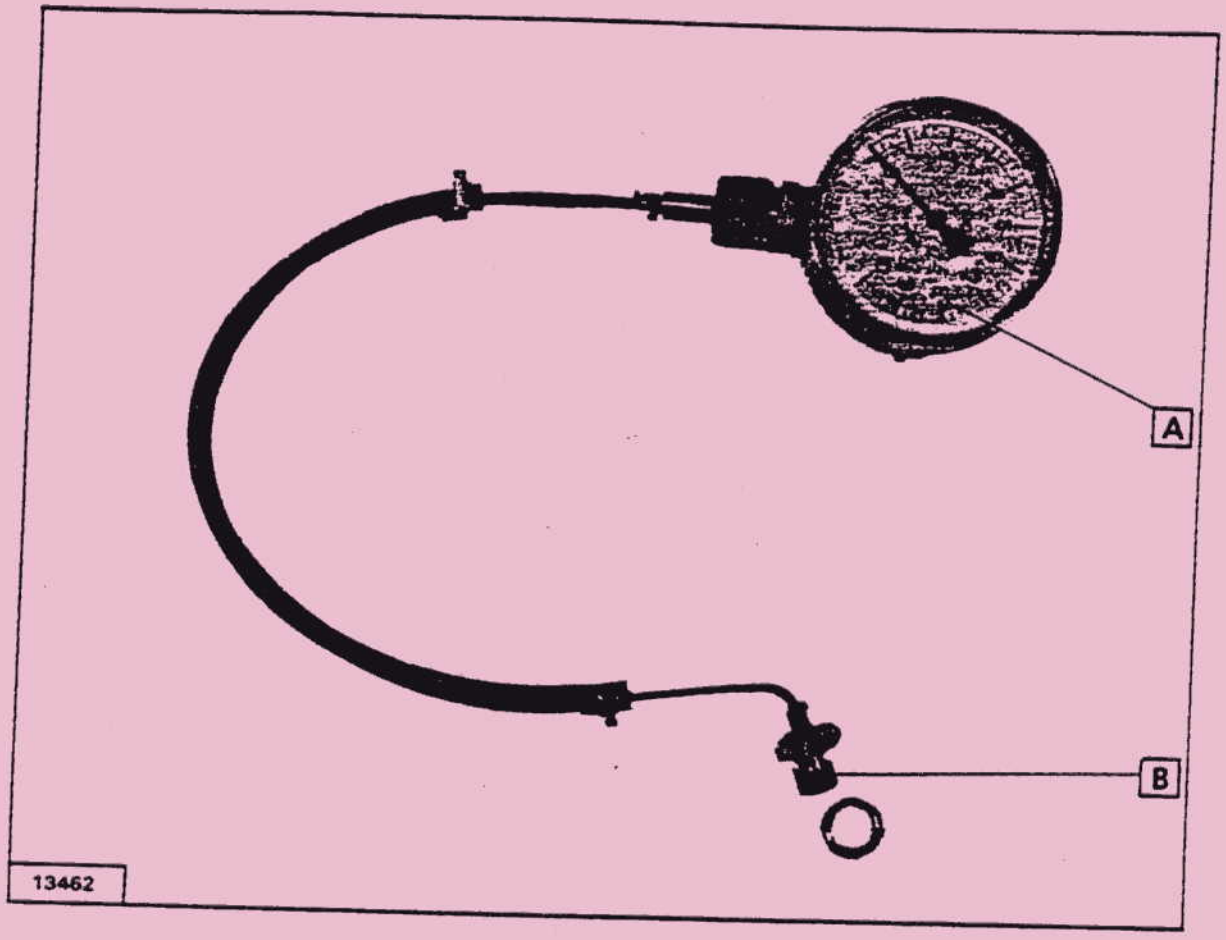

A
B
13462

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ENGINE SPECIFICATIONS AND SPECIAL FEATURES

DIESEL ENGINE

1 - SPECIFICATIONS

Engine :
- Type (as stated on engine number plate) U25/651
- Configuration : ..... Mounted transversely, inclined at 23 towards the front
- French taxable horse power : ..... 10 CV
- Number of cylinders : 4
- Direction of rotation : ..... Left hand (anticlockwise as seen from flywheel end)
- Bore : ..... 93 mm
- Stroke : ..... 92 mm
- Cubic capacity : ..... 2 500 litres
- Compression ratio : 22,25/1
- Injection order : ..... 1 - 3 - 4 - 2
- Maximum power : ..... ISO : 54.4 KW at 4 100 rpm / DIN : 75 ch at 4 100 rpm
- Maximum torque : ..... ISO : 15,1 m.daN at 2 000 rpm / DIN : 15.3 m.kg at 2 000 rpm
- Idling speed : ..... 725 to 775 rpm
- Off-load governed speed : ..... 4 450 ± 75 rpm
- Minimum cut-off speed wheen on load : ..... 4 100 rpm

Cooling system : water plus antifreeze.

Lubrication system :
- Pressure lubricated by an externally mounted gear pump driven from the crankshaft.
- Externally mounted PURFLUX or MAN cartridge type oil filter.

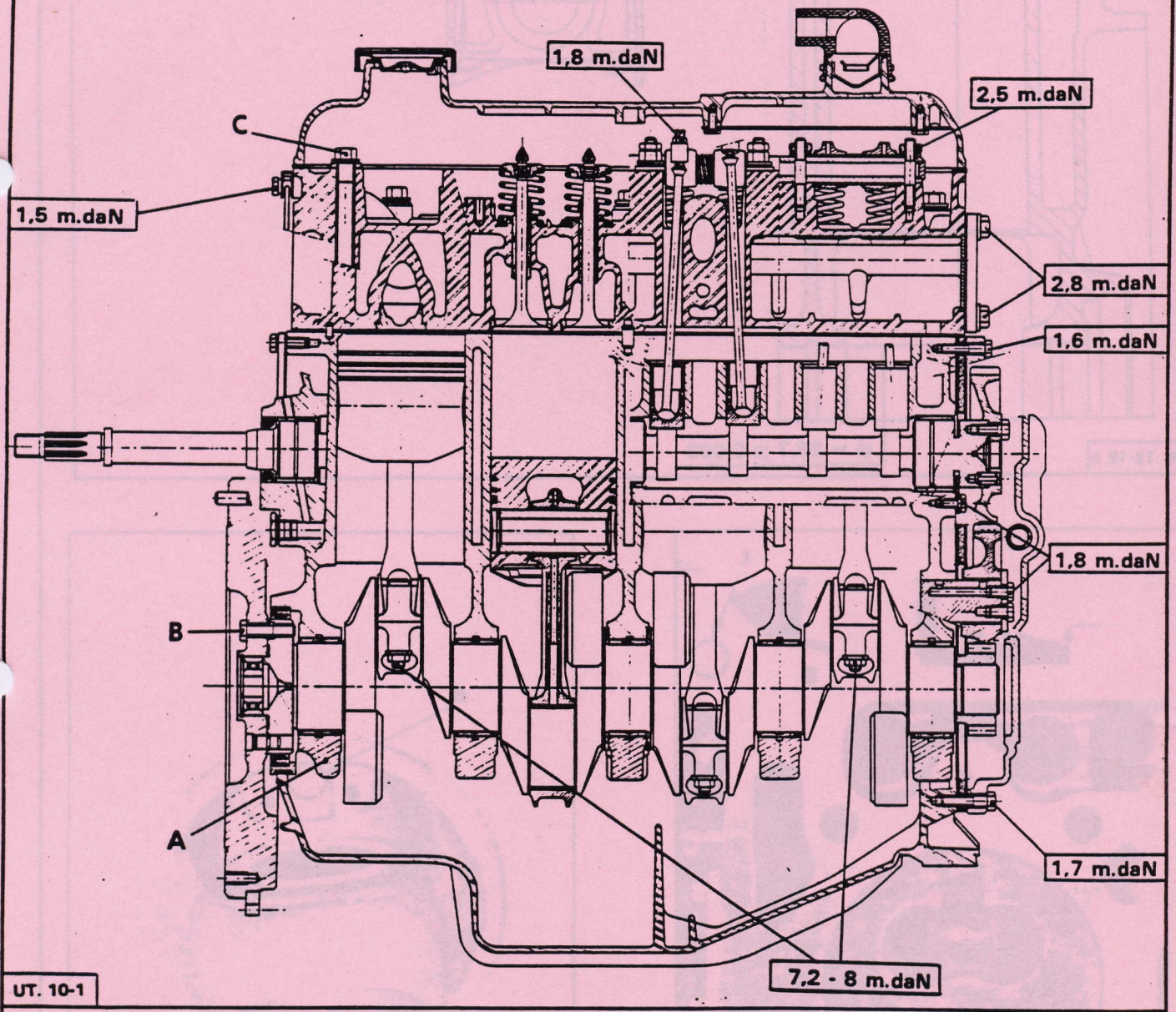
Fuel system :
- Injection pump : ROTO-DIESEL Type UT 100
  Reference : R 3443 F 900
- Direction of rotation : left hand (as seen from drive end).
- Pintle type injectors.
- Fuel : Diesel oil
- Replaceable element dry air filter
- Replaceable element fuel filter and priming pump.

Timing gear :
Side mounted camshaft, in the cylinder block.

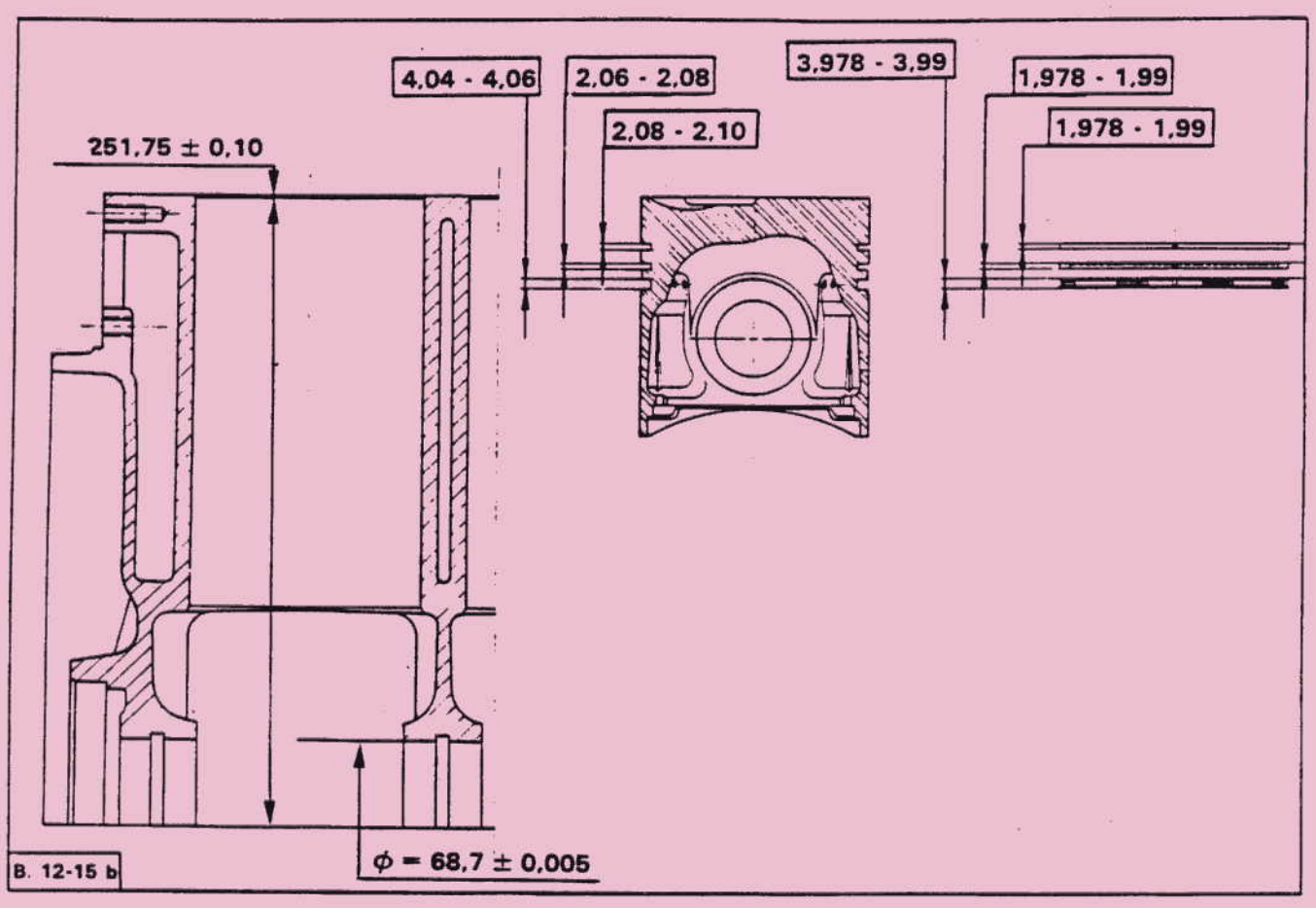
Tightening torques :	mdaN	Nm	lbf ft
A : main bearing bolts	9,5	95	70
B : flywheel securing bolts (bolts to be replaced by new ones every time they are removed and to be fitted coated with LOCTITE FRENETANCH compound).	9	90	66
C : cylinder head bolts : Initial tightening torque	6	90	66
Final tightening torque	10,5	105	77

Special requirements : Before fitting the flange under the head and the threads on each bolt are to be lubricated with gearbox oil.
The washers are to be fitted, without being lubricated, with the tags against the cylinder head.

At 1 000/1 500 mile (1 500 to 2 500 km) inspection : Loosen the bolts			
by a 1/4 of a turn and tighten them to	10,5	105	77
Engine mounting bolts	2,7	27	20

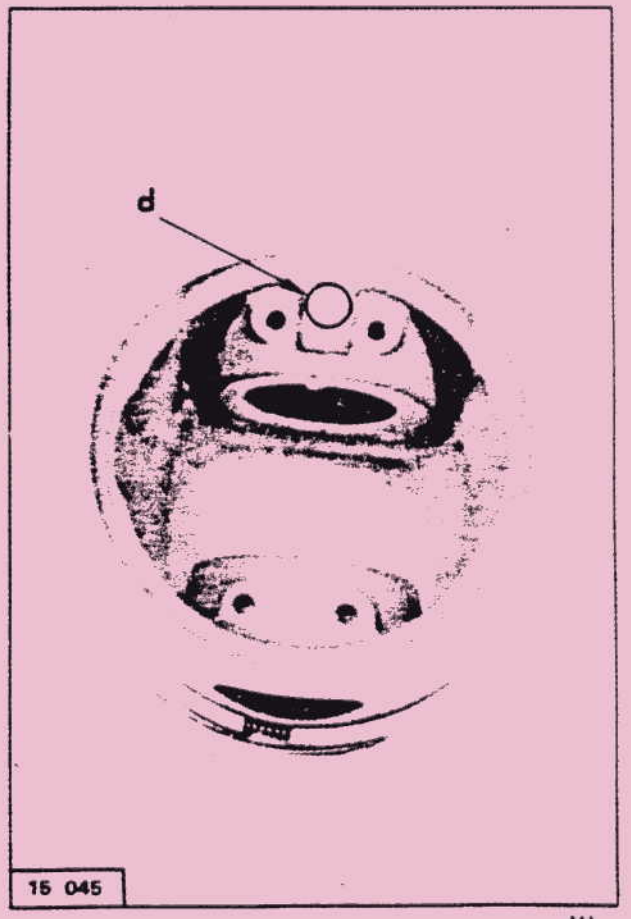

1,8 m.daN
2,5 m.daN
C
1,5 m.daN
2,8 m.daN
1,6 m.daN
1,8 m.daN
B
A
1,7 m.daN
7,2 - 8 m.daN

UT. 10-1


4,04 - 4,06
2,06 - 2,08
2,08 - 2,10
3,978 - 3,99
1,978 - 1,99
1,978 - 1,99
251,75 ± 0,10
B. 12-15 b
ϕ = 68,7 ± 0,005


c
15 050

II


d
15 045

III

II - SPECIAL FEATURES

Cylinder block : Fig. I
The cylinders are machined directly in the cast iron block.

(c) : Cylinder block class reference, Fig. II.

If the cylinder block is ever re-bored, this reference mark is to be effaced and the letter that corresponds to the new cylinder diameter is to be stamped in its place.

Permissible bow in cylinder head gasket face on cylinder block :

a) Overall bow..... 0.05 mm max.
b) Bow between cylinder head bolt holes 0.02 mm max.

Pistons : Fig. II
Made by P.d.C. (piston de Colmar)
Made from aluminium lead alloy, with a graphite treated skirt.

Made by A.E.F. (Associated Engineering France).
Made from aluminium lead alloy,. tinned.

The gudgeon pin is not off-set.
Operating clearance at the skirt, P.d.C. pistons.....0.98 mm to 0.123 mm
Operating clearance at the skirt, A.E.F. pistons.....0.10 mm to 0.12 mm

Class reference with the letter "n" marked on the boss at "d", Fig. III
Piston protrusion above cylinder block upper face (the correct protrusion is to be obtained by the person carrying out the repair whenever a piston is replaced), to suit the nominal diameter.

The Parts Department sells piston gudgeons pin and piston ring assemblies in sets of four.

		Cylinder			Pistons		
	Nominal diameter	Reference mark	Cylinder diameter	Diameter of P.d.C. piston	Diameter of A.E.F. piston	Reference Mark	Piston protrusion
Production	93	A1	93.00 to 93.01	92.887 to 92.902	92.890 to 92.900	1 n	0.50 to 0.55
		A2	93.01 to 93.02	92.897 to 92.912	92.900 to 92.910	2 n	
		A3	93.02 to 93.03	92.907 to 92.922	92.910 to 92.920	3 n	
Service	93.25	B1	93.25 to 93.26	93.137 to 93.152	93.150 to 93.160	B1 n	0.47 to 0.52
		B2	93.26 to 93.27	93.147 to 93.162	93.160 to 93.170	B2 n	
	93.50	C1	93.50 to 93.51	93.387 to 93.402	93.400 to 93.410	C1 n	0.44 to 0.49
		C2	93.51 to 93.52	93.397 to 93.412	93.410 to 93.420	C2 n	
	93.75	D1	93.75 to 93.76	93.637 to 93.652	93.650 to 93.660	D1 n	0.41 to 0.46
		D2	93.76 to 93.77	93.647 to 93.662	93.660 to 93.670	D2 n	

Outside diameter of gudgeon pin.....29.995 mm to 29.999 mm
Diameter of gudgeon pin bore in piston.....30.005 mm to 30.011 mm
Maximum difference between the weights of the piston and gudgeon pin assemblies on any given engine..... 5 grammes

Piston rings : Fig. I
- Made by GOETZE
- The inscription marked on one face of the piston ring is to point towards the piston crown.

(1) Molybdenumbearing area compression ring.
(2) Scraper ring (with torsion chamfer "b" pointing towards the piston crown).
(3) Oil control ring (the gap in the expander (4) is to be set a 180° to the gap (3) in the oil control ring).

(a) : There is a dab of paint on each ring identifiying the nominal piston diameter to which it corresponds.

Nominal diameter	Paint colour code
93	yellow
93.25	green
93.50	white
93.75	purple

Gaps
- Compression ring. . . . . 0.20 mm to 0.45 mm
- Scrapers ring . . . . . 0.15 mm to 0.40 mm
- Oil control ring . . . . . 0.10 mm to 0.30 mm

Connecting rods :
- Side clearance (not adjustable) . . . . . 0.037 to 0.247 mm
- c : Small end bush diameter . . . . . 30.014 to 30.020 mm
- e : Big-end diameter . . . . . { Class 1 : 57.675 mm to 57.685 mm / Class 2 : 57.685 mm to 57.695 mm

X : Connecting rod class reference (1 or 2)
d : Big-end bore to small-end bore between centres dimension 154 ± 0.05 mm . . . . . 154 ± 0.05 mm
- Maximum weight difference between any two connecting rods on a given engine. . . . . 7 grammes
- The Parts Department supplies connecting rods in sets of four (they are class 1).

Big-end shells (crank pins) :
- Big-end shell clearance. . . . . 0,29 mm to 0,066mm

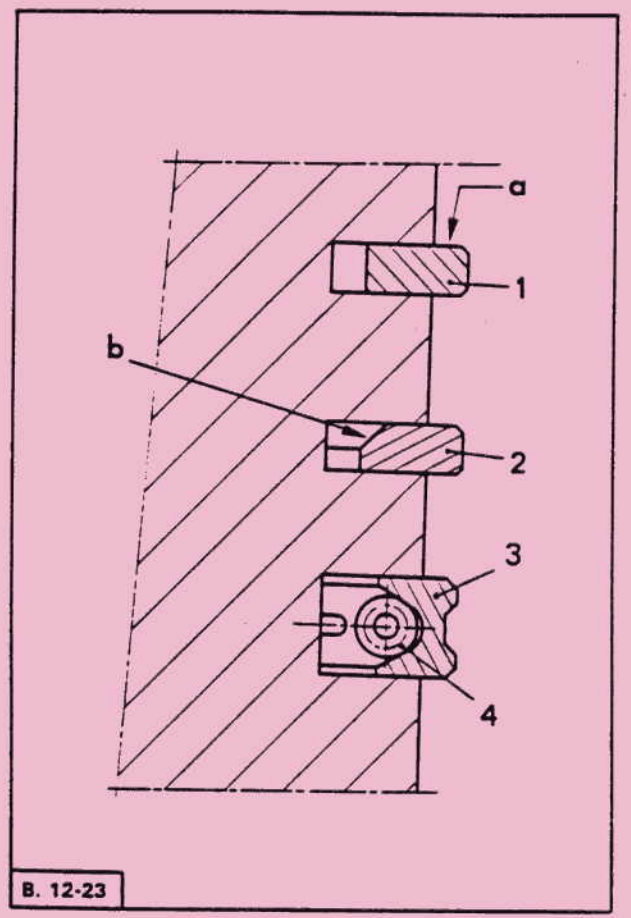
f : Big-end shell thicknesses.

Crankshaft	Connecting rods	Thickness in mm
Class A	Class I	1.820 to 1.826
	Class II	1.825 to 1.831
Class B	Class I	1.945 to 1.951
	Class II	1.950 to 1.956
Repair size	Class I	2.070 to 2.076
	Class II	20.075 to 2.081

Connecting rod-Piston position in engine :

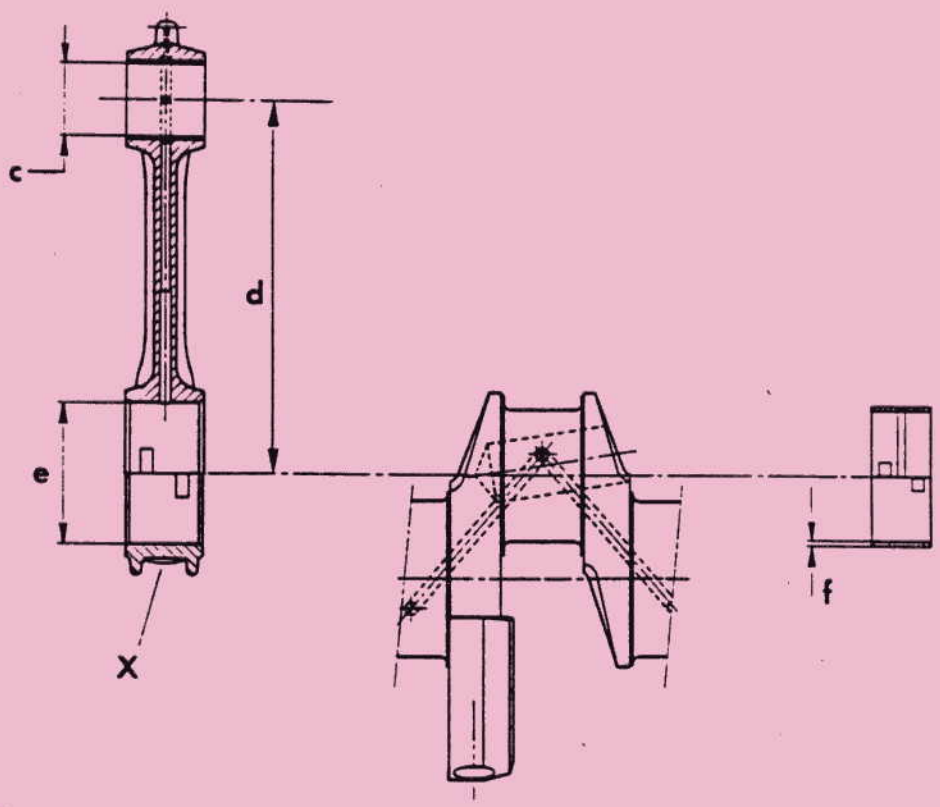
With the lubrication hole in the connecting rod big-end on the same side as the clover leaf recess in the piston crown.

with the clover leaf recess in the piston crown on the camshaft side.



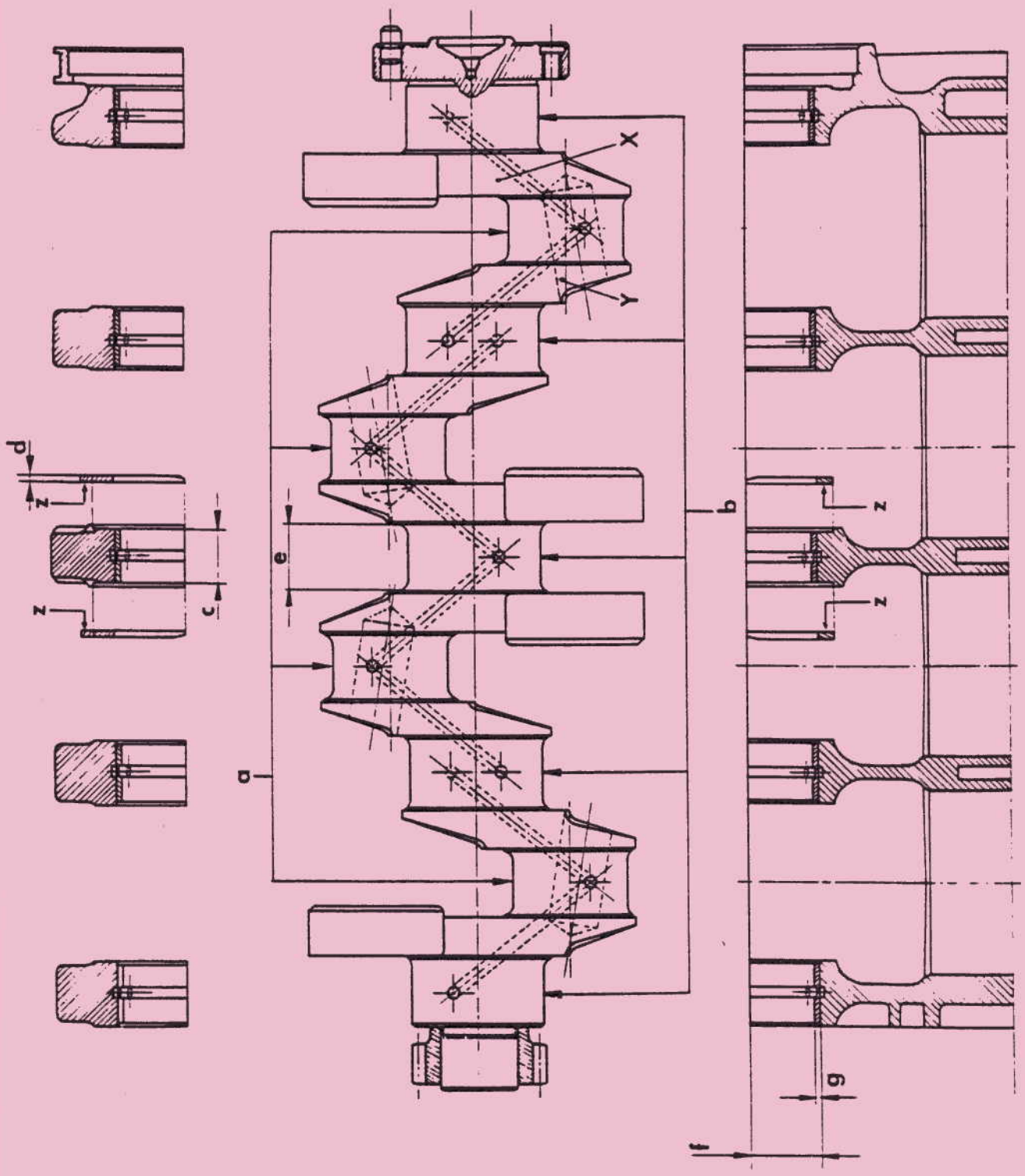
B. 12-23

I



B. 12-13 a

II


X
Y
a
b
c
d
e
f
g
z
z
z
z

Crankshaft : Fig. I

a : Crank pins

Standard	Class A : Ø 54.005 mm to 53.990 mm
	Class B : Ø 53.755 mm to 53.740 mm
Regrind	Ø 53.505 mm to 53.490 mm

b : Journals

Standard	Class A : Ø 64.050 mm to 64.035 mm
	Class B : Ø 63.800 mm to 63.785 mm
Regrind	Ø 63.550 mm to 63.535 mm

e : Width of centre main bearing ..... 33.995 mm to 34.10 mm
X : Journal class reference
Y : Crank pin class reference
Crankshaft type classes fitted to engines on the production line - AA
- AB
- BA
- BB

Crankshaft end float (adjustable) ..... 0.045 mm to 0.16 mm
The oil seal arrangement at the flywheel end of the crankshaft consists of :
— an oil throw impeller on the crankshaft
— a ridged lip seal (red in colour)
The Parts Department only supplies class AA crankshafts.

Main bearing shells :
c : Width of shell ..... 27.62 mm to 27.67 mm
f : outside dia. of shell, fitted. ..... 68.695 mm to 68.705 mm
g : Thickness of bearing shell ..... Class A : 2.306 mm to 2.312 mm; Class B : 2.431 mm to 2.437 mm; Regrind : 2.556 mm to 2.562 mm
Clearance between bearing shells and crankshaft. ..... 0.21 to 0.058 mm

Crankshaft thrust washers

d : Thrust washer thicknesses (the two washers on the same side must be the same thickness)

Class I	3.10 mm to 3.14 mm
Class II	3.14 mm to 3.18 mm
Class III	3.18 mm to 3.22 mm
Class IV	3.22 mm to 3.26 mm

Z : Class reference
The friction metal facing is to be against the crankshaft.

Camshaft :

End float (not adjustable) ..... 0.05 mm to 0.36 mm

Cam lift :

– Inlet and exhaust. ..... 6.83 ± 0.02 mm

Timing gear :

Intermediate wheel hub

– The hub projects past the housing face by. ..... $27.2 \begin{smallmatrix} +0.1 \\ +0.03 \end{smallmatrix}$ mm

The clearance between valves and rocker arm (when checking the timing diagram)

– Inlet and end exhaust ..... 1 mm

Timing diagram (as seen from flywheel end) : Fig. I

A : Top dead centre (T.D.C.)

B : Inlet open ..... $2^{\circ}52'$ after T.D.C.

C : Exaust closes. ..... $4^{\circ}12'$ before T.D.C.

D : Inlet closes ..... $33^{\circ}08'$ after B.D.C.

E : Exhaust opens. ..... $37^{\circ}48'$ before B.D.C.

F : Bottoms dead centre (B.D.C.)

Flywheel : Fig. II

a ..... 1.5 mm maxi

b ..... $0.5 \begin{smallmatrix} +0 \\ +0.15 \end{smallmatrix}$ mm

c ..... $28 \begin{smallmatrix} +0.2 \\ 0 \end{smallmatrix}$ mm

After refacing ..... 27.7 mm mini

d ..... $230 \begin{smallmatrix} +3 \\ 0 \end{smallmatrix}$ mm

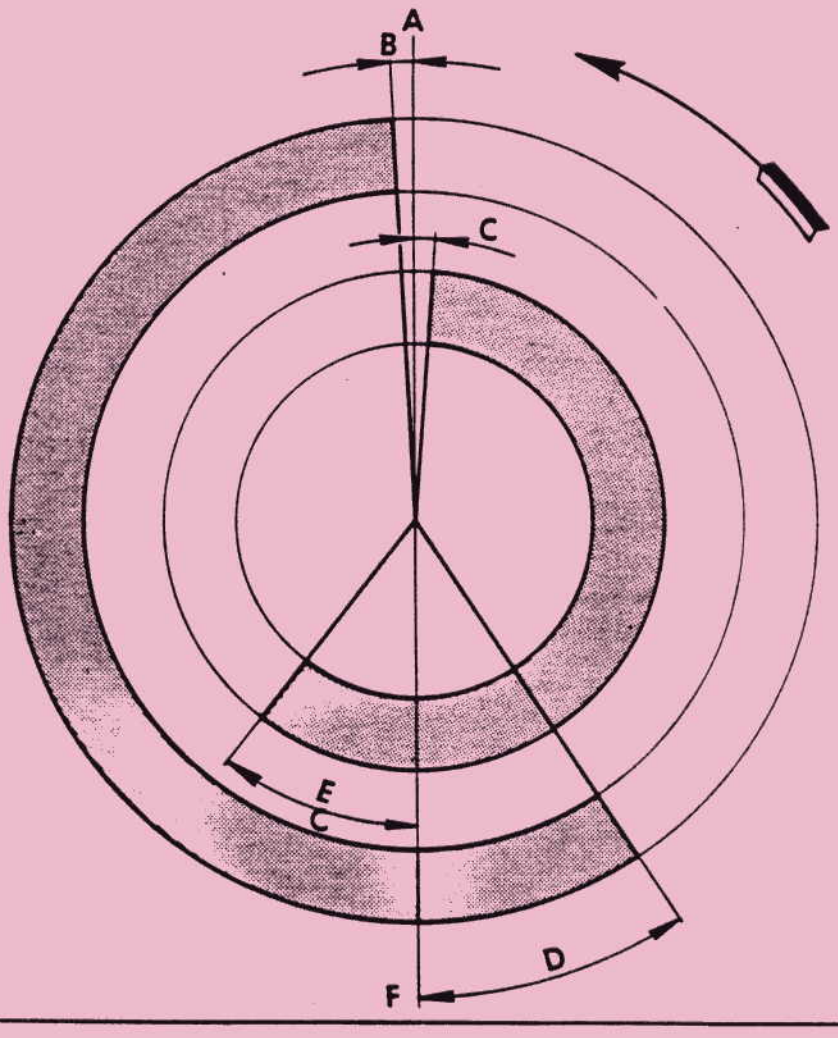
e ..... 236.5 mm maxi

– Starter ring gear with 120 teeth (no lead) (unmachined face against flywheel face).

Push rods

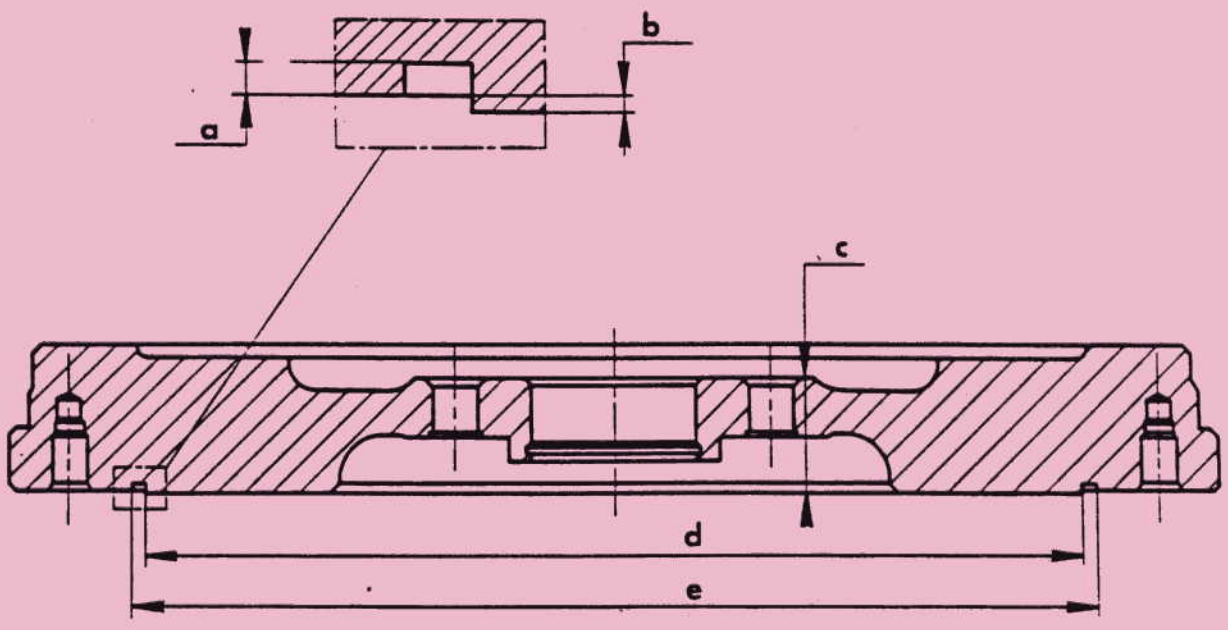
Length of push rods (inlet and exhaust are identical) ..... $183.85 \begin{smallmatrix} +0.3 \\ -0.75 \end{smallmatrix}$ mm

Maximum push rod bow ..... 1 mm



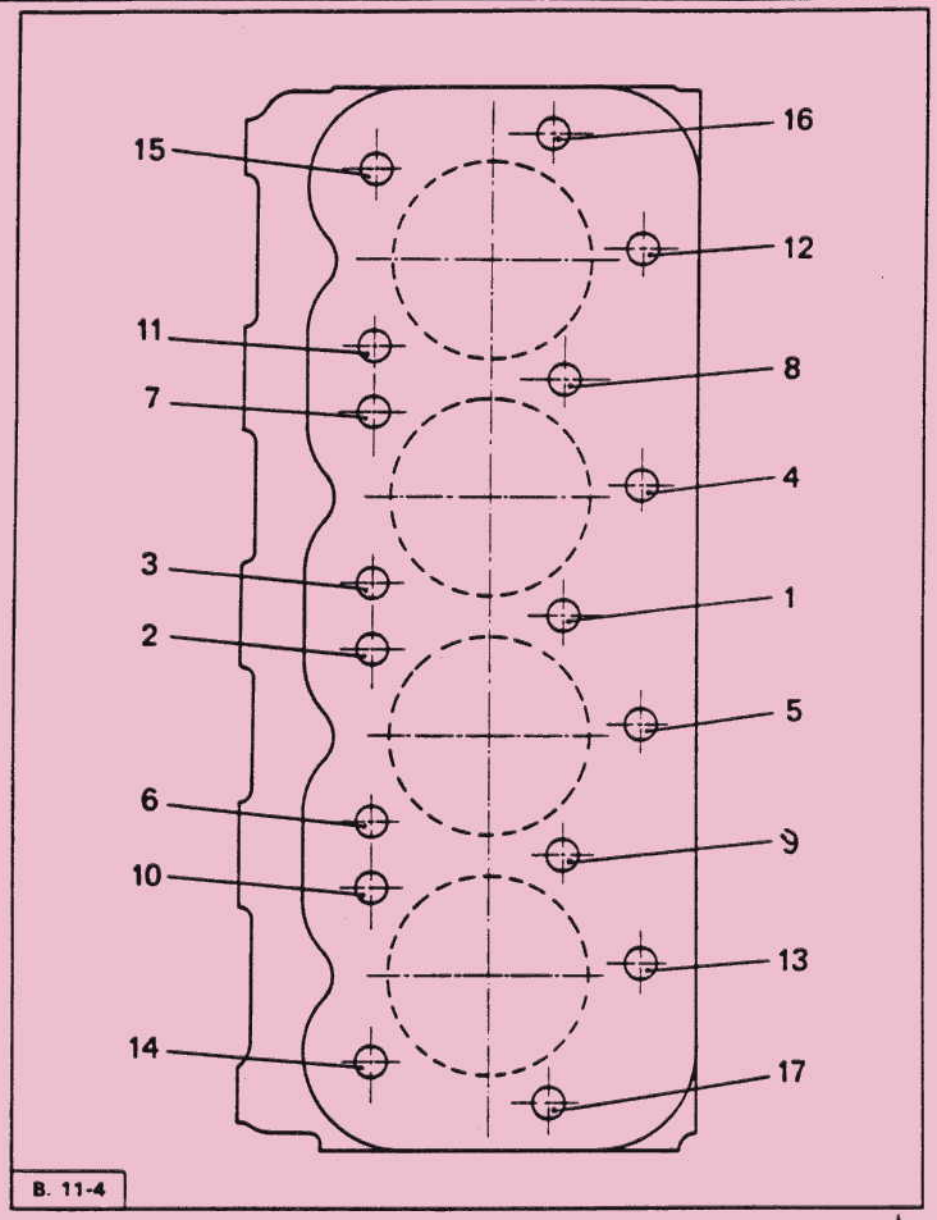
L 12-8

I

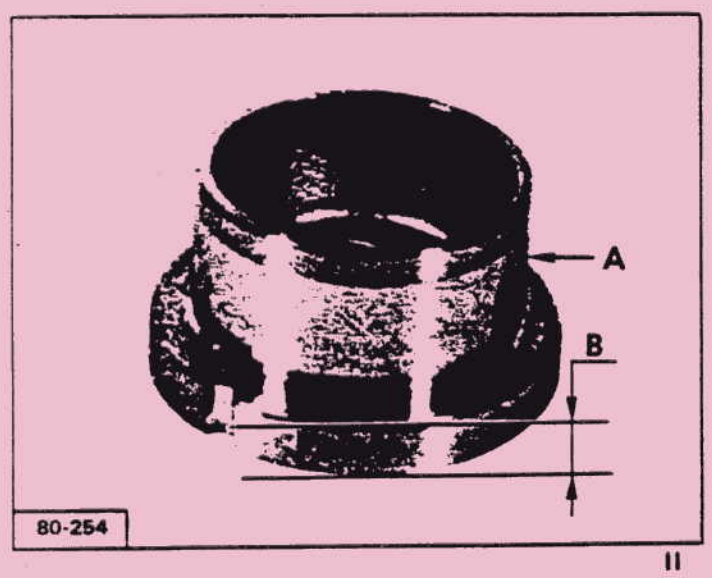


L 12-25

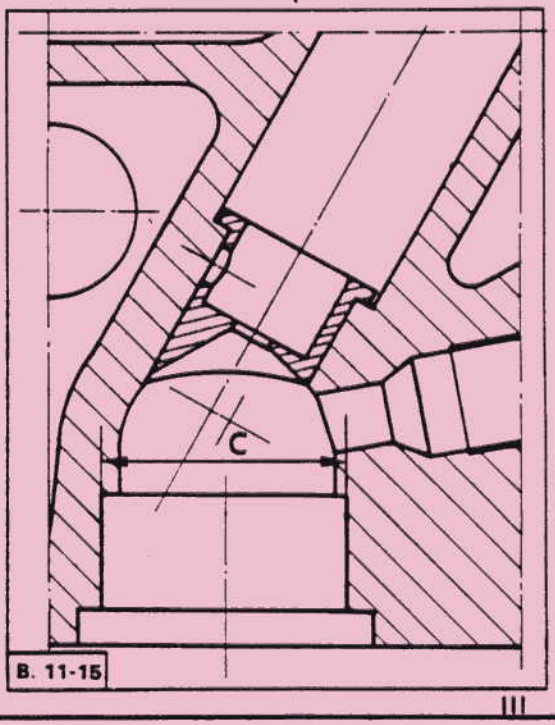
II



I



II



III

Cylinder head :

		mdaN	Nm	lft ft
Cylinder head tightening order Fig. I	Initial tightening torque	6	60	44
	Final tightening torque	10.5	105	77

Initial height of cylinder head ..... $117 \begin{smallmatrix} +0.5 \\ -0 \end{smallmatrix}$ mm

Minimum height after refacing ..... 116.3 mm

Maximum overall permissible bow on cylinder head ..... 0.1 mm

Maximum permissible bow between cylinder head bolt holes ..... 0.025 mm

Swirl chambers, Figs. II and III

	A : Ø of Swirl Chamber ± 0.05 ± 0.005	B : Thickness of Flange ± 0.05	C : Ø of chamber locating bore + 0.025
Standard	35.950 36.065 36.365	4.5	35.9 36 36.3
1st repair size	36.365	4.85	36.3
2nd repair size	36.465	5.05	36.4

The swirl chambers are fitted to an interference fit of between 0.02 mm and 0.065 mm.

They project past the cylinder head gasket face by : ..... 0 to 0.03 mm

Pre-heater plug thread ..... M12 x 1.25

– The cylinder head is provided with an aperture for the fast idling control thermostatic pick-up.

– Cylinder head gasket : made by REINZ

The gasket is fitted dry (no linseed oil is to be applied)

Identification (number engraved on a tab on the gasket). L25

– Rocker cover

The crankcase oil vapour is re-cycled through the rocker cover.

Valves guides seats, Figs. I and II

	A : Inlet	B : Exhaust
a : Ø valve stem	7,960 mm to 7.975 mm	8.940 mm to 8.955 mm
b : valve head Ø	41.85 mm to 42.15 mm	34.85 mm to 35.15 mm
c : valve guide Ø	7.990 mm to 8.015 mm	8.980 mm to 9.005 mm
d : length of valve guide	53.75 mm to 54.25 mm	56.75 mm to 57.25 mm

e : outside Ø of valve guide

Standard { Condition 1 ..... 13.055 mm to 13.075 mm
Standard { Condition 2 ..... 13.305 mm to 13.325 mm
Repair size ..... 13.555 mm to 13.675 mm

f : valve guide projection	11.9 mm to 13.4 mm	9.9 mm to 11.4 mm

g : valve guide locating bore in cylinder head

Standard { Condition 1 ..... 13.003 mm to 13.023 mm
Standard { Condition 2 ..... 13.253 mm to 13.273 mm
Repair size ..... 13.503 mm to 13.523 mm

h : valve seat locating bores

Standard	Condition 1	45 mm to 45.039 mm	38 mm to 38.039 mm
	Condition 2	45.3 mm to 45.339 mm	38.3 mm to 38.339 mm
	Repair size	45.6 mm to 45.639 mm	38.6 mm to 38.639 mm

J : outside Ø of valve seats

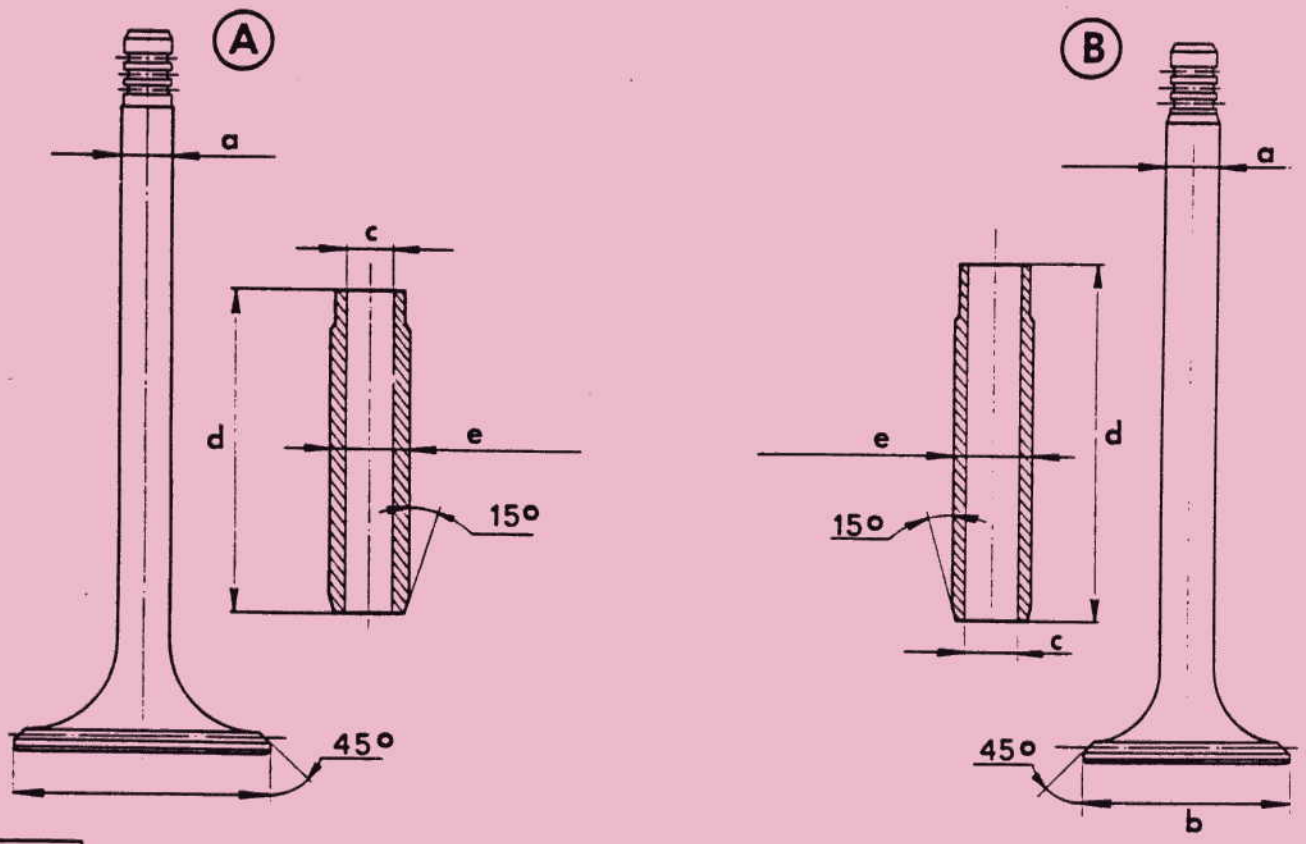
Standard	Condition 1	45.154 mm to 45.179 mm	38.160 mm to 38.185 mm
	Condition 2	45.454 mm to 45.479 mm	38.460 mm to 38.485 mm
	Repair size	45.754 mm to 45.779 mm	38.760 mm to 38.785 mm

- Width of valve seats : ..... 2.5 mm
- Valves recessed below cylinder head gasket face by : ..... 0.7 mm to 0.9 mm
- The valve seats and guides are a shrink fit in production

Valve springs :

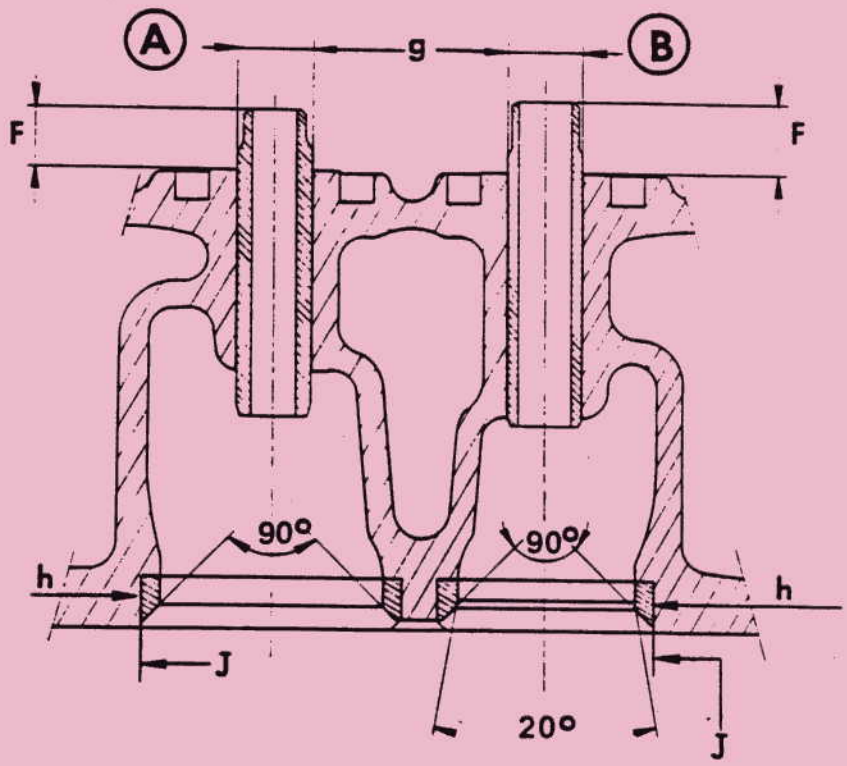
One spring per valve

Direction of coils ..... right hand
Wire diameter ..... 4.5 mm
Inside diameter ..... 25.2 mm ± 0.2 mm
Total number of coils 6.5
Free length ..... 49.4 mm
Length under a load of :
at { 29 ± 2.1 daN ..... 40.9 mm
at { 71 ± 4.2 daN ..... 30.9 mm



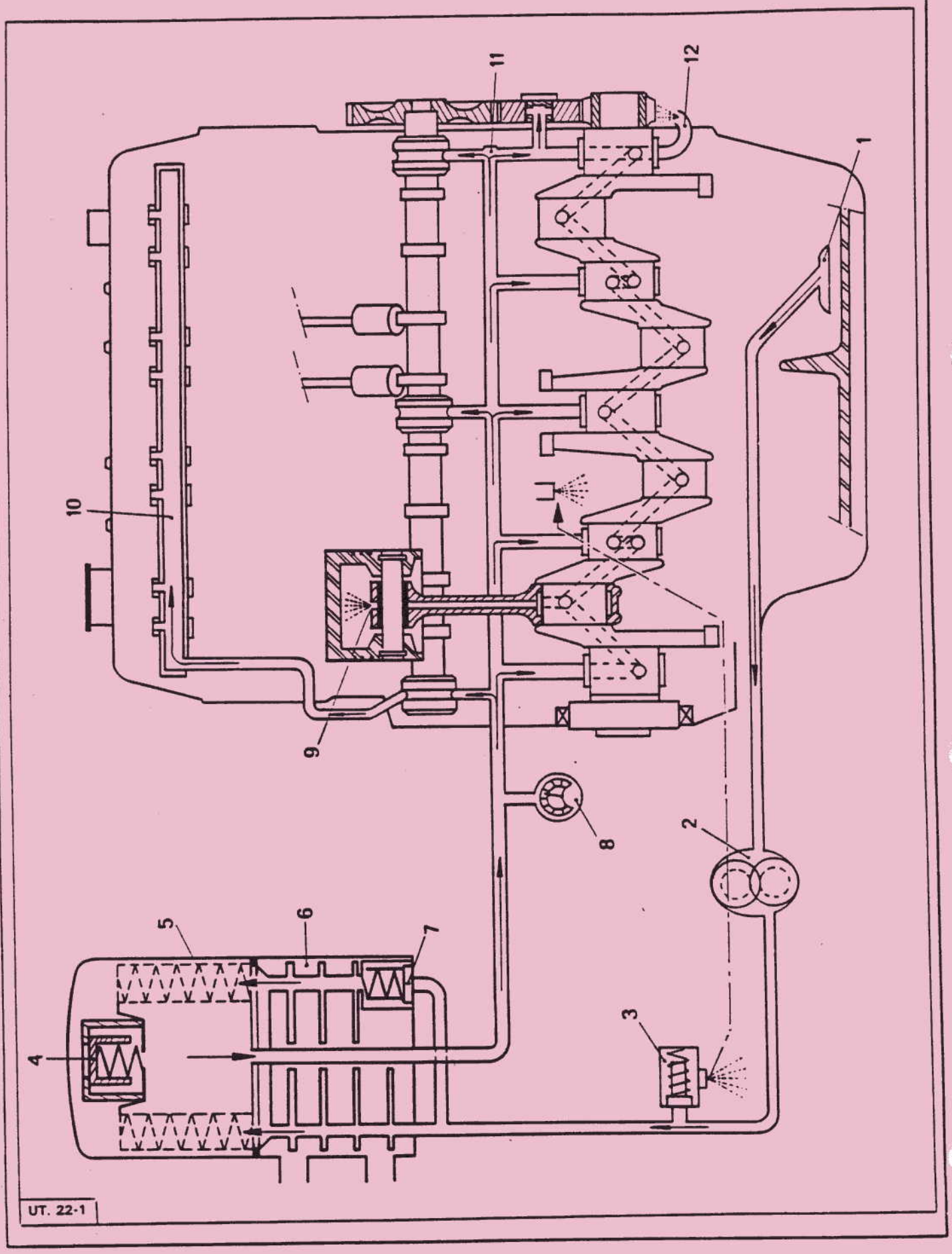
B. 12-5

I



B. 11-8

II


11
12
1
10
9
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2
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6
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4
3
UT. 22-1

Lubrication system : Fig. I

1 - Suction trainer
2 - Oil pump
3 - Pressure relief valve
4 - By-pass (in filter cartridge)
5 - Filter cartridge
6 - Heat exchanger
7 - By-pass (in oil cooler)
8 - Oil pressure switch
9 - Piston head cooling spray
10 - Rocker shaft
11 - Oil gallery
12 - Oil jet (to lubricate the timing gears).

— Oil grade

All season : ESSOLUBE XD3 15 W 40

For ambient temperatures of less than $-10^{\circ}C$: ESSOLUBE XD3 10 W 30.

— Capacities

After dismantling (dry engine)	5.8 litres (10.2 pints)
After oil change involving replacing the filter cartridge	4.7 litres (8.3 pints)
After simple oil change	4.4 litres (7.75 pints)
Difference between maximum and minimum marks on dipstick	1 litre (1.75 pints)

Oil pump (1) : Figs. I and III

"a" : Joint face coated with jointing compound.

Pressure relief valve : Figs. II and IV

(2) - Pressure relief valve support positioning screw.

– Filter cartridge :
  - PURFLUX or MAN or GUYOT
  - By-pass valve setting 550 ± 50 m.bars.
  - Cold start safety valve setting 0.3 bars.

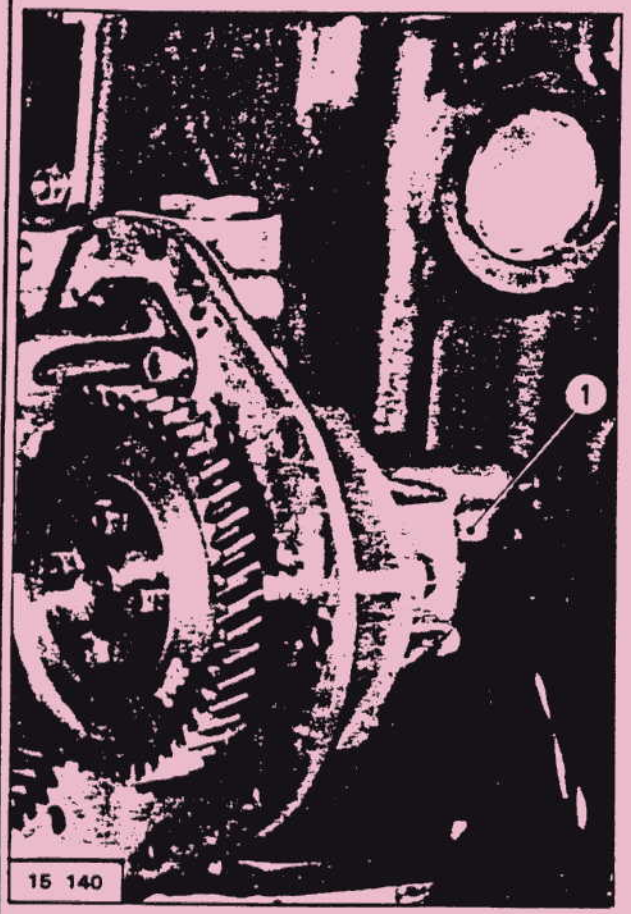
REMARK : Whenever replacing the filter cartridge, ensure that the face of the seal and the locating face on the support are both clean.

For replacing the filter cartridge use spanner 8.1404.

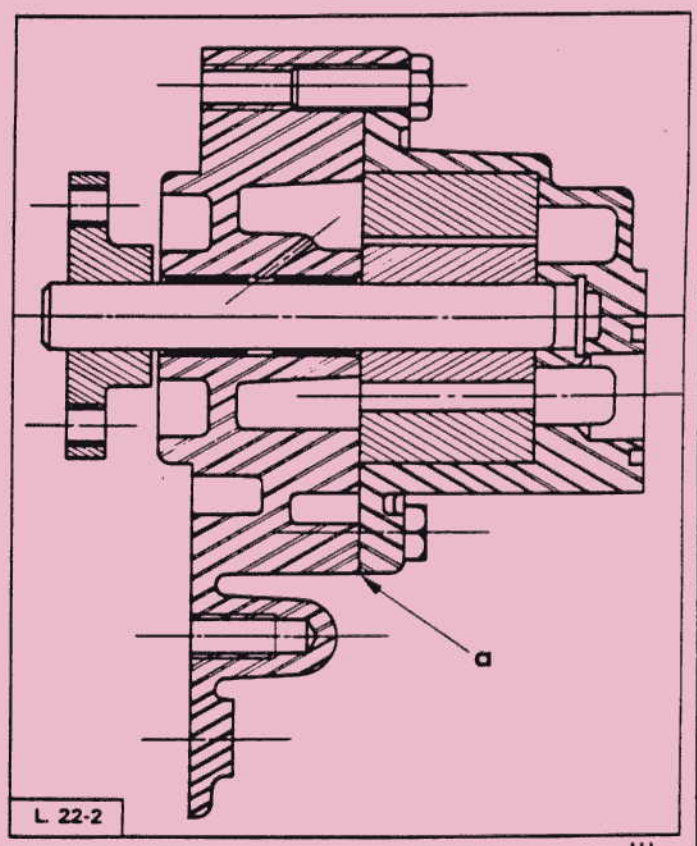
– Oil pressure (at an oil temperature of 95°C) : measured at the oil filter support.
  - at 1 000 rpm : 1 bar min.
  - at 3 500 rpm : 3.7 to 4.5 bars

– Pressure relief valve spring rate :
  coil bound : 31 mm
  length under a load of 10.9 kg : 42 mm.

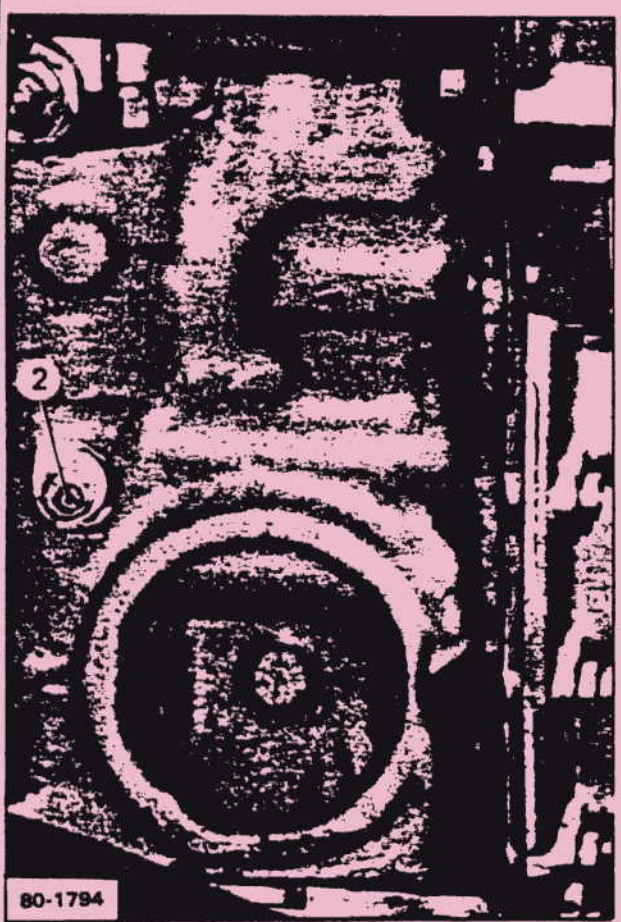
– Oil pressure switch settings :
  When the pressure is rising : the warning light goes out when the pressure exceeds 0.800 bars.
  When the pressure is falling : the warning light switches on at between 0.675 and 0.475 bars.



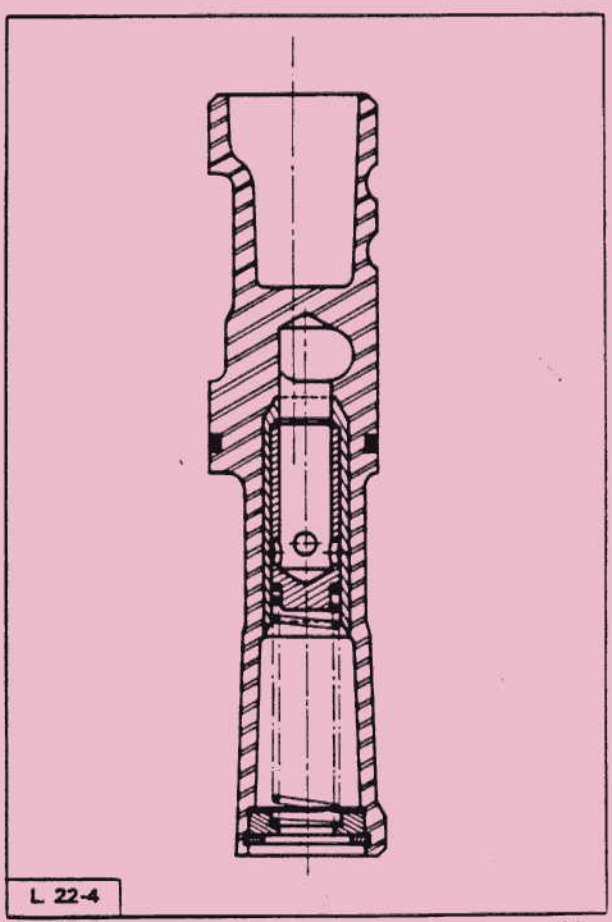
I



III



II



IV

	Pages
Engine data	A1.102
Tightening torques	A1.103
Data :	
– cylinder block	A1.105
– pistons	A1.105 and 106
– connecting rods	A1.106
– crankshaft	A1.109
– camshaft - timing gear - flywheel	A1.110
– cylinder head - pre-combustion chambers	A1.113
– valves - guides - seats	A1.114
– lubrication system	A1.117
– oil pump - pressure relief valve	

DATA AND SPECIAL FEATURES
OF THE U25/661 ENGINE
(Timing gear drive by toothed belt)

Engine

- Type (as marked on number plate) U25/661
- Configuration ..... Transverse, inclined forward at 23°
- French taxable horse power ..... 10 HP
- Direction of rotation ..... Left hand (anti-clockwise as seen from flywheel)
- Bore ..... 93 mm
- Stroke ..... 92 mm
- Capacity ..... 2.5 litres
- Compression ratio 22.25/1
- Injection order 1-3-4-2
- Max. power ..... ISO : 54 kW at 4,250 rpm
  DIN : 75 hp at 4,250 rpm
- Max. torque ..... ISO : 149 N.m (110 lbf.ft) at 2,250 rpm
  DIN : 15.7 mkg at 2,250 rpm
- Idling speed ..... 800 ± 25 rpm
- Governed speed empty ..... 4,625 ± 125 rpm
- Min. cut-off speed, under load ..... 4,250 ± 50 rpm

Lubrication

- Pressure lubrication system fed by an « Eaton » type pump driven by a toothed belt.
- External cartridge type filter (bypass valve set at 1.5 bars).
- Coolant/oil heat exchanger type oil cooler (valve set at 1 bar).

- ROTO-DIESEL injection pump type MA 300 Reference R 3449 F 010 → 5/87
  type MA 260 Reference R 8443 B 111 → 5/87
- Direction of rotation : left hand (Seen from timing gear).
- Injectors : ROTO-Diesel pintle type.
- Fuel : diesel oil.
- Fuel filter of the replaceable element type with priming pump. From 87 my water detector.
- Air filter of the replaceable dry element type.

Timing gear

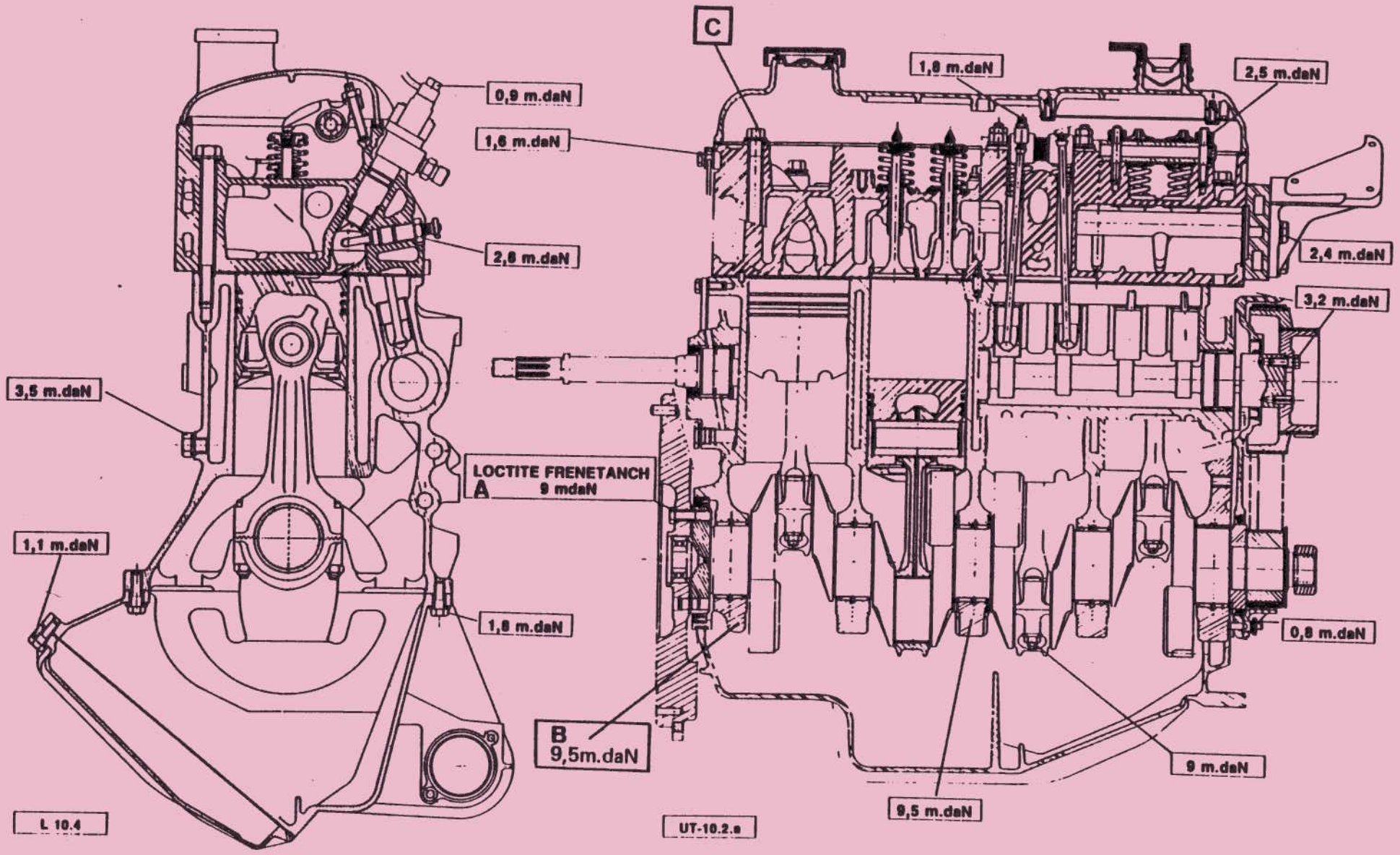
Side mounted camshaft driven by a toothed belt.

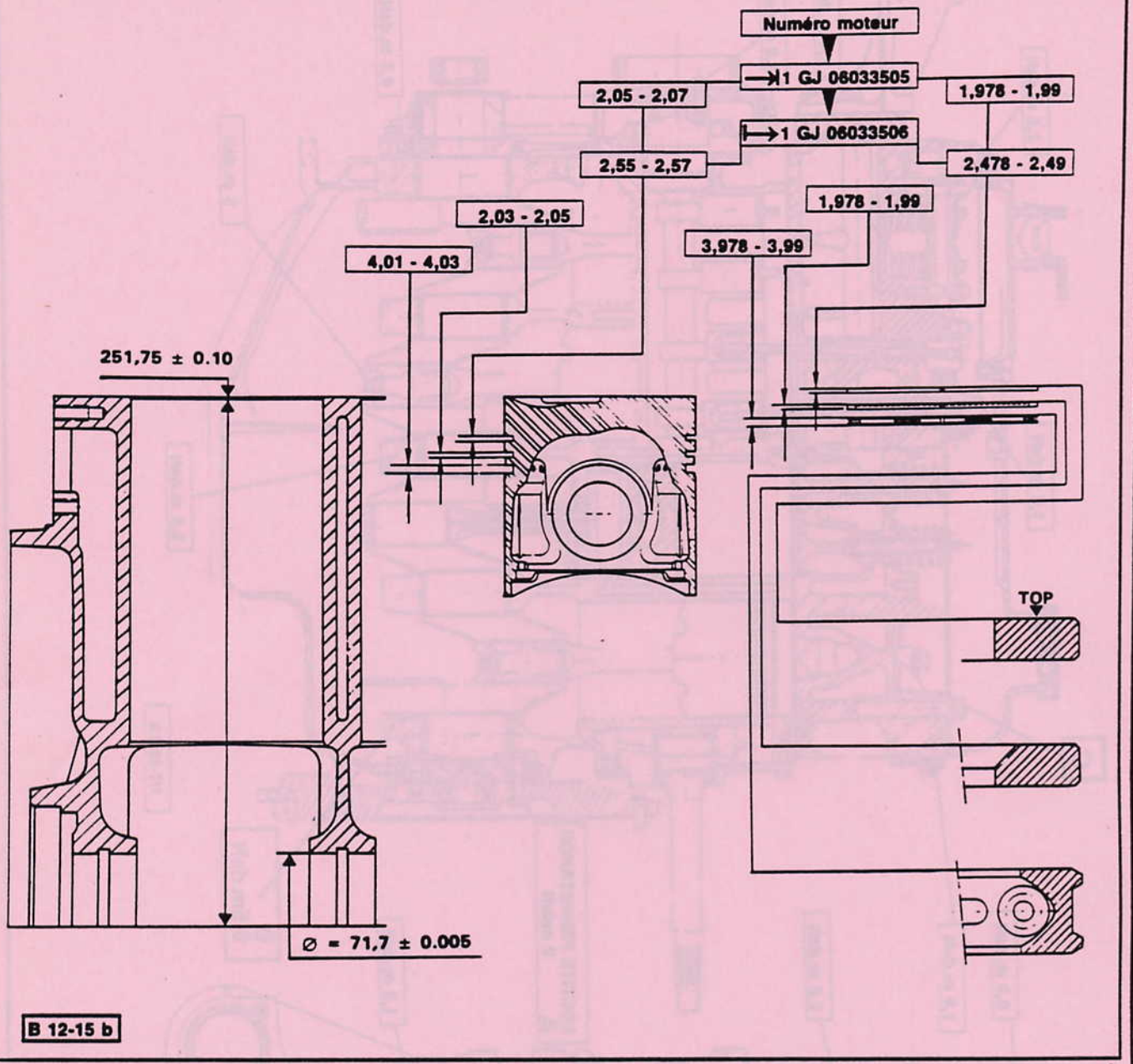
Tightening torques — Torques in N.m (lbf.ft)

A - Flywheel securing bolts (to be replaced each time they are removed) and coated with LOCTITE FRENETANCH compound before fitting ..... 90 N.m (66.4 lbf.ft)

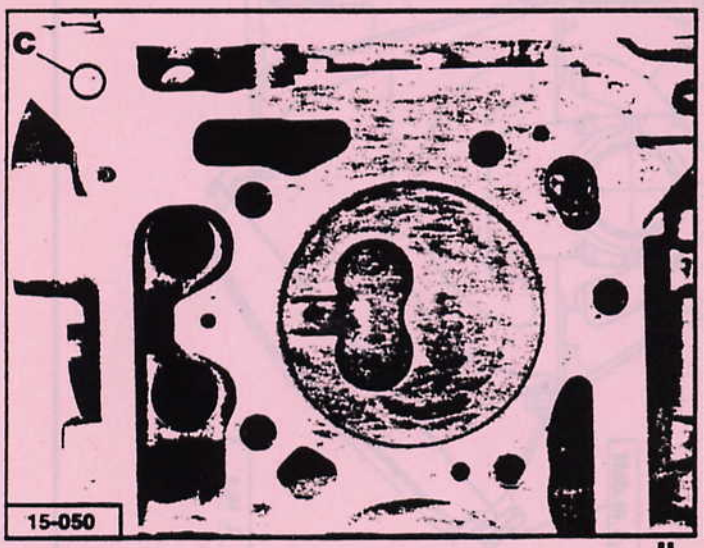
B - Bearing cap bolts (to be replaced each time they are removed) ..... 95 N.m (70.1 lbf.ft)

C - Cylinder head securing bolts : These bolts, together with the toothed washers, must be replaced by new ones each time the cylinder head is removed (for tightening operations see page A1.113).

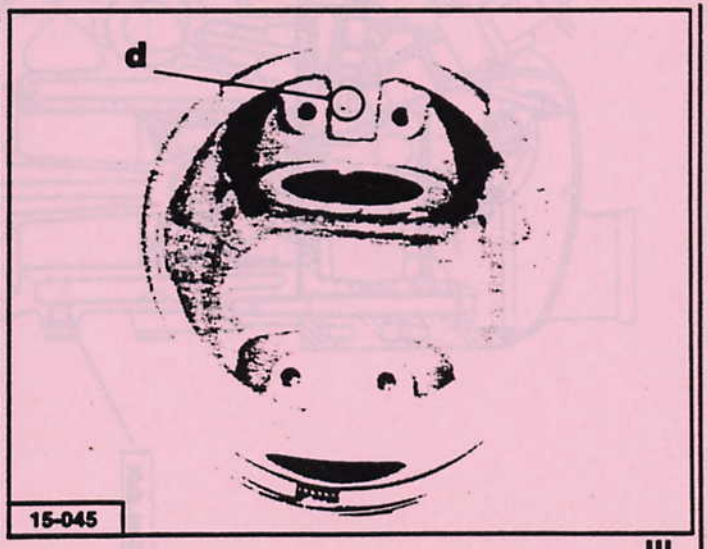

C
0,9 m.daN
1,6 m.daN
2,8 m.daN
3,5 m.daN
LOCTITE FRENETANCH
A 9 mdaN
1,1 m.daN
1,8 m.daN
B
9,5m.daN
L 10.4
UT-10.2.a
1,8 m.daN
2,5 m.daN
2,4 m.daN
3,2 m.daN
0,8 m.daN
9 m.daN
9,5 m.daN


Numéro moteur
1 GJ 06033505
1 GJ 06033506
2,05 - 2,07
2,55 - 2,57
1,978 - 1,99
2,478 - 2,49
2,03 - 2,05
4,01 - 4,03
1,978 - 1,99
3,978 - 3,99
251,75 ± 0.10
TOP
Ø = 71,7 ± 0.005
B 12-15 b

I


c
15-050

II


d
15-045

III

Cylinder block : Fig. I

— Bores machined in a cast iron block.

(c) - Cylinder block grade reference Fig. II.

If the block is rebored, this reference must be deleted and the letter corresponding to the new bore diameter stamped in its place.

Permissible distortion of cylinder block top face.

a) Overall distortion : .....0.05 maximum

b) Distortion between two head fixing holes : 0.02 mm maximum.

Pistons : Fig. III

Manufacturer : A.E.F. (Associated Engineering France).

Lead and tin coated aluminium.

Gudgeon pin is not offset.

Running clearance at the skirt, "N" reference : A.E.F.....0.10 mm to 0.12 mm

Running clearance, "U" reference.....0.0975 mm to 0.1305 mm

Grade reference with letter "n" or "u" on the boss "d" Fig. III.

Height of piston crown above cylinder block top face : (to be achieved whenever a piston is changed) according to nominal diameter.

The Parts Division supplies piston/gudgeon pin/ring assemblies in sets of four.

		Cylinder block		Piston		
	Nominal diameter	Ref. « c » Fig. II	Bore diameter	A.E.F. piston diameter	Reference	Piston height
Std.	93	A	93,007 - 93,022	92,890 - 92,910	U	0,50 - 0,55
	93,25	B1	93,25 - 93,26	93,140 - 93,150	B1n	0,47 - 0,52
		B2	93,26 - 93,27	93,150 - 93,160	B2n	
	93,50	C1	93,50 - 93,51	93,390 - 93,400	C1n	0,44 - 0,49
		C2	93,51 - 93,52	93,400 - 93,410	C2n	
	93,75	D1	93,75 - 93,76	93,640 - 93,650	D1n	0,41 - 0,46
		D2	93,76 - 93,77	93,650 - 93,660	D2n	

Diameter of gudgeon pin bore in piston .....30.004 mm to 30.014 mm

Maximum weight difference between piston/gudgeon pin assemblies (in one engine) .. 15 g. maximum

Piston rings : Fig. I

– GOETZE manufacture.

– The marking engraved on the face of the ring must be towards the piston crown.

1 - Molybdenum coated upper compression ring.

2 - Lower compression ring (the torsional chamfer "b" towards the piston crown).

3 - Oil control ring with expander (the gap in the expander (4) must be at 180° to the gap in the oil control ring (3)).

a - Paint reference on the ring according to nominal piston diameter.

Nominal diameter	Paint reference
93	Yellow
93.25	Green
93,50	White
93.75	Purple

Ring gap :

– Upper compression ring. . . . . 0,20 mm to 0.45 mm

– Lower compression ring . . . . . 0.15 mm to 0.40 mm

– Oil control ring : . . . . . 0,10 mm to 0.30 mm

Connecting rods : Fig. II

– Side clearance (non-adjustable) : . . . . . 0.037 to 0.247 mm

– c : Small en bush diameter : . . . . . 30.014 mm to 30.020 mm

– e : Big end diameter : . . . . . Grade 1 : 57.675 mm to 57.685 mm
Grade 2 : 57.685 mm to 57.695 mm

X - Connecting rod grade reference (1 or 2)

d - Distance between centres : . . . . . 154 ± 0.05 mm

– Maximum weight variation between connecting rods in one engine : . . . . . 7 grammes maxi.
The Parts Department supplies connecting rods in sets of four (grade 1).

Big end bearing shells (crank pin) :

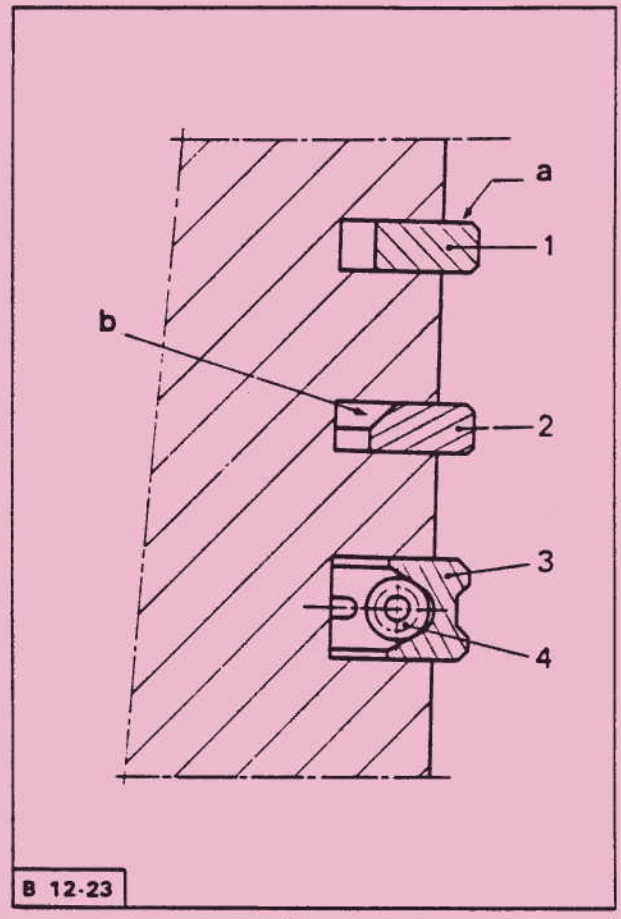
– Running clerance, big end to crankshaft . . . . . 0.029 mm to 0.074 mm

f - Width of big-end shell 24.4 mm → 12/86
22.6 mm ↦ 01/87

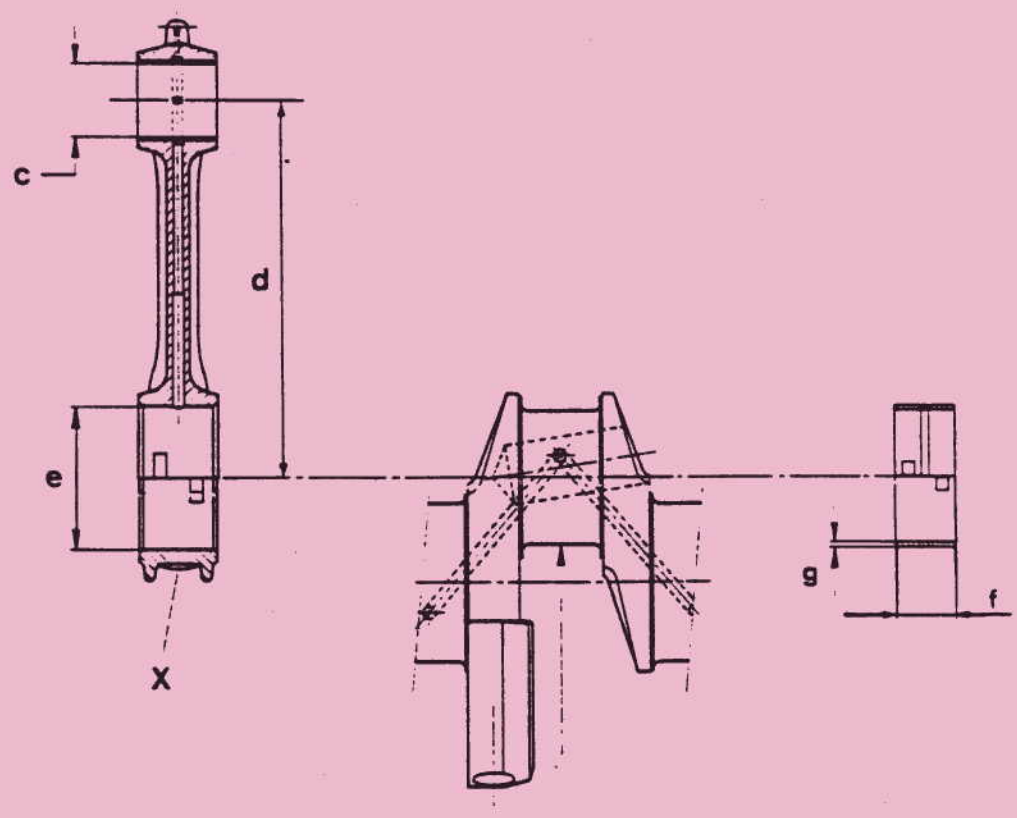
g - Thickness of big-end shell.

- Position of connecting rod-piston assembly on engine :
oil hole in connecting rod small-end pointing towards recess (clover leaf) in piston.
Recess (clover leaf) in piston : on camshaft side.

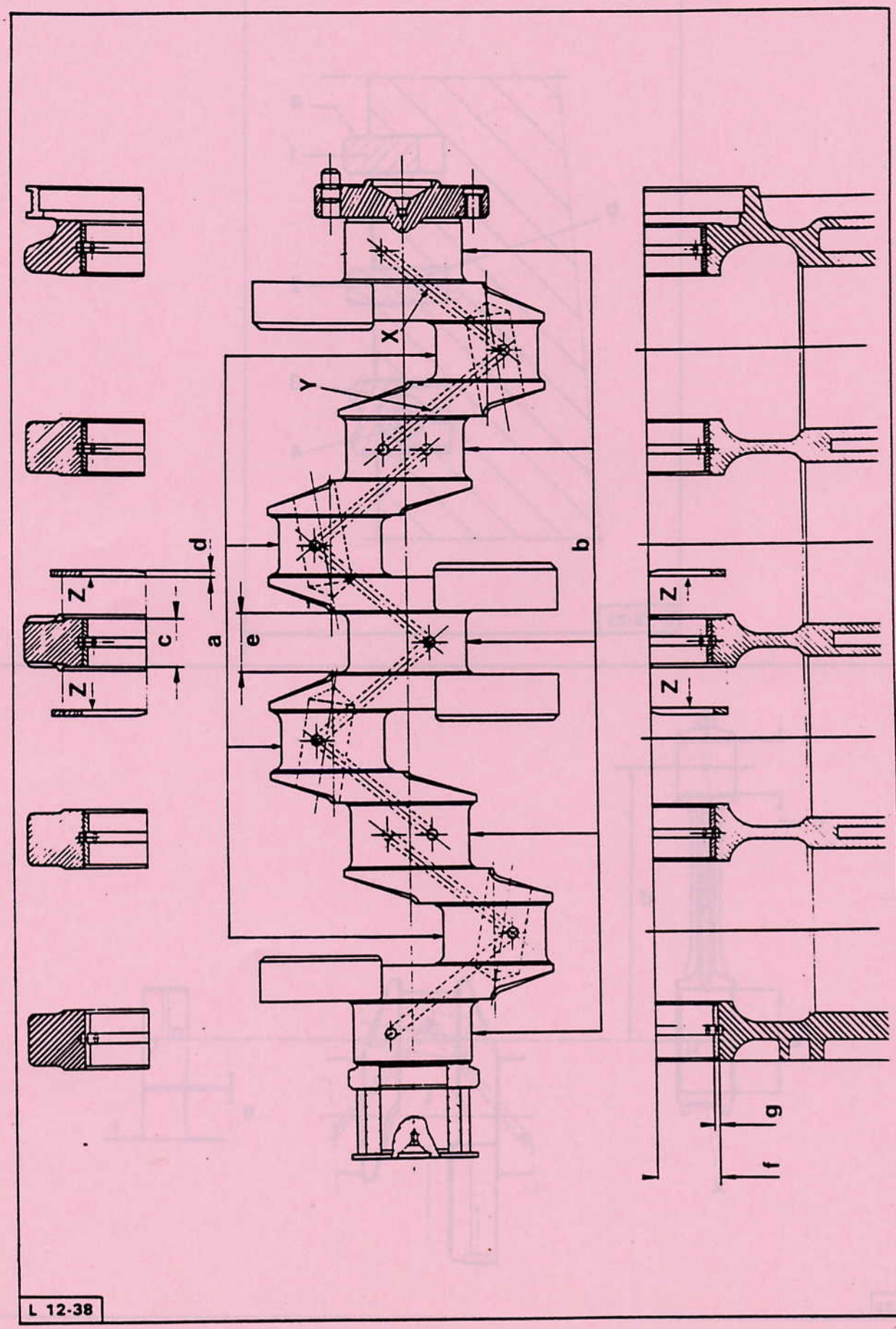
Crankshaft	Con. rod	Thickness in mm
Grade A	Grade I	1.820 - 1.826
	Grade II	1.825 - 1.831
Grade B	Grade I	1.945 - 1.951
	Grade II	1.950 - 1.956
Overhaul	Grade I	2.070 - 2.076
	Grade II	2.075 - 2.081



I



II



L 12-38

Crankshaft : Fig. I

a - Crankpins

Standard	Grade A : Ø = 53,990 mm to 54,005 mm
	Grade B : Ø = 53,740 mm to 53,755 mm
Undersize	: Ø = 53,490 mm to 53,505 mm

b - Journals

Standard	Grade A : Ø = 67.035 mm to 67.05 mm
	Grade B : Ø = 66.785 mm to 66.8 mm
Undersize	: Ø = 66,535mm to 66,55 mm

e - Centre journal width : 33.995 mm to 34.10 mm.

X - Journal grade reference

Y - Crankpin grade reference

Possible crankshaft grades fitted in production :

- AA
- AB
- BA
- BB

Example on a crankshaft :
- Crankpin grade = A
- Journal grade = B

Reference stamped on crankshaft :
- at y = A
- at x = B

= AB

Crankshaft end float (adjustable) : ..... 0.045 mm to 0.16 mm

At the flywheel end, the crankshaft is sealed by :

— a helical-toothed thrower on the crankshaft

— a ribbed lip oil seal (red).

The Parts Division supplies crankshafts only to grades AA.

Main bearing shells :

c - Width of shell ..... 28.45 mm to 28.7 mm

f - ø in block ..... 71.695 mm to 71.705 mm

g - Thickness of bearing shell .....
(Class A ..... 2.306 mm to 2.312 mm
(Class B ..... 2.431 mm to 2.437 mm
(Repair size ..... 2.555 mm to 2.563 mm

Clearance between bearing shells and crankshaft ..... 0.021 to 0.058 mm

End float flanges :

d - Thickness of flanges (the flanges on any given side of the bearing must be of the same thickness)
(. . 3.10 mm
(. . 3.14 mm
(. . 3.18 mm
(. . 3.22 mm

Z - Class reference

- Antifriction face against the crankshaft.

Camshaft :
End float (non-adjustable) ..... 0.05 mm to 0.36 mm
Thickness of flange ..... 5.41 mm

Cam lift :
- Inlet and exhaust : ..... 6.83 ± 0.02 mm

Timing gear : toothed belt drive
The belt is tensioned by a tensioner roller
(To adjust the tension, use special tool (-).0157 K

Clearance between rocker arm and valve (when checking the timing diagram)
- Inlet and exhaust : ..... 1 mm

Timing diagram (as seen from flywheel) : Fig. I
A - Top dead centre (T.D.C.)
B - Inlet opens after T.D.C. : ..... 2°52'
C - Exhaust closes before T.D.C. : ..... 4°12'
D - Inlet closes after B.D.C. : ..... 33°08'
E - Exhaust opens before B.D.C. : ..... 37°48'
F - Bottom dead centre (B.D.C.)

Actual valve clearances (on a cold engine)

Inlet	Exhaust
0.30 mm	0.20 mm

Flywheel
Injection point timing mark engraved on flywheel (Fig. II)
Since 3/87 a lighter flywheel has been fitted (Fig. III) at Engine No. 1 G J 06 09 45 04

Fig. IV

a - ..... 1.5 mm max.

b - Essential difference between locating faces on the disc and clutch unit ..... $0.5\ ^{+0}_{-0.15}$ mm

c - ..... $28\ ^{+0.2}_{-0}$ mm

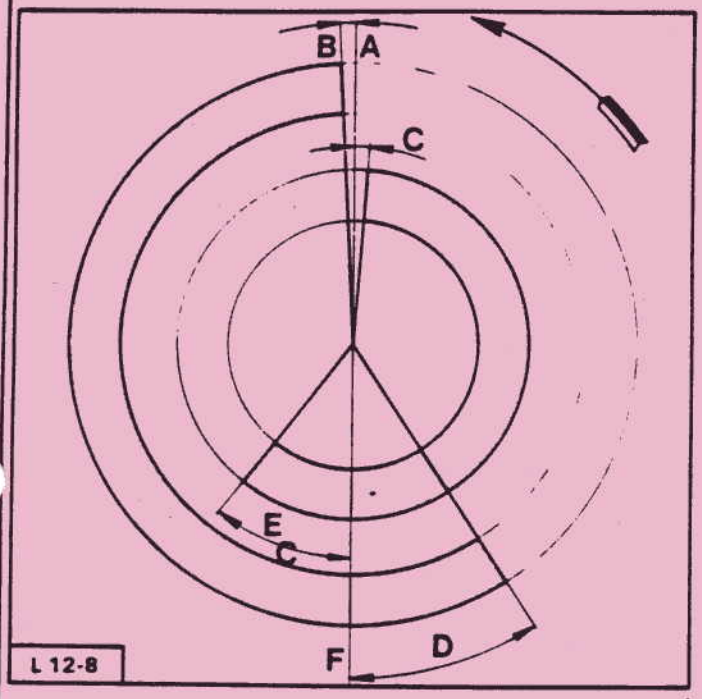
after refacing ..... 27.7 mm min.

d - ..... $243\ ^{+1}_{-0}$ mm

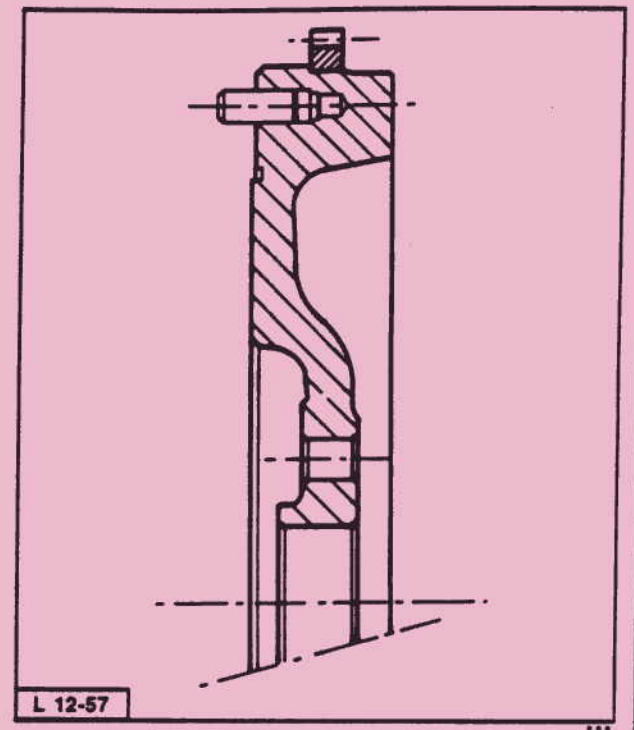
e - ..... 248 mm max.

- Starter ring gear with 120 teeth (no lead) (the unmachined side against the flywheel face)

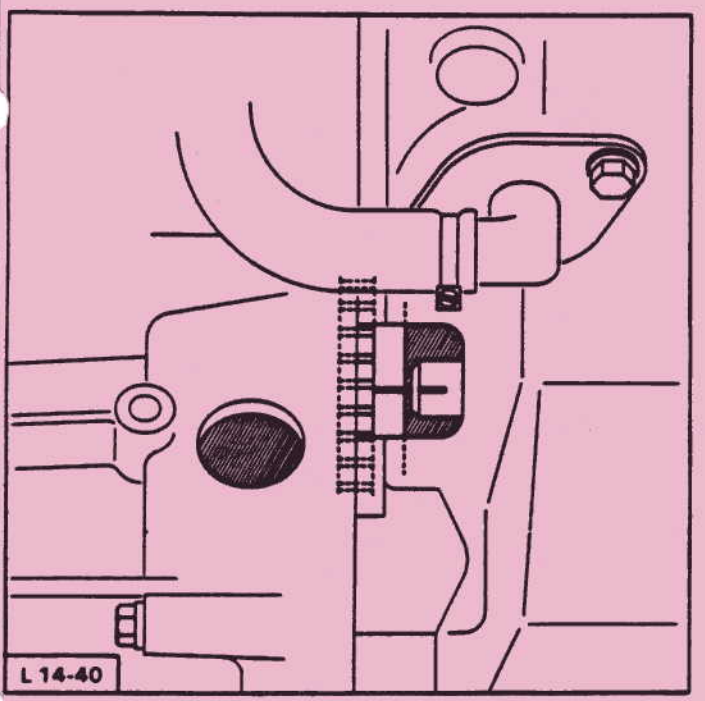
Push rods :
- Length of push rods (inlet and exhaust identical) ..... 180 ± 0.3 mm
- Max. push rod run-out ..... 1 mm



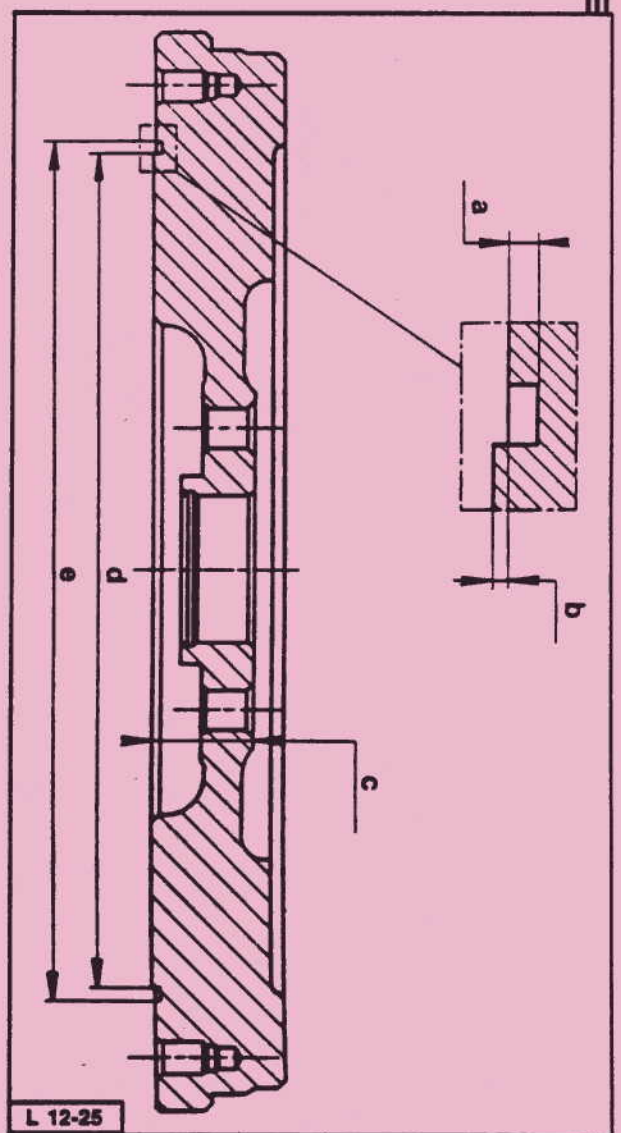
I



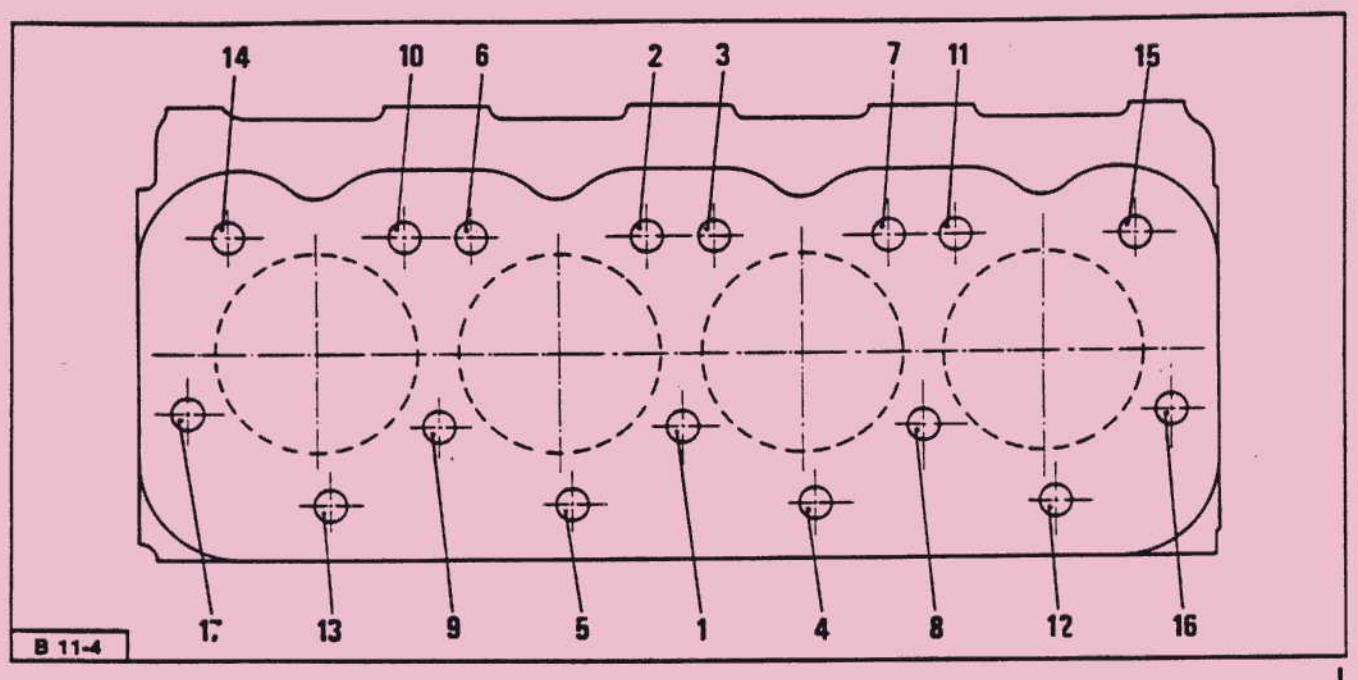
III



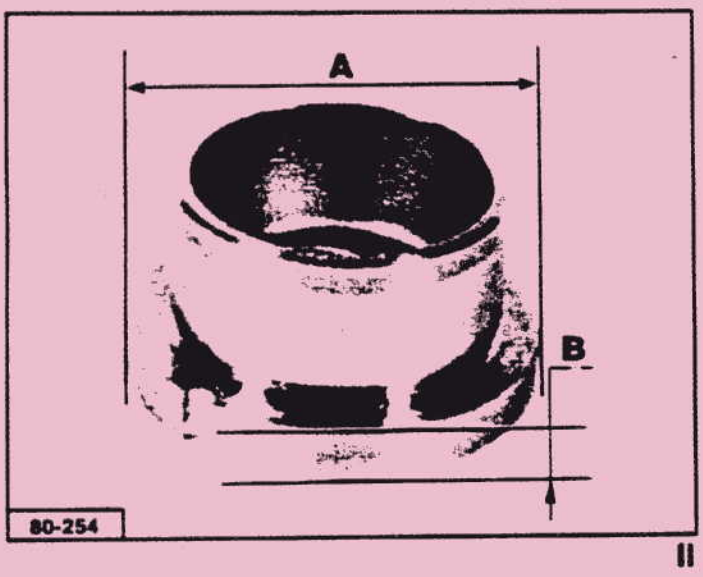
II



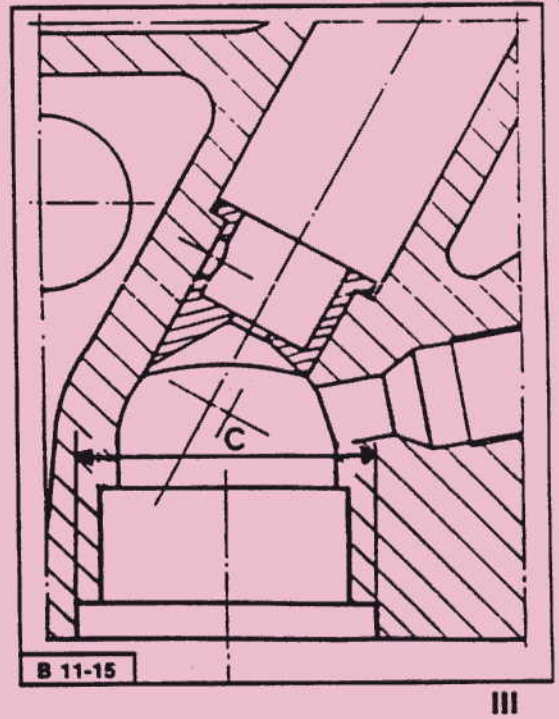
IV


14
10
6
2
3
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17
13
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12
16
B 11-4

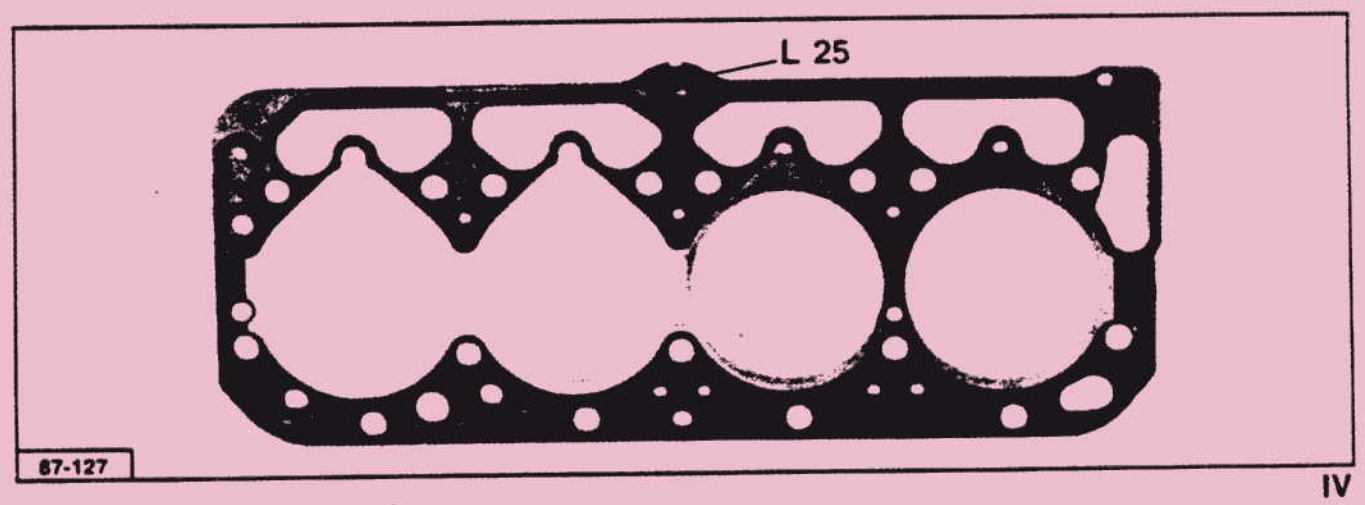
I


A
B
80-254

II


C
B 11-15

III

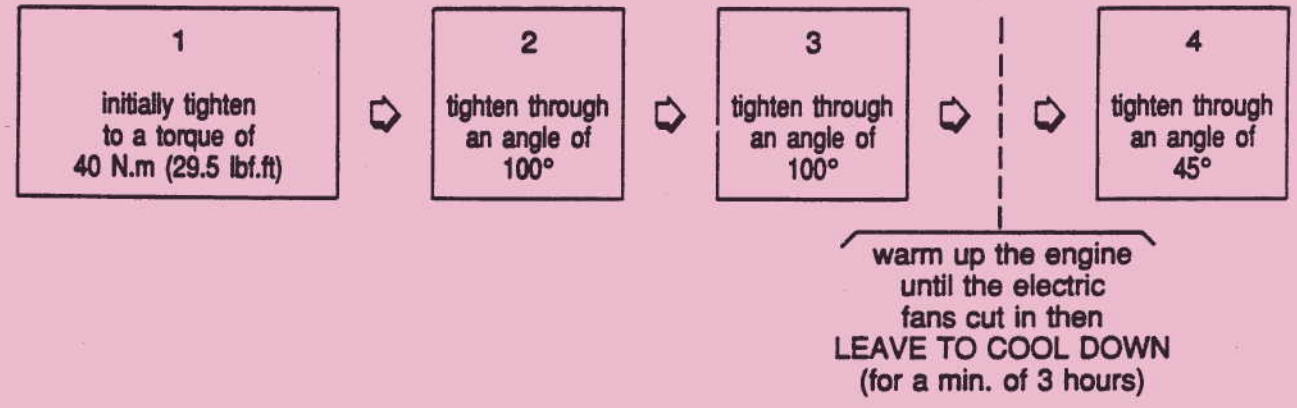

L 25
87-127

IV

Cylinder head

For cylinder head tightening order see Fig. I.

Tightening : (follow the conventional tightening order). The underhead faces and the threads of the bolts are to be oiled.
The teeth on the washers are to be against the cylinder head.



There is no cylinder head retightening operation at 1000/1500 miles (1500/2500 km)

Original height ..... $117 \begin{smallmatrix} +0.5 \\ -0 \end{smallmatrix}$ mm

Minimum height after refacing ..... 116.3 mm

Maximum permissible cylinder head bow ..... 0.1 mm

Maximum permissible bow between securing holes ..... 0.025 mm

Precombustion chambers Fig. II and III.

	A : Precombustion chamber ø $\begin{smallmatrix} 0 \\ -0,02 \end{smallmatrix}$	B : Thickness of flange ± 0,05	C : ø of cylinder head location $\begin{smallmatrix} +0,025 \\ 0 \end{smallmatrix}$
Standard	35,950 36,065 36,365	4,5	35,885 36 36,3
1st possibility	36,365	4,85	36,3
2nd possibility	36,465	5,05	36,4

The precombustion chambers are fitted with an interference fit of between 0.02 mm and 0.065 mm.
The precombustion chambers protrude above the cylinder head gasket face by : 0 to 0.03 mm.
After replacing the precombustion chambers, measure the protrusion after a load of 3000 mdaN has been applied per combustion chamber.
The combustion chamber positioning pins are recessed below the surface by 0 to 1 mm.
Preheater plug screw thread ..... M 12 x 1.25

- Cylinder head with a tapping for a temperature sensor which controls the fast idling.
- Cylinder head gasket : made by REINZ.
  The gasket is fitted dry.

Identification mark (engraved on the gasket tab) : Fig. IV ..... L 25

- Rocker arm cover :
  The oil vapour is recycled via the rocker arm cover.

Valves-guides-seats : Fig. I and II

Height of valves ..... 121.3 ± 0.35 mm

	A : Inlet	B : Exhaust
a: valve stem ø	7.960 to 7.975 mm	8.940 to 8.955 mm
b: valve head ø	41.85 to 42.15 mm	34.85 to 35.15 mm
c: valve guide inside ø	7.990 to 8.015 mm	8.980 to 9.005 mm
d: height of valve guide	53.75 to 54.25 mm	56.75 to 57.25 mm

e: outside ø of valve guide

Initial
- 1st possibility ..... 13.055 mm to 13.075 mm
- 2nd possibility ..... 13.305 mm to 13.325 mm

Repair size ..... 13.555 mm to 13.575 mm

f: height by which the guide projects	9.9 mm to 11.4 mm	11.9 mm to 13.4 mm

g: guide locating bore in cylinder head

Initial
- 1st possibility ..... 13.003 mm to 13.023 mm
- 2nd possibility ..... 13.253 mm to 13.273 mm

Repair size ..... 13.503 mm to 13.523 mm

h: valve seat bore

Initial	1st possibility	45 mm to 45.039 mm	38 mm to 38.039 mm
	2nd possibility	45.3 mm to 45.339 mm	38.3 mm to 38.339 mm
	Repair size	45.6 mm to 45.639 mm	38.6 mm to 38.639 mm

J: outside ø of valve seats

Initial	1st possibility	45.154 mm to 45.179 mm	38.160 mm to 38.185 mm
	2nd possibility	45.454 mm to 45.479 mm	38.460 mm to 38.485 mm
	Repair size	45.754 mm to 45.779 mm	38.760 mm to 38.785 mm

- Width of valve seat area ..... 2.5 mm
- Valves recessed below the cylinder head gasket face by ..... 0.7 mm to 0.9 mm
- K, recessed depth with reference to cylinder head gasket face ..... 1.4 mm to 1.7 mm
- The valve seats and guides are a shrink fit.

Valve springs :

Only one valve spring per valve

Direction of winding ..... right hand

Wire diameter ..... 4.5 mm

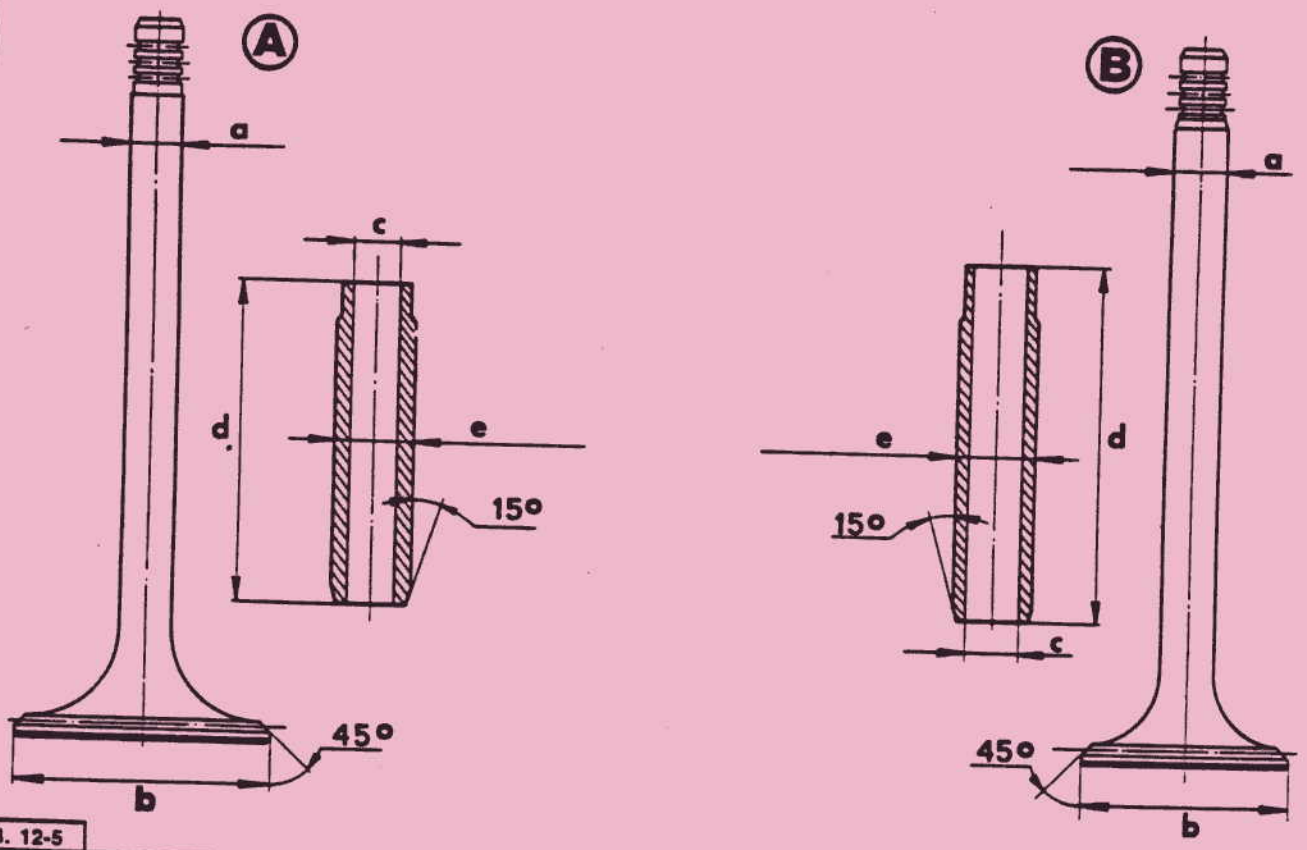
Inside diameter ..... 25.2 ± 0.2 mm

Total number of coils 6.5

Free height ..... 49.4 mm

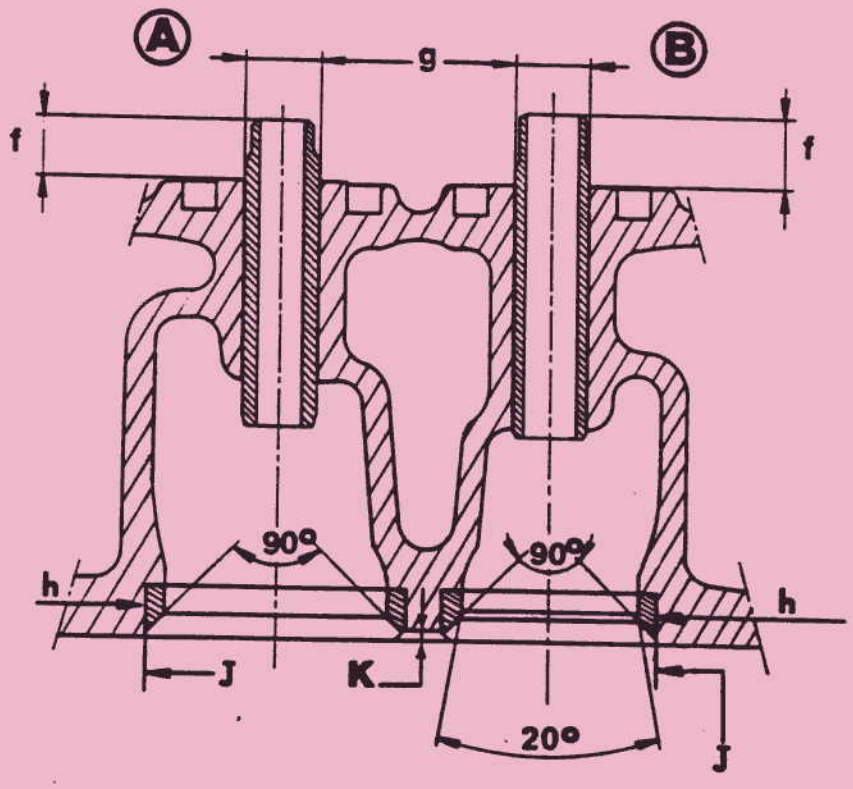
Height under a load of :

for
- 290 ± 21 Nm ..... 40.9 mm
- 710 ± 42 Nm ..... 30.9 mm



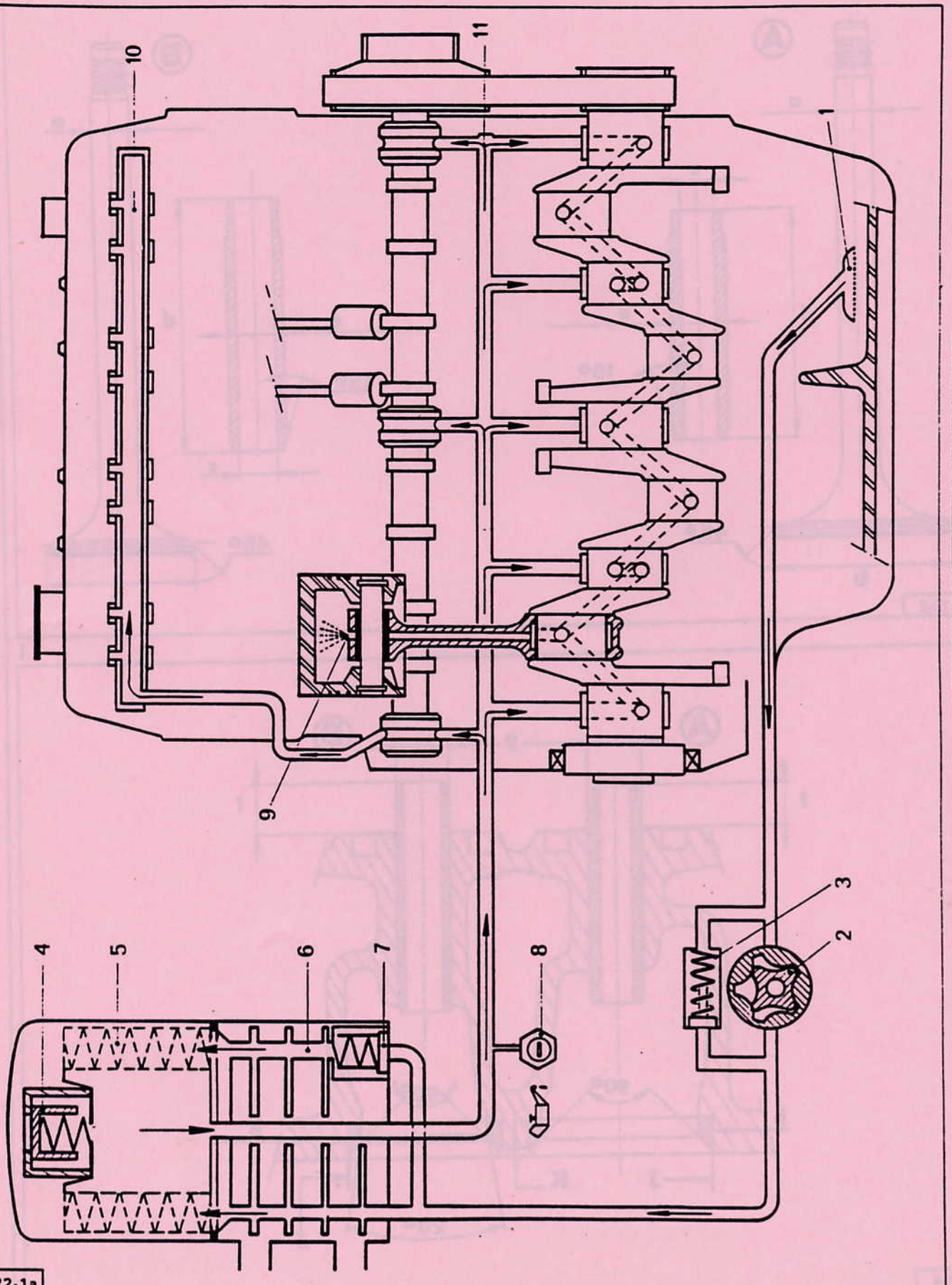
B. 12-5

I



B. 11-8

II



UT 22-1a

Lubrication system : Fig. I

1 - Suction strainer
2 - Oil pump ..... Driven by toothed belt
3 - Pressure relief valve ..... Integral with oil pump
4 - By-pass valve forming part of filter cartridge ..... 1.5 bars
5 - Filter cartridge ..... Purflux LS 483
6 - Oil cooler (heat exchanger) ..... Oil/water (Modine)
7 - By-pass (forming part of oil cooler) ..... 1 bar
8 - Oil pressure switch.
Oil pressure switch pressure setting :
When the pressure is rising : the warning light switches off when the pressure rises above 0.8 bars.
When the pressure is falling : the warning light switches on at between 0.6 and 0.4 bars.
9 - Cooling sprays for undersides of pistons.
10 - Rocker arm assembly.
11 - Oil distribution gallery.

Sump capacity	Engine no. date	→| 1 GJ 06 06 18 61 →| 7/86	↦ 1 GJ 06 06 18 62 ↦ 7/86
- After dismantling		5.8 L	6 L
- After draining and replacing the filter cartridge		4.7 L	5.6 L
- After draining		4.4 L	4.9 L
- Difference between min. and max. levels on dipstick		1 L	2.2 L

Oil pump

Driven by a toothed belt.

Pressure relief valve

An integral part of the oil pump

Oil pressures (oil at 95°C)

- at 1000 rpm : 2.5 bars
- at 3500 rpm : 4.5 to 5 bars

	Page
Engine data	A1.202
Tightening torques	A1.203
Data :	
- cylinder block	A1.205
- pistons	A1.205 - 206
- connecting rods	A1.206
- crankshaft	A1.209
- camshaft - timing gear - flywheel	A1.210
- cylinder head - precombustion chamber	A1.213
- valves - guides - seats	A1.214
- lubrication system	A1.217

DATA AND SPECIAL FEATURES
OF THE TYPE U25/673
(Toothed belt timing gear drive)

Engine

- Type (as marked on number plate) U25/673
- Configuration ..... Transverse, inclined forward at 23°
- French taxable horse power ..... 10 HP
- Direction of rotation ..... Left hand (anti-clockwise as seen from flywheel)
- Bore ..... 93 mm
- Stroke ..... 92 mm
- Capacity ..... 2.5 litres
- Compression ratio 21/1
- Injection order 1-3-4-2
- Max. power ..... ISO : 70 kW at 3,700 rpm
  DIN : 95 hp at 3,700 rpm
- Max. torque ..... ISO : 216 N.m (159 lbf.ft) at 2,000 rpm
  DIN : 22 mkg at 2,000 rpm
- Idling speed ..... 800 ± 25 rpm
- Governed speed empty ..... 4,600 ± 150 rpm
- Min. cut-off speed, under load ..... 3,900 rpm

Lubrication

- Pressure lubrication system fed by an « Eaton » type pump driven by a toothed belt.
- External cartridge type filter (bypass valve set at 1.5 bars).
- Coolant/oil heat exchanger type oil cooler (valve set at 1 bar).

- ROTO-DIESEL injection pump type MAS 100 Reference R 8443 B 123 B
- Direction of rotation : right hand (Seen from timing gear).
- Injectors : ROTO-Diesel pintle type.
- Fuel : diesel oil.
- Fuel filter of the replaceable element type with priming pump. From 87 model water detector.
- Air filter of the replaceable dry element type.
- Diesel oil heater : on engine cooling system at end of cylinder head right hand side.

Timing gear

Side mounted camshaft driven by a toothed belt.

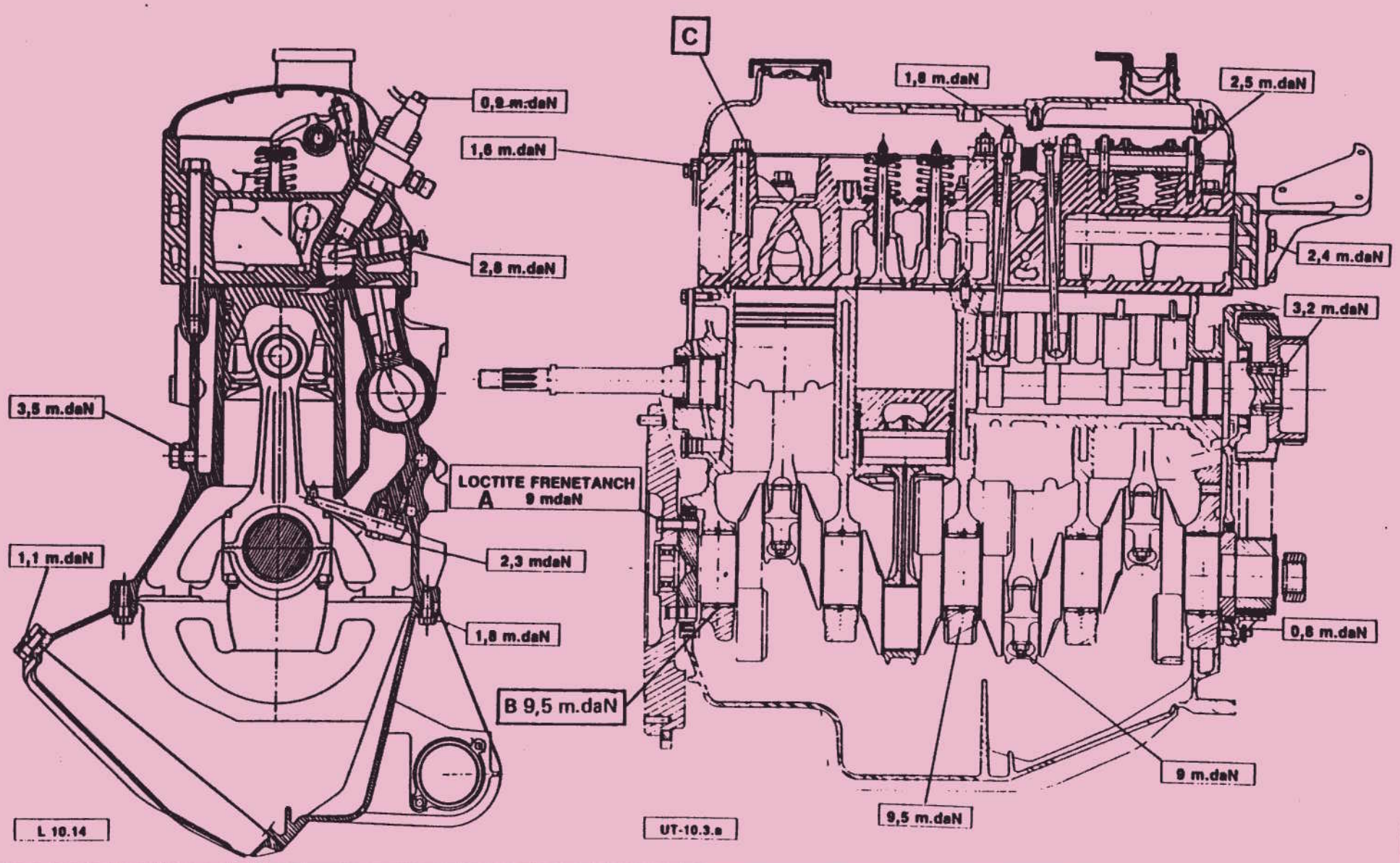
Tightening torques

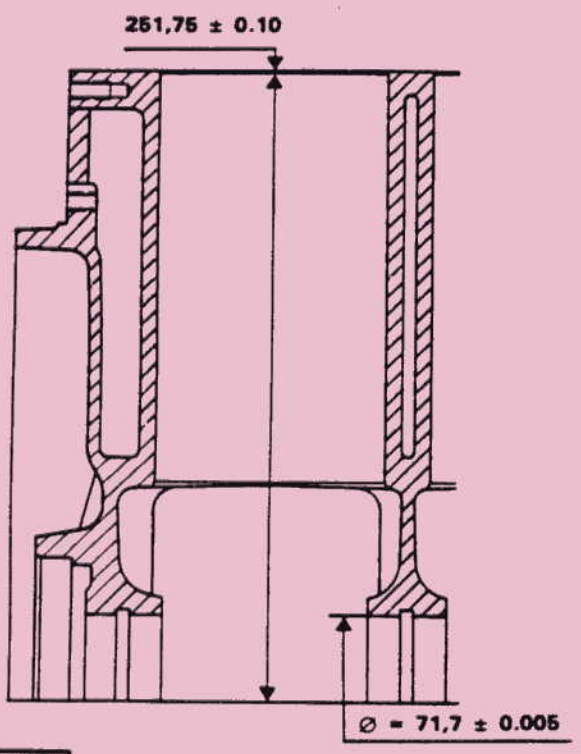
Torques in N.m (lbf.ft)

A - Flywheel securing bolts (to be replaced each time they are removed) and coated with LOCTITE FRENETANCH compound before fitting ..... 90 N.m (66.4 lbf.ft)

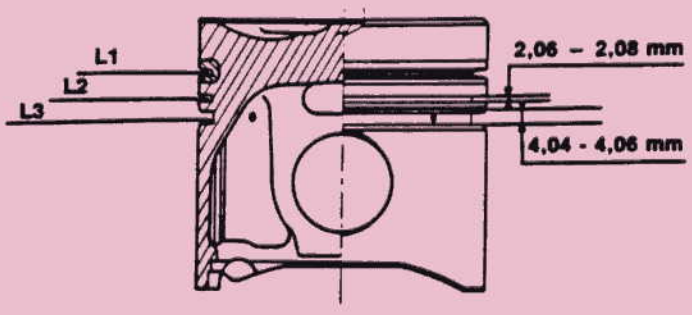
B - Bearing cap bolts (to be replaced each time they are removed) ..... 95 N.m (70.1 lbf.ft)

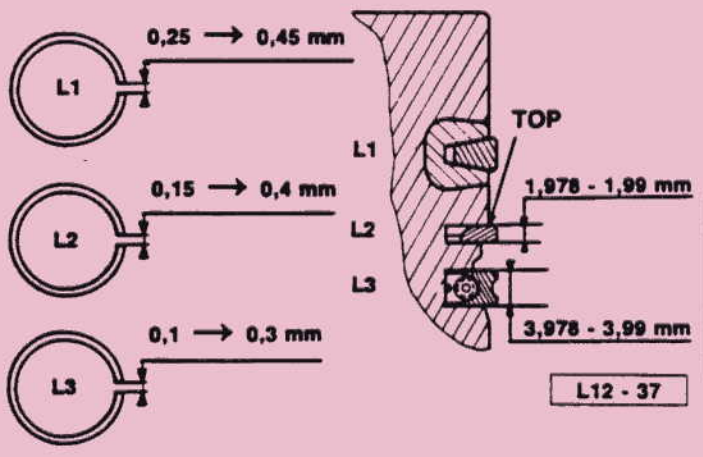
C - Cylinder head securing bolts : These bolts, together with the toothed washers, must be replaced by new ones each time the cylinder head is removed (for tightening operations see page A1.213).


C
0,8 m.daN
1,6 m.daN
2,8 m.daN
3,5 m.daN
LOCTITE FRENETANCH
A 9 mdaN
2,3 mdaN
1,1 m.daN
1,8 m.daN
B 9,5 m.daN
L 10.14
1,8 m.daN
2,5 m.daN
2,4 m.daN
3,2 m.daN
0,8 m.daN
9 m.daN
9,5 m.daN
UT-10.3.a



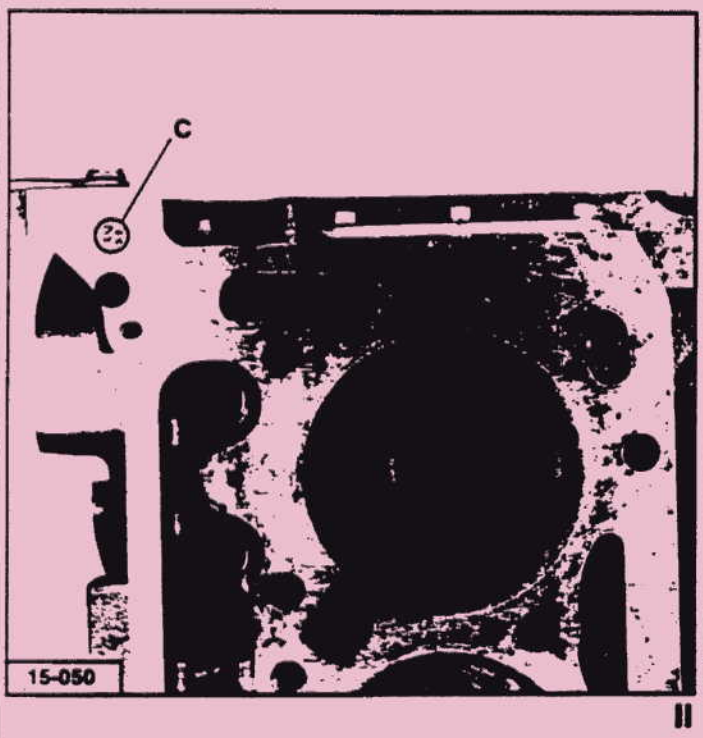
B 12-15 b





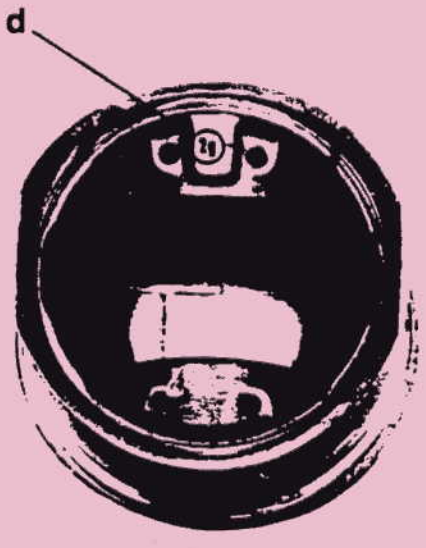
L12 - 37

I



15-050

II



15-045

III

Piston rings : Fig. I
- Make GOETZE.
- The inscription engraved on the upper face of the ring must point towards the piston crown.

1 - Upper compression ring made from cast iron coated with molybdenum.
2 - Compression/scraper ring (reference TOP « a » and chamfer « b » pointing towards the piston crown).
3 - Oil control ring (the gap in the expander (4) must be at 180° to the gap in the oil control ring (3)).
Nominal diameter 93 mm.

Ring gaps :
- Upper compression ring ..... 0.20 mm to 0.45 mm
- Compression/scraper ring ..... 0.15 mm to 0.40 mm
- Oil control ring ..... 0.10 mm to 0.30 mm

Connecting rods Fig. II
- End float (non-adjustable) ..... 0.037 mm to 2.47 mm
- c : small-end ø ..... 32.014 mm to 32.020 mm
- e : big-end ø ..... Class 1 : 57.675 mm to 57.685 mm
  Class 2 : 57.685 mm to 57.695 mm

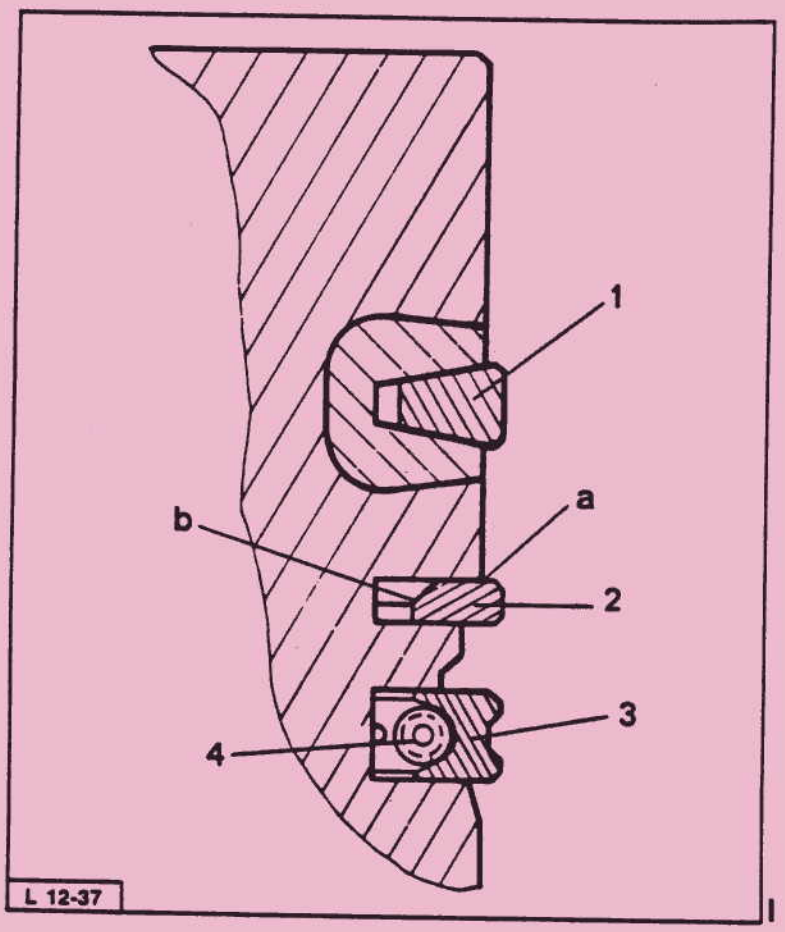
X - Connecting rod class reference (1 or 2)
d - Big-end to small-end between centres dimension ..... 154 ± 0.05 mm
- Maximum weight difference between any two connecting rods one given engine ..... 7 g
The parts Department supplies connecting rods in sets of four (class 1).

Big-end shells (big-end bearings) :
- Connecting rod big-end-crankshaft operating clearance ..... 0.029 mm to 0.074 mm

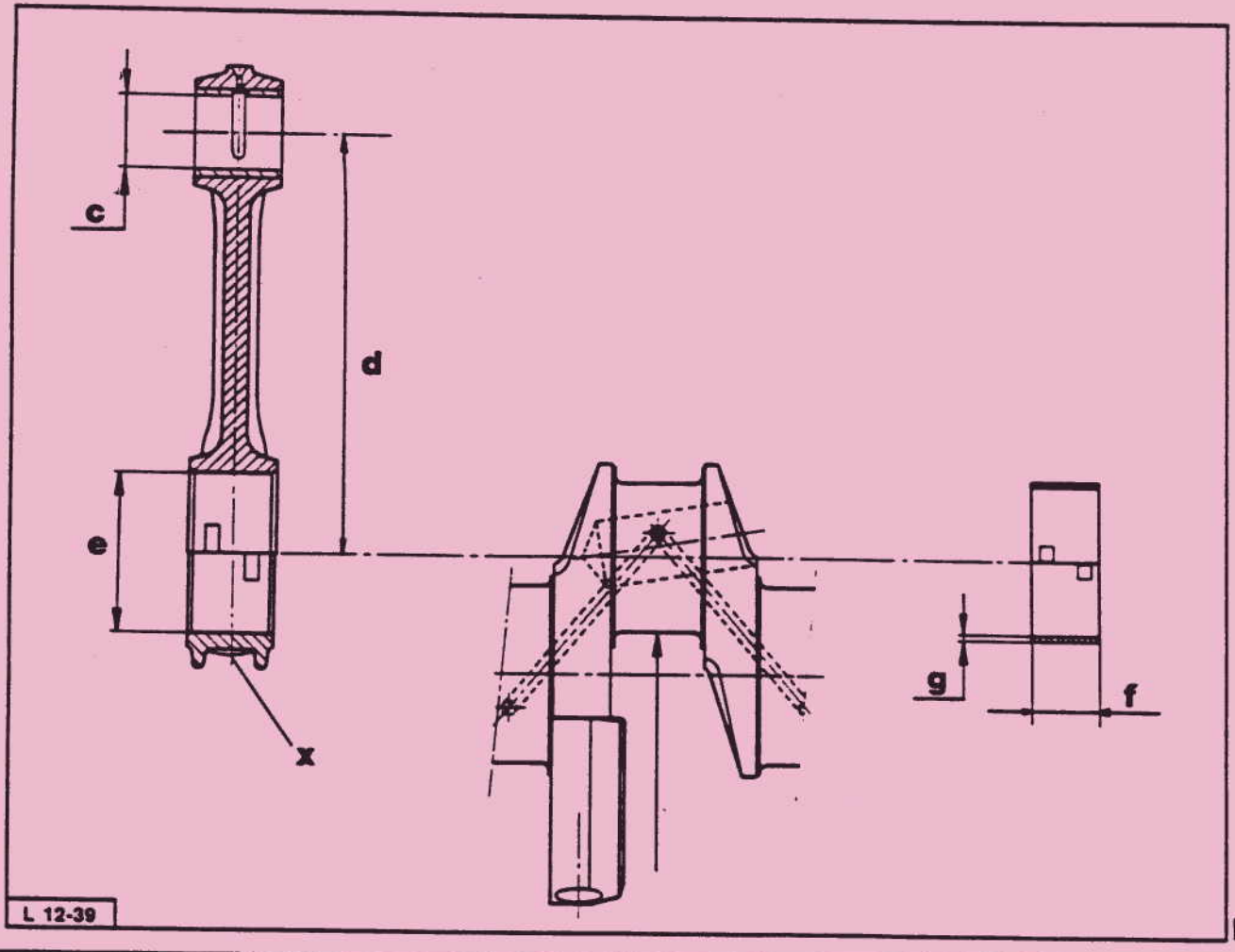
f - Width of big-end shell
g - Thickness of big-end shell
- Position of piston-connecting rod assembly on engine :

Recess (clover leaf) in piston : on camshaft side.

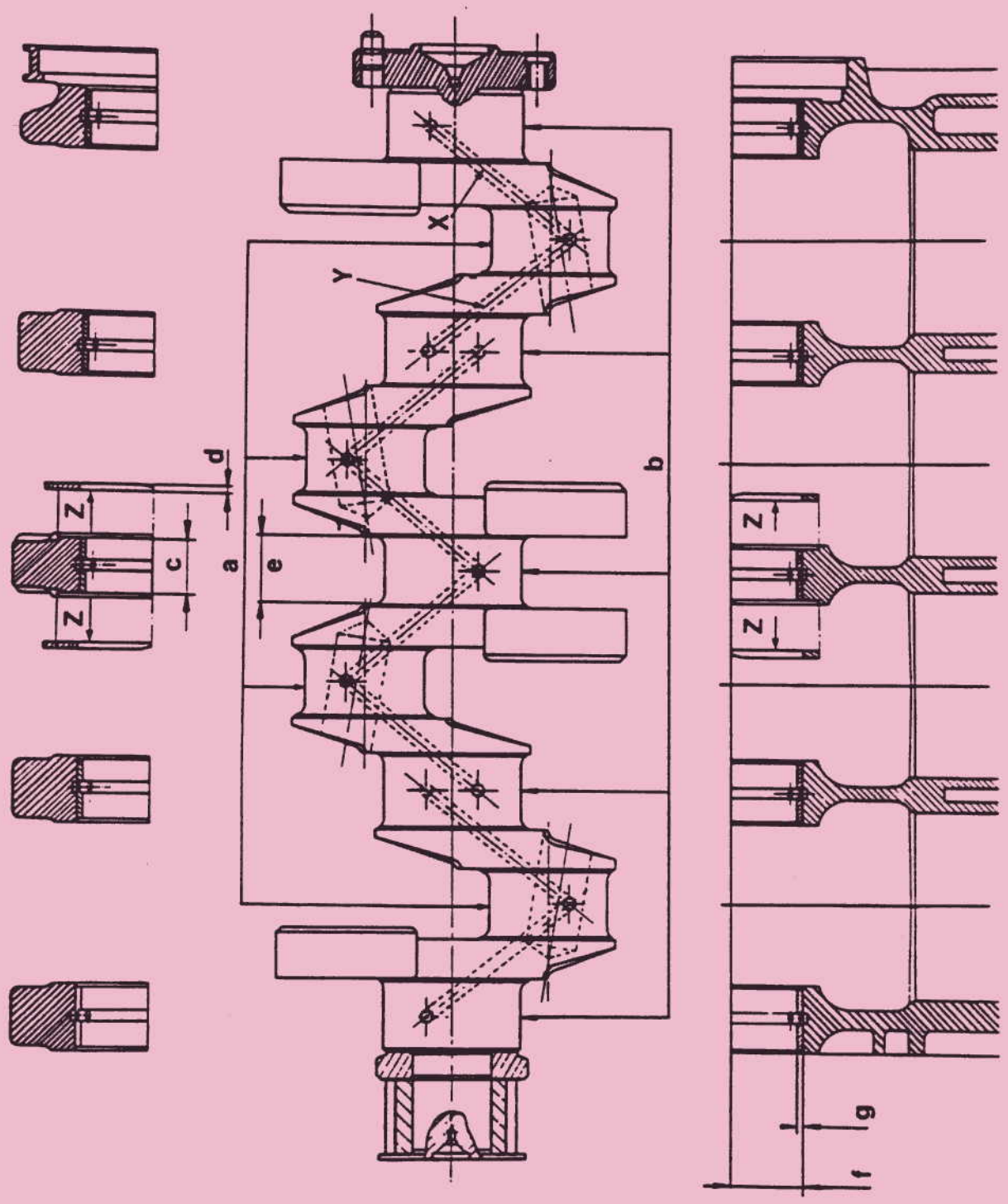
Crankshaft	Connecting rods	Thickness in mm
Initial Class A	Class I	1.816 to 1.826
	Class II	1.821 to 1.831
Initial Class B Repair size	Class I	1.941 to 1.951
	Class II	1.946 to 1.956



I



II


X
Y
d
b
z
z
c
a
e
z
z
g
f

Crankshaft : Fig. I

a - Crank pins

Initial	Class A : ø = 53.99 mm to 54.005 mm
	Class B : ø = 53.740 mm to 53.755 mm

b - Main bearing journals

Initial	Class A : ø = 67.035 mm to 67.05 mm
	Class B : ø = 66.785 mm to 66.8 mm
Repair size	: ø = 66.535 mm to 66.55 mm

e - Width of centre main bearing journal :
33.995 mm to 34.10 mm
X - Journal class reference
Y - Crank pin class reference
Possible initial size class arrangements :

- AA
- AB
- BA
- BB

Example on a given crankshaft :
- Crank pin class = A
- Main bearing class = B

References stamped on crankshaft :
- at y = A
- at x = B

= AB

Crankshaft end float (adjustable) : ..... 0.045 mm to 0.16 mm
The main bearing at the flywheel end is sealed by :
- an oil throw-back ring on the crankshaft
- a seal (red) with a grooved lip.

The Parts Department only supplies one type of crankshaft, class AA.

Main bearing shells :

c - Width of shell ..... 28.45 mm to 28.7 mm

f - ø in block ..... 71.695 mm to 71.705 mm

g - Thickness of bearing shell .....
- Class A ..... 2.306 mm to 2.312 mm
- Class B ..... 2.431 mm to 2.437 mm
- Repair size ..... 2.555 mm to 2.563 mm

Clearance between bearing shells and crankshaft ..... 0.021 to 0.058 mm

End float flanges :

d - Thickness of flanges
(the flanges on any given side of the bearing must be of the same thickness) ..
- . . 3.10 mm
- . . 3.14 mm
- . . 3.18 mm
- . . 3.22 mm

Z - Class reference
- Antifriction face against the crankshaft.

Camshaft :
End float (non-adjustable) ..... 0.05 mm to 0.36 mm
Thickness of flange ..... 5.41 mm

Cam lift :
- Inlet and exhaust ..... 6.83 ± 0.02 mm

Timing gear : toothed belt drive
The belt is tensioned by a tensioner roller
(To adjust the tension, use special tool (-).0157)

Clearance between rocker arm and valve (when checking the timing diagram)
- Inlet and exhaust : ..... 1 mm

Timing diagram (as seen from flywheel) : Fig. I
A - Top dead centre (T.D.C.)
B - Inlet opens after T.D.C. : ..... 2°52'
C - Exhaust closes before T.D.C. : ..... 4°12'
D - Inlet closes after B.D.C. : ..... 33°08'
E - Exhaust opens before B.D.C. : ..... 37°48'
F - Bottom dead centre (B.D.C.)

Actual valve clearances (on a cold engine)

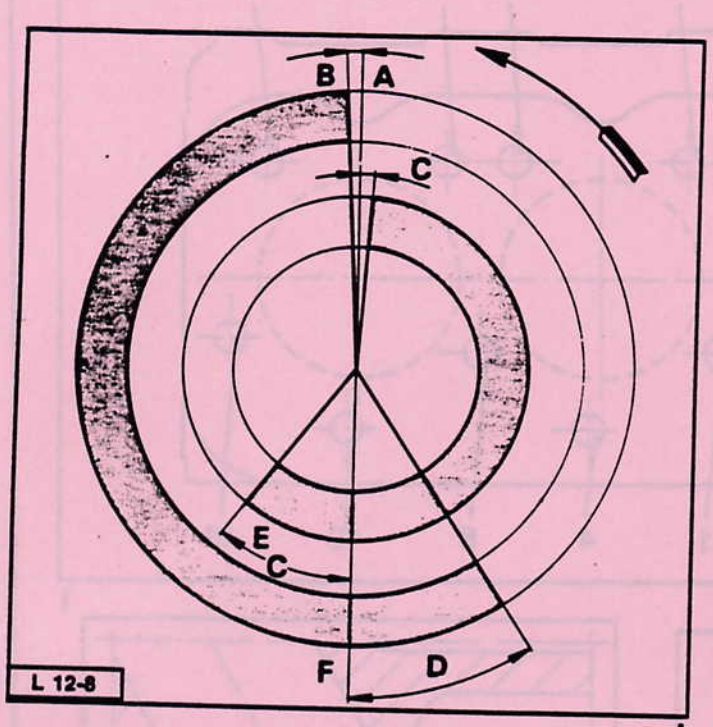
Inlet	Exhaust
0.30 mm	0.20 mm

Flywheel
Injection point timing mark engraved on flywheel (Fig. II)

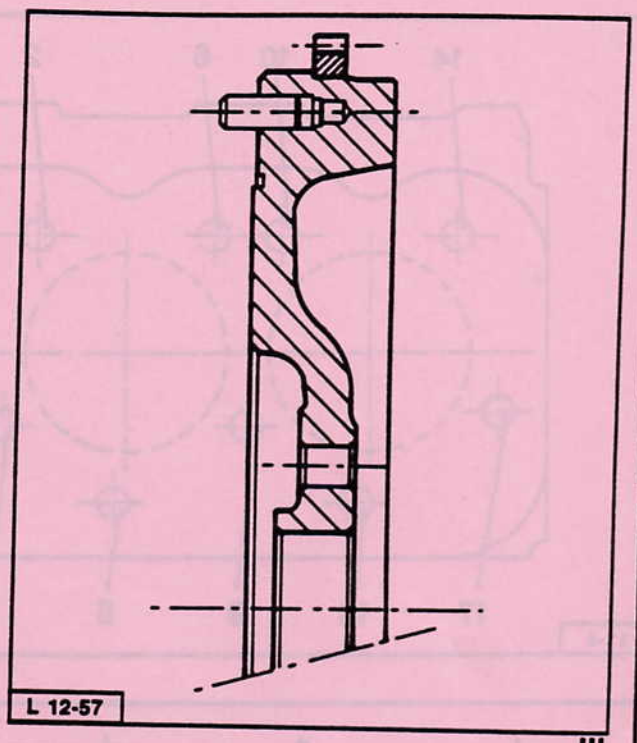
Fig. IV
a - ..... 1.5 mm max.
b - Essential difference between locating faces on the disc and clutch unit . $0.5\ ^{+\ 0}_{-\ 0.15}$ mm
c - ..... $28\ ^{+\ 0.2}_{-\ 0}$ mm
after refacing ..... 27.7 mm mini
d - ..... $243\ ^{+\ 1}_{-\ 0}$ mm
e - ..... 248 mm max.

- Starter ring gear with 120 teeth (no lead) (the unmachined side against the flywheel face)

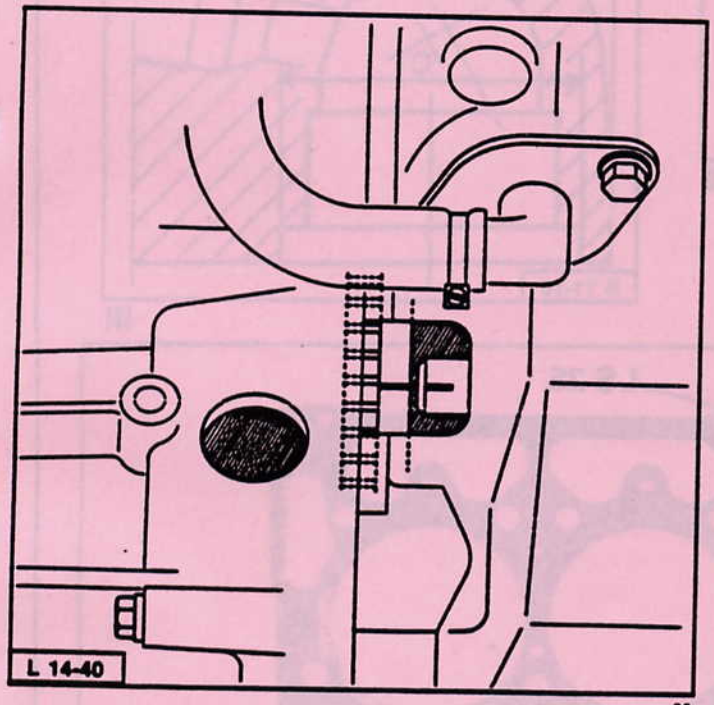
Push rods :
- Length of push rods (inlet and exhaust identical) ..... 180 ± 0.3 mm
- Max. push rod run-out ..... 1 mm



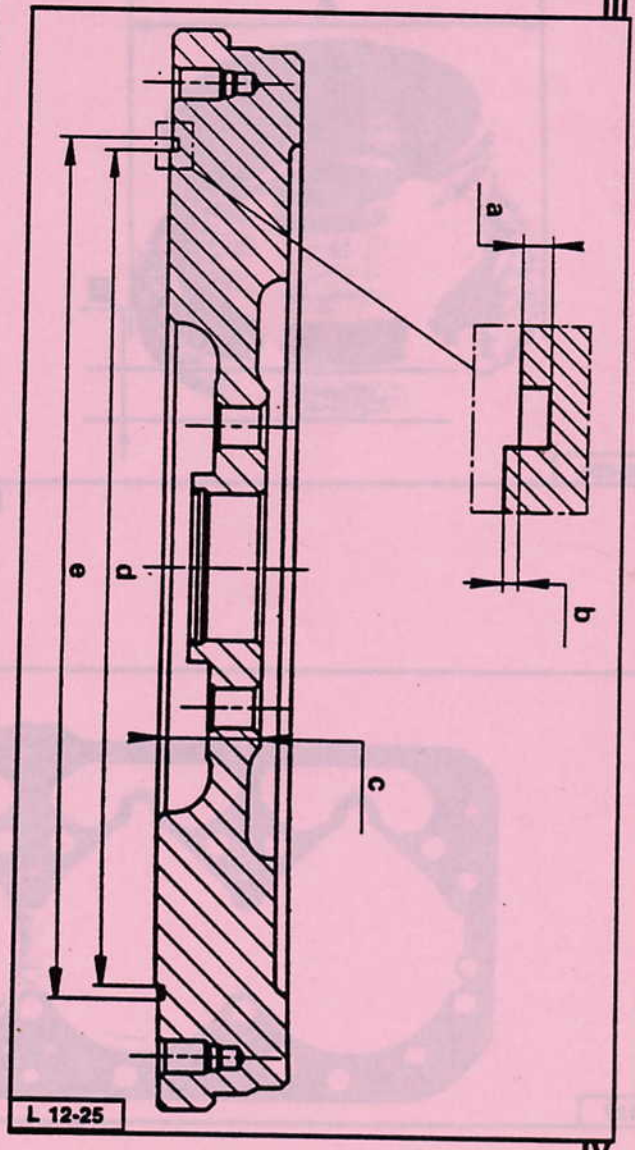
I



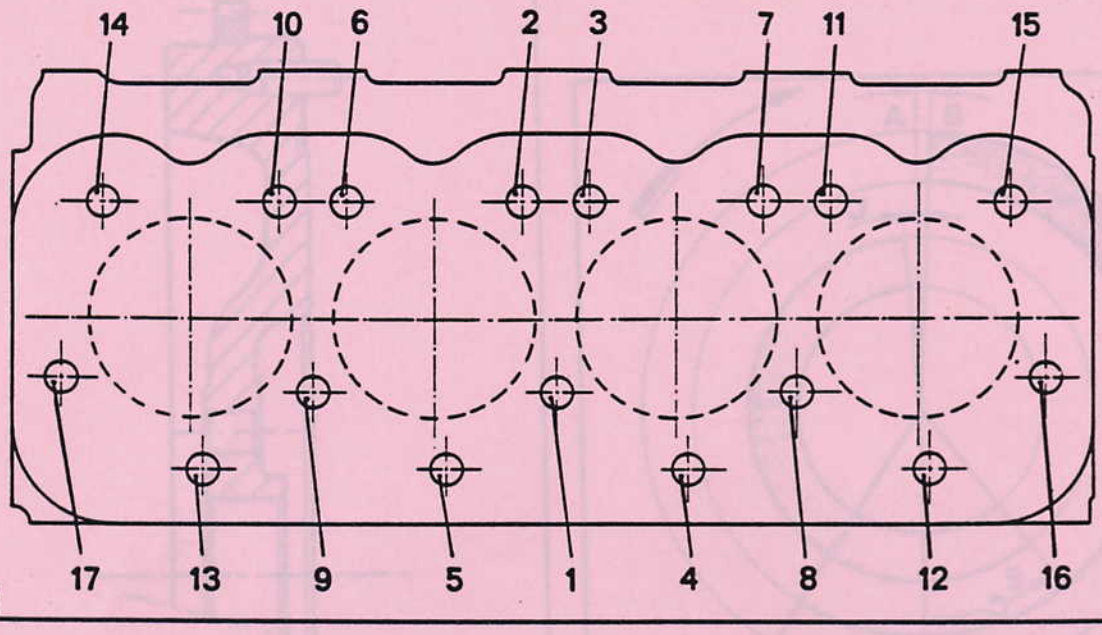
III



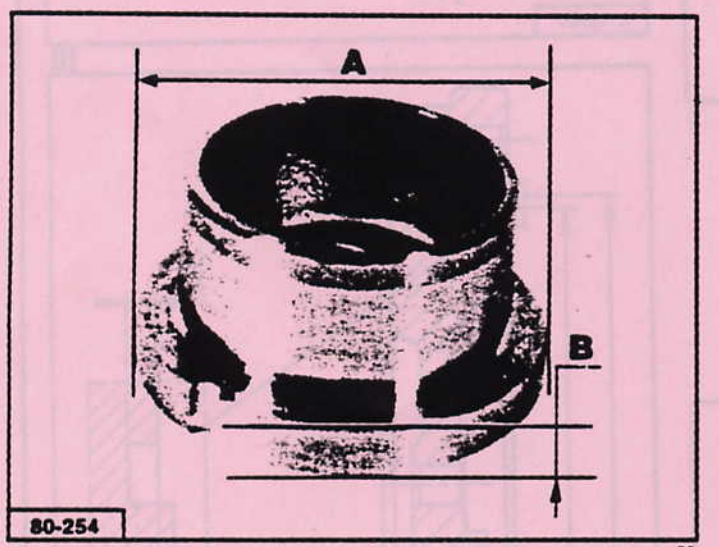
II



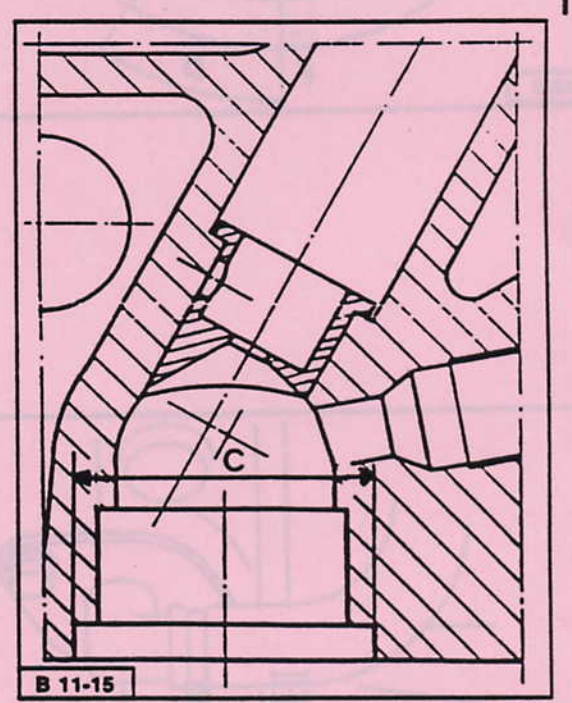
IV


14
10
6
2
3
7
11
15
17
13
9
5
1
4
8
12
16
B 11-4

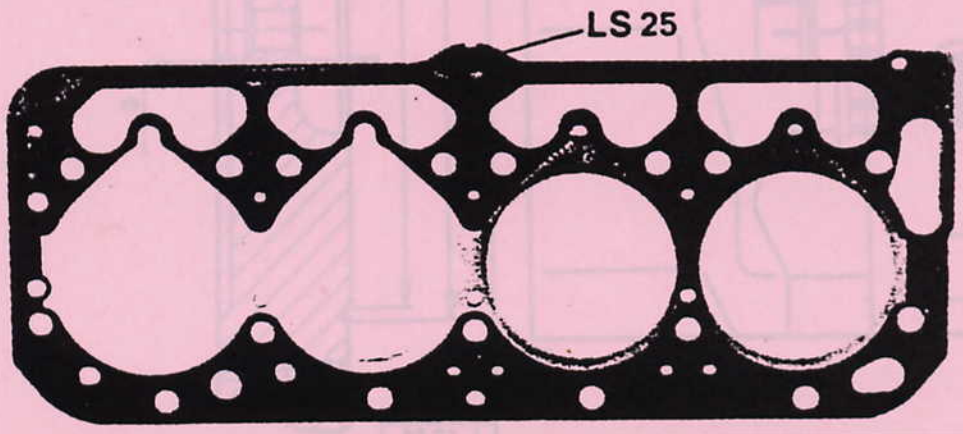
I


A
B
80-254

II


C
B 11-15

III


LS 25
87-127

IV

Cylinder head

For cylinder head tightening order see Fig. I.

Tightening : (follow the conventional tightening order). The underhead faces and the threads of the bolts are to be oiled.
The teeth on the washers are to be against the cylinder head.

1 initially tighten to a torque of 40 N.m (29.5 lbf.ft) ⇨ 2 tighten through an angle of 100° ⇨ 3 tighten through an angle of 100° ⇨ warm up the engine until the electric fans cut in then LEAVE TO COOL DOWN (for a min. of 3 hours) ⇨ 4 tighten through an angle of 45°

There is no cylinder head retightening operation at 1000/1500 miles (1500/2500 km)

Original height ..... $117 \begin{smallmatrix}+0.5\\-0\end{smallmatrix}$ mm
Minimum height after refacing ..... 116.3 mm
Maximum permissible cylinder head bow ..... 0.1 mm
Maximum permissible bow between securing holes ..... 0.025 mm

Precombustion chambers Fig. II and III.

	A : Precombustion chamber ø 0 - 0,02	B : Thickness of flange ± 0,05	C : ø of cylinder head location + 0,025 0
Initial	35,950 36,065 36,365	4,5	35,885 36 36,3
1st possibility	36,365	4,85	36,3
2nd possibility	36,465	5,05	36,4

The precombustion chambers are fitted with an interference fit of between 0.02 mm and 0.065 mm.
The precombustion chambers protrude above the cylinder head gasket face by : 0 to 0.03 mm.
After replacing the precombustion chambers, measure the protrusion after a load of 3000 mdaN has been applied per combustion chamber.
The combustion chamber positioning pins are recessed below the surface by 0 to 1 mm.
Preheater plug screw thread ..... M 12 x 1.25
- Cylinder head with a tapping for a temperature sensor which controls the fast idling.
- Cylinder head gasket : made by REINZ with a viton ring Fig. IV.
  The gasket is fitted dry.

Identification mark (engraved on the gasket tab) : Fig. IV ..... LS 25
- Rocker arm cover :
  The oil vapour is recycled via the rocker arm cover.

Valves-guides-seats : Fig. I and II

Height of valves ..... 121.3 ± 0.35 mm

	A : Inlet	B : Exhaust
a: valve stem ø	7.960 to 7.975 mm	8.940 to 8.955 mm
b: valve head ø	41.85 to 42.15 mm	34.85 to 35.15 mm
c: valve guide inside ø	7.990 to 8.015 mm	8.980 to 9.005 mm
d: height of valve guide	53.75 to 54.25 mm	56.75 to 57.25 mm

e: outside ø of valve guide

Initial
- 1st possibility ..... 13.055 mm to 13.075 mm
- 2nd possibility ..... 13.305 mm to 13.325 mm

Repair size ..... 13.555 mm to 13.575 mm

f: height by which the guide projects	9.9 mm to 11.4 mm	11.9 mm to 13.4 mm

g: guide locating bore in cylinder head

Initial
- 1st possibility ..... 13.003 mm to 13.023 mm
- 2nd possibility ..... 13.253 mm to 13.273 mm

Repair size ..... 13.503 mm to 13.523 mm

h: valve seat bore

		A : Inlet	B : Exhaust
Initial	1st possibility	45 mm to 45.039 mm	38 mm to 38.039 mm
	2nd possibility	45.3 mm to 45.339 mm	38.3 mm to 38.339 mm
	Repair size	45.6 mm to 45.639 mm	38.6 mm to 38.639 mm

J: outside ø of valve seats

		A : Inlet	B : Exhaust
Initial	1st possibility	45.154 mm to 45.179 mm	38.160 mm to 38.185 mm
	2nd possibility	45.454 mm to 45.479 mm	38.460 mm to 38.485 mm
	Repair size	45.754 mm to 45.779 mm	38.760 mm to 38.785 mm

- Width of valve seat area ..... 2.5 mm
- Valves recessed below the cylinder head gasket face by ..... 0.7 mm to 0.9 mm
- K, recessed depth with reference to cylinder head gasket face ..... 1.4 mm to 1.7 mm
- The valve seats and guides are a shrink fit.

Valve springs :

Only one valve spring per valve

Direction of winding ..... right hand

Wire diameter ..... 4.5 mm

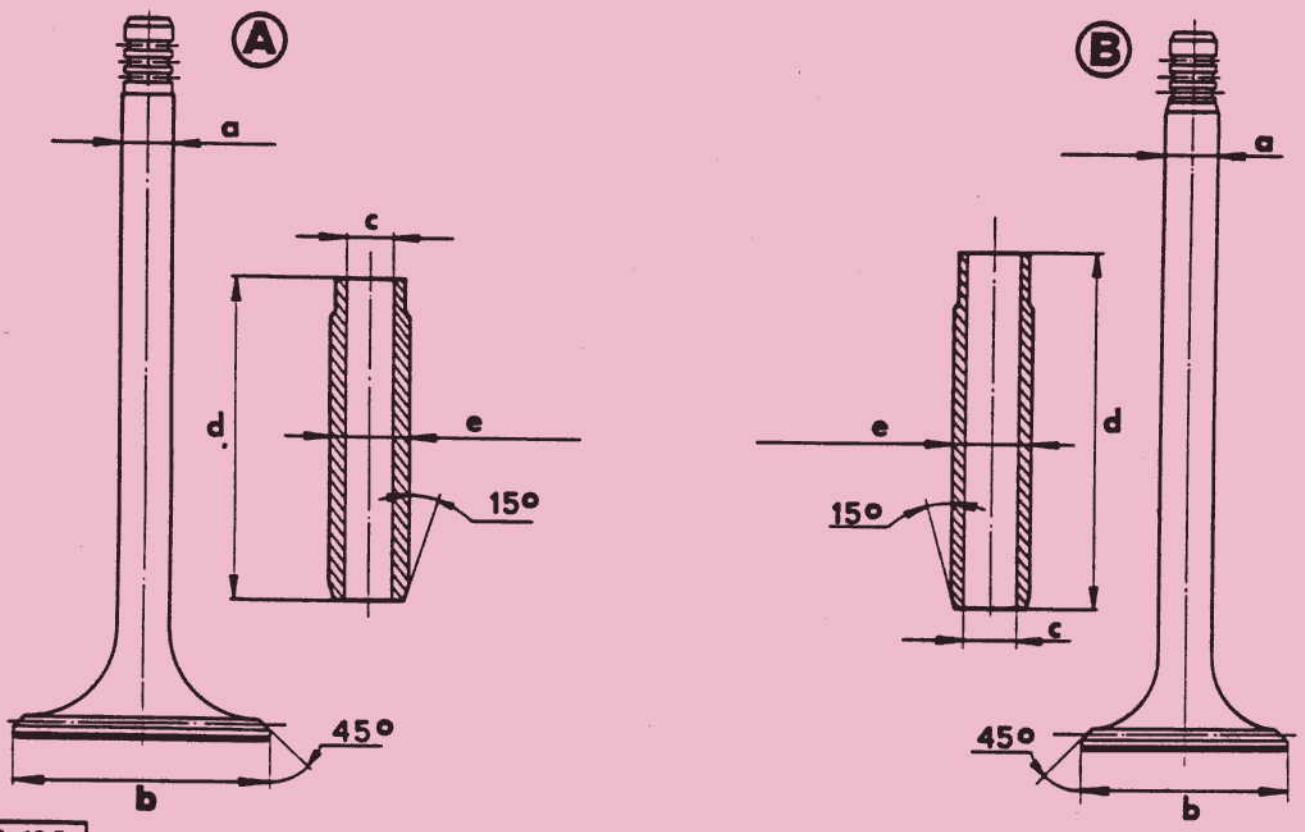
Inside diameter ..... 25.2 ± 0.2 mm

Total number of coils 6.5

Free height ..... 49.4 mm

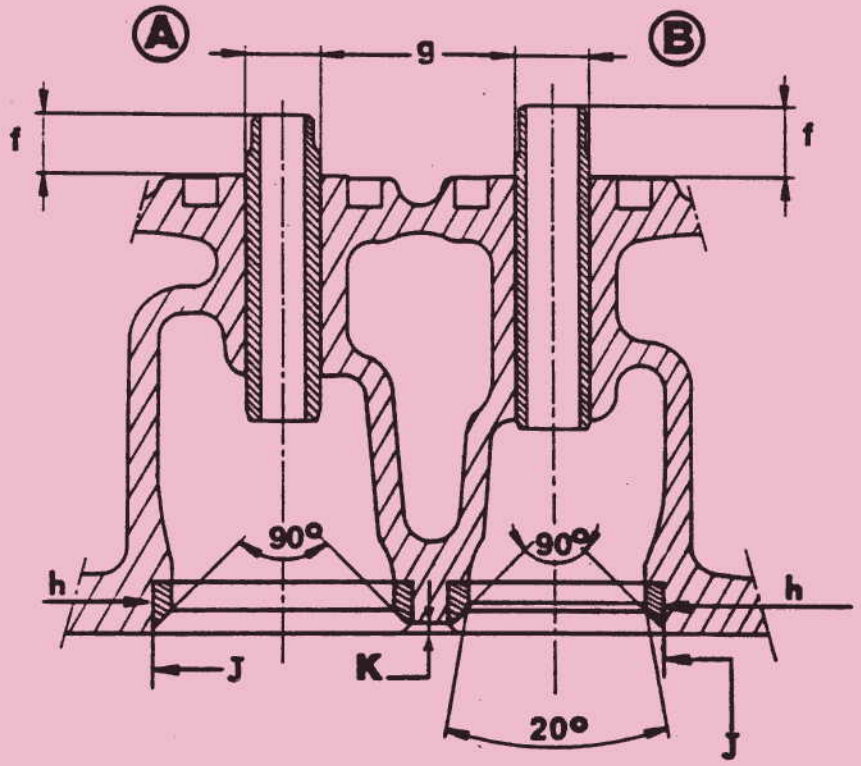
Height under a load of :

for
- 290 ± 21 Nm ..... 40.9 mm
- 710 ± 42 Nm ..... 30.9 mm



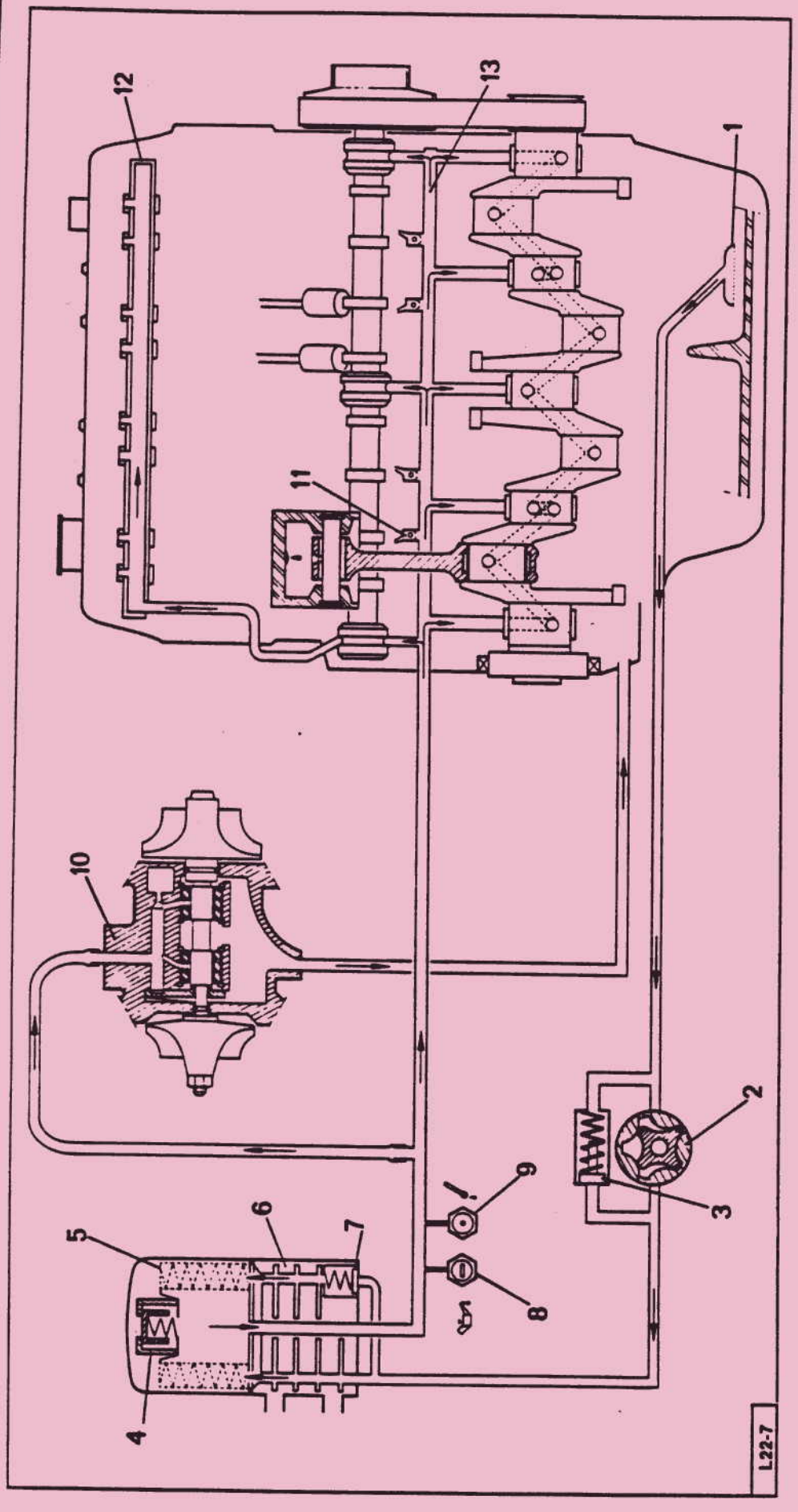
B. 12-5

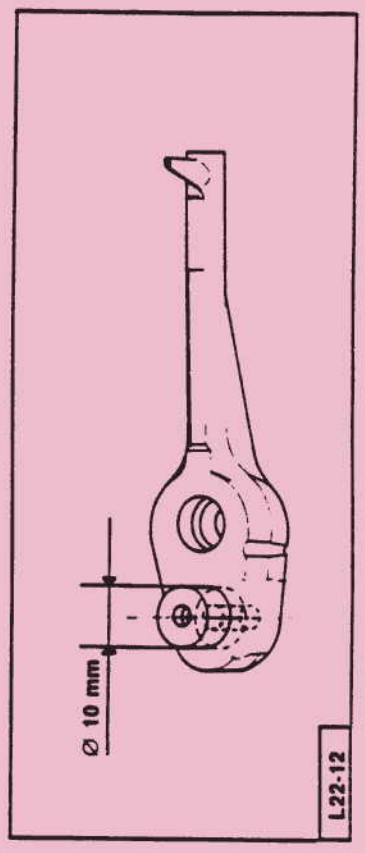
I



B. 11-8

II


12
13
1
11
10
2
3
9
6
7
5
8
4
L22-7


Ø 10 mm
L22-12

Lubrication system : Fig. I

1 - Suction strainer
2 - Oil pump, driven by toothed belt
3 - Pressure relief valve, integral with oil pump
4 - By-pass valve forming part of filter cartridge ..... 1.5 bars
5 - Filter cartridge ..... PURFLUX LS 520 C
6 - Oil cooler (heat exchanger) ..... Oil/water (Modine)
7 - By-pass, forming part of oil cooler ..... 1 bar
8 - Oil pressure switch.
Oil pressure switch pressure setting :
When the pressure is rising : the warning light switches off when the pressure rises above 0.8 bars.
When the pressure is falling : the warning light switches on at between 0.6 and 0.4 bars.
9 - Oil temperature warning light switch
10 - Turbo, bearing lubrication
11 - Cooling sprays for undersides of pistons Fig. II
12 - Rocker arm assembly.
13 - Oil distribution gallery.

SUMP CAPACITY

After dismantling ..... 6 lit.

After draining and replacing the filter cartridge ..... 5.6 lit.

After draining ..... 4.9 lit.

Difference between min. and max. levels on dipstick ..... 2.2 lit.

OIL PUMP (oil at 95°)

At idling speed ..... 2.5 bars min.

At 3700 rpm ..... 4.2 to 5 bars

Engine code (official type no.)	XUD9A (D9B)	
Configuration	Transverse, inclined at 30° towards the rear	
Number of cylinders	4 in line	
Bore x stroke	83 x 88 mm	
Capacity	1905 cm³	
Compression ratio	23/1	
Maximum power	51 kw EEC/70 hp DIN	
At a speed of	4600 rpm	
Maximum torque :	120 N.m (88.5 lbf.ft) EEC/12.2 m.kg DIN	
At a speed of	2000 rpm	
Maximum speed :		
no load	5150 rpm	
under load	4600 rpm	
Idling speed	800 rpm	
Lubrication :		
Capacity (with filter)	5 litres	
Oil filter	LS468	
Injection equipment	ROTO DIESEL	BOSCH
Injection pump	R8443B380A R8443B381B	VE4/9F2300R272
Injector holders	LCR67307	KCA17S42
Injector nozzles	RDN0SDC6751C	DN0SD287 +
Opening pressure	110/120 bars	130/135 bars

Valve timing

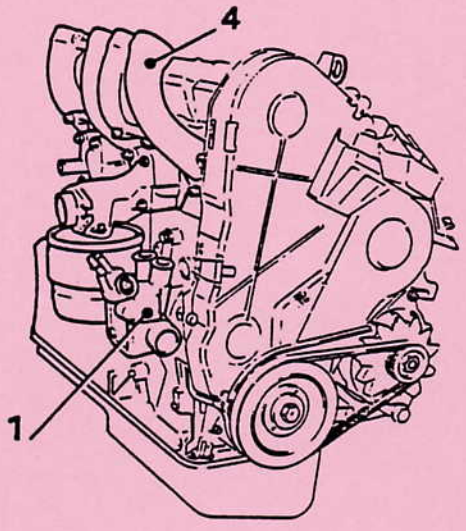
Overhead camshaft driven by a toothed belt

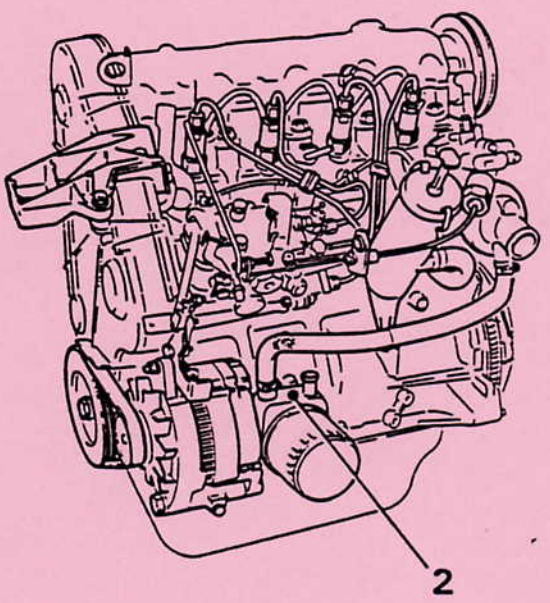
Timing diagram without initial clearance :

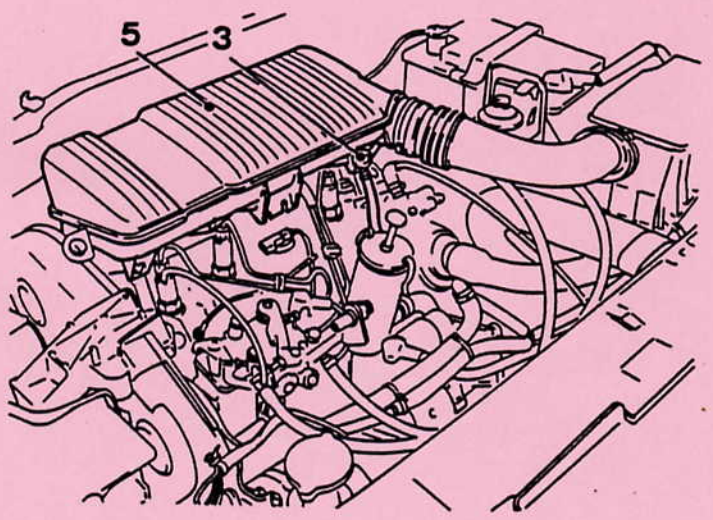
Advance on inlet opening	44°30'
Retard on inlet closing	83°30'
Advance on exhaust opening	89°30'
Retard on exhaust closing	46°30'

SPECIAL POINTS

- A fuel heater (1) with a thermostatic element integral with the water inlet casing.
- Oil cooler (modine) (2) under the oil filter.
- Crank case gas reintake system with a vacuum regulator unit (3).
- Air intake system comprising an inlet manifold (4) with separate ducting and air distributor (5).


4
1


2


5
3

SPECIAL TOOLS

[A] Sling for removing and refitting the engine-gearbox assembly
Reference : (-).0102 ZX + (-).0102 G

[B] Hub locking tool
Reference : (-).0606 AY

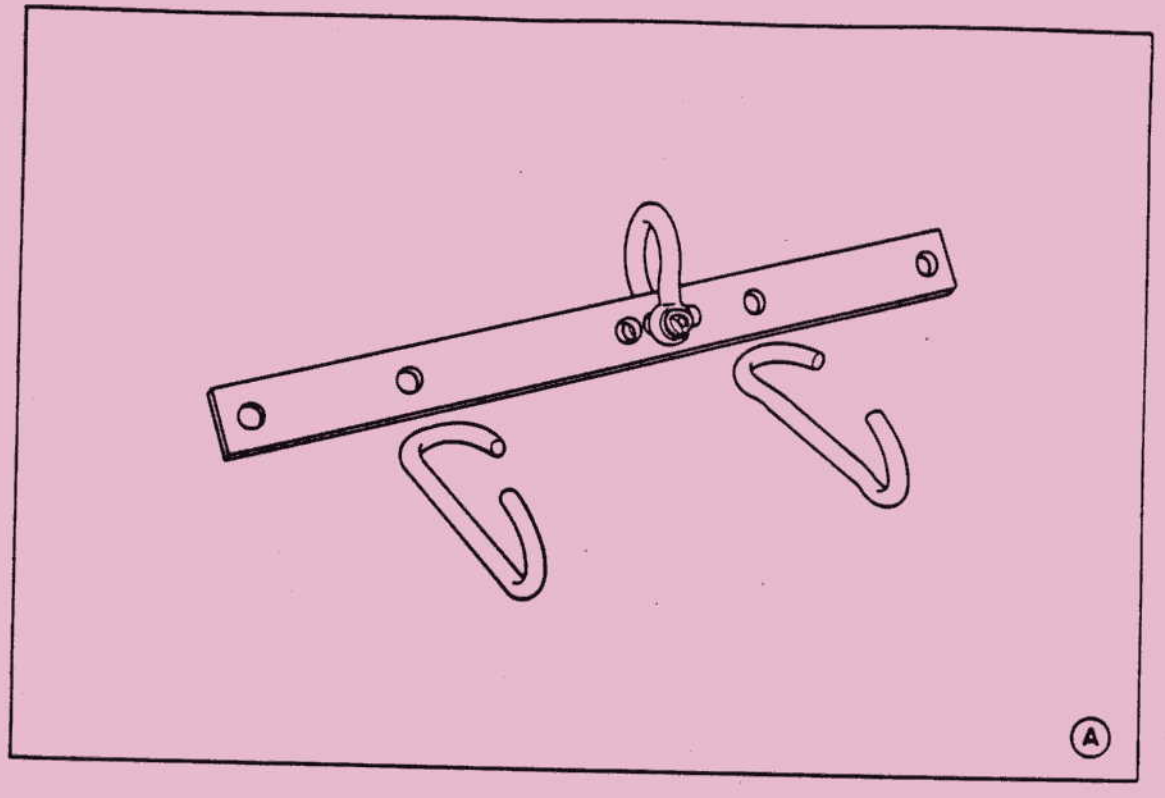
[C] FACOM extractor
Reference : U53 S2 + T2

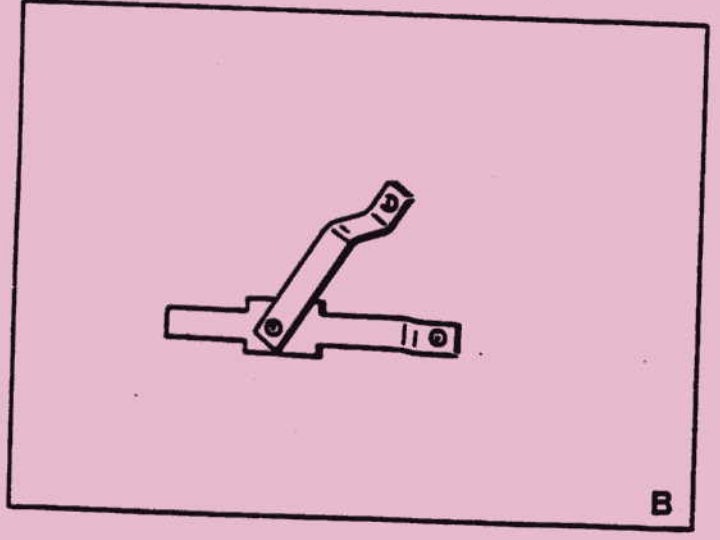
TIGHTENING TORQUES

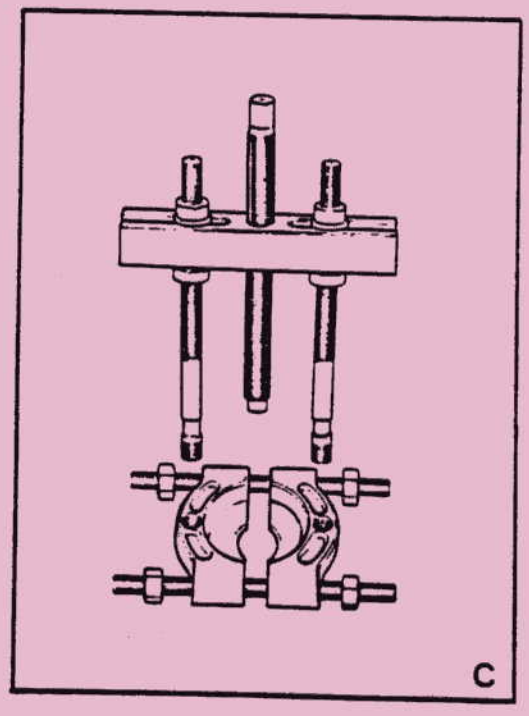
Tightening torque that must be observed (using a torque wrench) :	Torque in N.m (lbf.ft)
Nut securing the drive shaft to the stub axle carrier (LOCTITE FRENBLOC)	500 (369)

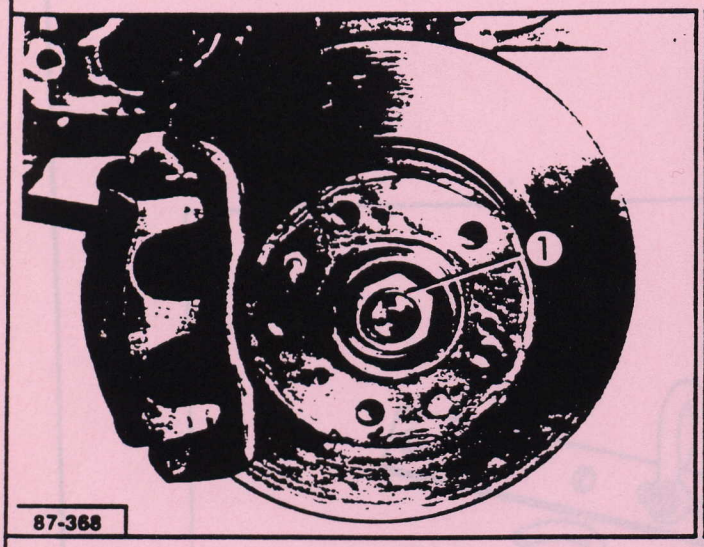
Recommended tightening torques :

Engine mounting flange securing bolts (cylinder block side)	50 (36.9)
Engine mounting securing bolts (gearbox side)	50 (36.9)
NYLSTOP nuts on engine - gearbox flexible mounting	55 (40.6)
Flexible block securing bolts (differential side)	55 (40.6)


A


B


C



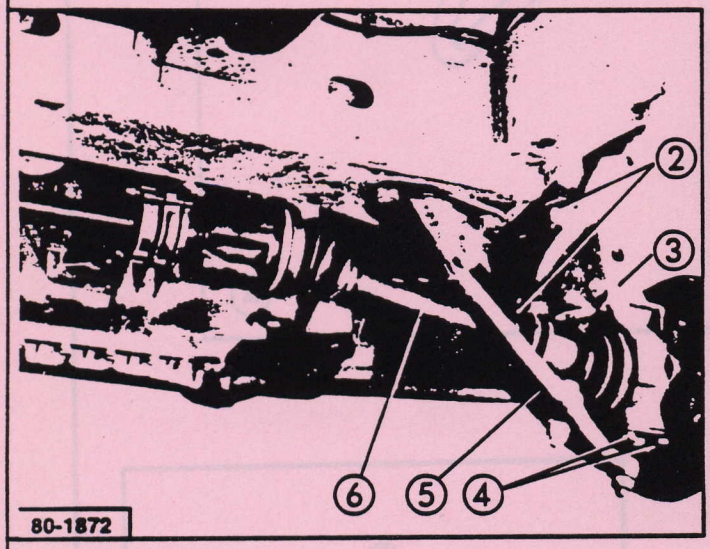
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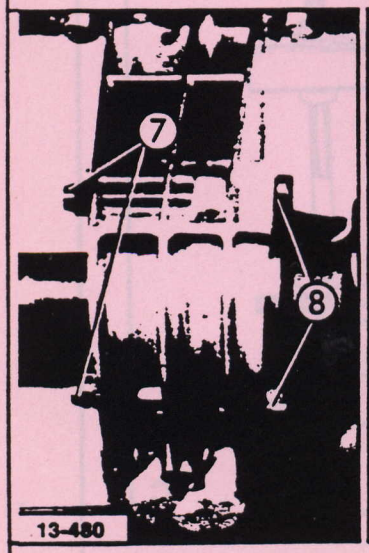
VI



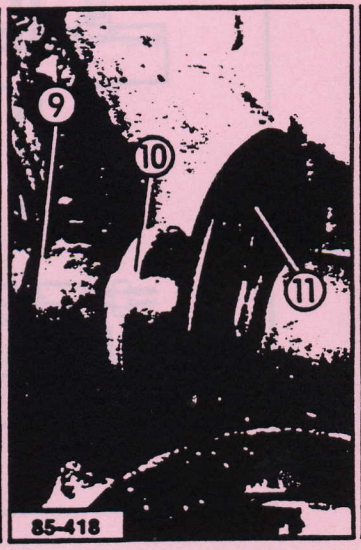
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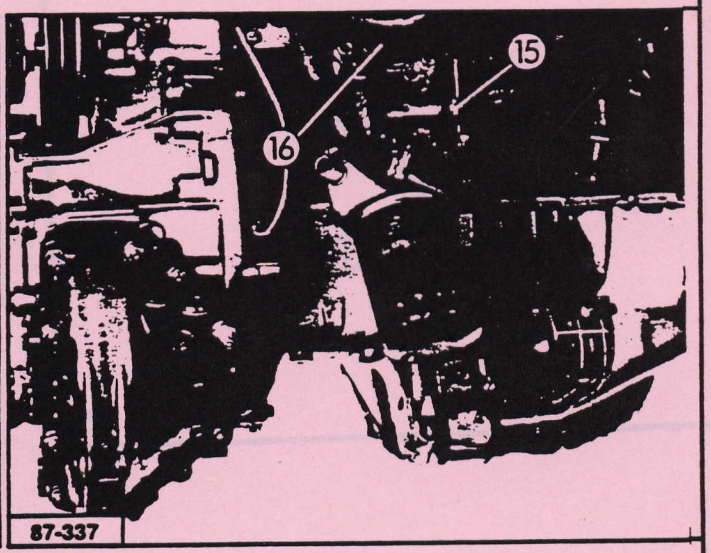
VII



III



IV



VIII

REMOVING

Disconnect

- The negative and positive battery cables
- Remove the spare wheel.

Support the front of the vehicle (with the wheels hanging free)

- Remove the wheels if necessary.

Remove the drive shaft on the right hand side (fig. I)

- Remove the protective cap which covers the nut (1) (nut 41 mm across flats).

> If the protective cap is to be refitted to the hub, the wheel will have to be removed to extract it using tool FACOM U 53 T2 (see section entitled : working on the rear hubs).

- Unlock the drive shaft nut (1) and remove it (lock the hub using the tool (-).0606 AY.
- Remove the bolts (4) from the lower ball joint (Fig. II and III) together with the bolts (2) on the steering lever.
- Free the ball joint from the stub axle carrier by pressing down the suspension arm (5).
- Tilt the suspension leg assembly (3) outwards.
- Free the drive shaft (6) from the hub.
- Loosen the nuts (7) and swing the two tie rods (8) out of the way Fig. III and IV.

Remove, Fig. IV

- The drive shaft
- The 0 ring (9)
- The teflon ring (10)
- The anti-dust seal (11)

Free the left hand drive shaft.

> It is not necessary to free the drive shaft from the hub to disconnect it from the gearbox.

Remove, Fig. V

The bolts (13) from the lower ball joint and the bolts (12) from the steering lever.

Free the ball joint from the stub axle carrier by pressing on the suspension arm.

Tilt the suspension leg assembly outwards.

Extract the drive shaft from the differential housing using a panel beaters drift (the drive shaft is retained, in the differential side wheel by a circlip (14)) Fig. VI.
Place the panel beaters drift between one of the differential housing bolts and the drive shaft casing then strike it, on the side, with a hammer, Fig. VII.

Free the drive shaft from the gearbox end.

Disconnect, Fig. VIII

- The oil temperature switch (15).
- The oil pressure switch (16).

Remove the gearbox dipstick.

Free

- The speedometer drive cable at the gearbox end.
- The clutch control cable.
- The exhaust pipe, under the body (Turbo version).

REMOVING (continued)

Drain off the coolant Fig. I and II (remove the cylinder block drain plug (7) and the radiator cap (10). Recover the anti-freeze solution).

Remove :

- The spare wheel carrier.
- The air filter assembly.

  The air intake casing.
- The coolant expansion bottle.

Disconnect Fig. I

- The lighting and direction indicator wires.
- The electric fan wires.
- The wires from the temperature switch on the radiator.
- The coolant temperature switch wire (1).
- The coolant temperature sensor on the cylinder head (2).
- The hose (3) from the air filter fouling indicator.
- Remove the two clips that retain the harness on the radiator grille.

TURBO ENGINED VERSIONS

Disconnect Fig. I and II

- The fuel filter pipes (8).
- The water indicator sensor (9) on the filter.
- Disconnect the excess pressure switch (6) from the turbo.

Disconnect Fig. III

- The bonnet latch cable.
- The coolant hoses from the radiator.

Loosen the nuts (→), remove the two bolts (11 and 12) and retrieve the pads.

Remove : Fig. I

- The radiator grille.
- The screens (5) that protect the alternator and the starter motor.
- Disconnect the wires from the alternator and the starter motor.
- Free the wiring harnesses.

Disconnect Fig. IV

- The exhauster vacuum pipe (13).
- The gear shift assembly (15).
- The heater pipes from the coolant casing, the heater unit and the cylinder block.
- The oil cooler hose.
- The accelerator cable.
- The hoses from the fuel filter.
- The hose which returns fuel to the fuel tank and the hose from the fuel heater.

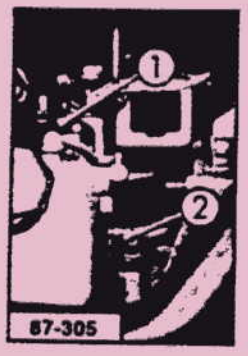
Disconnect

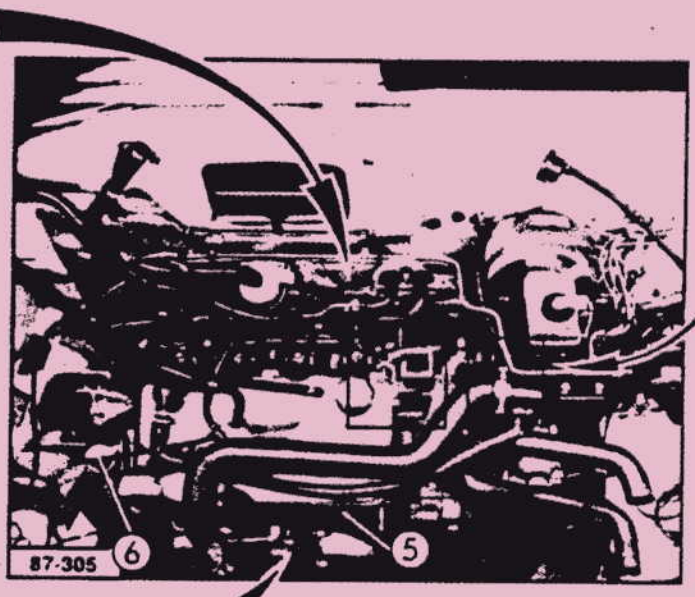
- The electrical shut-off unit wire.
- The wire that supplies the heater plugs.
- The reversing light switch wires.
- The earthing cable on the gearbox.
- Fit the sling and take the weight of the assembly on it Fig. V.

Remove : Fig. IV and V

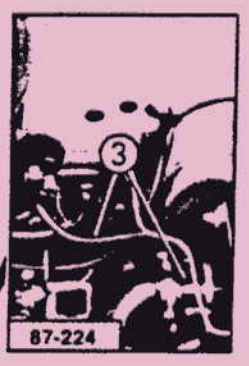
- The two bolts (4) that secure the gearbox rear lower mounting.
- The gearbox securing bolts (14), nuts « a » and « b » on the flexible mountings and the mounting at the gearbox end.

Take out the engine - gearbox assembly.


1
2
87-305

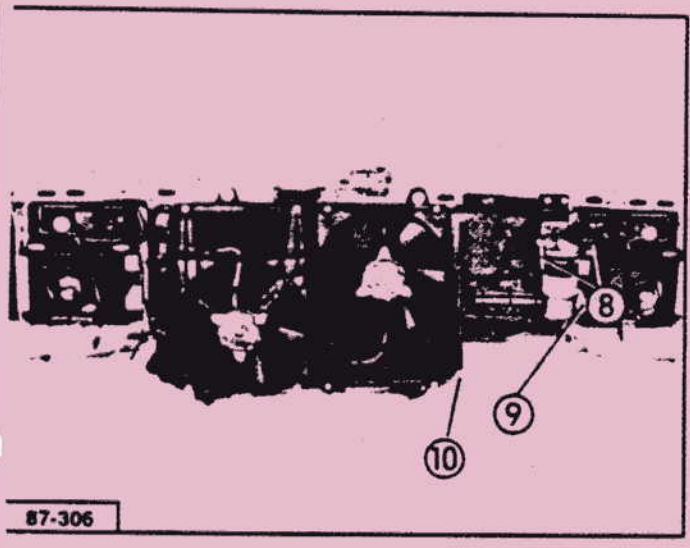

87-305
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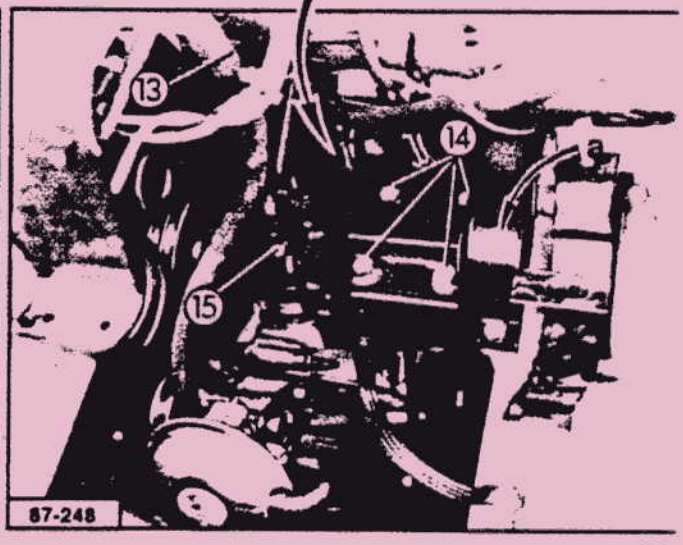

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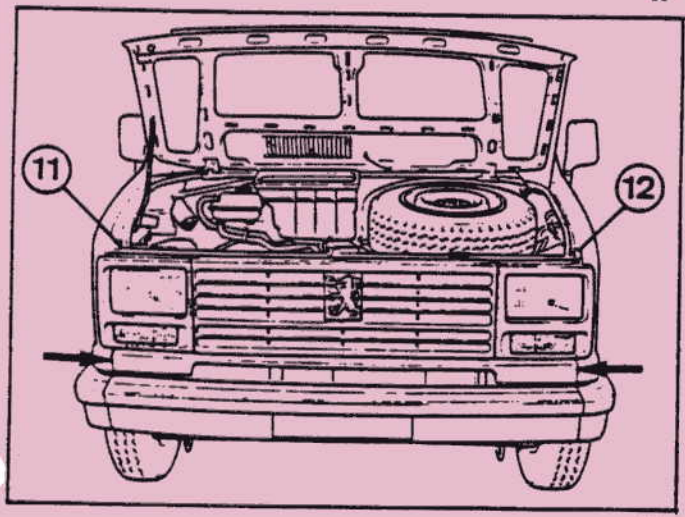

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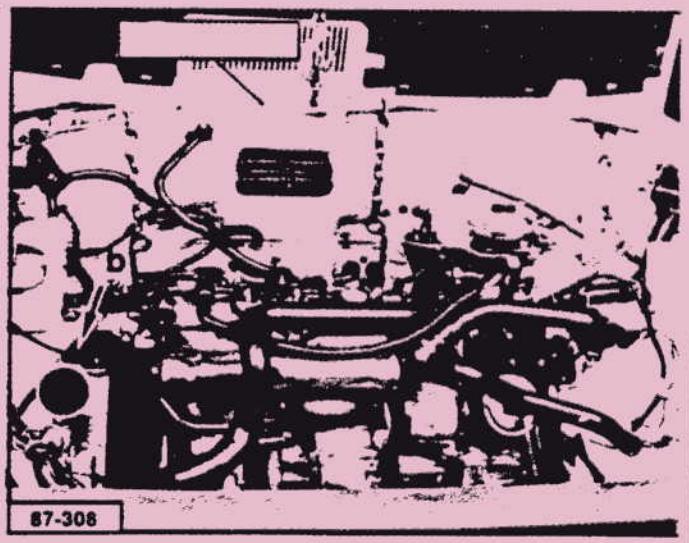
II


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14
15
87-248

IV


11
12

III


87-308

V



I



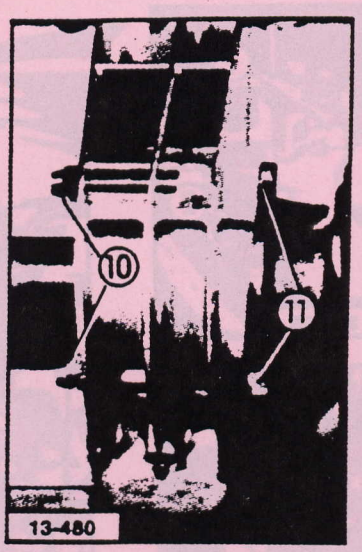
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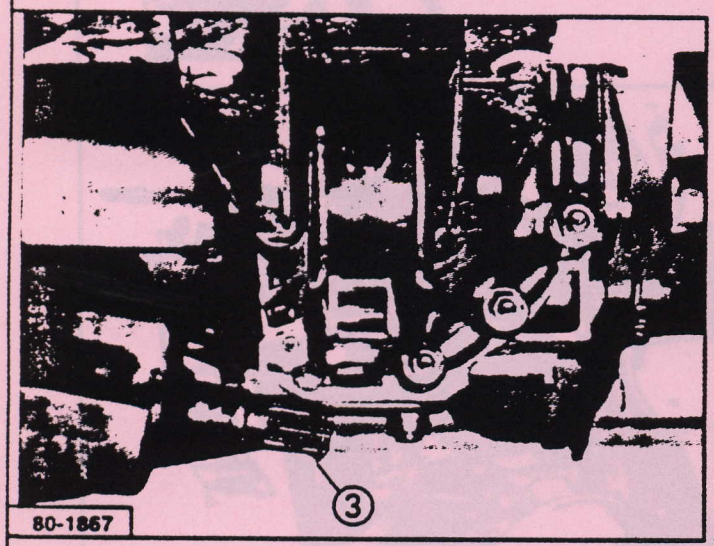
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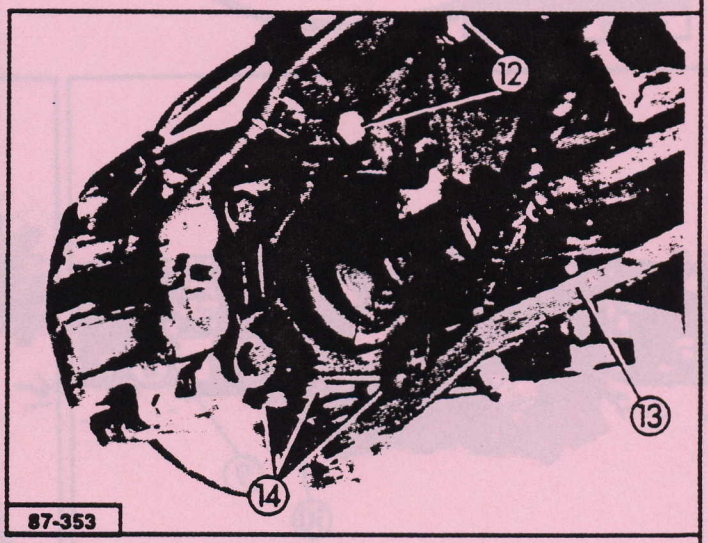
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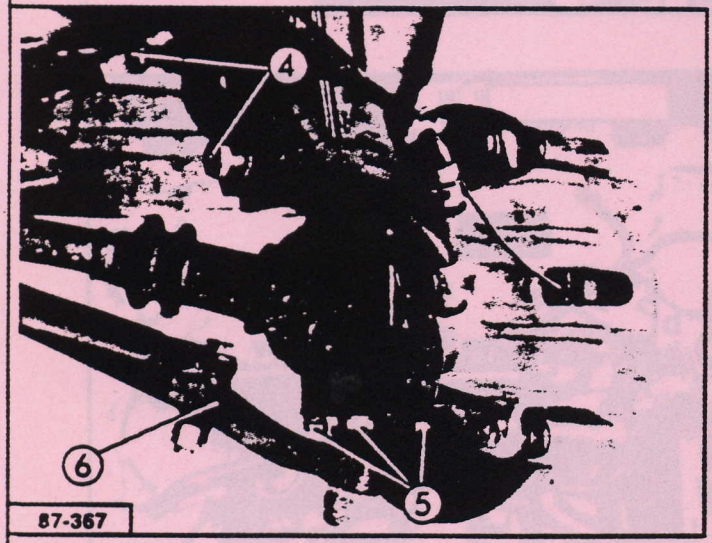
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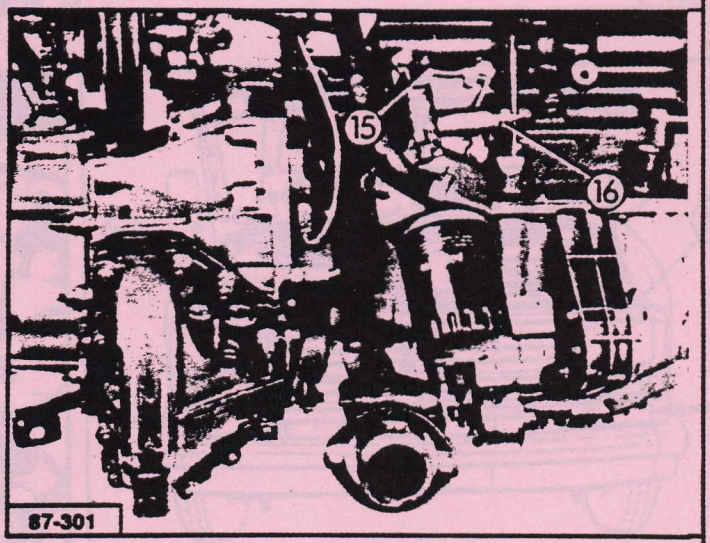
IV



VIII



V



IX

REFITTING

Lower the engine - gearbox assembly into position (sling (-).0102 ZX + (-).0102 G).

Fit, Fig. I, II and III

- The nuts « a » and « b » to the upper flexible mountings and the gearbox securing bolts (1).
  Tighten them to 50 N.m (36.9 lbf.ft)

The two bolts (2) that secure the gearbox lower rear flexible mounting.
Tighten them to 50 N.m (36.9 lbf.ft)

Remove the sling.

Connect up the left hand drive shaft (Fig. IV)

- Check that the 0 ring is in place on the drive shaft end and fit a NEW circlip (3).
- Insert the drive shaft end into the sun gear.
- Ensure that the circlip (3) has fully entered the sun gear.
- Engage the other end of the drive shaft into the hub.
  (Lubricate the area on which the antidust seal locates).
- Engage the ball joint in the stub axle carrier by pressing the suspension arm (6).

Fit : Fig. V

- The bolts (5) securing the lower ball joint
  Tightening torque 50 N.m (36.9 lbf.ft)
- The bolts (4) to the steering lever
  Tightening torque 125 N.m (92.2 lbf.ft)

Fit the right hand drive shaft Fig. VI

- Turn the steering to the left.
- Engage the drive shaft end into the bearing assembly.

Fit the following to the drive shaft

- The anti-dust seal (9).
- The ring (8).
- The 0 ring (7).

Push the bearing into the bearing assembly

- Swing the tie rods (11) through half a turn to bring them against the bearing outer track ring Fig. VII.

Tighten the self-locking nuts (10)
Tightening torque 7 N.m (5.2 lbf.ft).

- Engage the clutch shaft into the hub (lubricate the area on which the antidust seal locates).
- Engage the ball joint into the stub axle carrier assembly by pressing on the suspension arm (13) Fig. VIII.

Fit :

- The bolts (14) securing the lower ball joint
  Tightening torque 50 N.m (36.9 lbf.ft)
- The bolts (12) to the steering lever
  Tightening torque 125 N.m (92.2 lbf.ft)

Connect, Fig. IX

- The oil temperature switch (16).
- The oil pressure switch (15).

Fit the gearbox dipstick.

Connect the speedometer drive cable to the gearbox.

Connect up Fig. I and II
- The exhaust pipe (with the part that forms the ball joint previously coated with high temperature grease).
  Tighten the springs (1) until they are coil bound and then loosen them by one turn on each side.
- Fit the exhaust pipe (ensure that there is a clearance of at least 5 mm between it and the sump).
- The clutch cable.
- Adjust the height of the clutch pedal. See the section concerned. There is to be no clutch free travel.
- The gear shift control (2)
  Tightening torque 28 N.m (20.6 lbf.ft).

Connect Fig. V
- The earth cable to the gearbox.
- The wires to the reversing light switch.
- The wires supplying the preheater plugs.
- The electric shut-off unit wire.
- The alternator and the starter motor supply wires.
- The wire to the coolant temperature switch (coolant pump).
- The cylinder head water temperature sensor (14).
- The accelerator cable to the injection pump.

Fit Fig. V
- The cylinder block drain plug (fitting a NEW seal)
  Tightening torque 30 N.m (22.1 lbf.ft)
- The alternator and starter motor protection screens.
- The expansion bottle (10).

Connect up Fig. II
- The vacuum pipe (3) to the exhauster.
- The heater hoses to the expansion bottle, the heater unit and the cylinder block.
- The oil cooler hose (Modine).
- The fuel return pipe to the tank and the fuel heater hose.

Fit Fig. III and IV
- The radiator drain plug (8).
- The radiator grille.
- Tighten the nuts (→).
- Place the pads in position and tighten the two bolts (4 and 5).

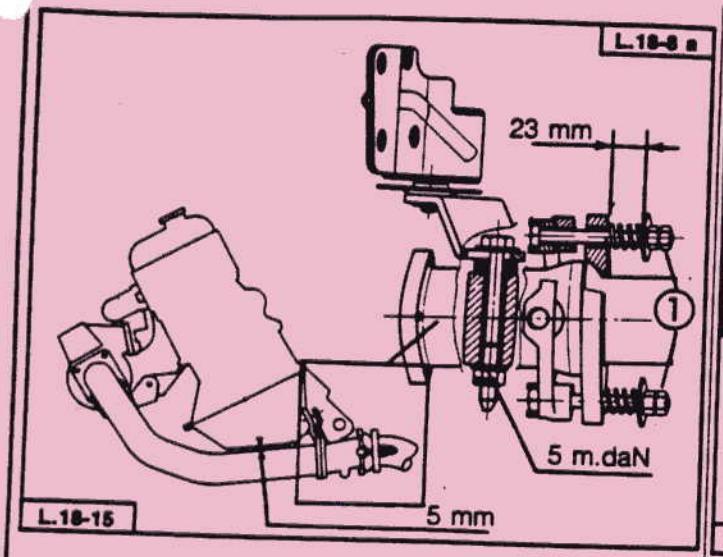
Connect up Fig. IV
- The fuel filter hoses (6).
- The radiator hoses.
- The bonnet latch cable and adjust it.

Connect up Fig. IV and V
- The turbocharger high pressure switch (16) (2 wires).
- The water indicator (7) on the fuel filter (3 wires).
- The lighting and direction indicator wires.
- The electric fan wires.
- The wires (9) to the temperature switch on the radiator.
- The hose (12) to the air filter fouling indicator.
- Fit the two clips that retain the wiring harness to the radiator grille.

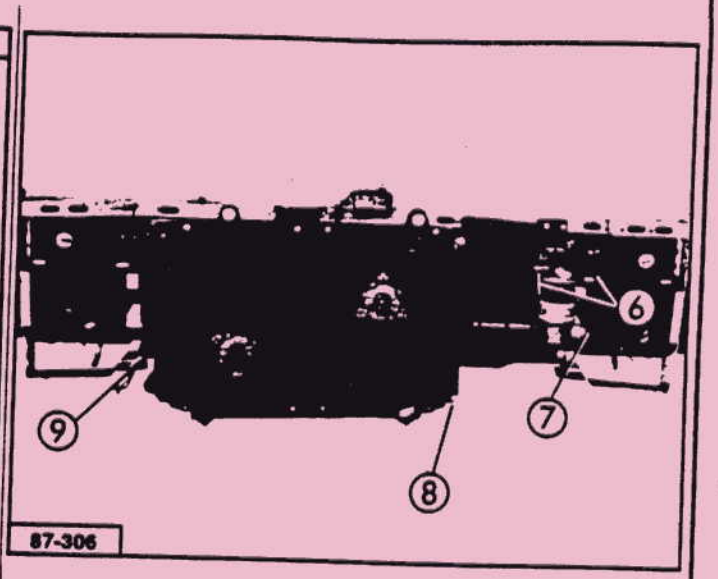
Fit Fig. V
- The air intake casing (11).
- The air filter assembly (13).
- The spare wheel carrier.

Connect up
- The battery positive and negative cables.
- Fill and bleed the cooling system.
  See the section concerned.
- Bleed the fuel filter.
- Fit the spare wheel.
- Fit the washer and tighten the drive shaft nuts (17).
  Tightening torque 500 N.m (369 lbf.ft)

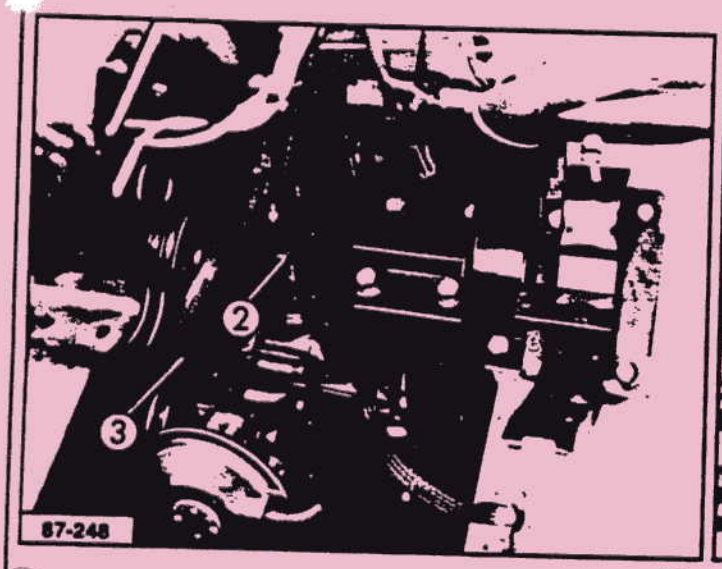
(Apply LOCTITE FRENBLOC) to lock the nut at two points (18).
- Fit the protective cap over the nut.
- Lower the vehicle to the ground.


L.18-8 a
23 mm
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5 m.daN
5 mm
L.18-15

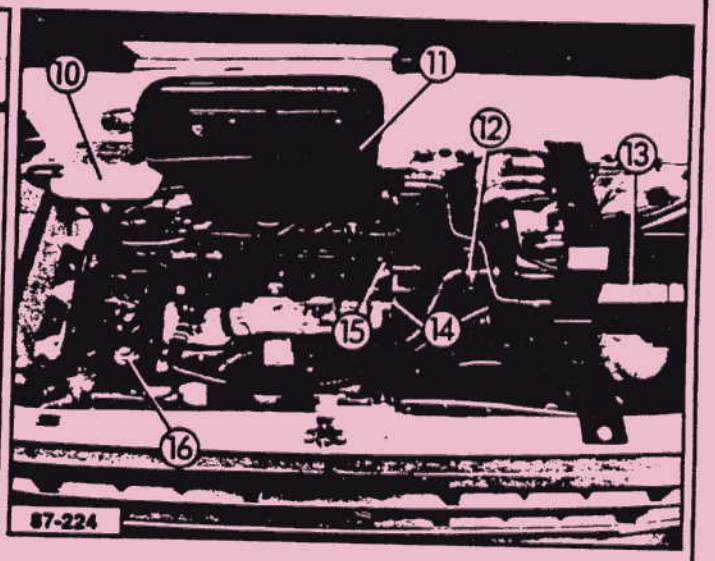
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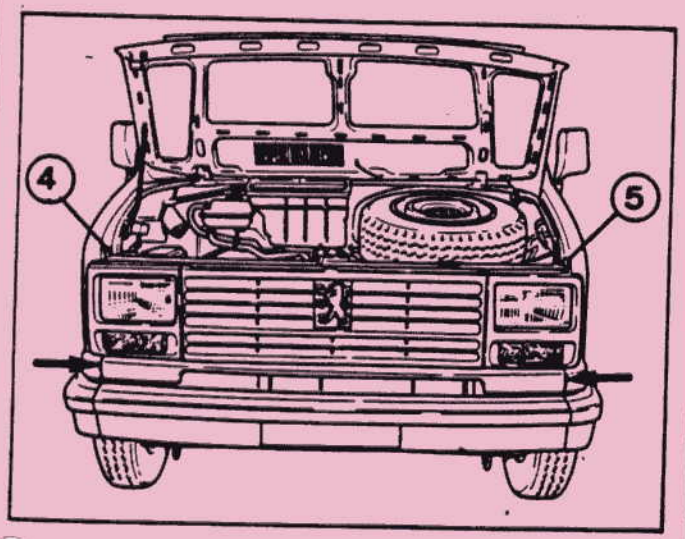
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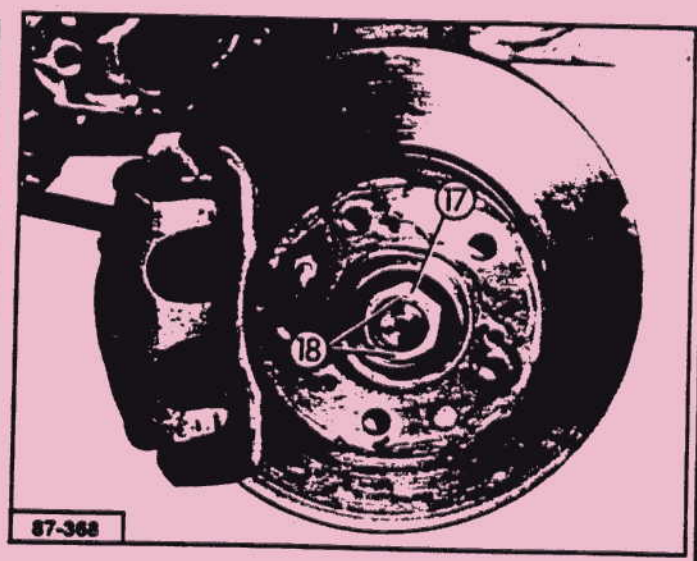

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II


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16
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V


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VI

SPECIAL TOOLS

A : Sling for removing and refitting the engine-gearbox assembly 8.0102 Y comprising :

D - Cross piece

H - Short hooks

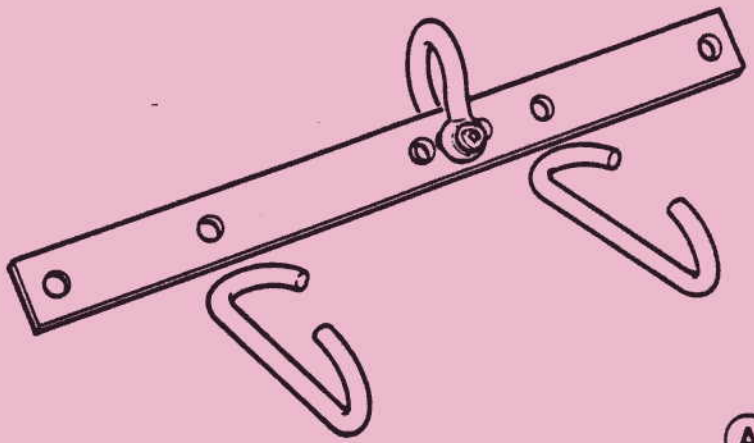
B : (-).0316N Thrust plate for removing the right hand drive shaft

TIGHTENING TORQUES

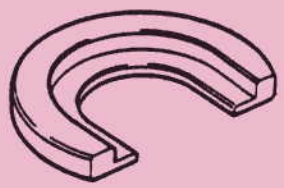
Tightening torque that must be adhered to (torque wrench) :	Torque in N.m (lbf.ft)
Nut securing drive shaft to stub axle carrier :	500 N.m (369 lbf.ft)

Recommended tightening torques :

Engine mounting flange securing bolts (on the cylinder head side)	50 (36.9)
Engine mounting securing bolts (on the gearbox side)	50 (36.9)
NYLSTOP nuts on engine - gearbox flexible mounting	55 (40.6)
Flexible mounting securing bolts (on the differential side)	55 (40.6)
Bolts securing the lower ball joints to the stub axle carriers	50 (36.9)

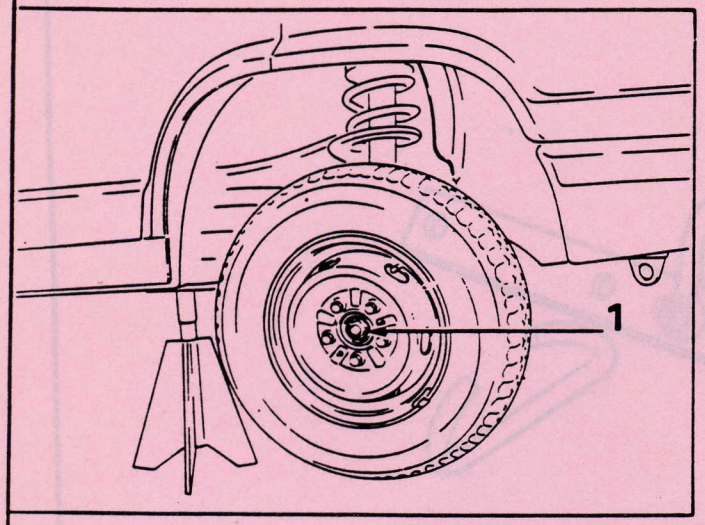


(A)

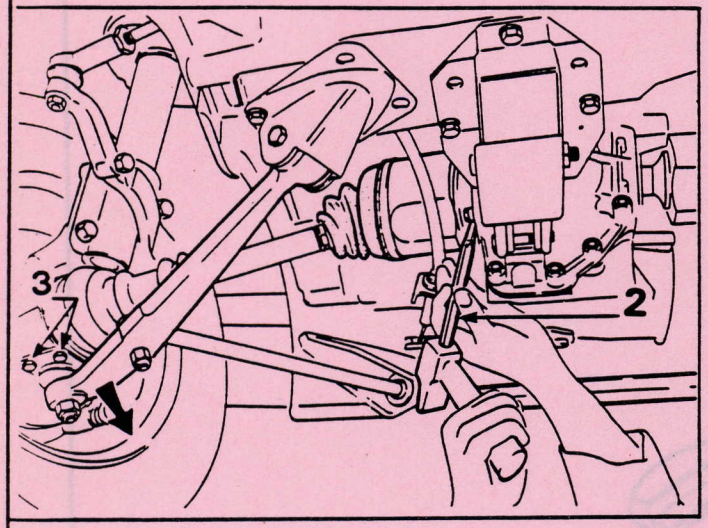


(B)

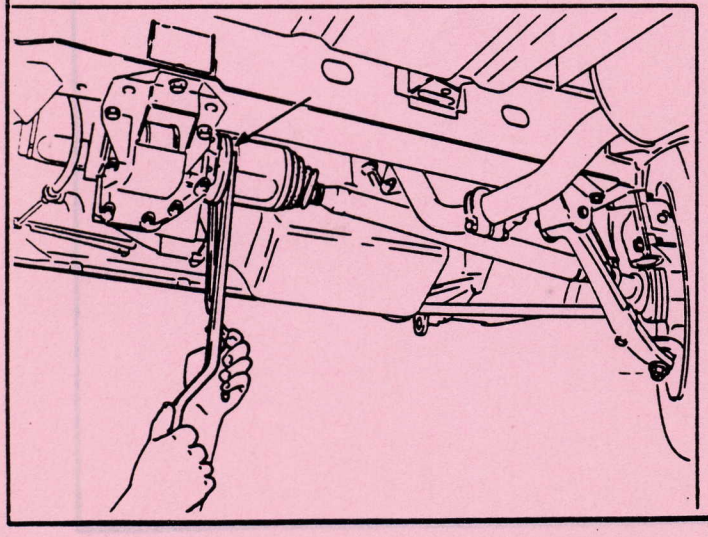
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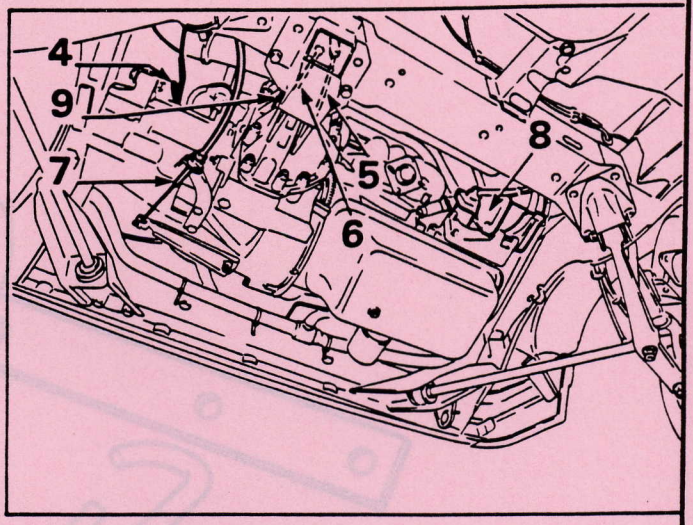
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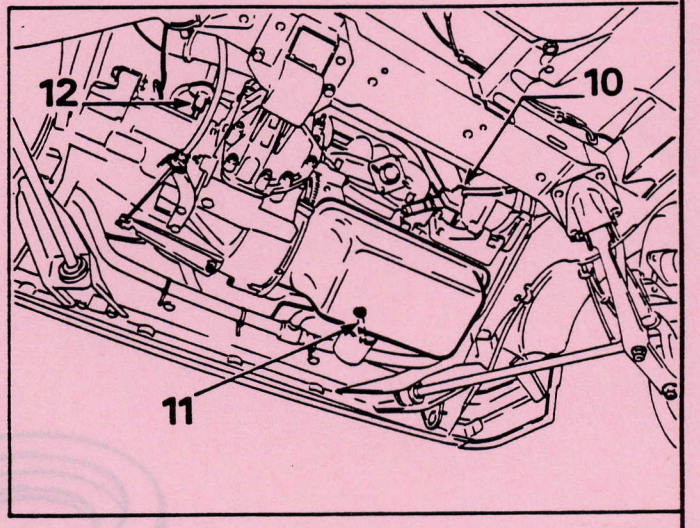
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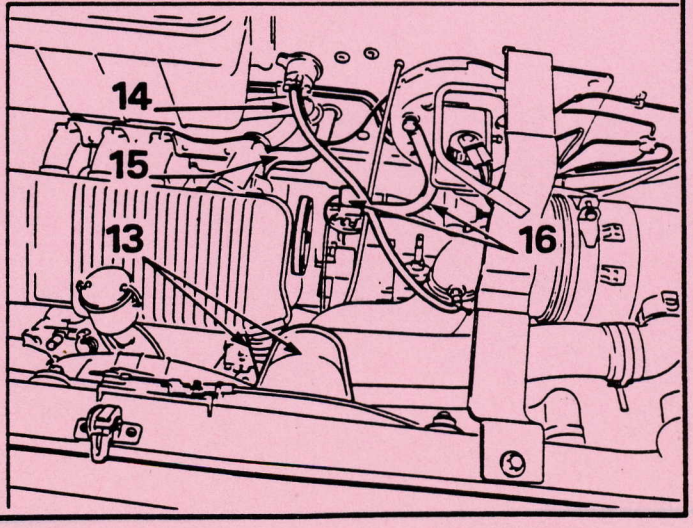
IV



V



VI



I

- Place the vehicle on a lift
- Disconnect the battery
- Remove the bonnet
- Remove the protective caps from the drive shaft nuts
- Remove the drive shaft nuts (1)
- Raise the front of the vehicle and support it on stands.

II

- Remove the 4 bolts (3) that secure the stub axle carrier lower ball joints in place
- Free the lower suspension arms ➞
- Extract the left hand drive shaft from the differential housing using panel beaters' drifts (2).

NOTE : The drive shaft is retained in the sun gear by a circlip.

III

- Remove the alternator drive belt protector
- Free the right hand drive shaft using tool (-).0316N and two levers, then remove it.

IV

- Disconnect the exhaust pipe from the manifold
- Remove the retaining rings and pull back the assembly
- Disconnect :
  - the reversing light switch (4)
  - the speedometer drive cable (5)
  - the clutch cable (7)
- Remove the dipstick (6) from the differential
- Disconnect the alternator (8)
- Free the differential from the cross member (9)
- Drain :
  - the engine, gearbox, final drive unit
  - the cooling system
- Put aside the oil and coolant if they are in fit condition to be re-used.

V

- Disconnect the hoses from :
  - the bottom of the fuel heater (10)
  - the oil cooler (11)
  - the heater
  - the coolant output casing
- Disconnect the gear shift control (12)
- Disconnect :
  - the starter motor
  - the wire from the oil pressure sensor
  - the earthing braid on the gearbox
  - the wires from the coolant output casing, after having first identified them (thermistor and temperature switch).

VI

- Remove the spare wheel
- Disconnect :
  - the air hoses (13) from the radiator upper cross member and the intake distributor casing
  - the foul filter indicator hose (14)
  - the heater hose (15)
  - the pipes from the exhauster (16).

A4.106	1	XUD9A	ENGINE COMPLETE UNIT - REMOVING-REFITTING THE POWER UNIT ASSEMBLY	J5 DIESEL

I

- Remove the heater air intake casing (17)
- Disconnect :
  - the degassing pipe (18) and the coolant feed hose (19) from the expansion bottle
  - the fuel input and output pipes (20) from the fuel heater
- Disconnect the pre-heater plug supply wire (21)
- Disconnect the accelerator cable from the pump

II

- Place the cross piece (22) in position and take the load on it
- Remove the nut (23), the 3 bolts (24) and the right hand engine mounting (25).

III

- Remove the 4 bolts (26) from the left hand engine mounting.

IV

- Remove the engine from below

V

REFITTING

- Carry out the removing operations in reverse

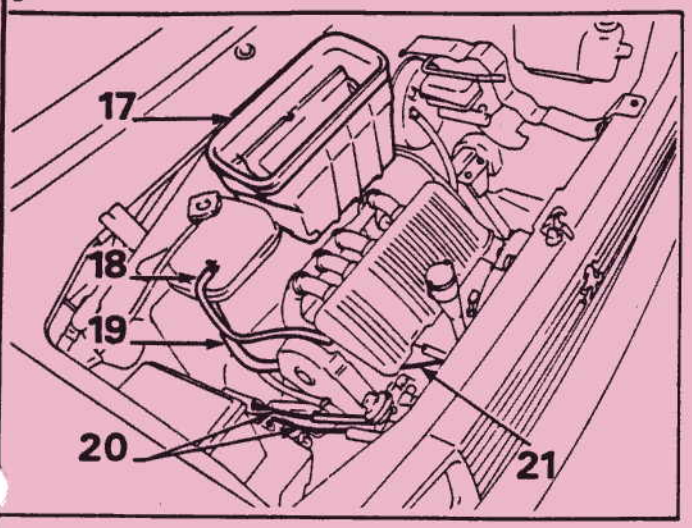
IMPORTANT

- Fit each of the drive shafts with a new circlip (27) and a new 0 ring (28) and copiously grease the splines.
- Make sure that the retaining circlip fully enters the differential side gear.

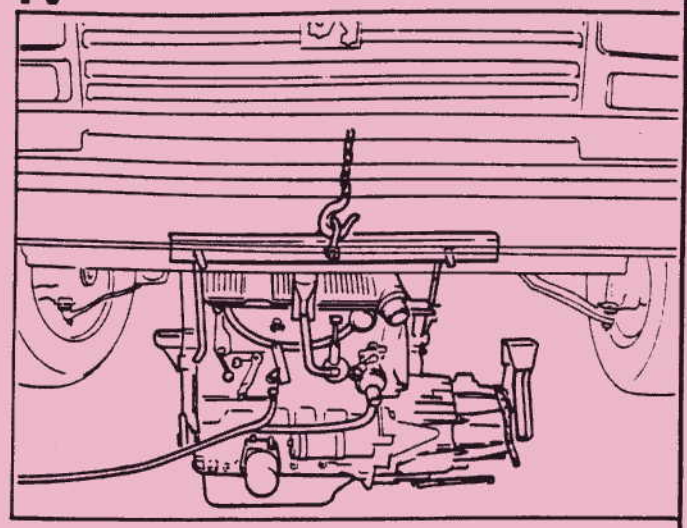
CAPACITIES

- Engine : 5 litres
- Gearbox - final drive unit : 1.25 litres
- Cooling system : 9.5 litres

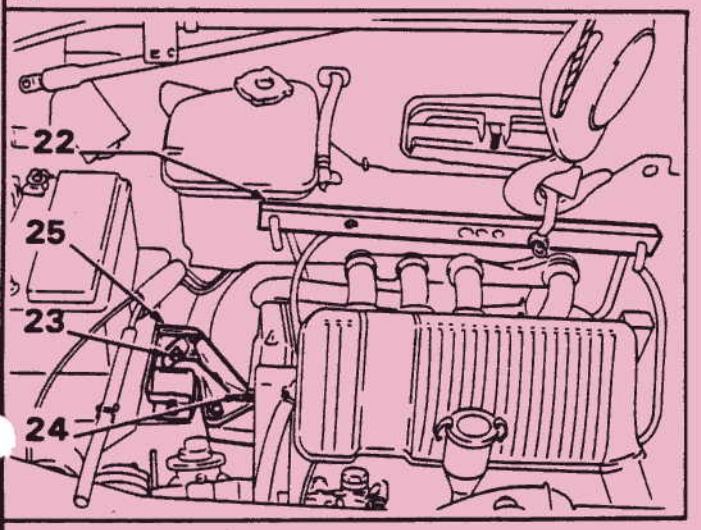
I



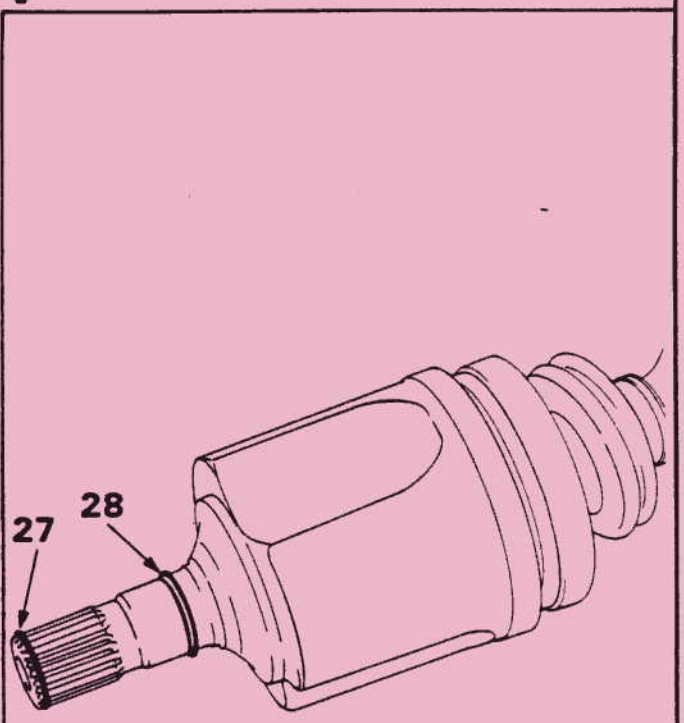
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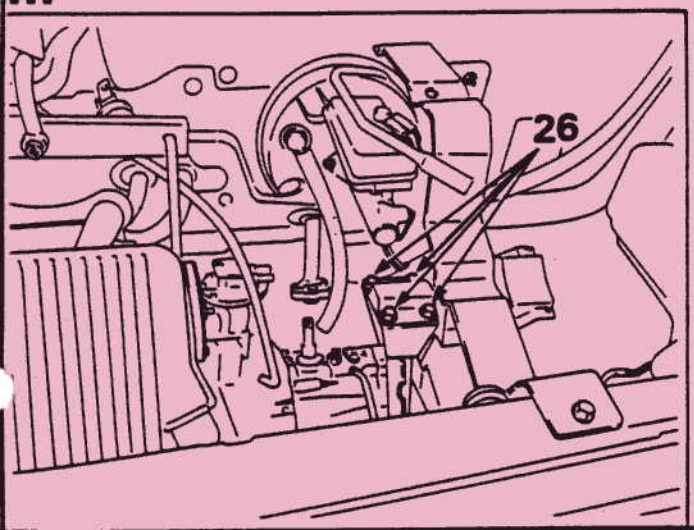
II



V



III



SPECIAL TOOLS

A : Sling for removing and refitting the power unit assembly 8.0102 Y,comprising :

D - Cross piece

H - Short hooks

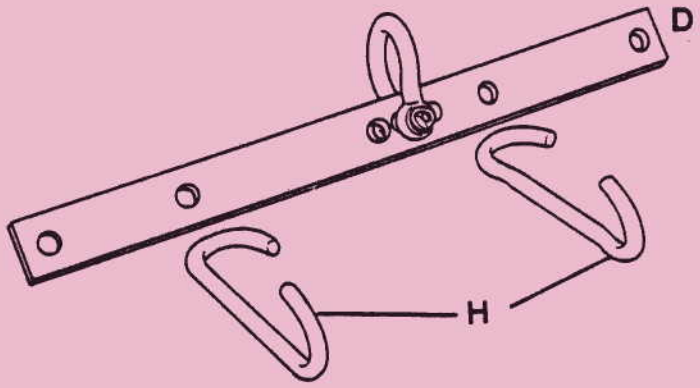
B : Mandrel for centralising the suspension arm tie rod : 4062T

TIGHTENING TORQUES

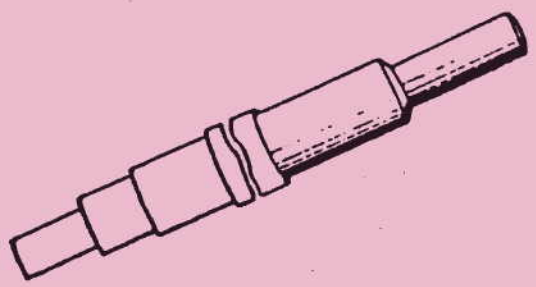
Tightening torque which must be adhered to (torque wrench) :	Torque in N.m (lbf.ft)
Nut securing drive shaft to stub axle carrier :	500 (369)

Recommended tightening torques :

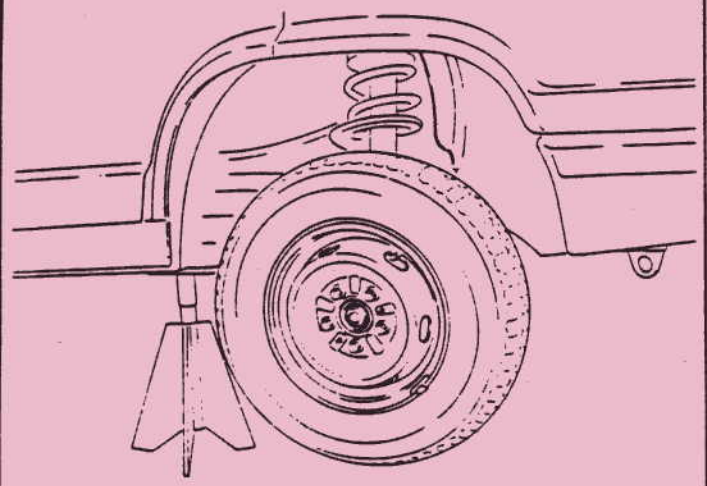
Engine mounting flange securing bolts (on cylinder head side)	50 (36.9)
Engine mounting securing bolts (on gearbox side)	50 (36.9)
NYLSTOP nuts on engine-gearbox flexible mounting	55 (40.6)
Flexible block securing bolts (on differential side)	55 (40.6)
Bolts securing tie rod clamp and suspension arm	50 (36.9)
Nut securing tie rod to lower suspension arm	140 (103)

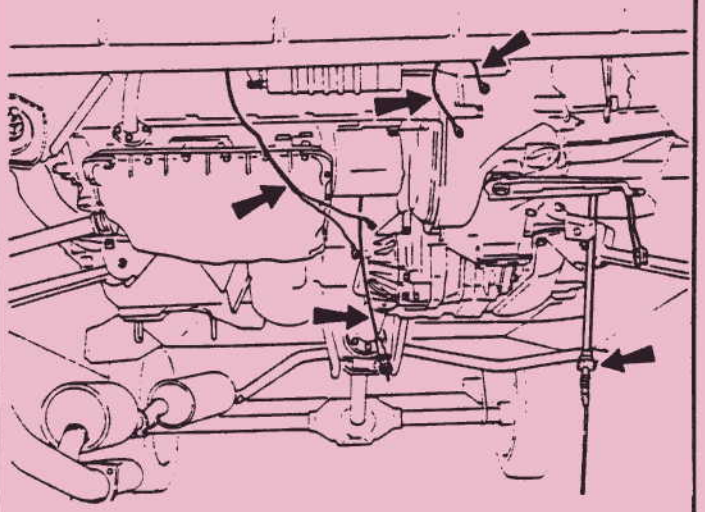


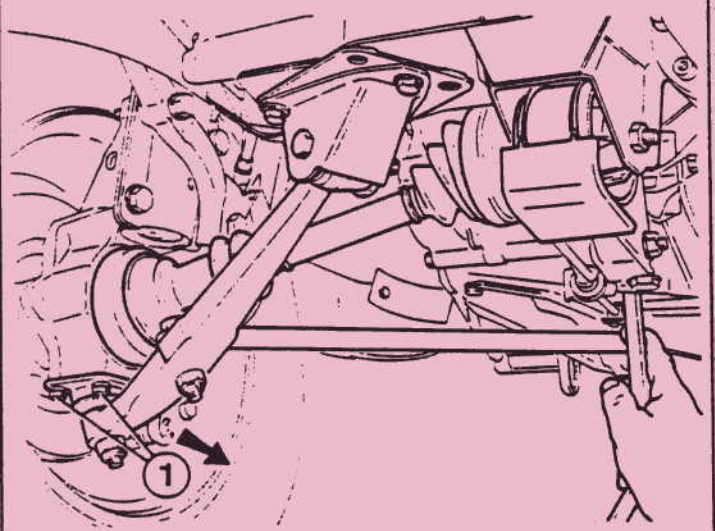
A

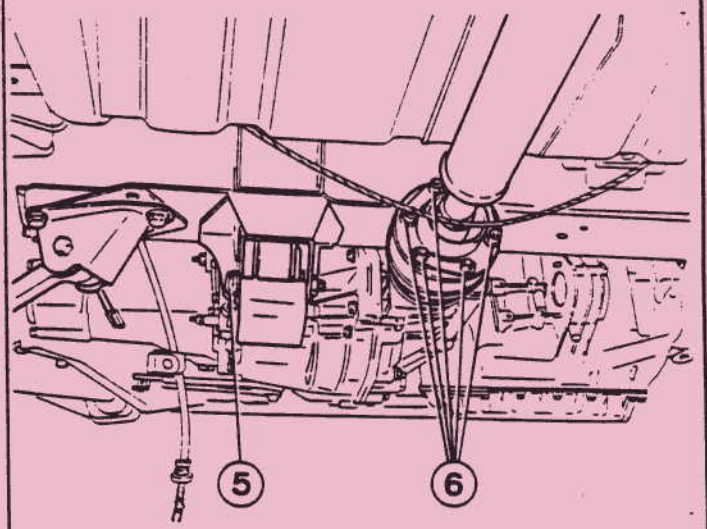


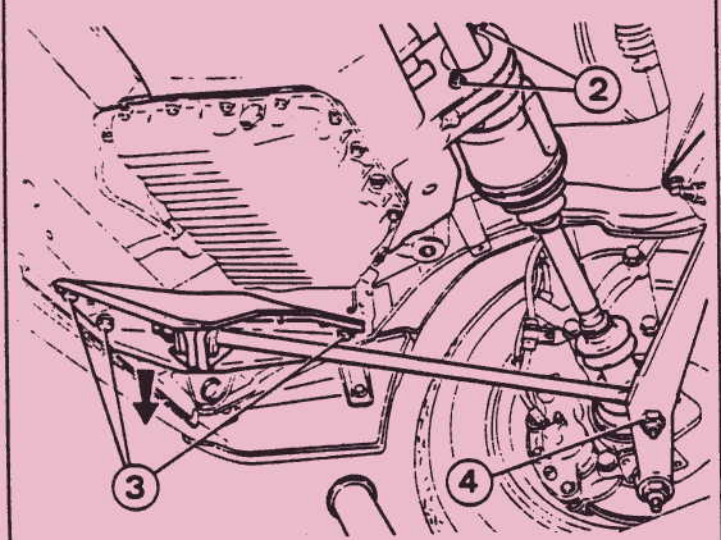
B

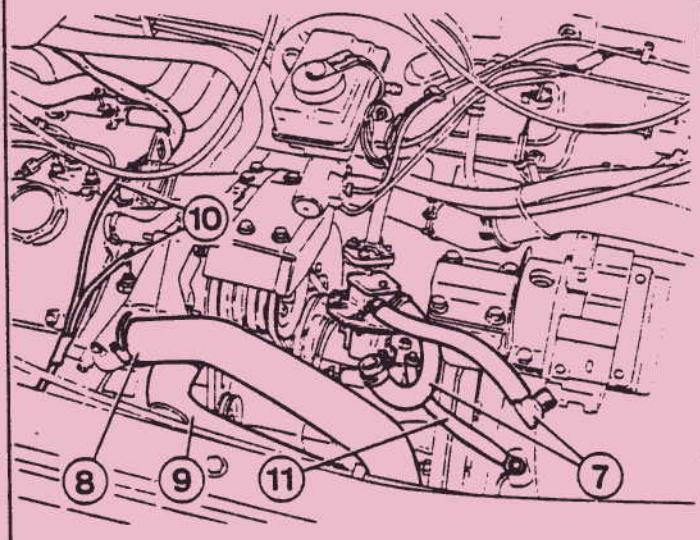





1


5
6


2
3
4


10
8
9
11
7

I

Raise the vehicle on a lift.

Disconnect the battery negative cable.

Remove :
- the bonnet
- the spare wheel and its carrier
- the caps that protect the drive shaft nuts and the nuts (41 mm across flats)

Raise the front of the vehicle and support it on stands, with its wheels hanging free.

II

Remove :
- the engine compartment sound proofing
- the four bolts (1) that secure the lower ball joints

Free the lower suspension arms →

Extract the left hand drive shaft from the differential housing, using a panel beater's drift or a lever.

NOTE : The drive shaft is retained, in the sun gear, by a circlip.

III

Disconnect the exhaust pipe from the manifold.

Remove the retaining rings and pull back the exhaust pipe assembly.

Loosen the two nuts (2) and swing the two tie rods out of the way.

Remove the right hand drive shaft and retrieve the teflon ring and the dust cover.

Remove the three bolts (3) from the suspension arm front support and loosen the rear securing nut (4).

Free the suspension arm towards the outside of the vehicle →

IV

Disconnect :
- the alternator
- the starter motor and the lug that secures its wiring harness on the timing gear casing.

Remove :
- the clutch cable
- the speedometer drive cable.

V

Remove the bolt (5) from the gearbox mounting.

Remove the bolts (6) that secure the transmission shaft front section to the output on the gearbox-final drive unit.

Free the transmission shaft by pushing the power unit assembly towards the front of the vehicle and secure the shaft assembly to the underside of the body.

VI

Remove :
- the air filter and its hoses
- the foul filter indicator (secured to the air intake casing).

Disconnect :
- the exhauster hoses (7)
- the radiator coolant input (8) and manifold cooland output (9) hoses.

Disconnect the wires from :
- the reversing light switch
- the coolant casing (thermistor and temperature switch) (10)
- the oil pressure switch
- the wire that supplies the preheater plugs
- the gearbox earthing braid (11)

I

Remove :
- the heater air intake casing
- the four nuts that secure the cooling system expansion bottle and secure it well away from the engine

Disconnect the hoses (12) from the fuel heater, the injection pump supply hose (13) and the coolant hose (14).

Disconnect the accelerator cable (15) from the injection pump.

Disconnect the electric shut-off unit supply wire.

II

Place the cross piece (-).0102 Y in position and take up the weight of the engine.

Remove the bolts (16) from the left hand engine mounting.

III

Remove the bolts (17) from the right hand engine mounting.

Remove the engine from under the vehicle.

IV

REFITTING

Carry out the removing operations in reverse.

IMPORTANT

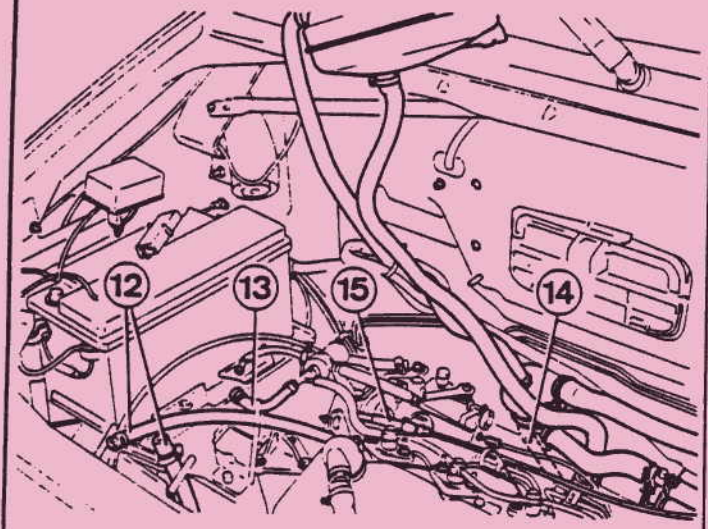
When refitting the front suspension arm, centralise the tie rod clamp with tool 4062T and tighten :
- the bolts (18) to 50 N.m (36.9 lbf.ft)
- the rear nut to 140 N.m (103 lbf.ft).

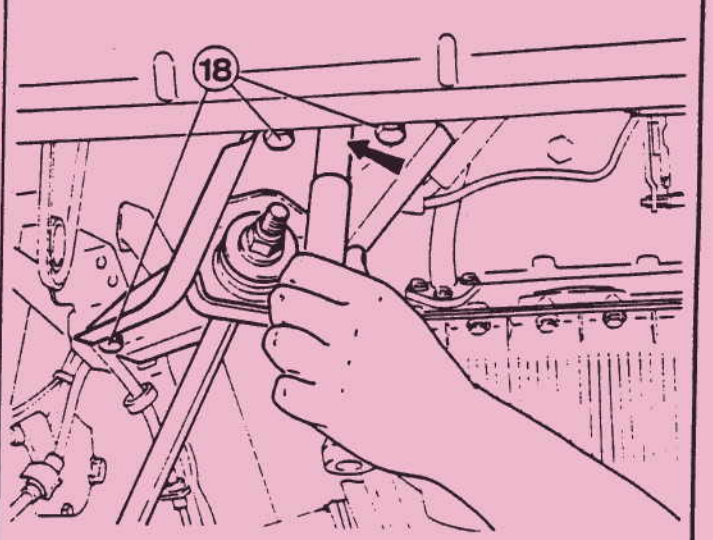
V

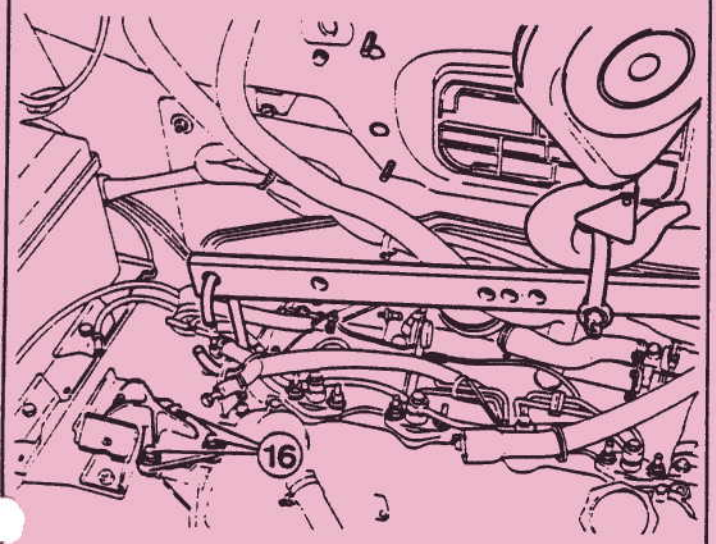
PRECAUTIONS

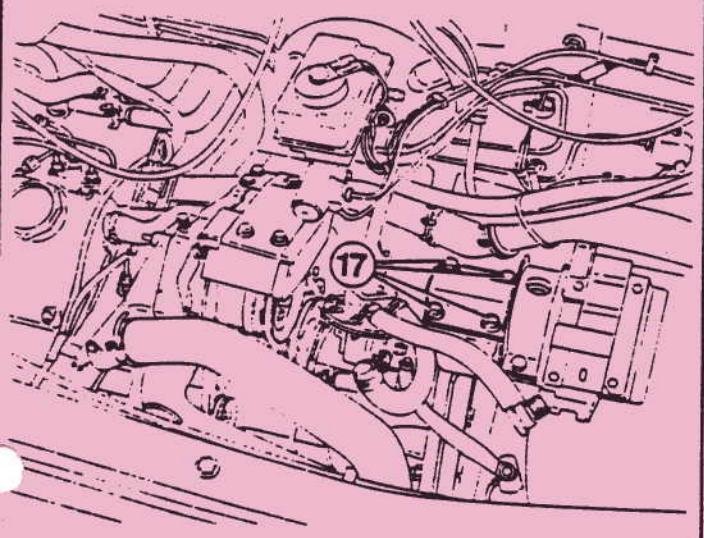
Always fit a new circlip to the left hand drive shaft and copiously grease its splines.

Ensure that the circlip fully enters the differential gear.


12
13
15
14


18


16


17

SPECIAL TOOLS

SPECIAL TOOLS

From kit 8.0117 ZW :

AF - Support for securing dial indicator to pump Fig. A (used with AG).

AG - Angle adaptor Fig. B.

AH - Support for mounting dial indicator on cylinder head Fig. C.

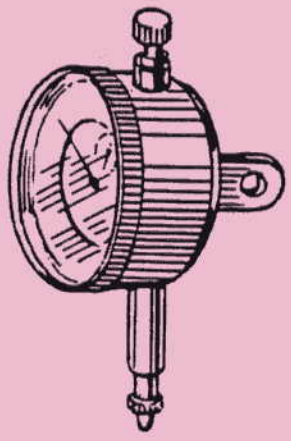
F - Pump dial indicator Fig. D.

H - Pump dial indicator extension Fig. E.

L - Nut and bolt for securing dial indicator to pump Fig. F.



A



D



B



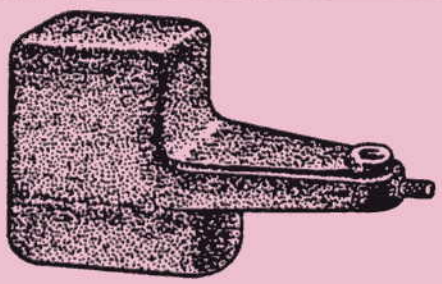
E



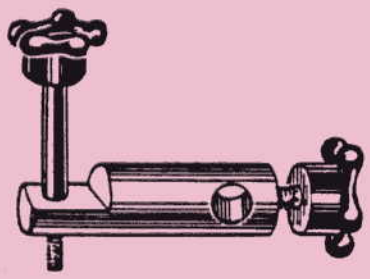
C



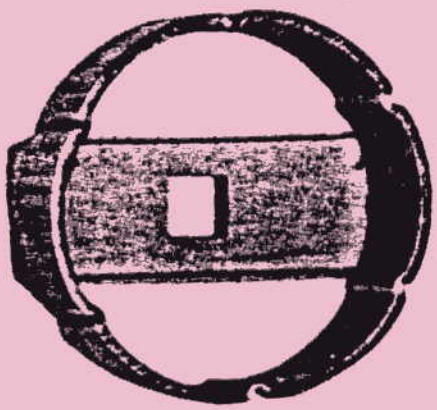
F



G



H



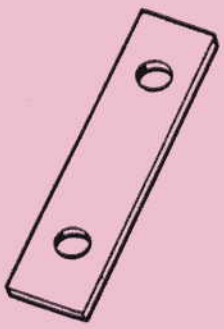
81-334

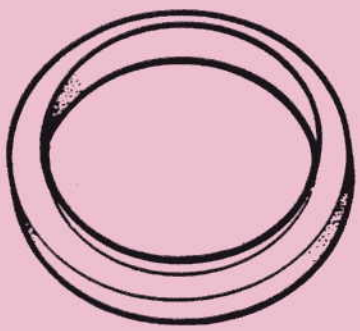
L



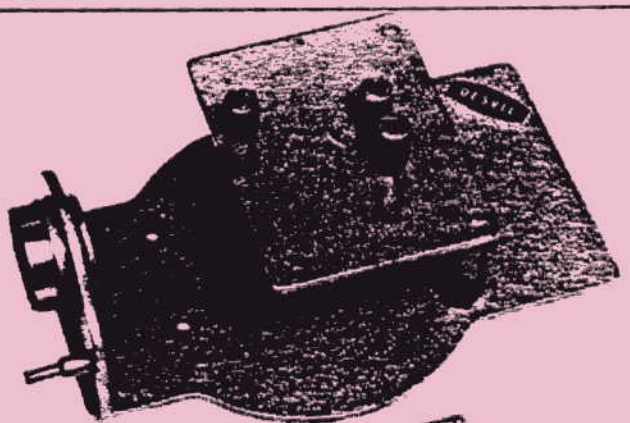
81-813

M



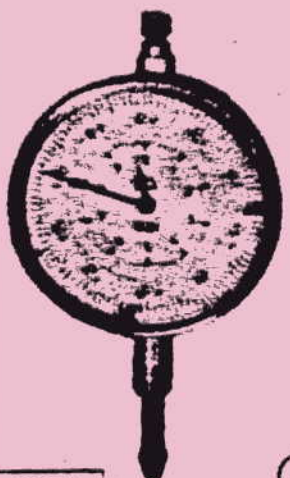


I





N



12827

J



12834

K

SPECIAL TOOLS

SPECIAL TOOLS (continued)

From kit 8.0110 Z.

H - Dial indicator support bracket Fig. G.

8.0118 FZ

– Adjustable dial indicator support Fig. H.

AB - Ring for fitting the crankshaft seal, at the clutch end Fig. I.

AC - Plate for fitting the crankshaft seal, Fig. I (used in conjonction with AB).

8.1504

– Dial indicator, with lug Fig. J.

From gearbox kit 8.0316 :

M - Dial indicator extension L – 20 mm Fig. K.

8.1404

– Oil filter cartridge spanner Fig. L.

8.0212

– Reversible mandrel for centralising the clutch friction disc Fig. M.

RECOMMENDED TOOLS

– Desvil dismantling stand.

– Support for U25/651 Diesel engine Fig. N, ref. 153/3 (see garage equipment brochure)

– Standard fixture Fig. N
ref. 126 (see garage equipment brochure).

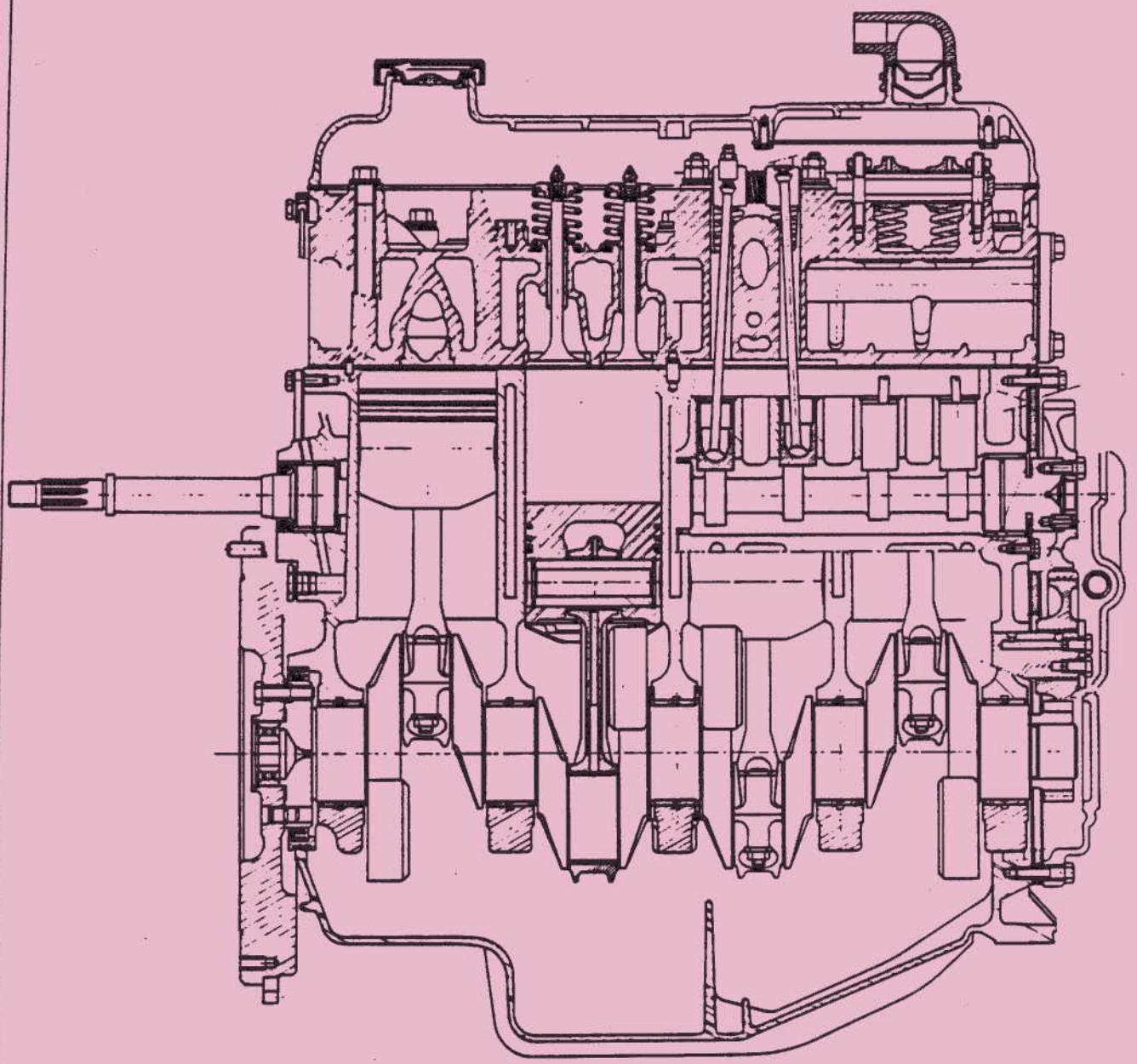
TIGHTENING TORQUES

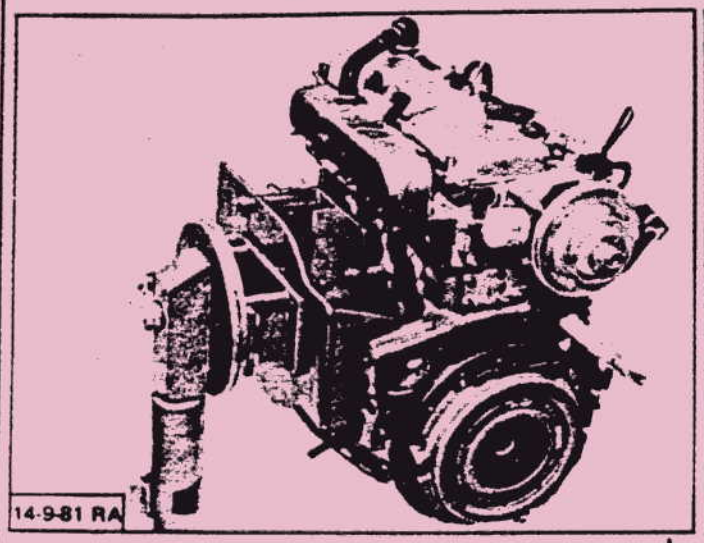
ESSENTIAL tightening torques (use torque spanner) :

Fastening to be tightened	m.daN	Nm	lbf ft	Remarks
Big-end bolts	7,6	76	56	To be replaced by new ones each time they are removed
Main bearing bolts	9,5	95	70	To be replaced by new ones each time they are removed
Fly wheel securing bolts	9	90	66	To be replaced by new ones each time they are removed and to be coated with LOCTITE on fitting
Cylinder head securing bolts (tagged washer)	Initial tightening torque : 6	60	44	Both faces and threads oiled (tags on washers against cylinder head)
	Final tightening torque 10,5	105	77	
Fast idling control thermostatic pick-up (copper washer)	4,5	45	33	PEUGEOT jointing compound

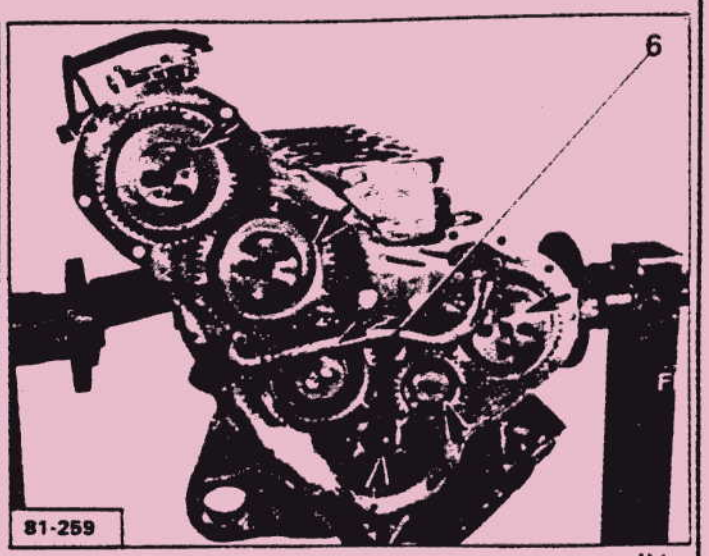
Recommended tightening torques :

Fastening to be tightened	m.daN	Nm	lbf ft	Remarks
Camshaft drive gear securing bolts	3,2	32	24	Flanged bolts
Camshaft thrust bearing securing bolts (serrated washers)	1,7	17	12	
Plugs on front plate	1,5	15	11	To be coated with LOCTITE
Injection pump securing stud lock nuts	1,7	17	12	To be coated with LOCTITE
Sump securing bolts	1,7	17	12	
Sump cover plate securing bolts	1,1	11	8	
Oil drain plug (copper washer)	4	40	30	
Rocker cover securing nuts (copper washer)	0,5-0,8	5-8	4-6	
Cylinder block water drain plug (copper washer)	3,5	35	26	
Cylinder head oil pipe union screw (double copper washer)	1,1	11	8	
Filter cartridge insert	1,1	11	8	To be coated with LOCTITE
Injection pipe nuts	2,4	24	18	
Injector leak-off union screw	1	10	7	
Pre-heat plugs	2,8	28	21	
Injector securing nuts (flat washers and contact washers)	2,4	24	18	
Injection pump drive gear securing bolts	2,5	25	18	
Injection pump securing nuts	3	30	22	Load distribution plates
Studs screwed into cylinder head	0,5	5	4	
Engine mounting bolts (on cylinder head)	2,7	27	20	

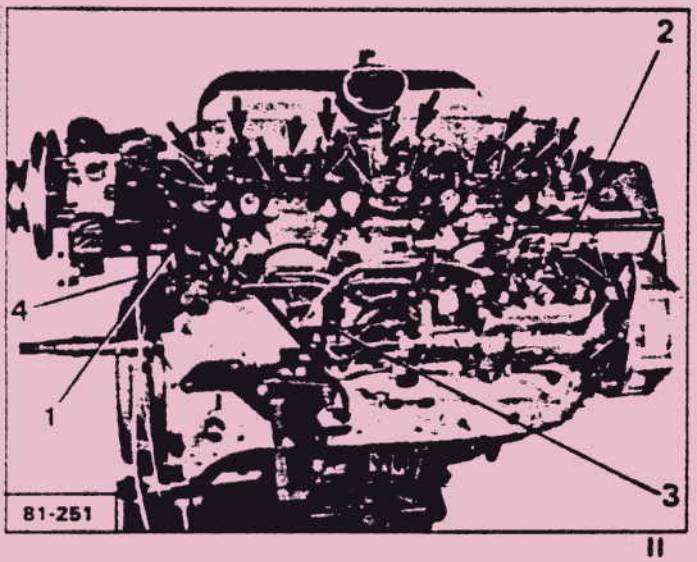




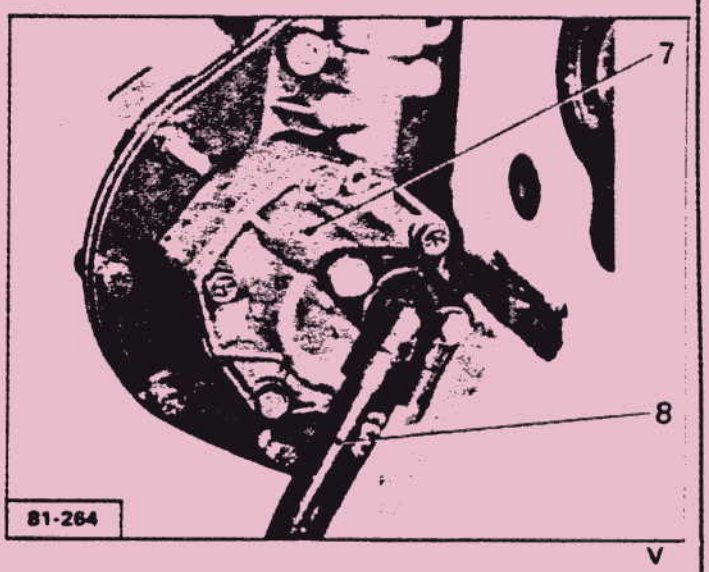
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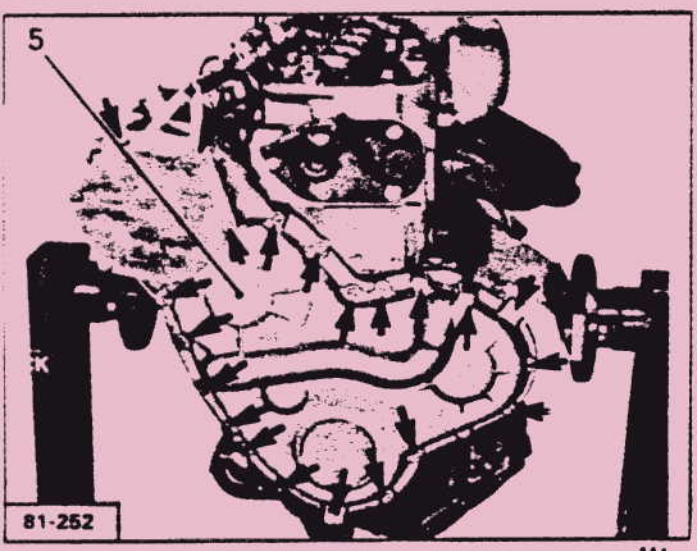
IV



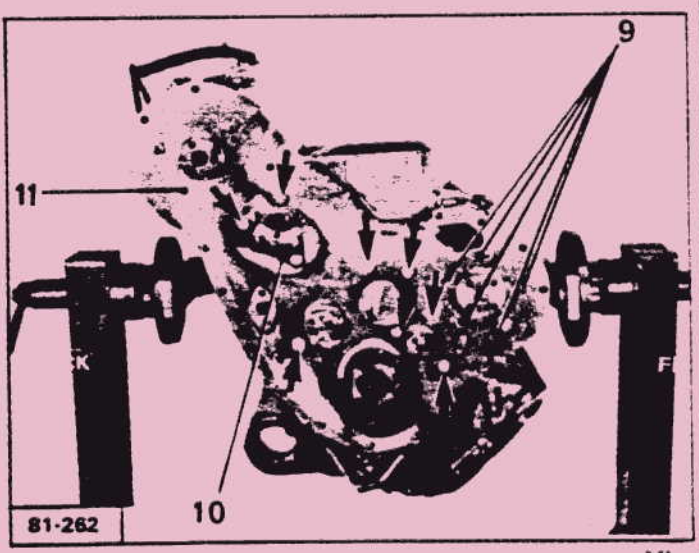
II



V



III



VI

The method described here is illustrated using a non-standard dismantling support.

Use the DESVIL stand equipped with the fixture the reference of which is given on the page entitled "special tools".

DIMANTLING

Remove :

- the starter motor,
- the exhaust manifold,
- the cylinder block water drain plug,
- the dowel shown ⟶ Fig. I,
- the oil pump suction pipe (8) Fig. V.

Secure the engine cylinder block to the DESVIL stand using three bolts :

- one M12 x 1,75 x 70,
- one M 7 x 1,00 x 60,
- one M 7 x 1.00 x 25.

Secure the assembly to the base fitted with the standard fixture, Fig. I.

Drain the engine.

Remove : Fig. II

- the cable clamp (2)
- the injection pipes assembly (3),
- the diagnostic harness (4),
- the rocker shaft lubrication pipe (1),
- the rocker shaft assembly,
- the bolts (⟶).

Remove the cylinder head and its gasket.

Remove the push rods and the tappets.
(Mark their respective positions).

Remove the timing cover (5) (⟶) :
Fig. III.

Remove : Fig. IV, V, VI.

- the timing gears (⟶),
- pipes (6),
- bolts (9).

Remove the oil pump (7).

Remove the injection pump.

Remove the bolts (⟶) Fig. VI and take off the timing cover back plate (11).

Remove the camshaft thrust plate (10) and withdraw the camshaft from the cylinder block.

Remove :

- the clutch,
- the flywheel,
- the sump cover plate,
- the sump (1) (bolt : ⟶) : Fig. I.

Remove the connecting rod-piston assemblies: Fig.

Ensure that the big-end caps remain with the connecting rods from which they have been removed. Mark the positions of the pistons relative to the cylinder block.

Remove the big-end caps (2).
Take out each connecting rod-piston assembly from the T.D.C. position.

Remove the crankshaft : Fig. II

Remove the main bearing caps (3).
Take out the crankshaft.
Remove the main bearing shells.

Stripping the cylinder block : Fig. III

Remove :

- bolt (5) and take out the pressure relief valve body (4),
- the dipstick guide,
- the front and rear cylinder block water circulation plates (6).

Remove the pistons from the connecting rods : Fig. IV.

Remove the piston rings.
Remove the circlips (with a scriber).
Push out the gudgeon pin.

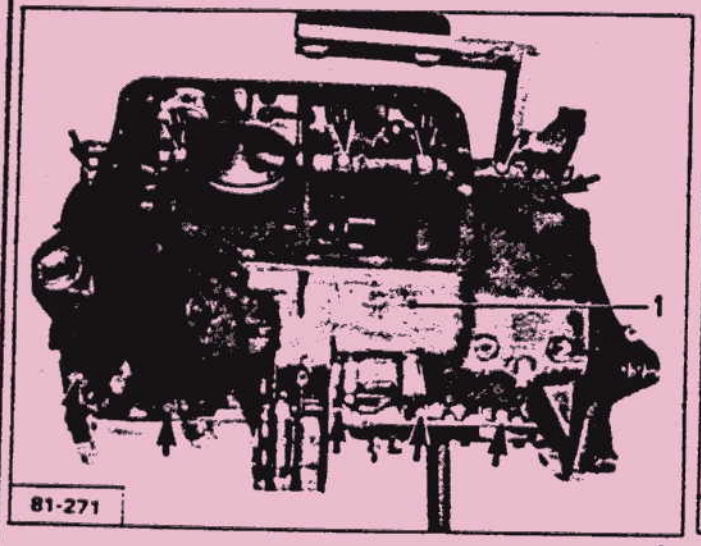
Dismantling the pressure relief valve : Fig. V.

Remove from the valve body (7) :
- the O ring seal (8),
- the circlip (12),
- the washer (11),
- the spring (10),
- the piston (9).

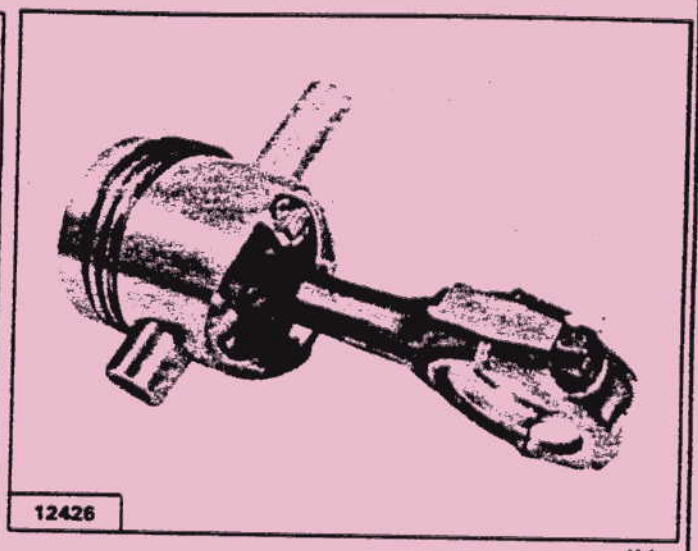
Dismantle the oil pump : Fig. VI.

Remove :
- the bolts (⟶),
- the cover (13),
- the seal (14).

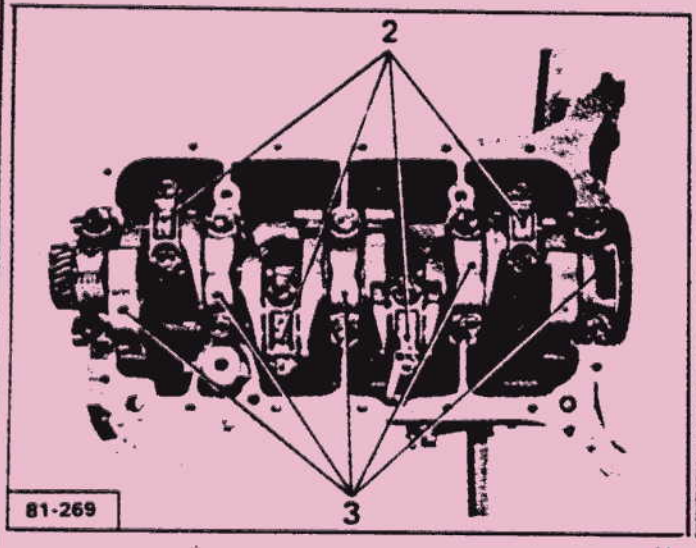
CLEAN ALL THE PARTS.



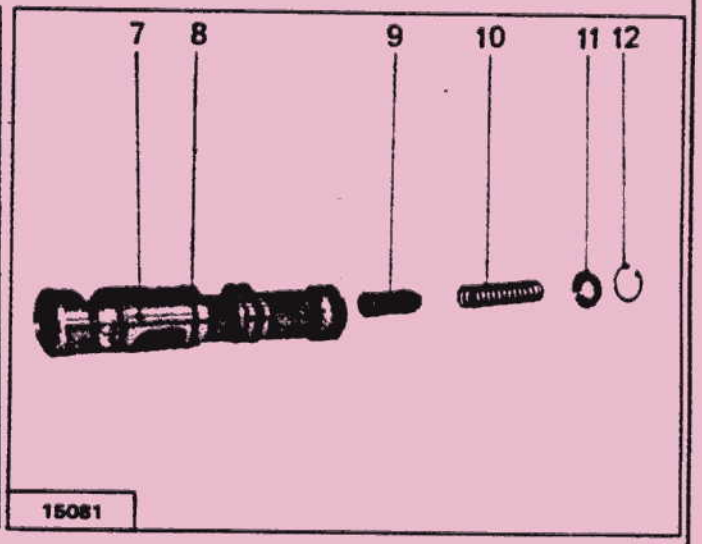
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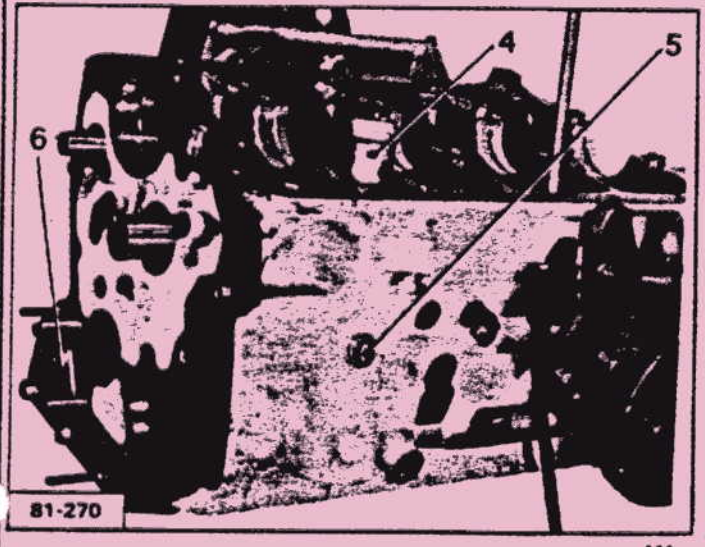
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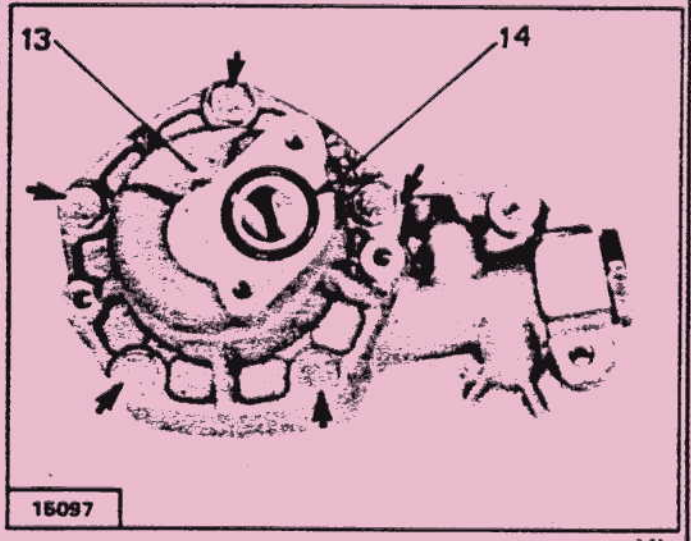
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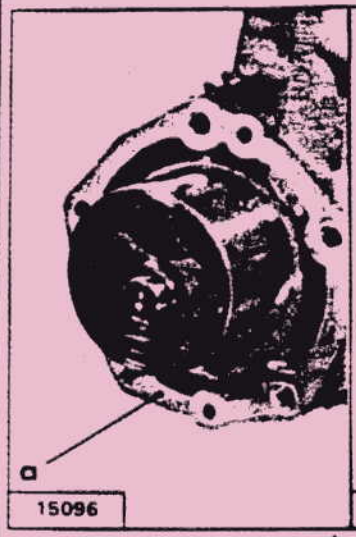
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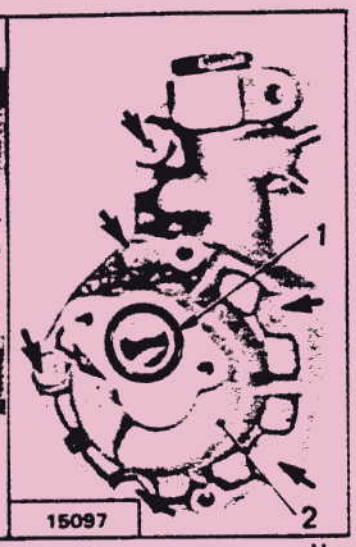
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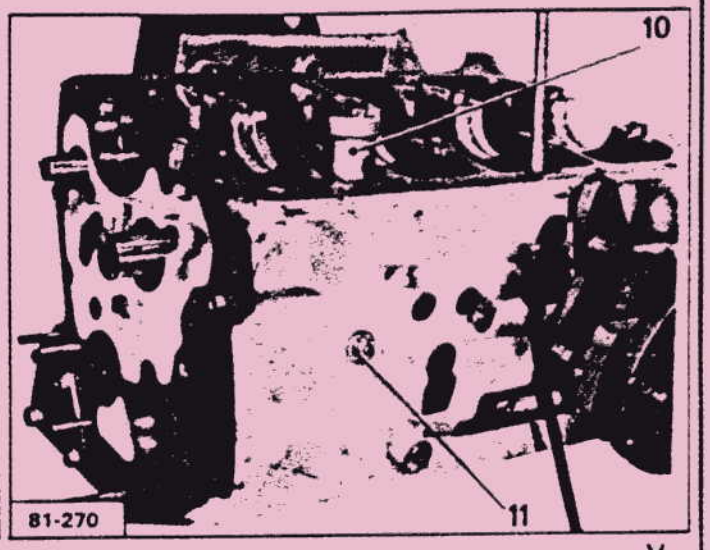
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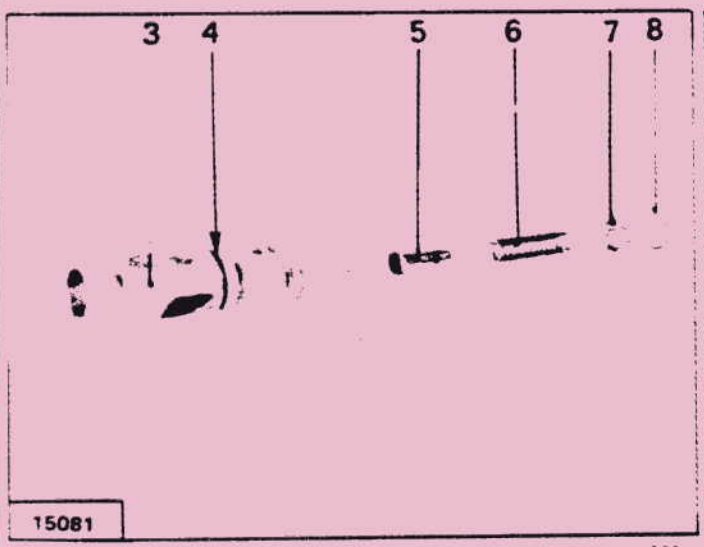
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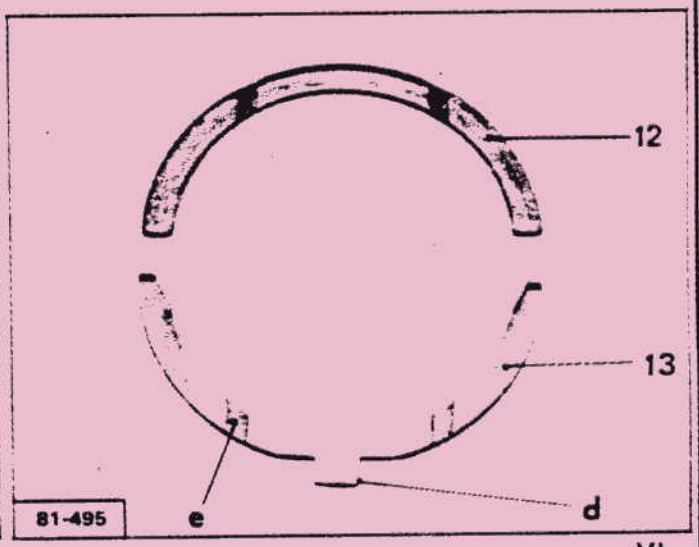
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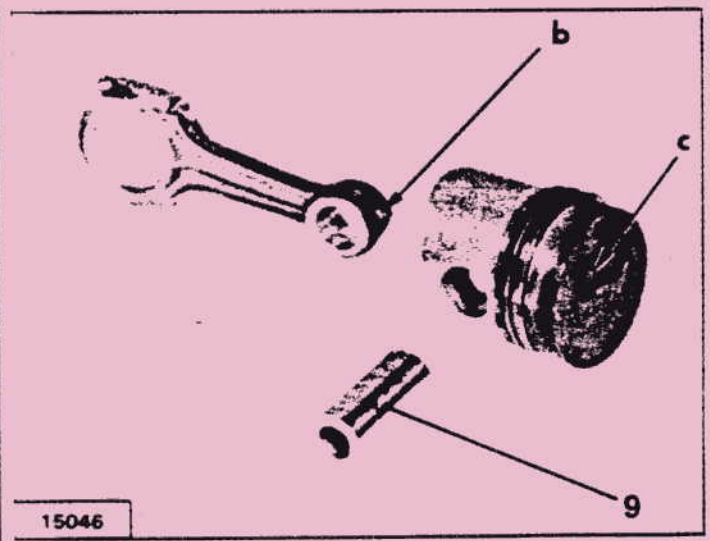
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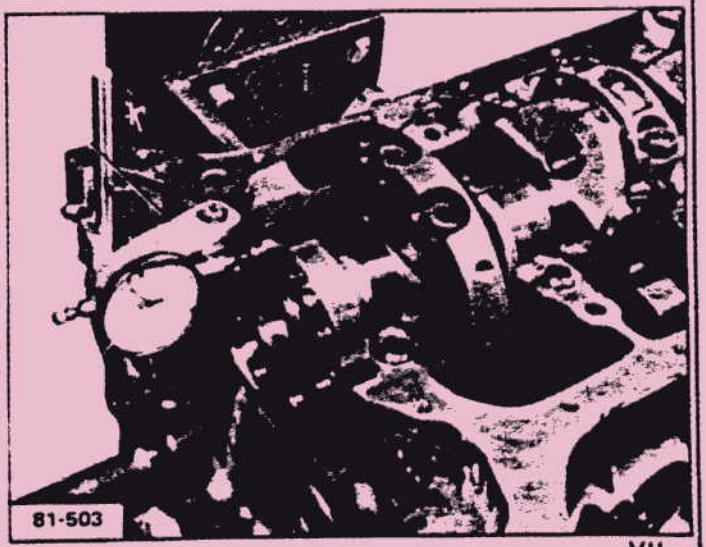
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VI



IV



VII

REASSEMBLY

Prepare the flywheel

Replace the fly wheel bearing (if necessary).

Replace the starter ring gear (if necessary).
Drive off the starter ring gear with a drift.
Clean the ring gear locating area.
Heat the new ring gear with a torch whilst continually moving it round to ensure that it expands evenly (heat it to between 200 and 250°C, that is to say until it is a light straw colour).
Fit the ring gear with the unmachined face against the shoulder on the flywheel.
Carry out this operation quickly. Drive the ring gear fully into place with a drift if necessary.

Check the ring gear run-out (max. 0.3 mm).

Prepare the oil pump : Fig. I and II.
Coat the edge of the oil pump body "a" with PEUGEOT jointing compound :
Fit the following to the oil pump body :
- the drive shaft,
- the two oil pump gears,
- the cover (2) tightening the bolts (➡).
- the seal (1) coated with grease.

Prepare the pressure relief valve : Fig. III
Fit in the valve body (3) :
- the piston (5),
- the spring (6),
- the washer (7),
- the circlip (8).

Fit the 0-ring seal (4).

Fit the pistons to the connecting rods : Fig. IV.
Position the connecting rod so that the oil hole "b" is on the same side as the recess "c" on the piston.
Fit a circlip
Fit a gudgeon pin (9).
Fit the other circlip.

Whenever replacing a piston, ensure that the new piston fitted is of the same class as the cylinder diameter.

Fit the accessory components to the cylinder block : as shown in Fig. V.

Fit the cylinder block water circulation plates :

Fit :
- the pressure relief valve body (10).
- tighten the cone ended grub screw and nut (11).
- The dipstick guide (with the dipstick parallel to the block and pointing towards the flywheel).

Fit the crankshaft : Fig. V.

Lubricate the various components parts with engine oil just before each is fitted.

Fit :
- the bearing half shells to the cylinder block and the main bearing caps, LUBRICATING them as they are fitted,
- the crankshaft,
- the upper half thrust washers (12) on either side of the centre main bearing, to obtain an end float of :
  0.07 to 0.17 mm : Fig. VII.

The lower thrust washers (13) which are fitted to the centre main bearing cap and which have a locating stud "d" : Fig. VI.

The two thrust washers placed on one SIDE of the bearing MUST BE the same tickness. The thrust washers fitted to one side of the bearing may BE OF A DIFFERENT THICKNESS to those fitted on the other side.
The white metal face and the lubrication grooves "e" on the washers must be against the crankshaft : see Fig. VI.

Fit the main bearing caps : Fig. I and II.

REMARK : Before fitting the main bearing cap on the flywheel side coat the face shown shaded and identified as "a", on Fig. I, with PEUGEOT jointing compound.

The main bearing cap numbers appear on the camshaft side. No. 1 bearing is at the flywheel end.

IMPORTANT - The main bearing cap bolts are to be replaced by new ones whenever they are removed.

Fit the lower thrust washers at "b" and fit the main bearing caps.

Tighten the bolts (→) to a torque of 9.5 m.daN (95 Nm, 70 lbf ft).

Fit seal (1) into the groove on the No. 1 main bearing cap (at the fly wheel end).

Before fitting seal (2) (which is red in colour), check that it is fact the correct type for the engine to which it is to be fitted. The arrow should be in the same direction as the rotation of the engine (to the left as seen from the fly wheel end).

Oil the lip on the seal and assembly sleeve 8.0110 AB.

Fit the seal to sleeve AB.

Place the assembly in front of the seal location, place fitting plate AC over the entire arrangement and tighten 2 of the flywheel securing bolts as far as they will go.

Take off the fitting sleeve AB by turning it.

Fit a new seal (3) to the camshaft aperture. Ensure that the lubrication gallery plugs (4) are fitted.
Fit the connecting rod-piston assemblies.
Fit the bearing shells to the connecting rod big-ends and big-end caps. Oil them.

The upper haft shell has a lubrication groove and hole in it.

Place the connecting rod-piston assembly in the cylinder block when the crank pin is at TDC.
The piston protrusion, which is dependent on the nominal diameter is as follows :

Diameter	Protrusion
93 mm	+ 0.5 mm
93.25 mm	+ 0.47 mm
93.50 mm	+ 0.44 mm
93.75 mm	+ 0.41 mm

+ 0.05 / 0 mm

(dial indicator 8.01504 and support 8.0110 H : Fig. V.

If it does not, reface the piston crown to obtain the correct height.
Fit the piston rings to the piston with the gap in the expander ring (6) set at 180° to the gap in the ring itself (5) : Fig. VI.
NOTE - There is an inscription mark on one face of each piston ring near the gap.
When they are fitted, this inscription must be towards the crown of the piston.

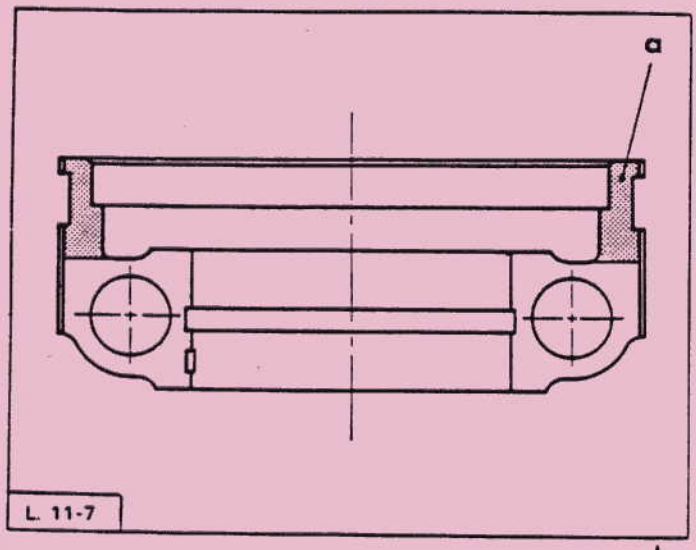
Stagger the gaps.

Fit each connecting rod-piston assembly when its crank pin is at TDC, with the clover leaf saped recess in the piston crown on the camshaft side.
Use a piston assembly sleeve.

IMPORTANT - The big-end bolts are to be replaced by new ones each they are removed.

Tighten the big-end nuts to a torque of 7.6 m.daN (76 Nm, 56 lbf ft).

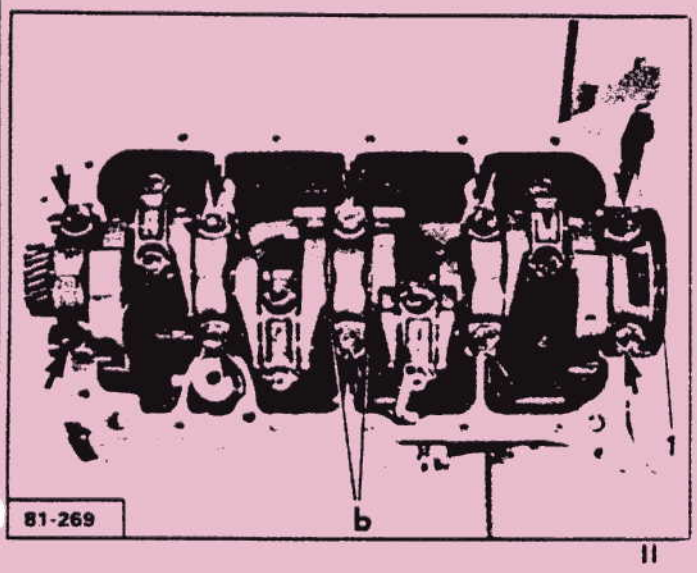
The connecting rod side float should be between 0.04 and 0.25 mm (it is not adjustable).



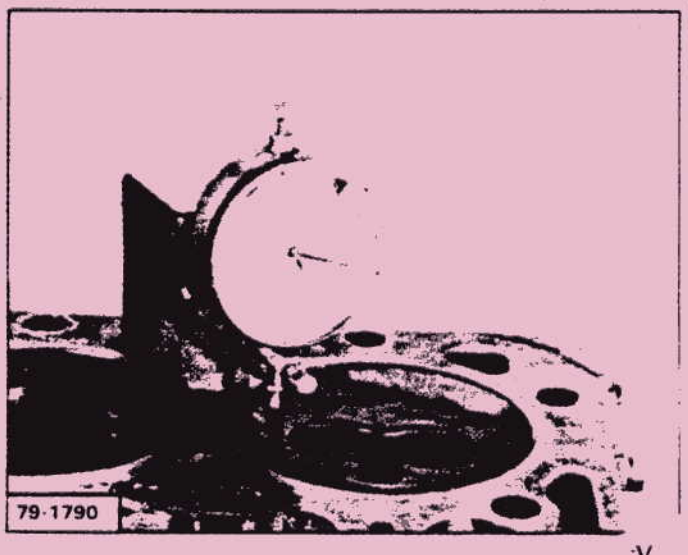
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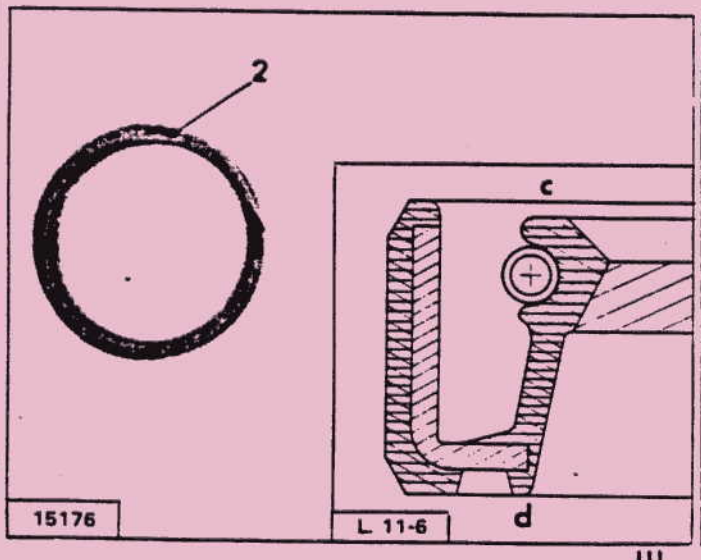
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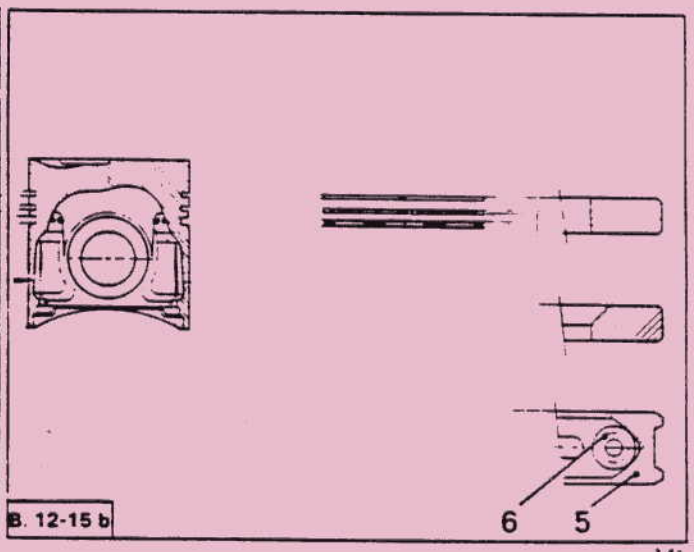
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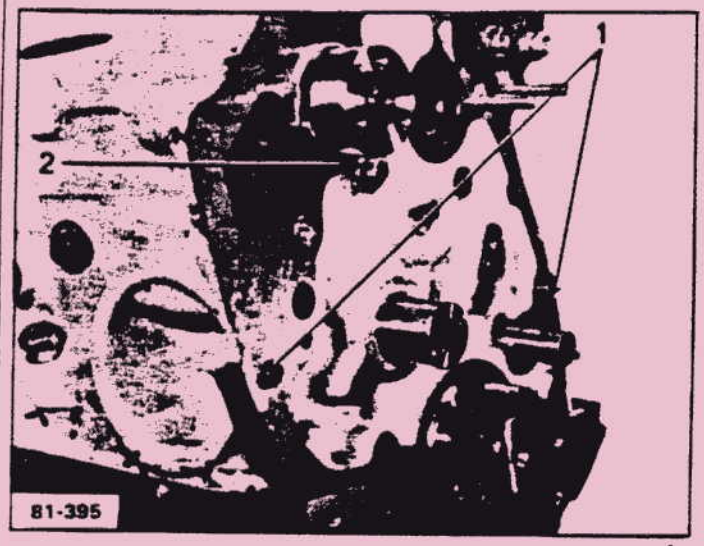
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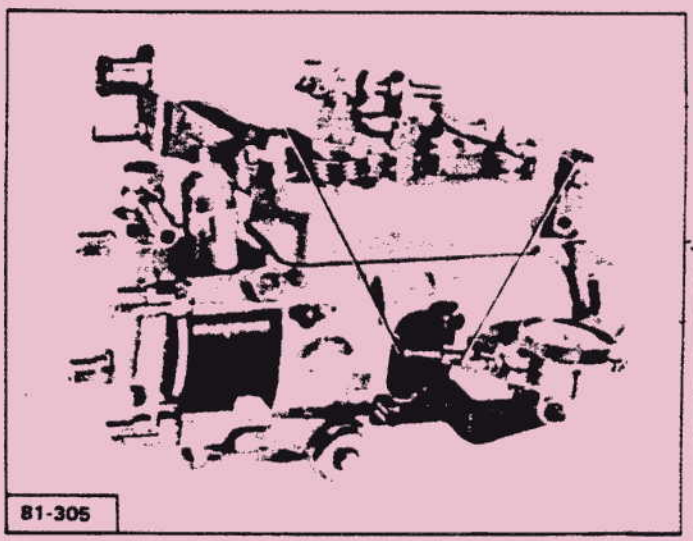
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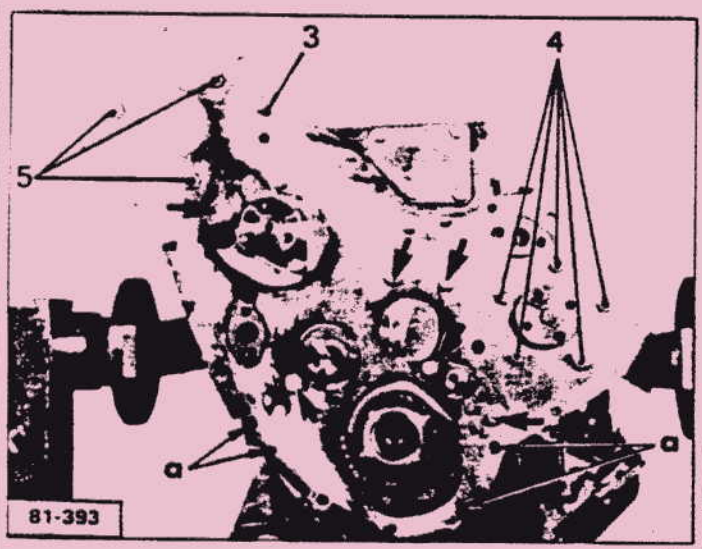
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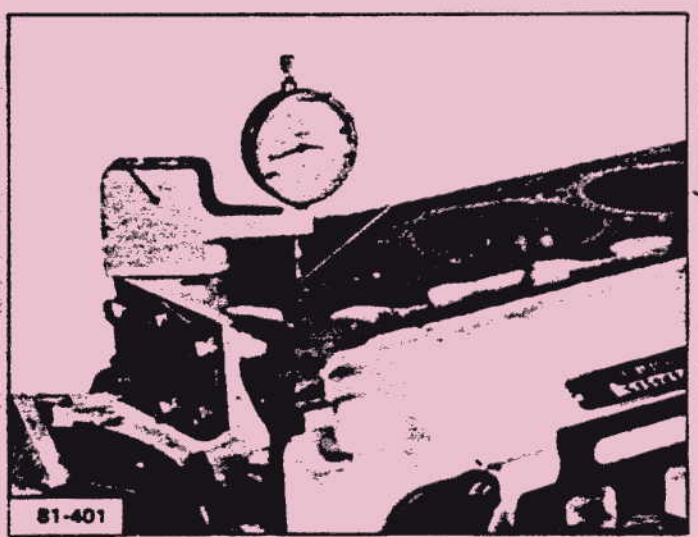
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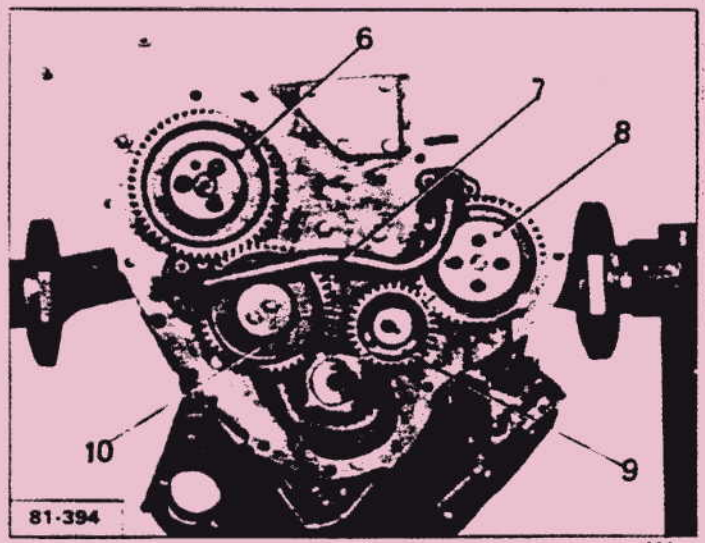
IV



II



V



III

Fitting the camshaft : Fig. I

Insert the camshaft into the cylinder block. Fit the thrust washer (2), of which there is only one thickness (5.41 mm) into the groove in the camshaft.

The camshaft end float should be between 0.05 mm and 0.36 mm (it is not adjustable).

Ensure that the locating dowels (1) are fitted to the cylinder block.

Fit :
- the sump, without tightening its bolts, after first having coated its locating faces and the bearing rubber seal with jointing compound,
- the front plate (3) equipped with a NEW gasket.

Fit the four housing aligning bolts at "a". Tighten the bolts (➡) on the sump front plate to a torque of 1.7 m.daN (17 Nm, 12 lbf ft).
Remove the four bolts "a".
NOTE - If the lock nuts (5) on the injection pump securing studs have been removed, refit them with LOCTITE (two drops on the thread lead-in of each) and tighten them to a torque of 1.7 m.daN (17 Nm, 12 lbf ft).

Fitting the oil pump : Fig. II

Fit the oil pump, using a NEW gasket.
Tighten the bolts (4) to a torque of 1.7 m.daN.

Fit the timing gears : Fig. III

(It is essential that the timing gear should be fitted before the cylinder head.

Fit the idler wheel (10) and the camshaft wheel (6).
Position the gear so that the timing marks are aligned.
Coat the base bolts with LOCTITE and tighten them to a torque of 3.2 m.daN (32 Nm, 24 lbf ft).
Fit the oil pipe (7) and the gears (8) and (9).

Fitting the ROTO-DIESEL injection pump and setting the timing Fig. IV and V.

NOTE - The pump is supplied by the Parts Department filled with a corrosion inhibiting fluid.
Drain the pump before fitting it to the engine.

Find the pump internal timing point
Remove the plate.
Fit from kit 8.0117 :
- dial indicator support AF,
- extension H,
- dial indicator F,
- dial indicator angle adaptor AG.

Turn the rotor in the normal direction of rotation of the pump (as shown by the arrow on the manufacturer's number plate) to bring the timing "V" groove in line with the dial indicator extension. Stop when the dial indicator pointer starts to move in the opposite direction (this means that the plunger is at its lowest point and corresponds to the No. 1 cylinder timing point).

Find the initial timing position :
Place the piston on No. 1 cylinder at the flywheel end) in roughy the TDC position by turning the crankshaft in the normal direction of rotation of the engine.
Check that the timing marks are in line, this means that No. 1 cylinder is on the compression stroke.
Place support 8.0110 H, fitted with dial indicator 8.1504 and extension 8.0316 M on the cylinder block with the dial indicator plunger against the piston of No. 1 cylinder (at the flywheel end). Find the piston TDC position.
Place the 0 on the dial indicator dial in line with the large pointer on the dial, at the exact moment when the pointer starts to change direction and note the position of the small pointer.
Turn the crankshaft back by approximately a quarter turn and set No. 1 cylinder on its injection point, which is :

5.12 mm or 24° } before TDC

Fitting the injection pump and setting the timing : Fig. I

Place the injection pump in position on the engine front plate, using a NEW gasket and moving it as far as it will go in an outward direction, as shown by the arrow (➡).
Tighten the nuts finger tight (against the load distribution plates).
Place the connecting lug (2) between the pump rear mounting point and the engine mounting point (tighten the bolts finger tight).
Check that the pump is on its internal timing position.
Fit the pump drive gear.
Tighten the bolts to a torque of 2.5 m.daN (25 Nm, 18 lbf ft).
Move the pump towards the engine until the dial indicator pointer starts to move in the opposite direction (which shows that the dial indicator extension has reached its lowest point).
Tighten the pump securing nuts (1) to 3 m.daN.
Tighten the bolts that secure the rear mounting connecting lug (2).

The dial indicator pointer should not move when the bolts are tightened.

Check the pump timing : Fig. II

Return the piston to T.D.C. and check that the dial indicator 8.1504 is still on its correct setting.
Move the crankshaft back through one quarter of a turn then turn it in its normal direction of rotation until the pump internal timing point is reached.
In this position, the dial indicator 8.1504 should indicate the initial timing figure of :
5.12 ± 0.03 mm before T.D.C.
If it does not, check the injection pump timing.

REMARK : If the pump is as far as it will go on its slots and the correct timing still cannot be obtained, the pump is to be refitted.

Remove the dial indicator and its support and also the dial indicator extension.
Fit the cover plate to the injection pump and seal its bolts.

Fit the timing cover : Fig. III

Fit :
- a NEW timing cover gasket,
- the timing cover,
- the shakerproof washers under the nuts (5),
- the copper washer under bolt (4),
- the lifting eye (3).

Tighten the cover securing nuts and bolts to a torque of 1.7 m.daN (17 Nm, 12 lbf.ft).

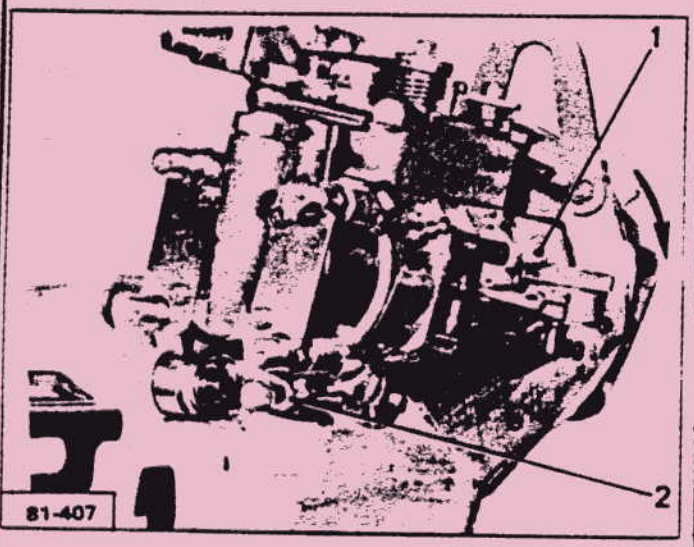
Fit the oil suction pipe : Fig. IV and V

Fit to the pipe (6) :
- flange (9),
- O-ring seal (8),
- plate (7),
- paper gasket (a).

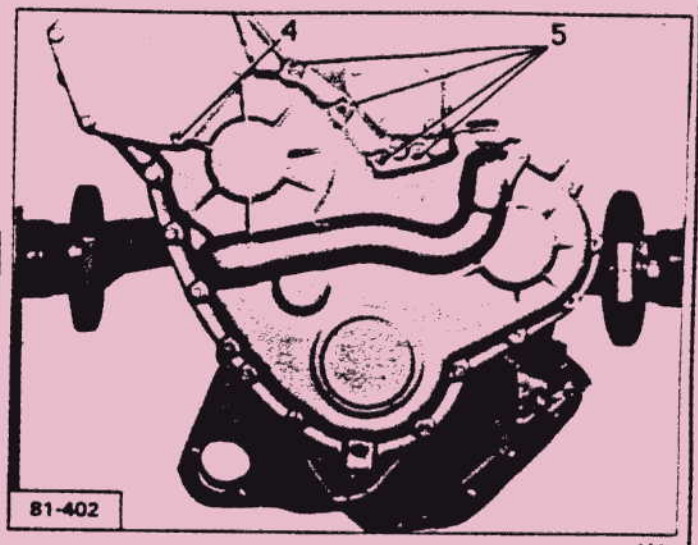
Fit the suction pipe and tighten the bolts (➡).

Fit the oil strainer : Fig. VI

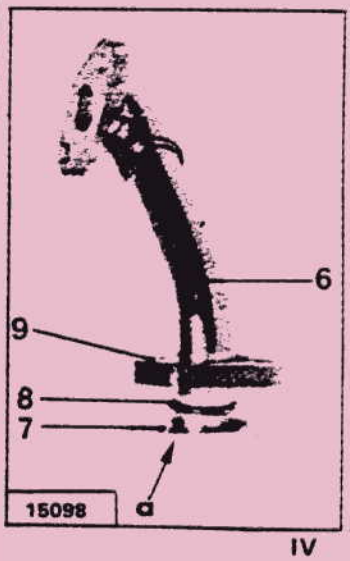
Fit the anti-frothing plate (10).
Fit the strainer (11) and its O ring seal.
Fit and tighten the bolts (12).
Fit the sump cover, using a NEW gasket.
Tighten the bolt.



I



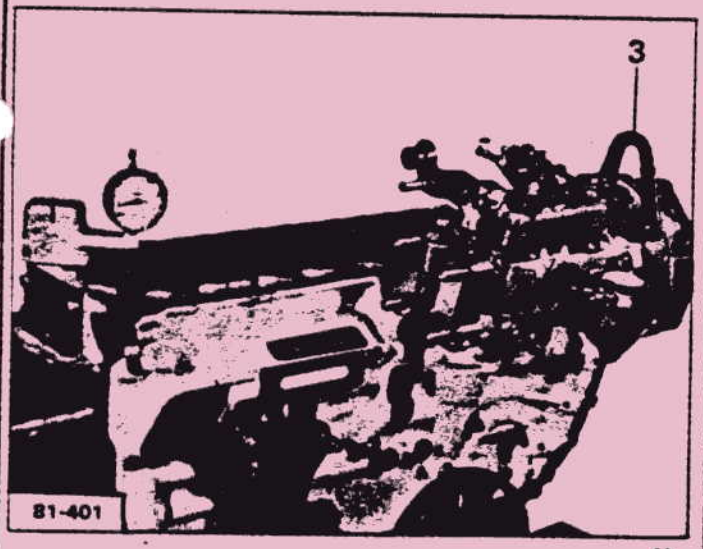
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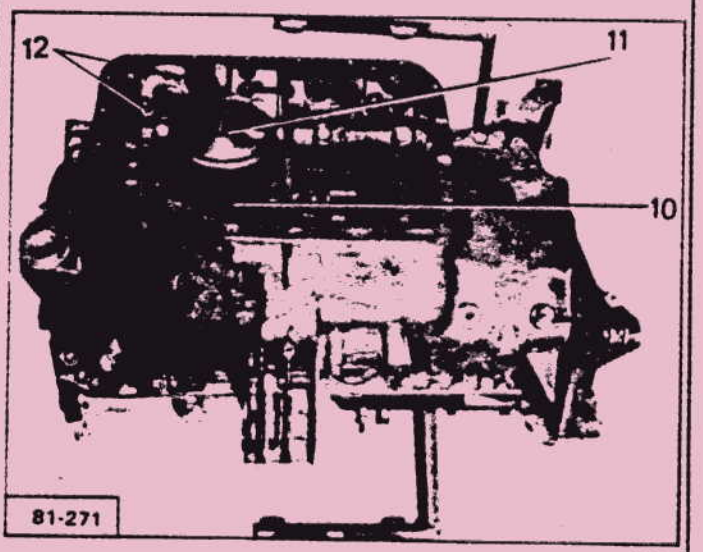
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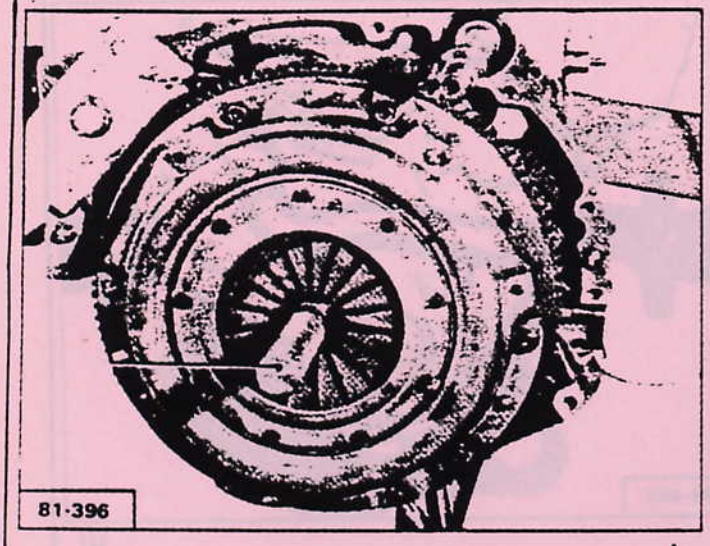
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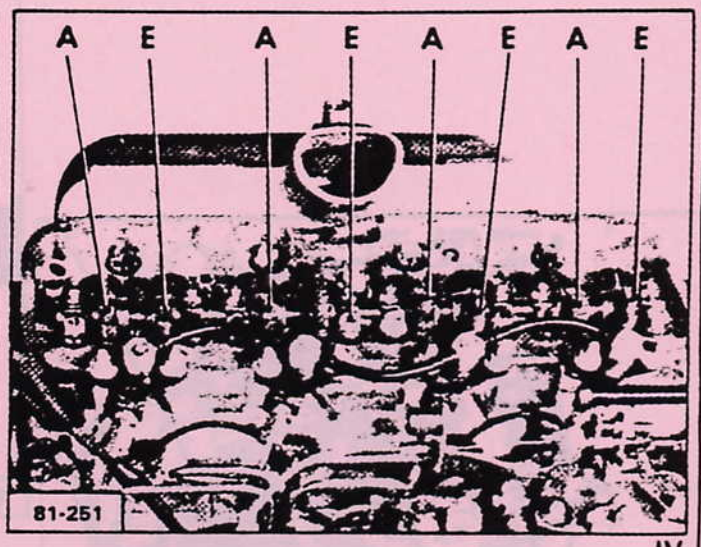
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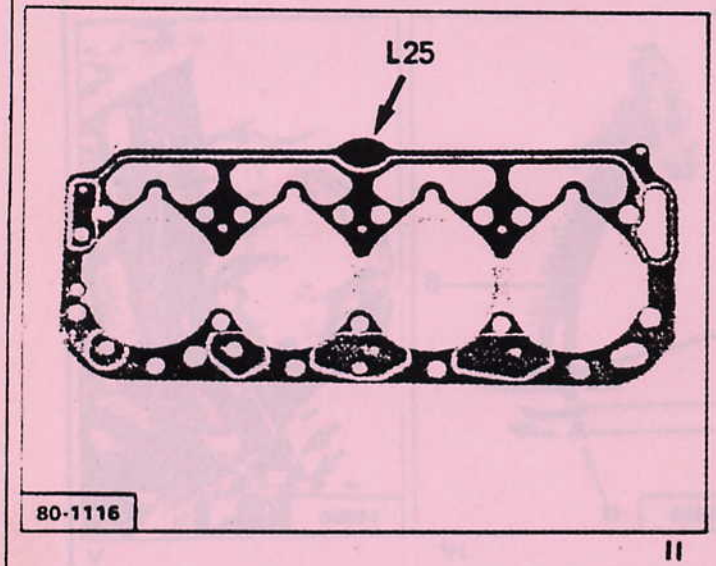
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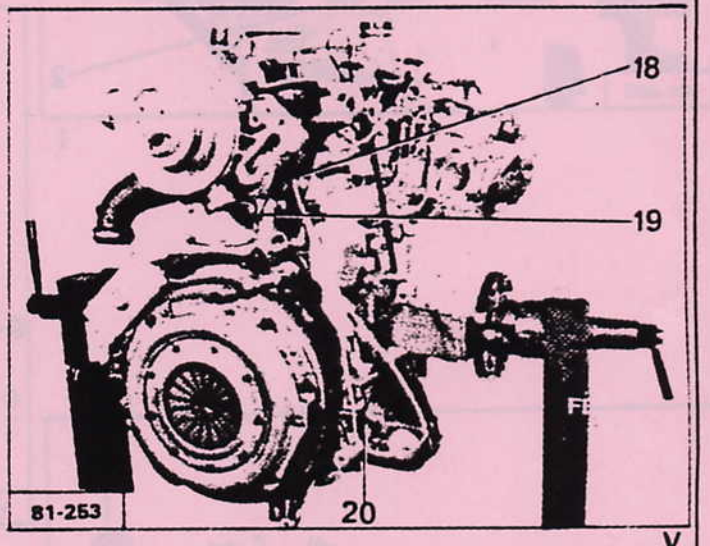
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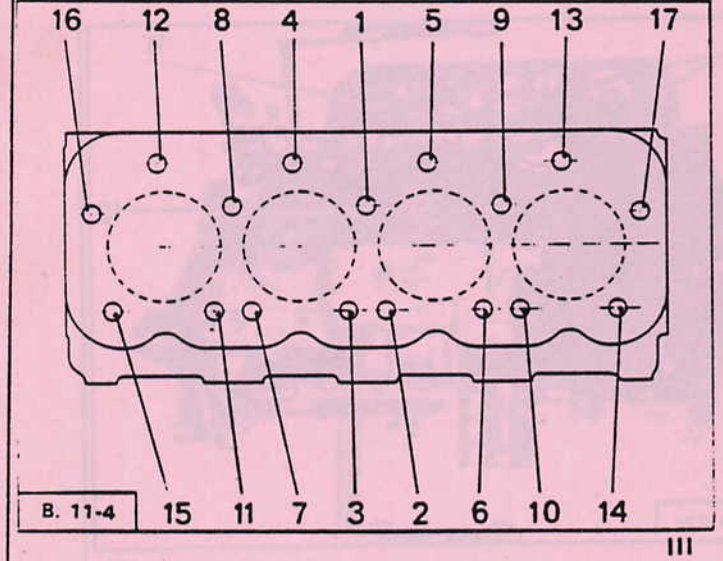
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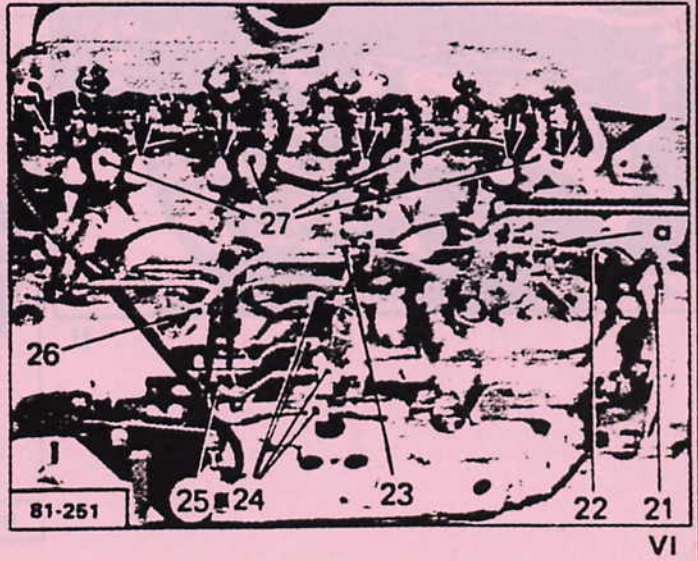
II



V



III



VI

Fitting the flywheel : Fig. I

Fit the new bolts, coated with LOCTITE and tighten them to a torque of 9 m.daN (90 Nm, 66 lbf ft).

Fit the clutch friction disc and mechanism using mandrel 8.0212.
Tighten the bolts to 3.5 m.daN (35 Nm, 26 lbf ft).

Fit the cylinder head : Fig. II and III

Fit the tappets and push rods.
Fit the cylinder head gasket.

Check that the cylinder head gasket is marked with the reference L25 on its tab.
This gasket is to be fitted dry (it must not be coated with linseed oil) : Fig. II.

Fit the cylinder head :

Before fitting it :
- Clean out the threads in the block.
- Lubricate the bolt thrust faces and threads with gear oil.
- The washers are to be fitted, unlubricated, with their tags on the cylinder head side.

Initially tighten the bolts to a torque of 6 m.daN (60 Nm, 55 lbf ft).

Finally tighten them to a torque of 10.5 m.daN (105 Nm, 77 lbf ft).

For the bolt tightening order : see Fig. IV.

Adjust the valves clearances : in Fig. IV.

A = Inlet = 0.30 mm
B = Exhaust = 0.20 mm

Fit : as shown in Fig. V

- the oil pipe (19),
- the diagnostic wiring harness (18),
- the T.D.C. pick-up (20).

Connect up the fast idle cable : Fig. VI.

Fit the cable cover (26) and the cable cover end clamp (23).
Pass the cable through the idling speed stop and fit the cable clamp (22).
Push the cable clamp as far as it will go in direction (a) and tighten its nut whilst holding the cable tight.
Fit lug (21) and the idling return spring.

Fit the injection assembly : Fig. VI

Fit the injection pipes assembly (25) and position the injectors so that the pipes are not under stress.

Tighten the nuts (➡) to a torque of 2.4 m.daN (24 Nm, 18 lbf ft).
Tighten the union screws (27) to a torque of 1 m.daN (10 Nm, 7 lbf ft).
Tighten the unions (24) on the injection pipes to a torque of 2.4 m.daN (24 Nm, 18 lbf ft).

Remove the engine from its cradle using lifting sling 8.0102 X and hooks G.

Fit :
- the oil filter cartridge support,
- the oil filter cartridge (spanner 8.1404).

Fill the engine with oil.

TOOLS REQUIRED

SPECIAL TOOLS

I

From engine overhaul kit (-).0157 :

A - Mandrel for fitting camshaft double lip seal.

B - Mandrel for fitting crankshaft double lip seal.

C - Mandrel for fitting oil pump double lip seal.

D and E - Centralising rings for timing gear plate.

H and J - Extractor, injection pump gear.

K - Balance weight, adjusting belt tension.

II

From engine kit (-).0132.

III

(-).1504 - Dial indicator gauge.

IV

From engine kit (-).0110 :

H - Dial gauge support.

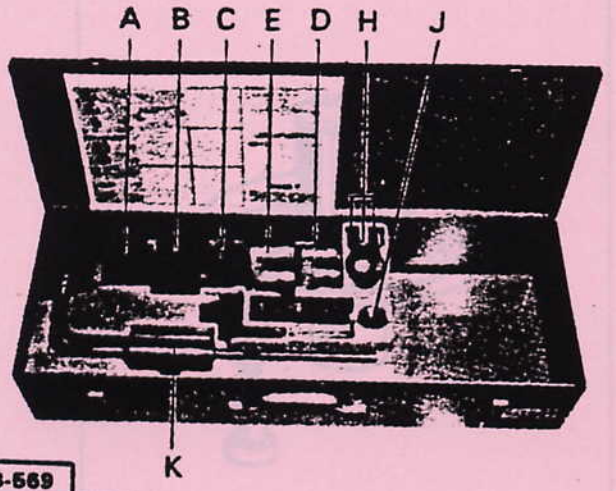
V

AB - Fitting ring to crankshaft oil seal, flywheel end.

AC - Seal fitting plate.
(used with AB and 2 flywheel bolts).

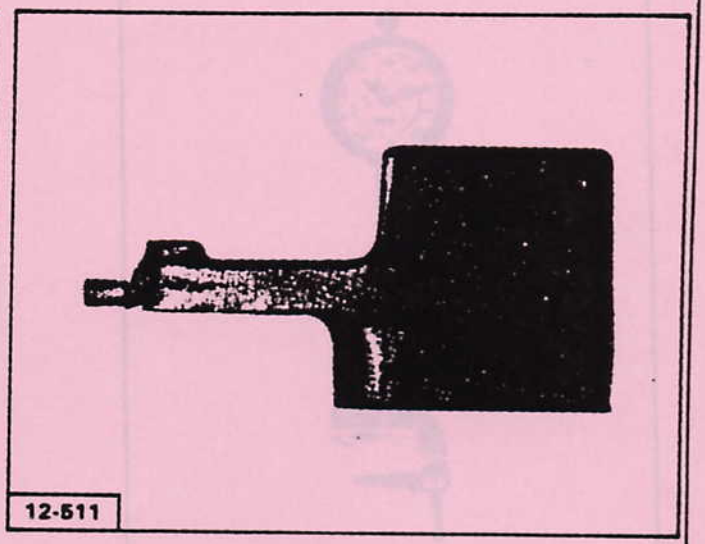
VI

(-).0212 - Reversible mandrel, for centralising the clutch plate.



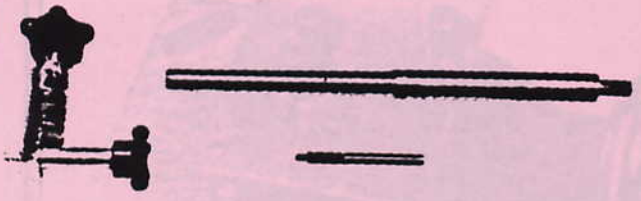
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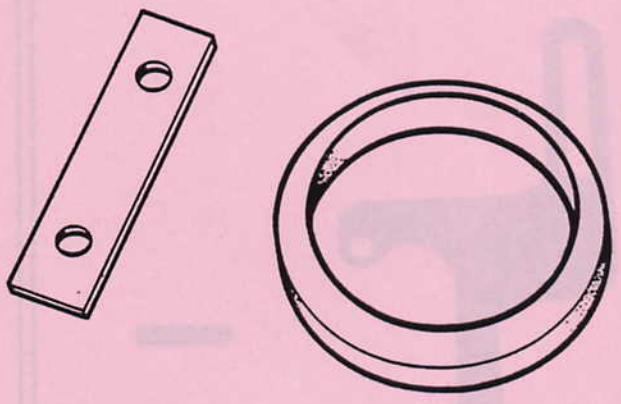
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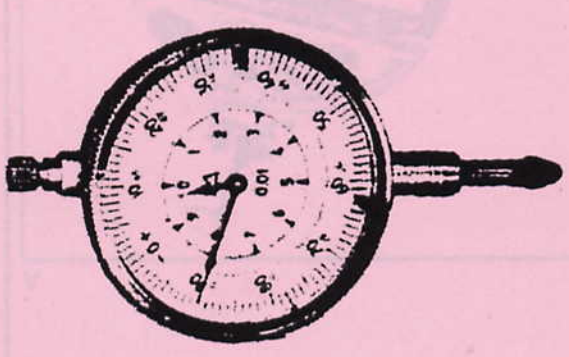


78-328

II



V



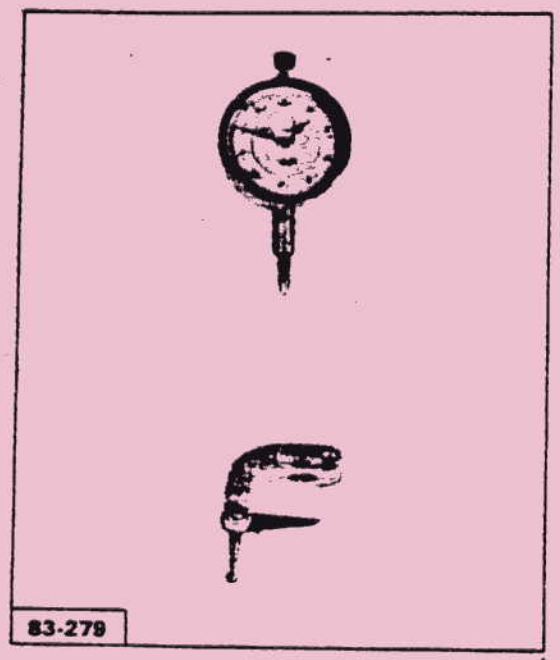
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IIII

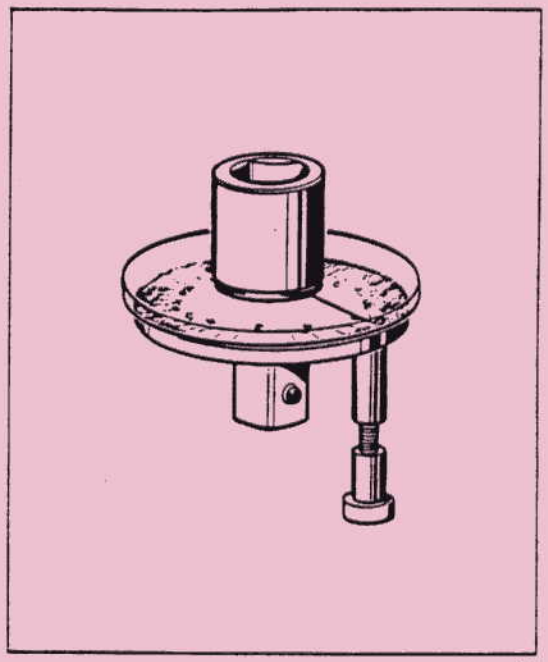


81-813

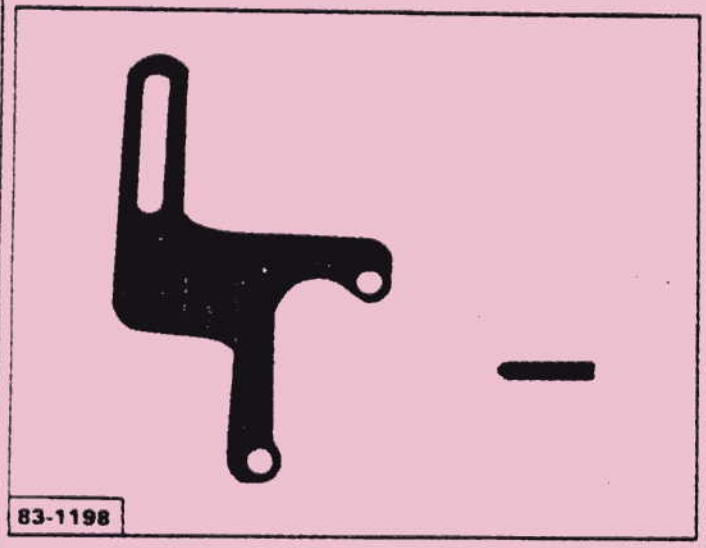
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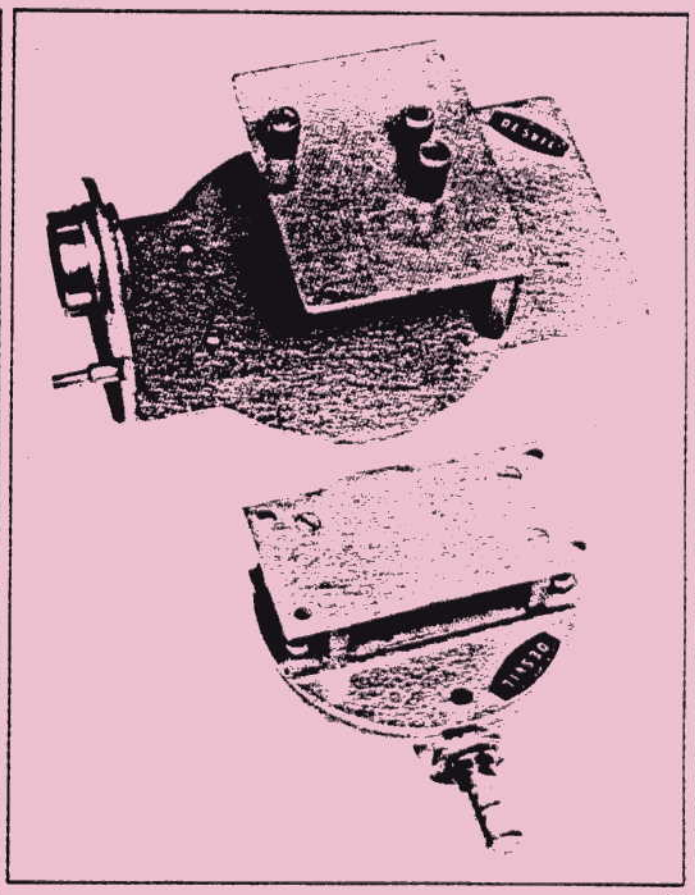
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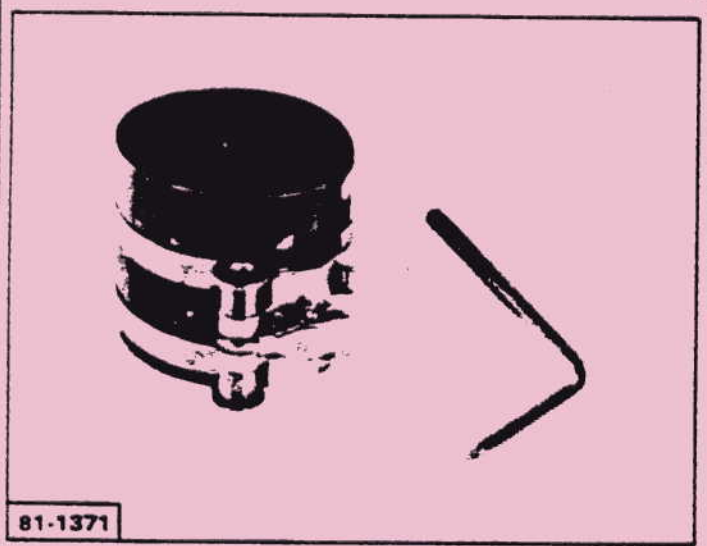
IV



II



V



III

TOOLS REQUIRED

SPECIAL TOOLS (continued)

I

From injection pump calibration kit (-).0117:

F - Dial gauge for pump.

AG - Bell crank for pump.

II

AL - Dial gauge support for pump (special for U25/661 engine).

H - Plunger for ROTO-DIESEL pump.

III

RECOMMENDED TOOLS

Piston ring compressor.

IV

Angular tightening tool for cylinder head bolts. FACOM D 360 (Part Number 9770.42).

V

DESVIL engine overhaul fixtures.

Support for U25/651 and 661 diesel engine ref. 153/3 (see Workshop Materials and Equipment Brochure).

Standard support ref. 126 (see Workshop materials and Equipment Brochure).

TIGHTENING TORQUES

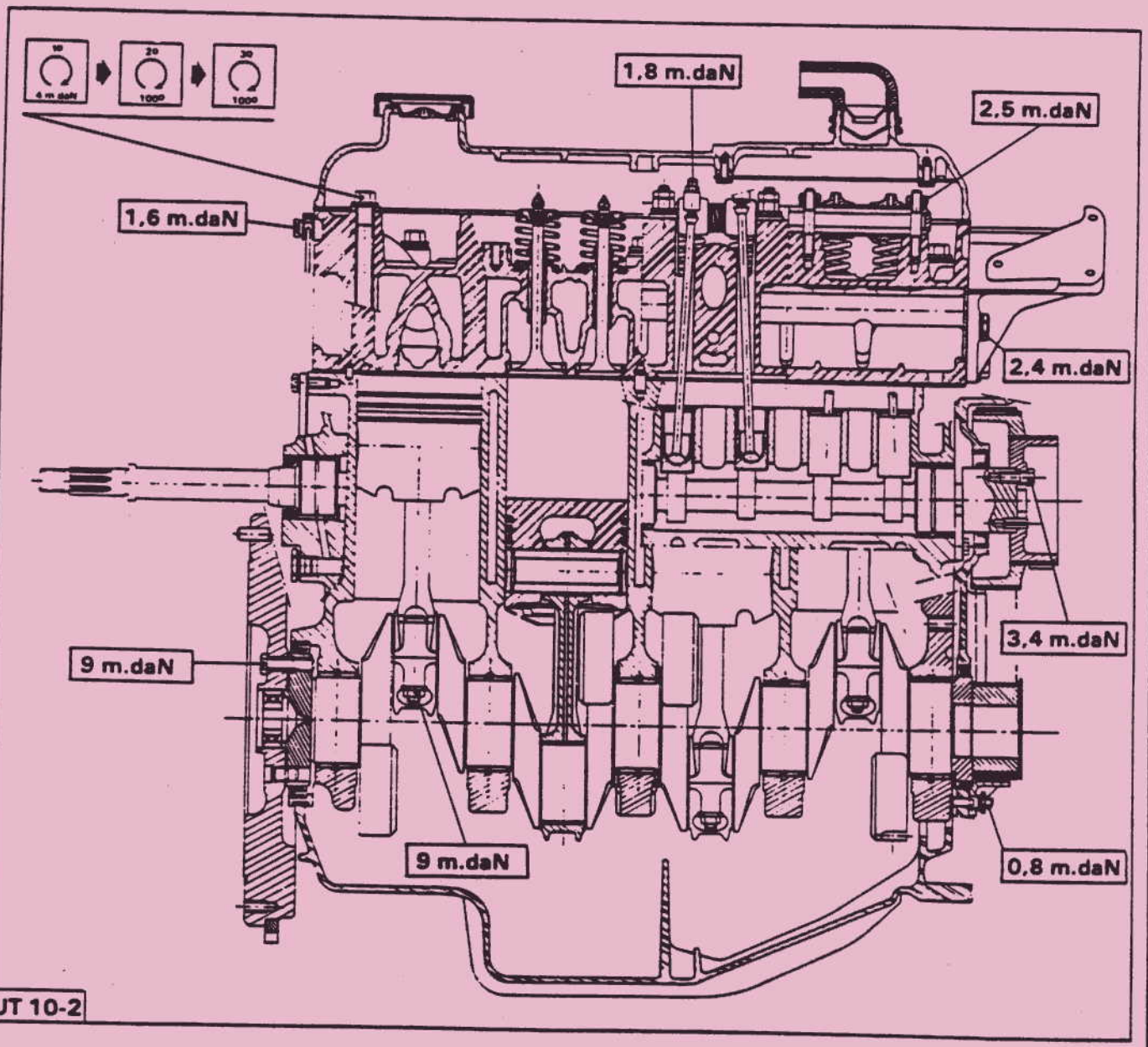
ESSENTIAL tightening torques (use a torque spanner) 

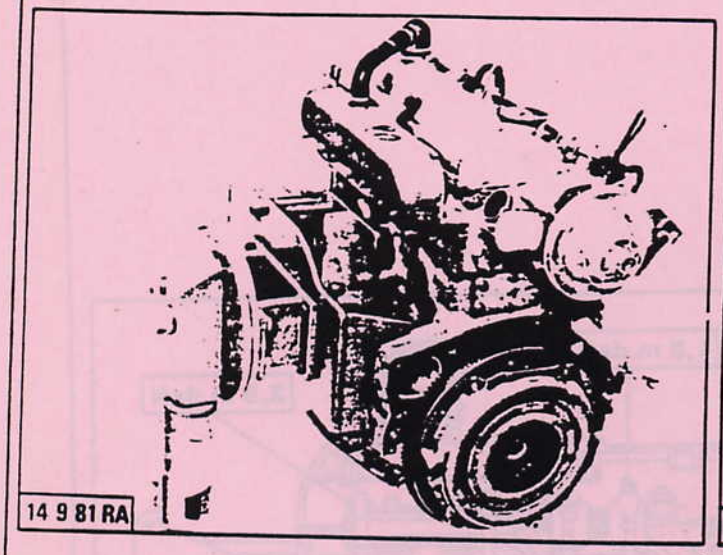
Item	Torque		Remarks
	m.daN	lbf ft	
Main bearing cap bolts	9.5	70	Fit new bolts on re-assembly
Fast idle control thermostatic pick-up	1.75	13	Assemble with LOCTITE SEAL

Recommended tightening torques :

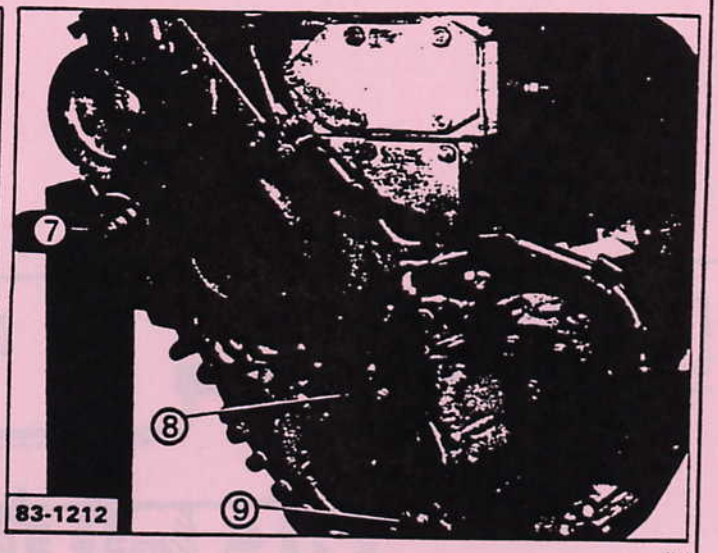
Item	Torque		Comments
	m.daN	lbf ft	
Camshaft gear securing bolt	34	250	
Oil pump gear securing bolt	2.1	15	
Injection pump gear securing nut	6	44	
Lower crankcase bolts	1.6	12	
Sump plate bolts	1.1	8	
Timing gear plate bolts and nuts	1.5	11	
Bolt, camshaft thrust plate	1.6	12	
Injection pump fixing bolt and nut	2.2	16	Fit with THREADLOCKING LOCTITE
Injection pipe retaining nuts	2.3	17	
Banjo bolts, injector leak-off pipes	0.9	7	
Injector clamp nuts	2.35	17	
Pre-heater plugs	2	15	
Cylinder head lubrication pipe union	1.6	12	Copper washer
Oil drain plug	4	30	Copper washer
Cylinder block coolant drain plug	3.5	26	Copper washer
Bolt, engine mounting to cyl. head	2.4	18	Copper washer

The figures illustrated are the tightening torques in m.daN.
1 m.daN = 7.38 lbf ft.

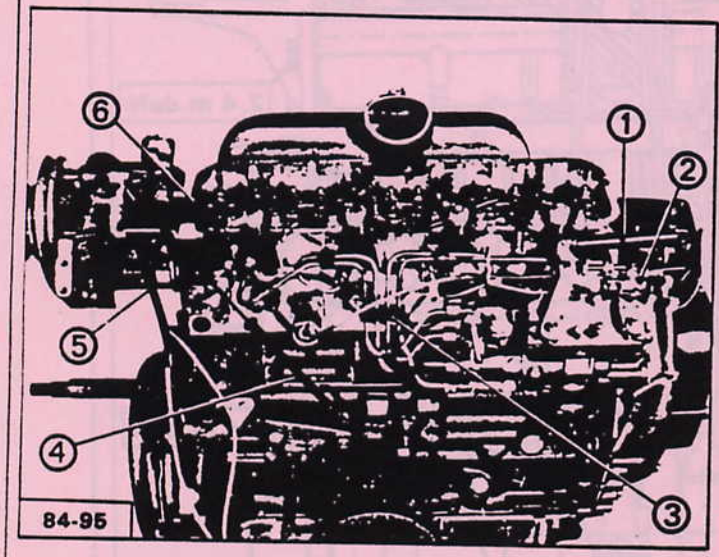

1,8 m.daN
2,5 m.daN
1,6 m.daN
2,4 m.daN
3,4 m.daN
9 m.daN
9 m.daN
0,8 m.daN
UT 10-2



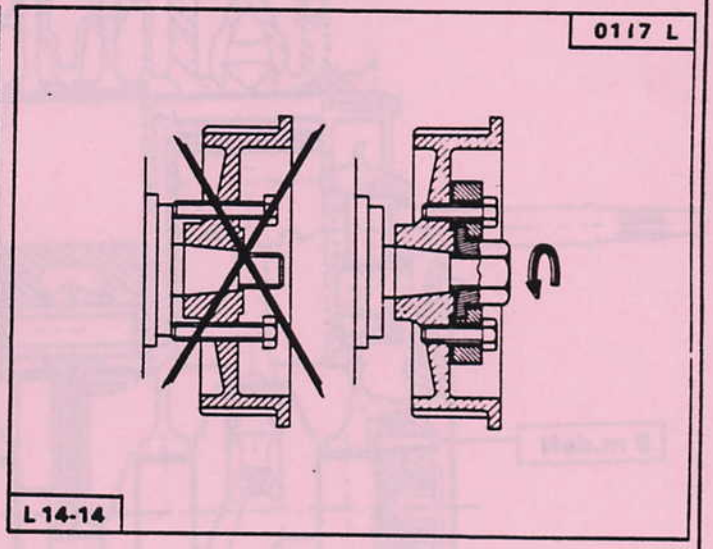
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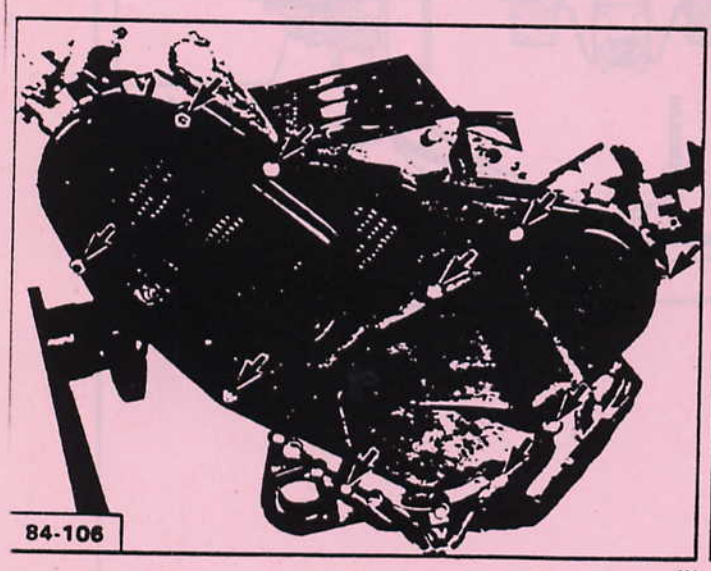
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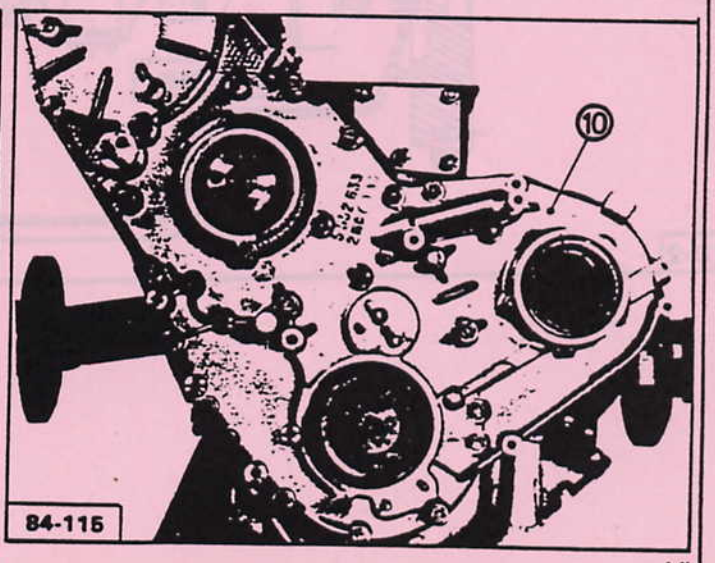
II



V



III



VI

The method described here has been carried out on an unapproved fixture.

Use the DESVIL fixture fitted with supports referred to on the "Special Tools" page.

DISMANTLING

Remove :
- the starter motor,
- the exhaust manifold,
- the cylinder block coolant drain plug,
- the dowel pin located at → Fig. I,
- the oil pump inlet pipe.

Attach the DESVIL engine support to the cylinder block using two bolts :
- on M 12 x 1,75 x 70,
- one M 7 x 1,00 x 60.

Mount the assembly to the stand fitted with the standard support Fig. I.

Drain the engine.

Remove : Fig. II
- the cylinder head cover,
- the fast idle control (2) and the spring (1),
- the injector pipes assembly,
- the diagnostic harness (5),
- the dipstick tube (4),
- the cylinder head lubrication pipe (6),
- the rocker shaft assembly,
- the push rods (mark their positions),
- the cylinder head bolts.

Lift off the cylinder head and its gasket.

Remove the tappets (mark their positions).

Remove the upper and lower timing covers Fig. III.

Remove : Fig. IV and V :
- the damper (9),
- the belt tensioners (7) and (8),
- the pump and timing gear belts,
- the camshaft and oil pump gears.

- the injection pump gear Fig. V, using tool (-).0117 H and J,
- the oil supply pipe,
- the oil pump and the injection pump.

Remove the nuts and bolts and lift off the timing gear plate (10).

Remove : Fig. I

The camshaft thrust plate (1).

Remove the camshaft.

Remove :

- the clutch assembly,
- the flywheel,
- the sum plate,
- the lower crankcase (2) (bolt) Fig. II.

Remove the piston/connecting rod assemblies : Fig. III.

Mark the positions of the pistons in relation to their bores.

DO NOT INTERCHANGE BIG END CAPS

- remove the big end caps (3),
- remove each piston/connecting rod assembly when it is at T.D.C.

Remove the crankshaft Fig. III

- remove the main bearing caps (4),
- lift out the crankshaft,
- remove the bearing shells and the thrust washers.

Strip the cylinder block : Fig. IV.

Remove :

- the dipstick guide,
- the front and rear (5) coolant circulation plates,
- the oil gallery plugs (6).

Clean the threads in the cylinder block.

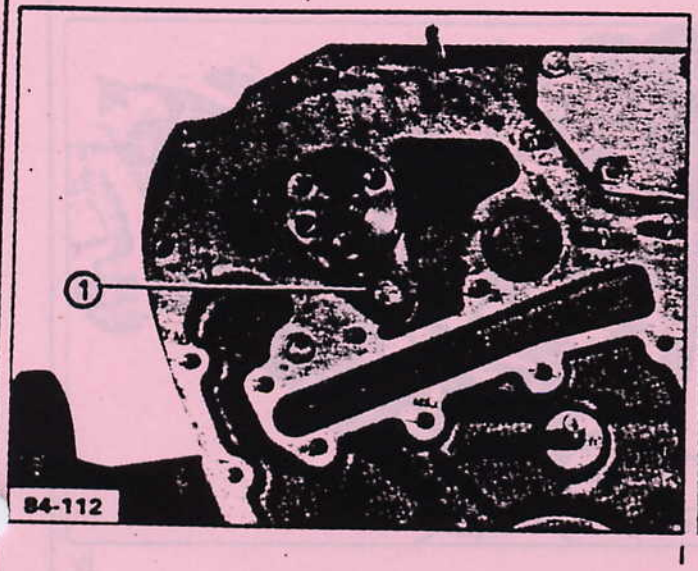
Dismantle the piston/connecting rod assemblies, Fig. V.

- remove the piston rings,
- remove the gudgeon pin circlips,
- remove the gudgeon pins.

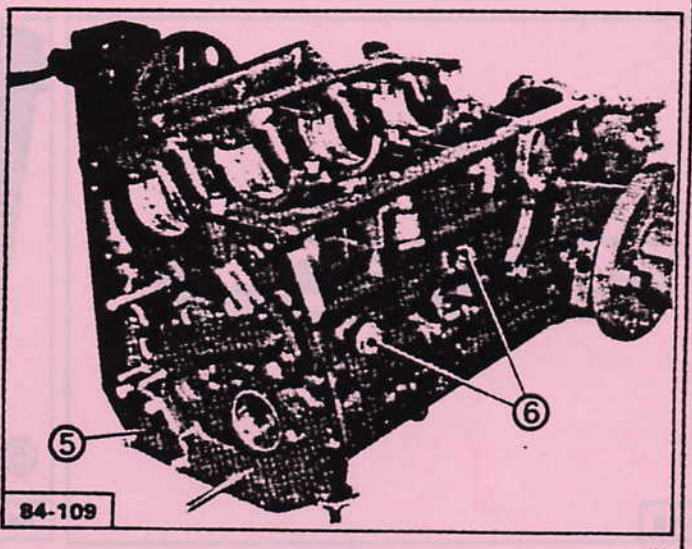
Dismantle the oil pump Fig. VI.

- remove the circlip and withdraw the relief valve,
- separate the pump body.

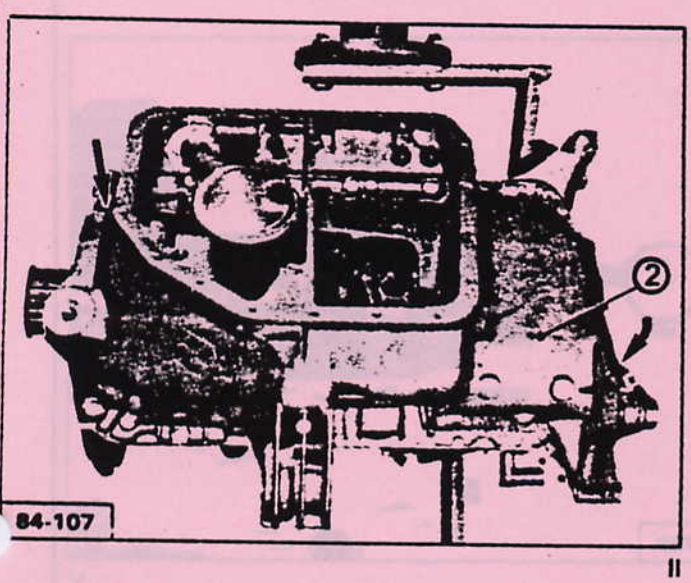
CLEAN THE PARTS AND CHECK THEIR CONDITION TEST IF NECESSARY



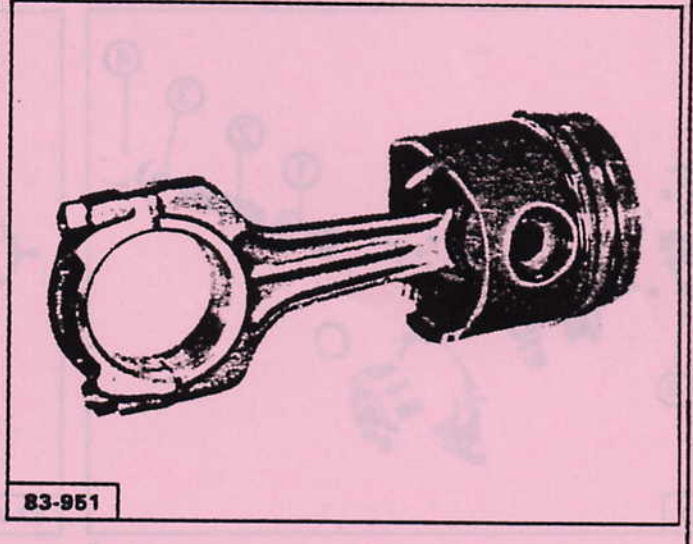
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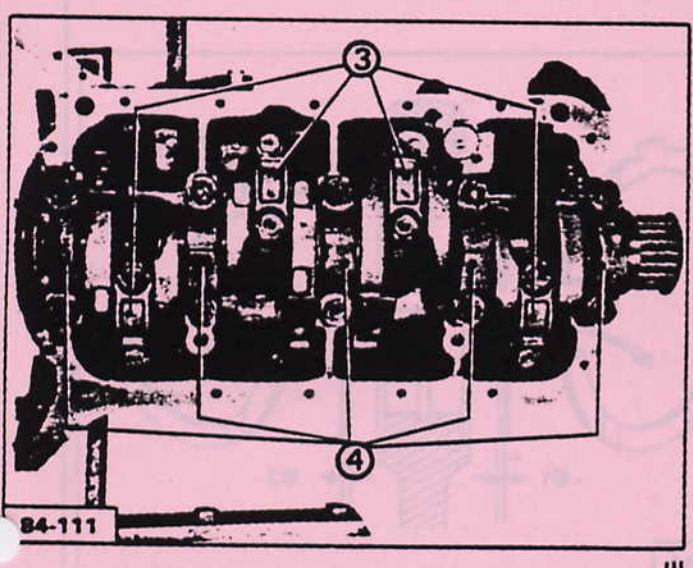


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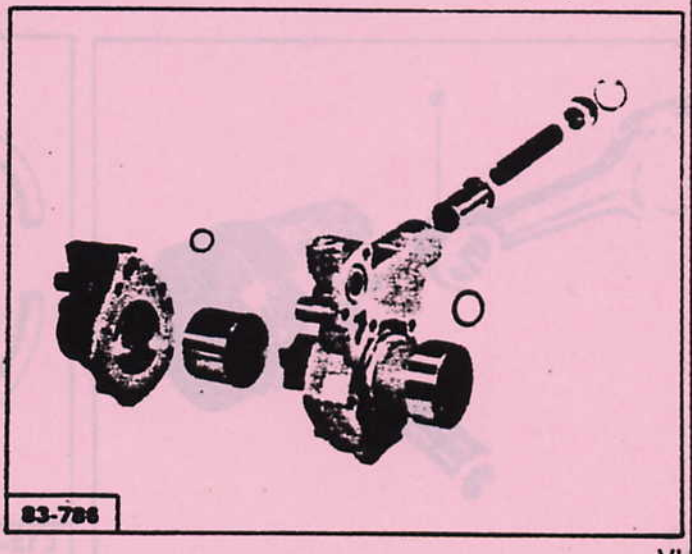


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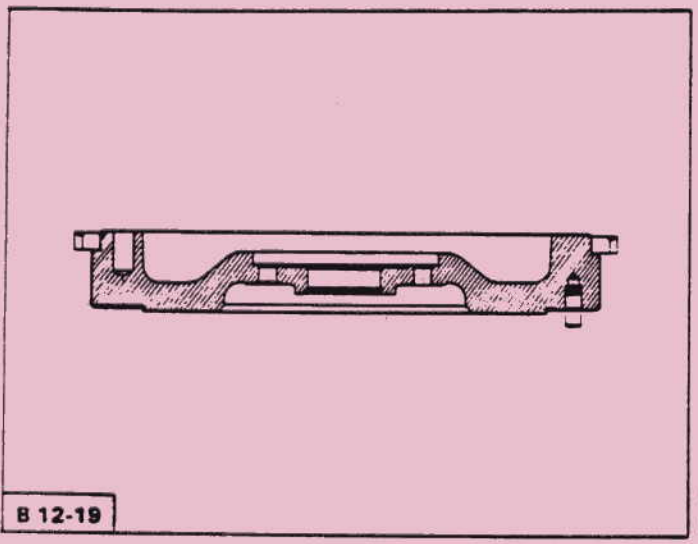




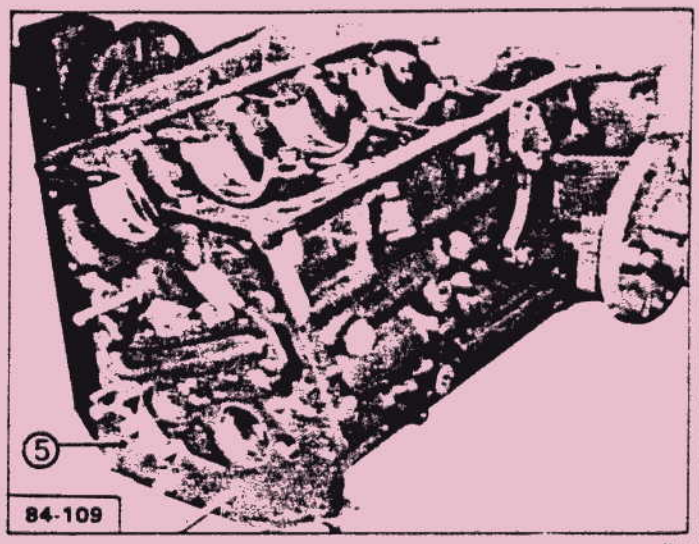
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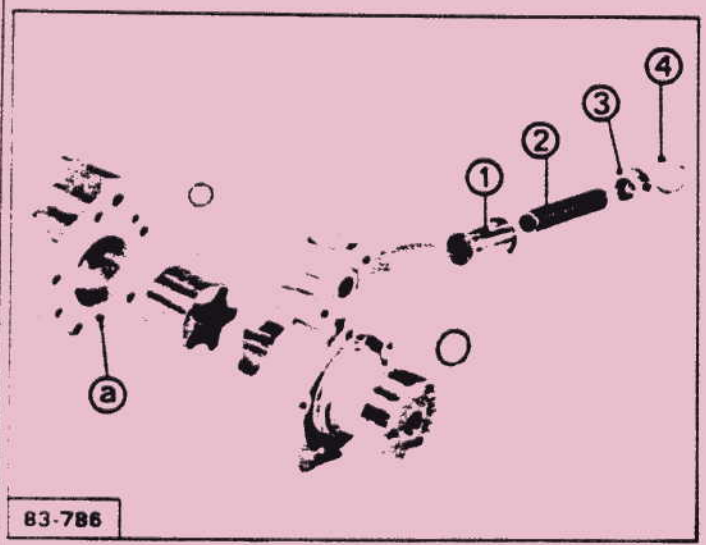
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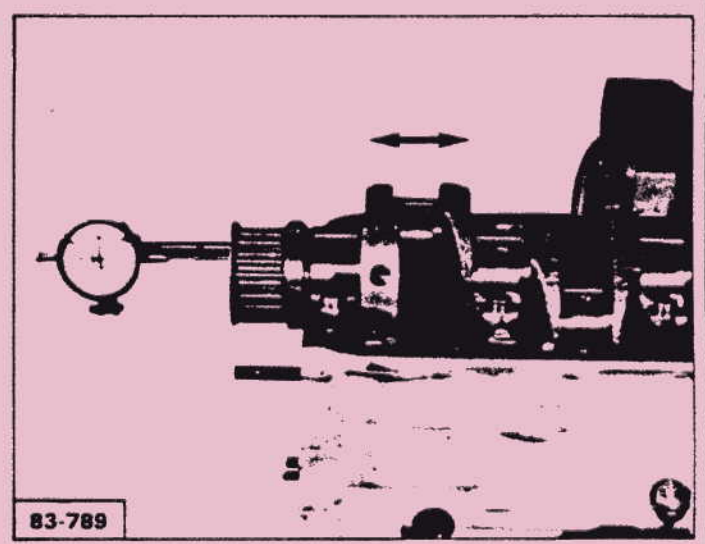
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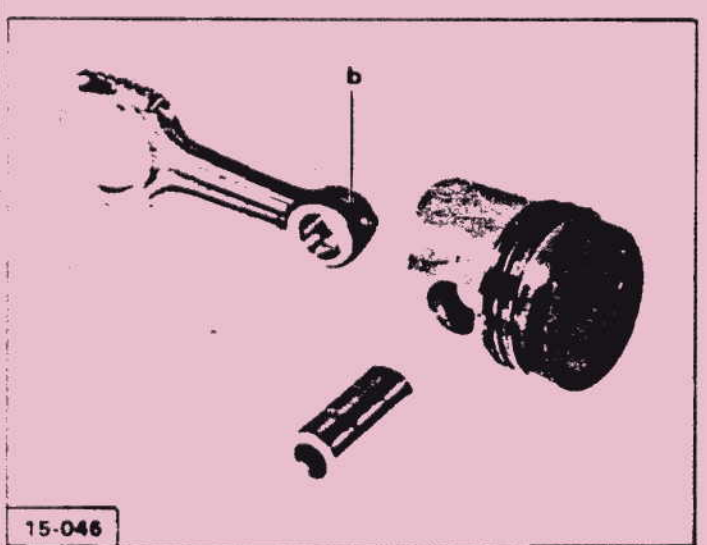
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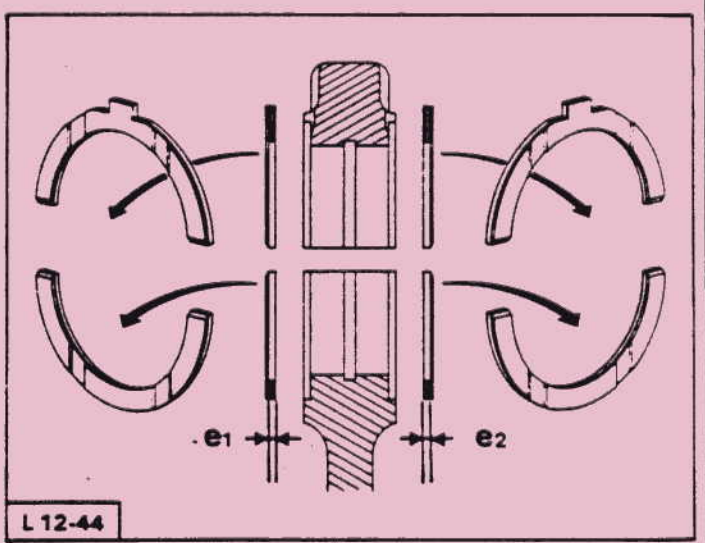
II



V



III



VI

RE-ASSEMBLY

DURING THIS OPERATION ALL THE MOVING PARTS MUST BE OILED

Prepare the flywheel Fig. I.

Change the spigot bearing (if necessary).

Replace the starter ring gear (if necessary).

Check the ring gear run-out : 0.3 mm max.

Prepare the oil pump : Fig. II.

Coat the edge "a" of the pump body with LOCTITE SEAL :

Position in the pump body :

- the drive shaft,
- the oil pump gears,
- assemble the pump.

Assemble the pressure relief valve :

- the piston (1),
- the spring (2),
- the plug (3) with its washer,
- the circlip (4).

Assemble the pistons to the connecting rods Fig. III

Position the connecting rod so that the spray hole "b" is towards the cut-out in the piston crown.

Fit one of the gudgeon pin circlips.

Offer up the connecting rod and fit the gudgeon pin.

Fit the circlip.

Dress the cylinder block : Fig. IV.

Fit the oil gallery plugs.

Fit the coolant circulation plates (5).

Fit the dipstick guide parallel to the axis of the block and directed towards the flywheel.

Fit the crankshaft Fig. IV.

Fit :

- the bearing shells to the block and to the main bearing caps,
- the crankshaft,
- the upper half thrust washers to each side of the centre main bearing to obtain an end float of :

0.045 to 0.16 mm.

This end float is checked using tool (-).0132. E1, E2, E3 see Fig. V.

End float is adjusted by fitting thrust washers.

These washers have a grooved anti-friction face which MUST be towards the crankshaft Fig. VI.

Grades of thrust washers :

Thickness (e) :	I	- 3.10 to 3.14
	II	- 3.14 to 3.18
	III	- 3.18 to 3.22
	IV	- 3.22 to 3.26

The thrust washers on the same side of the centre bearing must be the same thickness, but the two sides can be different. ($e1 \neq e2$).

Fit the main bearing caps : Fig. I and II.

NOTE : Before fitting No. a (flywheel end) main bearing cap, coat the shaded face "a" with LOCTITE SEAL. Do not use too much, as it must not form runs.

IMPORTANT - The main bearing cap bolts must be renewed on re-assembly.

Fit the lower thrust washers at "b" and fit the main bearing caps.

Tighten the bolts ( ), with the threads oiled, to 9.5 m.daN (70 lbf ft).

Fit the seal (1) to the channel in No. 1 (flywheel end) bearing cap.

Before fitting the oil seal (2), oil the lips and the seal housing. The arrow must correspond to the direction of engine rotation (anti-clockwise, viewed from the flywheel end).

Oil the entry cone of tool (-).0110 AB and fit the seal over it.

Using 2 flywheel bolts, fit the seal into its housing as shown in Fig. III.

Withdraw the ring AB with a turning movement.

Fit a new camshaft oil seal (3) using a socket or tube with an outside diameter of 35 mm.

Fit the piston/connecting rod assemblies without piston rings.

Fit the bearing shells to the connecting rods and caps.

The upper shell has a groove and a lubrication hole.

Fit the piston/connecting rod assembly in the bore with the crankpin at T.D.C.

According to its nominal diameter the piston must be proud of the block face by :

Diameter (mm)	Protusion (mm)	
93	0.5	+ 0.05 – 0
93.25	+ 0.47	
93.50	0.44	
93.75	0.41	

Check using dial gauge (-).1504 and support (-).0110 H.

If incorrect, rectify the piston height.

Fit the rings to the pistons. The gap in the oil control ring (6) must be at 180° to the gap in the expander (5) Fig. V.

Note - The rings have an inscription engraved on a face near the gap. This face must be fitted towards the top.

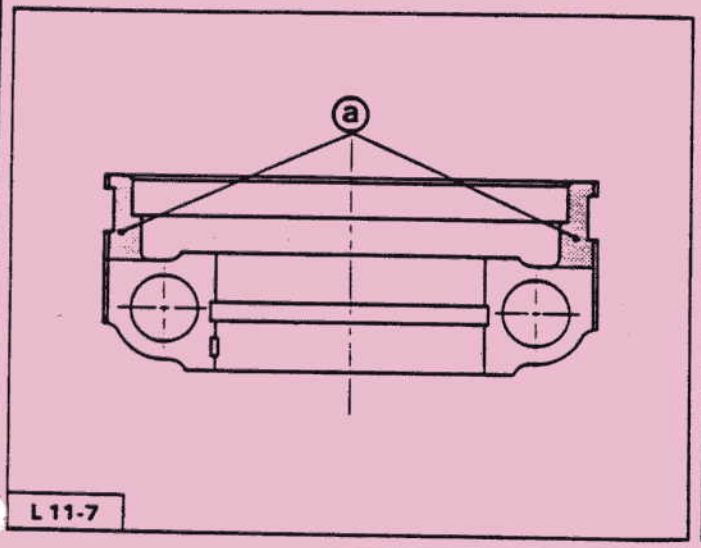
Stagger the gaps at 120° to each other.

Fit the piston/connecting rod assembly with the crankpin at T.D.C., with the cut-out in the piston crown towards the camshaft. Use a piston ring compressor.

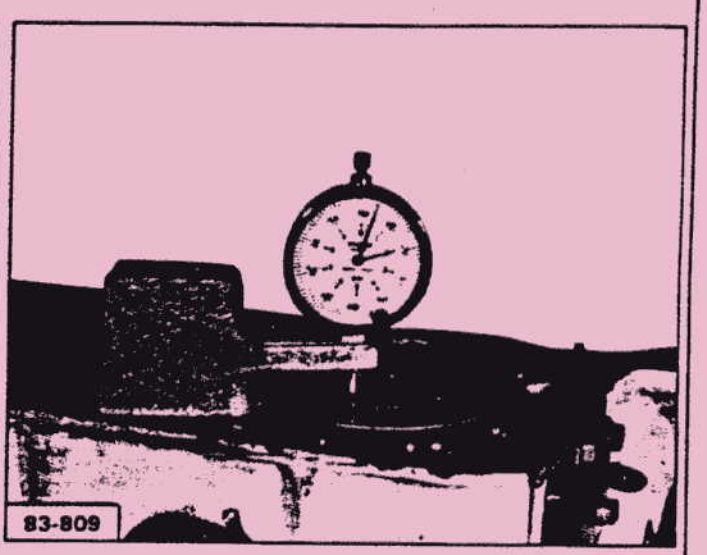
Important - New big end bolts must be fitted on re-assembly.

Tighten the big end bolts to 7.6 m.daN (56 lbf ft).

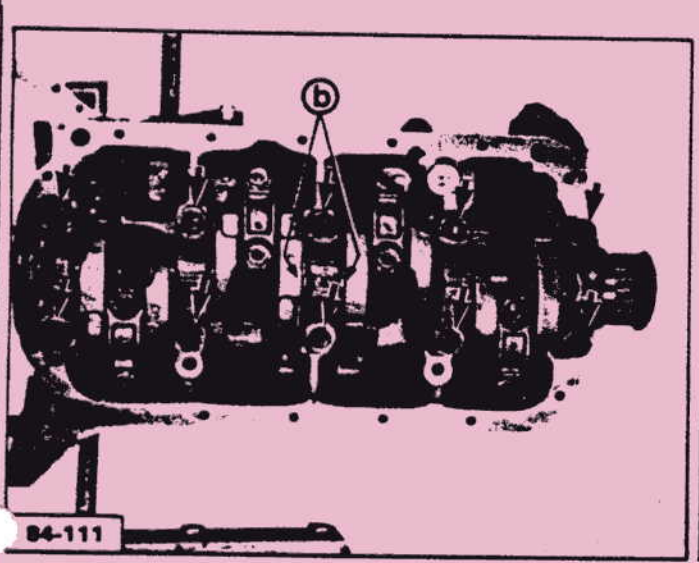
The side clearance of the connecting rods must be between 0.04 and 0.25 mm (non adjustable).



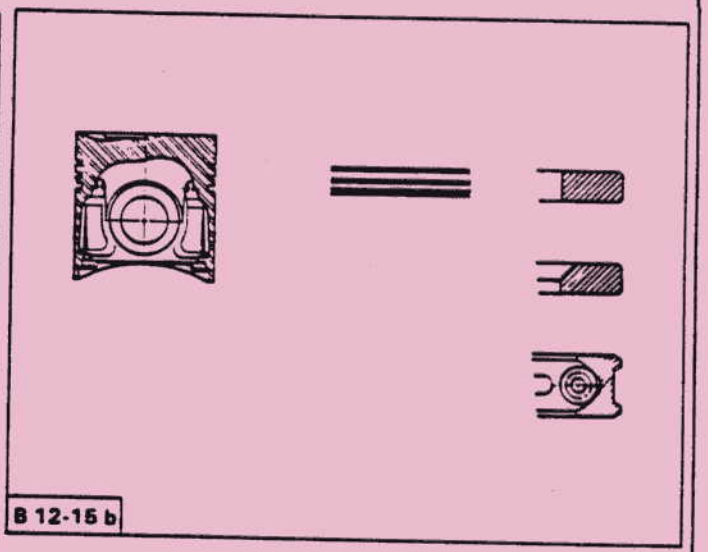
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IV



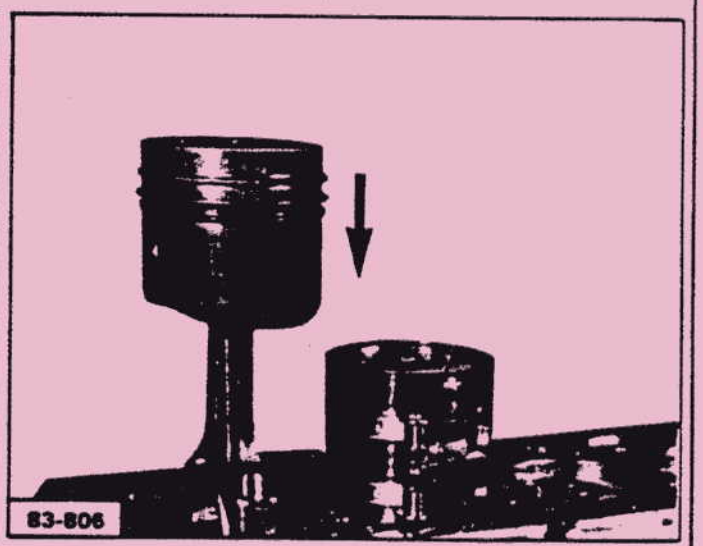
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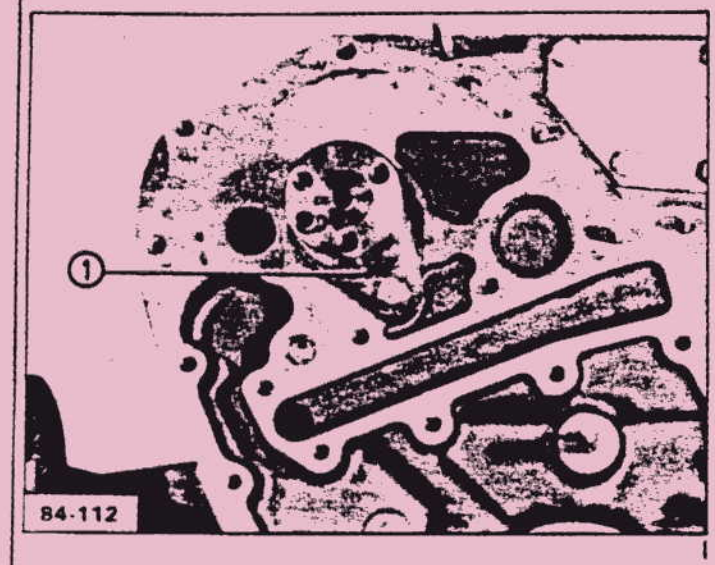
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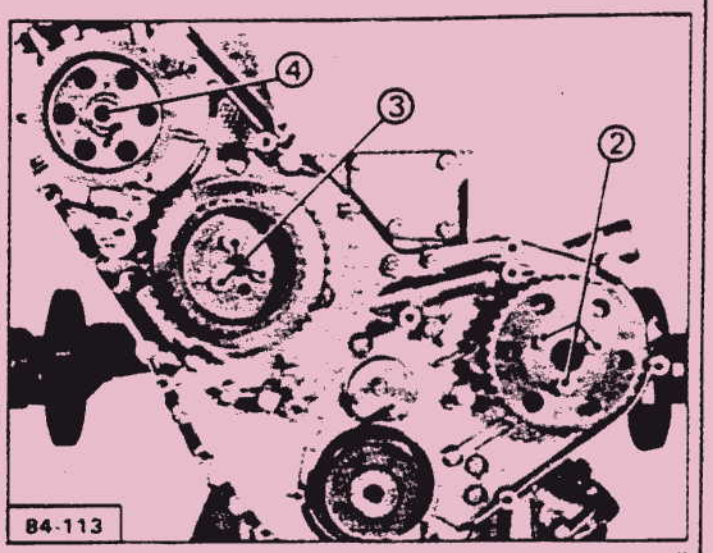
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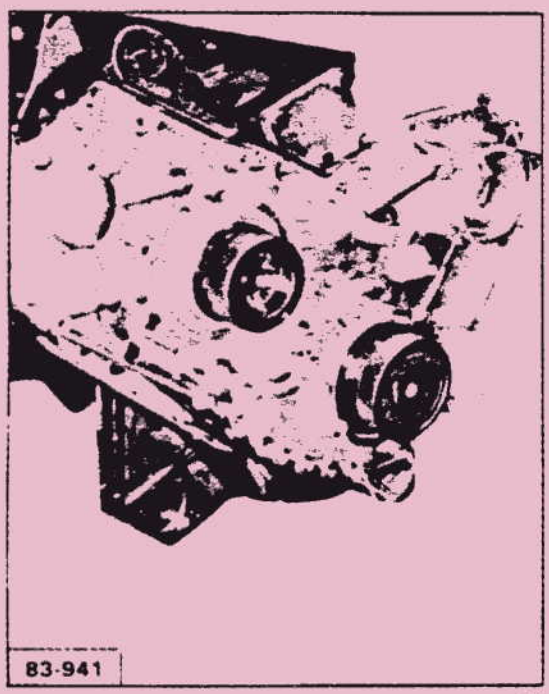
VI



I



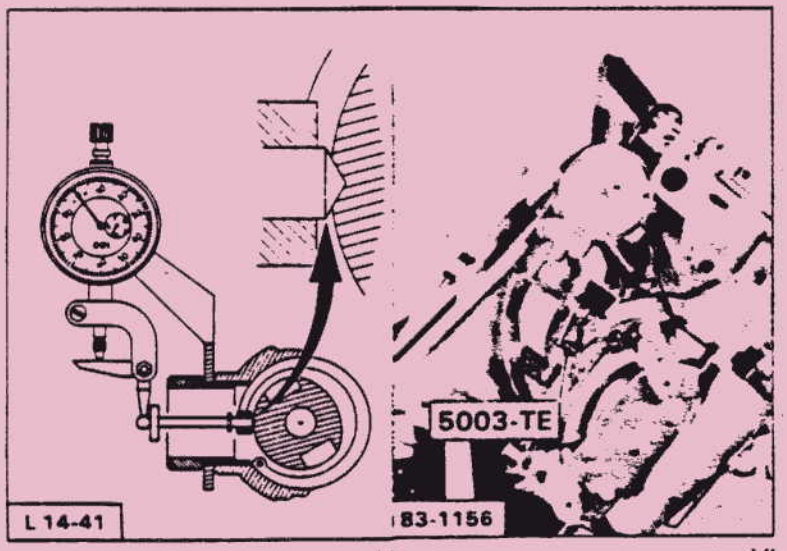
II



III

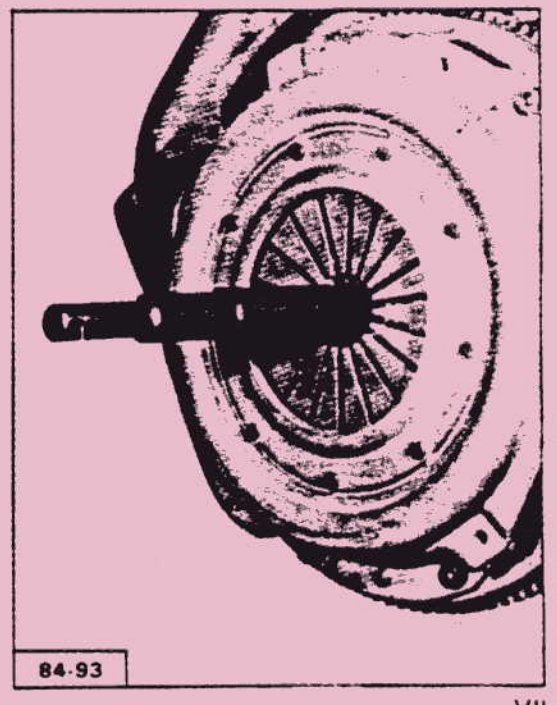


IV



V

VI



VII

Fit the camshaft : Fig. I.

Insert the camshaft into the block.

Locate the thrust plate (1) in the groove in the camshaft.

The camshaft end float must be between 0.05 and 0.36 mm (non adjustable).

Fit : Fig. II

- the lower crankcase, without tightening the bolts, after coating the contact faces and the main bearing rubber seal with sealant,
- the front plate, using a new joint,
- position it with the centralising rings : (-).0157 D and E,
- fit and tighten the front plate bolts to 1.5 m.daN (11 lbf ft).

Fit the oil pump :

Use a NEW joint.

Tighten the bolts to 1.5 m.daN (11 lbf ft).

Fitting the timing gear seals - see this section.

Fitting the injection pump : Fig. III.

Prepare the injection pump.

Remove the inspection plate and position :

- the dial gauge support (-).0117 AE,
- the plunger (-).0117 H,
- the bell crank (-).0117 AG.

Set the pump to the internal timing point : the plunger must be fully engaged in the rotor groove. Fig. V.

Note - Turn the pump in its direction of rotation as shown by the arrow on the manufacturer's plate.

Position the pump centrally in the slots.

Fit the timing gears Fig. II.

- Oil pump gear : the 3 bolts (2) tightened to 2.1 m.daN (15 lbf ft).
- Camshaft gear : the 3 bolts (3) tightened to 3.4 m.daN (25 lbf ft).
- Injection pump gear (4) : 6 m.daN (44 lbf ft).

Fit the flywheel Fig. IV.

Fit 8 new bolts using LOCTITE SEAL.

Tighten the bolts to 9 m.daN (66 lbf ft).

Fit the clutch Fig. VII

Fit the plate and mechanism.

Centralise the plate with mandrel (-).0212 Pull up the mechanism progressively and tighten the bolts to 3.3 m.daN (24 lbf ft).

Setting the timing Fig. I and II.

Set the engine to the initial timing position. To do so :

Bring the mark A on the flywheel opposite the mark B on the block Fig. I.

This correspond to :

4.32 mm or 22° B.T.D.C.

Bring the mark C on the camshaft opposite bolt (1) Fig. II.

Position the belt, lining up the marks (→) with the marks on the crankshaft D and the camshaft C.

Fit the belt.

Fit the tensioner roller.

Adjust the belt tension with tool (-).0157 K Fig. III, with the weight on the mark "2" on the rod.

Tighten the nuts :

(2) Ø 8 mm to 2 m.daN (15 lbf ft),

(3) Ø 10 mm to 3.2 m.daN (24 lbf ft).

Fit the damper E with a clearance of 0.5 to 1 mm to the belt.

Timing the injection pump Fig. IV.

Turn the crankshaft in its direction of rotation to bring the marks A and B opposite each other Fig. I.

With the pump at the point of injection, fit the belt (keeping the bolt run (→) tight).

Fit the tensioner (4).

Tighten the nut.

Rotate the crankshaft two turns in its direction of rotation and check the timing.

Fit the timing covers Fig. V.

Position the lower cover.

Tighten the 4 bolts (5).

Fit the upper cover and tighten all the bolts to 1 m.daN (7 lbf ft).

Assemble the oil pump intake pipe Fig. VI and VII.

Place on the pipe (6) Fig. VI.

- the clamp plate (7),
- a new O-ring (8),
- the plate (9),
- the paper joint "j".

Fit the intake pipe.

Tighten the bolts (→) Fig. VII.
(This can only be done after the engine has been removed from the DESVIL fixture).

Assemble the oil intake screen Fig. VIII.

Fit the anti-surge plate (10).

Fit the intake screen (11) with its O-ring.

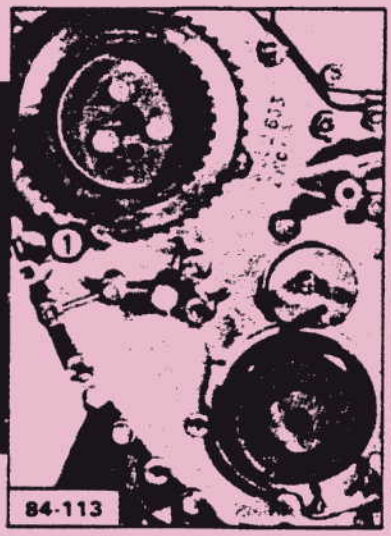
Tighten and lock the bolts (12).

Fit the sump plate using a NEW joint.

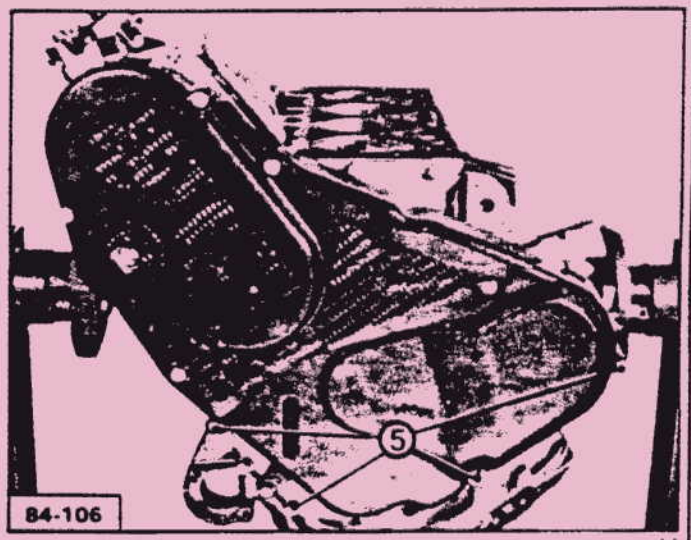
Tighten the bolts to 1.1 m.daN (8 lbf ft).



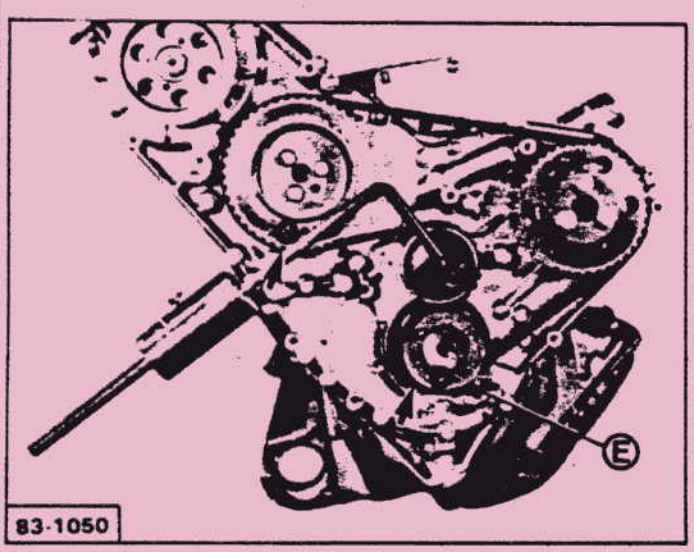
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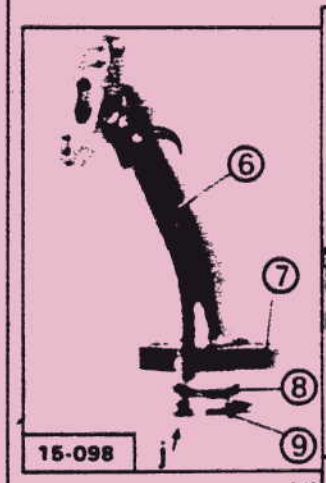
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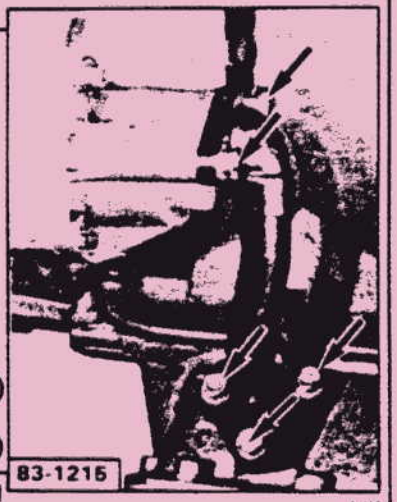
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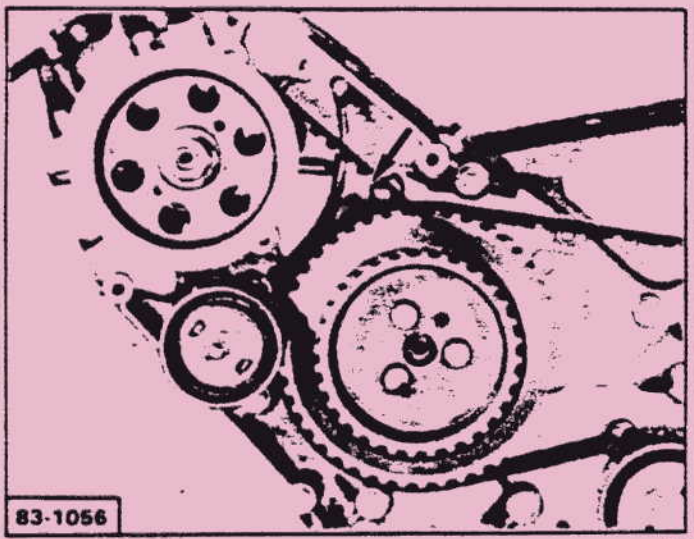
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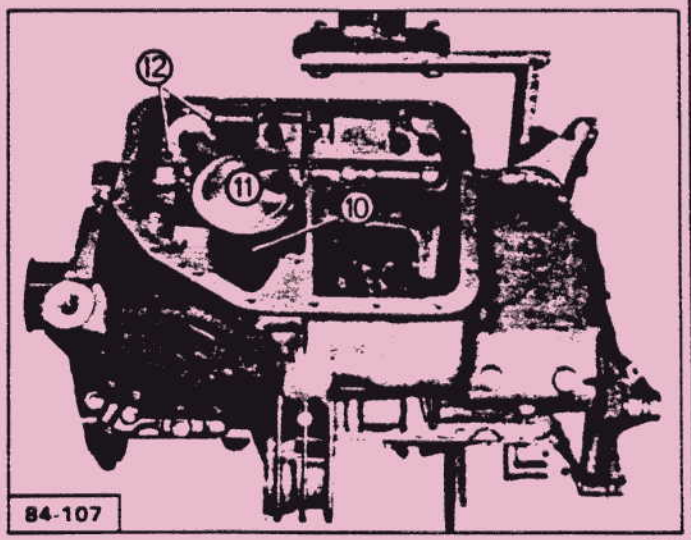
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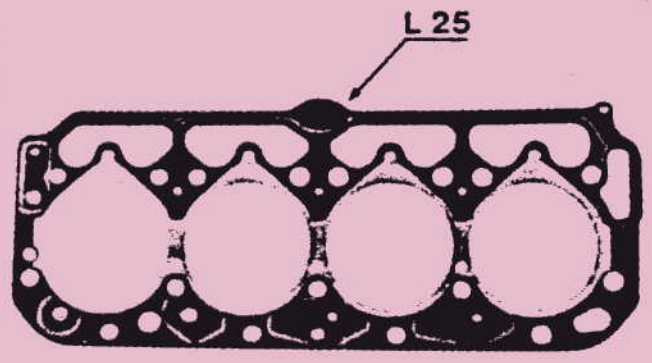
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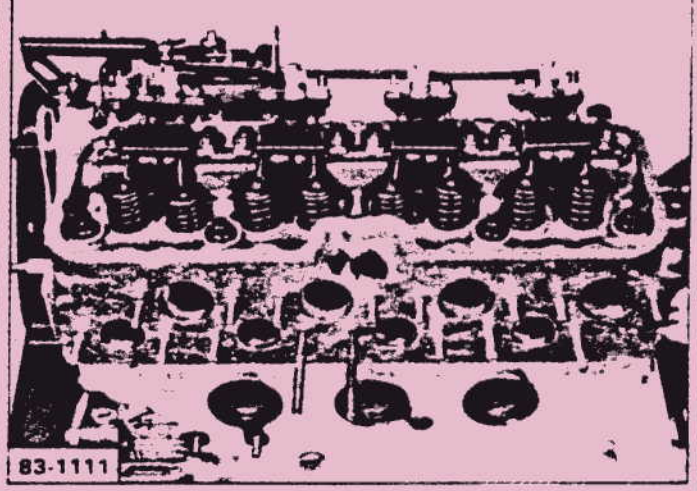
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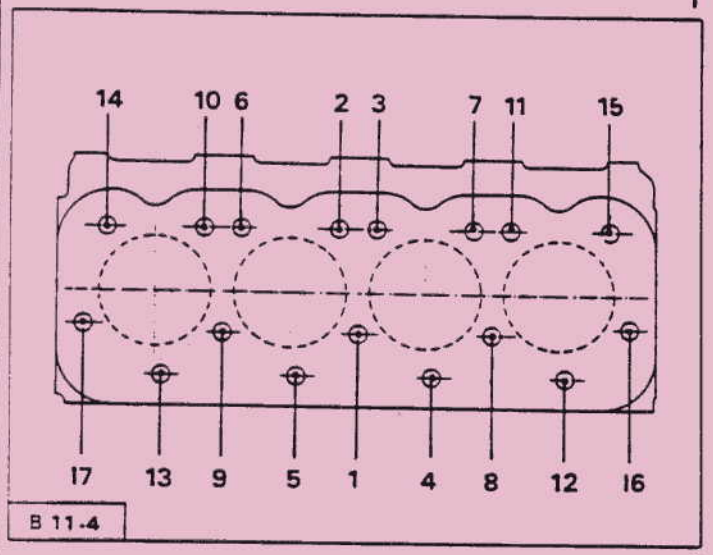
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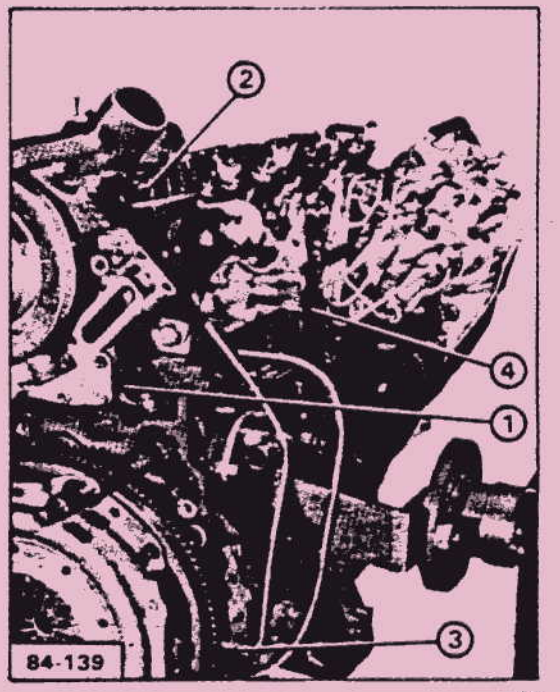
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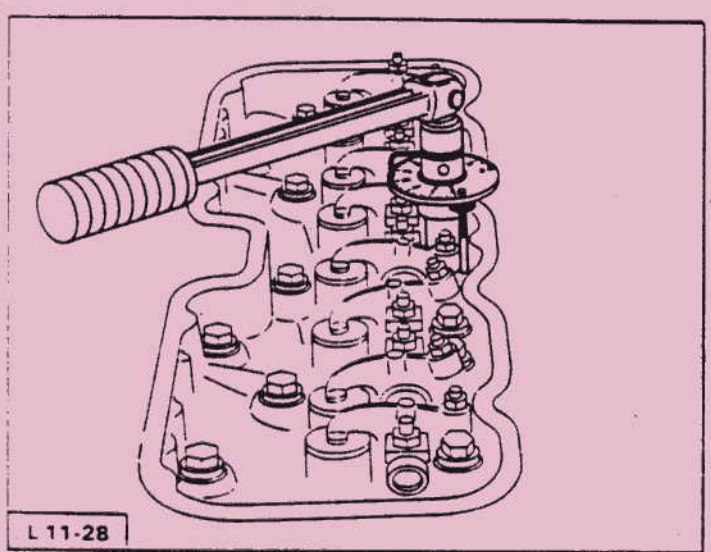
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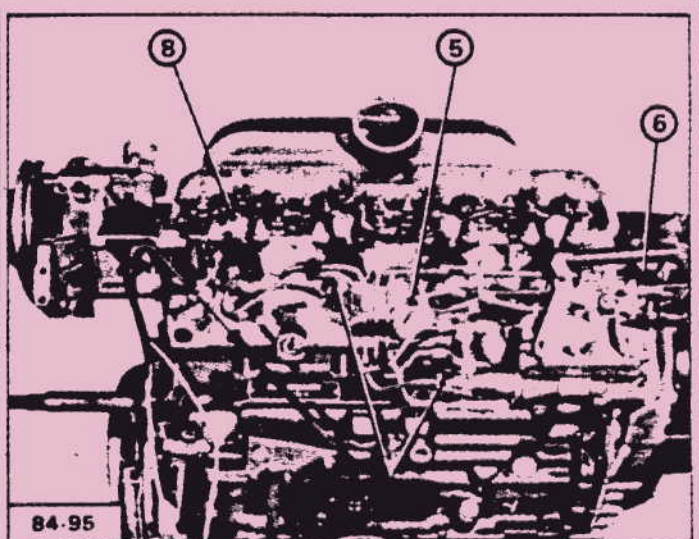
II



V



III



VI

Fitting the cylinder head Fig. I.

Lubricate and fit the tappets.

Position the pistons at mid-stroke.

Check that the cylinder head gasket has the reference L25 engraved on the tongue. Fig. I . The gasket is fitted dry.

NEW cylinder head bolts and serrated washers must be fitted, lubricated with gearbox oil.

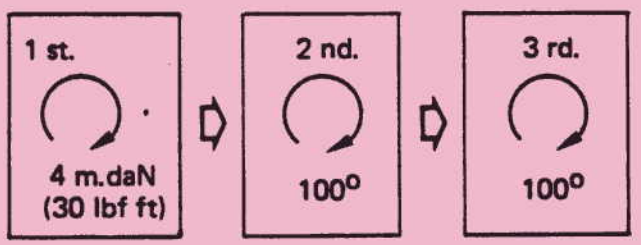
The serrated side of the washer must be fitted towards the cylinder head.

Fit the gasket.

Fit the cylinder head.

Fit the push rods.

Tighten the cylinder head : tightening order Fig. II.



For the angular tightening, use FACOM D360 adaptor, Part Number 9770.42.

Fit the rocker shaft assembly :

Retain the rockers by means of clamps 0.0162.

Ensure that the rocker shaft is correctly positioned with the lubrication holes downward and the with the larger hole towards the coolant pump.

Adjust the valve clearances Fig. IV.

Inlet : 0.30 mm.

Exhaust : 0.20 mm.

Fit Fig. V
- the cylinder head lubrication pipe (1),
- the diagnostic harness (2),
- the T.D.C. sensor (3),
- the dipstick tube (4).

Attach the fast idle cable Fig. VI.

Fit the cable sleeve (5) and the sleeve stop.

Pass the cable through the idle stop and fit the cable stop (6).

Push the fast idle lever to "a" and tighten the cable stop. The lever must rest against the stop at "a" - if not, adjust by means of the tensioner.

Fit the spring.

Fit the injector pipes assembly Fig. VI.

Position the pipes and the injectors so that the pipes are not under strain :

Tighten the nuts to 2.25 m.daN (17 lbf ft).

Tighten the banjo bolts (8) to 1 m.daN (7 lbf ft).

Tighten the unions (9) to 2.4 m.daN (18 lbf ft).

Fit the cylinder head cover with a new joint.

Use a sling to remove the engine from the cradle.

Fit the oil filter bracket, the oil cooler connector and the cartridge (wrench (-).1404).

Fill the engine with oil to the correct level.

After fitting the engine and warming it up, followed by cooling for 3 hours :

TIGHTEN THE CYLINDER HEAD BOLTS A FURTHER 45° (without slackening) and adjust the valve clearances.

SPECIAL TOOLS

A : Dial indicator support extension.

Tool no. 8.0110 H.

B : Dial indicator

Tool no. 8.1504.

RECOMMENDED TOOLS

C : Universal spring compressor

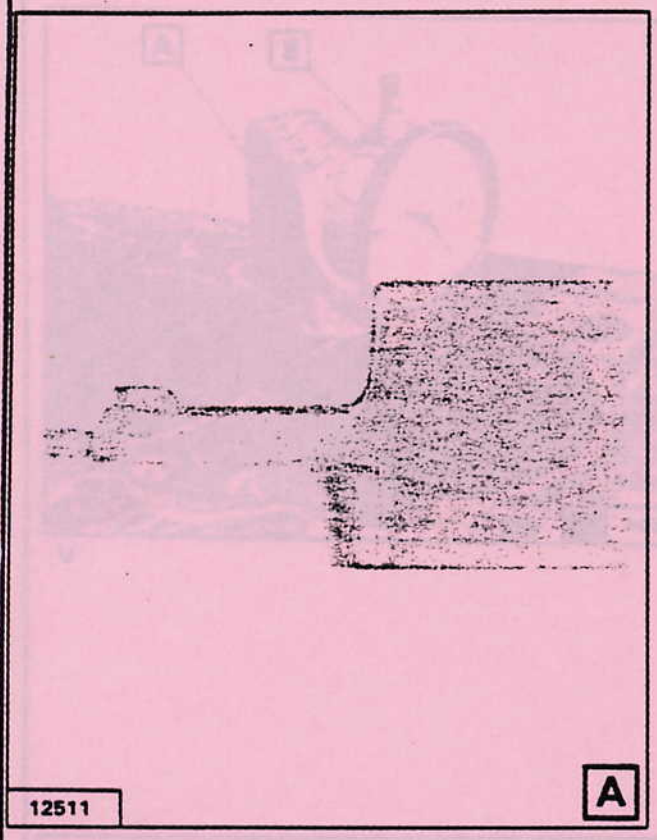
TOOLS TO BE MADE LOCALLY

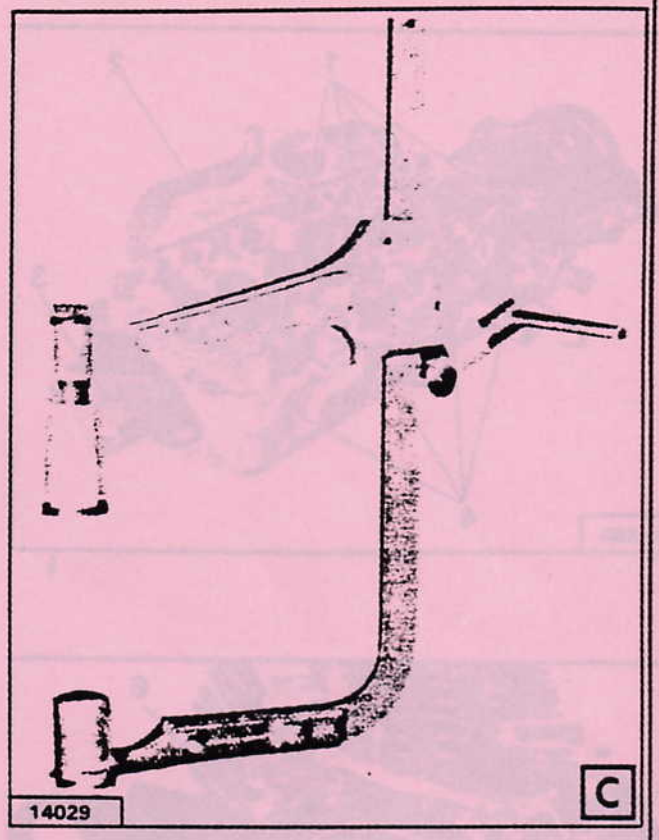
D : Set of four retaining clips for fitting the rocker shaft assembly.

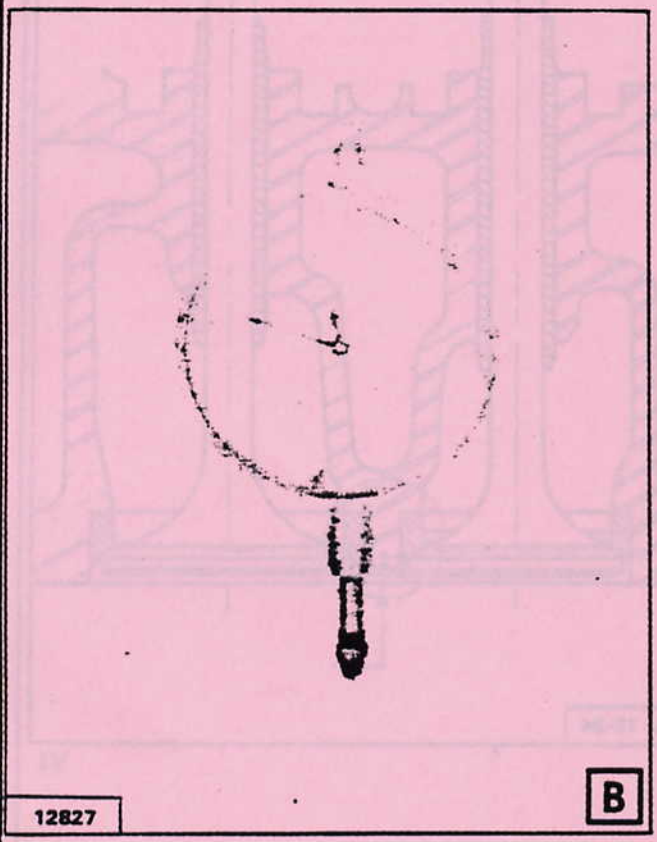
Tool no. 0.0612.

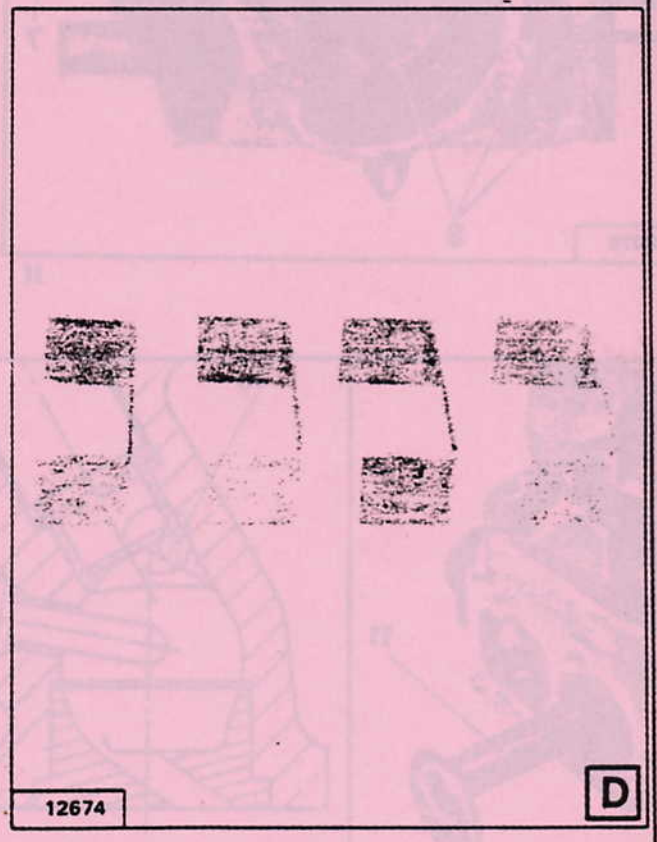
TIGHTENING TORQUES

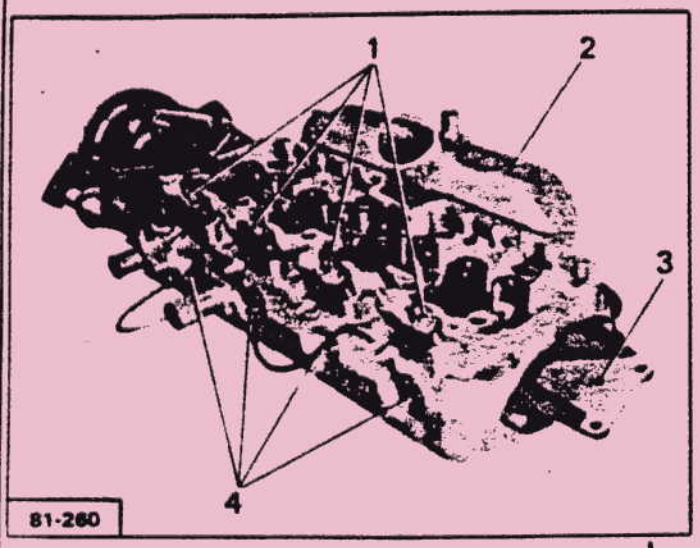
Essential tightening torques (use a torque spanner) :	m.daN	Nm	lbf ft
Fast idling control thermostatic pick-up, copper washer (apply PEUGEOT jointing compound) :	4,5	45	33
Recommended tightening torques :			
Injector securing nuts (flat washers and contact washers)	2,4	24	18
Injector leak-off union screw	1	10	7
Pre-heat plugs	2,8	28	21
Rocker shaft securing nuts	2,8	28	21
Engine mounting bolt on cylinder head	2,7	27	20


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A

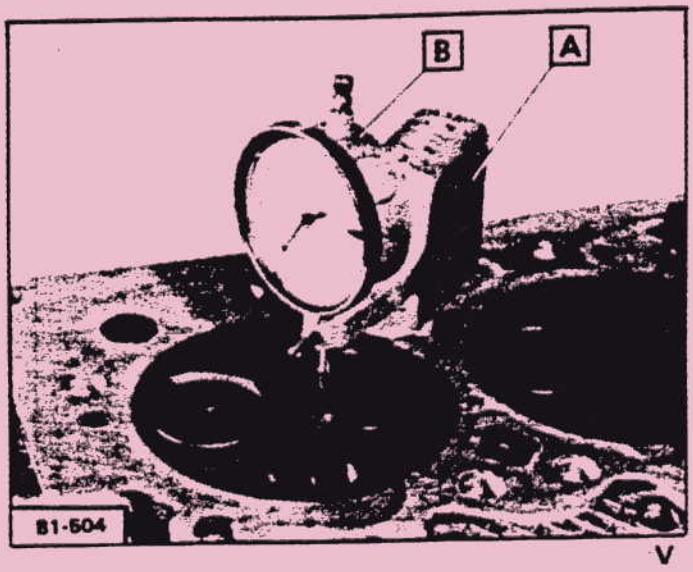

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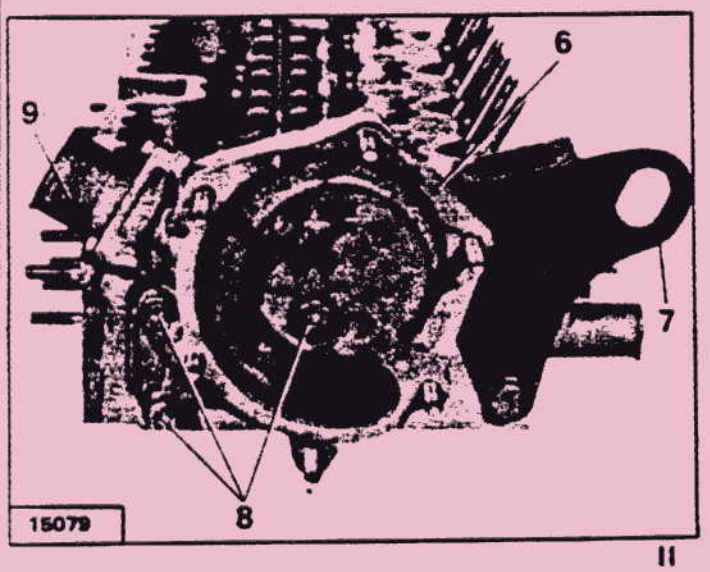

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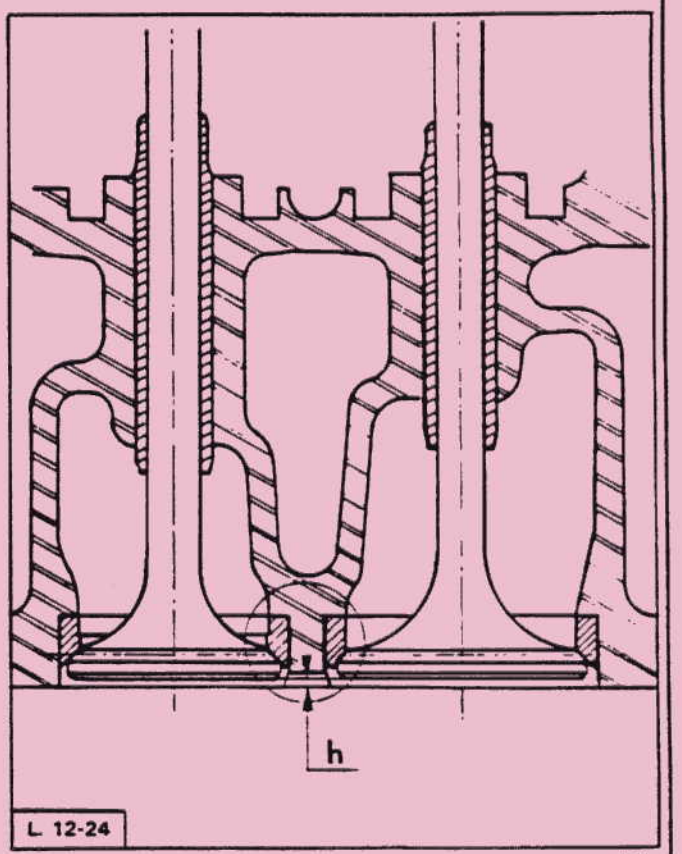
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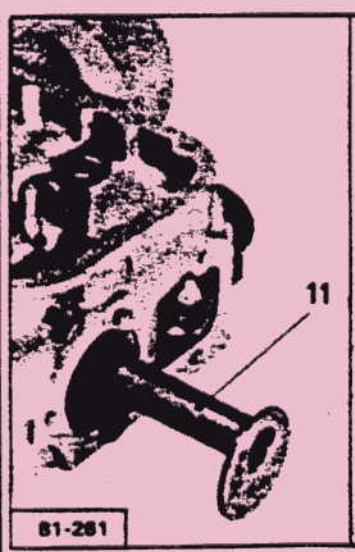
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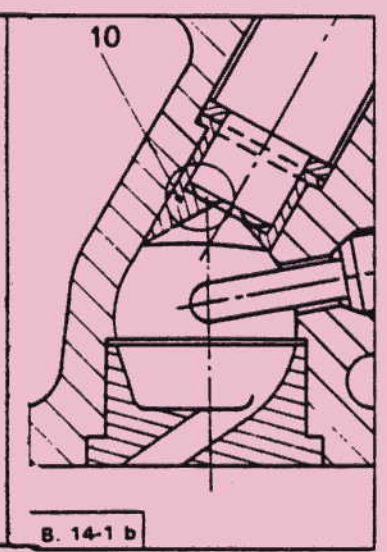
II



VI



III



IV

This schedule of operations does not deal with refacing the gasket face or replacing the swirl chamber.

These two operations can only be carried out by workshops that specialise in regrinding operations.

Reminder :

Height of cylinder head before refacing = 117 mm.
Height of cylinder head after refacing = 116.30 mm.
General bow tolerance = 0.1 mm max.

Strip the cylinder head : Fig. I, II, III and IV.

Remove (if necessary) :
- the complete rocker shaft,
- the inlet manifold (2) and the exhaust manifold,
- the water pump body,
- the water pump nuts (8) and back plate (6),
- the water outlet (9) and thermostat,
- the injectors (1).

Under no circumstances are the injector protectors (10) to be removed.

- the preheat plugs (4),
- the fast idling control thermostatic element (5),
- the lifting eye (7),
- the right hand engine mounting (3) and the water gallery (11),
- the valves, using the spring compressor.

Preparing the cylinder head :

Check the amount by which the valves are recessed : as shown in Fig. V and VI.

Fit the valves and measure their depth below the cylinder head gasket face.

Both the inlet and exhaust valve should be recessed below the gasket face by : Fig. VI.

h = 0.7 to 0.9 mm

To carry out this check use extension [A] 8.0110 H and dial indicator [B] 8.1504.

If the valve is recessed too far back from the gasket face the compression ratio will be lowered and this will cause cold starting and excessive exhaust smoke.
If the valves are not sufficiently recessed with reference to the gasket face they may come into contact with the piston crowns at TDC.

Grind in the valves :
After the valves are ground in, carefully remove all traces of grinding paste from the cylinder head and the valves. Use a small test tube brush to clean the inside of the valve guides.

Fitting the valves :
Fit the valves and their seals.

NOTE - Use the plastic assembly cap, supplied with each seal, and tool VSIT (FLOQUET REFERENCE) to fit the seals to the valves. To make fitting the seal easier, coat the and the fitting cap with grease. If a seal is worn or badly fitted, it is to be replaced by a new one. Never attempt to refit a seal that has already been fitted to a valve.

Fit the following on the valves :
- the valve spring seat,
- the spring,
- the spring cup,
- the collets.

Use the universal spring compressor for this operation.

Fit : Fig. I, and III

- the water gallery (1) after first checking its condition,
- the right hand engine mounting (3), together with its gasket (tighten the bolts to a torque of 2.7 m.daN (27 Nm, 21 lbf ft),
- the engine lifting eye,
- the water pump back plate (6),
- the water pump,
- the inlet and exhaust manifolds and their gaskets,
- the idling control thermostatic element (4) (apply PEUGEOT jointing compound to it) tightening it to a torque of 4.5 m.daN (45 Nm, 33 lbf ft),
- the water pump thermostatic element and flange (5).

Fit the injectors : Fig. IV

The copper washer (7) and the ridged washer (8) are to be replaced by new ones each time they are moved.
Ensure that the washer (8) is fitted the correct way round (see detail illustration).
Lightly grease the copper washer (7) and the ridged washer (8) with ESSO MULTIPURPOSE grease 4746 before fitting them to the injector holder.
Tighten the injector holder nuts evenly (they are fitted with flat washers and contact washers, (to a torque of 2.4 m.daN (24 Nm, 18 lbf ft).
Fit the leak-back piping (2) and tighten the unions to a torque of 1 m.daN.
Fit the pre-heat plugs and tighten them to 2.8 m.daN (28 Nm, 21 lbf ft).

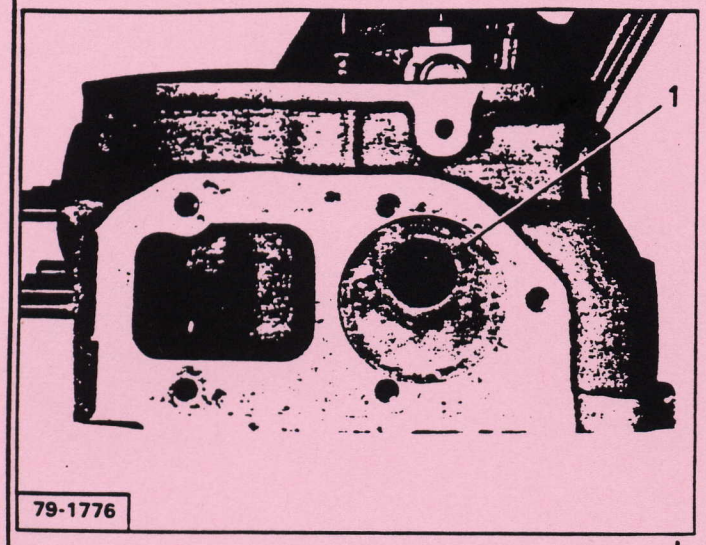
Prepare the rocker shaft assembly : Fig. IV

Use the large oil supply oil (a) as a position reference.
Place on the shaft :
- a washer,
- an inlet rocker arm (A),
- a washer,
- a spring,
- an exhaust valve rocker arm (E),
- a washer.

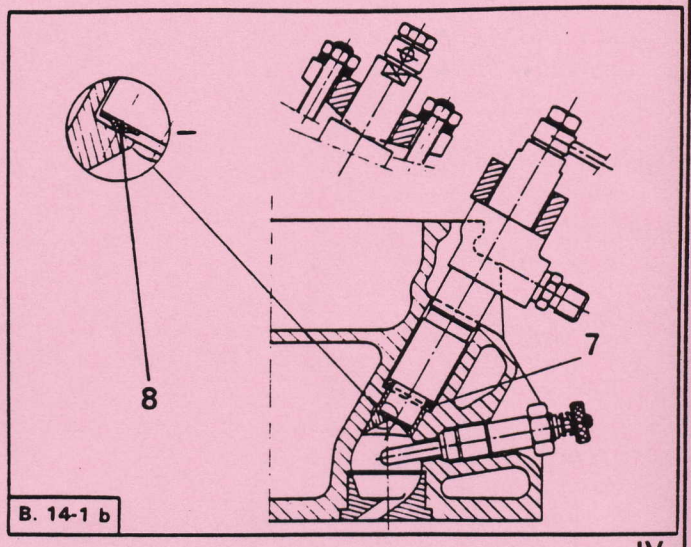
Hold the assembly together with one of the clips 0.0162.

Repeat this operation four times.

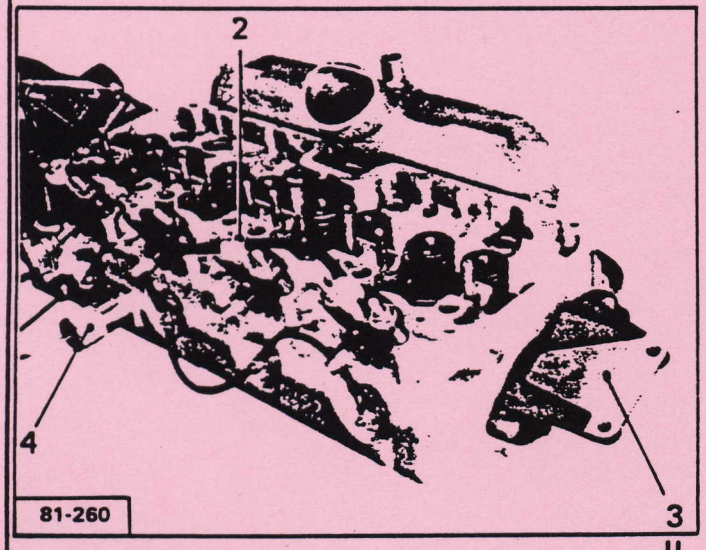
Place this pre-prepared assembly on the cylinder head with the large oil supply hole (a) at the water pump end and the oil holes towards the cylinder head.
Fit the clamps and tighten their nuts (9).
Tightening torque : 2.8 m.daN (28 Nm, 21 lbf ft).
Remove clips 0.0612.



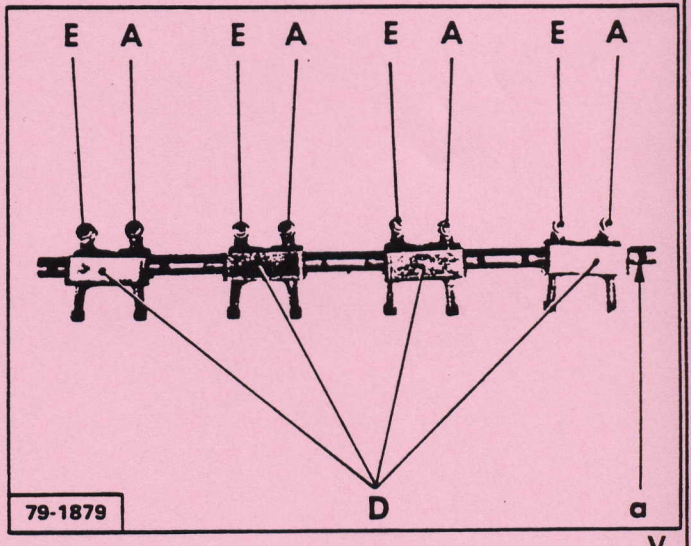
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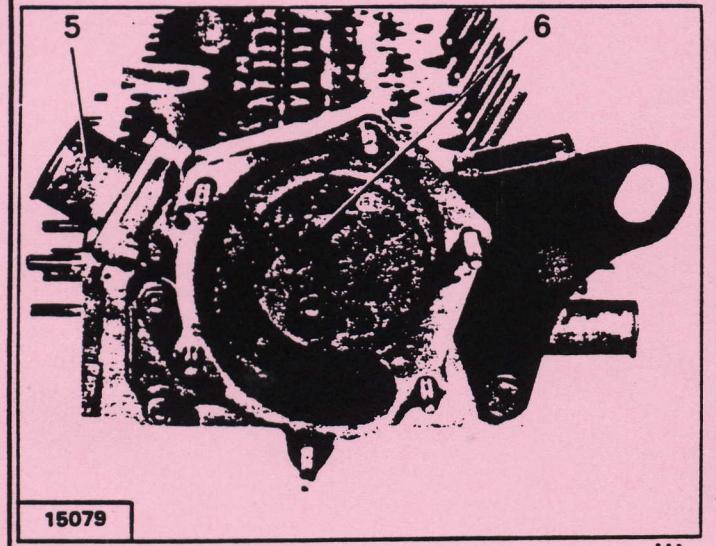
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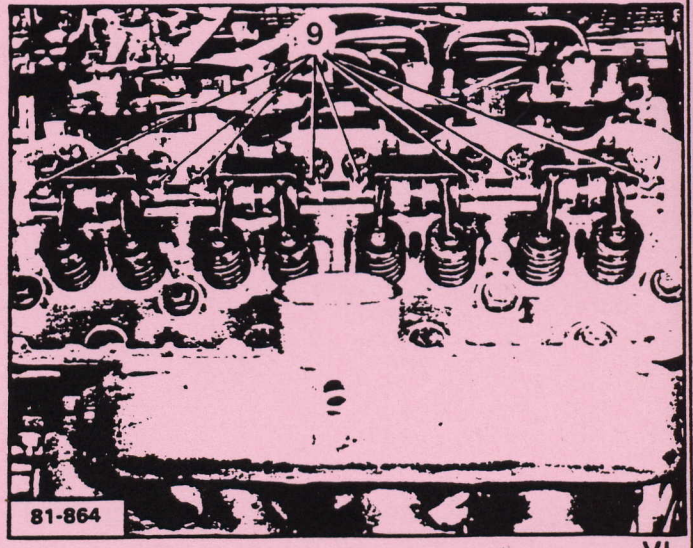
II



V



III



VI

SPECIAL TOOLS

I - Dial gauge support

Reference (-).0110 H.

II - Dial gauge

Reference (-).1504.

RECOMMENDED TOOLS

III - Universal spring compressor.

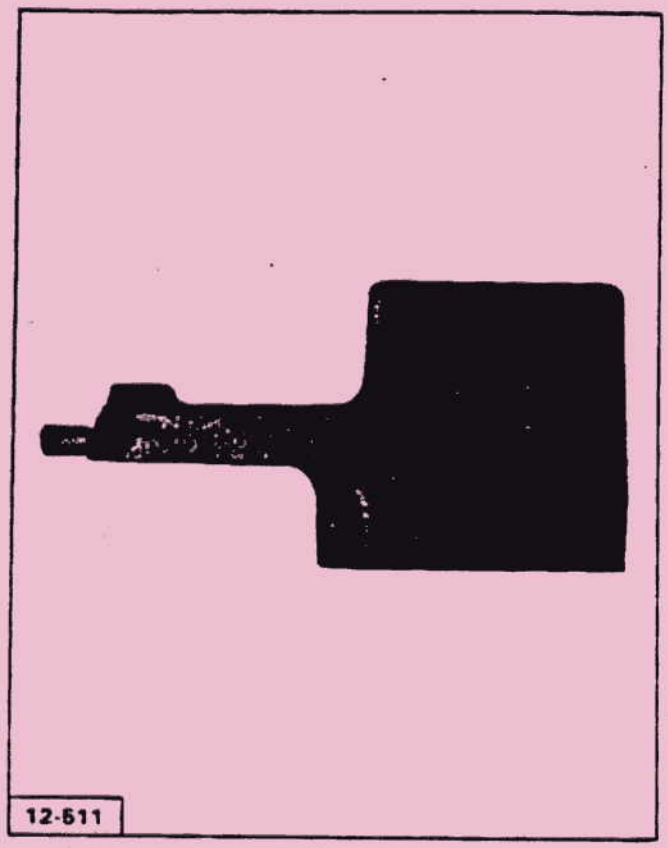
TOOLS TO BE MADE LOCALLY

IV - Set of four slips for fitting the rocker shaft assembly.

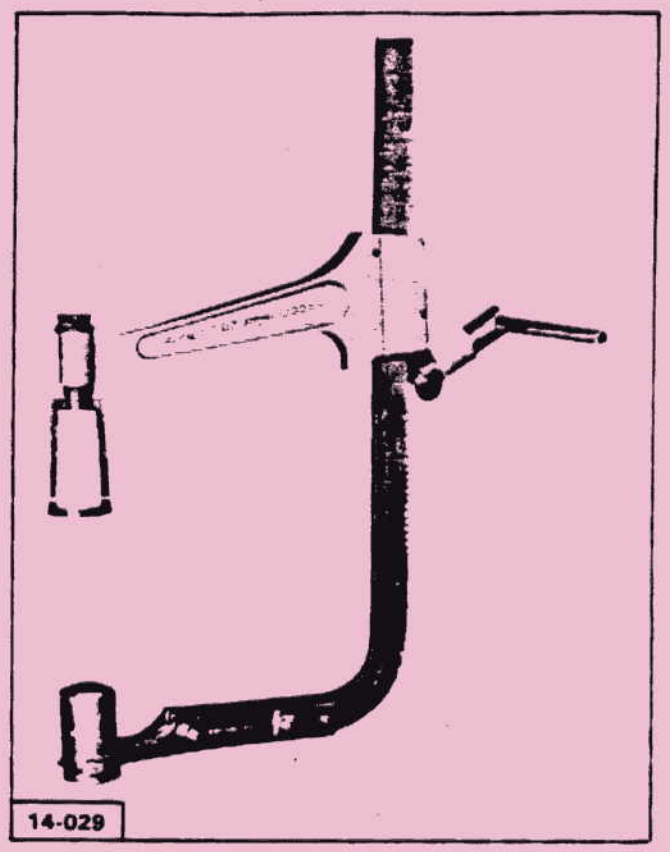
Reference 0.0162.

TIGHTENING TORQUES

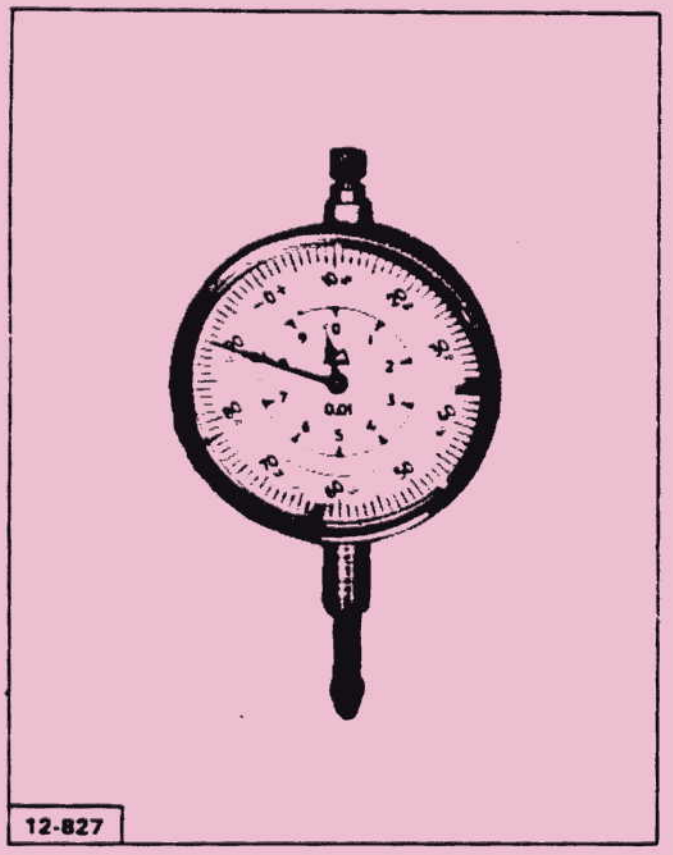
Tightening torques that must be adhered to (torque wrench) :	Torque in N.m (lbf.ft.)
The thermostatic sensor that controls the fast idling speed. Fit a copper washer (apply LOCTITE FORMETANCH) :	45 (33.2)
Recommended tightening torques :	
Injector securing nuts (flat washers and contact washers) :	24 (17.7)
Injector leak-back unions :	10 (7.4)
Preheater plugs :	28 (20.6)
Rocker arm assembly securing nuts :	28 (20.6)
Bolts securing engine mounting to cylinder head :	27 (19.9)

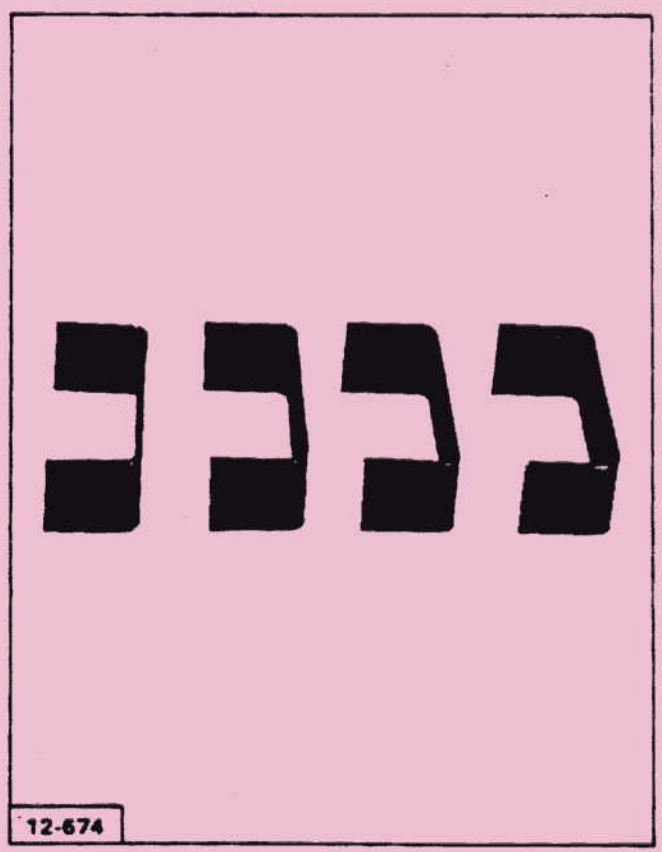


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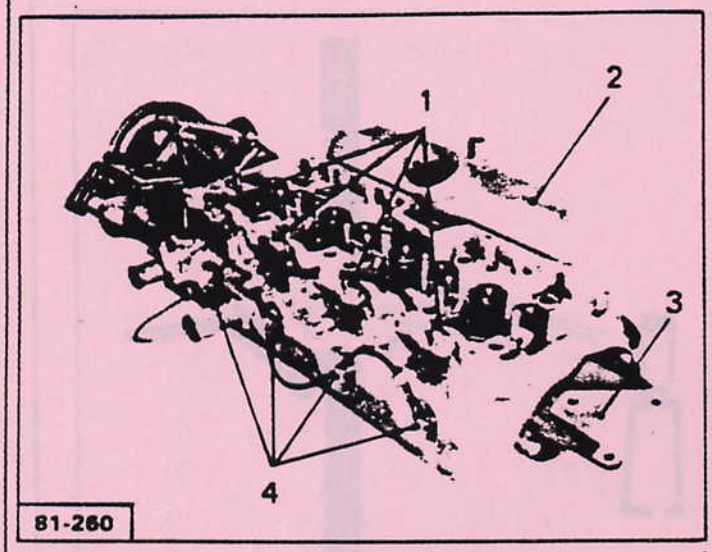


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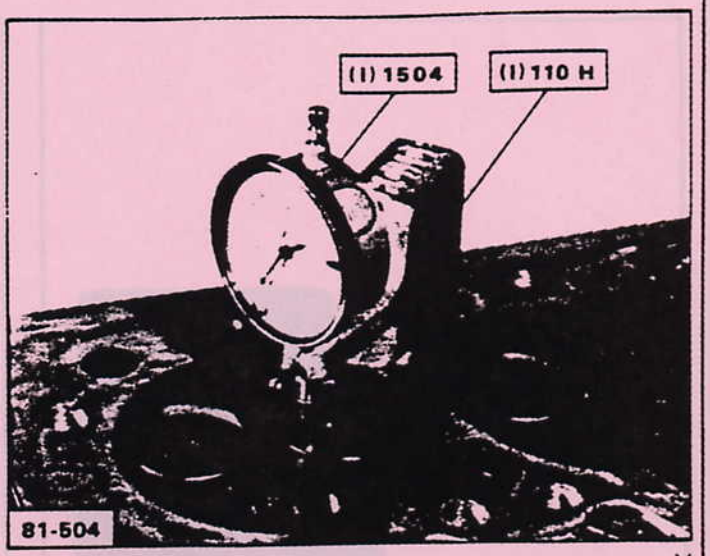




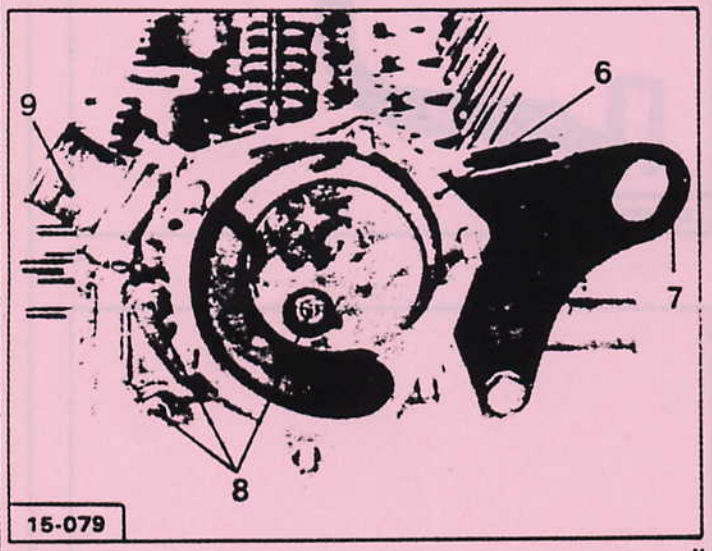
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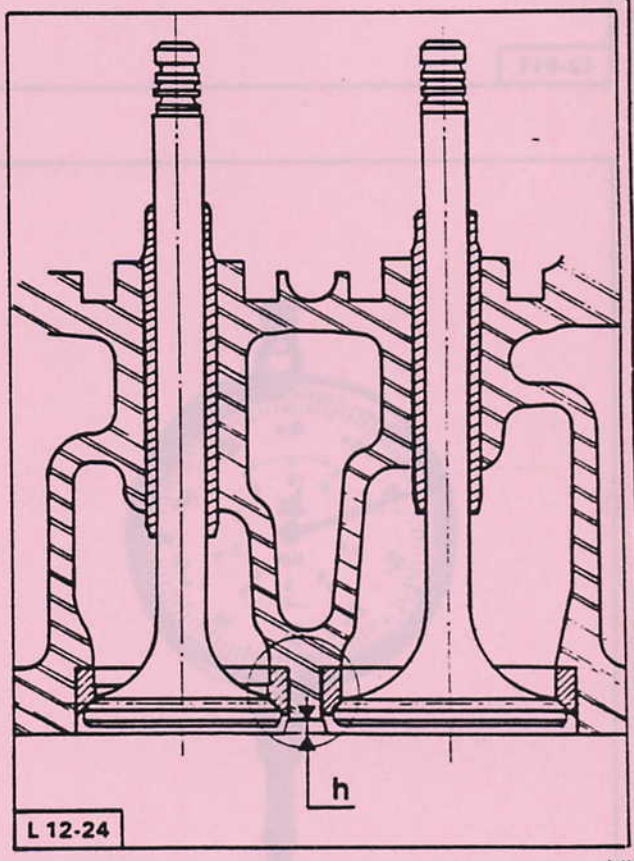
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V



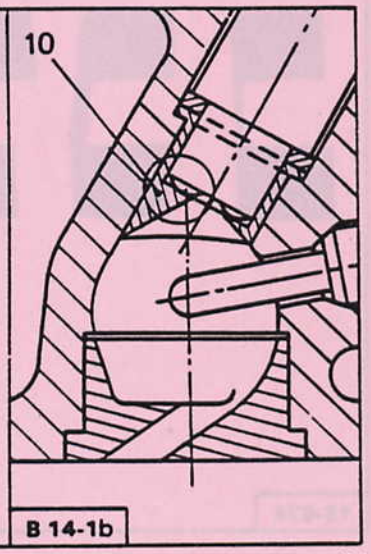
II



VI



III



IV

This section does not cover machining the cylinder head face or replacing the pre-combustion chambers.

These operations are only possible in a specialist workshop.

As a reminder :

Cylinder head height before machining
= 117 mm

Cylinder head height after machining
= 116.30 mm

Maximum distortion = 0.1 mm.

Strip the cylinder head : Fig. I, II, III and IV.

Remove (if necessary) :

- the inlet manifold (2) and the exhaust manifold,
- the coolant pump body,
- the coolant pump nuts (8) and back plate (6),
- the flange (9) and the thermostat element,
- the injectors (1).

The injector protectors (10) must never be removed.

- the pre-heater plugs (4),
- the fast idle control thermostatic element (5),
- the lifting eye (7),
- the right-hand engine mounting (3) and the coolant spray tube (11),
- the valves, using a spring compressor.

Prepare the cylinder head :

Check the valve recess dimension : Fig. V and VI.

Put the valves in place and check how far they are recessed in relation to the cylinder head face.

Both inlet and exhaust valves must be recessed : Fig. VI.

"h" = 0.7 to 0.9 mm.

For this check, use the support (-).0110 H and the dial gauge (-).1504.

If the valves are recessed too far, the compression ratio will be reduced - a cause of difficult cold starting and excessive exhaust smoke.

If the valves are not recessed sufficiently, they may contact the pistons at T.D.C.

Lap in the valves :

When they are lapped, carefully clean all traces of lapping paste from the cylinder head and the valves.

Use a small brush to clean the valve guide bores.

Fit the valves :

Fit the valves and their seals.

Note - To fit the seals, use the plastic fitting cap supplied with each seal and the VSIT tool (FLOQUET).

To aid fitting, coat the seal and the fitting cap with grease. When a seal is worn or badly fitted, it must be replaced.

Never re-use a seal which has been fitted previously.

Fit to the valves :

- the valve spring seat,
- the spring,
- the spring cup,
- the cotters.

Use a universal spring compressor.

Fit : Fig. I, II and III.

- the coolant gallery (1), after checking it,
- the rigt-hand engine mounting (3) fitted with its joint (tighten the bolts to 2.7 m.daN (20 lbf ft),
- the lifting eye,
- the coolant pump back plate (6),
- the coolant pump,
- the inlet and exhaust manifolds with their joints,
- the idle control thermostatic element (4) and tighten it to 1.8 m.daN (13 lbf ft) (fit with LOCTITE SEAL),
- the coolant thermostat and the flange (5). plate (5).

Fit the injectors : Fig. IV.

New cooper washers (7) and corrugated washers must always be fitted on re-assembly.

Ensure the washer (8) is fitted the right way up (see detail).

Lightly lubricate the copper washer (7) and the corrugated washer (8) with ESSO MULTI-PURPOSE 4746 GREASE before fitting them to the nozzle holder.

Tighten the nozzle holder securing nuts (flat washer and contact washer) to 2.4 m.daN (18 lbf ft).

Fit the leak-off pipes (2) and tighten the banjo bolts to 1 m.daN (7 lbf ft).

Fit the pre-heater plugs and tighten them to 2 m.daN (15 lbf ft).

Prepare the rocker shaft assembly : Fig. V.

Take as a reference the large oil inlet hole "a"

Fit on :

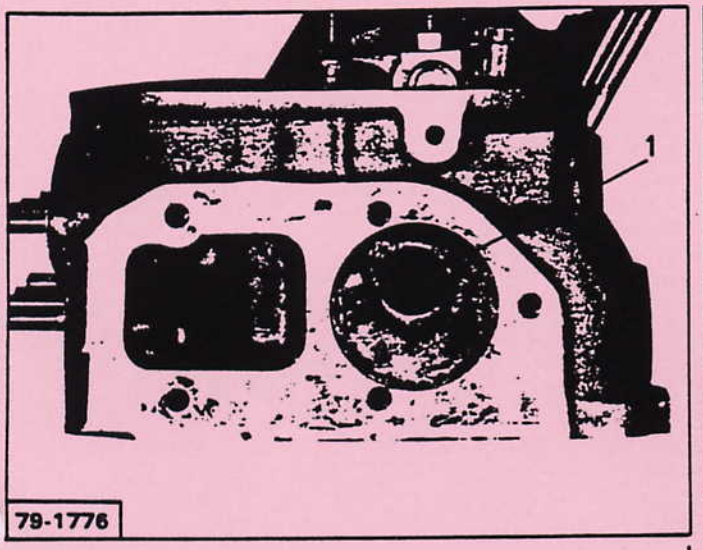
- a washer,
- an inlet rocker A,
- a washer,
- a spring,
- an exhaust rocker E,
- a washer.

Retain the assembly with a clip 0.0162.

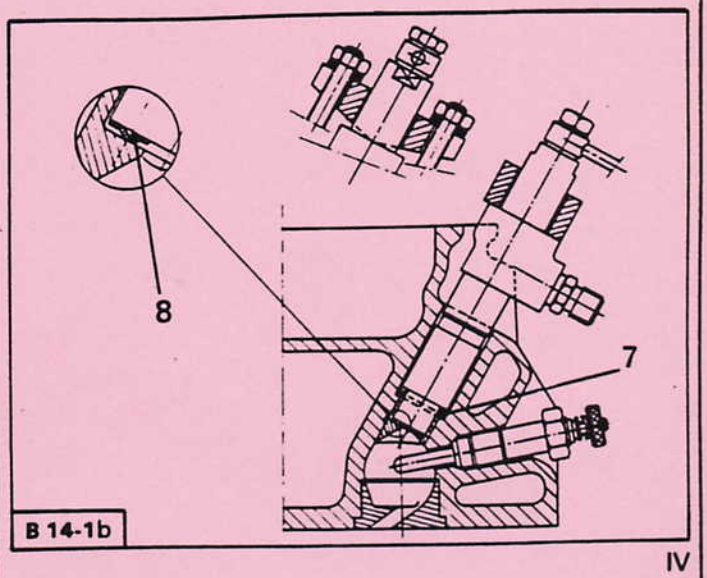
Repeat the operation three more times.

Fit the assembly, made up in this way, to the cylinder head with the large oil input hole « a » towards the coolant pump and the lubrication holes towards the cylinder head.

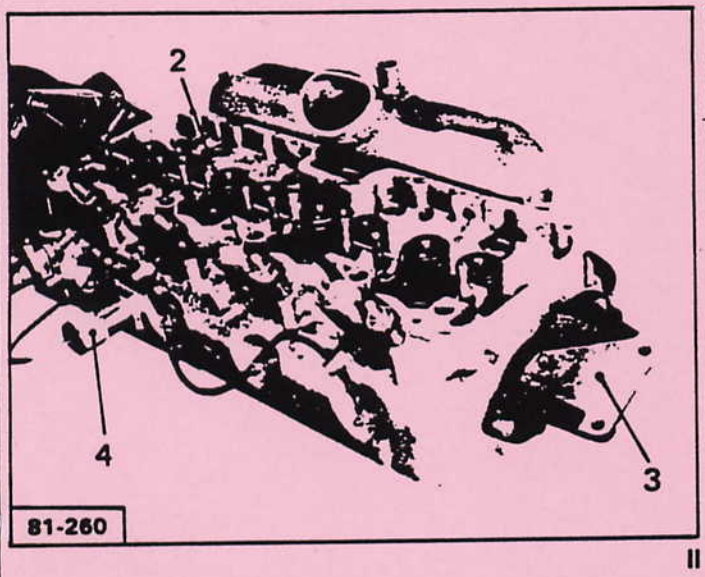
Fit the caps and tighten the nuts (9).
Tightening torque : 28 N.m (20.6 lbf.ft.)
Remove the clamp 0.0162.



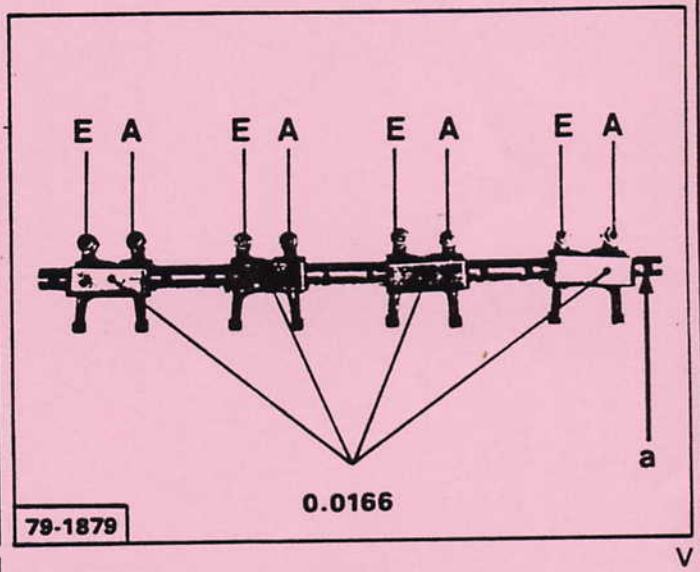
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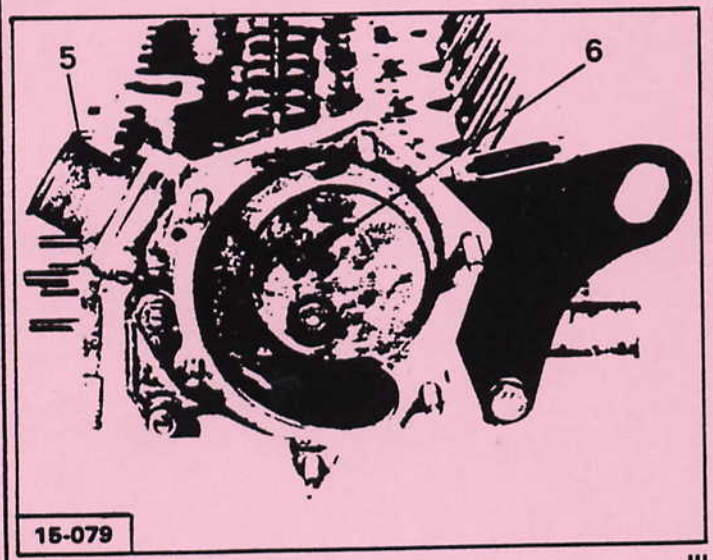
IV



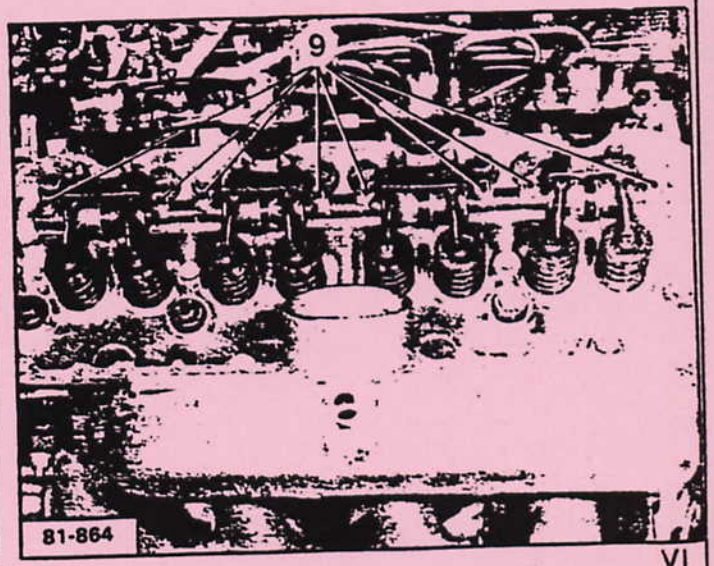
II



V



III



VI

SPECIAL TOOLS

A : Set of four rocker shaft retaining clips.

Tool no. : 0.0612.

B : Engine support cross piece.

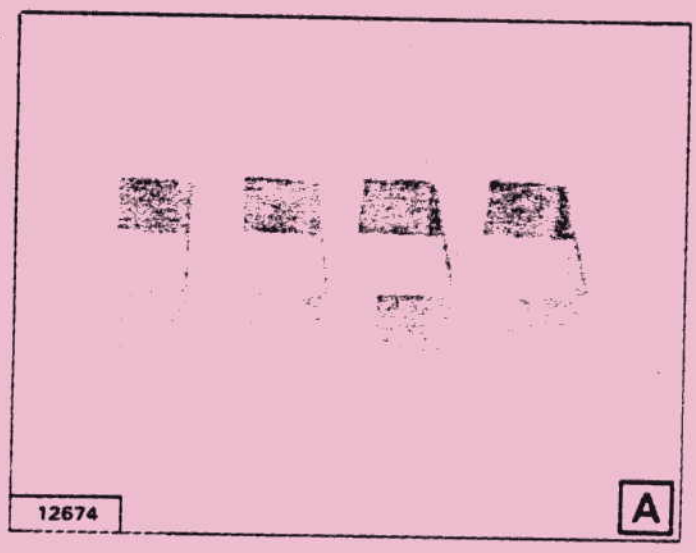
Tool no. : 8.0150 A.

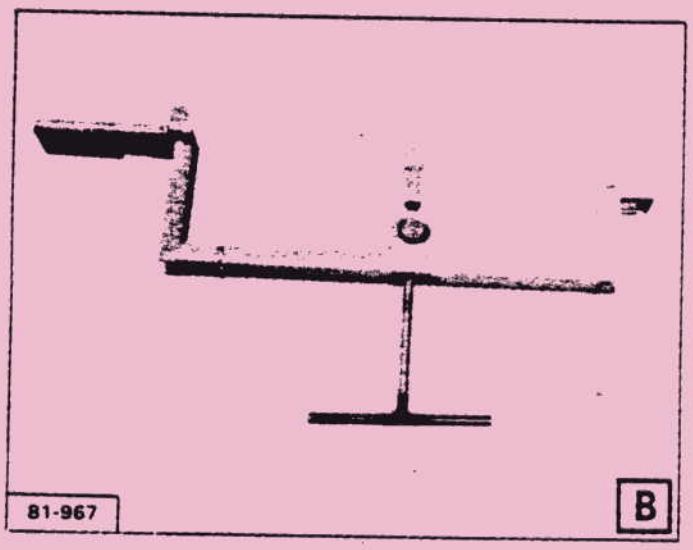
C : Set of two cylinder head freeing levers.

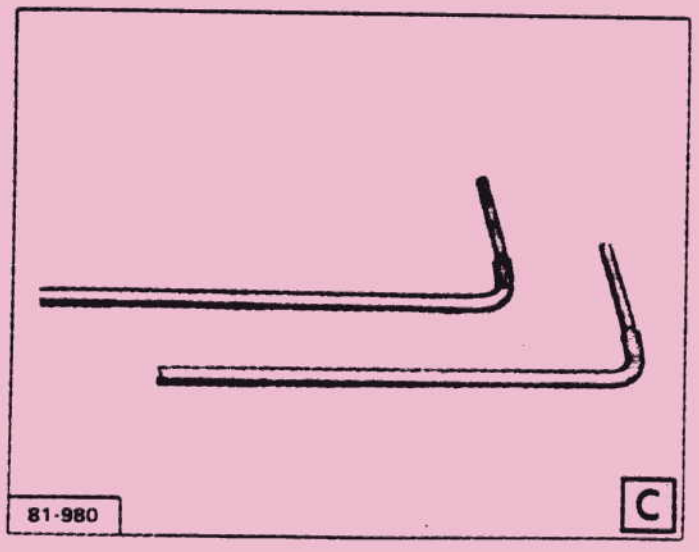
Tool no. : 0.0149

TIGHTENING TORQUES

		m.daN	Nm	lbf ft
Essential tightening torques (use torque spanner)				
Cylinder head securing bolts (faces and threads oiled, washer with tags against cylinder head)	initial tightening torque	6	60	44
	final tightening torque	10,5	105	77
Recommended tightening torques :				
Rocker shaft securing nuts		2,8	28	21
Injector pipe nuts		2,4	24	18
Engine mounting securing bolts (on cylinder head side).		5	50	40

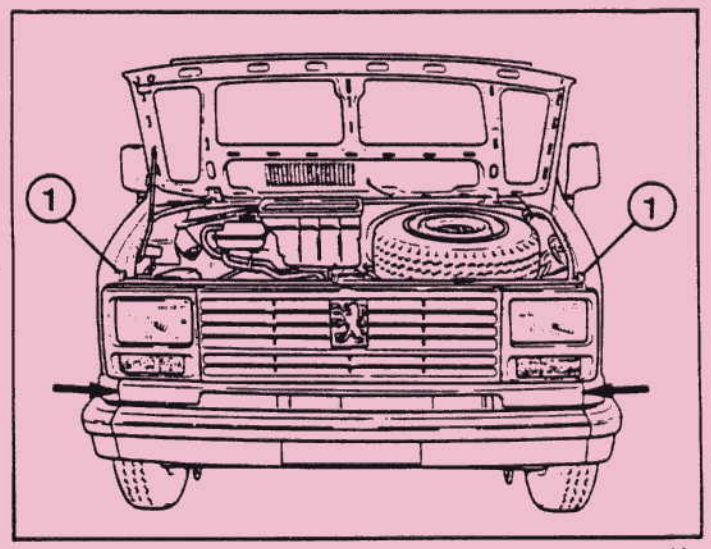

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A


81-967
B

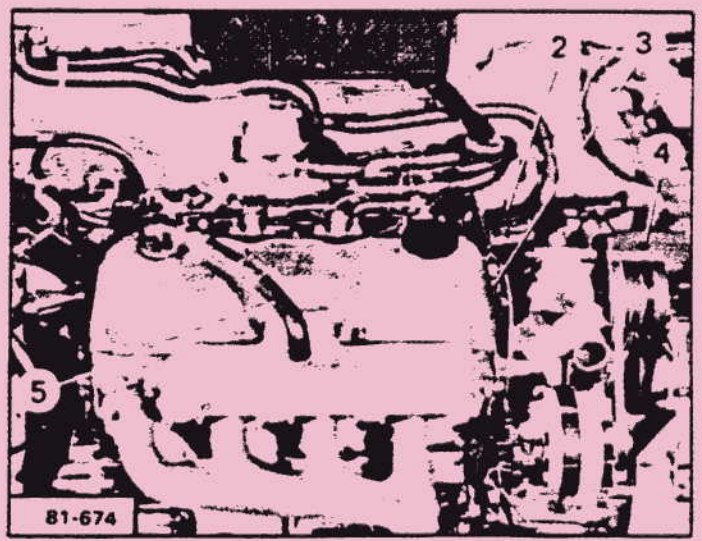

81-980
C



I



II



III

REMOVING

Place a trolley jack under the engine so that it remains in its original position.
Remove the right hand engine mounting.
Fit engine support [B]8.0150 A and allow it to take the weight of the engine.

Remove :
- the spare wheel.

- the wires from the temperature switch on the radiator,

Disconnect :
- the battery negative and positive cables,
- the lighting and signalling supply wires,
- the electric cooling fan wires,
- the water pump temperatures switch wires,
- the wires from the temperature switch on the radiator,
- the wires from the temperature switch on the water casing,
- the pre-heat plug supply wires,
- the electric shut-off solenoid wire,
- the diagnostic harness earth wire.

Free :
- the bonnet latch mechanism from the radiator grille,
- the spare wheel carrier rear securing point from the scuttle,
- the radiator hoses from the radiator,
- the accelerator and fast idling cables,
- the those from the tank leak-off line,
- the water hoses from the cylinder head,
- the exhaust downpipe from the exhaust pipes.

Loosen the nuts (➡) and remove the two bolts (1) : Fig. II.

Remove :
- the radiator grille,
- the air duct from the intake casing,
- the belt protector (4),
- the water pump, alternator and vacuum pump belts,
- pipe (5).

Free the diagnostic socket (2) from its support.

Loosen the pipe unions on the injectors.

Disconnect the cylinder head oil supply pipe (3).

Remove :
- the rocket cover and its gasket,
- the rocker shaft,
- the cylinder head bolts.

Free the cylinder head and its gasket using lifting levers 0.0149.

Remove the push rods.
(Mark the positions from which they are taken).

PREPARATION

Clean the cylinder block and cylinder head gasket faces.

> It is very important not to scrape the gasket faces of aluminium components.
> Use a stripper to dissolve those parts of the gasket that are still sticking to the faces. Be particularly carefull over this operation to prevent foreign bodies entering the oil input ducts.

REFITTING

Fitting the cylinder head :
Position the pistons haft way up the bores.
Fit the cylinder had gasket.

Check that the cylinder head gasket has the reference L25 marked on its tab.
This gasket is to be fitted dry (without linseed oil).

Fit the cylinder head.
Before fitting the cylinder head :
- Clean out the threads in the block.
- Oil the under head flanges and threads on the bolts.
- The washers do not require lubrication and are to be fitted with their tags against the cylinder head.

Pretighten the bolts to a torque of 6 m.daN (60 Nm, 44 lbf ft).
Finally tighten them to 10.5 m.daN (65 Nm. 77 lbf ft).
For the tightenihg order : see Fig. I.

Prepare the rocker shaft :

Use the large oil supply hole (a) as a position reference : Fig. I
Fit :
- a washer,
- an inlet valve rocker arm A,
- a washer,
- a spring,
- an exhaust valve rocker arm E,
- a washer.

Hold the assembly together with a clip 0.0612

Repeat this operation four times.

Fit the push rods.
Fit the assembly prepared in this way to the cylinder head with the large oil input hole (a) at the water pump end and the oil output holes pointing towards the cylinder head.
Fit the clamps and tighten their nuts (18).
Tightening torque : 2.8 m.daN (28 Nm, 21 lbft ft).
Remove clips : 0.0612.

Adjust the valve clearances :
A = Inlet = 0.30 mm
B = Exhaust = 0.20 mm

Fit the rocker cover and its gasket.
Reconnect :
- the cylinder head oil pipe (2),
- the diagnostic socket (19) with its support,

Tighten the injector unions to a torque of 2.4 m.daN (24 Nm, 18 lbf ft).

Fit :
- pipe (22),
- the water pump, alternator and vacuum pump drive belts,
- the belts protector (21),
- the air ducting to the air intake casing,

Connect up :
- the exhaust downpipe (the ball joint section is to be greased with high temperature MOLYKOMBIN grease, tighten the springs until they are coil bound then loosen them by one turn on each side,
- the hose to the fuel tank lead-off line,
- the water hoses to the cylinder head,
- the accelerator hand fast idling cables.

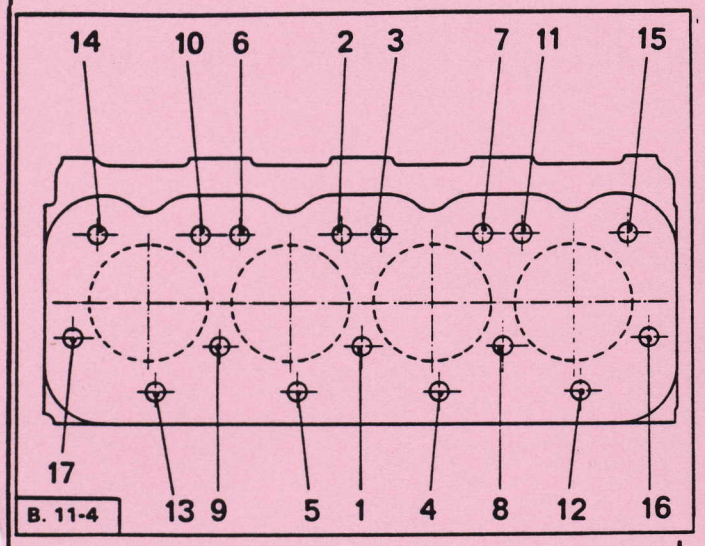
Fit the radiator grille and secure it with the two bolts (23).
Tighten the nuts (➡).

Connect :
- the radiator hoses to the radiator,
- the spare wheel carrier rear securing points to the scuttle,
- the bonnet latch mechanism to the radiator grille and adjust it.

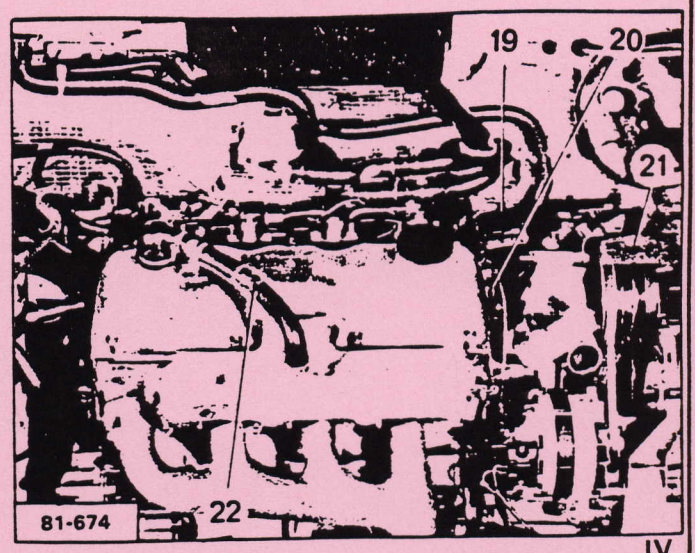
Connect :
- the wires to the temperature switch on the radiator,
- the wires to the temperature switch on the water pump,
- the electric cooling fan wires,
- the lighting and signalling supply wires,
- the pre-heat plug supply wire,
- the electric shut-off wire,
- the diagnostic harness earth wire,
- the battery positive and negative cables.

Place a trolley jack under the engine to hold it whilst the right hand engine mounting is fitted.
Tighten the engine mounting bolts to a torque of 5 m.daN (50 Nm, 37 lbf ft).
Remove the engine support [B] 8.0150 A.
Take out the trolley jack.
Fill and bleed the cooling system.

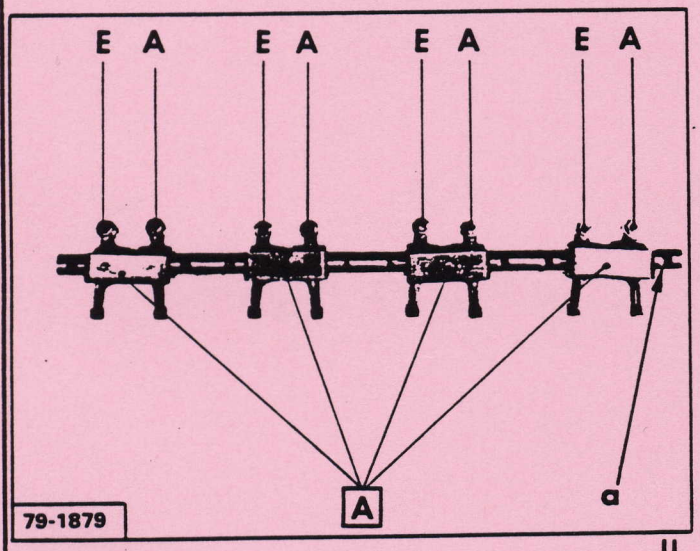
Refit the spare wheel.



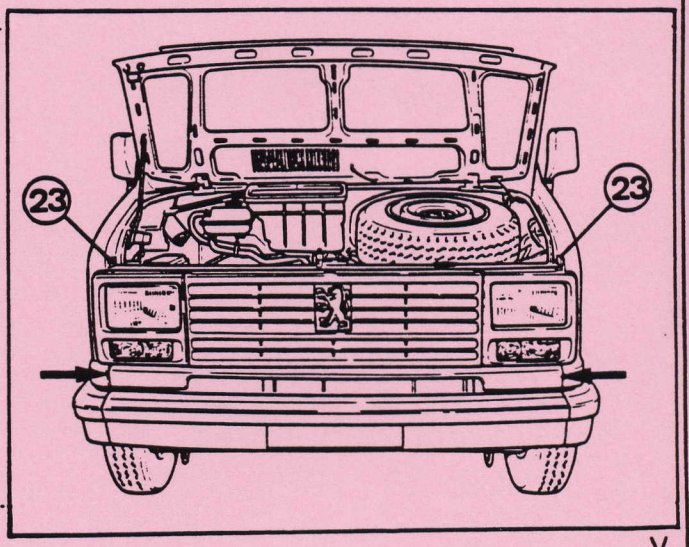
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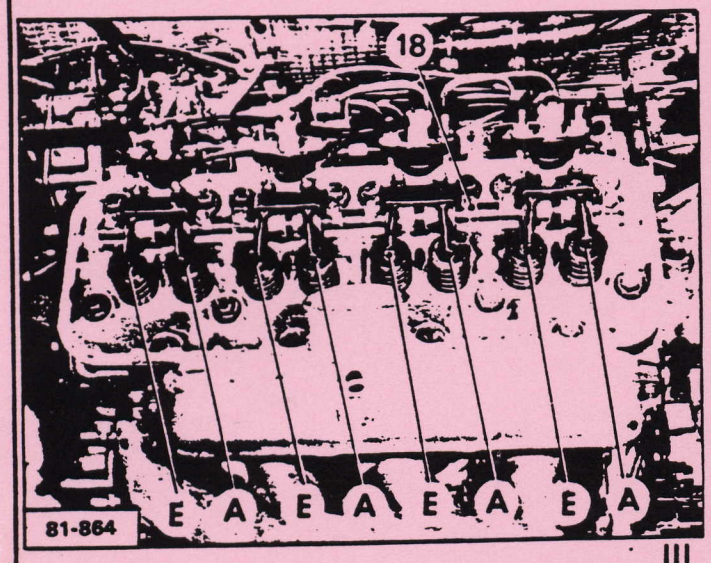
IV



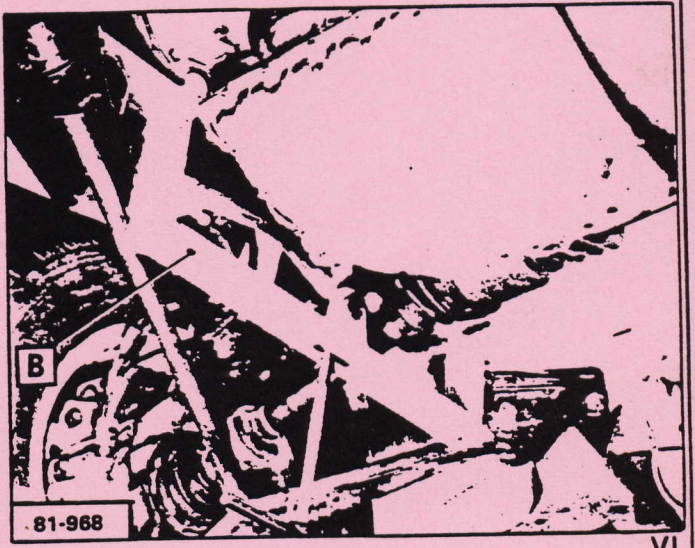
II



V



III



VI

SPECIAL TOOLS

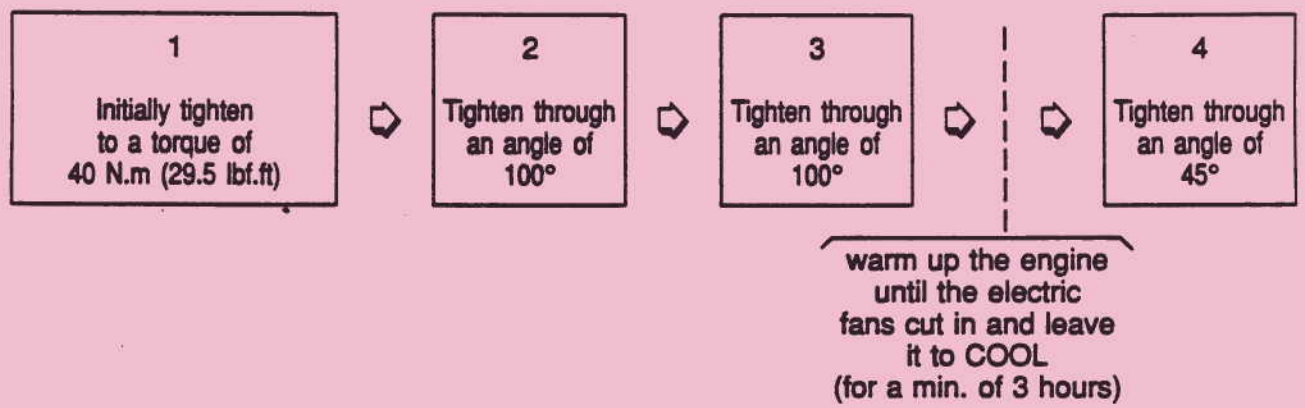
A Set of four retaining clamps for fitting to the rocker arm assembly
Reference : (-).0162

B Engine support
Reference : 8.0150 A
B1 : Pin, petrol engine support
B2 : Items additional to Diesel engine support (to be made locally).

C Set of two levers for freeing the cylinder head forming part of kit (-).0149.

TIGHTENING TORQUES

Engine types U 25/661 and U 25/673

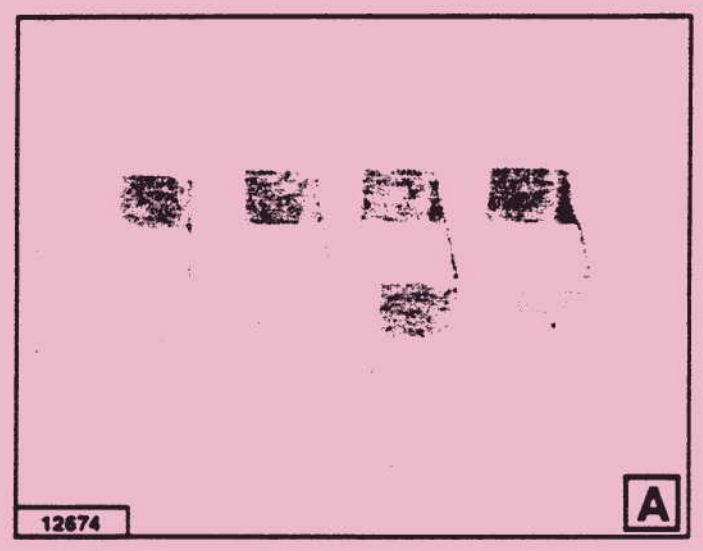


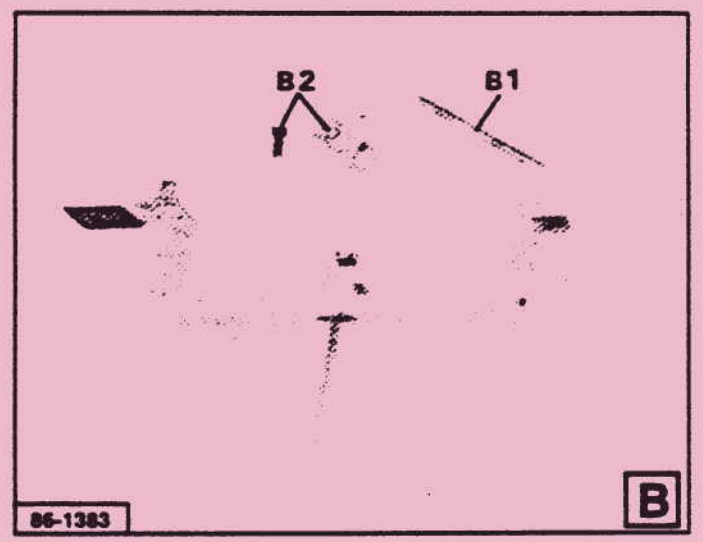
THERE IS NO CYLINDER HEAD RETIGHTENING OPERATION AT 600 MILES (1000 km)

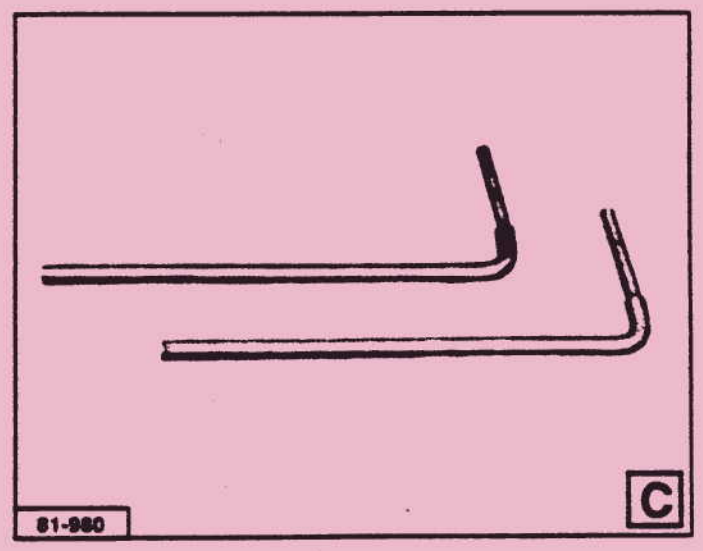
Torques in N.m (lbf.ft)

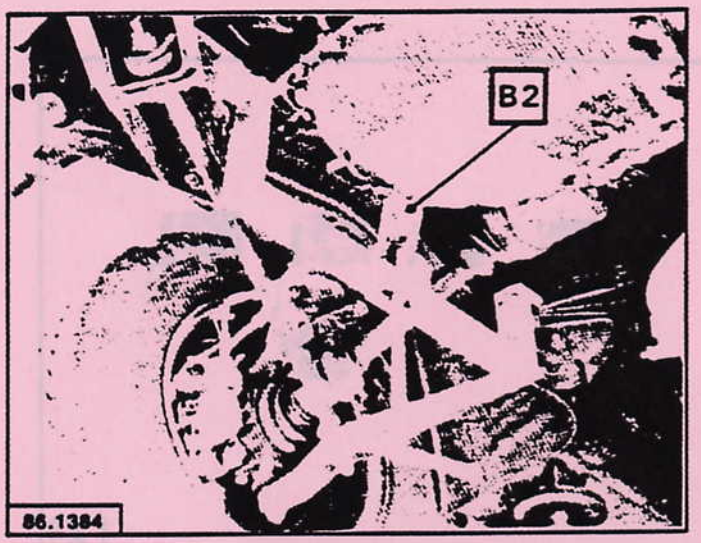
Recommended tightening torques :

Rocker arm assembly securing nuts	25 (18.4)
Nuts on injector pipes	25 (18.4)
Bolts securing the engine mounting (on the cylinder head side)	50 (36.9)

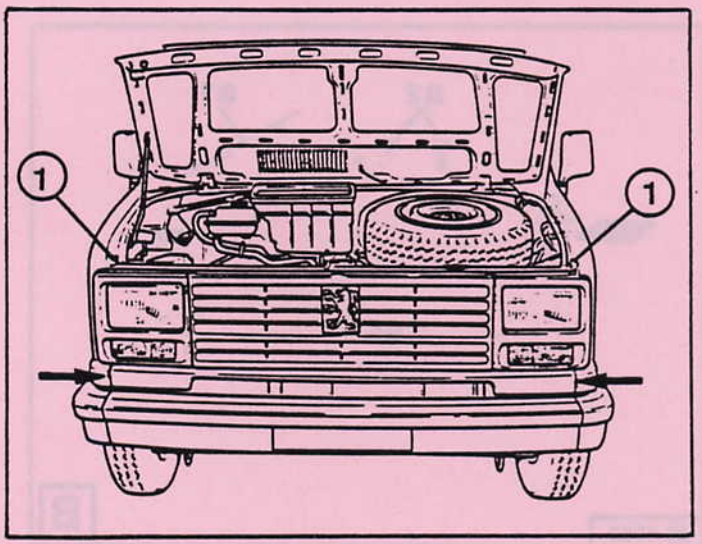

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A


B2
B1
86-1383
B

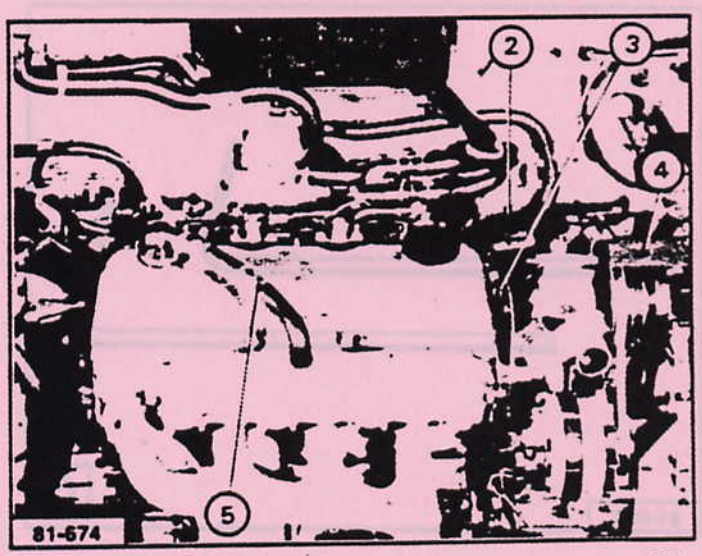

81-980
C



I



II



III

REMOVING

Place a trolley jack under the engine to retain it in its original position.
Remove the right hand engine mounting.
Place the engine support (-).0150 A and (B2) in position. Allow the engine to rest on the support (Fig. I).

Remove :
- the spare wheel.

Drain off the coolant and put it to one side (anti-freeze solution).

Disconnect :
- the battery negative and positive cables,
- the lighting and direction indicator wires,
- the electric fan wires,
- the wire from the temperature switch on the coolant pump,
- the wires from the temperature switch on the radiator,
- the wires from the temperature switch on the coolant casing,
- the wire that supplies the preheater plugs,
- the wire from the electric shut-off unit,
- the diagnostic harness earth wire.

Disconnect :
- the bonnet latch mechanism from the radiator grille,
- the rear spare wheel fastening from the scuttle,
- the coolant hoses from the radiator,
- the accelerator and fast idling cables,
- the fuel return to tank hose,
- the coolant hoses from the cylinder head,
- the exhaust pipes.

Loosen the nuts (→) and remove the two bolts (1) : Fig. II

Remove :
- the radiator grille,
- the air filter ducting from the intake casing,
- the belt protector (4),
- the coolant pump, alternator and exhauster belts,
- the ducting (5).

Free the diagnostic plug (2) from its support.

Loosen the injector pipe unions.

Disconnect the oil pipe (3) from the cylinder head.

Remove :
- the rocker arm cover and its gasket,
- the rocker arm assembly,
- the cylinder head bolts.

Release the cylinder head and gasket using the special freeing levers.

Remove the push rods.
(Note their respective positions).

PREPARATION

Clean the cylinder clock and the cylinder head gasket faces.

> It is very important not to scrape the joint or gasket faces of aluminium components.
> Use a chemical stripper to dissolve those parts of the gasket remaining sticking to the component. Take particular care during this operation to avoid any foreign bodies entering the oil input ducts.

REFITTING

Fit the cylinder head :
Position the pistons half way up their stroke.
Fit the cylinder head gasket.

> Check that the cylinder head gasket has the identification inscription L 25 engraved on its tab.
> This gasket is to be fitted dry (without linseed oil).

Fit the cylinder head. Before placing the cylinder head in position :
- Clean out the tappings in the block.

Tightening : (follow the conventional tightening order). The under head areas and threads on the bolts are to be oiled. Place the teeth on the washers against the cylinder head.

Each time the cylinder head is removed it is essential to replace the bolts and toothed washers by new ones.

1	→	2	→	3
Pretighten to a torque of 40 N.m (29.5 lbf.ft)		Tighten through an angle of 100°		Tighten through an angle of 100°

Prepare the rocker arm assembly :

> Use the large oil input hole « a » as a reference : Fig. I
> Fit :
> - one washer,
> - one inlet rocker arm A,
> - one washer,
> - one spring,
> - one exhaust rocker arm E,
> - one washer.
>
> Hold the assembly together using a clamp (-).0162. Repeat this operation four times.

Fit the push rods.
Fit the assembly prepared in this way to the cylinder head with the large oil input hole « a » pointing towards the coolant pump and the lubrication holes pointing towards the cylinder head.
Fit the caps and tighten the nuts (18).
Tightening torque 25 N.m (18.4 lbf.ft.)
Remove the clamp (-).0162
Adjust the valve clearances :
A = Inlet = 0.30 mm
B = Exhaust = 0.20 mm
Fit the rocker arm cover and its gasket.
Connect :
- the lubrication pipe (20) to the cylinder head,
- the diagnostic plug (19) to its support.

Tighten the injector unions to 25 N.m (18.4 lbf.ft.).

Fit :
- duct (22),
- the coolant pump, alternator and exhauster drive belts,
- the belt protector (21),
- the air filter duct to the intake casing.

Connect :
- the exhaust pipe (with the part that acts as a ball joint coated with high temperature grease). Tighten the springs until they are coil-bound and then loosen them by one turn on each side,
- the fuel return to tank hose,
- the coolant hoses to the cylinder head,
- the accelerator and fast idling cables.

Fit the radiator grille and secure it with the two screws (23).
Tighten the nuts (→).

Reconnect :
- the coolant hoses to the radiator,
- the fastening securing the spare wheel assembly to the scuttle.
- the bonnet latch mechanism to the radiator grille and adjust it.

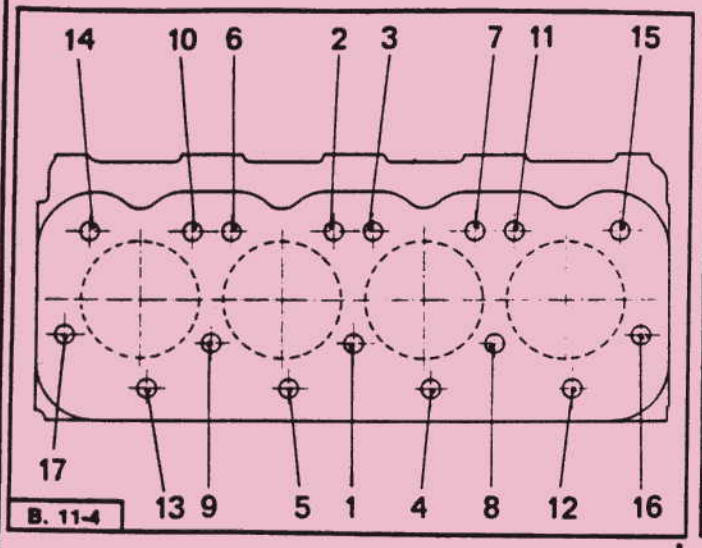
Connect up :
- the wires to the temperature switch on the radiator,
- the wires to the temperature switch on the coolant pump,
- the wires to the electric fan units,
- the lighting and direction indicator wires,
- the wire that supplies the preheater plugs,
- the electric shut-off unit wire,
- the diagnostic harness earth wire,
- the positive and negative cables to the battery.

Place a trolley jack under the engine, to position it so that the right hand engine mounting can be refitted. Tighten the engine mounting bolts to 50 N.m (36.9 lbf.ft.).
Remove the engine support (-).0150 A and B2.
Remove the trolley jack (Fig. VI).
Fill and bleed the cooling system.

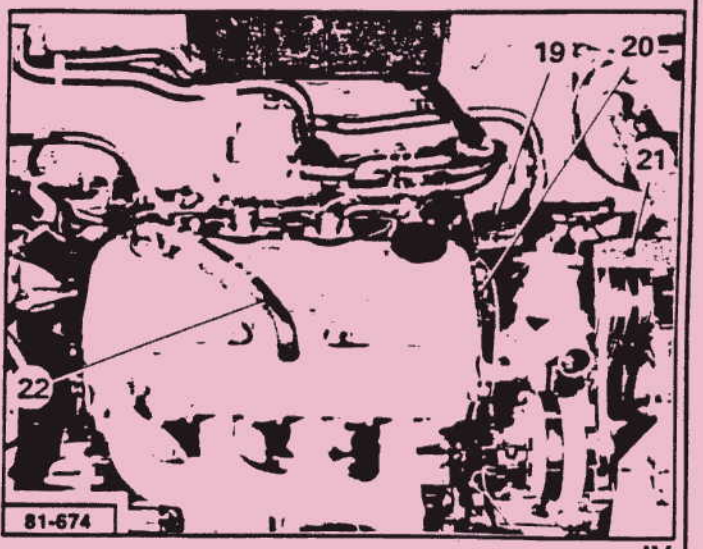
4
Tighten through an angle of 45°

Warm up the engine until the electric fans cut in then : leave it to COOL (for a min. of 3 hours)
- Adjust the valve clearances.

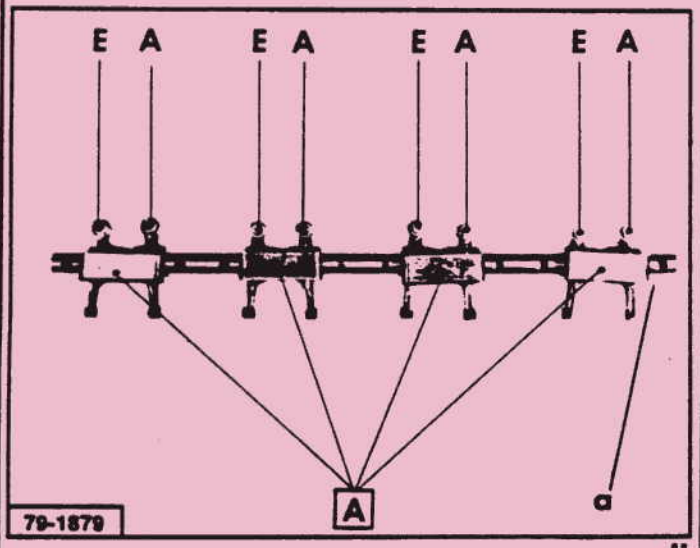
THERE IS NO CYLINDER HEAD RETIGHTENING OPERATION at 600 miles (1000 km)
Fit the spare wheel.



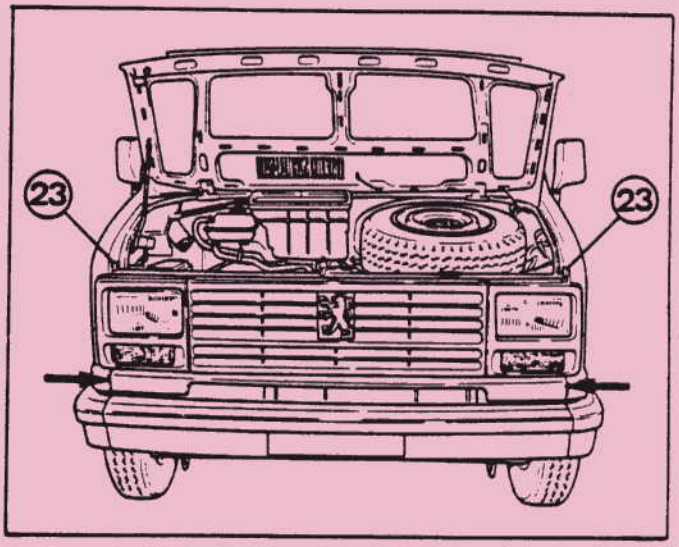
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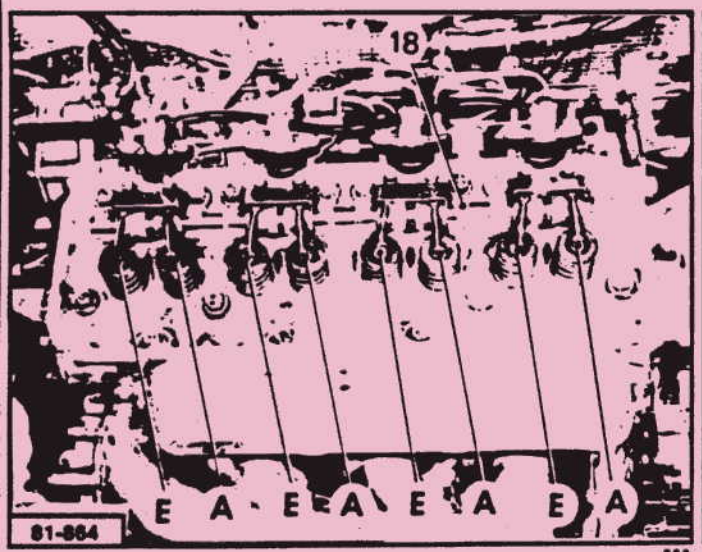
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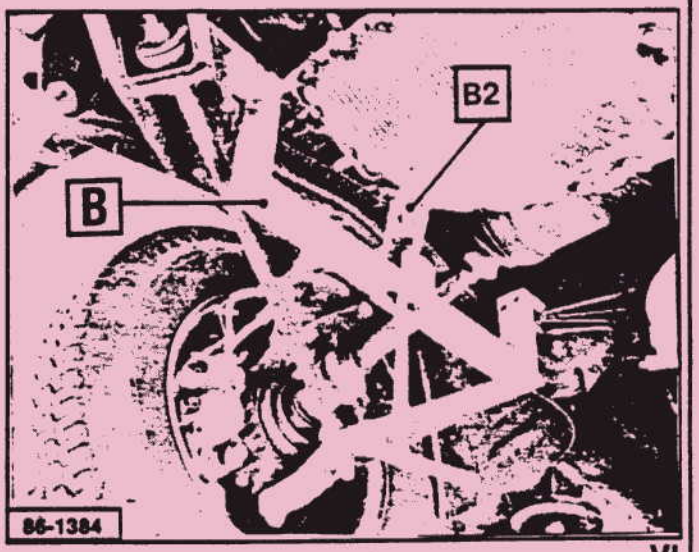
II



V



III



VI

I

SPECIAL TOOLS

Dial indicator (-).1504

Tools, in kits

Kit (-).0110 Tripod P
Support H

Kit (-).0117 Dial indicator plunger T
Support P
Crankshaft spanner EZ

Kit (-).0153 Pinning tool N

II

REMOVING

- Disconnect the battery
- Drain the cooling system
- Remove the air intake distributor (1)
- Partially remove the timing gear drive belt (see corresponding section)
- Disconnect, unclip and pull to one side the wiring harnesses and pipes and cables attached to the cylinder head
- Remove the injector pipes
- Remove :
  - the exhauster drive belt
  - the lifting ring (3)
- Disconnect the exhaust downpipe from the manifold

III

- Loosen the bolt that secures the timing sprocket (4)
- Remove the pinning bolt (5) and the sprocket (4)
- Tighten the nut (6) on the tensioner roller shaft-stud
- Remove :
  - the tensioner roller upper bolt
  - bolt (7) from the engine mounting

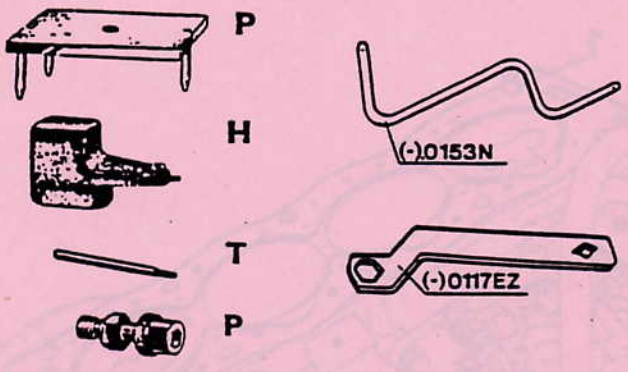
IV

- Remove the rocker arm cover
- Loosen the cylinder head bolts, evenly and progressively, in a spiral sequence starting from the outside
- Remove the cylinder head bolts
- Free the cylinder head using levers 0.0149 (see section 15)
- Remove the cylinder head and its gasket

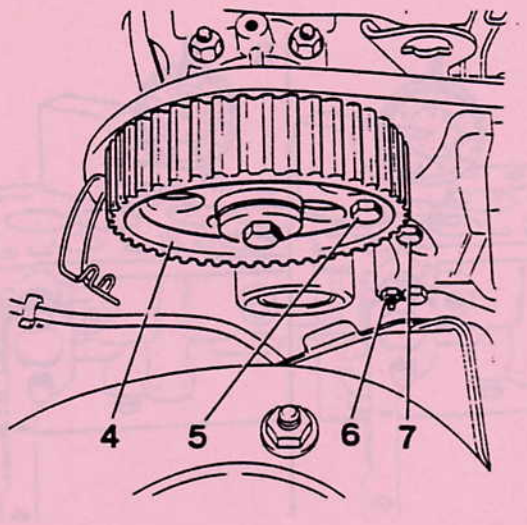
V

- Clean the gasket faces with officially approved stripping compound. Do not use abrasive or sharp edged tools to do so. There must be no impact marks or scores on the gasket and joint faces
- Clean the tappings in the cylinder block by running an m12 x 150 tap down them.

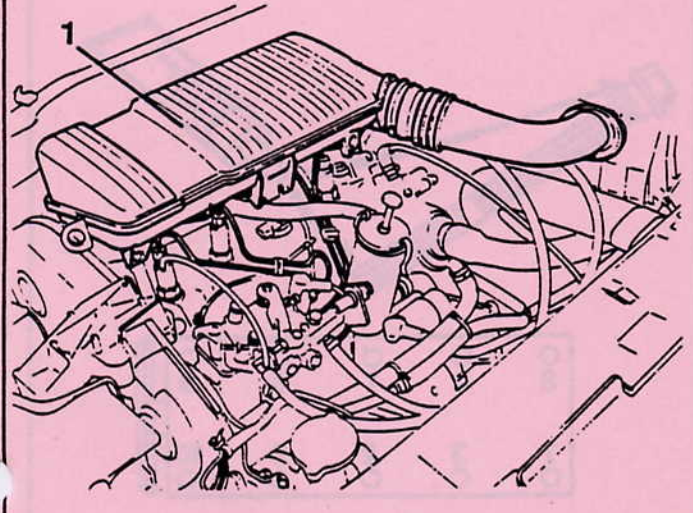
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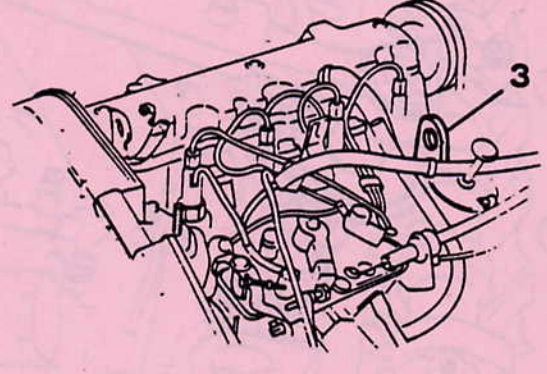


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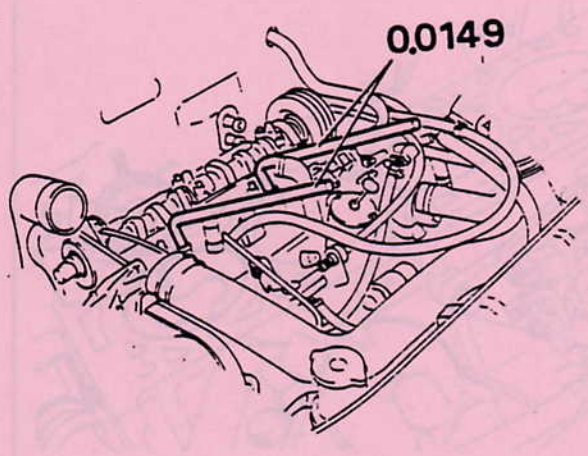


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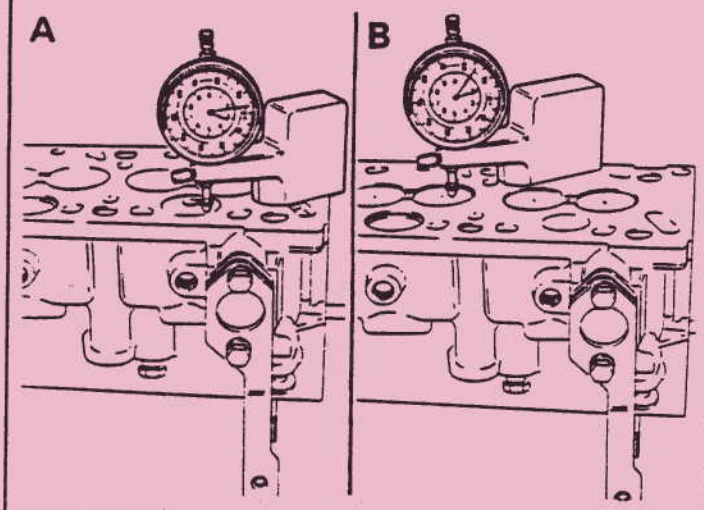




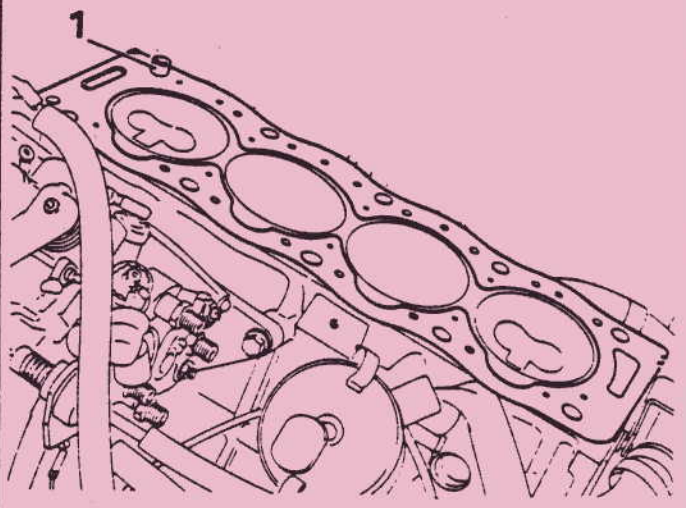
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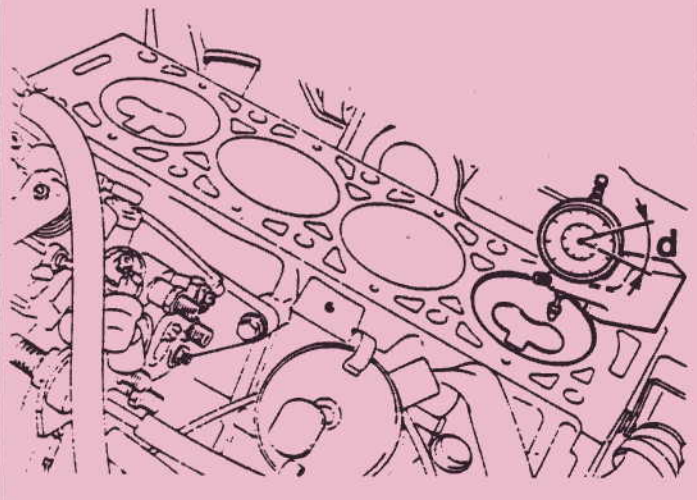
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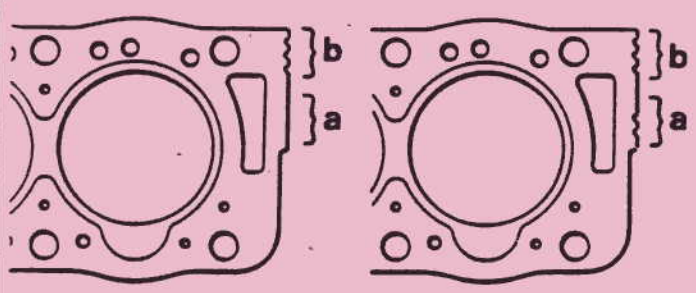


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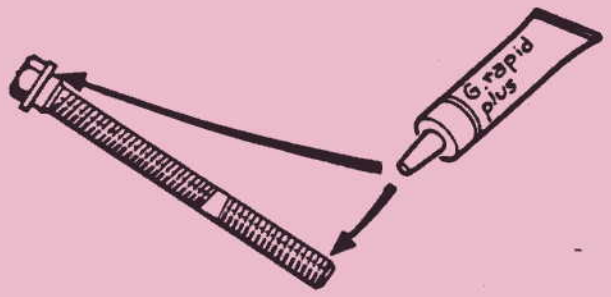


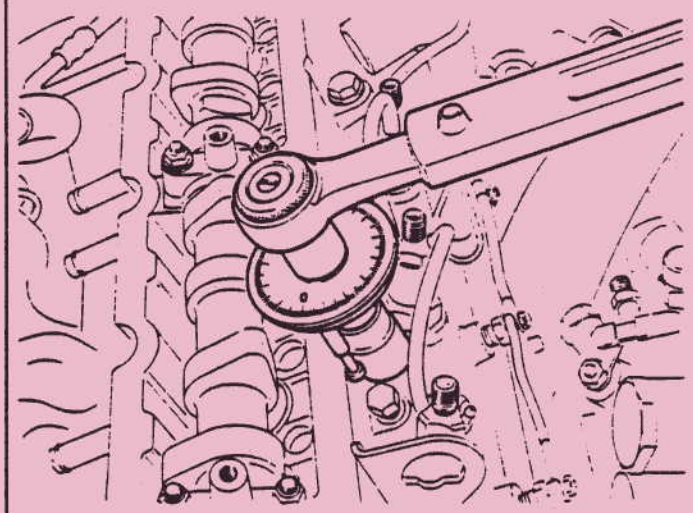
II





IV





I

CHECKING

- Check the flatness of the gasket face. The max. permissible bow : 0.07 mm (the camshaft must remain free to rotate)
- If necessary, reface the gasket face (see data sheets)
- Check the precombustion chamber protrusion (A)
  Protrusion : 0 to 0.03 mm
- Check the amount by which the valves are recessed below the surface (B) :
  Recess : ⊗ 0.9 to 1.45 mm
  ● 0.5 to 1.05 mm

II

SELECTING THE CYLINDER HEAD GASKET

- Remove the locating pin (-).0153 N from the flywheel
- Mount the dial indicator on the support (-).0110 H and zero it on a surface plate
- Turn the crankshaft and measure the amount by which each piston protrudes at TDC
- Note down the max. protrusion (d)
- Select the thickness of the gasket to suit this protrusion

Protrusion (d)	Reference (b)
0.54 to 0.77 mm	2 notches
0.77 to 0.82 mm	3 notches

Cylinder head gasket identification

- Engine reference (a)
- Thickness reference (b)

Engine	Reference (a)	Reference (b)	Thickness
XUD9A	No notches	2 notches	1.61 mm
		3 notches	1.73 mm

III

REFITTING

- Turn the crankshaft using spanner (-).0117 EZ and pin the flywheel in position using tool (-).0153 N
- Refit :
  - the locating dowel (1)
  - the cylinder head gasket, dry
- Ensure that the camshaft is in the correct position for insertion of the timing pin by fitting the timing sprocket.
- Refit the cylinder head

IV

- Before refitting the cylinder head bolts :
  - carefully brush the screw threads
  - coat the screw threads and the locating faces on the washers with MOLYKOTE G RAPID

TIGHTENING THE CYLINDER HEAD

- Refit the bolts, using new washers

In the order shown :

- pretighten to 30 N.m (22.1 lbf.ft.)
- tighten to 70 N.m (51.6 lbf.ft.)
- retighten through an angle of 120° using a tool of the FACOM D360 type

IMPORTANT

There is no retightening operation after the first warm-up.

I

- Refit :
  - bolt (2) to the engine mounting
  - the upper bolt (3) to the tensioner roller
  - the camshaft sprocket (4), pinning it with a bolt (5) and tightening the bolt (6) to 50 N.m (36.9 lbf.ft)
  - the rocker arm cover (1)
  - the timing gear drive belt (see corresponding section)

- Reconnect, clip in place and secure the wiring harnesses, connections, cables and pipes associated with the cylinder head.

II

- Refit :

  - the exhauster drive belt (see corresponding section)

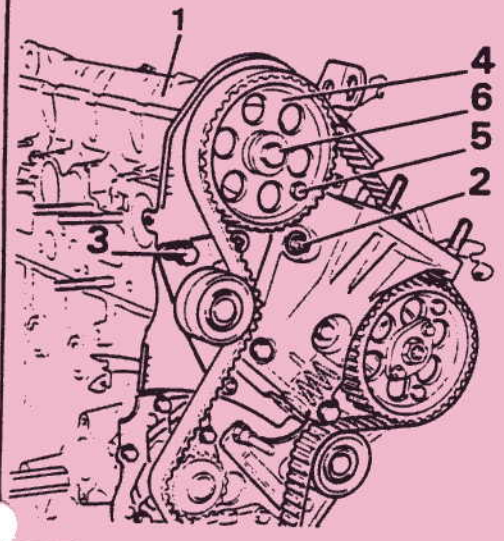
  - the air intake distributor

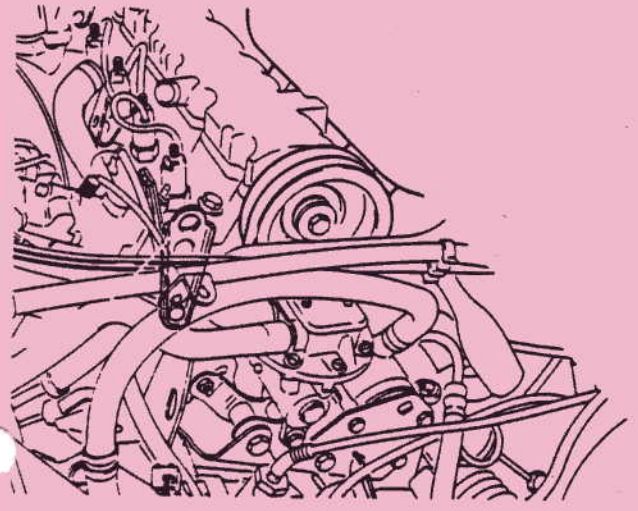
III

- Adjust the fast idling control (see corresponding section)

- Fill and bleed the cooling system (see corresponding section).

I





SPECIAL TOOLS

A : Dial indicator :

Tool no. : 8.1504.

B : Valve spring compressor

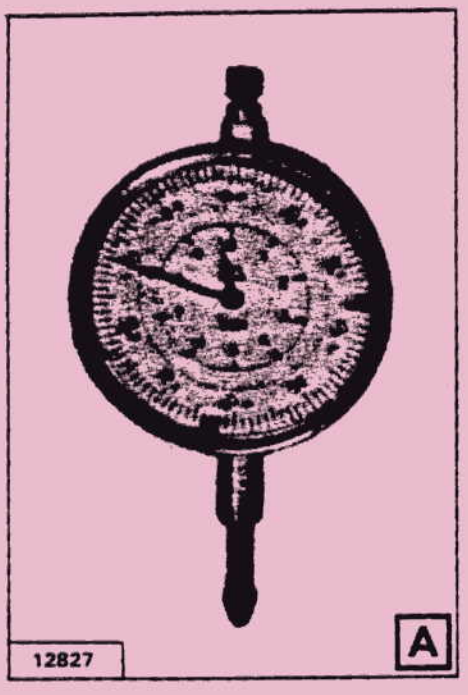
Tool no. : 8.1505 Y

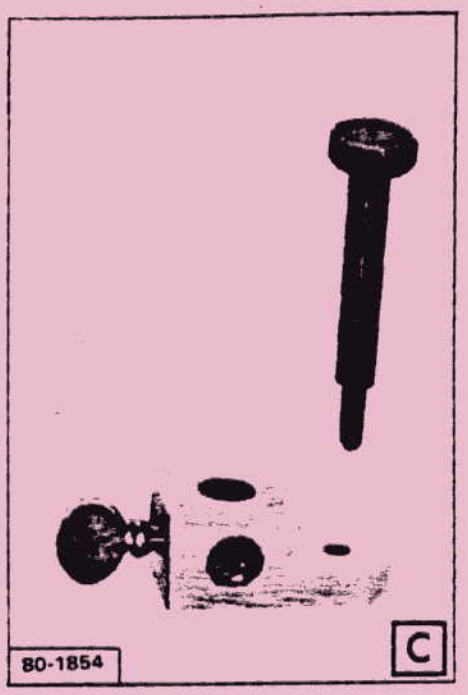
C : Disal indicator support adjustable section :

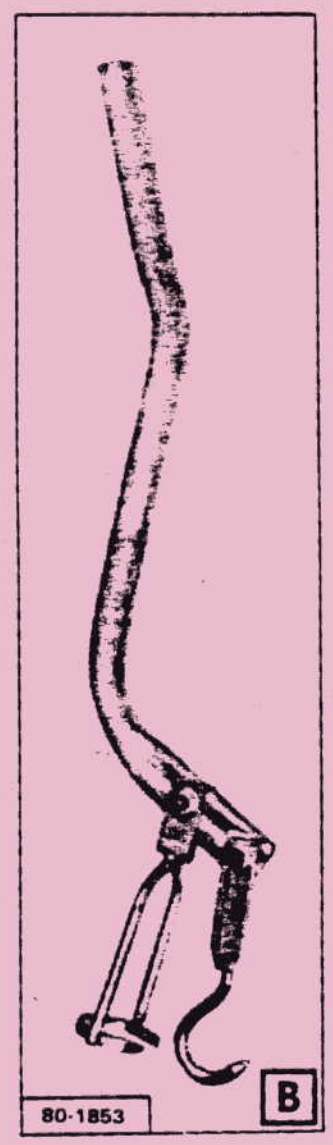
Tool no. : 8.1504 A2

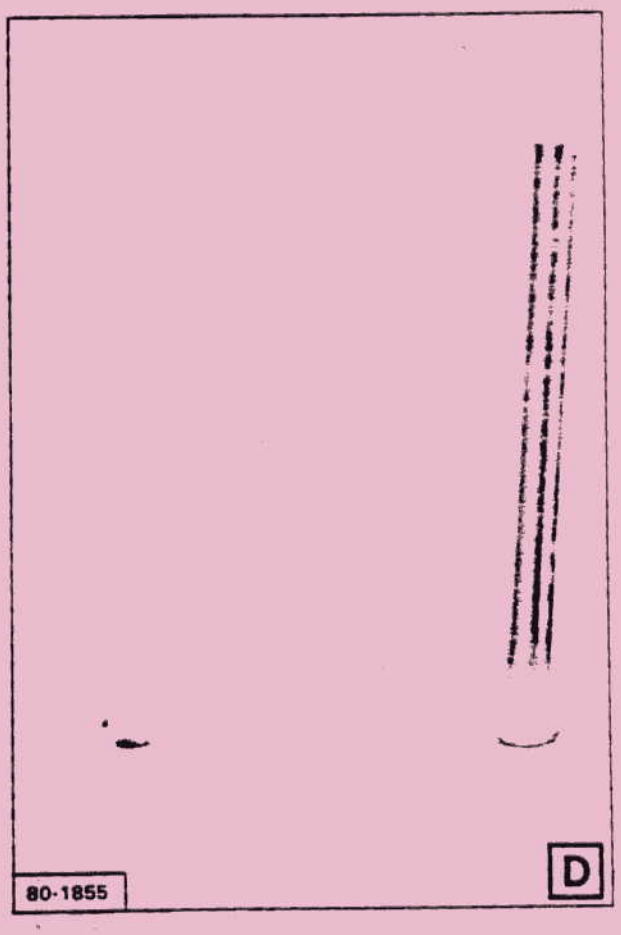
D : Support for mounting the dial indicator on the cylinder head :

Tool no. : 8.0117 AH.


12827
A

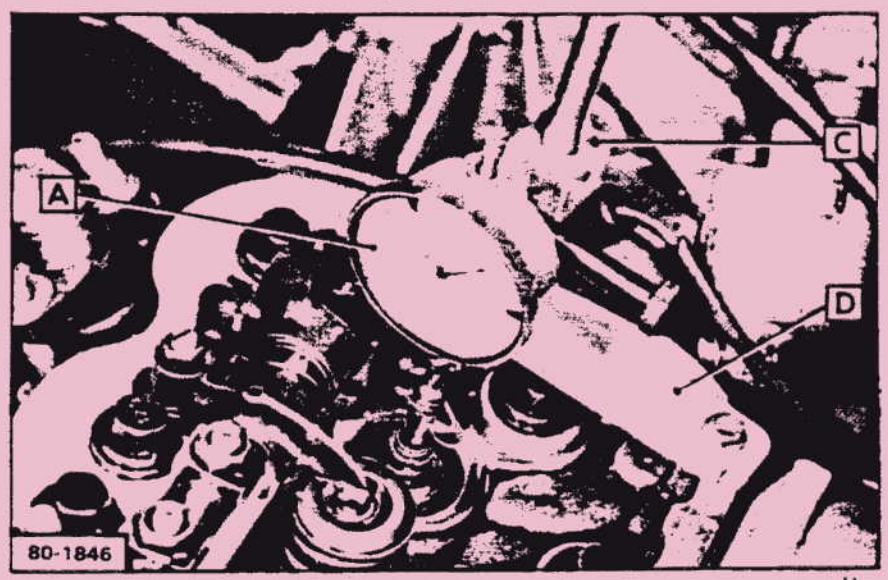

80-1854
C


80-1853
B

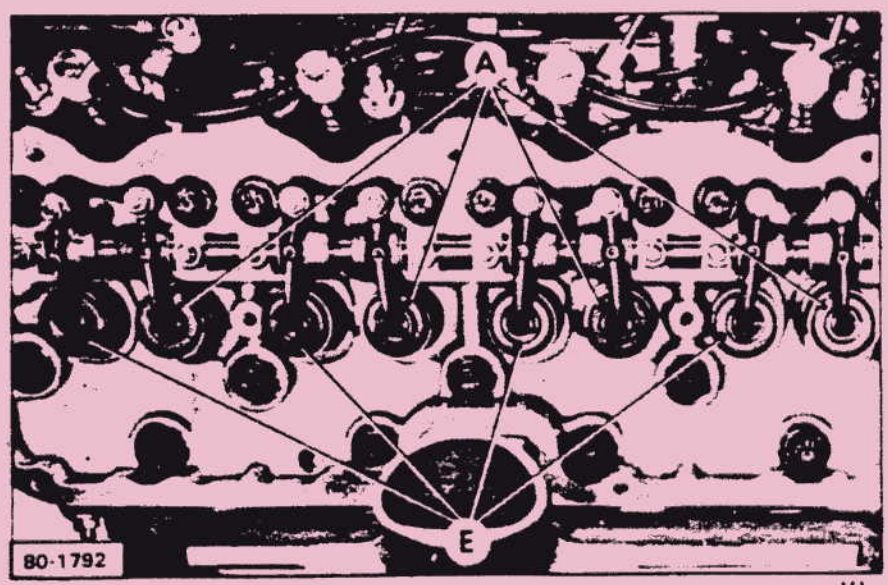

80-1855
D



I



II



III

VALVE CLEARANCES (on a cold engine) Fig. III

To turn the crankshaft :
Raise one of the front wheels, select the highest gear and turn the wheel to move the crankshaft.

Remove the rocker cover.
Bring the piston on no. 1 cylinder to somewhere near TDC, with the valves "rocking".

From the no. 1 cylinder inlet valve assembly remove : Fig. I :
- lock-nut (2),
- the push-rod.

Screw in the inlet valve rocker arm adjusting screw and move the rocker arm into the vertical position.
Fit valve spring compressor [B] 8.1505 Y to the inlet valve on no. 1 cylinder.
Remove :
- the collets and the spring cup,
- the spring.

Find TDC on No. 1 cylinder : Fig. II

Place a paper clip on the inlet valve stem to prevent the valve falling into the cylinder.

Fit support [D] 8.0117 AH.
and dial indicator support adjustable section. [C] 8.0504 A2, fitted with dial indicator, [A] 8.1504.

Turn the crankshaft through a quarter of a turn in the opposite direction to the normal direction of rotation of the engine and then return it in the normal direction of rotation until the large pointer on the dial indicator changes its direction of movement, showing that the piston TDC has been reached.
Set the "0" on the dial indicator face in line with the large pointer and note the position of the small pointer.

Adjust the inlet valve clearance on no. 4 cylinder to 1 mm (the theoretical valve clearance).

Turn the crankshaft through one complete turn in the normal direction of rotation, until it comes back to the TDC "rocking" position (where the dial indicator pointers are in the same position as was previously noted).

Measure the clearance on no. 4 cylinder inlet valve which should be between 0.05 and 0.45 mm.

Remove the dial indicator and refit the valve spring, the spring cup and the collets using spring compressor [B] 8.0105 Y.

Refit the inlet valve push rod and lock nut (2)

VALVE CLEARANCES (on a cold engine) Fig. III

Adjust the valves to the following clearances :
On a cold engine : Inlet : (A) 0.30 mm
Exhaust : (E) 0.20 mm

Fit the rocker cover and its gasket.
Tighten its securing nuts to 0,7 m.daN (copper washer).

ONE OF TWO METHODS CAN BE USED :

1 - With the valves "rocking" :

(inlet valve starting to open and the exhaust valve just closing)

Position No. 1 cyl. "rocking" and adjust the valves on No. 4 cyl.
No. 3 cyl. No. 2 cyl.
No. 4 cyl. No. 1 cyl.
No. 2 cyl. No. 3 cyl.

II - By fully opening the exhaust valves :

Valve to be fully open :	Adjust the following valves : Inlet	Exhaust
Exhaust No. 1 cyl.	No. 3 cyl.	No. 4 cyl.
" No. 3 cyl.	No. 4 cyl.	No. 2 cyl.
" No. 4 cyl.	No. 2 cyl.	No. 1 cyl.
" No. 2 cyl.	No. 1 cyl.	No. 3 cyl.

Support the right hand side of the vehicle on axle stands.
Disconnect the battery negative cable.
Engage the highest gear.

Remove, Fig. I
- the protector from under the engine (turbo)
- the crankshaft protection nut (1) (36 mm across flats)
- the drive belt protectors
- the engine oil filler cap.

Place, Fig. II
- the valves on no. 1 cylinder « in balance » (looking at them through the oil filler hole).
- the timing mark « A » on the camshaft in line with the bowl (2).

Check, Fig. II
- the number of belt pitches (teeth) between timing marks A and B, via the tensioner roller (1). There should be 35 pitches.

If this condition is not fulfilled, recheck the timing (see the corresponding section).

To make it easier to count the number of belt pitches, make chalk marks in line with the timing marks on the camshaft and the crankshaft and turn the engine to bring the mark on the belt that corresponds to the crankshaft mark into a more readily visible area « C ».

Fit, Fig. I

- the oil filler cap
- the belt protectors
- the crankshaft protection nut
- the protector under the engine (turbo).

ADJUSTING THE VALVE CLEARANCES (on a cold engine)

Valve clearances :

On a cold engine — Inlet: (A) ..... 0.30 mm
Exhaust: (E) . 0.20 mm

Refit the rocker arm cover and its gasket.

Tighten the securing nuts (7 mN - 5 lbf.ft) (fit copper washers).

POSSIBLE METHODS :

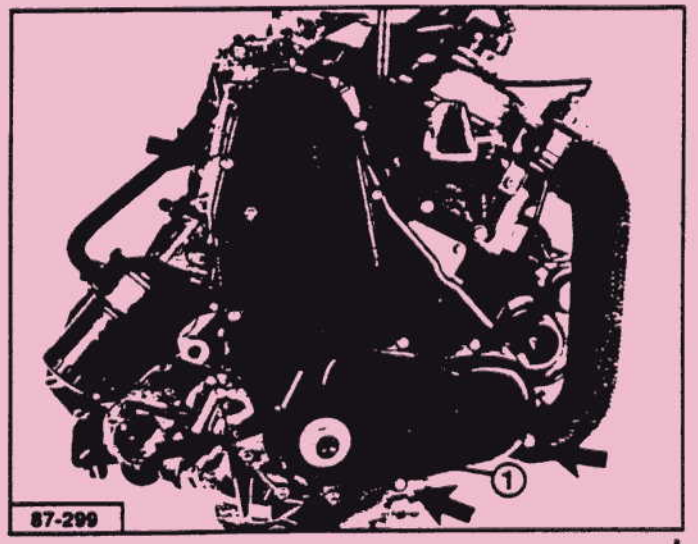
1. With the valves « in balance » :

(Inlet valve at beginning of inlet movement and exhaust valve at end of exhaust movement).

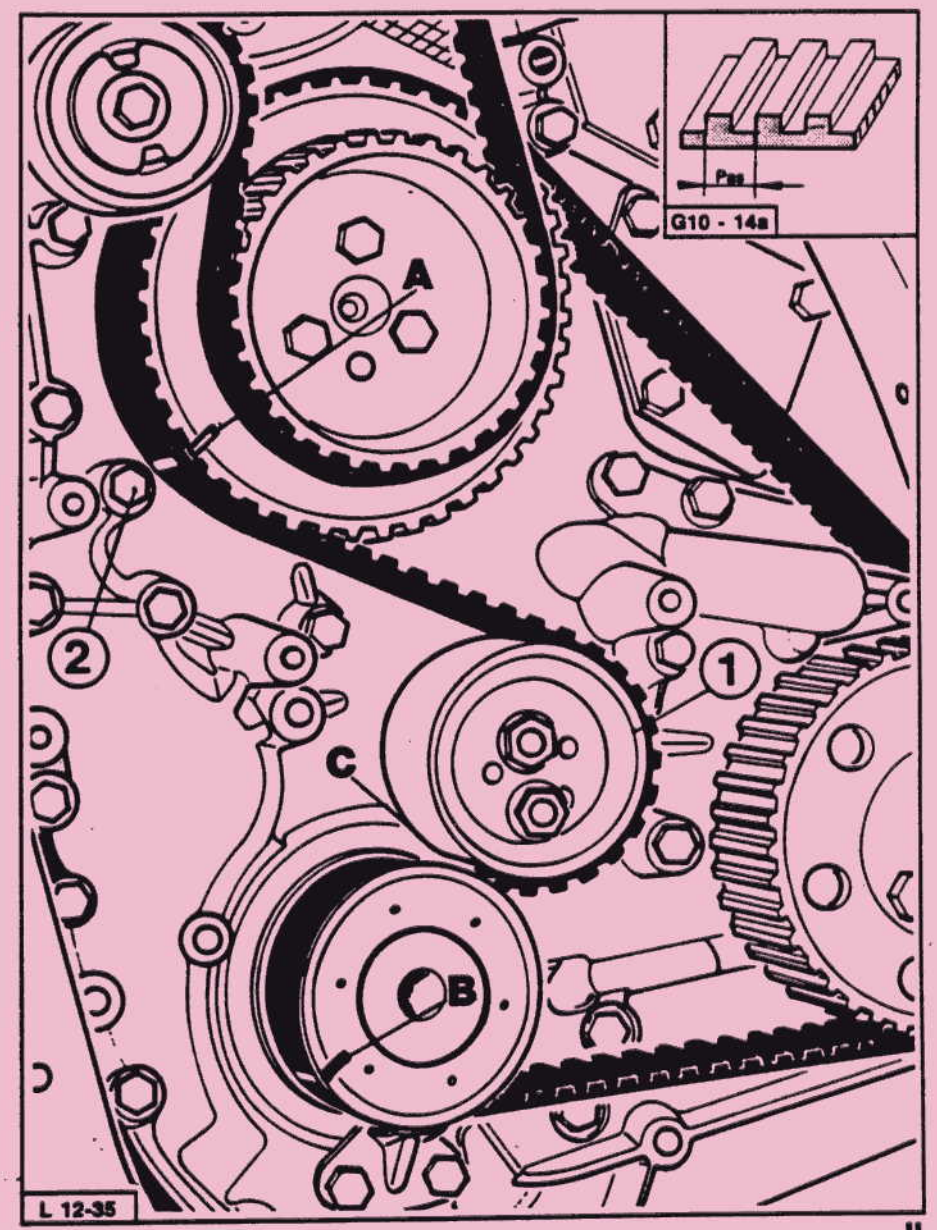
Place No.1 cyl in balance and adjust No.4 cyl
Place No.3 cyl in balance and adjust No.2 cyl
Place No.4 cyl in balance and adjust No.1 cyl
Place No.2 cyl in balance and adjust No.3 cyl

II. With the exhaust valve fully open

Valve to be fully opened :	Valve to be adjusted : Inlet	Exhaust
No.1 cyl exhaust	no.3 cyl	no.4 cyl
No.3 cyl exhaust	no.3 cyl	no.2 cyl
No.4 cyl exhaust	no.2 cyl	no.1 cyl
No.2 cyl exhaust	no.1 cyl	no.3 cyl



I



II

I

CHECKING THE VALVE CLEARANCES

- The clearances are to be checked when the engine is cold

- Remove :
  - the air intake distributor
  - the rocker arm cover
  - the pre-heater plugs

Method of checking

Valve clearances :

Inlet : ● 0.15 mm
Exhaust : ⊗ 0.30 mm
Tolerance : ± 0.07 mm

Place the following valves in balance	● 4	4	● 1	⊗ 1
Check	● 1 ● 2	1 3	● 4 ● 3	⊗ 4 ⊗ 2

- Note down the clearances

II

ADJUSTING THE VALVE CLEARANCES

CASE A

If the clearances noted during this check are incorrect

- Remove the camshaft (see corresponding section)

- Marking their positions :
  - take out the tappets
  - remove the adjusting pads

- Measure the thickness (e) of the pads

- Determine the thickness of the pad to be fitted to each (see III, column a or b)

- Fit the pads, the thickness of which has just been determined, and the tappets.

- Refit the camshaft (see the corresponding section)

III

EXAMPLE

	a	b	c
Nominal clearance	0.15	0.30	0.15
Clearance measured	0.25	0.20	0.45
Difference	+ 0.10	- 0.10	+ 0.30
e	2.35	2.725	2.425
Pad to be fitted	2.450	2.625	2.725
Clearance obtained	0.15	0.30	0.15

IV

CASE B

Adjusting the clearances after carrying out work on the cylinder head such as replacing the camshaft, the tappets or the valves or grinding-in the valves.

- Fit pads of the basic thickness (1)
  e = 2.425 mm

- Check that they project past the cup (2)

- Refit the tappets

- Turn the engine through 1/4 of a turn in the opposite to the normal direction of rotation, from the timing position (piston at mid-stroke)

- Refit the camshaft and tighten its bearing caps to 17.5 Nm (13 lbf.ft)

- Check the valve clearances by turning the camshaft and note them down.

- Remove the camshaft

- Take out the tappets, marking their positions.

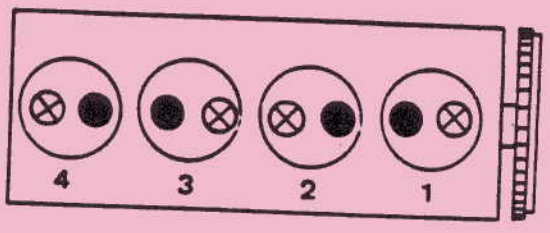
- Remove the pads of the basic thickness (1)

- Determine the thicknesses of the pads to be fitted (see III, column c)

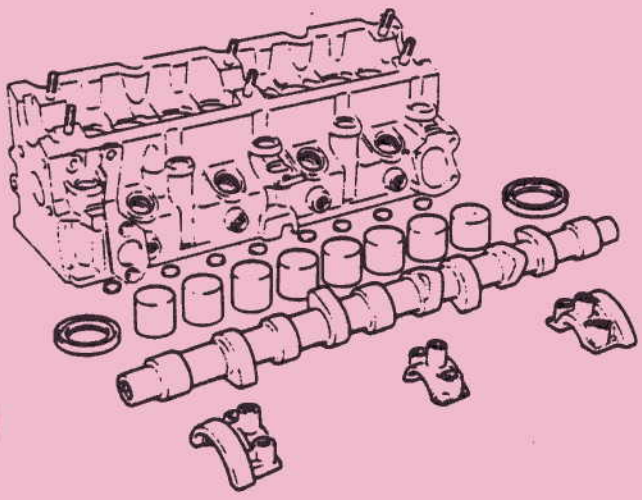
- Fit the pads, the thickness of which has just been determined, and the tappets

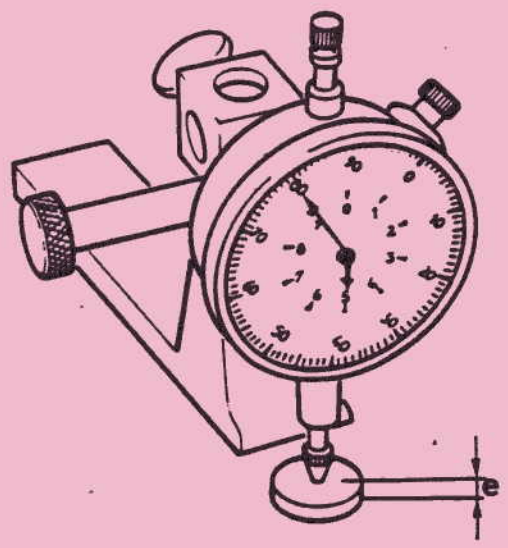
- Refit the camshaft (see the corresponding section).

I



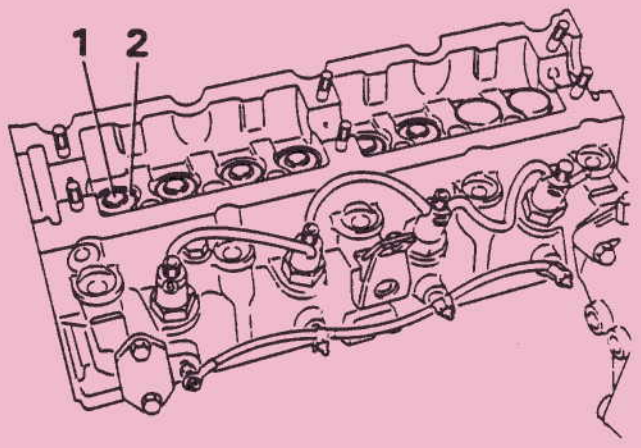
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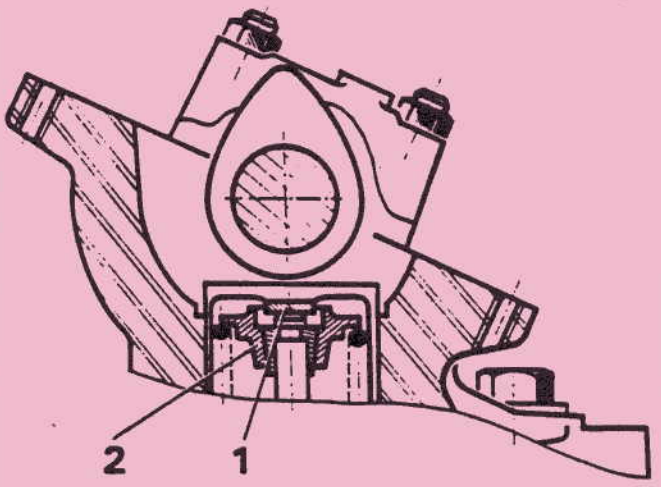




III

IV





This operation requires the removal of the engine (see this section) and the removal of the timing gear drive belts (see engine overhaul).

REMOVAL

Pierce two diametrically opposite holes with a punch or similar tool. Fig. I.

Position tool F from kit (-).0157, screw the two drive screws into the body of the seal and extract the seal by turning the centre bolt. Fig. II.

FITTING

Clean the seal housing and the bearing surface on the crankcase.

Lubricate the housing and the seal lips to assist fitting.

Mount the seal on tool (-).0157 B. Fig. III.

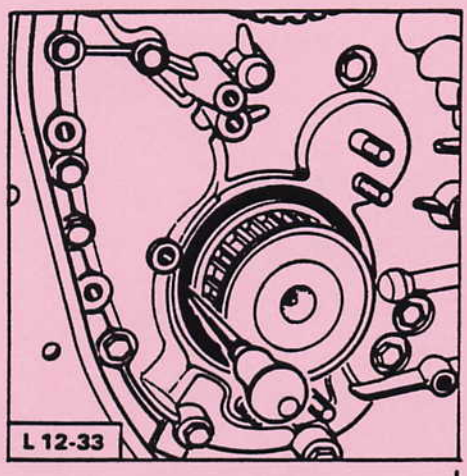
Position the seal so as to centralise the oil reserve groove in relation to the studs of the damper. Fig. IV.

Fit the seal. Fig. V.

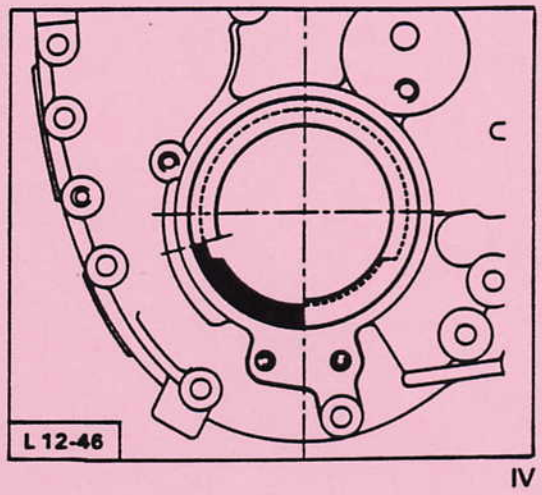
Withdraw the tool and check that the outer dust excluding lip is correctly positioned. If necessary, pull it out with a paper clip. Fig. VI.

> Note - Take same precautions when changing oil pump and camshaft seals, but these do not need to be positioned in the same way.

Refit the drive belts and the timing covers (see engine overhaul).



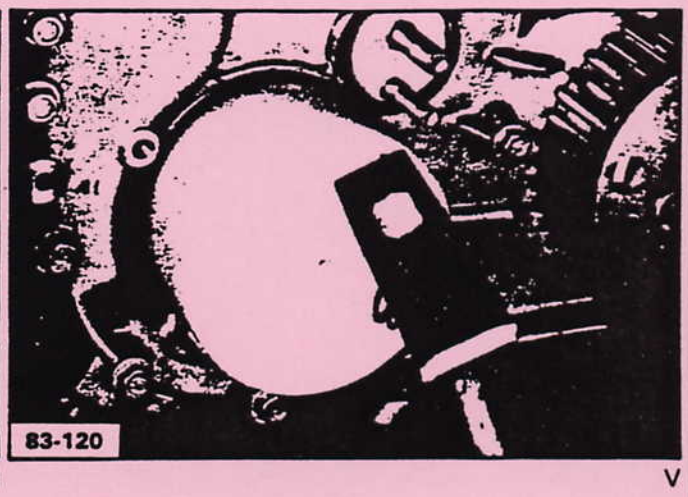
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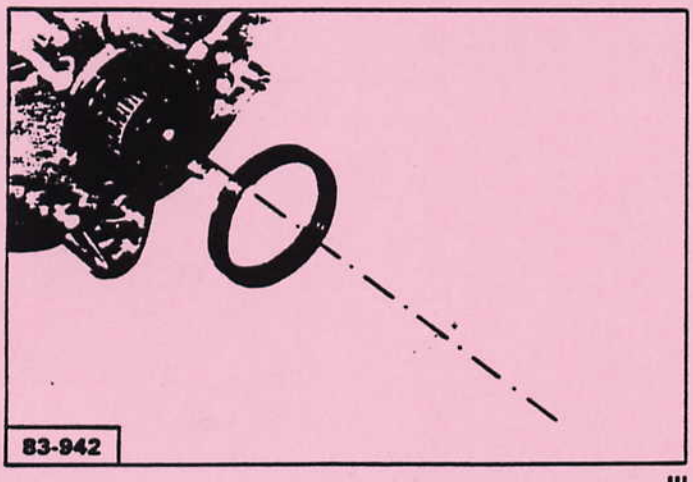
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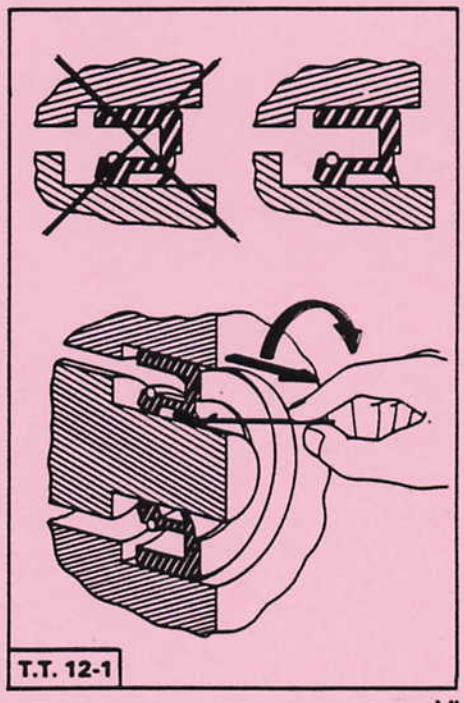
II



V



III



VI

SPECIAL TOOLS

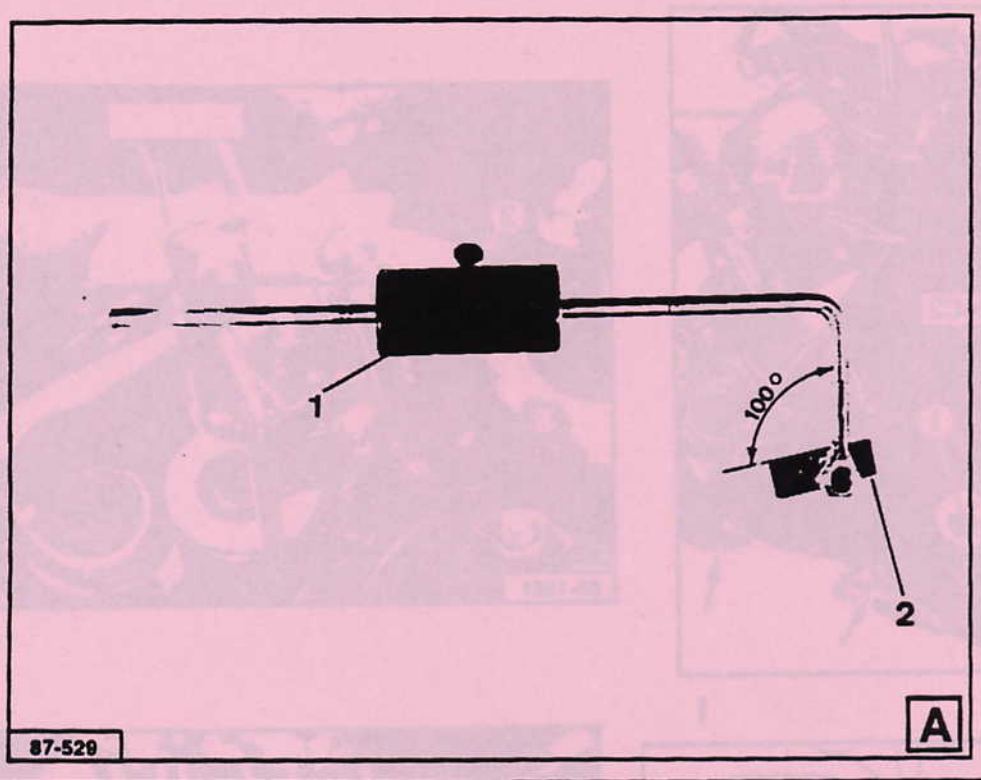
[A] From the Diesel engine tool kit
Reference : (-).0157
K : Timing gear drive belt tensioner
NOTE : Position the tool (2) at 100° from (1) (see photo)

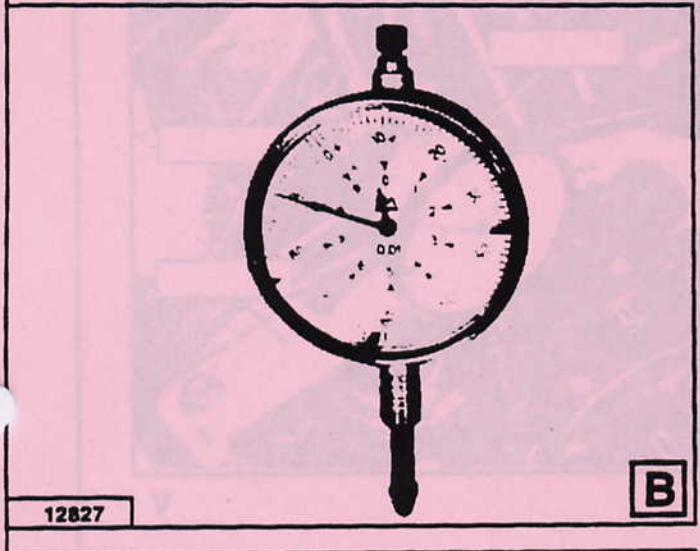
[B] Dial indicator
Reference : (-).1504

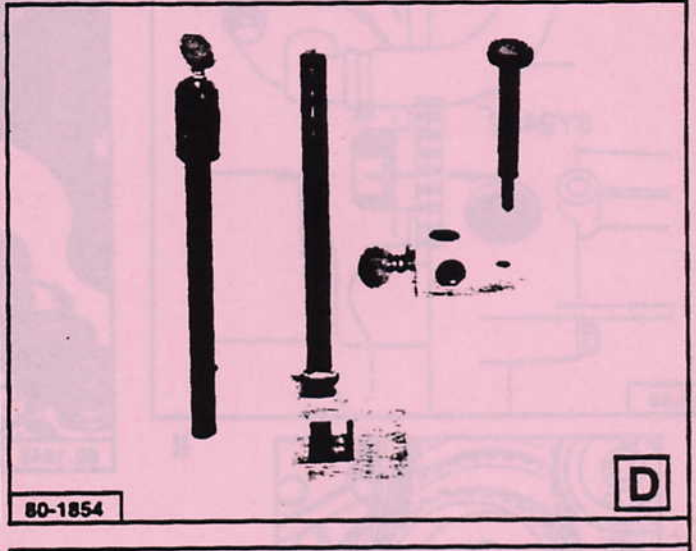
[C] Valve spring compressor
Reference : (-).0150 Y

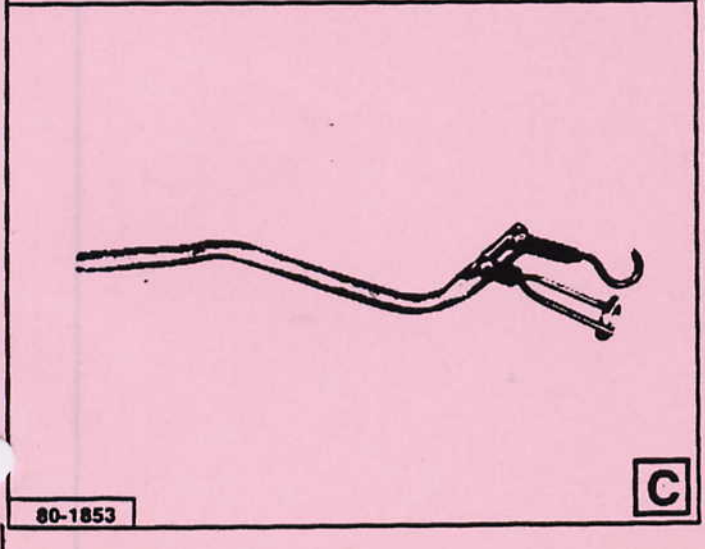
[D] Adjustable component for dial indicator support
Reference : (-).0504 A2

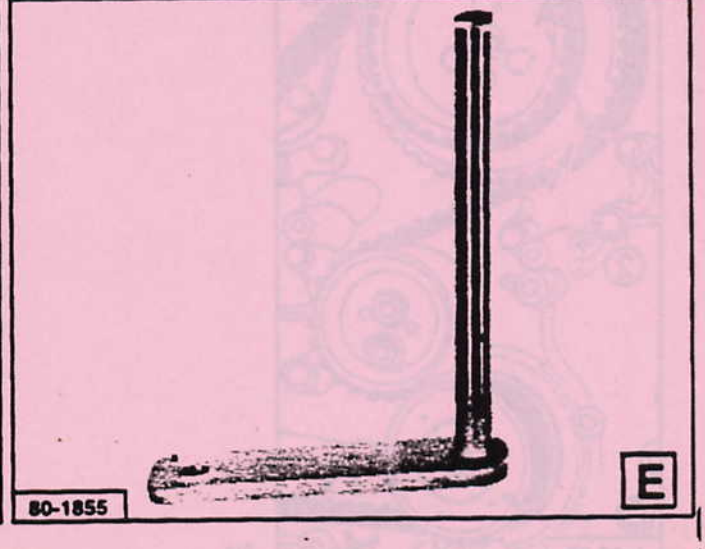
[E] Support for securing dial indicator to cylinder head
Reference : (-).0117 AH

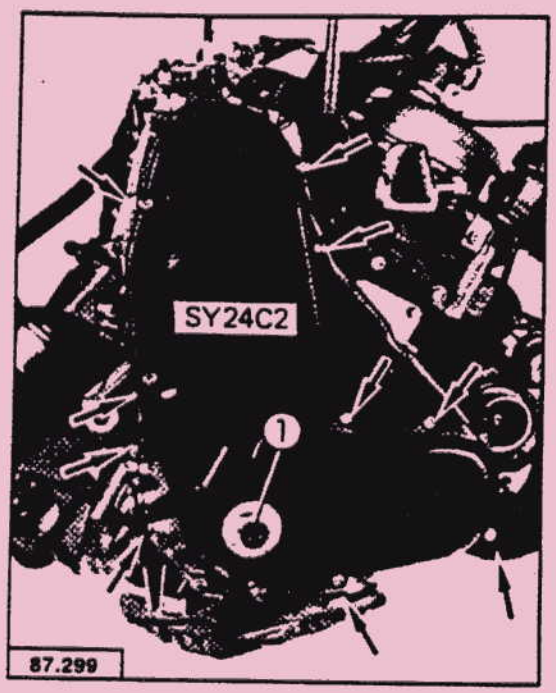

1
100°
2
87-529
A


12827
B

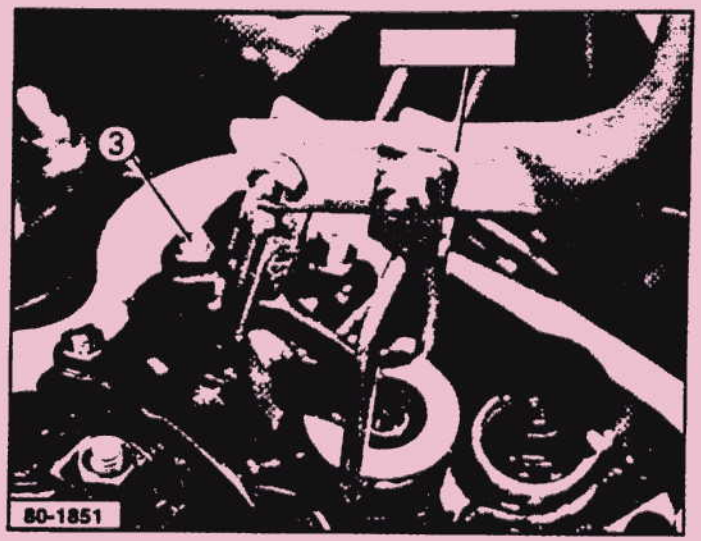

80-1854
D


80-1853
C

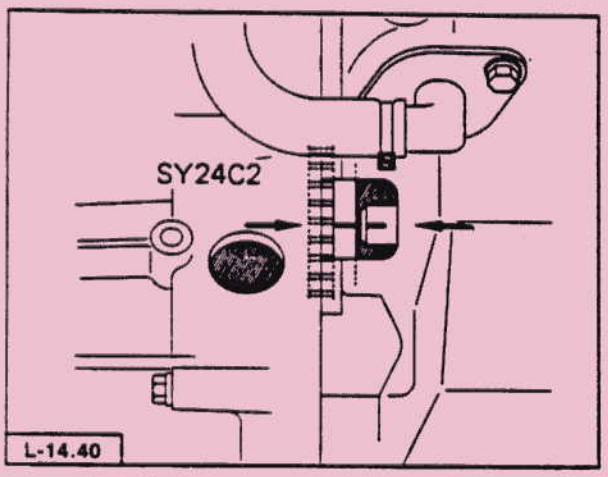

80-1855
E



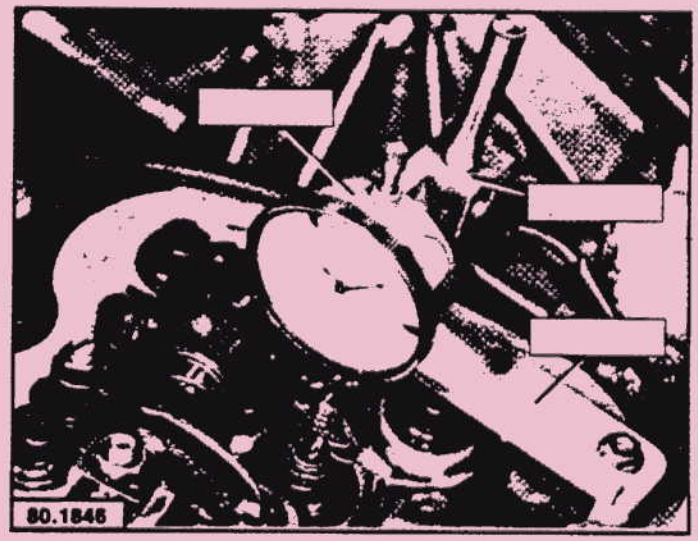
I



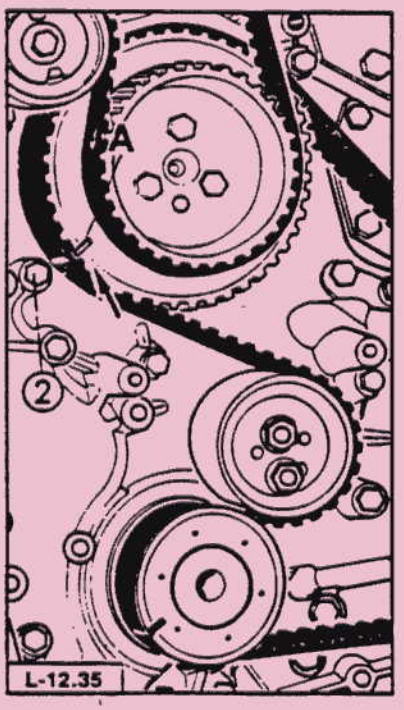
IV



II



V



III

REMOVING

Support the front right hand side of the vehicle.

Disconnect the battery negative terminal.

Engage the highest gear to permit the engine to be turned over.

Remove, Fig. 1

- The protector under the engine
- The crankshaft protection nut (1) (36mm across flats)
- The drive belt protectors.

Place No. 1 cylinder « in balance » by looking through the oil filler hole.

1 Method shown in Figs. I and III (when there is a mark on the flywheel)

- Position marks —> and <— are to be in line.

- The timing mark « A » on the camshaft sprocket is to be in line with the bolt (2).

2 Method shown in Figs. IV and V (when there is no mark on the flywheel)

- Remove the rocker arm cover. Bring the valves on No. 1 cylinder « in balance » (No. 1 piston will be almost at TDC)

- Remove the locking nut (3) and screw back the adjusting screw on No. 1 cylinder inlet rocker arm.

- Using the valve spring compressor (C) Fig. IV, compress the spring and move the rocker arm sideways to swing it into a vertical position.

- Take out the push rod.

- Remove :
  - The valve collets
  - The valve spring

To prevent the inlet valve dropping down into the cylinder, only turn the crankshaft by a quarter of a turn in each direction. Another method is to place a paperclip on the inlet valve stem.

ENGINE	BEFORE T.D.C.	PUMP	
U25/661	4.32 mm ± 0.05	MA 300	DPA
	4.71 mm ± 0.05	MA 260	DPC
U25/673	3.24 mm ± 0.05	MAS 100	

Find T.D.C. on No. 1 cylinder, Fig. V

- Fit the support brackets (E) together with the adjustable component (D) fitted with the dial indicator (B).

- Turn the crankshaft forwards and backwards to obtain the exact point at which the large pointer on the dial indicator changes direction (T.D.C.).

- Set the dial indicator moving dial on 0 in line with the large pointer and place the total pointer on 8 on the dial.

Find the timing point.

- Turn back the crankshaft (by a quarter of a turn) in the opposite direction to its normal direction of rotation and then in the normal direction of rotation to bring the piston to :

EG: 4.32 mm before T.D.C., that is to say 8 mm - 4.32 = a reading of 3.68 on the dial indicator.

Loosen, Fig. 1
- The nuts (1) and (4) on the belt tensioners and compress the spring in each of the tensioners. Retighten the nuts.

Remove
- The injection pump drive belt (2)
- The timing gear drive belt (3)

REFITTING

Fit, Figs. I and II
- The timing gear drive belt :

Align the timing marks —> and —> on the belt with the timing marks A and B on the sprockets (there should be 35 belt pitches between these two, measured via the roller (6).

Loosen the nuts (4) on the tensioner roller (6).

Fit, Fig. III
- The weight, from the tool, on mark 2 on the rod.
- The tool (-).0157 to the roller.

Tensioning the belt, Fig. II
- Apply pressure to the tool (-).0157, in the tensioning direction and when the span (5) on the opposite side to the roller is under tension, release the pressure and allow the weight on the tool to act on the belt.
- Tighten the 10 mm diameter nut (9) on the tensioner roller.
  To a torque of 32 N.m (23.6 lbf.ft), Fig. V
- Tighten the 8 mm diameter nut (10) on the tensioner roller.
  To a torque of 20 N.m (14.7 lbf.ft), Fig. V

NOTE : To avoid variations in the tensioning torque, it is essential to immobilise the tensioner roller during the tightening phase.

Remove the tool (-).0157.

Fit the injection pump drive belt.
Turn the engine through one turn in its normal direction of rotation to align timing marks —> and <—, Fig. IV.

No. 1 cylinder is then at its initial timing point (Mark —> on the camshaft pulley Fig. V).

Place the pump on its injection point. See the section concerned.

Fit, Fig. V

The injection pump drive belt with the span (2) on the opposite side of the roller under tension.

Loosen

The nut (8) on the roller and allow the pressure to act on the belt.

Tighten the nut (8)

Tightening torque 20 Nm
(14.7 lbf.ft)

Turn the engine through 2 turns in its normal direction of rotation and check the pump timing.

Remove the tooling.

Fit
- The valve spring, the cup and the collets
- The push rod and the rocker arm (adjust the valve clearance)

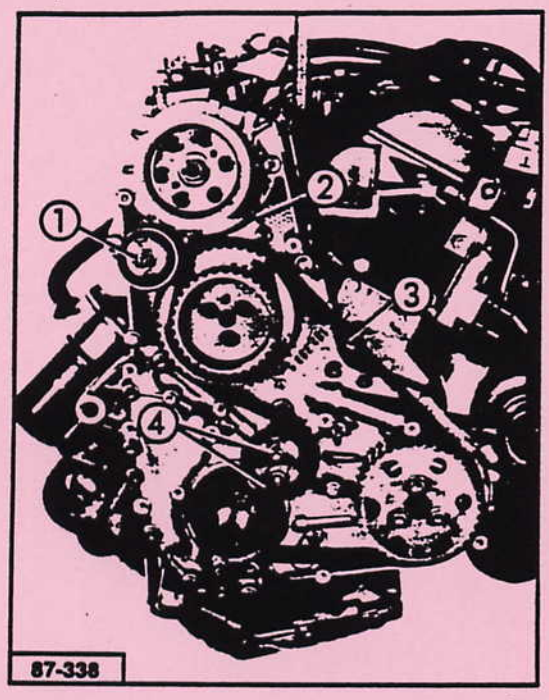
Connect up the battery negative cable.

Start the engine and warm it up until the electric fans cut in.

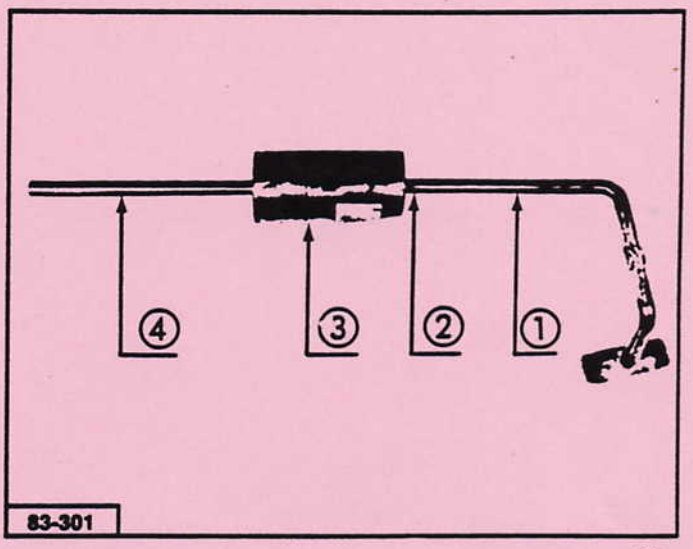
Re-tension the belts at this temperature.

Fit :
- The belt protectors
- The crankshaft protective nut (36 mm across flats)
- The protector under the engine.

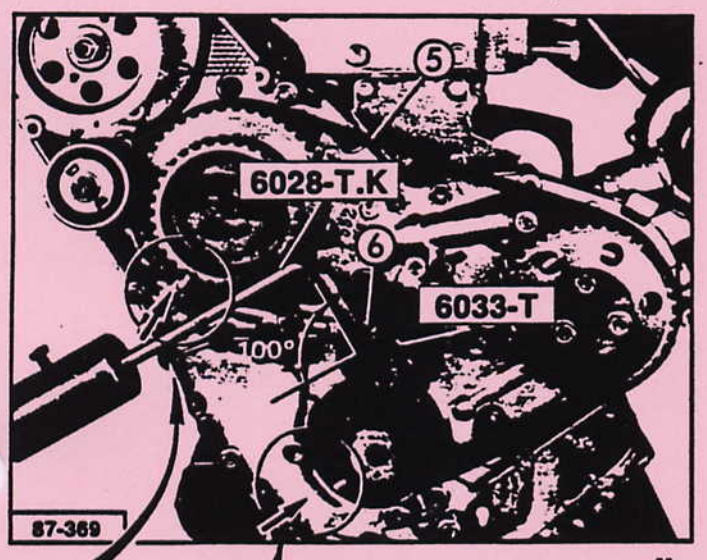
Lower the vehicle to the ground.


1
2
3
4
87-338

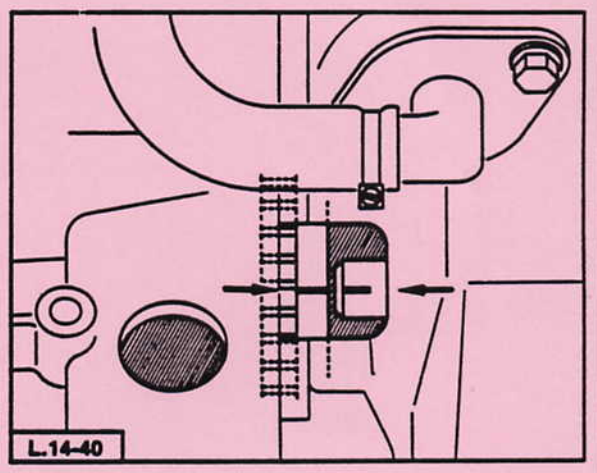
I


4
3
2
1
83-301

III

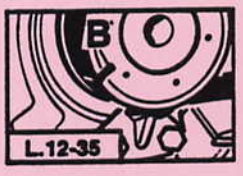

5
6028-T.K
6
6033-T
100°
87-369

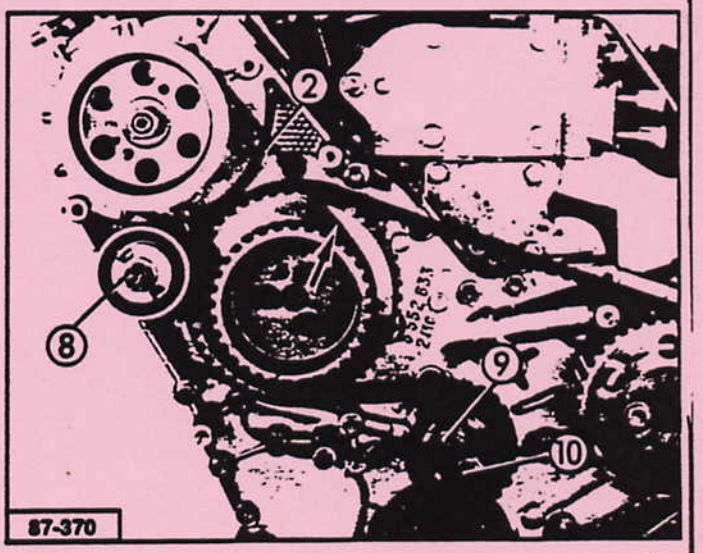
II


L.14-40

IV


7
L.12-35


B
L.12-35


2
8
9
10
87-370

V

I

TIMING GEAR DRIVE BELT

NOTE

1/ Carry out the partial removing operations involved in the following removing-refitting operations :
- cylinder head
- camshaft
- camshaft lip seal

2/ Carry out the complete removing operations involved in the following - removing-refitting operations :
- crankshaft lip seal
- cover plate
- oil pump drive sprocket and chain
- coolant pump

II

SPECIAL TOOLS

(-).0117
E2 - Crankshaft spanner

(-).0153
N - Pinning tool

(-).0316
P - Sling

III

PARTIAL REMOVAL

- Remove :
  - the lug (1) that secures the electrical wiring harness
  - the pre-heater plugs

IV

- Remove :
  - the front timing gear casing (3), removing it forwards and then upwards
  - the rear timing gear casing (4), freeing it from its securing studs.
- Retrieve the rubber spacer.

V

- Turn the crankshaft using tool (-).0117 EZ until the point at which the camshaft sprocket (5) and the injection pump sprocket (6) can be pinned.
- Pin :
  - the camshaft sprocket (5) using a M8 x 125 x 40 bolt
  - the injection pump sprocket (6)
    - ROTO DIESEL using an M8 x 125 x 30 bolt
    - BOSCH using an M8 x 125 x 35 bolt

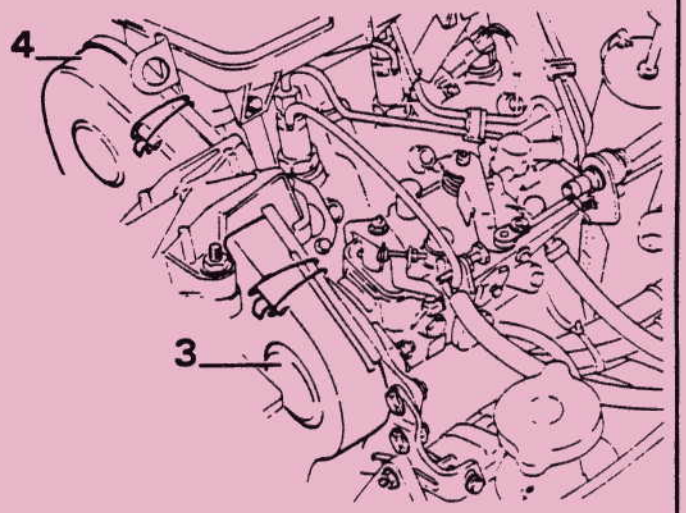
IMPORTANT
These bolts, used for the pinning operations, are only to be finger tight.

VI

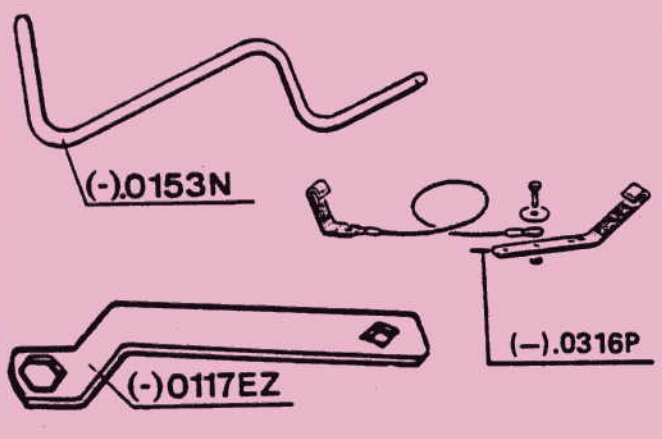
- Pin the flywheel using tool (-).0153N

I

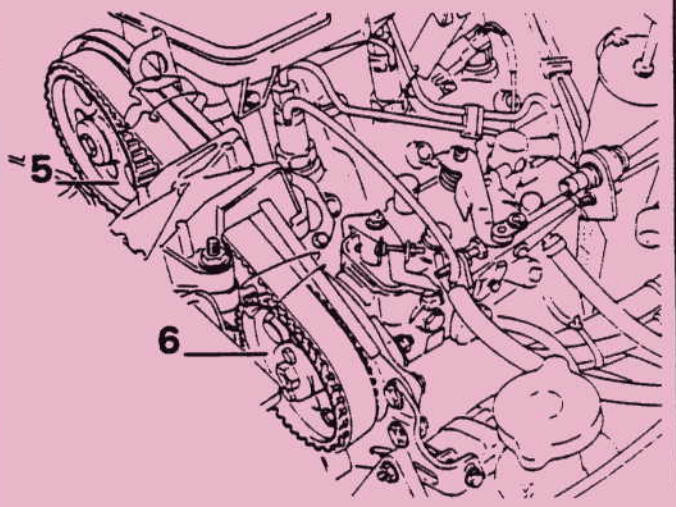
IV



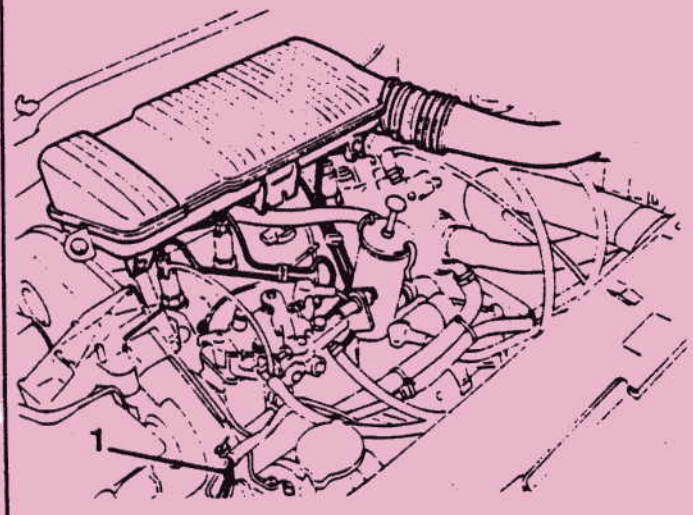
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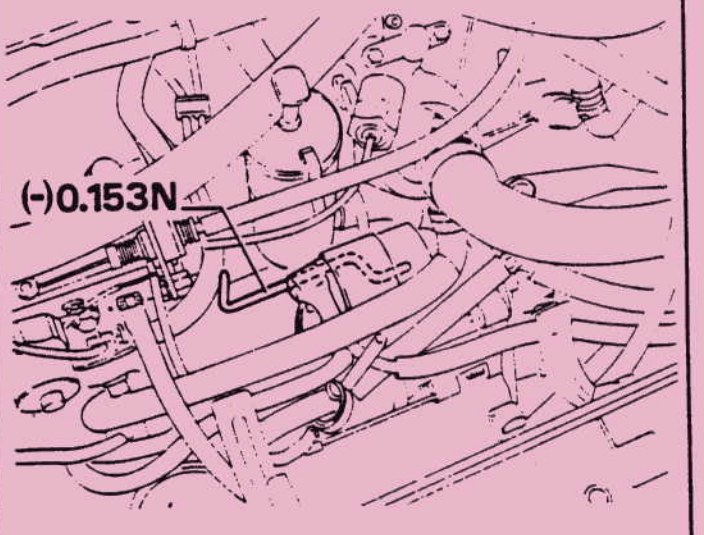
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III

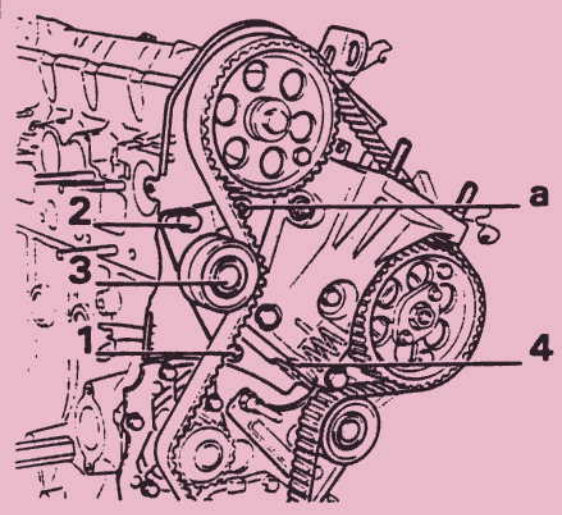


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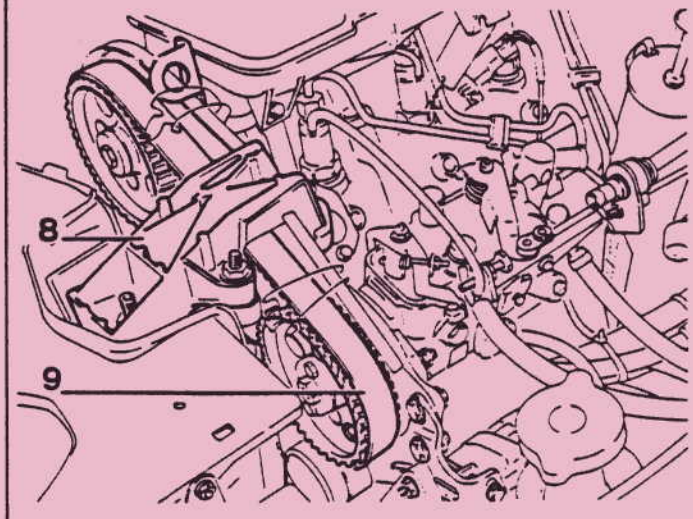


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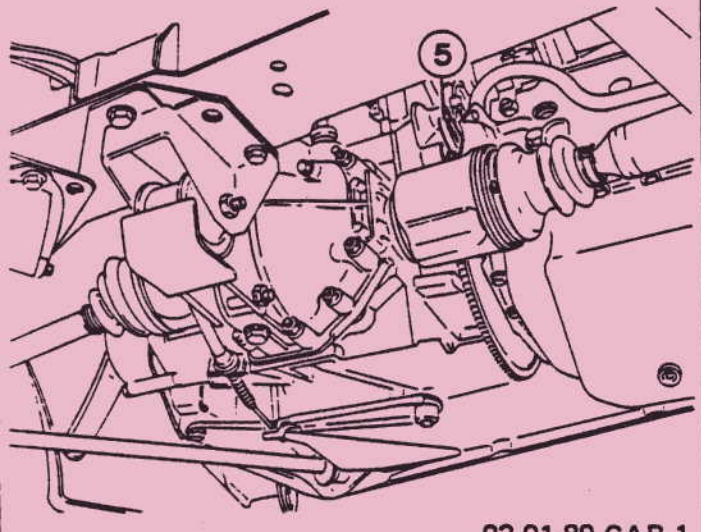
I



IV

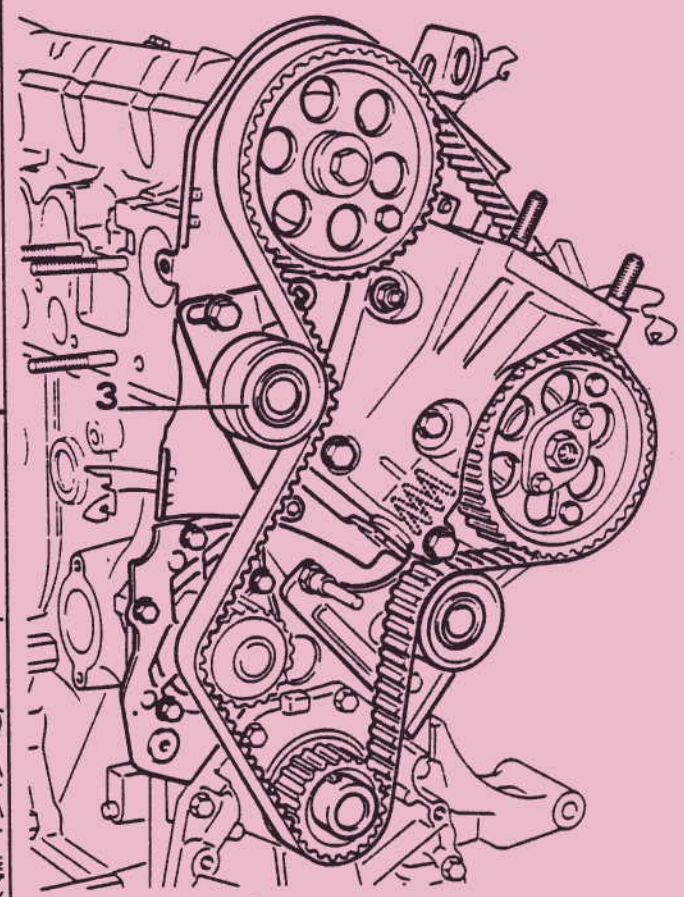


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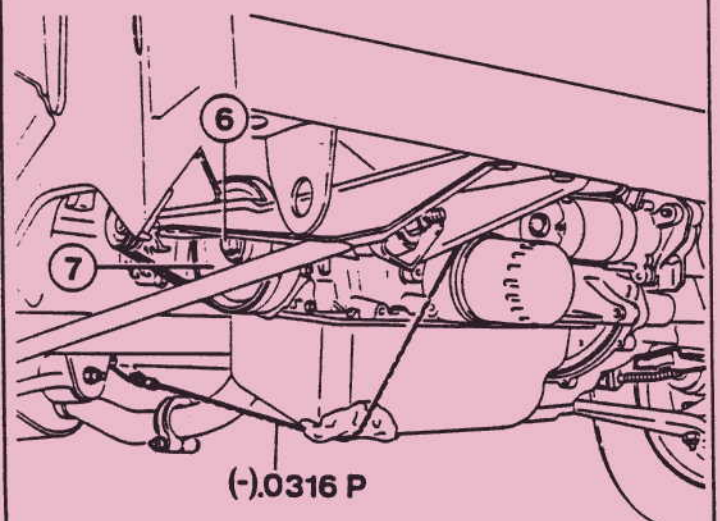


02-01-89 CAR 1

V



III



02-01-89 CAR 2

I

- Loosen the nut (1) and the bolt (2) on the tensioner roller support (3).
- Turn the square (a) on the tensioner roller support to compress the spring (4).
- Re-tighten the bolt (2).
- Free the timing gear belt from the camshaft sprocket, without kinking it.

II

COMPLETE REMOVAL

- Carry out the partial removing operations
- Remove the cover plate from the clutch housing
- Fit a tool of the FACOM D86 type (5) to lock the flywheel.

III

- Place the sling (-).0316P in position
- Remove :
  - bolt (6)
  - pulley (7)
  - tool (5)

IV

- Remove :
  - the upper engine mounting (8)
  - the timing gear drive belt (9)

V

REFITTING

- Ensure that :
  - the flywheel, the injection pump sprocket and camshaft sprocket are all pinned
  - that the tensioner roller (3) is locked in the « plunger compressed » position
- Fit the timing gear drive belt with the spans fully tensioned, in the following order :
  - crankshaft sprocket*
  - fixed roller
  - injection pump sprocket
  - camshaft sprocket
  - tensioner roller
  - coolant pump sprocket

* If only partial removing operations have been carried out, ensure that the belt is fully engaged on the crankshaft sprocket.

I

- Loosen the bolt (1) and the nut (2) to free the tensioner roller

- Re-tighten the bolt (1) and the nut (2) when the correct tension has been obtained.

II

CHECKING THE TIMING

- Remove the three pins

- Refit the bolt (3) and the washer (4)

- Turn the engine through two turns

- Refit the two timing bolts and the pin (-).0153N

IMPORTANT

If it is impossible to fit either of the bolts or the pin, recommence the operations involved in refitting the belt from the beginning.

- Loosen the tensioner roller and re-tighten the bolt, and then the nut to 17.5 nm (12.9 lbf.ft)

- Remove the four timing pins

III

- Remove the bolt (3) and washer (4)

- Refit, in the following order :
  - the rubber spacer (5)
  - the protectors (6) and (7)
  - the pulley

IV

- Lock the flywheel using a tool of the FACOM D86 type

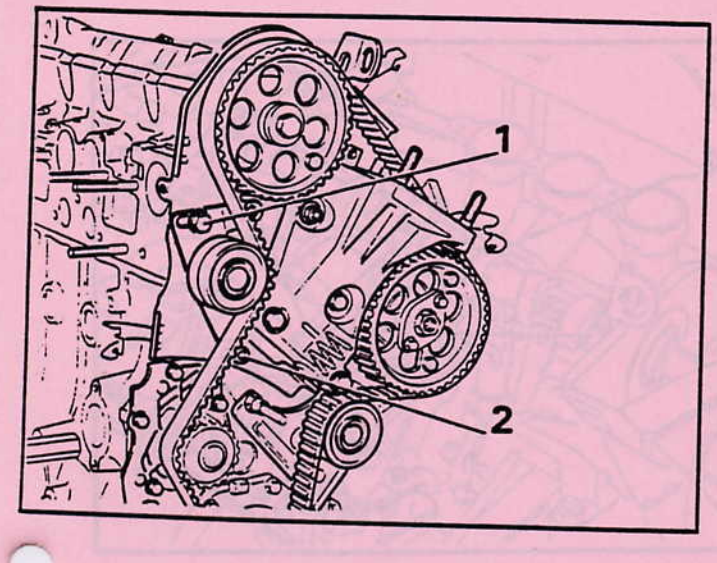
- Brush and de-grease :
  - the thread on the bolt
  - the locating faces of the washer (4) and the bolt head

- Refit the washer (4) and the bolt (3) after coating it with LOCTITE FRENETANCH and tightening it to a torque of 40 Nm (29.5 lbf.ft)

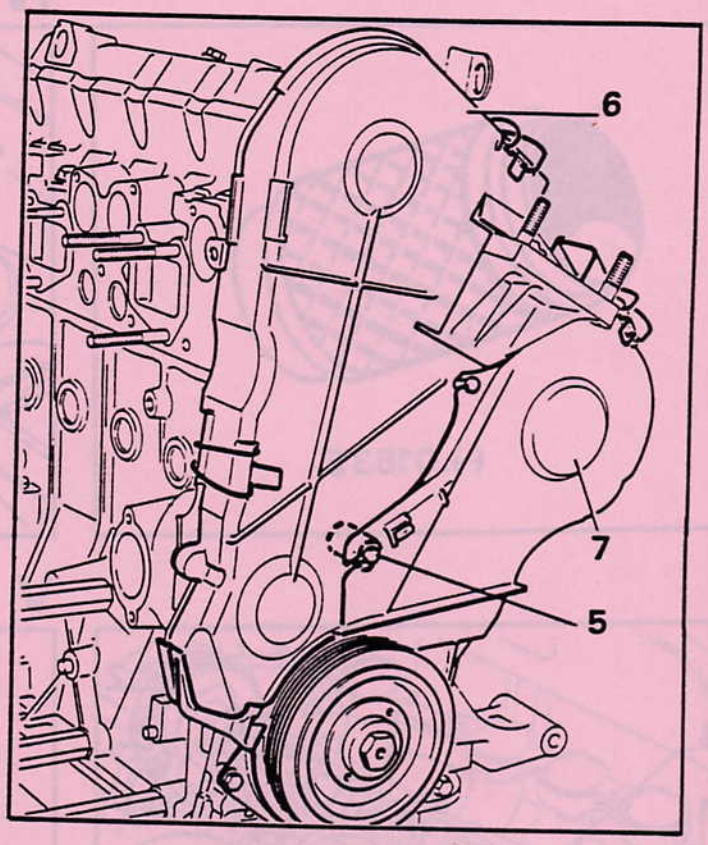
- Re-tighten the bolt through 60°, that is to say one of the flats on the bolt head

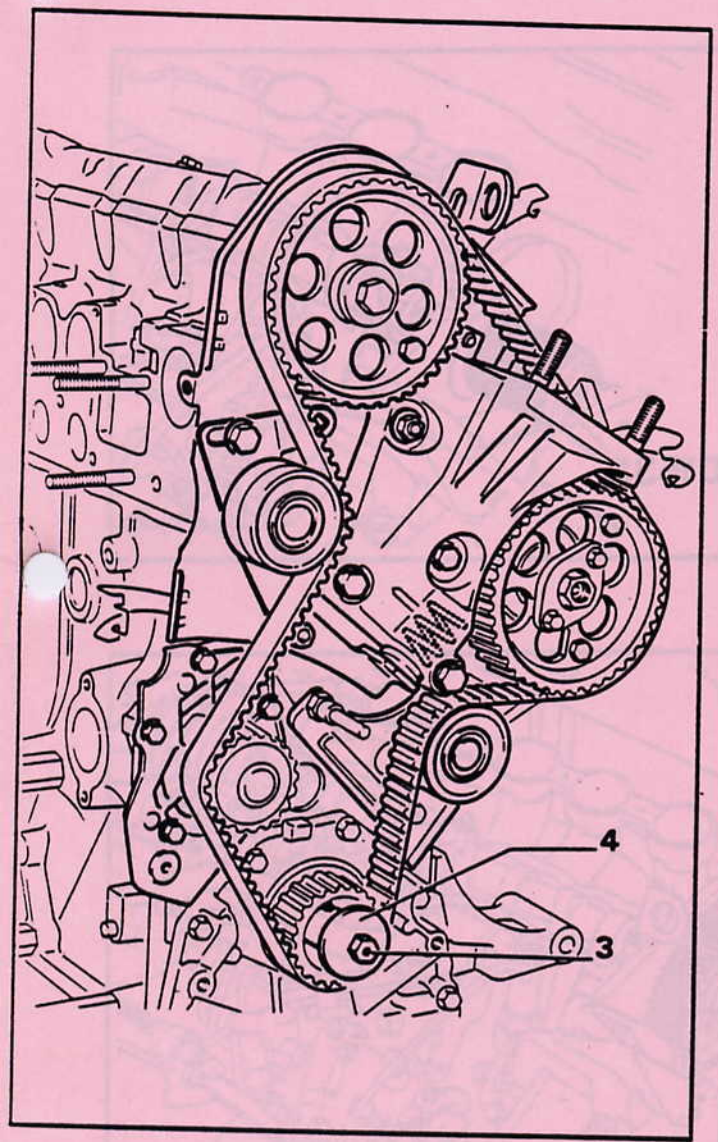
- The rest of the operations consist of the removing operations carried out in reverse

- Engine mounting tightening torque : 45 Nm (33.2 lbf.ft)

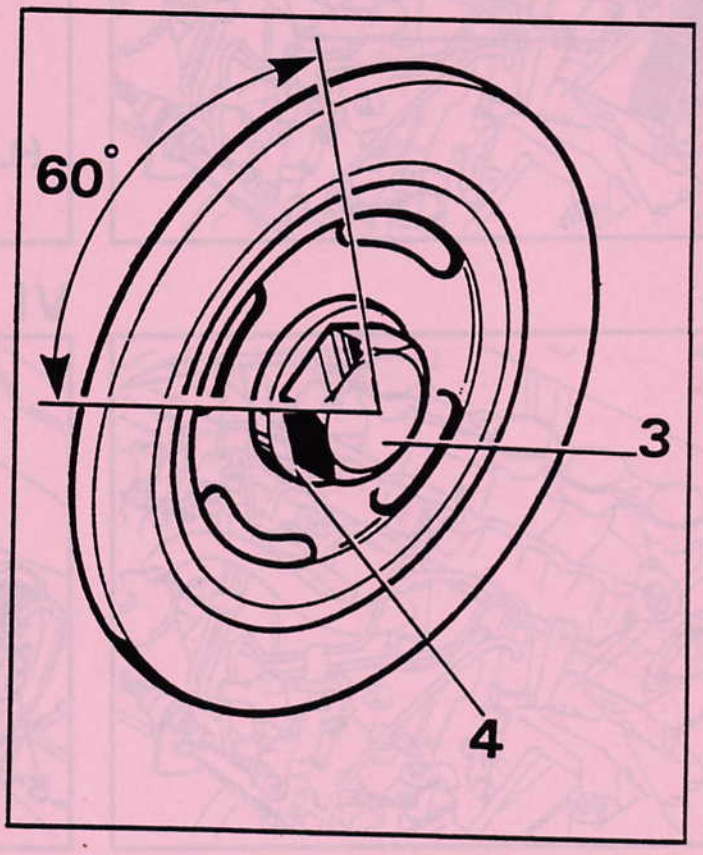


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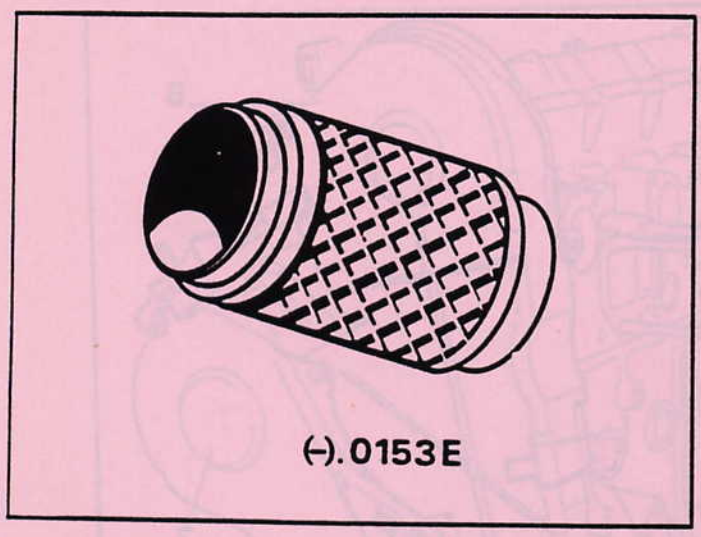


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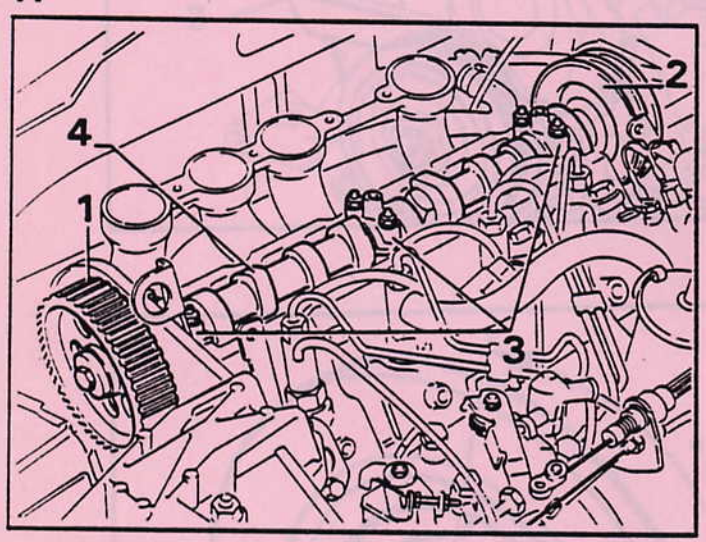


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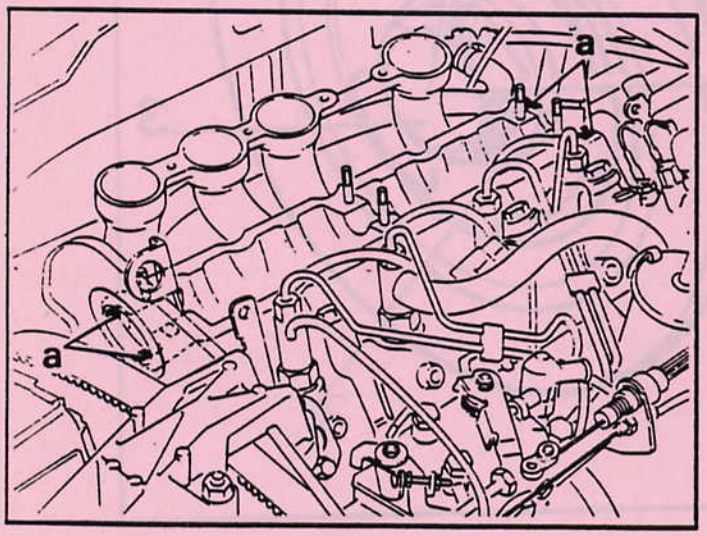
I



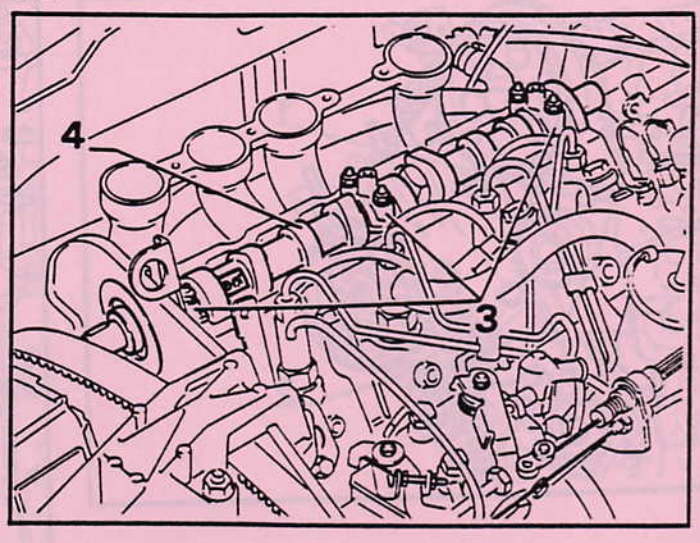
II



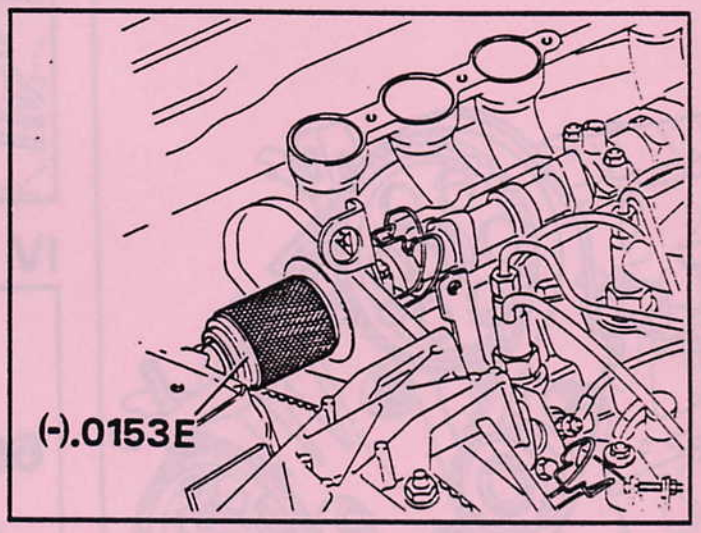
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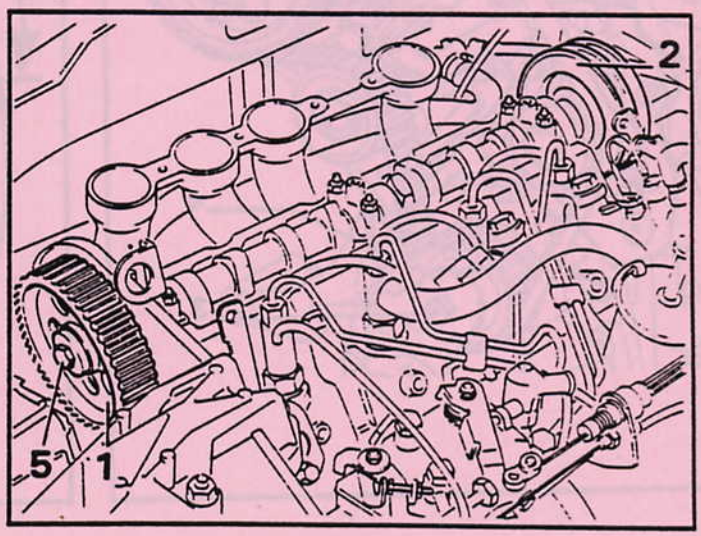
IV



V



VI



I

CAMSHAFT

SPECIAL TOOLS

(-).0153

E - Plug for fitting lip seal

II

REMOVING

- Remove :
  - partially, the timing gear drive belt (see the corresponding section)
  - the air intake distributor
  - the rocker arm cover
  - the drive belts
- Loosen the sprocket (1) and the pulley (2)
- Remove the sprocket (1) and the pulley (2)
- Retrieve the keys
- Loosen, evenly and remove the bearing caps (3) (cast-in references)
- Remove the camshaft (4)

III

REFITTING

- Remove the locating pin (-).0153N from the flywheel
- Turn the crankshaft through a quarter of a turn in the opposite direction to its normal direction of rotation (piston at half stroke)
- Adjust the valve clearances (see corresponding section)
- Apply :
  - a thin coat of FORMETANCH sealing compound to (a), at each end
  - MOLYKOTE G RAPID compound to the camshaft bearing areas

IV

- Refit :
  - the camshaft (4) with the reference mark DIST at the timing gear end
  - the bearing caps (3) (their position references are cast-in)
- Tighten the bearing caps, evenly, to a torque of 17.5 nm (12.9 lbf.ft)

V

- Fit, to that side of tool (-).0153E, on which the internal flange is farthest inwards, a new lip seal
- Refit the two camshaft lip seals using one of the sprocket or pulley securing bolts.

VI

Refit :

- the sprocket (1), pinning it with an M8 bolt and tighten the bolt (5) to a torque of 50 Nm (36.9 lbf.ft)
- the pulley (2), tightening it to 40 Nm (29.5 lbf.ft)
- the rocker arm cover, tightening it to 10 Nm (7.4 lbf.ft)
- Turn the crankshaft in the normal direction of rotation of the engine and pin the flywheel using tool (-).0153N.
- Refit the timing gear drive belt (see corresponding section)

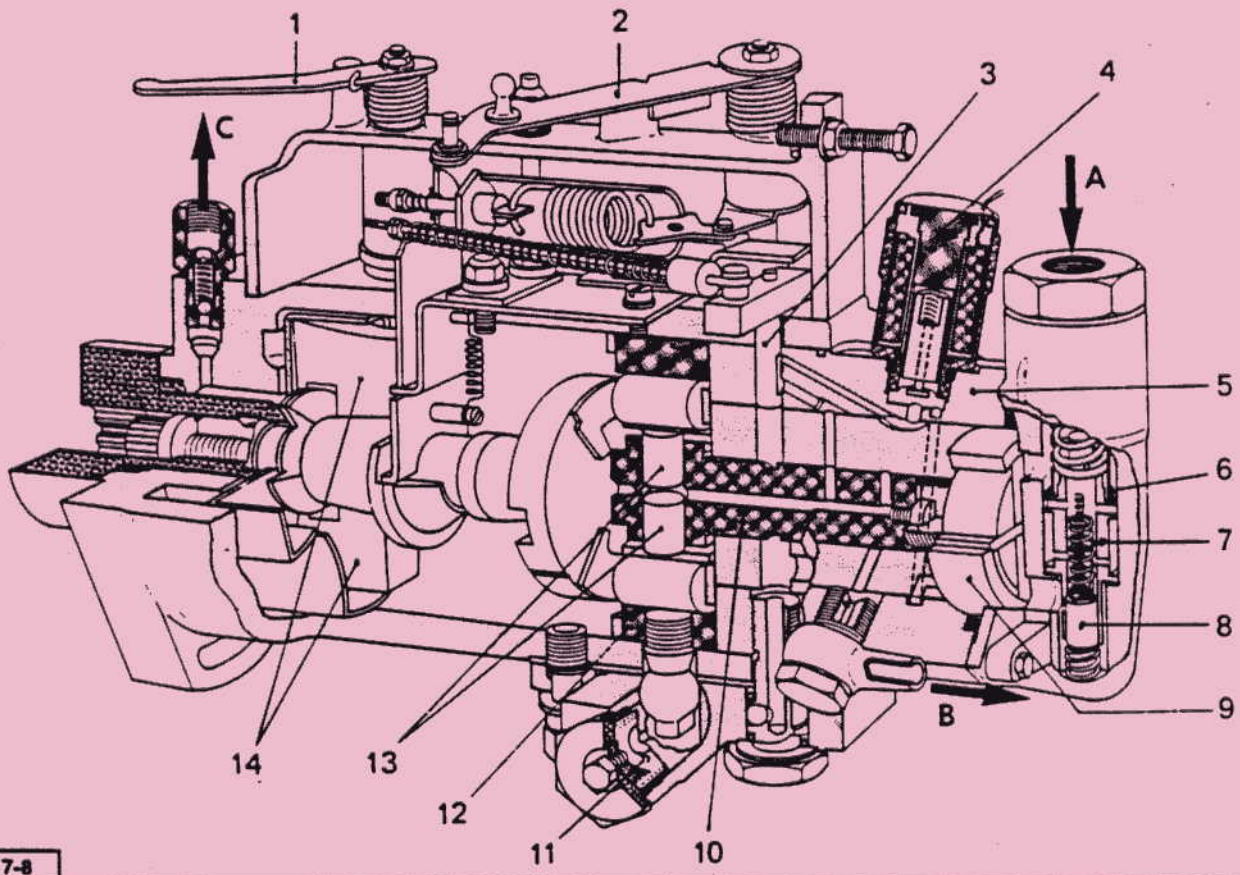
Injection pump

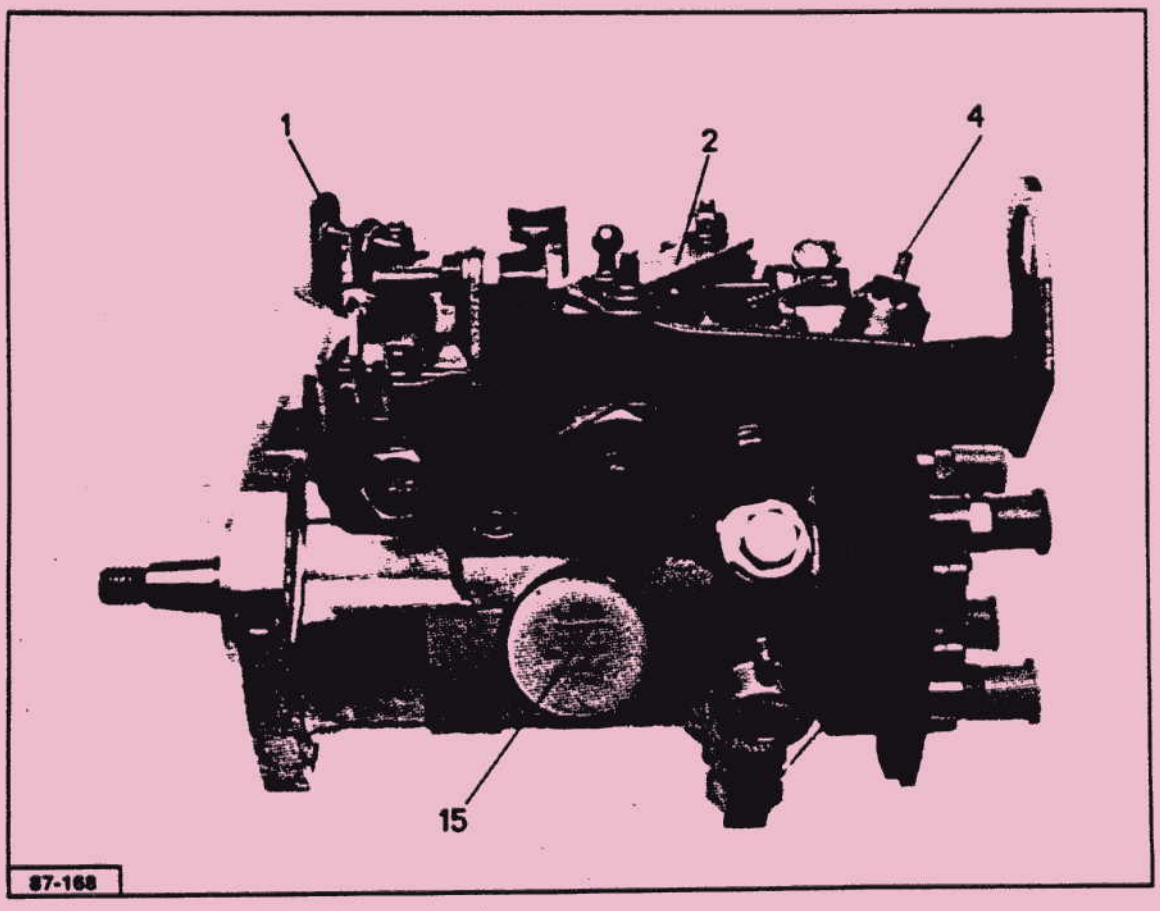
Engine	U25/651	U25/661		U25/673
Make	-	ROTO-DIESEL		
	(11/81 → 12/83) DPA (12/83 → 87)		DPC (→ 7/87)	
Type	UT 100	MA 300	MA 260	MAS 100
Reference number	R 3443 F 900	R 3449 F 010	R 8443 B 111 A	R 8443 B 123 B
Direction of rotation of pump (as seen from drive end)	left hand (anti-clock)	right hand (clock)		
Initial advance, before TDC (pump timing)	24° or 5,12 mm ± 0.05	22° or 4,32 mm ± 0.05	4,71 mm ± 0.05	19° or 3,24 mm ± 0.05
Timing test at idling speed	12.5° ± 1	11° ± 1		
Idling speed	-	800 ± 25 rpm		
Residual delivery speed (anti-stall)	800 ± 50 rpm	800 ± 25 rpm	800 ± 50 rpm	800 ± 50 rpm
No-load governed speed	4450 ± 75 rpm	4625 ± 150 rpm		4600 ± 150 rpm
Minimum shut-off speed, under load	4100 rpm	4250 ± 50 rpm		3900 rpm
Supercharging corrector	-			*

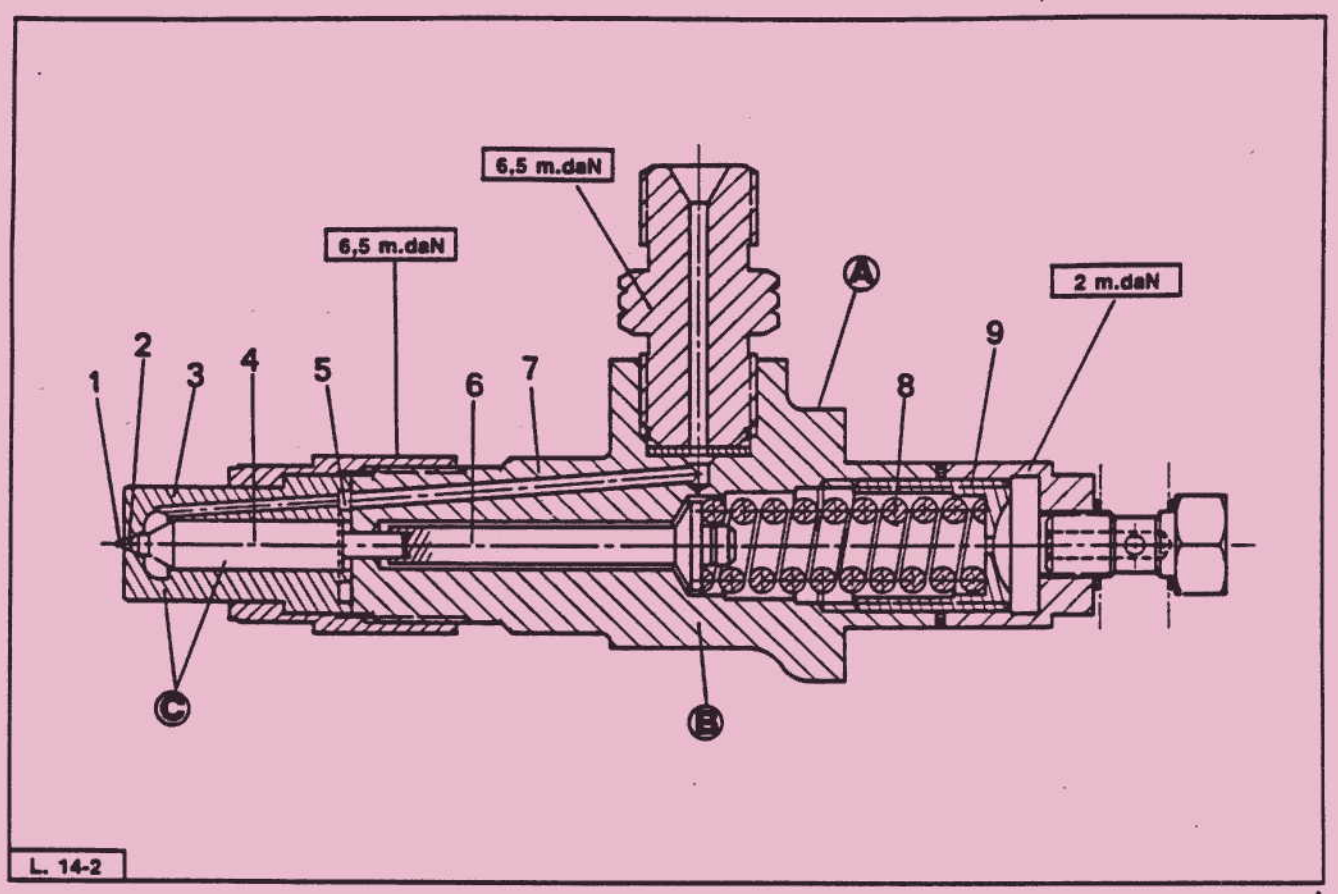
REFERENCE	DESCRIPTION
1	Idling speed control
2	Throttle control
3	Metering valve
4	Electric shut-off
5	Hydraulic head
6	Nylon filter
7	Governor valve liner
8	Governor piston
9	Transfer pump
10	Rotor
11	Automatic advance system
12	Cam ring
13	Pistons
14	Centrifugal governor bob weights
15	Commencement of injection/pump timing position (engraved on plastic label)
A	Fuel input
B	Injector supply
C	Return to tank

Pre-heater plugs

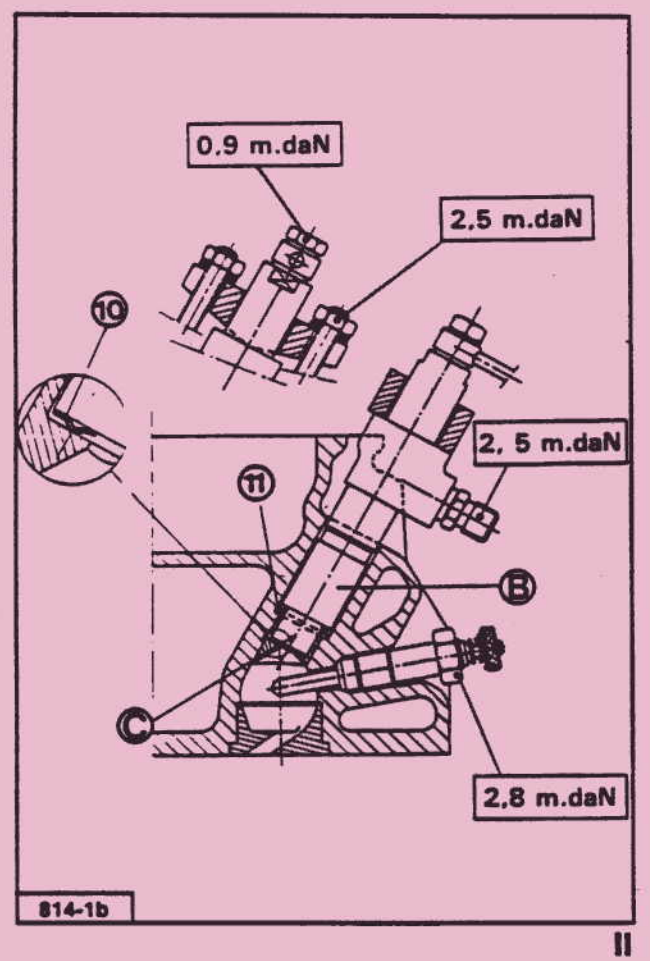
	Engine	U25/651 - U25/661 - U25/673
Plugs	BERU	0 100 221 106
	BOSCH	0 250 200 059


1
2
3
4
C
A
5
6
7
8
9
B
14
13
12
11
10
L.17-8

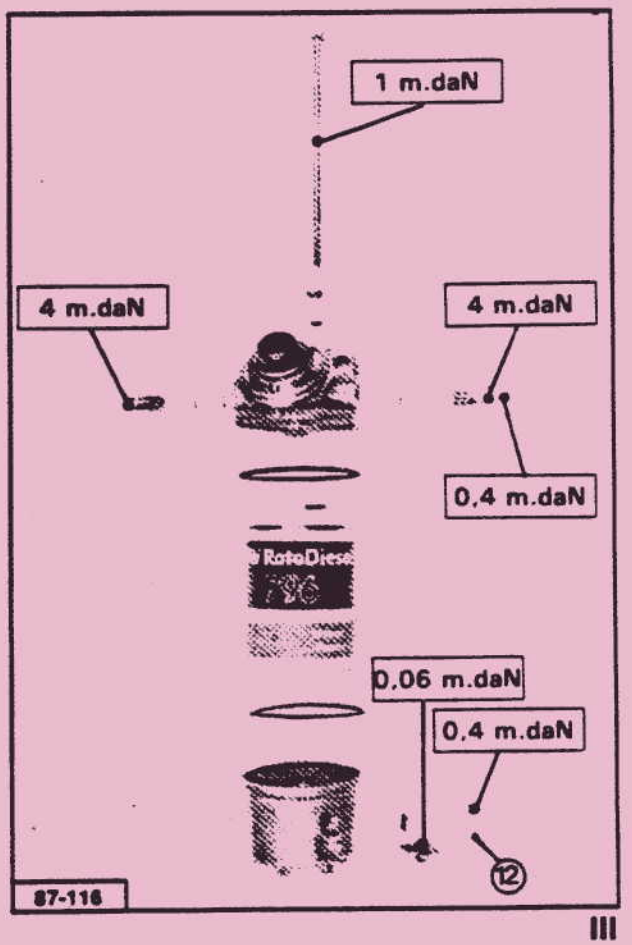

1
2
4
15
87-168


6,5 m.daN
6,5 m.daN
2 m.daN
A
1
2
3
4
5
6
7
8
9
C
B
L. 14-2

I


0.9 m.daN
2,5 m.daN
10
2, 5 m.daN
11
B
C
2,8 m.daN
814-1b

II


1 m.daN
4 m.daN
4 m.daN
0,4 m.daN
0,06 m.daN
0,4 m.daN
12
87-116

III

Injector nozzle and injector holder Fig. 1

REF	Engine	U25/651	U25/661	U25/673
	Make	ROTO-DIESEL		
B	Injector holder	RKB 45 SD 5422		
C	Injector nozzle (pintle type)	RDNO SDC 6577 B		RDNO SDC 6751
C + B	Injector holder + nozzle	R 53 56 501 B		R 53 56 502
A	Paint colour code	ORANGE		WHITE
	Opening pressure when new	$122 \begin{smallmatrix}+5\\-0\end{smallmatrix}$ bars		$137 \begin{smallmatrix}+5\\-0\end{smallmatrix}$ bars
	Opening pressure (after operating)	$112 \begin{smallmatrix}+5\\-0\end{smallmatrix}$ bars		$127 \begin{smallmatrix}+5\\-0\end{smallmatrix}$ bars

Injector nozzle and injector holder assembly, Figs. I and II

REF	DESCRIPTION
1	Injector hole
2	Seat
3	Injector body
4	Injector needle
5	Injector plate
6	Thrust rod
7	Injector holder
8	Spring
9	Adjusting screw

The copper washer (11) and the corrugated washer (10) must be replaced by new ones each time this item is removed.

Ensure that the washer (10) is the correct way round. See detail on Fig. II.

Fuel filter, Fig. III

Make ROTO-DIESEL 296 ⇥ 10/83 796 ↦ 10/83
- Hand pump forming part of filter ⇥ 1/85
- Diaphragm type priming pump ↦ 1/85
  Water detector (12) ↦ 7/86

Fuel heater Fig 1 ↦ 7/85

- Fuel filter (1)
- Injection pump (2)
- Engine (3)
- Heater (4)
- Fuel input (5)

Description of heater Fig. II

- Filter return (A)
- Fuel input (B)
- Return spring (6)
- Sealing plug (7)
- Thermostatic element (8)
- Fuel circuit (C)
- Governor spool (9)

Principle of operation, Figs. II, III and IV

1. Position Fig. II (Temperature < 15° C)

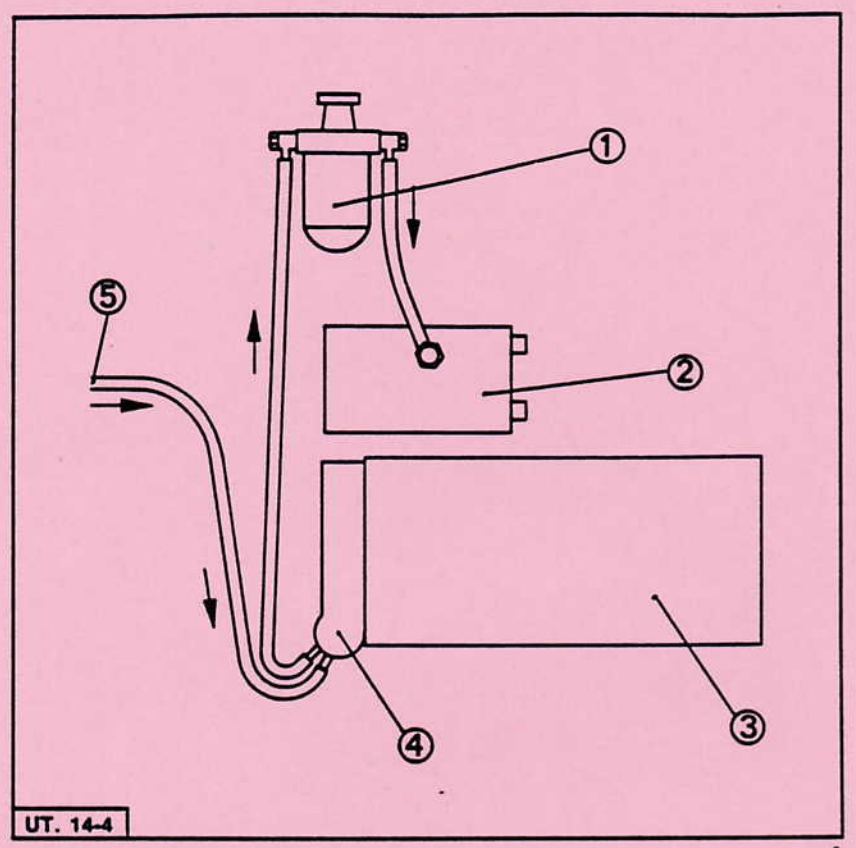
When the rod on the thermostatic element (8) is no longer expanded, the spool (9) allows fuel to enter, from the tank, into circuit (C) leading to the fuel filter.
(The entire output passes through the preheat circuit).

2. Position Fig. III (Temperature 15° to 30°C)

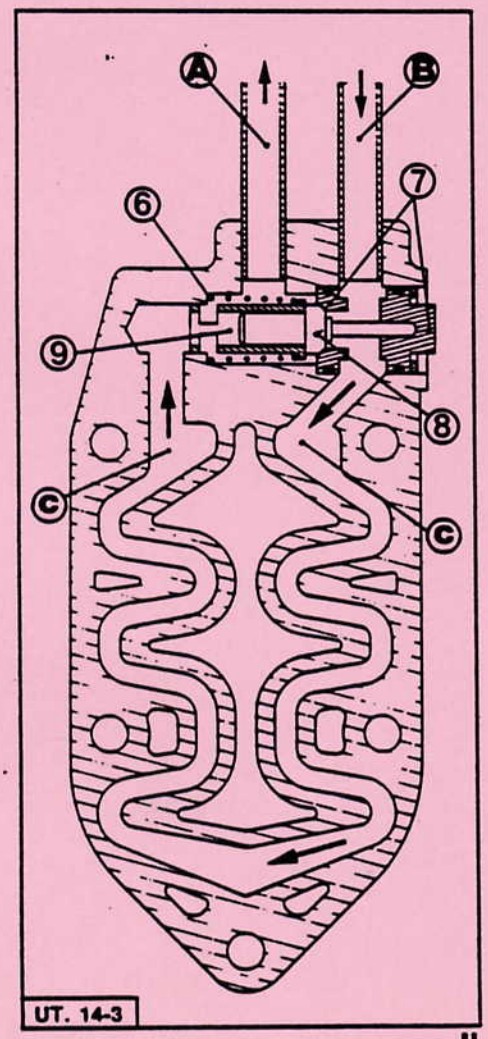
Once the rod on the thermostatic element (8) extends by a certain amount, the spool (9), pushed by the thermostatic element (8) partially blocks off duct (E) and fully blocks off duct (D).
(Fully closing off the preheat circuit).

3. Position Fig. IV (Temperature > 35°C)

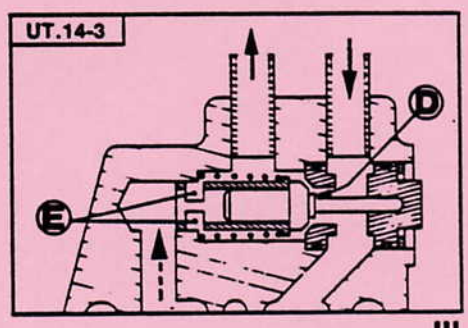
As the rod on the thermostatic element (8) extends as far as it will go, the spool (9), is pushed by thermostatic element (8), completely blocking off duct (E) and completely opening up duct (D).
(Total closing down of preheat circuit).



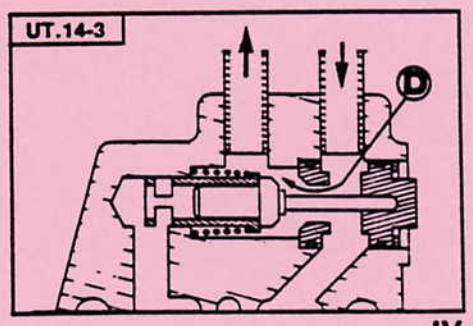
I



II

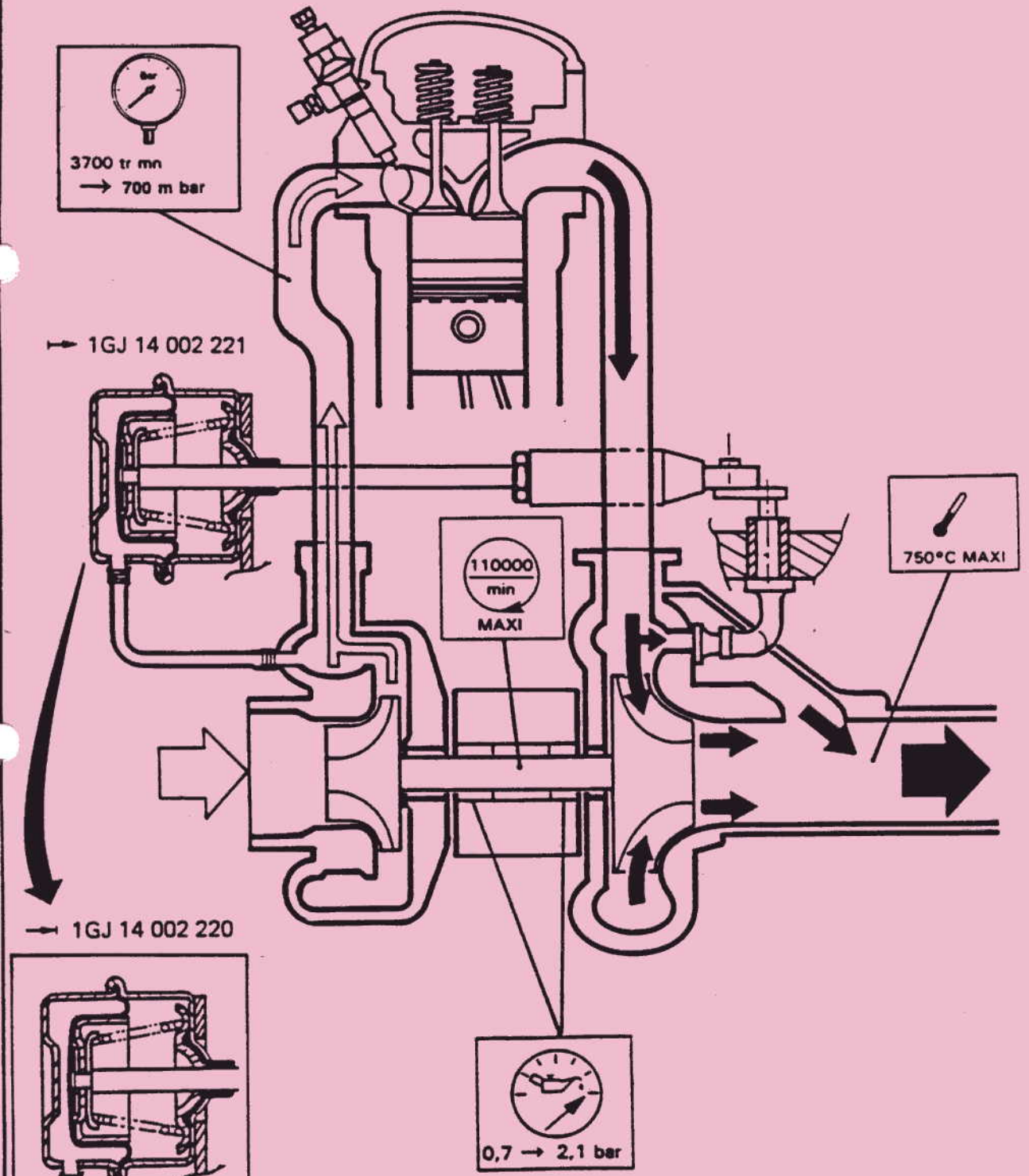


III



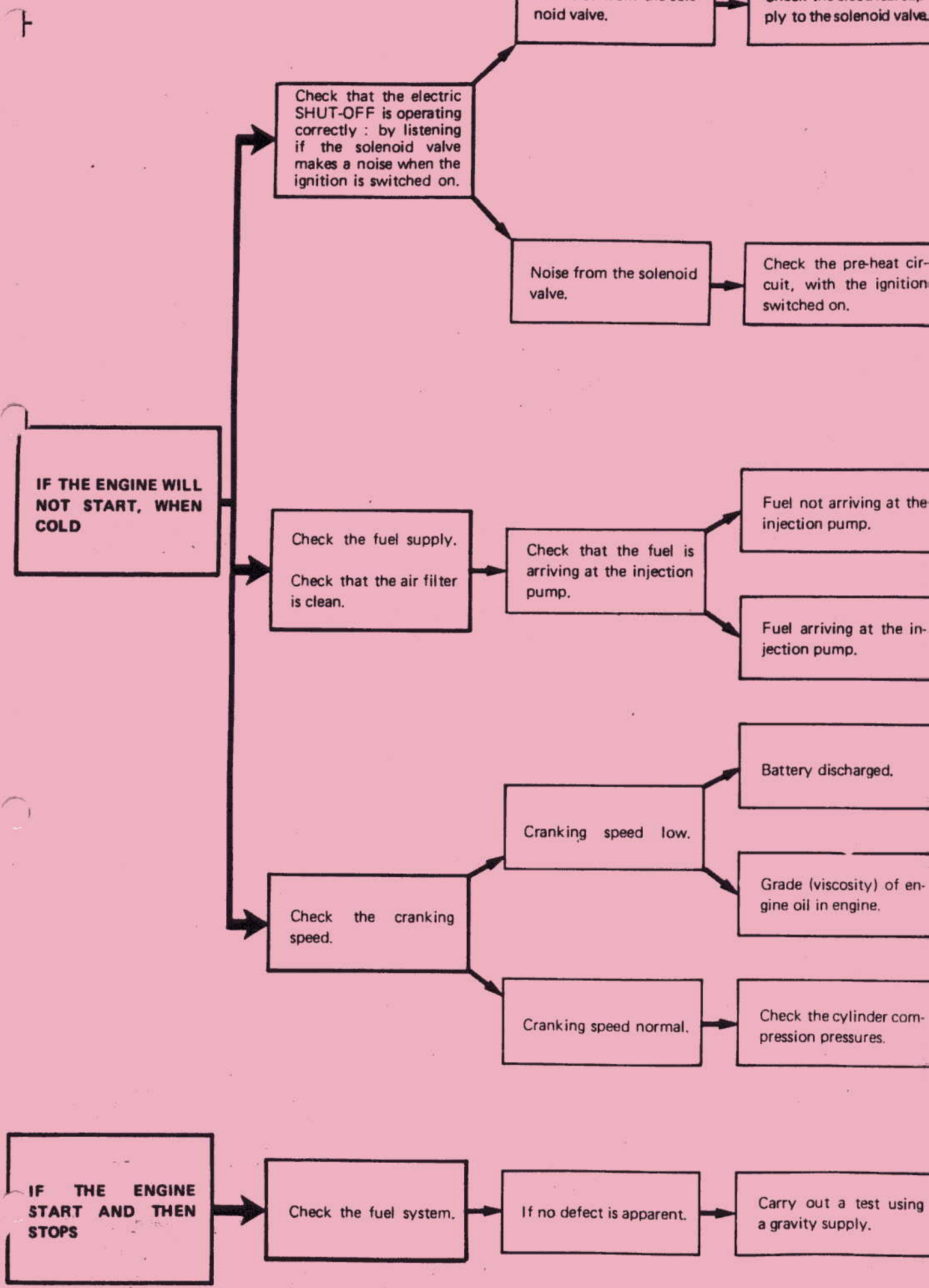
IV

GARRETT TD 25



L-14.59.a

L-14.59.b


IF THE ENGINE WILL NOT START, WHEN COLD
Check that the electric SHUT-OFF is operating correctly : by listening if the solenoid valve makes a noise when the ignition is switched on.
No noise from the solenoid valve.
Check the electrical supply to the solenoid valve.
Noise from the solenoid valve.
Check the pre-heat circuit, with the ignition switched on.
Check the fuel supply.
Check that the air filter is clean.
Check that the fuel is arriving at the injection pump.
Fuel not arriving at the injection pump.
Fuel arriving at the injection pump.
Check the cranking speed.
Cranking speed low.
Battery discharged.
Grade (viscosity) of engine oil in engine.
Cranking speed normal.
Check the cylinder compression pressures.
IF THE ENGINE START AND THEN STOPS
Check the fuel system.
If no defect is apparent.
Carry out a test using a gravity supply.

If the current supply to the solenoid valve is correct : Replace the solenoid valve.

If the warning light does not switch on.

- Connections discontinued → Warning light bult blown.
- Check the pre-heat plugs current supply to the warning light. → Starter pre-heat unit not operating.

If the warning light switches off after a brief period → Pre-heat plug (or plugs) short circuiting.

Fuel filter dirty or air entering at filter. → Pipe blocked (by foreing body or frozen fuel) or air entering the system. → Check that the priming pump is operating correctly (valves). → Check the suction strainer in the tank.

Check that the fuel is reaching the injectors. → If there is no flow from the injectors. → **Remove the injection pump and have it checked.**

Starter or electrical system defective.

If the engine operates normally air is entering the fuel system. → Check the unions (their conditions and tightness) → Bleed off AIR and WATER → Check the fuel tank air vent.

If the result is the same. → **Remove the injection pump and have it checked.**

ROTO-DIESEL INJECTION SYSTEM : FAULT FINDING

GENERAL

Should an operating defect or an actual breakdown of a DIESEL engine occur,

DO NOT IMMEDIATELY BLAME THE PUMP

The injection system consists of several components and each of them could be the cause of the trouble.

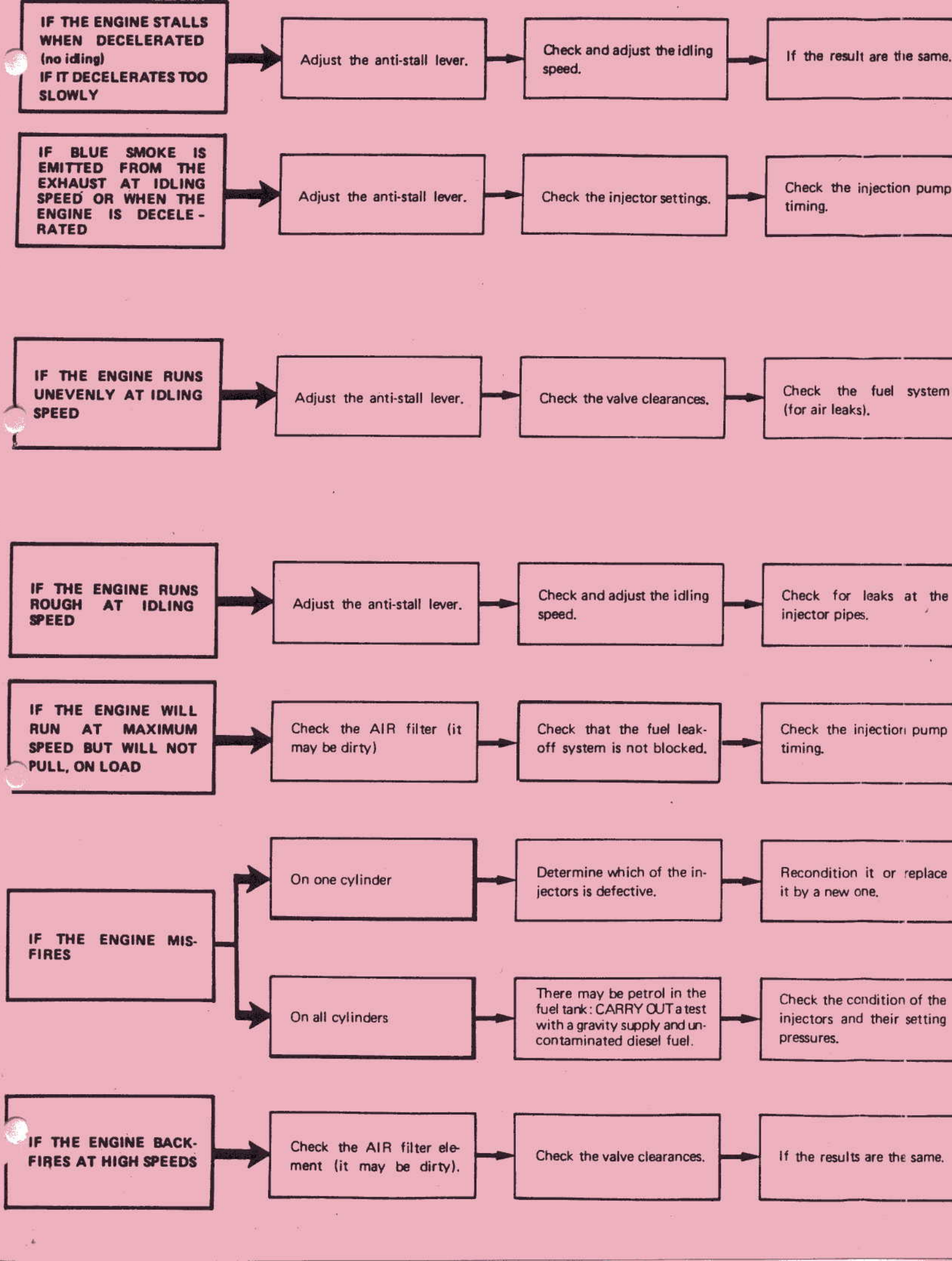
– The fuel itself, the tank, the pump supply or leak-off pipes, the filter element or the pump accessory controls (shut-off, anti-stall etc.), any one of them could be defective.

Furthermore, one should never forget the basic and fundamental principle of operation of a DIESEL engine : the fuel injected into the combustion chamber is ignited by the rise in temperature that occurs on the compression stroke and any factor that interferes with this compression could be the cause of an operating defect.

– Defective or incorrectly set injectors, incorrect injection timing, incorrect valve timing or clearances, low compression or excessive oil consumption can all of them cause smokey exhaust or knocking.

Finally, when starting the engine in cold weather, it is to be remembered that a DIESEL engine must be turned ower at a high enough speed by the starter motor, even when pre-heat is used and this means that the starter should be operating at full efficiency and there should be no excessive friction or drag in the engine, such as could be caused by using the incorrect type of engine oil for example.

The diagnostic method described overleaf, is, in fact, only based on the general information stated above, listed in greater detail.


IF THE ENGINE STALLS WHEN DECELERATED (no idling) IF IT DECELERATES TOO SLOWLY
Adjust the anti-stall lever.
Check and adjust the idling speed.
If the result are the same.
IF BLUE SMOKE IS EMITTED FROM THE EXHAUST AT IDLING SPEED OR WHEN THE ENGINE IS DECELE-RATED
Adjust the anti-stall lever.
Check the injector settings.
Check the injection pump timing.
IF THE ENGINE RUNS UNEVENLY AT IDLING SPEED
Adjust the anti-stall lever.
Check the valve clearances.
Check the fuel system (for air leaks).
IF THE ENGINE RUNS ROUGH AT IDLING SPEED
Adjust the anti-stall lever.
Check and adjust the idling speed.
Check for leaks at the injector pipes.
IF THE ENGINE WILL RUN AT MAXIMUM SPEED BUT WILL NOT PULL, ON LOAD
Check the AIR filter (it may be dirty)
Check that the fuel leak-off system is not blocked.
Check the injection pump timing.
IF THE ENGINE MIS-FIRES
On one cylinder
Determine which of the in-jectors is defective.
Recondition it or replace it by a new one.
On all cylinders
There may be petrol in the fuel tank: CARRY OUT a test with a gravity supply and un-contaminated diesel fuel.
Check the condition of the injectors and their setting pressures.
IF THE ENGINE BACK-FIRES AT HIGH SPEEDS
Check the AIR filter ele-ment (it may be dirty).
Check the valve clearances.
If the results are the same.

Remove the injection pump and have it checked.

Check the engine oil consumption.

If the engine is in good condition.

Remove the injection pump and have it checked.

Carry out a test with a gravity supply.

If the engine runs normally, air is enterring the system.

Check the unions and seals (their condition and to ensure that they are tight).

If the results are the same.

Remove the injection pump and have it checked.

Check the injector setting pressures and check them for leaks.

Check the valve clearances.

If the result are the same.

Remove the injection pump and have it checked.

Check the injection pump timing.

If the results are the same.

Remove the injection pump and have it checked.

Remove the injection pump and have it checked.

CARRYING OUT WORK ON THE INJECTION SYSTEM

FUEL

The main factor that determines the operating life of an injection pump or an injector is the cleanliness of the fuel on which it operates.
One must therefore take every necessary precaution to prevent dirt contaminating the fuel and, in particular, avoid water getting into the system.
The filter cartridge must be replaced at the mileage stated in the driver's handbook.

INJECTORS

General :
The power output of a Diesel engine depends to a large extent, on the correct operation of the injection system. To obtain maximum efficiency, each shot of fuel must be injected under conditions such that all of it is burned without producing excessive smoke at the exhaust. The function of the injector is therefore essential and it must be carefully checked and tested because of the high speed at which it carries out its operations.
Under no circumstances should any work other than cleaning and adjusting the pressure settings be carried out on the injectors.

Cleaning an injector :
Never use an abrasive to grind-in or reface the injector body seats, or the needle itself. Any such operation would change the injector characteristics and result in poor combustion, smoke, falling off in power and engine overheating.

An injector is to be cleaned only by washing it in filtered diesel fuel. Petrol is never to be used nor is it to be wiped with a rag or blown out with compressed air.

Injectors supplied from stores :
New injectors are supplied coated with vaseline to protect them against corrosion.
They are to be carefully cleaned before being fitted to the engine.

INJECTION PUMP :

All work involving adjusting or replacing any of the pump internal components is the exclusive fiels or specialists authorised for this purpose by the pump manufacturer.
Such specialists have available technical literature produced in conjunction with the vehicle manufacturer and are equipped with the special tools that are essential to the rapid execution of the work required.
In case of damage to an injection pump, or inefficient operation, one should therefore consult the nearest authorised dealer fo the pump manufacturer in question.

INJECTION PIPES :

Injection pipes SHOULD NEVER BE welded, brazed or heated as this would cause oxides to form which would result almost inevitably in damage to the injectors.
All the injection pipes are of the same length. This is essential to the efficient operation of the engine.
Clean them in diesel oil and blow them out with compressed air before fitting.

SPECIAL TOOLS

A : Dial indicator :
Reference : 8.1504

B : Valve spring compressor :
Reference : 8.0105 Y

C : Timing kit for BOSCH or ROTO-DIESEL pumps
Reference : 8.0117 ZR
From this kit, use the following tools

C2 : Dial indicator :
Reference : 8.0117 F

C6 : Nut and bolt for securing dial indicator C2
Reference : 8.0117 L

C9 : Plunger for dial indicator C2
Reference : 8.0117 H

D : Adjustable component for dial indicator support :
Reference : 8.0504 A2

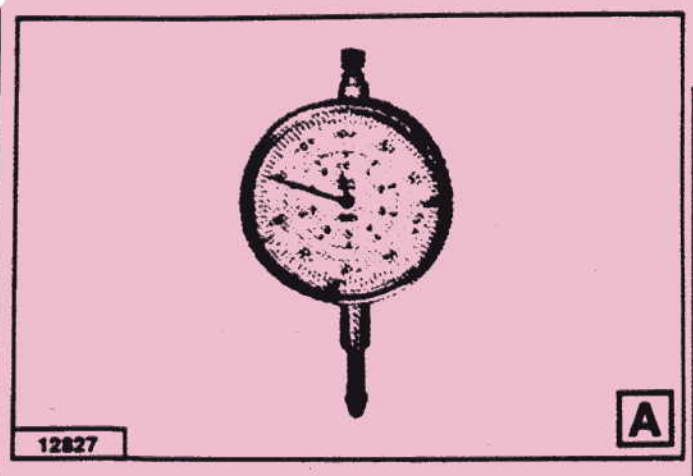
E : Support for mounting dial indicator on cylinder head :
Reference : 8.0117 AH

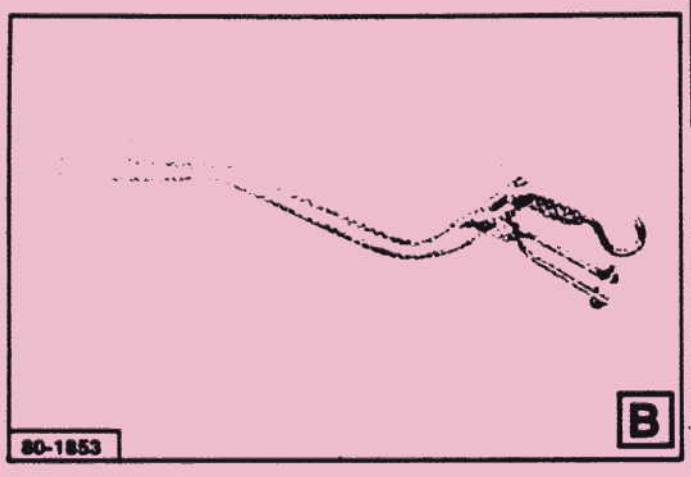
F : Dial indicator angle adaptor for ROTO-DIESEL pump
Reference : 8.0117 AG

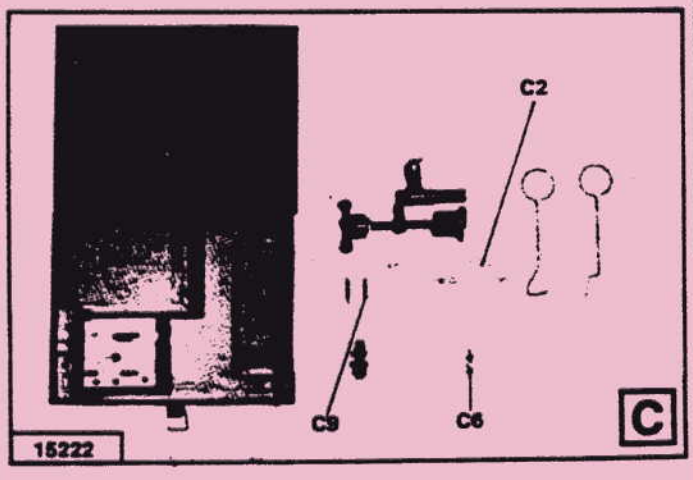
G : Dial indicator support for ROTO-DIESEL injection pump
Reference : 8.0117 AF

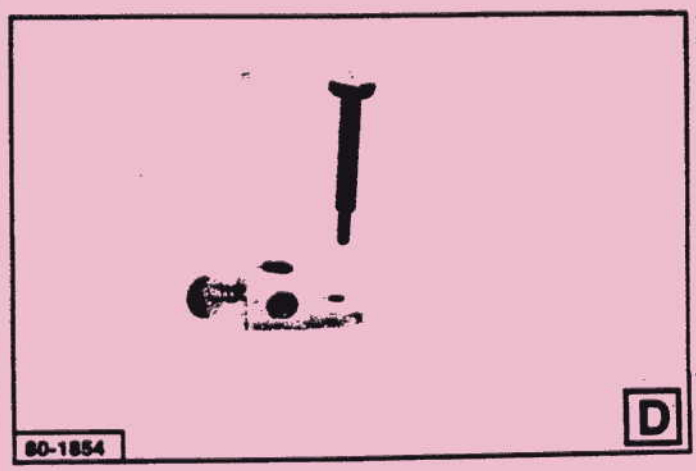
TIGHTENING TORQUES

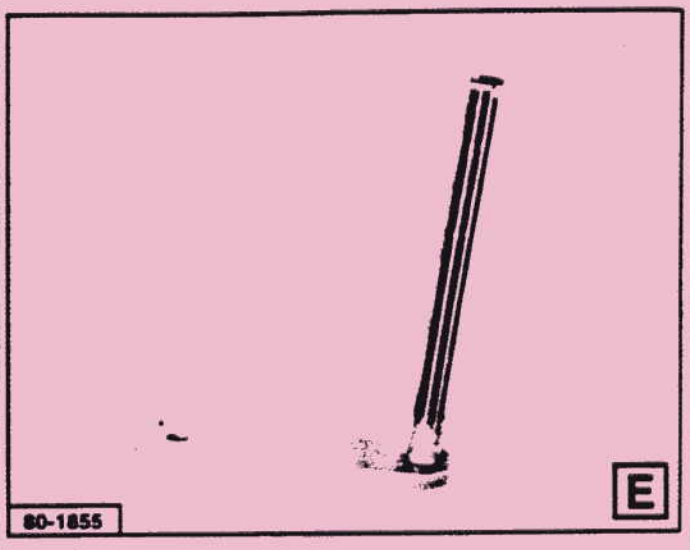
Recommended tightening torque :	Torque in N.m (lbf.ft.)
Injection pump sprocket securing bolts :	23 (16.9)
Nuts securing injection pump to timing gear casing :	30 (22.1)
Injection pump pipe unions :	29 (21.4)


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A

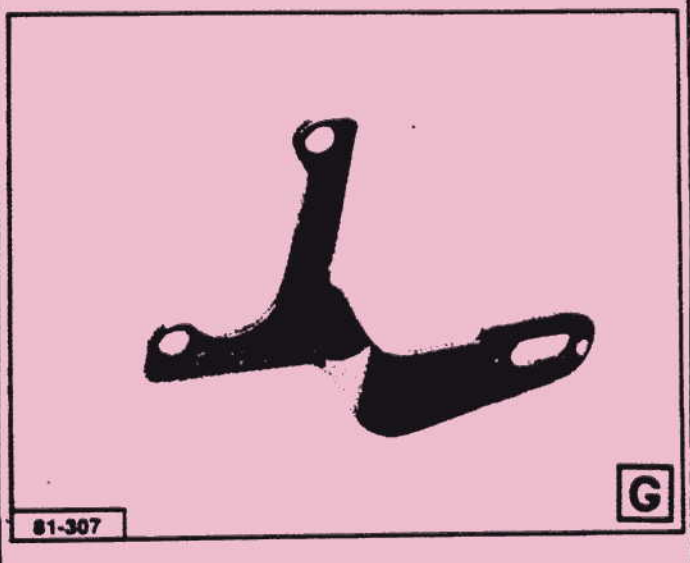

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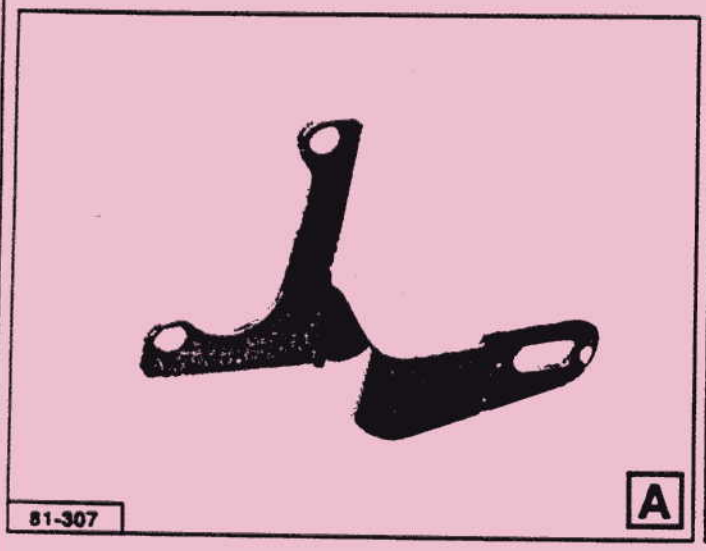

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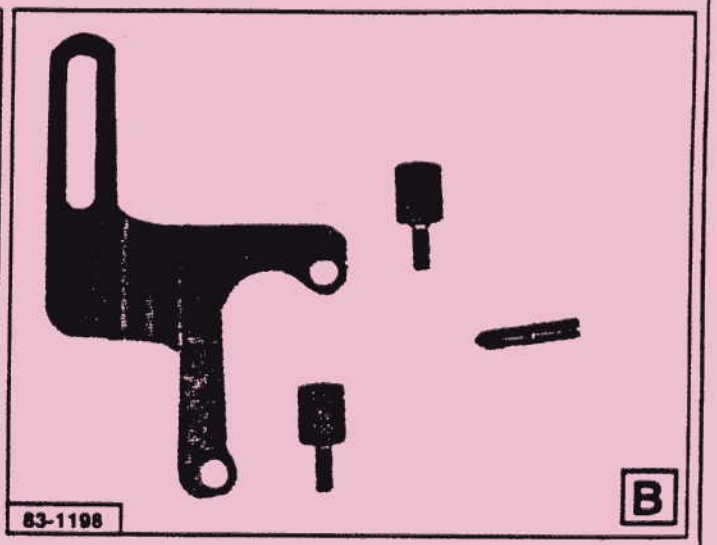

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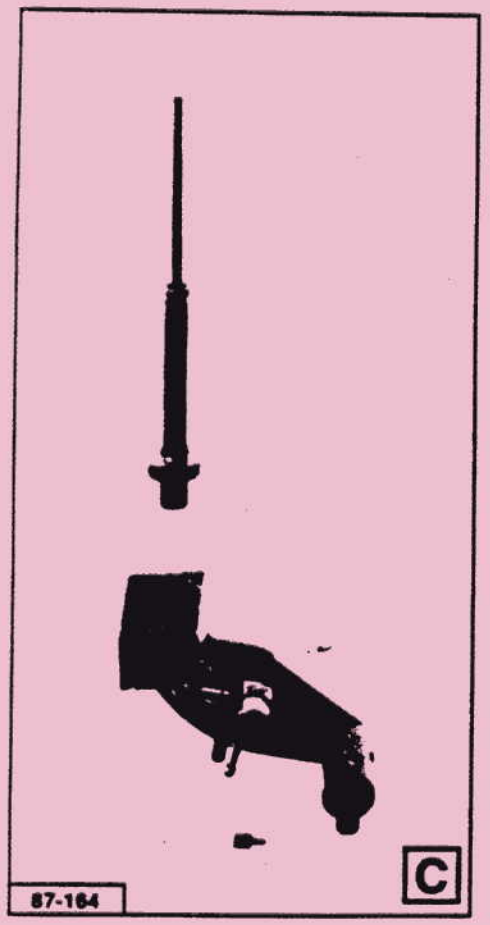

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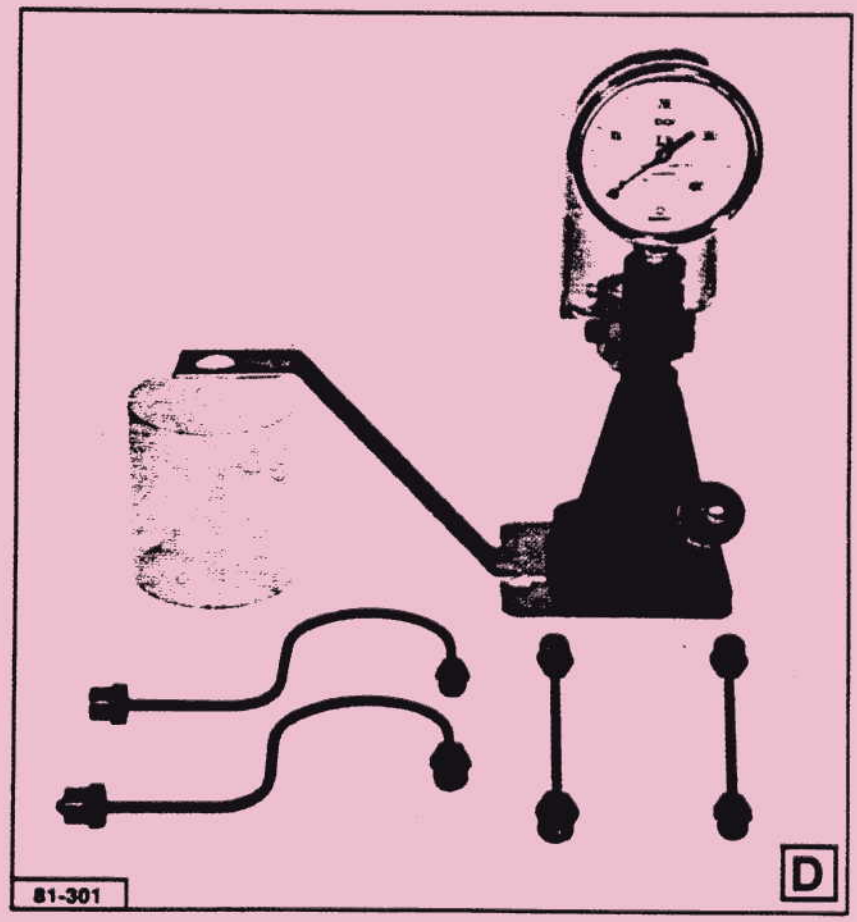

80-1907
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81-307
G


81-307
A


83-1198
B


87-164
C


81-301
D

SPECIAL TOOLS

[A] Dial indicator support for « ROTO DIESEL » DPA pumps
Reference : (-).0117 AF

[B] Dial indicator support for « ROTO DIESEL » DPA pumps
Reference : (-).0117 AL

[C] Tool for setting the timing of ROTO DIESEL pumps (1988 model year)
Reference : (-).0117 AM

[D] Pump and connecting pipe work for adjusting the injector settings
Reference : Part no. 9786.10

ADJUSTING THE OPENING PRESSURE OF AN INJECTOR

Test fluid:

Kerdanne or dilutine de-odourised paraffin viscosity : 1 to 2.5 centistokes at 20° centigrade.
Specific gravity 0.770 to 0.810 at 20° centigrade.

> Precautions to be taken :
> The sprayed fluid ignites very easily. It is essential to take all the necessary precautions and ensure that the fire regulations are adhered to.
> Never expose the hands or any other part of the body to the test fluid spray. The penetrating force of the spray is such that it could cause serious injury and blood poisoning.

Checking the opening pressure Fig. I.

Operate the pump lever slowly and note the pressure at which the injector opens (the setting pressure). Write down this figure. The opening pressure is adjusted by turning screw 7 Fig. II.

> The injector setting adjustment screw (7) is only to be screwed in or out on the test bench. The pump lever must be kept moving during the operation to ensure that the seat and needle are continually lubricated and cleaned.

Dismantling

To loosen an injector holder, grip it in a vice fitted with soft jaws made from lead.

> Never grip an injector holder directly in a vice.

The component is to be reassembled under conditions of absolute cleanliness. Lubricate the parts before reassembly them. Fit the injector nozzle (2) and its nut (3) to the injector holder body (1) Fig. II.

Tighten to a torque of 65 N.m (47.9 lbf.ft).

Place, in the injector holder body (1), the plunger rod (4), the spring (5) and the adjusting screw (7). Adjust the opening pressure (Fig. II).

REF	Engine	U25/651	U25/661	U25/673
	Make	ROTO-DIESEL		
2	Injector nozzle	RDNO SDC 6577 B		RDNO SDC 6751
1	Injector holder	RKB 45 SD 5422		
2 + 1	Holder + nozzle	R 53 56 501 B		R 53 56 502
A	Colour code	ORANGE		WHITE
	Setting, new component	122^{+5}_{-0} bars		137^{+5}_{-0} bars
	Setting, used component	112^{+5}_{-0} bars		127^{+5}_{-0} bars

Fit the seal (6) and the cap nut (7).

Tighten them to a torque of 20 N.m (14.7 lbf.ft).

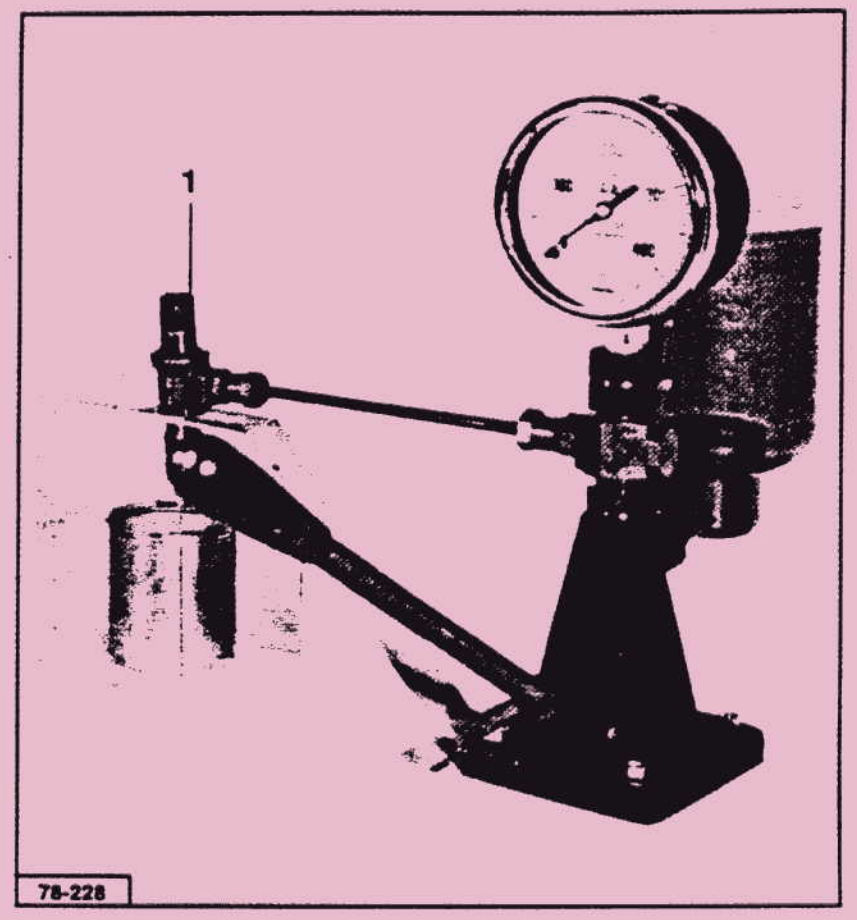
Check the spray pattern Fig. I

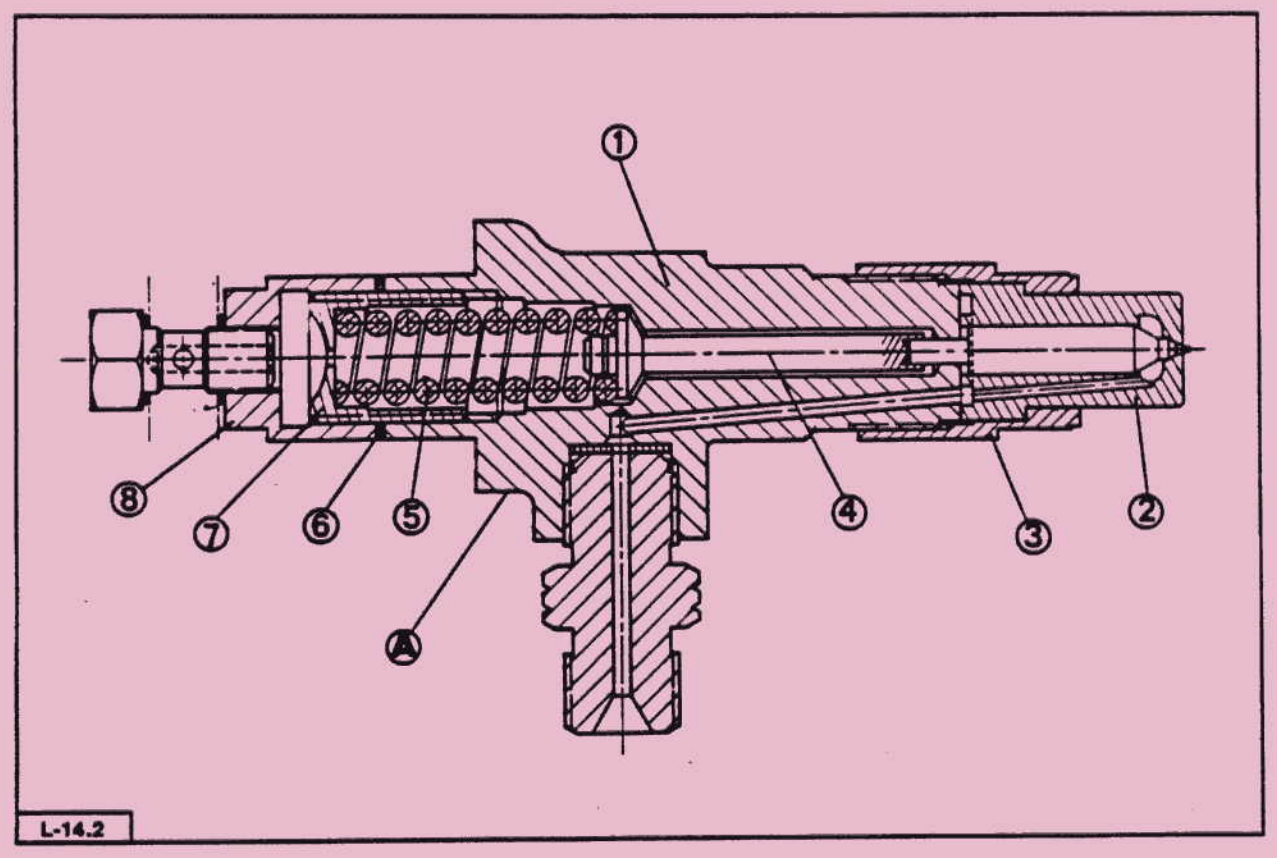
Operate the pump lever in sharp jerks.
The injector spray pattern should be very fine and homogeneous.

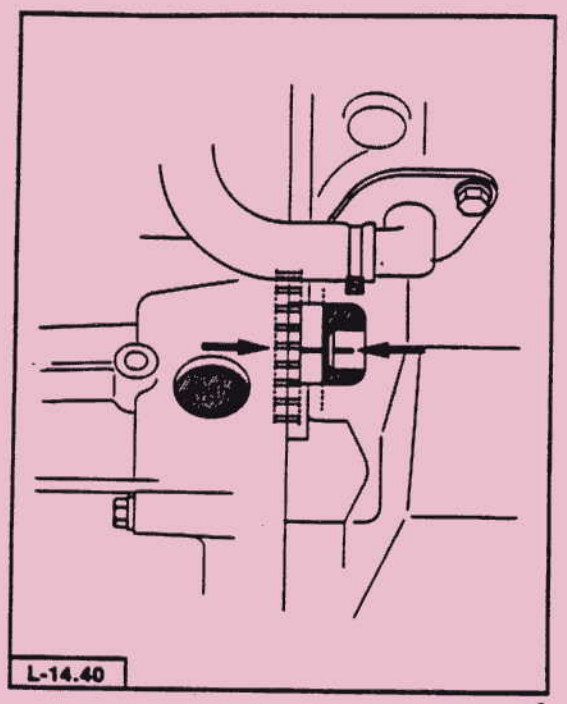
Check the needle seat for leaks.

This check should be carried out with the injector held vertical. Wipe dry the end of the injector.

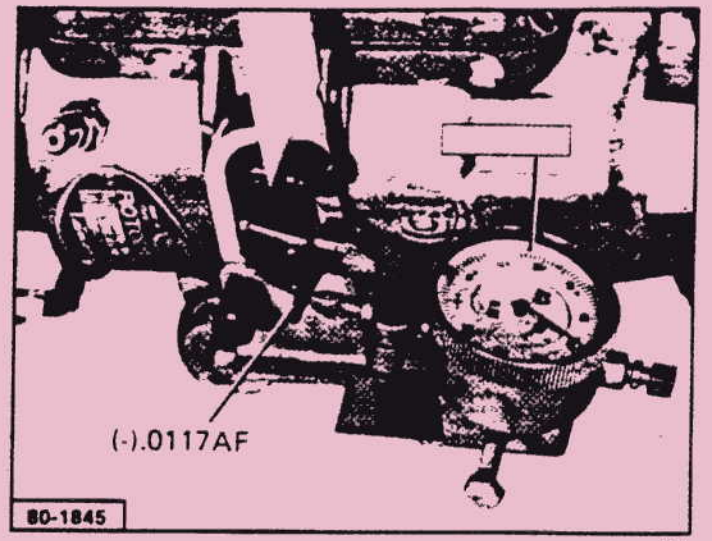
Pull down the pump lever to maintain a pressure of 10 bars lower than the opening pressure. No drop should fall from the injector within 30 seconds. Light wetting of the injector nozzle is acceptable.


1
78-228

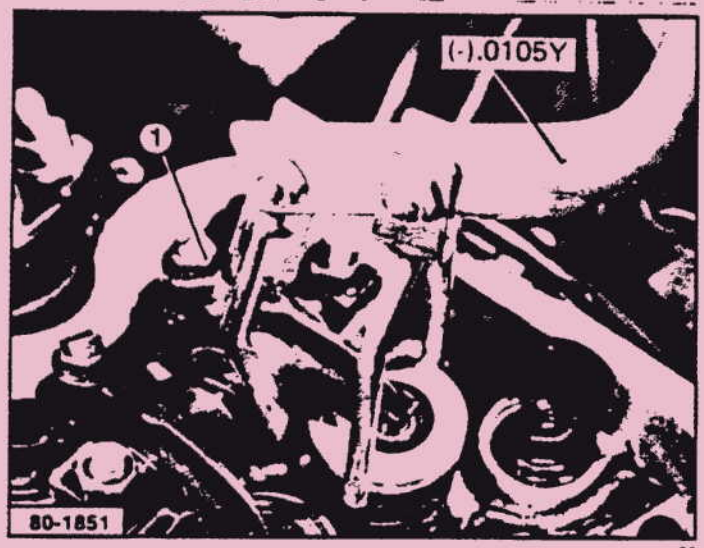

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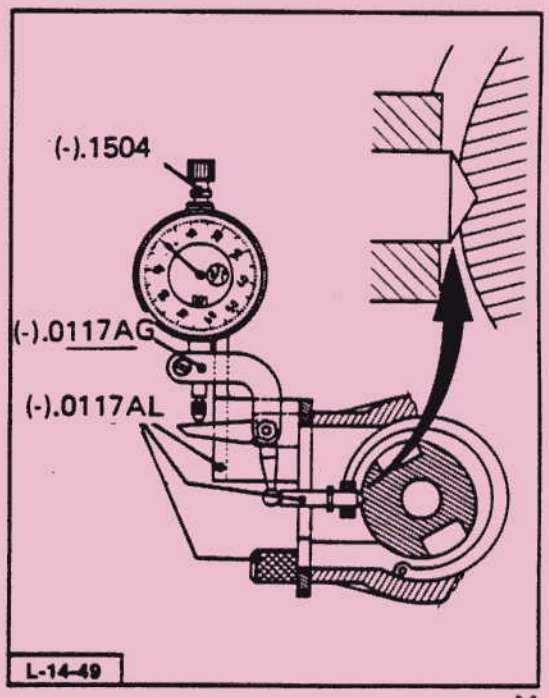
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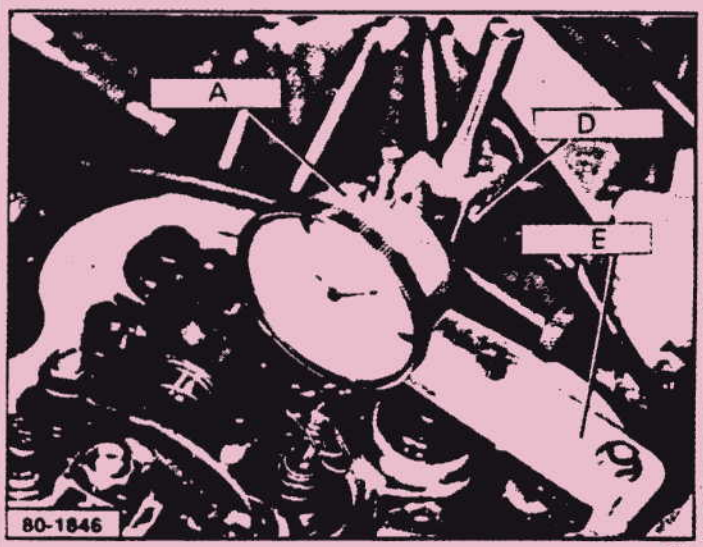
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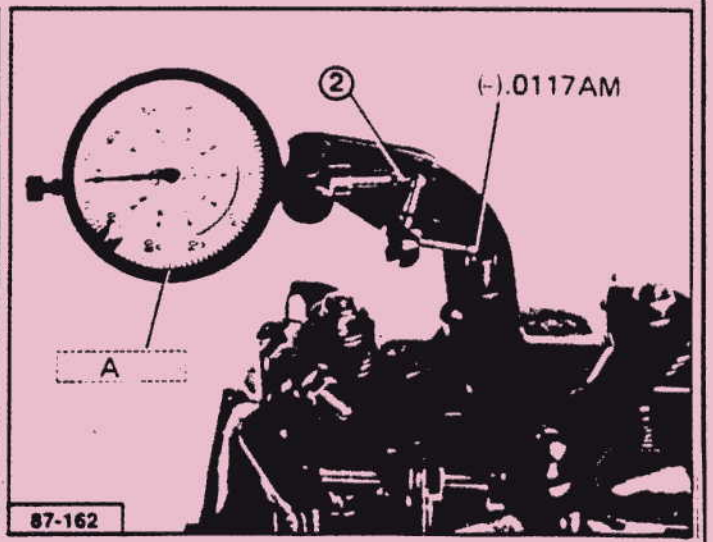
II



V



III



VI

CHECKING AND ADJUSTING THE « ROTO DIESEL » INJECTION PUMP

Support the left hand side of the vehicle on axle stands.
Disconnect the battery negative cable.
Engage the highest gear.
Turn the engine over by turning a wheel.

Set No. 1 timing at the initial timing point.

ENGINE	BEFORE TDC	PUMP	
U25/651	5.12 mm ± 0.05	UT 100	DPA
U25/661	4.32 mm ± 0.05	MA 300	DPA
	4.71 mm ± 0.05	MA 260	DPC
U25/673	3.24 mm ± 0.05	MAS 100	DPC

1° Method Fig. I
(when there is a timing mark on the flywheel)

Look down through the oil filler hole in the rocker arm cover.
Bring the valves on No. 1 cylinder « into balance », turn the engine through one turn (in its normal direction of rotation). Turn the engine, by turning the wheel, to bring the timing marks on the cylinder block and flywheel —> [<— in line with one another.
Check their positions with a mirror.

2° Method Fig. II and III
(when there is no mark on the flywheel)

Remove the rocker arm cover.
Bring the valves on No. 4 cylinder into balance (with the piston on No. 1 cylinder near TDC on the compression stroke (Fig. II).
Remove the lock nut (1) and screw back the screw on the No. 1 cylinder inlet rocker arm. With the valve spring compressor (B) (Fig. II), compress the spring and move the rocker arm sideways to swing it vertically.
Take out the push rod.
Remove - the valve collets
- the valve spring

To avoid the inlet valve falling into the cylinder, only turn the crankshaft through a quarter of a turn in either direction or place a paper clip on the inlet valve stem.

Find TDC on No. 1 cylinder (Fig. III)

Fit the support (E) together with the adjustable component (D) to which the dial indicator (A) has been fitted. Turn the crankshaft backwards and forwards to find the exact point at which the large pointer on the dial indicator changes direction (TDC).
Set the dial indicator moving dial to place the « 0 » in line with the large pointer and set the total pointer on 8.

Find the engine timing point

Turn back the crankshaft (by a quarter of a turn) and then turn it in the normal direction of rotation of the engine to bring the piston to : EG : 4.32 mm before TDC, that is to say a reading of :
8 mm - 4.32 mm = 3.68 mm on the dial indicator.

Remove

The injection pump inspection plate or plug.

Fit, Fig. IV, V and VI

The timing tools to suit the pump.

NOTE : Fig. VI

Fit the dial indicator A with the flat plunger (2) that forms part of the kit.

Find the pump timing point.

PUMP		BEFORE TDC	ENGINE	
D P A	U 100	5.12 mm ± 0.05	U25/651	SLOT (Fig. I)
	MA 300	4.32 mm ± 0.05	U25/661	

Turn the engine in the normal direction of rotation until the dial indicator pointer changes direction. Set the dial indicator zero in line with the large pointer.

PUMP		BEFORE TDC	ENGINE	
D P C	MA 260	4.71 mm ± 0.05	U25/661	STUD (Fig. II)
	MAS 100	3.24 mm ± 0.05	U25/673	

Place the angle adaptor against the pin and set the dial indicator on zero.
Check that the pin is not resting on the rotor timing stud (1), Fig. II.
Turn in the normal direction of rotation to find the injection point.
The amount by which the piston must lift, dimension X ± 0.04 mm, is engraved on the plastic cap (2) Fig. III.

Checking the injection pump

Turn back the engine against its normal direction of rotation.

D.P.A. pump

Slowly return in the normal direction of rotation to the zero point on the dial indicator.

D.P.C. pump

Slowly return in the normal direction of rotation until the pin lifts by a dial indicator reading of dimension « x » ± 0.04. (As engraved on the plastic cap (2) Fig. III).

1° Method where there is a timing mark on the flywheel

The timing marks —> and <— must be in line.

2° Method when there is no timing mark on the flywheel

The dial indicator should show the required readings before TDC (as specified in the above chart). If it does not, check the pump timing.

Setting the pump timing

Place the engine on its timing point.
Turn back the engine against its normal direction of rotation and then return in the normal direction of rotation to bring the timing marks —> and <— in line with one another.
Loosen the injection pipe unions and the four fastenings (3) Fig. IV.
Place the pump on its timing point.
Turn the body of the pump sharply towards the engine.
Slowly come back to the timing point by turning the body of the pump outwards, away from the engine.
D.P.A. until the dial indicator pointer is on the « 0 ».
D.P.C. until the dial indicator pointer is in line with the figure that represents « dimension X ».

Tighten the four fastenings (3) Fig. IV. The dial indicator pointer must not move as the fastenings are being tightened. Tightening torque 24 N.m (17.7 lbf.ft).

Check the pump timing.

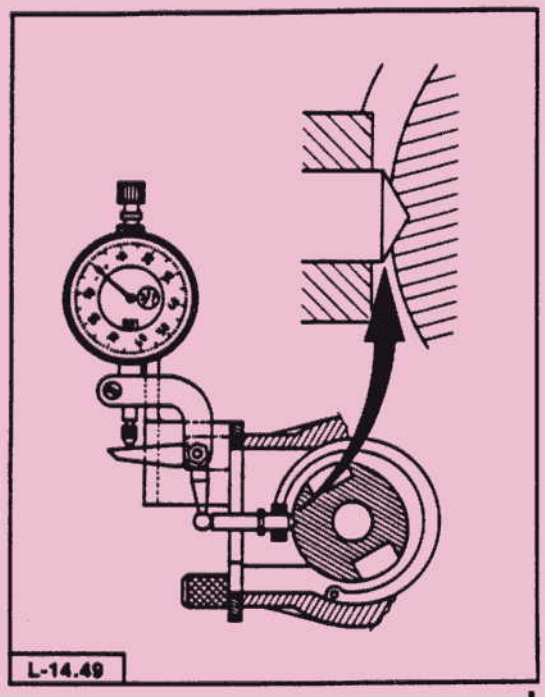
Remove the timing equipment.

Fit the inspection plate.

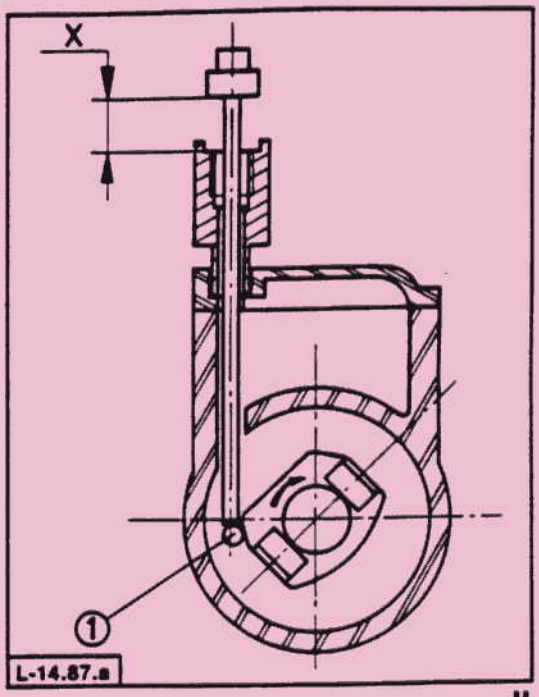
Fit the plug, together with its seal (D.P.C.).
Tightening torque 10 N.m (7.4 lbf.ft).

Tighten the pipe unions.
Tightening torque 25 N.m (18.4 lbf.ft).

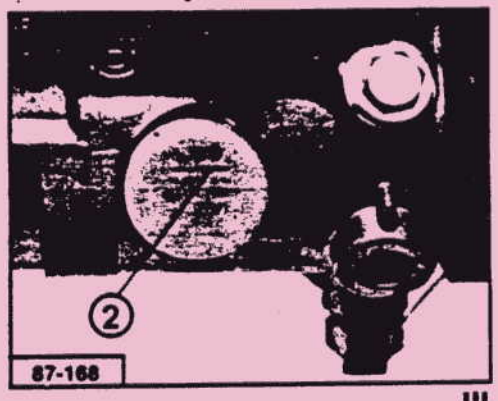
Connect up :
- The electric shut-off unit wire
- The battery negative cable.



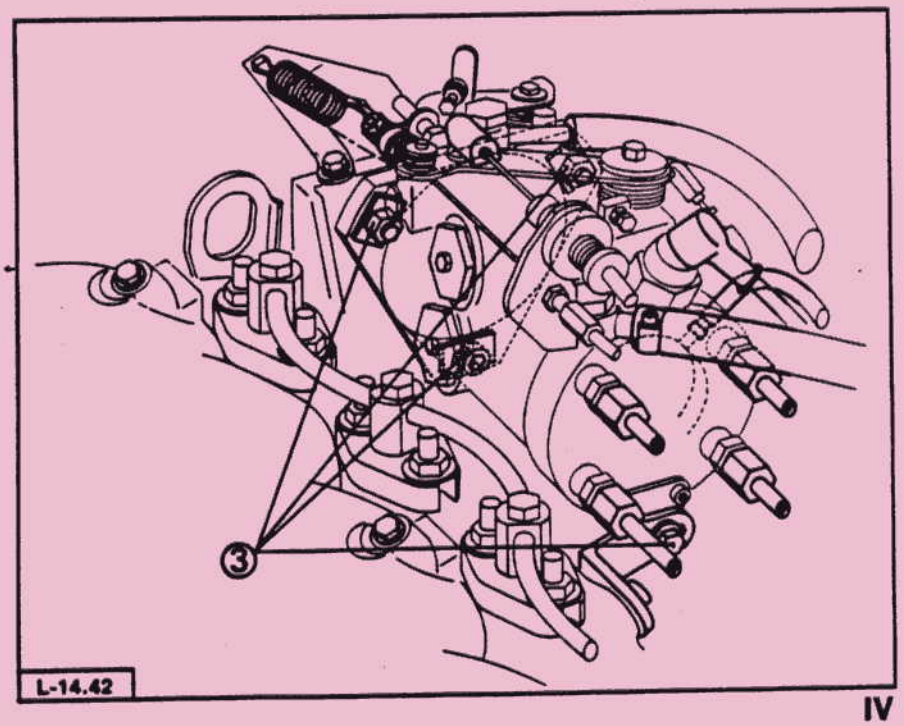
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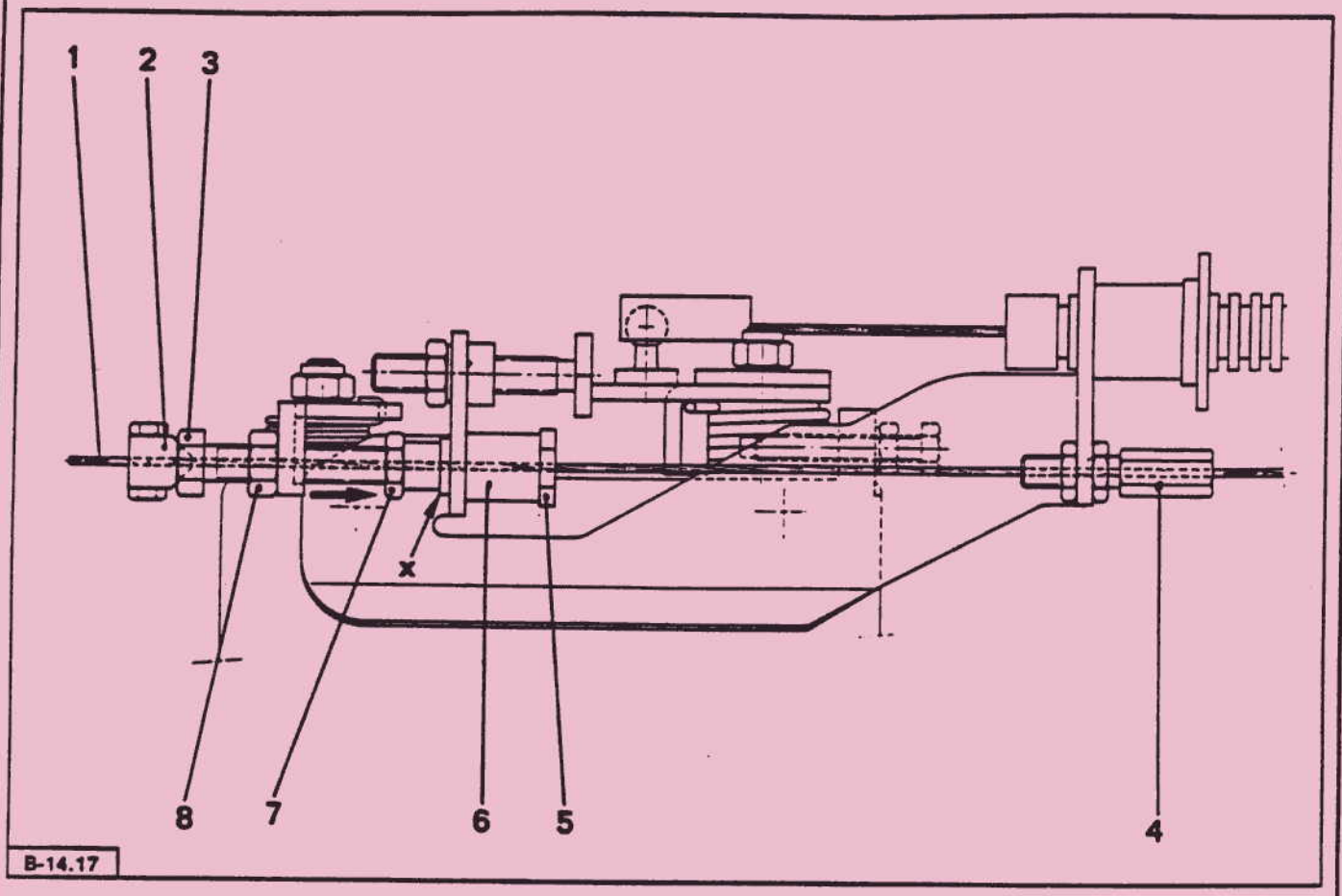
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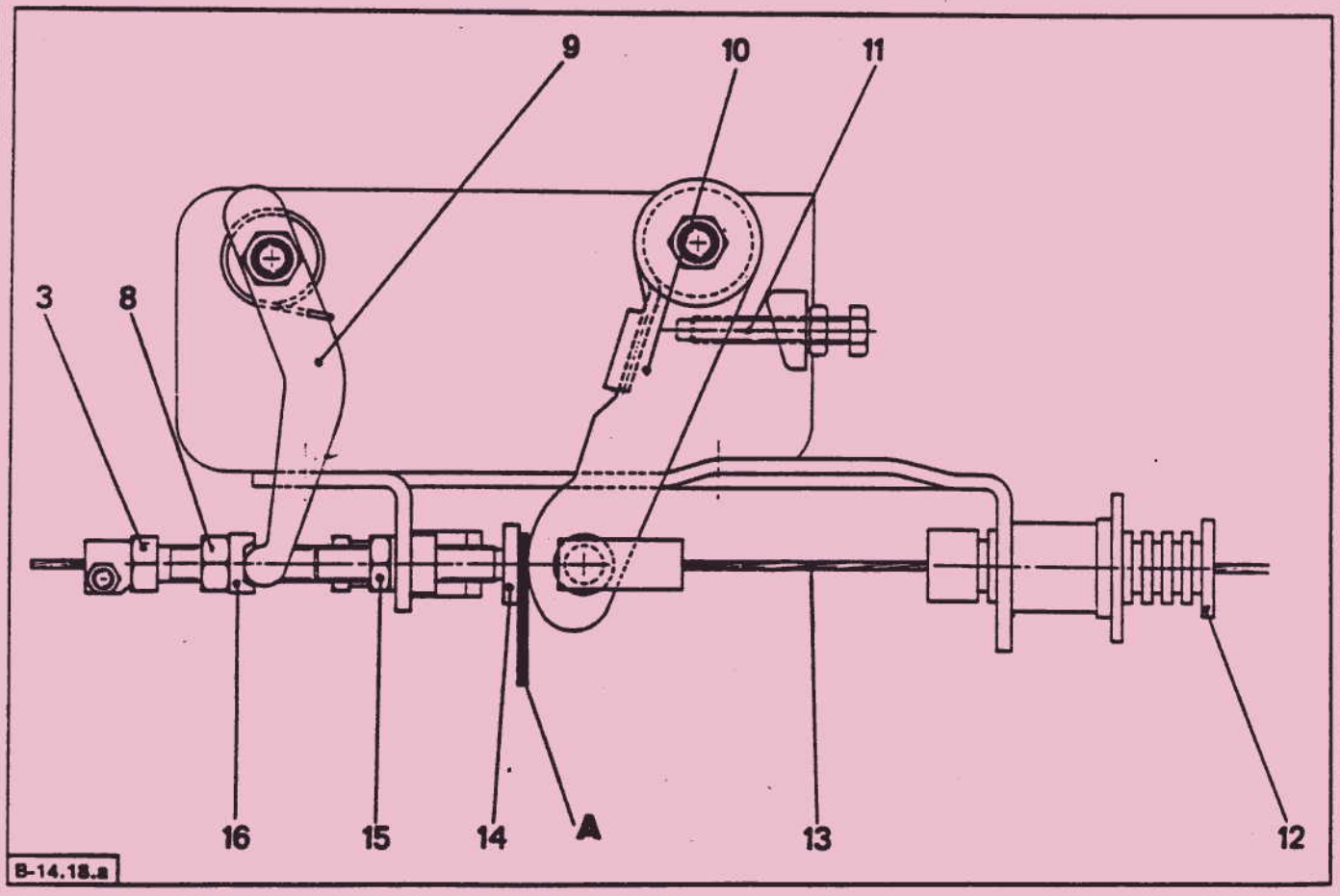


III



IV


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B-14.17


9
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B-14.18.a

ADJUSTING THE ROTO DIESEL INJECTION PUMP CONTROLS

PUMP		ENGINE
D P A	UT-100	U25/651

Adjusting the fast idling control : Fig. I

ON A COLD ENGINE

Check that the idling control cable (1) is fully tensioned and that the piston (7) is against its stop at « X ».

If not, push the piston (7) in the direction shown (→) : tension the cable (1) and tighten the cable clamp (2) against its stop (3). Complete the tensioning operation by applying tension to the cable at the tensioner (4).

ON A WARM ENGINE

Check that there is no tension on the control cable (1) and that the piston (5) is against its support (6). If it is not, replace the fast idling sensor.

Adjusting the idling speed : Fig.II
Loosen the lock nut (15) and screw the stop (14) fully in. (Check that there is no tension on cable (13).
Loosen the lock nut (8) on the stop (16) that limits the movement of the idling lever (9).
Adjust the idling speed to 750 ± 25 rpm by turning screw (3). Tighten the lock nut (8).

Adjust the throttle control stop : Fig. II.
Bring the stop screw (14) into contact with the lever (10) and insert a feeler A, 2 mm thick, between the stop (14) and the throttle lever (10).
Turn the stop screw (14) to increase the engine speed by approximately 100 rpm.
Tighten the nut (15).
Remove the 2 mm feeler gauge.
The engine should return to its normal idling speed.
- If the engine tends to stall, re-insert the feeler and slightly increase the speed.
- If the engine does not return positively to idling speed, slightly reduce the speed.

Adjust the throttle travel (with the engine stopped) : Fig. II
Fully depress the accelerator pedal and ensure that the lever (10) is against its screw (11).
If not, move the clip that retains the adjusting sleeve (12).
Release the pedal and check that the lever (10) comes against its stop (14) and that there is no tension on the accelerator cable (13).

Checking the shut-off controls :
Check that the engine stops when the ignition key is turned off. If not, check the operation of the electric shut-off control (solenoid valve).
Check the operation of the mechanical shut-off by turning the lever (9) after first moving the stop (16) out of the way.

ADJUSTING THE ROTO DIESEL INJECTION PUMP CONTROLS

PUMP		ENGINE	Thickness of feeler
DPA	MA 300	U25/661	2 mm
DPC	MA 260	U25/661	1,5 mm
	MAS 100	U25/673	

ON A COLD ENGINE

Adjusting the fast idling control : Fig. I

Check that the control cable (2) is fully tensioned and that the lever (3) is in the « MAX » position (by pushing it in direction →). If it is not, push the lever (3) as far as it will go in direction → and tension the cable (2) by turning the nut and the lock nut on the cable cover end stop (1).

ON A WARM ENGINE

Check that there is no tension on the control cable and that the lever (3) is against the cross piece (4) Fig. II. If it is not, check the operation of the thermostatic sensor (on the cylinder head) that controls the fast idling speed. With the cable disconnected there should be a cable movement between this position and the « cold engine » position of more then 6 mm.

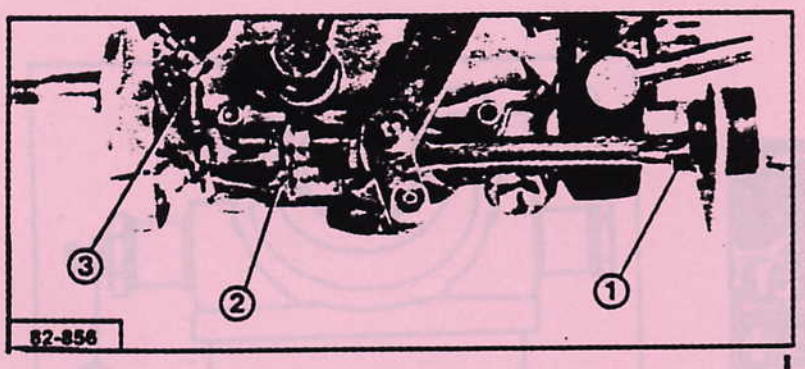
Adjust the throttle control (with the engine stopped) Fig. III.

Fully depress the accelerator pedal and ensure that the lever (6) is against the screw (5). If it is not, move the clip on the accelerator cable cover end stop.

Check that the lever (6) is against the stop (7) and that there is no tension on the cable.
If there is, adjust the accelerator pedal stop screw.

Adjusting the residual delivery (anti-stall) Fig. IV and V.
Push the shut-off lever (10) to be able to insert the 3 mm ø pin into the hole.
Insert the special feeler between the lever (6) and the screw (7).
NOTE : The special feeler can be replaced by a standard feeler gauge : see above chart.
Loosen the lock nut (11).
Adjust the speed to 800 ± 50 rpm by turning the special feeler or the screw (7).
Tighten the lock nut (11).
Remove the 3 mm ø pin.
Remove the special feeler or the feeler gauge.

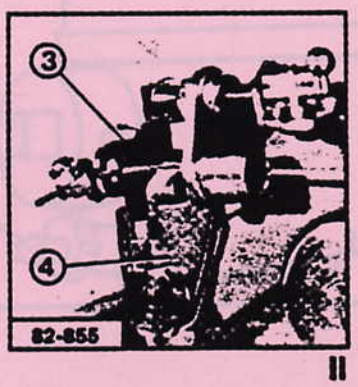
Adjusting the idling speed Fig. III
Loosen the lock nut (9).
Adjust the idling speed to 800 ± 25 rpm by turning the stop screw (8).
Tighten the lock nut (9).
Test the engine deceleration : accelerate to approximately 3000 rpm and then release the throttle lever.
If the fall in the engine speed overruns the specified idling speed, after this adjustment, turn the stop screw (7) that restrains lever (6).
If the fall in the engine speed tends to overrun, unscrew it by 1/4 turn.
If the fall in the engine speed is too sluggish, screw it in by 1/4 turn.
In each of these two cases, recheck the idling speed and readjust it if necessary.



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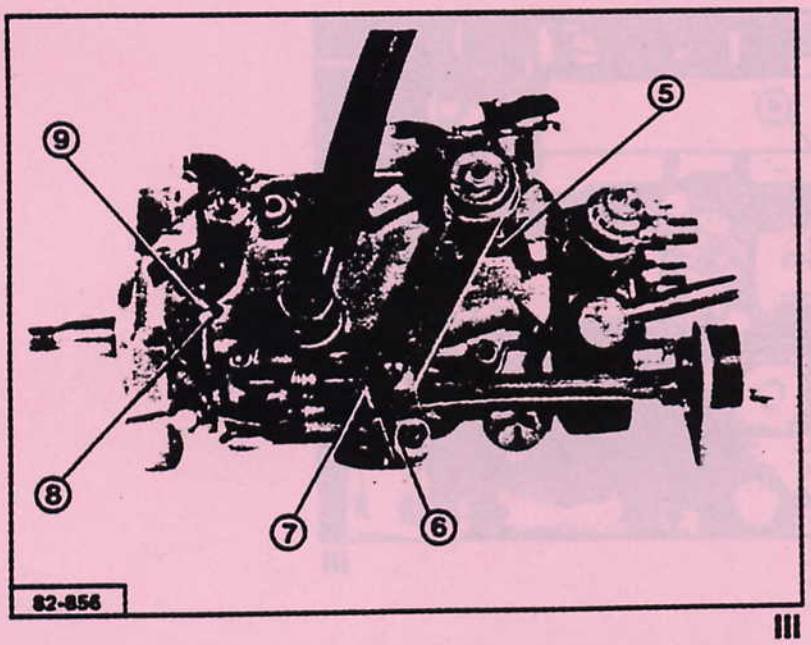
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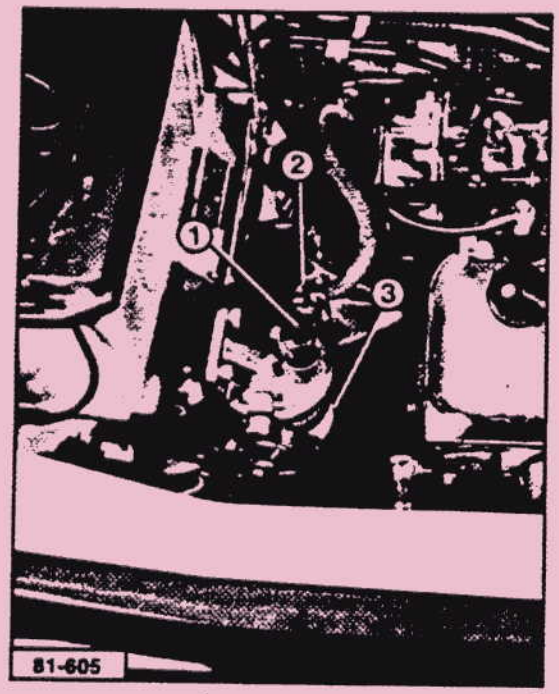
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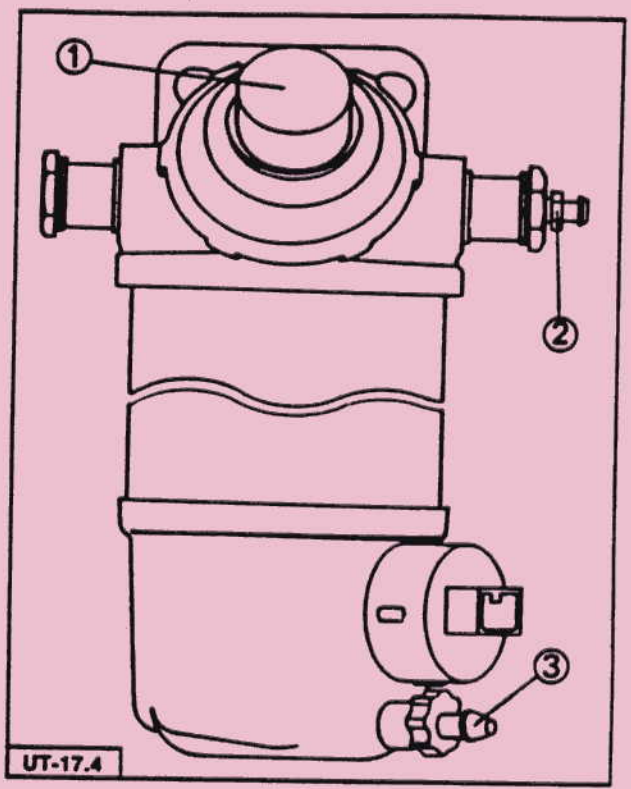
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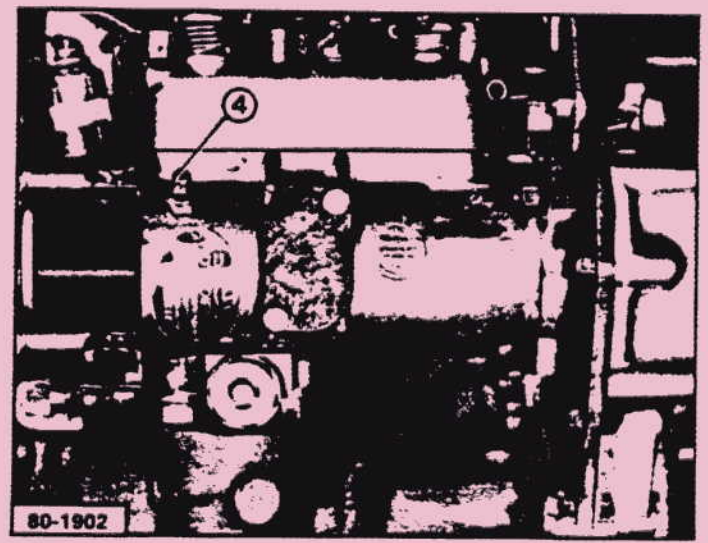
III



I



II



III

BLEEDING THE FUEL SYSTEM

Bleeding the fuel filter Fig. I and II.

Loosen the water drain screw (3) under the filter settling bowl (after draining off the water, and retighten the screw).

Loosen the bleed screw (2).

Unscrew the priming pump handle (1) ⇥ 1/85 Fig. I.

Bleed the air from the system by operating :
- either the handle (1) Fig. I
- or the piston (1) Fig. II ↦ 1/85

} that operates the priming pump

Tighten the bleed screw (2) to 4 N.m (3 lbf.ft)

Screw in the handle (1)

Bleeding the ROTO DIESEL - D.P.A. pump Fig. I and III

IT IS ESSENTIAL to bleed the filter before bleeding the pump

REMARK : One must follow the order stated below.

Loosen : Fig. I and III. The screw (4) on the injection pump hydraulic head.

Unscrew the priming pump handle (1).

Operate the handle (1) until there are no traces of air in the fuel flowing from the bleed screw (4) on the hydraulic head.

Tighten the bleed screw (4).

Screw in the handle (1).

NOTE : With this type of pump, the injectors are automatically bled.

Start the engine, pressurise the circuit with the hand priming pump whilst operating the starter motor.

The accelerator pedal must be fully depressed until the engine starts.

F4.002	1	REMOVING AND REFITTING THE INJECTION PUMP (on the vehicle)

SPECIAL TOOLS

A : Dial indicator
Tool no. : 8.1504

B : Valve spring compressor :
Tool no. : 8.0105 Y

C : BOSCH or ROTO-DIESEL pump timing kit :
Tool no. : 8.0117
Use the following tools from this kit.

C2 : Dial indicator
Tool no. : 8.0117 F

C6 : Dial indicator securing nut and bolt C2
Tool no. : 8.0117 L

C9 : Dial indicator extension C2
Tool no. : 8.0117 H

D : Dial indicator adjustable support :
Tool no. : 8.0504 A2

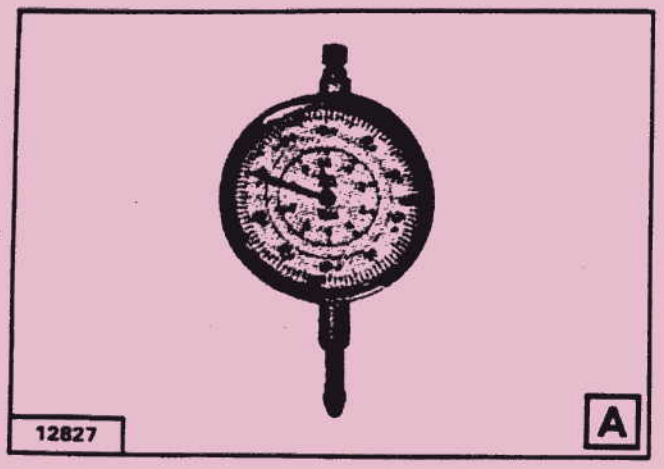
E : Support for mounting the dial indicator on the cylinder head :
Tool no. : 8.0117 AH

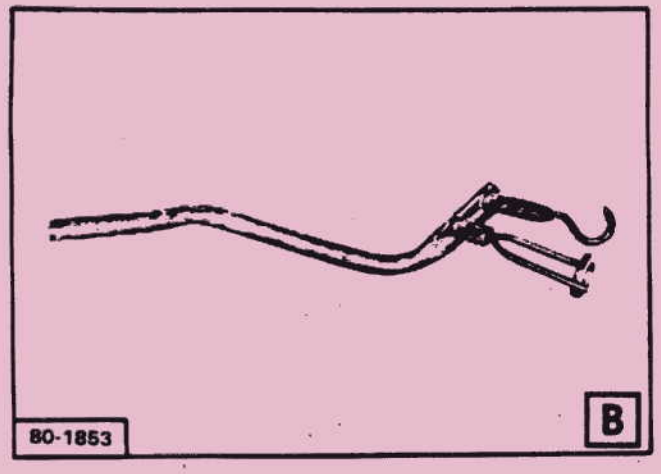
F : Dial indicator angle extension for ROTO-DIESEL pump :
Tool no. : 8.0117 AG

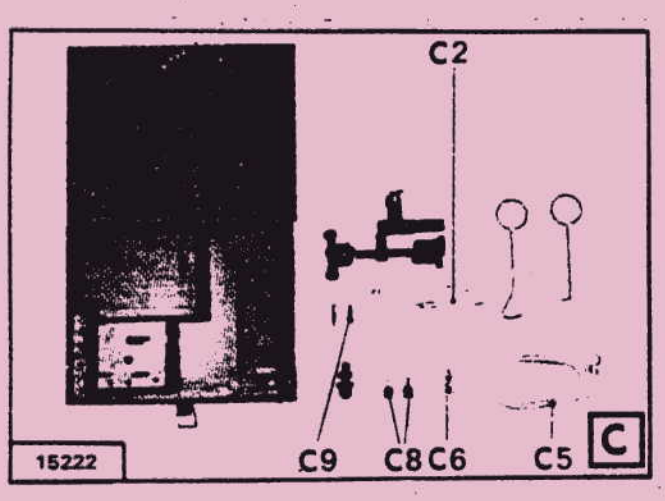
G : Dial indicator support for ROTO-DIESEL injection pump :
Tool no. : 8.0117 AF

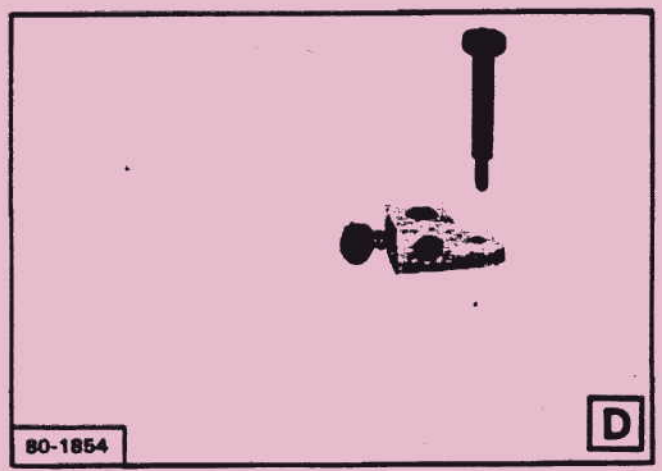
TIGHTENING TORQUES

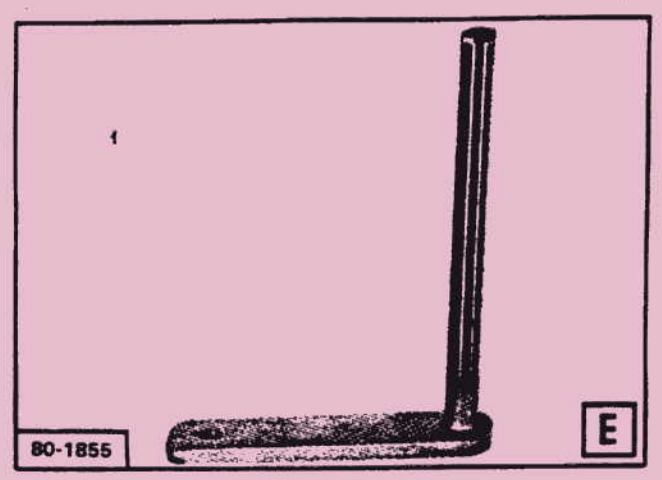
Recommended tightening torque :	m.daN	Nm	lbf ft
Injection pump gear securing bolts	2,3	23	17
Bolts securing injection pump to timing cover	3	30	22
Injector pipe unions	2,9	29	21

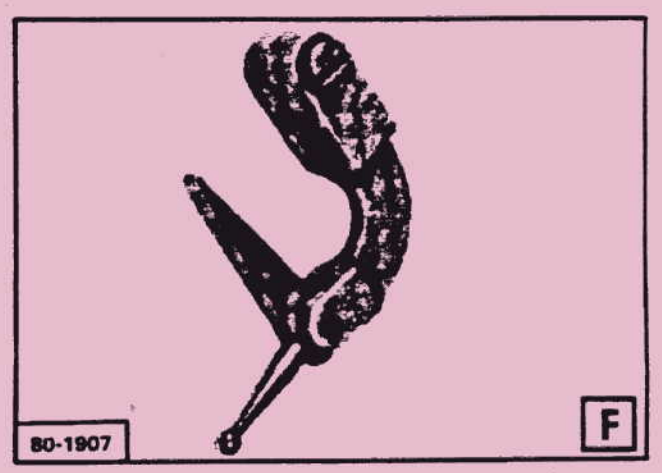

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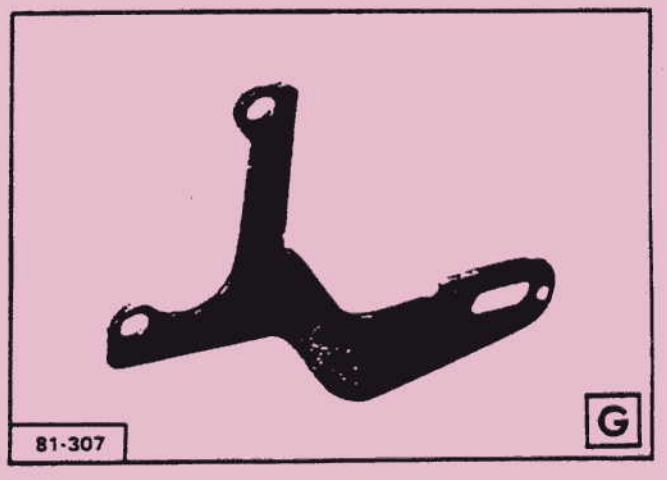

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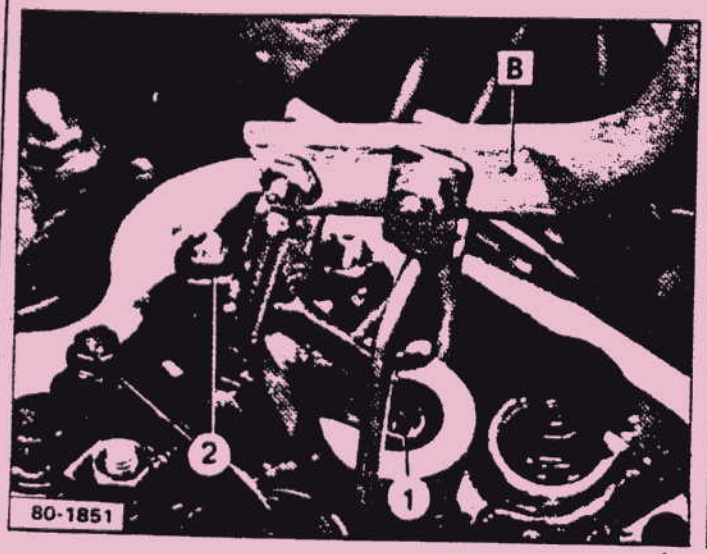

C2
C9
C8
C6
C5
15222
C


80-1854
D


80-1855
E


80-1907
F

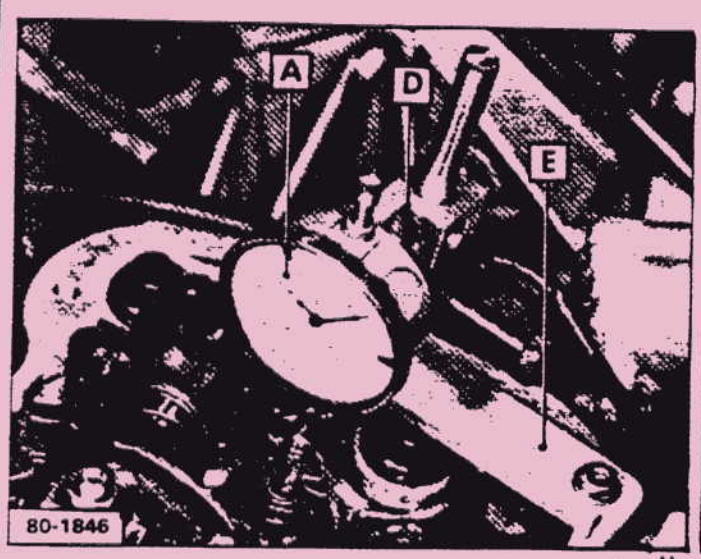

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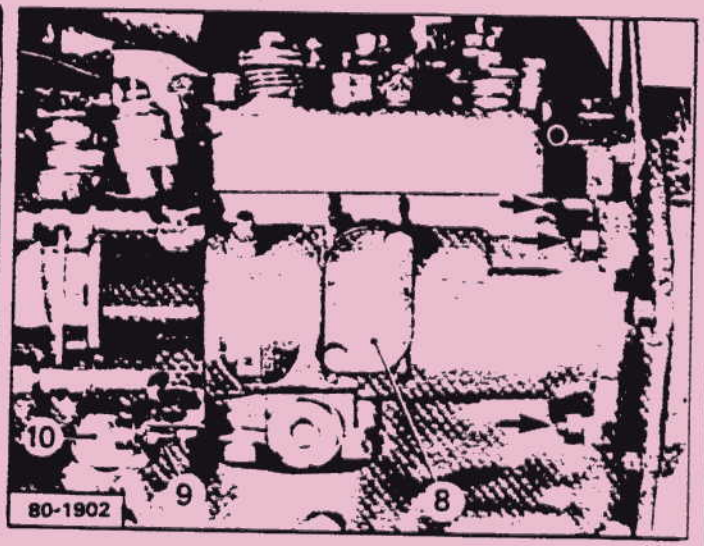
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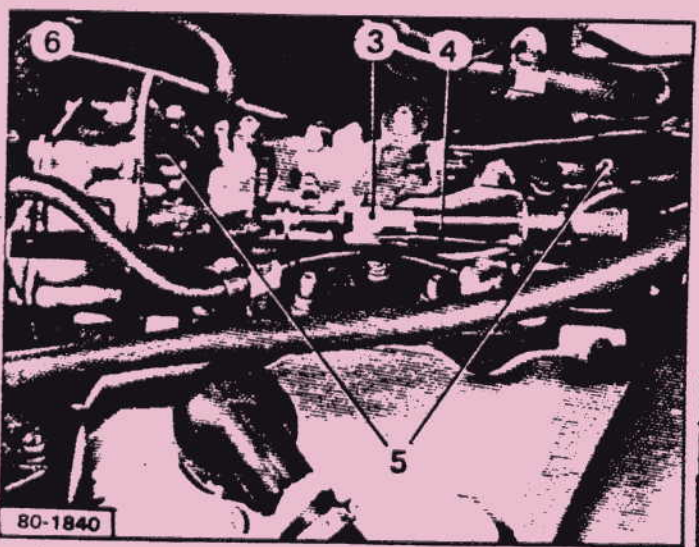
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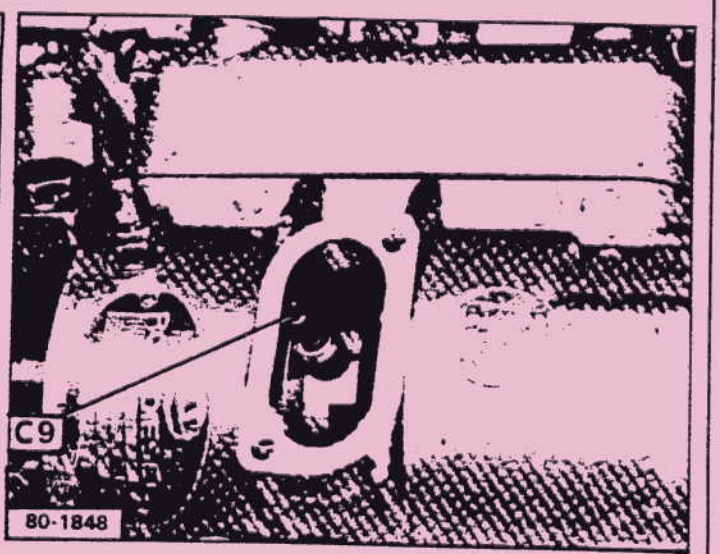
II



V



III



VI

REMOVING AND REFITTING THE INJECTION PUMP (ROTO-DIESEL)

REMOVING

Disconnect :
- the battery negative cable,
- the injection pump electric shut-off supply wire.

Raise the front right hand side of the vehicle and support it with an axle stand.

Remove the rocker cover.

Remove lock nut (2) and screw back the adjusting screw on the No. 1 cylinder inlet rocker arm.
- Using valve spring compressor [B] 8.0105 Y compress the spring, move the rocker arm to one side and swing it into the vertical position.
- Take out the push rod.
- Bring the valves on No. 4 cylinder into the "rocking" position (to place the piston of No. 1 cylinder near TDC on the "compression" stroke).
- Using valve spring compressor [B] 8.0105 Y, compress the inlet valve spring (1) :

Fig. :
Remove :
- the collets and spring cup,
- the valve spring.

Finding the engine initial timing point : Fig. II

To prevent the inlet valve falling into the cylinder , only turn the crankshaft through one quarter of a turn in either direction, or place a paper clip on the inlet valve stem to prevent it falling into the cylinder.

Finding TDC on No. 1 cylinder.
Fit support [E] 8.0117 AH equipped with dial indicator adjustable section [D] 8.0504 A2 fitted with dial indicator [A] 8.1504.

Turn the crankshaft through a quarter turn in the opposite direction to its normal direction of rotation and then bring it back in the normal direction of rotation until exactly the point at which the large pointer on the dial indicator starts to move back in the opposite direction. This is the TDC position.
Set the "0" on the moving dial on the dial indicator in line with the large pointer and bring the small pointer in line with the 8 on the dial.
Turn the crankshaft through a quarter of a turn in the opposite direction to its normal direction of rotation and then back in its normal direction of rotation to bring the piston to : 5.12 mm before TDC, that is to say : 8 mm – 5.12 mm = a reading of 2.88 mm on the dial indicator.

Disconnect the following from the injection pump : Fig. III :
- the fuel supply and leak-off hoses (5),
- the throttle control (3),
- the fast idling control (4).

Remove :
- the injection pipes assembly,
- the dipstick.

Remove the injection pump : as shown in Fig. III, IV and V.

Remove :
- the cover plate (6).
- the pump drive gear (7).

Remove the connecting lug securing bolt (10).

Loosen nut (9) (hold the bolt head with a 6 mm allen key).

Remove the pump securing nuts (➡) (use a 13 mm open ended spanner).

Take off the injection pump.
If necessary, remove the injector pipes assembly.
Prepare the pump.

Find the pump internal timing point : as shown in Fig. VI.
Remove inspection plate (8).
Turn the rotor in the normal direction of rotation of the pump (as shown by an arrow on the manufacturer's number plate).

Bring the "V" shaped timing groove opposite the inspection plate (injection point for No. 1 cylinder).
Fit extension C9 to the pump and bring the "V" section timing groove up to the extension.

Fit the injector pipes assembly to the pump, without tightening the unions.

F4 022	1	REMOVING AND REFITTING THE INJECTION PUMP (on the vehicle)

SPECIAL TOOLS

A : Dial indicator
Tool no. : 8.1504

B : Valve spring compressor :
Tool no. : 8.0105 Y

C : BOSCH or ROTO-DIESEL pump timing kit :
Tool no. : 8.0117 ZR
Use the following tools from this kit.

C2 : Dial indicator
Tool no. : 8.0117 F

C6 : Dial indicator securing nut and bolt C2
Tool no. : 8.0117 L

C9 : Dial indicator extension C2
Tool no. : 8.0117 H

D : Dial indicator adjustable support :
Tool no. : 8.0504 A2

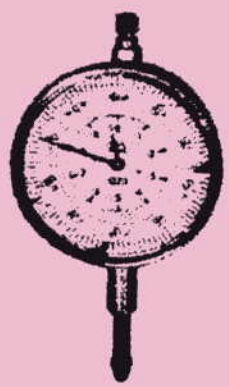
E : Support for mounting the dial indicator on the cylinder head :
Tool no. : 8.0117 AH

F : Dial indicator angle extension for ROTO-DIESEL pump :
Tool no. : 8.0117 AG

G : Dial indicator support for ROTO-DIESEL injection pump :
Tool no. : 8.0117 AF

TIGHTENING TORQUES

Recommended tightening torque :	m.daN	Nm	lbf ft
Injection pump gear securing bolts	2,3	23	17
Bolts securing injection pump to timing cover	3	30	22
Injector pipe unions	2,9	29	21



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A



80-1853

B



15222

C



80-1854

D



80-1855

E



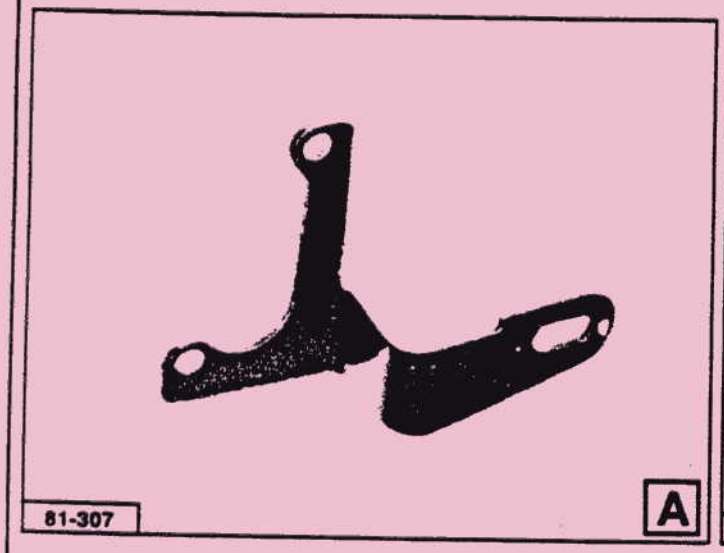
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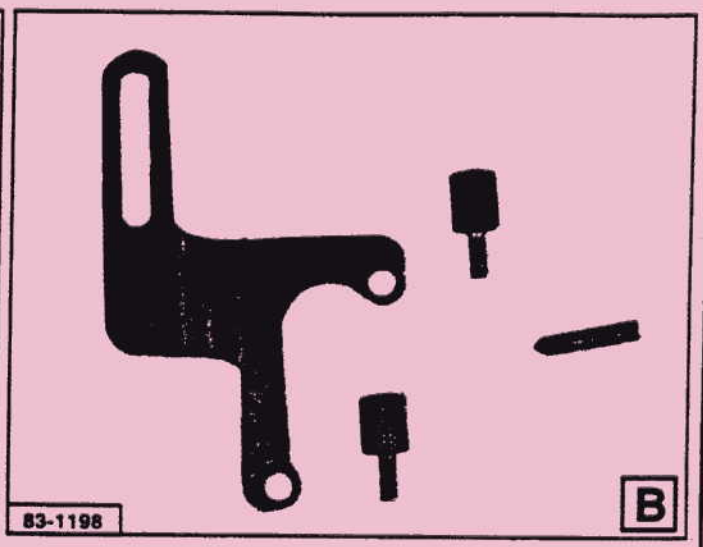
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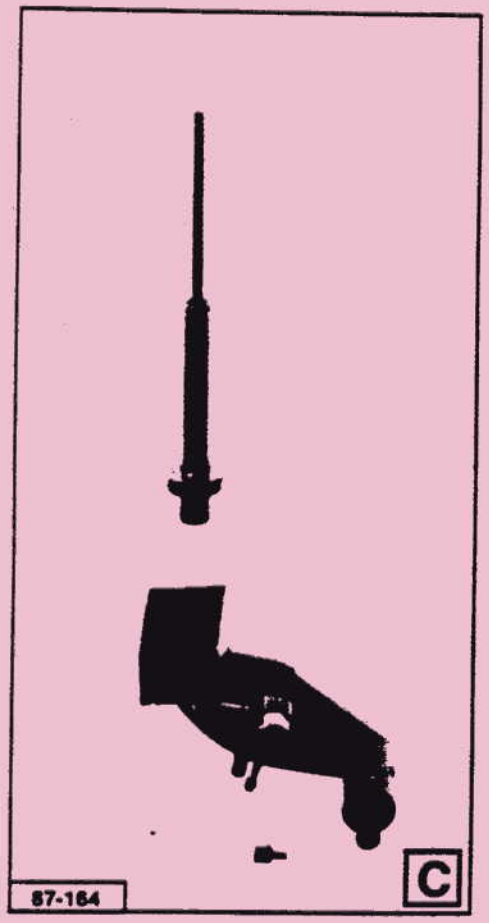


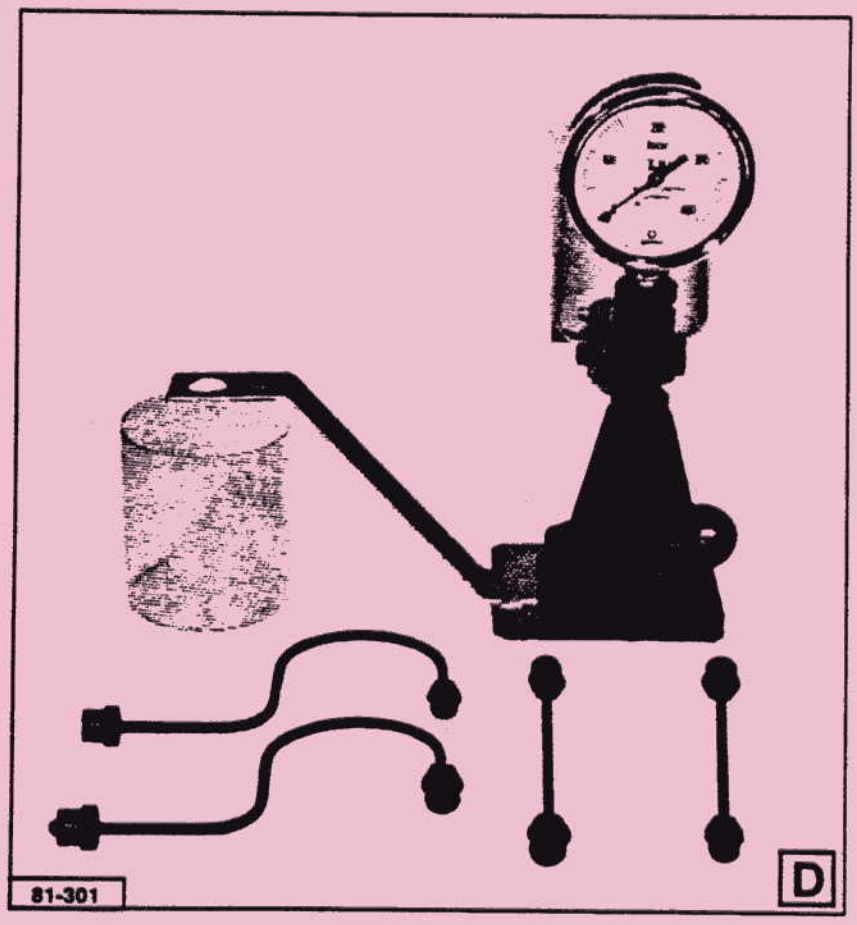
81-307

G


81-307
A


83-1198
B


87-164
C


81-301
D

SPECIAL TOOLS

[A] Dial indicator support for « ROTO DIESEL » DPA pumps
Reference : (-).0117 AF

[B] Dial indicator support for « ROTO DIESEL » DPA pumps
Reference : (-).0117 AL

[C] Tool for adjusting the ROTO DIESEL pump timing (1988 model year)
Reference : (-).0117 AM

[D] Pump and connecting pipework for adjusting injectors
Reference : Part no. 9786.10

REMOVING

Support the right hand side of the vehicle on stands.

Disconnect the battery negative cable.

Engage the highest gear to turn the engine by turning the wheel.

Place No. 1 cylinder at its initial timing point.

PUMP		BEFORE TDC	ENGINE	
DPA	MA 300	4.32 mm ± 0.05	U25/661	SLOT
DPA	MA 260	4.71 mm ± 0.05	U25/651	STUD
DPA	MAS 100	3.24 mm ± 0.05	U25/673	STUD

1° Method Fig. I
(When there is a timing mark on the flywheel)
Look down through the oil filler hole.

- Place the valves of No. 1 cylinder « in balance » and turn the engine through one turn (in the normal direction of rotation).
- The timing marks → and ← should be in line.

2° Method
(When there is no timing mark on the flywheel)
See section F2.051 to F2.057

Disconnect Fig. II

- The accelerator cable (1)
- The fast idling cable (2)
- The fuel input pipe
- The fuel return pipe

Turbocharged engines

Disconnect, from the turbocharging correction unit Fig. III

- The fuel return pipe (4).
- The air pipe (3).

Remove

- The spring
- The injection pipe assembly
- The upper belt protector.

Loosen Fig. IV

- The nut (5) on the injection pump drive sprocket.
- The nut (6) on the belt tensioner and compress ← the tensioner spring.

Remove

- The nut from the sprocket.
- The injection pump drive belt.

ESSENTIAL : TO AVOID INTERNAL DAMAGE TO THE PUMP WHEN REMOVING THE INJECTION PUMP DRIVE SPROCKET, ENSURE THAT THE EXTRACTOR IS USED FOR THIS OPERATION (ITEMS H AND ITS NUT J).

Fit, Fig. V, the nut (J) and the flange (H).

Unscrew the nut (J) until the sprocket is freed from the pump shaft.

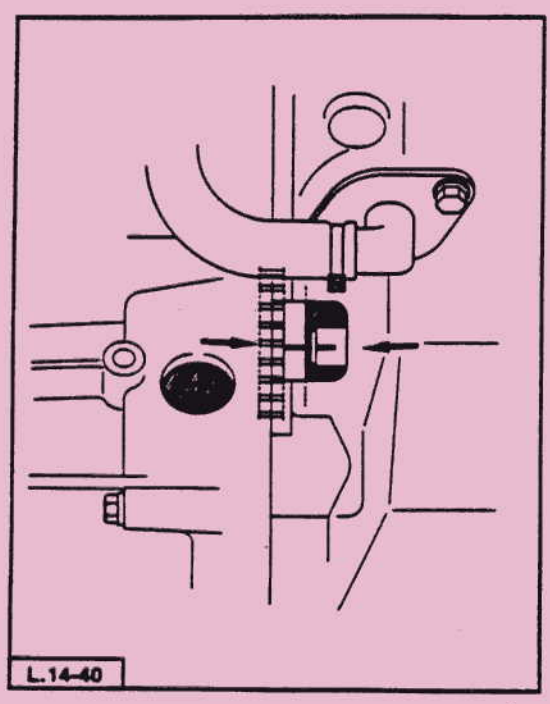
Disconnect the electric shut-off unit.

Remove, Fig. VI

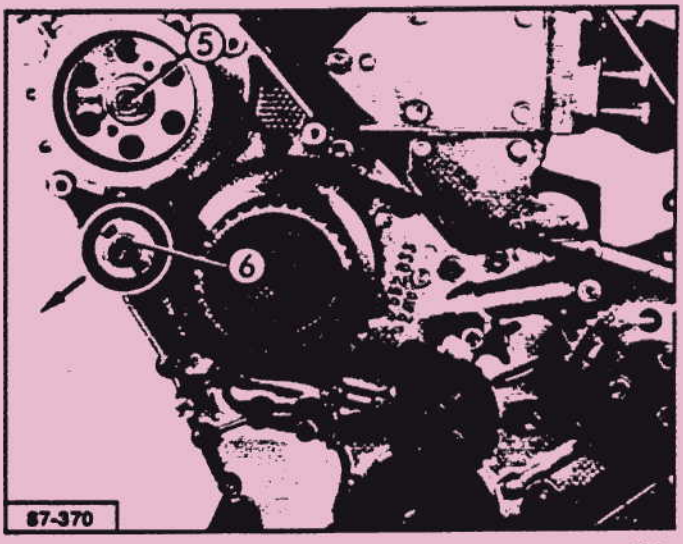
- The pump fastenings (7).

(Using a 13 mm open ended spanner and a 6 mm allen key).

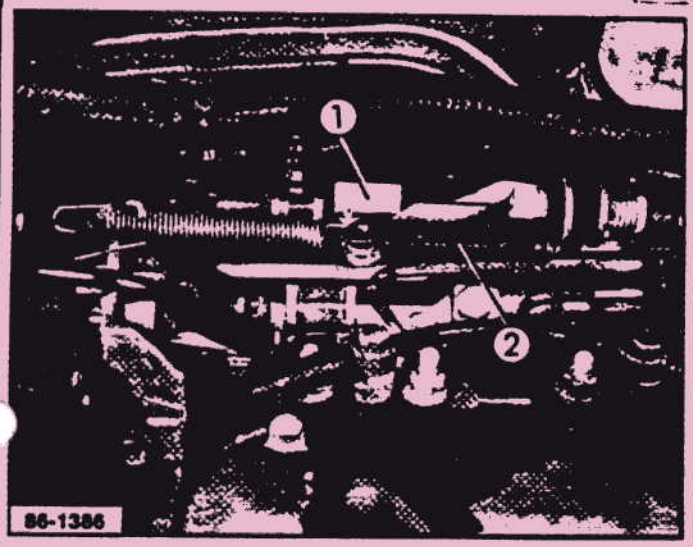
Remove the pump.



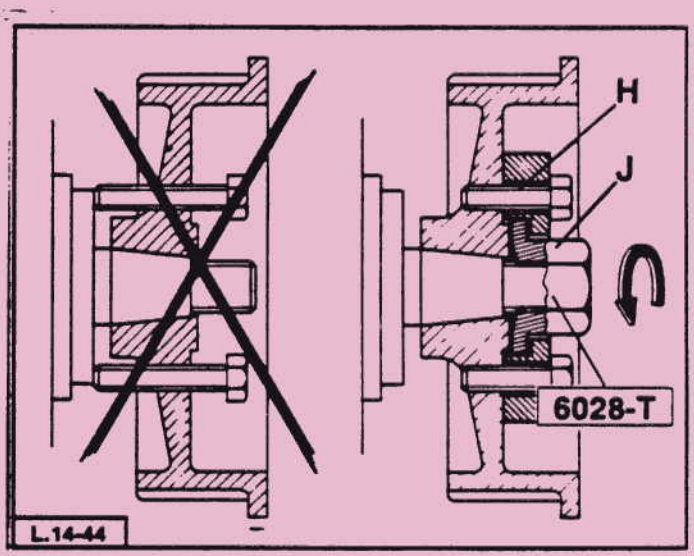
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IV



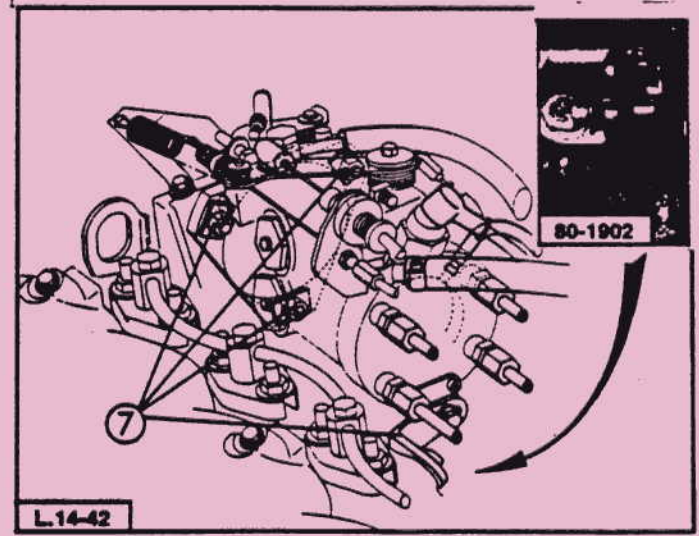
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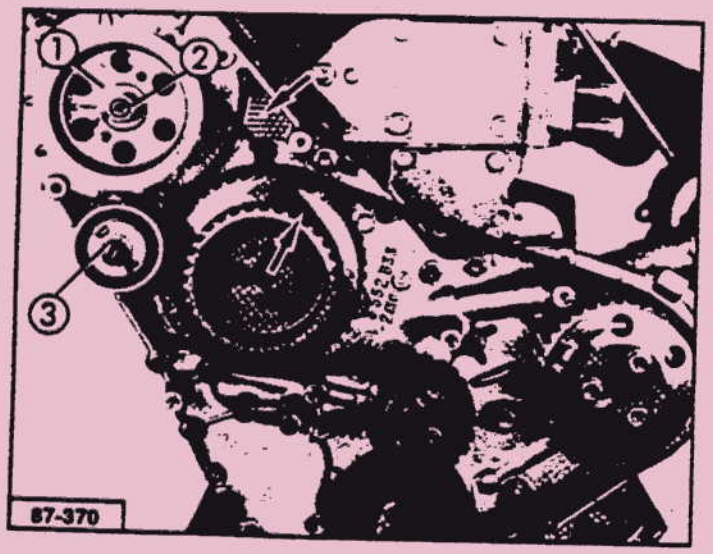
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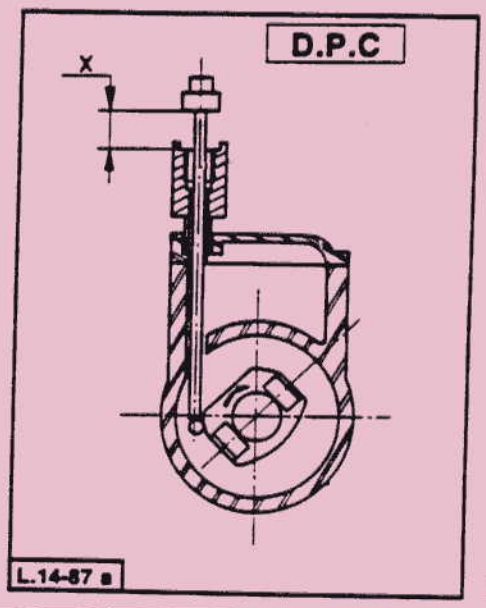
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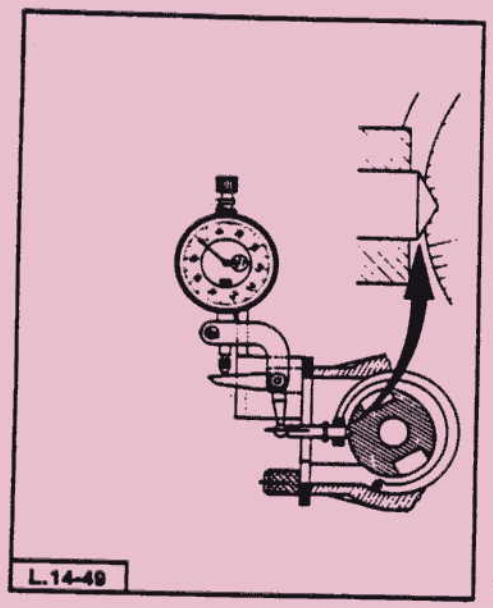
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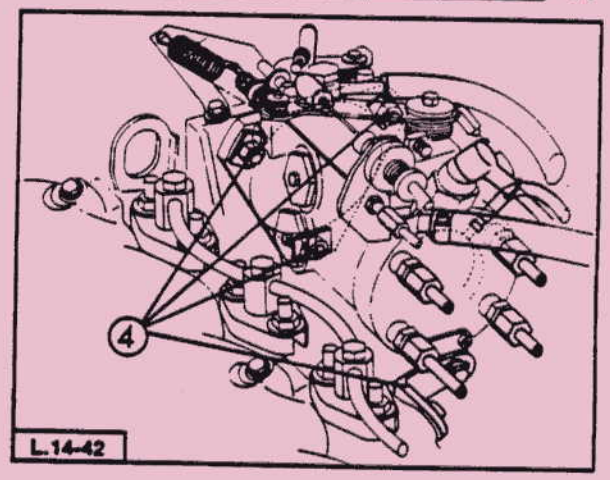
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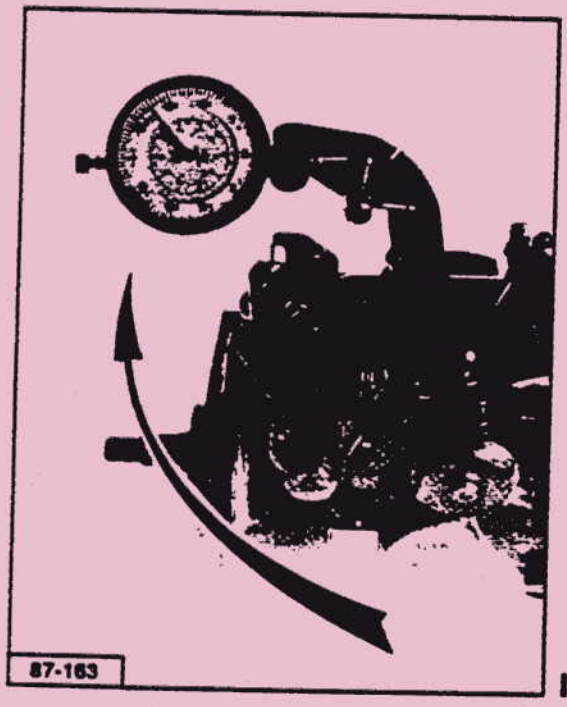
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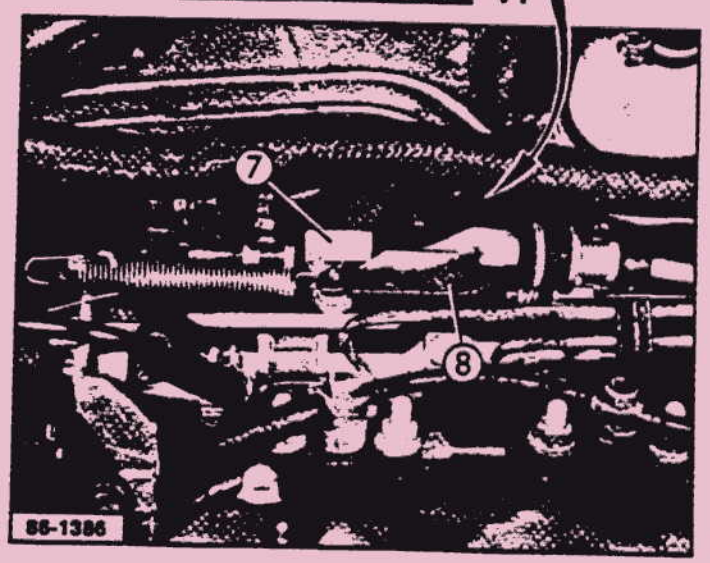
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VI



III



VII

FITTING

Prepare
- The pump (see Section F2.021 to 027).

Fit
- The pump, positioning it in the centre of its adjusting slots.
- Its fastenings, without tightening them.

Place No. 1 cylinder at TDC on the compression stroke (timing mark → on the camshaft sprocket Fig. I)

Fit, Fig. I
- The sprocket (1), tightening the nut (2) finger tight.
- The pump drive belt, with the span → on the opposite side to the roller under tension (Take care not to turn the pump).

Loosen, Fig. I
- The nut (3) on the tensioner, and allow the tensioner spring to act on the belt.

Tighten, Fig. I
- Nut (3)
  To a torque of 20 N.m (14.7 lbf.ft)
- Nut (2)
  To a torque of 50 N.m (36.9 lbf.ft)

Set the injection pump timing Fig. II, III and IV

Turn the injection pump body outwards, away from the engine, to the pump timing point :
- DPA with the dial indicator pointer in line with the « 0 » Fig. II.
- DPC with the dial indicator pointer at dial indicator reading « x ± 0.04 mm »
  (dimension x is engraved on the plastic cap Fig. III).

Tighten Fig. V
- The fastenings (4) : the dial indicator pointer must not move during the tightening operation.
  Tightening torque 24 N.m (17.7 lbf.ft)

Check the pump timing
(See corresponding section)

Remove the special tools

Fit :

D.P.A. - The inspection plate

D.P.C. - The plug, together with its seal.
Tightening torque 10 N.m (7.4 lbf.ft)

Fit :
- The drive belt protector.
- The accelerator return spring.
- The injector pipes.
  Tightening torque 25 N.m (18.4 lbf.ft)

On turbocharged engines Fig. VI

Connect, to the turbocharger corrector unit
- The air pipe (5).
- The fuel return pipe (6).

Connect Fig. VII
- The accelerator cable (7).
- The fast idling cable (8).
- The fuel supply pipe.
- The fuel return pipe.

Connect up
- The electric shut-off unit.
- The battery negative cable.

Prime the fuel system using the manual pump on the filter.

Adjust the controls and the idling speed (See section F2.021 to 2.087).

DATA

Cooling system :
Of the « auto-degaz » type, with an expansion bottle.
- Filled ..... through the expansion bottle cap
- Level check (when the system is cold and degassed) ..... by means of the level mark in the expansion bottle
- Coolant (water + anti-freeze solution) ..... 10.6 litres
- Frost protection (as shown by the label) ..... - 15°C with 28 % anti-freeze
- 30°C with 50 % anti-freeze

	U25/651 - U25/661	U25/673
- Radiator - Copper matrix		Heavy duty radiator
- Pitch of radiator fins	1.7 mm	1.5 mm
- Radiator dimensions	414 x 663 mm	
- Radiator surface area	27.5 dm²	

Termostat

- Type	CALORSTAT
- Reference	V26 - Ref. V 6755
- Starts to open at	86 $^{+1}_{-3}$°C
- Fully open at	98°C
- Valve lift	7.5 mm mini

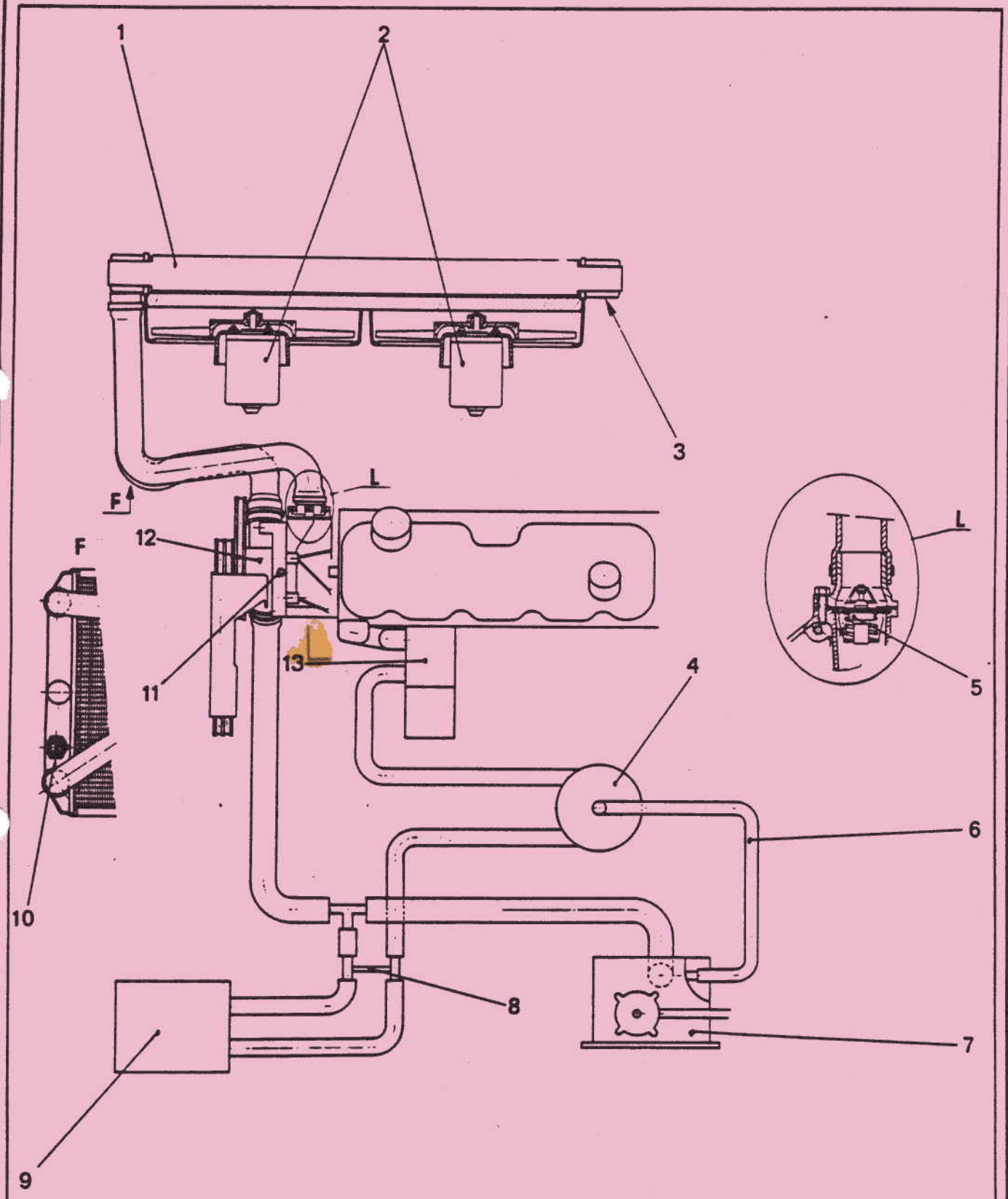
Coolant temperature switch (on cylinder head output casing) :
- Warning light on instrument panel switches on at a critical temperature of ..... 106° ± 2°C
- Tightening torque ..... 28 N.m (20.6 lbf.ft)

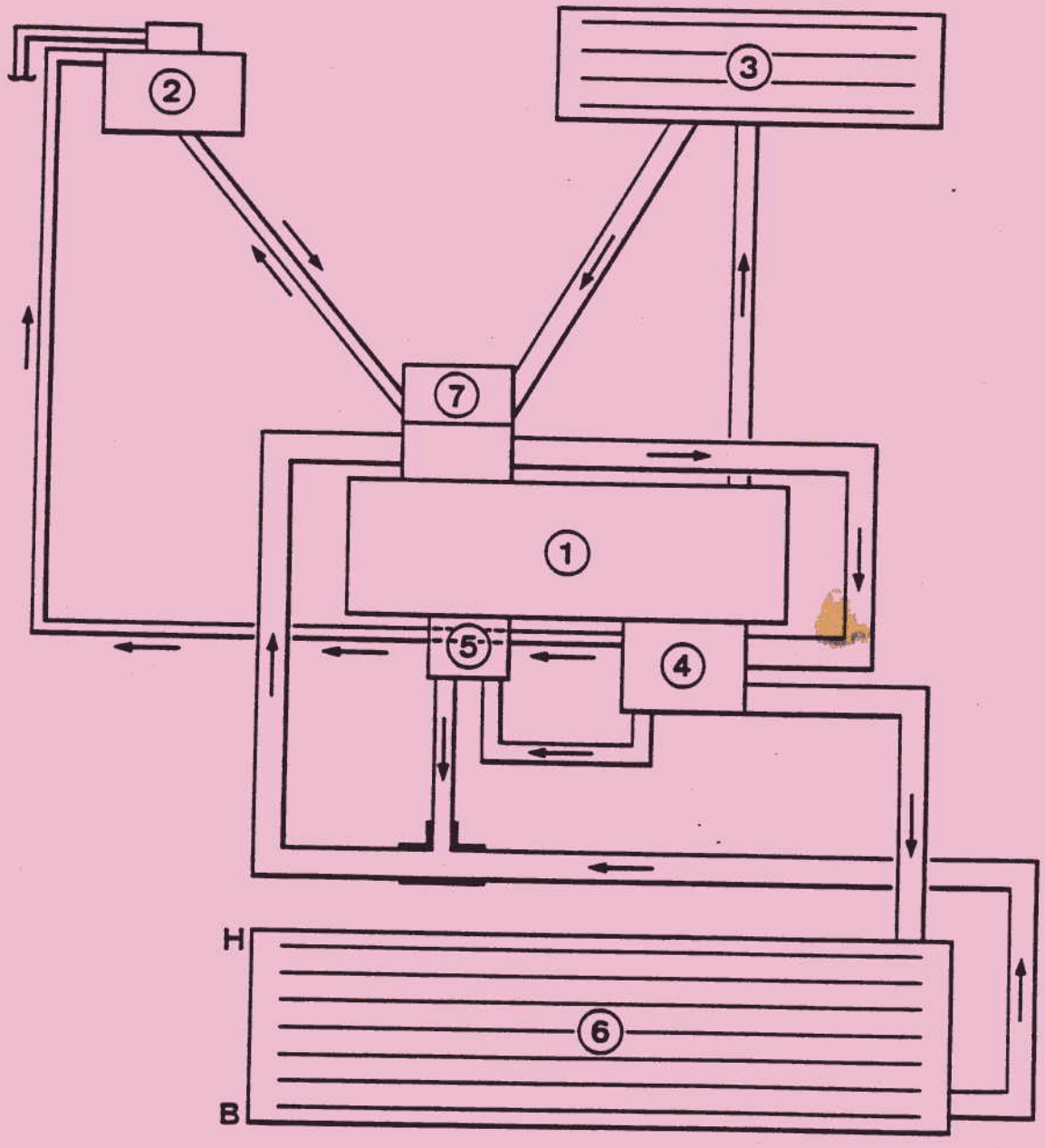
Cooling fans :
- 2 electric fans - 6 bladed (operated by a phased temperature switch)
- Power of electric fan ..... 150 W
- Speed ..... 2700 rpm
- Diameter across blades ..... 305 mm
- Direction of rotation (as seen from electric motor end) ..... C.W. (clockwise)

Phased temperature switch on radiator :	1st fan	2nd fan
Fan cuts in, temperature rising, at	88° ± 2°C	92° ± 2°C
Fan cuts out, temperature falling, at	83° ± 2°C	87° ± 2°C

Phased temperature switch tightening torque (apply LOCTITE FRENETANCH) ... 19 N.m (14 lbf.ft)

Drawing key :
1. Radiator
2. Electric fan units
4. Degassing tank
5. Thermostat
6. Degassing pipe
7. Expansion bottle
8. Four way union
9. Heater unit
10. Phased temperature switch that controls the electric fans
11. Bleed screw
12. Coolant pump
13. Oil cooler (water/oil heat exchanger)


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Cooling system

Coolant flow:

Of the 'auto-degaz' type with expansion tank
- Filling ..... by cap on expansion tank
- Level (cold with circuit degased) ..... to the level of the mark on the expansion tank

Coolant liquid (water + antifreeze) ..... 9 litres
Circuit protection indicated by label ..... 50 % antifreeze

Radiator in proprietary aluminium
Distance between fins on radiator
Dimensions of radiator
Surface of radiator

Type ..... Horizontal, inlet and outlet on same side
PO (reinforced)

Opening pressure of radiator cap ..... 0,9 bar

Thermostat

Make	VERNET	DAUPHINOISE THOMSON
- Reference or identification	V28 Ref. V6697	fawn
- Start of opening		
- Max. opening at	95°C	
- Travel	7,6 mm min.	

Coolant temperature switch (on cylinder head)
- Warning light lights up (on instrument panel): Temperature ..... 105° ± 3°C
- Tightening torque (dia. 18 x 150) ..... 2,8 m.daN

Temperature sensor on coolant outlet pipe on cylinder head ..... TORRIX (marked red)

Stepped temperature switch on radiator:

	1 fan
Fan engages: increasing temperature	92° ± 2°C
Fan cuts out: decreasing temperature	87° ± 2°C

Tightening torque for stepped temperature switch (assemble with LOCTITE THREADLOCK) ..... 1,9 m.daN

Ventilation:
- 1 fan - 6 blades (driven by stepped temperature switch):
- Power of one fan ..... 150 W
- Speed of rotation ..... 2200 rpm
- Diameter of blades ..... 305 mm
- Direction of rotation (seen from the electric motor side of the fan) ..... clockwise

WARNING: aluminium radiator
- there must always be a homologated coolant in the system (refer to documents currently in force)
- Must be renewed every 2 years
- Storage: after 48 hours, rinse with clear water only, then blow out with compressed air

Key to drawing:
1 - ENGINE BLOCK-CYLINDER HEAD
2 - EXPANSION BOTTLE
3 - HEATER MATRIX
4 - COOLANT PIPE-CALORSTAT
5 - OIL COOLER ADAPTOR
6 - RADIATOR
7 - DIESEL OIL HEATER

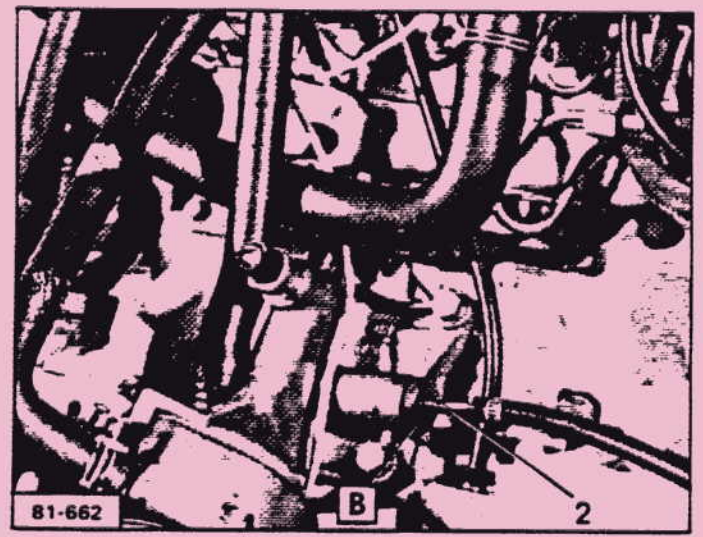
SPECIAL TOOLS

A Pressure gauge
Reference : A (-).1503 A

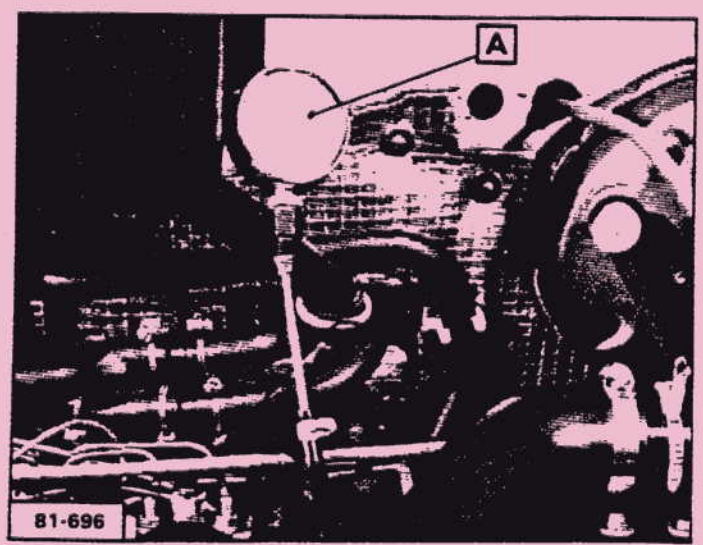
B Oil pressure test union
Reference : B (-).1503 C



I



II



III

Top up the oil level if necessary.

Remove the plug (1), Fig. I, or the oil temperature switch that occupies the same tapping.

Prepare the oil pressure test equipment.

Connect the pressure gauge (A) (-).1503 A to the union (B) (-).1503 C.

Screw the union (B) (-).1503 C into the tapping formerly occupied by the plug (1) or the temperature switch (with a copper washer under its head).

Tighten the union (2).

Run the engine.

When the oil pressure is between 95°C and 105°C, the pressure should be :

	ENGINE TYPE		
	U25/651	U25/661	U25/673
at 1,000 rpm	1 bar min	2.5 bars min	2.5 bars min
at 3,500 rpm	3.7 to 4.5 bars	4.5 to 5 bars	4.2 to 5 bars

Remove the union (B) (-).1503 C and the pressure gauge.

Refit the plug (1) or the temperature switch (copper washer).

Tighten the plug or the temperature switch to a torque of 35 nm (25.8 lbf.ft)

This operation can also be carried out using the MULLER test kit reference 451.