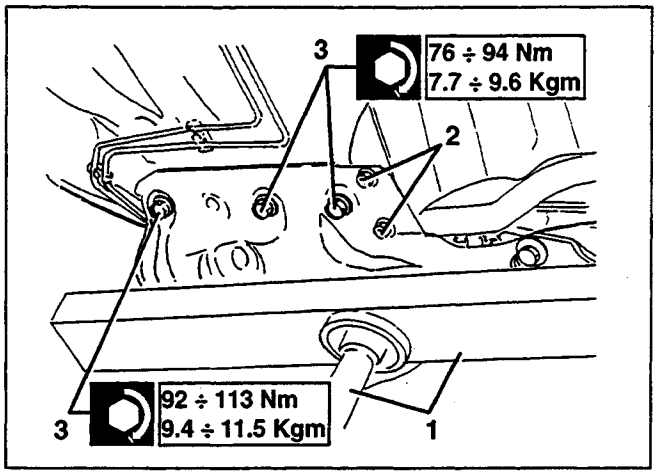
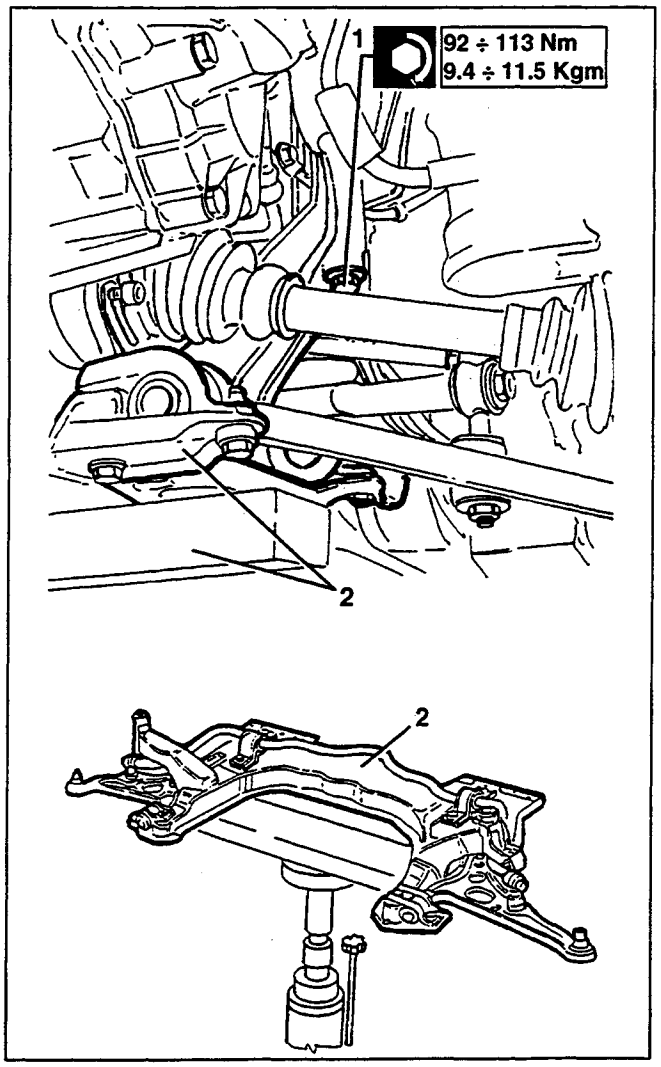
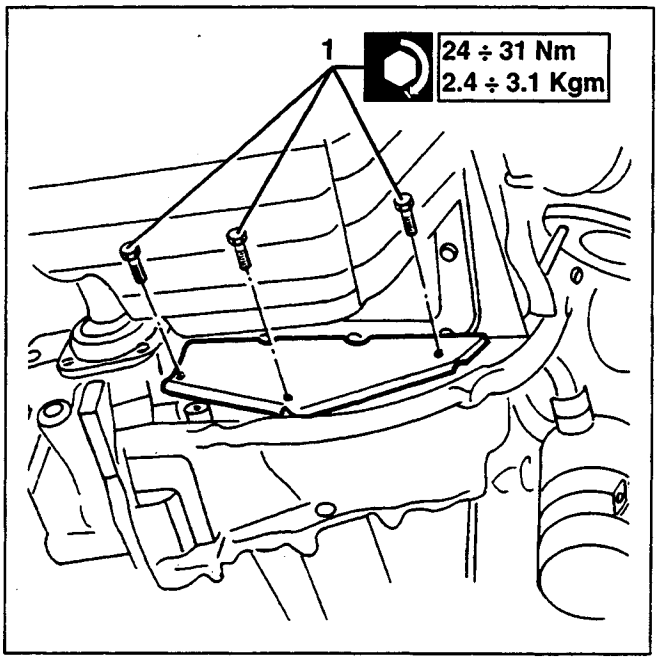
1. Position a hydraulic jack with special support under the crossmember.
2. Slacken the nuts fastening the crossmember to the gearbox controls support.
3. Slacken the screws fastening the crossmember to the body.



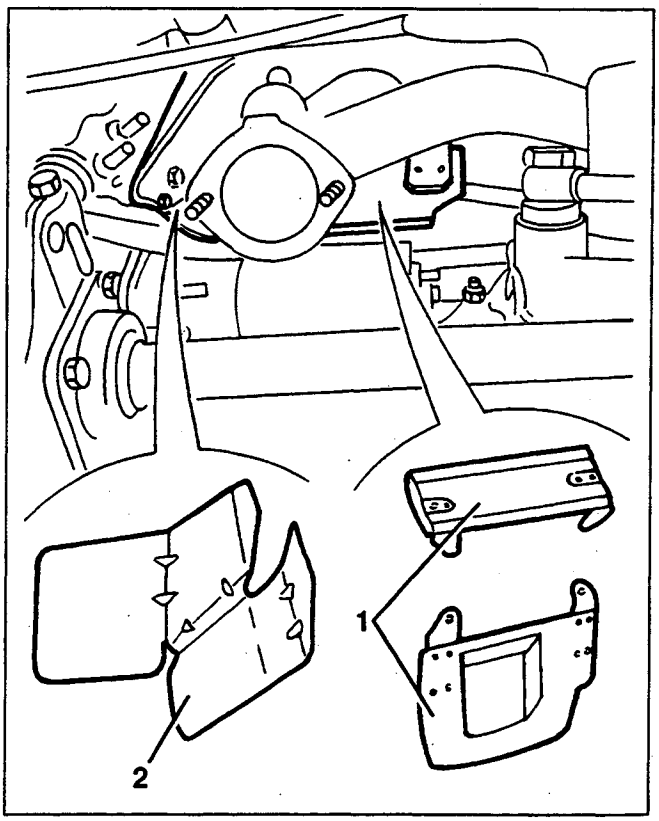
1. Slacken the upper sidemember fastening screw on each side.
2. Slowly lower the hydraulic jack and remove the crossmember complete with wishbones and stabilizer bar.



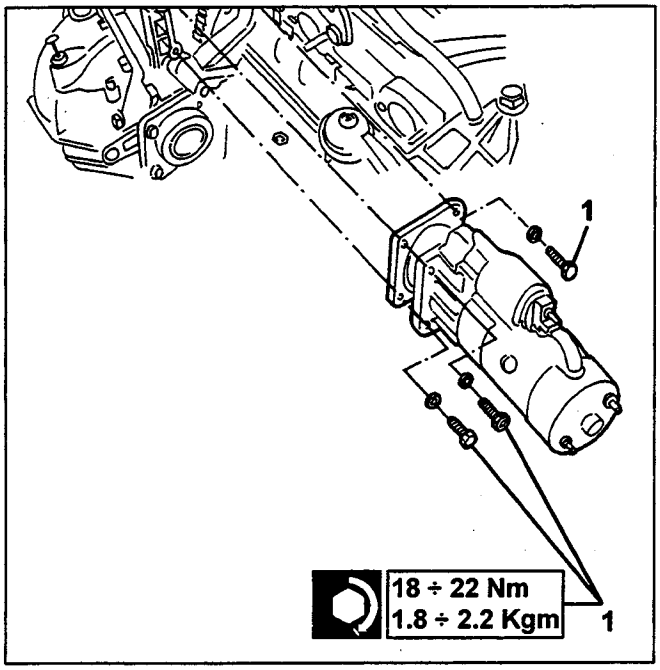
1. Slacken the screws fastening the lower flywheel cover and remove it.



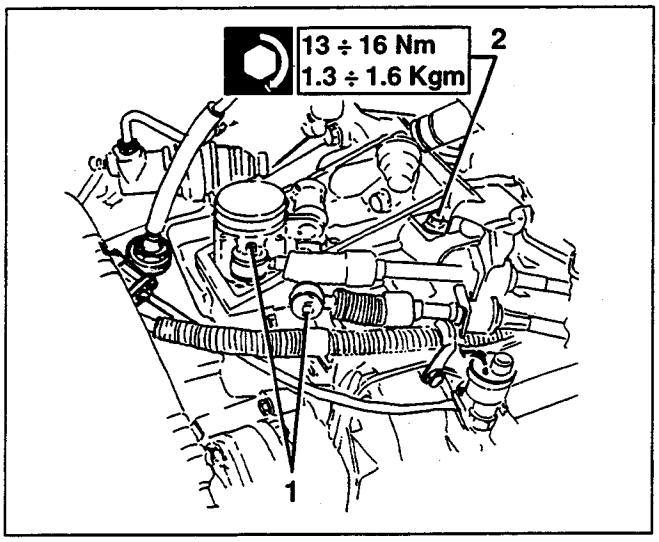
1. Remove the starter motor cover (in two sections)
2. Remove the gearbox control cables cover



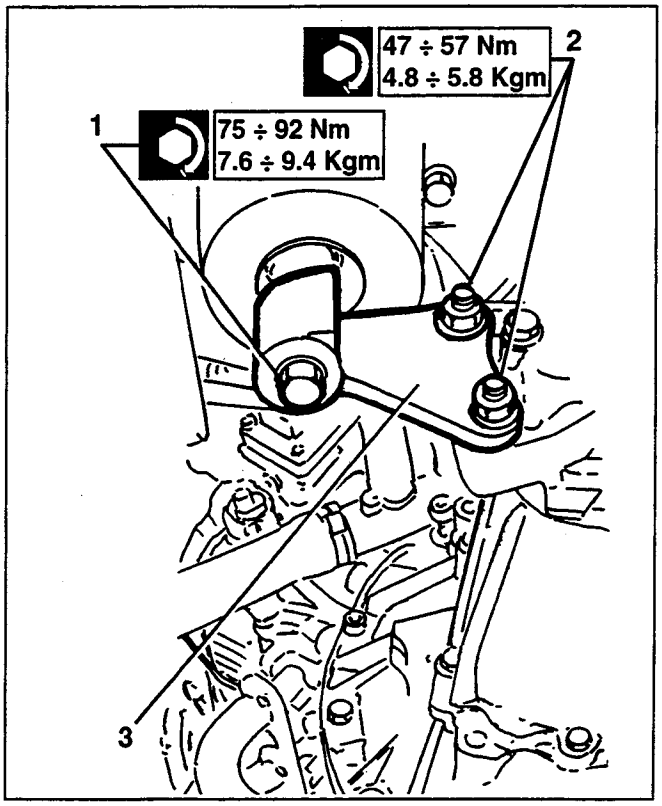
1. Slacken the starter motor fastening screws.



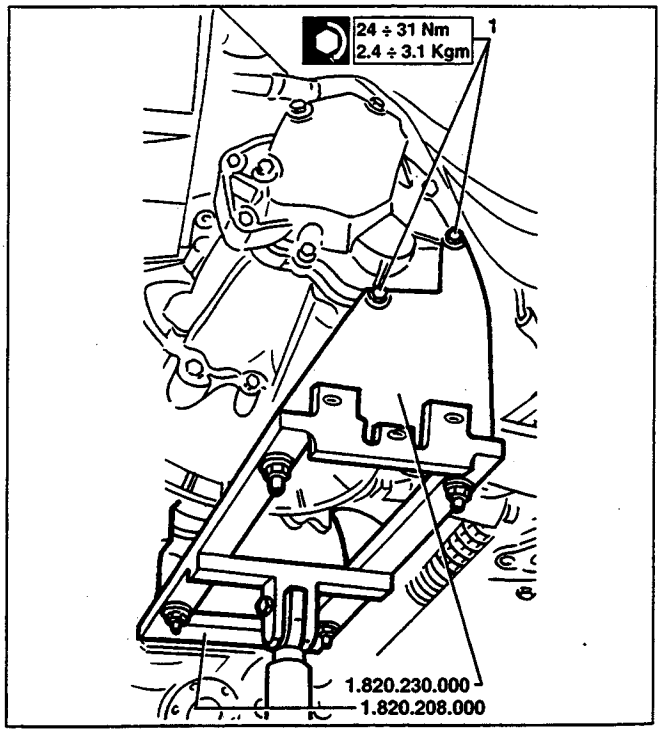
– Working from the top
1. Remove the retainer clamps and withdraw the gearbox control cables.
2. Slacken the upper screw of the gearbox control cables support bracket.



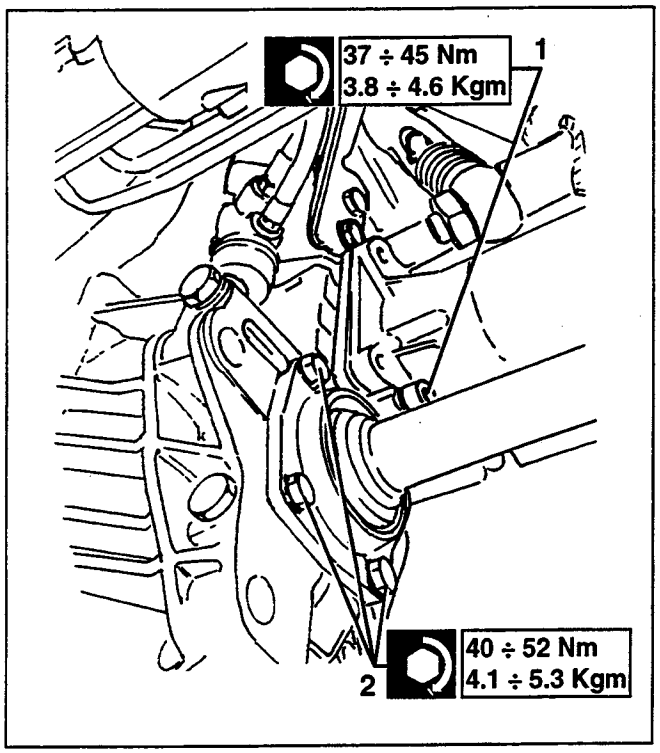
1. Slacken the screw fastening the rear gearbox support.
2. Slacken the nuts fastening the support to the gearbox.
3. Remove the support.



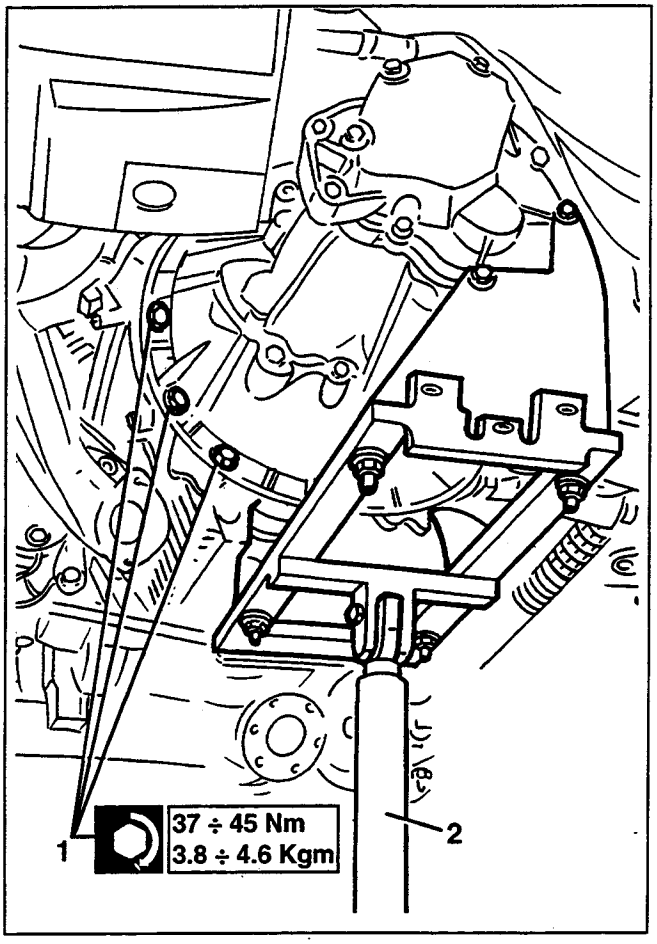
1. Slacken two of the gearbox cover fastening screws and fasten brackets no. 1.820.230.000 and support no. 1.820.208.000.
2. Using a hydraulic lift support the gearbox unit.



1. Slacken the rear engine-gearbox fastening screw.
2. Slacken the four screws fastening the intermediate shaft support to the differential.



1. Slacken the remaining three screws fastening the gearbox to the engine
2. Move the gearbox away from the engine and lower it using the hydraulic hoist.

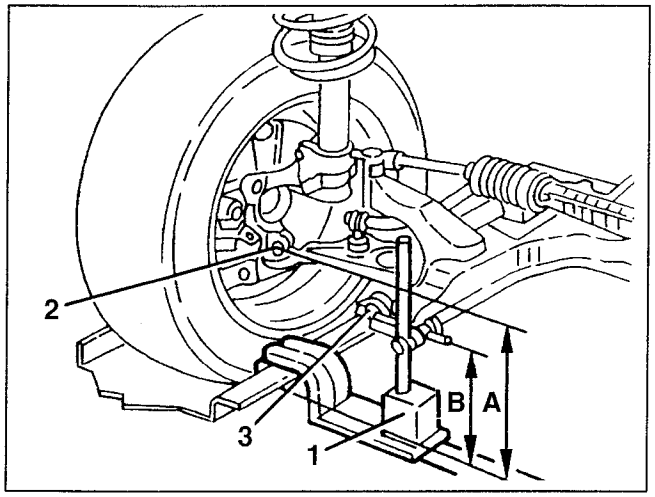


WHEEL ALIGNMENT

CHECKING THE FRONT WHEEL ALIGNMENT

- Inflate the tyres to the specified pressure.
- Fill with fuel and the specified oils and fluids.
- Set the car on a lift.
- Sway the car a few times to settle the suspensions.

1. Position the reference tool on the on the car resting surface.
2. Using a surface gauge measure the distance "**A**" between the car resting surface and the centre of the steering knuckle fastening screw.
- With the help of a millimetred rule measure the distance found.
3. Using the surface gauge measure the distance "**B**" between the car resting surface and the centre of the wishbone pin.
- With the help of the millimetred rule measure the distance found.



- Calculate the difference between dimension "**B**"and dimension "**A**" and check that it is with the specified limits.

Front alignment B-A
GTV V6 TB
-37 ± 5 mm* -48 ± 5 mm**

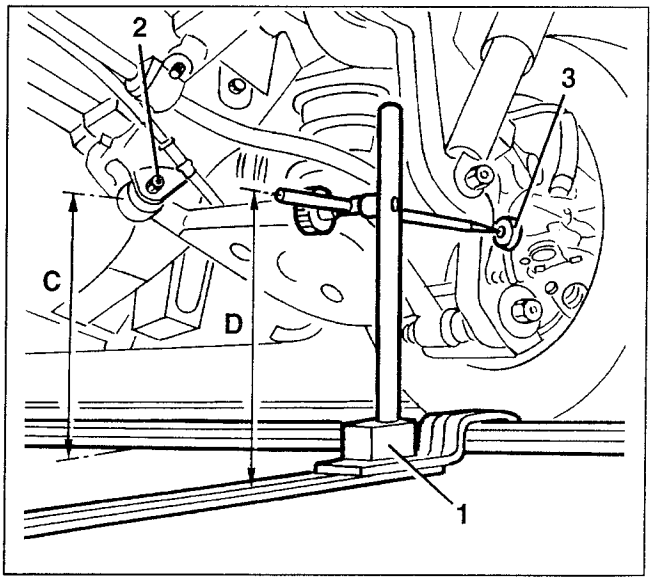
* to '97 versions
** '98 versions

NOTE: If the alignment values are not within the specified values change both suspension springs.

CHECKING THE REAR WHEEL ALIGNMENT

- Inflate the tyres to the specified pressure.
- Fill with fuel and the specified oils and fluids
- Set the car on a lift.
- Sway the car a few times to settle the suspensions.

1. Position the reference tool on the car resting surface.
2. Using a surface gauge measure the distance "**C**" between the car resting surface and the fulcrum of the spring carrier arm.
- With the help of a millimetred rule measure the distance found.
3. Using the surface gauge measure the distance "**D**" between the car resting surface and the rear wheel centre.
- With the help of the millimetred rule measure the distance found.



- Calculate the difference between dimension "**C**"and dimension "**D**" and check that it is with the specified limits.

Rear alignment C - D
GTV V6 TB
-77 ± 5 mm* -77 ± 3 mm**

* to '97 versions
** '98 versions

NOTE: If the alignment values are not within the specified values change both suspension springs.

CHECKING THE CHARACTERISTIC ANGLES

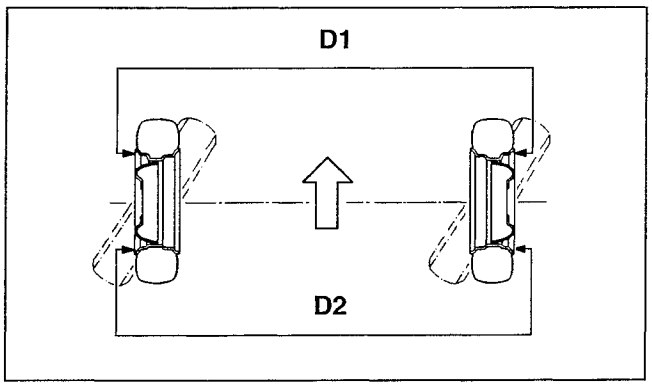
Preliminary operations

– Inflate the tyres to the specified pressure.
– Fill with fuel and the specified oils and fluids.
– Check that the eccentricity and orthogonality of the wheel rims does not exceed:

- 1 mm for steel rims
- 0.3 mm for alloy rims

CHECKING THE FRONT WHEEL TOE-IN

– Using suitable tools, check that the toe-in is within the specified limits.



Front wheel toe-in D2 - D1
GTV V6 TB
-1.5 ± 0.5 mm* -2.0 ± 1 mm**

* to '97 versions
** '98 versions

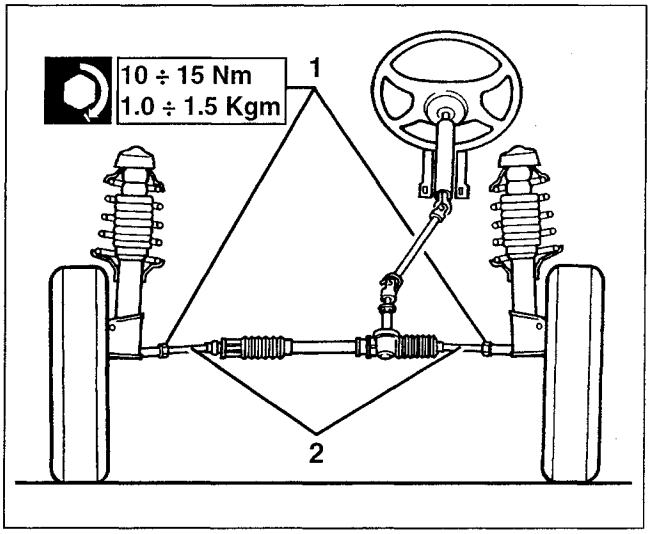
If the toe-in is other than specified, proceed as follows:
1. Slacken the fastenings for adjusting the track rods.

WARNING:
Each time the front wheel toe-in is adjusted, it is necessary to check that the boots turn freely on the rod and if necessary remove them and lubricate with the specified grease.

2. Turn the rods, until reaching the specified value without changing the position of the steering wheel spokes

NOTE: Adjustment should be carried out on the rods of both wheels.

– Tighten the track rod adjustment fastenings to the specified torque.



CHECKING THE FRONT WHEEL CAMBER AND CASTER

– Check that the camber and caster angles (not adjustable) are within the specified limits.

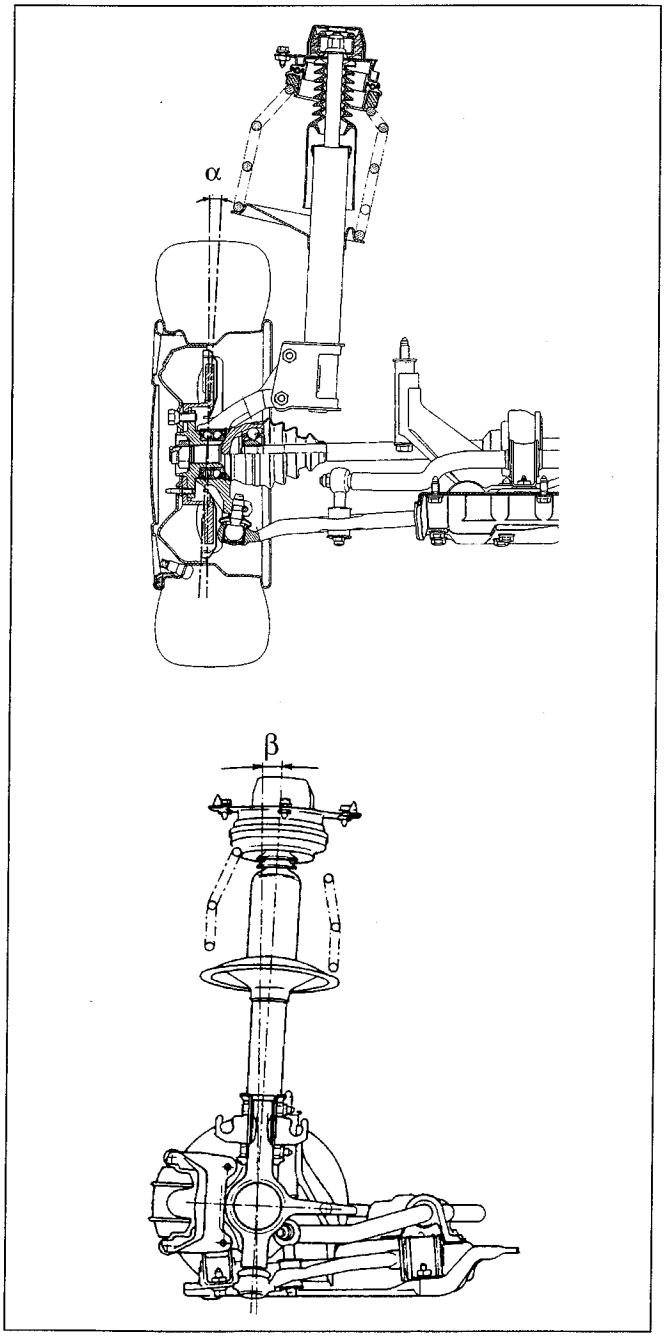
Front wheel camber "α"
GTV V6 TB
-0°40' ± 20'* -0°56' ± 20'**

* to '97 versions
** '98 versions

Caster "β"
GTV V6 TB
3°10' ± 30'* 2°54' ± 30'**

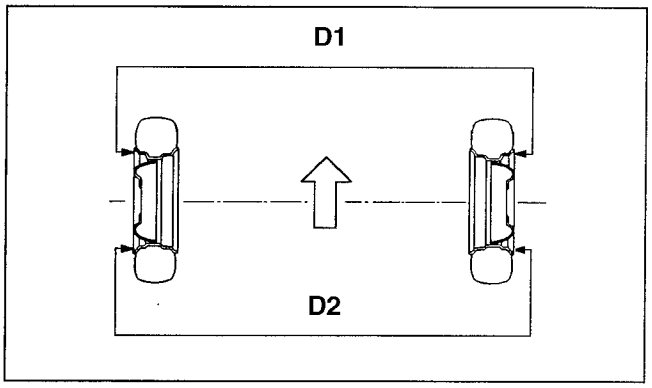
* to '97 versions
** '98 versions

NOTE: If the values are not within the specified limits, body squaring should be checked (see GROUP 70).



CHECKING THE REAR WHEEL TOE-IN

– Using suitable tools, check that the toe-in is within the specified limits.



Rear wheel toe-in D2 - D1
GTV V6 TB
2.5 ± 0.5 mm* 3.0 ± 1 mm**

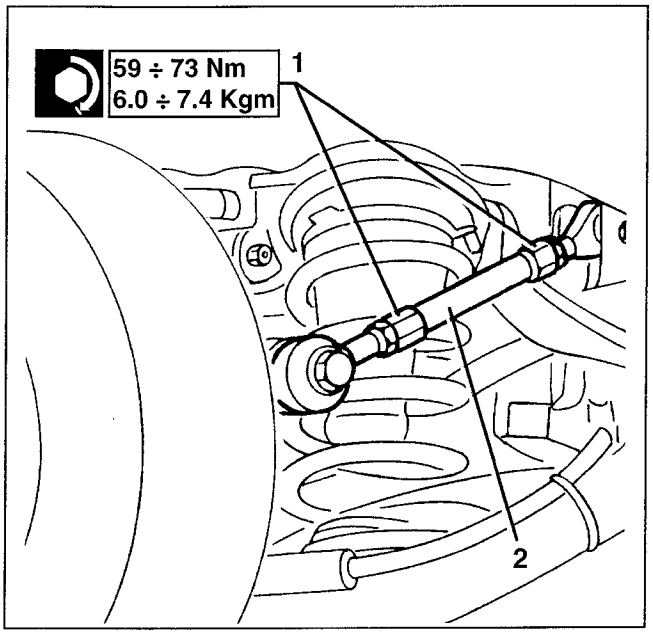
* to '97 versions
** '98 versions

If the toe-in is other than specified proceed as follows:

1. Slacken the fastenings of the adjustment rods.
2. Turn the rods, until reaching the specified value

NOTE: Adjustment should be carried out working on the rods of both wheels.

– Tighten the rod fastenings to the specified torque.

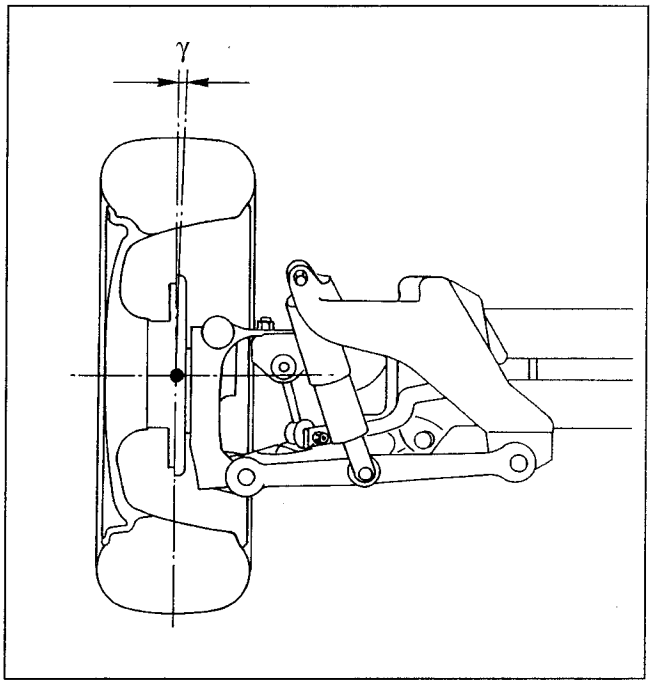


CHECKING THE REAR WHEEL CAMBER

– Check that the camber angle (not adjustable) is within the specified limit.

Rear wheel camber "γ"
GTV V6 TB
-1°8' ± 20'* -1°14' ± 20'**

* to '97 versions
** '98 versions



VARIANTS FOR GTV 2959 24V

INDEX

TECHNICAL DATA 00

ENGINE 10

(▲): See 1996 TB

INDEX

ENGINE *(Continued)* 10

'98 MODELS

(▲): See 1996 TB

INDEX

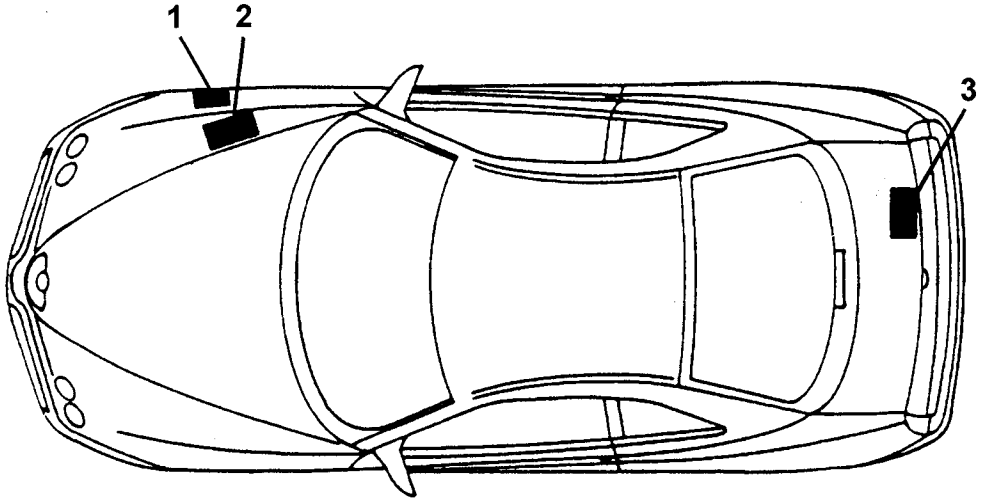
FOR THE INFORMATION NOT GIVEN HEREIN, REFER TO THE CORRESPONDING GROUP OF "SPIDER-GTV".
THE REFERENCE ENGINE IS THE "6 CYLINDER " (3.0 V6 ENGINE)

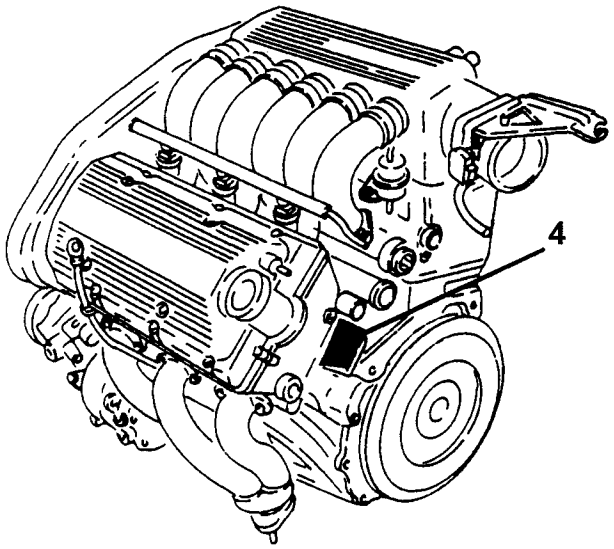
MODEL IDENTIFICATION

Brand name	GTV 3.0 24V
Version	Coupé
Version (on identification plate)	916C1
Chassis (in engine Compartment, on upper right-Hand shock absorber bracket)	-
Progressive chassis number	-
Engine (code)	AR 16102
Engine symbol	2959 24V
Gearbox (code)	C.503.5 C.530.6 (▲)

(▲): **For '98 models**

IDENTIFICATION PLATE LOCATION

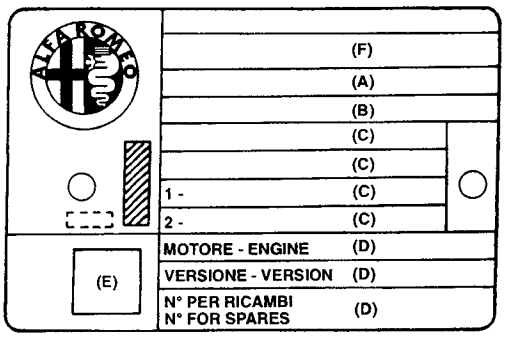




1. *Identification data plate*
2. *Chassis marking*
3. *Paintwork identification plate*
4. *Engine marking*

IDENTIFICATION DATA PLATE

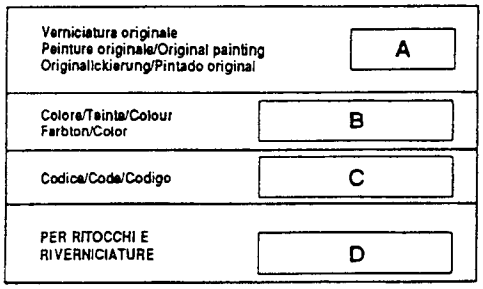
The plate is applied in the engine compartment on the upper left-hand shock absorber bracket. It contains the following data:



A. National homologation
B. Chassis number punch mark
C. Maximum authorised weights prescribed by national laws, where relevant
D. Version identification (e.g. 916C1) and for additional indications
E. Smokiness
F. Manufacturer's name punch marck

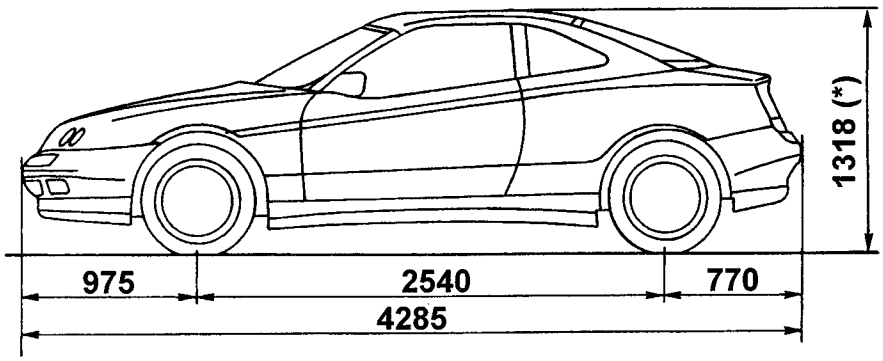
PAINTWORK IDENTIFICATION PLATE

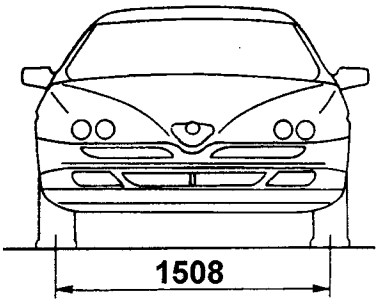
This plate is applied on the inside of the boot and contains the following data:

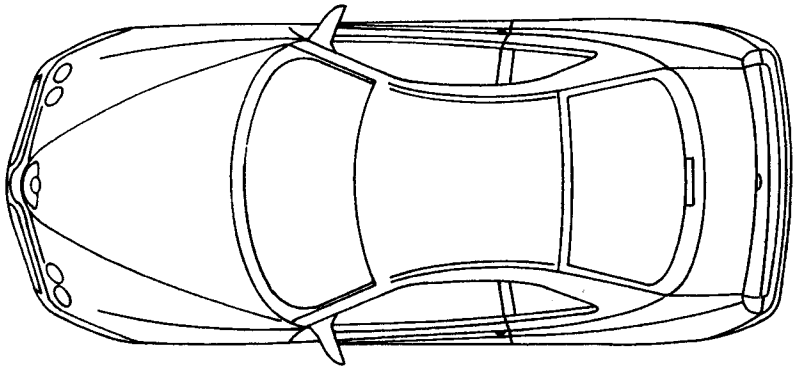


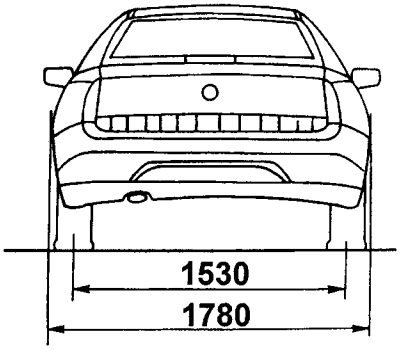
A. Paint manufacturer
B. Colour name
C. Colour code
D. Touch-up and re-spray code

DIMENSIONS









(*): Unladen vehicle

WEIGHTS AND LOADS

Features \ Version		GTV 3.0 24V
Kerb weight (without driver)		1415
Maximum admitted load		1820
Load		405
Maximum weight allowed on each axle	front	1060
	rear	870
Towable weight	trailer with brakes	1000
	trailer without brakes	500
Maximum load on tow hitch		50

WHEELS AND TYRES

Features \ Version			GTV 3.0 24V	
			To '97 models	'98 models
Rim size		Standard	6.5J x 16"	
		Optional	-	7.5J x 17"
Tyre size		Standard	205/50 R16 87W 205/50 ZR16	205/50 R16 87Y
		Optional	-	225/45 ZR17 91Y
Tyre pressure (cold)		bar (kg/cm^2)	front 2.7 rear 2.5	
Space saver spare wheel	Rim size		4J x 16" C24	
	Tyre size		T125/80 R16 97M	
	Tyre pressure	bar (kg/cm^2)	4.2	

Tyres for use with snow chains: Snow chains can only be used with 205/45 ZR16 REINFORCED or 205/45 R16 87W REINFORCED tyres.

Snow chains cannot be fitted on 225/45 ZR17 91Y tyres.

IMPORTANT:
Increase pressure by 0.3 bar in the event of constant driving at top speed.

FLUIDS AND LUBRICANTS

Type	Assembly ref.	Application	Classification	Name
OIL	10 - Engine	Engine (filling)	API SJ CCMCG5 ACEA A3-96 SAE 10W/40	SELENIA 20 K (*)
	21 - Gearbox	Gearbox-differential (filling)	API GL-5 SAE 75W 90	TUTELA ZC 75 SYNTH
	50 - Additional units	Compressor (filling)	-	SANDEN SP 10 "PAG"
FLUID	10 - Engine	Cooling circuit (filling)	-	ALFA ROMEO CLIMAFLUID SUPER PERMANENT -40°C
	18 - Clutch 33 - Brakes	Hydraulic brake-clutch circuit (filling)	DOT 4 SAE J 1703 F	ALFA ROMEO BRAKE FLUID SUPER DOT 4
	41 - Steering	Power steering (filling)	G.M. DEXRON II	TUTELA GI/A
	50 - Additional units	Climate control system (filling)	-	RIVOIRA: SUVA R134a HOECHST - TAZZETTI: FRIGEN R134a ICI - TAZZETTI: KLEA R134a
GREASE	18 - Clutch	Clutch thrust bearing and lever Clutch cylinder strut	-	TUTELA MR3
	21 - Gearbox	Gear engage rod and ball lever bushings	-	TUTELA ZETA2 ISECO MOLYKOTE LONGTERM N. 2
	27 - Front axle	Drive shaft CV joints	-	OPTIMOL PU 035 BERUTOX GKN HTB
	33 - Brakes	Pedal board joints and bushing ABS inductive sensor seats	-	TUTELA ZETA 2

(*): For sportier use, we recommend **SELENIA Racing 10W/60** fully synthetic engine oil.

FLUIDS AND LUBRICANTS (Continued)

Type	Assembly ref.	Application	Classification	Name
GREASE	41 - Steering	Roller bushing seat on steering column	-	SPCA SPAGRAPH ISECO ERGON RUBBER GREASE REINACH SFERUL B2 AR
	44 - Suspensions and wheels	Wishbone brackets	-	GREASE MOLYKOTE 7544 PG54 TUTELA MR3
		Side steering linkage	-	MOLYGUARD SYL 113

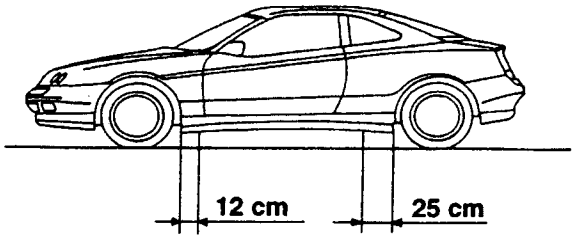
INDICATIVE CAPACITIES

Capacity \ Version		GTV 3.0 24V
Fuel tank		70 litres
Fuel reserve		~ 9 litres
Engine oil	Total capacity: sumps + filter + lines + pipes	-
	Sump + filter (for regular replacement)	6.0 litres
Gearbox-differential oil		2 litres
Power steering system oil		-
Brake and clutch circuit oil		-
Engine coolant fluid		11.7 litres
Climate control compressor oil		-
Climate control system fluid		-

JACKING POINTS

With arm hoist or shop jack.

- Position the arms or the jack in the areas shown.



IMPORTANT:
Be very careful when positioning the arms or the jack in the front jacking points to avoid squeezing the brake and fuel lines.

TOWING POINTS

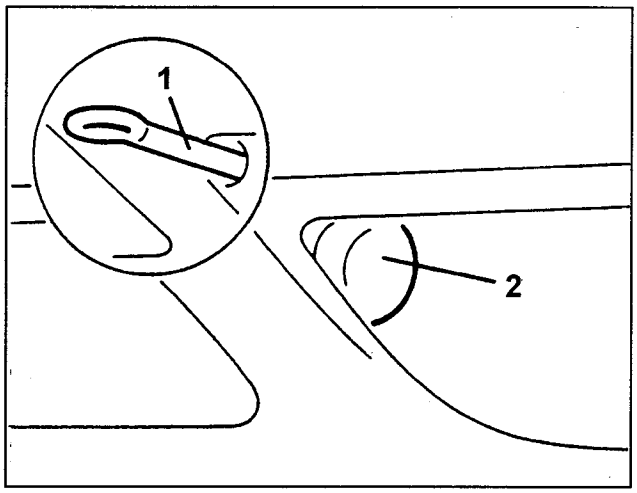
The vehicle is equipped with two threaded attachments - one at the front and the other at the back - where to screw the tow hitch which is provided in the tool bag (in the boot).

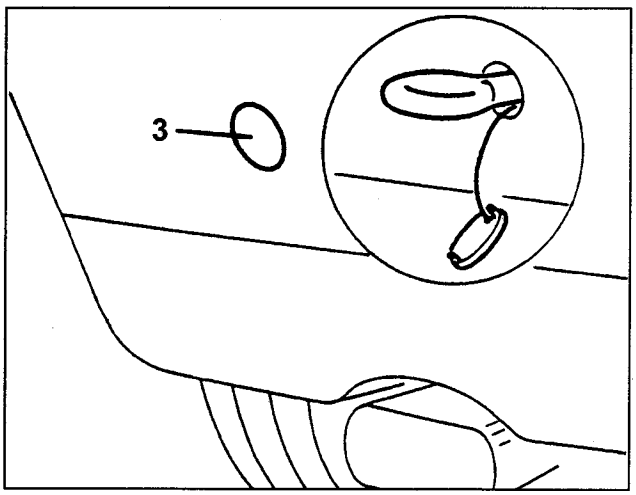
Attain scrupulously to the laws regulating towing.

IMPORTANT:
Before towing the vehicle, turn the key to MAR and back to STOP without removing it to prevent the steering wheel from locking.

Consider that while towing, the brake booster system is not running. Consequently, more effort on the brake pedal will be required.

Furthermore, when the engine is not running, the power steering system is neither working. Consequently, more effort on the steering wheel is required.





1. Tow hitch
2. Front bumper slot
3. Rear bumper cover

ENGINE TECHNICAL FEATURES

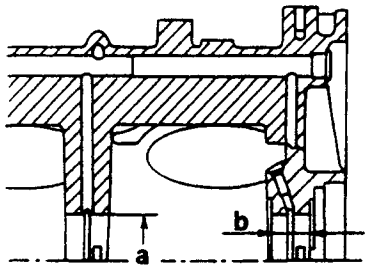
CHARACTERISTIC DATA

Engine		AR 16102	
Cycle		Otto, four stroke	
Injection / Ignition		Motronic M3.7.1	Motronic ME2.1 (▲)
Firing order		1 - 4 - 2 - 5 - 3 - 6	
Capacity	cm^3	2959	
Number of cylinders		6 at V 60°	
Bore	mm	93	
Stroke	mm	72.6	
Maximum power	CV CEE (kW CEE) rpm	225 (165) 6300	220 (162) 6300 (▲)
Maximum torque	kgm CEE (Nm CEE) rpm	27.5 (270) 5000	
Compression ratio		10.0 : 1	
Engine oil pressure (at 100°C) - Idling ratio - At 4000 rpm	bar	 > 0.8 > 4.5	
Idling ratio	rpm	700 ± 20	

(▲): For '98 models

COMPLETE CRANKCASE

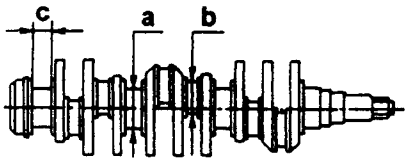
Crankcase



Unit: mm

Main journal diameter "a"	Class A - Red	63.657 ÷ 63.663
	Class B - Blue	63.663 ÷ 63.669
	Class C - Green	63.669 ÷ 63.675
Central main journal Shoulder length "b"		26.450 ÷ 26.500

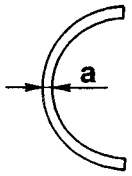
Crankshaft



Unit: mm

Main journal diameter "a"	Class A - Red	59.973 ÷ 59.979
	Class B - Blue	59.967 ÷ 59.973
	Class C - Green	59.961 ÷ 59.967
Connecting rod journal diameter "b"	Class A - Red	51.990 ÷ 52.000
	Class B - Blue	51.980 ÷ 51.990
Rear main journal length "c"		31.300 ÷ 31.335
Maximum main journal and connecting rod journal ovality		0.004
Maximum main journal and connecting rod journal taper ratio		0.010
Maximum parallel error between main journals and connecting rod journals		0.015
Main journal maximum eccentricity		0.040

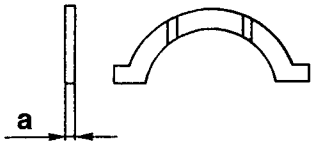
Main half-bearings



Unit: mm

Main half-bearing thickness "a"	Class A - Red	1.833 ÷ 1.839
	Class B - Blue	1.839 ÷ 1.845
	Class C - Green	1.845 ÷ 1.851
Main half-bearing and bearing Operating play		0.000 ÷ 0.024

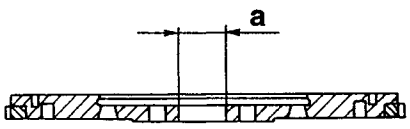
Thrust half-rings



Unit: mm

Thrust half-ring thickness "a"	2.310 ÷ 2.360
Crankshaft axial play	0.080 ÷ 0.265

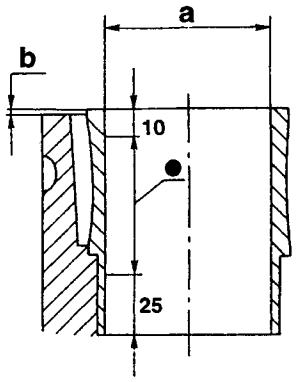
Flywheel



Unit: mm

Central bush internal diameter (bore) "a"	35.000 ÷ 35.025
Crown wheel heating temperature for fitting on flywheel	120° ÷ 140°C

Cylinder liner

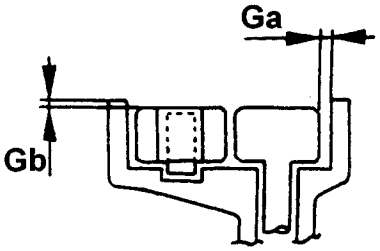


(•) Dimensional check area

Unit: mm

Cylinder liner diameter "a"	Class A - Blue	92.985 ÷ 92.994
	Class B - Pink	92.995 ÷ 93.004
	Class C - Green	93.005 ÷ 93.014
Cylinder liner projection from crankcase "b"		0.01 ÷ 0.06
Cylinder liner ovality/taper limit		0.01

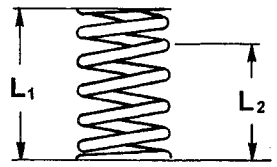
Oil pump



Unit: mm

Play "Ga" between gear edge and pump casing	0.025 ÷ 0.075
Play "Gb" between upper gear side and pump cover	0.013 ÷ 0.062

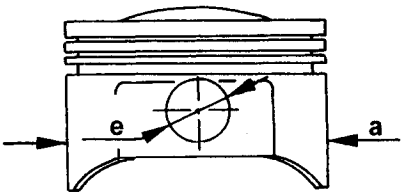
Engine oil pressure limiting valve spring

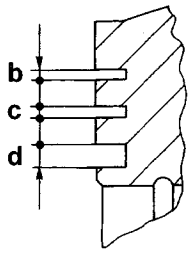


Length of spring L_1	33.35 mm
Load corresponding to L_1	15.86 ÷ 16.86 daN
Length of spring L_2	36 mm
Load corresponding to L_2	13.816 ÷ 14.816 daN

CONNECTING ROD - PISTON ASSEMBLY

Piston



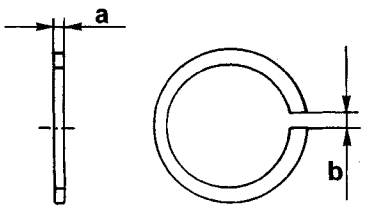


Unit: mm

Diameter of piston "a" (1)	Class A - Blue	92.925 ÷ 92.935
	Class B - Pink	92.935 ÷ 92.945
	Class C - Green	92.945 ÷ 92.955
Height of seats of first seal ring "b"		1.525 ÷ 1.545
Height of seats of second seal ring "c"		1.525 ÷ 1.545
Height of seats of oil scraper ring "d"		3.515 ÷ 3.535
Diameter of gudgeon pin holes in pistons "e"	Class A - Black	22.003 ÷ 22.006
	Class B - White	22.006 ÷ 22.009
Clearance between liners and pistons		0.059 ÷ 0.060
Difference in weight between pistons		≤ 4 g

(1): To be measured perpendicularly to the gudgeon pin hole at a distance of 17 mm from lower edge of skirt.

Seal rings

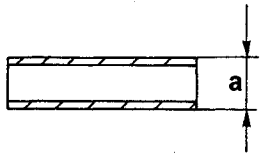


Unit: mm

Thickness of rings "a"	First ring	1.475 ÷ 1.490
	Second ring	1.475 ÷ 1.490
	Oil scraper ring	3.475 ÷ 3.490
Ring gap "b" (1)	First ring	0.40 ÷ 0.65
	Second ring	0.40 ÷ 0.65
	Oil scraper ring	0.30 ÷ 0.60
Axial play between rings and their seats	First ring	0.035 ÷ 0.070
	Second ring	0.035 ÷ 0.070
	Oil scraper ring	0.025 ÷ 0.060

(1): To be measured in the check ring nut or in the cylinder liner

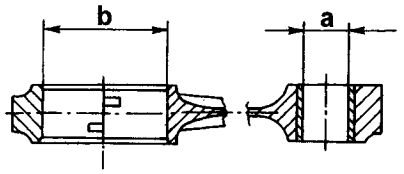
Gudgeon pins



Unit: mm

Outside diameter of gudgeon pins "a"	Class A - Black	21.994 ÷ 21.997
	Class B - White	21.997 ÷ 22.000
Clearance between pins and their housings on pistons		0.006 ÷ 0.012

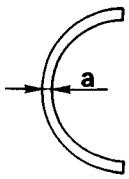
Connecting rods



Unit: mm

Diameter of connecting rod bush hole "a"		20.005 ÷ 20.015
Inside diameter of big ends "b"		55.511 ÷ 55.524
Difference in weight between connecting rods		≤ 2 g
Big end end float		0.2 ÷ 0.3
Clearance between gudgeon pins and small end bushes	Class A - Black	0.008 ÷ 0.021
	Class B - White	0.005 ÷ 0.018

Connecting rod half bearings

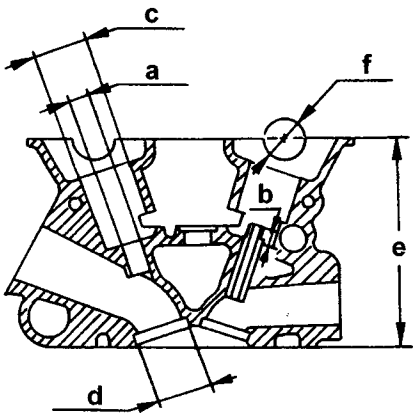


Unit: mm

Thickness of connecting rod half bearings "a"	Class A - Red	1.737 ÷ 1.745
	Class B - Blue	1.741 ÷ 1.749
Operating clearance between rod pins and their half bearings	Class A - Red	0.034 ÷ 0.060
	Class B - Blue	0.036 ÷ 0.062

CYLINDER HEADS

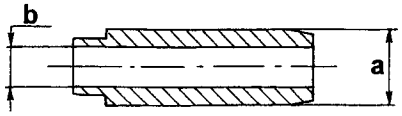
Heads



Unit: mm

Diameter of valve guide seats "a"		12.000 ÷ 12.018
Valve guide protrusion "b"		10.35 ÷ 10.65
Diameter of hydraulic tappets "c"		33.000 ÷ 33.025
Diameter of valve seat housings "d"	Intake	36.500 ÷ 36.525
	Exhaust	32.000 ÷ 32.025
Minimum permissible height of heads after refacing "e"		134.85 ÷ 135.15
Maximum error of flatness of head lower surface		0.05
Diameter of camshaft supports "f"		27.010 ÷ 27.036
Length of camshaft support shoulders		19.902 ÷ 19.935

Valve guides

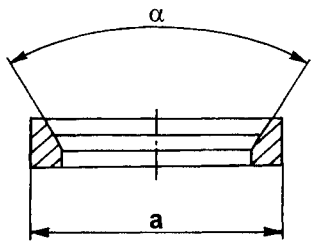


Unit: mm

Outside diameter of valve guides "a"	Intake	12.040 ÷ 12.051 (*)
	Oversize 0.2	
	Exhaust	12.050 ÷ 12.068 (**)
	Oversize 0.2	
Inside diameter of valve guides (bore) "b"		7.000 ÷ 7.015
Interference between valve guides and their seats	Intake	0.022 ÷ 0.051
	Exhaust	0.032 ÷ 0.068

(*): Spare 12.053 ÷ 12.064 (**): Spare 12.064 ÷ 12.082

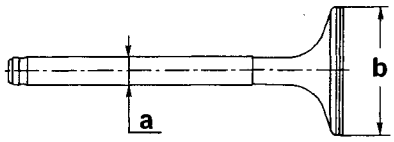
Valve seats



Unit: mm

Outside diameter of valve seats "a"	Intake	36.600 ÷ 36.616
	Oversize 0.3	
	Exhaust	32.100 ÷ 32.116
	Oversize 0.3	
Valve seat taper "α"		90° ± 20'
Interference between valve seats and their seats	Intake	0.075 ÷ 0.116
	Exhaust	0.075 ÷ 0.110
Heating temperature of cylinder heads for fitting valve seats		100 ÷ 120 °C

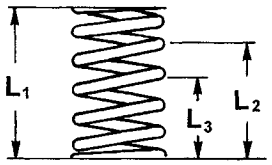
Valves



Unit: mm

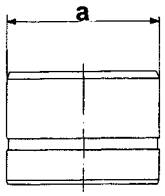
Diameter of valve stems "a"		6.965 ÷ 6.980
Diameter of valve mushrooms "b"	Intake	35.5 ÷ 35.7
	Exhaust	31.0 ÷ 31.2
Radial clearance between valve stems and valve guides		0.020 ÷ 0.050

Valve springs



	Outer spring	Inner spring
Free length "L_1"	~ 45 mm	~ 42 mm
Length with valves closed "L_2"	32.5 mm	30.5 mm
Corresponding load at "L_2"	219.1 ÷ 230.9 N (22.4 ÷ 23.6 kg)	123.6 ÷ 131.4 N (12.6 ÷ 13.4 kg)
Length with valves open "L_3"	23 mm	21 mm
Corresponding load at "L_3"	430.7 ÷ 450.3 N (43.9 ÷ 45.9 kg)	240.2 ÷ 259.8 N (24.5 ÷ 26.5 kg)

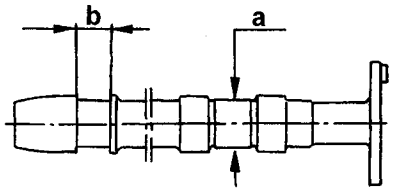
Hydraulic tappets



Unit: mm

Outside diameter of hydraulic tappets "a"	32.959 ÷ 32.975
Radial clearance between hydraulic tappets and their seats	0.025 ÷ 0.066

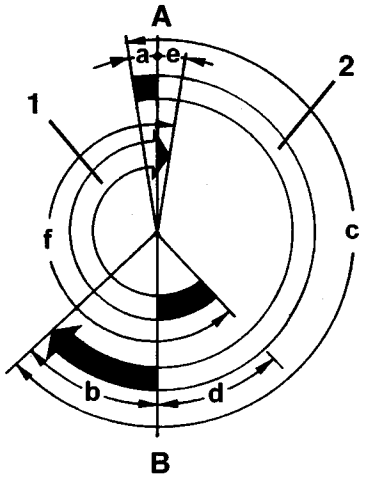
Camshafts



Unit: mm

Diameter of camshaft journals "a"		26.959 ÷ 26.980
Length of camshaft shoulder "b"		20.000 ÷ 20.033
Nominal cam lift	Intake	9.30
	Exhaust	9.30
Maximum eccentricity between journals		0.03
Clearance between camshaft journals and their seats		0.030 ÷ 0.077
Camshaft end float		0.065 ÷ 0.131

ANGLES OF ACTUAL TIMING DIAGRAM



Intake	Opens (before T.D.C.)	"a"	9°
	Closes (after B.B.C.)	"b"	47°
	Intake angle	"c"	236°
Exhaust	Opens (before B.D.C.)	"d"	47°
	Closes (after T.D.C.)	"e"	9°
	Exhaust angle	"f"	236°

(1) Exhaust
(2) Intake
(A) T.D.C.
(B) B.D.C.

FUEL FEED

FUEL

Unleaded petrol	Minimum R.O.N. = 95

FUEL TANK

Total capacity	70 litres
Reserve	~ 9 litres

FUEL FEED PRESSURE

Idling fuel pressure	3 bar 3.3 ÷ 3.7 bar (▲)
Maximum fuel pressure	4 bar

(▲): '98 models

FUEL FEED

FLOW TEST (with SOLEX flow meter)

Leaks with throttle closed	280 ± 10 on scale "N"

EXHAUST EMISSIONS

CO in exhaust	% vol.	< 0.2
HC in exhaust	p.p.m.	≤ 50

SENSORS

RPM AND PHASE SENSOR GAP

0.8 ÷ 1.5 mm

CAM ANGLE SENSOR GAP

≤ 1.5 mm

COOLING SYSTEM

THERMOSTAT

Opening start temperature	85° ÷ 89°C

COOLING FAN THERMAL CONTACT

Fan on/off temperature		
1st speed	On (contacts closed)	92° ± 2°C
	Off (contacts open)	87° ± 2°C
2nd speed	On (contacts closed)	97° ± 2°C
	Off (contacts open)	92° ± 2°C

COOLANT MAXIMUM TEMPERATURE TRANSMITTER

Contact closed temperature	115° ± 3°C
Contact open temperature	≥ 102°C

CLUTCH

Clutch plate thickness	New	7.1 ÷ 7.7 mm
	Wear limit	6.3 mm
Clutch plate diameter		235 mm

GEARBOX

RATIOS (To '97 models)

Axle ratio	Gear engaged	Gear ratio	Total ratio
17/57 1 : 3.353	1st 2nd 3rd 4th 5th Reverse	1 : 3.800 1 : 2.235 1 : 1.520 1 : 1.156 1 : 0.914 1 : 3.545	1 : 12.741 1 : 7.494 1 : 5.100 1 : 3.876 1 : 3.065 1 : 11.886

RATIOS ('98 models)

Axle ratio	Gear engaged	Gear ratio	Total ratio
16/57 1 : 3.563	1st 2nd 3rd 4th 5th 6th Reverse	1 : 3.800 1 : 2.235 1 : 1.520 1 : 1.156 1 : 0.971 1 : 0.816 1 : 3.545	1 : 12.471 1 : 7.963 1 : 5.416 1 : 4.119 1 : 3.460 1 : 2.907 1 : 12.631

BRAKES

BRAKE DISCS

		FRONT	REAR
Diameter	(mm)	305	240
Use thickness limit	(mm)	26.4	9.2
Min. thickness after grinding	(mm)	-	10.1
Nominal thickness	(mm)	28	11

FRONT BRAKE CALLIPERS

Type	BREMBO
Piston diameter	42 mm and 38 mm
Brake pad area	52.3 cm^2
Pad nominal thickness	17.3 ÷ 18.0 mm

FRONT SUSPENSIONS

SHOCK ABSORBERS

Rod diameter	22 mm
Stroke	159 mm

STABILISER BAR

Bar diameter	15 mm

REAR SUSPENSIONS

HELICOID SPRINGS

Wire diameter	13.35 ÷ 13.45 mm
Free length	293 mm

SHOCK ABSORBERS

Rod diameter	39.4 mm
Stroke	91.5 mm

STABILISER BAR

Bar diameter	21 mm

WHEEL TRIM AND CHARACTERISTIC ANGLES

Features		Unladen and filled	
		To '97 models	**'98 models**
Front trim (B - A)	(mm)	-36 ± 5	-45 ± 5
Rear trim (C - D)	(mm)	-74 ± 5	-69 ± 3
Front wheel toe-in (D_2 - D_1)	(mm)	-1.5 ± 0.5	-2.0 ± 1
Rear wheel toe-in (D_2 - D_1)	(mm)	+2.5 - 0.5	+3.0 ± 1
Front wheel camber (α)		0°1' ± 20'	-0°56' ± 20'
Caster (β)		3°5' ± 30'	2°42' ± 30'
Rear wheel camber (γ)		-2°3' ± 20'	-1°47' ± 20'

IGNITION

SPARK PLUGS

Type	NGK PFR6B

STARTING

STARTER MOTOR

Nominal voltage		(V)	12
Nominal power		(kW)	1.4
Operating test (*)	Voltage	(V)	8.5
	Absorption	(A)	360
	Rpm	(rpm)	1800
	Torque	(Nm)	9.8
Loadless test (*)	Voltage	(V)	11.8 ÷ 12
	Absorption	(A)	25 ÷ 40
	Rpm	(rpm)	3000 ÷ 4000
Pickup test (*)	Voltage	(V)	4.8 ÷ 5.2
	Absorption	(A)	690 ÷ 730
	Torque	(Nm)	21.5

(*): Data measured at room temperature of 20°C.

CHARGING

BATTERY

Nominal voltage	12V
Capacity	70 Ah

ALTERNATOR

Nominal voltage	12V
Nominal curremt	120A
Max. continuous speed	18000 rpm
Indctor winding resistance (measured between collector rings at 20°C)	-

NOTE: For the tightening torques of the groups not mentioned, refer to those of the engine 2959 V6

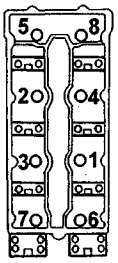
Group 00 - Engine maintenance

Part	Nm	kgm
Oil sump drain plug	64 ÷ 79	6.5 ÷ 8.0
Camshaft cap fastening screws (1)	18 ÷ 20	1.8 ÷ 2.0
Nuts fastening auxiliary components drive pulley (1)	200 ÷ 247	20.4 ÷ 25.2
Screws fastening camshaft drive pulleys	68 ÷ 84	6.9 ÷ 8.6
Screws fastening timing gear belt tensioner	17 ÷ 21	1.7 ÷ 2.1
Filter fuel inlet fitting	30 ÷ 37	3.1 ÷ 3.8
Filter fuel outlet fitting	21 ÷ 26	2.1 ÷ 2.7
Spark plugs	27 ÷ 34	2.8 ÷ 3.5
Screw fastening auxiliary components belt tensioner	17 ÷ 21	1.7 ÷ 2.1

(1): Lubricate with engine oil

Group 10 - Engine Removing/Refitting

Part	Nm	kgm
Screw fastening coolant fluid inlet/outlet pipe flange from turbocharger	22 ÷ 24	2.2 ÷ 2.4
Bolts fastening axle shafts	40 ÷ 52	4.1 ÷ 5.3
Bolts fastening wishbones to wheel uprights	67 ÷ 74	6.8 ÷ 7.5
Screws fastening power plant rear support to gearbox	102 ÷ 126	10.4 ÷ 12.8
Nuts fastening exhaust manifolds to cylinder heads	22 ÷ 27	2.2 ÷ 2.7
Screws fastening starter motor	18 ÷ 22	1.8 ÷ 2.2
Screws fastening lay shaft	8 ÷ 10	0.8 ÷ 1.0
Nuts fastening stay rod support bracket to cylinder head	34 ÷ 42	3.5 ÷ 4.3
Cylinder head tightening		
Approach all screws to a torque of:	24 ÷ 26	2.5 ÷ 2.7
Turn the screws by an angle of:	240° ± 2°	
Screws fastening camshaft drive pulleys	68 ÷ 84	6.9 ÷ 8.6
Screws fastening camshaft belt tensioner	17 ÷ 21	1.7 ÷ 2.1
Screw fastening drive gear to oil pump	48 ÷ 58	4.8 ÷ 5.9
Screws fastening oil pump main bearing caps	48 ÷ 58	4.8 ÷ 5.9
Screws fastening oil sump to crankcase	13 ÷ 16	1.3 ÷ 1.6
Screws fastening camshaft caps (1)	18 ÷ 20	1.8 ÷ 2.0
Screws fastening flywheel	116 ÷ 129	11.8 ÷ 13.2



(1): Lubricate with engine oil

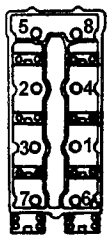
(CONTINUED)

(CONTINUED)

Part	Nm	kgm
Flywheel fastening screws (double)	137 ÷ 151	13.9 ÷ 15.4
Fuel distribution manifold fastening screws	19 ÷ 23	1.9 ÷ 2.4
Throttle casing fastening screws	12 ÷ 15	1.2 ÷ 1.5
Lambda sensor	50 ÷ 60	5.1 ÷ 6.1
Engine coolant temperature sensor (NTC)	30	2.9
Auxiliary unit belt take-up device fastening screw	17 ÷ 21	1.7 ÷ 2.1

Assembly 10 - Engine overhaul

Part	Nm	kgm
Engine oil dipstick guide fastening fitting to crankcase	36 ÷ 84	3.7 ÷ 8.6
Auxiliary unit drive pulley fastening nut (1)	200 ÷ 247	20.4 ÷ 25.2
Camshaft drive pulley fastening screws	68 ÷ 84	6.9 ÷ 8.6
Vibration damper connecting rod bracket fastening nuts to cylinder head	34 ÷ 42	3.5 ÷ 4.3
Coolant pump fastening screws to crankcase	7 ÷ 9	0.7 ÷ 0.9
Knock sensor fastening screws	14 ÷ 23	1.4 ÷ 2.3
Oil sump fastening screws to crankcase	13 ÷ 16	1.3 ÷ 1.6
Drive gear fastening screw to oil pump	48 ÷ 58	4.8 ÷ 5.9
Oil pump fastening screws to main bearings	48 ÷ 58	4.8 ÷ 5.9
Flywheel fastening screws	116 ÷ 129	11.8 ÷ 13.2
Flywheel fastening screws (double)	137 ÷ 151	13.9 ÷ 15.4
Connecting rod bearing fastening nuts (1)	53 ÷ 59	5.4 ÷ 6.0
Main bearing fastening nuts (1)	84 ÷ 93	8.5 ÷ 9.5
Camshaft bearing fastening nuts (1)	18 ÷ 20	1.8 ÷ 2.0
Cylinder head torque		
Fasten all screws at a torque of:	24 ÷ 26	2.5 ÷ 2.7
Turn all screws by an additional angle of:	240° ± 2°	
Timing belt take-up fastening screws	17 ÷ 21	1.7 ÷ 2.1
Engine oil minimum pressure warning light sensor	20 ÷ 25	2.1 ÷ 2.6



(1): Lubricate with engine oil

Assembly 55 - Electrical system

Part	Nm	kgm
Ignition coil fastening screws	5 ÷ 8	0.5 ÷ 0.8
Spark plugs	27 ÷ 34	2.8 ÷ 3.5
Rear engine mount fastening screws to gearbox	102 ÷ 126	10.4 ÷ 12.8
Wishbone fastening bolts to wheel hubs	67 ÷ 74	6.8 ÷ 7.5
Starter motor fastening screws	18 ÷ 22	1.8 ÷ 2.2

General

Specific tools play an important role in vehicle maintenance and are essential to ensure accurate, reliable and fast service.
It is important to note that intervention times are computed supposing the use of these tools.

This handbook lists and illustrated the specific tool expressly made by the Manufacturer for overhauling, maintenance and servicing.
The service network may provide specific tools according to the procedures in force at individual Alfa Romeo Dealerships.
Here follows the list of specific tools used.

NOTE: Refer to the tools for 2959 V6 engines for the assemblies not mentioned here.

Assembly 00 - Engine servicing

1.820.088.000	Flywheel retainer (to be used on vehicle)
1.822.146.000	Pulley wrench support
1.822.150.000	Camshaft pulley fasten screw extension wrench
1.825.013.000 (C.6.0183)	TDC check tool
1.825.040.000	Camshaft timing templates
1.860.950.000	Timing belt tension tool
1.860.954.001	Camshaft pulley/oil pump gear extractor
1.870.646.000	Crankshaft pulley torque reaction tool ('98 models)

Assembly 10 - Engine overhaul

1.820.011.000 (A.2.0192)	Valve support tool
1.820.012.000 (A.2.0195)	Cylinder head adjustable support
1.820.049.000 (A.2.0359)	Valve support tool special nut
1.820.050.000 (A.2.0360)	Cylinder head support fork
1.820.145.000 (R.4.0178)	Overhaul bench engine mount brackets
1.820.228.000	Flywheel retainer (to be used on bench)
1.820.279.000	Liner retainer
1.820.618.000	Cranlshaft revolving tool
1.821.006.001 (A.3.0139/0001)	Rear main bearing removal lever
1.821.006.002 (A.3.0139/0002)	Rear main bearing extraction fork
1.821.058.000 (A.3.0324)	Valve removal/refitting lever

(CONTINUED)

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1.821.124.000 (A.3.0522)	Valve removal/refitting support
1.821.176.000 (A.3.0641)	Valve guide extractor
1.821.205.000	Valve removal/refitting cage
1.821.206.000	Take-in for oil seal caps on guide valves
1.821.207.000	Valve guide taker-in
1.821.208.000	Extractor for oil seal caps on guide valves
1.821.250.000	Crankshaft rear oil seal taker-in
1.822.121.000	Cylinder head fastening nut wrench
1.822.146.000	Pulley wrench support
1.825.003.000 (C.6.0148)	Cylinder liner projection check tool
1.825.013.000 (C.6.0183)	TDC check tool
1.825.040.000	Camshaft timing template
1.860.942.000	Angle torque goniometer
1.860.948.000	Camshaft oil seal taker-in
1.860.949.000	Crankshaft front oil seal taker-in
1.860.950.000	Timing belt tensioning tool
1.860.952.000	Pair of studs to support cylinder head during overhaul
1.860.954.001	Camshaft pulley/oil pump gear extractor

Assembly 10 - Engine removal/refitting

1.820.088.000	Flywheel retainer (to be used on vehicle)
1.820.225.000	Engine removal/refitting support
1.820.228.000	Flywheel retainer
1.820.234.000	Engine removal/refitting bracket
1.820.239.000	Engine support crossmember brackets
1.820.279.000	Liner retainer
1.820.581.000 (R.4.0194)	Engine support crossmember
1.821.150.000	Crankshaft rear oil seal taker-in
1.822.146.000	Pulley wrench support
1.822.150.000	Camshaft drive pulley fastening screw extension wrench
1.825.013.000 (C.6.0183)	TDC check tool
1.825.040.000	Camshaft timing template
1.860.942.000	Angle torque goniometer
1.860.948.000	Camshaft oil seal taker-in

(CONTINUED)

(CONTINUED)

1.860.949.000	Crankshaft front oil seal taker-in
1.860.950.000	Timing belt tension tool
1.860.954.001	Camshaft pulley/oil pump gear extractor
1.860.978.000	Suspension crossmember removal tool
1.821.006.001	Rear main bearing removal lever
1.821.006.002	Rear main bearing removal extractor

Assembly 10 - Engine removal/refitting ('98 models)

1.820.088.000	Flywheel retainer (to be used on vehicle)
1.820.225.000	Engine removal/refitting support
1.820.226.000	Engine bracket
1.820.239.000	Engine support crossmember brackets
1.820.581.000	Engine support crossmember
1.821.150.000	Crankshaft rear oil seal taker-in
1.822.150.000	Camshaft drive pulley fastening screw extension wrench
1.860.910.001	Engine removal/refitting adapter
1.860.978.000	Suspension crossmember removal tool
1.870.644.000	Engine removal/refitting base
1.870.644.001	Engine removal/refitting bracket

Assembly 10 - Engine fuel feed

1.821.167.000	Wrench for removing fuel pump and gauge ('98 models)
1.822.135.000	Wrench for removing nut screw fastening fuel pump to tank
1.822.159.000	Wrench for removing nut screw fastening gauge to tank
1.824.011.000 (C.2.0056)	Flow test pad

Assembly 21 - Gearbox-Differential ('98 models)

1.820.028.000	Flywheel retainer
1.820.124.000	Clutch plate and frame refitting centring device
1.820.226.000	Engine bracket (use with 1.820.239.000 and 1.820.581.000)
1.820.229.000	Differential internal drive shaft extractor flange
1.820.239.000	Engine gearbox brackets (use with 1.820.581.000 and 1.820.226.000)
1.820.581.000	Engine support horizontal crossmember (use with 1.820.239.000 and 1.820.226.000)
1.821.161.000	Differential internal drive shaft extractor ram
1.821.170.000	Differential flange oil seal taker-in (left and right)
1.821.171.000	Differential flange oil seal taker-in handle (left and right)
1.821.215.000	Clutch thrust bearing extractor
1.860.978.000	Suspension crossmember support tool
1.870.644.001	Gearbox support
1.870.668.000	Gear stick knob extractor
1.870.974.000	Gear selection/engagement wire assembly shim

MAINTENANCE OPERATIONS

Maintenance operations consist in checking and restoring working conditions of car parts subject to wear and to displacement following normal conditions of use.
Here follows a list of the maintenance operations to be performed at the lieage shown in the service schedule.

IMPORTANT:
Precautions to be followd. The engine compartment contains many potentially dangerous moving, high temperature and high voltage parts.
Scrupulously observe following:
- Stop the engine and wait for it to cool down.
- Do not smoke. Do not use naked flames. The fuel could catcj fire.
Keep a fire extinghisher at hand.

Operations to be performed at the indicated km	km x 1.000								
	20	40	60	80	100	120	140	160	180
Check tyre conditions and wear	●	●	●	●	●	●	●	●	●
Check front disc brake pad wear warning light operation	●	●	●	●	●	●	●	●	●
Check rear disc brake pad wear		●		●		●		●	
Check intactness of drive shaft bellows, power steering, joint caps and tightness of fuel and brake lines	●	●	●	●	●	●	●	●	●
Inspect conditions of V-belt and/or accessory drive Poly-V belt		●		●		●		●	
Check handbrake lever travel		●		●		●		●	
Check exhaust emissions		●		●		●		●	
Check evaporation system operation				●				●	
Replace fuel filter				●				●	
Replace air cleaner cartridge		●		●		●		●	
Check fluids and top up if required (brakes, hydraulic clutch, power steering, windscreen washer, battery, engine coolant, etc.)	●	●	●	●	●	●	●	●	●
Replace timing belt						●			
Replace spark plugs					●				
Check engine control system operation (via diagnostic socket)		●		●		●		●	
Check gearbox and differential oil level (mechanical gearbox versions only)				●				●	
Change gearbox/differential oil and filter (automatic gearbox versions only)		●		●		●		●	
Change engine oil (*)	●	●	●	●	●	●	●	●	●
Replace engine oil filter	●	●	●	●	●	●	●	●	●
Change brake fluid (or every 24 months)			●			●			●
Check dust/pollen filter (or howerver every 12 months)	●	●	●	●	●	●	●	●	●
Check timing belt conditions				●					

(*): Or every 18 months for lower mileage.

SERVICE SCHEDULE ('98 models)

Operations to be performed at the indicated km	km x 1,000								
	20	40	60	80	100	120	140	160	180
Check tyre conditions and wear	●	●	●	●	●	●	●	●	●
Check front disc brake pad wear warning light operation	●	●	●	●	●	●	●	●	●
Check rear disc brake pad wear		●		●		●		●	
Check intactness of drive shaft bellows, power steering, joint caps and tightness of fuel and brake lines	●	●	●	●	●	●	●	●	●
Inspect conditions of: external bodywork and underbody protection (exhaust - fuel feed - brakes); rubber parts (boots - sleeves - bushings - etc.)	●	●	●	●	●	●	●	●	●
Inspect conditions of accessory drive Poly-V belt		●							●
Check handbrake lever travel		●		●		●		●	
Check exhaust emissions		●		●		●		●	
Check evaporation system operation				●				●	
Replace air cleaner cartridge		●		●		●		●	
Check fluids and top up if required (brakes, hydraulic clutch, power steering, windscreen washer, battery, engine coolant, etc.)	●	●	●	●	●	●	●	●	●
Replace timing belt and accessory drive Poly-V belt						●			
Replace spark plugs					●				
Check engine control system operation (via diagnostic socket)		●		●		●		●	
Check gearbox and differential oil level				●				●	
Change engine oil and filter (*)	●	●	●	●	●	●	●	●	●
Change brake fluid (or every 24 months)			●			●			●
Check dust/pollen filter	●	●	●	●	●	●	●	●	●

(*): Or every 18 months for lower mileage.

IMPORTANT:

Perfect operation and long working life of a car is strictly related to its good use and, above all, to the care with which regular service is performed.
Considering product evolution, new service schedules have been adopted.
The scheduled service coupons are planned at 20,000 km. It is, however, important to note that the car requires ordinary precautions, such as systematic fluid checks and topping up, tyre pressure checks, etc.
In any case, remember that the correct car maintenance is certainly the best way to ensure performance, safety, environmental friendliness and low running costs in time.

Additional operations

The following precautions are required in addition to the operations shown in the Service Schedule to ensure good operation of the car:
Every 1000 km or before long trips, check and top up if required:
- engine oil
- engine coolant
- brake/clutch fluid
- power steering fluid
- battery electrolyte
- tyre pressure
- windscreen washer fluid.

Engine oil

If the car is mainly used in one of the following especially demanding conditions:
- towing trailers
- dusty roads
- short, repeated trips (less than 7-8 km) with temperature below zero degrees centigrade
- engine frequently idling or long distances at slow speed (or after a long storage period)

we recommend changing the engine oil more frequently than shown in the Service Schedule.

Air cleaner

Replace the air cleaner more frequently than prescribed if the car is mainly used on dusty roads.

Brake pads

The brake pads are subject to different use and wear, according to conditions of use and to driving style.
Have the pad thickness checked at an Alfa Romeo Dealership as soon as the front brake pad warning light comes on.
As the car is equipped with front brake pad wear sensors only, check the rear pads when the front pads are replaced.
According to the car use, the rear brake pads may not need to be replaced immediately.
We recommend in this case to check them later.

Brake/clutch fluid

Brake fluid is hygroscopic, i.e. it absorbs moisture. To prevent faulty braking, change the brake fluid every two years, regardless of the mileage (see the Service Schedule).

Battery

Check the battery charge status, preferably at the beginning of winter, to prevent the electrolyte from freezing.
Perform this check more frequently if the car is mainly used for short trips or if permanent intake devices also running when the key is removed are fitted, especially those fitted after market.

Climate control system

To keep the system in perfect shape, simply turn it on once every fortnight - also in winter - and run the compressor for a few minutes.
Furthermore, we recommend having the system checked before the summer, when the system will be used.

Dust/pollen filter (cars with climate control only)

Have the filter checked once a year, preferably at the beginning of summer, by an Alfa Romeo Dealership.
If the car is frequently used in dusty or very polluted environments, we recommend you have the filtering element checked more frequently than shown in the Service Schedule.
The filter should be replaced in particular if decreased air intake into the passenger compartment is noticed.

Anti-freeze

We recommend topping up with Climafluid Super Permanent -40°C Alfa Romeo to preserve the protective features of the mixture.

Rubber hoses

The rubber hoses in the brake, power steering, fuel feed lines, etc. should be carefully checked at the frequency shown in the Service Schedule.

Wheels

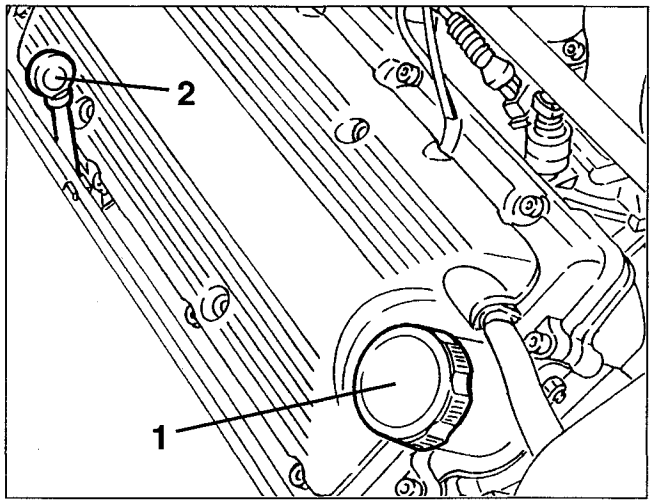
Periodically and before long trips, check the pressure of each tyre, including the spare.
Check pressure on cold tyres.
Periodically check that the depth of the tread complies with the minimum legal prescriptions.
Periodically check that the tyres are not cut, swollen or present irregular wear.
If this is so, go to an Alfa Romeo Dealership.
If a tyre is punctured, stop immediately and replace it to prevent damage to the tyre, the rim, the suspension and the steering.
The factory fitted wheels (rims and tyres) are suited to the features of the car and ensure maximum safety and comfort in all normal conditions of use.
Before replacing the rims or tyre fitted on the car, check the allowed type table.
However, observe the rim-tyre coupling of the original fitting.
Always fit new tyres.
Avoid tyres from unknown sources.

ENGINE MAINTENANCE

CHANGING THE ENGINE OIL AND FILTER

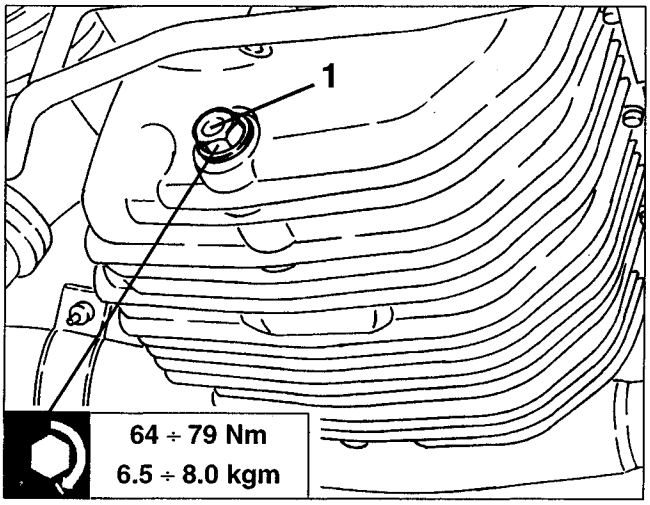
WARNING:
Engine oil is harmful to the skin: minimise contact of the oil with the skin; if not wash with soap and water.

1. With the engine hot, remove the topping up cap.
2. Remove the dipstick.



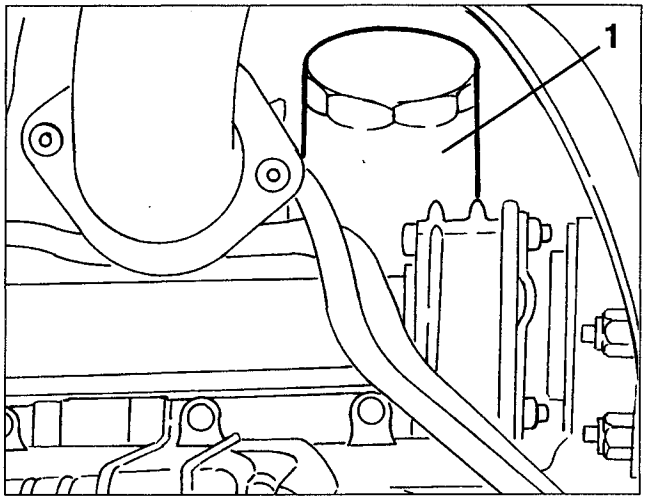
- Raise the car.
1. Slacken the drain plug and allow the oil to drain completely into a suitable container.

WARNING:
When removing the drain plug proceed with care; the oil could be very hot.



WARNING:
Do not discard the oil in the environment, as the indiscriminate dispersion of this product is a source of pollution.

1. Working under the car with the special wrench, release the oil filter and remove it.



- Clean the drain plug and screw it with its seal to the specified torque
- Moisten the seal of the new filter with engine oil and screw it tightening completely by hand.
- Lower the car.
- Fill with engine oil of the type and in the quantity specified.
- Check the level of the engine oil with the dipstick.

WARNING:
The oil level should be checked with the car on level ground. Oil level above the MAX mark may cause excessive evaporation of the oil resulting in lack of pressure.

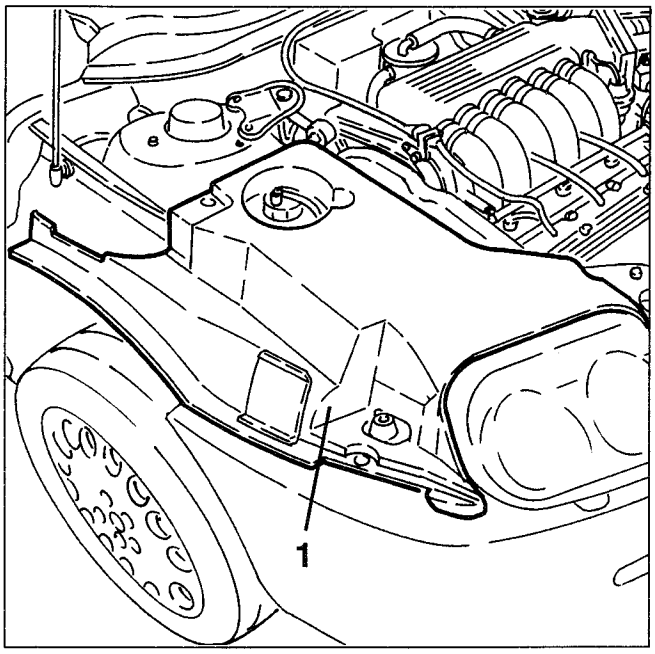
- Fit the topping up cap, run the engine at idle speed for appr. 2 minutes, then turn off the engine and wait for a few minutes.
- Check the oil level and for leaks.

WARNING:
When topping up the oil take the utmost care to avoid spilling it in the alternator ventilation slots which could cause serious damage to it and also the risk of fire.

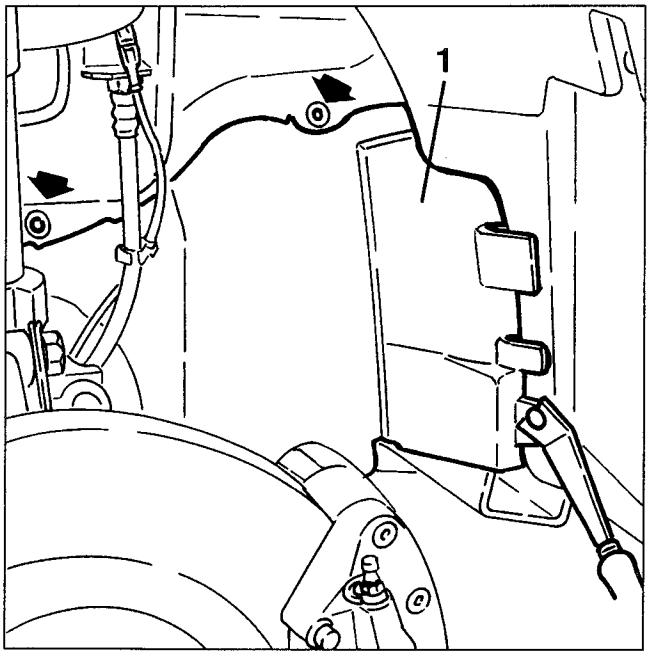
CHANGING THE TIMING GEAR DRIVE BELT

- Set the car on a lift.
- Disconnect the battery (-) terminal.
- Remove the right front wheel.

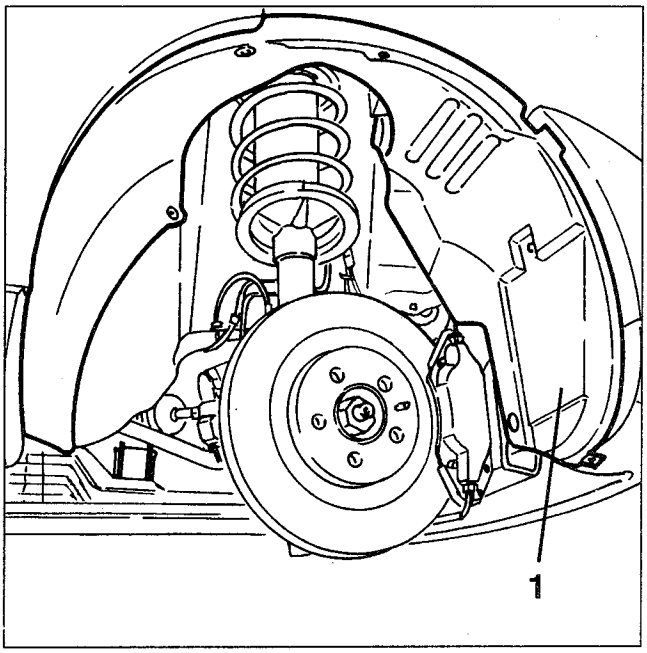
1. Slacken the fastening screws and remove the engine compartment right-hand trim.



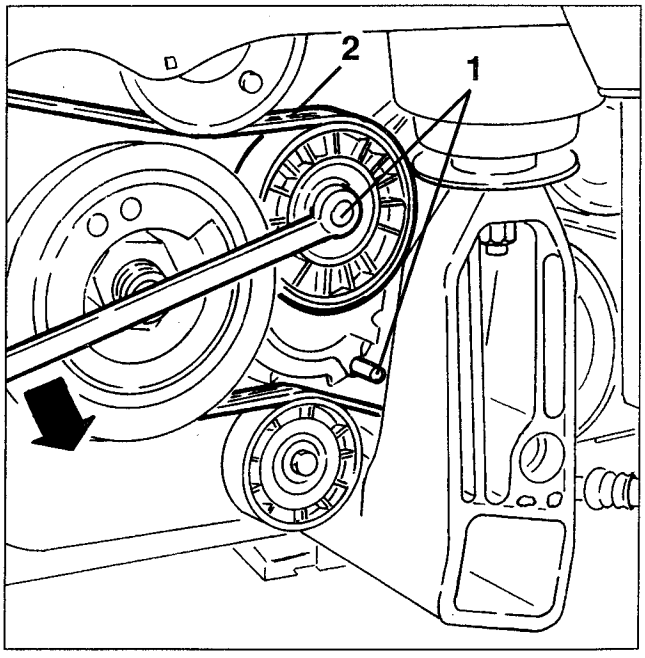
1. Slacken the two fastening screws, prise off the plastic button and remove the mud flap from the right front wheel house.



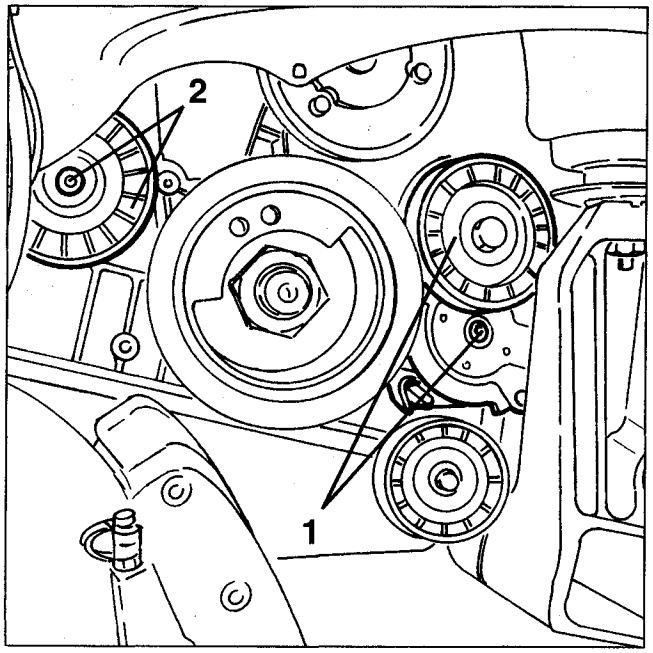
1. Slacken the fastenings and remove the right front wheel house.



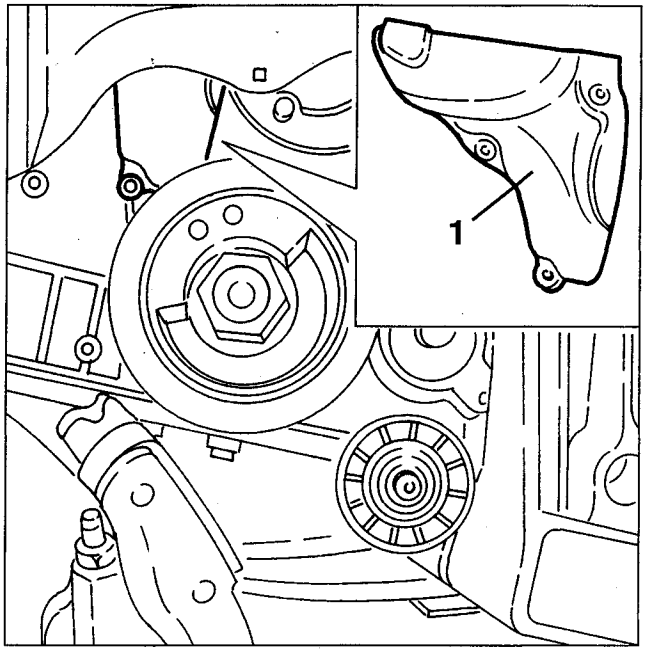
1. Using a wrench on the belt tensioner pulley fastening screw, overcome the force of the automatic tensioner and lock it in this position (belt slack) inserting the special peg as illustrated.
2. Prise and remove the auxiliary components drive belt.



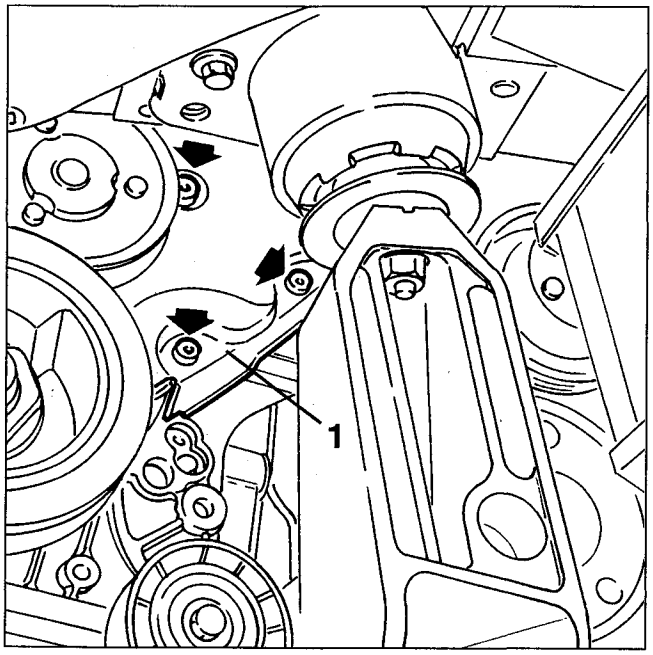
1. Slacken the fastening screw and remove the tensioner for the auxiliary components drive belt.
2. Slacken the fastening screw and remove the auxiliary components drive belt guide pulley.



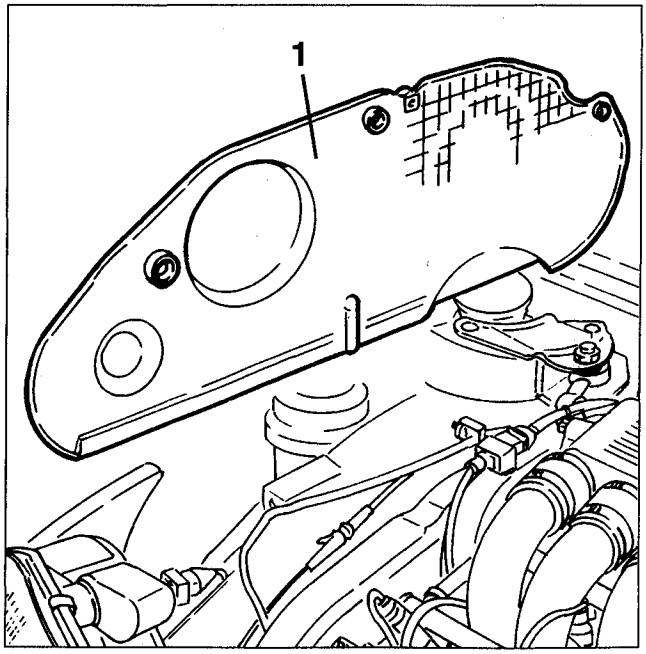
1. Slacken the fastening screws and remove the timing gear belt right lower guard.



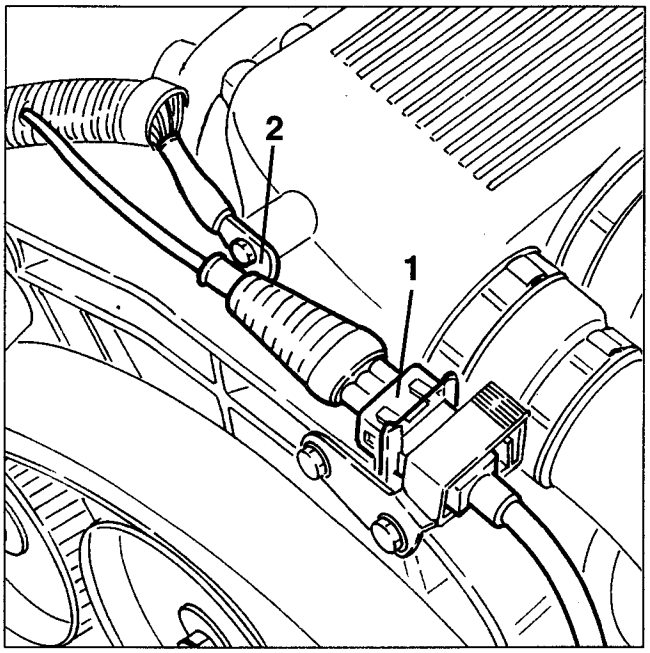
1. Slacken the fastening screws and remove the timing gear belt left lower guard.



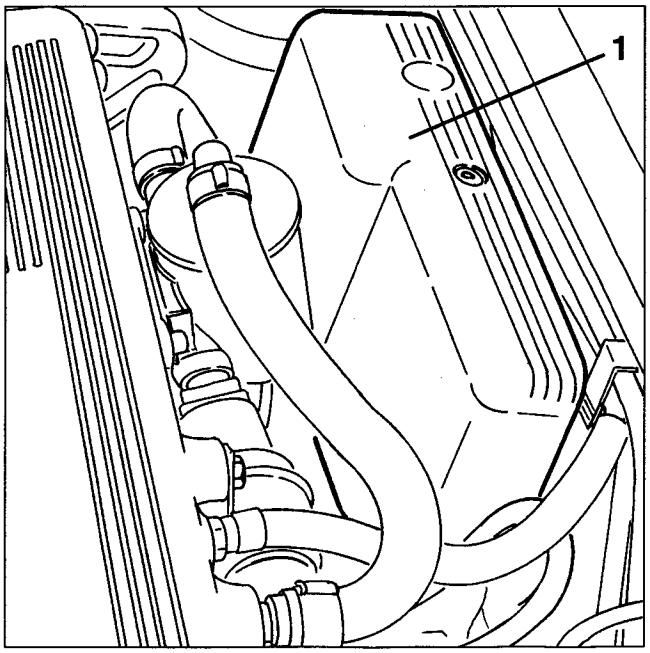
1. Slacken the fastening screws and remove the timing gear belt upper guard.



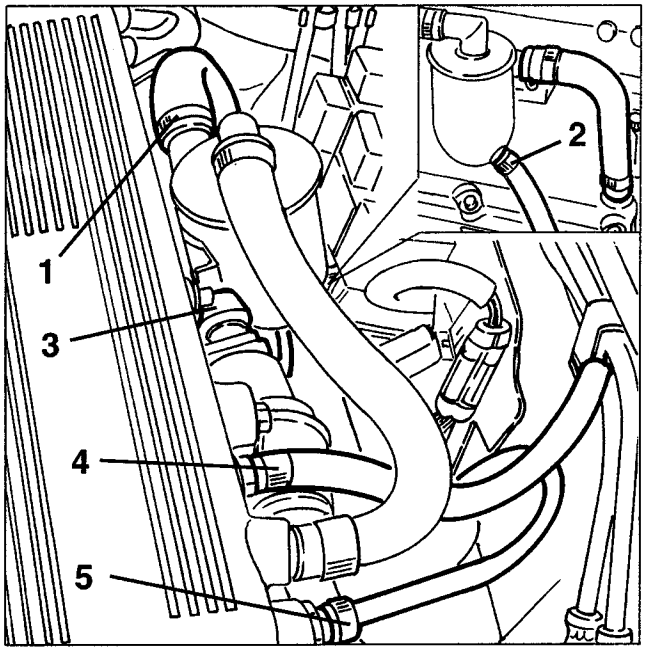
1. Disconnect the electrical connection of the front pinging sensor.
2. Disconnect the earth cable (front) from the intake box.



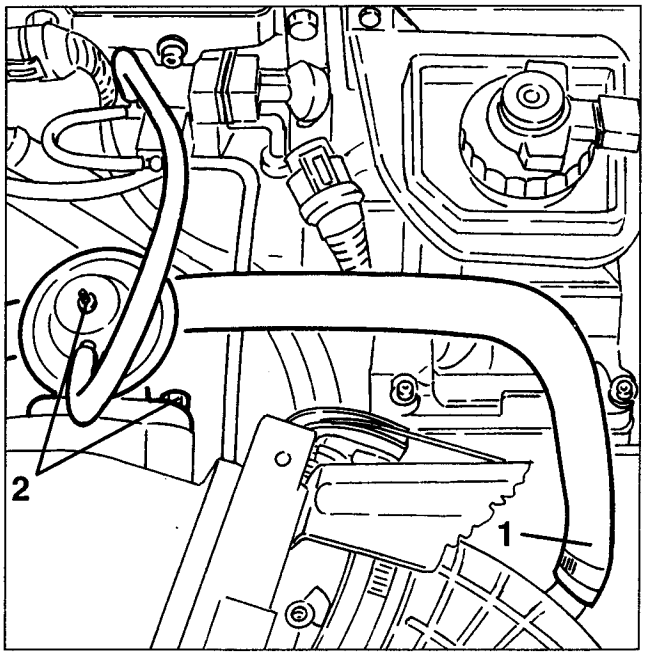
1. Remove the cover from the relays, fuses and electrical connections.



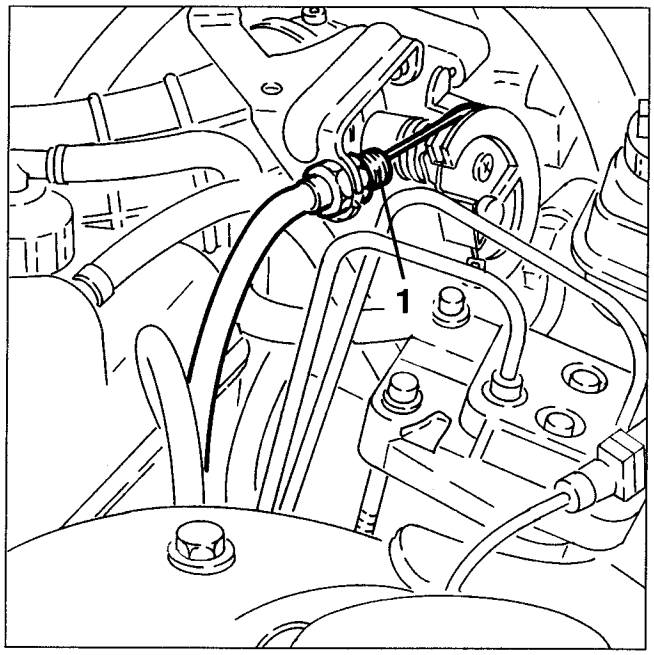
1. Disconnect the oil vapour recovery pipe from the separator
2. Disconnect the condensed oil recovery pipe from the separator.
3. Disconnect the electrical connection from the constant idle actuator.
4. Disconnect the fuel vapour recovery pipe from the intake box.
5. Disconnect the servobrake vacuum takeoff pipe from the intake box.



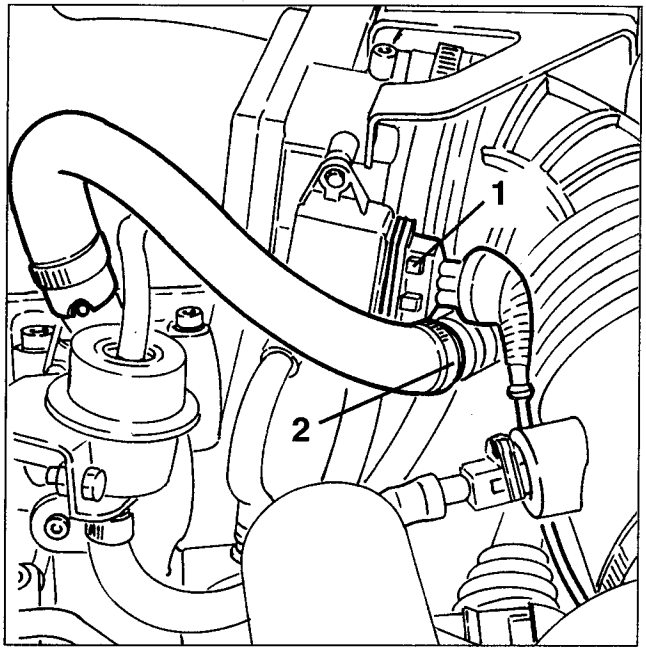
1. Disconnect the air inlet pipe for the constant idle speed actuator from the corrugated sleeve.
2. Slacken the two fastening nuts and remove the E.G.R. valve from the intake box.



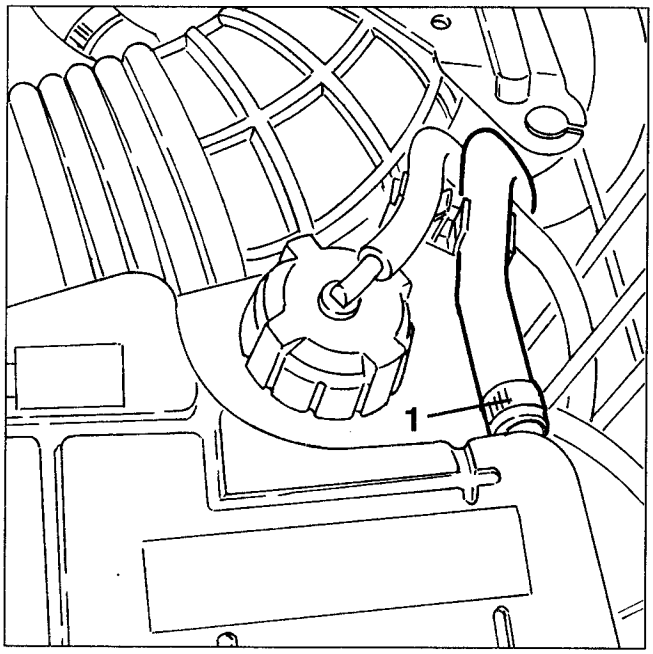
1. Disconnect the accelerator cable from the throttle cam.



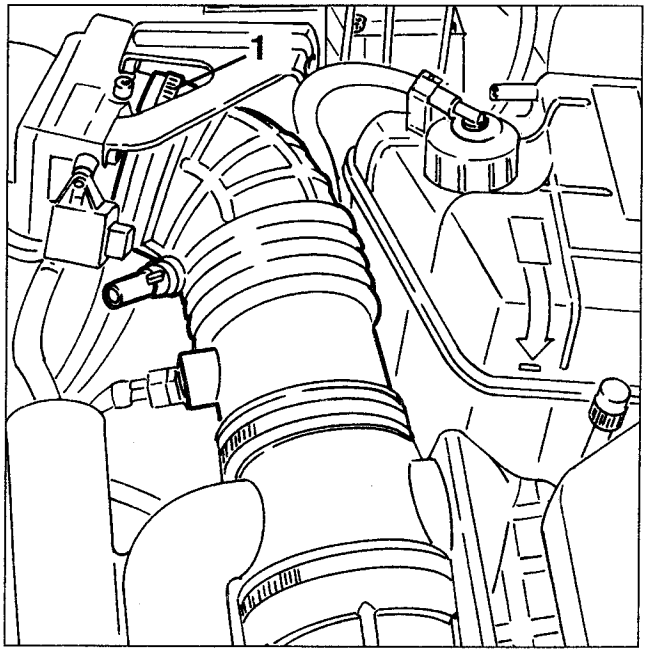
1. Disconnect the electrical connection from the throttle potentiometer.
2. Disconnect the oil vapour recovery pipe leading from the right cylinder head from the corrugated sleeve.



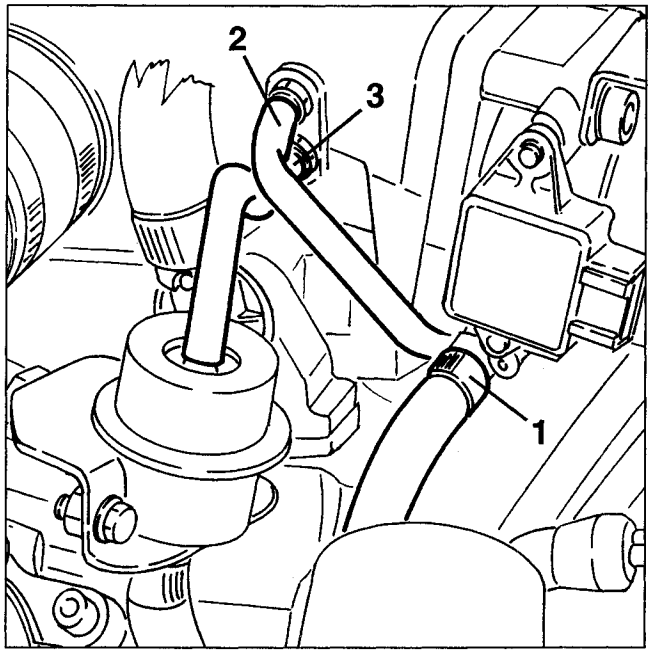
1. Disconnect the engine coolant return pipe from the throttle body from the expansion tank.



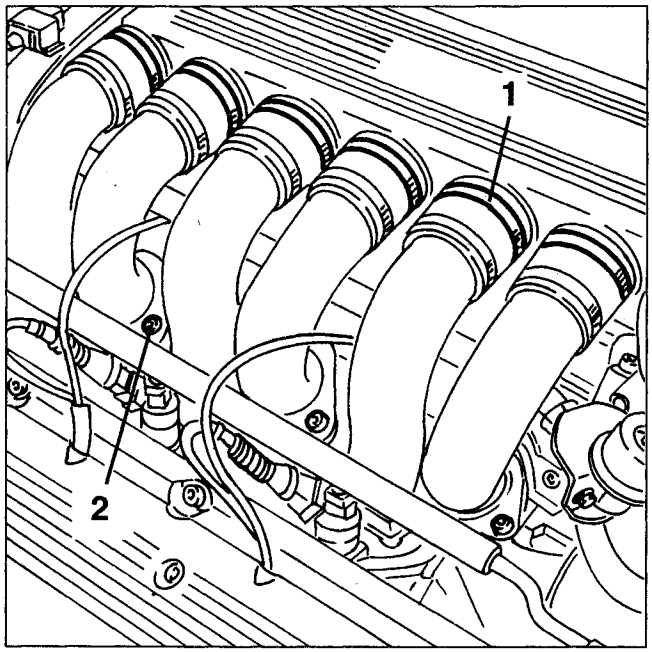
1. Slacken the fastening clamp and disconnect the corrugated sleeve from the throttle body.



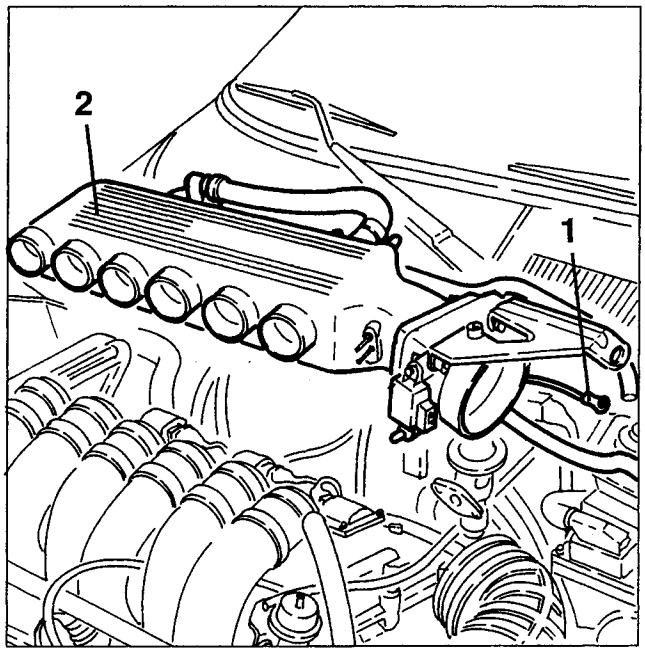
1. Disconnect the coolant fluid inlet pipe from the throttle body.
2. Disconnect the vacuum takeoff pipe for the E.G.R. modulating valve from the intake box.
3. Disconnect the vacuum takeoff pipe for the fuel pressure regulator from the intake box.



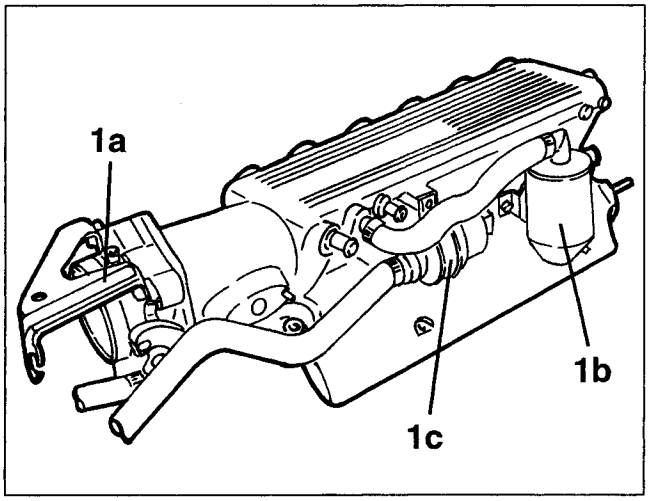
1. Slacken the clamps fastening the air supply ducts to the intake box.
2. Slacken the fastening screws of the cylinder head supply ducts.



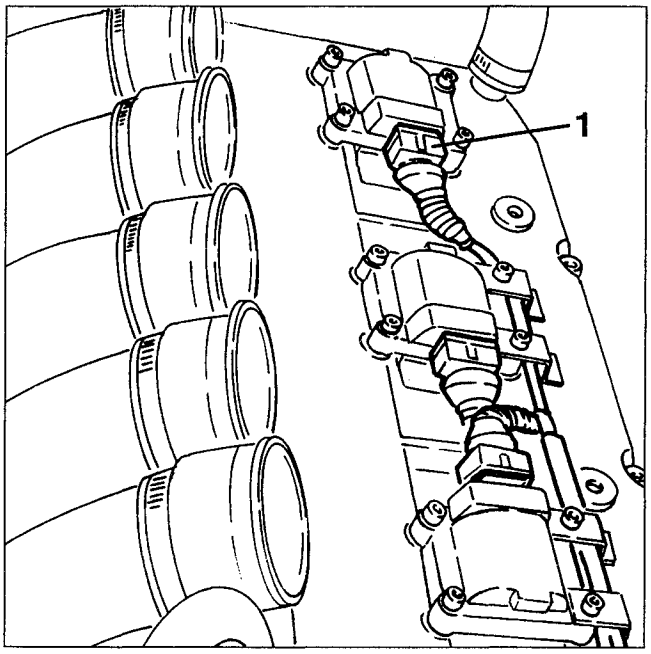
1. Disconnect the earth cable (rear) from the intake box.
2. Slacken the two fastening screws and remove the complete intake box.



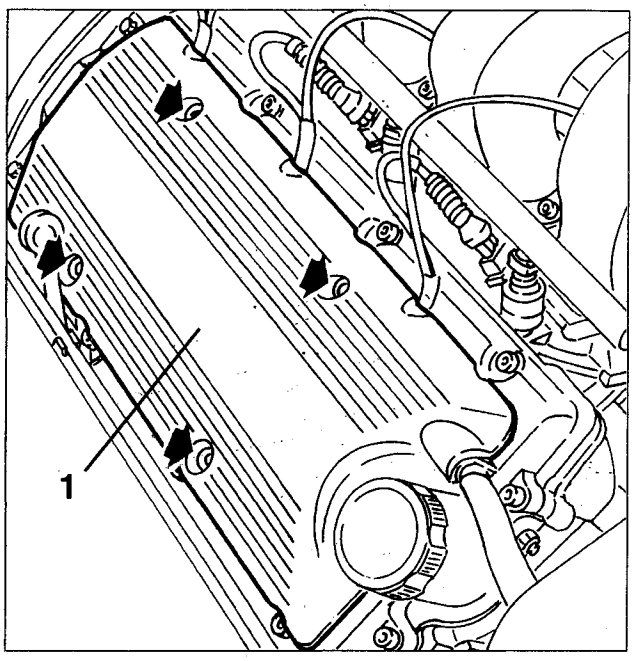
1. If necessary, on the bench separate the throttle body (1a), the oil vapour separator (1b) and the constant idle actuator (1c).



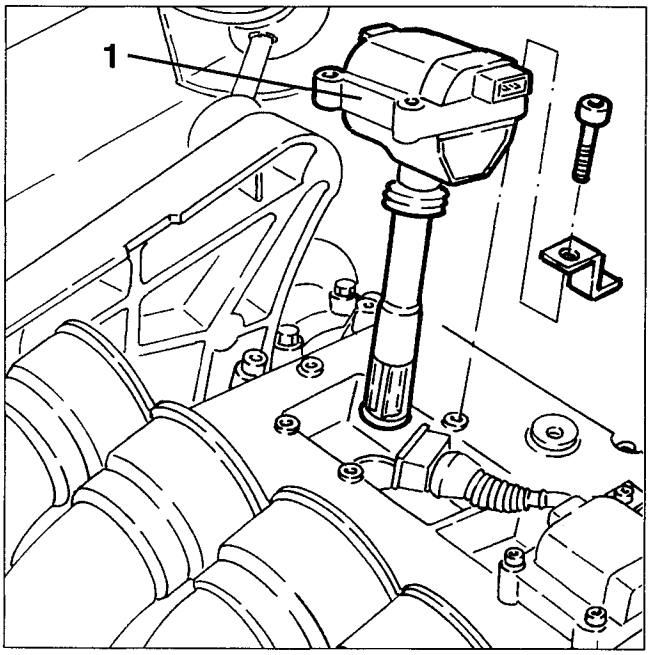
1. Disconnect the electrical connections from the ignition coils of the right cylinder head.



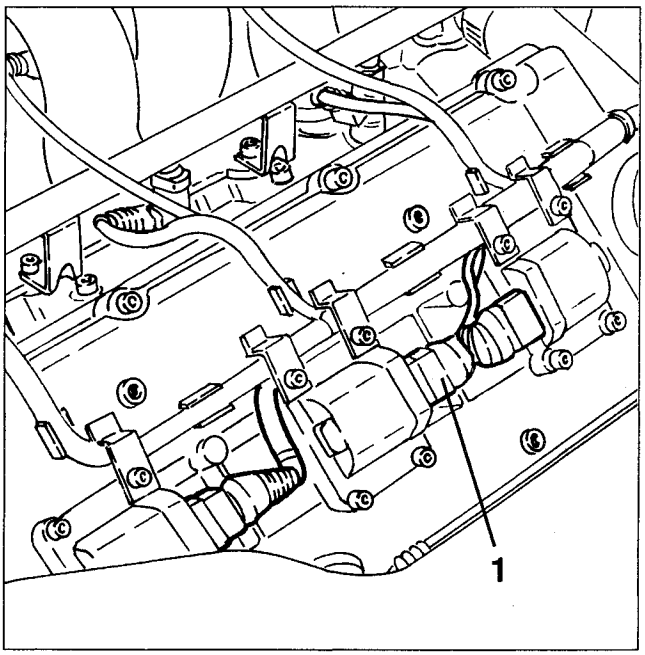
1. Slacken the fastening screws and remove the cover of the ignition coils of the left cylinder head.



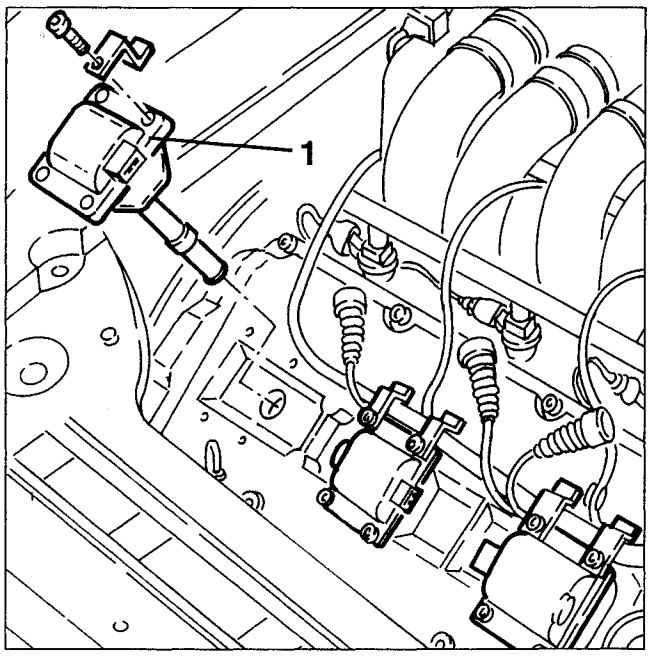
1. Slacken the fastening screws and remove the ignition coils from the right cylinder head.



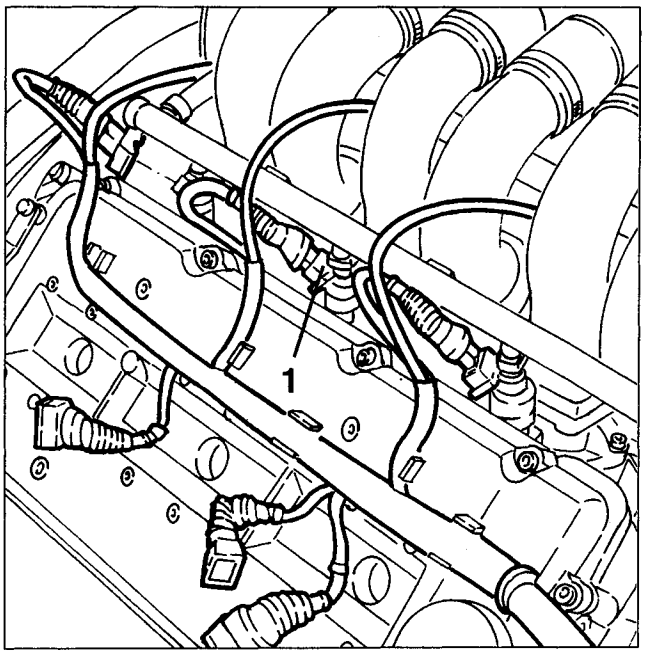
1. Disconnect the electrical connections from the ignition coils of the left cylinder head.



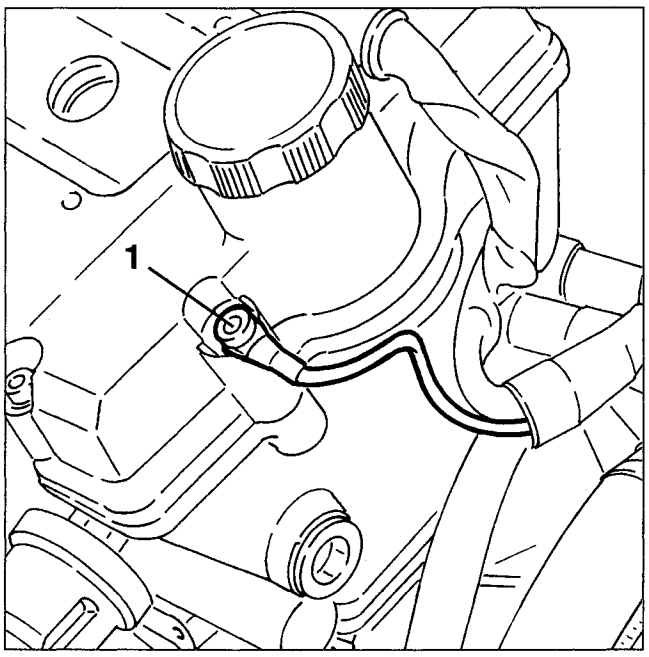
1. Slacken the fastening screws and remove the ignition coils from the left cylinder head.



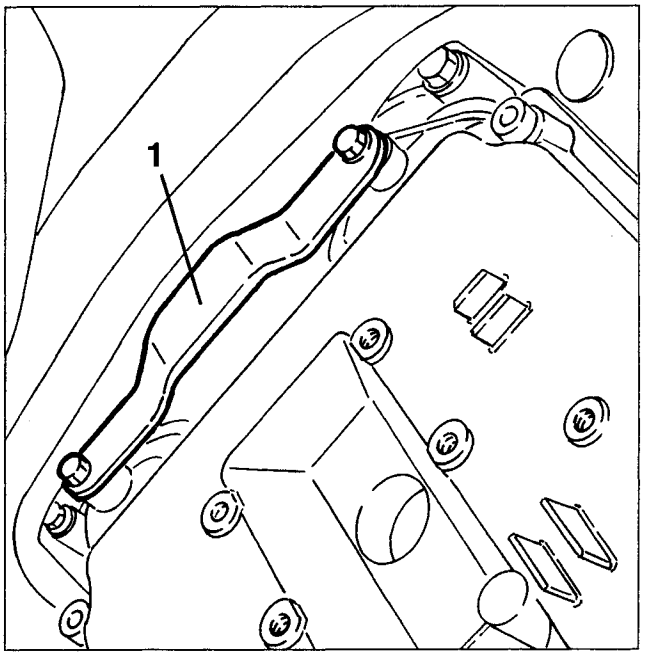
1. Disconnect the electrical connections from the injectors, then move the wiring to one side.



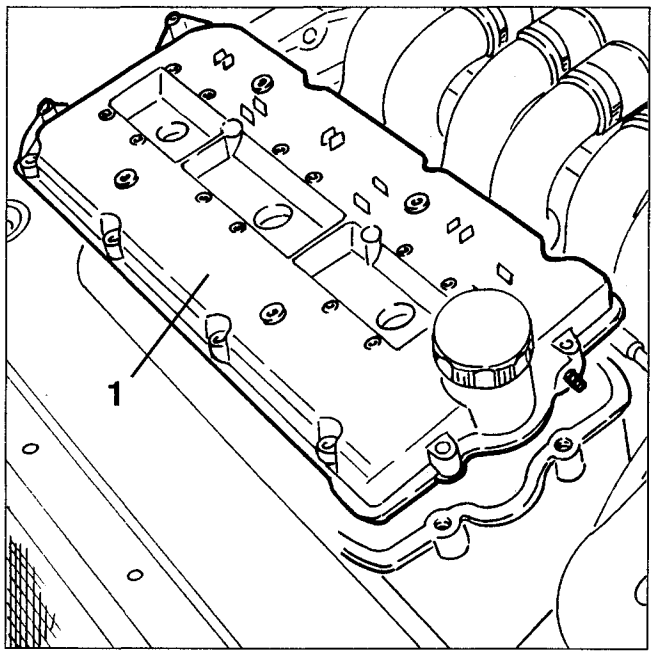
1. Disconnect the earth cable from the left cylinder head.



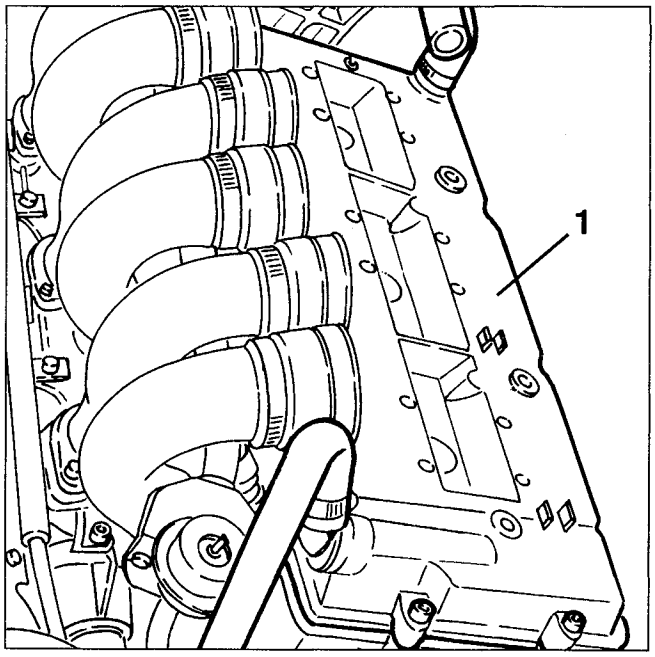
1. Slacken the fastening screws and remove the bracket complete with threaded nut for fastening the timing gear belt upper guard from the left cylinder head.



1. Slacken the fastening screws and remove the cover from the left cylinder head.



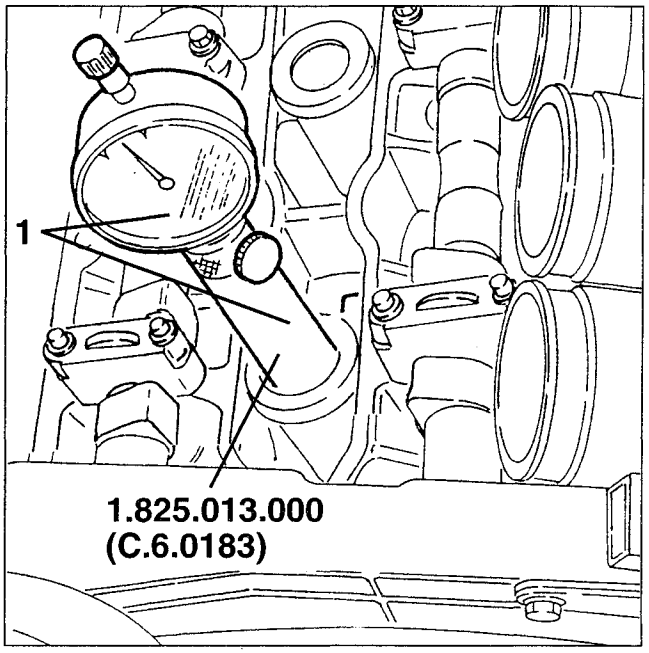
1. Slacken the fastening screws and remove the cover from the right cylinder head.



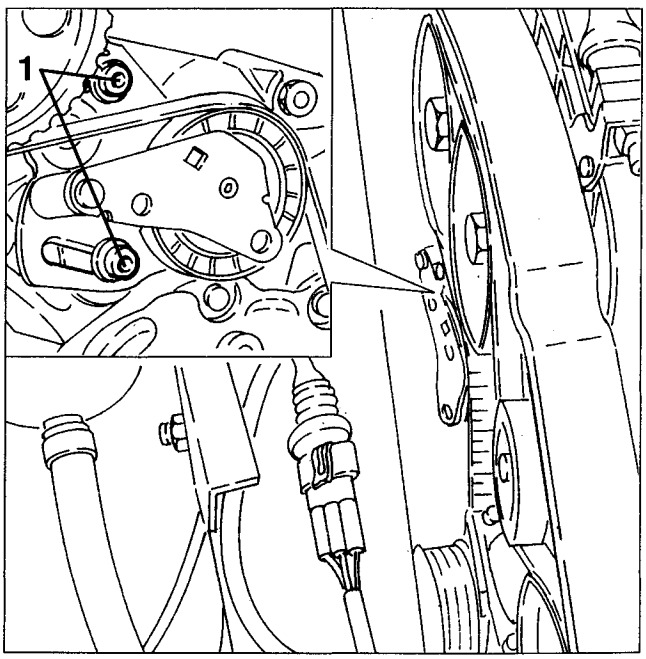
1. Install tool no. 1.825.013.000 (C.6.0183) in the housing of the first cylinder spark plug.

- Working on the fastening nut from the auxiliary components drive pulley, make the crankshaft turn a little (both ways) until the piston of the 1st cylinder reaches the T.D.C. in the bursting stroke.

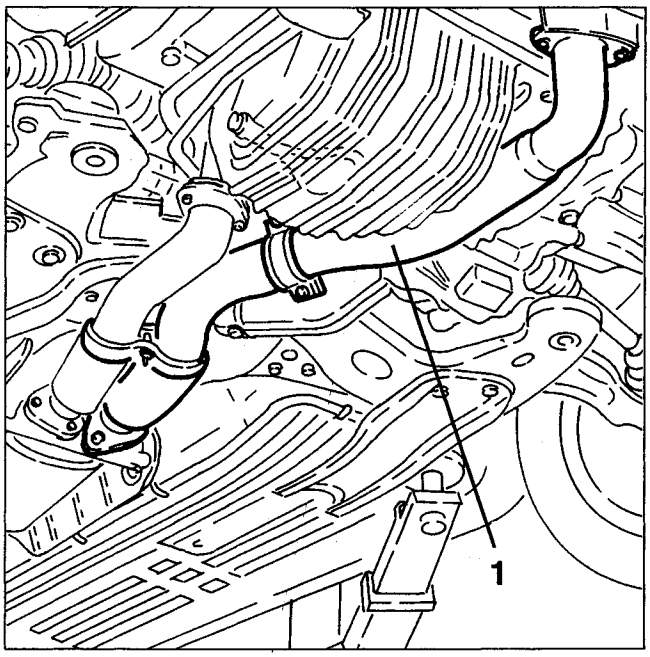
NOTE: Make sure that the last turn of the crankshaft is in the operating direction.



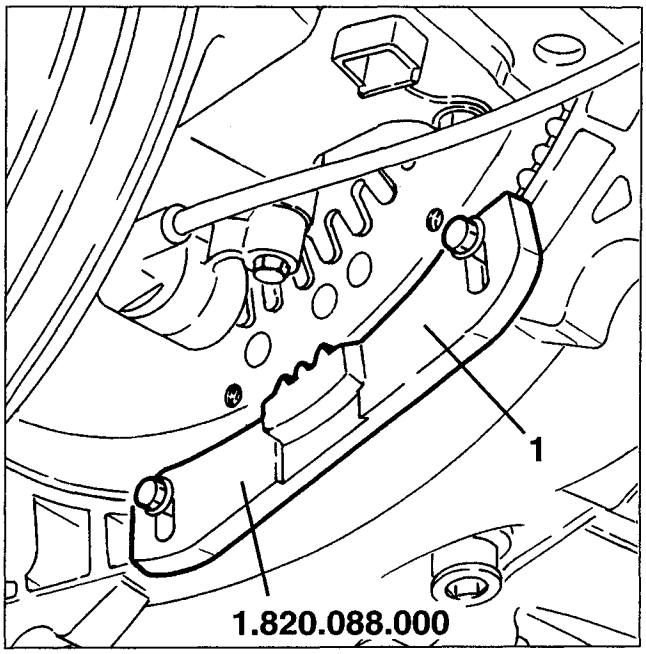
1. Slacken the two screws fastening the belt tensioner for the timing gear drive belt.



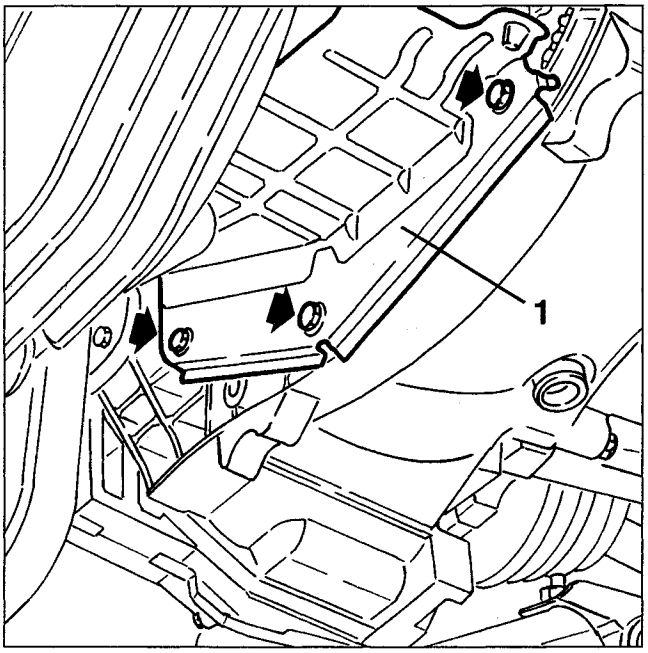
1. Raise the car, slacken the fastenings, then remove the front section of exhaust pipe only of the left cylinder head.



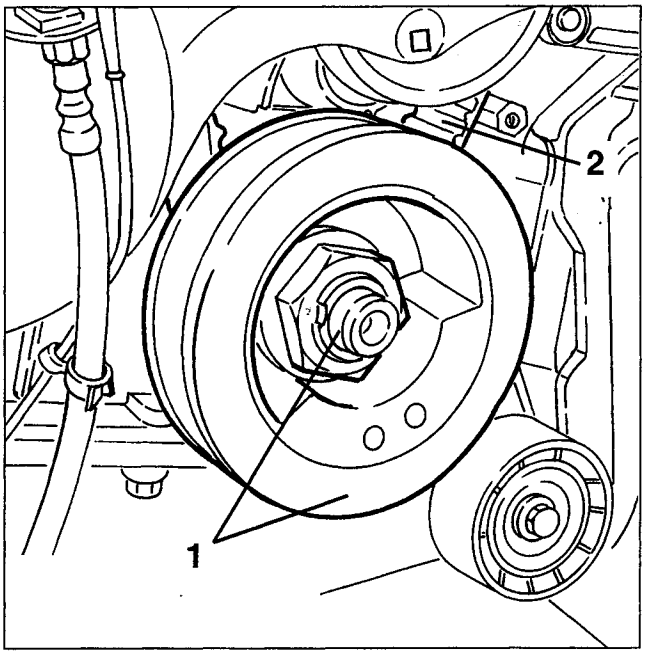
1. Install the flywheel stopper tool no. 1.820.088.000.



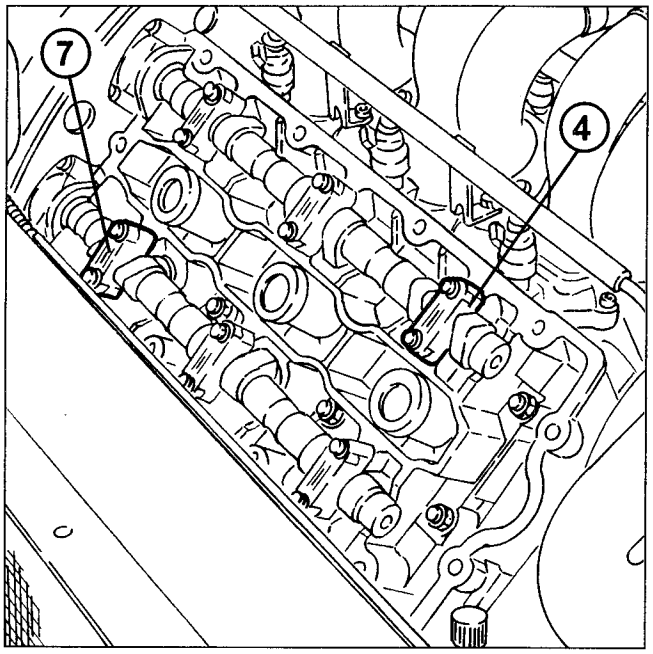
1. Slacken the fastening screws and remove the flywheel guard.

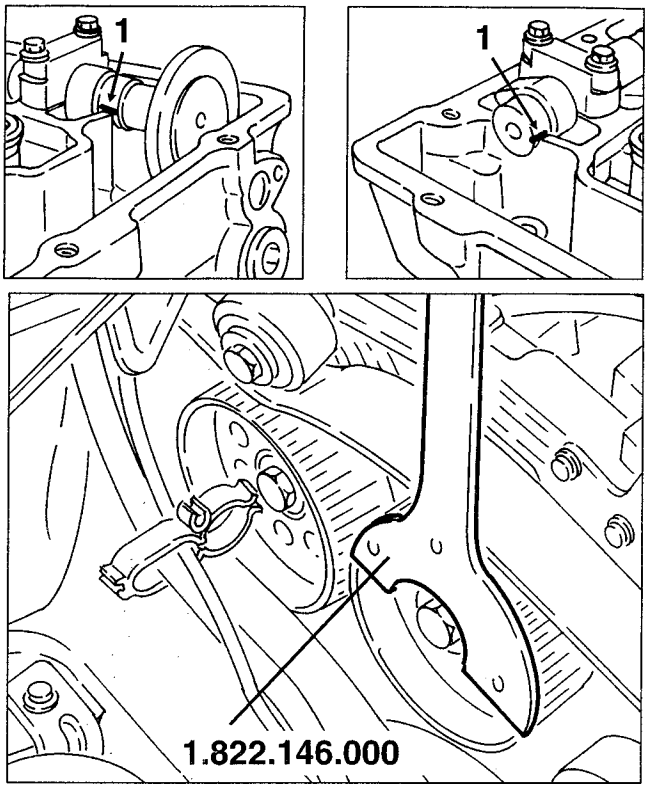


1. Remove the caulking and remove the fastening nut, then remove the auxiliary components drive pulley.
2. Prise and remove the timing gear drive belt.

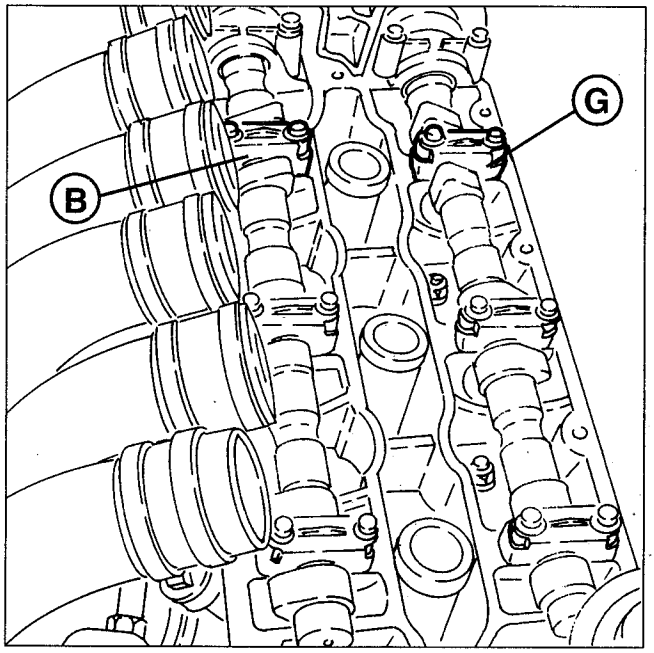


- Remove the camshaft caps **4** and **7** for the left cylinder head.





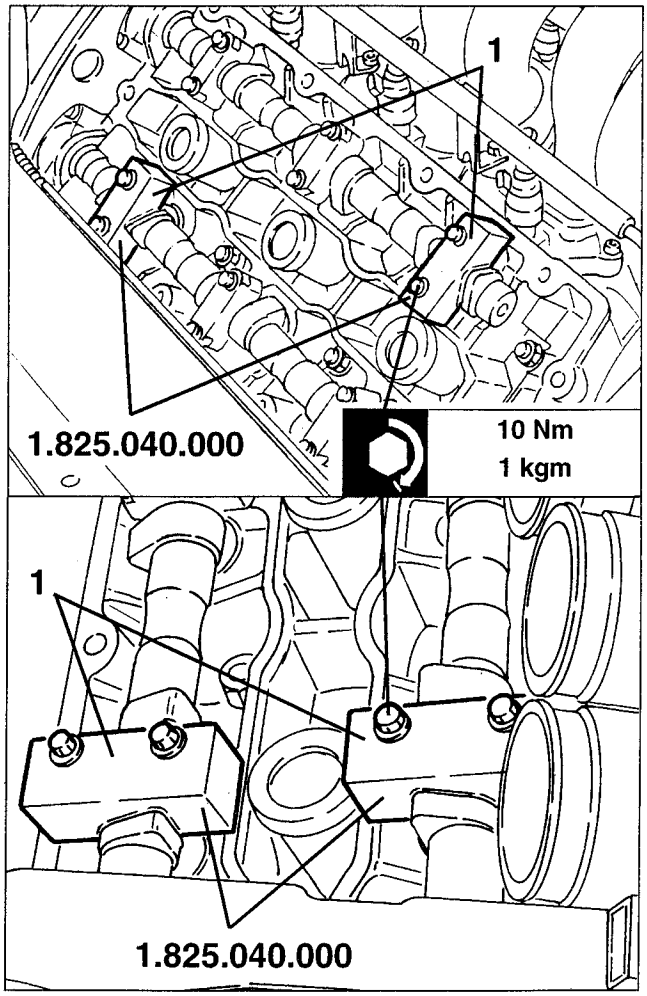
- Remove the camshaft caps **B** and **G** for the right cylinder head.



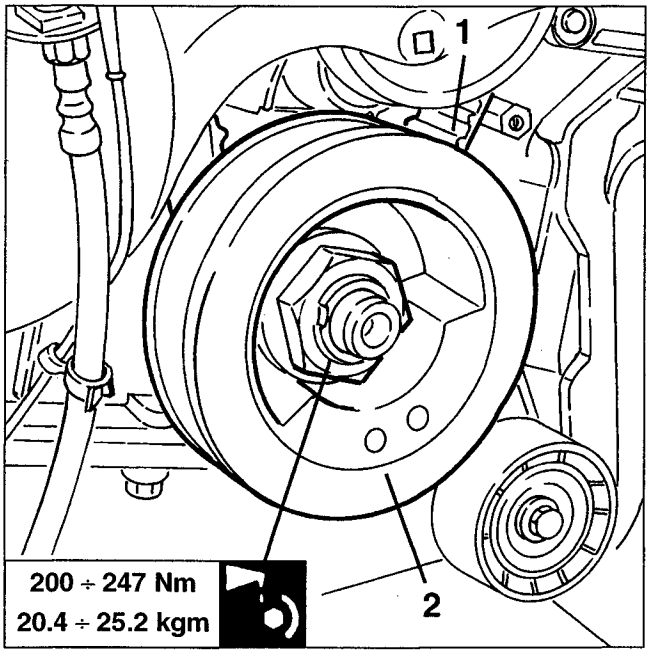
1. Using tool no. 1.822.146.000, turn each camshaft until the reference notches on them coincide with the upper surface of the cylinder head.

NOTE: The reference notches should face the centre of each head.

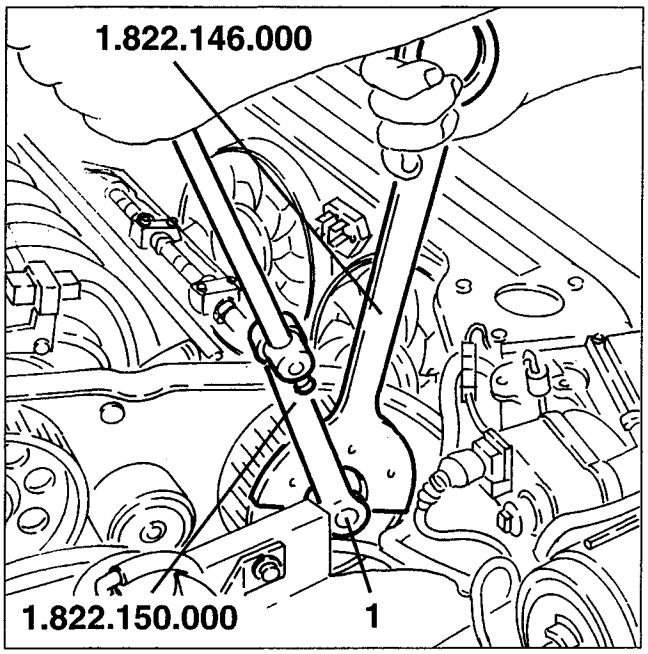
1. In place of the removed camshaft caps set templates no. 1.825.040.000 in the position shown by the stamping on the templates.



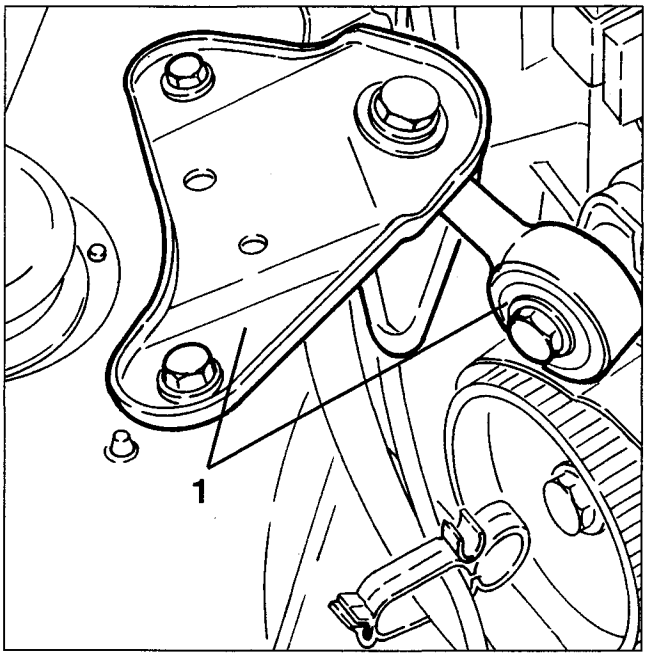
1. Raise the car and fit a new timing gear belt on the crankshaft drive pulley.
2. Fit the auxiliary components drive pulley and tighten the fastening nut to the specified torque.
- Remove the flywheel stopper tool no. 1.820.088.000 installed previously.



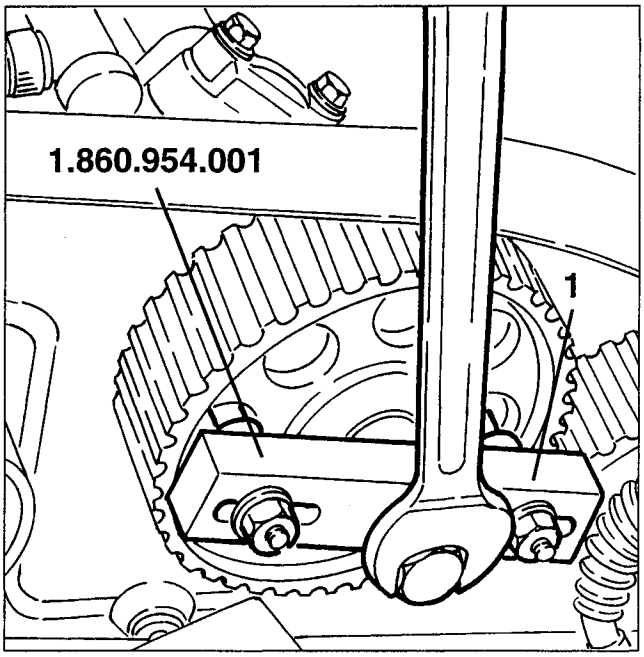
1. Lower the car and using extension no. 1.822.150.000 and tool no. 1.822.146.000 as counter torque, slacken the fastening screws of the camshaft drive pulleys.



1. Slacken the fastening screws and remove the engine stay connecting rod complete with support bracket.

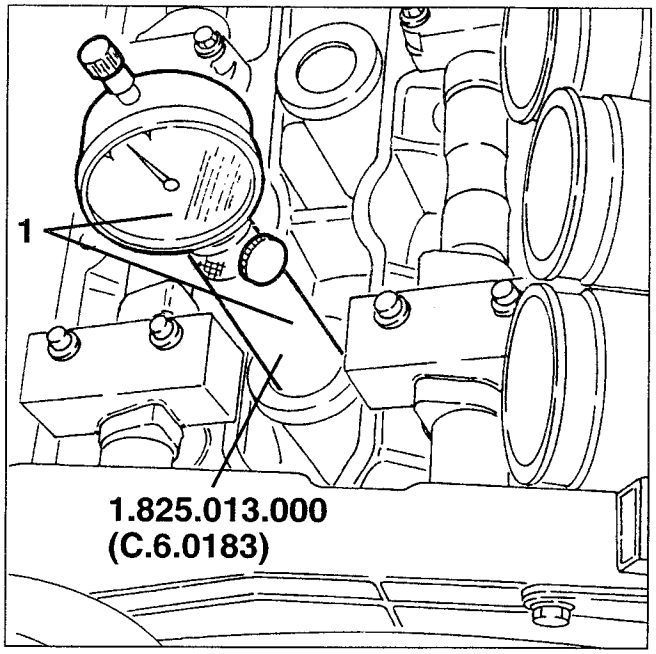


1. Using tool no. 1.860.954.001 remove the drive pulleys from the camshafts, then reposition them tightening the screws by hand.

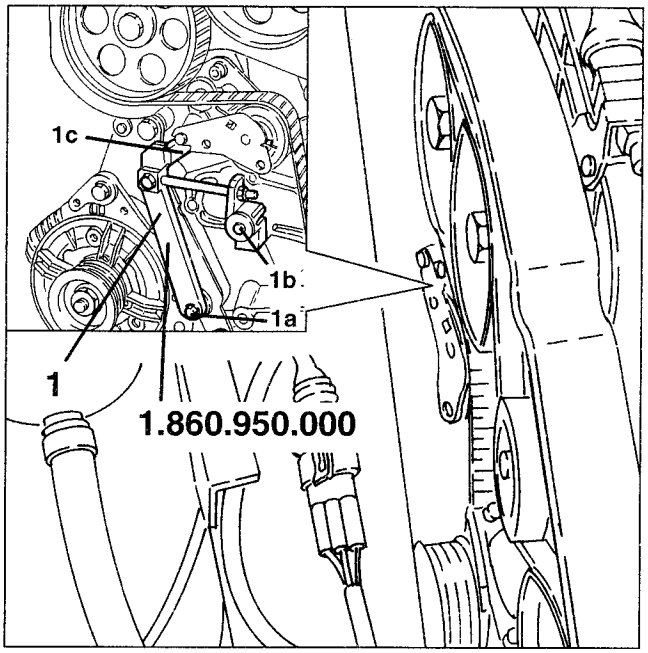


1. Working on the fastening nut from the auxiliary components drive pulley, make the crankshaft turn a little (both ways) until the piston of the 1st cylinder reaches the T.D.C. in the bursting stroke.

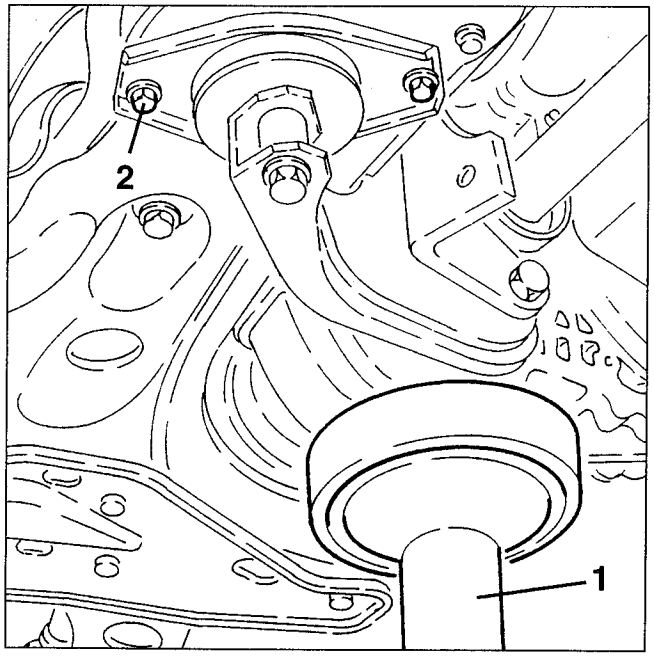
NOTE: Make sure that the last turn of the crankshaft is in the operating direction.



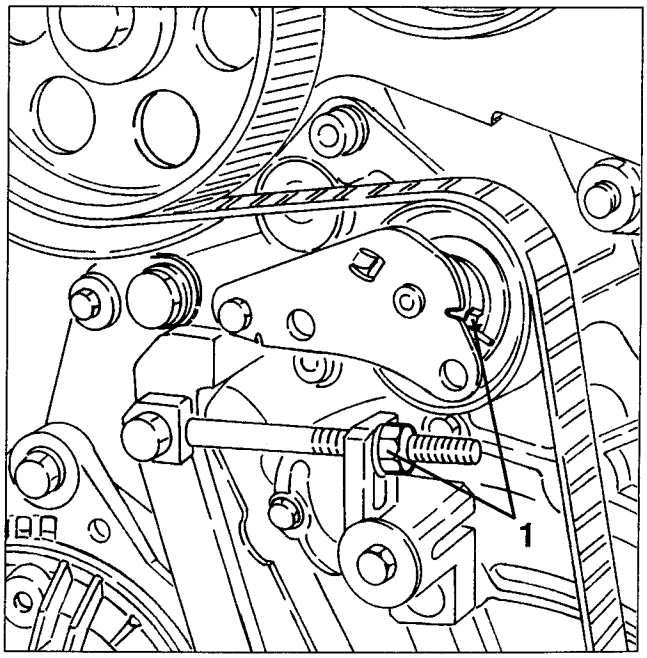
1. Install tool no. 1.860.950.000 for tensioning the timing gear drive belt fastening it with the screw removed previously (1a) to the alternator and with screw (1b) to the water pump, pin (1c) of the tool should lever on the mobile part of the belt tensioner.



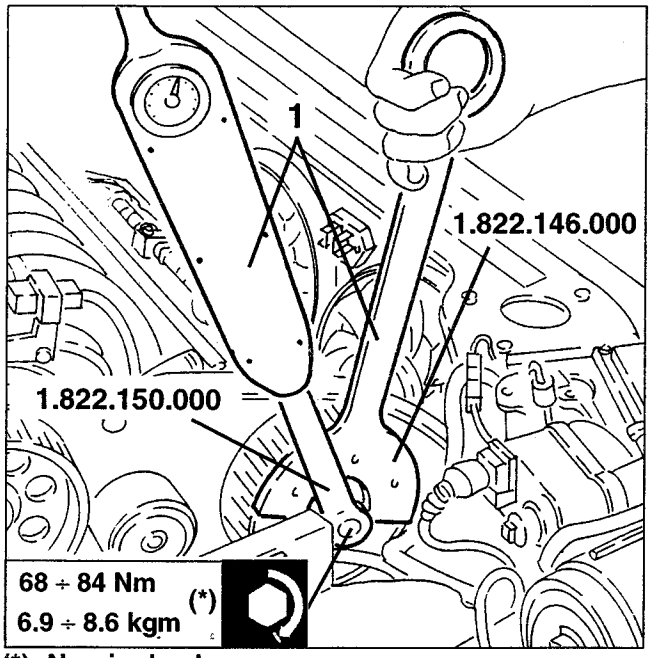
- Complete assembly of the timing gear drive belt fitting it on the camshaft drive pulleys.
1. Place a hydraulic jack under the differential as illustrated.
2. Slacken the two screws fastening the power unit rear support to the suspension cross rail.
- Remove the lower alternator fastening screw.



1. Working on the nut illustrated move the notch of the mobile index under the fixed notch of the tensioner.

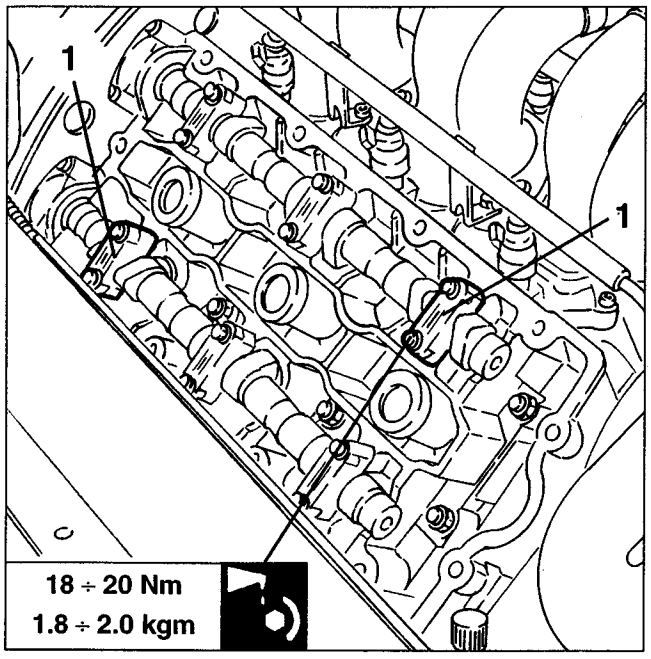


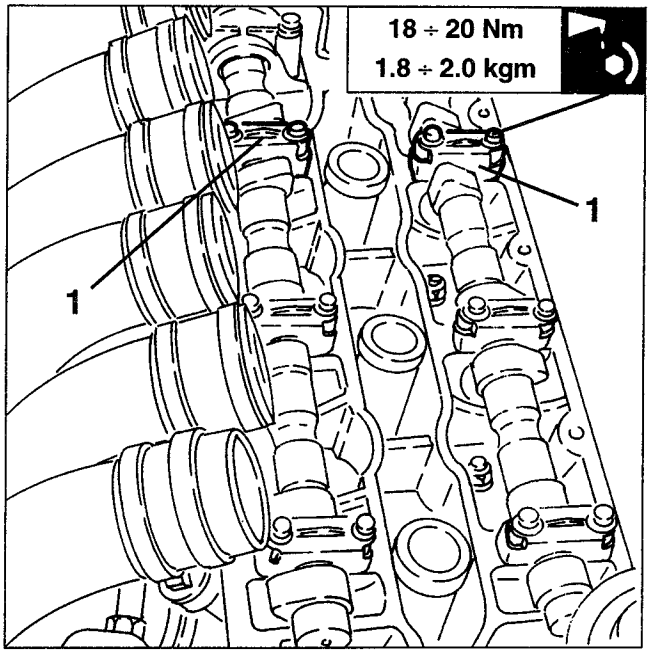
1. Using extension no. 1.822.150.000 and tool no. 1.822.146.000 as counter torque, tighten the camshaft drive pulley fastening screws to the specified torque.



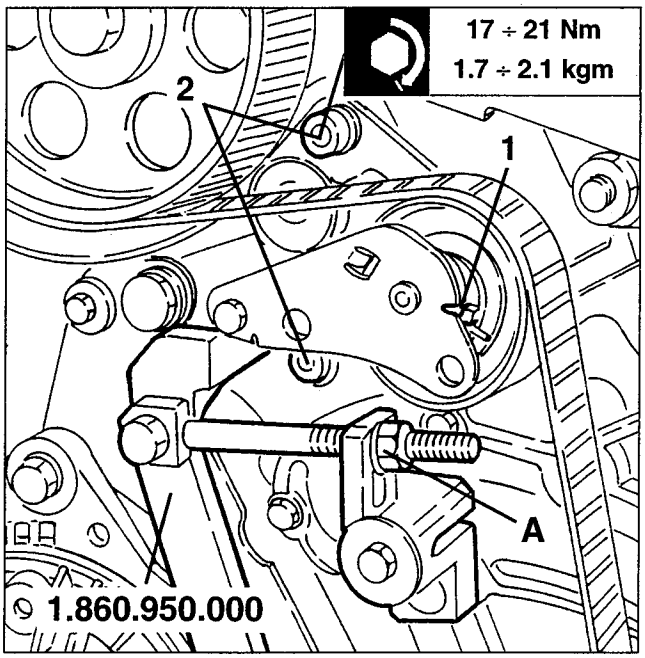
(*): Nominal value

1. Remove the templates no. 1.825.040.000 installed previously and in place of them fit the respective caps and tighten the fastening screws to the specified torque.





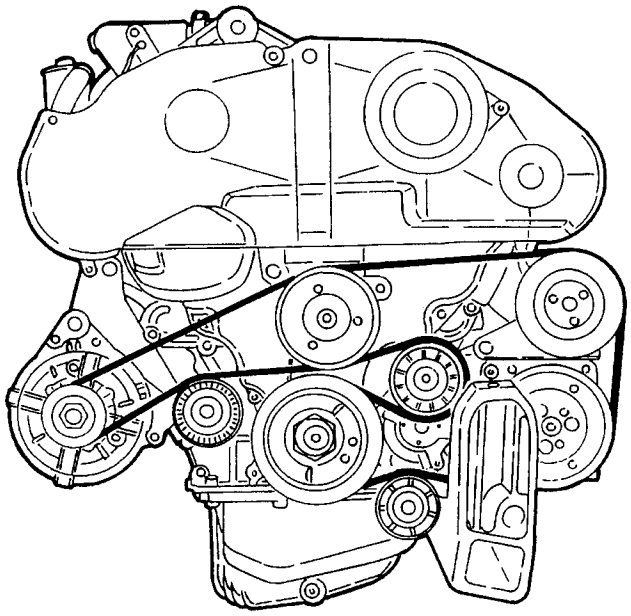
- Turn the crankshaft twice in its direction of rotation to allow the timing gear drive belt to settle.
1. Make sure that the fixed index of the tensioner coincides with the mobile index; if not slightly relieve the tension of the tensioner working on the nut (A) until the indexes coincide.
2. Tighten the belt tensioner fastening screws to the specified torque and remove tool no. 1.860.950.000 used for tensioning.



- Complete refitting reversing the sequence followed for disassembly.

AUXILIARY COMPONENTS BELT

The drive to the engine auxiliary components is transmitted through the single Poly V belt.
This belt is tensioned by an automatic tensioner: therefore it is unnecessary to check tensioning.



Replacement

- Set the car on a lift.
- Remove the right front wheel and mud flap.

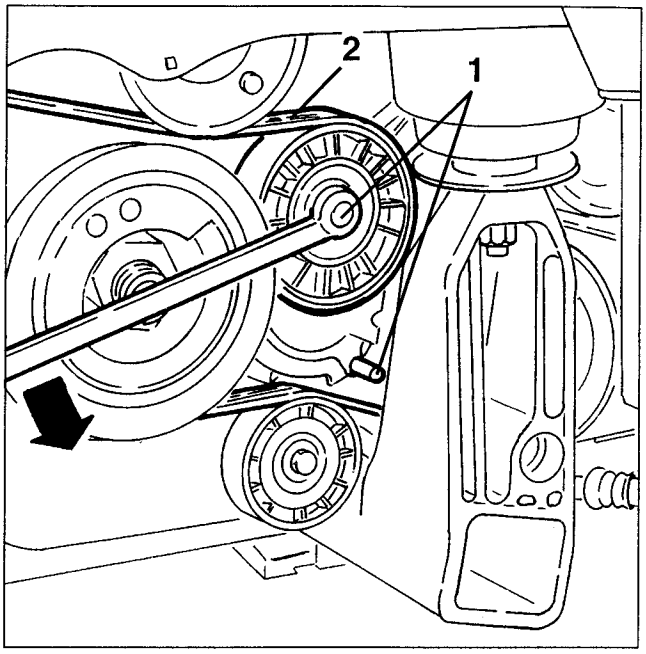
- Visually check that the belt is intact and in particular for the absence of:
• cuts
• cracks
• surface wear of the material (which appears smooth and shiny)
• dry or stiff parts (lack of adherence).

In the presence of any one of the above defects, replace the belt.

WARNING:
Contact of the belt with oil or solvents may compromise the elasticity of the belt rubber and reduce its adherence.

1. Working with a wrench on the belt tensioner pulley fastening screw, overcome the force of the automatic tensioner and lock it in this position (belt slack) inserting the special peg as illustrated.

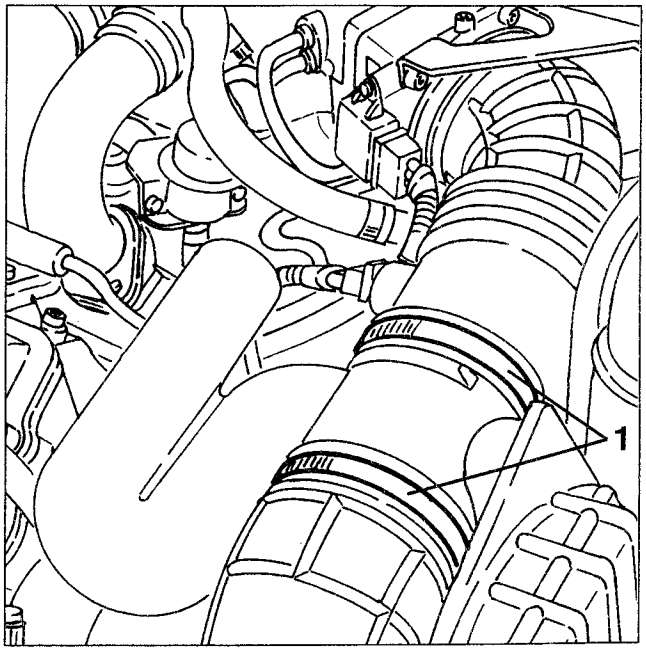
2. Prise and remove the auxiliary components belt.



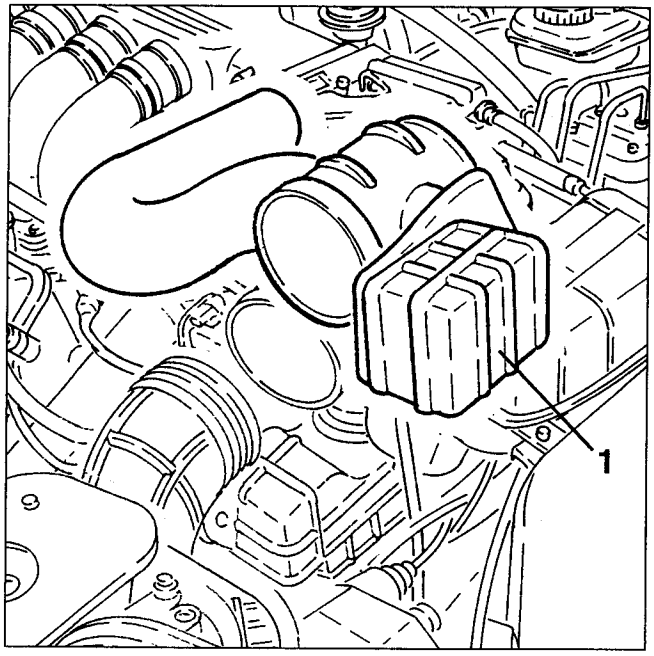
- Assemble a new belt reversing the sequence followed for removal.

CHANGING THE AIR CLEANER CARTRIDGE

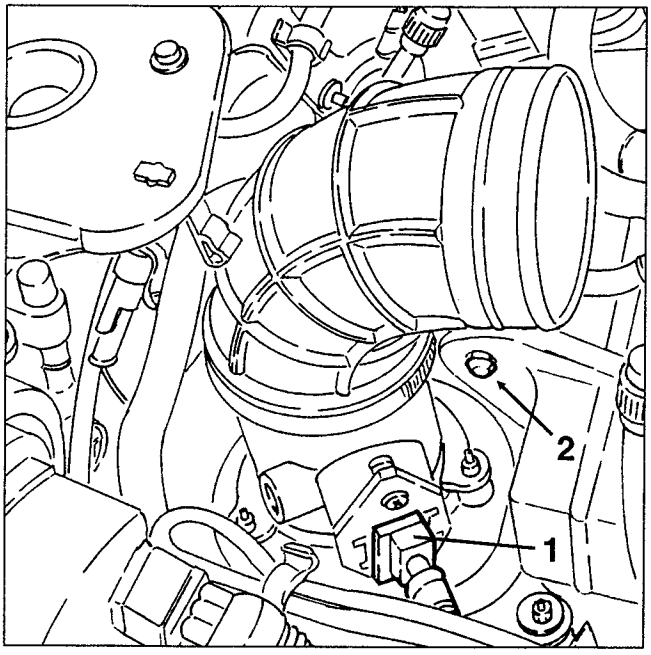
- Disconnect the battery (-) terminal.
- Remove the engine compartment trim on the left hand side
1. Slacken the two clamps fastening the resounder to the corrugated sleeve.



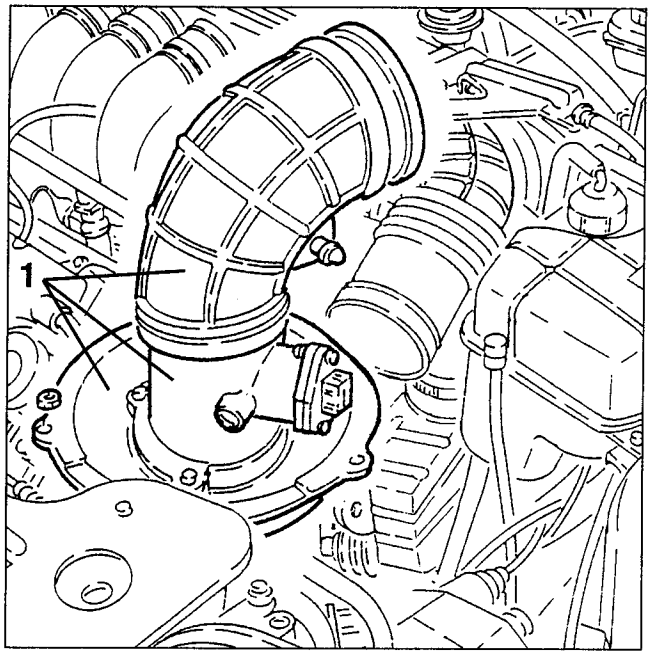
1. Withdraw and remove the upper resounder.



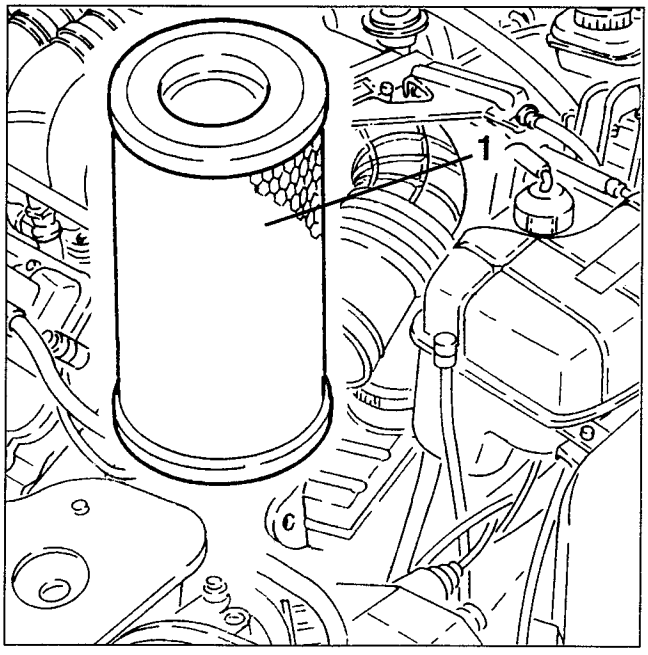
1. Disconnect the electrical connection from the hot film flow meter
2. Remove the button fastening the elbow of the corrugated sleeve to the resounder.



1. Slacken the three fastening nuts and remove the air cleaner cover complete with hot film flow meter and corrugated sleeve.



1. Remove the filtering element with its duct.

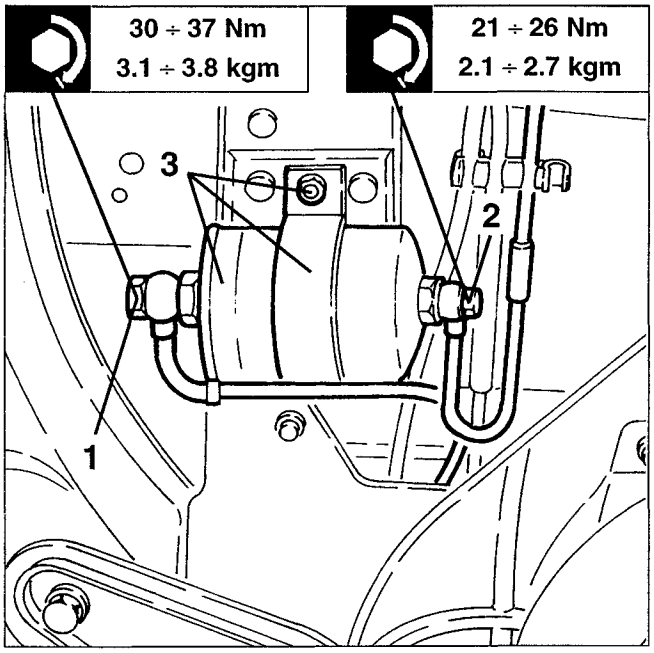


WARNING:
Any cleaning operation may damage the cleaner with the risk of compromising operation of the engine.

- Fit a new air cleaner reversing the sequence followed for removal.

CHANGING THE FUEL FILTER

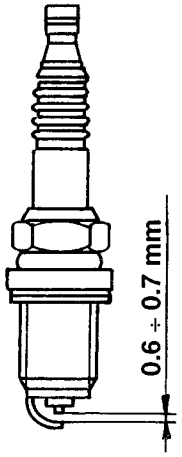
- Set the car on a lift and raise it.
1. Disconnect the fuel inlet pipe fitting from the filter.
2. Disconnect the fuel outlet pipe fitting from the filter.
3. Slacken the fastening clamp and remove the fuel filter.



- Refit the new filter reversing the sequence followed for removal and adhering to the following instructions:
• replace the copper seals of the fittings;
• assemble the filter so that the arrow stamped on it is in the direction of the flow of fuel.

CHECKING AND CHANGING THE SPARK PLUGS

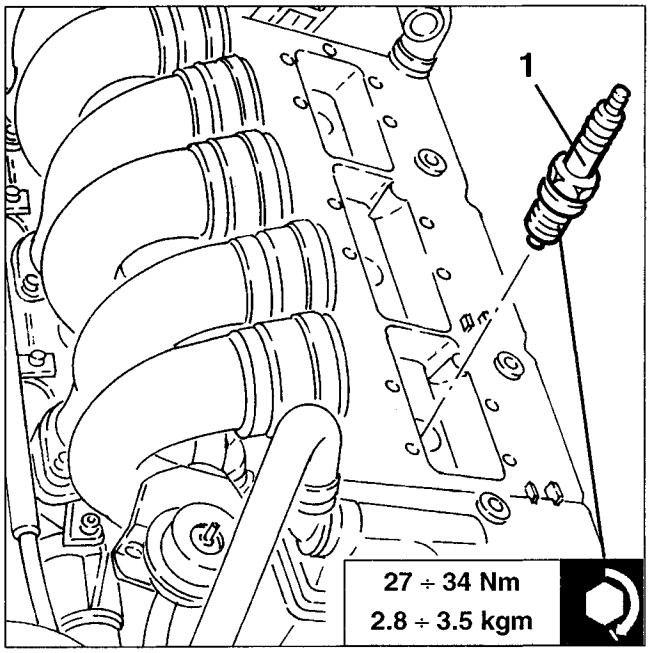
The standard fitted spark plugs are of the type with surface discharge with a peripheral point and a centre electrode.
In order to be able to work correctly, the gap between electrodes must be maintained.



Spark plugs
NGK PFR6B

Checking and replacement

- Remove the ignition coils (see specific paragraph).
1. With the engine cold, remove the spark plugs firstly blowing in the recesses to remove any impurity and traces of dirt.



- Check cleaning and for any breaks on the ceramic insulation. In this case replace the spark plugs.

WARNING:
The use of spark plugs with characteristics or dimensions other than those specified can cause damage to the engine and alter the level of harmful emission at the exhaust.

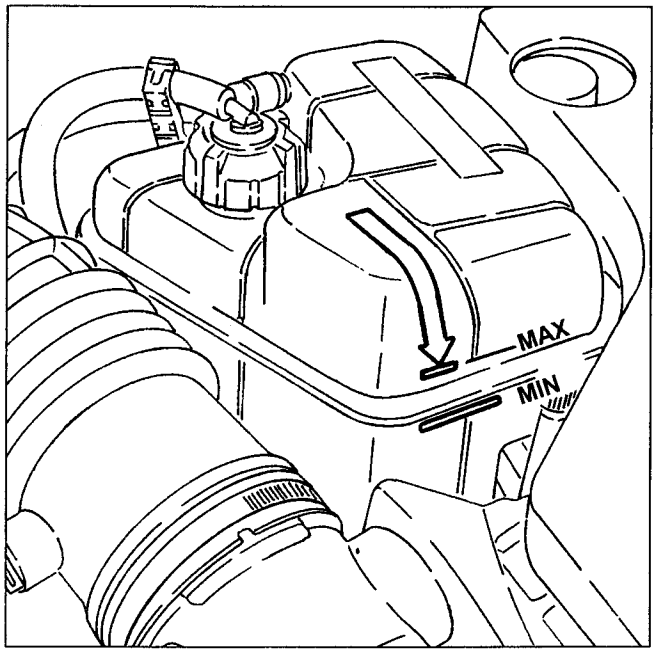
A dirty or burnt spark plug is often a symptom of an engine fault. For example:
• traces of carbon dust: incorrect mixture, air cleaner very dirty;
• oil stains: oil leaking from the piston rings;
• formation of ash: presence of aluminium particularly in the oil;
• melted electrodes: overheating due to unsuitable fuel, defects in the valves;
• high electrode wear: harmful additives in the fuel or oil, pinging in the cylinder head, overheating.

- Install the new spark plugs tightening them to the specified torque, then complete reassembly, reversing the sequence followed for removal.

CHECKING THE LEVEL AND CHANGING THE ENGINE COOLANT FLUID

Checking

- Visually check that the level of the coolant in the expansion tank cold is between the MIN and MAX marks.



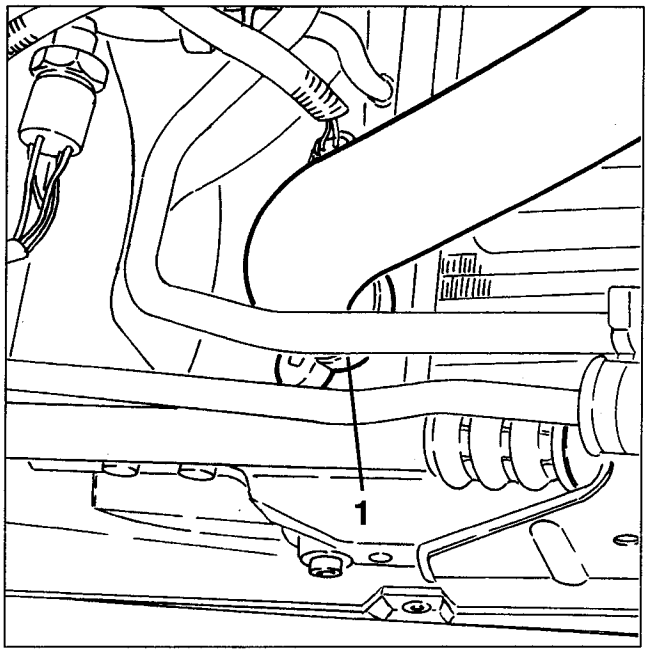
Changing

- Set the car on a lift.
- Slacken and remove the expansion tank plug.

WARNING:
Absolutely never remove the expansion tank plug when the engine is hot.

1. Raise the car and drain the engine coolant fluid, disconnecting radiator fluid outlet sleeve and retrieve it in a suitable container.

WARNING:
The antifreeze mixture used as coolant fluid is harmful for paint: therefore avoid contact with painted parts.



- Reconnect the sleeve to the radiator and any disconnected pipes, checking that all the clamps are tightened.
- Fill with fluid of the specified type and quantity, until reaching the MAX mark of the expansion tank.
- Start the engine and bring it to normal operating temperature so that the opening of the thermostat releases the residual air contained in the circuit.
- With the engine cold, top up to the MAX mark of the expansion tank.
- Retighten the pressurised cap of the expansion tank.

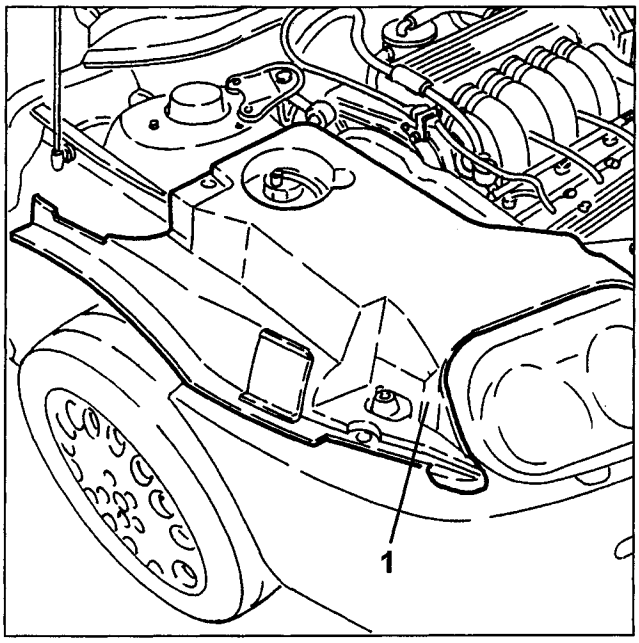
WARNING:
It is unwise to mix antifreeze fluids of different types and make.
Do not use antirust additives: they may not be compatible with the antifreeze used.

ENGINE MAINTENANCE

TIMING BELT REPLACEMENT

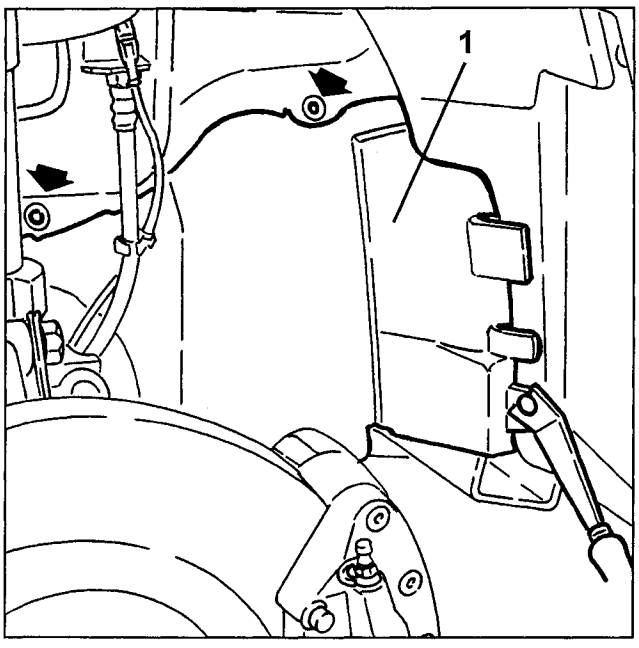
- Position the vehicle on a shop jack.
- Make sure the ignition key is at "STOP" and disconnect the (-) battery terminal.
- Remove the front right-hand wheel.

1. Loosen the fastening nuts and remove the engine compartment side guard.

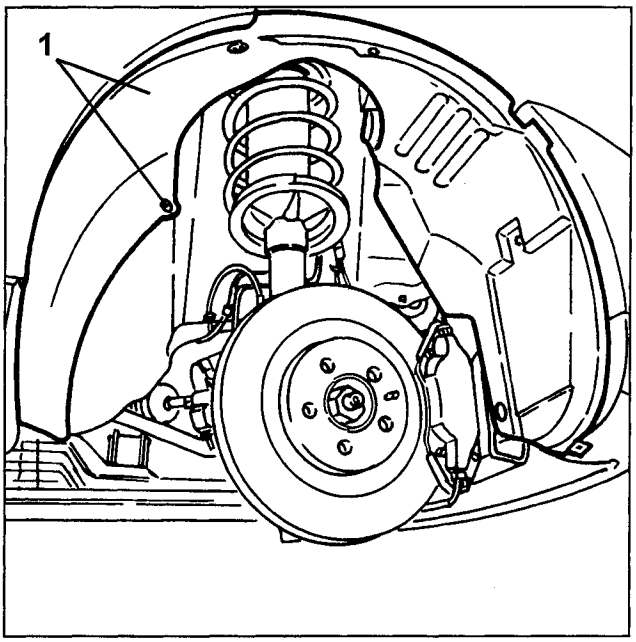


- Remove the front right-hand light cluster (see assembly 55).

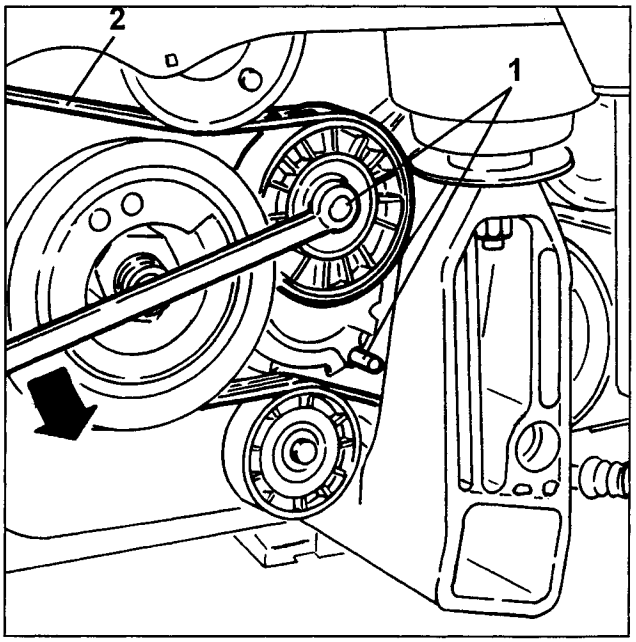
1. Loosen the fastening screws, remove the plastic button and remove the mud flap from the front right-hand wheel compartment.



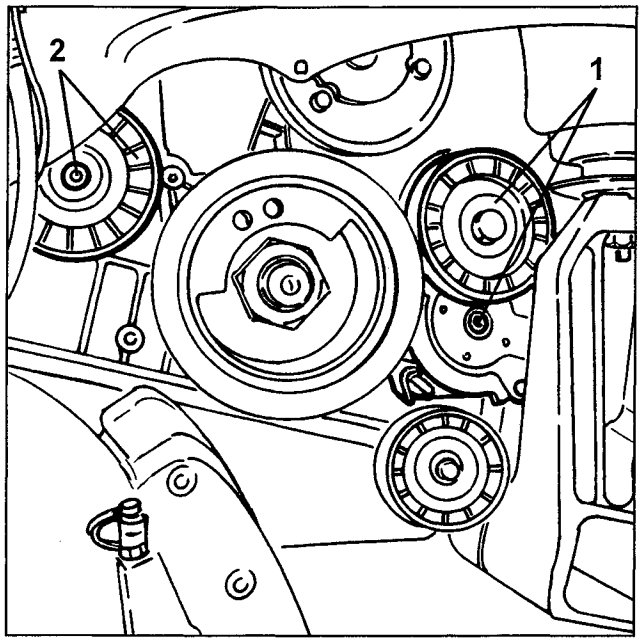
1. Loosen the fasteners and remove the front right-hand wheelhouse.



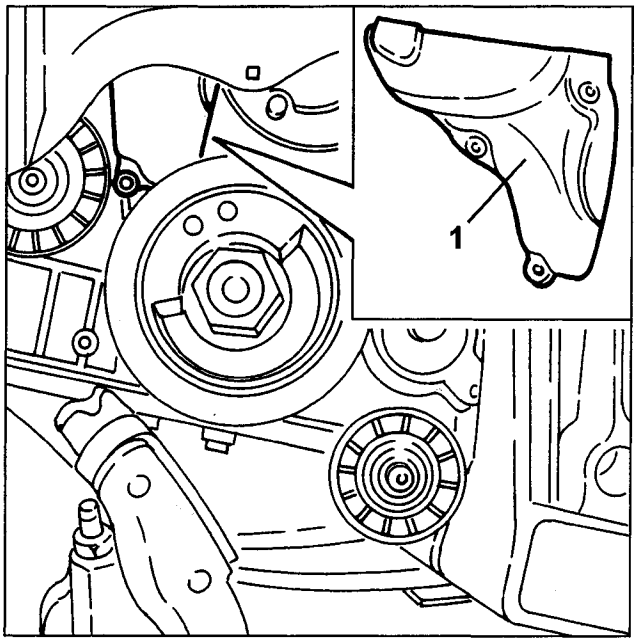
1. Loosen the belt take-up pulley fastening screw with a wrench to overcome the automatic take-up device force (belt loose) by inserting the pin as shown in the figure.
2. Remove the engine unit drive belt.



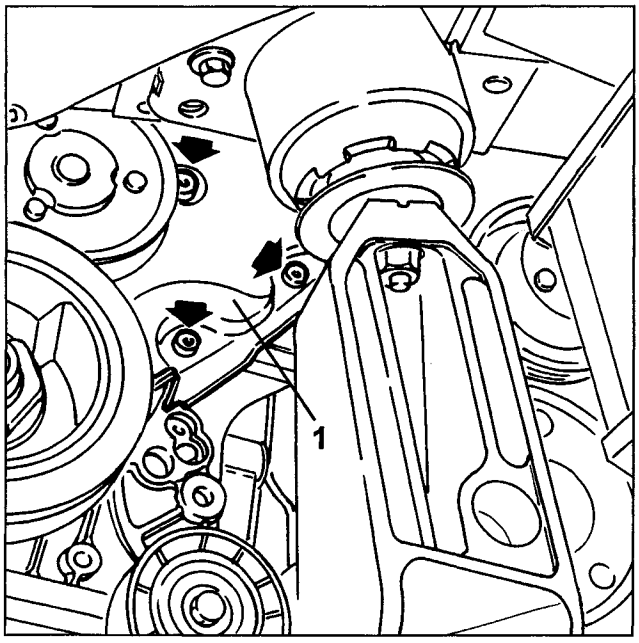
1. Loosen the fastening screw and remove the engine unit drive belt take-up device.
2. Loosen the fastening screw and remove the engine unit drive belt runner.



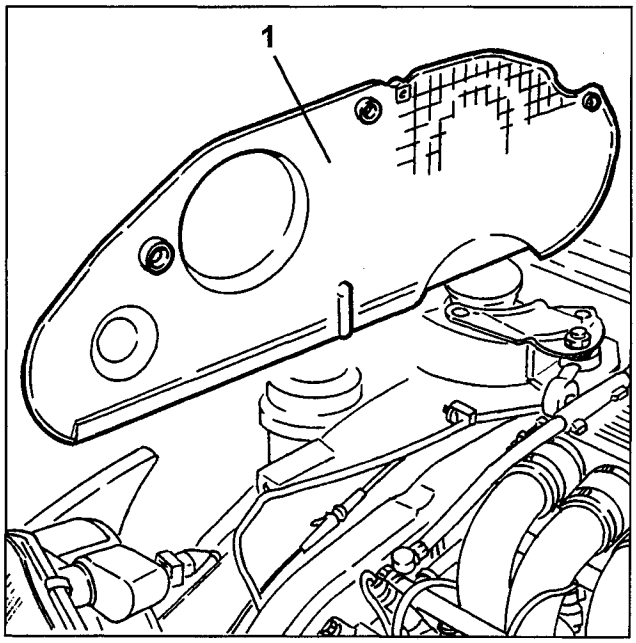
1. Loosen the fastening screws and remove the lower right-hand timing belt guard.



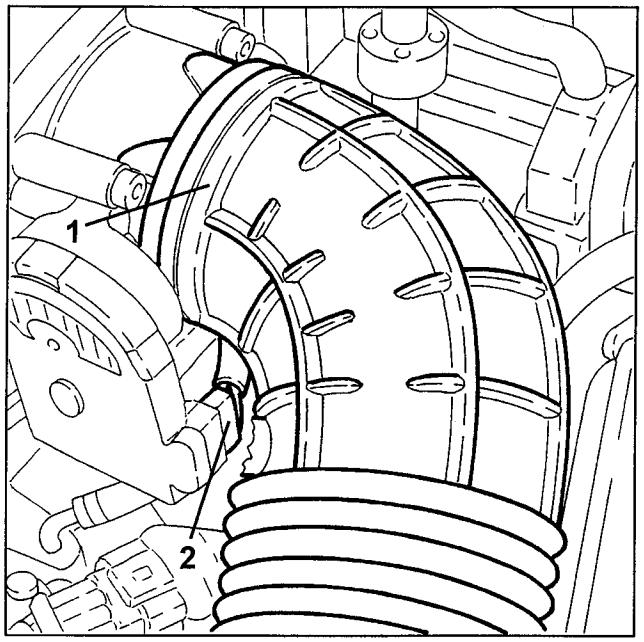
1. Loosen the fastening screws and remove the lower left-hand timing belt guard.



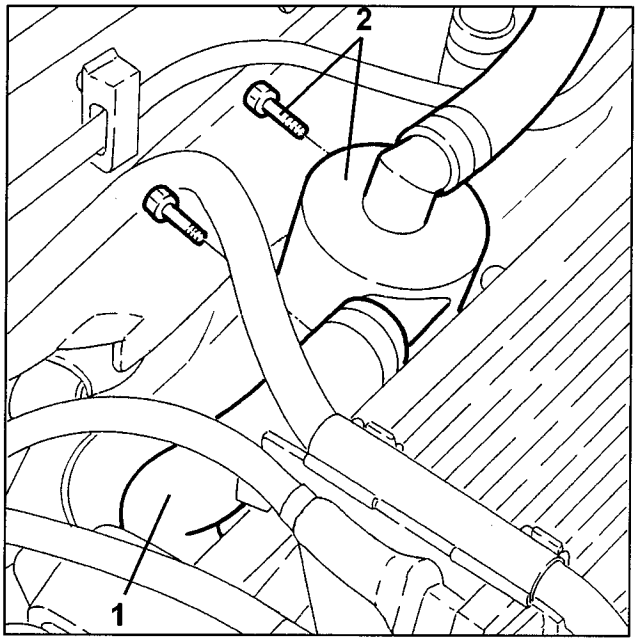
1. Loosen the fastening screws and remove the upper timing belt guard.



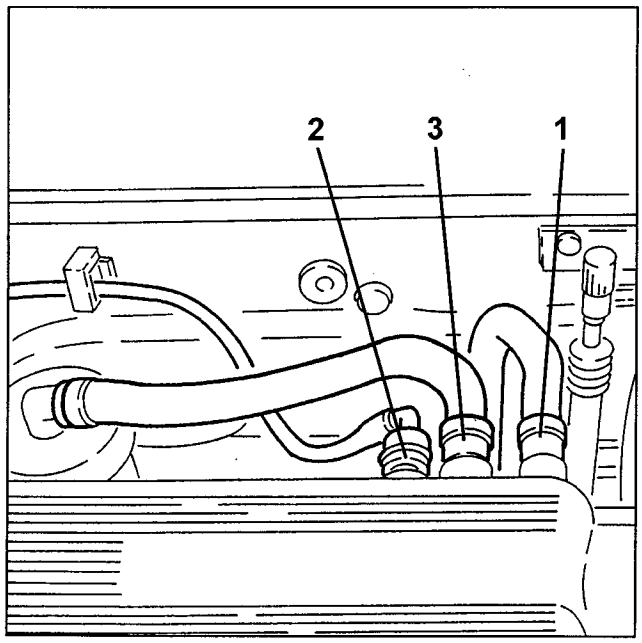
1. Disconnect the corrugated sleeve from the throttle with built-in DVL.
2. Disconnect the throttle and built-in DVL electrical connection.



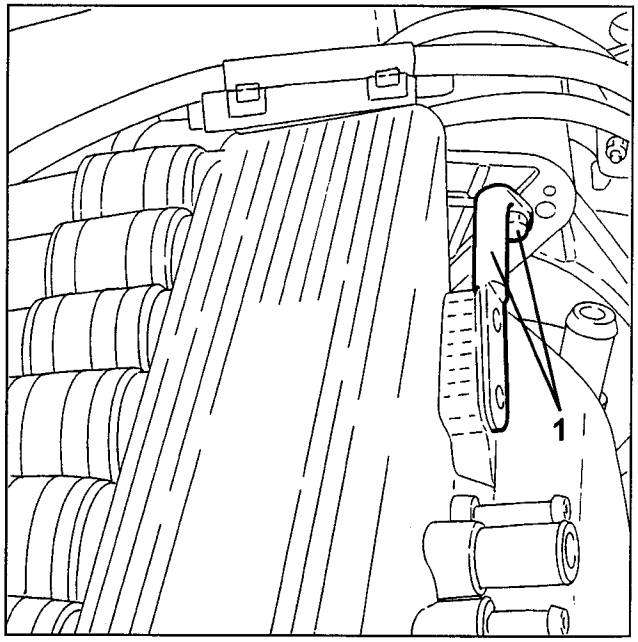
1. Disconnect the oil vapour recovery pipe from the right-hand cylinder head tappet cover.
2. Loosen the fasten screws and move the oil vapour separator from the intake manifold.



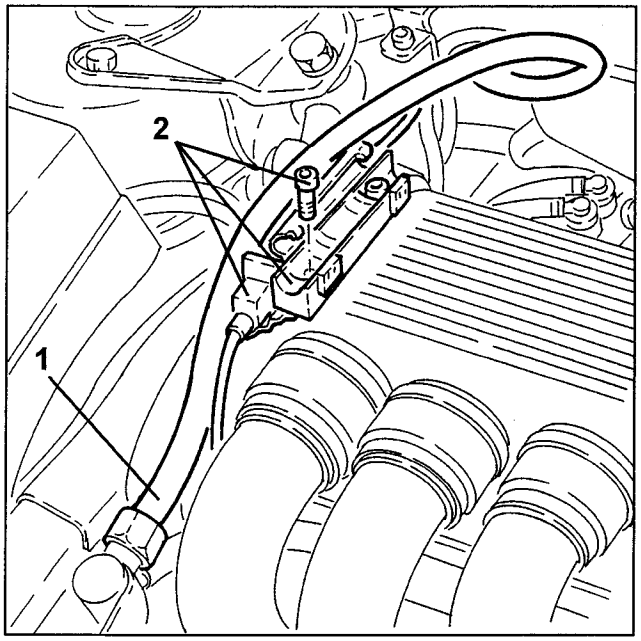
1. Disconnect the brake booster vacuum pipe from the intake manifold.
2. Disconnect the fuel vapour recovery pipe from the intake manifold.
3. Disconnect the oil vapour recirculation pipe from the intake manifold.



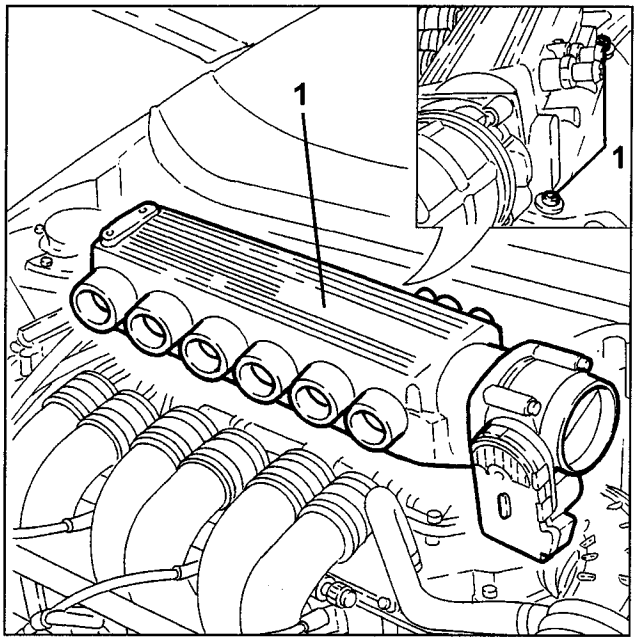
1. Loosen the screw and remove the intake manifold connection from the engine tie-rod.



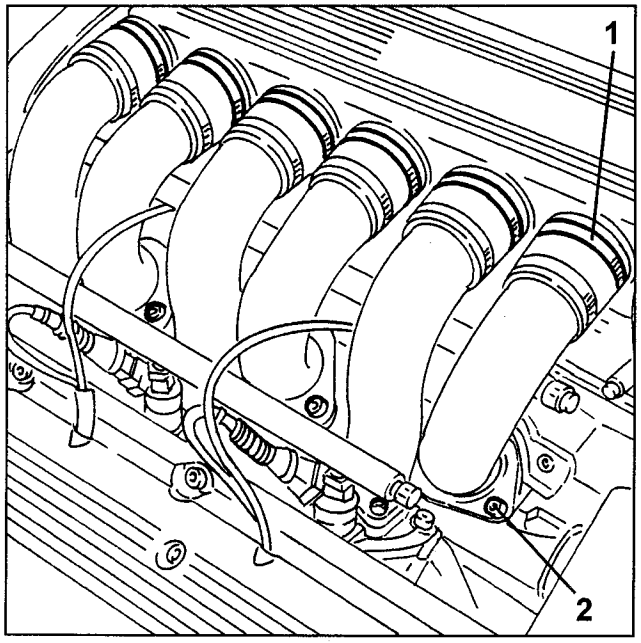
1. Release the fuel delivery pipe from the bracket.
2. Loosen the fastening screws and remove the fuel delivery pipe bracket and front knock sensor electrical connection.



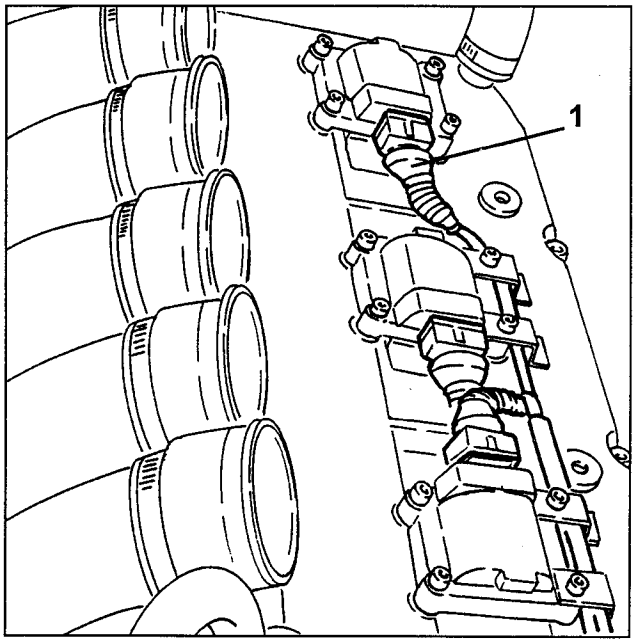
1. Loosen the fastening screws and remove the intake manifold.



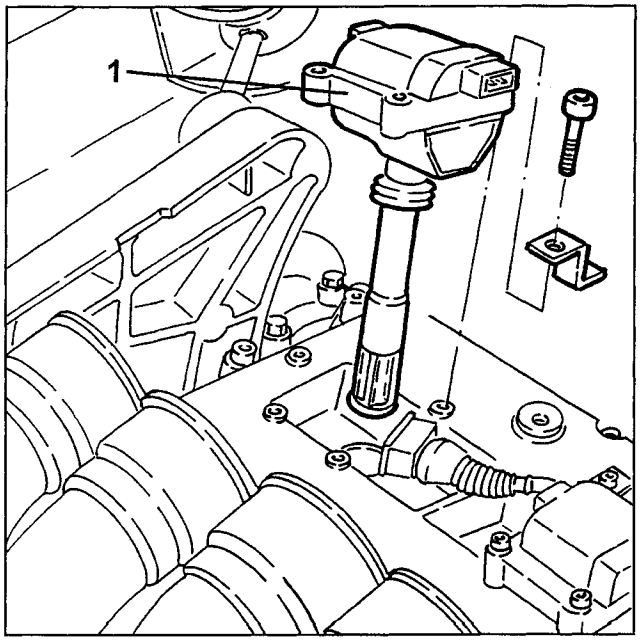
1. Loosen the intake manifold air feed duct fastening clips.
2. Loosen the cylinder head feed duct fastening screws.
- Release the air feed ducts from the intake manifold.



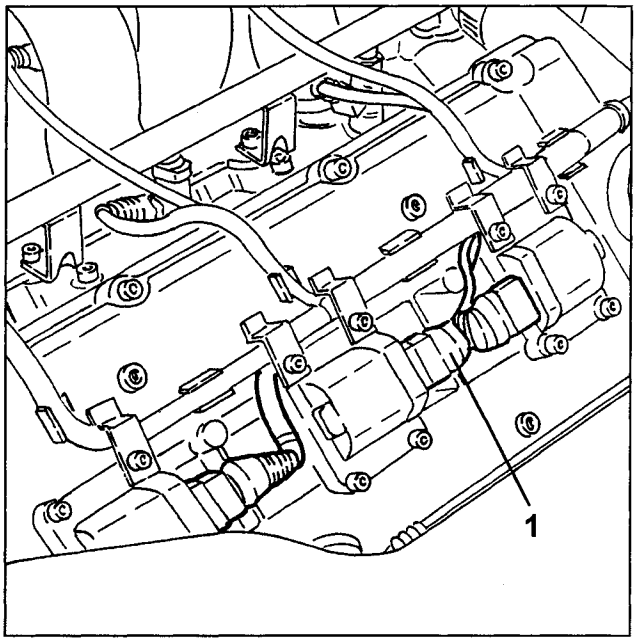
1. Disconnect the right-hand cylinder head ignition coil electrical connections.



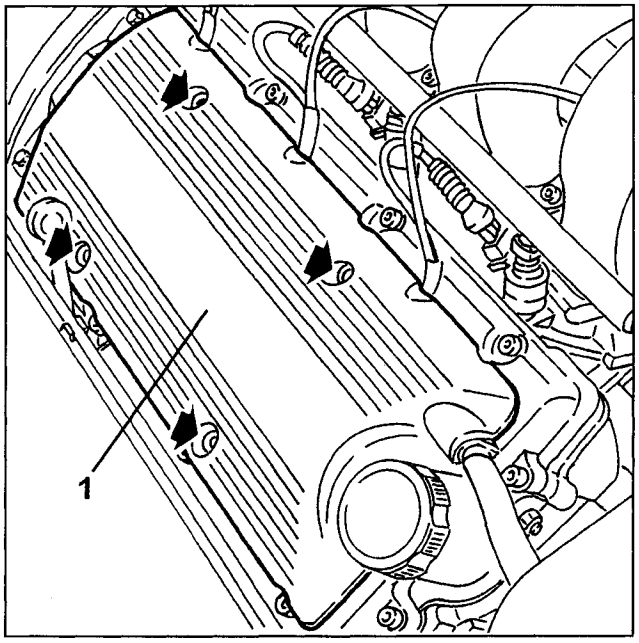
1. Loosen the fastening screws and remove the ignition coils from the right-hand cylinder head.



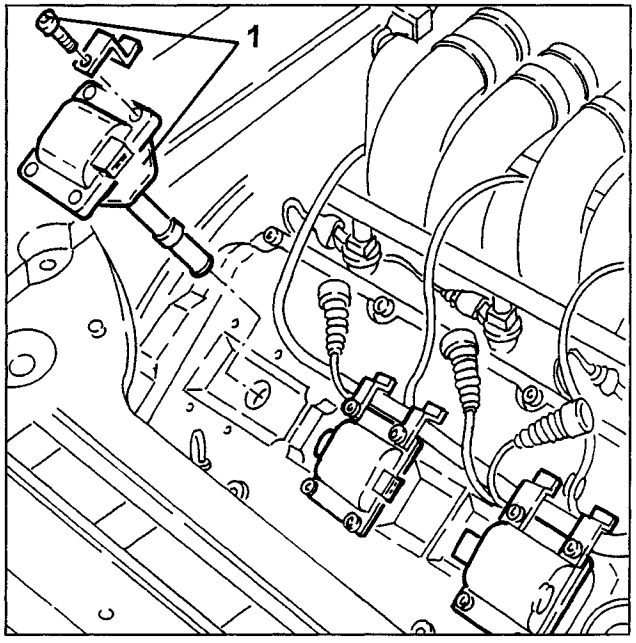
1. Disconnect the left-hand cylinder head ignition coil electrical connections.



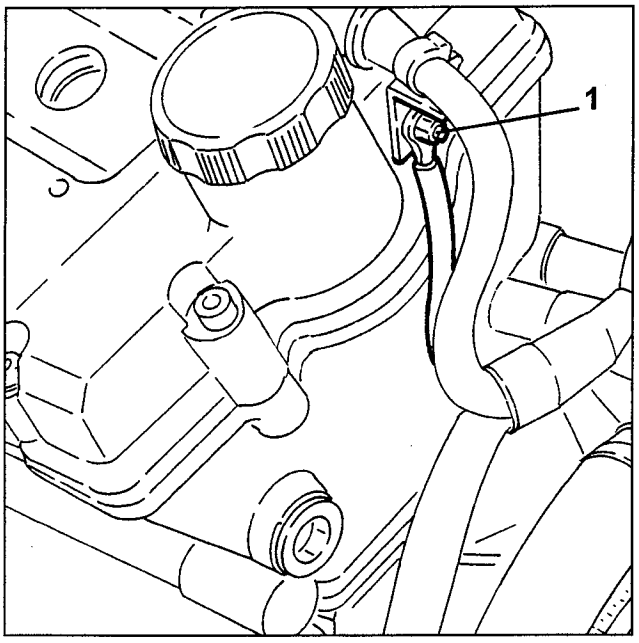
1. Loosen the fastening screws and remove the ignition coils from the left-hand cylinder head.



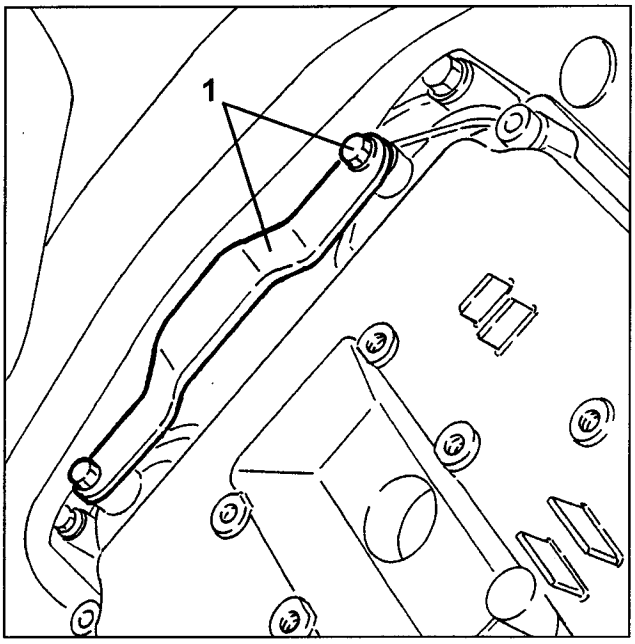
1. Loosen the fastening screws and remove the left-hand cylinder head ignition coils.



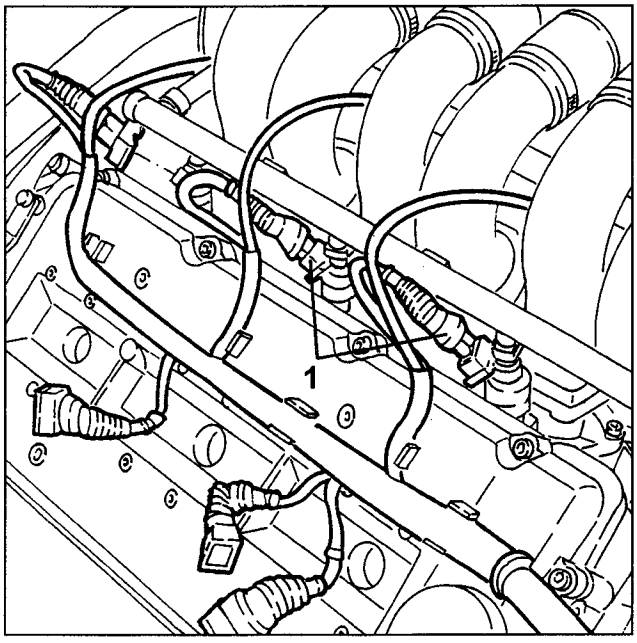
1. Disconnect the earth wire from the left-hand cylinder head tappet cover.



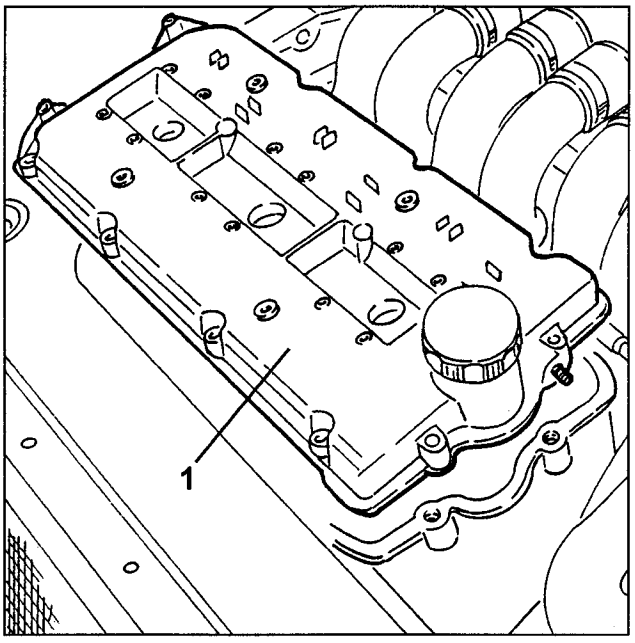
1. Loosen the fastening screws and remove the timing belt upper guard bracket nut from the left-hand cylinder head.



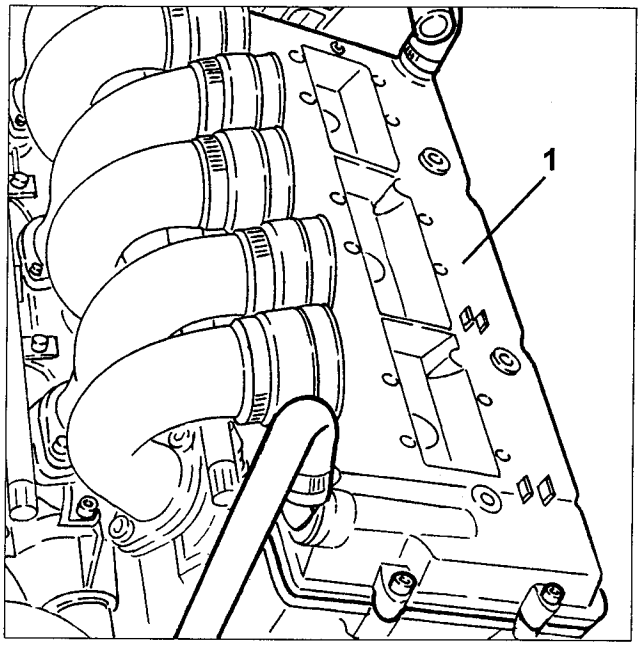
1. Disconnect the injector electrical connections and move the wiring aside.



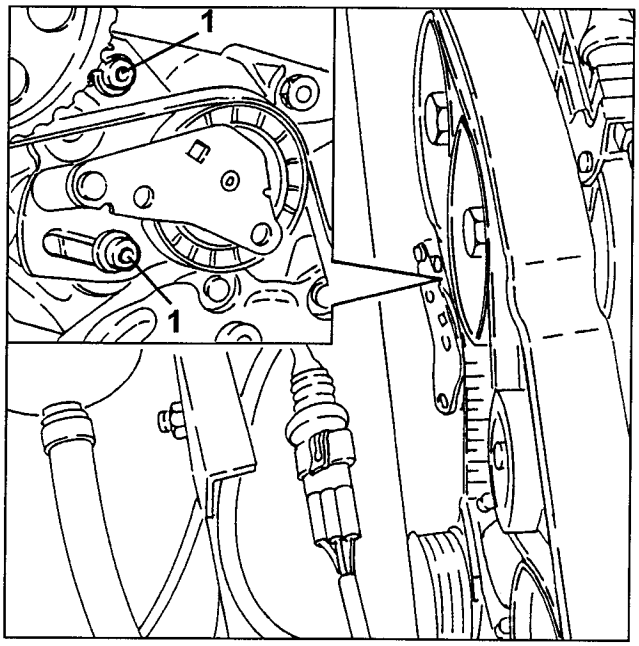
1. Loosen the fastening screws and remove the cover from the left-hand cylinder head cover.



1. Loosen the fastening screws and remove the right-hand cylinder head cover.

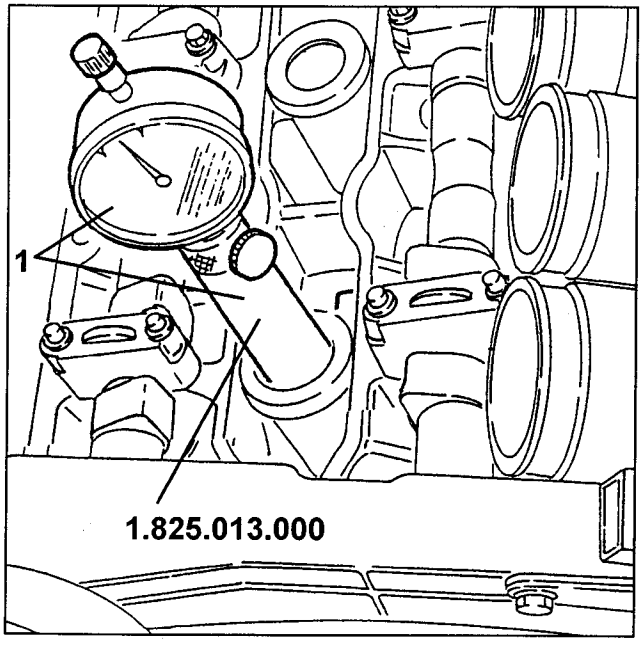


1. Loosen the timing belt take-up device fastening screws.

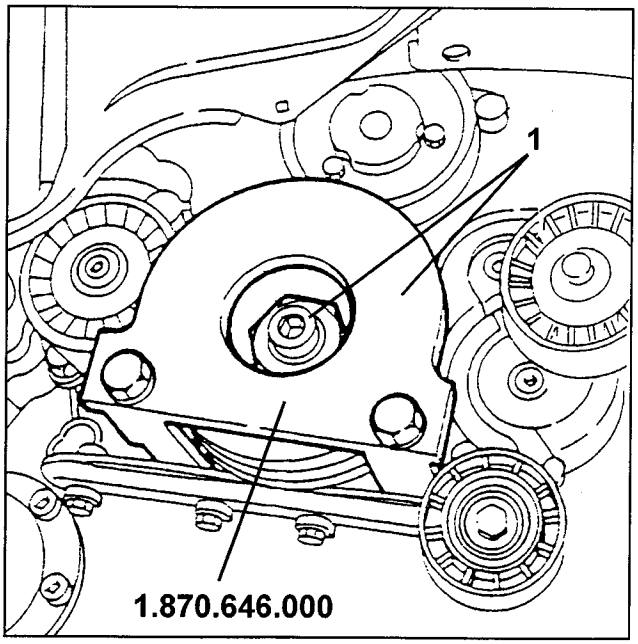


1. Fit tool no. 1.825.013.000 in the first cylinder spark plug seat.
- Take 1st cylinder piston to TDC, firing stroke, by slightly turning the crankshaft in both directions by means of the auxiliary unit drive pulley.

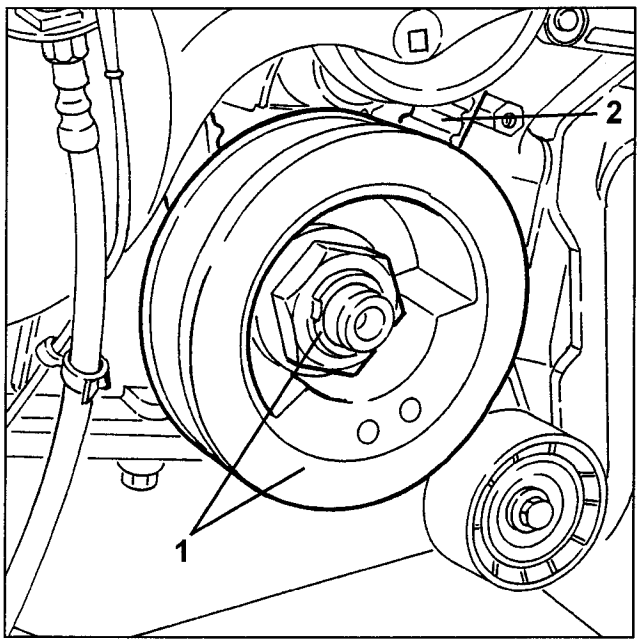
NOTE: Make sure the last crankshaft rotation is in the direction of operation.



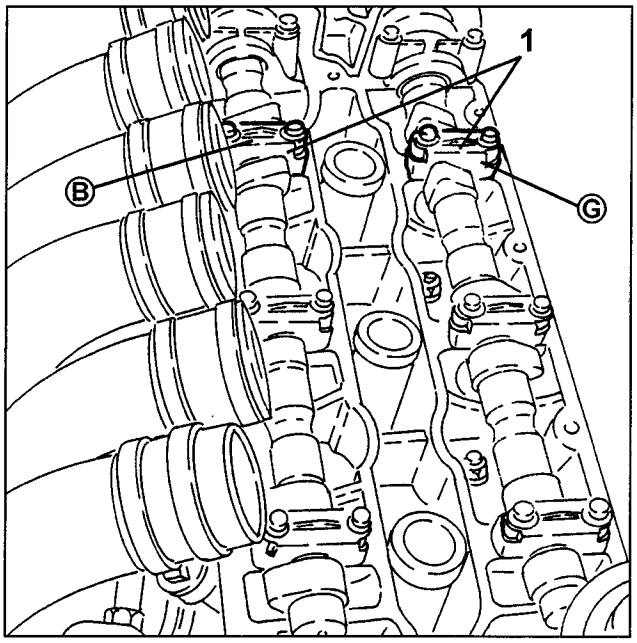
1. Loosen the engine pulley nut with tool no. 1.870.646.000 to contrast torque.



- Remove tool no. 1.870.646.000.
1. Loosen the nut and remove the engine pulley.
2. Remove the timing belt.



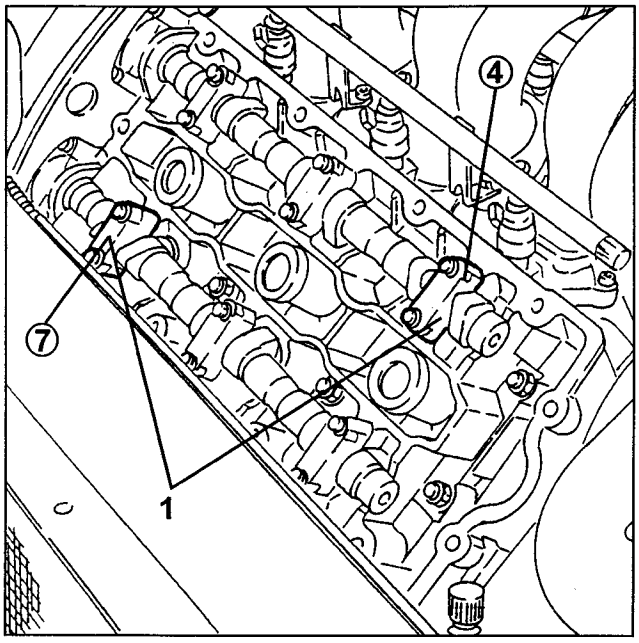
1. Remove the right-hand side camshaft bearings **B** and **G**.

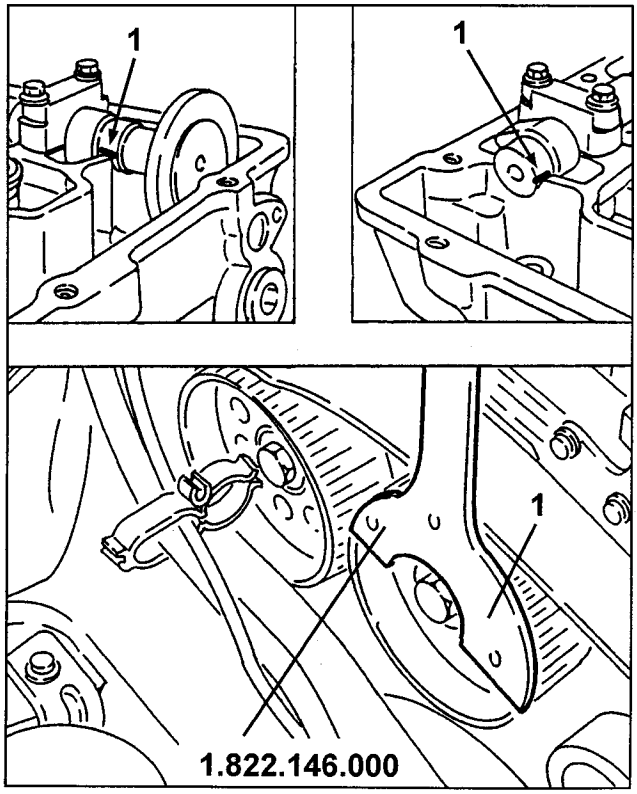


1. Use tool no. 1.822.146.000 and turn each camshaft so that the reference marks on the shafts coincide with the upper cylinder head surface.

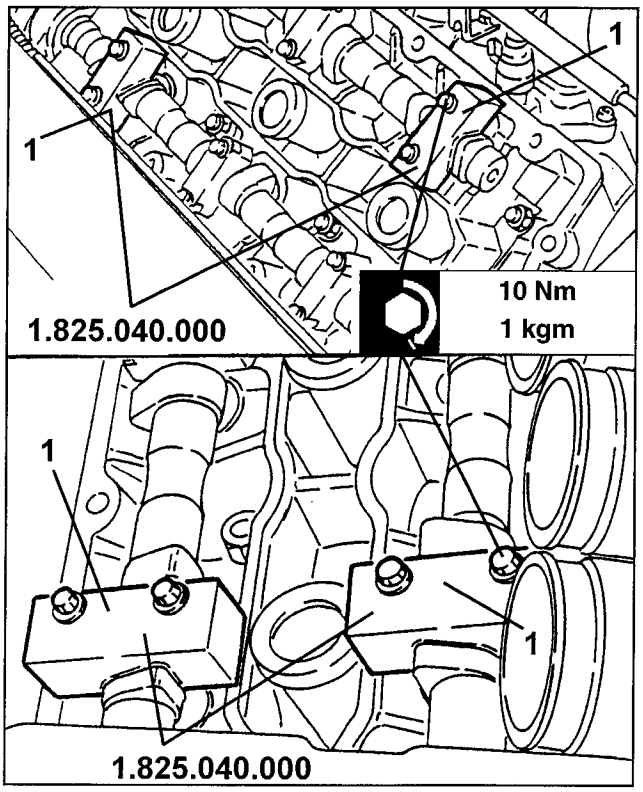
NOTE: The reference marks must face the centre of each cylinder head.

1. Remove the left-hand cylinder head camshaft bearings **4** and **7**.

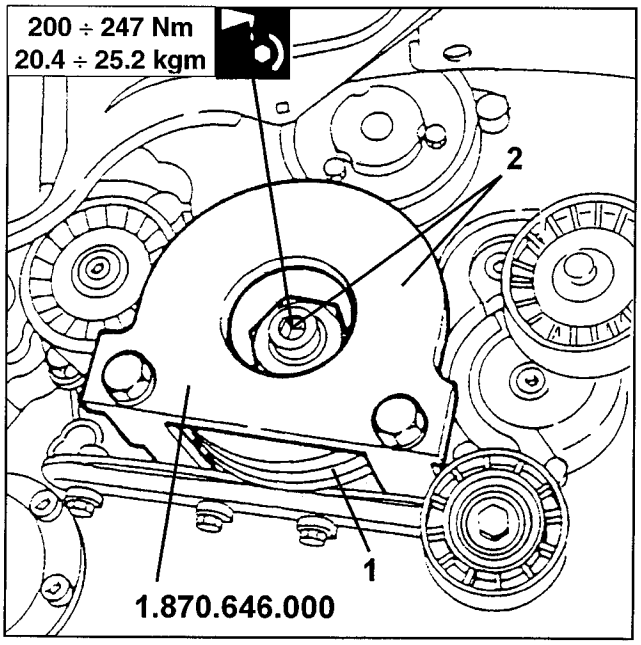




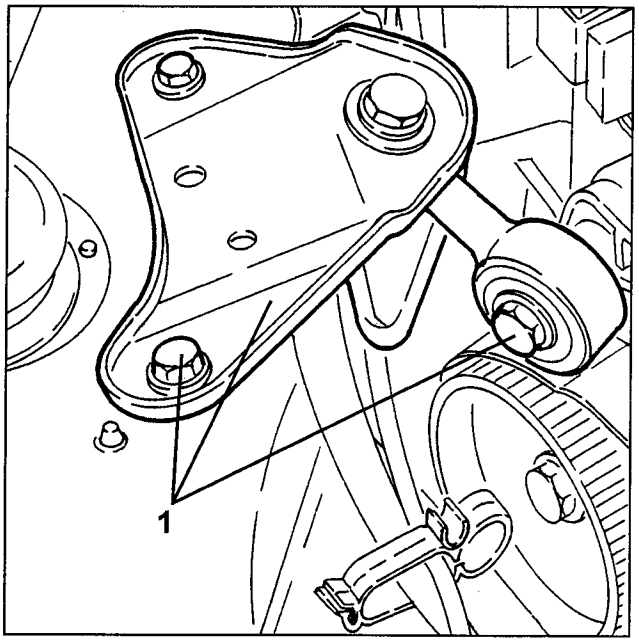
1. Fit templates no. 1.825.040.000 in the position shown on the templates in the place of the removed camshaft bearings.



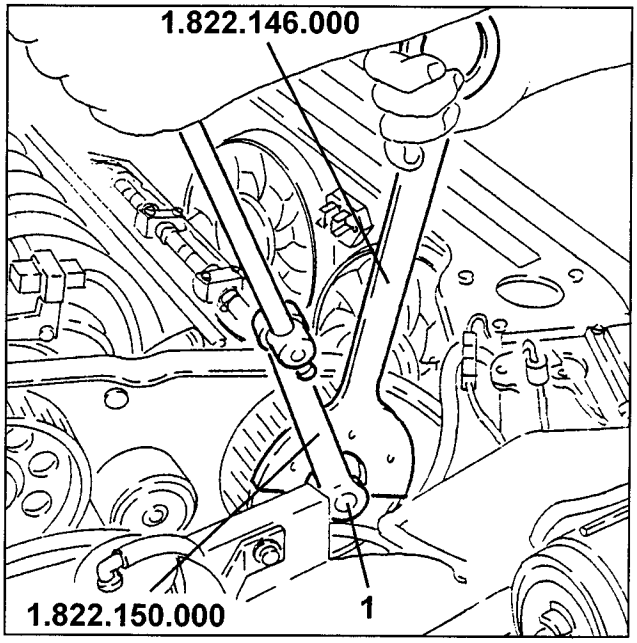
- Lift the vehicle and fit a new timing belt on the drive pulley.
1. Refit the engine pulley and fasten the respective nut without torquing.
2. Fit tool no. 1.870.646.000 and torque the engine pulley fastening nut as prescribed.
- Remove tool no. 1.870.646.000.



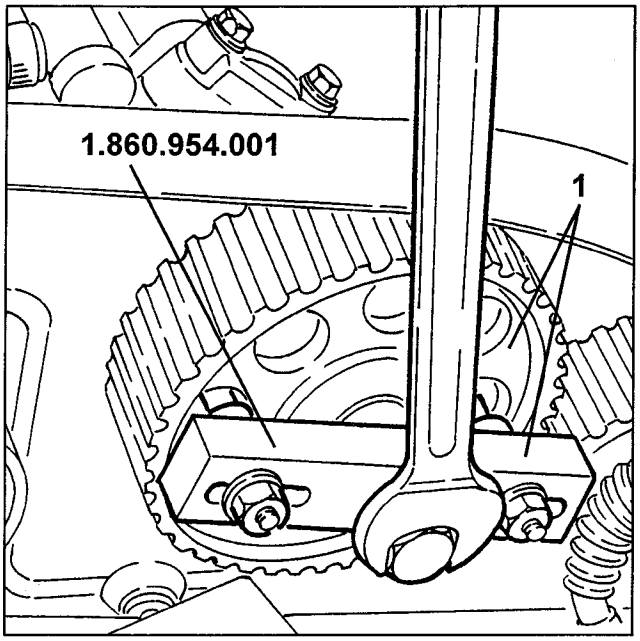
1. Loosen the fastening screws and remove the tie-rod and bracket on underbody side.



1. Lower the vehicle. Use extension no. 1.822.150.000 and tool no. 1.822.146.000 to contrast torque. Loosen the camshaft drive pulley fastening screws.

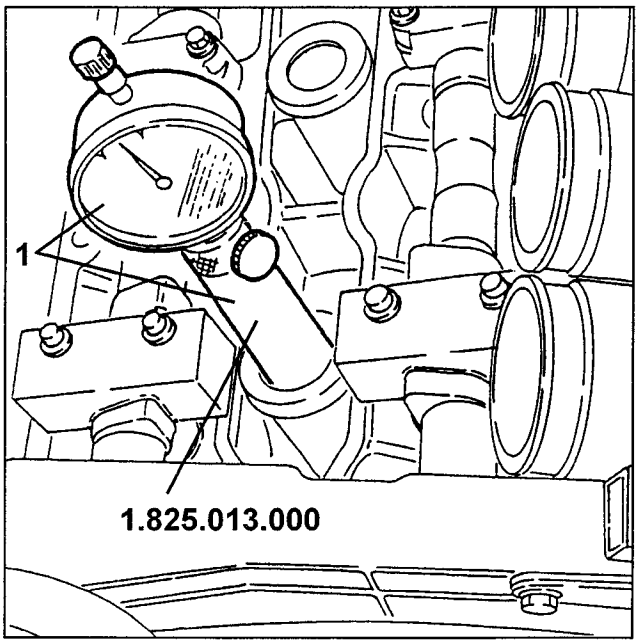


1. Use tool no. 1.860.954.001. Extract the camshaft drive pulleys and reposition in their seats fastening the screws by hand.



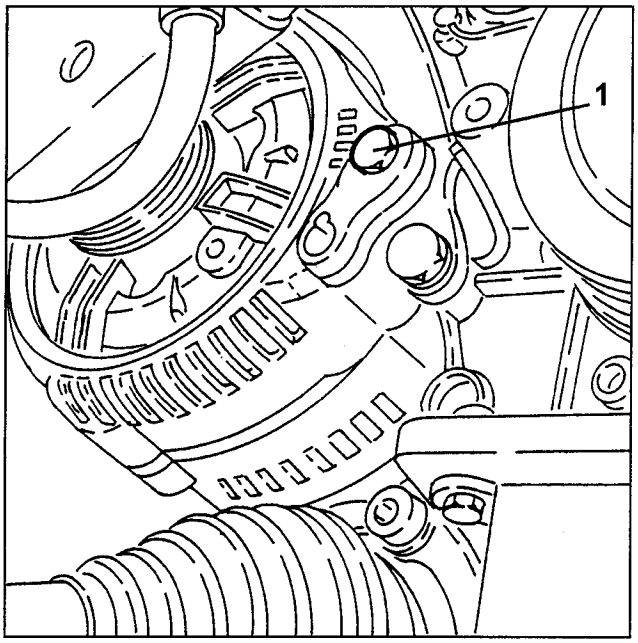
1. Turn the engine pulley fastening nut slightly in both direction to take 1st cylinder piston to TDC, firing stroke.

NOTE: Make sure the last crankshaft turn is in the direction of operation.

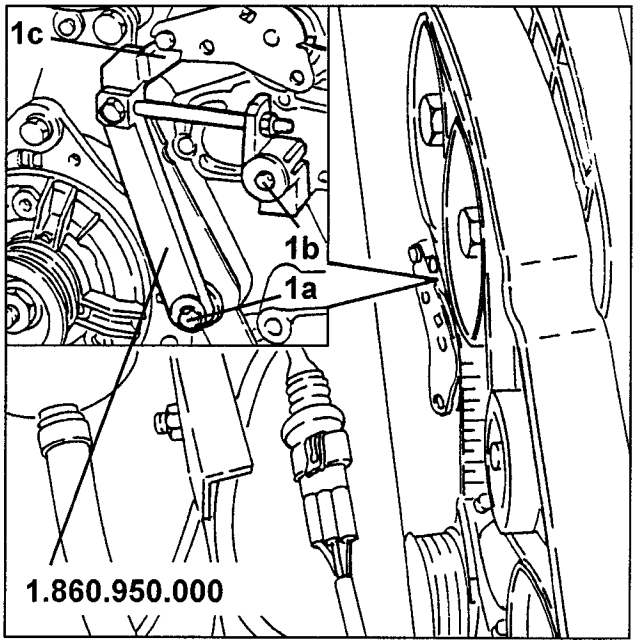


- Complete timing belt assembly by fitting it on the drive pulley.

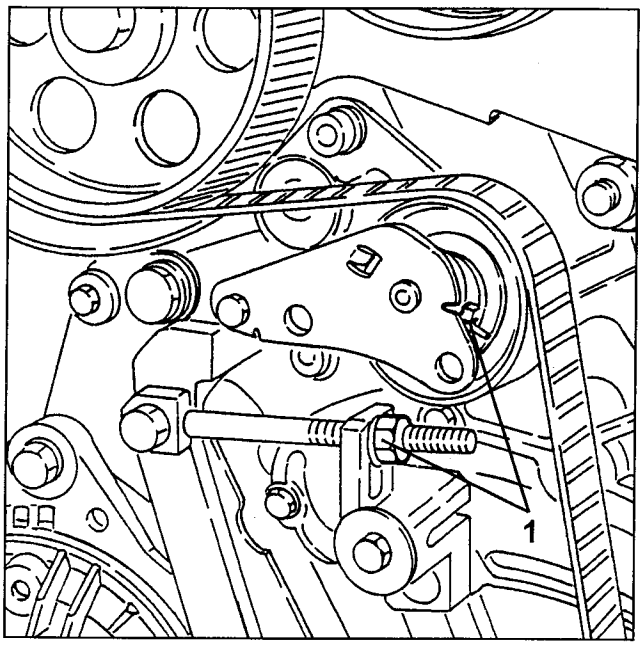
1. Loosen the lower alternator screw to fit the timing belt tension tool.



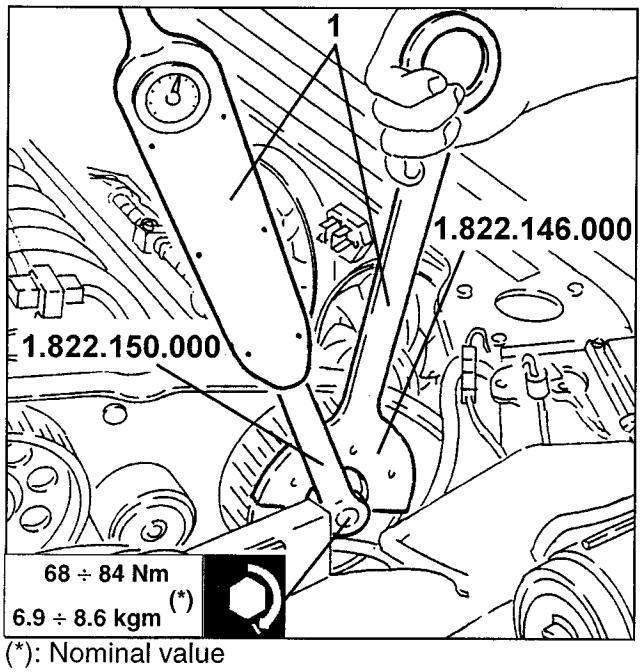
1. Fit timing belt tension tool no. 1.860.950.000 and fasten it with the previously screw (1a) to the alternator and screw (1b) to the coolant pump; tool pin (1c) should contrast the mobile part of the belt take-up.



1. Take the mobile notch under the fixed notch on the belt take-up by means of the nut shown in the figure.

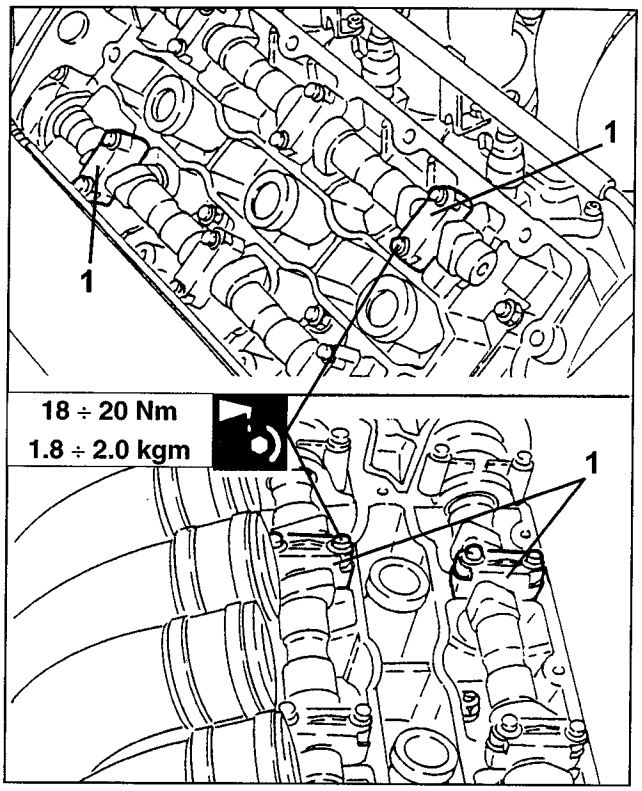


1. Use extension no. 1.822.150.000 and tool no. 1.822.146.000 to contrast torque: Torque the shaft drive pulley fastening screws as prescribed.

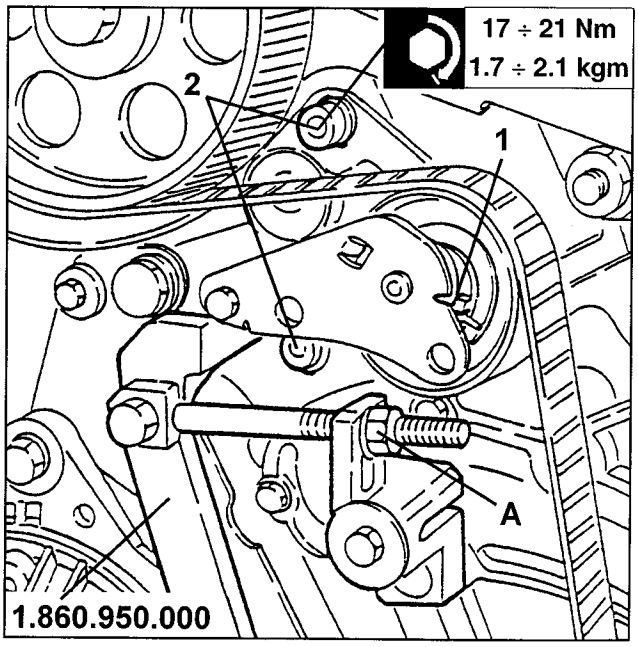


(*): Nominal value

1. Remove the previously fitted templates no. 1.825.040.000 and fit the respective bearings in their place. Torque the fastening screws as prescribed.



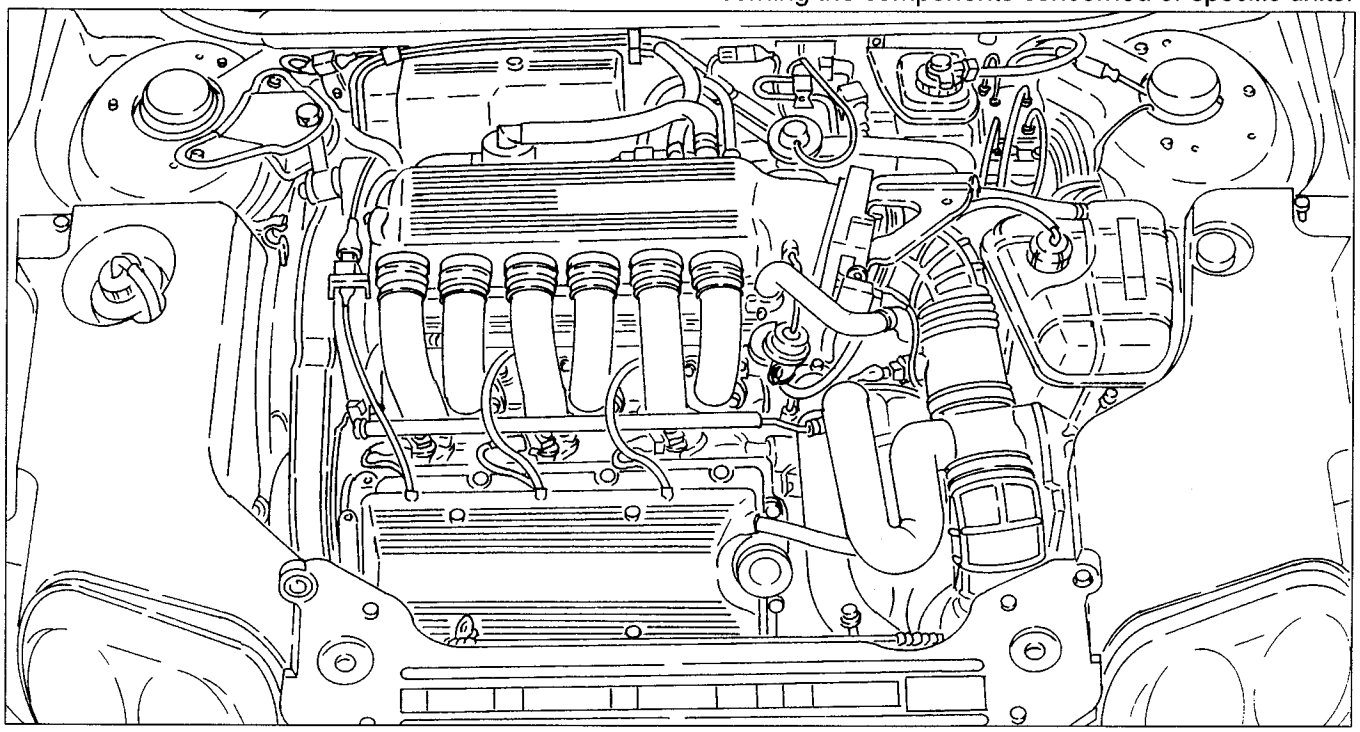
- Turn the crankshaft twice in the direction of rotation so to fit the timing belt well.
1. Check whether the fixed notch on the belt take-up coincides with the mobile notch. If this is not so, adjust take-up tension by means of nut (A) until the notches coincide.
2. Torque the belt take-up fastening screws and remove tension tool no. 1.860.950.000.



DESCRIPTION

The information and illustrations given below make it possible to quickly remove the power plant from its housing and subsequent refitting.

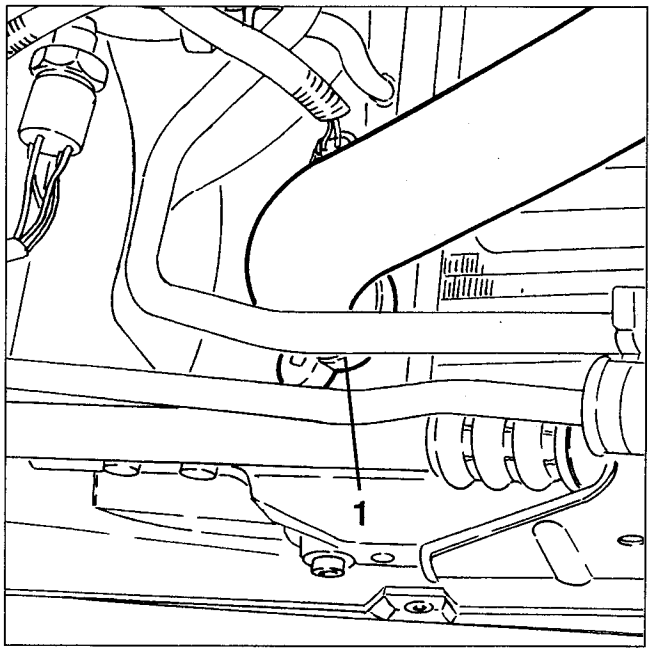
Disassembly of the engine on the bench is described in the volume "ENGINE OVERHAULING".
The following procedure gives the possibility to be used only in part depending on requirements. For further information and details see the chapters concerning the components concerned or specific units.



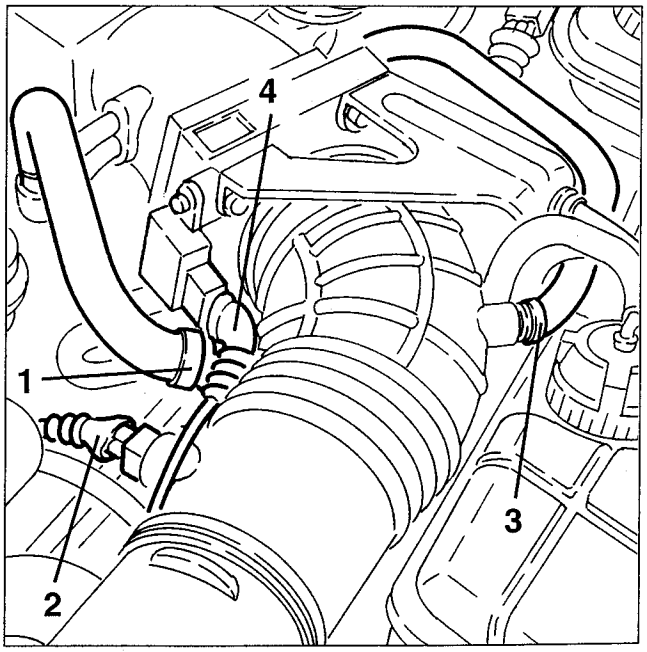
REMOVAL

- Set the car on a lift.
- Disconnect the battery (-) terminal.
- Remove the front wheels and mud flaps.
- Remove the engine compartment trim.
- Remove the right front wheel house.
- Drain the coolant fluid (R134a) of the air conditioning system (see specific paragraph).

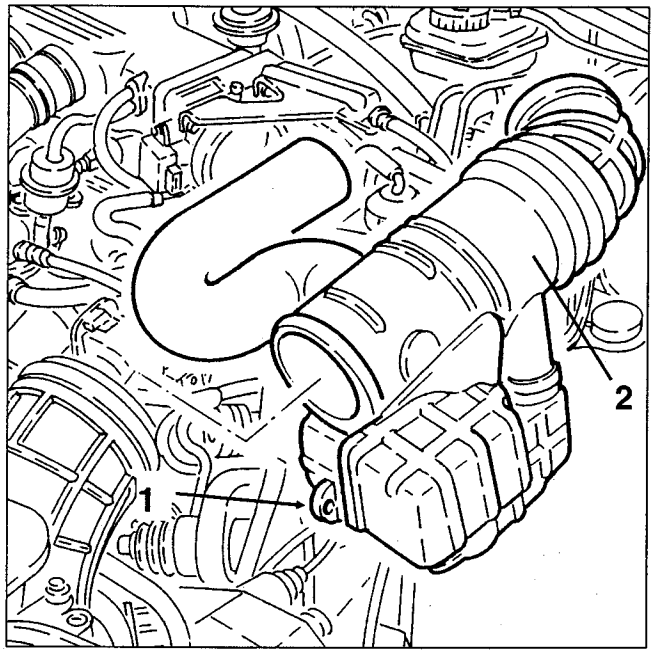
1. Raise the car and drain the coolant fluid, disconnecting the radiator outlet sleeve and collect it in a suitable container.



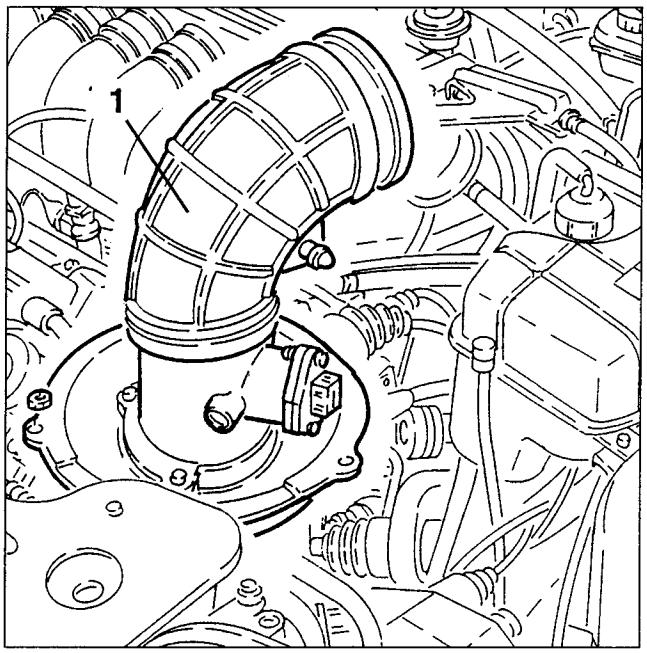
1. From the corrugated sleeve disconnect the oil vapour recovery pipe leading from the cylinder head.
2. Disconnect the electrical connection from the intake air temperature sensor.
3. From the corrugated sleeve disconnect the air intake pipe for the constant idle speed device.
4. Disconnect the electrical connection from the throttle potentiometer.



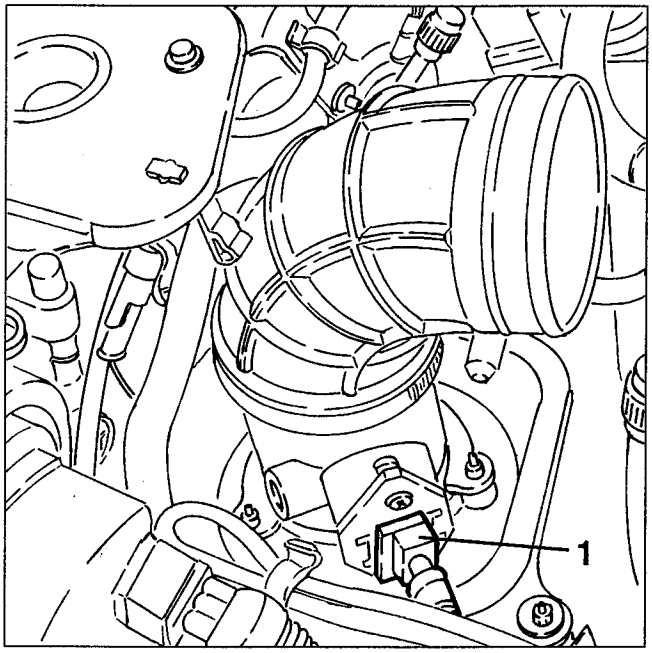
1. Remove the fastening button of the first section of corrugated sleeve to the resounder.
2. Slacken the two fastening clamps and remove the second section of the corrugated sleeve complete with resounders.



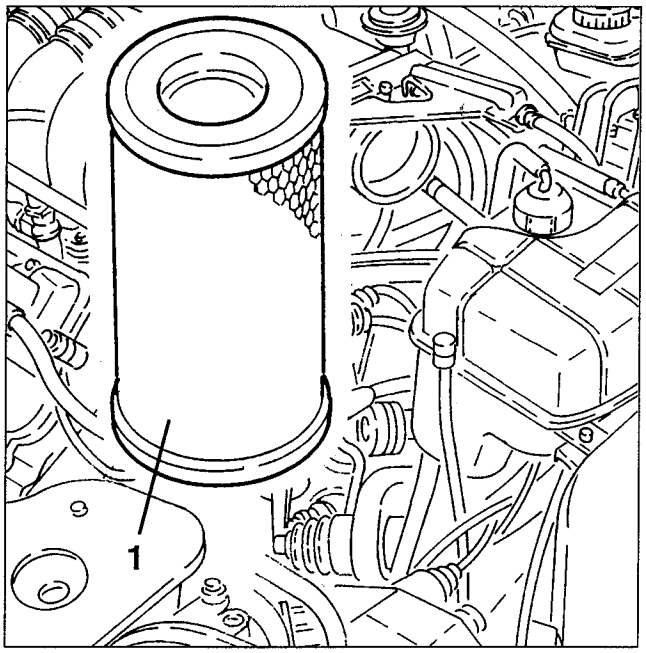
1. Slacken the three fastening nuts and remove the air cleaner cover complete with hot film air flow meter and the first section of the corrugated sleeve.



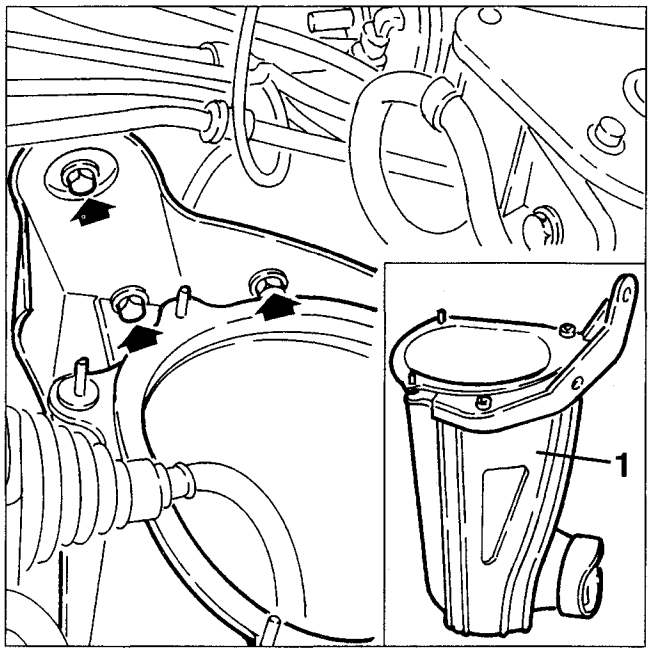
1. Disconnect the electrical connection from the hot film air flow meter.



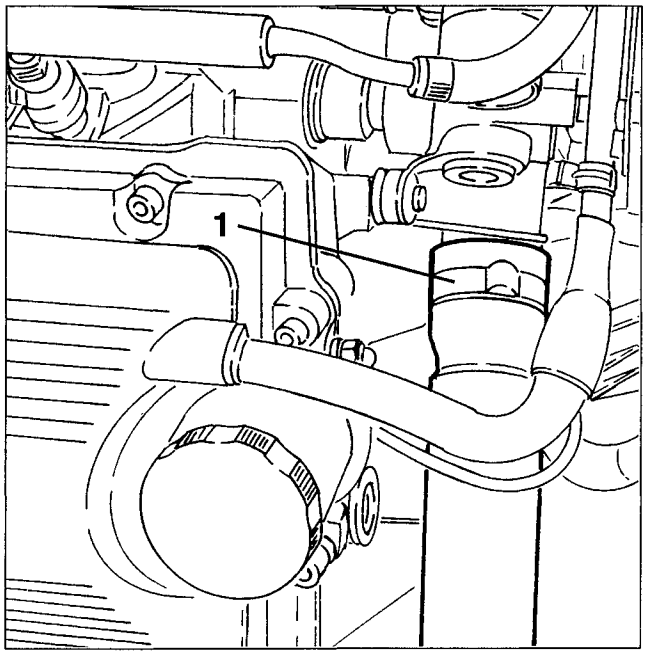
1. Remove the filtering element with its duct.



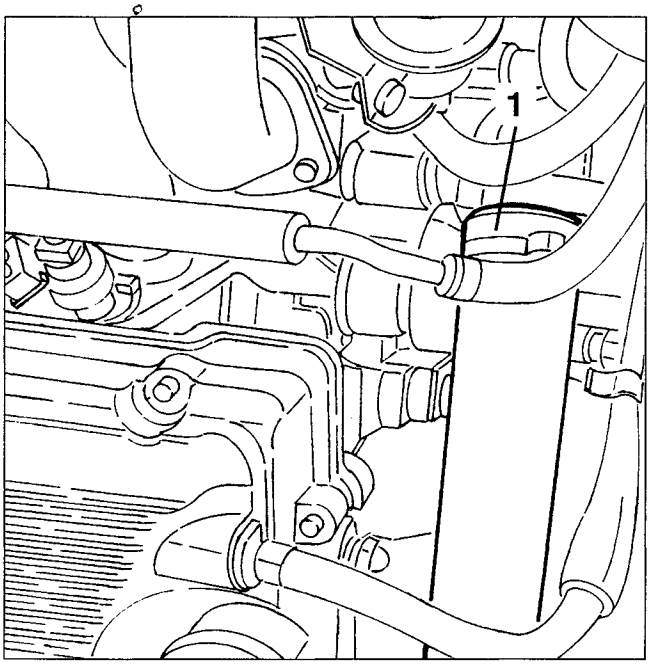
1. Slacken the fastening screws and remove the air cleaner container complete with support bracket.



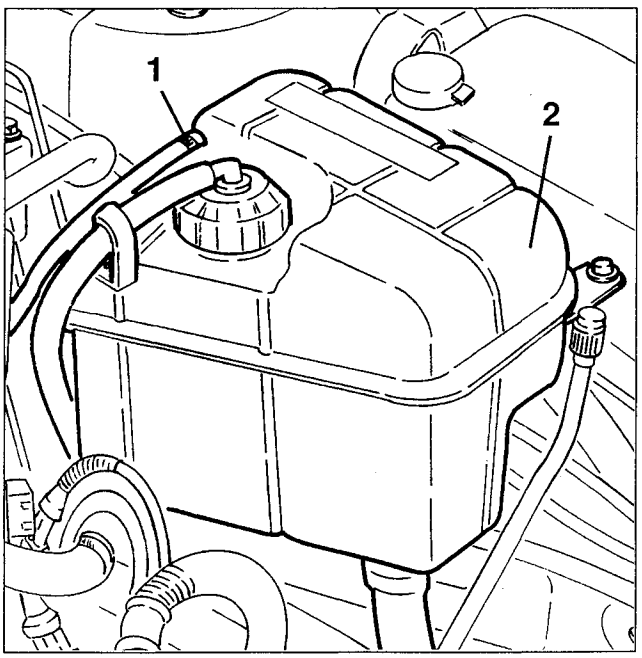
1. Disconnect the coolant return sleeve from the radiator from the thermostatic cup.



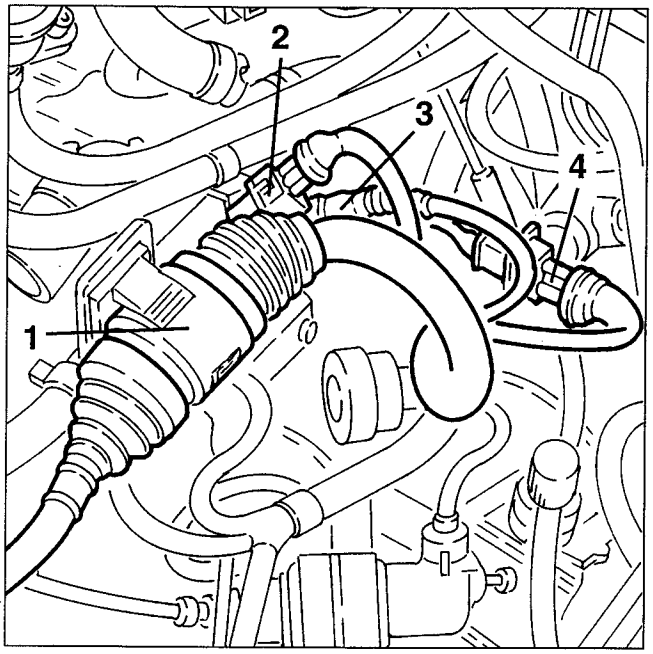
1. Disconnect the the coolant delivery sleeve to the radiator from the thermostatic cup.



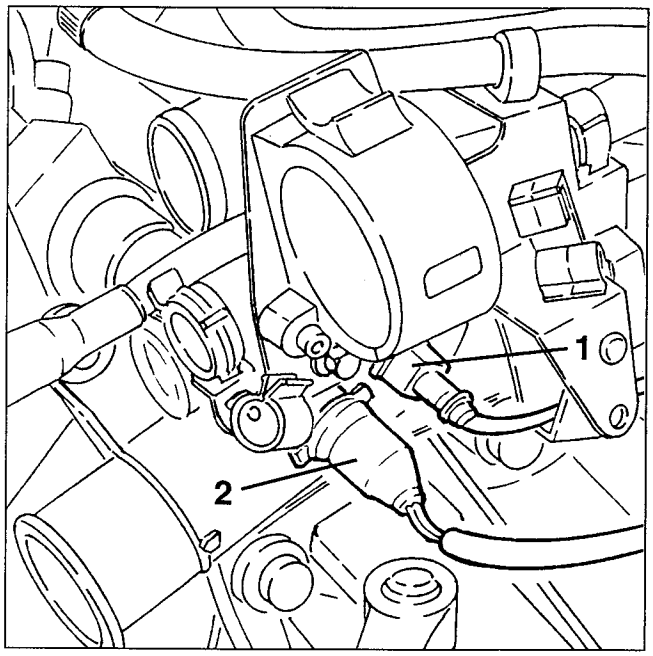
1. Disconnect the throttle barrel coolant outlet pipe from the expansion tank.
2. Slacken the fastening screws and remove the expansion tank complete with sleeve.



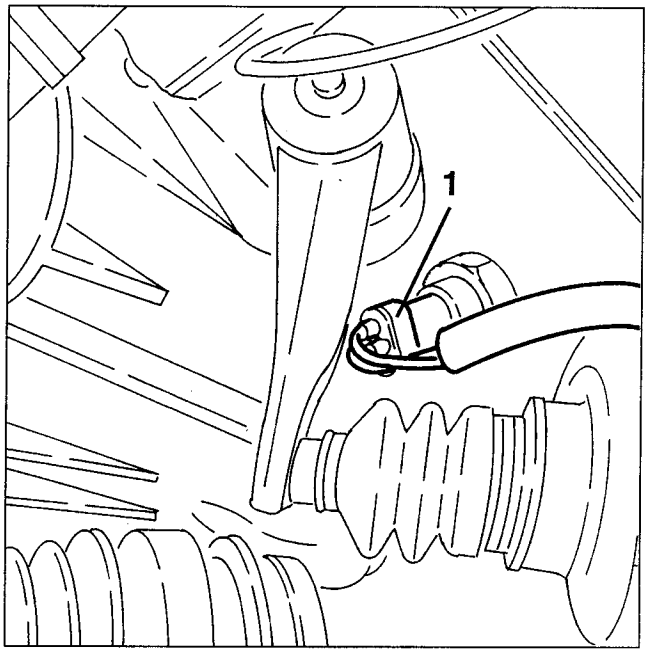
1. Disconnect the injection wiring connector.
2. Disconnect the electrical connection of the rear pinging sensor.
3. Disconnect the electrical connection of the rpm and timing sensor.
4. Disconnect the electrical connection of the cam angle sensor.



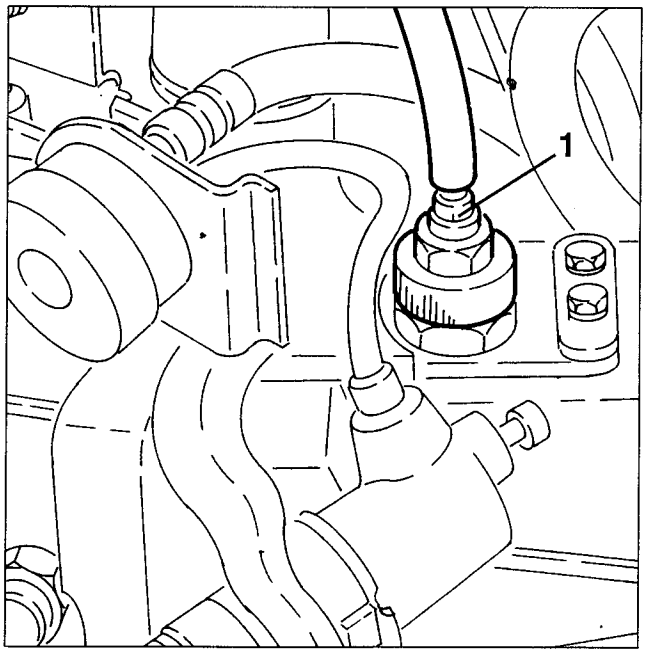
1. Disconnect the electrical connection from the engine coolant temperature sensor (NTC).
2. Disconnect the electrical connection from the coolant temperature transmitter and maximum temperature thermal contact.



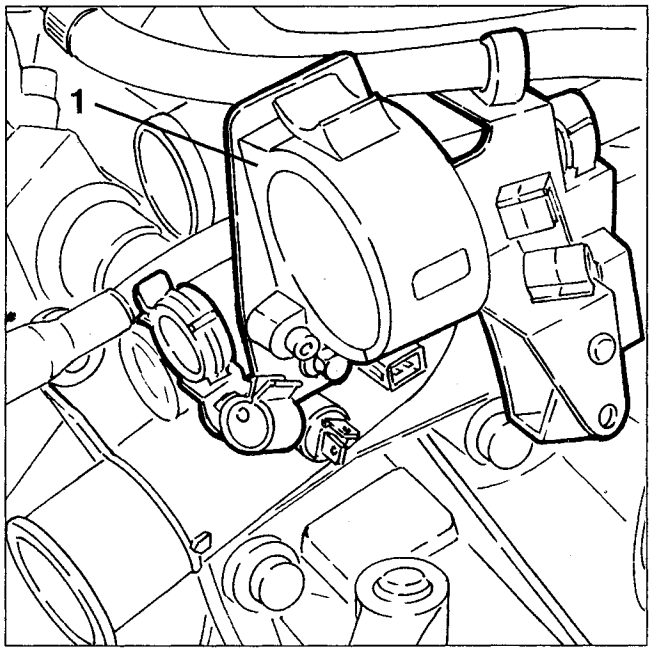
1. Disconnect the electrical connection from the reverse gear sensor.



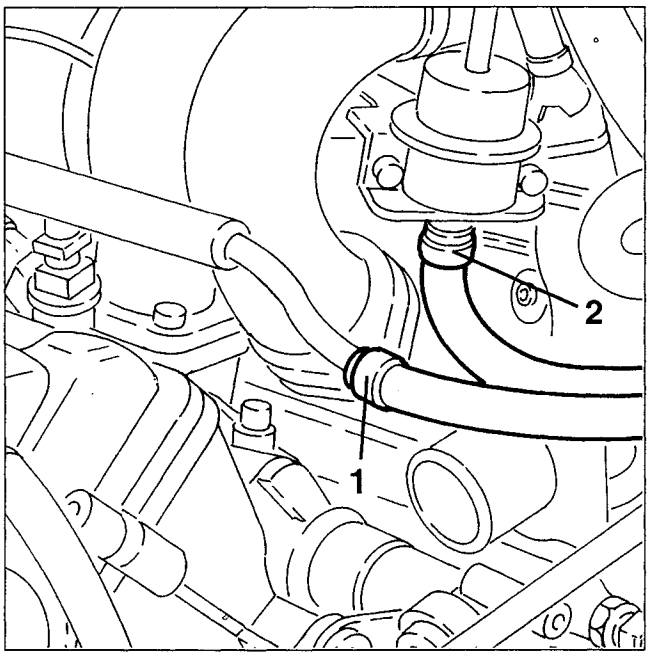
1. Disconnect the cable for synchronised reverse gear engagement.



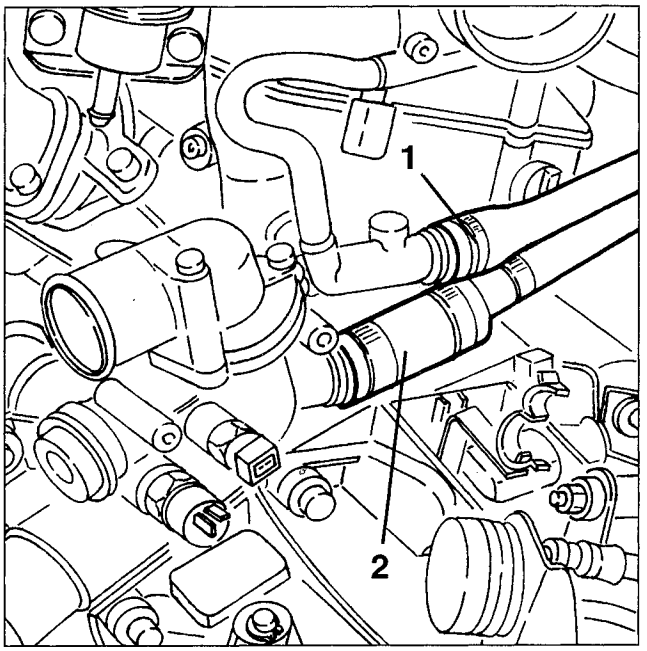
1. Slacken the fasteners and remove the injection wiring connector supports and pipe fasteners.



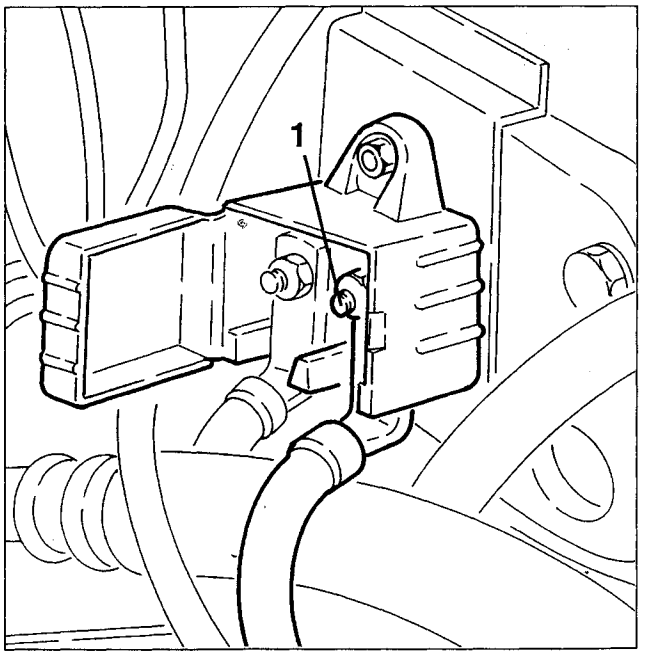
1. Disconnect the fuel delivery pipe from the distributor manifold.
2. Disconnect the excess fuel return pipe to the tank from the pressure regulator.



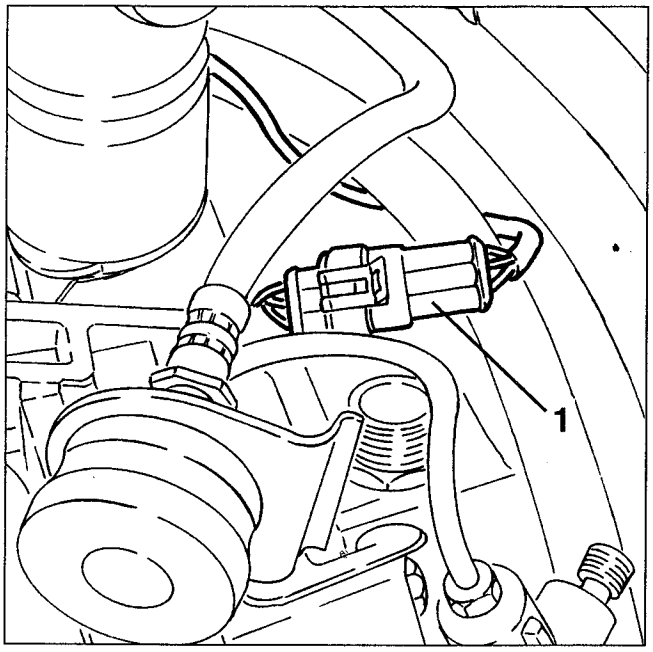
1. Disconnect from the union on the cylinder head the coolant delivery sleeve to the climate control system heater.
2. Disconnect from the thermostatic cup the coolant fluid return sleeve from the climate control system heater.



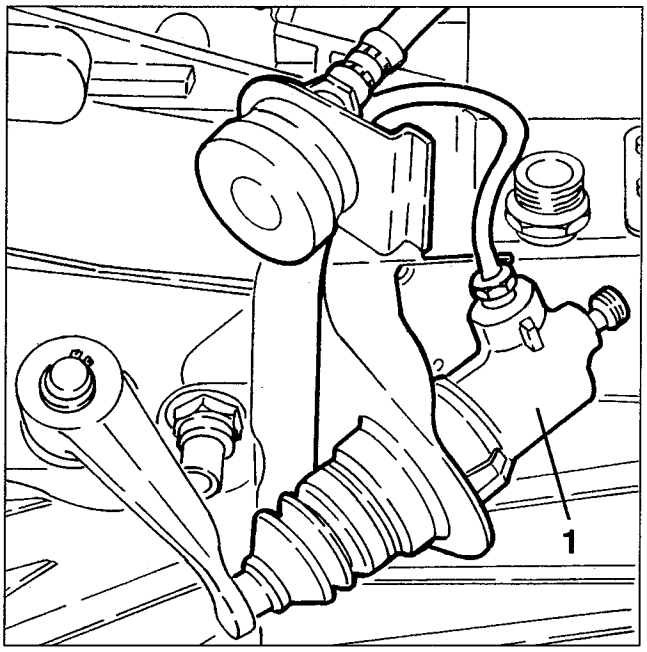
1. Working on the branch box, slacken the fastening nut and disconnect the earth terminal for the starter motor and alternator.



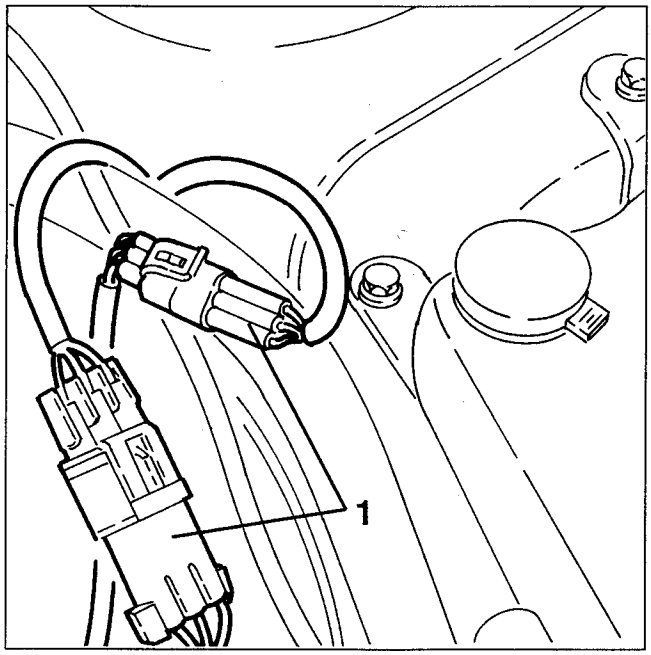
1. Disconnect the electrical connection of the tachometric sensor.



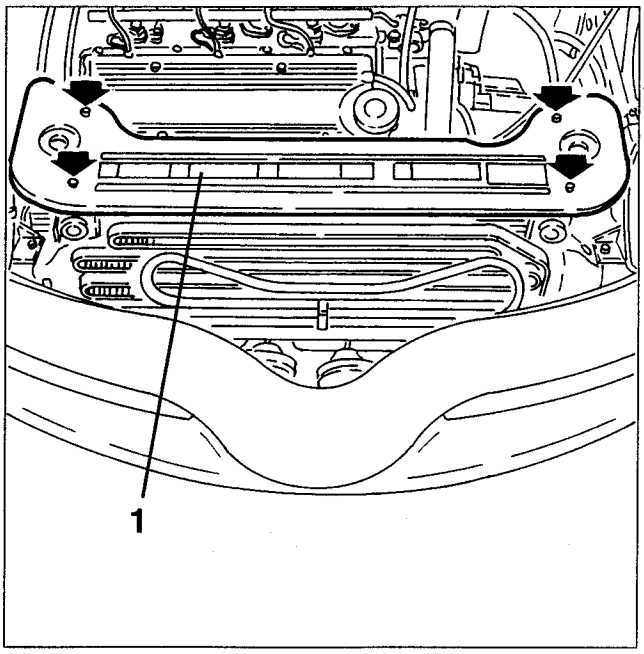
1. Slacken the screws fastening the clutch control cylinder support, then move everything aside without disconnecting the pipes.



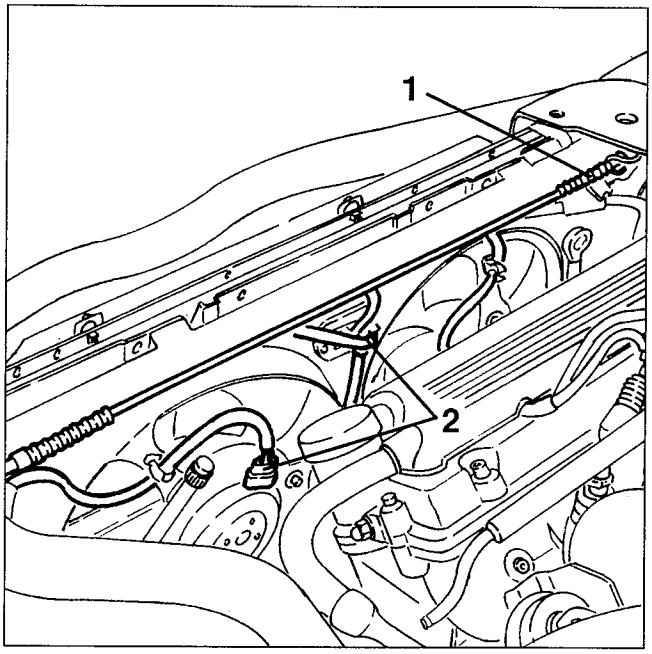
1. Disconnect the two electrical connections of the front services cable loom.



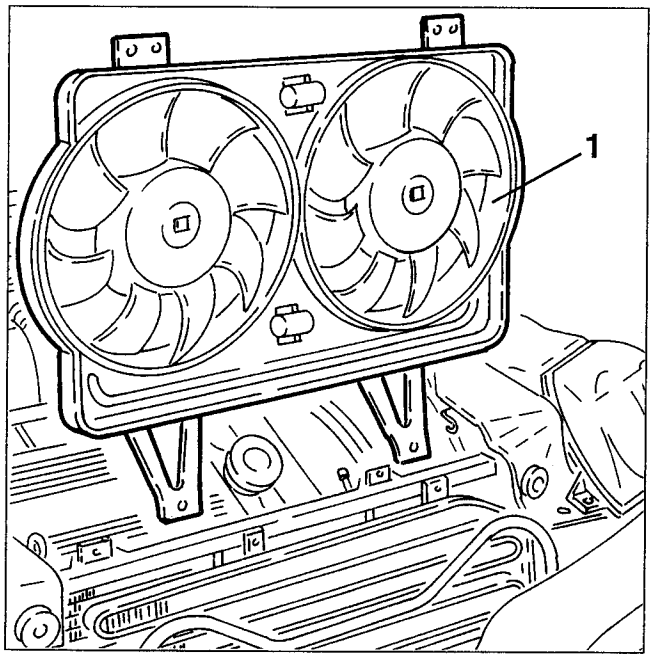
1. Slacken the fastening screws and remove the upper radiator crossmember.



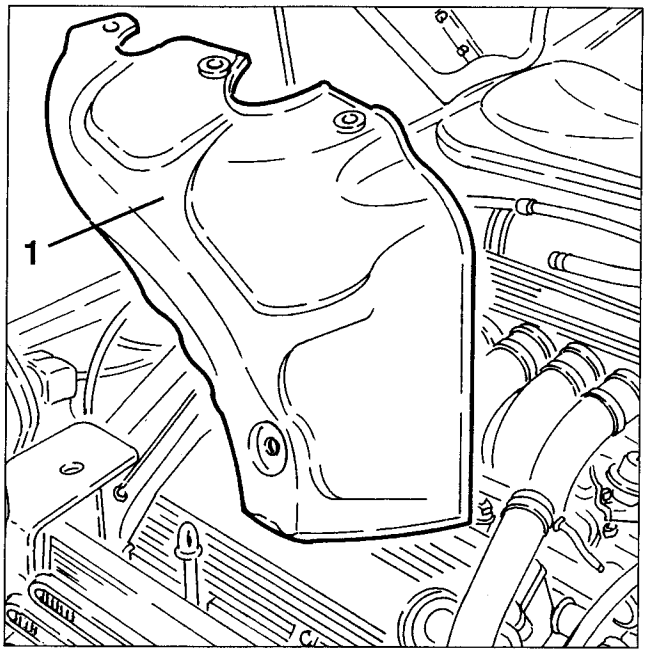
1. Disconnect the bonnet opening cables and move it aside to prevent it from hindering the following operations.
- Disconnect the electrical connection for supplying the electromagnetic joint of the conditioner compressor.
2. Disconnect the electrical connections from the fans and additional resistances, then release the cables from the clamps and groove.



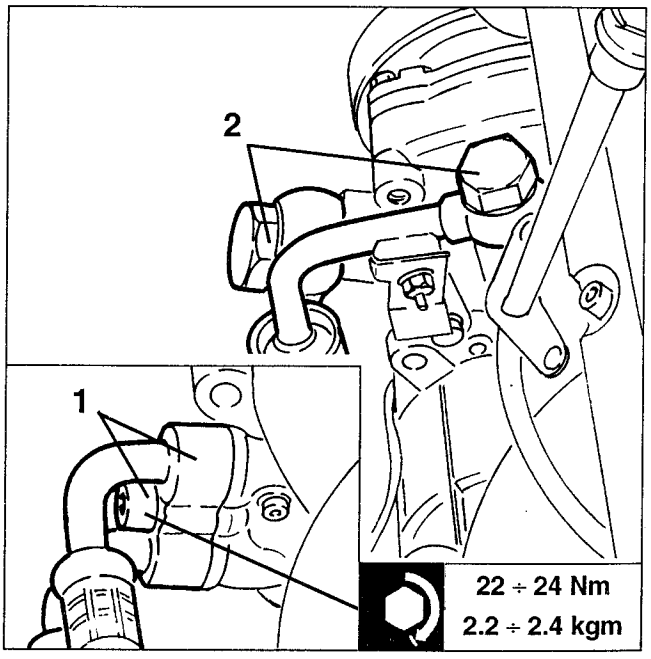
1. Slacken the fastening screws and remove the cooling fans withdrawing them upwards.



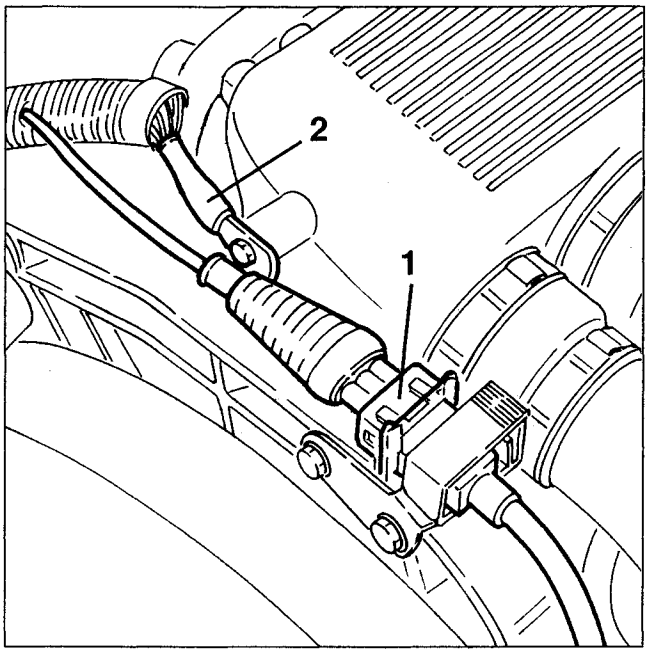
1. Slacken the fasteners and remove the heat shield from the exhaust manifold of the left cylinder head.



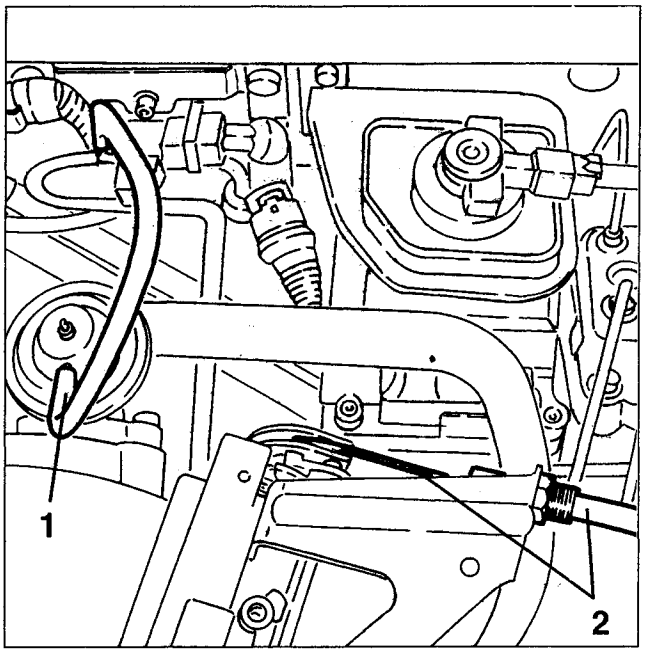
1. Slacken the fastening screw and disconnect the flange of the coolant fluid inlet and outlet pipes from the conditioner compressor (R134a).
- Using a suitable syringe drain the power steering tank oil.
2. Disconnect the unions of the oil intake and delivery pipes from the power steering pump.



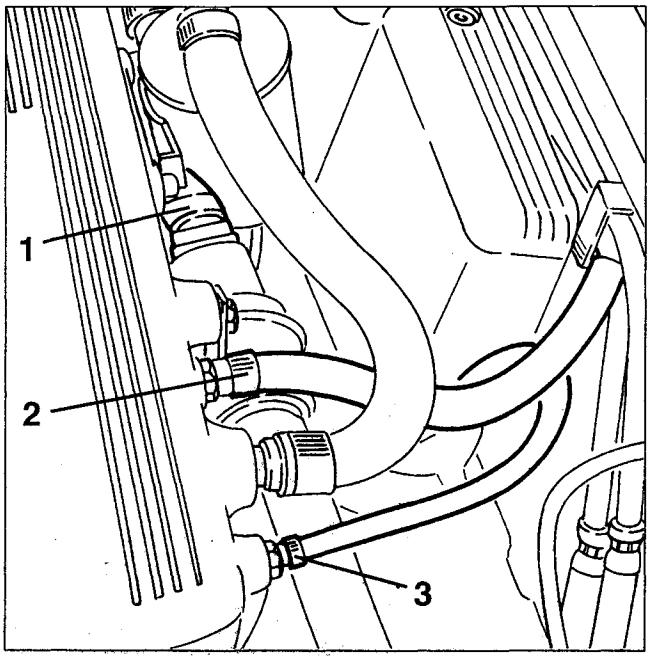
1. Disconnect the electrical connection of the front pinging sensor.
2. Disconnect the earth cable (front) from the intake box.



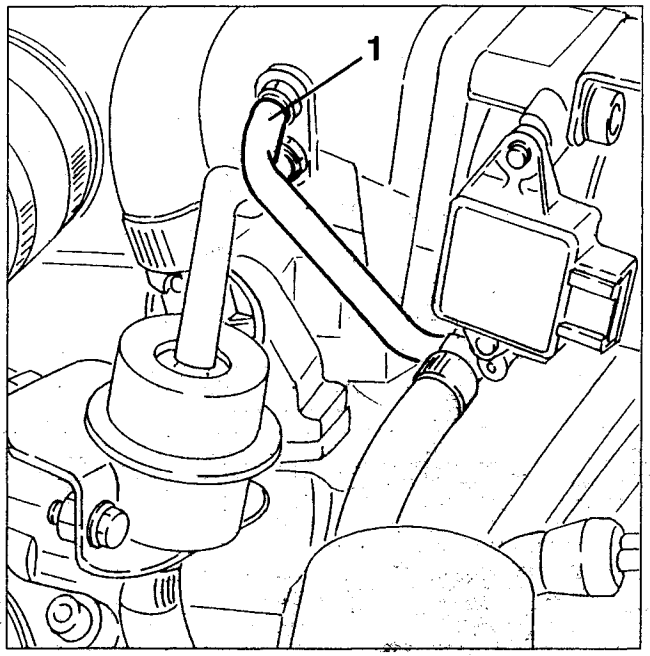
1. Disconnect the pneumatic signal inlet pipe leading from the solenoid valve from the E.G.R. valve.
2. Disconnect the accelerator cable from the throttle.



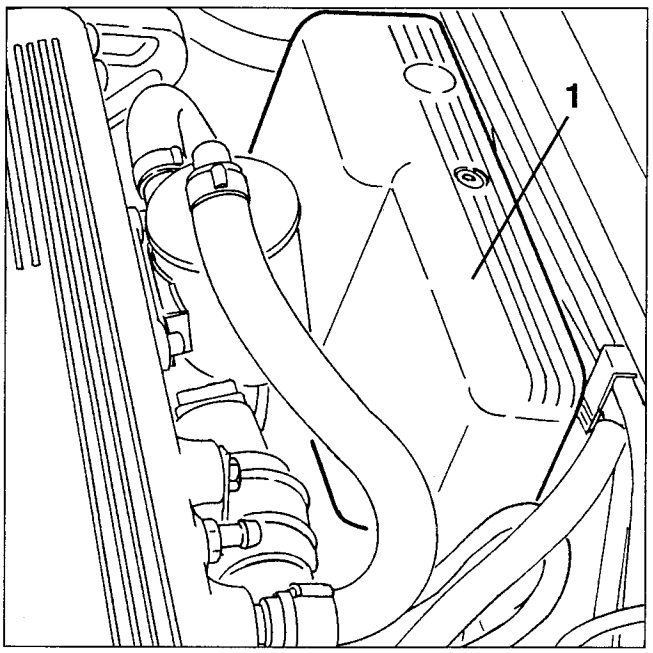
1. Disconnect the electrical connection from the constant idle device actuator.
2. Disconnect the fuel vapour recovery pipe from the intake box.
3. Disconnect the servobrake vacuum takeoff pipe from the intake box.



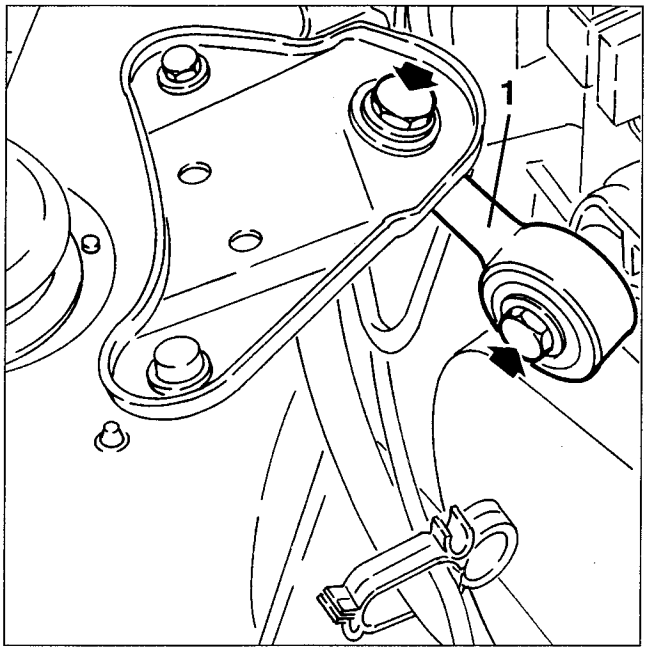
1. Disconnect the vacuum takeoff pipe for the E.G.R. modulation solenoid valve from the intake box.



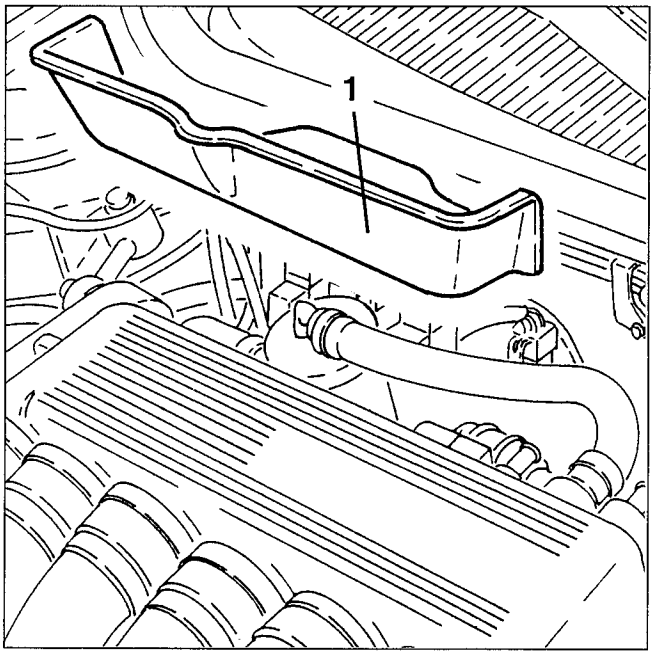
1. Remove the plastic cover of the relays, fuses and electrical connections.



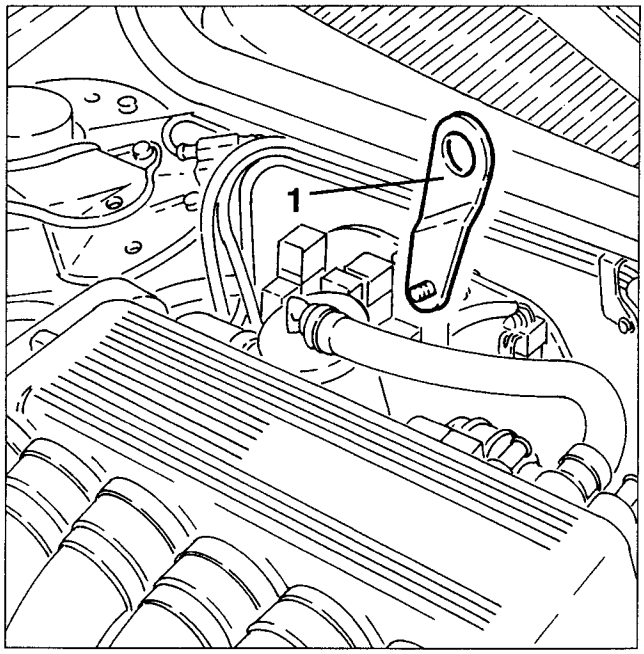
1. Slacken the fastening screws and remove the engine stay rod.



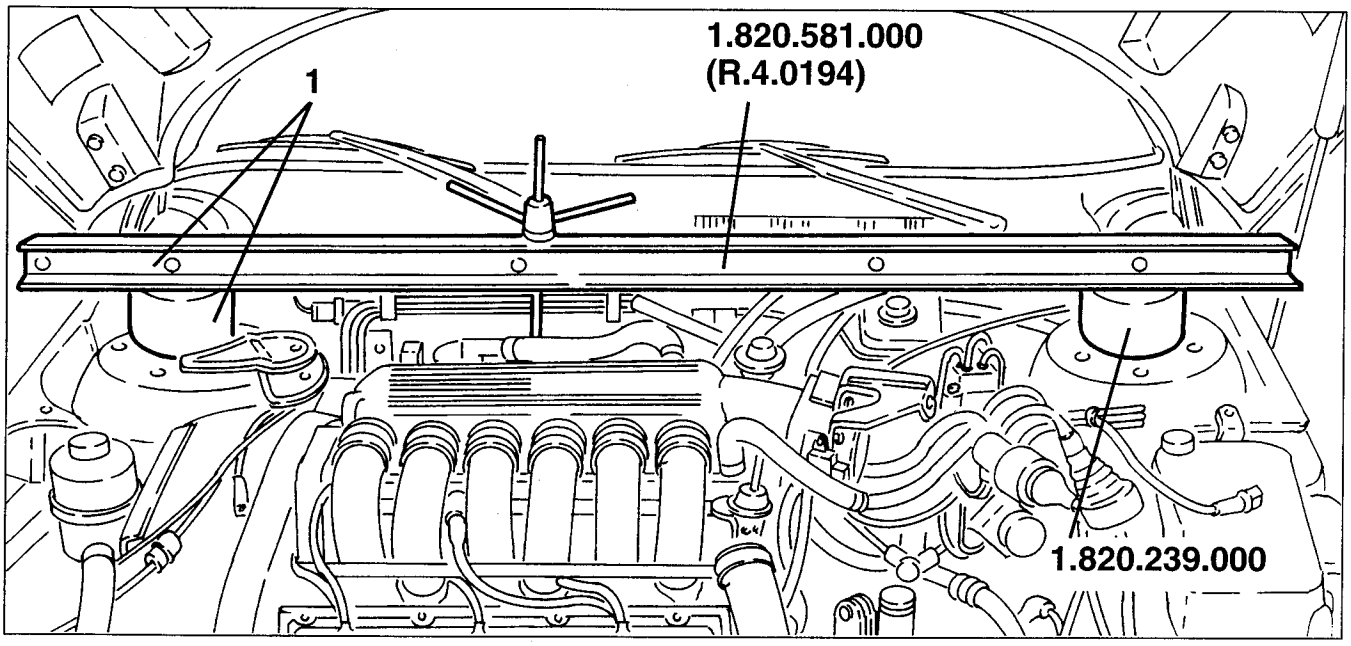
1. Slacken the fasteners and remove the heat shield.



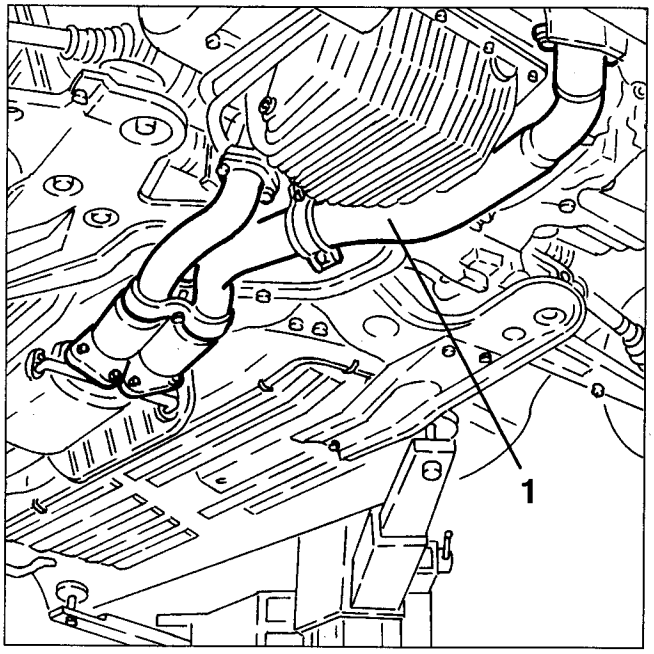
1. On the right cylinder head assemble a special engine support bracket.



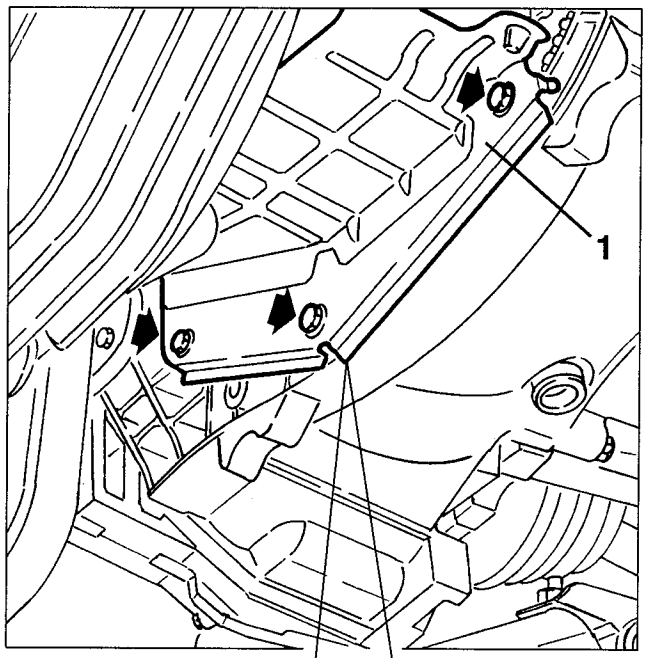
1. Install cross rail no. 1.820.581.000 (R.4.0194) complete with supports 1.820.239.000 to support the power unit.

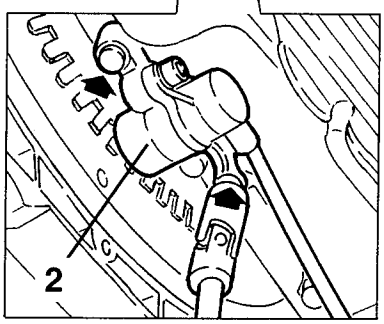


1. Raise the car and remove the front section of the exhaust pipe.

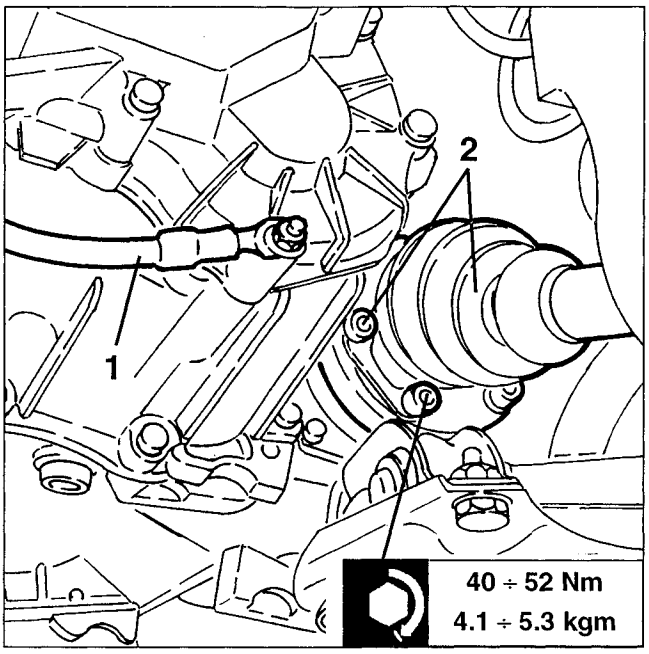


1. Slacken the fastening screws and remove the flywheel cover.
2. Slacken the fastening screws and remove the rpm and timing sensor.

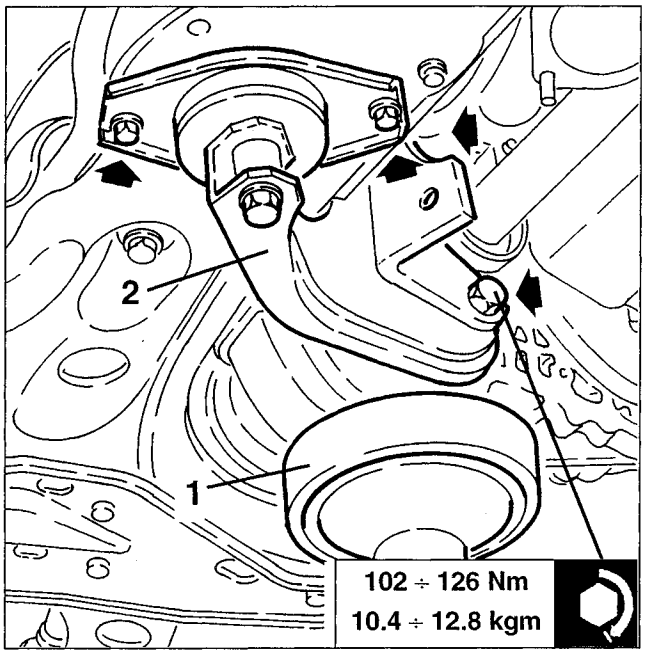




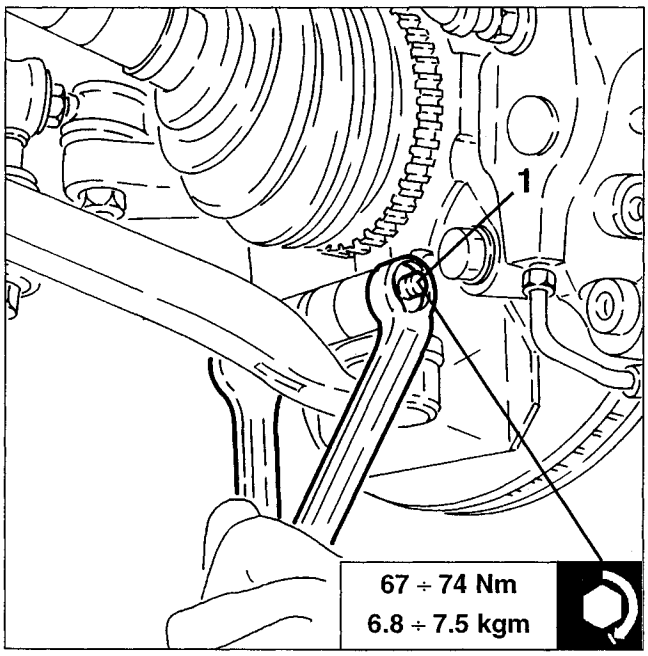
1. Disconnect the earth braid from the gearbox rear cover.
2. Slacken the fastening bolts and disconnect the axle shafts.



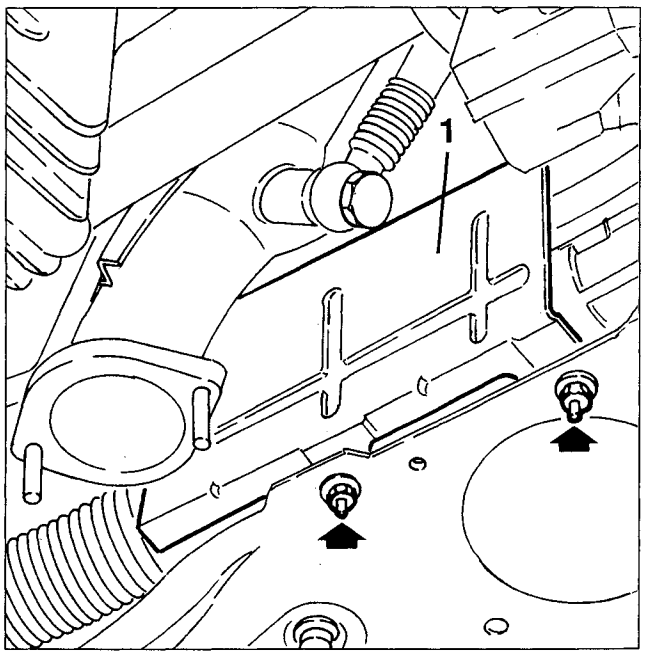
1. Position a hydraulic jack under the gearbox as illustrated.
2. Slacken the fastening screws and remove the powerplant rear support.



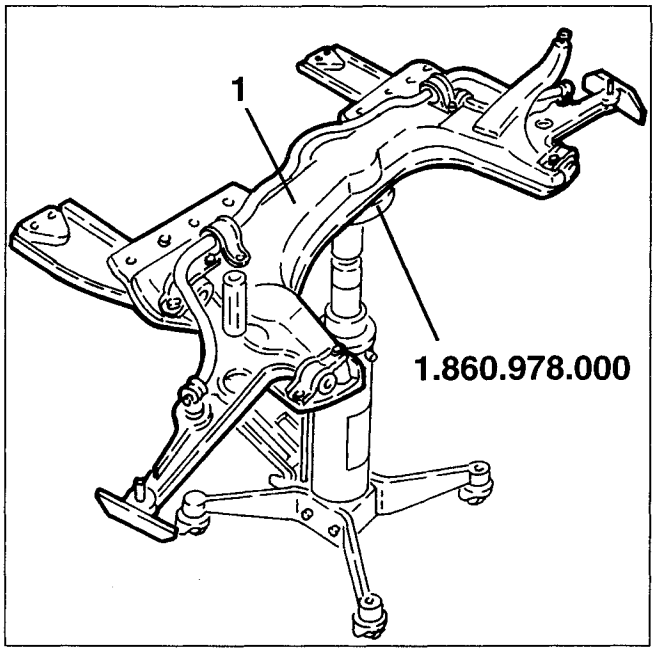
1. Slacken the bolts fastening the wishbones to the wheel uprights.



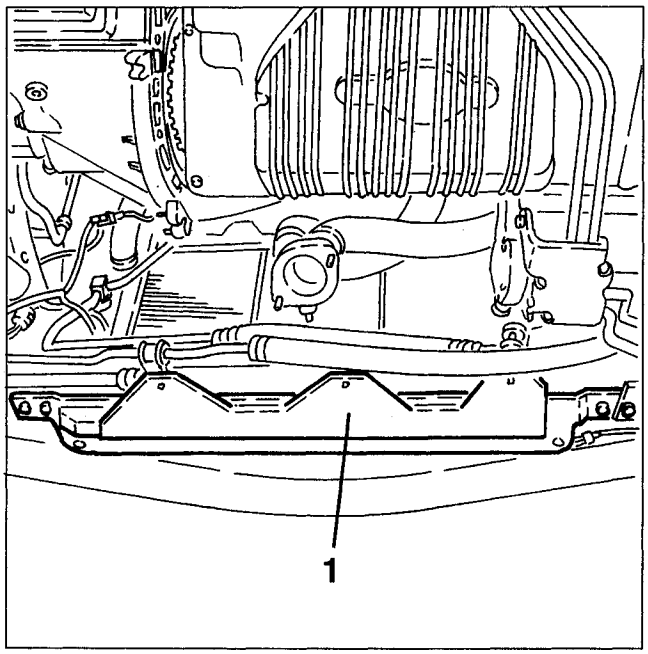
1. Slacken the fastenings and remove the heat shield from the power steering box.



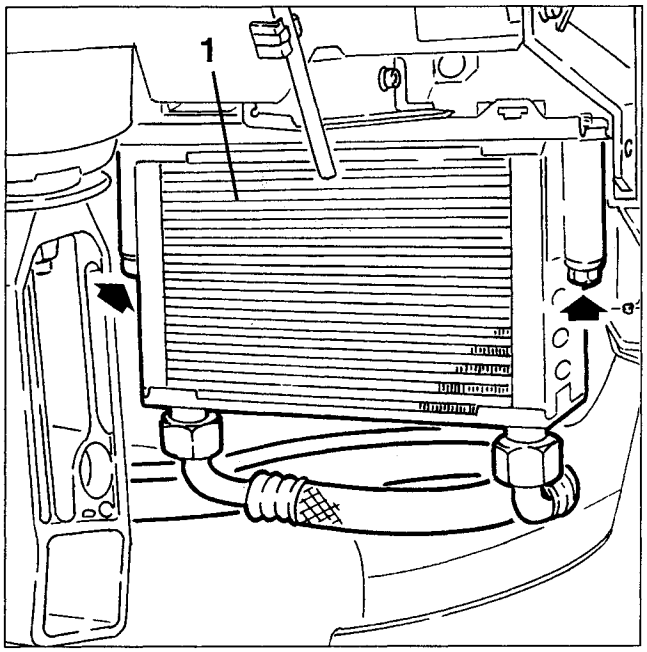
- Using a hydraulic jack support the crossmember using tool no. 1.860.978.000.
1. Slacken the screws and nuts fastening the crossmember, then remove it complete with wishbones, stabiliser bar and reinforcements.



1. Slacken the fastening screws and remove the radiator lower cross rail.

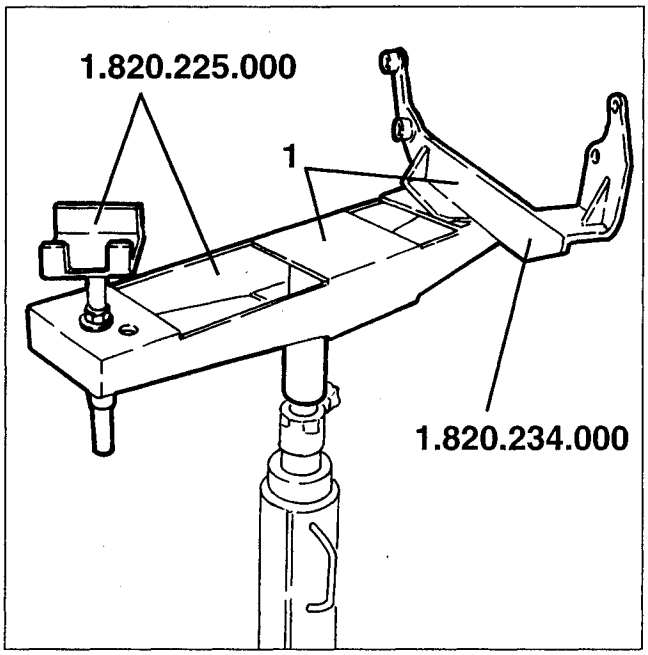


1. Slacken the fastening screws and remove the engine oil radiator from the support bracket, then without disconnecting the pipes, restrain it to the engine to prevent it from hindering the following operations.

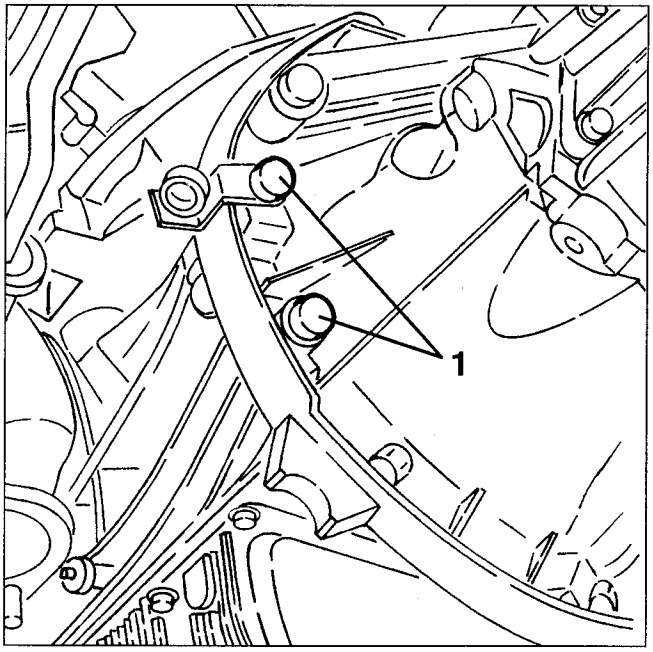


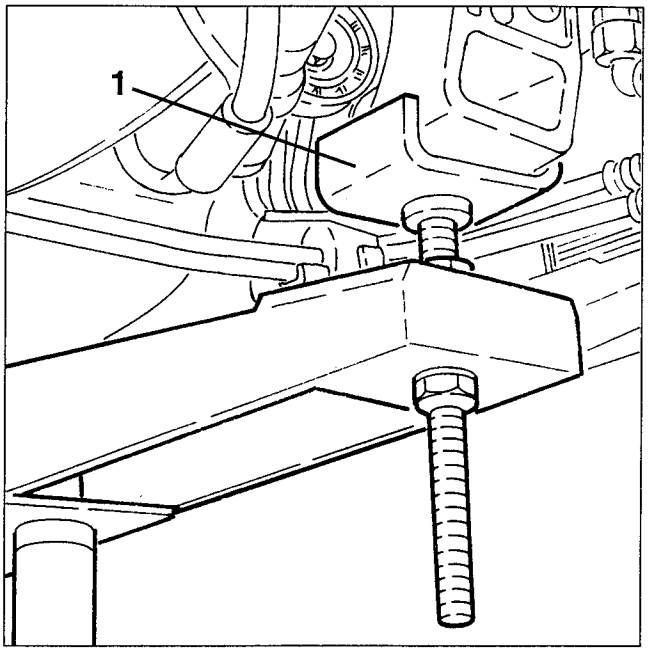
1. Position tool no. 1.820.225.000 complete with tool no. 1.820.234.000 on a hydraulic jack as illustrated.

NOTE: In order to balance the power unit on the support tool the jack should be placed in the centre hole of tool no. 1.820.225.000.

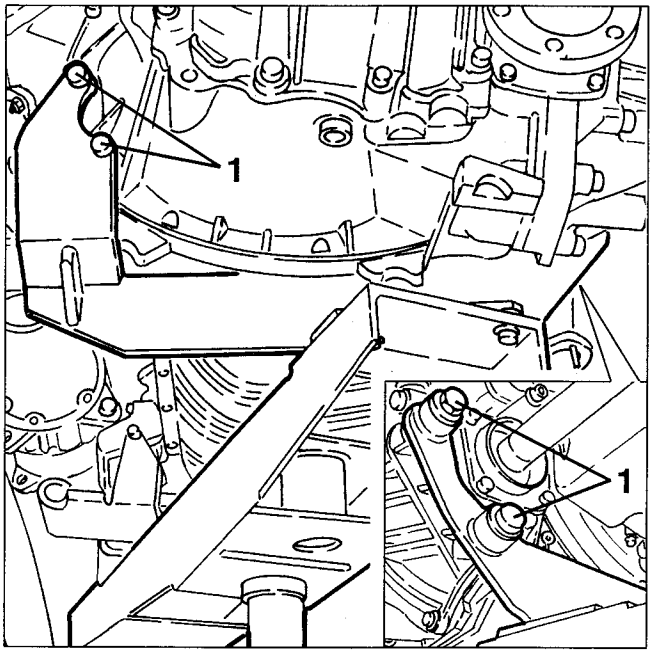


1. Remove the two screws illustrated for fastening the gearbox to the crankcase to be able to fasten the power unit support tool.

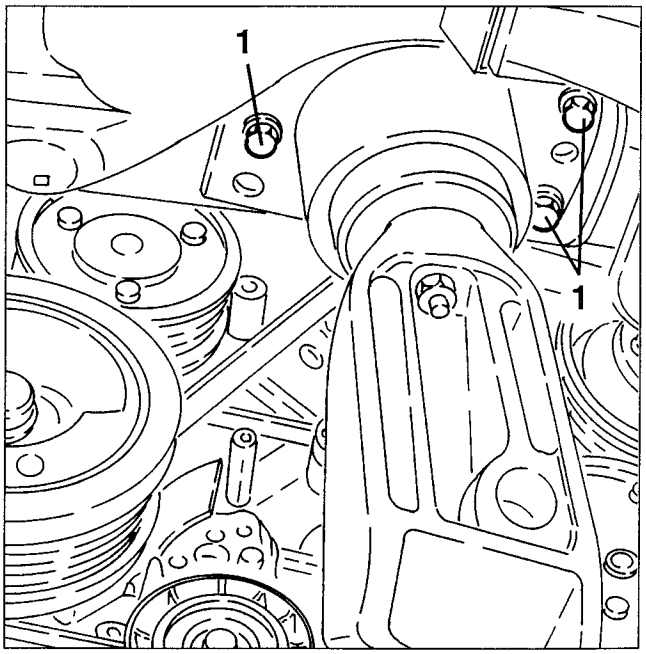




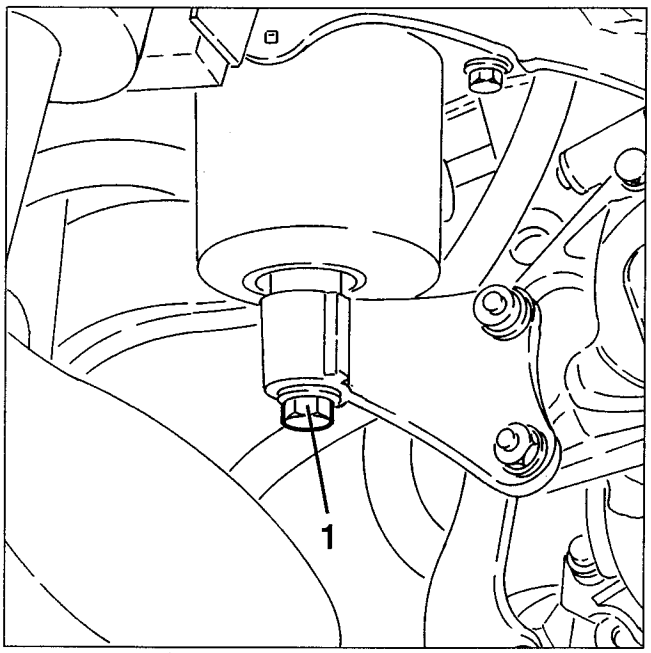
1. Position the hydraulic jack under the power unit and fasten the support tools as illustrated below.



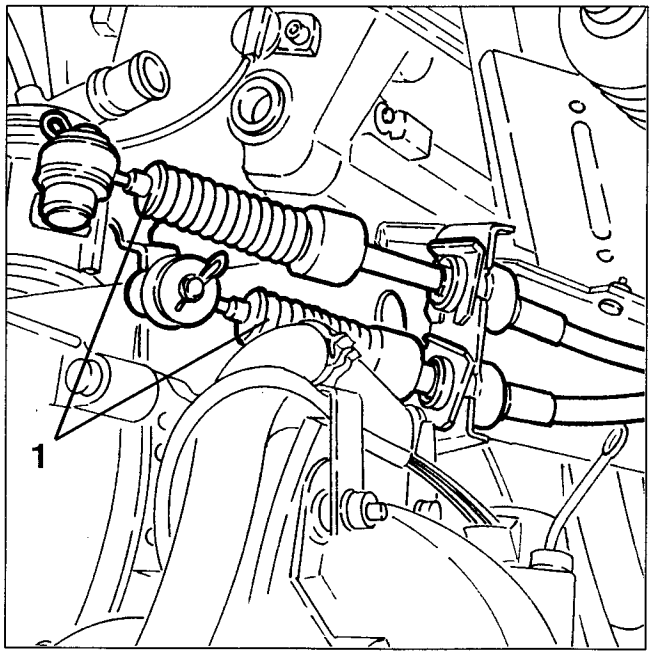
- Release the tierod of the safety cross rail of the power unit support installed previously from the support bracket.
1. Slacken the three screws fastening the power unit support on the camshaft side.



1. Slacken the power unit support fastening screw on the gearbox side.

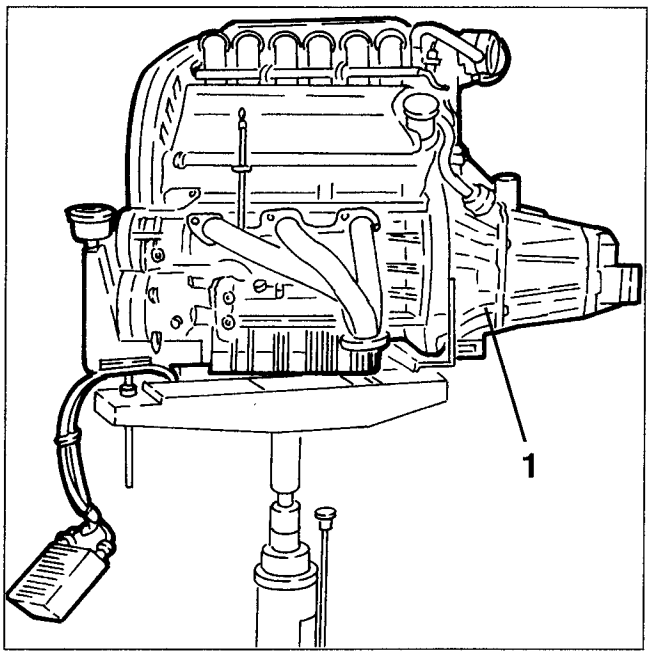


1. Lower the power unit with the hydraulic jack just enough to disconnect the gear control cable.



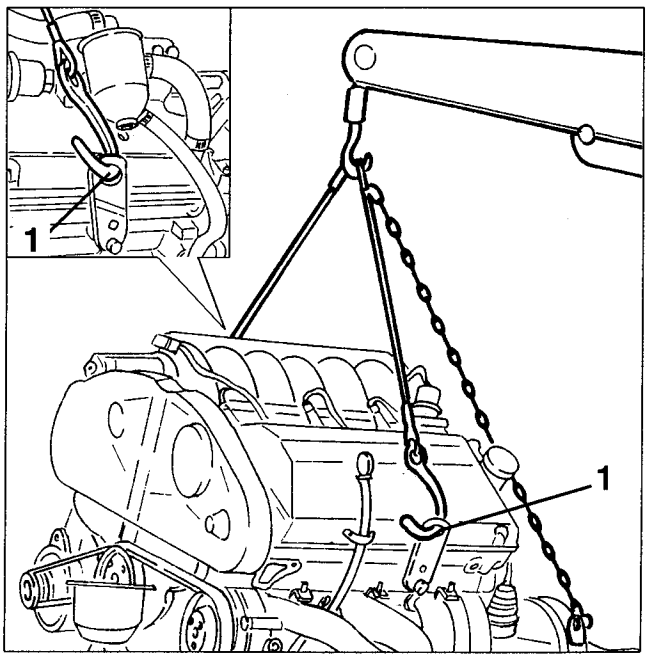
WARNING:
The hydraulic jack must have a capacity of at least 1000 kg.
Release the electric cables from any wire stays and move them away from the engine, to prevent them from getting stuck in the engine when it is removed.

1. Completely lower the hydraulic jack and remove the power unit from the engine compartment.



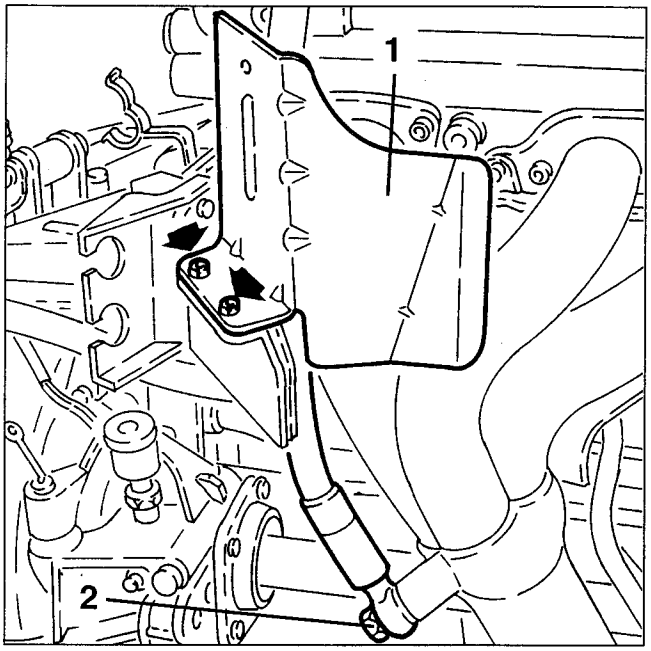
WARNING:
During the lowering operation make sure that there are no cables or pipes still connected.
Take due care not to damage any component.

1. In addition to the hydraulic jack used for removal, support the power unit with a hydraulic hoist restraining as illustrated.

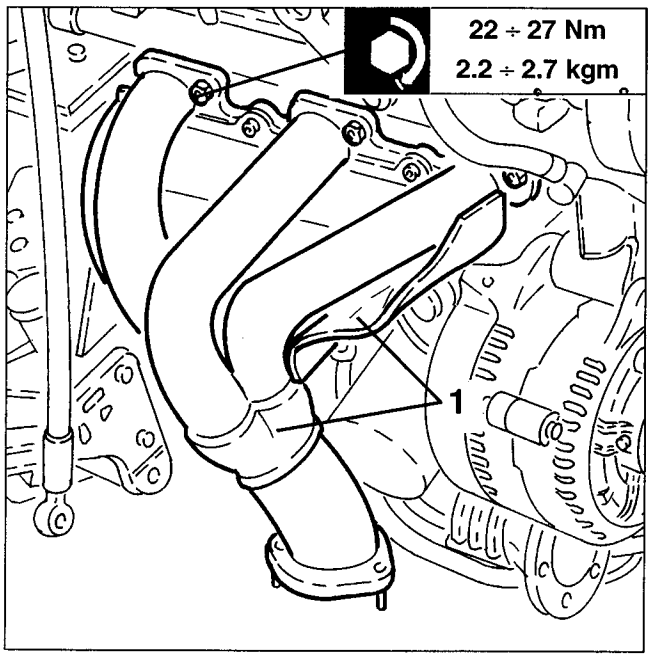


WARNING:
For handling the power unit use a hydraulic hoist after releasing it from the hydraulic jack.

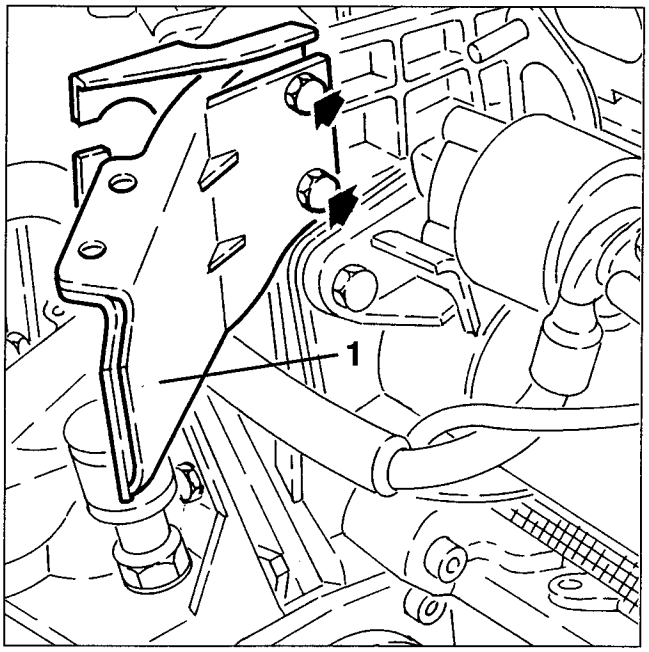
- Lower the hydraulic lift and position the power unit on a special work bench.
1. Slacken the fastenings and remove the upper heat shield from the exhaust manifold.
2. Disconnect the the union of the gas takeoff pipe for the E.G.R. valve from the manifold.



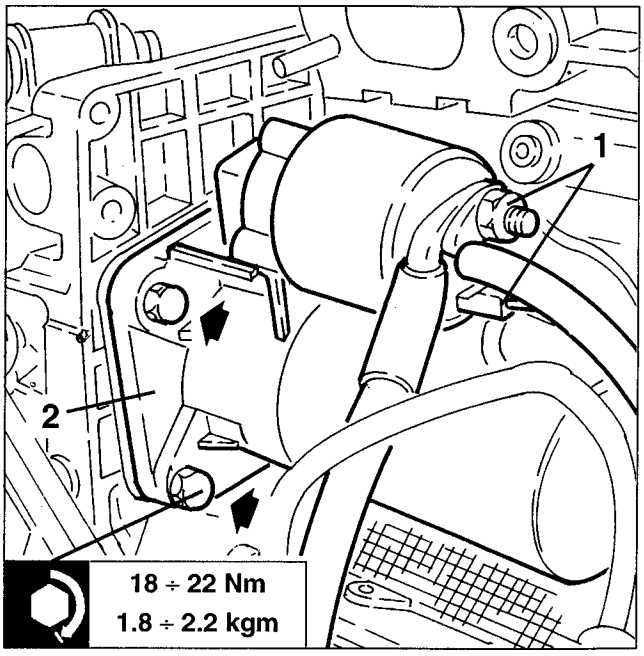
1. Slacken the fasteners and remove the exhaust manifold complete with heat shield for starter motor.
- Remove the seals.



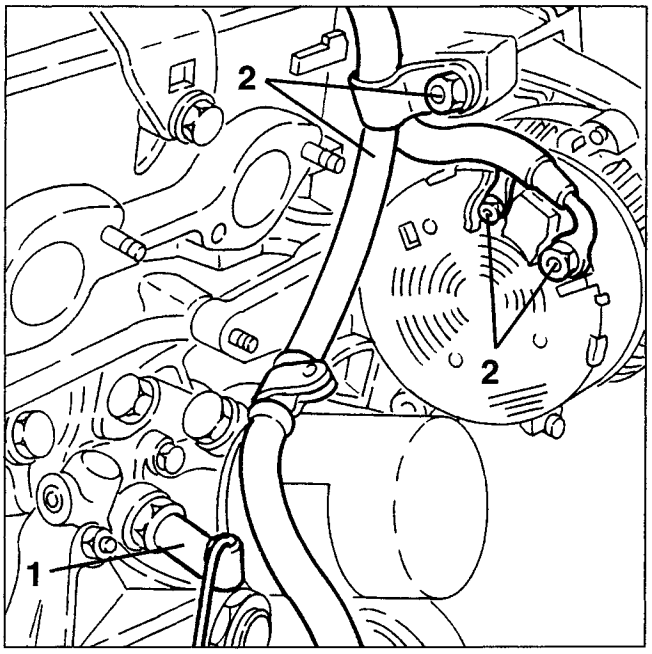
1. Slacken the two fastening screws and remove the gears control cable support bracket complete with lower heat shield.



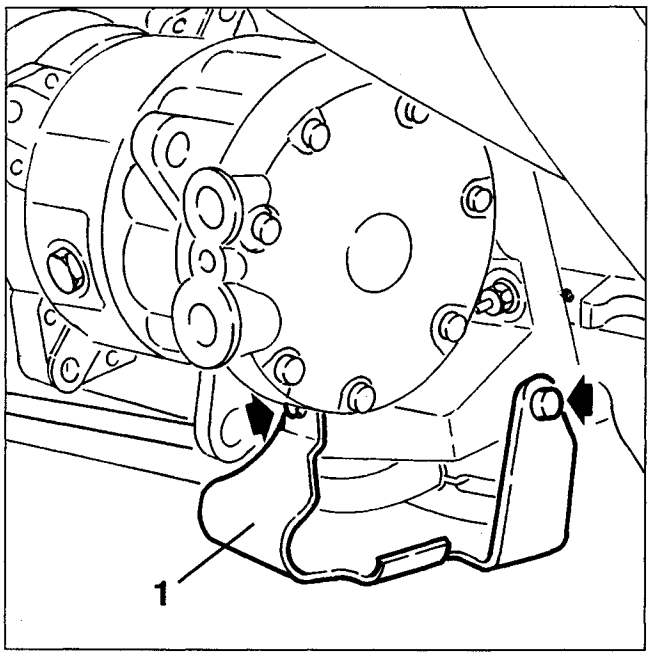
1. Disconnect the electrical connections from the starter motor.
2. Slacken the three fastening screws and remove the starter motor.



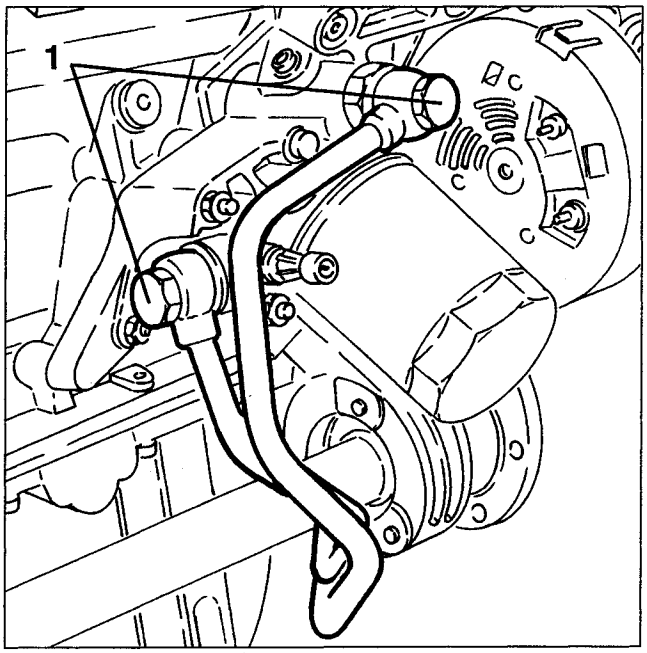
1. Disconnect the electrical connection from the engine oil minimum pressure sensor.
2. Disconnect the electrical connections from the alternator, then remove the wiring loom after releasing it from the fasteners.



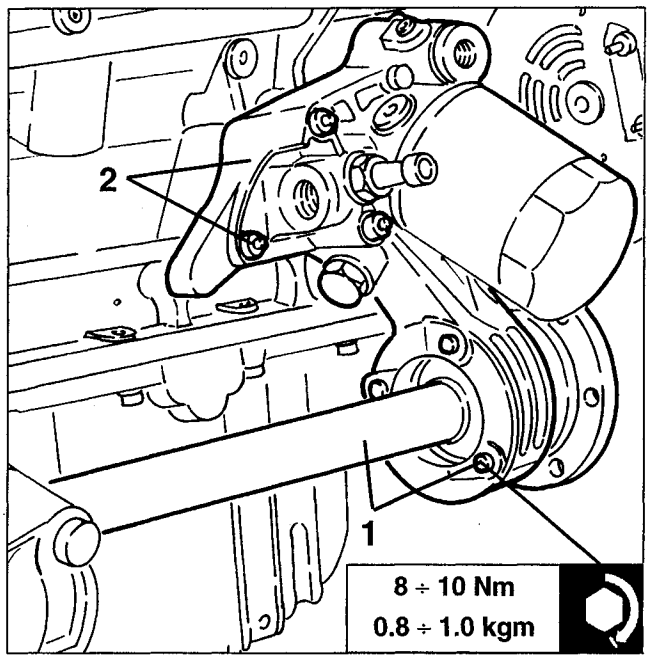
1. Slacken the fastening screws and remove the support bracket of the radiator engine oil delivery and return pipes.



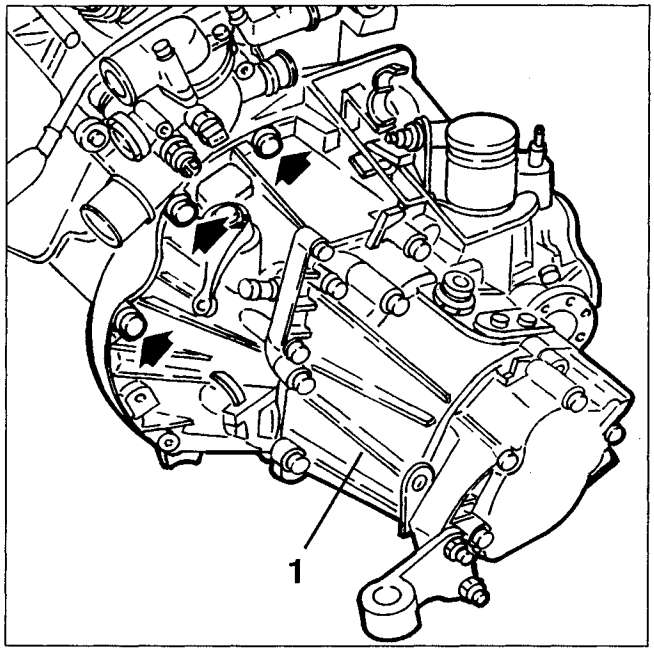
1. From the oil filter support bracket disconnect the unions of the radiator engine oil delivery and return pipes, then remove them complete with the radiator.



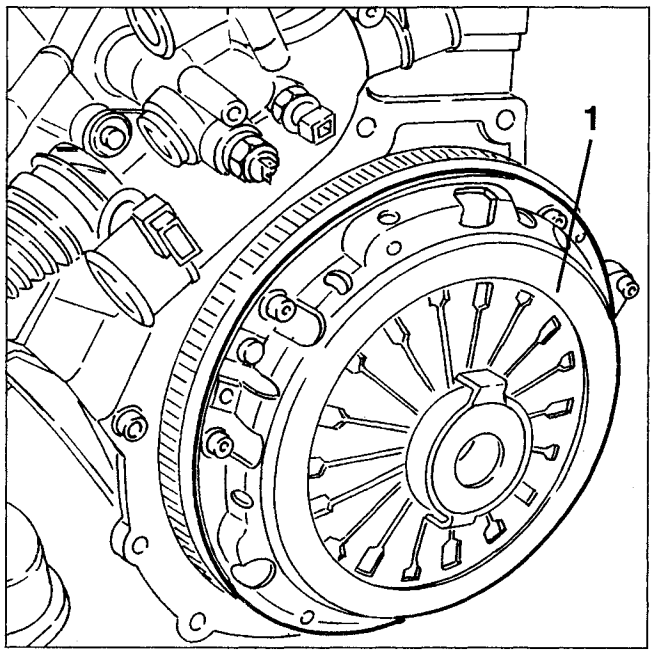
- Drain the gearbox - differential oil.
1. Slacken the fastening screws and withdraw the intermediate shaft.
- Remove the dust ring.
2. Slacken the fastening nuts and remove the oil filter support complete.



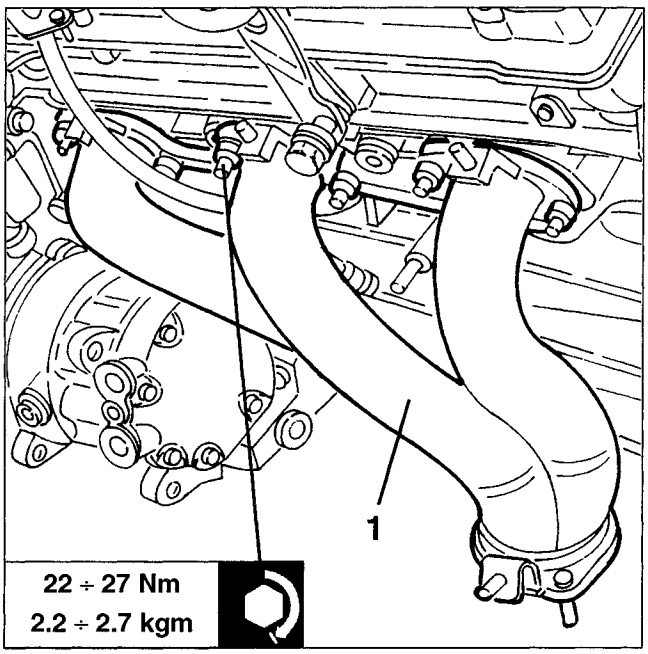
1. Slacken the fastening screws and, using a hydraulic hoist, remove the gearbox - differential unit.



1. Slacken the fastening screws and remove the pressure plate complete with thrust bearing and clutch plate.



1. Slacken the fastening nuts and remove the left exhaust manifold
- Remove the seals.



REFITTING

Reverse the sequence followed for removal, keeping to the following instructions:
- Prepare the engine compartment for inserting the power unit assembly, placing all the electric cables, pipes, etc. so that they do not interfere with reassembly operations.
- Take due care when fitting the power unit to avoid damaging the single components.

WARNING:
Make sure that the power unit support points have been fixed correctly.

- After assembly, fill the various systems as specified (see Group 00).
- Carry out all the necessary checks and operations (see Group 00).

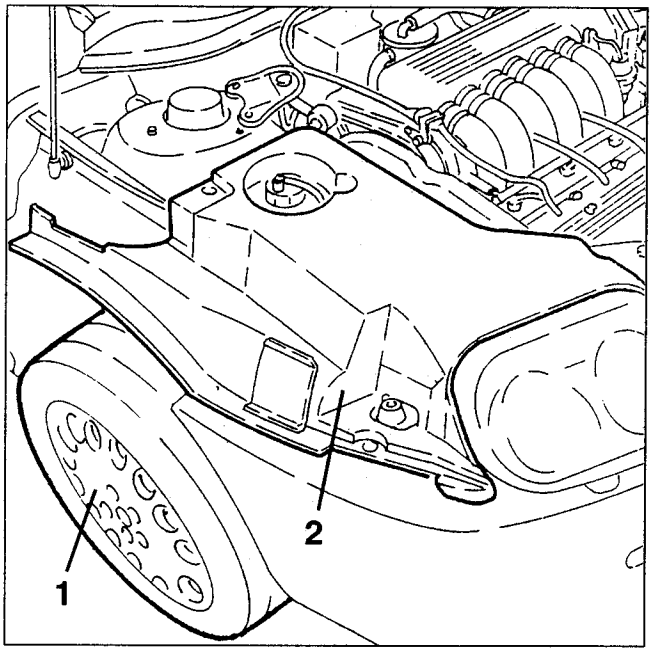
CYLINDER HEADS

NOTE: In the car it is only possible to remove the right cylinder head proceeding as described below.
When needing to remove the left cylinder head, it is necessary to remove the power unit (see specific paragraph).

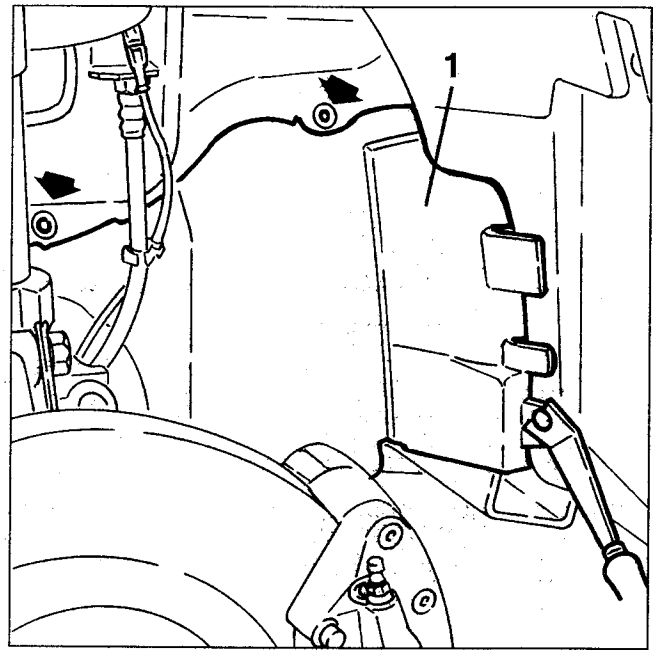
REMOVAL/REFITTING RIGHT CYLINDER HEAD

- Set the car on a lift.
- Disconnect the battery (-) terminal.

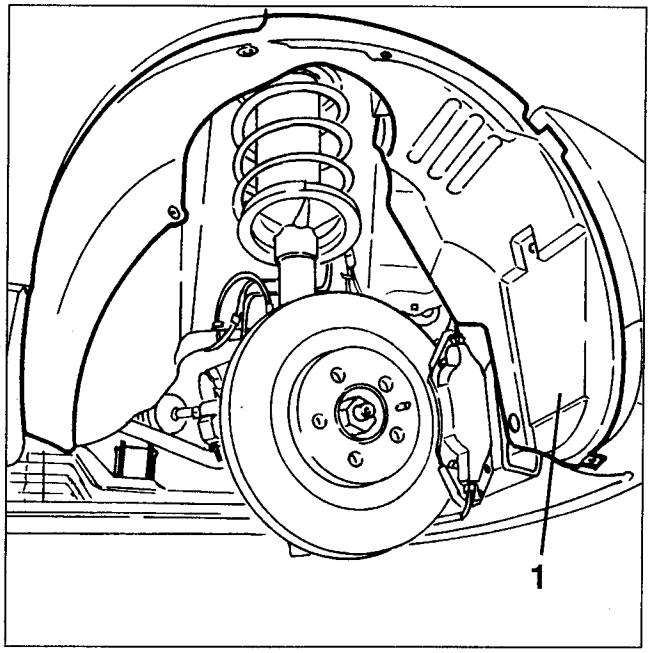
1. Remove the right front wheel.
2. Remove the engine compartment trim.



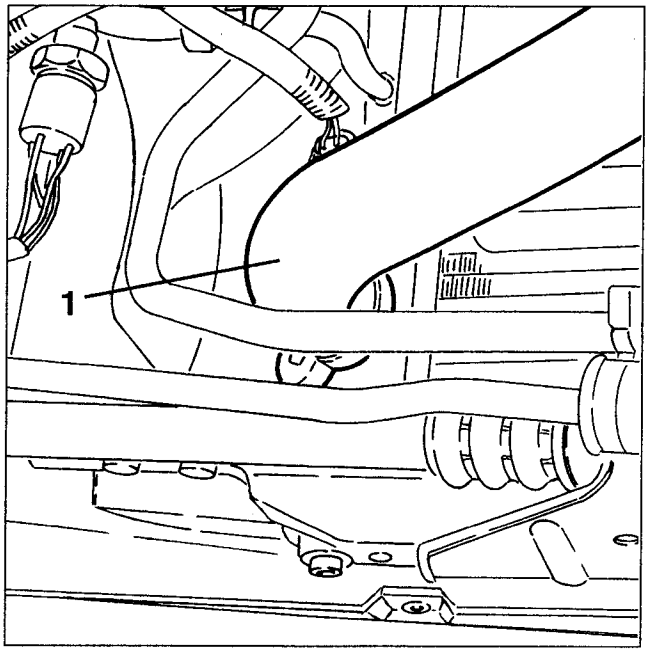
1. Slacken the two fastening screws, remove the plastic button and remove the right front wheel house mud flap.



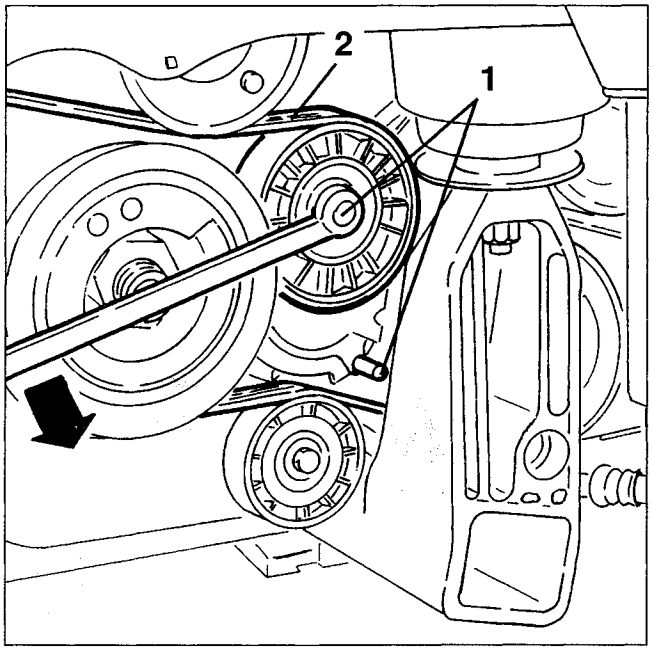
1. Slacken the fastenings and remove the right front wheel house.



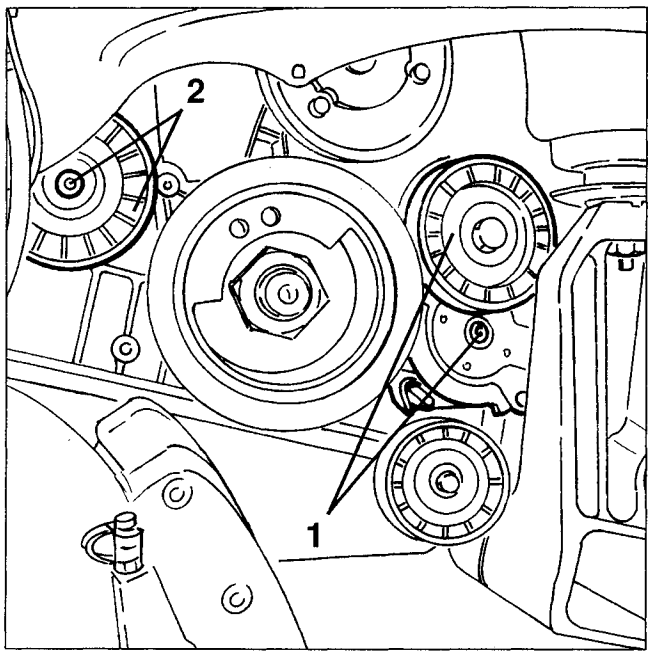
1. Raise the car and remove the engine coolant fluid, disconnecting the radiator outlet sleeve and retrieve it in a suitable container.



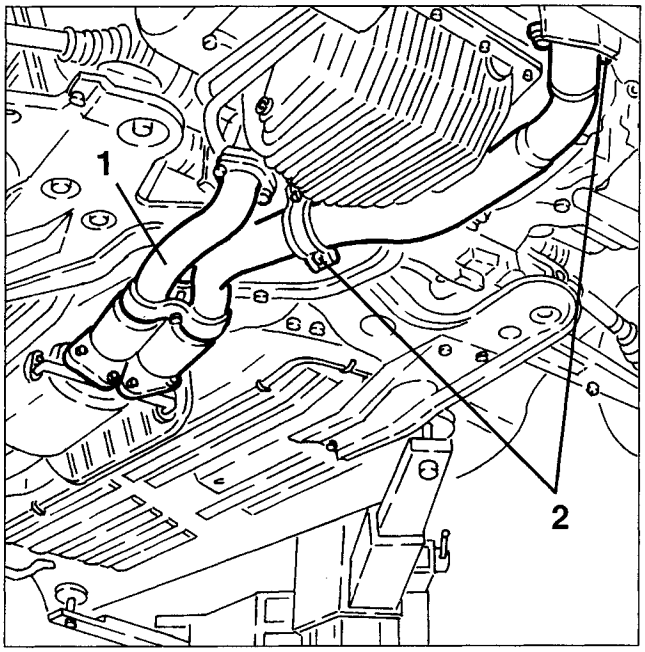
1. Using a wrench on the fastening screw of the belt tensioner pulley, overcome the force of the automatic belt tensioner and lock it in this position (belt slack) inserting the special peg as illustrated.
2. Prise and remove the auxiliary components drive belt.



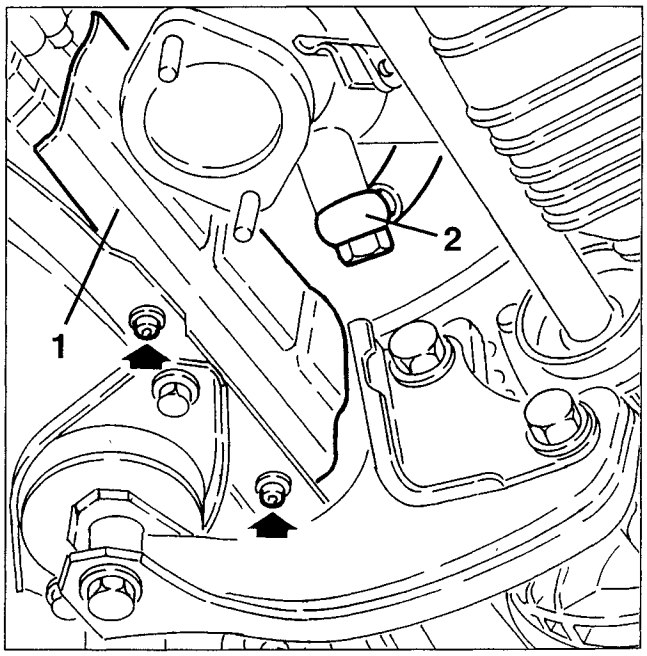
1. Slacken the fastening screw and remove the guide pulley for the auxiliary components drive belt.
2. Slacken the fastening screw and remove the auxiliary components guide pulley.



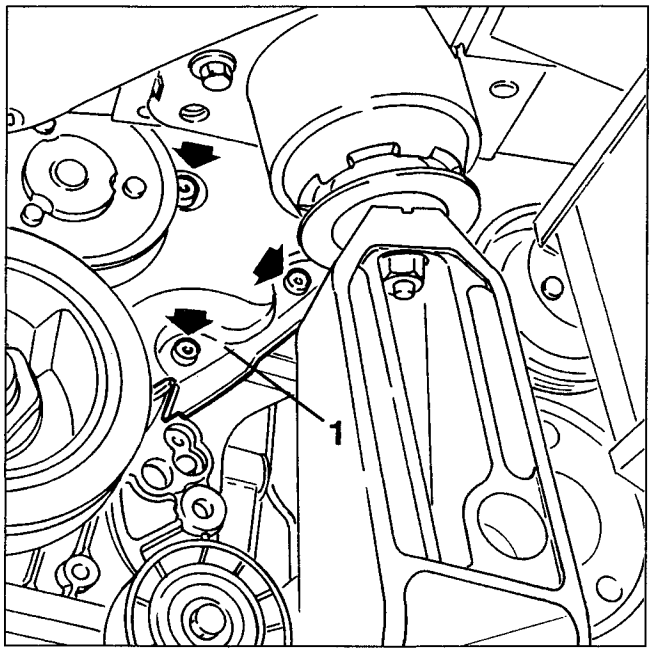
1. Remove the front section of the exhaust pipe only of the right cylinder head.
2. Disconnect the front section of the exhaust pipe from the left cylinder head and from the intermediate support clamp.



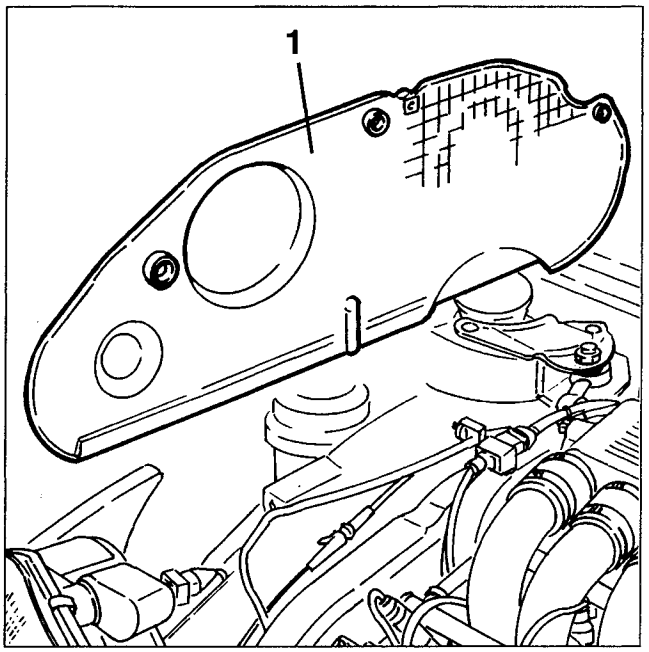
1. Slacken the fastenings and remove the heat guard of the power steering box.
2. Disconnect the fitting of the exhaust gas takeoff pipe for the E.G.R. valve from the right cylinder head exhaust manifold.



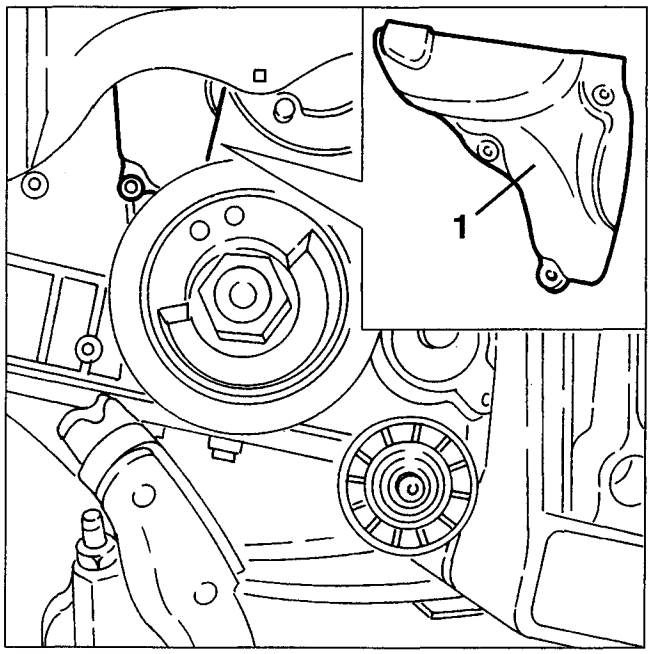
1. Slacken the fastening screws and remove the timing gear belt left lower guard.



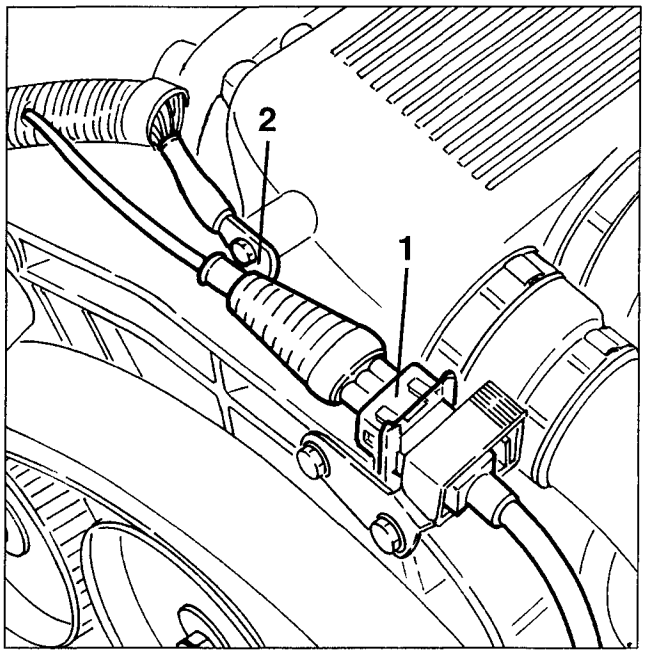
1. Slacken the fastening screws and remove the timing gear belt upper guard.



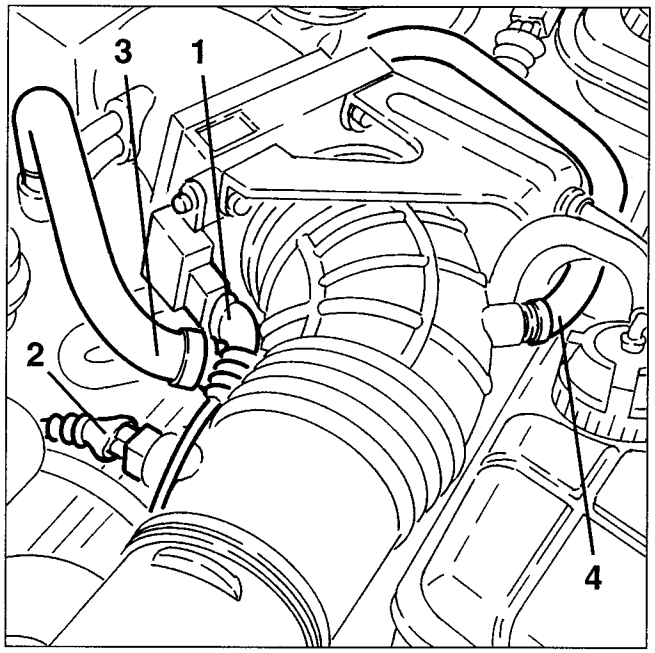
1. Slacken the fastening screws and remove the timing gear belt right lower guard.



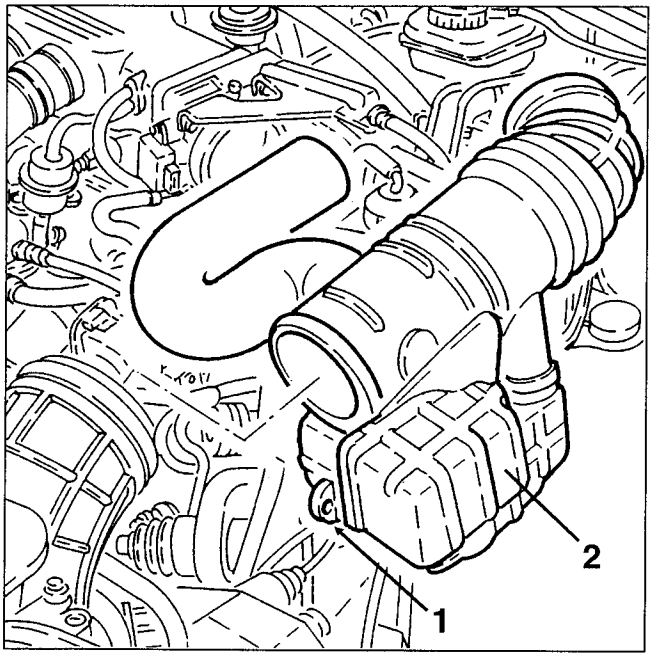
1. Disconnect the electrical connection of the front pinging sensor.
2. Disconnect the earth cable (front) from the intake box.



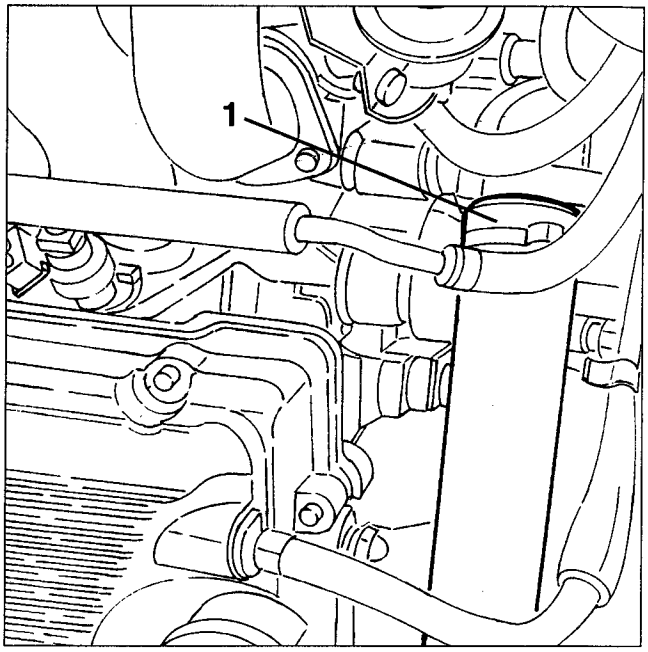
1. Disconnect the electrical connection from the throttle potentiometer.
2. Disconnect the electrical connection from the intake air temperature sensor.
3. Disconnect the oil vapour rcovery pipe leading from the right cylinder head from the corrugated sleeve.
4. Disconnect the air takeoff pipe for the constant idle speed device from the corrugated sleeve.



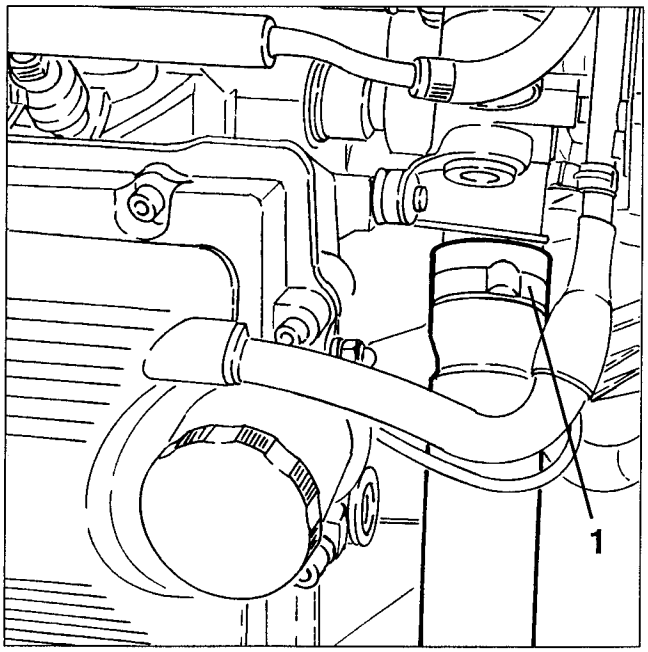
1. Remove the button fastening the first section of the corrugated sleeve to the resounder.
2. Slacken the two fastening clamps and remove the second section of the corrugated sleeve complete with resounders.



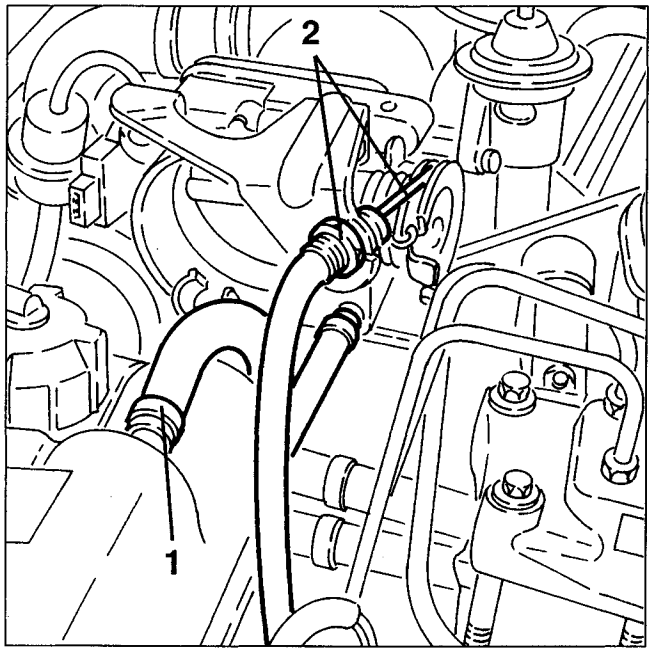
1. Disconnect the radiator coolant delivery sleeve from the thermostatic cup.



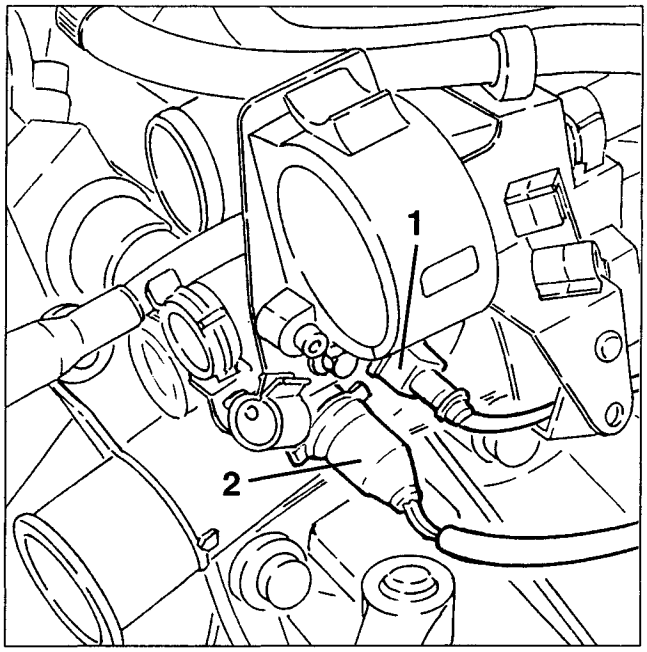
1. Disconnect the radiator coolant return sleeve from the thermostatic cup.



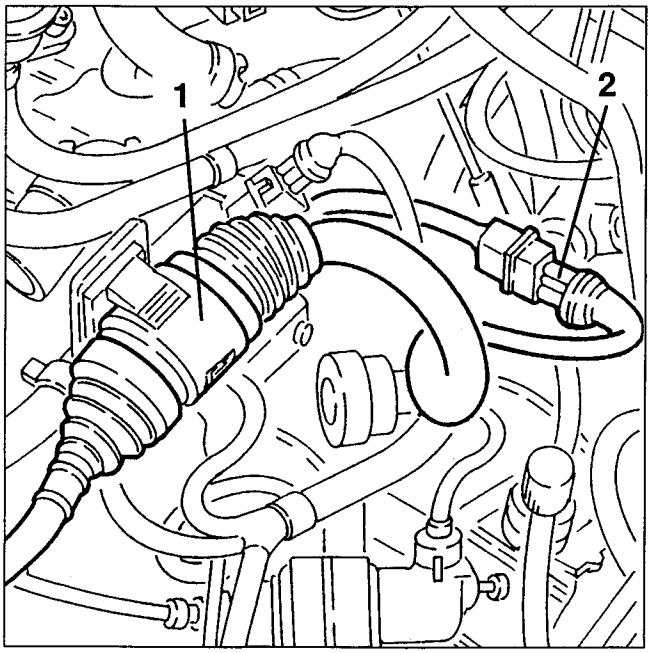
1. Disconnect the throttle body coolant outlet pipe from the expansion tank.
2. Disconnect the accelerator cable from the throttle cam.



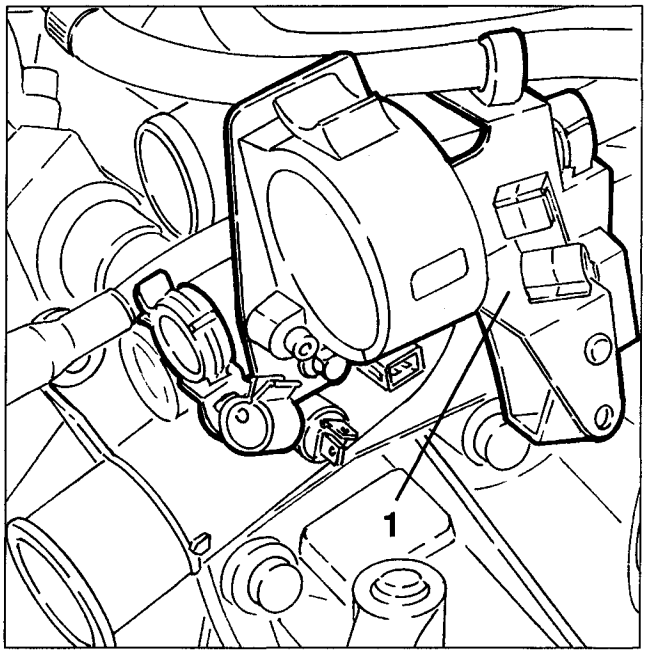
1. Disconnect the electrical connection from the engine coolant temperature transmitter (NTC).
2. Disconnect the electrical connection from the coolant temperature transmitter and max. temperature thermal contact.



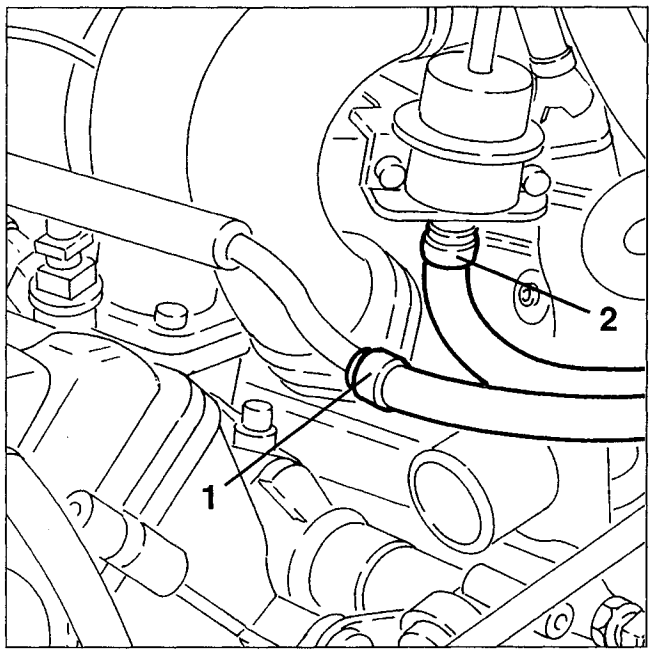
1. Release the injection wiring connector from the support bracket.
2. Disconnect the electrical connection of the cam angle sensor.



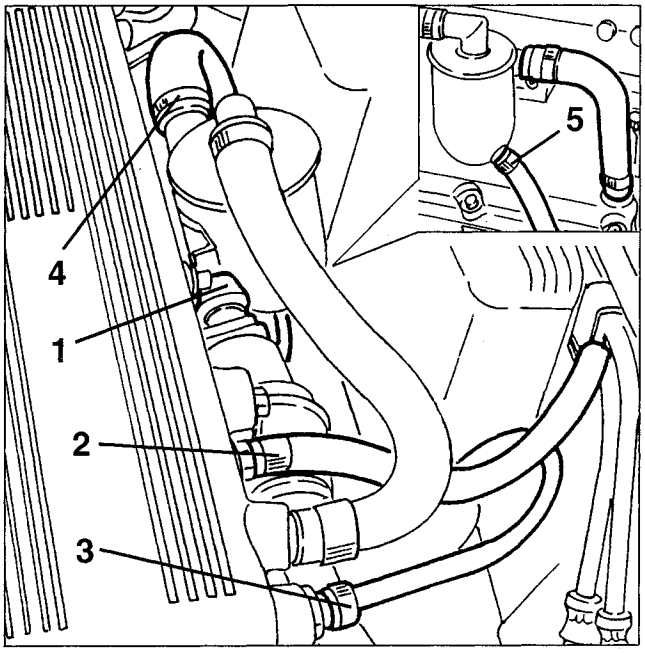
1. Slacken the fastening screws and remove the bracket supporting the injection wiring connector and fastening the pipes.



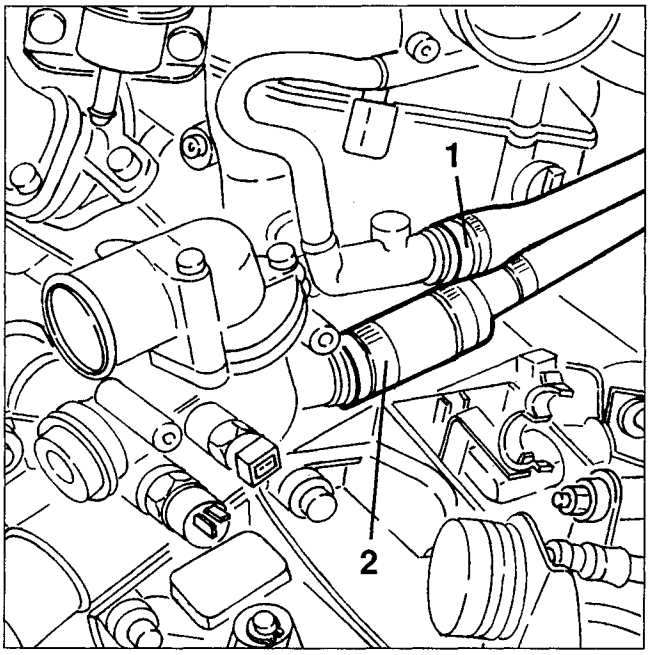
1. Disconnect the fuel delivery pipe from the distributor manifold.
2. Disconnect the excess fuel return pipe from the pressure regulator.



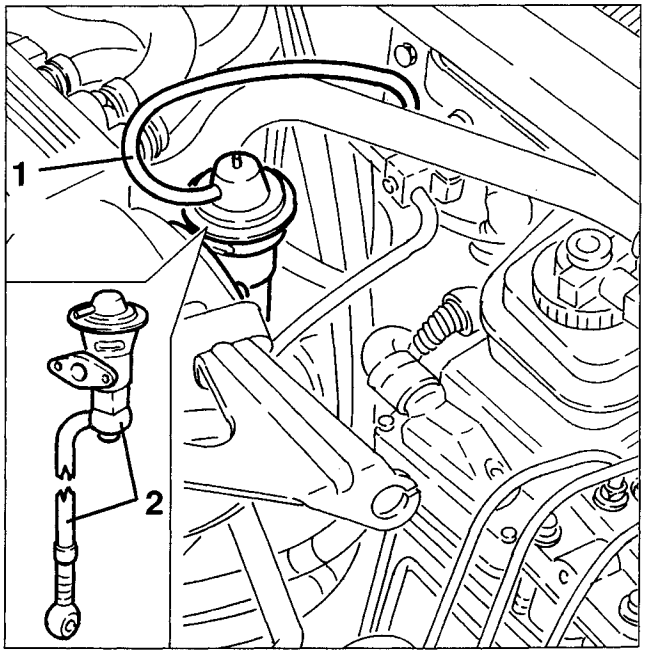
1. Disconnect the electrical connection from the constant idle speed device.
2. Disconnect the fuel vapour recovery pipe from the intake box.
3. Disconnect the servobrake vacuum takeoff pipe from the intake box.
4. Disconnect the oil vapour recovery pipe from the separator.
5. Disconnect the condensed oil recovery pipe from the separator.



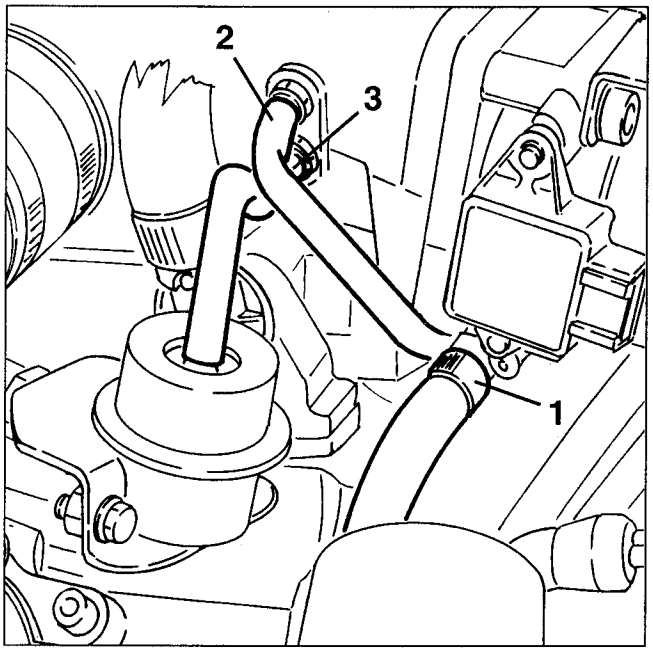
1. Disconnect the climate control system heater coolant delivery sleeve from the fitting on the cylinder head.
2. Disconnect the climate control system heater coolant return sleeve from the thermostatic cup.



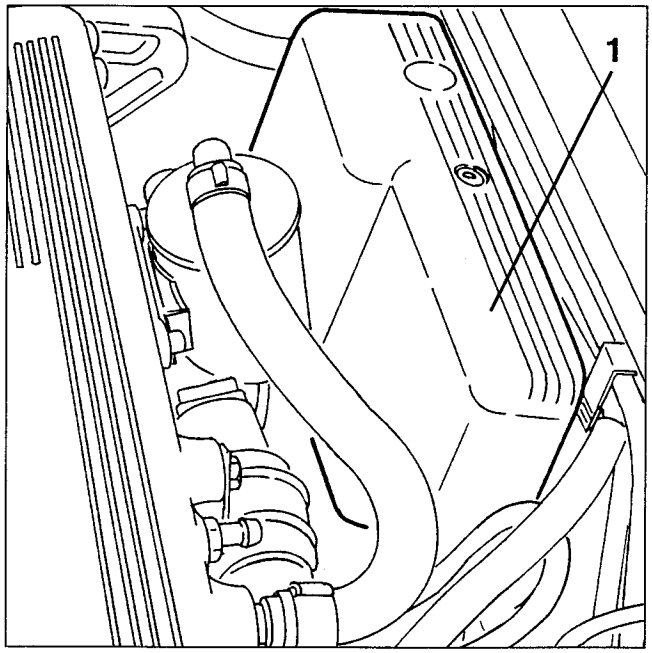
1. Disconnect the vacuum pipe leading from the modulating solenoid valve from the E.G.R. valve.
2. Slacken the two fastening screws and remove the E.G.R. valve complete with exhaust gas takeoff pipe.



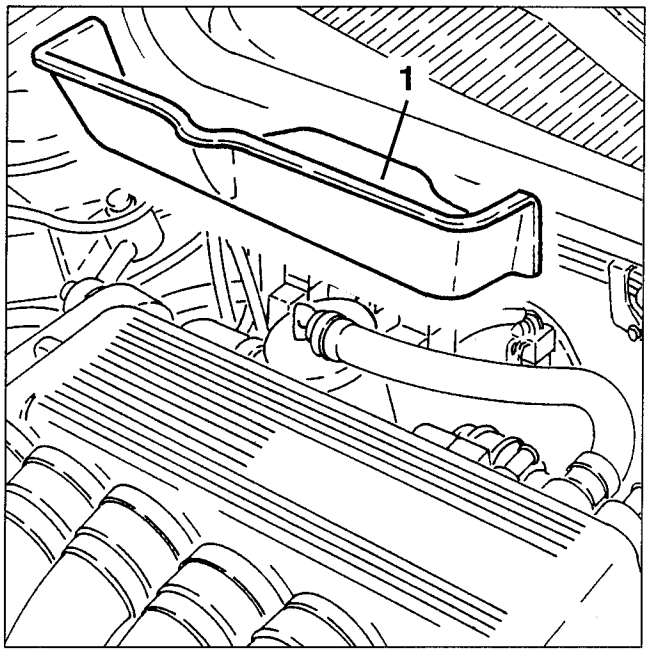
1. Disconnect the coolant fluid inlet pipe from the throttle body.
2. Disconnect the vacuum takeoff pipe for the E.G.R. modulating solenoid valve from the intake box.
3. Disconnect the fuel pressure regulator vacuum take off pipe from the intake box.



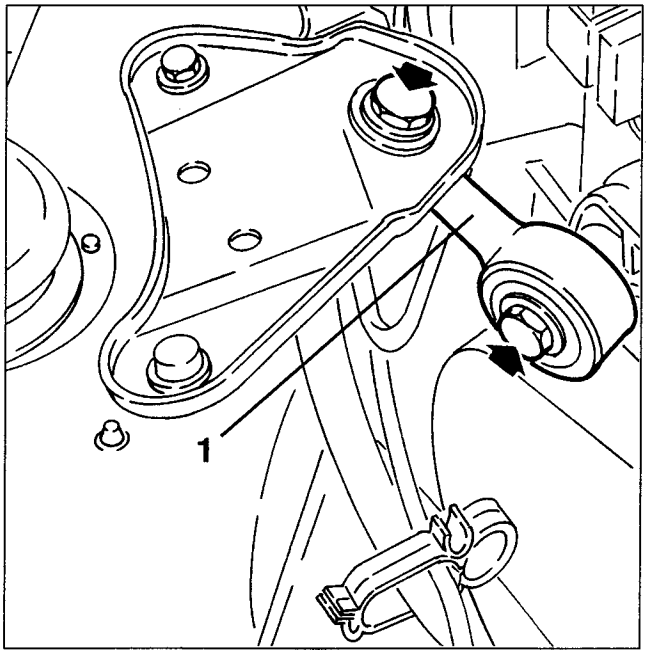
1. Remove the plastic cover protecting the relays, fuses and electrical connections.



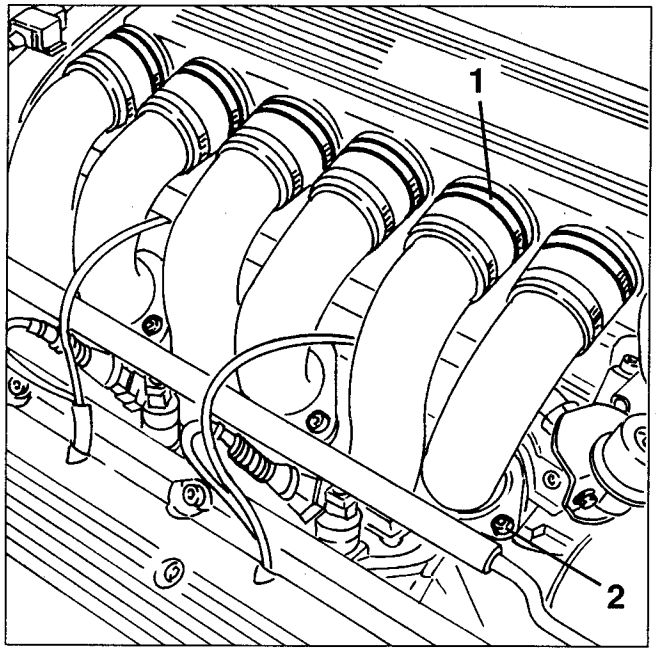
1. Slacken the fastenings and remove the heat guard.



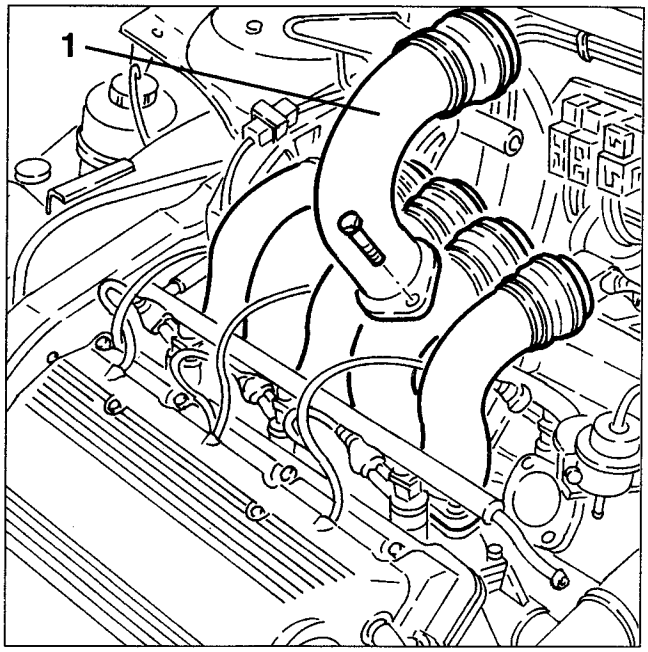
1. Slacken the fastening screws and remove the engine stay rod.



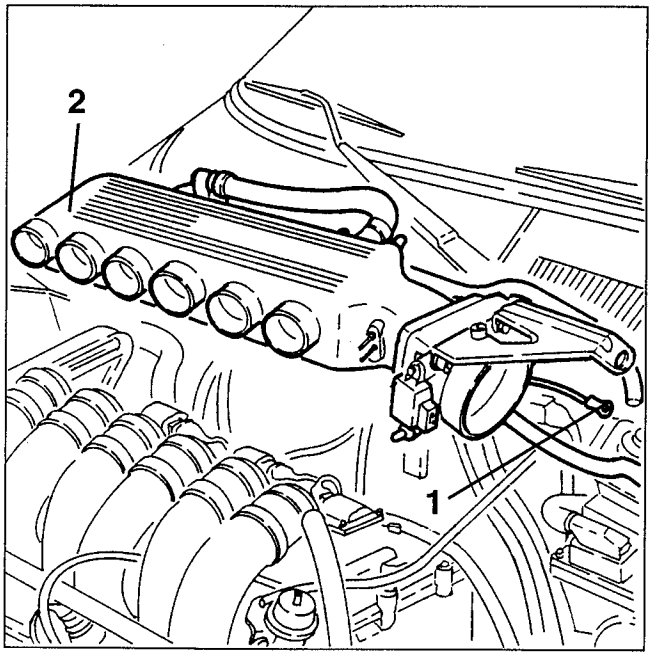
1. Slacken the clamps fastening the air ducts to the intake box.
2. Slacken the screws fastening cylinder head supply ducts.



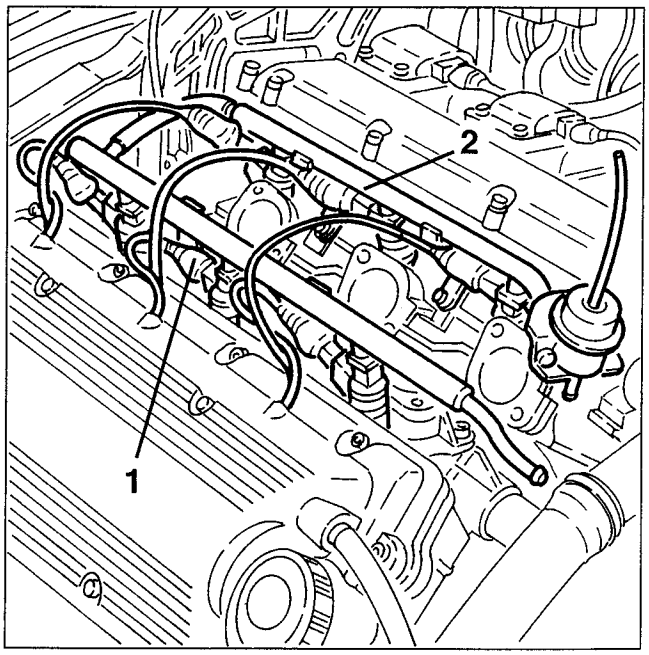
1. Completely slacken the fastening screws loosened previously and remove the intake ducts.
- Remove the corresponding seals.



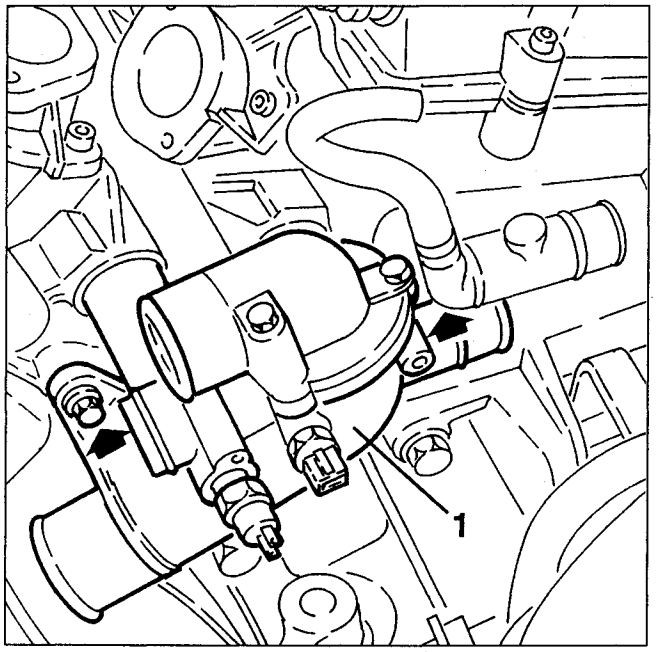
1. Disconnect the earth cable (rear) from the intake box.
2. Slacken the two fastening screws and remove the intake box complete.



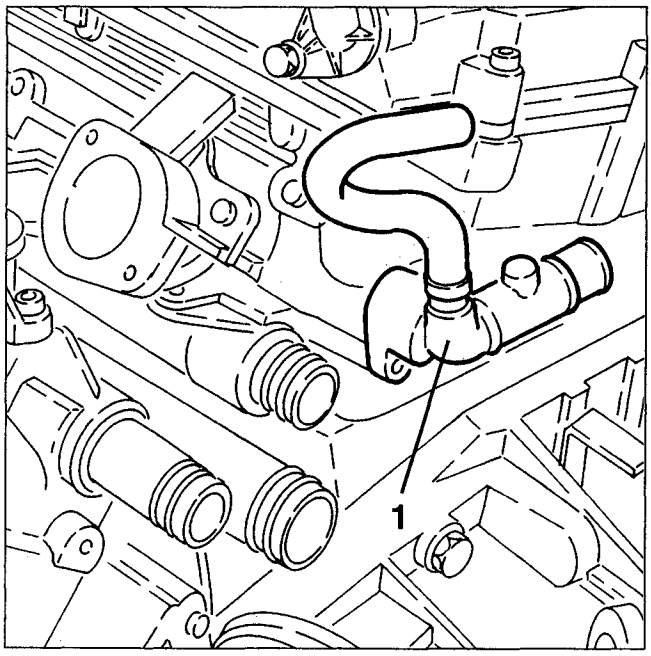
1. Disconnect the injector electrical connections.
2. Slacken the fastening screws and remove the fuel distributor manifold complete.



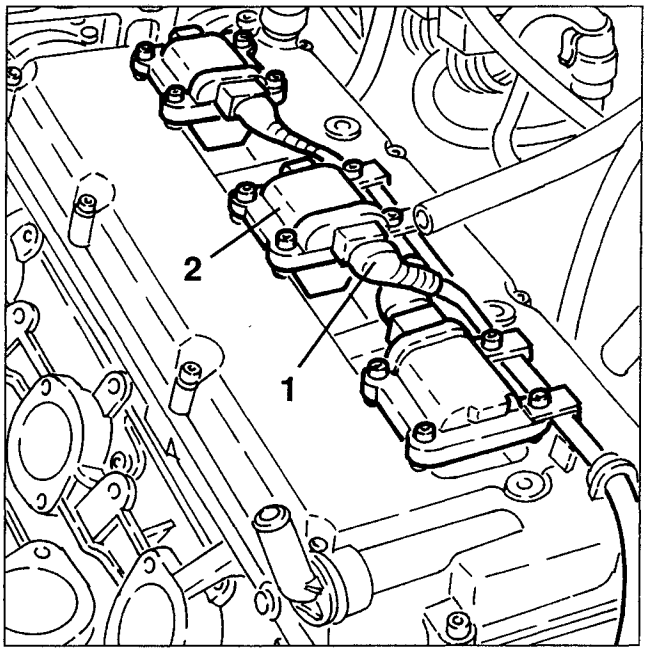
1. Slacken the fastening screws and remove the thermostatic cup.



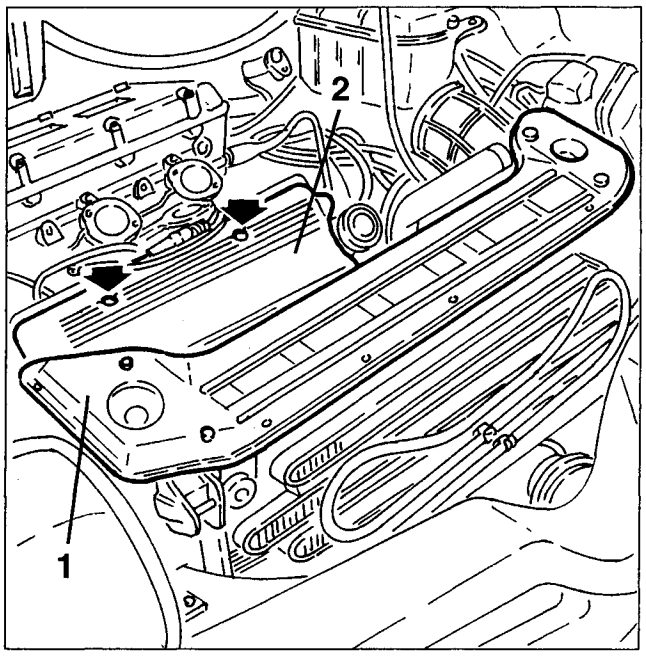
1. Withdraw and remove the fitting for the coolant fluid delivery pipe to the climate control system heater.



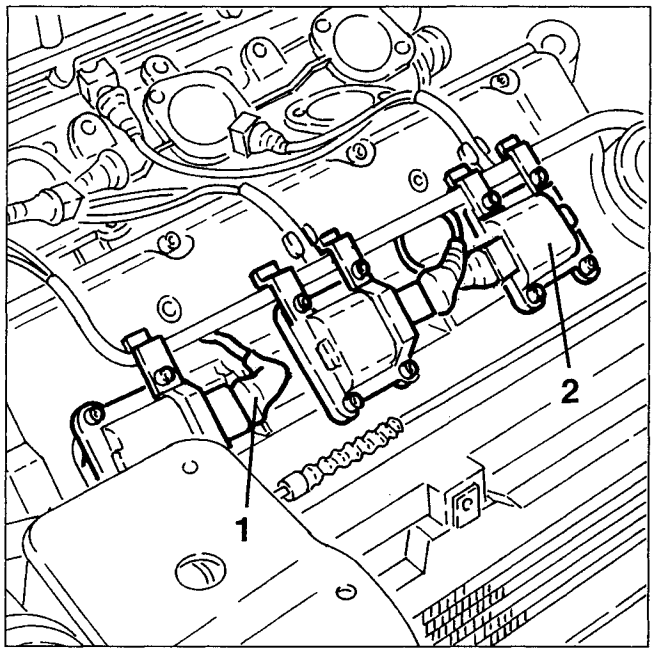
1. Disconnect the electrical connections from the ignition coils of the right cylinder head, then move the wiring aside.
2. Slacken the fastening screws and remove the right cylinder head ignition coils.



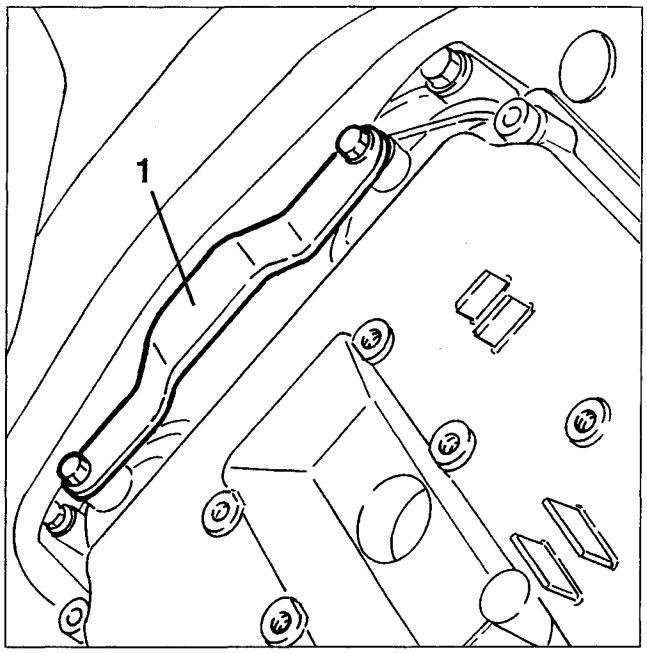
1. Slacken the fastening screws and remove the upper radiator crossmember.
2. Slacken the fastening screws and remove the left cylinder head ignition coil cover.



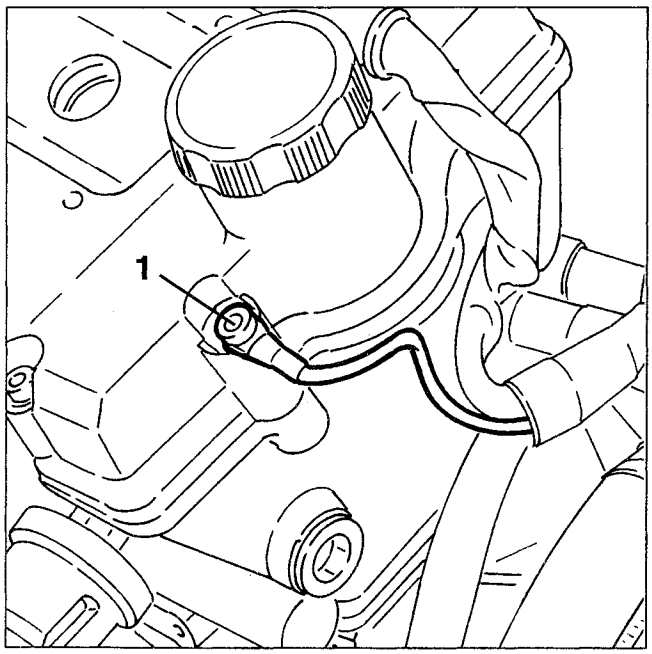
1. Disconnect the electrical connections from the left cylinder head ignition coils.
2. Slacken the fastening screws and remove the left cylinder head ignition coils.



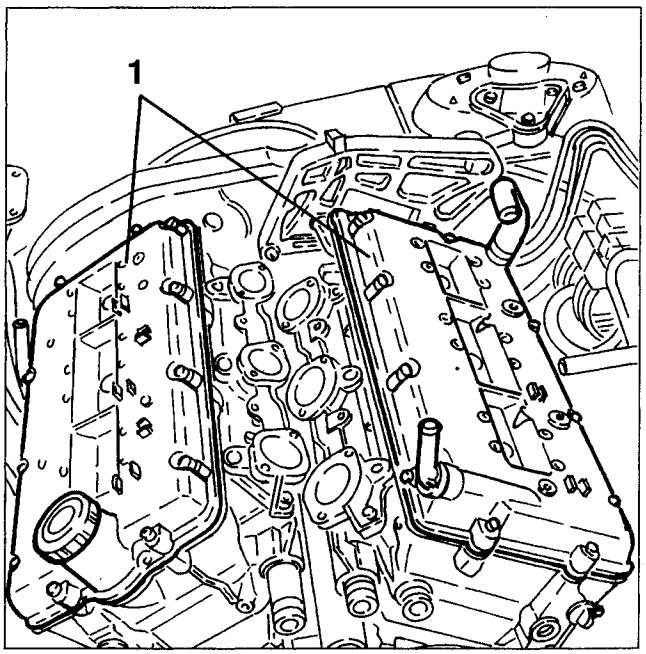
1. Slacken the fastening screws and remove the, bracket complete with threaded nut for fastening the timing gear belt upper guard from the left cylinder head.



1. Disconnect the earth cable from the left cylinder head, then move aside the wiring.

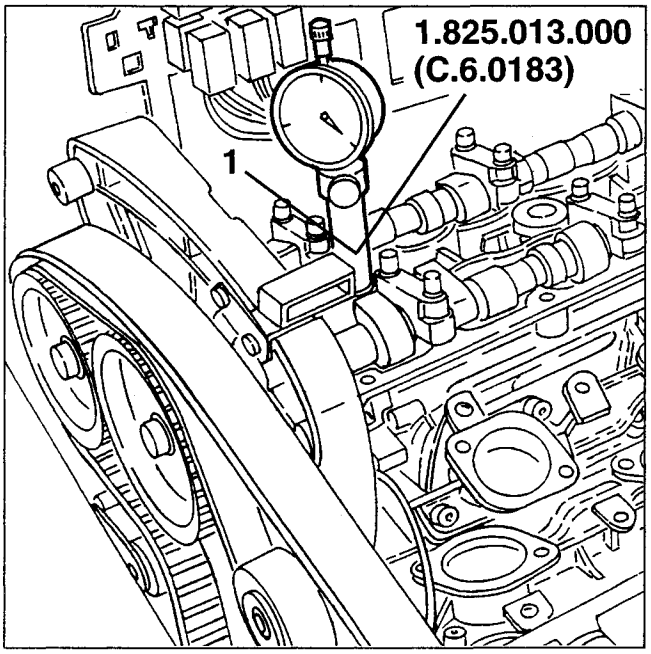


1. Slacken the fastening screws and remove the cylinder head covers with their seals.

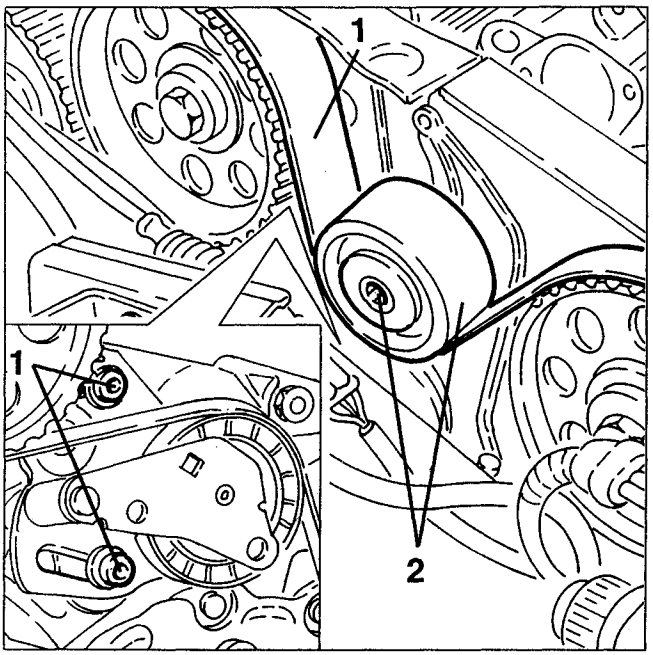


- Slacken the fastening nuts of the exhaust manifold of the right cylinder head, complete with heat guard and leave it rested against the power steering box.
1. Install tool no. 1.825.013.000 (C.6.0183) in the seat of the first cylinder spark plug.
- Working on the fastening nut of the auxiliary components drive pulley turn the crankshaft slightly (both ways) until the piston of the 1st cylnder reaches T.D.C. in the bursting stroke.

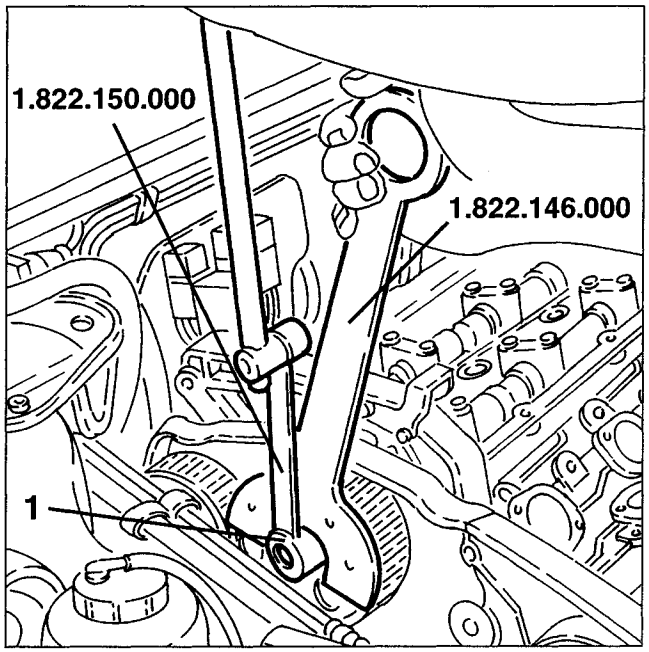
NOTE: Make sure that the last turn of the crankshaft is in the operating direction.



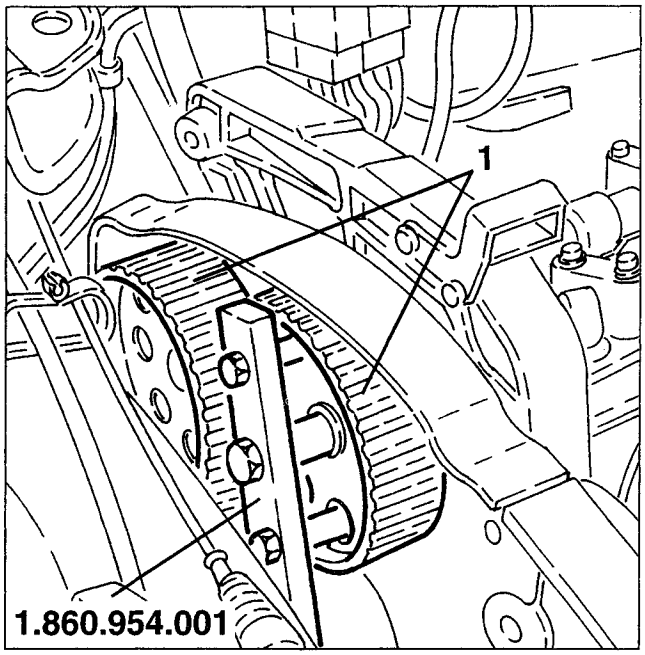
1. Slacken the two screws fastening the belt tensioner for the timing gear drive belt and prise the belt off the camshaft drive pulleys.
2. Slacken the fastening screw and remove the timing gear drive belt pulley guide.



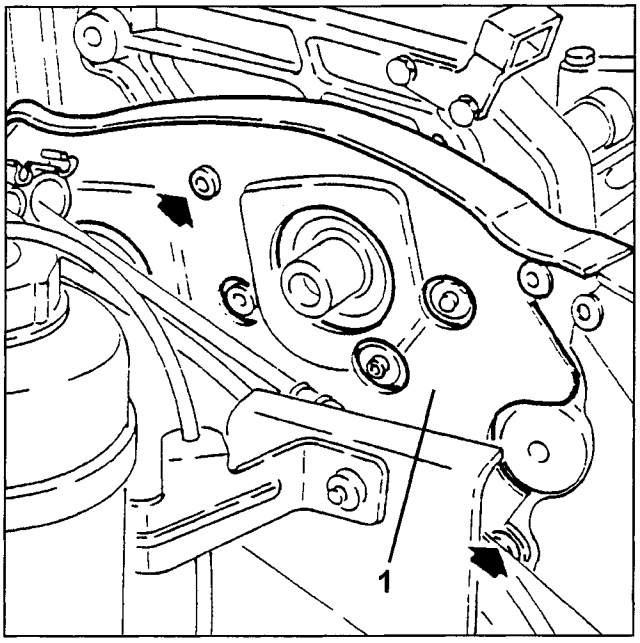
1. Using extension no. 1.822.150.000 and tool no. 1.822.146.000 as counter torque, slacken the screws fastening the timing gear drive pulleys of the right cylinder head.



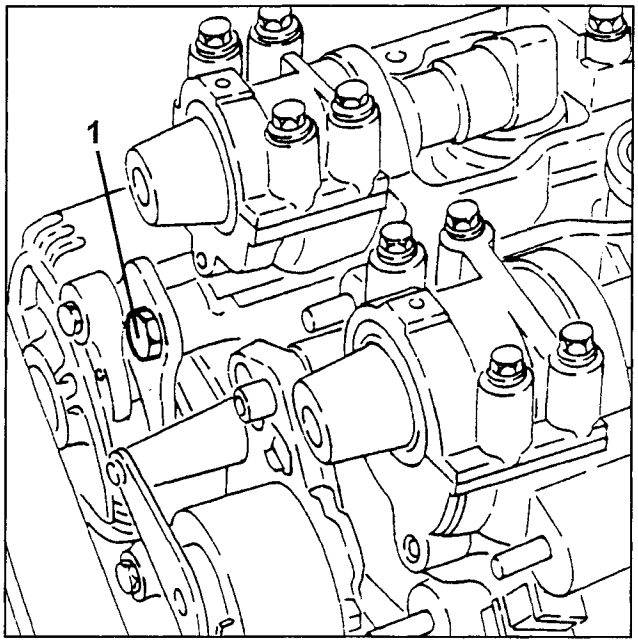
1. Using tool no. 1.860.954.001 withdraw and remove the drive pulleys from the camshafts of the right cylinder head.



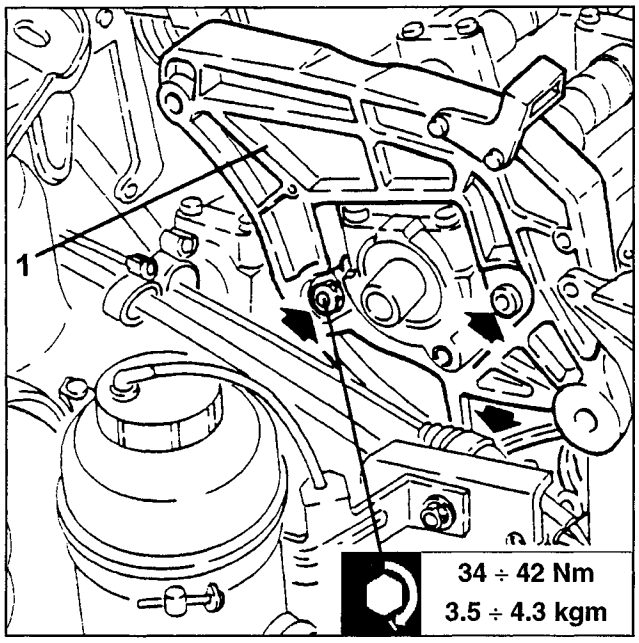
1. Loosen the fastening screws and remove the right-hand cylinder head from the timing belt internal guard.



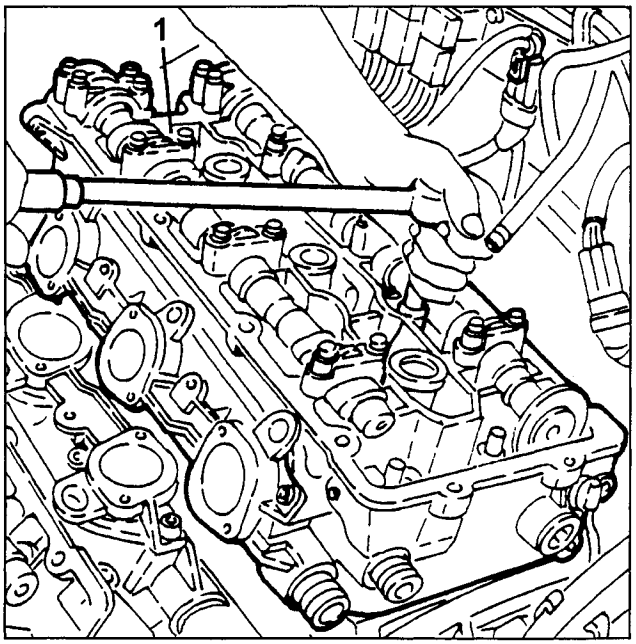
1. Loosen the upper alternator fastening bracket screw.



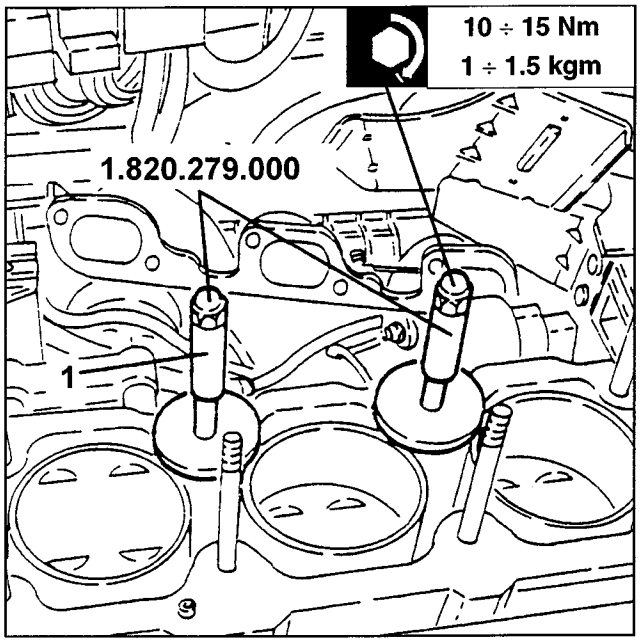
1. Loosen the fastening nuts and remove the engine shock-proof connecting rod bracket.



1. Loosen the fastening nuts and remove the right-hand cylinder head.
- Remove the respective seal.

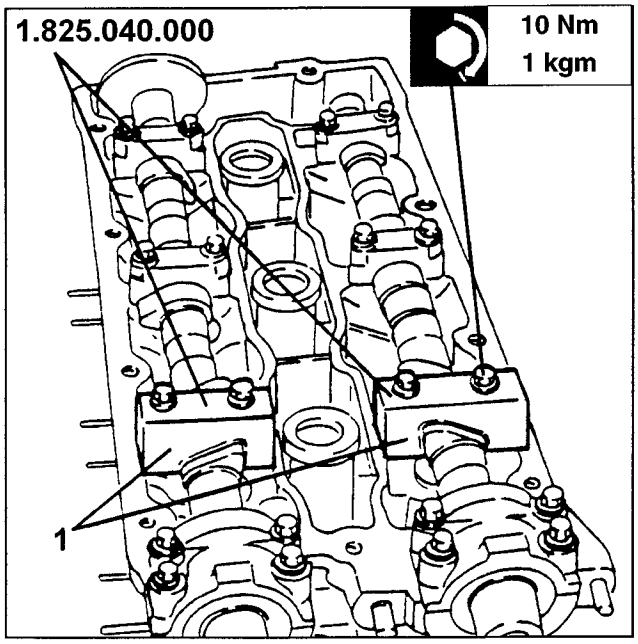


1. Fit cylinder liner retainer no. 1.820.279.000 as shown in the figure.

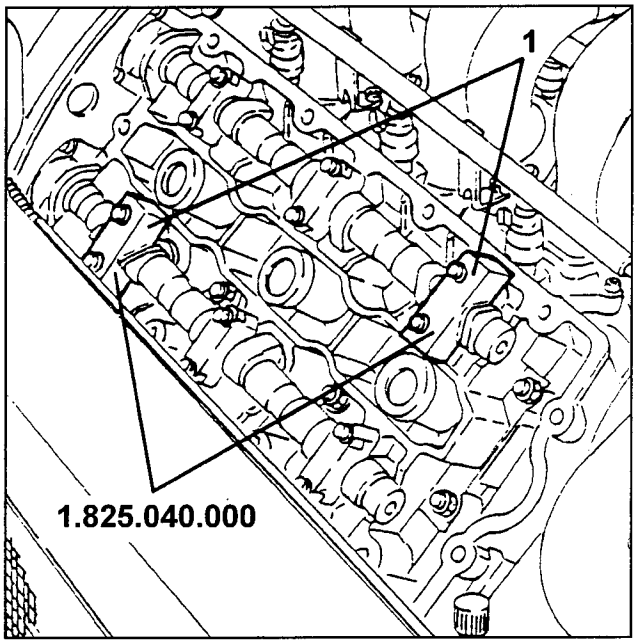


REFITTING PRECAUTIONS

Reverse the removal sequence and attain to the following precautions.
1. Fit templates no. 1.825.040.000 in the position printed on the templates in the place of camshaft bearings **B** and **G** after overhauling the removed cylinder head and before refitting it on the engine.



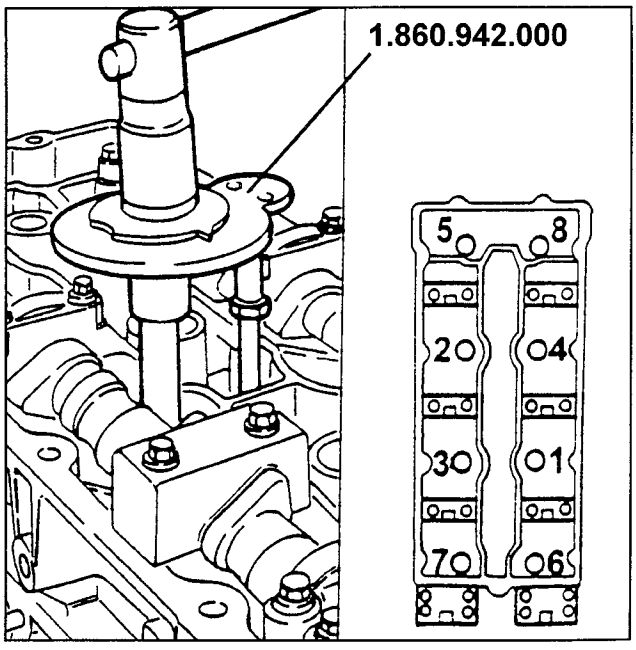
1. Fit templates no. 1.825.040.000 in the position printed on the templates in the place of camshaft bearings **7** and **4**.



- Remove the previously fitted cylinder liner retainers no. 1.820.279.000.
- Refit the right-hand cylinder head to the crankcase.
- Lubricate threading, nuts and washers with engine oil and torque as shown below in the order shown in the figure.

NOTE: Use the tool and gauge no. 1.860.942.000 for angle torque.

Tightening procedure	
Tighten all nuts at:	24 ÷ 26 Nm 2.5 ÷ 2.7 kgm
Complete torque with additional:	240° ± 2°

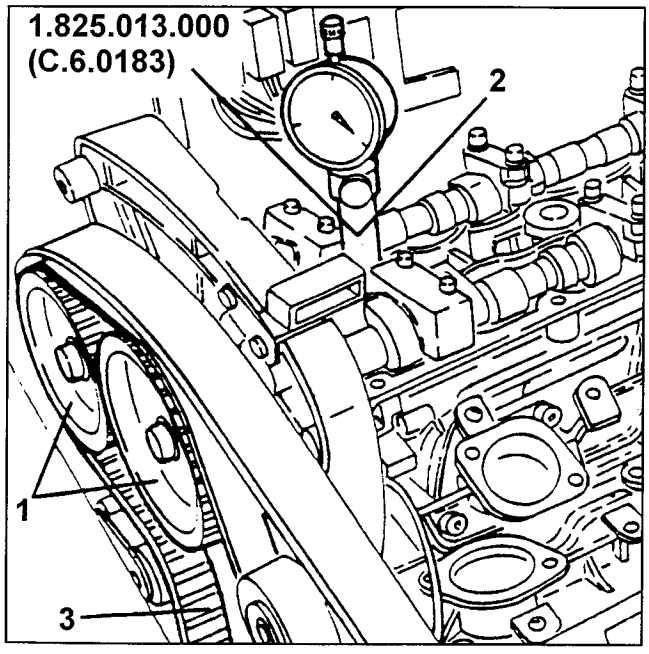


NOTE: ASTADUR cylinder head seals are used. The special material the seals are made of polymerises during engine operation and consequently becomes very hard.
The following precautions are required to ensure cylinder head seal polymerisation:
- keep the seals closed in their nylon bags;
- take them out of the packaging just before fitting;
- do not lubricate or soil the seals with oil. Make sure the cylinder head and crankcase surface are clean.

1. Reverse the removal sequence and refit the right-hand cylinder head camshaft drive pulleys, fastening the screws by hand.
- Use extension no. 1.822.150.000 and tool no. 1.822.146.000 to contrast torque. Loosen the left-hand cylinder head camshaft drive pulley fastening screws.
- Use tool no. 1.860.954.001. Extract the left-hand cylinder head camshaft drive pulleys are reposition them fastening the screws by hand.
2. Check whether the 1st cylinder piston is at TDC, firing stroke. If not, move it to this position by slightly turning in both directions the auxiliary unit drive pulley fastening nut.

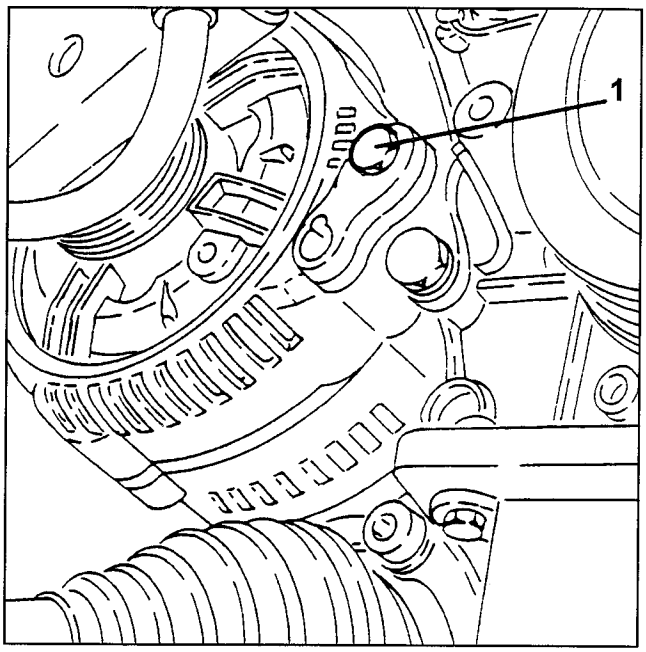
NOTE: Make sure the last revolution of the crankshaft is in the direction of operation.

3. Fit the camshaft drive pulley drive belt.

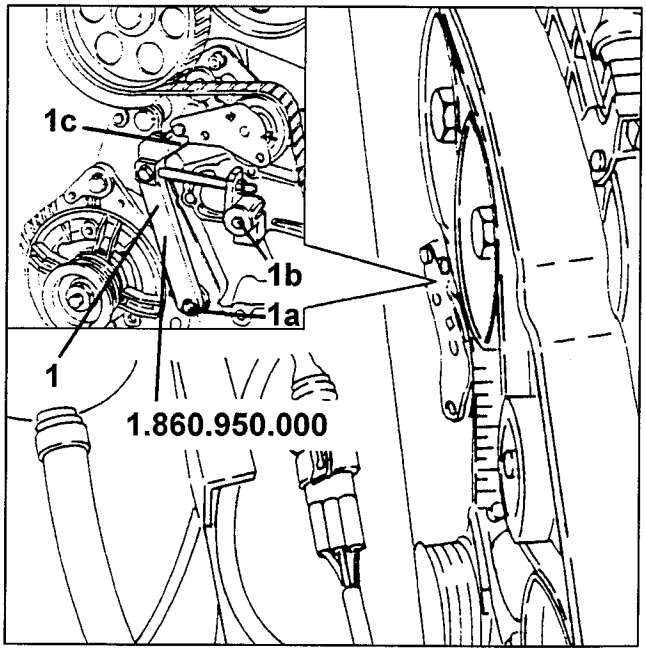


- Remove the cylinder head alternator bracket upper screw.

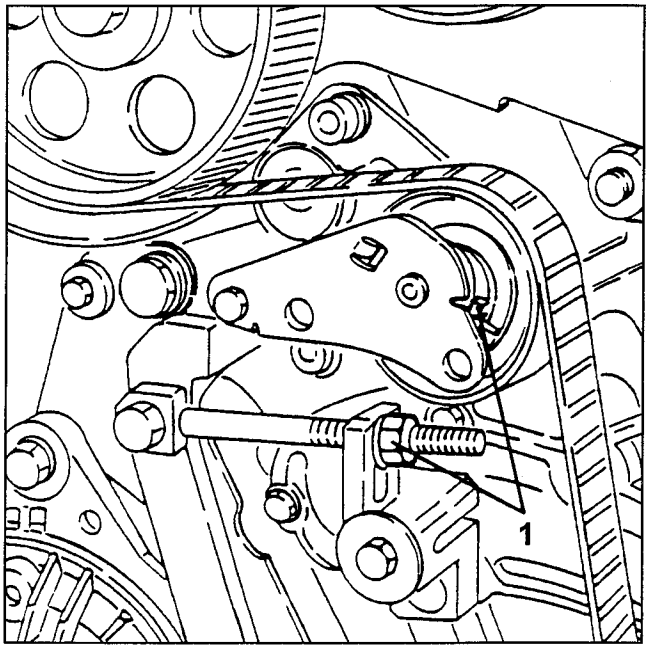
1. Loosen the lower alternator fastening screw to fit the timing belt tension tool.



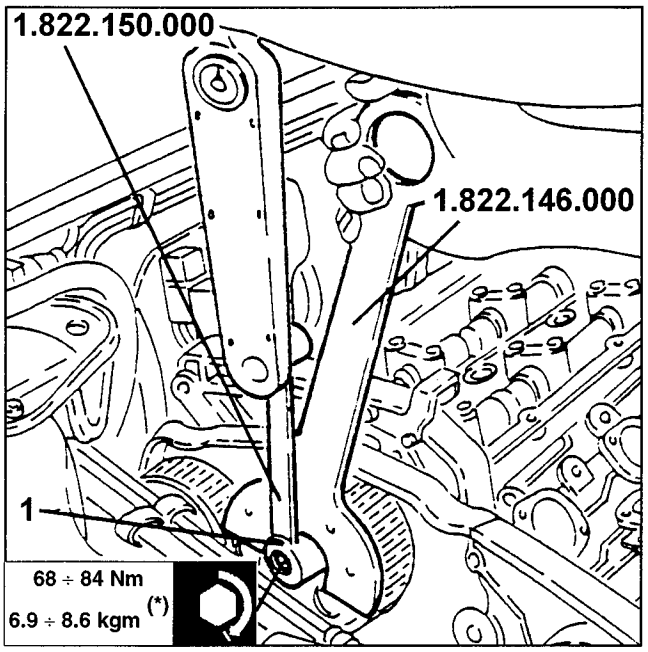
1. Fit timing belt tension tool no. 1.860.950.000 and fasten the previously loosened screw (1b) to the coolant pump; tool pin (1c) should contrast the belt take-up device mobile part.



1. Take the mobile notch under the belt take-up fixed notch as shown in the figure.

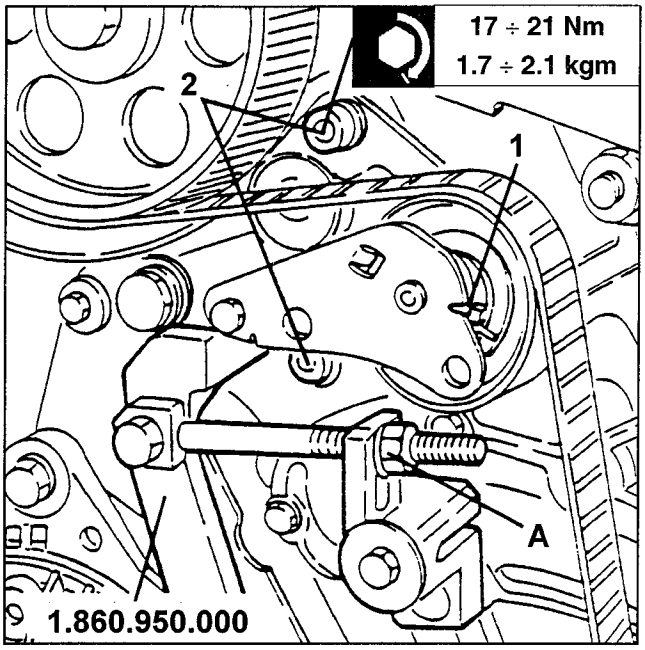


1. Use extension no. 1.822.150.000 and tool no. 1.822.146.000 to contrast torque. Fasten the camshaft drive pulley screws at the prescribed torque.



(*): Nominal value

- Remove the previously fitted templates no. 1.825.040.000. Fit the previously fitted bearings in their place and fasten the screws at the prescribed torque.
- Turn the crankshaft twice in the direction of revolution to fit the timing belt well.
1. Check whether the fixed notch on the belt take-up coincides with the mobile notch. If not, loosen the belt take-up tension by turning nut (A) until the notches meet.
2. Torque the belt take-up fastening nuts as prescribed and remove belt tension tool no. 1.860.950.000.



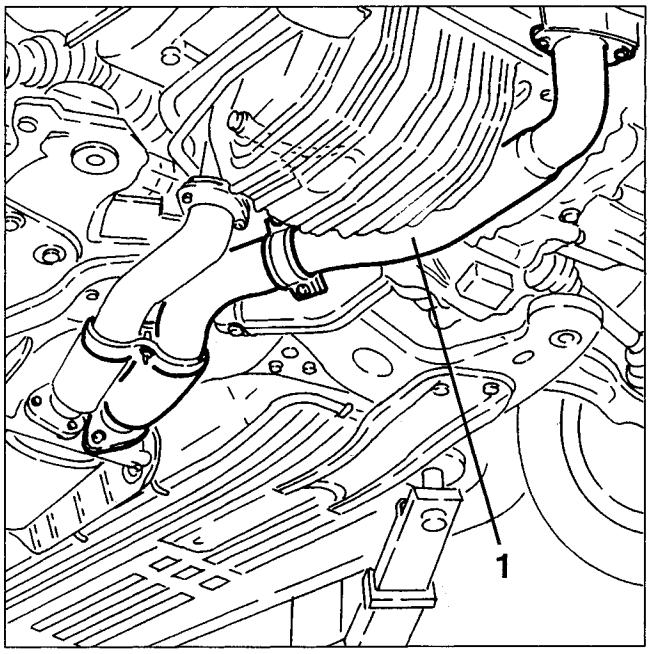
- Complete refitting by reversing the removal sequence.

OIL PUMP

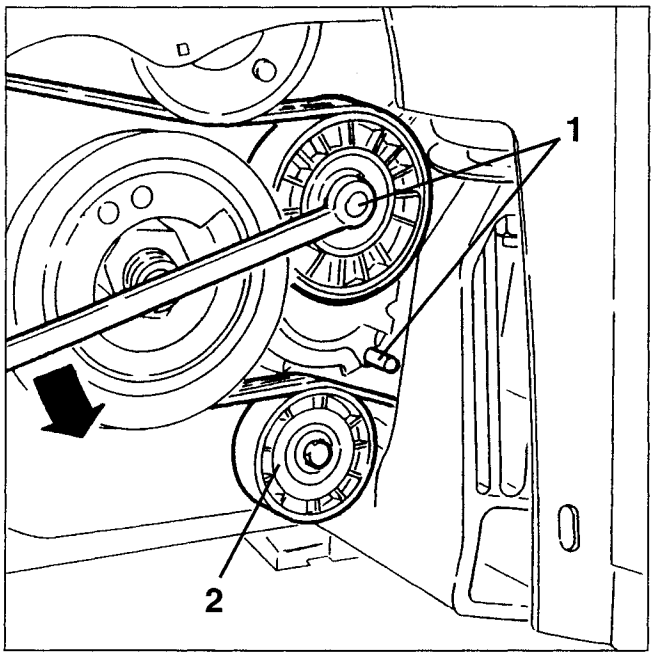
REMOVING/REFITTING

- Set the car on a lift.
- Disconnect the battery(-) terminal.
- Remove the right front wheel and mud flap.
- Drain the engine oil (see Group 00).

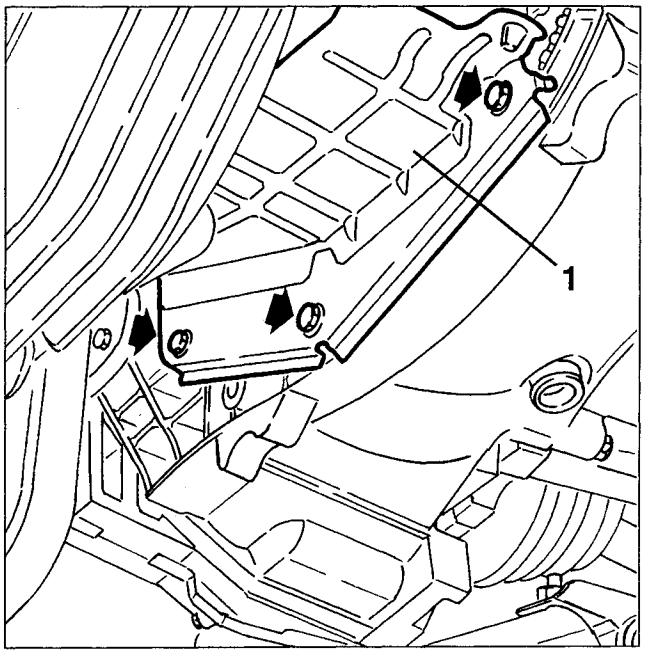
1. Slacken the fastenings, then remove the front section of the exhaust pipe only from the left cylinder head.



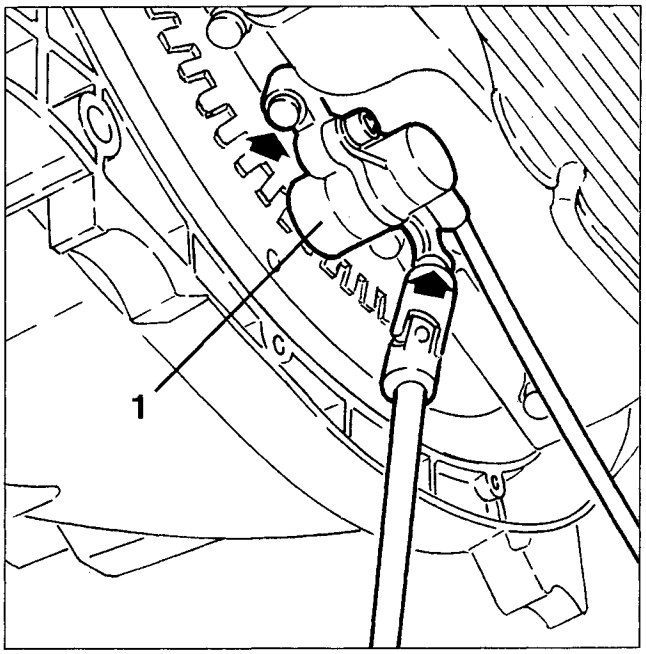
1. Using a wrench on the screw fastening the belt tensioner pulley, overcome the force of the tensioner and lock it in this position (belt slack) inserting the special peg as illustrated.
2. Slacken the fastening screw and remove the lower guide pulley of the auxiliary components drive belt.



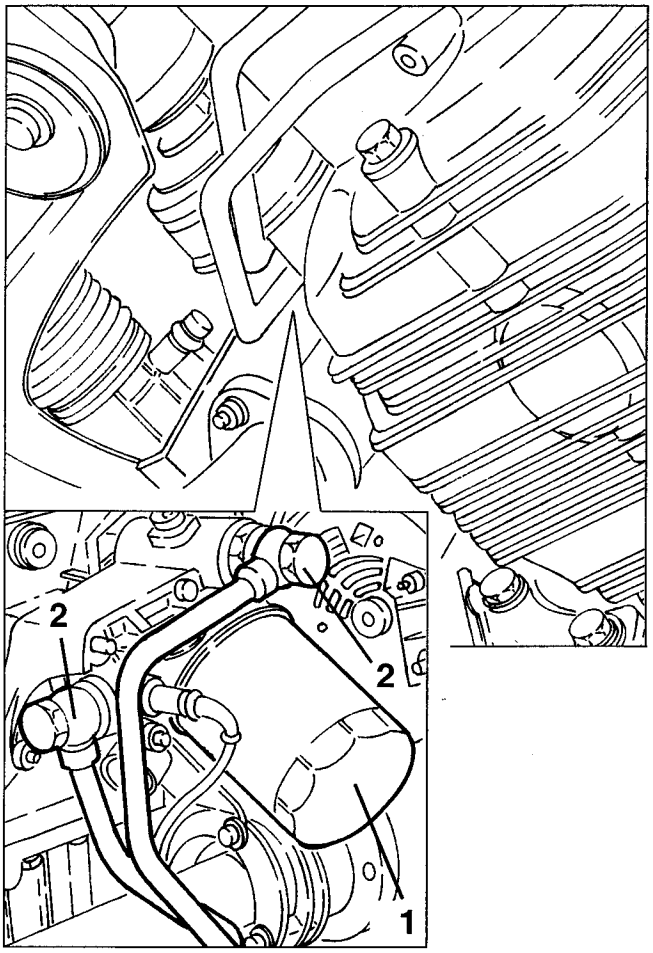
1. Slacken the fastening screws and remove the flywheel guard.



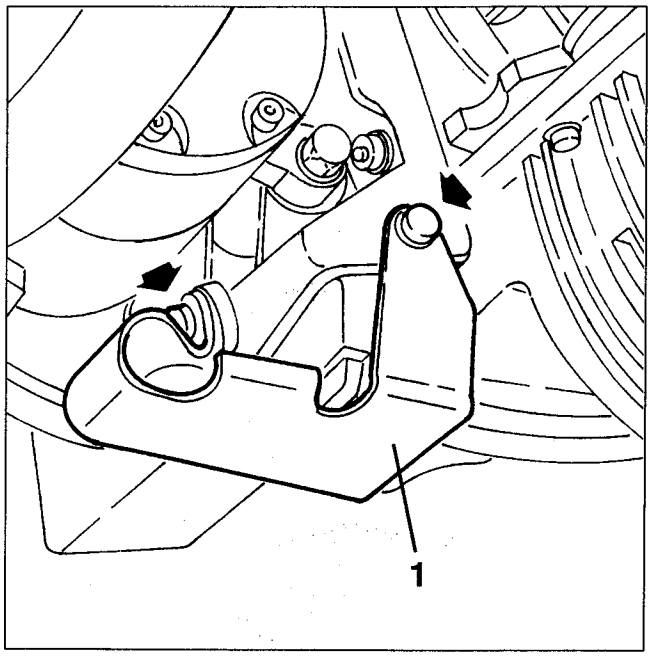
1. Slacken the fastening screws and remove the rpm and timing sensor.



1. Using a suitable wrench, slacken and remove the oil filter.
2. From the oil filter support disconnect the fittings of the radiator oil delivery and return pipes.

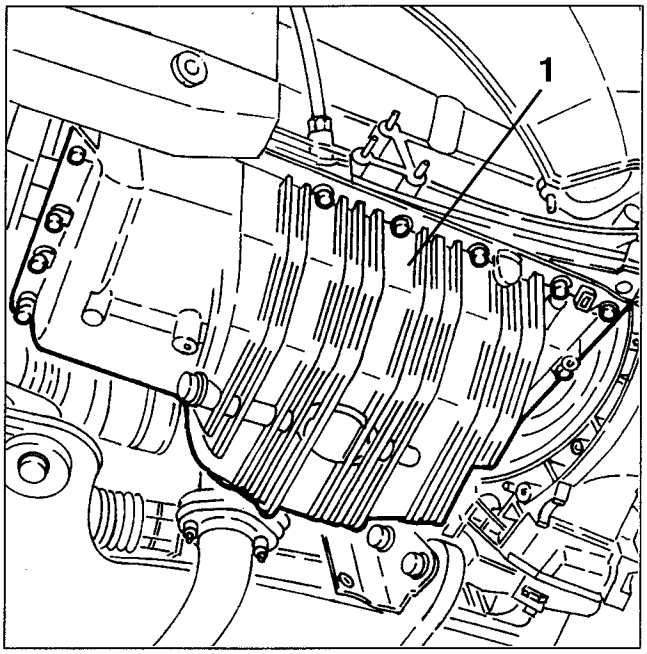


1. Slacken the fastening screws and remove the engine oil delivery and return pipe support bracket to the radiator, then without disconnecting the latter restrain them temporarily so that they do not hinder the following operations.

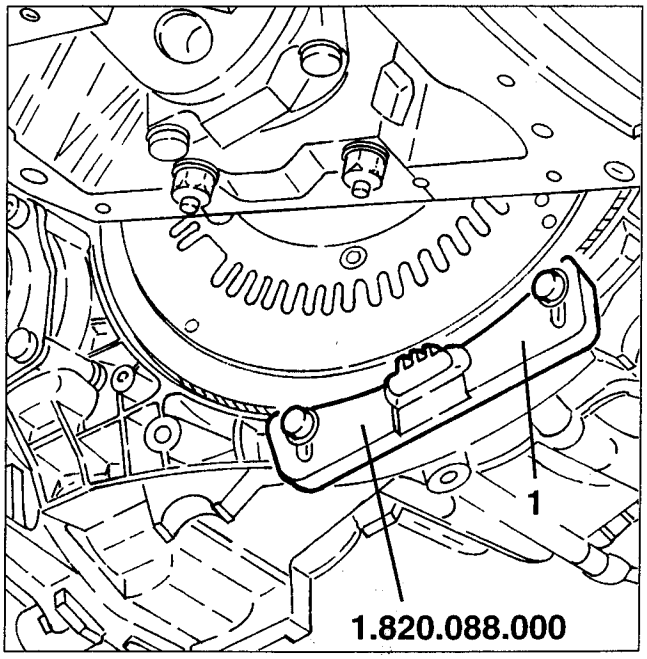


1. Slacken the fastening screws and remove the oil sump.

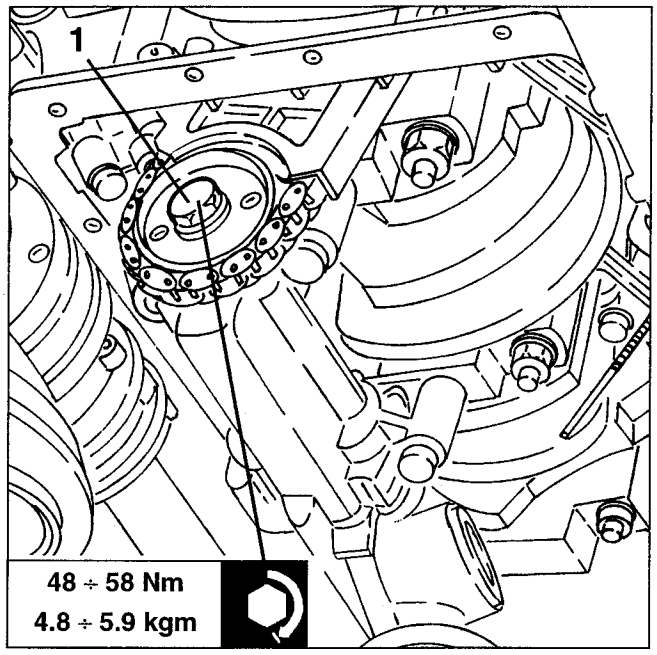
WARNING:
Sealant is applied between the oil sump and crankcase to ensure tightness; when the sump is removed it is necessary to cut the sealant taking care not to damage that in the two holes of the rear main bearing cap.
If not, restore the sealant inside the holes.



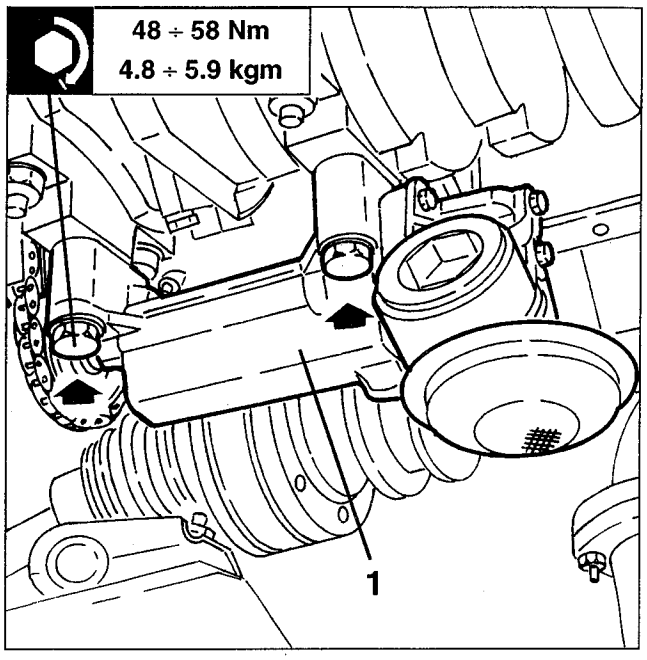
1. Install flywheel stopper tool no. 1.820.088.000.



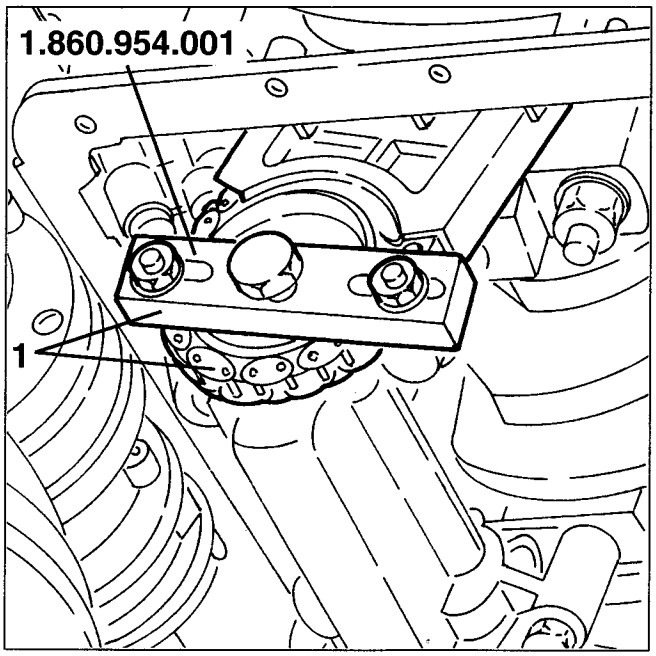
1. Slacken the fastening screw of the oil pump drive gear.



1. Slacken the fastening screws and remove the oil pump complete.



1. Using tool no. 1.860.954.001, remove the drive gear from the oil pump spindle.



Refit reversing the sequence followed for removal and adhering to the following instructions.
- Remove any traces of sealant on the mating surfaces of the oil sump - crankcase.
- Use a dry cloth to eliminate traces of oil to avoid compromising the sealing.
- Continuously apply (without interruptions) a seam of silicone sealant taking care to join the end with the beginning well.
1. Position the oil sump avoiding horizontal movements which could remove the silicone sealant, then tighten the oil sump fastening screws to the specified torque.