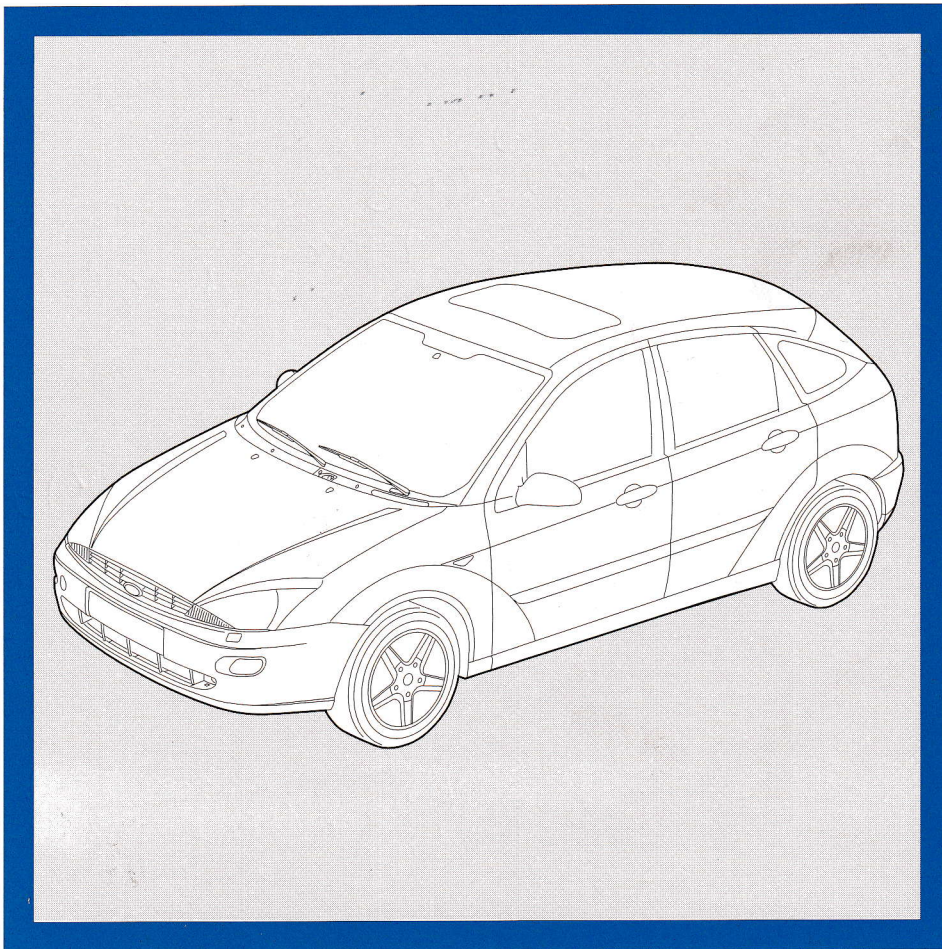


**Technical Service Training**

# **Focus**

**New Product Introduction 00/269**



**Student Information**



With the 1999 model year the Escort is superseded by a new generation vehicle, the “FOCUS”. This new innovative medium-sized vehicle incorporates the latest technical developments and modified components and systems from existing Ford vehicles.

The object of the “FOCUS” course is to present the vehicle and familiarize you with the vehicle components and systems. To this end, the training literature has been split into the following publications based on the main areas:

- **New Product Introduction 00/269 “Focus”, CG 7745/S**
- New Product Introduction 00/270 “Focus – Body”, CG 7746/S
- New Product Introduction 00/271 “Focus – 1.8L Endura-DI Turbocharged Intercooled Diesel Engine”, CG 7747/S
- New Product Introduction 00/272 “Focus – 4F27E Automatic Transmission”, CG 7748/S
- New Product Introduction 00/273 “Focus – Overview”, CG 7749/S

This New Product Introduction is designed to give an overview of the entire vehicle and presents the comprehensive safety features and measures for environmental protection.

The new chassis design and the Zetec-SE/Zetec-E engines are dealt with in detail. Brief descriptions are also given of the changes made to the iB5 and MTX-75 manual transmissions.

The Endura-DI diesel engine and the 4F27E automatic transmission are only described briefly as detailed information about these units is provided in the corresponding Student Information publications.

Descriptions are also given of numerous new electrical and electronic systems with which the Focus can be equipped. In addition, notes are provided on diagnosis and testing and new special tools.

Please remember that our training literature has been prepared solely for FORD TRAINING PURPOSES. Repair and adjustment operations **MUST** always be carried out according to the instructions and specifications in the workshop literature.

Please make extensive use of the training courses offered by Ford Technical Training Centres to gain extensive knowledge in both theory and practice.



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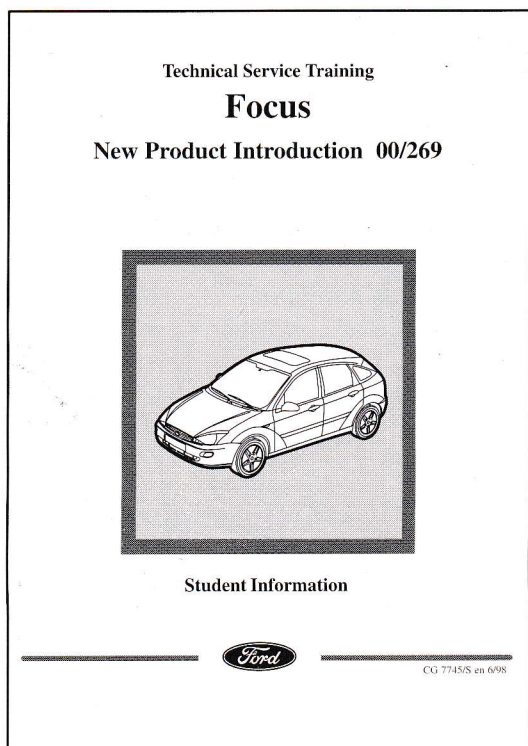
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New Product Introduction 00/270

“Focus – Body”, CG 7746/S

New Product Introduction 00/271

“Focus – 1.8L Endura-DI Turbocharged  
Intercooled Diesel Engine”, CG 7747/S

New Product Introduction 00/272

“Focus – 4F27E Automatic  
Transmission”, CG 7748/S

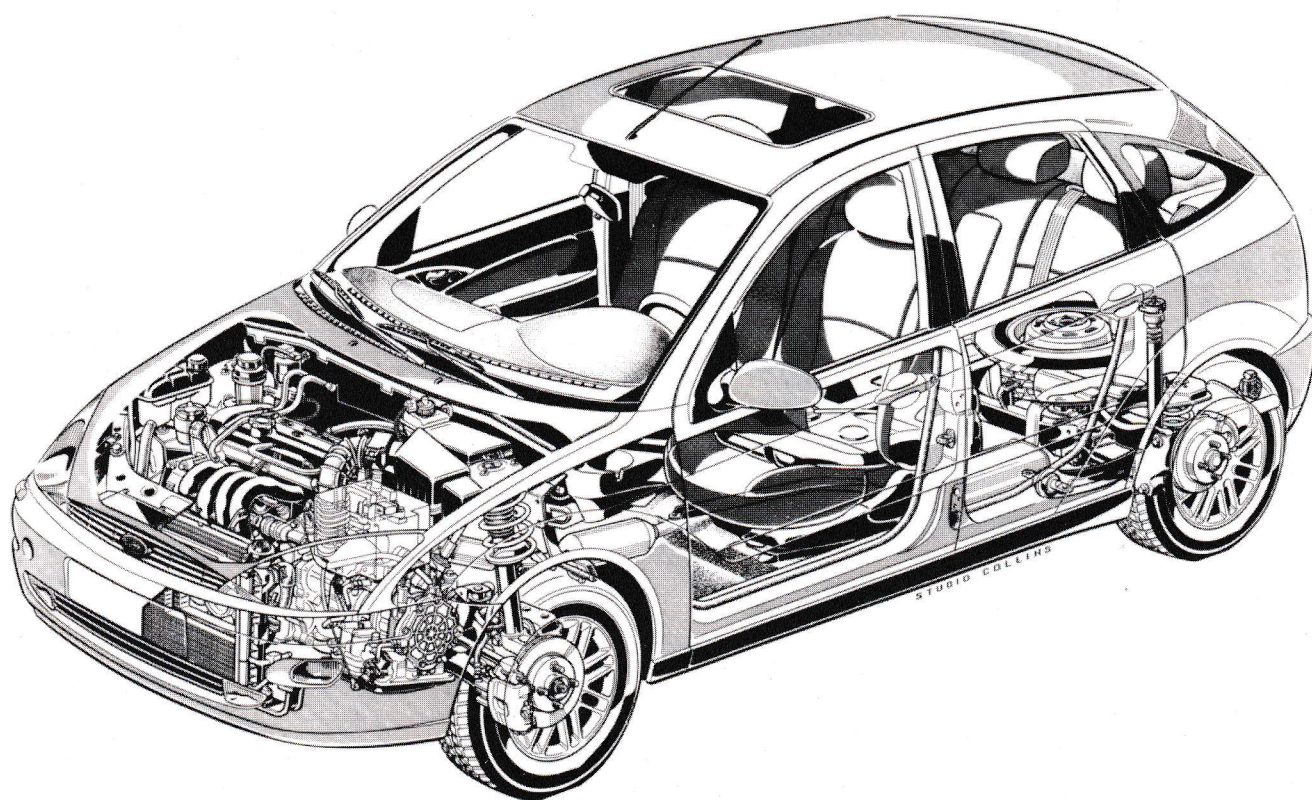
New Product Introduction 00/273

“Focus – Overview”, CG 7749/S

Video

“Focus”, CG 7751/V





**Powertrain**

- 1.4L and 1.6L Zetec-SE engines developing 55 kW (75 PS) and 74 kW (100 PS) respectively
- 1.8L and 2.0L Zetec-E engines developing 85 kW (115 PS) and 96 kW (130 PS) respectively
- 1.8L Endura-DI direct injection turbocharged diesel engine developing 66 kW (90 PS)
- iB5 manual transmission for 1.4L and 1.6L Zetec-SE and 1.8L Zetec-E engines
- MTX-75 manual transmission for 2.0L Zetec-E and 1.8L Endura-DI turbocharged diesel engine
- 4F27E automatic transmission for 1.6L Zetec-SE engine
- Hydraulic clutch mechanism

**Chassis**

- Front axle with strut and spring assemblies, suspension arms, subframe and stabilizer bar; disc brakes (internally ventilated) with sliding calipers
- Multilink rear suspension with stabilizer bar, individually adjustable toe settings; drum or disc brakes (depending on engine variant)

**Body**

- Bumpers painted body colour
- Direct glazing, tinted glass
- Two-piece doors

**Safety**

- ABS with traction control system (TCS) and electronic brake force distribution (EBD)
- Electronic stability program (ESP) optional; ESP includes ABS and TCS
- Front and side air bags for driver and front passenger

**Information and communications electronics**

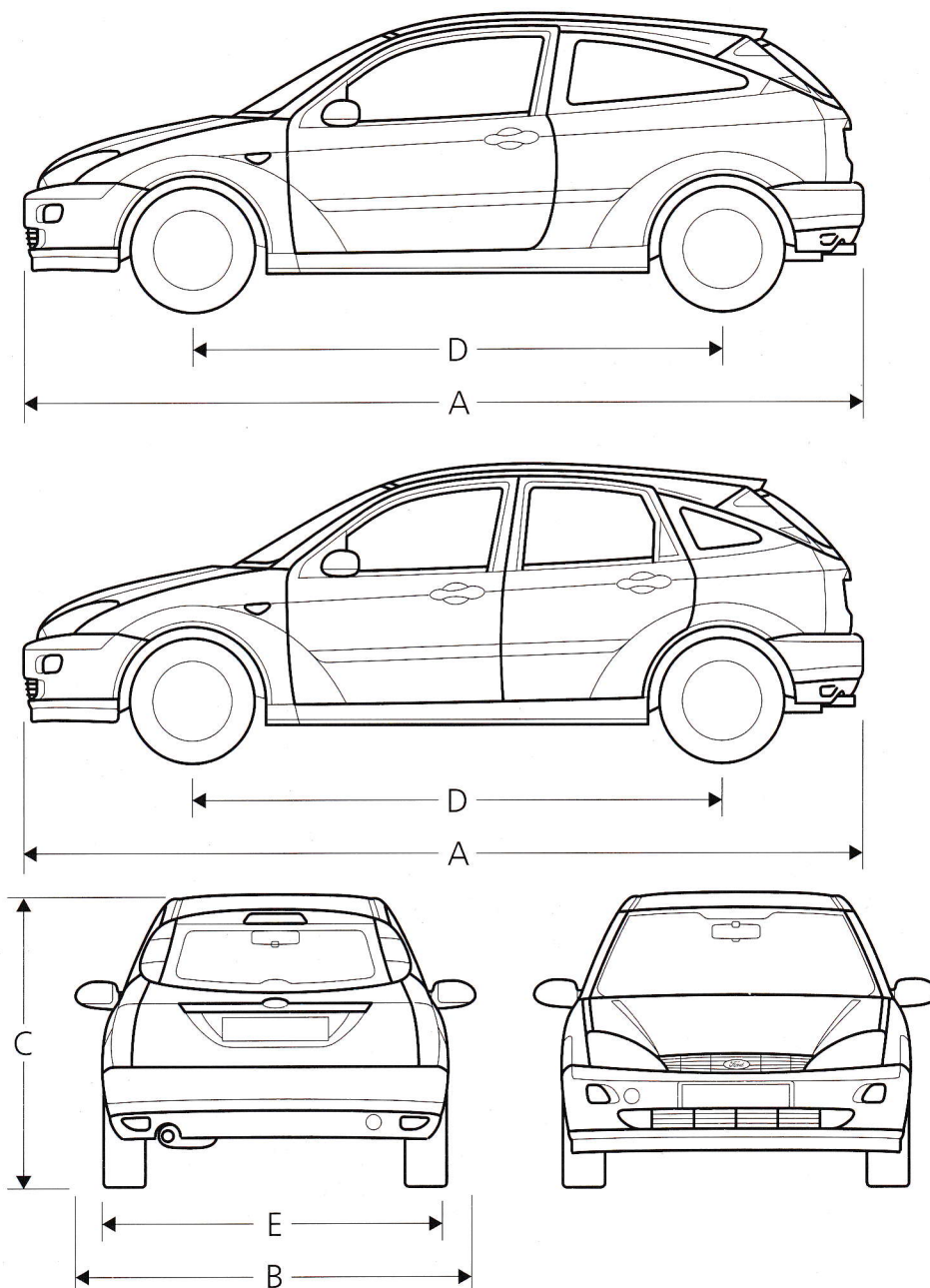
- Integral mobile telephone
- Telematic traveller assistance system (TAS)

**Service Training**



## Body

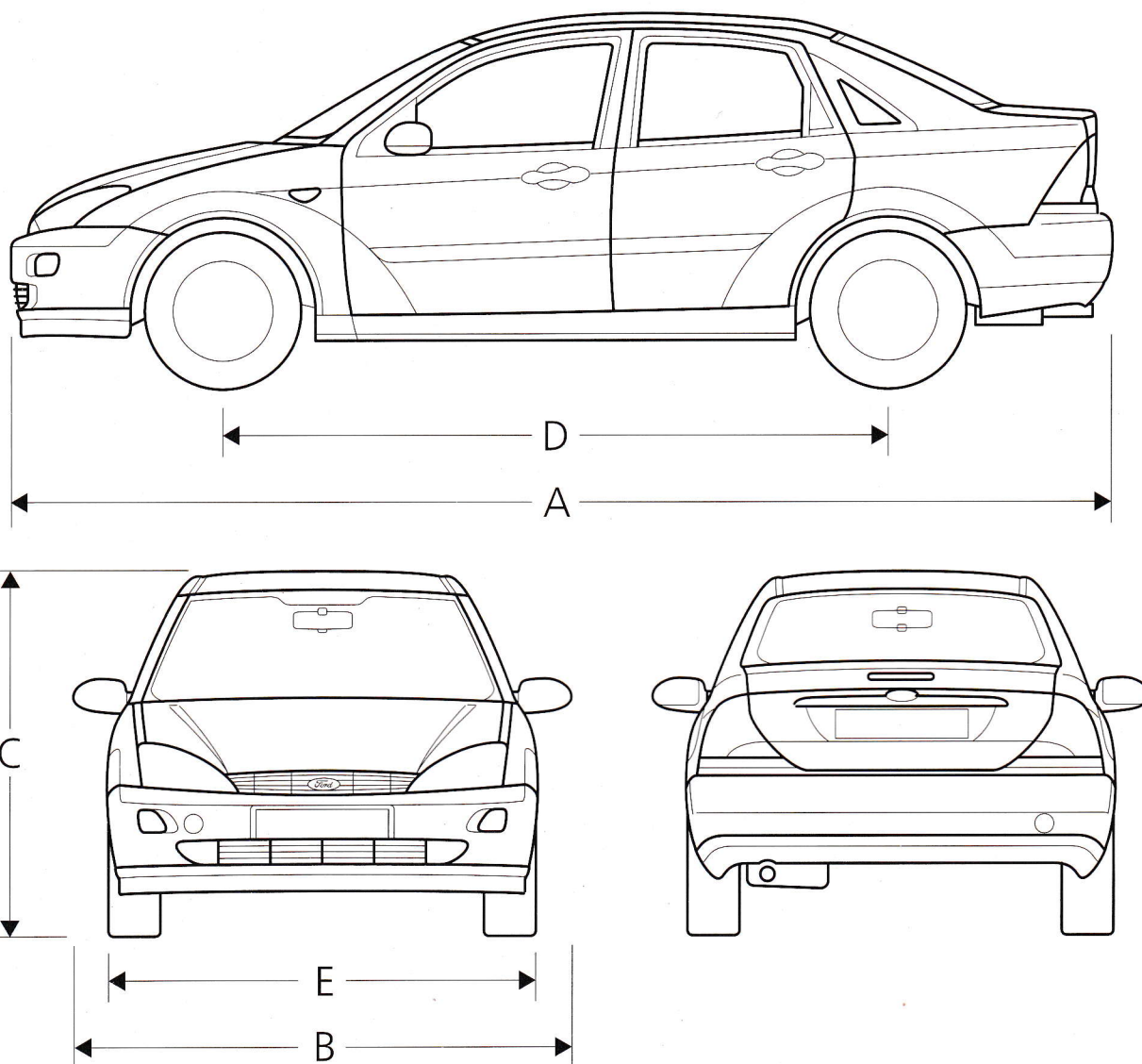
### Hatchback



7745/22/NF

A	Maximum length	4152 mm
B	Maximum width	1695 mm
C	Overall height (unladen)	1430 mm
D	Wheelbase	2615 mm
E	Track front/rear	1494/1497 mm

## Notchback

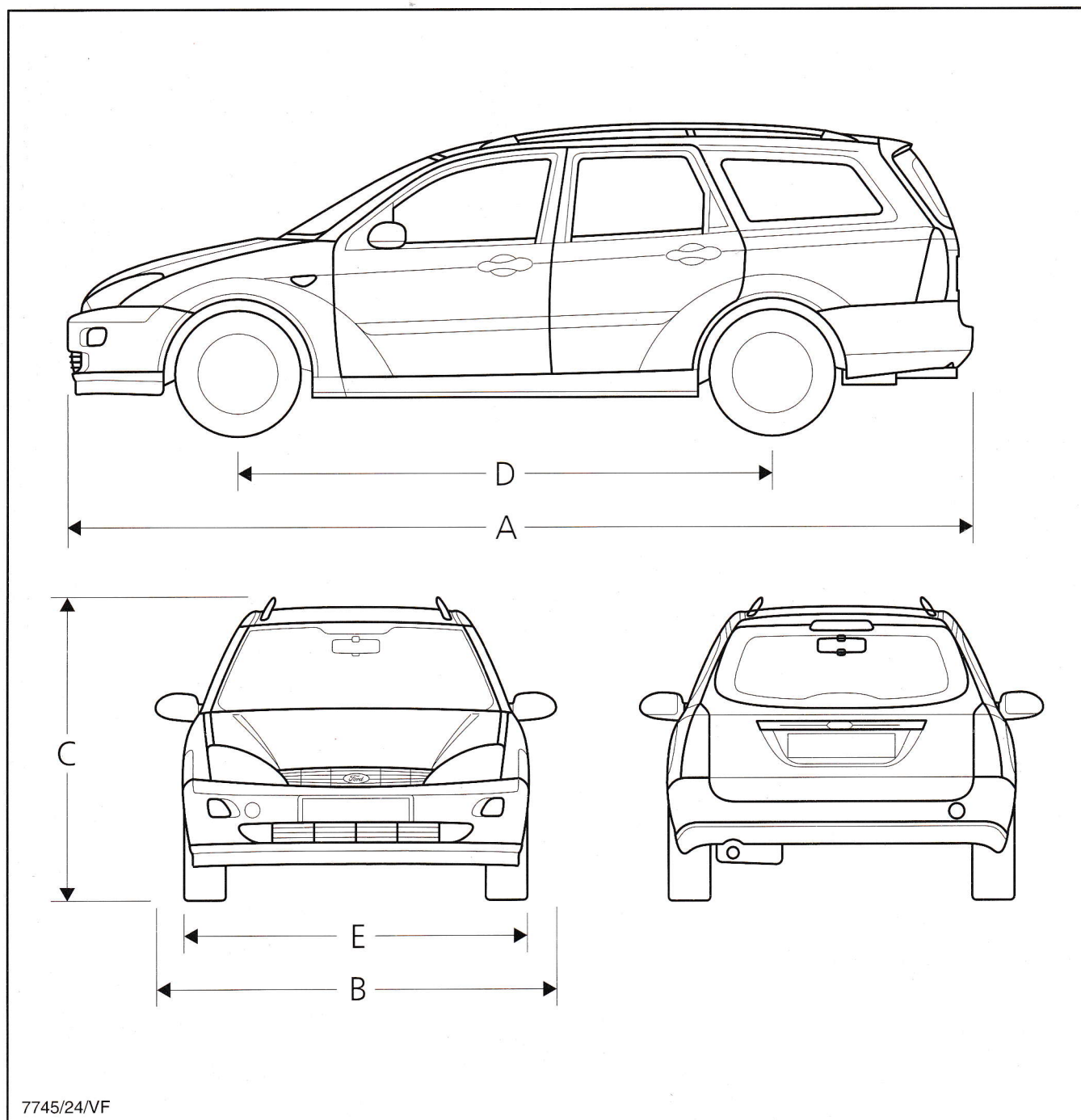


7745/23/VF

A	Maximum length	4295 mm
B	Maximum width	1695 mm
C	Overall height (unladen)	1430 mm
D	Wheelbase	2615 mm
E	Track front/rear	1494/1497 mm

## Body

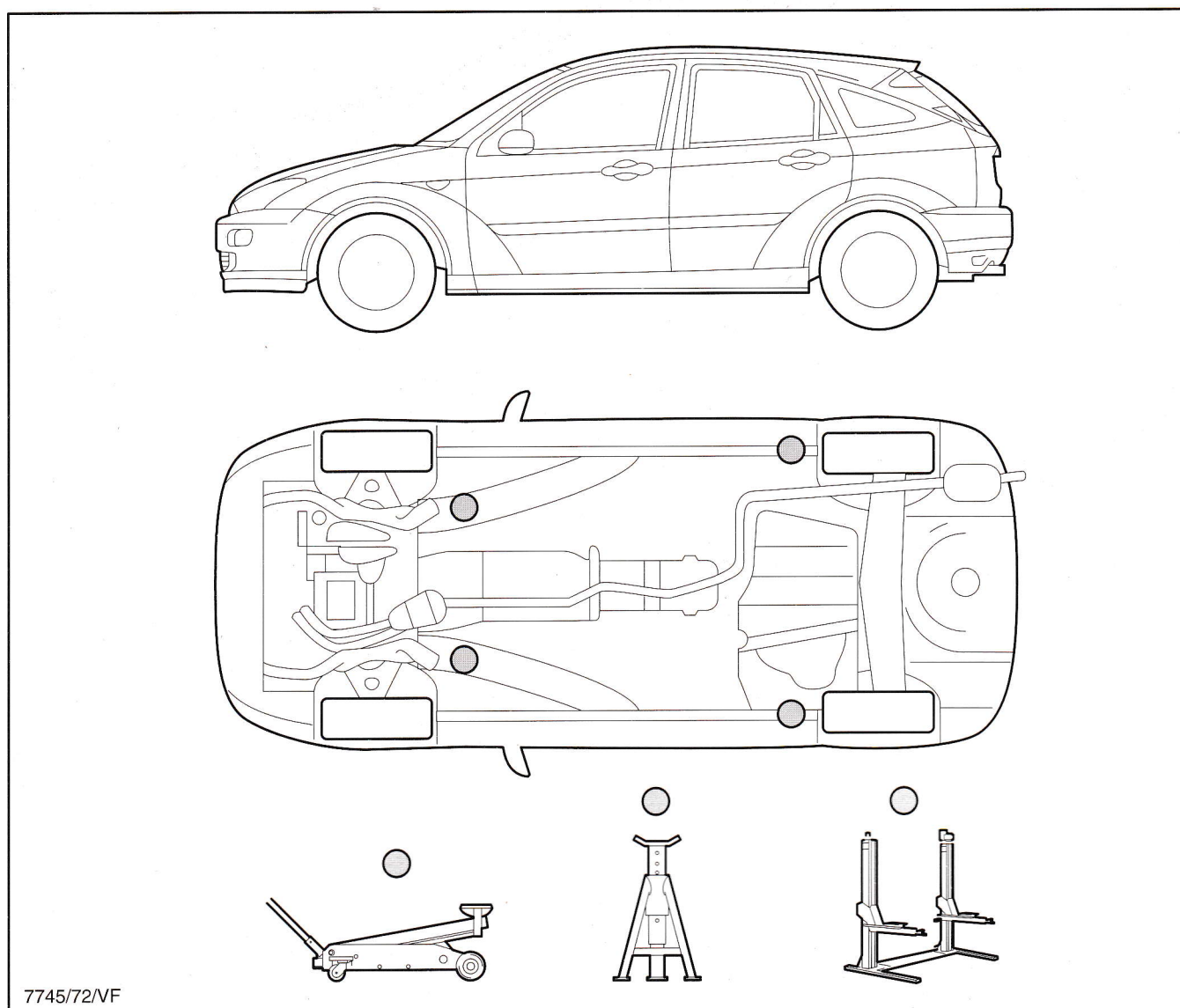
### Wagon



A	Maximum length	4438 mm
B	Maximum width	1695 mm
C	Overall height (unladen)	1441 mm
D	Wheelbase	2615 mm
E	Track front/rear	1494/1497 mm



## Raising/jacking the vehicle



**⚠ CAUTION:** The vehicle may **ONLY** be raised or supported at the points marked in the illustration shown above. Otherwise, serious damage could be caused to the chassis and the body.

**⚠ CAUTION:** The Focus can be equipped with brake traction control system. During servicing, the engine must **NOT** be started with a gear engaged while the driving axle is raised on one side (with the other wheel in contact with the ground). The vehicle would be pulled off the lifting device. This could result in personal injury and/or damage to the vehicle.

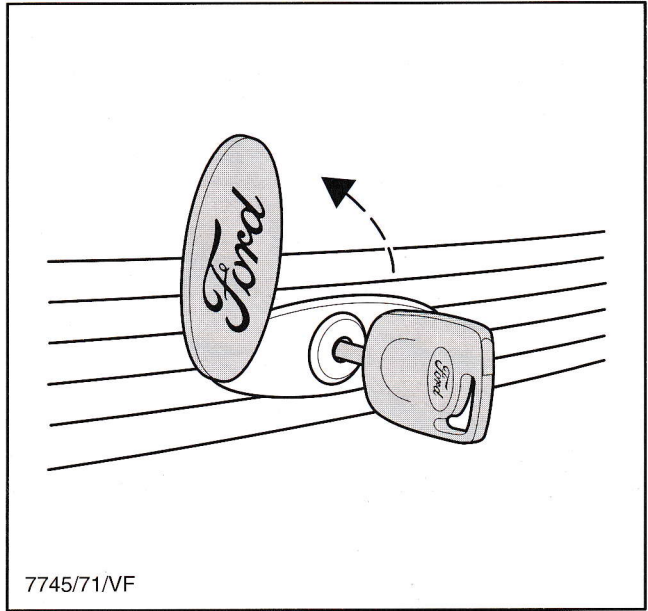
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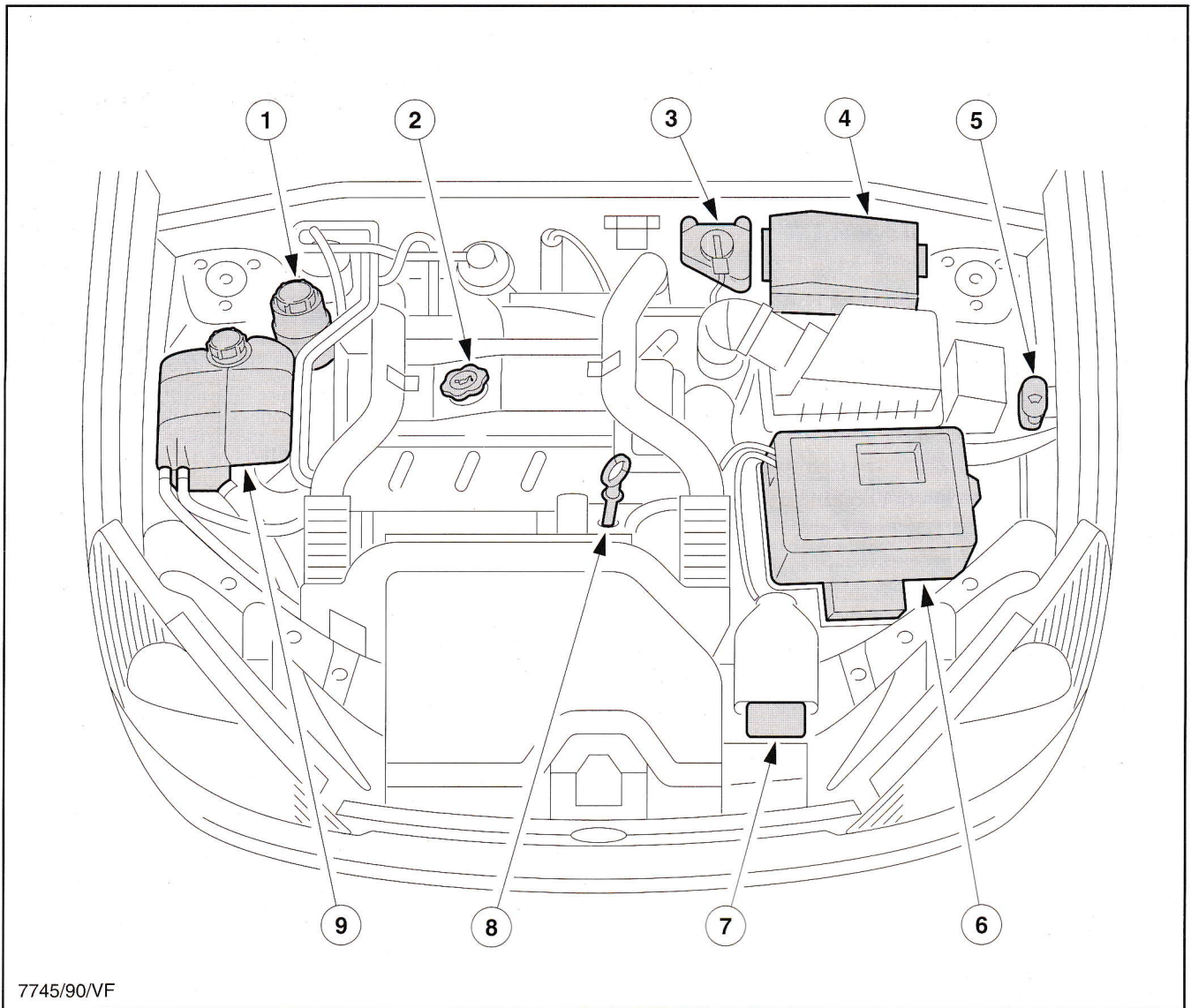
### Opening the hood

- For improved security, the hood can now only be unlocked with the vehicle key.
- The Ford emblem must be swung up to gain access to the lock cylinder.
- The key is first turned counterclockwise to unlock the hood. This can now be lifted but still cannot be opened completely.
- The key is then turned clockwise to allow the hood to be opened.

**NOTE:** Remove the key immediately after opening the hood.



## Under the hood



7745/90/VF

- |                                  |                                |
|----------------------------------|--------------------------------|
| 1 Power steering fluid reservoir | 6 Battery                      |
| 2 Oil filler cap                 | 7 Vehicle identification plate |
| 3 Brake fluid reservoir          | 8 Oil dipstick                 |
| 4 Battery junction box (BJB)     | 9 Coolant expansion tank       |
| 5 Screen washer fluid reservoir  |                                |



## Safety features

---

### Active safety

**Active safety** covers all the features which help to prevent an accident. In the Focus these include:

- power-assisted steering
- new front and rear suspension
- ABS with traction control system (TCS)
- electronic stability program (ESP)
- air conditioning
- new headlamps with improved light output
- traveller assistance system (TAS)


### Passive safety


**Passive safety** covers all the measures which help to minimise or totally avoid the consequences of an accident. In the Focus these include:

- front and side air bags for the driver and front passenger
- height-adjustable safety belts
- safety belt locks which prevent the belt slipping on the retractor
- pyrotechnic belt pretensioners for the driver and front passenger safety belts
- torsion bars in the belt retractor to reduce the load on the chest
- safety passenger cell with a crossmember in the instrument panel
- height-adjustable front and rear head restraints
- anti-submarine seats which prevent the occupants slipping under the safety belts
- hard foam padding in the interior of the doors to reduce the impact energy in a side impact
- rounded and padded trim elements in the immediate vicinity of the vehicle occupants
- threaded holes to accommodate the fixtures (ISO FIX) for child safety seats

### Air bag and belt pretensioner system

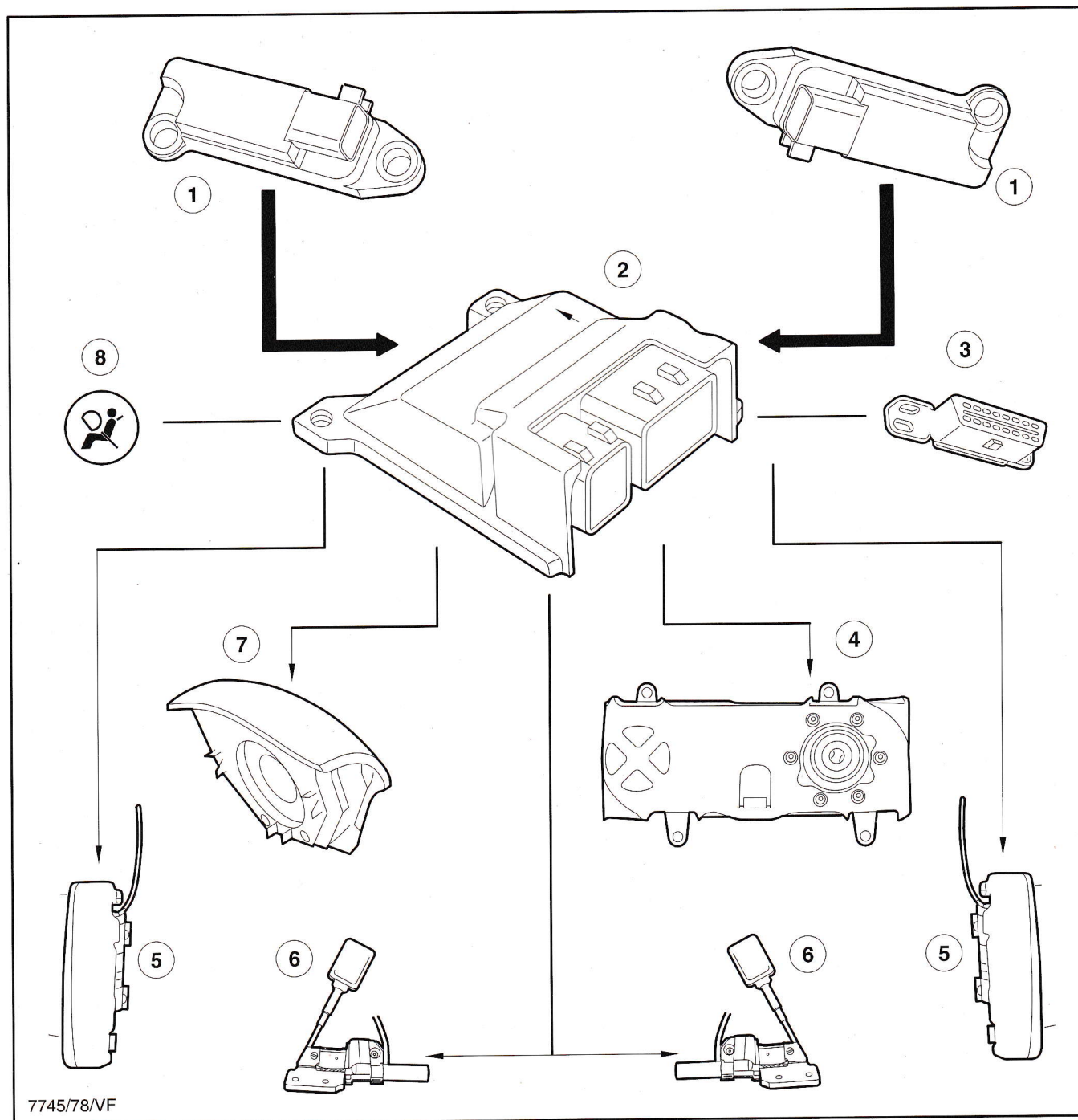
- The Focus is equipped with the latest Ford supplementary restraint systems. It has “full size” air bags for the driver and front passenger.
- The driver air bag has a volume of 55 liters and is standard equipment in all territories.
- The front passenger air bag has a volume of 100 liters and is standard equipment in many territories.
- Side air bags which protect the head and chest of the front occupants against injury in a side impact are optional equipment.
- A warning indicator in the instrument cluster indicates faults in the pyrotechnic supplementary restraint system.
- If a firing circuit is found to be faulty and this is indicated by the warning indicator, the remainder of the system remains operative. A faulty firing circuit may still be fired in certain circumstances.
- The pyrotechnic supplementary restraint system can be checked with FDS 2000.

 **CAUTION:** When fitting covers to seats with side air bags, only use original and fitting covers and only on the driver or passenger seat as specified.

 **CAUTION:** When working on pyrotechnic supplementary restraint systems, always observe all the safety precautions in the current service literature.

- When the air bags were developed, additional emphasis was placed on making sure that the occupants are not injured when they come into contact with the air bag while this is still not completely inflated.
- All pyrotechnic supplementary restraint systems are monitored and actuated by a single module. This central control module is located on the center tunnel in the area of the parking brake control.
- Crash sensors are incorporated in the floor on the left and right-hand sides of the passenger compartment to recognise a side impact.
- The firing current for the gas generators is now an alternating current and passed through a capacitor. Both serve to protect against unintentional firing of the supplementary restraint systems by short circuits or electrical faults.

### Air bag and belt pretensioner system (continued)



#### Overview of supplementary restraint systems

- |                             |  |
|-----------------------------|--|
| 1 Crash sensor              | 5 Side air bag                         |
| 2 Central control module    | 6 Pyrotechnic safety belt pretensioner |
| 3 Data link connector (DLC) | 7 Driver air bag                       |
| 4 Passenger air bag         | 8 Air bag system warning indicator     |



### Emissions

#### Exhaust gases

- All the engines installed in the Focus meet the current European exhaust emission standards.

#### Exterior noise

- The focus also meets the current EU standards as regards noise production. According to these, the drive-by figure must not exceed 74 dB (A).

### Protection of the ozone layer

- The air conditioning system of the Focus works with the CFC-free refrigerant R-134a.
- All the synthetic foams used are manufactured without the use of CFCs.

### Asbestos

- All the friction linings (brake and clutch linings) and gasket materials are asbestos-free.

### Recycling

- The used vehicle recycling targets set for the year 2002 in Europe require manufacturers to produce vehicles which are at least 85% recyclable. The Focus meets these requirements.
- The components of the Focus were developed so that removing components and separating the different materials can be carried out easily and without great expense.

### Metals

- Almost 100% of the steel and ferrous materials can be recycled by the steel industry.

### Light alloys

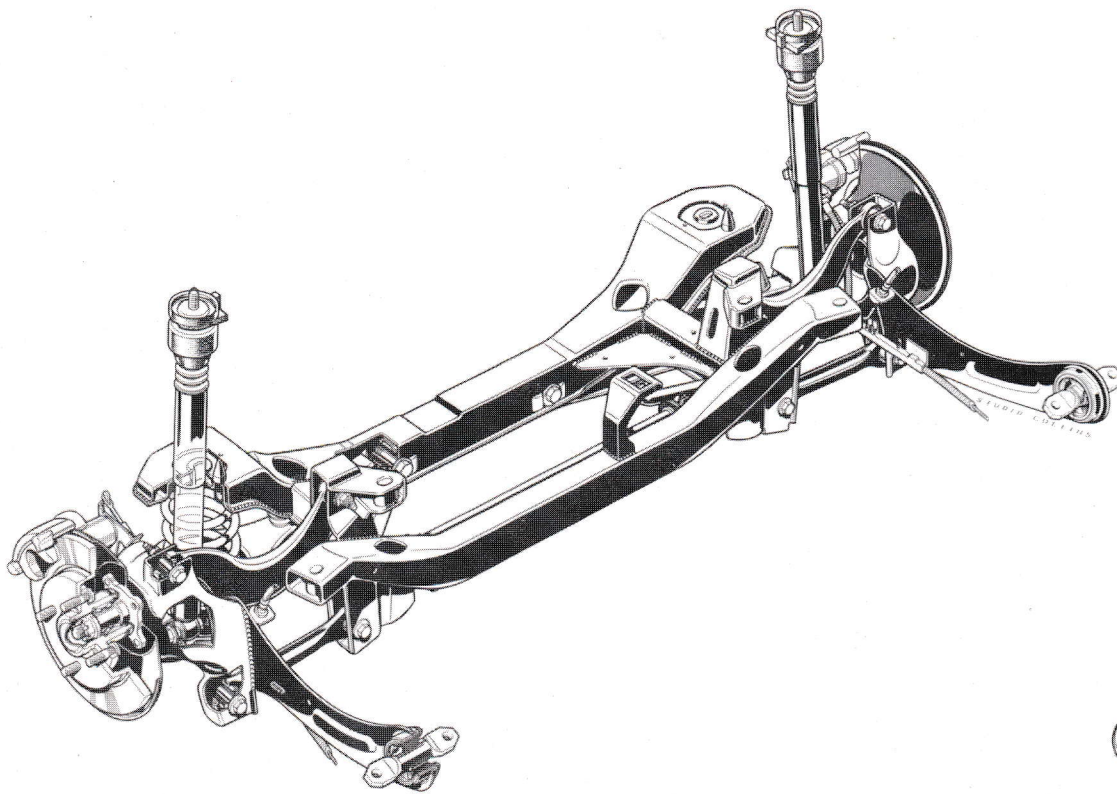
- All the light alloys can also be used again as raw materials after appropriate recycling.

### Plastics

- Research is forever creating new ways of recycling a wide variety of plastics.
- As a rule plastic components are marked so that they can be sorted into their particular type and processed.
- Basically, all plastics which are free of laminates, i.e. are not composites, are suitable for recycling.
- Laminated plastics (composites) can be used in combustion processes for energy recovery.
- Foams can be used by the chemical industry in the manufacture of polymers.

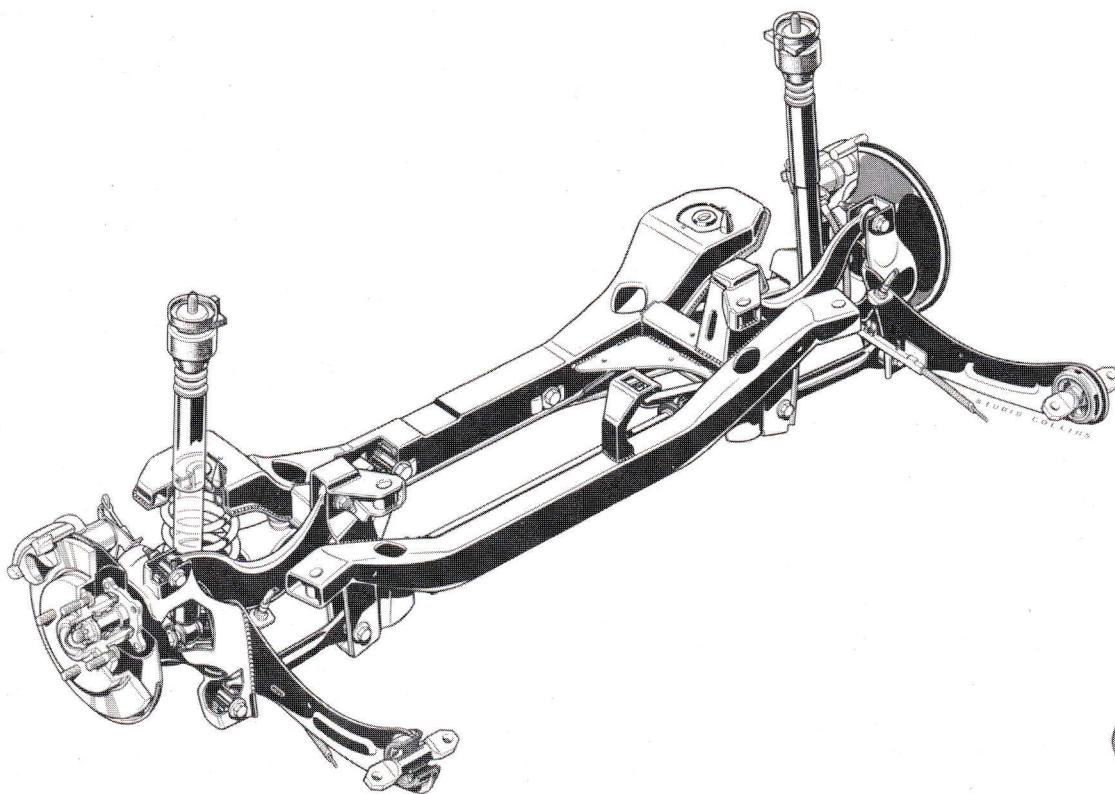
### Glass and rubber

- The hardened glass used in the side and rear windows can be employed to manufacture glass vessels.
- Rubber from tires, hoses, rubber bushings and insulators can also be used for combustion for energy recovery.



- Power-assisted rack and pinion steering (standard)
- Strut and spring assemblies and suspension arms at the front
- Independent short and long arm (SLA) suspension at the rear
- Torsion stabilizer bars at the front and rear
- 14 inch or 15 inch wheels (depending on engine)
- Disc brakes with sliding calipers at the front
- Internally ventilated brake discs at the front
- Drum brakes at the rear (disc brakes with ESP or 1.8L and 2.0L engine with ABS; standard in D)
- ABS optional (standard in D, DK and N)
- Traction control system (TCS) optional with ABS
- Electronic stability program (ESP) optional; ESP includes ABS and TCS





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- Electronic stability program (ESP) optional; ESP includes ABS and TCS

## Overview

**NOTE:** The wheel and tire combinations depend on vehicle, engine and equipment.

- Tires designed for optimum rolling resistance are used as standard. Standard tires may be used in service.

Wheel Tire	5 1/2 J X 14 47.5 mm rim offset (Steel)	6 J X 15 52.5 mm rim offset (Steel)	6 J X 15 52.5 mm rim offset (Light alloy)
175/70 R 14 T	●		
185/65 R 14 H	●		
195/55 R 15 H		●	●
195/60 R 15 V		●	●

**NOTE:** Do not use the nuts of the light alloy wheels for steel wheels (except the spare wheel).

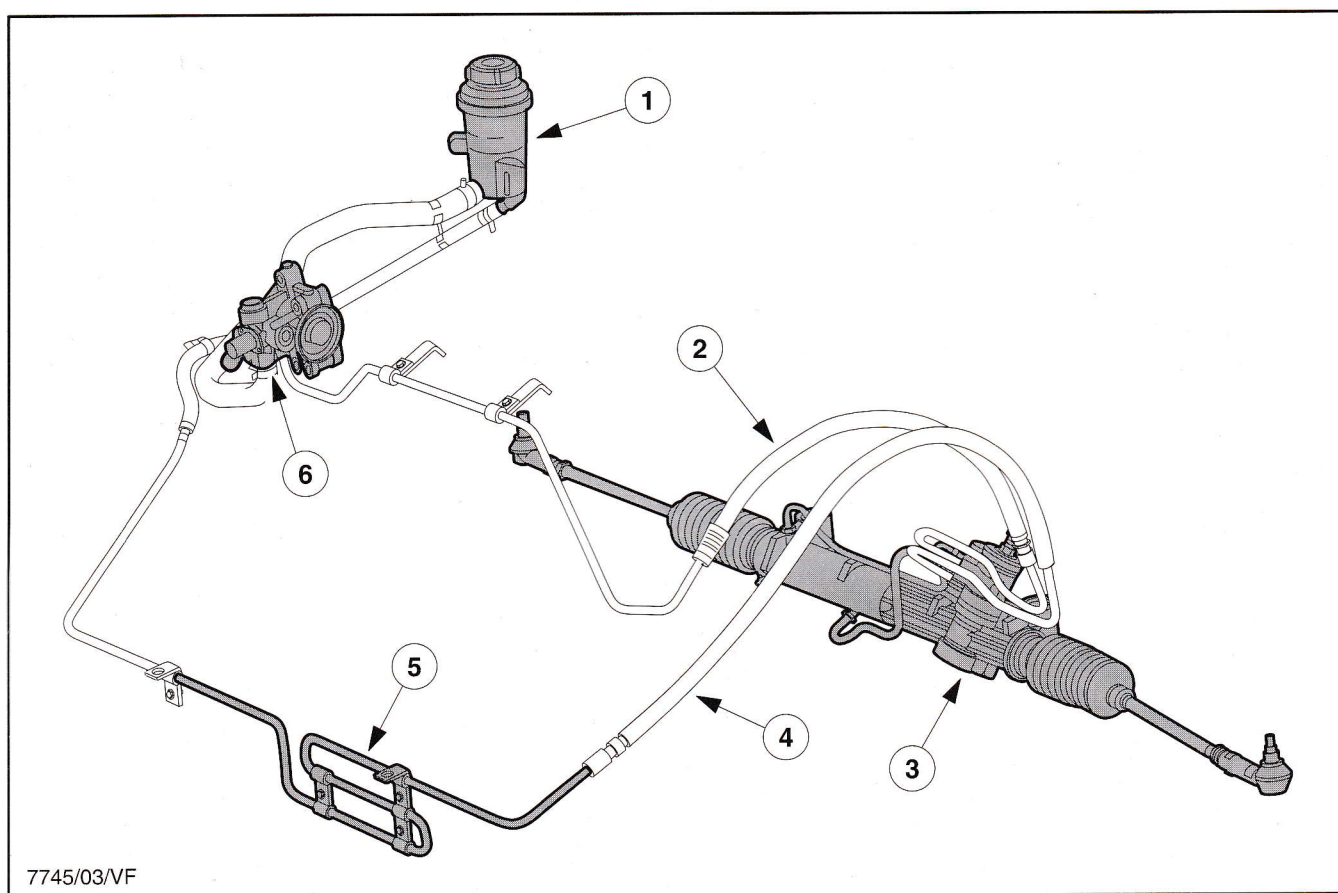
## Operating vehicle with snow chains

- Snow chains can only be used on the driving wheels.
- If the vehicle is fitted with 195/55 R 15 or 195/60 R 15 tires, operation with snow chains is **not** permitted.



## General

- The Focus has rack and pinion steering. Power steering is standard on all models.
- Two different hydraulic pumps can be used which can be distinguished by their housing:
  - grey cast iron housing without a power steering pressure (PSP) switch for vehicles with a diesel engine
  - light alloy housing with an integral PSP switch for vehicles with a petrol engine (in the case of 1.4L engines the PSP switch is located in the high-pressure pipe).
- 3.0 revolutions of the steering wheel are necessary to turn the steering gear from stop to stop. In the process the rack moves 145 mm.
- The turning circle of the Focus is 10.9 meters.
- All the bearings, oil seals and moving parts in the steering system were optimized as regards friction to ensure precise steering.
- The front axle steering geometry is designed to produce a toe-stabilizing negative steering offset.



- 1 Power steering fluid reservoir
- 2 High-pressure pipe
- 3 Steering gear

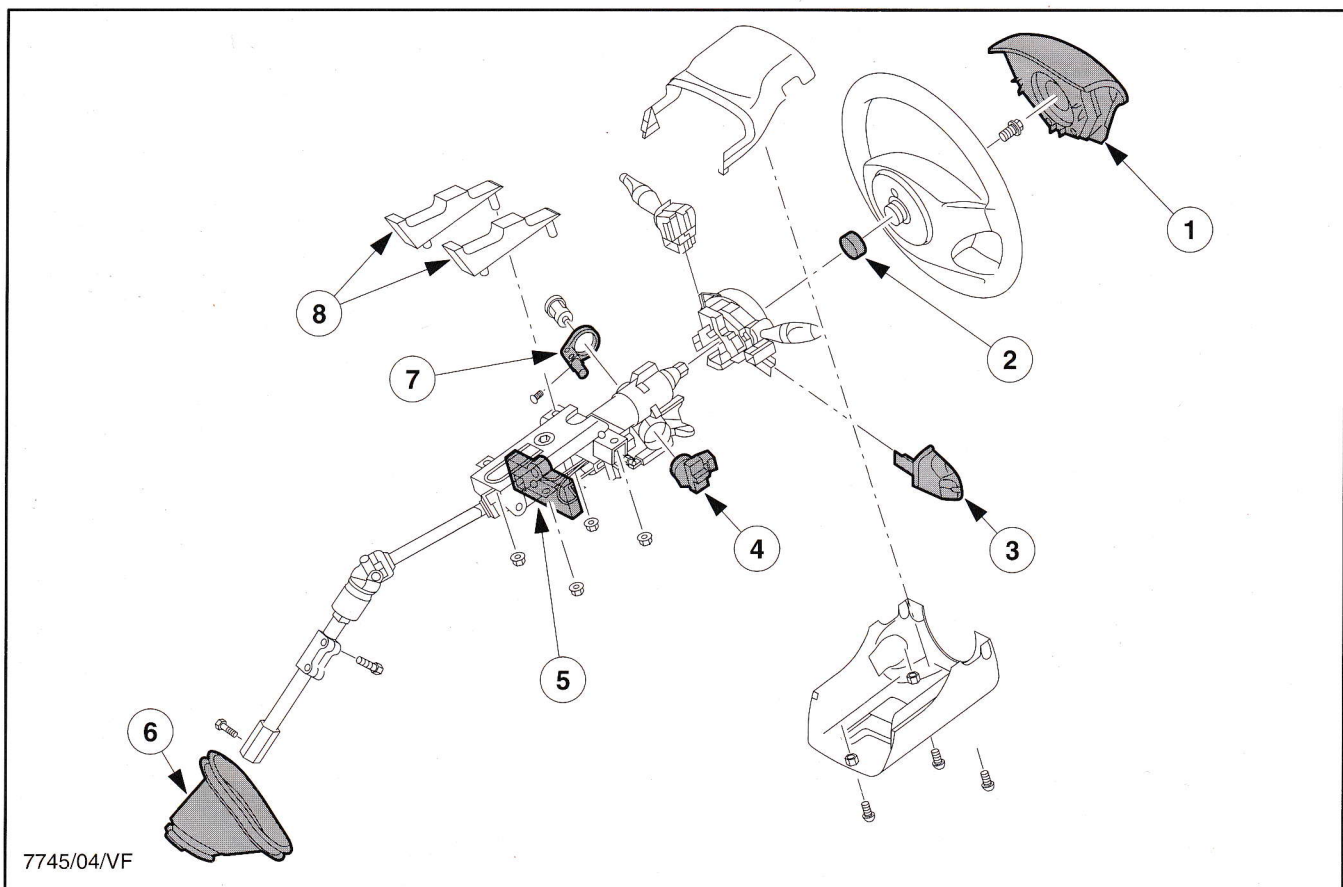
- 4 Return pipe
- 5 Cooling loop (depending on model)
- 6 Power steering pump

## Steering column

- The steering column is adjustable for height and reach as standard.
- All the electrical components in the steering column are readily accessible and can be removed and installed easily.

**⚠ CAUTION:** No repair operations of any kind may be carried out on the mechanical components of the steering column. If the steering column is damaged, a complete new steering column must be installed.

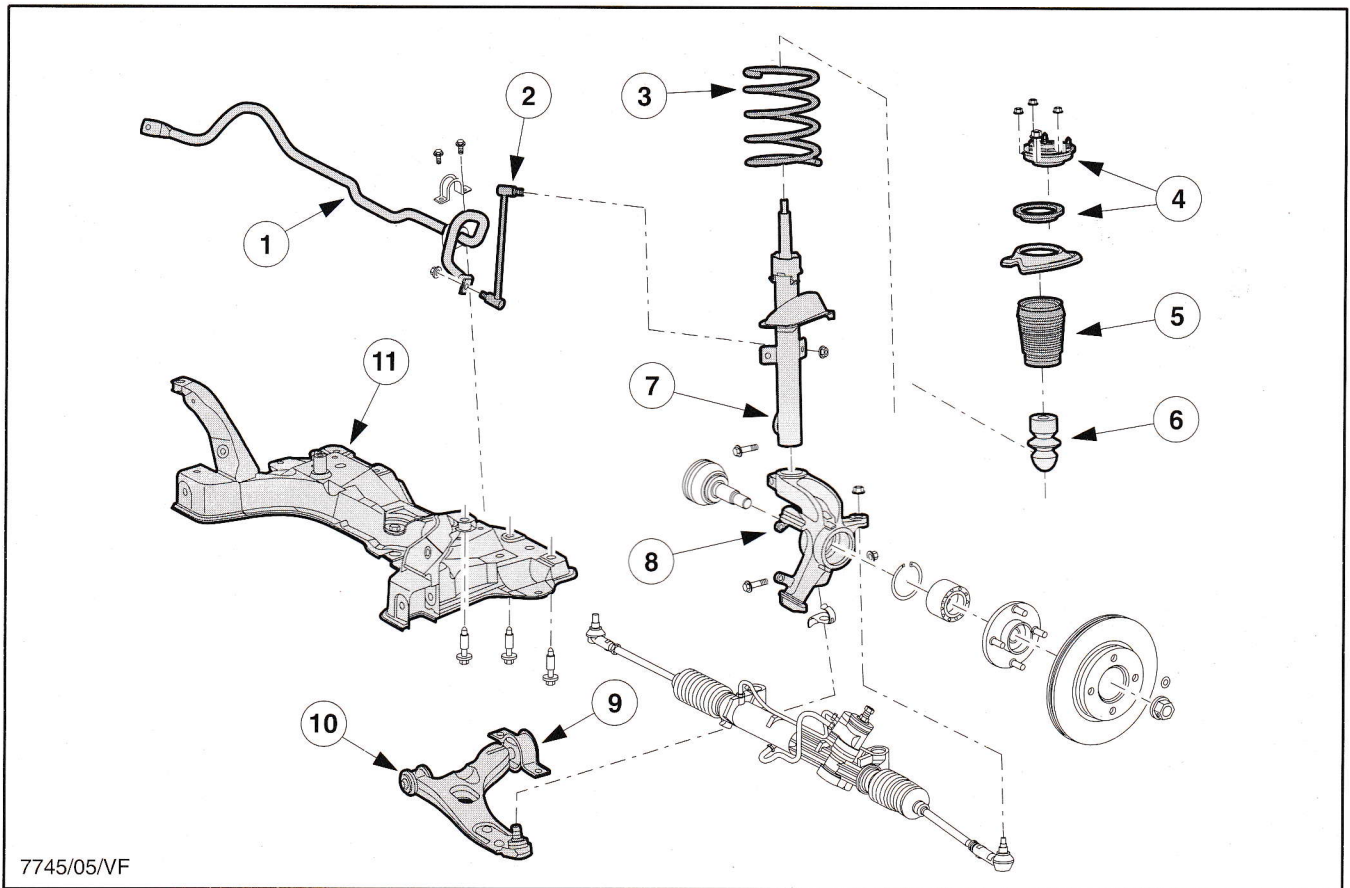
- Different components of the steering column are connected together frictionally. In an accident they can collapse and thus dissipate energy.
- Since this changes the contact areas of the frictionally connected components and also the corresponding coefficients of friction, a repaired steering column would not have calculable crash characteristics.



- |   |                                     |
|---|-------------------------------------|
| 1 Air bag module  | 6 Seal (clipped to steering gear)   |
| 2 Tolerance ring (yellow)                                       | 7 Transceiver for PATS              |
| 3 Radio remote control stalk                                    | 8 Mounting on in-vehicle cross-beam |
| 4 Ignition switch   |                                     |
| 5 Steering wheel position sensor (in conjunction with ESP only) |                                     |

## General

- The front suspension of the Focus essentially consists of a crossmember, strut and spring assemblies, suspension arms and a torsion bar stabilizer.
  - The A-shaped suspension arms are suspended from two horizontal rubber bushings on the crossmember. These bushings ensure stable lateral guidance and damping of shocks/harshness in the longitudinal direction of the vehicle
  - The torsion stabilizer bar is coupled to the struts by links.
  - No buckling forces whatsoever act on the struts due to the oblique positioning of the springs (100% lateral loading compensation).
- NOTE:** The front springs **must** be installed with the paint mark at the **bottom**.
- NOTE:** The rubber auxiliary spring **must** be installed with the tapered end pointing **downwards**. Only slide the rubber auxiliary spring on to the piston rod to a point behind the thread.



7745/05/VF

- |   |                                |
|---|--------------------------------|
| 1 Stabilizer bar                          | 7 Strut                        |
| 2 Stabilizer bar link                     | 8 Wheel knuckle                |
| 3 Spring (note position)                  | 9 Rubber bushing with retainer |
| 4 Strut tower with thrust bearing         | 10 Suspension lower arm        |
| 5 Boot                                    | 11 Crossmember                 |
| 6 Rubber auxiliary spring (note position) |                                |



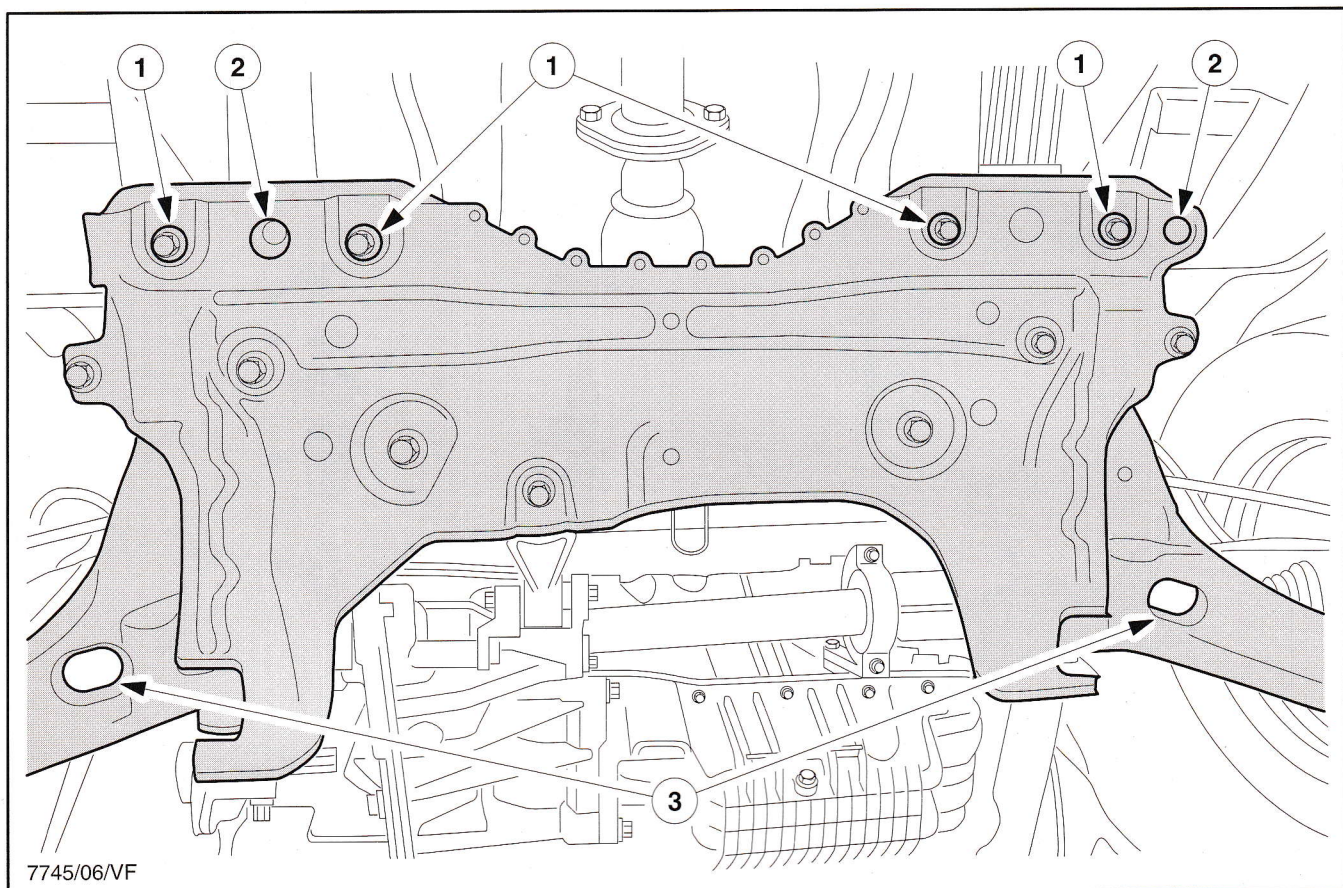
**Aligning front axle crossmember**

- When the front axle crossmember is installed, it must be aligned on the floor assembly with two alignment pins before the bolts are tightened.
- The front axle crossmember is secured to the body with M12 bolts at the front and M14 bolts at the rear.

- Washers with integral metal balls which press into the floor assembly when the bolts are tightened, hold the crossmember in its position.

**NOTE:** If washers are damaged or lost, new washers must always be installed.

**NOTE:** The bolts must never be reused.



- 1 M14 bolts
- 2 Openings for alignment pins
- 3 Openings in lower arms for access to M12 bolts

## Lower arms

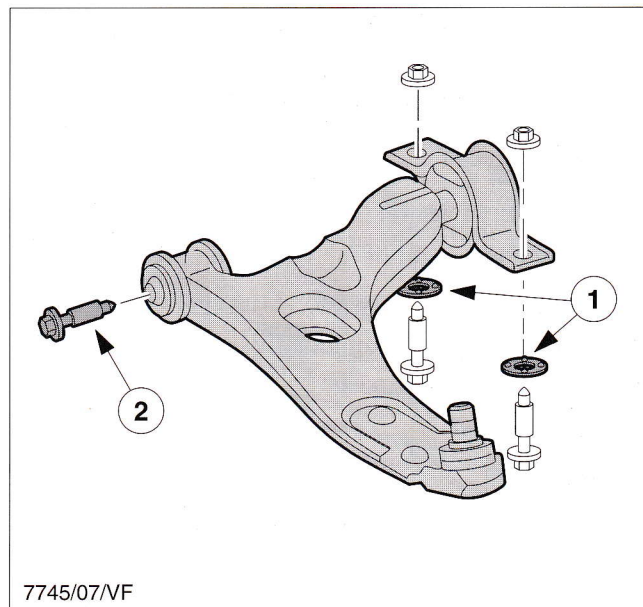
**NOTE:** The rubber bushings in the lower arms cannot be changed. New lower arms must always be installed.

- When installing the lower arms, it is imperative to check the position while tightening the retaining bolts so as to ensure that the rubber bushings are not overloaded when the suspension is compressed.
- For this, it is recommended that the rear mounting of the lower arm be secured first. The retainer fused to the bushing forces the lower arm into its correct position.
- Then the front necked down bolt can be tightened. Lastly, the strut is secured to the joint.
- Washers similar to those between the body and the front axle crossmember, ensure that the rear lower arm mounting is held securely.

**NOTE:** If washers are damaged or lost, always fit new washers.

- The axle geometry must always be checked after assembly operations on the front axle. Only the toe setting is adjustable on the front axle.

**NOTE:** The bolts must never be reused.



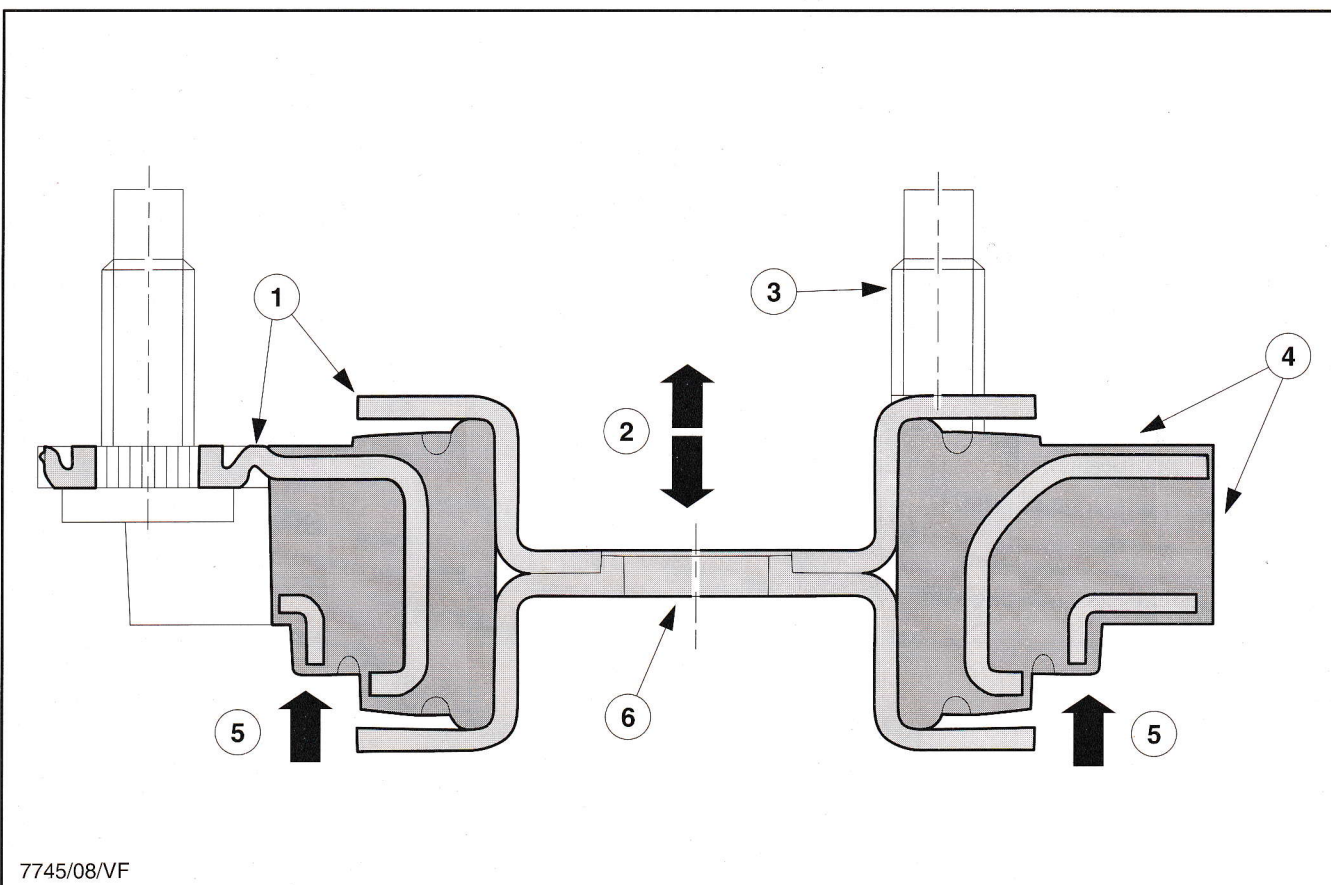
- 1 Washers
- 2 Necked down bolt

**NOTE:** Always use new necked down bolts. Refer to the service literature for the special tightening procedure (torque to yield tightening method).



## Strut towers

- Newly designed strut towers direct the spring and shock absorber forces into the body separately.
- The spring bears on the outer part of the strut tower. The weight of the vehicle and forces which occur during compression of the suspension produce a thrust loading on this part of the strut tower.
- Changing shear forces through the piston rod of the shock absorber act on the inner part of the strut tower.
- The inner and outer parts of the strut tower are connected together elastically.
- The advantage of such a design is that it allows individual mountings of different hardness to take the spring and shock absorber forces.
- In addition, the life of the strut tower is increased since the high spring forces are transmitted directly into the body. The shear forces which occur are not great enough to lead to premature settling of the strut tower.
- The strut towers on the rear axle are constructed on the same principle.



- |                         |   |
|-------------------------|---|
| 1 Metal                 | 4 Rubber                                |
| 2 Shock absorber forces | 5 Spring force                          |
| 3 Threaded pin          | 6 Opening for shock absorber piston rod |



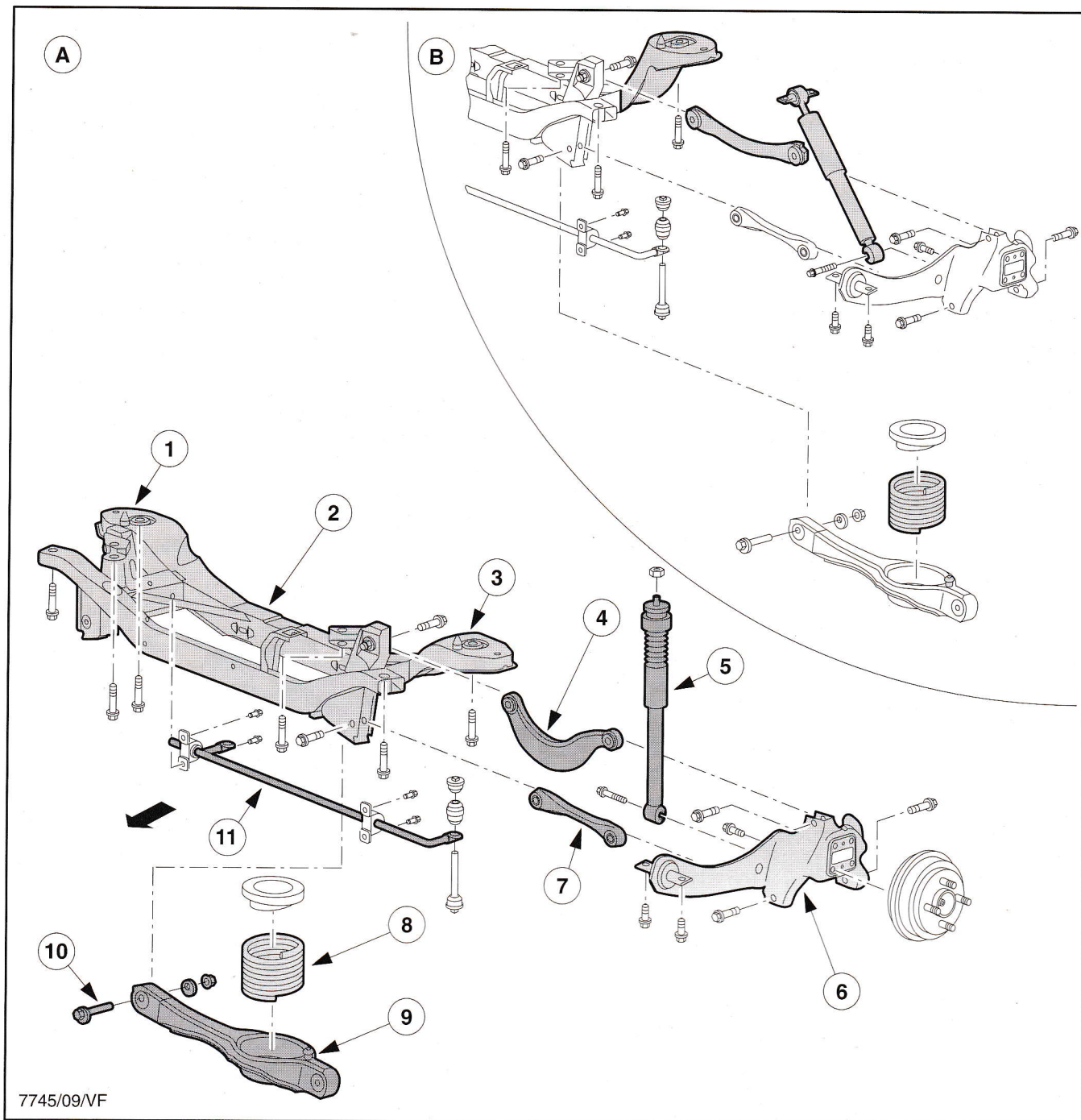
### General

- The Focus has short and long arm rear suspension of similar construction to that of the Mondeo wagon.
- The two wheels are individually suspended from an upper and two lower arms and a trailing arm. The trailing arm forms a one-piece tie-rod/wheel knuckle unit.
- The shock absorbers and springs are located separately.
- All variants have a torsion stabilizer bar with a diameter of 20 mm.
- All the components of the rear suspension are mounted on a crossmember and can be detached from the vehicle underbody as a complete assembly.
- Two different crossmembers are used due to the different floor assemblies for hatchback, notchback and wagon variants.
- The bracing inside the crossmember was introduced to optimise the oscillation and vibration characteristics of the rear axle crossmember.
- Hatchback, notchback and wagon variants are equipped with different springs. Progressive springs are used for the wagon. On the hatchback and notchback the progression is obtained through a rubber auxiliary spring on the piston rod of the shock absorber and a bump rubber on the rear lower arm.
- The upper arms on hatchback, notchback and wagon variants are also different. On the wagon straight pressed steel arms are used. The hatchback and notchback have curved forged steel arms.

**NOTE:** The rubber bushes on the arms cannot be changed. Complete new arms must always be installed.

**NOTE:** When arms are installed, the retaining bolts of the rubber bushes must only be tightened when the suspension is under normal load. If the bolts are tightened while the suspension is fully extended, the rubber bushes will be overloaded.

**NOTE:** Never reuse retaining hardware.



7745/09/VF

A Hatchback and notchback

B Wagon

1 Right-hand locating pin

2 Rear axle crossmember

3 Left-hand locating pin

4 Upper arm

5 Shock absorber

6 One-piece tie-rod/wheel knuckle

7 Front lower arm

8 Spring

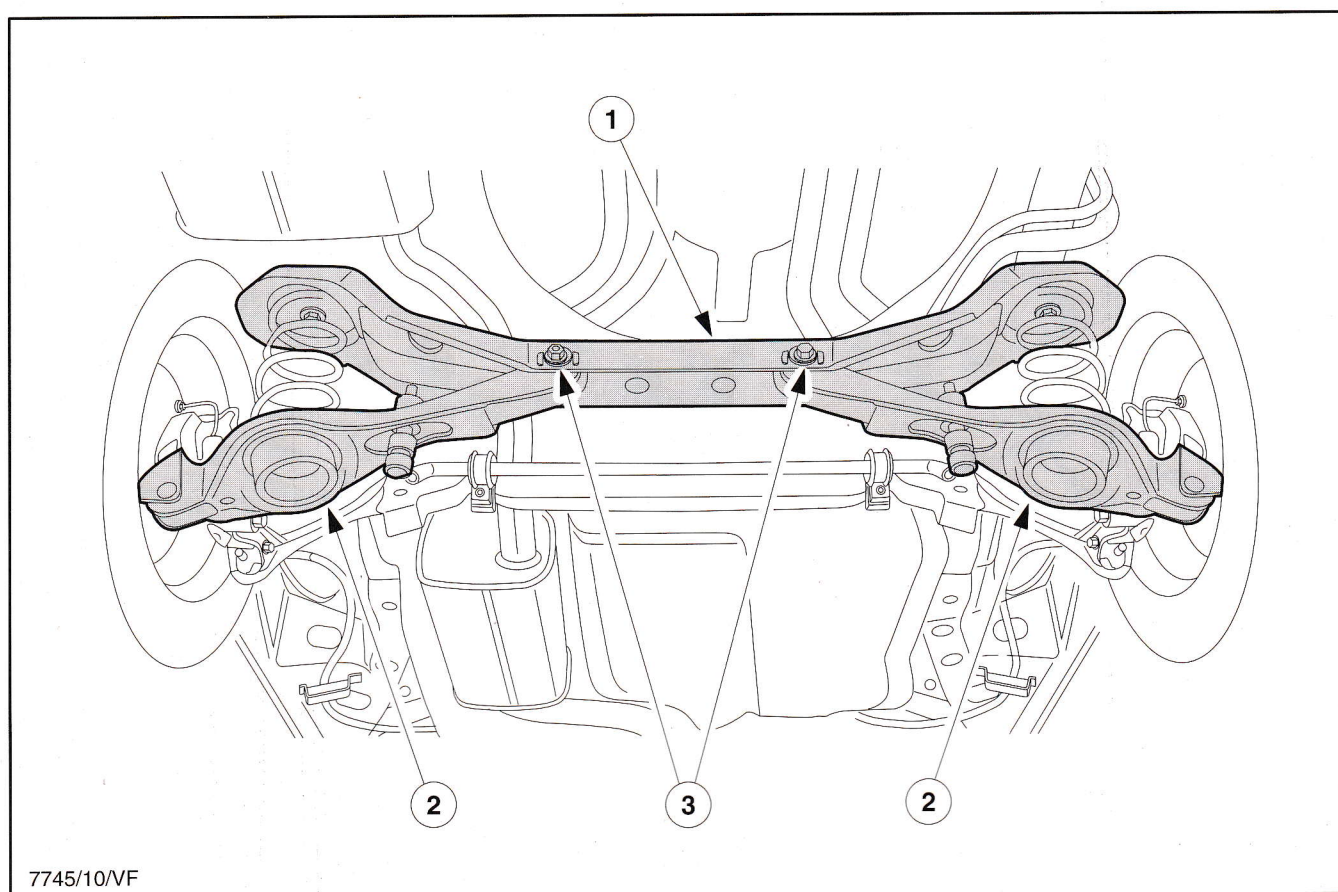
9 Rear lower arm

10 Eccentric bolt for adjusting toe setting

11 Torsion stabilizer bar

## Adjusting toe setting

- The toe setting of the rear wheels is adjusted individually on the left and right-hand sides. The value for the overall toe setting must be 3 mm +/- 1 mm toe-in.
- The setting is adjusted by turning the eccentric bolts securing the rear lower arms to the rear axle crossmember. This moves the lower arms 90 degrees to the longitudinal axis of the vehicle.
- This pivots the wheel about the outer bushings of the other two lower arms.



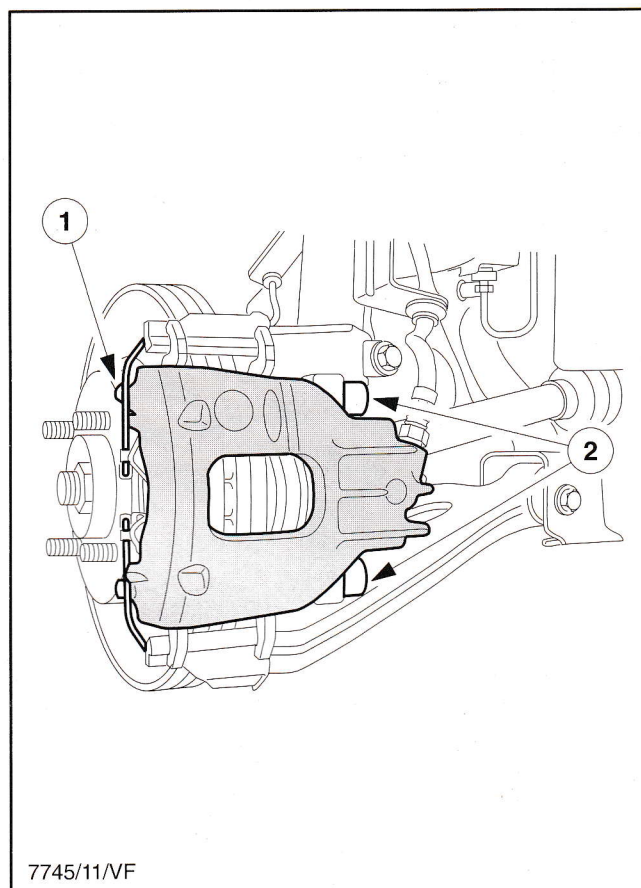
- 1 Rear axle crossmember
- 2 Rear lower arm
- 3 Eccentric bolts



### Front brakes

- Internally ventilated disc brakes with sliding calipers are used on the front axle. The diameter of the brake discs is 258 mm. The thickness is 22 mm.
- The caliper is of an integrated design with the anchor bracket incorporated with the spindle carrier casting.

**NOTE:** When installing the sliding calipers, the slide pins must be tightened to the specified torque as otherwise the threads in the wheel knuckle can be damaged.

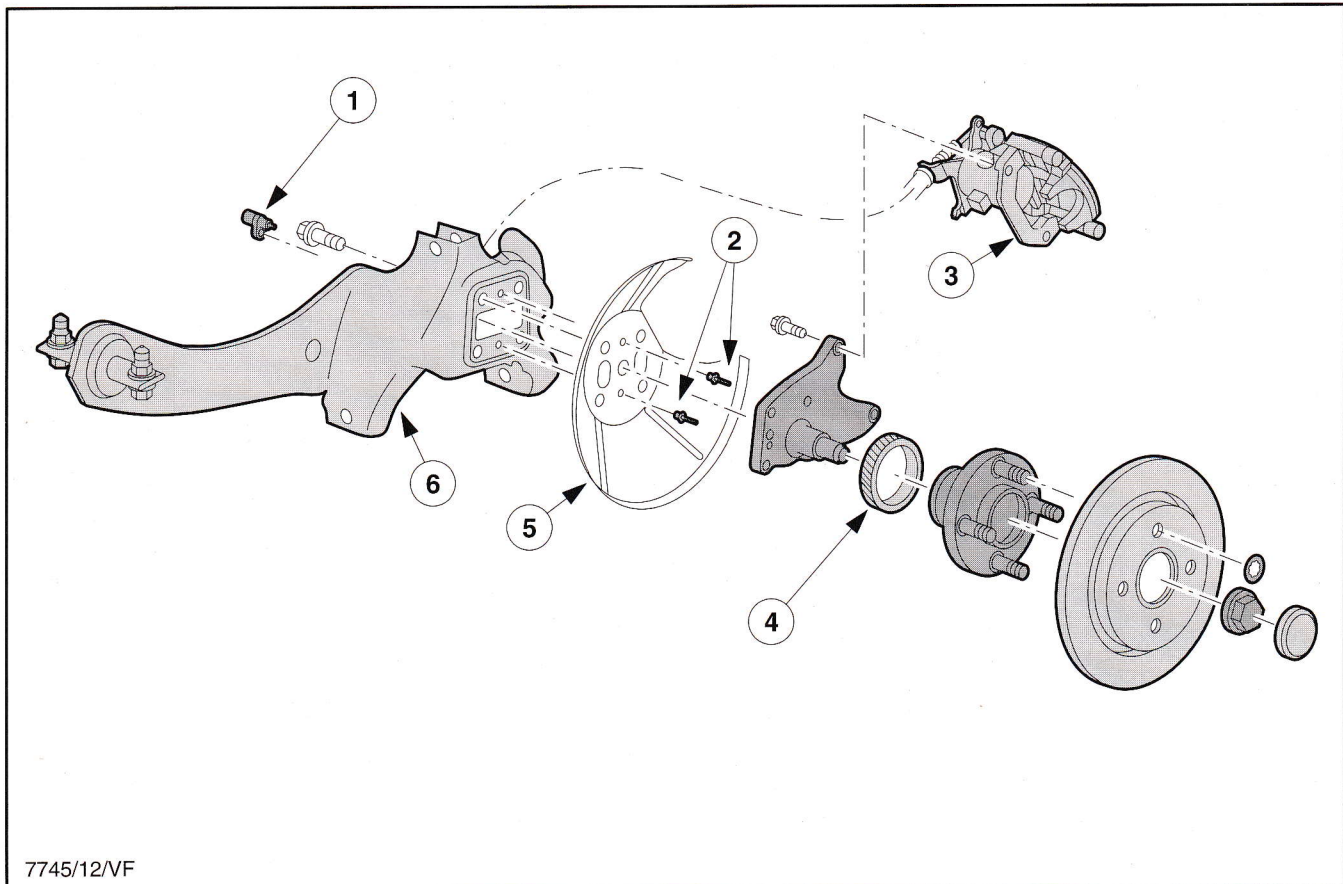


#### Front disc brake

- 1 Sliding caliper
- 2 Slide pins

## Rear brakes

- Drum brakes with a diameter of 8 inches are used as standard on the rear axle.
- Vehicles for the German market, with ESP or a 1.8L or 2.0L Zetec engine with ABS are equipped with disc brakes on the rear axle. The discs are carried over from the Scorpio (253 mm in diameter/10 mm in thickness).



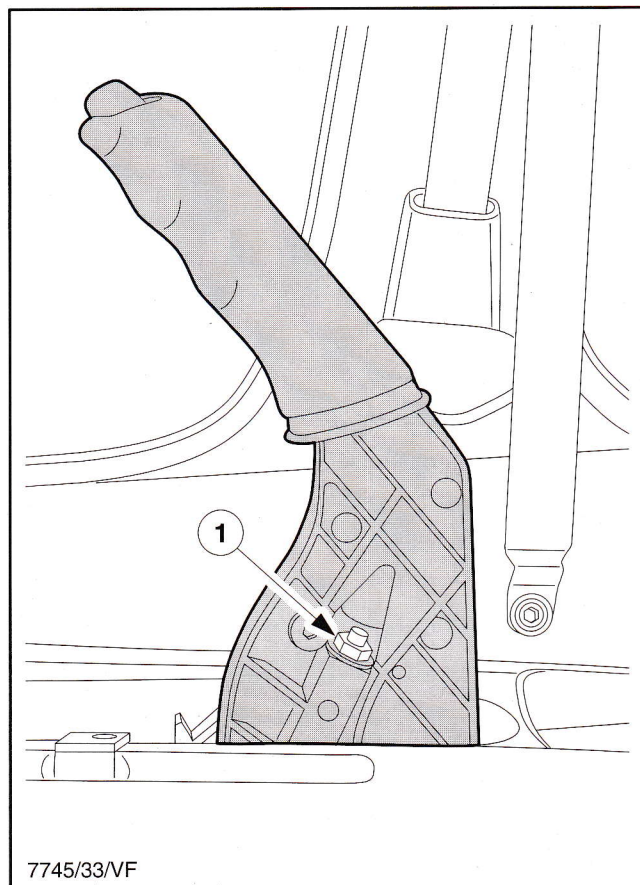
7745/12/VF

### Rear disc brake

- |   |  |
|---|--|
| 1 Wheel speed sensor  | 4 Wheel speed sensor rotor             |
| 2 Rivets for securing shield to one-piece tie-rod/wheel knuckle | 5 Shield                               |
| 3 Brake caliper   | 6 One-piece tie-rod/wheel knuckle unit |

### Parking brake

- The movement of the parking brake control lever is adjusted with the aid of an adjusting nut on the parking brake control lever.
- The adjustment process is different for drum and disc brakes. Refer to the current service literature for the precise instructions.



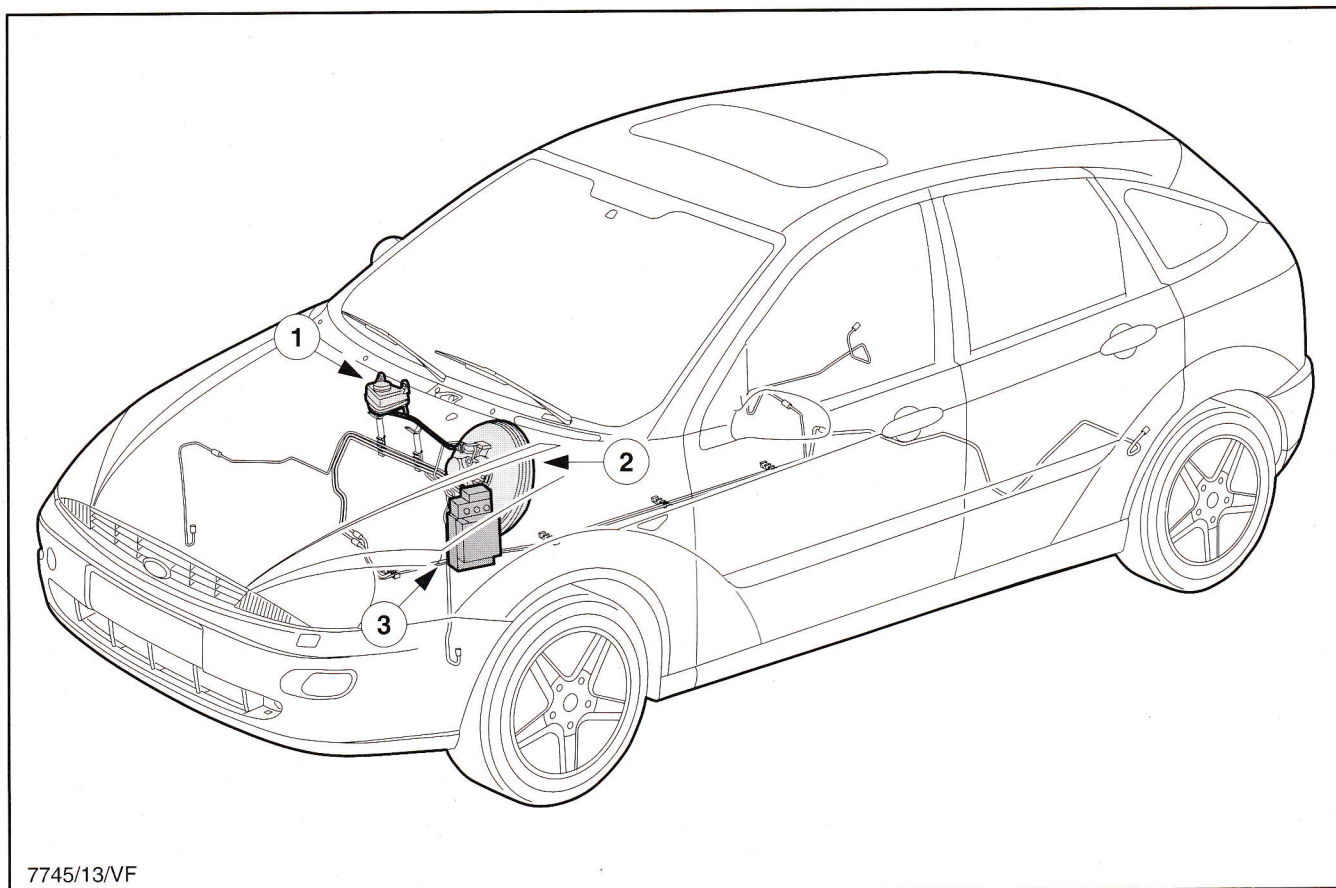
7745/33/VF

1 Adjusting nut for lever movement



## Brake hydraulics

- An ITT type MK 20E-I 4-channel anti-lock braking system is available as standard in D, DK and N (optional in other territories).
- A traction control system (TCS) is optionally available in conjunction with ABS (BTCS for 1.4L Zetec-SE and diesel).
- The electronic stability program (ESP) is also available as an option. ESP includes ABS and TCS.
- Pressure-conscious brake pressure regulating valves (PCRVs) are fitted to all 3-door, 4-door and 5-door vehicles and wagon variants with Zetec-SE engines and normal payload without ABS. They are located directly on the brake master cylinder at the connections for the rear brake tubes.
- A load apportioning valve (LAV) is used on all other wagon variants without ABS.
- All vehicles with ABS also have electronic brake force distribution (EBD). EBD supersedes the LAV as well as the PCRV.
- For reasons of space, new very short brake master cylinders are installed with a remote reservoir.



7745/13/VF

- |  |              |
|--|--------------|
| 1 Remote reservoir   | 3 ABS module |
| 2 Brake booster with brake master cylinder<br>(on the right-hand side on RHD variants) |              |

### General

- The Focus is one of the first vehicles of its class which can be equipped with an electronic stability program (ESP). It is available for the Focus with petrol engines of 1.6 liters cubic capacity or more.
- ESP is an extremely effective way of maintaining safe control even in difficult conditions.
- Various sensors monitor the intentions of the driver and the behaviour of the vehicle. When the limits of directional stability are exceeded, ESP comes into operation and brings the vehicle under control again.
- ABS ensures directional stability during braking and while accelerating through the intervention of TCS. ESP helps the driver control the vehicle while the driver is not using the brakes.
- As soon as the vehicle threatens to break away, ESP is able to keep the vehicle on line by braking individual wheels and reducing engine torque through the engine management system.

**NOTE:** When ESP intervenes, this is indicated by a flashing indicator in the instrument cluster.

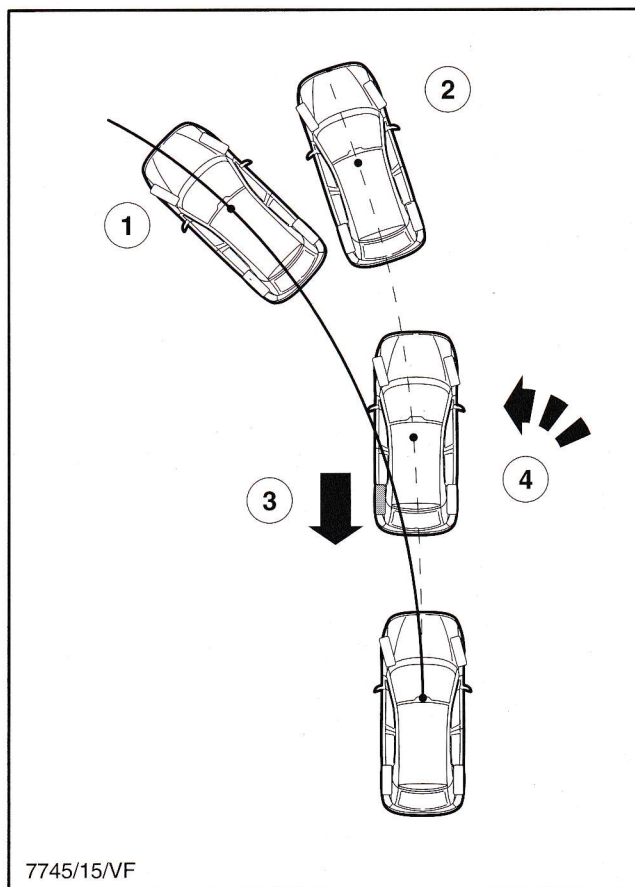
**NOTE:** If the ESP indicator is illuminated continuously, this means that ESP has been switched off with the TCS switch or there is a fault in the ESP system.

### Operation

- ESP senses the intentions of the driver through the steering wheel position sensor on the steering column and through the wheel speed sensors at the wheels.
- At the same time, the behaviour of the vehicle is monitored. This is done with the aid of sensors for the yaw rate (turning velocity about the vertical axis of the vehicle) and transverse acceleration, and also through the wheel speed sensors.
- If the vehicle starts to skid, i.e. no longer behaves according to the commands of the driver, ESP intervenes to counteract the skidding movement of the vehicle.
- For this the ESP-module with electronic control unit builds up a pressure of 130 – 180 bar within milliseconds. This pressure is directed to a particular brake cylinder by the ESP module.
- To ensure rapid pressure built up in all conditions the active brake booster, controlled by pressure sensors, applies a constant 8 bar pressure.
- Braking individual wheels produces a turning force which acts at the center of gravity of the vehicle. The vehicle is turned in a controlled manner in the direction in which the driver is steering.
- ESP is able to act on the engine management system. If need be, the engine torque can be reduced. This reduces the forces adversely affecting directional stability.
- The combined use of individual brakes and reduction of the engine torque brings the vehicle under the control of the driver again.

## Operation of ESP during understeer

- As a rule, a vehicle gets out of control either by understeering (when the front of the vehicle breaks away while cornering) or by oversteering (when the rear of the vehicle breaks away while cornering).
- As soon as the front of the vehicle breaks away to the right while negotiating a left-hand bend, ESP activates the left-hand rear wheel brake.
- This produces a counterclockwise turning force which turns the vehicle back in the direction of the bend.
- Since the front wheels have insufficient grip during understeer, ESP mostly uses the rear brakes since more grip is available here.



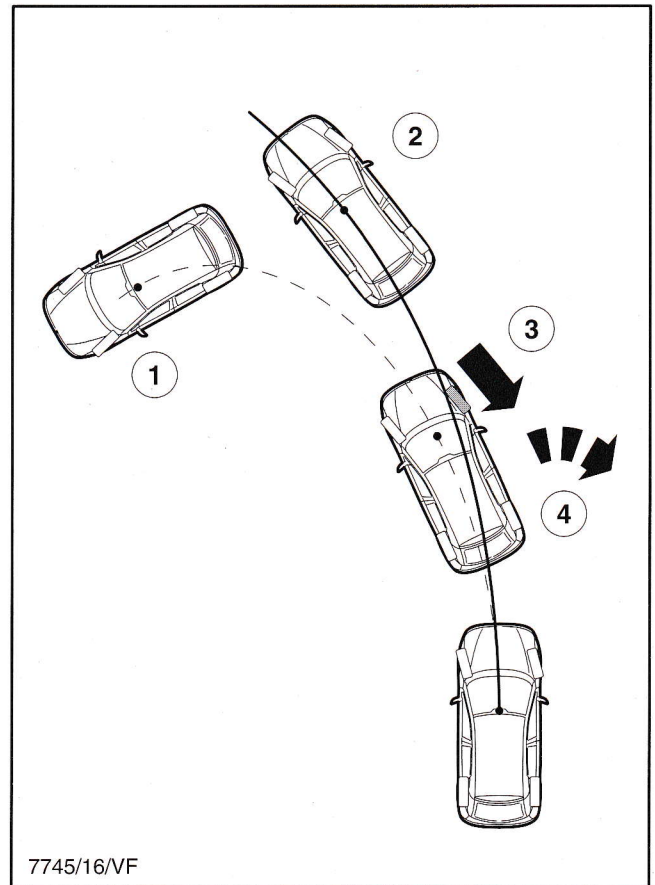
## Intervention of ESP during understeer

- 1 With ESP
- 2 Without ESP
- 3 Braking force
- 4 Balancing yaw movement



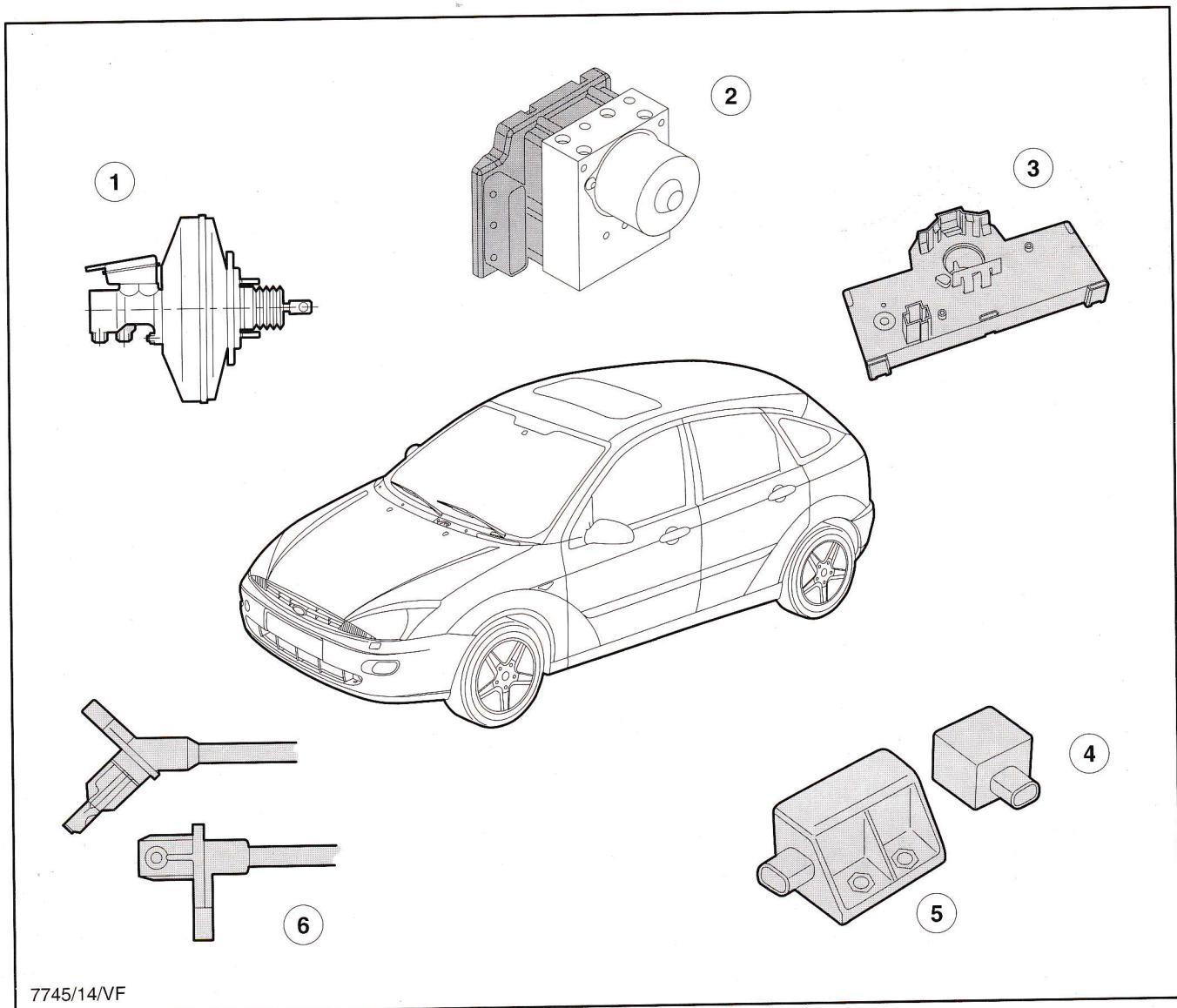
**Operation of ESP during oversteer**

- As soon as the rear of the vehicle breaks away to the right while negotiating a left-hand bend, ESP activates the right-hand front wheel brake.
- This produces a clockwise turning force which turns the vehicle back in the direction of the bend.
- Since the rear wheels have insufficient grip during oversteer, ESP mostly uses the front brakes as more grip is available here.

**Intervention of ESP during oversteer**

- 1 Without ESP
- 2 With ESP
- 3 Braking force
- 4 Balancing yaw movement

### Design

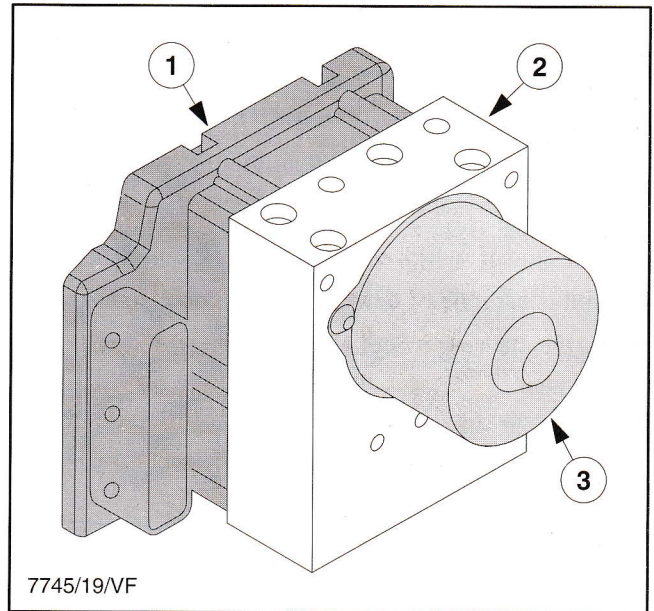


### ESP system overview

- 1 Active brake booster with pressure sensors on brake master cylinder
- 2 ESP module with electronic controller and integral ABS and TCS
- 3 Steering wheel position sensor
- 4 Sensor for lateral acceleration
- 5 Sensor for yaw rate
- 6 Wheel speed sensors

## ESP module

- The ESP module is based on the module of the type Mk 20E-I ABS with TCS. The valve block has two additional valves which allow individual braking of the rear wheels.
- The hydraulic pressure is produced by an electrically operated pump.
- The electronic control unit and the solenoids of the valves are located in the attached electronics module.
- The ESP module is in contact with the PCM through the SCP data bus.

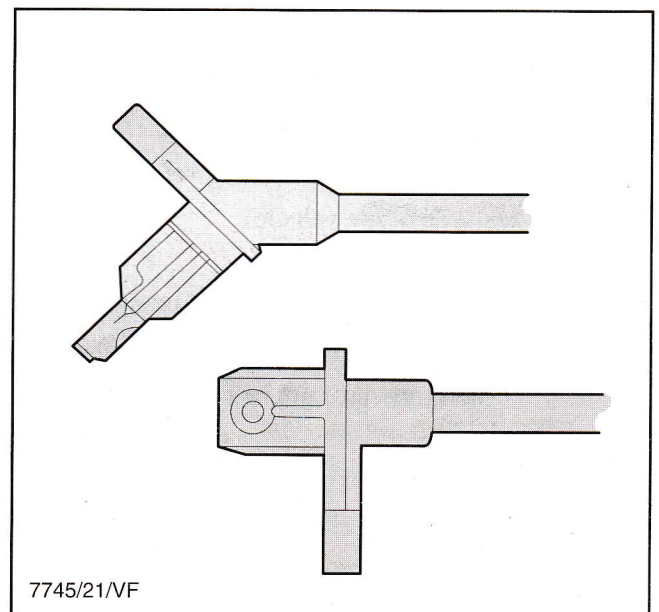


## ESP module

- 1 Attached electronics module
- 2 Valve block
- 3 Electric motor of high-pressure pump

## Wheel speed sensors

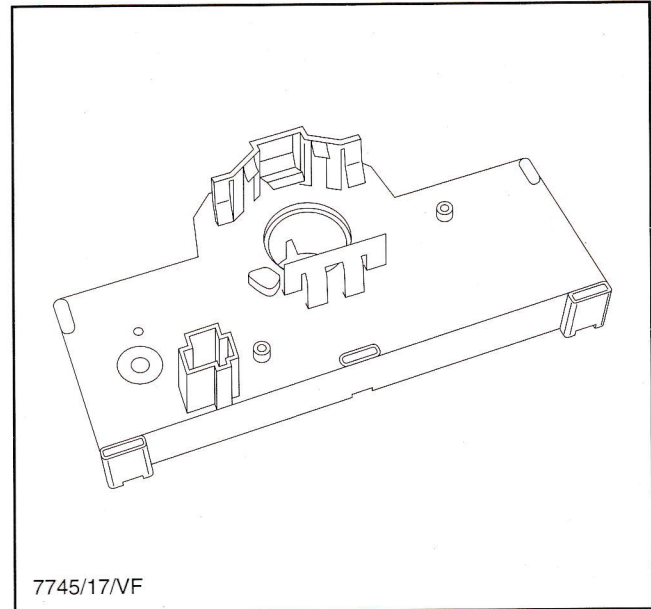
- The ESP module receives information about the individual wheel speeds from the wheel speed sensors.
- The four sensors supply the ESP module with an accurate picture of the path of the bend.





### Steering wheel position sensor

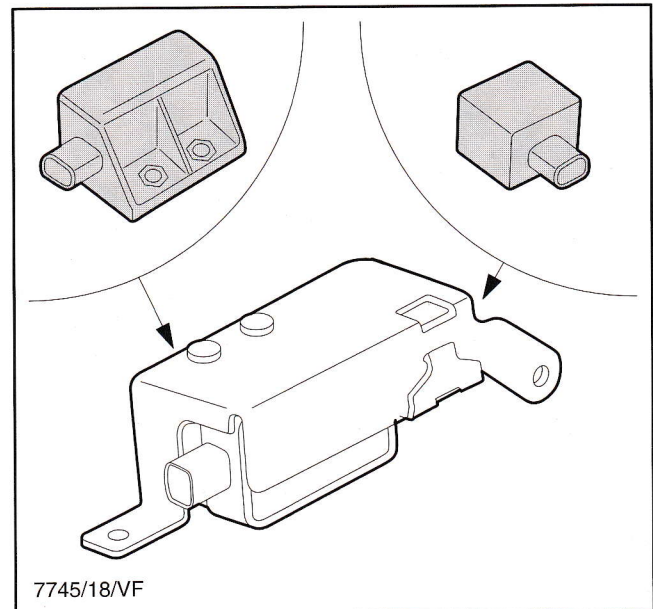
- The steering wheel position sensor tells the ESP module the direction in which the driver intends to steer.
- The sensor works on an opto-electrical principle and is capable of determining the precise angle of the steering wheel at any time.
- The working range of the sensor is 1080 degrees or three revolutions of the steering wheel.



### Sensors for lateral acceleration and yaw rate

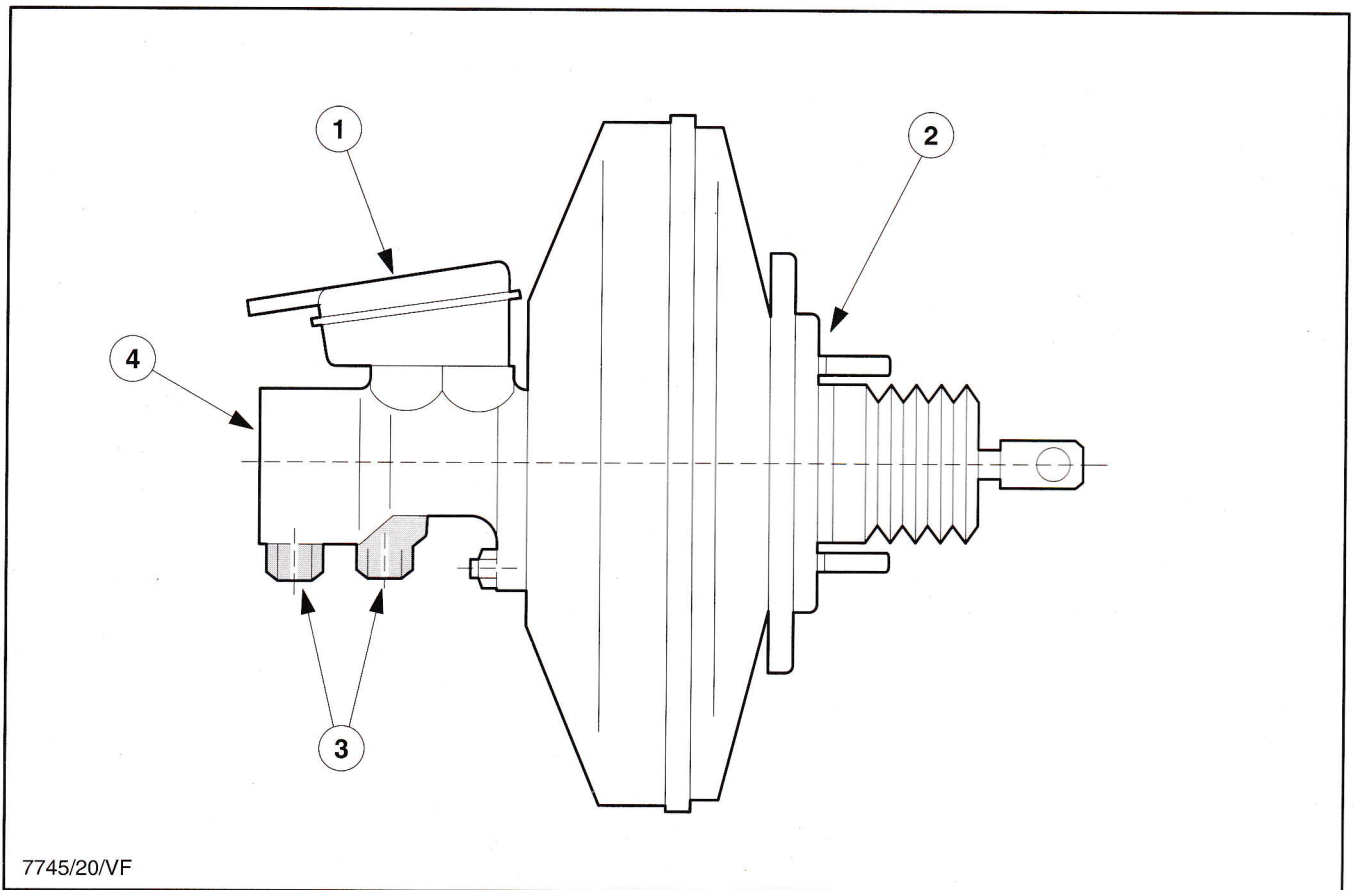
- The two sensors are mounted in a common bracket near the right-hand rocker panel.
- They supply the ESP module with signals according to the intensity of the lateral acceleration and yaw rate (turning velocity about the vertical axis of the vehicle).

**NOTE:** The position of the sensors is taken into account in the system control and therefore must not be changed.



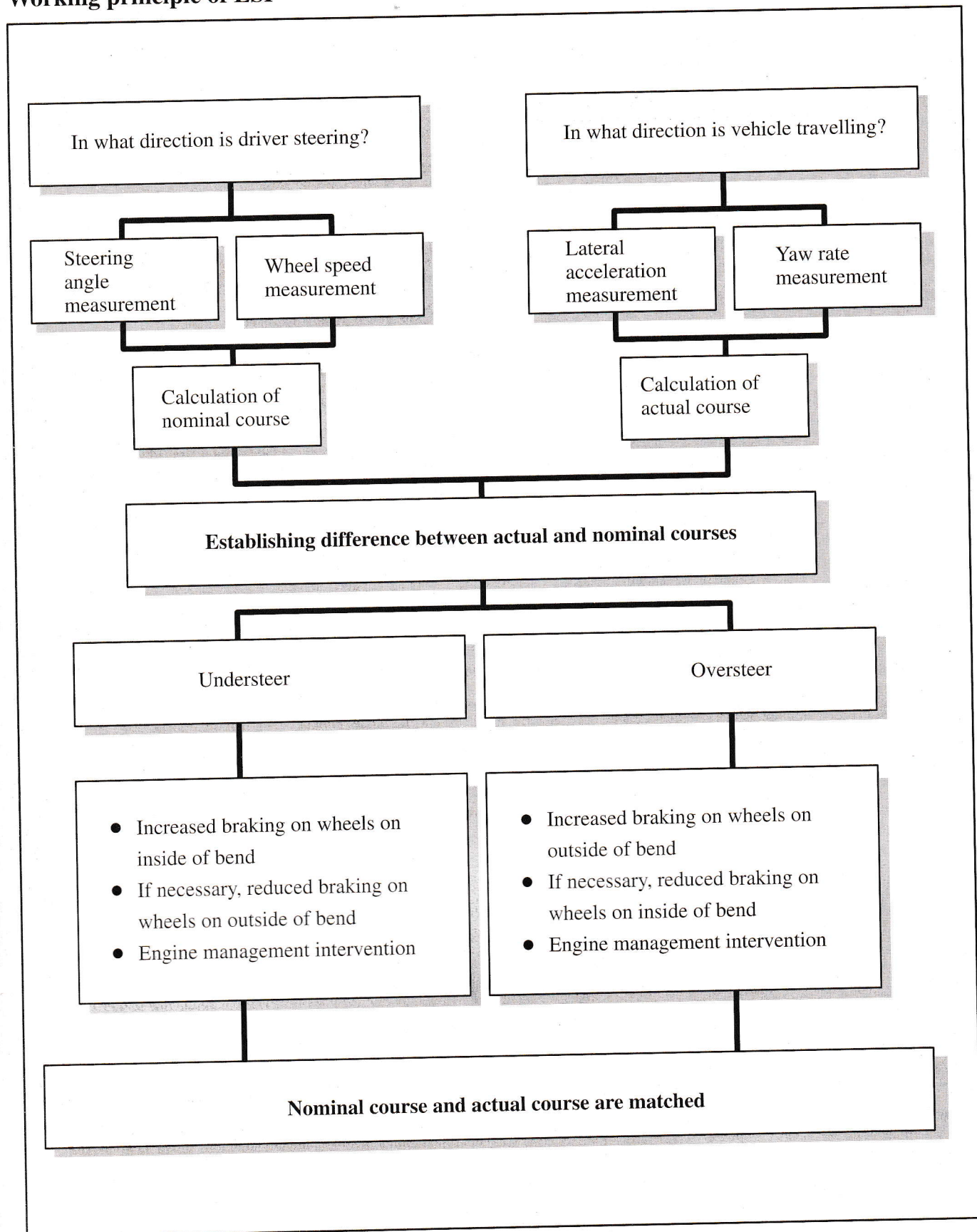
**Active brake booster**

- The brake booster incorporates the preloading booster which makes it easier for the hydraulic pump to draw in the brake fluid at low temperatures.
- As a result the system responds faster at low ambient temperatures (frost).
- On the brake master cylinder there is a pressure sensor for each of the two brake circuits. They tell the ESP module the preload pressure of both brake circuits.
- When the brakes are not being applied and the system is called upon to intervene, it must build up brake pressure on its own and if necessary request the engine management system to reduce engine torque.
- During ESP intervention with the brakes applied, it may be necessary for brake pressure to be reduced. This is achieved through the corresponding valves, as for ABS intervention.
- In this way ESP is able to intervene during braking and acceleration.

**Active brake booster**

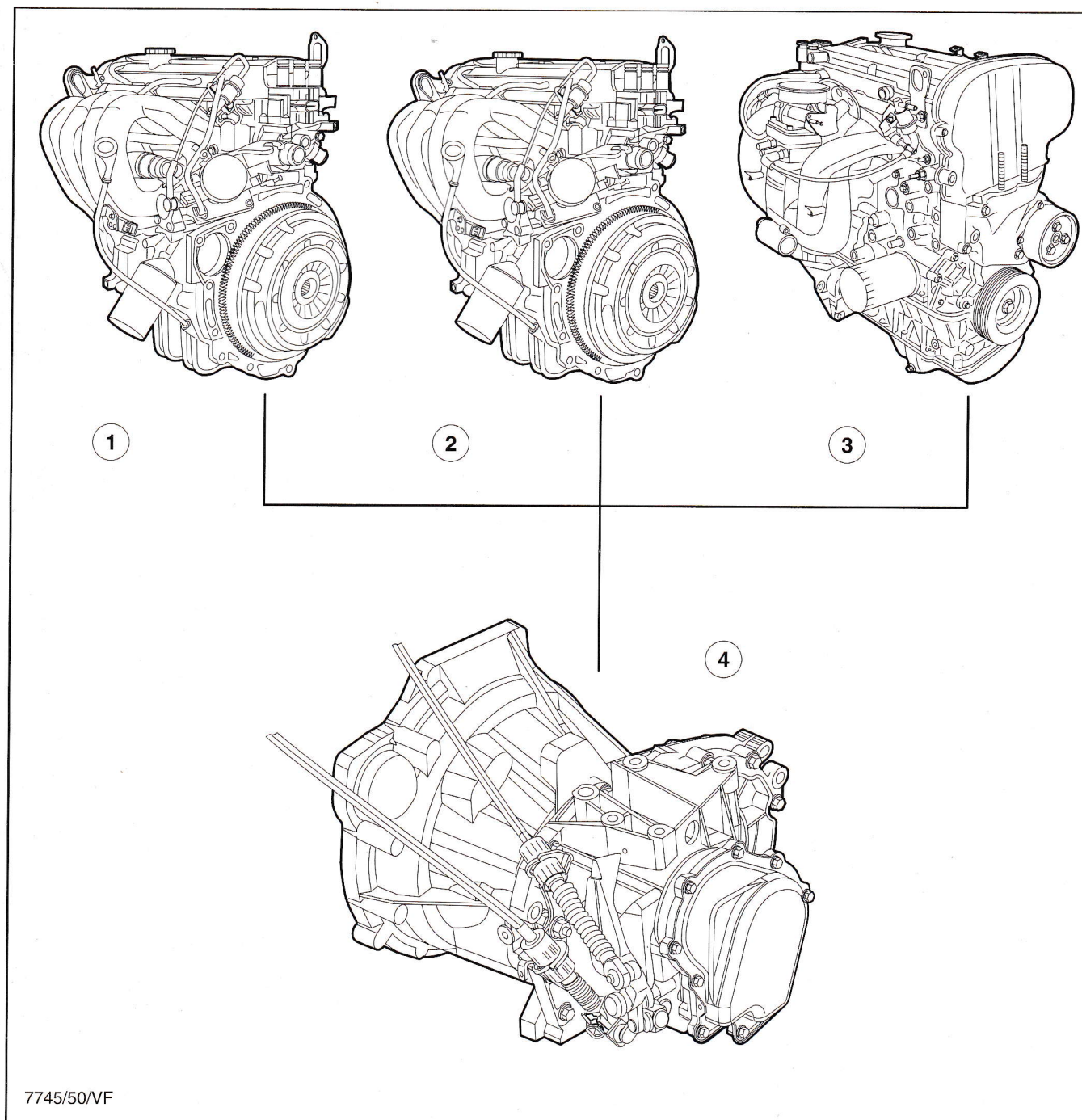
- 1 Connection for brake fluid reservoir
- 2 Integral electromagnet to actuate piston rod
- 3 Pressure sensors in brake circuits
- 4 Brake master cylinder

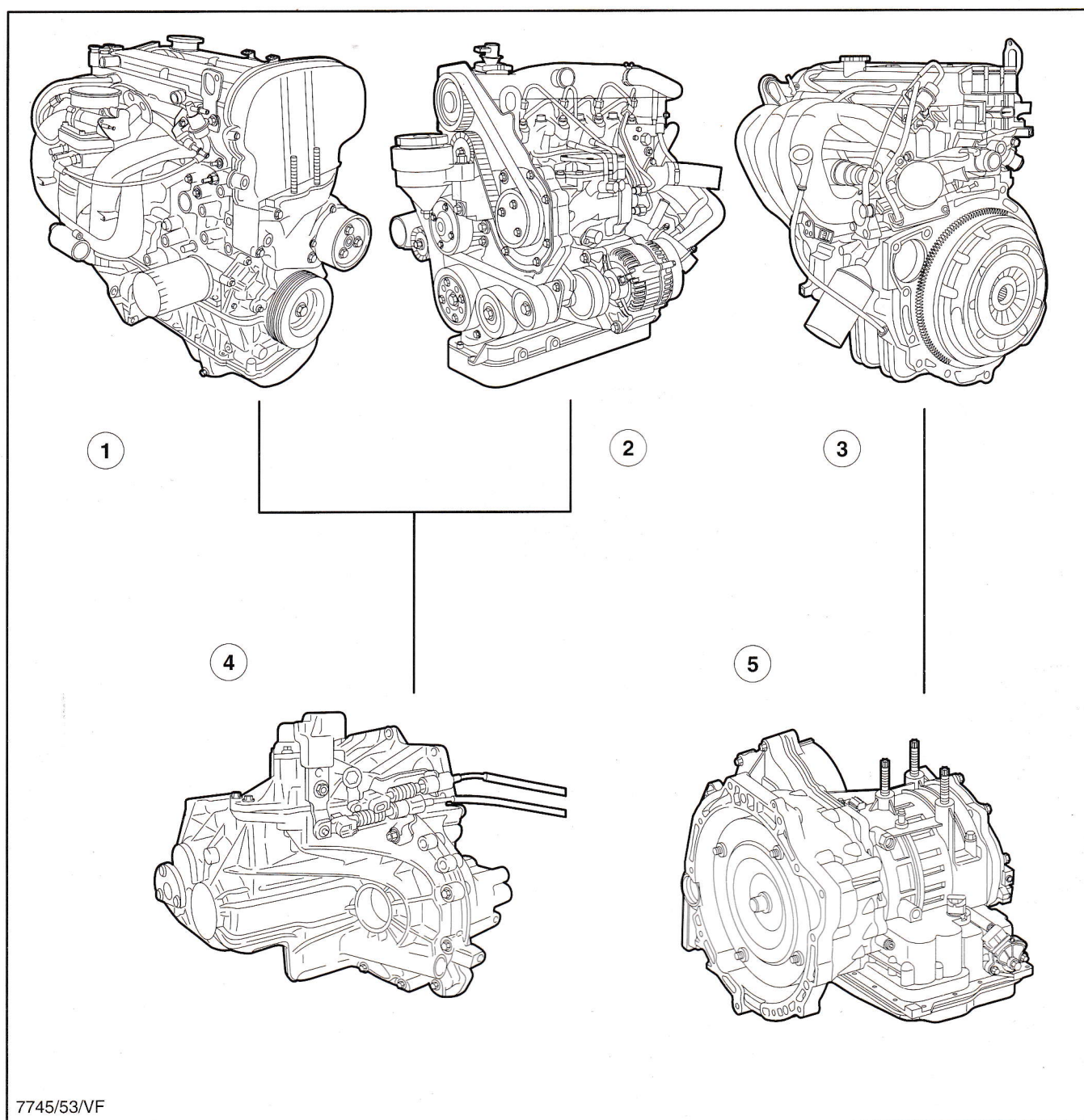
## Working principle of ESP





## Engine/transmission combinations

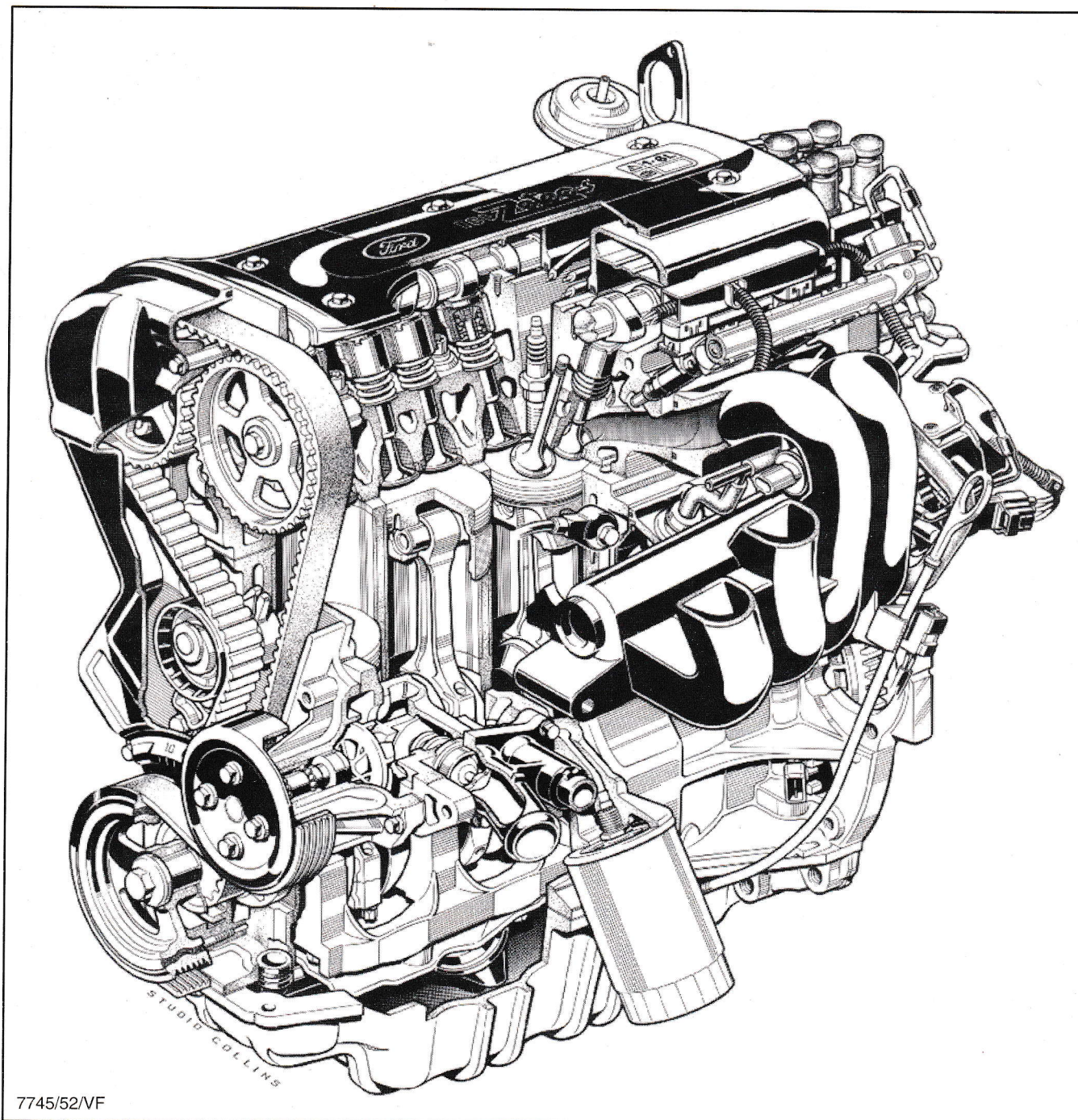




- 1 2.0L Zetec-E engine
- 2 1.8L Endura-DI engine
- 3 1.6L Zetec-SE engine

- 4 MTX-75 manual transmission
- 5 4F27E automatic transmission





1.6L Zetec-SE engine, emission level III



**Engine**

- Transversely installed 16-valve DOHC engines:
  - 1.4 l cubic capacity developing 55 kW (75 PS)
  - 1.6 l cubic capacity developing 75 kW (100 PS)
- Valve gear with mechanical bucket tappets
- Compression ratio of both engines 11.0 : 1
- Aluminium alloy cylinder block and head

**Engine management**

- EEC V engine management
- Sequential multiport fuel injection (SFI) through 4-hole fuel injectors with a vertical fuel inlet
- Mass air flow (MAF) sensor with integral intake air temperature (IAT) sensor in a new plastic housing
- Knock control
- Cylinder head temperature (CHT) sensor to measure engine operating temperature
- PCM-controlled alternator

**Emission control**

- 94/12/EC ('96 EEC emission standard) without exhaust gas recirculation (EGR)
- Evaporative emission (EVAP) management system
- 3-way catalytic converter and Lambda control
- 1.6L engine combined with 4F27E automatic transmission meeting emission Stage III with exhaust gas recirculation (EGR) and an additional downstream heated oxygen sensor

**Diagnosis and testing**

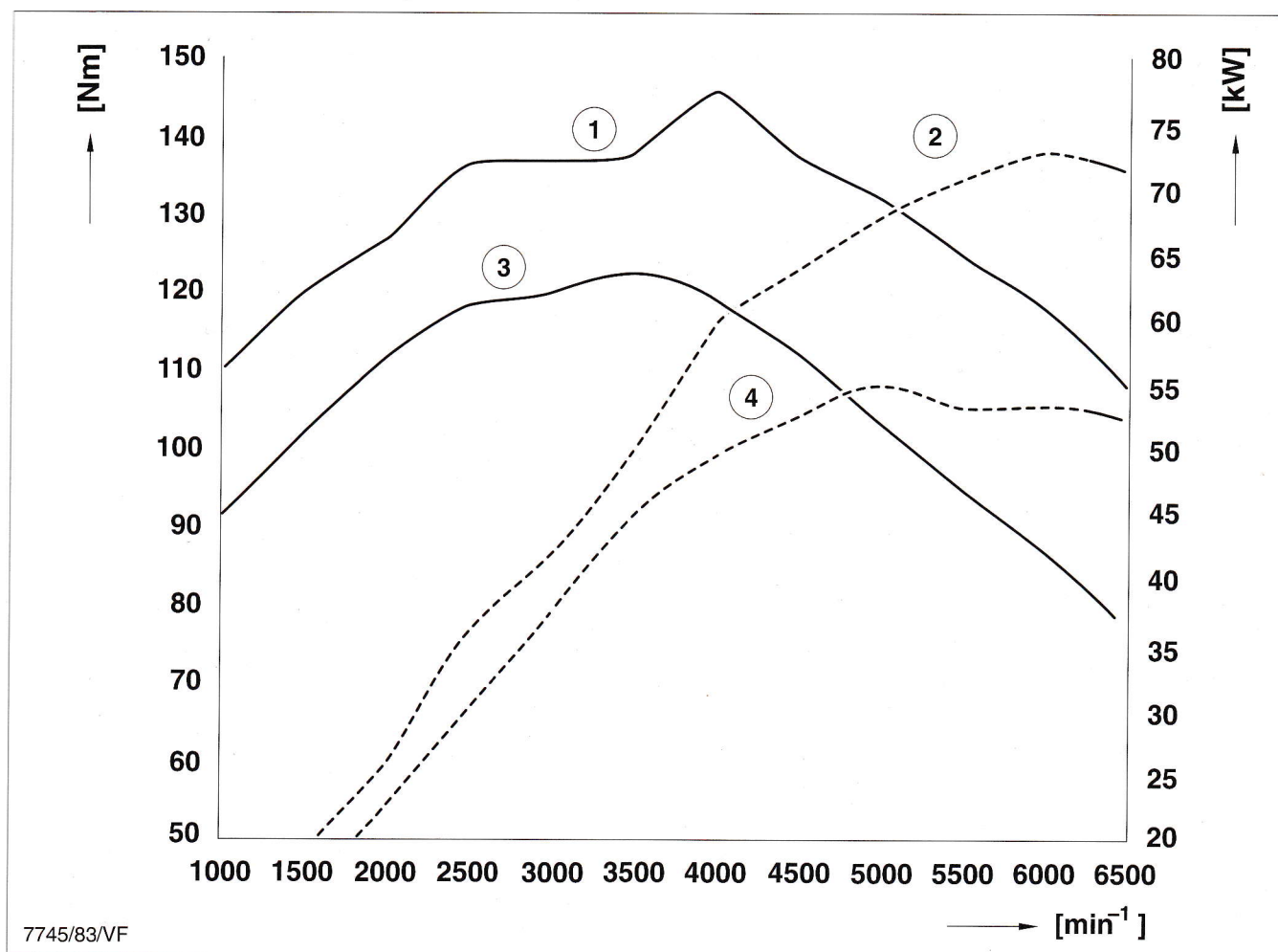
- Diagnosis and testing through data link connector (DLC) in the passenger compartment

- The 1.4L and 1.6L engines used in the Focus come from the range of Zetec-SE engines used in the Fiesta and the Puma.
- In its dimensions the 1.4L Zetec-SE engine is the same as the 1.4L Zetec-SE engine used in the Fiesta and the Puma. However, for the Focus the engine power output has been reduced to 55 kW (75 PS) and the torque adjusted to the specific requirements.

### **Modifications**

- The following modifications have been made to the Zetec-SE engine range:
  - changed plastic oil intake pipe
  - increased oil fill capacity for the 1.6L Zetec-SE engine
  - changed cylinder head gasket
  - increased exhaust valve clearance for the 1.6L Zetec-SE engine
  - right-hand engine mounting with integral engine lifting eye and integral generator bracket (one component)
  - knock control by means of knock sensor (KS)
  - changed fuel rail with vertical fuel inlet
  - cylinder head temperature (CHT) sensor in place of the engine coolant temperature (ECT) sensor to measure the engine operating temperature
  - modified coolant outlet housing due to the elimination of the ECT sensor and the coolant temperature gauge sender unit
  - no EGR system needed to meet the current exhaust emission standard
  - plastic throttle housing with changed TP sensor
  - mass air flow (MAF) sensor in plastic housing with integral intake air temperature (IAT) sensor

## Engine power output and torque



1 Torque – 1.6L Zetec-SE engine

2 Power output – 1.6L Zetec-SE engine

3 Torque – 1.4L Zetec-SE engine

4 Power output – 1.4L Zetec-SE engine

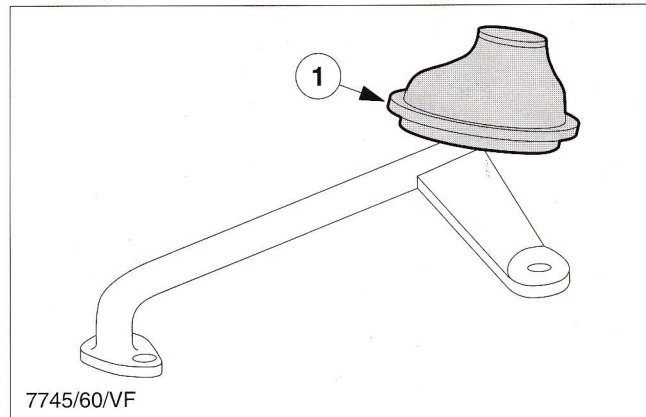
## Technical data

	1.4L Zetec-SE	1.6L Zetec-SE
Cubic capacity	1388 cc	1596 cc
Stroke	76.5 mm	81.4 mm
Bore	76.0 mm	79.0 mm
Compression ratio	11.0 : 1	11.0 : 1
Max. power output	55 kW (75 PS) at 5000 rpm	74 kW (100 PS) at 6000 rpm
Max. torque	123 Nm at 3500 rpm	145 Nm at 4000 rpm



### Oil intake pipe

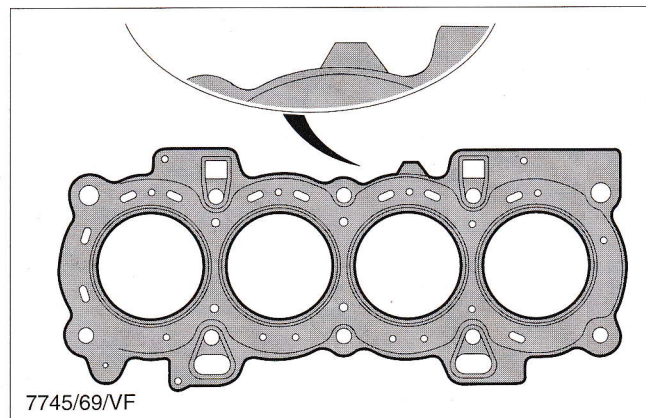
- The oil intake pipe is made of plastic.
- There are tiny differences between the oil intake pipes of the 1.4L and the 1.6L Zetec-SE engines. They can be distinguished by their color coding:
  - 1.4L Zetec-SE engine: beige screen housing
  - 1.6L Zetec-SE engine: black screen housing



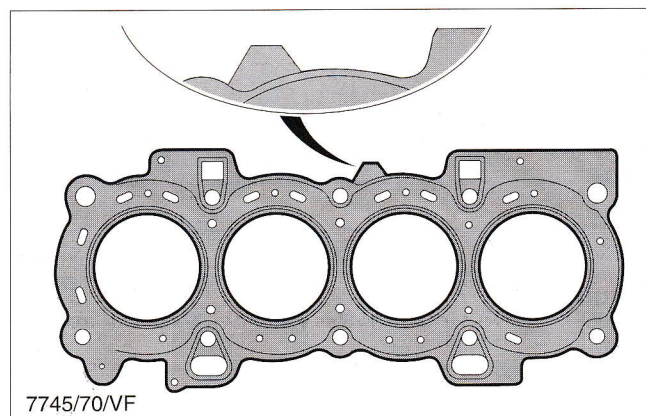
1 Screen housing

### Cylinder head gasket

- The cylinder head gasket is a two-layer steel gasket.
- The gaskets for the two engines are distinguished by trapezoidal projections on the right-hand upper edge. The projection on the gasket for the 1.4L engine is located further to the right and that of the 1.6L engine further to the middle.



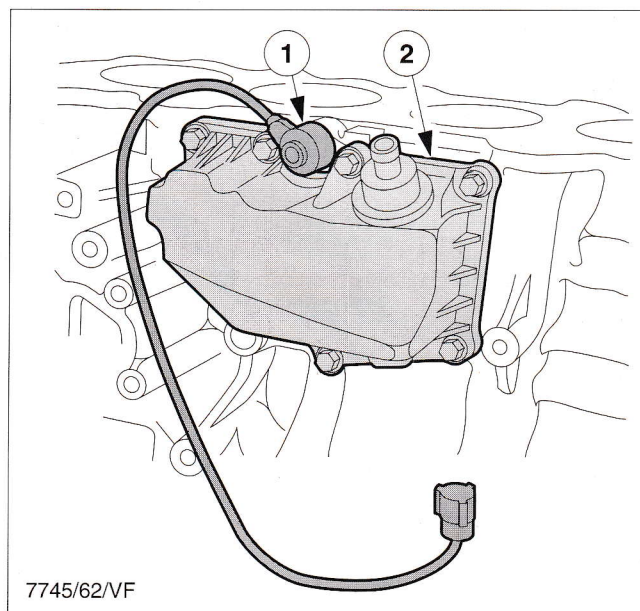
1.4L Zetec-SE



1.6L Zetec-SE

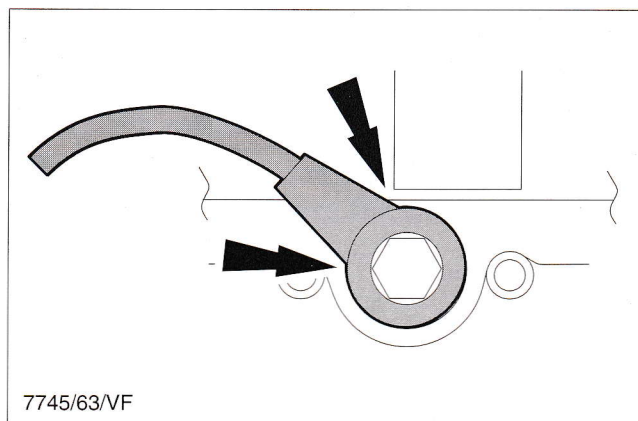
### Knock sensor (KS)

- Both the Zetec-SE engines used in the Focus have a knock control system.
- The KS is screwed to the cylinder block. It is seated in a pocket in the crankcase ventilation system.



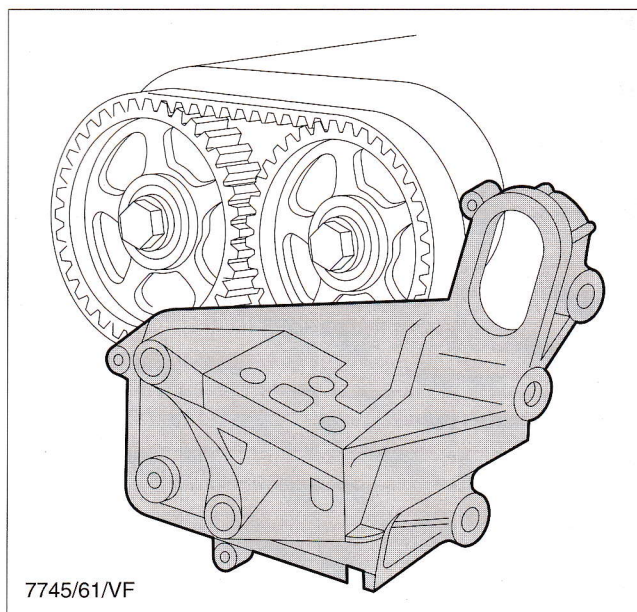
- 1 Knock sensor
- 2 Crankcase ventilation system

**NOTE:** The KS must never come into contact with the cylinder head or the crankcase ventilation system.



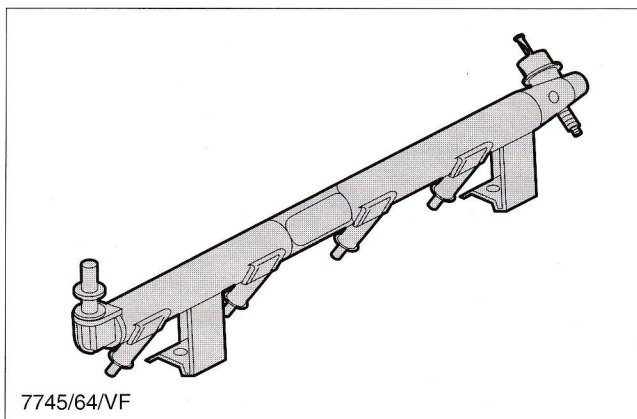
### Right-hand engine mounting

- The engine lifting eye and the generator bracket are incorporated in the right-hand engine mounting.



### Fuel rail

- The fuel rail is designed for a vertical fuel inlet.
- The fuel injectors are 4-hole fuel injectors.



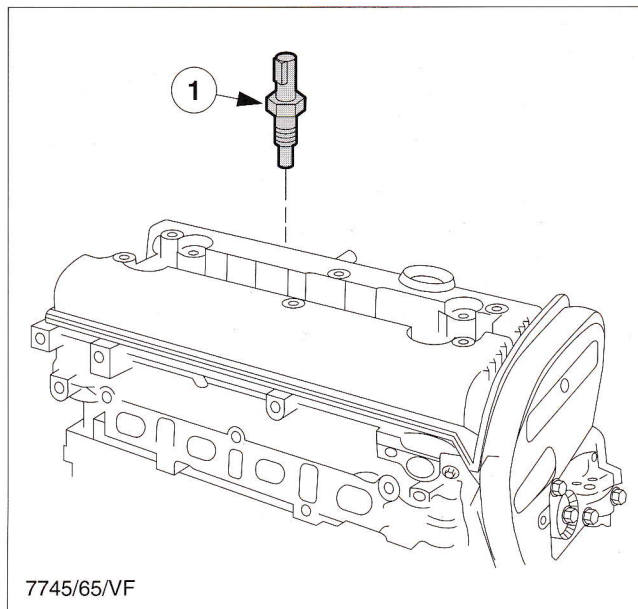


**Cylinder head temperature (CHT) sensor**

- The CHT sensor measures the temperature of the cylinder head directly. This eliminates the need for an engine coolant temperature (ECT) sensor.
- The CHT sensor is screwed into the cylinder head next to the spark plug of cylinder No. 3.

**NOTE:** Since the cylinder head temperature is measured through the mating face with the cylinder head and this mating face is deformed when the sensor is screwed in, the sensor must not be reused, otherwise the result would be incorrect temperature measurement and malfunctions in the engine management.

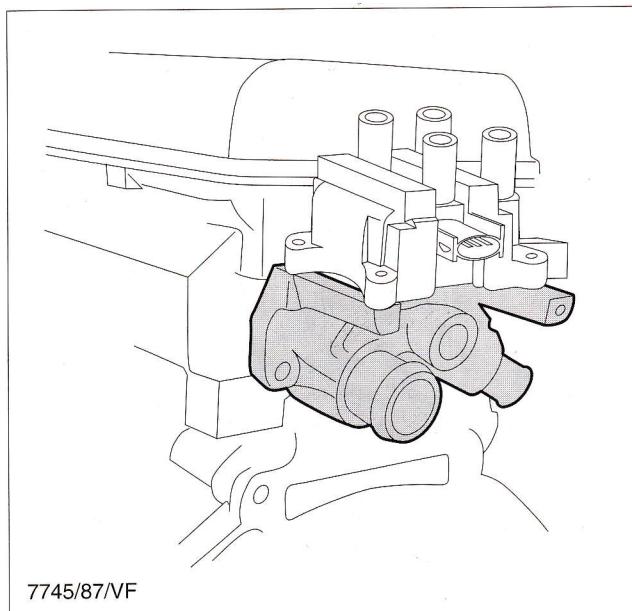
**NOTE:** The blind hole for the CHT sensor must be clean and dry before a new sensor is installed.



1 CHT sensor

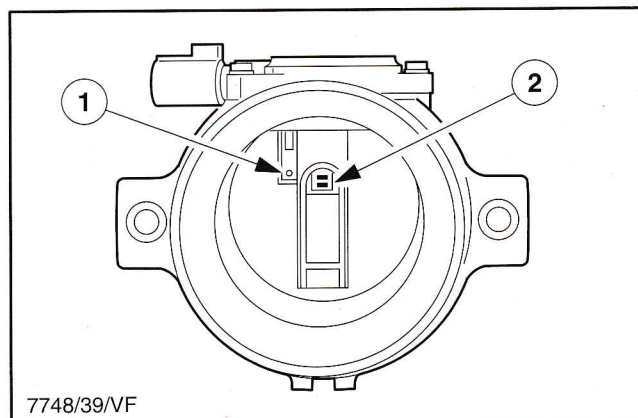
### Coolant outlet housing

- The coolant outlet housing was modified by eliminating the engine coolant temperature (ECT) sensor and the coolant temperature gauge sender unit.



### Mass air flow (MAF) sensor with integral intake air temperature (IAT) sensor

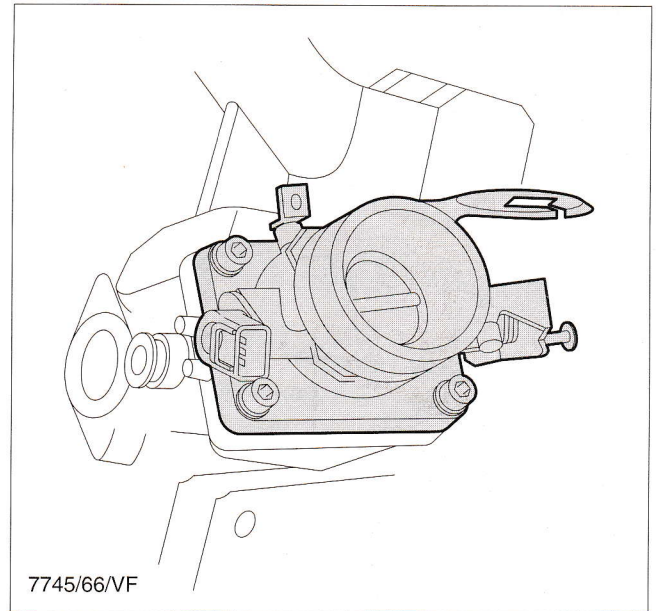
- The housing of the MAF sensor is made of plastic.
- The IAT sensor is now incorporated in the MAF sensor.



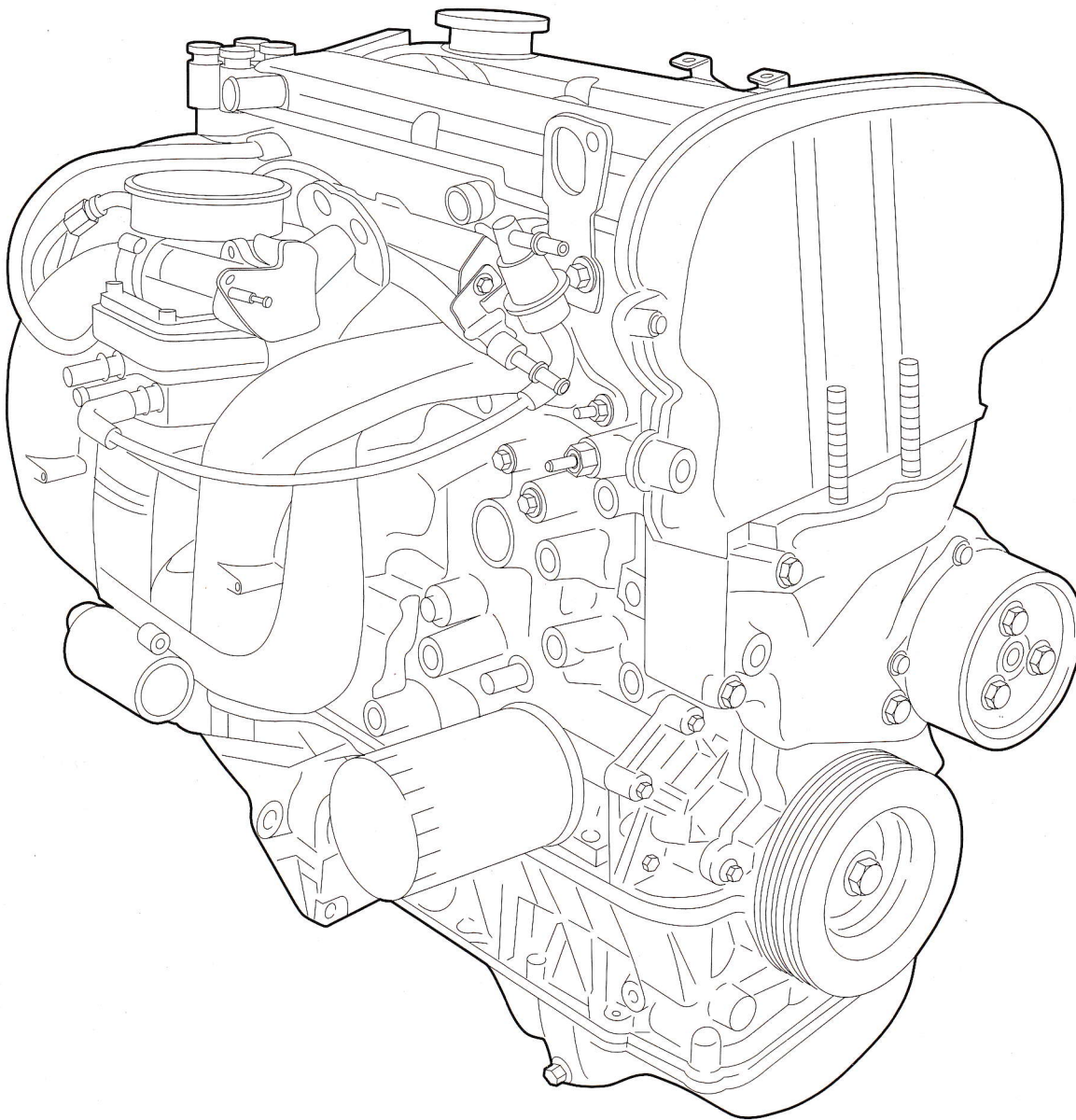
- 1 IAT sensor
- 2 MAF sensor

### Throttle body

- The throttle body is made of plastic.
- The TP sensor has been changed but it operates in exactly the same way as its predecessor.







7745/59/VF

**Engine**

- Transversely installed 16-valve DOHC engines:
  - 1.8 l cubic capacity developing 85 kW (115 PS)
  - 2.0 l cubic capacity developing 97 kW (130 PS)
- Valve gear with mechanical bucket tappets
- Compression ratio of both engines 10.0 : 1
- Aluminium alloy cylinder head and crankcase reinforcement

**Engine management**

- EEC V engine management
- Sequential multiport fuel injection (SFI) through 4-hole injectors with a vertical fuel inlet
- Mass air flow (MAF) sensor with integral intake air temperature (IAT) sensor in a new plastic housing
- Plastic throttle housing with progressive venturi
- Cylinder head temperature (CHT) sensor for measuring the engine operating temperature
- PCM-controlled alternator

**Emission control**

- 94/12/EC ('96 EEC exhaust emission standard) without exhaust gas recirculation (EGR)
- 3-way catalytic converter and Lambda control
- Evaporative emission (EVAP) management system

**Diagnosis and testing**

- Diagnosis and testing through the data link connector (DLC) in the passenger compartment

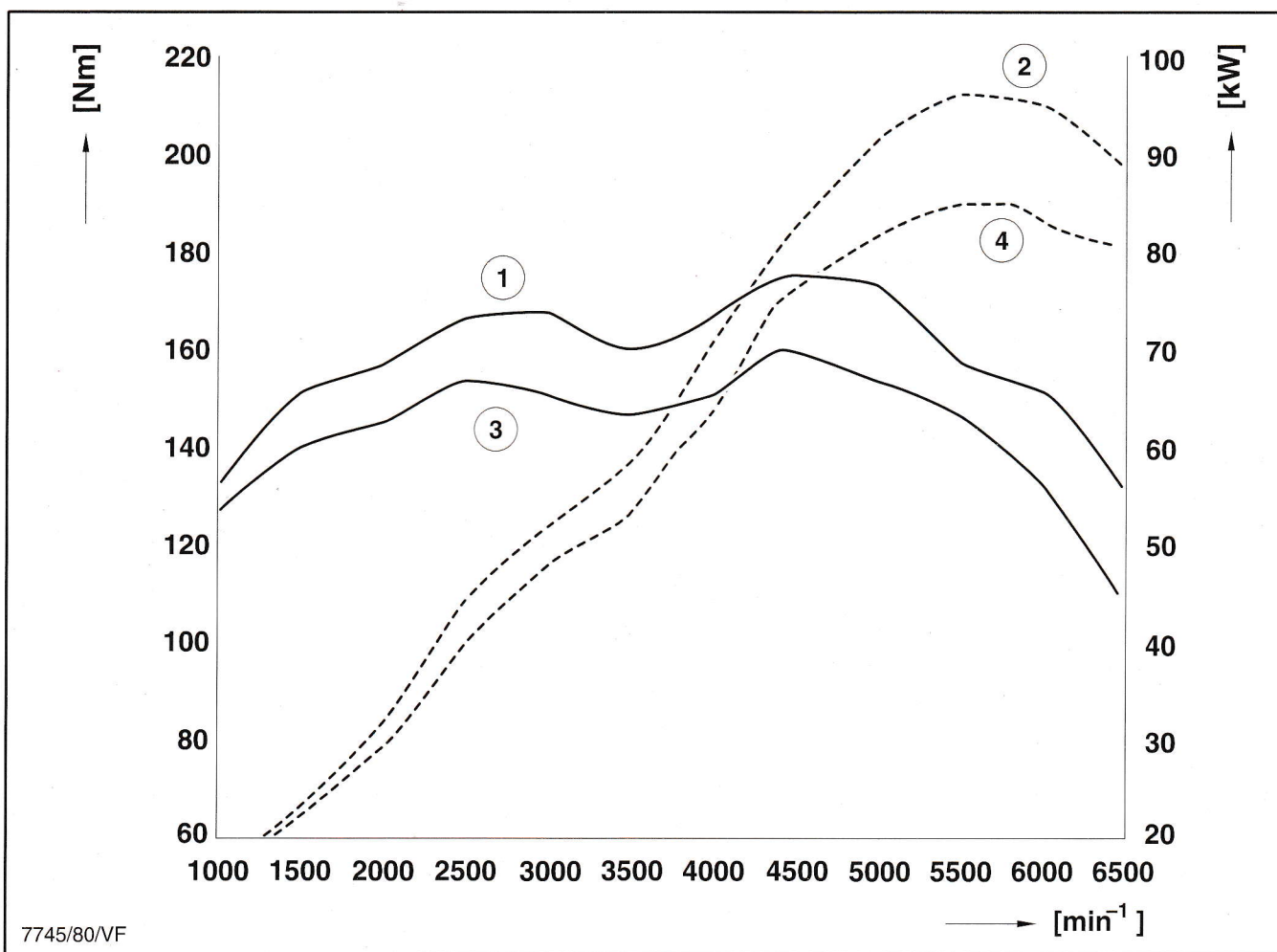
- The Zetec-E engines used in the Focus come from the “Zetec Upgrade” engine range introduced in the Mondeo and Cougar.
- The 1.8L and 2.0L Zetec-E engines are used in the Focus.

**Modifications**

- The following modifications have been made compared to the engines used in the Mondeo and the Cougar:
  - changed oil pan
  - changed oil intake pipe
  - close-coupled tri-metal catalytic converter
  - changed exhaust manifold
  - changed intake manifold
  - no EGR system needed to meet the current exhaust emission standard
  - changed throttle body
  - use of a cylinder head temperature (CHT) sensor in place of an engine coolant temperature (ECT) sensor
  - modified thermostat housing due to elimination of the ECT sensor and the coolant temperature gauge sender unit



## Engine power output and torque



1 Torque – 2.0L Zetec-E engine

3 Torque – 1.8L Zetec-E engine

2 Power output – 2.0L Zetec-E engine

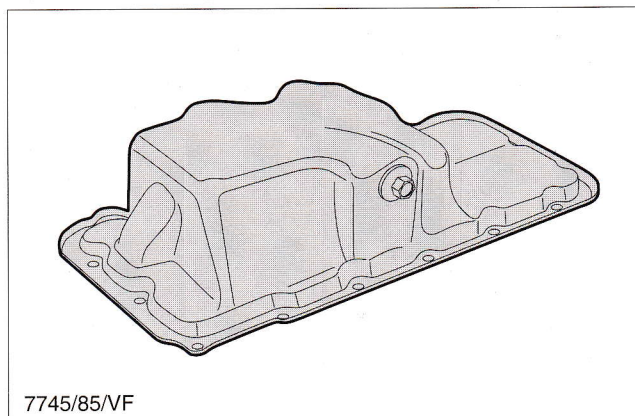
4 Power output – 1.8L Zetec-E engine

## Technical data

	1.8L Zetec-E	2.0L Zetec-E
Cubic capacity	1796 cc	1989 cc
Stroke	88.0 mm	88.0 mm
Bore	80.6 mm	84.8 mm
Compression ratio	10.0 : 1	10.0 : 1
Max. power output	85 kW (115 PS) at 5500 rpm	96 kW (130 PS) at 5500 rpm
Max. torque	160 Nm at 4400 rpm	178 Nm at 4500 rpm

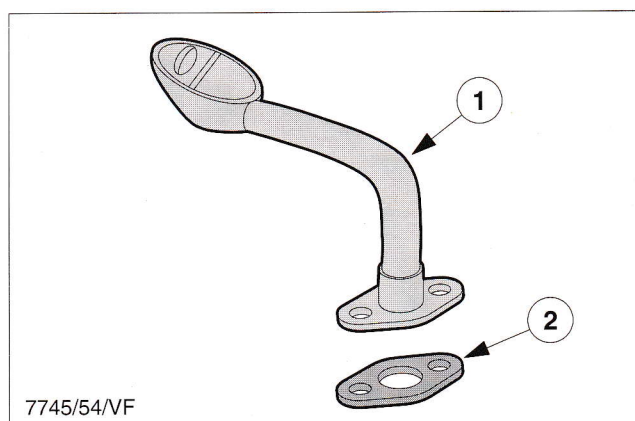
### Oil pan

- The oil pan was adapted to the Focus engine compartment and the position of the exhaust system.



### Oil intake pipe

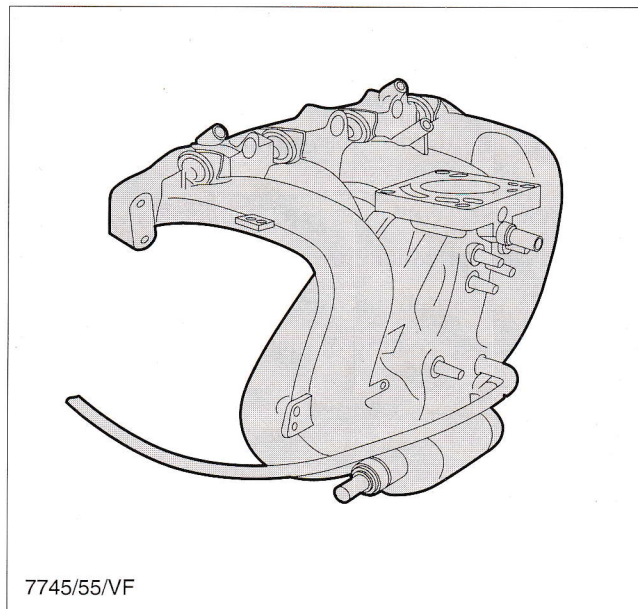
- The oil intake pipe on the Zetec-E engines is made of metal. The design was changed due to the angling of the engine in the Focus.



- 1 Oil intake pipe
- 2 Gasket

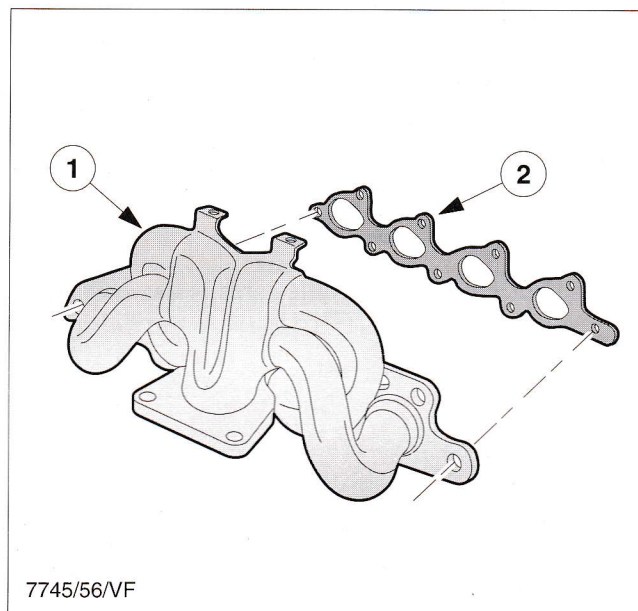
### Intake manifold

- The intake manifold was adapted to the requirements of the Focus.
- An EGR system is not required in the Focus to meet the current exhaust emission standard.



### Exhaust manifold

- The exhaust manifold was adapted to the requirements of the Focus as regards position and connection of the catalytic converter.
- A single-layer steel gasket is used.

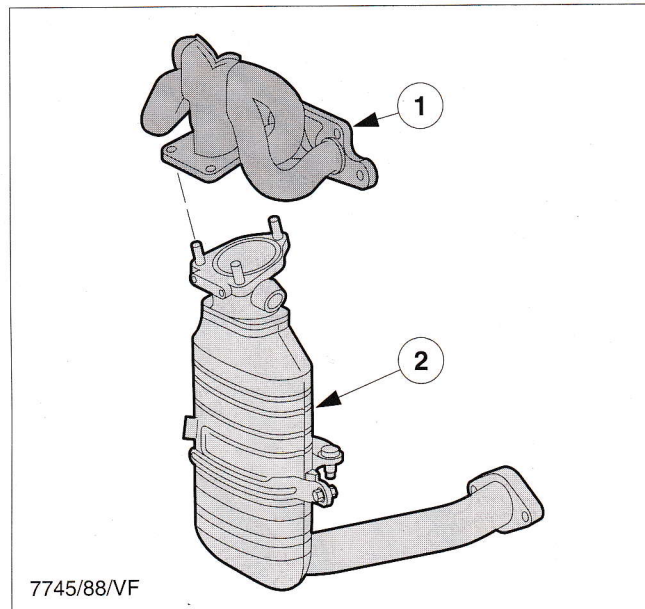


- 1 Exhaust manifold
- 2 Single-layer steel gasket



### Catalytic converter

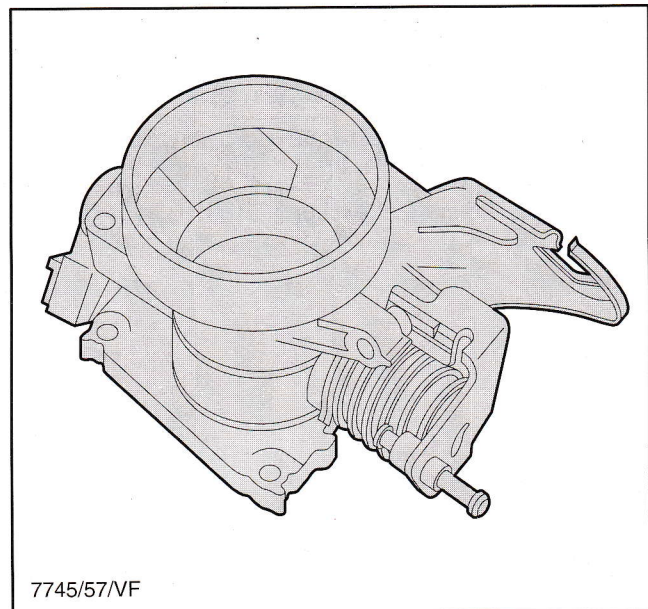
- The catalytic converter is coupled directly to the exhaust manifold so that it warms up quickly.
- The catalytic converter is a “tri-metal catalytic converter” in which the catalytic conversion process is carried out using palladium in addition to the normal coating of platinum and rhodium.



- 1 Exhaust manifold
- 2 Catalytic converter

### Throttle body

- The throttle body is made of plastic.
- It has a progressive venturi.
- The bracket for the throttle cable is incorporated in the throttle body.

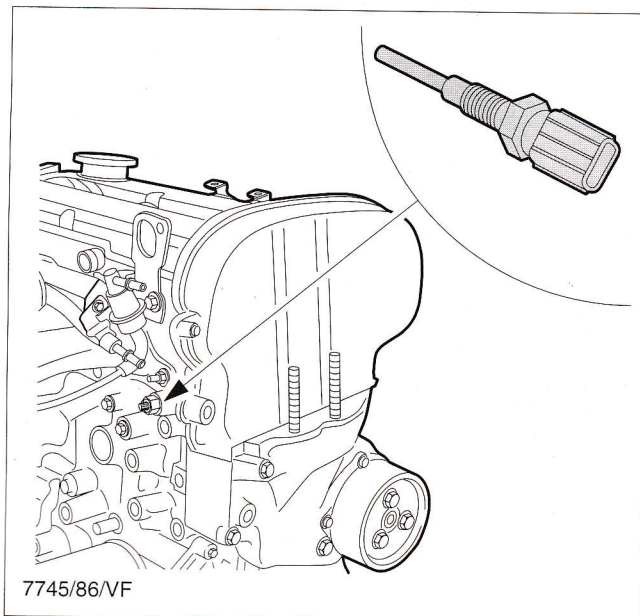


### Cylinder head temperature (CHT) sensor

- The CHT sensor measures the temperature of the cylinder head directly. This eliminates the need for an engine coolant temperature (ECT) sensor.
- The CHT sensor is located on the side of the cylinder head next to the timing belt cover.

**NOTE:** Since the cylinder head temperature is measured through the mating face with the cylinder head and this mating face is deformed when the sensor is screwed in, the sensor must not be reused, otherwise the result would be incorrect temperature measurement and malfunctions in the engine management.

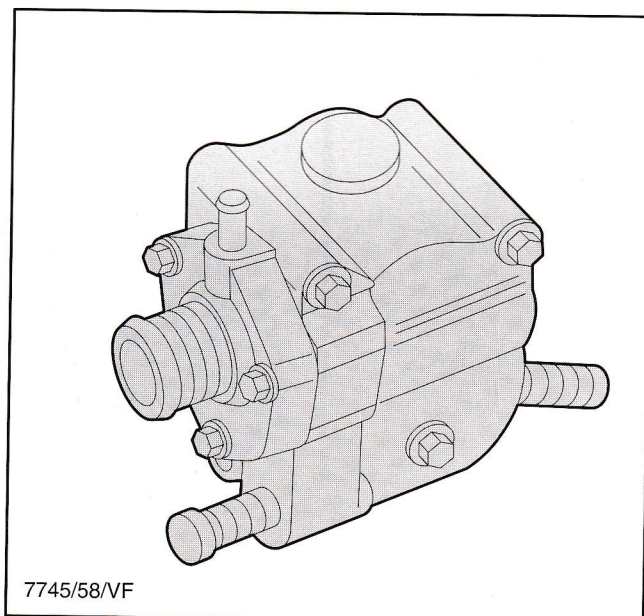
**NOTE:** The blind hole for the CHT sensor must be clean and dry before the sensor is installed.



7745/86/VF

### Thermostat housing

- The thermostat housing was modified due to the elimination of the engine coolant temperature (ECT) sensor and the temperature gauge sender unit.



7745/58/VF

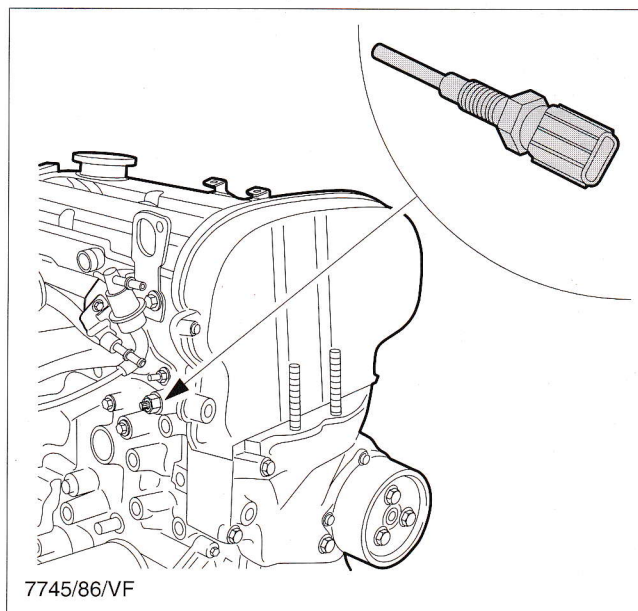


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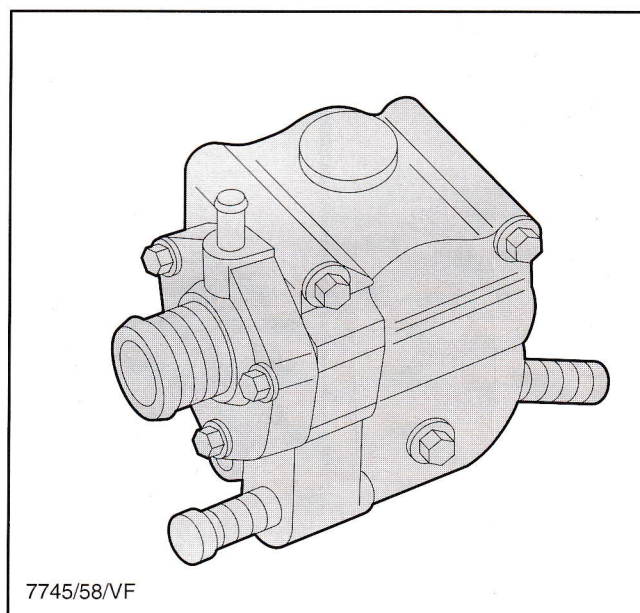
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**NOTE:** The blind hole for the CHT sensor must be clean and dry before the sensor is installed.

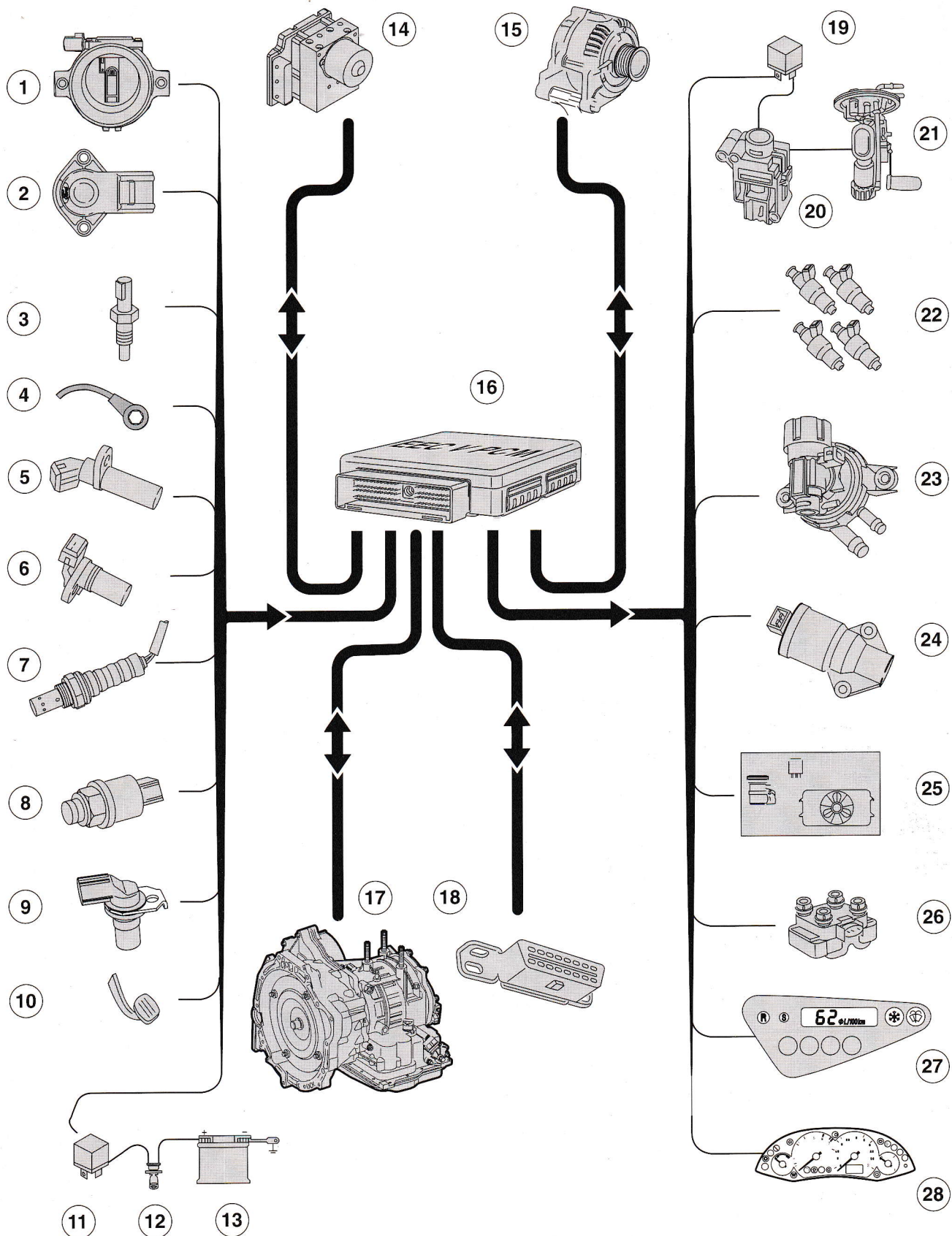


### Thermostat housing

- The thermostat housing was modified due to the elimination of the engine coolant temperature (ECT) sensor and the temperature gauge sender unit.







7745/67/VF

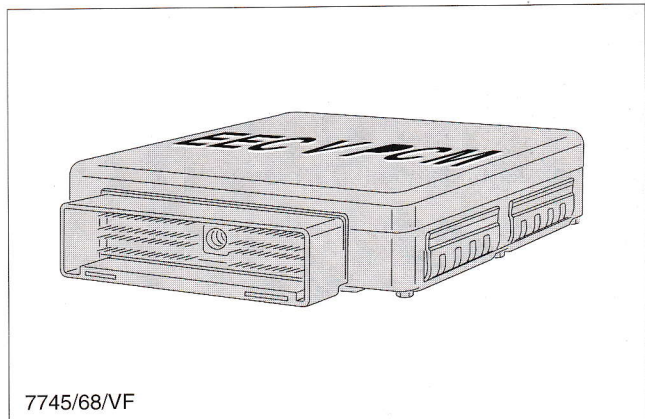
### Key to the illustration opposite

- 1 Mass air flow (MAF) sensor with integral intake air temperature (IAT) sensor
- 2 Throttle position (TP) sensor
- 3 Cylinder head temperature (CHT) sensor
- 4 Knock sensor (KS) (Zetec-SE engines only)
- 5 Crankshaft position (CKP) sensor
- 6 Camshaft position (CMP) sensor
- 7 Heated oxygen sensor (HO2S)
- 8 Power steering pressure (PSP) switch
- 9 Vehicle speed sensor (VSS)
- 10 Clutch pedal switch
- 11 Power supply relay
- 12 Ignition switch
- 13 Battery
- 14 Mk 20E-I control unit
- 15 Alternator
- 16 EEC V PCM with integral PATS
- 17 Automatic transmission (only 1.6L Zetec-SE)
- 18 Data link connector (DLC)
- 19 Fuel pump (FP) relay
- 20 Inertia fuel shutoff (IFS)
- 21 Fuel pump (FP)
- 22 Fuel injectors
- 23 EVAP canister purge solenoid valve
- 24 Idle air control (IAC) valve
- 25 Air conditioning compressor clutch/cooling fan circuit
- 26 Electronic ignition (EI) coil
- 27 Multifunction display
- 28 Instrument cluster

- This section only describes new or changed system components.

### EEC V powertrain control module (PCM)

- Zetec-SE and Zetec-E engines are only used with 60-pin EEC V powertrain control modules (PCM) in the Focus.
- The exception is the 1.6L Zetec-SE engine when combined with the 4F27E automatic transmission which has a 104-pin EEC V PCM since this also incorporates the transmission control system.
- The ignition control module (ICM) and the passive anti-theft system (PATS) are incorporated in the PCM.
- The PCM passes certain data direct to the instrument cluster or trip computer and the speed control system:
  - vehicle speed signal
  - engine speed signal
  - engine temperature signal
  - fuel consumption signal
- The tire/axle ratio is stored in the PCM and, if changed, must be loaded into the PCM through the FDS 2000.

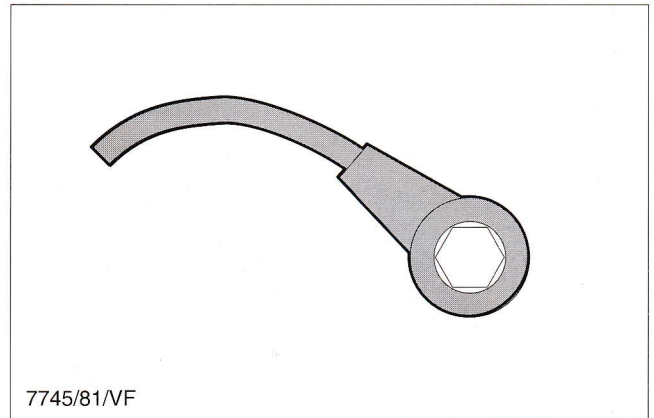


7745/68/VF



**Knock sensor (KS) (Zetec-SE engines only)**

- The compression ratio of the Zetec-SE engines has been increased to 11.0 : 1 to minimize further the fuel consumption and exhaust emissions.
- The high compression ratio can produce combustion knock depending on engine load and speed.
- Therefore, a knock control system has been introduced to prevent engine damage.

**Operation**

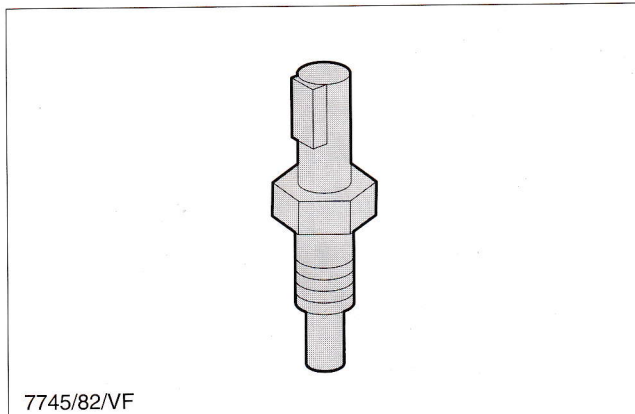
- The KS detects combustion knock and passes the signal on to the PCM.
- From the position of the crankshaft or camshaft the PCM identifies the cylinder in which the combustion knock is occurring.
- The PCM then retards the ignition for the specific cylinder by 1.5 degrees. If combustion knock is still registered, the ignition is retarded further.
- After approximately two seconds without combustion knock the ignition timing is advanced until knock is registered once again or until a determined threshold is achieved.

**Substitute function**

- The KS is monitored by the PCM during the self-test.
- If a fault occurs, a fault code is set in the PCM which can be read out with the FDS 2000. The PCM changes to a fixed ignition map which prevents combustion knock.

**CHT sensor**

- The CHT sensor measures the temperature of the cylinder head directly, eliminating the need for an engine coolant temperature (ECT) sensor.
- The advantage of the CHT sensor is that the required engine temperature can be established directly.
- This means that in the event of loss of coolant overheating of the engine can be established more reliably. An ECT sensor has the disadvantage that precise temperature measurement can become impossible due to vapour bubbles forming around the sensor.

**Signal use**

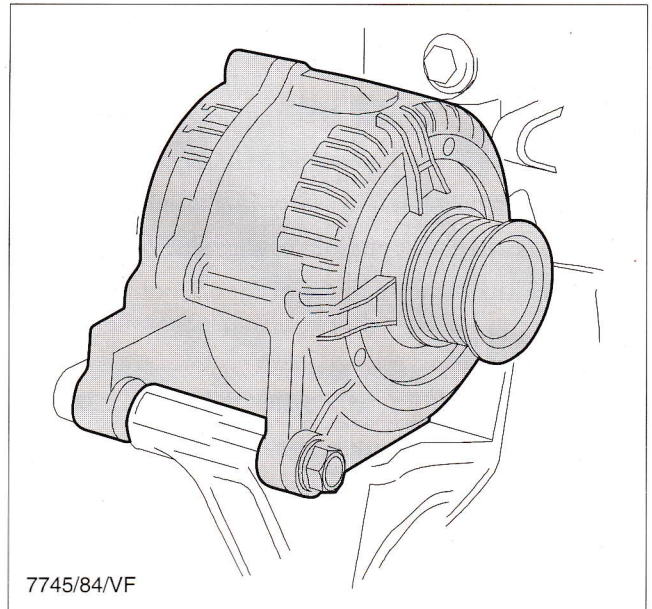
- The PCM requires the signal for the following functions:
  - to determine the quantity of fuel to be injected
  - idle air control (IAC)
  - to determine the ignition timing
  - to control the evaporative emission (EVAP) management system
  - to control the cooling fan
  - to operate the temperature gauge in the instrument cluster
  - to operate the engine management system warning indicator in the instrument cluster
  - engine overheating safety function

**Substitute function**

- If a sensor failure is registered during driving, the PCM assumes a temperature of 120°C.
- If a sensor failure is registered when the ignition is switched on, the signal of the IAT sensor is used as reference point. From this temperature the increasing of the engine temperature will be assumed through a time table.
- In both cases air conditioning cannot be switched on, cooling fans are permanently switched on and the EGR system (only 1.6L engine with automatic transmission) is switched off.

### Alternator control

- The alternator voltage is controlled by the PCM depending on the electrolyte temperature and the state of charge of the battery.
- The battery does not have a temperature sensor for the electrolyte temperature. This is determined instead by means of the intake air temperature (IAT).
- Refer to the section “Vehicle electrical and electronic systems” for a detailed description.

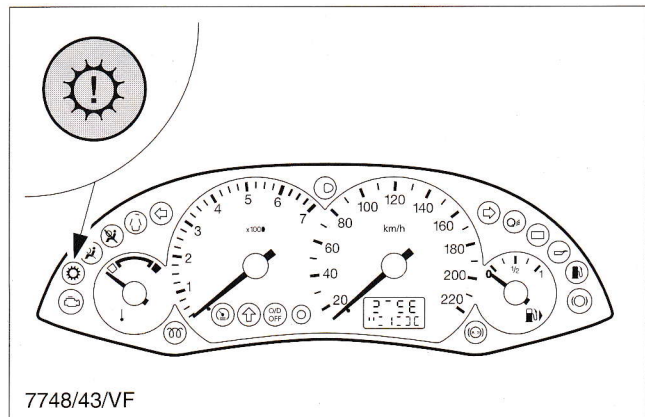




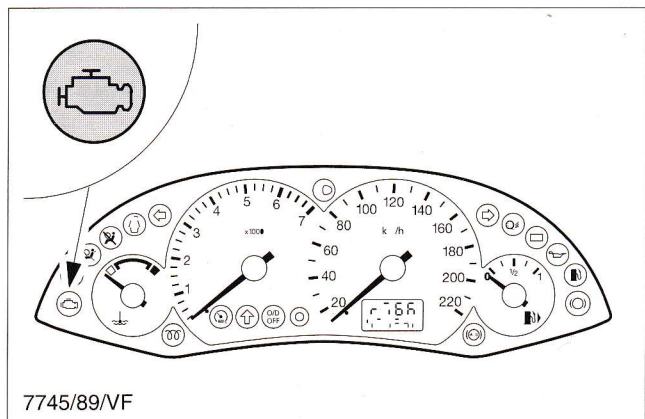
## Engine overheating safety function

- The use of a cylinder head temperature (CHT) sensor has made it possible to incorporate in the engine management a safety function designed to protect against engine damage due to the engine overheating in the event of cooling system failure.
- If the CHT sensor detects that the cylinder head temperature is too high, the PCM changes to the “engine overheating safety function” mode.
- In this mode first the powertrain warning indicator in the instrument cluster is switched on.
- If the temperature continues rising, the PCM switches on the engine management warning indicator in the instrument cluster and systematically deactivates cylinders by shutting off the fuel supply. The driver will notice severe bucking and power loss.
- With a further rise in the cylinder head temperature a flashing powertrain indicator indicates that the engine will stop completely after 30 seconds.
- If a vehicle is driven in the “engine overheating safety function” mode, the PCM always sets a fault code which can be read out with the FDS 2000.

**NOTE:** The “engine overheating safety function” mode does not always guarantee that no engine damage will occur. In each case all the affected components should be checked carefully.

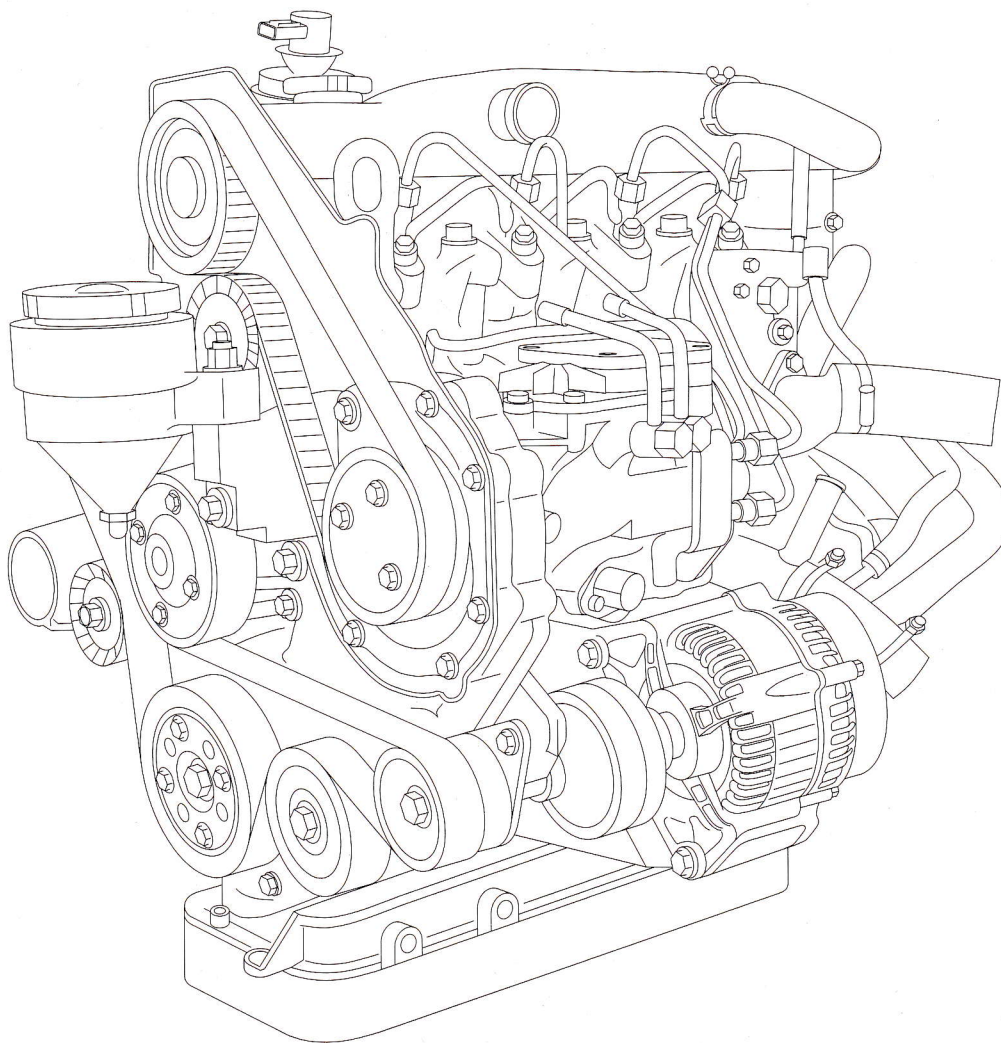


**Powertrain warning indicator**



**Engine management system warning indicator**

**NOTE:** If a vehicle driven in the “engine overheating safety function” mode is stopped and the cylinder head temperature drops below the value when the mode was initiated, the mode will not be active again on restarting until the critical temperature is reached again. The engine management system warning indicator stays on until it is switched off by means of FDS 2000.



7747/00/VF

### Engine

- Transversely installed 1.8L 4-cylinder direct injection turbocharged diesel engine
- Garrett GT15 turbocharger and intercooler
- Camshaft driven by a toothed belt from the fuel injection pump
- Fuel injection pump driven by a twin chain from the crankshaft
- Fully electronically controlled Bosch (VP 30) distributor-type fuel injection pump
- 5-hole fuel injectors with two-spring nozzle holder
- G-rotor oil pump mounted on the crankshaft

### Engine management

- EEC V electronic engine management (controlling fuelling, fuel injection timing and exhaust gas recirculation)
- PCM with 104 pins and integral passive anti-theft system (PATS)
- New cylinder head temperature (CHT) sensor
- PCM-controlled alternator

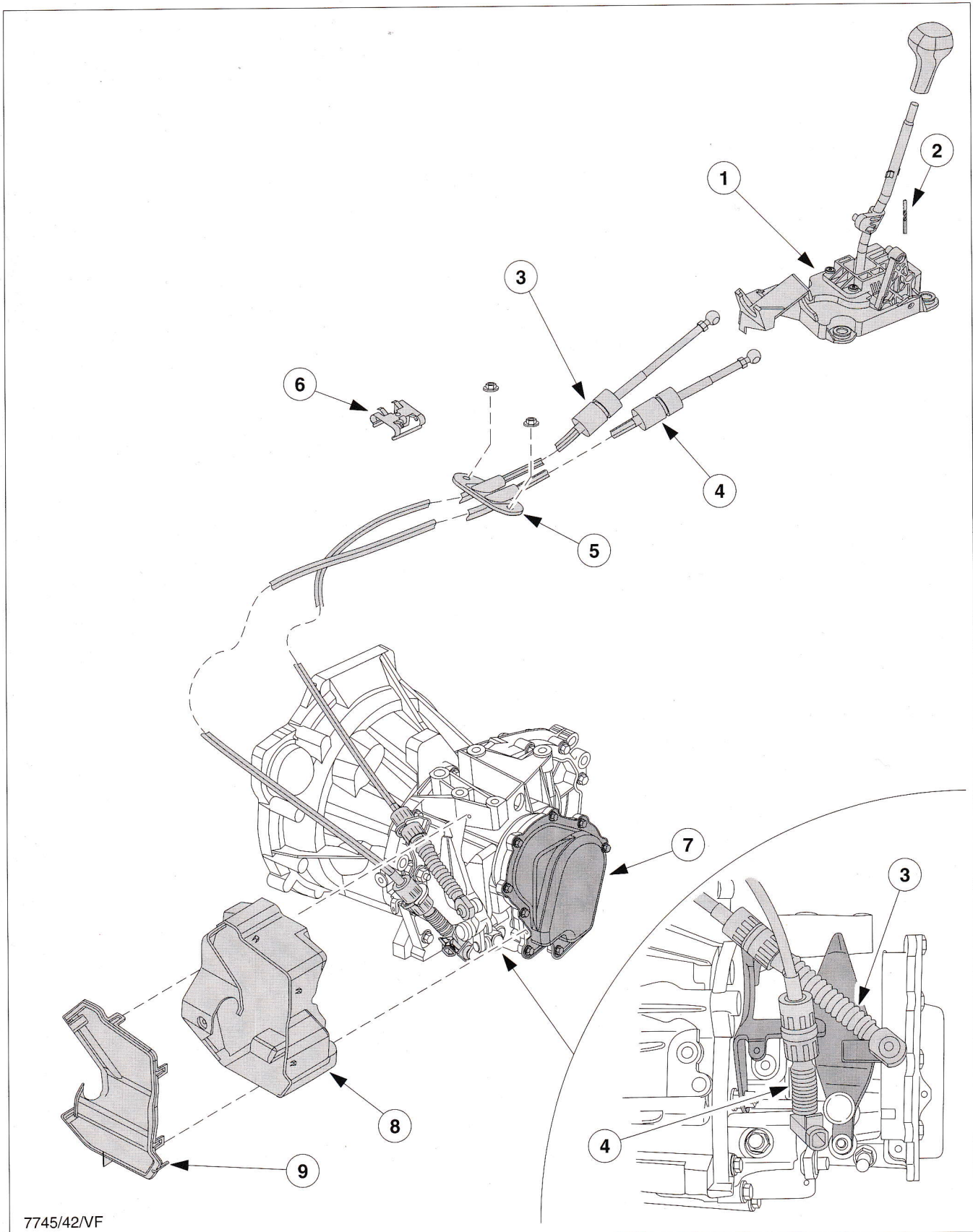
### Emission control

- 94/12/EG ('96 EEC exhaust emission standard)
- Electronically controlled exhaust gas recirculation (EGR)
- Oxidation catalyst

### Diagnosis and testing

- Data link connector (DLC) for FDS 2000





7745/42/VF

**Key to the illustration opposite**

- |  |                           |
|--|---------------------------|
| 1 External shift mechanism                 | 6 Cable retaining clip    |
| 2 3 mm drill bit (required for adjustment) | 7 5th gear blanking cover |
| 3 Shift cable                              | 8 Cable housing           |
| 4 Selector cable                           | 9 Cable housing cover     |
| 5 Body seal                                |                           |

**Changes to the iB5 manual transmission**

- The iB5 transmission installed in the Focus is operated by cable instead of the shift rod linkage used in the past.
- The cables are color-coded:
  - Shift cable – white
  - Selector cable – black
- The shift cable and the selector cable can only be changed together due to the common body seal.
- The internal shift mechanism has been changed due to the cable operating mechanism.
- The gasket between the two housing halves has been superseded by a liquid sealer. The distance between the two housing halves has been reduced through the elimination of the gasket employed previously. This means that some components inside the transmission have been changed.
- The cork gasket for the 5th gear blanking cover has also been superseded by a liquid sealer. The introduction of the liquid sealer has also been accompanied by the installation of a new black 5th gear blanking cover.
- 1st and 2nd gears have double synchronisers. In service a double synchroniser can be fitted to the 3rd gear in place of the single synchroniser. When changing from a single synchroniser to a double synchroniser, the 3rd gear wheel must not be changed.

**Vehicle speed sensor (VSS)**

- Vehicles with petrol engines are equipped with a VSS sensor (Hall sensor) like the '98 model year Mondeo.

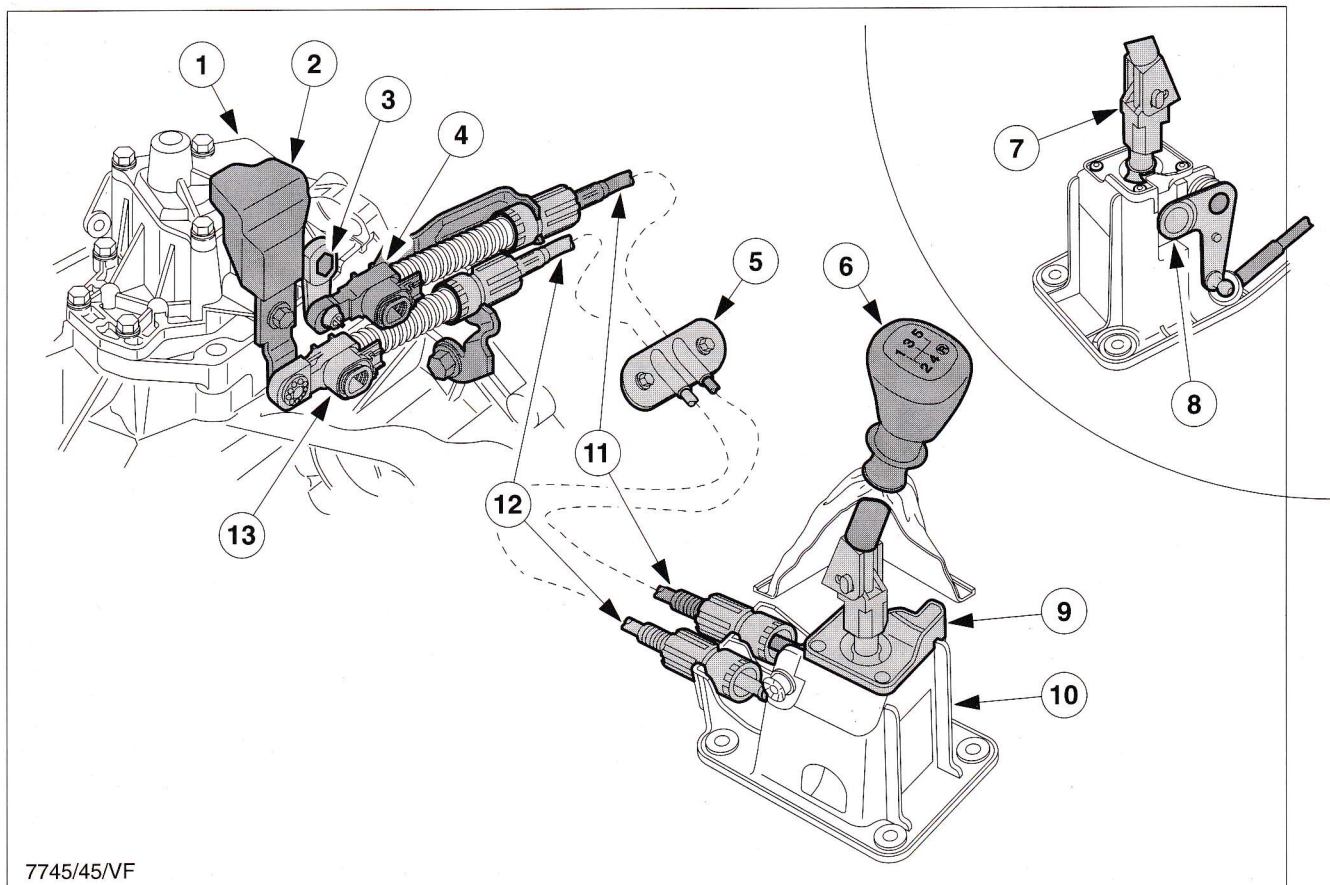
**Adjusting shift mechanism**

- In the iB5 transmission **only** the selector cable is adjusted. The shift cable cannot be adjusted.
- A 3 mm drill bit (item 2) is inserted to immobilize the shift lever in the 3rd – 4th shift alley.
- After the shift lever is immobilized, the selector lever in the transmission is brought to the center position and the selector cable is adjusted at the transmission end.

**NOTE:** Refer to the current service literature for the complete procedure.



- The cable operated MTX-75 transmission from the Mondeo '97 is installed in the Focus in place of the MTX-75 transmission with the shift rod linkage used previously.
- The selector cable is marked in black, the shift cable in white. The end fittings of the cables are of different types to avoid confusion during assembly.
- The external shift mechanism shown in the figure is made of plastic and is used from the 1999 1/4 model year onwards. The first vehicles have the external shift mechanism from the Mondeo '97.



7745/45/VF

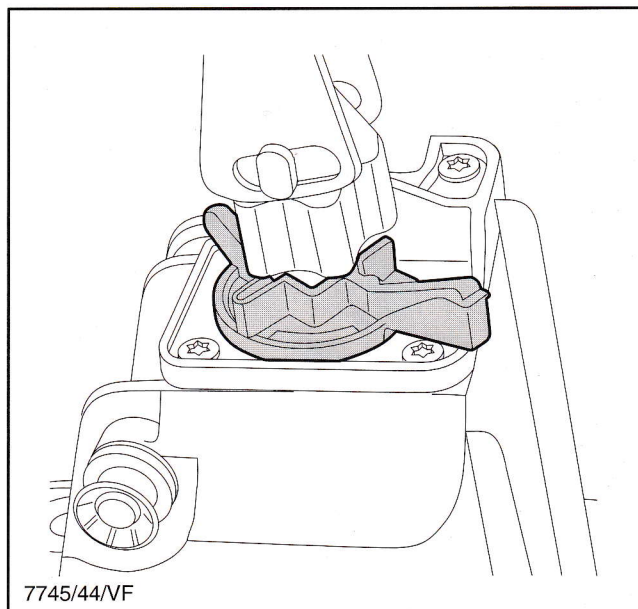
- |  |                                     |  |
|--|-------------------------------------|--|
| 1 Internal shift mechanism housing       | 7 Reverse gear lock                 | 11 Selector cable (black)              |
| 2 Balance weight                         | 8 Angle lever                       | 12 Shift cable (white)                 |
| 3 Selector lever shaft                   | 9 Reverse gear locking mechanism    | 13 Adjusting mechanism for shift cable |
| 4 Adjusting mechanism for selector cable | 10 External shift mechanism housing |  |
| 5 Body seal                              |                                     |  |
| 6 Shift lever                            |                                     |  |



### Adjusting shift mechanism

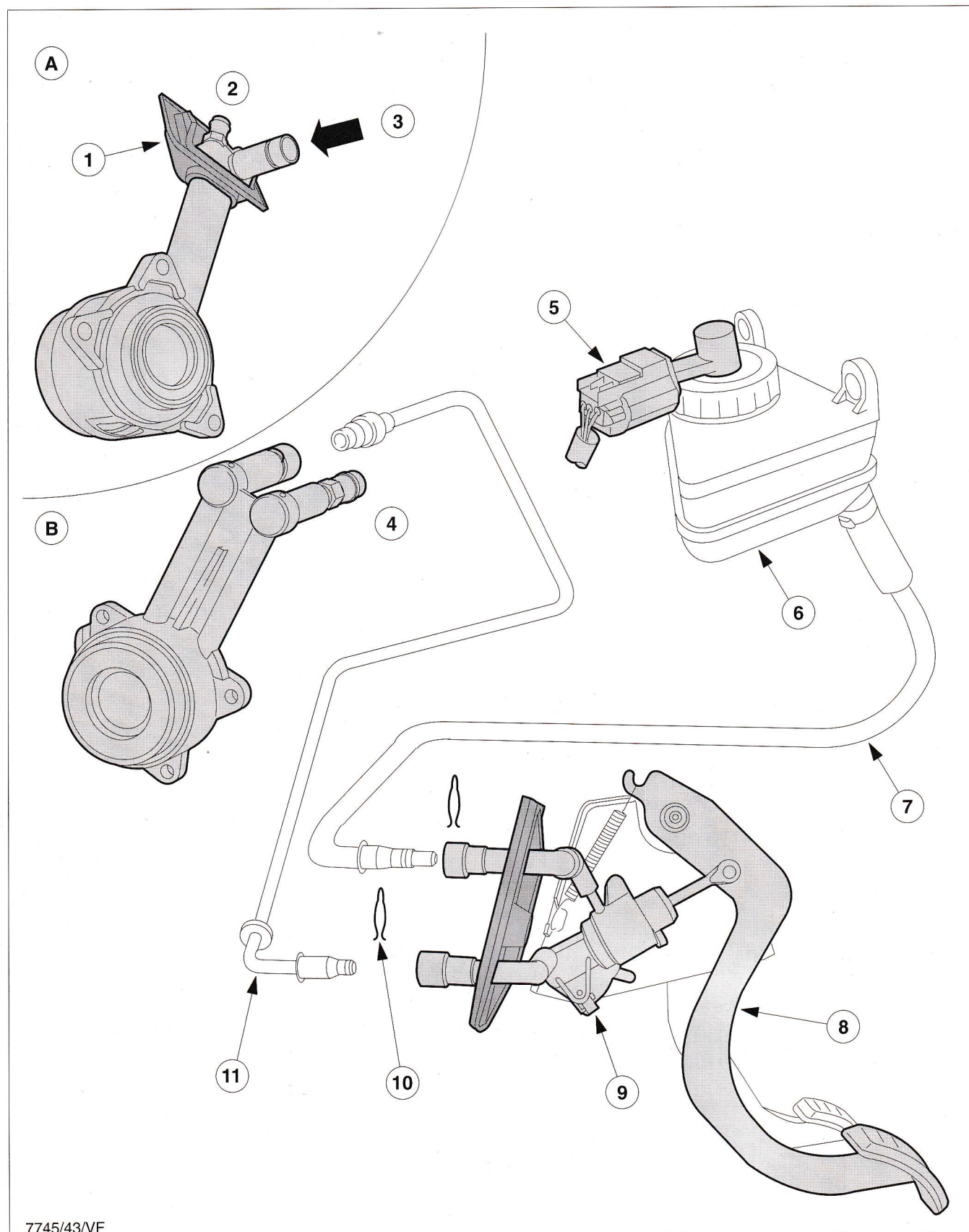
- Both cables are adjusted at the transmission end as on the Mondeo '97.
- From the 1999 1/4 model year onwards the aluminium bearing housing for the shift lever used in the past is superseded by a new design of plastic bearing housing.
- The use of the plastic bearing housing means that adjusting tool 16-088 **cannot** be used any more to immobilize the gear lever in the neutral position.
- From the 1999 1/4 model year onwards a new Special Tool 16-088A (yellow) must be used to immobilize the shift lever in the neutral position.
- Special Tool 16-088 A is inserted at the side and turned clockwise approximately 30 degrees. It can be used both in the Focus and in the Mondeo '97 model year onwards.

**NOTE:** Special Tool 16-088 A was developed for production. It cannot be used unrestrictedly in service.



### Vehicle speed sensor (VSS)

- Vehicles with petrol engines are equipped with a VSS sensor (Hall sensor) like the Mondeo '98.



7745/43/VF

### Key to the illustration opposite

- |   |                            |
|---|----------------------------|
| A MTX-75 transmission slave cylinder<br>with integral release bearing | 4 Bleed connection         |
| B iB5 transmission slave cylinder<br>with integral release bearing    | 5 Brake fluid level switch |
| 1 Plastic boot  | 6 Brake fluid reservoir    |
| 2 Bleed connection  | 7 Replenishing pipe        |
| 3 Feed  | 8 Clutch pedal             |
|   | 9 Master cylinder          |
|   | 10 Retaining clip          |
|   | 11 Pressure pipe           |

### General

- Both transmissions, the MTX-75 and the iB5, are equipped with a hydraulic clutch mechanism.
- The master cylinder is the **same** in both systems. The master cylinder has plastic extensions to make it easier to install the pipes. The pipes can be disconnected from the engine compartment by removing the retaining clip.
- The slave cylinders are of **different** design due to the different positions of the input shaft oil seals and the different front transmission housing halves on the MTX-75 and iB5 transmissions.

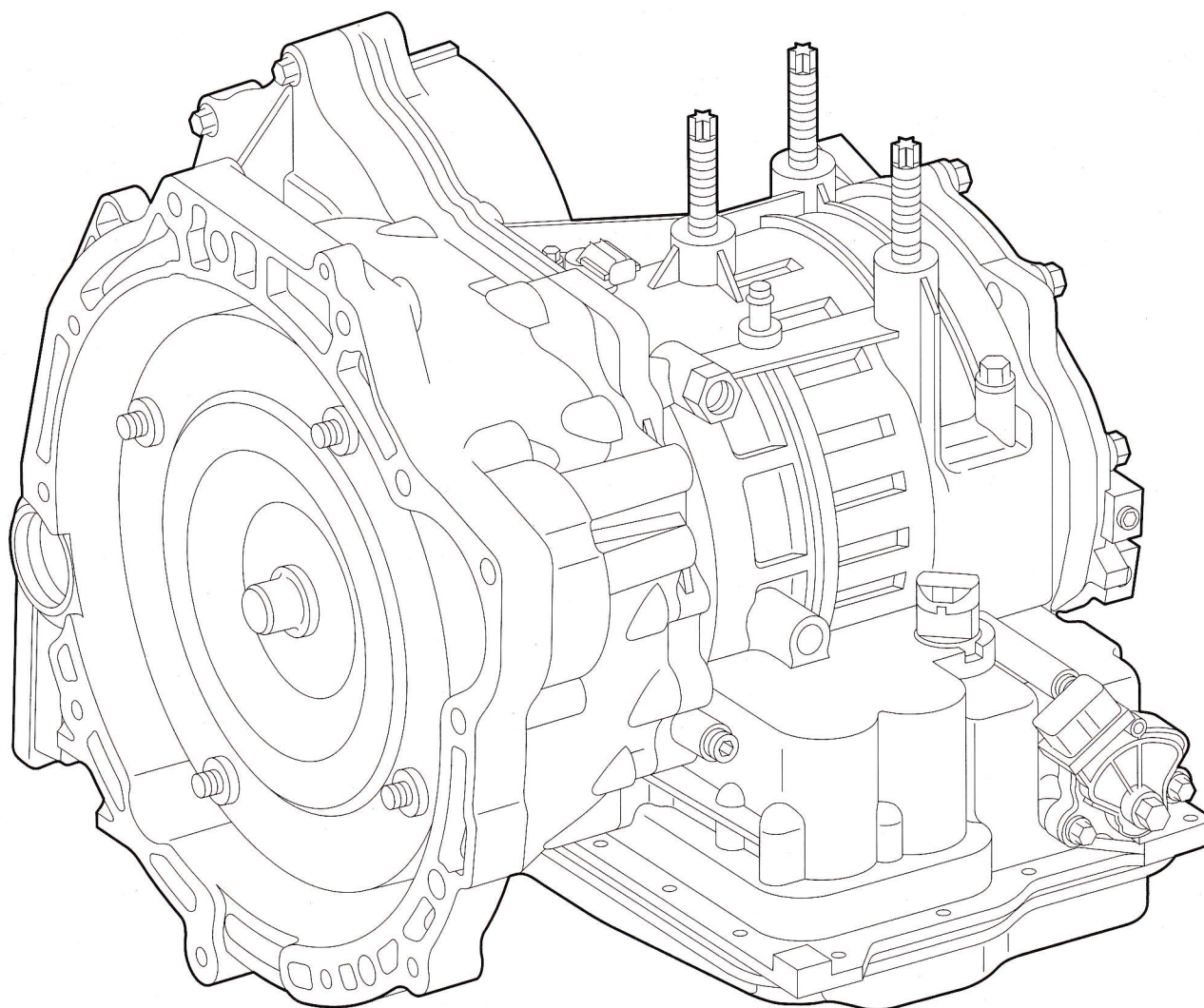
**NOTE:** The release bearings are incorporated in both slave cylinders and cannot be changed on their own.

**NOTE:** In the MTX-75 the plastic boot is part of the slave cylinder. It cannot be changed on its own.

- The pressure holding valve used in the past in the iB5 transmission has been eliminated. The preload on the release bearing is now provided by a spring located in the slave cylinder.

**NOTE:** The pedal travel is the same with both the MTX-75 and iB5 transmissions. It is no longer adjustable.





7748/00/VF

**Transmission design**

- Four-speed automatic transmission (for front wheel drive vehicles)
- Two single planetary gear sets connected one behind the other
- The components of the planetary gear sets are driven or locked hydraulically by means of multiplate clutches and brakes, a one-way clutch and a brake band
- Intermediate gear stage and final drive assembly incorporated in the transmission housing
- Electronically controlled, hydraulically closed torque converter lock-up clutch
- Stator made of synthetic resin (to reduce weight)

**Ratios in the individual gears**

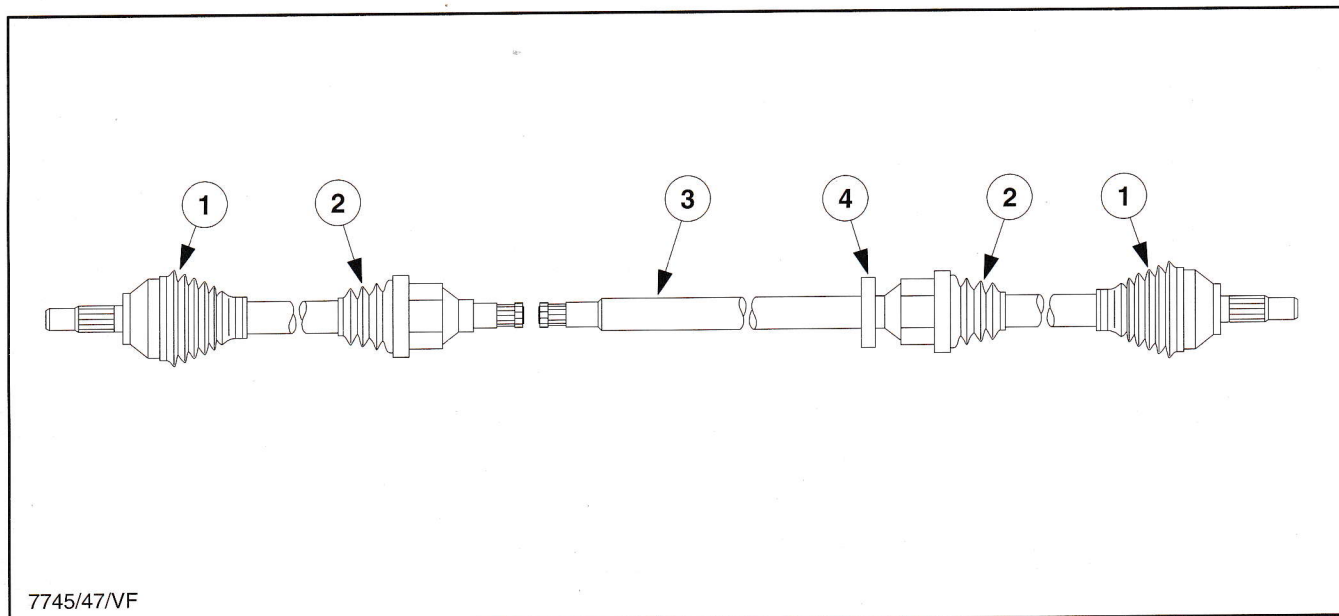
- 1st gear: 2.816 : 1
- 2nd gear: 1.498 : 1
- 3rd gear: 1.000 : 1
- 4th gear: 0.726 : 1
- Reverse gear: 2.649 : 1

**Transmission control**

- Electronic synchronous shift control (ESSC)
- Integrated in the EEC V PCM
- Overdrive (O/D) switch to select and deselect 4th gear

**Diagnosis and testing**

- Diagnosis and testing with the FDS 2000 through the data link connector (DLC) in the passenger compartment



1 Outer cv joint boot made of thermoplastic

2 Inner cv joint boot made of rubber

3 Intermediate shaft

4 Intermediate shaft center bearing

- Compared to the Escort, a few changes have been made to the halfshafts which also affect service.

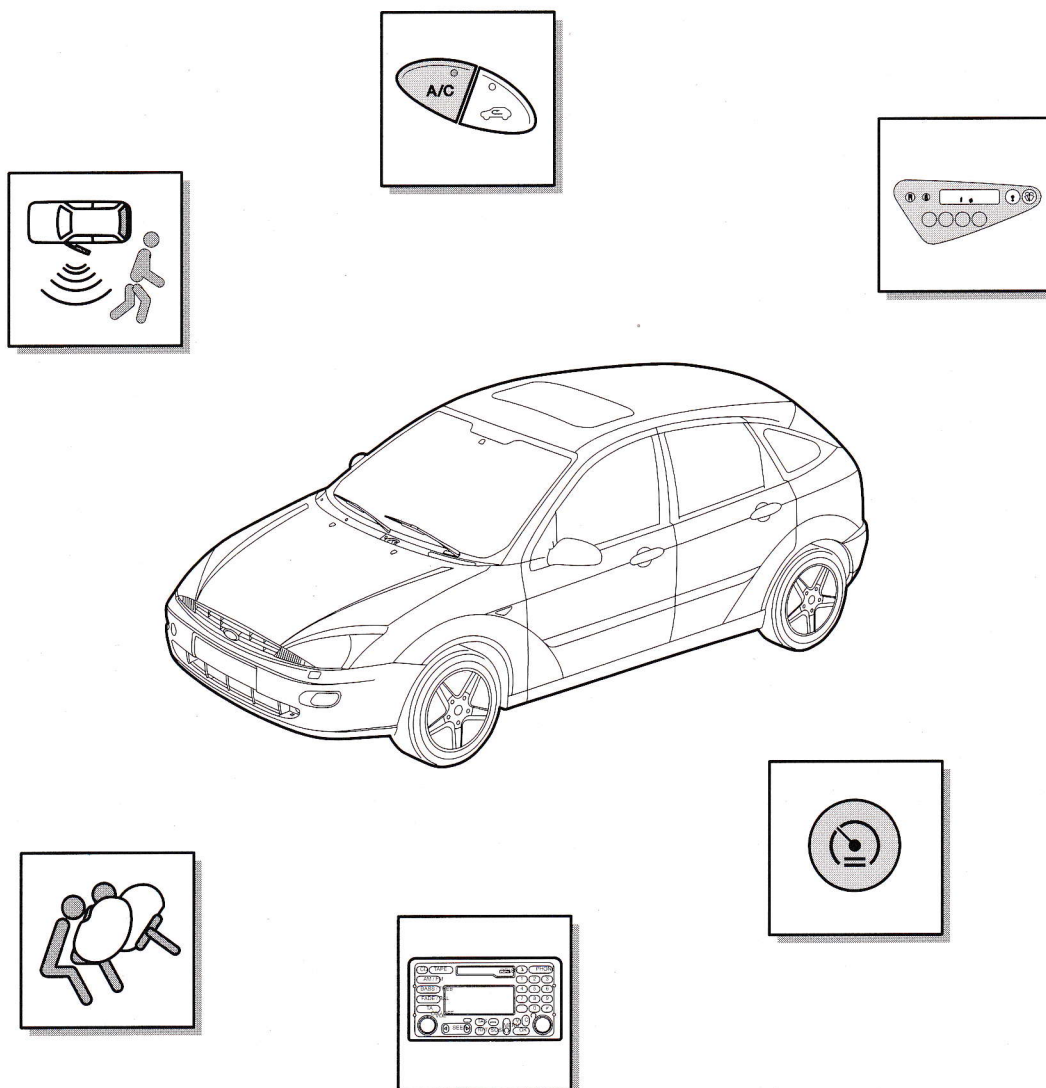
**NOTE:** Refer to the current service literature for the precise procedures for disassembling and assembling the halfshafts.

- The cv joints are a press fit on the splines of the shafts. They are additionally secured by circlips. The press fits significantly improve uniformity of drive flow since the connections are free of play.
- A different grease with improved friction reduction is used in the cv joints.

**NOTE:** The proprietary pliers provided must be used to secure the boot clamps in service.

- The Focus has halfshafts of the same length. An intermediate shaft with a center bearing connects the transmission to the right-hand halfshaft.
- The outer cv joints have been optimised and made as small and light as possible.
- The outer cv joint boots are made of thermoplastic and therefore particularly resistant to external factors such as stones and permanent loading when the steering is turned.
- The positioning of the cv joint boot on the cv joint is determined by the shape.





7745/26/VF

### General electrics

- Central timer module (CTM)
- Modular vehicle wiring harness
- Multiplex data bus system
- EEC V engine management with 60-pin or 104-pin module
- PCM-controlled alternator

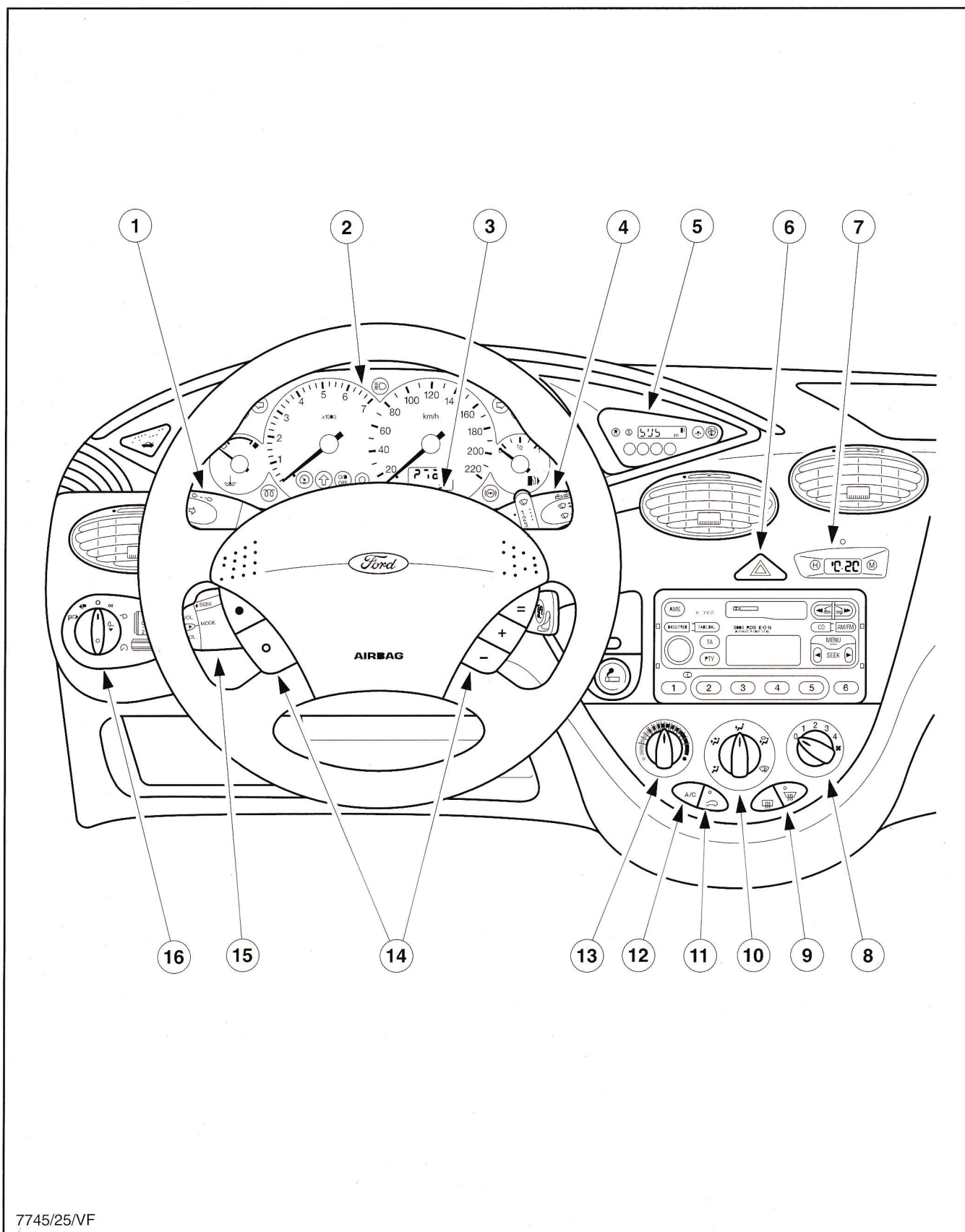
### Safety and security electronics

- Side and front air bags for the driver and front passenger
- Pyrotechnic safety belt pretensioners for the driver and front passenger
- central locking with radio frequency remote control
- PATS with variable code
- Anti-theft alarm system

### Comfort electronics

- Electrically operated windows with anti-trap protection
- Speed control system
- Integral mobile telephone
- Telematic traveller assistance system (TAS)
- Multifunction display

## Instrument panel



7745/25/VF



- The instrument panel has been completely redesigned and reflects the design of the body.

**Key to the illustration opposite:**

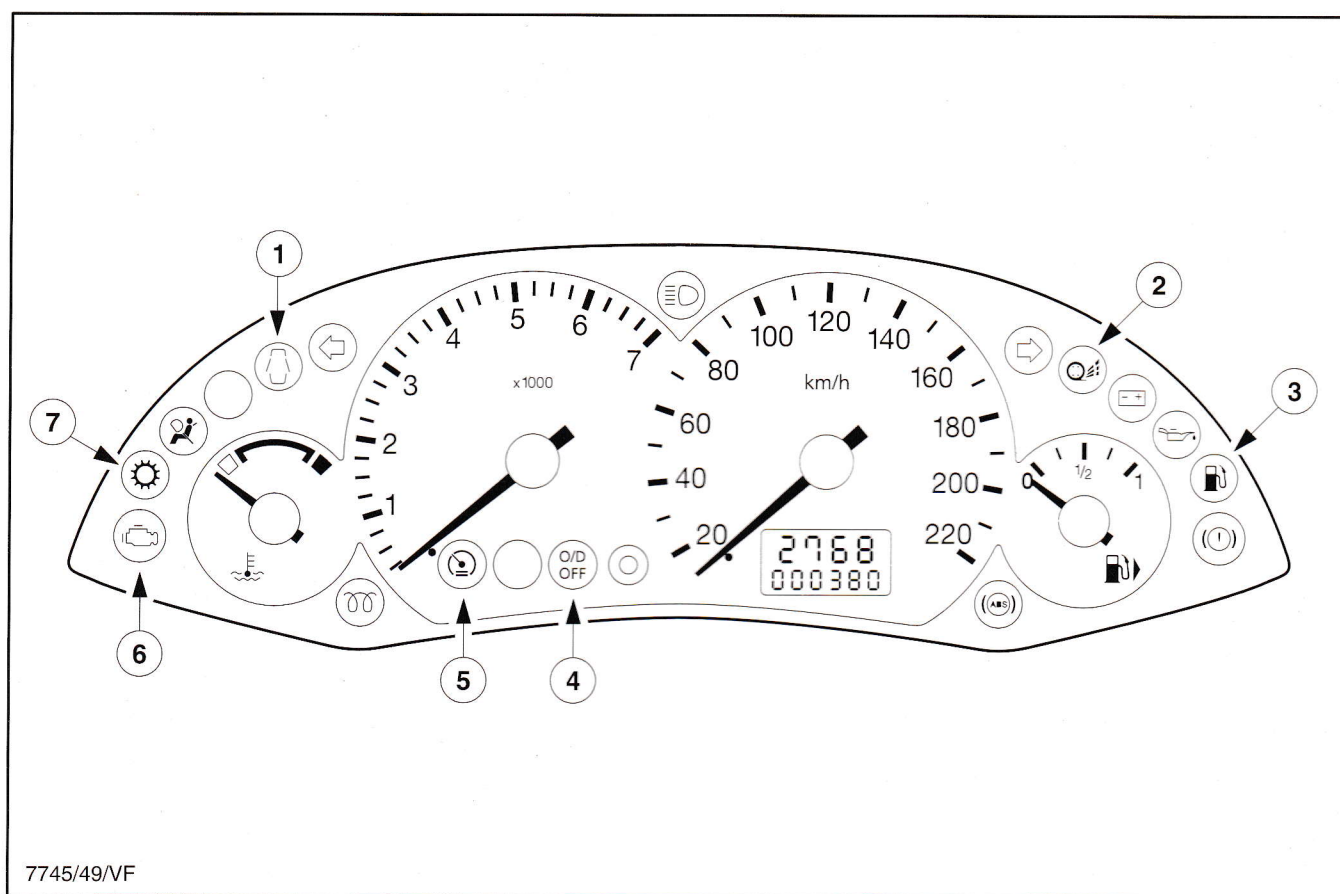
- 1 Multifunction switch (turn signals/dip switch/headlamp flasher/multifunction display)
- 2 Instrument cluster with indicators and warning indicators
- 3 Horn control
- 4 Windshield/rear window wiper switch
- 5 Multifunction display with auxiliary indicators and warning indicators
- 6 Hazard flasher switch
- 7 Digital clock
- 8 Rotary switch for blower
- 9 Switches for heated windshield and rear window
- 10 Rotary switch for air distribution
- 11 Switch for air recirculation
- 12 Switch for air conditioning
- 13 Rotary switch for temperature selection
- 14 Speed control buttons
- 15 Radio remote control stalk
- 16 Lamp switch unit

**Multiplex data bus system**

- The Focus is the first compact Ford equipped with the multiplex data bus system. This allows several vehicle systems to access common data.
- With the multiplex data bus system the number of sensors can be kept relatively low. At the same time, the vehicle wiring harness for high-series variants remains comparatively compact.
- Both play a major part in enhancing the reliability of the electrical system.
- Up to four data bus systems can be used in the Focus depending on the model and level of equipment:
  - SCP (standard corporate protocol)
  - ISO 9141 diagnostic interface
  - CAN (controller area network)
  - ACP (audio communications protocol)
- The SCP data bus provides the communication between the engine management (EEC V PCM), the vehicle dynamics systems (ABS/EBD/TCS/ESP) and the instrument cluster.
- The SCP data bus is additionally connected to the data link connector (DLC) and is also used for fault-finding with the aid of FDS 2000.
- The ISO 9141 data bus is also connected to the DLC.
- The following systems are tested using the ISO 9141 data bus:
  - booster heater (vehicles with a diesel engine)
  - telematic system
  - central locking and anti-theft alarm system
  - central timer module (CTM)
  - air bag module
  - multifunction display
- In addition to the PCM, vehicles with a diesel engine also have a pump control unit (PCU). The communication between these two modules is provided through the third data bus, the CAN data bus.
- If the vehicle is equipped with a CD autochanger, the CD autochanger is controlled by the audio unit through the fourth data bus, the ACP data bus.
- The data transfer between the audio system and the mobile telephone module also takes place through the ACP data bus.

## Instrument cluster

- The instrument cluster communicates with the PCM through the SCP data bus. Engine speed, coolant temperature and vehicle speed are transmitted to the instrument cluster from the PCM by this route.
- In addition, the SCP data bus is used for diagnosis and testing and programming of the instrument cluster module with the aid of FDS 2000.
- Bulbs, instruments and the housing of the instrument cluster can be changed separately. It is also possible to install a new complete instrument cluster insert inexpensively.



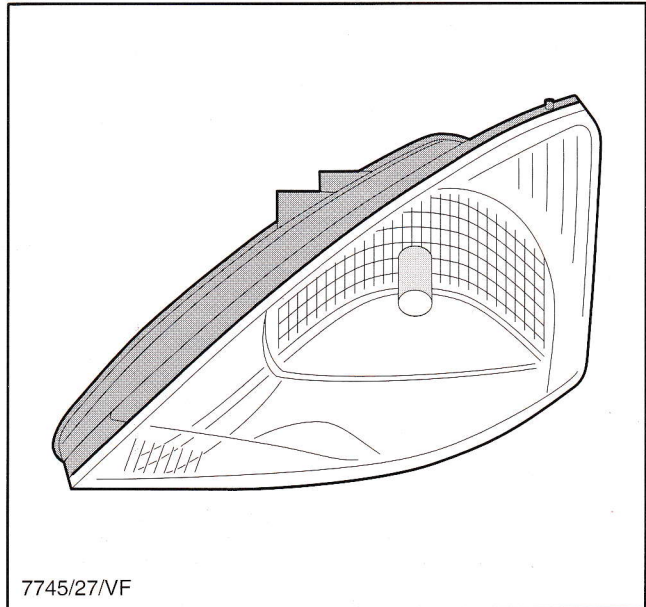
## Instrument cluster

- |                            |   |
|----------------------------|---|
| 1 Door ajar warning lamp   | 5 Speed control indicator lamp          |
| 2 TCS / ESP indicator lamp | 6 Engine management system warning lamp |
| 3 Low fuel warning lamp    | 7 Powertrain warning lamp               |
| 4 O/D indicator lamp       |   |



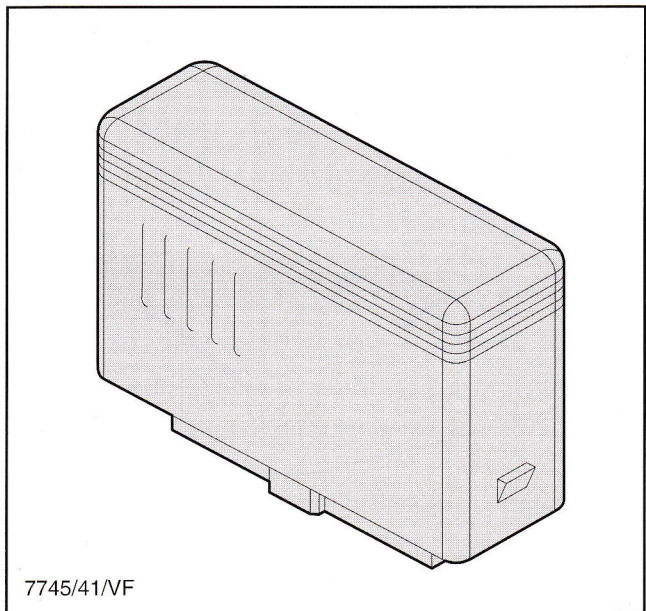
## Headlamps

- The headlamps of the Focus are equipped with a lens made of high impact-resistant polycarbonate.
- The light is focussed with free-form reflectors.
- Conventional H4 bulbs are used as the light source.



## Central timer module (CTM)

- The central timer module switches various electrical loads whose operation is timed.
- In addition, it monitors various systems which are required to send a signal (with an acoustic warning and/or indicator) to the driver in certain situations.
- The central timer module is plugged into the back of the central junction box (CJB).
- Two different modules are used for vehicles with manual transmission and automatic transmission.



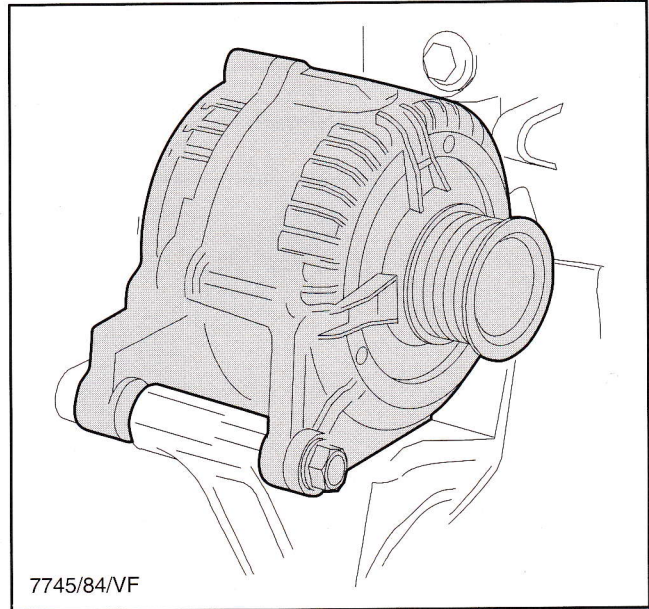
## Overview of functions of central timer module

Type of function	Signal	Function	With manual transmission	With automatic transmission
Timer function		Battery saving	●	●
		Automatic windshield wash/wipe	●	●
		Heated rear window	●	●
		Heated windshield	●	●
		Interior light dimmer	●	●
		Windshield intermittent wiper operation	●	●
		Rear window intermittent wiper operation	●	●
		Rear window automatic wash/wipe	●	●
Warning function	Acoustic warning	Key in ignition (North America only)		●
	Acoustic warning and warning indicator	Safety belt not in use (North America only)		●
	Acoustic warning	Reverse gear selected (Japan only)		●
	Acoustic warning	Selector lever not in position "P"		●
	Acoustic warning	Lights switched on	●	●
	Indicator	Door ajar	●	●
Acoustic signal		Central locking (confirmation of operation)	●	●
		Confirmation of operation of multi-function display buttons	●	●
		Low fuel (multifunction display)	●	●
		Failure of air bag warning indicator	●	●
Diagnosis and testing		Data link connector (DLC)	●	●



## Alternator

- The Focus is fitted with one of the most advanced “smart charge” vehicle power supply systems. It optimally charges the vehicle battery and at the same time supplies all the electrical loads which are switched on.
- Conventional alternators operate to a mapped voltage value. The new power supply system of the Focus is controlled by the powertrain control module (PCM).
- Since a vehicle battery is best charged with a higher voltage when cold and a lower voltage when warm, it is advantageous to adjust the charging voltage according to the temperature of the battery.
- For this, the PCM requires the information about the temperature of the electrolyte in the vehicle battery.

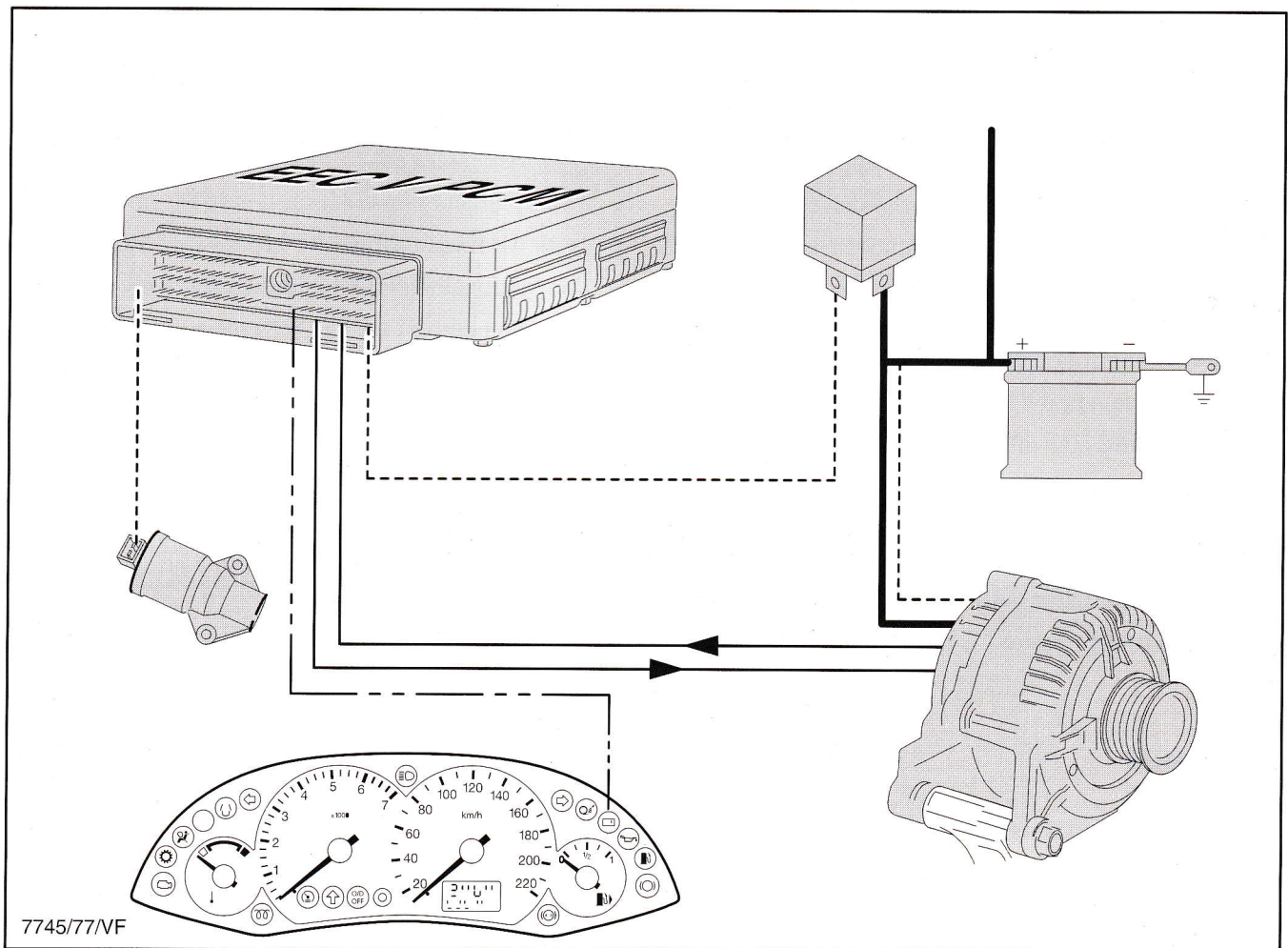


## Establishing the electrolyte temperature

- When considering the temperature of the electrolyte in the vehicle battery, it must be remembered that the battery temperature is influenced by the heat radiated from the engine.
- The intake air temperature (IAT) is measured to calculate the temperature of the electrolyte.
- This temperature is compared with the stored value which prevailed the last time the engine was stopped.
- From this comparison the PCM calculates the temperature of the electrolyte in the vehicle battery during the running of the engine.



## Design of the “smart charge” power supply system



- The new “smart charge” power supply system has no additional components and consists of:
  - alternator with controllable voltage regulator
  - powertrain control module (PCM)
  - charge indicator in the instrument cluster
  - battery
  - engine run relay
- The PCM simultaneously controls and monitors the output of the alternator. Thus there are two electrical connections between the two components.
- The PCM also regulates the idle speed when this drops due to the load on the alternator.
- The PCM actuates the engine run relay. This relay ensures that certain loads which have a high current consumption (such as the heated windshield) are only supplied with power when the alternator is working.
- The PCM switches the charge indicator in the instrument cluster on and off.

**Initial alternator operation when starting engine**

- As soon as the ignition is switched on, conventional alternators draw current which is therefore no longer available to start the engine.
- In addition, the starter motor must apply a relatively large amount of power to drive the alternator as this builds up a magnetic field during starting.
- The PCM-controlled alternator of the “smart charge” power supply system is not activated during starting. The alternator is not switched on until the engine has fired.
- The alternator is switched on electronically by the PCM. The alternator output is progressively increased to the required value.

**Fast idle speed**

- When the current consumption is high because loads are switched on or the battery is discharged, the system is able to boost the idle speed progressively by up to 125 rpm.
- The increased idle speed allows the alternator to deliver increased electrical output.

**Diagnosis and testing**

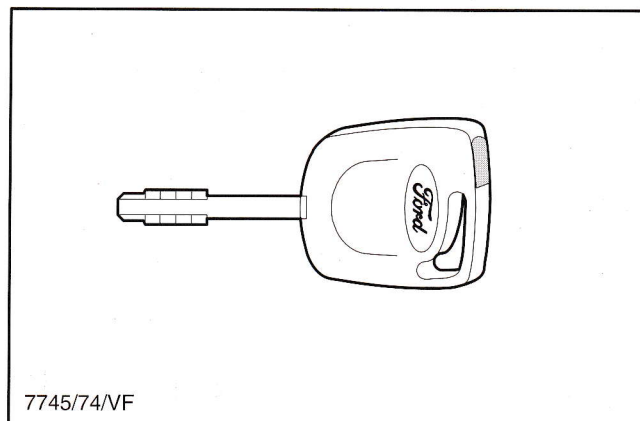
- The “smart charge” power supply system is checked during the self-test. If the control system fails, the alternator works with a fixed charging voltage. The PCM switches the charge indicator on.
- With the fixed charging voltage it works like a conventional alternator and therefore still supplies sufficient current for all the vehicle systems.
- After the ignition is switched on, the PCM switches on the charge indicator to check the operation of the alternator. If the alternator delivers charging current after the engine has fired, the PCM switches the charge indicator off again.
- The system can be checked with FDS 2000.

**Passive anti-theft system (PATS)**

- All versions of the Focus are equipped with the passive anti-theft system (PATS).
- The integral PATS is part of the PCM control electronics. There is no PATS module or component inside the PCM. All the PATS functions are executed by the PCM.
- The PATS LED is located above the clock.
- PATS now has a “crypto transponder” with an automatically variable code.
- The key for the new PATS with the “crypto code” can be recognized by the blue marking.

**NOTE:** Keys with a red or blue marking cannot be used for the other system.

- If an attempt is made to start the vehicle with a key which is not programmed, the PCM initiates the “anti-scan” mode. This prevents the engine starting for 20 seconds, even when the correct key is being used.



**Key with blue marking**



## Identifying faults

- PATS can be checked with the FDS 2000. It is still possible to identify faults with the flashing code.

Flashing code	Description	Possible cause/remedy
11	Transceiver not connected	Check wiring and connectors between PCM and transceiver
12	Transceiver faulty	Check fixture of transceiver; install new transceiver
13	No code received	Faulty or wrong key (no Focus PATS key)
14	Code only received in part	Check fixture of transceiver; check battery voltage; check for metal near key used
15	Wrong code received	Wrong (not programmed) key
21	Not enough keys stored	Store missing keys

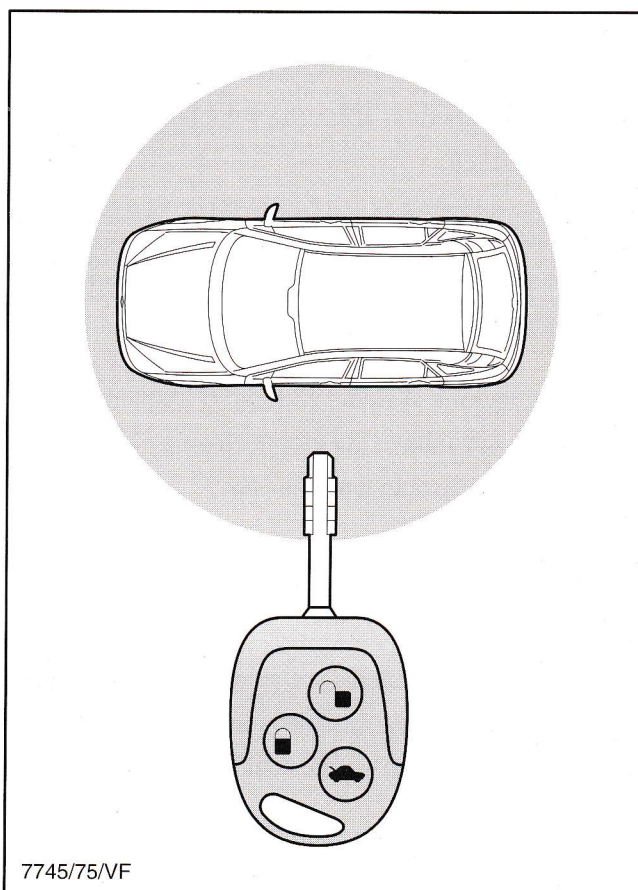
## Central locking

- The Focus can be supplied with various locking systems:
  - central locking
  - central locking with radio frequency remote control
  - central locking with double locking and radio frequency remote control
  - central locking with double locking, radio frequency remote control and anti-theft alarm system
  - central locking with double locking, radio frequency remote control and anti-theft alarm system with interior monitoring
- The central locking and anti-theft alarm systems are largely the same in design and operation as those in the current Mondeo.

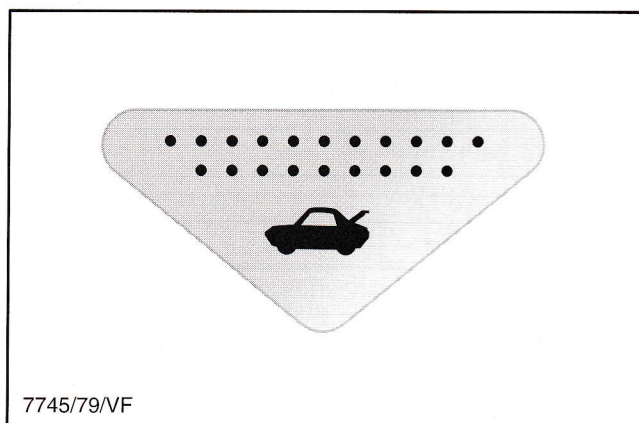
**NOTE:** In service the remote control of the Focus **must not** be interchanged with the similar looking remote control of the current Mondeo (transponder changed). Note the parts number.

## Operation

- The liftgate or luggage compartment lid can be unlocked using the vehicle key, the radio frequency remote control or the switch in the instrument panel.
- Unlocking using the switch in the instrument panel is disabled at vehicle speeds in excess of 7 km/h (4 mph). Unlocking using the switch is also impossible when the vehicle is locked.



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Switch for unlocking liftgate/luggage compartment lid

## Operation (continued)

- When an anti-theft alarm system is installed, it is always switched on when the vehicle is single or double locked.
- The interior monitoring function of the anti-theft alarm system is only switched on when the vehicle is double locked.
- Central locking systems with radio frequency remote control have the global closing system for the electrically operated windows.
- The radio frequency remote control only works when the ignition is switched off.
- All the locking systems are controlled by a module. The central locking module is located in the right-hand footwell on the A-pillar.
- As in the case of the Mondeo, radio frequency remote controls must be programmed in the central locking module for the radio frequency remote control to operate.
- All versions can be checked with FDS 2000, except those with the single central locking.

- The self-test without diagnostic equipment can be carried out on all locking systems with double locking and/or anti-theft alarm system.

## Self-test without diagnostic equipment

- The self-test mode can be called up by operating any door contact switch (or the contact switch for the hood or liftgate) six times within eight seconds.
- For this, the ignition and the anti-theft alarm system must be switched off.
- When carrying out the following checks, the operation of the components concerned is confirmed acoustically and visually by acoustic signals ("gong") and illumination of the turn signal lamps.
- In the absence of acoustic or visual confirmation in response to the checks carried out, the corresponding components and their electrical connections must be checked.

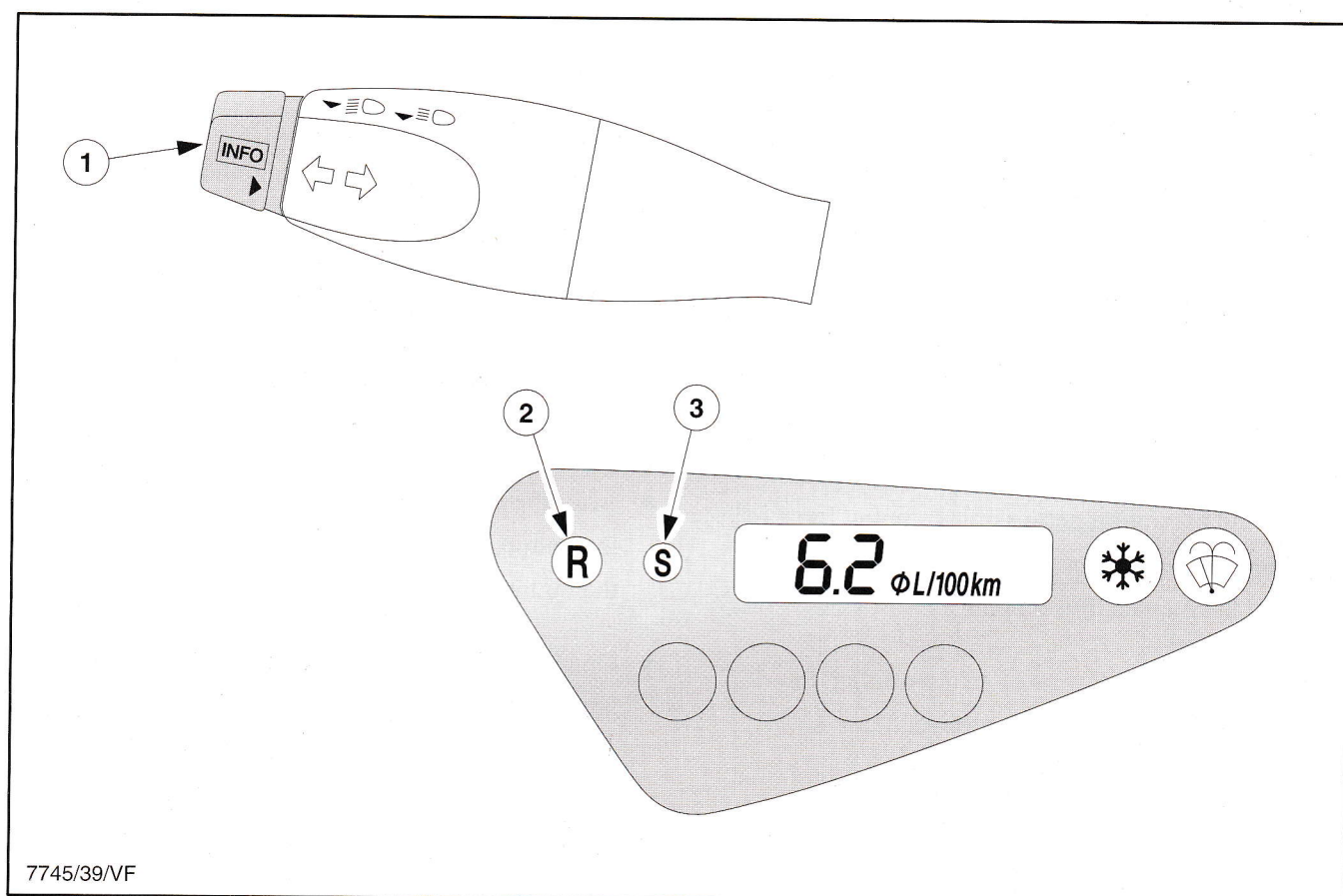
Check to be carried out	Number of acoustic and visual signals
Open door or hood	1
Open liftgate/luggage compartment lid (with key)	2 (*)
Lock door with key	2
Unlock door with key	2
Switch on ignition	1
Disconnect ground connection of audio unit	1 (*)
Operate switch to unlock liftgate/luggage compartment lid	1
Operate radio frequency remote control	1

(\*) with anti-theft alarm system only



### Multifunction display

- On high-series variants a multifunction display is incorporated in the instrument panel. It supplies the following information to the driver:
  - instantaneous fuel consumption
  - average fuel consumption
  - range (with warnings at 80, 40 and 20 km)
  - ambient temperature (with a warning at temperatures below +5°C)
  - low screen washer fluid
- The different functions can be called up in turn using an INFO button on the turn signal lever.
- The Select and Reset buttons are located next to the display.



### Multifunction display

- 1 INFO button on turn signal stalk
- 2 Reset button for setting back average fuel consumption
- 3 Select button for switching between metric and imperial display mode

**Electrically operated windows with anti-trap protection****General**

- Electrically operated windows in the front doors are standard on the Focus. Electrically operated windows for the rear doors are available as an option.
- The functions always include one-touch window opening for the driver door.
- Vehicles equipped with four electrically operated windows also have a function by which the windows are closed when the switch is pressed once into the second position. This function is combined with anti-trap protection and one-touch window opening on all four windows.
- This anti-trap protection is active whenever the window is closing (manual, automatic or global operation). If an object is trapped by the closing window, the trapping force must not exceed a certain limit.
- When the maximum permissible trapping force is reached, the window must open again (reverse) to release the trapped object again.
- Reversing the window must achieve either an opening of at least 20 cm or a travel 5 cm downwards.

**Operation of system**

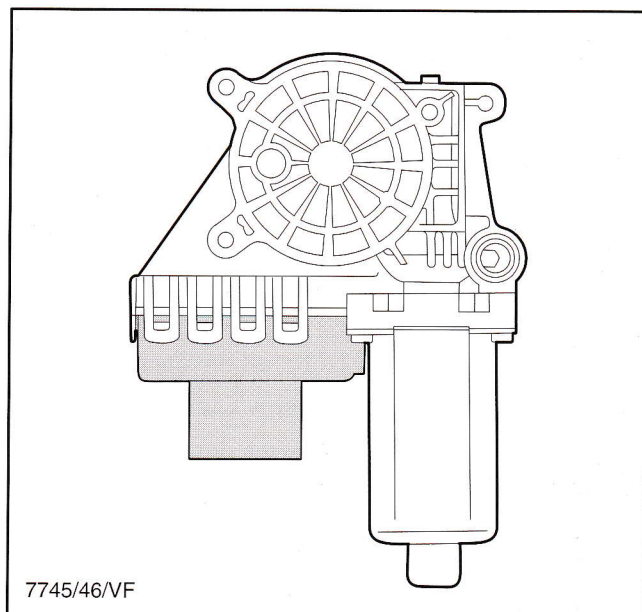
- “Manual” operation is activated by pressing the switch into the first position. The window stops immediately the switch is released.
- “Automatic” operation is activated by pressing the switch into the second position. When the switch is released, the window continues moving as far as the stop.
- The window can be stopped during its movement by pressing the switch again into the first or second position.
- If the “lock” remote control button is held down for two seconds, the global closing function for all the windows is activated (with four electrically operated windows).
- The button can be held down immediately (single locking) or after pressing once (double locking).
- After the activation of the global closing function the button can be released. Any further pressing of the button stops the movement of the windows.
- Operation of the rear windows by means of the switches in the rear can be prevented with the child safety switch in the block of switches on the driver door. However, the rear windows can still be operated with the switches in the front.

## Operation

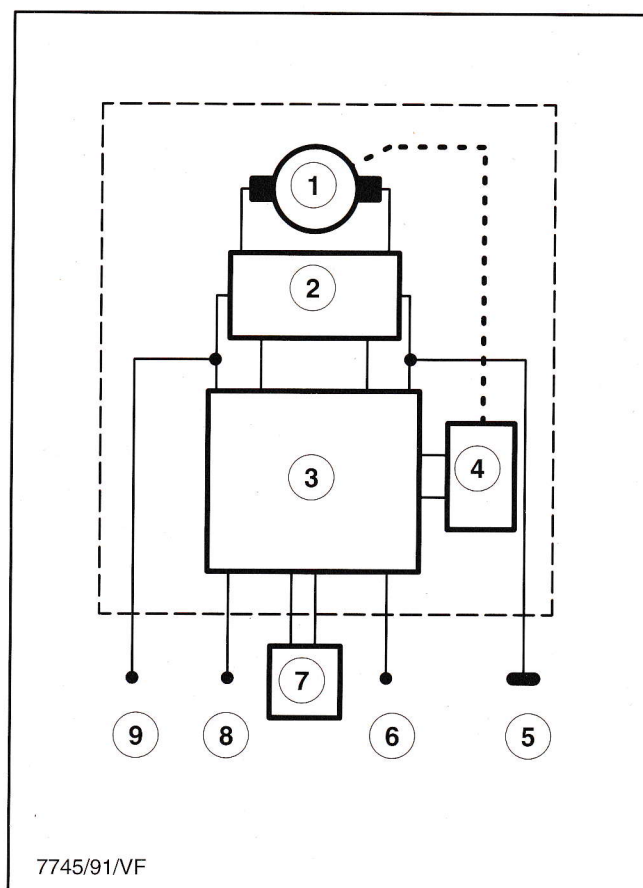
- The power window motor with anti-trap protection has an electronic module.
- The information on the end position of the window is stored in the electronic module.
- The module monitors speed and number of revolutions of the electric motor with the aid of a Hall sensor.
- If the speed drops as the window begins to trap an object, the module stops the motor and reverses the window.
- Stiffness during travel (for example window covered with ice) leads also to reversing of the window. Stiffness can be overrun after the second reversal by manual operation.

## Diagram of electric window module

- 1 Electric motor
- 2 Relay
- 3 Electronic module
- 4 Hall sensor
- 5 Ground (terminal 31)
- 6 Global closing command
- 7 Switch for power window
- 8 Ignition (terminal 15)
- 9 Battery + (terminal 30)



Power window module



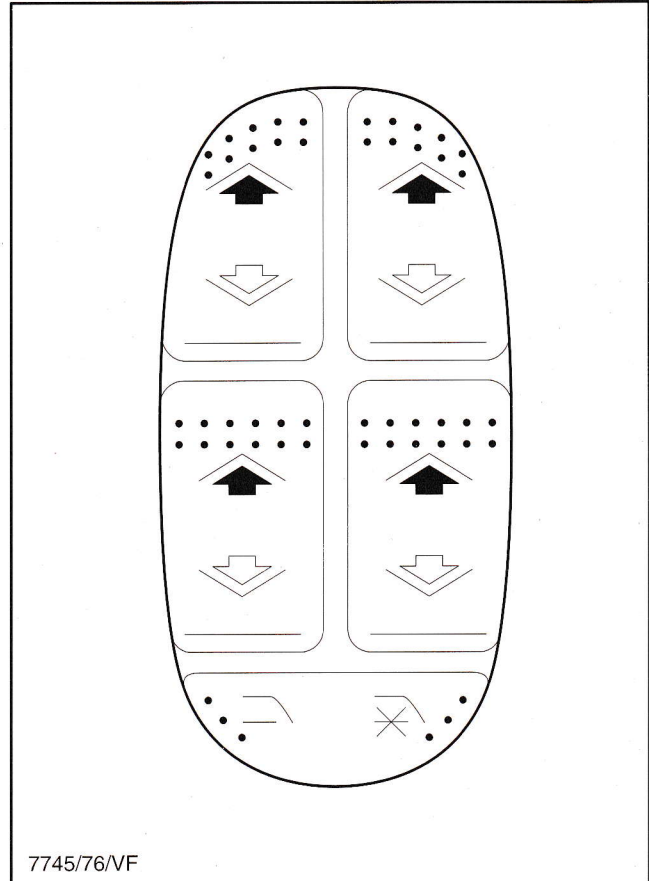


### Initialisation of system

**NOTE:** The vehicles leave the production plant with the electrically operated windows initialised. However, the initialisation must be carried out again whenever the power supply is disconnected.

- The system is initialised for all the operating states by closing each window with the switch pressed and holding the switch down for a further second after the window has reached the seal.
- Then the switch must be held down again for a further second.

**NOTE:** The automatic closing and global closing functions only become operative when the end position has been programmed.



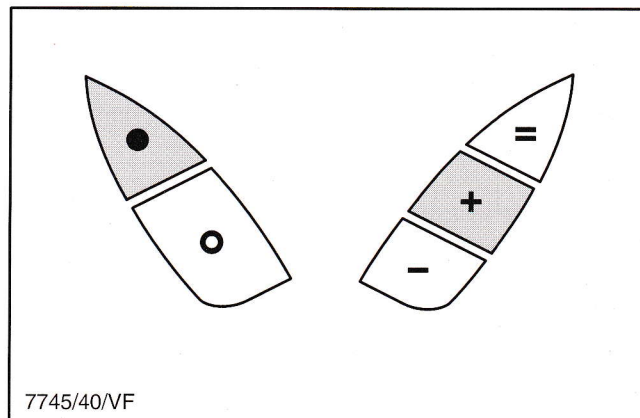
Power window switch

### Soft stop

- After programming, the system has a “soft stop”. The window only touches the upper seal and is no longer run up into it with the full force.
- It may be necessary to carry out the initialisation again to position the window precisely in relation to the upper window frame.
- From time to time the window runs into the upper seal with the full force for renewing its initialisation.
- If the window does not close completely, even by manual operation, pressing the “upwards” switch eight times makes the window run into the upper seal with the full force. A new initialisation is completed by this procedure.

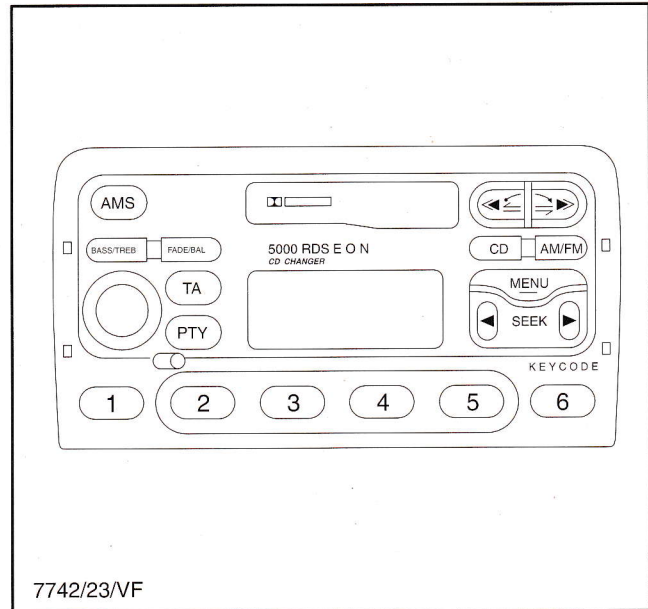
### Speed control system

- Vehicles with a 2.0L Zetec-E engine can be equipped with a speed control system. This system is basically the same as that in the Mondeo.
- It is operated by five illuminated buttons on the steering wheel. When the system is in operation, this is indicated by an indicator in the instrument cluster.



## Audio systems

- Four different audio systems are available for the Focus:
  - Basic installation ready to receive a radio, with antenna, wiring and four speaker grilles (excluding speakers)
  - Series 4000 (radio/cassette with RDS)
  - Series 5000 (“high power” radio/cassette with RDS)
  - Series 6000 (“high power” radio/CD player with RDS)
- These units are largely the same as the existing systems. They now have a rotary control switch instead of the earlier rocker switch to make it easier to adjust the volume.
- All the audio systems drive four speakers in all.



## Integral mobile telephone (hands-free telephone installation)

- A hands-free installation for mobile telephones can be supplied as optional equipment. It works in conjunction with the series 5000 and 6000 audio systems.
- For the hands-free telephone installation a concealed microphone is located in the upper part of the A-pillar. The speakers of the audio system are used as the source of the sound.
- The audio systems have a muting circuit for telephone calls.



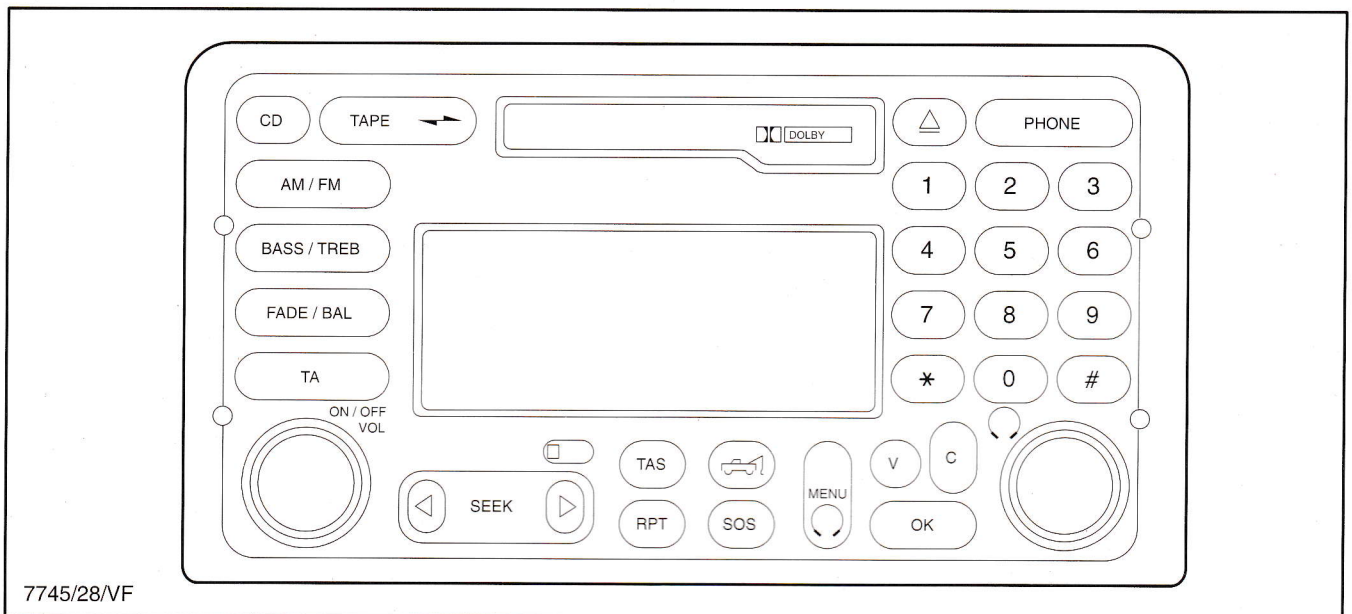
## Telematic system

### General

- The telematic system is an audio system offering the traveller assistance system (TAS) by means of an integral mobile telephone and a GPS receiver.
- Two versions are offered with different audio features. There is a choice of radio and tape cassette (like the series 5000) and radio.
- Behind a detachable ("SEEK") rocker switch there is a slot for insertion of the SIM card. The customer signs the Telematic and GSM contract when the vehicle is purchased. The card is available at the time of the pre-delivery inspection.
- When the SIM card is first inserted, a commissioning operation taking approximately 10 minutes must be initiated, during which data specific to the territory and the code for transmission of the GPS coordinates are loaded by means of the telephone.

**NOTE:** During the initialisation operation the vehicle should be standing out in the open and stationary.

- The telematic system also loads any necessary updates automatically through the telephone.
- The telematic system enables the driver to do the following:
  - make emergency ("SOS") calls,
  - call a breakdown service ("breakdown vehicle" symbol),
  - establish the position of the vehicle,
  - make telephone calls ("PHONE"),
  - obtain route guidance,
  - obtain traffic information,
  - make use of services (such as hotel reservations).



Ford HelpNet 5100 RDS EON

### Telephone

- The telematic system mobile telephone works as a hands-free telephone installation. For this there is an unobtrusive microphone located in the upper part of the A-pillar on the driver side. The speakers of the audio system are used to reproduce the sound.
- The telephone functions are called up using the buttons on the audio unit. They are the same as those of the Ford mobile telephone which is also available separately as an option for the Focus.
- If the customer already has a mobile telephone, incoming calls can be transferred from the mobile telephone or telematic system to the other telephone.

### New TAS features

- Service centers with trained personnel are available to Ford customers around the clock every day of the year. They offer customers a broad spectrum of services in which safety and convenience come top of the list.
- A GPS receiver incorporated in the telematic unit evaluates signals from the worldwide GPS satellite system and continuously calculates the position of the vehicle with an accuracy of 100 m.
- Whenever the customer makes contact with one of the service centers, the position of the vehicle is transmitted. Information in response to customer enquiries (traffic information, services) can be tailored to his current position.

### Emergency calls

- A separate "SOS" button connects the customer to the emergency service personnel who can use the GPS position information to locate the vehicle.
- Security procedures prevent or terminate false alarms. However, required help is always available, even when it is impossible for the customer to speak.
- A further separate button is used to call a breakdown service. Here again the customer is first connected to central breakdown service personnel.
- They then send a vehicle from the appropriate breakdown service (such as ADAC or RAC) to the indicated position of the vehicle.

**Traffic information and route planning**

- With the aid of menus the customer can call up traffic information relating to his position and destination.
- The information extends from local traffic reports to a recommendation for the best route to his destination according to the traffic situation. The information is updated if the conditions change during the journey.
- The information can be provided verbally or alternatively shown on a large display on the telematic unit. The customer can scroll at will through the message on his unit.

**Important facilities and places of interest**

- In addition to accurate electronic maps, the service personnel also have up to date information on important facilities and places of interest, among other things:
  - filling stations
  - Ford dealers
  - hospitals
  - hotels, restaurants and camp sites
  - car parking
  - sights
  - cinemas and theaters
  - automatic cash machines
  - railway stations
  - sports centers
  - shopping centers
  - police stations
- The service personnel are able to describe how to get to the named places or find the nearest facility.

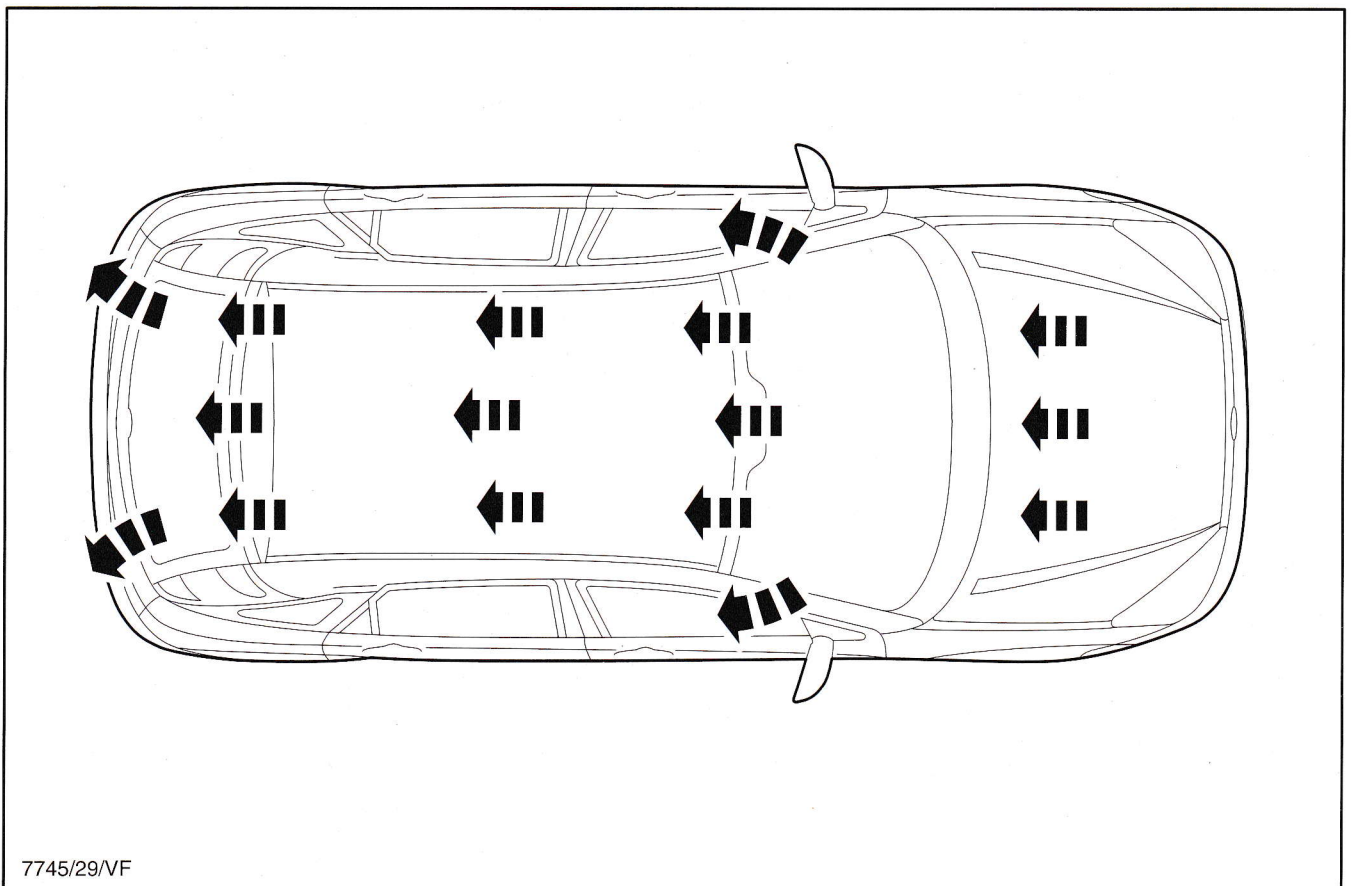
**Ordering service**

- The service personnel are also able to accept reservations and orders for:
  - airlines
  - hotels
  - theaters
  - restaurants
  - workshops
  - test drives in new Ford models
  - car rental
  - parking
  - florists
  - railway stations
- The service personnel are able to work out individual solutions for services which are not available directly.



## General

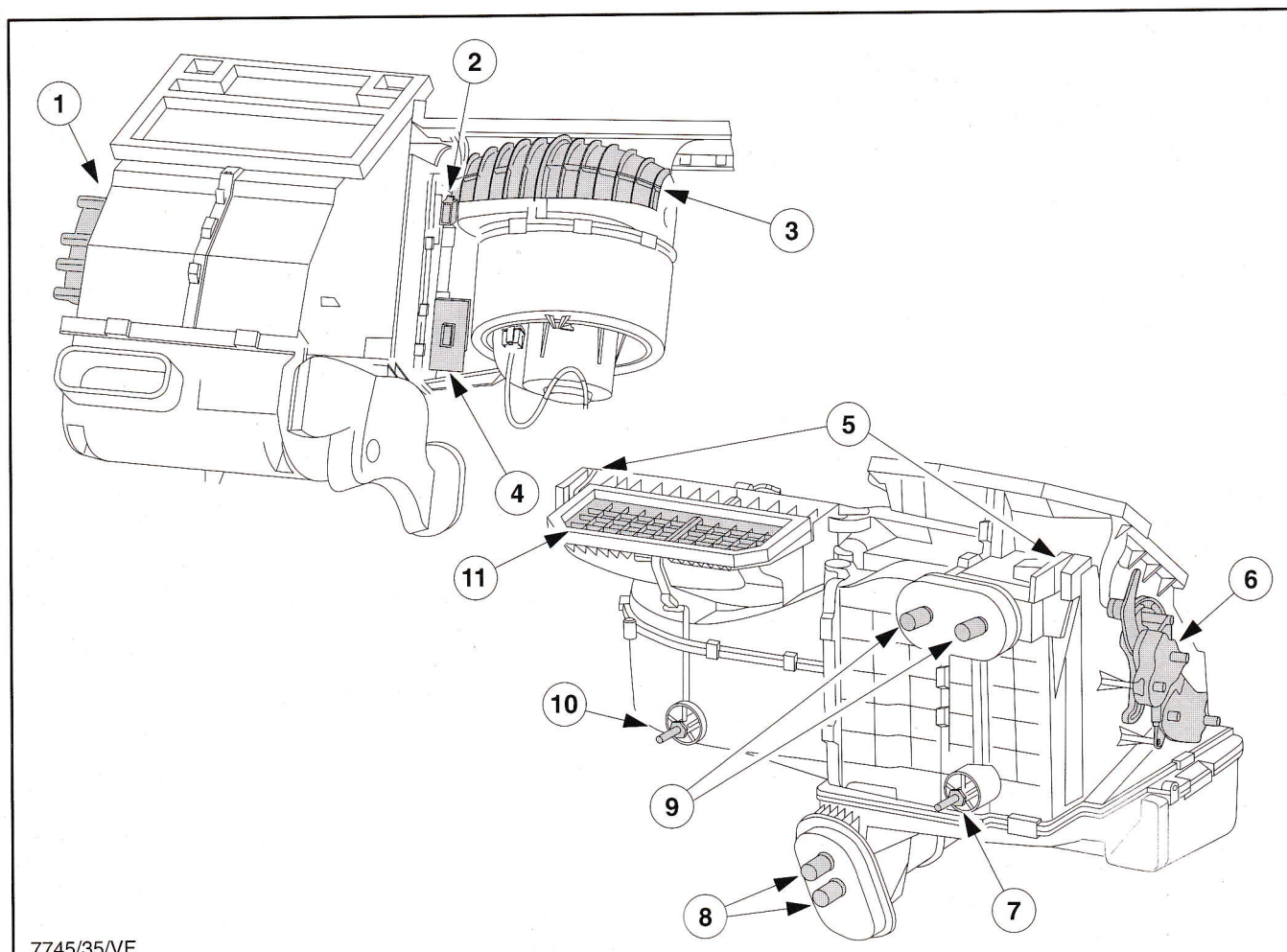
- In most territories the pollen filter is standard equipment. In normal vehicle operating conditions it must be changed every 30,000 km (20,000 miles).
- If no pollen filter is installed, a plastic grille is fitted over the air inlet. It can easily be changed for a pollen filter.
- Air is continuously directed to the windshield and side windows irrespective of the setting of the air distribution controls.
- All vehicles have an air recirculation function. If the air recirculation function is selected, it is deactivated after the ignition is switched off and on.
- The air recirculation function is also deactivated at blower speed "0", but can be switched on again.
- For the Scandinavian market vehicles with a diesel engine are equipped as standard with a fuel-operated booster heater of the kind also available for the Mondeo.



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Passage of fresh air through vehicle interior

- Coolant flows through the heater radiator all the time. On the air side the heating output is regulated by mechanical operation of the temperature regulating door.
- A new heater radiator can be installed without removing the air distribution housing.
- Once the side air ducts have been removed, the lower part of the housing can be extracted with the heater radiator.
- To install a new air conditioning evaporator, the complete housing must be removed and disassembled.



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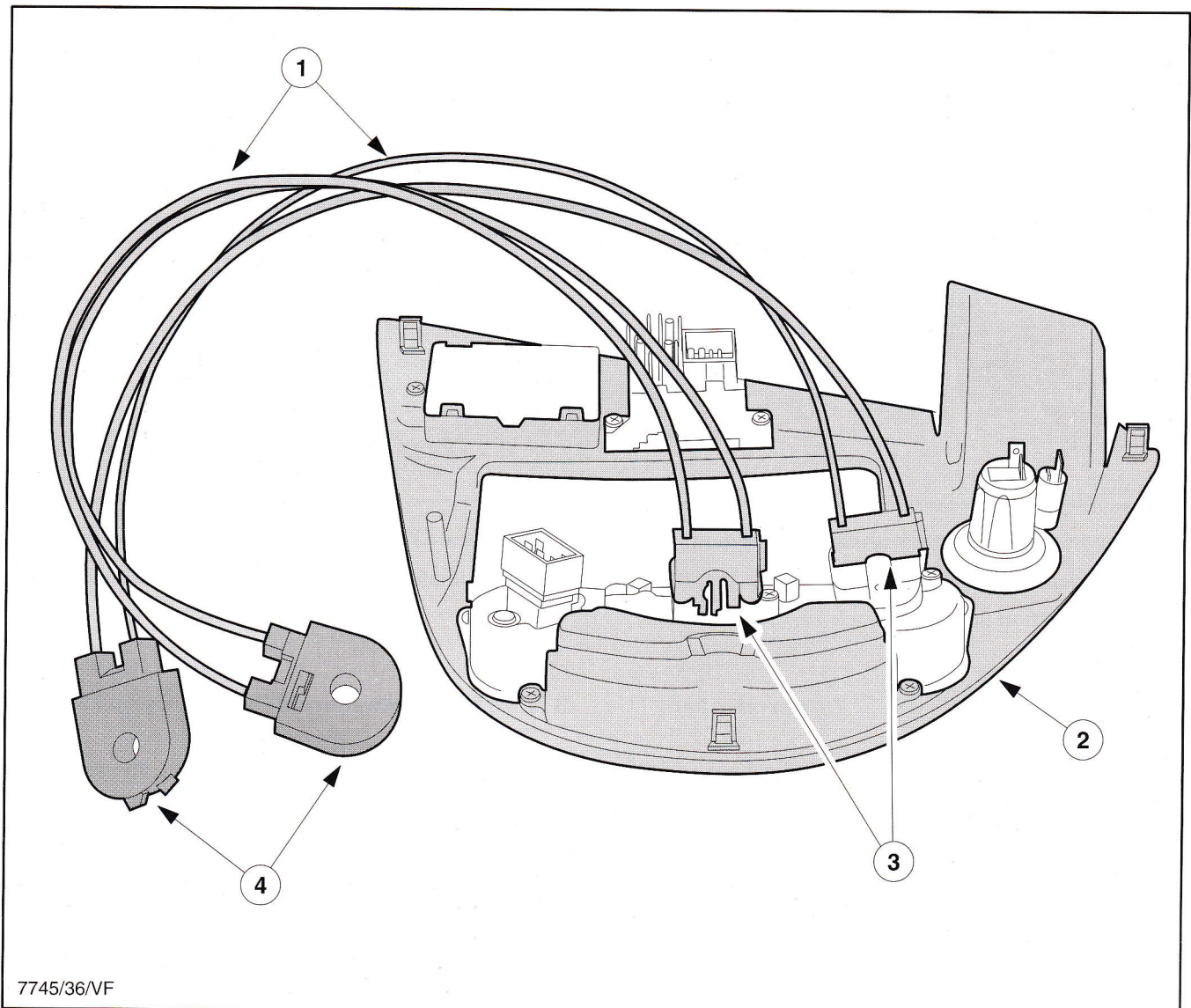
### Air distribution housing

- |   |                                   |
|---|-----------------------------------|
| 1 Mechanism for operating air doors               | 7 Threaded fixing stud            |
| 2 Electric servo motor for air recirculation door | 8 Connections for heater radiator |
| 3 Interior air inlet                              | 9 Connections for evaporator      |
| 4 Blower motor ballast resistor                   | 10 Threaded fixing stud           |
| 5 Openings for studs welded to body               | 11 Exterior air inlet             |
| 6 Mechanism for operating air doors (side view)   |                                   |



### Operation of air doors

- The temperature regulating and air distribution doors are operated mechanically by means of two operating cables in each case.
- When the operating cables are removed and installed, the knobs must be turned to the left-hand stop.
- In this position the air door mechanism engages slightly. This makes it easier to install the operating cables.
- The operating cables for LHD and RHD variants are the same. They are merely connected to the air door operating mechanism by the other side of their connectors.

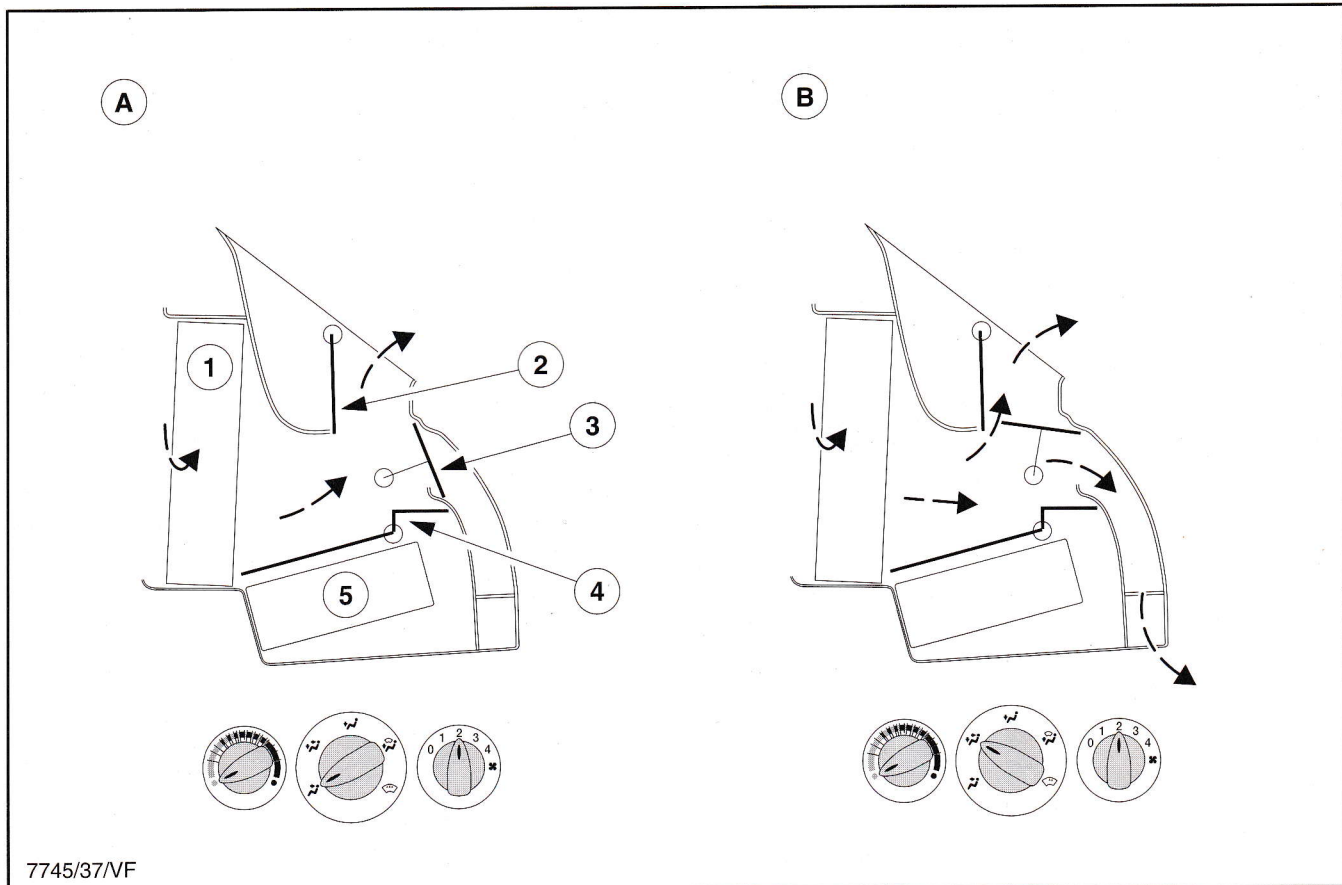


### Operating cables

- 1 Encapsulated cables
- 2 Operating unit (back)
- 3 Couplings which plug into knobs
- 4 Connectors which attach to air door operating mechanism



Operating of air doors (continued)



- 1 Evaporator (on variants with air conditioning)
- 2 De-ice/demist door
- 3 Air distribution door

- 4 Temperature regulating door
- 5 Heater radiator

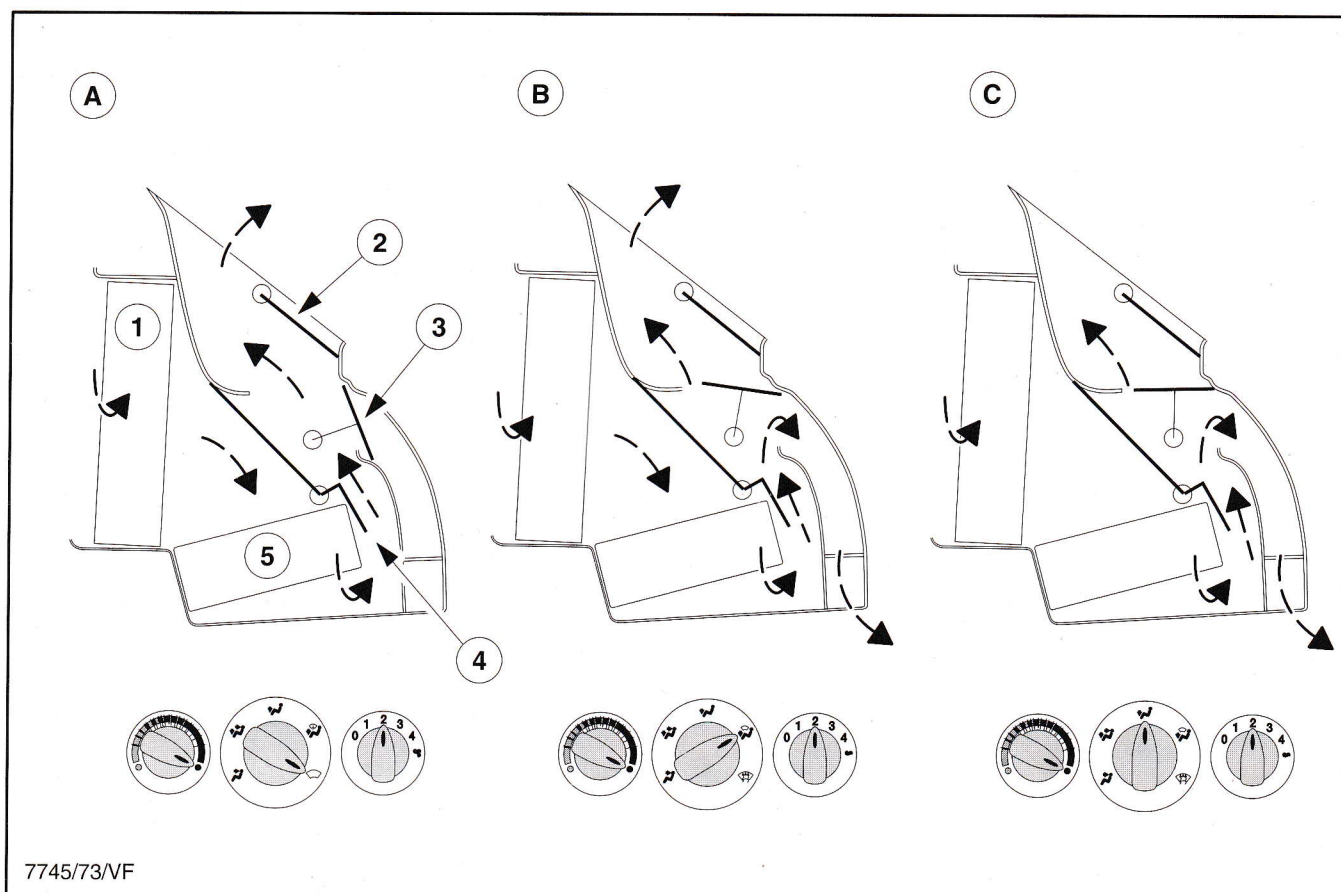
**A Face level (cold)**

- The induced air first flows through the evaporator (1). The temperature regulating door stops the incoming air passing to the heater radiator (5).
- The cooled air reaches the vents in the instrument panel. The de-ice/demist and footwell ducts are closed.

**B Face level/footwell (cold)**

- After passing through the evaporator, the incoming air passes to the ducts for the vents in the instrument panel and footwell.

# Operation of air doors (continued)



1 Evaporator (on variants with air conditioning)

2 De-ice/demist door

3 Air distribution door

4 Temperature regulating door

5 Heater radiator

## A De-ice/demist (warm)

- The incoming air first flows through the evaporator (1) and then through the heater radiator (5).
- From the heater radiator the warmed air passes to the vents by the windshield.

## C Footwell (warm)

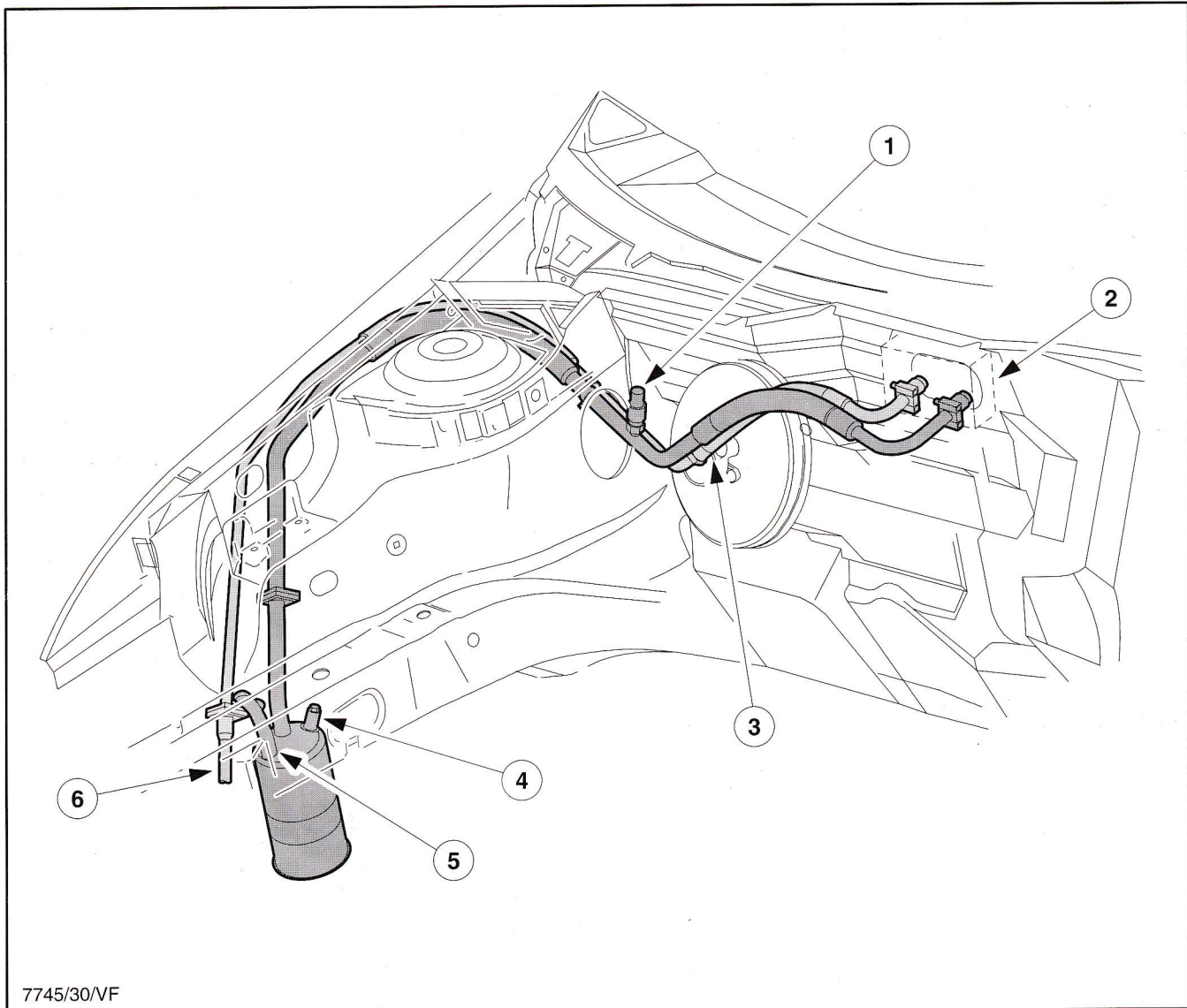
- The air warmed by the heater radiator is directed into the footwell.
- As already mentioned, with this valve setting a part of the air is also directed to the windshield and side windows.

## B De-ice/demist/footwell (warm)

- The air warmed by the heater radiator is directed to the vents by the windshield and in the footwell.

**Refrigerant circuit**

- The Focus can optionally be supplied with an air conditioning system. This works on the fixed orifice tube principle.
- The temperature is regulated manually by the user.
- The type of fixed orifice tube and the positions of the service connections are the same on all model variants.

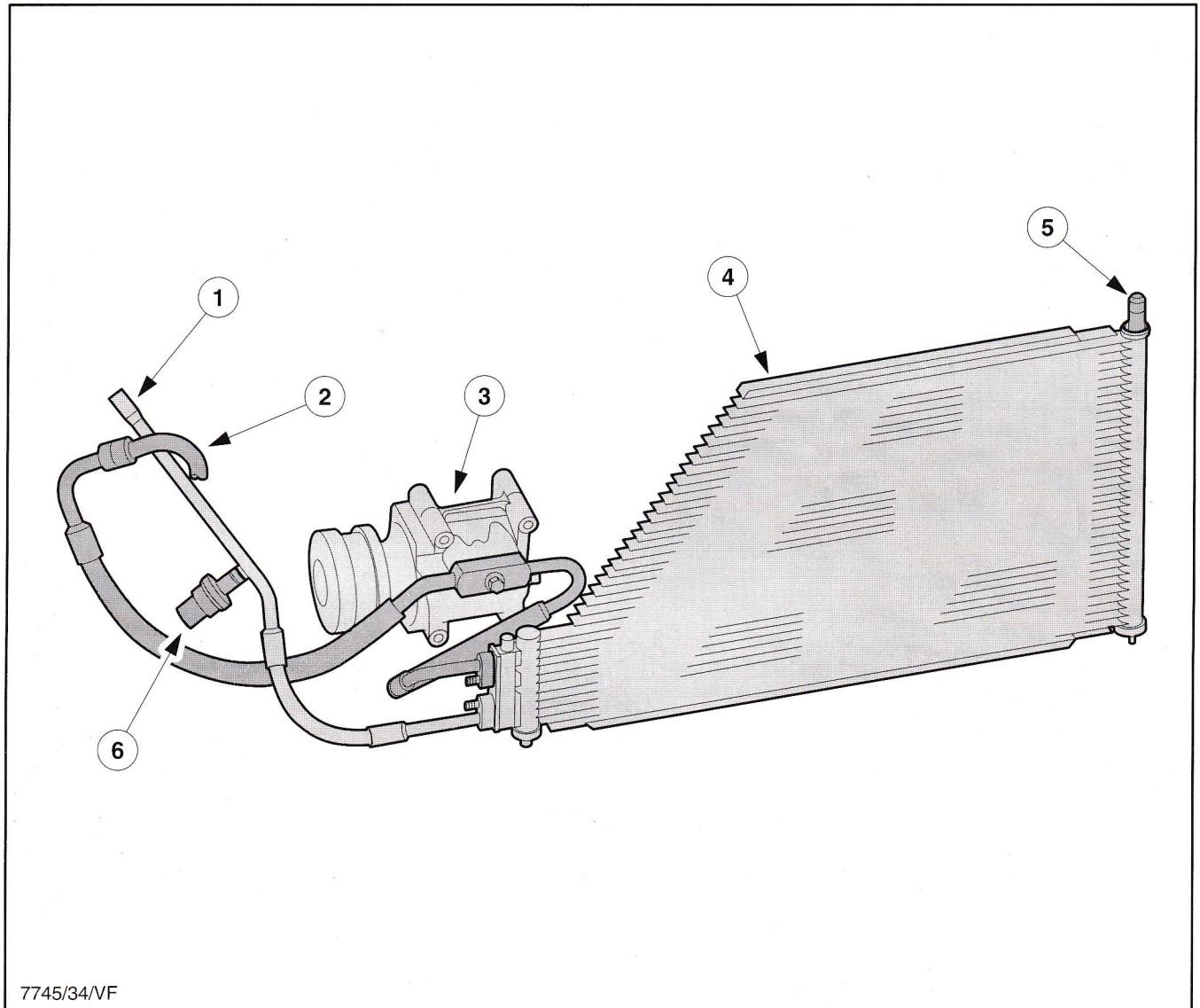


- 1 Low-pressure switch
- 2 Evaporator
- 3 Fixed orifice tube
- 4 Low-pressure service connection on suction accumulator/drier
- 5 Line to low-pressure connection on compressor
- 6 Line from high-pressure connection on compressor



### Refrigerant circuit (continued)

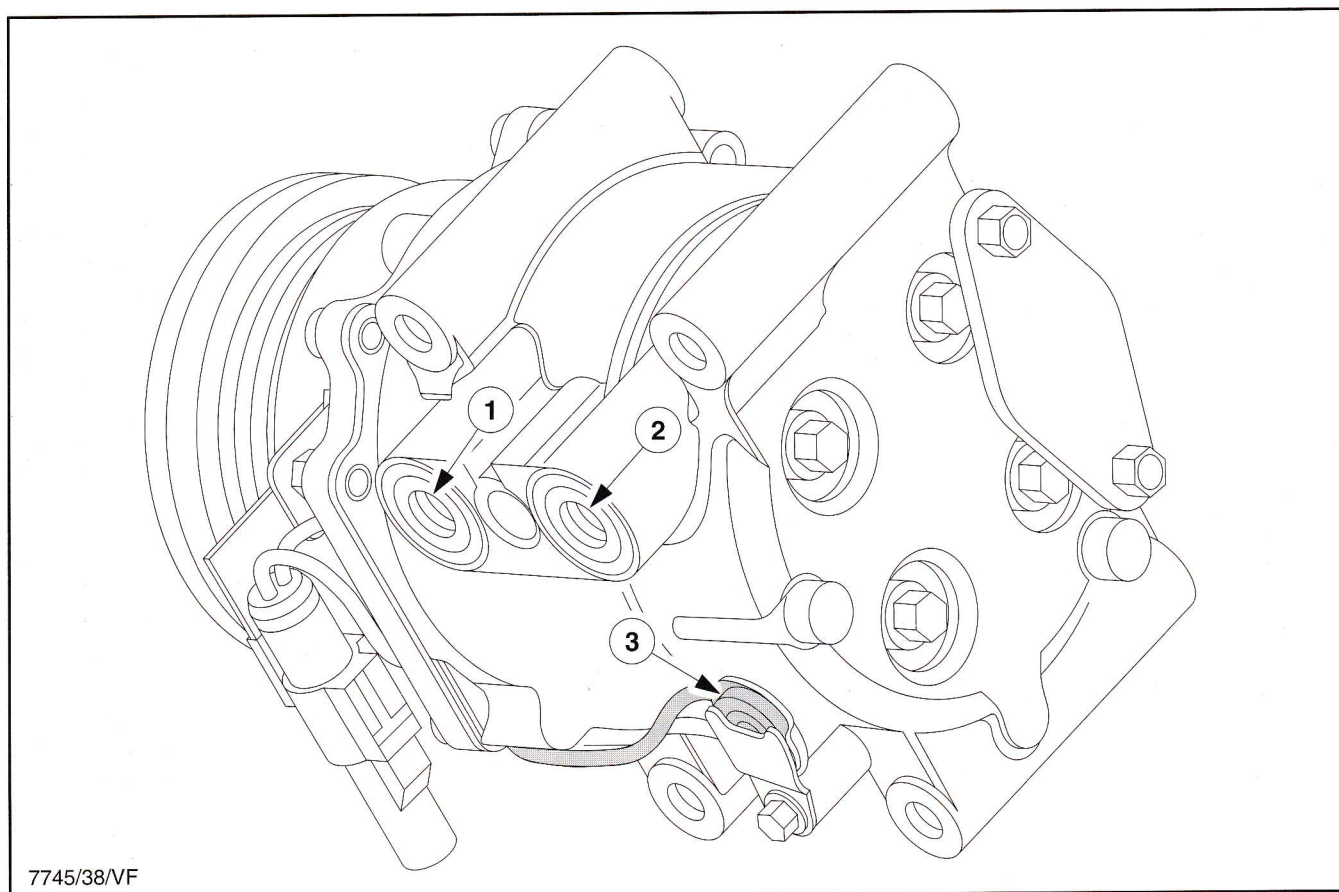
- Vehicles with air conditioning have two electric fans for the radiator and condenser.



- |                                    |                                    |
|------------------------------------|------------------------------------|
| 1 High-pressure line to evaporator | 4 Condenser                        |
| 2 Low-pressure line to compressor  | 5 High-pressure service connection |
| 3 Compressor                       | 6 High-pressure switch             |

### Compressor

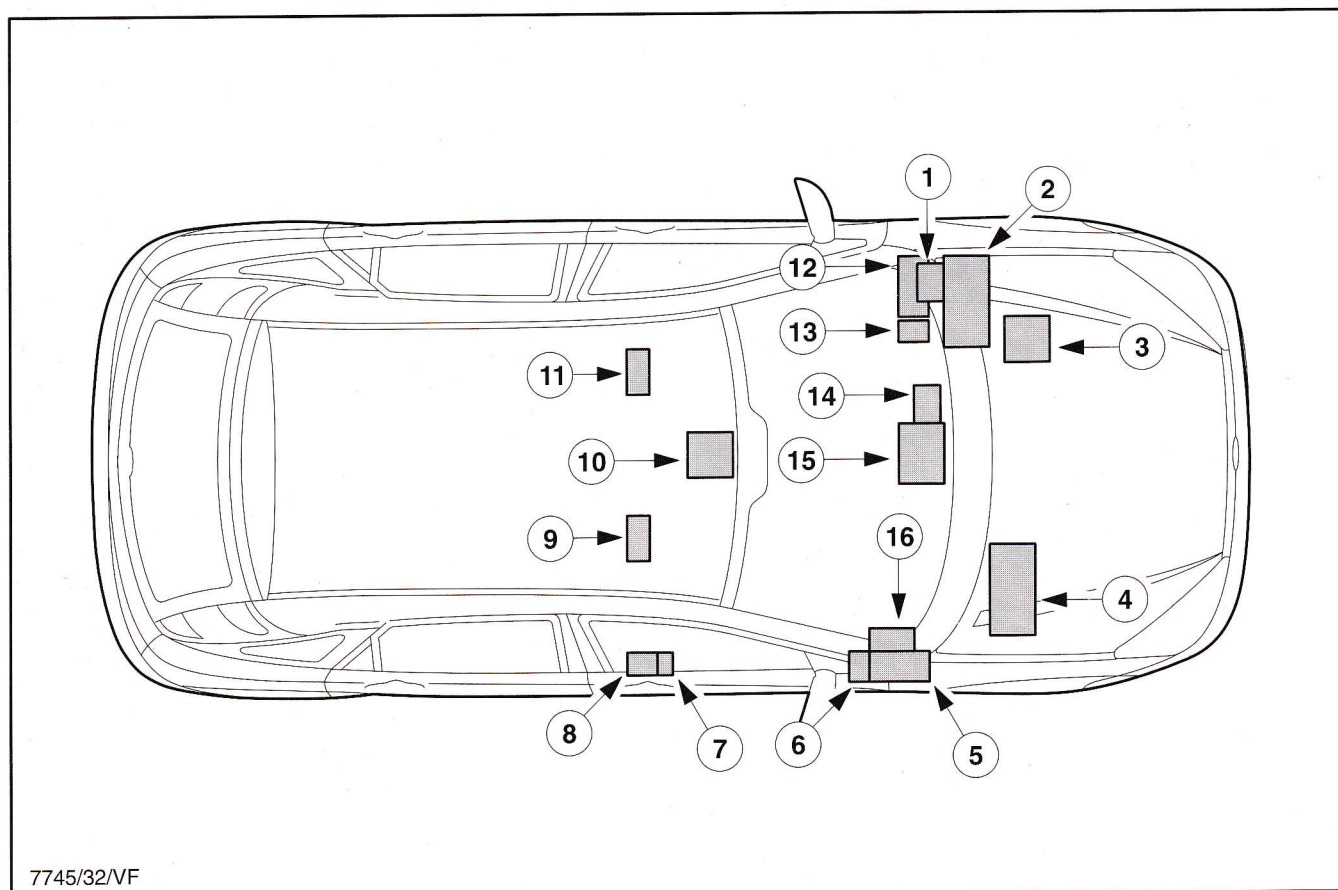
- The compressor is a scroll compressor which has a controlled output and is of the type used in the Fiesta '96 with a diesel engine. The type designation is FVS 090 (Ford variable scroll).
- The compressor incorporates a thermal protection switch (TPS) which cuts the power supply to the electromagnetic clutch when the temperature at the compressor outlet (high-pressure) reaches 115°C.



- 1 Compressor inlet (low-pressure)
- 2 Compressor outlet (high-pressure)
- 3 Thermal protection switch (TPS)

## Diagnosis and testing

### Locations of modules and data link connector (LHD shown)

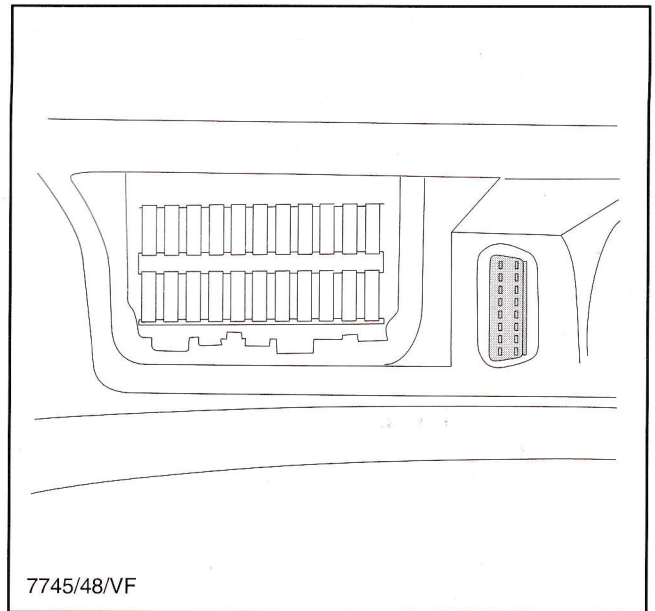


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- |                               |                                      |
|-------------------------------|--------------------------------------|
| 1 Central timer module (CTM)  | 9 Right-hand crash sensor            |
| 2 Battery junction box (BJB)  | 10 Air bag module                    |
| 3 ABS or ESP module           | 11 Left-hand crash sensor            |
| 4 Auxiliary heater            | 12 Central junction box (CJB)        |
| 5 PCM with integral PATS      | 13 Data link connector (DLC)         |
| 6 Inertia fuel shutoff (IFS)  | 14 Multifunction display             |
| 7 Lateral acceleration sensor | 15 Traveller assistance system (TAS) |
| 8 Yaw rate sensor             | 16 Central locking module            |



- Diagnostic checks can be carried out on the following systems using FDS 2000:
  - engine management (EEC V PCM)
  - ABS, TCS and ESP
  - supplementary restraint system (SRS)
  - double locking and anti-theft alarm system
  - passive anti-theft system (PATS)
  - central timer module (CTM)
  - booster heater
  - Telematic system
  - multifunction display
  - instrument cluster
- The data link connector (DLC) is located on the right-hand side of the central electric box.



**Data link connector (DLC)**

## Overview – new special tools/diagnostic equipment

---

The following is a list of all the new special tools for the Focus (**correct at the time of going to print**). Please refer to the Service Microfiche for further special tools.

13-023	Expander for Teflon seal of power steering hydraulic pipe
13-024	Socket for removal and installation of power steering hydraulic pipe
13-024-01	Adaptor for 13-024
13-025	Socket – tie-rod to steering gear
16-092	Removal tool for halfshaft
16-092-01	Adaptor for removal tool for halfshaft
21-140-08	Adaptor for engine support bar
21-229	Remover for camshaft sprocket (diesel engine)
21-230	Aligner for oil pump and installation of oil seal (diesel engine)
21-231	Aligner for crankshaft oil seal carrier (diesel engine)
23-054	Wrench for sender unit for fuel gauge/fuel pump
40-010	Passenger air bag simulator
40-011	Side air bag simulator

The abbreviations conform to standard SAE J1930 with the exception of those marked with an asterisk \*.

<b>ABS*</b>	<b>Anti-lock Braking System</b>	<b>DLC</b>	<b>Data Link Connector</b>
<b>ADAC*</b>	<b>Allgemeiner Deutscher Automobil Club</b>	<b>DOHC*</b>	<b>Double Overhead Camshaft</b>
<b>BJB*</b>	<b>Battery Junction Box</b>	<b>EBD*</b>	<b>Electronic Brake Force Distribution</b>
<b>BTCS*</b>	<b>Brake Traction Control System</b>	<b>ECT</b>	<b>Engine Coolant Temperature</b>
<b>ACP*</b>	<b>Audio Communication Protocol</b>	<b>EEC*</b>	<b>European Economic Community</b>
<b>CAN*</b>	<b>Controller Area Network</b>	<b>EEC V*</b>	<b>Electronic Engine Control System 5</b>
<b>CD*</b>	<b>Compact Disc</b>	<b>EGR</b>	<b>Exhaust Gas Recirculation</b>
<b>CFC</b>	<b>Chlorinated Fluorocarbon</b>	<b>EI</b>	<b>Electronic Ignition</b>
<b>CHT*</b>	<b>Cylinder Head Temperature</b>	<b>ESP*</b>	<b>Electronic Stability Program</b>
<b>CJB*</b>	<b>Central Junction Box</b>	<b>ESSC</b>	<b>Electronic Synchronous Shift Control</b>
<b>CKP</b>	<b>Crankshaft Position</b>	<b>EU*</b>	<b>European Union</b>
<b>CMP</b>	<b>Camshaft Position</b>	<b>EVAP</b>	<b>Evaporative Emission</b>
<b>CTM*</b>	<b>Central Timer Module</b>	<b>FDS*</b>	<b>Ford Diagnostic System</b>



## List of abbreviations

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<b>FP</b>	<b>Fuel Pump</b>	<b>O/D*</b>	<b>Overdrive</b>
<b>FVS*</b>	<b>Ford Variable Scroll</b>	<b>PATS*</b>	<b>Passive Anti-Theft System</b>
<b>GPS*</b>	<b>Global Positioning System</b>	<b>PCM</b>	<b>Powertrain Control Module</b>
<b>HO2S</b>	<b>Heated Oxygen Sensor</b>	<b>PCRV*</b>	<b>Pressure Conscious Regulating Valve</b>
<b>IAC</b>	<b>Idle Air Control</b>	<b>PCU*</b>	<b>Pump Control Unit</b>
<b>IAT</b>	<b>Intake Air Temperature</b>	<b>PSP</b>	<b>Power Steering Pressure</b>
<b>ICM</b>	<b>Ignition Control Module</b>	<b>RAC*</b>	<b>Royal Automobile Club</b>
<b>IFS*</b>	<b>Inertia Fuel Shutoff</b>	<b>RDS*</b>	<b>Radio Data System</b>
<b>KS</b>	<b>Knock Sensor</b>	<b>RHD*</b>	<b>Right-Hand Drive</b>
<b>LAV*</b>	<b>Load Apportioning Valve</b>	<b>SAE*</b>	<b>Society of Automotive Engineers</b>
<b>LED*</b>	<b>Light Emitting Diode</b>	<b>SCP*</b>	<b>Standard Corporate Protocol</b>
<b>LHD*</b>	<b>Left-Hand Drive</b>	<b>SFI</b>	<b>Sequential Multiport Fuel Injection</b>
<b>MAF</b>	<b>Mass Air Flow</b>	<b>SIM*</b>	<b>Single In-line Memory</b>
		<b>SLA*</b>	<b>Short and Long Arm (Suspension)</b>

**SRS\***    **Supplementary Restraint System**

**TAS\***    **Traveller Assistance System**

**TCS\***    **Traction Control System**

**TP**    **Throttle Position**

**TPS\***    **Thermal Protection Switch**

**VSS**    **Vehicle Speed Sensor**