

# Technical Service Training

Technicians  
Information

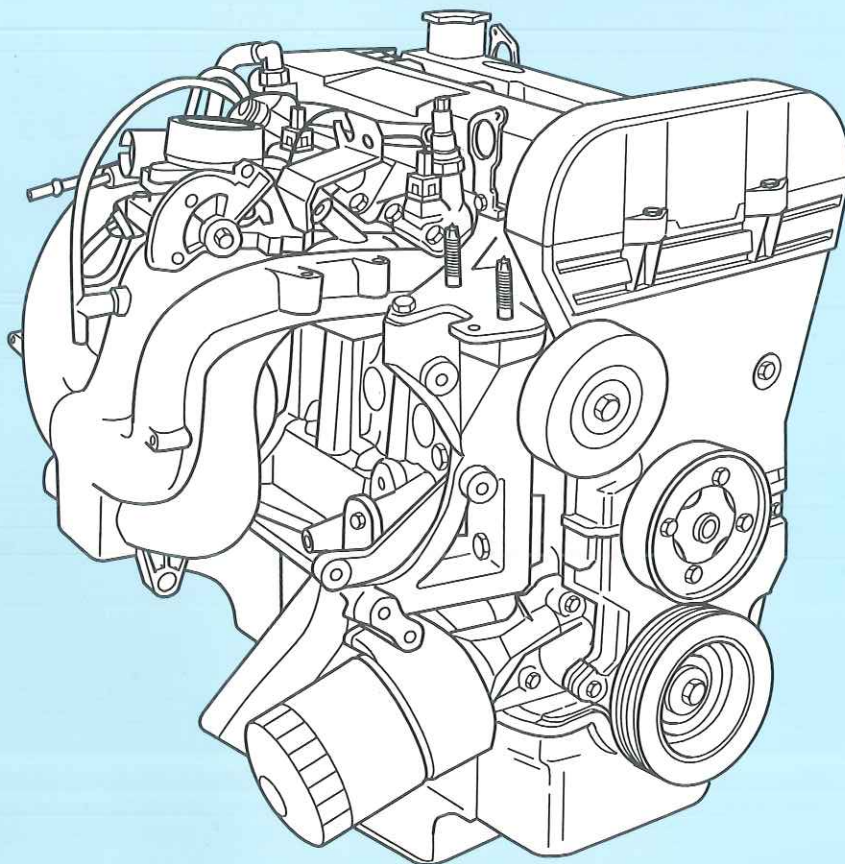
CG 7471 GB 11/92

New  
Product Introduction

00/209

Ford Mondeo

1.6/1.8 and  
2.0 DOHC 16V Zeta Engine



The Ford Mondeo sees the introduction of three further 16-valve engines (Ford code: Zeta) on the market. The 1.8 litre DOHC 16V engine (77 kW/105 HP and 96 kW/130 HP) already installed in the Fiesta and Escort/Orion is joined by a further 1.8 litre engine with higher power output. A 1.6 litre and a 2.0 litre version will also be available. The Mondeo will therefore be offered with four-valve technology petrol engines.

This New Product Introduction Brochure describes - **based on the brochure 00/204** - all new features and modifications compared to the existing 1.8 DOHC 16V Zeta engine.

The colours used in coloured illustrations indicating the scope of modification have the following significance:

-  New
-  Modified

Special functions may be depicted in this brochure by colours which have been shown previously or by other colours. The meaning of the colours is explained in such instances on the pages concerned.

The illustrations, technical information, data and descriptive text in this issue, to the best of our knowledge, were correct at the time of going to print. The right to change prices, specifications, equipment and maintenance instructions at any time without notice, is reserved as part of Ford policy of continuous development and improvement.

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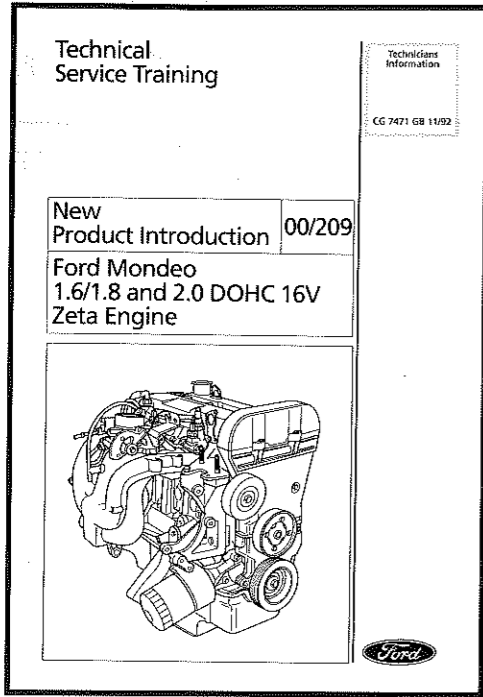
Repair and service operations **must** always be carried out according to instructions and specifications in the workshop literature.

Please make extensive use of the training courses offered by the Ford Care Institute in order to gain extensive knowledge in both theory and practice.

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Training Literature



00/204 "1.8 DOHC 16V Engine", CG 7455

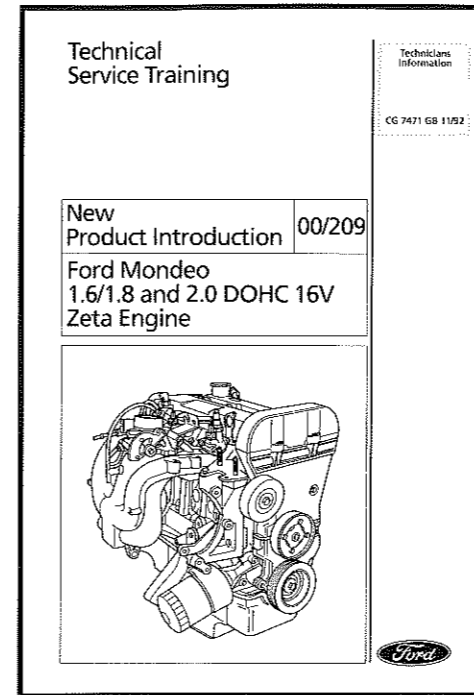
- Additional Ford Mondeo New Product Introduction Brochure:**
- 00/218 "Ford Mondeo", CG 7485
  - 00/208 Ford Mondeo "Body", CG 7470
  - 00/210 Ford Mondeo "MTX 75 Transmission and 4x4 Drive", CG 7472
  - 00/211 Ford Mondeo "Chassis", CG 7473
  - 00/212 Ford Mondeo "Antilock Braking System ABS and Traction Control System TCS", CG 7474
  - 00/213 Ford Mondeo "Vehicle Electrics and Electronics", CG 7475
  - 00/214 Ford Mondeo "Automatic Transmission CD4E", CG 7481
  - 00/215 Ford Mondeo "1.8 Turbo Diesel Engine with Intercooler", CG 7482

Video Film "Product Introduction"  
Ford Mondeo, CG 7483

Video Film "Product Training"  
Ford Mondeo, CG 7484

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Workshop Literature



- Service Microfiche:
- Ford Mondeo, Section 21
  - Ford Mondeo, Section 22
  - Ford Mondeo, Section 23
  - Ford Mondeo, Section 24
  - Ford Mondeo, Section 25
  - Ford Mondeo, Section 29

New Vehicle System Test Manual for Fuel Injection Engines

- Parts Microfiche:
- Ford Mondeo
  - Engine

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**Modifications/New Features**

The three 16-valve engines of the Mondeo with a capacity of 1.6/1.8 and 2.0 litre are based on the well known 1.8 l DOHC 16V Zeta engine range.

All engines have the same external dimensions and use a common crankshaft. Having the same stroke, the different displacements are thus derived from the cylinder bore diameters. *to MONDEO*

All modified and new components are described in detail in the sections "ENGINE COMPONENTS" and "ENGINE MANAGEMENT". Important modifications/new features are listed:

- Installation position of the engines tilted forward by 8°.
- New intake system with a vertically arranged throttle housing, a plastic inlet manifold as well as resonators for additional intake noise suppression.
- Modified exhaust manifold with two-piece exhaust downpipe.
- New oil pan, modified oil pump and pick-up pipe, *(NOT FITTED)* oil cooler for 2.0 l engines, sensor for engine oil level indication (2.0 l engine with auxilliary warning system), new oil dipstick position.
- Modified engine mounting with hydraulic engine mount on the engine end and rubber-elastic mounts on the transmission end. Additional torque restrictors to reduce noise and vibration, secured to transmission and subframe (see brochure 00/211 "Chassis").

**Technology  
Engine**

■ Transverse mounted DOHC 16V Zeta engines in three different capacities:

- 1.6 DOHC 16V engine at 66 kW (90 HP) (DIN)
- 1.8 DOHC 16V engine at 85 kW (115 HP) (DIN)
- 2.0 DOHC 16V engine at 100 kW (136 HP) (DIN)

■ Compact, roof-shaped combustion chamber with spark plug in centre position

■ Hydraulic tappets

**Engine Management**

■ EEC IV engine management with integrated fully electronic ignition system EDIS-4

■ EDIS-4 Diagnostic Monitor (EDM)

■ Sequential Electronic Fuel Injection (SEFI)

■ Air mass measurement

**Emission Control**

■ 83 US Emission Regulation */010193 91/441 EEC*

■ HEGO of controlled three-way catalytic converter

■ Electronically controlled pulse air system

■ Electronically controlled exhaust gas recirculation (EGR)

■ Evaporative emission control system (EVAP)

**Diagnosis**

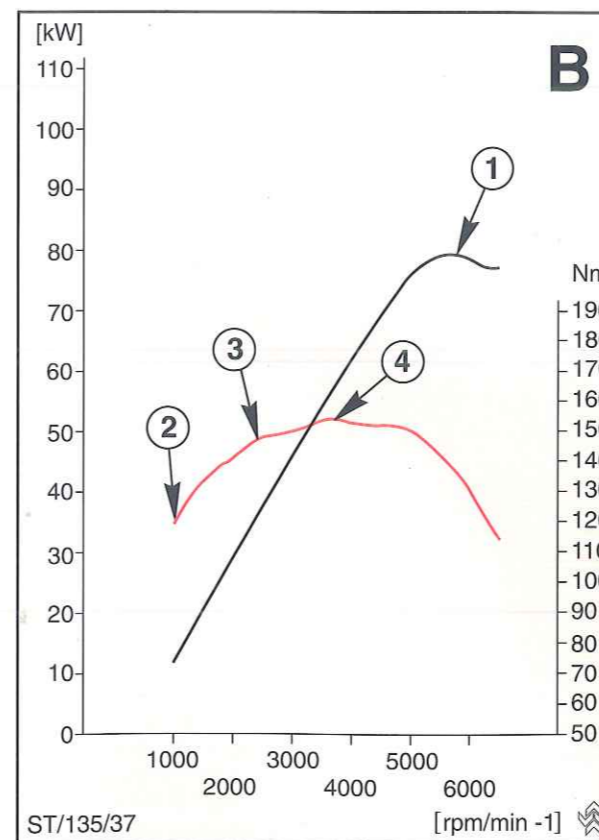
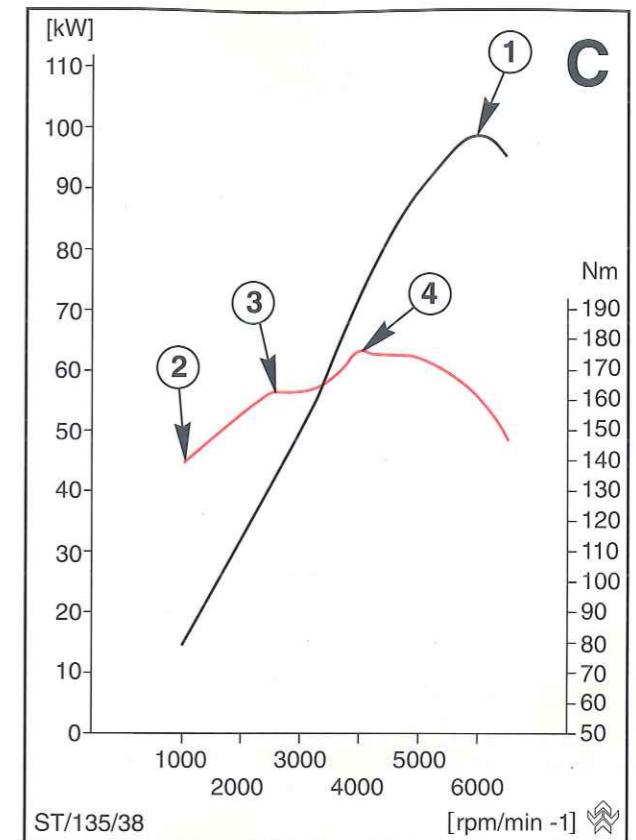
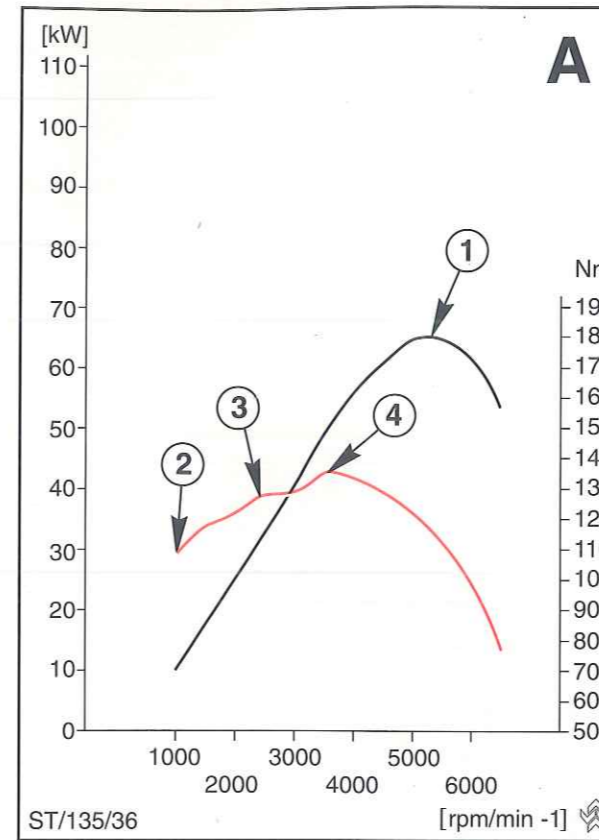
■ Serial interface for Ford Diagnostic System FDS 2000

# ENGINE PERFORMANCE DATA

Engine	1.6l	1.8l	2.0l
Bore (mm):	76.0	80.6	84.8
Stroke (mm):	88.0	88.0	88.0
Displacement (cm <sup>3</sup> ):	1597	1796	1988
Engine management:	EEC IV/SEFI		
Emission regulation:	83 US		
Fuel:	Premium RON 95 unleaded		
Engine build code:	L1F	RKA	NGA
Max. power (EEC*):	65 kW	82 kW	100 kW
at:	5250 rpm	5750 rpm	6000 rpm
Max. torque (EEC):	135 Nm	153 Nm	175 Nm
at:	3500 rpm	3750 rpm	4000 rpm
Max. power (DIN):	66 kW (90 HP)	85 kW (115 HP)	100 kW (130 HP)
at:	5250 rpm	5750 rpm	6000 rpm
Max. torque (DIN):	138 Nm	158 Nm	180 Nm
at:	3500 rpm	3750 rpm	4000 rpm
Compression ratio:	10.3 : 1	10.0 : 1	10.0 : 1
Engine speed limitation at:	7100 rpm	7100 rpm	7100 rpm

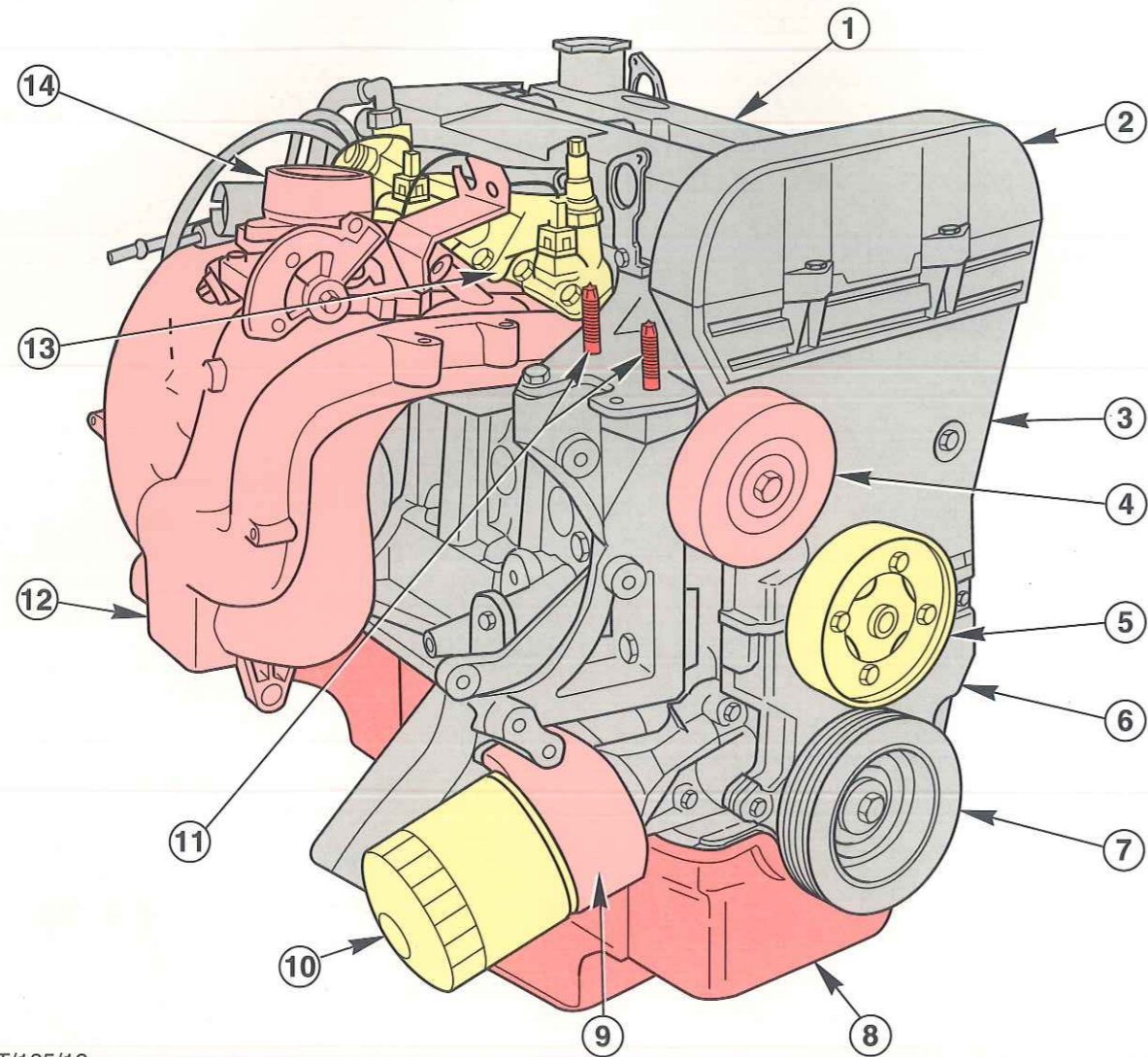
\* EEC = European Economic Community

# ENGINE PERFORMANCE DATA



- A 1.6 DOHC 16V Zeta
  - B 1.8 DOHC 16V Zeta
  - C 2.0 DOHC 16V Zeta
- 1 Power curve (EEC norm)
  - 2 Torque curve (EEC norm)
  - 3 First torque peak (continuous torque)
  - 4 Second torque peak (max. torque)

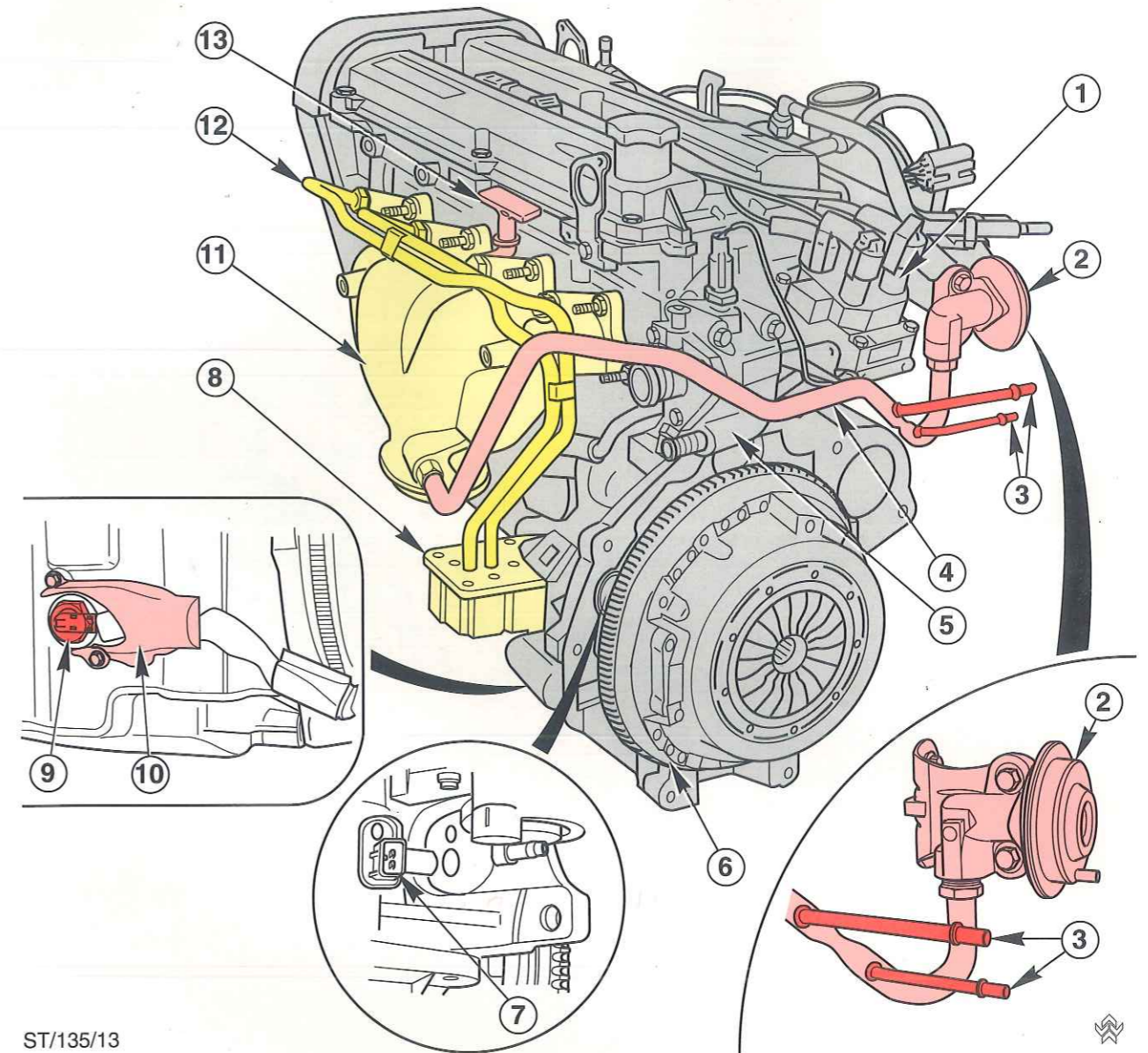
Inlet Side



ST/135/12

- |                                     |   |
|-------------------------------------|---|
| 1 Camshaft cover                    | 9 Oil cooler (2.0 DOHC 16V only) <i>Not fitted</i>      |
| 2 Upper timing cover                | 10 Oil filter   |
| 3 Middle timing cover               | 11 Stud bolt for engine mounting                        |
| 4 Idler pulley                      | 12 Inlet manifold                                       |
| 5 Water pump pulley                 | 13 Fuel rail with fuel injectors and pressure regulator |
| 6 Lower timing cover                | 14 Throttle housing                                     |
| 7 Crankshaft pulley/damper assembly |   |
| 8 Oil pan                           |   |

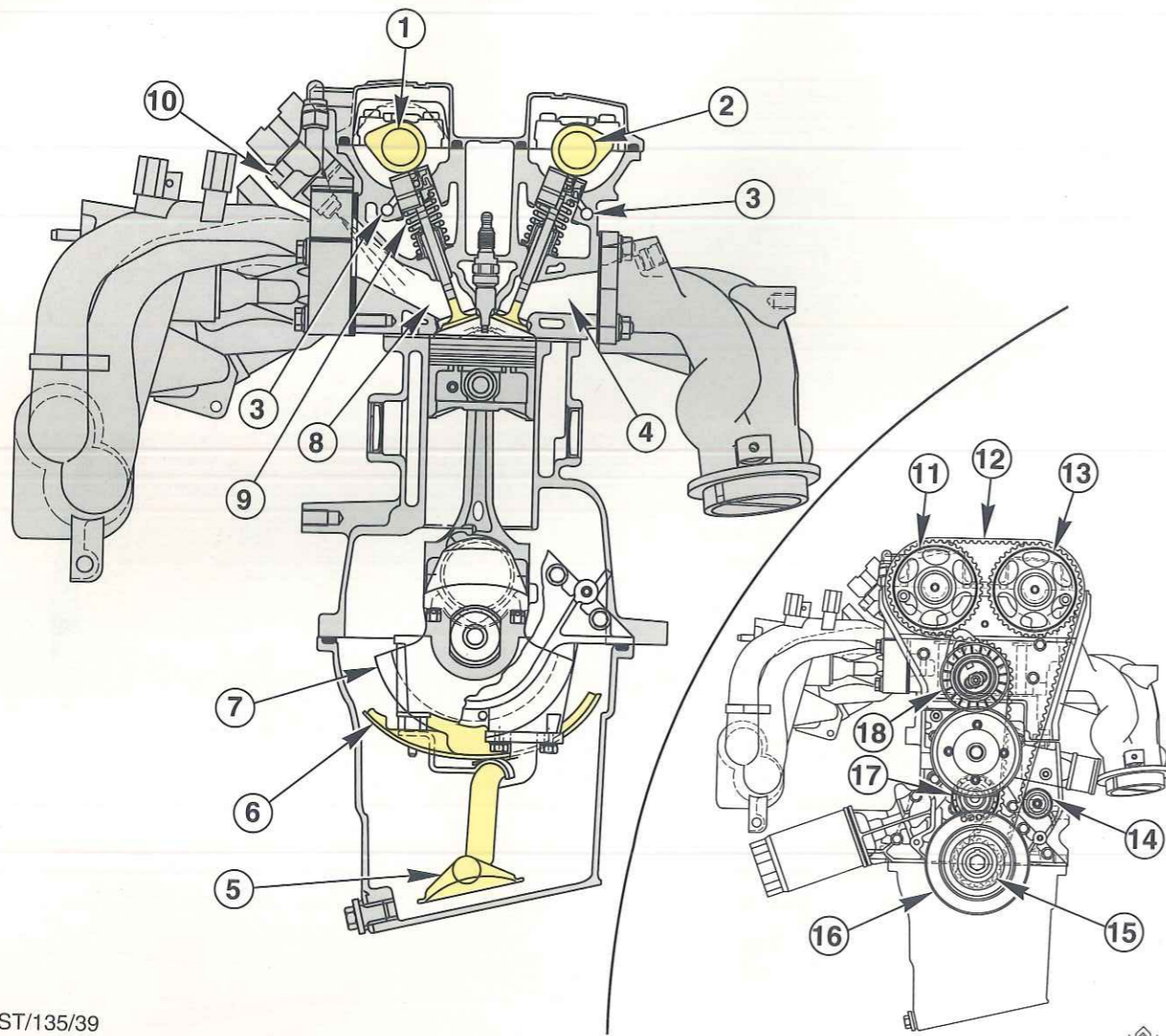
Exhaust Side



ST/135/13

- |   |   |
|---|---|
| 1 DIS coil  | 8 Pulse air filter housing with integrated valves |
| 2 EGR valve   | 9 Oil level indication sensor                     |
| 3 Hose connections for delta pressure feedback electronic system (DPFE) | 10 Sensor cover                                   |
| 4 EGR tube  | 11 Exhaust manifold                               |
| 5 Thermostat housing  | 12 Pulse air system                               |
| 6 Flywheel  | 13 Oil dipstick                                   |
| 7 CPS sensor  |   |

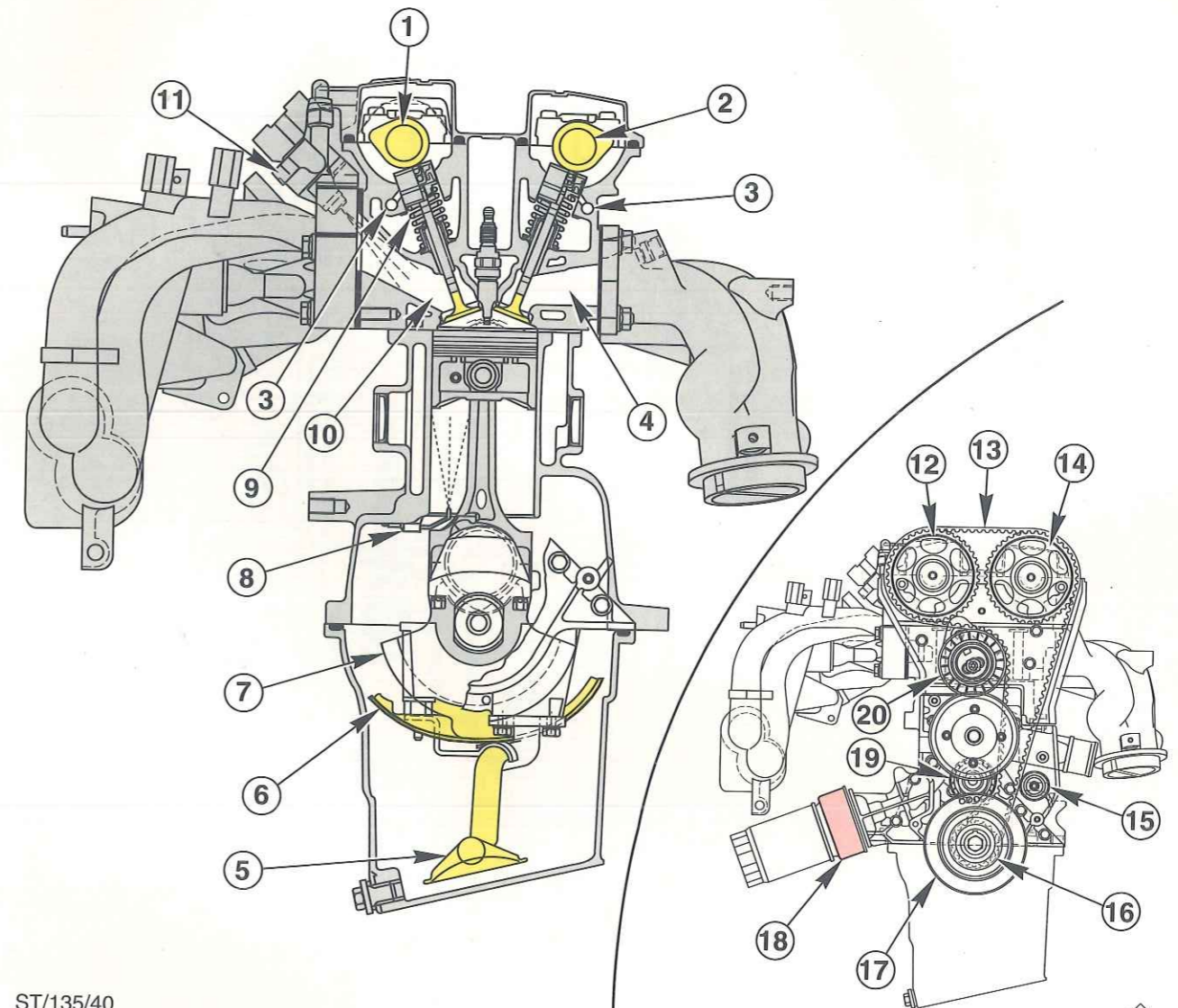
1.6 DOHC 16V Zeta



ST/135/39

- |                    |                                       |
|--------------------|---------------------------------------|
| 1 Inlet camshaft   | 10 Fuel injector                      |
| 2 Exhaust camshaft | 11 Inlet camshaft sprocket            |
| 3 Oil galleries    | 12 Timing belt                        |
| 4 Exhaust port     | 13 Exhaust camshaft sprocket          |
| 5 Oil pick-up pipe | 14 Timing belt guide pulley           |
| 6 Oil baffle plate | 15 Crankshaft sprocket                |
| 7 Crankshaft       | 16 Crankshaft pulley/ damper assembly |
| 8 Inlet port       | 17 Timing belt guide pulley           |
| 9 Valve assembly   | 18 Timing belt tensioner              |

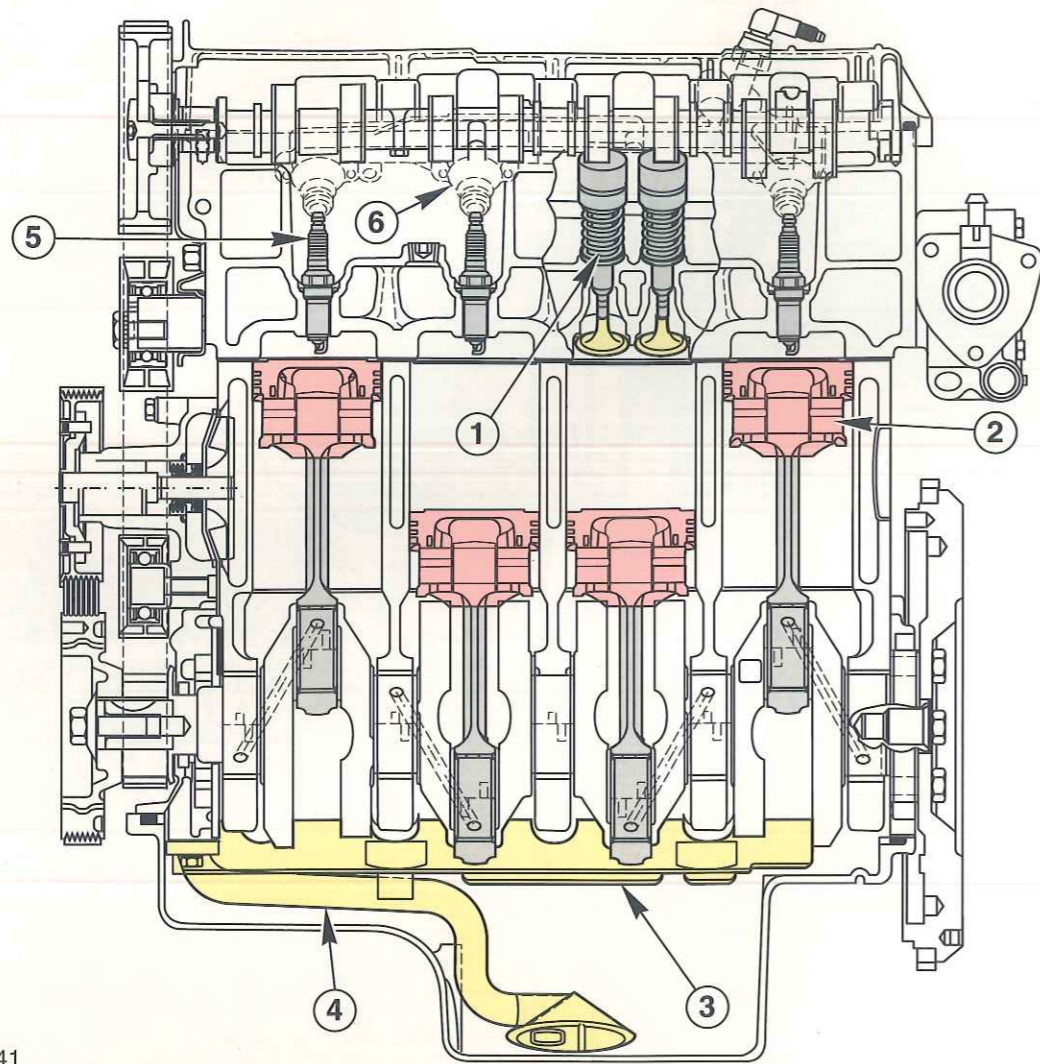
1.8 and 2.0 DOHC 16V Zeta



ST/135/40

- |   |   |
|---|---|
| 1 Inlet camshaft                          | 11 Fuel injector  |
| 2 Exhaust camshaft                        | 12 Inlet camshaft sprocket                              |
| 3 Oil galleries                           | 13 Timing belt  |
| 4 Exhaust port                            | 14 Exhaust camshaft sprocket                            |
| 5 Oil pick-up pipe                        | 15 Timing belt guide pulley                             |
| 6 Oil baffle plate                        | 16 Crankshaft sprocket                                  |
| 7 Crankshaft                              | 17 Crankshaft pulley/ damper assembly                   |
| 8 Oil spray tubes (only 2.0 litre engine) | 18 Oil cooler (only 2.0 litre engine) <i>NOT FITTED</i> |
| 9 Valve assembly                          | 19 Timing belt guide pulley                             |
| 10 Inlet port                             | 20 Timing belt tensioner                                |

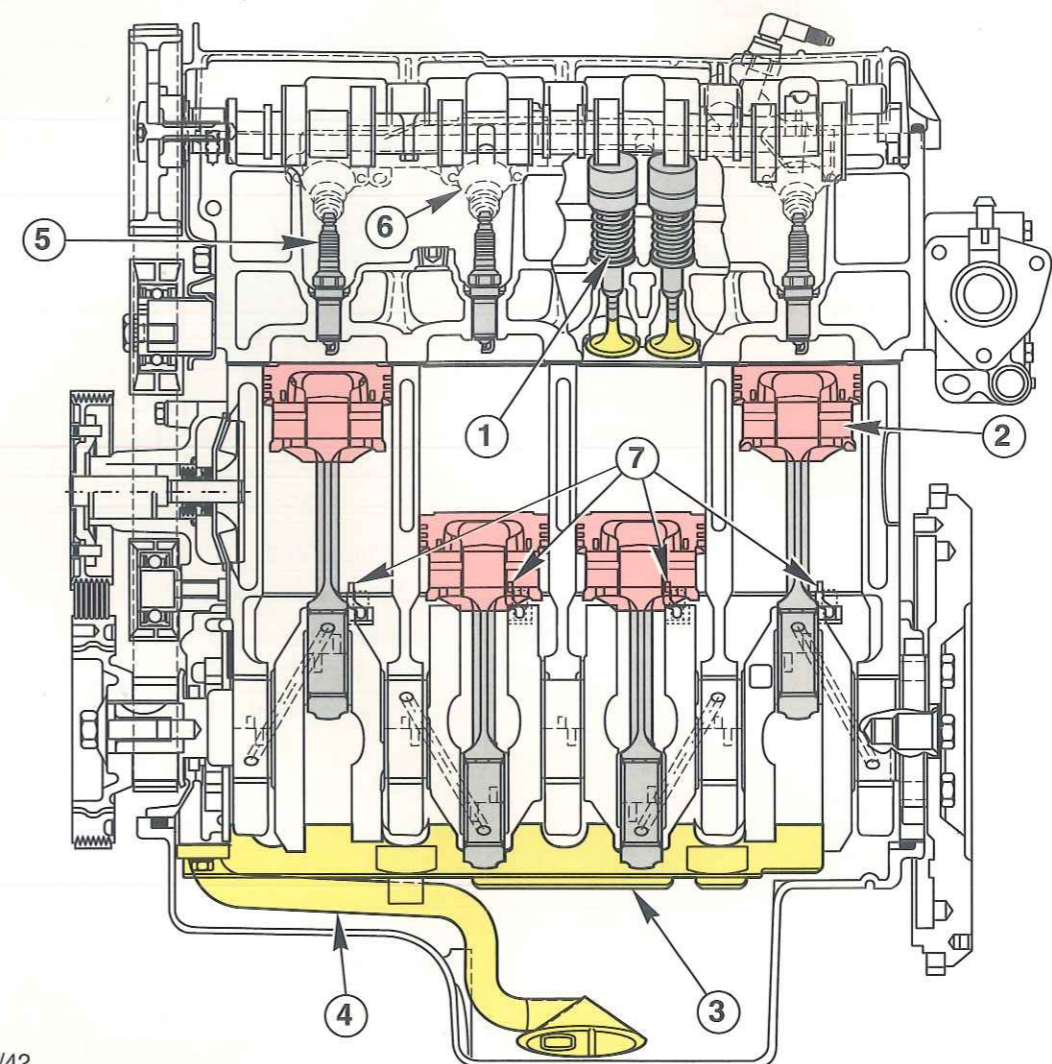
1.6 DOHC 16V Zeta



ST/135/41

- |   |                  |   |                  |
|---|------------------|---|------------------|
| 1 | Valve assembly   | 4 | Oil pick-up pipe |
| 2 | Piston           | 5 | Spark plug       |
| 3 | Oil baffle plate | 6 | Fuel injector    |

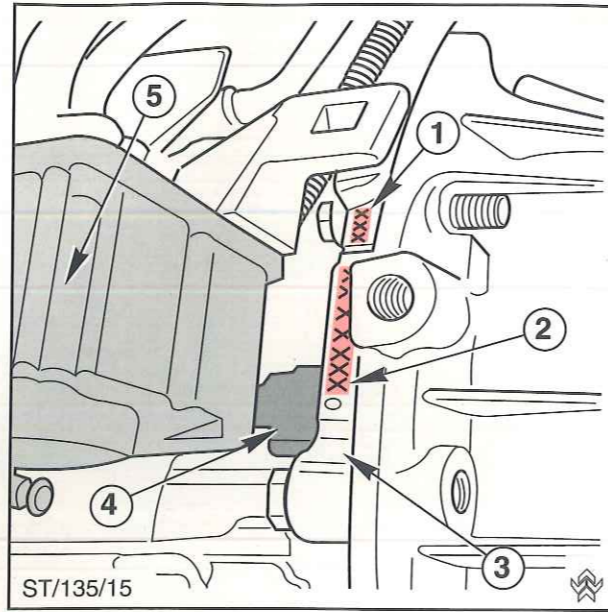
1.8 and 2.0 DOHC 16V Zeta



ST/135/42

- |   |                  |   |   |
|---|------------------|---|---|
| 1 | Valve assembly   | 5 | Spark plug                              |
| 2 | Piston           | 6 | Fuel injector                           |
| 3 | Oil baffle plate | 7 | Oil spray tubes (only 2.0 litre engine) |
| 4 | Oil pick-up pipe |   |   |

- The three-digit engine build code and the engine serial number (consisting of 2 letters and 5 numbers) is located at the rear of the engine block above the mount for the CPS sensor.



- 1 Engine build code
- 2 Engine serial number
- 3 Engine flange
- 4 CPS sensor
- 5 Filter housing (pulse air system)

**Engine Build Code**

- 1.6 DOHC 16V engine: **LIF**
- 1.8 DOHC 16V engine: **RKA**
- 2.0 DOHC 16V engine: **NGA**

**Code Breakdown**

1st letter: Displacement  
 L = 1.6 litre  
 R = 1.8 litre  
 N = 2.0 litre

2nd letter: Power Output

3rd letter: Model and Emission Regulation

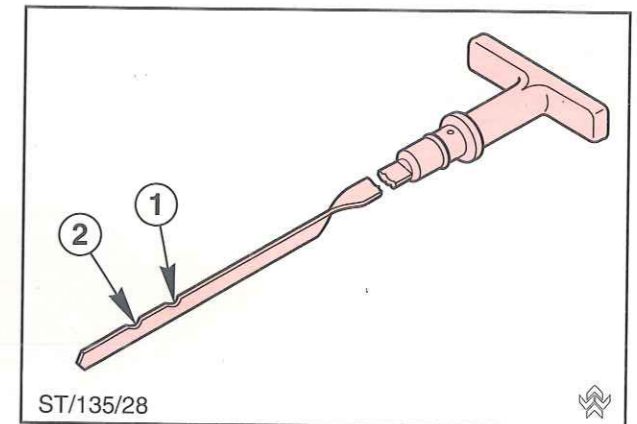
- The engine capacity specifications can be identified from a sticker located on the upper timing belt cover (Identification code: 1.6/1.8 or 2.0).

**Service Intervals**

- First service at **1,500 miles** free of charge
- Interim service (maintenance with engine oil and filter change) every **10,000 miles** or not later than 12 months from date of registration or previous service.
- Standard service every **30,000 miles** or not later than 12 months from interim or previous service.

**Engine Oil Change**

- The engine oil and filter should be changed every **10,000 miles**.
- Engine oil: Ford Super engine oil  
 Specification: API/SG/CD  
 Filling capacity with filter: 4.25 litre  
 without filter: 3.75 litre



- 1 "MAX" mark
- 2 "MIN" mark

**Note:** Do not overfill engine.

- Marks on dipstick:
  - MAX = 3.75 litre (in oil pan)
  - MIN = 3.0 litre (in oil pan)

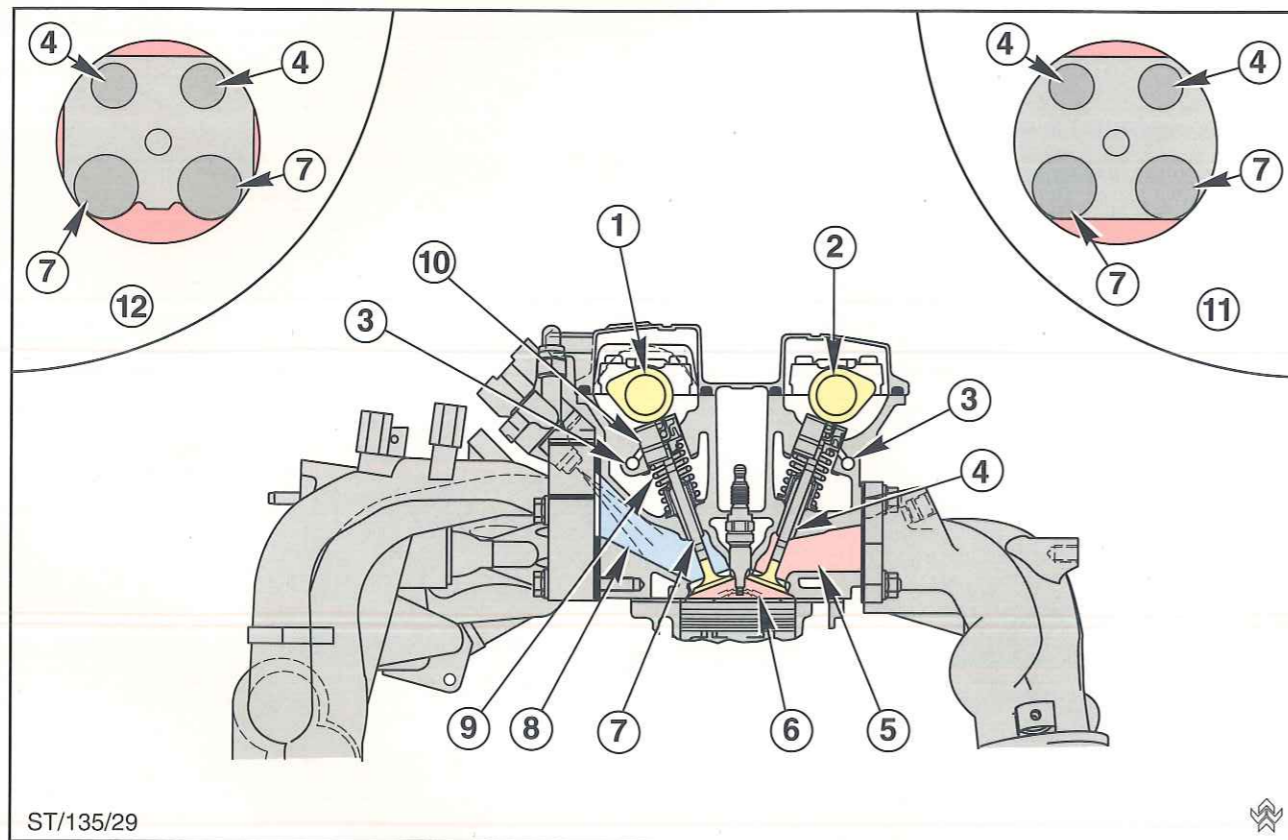
CYLINDER HEAD AND VALVE TRAIN

Valves and Combustion Chamber

- Valve head diameters (inlet/exhaust):

1.6 DOHC 16V	1.8 DOHC 16V	2.0 DOHC 16V
26.0/24.5 mm	32.0/28.0 mm	32.0/28.0 mm

- Valve stem diameter of inlet and exhaust valve for all engines: 6.0 mm.
- The hydraulic tappets remain unchanged (diameter: 28.4 mm).
- The compact, roof-shaped combustion chambers of the three engines differ in size due to the different cylinder bore dimensions. The 1.8 and 2.0 DOHC 16V Zeta engines have an "open" combustion chamber. In the 1.6 DOHC 16V Zeta engine a masked area on the inlet valves provides improved flow and swirl motion. This became necessary on these engines in order to meet the demands of emission legislation.

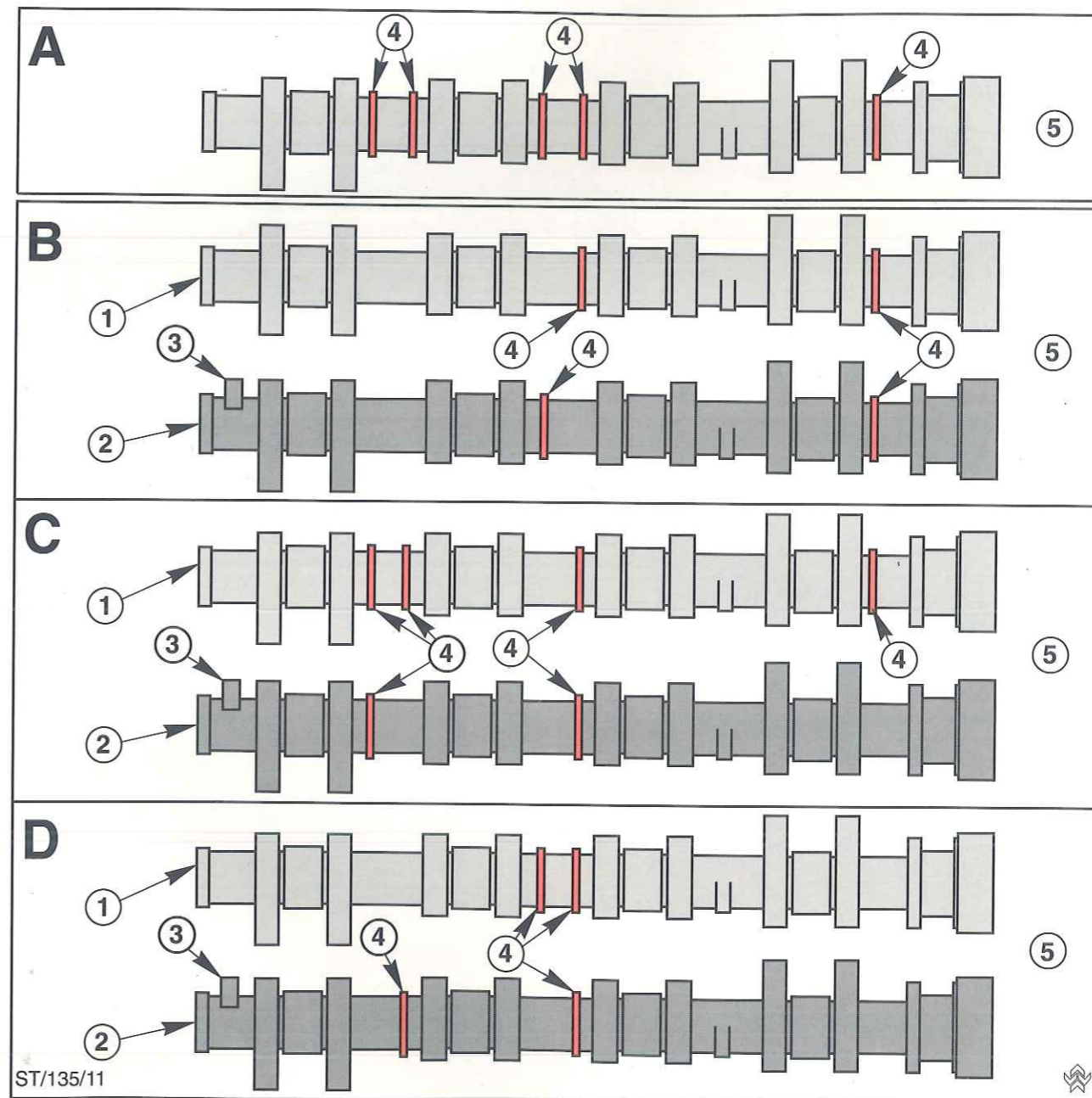


ST/135/29

- |                    |  |
|--------------------|--|
| Intake air         | 6 Roof-shaped combustion chamber                         |
| Exhaust gases      | 7 Inlet valve  |
| 1 Inlet camshaft   | 8 Inlet port   |
| 2 Exhaust camshaft | 9 Valve spring   |
| 3 Oil galleries    | 10 Hydraulic tappet                                      |
| 4 Exhaust valve    | 11 Open combustion chamber (1.8 and 2.0 DOHC 16V engine) |
| 5 Exhaust port     | 12 Masked combustion chamber (1.6 DOHC 16V engine)       |

Camshaft Identification

- The camshafts of the three engines differ by slightly modified valve timing and are identified by the different locations of the cast rings on the camshaft stem.



ST/135/11

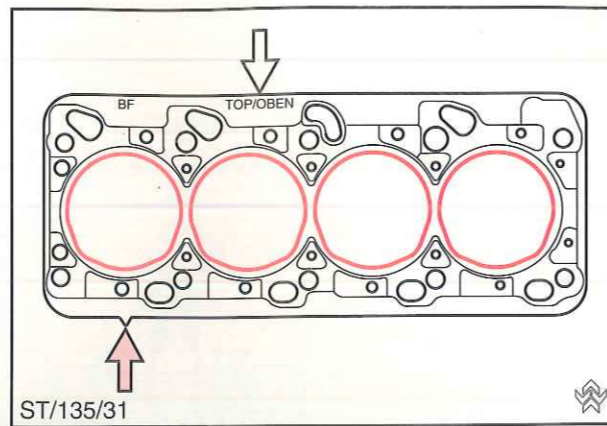
- |  |                                 |
|--|---------------------------------|
| A = All possible cast ring positions shown | 1 Exhaust camshaft              |
| B = 1.6 DOHC 16V Zeta                      | 2 Inlet camshaft                |
| C = 1.8 DOHC 16V Zeta                      | 3 Reference lobe for CID sensor |
| D = 2.0 DOHC 16V Zeta                      | 4 Cast rings                    |
|  | 5 Camshaft - drive end          |

**Cylinder Head Gasket**

- Cylinder head gaskets are identified by having 1, 2 or 3 teeth. They are also marked "TOP" for correct assembly.

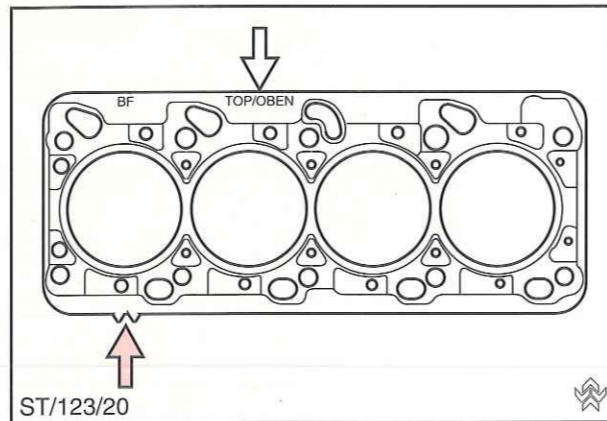
**1.6 DOHC 16V Zeta**

- Cylinder bore: 76.0 mm
- Identification: 1 tooth



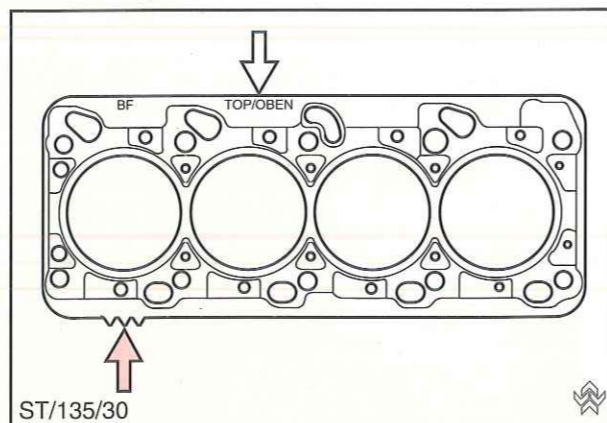
**1.8 DOHC 16V Zeta**

- Cylinder bore: 80.6 mm
- Identification: 2 teeth

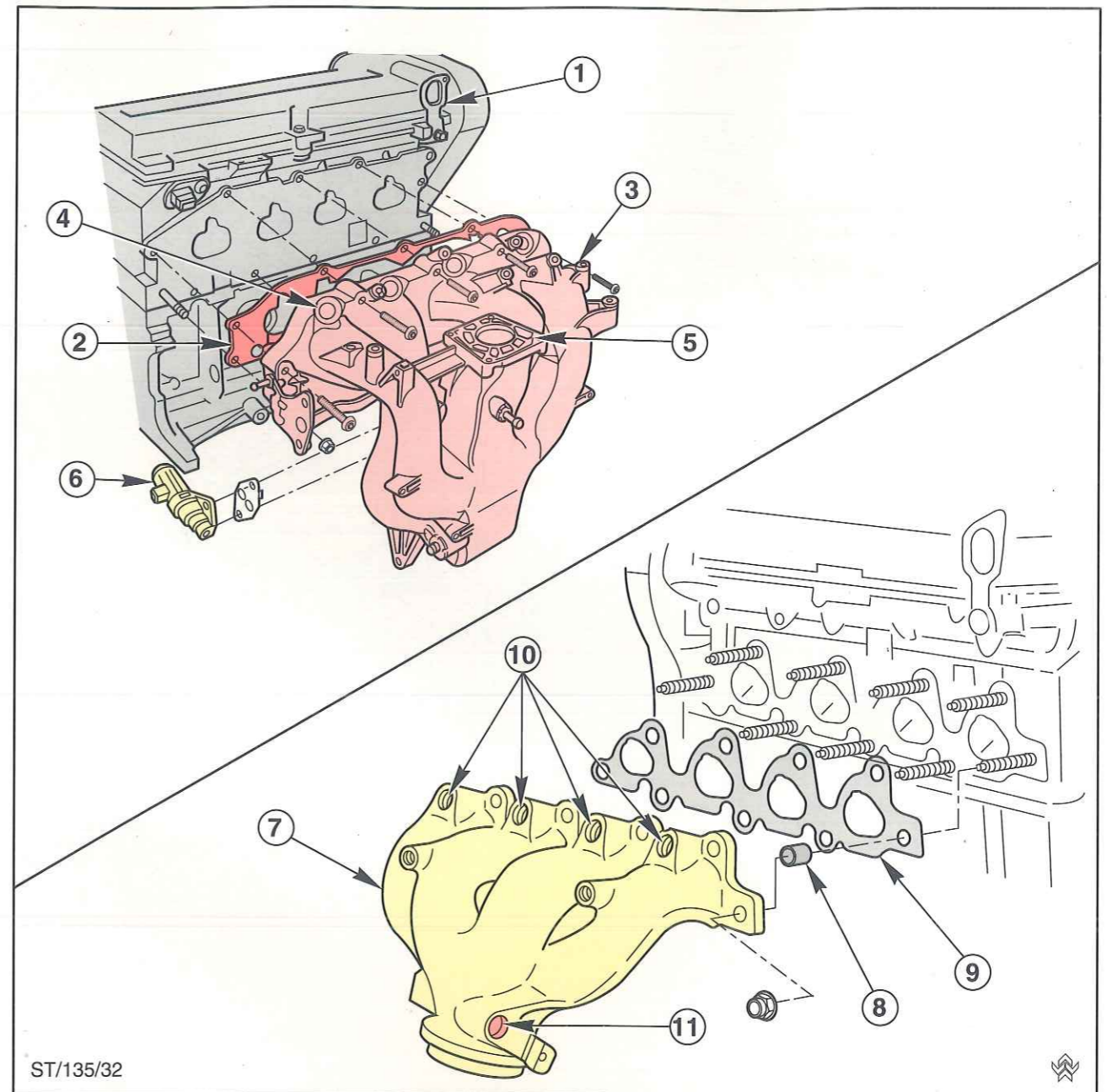


**2.0 DOHC 16V Zeta**

- Cylinder bore: 84.8 mm
- Identification: 3 teeth



**CYLINDER HEAD COMPONENTS**

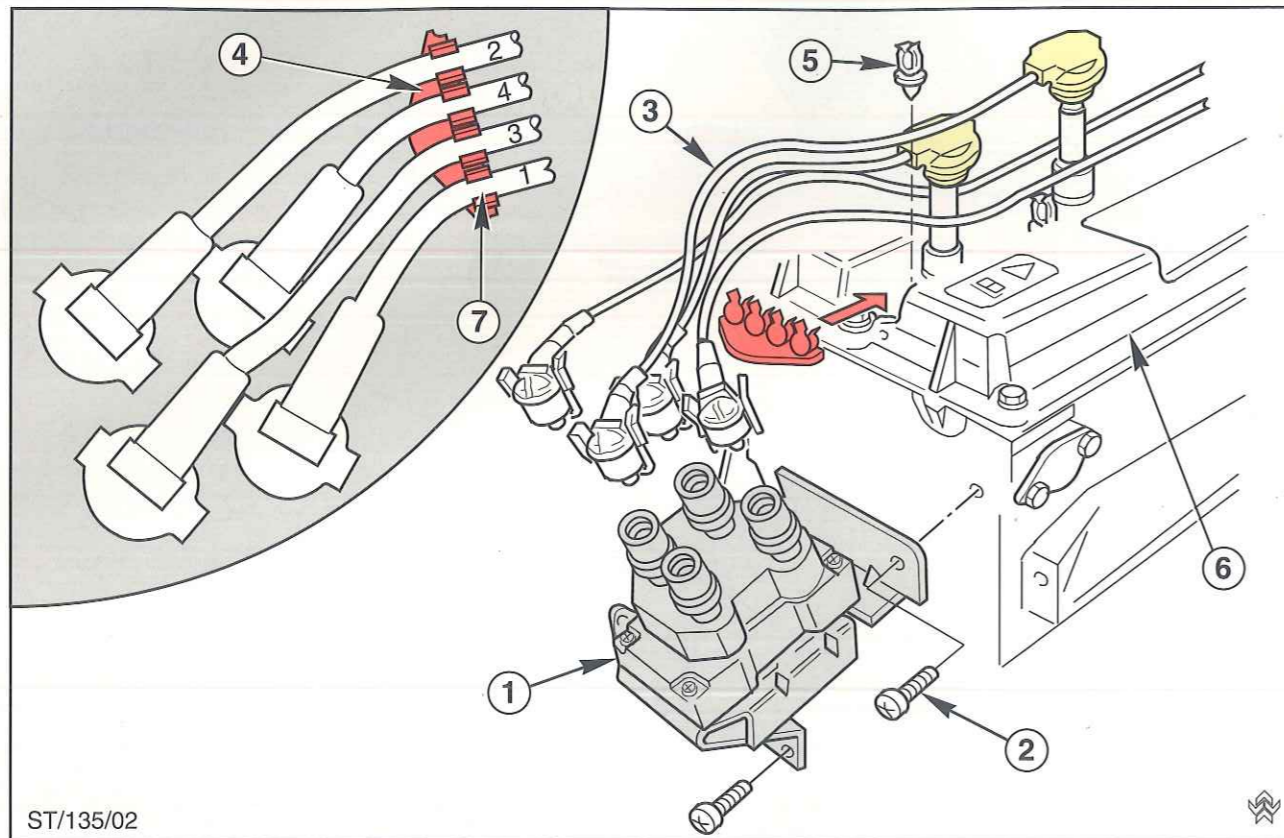


- 1 Camshaft cover
- 2 Inlet manifold gasket
- 3 Plastic inlet manifold with air chamber
- 4 Location for injector/fuel rail
- 5 Mounting flange for throttle housing

- 6 Idle speed control valve (ISC)
- 7 Exhaust manifold
- 8 Guide sleeve
- 9 Exhaust manifold gasket
- 10 Connections for pulse air pipes
- 11 Connection for EGR tube

DIS Coil

- The holder for the HT leads has been modified.



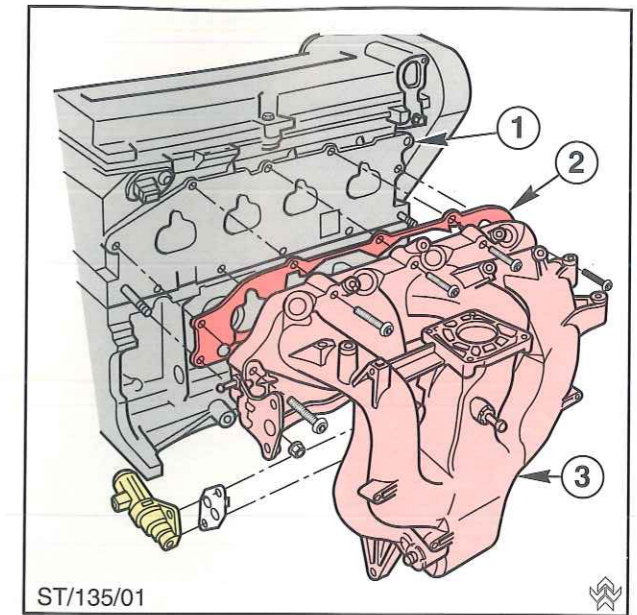
ST/135/02

- |                      |                                   |
|----------------------|-----------------------------------|
| 1 DIS coil           | 5 Clips for HT leads              |
| 2 Retaining screws   | 6 Camshaft cover                  |
| 3 HT lead            | 7 Correct arrangement of HT leads |
| 4 Holder for HT lead |                                   |

Inlet Side

- The plastic inlet manifold is secured with a gasket directly on the cylinder head.

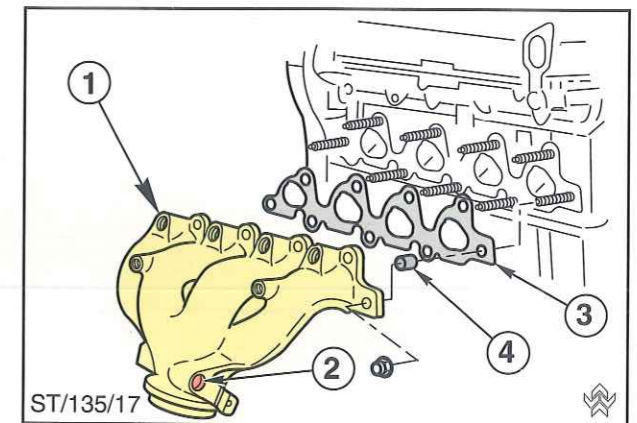
- Cylinder head
- Gasket
- Plastic inlet manifold



ST/135/01

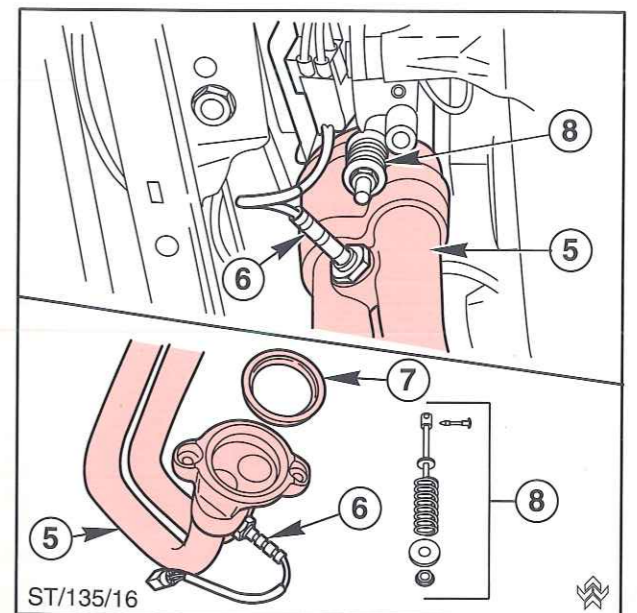
Exhaust Side

- The exhaust manifold has a new design. In addition to the pipes for the pulse air system, it also connects with the EGR tube.
- The exhaust manifold of the 2.0 l engine is divided internally (cylinder pairs 1-4 and 2-3).
- On all engines, the manifold is bolted to a twin downpipe.



ST/135/17

- Exhaust manifold
- Location for EGR tube
- Gasket
- Guide sleeve
- Twin downpipe
- HEGO sensor
- Exhaust pipe to manifold seal
- Exhaust pipe/manifold flexible coupling

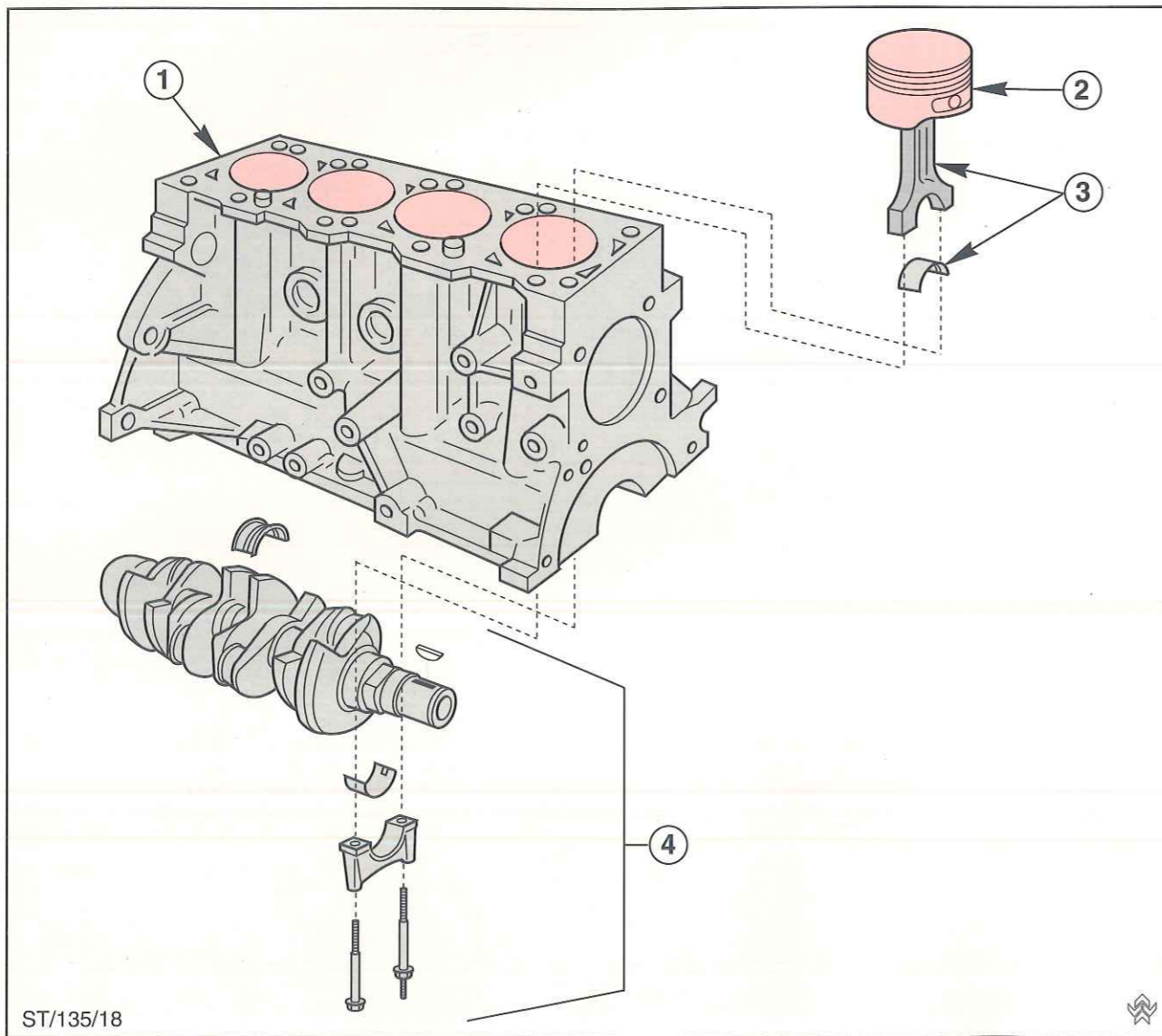


ST/135/16

ENGINE BLOCK AND CRANKGEAR

The different displacement capacities of the 1.6/1.8 and 2.0 DOHC 16V Zeta engines in the Mondeo result from the different cylinder bore diameters.

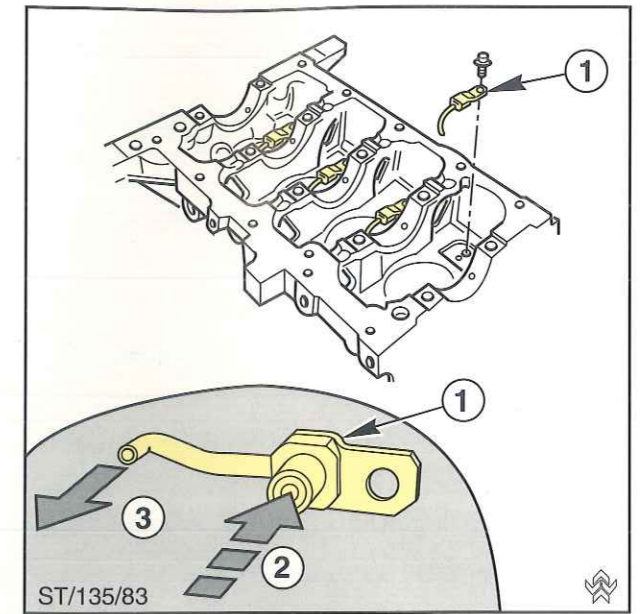
- 1 Engine blocks with cylinder bores of the standard classes 1 to 3 are used.
- 2 Piston diameter, piston weight, lower compression ring and oil scraper ring differ.
- 3 **Common** connecting rod, connecting rod bearing shell and big-end bearing cap for all engines.
- 4 **Common** crankshaft, main bearing shells and main bearing caps for all engines.



Oil Spray Tubes

- The 2.0 DOHC 16V Zeta engine uses oil spray tubes for additional piston cooling.

- 1 Oil spray tube
- 2 Valve opens against spring force at a specified oil pressure
- 3 Oil spray

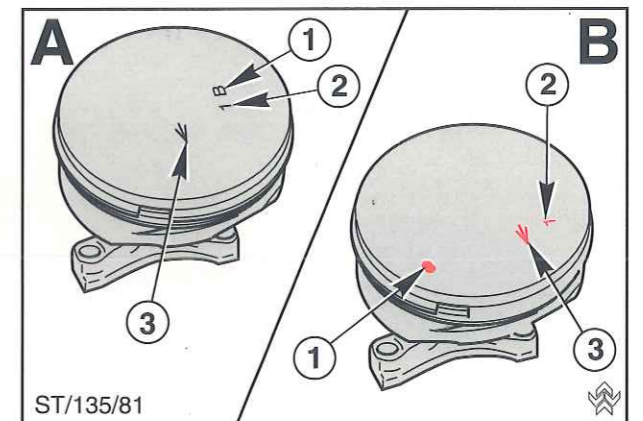


Pistons

- In line with the 3 standard classes of the cylinder bores for each engine version there are also 3 standard grades for the pistons.

Identification

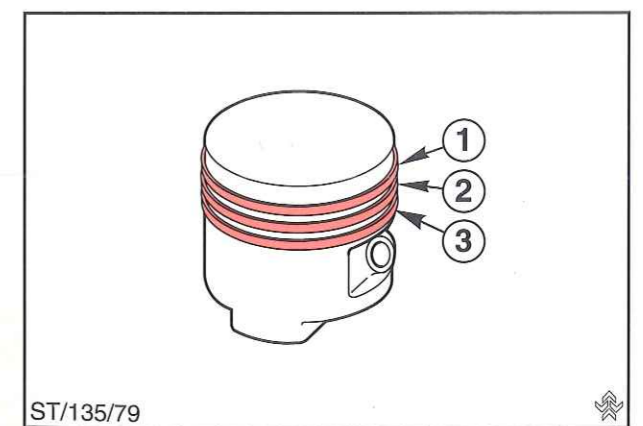
- 1 Classification of piston pin bore (Capital letters **A**, **B** or **C** for 1.6/1.8 litre engines, coloured marks in **red**, **white** or **blue** for 2.0 litre engine)
- 2 Piston grade
- 3 Installation direction (engine front)



- A 1.6 and 1.8 DOHC 16V Zeta engine
- B 2.0 DOHC 16V Zeta engine

- 1 Upper compression ring:  
Ring thickness **common** for all engines.
- 2 Lower compressing ring:  
Ring thickness **different**
- 3 Oil scraper ring:  
Ring thickness **different**

(See Service Microfiche, Section 21)



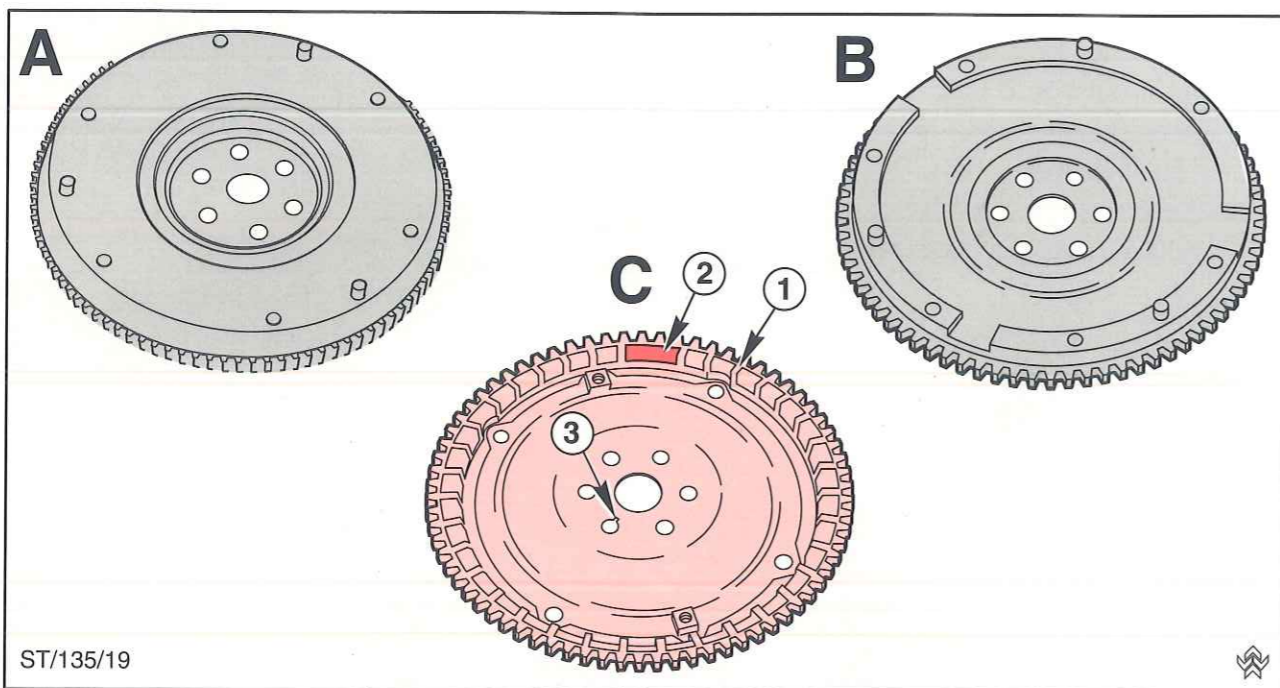
**Flywheel**

- Flat flywheel for 1.6 and 1.8 DOHC 16V Zeta engines with MTX 75 transmission.  
Diameter: 220 mm
- Dished flywheel for 2.0 DOHC 16V Zeta engines with MTX 75 transmission.  
Diameter: 240 mm

**Note:** The flywheel fastening bolts must not be re-used.

**Drive Plate - Automatic Transmission CD4E**

- A sensor ring made of steel plate is welded to the torque converter drive plate for the crankshaft position/speed sensor (CPS) with 36-1 rectangular window pattern. The crankshaft position 90° before TDC is marked by the wide window (missing steel plate web).
- The correct installation position is fixed by a recess at one of the disc securing holes.



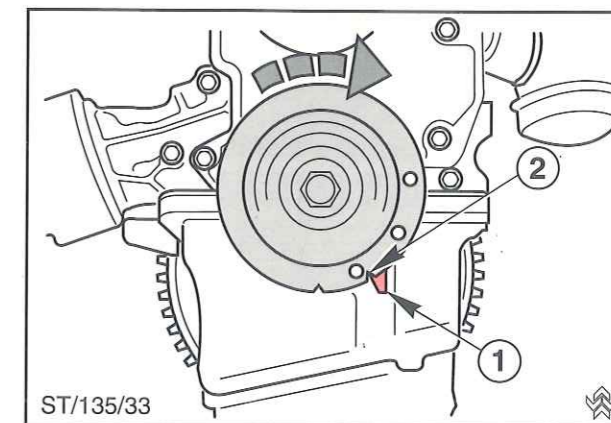
- |   |   |   |                                  |
|---|---|---|----------------------------------|
| A | Flat flywheel                               | 1 | 36-1 sensor ring                 |
| B | Dished flywheel                             | 2 | 90° before TDC position          |
| C | Drive plate for automatic transmission CD4E | 3 | Recess for installation position |

**CAMSHAFT DRIVE**

- The camshaft drive with a 25.4 mm wide timing belt is the same as previous Zeta engines.
- No return spring is fitted on the timing belt tensioner during production. This spring must be installed when replacing the timing belt during service work.
- **The timing belt must be renewed every 60,000 miles (90,000 km).**

**TDC Mark**

- 1 TDC mark on oil pan
- 2 TDC mark on crankshaft pulley/damper assembly

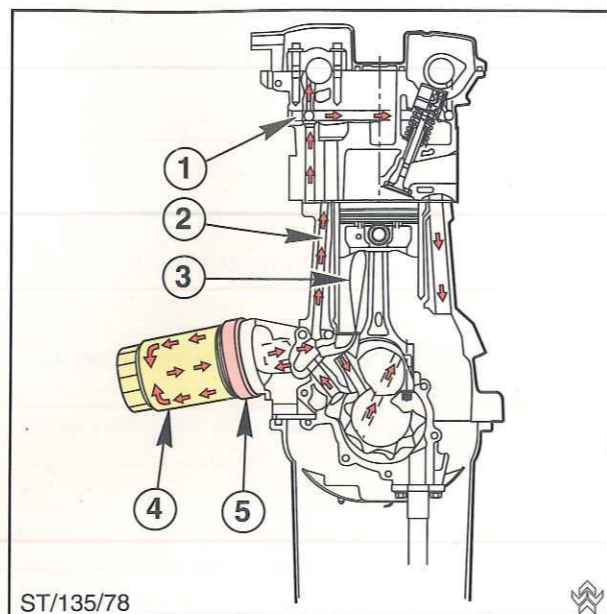


ST/135/33

ENGINE LUBRICATION CIRCUIT

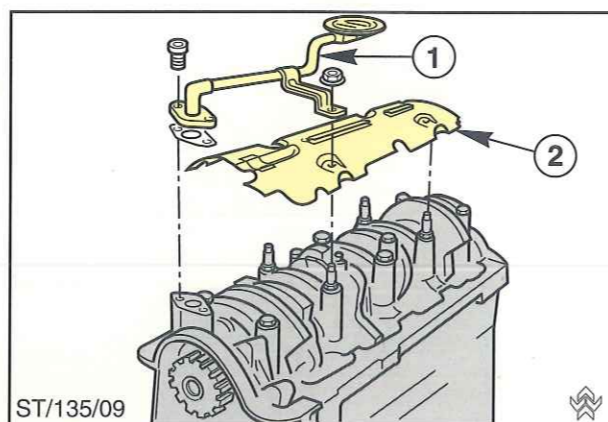
■ Engine lubrication circuit by way of example of the 2.0 DOHC 16V Zeta engine

- 1 Oil gallery in cylinder head
- 2 Riser oil gallery
- 3 Oil spray for additional piston cooling
- 4 Oil filter
- 5 Oil cooler *NOT FITTED*



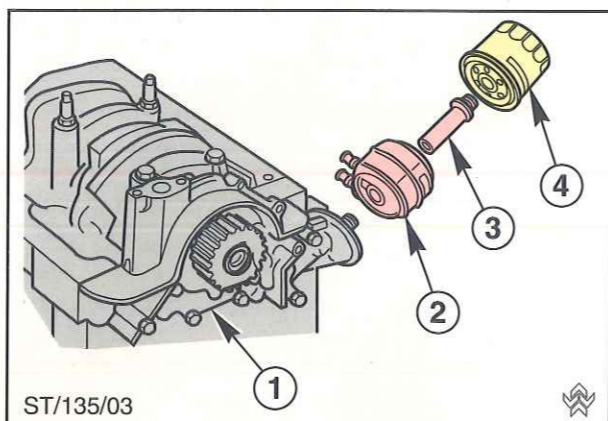
Oil Pump Pick-Up Pipe/Oil Baffle Plate

- 1 Modified oil pump pick-up pipe, supported by a bracket on main bearing.
- 2 Modified oil baffle plate, secured on stud at main bearing locations.



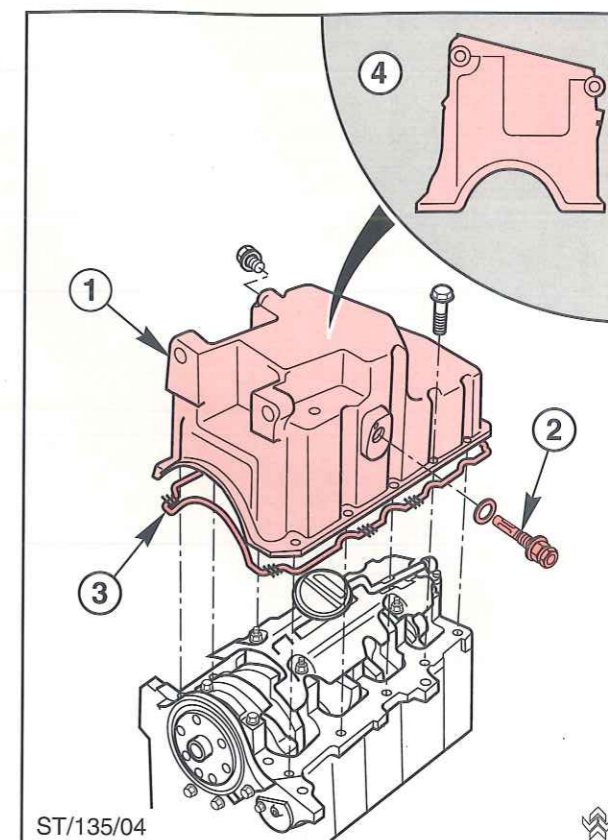
Oil Cooler

- 1 Ge-rotor-type oil pump
- 2 Oil cooler (for 2.0 l Zeta engine only) *NOT FITTED*
- 3 Fastening bolt for oil cooler (banjo bolt)
- 4 Oil filter



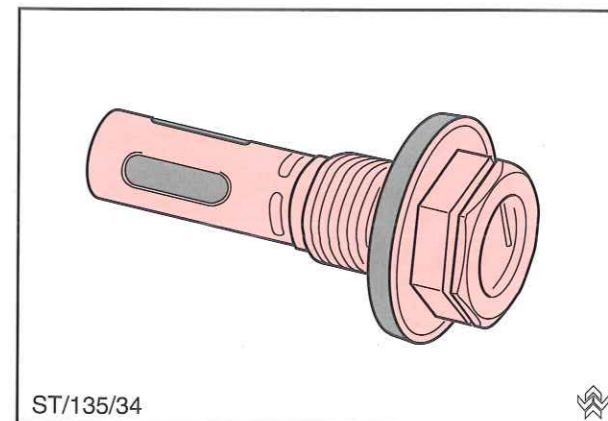
Oil Pan

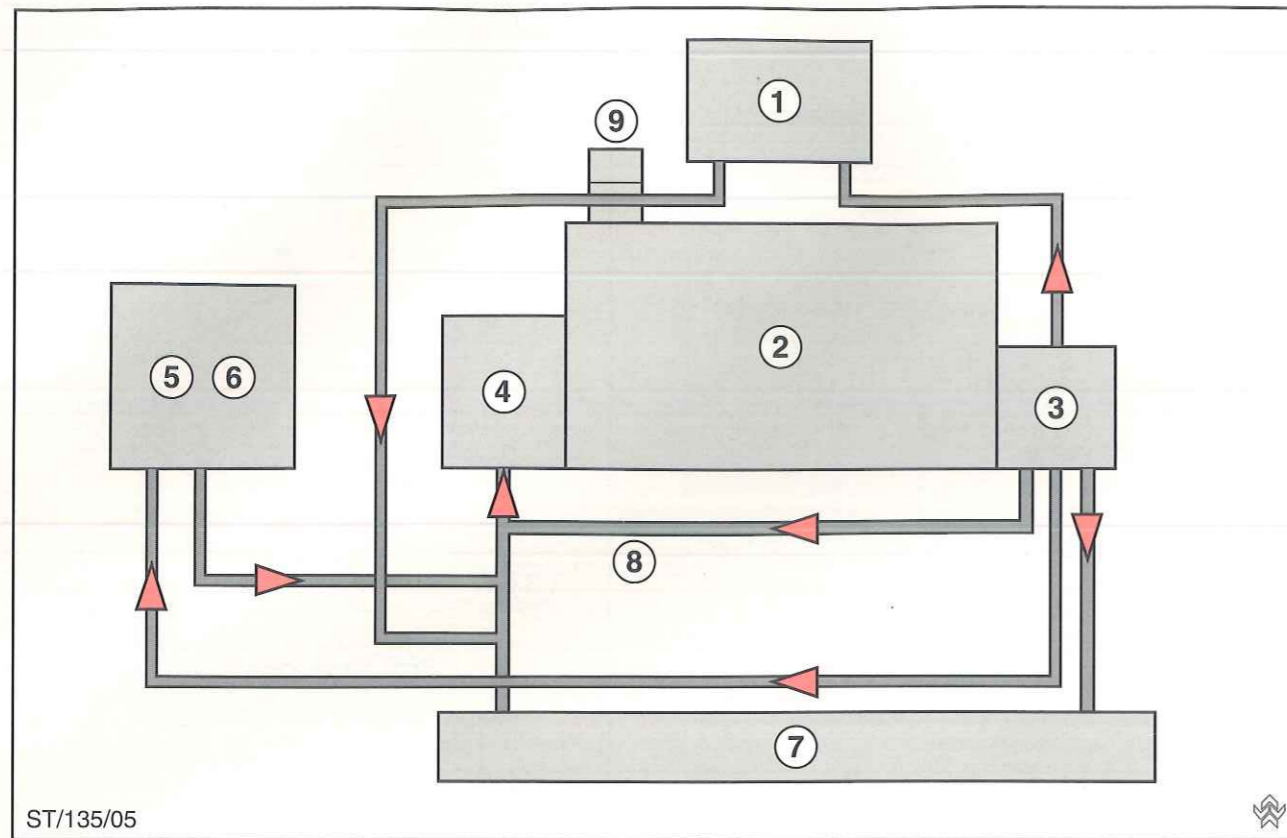
- 1 New aluminium oil pan for all Mondeo engines. The oil pan is bolted to the engine block "metal on metal".
- 2 Oil level indication sensor (2.0 l Zeta engine with auxilliary warning system).
- 3 Pre-formed gasket
- 4 Due to the installation position of the engine tilted forward by 8°, the underside of the oil pan is tapered.



Oil Level Indication Sensor

- On vehicles equipped with the 2.0 l Zeta engine and the auxilliary warning system a sensor for indicating the engine oil level is installed in the side of the oil pan.
- The warning lamp lights when the oil level in the pan drops below "MIN".
- A low engine oil level will be indicated under all operating conditions.



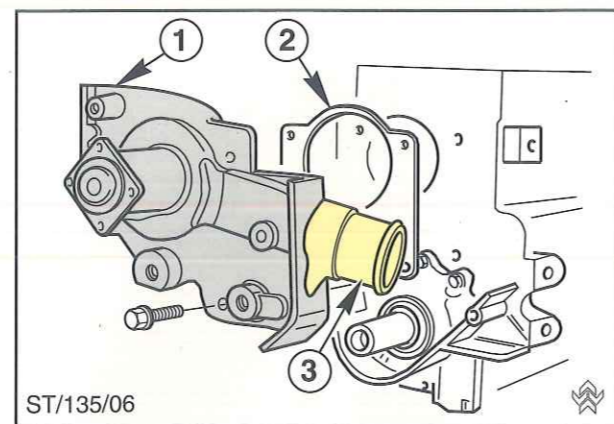


- Coolant circuit
- 1 Heater radiator
- 2 Engine
- 3 Thermostat housing
- 4 Water pump
- 5 Degas tank
- 6 Pressure cap
- 7 Radiator
- 8 Bypass pipe
- 9 Oil cooler (2.0 DOHC 16V Zeta engine only) **NOT FITTED**

**Water Pump**

- The coolant inlet connector has been modified. It is now cranked towards the rear.

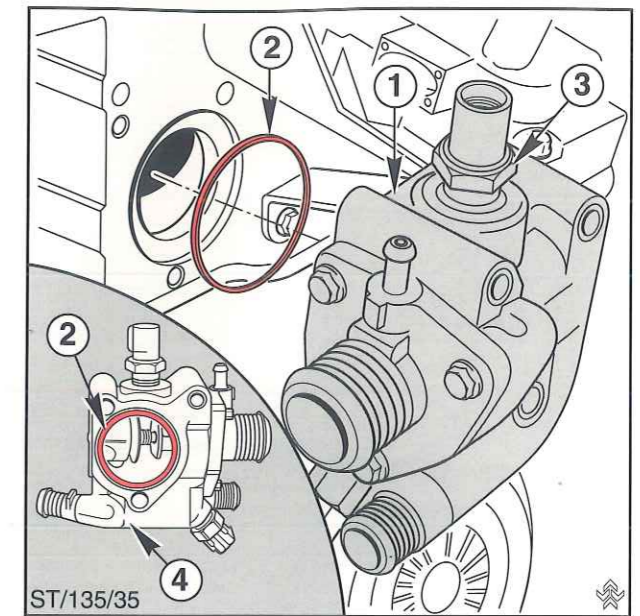
- 1 Water pump
- 2 Gasket
- 3 Coolant inlet connector



**Thermostat Housing**

- Sealing of the plastic thermostat housing is by means of a pre-formed ring.

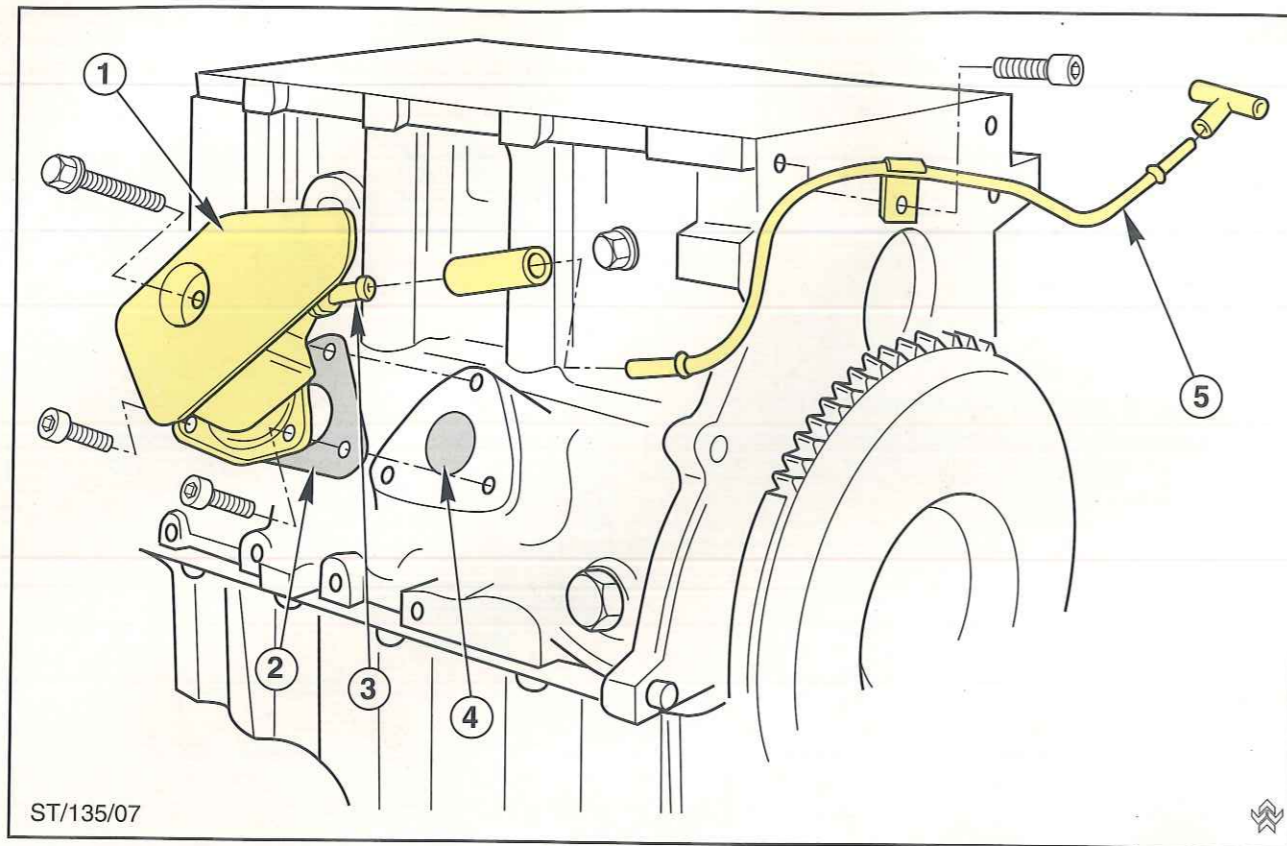
- 1 Plastic thermostat housing
- 2 Pre-formed ring
- 3 Engine coolant temperature sensor (ECT)
- 4 Connection for bypass hose



**Thermostat opening temperature for 1.6/1.8 and 2.0 DOHC 16V Zeta engines: 88 °C**

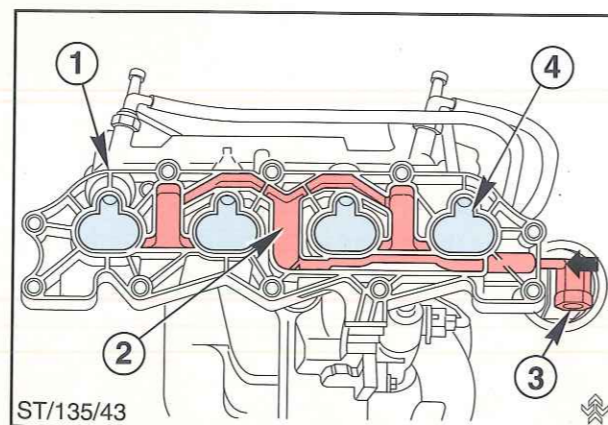
**Radiator Fan**

- The radiator fan is switched dependent on the engine temperature by the EEC IV module. The thermo switch which was previously used for this purpose (installed in main coolant circuit) is no longer fitted.
- The EEC IV module detects the engine coolant temperature on the basis of ECT signals and switches the radiator fan(s) on and off at the preprogrammed temperature.
  - a) Single fan (one speed)
    - switches on at approx. 100 °C
    - switches off at approx. 93 °C
  - b) Single fan (two speed)
    - Stage 1 switches on at approx. 100 °C
    - Stage 2 switches on at approx. 103 °C
    - When the second stage switches off, the fan continues to run in the first stage until the temperature drops below approx. 93 °C.
  - c) Double fan (two speed)
    - Stage 1: both fans switch on at approx. 100 °C
    - Stage 2 switches on at approx. 103 °C
    - After the second stage switches off, the fans continue to run in the first stage until the temperature drops below approx. 93 °C.



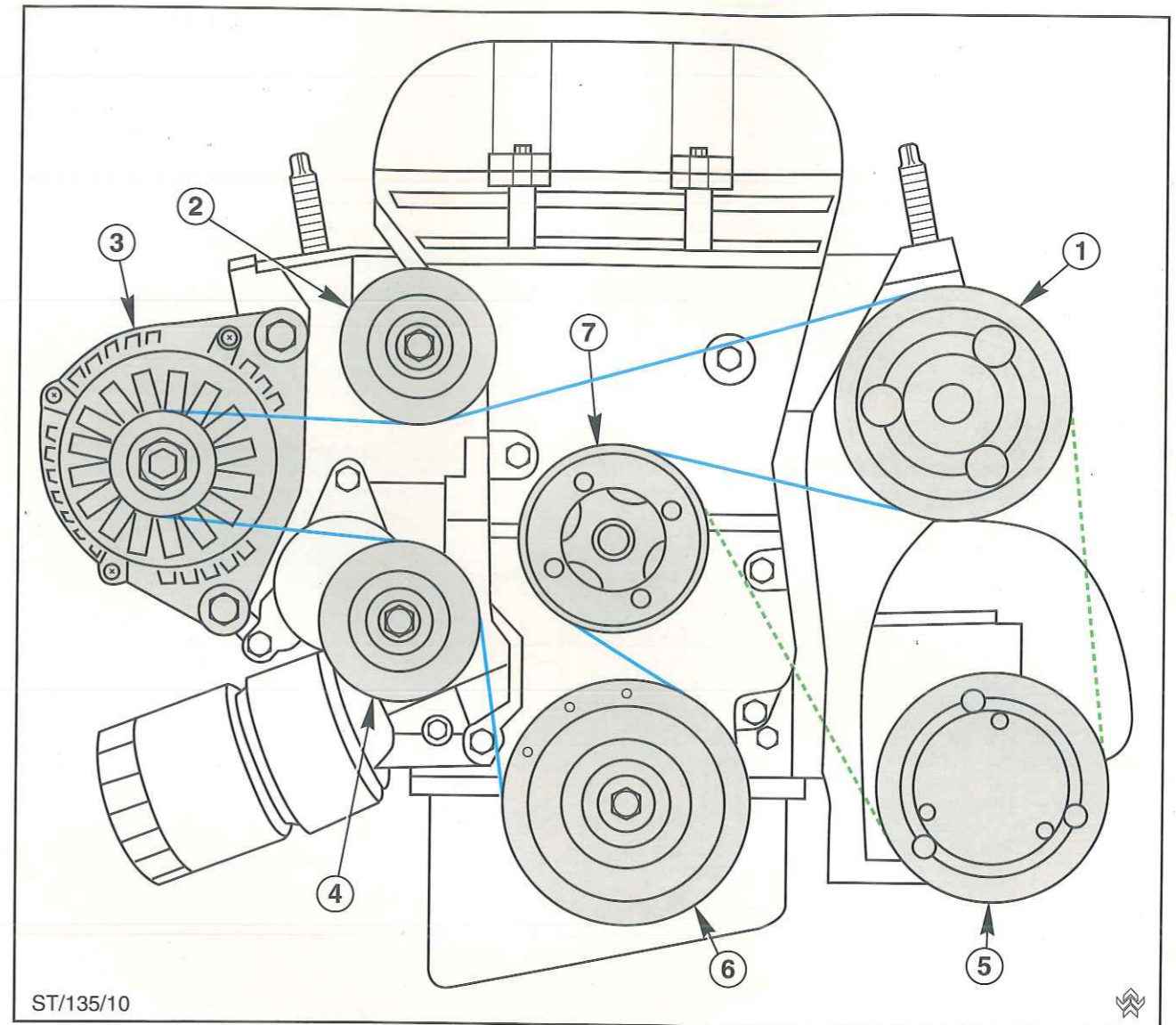
- 1 Oil separator
- 2 Oil separator gasket
- 3 PCV valve
- 4 Crankcase opening
- 5 Connecting hose of inlet manifold

- 1 Inlet manifold
- 2 Channel for recirculation of crankcase gases to the cylinders
- 3 Crankcase gases from the PCV valve
- 4 Inlet ports - cylinder head



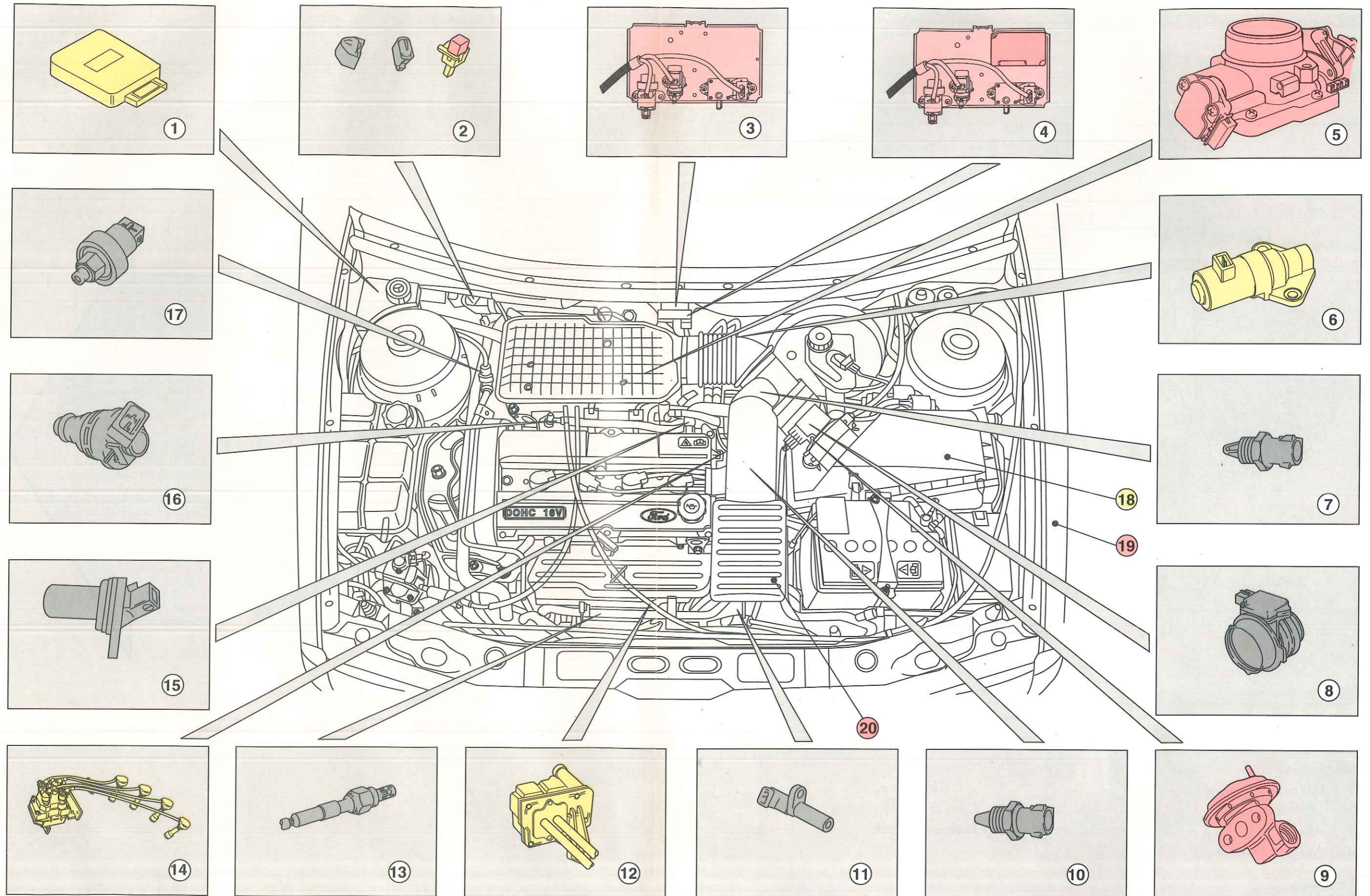
ST/135/43

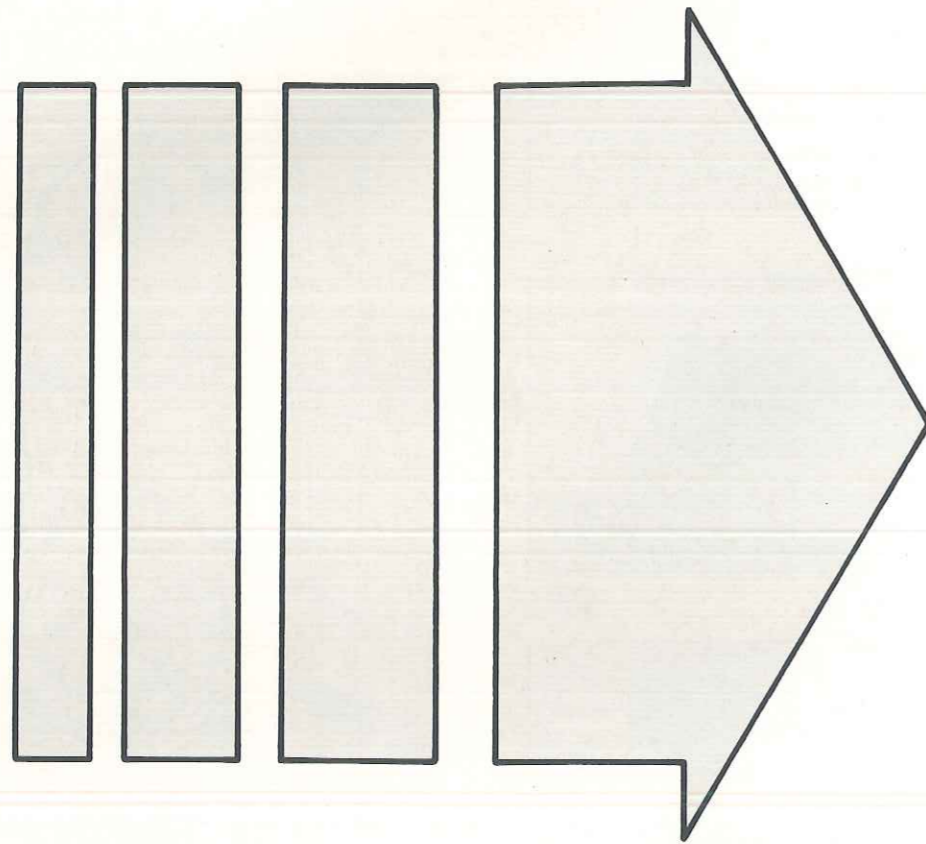
The illustration shows the possible auxiliary units which are driven by a multi-groove belt (Poly-V belt).



ST/135/10

- Standard equipment
- Possible additional equipment
- 1 Power steering pump
- 2 Idler pulley
- 3 Alternator
- 4 Automatic tensioner
- 5 A/C compressor
- 6 Crankshaft pulley/damper assembly
- 7 Water pump pulley



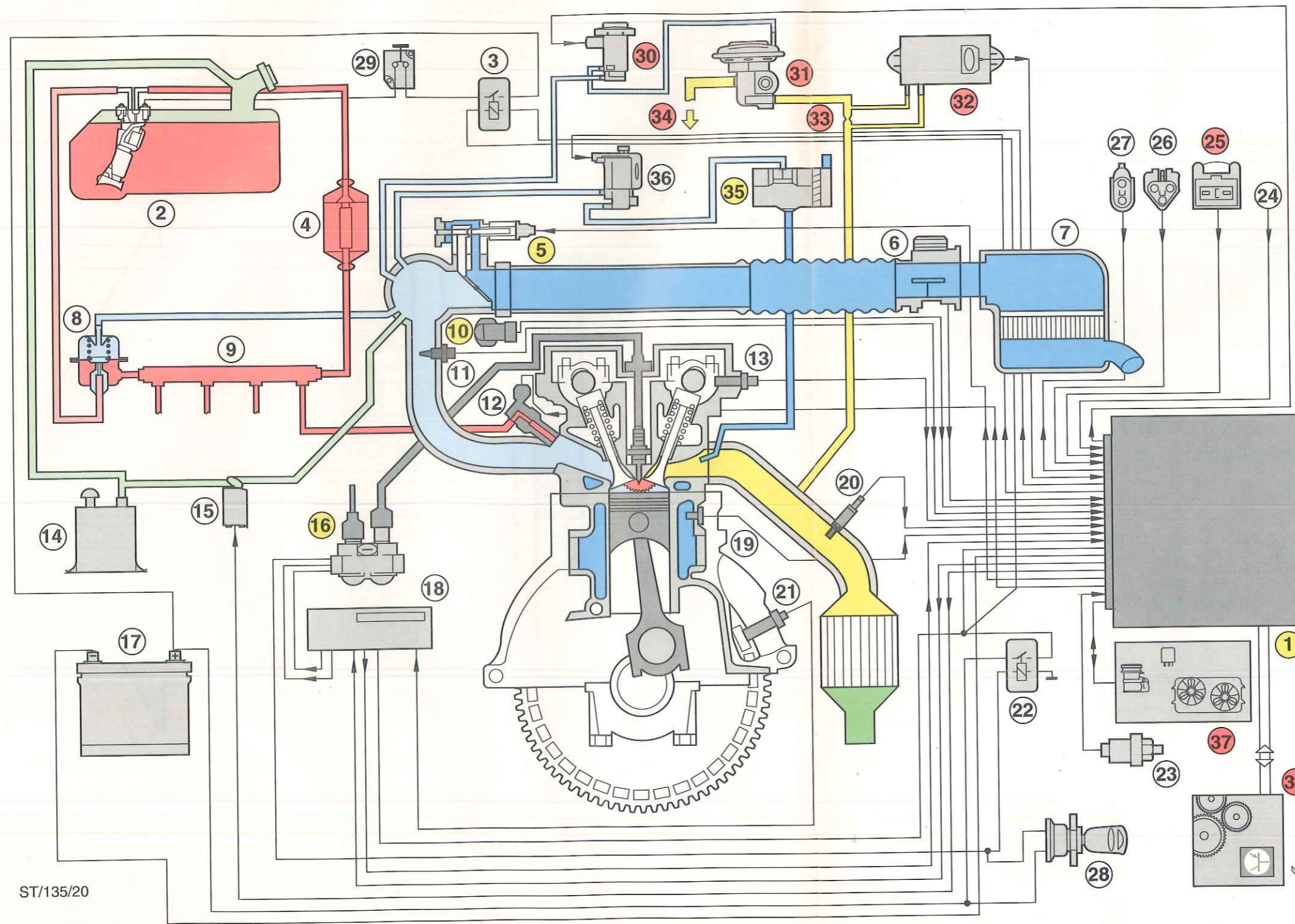


- Air mass measurement by hot-wire air mass meter
- Sequential electronic fuel injection (SEFI)
- Fuel injectors with lateral fuel supply
- Integrated fully electronic ignition system EDIS-4 with one DIS coil
- EEC IV module with integrated EDIS-4 module (vehicles with manual transmission)
- EEC IV module for electronic engine management and electronic CD4E transmission control
- Switching the air conditioning system with interface for switching the radiator fan (two speeds) by the EEC IV module
- Power steering pressure switch (PSPS) for idle speed control
- HEGO-controlled three-way catalytic converter
- Evaporative emission control system
- Electronically controlled pulse air system, filter housing with integrated valves and silencer
- Electronically controlled exhaust gas recirculation (EGR)
- Serial interface (diagnosis connector) for Ford Diagnostic System FDS 2000

#### Key to folded page

- |   |   |    |  |
|---|---|----|--|
| 1 | EEC IV module with integrated EDIS-4 module (manual transmission)   | 8  | Mass air flow meter (MAF)                                |
| 2 | Self-test connector, diagnosis connector, service connector   | 9  | EGR valve  |
| 3 | Bracket (vehicles with manual transmission) with differential pressure transducer (DPFE sensor), electronic vacuum regulator (EVR) and pulse air solenoid valve | 10 | Engine coolant temperature sensor (ECT)                  |
| 4 | Bracket (vehicles with CD4E transmission) with EDIS-4 module, DPFE sensor, EVR and pulse air solenoid valve   | 11 | Crankshaft position/speed sensor (CPS)                   |
| 5 | Throttle housing with throttle position sensor (TPS)  | 12 | Pulse air filter/valve housing                           |
| 6 | Idle speed control valve (ISC)  | 13 | HEGO sensor  |
| 7 | Air charge temperature sensor (ACT)   | 14 | DIS coil and HT leads                                    |
|   |   | 15 | Camshaft identification sensor (CID)                     |
|   |   | 16 | Fuel injectors   |
|   |   | 17 | Power steering pressure switch (PSPS)                    |
|   |   | 18 | Intake noise suppressor/air cleaner                      |
|   |   | 19 | Resonator for damping intake noise (under fender)        |
|   |   | 20 | Resonator for damping intake noise in engine compartment |

Shown: 1.8 and 2.0 DOHC 16V Zeta Engine with CD4E Automatic Transmission



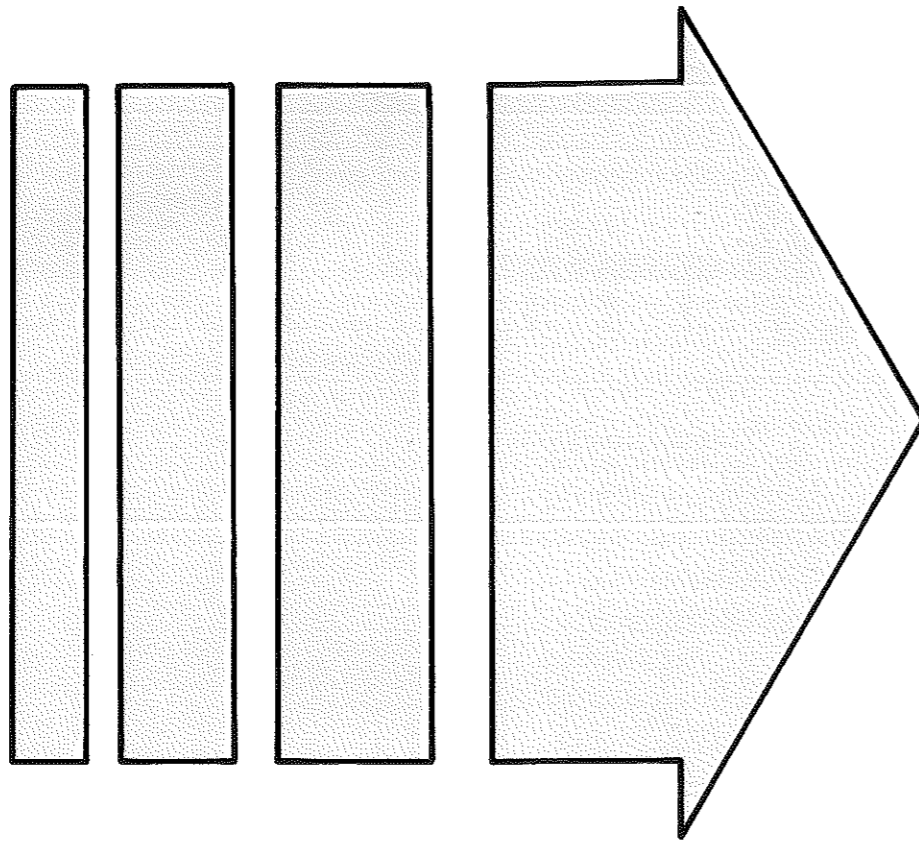
ST/135/20

■ Air intake - atmospheric pressure  
■ Fuel supply - low pressure  
■ Fuel vapour

■ Air intake - inlet manifold pressure  
■ Exhaust gases ahead of catalytic converter

■ Fuel supply - system pressure  
■ Exhaust gases after catalytic converter

- 1 EEC IV module
- 2 In-tank fuel pump
- 3 Fuel pump relay
- 4 Fuel filter
- 5 Idle speed control valve (ISC)
- 6 Mass air flow meter (MAF)
- 7 Air cleaner
- 8 Fuel pressure regulator
- 9 Fuel rail
- 10 Throttle position sensor (TPS)
- 11 Air charge temperature sensor (ACT)
- 12 Fuel injector
- 13 Camshaft identification sensor (CID)
- 14 Carbon canister (EVAP)
- 15 Purge solenoid valve (EVAP)
- 16 DIS coil
- 17 Battery
- 18 EDIS-4 module
- 19 Engine coolant temperature sensor (ECT)
- 20 HEGO sensor
- 21 Crankshaft position/speed sensor (CPS)
- 22 Power relay
- 23 Power steering pressure switch (PSPS)
- 24 A/C compressor clutch
- 25 Service connector (octane adjust (OAI))  
(plug-in bridge during production for operation with Premium RON 95 unleaded fuel)
- 26 Self-test connector
- 27 Diagnosis connector for FDS 2000
- 28 Ignition switch
- 29 Inertia switch
- 30 Electronic vacuum regulator (EVR)
- 31 EGR valve
- 32 Differential pressure transducer (DPFE sensor)
- 33 Differential pressure sampling point
- 34 To inlet manifold (air chamber)
- 35 Pulse air filter/valve housing
- 36 Pulse air solenoid valve
- 37 A/C radiator fan switching
- 38 Electronic transmission control (CD4E)



The function of the EEC IV engine management system of the Mondeo DOHC 16V Zeta engines is based on the system of the 1.8 l Zeta engine (see New Product Introduction Brochure 00/204).

The folded page opposite shows the overall system, the new or modified components are shown with corresponding colours in the figure numbers and are listed in the following.

#### EEC IV System

The EEC IV module additionally undertakes the control of the following systems:

- Electronic control of the CD4E automatic transmission (see brochure 00/214).
- Switching of air conditioning system with interface for electronic radiator fan switching.
- Electronically controlled exhaust gas recirculation (EGR)

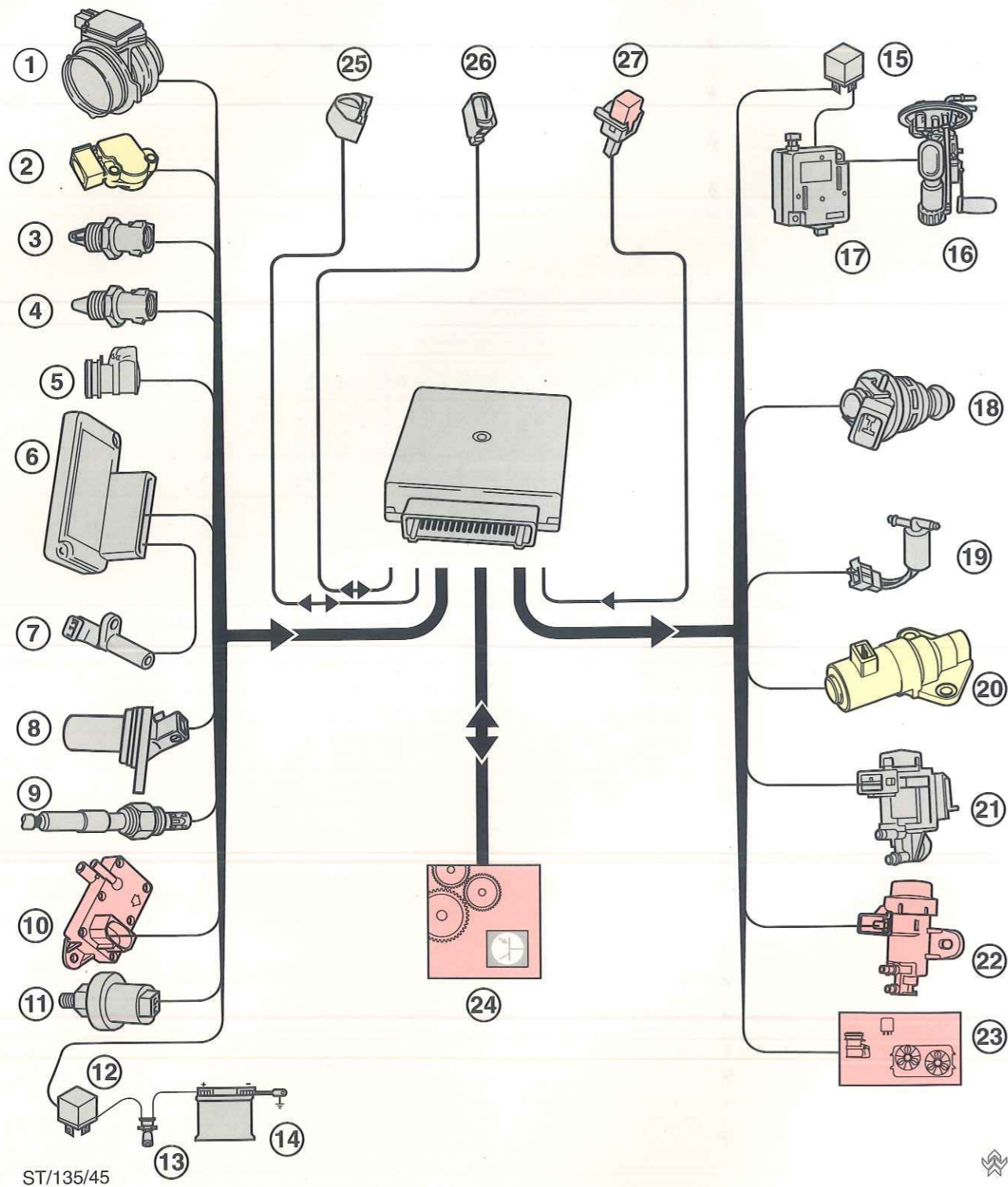
(Refer to component description on following pages.)

#### EGR System

- All Mondeo DOHC 16V Zeta engines are equipped with an Exhaust Gas Recirculation System (EGR) in order to reduce nitrogen oxides (NO<sub>x</sub>) under certain engine operating situations (see detailed description under "Exhaust System").

SENSORS

ACTUATORS



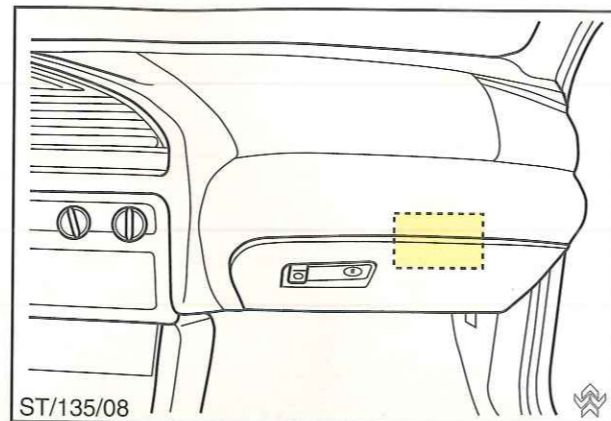
ST/135/45

- 1 Mass air flow meter (MAF)
- 2 Throttle position sensor (TPS)
- 3 Air charge temperature sensor (ACT)
- 4 Engine coolant temperature sensor (ECT)
- 5 A/C compressor clutch
- 6 EDIS-4 module (on vehicles with manual transmission integrated in the EEC IV module)
- 7 Crankshaft position/speed sensor (CPS)
- 8 Camshaft identification sensor (CID)
- 9 HEGO sensor
- 10 Differential pressure transducer (DPFE sensor)
- 11 Power steering pressure switch (PSPS)
- 12 Power supply relay
- 13 Ignition switch
- 14 Battery
- 15 Fuel pump relay
- 16 In-tank fuel pump
- 17 Inertia switch
- 18 Fuel injector
- 19 Purge solenoid valve (EVAP)
- 20 Idle speed control valve (ISC)
- 21 Pulse air solenoid valve
- 22 Electronic vacuum regulator (EVR)
- 23 Air conditioning/radiator fan switching
- 24 Electronic transmission control (CD4E)
- 25 Self-test connector (STAR tester) for engine management and transmission control
- 26 Diagnosis connector (FDS 2000) for engine management and transmission control
- 27 Service connector for octane adjust (OAI) with plug-in bridge for operation with Premium RON 95 unleaded fuel

All new and modified components are described in the following.

**EEC IV Module**

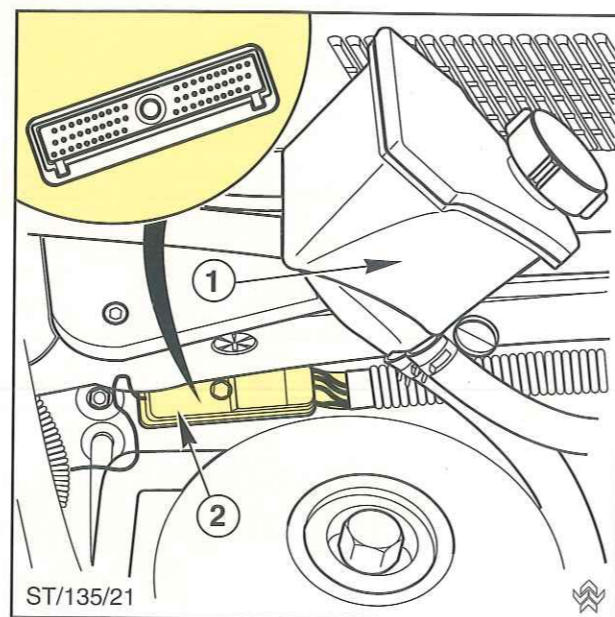
- The EEC IV module is located in LHD and RHD vehicles on the right hand side under the instrument panel (forward direction).



Installation location - EEC IV module  
(LHD vehicle shown)

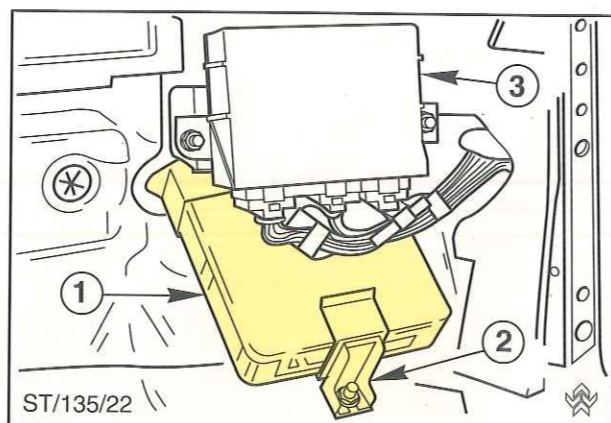
- The module cable connector is accessible from the engine compartment after removing the power steering reservoir (reservoir connected).

- Power steering reservoir
- EEC IV module connector



- The module is removed from the passenger compartment.

- EEC IV module
- Bracket
- Antiheft alarm system module

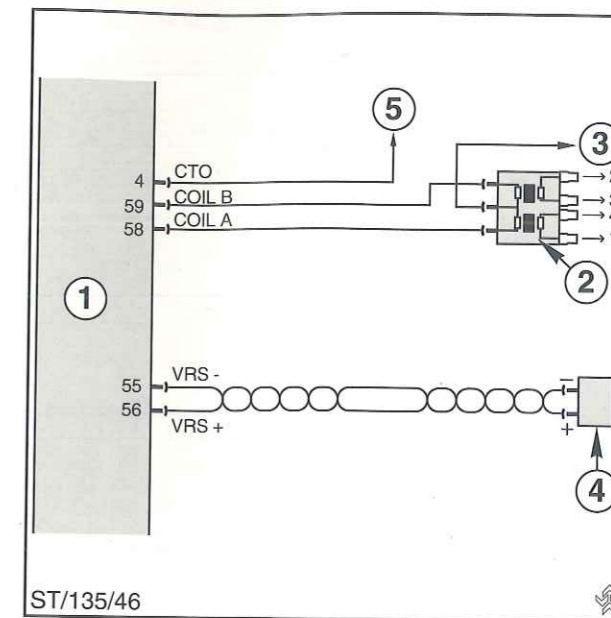


**EDIS-4 Module**

**Vehicles with Manual Transmission**

- EDIS-4 module integrated in the EEC IV module (extract from wiring diagram)

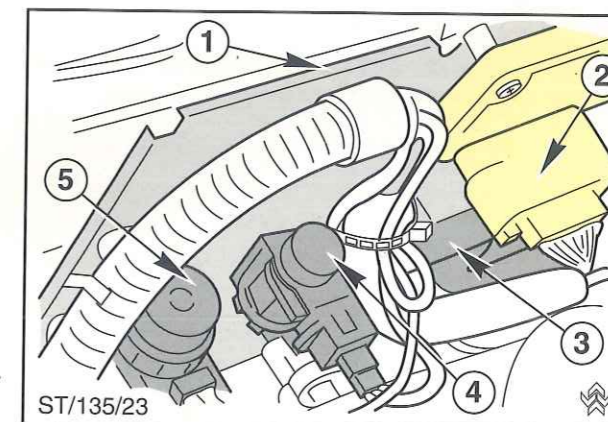
- EEC IV module
- DIS coil (coil A and B)
- To ignition relay
- Crankshaft position/speed sensor (CPS)
- Tachometer



**Vehicles with CD4E Automatic Transmission**

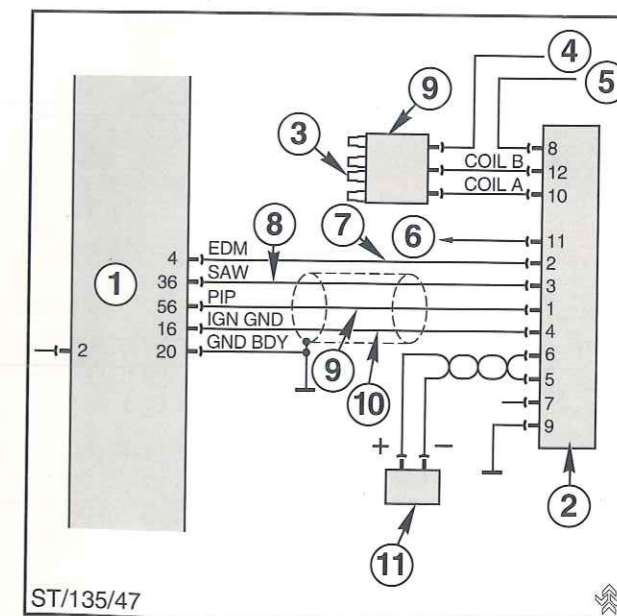
- The EDIS-4 module is located in the engine compartment.

- Bracket on bulkhead
- EDIS-4 module
- DPFE sensor
- Pulse air solenoid valve
- Electronic vacuum regulator (EVR)



Extract from wiring diagram

- EEC IV module
- EDIS-4 module
- DIS coil (coil A and B)
- To ignition relay
- Battery
- Tachometer
- EDM signal
- SAW signal
- PIP signal
- Ignition ground
- Crankshaft position/speed sensor (CPS)

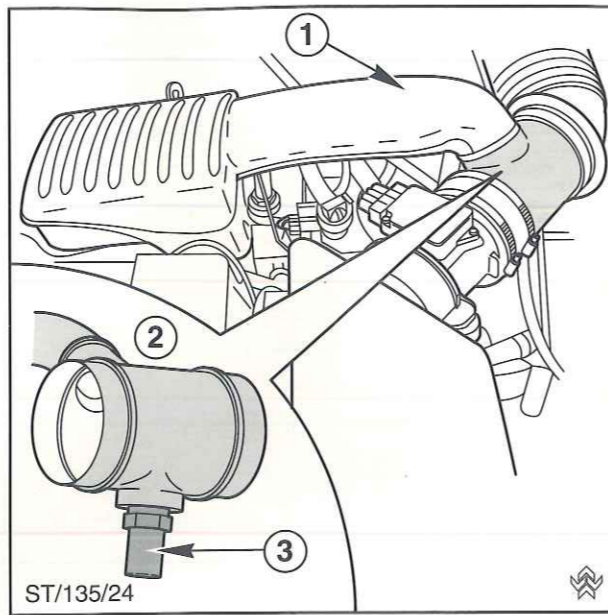


**SENSORS**

**Air Charge Temperature Sensor (ACT)**

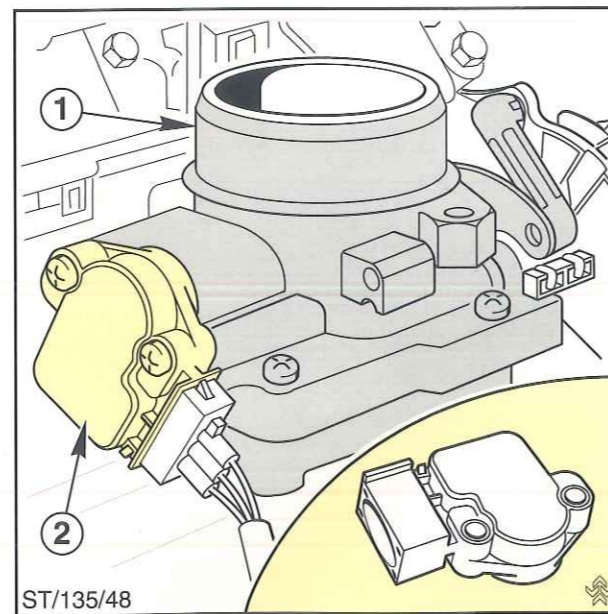
- The ACT sensor is installed from below in the intake air resonator (not visible from above).
- The intake air resonator must be removed in order to remove the ACT sensor.

- 1 Intake air resonator
- 2 Intake air resonator removed
- 3 ACT sensor



**Throttle Position Sensor (TPS)**

- The TPS sensor has a new design with lateral connector (due to vertical installation position of the throttle housing).



- 1 Throttle housing
- 2 TPS sensor

**Power Steering Pressure Switch (PSPS)**

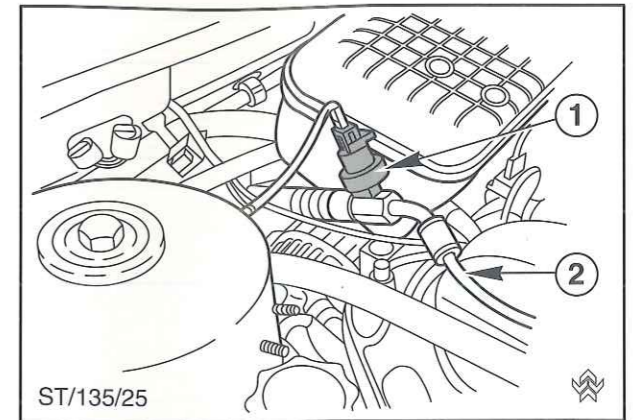
- The PSPS is installed in the delivery pipe from the power steering pump to the steering gear. It is located in the engine compartment.
- The PSPS is closed at low oil pressure in the steering system.

Values apply to all Mondeo engines:

PSPS opens at: ..... 31.5 ± 3.5 bar

PSPS closes between: ..... 13.5 and 24.0 bar

Housing colour: ..... Green



- 1 Power steering pressure switch (PSPS)
- 2 Power steering delivery pipe

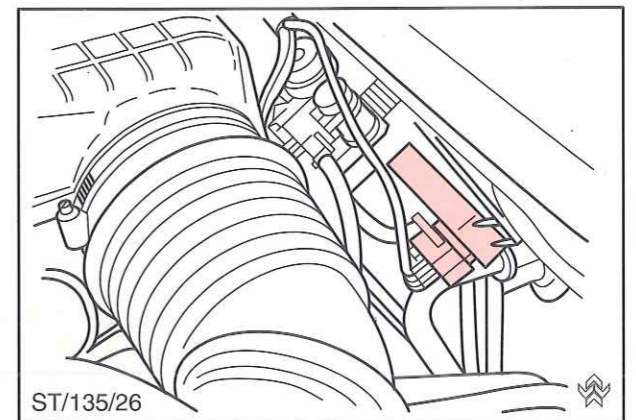
**Differential Pressure Transducer (DPFE sensor)**

DPFE = **D**elta **P**ressure **F**eedback **E**lectronic **S**ystem

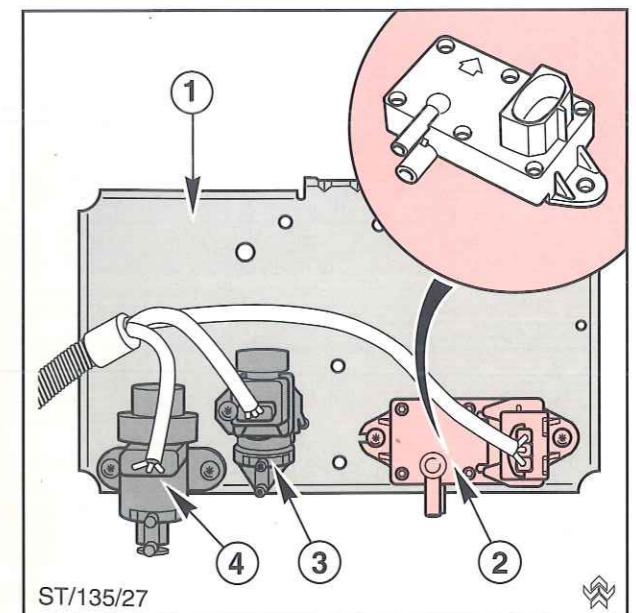
- The DPFE sensor for the EGR system is mounted together with other components on a bracket in the centre of the bulkhead.
- The DPFE sensor measures the differential pressure in the EGR exhaust pipe and sends a corresponding signal to the EEC IV module.

- 1 Bracket
- 2 DPFE sensor
- 3 Pulse air solenoid valve
- 4 Electronic vacuum regulator (EVR) (shown: Vehicle with manual transmission)

Refer to description in Section "Exhaust System".



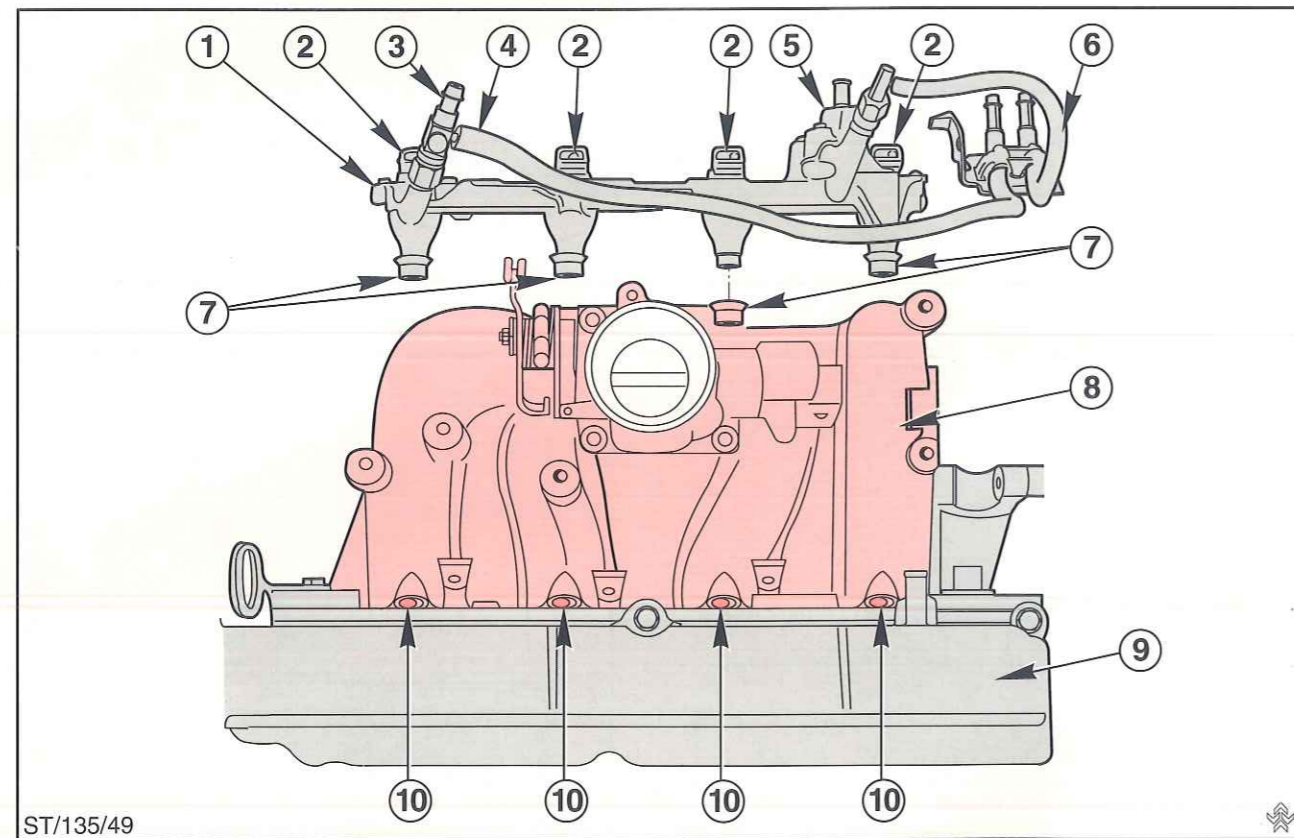
Installation location - DPFE sensor



ACTUATORS

Fuel Injectors/Fuel Rail

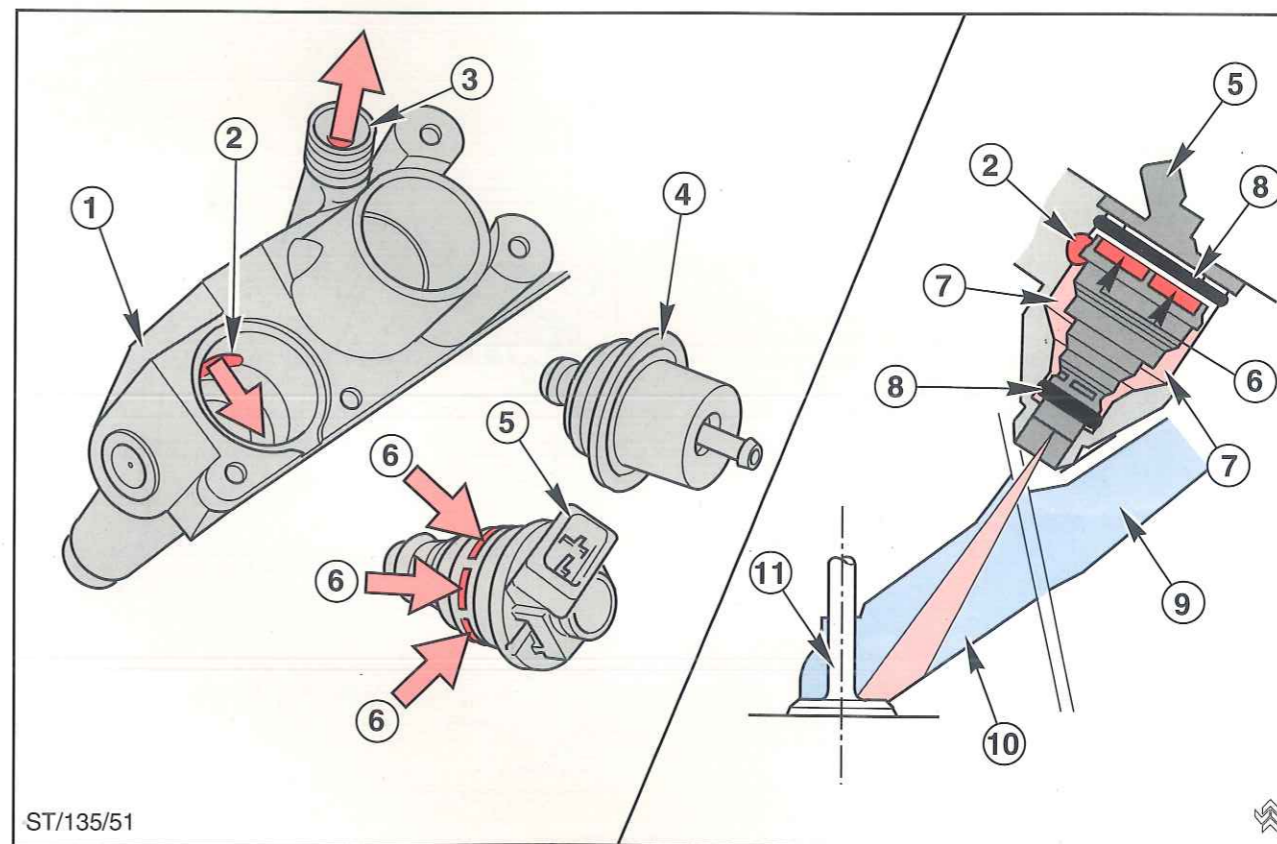
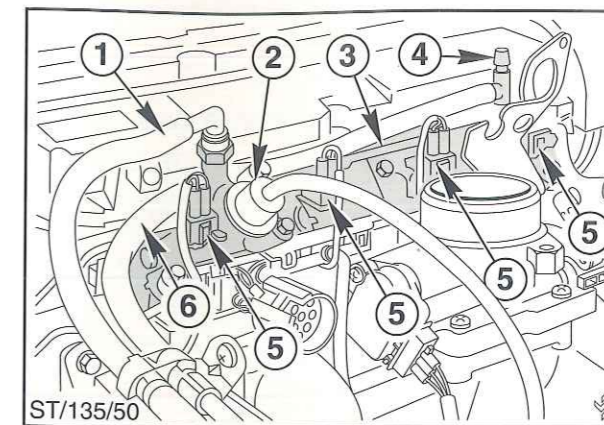
- Fuel injectors with lateral fuel supply. They are surrounded in the fuel rail by fuel-flushed pockets.
- The fuel rail (with integrated injectors and pressure regulator) is mounted **directly in the plastic inlet manifold**. The seal is provided by rubber sealing rings in the inlet manifold.
- The fuel injectors are sealed in the fuel rail by means of O-rings.
- All components shown have been subject to an endurance test of 100,000 miles (160,000 km). Maintenance during service work is therefore not necessary under normal conditions.



- |                       |  |
|-----------------------|--|
| 1 Fuel rail           | 7 Sealing rings in inlet manifold            |
| 2 Fuel injectors      | 8 Inlet manifold                             |
| 3 Pressure test point | 9 Cylinder head                              |
| 4 Fuel supply         | 10 Locations for injectors in inlet manifold |
| 5 Pressure regulator  |  |
| 6 Fuel return         |  |

Fuel Rail Location

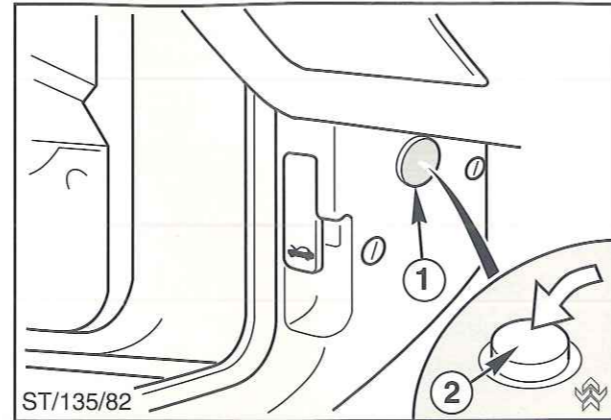
- 1 Fuel return
- 2 Pressure regulator
- 3 Fuel rail
- 4 Control valve
- 5 Fuel injectors
- 6 Fuel supply



- |                       |                                   |
|-----------------------|-----------------------------------|
| 1 Fuel rail           | 7 Valve pockets, filled with fuel |
| 2 Fuel supply         | 8 O-rings                         |
| 3 Fuel return to tank | 9 Inlet manifold                  |
| 4 Pressure regulator  | 10 Inlet port - cylinder head     |
| 5 Fuel injectors      | 11 Inlet valve                    |
| 6 Lateral fuel inlet  |                                   |

**Inertia Switch**

- The inertia switch is located on the left-hand side at the A-pillar under the lower dash insulation panel (LHD and RHD vehicles).
- The release button can be reached through an opening in the insulation panel.

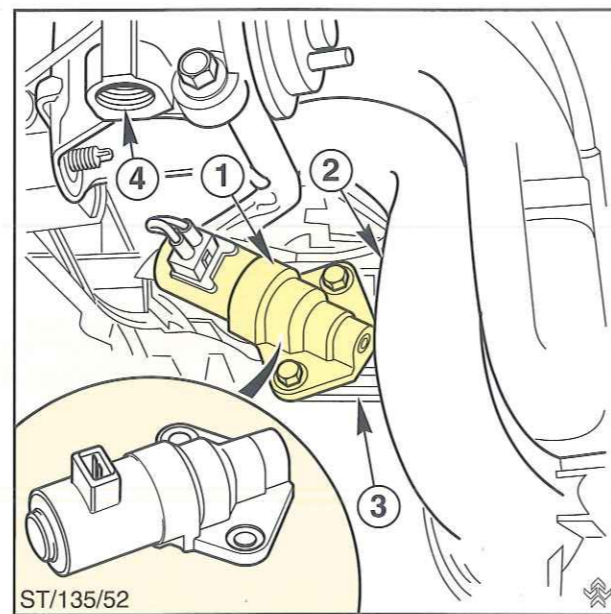


- 1 Opening in the lower dash insulation panel
- 2 Inertia switch reset button

**Idle Speed Control Valve (ISC)**

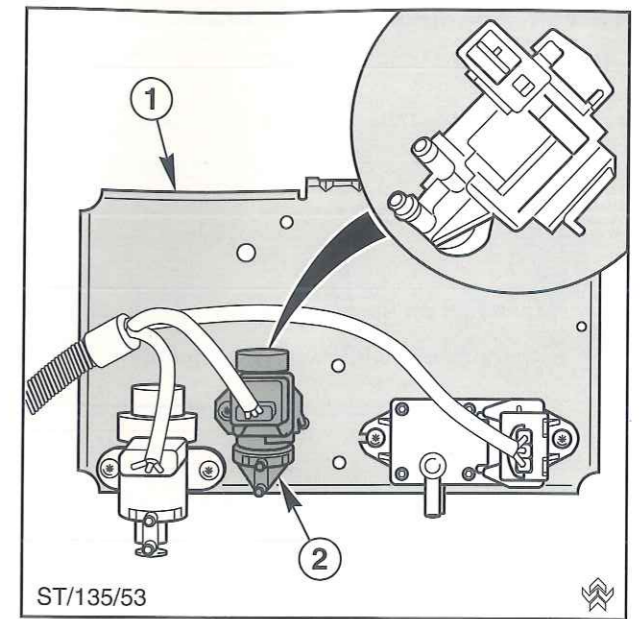
- The ISC (Hitachi valve) is mounted directly on the air chamber of the inlet manifold (not visible from above).

- 1 ISC
- 2 Inlet manifold
- 3 Air chamber
- 4 EGR valve



**Pulse Air Solenoid Valve**

- The pulse air solenoid valve is also mounted on the bracket at the bulkhead.
- The solenoid valve is switched by the EEC IV module and controls the vacuum necessary to operate the air control valve.

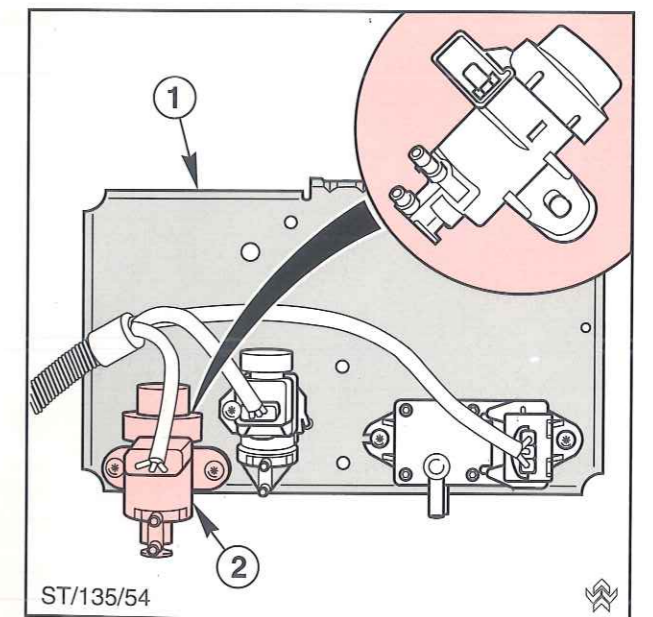


- 1 Bracket
- 2 Pulse air solenoid valve

**Electronic Vacuum Regulator (EVR)**

- The EVR for the EGR system is secured next to the pulse air solenoid valve on the support bracket.
- The EVR is controlled by the EEC IV module and regulates the vacuum which is applied to the EGR valve.

Refer to description in Section "Exhaust System".



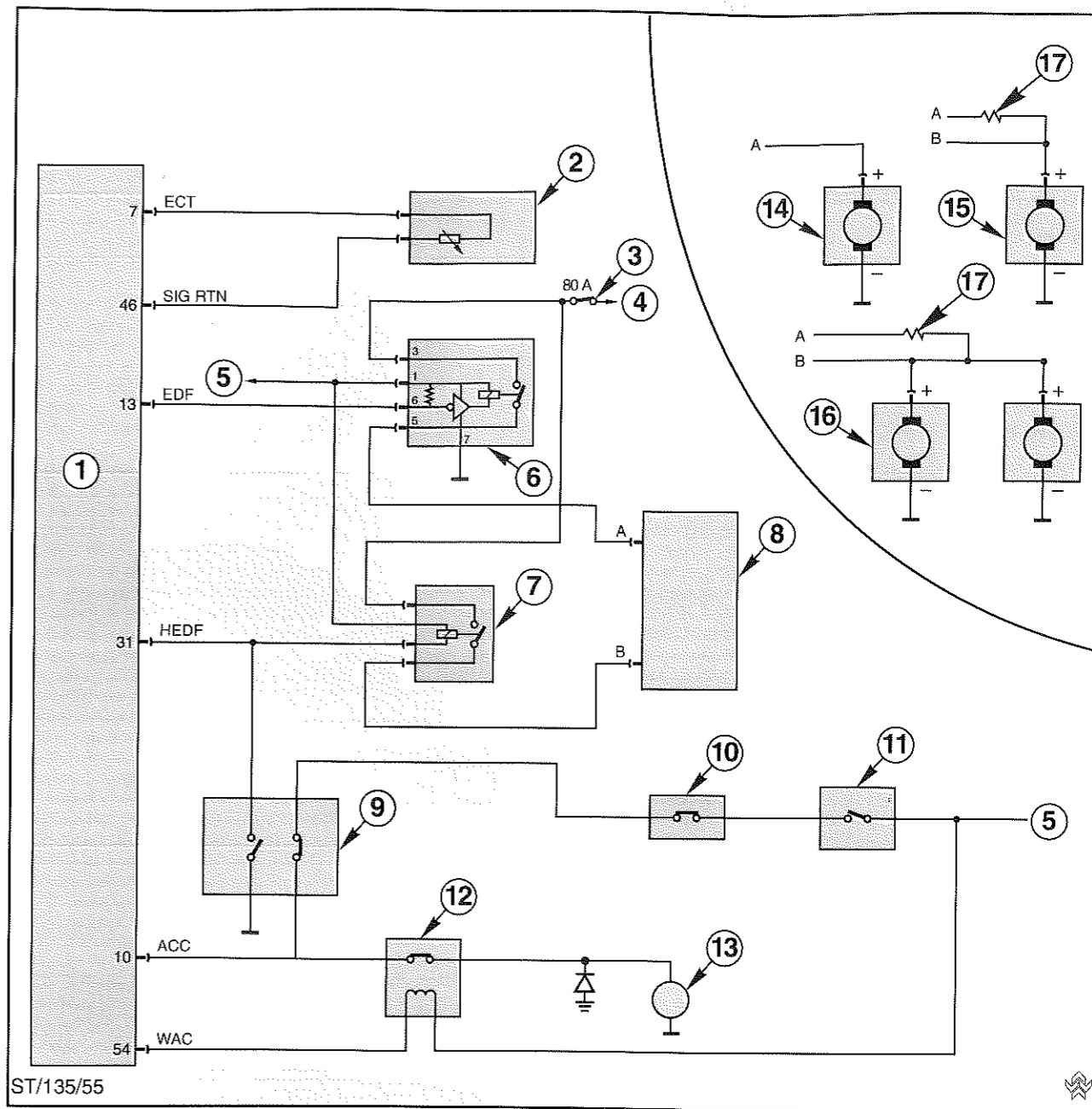
- 1 Bracket
- 2 Electronic vacuum regulator (EVR)

**Air Conditioning/Fan Switching**

- The radiator fans of the Mondeo with or without air conditioning are switched electronically by the EEC IV module dependent on the input signals from the engine coolant temperature sensor (ECT).
- Dependent on the equipment configuration, the vehicles can be equipped with a one speed or two speed radiator fan or with two speed double radiator fans. Vehicles with CD4E automatic transmission and air conditioning are always equipped with double fans. Fans with two speeds are switched through a series resistor.
- The EEC IV module switches the electrical fans on and off either via the EDF relay\* or HEDF relay\*\* at different coolant temperatures dependent on the input signals of the ECT sensor.
- The EEC IV system compensates for the drop in speed by means of a corresponding correction in the air mass value. This value varies in line with activation of the air conditioning and the various radiator fan speeds.
- With the air conditioning switched on, the radiator fans operate at low speed when the vehicle speed is below 48 mph (76 km/h). This ensures adequate cooling for the air conditioning system.

\* EDF = Electro Drive Fan

\*\* HEDF = High Speed Electro Drive Fan



Wiring diagram - Air conditioning/radiator fan switching

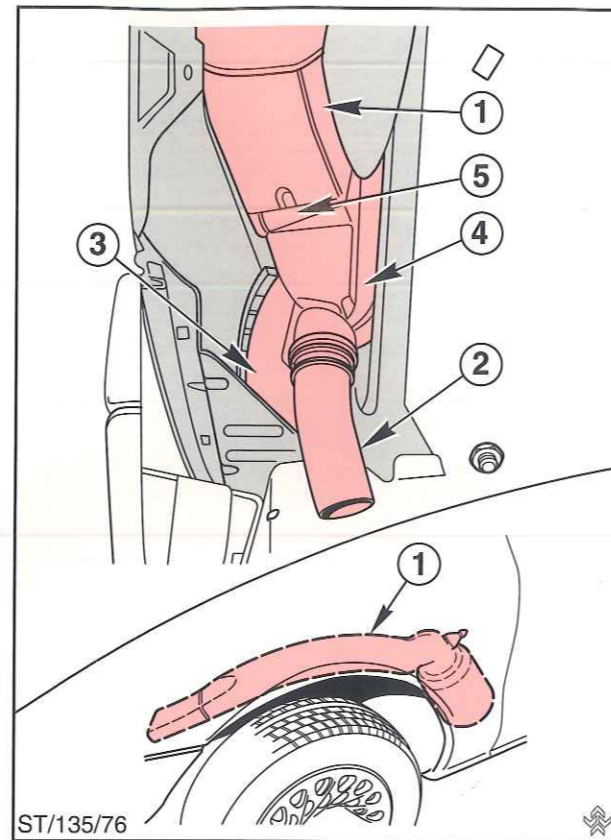
- |  |   |
|--|---|
| 1 EEC IV module  | 9 Air conditioning - pressure switch          |
| 2 Engine coolant temperature sensor (ECT)                              | 10 Air conditioning - pressure cycling switch |
| 3 80 Ampere fuse   | 11 Air conditioning - operating switch        |
| 4 Battery  | 12 Air conditioning - cut-out relay           |
| 5 Ignition switch  | 13 Air conditioning - clutch                  |
| 6 EDF relay (single-stage radiator fan)                                | 14 Radiator fan - one speed                   |
| 7 HEDF relay (in conjunction with two-stage radiator fans (15 and 16)) | 15 Radiator fan - two speeds                  |
| 8 Interface - radiator fan switching                                   | 16 Double radiator fan - two speeds           |
|  | 17 Series resistor                            |

**INTAKE SYSTEM**

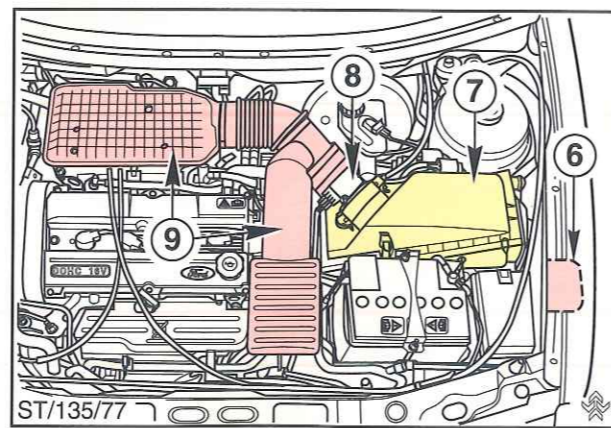
**Air Intake Resonators**

In order to reduce the intake noises of the engine to a minimum, all Mondeo vehicles are equipped with air intake resonators.

- Two resonators are located at the front under the left hand fender.
- The first is a small resonator which is connected into the air inlet tube and points vertically downwards.
- The second is a larger resonator which also connects into the air inlet tube. This resonator extends over the length of the wheelarch and is held in place with one retaining lug.
- Both resonators are covered by the plastic wheelarch liner.
- Two further resonators are located in the engine compartment between the MAF sensor and throttle housing.



Resonator under left hand fender

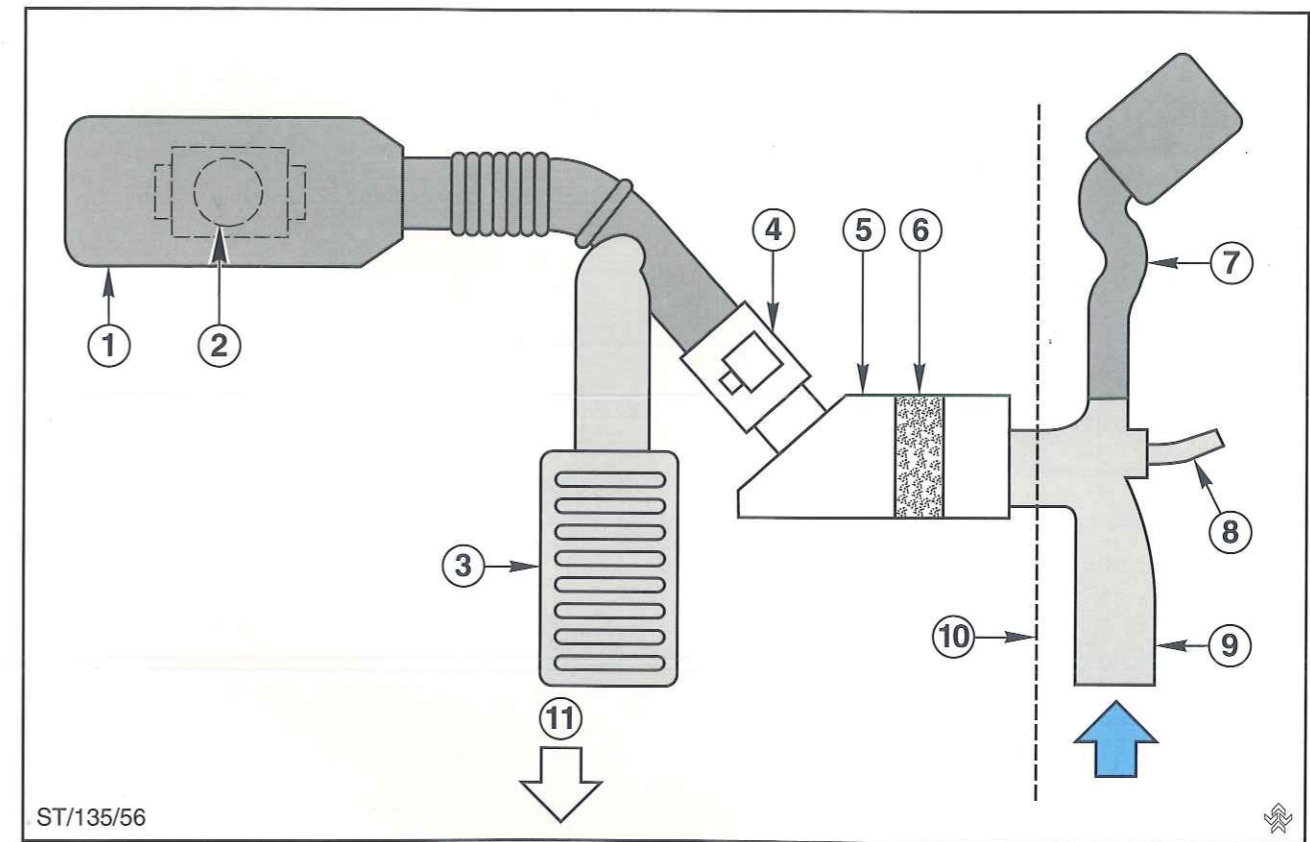


Resonators in engine compartment

- 1 Large resonator
- 2 Small resonator
- 3 Intake air inlet tube
- 4 Connection hose
- 5 Connection to large resonator
- 6 Connection to small resonator under fender
- 7 Air cleaner
- 8 MAF sensor
- 9 Resonators in engine compartment

- The air intake resonators act as silencers to reduce the noise produced by the engine air intake pulse.
- The resonators work by reducing the movement of air pulses in the intake system.
- Each resonator is designed to reduce noise over a particular engine speed range. This range and the amount of noise reduction is determined by the resonator volume and pipe sizes.

**Schematic Representation of the Intake System**



- Intake air
- 1 Engine compartment resonator
- 2 Throttle housing
- 3 Engine compartment resonator
- 4 MAF sensor
- 5 Air cleaner housing
- 6 Air cleaner
- 7 Large resonator (under fender)
- 8 Small resonator (under fender)
- 9 Intake air inlet
- 10 Fender apron panel
- 11 Forward direction

**Throttle Housing**

- The throttle housing (single Venturi design) is installed in vertical position on the air chamber.

- 1 Throttle housing
- 2 Throttle operating linkage
- 3 Gasket
- 4 Inlet manifold flange
- 5 TPS
- 6 Retaining screws

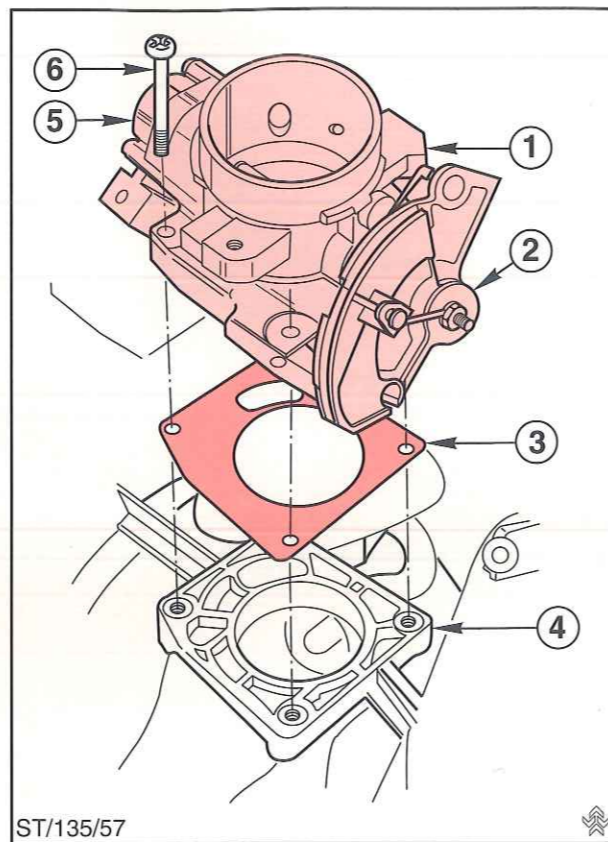
- Venturi diameter:

**1.6 DOHC 16V Zeta: 42 mm**

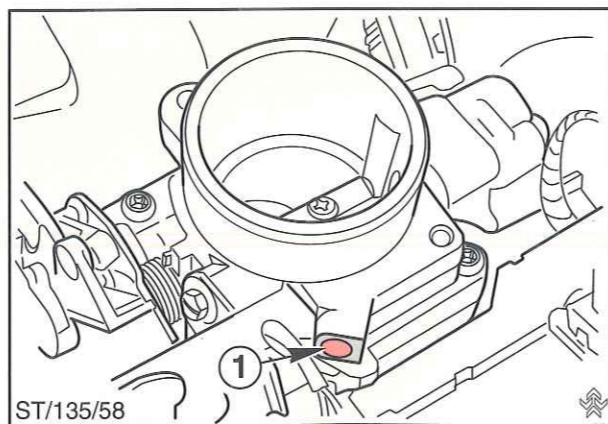
**1.8 DOHC 16V Zeta: 48 mm**

**2.0 DOHC 16V Zeta: 55 mm**

- The different throttle housings are identified by an adhesive label with part number on the housing.
- Same throttle plate operation on all engines.
- The basic idle speed is set in production by means of the bypass screw.  
The screw setting is fixed with a white plastic plug. If resetting is necessary during service work, secure screw with blue plug.



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1 Bypass screw with plastic plug

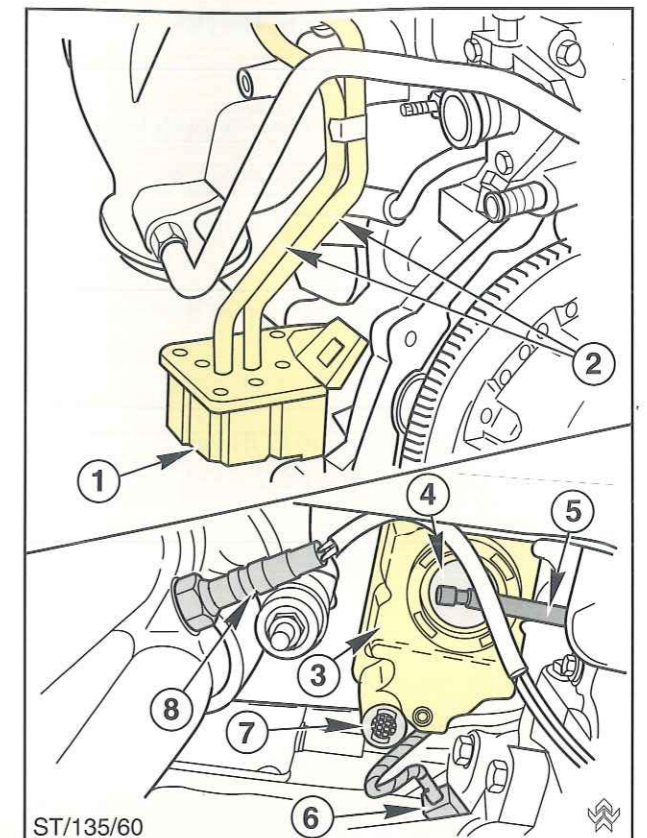
**Note:** If the idle speed changes due to dirt or similar problems, the speed is compensated by the EEC IV module. Therefore, wherever possible do not change the setting of the bypass screw during service work.

**EXHAUST SYSTEM**

**Pulse Air System**

The pulse air system of the Mondeo DOHC 16V Zeta engines is based on present Zeta engines, with the following modifications:

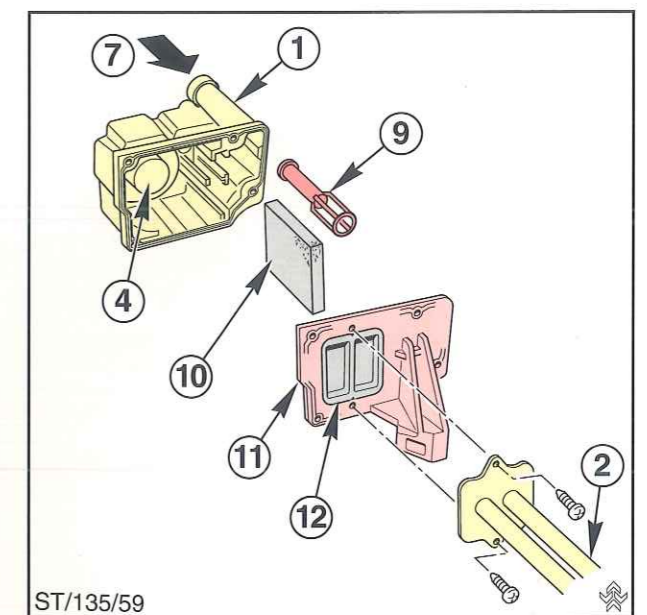
- The pulse air filter/valve housing is turned through 90° and features a new, separate aluminium cover, to which the pulse air pipes are screwed.
- A silencer installed in the air inlet duct reduces the intake noises which occur during the warm-up phase (while the pulse air system is in operation).



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Installation location - pulse air filter/valve housing

- 1 Pulse air filter/valve housing
- 2 Air pipes to exhaust manifold
- 3 Pulse air filter/valve housing (viewed from below)
- 4 Air control valve
- 5 Vacuum hose from solenoid valve
- 6 Crankshaft position/speed sensor (CPS)
- 7 Air inlet direction
- 8 HEGO sensor
- 9 Silencer
- 10 Foam filter
- 11 Aluminium cover
- 12 Pulse air valve unit

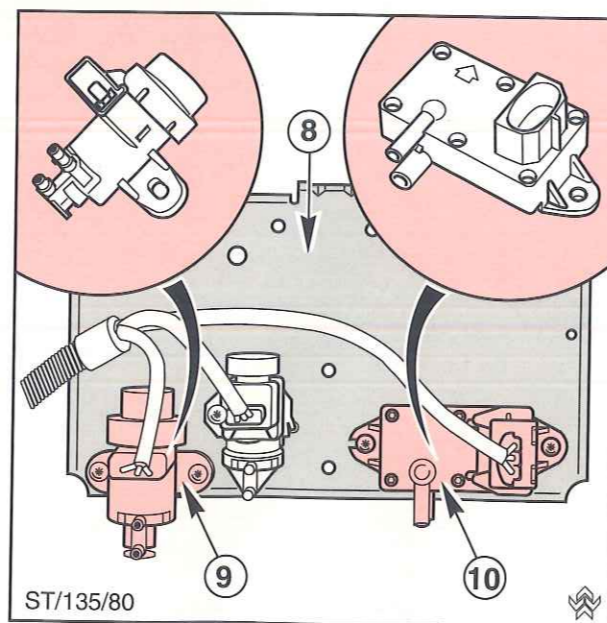
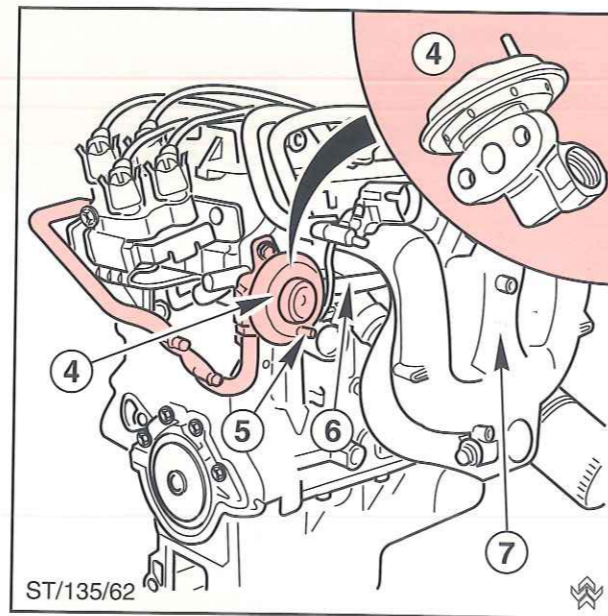
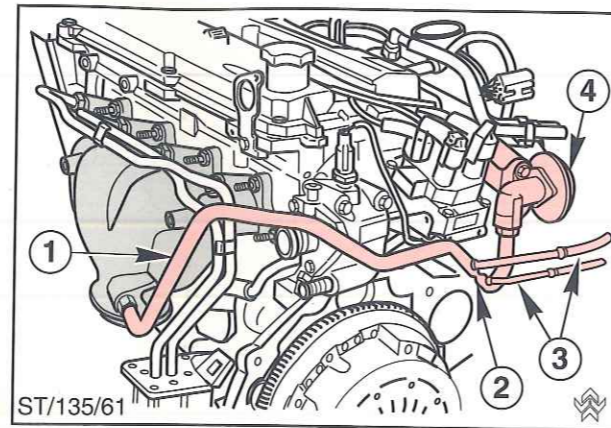


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**Exhaust Gas Recirculation (EGR)**

All Zeta engines of the Mondeo are equipped with an electronically controlled Exhaust Gas Recirculation system (EGR).

- The EGR system is made up of the following:
  - 1 EGR tube to take exhaust gas from exhaust manifold to EGR valve
  - 2 Control venturi in EGR tube: Measuring point for differential pressure in EGR tube
  - 3 Hose connections to differential pressure transducer (DPFE sensor) (Different diameters to prevent the hoses being interchanged)
  - 4 EGR valve
  - 5 Vacuum spigot for the electronic vacuum regulator (EVR)
  - 6 EGR tube from EGR valve to inlet manifold
  - 7 Inlet manifold
  - 8 Bracket, secured on bulkhead
  - 9 Electronic vacuum regulator (EVR)
  - 10 DPFE sensor



**Service Note**

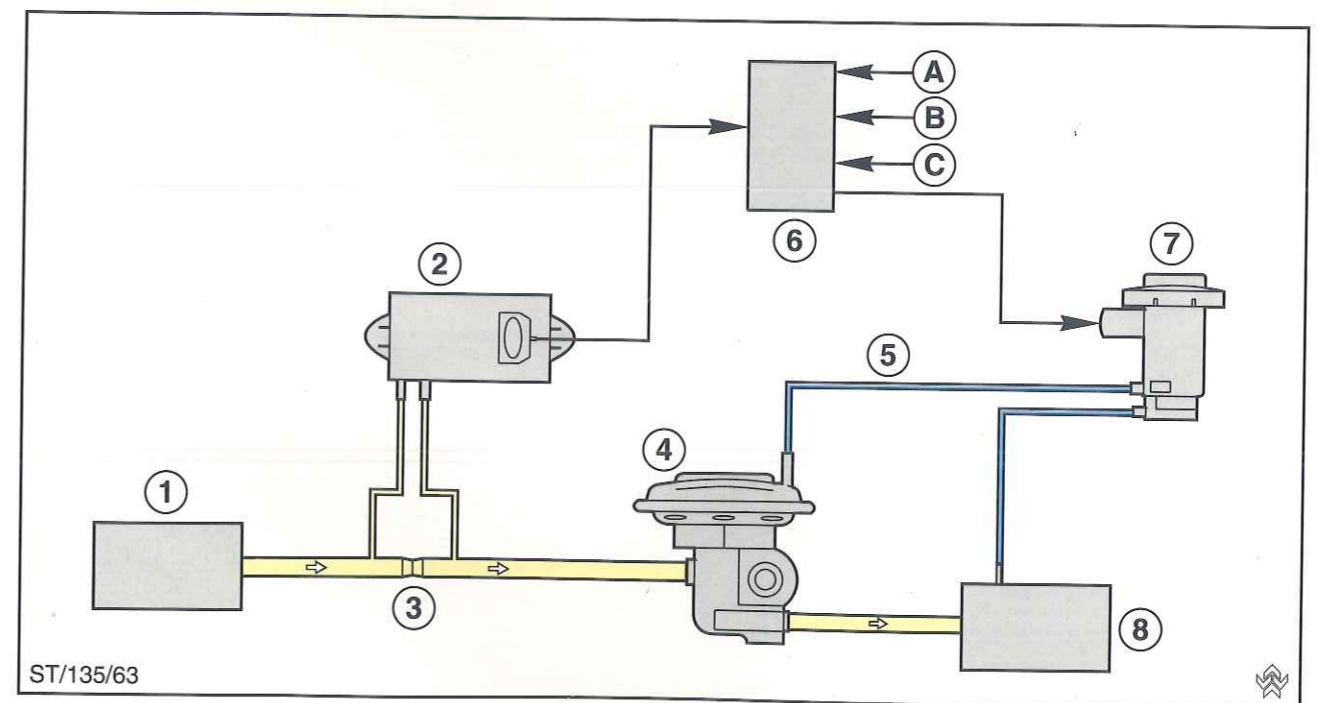
If the exhaust gases blow back excessively (e.g. due to a blocked exhaust system), the hoses to the DPFE sensor must be replaced and the connection points on the EGR tube cleaned.

**Function of the EGR System**

The production of nitrogen oxides (NOx) during combustion is reduced by recirculating a part of the exhaust gases back into the combustion chamber. This procedure has to take place without impairing the running qualities of the engine. Since the EGR system operates in the part load range dependent on temperature and time, the engine coolant temperature at start up and during the warm-up period is an important factor.

The EGR system of the Mondeo contains a "Delta Pressure Feedback Electronic System" (DPFE).

- The exhaust gases from the exhaust manifold pass through a venturi in the EGR tube. The difference in exhaust gas pressure which occurs at this point is measured by the DPFE sensor. The DPFE sensor determines the pressure drop value, converts into a voltage signal and sends it to the EEC IV module.
- The EEC IV module then modifies the signal to the EVR which in turn regulates the vacuum to the EGR valve according to the incoming signal. In this way, a precisely measured quantity of exhaust gas is routed via the EGR valve into the inlet manifold after the throttle plate.



- 1 Exhaust manifold
- 2 DPFE sensor
- 3 Differential pressure measuring point (Delta P)
- 4 EGR valve
- 5 Regulated vacuum
- 6 EEC IV module
- 7 Electronic vacuum regulator (EVR)
- 8 Inlet manifold
- A Engine speed
- B Load
- C Coolant temperature

**Evaporative Emission Control System**

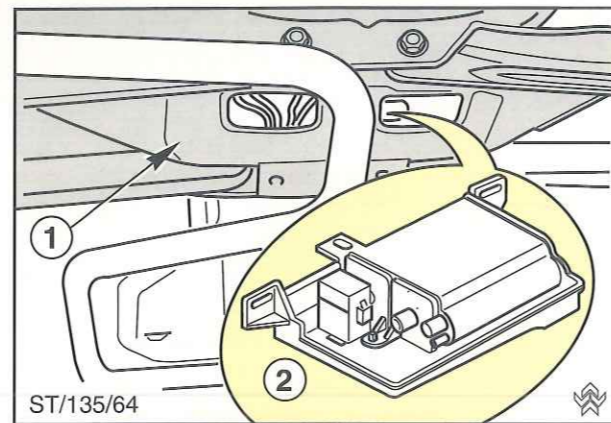
On the Mondeo, the carbon canister is mounted at the rear under the vehicle.

- On the 2WD Saloon, on the floor pan above the rear suspension cross member in front of the spare wheel well.
- On the Estate and Saloon/Estate 4x4 along side the spare wheel well.

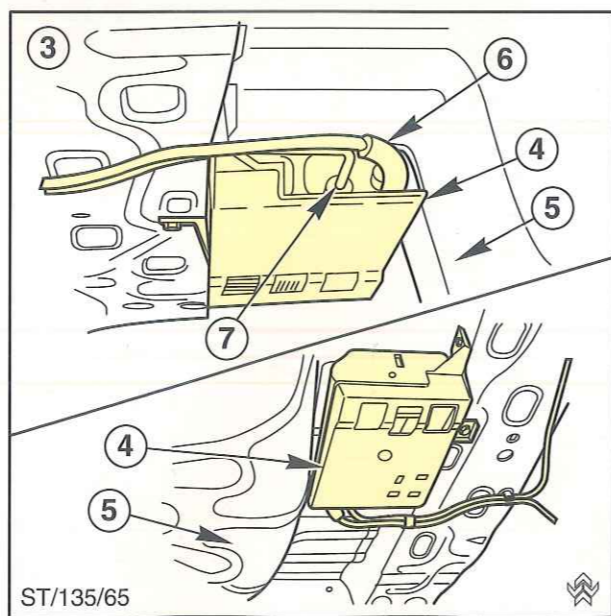
The purge solenoid valve is installed in the engine compartment.

**Installation Location - Carbon Canister  
(2WD Saloon shown)**

- 1 Rear suspension cross member
- 2 Location of carbon canister on floor pan above the cross member

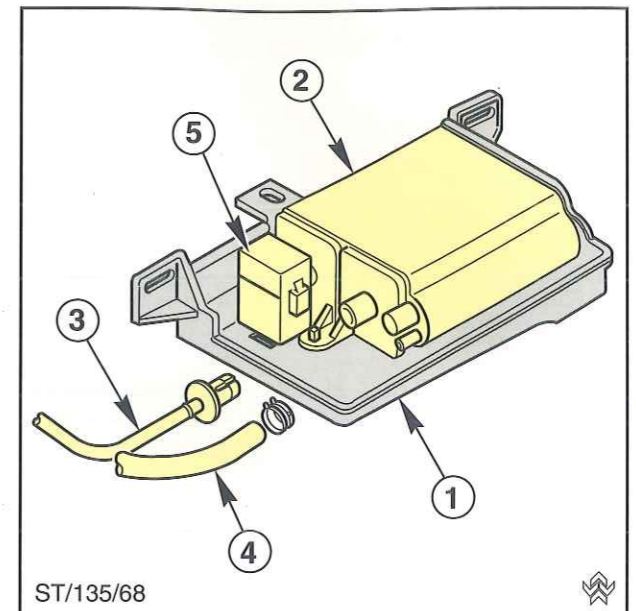


- 3 Location of carbon canister (with cross member removed for clear illustration)
- 4 Canister cover and support bracket
- 5 Spare wheel well
- 6 Fuel vapour pipe from tank
- 7 Fuel vapour pipe to engine



**Carbon Canister Removed**

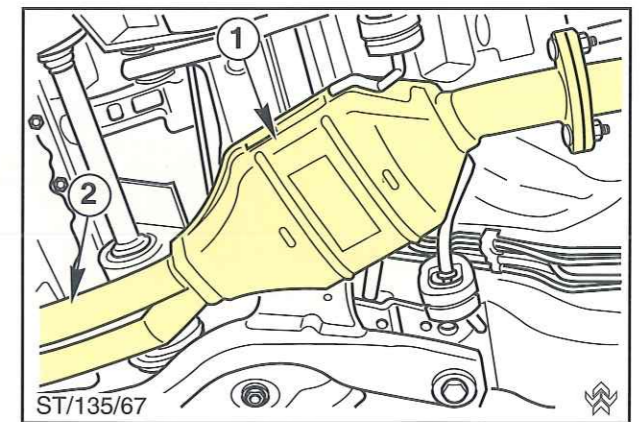
- 1 Canister cover and support bracket
- 2 Canister
- 3 Connection - fuel vapour pipe to engine
- 4 Connection - fuel vapour pipe from tank
- 5 Canister vent, water separator



**Catalytic Converter/HEGO Sensor**

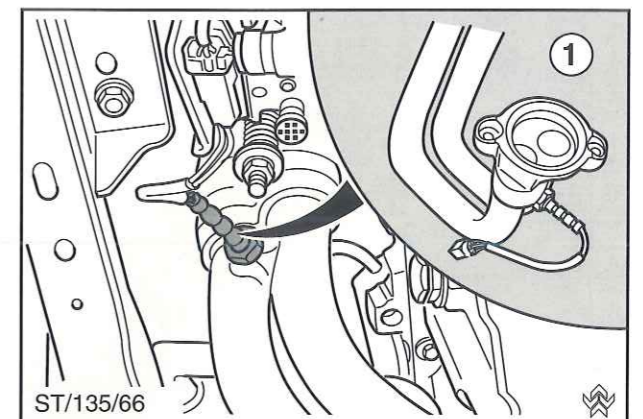
- The three-way catalytic converter forms one unit with the front twin exhaust pipe

- 1 Catalytic converter
- 2 Front twin exhaust pipe

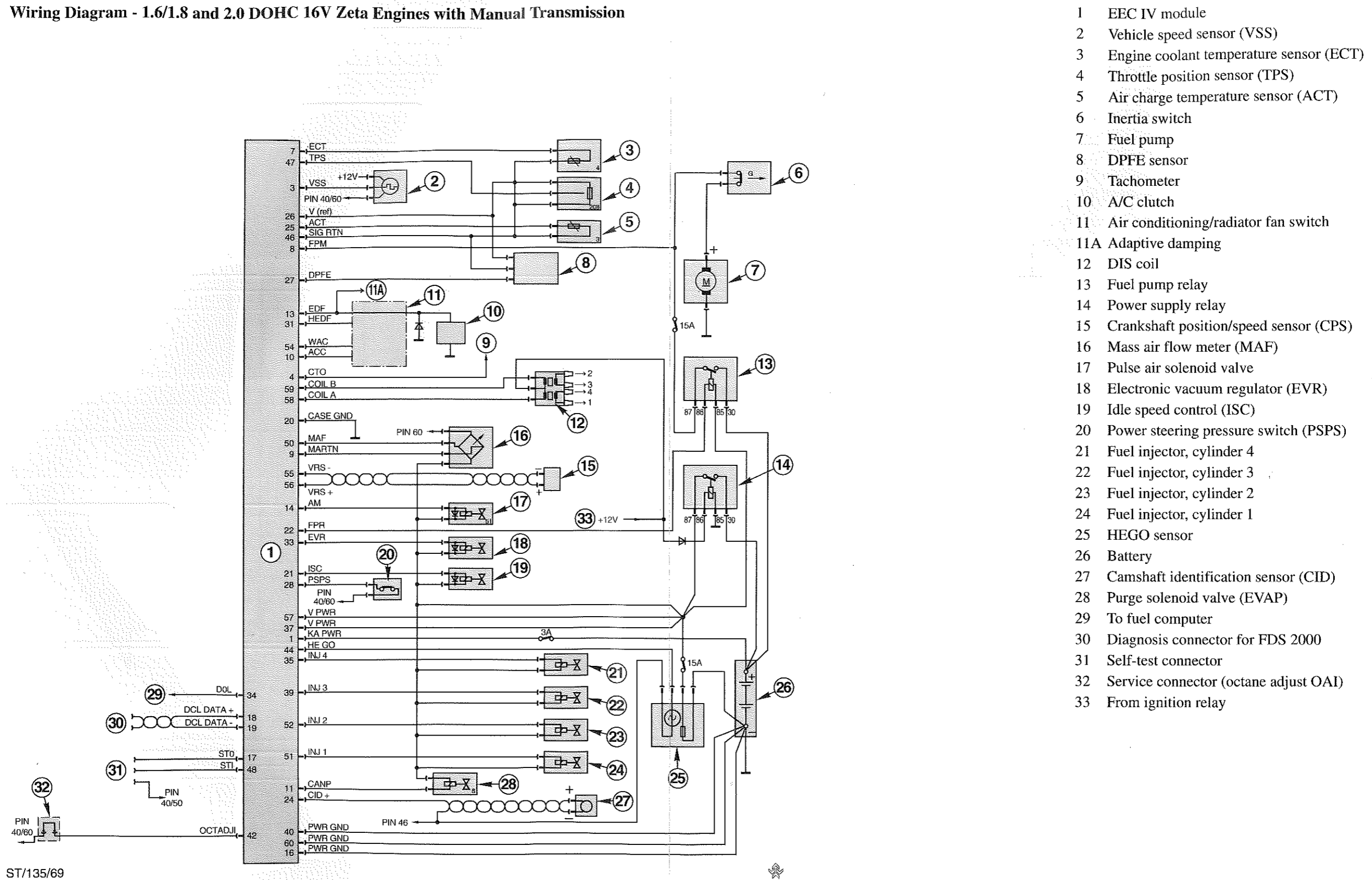


- The HEGO sensor (insulated sensor with 4 cables, ground connection via EEC IV module) is mounted directly under the exhaust pipe flange between the twin pipes.

- 1 HEGO sensor



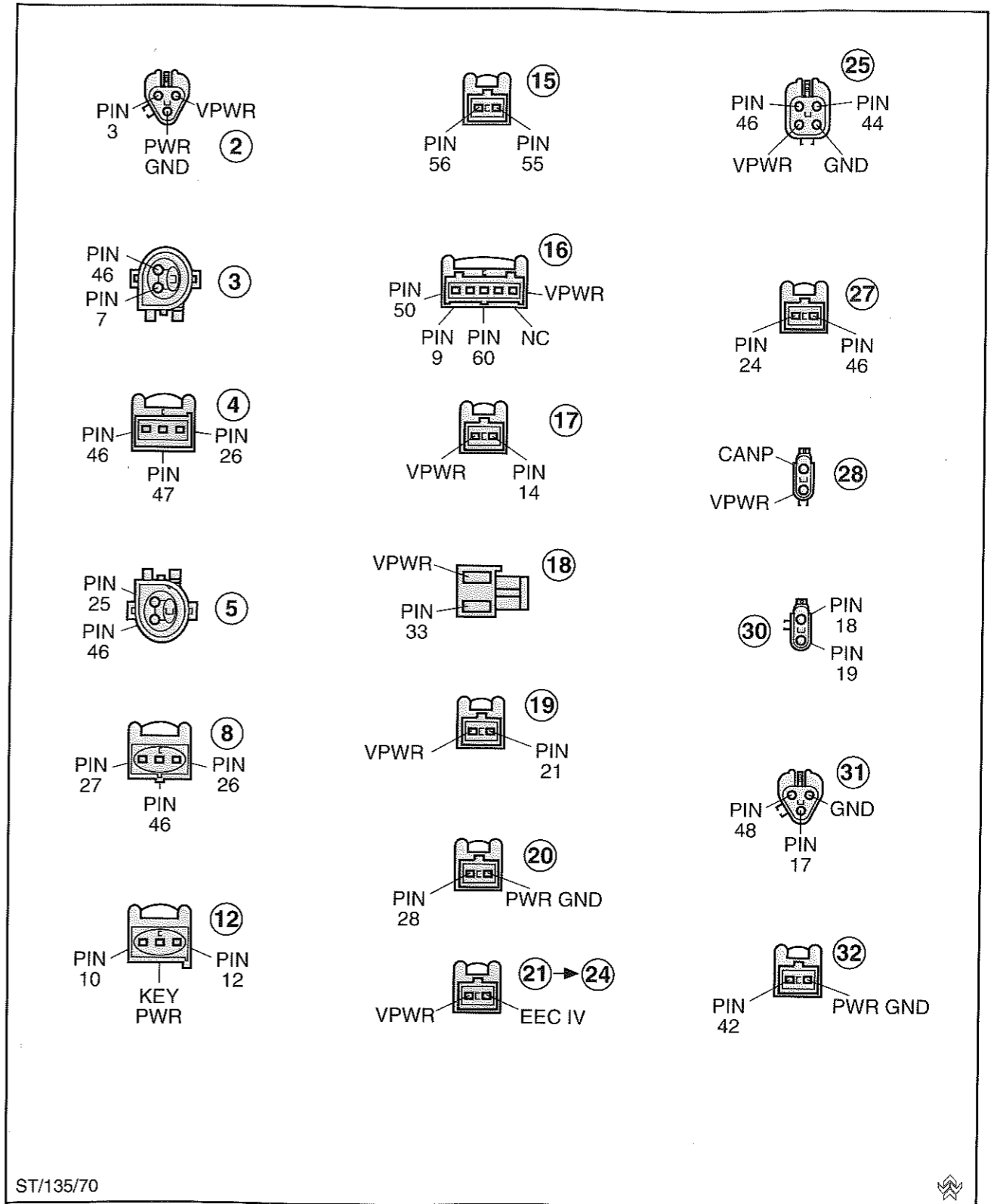
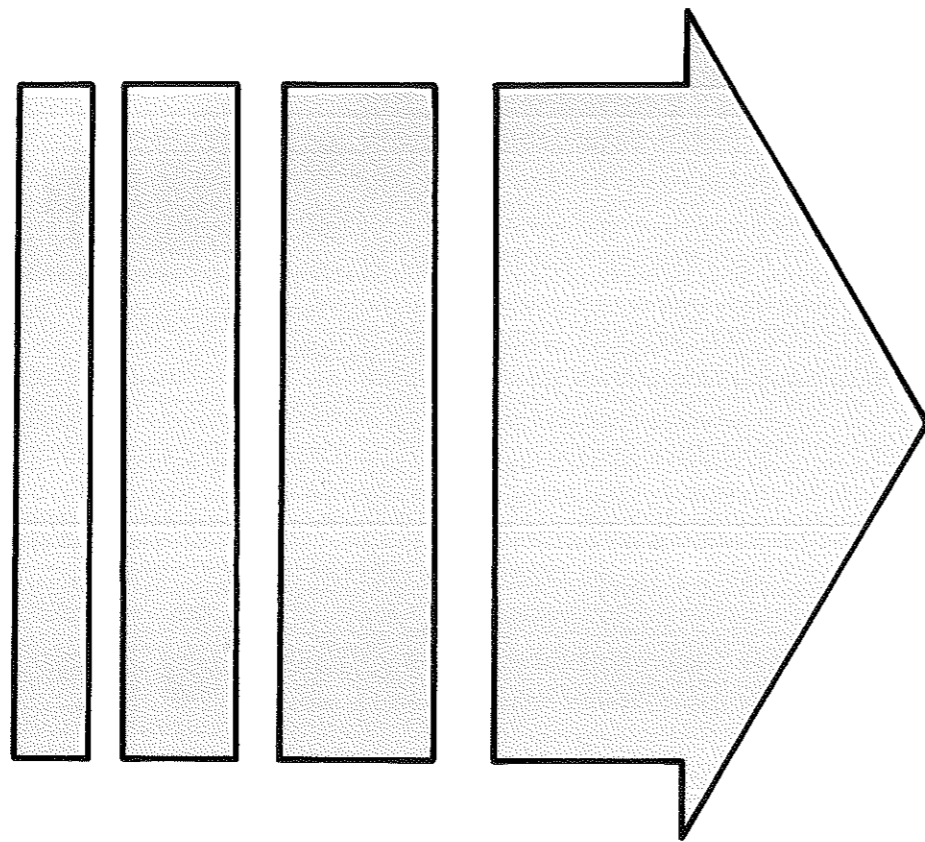
Wiring Diagram - 1.6/1.8 and 2.0 DOHC 16V Zeta Engines with Manual Transmission



- 1 EEC IV module
- 2 Vehicle speed sensor (VSS)
- 3 Engine coolant temperature sensor (ECT)
- 4 Throttle position sensor (TPS)
- 5 Air charge temperature sensor (ACT)
- 6 Inertia switch
- 7 Fuel pump
- 8 DPFE sensor
- 9 Tachometer
- 10 A/C clutch
- 11 Air conditioning/radiator fan switch
- 11A Adaptive damping
- 12 DIS coil
- 13 Fuel pump relay
- 14 Power supply relay
- 15 Crankshaft position/speed sensor (CPS)
- 16 Mass air flow meter (MAF)
- 17 Pulse air solenoid valve
- 18 Electronic vacuum regulator (EVR)
- 19 Idle speed control (ISC)
- 20 Power steering pressure switch (PSPS)
- 21 Fuel injector, cylinder 4
- 22 Fuel injector, cylinder 3
- 23 Fuel injector, cylinder 2
- 24 Fuel injector, cylinder 1
- 25 HEGO sensor
- 26 Battery
- 27 Camshaft identification sensor (CID)
- 28 Purge solenoid valve (EVAP)
- 29 To fuel computer
- 30 Diagnosis connector for FDS 2000
- 31 Self-test connector
- 32 Service connector (octane adjust OAI)
- 33 From ignition relay

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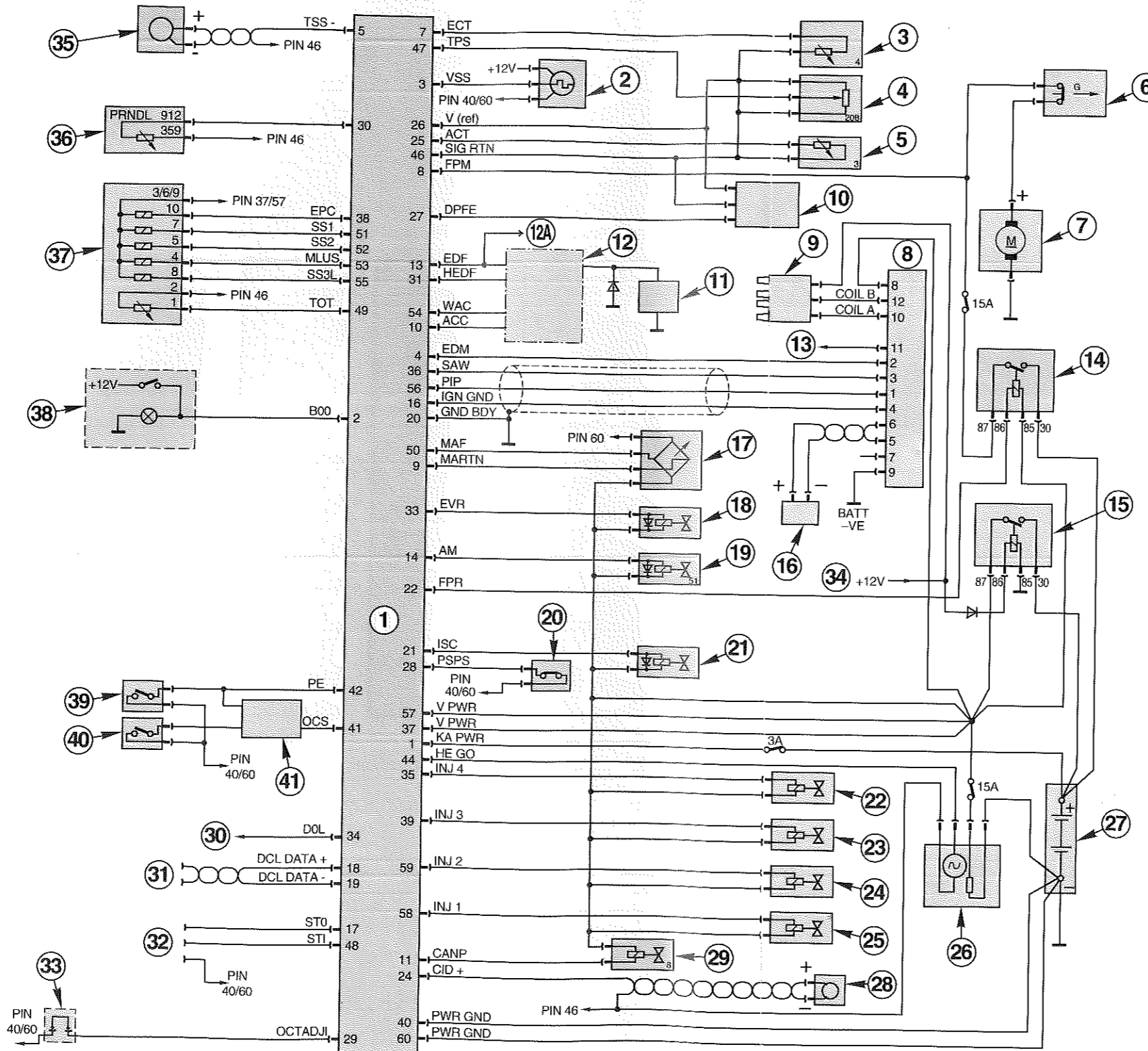
Connector Assignments - 1.6/1.8 and 2.0 DOHC 16V Zeta Engines with Manual Transmission



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Wiring Diagram - 1.8 and 2.0 DOHC 16V Zeta Engines with CD4E Automatic Transmission



Engine Management

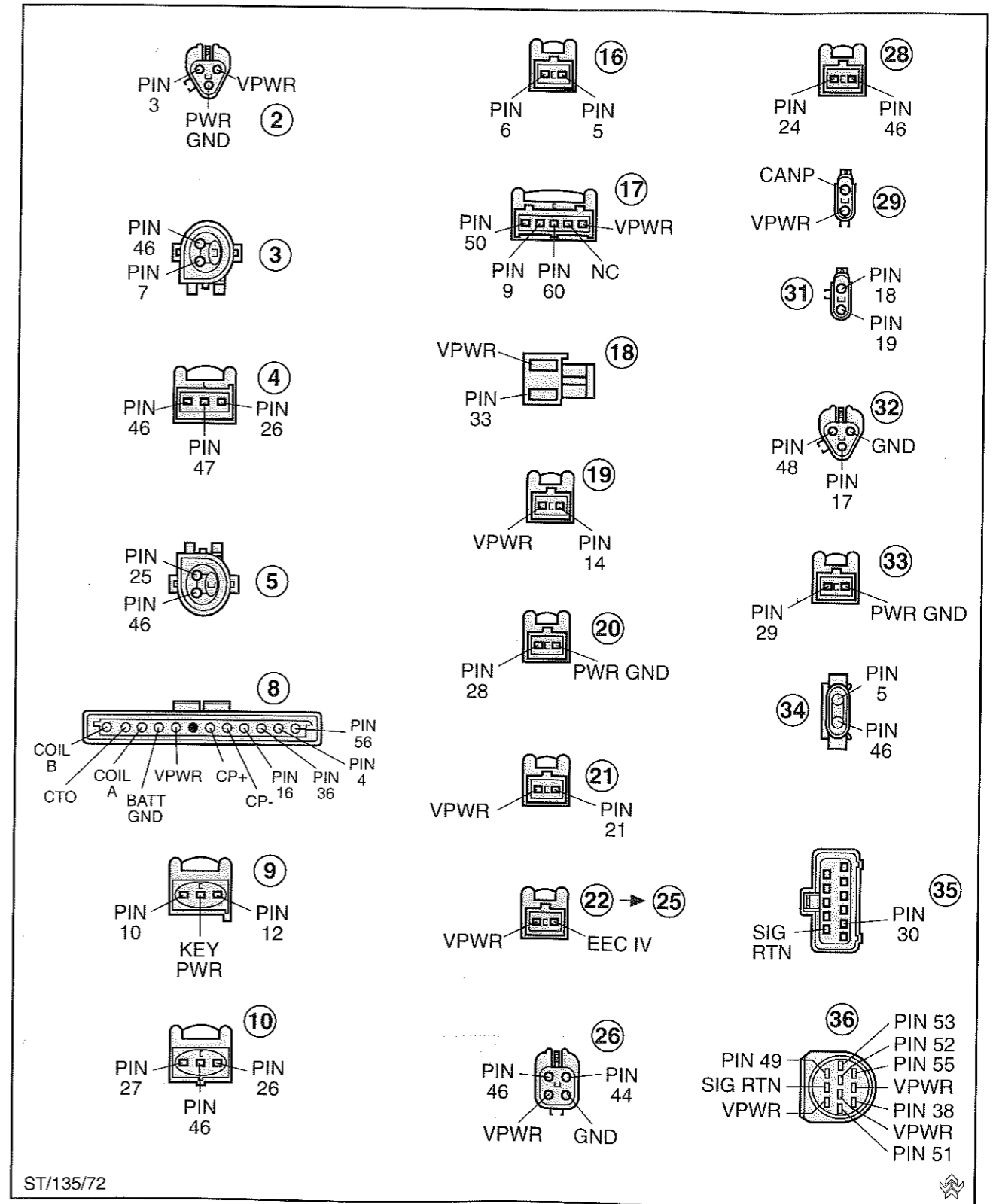
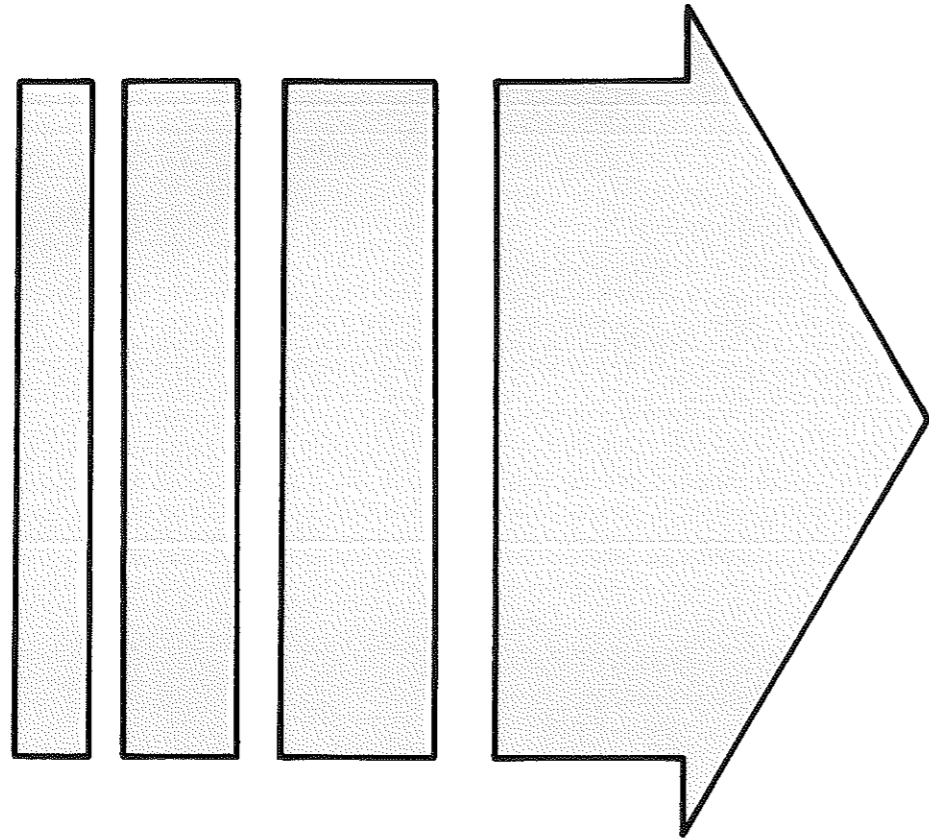
- 1 EEC IV module
- 2 Vehicle speed sensor (VSS)
- 3 Engine coolant temperature sensor (ECT)
- 4 Throttle position sensor (TPS)
- 5 Air charge temperature sensor (ACT)
- 6 Inertia switch
- 7 Fuel pump
- 8 EDIS-4 module
- 9 DIS coil
- 10 DPFE sensor
- 11 A/C clutch
- 12 Air conditioning/radiator fan switching
- 12A Adaptive damping
- 13 Tachometer
- 14 Fuel pump relay
- 15 Power supply relay
- 16 Crankshaft position/speed sensor (CPS)
- 17 Mass air flow meter (MAF)
- 18 Electronic vacuum regulator (EVR)
- 19 Pulse air solenoid valve
- 20 Power steering pressure switch (PSPS)
- 21 Idle speed control (ISC)
- 22 Fuel injector, cylinder 4
- 23 Fuel injector, cylinder 3
- 24 Fuel injector, cylinder 2
- 25 Fuel injector, cylinder 1
- 26 HEGO sensor
- 27 Battery
- 28 Camshaft identification sensor (CID)
- 29 Purge solenoid valve (EVAP)
- 30 To fuel computer
- 31 Diagnosis connector for FDS 2000 (for engine and CD4E)
- 32 Self-test connector
- 33 Service connector (octane adjust OAI)
- 34 From ignition relay

Transmission Control

- 35 Turbine speed sensor (TSS)
- 36 Selector lever position sensor (MLPS)
- 37 Solenoid valve unit
- 38 Wiring (stop light switch)
- 39 Power/economy switch
- 40 Overdrive switch
- 41 Module-instrument interface

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Connector Assignments - 1.8 and 2.0 DOHC 16V Zeta Engines with CD4E Automatic Transmission



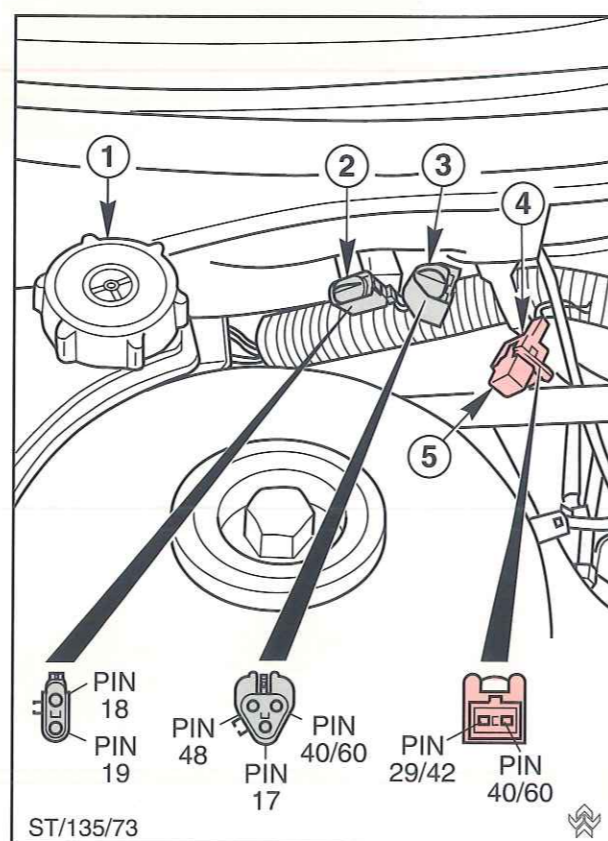
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All checks and adjustments operations must always be performed in accordance with the New Vehicle System Test Manual (NVSTM).

**Test Connections**

All test connectors are provided as a "connector bundle" on the right-hand side of the engine compartment on the bulkhead next to the power steering reservoir.

- 1 Power steering reservoir
- 2 **Diagnosis connector**  
Serial interface for connection of the Ford Diagnostic System FDS 2000.  
PIN 18 = Data link (+)  
PIN 19 = Data link (-)
- 3 **Self-test connector**  
For connection of the STAR tester.  
PIN 48 = Self-test input (STI)  
PIN 17 = Self-test output (STO)  
PIN 40/60 = Ground
- 4 **Service connector with plug-in bridge (5)**  
For octane adjust.  
PIN 29 = Octane adjust  
CD4E automatic transmission  
PIN 42 = Octane adjust  
MTX 75 transmission  
PIN 40/60 = Ground



**New Self-Test Codes for Ford Mondeo:**

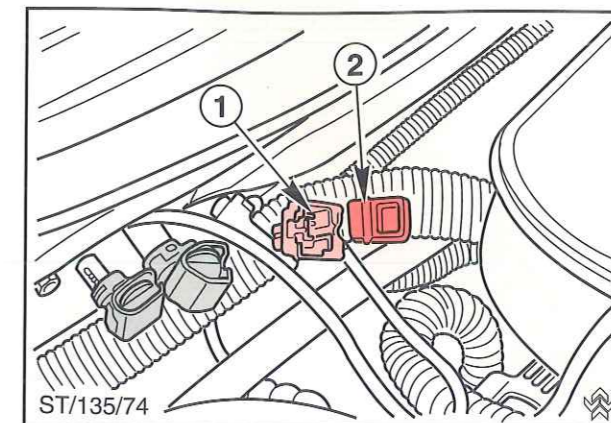
- DPFE sensor: 326, 327, 335, 336, 337
- EVR: 332, 558
- EDV; 564

**Service Note**

Particular care must be taken during the engine test sequence to ensure the throttle plate is **not moved** before the code 010 **VISIBLY** appears in the display of the STAR tester. If the throttle plate is moved before code 010 appears, incorrect codes may be displayed.

**Octane Adjust**

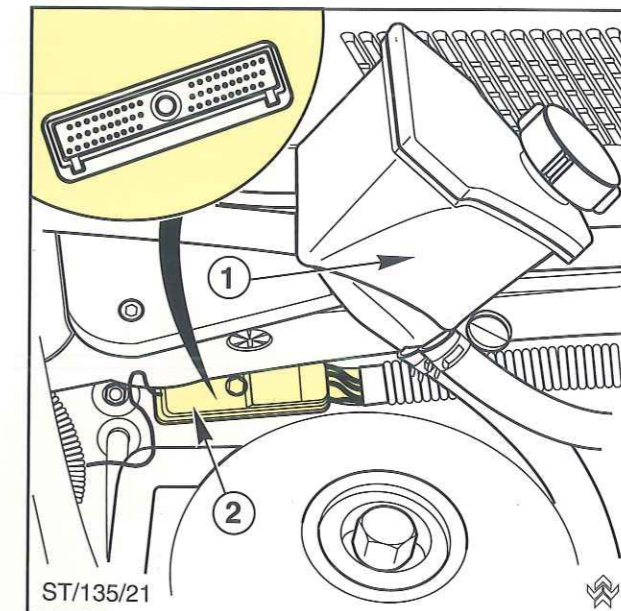
- The service connector for octane adjust now features a simple plug-in bridge which is plugged into the connector during production to facilitate operation with Premium RON 95 unleaded fuel.
- If the plug-in bridge is removed the ignition timing will be shifted in the "retard" direction (no fixed value).



- 1 Service connector
- 2 Plug-in bridge removed

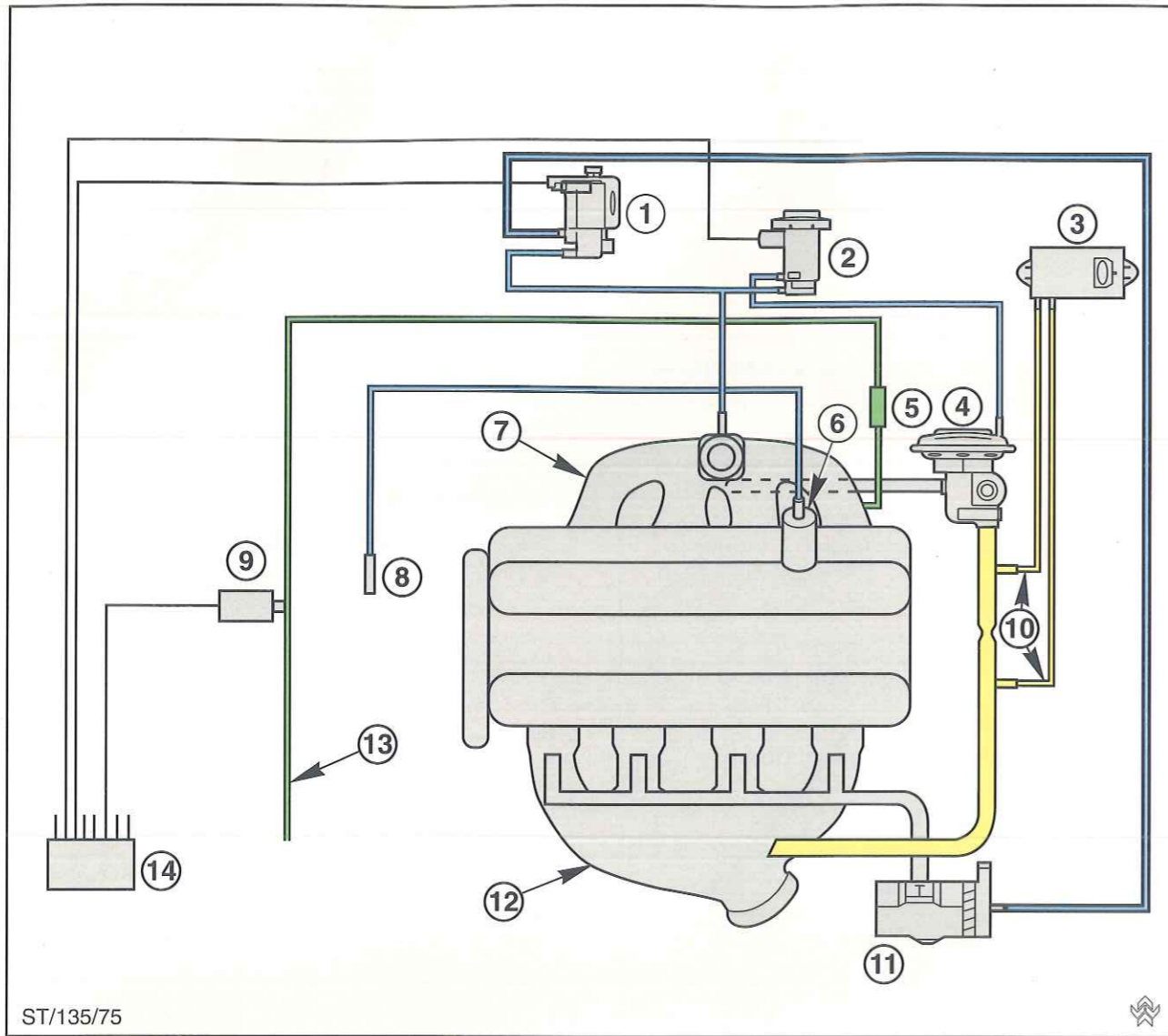
**EEC IV Module - Test Connection**

- Remove power steering reservoir (reservoir is plugged in).
- Unscrew EEC IV module cable connector and connect test lead.



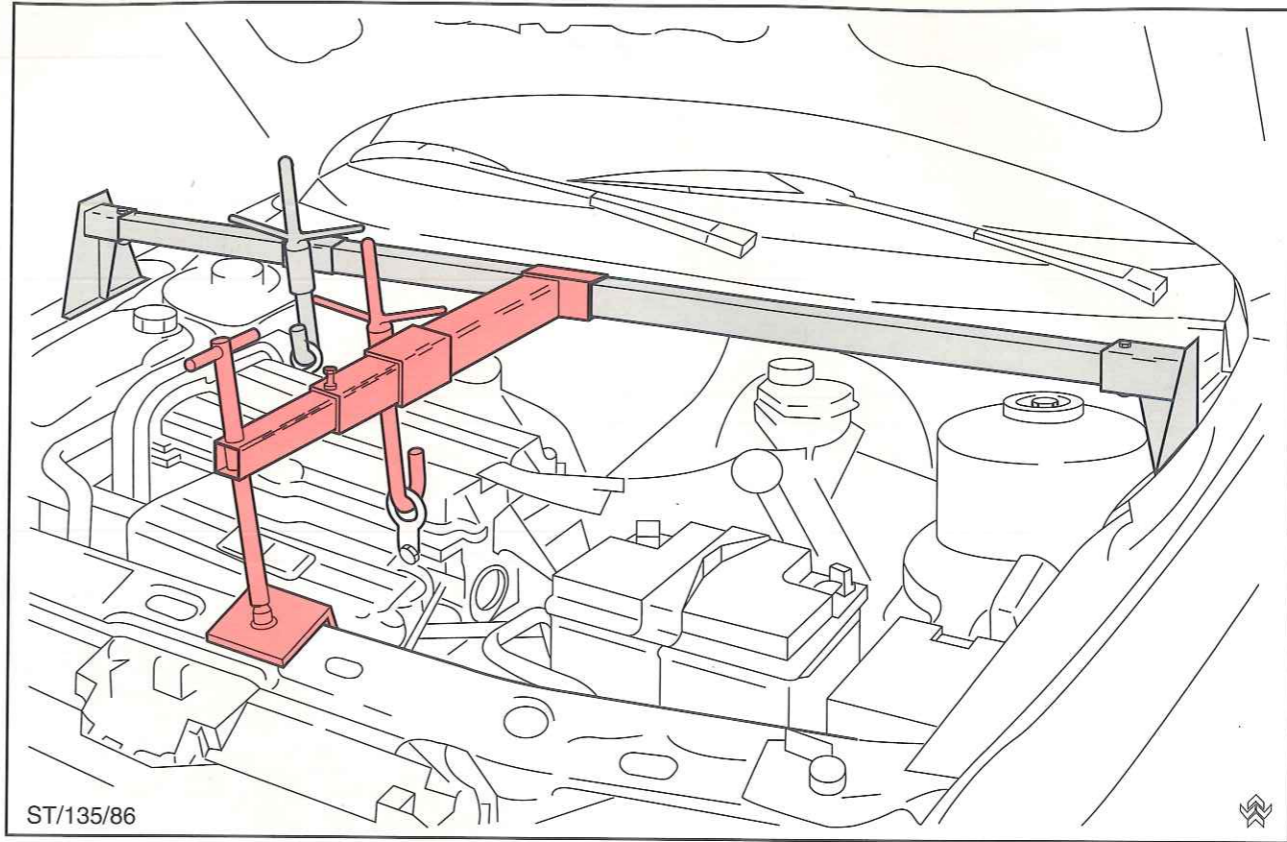
- 1 Power steering reservoir
- 2 EEC IV module connector

Schematic Graphic of Vacuum Hoses and Connections

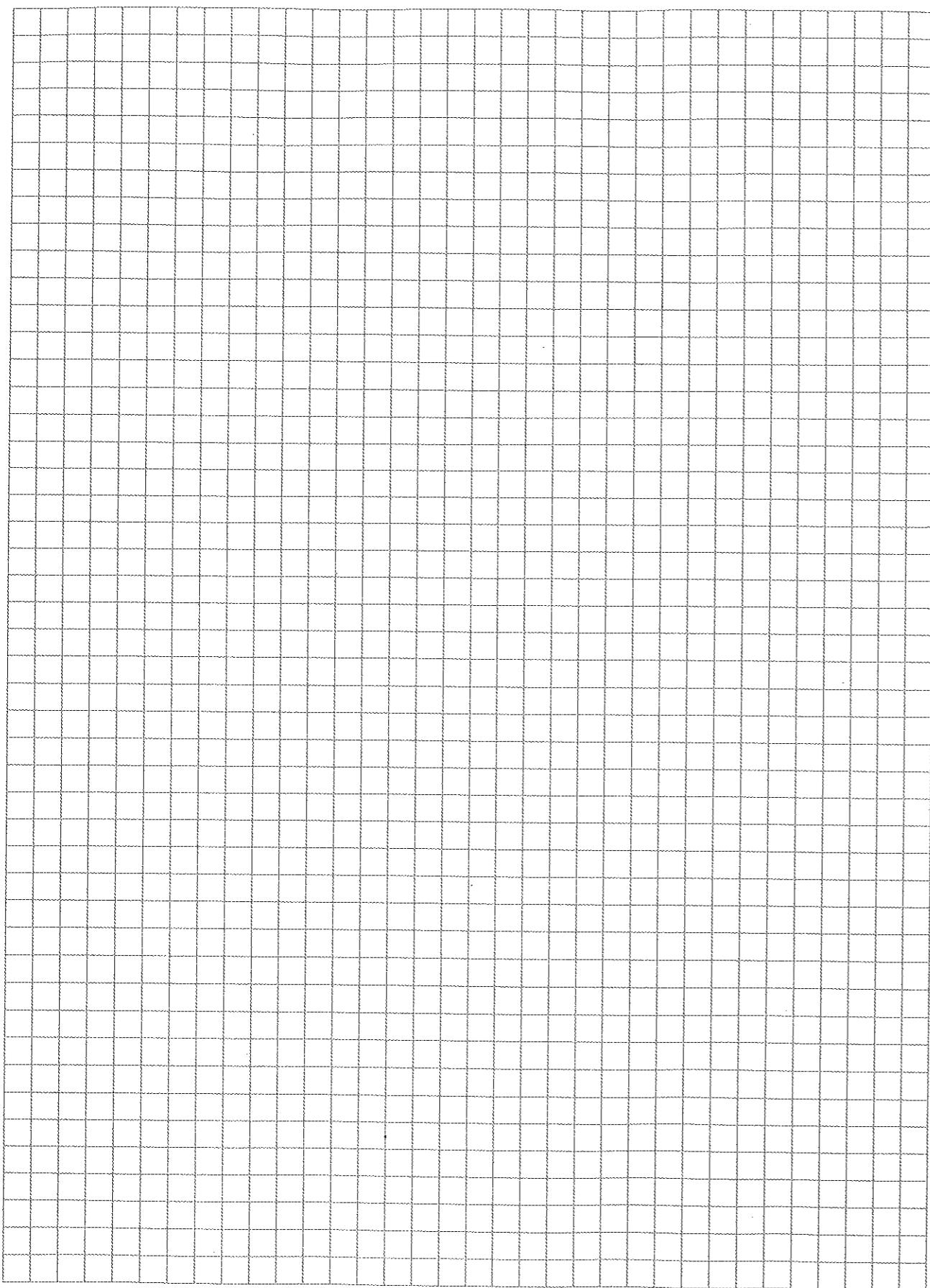


- Inlet manifold pressure
  - Fuel vapour
  - Exhaust gases
  - 1 Pulse air solenoid valve
  - 2 EVR
  - 3 DPFE sensor
  - 4 EGR valve
  - 5 Restrictor
  - 6 Fuel pressure regulator
- 7 Inlet manifold/air chamber
  - 8 Heating/air conditioning
  - 9 Purge solenoid valve (EVAP)
  - 10 Hoses to DPFE sensor
  - 11 Pulse air filter/valve housing
  - 12 Exhaust manifold
  - 13 Fuel vapour pipe from carbon canister (EVAP)
  - 14 EEC IV module

- The vacuum hoses and connections shown must be visually checked at the regular service intervals for wear and/or damage.



New Special Tool	Description
21-140-03	Adaptor for Engine Support Bar 21-140



**1.6 DOHC 16V Zeta Engine**

Engine .....	1.6 litre DOHC 16V
Engine build code .....	L1F
Engine management .....	Electronic engine management (EEC IV)
Ignition system .....	Integrated electronic ignition system (EDIS-4)
Mixture control .....	Sequential electronic fuel injection (SEFI)
Emission system .....	Three-way catalytic converter
	Evaporative emission control system (EVAP)
	Pulse air system
Emission regulation .....	83 US
Bore .....	76.0 mm
Stroke .....	88.0 mm
Displacement .....	1597 cm <sup>3</sup>
Throttle plate housing, Venturi diameter .....	42 mm
Power output (DIN) .....	66 kW (90 HP) at 5250 rpm
Torque (DIN) .....	138 Nm at 3500 rpm
Compression ratio .....	10.3 : 1
Idle speed .....	700 rpm
Overspeed limitation at .....	7100 rpm
Engine oil specification .....	API/SG/CD (SAE 10W-30)
Engine oil-filling capacity - with filter .....	4.25 litre
	- without filter .....
	3.75 litre
Oil filter .....	0.5 litre
Spark plug type .....	AYRF 22 PP (PP = platinum tipped centre and side electrodes)
Electrode gap .....	1.3 mm

For all engine tightening torques please refer to Ford Mondeo Service Microfiche, Section 21.

1.8 DOHC 16V Zeta Engine

Engine .....	1.8 litre DOHC 16V
Engine build code .....	RKA
Engine management .....	Electronic engine management (EEC IV)
Ignition system .....	Integrated electronic ignition system (EDIS-4)
Mixture control .....	Sequential electronic fuel injection (SEFI)
Emission system .....	Three-way catalytic converter
	Evaporative emission control system (EVAP)
	Pulse air system
Emission regulation .....	83 US
Bore .....	80.6 mm
Stroke .....	88.0 mm
Displacement .....	1796 cm <sup>3</sup>
Throttle plate housing, Venturi diameter .....	48 mm
Power output (DIN) .....	85 kW (115 HP) at 5750 rpm
Torque (DIN) .....	158 Nm at 3750 rpm
Compression ratio .....	10.0 : 1
Idle speed .....	800 rpm
Overspeed limitation at .....	7100 rpm
Engine oil specification .....	API/SG/CD (SAE 10W-30)
Engine oil-filling capacity - with filter .....	4.25 litre
	- without filter .....
	3.75 litre
Oil filter .....	0.5 litre
Spark plug type .....	AYRF 22 PP (PP = platinum tipped centre and side electrodes)
Electrode gap .....	1.3 mm

For all engine tightening torques please refer to Ford Mondeo Service Microfiche, Section 21.

2.0 DOHC 16V Zeta Engine

Engine .....	2.0 litre DOHC 16V
Engine build code .....	NGA
Engine management .....	Electronic engine management (EEC IV)
Ignition system .....	Integrated electronic ignition system (EDIS-4)
Mixture control .....	Sequential electronic fuel injection (SEFI)
Emission system .....	Three-way catalytic converter
	Evaporative emission control system (EVAP)
	Pulse air system
Emission regulation .....	83 US
Bore .....	84.8 mm
Stroke .....	88.0 mm
Displacement .....	1988 cm <sup>3</sup>
Throttle plate housing, Venturi diameter .....	55 mm
Power output (DIN) .....	103 kW (136 HP) at 6000 rpm
Torque (DIN) .....	180 Nm at 4000 rpm
Compression ratio .....	10.0 : 1
Idle speed .....	800 rpm
Overspeed limitation at .....	7100 rpm
Engine oil specification .....	API/SG/CD (SAE 10W-30)
Engine oil-filling capacity - with filter .....	4.25 litre
	- without filter .....
	3.75 litre
Oil filter .....	0.5 litre
Spark plug type .....	AYRF 22 PP (PP = platinum tipped centre and side electrodes)
Electrode gap .....	1.3 mm

For all engine tightening torques please refer to Ford Mondeo Service Microfiche, Section 21.

## ABBREVIATIONS

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ACT	Air Charge Temperature
CID	Camshaft Identification Sensor
CPS	Crankshaft Position/Speed Sensor
DPFE	Delta Pressure Feedback Electronic System
EDIS-4	EEC IV with Distributorless Ignition System, 4 Cylinder Engines
ECT	Engine Coolant Temperature
EDF	Electro Drive Fan
EDM	EDIS Diagnostic Monitor
EEC	European Economic Community
EEC IV	Electronic Engine Control, System IV
EGR	Exhaust Gas Recirculation
EVAP	Evaporative Emission Control System
EVR	Electronic Vacuum Regulator
FDS	Ford Diagnostic System

## ABBREVIATIONS

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HEDF	High Speed Electro Drive Fan
HEGO	Heated Exhaust Gas Oxygen Sensor
ISC	Idle Speed Control
MAF	Mass Air Flow Meter
OAI	Octane Adjust Input
PCV	Positive Crankcase Ventilation
PIP	Profile Ignition Pickup
PSPS	Power Steering Pressure Switch
SAW	Spark Advance Word
SEFI	Sequential Electronic Fuel Injection
STI	Self Test Input
TPS	Throttle Position Sensor
VSS	Vehicle Speed Sensor

