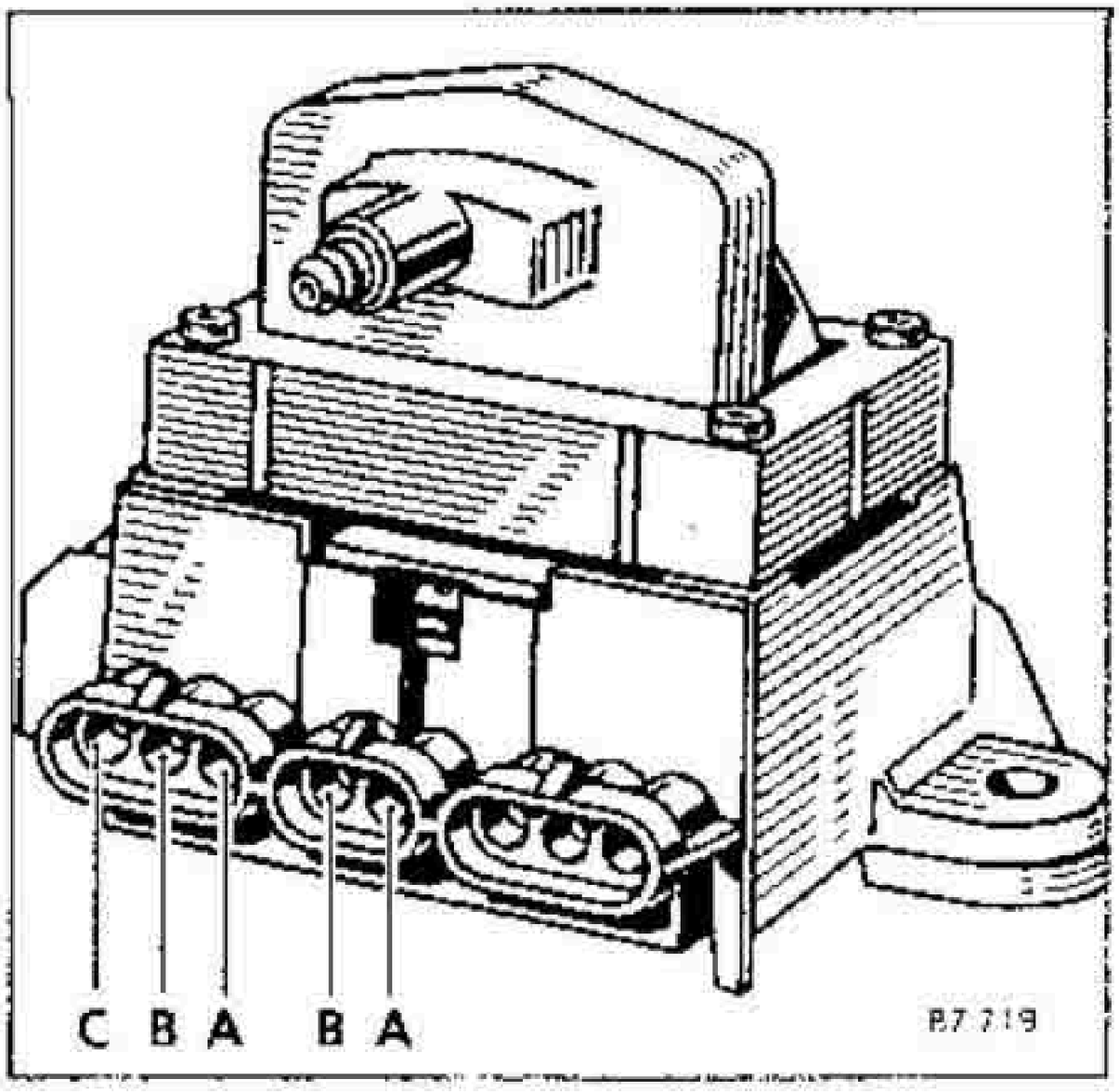
The injection computer calculates the ignition advance and transmits a signal (5 volts) to the ignition power module.



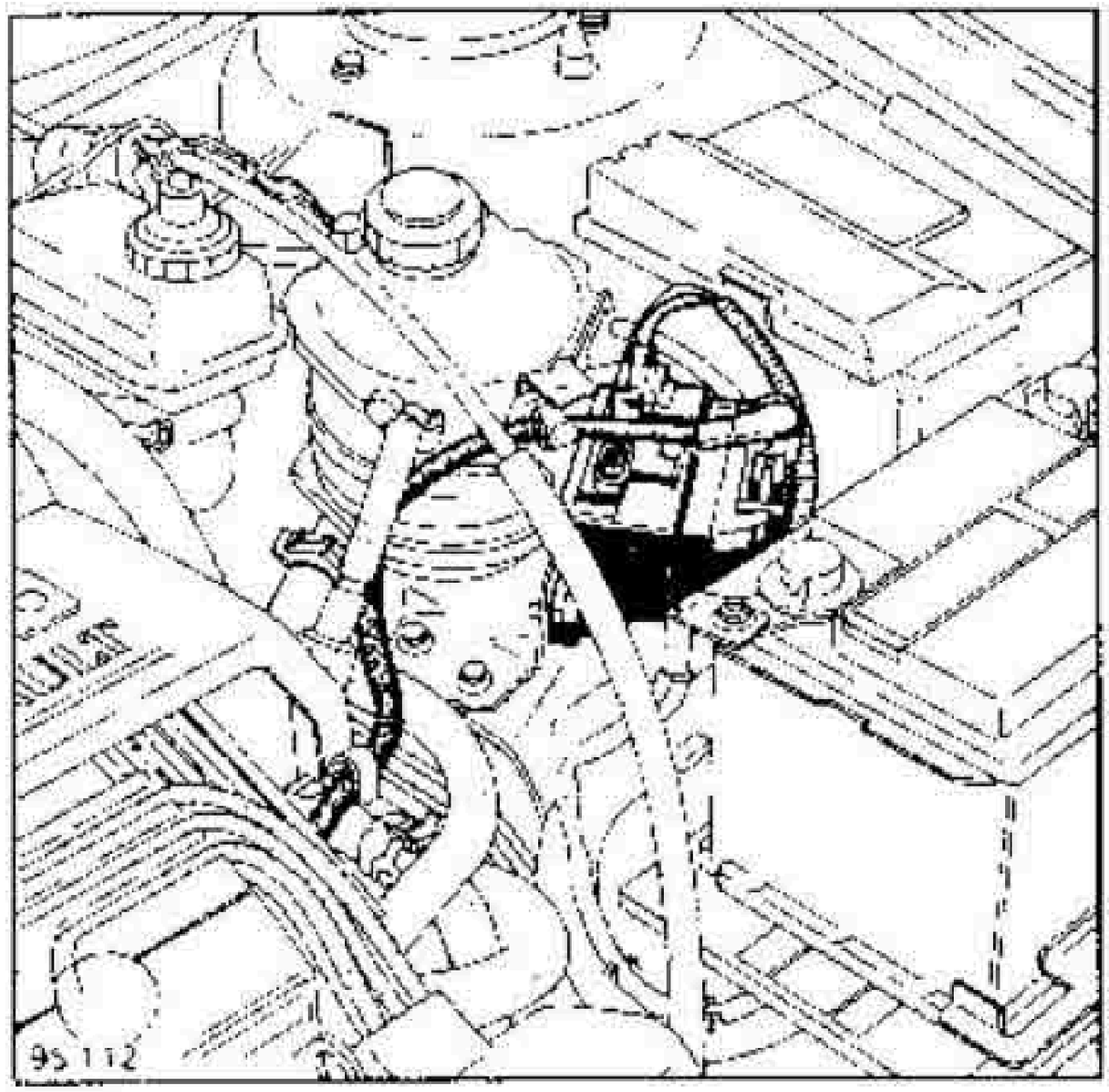
3 track connector

A + Battery
B Earth
C Not used

2 track connector

A Not used
B Control signal

LOCATION



NOTE
For certain engines, there is a plastic cover housing the following components :

- Battery
- Coolant bottle
- Engine compartment fuse box
- Ignition power module

Type	Engine	CHAMPION	EYQUEM	NGK	Gap (mm) ± 0,05
B 540	J7R 732	S 281 YC (1)	C52 L J S (1)		0,9
B 543	J7T 760		FC 62 LS3 (2)	BCP 6 ET (2)	1,2 not adjustable
B 544	Z7X 722 Z7X 723		RFC 58 LS3 (2)		1,2 not adjustable

(1) Conical seal plug : Tightening torque **1 to 2 daNm.**
(2) Plug with seal : Tightening torque from **2,5 to 3 daNm.**

ATTENTION : Ensure the correct make and type of plugs are used. They are selected for their heat range.

The multipoint injection systems on J7R, J7T and Z7X engines for this vehicle type have several special features. The most important new features are in fault finding. Especially:

- New injection warning light illumination patterns and management.
- Special notes for vehicles fitted with electronic anti-theft device.
- Influence of injection on air conditioning.
- injection and ABS system link.
- Fault finding with XR25 :
  - New cassette (N° 10) and new fiche for use with computer diagnostic output .
  - No fault finding codes - direct reading of part number.
  - New bar graph presentation.
  - New gates (#) :
    - # 21 : Auto correction for idle speed.
    - # 30 and 31 : Auto correction for richness at idle speed and when operating

ATTENTION : The use of these gates is difficult and requires good knowledge of idle speed and richness regulation adjustment.

Maximum engine speed : (limits before injection cut off)

- Z7X engine = { 6300 rpm in 1st and 2 nd / 6200 rpm in 3rd, 4th and 5th
- J7R engine - J7T 12 valve version = 6350 rpm
- J7R engine - J7T 8 valve version = 6000 rpm

Important : After the computer memory has been erased, the auto correction alterations are cancelled. (see pages 17-26 and 17-28).
It is therefore important to operate the vehicle for about 5 minutes before returning to the customer.
The auto corrections can then reset themselves and avoid any operational problems for the customer.

ILLUMINATION OF THE WARNING LIGHT ON THE INSTRUMENT PANEL

On all X54 engines, the injection warning light is used.

Depending on the seriousness of the fault, the warning light illumination may be accompanied by a voice synthesiser message (if fitted)

The following units will cause the warning light to illuminate if they are faulty :

- Absolute pressure sensor.
- Throttle potentiometer
- Oxygen sensor
- Vehicle speed sensor.
- Idle speed regulation valve.
- Primary ignition circuit.
- Injectors
- TDC sensor connections reversed.

In addition, the warning light also illuminates in connection with the electronic anti-theft system. When the signals from the decoder to the injection computer are interrupted during operation , between idle speed and 1800 rpm the injection warning light begins to flash. (A voice synthesiser message is given.)

PINKING SENSOR

The Z7X engine is fitted with two pinking sensors one on each cylinder bank.
These can be read with gate 13 on the XR25, and the total engine noise sensed by each sensor is given.
If a sensor is faulty the signal to the computer is greatly reduced.
A fault in the sensor circuit is then detected ; the right hand bar graph no. 10 is illuminated by the computer

The faulty sensor must still be identified.
- With XR25 connected, enter D03 # 13.
- Engine warm, accelerate the engine to 3000 rpm, no load.

The value given by gate 13 should not be zero, and is variable.

Disconnect one of the two sensors :
a) The value read does not change.

→ The sensor which is disconnected is faulty. Replace it.

b) The value drops to zero.

→ As the disconnected sensor is correct, the other sensor is faulty. Replace the other sensor.

INJECTION COMPUTER INFLUENCE ON THE AIR CONDITIONING

Under certain operating conditions, the injection computer may prohibit the compressor clutch engaging via the air conditioning computer.

- Compressor clutch engagement, when the engine is idling, is anticipated for by increasing the idle speed. The engine speed increases to 900 rpm.
- Under certain operating conditions, the injection computer does not permit or delays the air conditioning compressor activation.

Thermal protection strategy

If the coolant temperature is too high, the compressor may not be engaged

8 valve engine : coolant temperature > 113°c

12 valve engine : coolant temperature > 120°c

V6 engine: coolant temperature > 120°c

Performance protection strategy

Under full load, if the engine speed is below a certain threshold, the compressor activation is cut out.

8 valve engine : 4000 rpm 30s cut out.

12 valve engine : 4500 rpm 20s cut out.

V6 engine : 3000 rpm 20s cut out.

Starting system: (when the starter is activated and after moving off)

Compressor clutch engagement :

8 valve engine delayed 5 s

12 valve engine delayed 5 s

V6 engine delayed 10 s.

System for protection against over-revving :

Compressor clutch cut out to avoid damage due to centrifugal force.

8 valve engine : 5350 rpm

12 valve engine : 6000 rpm

V6 engine : 6000 rpm

ABS COMPUTER - ABS COMPUTER LINK (4x4)

A signal is sent from the ABS computer to the injection computer to reduce engine braking during a braking phase.
Under very poor adherence conditions and high resistance to engine torque (transmission is braking the engine), the wheels may lock despite the ABS reducing the pressure on the brakes to zero.

Signal transmission conditions (ABS)

- Vehicle speed > 15 mph (24 km/h).
- Deceleration < 3 m/s^2.
- Stop signal active
- Gear engaged.
- Clutch pedal released.

Signal acceptance conditions (injection)

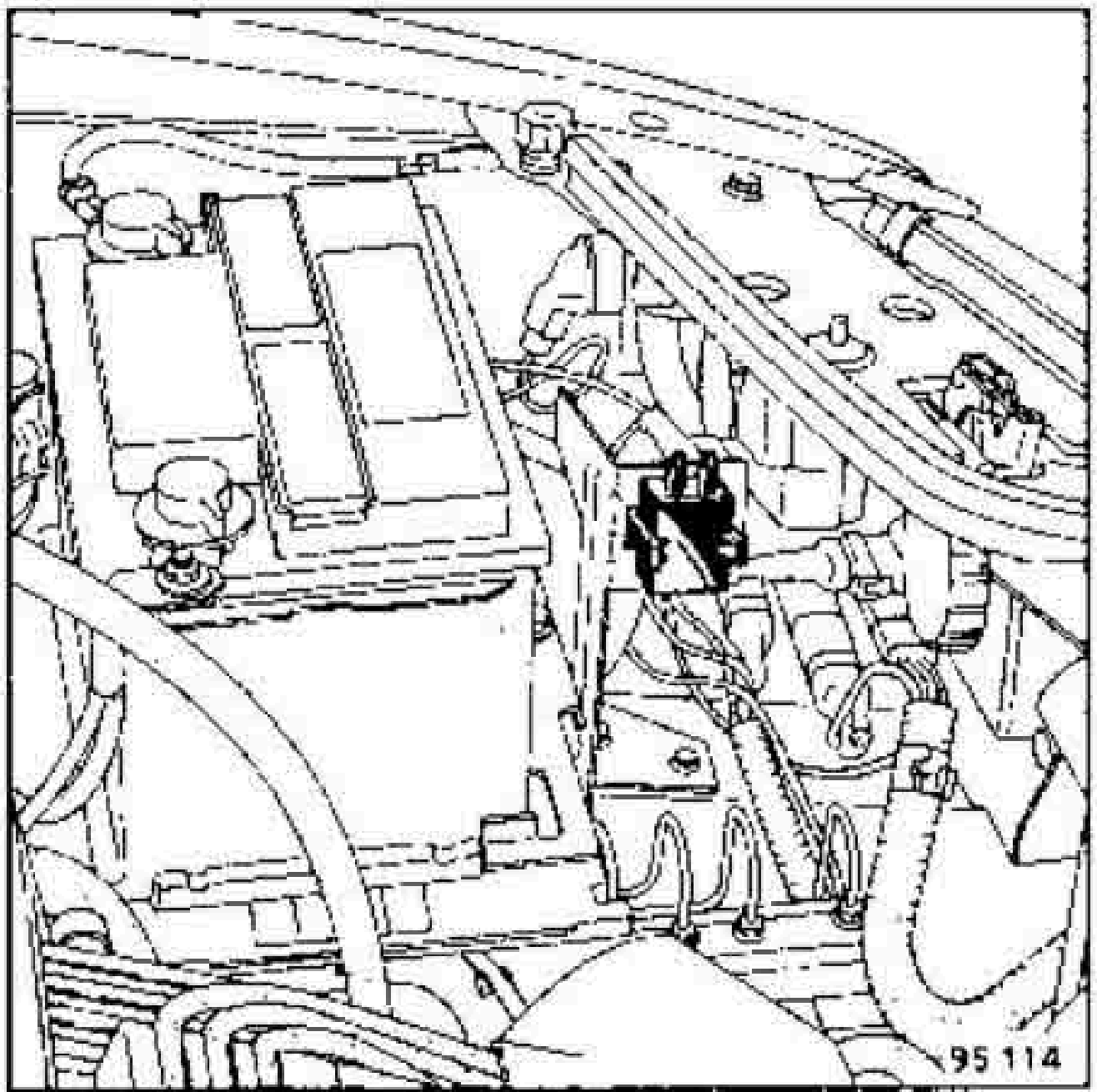
- Accelerator not depressed.
- Vehicle speed > 20 km/h.
- Engine speed > 1000 rpm.

When the signal has been transmitted and accepted, the injection computer controls the idle speed regulation valve in the opening direction. (The RCO for valve control changes to a value which corresponds to the deceleration speed).

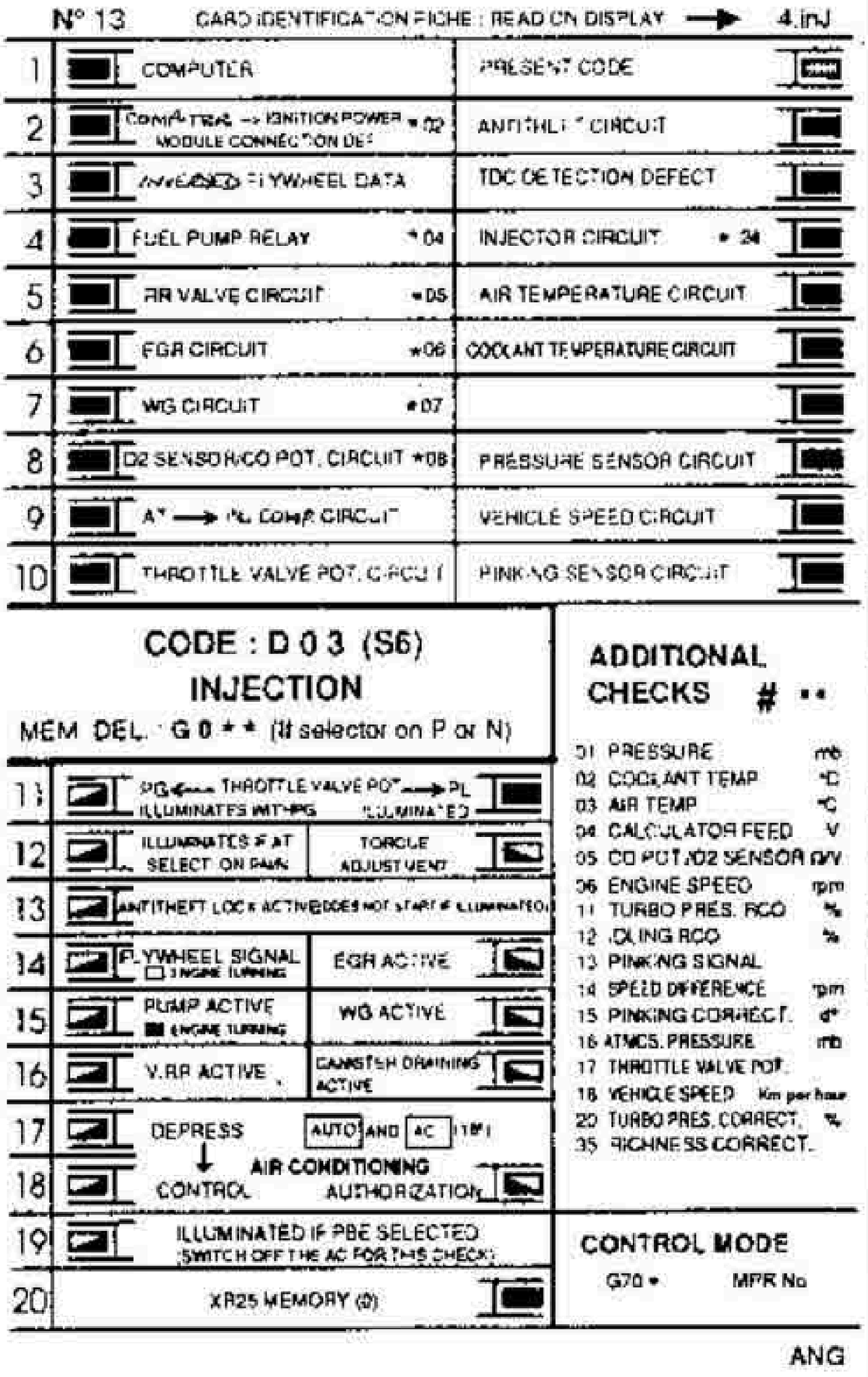
Checking the injection equipment is only possible using XR25, and cassette N° 10.
When the XR25 is connected to the vehicle diagnostic socket, the computer and peripherals may be rapidly assessed for faults.

XR25

Diagnostic socket
This is located in the engine compartment.
It is located in the same position for all petrol versions.



THE NEW DIAGNOSTIC FICHE FOR XR25



The injection should be examined using the new cassette N° 10 and the corresponding diagnostic fiche.

In contrast to previous injection systems, the computer identification is no longer carried out by using a diagnostic code, but by directly reading the part number of the computer. This is carried out, after entering D03, by entering the code G 70*.

The part number of the computer is then displayed in three sections.

Example : B544 vehicle, Z7X 722 engine. (4x2)

D03 → 4. INJ

then G70* → 77 00

860

292

Each display is given for about 2 seconds ; the sequence is repeated twice.

Erasing the memory

Following work on the injection system, the computer memory may be erased by using the code GO**.(For erasing the faults memorised during the diagnostic mode D03, selector switch in position S6, enter GO**).

This operation does not erase the memory relating to any other assembly on the vehicle.

ACCESS TO COMPUTER INFORMATION USING

TESTS CARRIED OUT (depending on nº on XR25)	Key #	Unit
Vacuum sensor	01	Millibar
Coolant temperature	02	Degrees
Air temperature	03	Degrees
Feed voltage	04	Volts
O_2 sensor	05	Millivolts
Engine speed	06	rpm
RCO turbo pressure	11	%
RCO idle regulation valve	12	Millisec - %
Pinking sensor info	13	No unit
Engine speed variation	14	rpm.
Pinking correction	15	Degrees
Atmospheric pressure correction	16	Millibar
Full/no load potentiometer value	17	No unit
Vehicle speed	18	Km/h
Turbo pressure correction	20	Millisec
RCO idle speed correction	21	% or Millisec.
Auto correction during operation	30	No unit
Auto correction at idle speed	31	No unit
Richness correction	35	No unit

Cassette n° 10 allows the three new gates to be used (#) :

- # 21 - Auto correction of RCO idle speed.
- # 30 - Auto correction of richness under high loads.
- # 31 - Auto correction of richness under low loads.

Auto correction principle :

These corrections are designed to realign injection patterns, after the individual components of the pattern have been offset, to ensure that the control principle retains a constant character.

PRESENTATION OF DIFFERENT BAR GRAPHS

Line 1

Computer Computer internal self-test. if illuminated, computer incorrect.	**Code present** This bar graph indicates the condition of the diagnostic signals. It illuminates when the ignition is turned on and remains illuminated while the engine is running.

Line 2

Computer → MPA link fault Confirms a fault in the link between the MPA and the computer for ignition pulse transmission.	**Anti-theft circuit** Confirms a fault on the line between the decoder and the computer for transmission of the electronic anti theft code.

Line 3

Flywheel sensor connections reversed Indicates the flywheel sensor is incorrectly connected.	**TDC detection fault** Fault on the flywheel sensor or the sensor circuit or a target problem (Cycle irregularity)

Line 4

Fuel pump relay Not currently used.	**Injector circuit** Signals a fault on the injector circuit either because of a short circuit or an open circuit.

Line 5

Idle regulation valve circuit Signals a fault in the idle speed regulation valve circuit. (Valve or wiring fault).	**Air temperature circuit** Indicates an air temperature sensor fault or a fault in the line between the sensor and the computer (short circuit or open circuit). Check with # 03

Line 6

EGR circuit

Not currently used

Coolant temperature circuit

Indicates a fault in the coolant temperature circuit (Short circuit or open circuit. Sensor or wiring fault.) Check with #02.

Line 7

WG circuit

Not currently used

Not currently used

Line 8

Oxygen sensor circuit

Signals an oxygen sensor circuit fault (Short circuit or open circuit. Sensor or wiring fault.) Accompanied by #05 fixed and #35 = 128

Pressure sensor circuit

Signals a fault on the absolute pressure sensor circuit. (Short circuit or open circuit. Sensor or wiring fault.) Check with #01.

Line 9

Circuit for AT ⟶ INJ computers

Signals a fault on the line between the automatic transmission and injection computers.

Vehicle speed circuit

Indicates a fault on the vehicle speed sensor circuit (Short circuit or open circuit. Sensor or wiring fault.) May be accompanied by a lack of vehicle speed information on the instrument panel. Check with #18 on a road test.

Line 10

Throttle potentiometer circuit

indicates a fault on the throttle potentiometer circuit. (Potentiometer or wiring fault, short or open circuit). Check with #17.

Pinking sensor circuit

Indicates a fault in the pinking sensor circuit (Short circuit or open circuit. Sensor or wiring fault.) Under acceleration check #13 and 15.

PRESENTATION OF DIFFERENT BAR GRAPHS

Line 11

PG ← **Throttle pot.** → **PL**

Bar graph indicates recognition

Full load | **No load**

Line 12

Illuminated when AT selector lever on P/N

Bar graph illuminated when the automatic transmission lever is in Park or Neutral. Extinguishes when Drive is selected.

Torque reduction

(Automatic transmission) When the bar graph is illuminated it confirms a demand for torque reduction (advance delay) during gear changing.

Line 13

Anti-theft device active

Bar graph indicates anti-theft device is activated, the vehicle may not be started.

Line 14

Flywheel signal

This bar graph is illuminated when the ignition is turned on and extinguishes when the starter is activated. It is extinguished when the engine is running, if it does not extinguish when the starter is activated, see right hand bar graph number 3.

EGR activated

Not currently used

Line 15

Pump active

Bar graph indicates the earthing of the pump relay by the computer.
This bar graph illuminates when the ignition is on for a period of 3 seconds, then extinguishes. It should illuminate if the starter is activated and when the engine is running.(Internal computer strategy)

WG activated

Not currently used

PRESENTATION OF DIFFERENT BAR GRAPHS

Line 16

Idle speed regulation valve active

Bar graph indicates computer request for idle speed regulation.

Canister bleed active

Bar graph illuminates when the canister bleed solenoid valve is fed by the computer (Z7X engine).

Line 17

Press ...

Bar graph illuminates when the air conditioning is activated. Press Auto then Ac at temperature 18° C to confirm air conditioning request.

Not currently used

Line 18

Request

Bar graph signalling to injection computer that the air conditioning unit requires the compressor to be activated (This bar graph may only illuminate if bar graph 18 right hand side is illuminated).

Authorisation

Bar graph signalling acceptance of request for air conditioning compressor activation by injection computer, depending on engine operation conditions.

Line 19

Illuminated if electric windscreen de-icer is selected

Bar graph illuminates if electric windscreen de-icer is activated.

Line 20

XR25 memory : Enter "0"

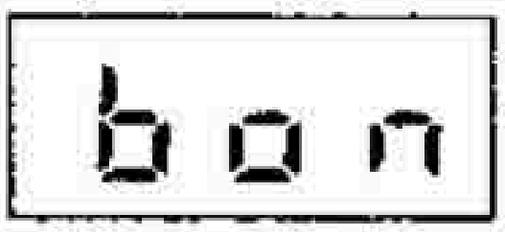
Storage of values and bar graph displays.

Special features of certain bar graphs

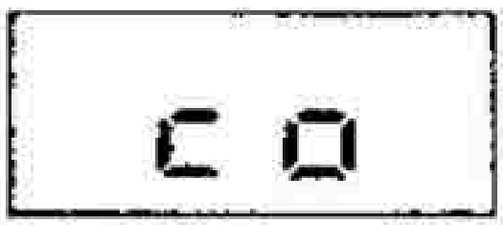
Bar graphs of lines 2, 4, 5, 6, 7, 8 left hand side and 2 on the right hand side have additional tests :

*02 *24
*04
*05
*06
*07
*08

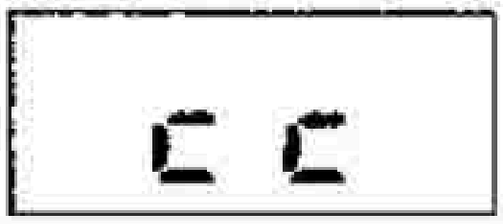
These tests allow the fault finding process to be extended , for example, if you enter : [*] [0] [2]
the test kit may display

either: 

No fault on the element or line in question.

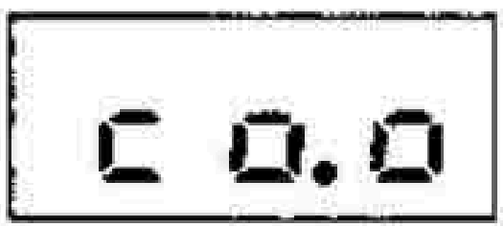
or 

: Open circuit ; line in question cut.

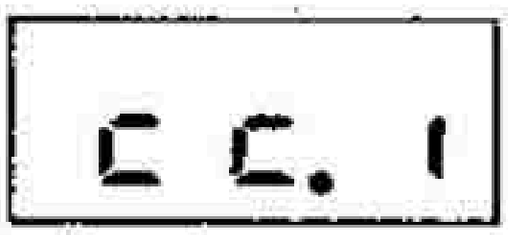
or 

: Short circuit. The fault must be found using bornier MS 1048 and insulation checked in relation to + 12 volts, earth or between two wires.

Definite faults :



: Detection of short circuit to earth or open circuit

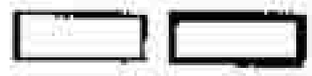
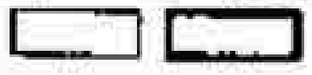
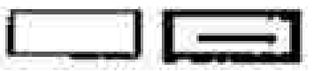
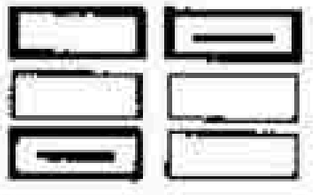
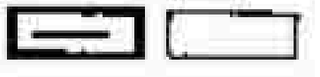


: Detection of short circuit with + battery

Test: Disconnect the battery. use an ohmmeter to check continuity and insulation in relation to earth and the + battery wiring, using bornier M. S. 1048, in place of the computer 35 track connector.

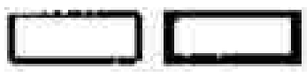
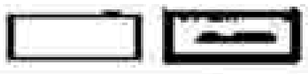
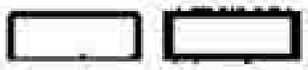
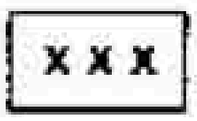
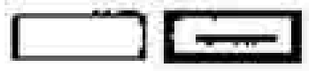
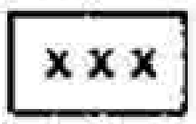
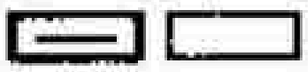
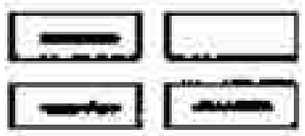
CHECKING CONFORMITY

Engine cold - ignition on

Functions to be checked	Conditions	Line no.	Bar graph display	XR 25 code	Display on central display - notes
Computer conformity	- Engine stopped Ignition on Enter D03			G70*	X X X X Part number of computer displayed in 3 sections (see chapter 12)
Injection diagnosis position	- Engine stopped Ignition on	L1 L11 L14 L15			L1 right: code present L11 right: no load recognition L14 left: TDC signal L15 left: pump activation during delay
Coolant temperature sensor	- Engine stopped Ignition on, cold	L6		# 02	X X X X ambient temperature ± 5°C
Air temperature sensor	- Engine stopped - Ignition on, cold	L5		# 03	X X X X ambient temperature ± 5°C
Absolute pressure sensor	- Engine stopped Ignition on	L8		# 01	X X X X X depending on local atmospheric pressure 950< X< 1025 mb
	Fault	I 8		# 01	X = 103 mb
Throttle position potentiometer	- Engine stopped - Ignition on - Position : No load Half load Full load	L11 L11 L11		# 17 # 17	X X X X 10 < X < 47 190 < X < 252
	Fault	I 10		# 17	X = 128

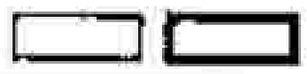
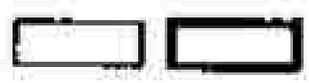
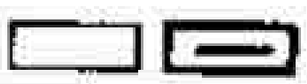
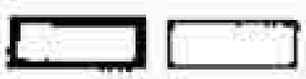
CHECKING CONFORMITY

Engine warm at idle speed

Functions to check	Conditions	Line no.	Bar graph display	XR 25 code	Display on central display - Notes
Coolant temperature sensor	- Engine warm after engine cooling fan has operated once	L6		# 02	 X = 85 to 95°c
	If fault	L6		# 02	X = 90°c
Air temperature sensor	- Engine warm	L5		# 03	 X = temperature above ambient temperature
	If fault	L5		# 03	X = 20°c
Battery voltage				# 04	 X = 11v to 13v
Idle speed	- Engine warm without consumer	L16		# 06 # 12	 X = 700 to 800 rpm X = 26 to 38 %
	If AT in drive			# 06 # 12	X = 775 ± 50 rpm to
	If air conditioning	L17 L18		# 06	X = 900 ± 50 rpm
	If fault	L5			

CHECKING CONFORMITY

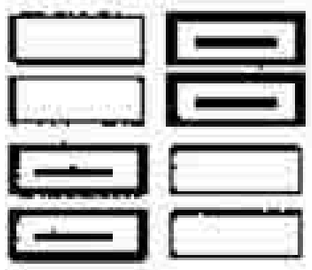
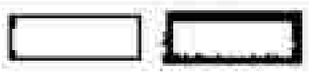
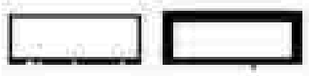
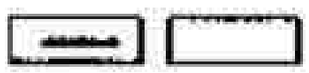
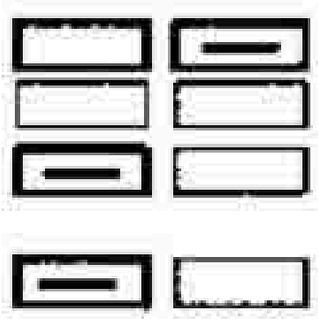
On road test

Function to check	Conditions	Line no	Bar graph display	XR 25 code	Display on central display - notes
Vehicle speed info	- Vehicle moving	L9		# 18	X X X X = speed on counter
Pinking sensor	- Full load from 2000 rpm to 4000 rpm in 4th gear	L10		# 13	X X X X = variable and not zero
				# 15	X ≤ 6 (J7R) X ≤ 8 (J7T)
	If fault	L10		# 13	X > 0
				# 15	X = 0 (*)
Oxygen sensor	- Vehicle moving between 50 and 80 km/h in 3rd (stable speed)	L8		# 05	X X X X varies between approx 50 - 900 mv
				# 35	X varies around 128 between 0 and 255
	If fault	L8		# 05	X = Value varies slightly
				# 35	X = 128

(*) In the defect mode, the advance is put back by 2degrees. (not visible in#15)

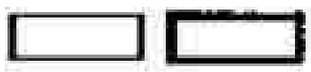
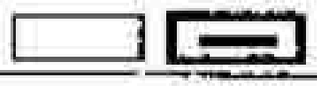
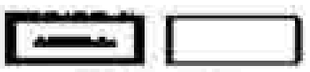
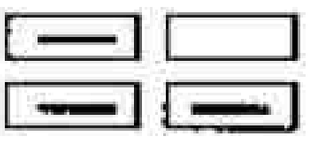
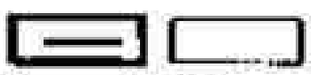
CHECKING CONFORMITY

Engine cold, ignition on

Functions to be checked	Conditions	Line no.	Bar graph display	XR 25 code	Display on central display - notes
Computer conformity	Engine stopped - Ignition on Enter D03			G70*	X X X X Part number of computer displayed in 3 sections (see chapter 12)
Injection diagnosis position	- Engine stopped - Ignition on	L1 L11 L14 L15			L1 right: code present L11 right: no load recognition L14 left: TDC signal L15 left: pump activation during delay
Coolant temperature sensor	- Engine stopped - Ignition on, cold	L6		# 02	X X X X ambient temperature ± 5°c
Air temperature sensor	- Engine stopped - Ignition on, cold	L5		# 03	X X X X ambient temperature ± 5°c
Absolute pressure sensor	- Engine stopped - Ignition on Fault	L8 L8		# 01 # 01	X X X X X depending on local atmospheric pressure 950< X< 1025 mb X - 103 mb
Throttle position potentiometer	- Engine stopped - Ignition on - Position : No load Half load Full load Fault	 L11 L11 L11 L10		 # 17 # 17 # 17	X X X 64 < X < 89 194 < X < 240 X = 128

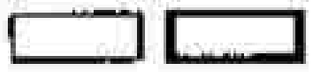
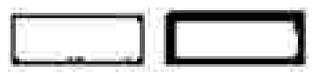
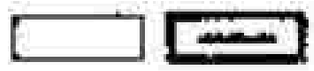
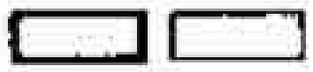
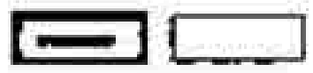
CHECKING CONFORMITY

Engine warm, at idle speed

Functions to check	Conditions	Line no.	Bar graph display	XR25 code	Display on central display - Notes
Coolant temperature sensor	Engine warm after engine cooling fan has operated once	L6		# 02	X X X X = 85 to 95°c
	If fault	L6		# 02	X = 90 °c
Air temperature sensor	Engine warm	L5		# 03	X X X X = temperature above ambient temperature
	If fault	L5		# 03	X = 20°c
Battery voltage				# 04	X X X X = 11v to 13v
Idle speed	- Engine warm without consumer	L16	 Manual AT	# 06 # 17 # 12	X X X X = 775 to 875 rpm X = 25 to 32 % X = 23 to 30 %
	If AT in drive			# 06	X = 775 ± 50 rpm
	If air conditioning	L17 L18		# 06	X = 900 ± 50 rpm
	If fault	L5			

CHECKING CONFORMITY

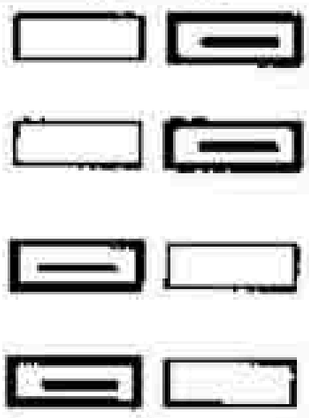
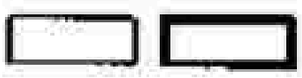
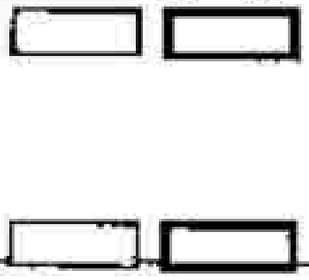
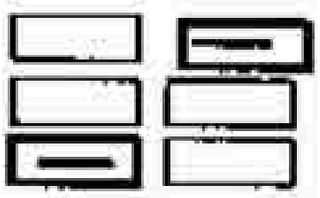
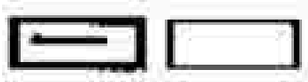
On road test

Function to check	Conditions	Line no	Bar graph display	XR 25 code	Display on central display - notes
Vehicle speed into	- Vehicle moving	L9		# 18	X X X X = speed on counter
Pinking sensor	- Full load from 2000 rpm to 4000 rpm in 4th gear	L10		# 13	X X X X = variable and not zero
				# 15	X ≤ 6
	If fault	L10		# 13	X = 0
				# 15	X = 0 (*)
Oxygen sensor	- Vehicle moving between 50 and 80 k m/h in 3rd (stable speed)	L8		# 05	X X X X varies between approx 50 - 900 mv
				# 35	X varies around 128 between 0 and 255
	If fault	L8		# 05	X = Value varies slightly
				# 35	X = 128

(*) In the defect mode, the advance is put back by 2 degrees. (not visible in# 15)

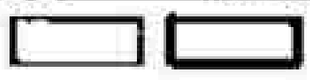
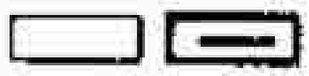
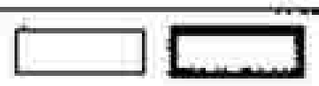
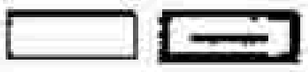
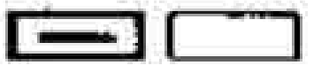
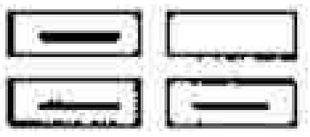
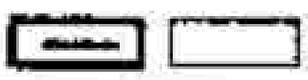
CHECKING CONFORMITY

Engine cold - ignition on

Functions to be checked	Conditions	Line no.	Bar graph display	XR 25 code	Display on central display - notes
Computer conformity	- Engine stopped - Ignition on Enter D03			G70*	X X X X Part number of computer displayed in 3 sections (see chapter 12)
Injection diagnosis position	Engine stopped - Ignition on	L1 L11 L14 L15			L1 right: code present L11 right: no load recognition L14 left: TDC signal L15 left: pump activation during delay
Coolant temperature sensor	- Engine stopped - Ignition on, cold	L6		# 02	X X X X ambient temperature ± 5°c
Air temperature sensor	- Engine stopped - Ignition on, cold	L5		# 03	X X X X ambient temperature ± 5°c
Absolute pressure sensor	- Engine stopped - Ignition on Fault	L8 L8		# 01 # 01	X X X X X depending on local atmospheric pressure 950 < X < 1025 mb X = 103 mb
Throttle position potentiometer	- Engine stopped - Ignition on - Position : No load Half load Full load Fault	L11 L11 L11 L10	 	# 17 # 17 # 17	X X X X 10 < X < 47 190 < X < 252 X = 128

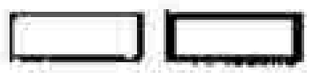
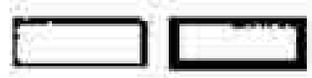
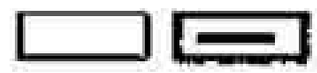
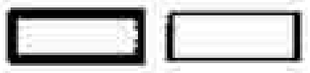
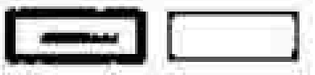
CHECKING CONFORMITY

Engine warm at idle speed

Functions to check	Conditions	Line no.	Bar graph display	XR 25 code	Display on central display - Notes
Coolant temperature sensor	- Engine warm after engine cooling fan has operated once	L6		# 02	X X X X = 85 to 95°c
	If fault	L6		# 02	X = 90 °c
Air temperature sensor	- Engine warm	L5		# 03	X X X X = temperature above ambient temperature
	If fault	L5		# 03	X - 20°c
Battery voltage				# 04	X X X X - 11v to 13v
Idle speed	- Engine warm without consumer	L16	 Manual AT	# 06 # 12	X - 650 to 750 rpm X = 26 to 36 %
	If AT in drive			# 06	X - 750 ± 50 rpm
	If air conditioning	L17 L18		# 06	X - 900 ± 50 rpm
	If fault	L5			

CHECKING CONFORMITY

On road test

Function to check	Conditions	Line no	Bar graph display	XR 25 code	Display on central display - notes
Vehicle speed info	- Vehicle moving	L9		# 18	XXX X = speed on counter
Pinking sensor	- Full load from 2000 rpm to 4000 rpm in 4th gear	L10		# 13 # 15	XXX X = variable and not zero X ≤ 6
	If fault	L10		# 13 # 15	X = 0 X = 0 (*)
Oxygen sensor	- Vehicle moving between 50 and 80 km/h in 3rd (stable speed)	L8		# 05 # 35	XXX X varies between approx. 50 - 900 mv X varies around 128 between 0 and 255
	If fault	L8		# 05 # 35	X = Value varies slightly X = 128

(*) In the defect mode, the advance is put back by 2 degrees. (not visible in # 15)

OXYGEN SENSOR FAULT FINDING

I - Oxygen sensor voltage (or Lambda sensor)

Reading # 05 on XR25 : the value read represents the voltage transmitted to the computer by the oxygen sensor ; it is expressed in volts (In fact, the value varies between 0 and 1000 millivolts).
When the sensor loop system is closed, the voltage value should oscillate rapidly between **200 ± 100 mV** (poor mixture) and **700 ± 50 mV** (rich mixture) and vice versa. The smaller the variation , the better the sensor (The variation is generally at least 600 mV)

II - Richness correction (reading # 35 on XR25)

The reading under # 35 on the XR25 represents the richness correction made by the computer depending on the fuel mixture as analysed by the oxygen sensor. (The oxygen sensor analyses the oxygen content of the exhaust gas which is a direct product of the fuel mixture richness).
With a maximum of 255 and a minimum of 0, the richness correction value normally oscillates around 128.

- Value below 128 : Request for weaker mixture.
- Value above 128 : Request for richer mixture.

IIA - Starting richness regulation (closing the loop) - For engines J7R - J7T.

When the engine is started, the computer does not consider the voltage from the oxygen sensor immediately (starting delay) → the loop system is open (# 35 = 128).
At idle speed when the coolant temperature is 45°C, the loop system (if the loop system is closed after the starting delay) remains closed until the coolant temperature reaches 80 °c. During this period, the computer samples the richness correction values relative to engine requirements and calculates the average correction value
The loop system open after 30 seconds and retains this average value. The system recloses after two minutes for a period of 30 seconds. (This process is repeated until the accelerator is depressed).
Taking this strategy into consideration for these types of engine, the oxygen sensor must be checked when the engine is warm at an engine speed of 1500 to 2000 rpm (After the starting delay).

IIIB - Starting richness regulation - For engine Z7X

At idle speed, when the coolant temperature reaches 45°C, the loop system (if the loop system is closed after the starting delay) remains closed until the accelerator pedal is depressed **Note** : the system is not open at idle speed.

IV - Open loop system

The operating phases during which the computer disregards oxygen sensor information are :
- Starting the engine : # 35 = 128 (starting delay = oxygen sensor heating time).
- At idle speed, above 75-80°C ; # 35 = fixed value during loop closing period (J7R and J7T).
- Sharp acceleration # 35 = fixed value (Example : # 35 = 180 ; engine 12 S).
- Sharp deceleration # 35 = 128.
- Oxygen sensor fault # 35 = 128.

V - Sensor fault and the defect mode

If there is a sensor fault (# 05 varies only slightly or not at all) during the loop closing periods, the computer makes several successive corrections.
After about ten corrections (# 35 changes from 128 to 255), the computer declares the sensor to be faulty and initiates the defect mode,the loop system is opened : # 35 = 128 whatever the operating phase (except for full load), the left hand bar graph of line 8 on the XR25 changes state until the next time the ignition is turned off

AUTO CORRECTION OF RCO IDLE SPEED # 21

Under normal warm operating conditions, the RCO idle speed value changes, around nominal idle speed between a high and low value (see checking conformity)
It may be after certain operating conditions (running in, engine dirty....) that the RCO value is close to either the upper or lower values.
The auto correction of the RCO idle speed allows slow variations in engine air requirement to be allowed for, to return the RCO during operation to a nominal average RCO value.

Valve RCO values and auto correction (engine warm)

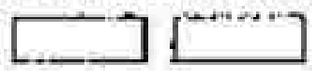
Engines	RCO valve control (# 12)	Auto correction (# 21)
J7R - J7T 8 valve	26 ≤ # 12 ≤ 38%	-2,3 ≤ #21 ≤ 3,9%
J7R - J7T 12 valve	25 ≤ # 12 ≤ 32% 23 ≤ # 12 ≤ 30% (1)	-8,6 ≤ #21 ≤ 6,2%
Z7X	26 ≤ # 12 ≤ 36%	-3,1 ≤ #21 ≤ 6,2%

(1) Engine J7T 761

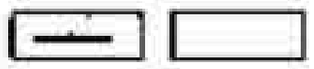
Note: The auto correction may be considered as an automatically adjusting bypass.

FAULT FINDING FOR IDLE SPEED REGULATION

If the idle speed regulation is not correct, or if there are problems returning to idle speed, the following tests may be carried out :

Idle speed valve circuit :
L5 :  bar graph extinguished

No load:
L11 :  no load recognised

Idle speed valve energised :
L16 :  idle speed regulation effective (requested by computer)

Then, only if the tests carried out are correct, gates 12 and 21 may be used.

#12 : The RCO values given in the conformity tables are nominal values, above which an anomaly on the vehicle may be suspected.

#21 : The auto correction value changes between two thresholds.
This information may only be used if the idle speed is outside the tolerance and if the values read under #12 are outside the specified range.

Fault finding using gates 12 and 21 for idle speed regulation

Example 1 : Idle speed too high.

Confirmation using XR25 :
Value read under #12 = 25% (the RCO idle speed is outside the specified range).
Value read under #21 = - 2,3%. (the correction is at the minimum threshold)

Diagnosis: The fault may be an air leak or one of the throttle housing stops may be incorrect.

Example 2 : Idle speed too low.
Confirmation using XR25 :
Value read under #12 = 39%. (the RCO idle speed is outside the specified range).
Value read under #21 = - 3,9%. (the correction is at the maximum threshold).

Diagnosis : The readings under gates 12 and 21 confirm that the engine is dirty.

Action: In this case only, act as follows :
- Engine stopped : disconnect the battery (to erase the computer memory)
- Start the engine
- Unscrew the bypass gradually to centre the RCO value in the middle of the conformity range.

(if 28 ≤ RCO ≤ 36% adjust to 32% using the bypass screw).
Note: On the new throttle housing body, the bypass screw is fully tightened.

AUTO CORRECTION OF RICHNESS : # 30 and 31

Principle

When the loop system is closed, the richness regulation (# 35), alters injection duration to obtain fuel mixture metering which is as close as possible to richness 1. The correction value oscillates around 128 between 0 and 255.

However, variations may affect the injection system components, during the life of the vehicle, and the richness correction may tend towards 0 or 255, to obtain richness 1.

Auto correction allows the injection to be altered to recentre the richness regulation (# 35) around 128 (to ensure it remains constant in time).

Auto correction of richness is made up of two phases :

- # 30 : Auto correction for high and medium loads. Correction in relation to operating richness closed loop system (between 0 and 255).

- # 31 : Auto correction for low loads and idle speed. Correction in relation to operating richness closed loop system (value for #31 changes between a maximum and a minimum threshold).

Engines	# 31
J7R - J7T 8 valve	64 ≤ # 31 ≤ 255
12 valve { J7R	48 ≤ # 31 ≤ 176
12 valve { J7T	32 ≤ # 31 ≤ 208
Z7X	0 ≤ # 31 ≤ 255

Aim of auto correction

The measurements made and the correction adopted by the auto correction system allows the computer to target the mixture enrichment or weakening process of the injection system. This adapts the richness to all phases of engine operation. (adaption of the mixture to full load, temporary phases between idle speed and partial load, deceleration and while the engine warms up).

Example :

Example on a vehicle where the injectors are dirty, (which makes the mixture weaker for a given injection period).

To obtain richness 1, the richness regulation value oscillates around 200 (tends to make the mixture richer).

In this case, the correction may only be 55 units towards maximum richness.

The auto correction therefore alters the injection pattern towards enrichment.

The auto correction richness regulation value for intermediate engine speeds (#30) increases until the richness correction returns to oscillating around 128.

(The regulation range and therefore the authority to correct the richness regulation are maintained)

Important

Gates (#) 30 and 31 must not be used and analysed except after a customer complaint, regarding engine operation.

The information given by these two gates gives an idea on the engine richness for operation and therefore allows the fault finding process to be directed. Although they may be of use during fault finding, you can never be certain if the value given is the minimum or maximum threshold value.

ROAD TEST

The auto correction adjusts variations gradually by using a constant examination of the whole range of engine operating conditions.
The values given under gates 30 and 31 are subject to considerable influences, especially when driving in a sports style (false reading under gates 30 and 31 due to richness required).
Before driving, note the readings under gates 30 and 31, then disconnect the battery to erase the computer memory.

Conditions :
- Engine warm (coolant temperature > 80° c)
- Engine speed threshold not to be exceeded.
- Stable driving for at least 20 seconds for each pressure.

It is advisable to start using a low engine speed,in 3rd or 4th gear using progressive acceleration (on the level) to stabilise the required pressure. ("constant" reading under #01 on XR25).

Stabilise the pressures while driving for at least 20 seconds for each point in the table below (see test conditions).

Engine	Manifold pressures stabilised while driving (mbar) (1)	Max. engine speed rpm
J7R - J7T 8 and 12 valves	375 ↗ 510 ↗ 620 ↗ 740 ↗ 850	3500
Z7X	300 ↗ 420 ↗ 540 ↗ 660 ↗ 800	4250

Then conduct a normal road test. (Drive normally, gently and in varied conditions over 3 to 6 miles).
After the test, read the values under gates 30 and 31 Initially at 128, they should have altered. If not, restart the test, ensuring the test conditions are observed.
(1) Stabilised pressure ± 20 mbar.

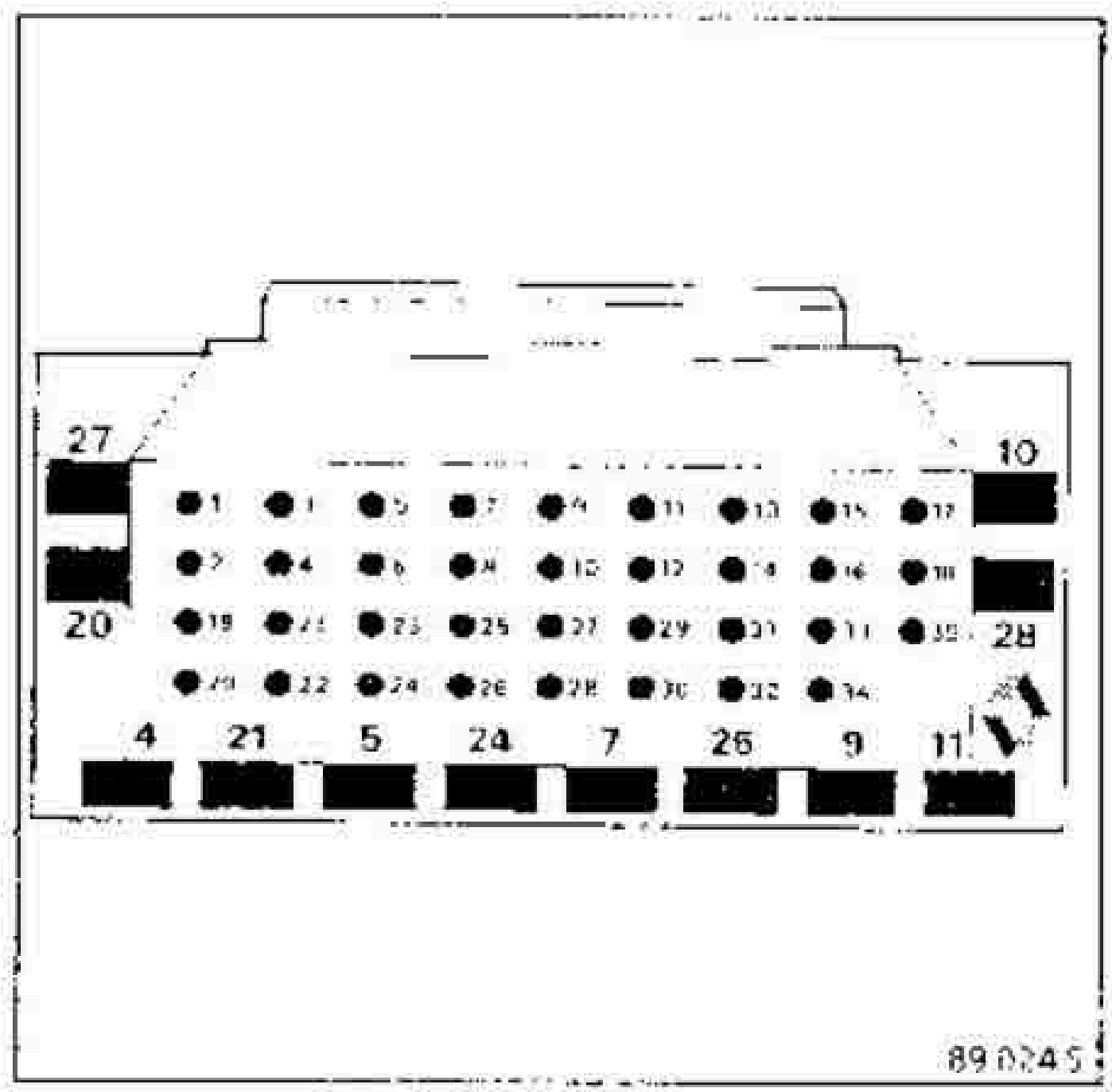
Analysis example for # 30 :
Problem : A customer complains of lack of performance, flat spots.
Confirmation: After the road test, no bar graph shows a fault. Richness regulation is correct (# 05 and 35) but gate 30 shows a richness threshold.
Conclusion : The auto correction system confirms the "lack" of fuel. Fault finding may then be directed to measuring fuel pressure (regulator, fuel pump or filter faulty), checking the injectors (may be dirty).

Attention :
The analysis carried out using #31 remains difficult since this correction only intervenes at idle speed and under low load, and is also very sensitive.
Avoid drawing hasty conclusions from this gate, but analyse # 30.

Note: Vehicles may be found with # 05, 35 and 30 values which are correct but with a
31 value close to 0.
in this case, there is no problem at idle speed. This could be because of a partial bleeding of a saturated fuel vapour canister at idle speed.

If information obtained using XR25 requires wiring continuity to be checked, by connecting bornier **MS 1048**, in the place of the injection computer connector, access to the various contacts is made easier.

Bornier MS 1048

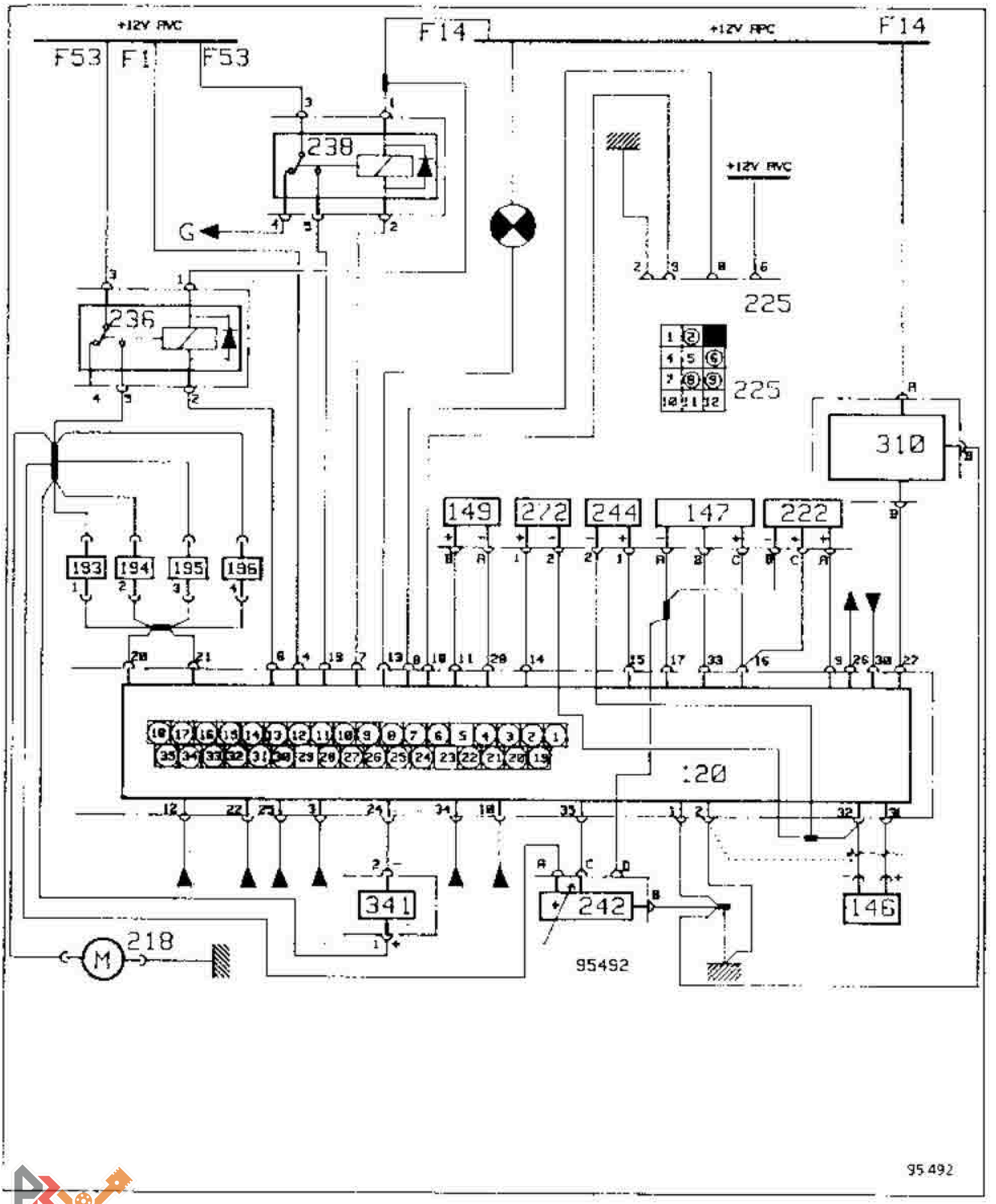


(The **MS 1048** is composed of a **35** track base and a printed circuit which has **35** copper coated surfaces numbered from **1 to 35**).
Using the following wiring diagrams, the tracks for the components to be tested are easy to identify.

IMPORTANT :

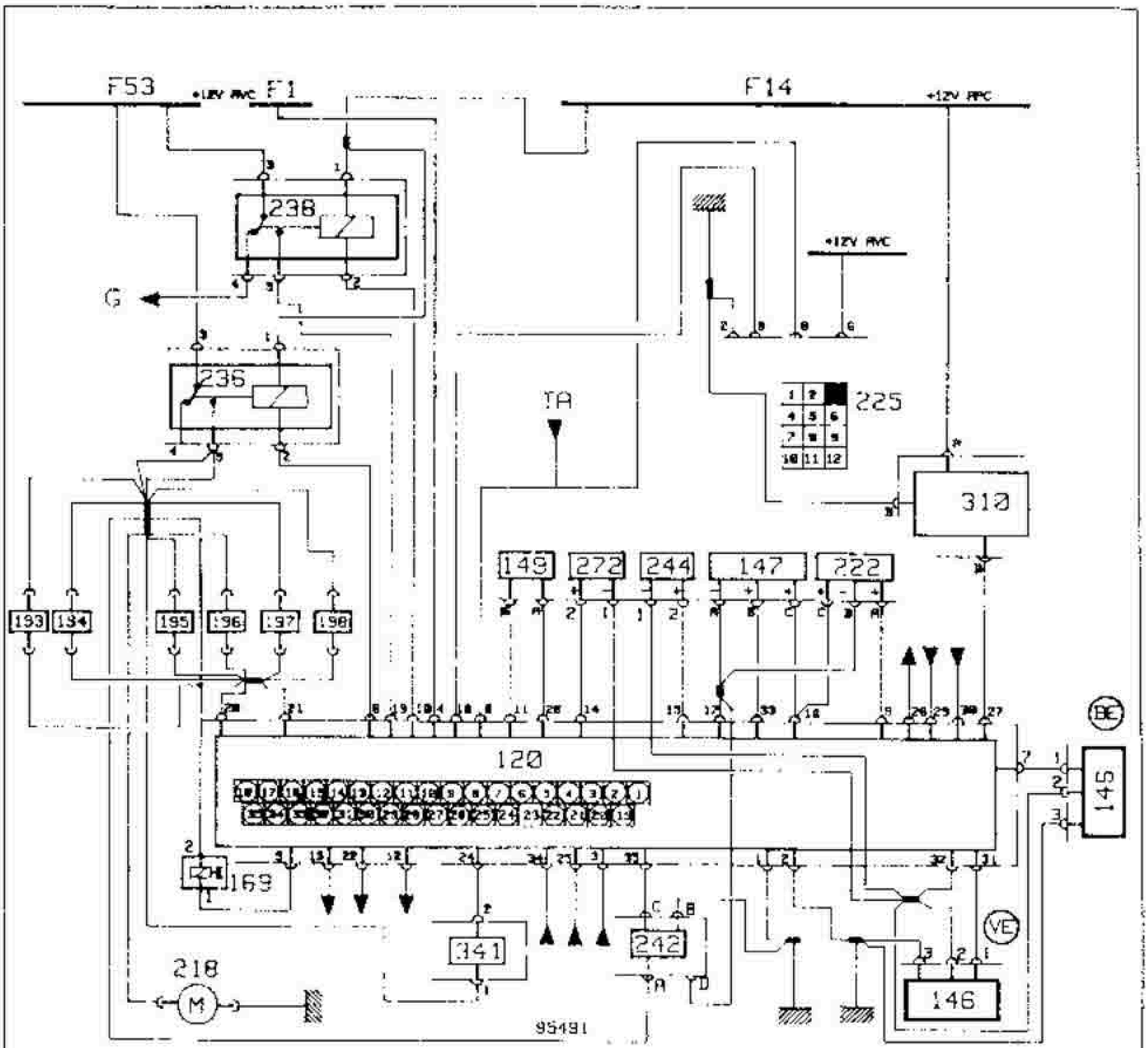
- All tests using bornier **MS 1048** must be carried out with the battery disconnected.
- The bornier is designed for use with an ohmmeter Never apply 12 volts to the test points.

WIRING DIAGRAM Engines J7R - J7T 8 and 12 valve



NB : The wiring diagrams may be altered. Refer to the electrical technical notes for the vehicle in question for all additional information.

WIRING DIAGRAM Engine Z7X Manual gear box - automatic transmission



95 491

NB : The wiring diagrams may be altered. Refer to the electrical technical notes for the vehicle in question for all additional information

OPERATIONAL WIRING DIAGRAM KEY

120	-	Computer
146	-	Pinking sensor
147	-	Absolute pressure sensor
149	-	TDC sensor
169	-	Canister bleed solenoid valve
193 to 198	-	Injectors
218	-	Electric fuel pump
222		Throttle position potentiometer
225	-	Diagnostic socket
236	-	Fuel pump relay
238	-	Injection locking relay
242	-	Oxygen sensor
244	-	Coolant temperature sensor
272		Air temperature sensor
310	-	Ignition power module
341	-	Idle speed regulation valve

G - Anti percolation device control (after ignition has been turned off)

FEED AFTER FUSES:

Before ignition :

F1 : 10 amps. (computer memory)

F53 : 30 amps. (pump relay and injection locking)

After ignition :

F14: 20 amps (ignition power module)

SPECIAL NOTES: IDENTIFICATION OF OPTIONAL COMPUTER INPUTS

Track 3 : Vehicle speed information (link via front left hand wing connection track B3)

Track 8 : Automatic transmission Park / Neural information and computer memory erasure by XR25. (link via front left hand wing connection track D3).

Track 10 : Power assisted steering pressostat information. (J engine only)

Track 12 : Engine speed information to rev counter and automatic transmission computer. (link via front left hand wing connection track C7)

Track 13 : injection warning light on instrument panel control (link via front left hand wing connection track B9)

Track 18 : Emission of diagnostic signal to XR25. (link via front left hand wing connection track B8)

Track 22 : Information for engaging AC compressor clutch to AC computer. (link via front right hand wing connection track C3)

Track 25 : Coded signal information from decoder (electronic anti-theft device). (link via front right hand wing connection track A3)

Track 26 : Fuel flow information for on-board computer. (link via front right hand wing connection track A4)

Track 29 : ABS computer information. (link via front left hand wing connection track A4) (2 engine 4 x 4 transmission only)

Track 30 : On/off information for air conditioning for increase of idle speed. (link via front right hand wing connection track C1)

Track 34 : Information on request for AC clutch operation for compressor. (link via front right hand wing connection track C2)

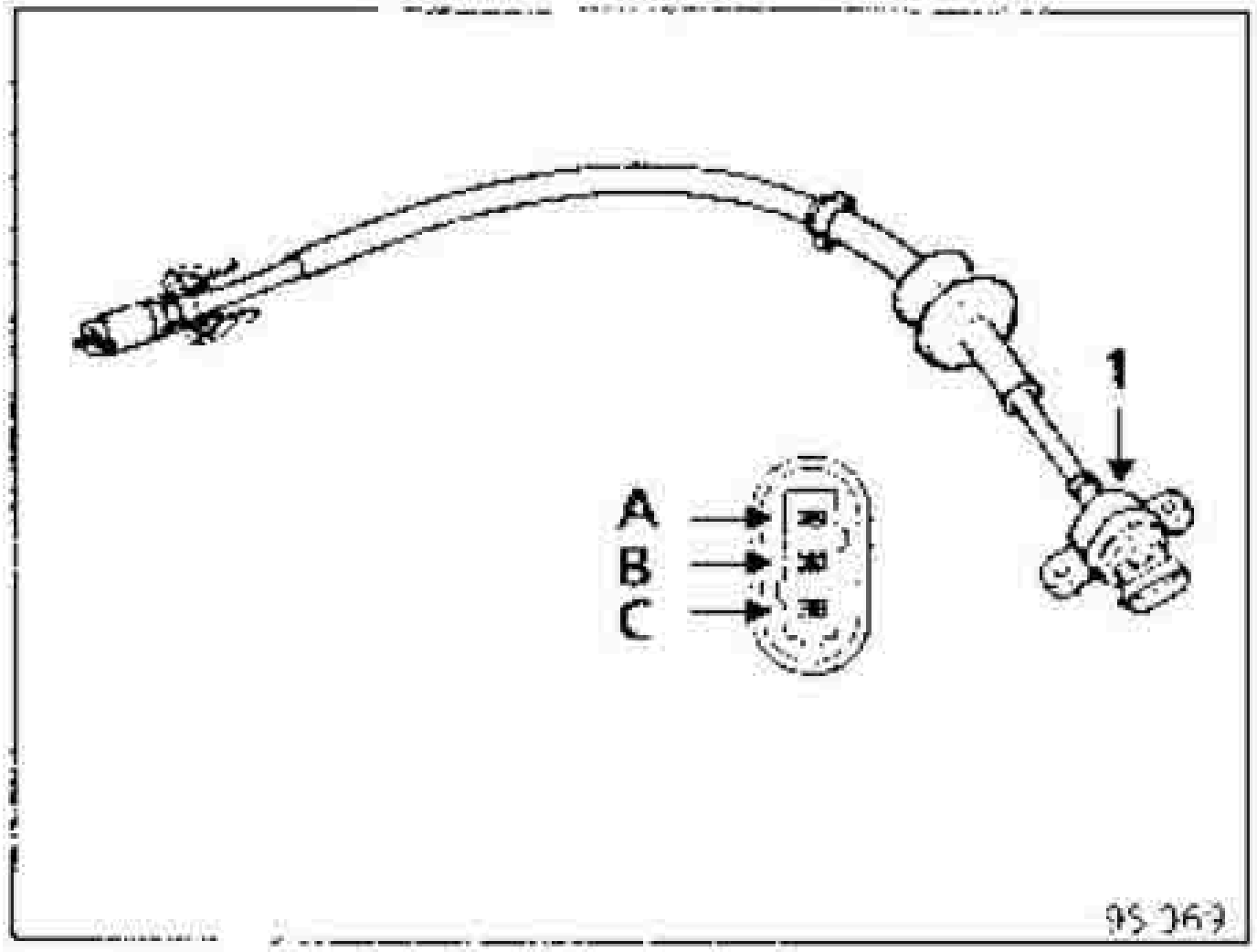
COMPUTER TRACK ALLOCATION

Track	J7R - J7T	Z7X
1	Power earth	
2	Electronic earth	
3	Vehicle speed information	
4	+ AVC permanent (computer memory)	
5	Not used	Canister bleed command
6	Command for relay 236 on track n° 2	
7	Command for relay 238 on track n° 2	Pinking information n° 2
8	Information P/N AT, torque reduction Computer memory erasure by XR25	
9	Throttle position potentiometer voltage return	
10	PAS pressostat information	Command for relay 238 on track n° 2
11	TDC sensor information (track B)	
12	Engine speed information for rev counter and AT	
13	Instrument panel injection warning light command	
14	Air temperature sensor link (track 2)	
15	Coolant temperature sensor link (track 2)	
16	Feed + 5 volts for throttle potentiometer and absolute pressure sensor	
17	Common earth for throttle potentiometer, pressure sensor and oxygen sensor	
18	Diagnostic signal to diagnostic socket	
19	Feed + 12 volts via relay 238 (track 5)	
20 21	Injector earth	

COMPUTER TRACK ALLOCATION (Cont)

Track	J7R - J7T	Z7X
22	AC compressor clutch authorisation	
23	Track not used	
24	Idle speed regulation valve control	
25	Electronic anti-theft coded signal reception	
26	Flowmeter information for on-board computer	
27	Ignition power module control	
28	TDC sensor information (track A)	
29	Not used	Information via ABS computer
30	Air conditioning on/off information	
31	Pinking information n° 1	
32	Common earth for coolant, air and pinking sensors	
33	Manifold pressure information (sensor track B)	
34	AC computer request to authorise AC compressor clutch	
35	Oxygen sensor voltage information	

Vehicle speed information is transmitted to the injection computer and the instrument panel, from an impulse generator in the speedo cable (1)



The impulse generator is mounted under the dashboard at the brake pedal level (on the right hand side).

Identification on the connector :

Wire A : + APC, after fuse.
Wire B : Speed information.
Wire C : Earth.

The speed information is transmitted through the passenger compartment connection (tracks B4 and A1), via the passenger compartment front left hand wing connection (track B7), by the front left hand wing engine connection (track B3) and arrives at the injection computer (track 3).

IMPORTANT : if there is no vehicle speed information this may explain why the idle speed regulation is not operating correctly.
Carry out a road test using **XR25**, check the conformity of the vehicle speed information **#18** (see checking conformity when the vehicle is moving) and check that bar graph **L9D** does not illuminate.

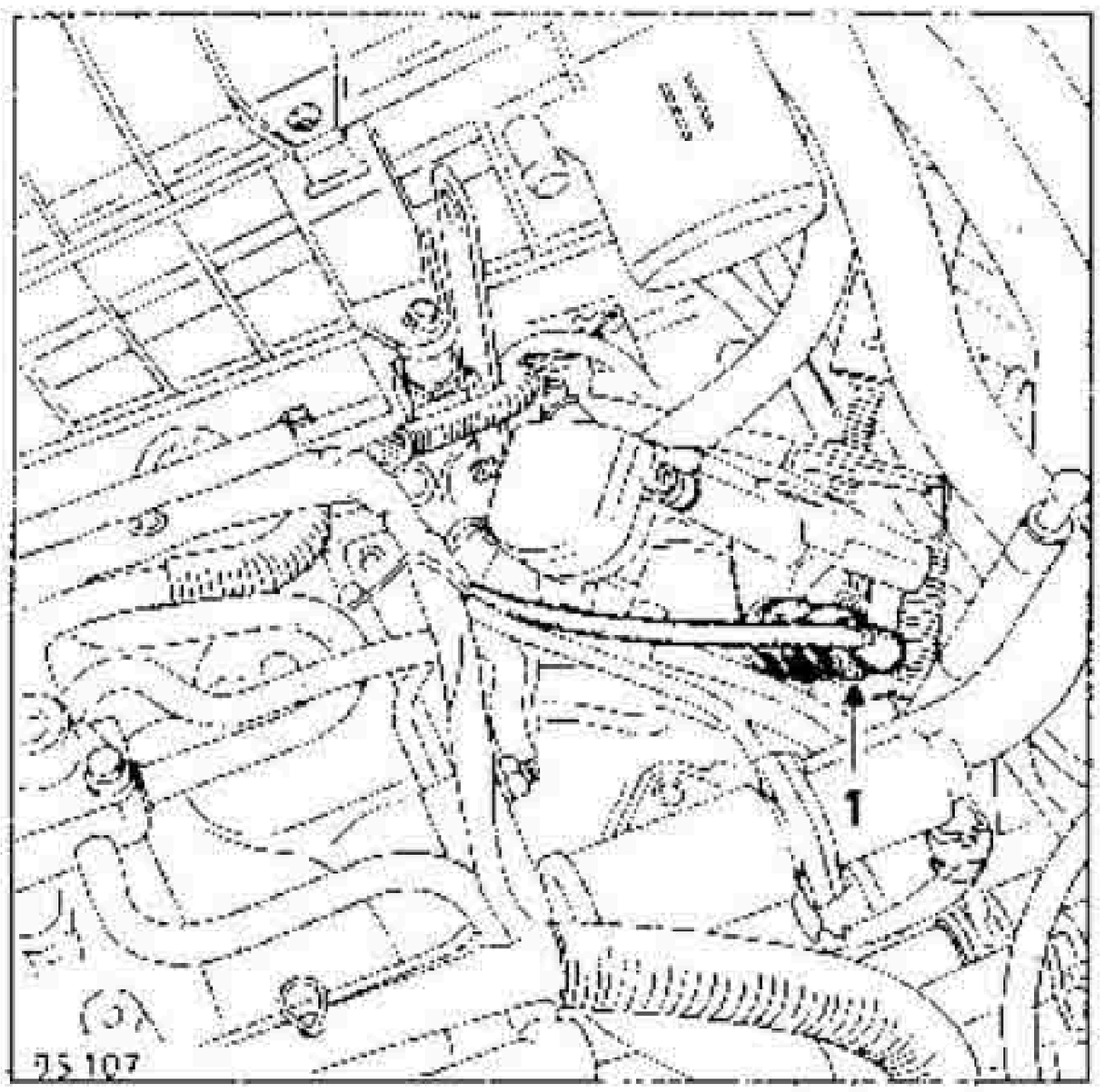
SENSOR SPECIFICATIONS (1)

Resistance (for type CTN)

Temperature (°c)	0 ± 1	20 ± 1	40 ± 1
Resistance (in Ω)	7470 to 11970	3060 to 4045	1260 to 1650

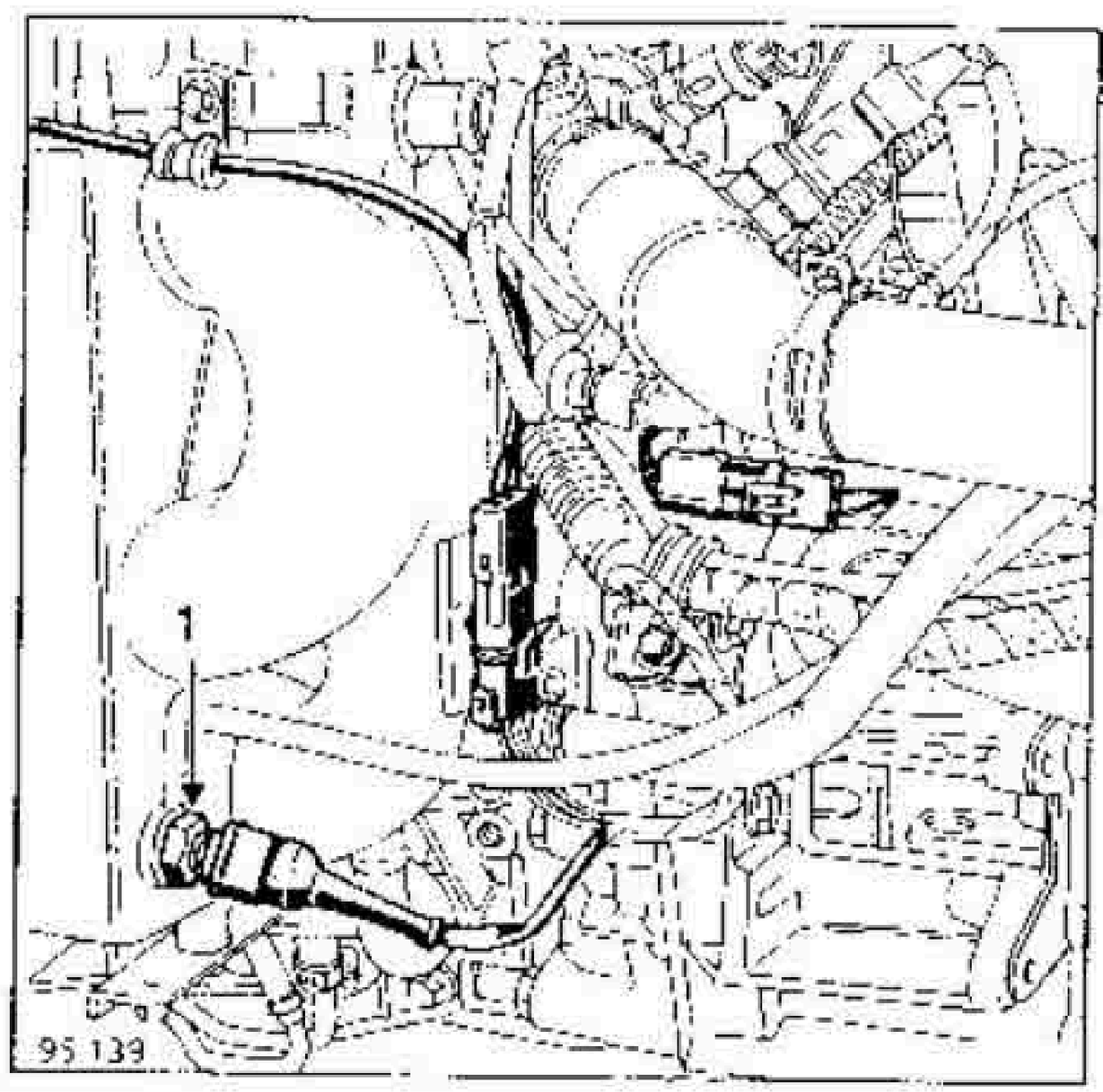
LOCATION

Engines Z7X



The cover must be removed to access the sensor . The sensor is bolted on to the throttle housing.

Engines J7R - J7T



The sensor is bolted on to the lower part of the inlet manifold. (For 8 valve engines, the sensor is at the same height on the other side of the manifold).

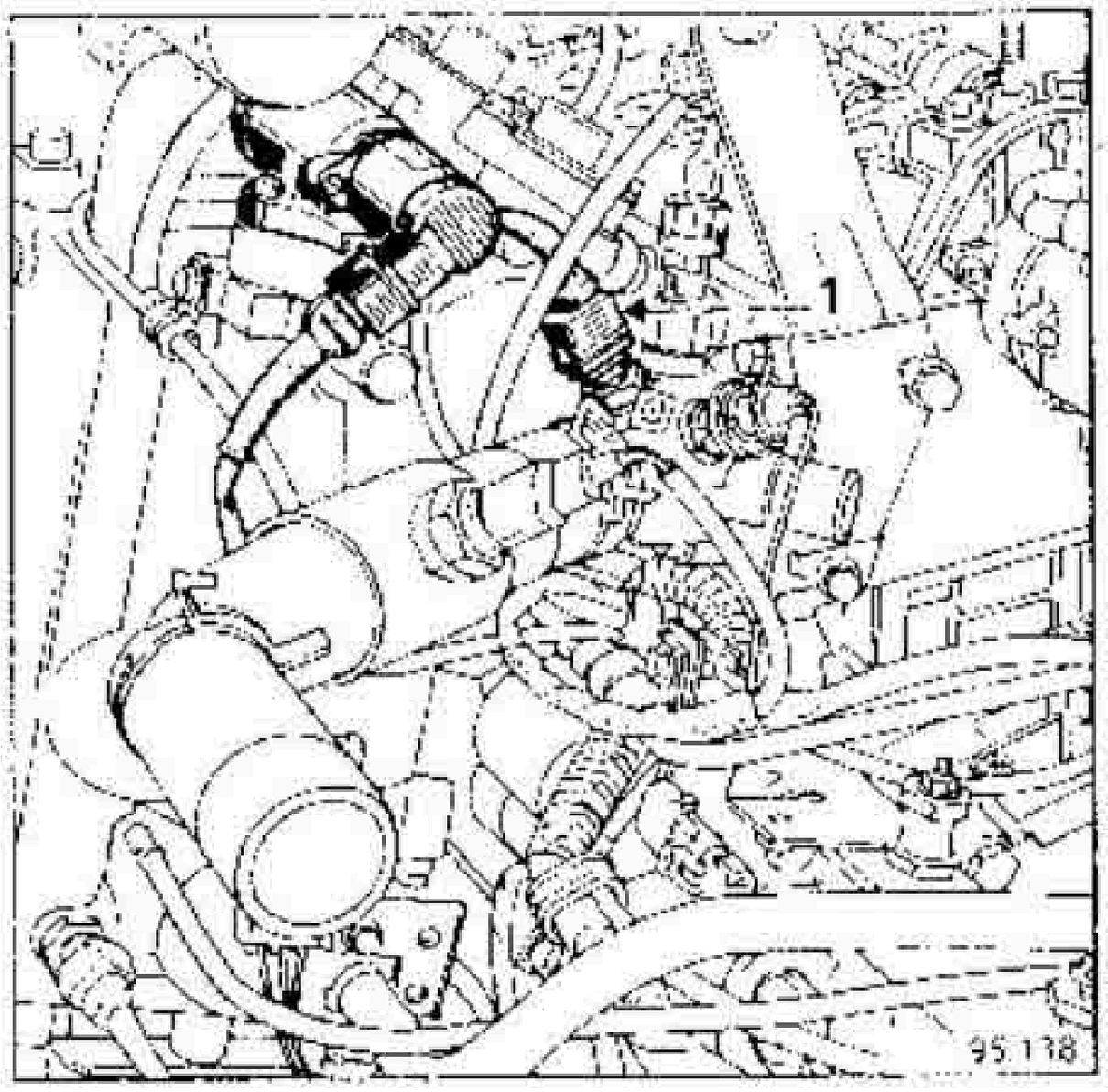
SENSOR SPECIFICATIONS (1)

Resistance (for type CTN)

Temperature (°c)	20 ± 1	80 ± 1	90 ± 1
Resistance (in Ω)	3060 to 4045	300 to 370	210 to 270

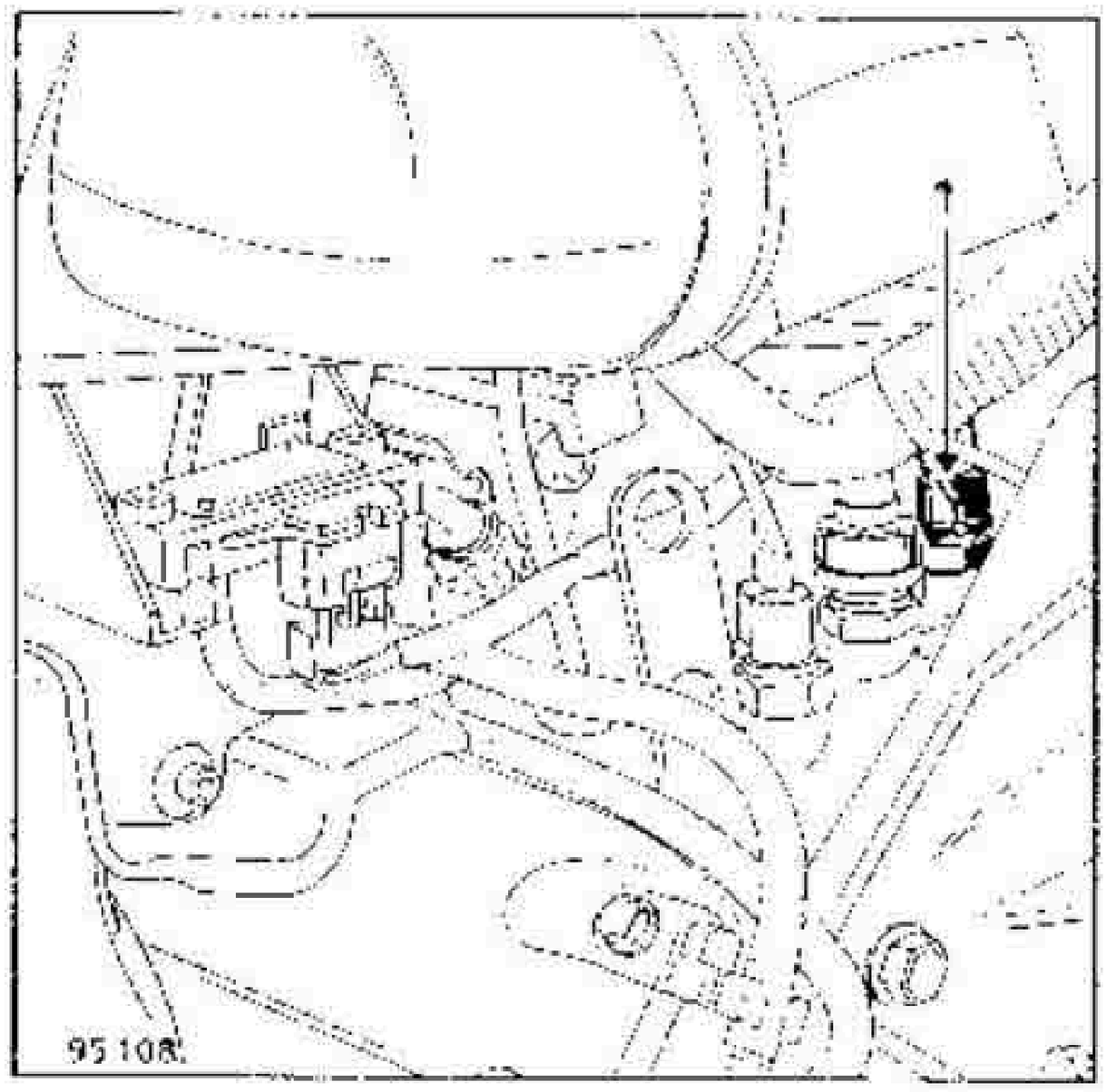
LOCATION

Engines J7R - J7T



The sensor is mounted on the cylinder head coolant outlet. For 8 valve engines, the sensor is mounted horizontally.

Engines Z7X



The sensor is mounted on the rear of the coolant circulation bridge between the two cylinder banks.

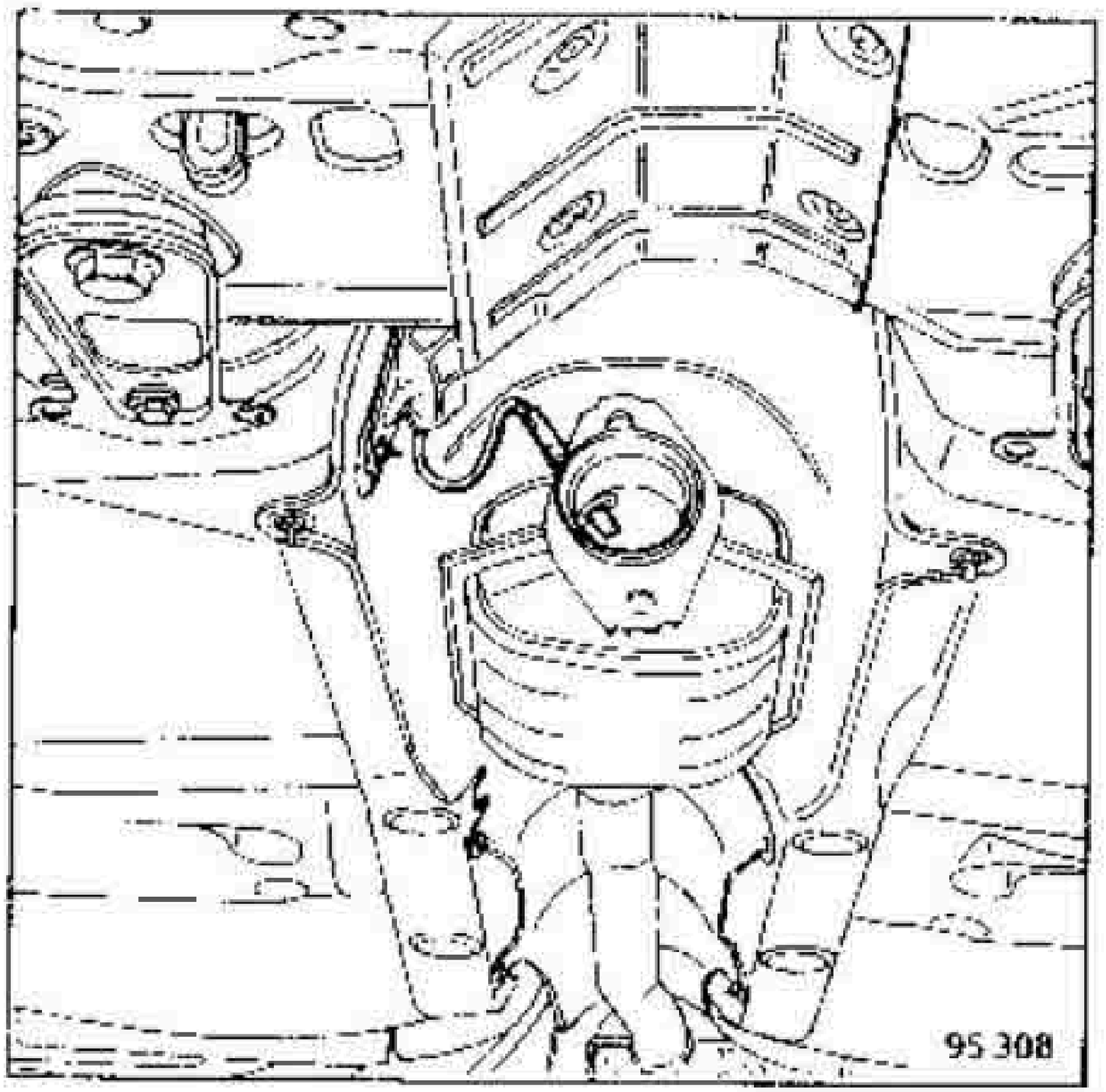
Removing the sensor (engine Z7X)

To gain access to the sensor:

- Remove the cover and remove it to the left.
- Remove the four wiring support mounting bolts.
  Remove the connecting bracket between the manifold and the suspended engine mountings (four bolts and two earth wires).
- remove the sensor being careful not to spill coolant

(For more details, refer to the section on removing the inlet manifold, chapter 12).

REMOVAL:



Put the vehicle on a lift
Remove the protective cover on the sensor connector.
Disconnect the sensor wiring.
Unscrew the sensor. (do not drop it)

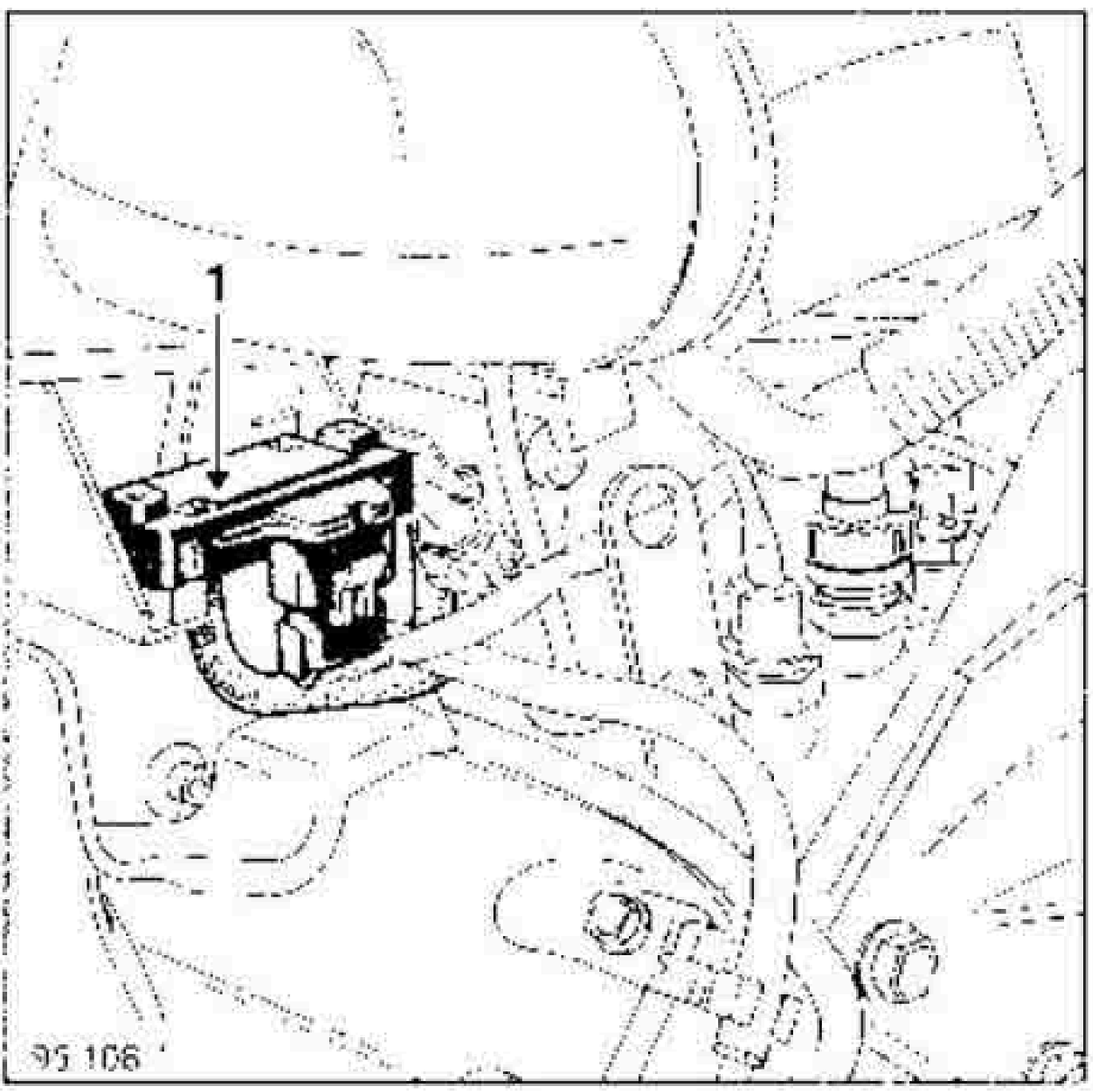
When refitting:
Sensor tightening torque 2,7 to 3,7 daN.m
Important : check the wiring path and the sensor clips. (the wiring must not touch any shields under the body).
Refit the upper shield hook

Note:
The sensor wires must not be spliced or soldered.
If the wires are broken, replace the sensor.

Note :
In the case of instability or jerky operation at idle speed check for 12 V on the oxygen sensor heater using a voltmeter.

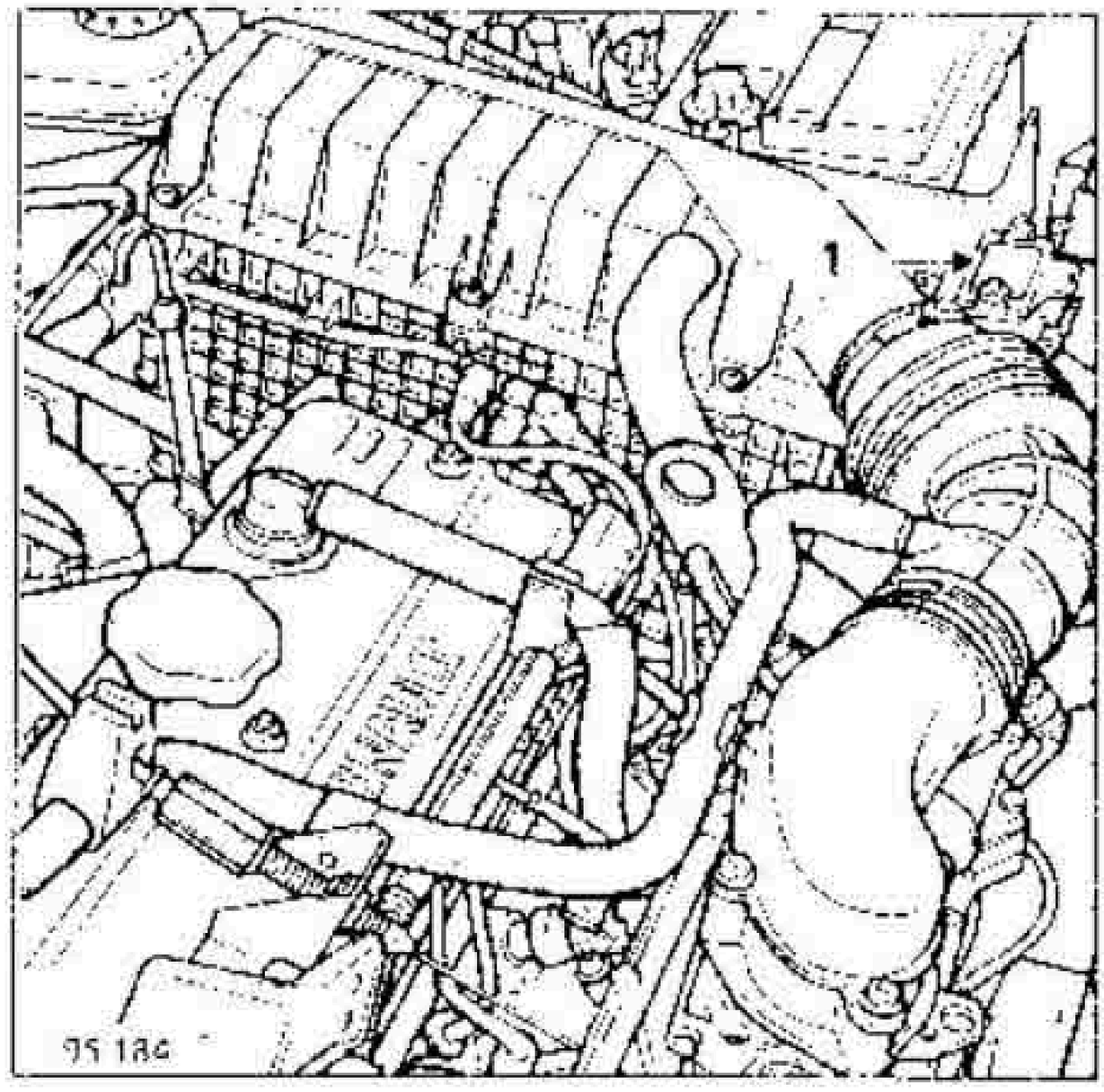
LOCATION - SPECIAL NOTES

Engine Z7X



The pressure sensor **(1)** is mounted on the right hand side of the air filter.
There is a jet Ø 1,2 mm in the vacuum pipe.

Engines J7T - J7R

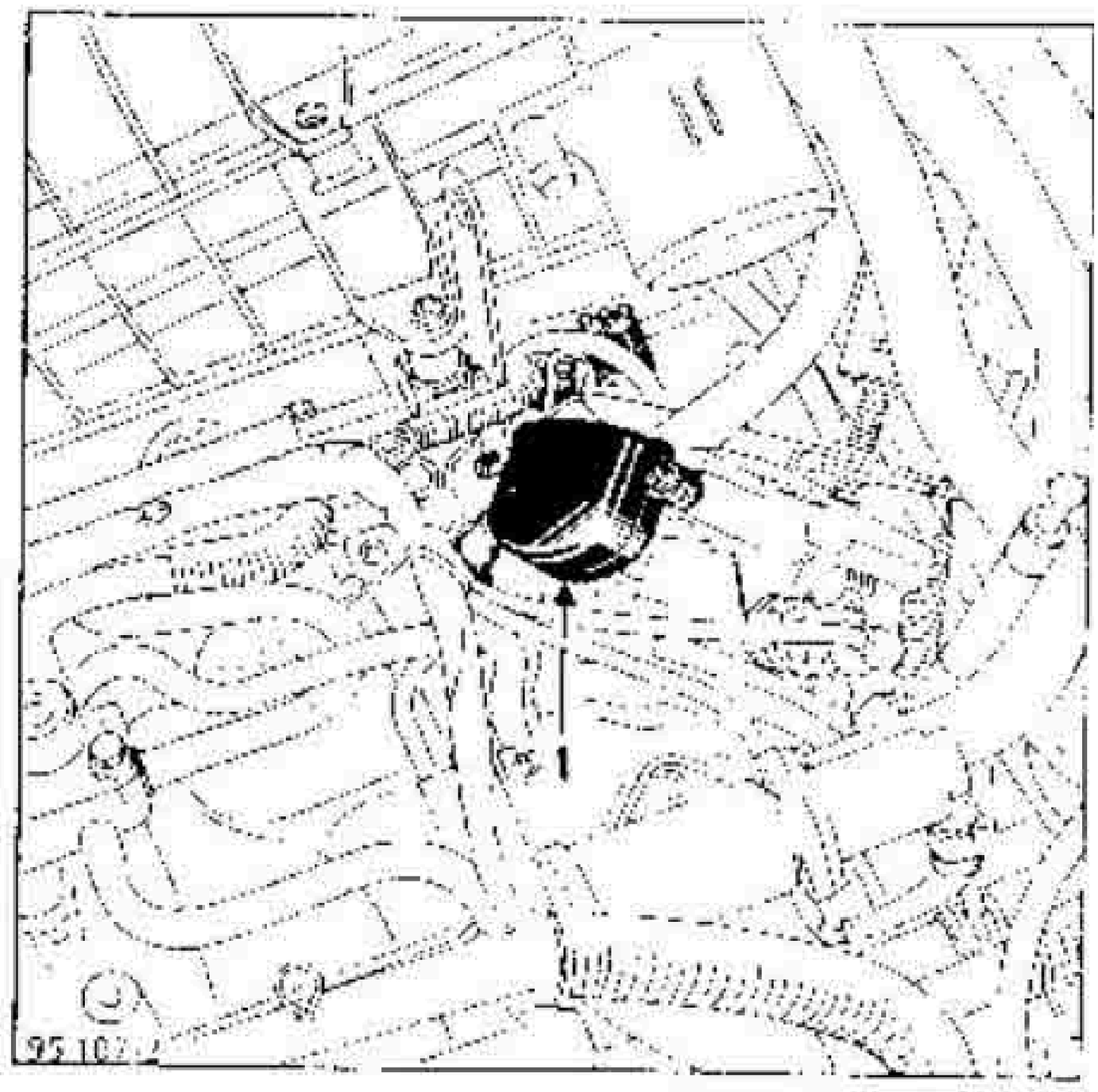


The pressure sensor **(1)** is mounted on the front of the air filter

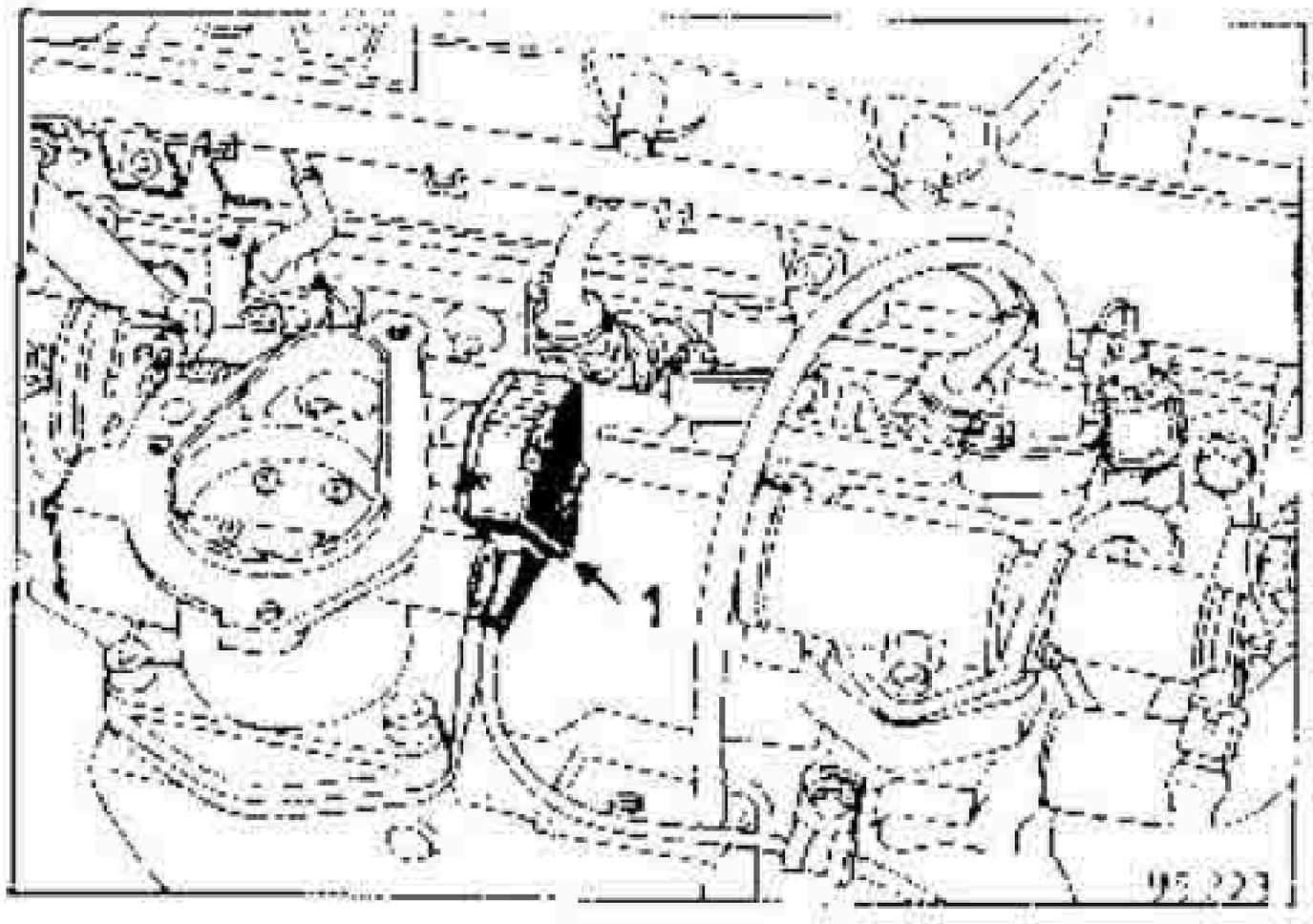
Note: Engine J7R - J7T. There is a jet Ø 1,5 mm in the vacuum pipe (manifold side).

LOCATION

Engines Z7X



Engines J7R - J7T



The throttle position potentiometer (1) is mounted on the throttle housing.

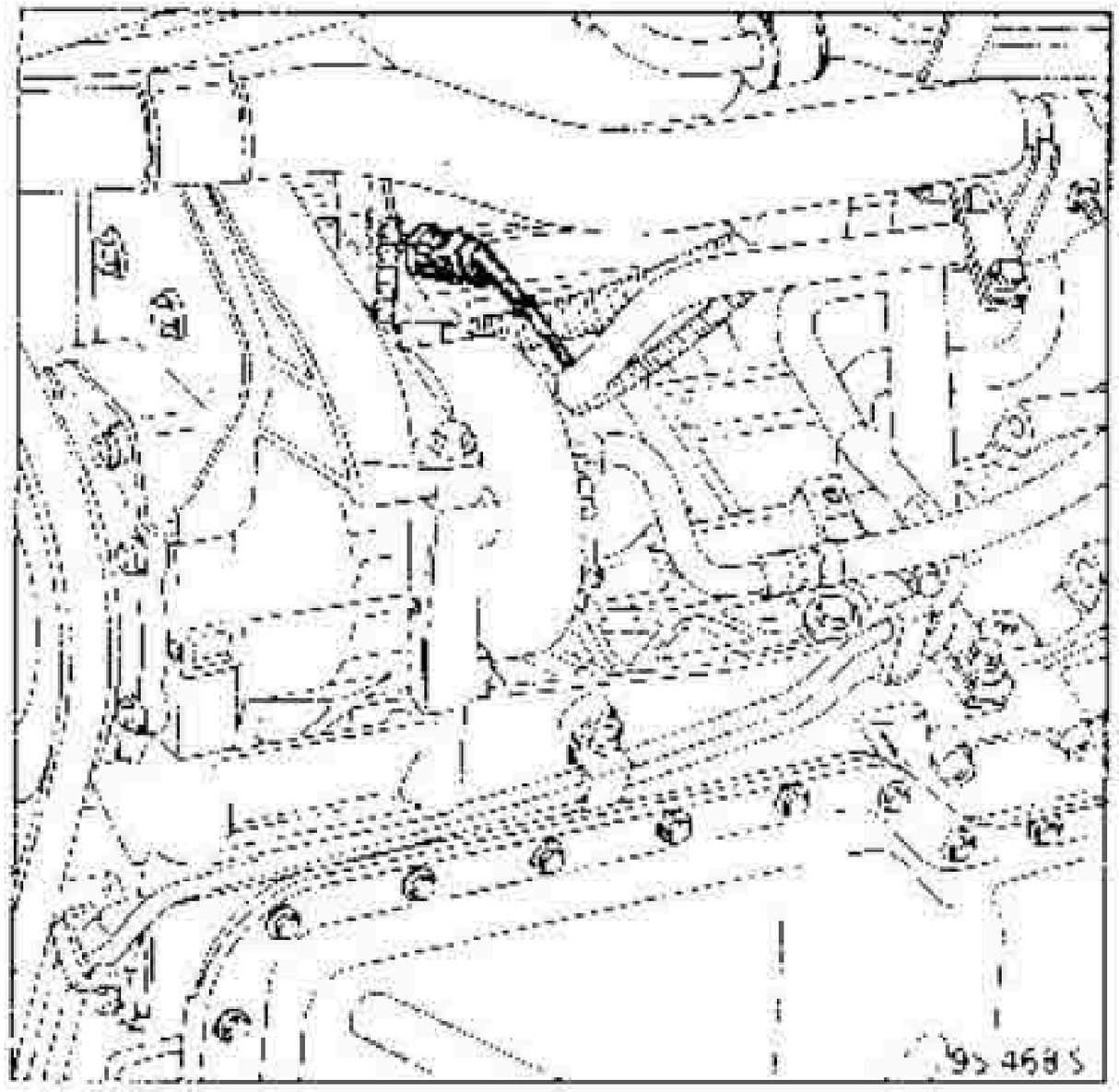
IMPORTANT : The potentiometers may not be adjusted. When replacing, check the values read under #17.

REMOVAL - REFITTING

Engine J7R - J7T

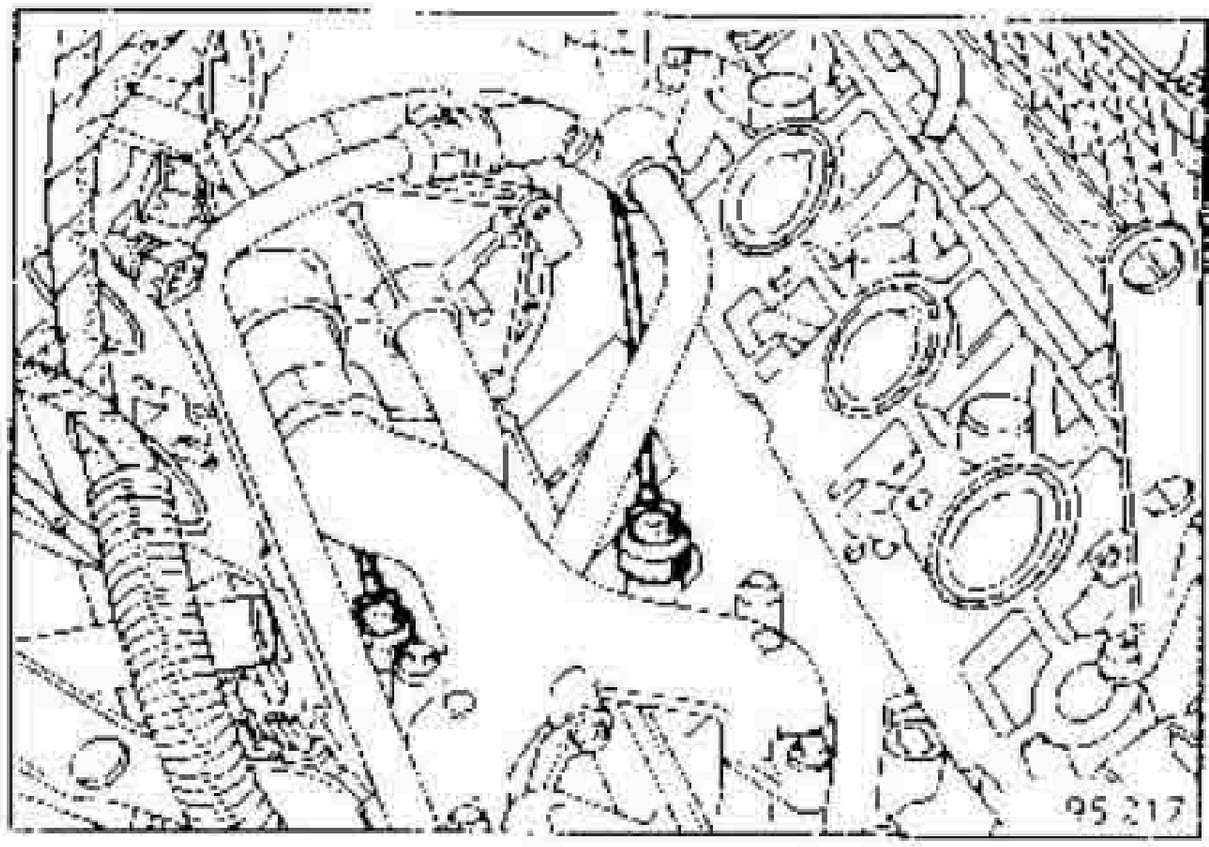
Put the vehicle on a lift.

- Remove the engine undertray.
- Disconnect the connector
- Unscrew the pinking sensor.



SPECIAL NOTES

Engine Z7X



To gain access to the two sensors the inlet manifold must be removed, as they are mounted at the bottom of the V formed by the two cylinder banks.

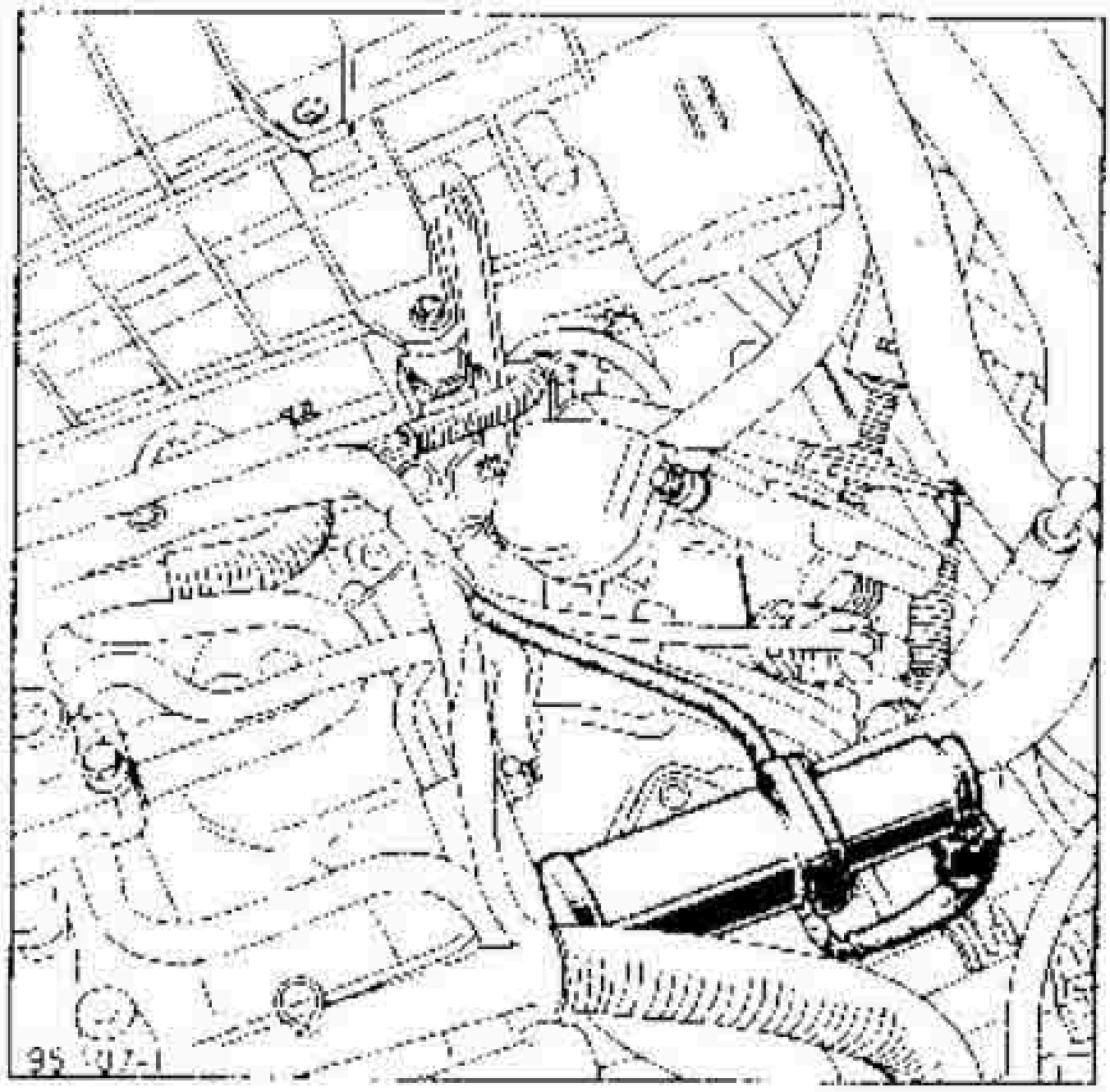
Identification of the sensors

The two sensor connectors are mounted at the level of the suspended engine mountings.
The green connector pinking sensor must be mounted on the front bank. (corresponding to cylinders 1, 2 and 3).
The blue connector pinking sensor must be mounted on the rear bank. (corresponding to cylinders 4, 5 and 6).

Check :Checking operation is carried out using XR25 reading bar graph 10 right hand side, for #13,15. (see checking conformity).

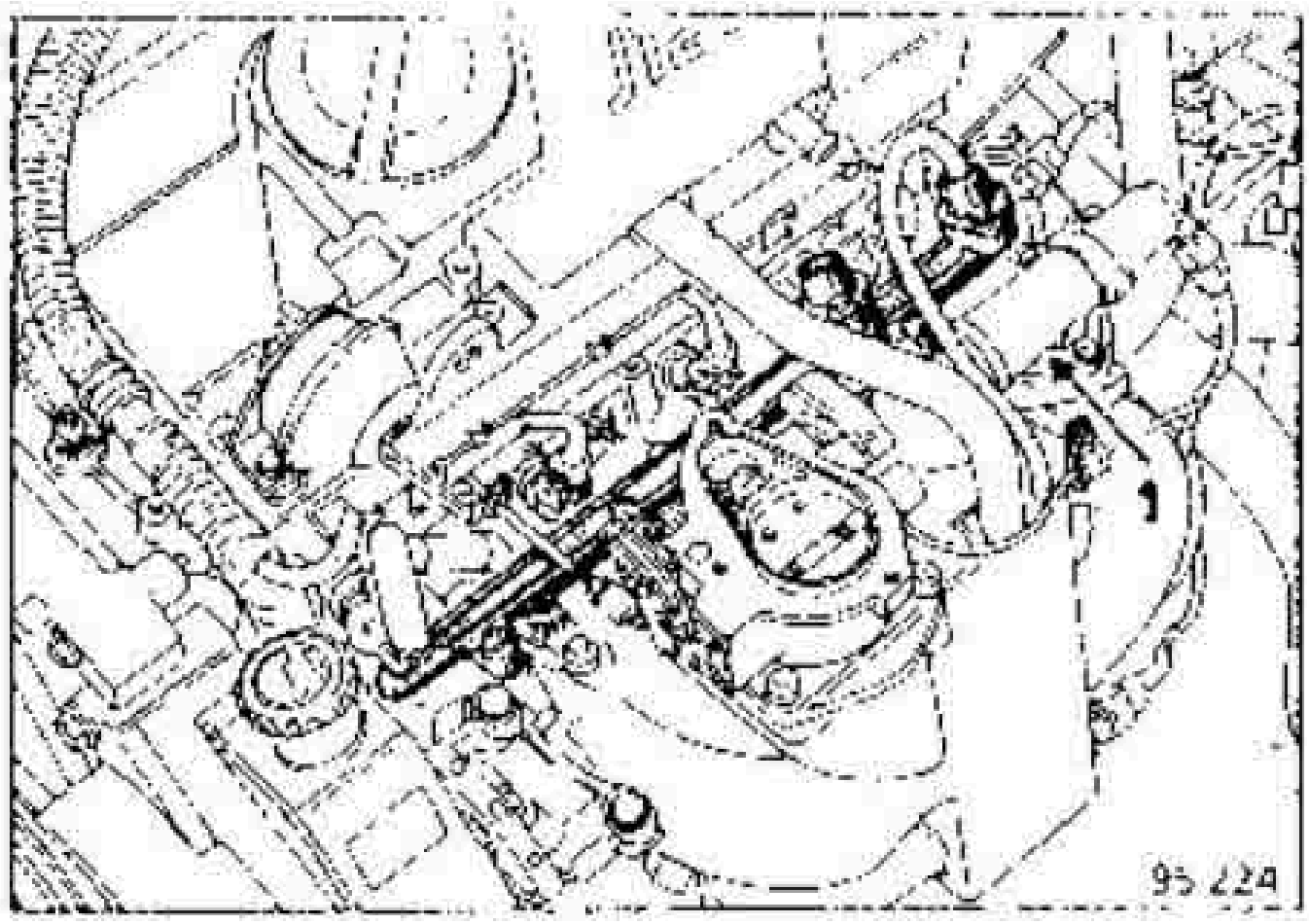
LOCATION ("Hitachi" valve)

Engines Z7X

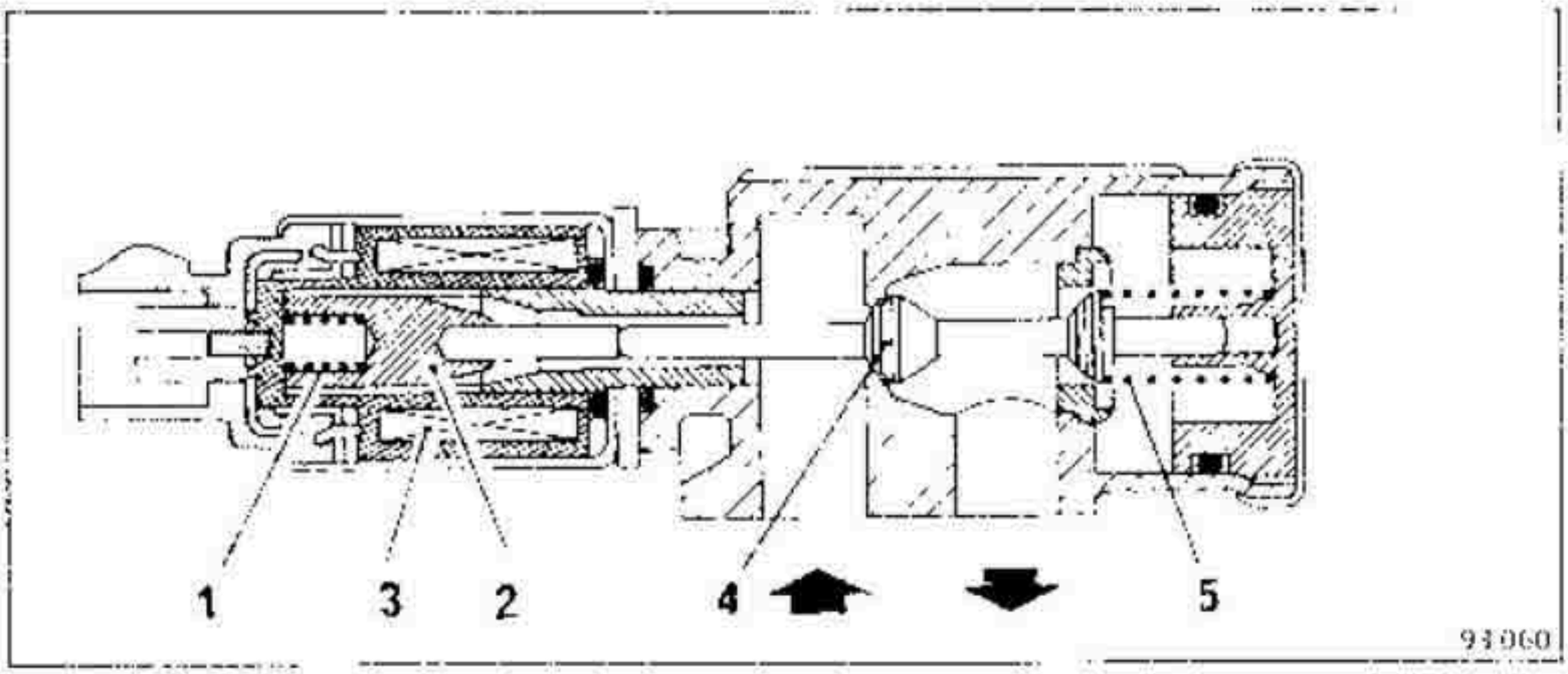


The valve is mounted on the intermediate manifold

Engines J7R - J7T



The valve (1) is mounted on the left hand section of the inlet manifold.



Operation:

The Hitachi idle speed regulation valve has a single winding (2 wire connector).

In rest position : the air circuit is closed

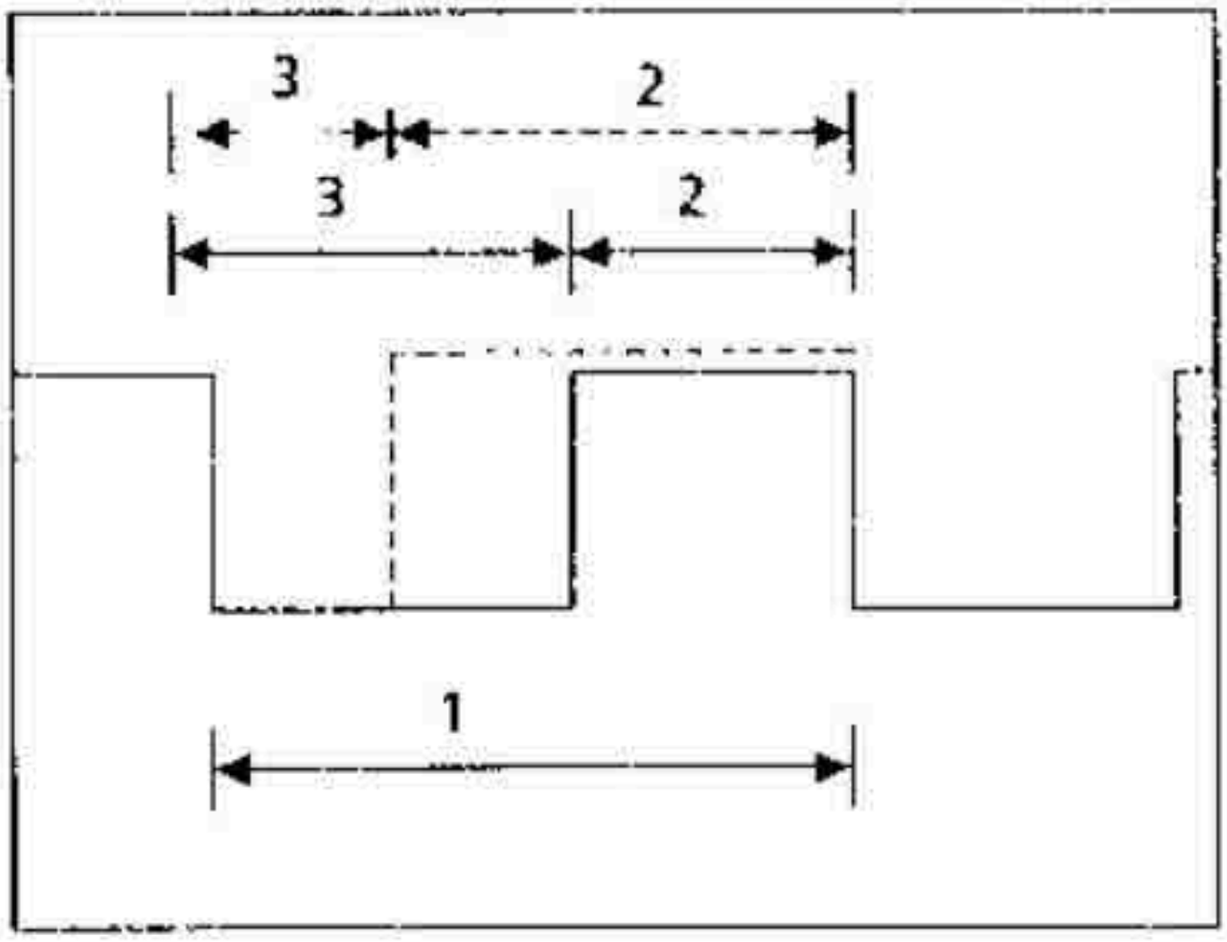
Valve (4) is pushed back by spring (5) to coil (3). The core (2) is held against the valve by the small spring (1).

Ignition on - Engine at idle speed :

The coil is fed : the magnetic field moves the core in the valve ; the valve opens
The computer retains a cyclical opening pattern corresponding to the required flow to obtain the correct idle speed (depending on engine operation conditions)

When operating, the valve has a constant feed of + 12 volts; the valve is therefore controlled by earthing. (application of a sequential earth time).

Principle of valve electrical control



1) Total feed period for valve.
(about 6,1 ms)

2) Sequential earth period for controlling valve opening. The maximum sequential earth period is 6 ms ; this corresponds to a valve opening of 100%.

3) XR25 reading : Using XR25. (pulse detector function : key connected to "Vin", enter G).
The value read represents the period when the valve is not operated. (Earth cut-off in relation to the total feed period)

3) XR25 reading (cont)
Example reading

Pulse detection (1)	Confirmation	RCO Idle #12
6 ms	The earth cut-off period is high. The valve is almost closed	0%
0,3 ms	The cut off time is low The valve is fully open.	100%
3,5 ms	For example, at idle speed when warm idle speed is respected by valve control	32%

(1) - Reading on track n° 2 of connector on valve (orange · green wire)

FAULT FINDING

If the idle speed regulation valve is faulty, the engine stalls when the accelerator is not depressed

Check:

The coil resistance (9 to 30 ohms)

The presence of + after ignition on the connector feed wire (voltage present, engine stopped, for about 1 second after the ignition is turned on)

Check circuit continuity between :
- track n°24 of the computer connector (computer disconnected and replaced by bornier M.S. 1048) and track n° 5 of the fuel pump relay connector (236). See chapter 17 wiring diagram.

ANTIFREEZE QUANTITY AND QUALITY

Engine	Quantity (in litres)	Quality	Notes
J7R J7T (12S) J8S Z7X	7 7 7,2 10	GLACEOL AL (type C) use coolant only	Protection to - 23 °C for hot temperate and cold countries Protection to - 40 °C for very cold countries

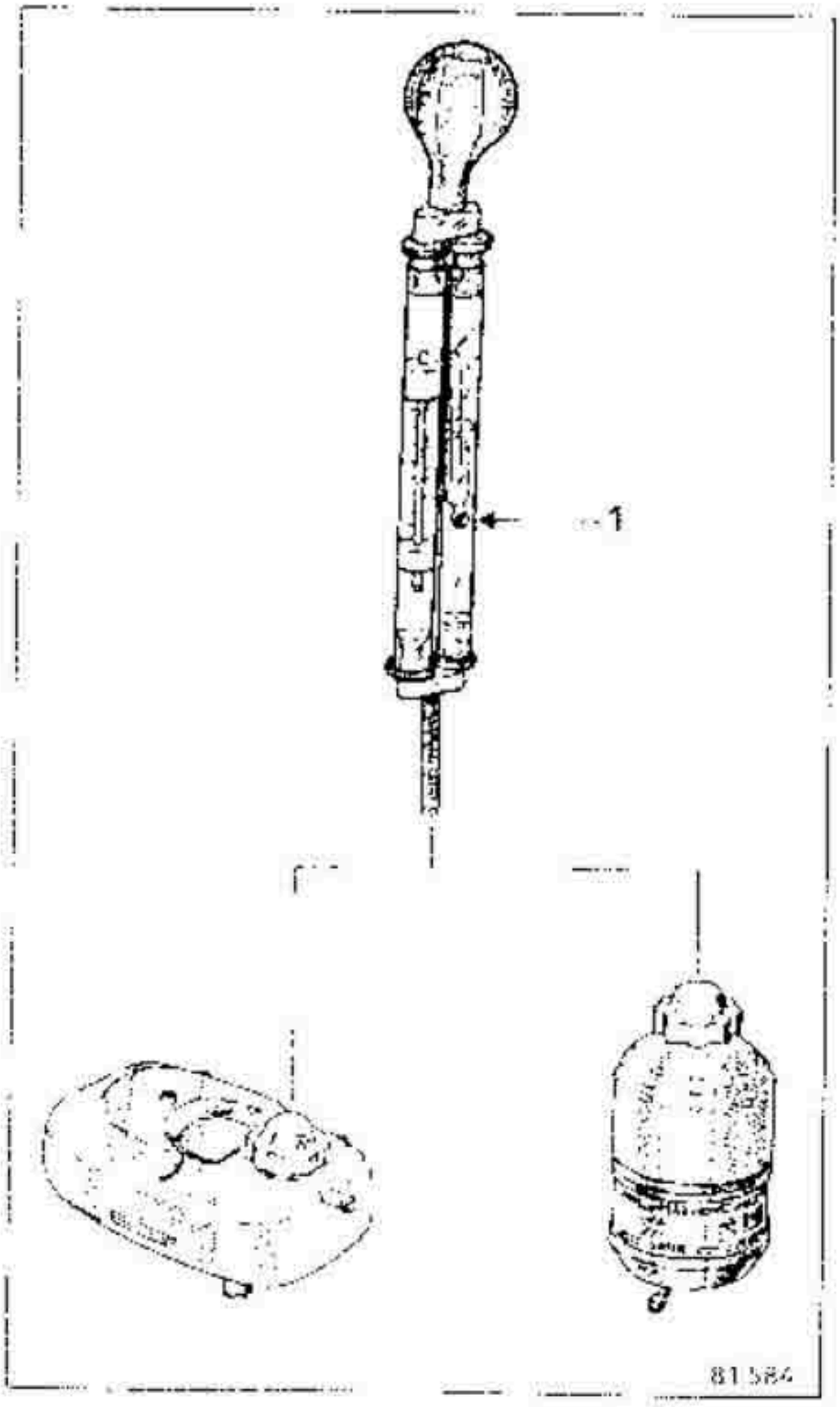
THERMOSTAT

Engine type	Starts opening (in °C)	Fully open (in °C)	Travel (in mm)
J7R J7T (12S) J8S	73	85	7,5
Z7X	84	115	7,5

ANTIFREEZE CONCENTRATION

HYDROMETER 778A*

Draw up coolant so that it covers the base of the thermometer and allows the hydrometer to float freely



(1) Hydrometer 778A*

*

Hydrometer

Supplier:
- FACOM
  Refer to your local After Sales Head Office for details.

OR

Refractometer

Supplier:
- CEPAC
  Refer to your local After Sales Head Office for details

See instructions provided with the equipment

Check that the hydrometer:

Does not touch the upper edge of the tube (too much liquid).

Is not stuck against the wall of the tube, if necessary tap gently to free it.

Read off:
- the temperature of the liquid,
- the density of the liquid.

Refer to the correction table to calculate the effective protection of the coolant.

	HYDROMETER READING						
	3	5	10	15	20	30	40
10	0	0	5	8	11	14	18
20	1	2	6	10	14	18	24
30	2	3	8	12	17	24	33
40	3	5	10	15	20	30	40
50	4	7	12	18	24	35	
60	6	9	15	22	28	40	
70	8	12	18	25	32		
80	10	14	22	32	37		
	PROTECTION IN DEGREES						

EXAMPLE { Thermometer reading . 60 } PROTECTION
{ Hydrometer reading . 10 } to MINUS 15°C

Hot, temperate and cold countries :

Protection - **23 °C (35 %** antifreeze mixture).

Very cold countries :

Protection - **40 °C (50 %** antifreeze mixture).

Protection reduces if the concentration exceeds **60 %** antifreeze.

The protection values in the table are valid for a liquid temperature of 40 °C.

Using the following tables.

On vehicles with a **6 litres** liquid capacity, for a protection value reading of - **15 °C**

To increase to a protection value of - **23 °C, 0,7** litre of circuit mixture must be replaced with **0,7** litre of pure antifreeze.

To increase to a protection value of - **40 °C, 1,9** litre of circuit mixture must be replaced with **1,9** litre of pure antifreeze

AMOUNT OF PURE ANTIFREEZE TO ADD

- 23 °C
Hot temperate and cold countries

Protection read at 40 °C (liquid temperature)	Volume of liquid to be replaced with Glaceol AL Anti-freeze mixture Type C for protection -23 °C	Circuit capacity (litres) 5	6	7	8	9
- 5 °C		1,3	1,6	1,8	2,1	2,4
- 10 °C		1,0	1,1	1,3	1,5	1,7
- 15 °C		0,6	0,7	0,9	1,0	1,1
- 20 °C		0,2	0,2	0,2	0,3	0,3

- 40 °C
Very cold countries

Protection read at 40 °C (liquid temperature)	Volume of liquid to be replaced with Glaceol AL Anti-freeze mixture Type C for protection -40 °C	Circuit capacity (litres) 5	6	7	8	9
- 5 °C		2,2	2,6	3,1	3,5	3,6
- 10 °C		1,9	2,3	2,7	3,0	3,4
- 15 °C		1,6	1,9	2,2	2,6	3,0
- 20 °C		1,3	1,6	1,8	2,0	2,3
- 25 °C		1,0	1,2	1,4	1,7	1,9
30 °C		0,9	1,0	1,2	1,4	1,5
- 35 °C		0,5	0,5	0,6	0,7	0,8

ALUMINIUM

Certain vehicles are fitted with radiators with aluminium cores.

Rinsing

Do not rinse this type of equipment or the cooling circuit with caustic soda or alkaline products (risk of corrosion to light alloy elements which could cause leaks).

Storage

Radiators which have been removed may be stored with no special precautions for a maximum of **48 hours**.

After this period, the brazing solder particles which entered the radiator during manufacture, and the dichlorides in the coolant which was previously in the radiator, begin to oxidise the aluminium components of the radiator when they are exposed to the air and to cause leaks.

If a radiator is removed for more than **48 hours**, it is therefore necessary to :

- **RINSE WELL** with water, **BLOW OUT** with compressed air and **PLUG** all openings

- or keep the radiator filled with coolant if this is possible.

Antifreeze

Aluminium radiators require a special type of antifreeze.

AL type C antifreeze which is sold by the **RENAULT Network** fulfils the specifications of the Technical Department for :

- non-reactivity in relation to the various aluminium and cast elements,

- alkaline content which is specially adapted for particular light alloys ,

- special additives which guarantee efficient protection against acidic combustion products, both for Diesel and Petrol versions. ,

- concentration giving protection and good operation at all temperatures.

There is no heater matrix valve.

Circulation in the heater matrix is continuous, aiding engine cooling.

FILLING

Check the drain plugs are tight.

Open the bleed screws.

Fill the circuit through the expansion bottle opening.

Close the bleed screws as soon as liquid emerges in a constant jet.

Start the engine (1 500 rpm).

Adjust the level by overflow after about
4 minutes

Close the reservoir.

BLEEDING

Run the engine for 10 minutes at 1 500 rpm, until the engine cooling fan operates. (Period required for automatic degassing).

Check the liquid level is near "Max".

DO NOT OPEN THE BLEED SCREWS WHEN THE ENGINE IS RUNNING

RETIGHTEN THE EXPANSION BOTTLE PLUG WHEN THE ENGINE IS WARM

SPECIAL TOOLING REQUIRED

M.S.	554-05	Kit for testing cooling circuit sealing
M.S.	554-01	Adaptor for M.S. 554-05
M.S.	554-06	Adaptor for M.S. 554-05

1 - Checking the sealing of the circuit

Replace the expansion bottle valve with tool **M.S. 554-01**.

Connect this to tool **M.S. 554-05**

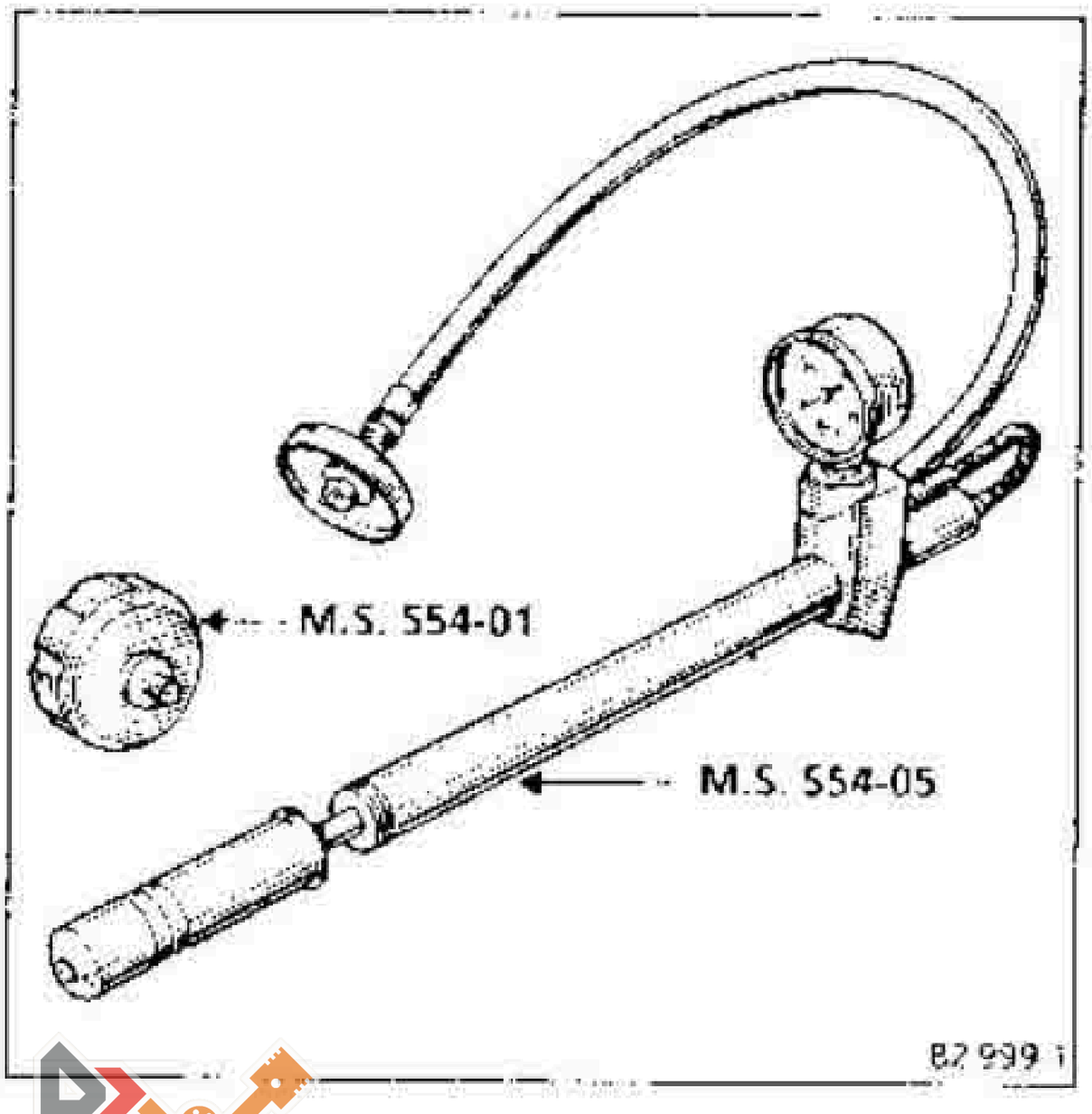
Warm the engine then stop it.

Pump to pressurise the circuit.

Stop pumping at **0,1 bar** below the valve setting

The pressure should not drop, if it does, locate the leak.

Slowly unscrew the connecting piece of tool **M.S. 554-05** to decompress the cooling circuit, then remove tool **M.S. 554-01** and refit the expansion bottle valve with a new seal



2 - Checking the valve setting

When liquid passes the expansion bottle valve, it must be replaced.

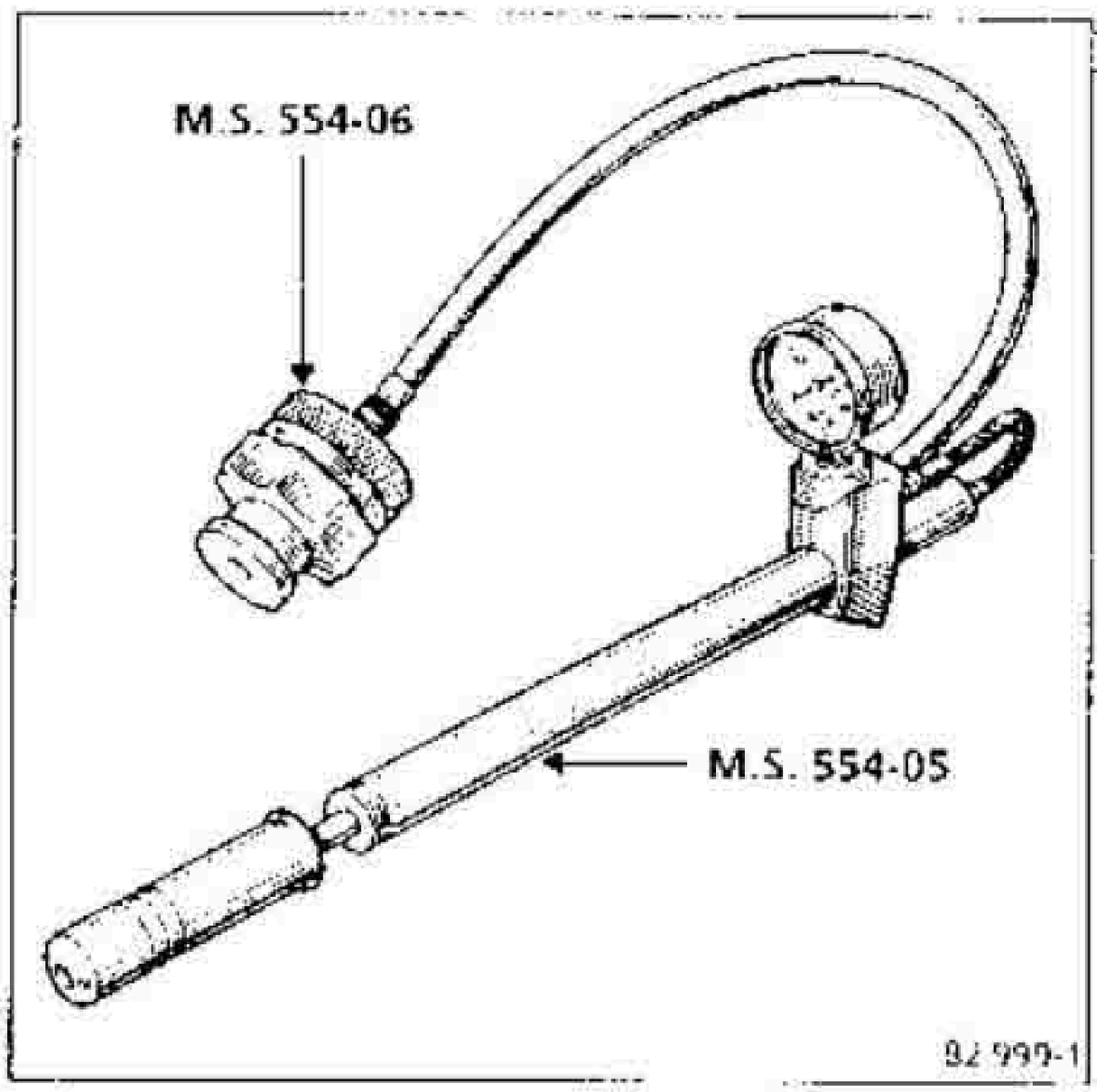
Fit on to tool **M.S. 554-05** tool
M.S. 554-06 and fit the assembly on to the valve to be inspected.

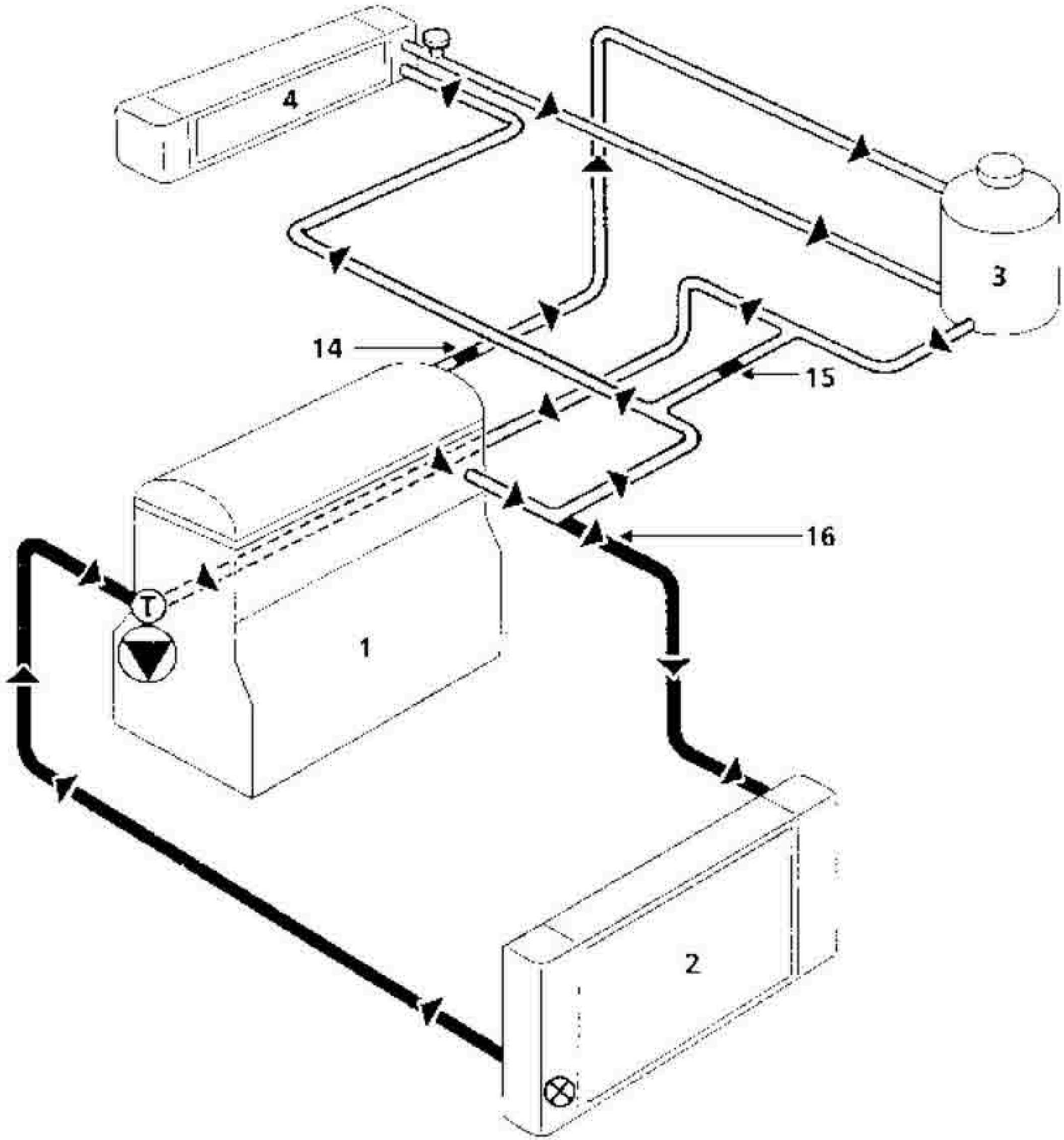
Increase the pressure, which should stabilise at the valve setting pressure, inspection tolerance **± 0,1 bar**

Valve setting value :

Brown plastic valve **1,2 bar**.

Blue plastic valve **1,6 bar**.





1 Engine
2 Radiator
3 "Hot" bottle with permanent degassing
4 Heater matrix
14 Restriction Ø 3 mm
15 By-pass Ø 8,5 mm
16 Nozzle Ø 22 mm

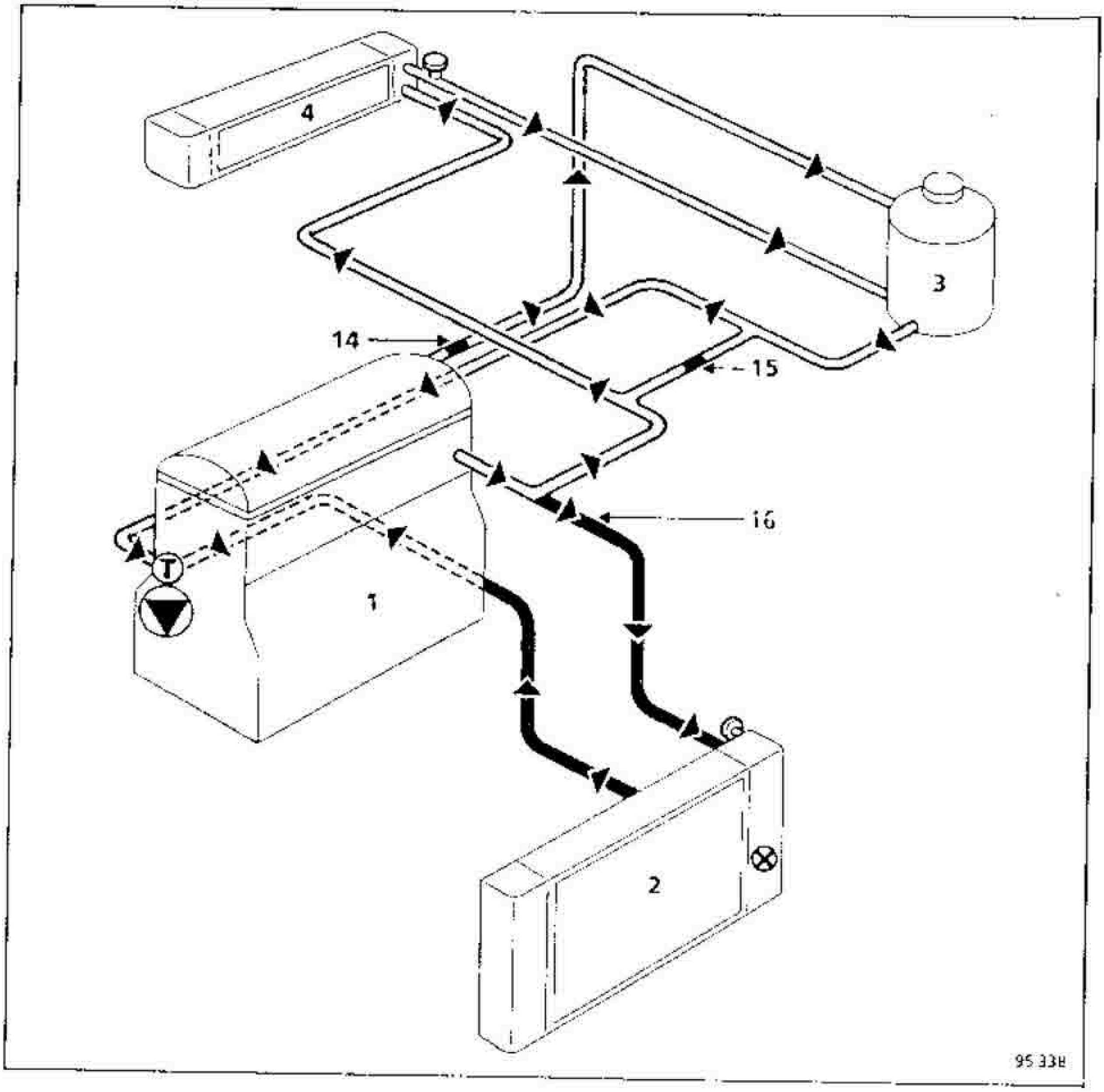
Water pump

Thermostat

Bleed valve

Temperature switch

The expansion bottle valve is set at **1,2 bar**



1 Engine
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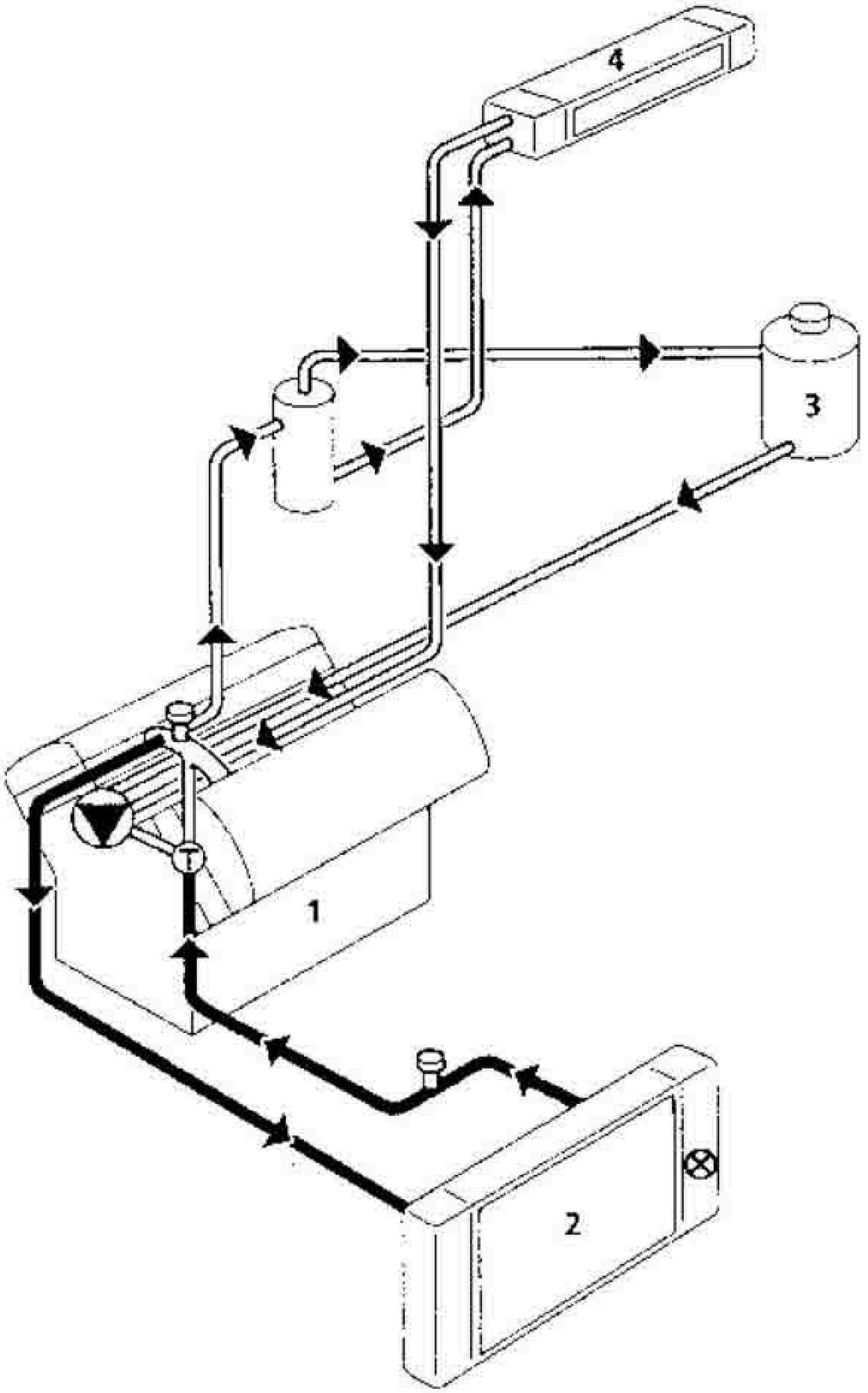

1 Engine
2 Radiator
3 "Hot" bottle
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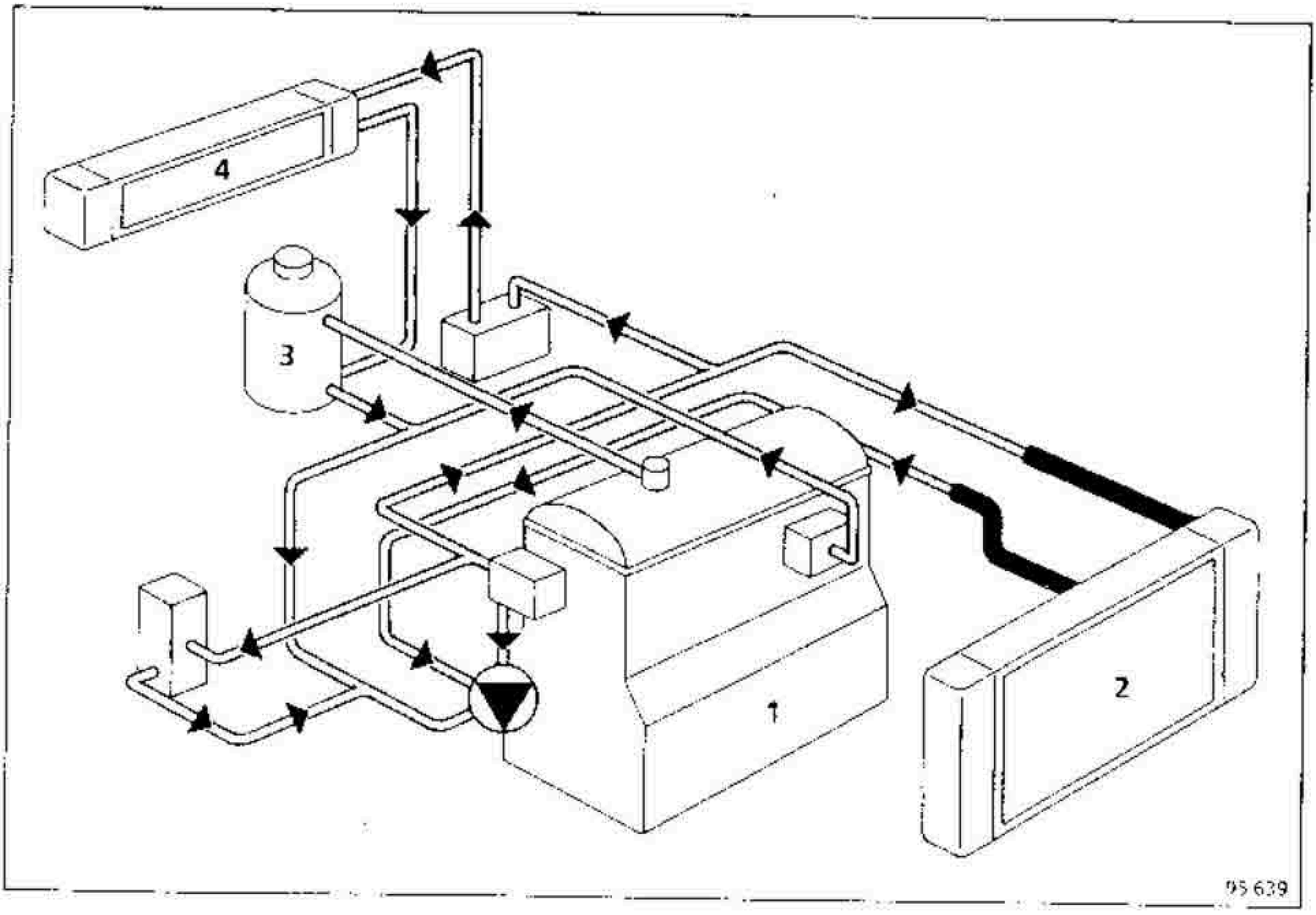
Water pump

Thermostat

Bleed valve

Temperature switch

The expansion bottle valve is set to **1,2 bar**.



1 Engine
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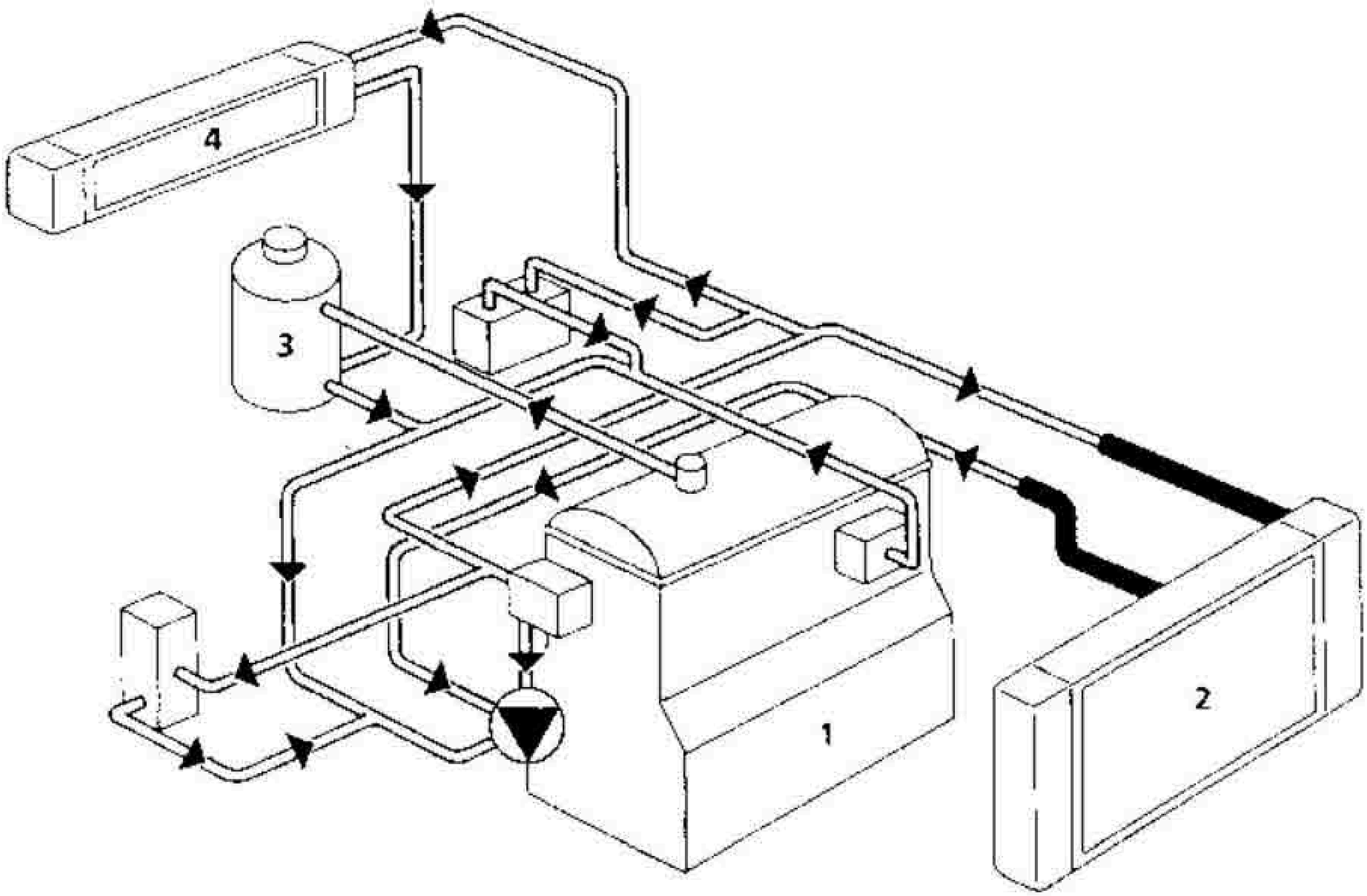
Water pump

Thermostat

Bleed valve

Temperature switch

The expansion bottle valve is set to **1,2 bar**.



1 Engine
2 Radiator
3 "Hot" bottle
4 Heater matrix

Water pump

Thermostat

Bleed valve

Temperature switch

The expansion bottle valve is set to 1,2 bar.

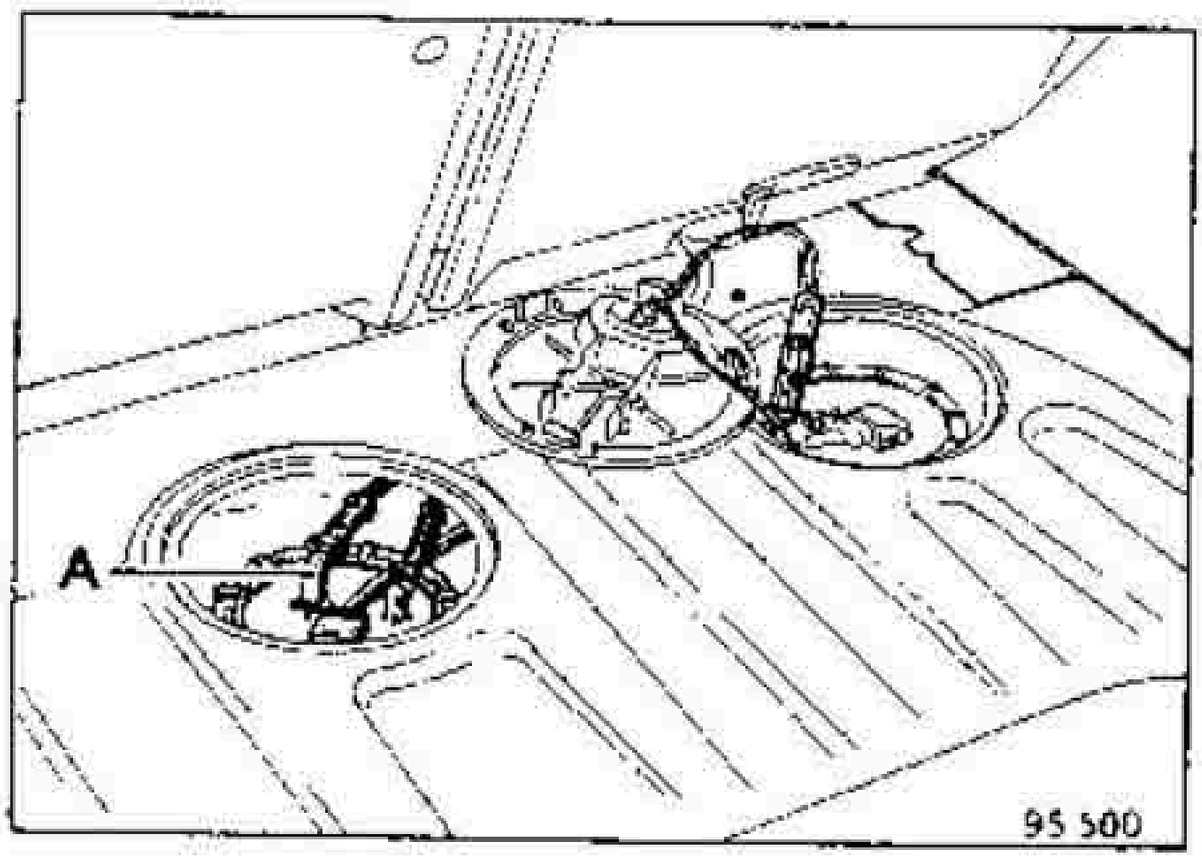
REMOVAL - REFITTING

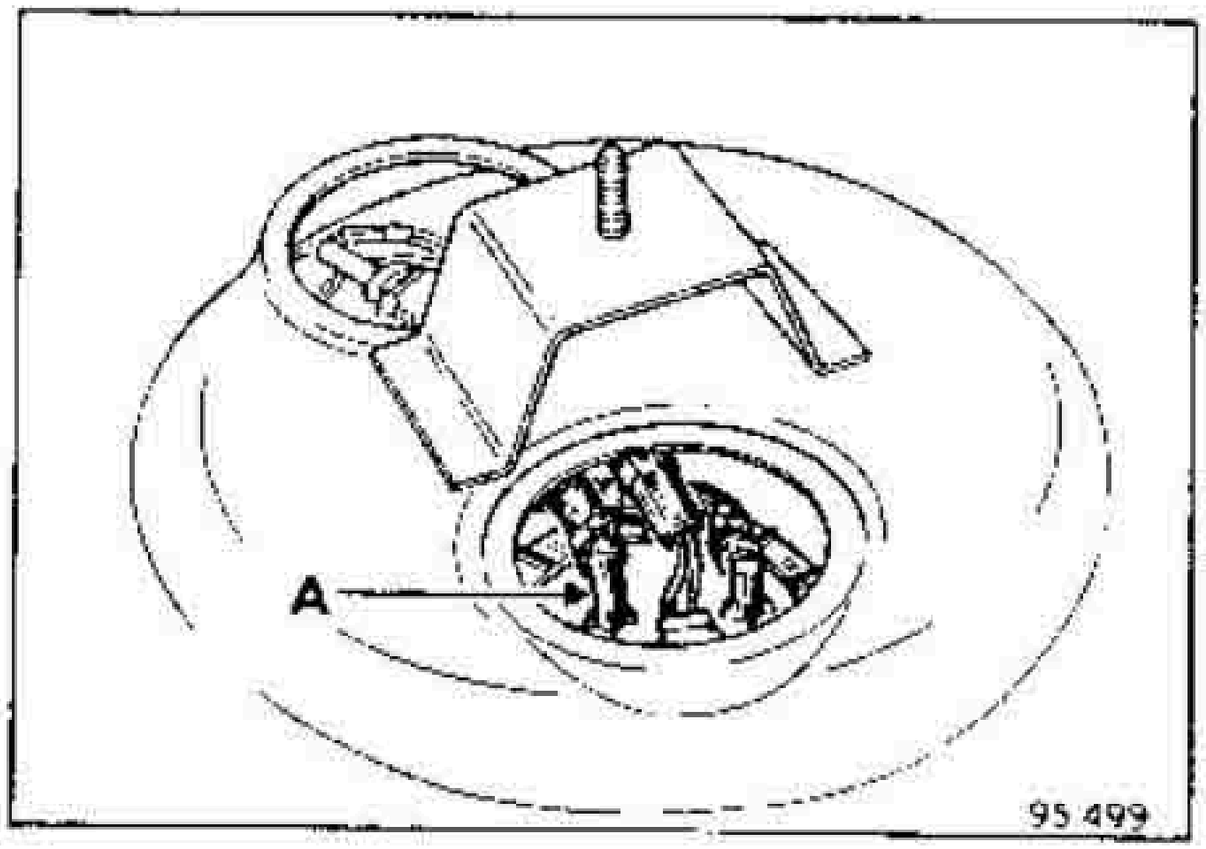
TIGHTENING TORQUES (in daN.m)	
Fuel filter mounting (tighten until the filter no longer rotates in its position)	0,4
Tank retaining strap	3,5
Rear axle assembly on body	9,5
Filler neck on body	3,5
Pump and gauge nut	5 max.

IMPORTANT : while removing and refitting the fuel tank, do not smoke or bring heat sources into the working area.

DRAINING THE FUEL TANK (petrol versions)

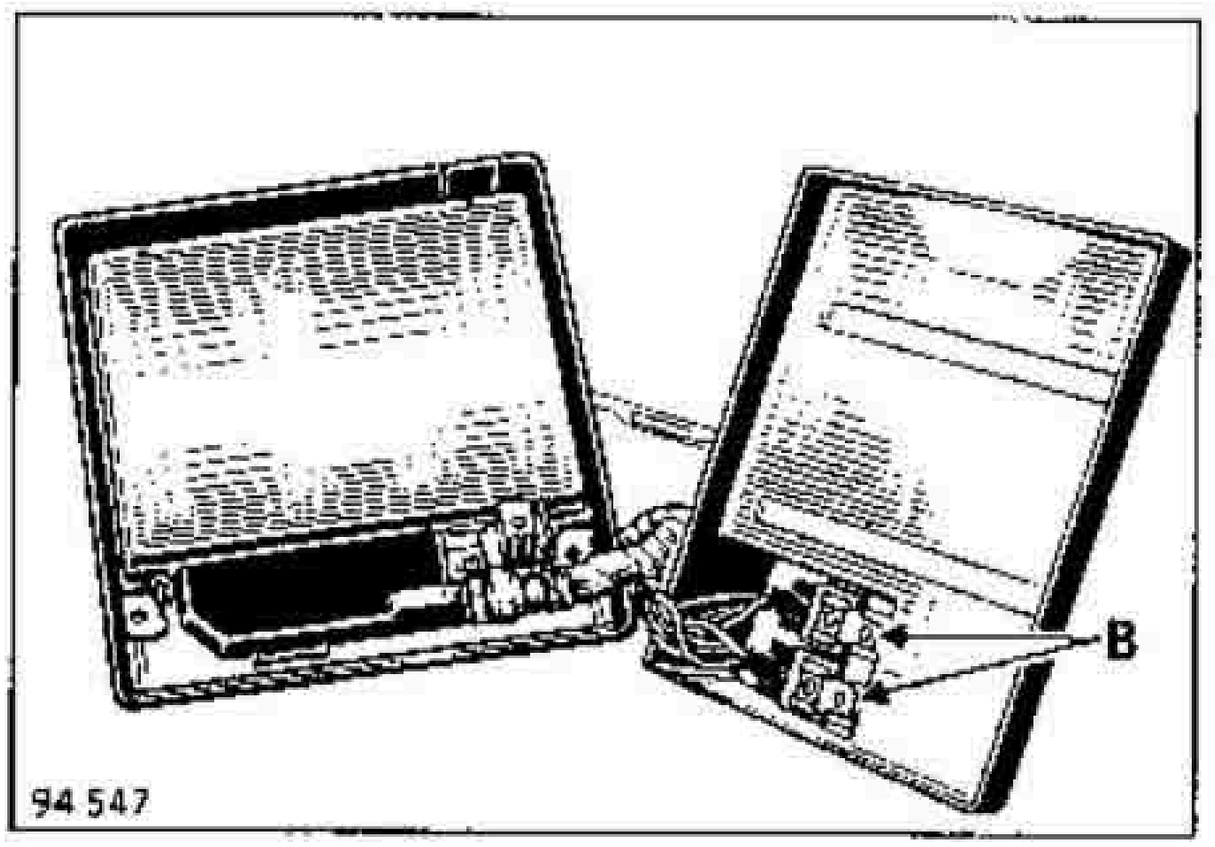
Fit a flexible pipe on to the fuel pump outlet through the access hole in the boot (A) (tube must be long enough to put the other end into a container).





Open the computer protective cover, disconnect the fuel pump relay (large wires Ø 5 mm) and shunt tracks 3 and 5.

The fuel pump operates.



B Fuel pump relay (wires Ø 5 mm) and injection locking relay

Let the fuel pump out until it emerges intermittently. Do not continue for more than a minute under these conditions, disconnect the shunt. (Reconnect the relay).

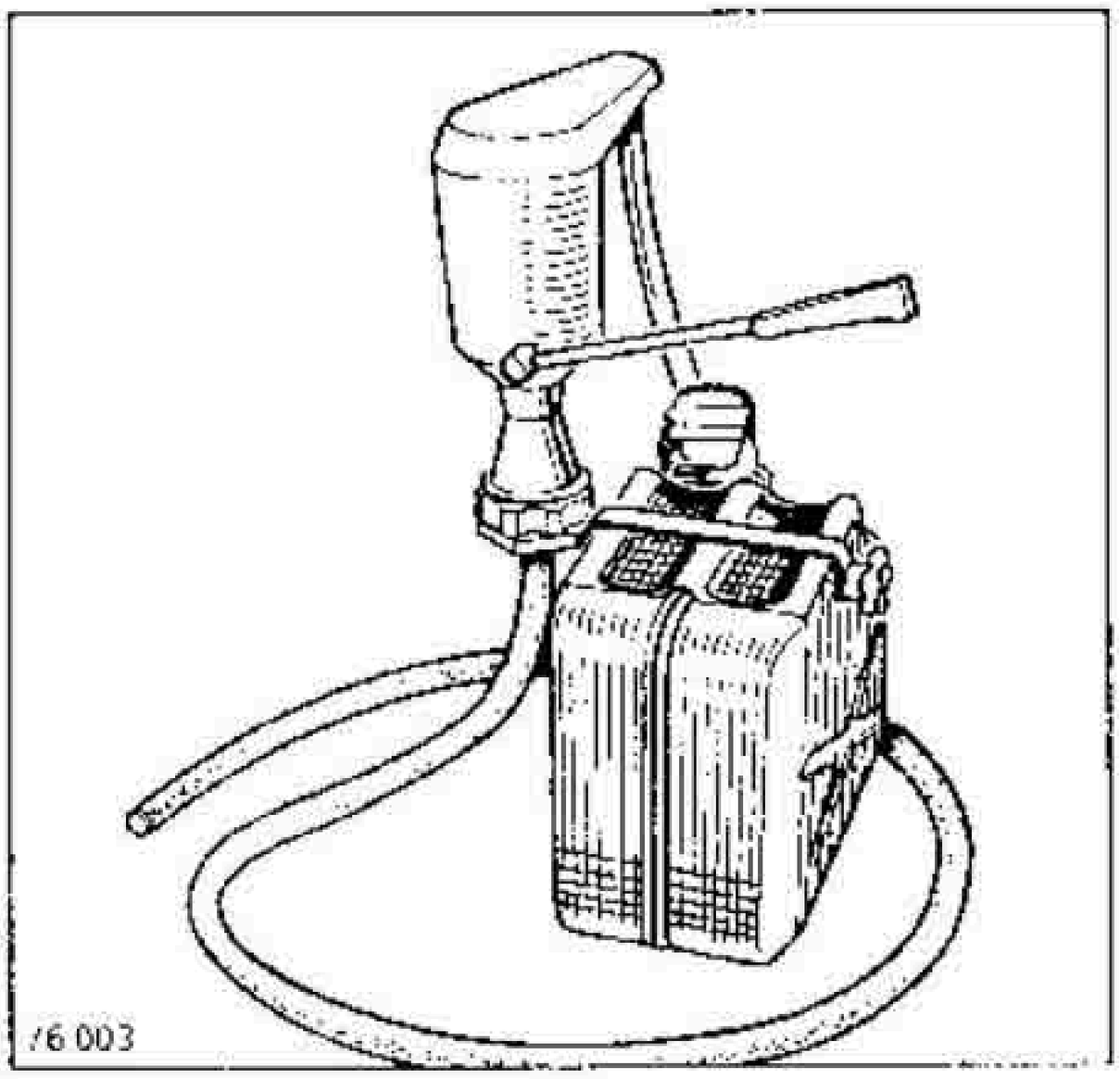
Disconnect the battery

Draining the fuel tank (diesel versions)

A pump must be used to drain the fuel tank as there is no electric fuel pump.

For example use the "piston pump 333" supplied by:

La Compagnie des Pompes et Distributeurs
7, rue J. Macé 92150 Suresnes
Tél. 45 06 23 95



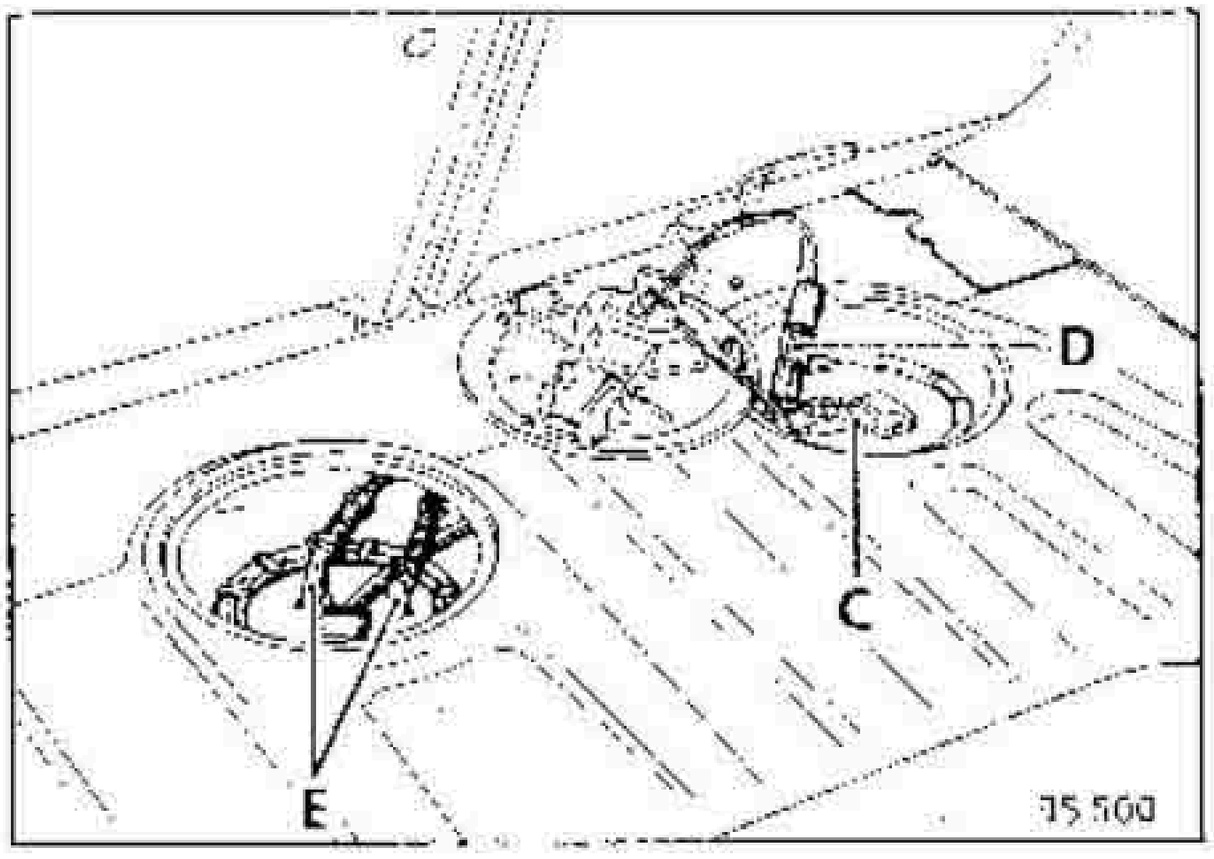
REFITTING THE FUEL TANK

If the vehicle is on a 4 post lift, put the rear of the vehicle on axle stands.

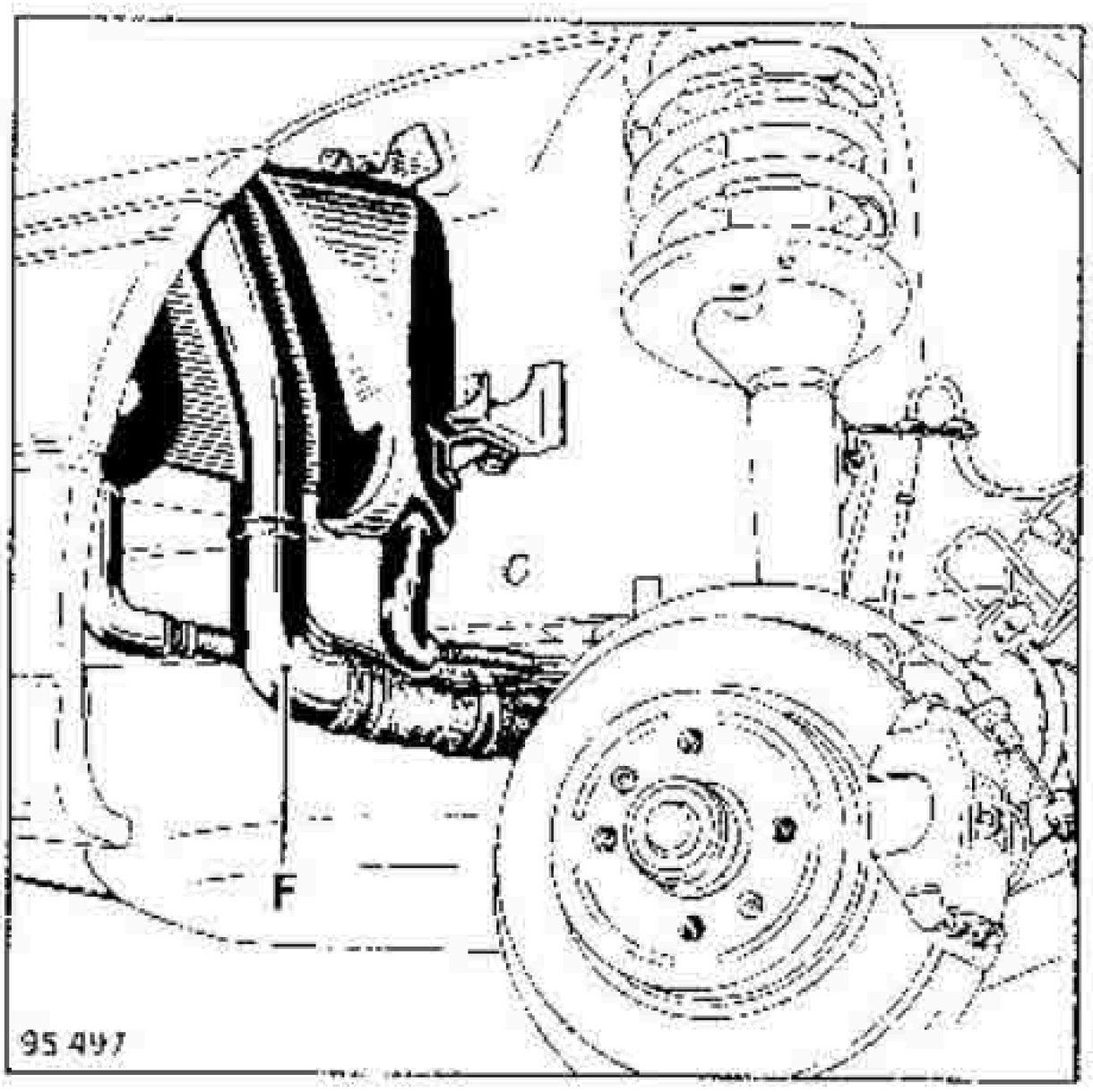
To remove the fuel tank, the whole of the rear axle assembly must be removed.

First of all, from inside the boot, under the carpet, disconnect the tank sender unit wiring (C) and the pump wiring (D).

On the pump, disconnect the fuel inlet and return lines (E).

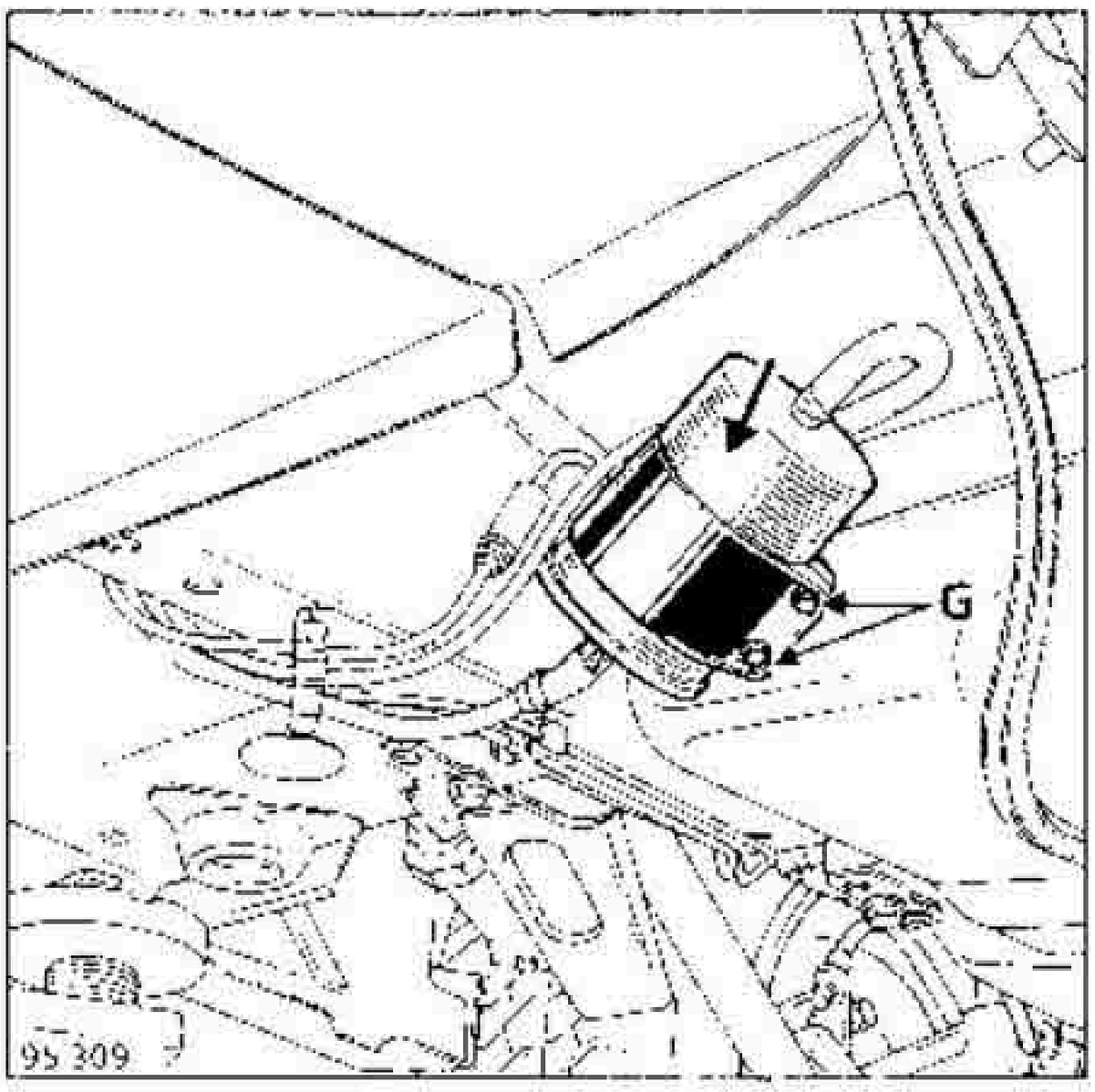


From under the vehicle, disconnect the pipes on the filler neck (F).



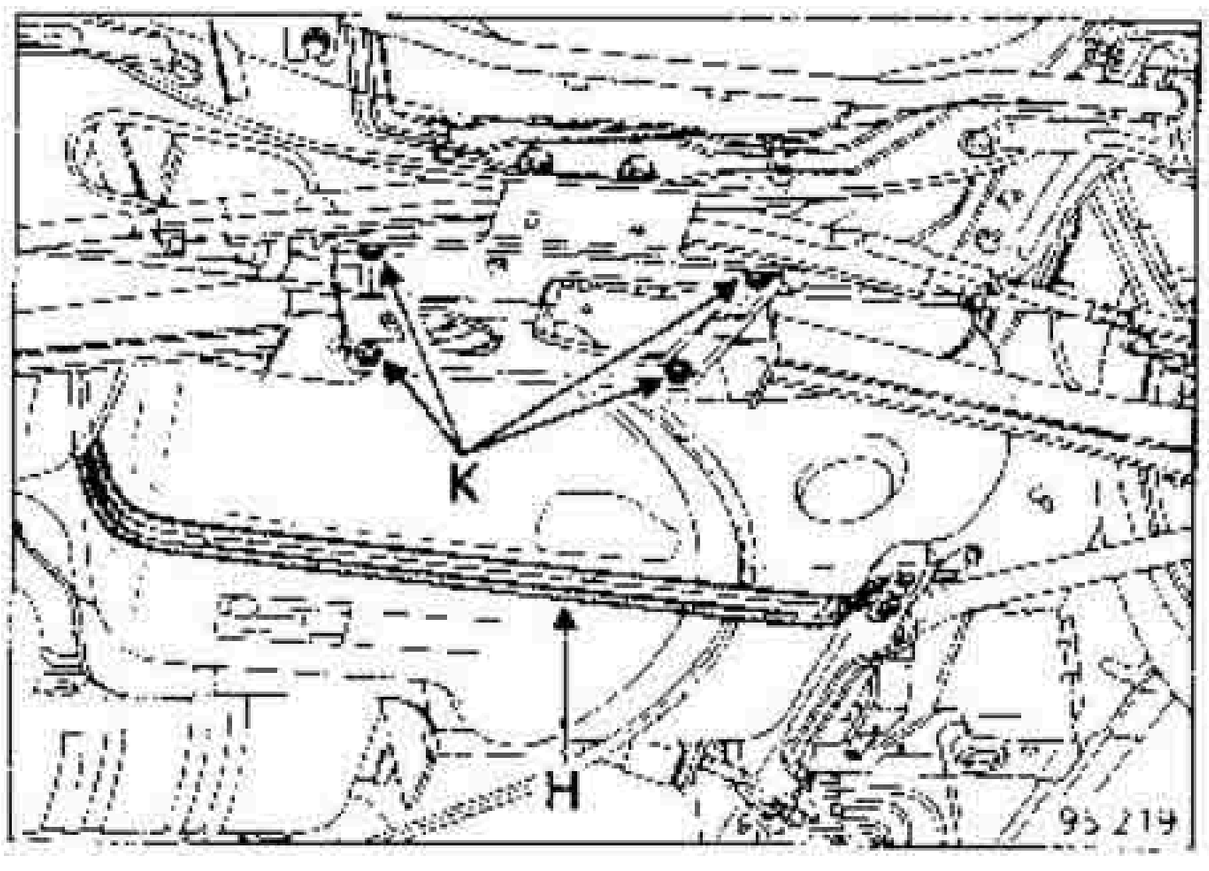
Loosen the fuel filter retaining strap (G).

Remove the fuel filter and the two pipes.

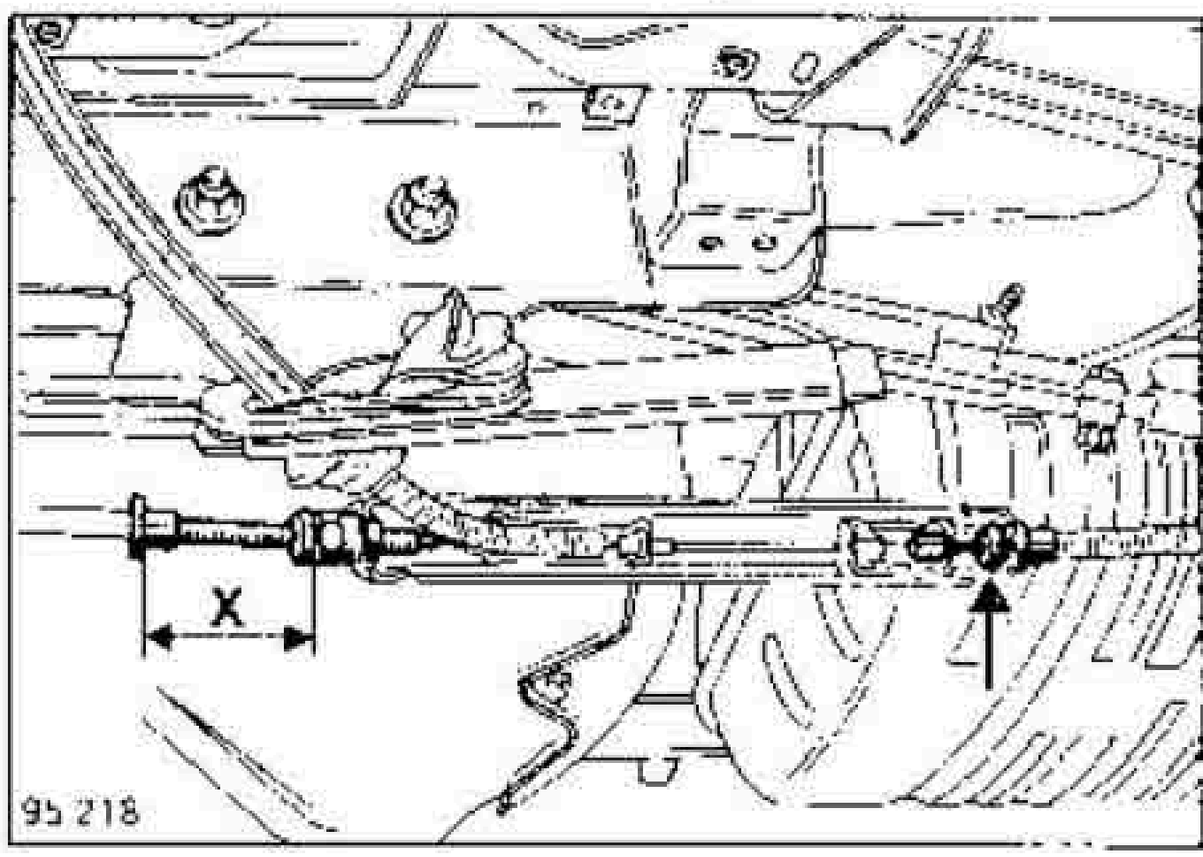


Remove:

- the fuel tank retaining strap (H),
- the four support bolts for the handbrake cable guide (K).



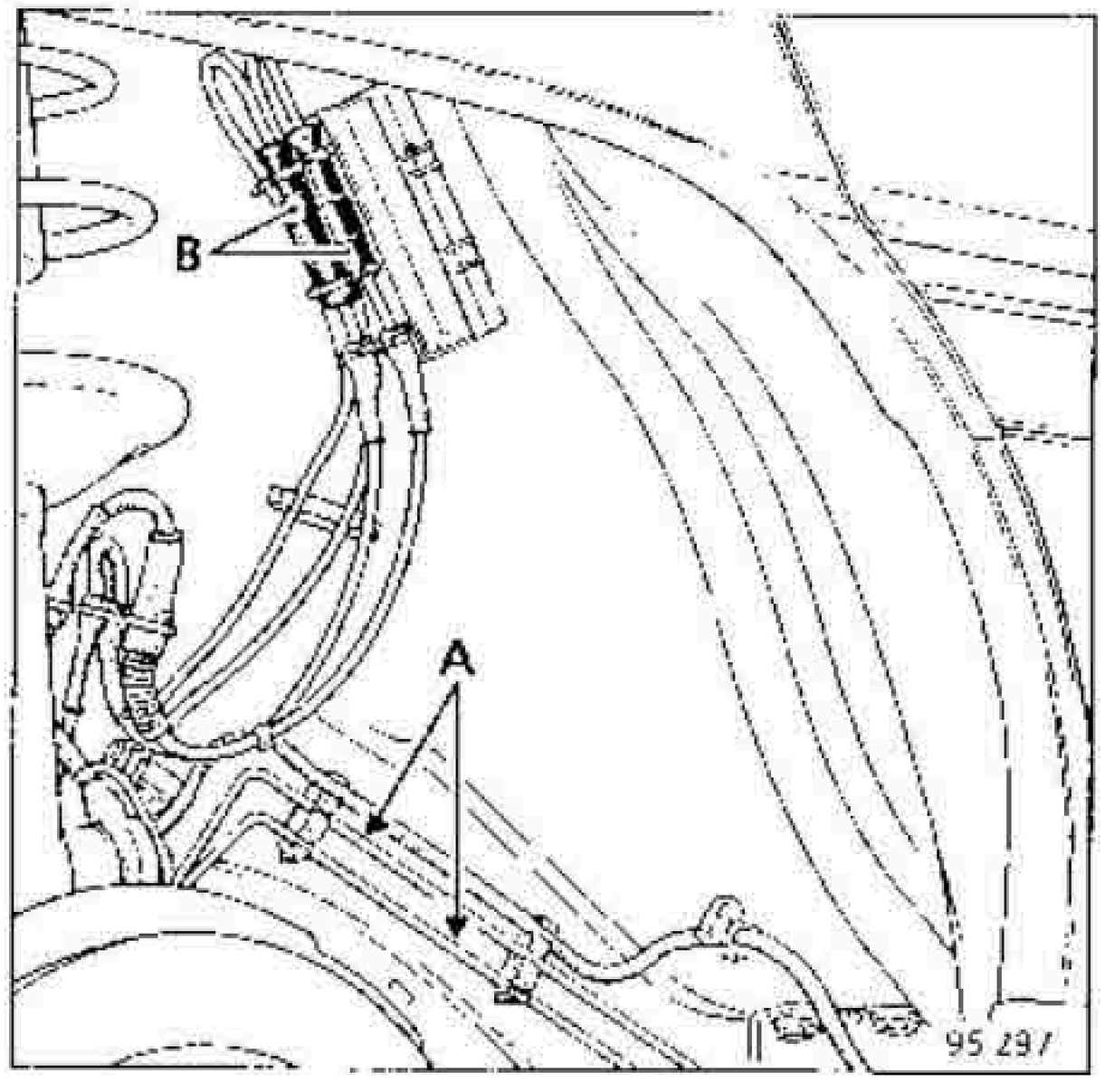
On the guide measure distance "X" before moving the part.



Move the part to release the left hand cable (remove the plastic cable stop with care).

Release the guide at the side.

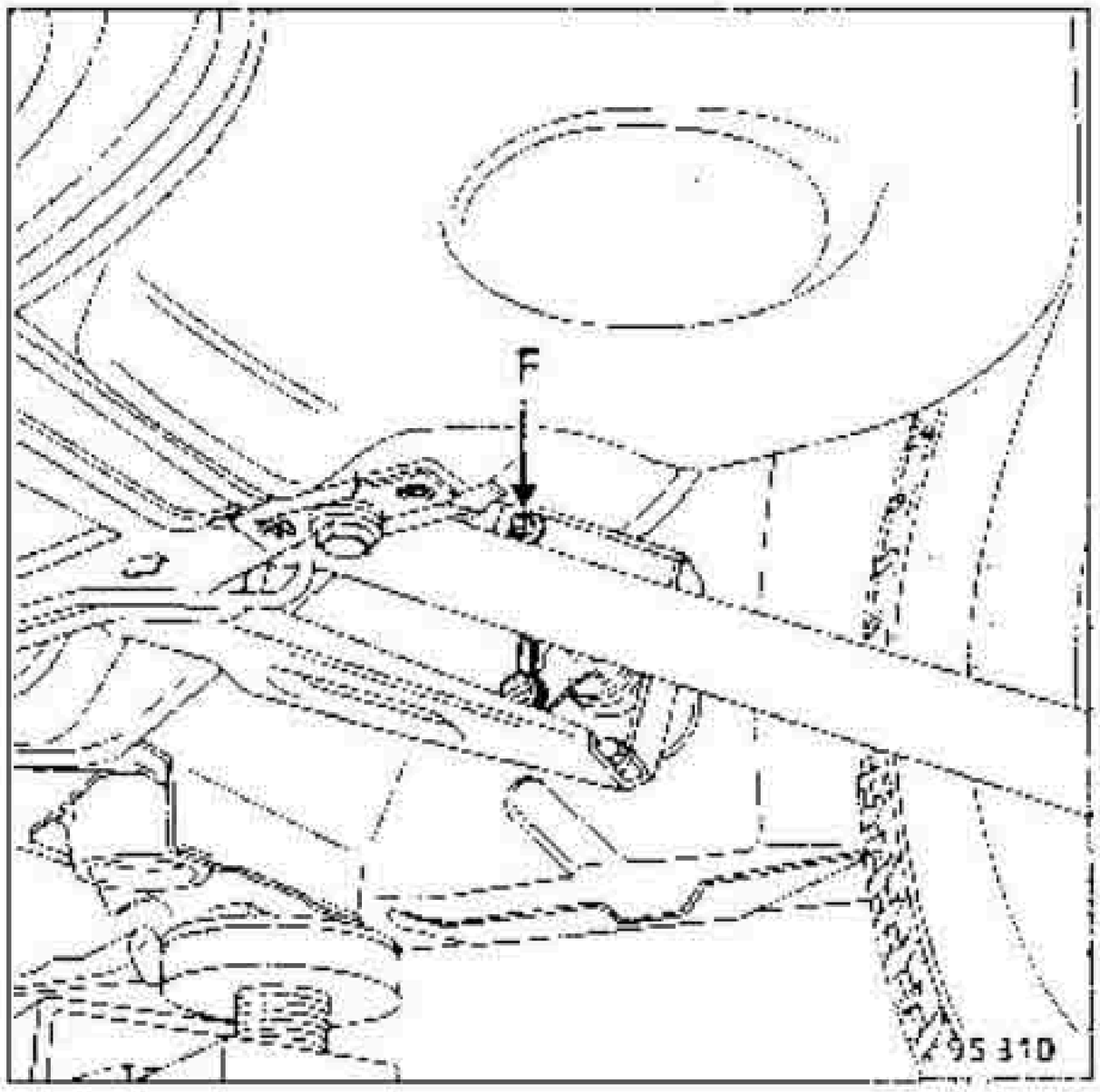
In the rear left hand wheel arch, unclip the two brake pipes (A) and the two controlled suspension connectors (B).



Fit the jack under the rear axle assembly and take the weight.

ATTENTION : if the vehicle is fitted with electronically controlled suspension, the position sensor links must be disconnected.

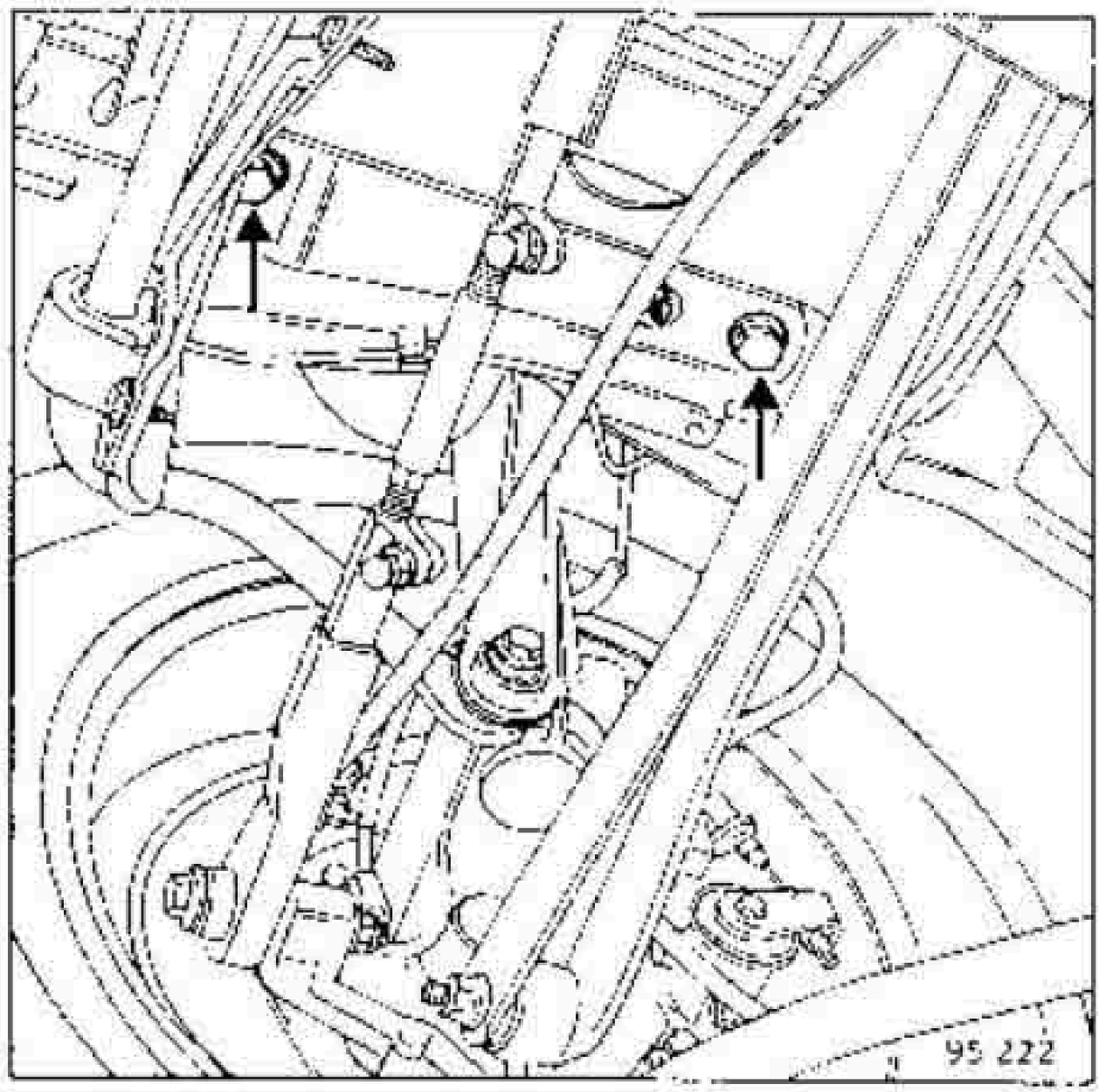
Remove the link nut (F).



IMPERATIVE : the jack must support the weight of the rear axle assembly.

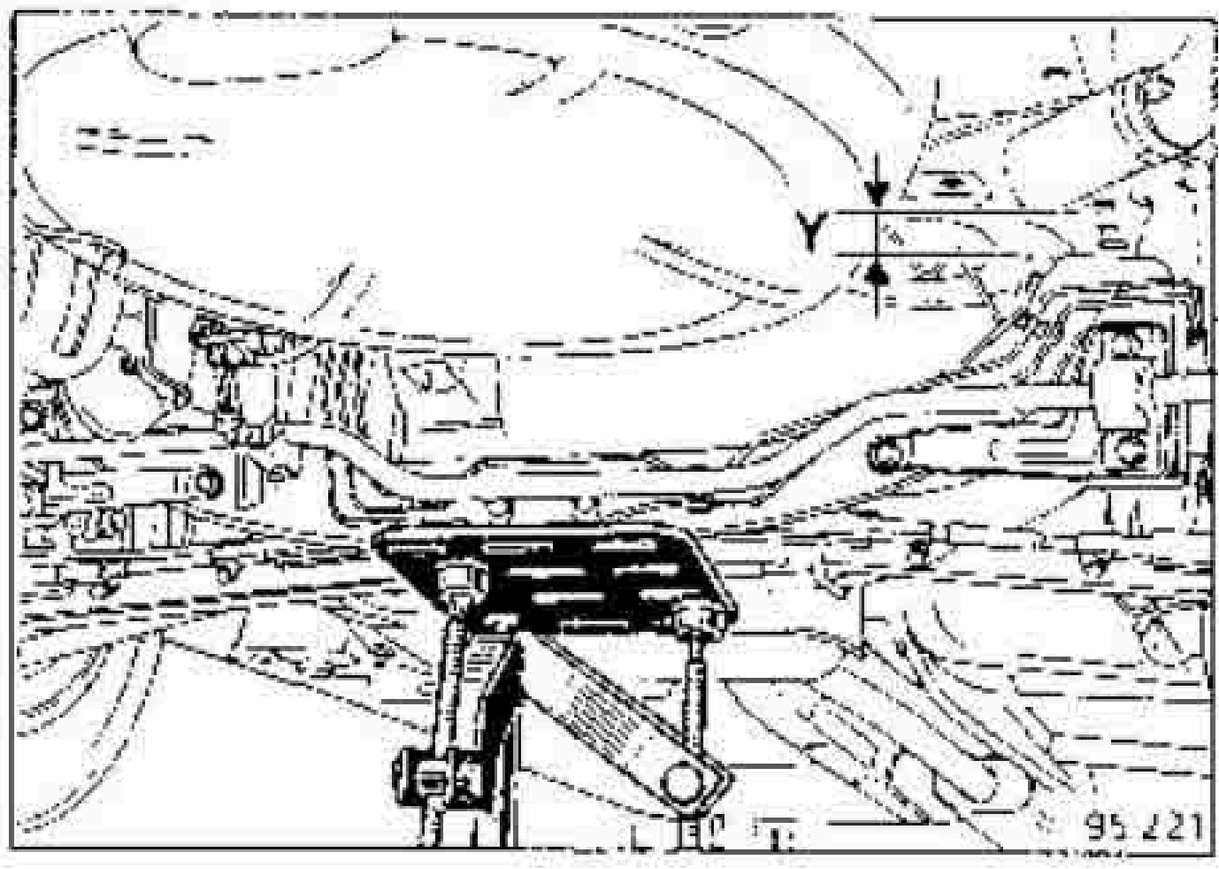
Remove the four mounting bolts fixing the rear axle assembly on to the body

Left hand side



While supporting the fuel tank, slowly lower the support under the rear axle until the fuel tank can be released.

(The axle must be lowered about **60 mm (Y)**).

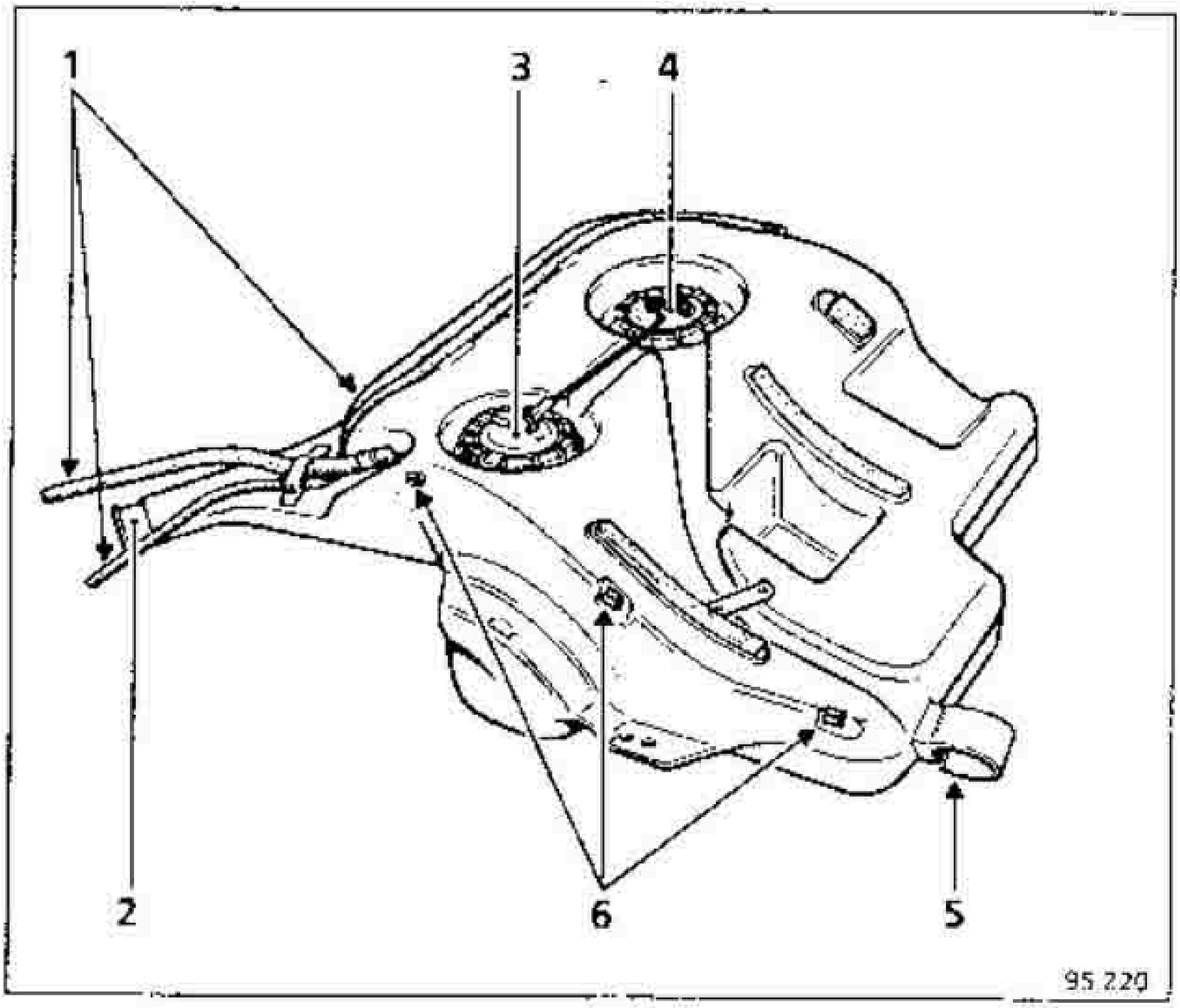


The fuel tank tips forwards.

When removing the fuel tank, unhook the fuel vapour recycling pipe.

ATTENTION : some fuel may still remain in the fuel tank, even after it has been drained.

FUEL TANK ASSEMBLY



1 Vent pipes
2 Filler neck connection
3 Fuel tank sender unit
4 Fuel pump
5 Filter retaining strap
6 Petrol vapour rebreathing pipe fixings

(See special notes on electric fuel pumps, chapter 13).

REFITTING THE FUEL TANK

When refitting the fuel tank in its position, replace the petrol vapour rebreathing pipe and the fuel pipes and the fuel filter.

Fit the strap to support the fuel tank.

Refit the rear axle assembly, using the centring dowels.

Connect the brake lines to the body. On the handbrake cable guide, adjust to distance "X" and tighten the counter nut.

Refit the cable under the fuel tank strap, and finally tighten the strap.

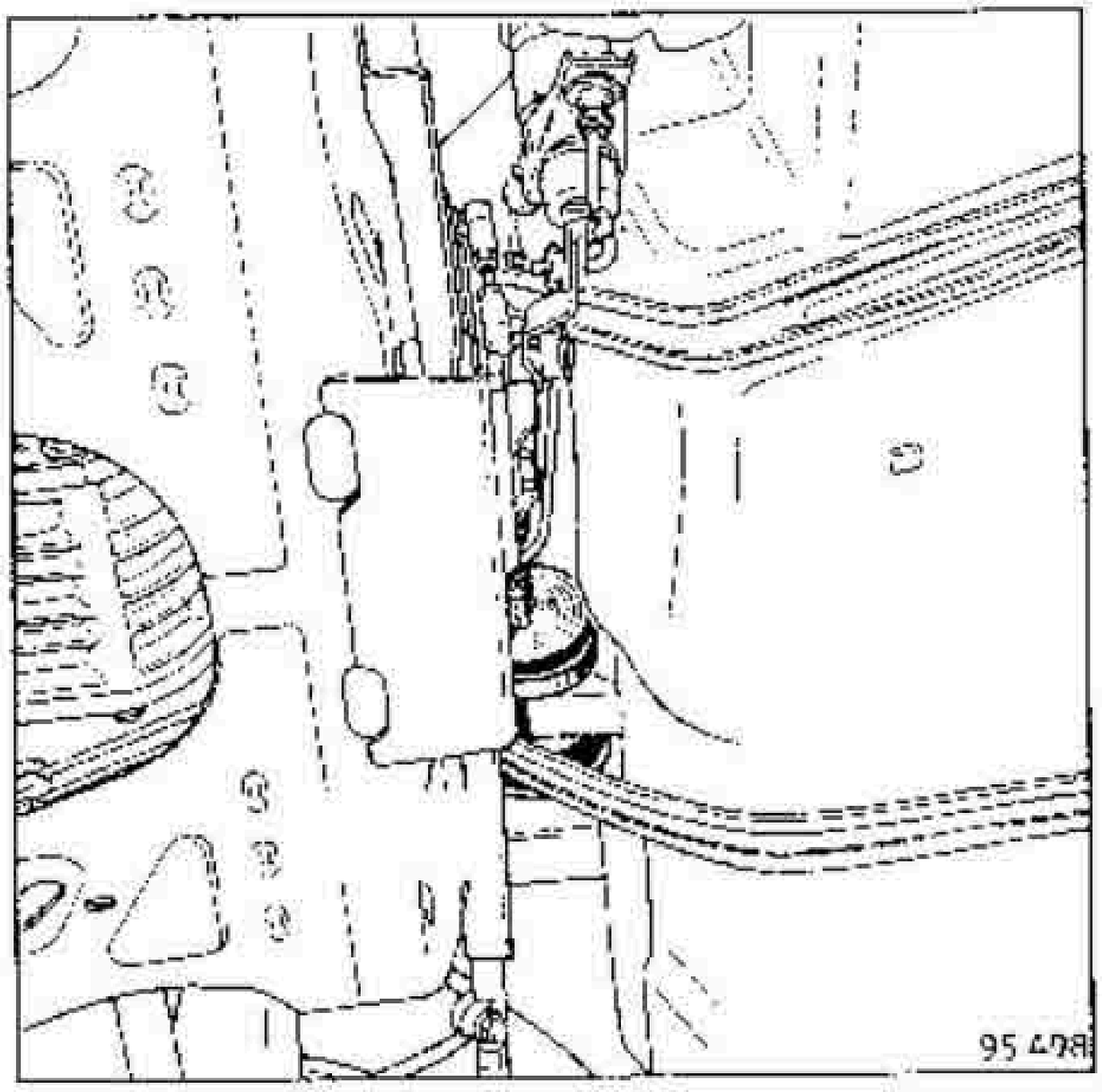
Replace any collars which were damaged during removal at the filler neck connection.

REMOVAL - REFITTING

Put the vehicle on a two post lift.

Drain the fuel tank (see pages 19-12 and 19-13).

Disconnect the fuel pipe from the filter under the vehicle.



Remove the plastic cover in the rear right hand wheel arch (filler neck protection), (5 bolts and one panel nut).

In the boot, disconnect the fuel return pipe on the fuel pump and the electrical connectors

At the filling flap, remove the rubber around the filler neck.

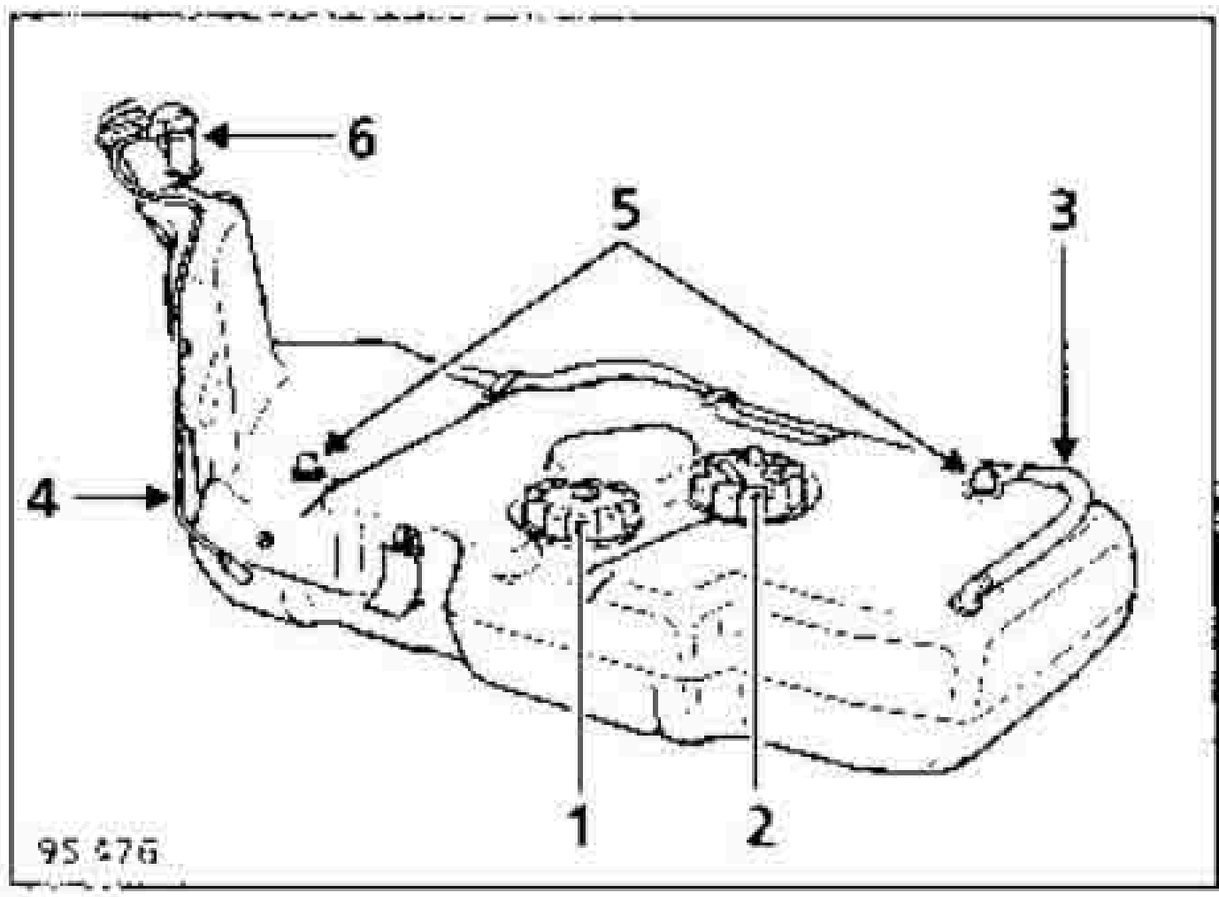
Disconnect the petrol vapour rebreather pipe at the bottom of the filler neck.

Fit the jack under the fuel tank .

Remove the fuel tank retaining strap bolts (bumper side).

Lower the fuel tank

FUEL TANK ASSEMBLY



1 Fuel tank sender unit
2 Fuel pump
3 Degassing pipe
4 Petrol vapour rebreathing pipe to canister
5 Centring dowels (positioned under body)
6 Anti-leak non-return valve in case of tipping over or overpressure or underpressure.

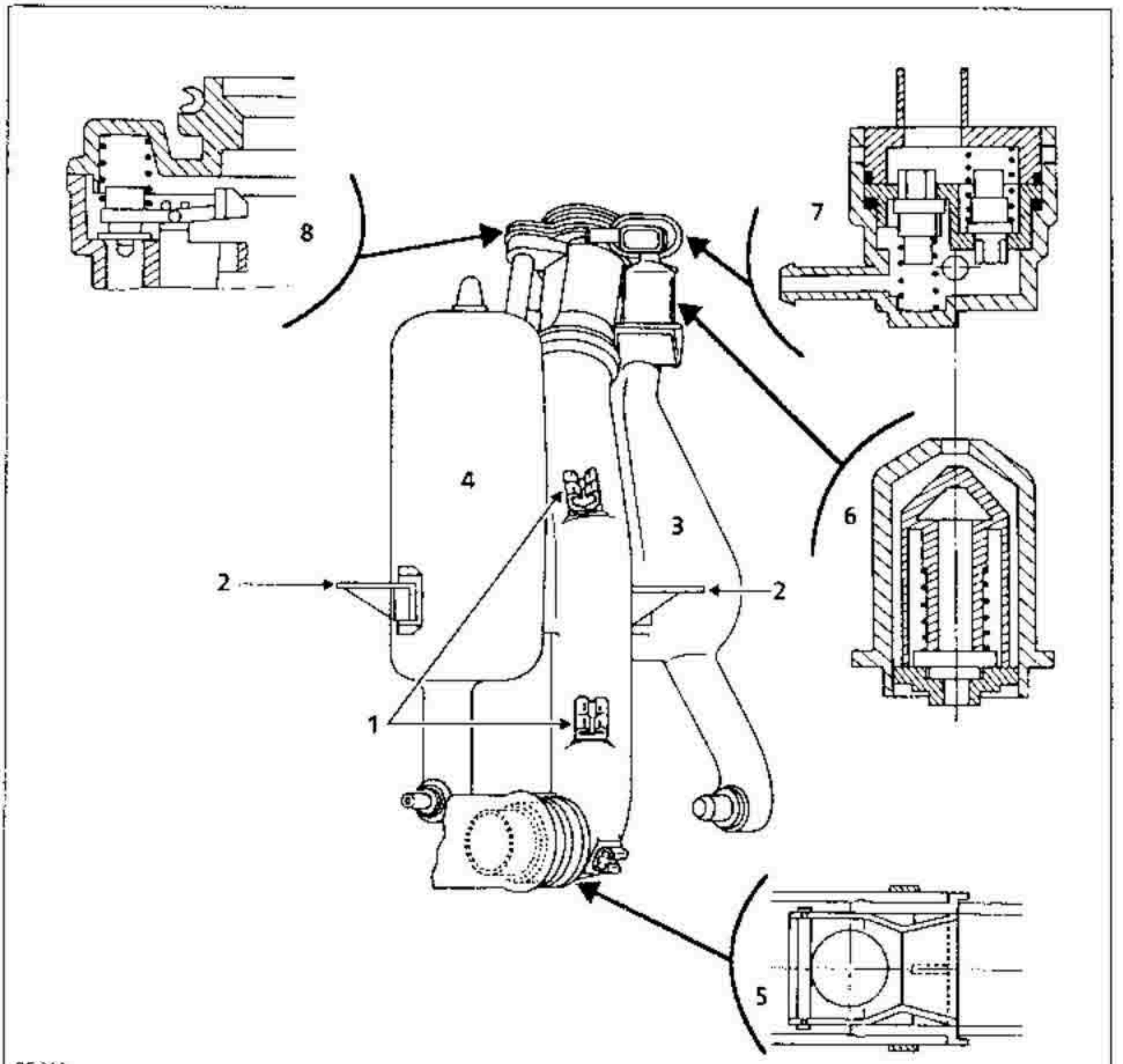
REFITTING

When refitting the fuel tank under the body, ensure the two centring dowels are correctly located (5).

Fit the retaining straps.
Tightening: **3,5 daN.m**.

Check all the collars are correctly tightened, check the electrical connectors on the sender unit and fuel pump are in good condition.

FILLER NECK SPECIAL FEATURES



1 Petrol vapour rebreathing pipe retaining clips
2 Filler neck mounting brackets on body
3 Degassing chamber
4 Vent chamber
5 Ball valve
6 Non-return valve in case of tipping over
7 Overpressure - underpressure safety valve
8 Overfilling safety valve

PRINCIPLE OF OPERATION OF THE DIFFERENT VALVES

5 The ball valve prevents fuel frothing in the filler neck. (This valve is only fitted to vehicles running on unleaded fuel).

6 "Overturn" valve. If the vehicle turns over, this prevents the fuel tank draining either from the canister pipe or the vent pipe.

7 Overpressure - underpressure valve. If the petrol vapour rebreathing circuit is blocked, this valve opens to prevent the fuel tank being subjected to overpressure (inflation) or underpressure (as fuel is used, the fuel tank is sucked in).

8 Over filling safety valve.
When the filler cap is removed, the valve is closed, which traps a volume of air in the air vent chamber. This prevents fuel from filling this chamber.
When the cap is replaced, the valve opens, allowing the tank to vent to the canister

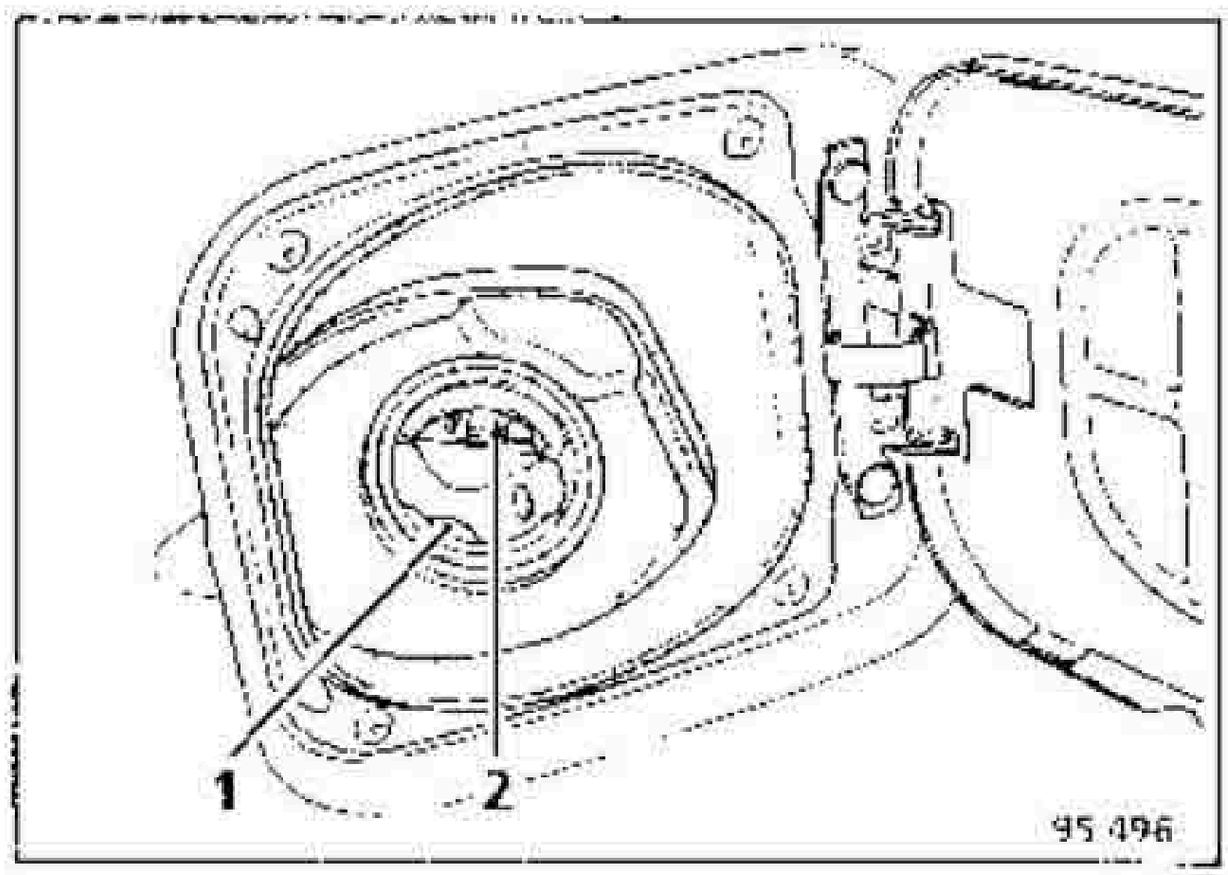
NOTE: For 4 x 4 transmission vehicles, the filler neck is integral with the fuel tank.

The fuel tank has a sealed cap and a vent circuit.

The unleaded fuel filler neck has :

- a smaller filling opening which a normal filler nozzle will not fit.
(lead would pollute the depollution system : oxygen sensor and catalytic converter).

- a valve blocking the filler neck, (to avoid petrol vapours escaping, or fuel escaping) (1).



When the fuel filler cap is refitted the over filling valve (2) allows the fuel tank to be vented.

The exhaust systems on the X54 vehicles are single units That is, there is no division between the inlet to the catalytic converter and the silencer outlet (except version 4 x 4).

The exhaust system must be cut to replace an element as part of an after sales service.

To do this :
- Mark the cutting area well,
- use cutting tool **Mot. 1199**,
- position the after sales sleeve correctly.

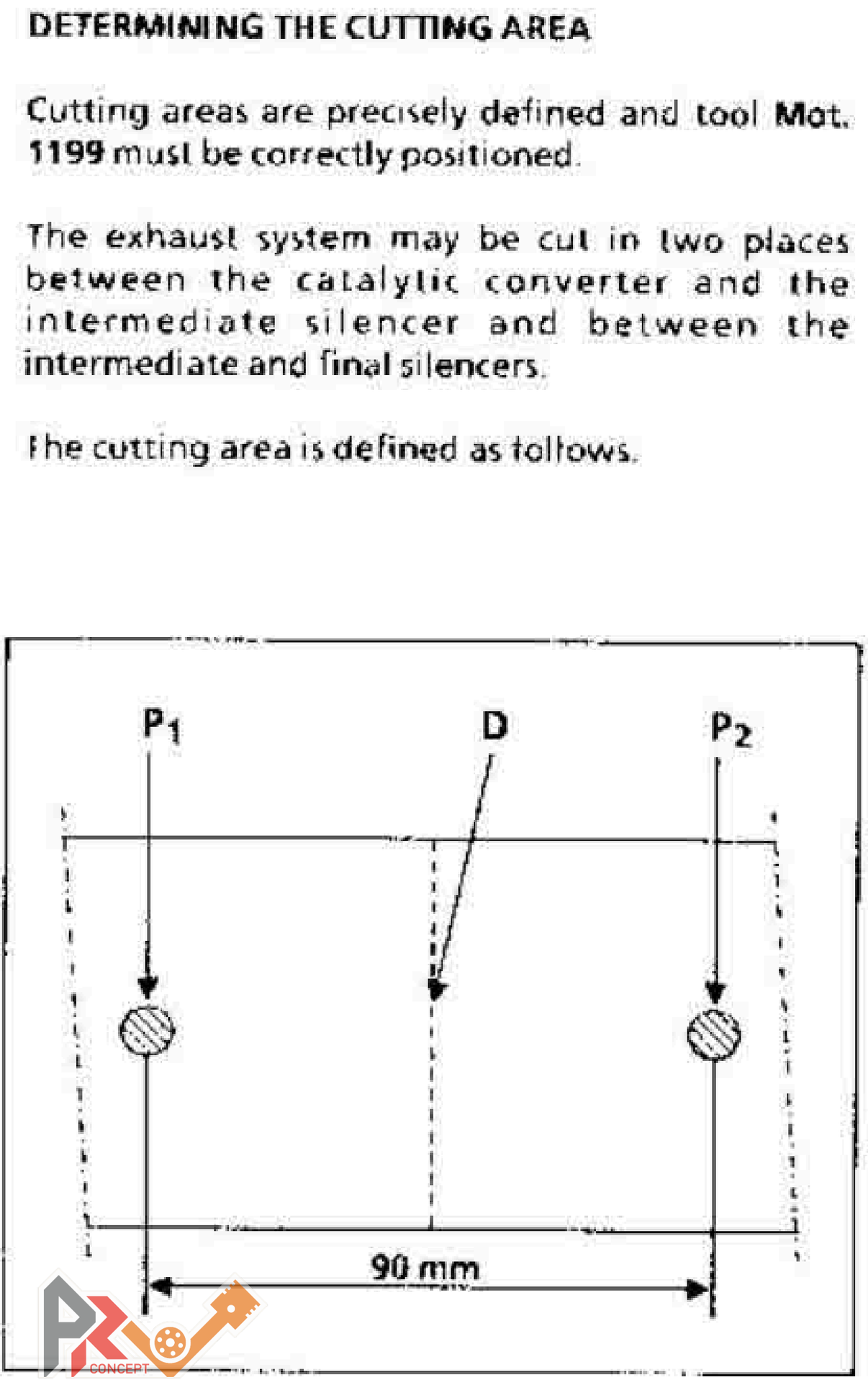
NOTE:
only the exhaust pipe for vehicles with 4 x 4 transmission is cut. because of the final drive, access to the cutting area using tool **Mot. 1199** is impossible
Therefore there is a sleeve with two collars which is fitted during production.
(This type of collar is used for this purpose only, for this exhaust assembly and is fitted in production).

DETERMINING THE CUTTING AREA

Cutting areas are precisely defined and tool **Mot. 1199** must be correctly positioned.

The exhaust system may be cut in two places between the catalytic converter and the intermediate silencer and between the intermediate and final silencers.

The cutting area is defined as follows.



Cutting the pipe

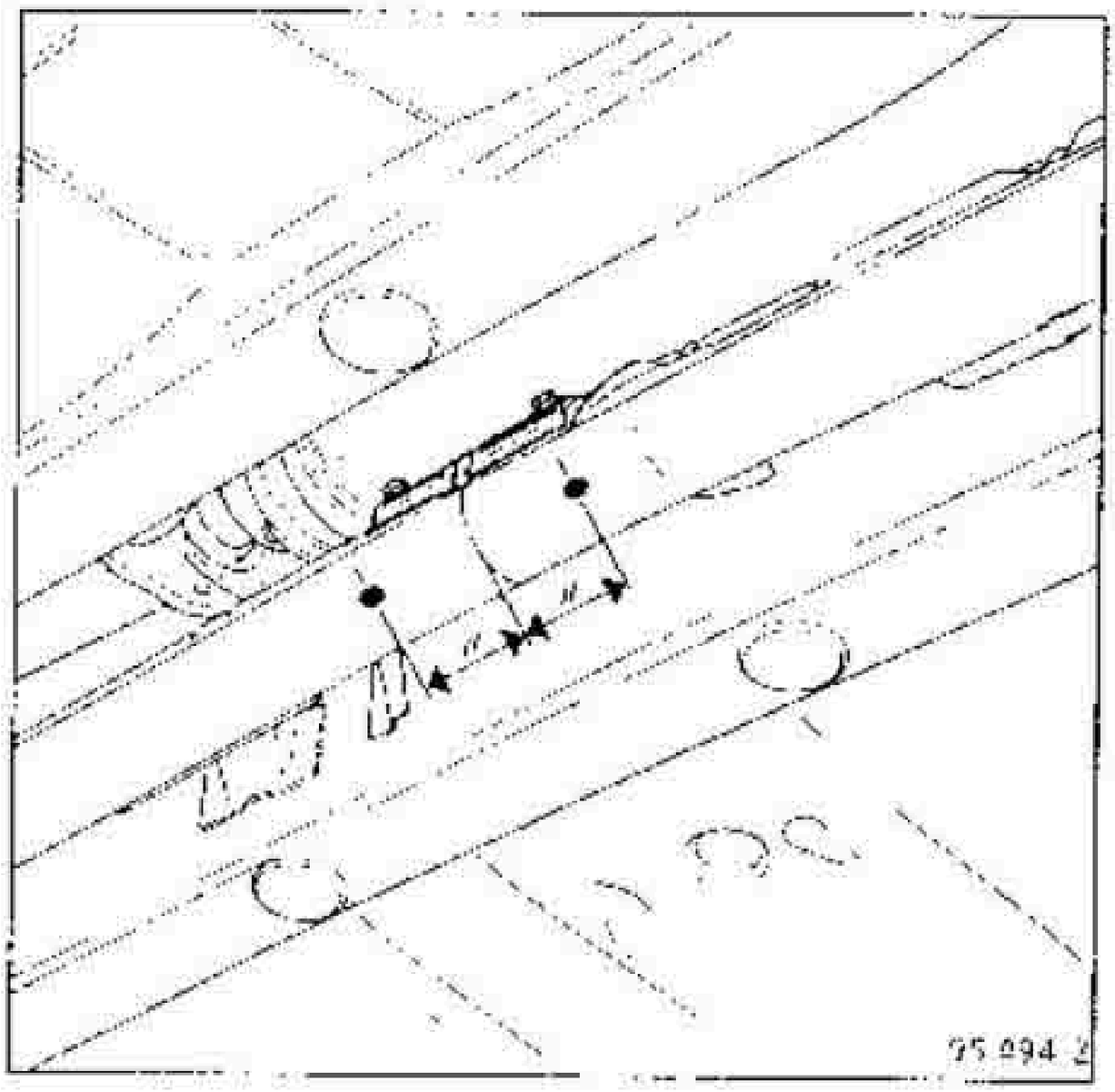
The distance between the two marks is **90 mm**. To cut the pipe mark the centre line (D) between the two marks (P_1 and P_2).

Marks P_1 and P_2 are used for fitting the sleeve (see page 19- 21).

USING TOOL Mot. 1199

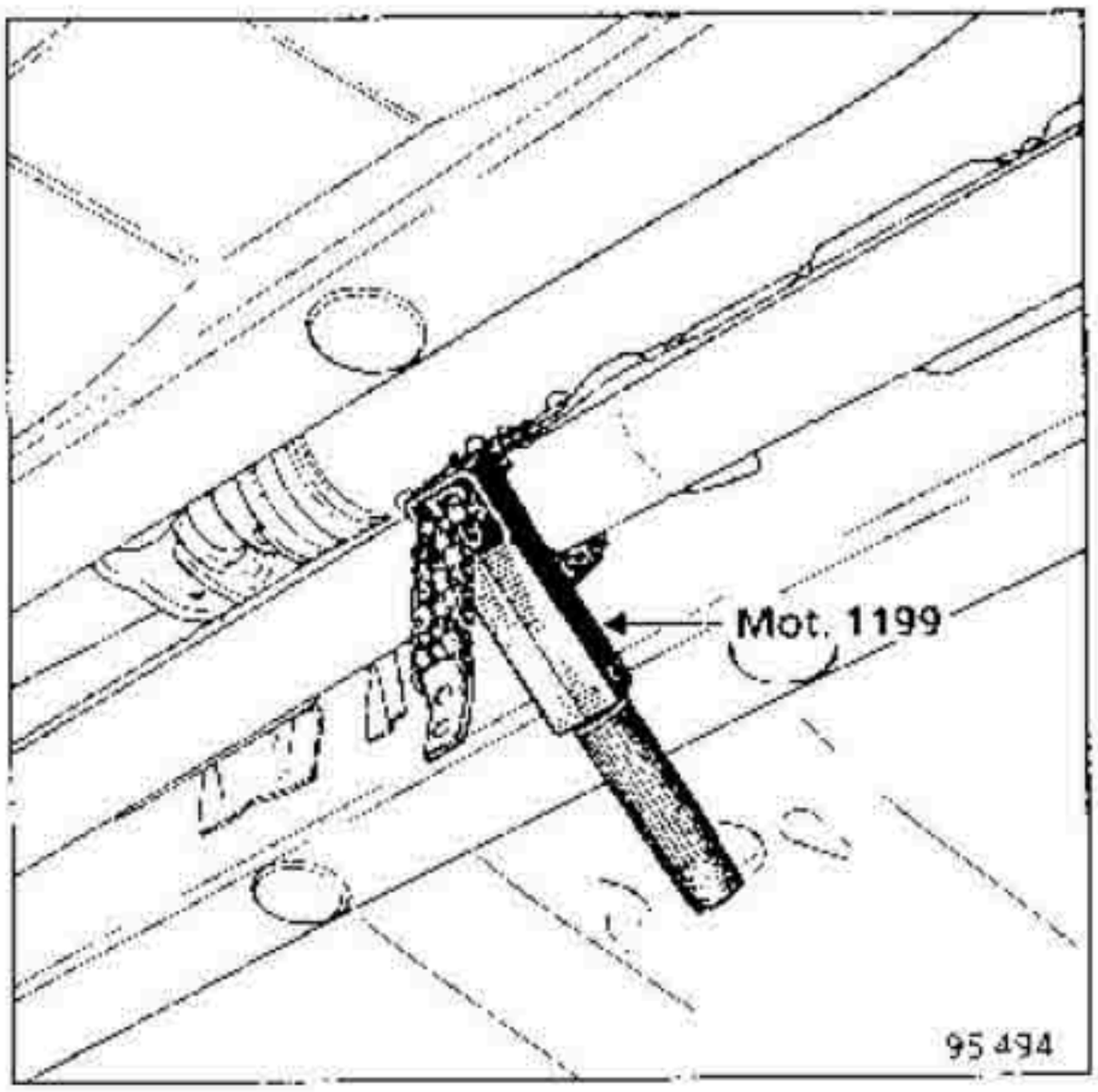
Example : cutting an exhaust pipe on a 4 x 4 transmission vehicle

1 - Mark the cut



The cut in this case is located precisely between the catalytic converter and the expansion chamber, by the small shield towards the centre of the pipe (Remove the four bolts and the shield).

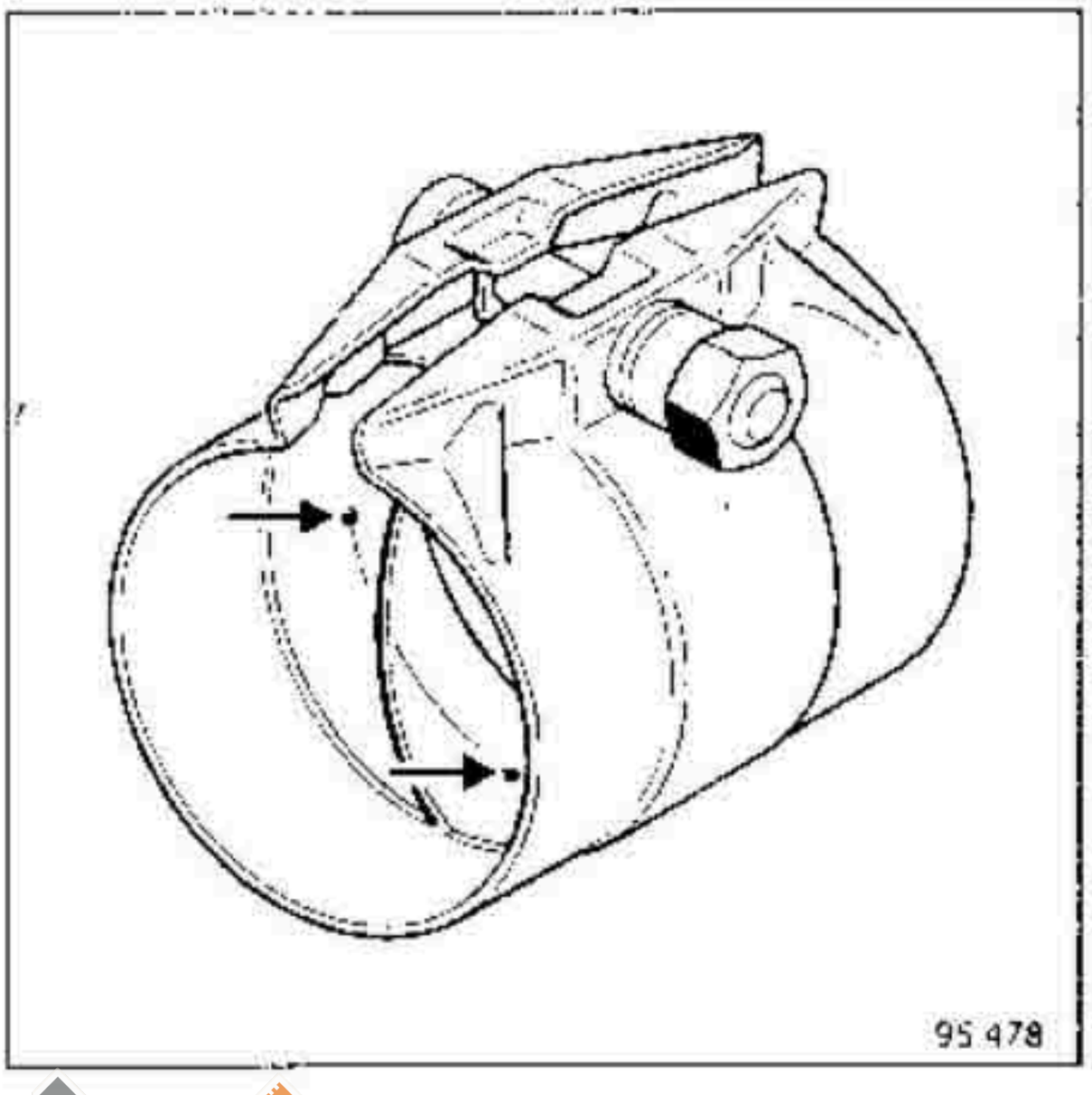
2 - Fit tool **Mot. 1199**



Slacken the chain as much as possible (unscrew) and fit it around the pipe. Attach the chain onto the tool.

Tighten the screw and pivot the tool around the pipe while moving the chain along the length of the cut (do not tighten the tool too much to avoid deforming the pipe).

FITTING THE AFTER SALES SLEEVE



To avoid an exhaust leak, the sleeve must be correctly positioned on the two pipes. The pipe must be fully in contact with the lugs inside the sleeve.

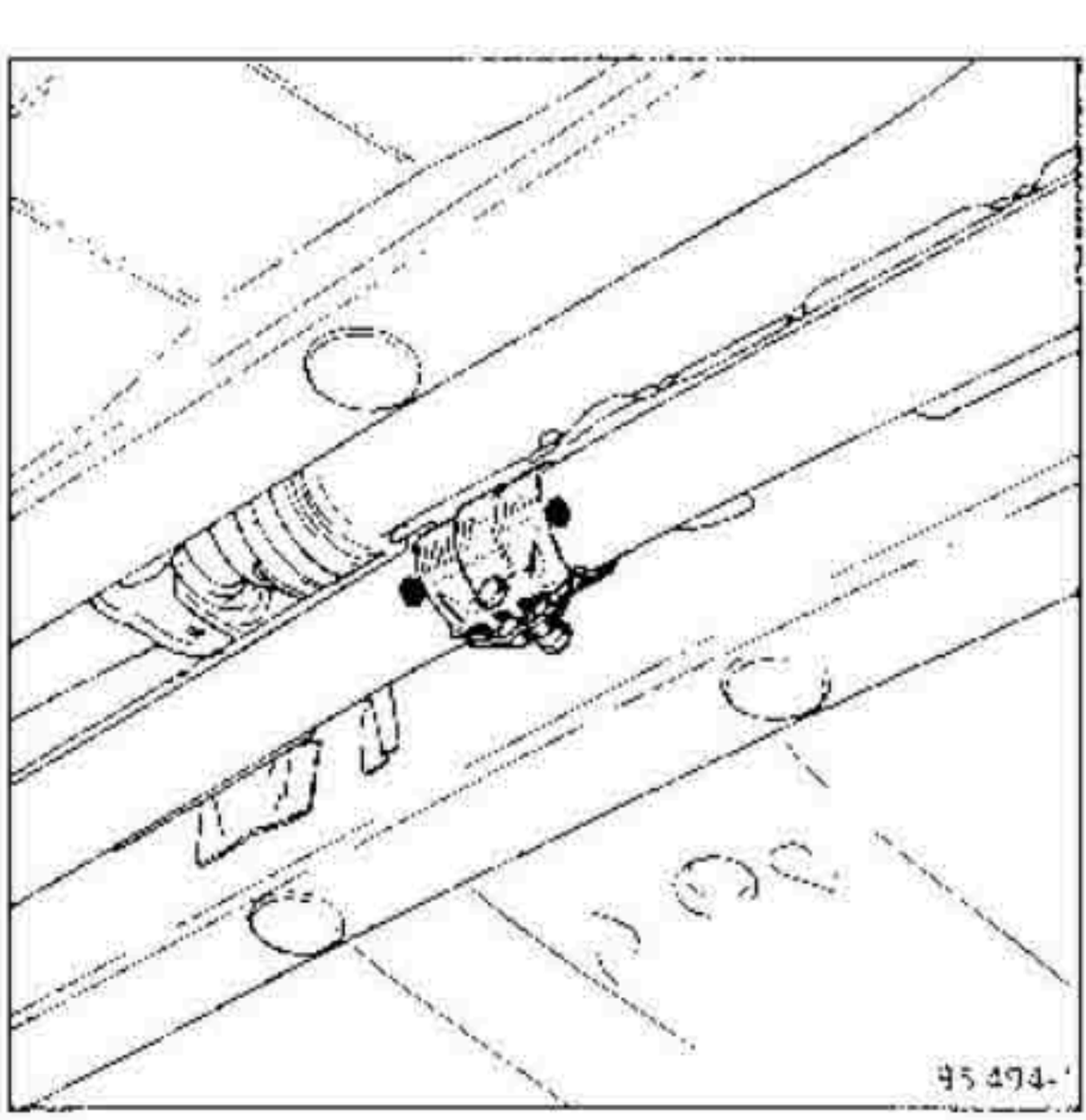
Begin by positioning the sleeve on the original pipe and adjust the collar diameter by tightening gently.

Check the pipe is correctly positioned on the lugs.

Fit the new pipe element.

Before fitting the sleeve, leaks can be prevented by applying mastic to the inner ring of the sleeve. (Exhaust mastic part number. 77 01 421 161)

The tightening bolt should be positioned at the bottom of the pipe.



The nut should be torque tightened to **2,5 daN.m**.

When it is correctly tightened, the groove on the nut should no longer be visible.

NOTE: there are three different diameters of sleeve :

Ø 50 mm J7R-J7T 8 valve
Ø 55 mm J7R-J7T 12valve, J8S, Z7X,
Ø 60 mm S8U

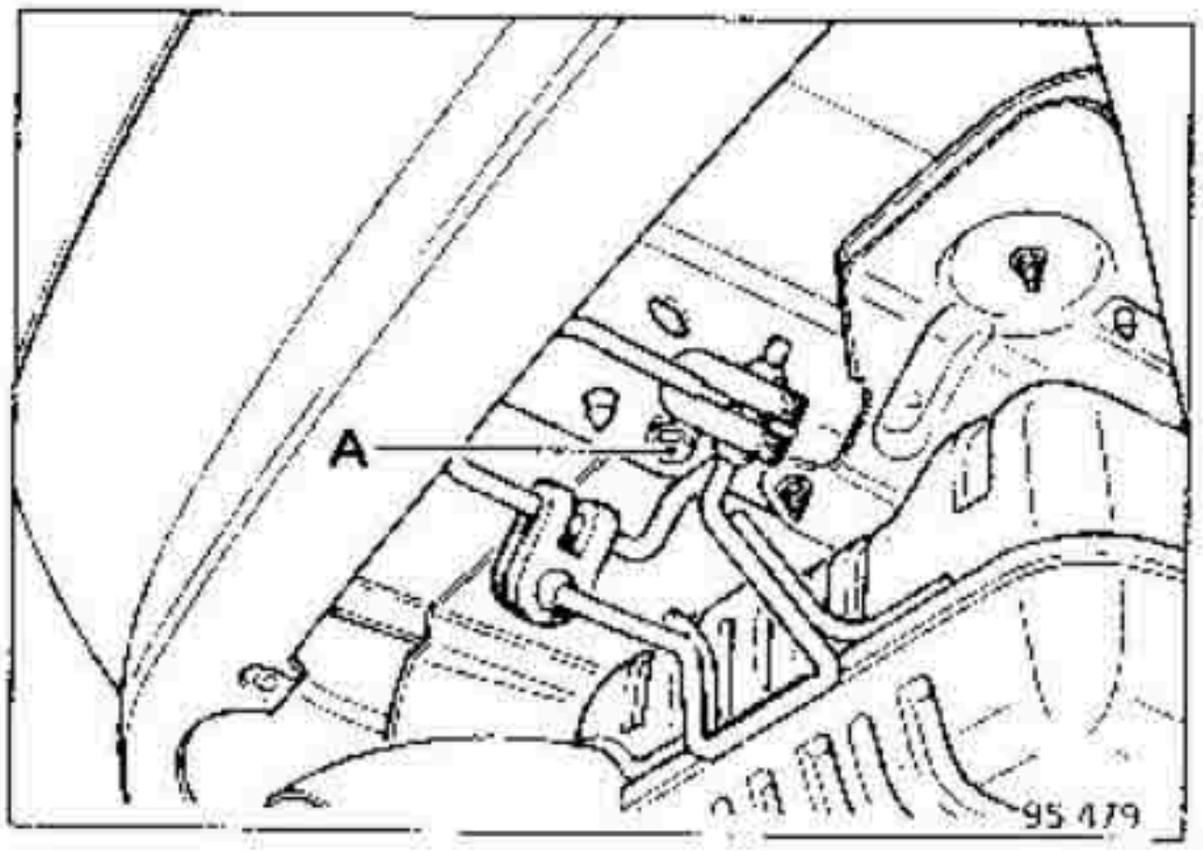
Once a collar has been fitted, it should not be reused.

PIPE ATTACHMENT UNDER THE BODY

the pipe is attached to the underside of the body by rubber mountings.

When the pipe is supported, these can usually be removed by hand.

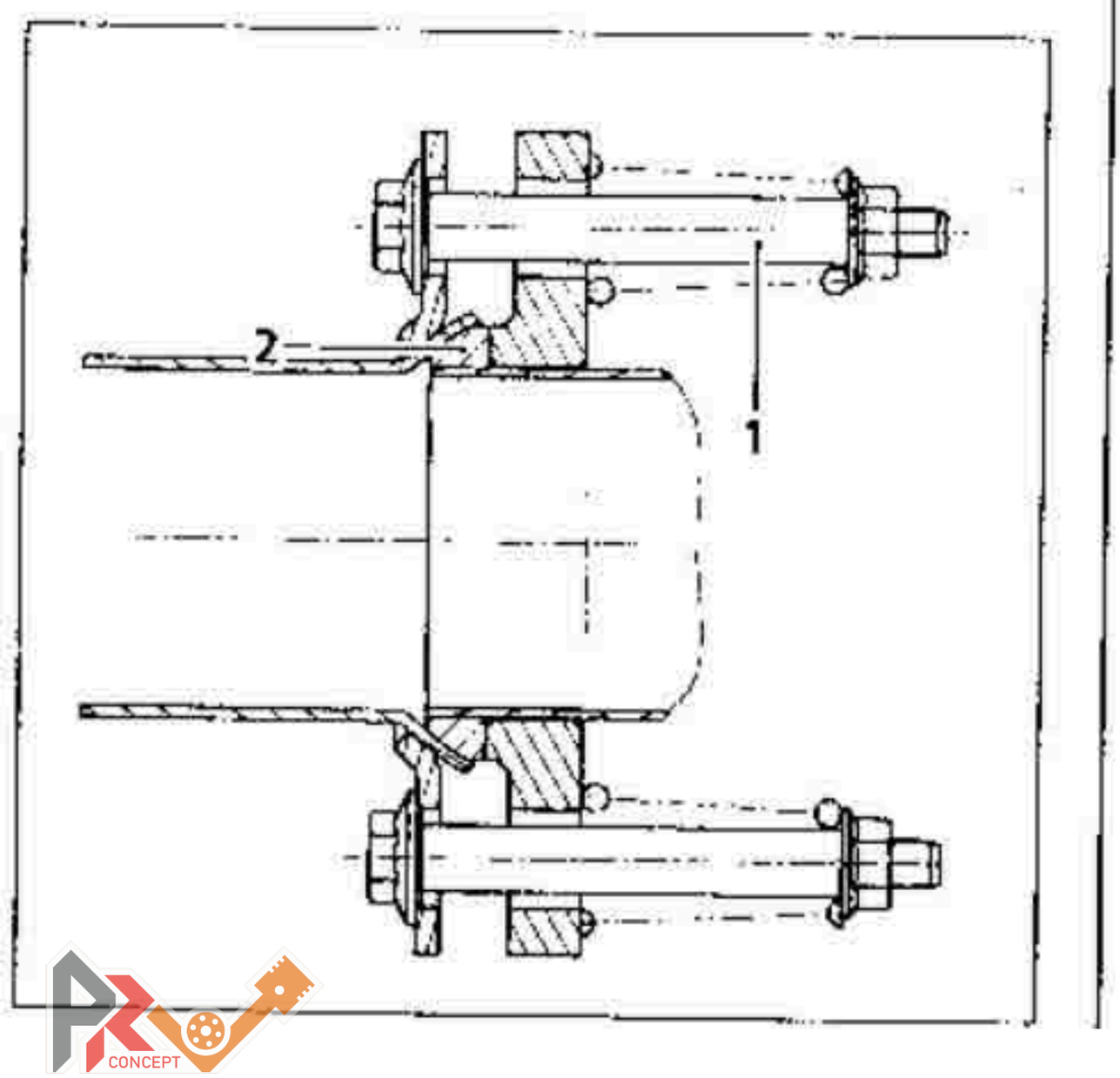
In certain cases the support mounting bolt may have to be undone (A) to remove the rubber mountings.



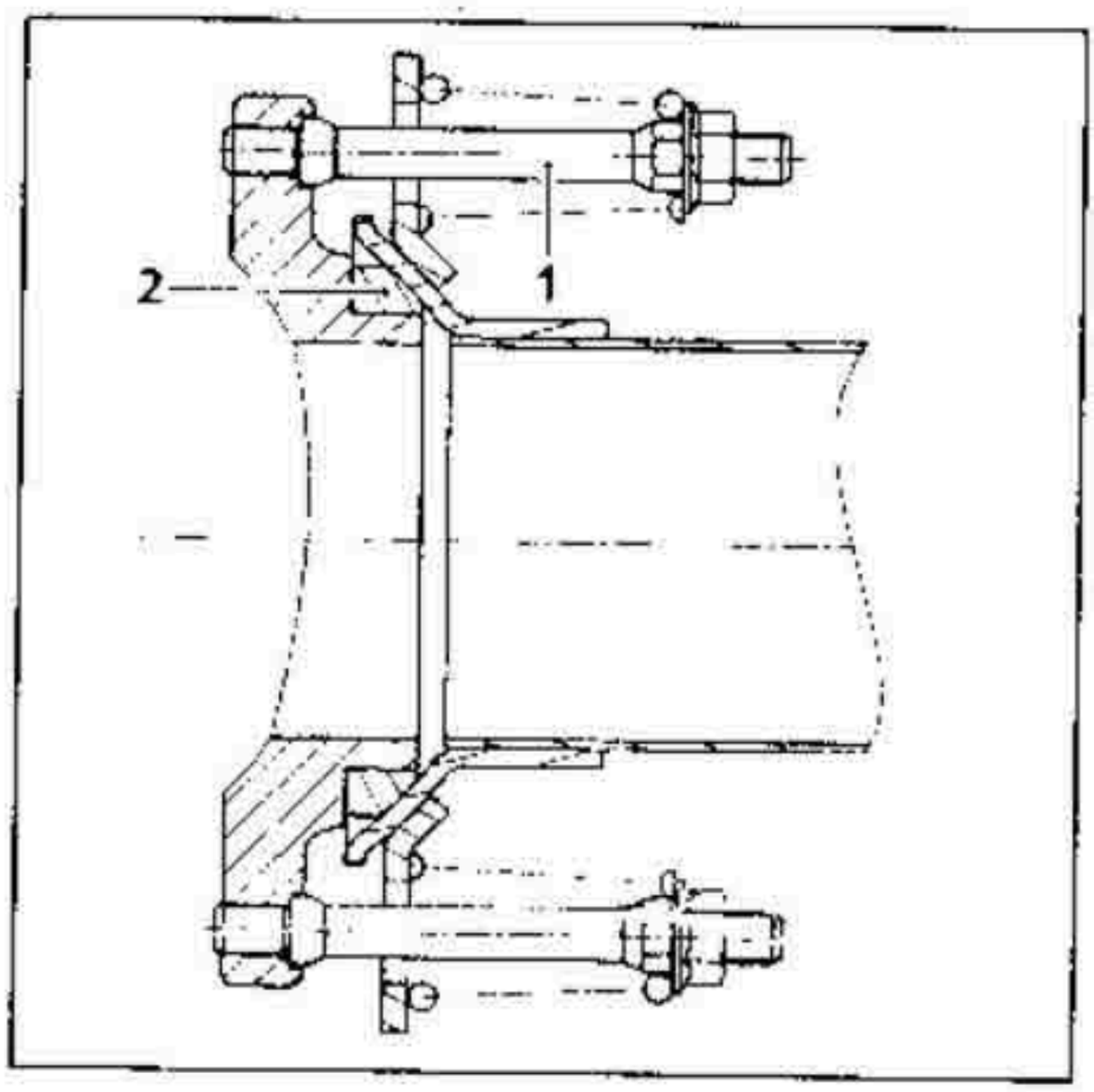
(Line 4 x 2 : retaining clips at intermediate silencer fixings part number. 77 03 080 023).

"METEX" BALL JOINT CONNECTIONS

Engine Z7X



Engines J7R - J7T - J8S



The exhaust downpipe bolts (1) are fitted with stops which determine the spring tension. Tighten to the stop.

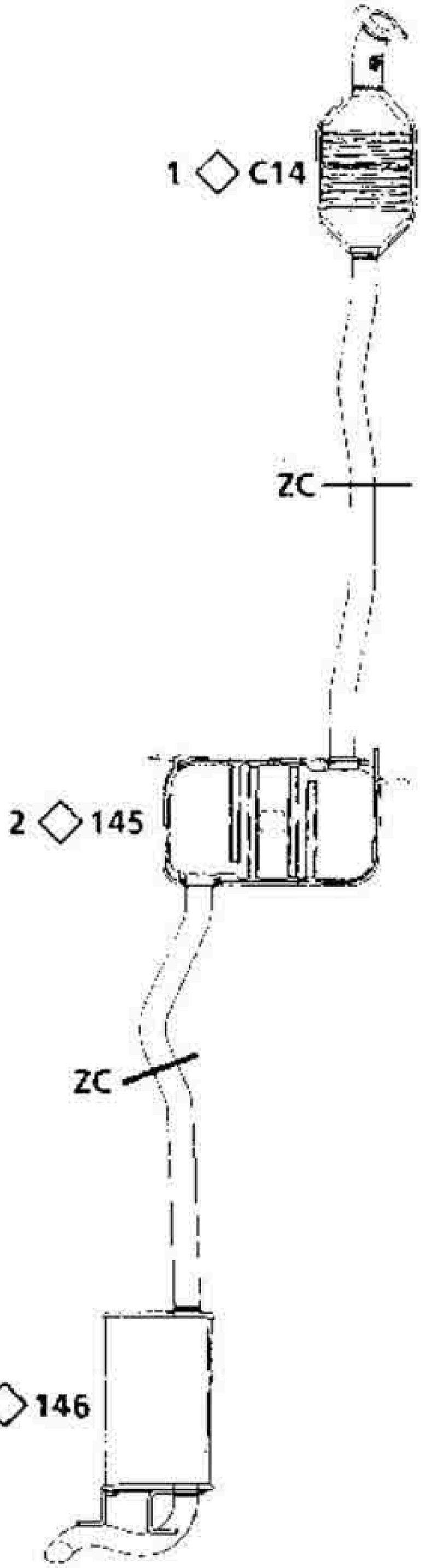
A "Metex" friction ring ensures sealing (2).

IMPORTANT .

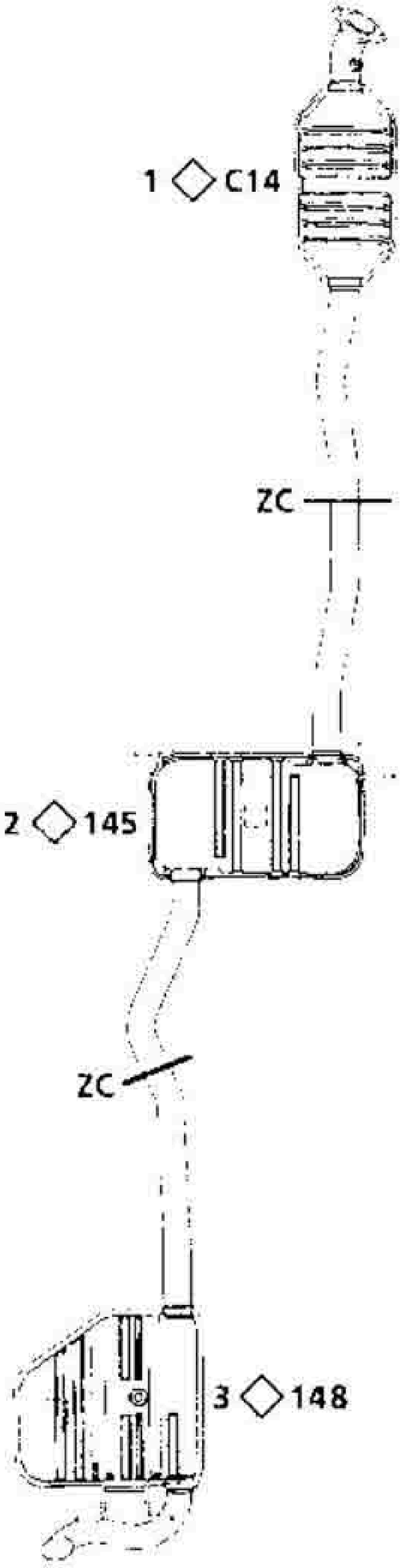
- Sealing between the exhaust manifold seal up to and including the catalytic converter must be perfect.
- Any seal removed must be **RENEWED** (especially at the catalytic converter flange).
- When removing or refitting, do not subject the catalytic converter to mechanical shocks which could, if repeated, damage it.

EXHAUST SYSTEMS LAYOUT AND CUTTING AREAS

B540



B541

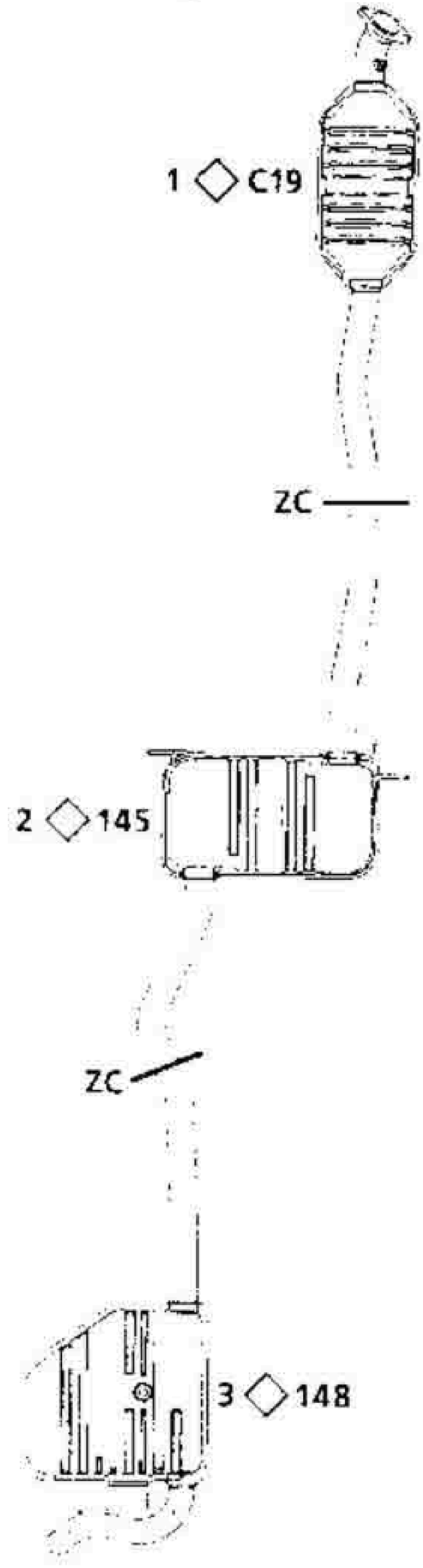


1 Catalytic converter
2 Expansion chamber
3 Silencer
ZC Cutting area

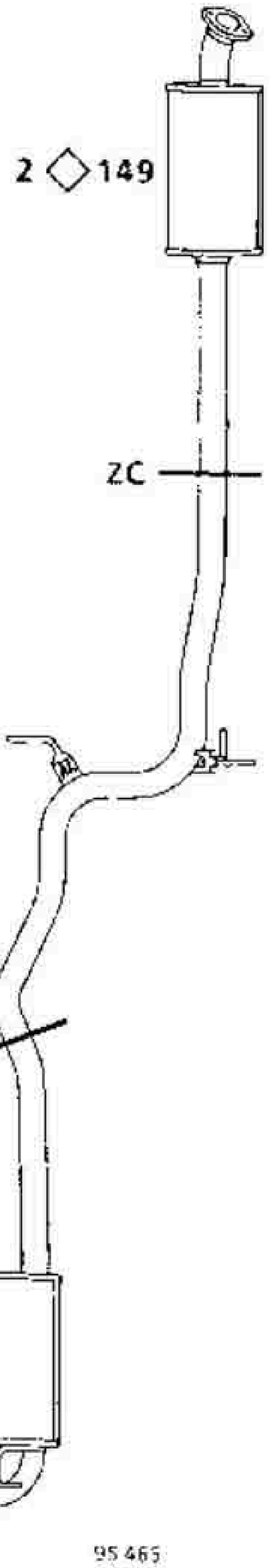
(◇ . . . : Element identification mark)

EXHAUST SYSTEM LAYOUT AND CUTTING AREAS

B543



B546



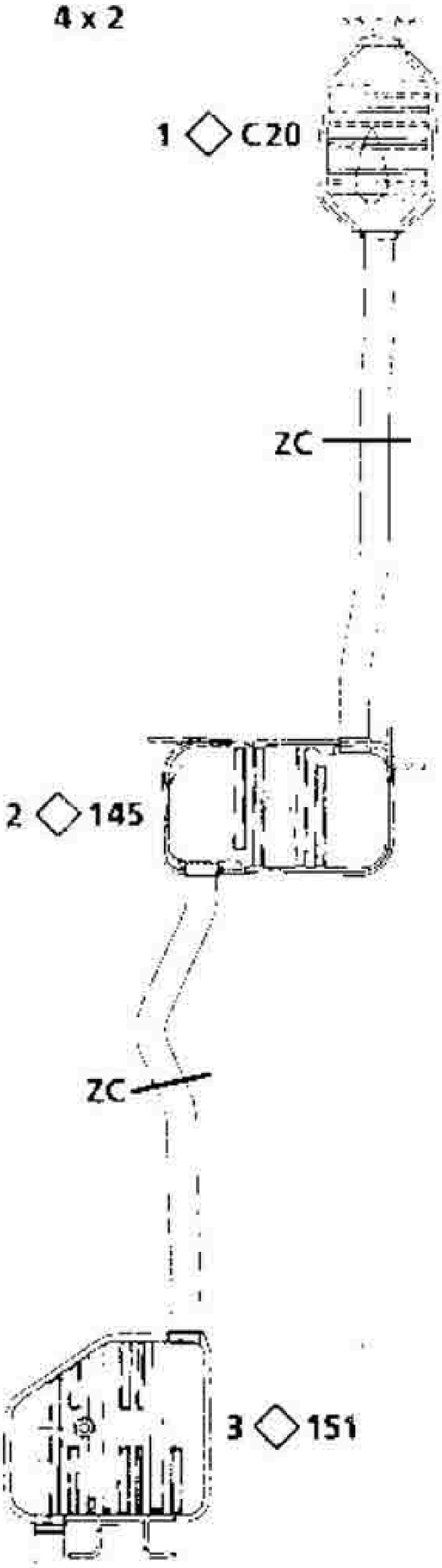
95 465

1 Catalytic converter
2 Expansion chamber
3 Silencer
ZC Cutting area

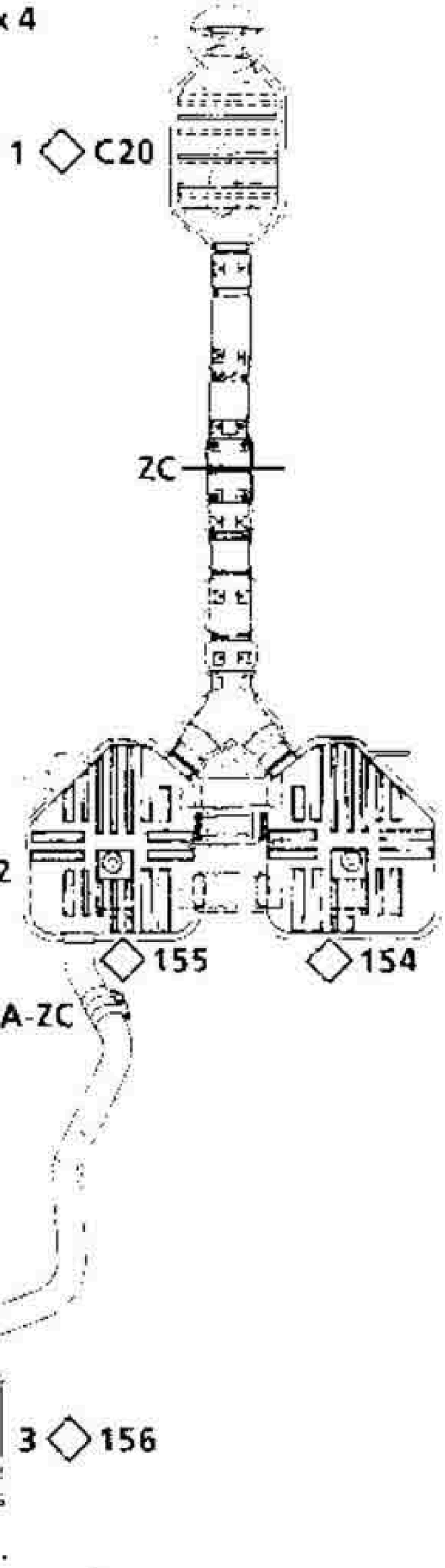
(◇ ... : Element identification mark)

EXHAUST SYSTEMS LAYOUT AND CUTTING AREAS

B544 4 x 2



B544 4 x 4



1 Catalytic converter
2 Expansion chamber
3 Silencer
ZC Cutting area
A 4 x 4 are cut and sleeves are fitted when they are originally fitted (the sleeve is replaced in after sales servicing by a simple sleeve).

(◇ .... : Element identification mark)

CHECKING THE CATALYTIC CONVERTER

Warm the engine until the engine cooling fan has operated twice.

Connect a gas analyser to the exhaust at the rear of the vehicle.

Read off pollutant values for engine speeds between **2 000** and **2 500 rpm** (wait for the values to stabilise).

The value read should be less than **0,5 %**.

- If CO is above **0,5 %** :

  Check bar graph line 08 and variations of **# 05** (stable engine speed of **2 000 - 2 500 rpm** with sensor connected).

  Change the sensor if the test is incorrect then repeat the test at **2 000 - 2 500 rpm**, and also repeat the test for lead in the exhaust fumes.

  If the sensor test is correct or if a new oxygen sensor still gives a CO reading above **0,5 %**.

  Ensure that :

  - the catalytic converter does not make a noise when it is shaken when the vehicle has stopped (check when the vehicle is moving),

  - after the catalytic converter has been removed :

    - that there is no visual damage,
    - that no noise is heard when the catalytic converter is shaken,
    - that the catalytic converter is not partially or completely obstructed.

  - that the catalytic converter has not been polluted by leaded petrol.

NOTE: before replacing a catalytic converter or an oxygen sensor :
check the fuel in the system is unleaded (test for lead at the exhaust). (See **NT 1 529**).

If the test is positive, rinse the circuit using unleaded petrol making the vehicle use at least two tankfulls of unleaded petrol.

ATTENTION : before replacing a catalytic converter check :

- the vehicle is operating correctly : supply, ignition, oxygen sensor richness regulation (using XR25 and lead test), and air filter,

- the vehicle road performance in a road test,

- that the catalytic converter does not produce any noise during the road test,

- that the exhaust system is perfectly sealed,

- the pollutant values read :

  - engine temperature,
  - values read at idle speed and at an engine speed between **2 000** and **2 500** rpm.

Variations in different pollutant are not always immediate and may be intermittent and only last for a short, irregular period, as their values depend on the gas analysis equipment used (sensitivity, response time, condensation in the circuits, filter condition, pipe length etc).

- Ensure the equipment is correctly calibrated after it has warmed up.

IMPORTANT : AVOID OVERHEATING

- The engine should be in good condition (the injection and ignition should be in perfect condition) to ensure the catalytic converter is not operating under abnormal conditions.

- The vehicle should be stopped if the ignition misfires, if there is a supply fault, or a loss of power (engine overheating, which could overheat the catalytic converter).

- Overheating may follow overuse of the starter, starting by towing (circumstances under which the engine receives a rich mixture which only ignites occasionally).

IMPORTANT NOTE : do not park the vehicle or leave the engine running where combustible material could come into contact with the hot exhaust pipes.

Under certain conditions, these materials could catch fire.