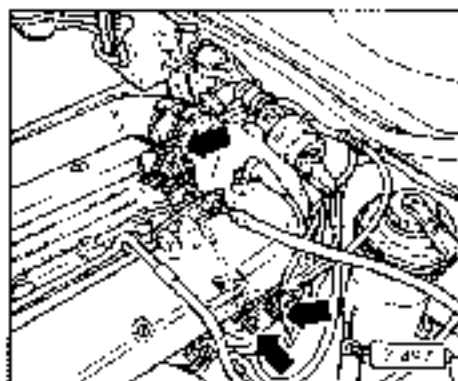


- **check the belt** for correct diameter and adjustment, check for
 - correct size (correct belt length)

13



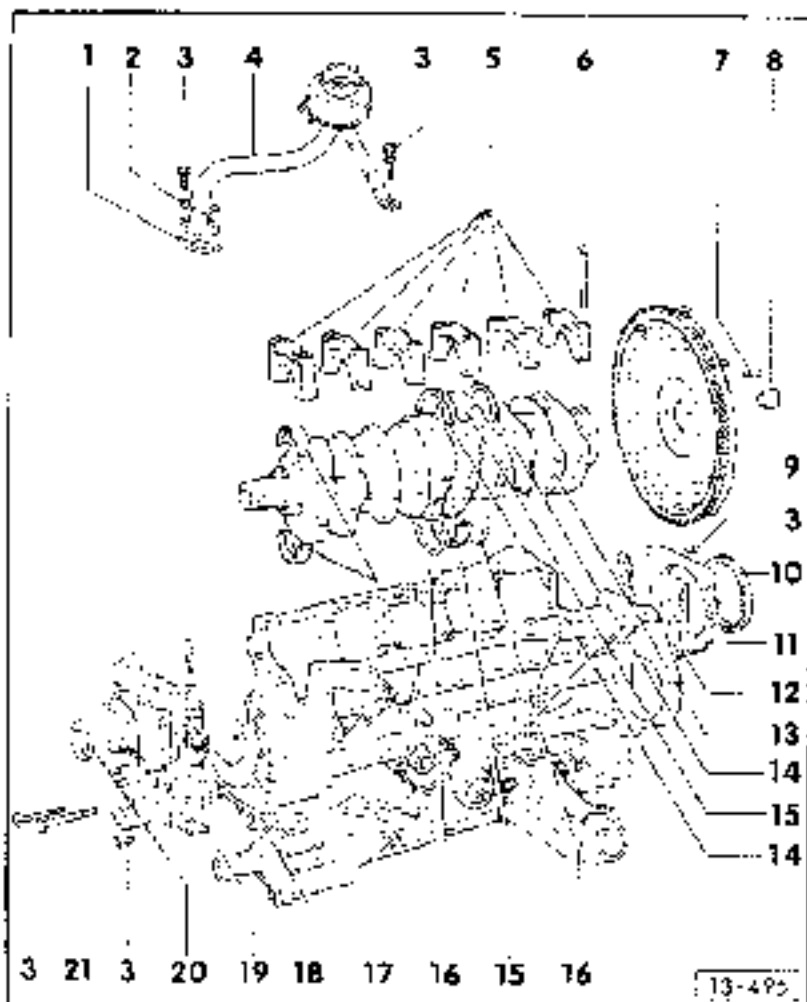
- **check the belt** for correct diameter and adjustment, check for
 - correct size (correct belt length)
- correct size (correct belt length)
- correct size (correct belt length)
- correct size (correct belt length)
- correct size (correct belt length)



- **check the belt** for correct diameter and adjustment, check for
 - correct size (correct belt length)
- correct size (correct belt length)
- correct size (correct belt length)
- correct size (correct belt length)
- correct size (correct belt length)

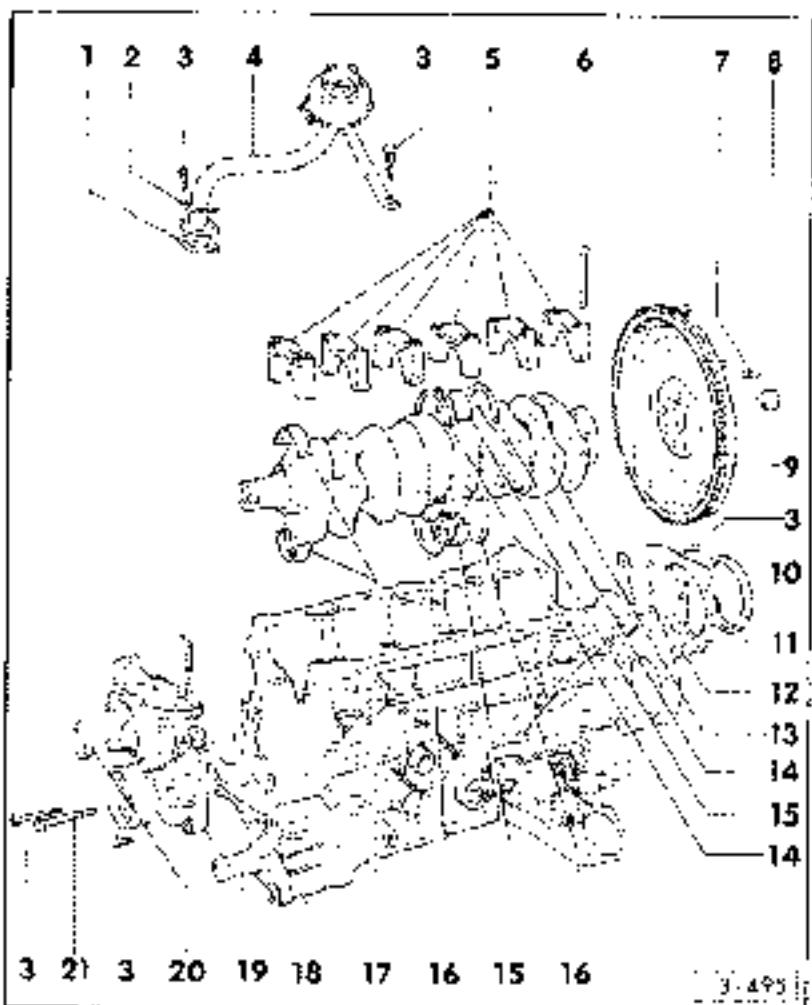


13



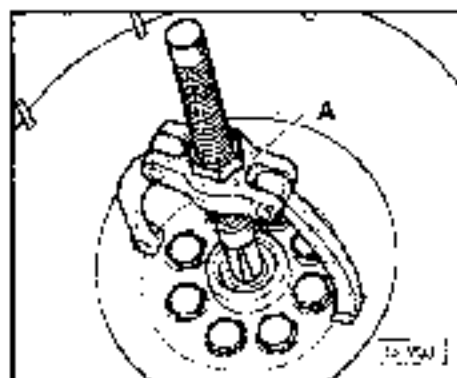
- 10- Crankshaft
- Measure axial clearance - Fig. 7
page 13-22
 - Wear limit: 0.05 mm
 - Measure radial clearance with
feeler gauge - page 13-21
 - Wear limit: 0.05 mm
 - Measure dimensions
page 13-27
- 11- Thrust washer
- For cap
 - Match number of oil rings
- 12- Bearing shell 4
- Complete with thrust washers
 - For top with oil ring cover
 - For oil cover with oil ring
- 13- Thrust washer
- For cylinder block (attach oil
railing top)
- 14- Bearing shell 1, 2, 3, 5 and 6
- For cap with oil ring cover
 - For cylinder block with oil ring cover
 - For oil interconnect with bearing
shells
 - Refueling top must engage with
oil crankcase bearing cap
- 15- Oil pump gears

13-15



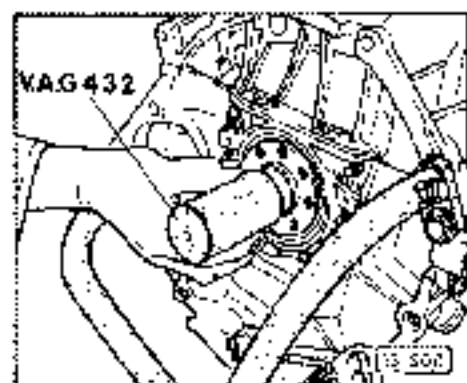
- 16- Oil pump
- 1/16" increment crank cap wear
needs 1/16" pump
- 21- Oil seal
- Avoid using O-ring - Fig. 5
page 13-19
 - Apply coat sealing the end
of the pump with oil pump
sealing
 - Refer to step 14 - Fig. 5
page 13-19
 - Press into using 3/16" x 1/2" screw
from oil seal kit - Fig. 7
page 13-19
- 22- Oil seal

13-15



→ Fig. 1. Withdrawing needle bearing.

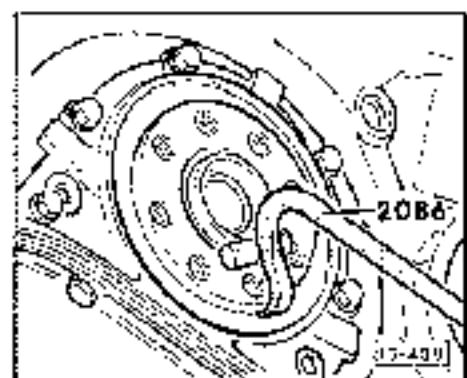
- Remove using bearing extractor and holding tool (50), see. Waste Oil - Instructions - 12.0 for one (48) 20-1.



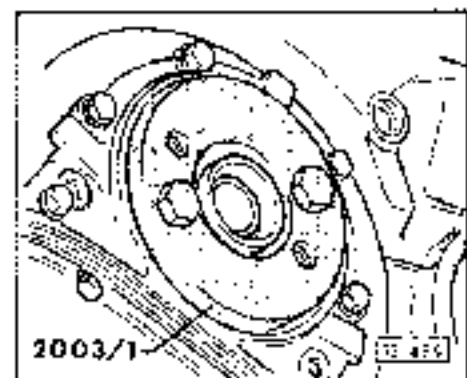
→ Fig. 2. Inserting in needle bearing.

- After installation, the bearing side must be evenly visible.
- Check bearing hole with micrometer using 10-43.

10-11



→ Fig. 3. Fit of crankshaft seal (oil seal). 10-400 and.



→ Fig. 4. Fit of crankshaft seal (oil seal). 10-400 and.

- Evenly coat sealing lip and outer edge of seal with oil before installing.
- Offer up the seal using a bore 2003-20.
- Press home till seal using special seal tool (5).

10-12

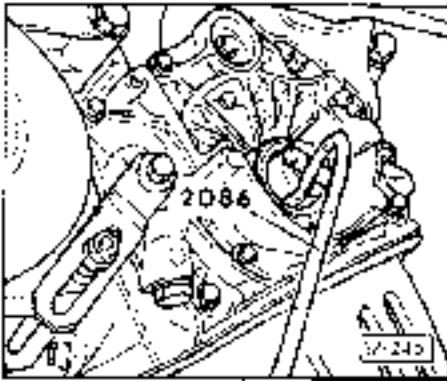


Fig. 6 Reinstalling crankshaft (1) seal, pulley and

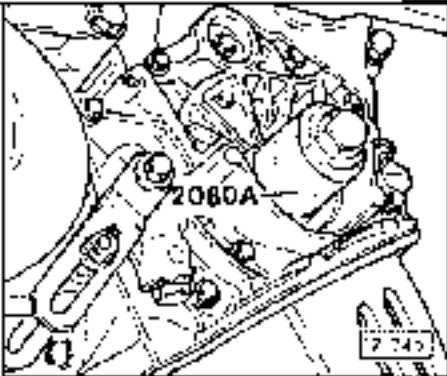


Fig. 6 Reinstalling 20 crankshaft (2) seal, main pulley and
use vibration number mounting bolt.

- Insertly seal bearing in the outer edge of seal with oil before assembly in.

 1. Seal
 2. Vibration bolt
 3. Pulley
 4. Crankshaft
 5. Main bearing
 6. Connecting rod
 7. Piston
 8. Oil pan
 9. Oil pump
 10. Oil filter
 11. Oil seal
 12. Oil dipstick
 13. Oil filler cap
 14. Oil drain plug
 15. Oil pressure switch
 16. Oil pressure sensor
 17. Oil pressure relief valve
 18. Oil pressure regulator
 19. Oil pressure switch
 20. Oil pressure sensor
 21. Oil pressure relief valve
 22. Oil pressure regulator
 23. Oil pressure switch
 24. Oil pressure sensor
 25. Oil pressure relief valve
 26. Oil pressure regulator
 27. Oil pressure switch
 28. Oil pressure sensor
 29. Oil pressure relief valve
 30. Oil pressure regulator
 31. Oil pressure switch
 32. Oil pressure sensor
 33. Oil pressure relief valve
 34. Oil pressure regulator
 35. Oil pressure switch
 36. Oil pressure sensor
 37. Oil pressure relief valve
 38. Oil pressure regulator
 39. Oil pressure switch
 40. Oil pressure sensor
 41. Oil pressure relief valve
 42. Oil pressure regulator
 43. Oil pressure switch
 44. Oil pressure sensor
 45. Oil pressure relief valve
 46. Oil pressure regulator
 47. Oil pressure switch
 48. Oil pressure sensor
 49. Oil pressure relief valve
 50. Oil pressure regulator
 51. Oil pressure switch
 52. Oil pressure sensor
 53. Oil pressure relief valve
 54. Oil pressure regulator
 55. Oil pressure switch
 56. Oil pressure sensor
 57. Oil pressure relief valve
 58. Oil pressure regulator
 59. Oil pressure switch
 60. Oil pressure sensor
 61. Oil pressure relief valve
 62. Oil pressure regulator
 63. Oil pressure switch
 64. Oil pressure sensor
 65. Oil pressure relief valve
 66. Oil pressure regulator
 67. Oil pressure switch
 68. Oil pressure sensor
 69. Oil pressure relief valve
 70. Oil pressure regulator
 71. Oil pressure switch
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 73. Oil pressure relief valve
 74. Oil pressure regulator
 75. Oil pressure switch
 76. Oil pressure sensor
 77. Oil pressure relief valve
 78. Oil pressure regulator
 79. Oil pressure switch
 80. Oil pressure sensor
 81. Oil pressure relief valve
 82. Oil pressure regulator
 83. Oil pressure switch
 84. Oil pressure sensor
 85. Oil pressure relief valve
 86. Oil pressure regulator
 87. Oil pressure switch
 88. Oil pressure sensor
 89. Oil pressure relief valve
 90. Oil pressure regulator
 91. Oil pressure switch
 92. Oil pressure sensor
 93. Oil pressure relief valve
 94. Oil pressure regulator
 95. Oil pressure switch
 96. Oil pressure sensor
 97. Oil pressure relief valve
 98. Oil pressure regulator
 99. Oil pressure switch
 100. Oil pressure sensor

- After assembly location screw for 2080 A.

Check in using thrust washer from 2080 A.

2080

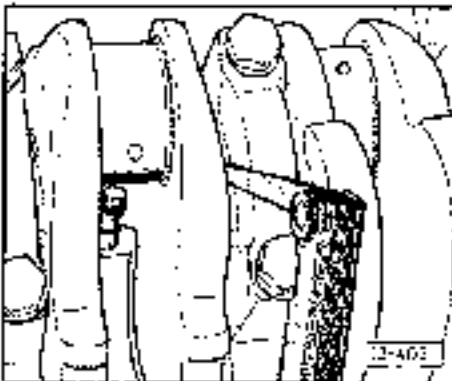


Fig. 7 Crankshaft - Reinstalling 20 crankshaft

Measure axial clearance at no. 4 bearing (crank bearing).

Max: 0.01 - 0.03 mm
 Min: 0.00 mm



REMOVING BEARING CLEARANCE OF BEARING

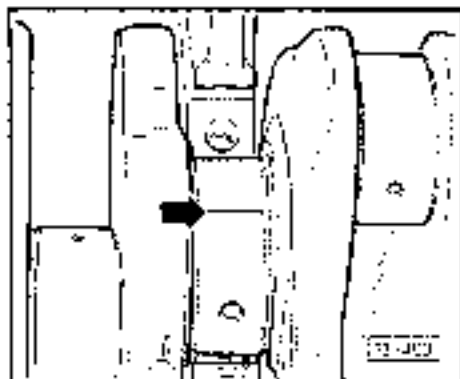
Note

Excess clearance can be corrected with Plastigage, even without the use of a dial.

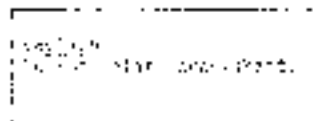
Removing bearing with Plastigage clearance

Oil	Oil Viscosity	Oil Weight	Temp
SAE 100	100	100	100
SAE 150	150	150	150
SAE 200	200	200	200

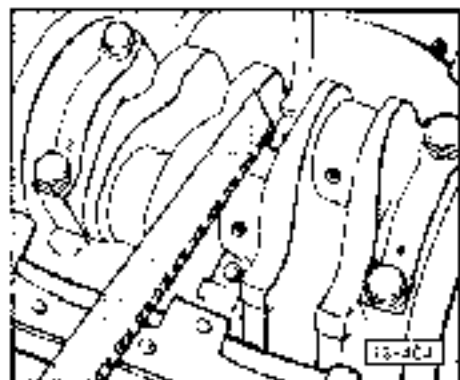
- Turn the bearing cap off.
- Wash bearing shell and crankshaft journal



- Place Plastigage strip on journal or bearing shell to a width of 0.0015"
- Install cap and nut and tighten to 30 ft



- Take bearing cap off again



- Remove shell of shell with bearing cap

Shell weight: 1.00 lb
Cap weight: 1.00 lb

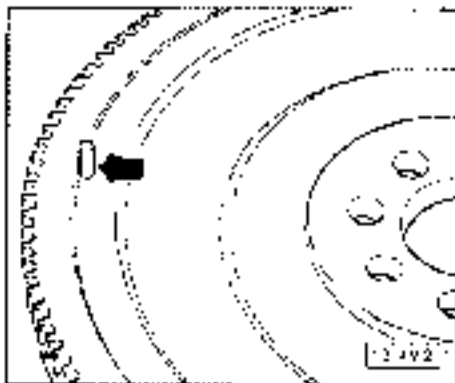
15-300

CRANKSHAFT DIMENSIONS

Note

Journal	Journal Diameter	Journal Length	Journal Weight
1st journal	1.0000	1.0000	1.0000
2nd journal	1.0000	1.0000	1.0000
3rd journal	1.0000	1.0000	1.0000
4th journal	1.0000	1.0000	1.0000

15-300

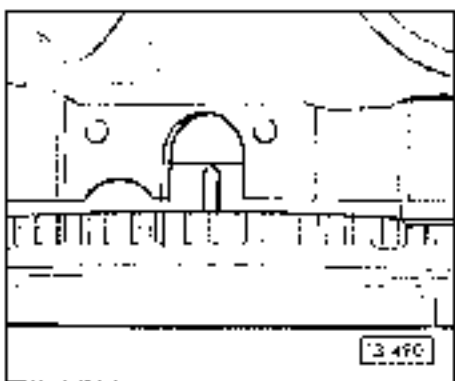


- Directing pin for ignition timing point
 Do not bend pin when fitting a new flywheel

Caution
 Do not use for ignition timing point with fitting a new flywheel. Otherwise, the electronic control system will not receive correct balance for the engine speed control.

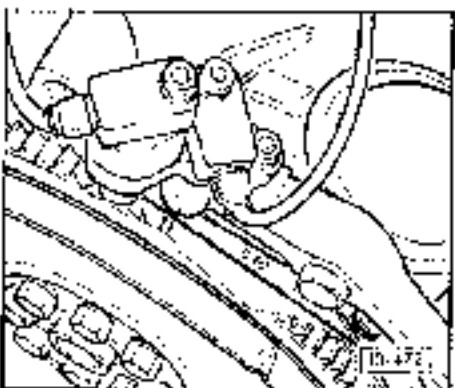
Do not tighten timing points pin when flywheel is bent. It is a risk.

Example distance between pin and timing point sender: 6.1 mm
 6.1 mm distance between flywheel and engine speed sender: 6.3 mm

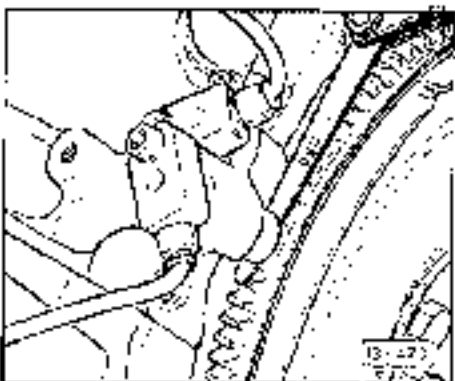


- Replace flywheel and pin as a set (timing point sender assembly).

13-27

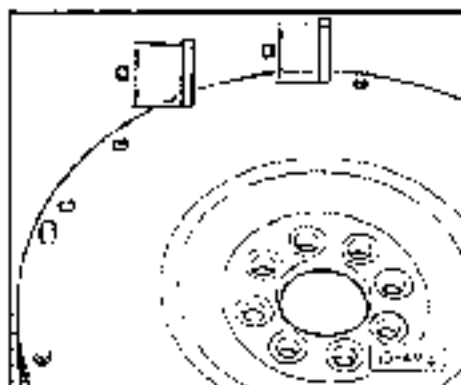


- Check the timing point sender.
 → Check timing point sender (13) and timing point sender (14) (13) and (14) (13) mm.



- Check flywheel gap between flywheel starter ring gear teeth and engine speed sender.
 Check flywheel gap: 0.15 mm

13-28

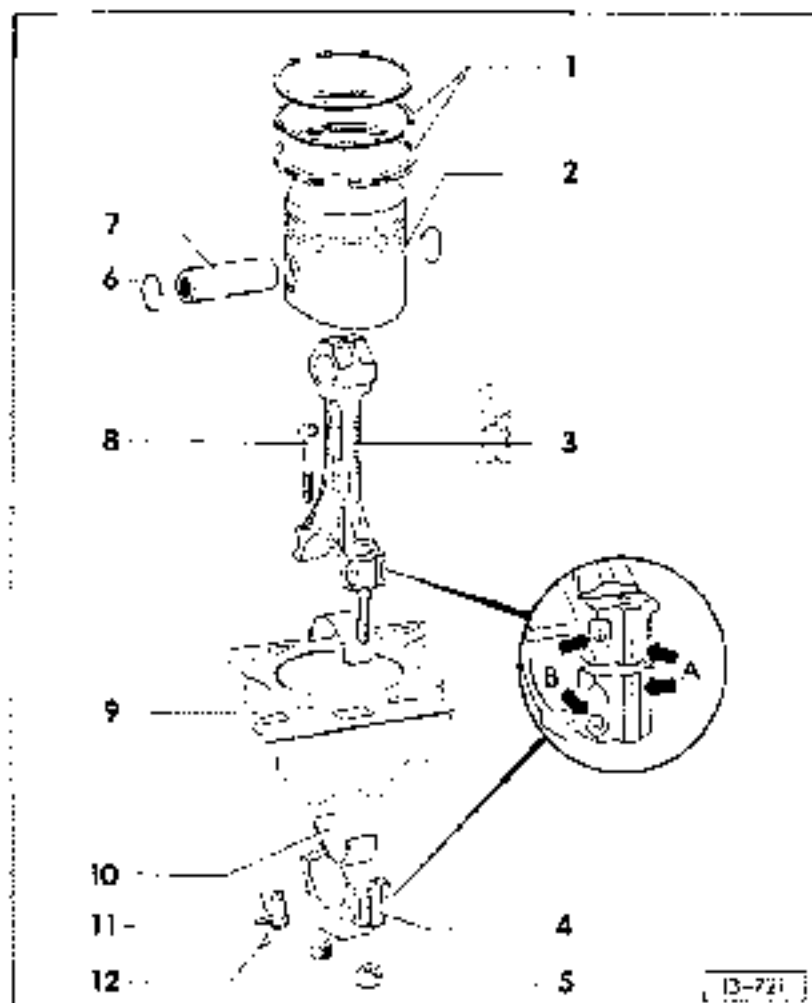


→ Preparation of the rotor assembly

Do not touch pins with fingers or any object.

Height of pins = 35 ± 0.05 mm (Fig. 1)

13-25



DISK DRIVE AND DISK PACHYNA ASSEMBLY

1. DISK DRIVE AND DISK PACHYNA ASSEMBLY

2. DISK DRIVE

3. DISK PACHYNA

1- Preparation

- Remove pins on Fig. 1
- TMP spindle sleeve is not to be used (Fig. 1)
- Removing and installing with master pins (Fig. 2)
- Checking clearance for pins on Fig. 3
- Checking ring gap = Fig. 4

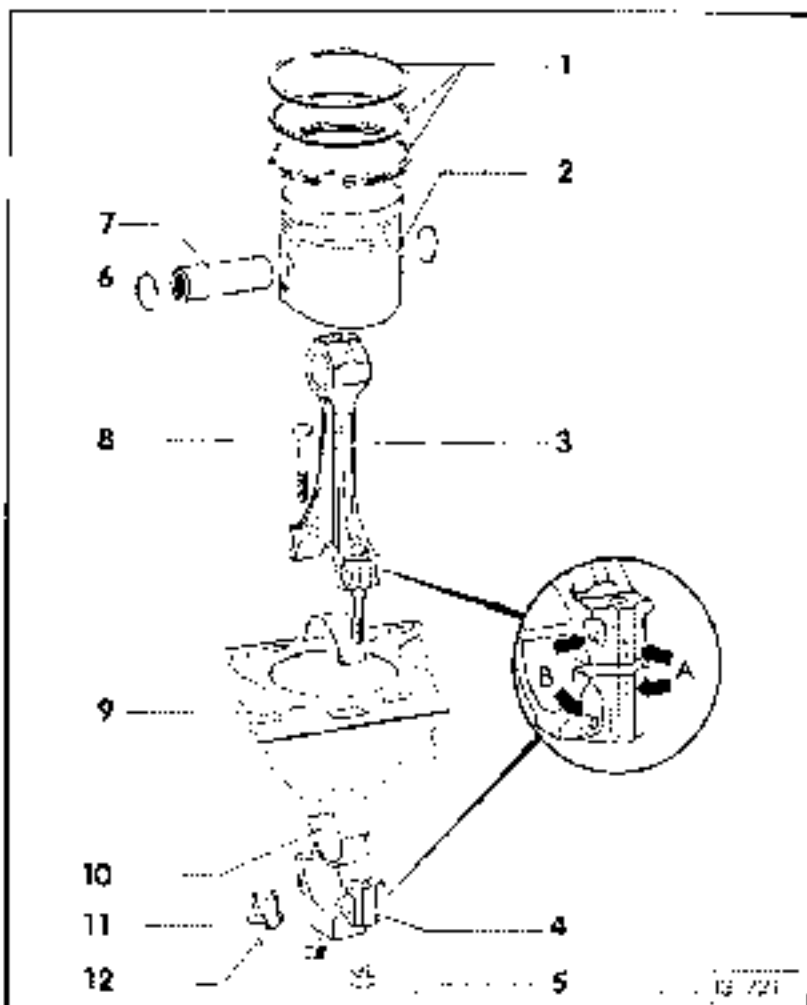
2- Pinion

- Checking (Fig. 4)
- Mark installation position for pinion cylinder (Fig. 5)
- Install using master ring clamp (Fig. 5)
- Check for master screw points of pinion end
- Insert drive pins (page 13-21)

3- Spring

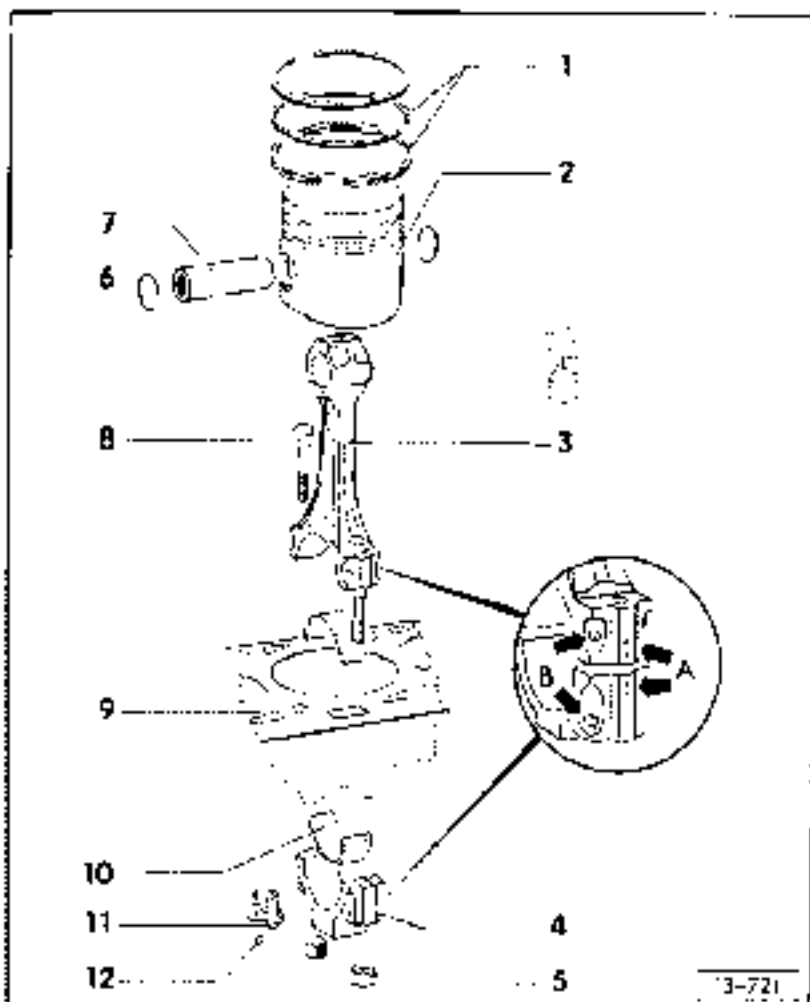
- Always use new springs
- Mark cylinder number (Fig. 6)
- Installation position (Fig. 6) and all the details of Fig. 6

13-26



- 4. Check bearing fit
 - No axial clearance (method 1)
 - Initial axial clearance 0.04 in; 0.02 point tolerance (method 2)
- 5. Slide in the nut (10)
 - 9" contact surface
 - For assembly, maintain clearance, tighten to 20 ft-lb (27 N-m)
- 6. Finishing
 - Grease nut - (see 5)
- 7. Disassembly
 - If difficult to remove, heat system to approx. 600 °F
 - Use special tool 12-435 for removing and installing
- 8. Coating parts
- 9. Cylinder head
 - Pressing out from nuts - (Fig. 4)
 - Diagram and coating instructions - (see 12-3)

12-27



- 10. Bearing shell
 - Balls installed in position
 - Do not interchange used bearing shells
 - Insure that retaining lugs locate in recessed in bearing seat and cone
 - Pressing used clearance (Fig. 12)
 - Wear limit: 0.4 mm
 - Checking radial clearance and Preload - (see 14-22)
 - Max: 0.016 - 0.027 in
 - Min: 0.011 - 0.017 in

Note
Do not rotate crankshaft when checking radial clearance.

- 11. Oil pump shell
 - For coating parts

12. Coat

12-28

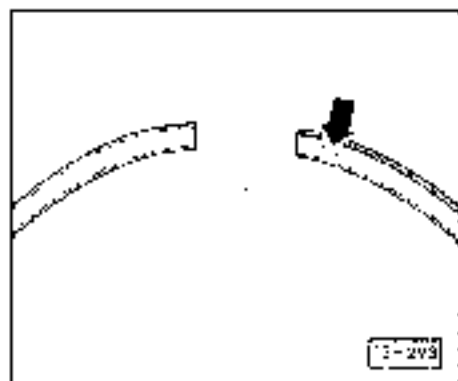


Fig. 1. Piston ring, installation position

- 1750^h oil film used on piston crown.
- Lip for oil piston ring must face outward, piston crown.
- Lip or stepped ring must face towards piston pin.

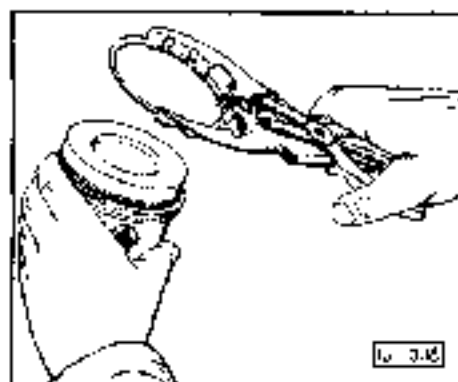


Fig. 2. Expanding and installing piston ring

15-25

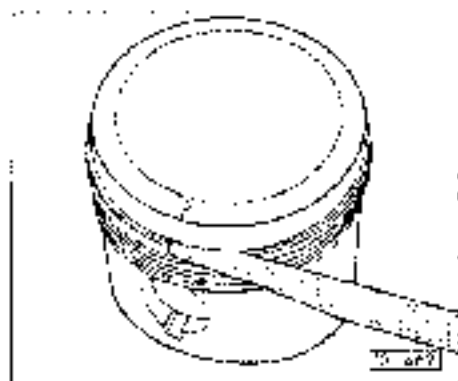


Fig. 3. Checking piston ring clearance in groove

- | | |
|-------------|------------------|
| Gap: | 0.04 ... 0.17 mm |
| Max. limit: | 0.2 mm |

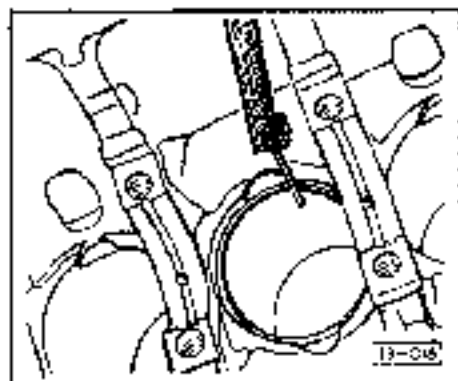


Fig. 4. Inserting piston into cyl. b.

- Piston ring securely into lower end of cyl. b. after level oil is about 10 mm from bottom edge.

- | | |
|-------------|------------------|
| Gap: | 0.10 ... 0.30 mm |
| Max. limit: | 0.4 mm |

Table 2-10-10

Offspring dimension	7.5mm dia.	10.0mm dia.
Basic diameter	68.96	71.01
Max. tolerance	0.003	0.006
Min. clearance	0.000	0.000

13-21

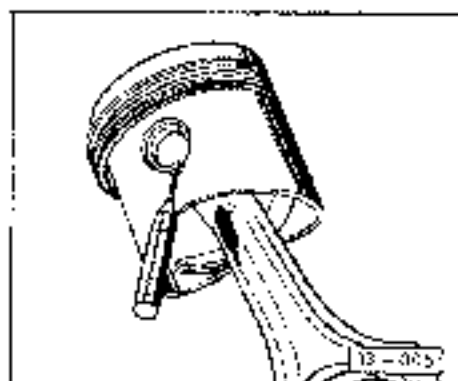


Fig. 2-10-10-1 Pin Insertion

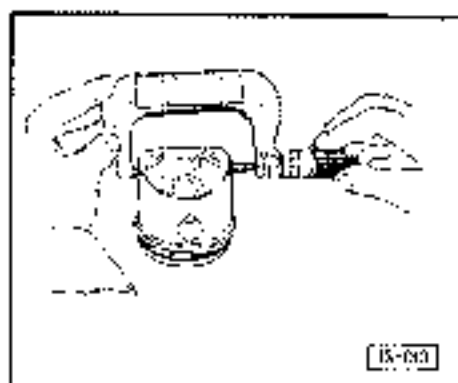


Fig. 2-10-10-2 Pin Checking

Measure pin at about 1 cm from bottom of hole at 50 ° to pin at 10 mm

Maximum deviation from nominal dimension 0.04 mm

13-22

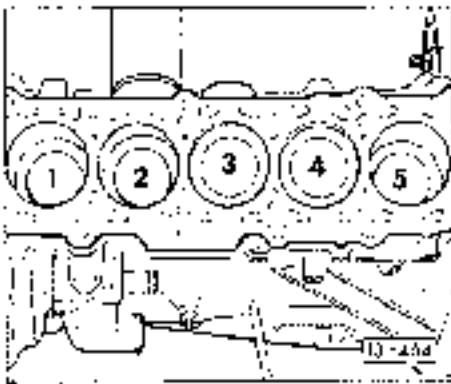


Fig. 13-43a. Inserting piston into cylinder

Use a piston pin clip to hold the piston into the cylinder. Mark with cylinder number.

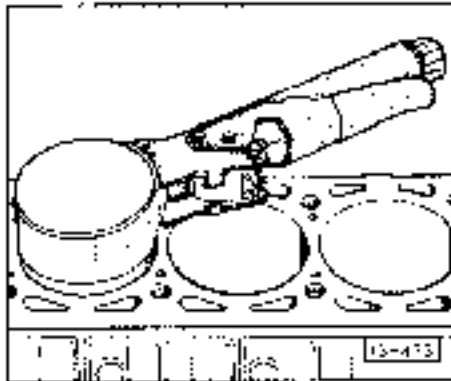


Fig. 13-43b. Removing and installing piston

Use piston ring flange to install.

13-44. Measuring cylinder bore

13-44

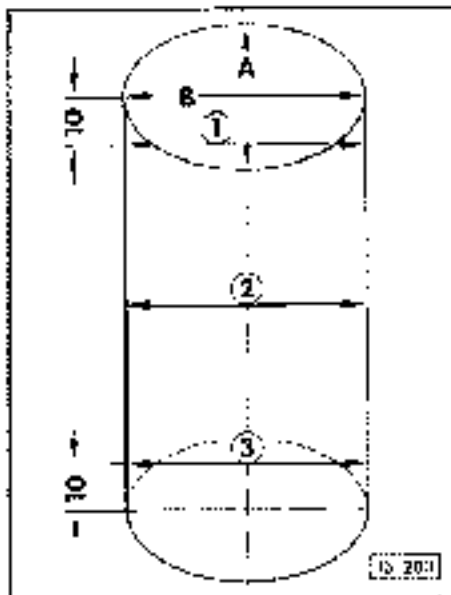


Fig. 13-201. Measuring cylinder bore

Measure bores at three locations in both directions, (i.e., A) during the engine overhaul in line with the crankshaft.

Use internal dial gauge 0.01 mm.

Vertical deviation from horizontal appearance: max. 0.02 mm.

Detail on cylinder diameter: page 13-202.

NOTE:

Measuring the cylinder bore must not be done when the cylinder block is mounted on a main stand with section A-B, as the correct measurements could then be possible.

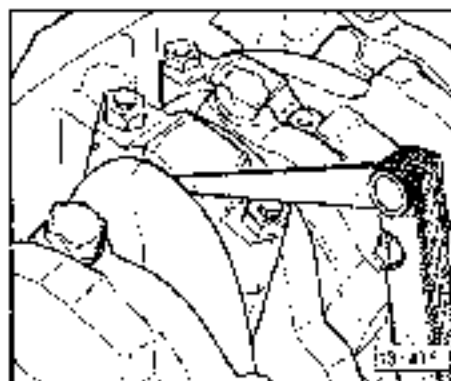
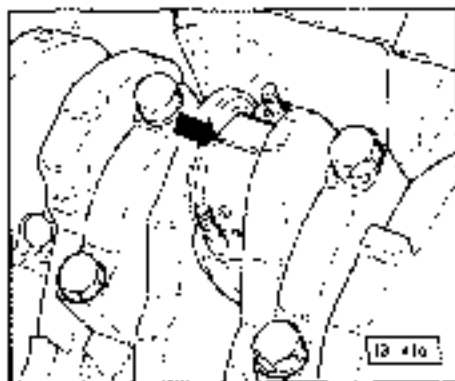


Fig. 13-41a. Removing piston with ring exp.

See 13-41, 13-41a.



BEARING CAPS AND BEARINGS

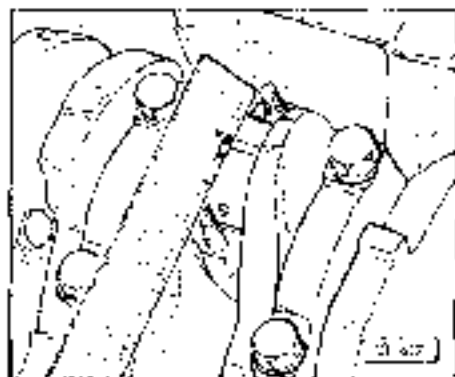
Note
 IT IS possible to check metal clearance with Plastigeal, only with engine in oil.

→ Measuring length of Plastigeal strips

Code	Length	Width	Qty
0.027	0.070 m	0.140	25-1
0.050	0.110 m	0.140	25-1
0.150	0.220 m	0.140	25-1

- Remove the red bearing cap.
- Clean cap's and crank pin.
- Place Plastigeal strips corresponding to width of crank pin on crank pin in axial direction on the bearing shell.
 → To ensure metal clearance, install by sliding cap and bearing on 10 at min. as follows:

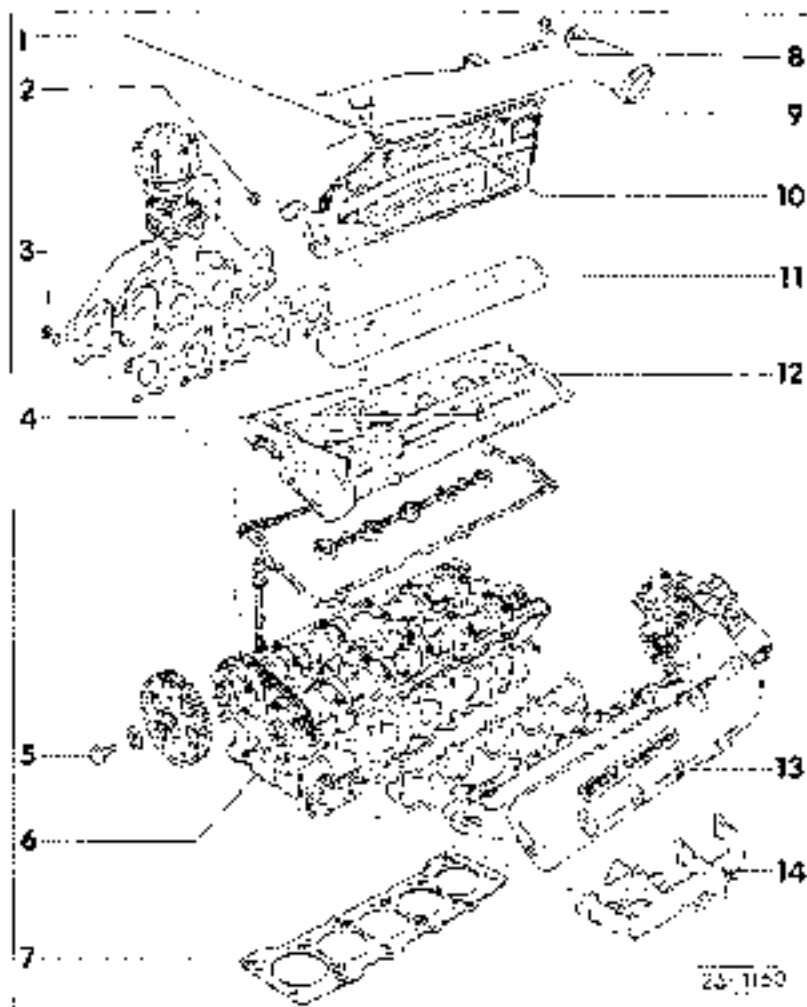
Caution
 Do not rotate the shaft.



- End of the job set off again.

→ Check axial clearance with necessary tools

Max. : 0.010 - 0.020 mm
 Min. : 0.000



REMOVING AND INSTALLING CYLINDER HEAD

Notes:

- Before any installation procedure, inspect for damage.
- Install any stretched bolts - use heavier bolts (2).
- The cylinder head can be removed with the engine in place.
- Always refer to the service manual for performing assembly work.
- After installing a replacement cylinder head, all the contact surfaces between the cylinder head and cam surfaces.

Warning:

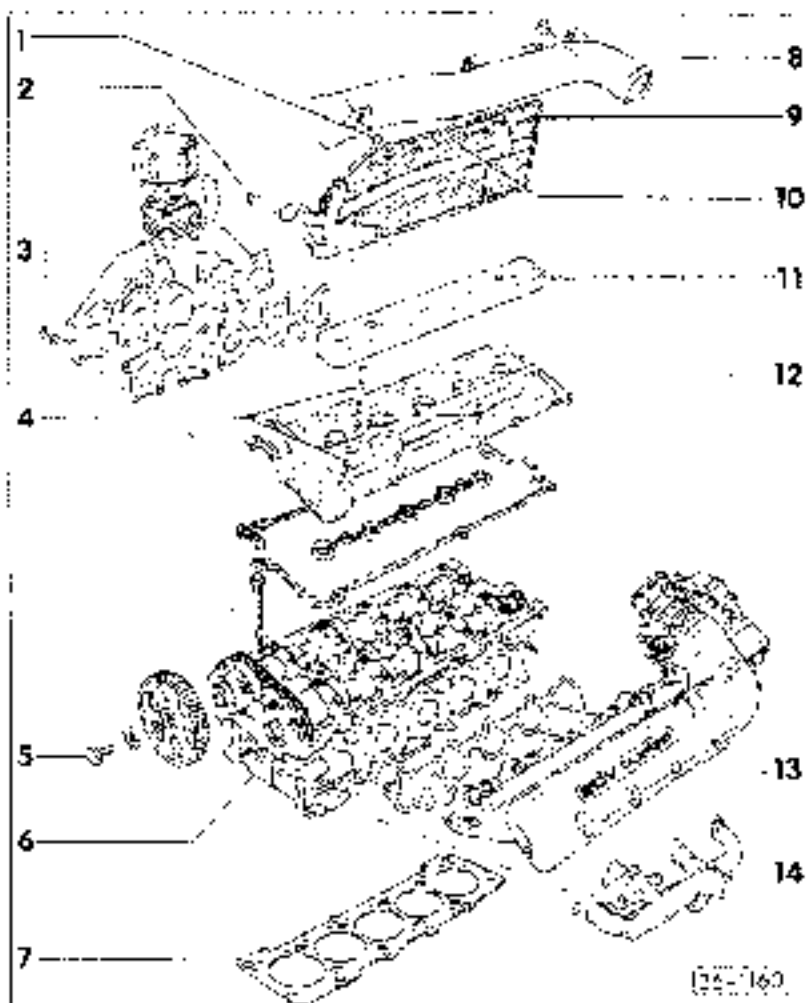
After new gaskets have been installed, the engine may run for about 20 minutes (cold) with the oil system.

- See the engine manual on page 116.

1- 22.5

1- 23.5

1- 24.5



1- 25.5

1- 27.5

1- 28.5

- Cylinder head
 - Check for any water head for damage (see Fig. 1)
 - Removing and installing cylinder head, page 116.

1- 29.5

- Cylinder head gasket
 - Polished gasket.
 - Use the correct mounting oil film.
 - The marking "DIN 117" on the gasket must be used. Use the oil film head.
 - The gasket must be mounted flat in all four blocks.

1- 30.5

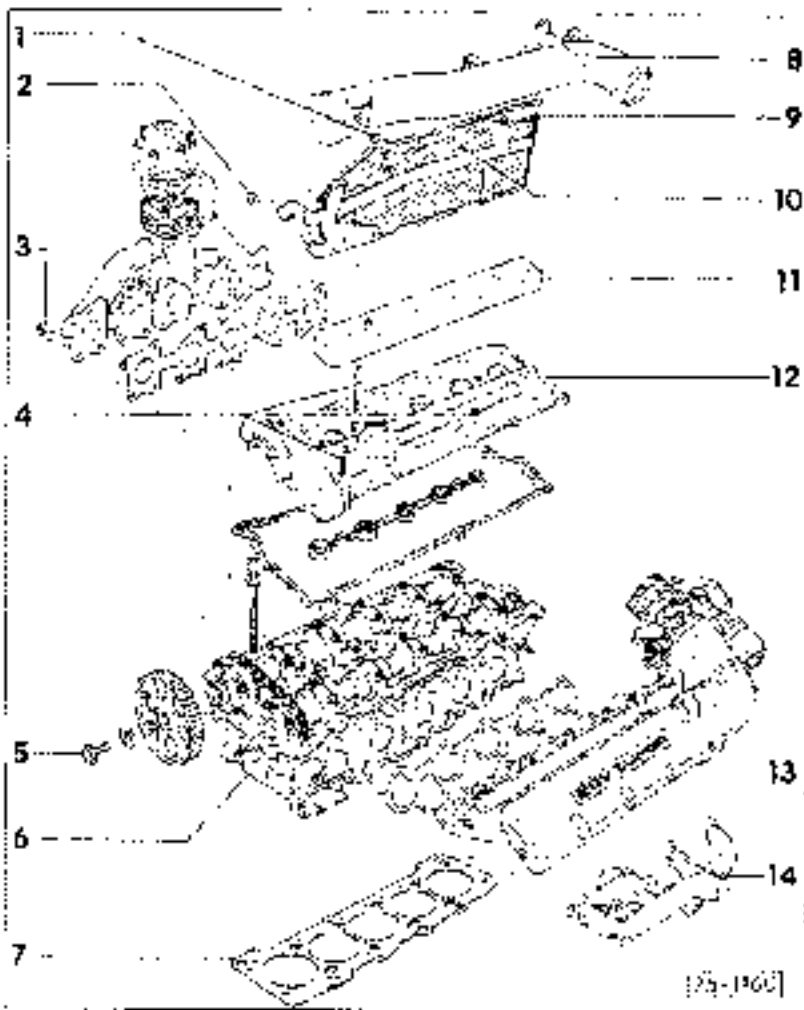
1- 31.5

1- 32.5

1- 33.5

1- 34.5

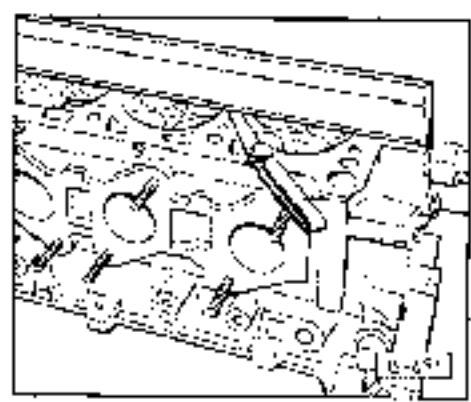
- Cylinder head cover
 - Remove the cover before working before installing the cylinder head cover.



- 13- Injection manifold
 - Tighten securing bolts to 20 Nm.
 - Use 184-9966 key holder when the removal and install torque of the bolts is low.
 - Vehicles equipped with 110 kw/hp engine. Remove the valve unit before pushing the injection manifold - begin to fit.
- 14- Alternator
 - Tighten securing bolts to 10 Nm.

[75-1960]

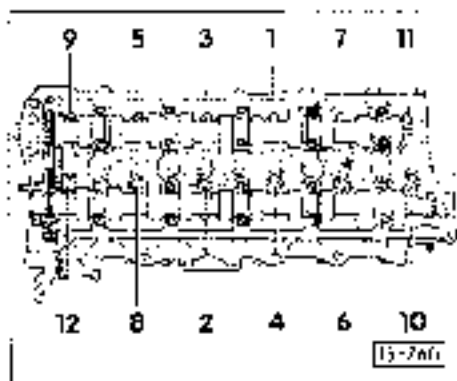
25-3



REMOVAL AND INSTALLATION OF Timing belt

- Notes
 - Before adjusting cylinder head, ensure that camshaft is set with cam lock and set to TDC.
 - The cylinder head gasket is to center of piston. The word "TOP" on the Part No. must face the cylinder head (with pulley of 155cc).
 - Install the timing belt, fit a 22mm hex bolt and tighten by hand.

- Final check
 - Check the timing belt for slack.
 - No. possible. Note that 2.0 liter



→ - Higher cylinder head ability in three stages, achieved in two stages.

Operating pressure stages of id

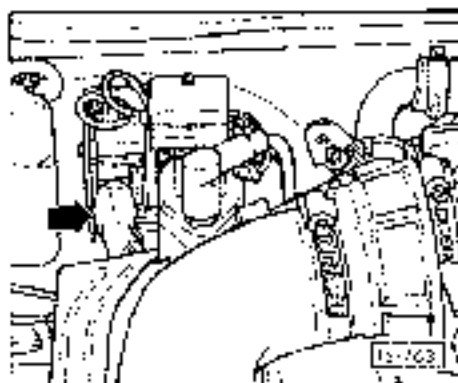
Stage 1	100 psi
Stage 2	150 psi
Stage 3	200 psi

Neither with normal operation, without stopping, if a seal or valve is compressed.

Notes:

- Stopping only can lead to failure, reverse operation
- To be safe, always install the cylinder head bolts. Verify the installation before an air release.

15-8



DETERMINE COMPRESSION PRESSURE:

- Stop the engine and temperature 30°C
- Inertia valve fully open
- Set to pressure (about 100 psi) for the lower stage
- Reverse start stage using 1122

- Check compression pressures with P.A.G. 126 and record results.

Note:

see later on instructions when using compression test kit.

- operate starter until tester shows no further pressure build-up.

OBJECTS OF PRESSURE:

Compression pressures	
psi	
low	high
100 - 150	150 - 200
9 - 13	7



Great pressure difference between cylinders is bad.

15-9

REVISIONS TO FIG. 15-758

.....

Note:
 2) In the heads which have grooves between the side valve ports and the spark plug threads, the spark plug threads can be used further in that condition as long as the groove does not exceed a maximum of 1/16 inch in width or when the groove there the first spark plug thread is checked.

1- Head in cap

- Installation position - fig. 1 and fig. 2
- Installation see para. 4 see "Installing Landing Gear" - page 19-20

2- Oil seal

- Remove
- Oil seal - fit into outer edge of oil seal
- Removing and installing - page 15-17

3- Drive gear

4- Outer valve spring

- Remove and install with 207 or fitting tool 207, valve lever WK 211, and adapter WK 211, 5

5- Inner valve spring

- Remove with 10314 with 05, or fitting tool 207, valve lever WK 211 and adapter WK 211, 5

6- Lower valve spring seat

- Remove with 10314 with 05, 4

7- Valve stem seal

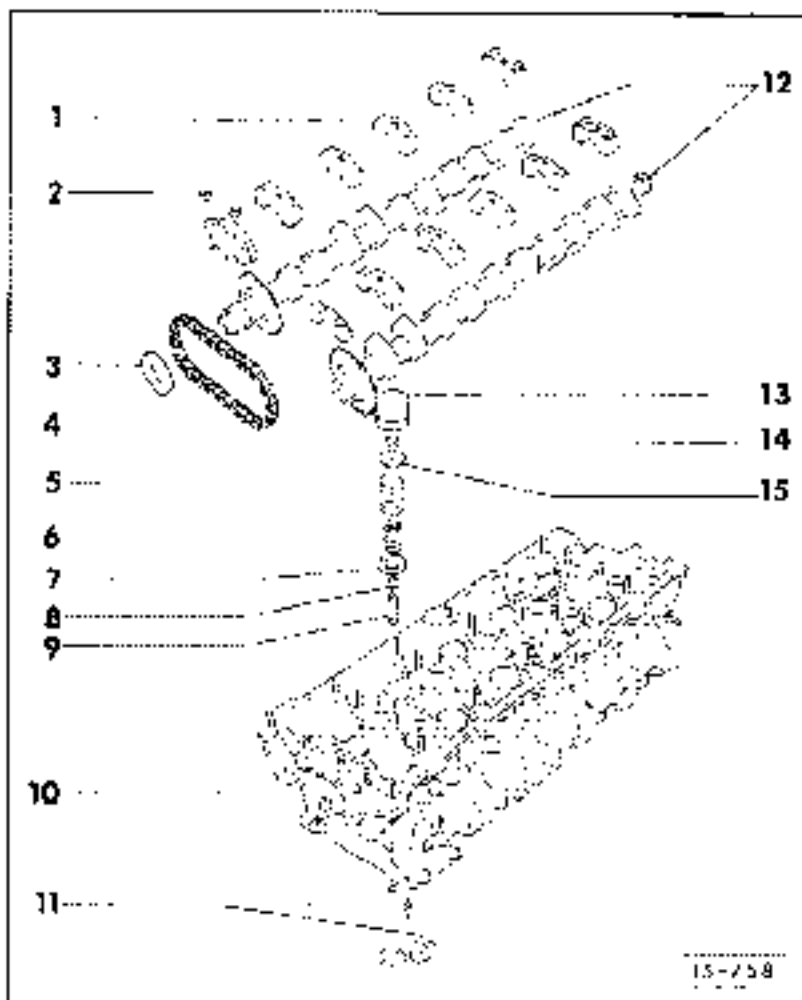
- Operating - page 15-25
- After oil pump head removed - page 15-27

8- Valve guide

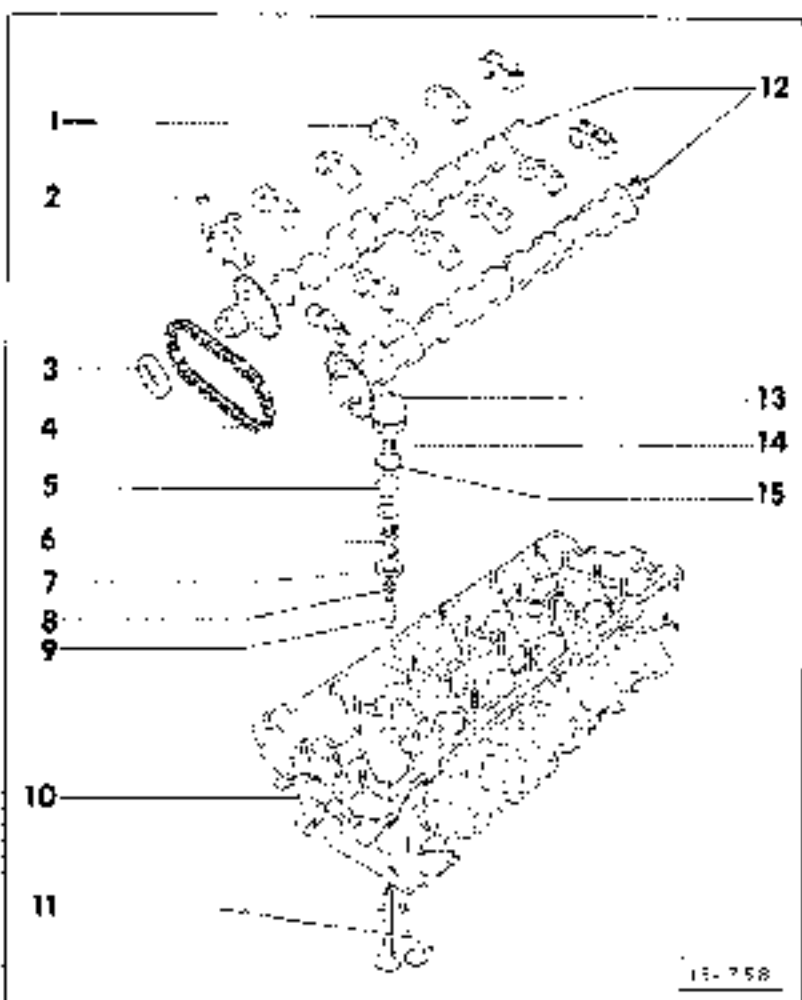
- Marking - only and reworking - page 15-29
- After marking and reworking, use valve guide with shims
- See support 5121

9- Oil valve head

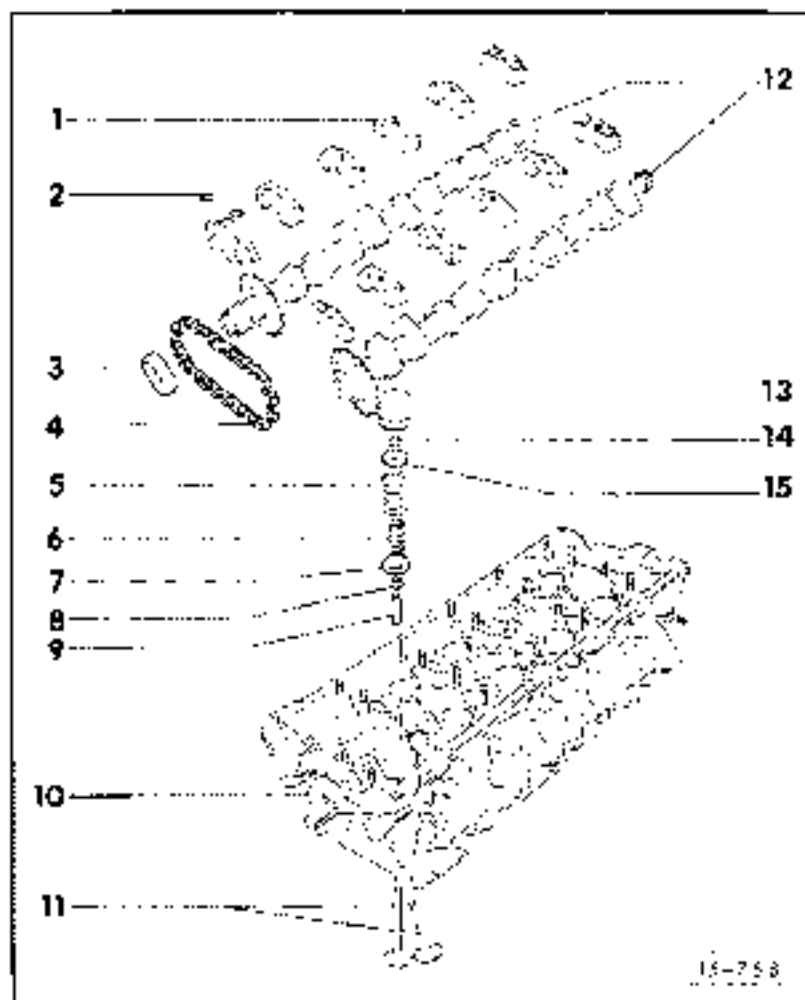
- Marking valve seats - page 15-30
- Marking dimensions - page 15-31
- Marking dimensions for cylinder head - page 15-32
- Marking dimensions for 115 line 15, retaining through a cylinder head 10" in dia.



15-758



15-758



- 10- Valves
 - Only grind in 10-100 mm
 - Valve dimensions - Fig. 1
 - Axial, filled standard valves, see note on page 15-17
- 11- Gaskets
 - Check gasket for damage - Fig. 3
 - Remove and install - Page 15-17
 - Gasket must be covered with Plastiforge
 - Axial length 1.2 mm
 - Valve must be 0.04 mm with bearing cap in front of shaft and last bearing cap fitted
- 13- Gasket (cylinder)
 - With hydraulic valve mechanism compensation
 - When retaining, mark by inner number
 - See note - page 15-17
 - Check mounting, it is tapered with 10 degrees surface facing down - check
 - Before installation, check axial clearance of combustion - Fig. 1
 - Do not touch surface
- 14- Valve patterns
 - Marking - page 15-20
- 15- Upper valve spring seat

15-758

15-8

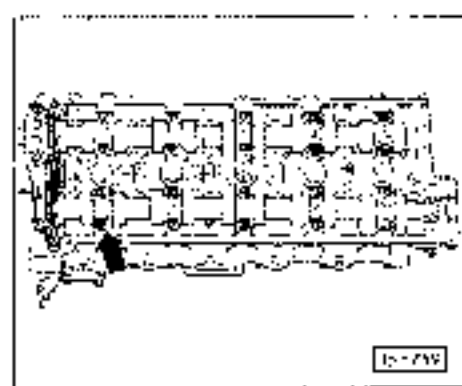


Fig. 1 Installation position of separate bearing cap
 The correct position of the bearing cap must point towards the intake side of the cylinder head (arrow).

15-759

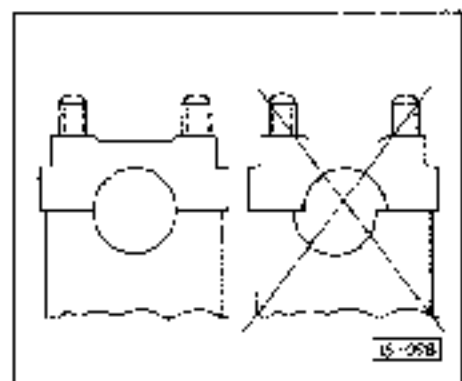


Fig. 2
 Watch offset. Before installing camshaft, fit bearing cap and complete installation sequence.

15-758

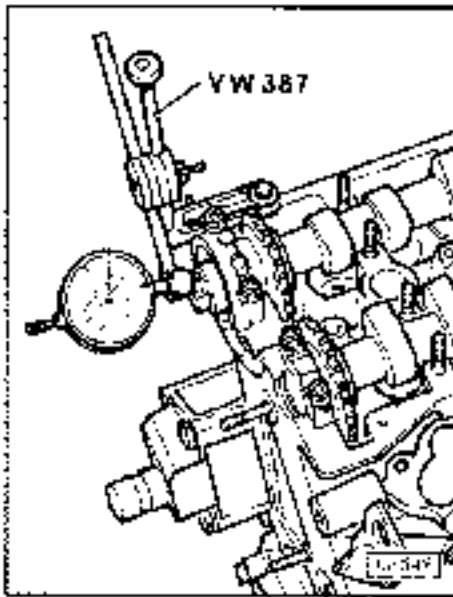


Fig. 3. Working slightly different.

Max. force: 2.0 mN

Note: loading with thrust caplets removed, chain removed and first and last bearing caps fitted.

13-11

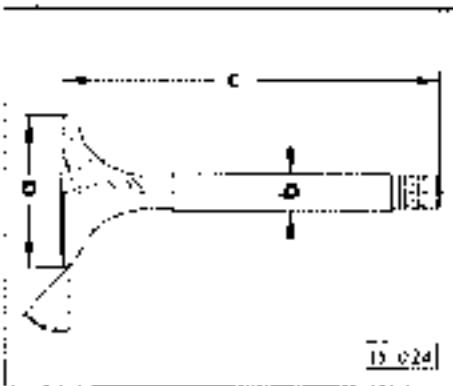


Fig. 4. Valve dimensions

Inlet valve	Exhaust valve
d = dia. 30.00 mm	30.00 mm
e = dia. 6.00 mm	6.00 mm
c = 50.00 mm	50.00 mm
a = 45 deg.	45 deg.

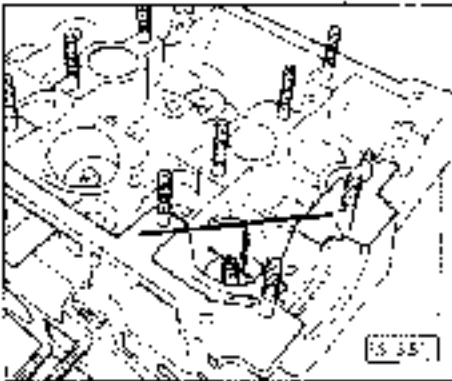
Warning:
Valves must not be reworked. They can only be ground.

Warning:
In almost all sea-filled exhaust valves, cannot just plug, to be removed. Using a hammer, the valve should be hit on the across the middle of the stem. During this operation they must not come into contact with water. Further removal of 10 valves prepared with a key into a bucket of water and steel bars. Caution: be careful of danger from the engine. During the test for during which the valves will open. The joints created in this way can then be disposed of the valve, pipe.

13-12

30064.10 Valve seats

10%
 2-17 new: the valve seat depth is to be a perfect contact surface. Before working commence, calculate the maximum diameter of grinding operation. If this diameter is excessive, correct location of the hydraulic valve will no longer be guaranteed and the cylinder head must be retined.

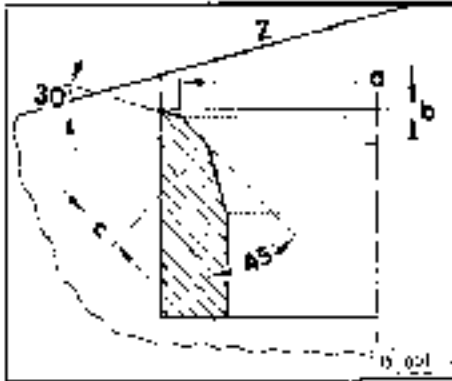


calculating maximum permissible grinding dimension:

- Insert d_1 and d_2 to tightly against the valve seat.
- Measure the distance between the end of the valve stem, tapered and upper edge of cylinder head.

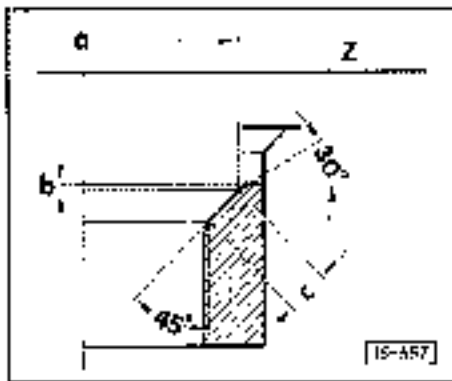
Measure diameters on various diameters on lines (10-1) as permissible working diameter.

Working dimension:
 initial value = 36.0 mm
 maximum value = 36.1 mm



Working initial value 1995

- a = 31.5 mm
- b^* = max. permissible grinding diameter
- c = 1.5 mm (1.2 mm)
- Z = 2.7 mm (max. valve seat with 30° rearing tool)
- d = lower edge of cylinder head
- 30° = taper connection angle
- 45° = valve seat angle



Working initial value 1995

- a = 31.5 mm
- b^* = max. permissible grinding diameter
- c = approx. 1.2 mm
- d = lower edge of cylinder head
- 30° = taper connection angle
- 45° = valve seat angle

* Max. permissible grinding diameter = page 15-11



CAUTION: CRACKS, SPALLS, REPAIRS

Notes:

- Place between tanks with the lowest surface (air side) facing downward, in a clean surface.
- Remove trapped concrete. Control be adjusted on repair zone.
- Insulation value increases when starting angles are called normal.

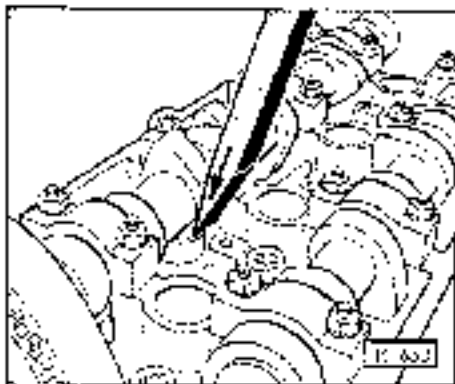
Start fan in and until water radiator has been switched on once.

Increase on fan speed to approx. 2/3 rpm per 10 minutes. If the ducts are still noisy, it can be done by repeating the process.

- Remove cylinder head cover.

Remove inner part of engine until you get to the check of cooling covers.

15-1.

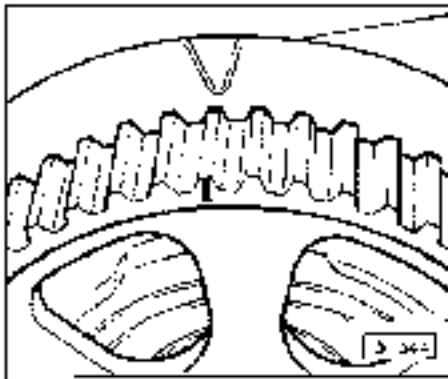


- Press down with a wooden or plastic wedge. If free for the excess of 1/2 inch as for the first time, also attempt.

When the engine has been inspected, the engine must not be started for about 24 hours, unless the engine is started.



15-2



3-362-196 (R&R) (See also:

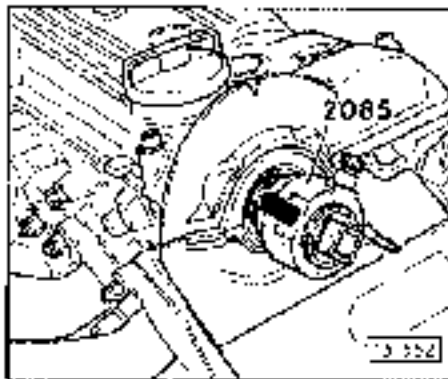
3-362-197)

- Remove upper section bolt (2) (A).
- - Drive crossstaff until top of eye reaches end of shaft.
- Release turn of crossstaff with red handle.

Remove shaft sprocket.

- Remove shaft assembly retaining bolt with upper left crossstaff as far as it will go.

Break inner cone of 2 (1) seal extractor (1) & turn assembly, pull out of the bearing path and lock in position with locking cones.



- - Lubricate threads and oil seal extractor, align in its position and press it into oil seal as far as possible while extracting protrusion.

14-1

- Loosen locking screw and turn inner cone of extractor against camshaft until oil seal is extracted.
- Clamp extractor to side of shaft and remove oil seal with pliers.

Installation:

- Lightly oil sealing lip and outer edge of oil seal.
- Offer seal over locating sleeve (2-407).
- Press oil seal in as far as it will go using thrust washer handle and offset screw (2-408).

Caution

DO NOT press oil seal over the first shoulder otherwise the oil return drilling will be covered.



LOCKING AND INSTALLING CAPS
 15-23

Removal:

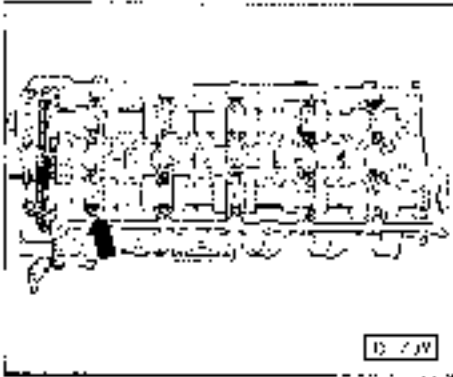
- Remove upper bearing caps and girders.
- Remove intake manifold.
- Remove cylinder head covers.
- Remove upper and lower cylinder bolts (TDI).
- Release tension of timing belts at coolant pump and timing.
- Remove timing sprockets.

Exhaust manifold:

- - Remove bearing caps in front of crank as well as caps 1 and 4, bearing caps 1, 3 and 4 alternately in diagonal sequence.

Timing sprockets:

- Remove bearing caps in front of crank as well as caps 2 and 9.
- Remove bearing caps 6, 8 and 10 also remove in diagonal sequence.

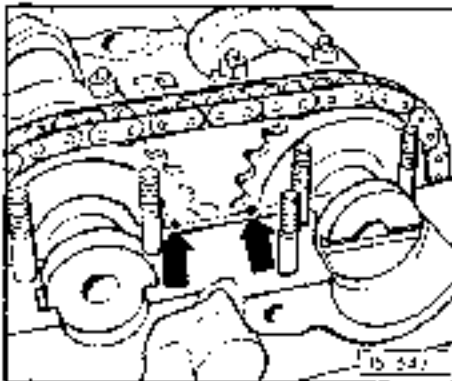


15-23

Installation:

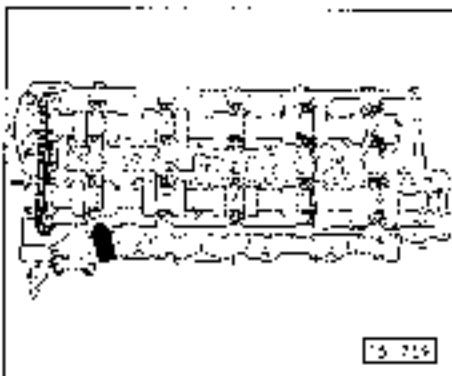
- - Fit sprockets with chain so that markings on chain sprockets align perfectly.

15-23V
 After installing the bearing caps, ensure that the recessed corners of the caps face towards the inside side of the cylinder head - (see 15-1).
 Remove distributor before installing camshaft.
 Timing distributor - (see Group 2a)
 Crankshaft lower end cap (1) - (see Group 2F)



Final checks:

- - Tighten bearing caps 1, 3 and 4 alternately and in diagonal sequence.
 Tightening torque: 15 Nm
- Fit remaining lower 14 caps
 Tightening torque: 15 Nm



15-23

Exhaust Valve(s)

- Tighten bearing near 1, 3 and 4 (alternately one in diagonal sequence).
Tightening torque: 15 Nm.
- Fit intermediate bearing caps.
Tightening torque: 10 Nm.
- Fit camshaft cover (page 15) &
- Fit camshaft suncover and tighten.
Tightening torque: 10 Nm.
- Install control belt
Adjusting valve timing - Repair - 500.0 1.0.

CAUTION

When new tappets have been installed, the engine must not be started for about 30 minutes, valve will strike p. 10.0.

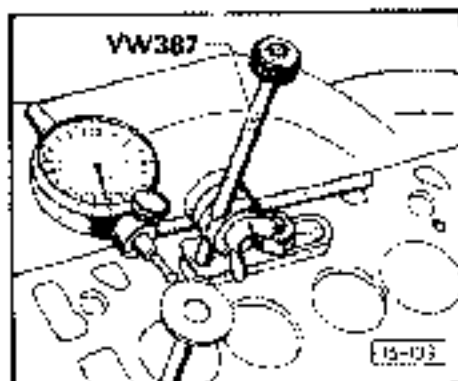
10-01

CHECKING AND REMOVING VALVE GUIDES

10-02

Checking valve guides

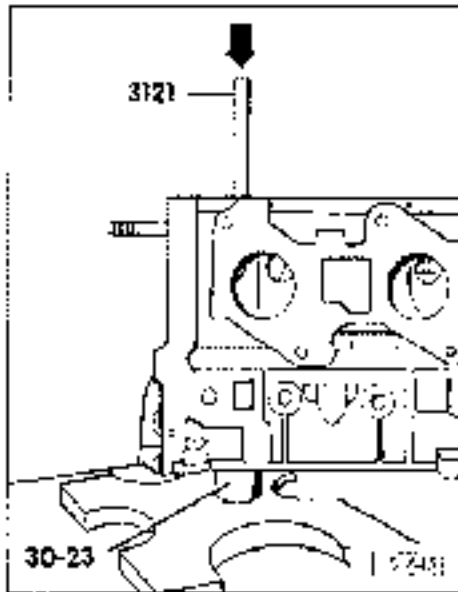
When a cylinder is being worked with the engine is not built, 100% to 150% of the valve seats and guides. It is also necessary to check the valve guides for wear. This is done by using a gauge when working on the engine.



- Insert new valve into guide until end of valve stem is flush with end of guide. Due to the difference in stem diameters, check that oil jet inlet valve is used in the valve guide. In case of a valve in the exhaust valve.

- Determine end of stem:
Inlet valve guide - 1.0 mm
Exhaust valve guide - 1.0 mm

10-01

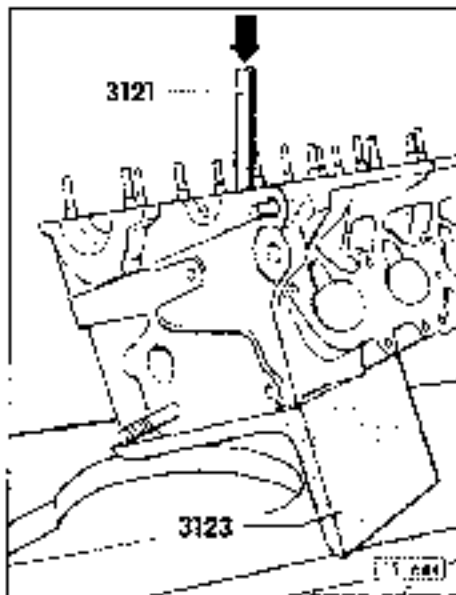


INSTALL VALVE GUIDES

Use the tools in which the valve seats can no longer be corrected or cylinder heads which have already been machined to the correct dimension, should no longer be repaired.

- Press each valve guide into the cylinder head with using 3121. Excess of support, use sleeve 30-23 during this operation.

30-23



- Grind the guide with 3121 and press in using 3121 from left side with head of 3121 until shoulder makes contact.

Note:

Use supports 3123 for pressing and grinding.

Caution
When the shoulder of guide makes contact, the pressure must not exceed 100 pounds otherwise the grinding wheel will break off.

Use guides with hard metal 3123, using plenty of cutting fluid.

Grind valve seats.

Note:

When reworking valve seats, refer to the dimension page 21-13.

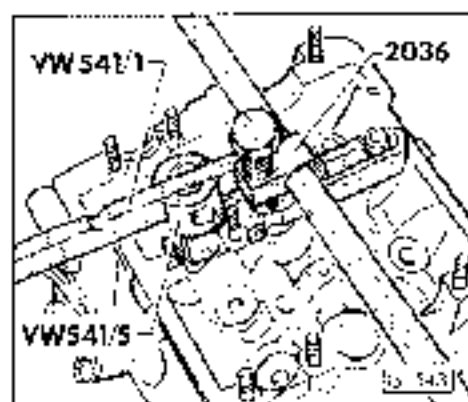
30-24

026260 (VW) 0261 026 100/0

Wiring cylinder head (in order)

- Remove camshaft and lay on supports.
- Remove pushrods.
- Remove 10 mm of head on side cylinder (to 2036).
- Remove compressed air (out to 660 E with plug thread and hole) in cylindrical structure of

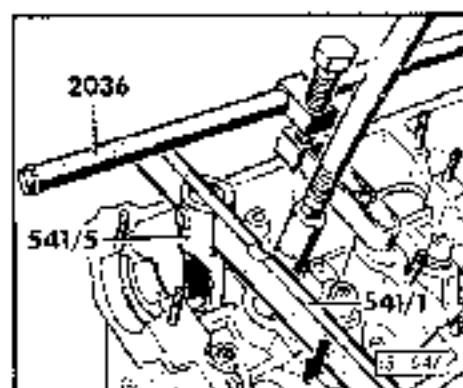
026260 0261 026



1) 1) Step:

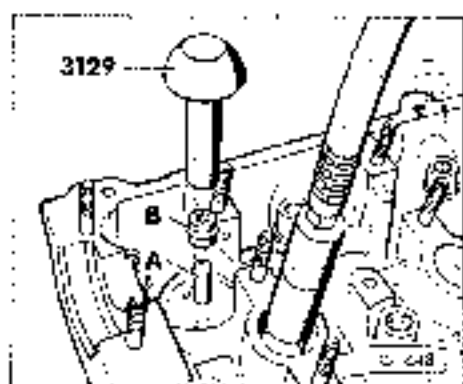
- Install timing spanner that can adjust to height of rods.
- Remove valve springs with valve lever (to 541/5) and adapter (to 543).

12-25



Exhaust side:

- Note:
- Tighteners can be loosened by turning 1/8 turn of the lever on the top of the shaft.



- Remove valve stem seals with 0267 E.

- Install valve stem seals.
- Fit 1.350 E sleeve (to 0260) on end stop of valve stem seal.
- Slip piece 13 on fitting cap 3129 and push it down on it fully onto the valve guide.

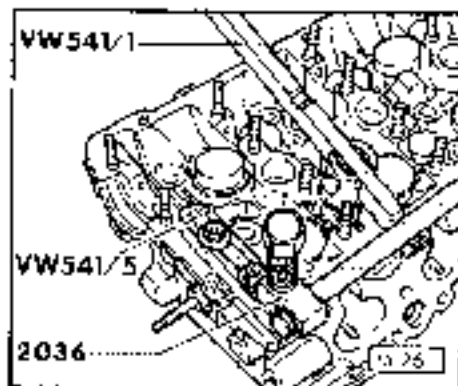
Caution:
To prevent damage to the valve stem seal, always use the
adjuster sleeve.

12-26

REPAIRING VALVE WITH OIL SEAL

(Cylinder head repairs)

- Remove handle and bucket support.
- Remove spark plugs.



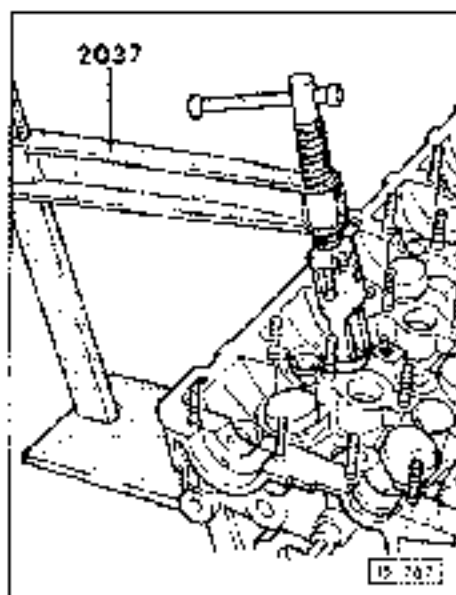
Inlet side:

Note:

Adjust front valve clearance by lightly tapping the assembly back to 541/1 with a mallet.

- Install fitting appliance 2036 and adjust to height of studs.
- Remove valve springs using valve lever (A 541/1) and adapter (A 541/5).

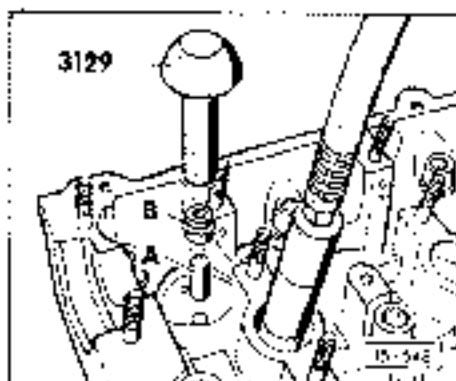
15-27



Exhaust side:

Remove valve springs using 2037.

- Remove valve stem seals using 2041.



- Install valve stem seals.
Fit plastic sleeve (A) over valve stem. Seat valve stem seal on with all plastic in fitting tool 3129 and carefully slide over valve guide.

Caution

Always use the plastic sleeve when fitting valve stem seals to prevent damage.

15-28

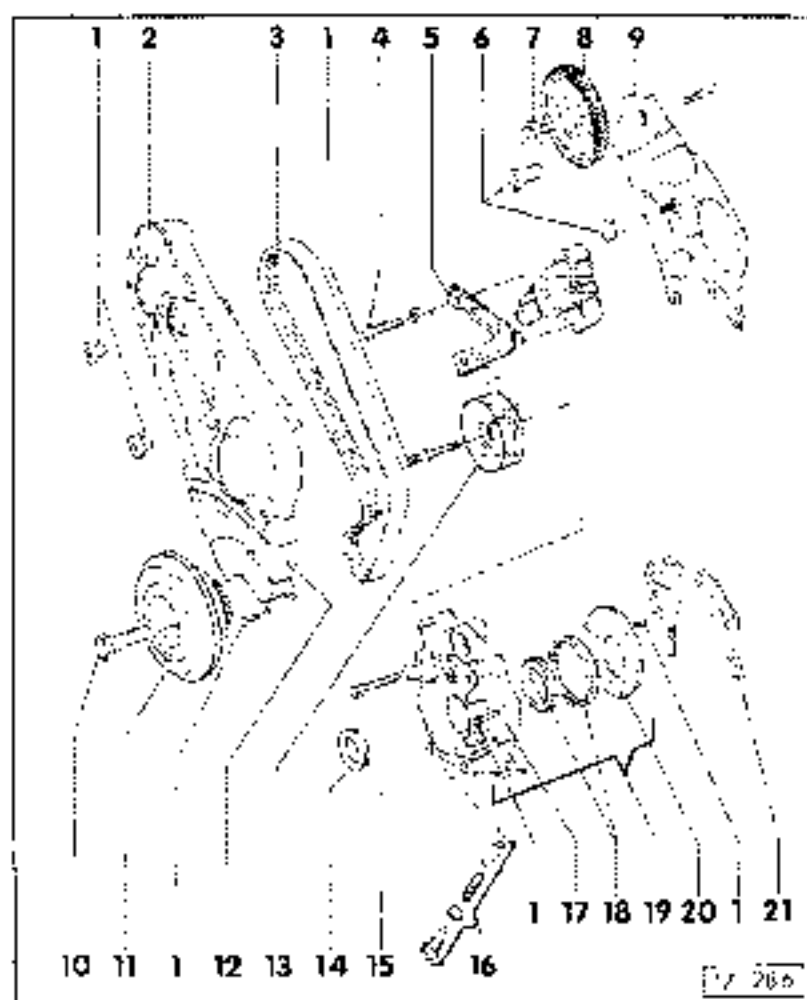
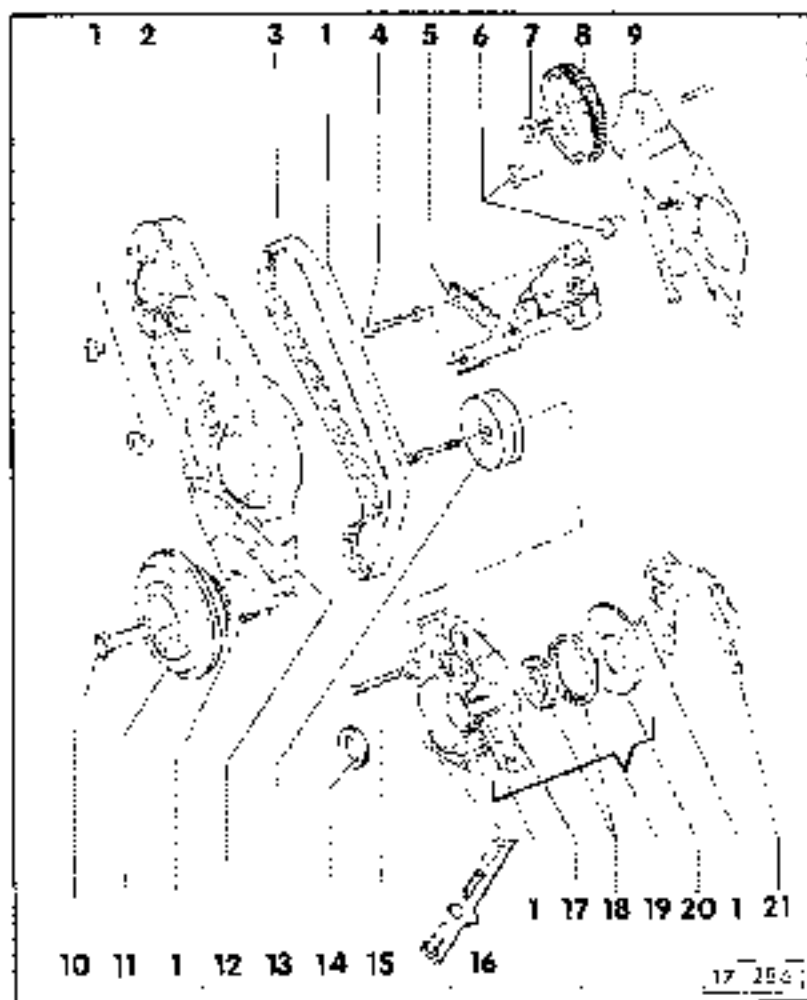
FIXING AND INSTALLING SUBSTITUTION

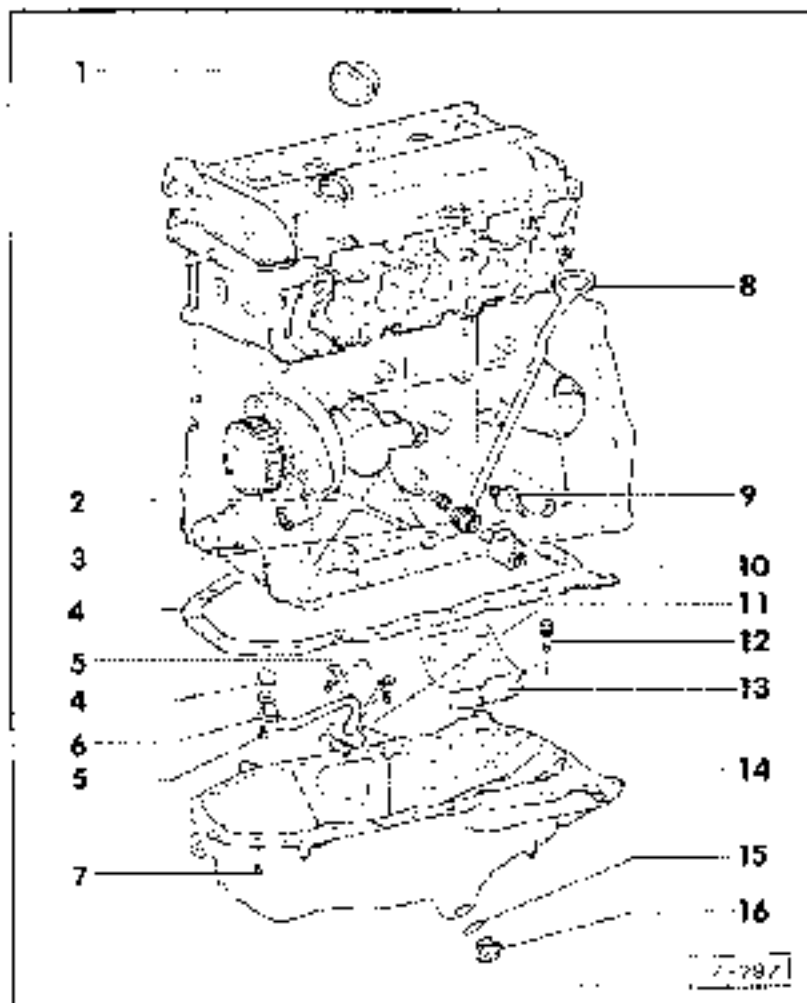
SYSTEM CORRECTIONS

Info:
 The parts shown in the instruction can be replaced and installed with equipment.

- 1- Oil
- 2- Upper toothed belt guard
- 3- Toothed belt
 - Fit of system entry - repair group 13
- 4- Oil pan
- 5- Wear parts and seals (lubrication system)
- 6- Spacer bushes
 - Long spacer bush 102
 - Short spacer bush 101a
- 7- Oil
- 8- Crankshaft assembly
 - Fit - wear protection area
 - Fitting toothed belt - repair group 13
- 9- Lower toothed belt guard

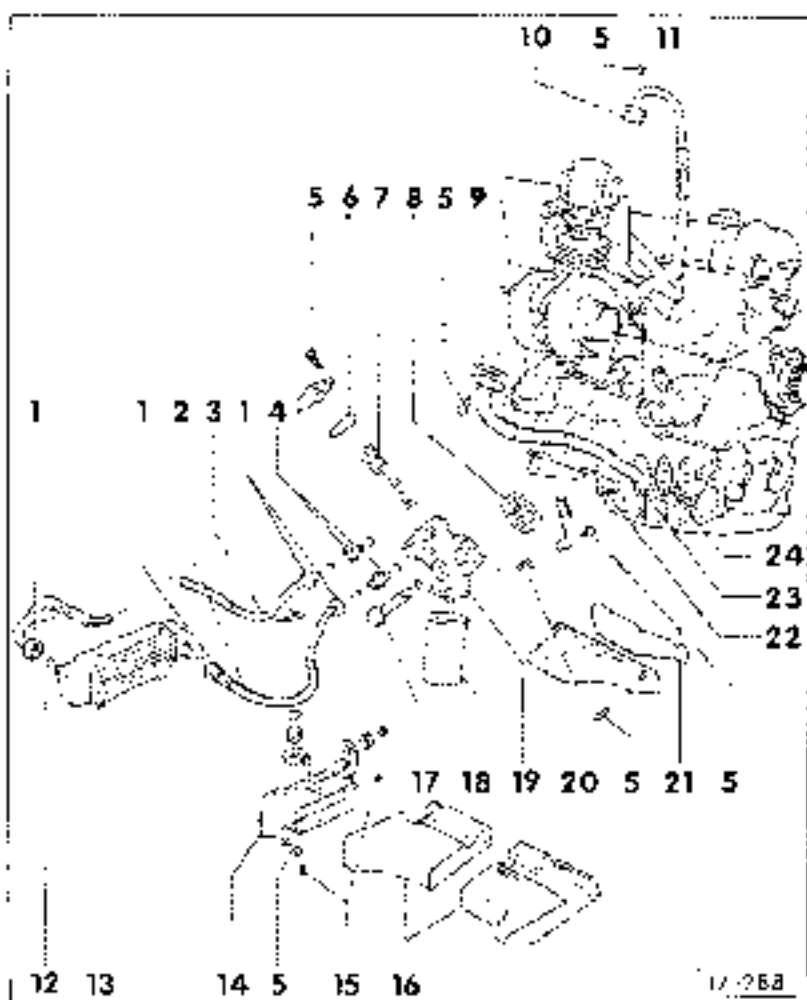
- 10- Oil
 - Tightening to the specified value after using special tools 207a and 207b - repair group 13.
 - Coat threads and seating surface of bolt head with sealing compound 499 156 00 02.
 - Tightening and tightening - repair group 13.
- 11- Generator carrier
 - Fitting oil filter ring - repair group 13.
- 12- Lower toothed belt guard
- 13- Oil pump
 - Fitting - page 17-11
- 14- Oil seal
 - Fitting - page 17-11
 - Sealing - page 17-11
- 15- Oil
- 16- Oil temperature sender (oil and oil pressure) (102 156 00 02)
 - Fitting pressure
 - Oil level sensor
- 17- Oil pump bearings
- 18- Oil pump gears
 - The must face towards the cover plate





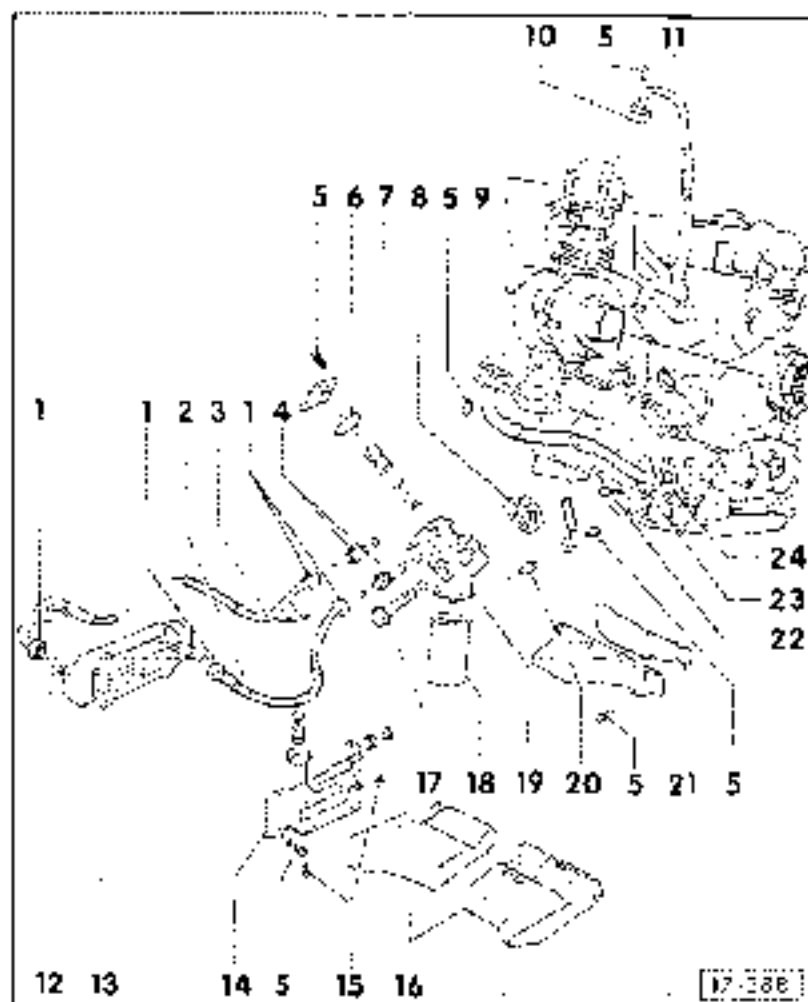
- 8- Support
- 9- Oil pressure switch (401-3), 25.11
 - 1.0 bar
 - Checking - page 27-10
- 10- Oil pressure switch, 25.11
 - Checking - page 27-10
- 11- Inner cap
 - See 25.11 oil cap (1.0 bar)
- 12- Oil cap
- 13- Baffle plate
- 14- Seal
 - Replacing and installing: Remove front oil frame securing (2.15 - page 17.8)
 - Clean mating surface before installation
- 15- Seal
 - Renew
- 16- Oil cap

27-8



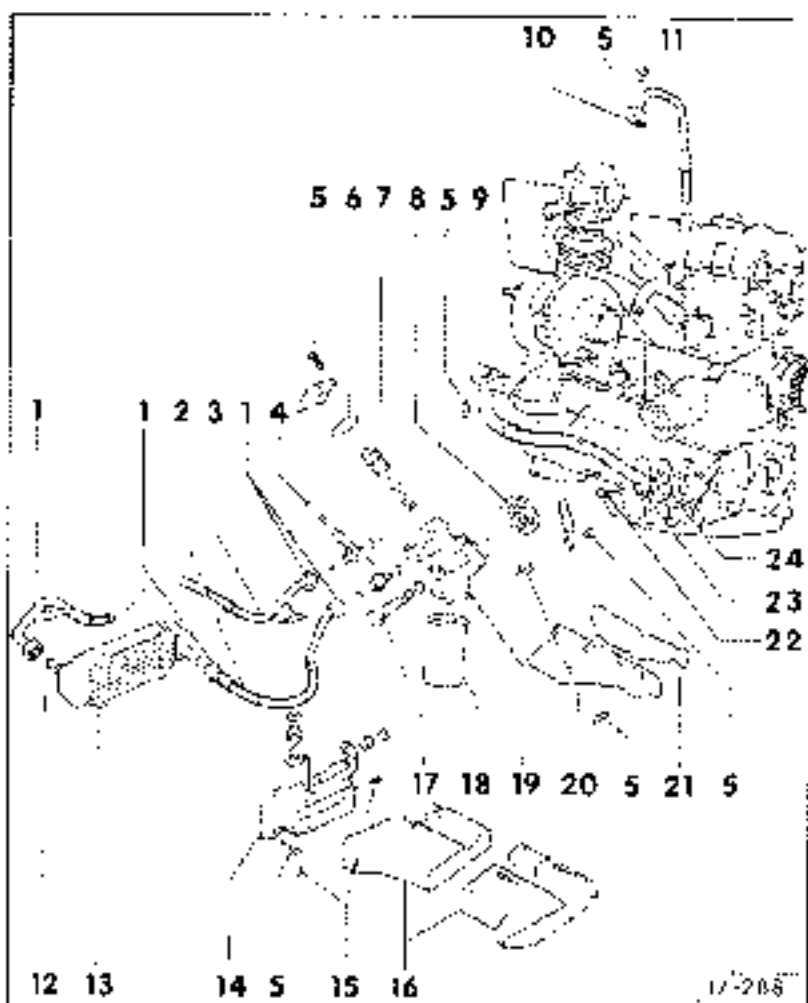
- 10- Seal
 - Filter mesh gaskets
- Oil capacity: 4.0 l without oil filter change
4.3 l with oil filter change
- 1- 10 bar
- 2- Flow line (oil system)
- 3- Return line (oil system)
- 4- Adapter 50 bar
- 5- 1.0 bar
- 6- Oil line welded steel
 - 10mm
- 7- Oil cooler thermostat
- 8- Oil filter housing gasket
 - 10mm
- 9- Oil return line basket (assembly 25-106)
 - 20mm
- 10- Flow line gauge, turbocharger
 - 10mm

27-8



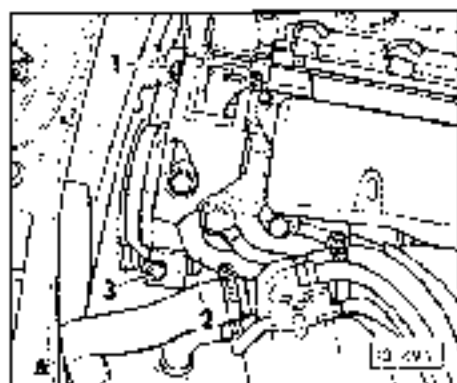
- 11- Flow line (Linschmitt)
- 12- Supply seal
• rubber
- 13- Oil cooler
- 14- Oil cooler bracket
- 15- Self-lubricating sleeve
• for securing air duct
- 16- Air duct
- 17- Ear(s) bolt 70 Nm
- 18- Oil filter 20 µm
• replace with 10 micron wrench, tighten by hand
• observe installation that actions printed on oil filter
- 19- Oil filter housing
- 20- Flow line gasket (Linschmitt)
• oil filter housing
• rubber
- 21- Gasket
• rubber
- 22- Valve

17-7



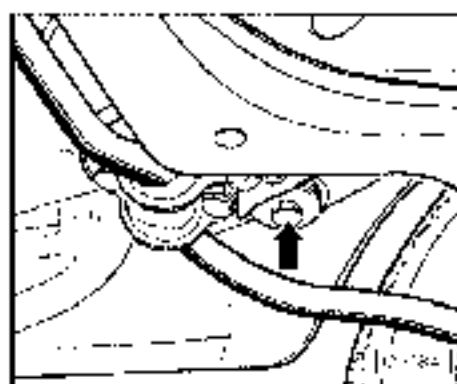
- 23- Airline line - bynchanger
- 24- Bynchanger (Linschmitt) (1000000000)
gasket
• rubber

17-6



→ **Roller Guide left**

- Release top roller (1) and roller (2) roller and release wheels for alternator, and control solenoid valve and control hydraulic pump.
- Remove top from hydraulic unit and move to the right (roller disassembling product).
- Slacken roller support on the left side (Figure 30-11).
- Roll over turned with gears.



→ **Removal of top**

Caution
The subframe will suddenly drop by applying the force.

- Remove bolt from subframe bolts.

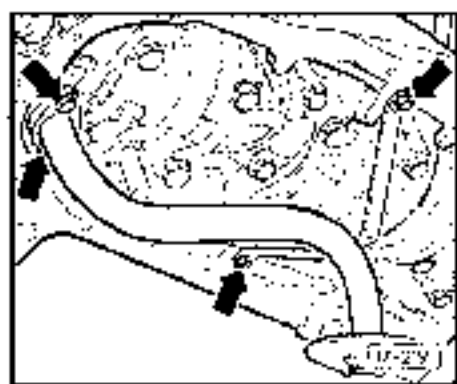
Warning
When the subframe bolts must be removed.

- During refilling, the top subframe bolts should be tightened to 20 N plus a quarter turn.
- Remove oil reservoir.
- Drain engine oil.

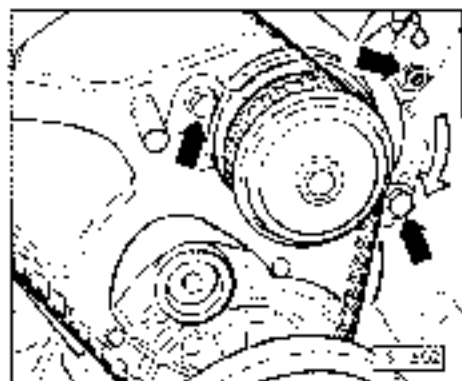


→ **There are the bolts at the "flange" end of the pump**

- Use an Allen key to access the 20 mm diameter 20 mm hexagon socket head screws.
- When refilling the pump these bolts should first be checked in finger-tight and then tightened to 20 N (1.7) and 20 N (1.8).



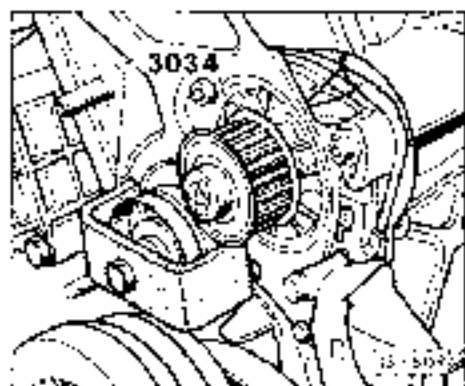
→ **Remove end section line.**



- Release tension belt and remove. To do this, tension adjuster must be turned in direction of arrow (clockwise).

Important:
Crankshaft must not be rotated further.

- Remove vibration damper with cranked belt pulley.



- Remove water pulley with 3034.
 - It is only necessary to remove the water pulley when removing the oil pump and if the water pump bearing is damaged. If the bearing is OK, it has to be replaced to have out the oil pump.

Remove oil pump.

17-13



- Remove crankshaft oil seal, pulley end.



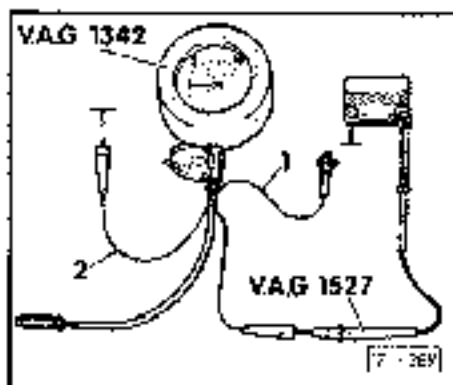
- Press oil seal (part 2080A) on seal pulley end, see 17-13 Plus.
- Use vibration damper mounting bolt for pressing oil seal on.
- Remove mounting, lightly oil bearing lip and outer edge of oil seal.
- Check oil seal for correct fit and correct operation.
- CAUTION:**
If the crankshaft shows signs of scoring, press oil seal as far as it will go.
- Press oil seal on seal pulley end, see 17-13 Plus.
- Install oil seal ring with screw (part 2080A).
- Pressure seal using thrust sleeve (part 2080A).

17-17

Diagnosis and pressure indication

Test conditions:

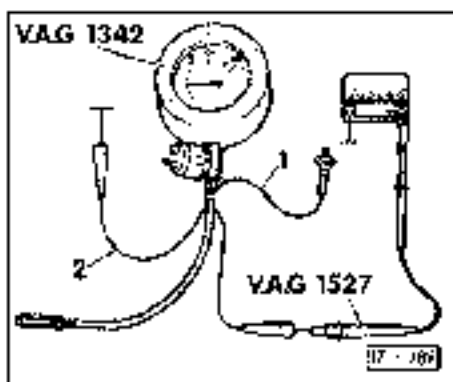
- Oil level 2/3.
- Oil pressure detector (P3) must glow when ignition is switched on.
On vehicles with auto check system the indication must be O.P. (Call up symbol).
- Minimum engine oil temperature: 50 deg. C. (indicator for must have hot in area).



(a) pressure switch 1.8 bar

- Remove cables from oil pressure switch and oil pressure sensor.
- Unscrew oil pressure sensor and screw into oil pressure sensor test unit V.6.3 1342.
- - Screw V.6.3 1342 into the crankcase in place of the oil pressure sensor.
- Connect wire -2- (brown) to earth (-).
- Connect wire -1- (blue) to 1.8 bar oil pressure switch (with insulation).

17-13



- - Connect disc test unit V.6.3 1527 to wire -1- and positive battery terminal.

- Start engine.
- Slowly increase engine speed. Test lamp should illuminate at 1.0 ... 2.0 bar. If this is not the case the oil pressure switch must be renewed.

Increase engine speed further. At 2000 rpm and an oil temperature of 80 deg. C the oil pressure must be at least 2.0 bar.

- Increase engine speed further. Pressure relief valve working pressure. 5.0 ... 5.5 bar. This pressure should not be exceeded except by a minimal amount.

NOTE:

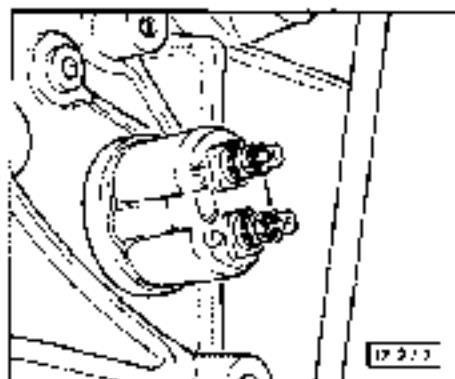
- If the oil pressure is excessive (pressure relief valve sticking or incorrectly fitted) the hydraulic system will be subjected to excessive pressure. As a result the engine will cut out soon after starting and turn over not readily test during subsequent starting because of lack of compression.
- If the wires are incorrectly connected to the oil pressure switch the auto check system will cause the engine oil pressure warning symbol to illuminate (oil bar).

Test conditions:

- Oil level O.K.
- Oil pressure warning lamp (if equipped) glow when ignition is switched on.
- In vehicles with auto check system the indicator must = 200 (200) psi (138 kPa).
- Minimum engine oil temperature = 20 deg. C (68 deg. F) (just above oil 100 deg. C).
- Temperature in instrument cluster panel assembly O.K.

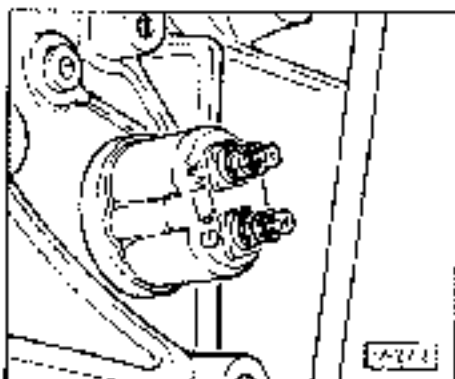
Notes:

- Check auto check system on oil pressure sender level of the oil pressure warning lamp (W) does not illuminate.
- For oil pressure sender (oil) wiring (wiring) see page 17-213.



- • Disconnect wire from oil pressure sender contact as shown in Fig. 17-213. Connect oil pressure sender contact to engine earth using the auxiliary cable from J2500 (1994).
- Switch S.A.S. (S) to the 250 (20) range. Specified reading = 20 (20) psi.
- Start engine and run at idling speed. Specified reading = 20 (20) psi.
- Increase engine speed to 1500 rpm. Specified reading = 27 (27) psi.

17-17

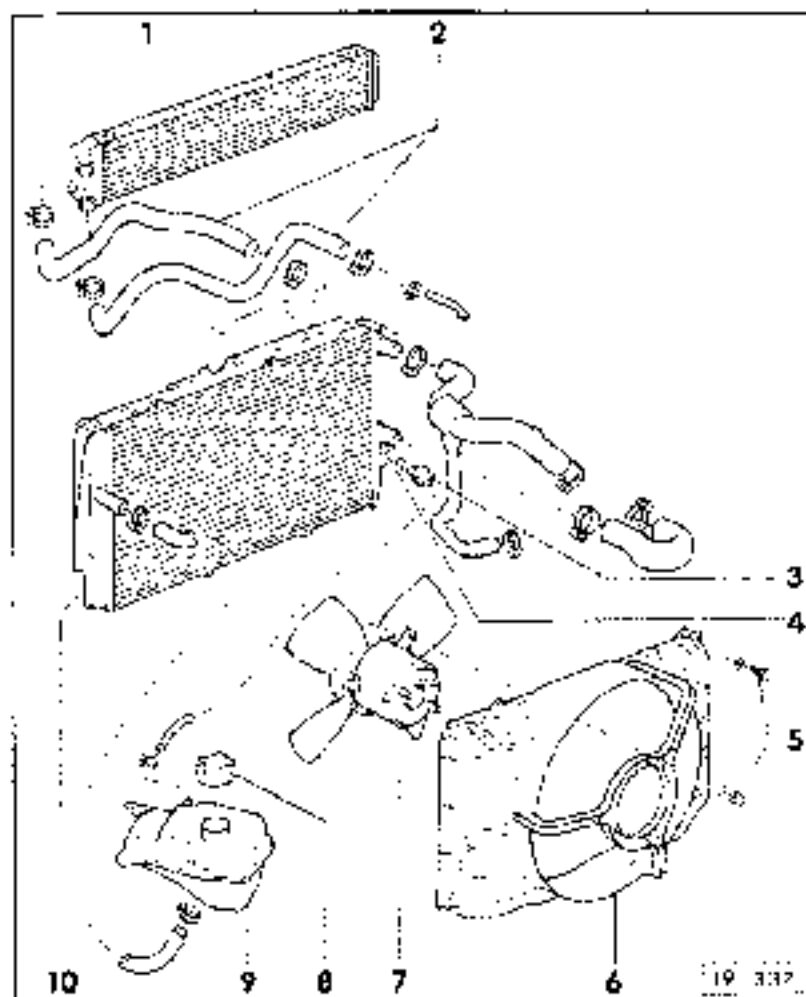


- • Connect J2500 test unit between oil pressure sender contact to engine earth using the auxiliary cable from J2500 (1994).
- Start engine and run at idling speed. Specified reading = 20 (20) psi.
- Switch off engine. Specified reading = 20 (20) psi.
- IF these values are not obtained the oil pressure sender (SIC) should be replaced.

Note:

Incorrect wiring of the oil pressure sender will cause the auto check system to display the engine oil pressure warning symbol (oil lamp).





PREPARED BY THE THERMO-FLUO SYSTEMS
 DIVISION OF THE GENERAL ELECTRIC COMPANY
 WATSONVILLE, CALIFORNIA

Drinking and ventilation systems -
 Page 184
 Working - working, care for tanks -
 19-3337

1. Check
 Check system pressure and level.

2. Apply radiator

3. Check hose
 between radiator and water
 radiator.

4. Check switch for adjustment

switch	Setting temperature °F	°C
--------	---------------------------	----

1st	100-110	38-43 approx
2nd	120-130	49-55 approx
3rd	140-150	60-66 approx

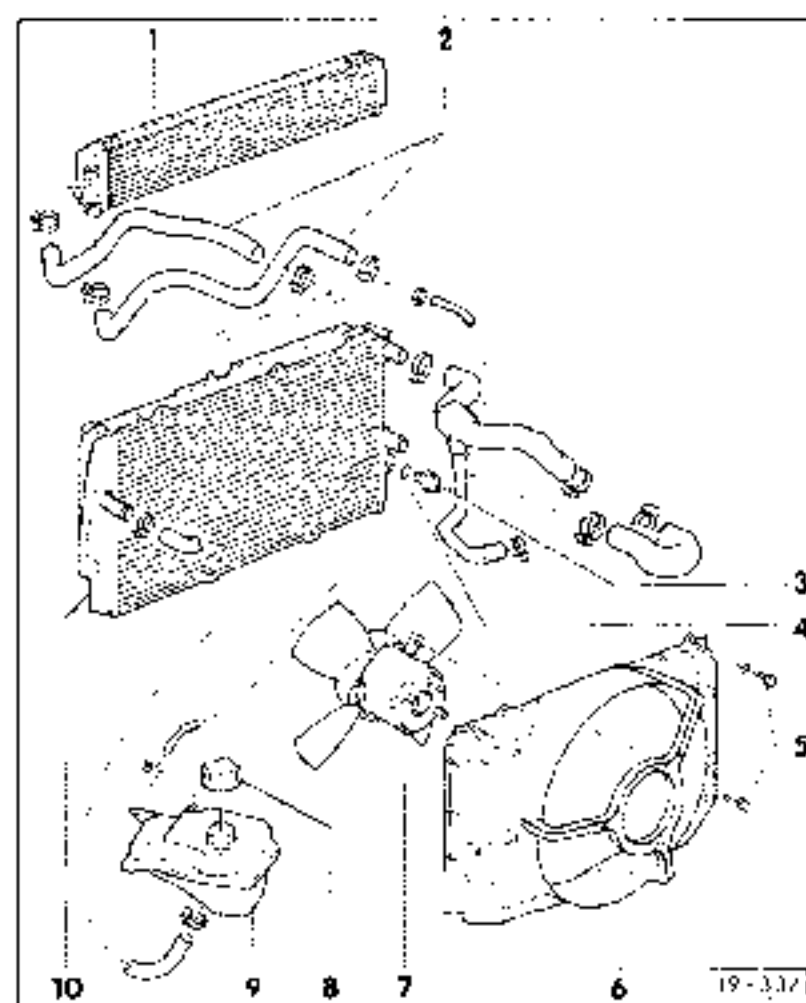
5. Check
 Fan

6. Check

7. Check hose

8. Check fan

19-3337

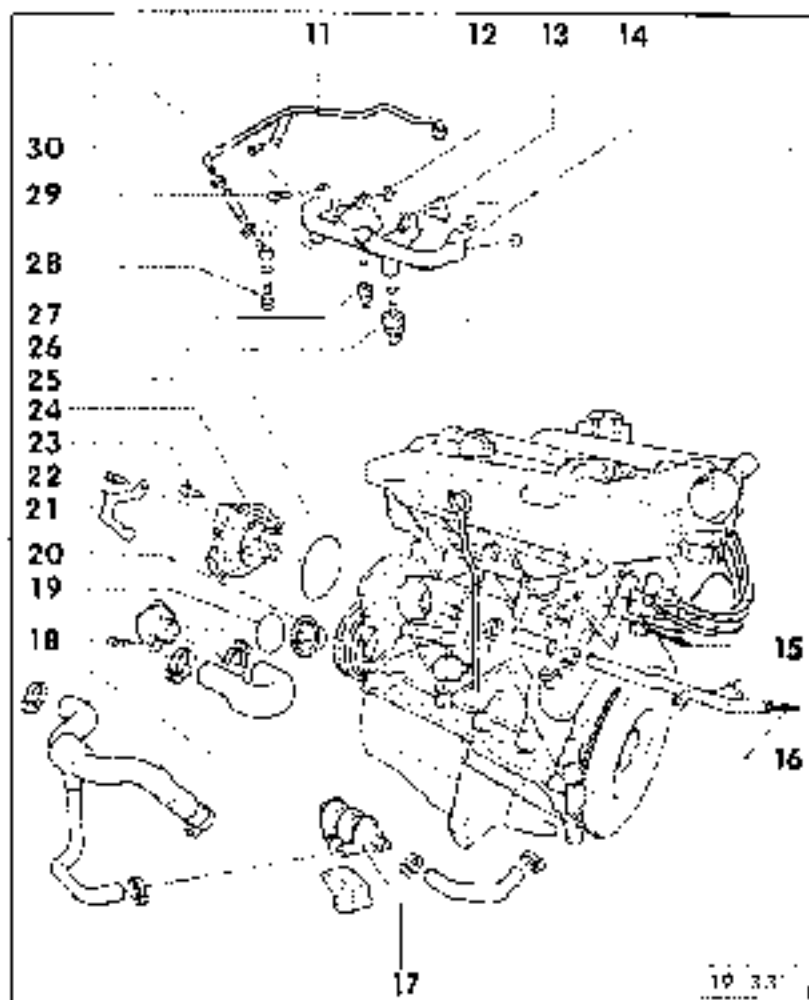


9. Check
 Fan

10. Expansion tank
 For filling and working tank
 see page 184

11. Check
 starting and installing
 Purge Equipment and the air
 hoses and nitrogen radiator
 venting.

19-3337



11- Radiator (See 22 for location)

12- Fan
 • Motor

13- Fan belt
 • Motor

14- Fan belt shroud

15- Water pump

16- Thermostat housing

17- Turbocharger coolant pipe
 • Check page 19-11

18- Hose

19- Coolant reservoir cap
 • Motor

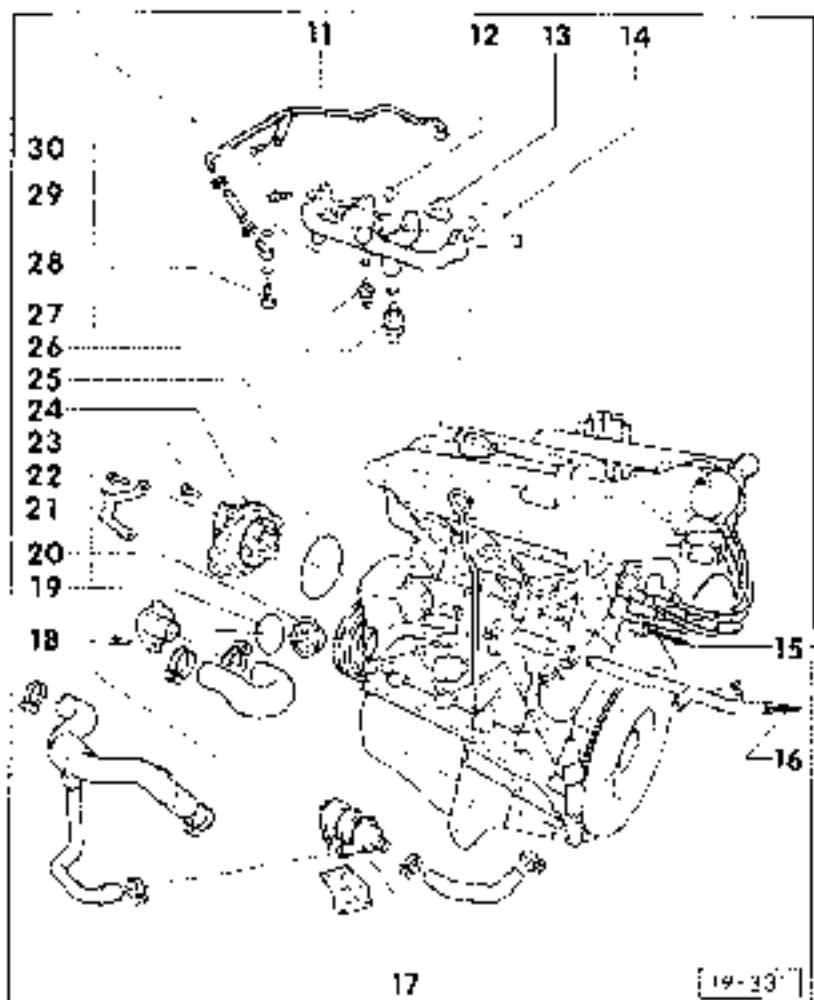
20- Coolant thermostat
 • Motor
 • Operates at 180 degrees
 • Fully open at 190 degrees
 • Spring stroke 1/2 inch

21- Cooling system inlet hose

22- Hose

23- Hose

19-33



14- Fan shroud

15- Water pump
 • Motor

16- Turbocharger coolant pipe
 • Operates at 180 degrees
 • Fully open at 190 degrees
 • Spring stroke 1/2 inch

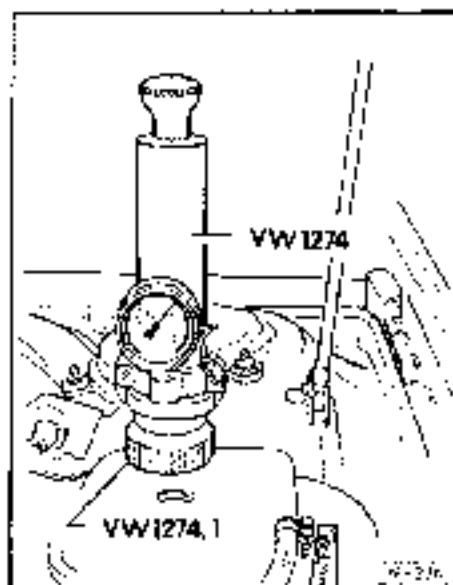
17- Turbocharger coolant pipe
 • Check page 19-11

18- Hose

19- Hose

20- Hose

19-33

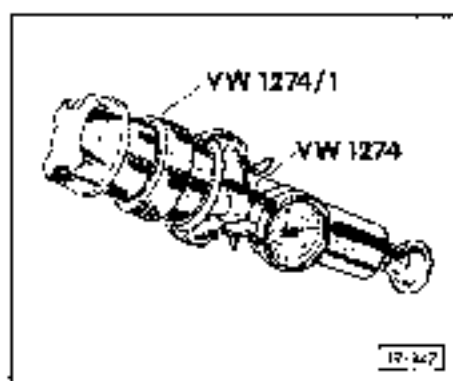


→ Fig. 2: Preparing cooling system (pre-1993)

The heat exchanger fully recovers fluid when engine is at normal temperature.

Fit hose units to expansion valve.

Evacuate system, up to 1.0 bar a.p.s.v., using the fast unit hose pump. If pressure drops, locate leak and repair it.

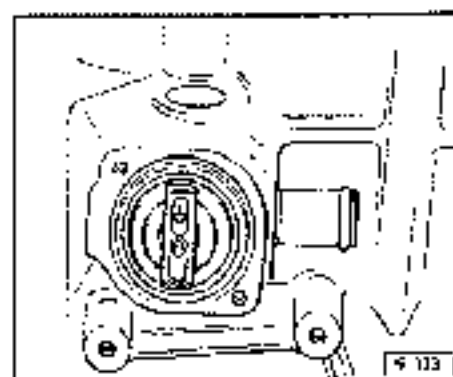


→ Fig. 3: Replacing the pressure relief valve

Fit up to test unit.

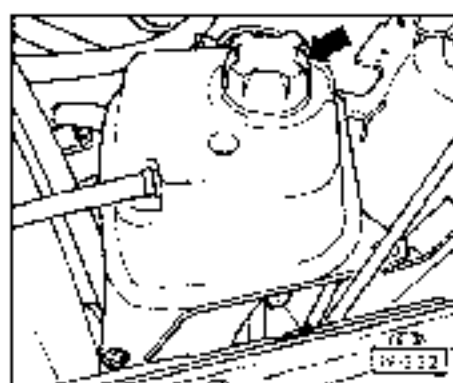
Pressure test using the fast unit hose pump.

The pressure relief valve must open at 1.0 ... 1.5 bar.



→ Fig. 4: Pressure relief valve, installation position

Start opening:	90° approx.
Fully stroke:	180° approx.
Working stroke:	8 mm min.

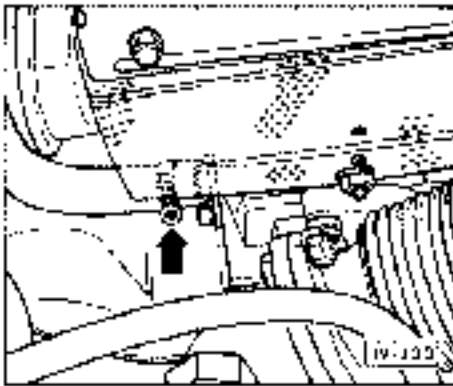


REFRIGERANT RECOVERY AND FILLING COOLING SYSTEM

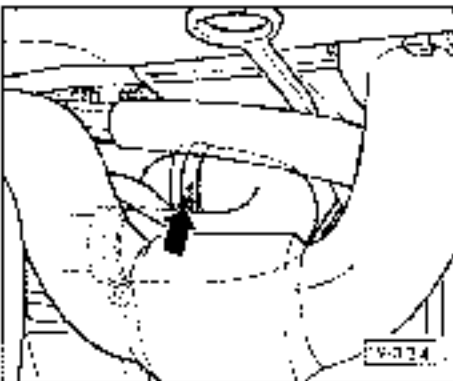
WARNING:

- Use heater controls to max. position.
- Close expansion valve cap.





- Drain coolant by detaching coolant hose to heater at rear of engine block. Catch coolant for reuse.



- Lower coolant hose at lower coolant pipe.

19-7

Filling cooling system.

NOTE:

The cooling system is filled with the year-round with a mixture of water and full antifreeze.

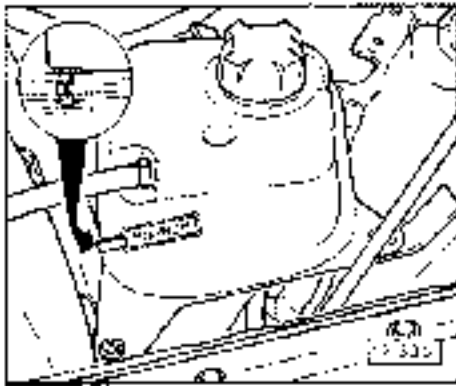
All air coolant additives should be being in accordance with the manufacturer's prevent freezing, corrosion damage and scale formation and reach the end of boiling point. For these reasons the cooling system should be filled with the year-round with antifreeze and anti-corrosion additive. Due to the high boiling point the coolant is used in operations efficiency when the engine is operating on full load, particularly in tropical climates.

Recommended mixture ratio:

Operating temperature	Volume of Oil	Volume of water
20°	1.5 l	4.5 l
30°	1.0 l	4.0 l

- Use caution with cold antifreeze.
- Set heater controls to hot.
- Fill with coolant until air expansion tank is full.
- Start and run engine...

Keep tapping up expansion tank with coolant until the coolant level drops no further and is slightly above the level mark.



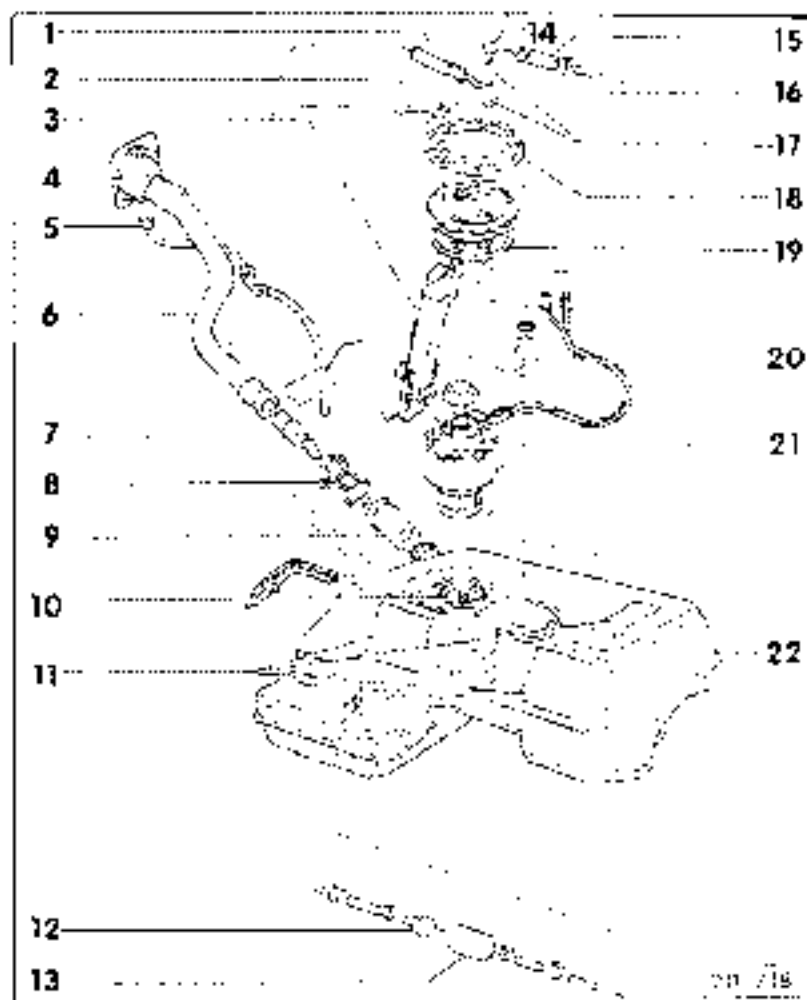
- Replace expansion tank if it:
 - o Does not pump until the electric radiator fan cuts in.
 - o Shows a low level of liquid or top up if necessary.
- When the engine is at operating temperature, the coolant level should be checked above the minimum level mark. When the engine is cold, the level should at least reach the 1/2 mark of the maximum.

2-3

COOLING SYSTEMS, WATER PUMPS AND COOLANT

- When engine is at operating temperature, the electric radiator fan cuts in.
 - o Turn off engine.
- After a min. 30sec, the electric fan and pump and radiator fan must switch on.
 - o If electric radiator pump and radiator fan are not switched on proceed as follows:
 - Disconnect wires from thermostatic and connect wires to each other.
- The electric radiator pump and fan should now run.
 - o If coolant pump and fan runs:
 - Repair thermostatic.
- If neither pump and radiator fan do not run:
 - Update and repair faults using current flow diagram.



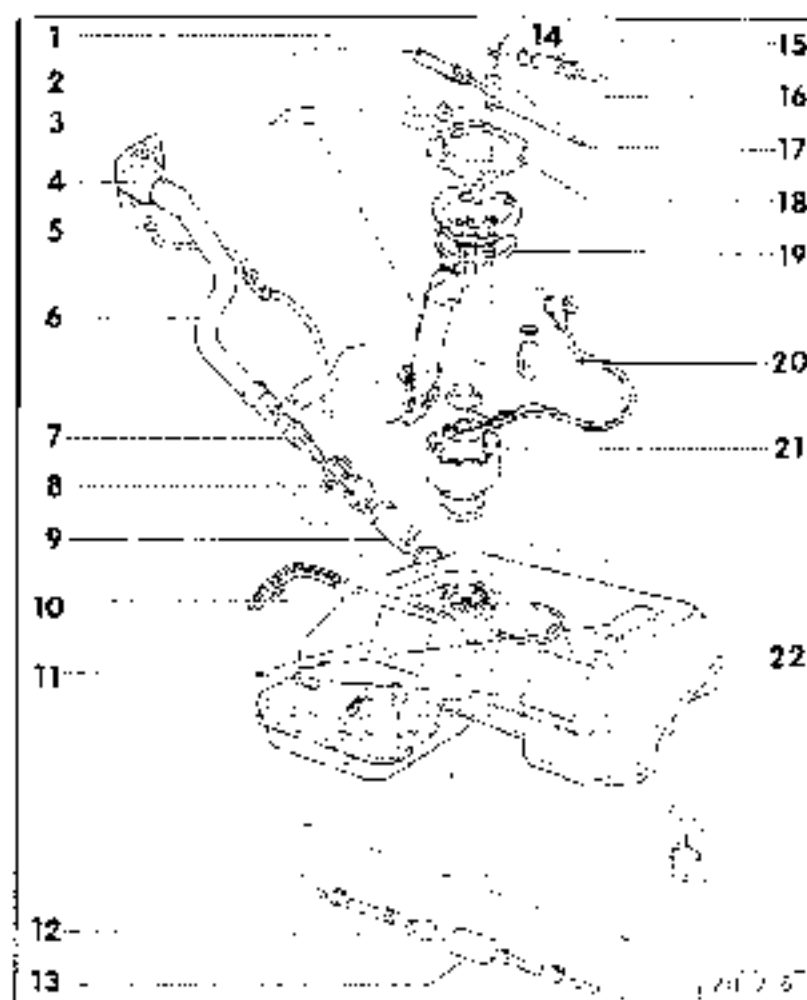


STOWING AND INSTALLING FUEL SYSTEM COMPONENTS

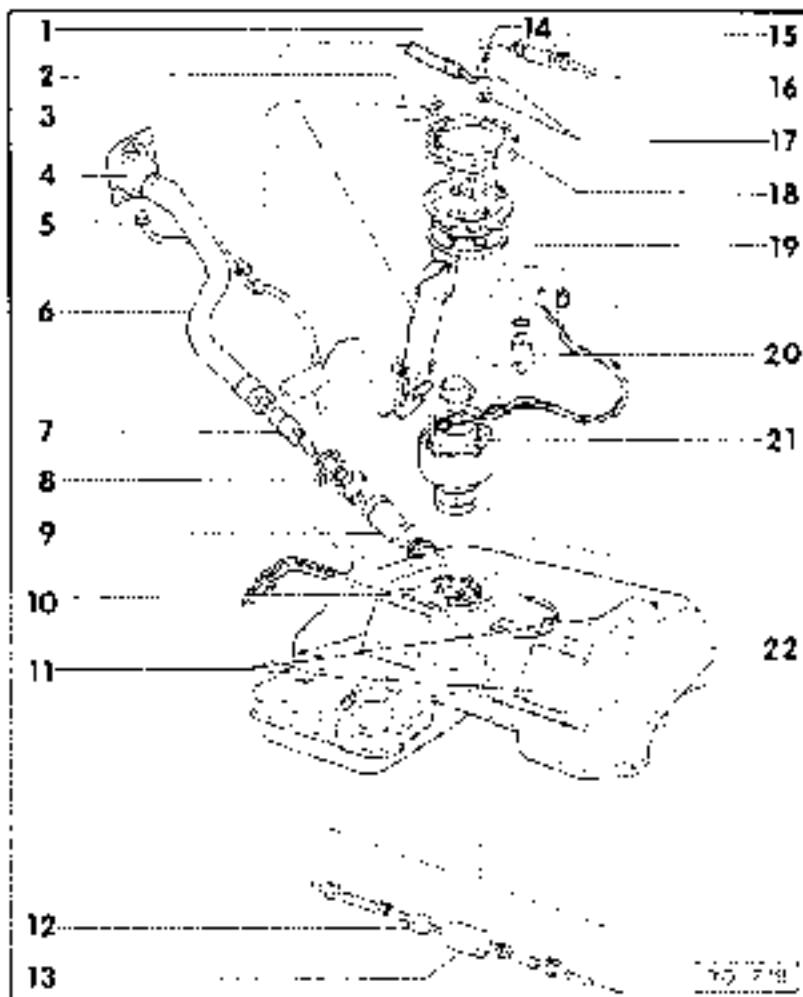
Warning
Always observe the safety rules when working on the fuel system.

Notes

- Always wear safety glasses and nose clips when working on the fuel system.
- All bolts are secured against rotation by spring-loaded pins.
- Always observe rules of cleanliness - page 2-14.
- Connecting remote control - page 2-15.
- Checking fuel pump filter - page 2-16.
- When removing or installing fuel stage sender unit, make sure that the wires are not damaged.



- 1- Fuel supply line
- 2- Fuel nozzle
- 3- Fuel stage sender
- 4- Tank filler cap
- 5- Fuel filter
- 6- Tank filler pipe
- 7- Tank filler pipe bracket
- 8- Tank filler clip
- 9- Tank filler pipe hose
- 10- Screen cap
- 11- Packing
- 12- Fuel chamber neck valve
- 13- Support plate



- 14- Surge valve 20 hp
- 15- Ventilation hose
- 16- Ventilation pipe to exhaust (the hose, filter)
- 17- Seal
- 18- Retainer ring
- 19- Seal
- 20- Gravity valve
- 21- Fuel pump
 - Removal and installation - page 20-4
 - Disassembly and assembly - page 20-13
 - Checking - page 20-12
- 22- Fuel tank

20-4

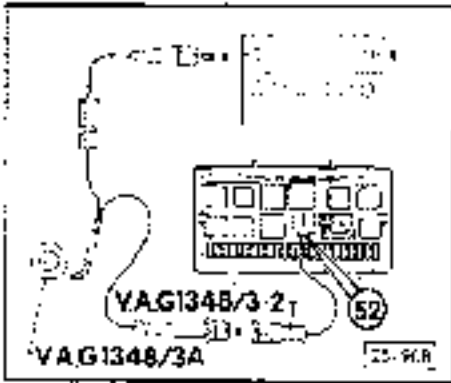
GUIDES FOR CLEANLINESS WHEN WORKING ON THE FUEL SYSTEM

Important

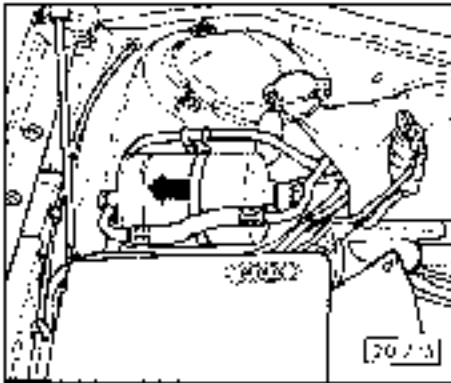
When working on the fuel system the following five rules should be observed:

- 1- Thoroughly clean all unions, etc. and the adjacent areas before disconnecting.
- 2- Place parts removed from the fuel system on a clean surface and cover against contamination.
- 3- Components that have been opened or dismantled must be carefully covered or sealed if the repair cannot be carried out immediately.
- 4- Only install clean components.
 - Do not remove replacement parts from their packaging until ready for installation.
 - Do not use parts that have been stored without their packaging (e.g. in toolboxes etc.).
- 5- When the fuel system is open:
 - Do not use compressed air.
 - Do not cover the vehicle unless absolutely necessary.

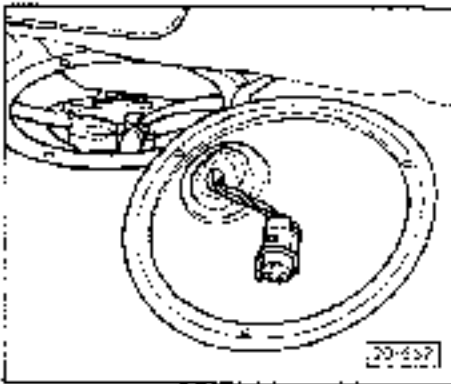
20-4



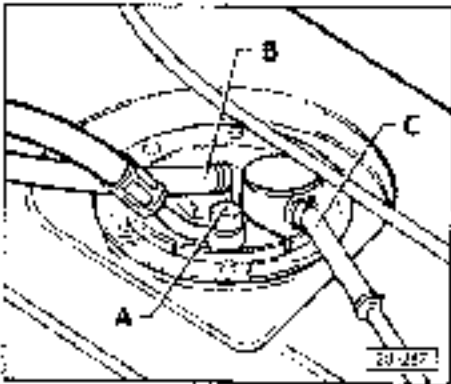
- Fig. 4. Connecting engine control unit 204623
 (part of the engine control unit).
- Remove the relay from the relay plate (part of the engine control unit).
- Insert the relay into the relay plate (part of the engine control unit) and connect it to the engine control unit (part of the engine control unit).



- Fig. 5. Fuel filter (part of the engine control unit).
- Remove the fuel filter from the engine control unit.



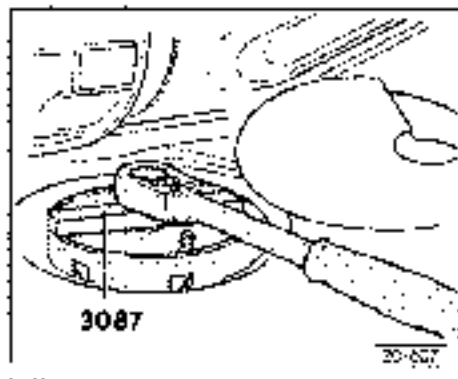
- Fig. 6. Fuel filter (part of the engine control unit).
- Remove the fuel filter from the engine control unit.
- Insert the fuel filter into the engine control unit.
- Tighten the fuel filter (part of the engine control unit).



- Fig. 7. Fuel filter (part of the engine control unit).
- Remove the fuel filter from the engine control unit.
- Insert the fuel filter into the engine control unit.
- Tighten the fuel filter (part of the engine control unit).

20-557

20-557



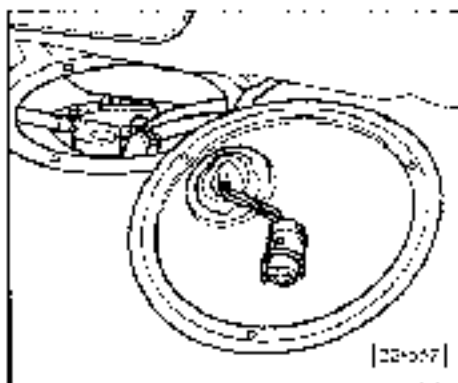
- ➔ Remove the sender unit using screwdriver 3087 and withdraw the fuel gauge sender from the fuel tank.

Notes:

When removing and installing the fuel gauge sender unit ensure that the connecting cables are not damaged.

- Disconnect supply and return lines from the inside of the sender housing.
- Disconnect fuel pump electrical connections.
- Drain gravity drain.

20-7

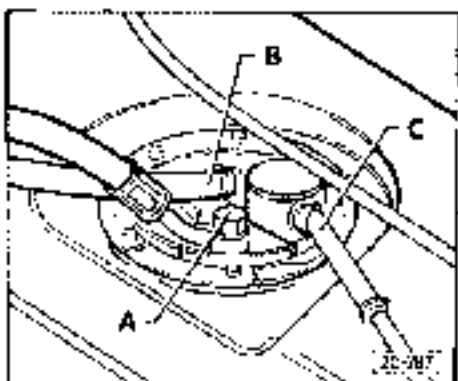


NOTE: Use fuel 1500, 100-100, 1000

Notes:

- ➔ Remove fuel gauge sender unit using screwdriver 3087.

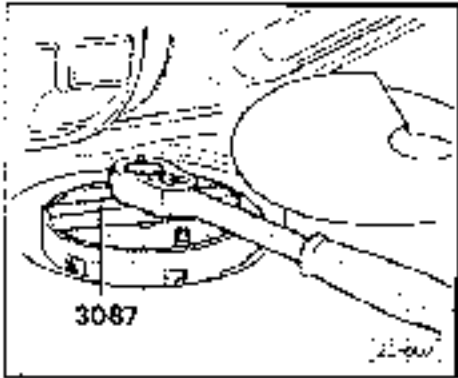
Pay attention to the fuel gauge and fuel pump.



- ➔ Remove fuel supply line (A), return line (B) and vent line (C).

Important:
The fuel tank should be more than 2/3 full.

20-6



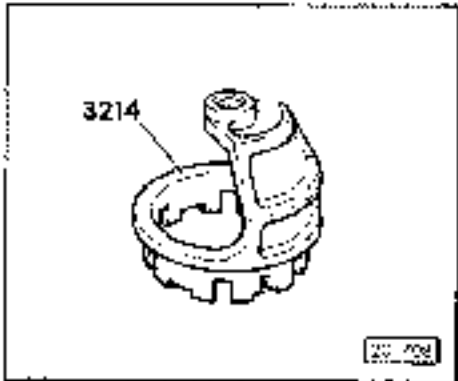
- Rotate the fuel filter until the fuel filter and the fuel pump pump handle meet the fuel tank.

Note

When removing and installing the fuel filter, be sure that the O-ring and gaskets are not damaged.

- Disconnect the fuel return lines from the bottom of the fuel filter.

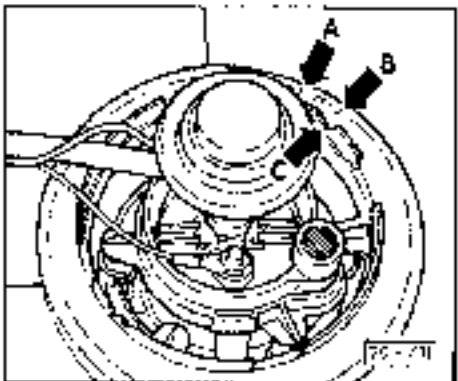
Disconnect fuel lines electrical connections.



- Rotate the fuel pump until the fuel pump handle meets the fuel tank.

Disconnect pump wires.

200



Installation Precautions

(Installation is required if removed.)

The fuel pump should be installed as follows:

- Fit fuel pump in the fuel tank so that it is 1/2 inch (12.7 mm) from the tank bottom.
- Fit return line to the fuel pump.
- Rotate fuel pump clockwise until the pump handle meets tank side.



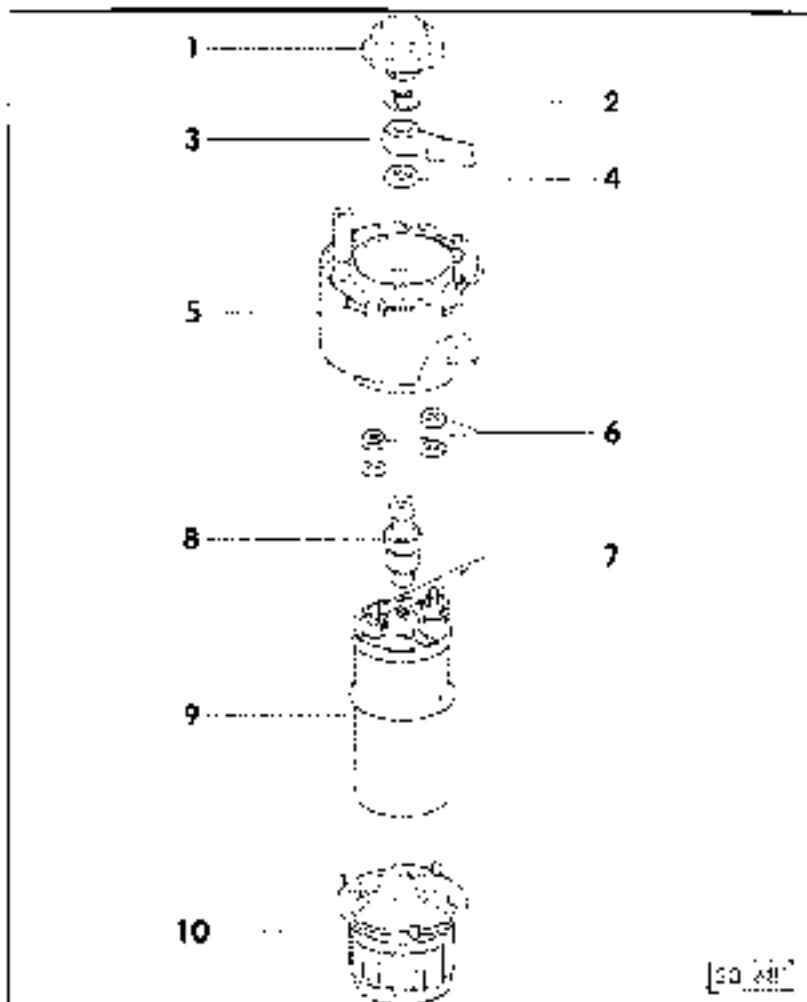
201

INSTALLING AND REPAIRING THE FUP

..... 10-107

Always replace seals and gaskets. The chamber is fitted to the fuel reservoir by a number of seals:

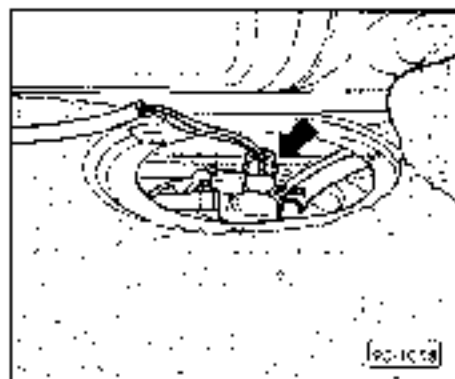
- 1- Sealant 15-16
- 2- Seal
 - 15-16a
- 3- Sealing line
- 4- Seal
 - 15-16b
- 5- Fuel reservoir cover gasket
- 6- O-ring
- 7- Electrical connections
 - To positive (+)
 - To earth (-)
- 8- Gas return valve
 - Checkings page 106
- 9- Fuel pump
 - Checkings - page 104-2
- 10- Filter etc.



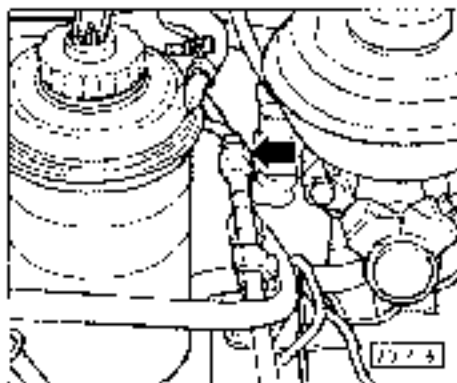
INSTALLING THE FUP

Tools and parts:

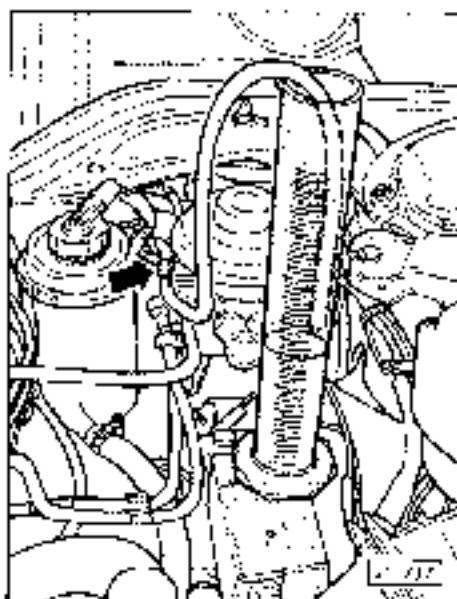
- Fuse (1.0A, 10mm ring) from fuse relay
- Fuel filter (2)
- Airline filter (1) from (17) set
- Fuel pump (1) 2 9 0348/17 same red complete with gasket (1) 2 9 0348/17 - page 104



- Fit the fuel gauge under the fuel pump cover (follow the instructions)
- Connect the fuel pump and fuel gauge correctly.

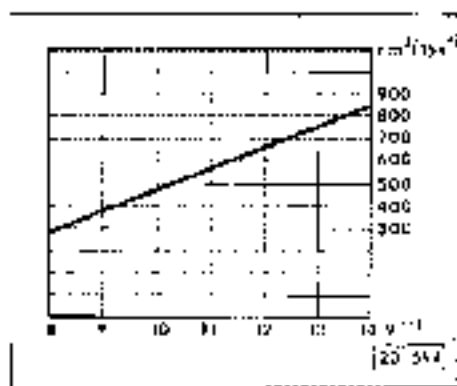


→ Connect the fuel supply pipe to the (upper fuel) line - see A 106.



→ Connect a hose to the fuel supply pipe and the other end of hose to a protected breathing mask.

20-15



→ Check pump delivery rate by pressing the button of voice control of A/S 1340 on for 15 sec.

The data field on fuel delivery rate can be read from the diagram.

→ Measure the air delivery rate (l/min) at the fuel return line.

** Check fuel pump voltage with engine switched off and pump running. This voltage should be approx. 15.5V from the battery unit(s).

24070102 FUEL PUMP (300-307) A/S 1340

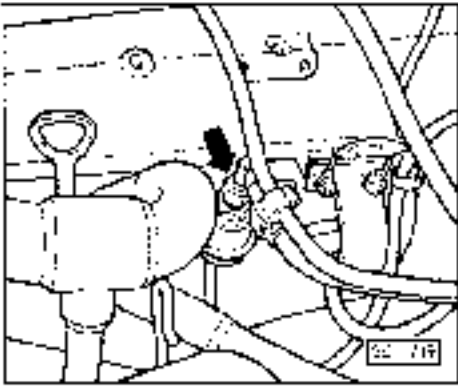
Notes:

For this test fuel pressure regulator, fuel pump and injectors must be work as properly and there must be no leak in the fuel system.

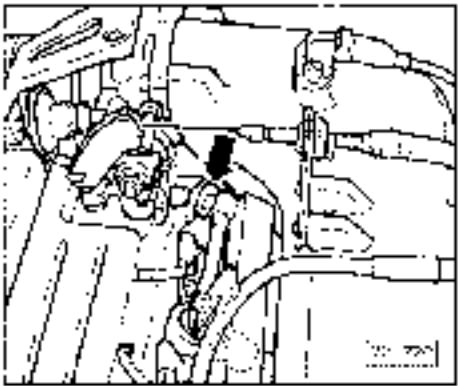
Precautions:

The pressure gauge lever must remain closed during the test.

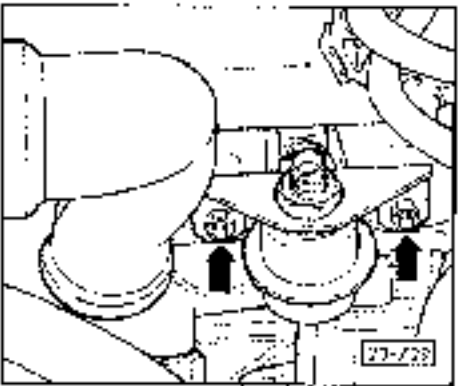
20-16



→ Disconnect fuel return line from pressure regulator.

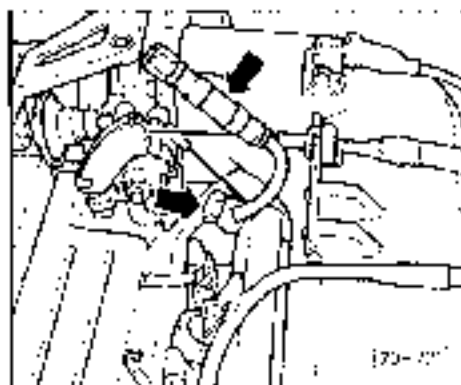


→ Disconnect connecting line between fuel line and pressure regulator from the fuel line next.

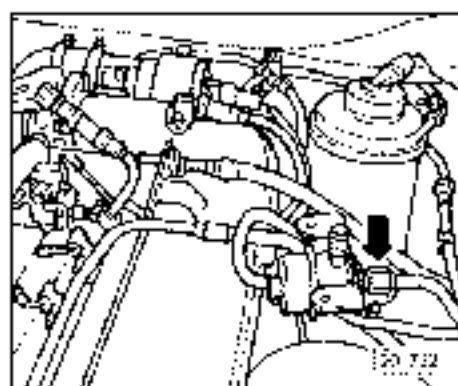


→ Remove pressure regulator and its utility in relation to induction manifold complete with connecting line.

→ Remove connecting line from pressure regulator



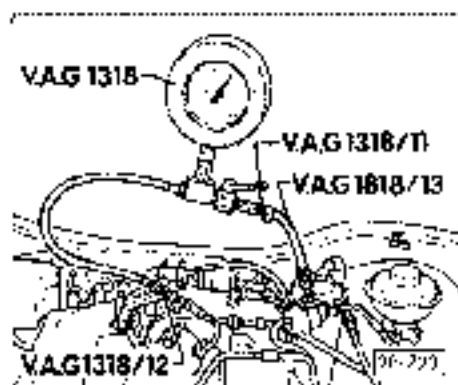
- ➔ Connect an ending line to fuel regulator after installation through the segments.



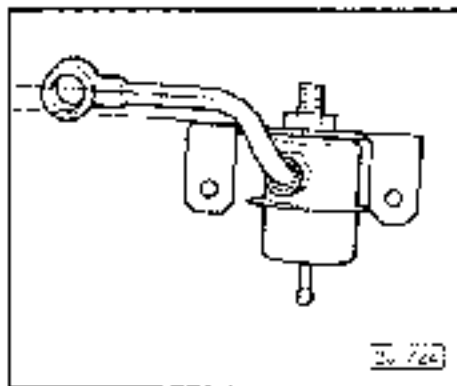
- ➔ Connect fuel return line to pressure regulator.

10.3.3.3. Fuel pressure test

13-14

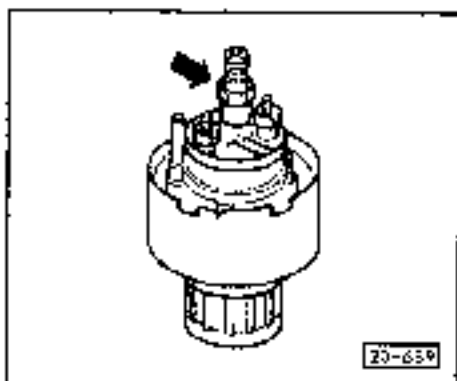


- ➔ Connect pressure gauge VAG 1318 between controller line and pressure regulator, fuel pressure gauge VAG 1318/12 to fuel line.
- Connect remote control VAG 1246 13 - page 10-14
- Press remote control switch for approx. 30 sec.
- Set pressure gauge VAG 1318/12 to closed position.
- Press remote control switch for a short time until the needle is a maximum of 200 bar.
- Fuel pressure gauge VAG 1318/12 pressure drop after 30 min: 0,5 bar.
- If pressure drop exceeds this value check pressure gauge and fuel supply, and connections for leaks. If leaks are not found replace the return valve.



Detailing the pressure regulator (is a removal or repair).

- Note that the connection line should be fitted to the pressure regulator in a manner with the pressure regulator of work.



Insulating secondary side

→ Refer to page 20-8

- Insulate secondary cable and seal it with tape with seal.
- Tightening screws at top

Example

→ Insulating the electric fuel pump in a pipe.

20-25

20-25. Fuel Pump Relay (Relay) (20-25) (20-25) (20-25)

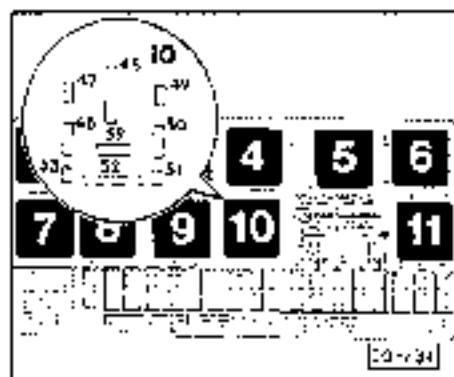
Checking Fuel Pump Relay (Fuel)

→ Refer to page 20-25 and 20-26

- Connect diode test lamp (A 5 100) between earth and the ground contact of fuel relay.
- Operate starter motor briefly.
- Connect diode test lamp (A 5 100) between earth the left-hand contact of fuel relay.
- Operate starter motor briefly.
- If the diode test lamp illuminates as soon as the ignition is switched on, connect diode test lamp to the right-hand contact of fuel relay.
- Connect diode test lamp (A 5 100) between earth and the left-hand contact of fuel relay.
- Operate starter motor briefly. (If the diode test lamp illuminates as soon as the ignition is switched on, connect diode test lamp to the right-hand contact of fuel relay).

The diode test lamp must illuminate during all three checks and the relay must operate normally. If relay cannot be tested, operating diode test lamp on relay housing to check operation.

20-26



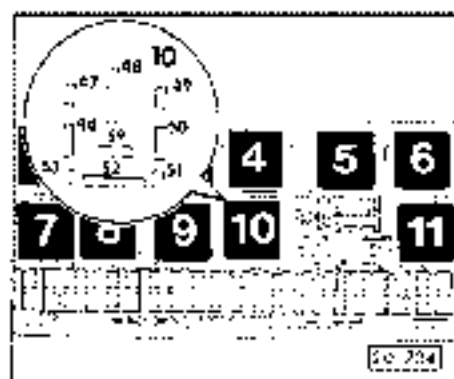
- ➔ If one of the test lamps does not illuminate the fuel pump relay coil should be withdrawn from relay location 10 on the relay board.
- Check connecting cable between test 10 and contact 10 of relay location 10 for continuity using an ohmmeter.
- Check connecting cable between test 19 and contact 19 of relay location 10 for continuity using an ohmmeter.
- Check connecting cable between test 18 and contact 18 of relay location 10 for continuity using an ohmmeter.
- If necessary verify any open circuits.
- If the relay does not operate check the fuel pump relay control circuit.
- If the control circuit is OK replace fuel pump relay.

Condition: fuel pump relay, general supply

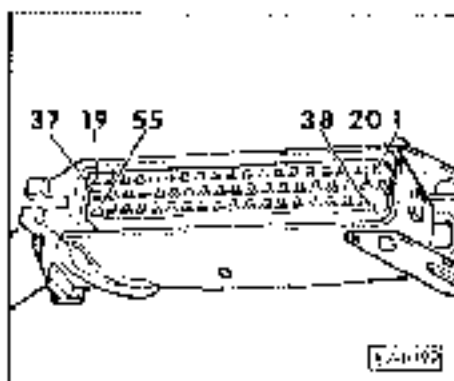
- Withdraw fuel pump relay coil from relay location 10 on the relay board.
- Switch on ignition.
- Connect voltmeter first to contacts 46 and 51 and then to contacts 48 and 50 of the relay socket.
- The voltmeter should read approx. 10V.

© 1995 Ford Motor Company

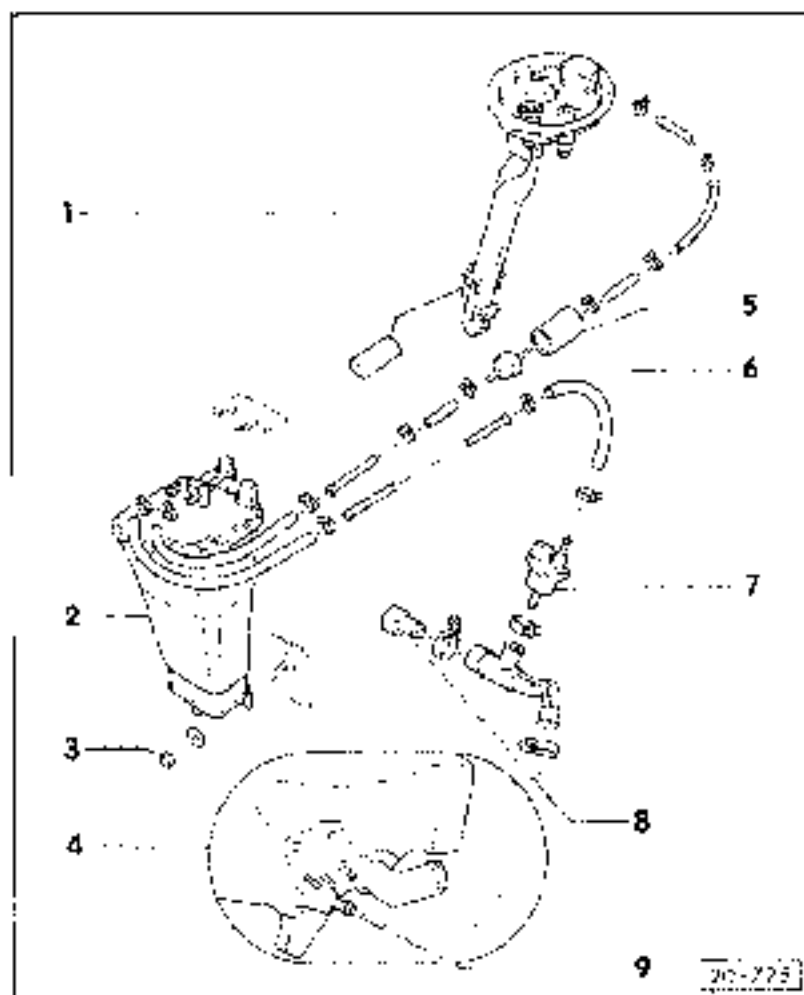
10-73



- If the ignition switchings are not done and correct open circuits using learners flow diagram.
- ➔ Connect three test lamp leads 14, 15 to contacts 46 and 47.
- The test lamp will be switched on the engine test lamp should illuminate and become brightly brighter as soon as the engine starts to revolve.
- If the engine test lamp does not become brightly brighter the wiring is as follows:
 - Contact test one 46, 47, 48 to the starting motor unit harness using adapter cap 152P/5 - see resist cycle 31. (Control unit connector plug disconnected).



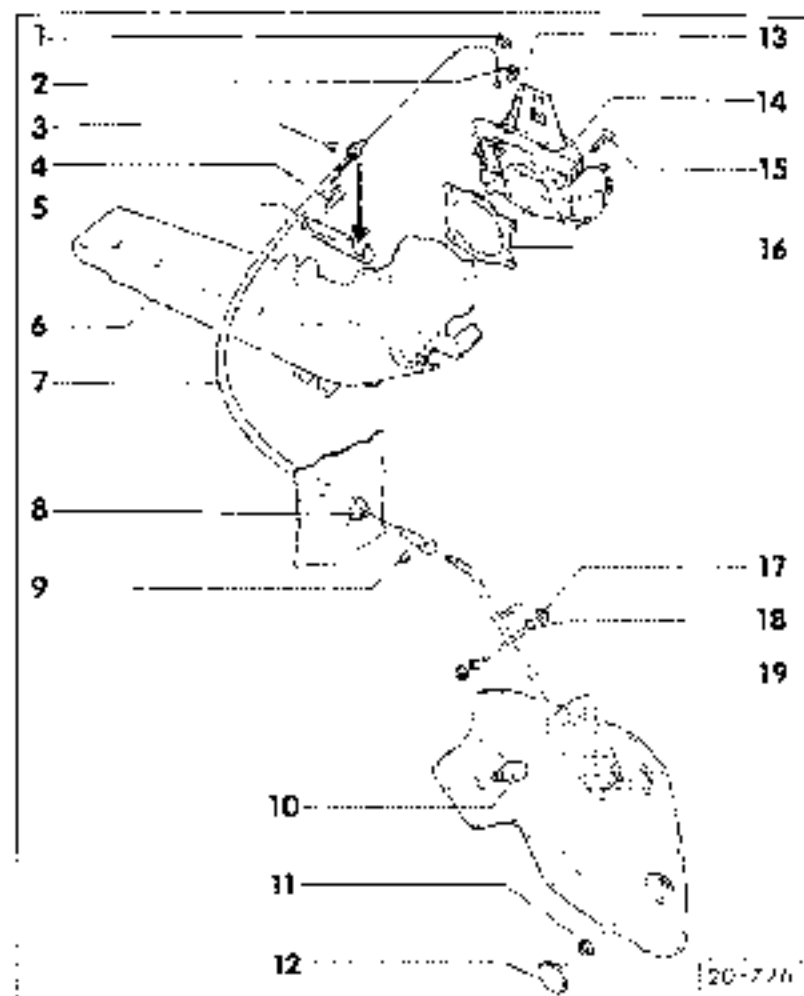
- ➔ Check connecting cable between contact 47 of relay location 10 and test box socket 3 for continuity and if necessary replace open circuit between contacts 47 of relay socket and contact 3 of control unit connector plug.
- If there is no open circuit replace control unit.
- Test to start 10, 14 and 15.



20-225

- 1- Motor housing
- 2- Motor
- 3- Screw
- 4- Motor base
- 5- Motor shaft
- 6- Motor pulley
- 7- Motor belt
- 8- Motor pulley
- 9- Motor pulley

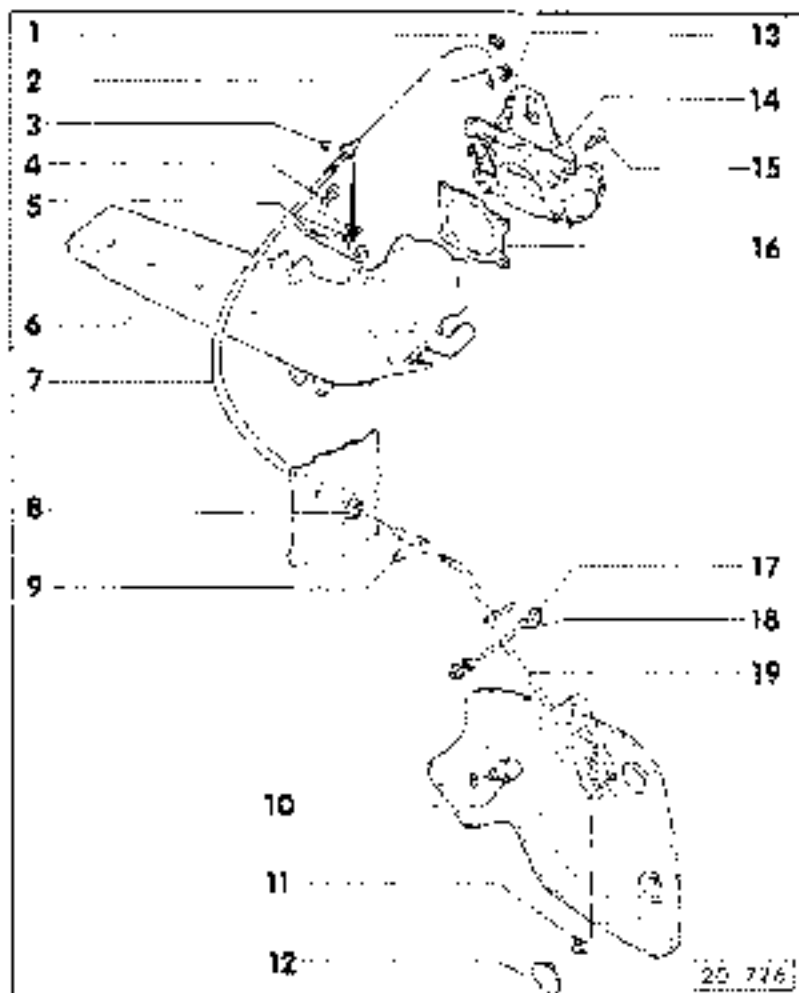
- 10- Motor housing
- 11- Motor housing
- 12- Motor housing
- 13- Motor housing
- 14- Motor housing
- 15- Motor housing
- 16- Motor housing
- 17- Motor housing
- 18- Motor housing
- 19- Motor housing



20-225

- 1- Motor housing
- 2- Motor housing
- 3- Motor housing
- 4- Motor housing
- 5- Motor housing
- 6- Motor housing
- 7- Motor housing
- 8- Motor housing
- 9- Motor housing
- 10- Motor housing
- 11- Motor housing
- 12- Motor housing
- 13- Motor housing
- 14- Motor housing
- 15- Motor housing
- 16- Motor housing
- 17- Motor housing
- 18- Motor housing
- 19- Motor housing

- 20- Motor housing
- 21- Motor housing
- 22- Motor housing
- 23- Motor housing
- 24- Motor housing
- 25- Motor housing
- 26- Motor housing
- 27- Motor housing
- 28- Motor housing
- 29- Motor housing



- 1. Bolt
- 2. Cap
- 3. Bolt
- 4. Bolt
- 5. Bolt
- 6. Bolt
- 7. Bolt
- 8. Bolt
- 9. Bolt
- 10. Bolt
- 11. Bolt
- 12. Bolt
- 13. Bolt
- 14. Bolt
- 15. Bolt
- 16. Bolt
- 17. Bolt
- 18. Bolt
- 19. Bolt

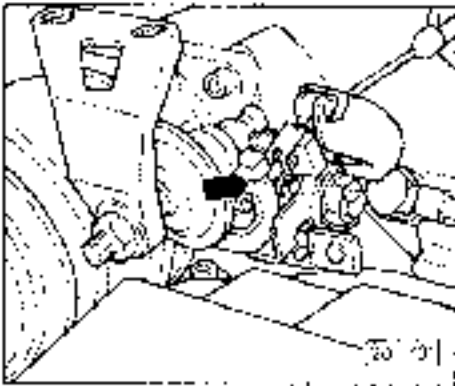
29 776

29 776

The turbine nozzle is made of steel and should be inspected for any cracks or surface defects before use.

Use a torque wrench to tighten the nozzle vanes to the specified torque values and angles.

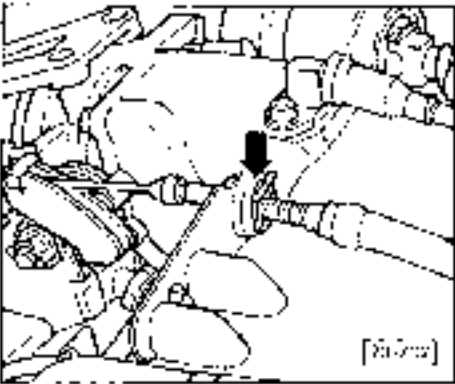
Use a torque wrench to tighten the nozzle throat to the specified torque values and angles.



20-71
 The throttle cable is fixed to the accelerator pedal and the carburetor. The long female adjustment end of the throttle cable should be set 1/4" (6.35 mm) from the carburetor.

1. Fully depress the accelerator pedal.

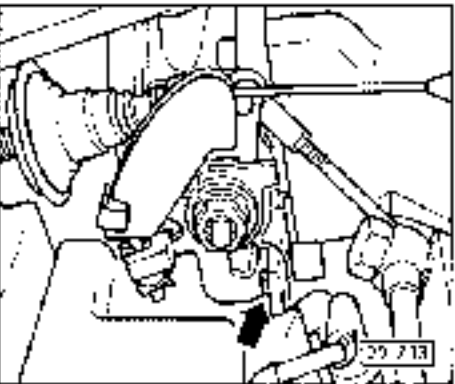
- 2. Pull back throttle cable adjustment end of the throttle cable 1/4" (6.35 mm) to rest against the full lead stop.



- 3. Use carburetor adjustment to adjust the clip.

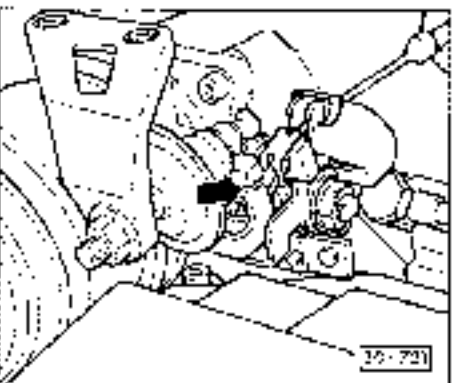
For more information see [Chapter 10](#).

20-73



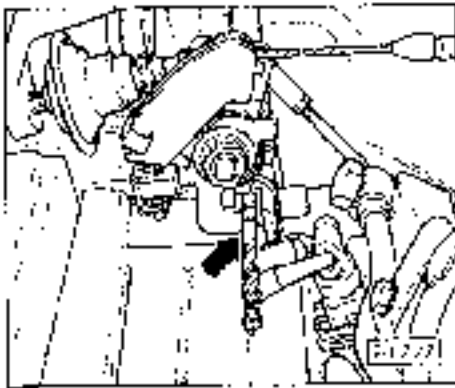
- 4. Check throttle cable adjustment using procedure.
- 5. Adjust throttle cable adjustment using procedure.
- 6. Test throttle cable by hand, ensuring fulling stop.

20-74



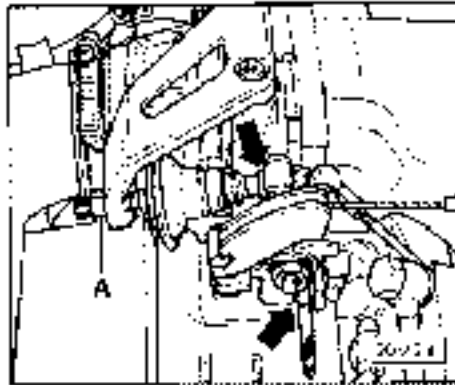
- 7. Fully depress accelerator pedal.
- 8. The throttle cable should rest against the full lead stop.

20-75

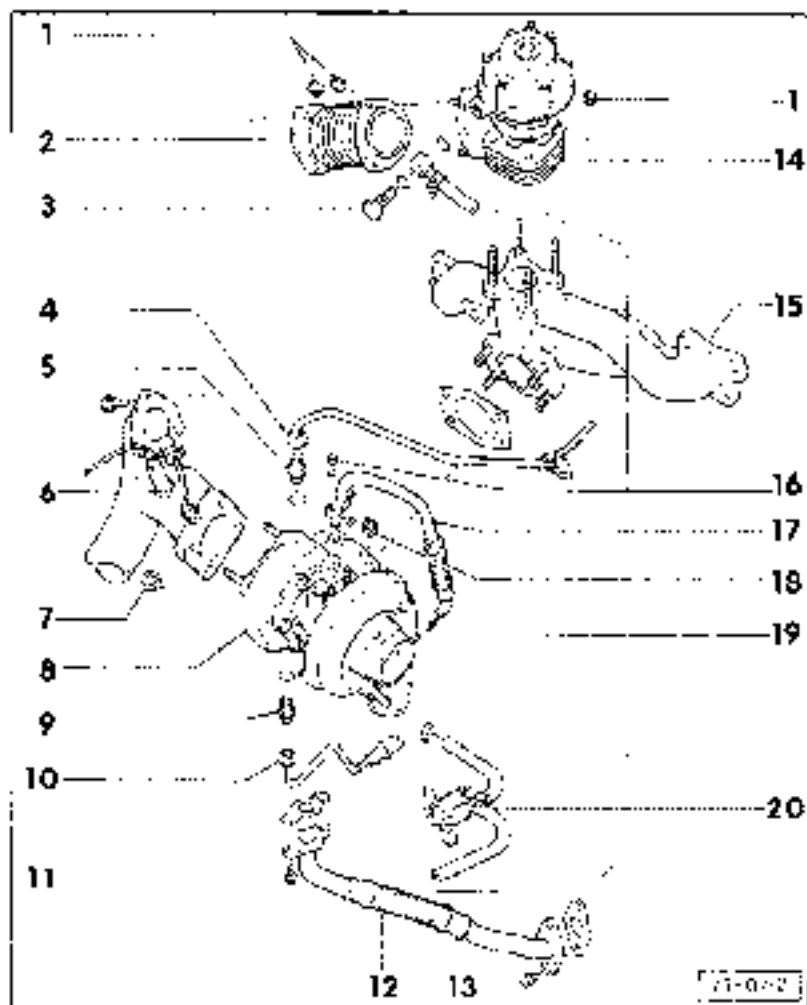


COUPLER AND REVERSE THROTTLE LINK

- Open throttle cable.
- Start a pull on cable with controls; between 2700 and throttle cable cover (see arrow).



- The throttle cable should just start moving and the throttle lever puller. If this is not the case check that the 1/2" dia and rotate throttle cable and that no longer exceeds 1/6" (1mm).
- Re-adjust throttle cable.



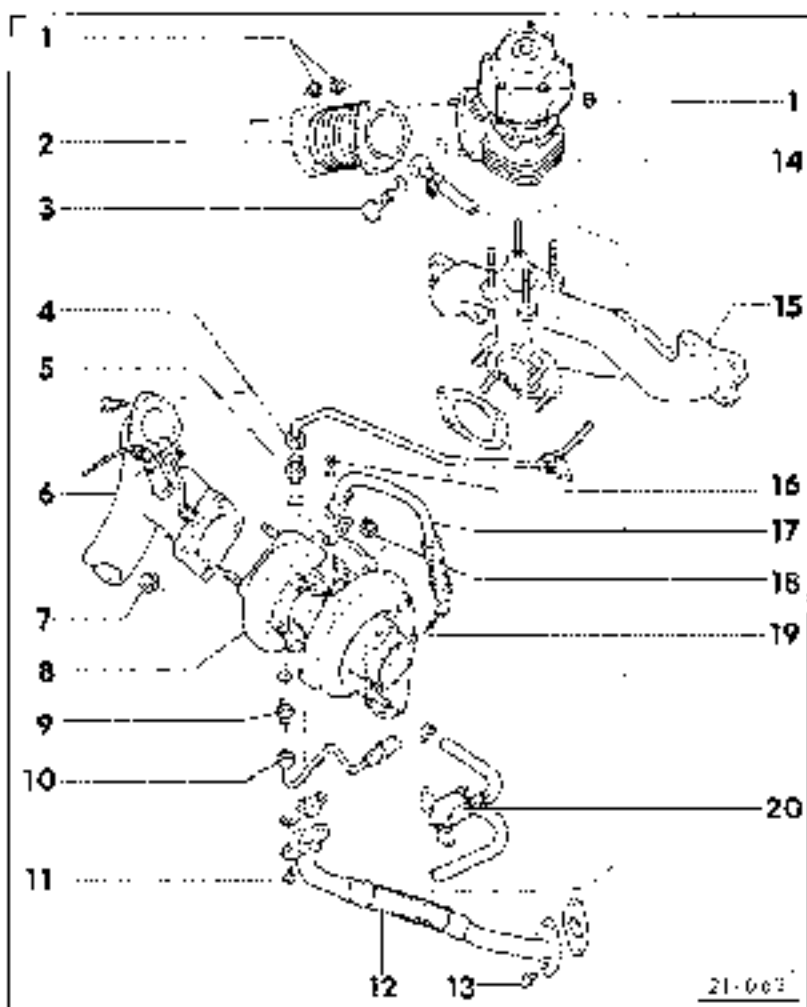
INSTALLING AND PRE-ALIGNING TURBOCHARGER

GENERAL:

Notes:

Always remove tools and jacks.

- 1- 25 lb
- 2- Recommended oil
 - The oil in the turbocharger oiling system should be replaced with a petroleum oil, 30 weight, towards the top of the list.
- 3- Exhaust pipe clamp
- 4- Exhaust pipe clamp
- 5- Exhaust pipe clamp
- 6- Exhaust pipe clamp
- 7- 30 lb
- 8- Turboswinger
 - Detailing - page 20-10
 - Removing and Installing - page 20-4
- 9- Exhaust pipe clamp
- 10- Exhaust pipe clamp
- 11- 20 lb
- 12- Oil separator
- 13- 20 lb

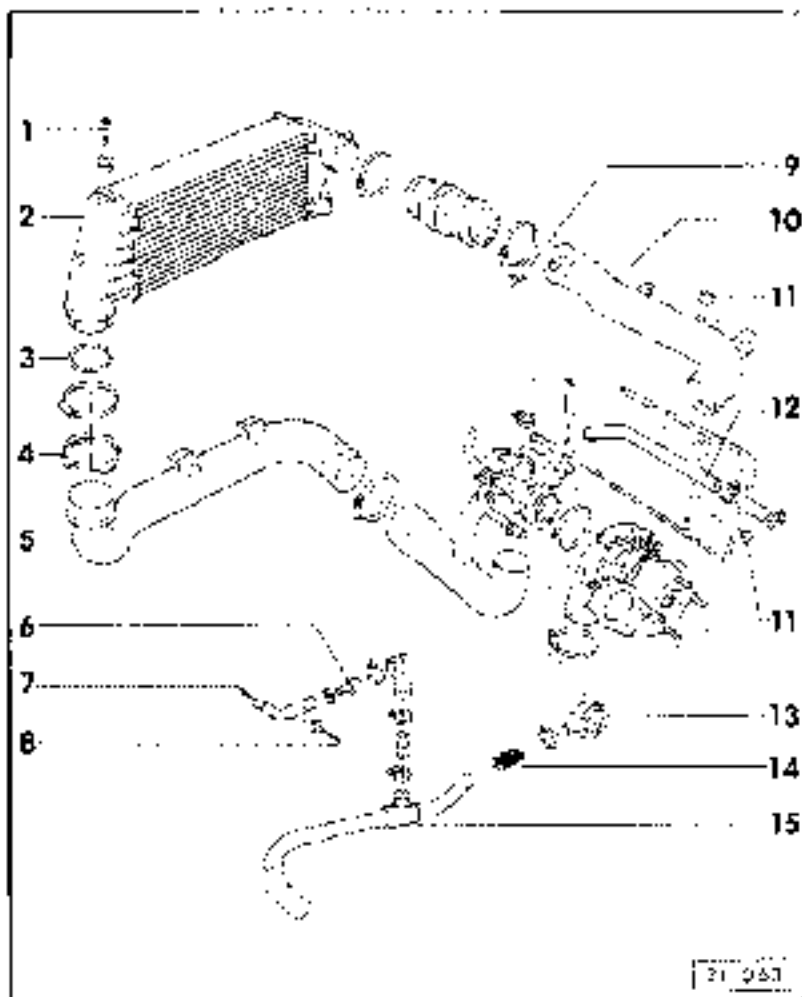


- 14- Exhaust pipe clamp
 - Detailing - page 20-10

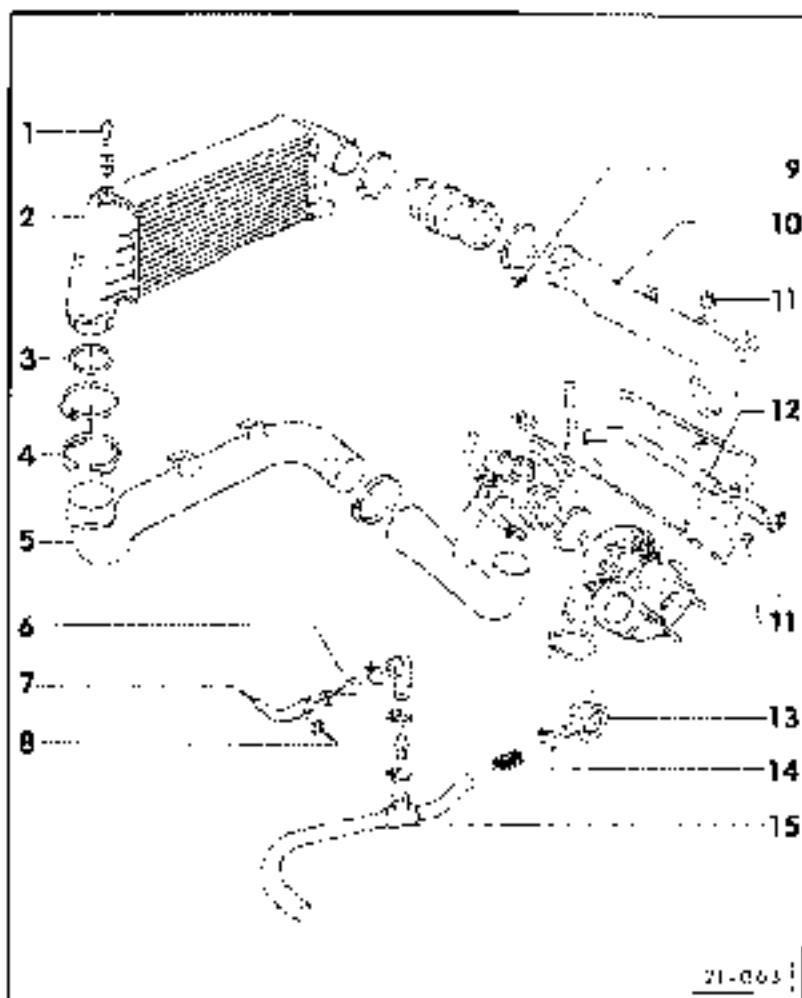
- 15- Exhaust pipe clamp
- 16- 15 lb
- 17- 10 lb
- 18- 50 lb
- 19- Exhaust pipe clamp
- 20- Exhaust pipe clamp
 - Detailing - page 20-10



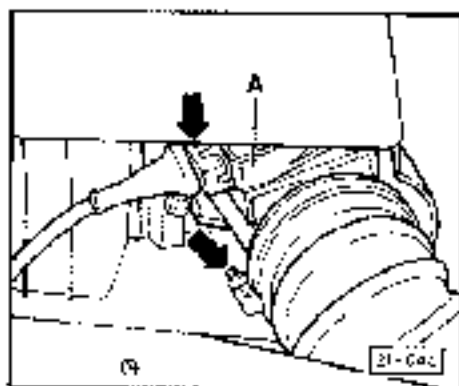
REMOVING AND INSTALLING CHARGE AIR COOLER
 21-0661 (REV. 11/06) (2004-01)
 21-0661-0000



- 1- Charge air cooler
- 2- Bracket
- 3- Nut
- 4- Nut
- 5- Nut
- 6- Washer
- 7- Washer
- 8- Hose
- 9- Pressure regulator valve
- 10- Pressure relief valve
- 11- Transmission pulley
- 12- Preheated ventilation pipe
- 13- Pressure regulator valve
- 14- Flange
- 15- Preheated ventilation hose



- 1- Charge air cooler
- 2- Bracket
- 3- Nut
- 4- Nut
- 5- Nut
- 6- Washer
- 7- Washer
- 8- Hose
- 9- Pressure regulator valve
- 10- Pressure relief valve
- 11- Transmission pulley
- 12- Preheated ventilation pipe
- 13- Pressure regulator valve
- 14- Flange
- 15- Preheated ventilation hose



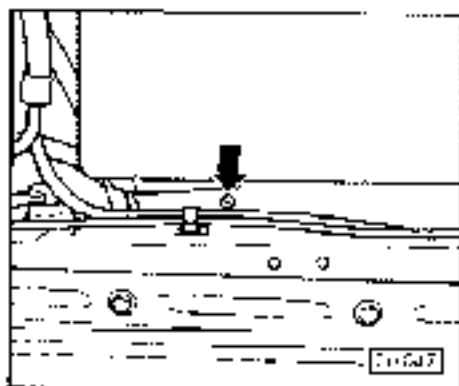
REMOVING AND INSTALLING AIR FILTER COVER

Note
Always release stress and/or safety cables.

- Disconnect battery.

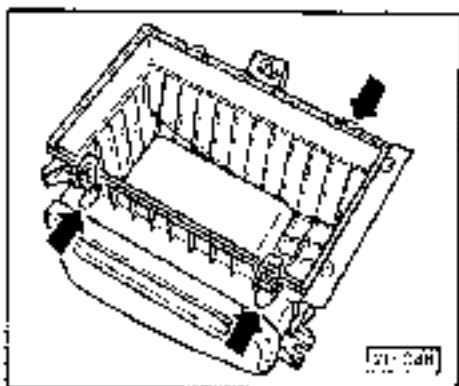
Removing air filter cover

- ➔ Pull off connector from hot wires and voltage meter.
- Release hose clips.
- Pull off nut, from hot wire and voltage meter.

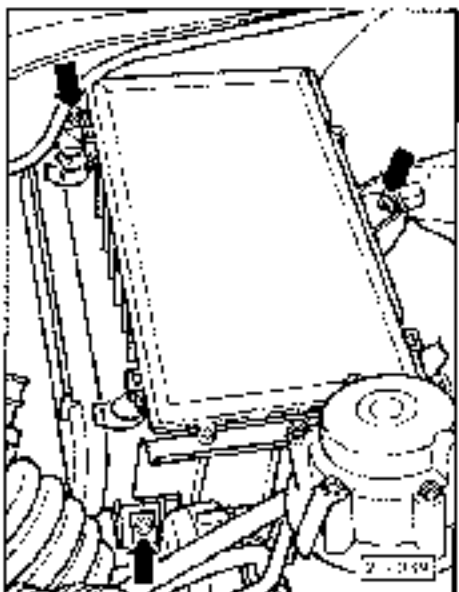


- ➔ Disconnect lead-in wires from securing cables.

114

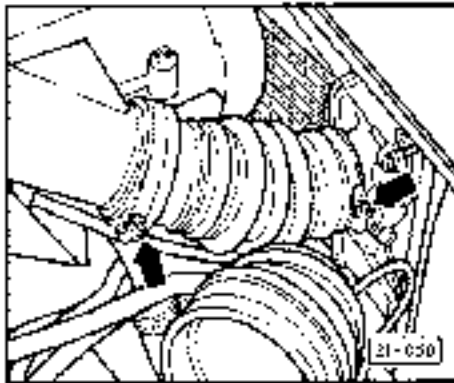


- ➔ Release spring of the anchor, and place it into the hole in the housing.
- Remove wire from upper section from engine compartment.

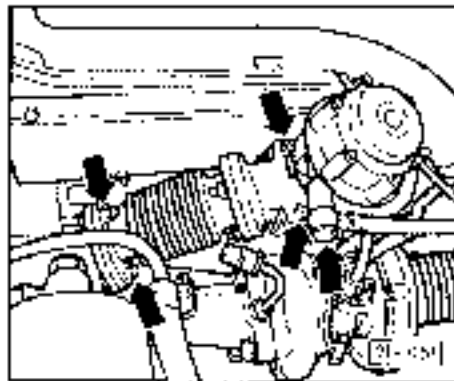


- ➔ Remove air filter lower section.

115



- Remove hose from the upper charge air cooler and induction filter.



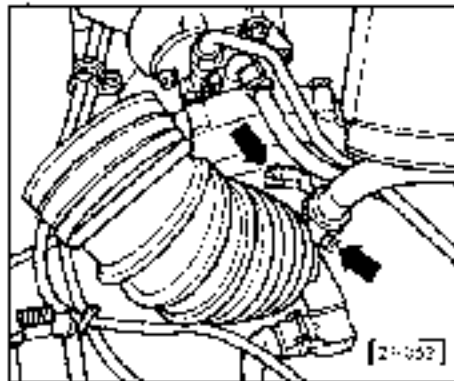
- Rotate wastegate
to prevent exhaust flow from escaping.

Notes:

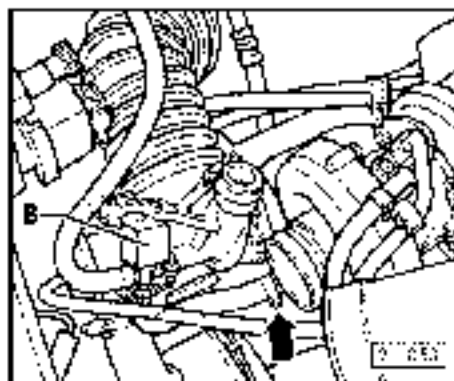
Keep hot, a little clean and safe.

- Use a suggested size for exhaust pipe.
- Do not waste gate in a closed position.

21-7



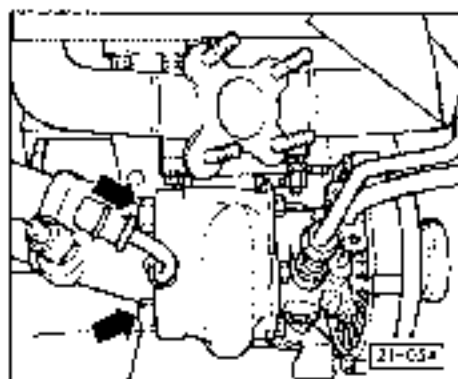
- Remove hose between hot water and pressure meter and turbo-charger from under case. 800 cfm pipe and turbocharger by connecting the two to the inlet (pressure).



- Add a connecting hose between turbocharger and boost pressure limiting or boost valve use high turbocharger.

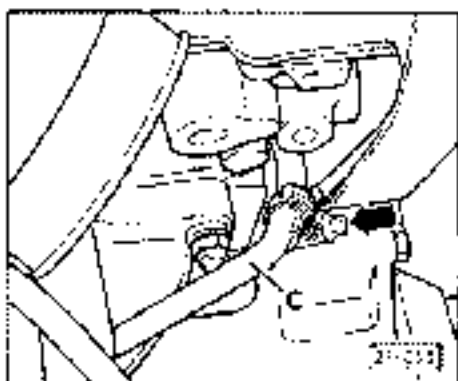


21-8



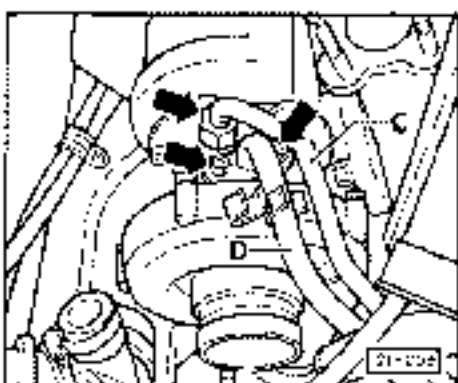
→ - Discontinue hose from turbochargers.

CAUTION
 Do not use tools capable of crushing or marring parts.



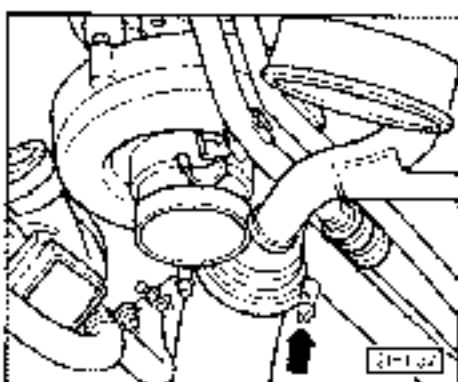
→ - In these positions, the cooling flow pipe to the turbocharger is:

21-07



→ - Disconnect cooling flow pipe (C) at turbochargers.

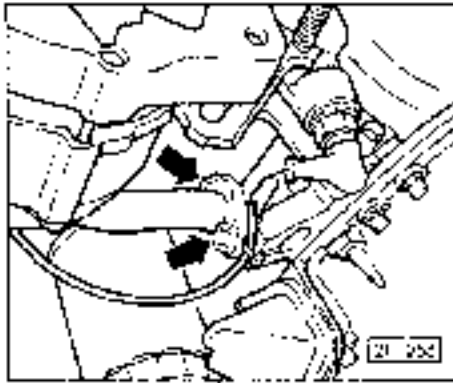
- Disconnect it at pipe (D) at turbochargers.



→ - Disconnect hose between turbochargers and merge air cooler at turbochargers.



21-10

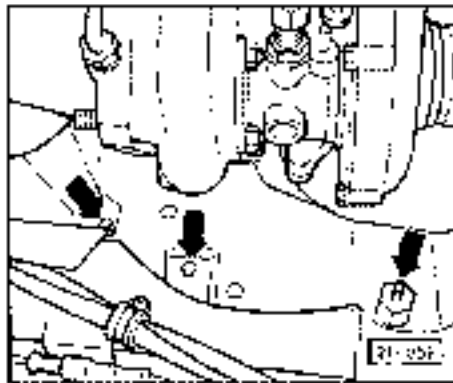


→ Turbochargers: If return line is a wastegate.

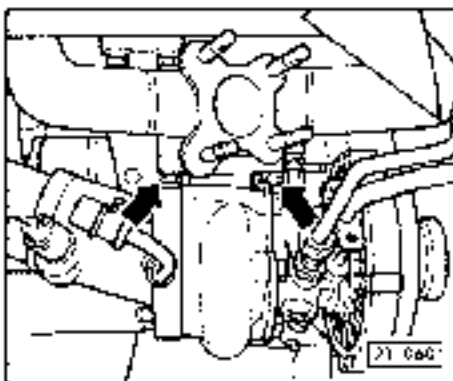
Note:
The correct return line should be changed immediately after disassembly.

- Disconnect constant return line from turbocharger

21-27



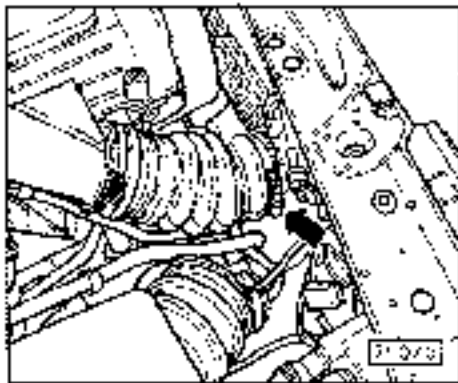
→ Remove heat shield located on right-hand side, refer to 21-25B.



→ Test turbochargers in fresh exhaust manifold and remove
→ To test all the turbochargers reverse run in sequence.

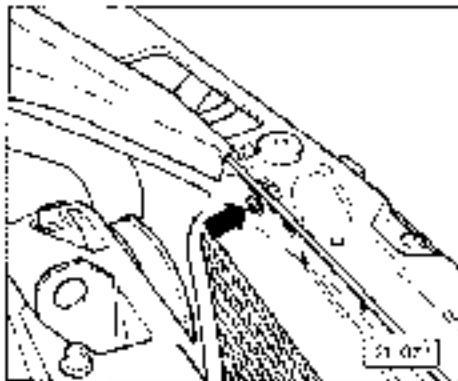


21-27



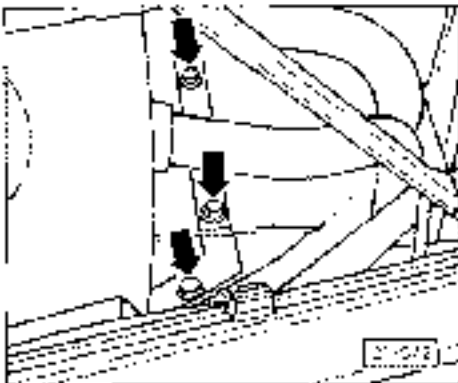
740784 AN, INSTALLING AND REMOVING

- remove and install inlet air filter - Repair Group 01.
- remove and install insulator grille - Repair Group 02.
- fasten the pipe between shipping air duct and inspection pipe from front side.

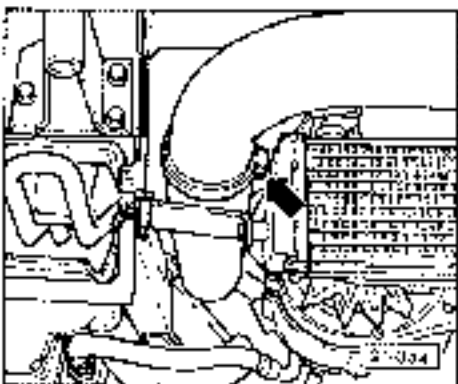


- insert side air duct into front panel.

11-15



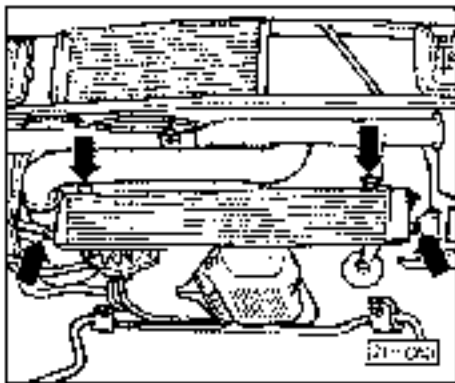
- insert side air duct into cabinet air duct.



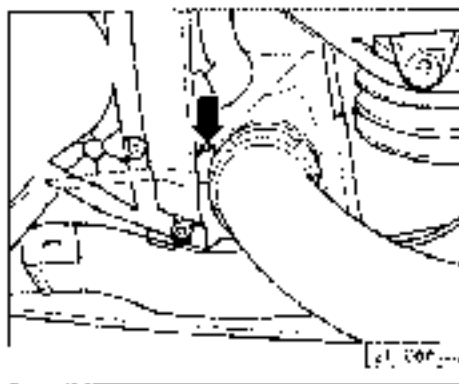
- detach hose between turbocharger and duct with flap level pipe.

11-16

11-15

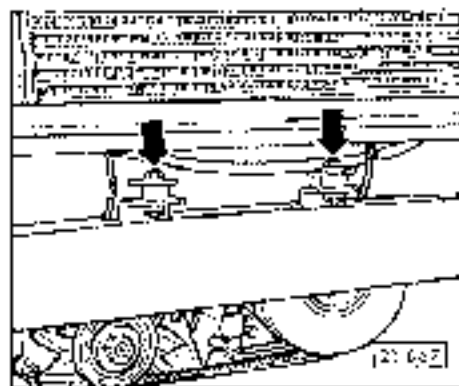


→ Install air filter (1,01050).

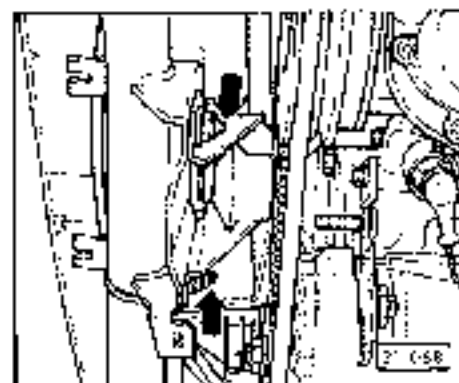


→ Before using hose, check charge air cooler by refueling nozzle and increase pressure slightly.

21-12

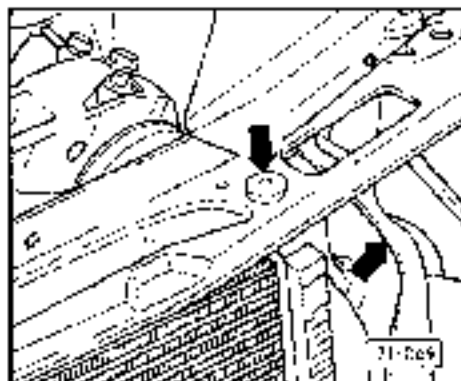


→ Before using fuel system, check with fueling lance for correct position and with this device to check that charge air cooler.

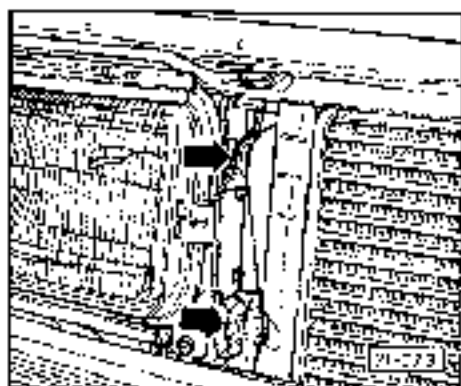


→ Limit bracket plate from sprayer bar.

21-13

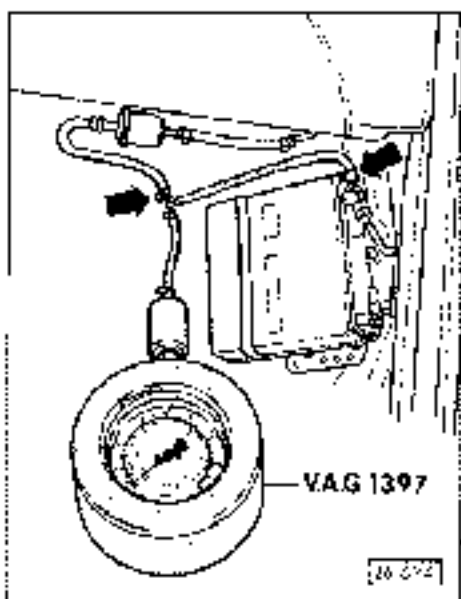


- ➔ - Turbocharger with cooling fan (not shown) from side of duct to the left.



- ➔ - Both ducts are secure to the left out of the turbocharger.
- Remove charge air cooler towards left in entire duct towards in install things and use of several removed segments.

1111



průběhu testů provozní podmínky

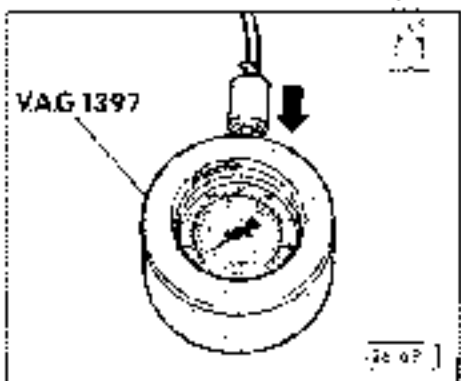
- Engine oil temperature 20 deg. C or +
- No leaking (visual control only).

- Remove electronic control unit lever (fixed in position) in turn, bearing (figure 1).
- Remove vacuum hose from electronic control unit.

- ➔ - Connect turbocharger test instrument VAG 1397 between vacuum hose and electronic control unit.

Note:

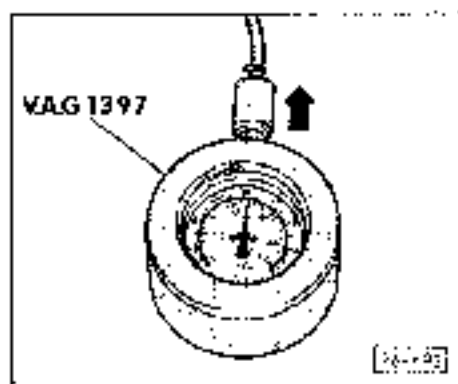
When checking the boost pressure the vehicle should be taken for a fast run over a 900 meters of an level road. No starting lights apply. The boost pressure is measured while the vehicle is being driven. For safety reasons a second person should be present to take the readings from the turbocharger test instrument.



- ➔ - Open turbocharger test instrument valve.

- Fully depress accelerator in fourth gear when the needle reads 130 kPa (0.95 bar).

1111



- Positive indication.

- Boost test (3000rpm) as per wheel speed sensor - 100 rpm.

Expected readings:

Bar	Altitude
0.18 - 0.65	Sea level
0.65 - 0.61	500
0.56 - 0.60	1000
0.60 - 0.67	1000
0.57 - 1.03	2000

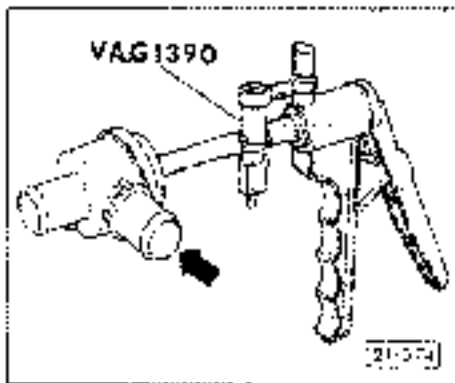
- If the readings are obtained, no need to check for the Electronic fuel injection and ignition system or intergrate fault memory.
 - Refer to Group 18.
- If the boost readings are not obtained, check boost pressure (including solenoid) by control manual (if not control) diagnosis.
 - Refer to group 18 or replace valve and check.
- If the boost readings are not obtained, check boost valve - page 20-11.

21-10

- If the specified reading is not obtained, replace wastegate and check.

If after a repeated boost pressure check the appropriate reading is still not obtained, the turbocharger should be replaced.



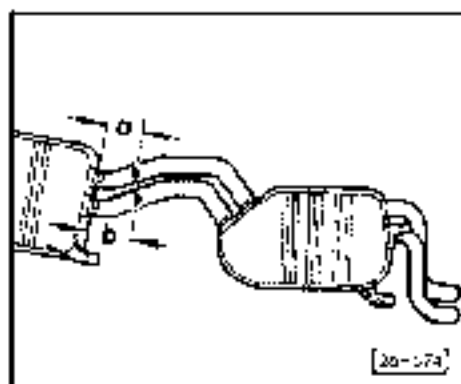


ENGINE EXHAUST BYPASS VALVE (EVB) VALVE BODY VAG1390

The bypass valve (VAG1390) fitted to front of the turbocharger, is used to the exhaust gases that following the VAG1390, must ensure there is flow in the bypass valve to prevent back pressure when accelerating again.

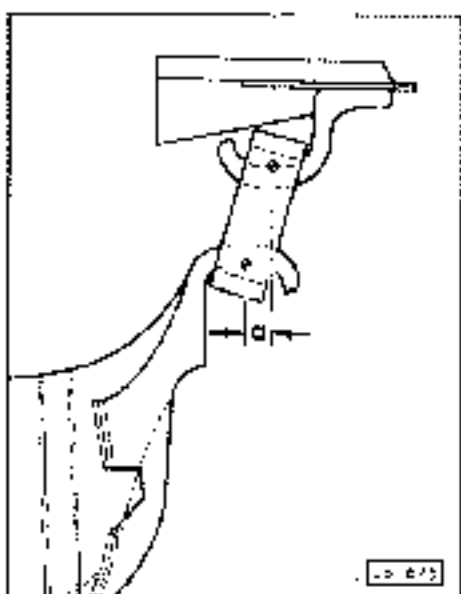
If the engine exhaust is slow or stops then when during load means the bypass valve should be checked.

- For various turbochargers to ensure bypass valve:
 - Press down on push
 - The bypass valve must open (arrow)
 - Press valve up venting valve after 30 seconds approx.
 - The bypass valve should close (arrow)
- In the exhaust bypass valve must open or close or if the valve is leaking, check valve.
 - Ensure bypass valve operation following flow of gas.



MINIMUM SPRAY GUN DISTANCE TO SUBSTRATE

- ➔ A spraying point is provided to facilitate the adjustment of spray gun air distances.
- Minimum = 124.0 mm
- Maximum = 140.0 mm

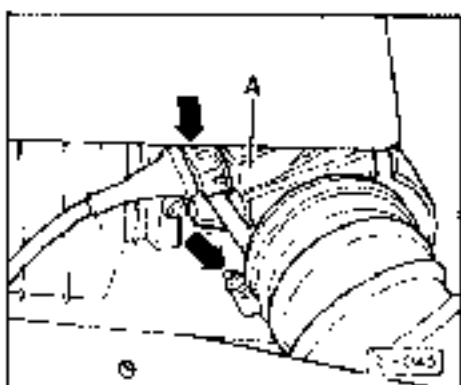


MINIMUM SPRAY GUN DISTANCE TO SUBSTRATE

Before spraying, the product system built ensure sufficient distance exists between body and circuit system.

- ➔ Minimum spray gun distance is provided by the following points:
 - Distance between spray system and transmission to the substrate area.
 - Distance between conduct system and spray gun connection.
- ➔ Minimum distance between spray gun and substrate.

➔ Minimum distance between spray gun and substrate.



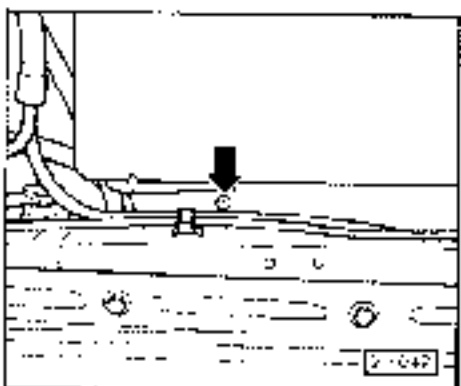
SPRAYING AND INSTALLING SUBSTRATE

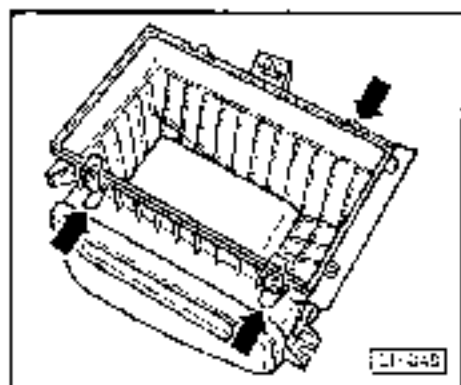
Note:
Always maintain gas flow and solid-feeding rates.

➔ Distance between spray gun and substrate.

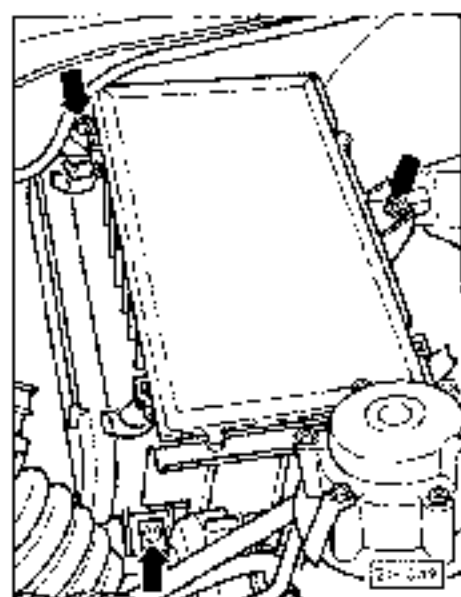
➔ Distance between spray gun and substrate.

- ➔ Distance between spray gun and substrate.
- ➔ Distance between spray gun and substrate.
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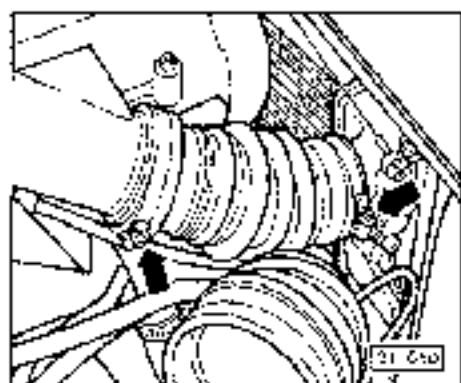




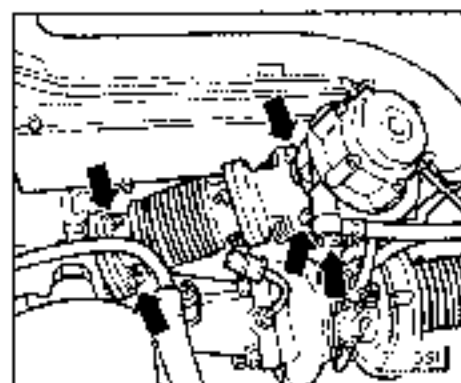
- Inspect and clean the top surface from dust or debris.
- Keep the top surface free of dust from any air ducts or filters.



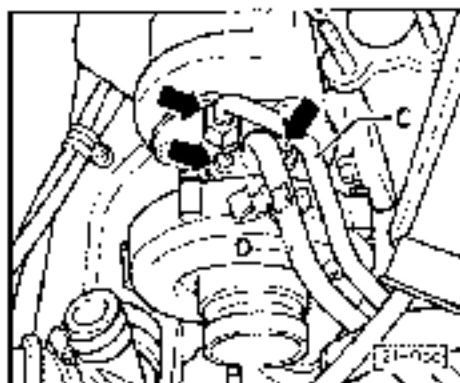
- Inspect and clean the bottom surface.



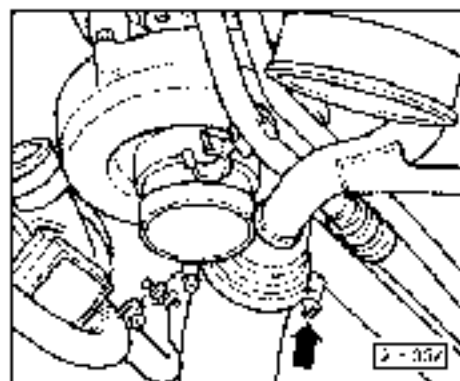
- Remove and clean the hoses with the charge air cooler and intake air pipes.



- Inspect and clean the intake water pipes.
- Inspect and clean the intake air pipes.
- Inspect and clean the intake air pipes.
- Inspect and clean the intake air pipes.



- Remove patient from base of front endotracheal tube and allow flow to return to normal.



- Remove tube between tracheostomy and change cuff around the tracheostomy.

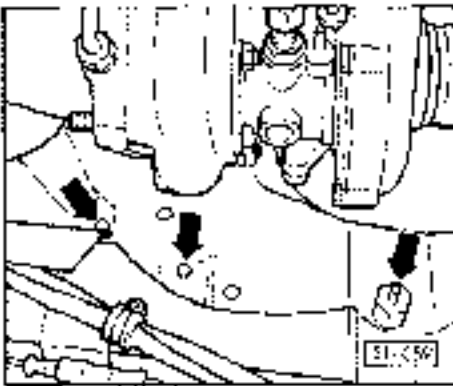


- Place tracheostomy in repair site from oral cavity.

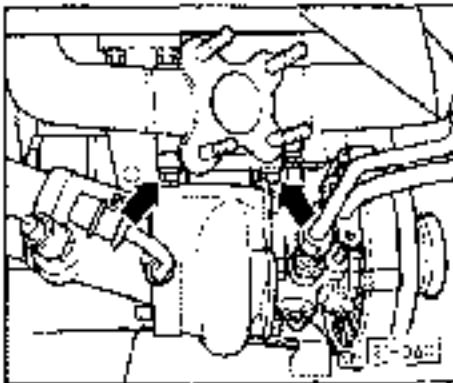
Warning: A patient's head should be stopped immediately after dislodging.

- Do not attempt to get the front endotracheal tube.

21-052

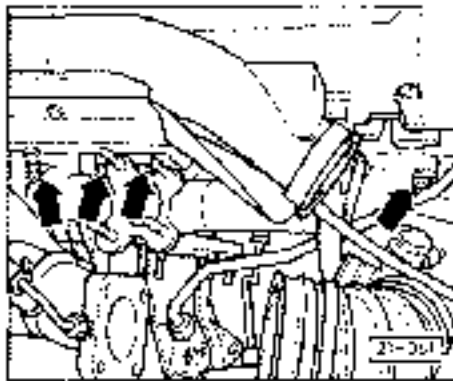


→ - Remove heat shields and secure system to side under hood turbochargers.



→ - Connect turbocharger from exhaust manifold and manifold.

38-1



→ - Unbolt and remove exhaust manifold.
 - Remove exhaust manifold gaskets from cylinder heads.

To install exhaust manifold reverse removal procedure.

Notes:

The gasket between exhaust manifold and cylinder head should be fitted in such a way that the gasket faces to face the exhaust manifold.

38-12

11. Section 20083, N.J.A.C. 17:27

Leave location in the default system position of the Lambda probe on table.

- starting position
- end of the run
- about 100mm
- about 100mm
- with progression

refine fault finding, as carried out on the main system, equal group 20, on ignition system, Repair Group 20

no reaction system should be provided for tools as follows:

- Engine should be fully on ground
- Engine should be tested on
- If it is not tested for left into exhaust system (ignition and fuel) with a plug.
- New the system (oil) with a plug.
- Set up pressed air system operating pressure to 1 bar @ 2000.
- (oil) on jet
- Oil, by other hand joints.

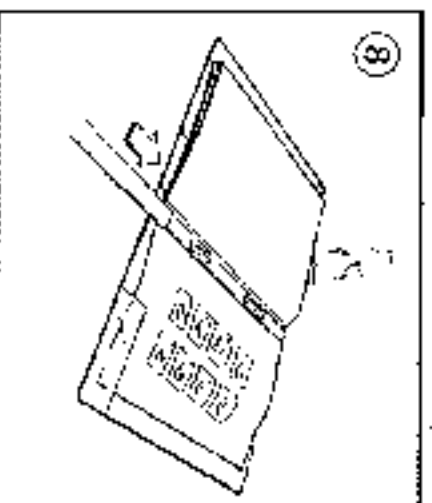
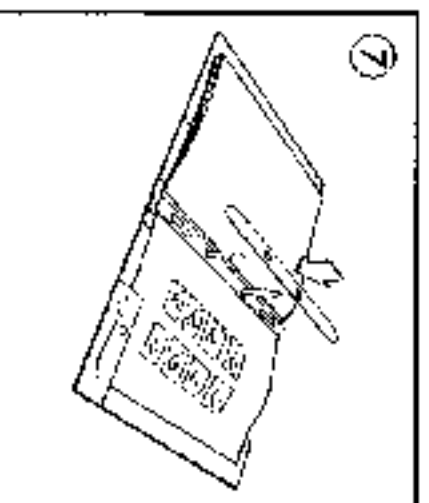
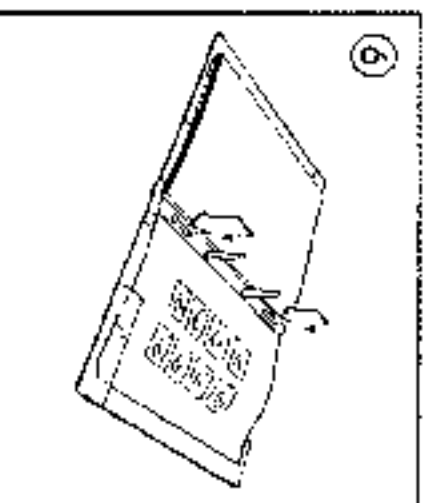
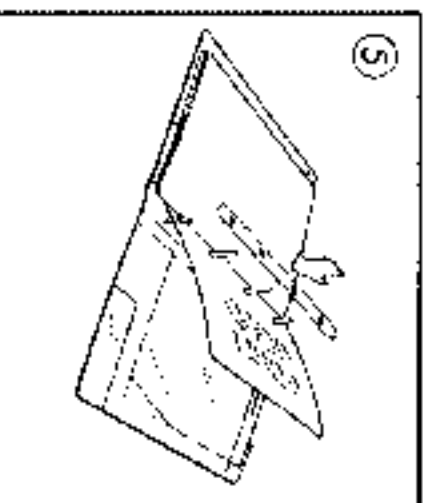
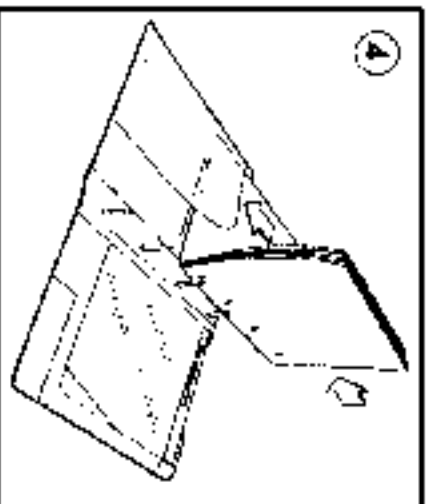
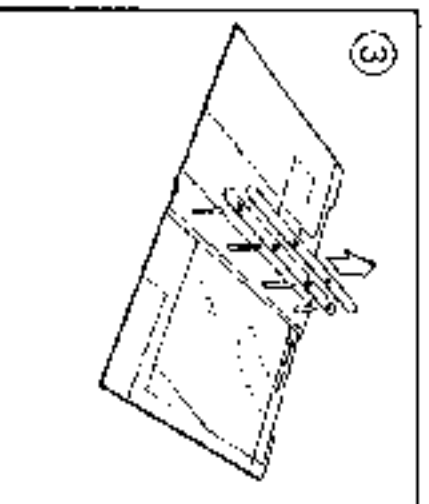
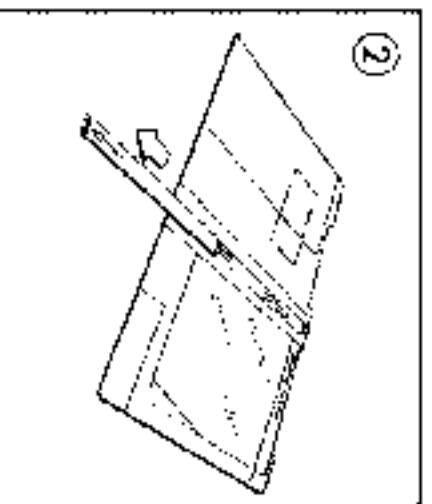
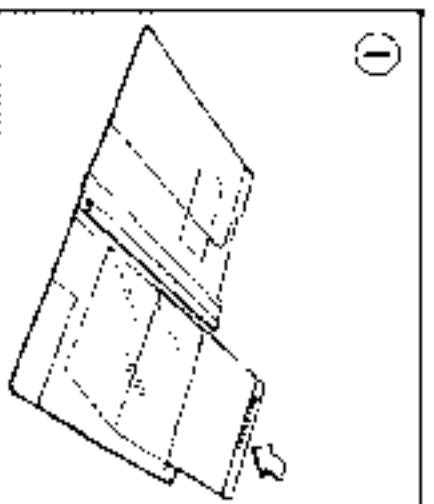
18.13

- Check manifold and in intake air development.

Spray carburetor, carburetor, (100% flow) from carburetor, the carburetor 100, with 100% carburetor spray and look for white.

- Repair Any leaks found





V.A.G Service.

Workshop Bulletin to Workshop Manual

Audi 100 1983 ▶, Audi 200 1984 ▶

Engine Code letters	3B																			
Booklet	5-cylinder fuel injection engine, (4-valve), mechanics																		Edition 05.89	

Mark Repair Group Index Column 13

with Bulletin No. **2**

Models affected: all vehicles

Subject	Bulletin page	Booklet from page
Flywheel mounting bolts - Different tightening method	-	13-13

From now on the flywheel mounting bolts must be tightened as follows:

30 Nm and then turn another 1/4 turn (90°)

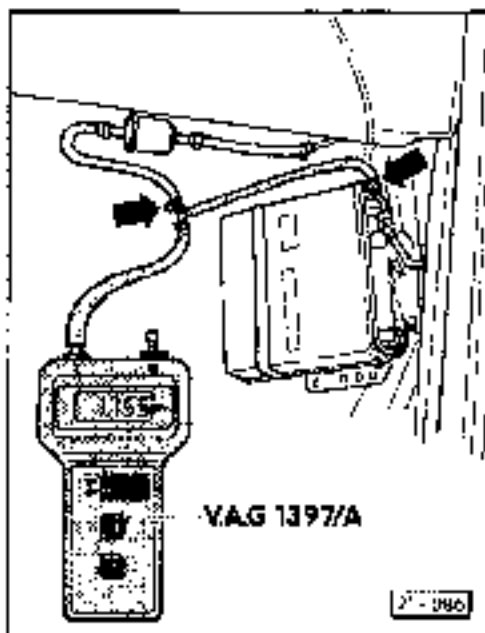
Notes:

- The additional 1/4 turn can also be done in two stages of 45° if it is not possible to turn the bolts through 90° in one movement.
- Always install new bolts, and coat with locking compound before installing.

440/466/-

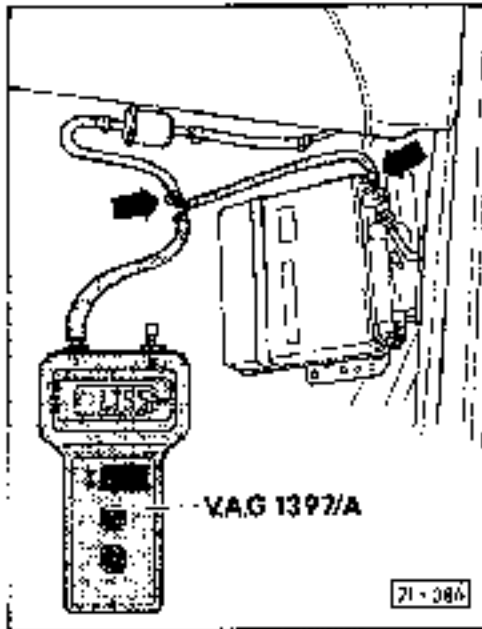
ENGINE TURBOCHARGER AND WASTEGATE

- Engine oil temperature 30° C min.
 - No freezing vacuum connections.
 - Remove Manifold control unit cover or -4- pillar in front passenger footwell.
 - Remove vacuum hose from Manifold control unit.
 - ➔ Connect turbocharger tester V.A.G 1397/A between standardized vacuum hose and No 10000 control unit.
 - Connect plug connector on vacuum hose to connection 1 on turbocharger tester.
 - Set selector switch to position 1 (vacuum pressure range).
- Switch on turbocharger tester.



Notes

- When Memory button H on Turbocharger tester is pressed the last reading is stored until memory button M is pressed again or the tester is switched off.
- A flashing decimal point in the display indicates that a reading has been stored.
- If the battery voltage of the turbocharger tester drops below the permitted limit an arrow appears in the upper left corner of the display.
- Before testing the vehicle should be taken for a fast run over a distance of at least 3 km (no stops at traffic lights, etc.).
- As the boost pressure is tested during driving for safety reasons a second person should be present to operate the turbocharger tester.



• When the flow speed is approx. 60 km/h accel-
erate in fourth gear and observe the rev.
counter.

• At 2,000 rpm press turbo button 4 on turbo-
charger tester

• Specified readings.

Altitude (m)	bar
Sea level to 1,000 m	1.075
1,000 m	1.065
1,500 m	1.055
2,000 m	1.045
2,500 m	1.035

• If the specified reading is obtained but
there is reduced performance below 2,000 rpm,
check for wrong fuel (e.g. less than 95
RON) and check overrun by-pass valve - Repair
Group 21.

If the specified reading is not obtained
interrogate fault memory and carry out final
control element diagnosis - see Workshop
Manual, Intermittent Fuel Injection and Ignition
system. Temporarily replace wastegate and
conduct check.

• If the specified reading is still not obtained
replace turbocharger.

Technical Bulletin to Workshop Manual

Audi 100 1983 ▶, Audi 200 1984 ▶

Engine code	3 B							
Booklet	5-cylinder fuel injection engine (4-valve), mechanics						Edition 05.89	

Enter in Repair Group list

Repair Group 17

Bulletin No. **4**

Affected: All vehicles

Subject

REMOVING AND INSTALLING OIL SUMP

=====

Contents	Bulletin page	Booklet from page
Removing and installing oil sump	1	17-20

AMENDMENT

REMOVING AND INSTALLING OIL PUMP

When installing the oil pump, tighten the #6 screws to 20 Nm first, and then tighten the #6 screws to 10 Nm.