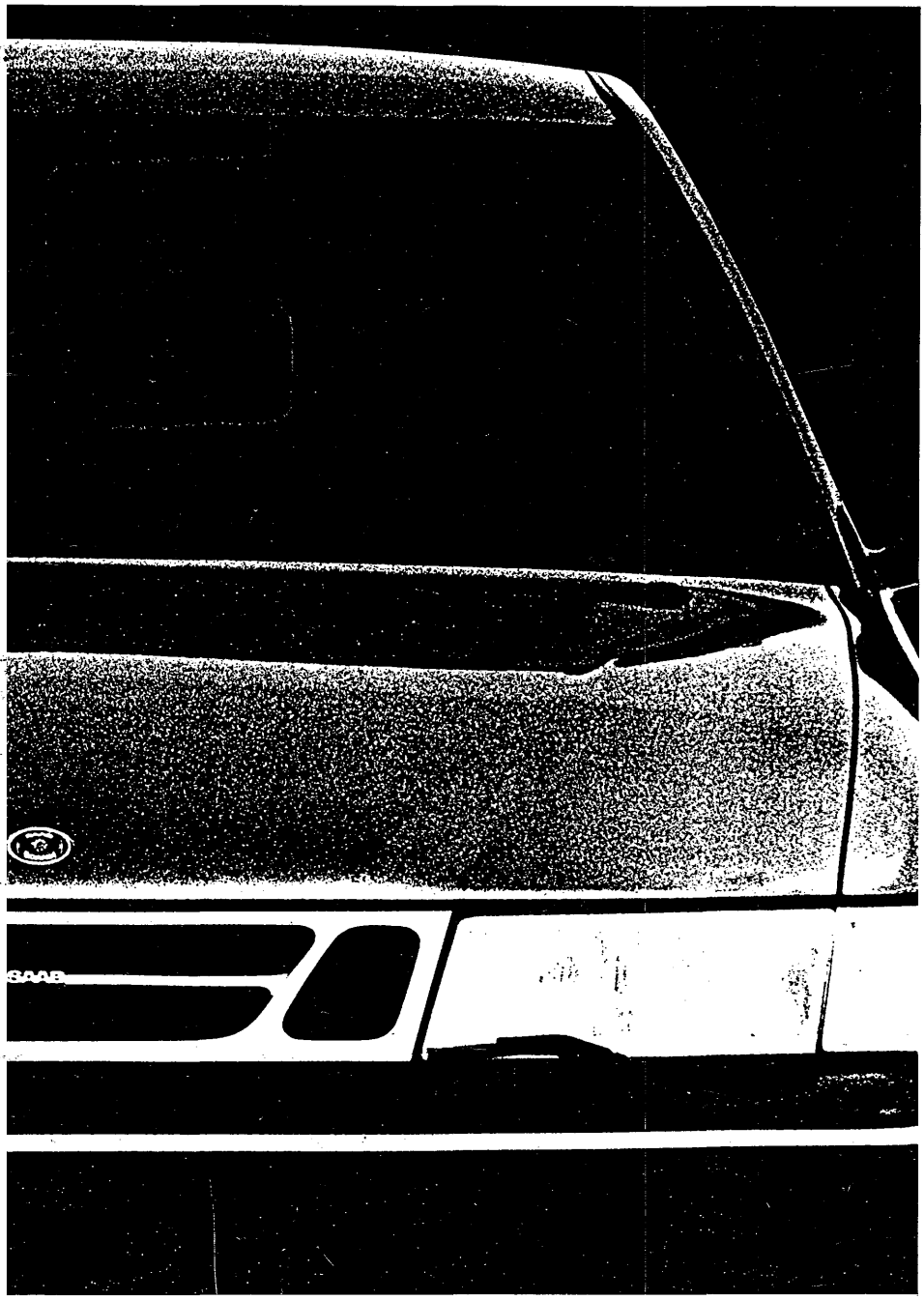
# Saab 9000

## Service Manual




**M 1994–**

US

# 0 News

$17.003-6 HP

# Saab 9000

# SERVICE MANUAL

## 0 News

**M 1994**

**Foreword**

This manual contains brief descriptions of the most important new features of 1994 Saab 9000 cars.

It is intended to be used as a service manual as well as a workbook for training instructors and mechanics.

Since no production cars are available at the time of writing, the information in this manual is not binding.

We reserve the right to introduce modifications without notice.

**Saab Automobile AB**

# Warning, Important and Note

The headings "Warning", "Important" and "Note" occur from time to time in the Service Manual. They are used to draw the attention of the reader to information of special interest and seriousness. The importance of the information is indicated by the three different headings and the difference between them is explained below.

**WARNING**

Warns of the risk of material damage and grave injury to mechanics and the driver, as well as serious damage to the car.

**Important**

Points out the risk of minor damage to the car and also warns the mechanic of difficulties and time-wasting mistakes.

**Note**

Hints and tips on how the work can be done in a way that saves time and labour. This information is not supplied for reasons of safety.

## Market codes

The codes refer to market specifications

| | | | |
|---|---|---|---|
| AT | Austria | GB | Great Britain |
| AU | Australia | GR | Greece |
| BE | Belgium | IS | Iceland |
| CA | Canada | IT | Italy |
| CH | Switzerland | JP | Japan |
| DE | Germany | ME | Middle East |
| DK | Denmark | NL | Netherlands |
| ES | Spain | NO | Norway |
| EU | Europe | SE | Sweden |
| FE | Far East | US | USA |
| FI | Finland | UC | US California |
| FR | France | | |



Production: Service Support, Saab Automobile AB, Trollhättan, Sweden

# Important

**⚠ WARNING**

Lengthy and repeated contact with mineral oil removes the natural oils of your skin, drying it out and causing irritation. If oil has been swallowed, do not provoke vomiting. Call a doctor.

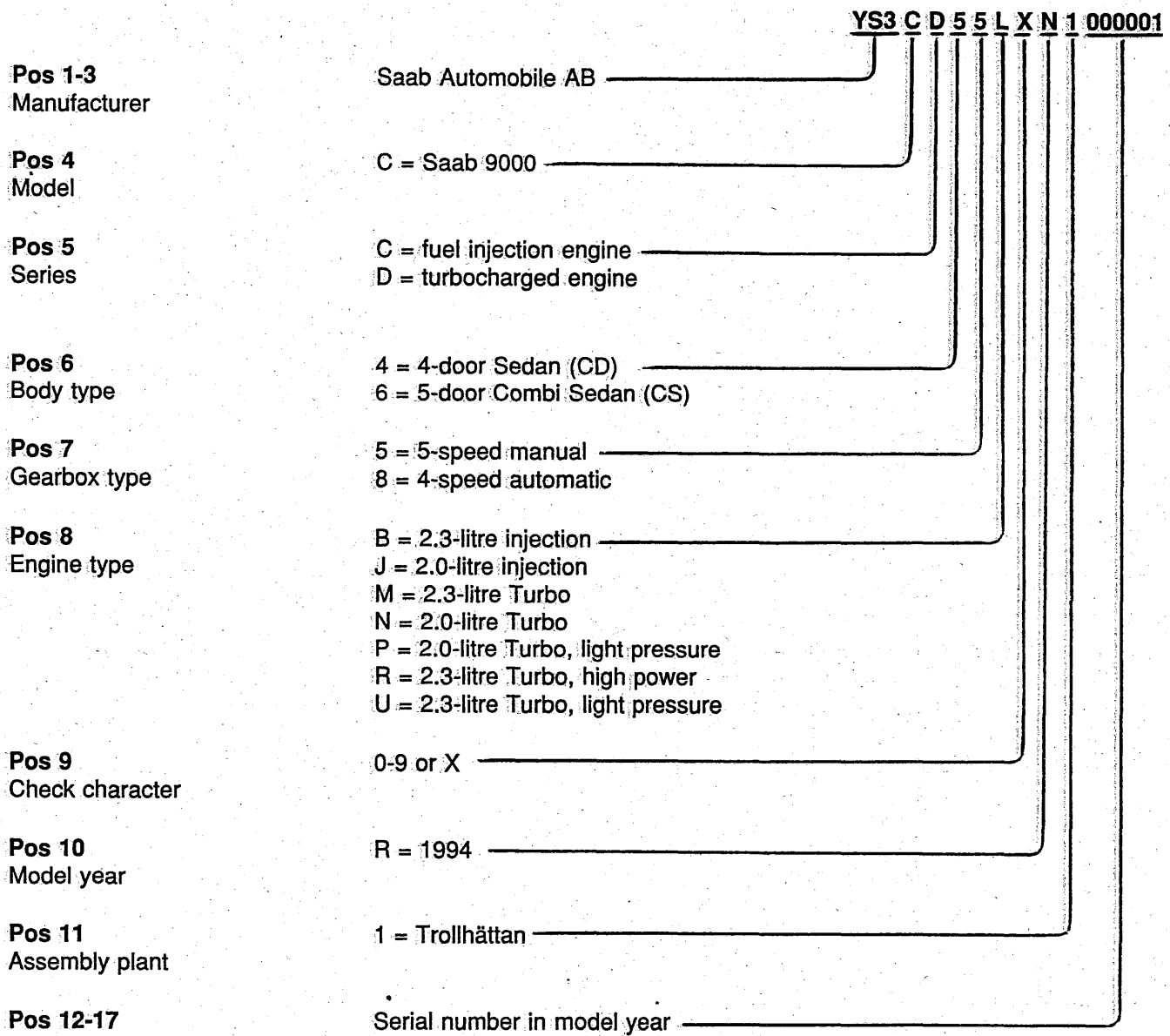
Waste oil may contain harmful impurities which can cause skin cancer. Always use suitable protection and thoroughly wash your hands and other areas of bare skin that have come into contact with the oil.

Observe the following safety rules:

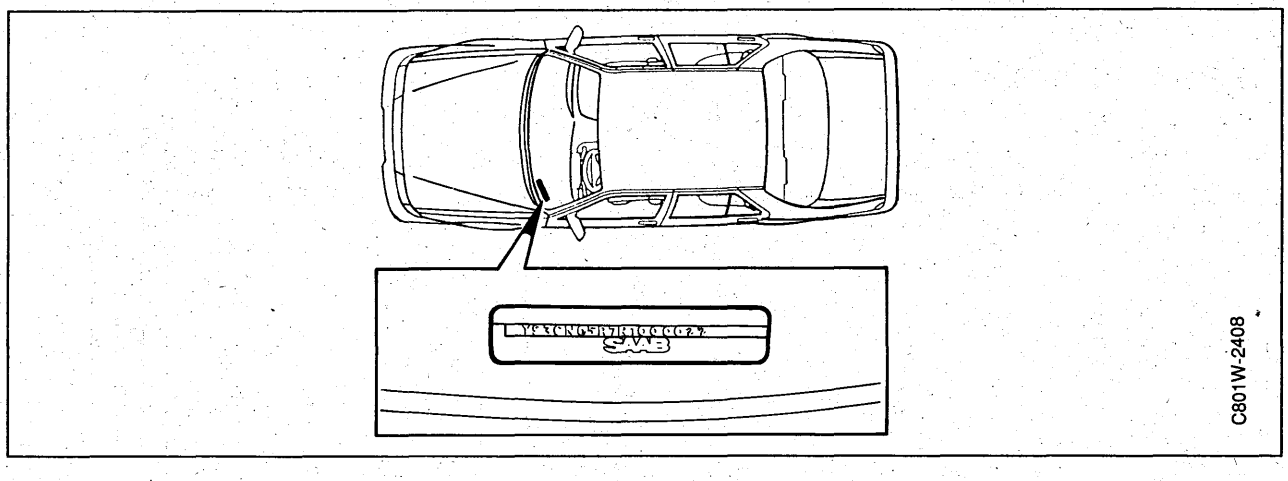
- Avoid lengthy and repeated contact with oil, grease, etc. and especially waste oil.
- Wear protective clothing, including impermeable gloves, if possible.
- Do not put oily rags in your pockets.
- Do not wear clothes that have been soiled by oil, especially items of underwear. Clothes must be washed at regular intervals.
- Do not wear oily shoes.
- Clean open sores immediately and cover them with an adhesive bandage, sticking plaster, etc.
- Use barrier cream, part No. (45) 30 04 397. Apply it to your exposed skin before each working period so that it will be easier for you to wash oil and grease off afterwards.
- Remove oil from your face and hands, etc. by washing them thoroughly with soap and water (special skin cleansers and a nailbrush will help). Preparations containing lanolin will restore the skin's natural moisture.
- Do not use petrol, paraffin, diesel oil, thinner or solvents to remove oil from any part of your body.
- If you notice any changes in your skin, consult a doctor without delay.
- If possible, clean the parts before starting work.
- If there is a danger of oil getting into your eyes, wear protective goggles, a visor or a face mask. Eye-washing equipment must also be readily available.

# Technical data

## Chassis number



# Chassis number plate



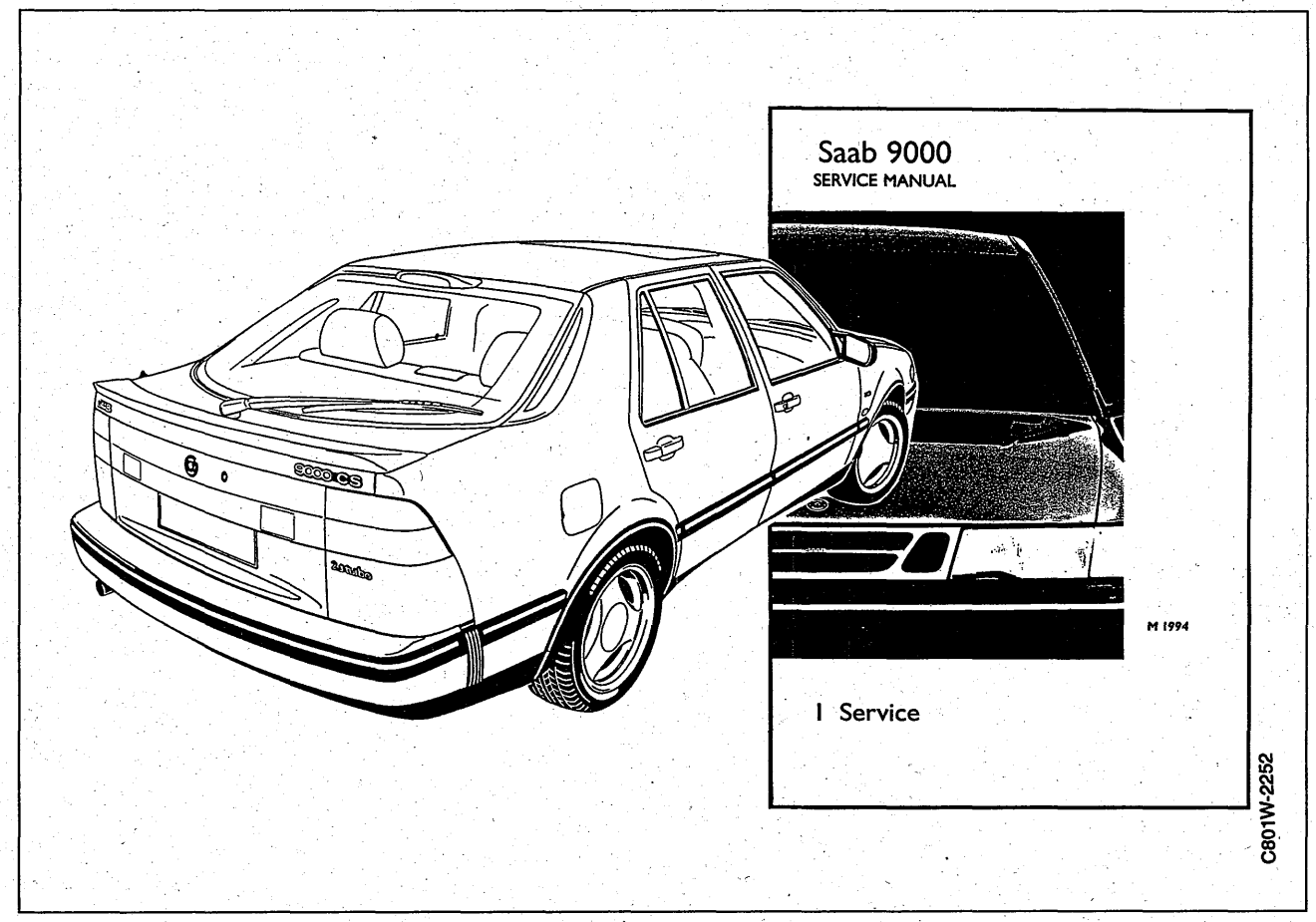

The chassis number plate inside the windscreen which was previously affixed to cars for certain markets only is now affixed to all cars

The number can be read right way round from outside the car.

# Performance

Starting with model year 1994 cars, engine power and torque are given in accordance with EEC standards. Consequently, these particulars are no longer given in accordance with DIN standards.

# Service




## Updated service programme, M1994

The following changes have been introduced in the M1994 service programme:

**The pre-delivery inspection programme** now has a smaller number of service points.

**Saab Original Service** . Changes have been made in the order of the service points.

**Saab Original Heavy-Duty Service** , which applies to certain markets only, will be included in Service Manual "1 Service" for all markets except USA.

**Service interval 1,** which was previously scheduled for 5,000 km (3,000 miles), has now been changed to 10,000 km (6,000 miles). This does not apply to the United States, however, where service is to be carried out as before. The service intervals remain unchanged, see table.

| **M1993 km (miles)** | **M1994 km (miles)** |
|---|---|
| 5,000 (3,000) | 10,000 (6,000) |
| 20,000 (12,000) | 30,000 (18,000) |
| 40,000 (24,000) | 50,000 (30,000) |
| 60,000 (36,000) | 70,000 (42,000) |
| etc. | etc. |

# Engine



## General

### The B204 engine

The B202 engine has been discontinued and replaced by the B204 engine which differs from the B202 in that it has balance shafts and a straight block. It is also "shorter" as a result of modifications to the cylinder block, timing cover, gearbox end and sump. In appearance, the B204 is similar to the "old" B234 engine.
The engine is produced in the following versions:

- B204i, fuel injection
- B204S, turbo without charge air cooler
- B204L, turbo with charge air cooler

### The B234 engine

The B234 engine with balance shafts is also of "shorter" design as it has been modified in the same way as the B204.

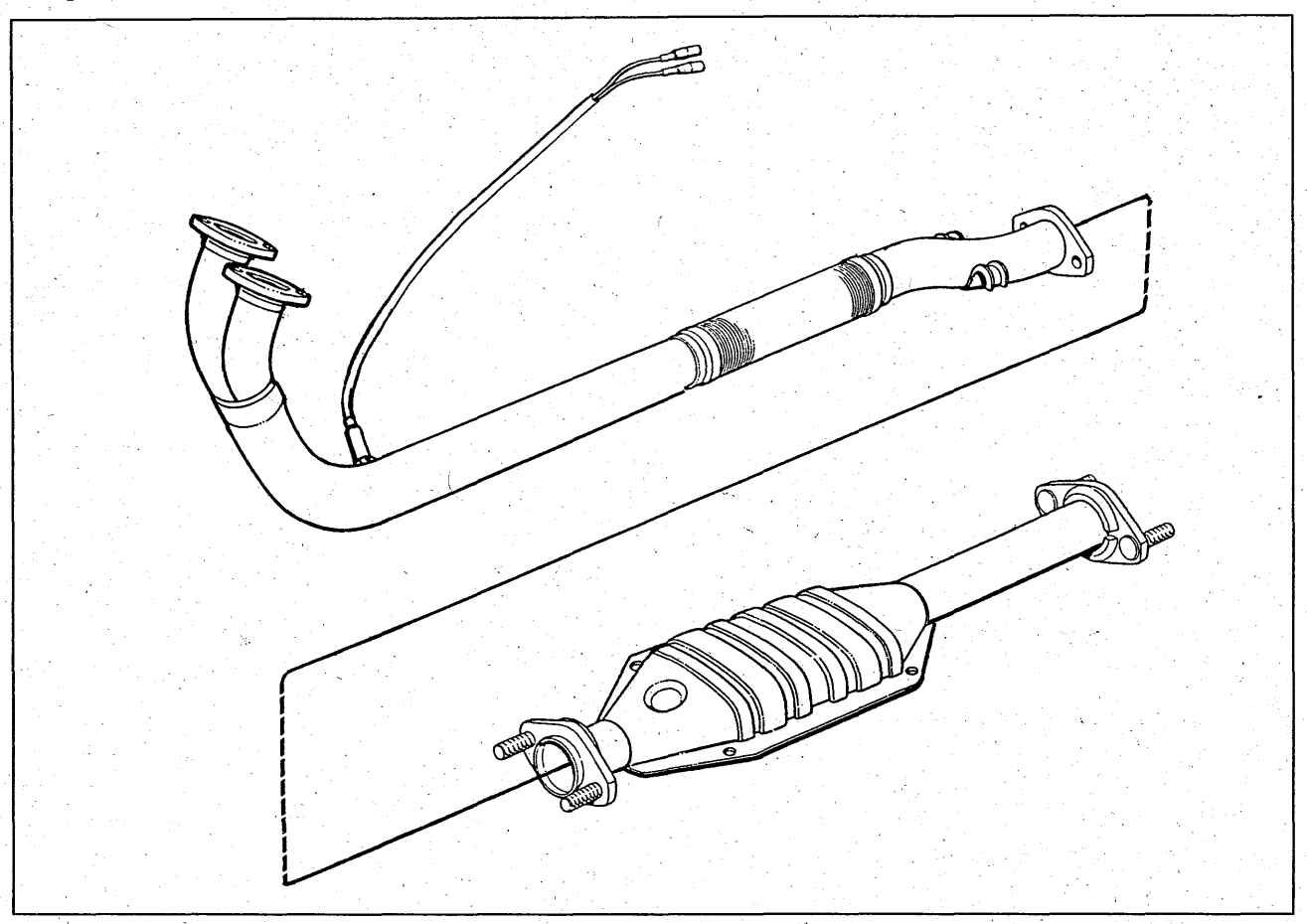
The engine is produced in the following versions:

- B234i, fuel injection
- B234E, turbo with charge air cooler for manual gearbox, light pressure
- B234R, turbo with charge air cooler and high power output
- B234L, turbo with charge air cooler and normal power output

### The TRIONIC engine management system

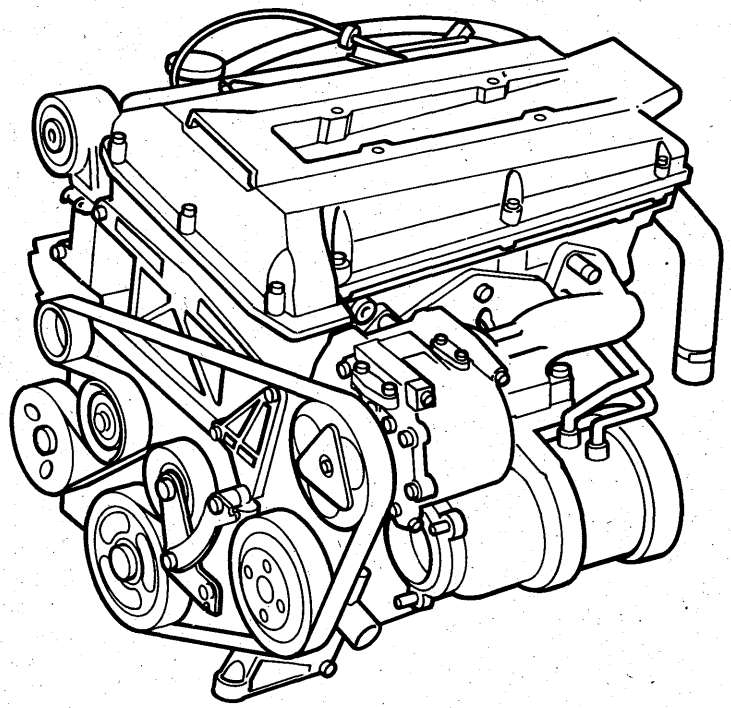
Previously only available with turbo engines, the Saab TRIONIC engine management system will from M1994 also be featured on fuel injection engines. In consequence, all Saab 9000 models will now be equipped with the TRIONIC system.

# Repositioned catalytic converter



Repositioning of the catalytic converter has been carried out on cars equipped with a 2.3-litre fuel injection engine. The location of the oxygen sensor on the front exhaust pipe remains unchanged. This modification applies to cars for the US, CA and SE markets.

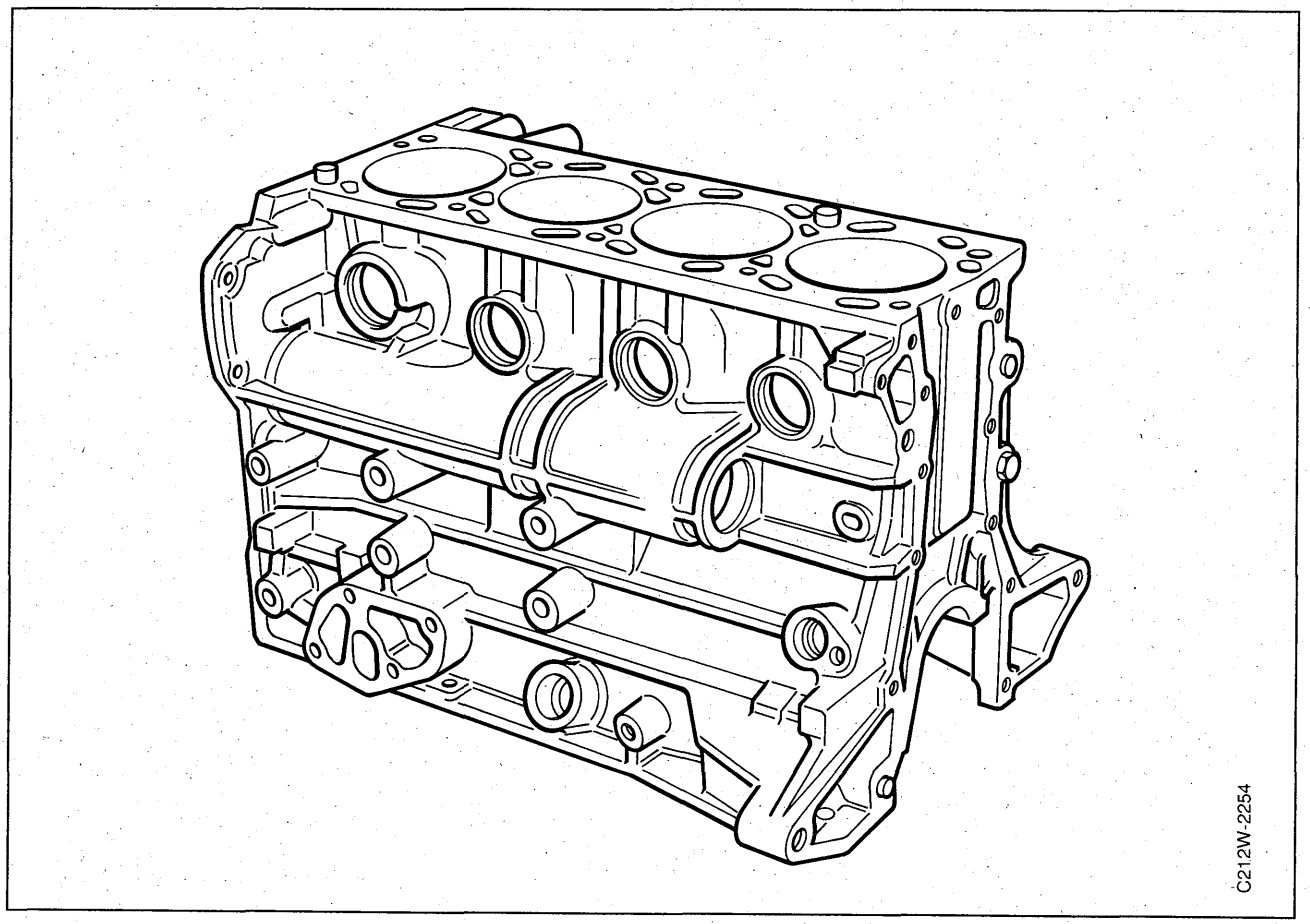
# B204/B234 engines
# Technical data




## General data

| | | B204 | B234 |
|---|---|---|---|
| Engine type | | Four-cylinder, four-stroke, 16-valve engine with twin overhead camshafts and two balance shafts. Transverse. | |
| Cylinder bore | mm | 90 | |
| Stroke | mm | 78 | 90 |
| Swept volume | $cm^3$ | 1985 | 2290 |
| Firing order | | 1-3-4-2 | |
| Approximate weight | kg (lb) | 165 (363) | |

## Engine block




### Cylinder bores

| | | |
|---|---|---|
| Standard (A) | mm | 90.000—90.012 |
| Standard (B) | mm | 90.003—90.020 |
| Standard (B+) | mm | 90.011—90.030 |
| First oversize | mm | 90.500—90.512 |
| Second oversize | mm | 91.000—91.012 |

### Cylinder head

| | | |
|---|---|---|
| Height of new head | mm | 139.4—139.6 |
| Minimum after regrinding | mm | 139.0 |

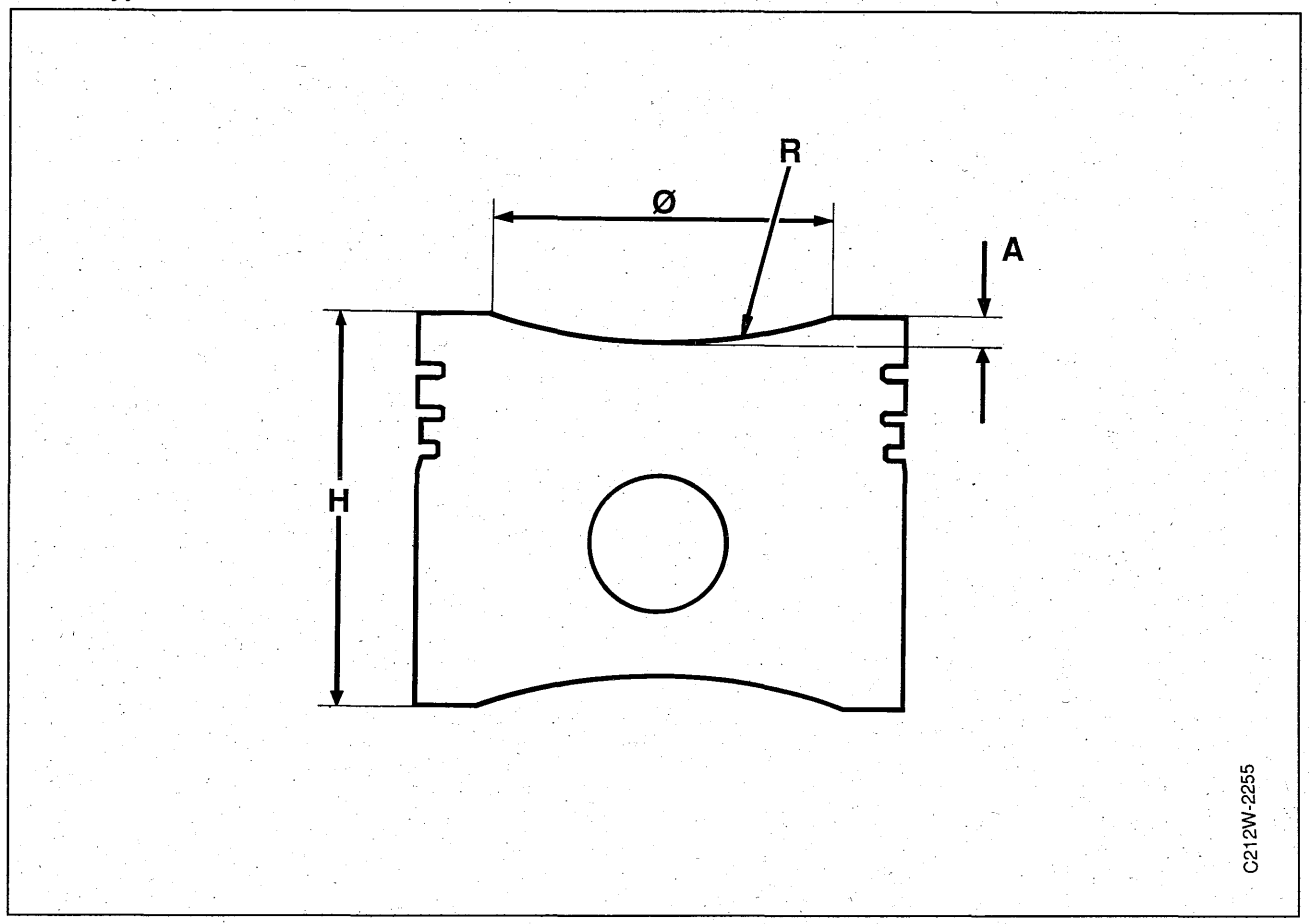
# Pistons

## General data

| | | B204 | B234 |
|---|---|---|---|
| Piston speed at 5000 rpm | m/s | 13 | 15 |

Different makes of piston must not be fitted in the same engine.

## Piston types




| Engine | Model year | | R | Ø | A | H |
|---|---|---|---|---|---|---|
| B204i | 1994 | mm | 55 | 42.3 | 4.4 | 68.3 |
| B204L | 1994 | mm | 150 | 70 | 4.4 | 68.3 |
| B234i | 1994 | mm | 149 | 70 | 4.4 | 58.3 |
| B234L/R/E | 1994 | mm | 145 | 83.6 | 6.4 | 68.3 |
| B204S | 1994 | mm | 255 | 83.6 | 4.0 | 68.3 |

# Pistons (contd.)

### Classification of pistons and cylinder bores

The piston classification code is stamped on the piston crown. The service codes are:
AB
B
C
The cylinder classification code for each cylinder is stamped on the block. The cylinder class codes are:
A
B
B+
All cylinder classes may occur in the same block.

### Piston sizes

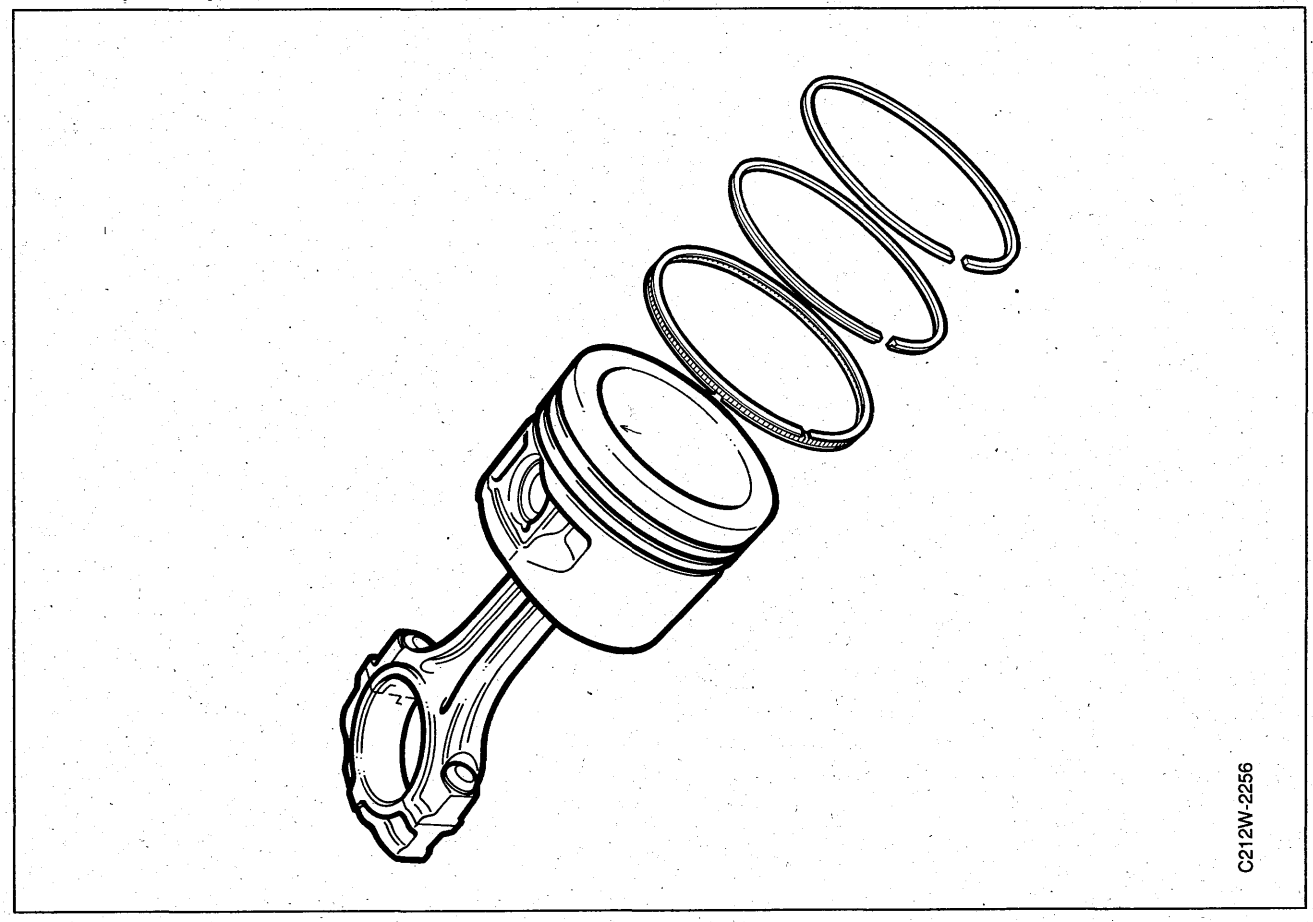
| | | |
|---|---|---|
| Standard A (not carried as spare part) | mm | 89.971—89.980 |
| Standard AB | mm | 89.980—89.989 |
| Standard B | mm | 89.989—90.000 |
| Standard C | mm | 90.000—90.013 |
| First oversize (0.5) | mm | 90.472—90.488 |
| Second oversize (1.0) | mm | 90.972—90.988 |
| Nominal piston clearance | mm | 0.011—0.040 |

| **Classification, piston/cylinder** | | **Clearances** |
|---|---|---|
| A/A | mm | 0.020—0.041 |
| AB/A | mm | 0.011—0.032 |
| AB/B | mm | 0.014—0.040 |
| B/B+ | mm | 0.011—0.041 |

### Piston diameter

Piston diameter is measured at right angles to the piston boss at a distance of 9.3 mm (turbo cars) or 11 mm (non-turbo cars) from the bottom of the skirt.

**Pistons (contd.)**



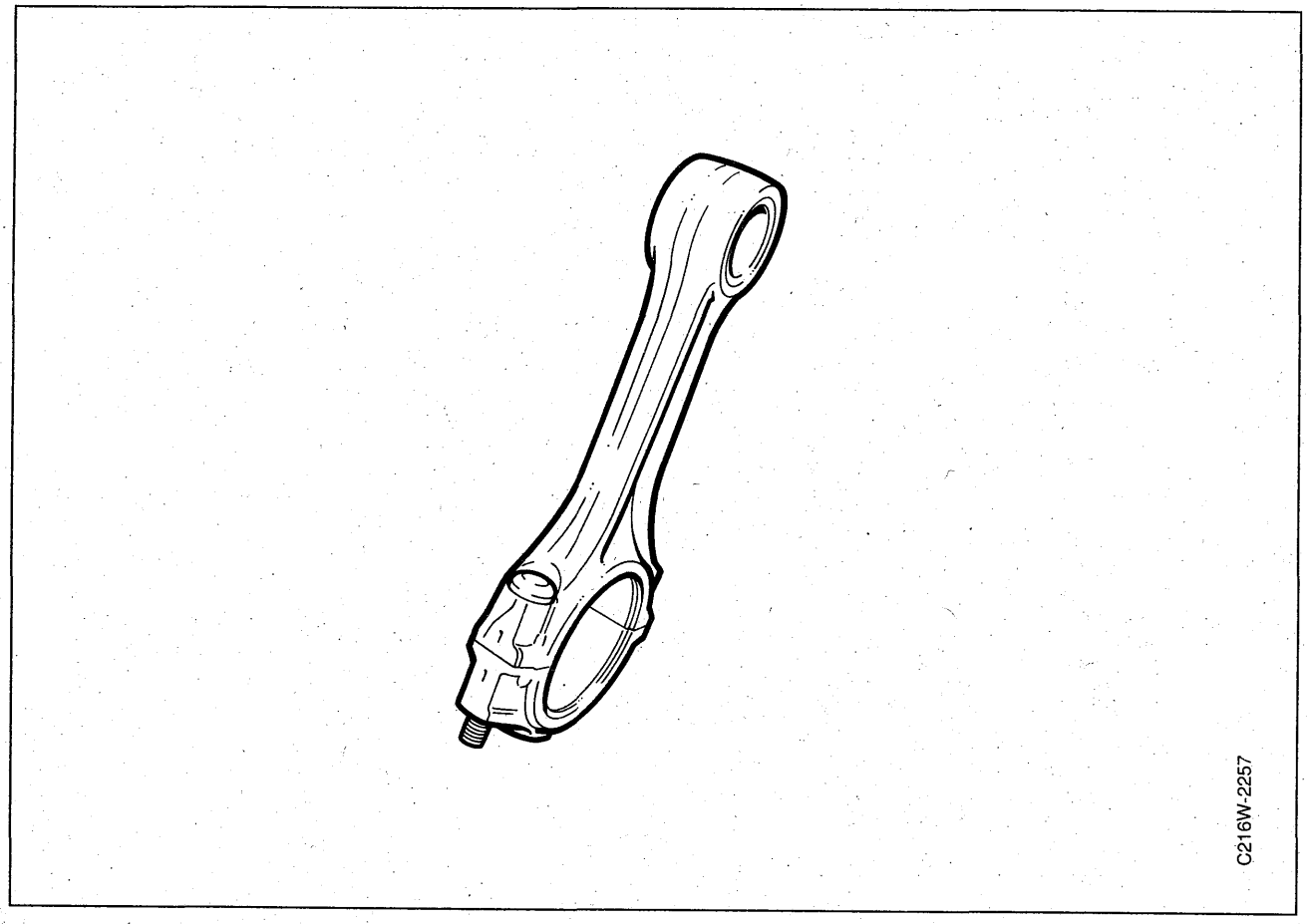

**Piston rings**

| | | Top compression ring | Second compression ring | Scraper ring |
|---|---|---|---|---|
| Thickness | mm | 1.728—1.740 | 1.978—1.990 | 2.976—3.052 |
| Clearance in groove | mm | 0.050—0.082 | 0.040—0.072 | |
| Gap in cylinder | mm | 0.30—0.50 | 0.15—0.65 | 0.38—1.40 |

**Gudgeon pin**

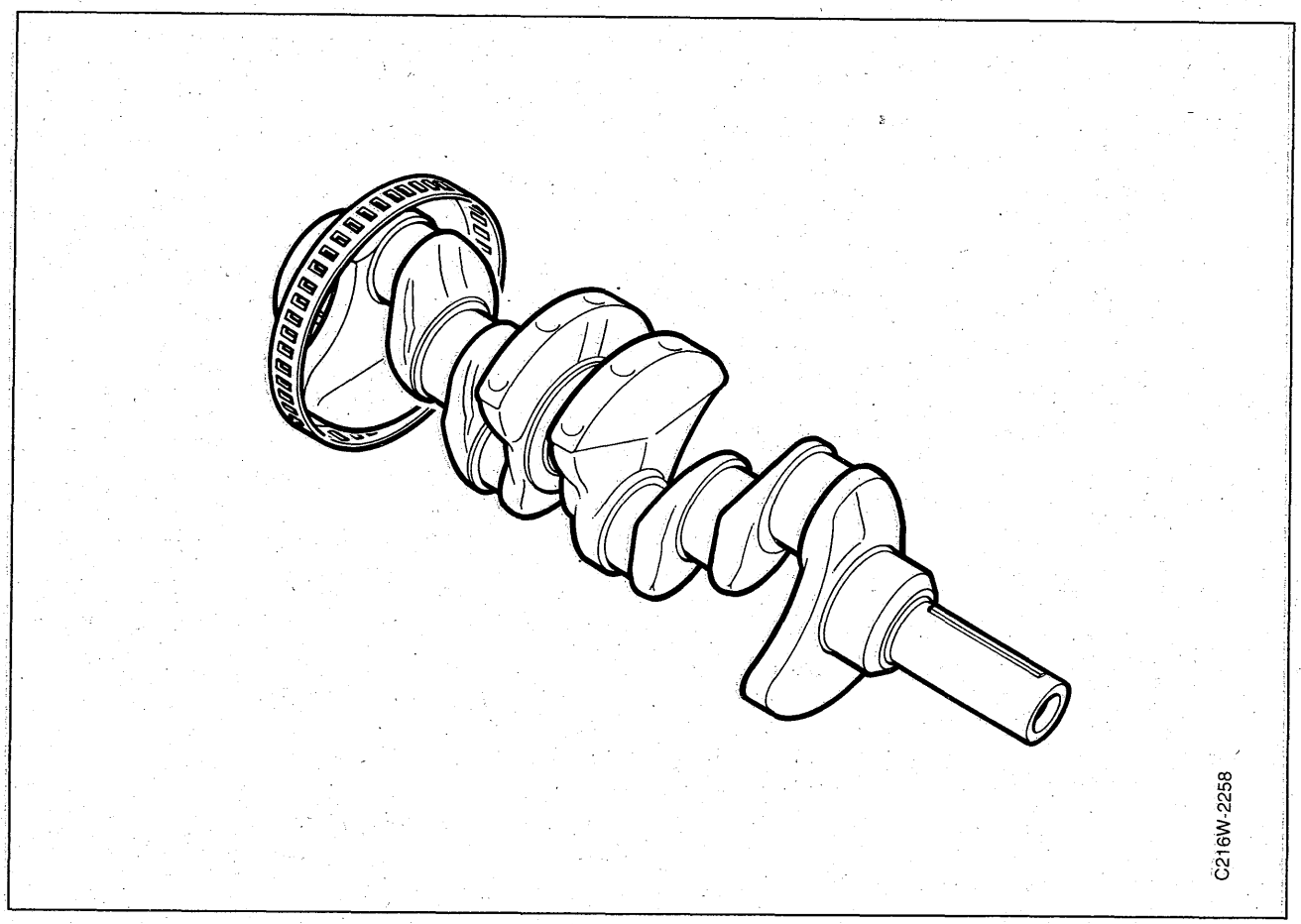
| | | |
|---|---|---|
| Diameter | mm | 23.996—24.000 |
| Fit | mm | 0.005—0.014 |

**Connecting rods**




| | | |
|---|---|---|
| Diameter of big end | mm | 56.000—56.019 |
| Diameter of small-end bush (fitted) | mm | 24.005—24.010 |
| Maximum permissible weight variation per set | g (oz) | 6 (0.21) |
| Length (B234 L/R) | mm | 147 |
| Length, other | mm | 153 |

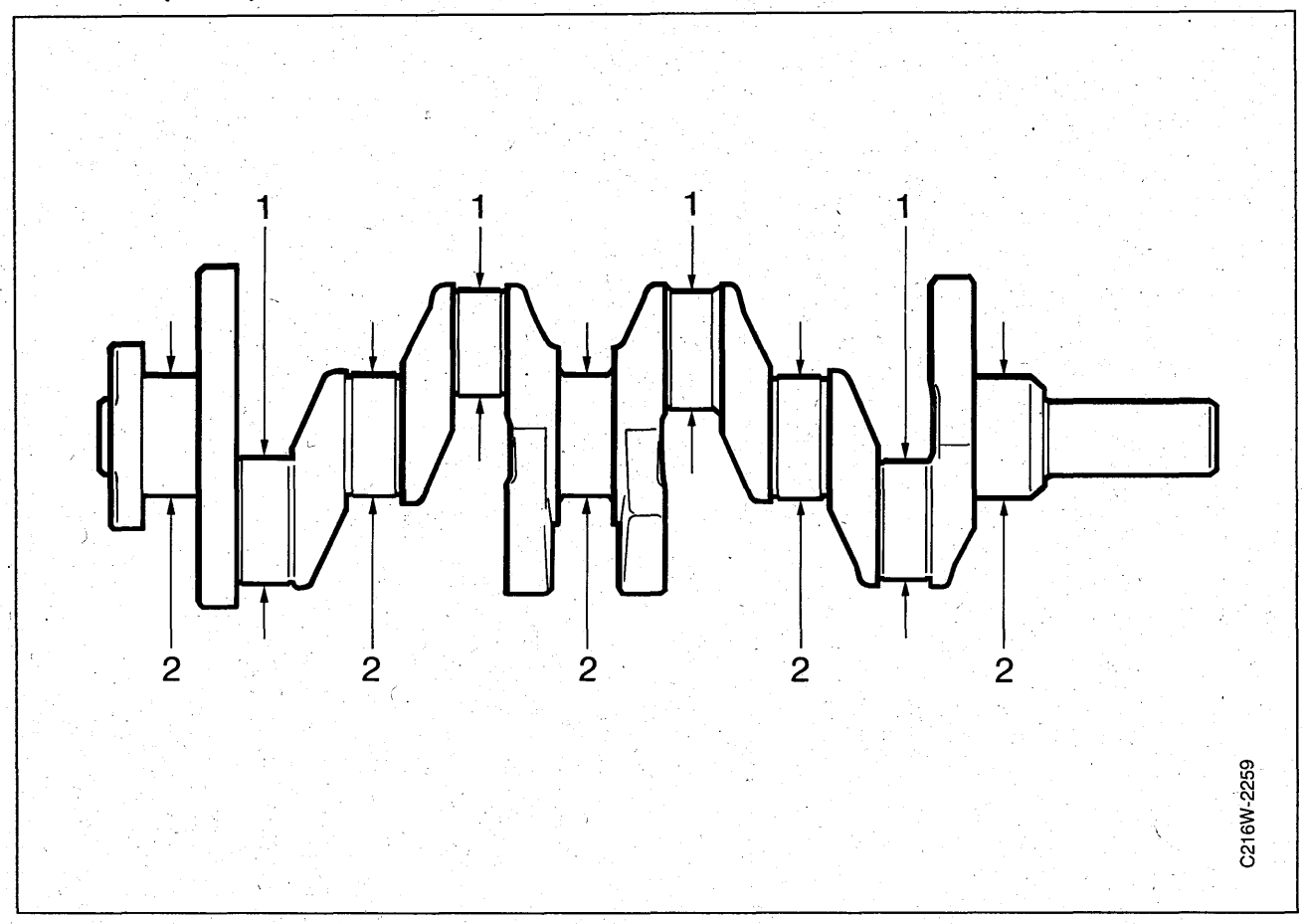
**Crankshaft**




**General data**

| | | |
|---|---|---|
| Alignment, maximum variation in straightness | mm | 0.10 |
| End float | mm | 0.06—0.31 |
| Maximum journal out-of-round | mm | 0.005 |
| Maximum taper of journals | mm | 0.005 |
| Radius of main journal fillet | mm | 1.65—1.85 |
| Main bearing clearance | mm | 0.014—0.062 |
| Length | mm | 539.2 |

**Crankshaft (contd.)**




**Colour markings of main-bearing and big-end bearing shells**

Standard bearing shells are **Yellow—Yellow** or **Red—Blue** .

Red is thinnest, yellow is 0.005 mm (0.0002 in) thicker than red and blue is 0.005 mm (0.0002 in) thicker than yellow. Only yellow bearing shells are carried as a spare part.

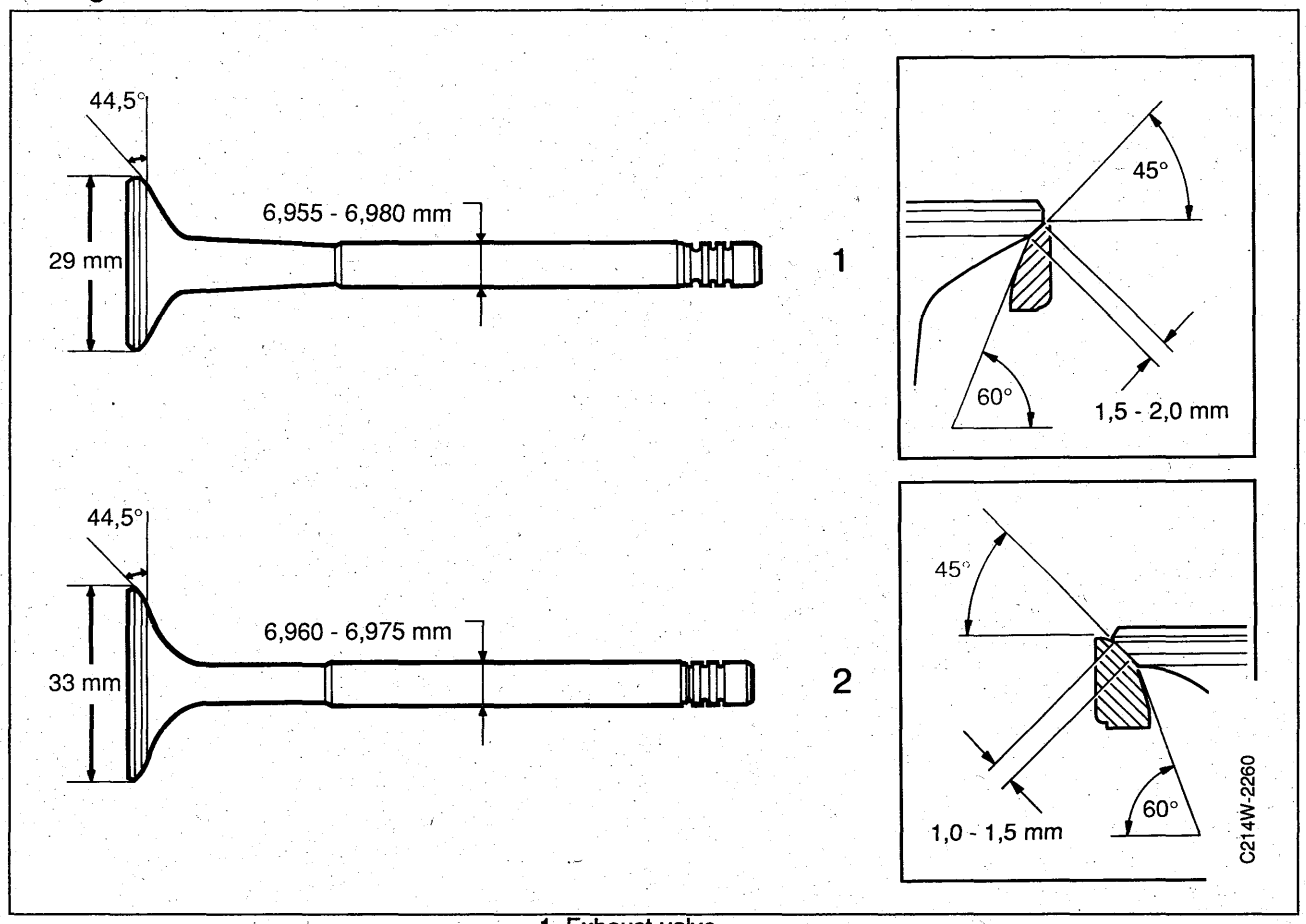
**Crank-pin diameter (1)**

| | | |
|---|---|---|
| Standard | mm | 51.981—52.000 |
| First undersize | mm | 51.731—51.750 |
| Second undersize | mm | 51.481—51.500 |
| Third undersize | mm | 51.237—51.250 |
| Fourth undersize | mm | 50.987—51.000 |
| Big-end bearing clearance | mm | 0.020—0.068 |

**Main journal diameter (2)**

| | | |
|---|---|---|
| Standard | mm | 57.981—58.000 |
| First undersize | mm | 57.731—57.750 |
| Second undersize | mm | 57.481—57.500 |
| Third undersize | mm | 57.237—57.250 |
| Fourth undersize | mm | 56.987—57.000 |
| Main bearing clearance | mm | 0.014—0.062 |

## Valve gear




1 Exhaust valve
2 Inlet valve

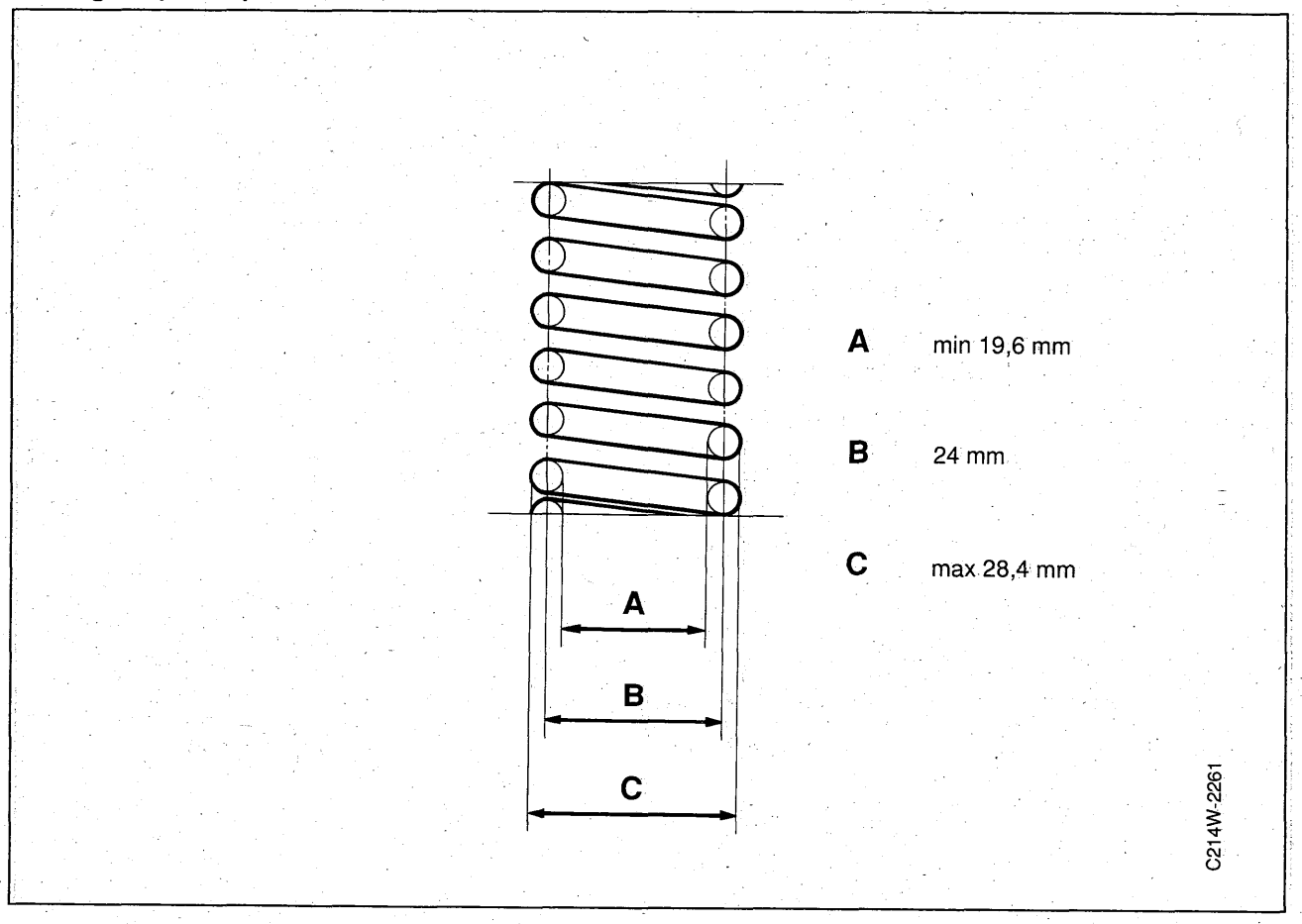
**Important**

The exhaust valves are stellited and should therefore not be machined. Grinding using valve-grinding (lapping) paste is the only recommended method.

### Valve guides

| | | |
|---|---|---|
| Length | mm | 42.5 |
| Outside diameter | mm | 12.039—12.050 |
| Bore for valve guides in cylinder head | mm | 12.000—12.018 |
| Maximum clearance between valve stem and valve guide | mm | 0.50 (measured on valve head raised 3 mm above seat) |

**Valve gear (contd.)**



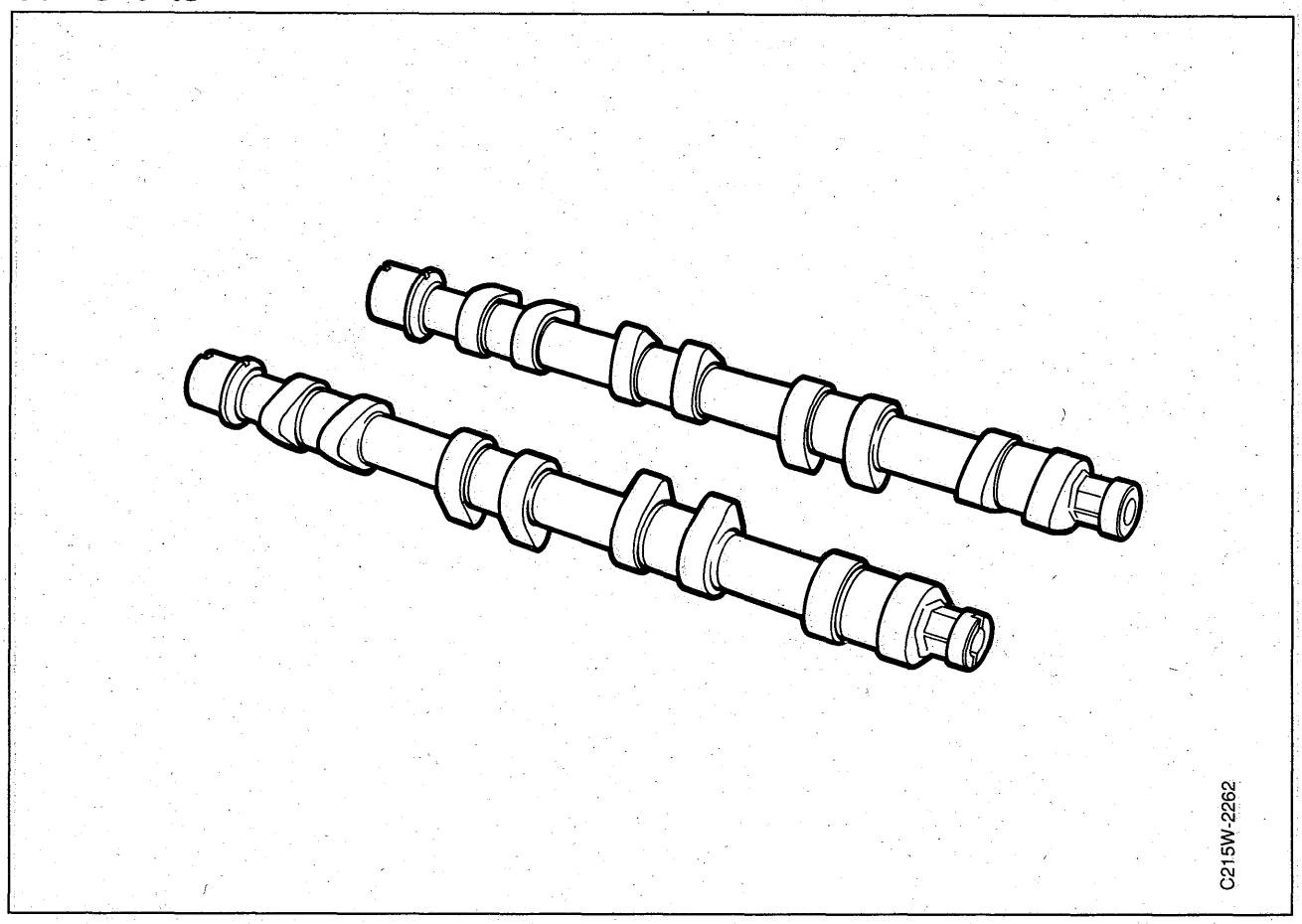

**Valve springs**

| | | | |
|---|---|---|---|
| Length, | fitted | mm | 37.0 |
| | free | mm | 44.0—47.0 |
| | when subjected to compressive force of 620—670 N (138—150 lbf) | mm | 28.4 |

**Tappets**

| | | |
|---|---|---|
| Diameter | mm | 32.959—32.975 |
| Height | mm | 26.0 |
| Bore for tappets in cylinder head | mm | 33.000—33.016 |

## Camshafts




### General data

| | | |
|---|---|---|
| Number of bearings | | 5 |
| Bearing diameter | mm | 28.922—28.935 |
| End float | mm | 0.08—0.35 |

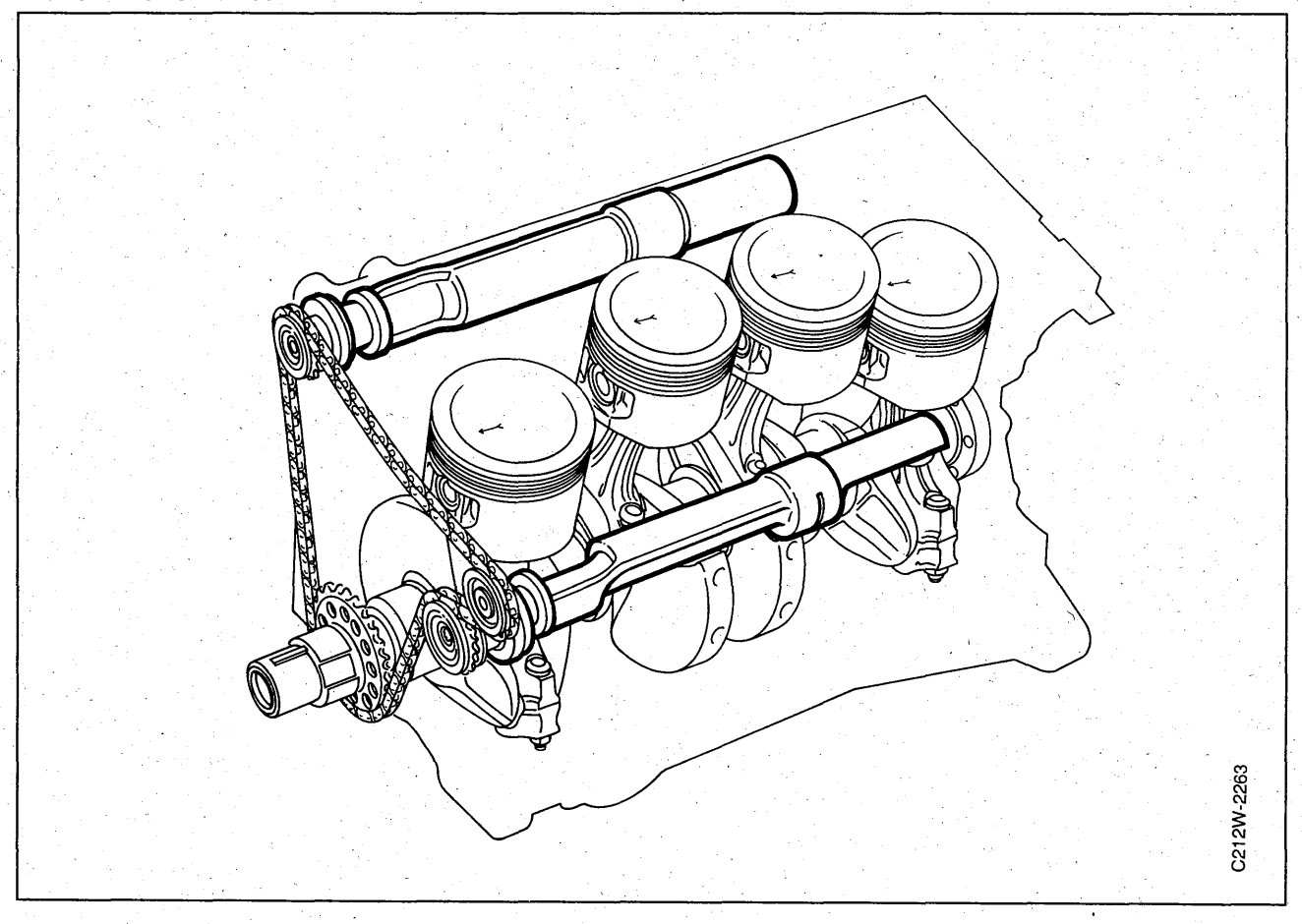
### Cam lift

| Model year | | Inlet valves | Exhaust valves |
|---|---|---|---|
| 1994 | mm | 8.65 | 8.65 |

### Valve timing

| | | Inlet valves | | Exhaust valves | |
|---|---|---|---|---|---|
| | Model year | Open | Close | Open | Close |
| B204i/S/L, B234 E/L/R | 1994 | 14° BTDC | 46° ABDC | 44° BBDC | 16° ATDC |
| B234i | 1994 | 13° BTDC | 53° ABDC | 48° BBDC | 18° ATDC |

## Balance shafts



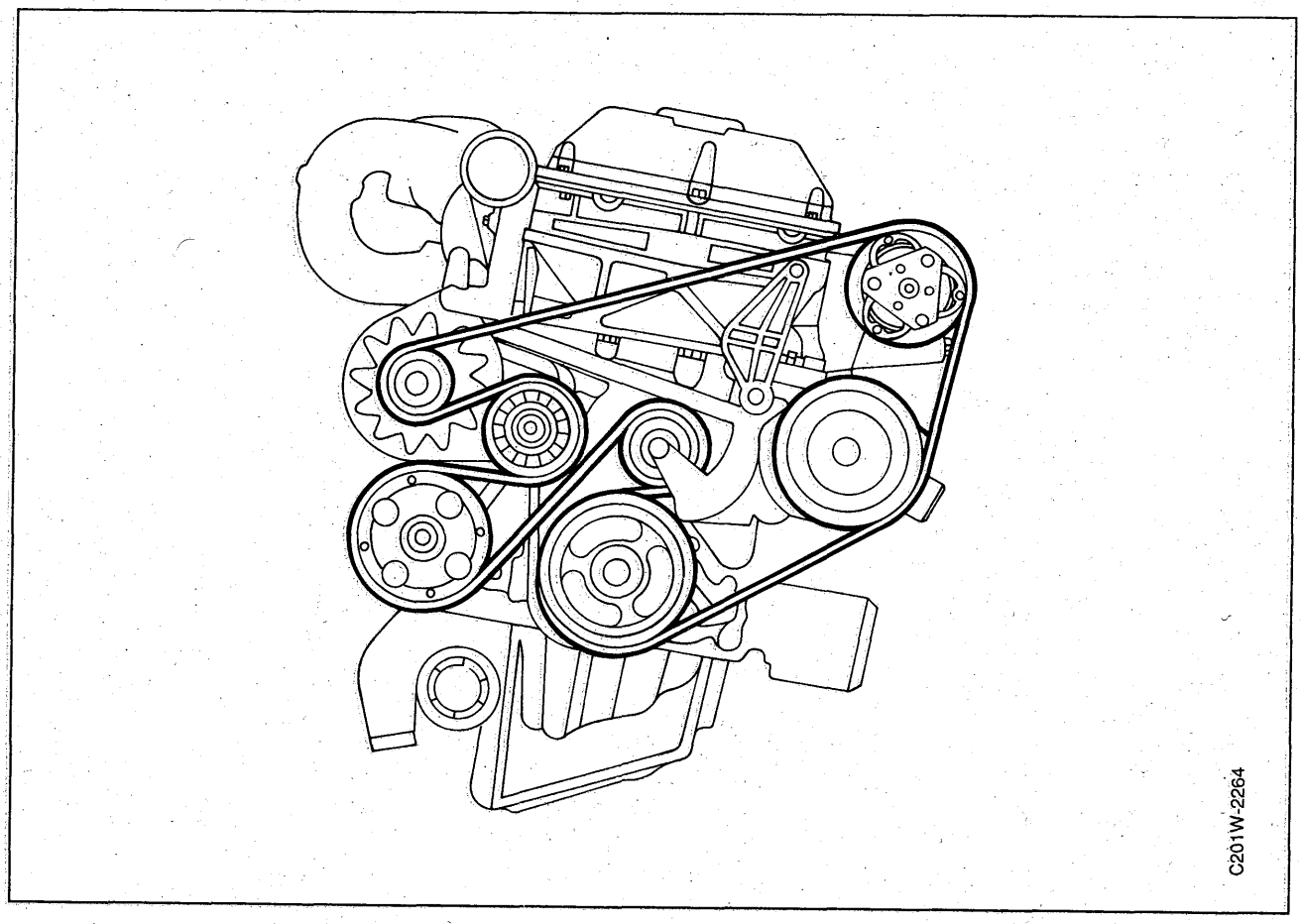

**General data**

| | | |
|---|---|---|
| Diameter, balance-shaft journal (inner) | mm | 39.892—39.908 |
| Diameter, balance-shaft bearing (inner) | mm | 39.988—40.043 |
| Bearing clearance (inner) | mm | 0.080—0.151 |
| Maximum permissible bearing clearance (inner) | mm | 0.18 |
| Diameter, balance-shaft journal (outer) | mm | 19.947—19.960 |
| Diameter, balance-shaft bearing (outer) | mm | 20.000—20.021 |
| Bearing clearance (outer) | mm | 0.040—0.074 |
| End float | mm | 0.050—0.450 |

## Tightening torques

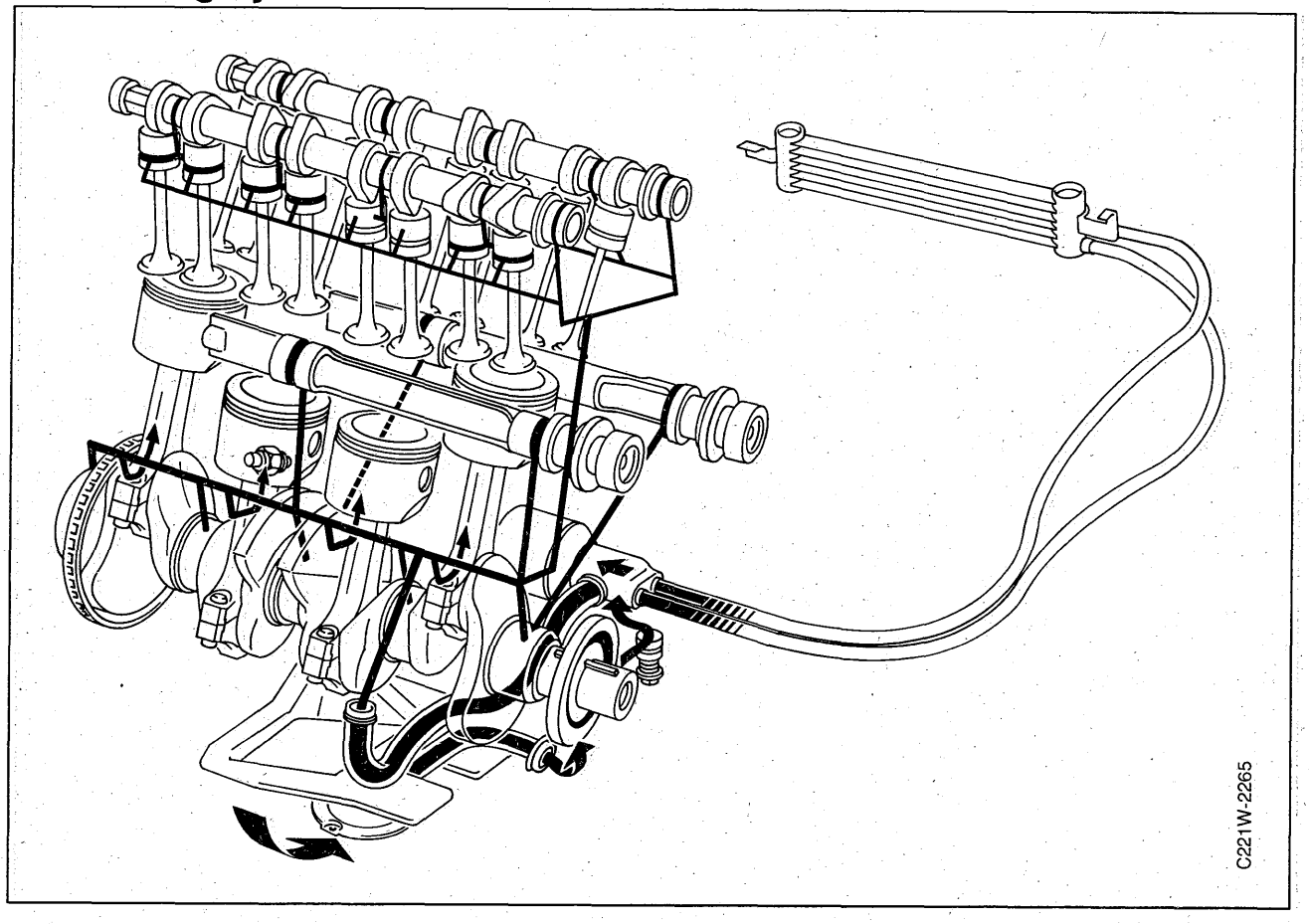
| | Torque (Nm) | Torque (lbf ft) | Bolt size |
|---|---|---|---|
| Exhaust manifold, normally aspirated engines | 18 | 13.3 | M8 |
| Exhaust manifold, turbo | 25 | 18.5 | M8 |
| Oil drain plug | 25 | 18.5 | M14x1.5 |
| Idler sprocket, balance-shaft chain | 25 | 18.5 | M8 |
| Cylinder head stage I | 60 | 44 | |
| stage II | 80 | 59 | |
| stage III | Tighten a further quarter-turn (90°) | Tighten a further quarter-turn (90°) | |
| Intake manifold | 22 | 16 | M8 |
| Camshaft bearing caps | 15 | 11 | M8 |
| Balance-shaft sprocket | 42 | 31 | M10 |
| Camshaft sprocket | 63 | 47 | M10 |
| Timing chain tensioner | 63 | 47 | M22 |
| Piston cooling nozzle | 18 | 13.3 | M10 |
| Driver disc | 95 | 70.3 | M10x1.25 |
| Oil filter | 10 | 7.4 | |
| Oil cooler hoses | 18 | 13.3 | |
| Sump | 22 | 16 | M8 |
| Plug for timing chain tensioner | 22 | 16 | |
| Plug for oil pressure reducing valve | 30 | 22 | |
| Plug for oil-cooler thermostat | 60 | 44 | |
| Main bearing caps | 110 | 81.4 | M12 |
| Throttle body | 22 | 16 | M8 |
| Flywheel | 80 | 59.2 | M10x1.25 |
| Thermostat housing | 22 | 16 | M8 |
| Timing cover (all bolts) | 22 | 16 | M8 |
| Turbocharger | 25 | 18.5 | M8 |
| Ignition discharge module | 11 | 8 | M6 |
| Spark plugs | 28 | 20.7 | |
| Camshaft cover | 15 | 11 | M8 |
| Crankshaft pulley | 175 | 129.5 | M16x1.5 |
| Big-end bearing caps | 48 | 35.5 | M9x1 |
| Other bolts | 5 | 3.7 | M5 |
| | 10 | 7.4 | M6 |
| | 20 | 15 | M8 |
| | 40 | 30 | M10 |

## Drive-belt tension




| | | |
|---|---|---|
| Tension on checking | N (lbf) | minimum 170 (minimum 38) |

## Lubricating system



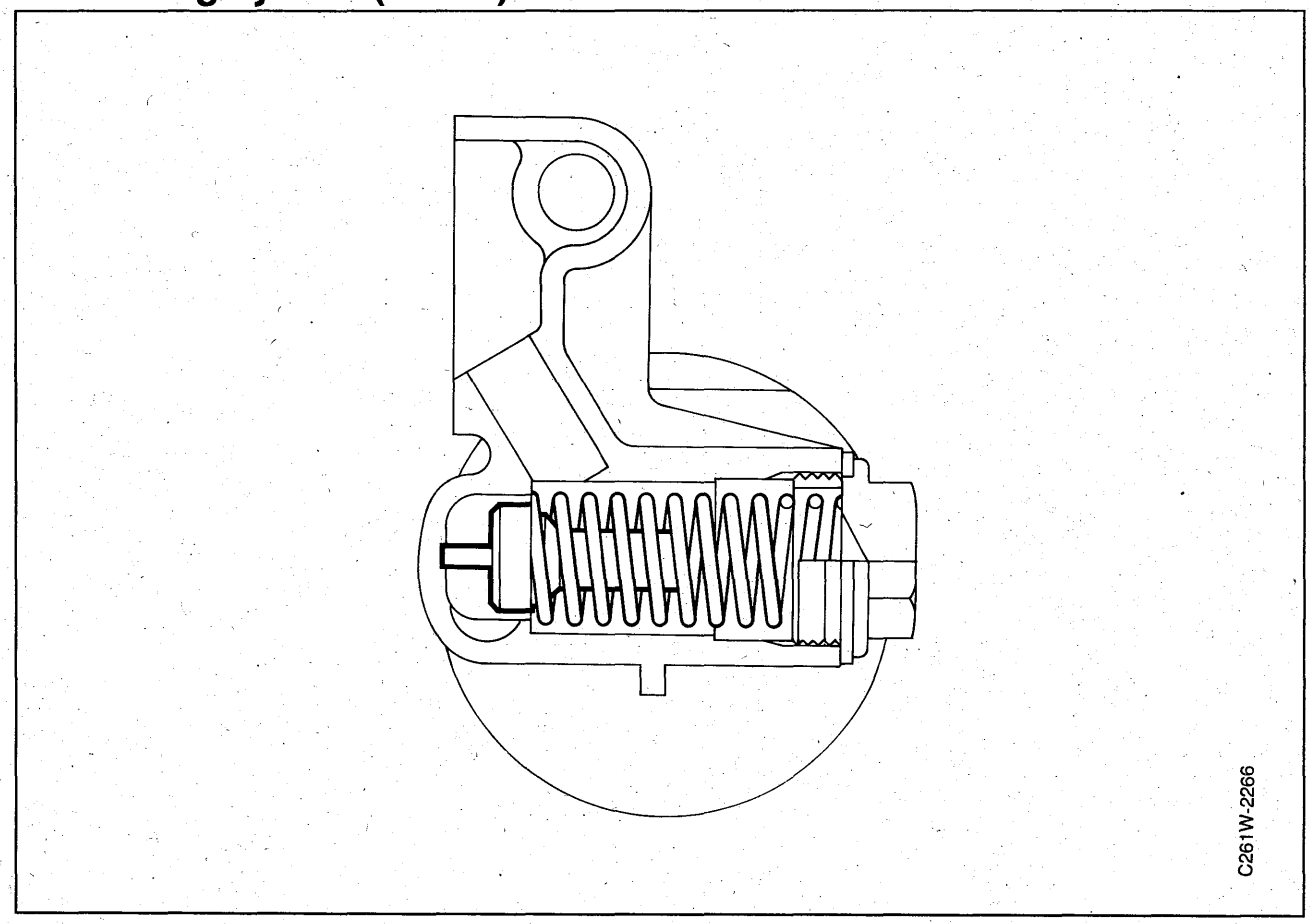

### General data

| | | | |
|---|---|---|---|
| Oil capacity, including oil in filter | without oil cooler | litres | 5.0 |
| | with oil cooler | litres | 5.4 |
| | in connection with service | litres | 5.0 |
| Volume between MAX and MIN marks on dipstick | | litres | 1.0 |
| Grade of oil | | | Saab Turbo motor oil or motor oil to API SG and CCMC G4/G5 specifications. |
| Viscosity | | | SAE 10W-30 or 10W-40. SAE 15W-40 oil may be used in markets where these grades are unobtainable, but not during the winter. In climates with temperatures regularly below -20°C (-4°F), use 5W-30 or 5W-40 oil of all-synthetic or partially synthetic type. |

**Important**

The recommended grades of oil contain all necessary additives and the use of additional additives should therefore be avoided.

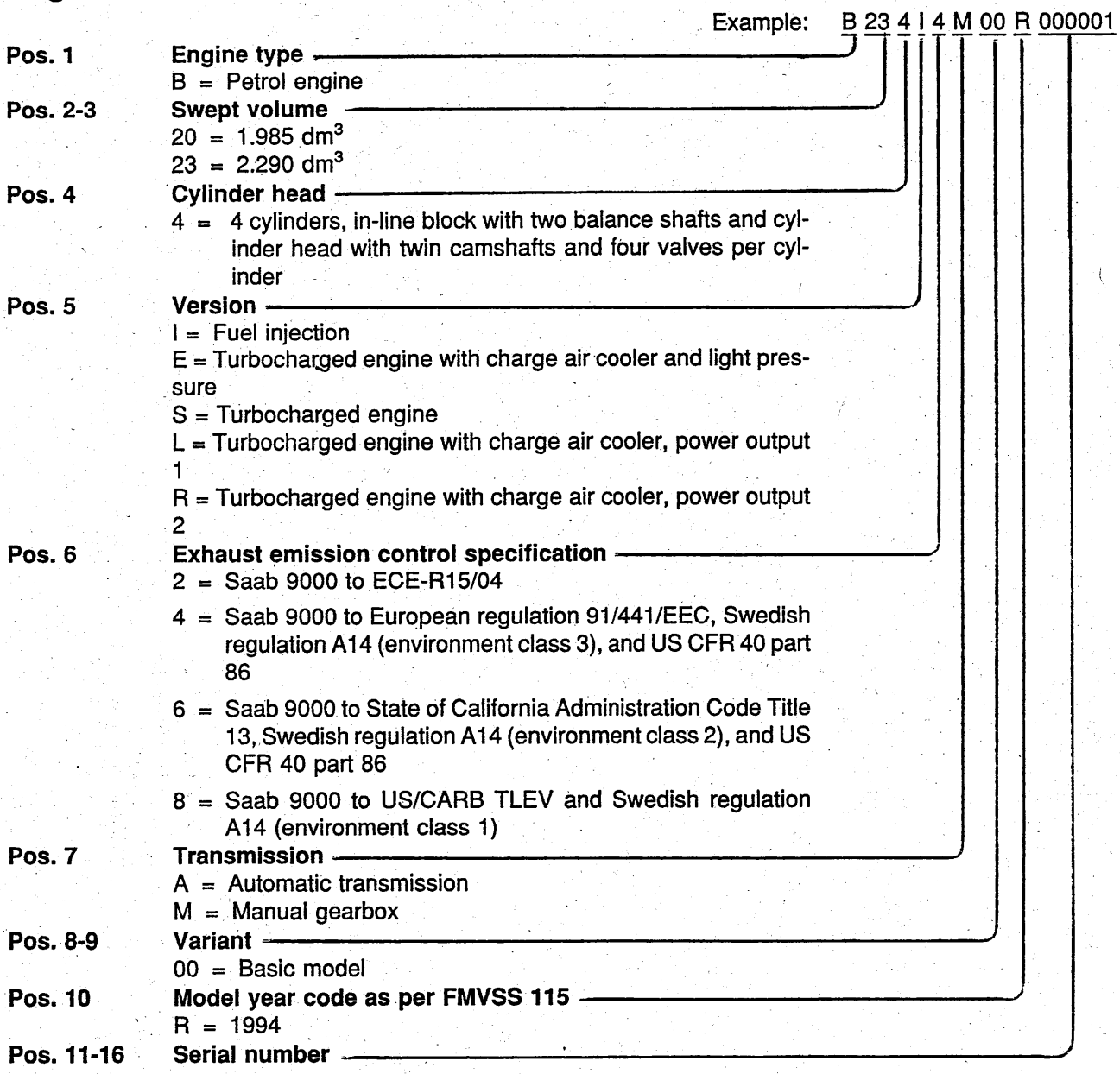
## Lubricating system (contd.)




**Oil pressures**

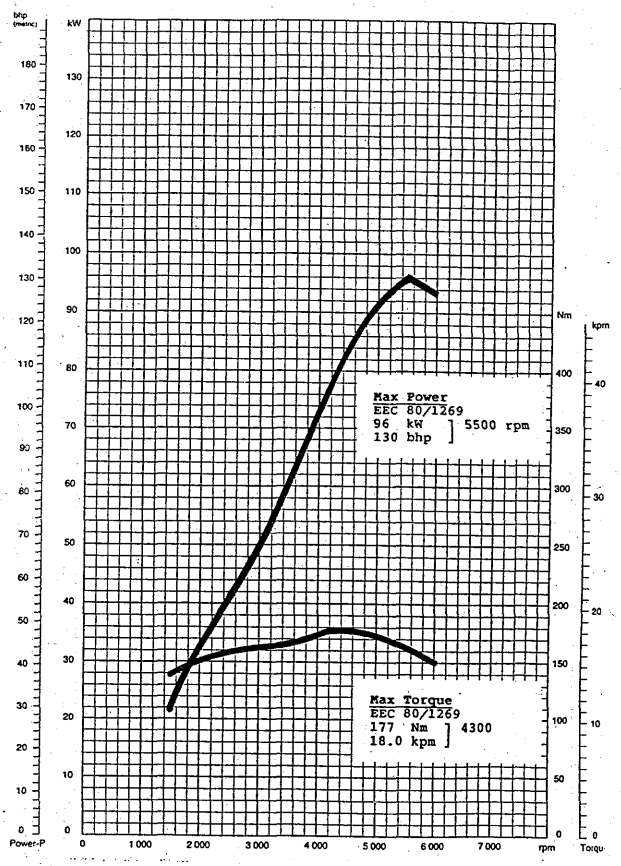
| | | |
|---|---|---|
| Oil pump pressure reducing valve opens at | bar | 3.0 |
| Warning lamp comes on when pressure drops below | bar | 0.3—0.5 |
| Minimum oil pressure at 2000 rpm, hot engine (80°C/176°F) and 10W-30 oil | bar | 2.7 |
| End float between pump rotor and housing | mm | 0.03—0.08 |
| Oil cooler thermostat opens at | °C (°F) | 107 (225) |

## Engine number

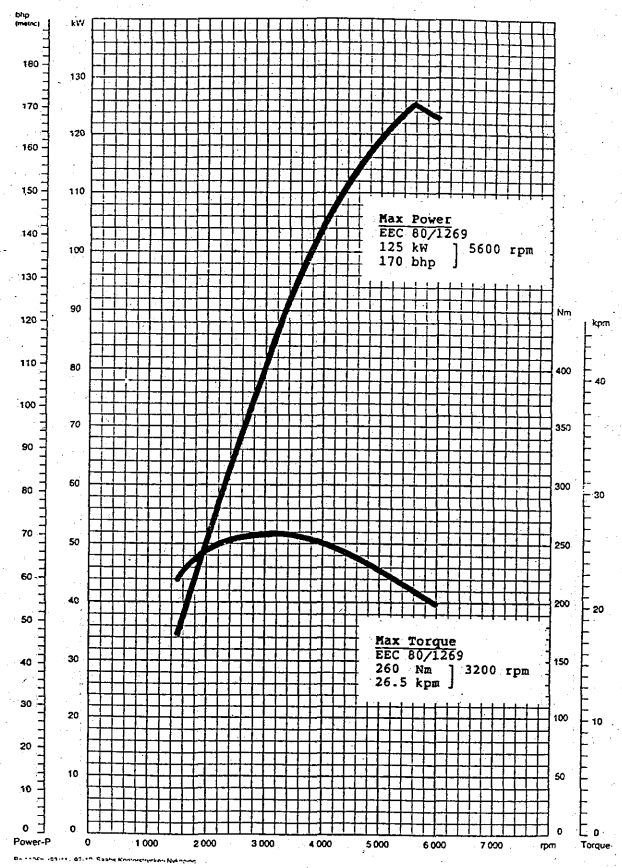


# Engine performance graphs

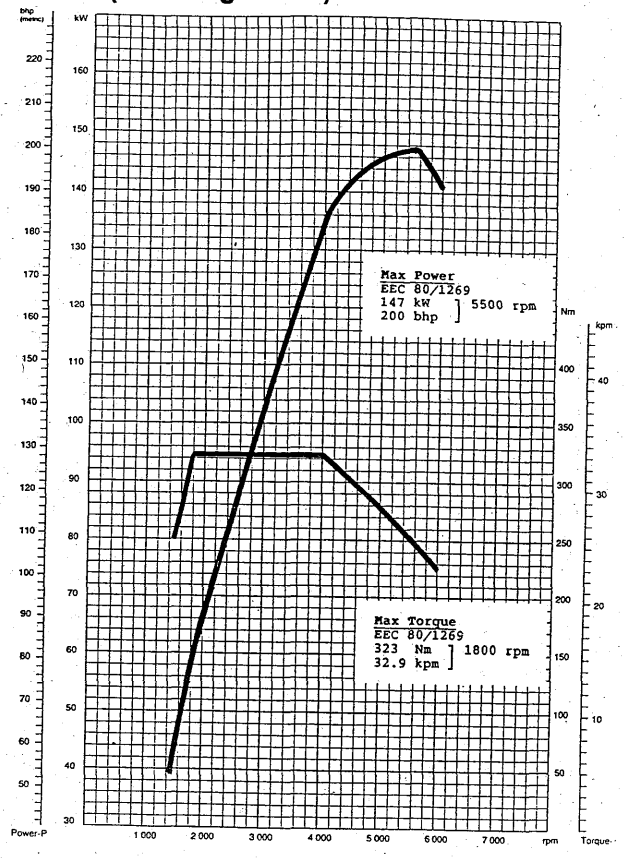
## B204i



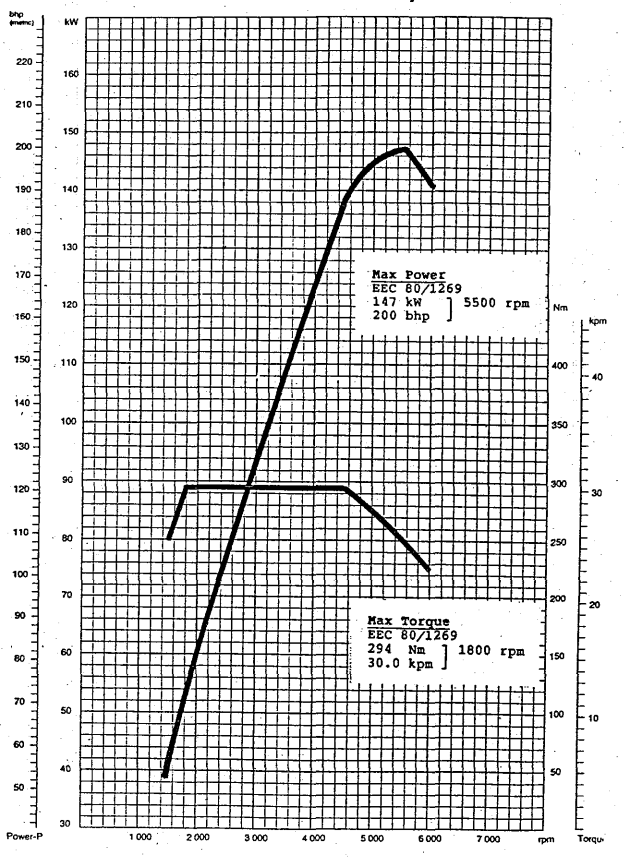

## B234E




## B234L (manual gearbox)

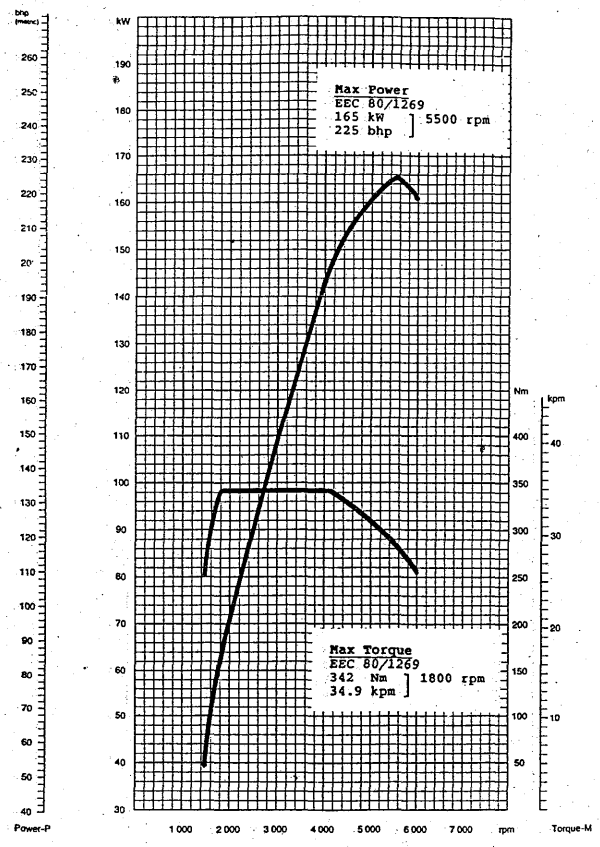



## B234L (automatic transmission)

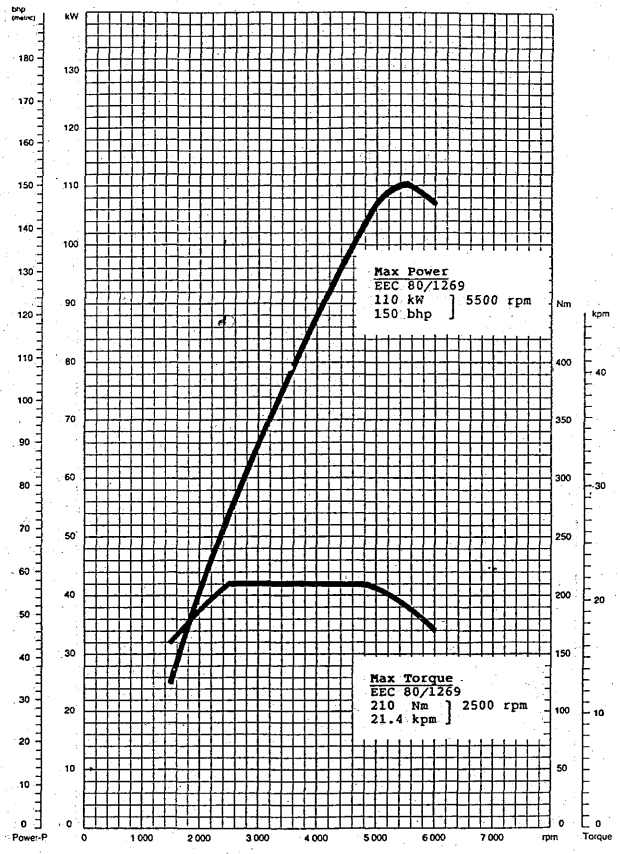


# Engine performance graphs

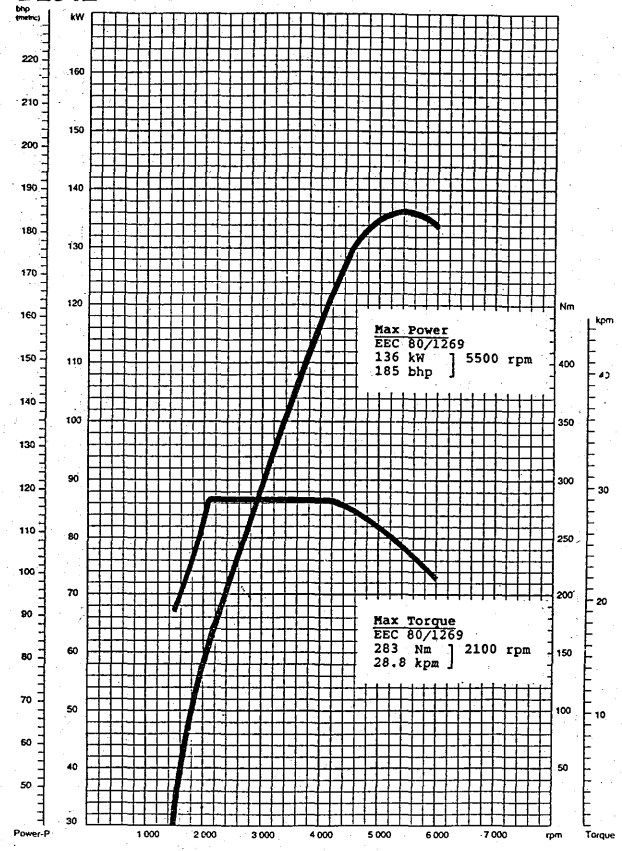
## B234R



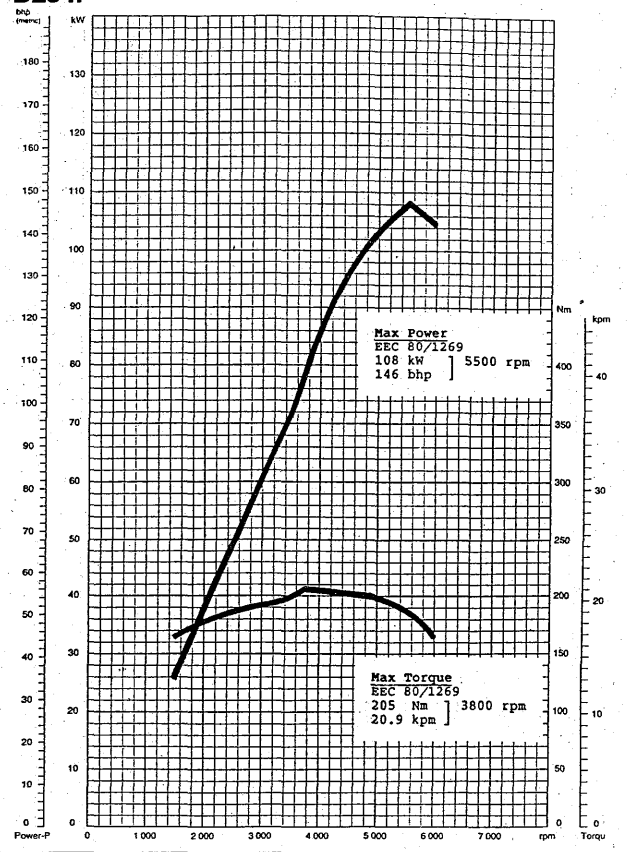

## B204S



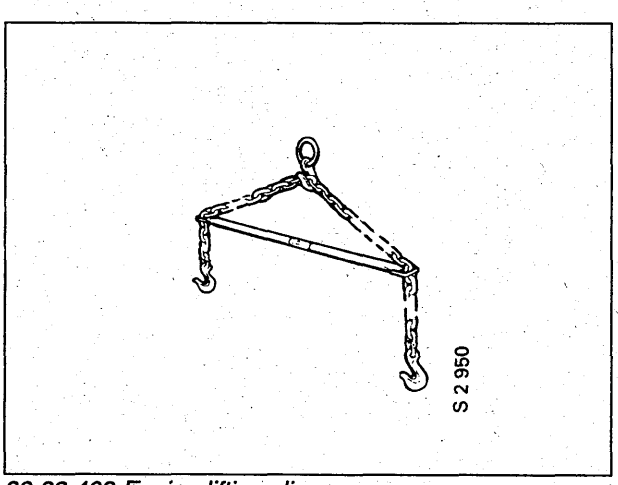

## B204L



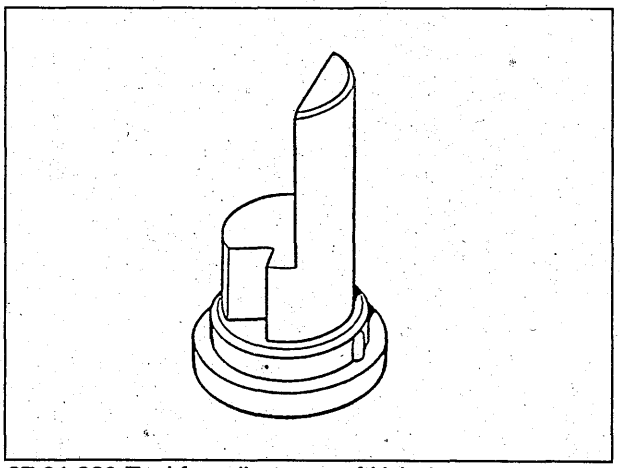

## B234i



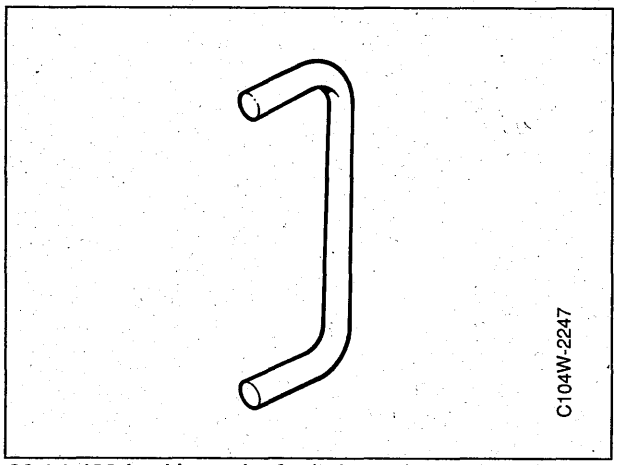
# Special tools, engine



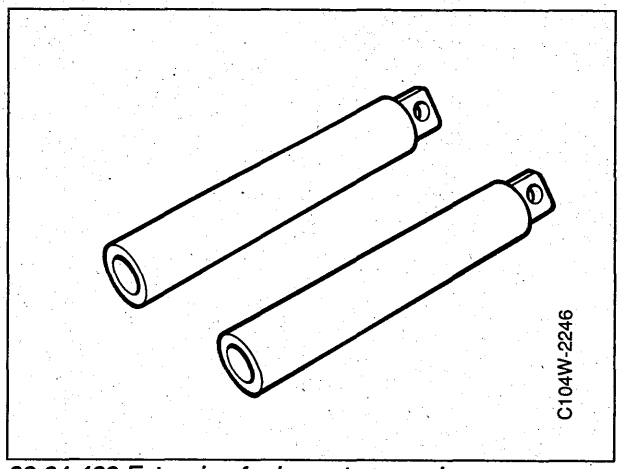

*83 92 409 Engine lifting sling*



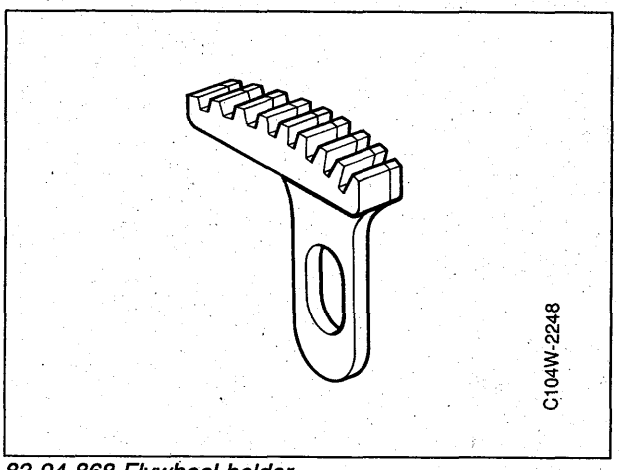
*87 91 980 Tool for adjustment of kick-down position*




*83 94 488 Locking yoke for belt tensioner*



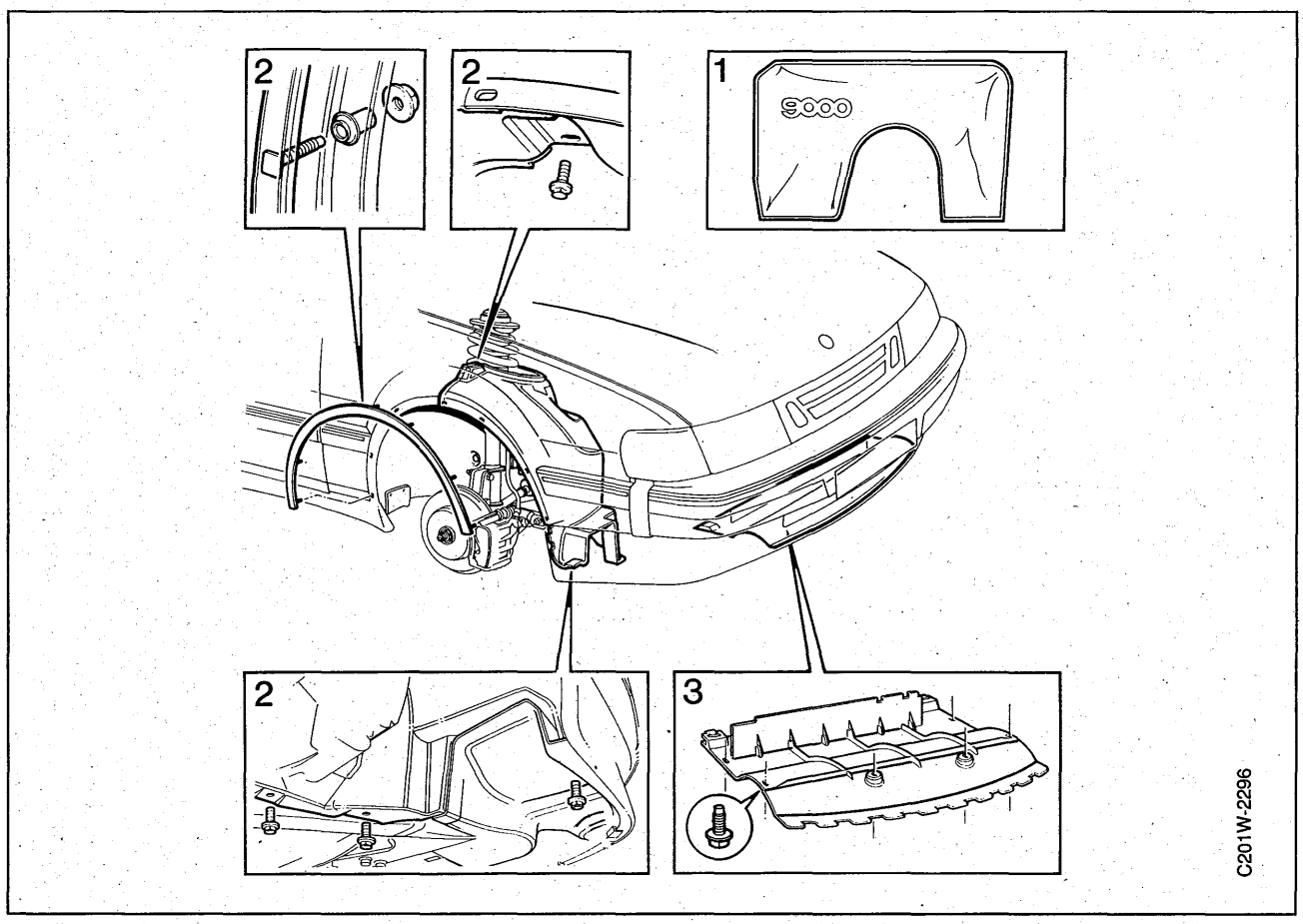

*83 94 439 Extension for bonnet gas spring*




*83 94 868 Flywheel holder*

# Removal and fitting

## To remove




The method described applies to the car when equipped with turbocharger, AC, automatic transmission or manual gearbox.

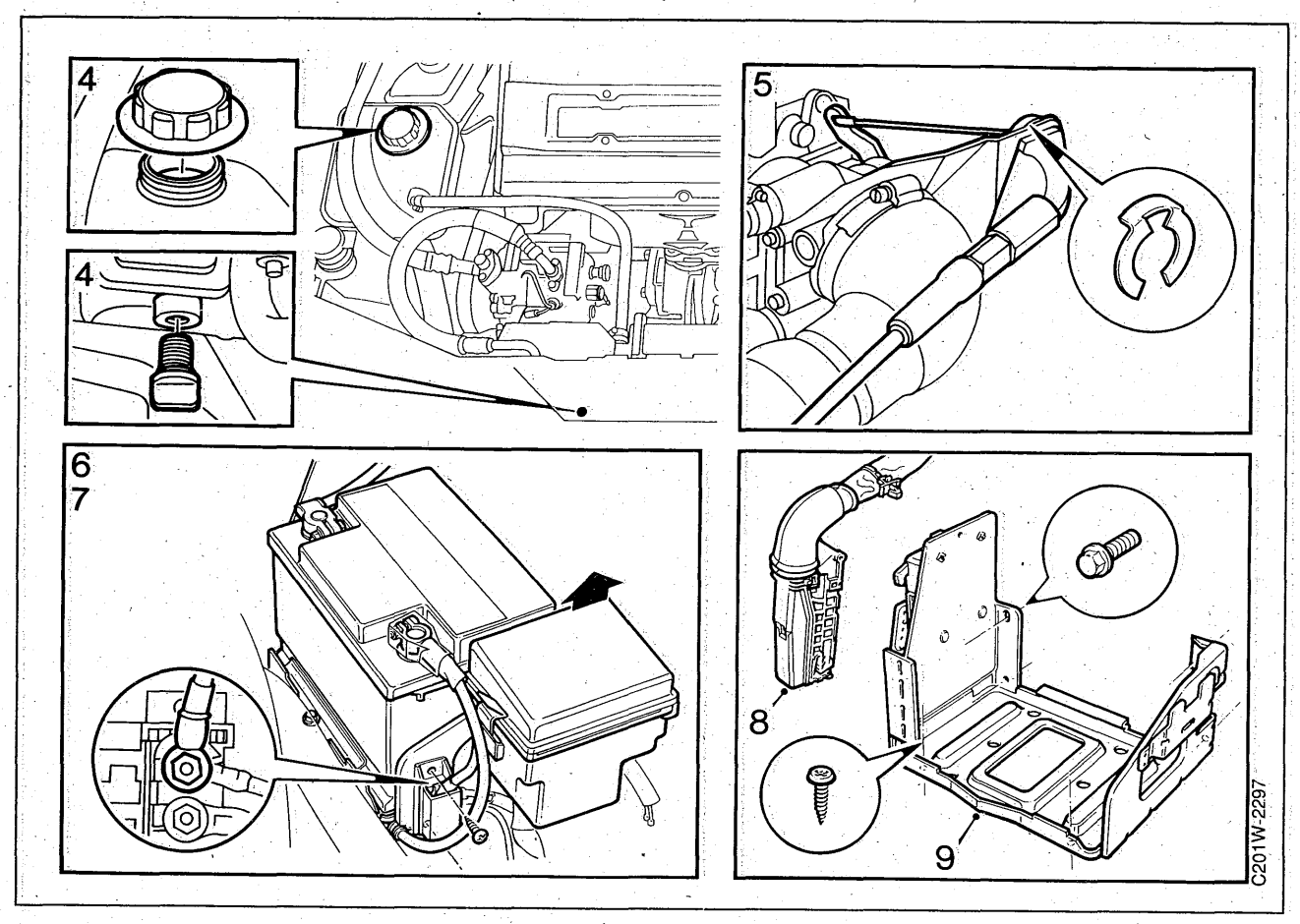
**Important**

Numerous electrical leads, hoses, etc. are secured by plastic cable ties.
After these ties have been pulled tight, the excess length is cut off, often leaving a sharp edge on the plastic.
Bear this in mind when securing cable ties to avoid leaving sharp edges that could cut or scratch bare hands or cause damage by chafing.

1 Place protective covers over the front wings.

2 Raise the car and remove both front wheels. Remove the wheel housing trim moulding and front wing liner on the right-hand side.

3 Remove the middle infill panel from under the spoiler.




4 Unscrew the radiator drain plug and drain off the coolant.

To speed up the process, lower the car to the floor and remove the filler cap from the expansion tank.

Screw the drain plug back in place.

5 Remove the retaining clip from the cable and bend the throttle cable aside.

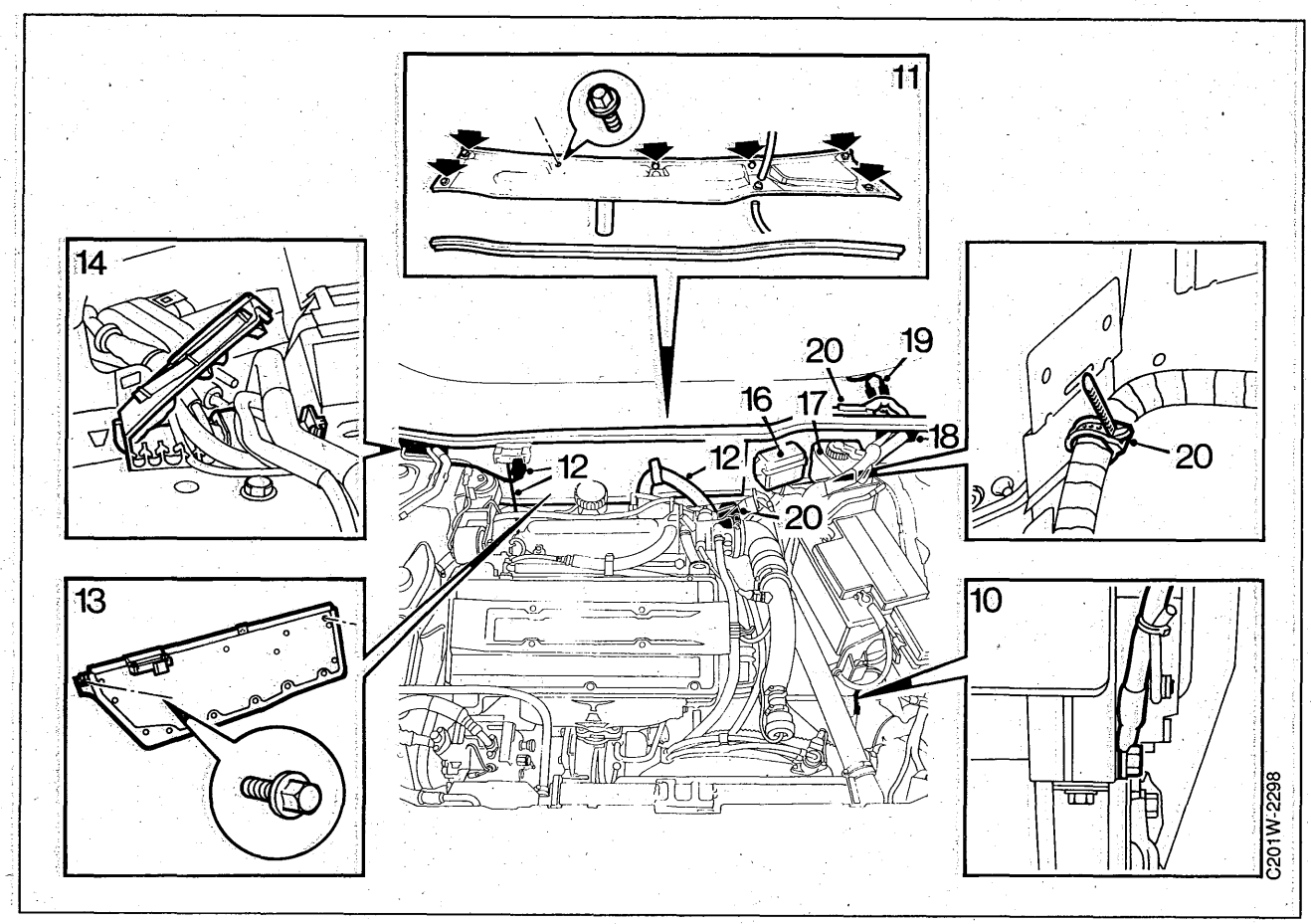
6 Disconnect the battery cables and remove the battery.

7 Expose the battery tray as follows:

- undo and lift away the front main fuse box
- remove the terminal block for the positive cable. Disconnect the positive cable from the terminal block and remove the clamp from the tray.

8 Unplug the ABS control module connector.

9 Remove the battery tray.




10 Disconnect the negative cable from the grounding point at the gearbox.

11 Disconnect the windscreen washer hose and remove the cover over the bulkhead space as well as the rubber moulding on the bulkhead partition.

12 Undo the clamp securing the engine wiring harness to the bulkhead partition and unplug the connector. Remove the electric lead and place the pressure sensor on the engine.

13 Remove the bulkhead partition.

14 Snip through the cable tie on the right-hand side.

15 Undo the pressure sensor cable and bend it aside.

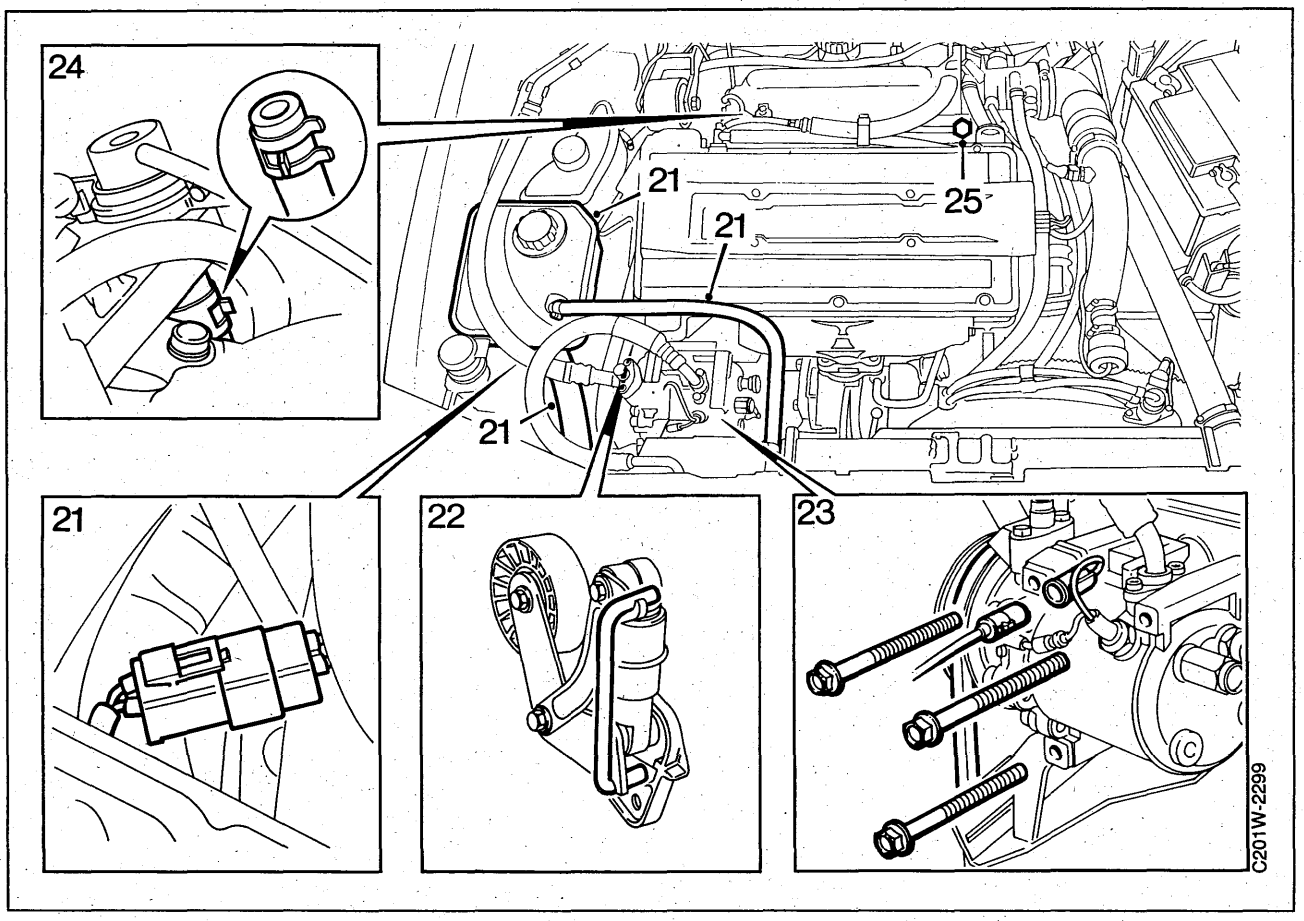
16 Lift the ABS relay box out of its holder.

17 Lift the brake fluid reservoir out of its holder.

18 Snip through the cable tie on the left-hand side.

19 Disconnect the two engine wiring harness connectors.

20 Unplug the control module connector, snip through the cable tie and separate the engine wiring harness in the connector. Bend the wiring up onto the engine.



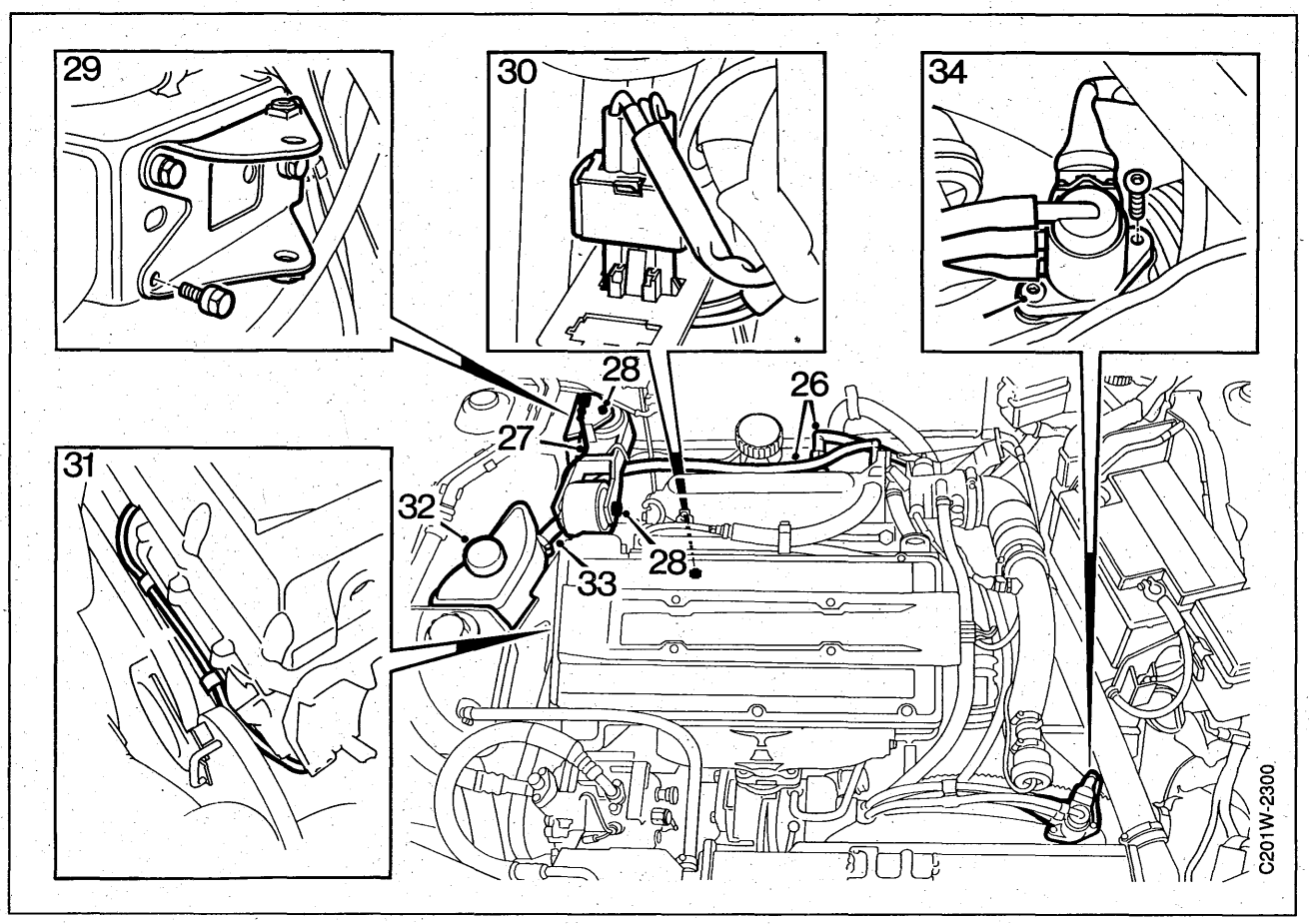

21 Disconnect the expansion tank hoses. Unplug the connector and lift out the tank.

22 Relieve the tension applied by the automatic belt tensioner as follows: pull the belt hard upwards while an assistant fits locking yoke 83 94 448 in place to secure the tensioner. Ease the belt off the AC compressor pulley.

23 Unplug the AC compressor connector, unscrew the retaining bolts and rest the compressor on the radiator cross-member.

24 Disconnect the return fuel hose from the fuel pressure sensor and bend the hose up against the bulkhead partition.

25 Disconnect the fuel delivery hose from the fuel rail.




26 Disconnect the vacuum hose from the evaporative emission canister on the intake manifold and disconnect the brake servo hose. Bend the hose aside.

27 Disconnect the interference suppressor cable (ground) from the torque arm bracket.

28 Snip through the cable ties holding the hoses and wiring at the upper torque arm. Remove the torque arm.

29 Remove the torque arm bracket.

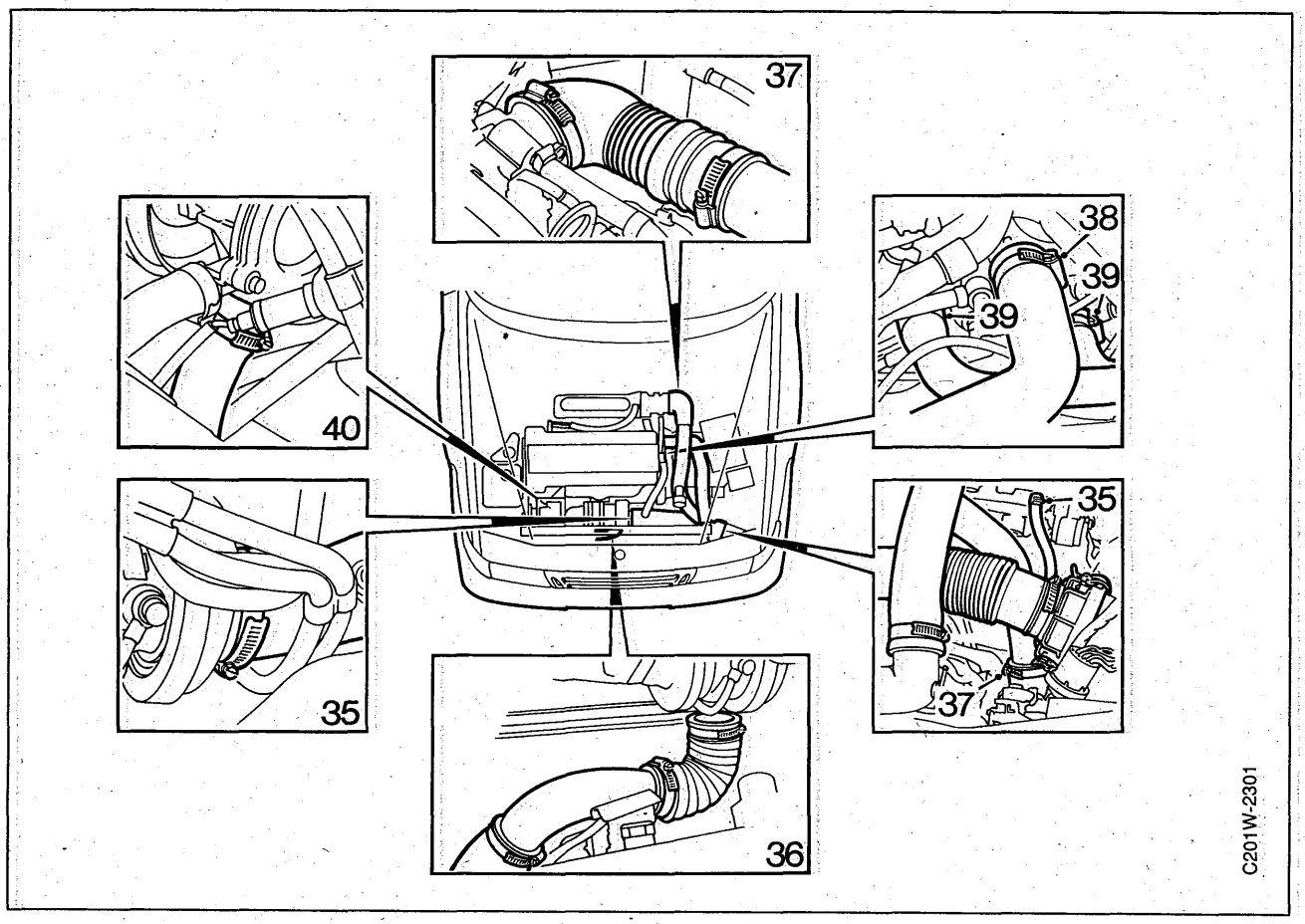
30 Unplug the oxygen sensor connector below the intake manifold.

31 Disconnect the oxygen sensor's cable.

32 Undo the power steering fluid reservoir, lower the reservoir and siphon off the fluid.

33 Disconnect the power steering pump's suction hose from the reservoir and bend it up under the intake manifold. Stand the reservoir on the bulkhead.

34 Unplug the solenoid valve connector. Remove the solenoid valve from the holder and bend the valve up against the engine.




35 Remove the intake hose between the air cleaner and turbo. Remove the filter insert from the air cleaner.

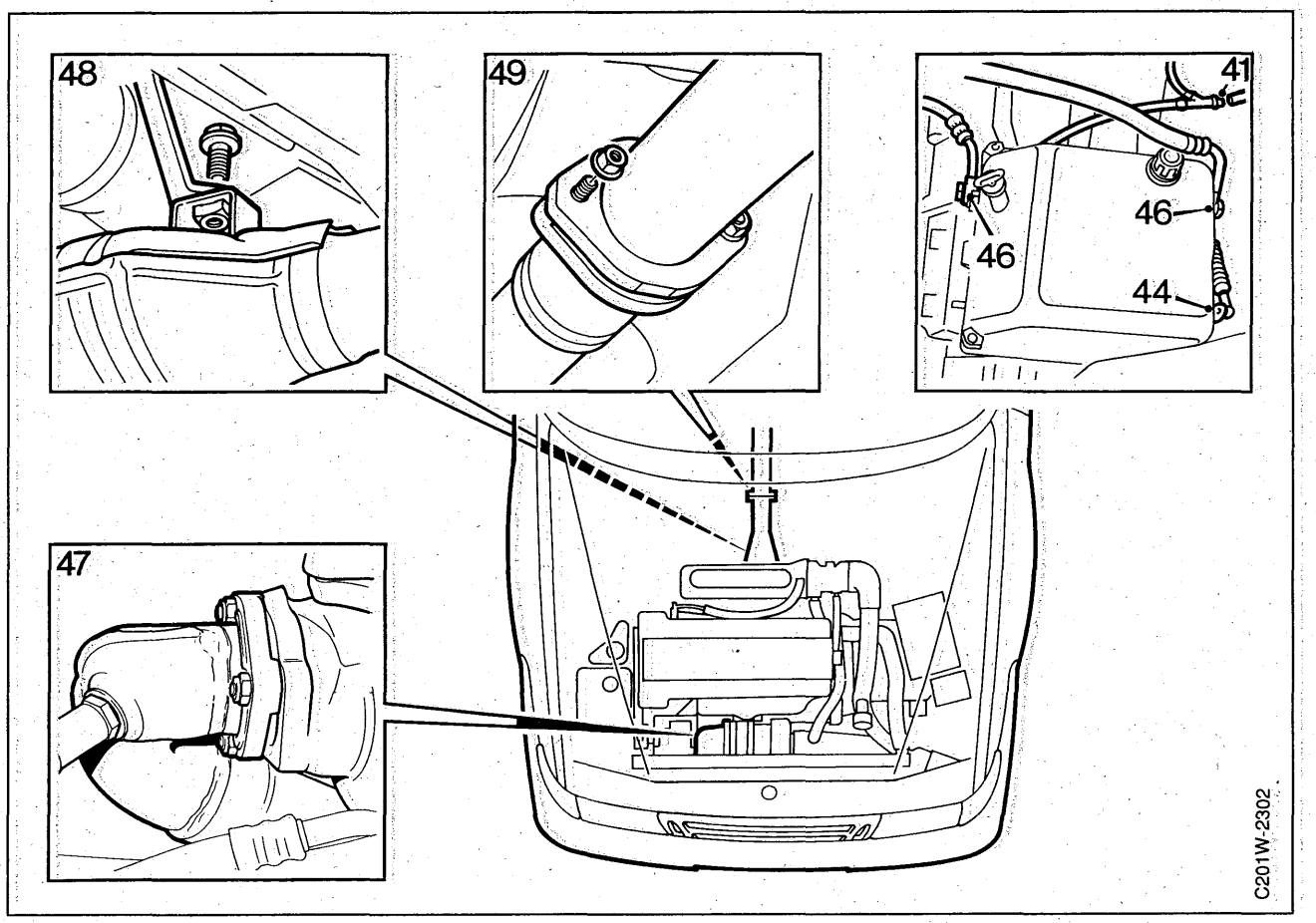
36 Remove the delivery pipe between the turbo and charge air cooler.

37 Remove the by-pass valve from the hose and remove the delivery pipe between the charge air cooler and throttle body with by-pass valve.

38 Remove the upper coolant hose.

39 Disconnect the heat exchanger hoses from the engine.

40 Remove the coolant hose from the water pump.




41 Separate the vacuum hose between the intake manifold and the turbo instrument.

42 Remove the kick-down cable.

43 Remove the gear selector arm from the gearbox (do not separate the ball joint).
Manual gearbox: separate the gear selector rod by removing the tapered pin.

44 Press out the gear selector cable's rubber bush from the bracket on the gearbox casing.
Manual gearbox: separate the clutch pipe.

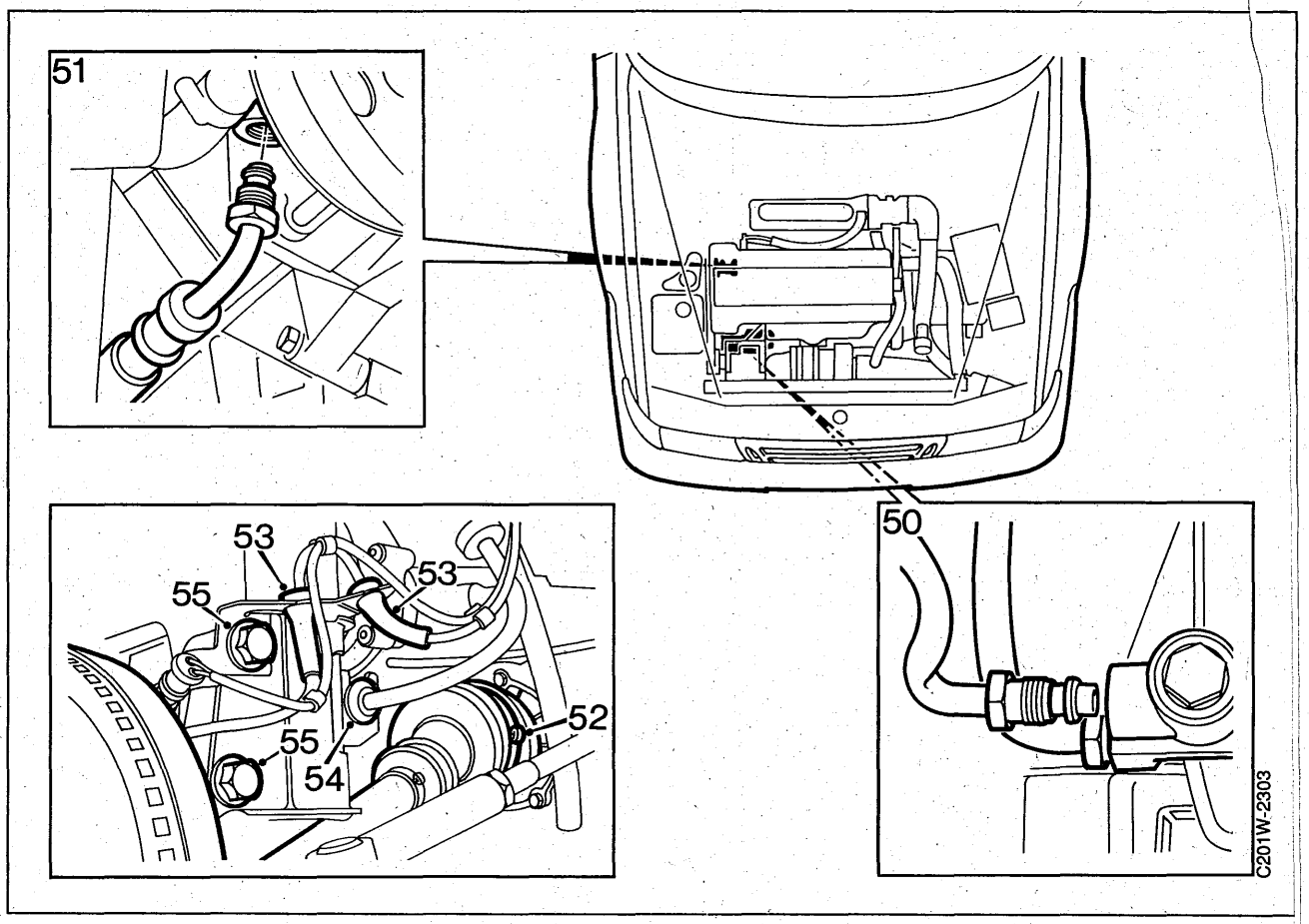
45 Place a receptacle under the car to collect the fluid.

46 Disconnect the oil cooler hoses from the gearbox.

47 Remove the front exhaust pipe (points 47-49). Remove the bolts securing the front exhaust pipe to the exhaust manifold.

48 Undo the bolt in the mounting on top of the catalytic converter from above, using an extension bar.

49 Raise the car. Remove the bolt from the mounting on the catalytic converter, remove the bolts from the front exhaust pipe's rear connecting flange. Carefully lower the front exhaust pipe, making sure not to damage the oxygen sensor.




50 Disconnect the two oil cooler hoses from the engine.

51 Disconnect the power steering pump's delivery hose from the pump. Plug the hose.

52 Undo and remove the clips round the rubber gaiters secured to the drive-shaft joints.

53 Remove the two electric leads from the MacPherson struts.

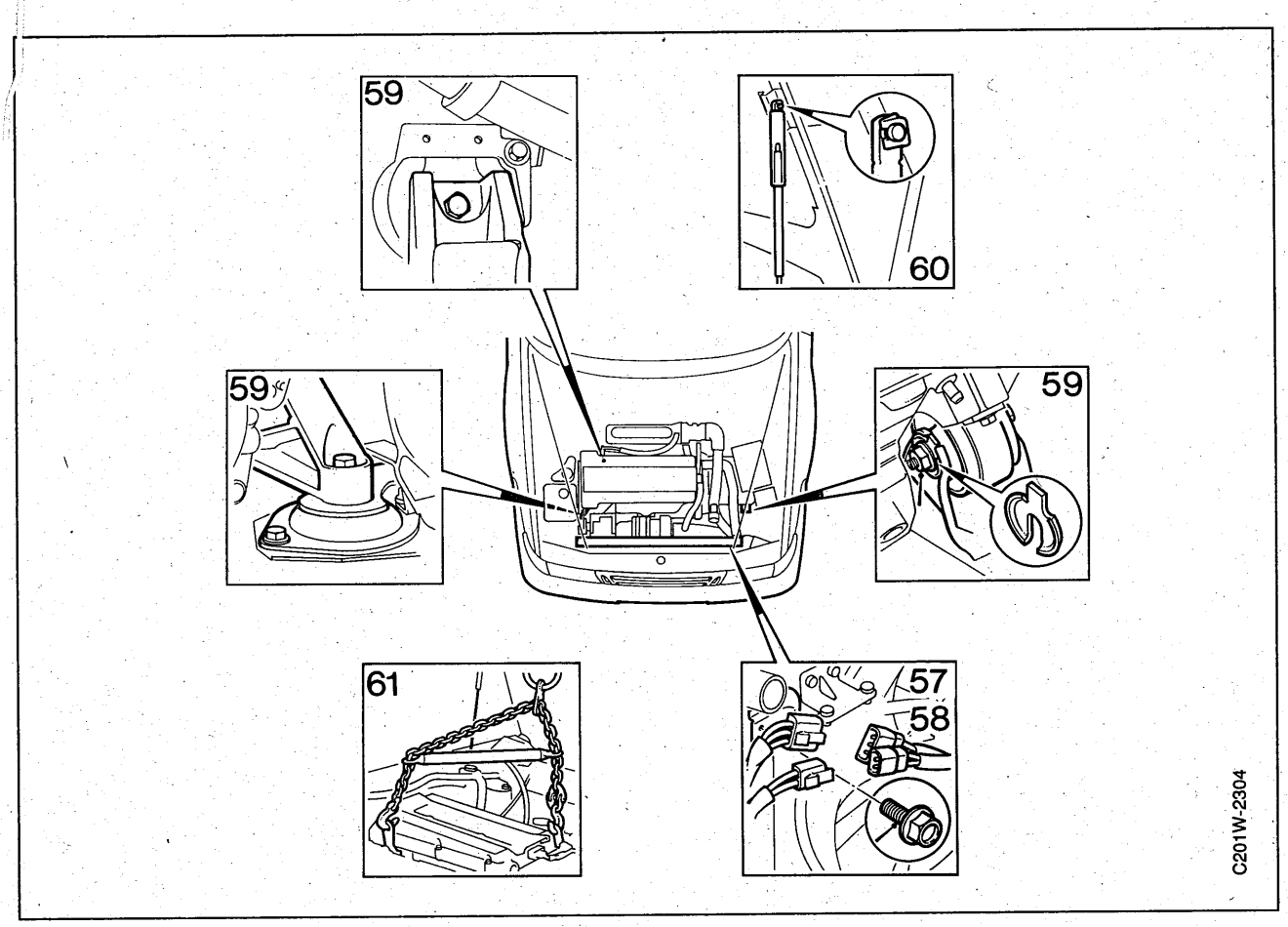
54 Release the brake hoses from their mountings on the MacPherson struts.

**Important**

Mind the rubber gaiters.

55 Remove the bottom MacPherson strut bolts from the steering swivel members.

56 Pull out the steering swivel members to separate the drive- shaft joints. Fit protective caps over both halves of the drive-shaft joints.




57 Remove the radiator fan's lower retaining bolt.

58 Lower the car to the floor and remove the radiator fan's upper retaining bolts. Disconnect the wiring harness and lift out the radiator fan.

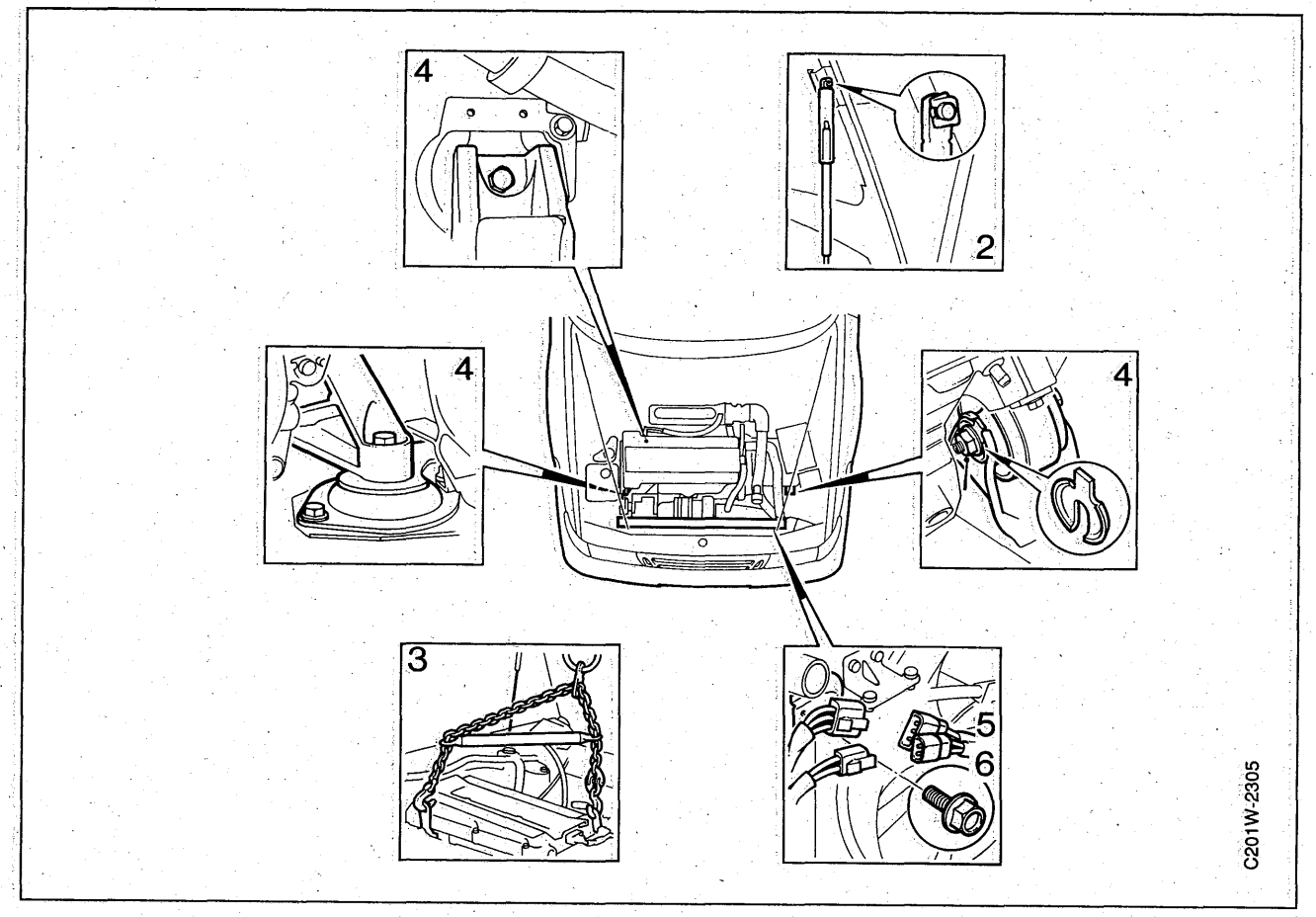
59 Undo the bolts in the three engine mountings.

60 Detach the gas springs from the bonnet and fit bonnet gas spring extensions 83 94 439 on them.

61 Hook engine lifting yoke 83 92 409 in the engine lifting eyes and raise the engine slightly. Check that it is suspended in balance. If it is not, lower it again and rebalance the lifting yoke.

Exercise great care when lifting the engine.

## To fit




**Important**

Numerous electrical leads, hoses, etc. are secured by plastic cable ties.
After these ties have been pulled tight, the excess length is cut off, often leaving a sharp edge on the plastic.
Bear this in mind when securing cable ties to avoid leaving sharp edges that could cut or scratch bare hands or cause damage by chafing.

1 Place protective covers over the front wings.

2 Detach the gas springs from the bonnet and fit bonnet gas spring extensions 83 94 439 on them.

3 Hook engine lifting yoke 83 92 409 in the engine lifting eyes and raise the engine slightly. Check that it is suspended in balance. If it is not, lower it again and rebalance the lifting yoke.

Before lowering the engine, make sure that the bolt for the left-hand engine mounting is fitted in place.

Position the engine over the engine bay and carefully lower it onto its mountings.

Lift with care to avoid damaging the engine.

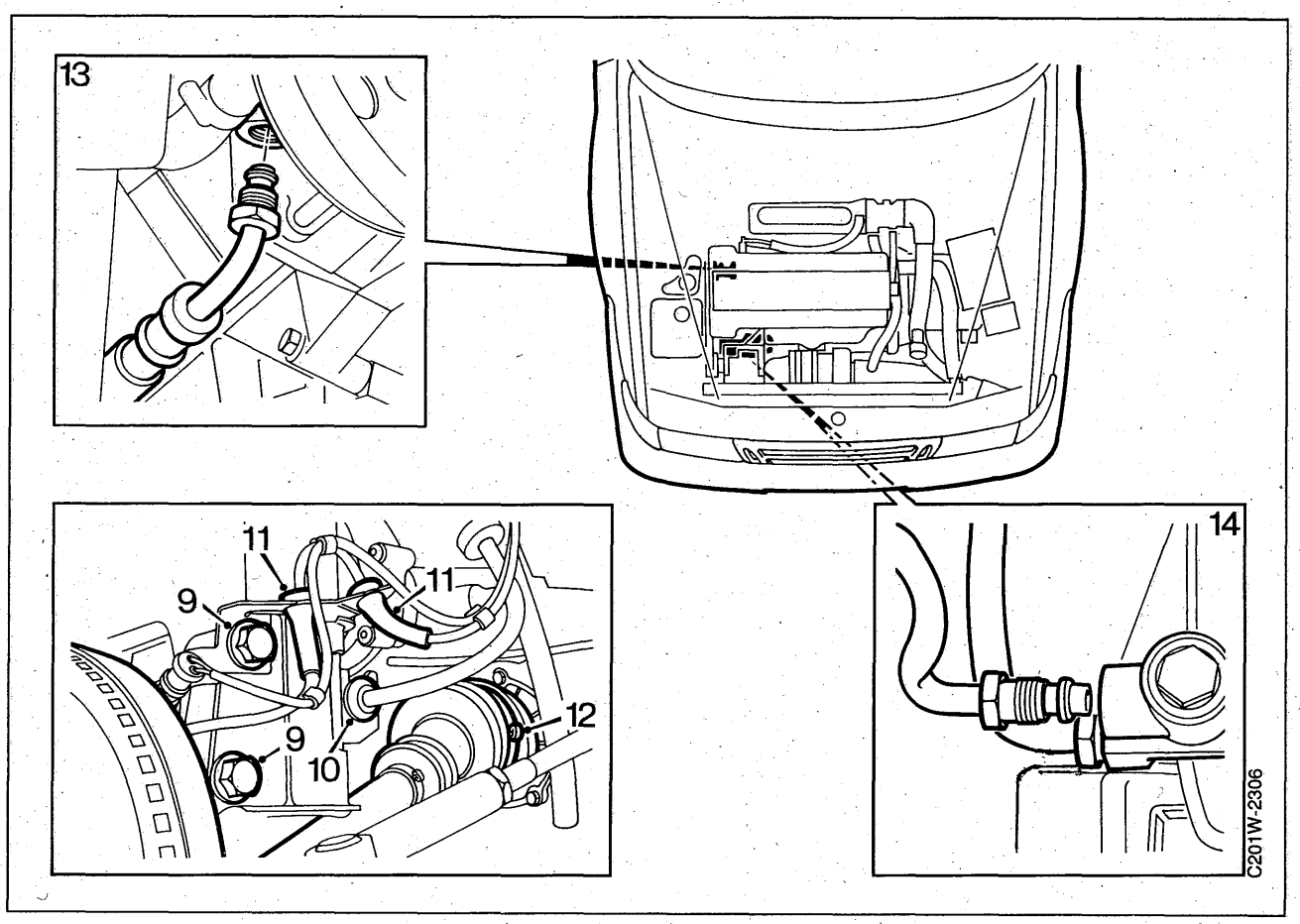
Remove the lifting yoke.

4 Tighten the engine mountings. Use an extension bar for the engine mountings on the right-hand side.

**Tightening torque: 73 Nm (54 lbf ft).**

5 Fit the radiator fan in place and fit the upper retaining bolts. Plug in the radiator fan connector.

6 Raise the car. Fit the radiator fan's lower retaining bolt.




7 Remove the protective caps from the drive-shaft joints and pack with grease.

8 Fit the two halves of the drive-shaft joints together.

9 Fit the upper bolts securing the MacPherson strut to the steering swivel members. Tighten both upper and lower bolts.
**Tightening torque:**
**92 ± 13 Nm (68 ± 10 lbf ft)**

10 Fit the brake hoses in their rubber mountings.

11 Fit the electric leads in their mountings on the MacPherson struts.

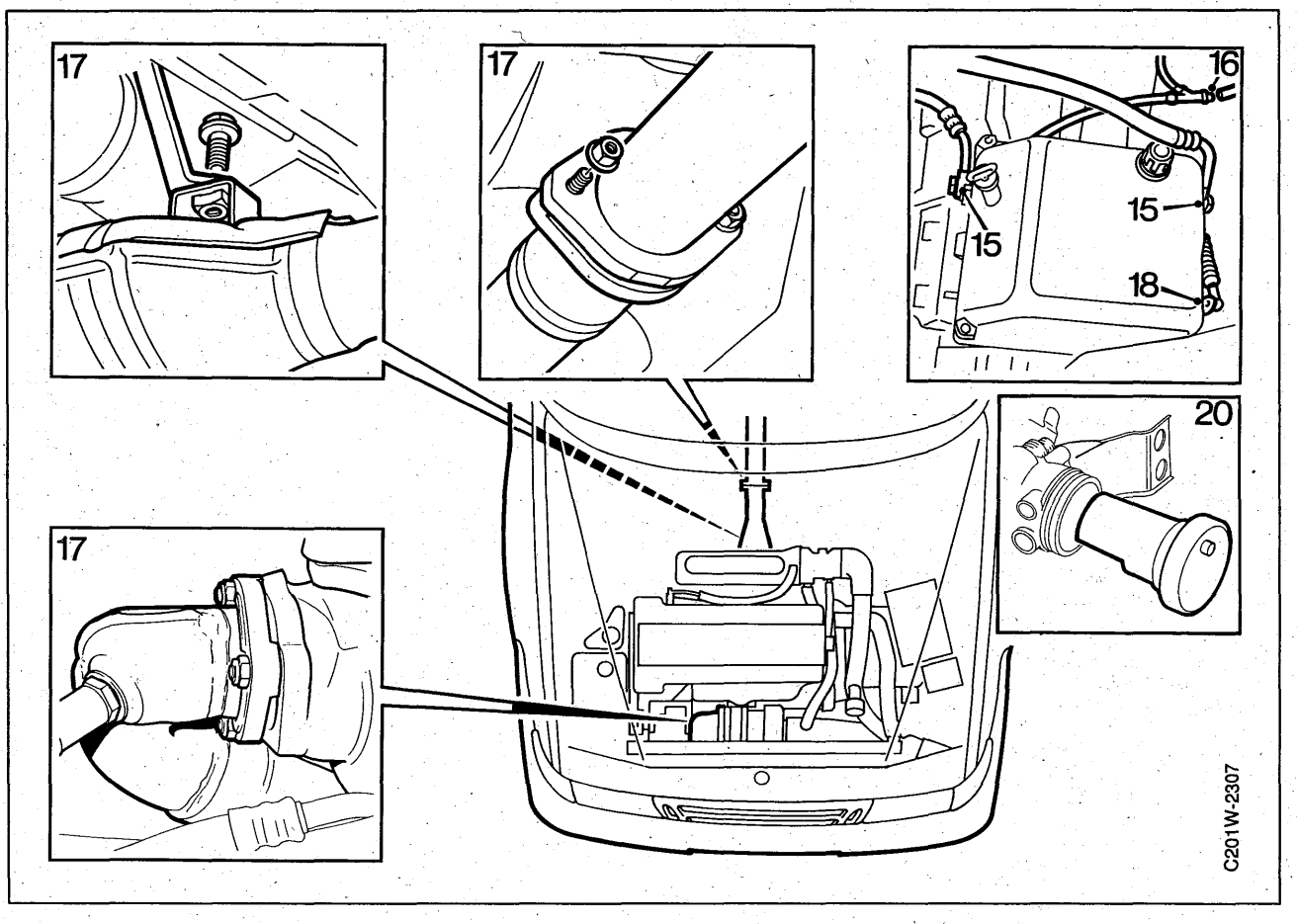
12 Fit the rubber gaiters in place and tighten the clips.

**Important**

Mind the rubber gaiters.

13 Raise the car a little higher. Fit the power steering pump's delivery hose to the pump.

14 Fit the two oil cooler hoses to the engine.




15 Fit the oil cooler hoses to the gearbox.

16 Fit the vacuum hose between the turbo instrument and the intake manifold.

17 Fit the front exhaust pipe as follows:

- Fit the exhaust pipe loosely by means of the bolts. Tighten the rear connecting flange.
- Lower the car and tighten the bolt securing the front exhaust pipe to the exhaust manifold.
- Tighten the bolt in the mounting on the catalytic converter from above, using an extension bar.

18 Fit the gear selector arm to the gearbox and press the gear selector cable's rubber bush into the bracket on the gearbox casing.

19 Fit the kick-down cable.

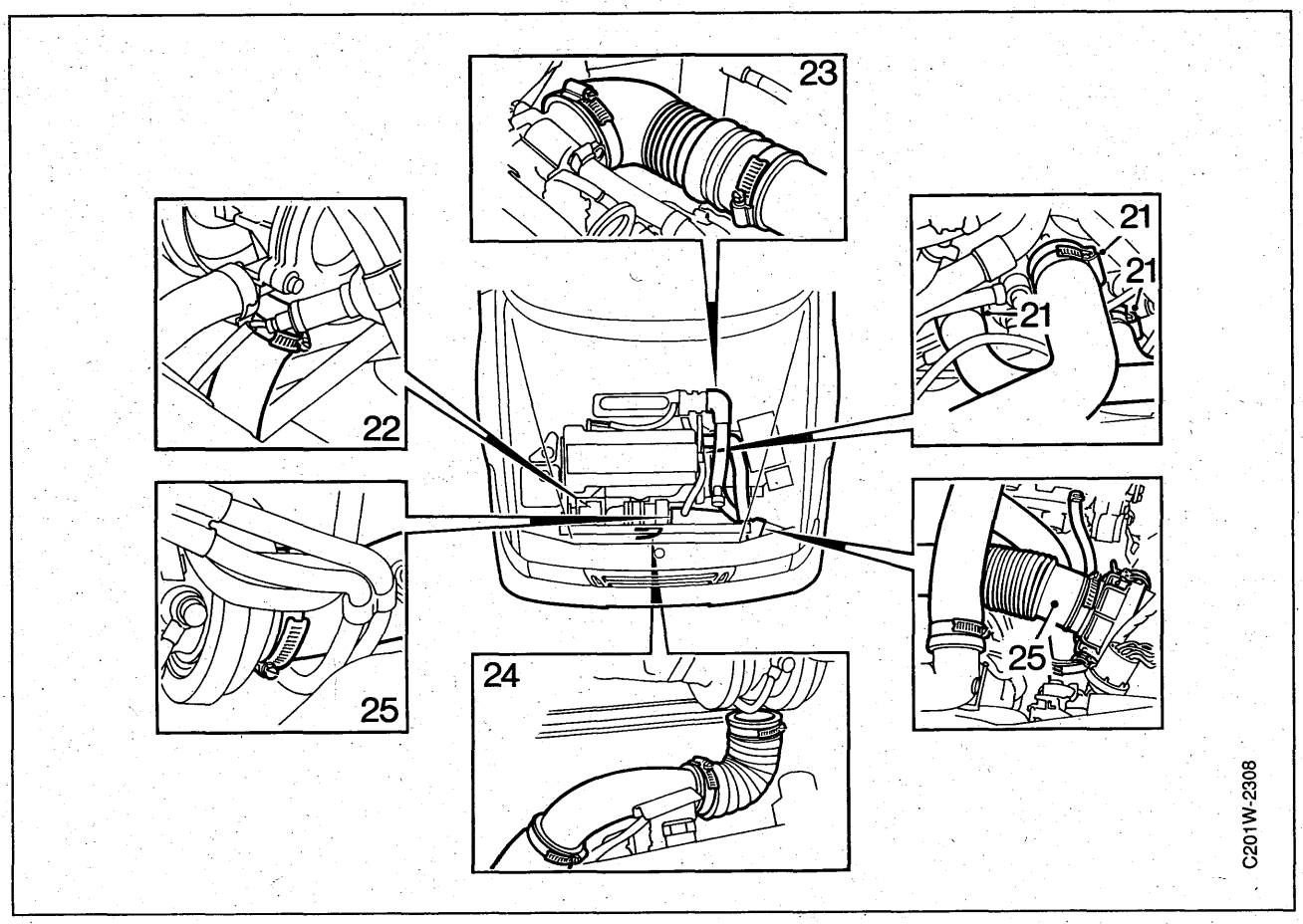
20 Press down the throttle lever to the kick-down position and insert tool 87 91 980 in the throttle body. Align the tool's "UP" marking with the casting seam in the throttle body.

Undo the stop nut on the cable and press the sheathing down until the full-throttle position is felt (the full-throttle position can be felt just before the kick-down position).

Tighten the nut while holding the cable sheathing in the full-throttle position. Press the throttle lever down and remove the tool. Carefully move the throttle lever back.

Cars with TCS: see SI 200-1245.

Manual gearbox: insert the tapered pin, fit the clutch pipes and bleed the system.




21 Connect the heat exchanger hoses to the engine

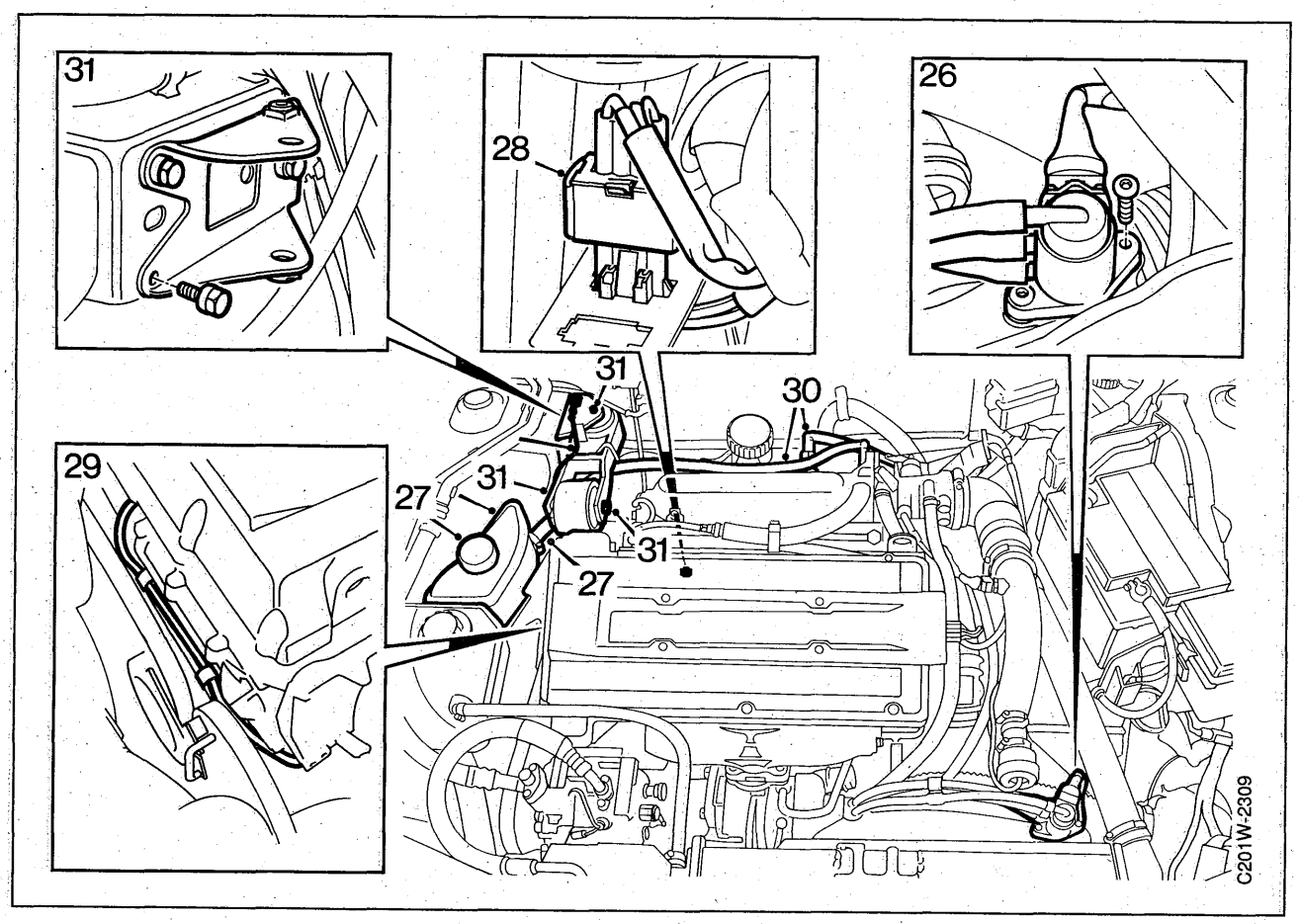
Connect the upper radiator hose to the water pump.

22 Connect the lower radiator hose to the water pump and tighten the clip.

23 Connect the delivery pipe to the charge air cooler and fit the by-pass valve.

24 Connect the delivery pipe between the turbo and charge air cooler.

25 Fit the filter insert in the air cleaner and connect the intake hose.




26 Fit the solenoid valve to the holder and plug in the solenoid valve's connector.

27 Fit the power steering fluid reservoir and connect the power steering pump's suction hose.

28 Plug in the lambda (oxygen) sensor's connector below the intake manifold.

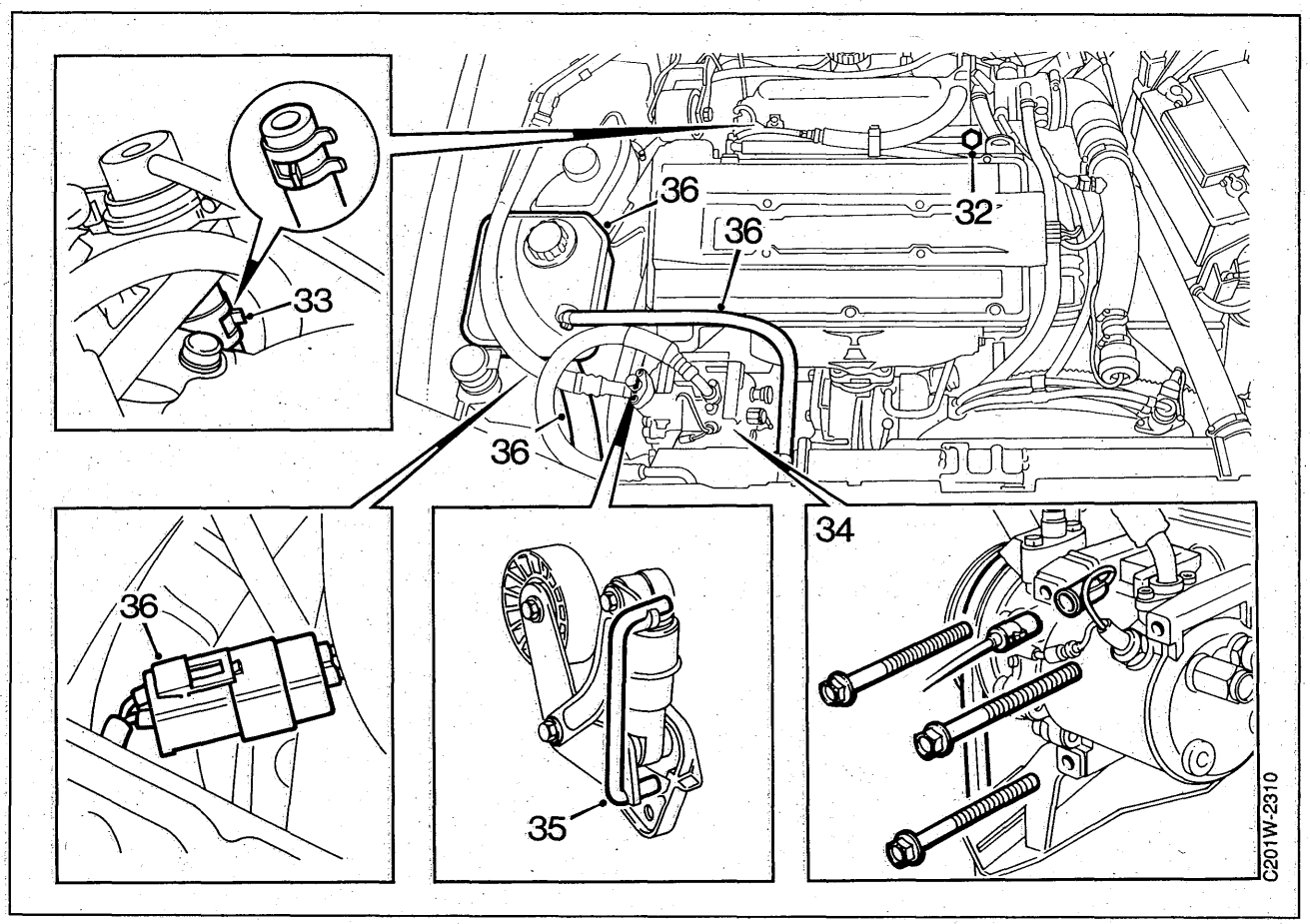
29 Fit the lambda (oxygen) sensor's cable in place.

30 Connect the vacuum hose to the evaporative emission canister. Connect the hose to the brake servo.

31 Fit the upper torque arm's bracket and fit the torque arm.

Connect the interference suppressor cable (ground) to the torque arm's bracket.

Fix hoses and cables to the torque arm by means of cable ties.




32 Connect the fuel delivery hose to the fuel rail. Check that the O-rings are intact and undamaged. Replace as necessary.

33 Connect the return fuel hose to the fuel pressure sensor.

34 Fit the AC compressor.

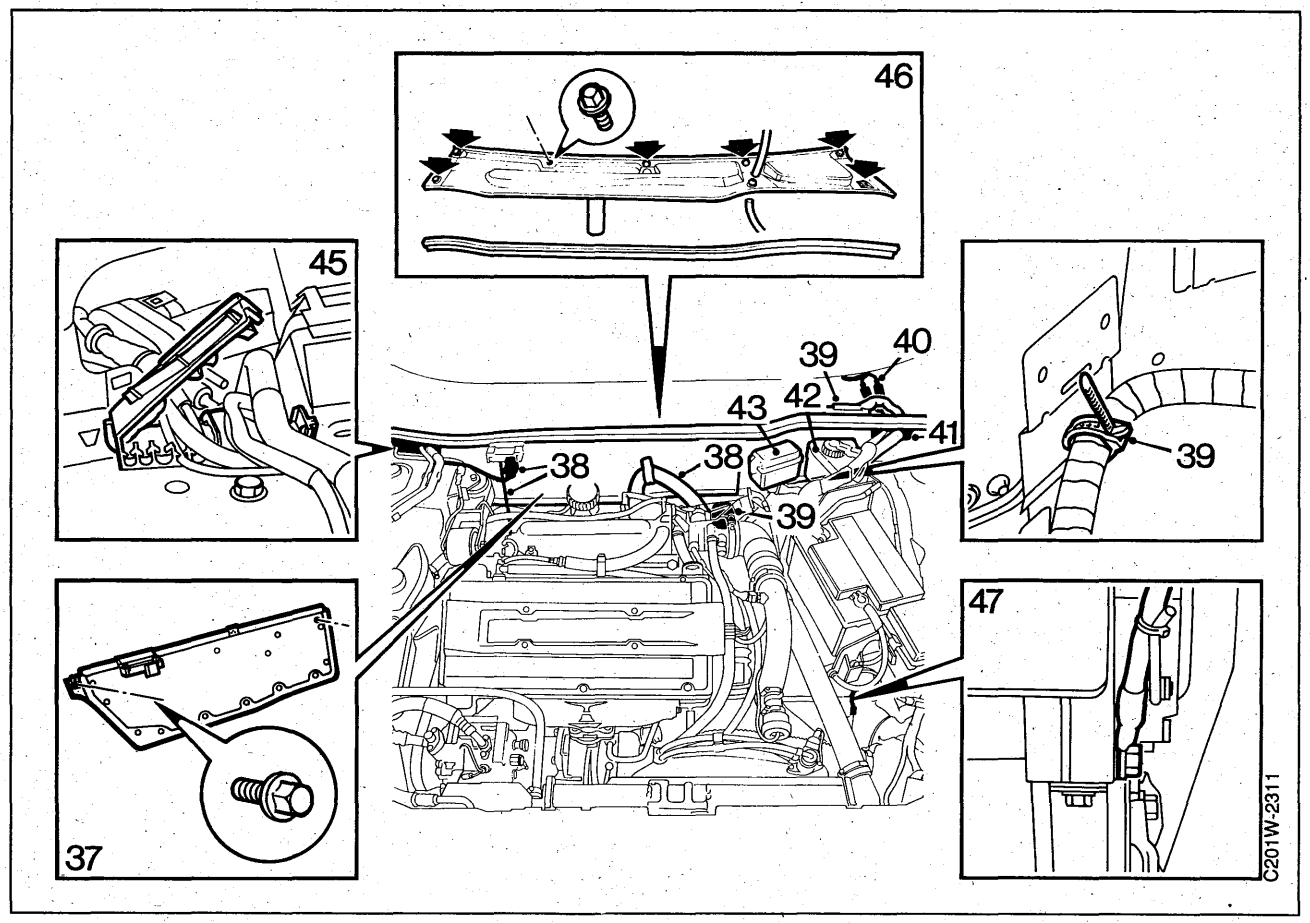
**Tightening torque: 20 Nm (14.8 lbf ft).**

Plug in the wiring harness connector and make sure that the wiring is clear of the pulley.

35 Fit the belt on the AC compressor's pulley.

Pull the belt up hard while removing locking yoke 83 94 488. Release the belt and check that it is correctly fitted round all the pulleys.

36 Fit the expansion tank and connect its hoses. Plug in the connector.




37 Fit the bulkhead partition and the rubber moulding.

38 Insert the clamp in the bulkhead partition and fit the engine wiring harness in it. Fit the connector, pressure sensor and wiring harness.

39 Fit the control module connector, fit cable ties and plug in the engine wiring harness connector.

40 Plug in the two engine wiring harness connectors.

41 Fit cable ties for the wiring harness on the left-hand side.

42 Fit the brake fluid reservoir in its holder.

43 Fit the ABS relay box in its holder.

44 Connect the pressure sensor cable. Make sure that the cables clear the wiper motor levers.

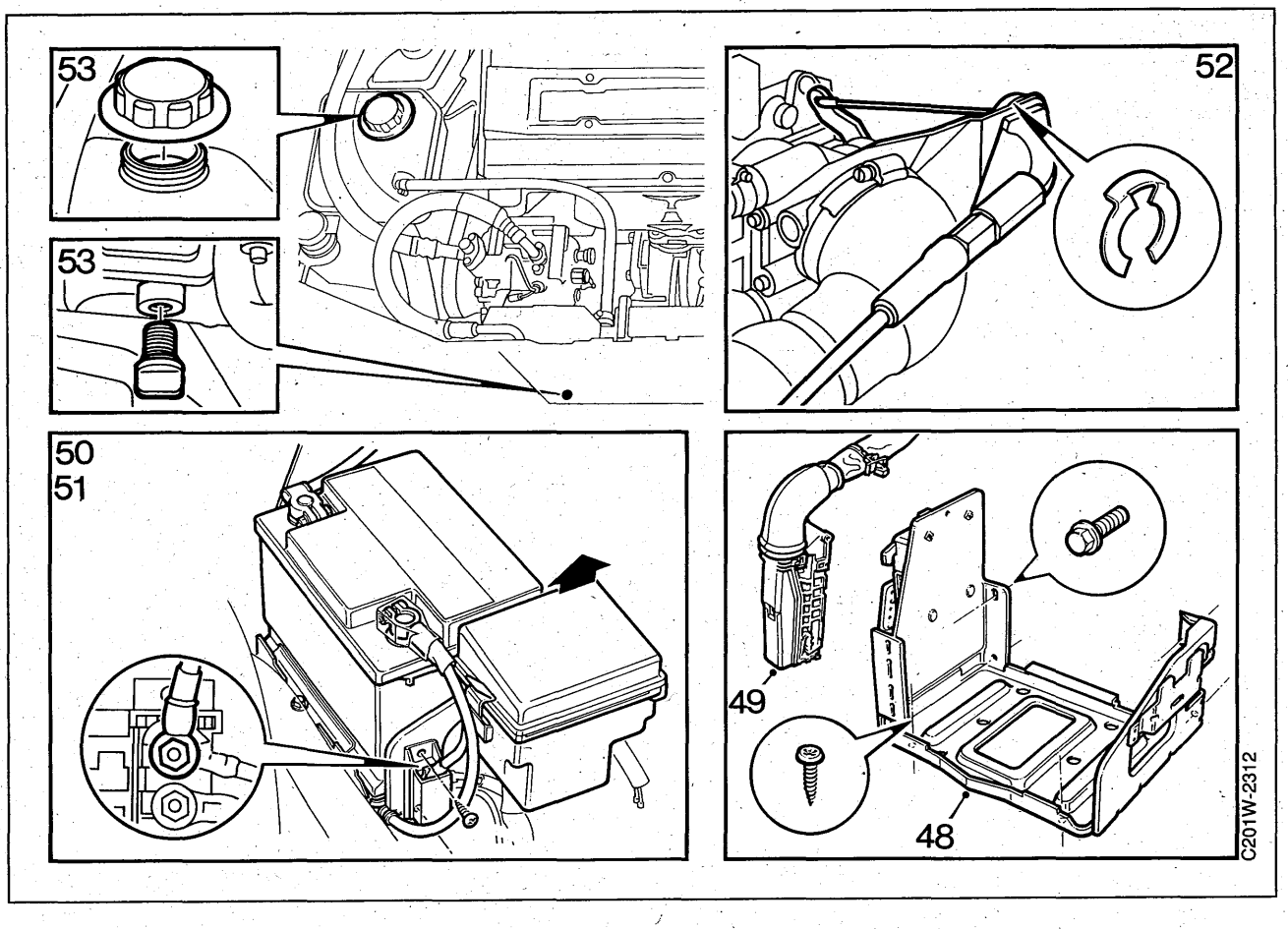
45 Fit cable ties for the wiring harness on the right-hand side.

46 Fit the cover over the bulkhead space. Connect the windscreen washer hose.

47 Connect the ground cable to the gearbox.

**WARNING**

It is extremely important to remember the ground cable connection. Danger of fire.




48 Fit the battery tray.

49 Plug in the ABS control module connector.

50 Fit the positive cable terminal block. Connect the cable to the terminal block and fasten the cable to the battery tray by means of the clamps.

51 Fit the battery and battery cables.

52 Fit the throttle cable.

53 Check that the radiator drain plug is screwed in place and fill up with coolant. Test under pressure.

54 Fill up with power steering fluid, check the engine oil and gearbox fluid levels.

55 Remove the extensions from the bonnet gas springs.

56 Start the engine and check for leakage. Check that all general systems are in proper working order (lighting, radiator fan, AC, etc.).

57 Raise the car. Fit the middle infill panel under the spoiler. Fit the wing liners and wheel housing trim mouldings.

58 Fit the front wheels and tighten the bolts.

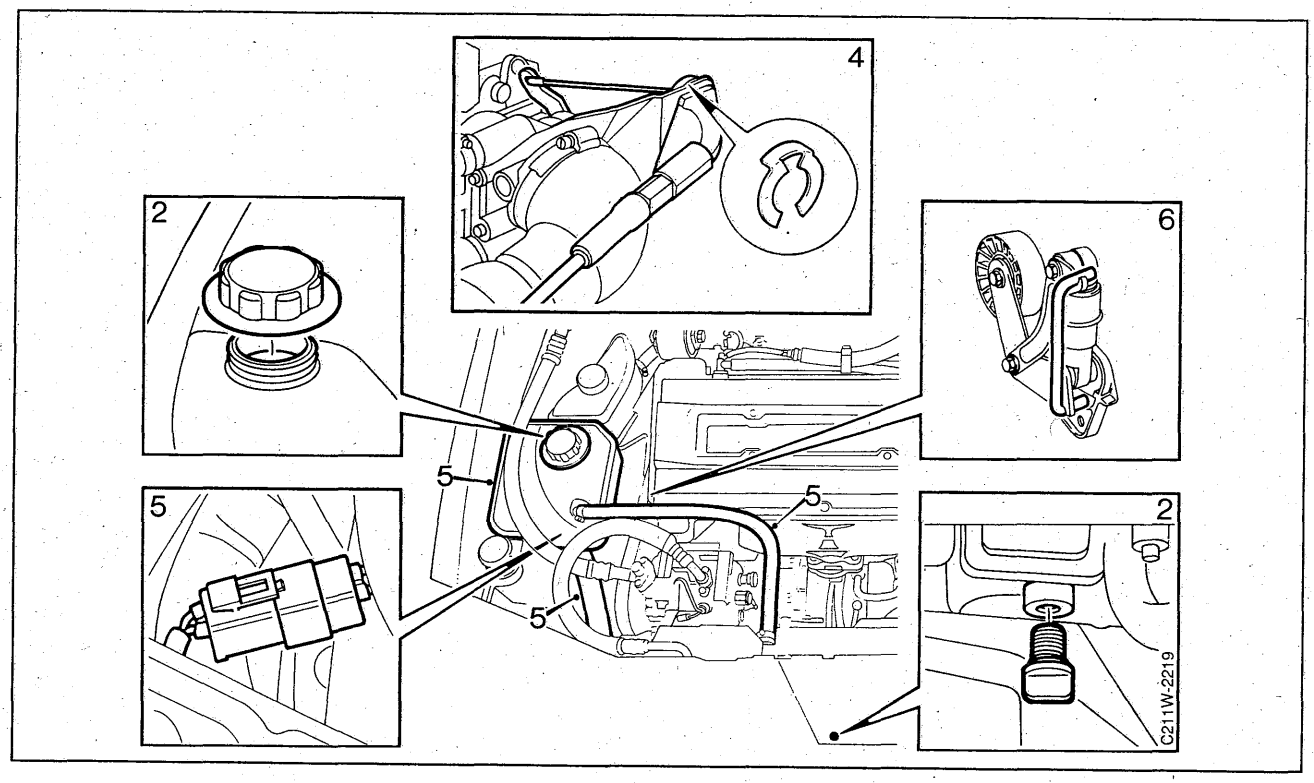
**Tightening torque: 120 Nm (89 lbf ft).**

59 Lower the car to the floor. Check all oil and fluid levels. Top up as necessary. Check that the engine bay and engine are clean and tidy.

60 Drive the car on test. Check all functions, tightness of hose connections, unwanted noise from loose wiring and loose components, etc.

# Cylinder head

## To remove




The method described applies to removal of the cylinder head with turbo and AC.

**Important**

Numerous electrical leads, hoses, etc. are secured by plastic cable ties.
After these ties have been pulled tight, the excess length is cut off, often leaving a sharp edge on the plastic.
Bear this in mind when securing cable ties to avoid leaving sharp edges that could cut or scratch bare hands or cause damage by chafing.

1 Place protective covers over the front wings and front of the car to avoid damaging the paintwork.

2 Raise the car. Unscrew the radiator drain plug and drain off the coolant.

To speed up the process, lower the car to the floor and remove the filler cap from the expansion tank.

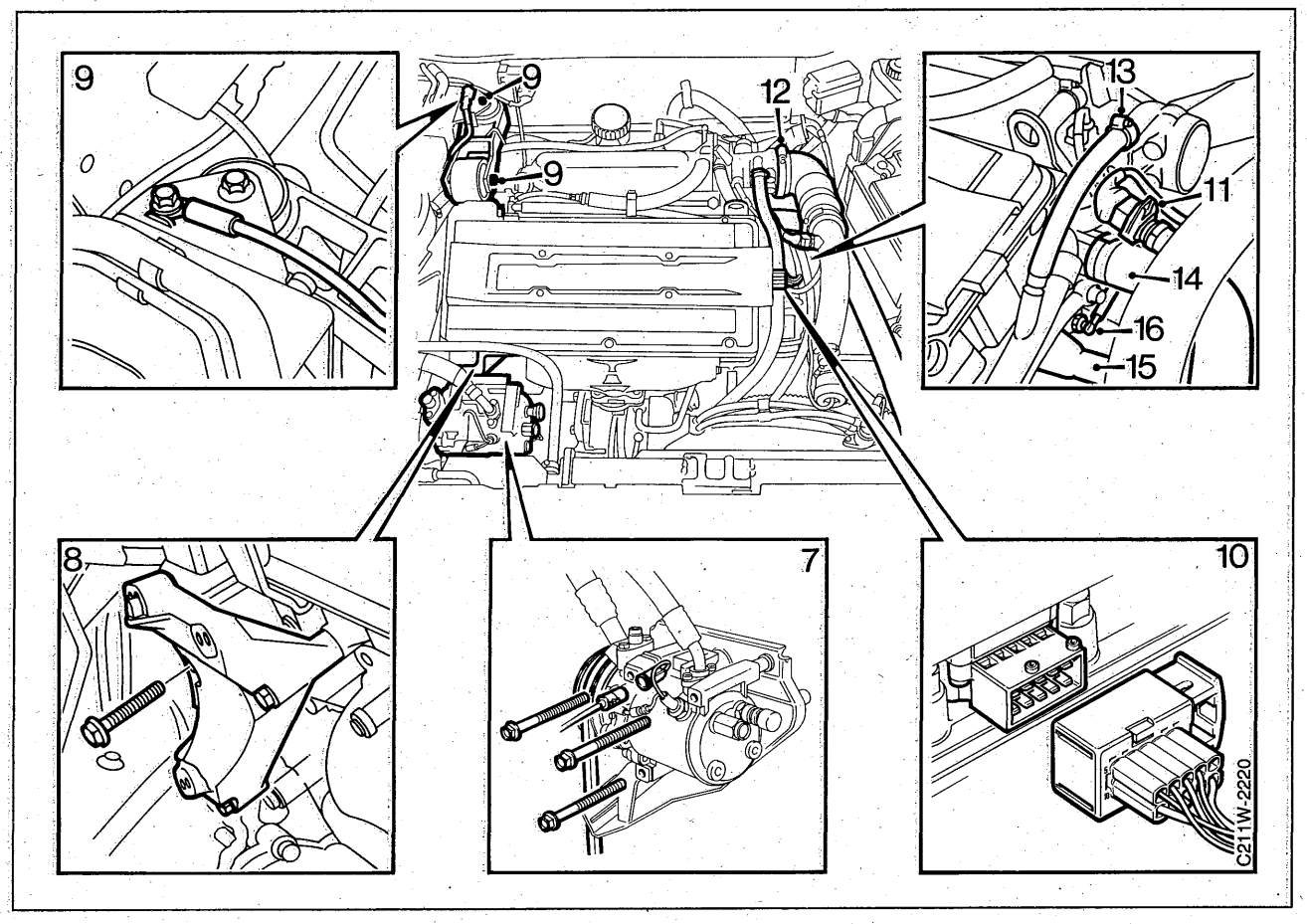
Screw the drain plug back in place.

3 Disconnect the negative battery cable.

4 Remove the throttle control retaining clip, bend up the lever and remove the control.

5 Unplug the coolant level sensor connector. Remove the coolant tank. Disconnect the hoses so that they accompany the tank.

6 Relieve the tension applied by the automatic belt tensioner as follows: pull the belt hard upwards while an assistant secures the tensioner by means of locking yoke 83 94 448.




7 Remove the belt. Unplug the AC compressor connector, unscrew the retaining bolts and rest the compressor on the radiator cross-member.

8 Remove the AC compressor's bracket.

9 Snip through the cable ties holding the hoses and wiring at the upper torque arm.

Remove the interference suppressor cable (ground).

Remove the torque arm.

Remove the two upper bolts in the cylinder head.

10 Unplug the ignition discharge module connector.

11 Unplug the temperature sensor connector.

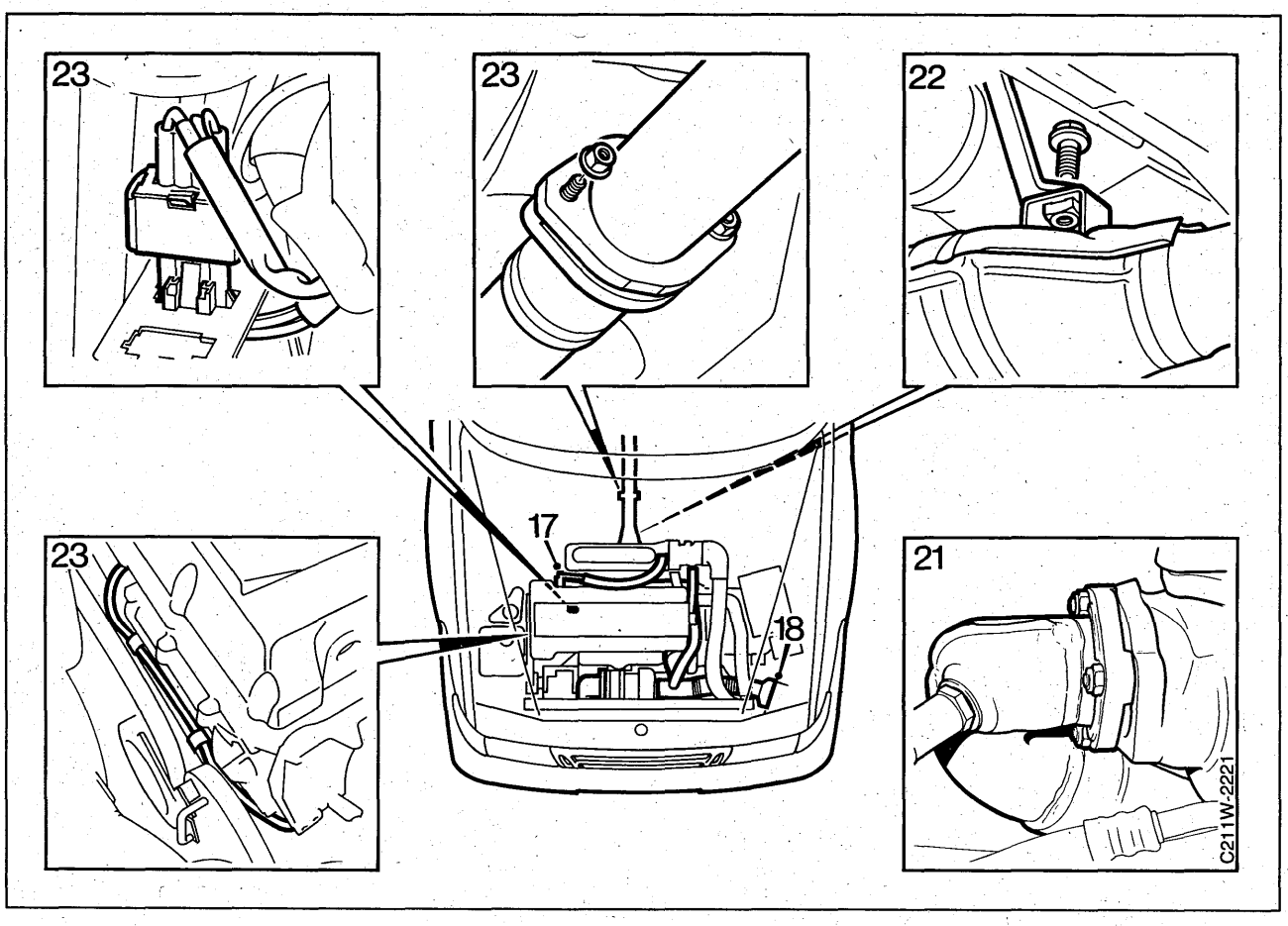
12 Remove the turbo pressure pipe between the charge air cooler and throttle body.

13 Remove the radiator hose from the throttle body.

14 Remove the upper radiator hose from the cylinder head.

15 Disconnect the heat exchanger hose from the cylinder head.

16 Unplug the water temperature sensor connector from the cylinder head.




17 Disconnect the crankcase-breather and vacuum hoses from the camshaft cover.

18 Remove the turbo intake hose.

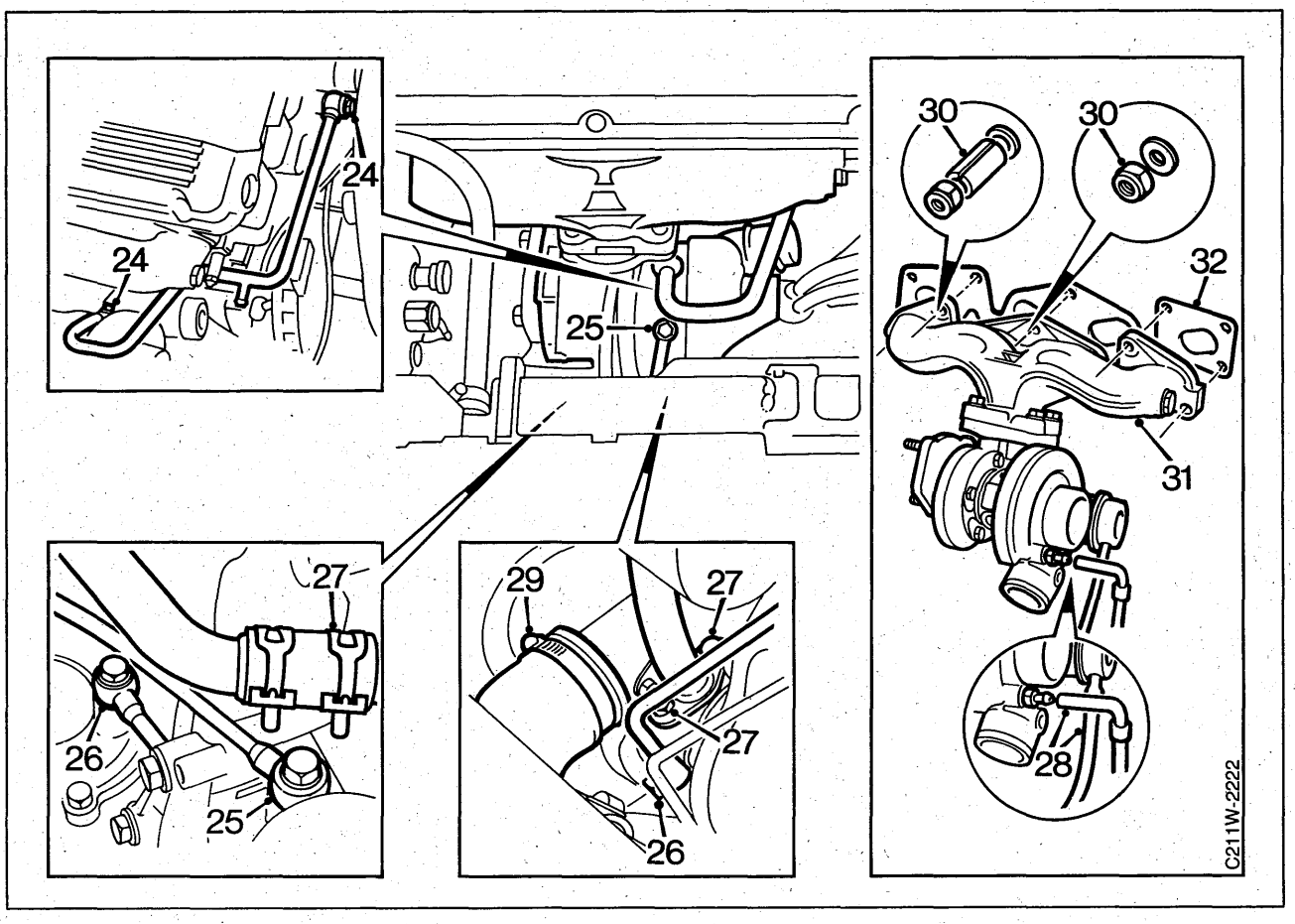
19 Unplug the solenoid valve's connector. Remove the solenoid valve from the holder and bend the valve up against the engine.

20 Remove the vacuum hose at the by-pass valve and remove the by-pass valve.

21 Remove the front exhaust pipe as follows (points 21-23): undo the bolts securing the front exhaust pipe to the exhaust manifold.

22 Undo the bolt in the bracket on top of the catalytic converter from above, using an extension bar.

23 Raise the car. Remove the bolt from the bracket on the catalytic converter, remove the bolts from the front exhaust pipe's rear connecting flange. Disconnect the oxygen sensor's cable at the exhaust pipe and feed it up into the engine bay. Carefully lower the front exhaust pipe. Remove the oil drain pipe.




24 Lower the car to the floor. Remove the coolant pipe between the turbo and the cylinder head.

25 Remove the turbo oil delivery pipe.

26 Remove the coolant pipe between the turbo and water pump.

27 Remove the oil return pipe.

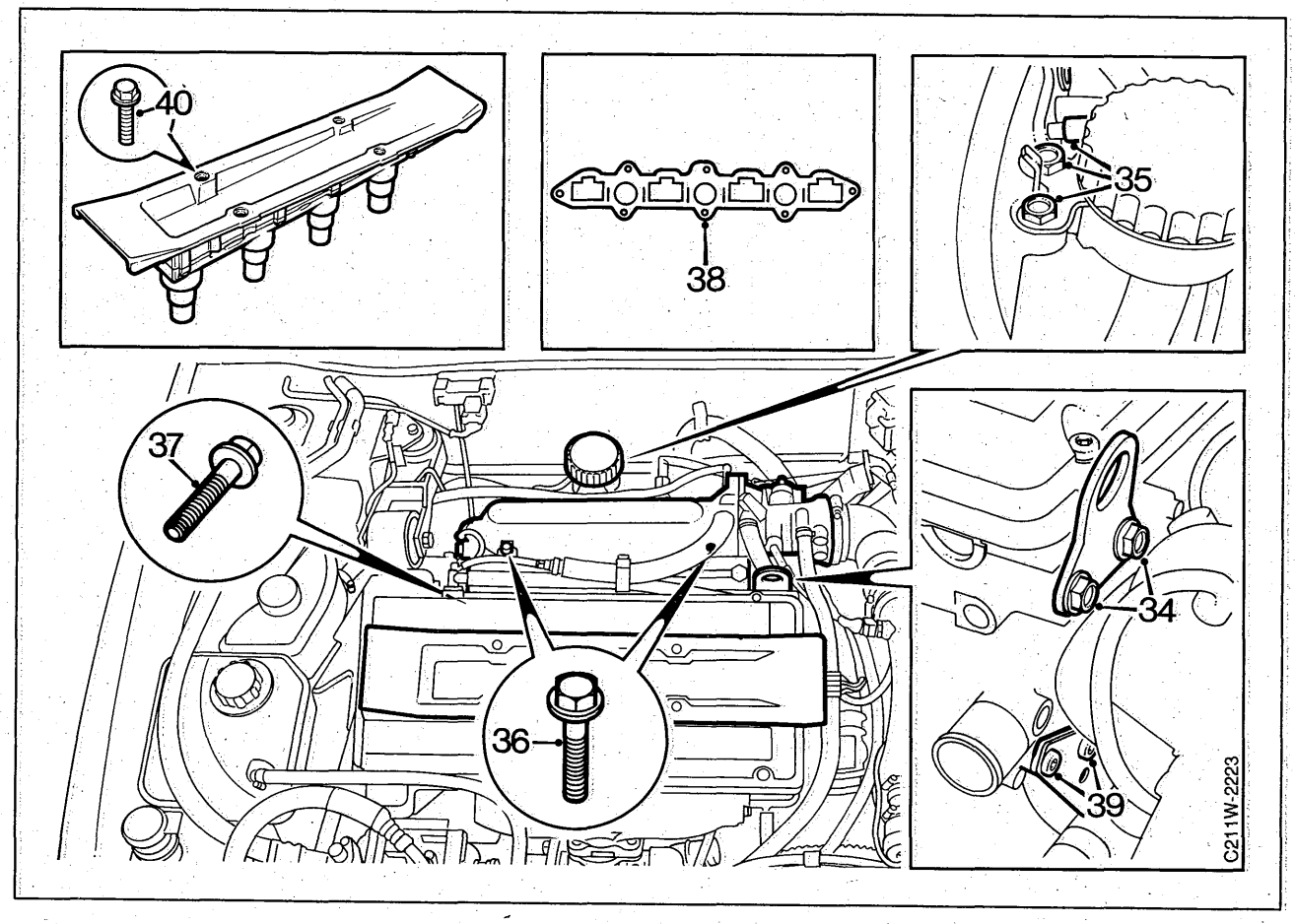
28 Remove the two hoses between the solenoid valve and the turbo.

29 Remove the delivery pipe between the turbo and charge air cooler.

30 Remove the seven bolts and five washers securing the manifold to the cylinder head.

31 Remove the manifold and turbo unit.

32 Remove the gasket.




33 Remove the intake manifold from the cylinder head as follows (points 34-39):

34 Remove the lifting eye.

35 Remove the oil filler pipe bracket.

36 Remove the retaining bolts and lift out the fuel rail with nozzles.

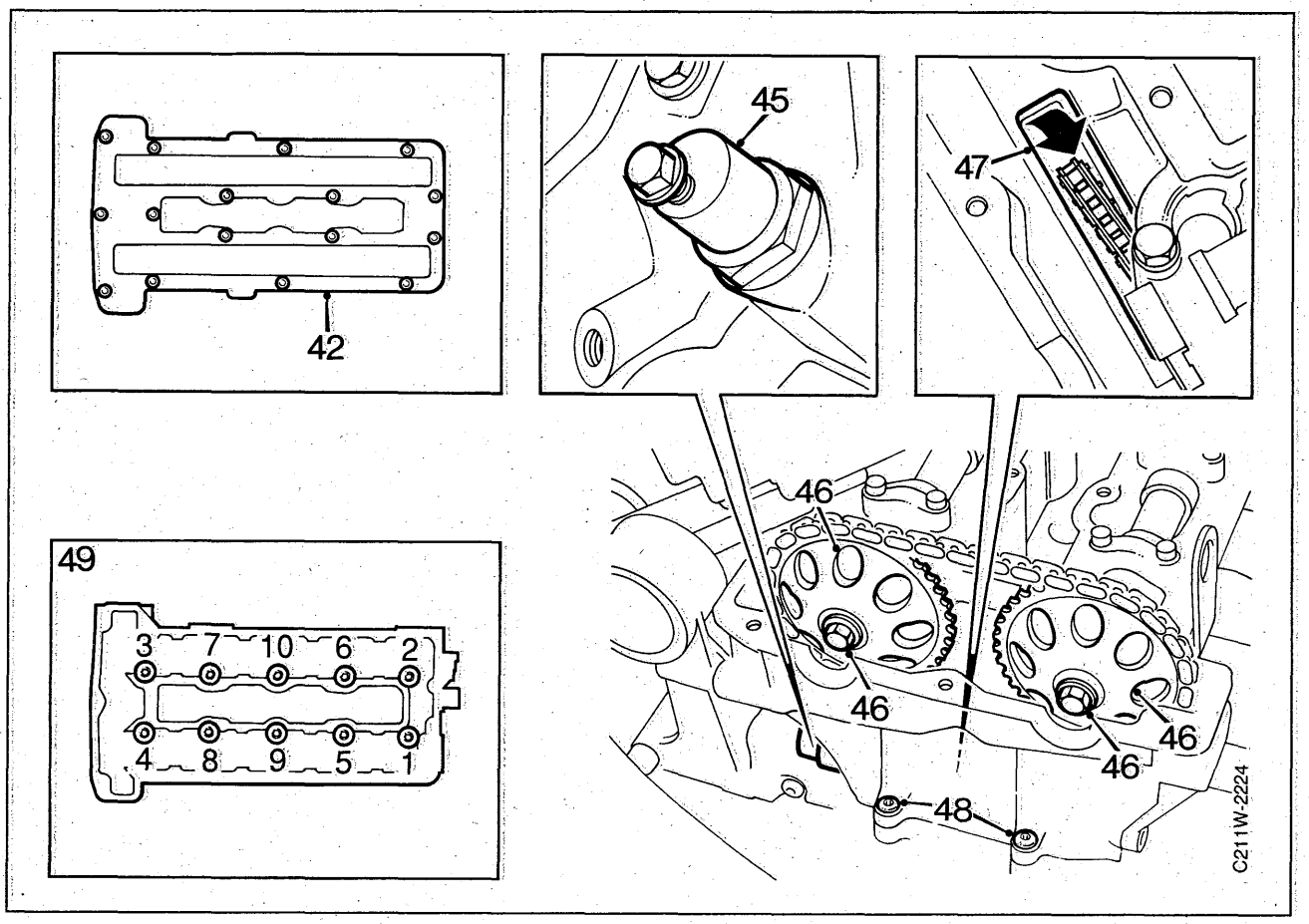
37 Remove the intake manifold retaining bolts.

38 Remove the gasket.

39 Remove the water pipe bracket on the thermostat housing.

40 Remove the ignition discharge module.

41 Remove the spark plugs.




42 Remove the camshaft cover (16 bolts).

43 Line up the crankshaft with the 0° mark and check that the timing marks on the camshafts are also in alignment.

44 Undo and move aside the power steering fluid reservoir.

45 Remove the chain tensioner.

46 Unscrew the bolts in the camshaft sprockets and remove the sprockets from the camshafts.

47 Hold up the chain and lower the chain guide to the middle of the engine.

48 Remove the two bolts by the timing cover that are screwed into the cylinder head.

49 Unscrew the cylinder head bolts in the order shown.

50 Soak up any oil and lift off the cylinder head.

## To fit

**Important**

Numerous electrical leads, hoses, etc. are secured by plastic cable ties.
After these ties have been pulled tight, the excess length is cut off, often leaving a sharp edge on the plastic.
Bear this in mind when securing cable ties to avoid leaving sharp edges that could cut or scratch bare hands or cause damage by chafing.

1 Place protective covers over the front wings.

2 Clean all the bolt holes in the cylinder head by blowing them with compressed air.

3 Inspect and clean all gasketed joint surfaces.

4 Fit two studs in the two outer threaded holes at the top for the intake manifold.

5 Fit a new cylinder head gasket and a new gasket for the intake manifold.

6 Rotate the crankshaft through 45°.

7 Carefully fit the cylinder head into position.

8 Insert the bolts and tighten them, using a torque wrench.

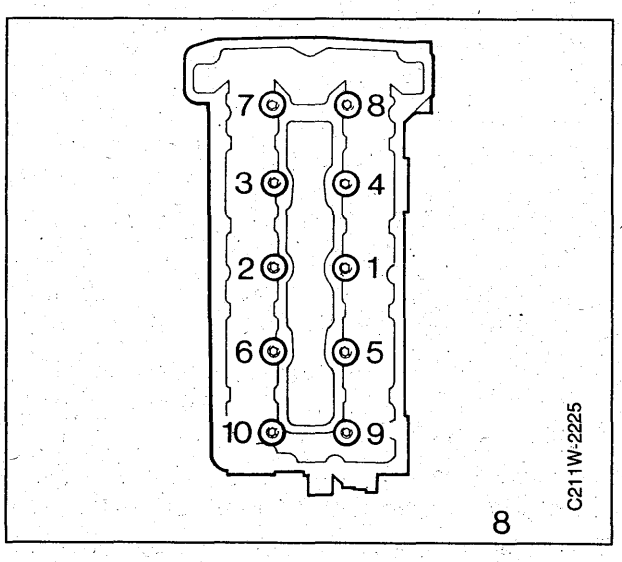
**Tighten the cylinder head bolts in three stages.**

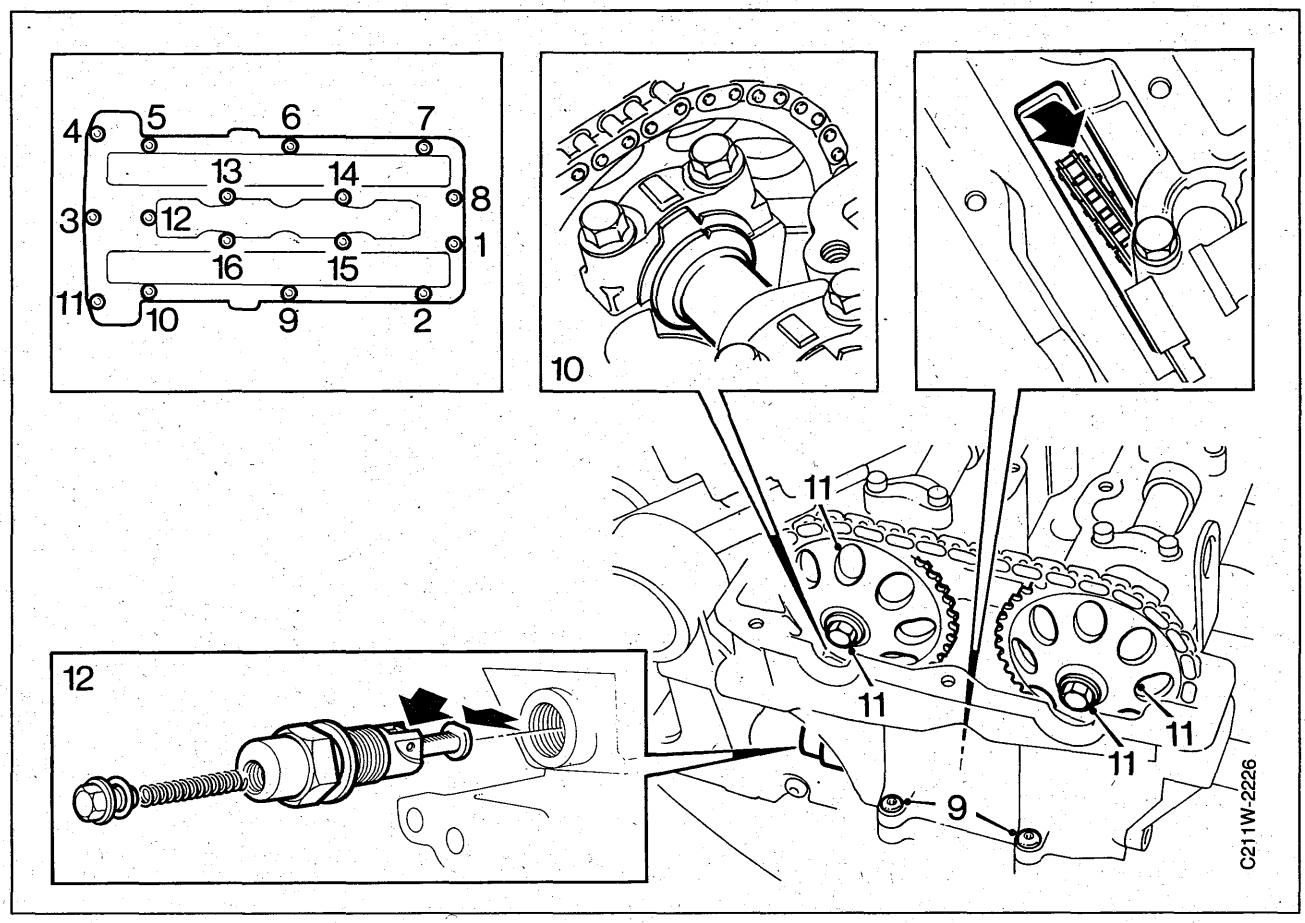
**Stage I 60 Nm (44 lbf ft)**

**Stage II 80 Nm (59 lbf ft)**

**Stage III Tighten a further quarter-turn (90°)**

Tighten the bolts in the order shown.






9 Screw the two bolts in the cylinder head by the timing cover.

10 Check that the camshafts are in alignment with their timing marks. Rotate the crankshaft back to the 0° position.

11 Fit the chain sprockets and chain, beginning with the camshaft on the intake side.

***Do not tighten the bolts yet.***

12 Prepare the chain tensioner for mounting by pressing down the catch and inserting the chain tightener.

13 Fit the chain tensioner.

**Tightening torque: 63 Nm (47 lbf ft).**

14 Fit the chain tensioner plug with push rod and spring.

**Tightening torque: 22 Nm (16 lbf ft).**

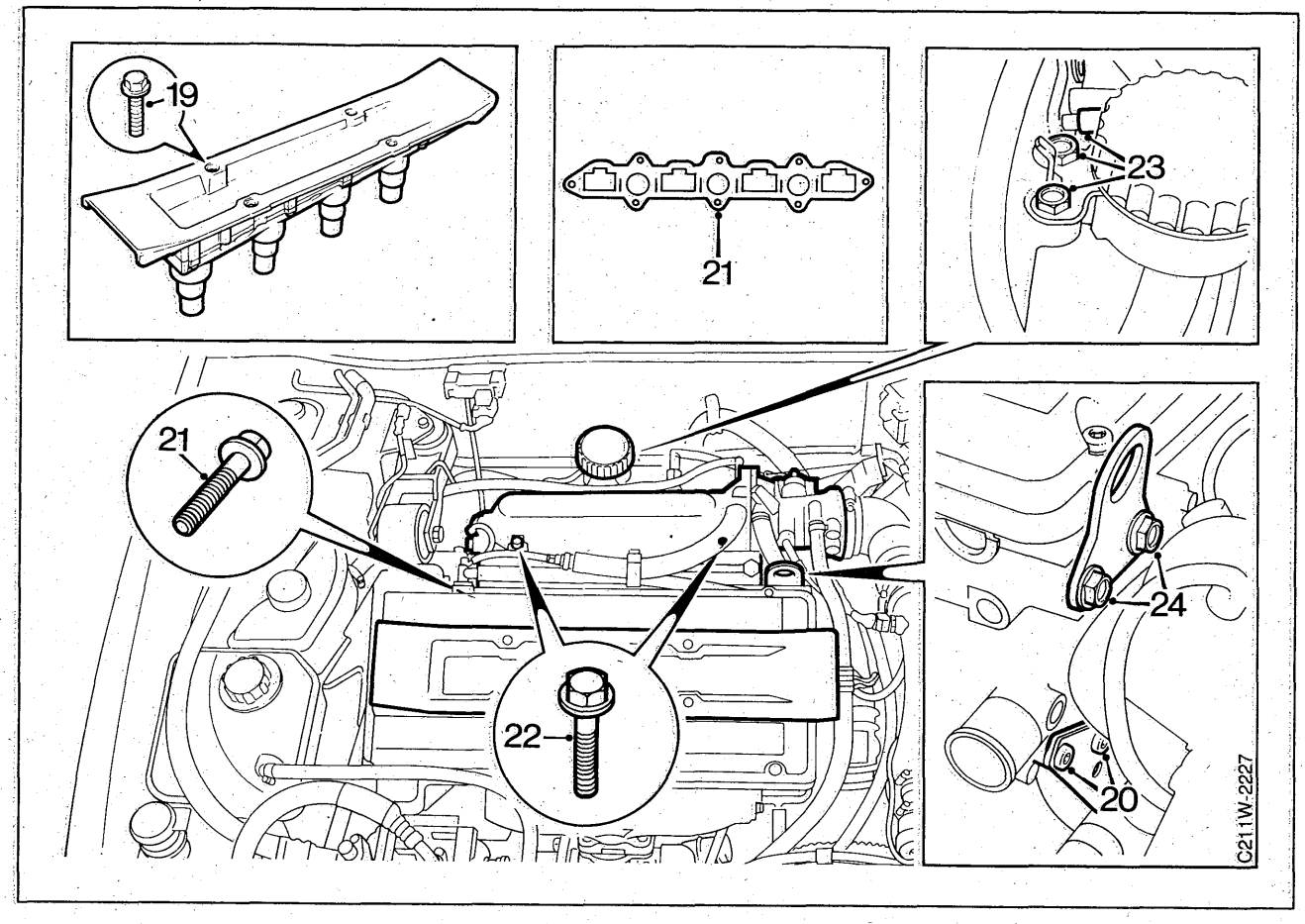
15 Rotate the crankshaft two whole turns and align it with the 0° mark, checking that the camshafts are lined up with their timing marks.

16 Tighten the chain sprocket bolts.

**Tightening torque 63 Nm (47 lbf ft).**

17 Fit the timing cover. Tightening sequence as shown.

**Tightening torque; 15 Nm (11 lbf ft).**




18 Fit the spark plugs.

**Tightening torque: 28 nm (20.7 lbf ft).**

19 Fit the ignition discharge module.

**Tightening torque: 11 Nm (8 lbf ft).**

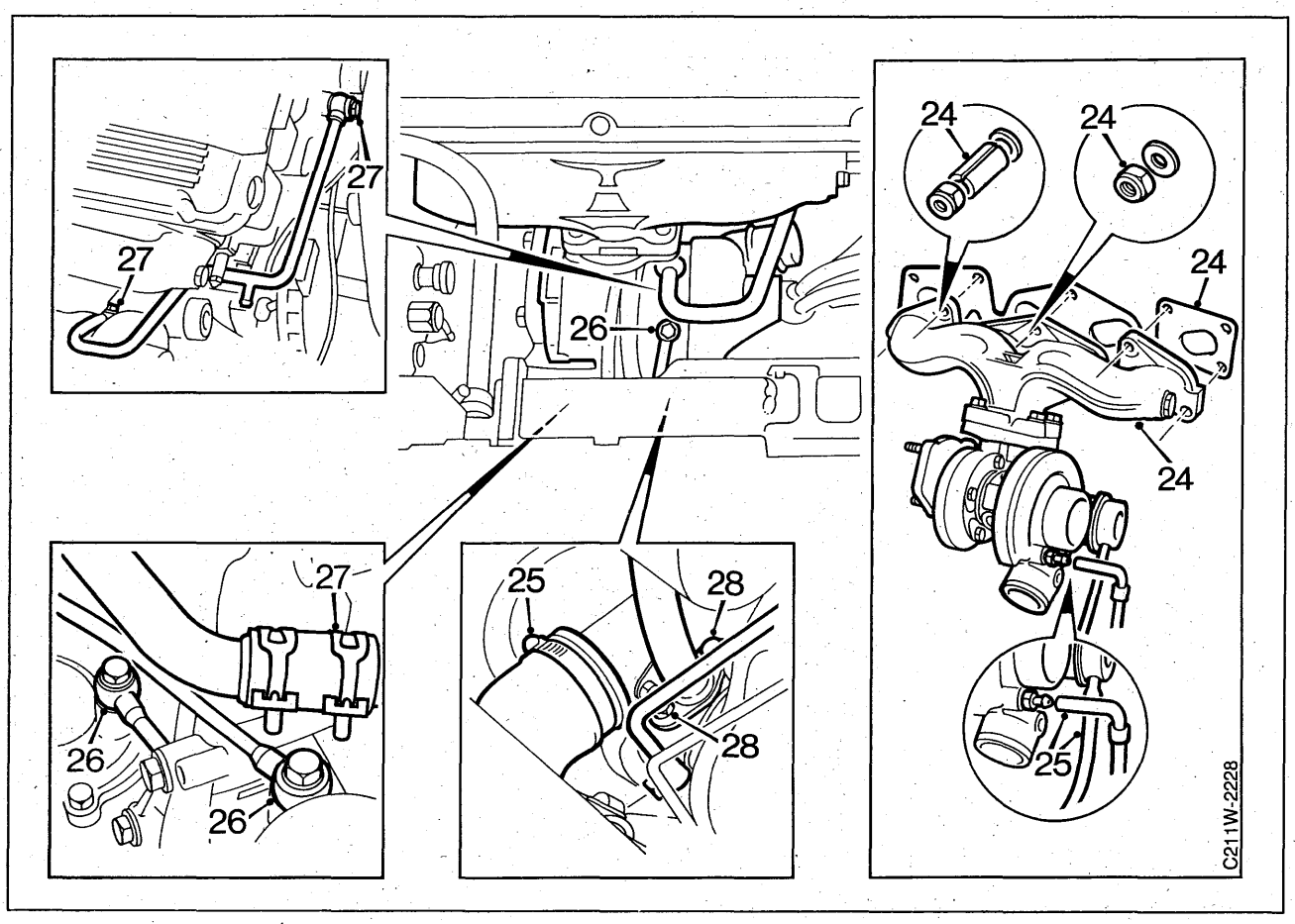
20 Fit the bracket for the water pipe on the thermostat cover.

21 Fit the intake manifold. Fit the bolts loosely. Remove the studs. Tighten all bolts.

**Tightening torque: 22 Nm (16 lbf ft).**

22 Fit the fuel rail with nozzles. Lubricate with petroleum jelly (Vaseline).

23 Fit the bracket for the oil filler pipe.




24 Fit the turbo unit and exhaust manifold complete with new gasket.

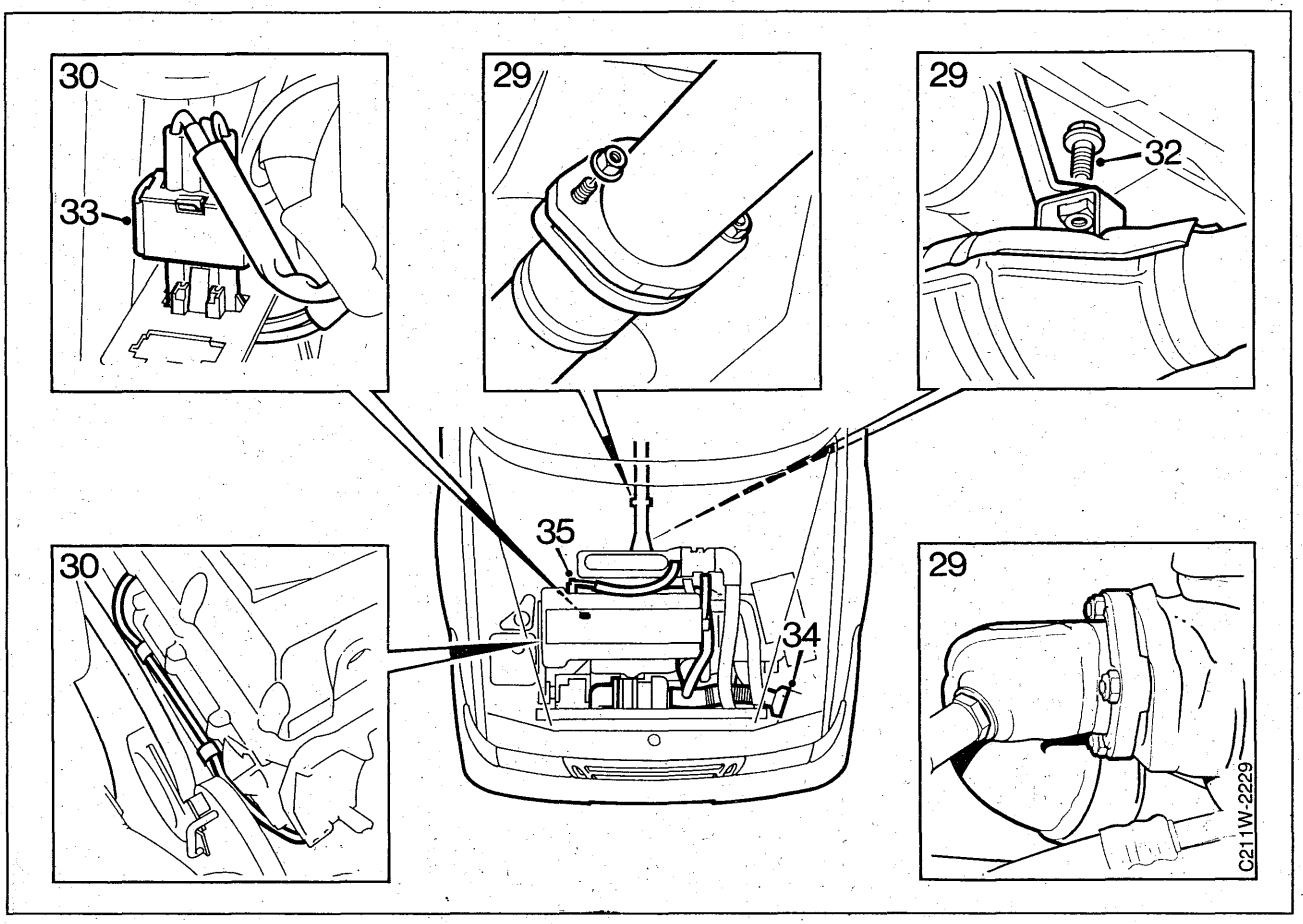
**Tightening torque: 25 Nm (18.5 lbf ft).**

25 Fit the delivery pipe between the turbo and charge air cooler and the two hoses on the solenoid valve.

26 Fit the coolant pipe between the turbo and water pump. Fit the oil delivery pipe.

27 Fit the coolant pipe between the turbo and cylinder head.

28 Fit the oil drain pipe.




29 Raise the car. Fit the front exhaust pipe.

30 Fit the oxygen sensor cable at the exhaust pipe.

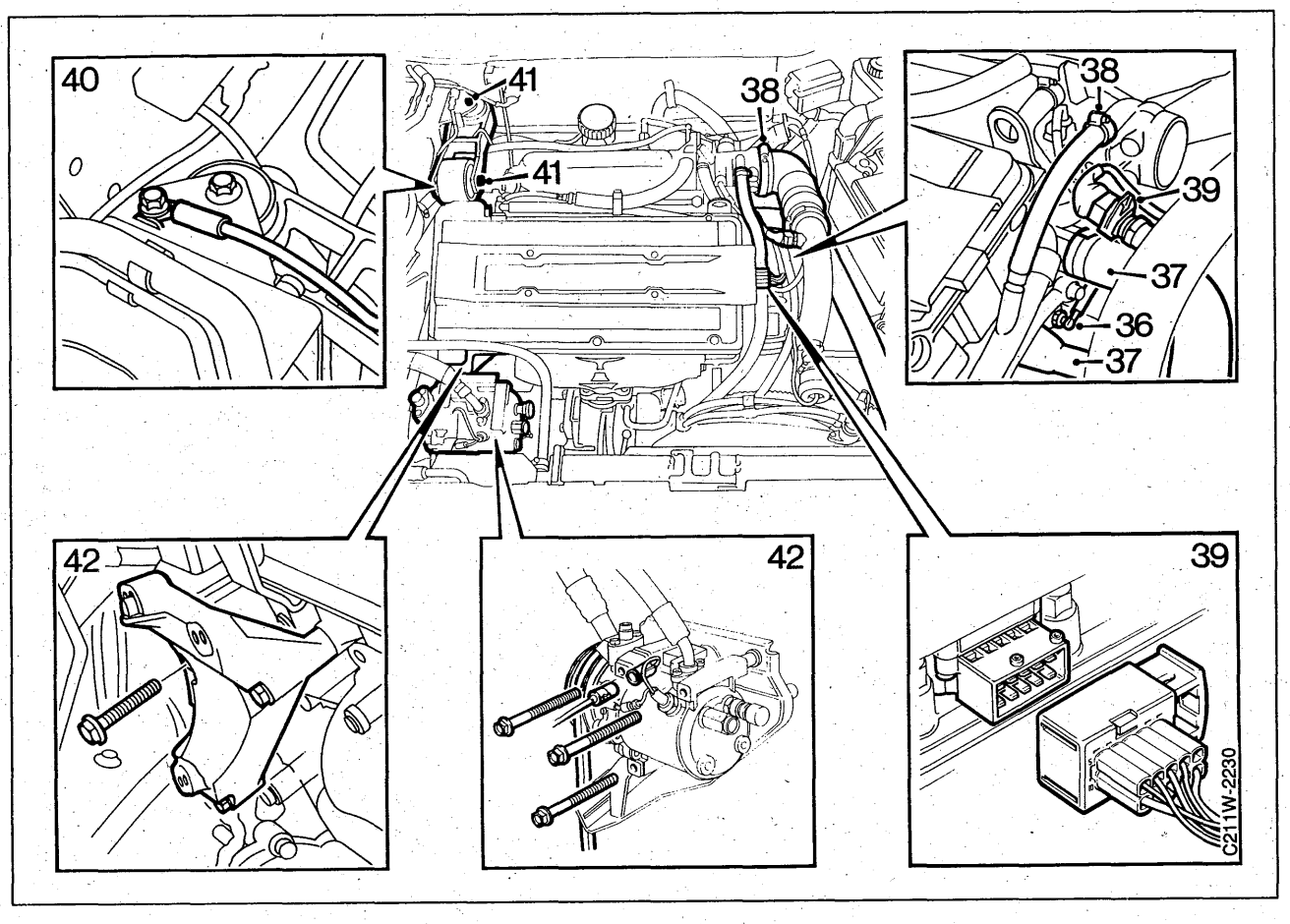
31 Make sure that the coolant drain plug is fitted in place.

32 Fit the by-pass valve and vacuum hose.

33 Fit the solenoid valve and plug in its connector.

34 Fit the intake hose to the turbo.

35 Fit the crankcase-breather and vacuum hoses to the timing cover.




36 Plug in the water temperature sensor connector.

37 Fit the upper radiator hose and the heat exchanger hoses at the cylinder head.

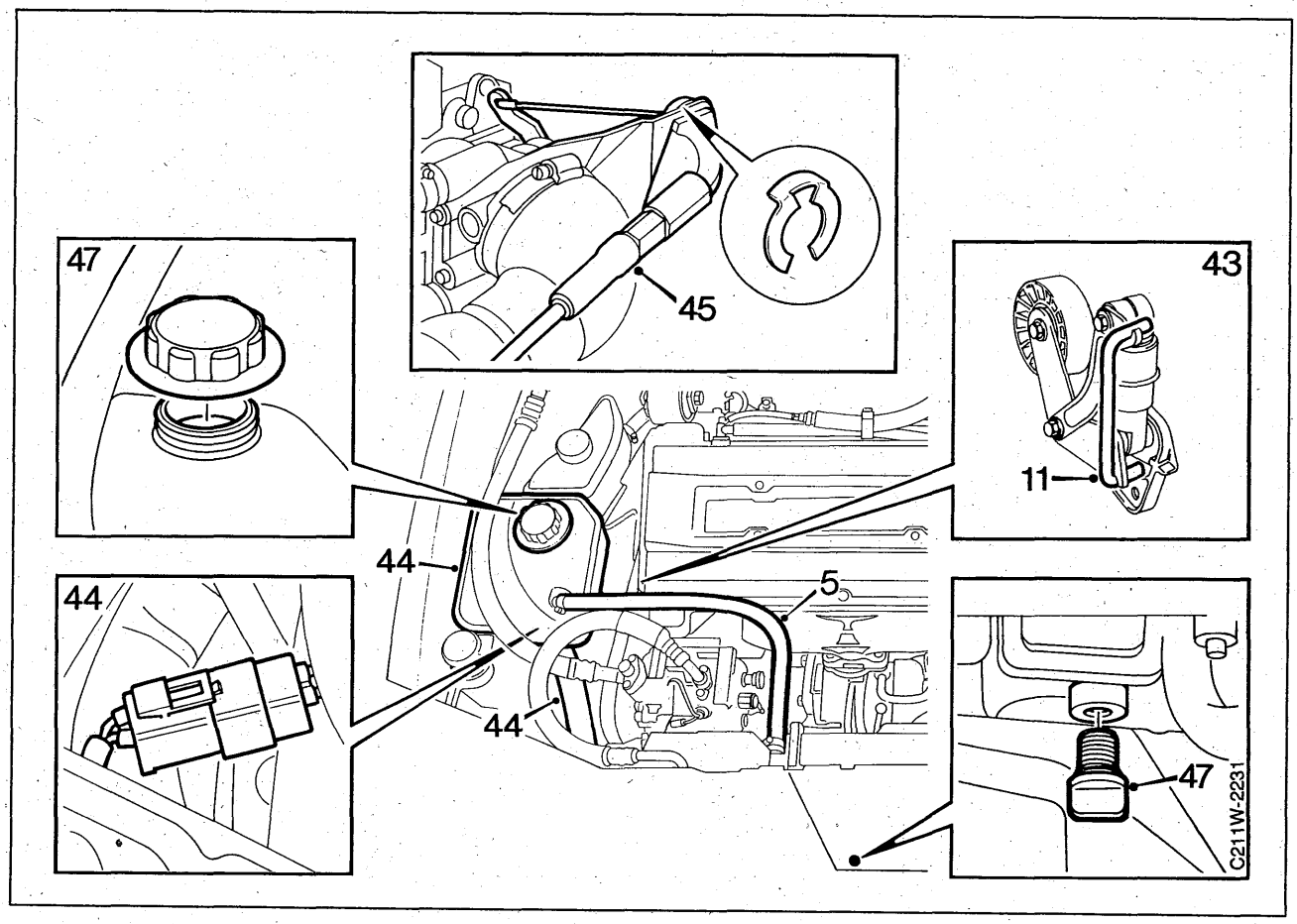
38 Fit the radiator hose to the throttle body and the delivery pipe between the charge air cooler and throttle body.

39 Plug in the temperature sensor and the ignition discharge module connector.

40 Screw the two front torque arm bracket bolts into the cylinder head. Do not forget the interference suppressor cable (ground).

41 Fit the torque arm and secure hoses and cables by means of cable ties.

42 Fit the AC compressor bracket and fit the AC compressor, not forgetting the clamp for the lambda (oxygen) sensor cable. Plug in the connector.




43 Fit the multigroove V-belt and remove locking yoke 83 94 448.

44 Fit the coolant tank and connect the hoses. Plug in the connector.

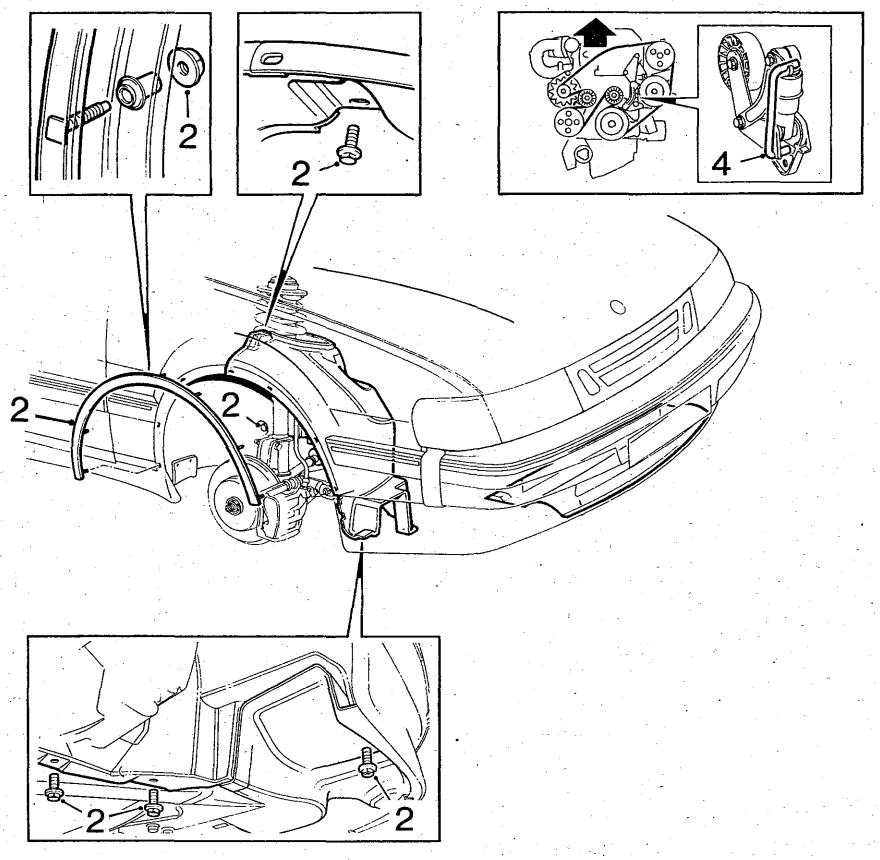
45 Fit the throttle control.

46 Connect the negative battery cable.

47 Check all oil and fluid levels. Top up as necessary. Check that the engine bay and engine are clean and neat.

48 Drive the car on test.

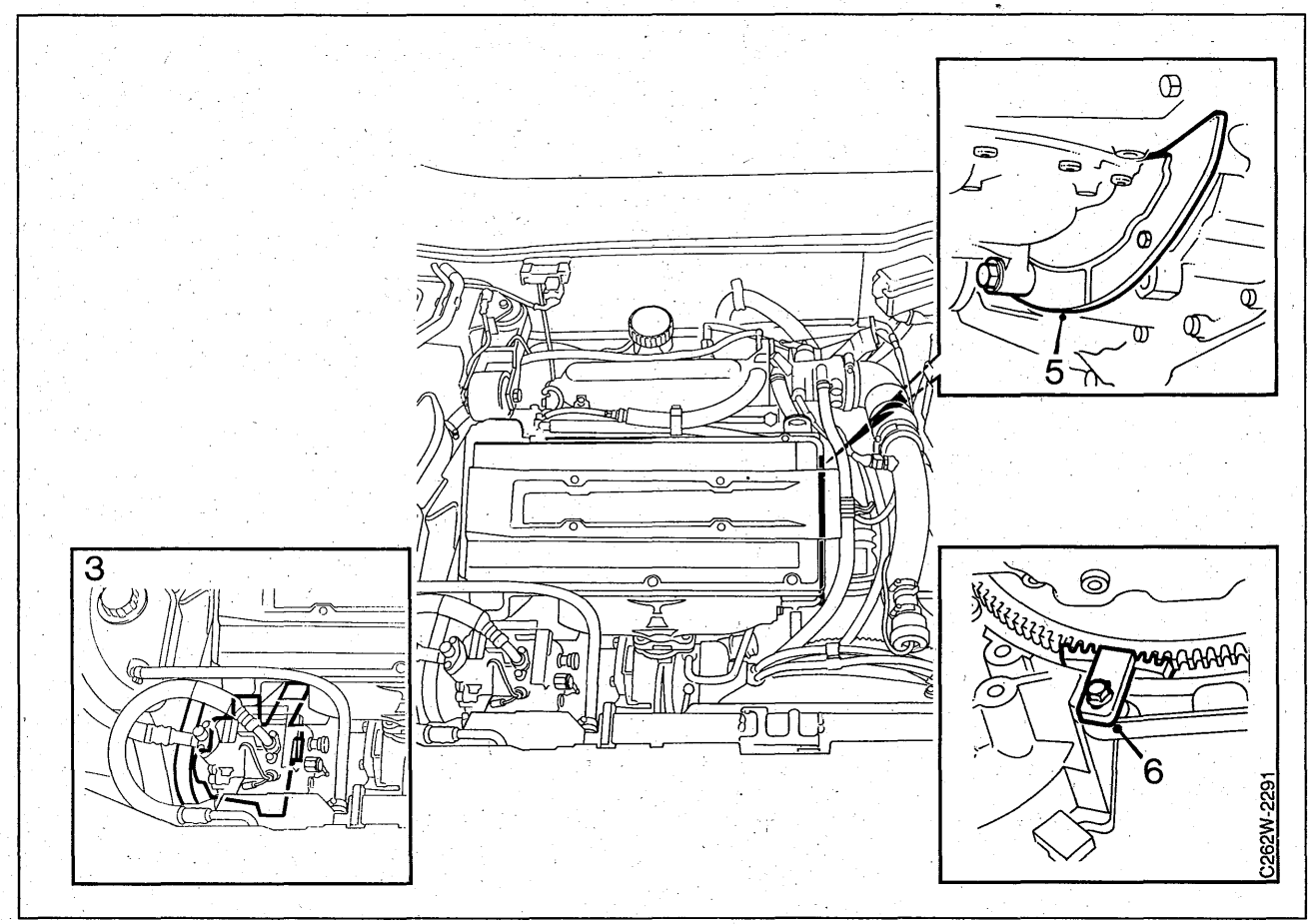
# Timing cover (engine in situ)




## To remove

1 Prior condition: the cylinder head should already have been removed, see the section entitled "Cylinder head" on page 40.

2 Remove the right-hand front wheel, wheel housing trim moulding and front wing liner.

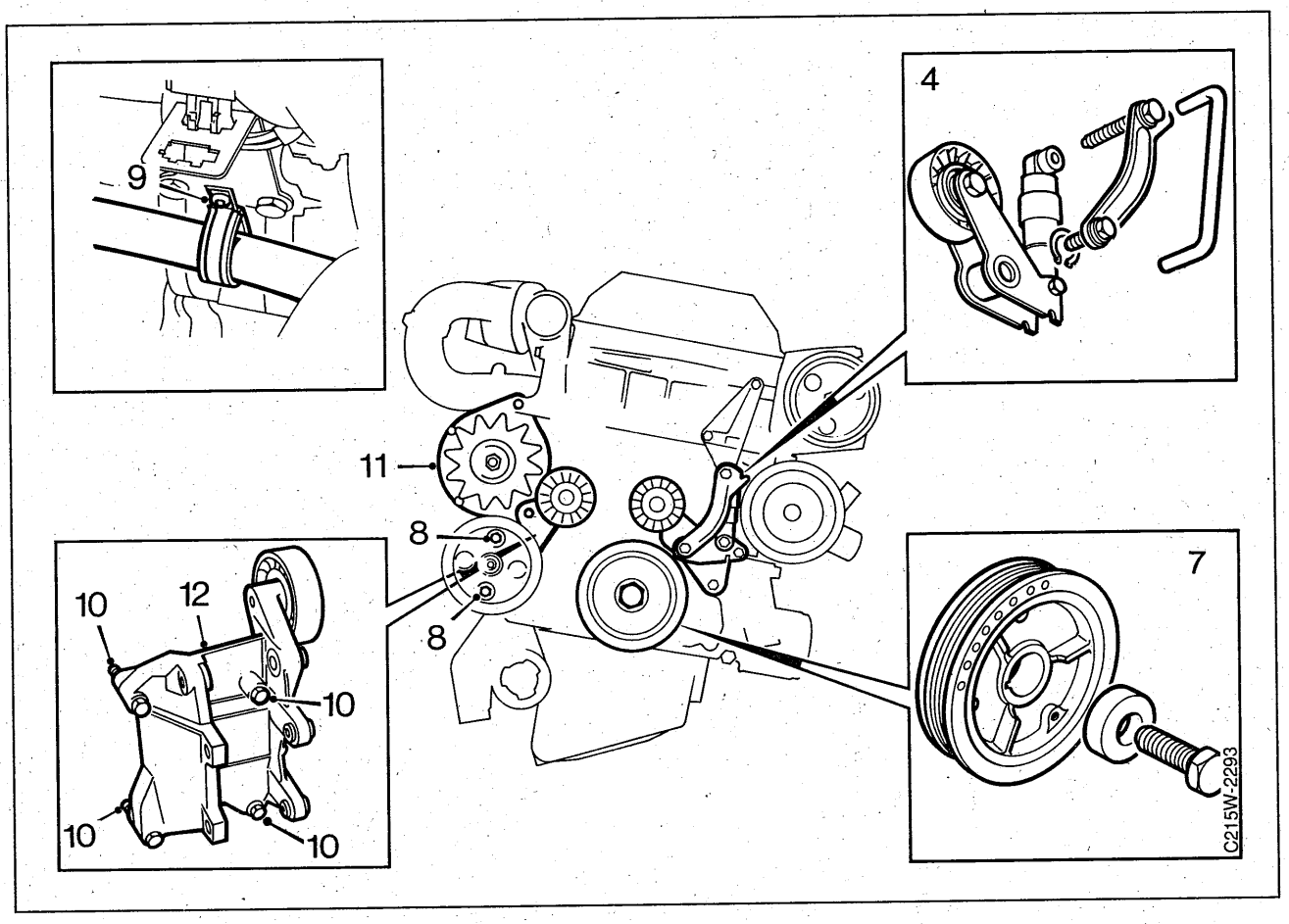



3 Remove the water pump.

4 Remove the belt tensioner. First remove the locking yoke, using a pair of pliers. Then remove the holder, lock washer and belt tensioner. Remove the belt.

5 Remove the protective plate from the gear casing (2 bolts).

6 Fit flywheel holder 83 94 868.




7 Remove the crankshaft pulley.

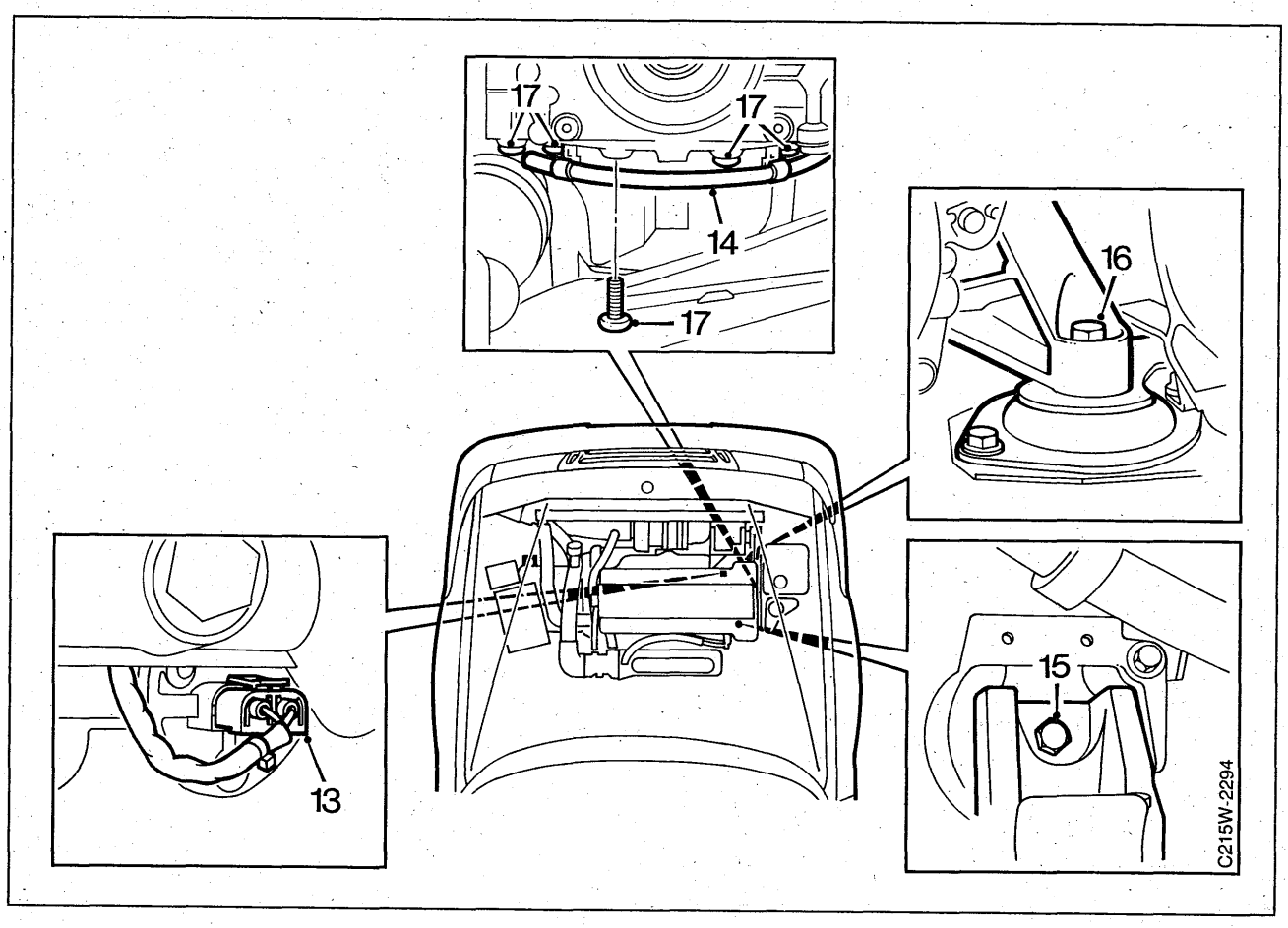
8 Remove the power steering pump retaining bolts through the holes in the pulley and remove the pump.

9 Remove the holder for the power steering pump hose.

10 Remove the four bolts securing the lower bracket to the engine, see illustration.

11 Remove the alternator.

12 Remove the upper bracket.



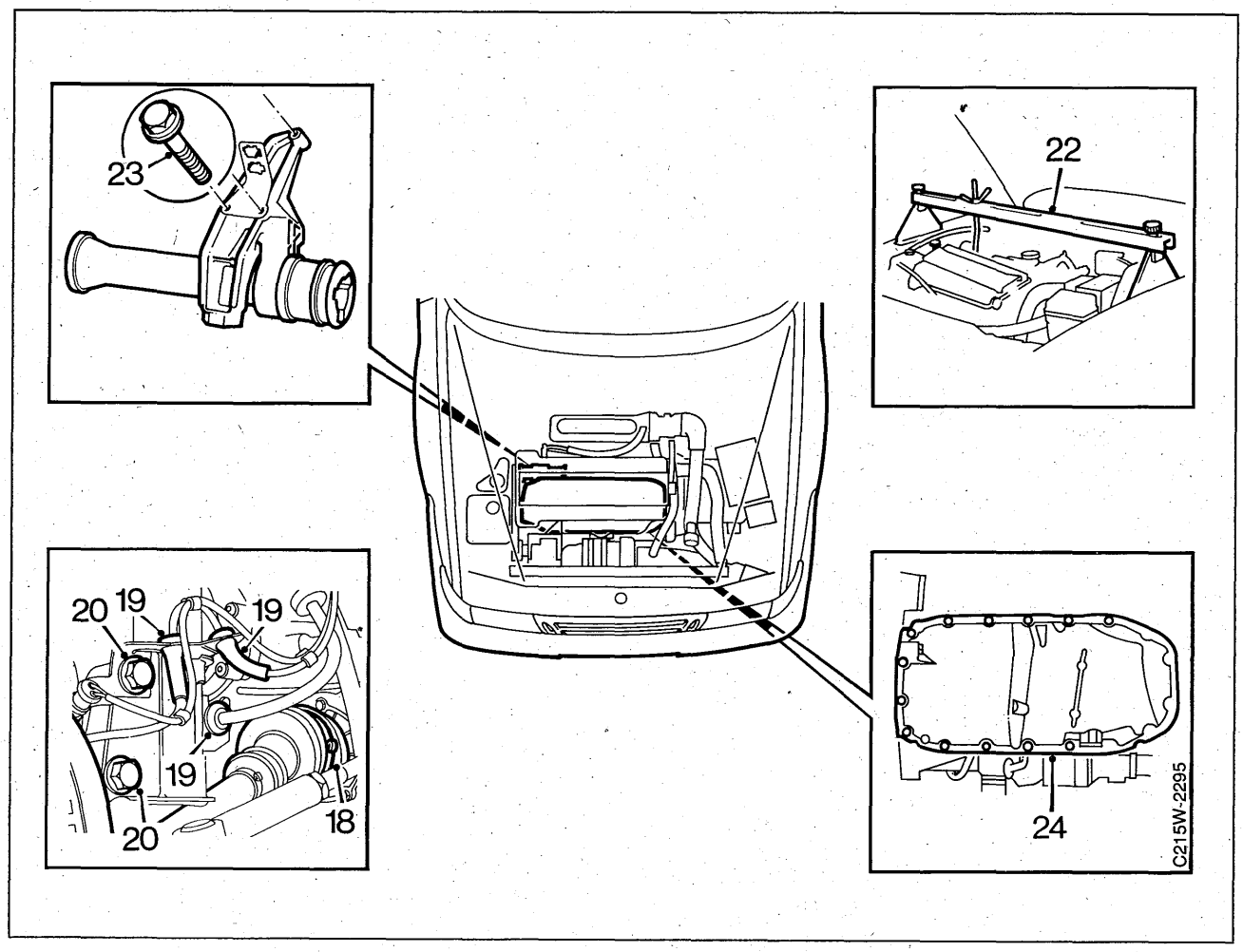

13 Unplug the oil level sensor connector.

14 Disconnect the oil level sensor cable from the sump.

15 Remove the bolt from the rear engine mounting.

16 Remove the bolt from the right-hand engine mounting.

17 Remove the five front sump retaining bolts.




18 Undo and remove the clip round the rubber gaiter on the right-hand drive-shaft universal joint.

**Important**

*Mind the rubber gaiters.*

19 Disconnect the two electric leads and brake hose from the steering swivel member.

20 Undo the MacPherson strut mountings on the steering swivel member.

21 Pull out the steering swivel member to separate the drive- shaft joint. Fit protective caps.

22 Lower the car to the floor. Attach lifting sling 83 92 409 to the engine.

23 Lift the engine. Remove the driver bracket retaining bolts from the engine and remove the driver.

24 Raise the car and drain the engine oil. Remove the remaining bolts from the sump. Remove the sump.

25 Remove the timing cover.

## To fit

1 Scrape all old sealing compound off the joint surfaces of the sump and cylinder block. Apply a bead of Loctite 518 and spread it out with your thumb. Be sure to clean the surfaces or a good seal will not be obtained.

2 Fit the timing cover.
**Tightening torque: 22 Nm (16 lbf ft).**

3 Raise the car and fit the sump.
**Tightening torque: 22 Nm (16 lbf ft).**

4 Fit the driver bearing bracket.
**Tightening torque: 30 ± 4 Nm (22 ± 3 lbf ft).**

5 Fit the oil level sensor's cable on the sump and plug in the cable.

6 Lower the car to the floor and remove the lifting sling.

7 Remove the protective caps from the drive-shaft universal joint halves and pack with grease. Fit the two halves together. Fit the rubber gaiter.

8 Bolt the MacPherson strut to the steering swivel member and secure electric leads and brake hose in their holders.
**Tightening torque:**
**92 ± 13 Nm (68 ± 10 lbf ft).**

9 Tighten the engine mountings.
**Tightening torque: 73 Nm (54 lbf ft).**

10 Fit the upper bracket and alternator.

11 Fit the lower bracket and power steering pump.

12 Fit the holder for the power steering pump hose.

13 Fit the crankshaft pulley.
**Tightening torque: 190 Nm (140 lbf ft).**

14 Remove the flywheel holder and mount the protective plate on the gear casing.

15 Fit the belt tensioner.

16 Fit the water pump.

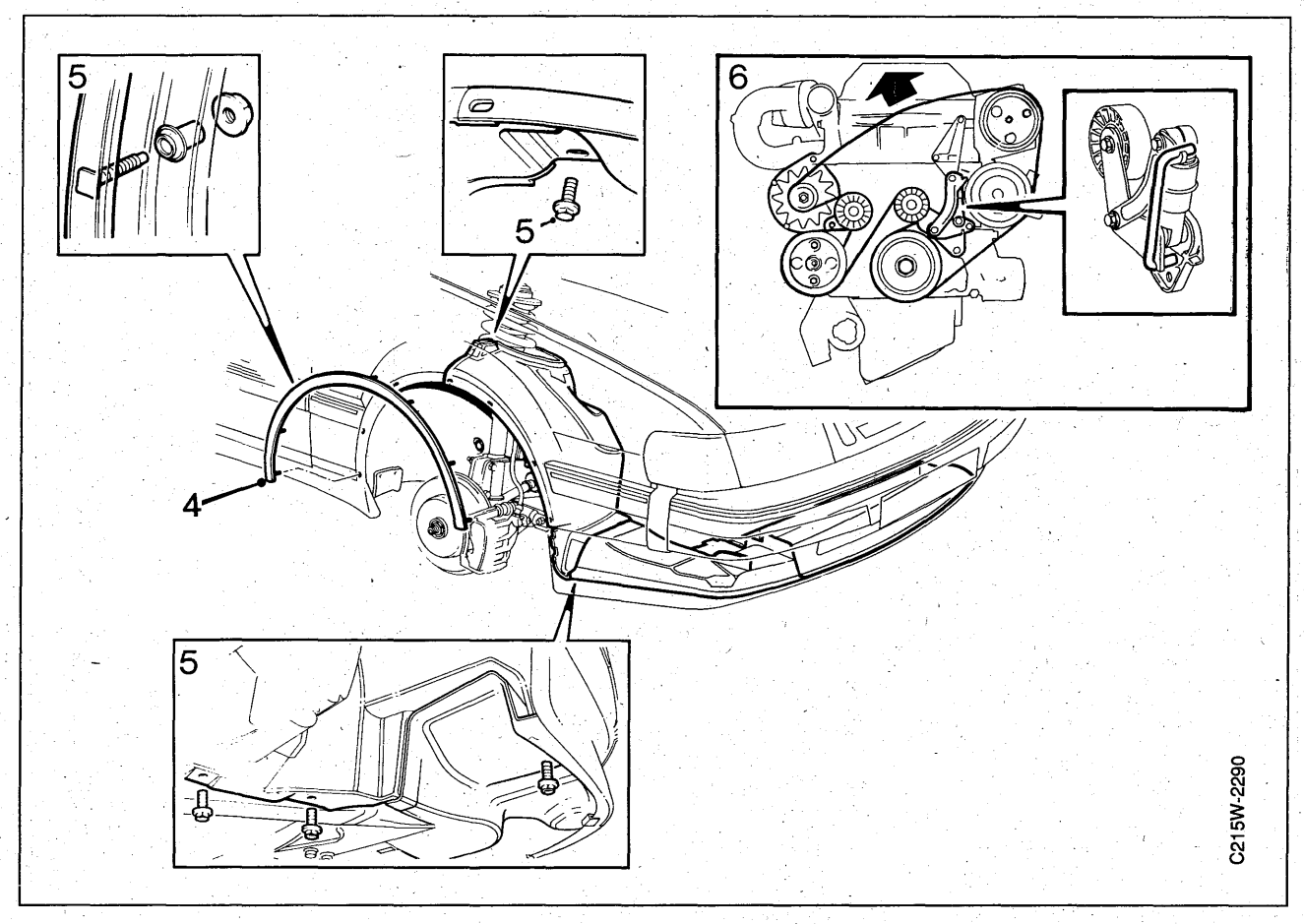
17 Fit the cylinder head, see the section entitled "Cylinder head".

18 Fit the wing liner, wheel housing trim moulding and right- hand front wheel.
**Tightening torque, wheel bolts: 120 Nm (89 lbf ft).**

19 Check all oil and fluid levels. Top u as necessary. Check that the engine bay and engine are clean and neat.

20 Drive the car on test.

# Sump (engine in situ)




## To remove

1 Drape protective covers over the front wings.

2 Disconnect the negative battery cable.

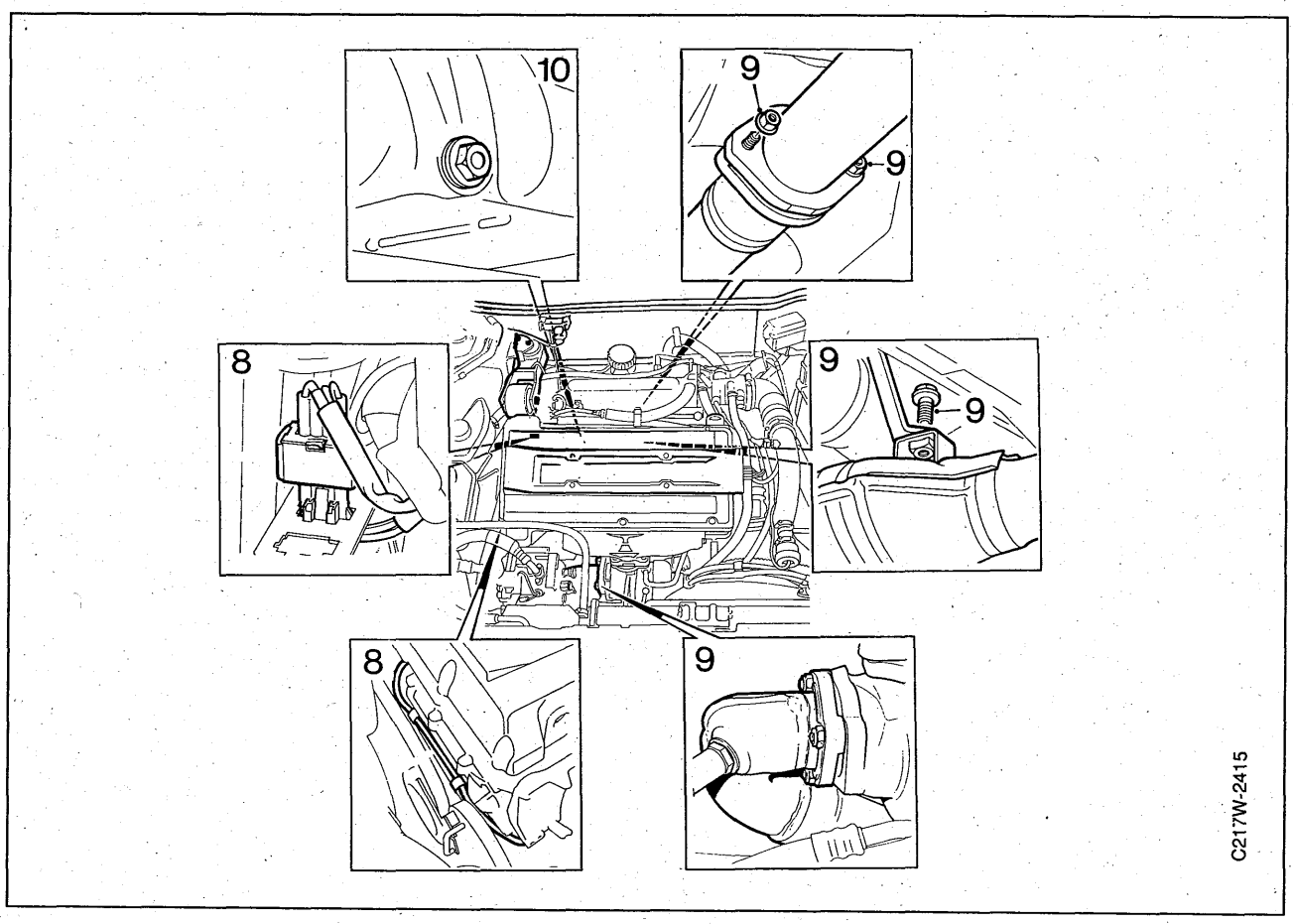
3 Remove the right-hand front wheel.

4 Remove the wheel housing trim moulding from the right-hand front wing.

5 Remove the front wing liner.

6 Relieve the tension applied by the automatic belt tensioner as follows: pull the belt hard upwards while an assistant secures the tensioner by means of locking yoke 83 94 448.

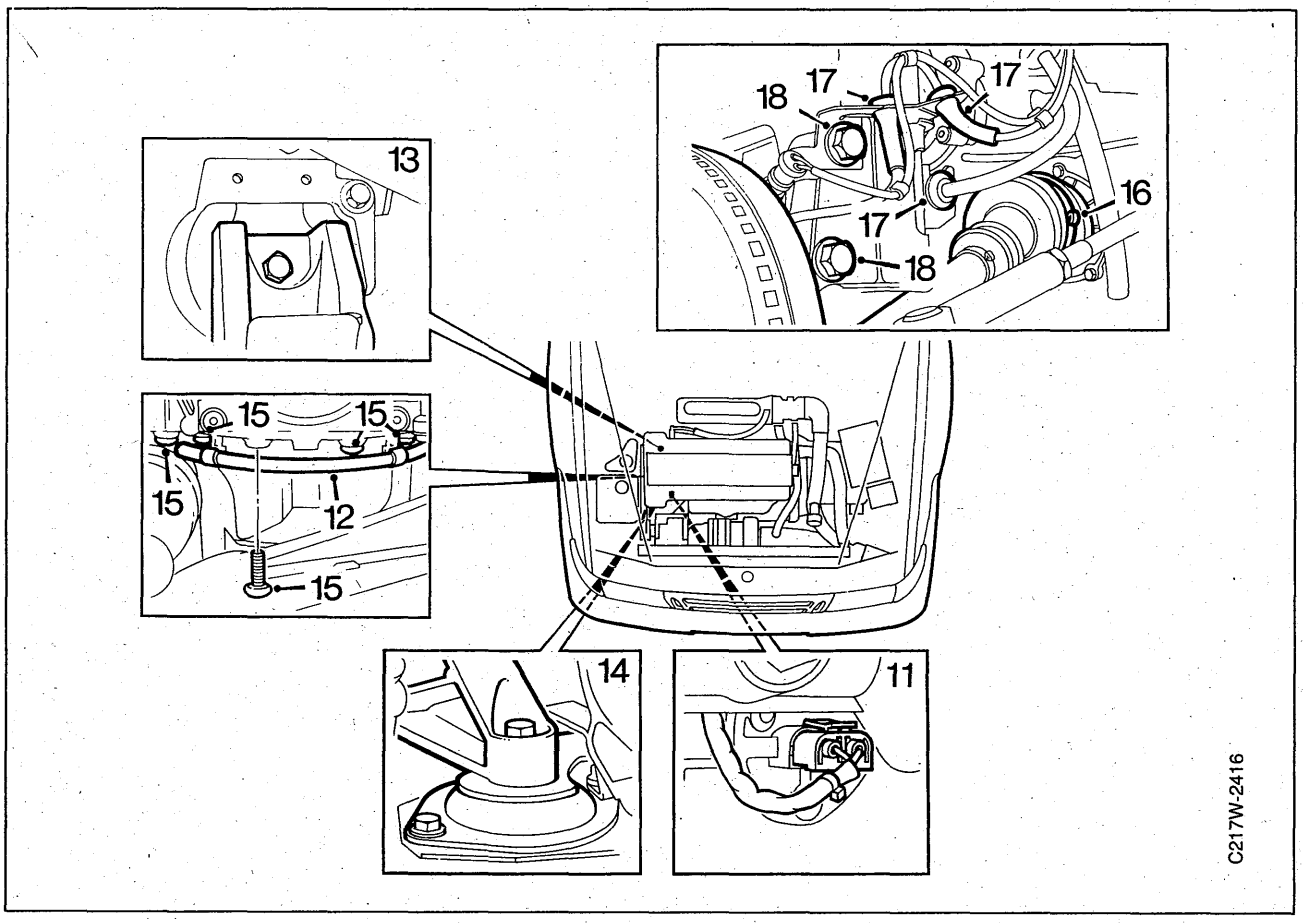
7 Remove the three bolts securing the front exhaust pipe to the turbo.




8 Unplug the oxygen sensor's connector and disconnect the oxygen sensor's cable.

9 Remove the front exhaust pipe.

10 Remove the drain plug from the sump and drain off the oil.




11 Unplug the oil level sensor connector.

12 Remove the oil level sensor cable from the sump.

13 Remove the bolt from the rear engine mounting.

14 Remove the bolt from the right-hand engine mounting.

15 Remove the five front retaining bolts from the sump.

16 Undo and remove the clip round the rubber gaiter on the right-hand drive-shaft universal joint.

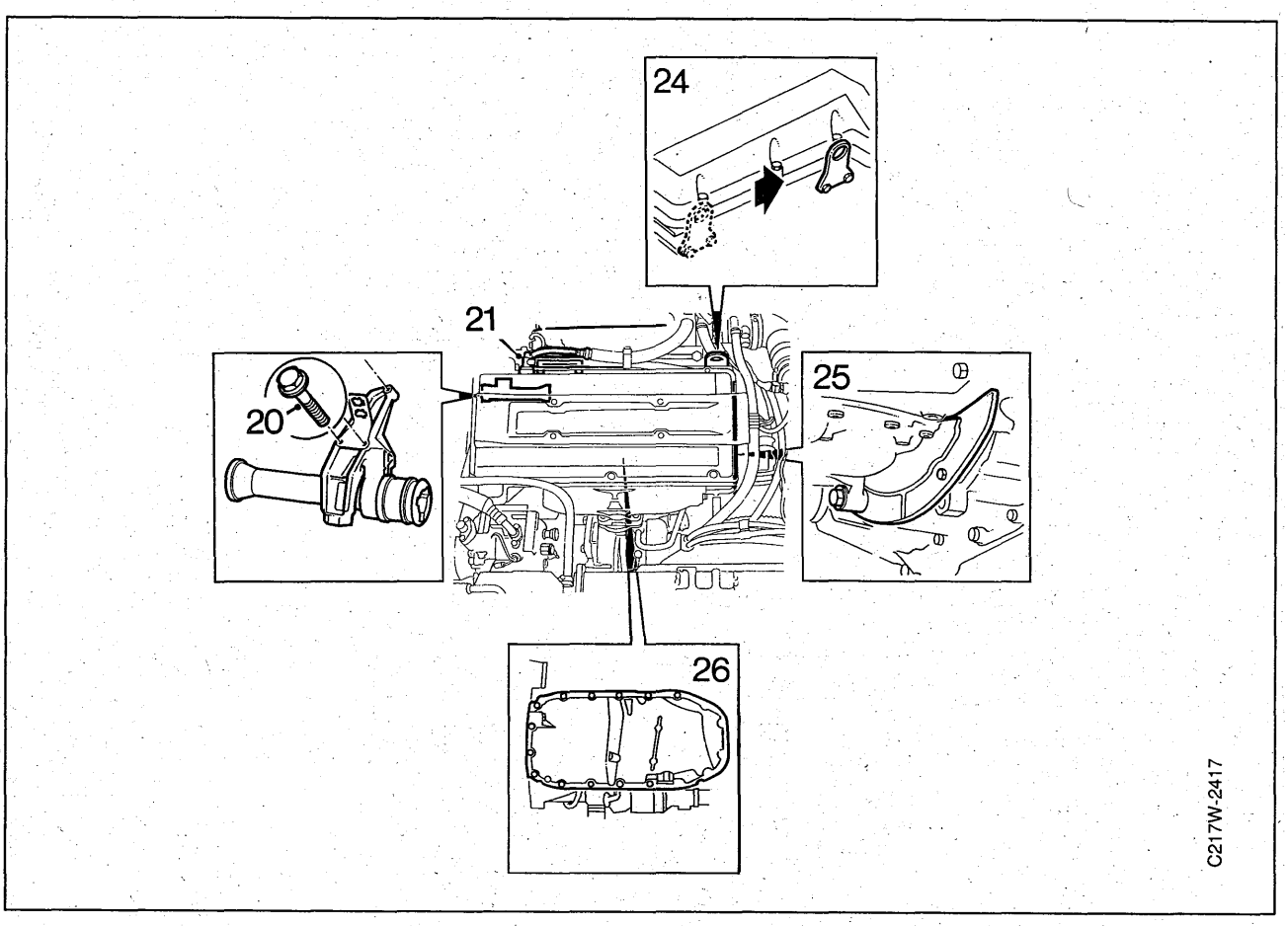
**Important**

Mind the rubber gaiters.

17 Remove the two electric leads and the brake hose from the steering swivel member.

18 Remove the MacPherson strut's lower bolts from the steering swivel member.

19 Pull away the steering swivel member to separate the drive- shaft joint. Fit protective caps.




20 Remove the driver bracket retaining bolts from the engine and remove the driver.

21 Remove the crankcase breather hose.

22 Remove the ground cable from the torque arm.

23 Remove the torque arm.

24 Move the lifting eye from its rear position to the front position.

25 Lift the engine and remove the protective plate from the gearbox.

26 Raise the car and remove the remaining bolts from the sump. Remove the sump.

## To fit

1 Clean the joint surfaces on the sump and cylinder block.

2 Apply Loctite 518 sealing compound to the joint surfaces of the sump and cylinder block.

3 Fit the sump and drain plug.
**Tightening torque, sump: 22 Nm (16 lbf ft).**
**Tightening torque, drain plug: 25 Nm (18.5 lbf ft).**

4 Fit the protective plate on the gearbox.

5 Detach the lifting sling and move the lifting eye back to the rear position.

6 Fit the torque arm and connect the ground cable.

7 Fit the crankcase breather hose.

8 Fit the driver.

9 Remove the protective caps and fit the two driveshaft joint halves together and fit the rubber gaiter.

10 Fit the MacPherson strut mounting and attach the brake hose and electric leads.

11 Screw the bolt in the right-hand engine mounting.
**Tightening torque: 73 Nm (54 lbf ft).**

12 Screw the bolt in the rear engine mounting.
**Tightening torque: 73 Nm (54 lbf ft).**

13 Fit the oil level sensor cable on the sump.

14 Plug in the oil level sensor connector.

15 Fit the front exhaust pipe and attach the oxygen sensor's cable. Plug in the oxygen sensor connector.

16 Fit the multigroove V-belt and remove the locking clamp.

17 Fit the wing liner, wheel housing trim moulding and right- hand front wheel.
**Tightening torque, wheel bolts: 120 Nm (89 lbf ft).**

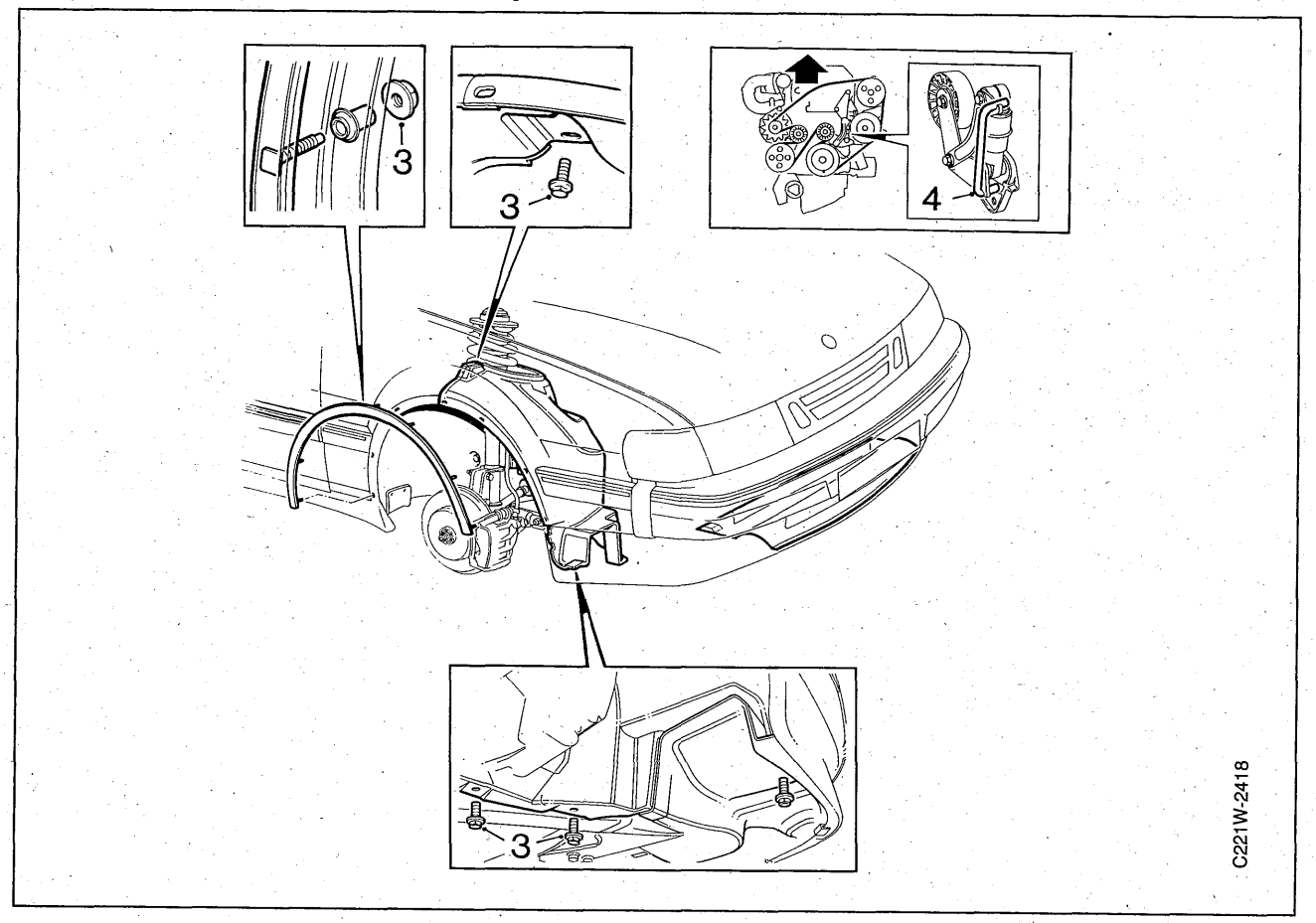
18 Fill up with motor oil.

19 Connect the negative battery cable.

20 Check all oil and fluid levels and top up as necessary. Check that the engine bay and engine are clean and neat.

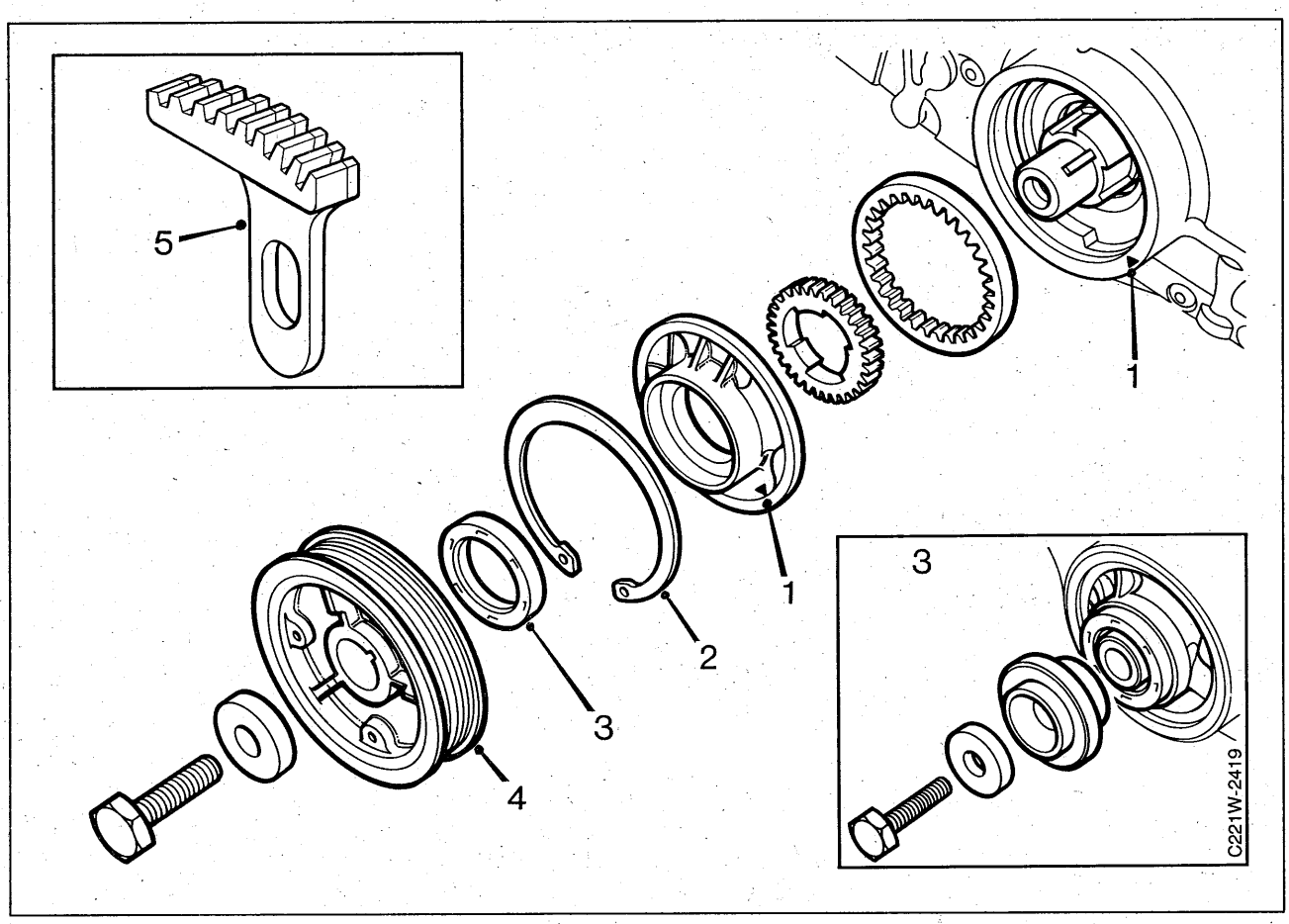
21 Check that the engine bay is clean. Drive the car on test.

# Oil pump (engine in situ)




## To remove

1 Drape protective covers over the front wings.
2 Remove the right-hand front wheel.
3 Remove the wheel housing trim moulding and the front wing liner.
4 Relieve the tension applied by the automatic belt tensioner as follows: pull the belt hard upwards while an assistant secures the tensioner by means of locking yoke 83 94 488.
5 Remove the protective plate from the gearbox.
6 Lock the flywheel by means of flywheel holder 83 94 868.
7 Lift the belt off the crankshaft pulley.
8 Remove the crankshaft pulley.
9 Use a screwdriver to prise out the crankshaft seal if it needs replacing.
10 Remove the retaining ring (chamfer facing outwards).
11 Note the marking (arrows opposite each other).
12 Remove the oil pump.




## To fit

1 Fit the oil pump, making sure that the arrows are opposite each other.

2 Fit the retaining ring (chamfer facing outwards).

3 Use tools to fit the crankshaft seal, pressing it into position by means of the crankshaft pulley bolt and spacer ring.

4 Fit the crankshaft pulley.
**Tightening torque: 190 Nm (140 lbf ft).**

5 Remove the flywheel holder and fit the protective plate.

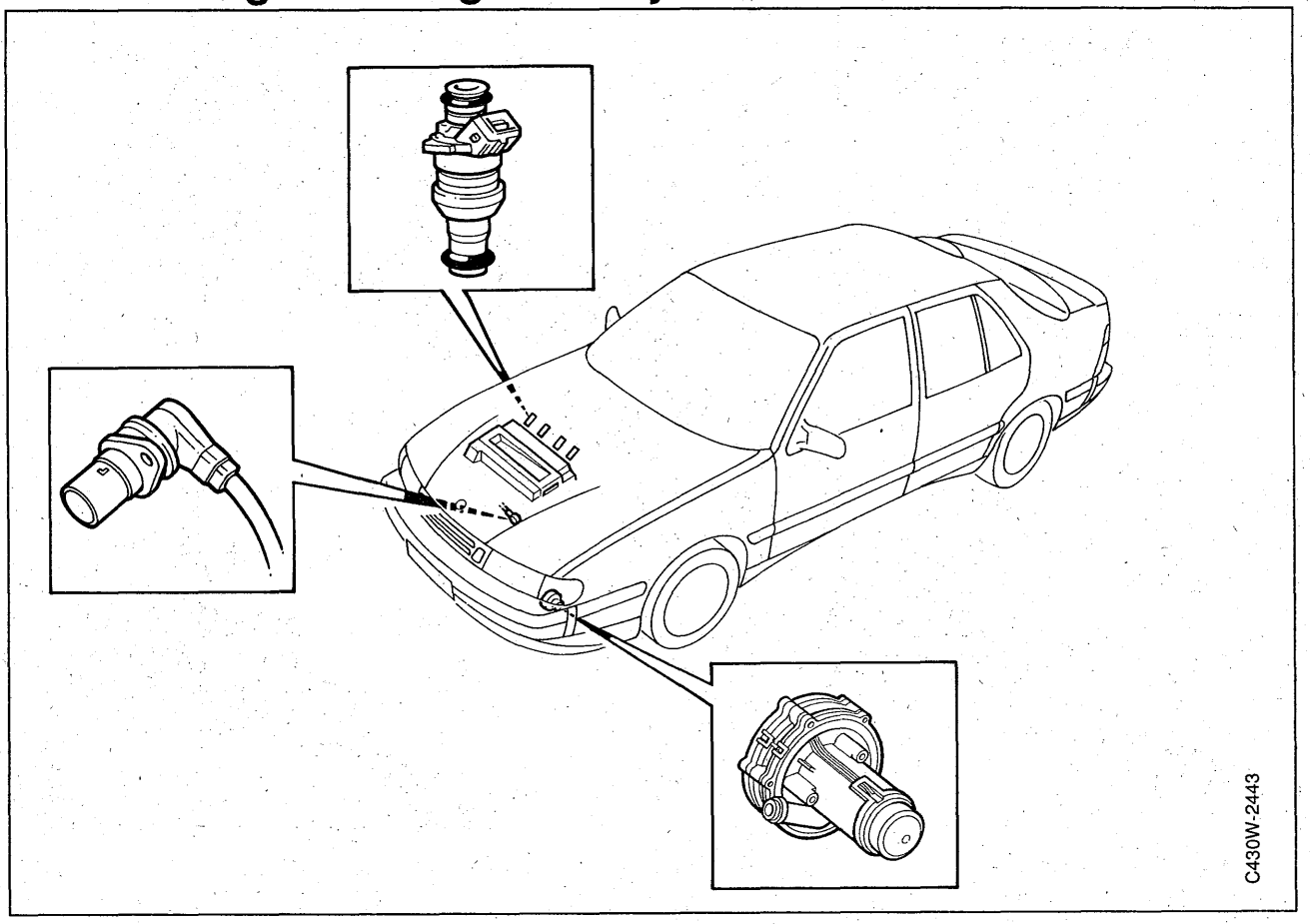
6 Fit the belt and remove the locking yoke.

7 Fit the wing liner, wheel housing trim moulding and right- hand front wheel.
**Tightening torque, wheel bolts: 120 Nm (89 lbf ft).**

8 Check all oil and fluid levels and top up as necessary. Check that the engine bay and engine are clean and neat.

9 Drive the car on test.

# TRIONIC engine management system




Starting with model year 1994 cars, the TRIONIC engine management system will be fitted to all Saab 9000 models, both with and without turbo.

The following components on model year 1994 cars differ in some respects from those on model year 1993 cars:

- Injectors
- Crankshaft position sensor
- Secondary air injection system

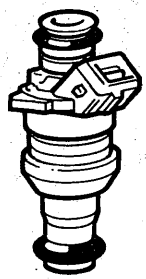
The secondary air injection system is fitted only on models equipped with the B234i engine for the SE and US markets.
The ISAT fault diagnosis system has additional diagnostic trouble codes for:

- Secondary air injection system air pump faulty.

In addition, a number of new command codes have been added to facilitate fault diagnosis. Procedures for using these trouble codes are described in the fault diagnosis section.
During the autumn of 1993, Service Manual 2:7 "TRIONIC engine management system" will be updated.

# Technical data

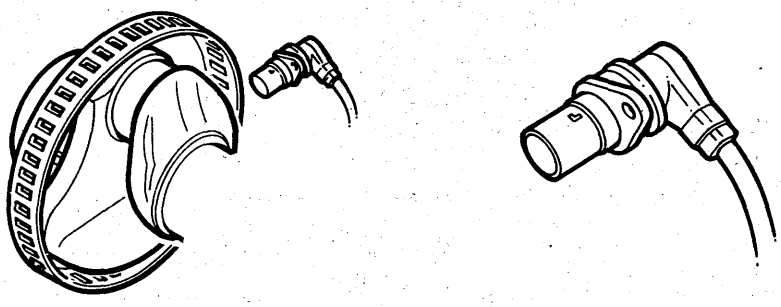
## Injectors



C430W-2444

| | | |
|---|---|---|
| Manufacturer | | Bosch EV1-3E |
| Type | | Twin-jet (4 holes in nozzle) |
| Resistance | Ohms | 14.5 ± 0.35 |
| Flow capacity, normally aspirated engine | ml/30 s | 111 |
| Flow capacity, turbo engine | ml/30 s | 155 |

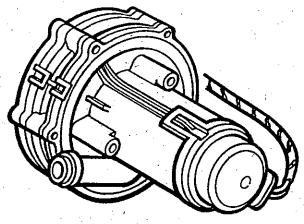
## Crankshaft position sensor



C430W-2441

| | | |
|---|---|---|
| Location | | Mounted in crankcase wall |
| Type | | Inductive sensor |
| Resistance, pin 1—2 | Ohms | 540 |
| Perforated disc, number of ribs | | 58 (60-2) |
| Distance between sensor and disc | mm | 0.4-1.3 |

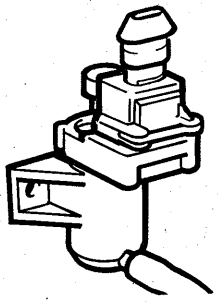
## Air pump, secondary air injection system



C430W-2442

| | | |
|---|---|---|
| Manufacturer | | Pierburg |
| Pump capacity at 13 V | kg/h | 25-30 |
| Rating | W | 325 |

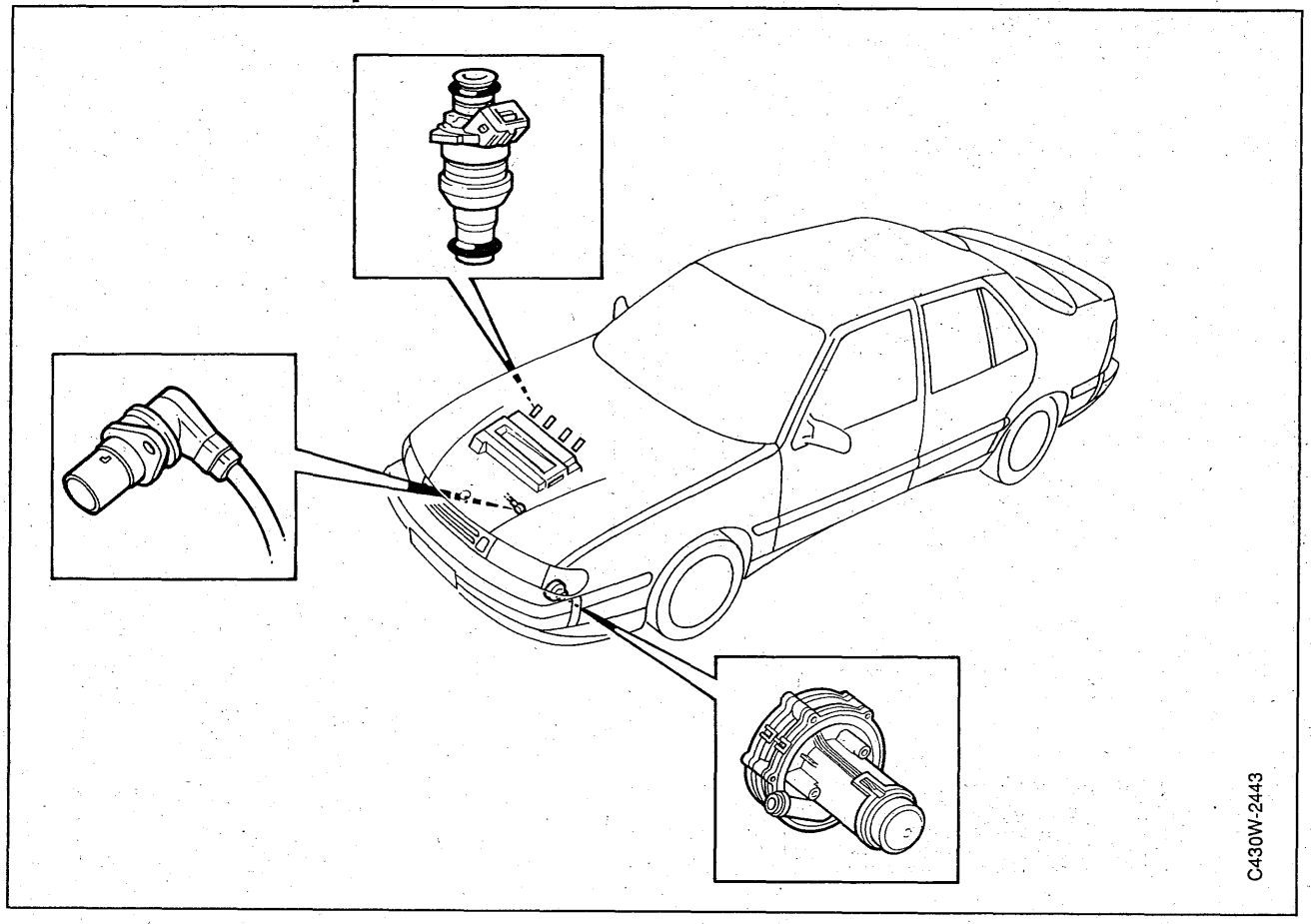
## Control valve, secondary air injection system



C430W-2445

| | | |
|---|---|---|
| Manufacturer | | Eaton |
| Characteristic feature | | Closed without current |
| Resistance | Ohms | 40 |

# Technical description



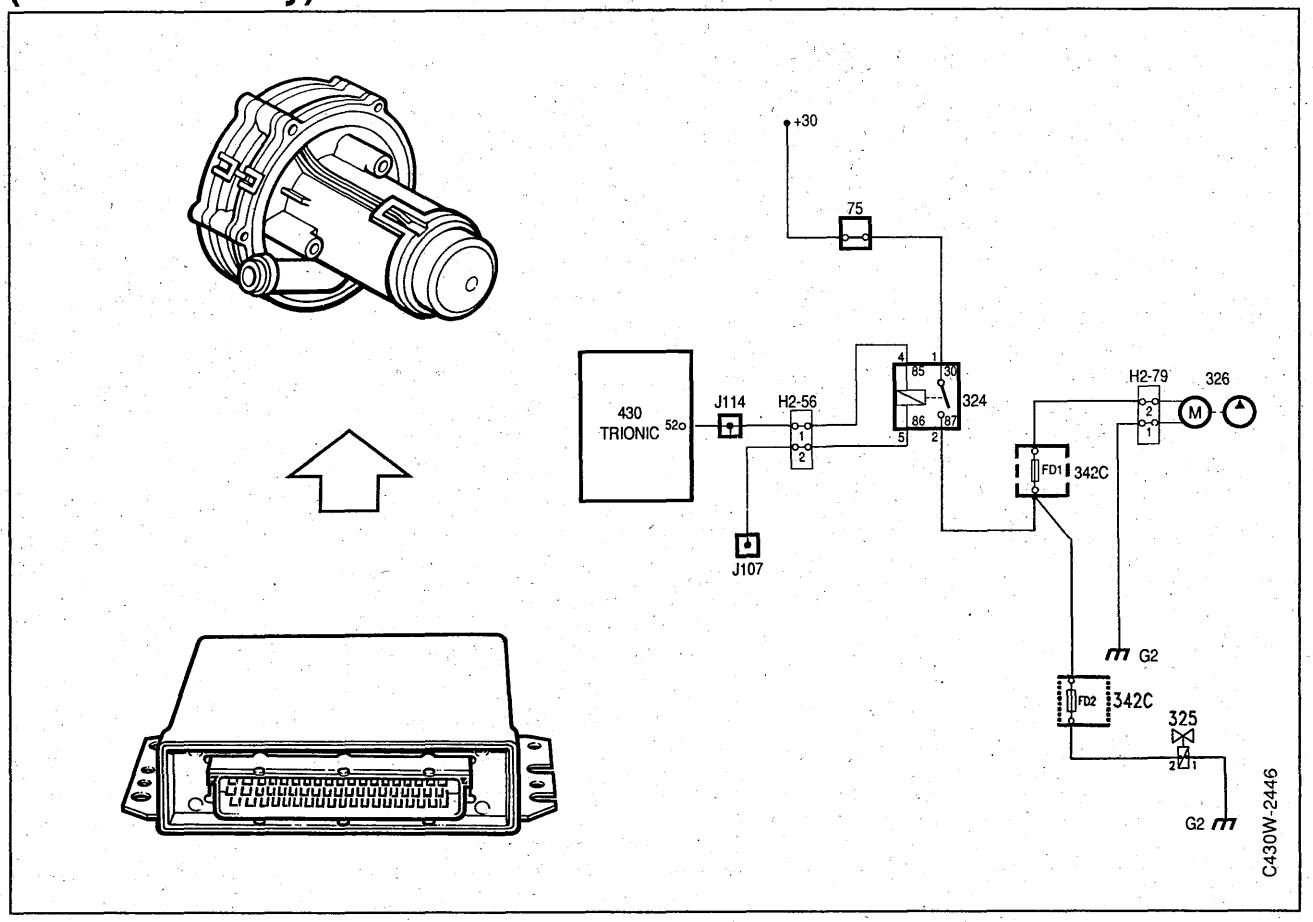

## System description, new features

Starting with model year 1994 cars, the TRIONIC engine management system will be fitted to all Saab 9000 models.
The following components on model year 1994 cars differ in from those on model year 1993 cars:

- Injectors
- Crankshaft position sensor
- Secondary air injection system

(The secondary air injection system is fitted only on models equipped with the B234i engine for the SE and US markets.)
The fuel injection and secondary air injection systems are described in the following pages.

## Principle of operation, secondary air injection system (SE and US only)




To get the catalytic converter working quickly and efficiently after a cold start, ambient air is pumped into the exhaust manifold where the oxygen in the air starts a chemical combustion process together with CO, HC and NOx pollutants. Since heat is thus generated, the catalytic converter can quickly start operating effectively.

The control module starts the air pump only if the signals from the coolant temperature sensor and intake air temperature sensor are within the following limits: above +5°C and below +35°C. If these conditions are met, the air pump will start working immediately after the engine starts.
The control module grounds pin 52 to activate the secondary air injection pump 326 and solenoid valve 325.

Relay 324 operates and applies supply voltage to the air pump and solenoid valve. The solenoid valve opens the passage leading to the exhaust manifold.

This process is regulated by the control module and dependent on temperature. The air pump always runs for 60 seconds. At the end of this time the solenoid valve closes and the air pump stops.

# TRIONIC fault diagnosis

## Diagnostic trouble code table

Engine running or ignition switched on

| DTC | Malfunction/faulty component | CHECK ENGINE | ISAT display text | Procedure: see Service Manual 2:7, page |
|---|---|---|---|---|
| P0105 | Manifold absolute pressure sensor—faulty operation. | on | P0105 INTAKE PRESSURE FAULTY | 82 |
| P0106 | Manifold absolute pressure sensor—input wrong. | on | P0106 INTAKE PRESSURE INPUT FAULTY | 82 |
| P0107 | Manifold absolute pressure sensor—Signal too low. | on | P0107 INTAKE PRESSURE INPUT LOW/ SHORTING TO GROUND | 82 |
| P0108 | Manifold absolute pressure sensor—Signal too high. | on | P0108 INTAKE PRESSURE INPUT HIGH/BREAK SHORTING TO BATT+ | 82 |
| P0110 | Intake manifold temperature sensor - malfunctioning. | on | P0110 INDUCTION AIR TEMP FAULTY | 85 |
| P0112 | Intake manifold temperature sensor - Signal too low. | on | P0112 INDUCTION AIR TEMP INPUT LOW/ SHORTING TO GROUND | 85 |
| P0113 | Intake manifold temperature sensor - Signal too high. | on | P0113 INDUCTION AIR TEMP INPUT HIGH/BREAK SHORTING TO BATT+ | 85 |
| P0115 | Coolant temperature sensor - malfunctioning. | on | P0115 COOLANT TEMPERATURE FAULTY | 85 |
| P0117 | Coolant temperature sensor - Signal too low. | on | P0117 COOLANT TEMPERATURE INPUT LOW/ SHORTING TO GROUND | 89 |
| P0118 | Coolant temperature sensor - Signal too high. | on | P0118 COOLANT TEMPERATURE INPUT HIGH/BREAK SHORTING TO BATT+ | 89 |
| P0120 | Throttle position sensor—faulty operation (not TCS). | on | P0120 THROTTLE POSITION FAULTY | 89 |
| P0121 | Throttle position sensor—input wrong (not TCS). | on | P0121 THROTTLE POSITION INPUT FAULTY | 92 |
| P0122 | Throttle position sensor—Signal too low (not TCS). | on | P0122 THROTTLE POSITION INPUT LOW/ SHORTING TO GROUND | 92 |
| P0123 | Throttle position sensor—Signal too high (not TCS). | on | P0123 THROTTLE POSITION INPUT HIGH/BREAK SHORTING TO BATT+ | 92 |

| DTC | Malfunction/faulty component | CHECK ENGINE | ISAT display text | Procedure: see Service Manual 2:7, page |
|---|---|---|---|---|
| P0130 | Oxygen sensor—malfunctioning. | on | P0130 OXYGEN SENSOR FAULTY | 95 |
| P0131 | Oxygen sensor—maximum enrichment. | on | P0131 OXYGEN SENSOR INPUT LOW/RICH | |
| P0132 | Oxygen sensor—maximum weakening or signal too high. | on | P0132 OXYGEN SENSOR INPUT HIGH/ LEAN | |
| P0135 | Oxygen sensor—preheating, shorting to ground or open circuit. | on | P0135 OXYGEN SENSOR NO PREHEATING | 96 |
| P0170 | Fuel-air mixture - adaptation faulty. | on | P0170 ADAPTATION FAULTY | 94 |
| P0171 | Fuel-air mixture - lean. | on | P0171 ADAPTATION LEAN | 94 |
| P0172 | Fuel-air mixture —rich. | on | P0172 ADAPTATION RICH | 94 |
| P0325 | Knock sensor—Signal too low. | | P0325 INPUT LOW/ BREAK | 102 |
| P0335 | Crankshaft position sensor—malfunctioning. | | P0335 CRANKSHAFT POS SENS FAULTY | 98 |
| P0410 | Relay, secondary air injection control - faulty. | on | P0410 SECONDARY AIR RELAY FAULTY | |
| P0413 | Relay, secondary air injection control - Voltage too high, open circuit. | on | P0413 SECONDARY AIR RELAY OUTPUT HIGH/BREAK | |
| P0414 | Relay, secondary air injection control - Voltage too low, short circuit. | on | P0414 SECONDARY AIR RELAY OUTPUT LOW/ SHORTING TO GROUND | |
| P0443 | EVAP valve control circuit (ELCD) faulty. | on | P0443 EVAP VALVE FAULTY | 100 |
| P0444 | EVAP valve—current too high, open circuit. | on | P0444 EVAP VALVE OUTPUT HIGH/ BREAK | |
| P0445 | EVAP valve—current too low, short circuit. | on | P0445 EVAP VALVE OUTPUT LOW/ SHORTING TO GROUND | |
| P0500 | Speed sensor—RH front wheel, faulty. | | P0500 WHEEL SPEED FR FAULTY | 104 |
| P0501 | Speed sensor—RH front wheel, speed too high. | | P0501 WHEEL SPEED FR SIGNAL FAULTY | 104 |

| DTC | Malfunction/faulty component | CHECK ENGINE | ISAT display text | Procedure: see Service Manual 2:7, page |
|---|---|---|---|---|
| P0502 | Speed sensor—RH front wheel, no signal. | | P0502<br>WHEEL SPEED FR<br>SIGNAL LOW/<br>BREAK | 104 |
| P0505 | Idling control (IAC)—faulty operation. | | P0505<br>IAC VALVE<br>FAULTY | 106 |
| P0605 | Control module—internal fault in engine management system control module. | | P0605<br>CONTROL MODULE<br>INTERNAL FAULT | |
| P1322 | Engine rpm—signal faulty. | | P1322<br>ENGINE RPM<br>SIGNAL FAULTY | |
| P1500 | Battery voltage—voltage faulty. | | P1500<br>BATTERY VOLTAGE<br>VOLTAGE FAULTY | 109 |

## Command codes—obtain reading from component

Engine running or ignition switched on

| Command | Function/component | ISAT display text |
|---|---|---|
| EE00 | Shows engine (coolant) temperature, -40° to 175°C. | PAE00<br>COOLANT TEMP<br>XXX °C |
| EE01 | Shows intake air temperature. | PAE01<br>INDUCTION AIR TEMP<br>XXX °C |
| EE10 | Shows pressure in intake manifold. | PAE10<br>INTAKE PRESSURE<br>XXX KPA |
| EE20 | Shows battery voltage. | PAE20<br>BATT VOLTAGE<br>XX.X V |
| EE21 | Shows oxygen sensor's signal voltage. | PAE21<br>OXYGEN SENSOR<br>X.XX V |
| EE30 | Shows position of throttle. | PAE30<br>THROTTLE POS<br>XX.X % |
| EE40 | Shows current consumption of oxygen sensor's preheating circuit. | PAE40<br>OXY SENSOR PREHEAT<br>XXXX MA |
| EE41 | Shows level of knock sensor operation on scale of 1 to 255. Rapid variations indicate knocking. | PAE41<br>KNOCK SENSOR<br>XXX LEVEL |
| EE50 | Shows engine rpm. | PAE50<br>ENGINE RPM<br>XXXX RPM |
| EE51 | Shows speed of vehicle. | PAE51<br>WHEEL SPEED FR<br>XXX KM/H |
| EE60 | Shows status of torque limitation, ON or OFF. | PAE60<br>TORQUE LIMITATION<br>ON/OFF |
| EE61 | Shows position of selector lever (N/D). | PAE61<br>DRIVE SIGNAL<br>ON/OFF |
| EE62 | Shows status of brake light switch, ON or OFF. | PAE62<br>BRAKE LIGHT SWITCH<br>ON/OFF |
| EE63 | Shows status of Cruise Control, ON or OFF. | PAE63<br>CRUISE CONTROL<br>ON/OFF |
| EE64 | Shows status of A/C, ON or OFF. | PAE64<br>A/C<br>ON/OFF |
| EE65 | Shows CHECK ENGINE (MIL) status, ON or OFF. | PAE65<br>CHECK ENGINE<br>ON/OFF |
| EE66 | Shows status of IGN. SWITCH +15, ON or OFF. | PAE66<br>IGN. SWITCH +15<br>ON/OFF |
| EF00 | Shows injector opening duration. | PAF00<br>INJECTION TIME<br>XXX MS |

| Command | Function/component | ISAT display text |
|---|---|---|
| EF01 | Shows engine load signal (Tq) | PAF01<br>ENGINE LOAD SIGNAL<br>XX.XX MS |
| EF10 | Shows ignition timing (angle). | PAF10<br>IGNITION TIMING<br>XX.X DEGREES |
| EF20 | Shows opening angle of solenoid valve. | PAF20<br>SOLENOID VALVE<br>XX.X %OPEN |
| EF21 | Shows opening angle of<br>idle air control (IAC) valve. | PAF21<br>IAC VALVE<br>XX.X %CLOSED |
| EF40 | Shows status of oxygen sensor's preheating circuit, ON or OFF. | PAF40<br>OXY SENSOR PREHEAT<br>ON/OFF |
| EF42 | Shows status of AC relay, ON or OFF. | PAF42<br>AC RELAY<br>ON/OFF |
| EF43 | Shows status of CHECK ENGINE lamp (MIL), ON or OFF. | PAF43<br>CHECK ENGINE LAMP<br>ON/OFF |
| EF44 | Shows status of SHIFT-UP lamp, ON or OFF. | PAF44<br>SHIFT-UP LAMP<br>ON/OFF |
| EF45 | Shows status of fuel pump relay, ON or OFF. | PAF45<br>FUEL PUMP RELAY<br>ON/OFF |
| EF46 | Shows status of main relay, ON or OFF. | PAF46<br>MAIN RELAY<br>ON/OFF |
| EF47 | Shows status of secondary air injection relay, ON or OFF. | PAF47<br>SECONDARY AIR RELAY<br>ON/OFF |
| ED20 | Shows whether knock control has active ignition retard. | PAD20<br>KNOCK REG. ACTIVE<br>YES/NO |
| ED30 | Shows that the turbocharger provides only basic charge due to knock control. | PAD30<br>BASIC CHARGE PRESS<br>KNOCK CONTROL |
| ED31 | Shows that the turbocharger provides only basic charge because the brake circuit is active. | PAD31<br>BASIC CHARGE PRESS<br>BRAKE ACTIVE |
| ED32 | Shows that the turbocharger provides only basic charge due to malfunctioning pressure sensor. | PAD32<br>BASIC CHARGE PRESS<br>PRESS SENS FAULTY |
| ED33 | Shows that the turbocharger provides only basic charge because the Cruise Control is active. | PAD33<br>BASIC CHARGE PRESS<br>CRUISE CONTROL ON |
| ED34 | Shows that the turbocharger provides only basic charge because the selector lever is in position R. | PAD34<br>BASIC CHARGE PRESS<br>GEAR R |
| ED35 | Shows that the turbocharger provides only basic charge because battery voltage is low. | PAD35<br>BASIC CHARGE PRESS<br>BATTERY VOLTAGE |
| ED40 | Shows selector lever position. | PAD40<br>GEAR POSITION<br>P/R/N/D/3/2/1 |

## Command codes—activate components

When any of the following command codes is activated, the engine management system's control module will be turned off for 15 minutes. As a result, the car cannot be started.
The control module can be turned on again before the 15- minute period has elapsed by activating command code FF00.

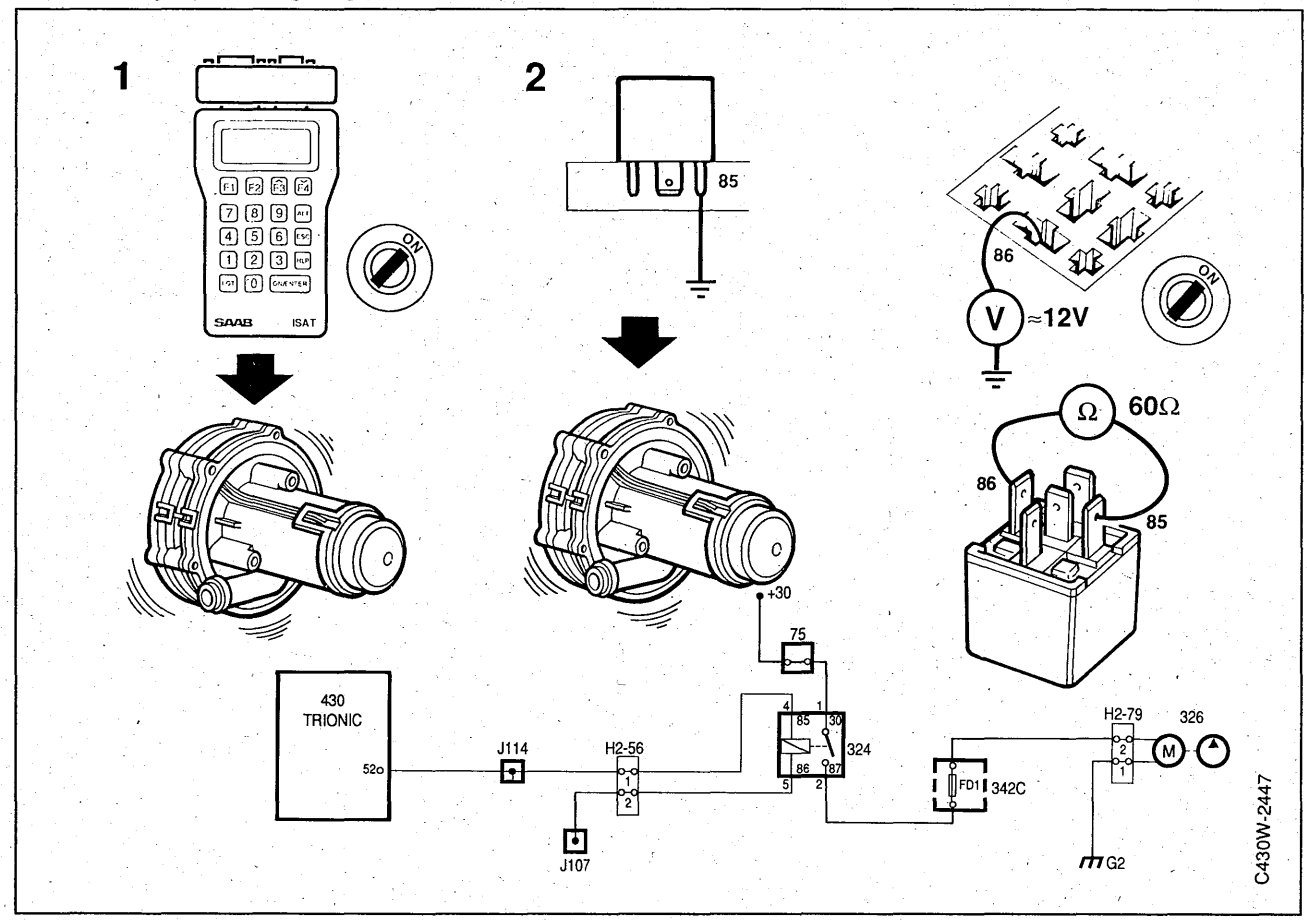
| Command | Function/component | ISAT display text |
|---|---|---|
| 3000 | Injector, cylinder 1 (10 Hz). | PB3000<br>INJECTOR 1<br>ACTIVE 10S/1HZ |
| 3001 | Injector, cylinder 2 (10 Hz). | PB3001<br>INJECTOR 2<br>ACTIVE 10S/1HZ |
| 3002 | Injector, cylinder 3 (10 Hz). | PB3002<br>INJECTOR 3<br>ACTIVE 10S/1HZ |
| 3003 | Injector, cylinder 4 (10 Hz). | PB3003<br>INJECTOR 4<br>ACTIVE 10S/1HZ |
| 3010 | Ignition coil, cylinder 1 (200 Hz). | PB3010<br>IGNITION COIL 1<br>ACTIVE 10S/200HZ |
| 3011 | Ignition coil, cylinder 2 (200 Hz). | PB3011<br>IGNITION COIL 2<br>ACTIVE 10S/200HZ |
| 3012 | Ignition coil, cylinder 3 (200 Hz). | PB3012<br>IGNITION COIL 3<br>ACTIVE 10S/200HZ |
| 3013 | Ignition coil, cylinder 4 (200 Hz). | PB3013<br>IGNITION COIL 4<br>ACTIVE 10S/200HZ |
| 3020 | Boost pressure control (BPC) valve (90 Hz) | PB3020<br>SOLENOID VALVE<br>ACTIVE 10S/90HZ |
| 3021 | Idle air control (IAC) valve (0.6 A). | PB3021<br>IAC VALVE<br>ACTIVE 10S/0.6A |
| 3022 | EVAP canister purge valve (ELCD) (8 Hz). | PB3022<br>EVAP VALVE<br>ACTIVE 10S/8HZ |
| 3040 | Oxygen sensor preheating. | PB3040<br>OXY SENSOR PREHEAT<br>ACTIVE 10S |
| 3042 | AC relay (1 Hz). | PB3042<br>AC RELAY<br>ACTIVE 10S/1HZ |
| 3043 | CHECK ENGINE. | PB3043<br>CHECK-ENGINE LAMP<br>ACTIVE 10S/1HZ |
| 3044 | SHIFT-UP lamp (1 Hz) (manual gearbox). | PB3044<br>SHIFT-UP LAMP<br>ACTIVE 10S/1HZ |
| 3045 | Fuel pump relay (1 Hz). | PB3045<br>FUEL PUMP RELAY<br>ACTIVE 10S/1HZ |

| Command | Function/component | ISAT display text |
|---|---|---|
| 3046 | Main relay (1 Hz). | PB3046<br>MAIN RELAY<br>ACTIVE 10S/1HZ |
| 3047 | Secondary air injection relay | PB3047<br>SECONDARY AIR RELAY<br>ACTIVE 10S/1HZ |

# Diagnostic trouble codes, diagnostic instructions

## Diagnostic trouble codes P1206, P1207 (B234i SE and US only)

Secondary air injection relay, output from control module low/high, no continuity or shorting to ground/batt+.




### Fault symptom

CHECK-ENGINE LAMP (MIL) on.

### Condition

No continuity or shorting to ground in the circuit to pin 52.

### Diagnostic procedure

1 Enter ISAT command code 3047 and listen to check whether the air pump and solenoid valve are activated. If the pump is activated, proceed to point 5. If it is not, continue as described below.

2 Connect a lead between a good ground and pin 85 of the secondary air injection pump relay. With the ignition switch in the Drive position, the relay should operate and the pump start running.

If the relay operates and the pump starts, proceed to point 4. If the relay does not operate, check whether current is present on pin 85 of the relay when the ignition switch is in the Drive position (the current comes from terminal block 159 in the main fuse box).

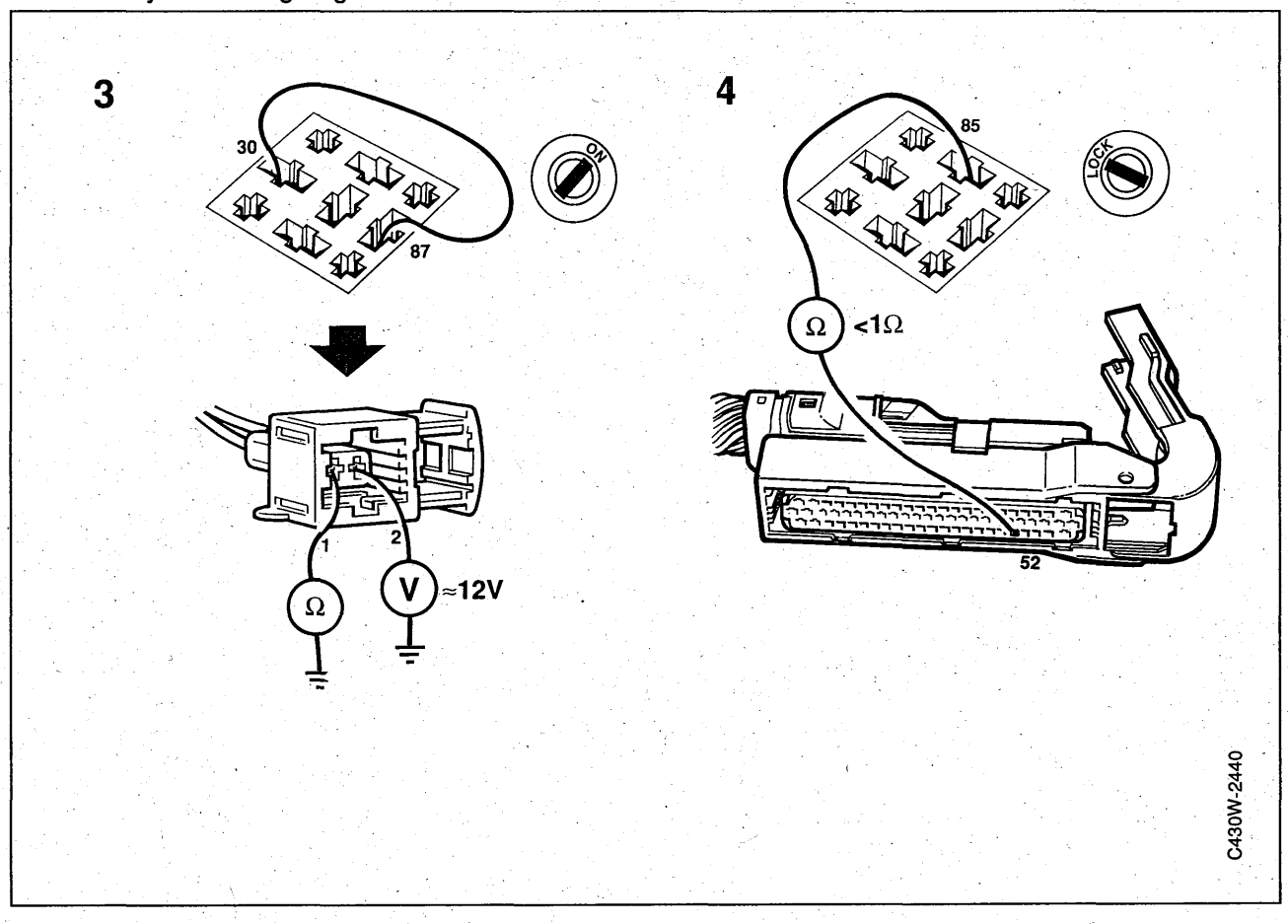
If the relay does not operate, despite current on pin 86 and pin 85 connected to ground, check the resistance of the relay coil. The resistance across pins 85 and 86 should be about 60 ohms. If it is not, change the relay.

3 If the relay operates but the pump does not start, check whether current is present on pin 30 of the relay.

Connect a jumper between pins 30 and 87 of the relay holder and check whether the air injection pump receives current. Also check that the pump is properly connected to grounding point G2. If the pump is grounded and receiving current but still does not work, change the pump.

**Diagnostic trouble codes P1206, P1207 (B234i SE and US only) (contd.)**

Secondary air injection relay, output from control module low/high, no continuity or shorting to ground/batt+




4 Check the lead between pin 52 of the control module and pin 4 of the relay for continuity or shorting.

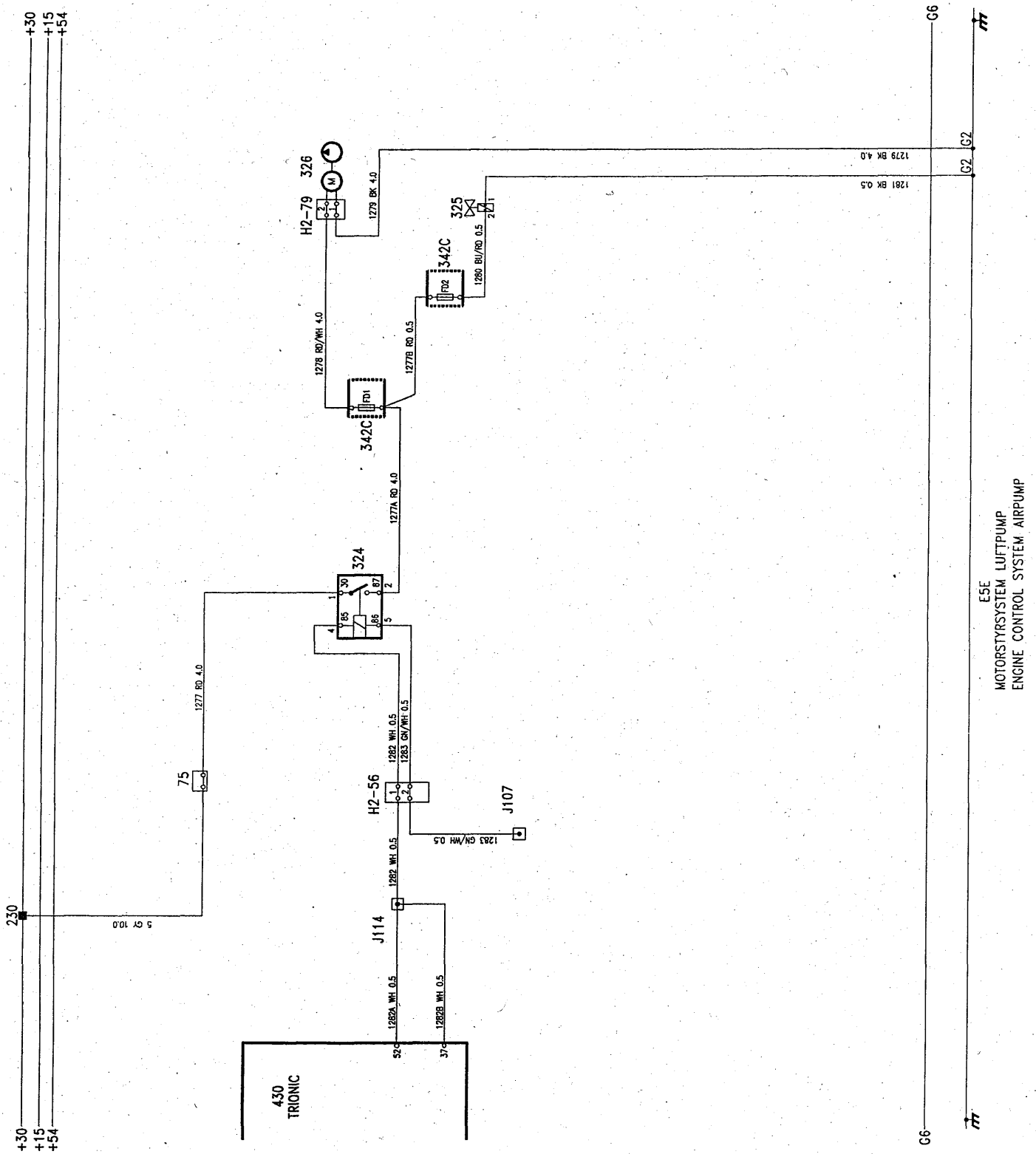
**Note**

The control module starts the air injection pump only if the signals from the coolant temperature sensor and intake air temperature sensor are within the following limits: above +5°C and below +35°C. If this condition is satisfied, the air pump will start immediately after the engine starts. The air injection pump always runs for 60 seconds.
Clear the trouble code and wait for the engine temperature to drop to about 35°C. Start the engine and check that the control module grounds pin 52 for about 60 seconds.
The easiest way to carry out this test is with a voltmeter connected to batt+ and pin 85 of the relay.
If the control module does not ground pin 52, try carrying out point 3 once again at a lower engine temperature.

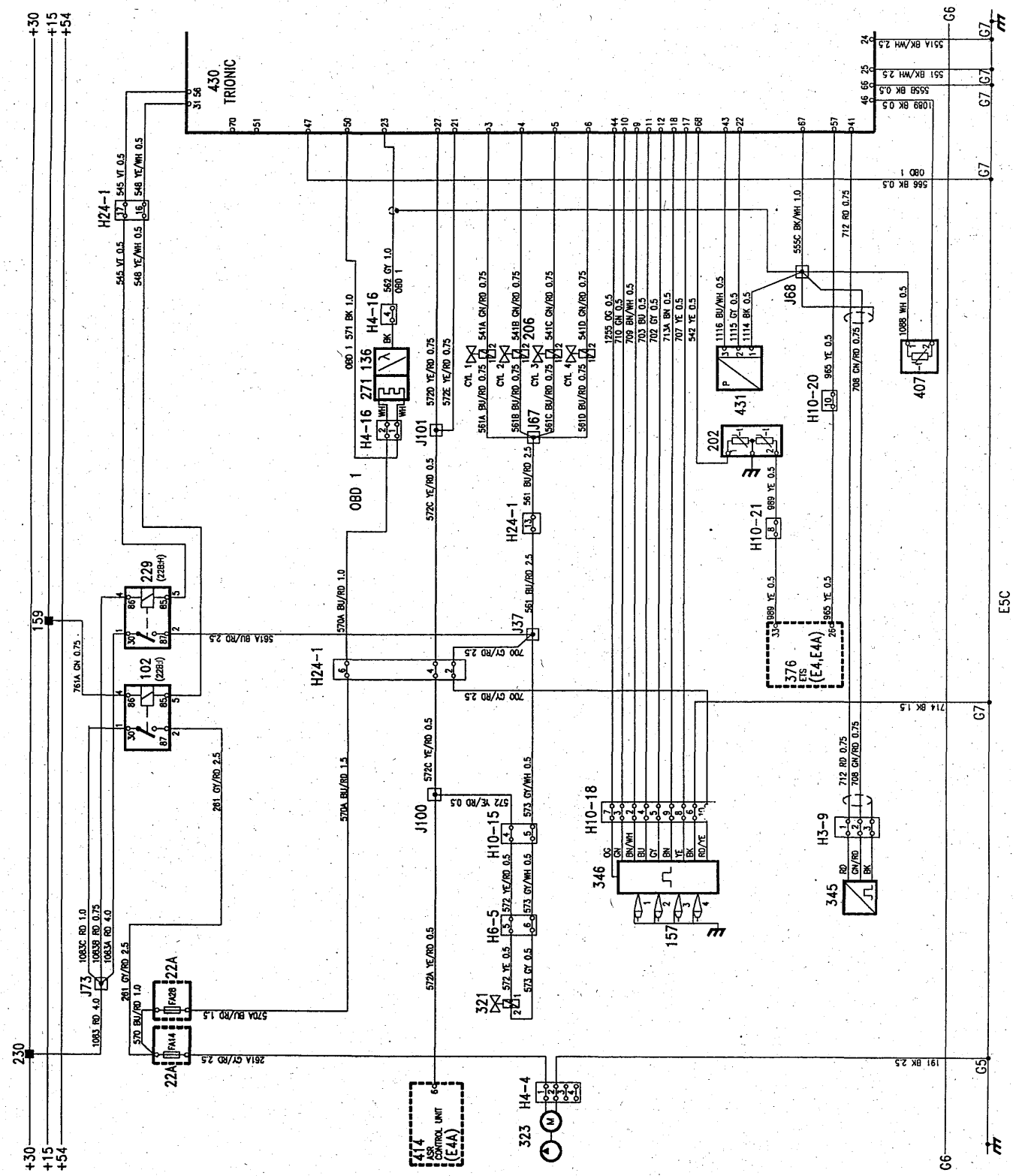
5 Clear the trouble code and drive the car on the road to check whether the code is generated afresh. If it is, turn to page 149 in Service Manual 2:7 for further diagnostic instructions.

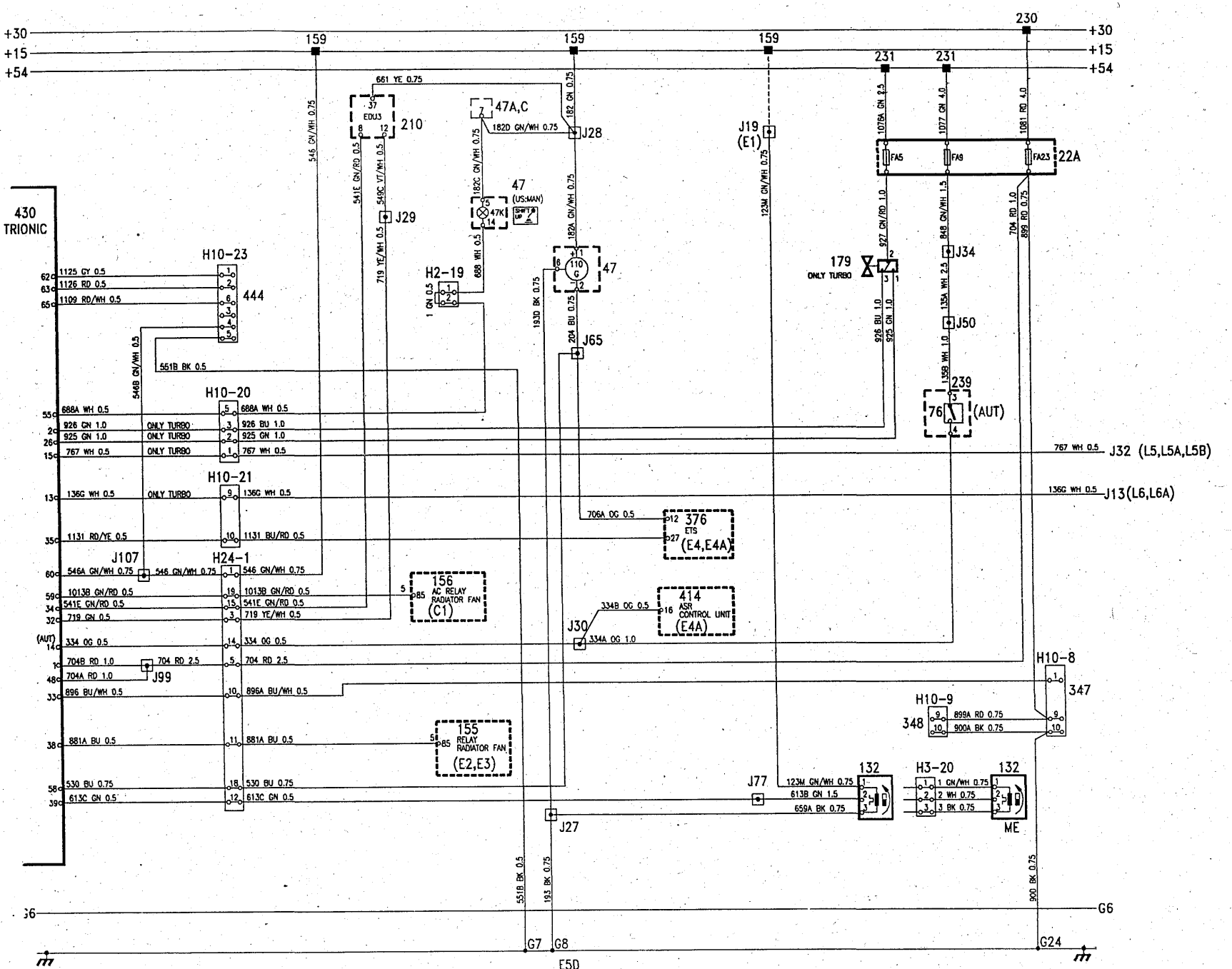
# Wiring diagram

## Engine management system, secondary air injection system

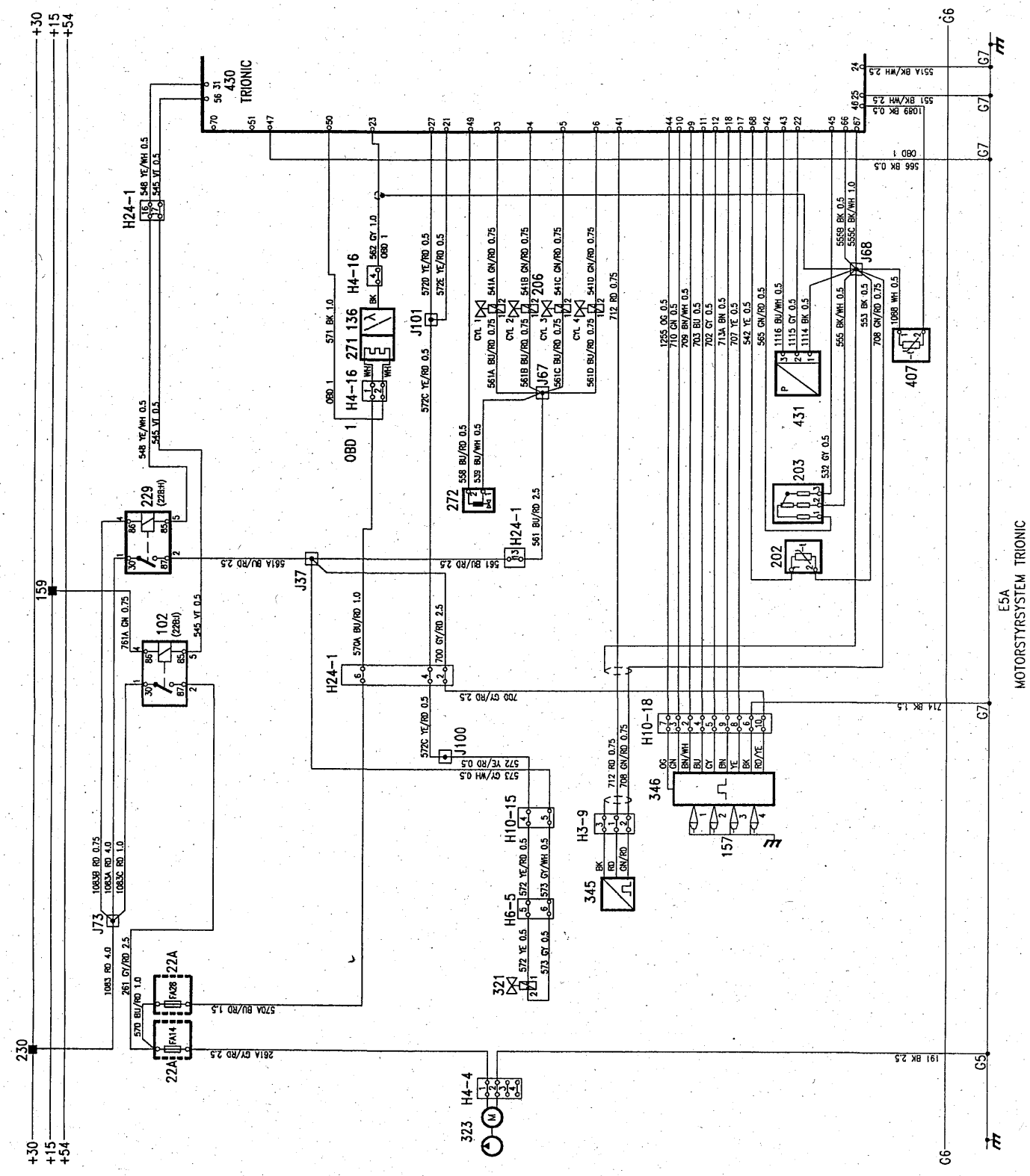


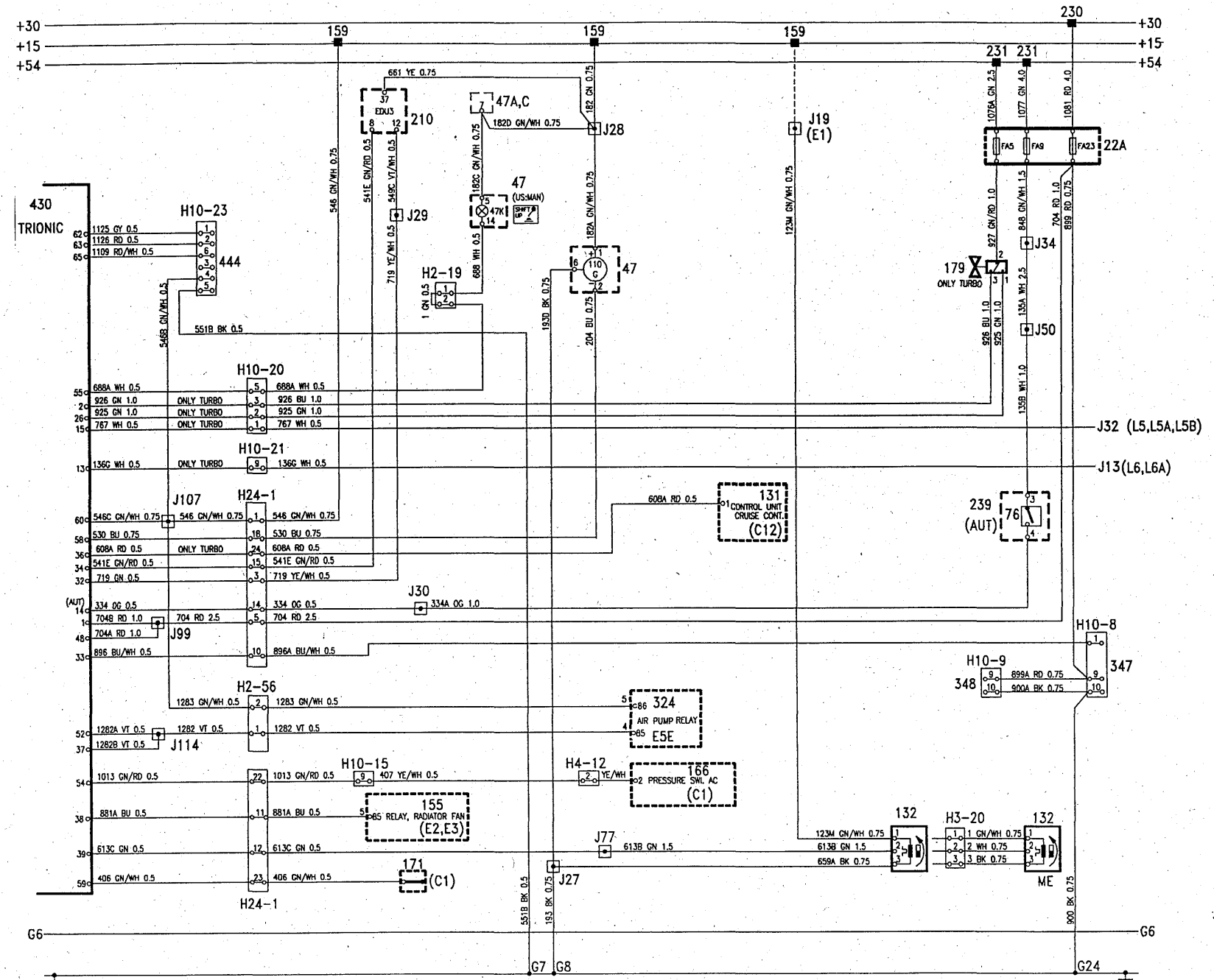
# TRIONIC engine management system, ETS




+30
+15
+54
159
230
231
430 TRIONIC
H10-23
444
H10-20
H10-21
H24-1
J107
J99
J29
J28
J65
J19 (E1)
J34
J50
J30
J27
J77
H2-19
47
47A,C
47K
(US:MAN)
210
EDU3
179 ONLY TURBO
239
76 (AUT)
22A
FA5
FA9
FA23
376 ETS (E4,E4A)
414 ASR CONTROL UNIT (E4A)
156 AC RELAY RADIATOR FAN (C1)
155 RELAY RADIATOR FAN (E2,E3)
H10-8
347
H10-9
348
132
H3-20
ME
J32 (L5,L5A,L5B)
J13(L6,L6A)
G6
G7
G8
G24
E5D
MOTORSTYRSYSTEM TRIONIC ETS
ENGINE CONTROL SYSTEM TRIONIC ETS

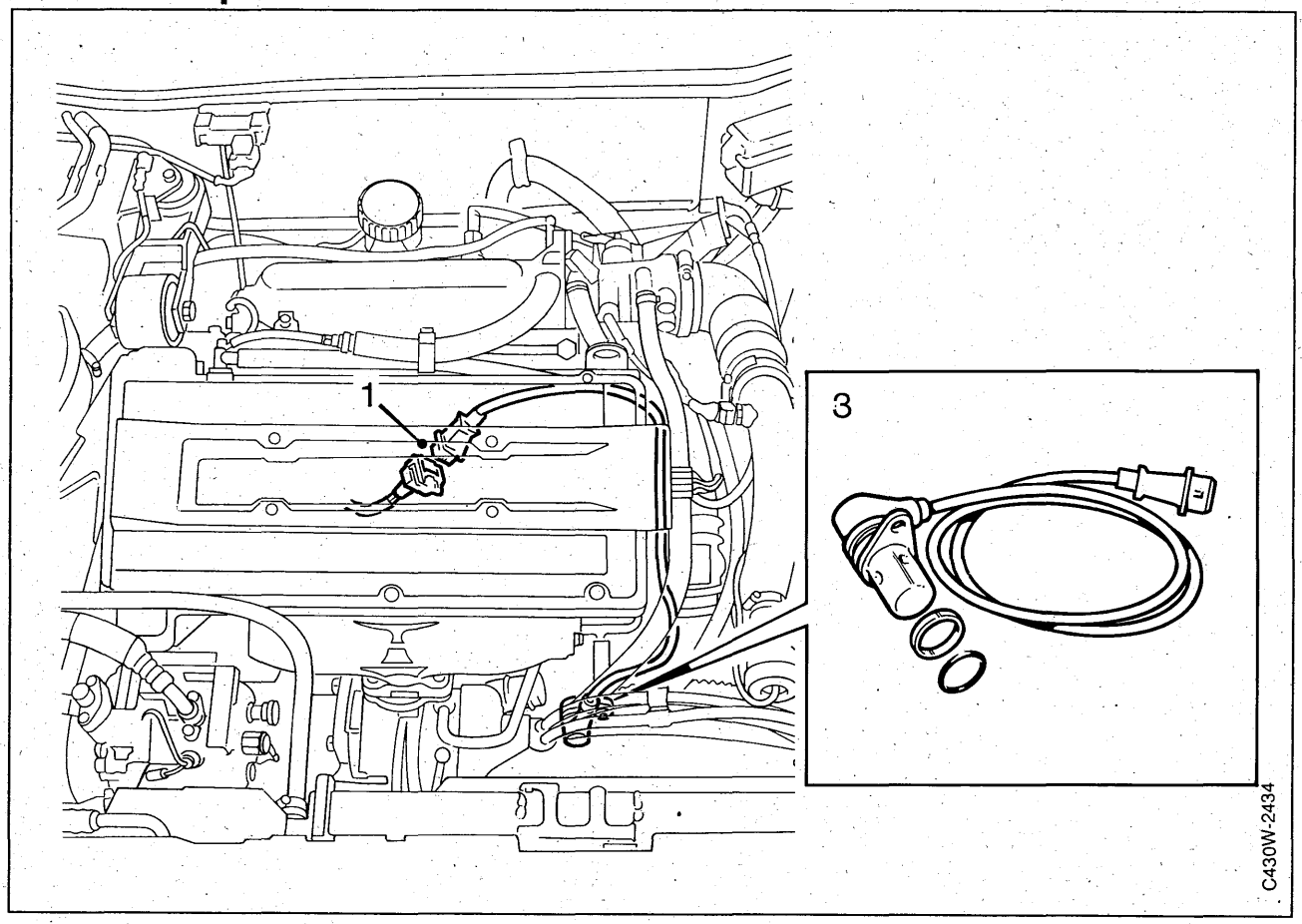
# TRIONIC engine management system, without ETS




+30
+15
+54
159
230
231
430
TRIONIC
H10-23
444
H10-20
H10-21
H24-1
J107
J99
J114
J29
J30
J34
J50
J19 (E1)
J28
J27
J77
47A,C
47
(US:MAN)
210
EDU3
H2-19
H2-56
H10-15
H4-12
179
ONLY TURBO
22A
FA5
FA9
FA23
239
(AUT)
76
131
CONTROL UNIT CRUISE CONT.
(C12)
324
AIR PUMP RELAY
E5E
166
PRESSURE SWI. AC
(C1)
155
RELAY, RADIATOR FAN
(E2,E3)
171
(C1)
132
H3-20
ME
H10-8
H10-9
347
348
J32 (L5,L5A,L5B)
J13(L6,L6A)
G6
G7
G8
G24
E5B
MOTORSTYRSYSTEM TRIONIC
ENGINE CONTROL SYSTEM TRIONIC

# Adjustment/replacement of components

## Crankshaft position sensor




### To remove

The crankshaft position sensor is located at the flywheel end of the engine block.

1 Unplug the connector under the intake manifold to release the cable from the sensor. (The connector and cable under the intake manifold are difficult to reach.)

**Important**

Note how the cable is run and the locations of the fastening points for the cable ties.

2 Snip through the cable ties and remove the cable.

3 Undo the sensor retaining bolt and remove the sensor. Note how the sealing ring is positioned.

### To fit

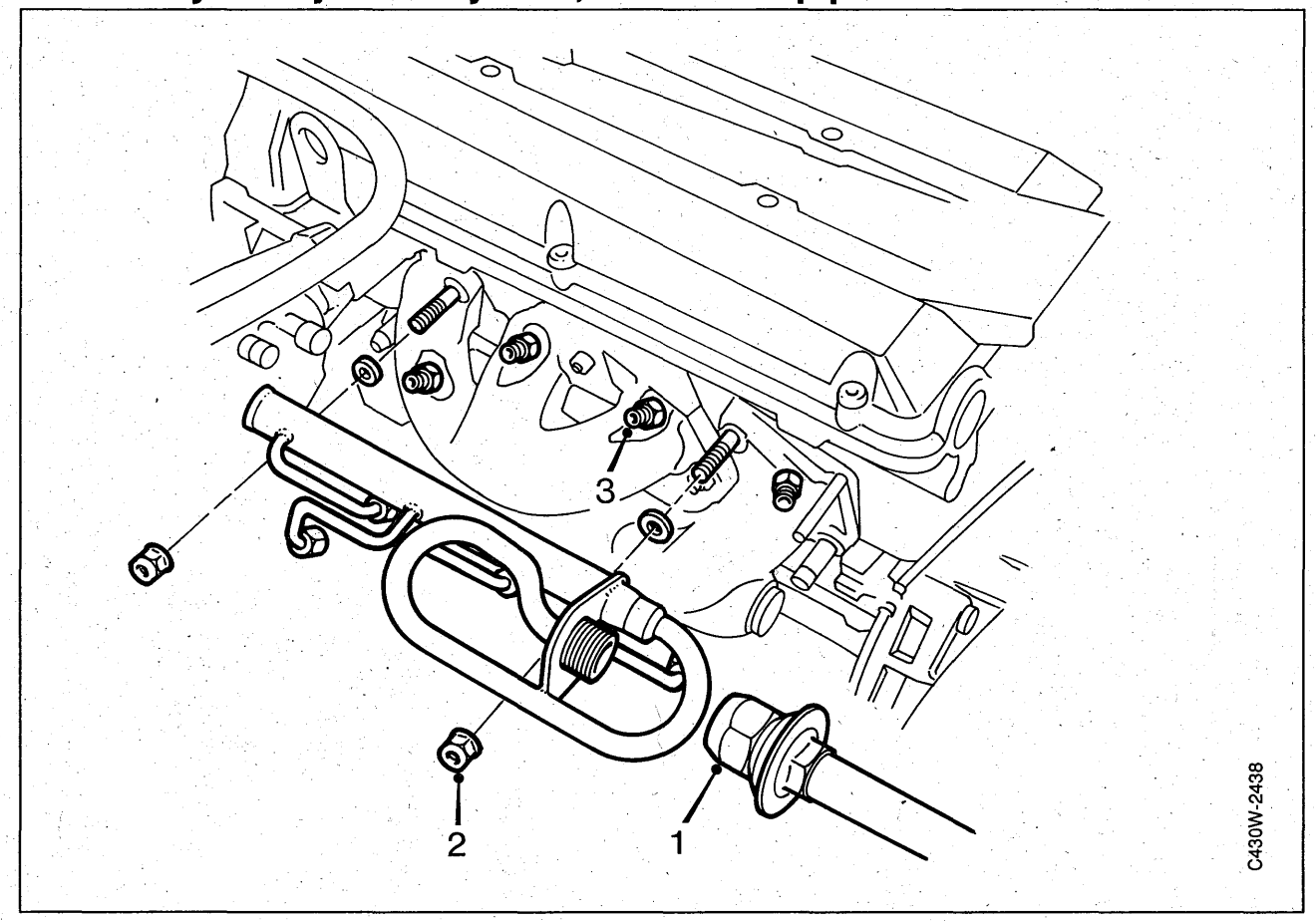
1 Clean the sensor seating and fit the sensor with the sealing ring correctly mounted.

**The tightening torque for the retaining bolt should be 8 Nm (5.9 lbf ft).**

2 Refit the cable and secure it with cable ties.

3 Plug in the connector.

## Secondary air injection system, distributor pipe




**To remove**

1 Remove the non-return valve.

2 Undo the two retaining nuts.

3 Undo the four fittings for the nipples and lift out the distributor pipe.

**To fit**

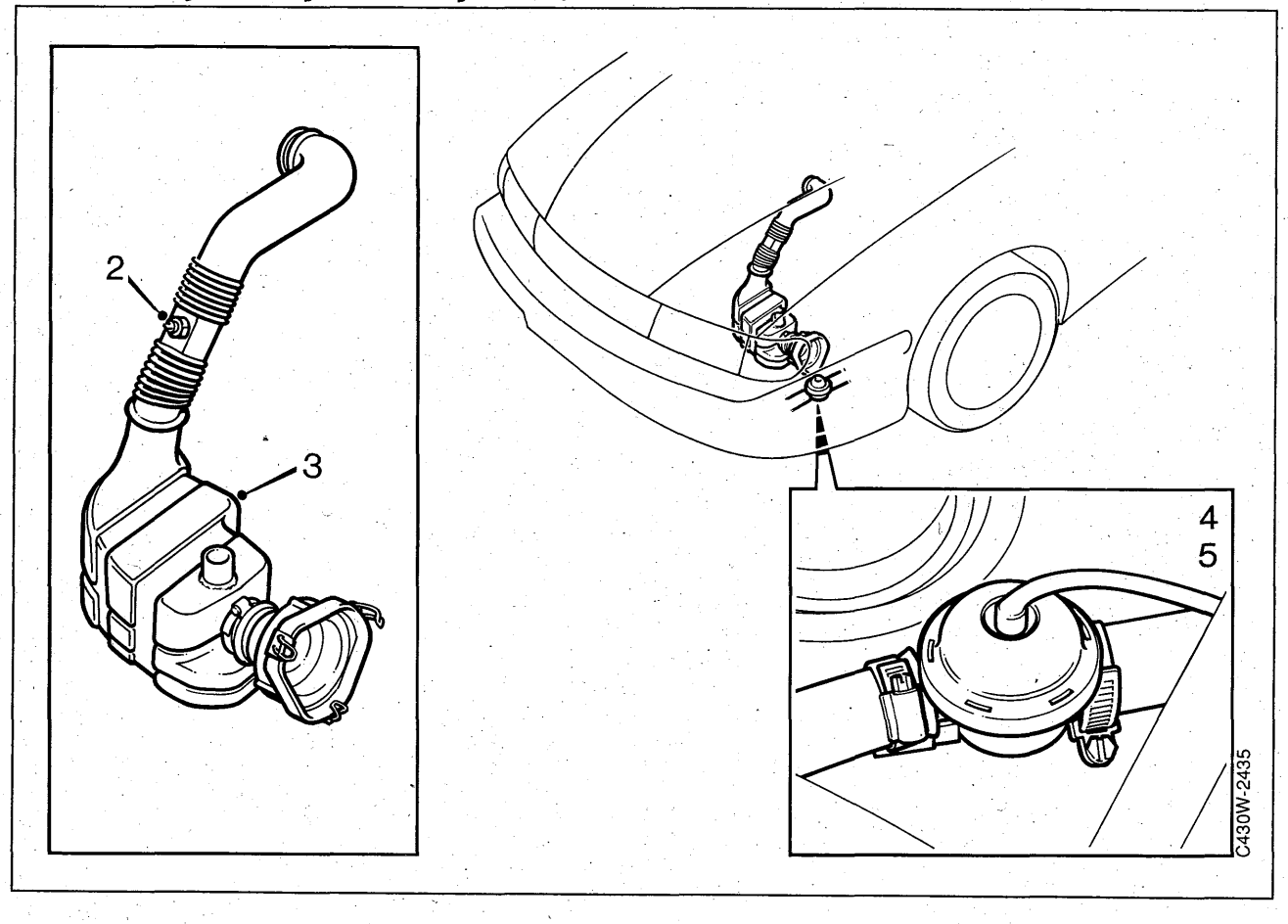
Fit in reverse order.

**Tightening torque, non-return valve: 25 Nm (18. 5 lbf ft)**

**Tightening torque, retaining nuts: 25 Nm (18. 5 lbf ft)**

**Tightening torque, fittings: 30 Nm (22 lbf ft)**

## Secondary air injection system, vacuum valve




**To remove**

1 Disconnect the non-return valve and air injection pump hoses.
2 Unplug the temperature sensor connector.
3 Remove the silencer (hose clip on throttle body, three clips on air cleaner and steady bar).
4 Undo the hose clips and remove the hoses.
5 Disconnect the vacuum hose and remove the valve.

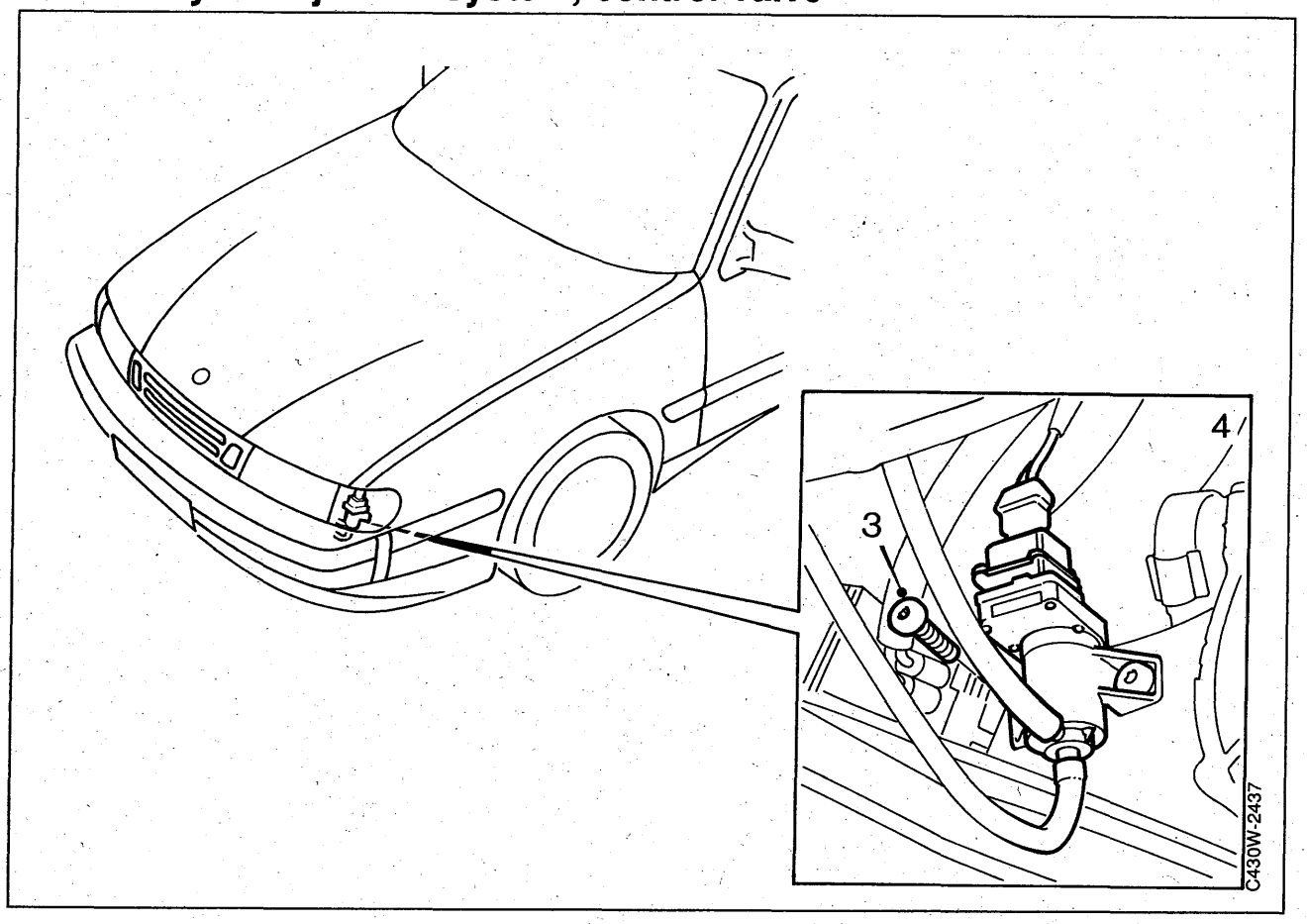
**To check**

Use a vacuum pump and blow air into the valve to check its operation.

**To fit**

Fit in reverse order.
Note the direction-indicating arrow on the vacuum valve.

## Secondary air injection system, control valve




**To remove**

1 Raise the car. Remove the middle and left-hand lower spoiler sections.

2 Disconnect the hoses from the air pump.

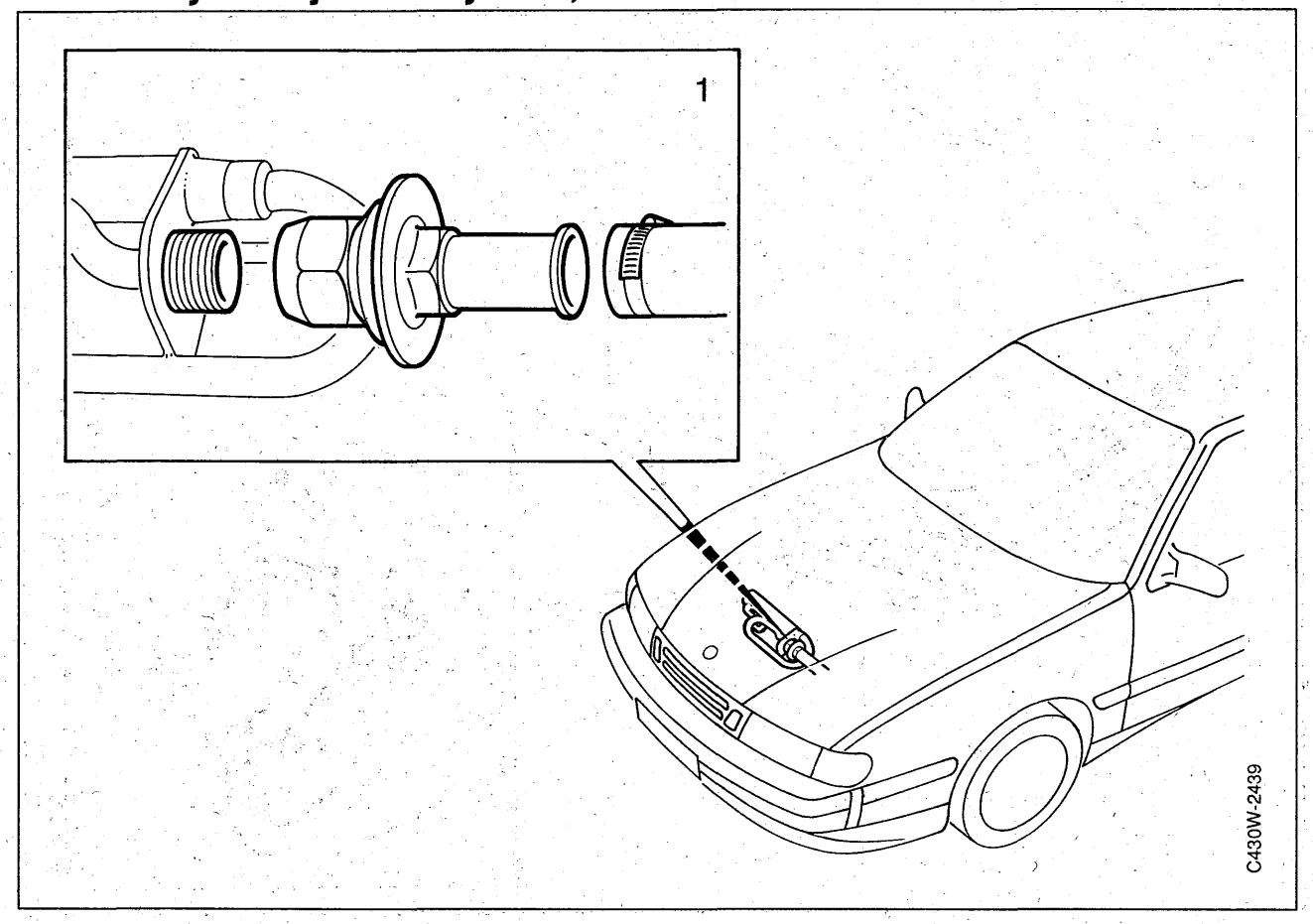
3 Undo the retaining bolts.

4 Remove the vacuum valve and intake manifold hoses.

**To fit**

Fit in reverse order.

## Secondary air injection system, non-return valve




**To remove**

1 Disconnect the hose. Disconnect and remove the valve.

**To check**

Check that the valve does not allow exhaust gases to escape in the reverse direction.

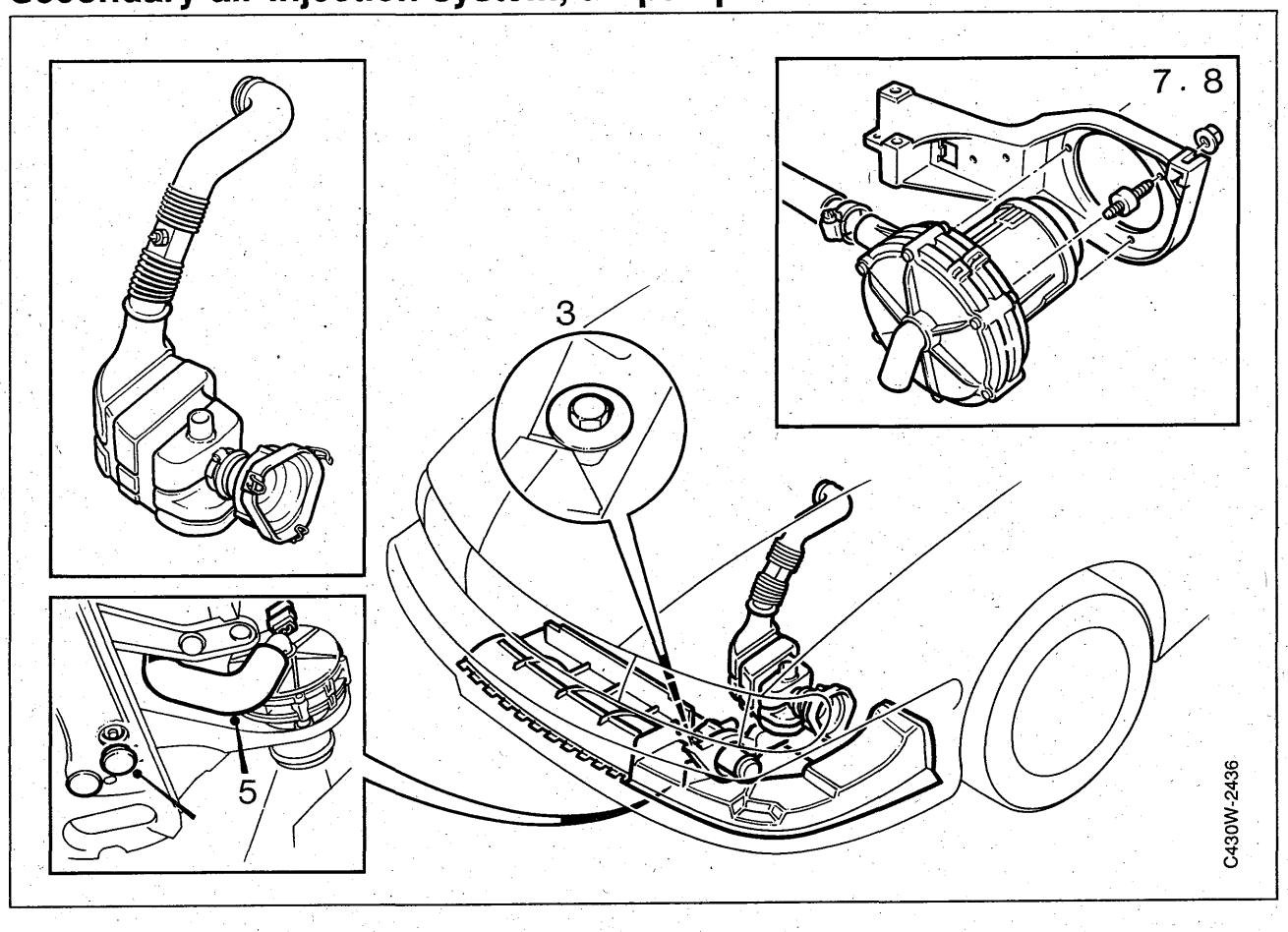
**To fit**

Fit in reverse order.

**The tightening torque should be 25 Nm (18.4 lbf ft).**

Note the tapered pipe threads.

## Secondary air injection system, air pump




**To remove**

1 Remove the grille, left-hand direction indicators and left- hand headlamp.

2 Unbolt the steady bar from the silencer and undo the hose clip on the air cleaner. Move the silencer aside.

3 Remove the bolt from above.

4 Raise the car and remove the middle and left-hand spoiler sections.

5 Disconnect the air pump hose.

6 Remove the rubber plugs from the supporting arm and undo the two retaining bolts. Lift out the retaining bolts.

7 Swing out the bracket and undo it at the vacuum valve. Unscrew the control valve retaining bolts. Unplug the connector and lift out the bracket with air pump.

8 Remove the air pump from the bracket.

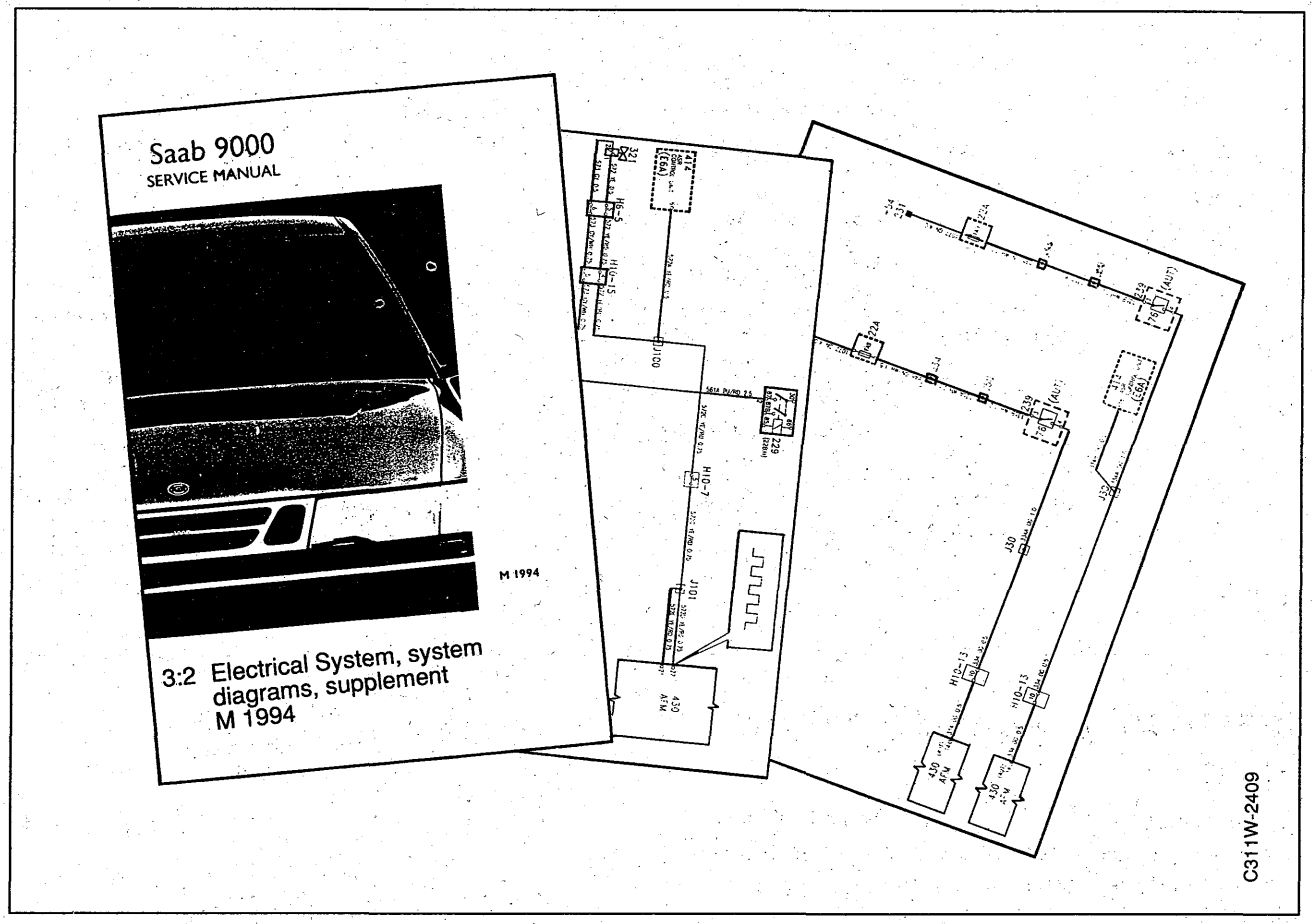
**To fit**

The nut for the retaining bolt that is screwed in place from above must be positioned in the bracket before assembly.
In other respects, fit in reverse order.

# Electrical system

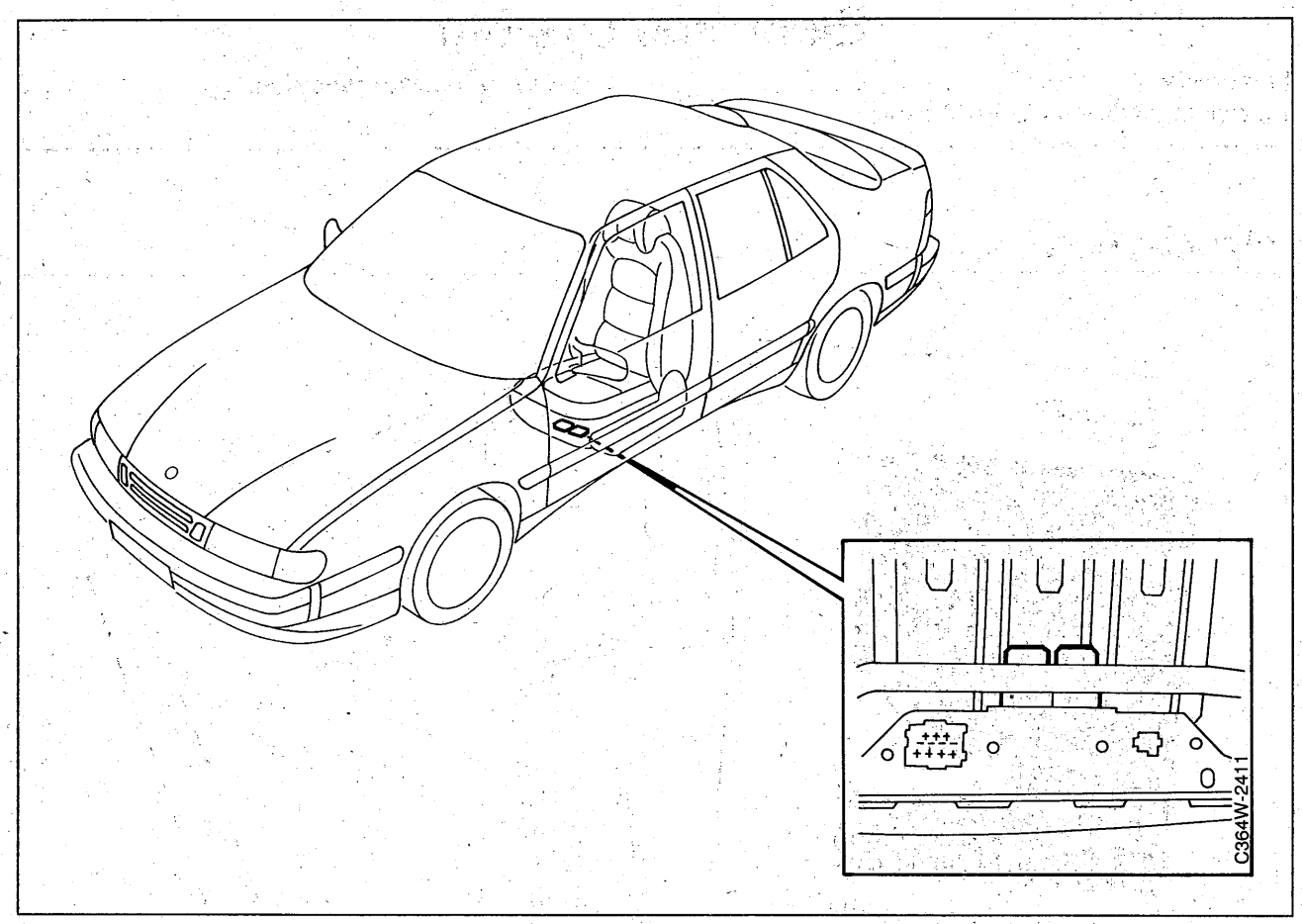


## Introduction




Service Manual 3:2 "Electrical system, system diagrams, operation and fault diagnosis M1994" will be published in the autumn of 1993 as a supplement to the previous year's manual. The supplement will contain:

- all wiring diagrams for M1994
- a list of components
- a list of connectors
- a list of crimped connections
  For descriptions of the principle of operation and fault diagnosis in respect of the modified diagrams in the supplement, refer to Service Manual 3:2 "Electrical system, wiring diagrams, operation and fault-tracing M1993"
  The supplement will also contain details of fuses and grounding points.




## Electrically adjustable front seats

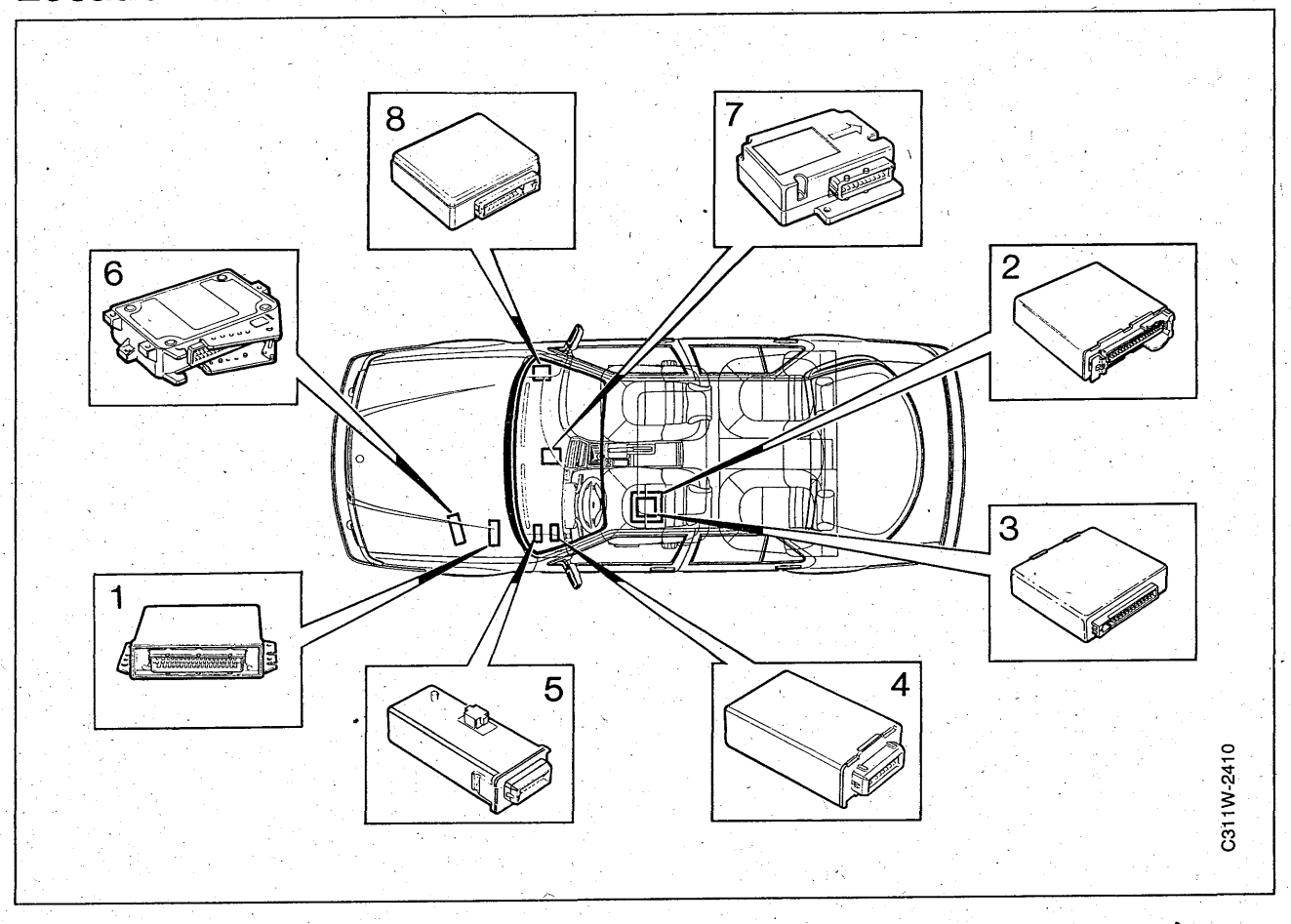
On cars fitted with electrically adjustable front seats it will be possible to adjust the seats when the relevant front door is open without having to switch on the ignition.

Two relays for each seat have been added for this function. These relays are mounted on a bracket under the seat. One relay is used for the open front door function, the other relay for the ignition switch function.

## Other changes

- The Saab 9000 CS will be fitted with the same rear fog light for the USA and Canada markets as is currently fitted for the Europe market.
- In addition, all CD models will be fitted with grey-tinted rear lights.
- The main fuse box has been moved down on all cars. This affects the accessibility of relays and fuses.
- Engine bay lighting and the lamp in the centre console glove box have been discontinued.

# Location of control modules




Since all Saab 9000 M1994 models are fitted with the TRIONIC engine management system, the control modules for LH and DI/APC (EZK) have been discontinued. The control module for the seat-belt tensioners has been discontinued because all cars are fitted with airbags and the belt tensioners are controlled by the airbag control module.

## Engine systems

**1 TRIONIC**
The TRIONIC control module is located on a bracket in the space between the bulkhead partitions. It is mounted on the left-hand side of the front upper bulkhead panel.

**2 ETS**

**3 ASR**
The ETS control module is located on a bracket under the left-hand front seat. On cars equipped with an anti-spin system for automatic transmission, an ASR control module is also mounted on top of the ETS control module.

## Comfort systems

**4 Cruise Control**

**5 Central locking**
The control modules for the Cruise Control and central locking systems are located on a bracket on the left below the dashboard.

## Safety systems

**6 ABS or TC/ABS**
The ABS or TC/ABS control module is mounted on the battery tray.

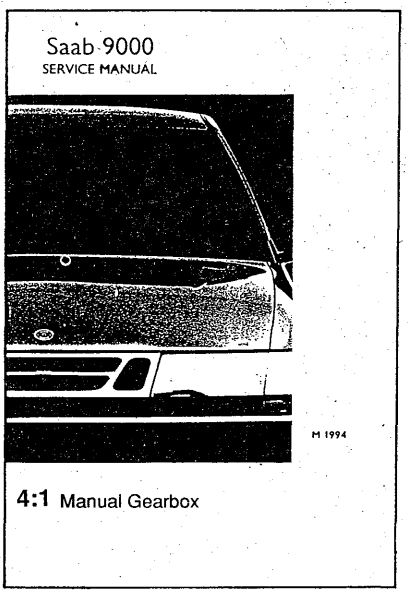
**7 Airbag**
The airbag control module is located on a bracket at the front of the centre console inside the cabin below the dashboard.

**8 Anti-theft alarm**
The control module for the anti-theft alarm is located inside the cabin behind the glove box and knee shield on the right in the dashboard.
For further information on the wiring diagrams, see "3:2 Electrical system, supplement". In regard to principles of operation and fault diagnosis, see Service Manual 3:2 "Electrical system, system diagrams, operation and fault- tracing M1993" under the relevant system description.

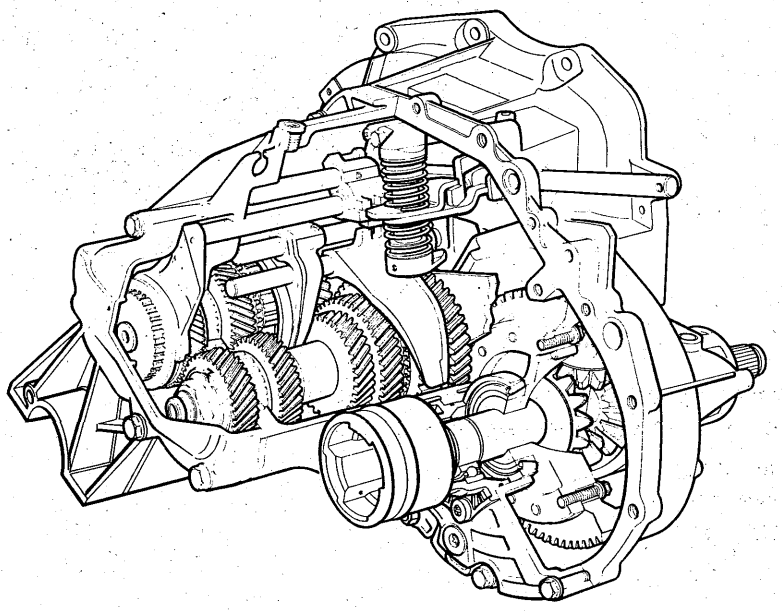
# Transmission



## Manual gearbox F35




4:1 Manual Gearbox

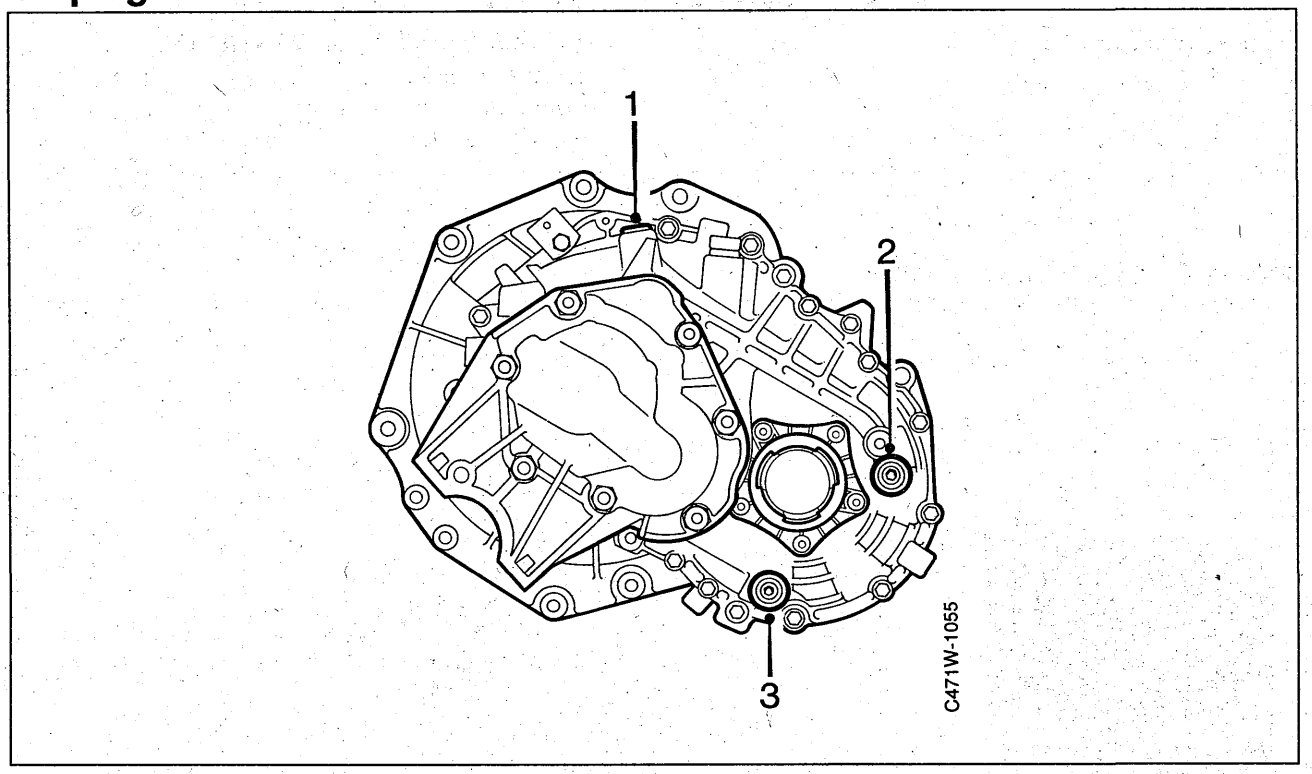


C471W-2232

The manual gearbox for the Saab 9000 is of "shorter" design with a different pattern of mounting holes. It has been improved in several ways, including synchromesh on reverse gear and stronger synchromesh for 1st and 2nd gears.

This new gearbox is described in Service Manual 4:1 "Manual gearbox M1994".

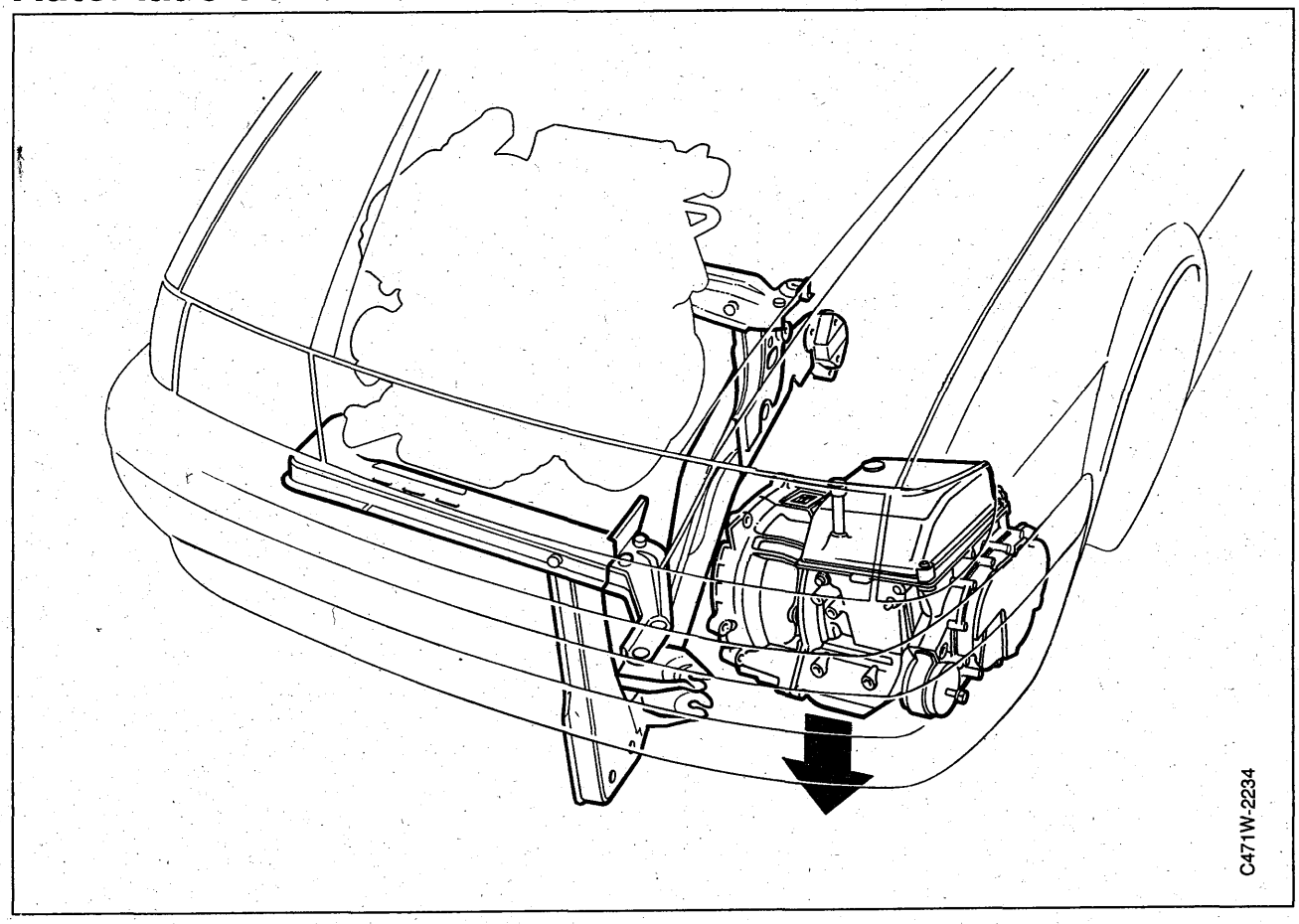
## Oil plugs




The earlier dipstick has been replaced by a level plug and the gearbox now has three oil plugs:

1 Oil filler plug
2 Oil level plug
3 Oil drain plug

# Automatic transmission ZF 4HP 18




## General

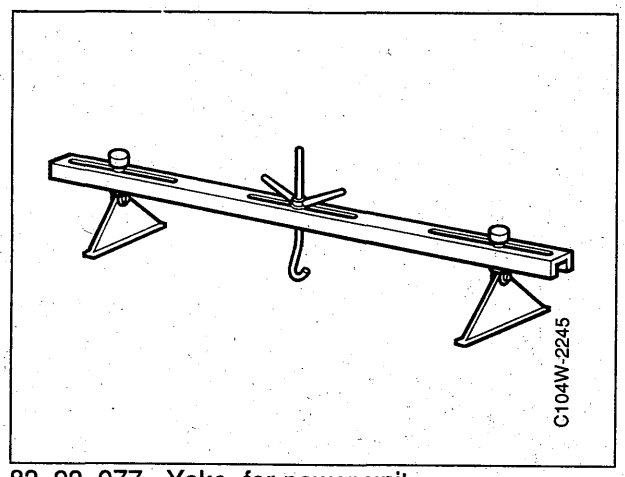
The automatic transmission has been fitted with a new torque converter casing with a new pattern of holes and also a new torque converter, driver disc and starter gear ring.

Removal and fitting of the gearbox and the special tools required for this are described in "News".

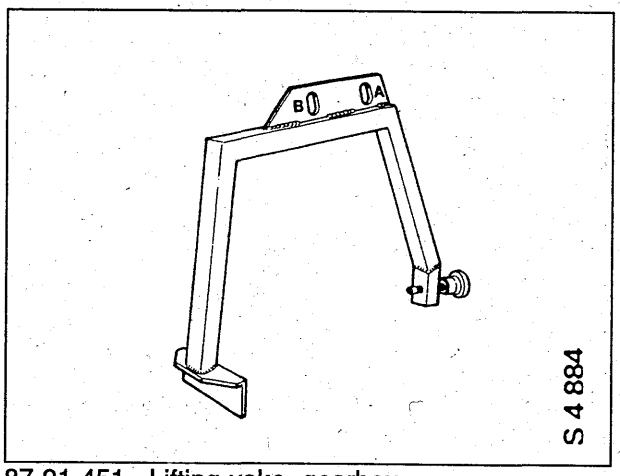
A special tool, 87 92 293, has been designed for holding the torque converter in place when fitting the gearbox.

Starting in model year 1994, tool 87 91 980 for adjusting the kick-down cable on the throttle body is of such a design that it can be used on all Saab 9000 models fitted with automatic transmission, regardless of model year or version.

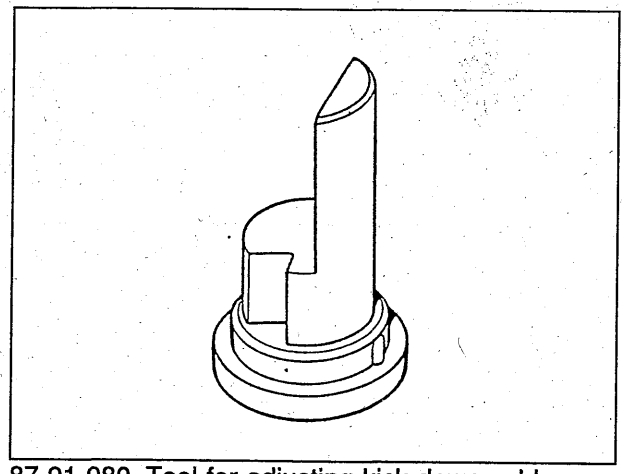
## Special tools



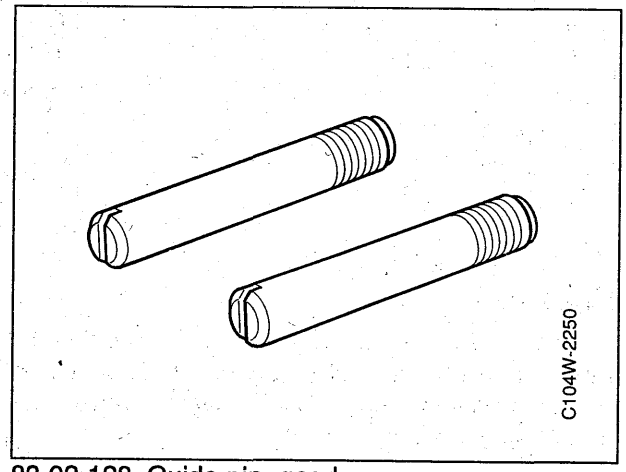

83 93 977 Yoke, for power unit.



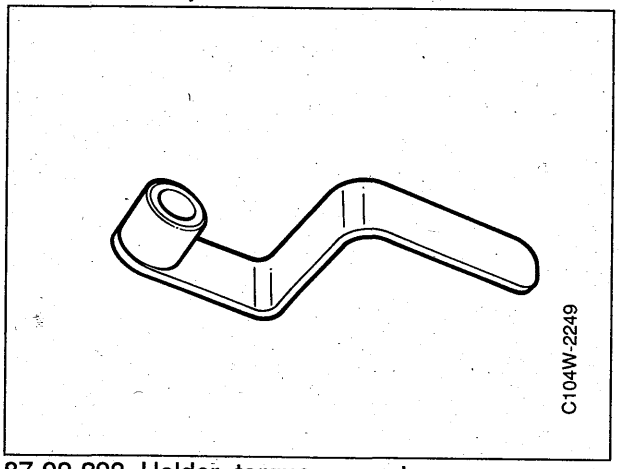

87 91 451 Lifting yoke, gearbox.



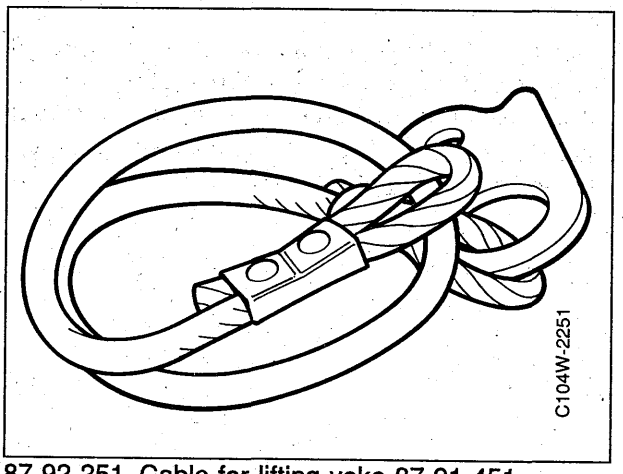
87 91 980 Tool for adjusting kick-down cable.




83 92 128 Guide pin, gearbox

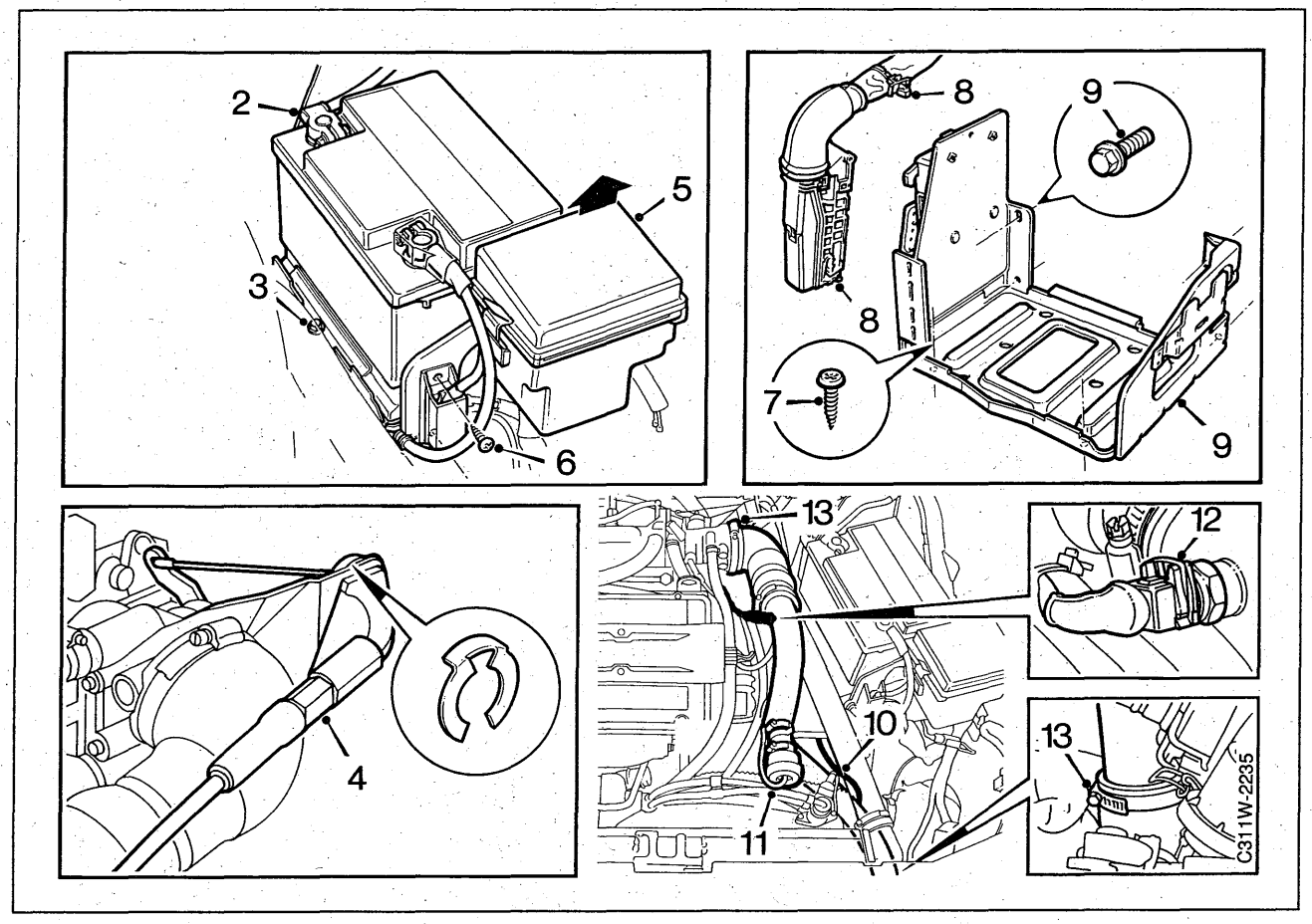



87 92 293 Holder, torque converter.




87 92 251 Cable for lifting yoke 87 91 451.

## To remove




Removal and fitting of automatic transmission ZF 4 HP 18 is shown on a car equipped with a turbo-charged B234 engine and air conditioning (AC).

**Important**

Electrical leads, hoses, etc. are secured by plastic cable ties. When these cable ties have been pulled tight the excess length is cut off, often leaving a more or less sharp edge on the plastic. Bear this in mind and take care to avoid getting your bare hands scratched or cut by the sharp edges of cable ties.

1 Drape the wings with protective covers to avoid soiling or damaging the paintwork.

2 Disconnect the battery cables.

3 Remove the battery

4 Remove the retaining clip holding the throttle cable in the lead-through and bend the throttle cable aside.

5 Undo and move aside the main fuse box.

6 Undo the positive terminal block (without disconnecting the leads).

7 Remove the positive cable's two clamps on the battery tray.

8 Unplug the connector from the ABS control module.

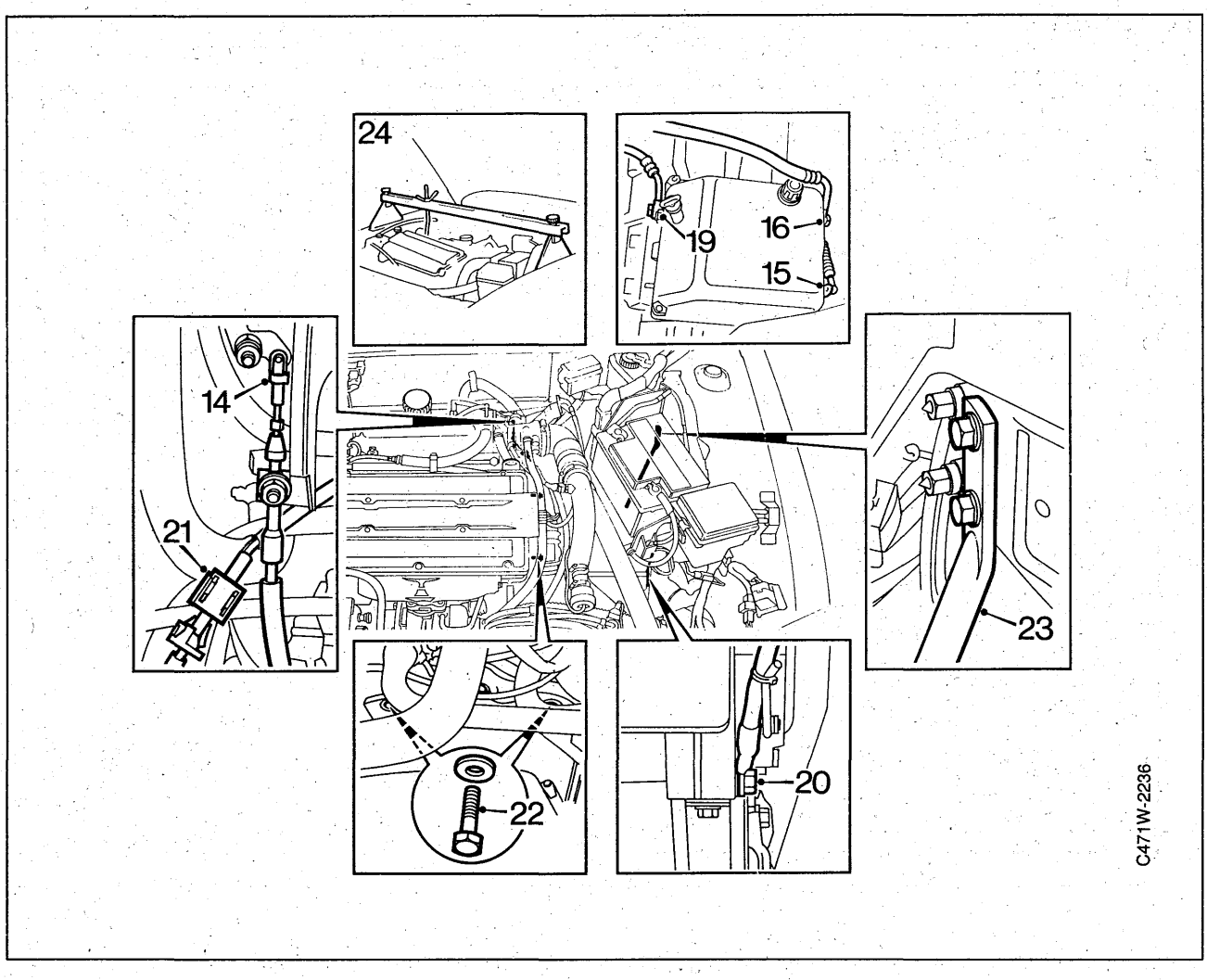
9 Remove the battery tray.

10 Remove the hose between the turbo pressure pipe and gearbox.

11 Disconnect the hose from the by-pass valve.

12 Unplug the temperature sensor's connector on the turbo pressure pipe.

13 Undo the hose clips and remove the turbo pressure pipe.




14 Remove the kick-down cable from the throttle body.

15 Remove the gear selector arm from the gearbox. Do not separate the ball joint.

16 Remove the nipple for the hose connected to the inlet side of the oil cooler from the rear of the gearbox.

17 Undo the nut and press out the gear selector cable's rubber bush from the mounting on the gearbox casing.

18 Place a receptacle under the car to collect the fluid. Fluid volume: USA 7.2 litres, Europe 6.9 litres.

19 Remove the nipple for the hose connected to the outlet side of the oil cooler from the front of the gearbox and plug the hole.

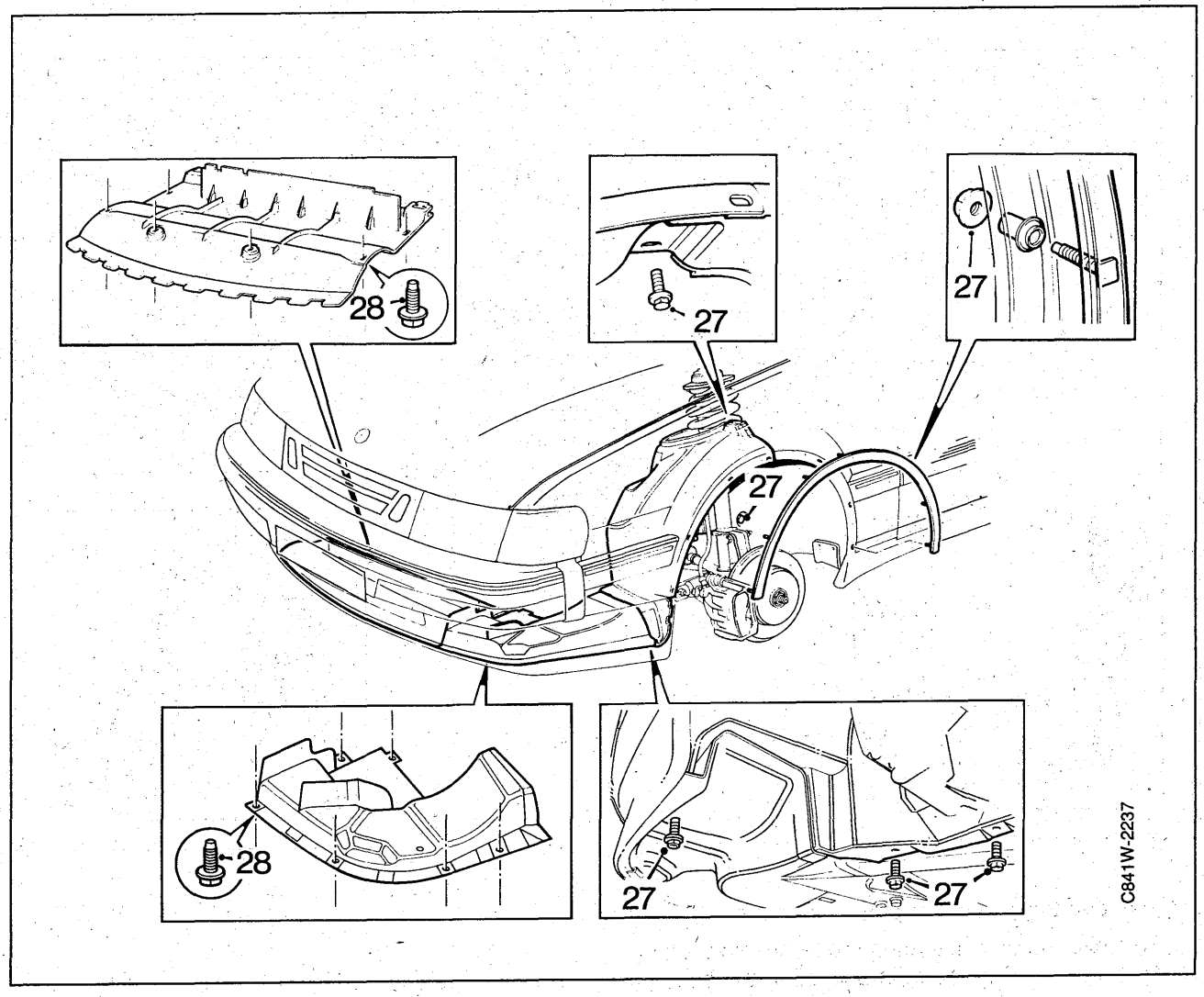
20 Disconnect the ground (negative) battery cable from the gearbox.

21 Unplug the connector on the speedometer sensor cable.

22 Remove the bolts in the mating surface which are accessible from the top, except the front bolt. One of the bolts is also a retaining bolt for the starter motor.

23 Remove the bolts securing the upper end of the steady bar in the wheel housing.

24 Place engine lifting beam 83 93 977 on the wheel housings, making sure that the beam abuts against the edges of the wings. Fit the hook in the engine's lifting eyebolt and tighten the wing nut loosely.

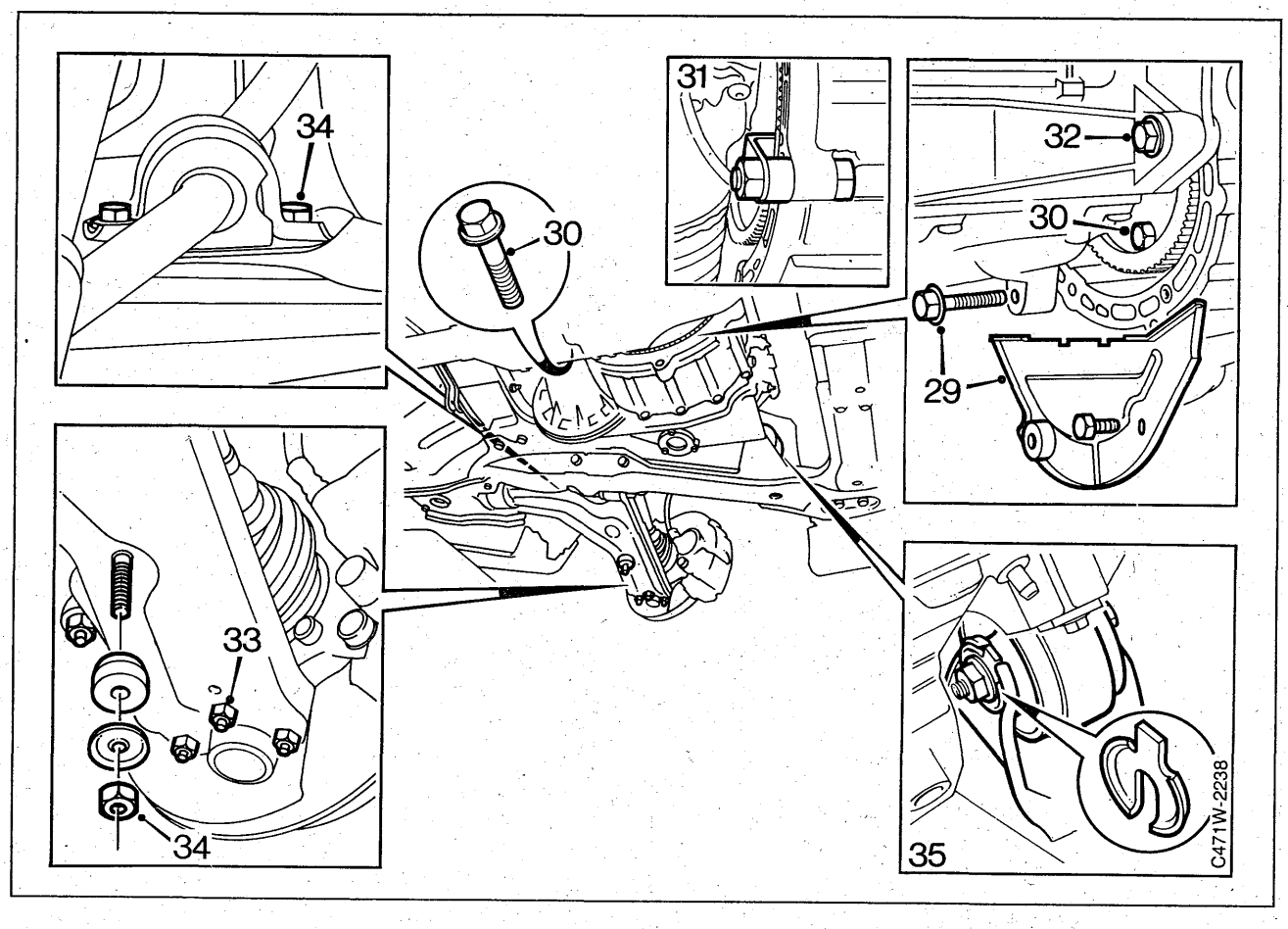



25 Raise the car.

26 Remove the left-hand front wheel.

27 Remove the wheel housing trim moulding and the front part of the wing liner.

28 Remove the left-hand and centre spoiler sections.




29 Remove the gearbox's protective plate.

30 Remove the bolts securing the torque converter to the driver disc. To gain access to the bolts it will be necessary to turn the engine (undo the bottom of the right-hand wing liner and insert the spanner at the side of it).

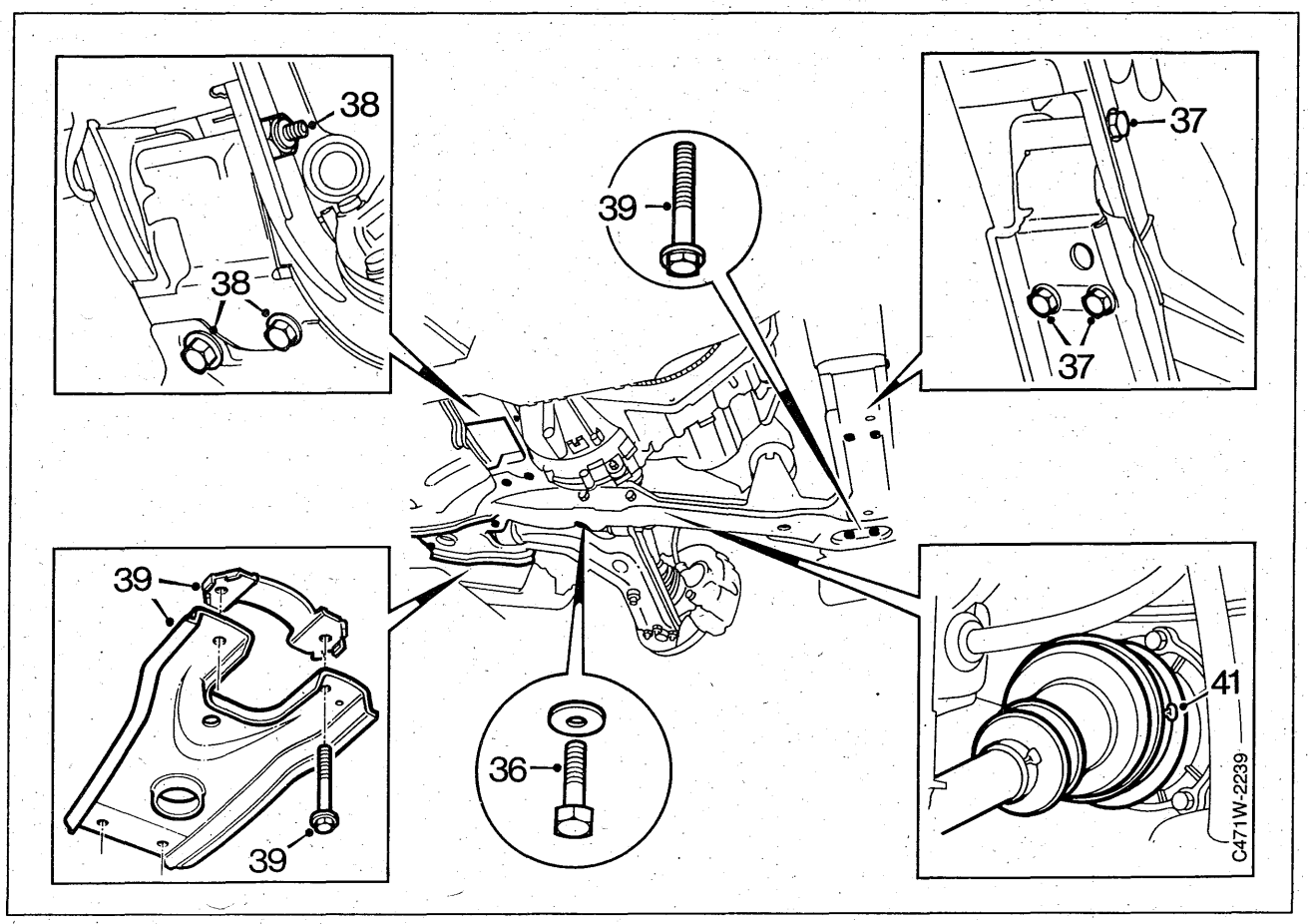
31 Fit holder 87 92 293 to hold the torque converter in place when the gearbox is removed. The holder is secured with M10 bolts.

32 Remove the remaining bolts in the mating surface (accessible from underneath).

33 Remove the three bolts securing the ball joint to the suspension arm.

34 Remove the nut from the anti-roll bar mounting in the suspension arm. Remove the two bolts securing the anti-roll bar's bearing.

35 Unscrew the nut from the bolt in the front engine mounting. Collect the two washers.




36 Remove the steady bar at the wheel housing (the top of the bar has already been unbolted).

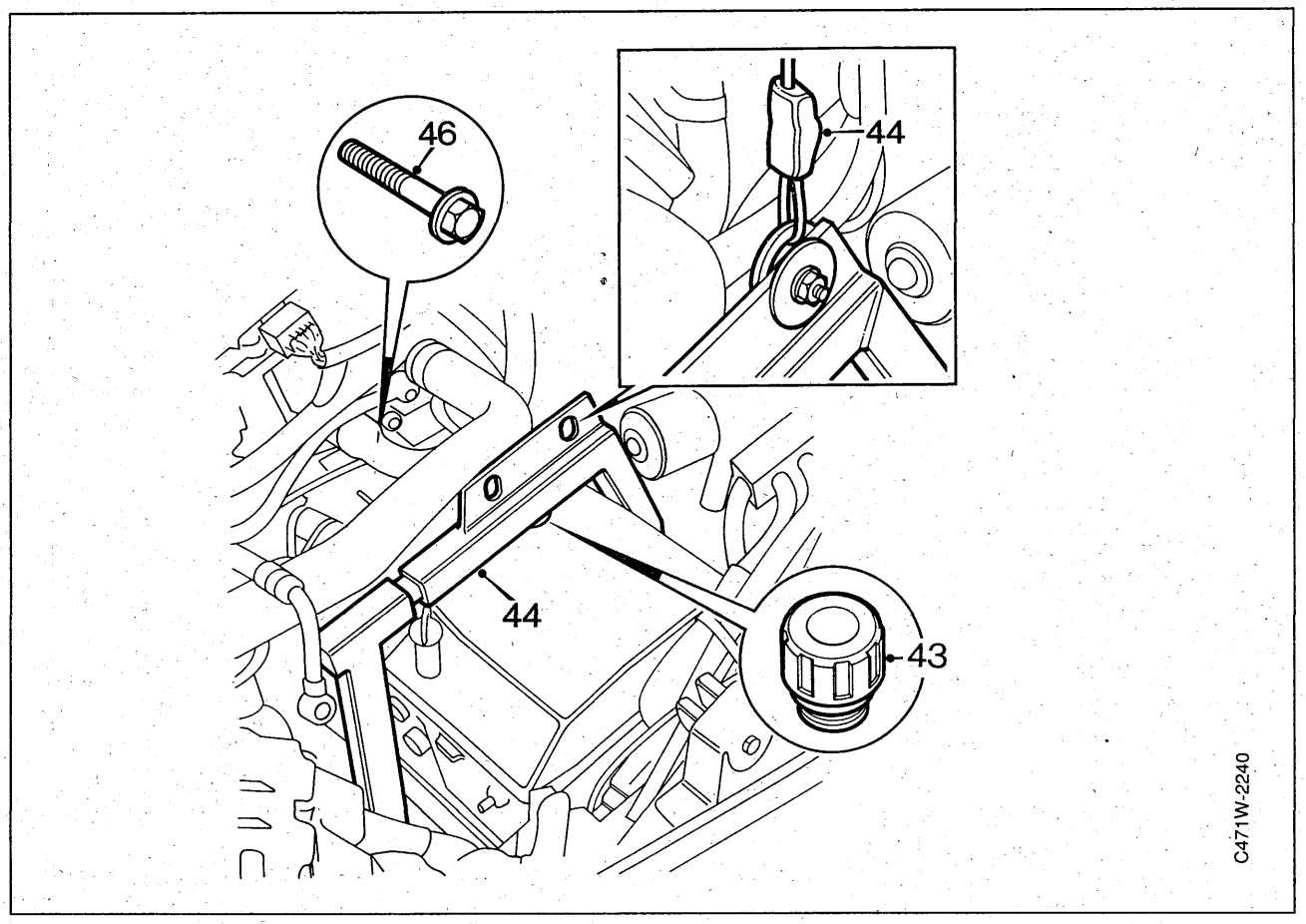
37 Undo the bolt in the subframe's front link and remove the two bolts securing the link.

38 Undo the bolt in the subframe's rear link and remove the two bolts securing the link (one of the bolts also secures the steering gear).

39 Remove the two bolts in the front corner and the four bolts in the rear corner of the subframe. Carefully lower the subframe. Collect the sheet metal bracket.

40 Remove the bolts in the two links and remove the subframe.

41 Remove the clamp round the drive-shaft joint's rubber gaiter. Clamps without a screw should be cut away with a suitable pair of pliers. Be careful not to damage the rubber gaiter. Separate the joint and let the shaft hang down. Fit protective covers on drive-shaft joint and driver.




42 Lower the car to the floor.

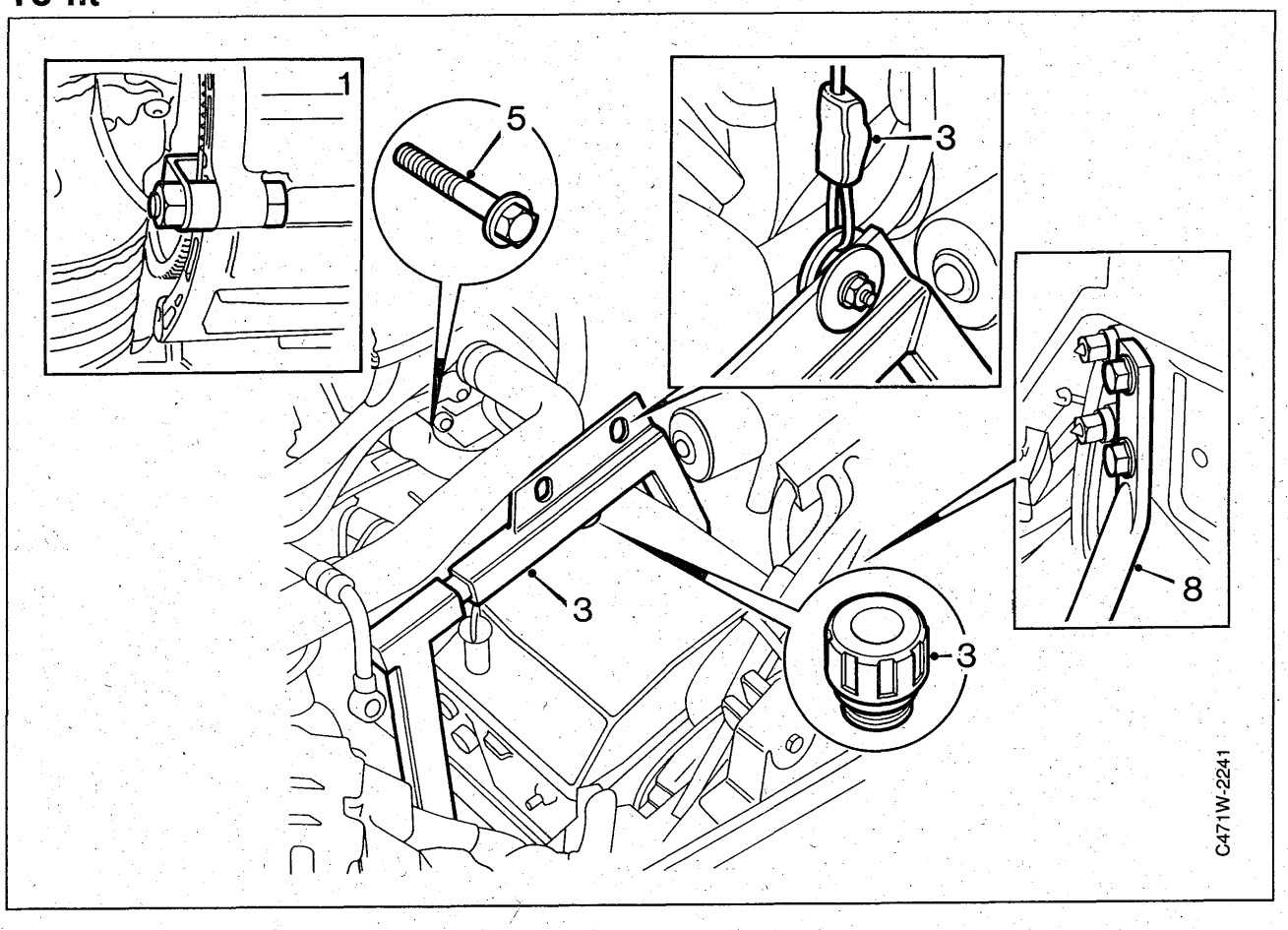
43 Remove the vent plug from the top of the gearbox.

44 Fit lifting yoke 87 91 451 on the gearbox and insert cable 87 92 251 in the yoke.

45 Hook the cable to the hoist and tension the cable.

46 Remove the last bolt in the mating surface, withdraw the gearbox and lower it.

## To fit




It is assumed that the car is on the floor and the engine suspended in the yoke.

1 The torque converter must be in such a position that its holes are in line with the bolt holes for the driver disc. Fix the torque converter with holder 87 92 293 on a suitable box.

2 Insert guide pin 83 92 128 in the top hole in the engine mating surface.

3 Undo the venting device. Then fit lifting yoke 87 91 451 to the gearbox and attach cable 87 92 251. Hook the cable to the hoist and lift the gearbox to the assembly position.

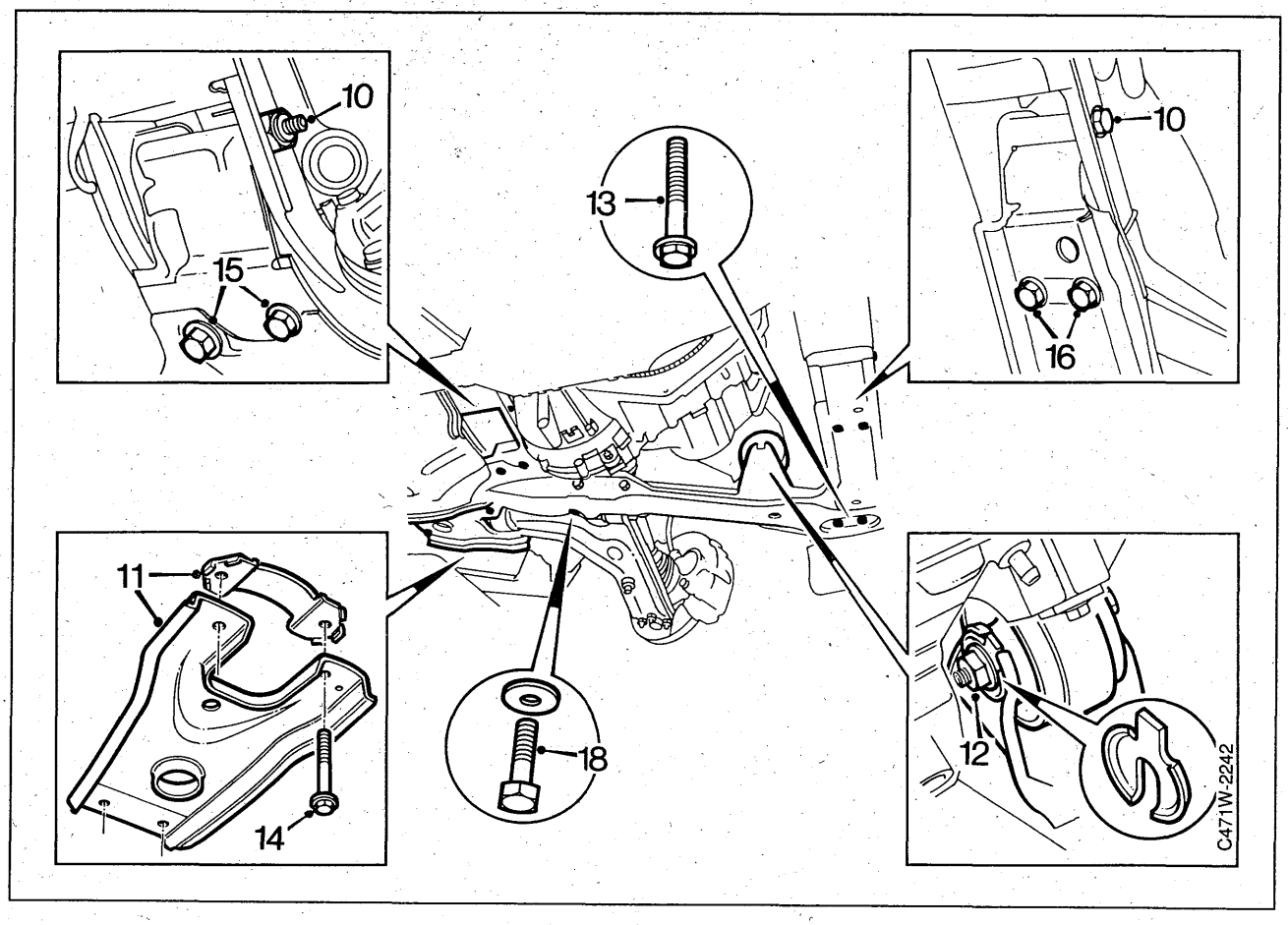
4 Coat the stud with grease. Fit the gearbox onto the guide pin in the mating surface, making sure that the stud on the torque converter is properly located.

5 Fit a bolt in the mating surface.

6 Remove the guide pin and lifting yoke.

7 Screw the venting device into the gearbox.

8 Fit the two bolts at the top of the steady bar in the wheel housing but do not tighten them.




9 Raise the car.

10 Suspend the subframe and fasten the two links by means of a bolt in each.

11 Raise the subframe, making sure that the sheet metal bracket at the rear is properly located.

12 Insert the bolt in the engine mounting, making sure that the washers are correctly fitted. Fit the nut.

13 Fit the two bolts at the front corner of the subframe.

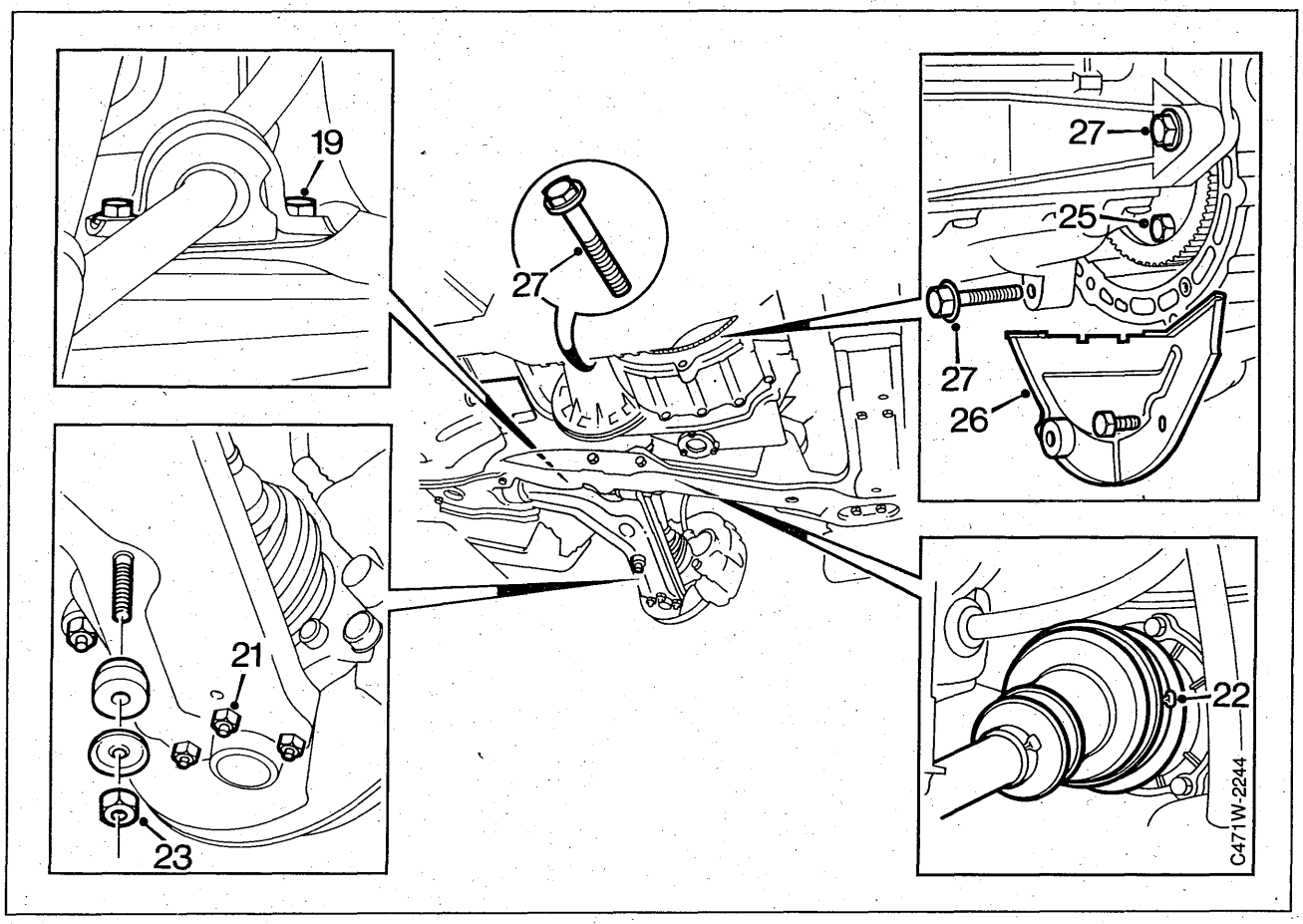
14 Fit the four bolts at the rear corner of the subframe.

15 The fit the two bolts securing the rear link (one of the bolts also secures the steering gear).

16 Fit the two bolts securing the front link.

17 Tighten all 12 bolts in the subframe, using a torque wrench.
**Tightening torque, front mounting:**
**50 ± 7 Nm (37 ± 5 lbf ft).**
**Tightening torque, rear mounting:**
**55 ± 8 Nm (41 ± 6 lbf ft).**

18 Bolt the lower end of the wheel housing's steady bar to the subframe.
**Tightening torque: 50 ± 7 Nm (37 ± 5 lbf ft).**




19 Fit the bolts securing the anti-roll bar's bearing.
**Tightening torque: 47 ± 7 Nm (35 ± 5 lbf ft).**

20 Remove the protective covers and fit the drive shaft in place.

21 Fit the three bolts securing the ball joint to the suspension arm. Use new self-locking nuts.
**Tightening torque: 30 ± 4 Nm (22 ± 3 lbf ft)**

22 Fit the drive shaft rubber gaiter, using a new clamp.

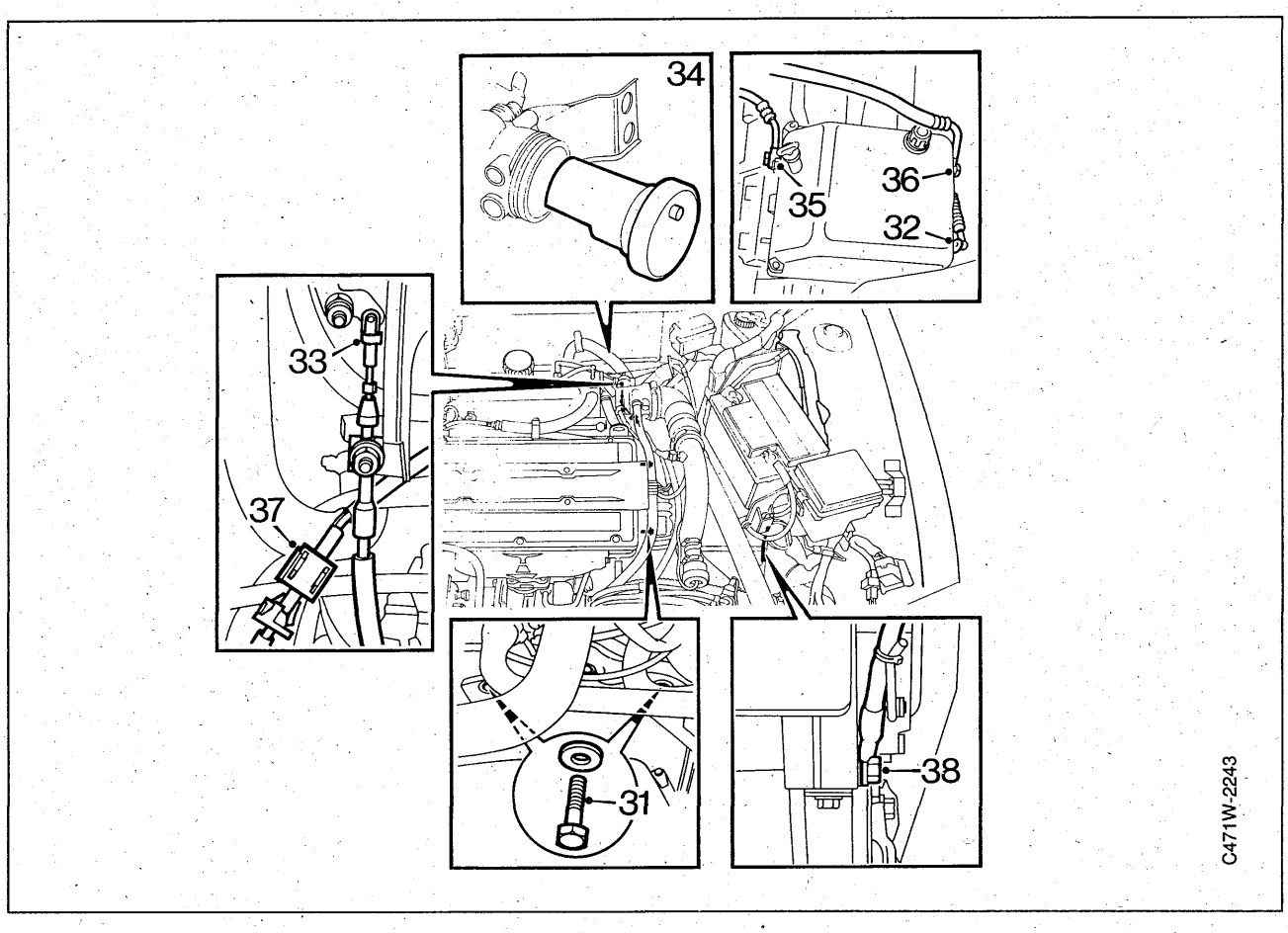
23 Fit the nut securing the anti-roll bar's mounting in the suspension arm.
**Tightening torque: 47 ± 7 Nm (35 ± 5 lbf ft).**

24 Remove holder 87 92 293 holding the torque converter.

25 Fit the three bolts in the torque converter but do not tighten them. Then tighten the bolts, using a torque wrench. Apply Loctite 242 to the threads.
**Tightening torque: 58 ± 9 Nm (43 ± 6 lbf ft).**

26 Fit the gearbox's protective plate.

27 Tighten the remaining bolts in the mating surface that are accessible from below, using a torque wrench.
**Tightening torque: 70 ± 20 Nm (50 ± 15 lbf ft).**




28 Lower the car to the floor and remove the yoke.

29 Fit the nut on the engine mounting bolt and tighten it.
**Tightening torque: 70 ± 21 Nm (50 ± 15.5 lbf ft).**

30 Tighten the two bolts securing the steady bar to the wheel housing.
**Tightening torque: 50 ± 7 Nm (37 ± 5 lbf ft).**

31 Tighten the remaining bolts in the mating surface that are accessible from above, using a torque wrench.
**Tightening torque: 70 ± 20 Nm (50 ± 15 lbf ft).**

32 Fit the gear selector cable's rubber bush in the mounting on the gearbox casing, tighten the nut and fit the gear selector arm.
**Tightening torque: 18 ± 3 Nm (10 ± 2.2 lbf ft).**

33 Fit the kick-down cable to the throttle body.

34 Press the throttle lever to the kick-down position and fit tool 87 91 980 in the throttle body. Align the tool's "UP" marking with the casting seam in the throttle body. Undo the stop nut on the cable and press the sheathing down until the full-throttle position is felt (the full-throttle position can be felt just before the kick-down position). Tighten the nut while holding the cable sheathing in the full-throttle position. Press the throttle lever down and remove the tool. Carefully move the throttle lever back.

35 Remove the protective plug and fit the nipple for the hose connected to the outlet side of the oil cooler to the gearbox at the front.

36 Remove the protective plug and fit the nipple for the hose connected to the inlet side of the oil cooler to the gearbox at the rear.

37 Plug in the connector on the speedometer sensor cable.

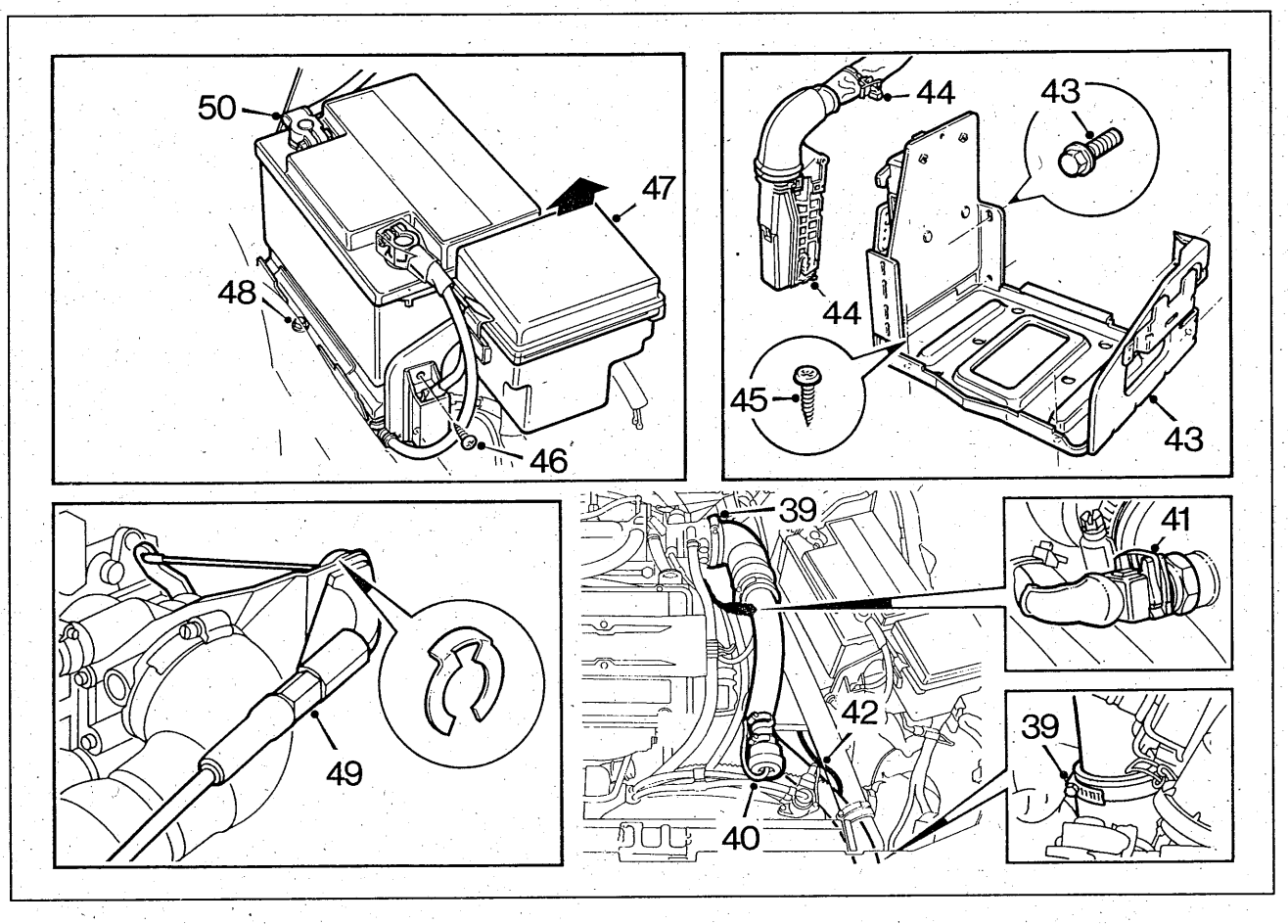
**Important**

Make sure that gear selector cables, kick-down cables and the speedometer cable are correctly located.

38 Reconnect the battery ground (negative) cable to the gearbox.

**WARNING**

Grounding is extremely important. Do not forget it. Danger of fire.




39 Refit the turbo pressure pipe.

40 Fit the hose on the by-pass valve.

41 Plug in the connector on the temperature sensor.

42 Refit the hose between the turbo pressure pipe and gearbox.

43 Fit the battery tray.

44 Plug in the connector on the ABS control module and fasten the cable with clips.

45 Fasten the positive cable with the two clamps on the battery tray.

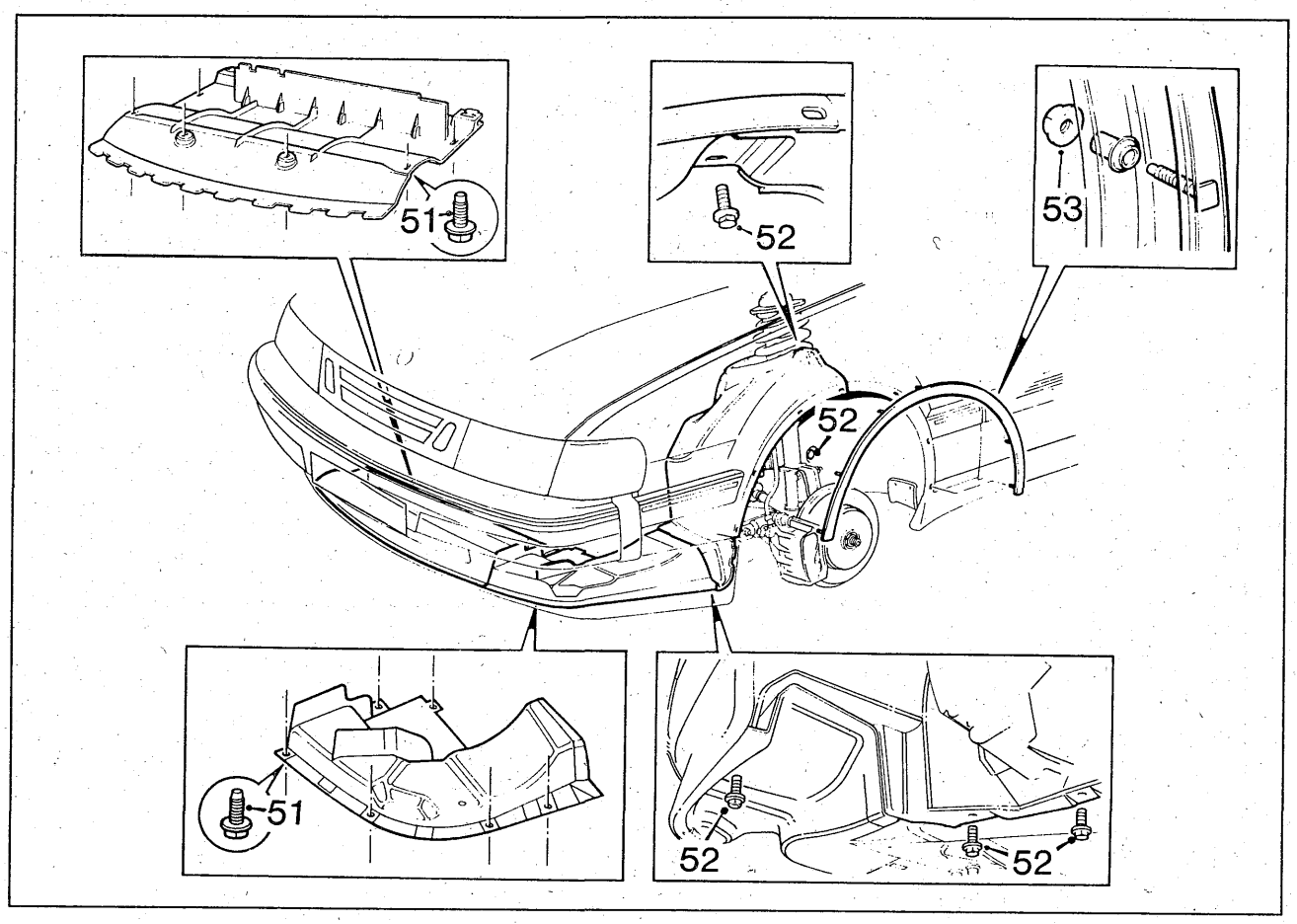
46 Fit the positive terminal block.

47 Fit the front main fuse box.

48 Fit the battery.

49 Connect the throttle cable to the throttle body.

50 Connect the battery cables.




51 Fit the left-hand and centre spoiler sections.

52 Fit the front part of the wing liner.

53 Fit the wheel housing trim moulding.

If it has previously been removed, check that the wing liner on the right-hand side is fitted in place.

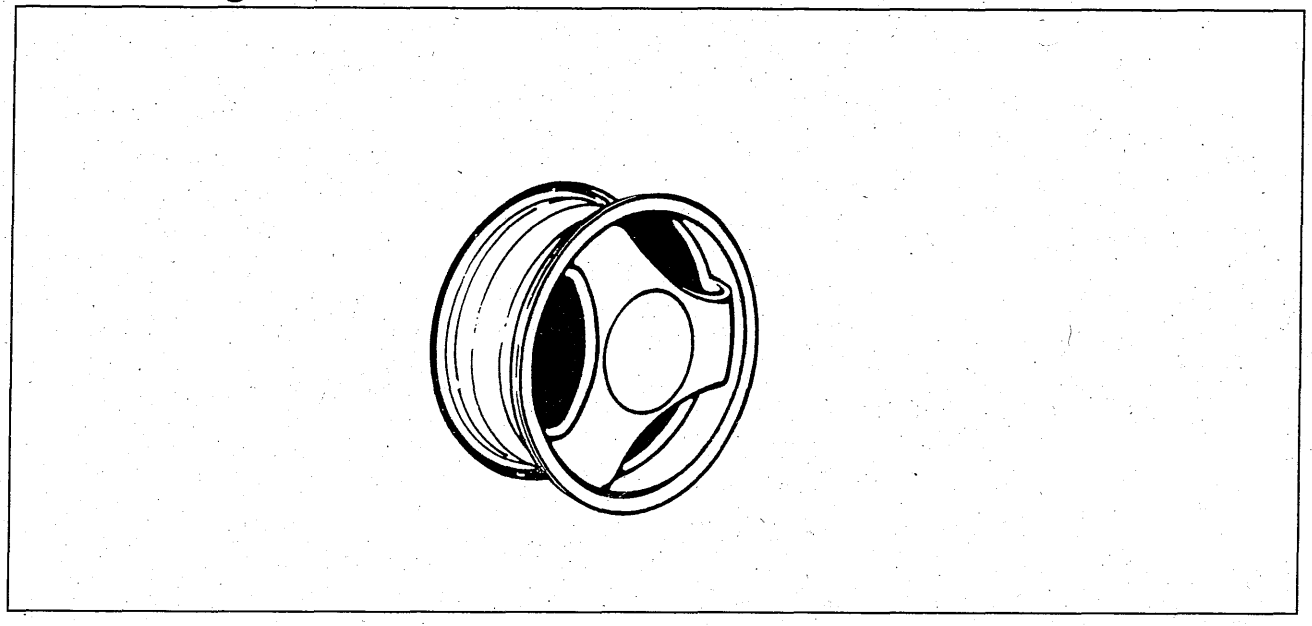
54 Fit the road wheel.
**Tightening torque: 120 Nm (89 lbf ft).**

55 Remove the protective covers from the wing.

56 Check the fluid level in the gearbox and drive the car on the road to test it.

# Suspension and wheels

## Wheel range

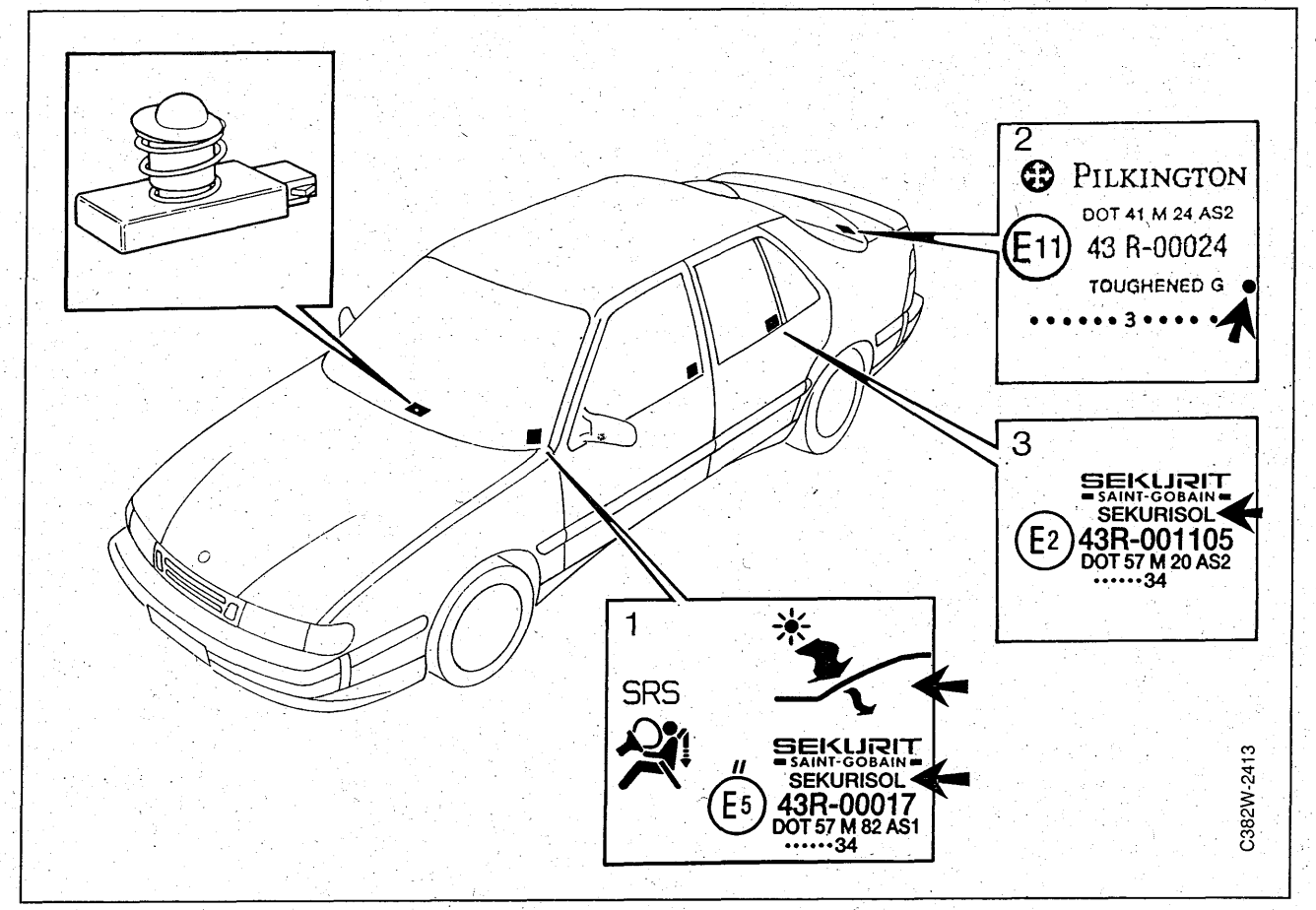


The present range of wheels has been expanded with a new three-spoke silver-coloured Super Aero wheel. The size of this wheel is 16x6 " and it has a flush-fitting wheel cover. (The wheel cover is the same as for the present three-spoke asymmetric wheel.

# Body



## Heat-absorbing glass

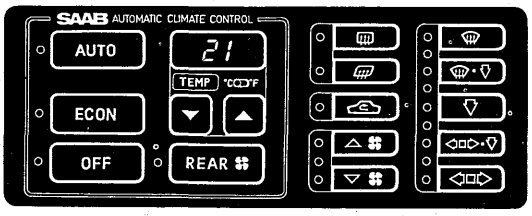


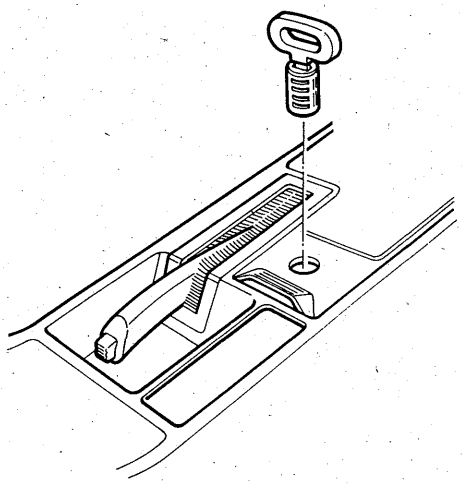

All Saab 9000 models are fitted with a new type of heat- absorbing glass all round.
Cars equipped with an ACC system have a special sun sensor, since the new type of glass affects the rays of the sun which fall on the sensor. To distinguish the heat-absorbing window glass from the ordinary glass fitted earlier, the glass is marked as follows:

1 The windscreen is marked with a symbol and the word "SEKURISOL". (This marking is placed adjacent to an SRS symbol indicating that the car is equipped with an airbag.)

2 The rear window has a dot on the right of the wording.

3 Other window glass is marked with the word "SEKURISOL".




## Climate control ACC

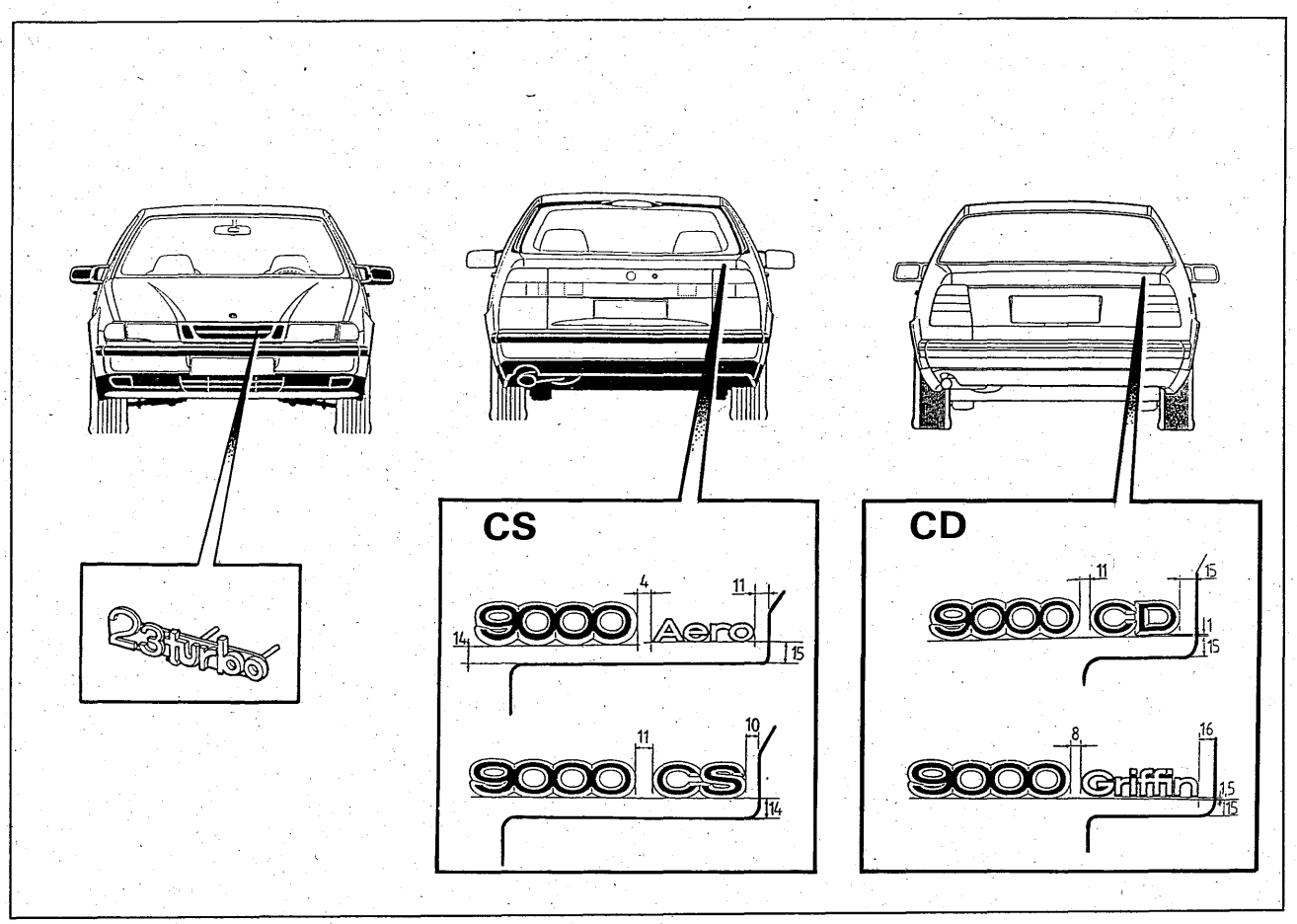
The ACC system has been improved in several ways, including:

- To reduce the likelihood of the windscreen misting up on starting, the system's program for automatic engagement has been modified. Depending on the outside temperature and how long the AC compressor was in operation the last time the car was used, the starting process will differ. The principle of operation is that any damp air will always be discharged via the floor vents.
- The operation of the DEF button has also been modified to facilitate demisting of the windscreen. When this button is depressed the system selects the defrost mode and the recirculation damper is changed to the fresh-air position. The AC compressor, the rear door fans, the electrically-heated rear window and the ventilation fan are switched on at the same time, the ventilation fan at its highest speed.
- Recirculation will be selected only if the outside temperature exceeds +27°C.
- The cabin sensor's suction fan runs for 3.9 minutes after the ignition has been switched off. This counteracts unintentional cooling of the cabin during short stops.
- Four by-pass holes have been made in the heating and ventilation box to improve floor-level heating in the cabin.
- Faulty detection by the rear AC has been eliminated.
- Communication between the ACC system and an ISAT, which has suffered from certain shortcomings, has been remedied by modifying the program and replacing components in the ACC system.
- A new type of sun sensor has been introduced on account of the new heat-absorbing window glass. (The new sun sensor cannot be used as a spare part for earlier model year cars.)

## Glove box, centre console

On cars fitted with an airbag for the front-seat passenger, the space for the regular glove box is occupied by the airbag module. The glove box in the centre console on these cars is instead equipped with a lock.

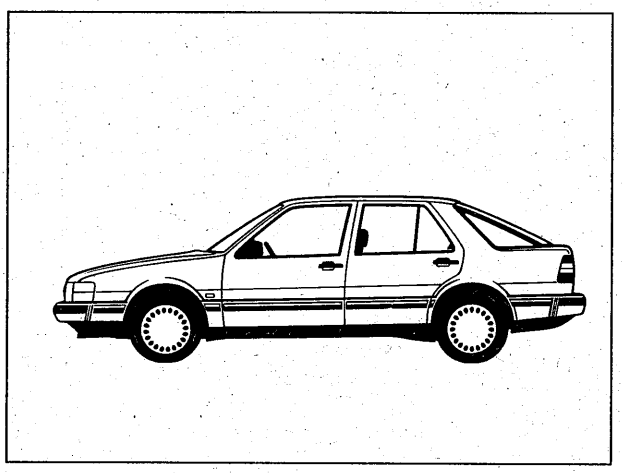
# Emblems




The emblems have a bright-polished finish and are of somewhat different design. In addition, they are "divided" so that 9000 can be combined with CD, CSE, etc.
A new emblem, "2.3 turbo", for the grille has been added and the "Aero" emblem was introduced during model year 1993.
The illustration shows how the emblems are positioned on the 9000 CS and 9000 CD models.

## Saab 9000 CC

The Saab 9000 CC will be discontinued with effect from model year 1994.



## Body colours

A new body colour has been added for model year 1994 cars and three colours have been discontinued.

| Colour code | Colour | Type of finish | Remarks |
|---|---|---|---|
| 241 | Aubergine | Mica-metallic* | New colour, grey |
| 223 | Odoardo grey | Metallic | Discontinued |
| 233 | Carrara white | Solid | Discontinued |
| 234 | Nocturne blue | Metallic | Discontinued |

*) A special type of metallic finish that refracts the light reflected from it. This gives the paintwork a deeper lustre at the same time as a shimmering effect is achieved.

# Airbag



## General

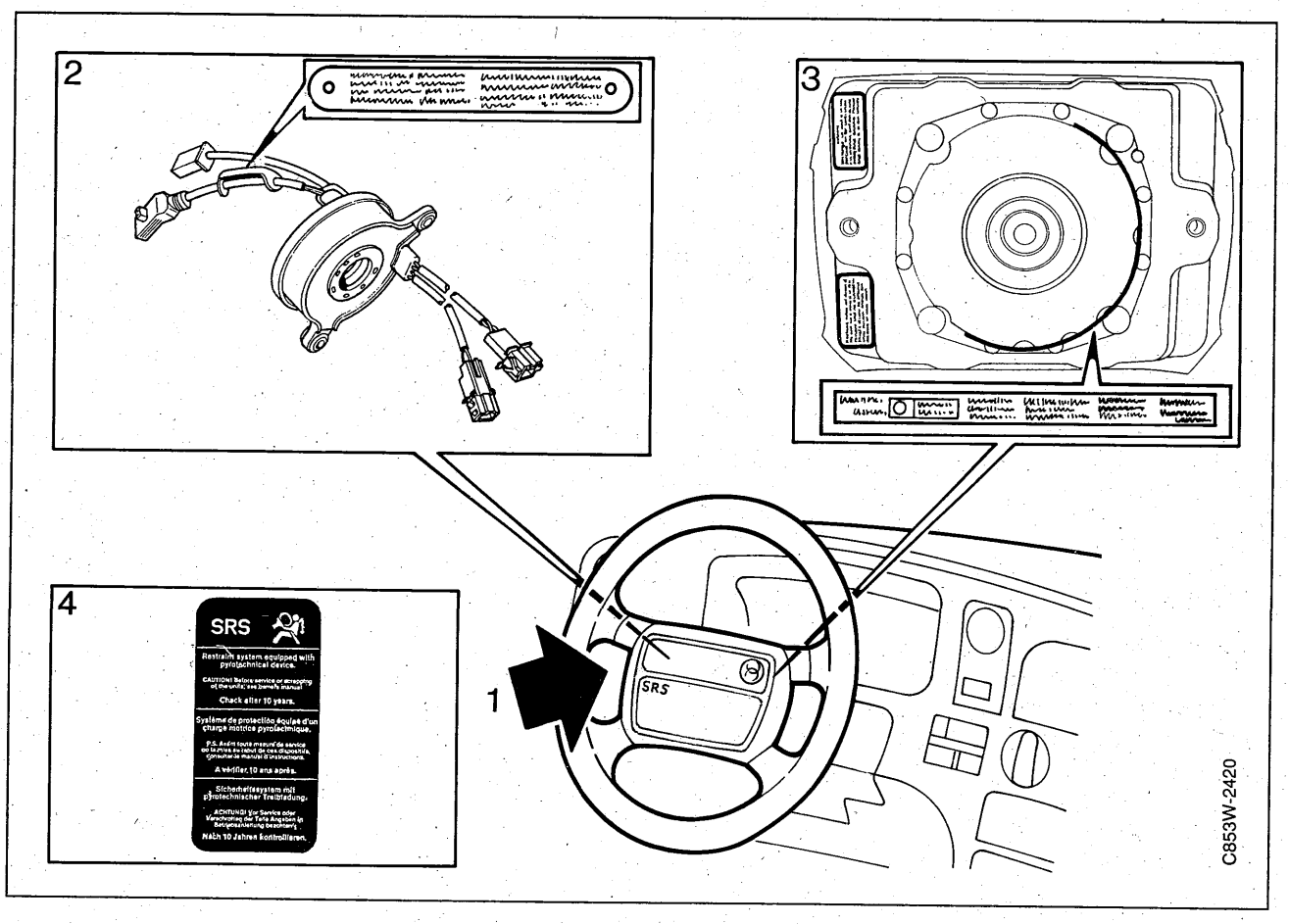
Included in this year's "News" are the innovations presented in Service Manual "0 News M1992". The information in this year's "News" therefore supersedes the Airbag section in the "News" Service Manual for M1992.

## Safety and handling instructions

### Working on the airbag system

When carrying out any work on the airbag system it is absolutely essential to observe the following points:

- All work on the system must be carried out in accordance with the Service Manual, taking great care to avoid injuries.
- Before commencing any work on the system, always disconnect the negative battery cable. Then wait for 20 minutes before proceeding with your work.
- Components incorporated in the system must not be dismantled and repaired. They should be handled with care and stored in a dry place at room temperature.
- Airbags should be stored at room temperature. At higher temperature they will age more rapidly. At temperatures above +135°C they may detonate spontaneously.
- Airbags should be stored in a special place, away from petroleum products and other flammable materials.
- Airbags are classified as explosive (pyrotechnic) items and must be stored and handled in accordance with the legal requirements and regulations of the country concerned.
- The airbag should be installed immediately after it has been taken out of the stores. If work is interrupted for any reason, return the airbag to the stores where it should be kept safely under lock and key. Under no circumstances may an airbag be left unattended.
- Airbags should be stored and carried with the metallic casing facing downwards, to avoid injuries in the event of accidental detonation.




## Warning and informative labels, model years 1992 and 1993

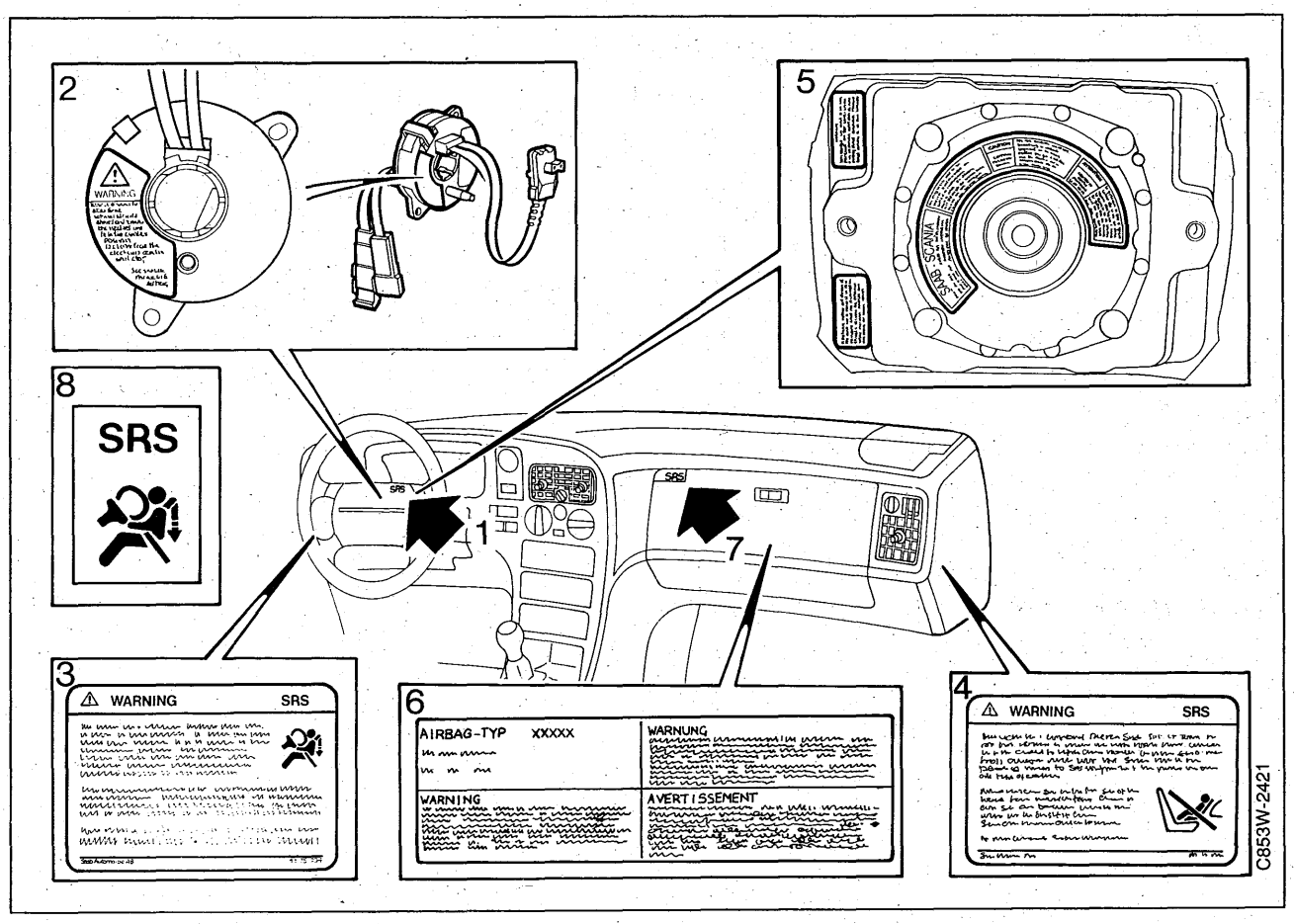
A number of warning and informative labels affixed to the car advise that it is equipped with an airbag system. To ensure personal safety, do not fail to observe the directives on the labels.

1 The letters "SRS" (Supplementary Restraint System) are stamped on the steering wheel.

2 A label is affixed to one of the contact roller leads.

3 A warning text is affixed to the reverse side of the steering wheel centre pad.

4 A warning label is affixed to the end panel of the driver's door.




## Warning and informative labels, model year 1994

A number of warning and informative labels affixed to the car advise that it is equipped with an airbag system. To ensure personal safety, do not fail to observe the directives on the labels.

1 The letters "SRS" (Supplementary Restraint System) are stamped on the steering wheel.

2 A label is affixed to the contact roller.

3 An airbag warning label is affixed to the end of the dash on the driver's side.

4 A passenger airbag warning label is affixed to the end of the dash on the passenger's side.

5 A warning text is affixed to the reverse side of the steering wheel centre pad.

6 A warning text is affixed to the reverse side of the passenger's airbag.

7 On cars equipped with an airbag for the passenger, an emblem with the letters "SRS" is affixed to the cover of the passenger's airbag.

8 An "SRS" symbol is located in the bottom left-hand corner of the windscreen. The purpose of this symbol is to inform rescue personnel in the event of an accident that the car is equipped with an airbag.

## Welding

Before starting any welding work on the car, disconnect the negative battery cable and cover it. Wait for 20 minutes before continuing with your work.

## Painting

If stove enamelling is to be carried out on the car, mask the bolt holes in the airbag control module's mounting bracket to ensure a good ground connection for the control module.

## Electrical work

Do not splice any cables or leads in the airbag system. Splicing may cause malfunctioning of the system, which could lead to bodily injury or render the system unserviceable.

## Fault diagnosis

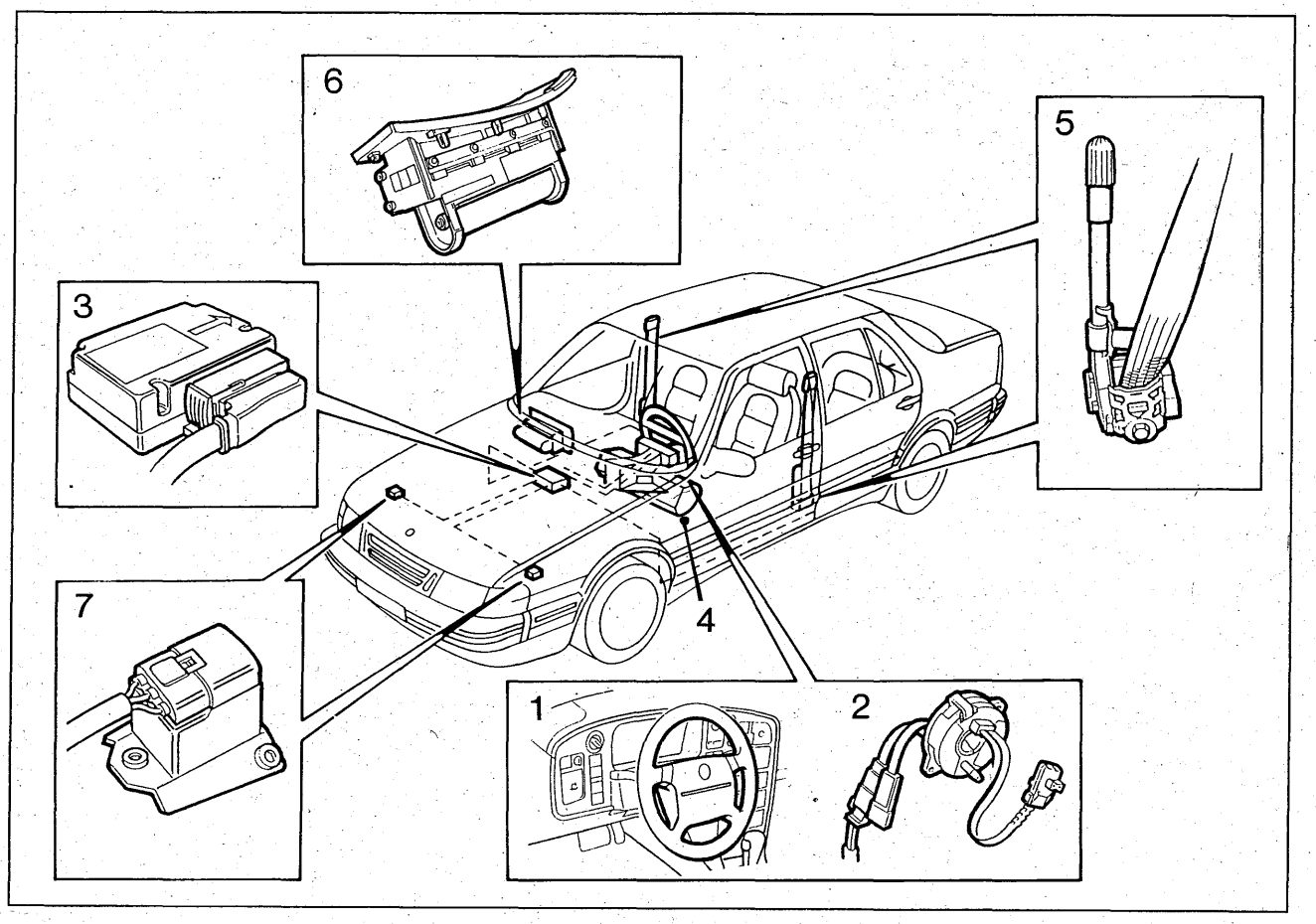
Do not use instruments with their own power source (such as ohmmeters, diode testers, buzzers, etc.) for fault diagnosis **directly** on the steering wheel centre pad or the passenger's airbag. Instead, unplug the airbag connectors and connect them to a reference resistor (special tool).

## Work on the car body

Before doing any work entailing blows and shocks to the car body, unplug the control module's connector.

## Work on the steering gear

In connection with all work carried out when the contact roller is left in position and the steering column shaft is not connected to the steering gear, the steering wheel must be locked so that the basic setting of the contact roller will not be altered. If the basic setting of the contact roller is altered, the coiled conductor in the contact roller could easily be irreparably damaged when the steering wheel is turned to full lock.




## Replacement of safety components when repairing cars involved in a collision

When repairing cars that have been involved in a collision, it is vitally important to change the correct components so that all doubts as to the reliability of the car after it has been repaired are avoided. These components are listed below.

For further details on repairing cars that have been involved in a collision, refer to relevant sections of the Service Manual.

When repairing a car in which the airbag has detonated, the following components must **always** be replaced:

1 Steering wheel, steering wheel centre pad, steering column and steering column shaft
2 Contact roller
3 Control module
4 Knee shield (US specification cars only)
5 All seat belts in use at the time of the collision. The seat belt on the passenger's side must always be replaced, even if it has not been used, because the belt tensioners will have been triggered.
6 Passenger airbag (if fitted)
7 Front sensor

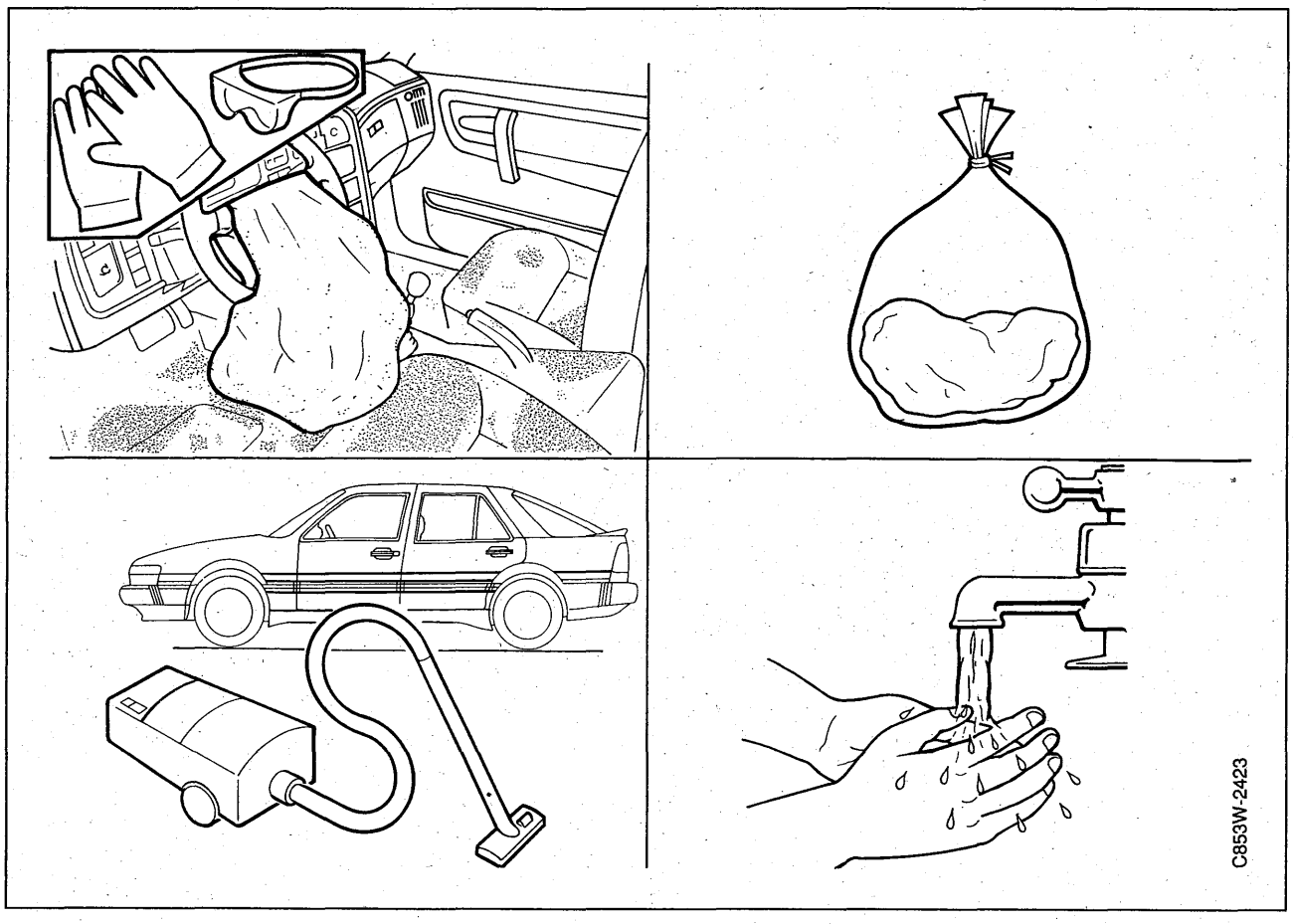
**Important**

Change all the seat belts if you cannot accurately determine which ones were in use at the time of the collision.

Check the following components for burning and deformation:

- System wiring
- Windscreen

Change damaged components.

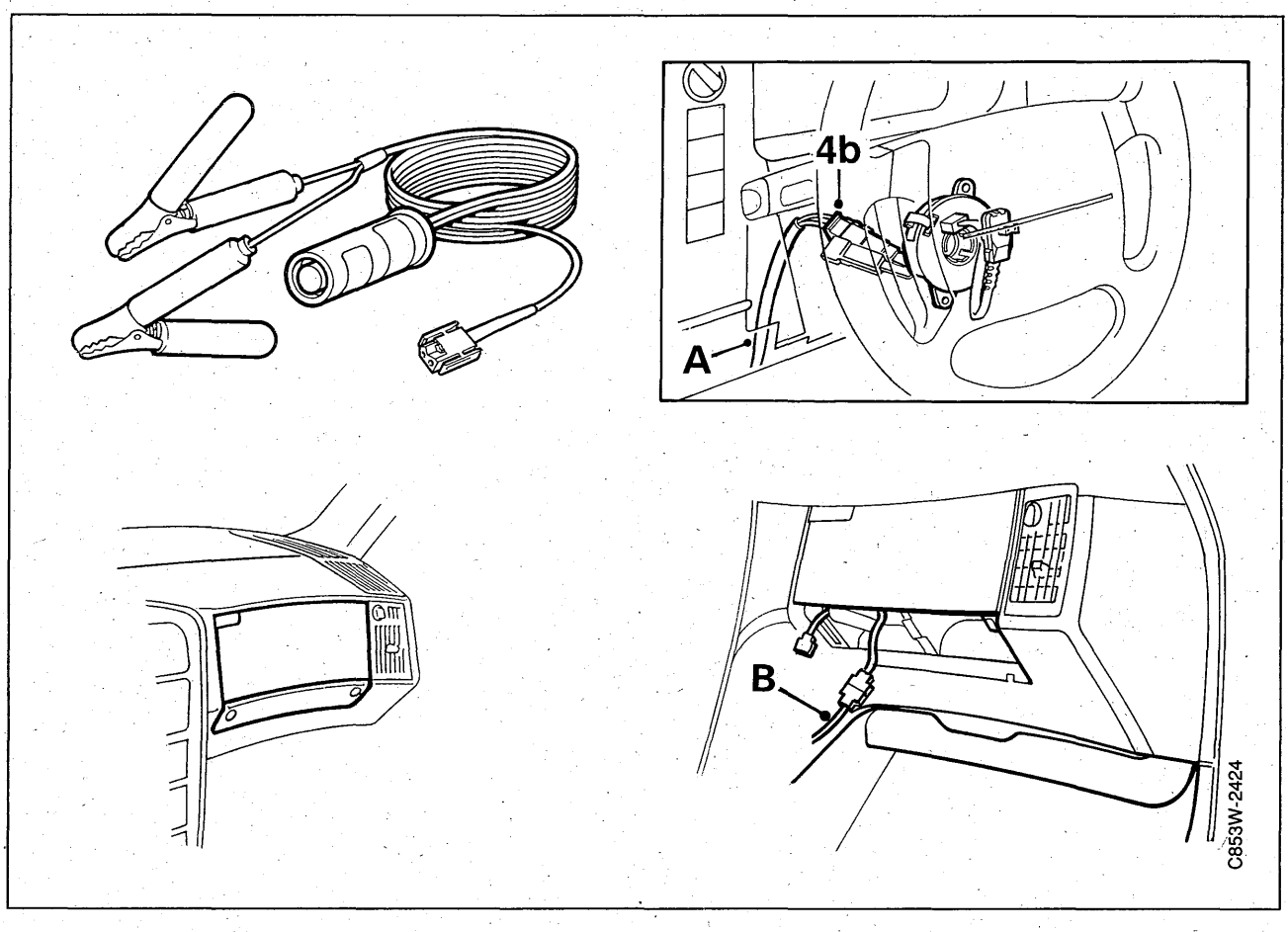



## Cleaning the car after airbag detonation

- When the airbag detonates, talcum powder and combustion residues in the form of dust particles are released. To avoid irritation of the skin and eyes, it is therefore advisable to wear protective goggles and gloves when cleaning a car in which the airbag has detonated.
- After removal, place the airbag in an airtight plastic bag. Remember that the gas generator will be extremely hot immediately after detonation of the airbag.
- Clean the interior of the car thoroughly with a vacuum cleaner.
- Wash your hands with soap and water after handling a detonated airbag.

**WARNING**

It is important to follow the instructions meticulously to avoid skin or eye injuries. In the event of an injury, call a doctor.




## Scrapping cars equipped with an airbag

To avoid injuries occurring when cars equipped with an airbag are scrapped, airbags that have not been detonated must be rendered unserviceable by detonating them electrically before scrapping as described below.

**WARNING**

An airbag must be correctly fitted when it is detonated for scrapping. Make sure that there are no loose objects in the vicinity of the airbag.

The airbag is to be detonated by means of detonating device 84 71 104. Cable 86 11 477 is an additional special tool for M1994. The detonating device consists of a two-wire cable approximately 15 metres long with a pushbutton, battery clips and a connector for plugging into the cables.
The battery to which the detonating device is connected should be in good condition.

1 The car should stand outdoors. The safety distance from the car is ten metres. No persons or objects must be present within this distance.

2 Check that there are no loose objects in the front seats or on the dashboard, and make certain that nobody is inside the car.

3 Disconnect the negative battery cable.

4 Steering wheel centre pad:

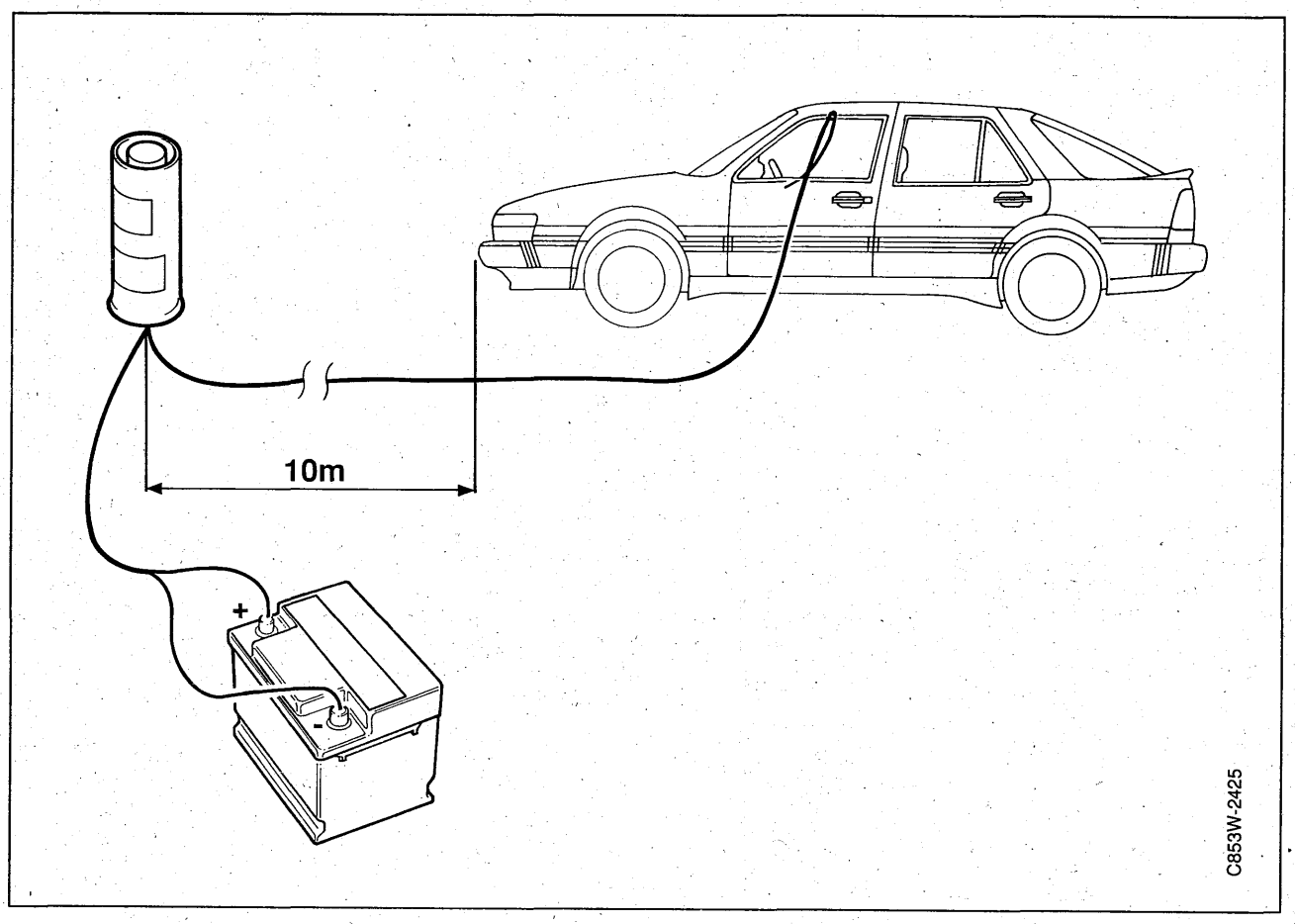
a. Remove the bottom steering column cover.

b. Unplug the orange two-pin connector.
M1993 and earlier:
Plug the detonating device (A) into the orange connector.
M1994:
Plug the detonating device's connector into cable 86 11 477 (A). Plug the cable into the orange connector.

5 Airbag on passenger's side:

a. Remove the plastic covers from the two bolts securing the bottom cover. Remove the bolts. Withdraw the bottom cover, which is held in place by clips. Use tool 82 92 997, working from right to left. Do not prise it loose.

b. Unplug the two-pin airbag connector. Plug the detonating device into cable 86 11 477 (B). Plug the cable into the two- pin airbag connector.




6 Run the cable through the door opening and close the door. Make sure that all doors and windows are closed.

7 Place a battery on the ground about ten metres away from the car. Connect the detonating device to the battery. Make sure that nobody is within the safety distance (a radius of ten metres from the car).

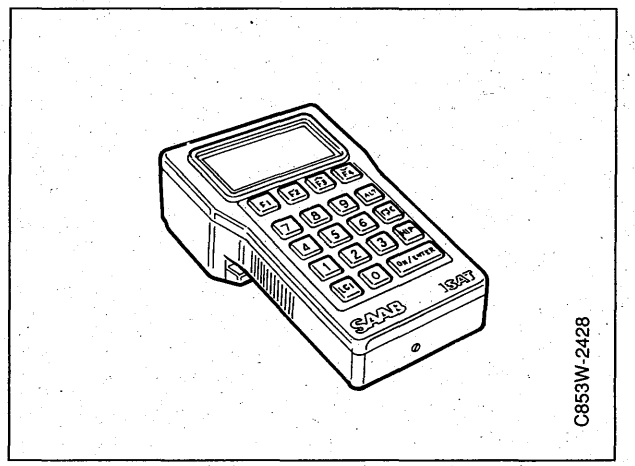
8 Press the button to detonate the airbag. When it detonates, the sound of the explosion will be heard and white smoke will be visible inside the car.

9 Disconnect the detonating device cables from the battery as soon as the airbag has detonated. Wait for 30 minutes before carrying out any work on the car to allow the airbag gas generator to cool down

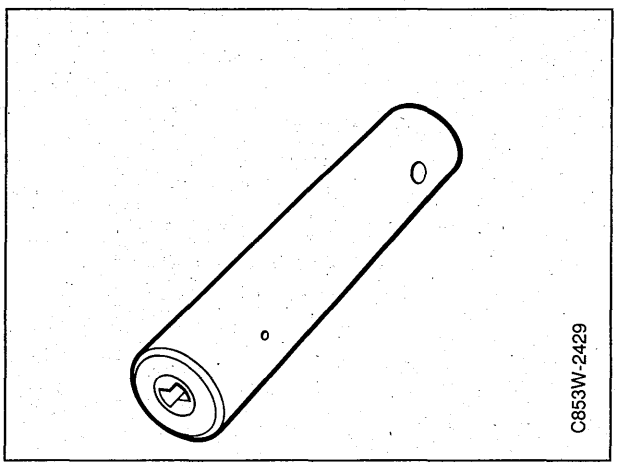
**WARNING**

If the airbag fails to detonate on the first attempt, disconnect the detonating device from the battery and inspect the cables carefully.

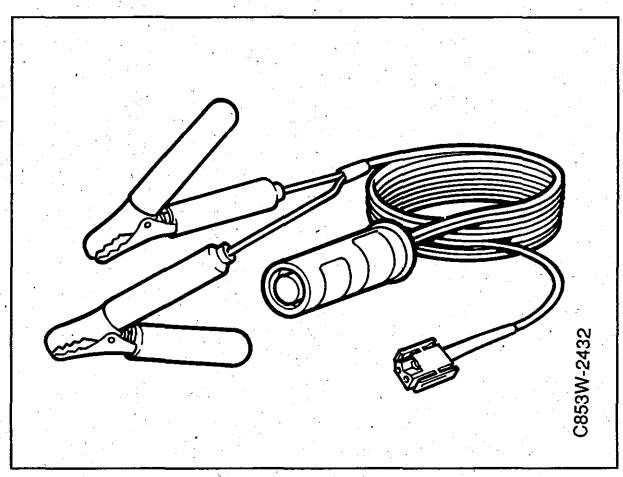
# Special tools



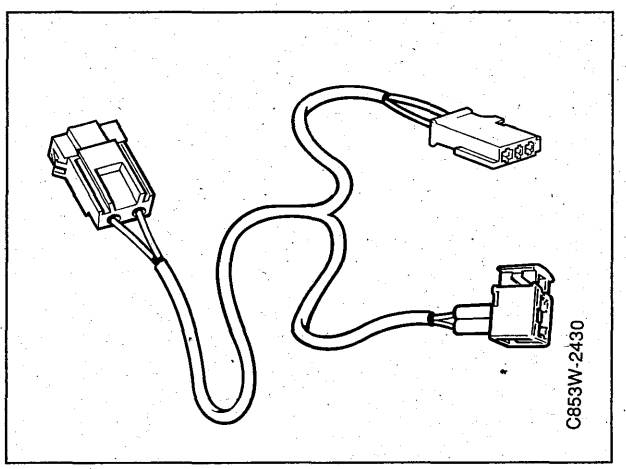

*ISAT.*



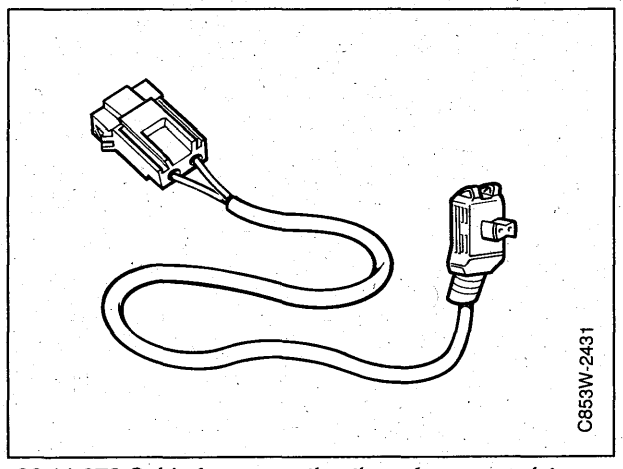

*84 71 153 Reference resistor.*



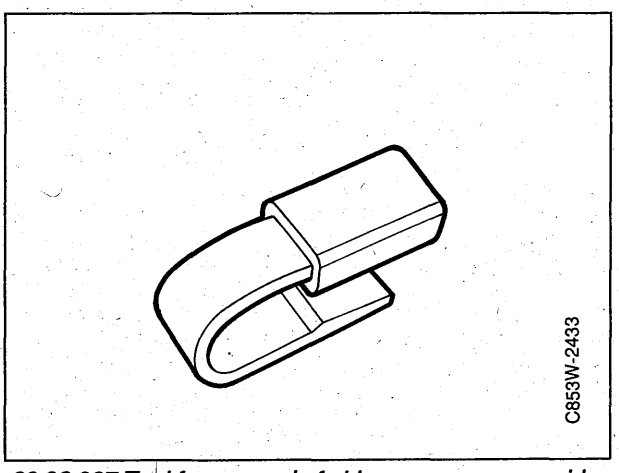

*84 71 104 Detonating device for scrapping airbags.*



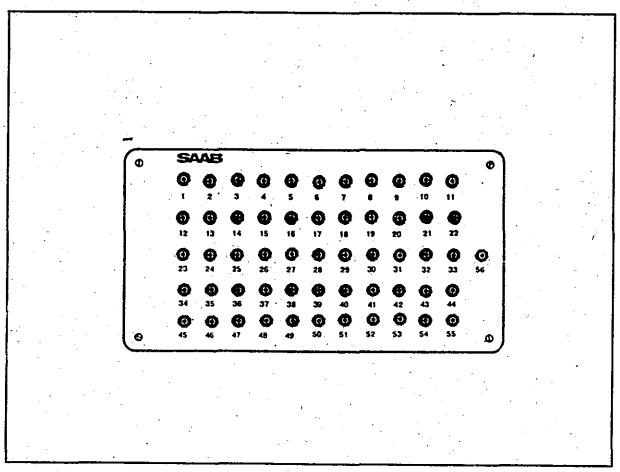

*86 11 477 Detonating device cable for scrapping airbags. M1994 and later.*



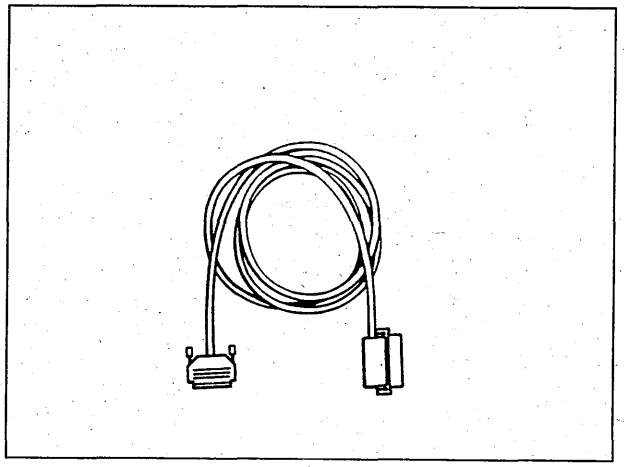

*86 11 378 Cable for connecting the reference resistor on the passenger side.*




*82 92 997 Tool for removal of airbag on passenger side.*

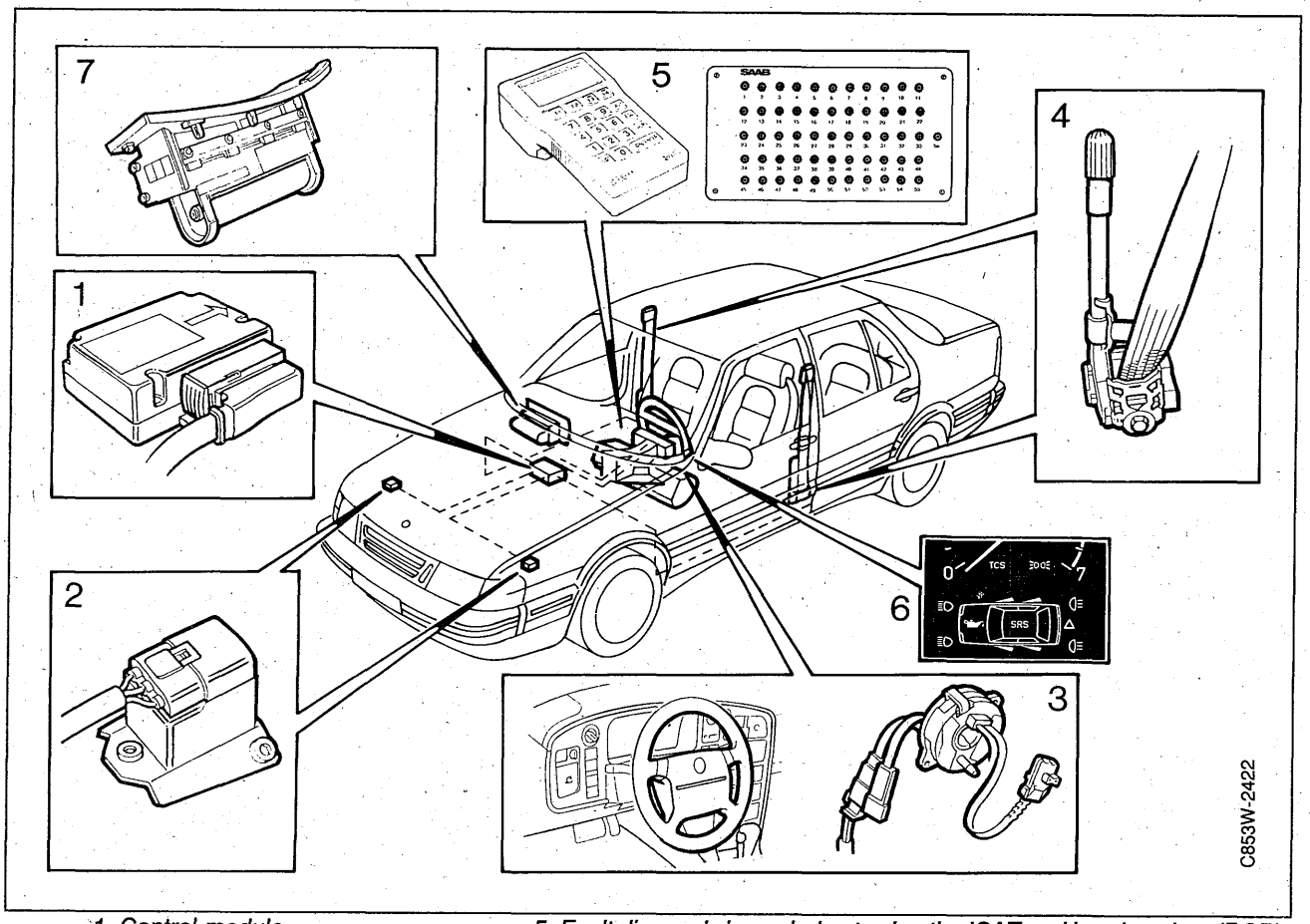



*86 11 006 Breakout Box (BOB).*



*86 11 113 Test cable for breakout box.*

# Technical description



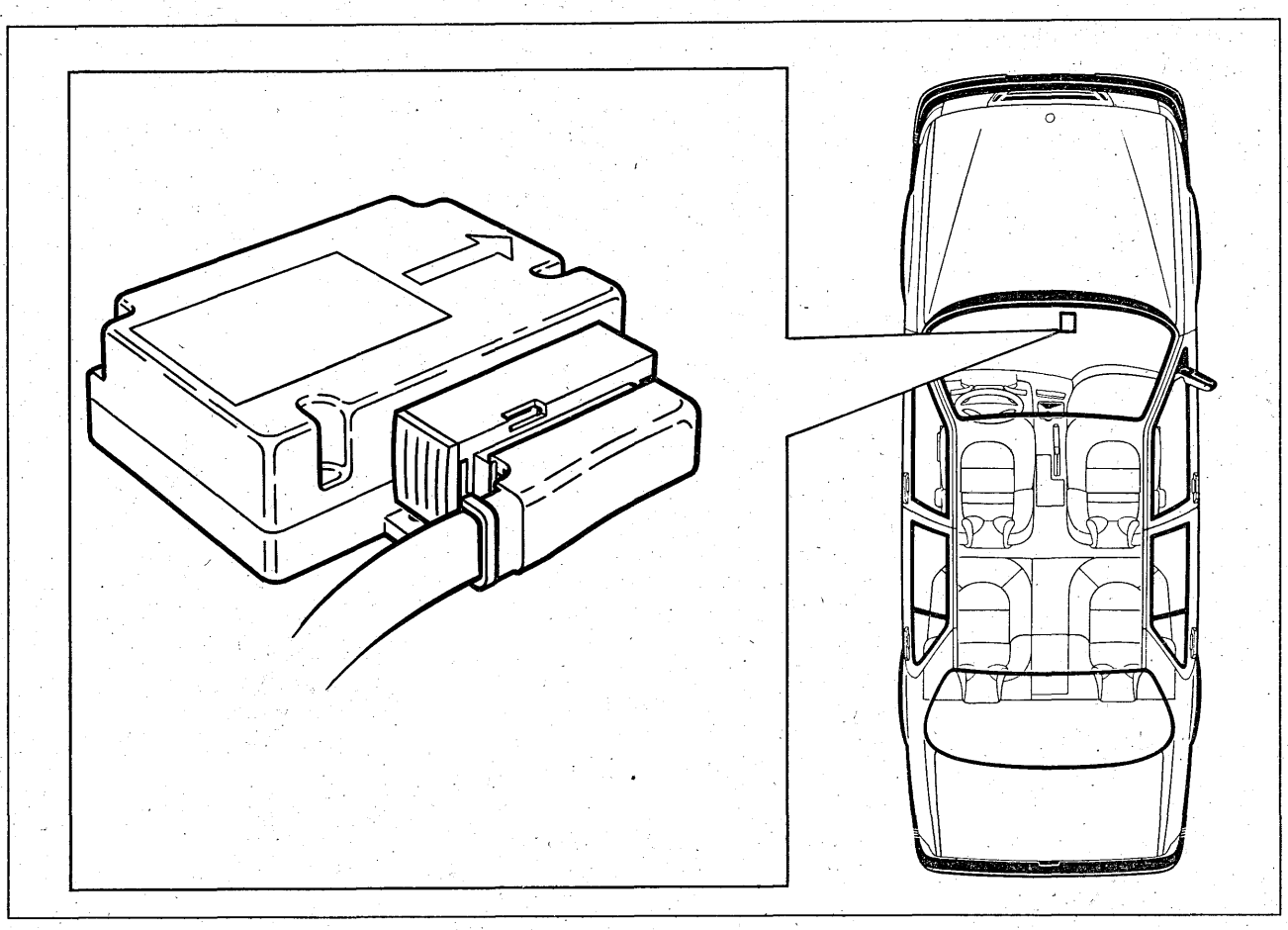

1 Control module
2 Front sensor
3 Contact roller (coil spring)
4 Belt tensioner
5 Fault diagnosis is carried out using the ISAT and breakout box (BOB)
6 Two bulbs in the SRS symbol
7 Passenger airbag

## News M1992

- The control module has improved features, higher reliability and is adapted for fault diagnosis with an ISAT.
- The SRS symbol in the pictogram has two bulbs. In the event of a fault, one bulb shines with a steady light and the other flashes.
- Seat-belt tensioners on both the driver's and passenger's side. The tensioners are activated by the airbag system control module.
- The front sensors are of new design and secured by three retaining screws.
- Fault diagnosis is carried out with an ISAT (system number 7). A breakout box (BOB), part No. 86 11 006, and test cable 86 11 113 are used for carrying out measurements on the connector that plugs into the control module.

## News M1994

- All Saab 9000 models are equipped with an airbag on the driver's side (steering wheel centre pad). All U.S. specification cars also have an airbag on the front passenger's side (passenger airbag). In certain other markets the passenger airbag is available as a factory-fitted optional extra.
- The SRS symbol on the steering wheel centre pad has been moved and the contact roller (coil spring) is of new design with new contacts and a new mounting in the steering column.
- Knee shields of impact-absorbing material are fitted on U.S. specification cars.
- Fault diagnosis using an ISAT has been updated.
- A cable for use when scrapping steering wheel centre pads and passenger airbags has been developed, see under "Special tools".



## Control module

An hour-counter in the control module starts up each time a diagnostic trouble code is generated. When carrying out fault diagnosis it is therefore possible to see when the fault occurred for the first time. The number of times an intermittent fault occurs is also counted.

Up to five diagnostic trouble codes can be stored at the same time. They are stored in order of priority so that the "most important" faults are displayed first when a reading is obtained on the ISAT. Faults which prevent activation of the airbags have the highest priority. Permanent faults have a higher priority than intermittent faults. If an additional diagnostic trouble code is generated when five other faults are already stored in the memory, the diagnostic trouble code having the lowest priority is cleared to make room for the new trouble code.

To increase the reliability of the system still further, the number of capacitors in the control module has been increased from one to six.

If the control module is not connected, the "SRS" symbol in the main instrument display shines with a steady light as soon as the ignition is switched on.

The control module is located on the right-hand side of the centre console.

## SRS symbol

As a safety measure, two bulbs (47T) protected by separate fuses are fitted behind the SRS symbol in the pictogram. When the ignition switch is turned to the Start or Drive position, both bulbs light up for about five seconds and then go out, provided that no diagnostic trouble codes are stored in the memory.

If one or more diagnostic trouble codes are stored in the memory, on the other hand, bulb 1 will flash for five minutes and then shine with a steady light until the ignition is switched off or the trouble codes are cleared. Bulb 2 will shine with a steady light as soon as the ignition is switched on and remain alight until the ignition is switched off or the trouble codes are cleared.
If the airbag or airbags have been activated, both bulbs will shine with a steady light as long as the ignition is switched on.

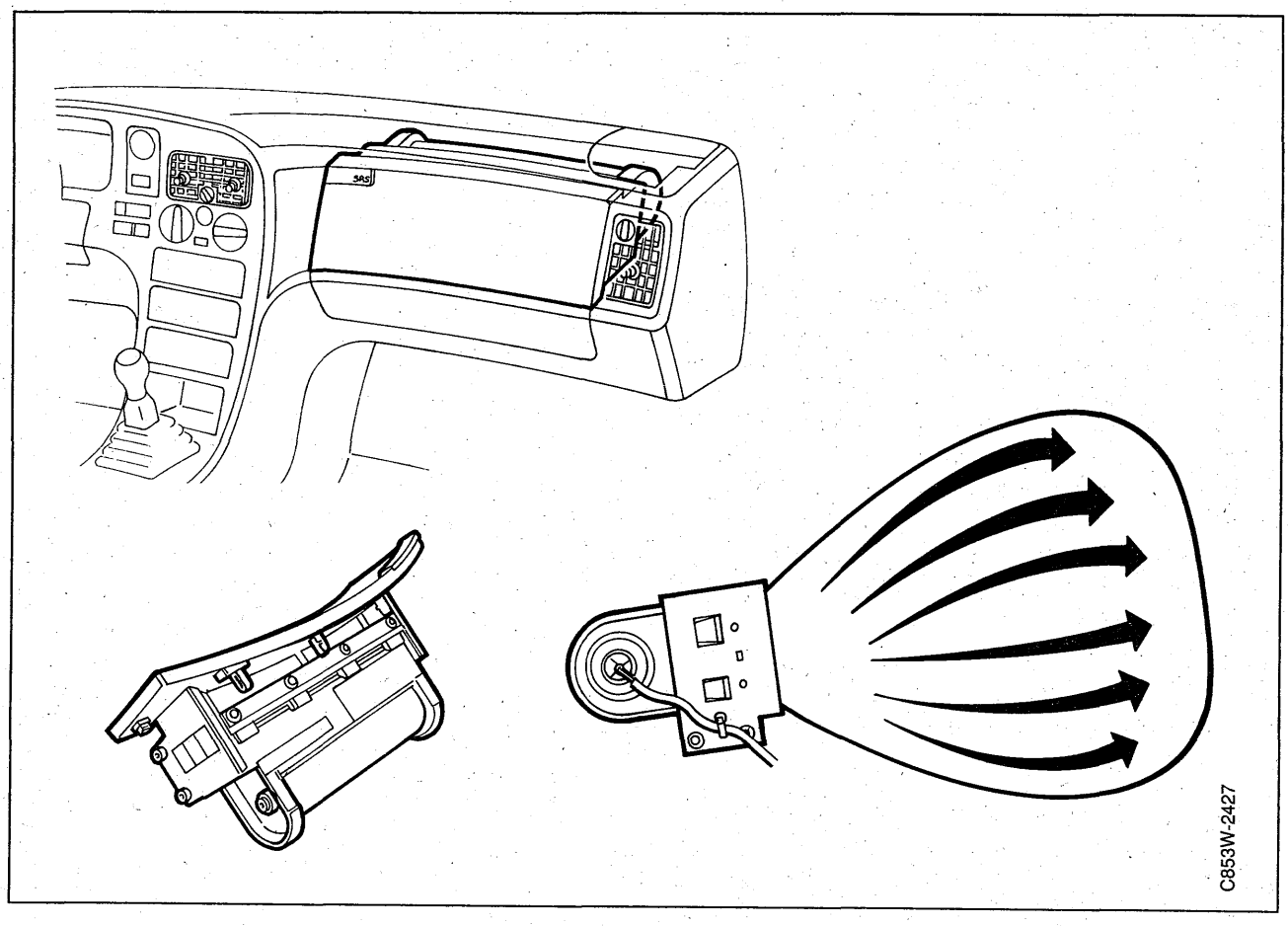
## Power supply

For reasons of safety the control module has duplicate power supplies so that it will continue to work even if one of the supplies fails. When the ignition switch is turned to the Start or Drive position, primary current (+15) will flow via fuse 4 to pin 1 of control module 331. At the same time, secondary current will flow via fuse 13 to pin 22 of the control module.

Ten seconds later the capacitors will be fully charged and the system operational.

The capacitors serve as a source of energy on activation of the airbag or airbags and seat-belt tensioners.

The bulbs for the SRS warning lamp (47T) receive a +15 supply via fuses 4 and 13 when the ignition switch is turned to the Start or Drive position. They light up through being grounded via pins 14 and 22 of the control module.




## Passenger airbag

The passenger airbag module contains a gas generator and airbag. The airbag has a volume of 150 litres. Inflation time is about 50 ms.

The gas generator is screwed to the airbag housing which in its turn is screwed to the dashboard. The airbag housing is fitted in the space normally occupied by the glove box on cars not equipped with an airbag for the passenger.

The passenger airbag is connected to pins 15 and 16 of the control module by connector H2-80. On cars not equipped with a passenger airbag, a resistor 429 is connected across these pins.

### Passenger airbag gas generator

The gas generator consists of an aluminium container divided into an inner chamber, a centre chamber and two outer chambers.

The inner chamber contains an electric detonator and an explosive charge. Passages connect the inner chamber with the centre chamber.

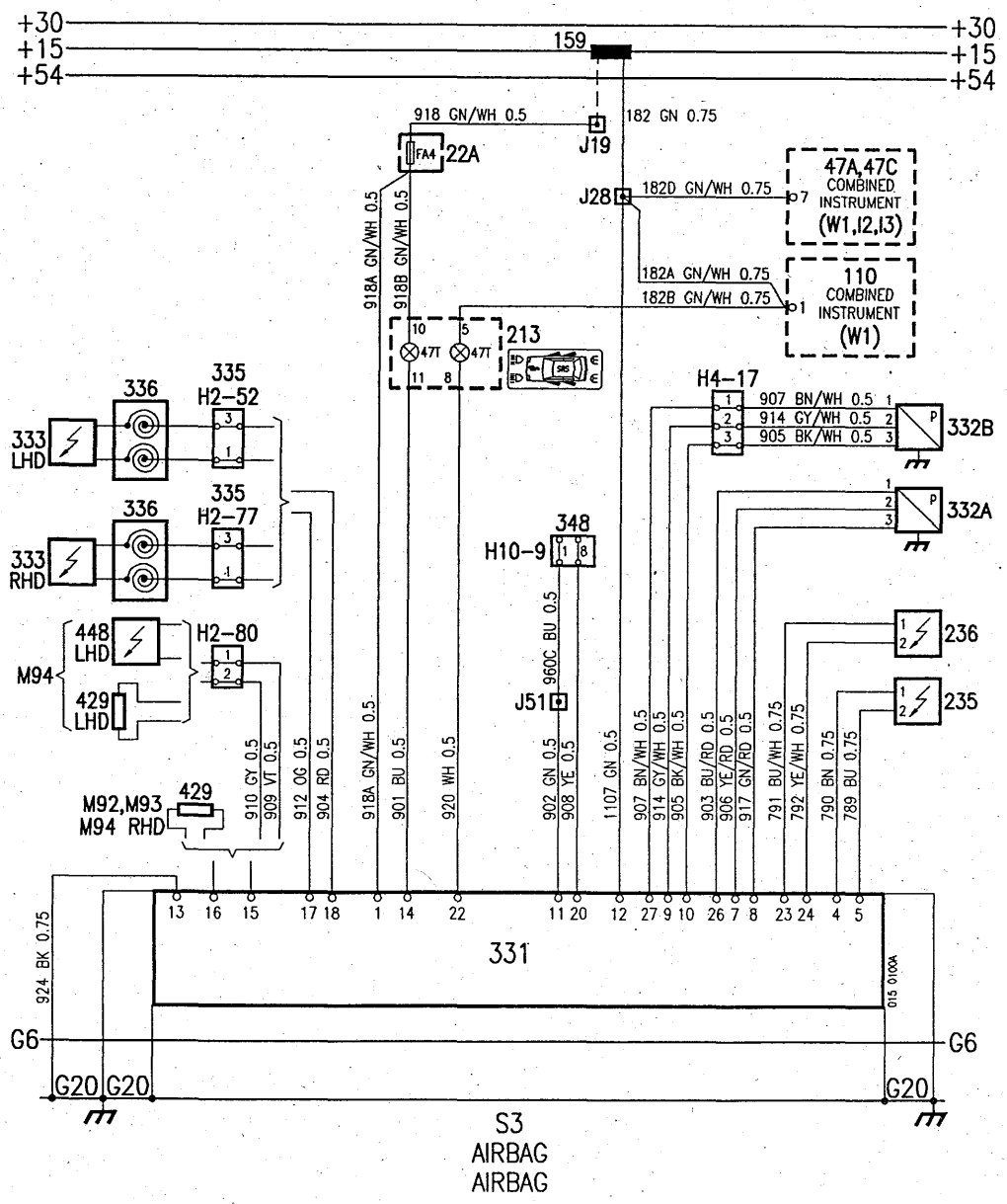
The centre chamber contains fuel in tablet form that generates a gas when it burns. Passages fitted with a filter connect the centre chamber with the two outer chambers. The filter separates and collects particles from the gas.

The gas passes an additional filter in the outer chambers before it enters the airbag.

## Knee shield

U.S. specification cars are equipped with a knee shield of impact-absorbing material on the passenger's side to protect the passenger's knees.

## Wiring diagram

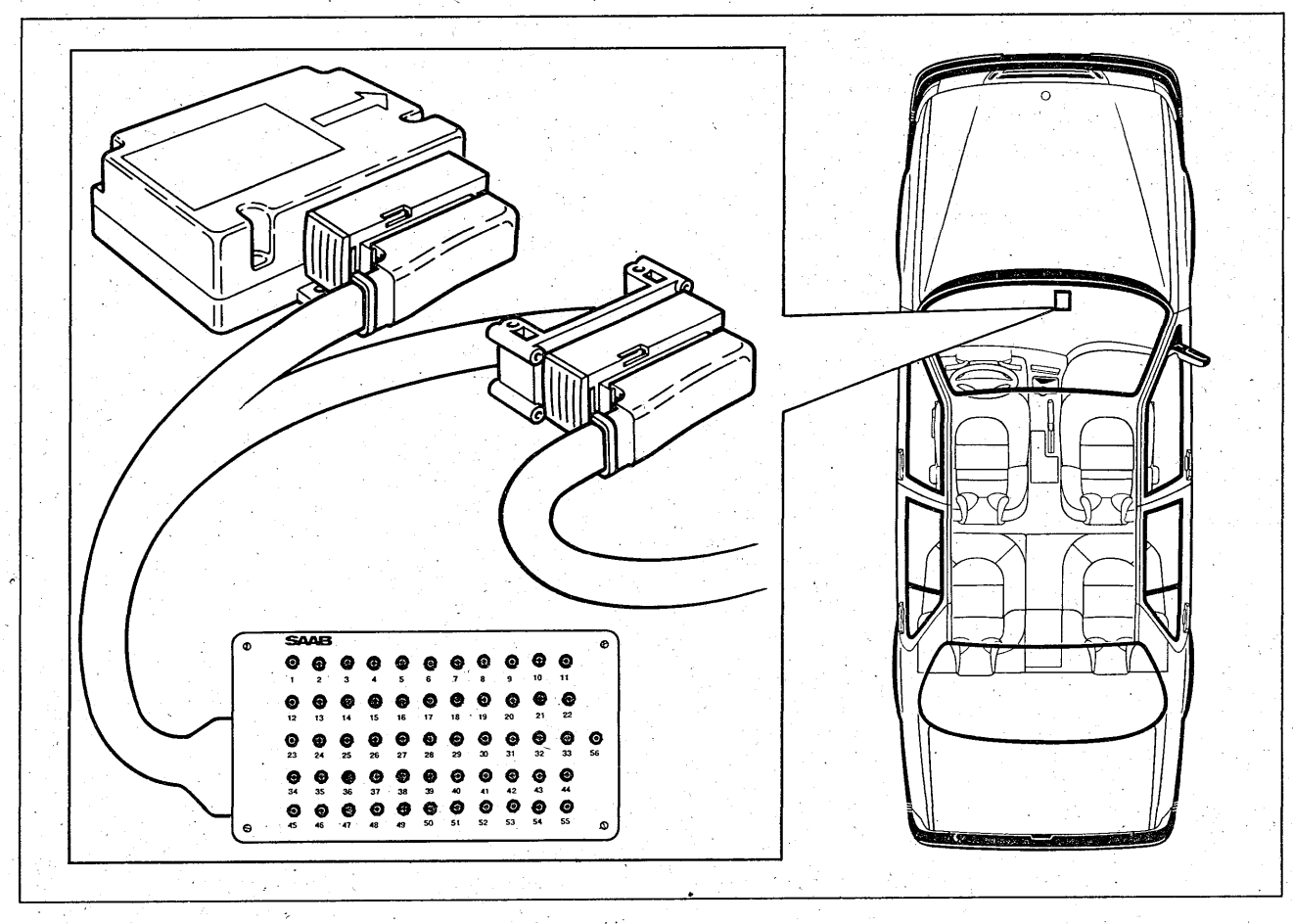


# Command codes

**Important**

If no diagnostic trouble codes are stored in the memory when command codes 101-105 are used, communication will end.

| Command | Description |
|---|---|
| 100 | Shows all stored diagnostic trouble codes. |
| 101 | Shows diagnostic trouble code 1 with hour and fault counters.<br>Apart from the diagnostic trouble code, the ISAT will then also show "802419 15", for instance (24 = 24 hours, 19 = 19 minutes, 15 = 15 times). This means that the fault occurred 24 hours and 15 minutes ago, that it is intermittent and that it has occurred 15 times. |
| 102 | Shows diagnostic trouble code 2 with hour and fault counters. |
| 103 | Shows diagnostic trouble code 3 with hour and fault counters. |
| 104 | Shows diagnostic trouble code 4 with hour and fault counters. |
| 105 | Shows diagnostic trouble code 5 with hour and fault counters. |
| 380 | Shows serial number of control module.<br>The ISAT then shows "8B12345678", for instance, in which 12345678 is the serial number. |
| 381 | This command code is provided only on M1992 and M1993 and certain M1994 having control modules assigned part No. 41 76 368 (these control modules are programmed by the manufacturer).<br>Shows programming.<br>If the ISAT shows "8B203", the control module is incorrectly programmed. If it shows "8B204", the control module is correctly programmed. |
| 550 | Turns on bulb 2 in the SRS symbol, causing it to shine with a steady light for about five seconds. |
| 551 | Turns on bulb 1 in the SRS symbol, causing it to flash for about five seconds. |
| 800 | Ends communication. |
| 900 | Clears all trouble codes, resets all fault counters to zero and ends communication. |
| B24 | This command code is provided only on M1992 and M1993 and certain M1994 having control modules assigned part No. 41 76 368 (these control modules are programmed by the manufacturer). |




# Diagnostic trouble codes

The airbag system has system number 7.

**Important**

The ignition must have been switched on for at least one minute before readouts of diagnostic trouble codes are obtained on the ISAT. The control module needs one minute to determine whether the trouble codes are to be classified as permanent or intermittent.

For a trouble code to be classified as permanent, it must have been generated by the control module for at least one whole minute.

If the fault disappears before one minute has elapsed, the fault is instead classified as intermittent.

If the fault disappears after one minute has elapsed, it will be reclassified from permanent to intermittent.

The following abbreviations are used in the table:

FS 1 = Front sensor, left-hand
FS 2 = Front sensor, right-hand
Electric detonator 1 = Electric detonator, driver's airbag
Electric detonator 2 = Electric detonator, left-hand belt tensioner
Electric detonator 3 = Electric detonator, right-hand belt tensioner
Electric detonator 4 = Electric detonator, passenger's airbag

| Permanent diagnostic trouble codes | Intermittent diagnostic trouble codes | Explanation | Procedure, see page |
|---|---|---|---|
| 43A21 | 23A21 | Electric detonator 1, no continuity | 20 |
| 43A22 | 23A22 | Electric detonator 4, no continuity | 21, 23 |
| 43A24 | 23A24 | Electric detonator 2, no continuity | 28 |
| 43A25 | 23A25 | Electric detonator 3, no continuity | 28 |
| 43A31 | 23A31 | Electric detonator 1, short circuit | 27 |
| 43A32 | 23A32 | Electric detonator 4, short circuit | 24, 26 |
| 42450 | 22450 | Secondary current, no continuity | 43 |
| 42482 | 22482 | Bulb 2, SRS symbol, shorting to battery positive | 35 |
| 45321 | 25321 | FS 1, no continuity | 30 |
| 45322 | 25322 | FS 2, no continuity | 31 |
| 45341 | 25341 | FS 1, resistance to ground too high | 33 |
| 45342 | 25342 | FS 2, resistance to ground too high | 33 |
| 47421 | 27421 | Bulb 1, SRS symbol, faulty or open circuit | 34 |
| 47471 | 27471 | Bulb 1, SRS symbol, shorting to ground | 36 |
| 47481 | 27481 | Bulb 1, SRS symbol, shorting to battery positive | 35 |
| 67570 | 77570 | Electric detonator 1, shorting to ground | 37 |
| | | Electric detonator 2, shorting to ground | 37 |
| | | Electric detonator 3, shorting to ground | 37 |
| | | Electric detonator 4, shorting to ground | 37 |
| | | FS 1, shorting to ground | 37 |
| | | FS 2, shorting to ground | 37 |
| 67580 | 77580 | Electric detonator 1, shorting to battery positive | 40 |
| | | Electric detonator 2, shorting to battery positive | 40 |
| | | Electric detonator 3, shorting to battery positive | 40 |
| | | Electric detonator 4, shorting to battery positive | 40 |
| | | FS 1, shorting to battery positive | 40 |
| | | FS 2, shorting to battery positive | 40 |
| 67590 | – | Control module faulty | - |
| – | 77590 | Control module faulty | 44 |
| 67592 | – | Collision registration | - |
| E 2991 | – | System incorrectly programmed | 44 |

# Fault diagnosis

**Important**

Before starting any work on the airbag system, always carry out the following measures first:

- Read through the section entitled "Safety and handling instructions".
- Disconnect the negative battery cable.
- Unscrew the steering wheel centre pad and unplug the connector at the rear of the pad. Plug reference resistor 84 71 153 into the connector.
- In addition, on cars equipped with a passenger airbag:
  Remove the bottom cover and unplug the passenger airbag connector, see the section entitled "Removal of the passenger airbag". Connect reference resistor 87 71 153 to the wiring connector by means of cable 86 11 378.

The last three points eliminate the need to wait for 20 minutes with the ignition switched on after disconnecting the battery, as pointed out in "Safety and handling instructions".

Also take note of the following:

- Never splice any SRS cables. Splicing could give rise to malfunctioning of the system, rendering it unserviceable and in the worst case leading to serious injuries.
- If a connector is unplugged while the ignition is switched on, a control module fault will be registered. This fault will remain stored until it is cleared and the connector plugged in again.
- If the fault cannot be found by carrying out the indicated fault diagnosis procedure, try changing the control module as a last resort.
  Clear the diagnostic trouble codes and wait for at least 40 seconds with the ignition switched on after completing each diagnostic measure. Check once again that no trouble codes remain stored in the memory.

**Important**

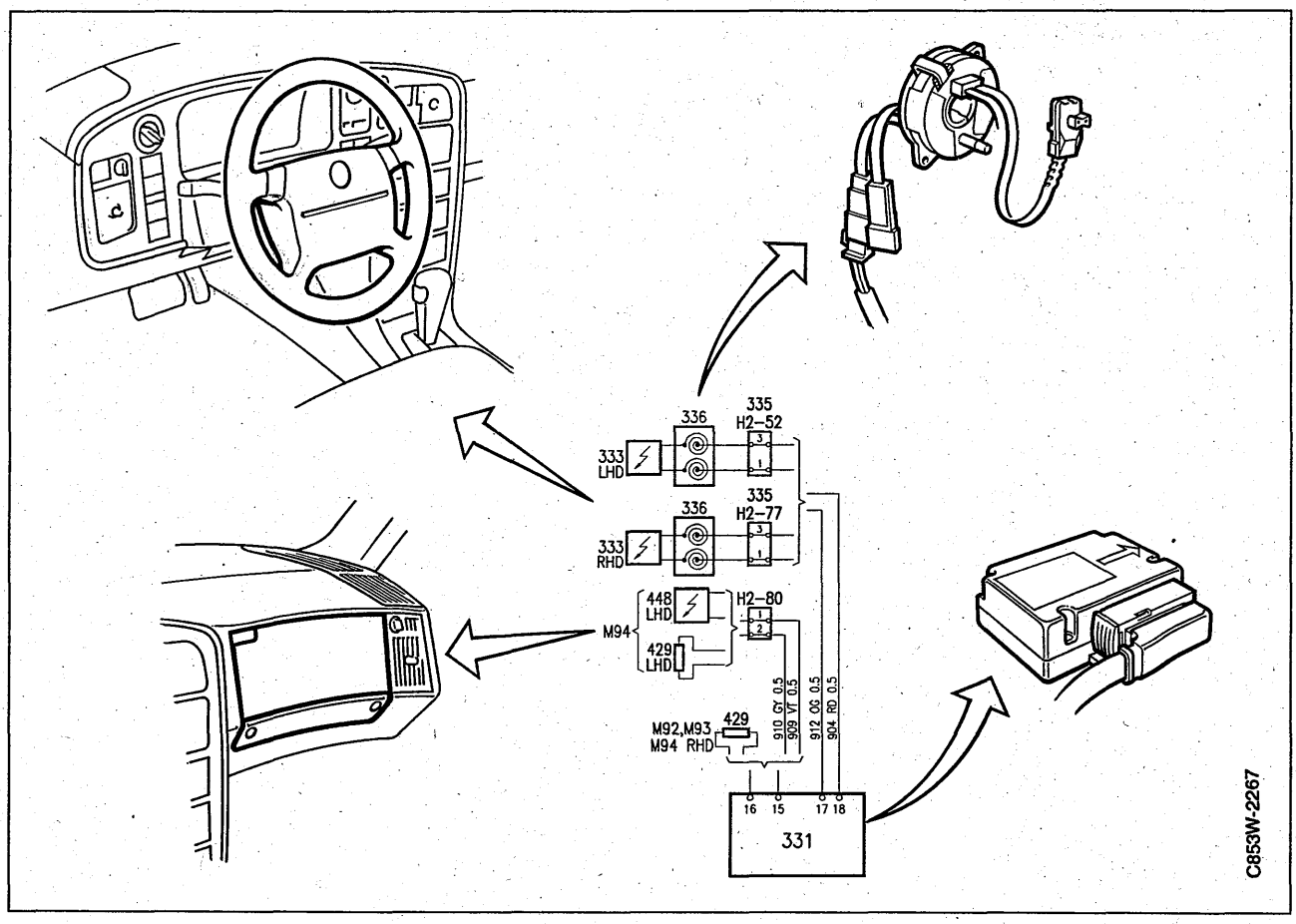
The diagnostic measures apply to permanent faults only. If the fault is intermittent, it might not occur while fault diagnosis is in progress. Clear the trouble codes and try to provoke the fault by shaking or jiggling the relevant connectors, leads, etc.

If this fails to produce results, try changing components in the order listed under the appropriate component heading below:

| Front sensor | Electric detonator 1 | Electric detonators 2 and 3 |
|---|---|---|
| - front sensor | - contact unit | - belt tensioner |
| - wiring | - wiring | - wiring |
| - control module | - steering wheel centre pad | - control module |
| | - control module | |

Electric detonator 4
- wiring
- passenger airbag
- control module

Clear the trouble codes and drive the car for at least ten minutes after each component replacement. Afterwards check that no faults are present.




**Diagnostic trouble code 43A21**
Electric detonator 1, no continuity

1 Unscrew the steering wheel centre pad and unplug the connector at the rear of the pad. Plug reference resistor 84 71 153 into the connector.

In addition, on cars equipped with a passenger airbag: remove the bottom cover and unplug passenger airbag connector H2-80. Connect reference resistor 84 71 153 to the connector by means of cable 86 11 378.

2 Unplug the connector at control module 331 and check pins 17 and 18 for continuity.

Plug in the connector, clear the trouble code and wait with the ignition switched on for at least 40 seconds. Then check whether the trouble code recurs.

If it does not, the fault was in the connector.

If it does, continue with point 3.

3 Unplug connector H2-52 and check pins and sockets for continuity.

Plug in the connectors, clear the trouble code and wait with the ignition switched on for at least 40 seconds. Then check whether the trouble code recurs.

If it does not, the fault was in the connector.

If it does, continue with point 4.

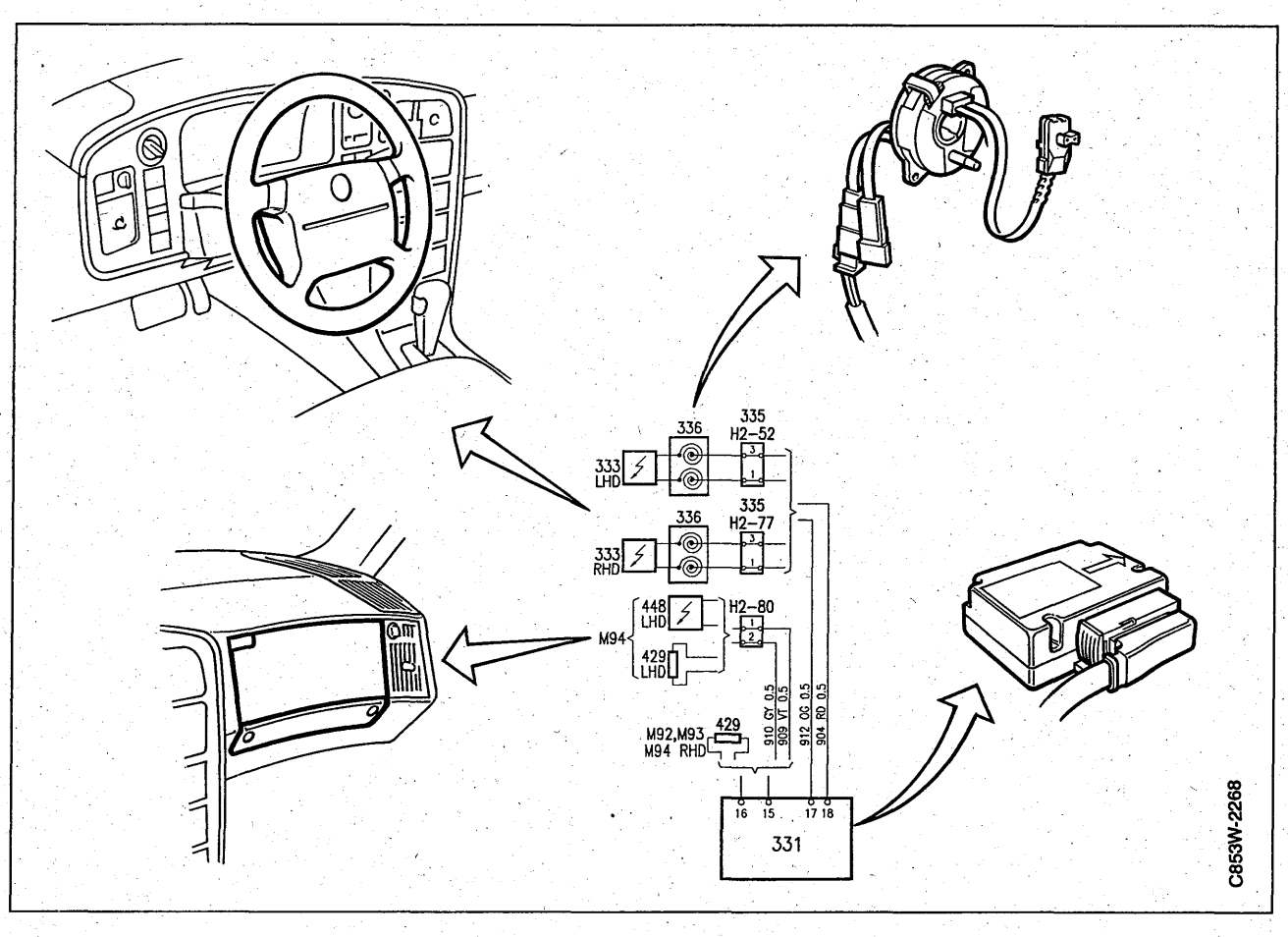
4 Unplug connector H2-52 and disconnect reference resistor 84 71 153 from the steering wheel centre pad connector. Change the contact roller (coil spring), plug in the connector and reconnect the reference resistor.

Clear the trouble code and wait with the ignition switched on for at least 40 seconds. Then check whether the trouble code recurs.

If it does not, the fault was in the contact roller.

If it does, the fault is in the wiring between connector H2- 52 and the connector at the control module.

Determine the cause. Rectify the fault or change the wiring as necessary.




**Diagnostic trouble code 43A22. Cars equipped with a passenger airbag.**

Electric detonator 4, no continuity

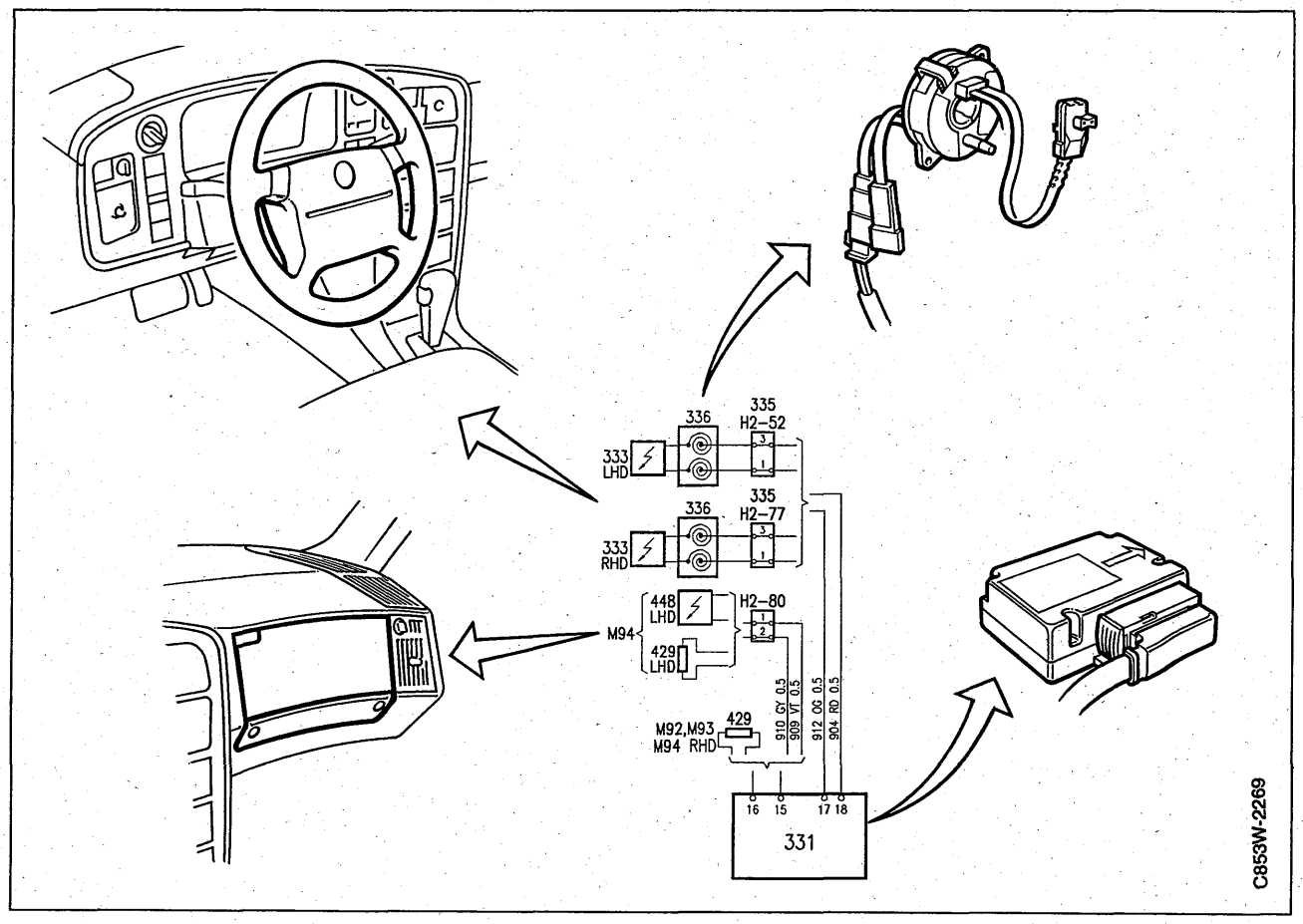
1 Unscrew the steering wheel centre pad and unplug the connector at the rear of the pad. Plug reference resistor 84 71 153 into the connector.

Remove the bottom cover and unplug passenger airbag connector H2-80. Connect reference resistor 84 71 153 to the connector by means of cable 86 11 378.

2 Switch on the ignition and clear the trouble code. Switch the ignition off and on again, wait at least 40 seconds. Check whether the trouble code recurs.

If it does, continue with point 3.

If it does not, the fault could be in the passenger airbag. Switch off the ignition and carry out a double check by plugging in the airbag. Switch on the ignition and wait for at least 40 seconds. Check whether the trouble code recurs.




3 Switch off the ignition and unplug the connector at the control module. Check pins 15 and 16 for continuity/retraction.

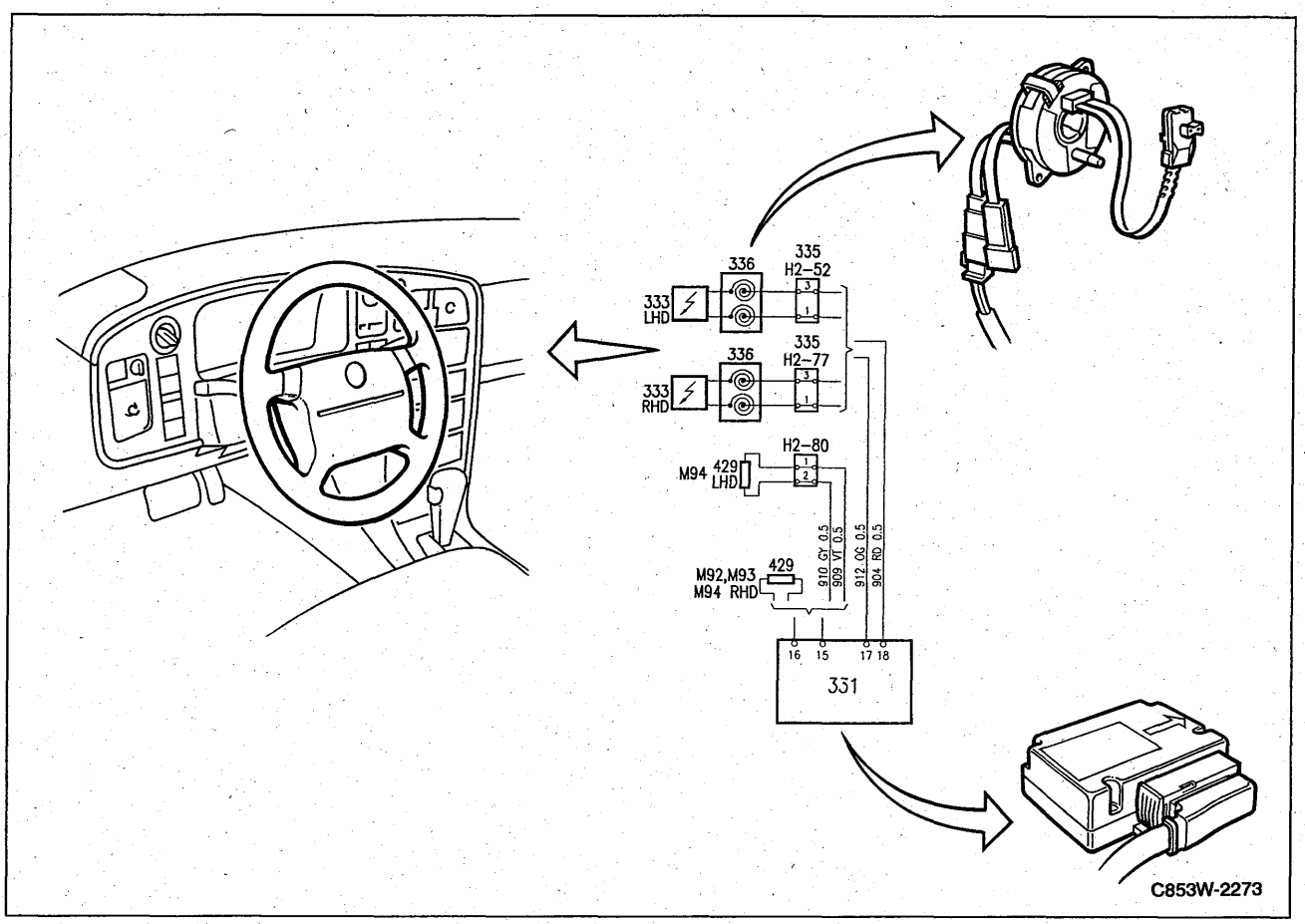
Plug in the connector, switch on the ignition and clear the trouble code. Switch the ignition off and on again, wait at least 40 seconds. Check whether the trouble code recurs.

If it does not, the fault was in the connector.

If it does, check the wiring by connecting breakout box 86 11 006 to the control module connector and measuring the resistance across pins 15 and 16.

If the resistance is high, determine the cause and change the wiring as necessary.

If the resistance is 2-3 ohms, plug the connector into the control module, switch on the ignition and clear the trouble code. Switch the ignition off and on again, wait at least 40 seconds. Check whether the trouble code recurs.
If it does, turn to page 45 and read the section entitled "Procedure for control module replacement".




**Diagnostic trouble code 43A22. Cars not equipped with a passenger airbag**

Electric detonator 4, no continuity

1 Unscrew the steering wheel centre pad and unplug the connector at the rear of the pad. Plug reference resistor 84 71 153 into the connector.

2 Unplug the connector at the control module and check pins 15 and 16 for continuity/retraction. Plug in the connector, switch on the ignition and clear the trouble code. Switch the ignition off and on again, wait at least 40 seconds. Check whether the trouble code recurs.

If it does not, the fault was in the connector.

If it does, continue with point 3.

3 Switch off the ignition and unplug connector H2-80 with resistor under the glove box. Use an ohmmeter to measure the resistance across the pins of the connector with resistor.

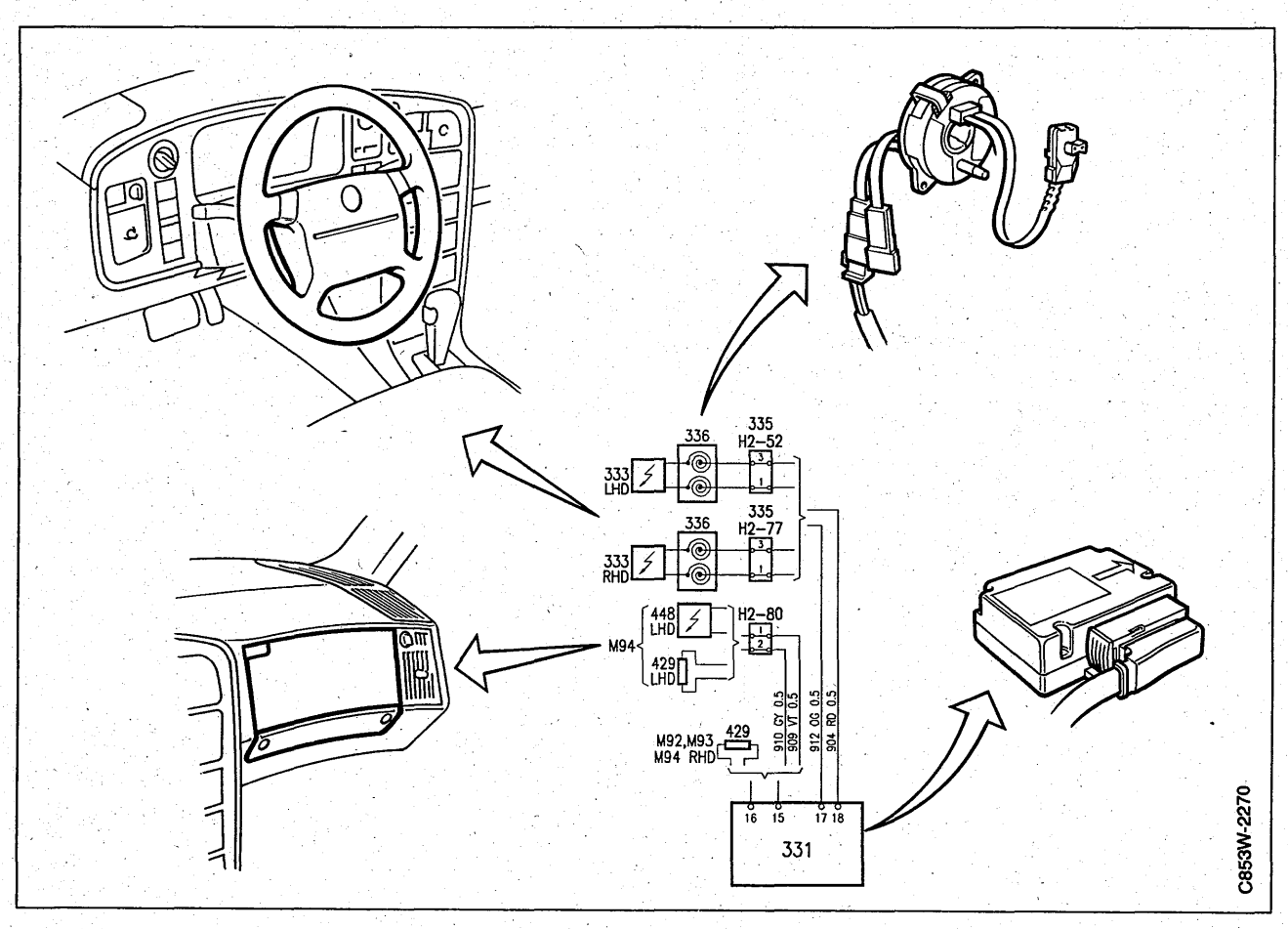
If the resistance is high, change the resistor complete with connector.

If the resistance is 2-3 ohms, the fault could be n the wiring between the resistor's connector and the control module's connector.

Determine the cause. Change the wiring as necessary.

Switch on the ignition and clear the trouble code. Switch the ignition off and on again, wait at least 40 seconds. Check whether the trouble code recurs.

If it does, turn to page 45 and read the section entitled "Procedure for control module replacement".




**Diagnostic trouble code 43A32. Cars equipped with a passenger airbag**

Electric detonator 4, short circuit

1 Unscrew the steering wheel centre pad and unplug the connector at the rear of the pad. Plug reference resistor 84 71 153 into the connector.

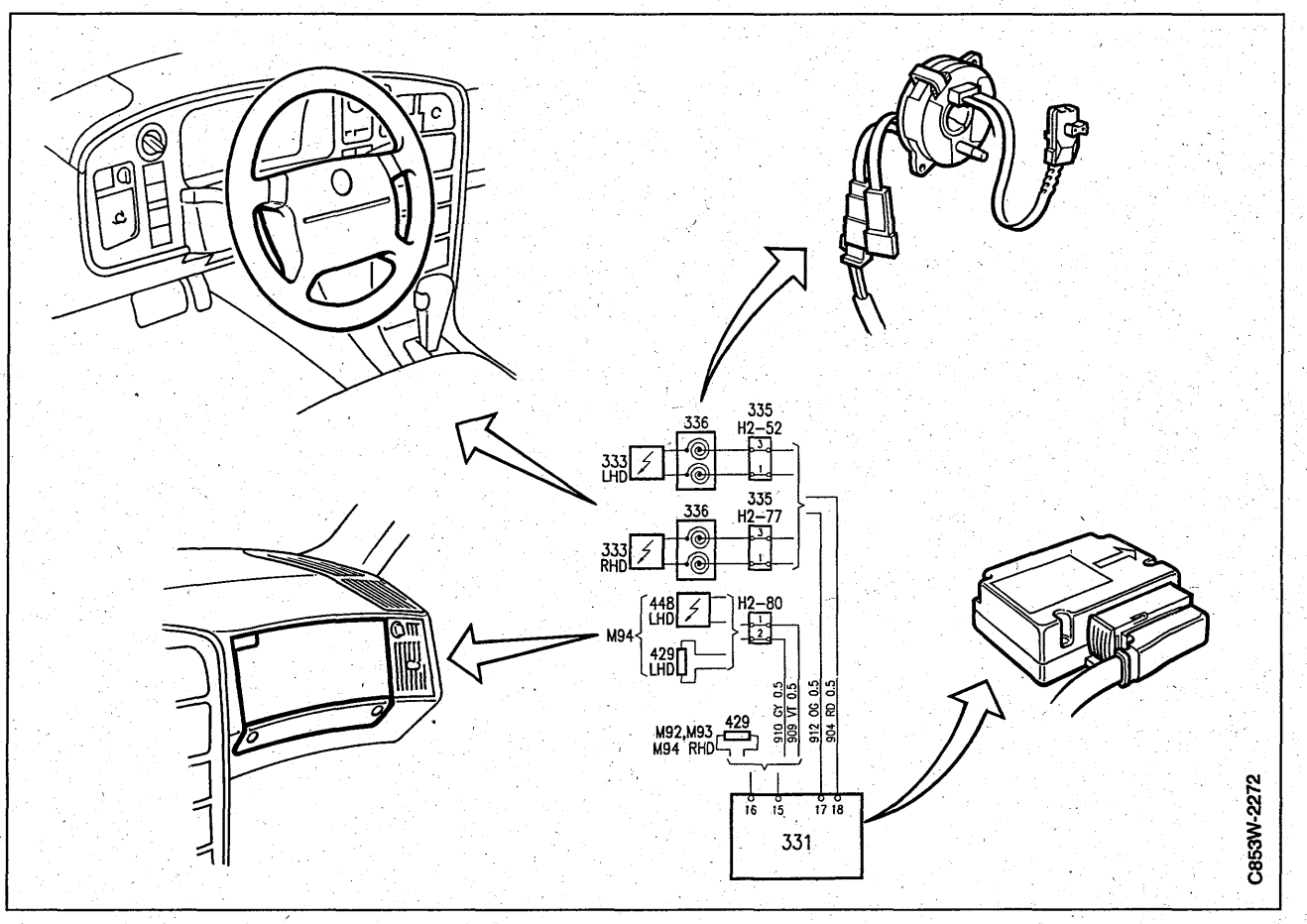
Remove the bottom cover and unplug passenger airbag connector H2-80. Connect reference resistor 84 71 153 to the connector by means of cable 86 11 378.

2 Switch on the ignition and clear the trouble code. Switch the ignition off and on again, wait at least 40 seconds. Check whether the trouble code recurs.

If it does, continue with point 3.

If it does not, the fault could be in the passenger airbag. Switch off the ignition and carry out a double check by plugging in the airbag. Switch on the ignition and wait for at least 40 seconds. Check whether the trouble code recurs.

If it does, switch off the ignition and change the passenger airbag. Switch on the ignition and clear the trouble code. Switch the ignition off and on again, wait at least 40 seconds. Check whether the trouble code recurs.




3 Switch off the ignition, unplug the connector at the control module and check the operation of the short-circuiting strip between pins 15 and 16 of the connector.

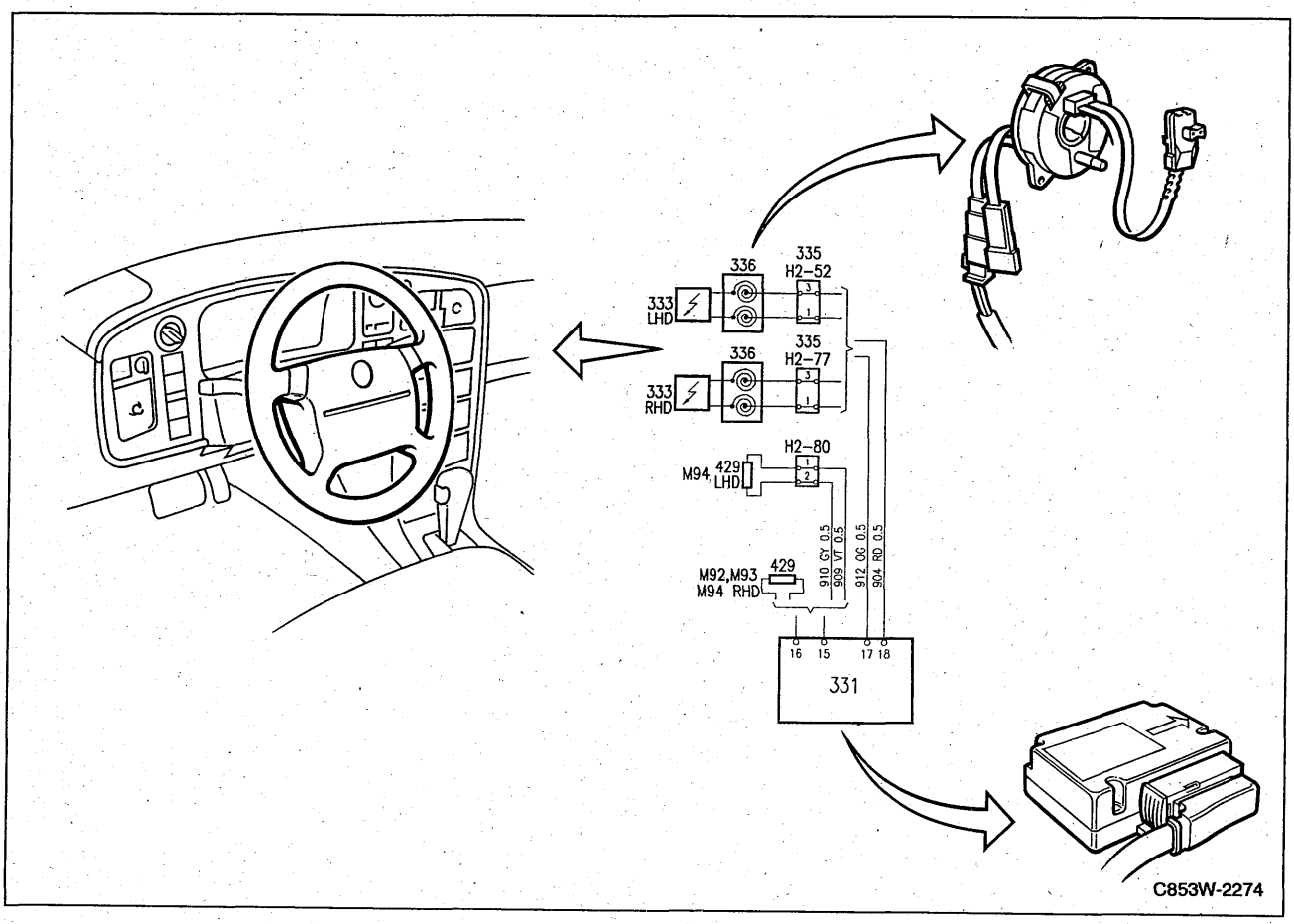
Remove the reference resistor.

Check the wiring by connecting breakout box 86 11 006 to the control module connector and measuring the resistance across pins 15 and 16.

If the resistance is low, determine the cause and change the wiring as necessary.

If the resistance is high, connect the reference resistor and connector to the control module, switch on the ignition and clear the trouble code. Switch the ignition off and on again, wait at least 40 seconds. Check whether the trouble code recurs.

If it does, turn to page 45 and read the section entitled "Procedure for control module replacement".




**Diagnostic trouble code 43A32. Cars not equipped with a passenger airbag**

Electric detonator 4, short circuit

1 Unscrew the steering wheel centre pad and unplug the connector at the rear of the pad. Plug reference resistor 84 71 153 into the connector.

2 Unplug connector H2-80 with resistor under the glove box and change the connector complete with resistor. Switch on the ignition and clear the trouble code. Switch the ignition off and on again, wait at least 40 seconds.

Check whether the trouble code recurs.

If it does not, the fault was in the resistor.

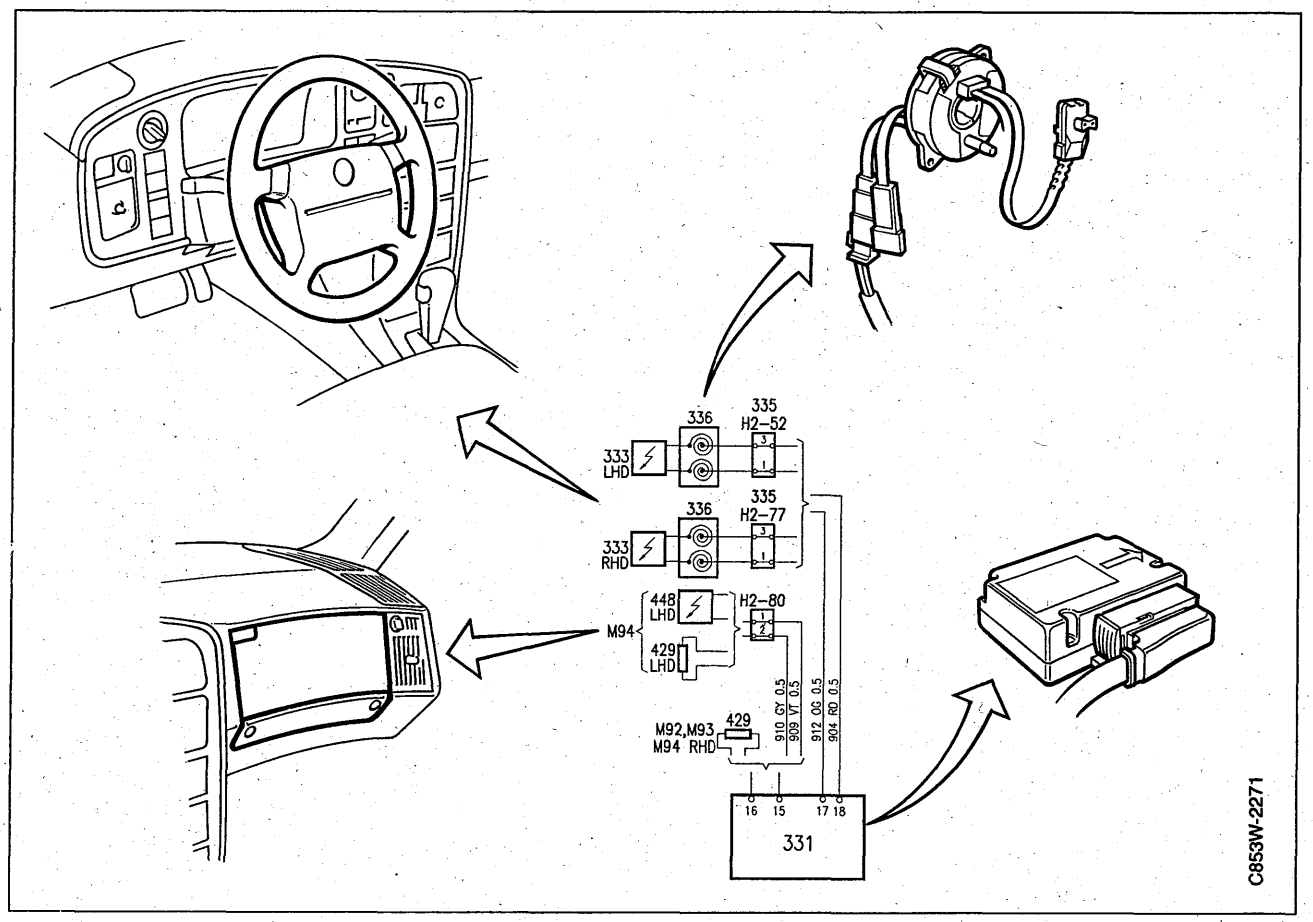
If it does, check the operation of the short-circuiting strip between pins 15 and 16 in the connector and the wiring between the resistor's connector and the control module's connector.

Rectify or change the wiring as necessary.

Switch on the ignition and clear the trouble code. Switch the ignition off and on again, wait at least 40 seconds. Check whether the trouble code recurs.

If it does not, the fault was in the wiring.

If it does, turn to page 45 and read the section entitled "Procedure for control module replacement".




**Diagnostic trouble code 43A31**

Electric detonator 1, short circuit

1 Unscrew the steering wheel centre pad and unplug the connector at the rear of the pad. Plug reference resistor 84 71 153 into the connector.

In addition, on cars equipped with a passenger airbag: remove the bottom cover and unplug passenger airbag connector H2-80. Connect reference resistor 84 71 153 to the connector by means of cable 86 11 378.

2 Unplug the connector at control module 331 and connect breakout box 86 11 006 to the connector on the wiring.

Unplug connector H2-52 and measure the resistance across pins 17 and 18 on the breakout box.

If the resistance is low, the fault is in the wiring between connector H2-52 and the connector at the control module.

Determine the cause. Rectify the fault or change the wiring as necessary.

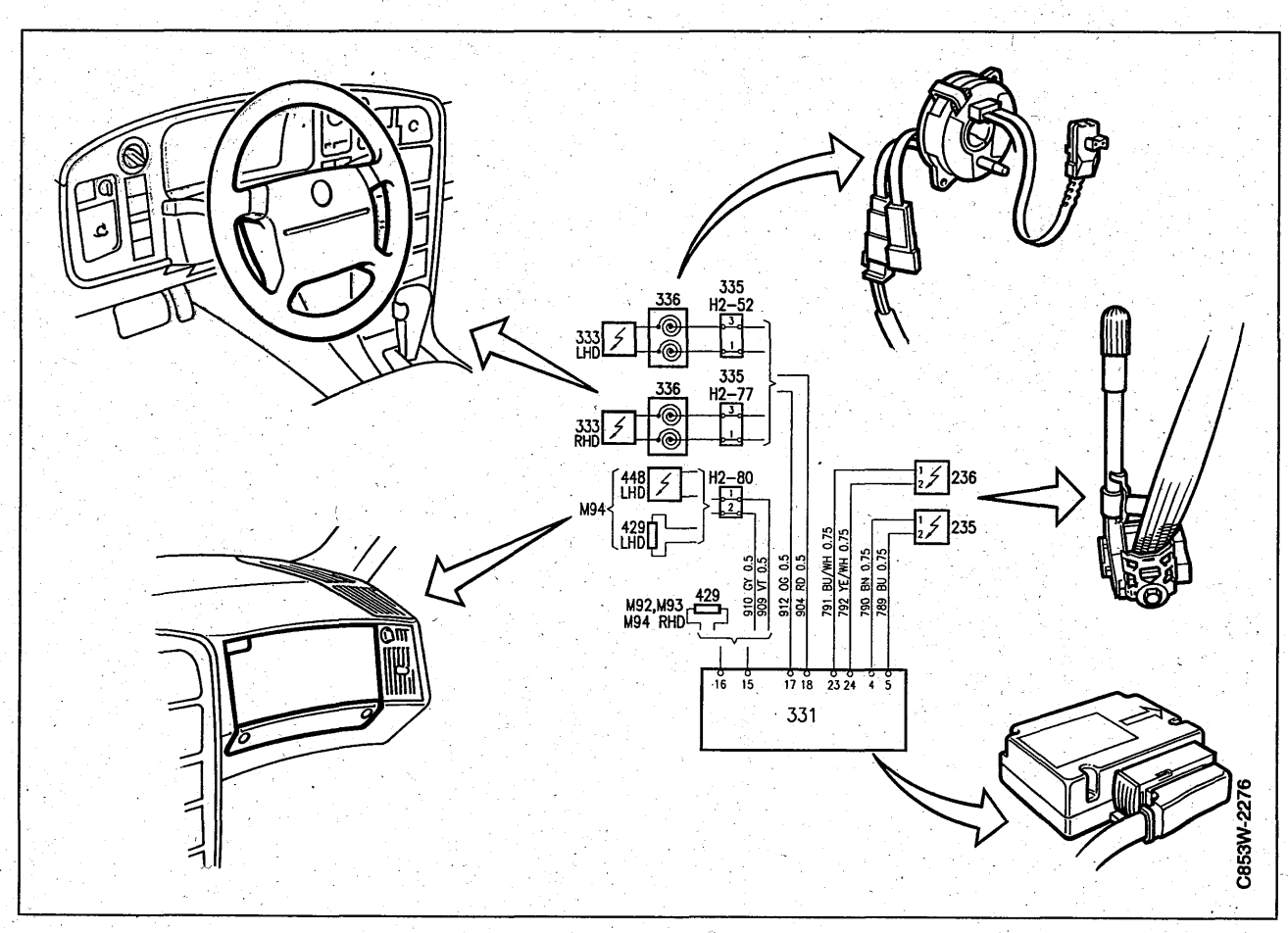
If the resistance is high, continue with point 3.

3 Change the contact roller (coil spring), connect the steering wheel centre pad and plug in connector H2-52. Also plug the connector into control module 331.

Clear the trouble code and wait with the ignition switched on for at least 40 seconds. Then check whether the trouble code recurs.

If it does not, the fault was in the contact roller.

If it does, the fault is in the steering wheel centre pad which should then be changed.




**Diagnostic trouble codes 43A24 and 43A25**

Electric detonators 2 and 3, no continuity

1 Unscrew the steering wheel centre pad and unplug the connector at the rear of the pad. Plug reference resistor 84 71 153 into the connector.

In addition, on cars equipped with a passenger airbag: remove the bottom cover and unplug passenger airbag connector H2-80. Connect reference resistor 84 71 153 to the connector by means of cable 86 11 378.

2 Unplug the connector at control module 331.

Check pins 4 and 5, 23 and 24 for continuity in the wiring connector.

Pins 4 and 5 are for left-hand belt tensioner 235 (electric detonator 2).

Pins 23 and 24 are for right-hand belt tensioner 236 (electric detonator 3).

Plug in the connector, clear the trouble code and wait with the ignition switched on for at least 40 seconds. Then check whether the trouble code recurs.

If it does not, the fault was in the connector.

If it does, continue with point 3.

3 Unplug the belt tensioner connector and plug reference resistor 84 71 153 into it.

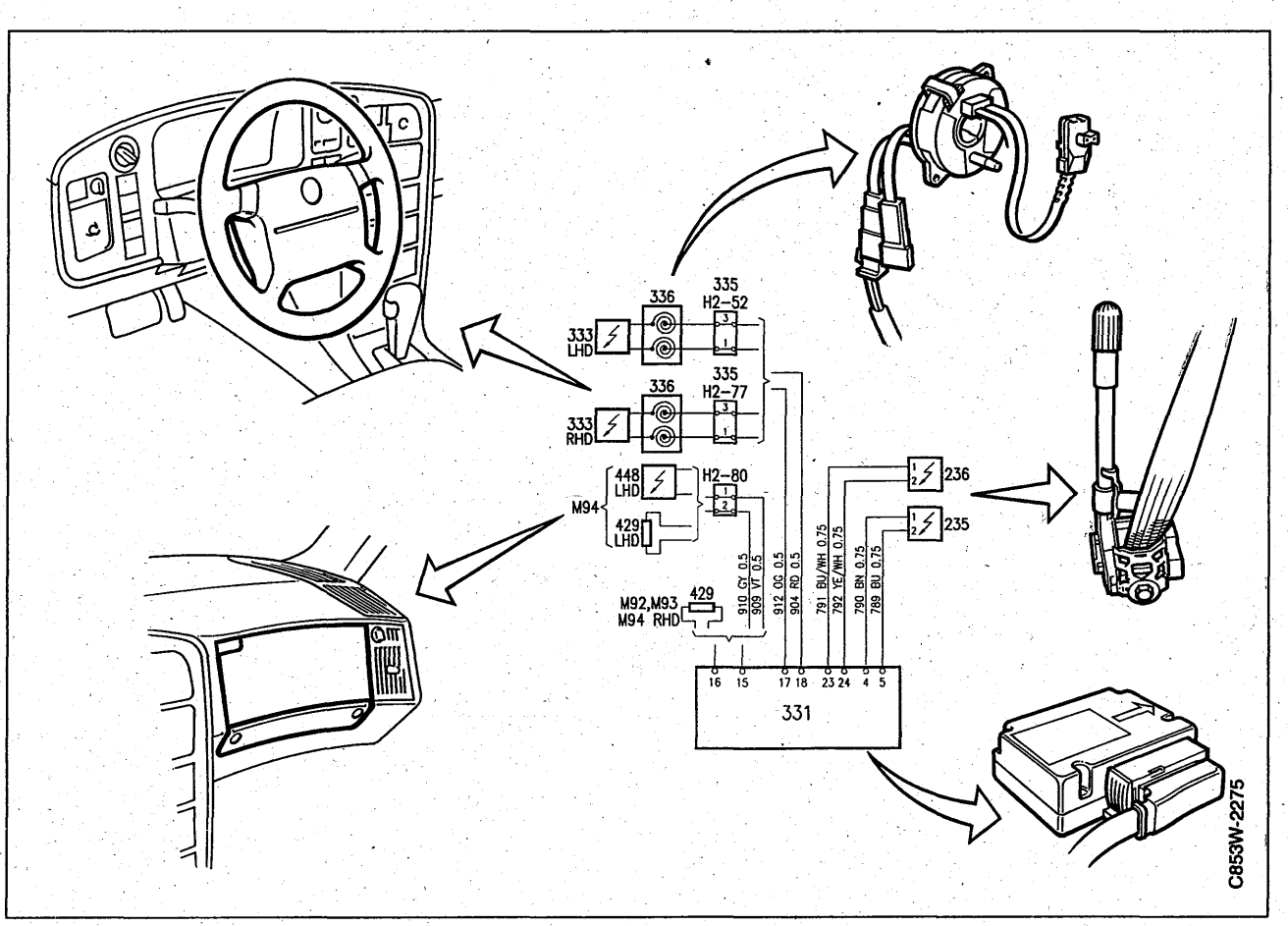
Clear the trouble code and wait with the ignition switched on for at least 40 seconds. Then check whether the trouble code recurs.

If it does, continue with point 4.

If it does not, the fault is probably in the belt tensioner which should then be changed.

Check by removing the reference resistor and plugging in the belt tensioner. Switch on the ignition and wait for at least 40 seconds.

If the trouble code recurs, the fault is in the belt tensioner.




4 Plug reference resistor 84 71 153 back into the belt tensioner connector.

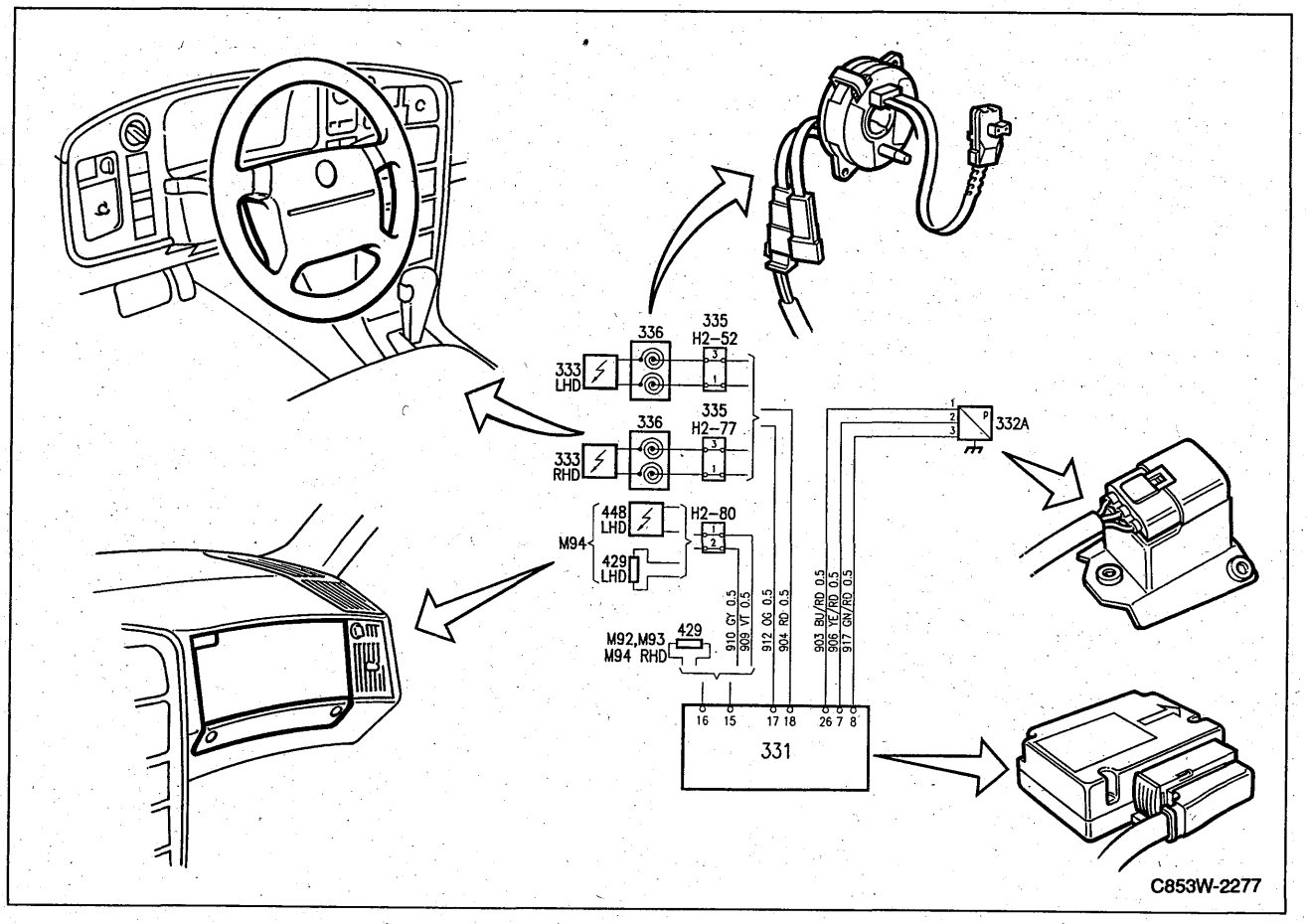
5 Unplug the connector at control module 331 and connect breakout box 86 11 006 to the connector on the wiring.

Measure the resistance across pins 4 and 5 for left-hand belt tensioner 235 (electric detonator 2) and across pins 23 and 24 for the right-hand belt tensioner (electric detonator 3).

The resistance should not be more than 100 ohms.

If it is higher than 100 ohms, the fault is in the wiring between the belt tensioner connector and the connector at control module 331.

Determine the cause. Rectify the fault or change the wiring as necessary.




**Diagnostic trouble code 45321**

FS 1, no continuity

1 Unscrew the steering wheel centre pad and unplug the connector at the rear of the pad. Plug reference resistor 84 71 153 into the connector.

In addition, on cars equipped with a passenger airbag: remove the bottom cover and unplug passenger airbag connector H2-80. Connect reference resistor 84 71 153 to the connector by means of cable 86 11 378.

2 Unplug the connector at control module 331 and check pins 7, 8 and 26 for continuity in the wiring connector.

Plug in the connector, clear the trouble code and wait with the ignition switched on for at least 40 seconds. Then check whether the trouble code recurs.

If it does not, the fault was in the connector.

If it does, continue with point 3.

3 Unplug the connector at front sensor 332A and check the pins for corrosion and continuity.

Plug in the connector, clear the trouble code and wait with the ignition switched on for at least 40 seconds. Then check whether the trouble code recurs.

If it does not, the fault was in the connector.

If it does, the fault is either in the wiring between the connector at the front sensor and the connector at the control module or else in the front sensor.

Try changing the front sensor, clear the trouble code and wait with the ignition switched on for at least 40 seconds.

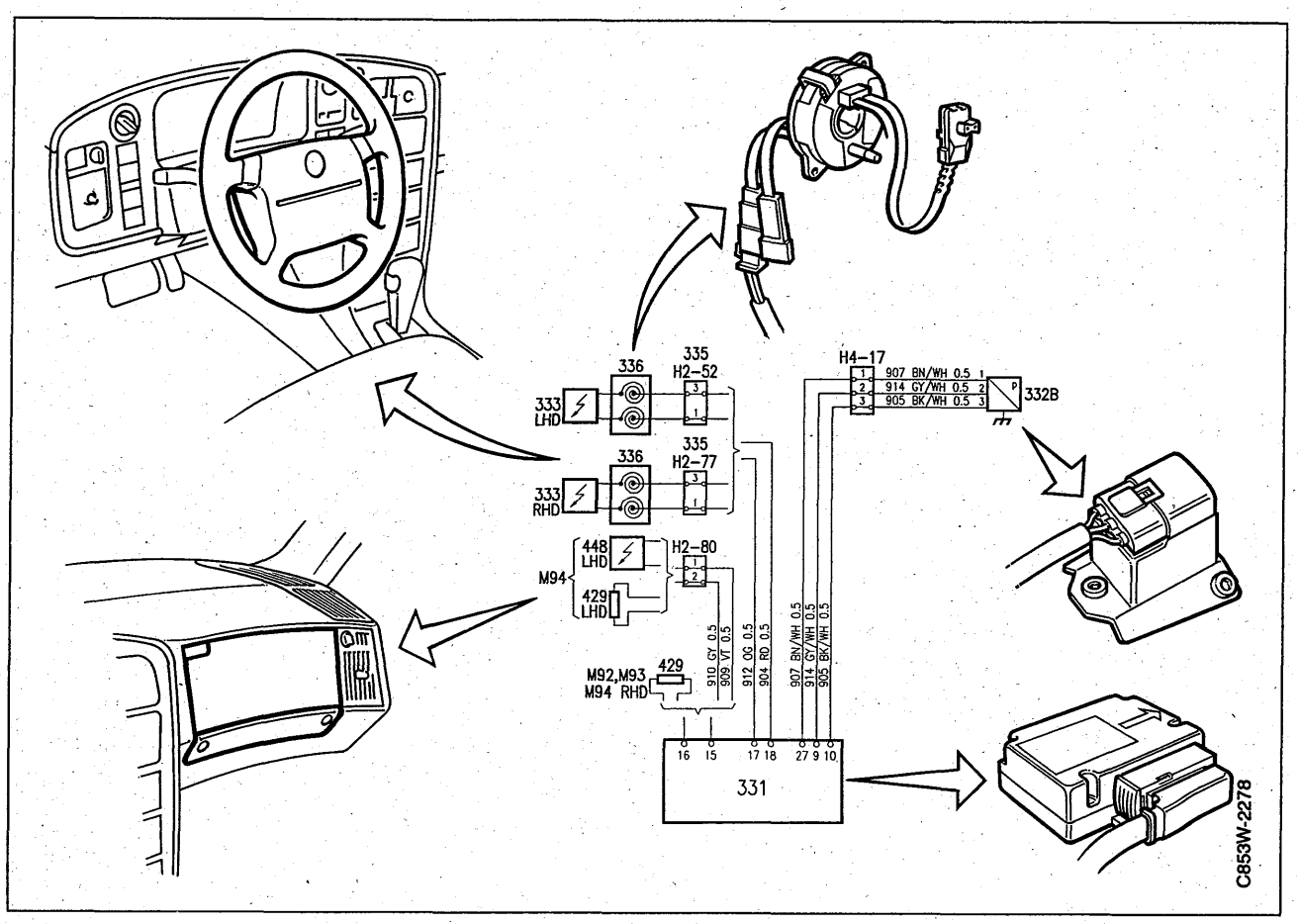
Then check whether the trouble code recurs.

If it does not, the fault was in the front sensor.

If it does, the fault is in the wiring between the connector at the front sensor and the connector at control module 331.

Determine the cause.

Rectify the fault or change the wiring as necessary.




**Diagnostic trouble code 45322**

FS 2, no continuity

1 Unscrew the steering wheel centre pad and unplug the connector at the rear of the pad. Plug reference resistor 84 71 153 into the connector.

In addition, on cars equipped with a passenger airbag: remove the bottom cover and unplug passenger airbag connector H2-80. Connect reference resistor 84 71 153 to the connector by means of cable 86 11 378.

2 Unplug the connector at control module 331 and check pins 27, 9 and 10 for continuity.

Plug in the connector, clear the trouble code and wait with the ignition switched on for at least 40 seconds. Then check whether the trouble code recurs.

If it does not, the fault was in the connector.

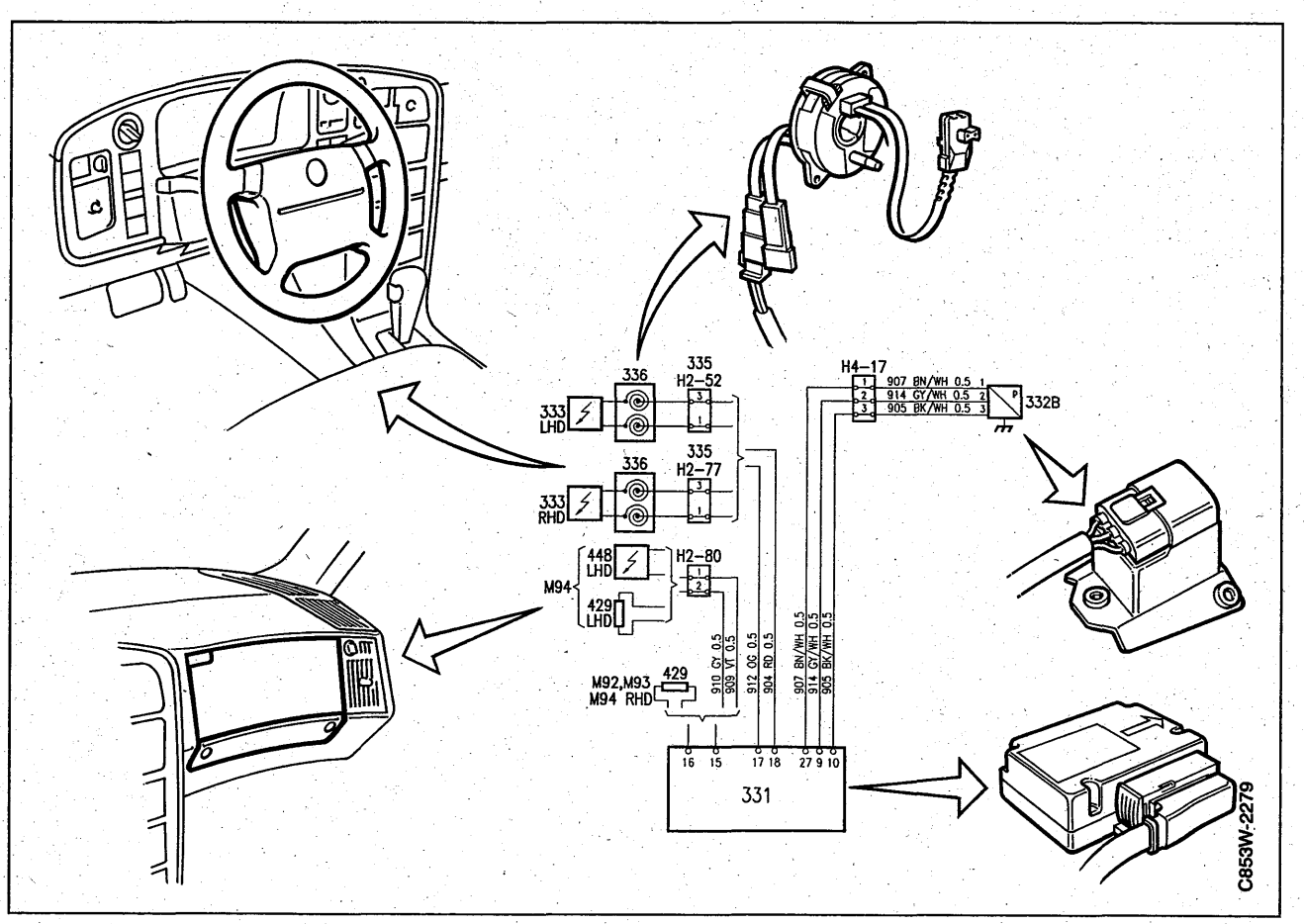
If it does, continue with point 3.

3 Unplug connector H4-17 and check the pins for corrosion and continuity.

Plug in the connector, clear the trouble code and wait with the ignition switched on for at least 40 seconds. Then check whether the trouble code recurs.

If it does not, the fault was in the connector.

If it does, continue with point 4.




4 Unplug the connector at front sensor 332 B and check the pins for corrosion and continuity.

Plug in the connector, clear the trouble code and wait with the ignition switched on for at least 40 seconds. Then check whether the trouble code recurs.

If it does not, the fault was in the connector.

If it does, the fault is probably in the front sensor.

Try changing the front sensor, clear the trouble code and wait with the ignition switched on for at least 40 seconds. Then check whether the trouble code recurs.

If it does not, the fault was in the front sensor.

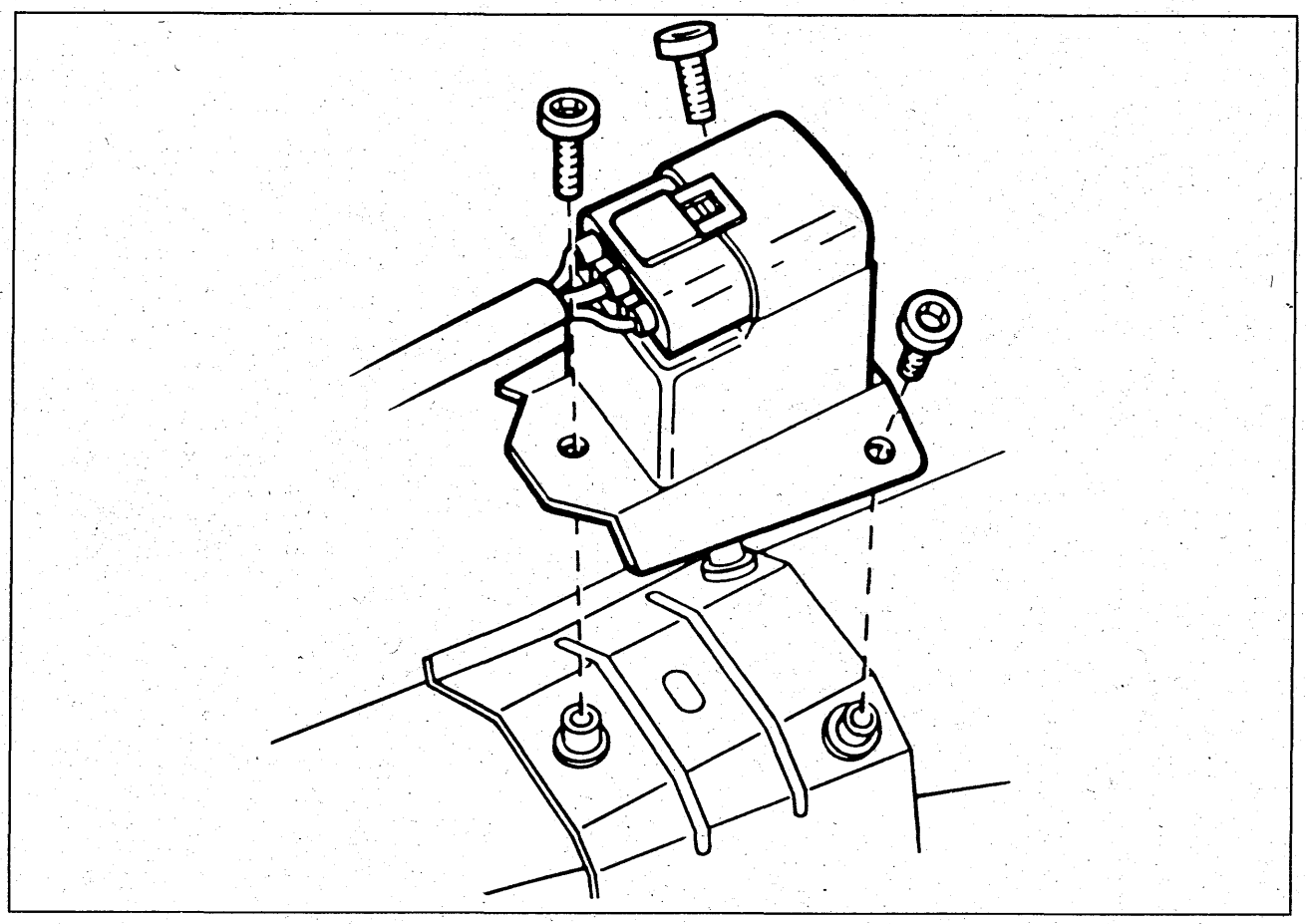
If it does, continue with point 5.

5 Change the wiring between connector H4-17 and the connector at front sensor 332B, clear the trouble code and wait with the ignition switched on for at least 40 seconds. Then check whether the trouble code recurs.

If it does not, the fault was in the wiring.

If it does, the fault is in the wiring between connector H4- 17 and the connector at control module 331.

Determine the cause. Rectify the fault or change the wiring as necessary.

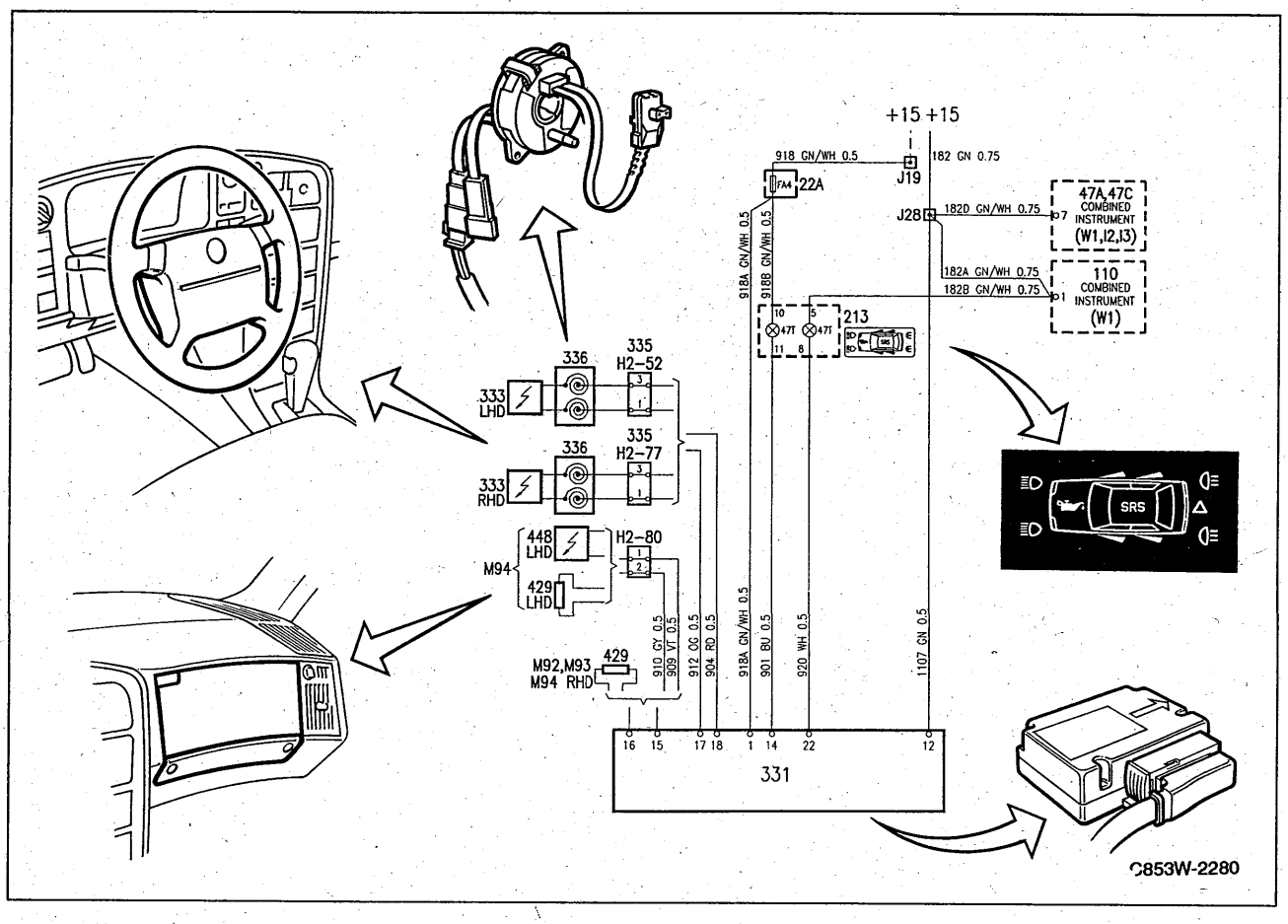


**Diagnostic trouble code 45341**

FS 1, resistance to ground too high
Undo the front sensor retaining screws. Clean the contact surfaces between the sensor and its bracket as well as the threads of the rivet nuts, using a wire brush or a blunt thread tap. Do not use chemicals.
Lubricate the threads and the cavities in the rivet nuts.
Lubricate the threads of three **new** retaining screws and screw them in place.
Use lubricant (45) 30 07 309, Ford Motorcraft Silicone Dielectric Compound or an equivalent product having good conductivity and high viscosity.
Clear the trouble code and wait with the ignition switched on for at least 40 seconds. Then check whether the trouble code recurs.
If it does, proceed with diagnostic trouble code 45321.

**Diagnostic trouble code 45342**

FS 2, resistance to ground too high
Undo the front sensor retaining screws. Clean the contact surfaces between the sensor and its bracket as well as the threads of the rivet nuts, using a wire brush or a blunt thread tap. Do not use chemicals.
Lubricate the threads and the cavities in the rivet nuts.
Lubricate the threads of three **new** retaining screws and screw them in place.
Use lubricant (45) 30 07 309, Ford Motorcraft Silicone Dielectric Compound or an equivalent product having good conductivity and high viscosity.
Clear the trouble code and wait with the ignition switched on for at least 40 seconds. Then check whether the trouble code recurs.
If it does, proceed with diagnostic trouble code 45322.




**Diagnostic trouble code 47421**
Bulb 1 in SRS symbol faulty or open circuit (bulb connected to pin 14 of the control module)

1 Unscrew the steering wheel centre pad and unplug the connector at the rear of the pad. Plug reference resistor 84 71 153 into the connector.

In addition, on cars equipped with a passenger airbag: remove the bottom cover and unplug passenger airbag connector H2-80. Connect reference resistor 84 71 153 to the connector by means of cable 86 11 378.

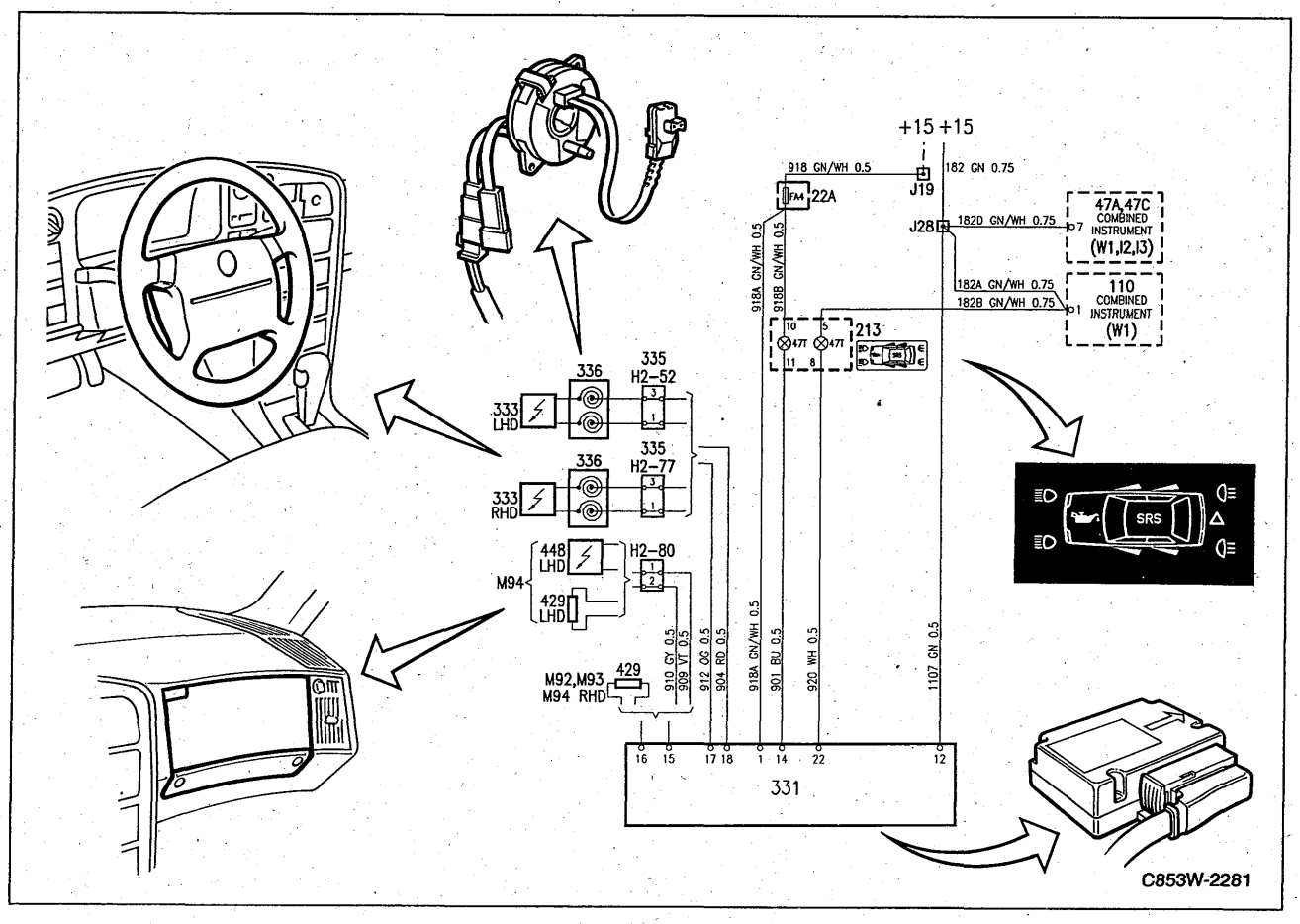
2 Test bulb 1 by entering command code 551 on the ISAT. The lamp should then flash for six seconds.

If it does not, continue with point 3.

3 Change the bulb, clear the trouble code and wait with the ignition switched on for at least 40 seconds. Then check whether the trouble code recurs.

If it does not, the bulb was faulty.

If it does, inspect the wiring between fuse 4 and pin 14 of the connector at control module 331 for continuity. Rectify the fault and clear the trouble code.




**Diagnostic trouble code 42482**

Bulb 2 in SRS symbol, shorting to battery positive (bulb connected to pin 22 in the connector at control module 331)

Shorting to battery positive is indicated by the SRS symbol going out between flashes during the first six seconds after the ignition is switched on.

1 Unscrew the steering wheel centre pad and unplug the connector at the rear of the pad. Plug reference resistor 84 71 153 into the connector.

In addition, on cars equipped with a passenger airbag: remove the bottom cover and unplug passenger airbag connector H2-80. Connect reference resistor 84 71 153 to the connector by means of cable 86 11 378.

2 Check lead 920 between pin 8 of the pictogram and pin 22 of the connector at control module 331 for shorting to battery positive.

3 Check the bulb for possible internal shorting. Change as necessary.

**Diagnostic trouble code 47481**

Bulb 1 in SRS symbol, shorting to battery positive (bulb connected to pin 14 in the connector at control module 331)

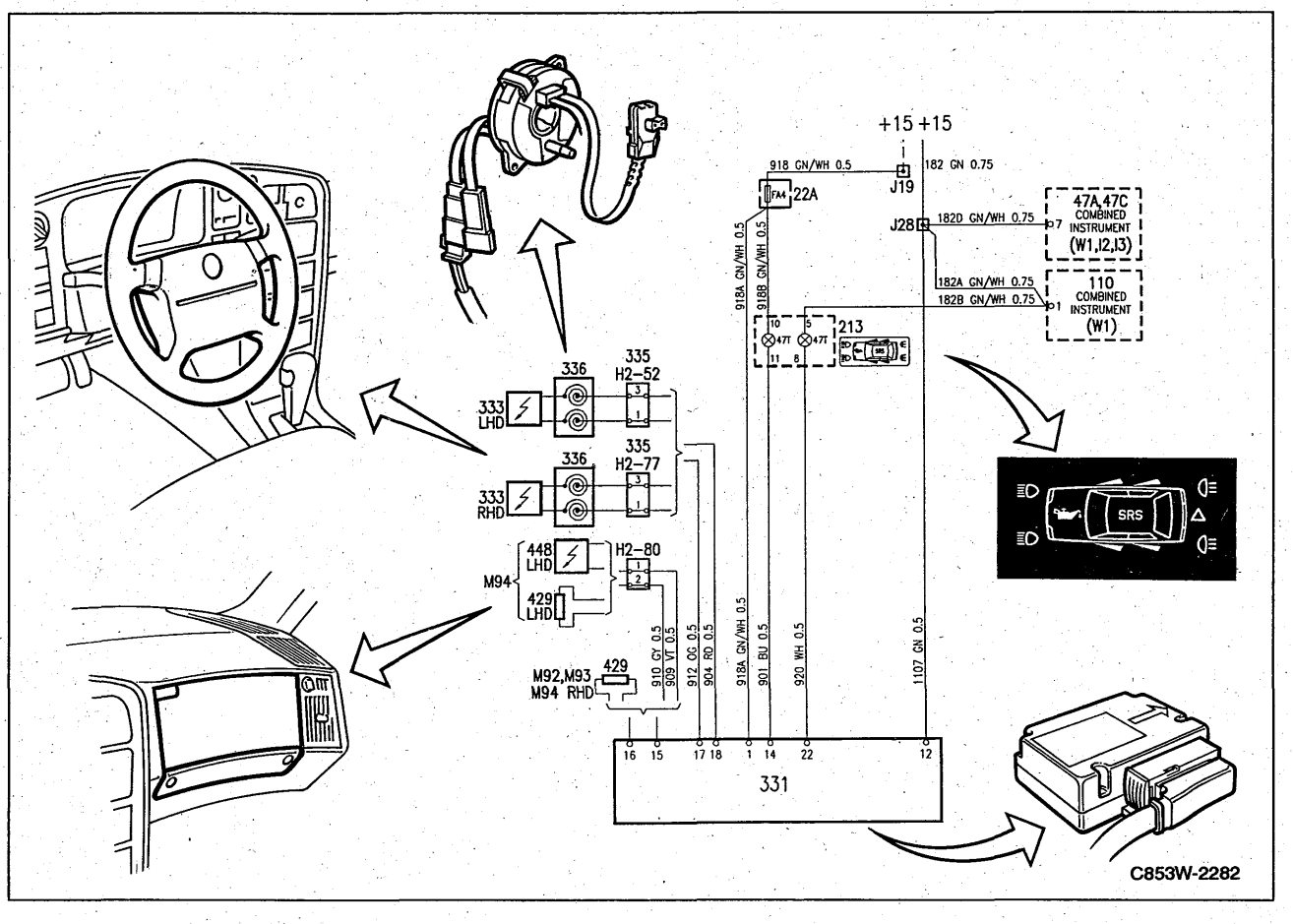
Shorting to battery positive is indicated by the SRS symbol shining with a steady light when the ignition is switched on.

1 Unscrew the steering wheel centre pad and unplug the connector at the rear of the pad. Plug reference resistor 84 71 153 into the connector.

In addition, on cars equipped with a passenger airbag: remove the bottom cover and unplug passenger airbag connector H2-80. Connect reference resistor 84 71 153 to the connector by means of cable 86 11 378.

2 Check lead 901 between pin 11 of the pictogram and pin 14 of the connector at control module 331 for shorting to battery positive.

3 Check the bulb for possible internal shorting. Change as necessary.




**Diagnostic trouble code 47471**

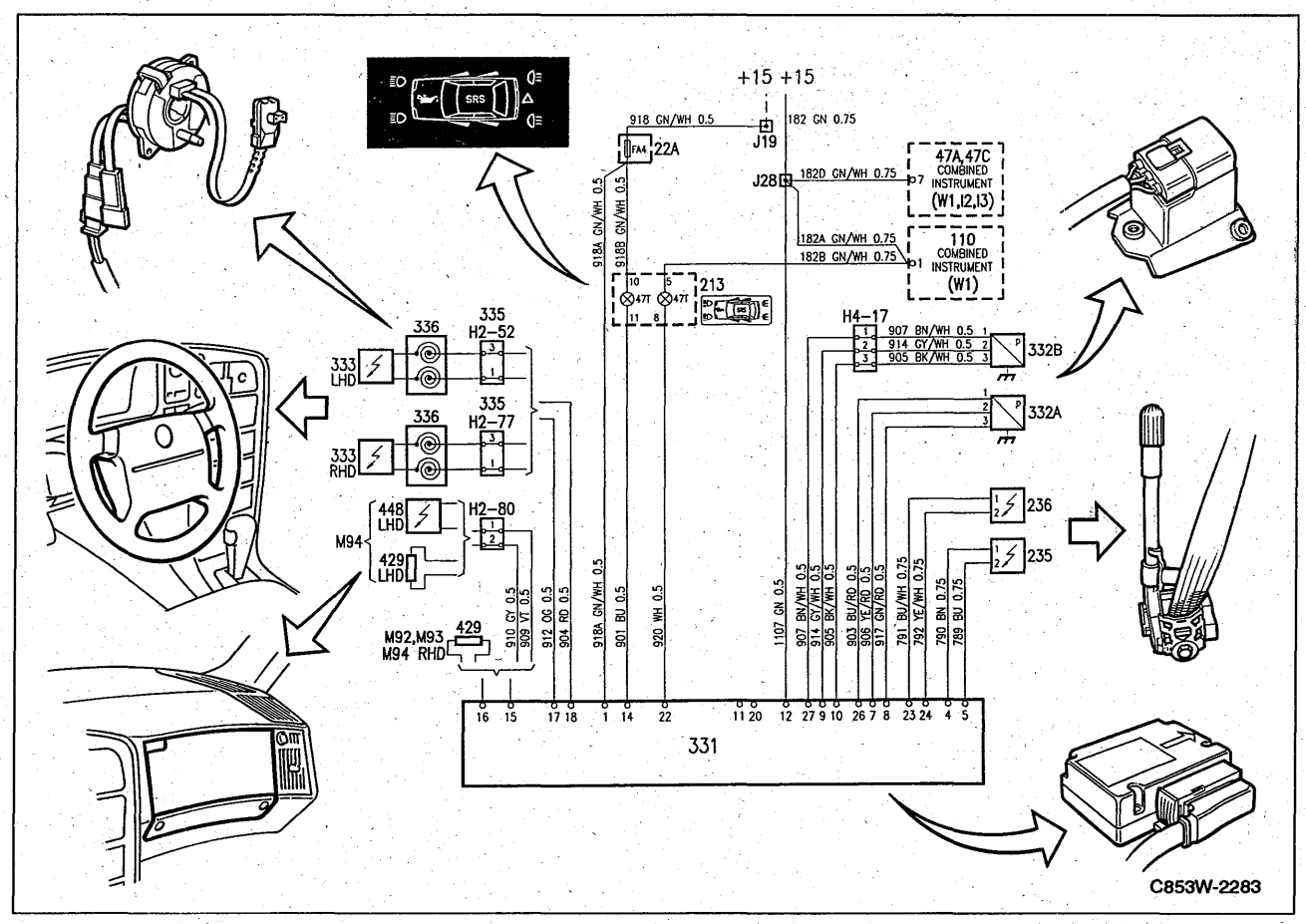
Bulb 1 in SRS symbol, shorting to ground (bulb connected to pin 14 in the connector at control module 331)

Shorting to ground is indicated by the SRS symbol shining with a steady light when the ignition is switched on.

1 Unscrew the steering wheel centre pad and unplug the connector at the rear of the pad. Plug reference resistor 84 71 153 into the connector.

   In addition, on cars equipped with a passenger airbag: remove the bottom cover and unplug passenger airbag connector H2-80. Connect reference resistor 84 71 153 to the connector by means of cable 86 11 378.

2 Check lead 901 between pin 11 of the pictogram connector and pin 14 of the connector at control module 331 for shorting to ground.



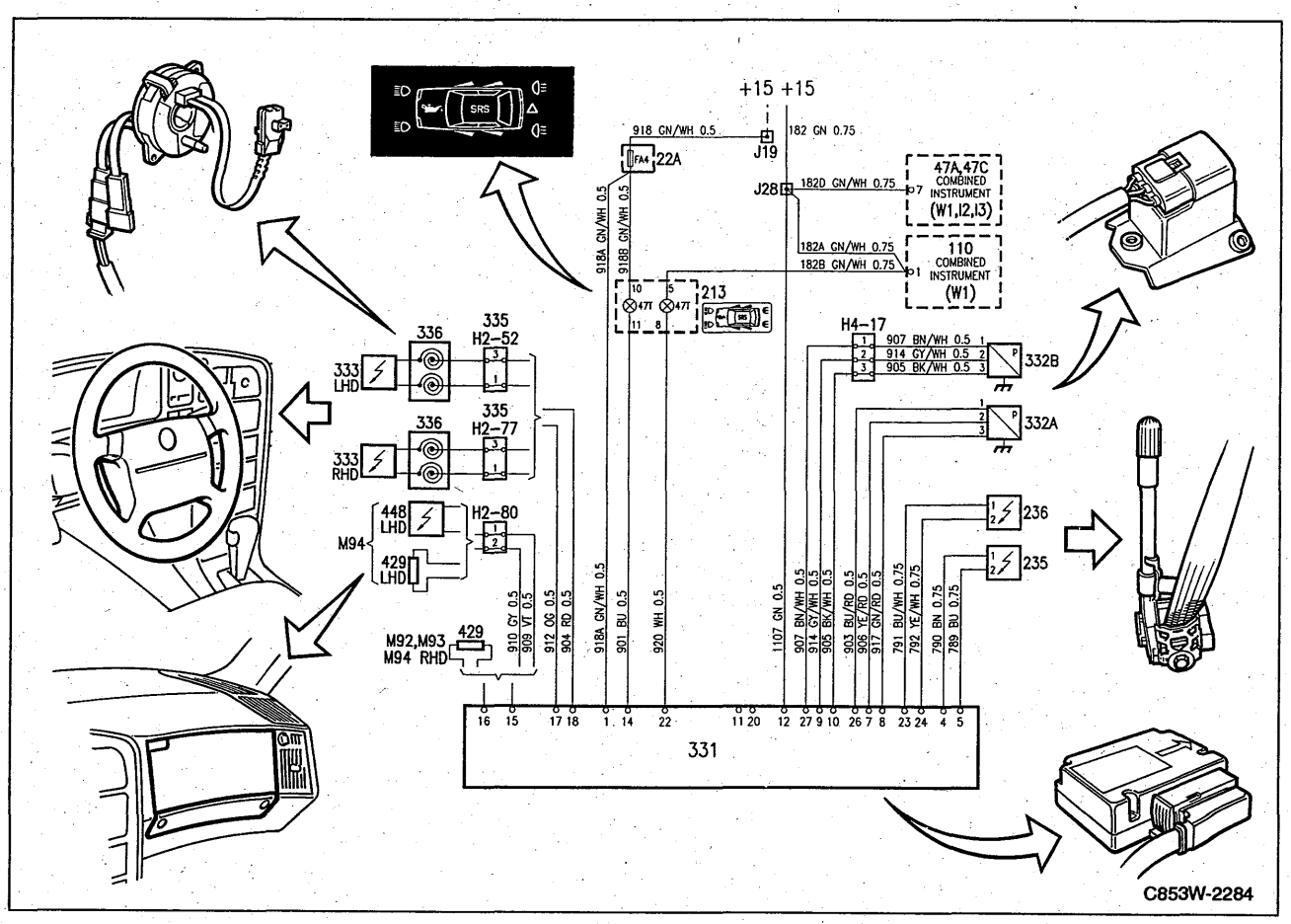

**Diagnostic trouble code 67570**

Electric detonators 1, 2, 3 and 4, FS 1 and FS 2, shorting to ground

**WARNING**

To eliminate the danger of accidental activation of the steering wheel centre pad, passenger airbag and seat-belt tensioners, the following measures must be taken before commencing fault diagnosis:

* Unscrew the steering wheel centre pad and unplug the connector at the rear of the pad.
* Unplug the connectors at the right-hand and left-hand belt tensioners (235 and 236).
* Unplug the connectors at both front sensors (332A and 332B).
* In addition, on cars equipped with a passenger airbag: remove the bottom cover and unplug passenger airbag connector H2-80.




1 Unplug the connector at control module 331 and plug breakout box 86 11 006 into the connector on the wiring.

Use a voltmeter to take readings across pin 17 and battery positive (pin 1) and across pin 18 and battery positive.

If any of the readings indicates battery voltage, continue with point 2.

If none of the readings indicates battery voltage, continue to take readings across pin 4 and battery positive and across pin 5 and battery positive.

If any of the readings indicates battery voltage, proceed to point 3.

If none of the readings indicates battery voltage, continue to take readings across pin 23 and battery positive and across pin 24 and battery positive.

If any of the readings indicates battery voltage, proceed to point 3.

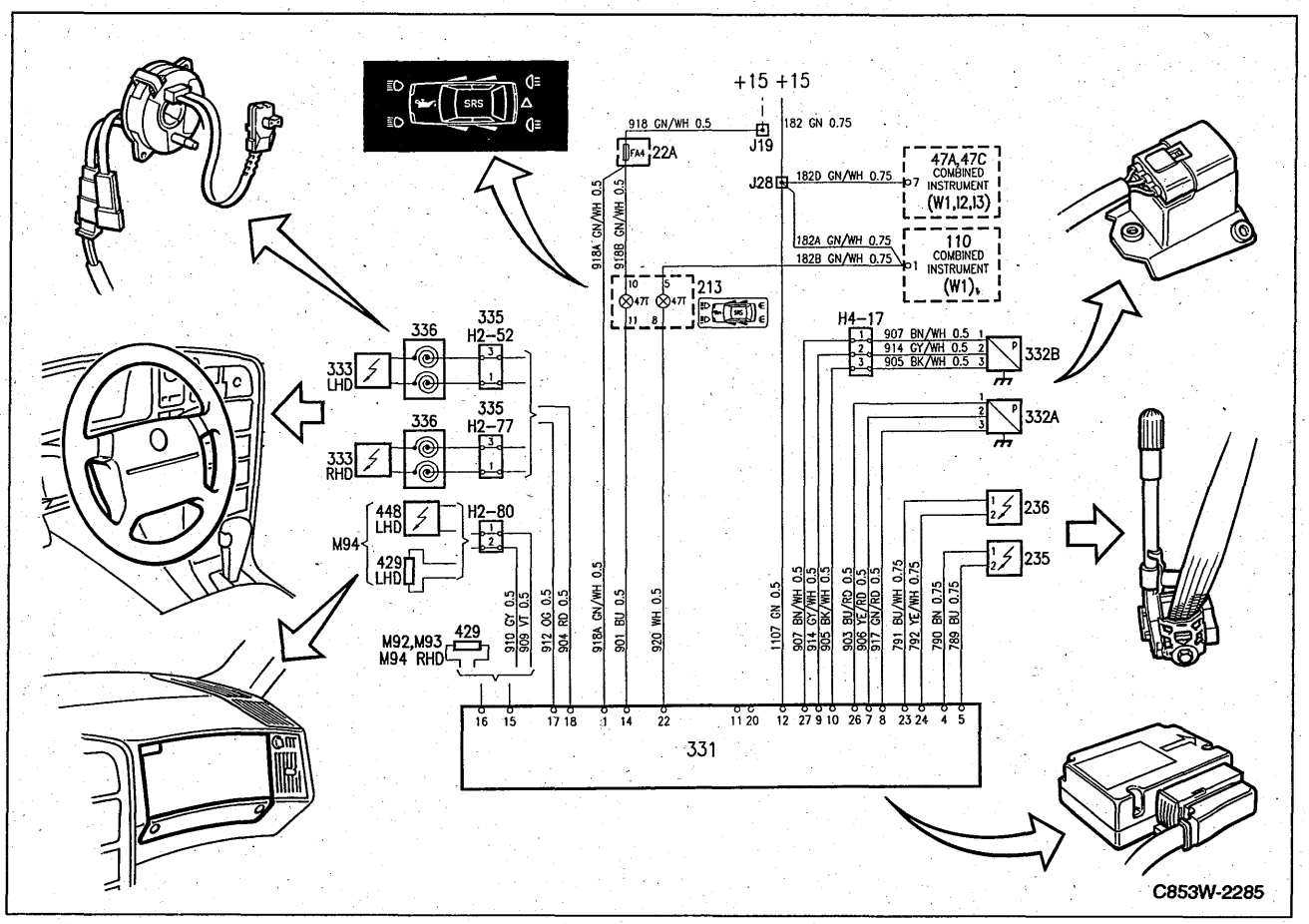
If none of the readings indicates battery voltage, continue to take readings across pin 8 and battery positive and across pin 26 and battery positive.

If any of the readings indicates battery voltage, proceed to point 3.

If none of the readings indicates battery voltage, continue to take readings across pin 27 and battery positive and across pin 10 and battery positive.

If any of the readings indicates battery voltage, proceed to point 4.
If none of the readings indicates battery voltage, continue to take readings across pin 15 and battery positive and across pin 16 and battery positive.

If any of the readings indicates battery voltage, proceed to point 3. If none of the readings indicates battery voltage, proceed to point 5.




2 Unplug connector H2-52 and take a reading across pin 17 and battery positive and across pin 18 and battery positive.

If none of the readings indicates battery voltage the fault is in the contact roller (coil spring), which should then be changed.

If any of the readings indicates battery voltage, the fault is in the wiring betweeh connector H2-52 and the connector at control module 331.

Determine the cause. Rectify the fault or change the wiring as necessary.

3 The fault is in the wiring. Determine the cause. Rectify the fault or change the wiring as necessary.

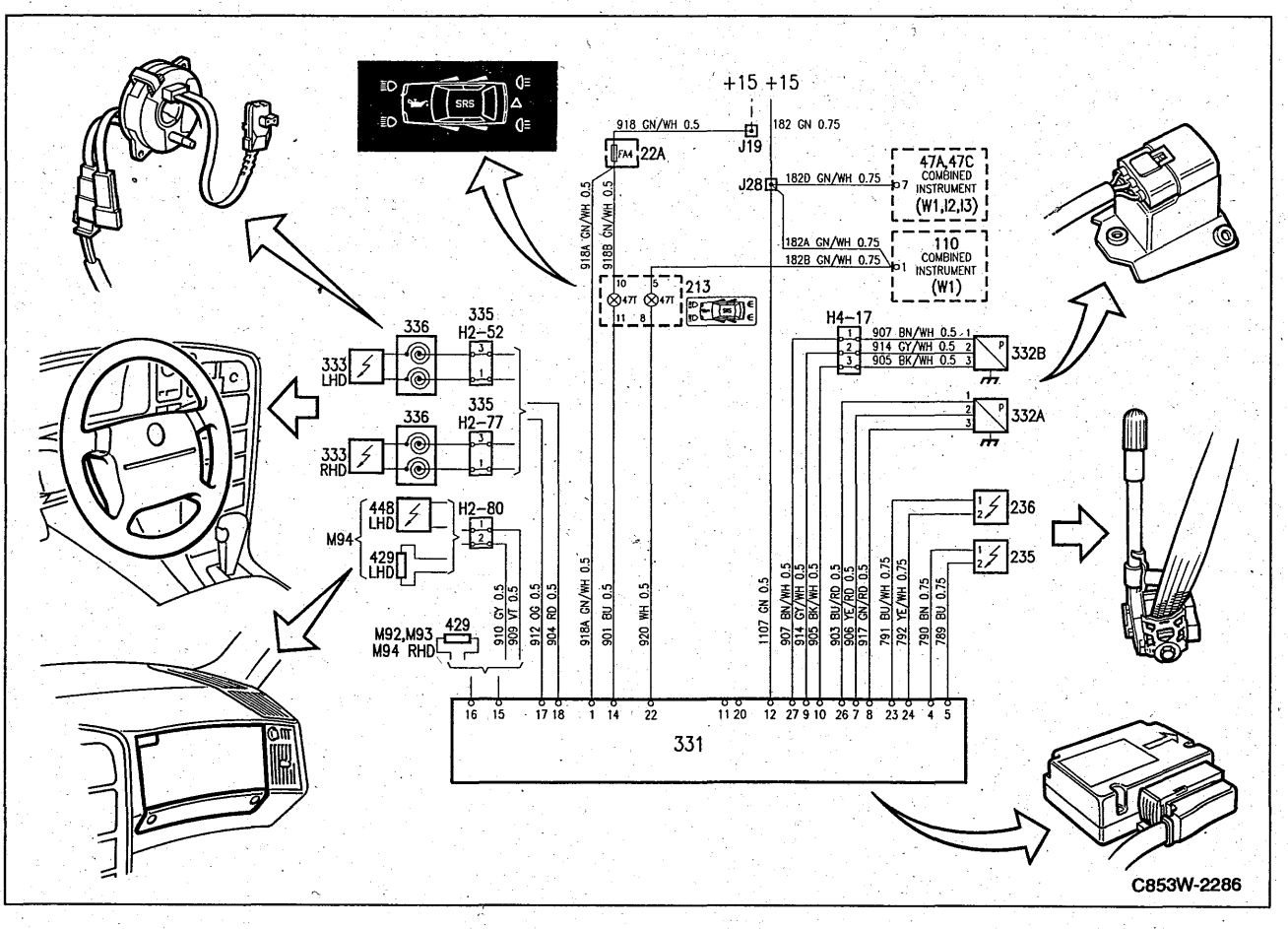
4 Unplug connector H4-17 and take a reading across pin 27 and battery positive and across pin 10 and battery positive.

If none of the readings indicates battery voltage, the fault is in the wiring between connector H4-17 and the connector at front sensor 332 B.

Determine the cause. Rectify the fault or change the wiring as necessary.

If any of the readings indicates battery voltage, the fault is in the wiring between connector H4-17 and the connector at control module 331.

5 Passenger airbag only:
The fault is in the passenger airbag or the resistor, which should then be changed.



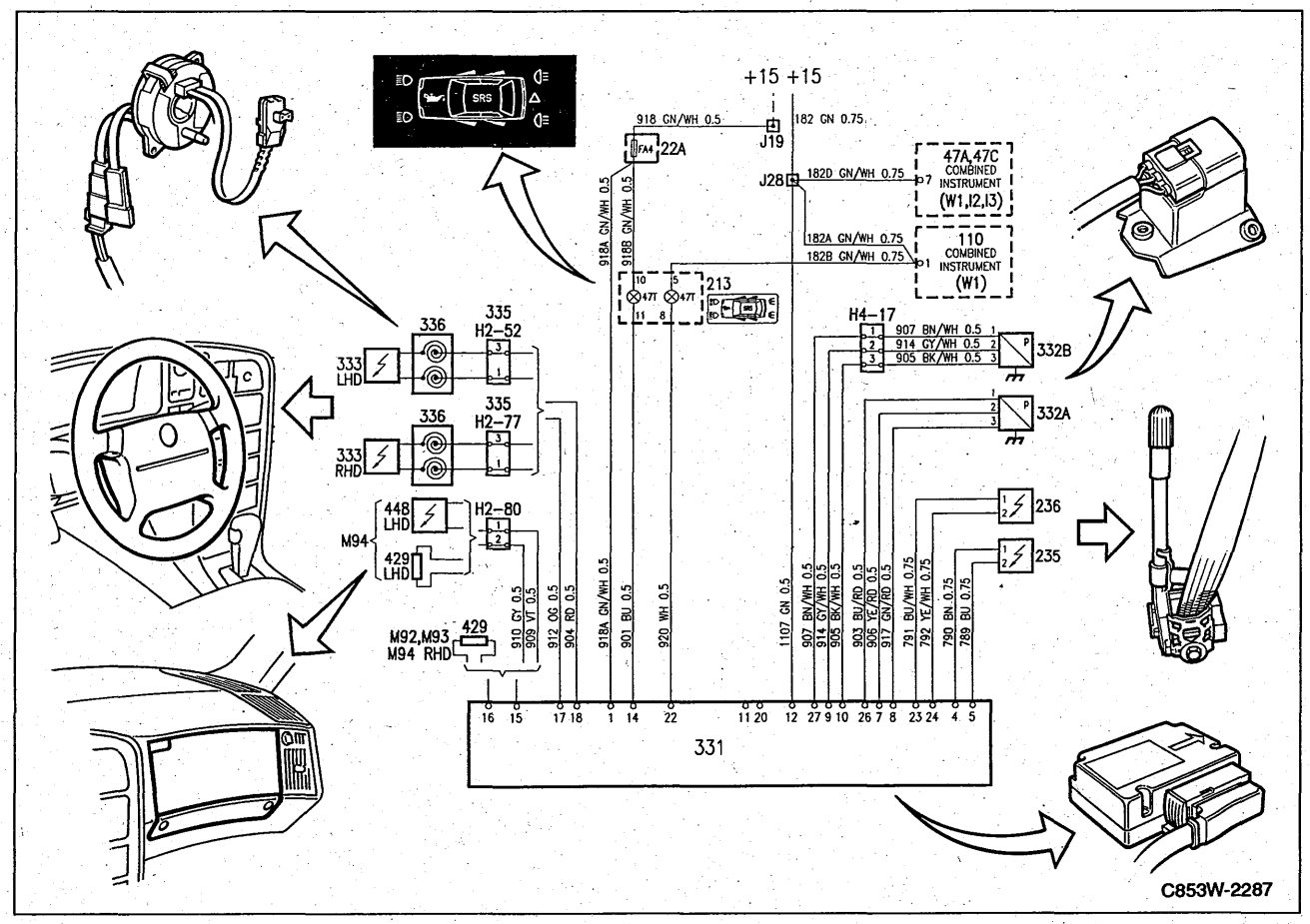

**Diagnostic trouble code 67580**

Electric detonators 1, 2, 3 and 4, FS 1 and FS 2, shorting to battery positive

**WARNING**

To eliminate the danger of accidental activation of the steering wheel centre pad and seat-belt tensioners, the following measures must be taken before commencing fault diagnosis:

* Unscrew the steering wheel centre pad and unplug the connector at the rear of the pad.
* Unplug the connectors at the right-hand and left-hand belt tensioners (235 and 236).
* Unplug the connectors at both front sensors (332A and 332B).
* In addition, on cars equipped with a passenger airbag: remove the bottom cover and unplug passenger airbag connector H2-80.




1 Unplug the connector at control module 331 and plug breakout box 86 11 006 into the connector on the wiring.

Use a voltmeter to take readings across pin 17 and ground (pin 13) and across pin 18 and ground.

If any of the readings indicates battery voltage, continue with point 2.

If none of the readings indicates battery voltage, continue to take readings across pin 4 and ground and across pin 5 and ground.

If any of the readings indicates battery voltage, proceed to point 3.

If none of the readings indicates battery voltage, continue to take readings across pin 23 and ground and across pin 24 and ground.

If any of the readings indicates battery voltage, proceed to point 3.

If none of the readings indicates battery voltage, continue to take readings across pin 8 and ground and across pin 26 and ground.

If any of the readings indicates battery voltage, proceed to point 3.

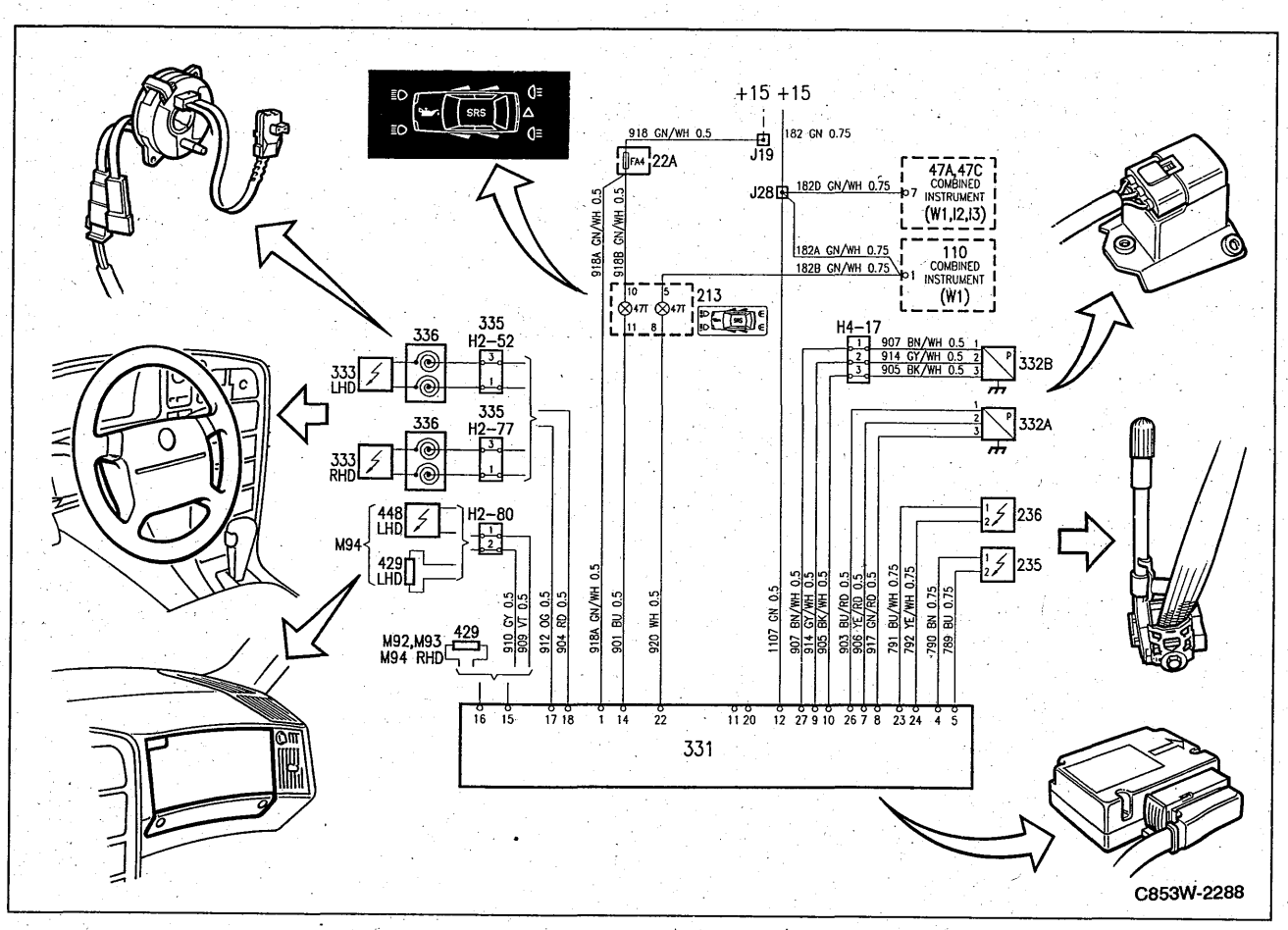
If none of the readings indicates battery voltage, continue to take readings across pin 27 and ground and across pin 10 and ground.

If any of the readings indicates battery voltage, proceed to point 4.

If none of the readings indicates battery voltage, continue to take readings across pin 15 and ground and across pin 16 and ground.

If any of the readings indicates battery voltage, proceed to point 3.

If none of the readings indicates battery voltage, proceed to point 5.




2 Unplug connector H2-52 and take a reading across pin 17 and ground and across pin 18 and ground.

If none of the readings indicates battery voltage the fault is in the contact roller (coil spring), which should then be changed.

If any of the readings indicates battery voltage, the fault is in the wiring between connector H2-52 and the connector at control module 331.

Determine the cause. Rectify the fault or change the wiring as necessary.

3 The fault is in the wiring. Determine the cause. Rectify the fault or change the wiring as necessary.

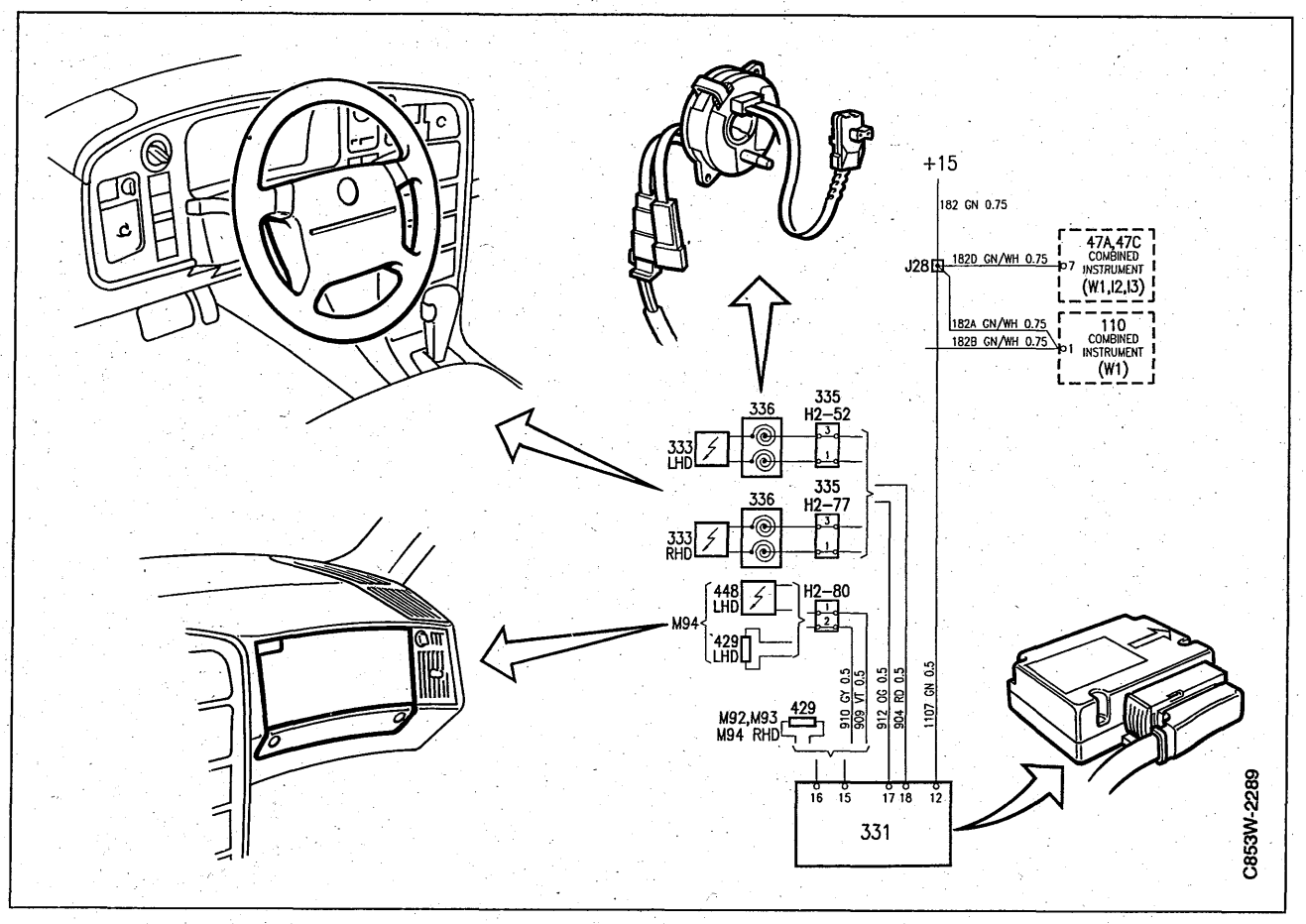
4 Unplug connector H4-17 and take a reading across pin 27 and ground and across pin 10 and ground.

If none of the readings indicates battery voltage, the fault is in the wiring between connector H4-17 and the connector at front sensor 332 B.

Determine the cause. Rectify the fault or change the wiring as necessary.

If any of the readings indicates battery voltage, the fault is in the wiring between connector H4-17 and the connector at control module 331.

5 Passenger airbag only:
The fault is in the passenger airbag or the resistor, which should then be changed.




**Diagnostic trouble code 42450**

No continuity, secondary current (connected to pin 12 of the connector at the control module).

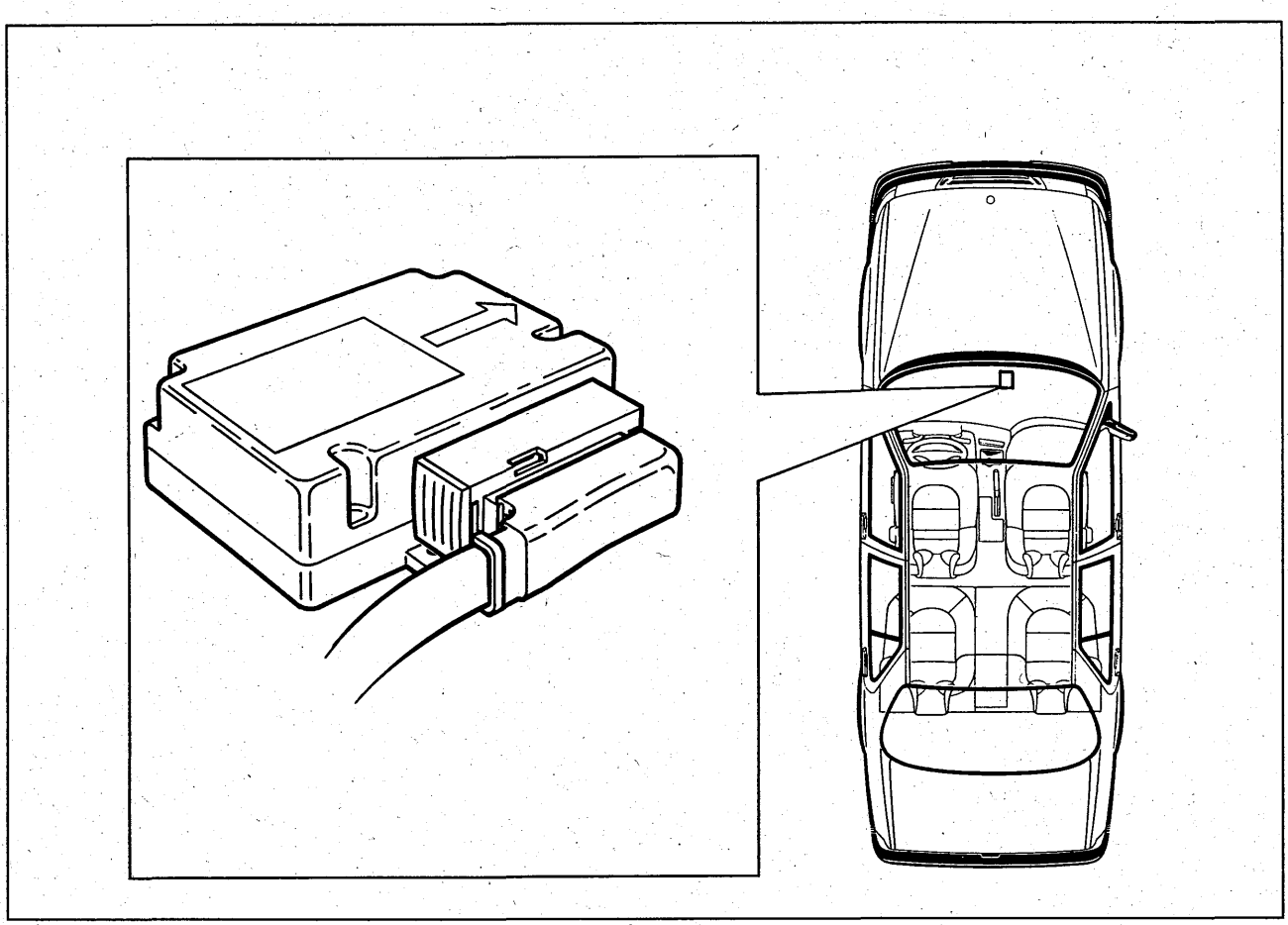
1 Check fuse 13.

2 Unscrew the steering wheel centre pad and unplug the connector at the rear of the pad. Plug reference resistor 84 71 153 into the connector.

In addition, on cars equipped with a passenger airbag: remove the bottom cover and unplug passenger airbag connector H2-80. Connect reference resistor 84 71 153 to the connector by means of cable 86 11 378.

3 Check lead 1107 between fuse 13 and the connector at control module 331 for continuity.

Rectify the fault or change the wiring as necessary.



**Diagnostic trouble code E2991**

This trouble code is provided only in respect of M1992 and M1993 and certain M1994 with a control module having part No. 41 76 368.

System incorrectly programmed

Carry out programming by entering command code B24 and clearing the trouble code.

**Diagnostic trouble code 77590**

Control module faulty

Clear the trouble code and check whether it is generated afresh. Since this fault is probably of a once-only nature, do not change the control module. If the trouble code is generated afresh, change the control module.

# Procedure for control module replacement

When all tests have been carried out according to the relevant diagnostics procedure without any faults having been found, it is natural to assume that the control module is at fault.

In view of the fact that the control module is an exceptionally high-quality component and also extremely expensive, it is important to verify the diagnosis as far as possible.

Therefore, go through all the points very carefully before definitely pointing to the control module as the cause of the fault.

1 Check once again that every single point in the fault diagnosis programme of the relevant diagnostic trouble code has been carried out.

2 Study the wiring diagram of the circuit in question and make sure you understand how it works. Relevant parts of the technical description and the electrical descriptions of operation in Service Manual 3:2 "Electrical system" may be of assistance in this respect.

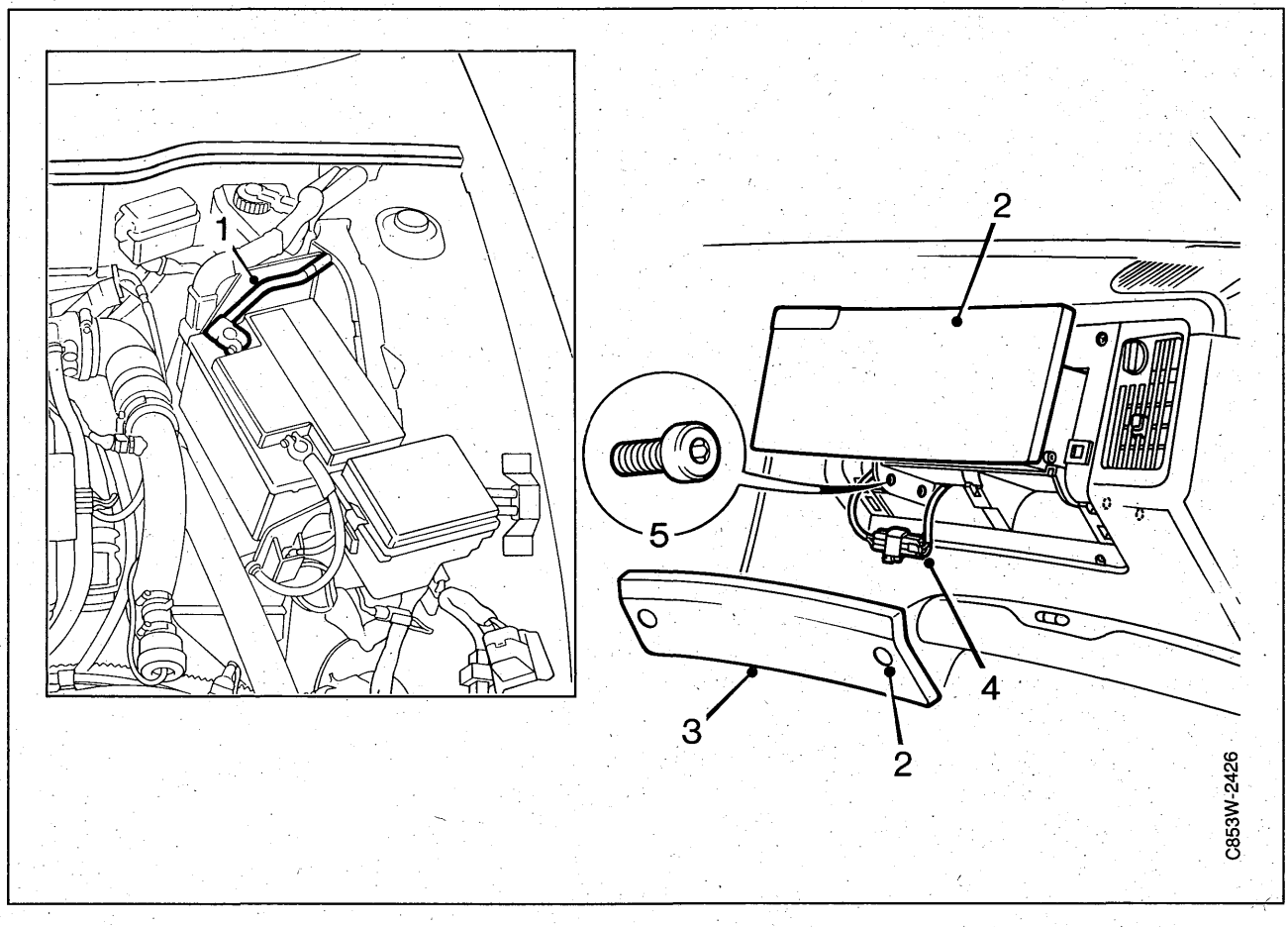
3 Check all grounding points. If you have already done so, do it once again.

4 Check the voltage supplied to the control module and the fuses protecting it.

5 Make sure that none of the pins or sockets in the control module connectors have become displaced.

6 If the original fault still persists in spite of this, then the control module will have to be replaced.

# Replacement of passenger airbag




## To remove

**WARNING**

Read through the section entitled "Safety and handling instructions" before starting work on the airbag.

1 Disconnect the negative battery cable.

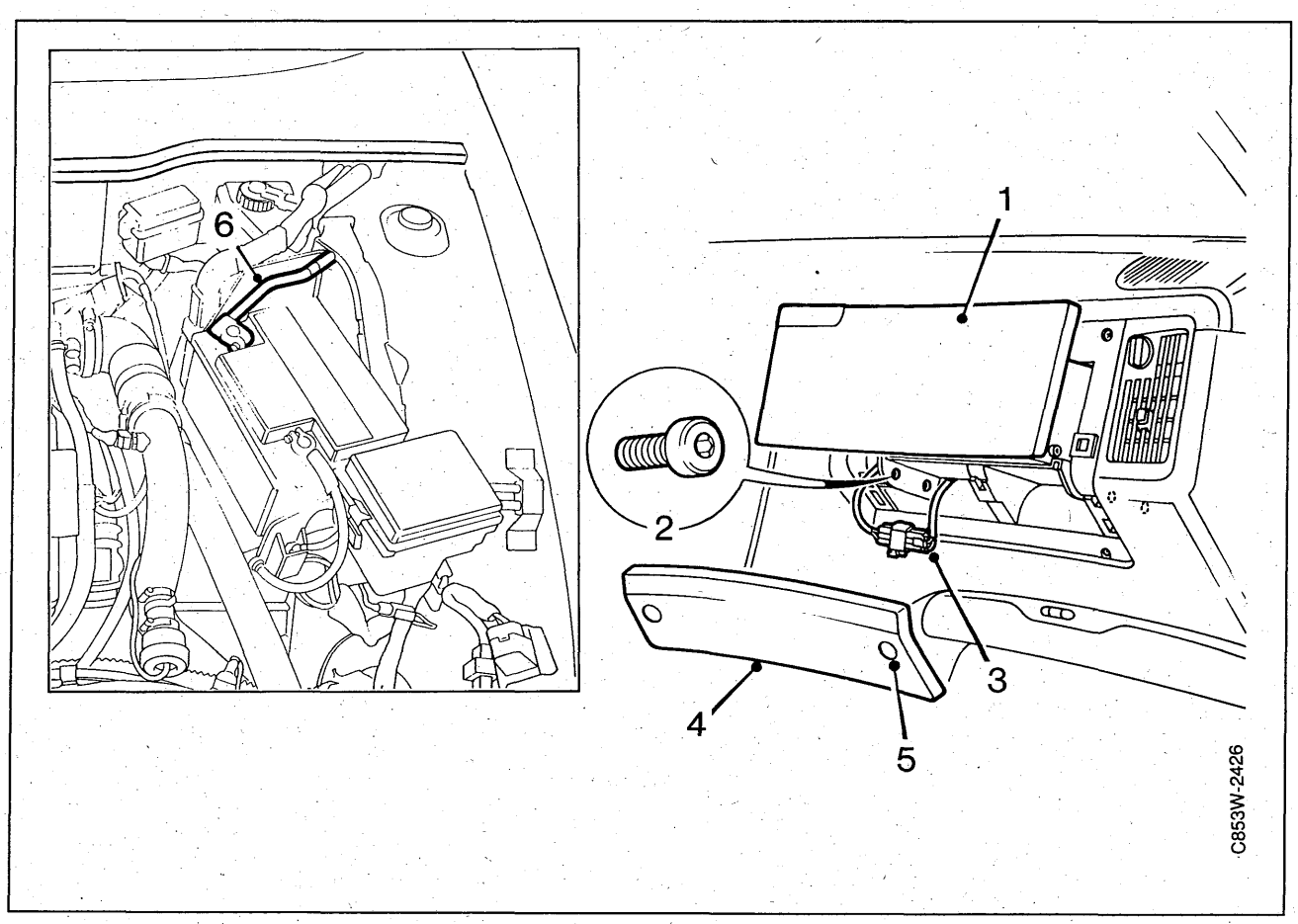
2 Remove the plastic covers from the two bolts securing the bottom cover. Remove the bolts.

3 Withdraw the bottom cover (held in place by clips). Use tool 82 92 997, working from right to left. Do not prise it loose.

4 Unplug the passenger airbag connector.

5 Undo the passenger airbag's four retaining bolts (two on each side) in the space revealed upon removal of the bottom cover.

6 Grasp the rear of the passenger airbag with both hands and pull it out (it is also held in place by clips).




## To fit

**WARNING**

Read through the section entitled "Safety and handling instructions" before starting work on the airbag.

1 Fit the passenger airbag in place. Make sure that the clips engage properly.

2 Fit the four bolts in place, two on each side in the space under the airbag.

**Tightening torque: 4 ± 1 Nm (3 ± 0.7 lbf ft).**

3 Plug in the passenger airbag connector.

4 Refit the bottom cover.

5 Fit the bolts securing the bottom cover and the plastic covers for the bolts.

**Tightening torque: 4 ± 1 Nm (3 ± 0.7 lbf ft).**

6 Reconnect the negative battery cable.

7 Connect an ISAT to the test socket and clear any trouble codes.

8 Start the car and check that the SRS symbol lights up for about five seconds and then goes out.

# Workshop Information

# User feedback

To

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S-461 80 TROLLHÄTTAN
SWEDEN

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From

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Comments/suggestions

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Manual concerned: .....

It is important that Saab technicians in the field regard the Workshop Service Manual as their bible, and we therefore strive to make the manual easy to use and to provide accurate information.

By letting us have your views on this manual you will be helping us to maintain a high standard in our literature.

Note down any comments or suggestions you may have on a sheet of paper or take a copy of this page and send us your views at the above address. For greater convenience, you are also welcome to send your comments by fax, using the telephone number shown.

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