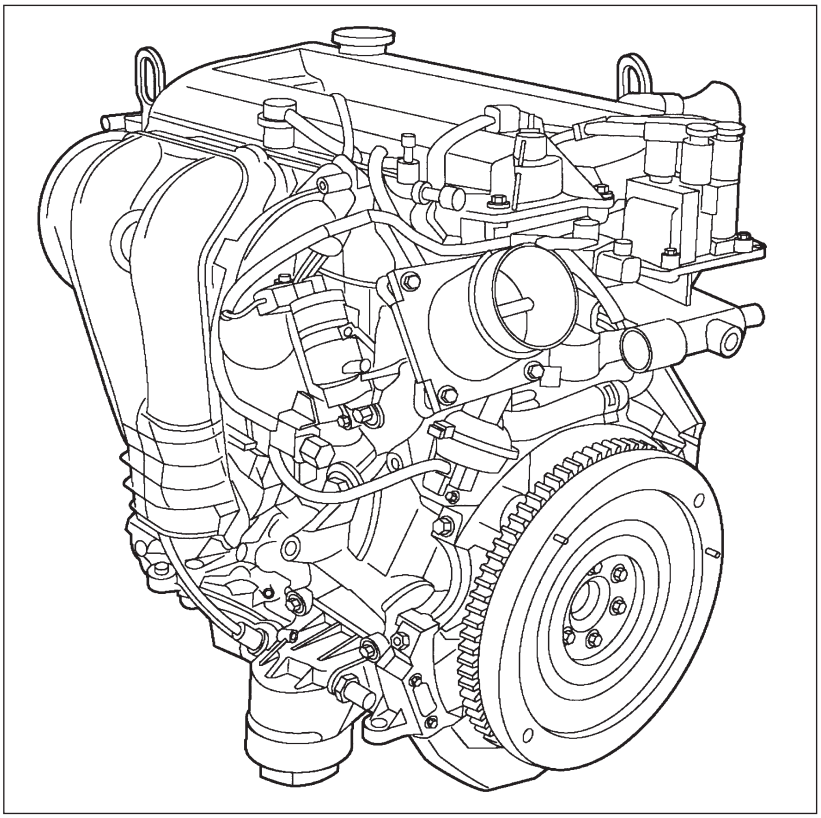
ENGINE SPECIFICATION

DHE RANGE

DHE 418 and DHE 420
4 CYLINDER IN-LINE
AUTOMOTIVE GASOLINE ENGINES

Ford Power Products

The Source for Power...
Worldwide™



Contents

REGISTERED FIRM ISO 9001:1994 UKAS QUALITY MANAGEMENT 028

The information in this publication is based on tests of representative engines from the range. Ford Power Products reserves the right to change the specification at any time. Where possible any such changes which may be introduced after the publication of this booklet, but before it is supplied will be incorporated herein.

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Introduction

The DHE Range engines described in this brochure are based upon the engines used in the Ford Mondeo passenger car. They are of all aluminium construction and of four-cylinder, in-line configuration and are intended for automotive applications. Both engines are available for use in east-west (transverse) installations.

The DHE 418 engine has a capacity of 1,8 litres and the DHE 420 engine has a capacity of 2,0 litres.

On both engines, the aluminium alloy cylinder block incorporates a separate aluminium alloy stiffening frame which carries the five crankshaft bottom bearing shells. This arrangement, together with the structural cast aluminium oil pan, gives enhanced engine stiffness resulting in quieter and smoother running.

Both engines use 'silent chain' driven twin overhead camshafts operating four valves per cylinder. The sequential fuel injection system is controlled by a sophisticated electronic engine management system that enables current European emission control requirements to be met when used with a three-way catalytic converter in the exhaust system.

The principal features of these engines are:

- Aluminium alloy cylinder block with cast-in cylinder liners and deep drawn side walls to reduce vibration.
- Structural aluminium stiffening frame carrying crankshaft bottom bearing shells for increased engine stiffness.
- Five bearing crankshaft with fillet rolled main and crankpin journals.
- Dual mass flywheel
- Aluminium alloy 'cross-flow' cylinder head.
- Four-layer steel laminate cylinder head gasket.
- Sintered material valve seat inserts and valve guides.
- Five bearings for each camshaft.
- Valve gear with maintenance-free mechanical 'bucket' tappets.
- Thermoplastic inlet manifold with integral electronically controlled 'swirl plates' to increase intake air swirl at lower engine speeds.
- 'Silent chain' driven chilled iron camshafts.
- Asymmetrically inclined valve angles (inlet 19° & exhaust 10° from the vertical).
- Distributorless ignition system.
- Asbestos-free gaskets used throughout.
- Cast aluminium alloy camshaft cover.
- Lightweight high silicon aluminium pistons with two compression rings and 3-piece oil control rings.
- Piston cooling by means of nozzles in the crankshaft bearings.
- Camshaft drive pinned link chain designed to achieve maintenance-free operation
- Hydraulic engine mount.
- Aluminium alloy timing chain cover with integral crankshaft oil seal.
- Ribbed, structural aluminium alloy oil pan for increased rigidity.
- Electrically heated thermostat to achieve lower fuel consumption and exhaust emissions.
- Automatic hydraulic tensioner on camshaft drive chain.
- Plastic inserts on camshaft drive chain sprockets for virtually silent running.
- Oil pump driven by separate chain with automatic tensioner.
- Oil filter housing with integrated oil filter element.
- EGR system controlled by a water-cooled stepper motor.
- Visteon 'Black Oak' engine management system.
- 'Sinter-forged' connecting rods with fracture-split big ends.
- Exhaust manifold of welded steel tube construction.

Basic Engine Data

Engine Model	DHE 418	DHE 420
Displacement:	1798 cc	1999 cc
Bore:	83,0 mm	87,5 mm
Stroke:	83,1 mm	83,1 mm
Compression ratio:	10,8: 1	10,8: 1
Firing order:	1-3-4-2	1-3-4-2
Max. continuous speed:	6450 rpm	6450 rpm
Max. intermittent speed:	6800 rpm	6675 rpm
Idle speed:	700 ± 25 rpm	700 ± 25 rpm
Maximum BMEP:	11,9 bar	11,9 bar
Height (nominal):	640 mm	640 mm
Width (nominal):	650 mm	650 mm
Length (nominal):	630 mm	630 mm
Weight (nominal) with oil but less alternator:	109 kg	109 kg

Options

For the current list of production options, refer to the Engine Build Scheme Chart.

Use of these items in specialist vehicles will require great care in selecting associated emission devices and some re-calibration is to be expected following any compulsory emission validation. For information on the compatibility and conformability of the various emission options please refer to Ford Power Products Engineering.

The available options include: Alternator, starter motor, engine management module with PATS (Passive Anti-Theft System), distributorless ignition coil, engine bay wiring loom, oil pan and flywheel assembly to suit a transverse transmission, 5-speed manual transaxle assembly, gear change mechanism, clutch and release mechanism, clutch master cylinder, front and rear engine mountings, electric fuel pump, electric cooling fan assembly, air cleaner assembly and crankcase ventilation components. A power steering pump and air conditioning compressor are also available.

To enable current European automotive emission requirements to be met, a close coupled, tri-metal catalytic converter and an evaporative emission control system are available.

Power Ratings

Full power curves to EEC 88/195 are included at the end of this publication.

Engine Model	Max. Power	Max. Torque
DHE 418:	92 kW at 6000 rpm	170 Nm at 4500 rpm
DHE 420:	107 kW at 6000 rpm	190 Nm at 4500 rpm

Exhaust Emission Certification

The DHE Range engines described in this brochure are based on engines which, when installed in the Ford Mondeo, have been homologated to meet current (Stage III) European exhaust emission legislation. In addition, they also comply with Stage IV tailpipe emissions, which do not come into effect until 1st January, 2005.

These engines, when installed in Ford vehicles, also comply with European On Board Diagnosis (OBD) requirements which were implemented in January 2001.

The test procedures required to validate conformity with these emission regulations are very complex. Conformity can be affected by factors such as vehicle weight, tyre size, gear-box ratios, axle ratios and non-standard engine ancillaries such as air cleaners and exhaust systems.

Some further in-vehicle development may therefore be required to pass European or other local legislation. It is the responsibility of the O E M to prepare and submit his equipment for exhaust emission approval.

Installation Data

Recommended Installation Angles (transverse installation)
Vertical, (as in Ford Mondeo) but with the option of the exhaust manifold side downwards to a maximum of 5°.

Operating Angles
Maximum engine angles, including installed angles, for continuous operation:

Front end down:	15°
Rear end down:	15°
Exhaust manifold side down:	25°
Inlet manifold side down:	25°

Please contact the Ford Power Products Engineering Installation Department at Aveley if any other installation angles are contemplated.

Flywheel Data

Mass:	12,5 kg
Moments of Inertia:	0,14 kg m^2

Polar Moments of Inertia

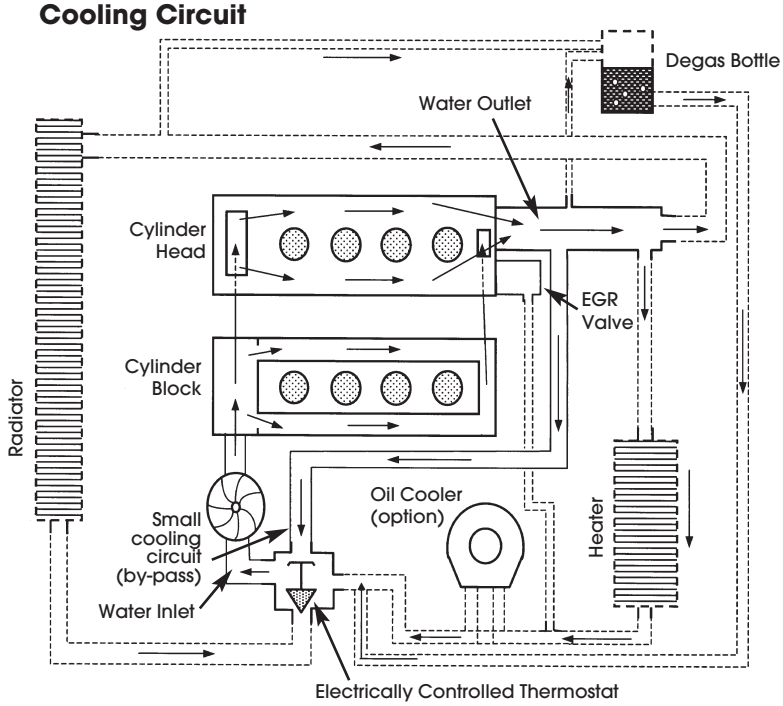
Crankshaft:	0,0250 kg m^2

Cooling System

Coolant By-pass
DHE range engines use a by-pass system (small cooling circuit) which protects the engine during the warm-up phase. In addition, the vehicle heater circuit permits an unrestricted flow of coolant between the engine coolant outlet and inlet connections irrespective of the heater control positions.

If a heater is not part of the final specification then the heater inlet and outlet connections on the engine must be joined together with a suitable pipe.

Cooling Circuit



Coolant Pump

Type:	Centrifugal six-vane impeller.
Drive method:	6 groove poly-vee belt.
Drive ratio:	1,21:1

Coolant

Initial fill (engine in Ford vehicle):	60% clean water, 40% antifreeze.
Recommended service re-fill:	50% clean water, 50% antifreeze.
Antifreeze:	Must meet Ford specification WSS-M97B44-D.
Cooling system capacity in Ford vehicle:	8,2 litres including radiator and heater.

Thermostat

Thermostat type:	Wax element with integral electric heater controlled by the powertrain control module.
Thermostat location:	In a housing which forms the coolant inlet to the engine.
Thermostat opening temperature without heater activated.	
Starts to open:	98°C ± 2°C.
Fully open (8 mm):	113°C
Thermostat opening temperature with heater activated.	Less than or equal to 78°C.
Thermostat closing temperature without heater activated.	Greater than or equal to 91°C.
Heater electrical resistance:	15 Ohms.

Engine Coolant Temperature (ECT) Sender

Location:	In the water outlet connection situated under the ignition coils at the rear of the cylinder head.

Fan

Type:	8 bladed plastic – 370 mm diameter.
Drive method:	12V 375W electric motor.
Location (engine in Ford vehicle):	In shroud of remote mounted radiator.

***Coolant flow rate against back pressure rise** (with fully open thermostat)

	Pump Speed in rpm				
	2000	3000	4000	5000	6000
Flow rate in litres/second:	0,58	0,91	1,25	1,58	2,08
Pressure rise in bars:	0,35	0,54	0,80	1,14	1,54

*Applicable to engine installed in Ford vehicle.
Flow and pressure figures measured at the engine coolant outlet.

Fuel System

Type of system:	Sequential multi-port fuel injection (SFI) through 4-hole injectors with vertical fuel inlet.
Fuel type:	Unleaded gasoline
Octane rating:	95 (RON). These engines are designed specifically to operate on 95 octane unleaded gasoline and cannot be adjusted to operate continuously on lower grade fuels.
Fuel pump type:	Continuous flow electrically driven roller vane pump, submerged in fuel tank.
Fuel pump delivery:	58 litres/hour maximum
Fuel pressure:	3,8 bar (controlled by pressure regulator) <8 bar transient dead end pressure 7 bar steady dead end pressure (relief valve setting)
Fuel supply and return pipes:	6 mm min. internal dia.

NOTE: No fuel return line from the fuel rail is used with this system. Surplus fuel is returned directly from the filter to the fuel tank via a pressure regulating valve. This valve is located in the fuel pump module and opens when the fuel pressure exceeds 3 bar.

This system prevents heated fuel passing back into the fuel tank. This ultimately leads to a reduction in harmful vapour emissions.

Fuel rail supply connection:	ITT Posilock Quick-Connector SAE Endform 8 mm
Fuel return connection:	ITT Posilock Quick-Connector SAE Endform 8 mm
Fuel filter (essential item for system protection):	Mesh area 2340 cm^2. Mesh size 4 microns

NOTE: It is recommended that the fuel system components detailed under the heading 'Options' are specified to ensure correct matching of components.

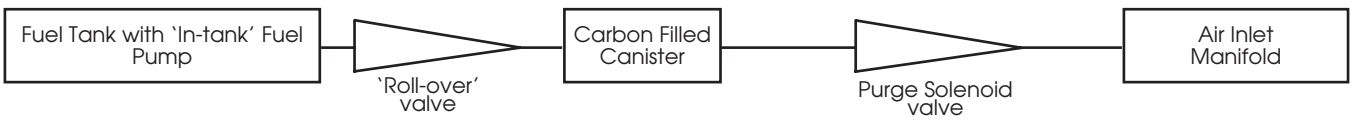
Evaporative Emission Control System

In order to meet current European automotive emission control requirements, these engines use an evaporative emission control system to prevent the release into the atmosphere of vaporised fuel containing harmful hydrocarbons (HC) from the fuel tank.

With the engine switched off, vapours from the fuel tank are fed into a carbon filled canister where they are absorbed by the active carbon.

A schematic representation of the system is shown below.

When the engine is started, the engine management module causes a purge solenoid valve to open and the fuel vapours are fed into the inlet manifold and mixed with incoming air; this cleans the carbon filled canister. A 'roll-over' valve will close to prevent siphoning from the fuel tank in the event of the vehicle overturning; it will also close until the fuel tank pressure rises above a predetermined level.



Specific fuel consumption at full load in g/kWh

	Engine rpm											
	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500
DHE 418	285	261	261	256	262	256	257	279	276	283	297	311
DHE 420	314	276	254	267	264	267	267	269	276	293	309	327

Lubrication System

NOTE: Dipstick re-calibration may be necessary if installation angles differ from those used in the Ford Mondeo vehicle. Refer to 'Installation Data' on page 5.

Oil pan type:	Structural cast aluminium alloy
Oil filter type:	Full flow disposable cartridge element
Engine oil capacity including filter	
Initial fill:	4,6 litres
Service fill	4,3 litres
Filter capacity:	0,4 litre
Max. bulk oil temperature:	150°C
Oil pump type:	G-rotor
Min. oil pressure at idle:	1,1 bar
Recommended oils:	SAE 5W/30 engine oil which meets the requirements of Ford specification WSS- M2C913-A. SAE 5W/30 engine oils meeting this specifications are suitable for operating in ambient air temperatures from below -20°C to above +40°C.
Oil pressure sender unit Location:	In oil filter housing (situated under the intake manifold) facing towards the rear of the cylinder block.
Thread size:	1/4 - 18 NPTF
Piston cooling:	Four oil-splash nozzles for piston cooling are located in the crankshaft bearings in the cylinder block. The nozzles are fitted with ball valves which only open when the oil pressure reaches a pre-determined level.

Inlet & Exhaust Systems

Inlet System

Air cleaner type:	Remote mounted paper element	
Inlet manifold type:	Thermoplastic with integral, electronically controlled 'swirl plates' to increase intake air swirl at lower engine speeds	
Crankcase breathing system:	Fully closed	
	DHE 418	**DHE 420**
Air demand:	4,7 m^3/min at 5750 rpm	5,2 m^3/min at 5750 rpm
Maximum inlet restriction:	2,6 kPa at 4,7 m^3/min	3,2 kPa at 5,2 m^3/min

Exhaust System

Exhaust manifold type:	Single outlet	Single outlet
Maximum exhaust back pressure at 6000 rpm and wide open throttle:	31 kPa	40 kPa
Exhaust gas temperature at full load measured before the catalytic converter:	825°C at 6000 rpm	866°C at 6000 rpm
Exhaust gas flow At 1000 rpm: At 6000 rpm:	 51 kg/hour 343 kg/hour	 59 kg/hour 407 kg/hour

Exhaust Gas Recirculation (EGR) System
DHE range engines use an internal Exhaust Gas Recirculation (EGR) system controlled by means of a water-cooled stepper motor. Gases are recirculated from the exhaust manifold directly through the cylinder head to a valve controlled by the stepper motor. From here, the exhaust gases are conveyed through the cylinder head to the intake manifold.

Controlled Catalytic Convertor:
DHE range engines meeting current European emission standards use an underbody, precious metal catalytic converter in the exhaust system. This is of the '3-way' type which means reducing carbon monoxide (CO), hydrocarbons (HC) and oxides of nitrogen (NOx). For optimum operation, the air/fuel ratio must be kept as close as possible to the ideal ratio of 14,3:1. To achieve this, a Heated Oxygen sensor (HO2S) is mounted in the exhaust pipe assembly in front of the catalytic converter. The sensor consists of a galvanic cell which generates a voltage proportional to the oxygen content of the exhaust gas. The voltage signals from the sensor are evaluated by the engine management module to adjust and control the air/fuel ratio. A CMS (Catalyst Monitoring Sensor) is mounted behind the catalytic converter.

NOTE: Leaded fuel will permanently damage the catalytic converter.

Electrical System

System type:	12V negative earth
Charging system:	Smart charge system which is controlled by the powertrain control module. The charging voltage is adjusted according to the temperature of the battery. This information is established using stored data and the input of the Ambient Air Temperature (AAT) sensor
Alternator	
Type:	12V 120A with integral controllable voltage regulator
Drive method:	6 groove poly-vee belt
Drive ratio:	2,38:1
Starter motor	
Type:	Pre-engaged
Make and output:	Visteon 1,4 kW
Ignition system type:	Electronically controlled 'distributorless' (DIS) ignition system
Ignition coil:	High output 4-terminal type
Spark plug type:	AGSF 22 PPJ
Spark plug gap:	1,3 mm
Electronic ignition control:	Visteon 'Black Oak' module
Battery size:	See table below

Recommended Battery Sizes

Operation down to	
–15°C:	390A/65RC
–29°C:	590A/105RC

NOTE: Battery size is quoted against cold start performance and reserve capacity; e.g. for a 390A/65RC battery:

390A is the cold start performance, and is the current the battery can supply at a temperature of –18°C for a minimum period of 30 seconds with the terminal voltage not dropping below 7,2V.

65 RC is the reserve capacity of the battery in minutes. This is the time for the battery voltage to drop to 10,5V when supplying a load of 25A with the battery temperature at 25°C.

Electrical Circuits

Unless otherwise stated, the voltage loss in any of the electrical circuits should not exceed 4% of system voltage when the engine is cranking from cold in the minimum required ambient air temperature.

Engine Management System

DHE 418 and DHE 420 engines use the Visteon 'Black Oak' Powertrain Control Module (PCM). The Electronic Ignition (EI) control module and the Passive Anti-theft System (PATS) are incorporated into the PCM.

Crank angle position and engine speed are sensed by a front cover mounted sensor from a toothed rotor which is integral with the crankcase vibration damper. A gap in the teeth corresponds to 90° before T.D.C. on piston number one. As the engine speed increases, so does the frequency and amplitude of the voltage output signal.

The signal is processed by the electronic control module. This information is combined with data from a wide range of engine variables including engine load, throttle position, coolant temperature, intake air temperature and exhaust oxygen content.

After processing, using the algorithms, the PCM then controls the sequential electronic fuel injection (SEFI) system and spark timing.
The system includes an adaptive learning programme, backed-up by a 'keep-alive' memory that stores historical operating data. This allows it to match precisely the electronic controls to each individual engine's requirements.

The diagram on page 13 identifies the various sensors and actuators which are connected to the control modules.

Diagnostic Connector
The diagnostic data link connector J1962 is the communication link for unloading data being recorded by the powertrain control module relative to the many sensors that are associated with the efficient operation of the engine.

In the event of any engine experiencing a concern, the only means of diagnosis is through specialised equipment, such as FDS 2000 or NGS (New Generation Startester), which utilises the diagnostic link. It is therefore imperative that the diagnostic link is included in any wiring harness associated with the engine.

Sensors and Switches
Crankshaft Position (CKP) sensor
The CKP sensor is mounted on the front cover and operates as previously described.

Camshaft Position (CMP) sensor
This is an induction sensor mounted on the camshaft cover and used to identify cylinder No.1. This is achieved by means of an additional cam on the intake camshaft.

Engine Coolant Temperature (ECT) sensor
This is located in the small (by-pass) coolant circuit under the electronic ignition coil and measures the coolant temperature.

Temperature and Manifold Absolute Pressure (T-MAP) sensor
This is mounted directly on the intake manifold and monitors engine load. When the ignition is switched on, it measures the barometric pressure at full load. This information is stored by the Powertrain Control Module (PCM) and used as a reference pressure for the intake manifold pressure at different loads. The integrated Intake Air Temperature (IAT) sensor is required for cold starting and the warm-up phase. Additionally, it provides a correction factor for the MAP signal. This compensates for different air temperatures and the resulting different cylinder charging levels.

Knock Sensor (KS)
The knock sensor is located on the intake side of the cylinder block between cylinders Nos. 2 and 3. It allows very advanced spark timing to be used, which leads to a reduction in fuel consumption. The knock sensor is a mechanical vibration pick-up and when knock is detected, the cylinder concerned is identified by the CKP and CMP sensors. The PCM then calculates a new spark angle and the spark timing of the corresponding pair of cylinders is retarded thus reducing cylinder pressure and the knocking.

Throttle Position (TP) sensor
This is a rotary potentiometer mounted on the throttle body. It records the actual position of the throttle plate.

Engine Management System

Power Steering Pressure (PSP) switch
This is installed in the high-pressure line from the power steering pump to the steering gear. On reaching a certain pressure when the steering wheel is turned, the switch opens and sends the PCM a signal to boost the idle speed.

Upstream and downstream Heated Oxygen Sensors (HO2S)
These two sensors measure the oxygen content of the exhaust gas before and after the catalytic converter. The two signals are compared to establish the oxygen storage capacity (efficiency) of the catalytic converter. This data is required for the on-board diagnostic system.

Ambient Air Temperature (AAT) Sensor
This sensor is located in the front bumper on the Ford vehicle. It is required for the alternator smart charge system and the air conditioning system and can provide an ambient temperature display on the vehicle instrument panel.

Output Shaft Speed (OSS) sensor and Vehicle Speed Sensor (VSS)
The signal from the VSS or OSS (depending on model) is required by the PCM for idle speed control, fuel enrichment and over-run fuel shut-off.

Actuators
Idle Air Control (IAC) Valve
This is installed in the intake manifold, near the throttle body. This valve regulates the quantity of air that by-passes the throttle when the throttle plate is closed (at idle).

Swirl Plate Solenoid Valve
The swirl plate solenoid valve is located on the intake manifold at an oblique angle immediately under the IAC valve. The solenoid valve is actuated according to the engine speed and throttle position such that the swirl plates are either fully opened or closed.

Canister Purge Solenoid Valve
A new type of canister purge solenoid valve is used with the Black Oak engine management system. Under certain engine operating conditions, the solenoid valve is opened. The hydrocarbons held in the carbon canister are then induced by the engine and passed to the combustion chambers.

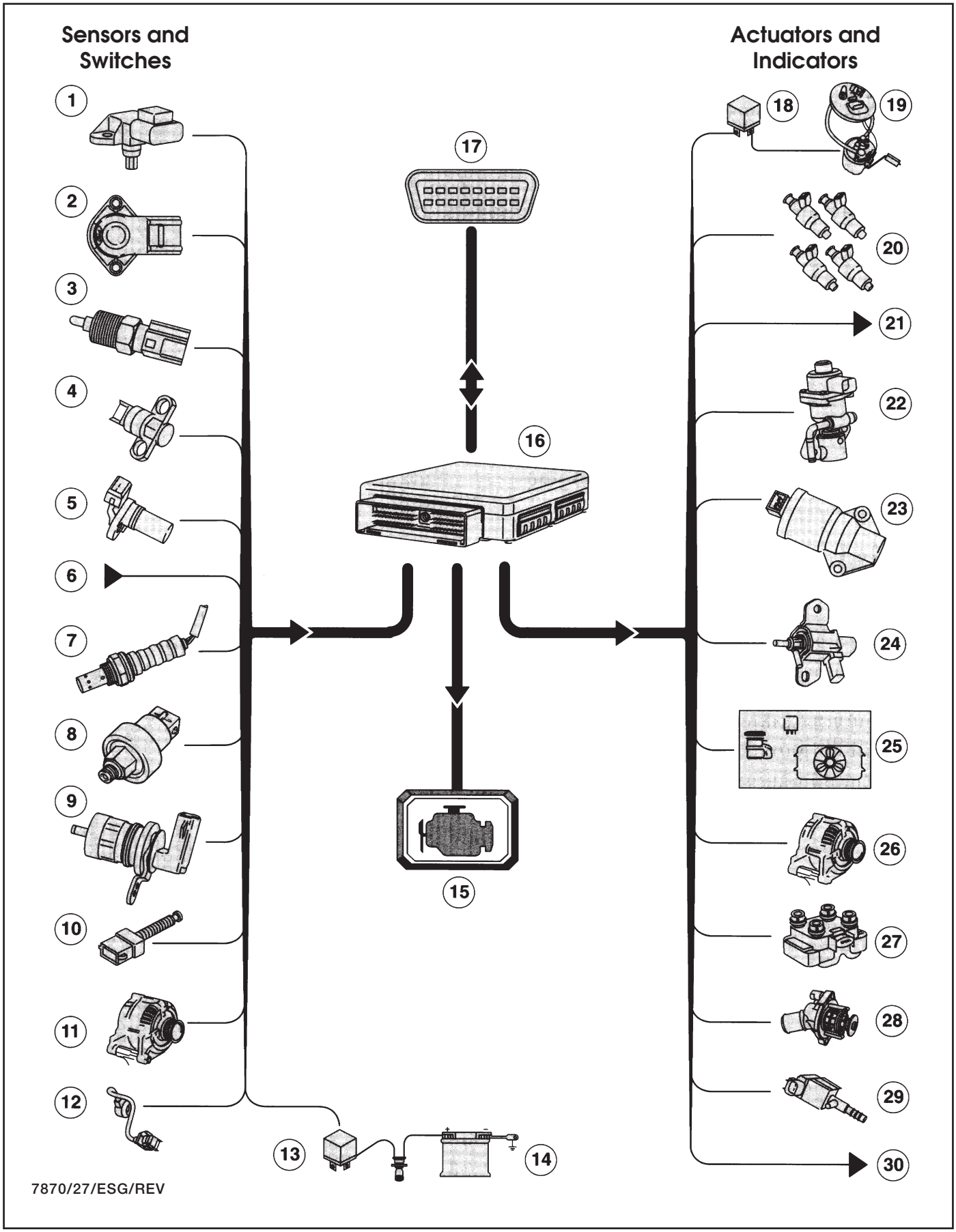
Exhaust Gas Recirculation (EGR) Stepper Motor
The EGR stepper motor is mounted at the rear end of the cylinder head and controls the exhaust gas recirculation.

Electrically Heated Thermostat
Refer to the Cooling System section.

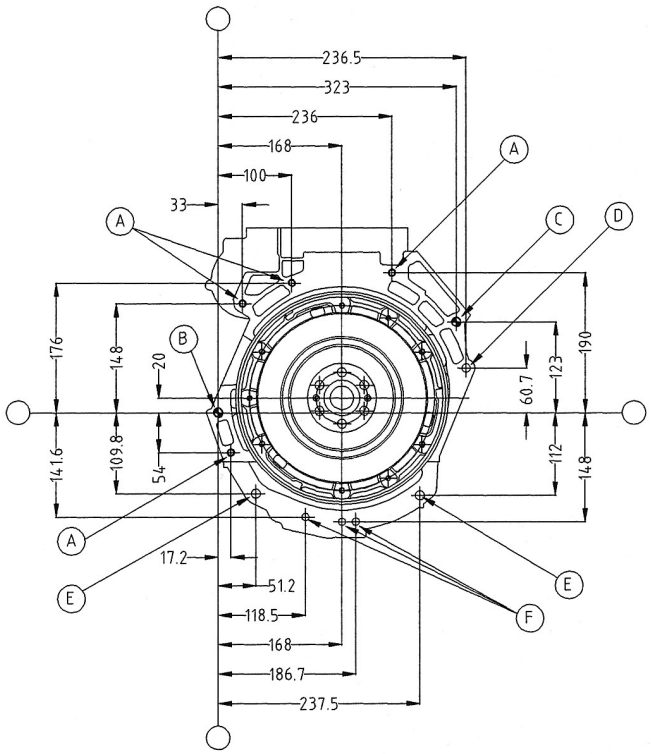
Key to the illustration opposite

1. Temperature and Manifold Absolute Pressure (T-MAP) sensor
2. Throttle Position (TP) sensor
3. Engine Coolant Temperature (ECT) sensor
4. Crankshaft Position (CKP) sensor
5. Camshaft Position (CMP) sensor
6. Ambient Air Temperature (AAT) sensor
7. Upstream and downstream Heated Oxygen Sensors (H02S)
8. Power Steering Pressure (PSP) switch
9. Vehicle Speed Sensor (VSS) or Output Shaft Speed (OSS) sensor
10. Clutch Pedal Position (CPP) switch
11. Generator control (smart charge system)
12. Knock Sensor (KS)
13. Power supply relay
14. Battery
15. Emission control Malfunction Indicator Lamp (MIL)
16. Powertrain Control Module (PCM)
17. Data Link Connector (DLC)
18. Fuel pump relay
19. In-tank fuel pump
20. Fuel injectors
21. Passive Anti-Theft System (PATS) LED in the instrument panel
22. Exhaust Gas Recirculation (EGR) stepper motor
23. Idle Air Control (IAC) valve
24. Swirl plate solenoid valve
25. Air conditioning compressor (Where fitted)
26. Generator control (smart charge) system
27. Electronic Ignition (EI) system ignition coil
28. Electrically heated thermostat
29. Canister purge solenoid valve
30. Vehicle speed or output shaft speed information

Engine Management System

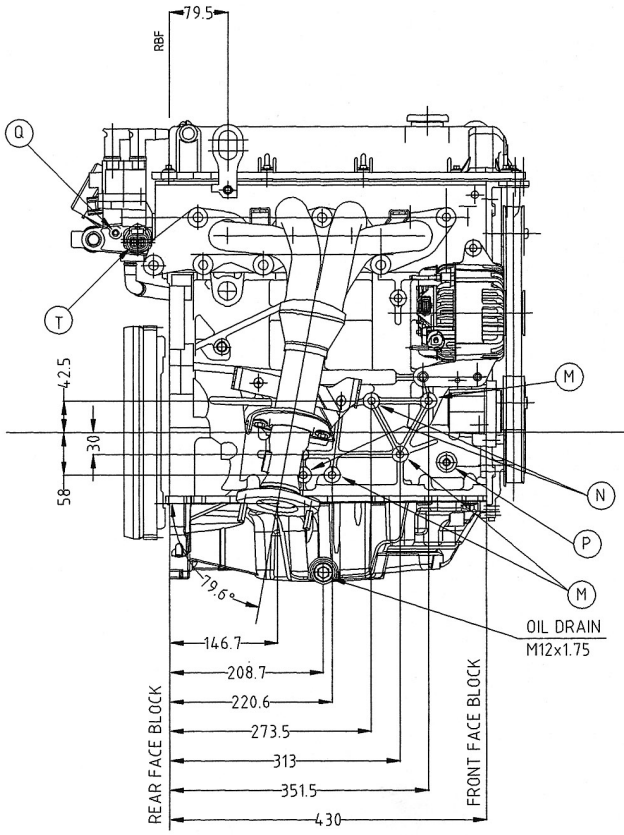


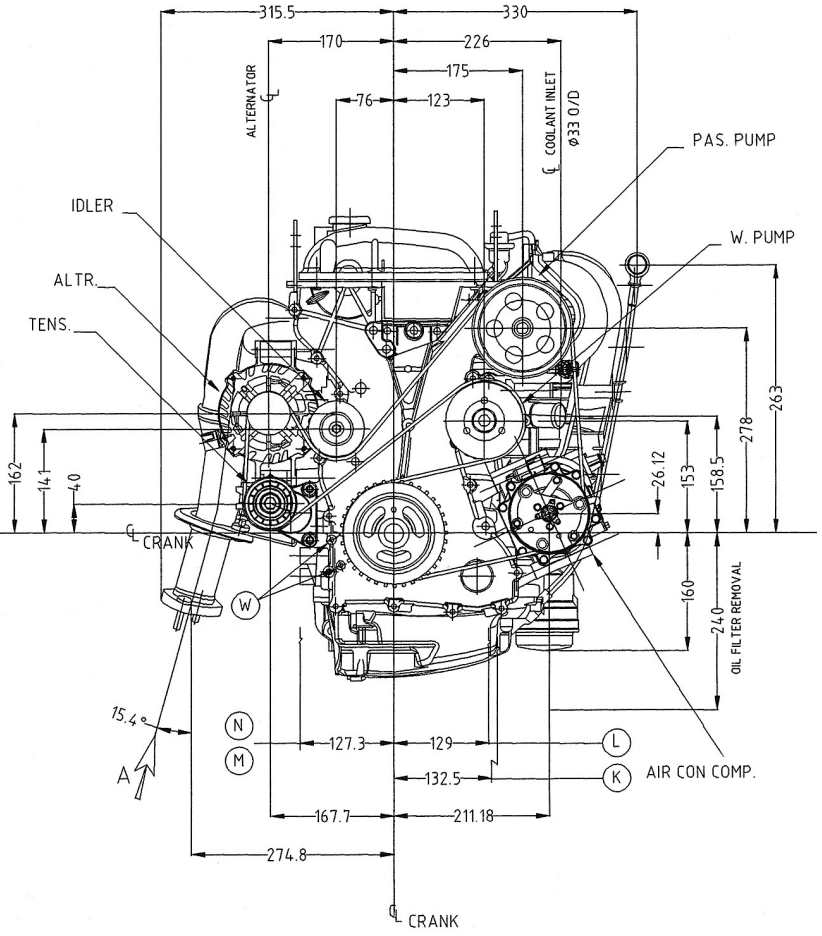
Engine Management System used with DHE Range Engines

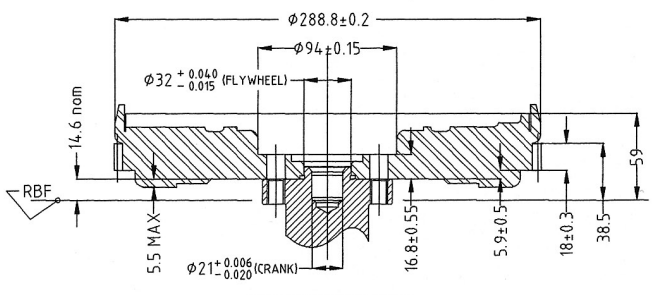


VIEW ON ENGINE REAR COVER PLATE

(A) 4 HOLES M10 x 32 DEEP x 25 THRU.
(B) 1 HOLE M10 x 38 THRU. x 33THRU. C.BORED Φ12.676 ± 0.018 x 9.7 DEEP
(C) 1 HOLE Φ11.5 ± 0.2 x 30 THRU. C.BORED Φ12.676 ± 0.018 x 9.7 DEEP
(D) 1 HOLE Φ11.5 ± 0.2 x 30 THRU.
(E) 2 HOLES Φ12.6 x 30 THRU.
(F) 3 HOLES M10 x 1.5 - 29 DEEP x 24.9 THRU.
(G) 3 DOWELS Φ6.318 ± 0.007 x 11.5 PROUD EQUALLY SPACED ON A Φ260
(H) 6 HOLES M8 x 1.25 - 18.3 DEEP x 15.3 THRU. EQUALLY SPACED ON A Φ260
(J) Φ 19.1 HEATER FEED
(K) 2 HOLES M10 x 29 DEEP x 22 THRU.
(L) 1 HOLE M6 x 20 DEEP x 14 THRU.
(M) 3 HOLES M10 x 29 DEEP x 22 THRU.
(N) 2 HOLES M10 x 29 DEEP x 22 THRU.
(P) TDC ADJUST HOLE
(Q) Φ 8.8 AIR BLEED (TO EXPANSION TANK)
(R) Φ 19.1 HEATER RETURN



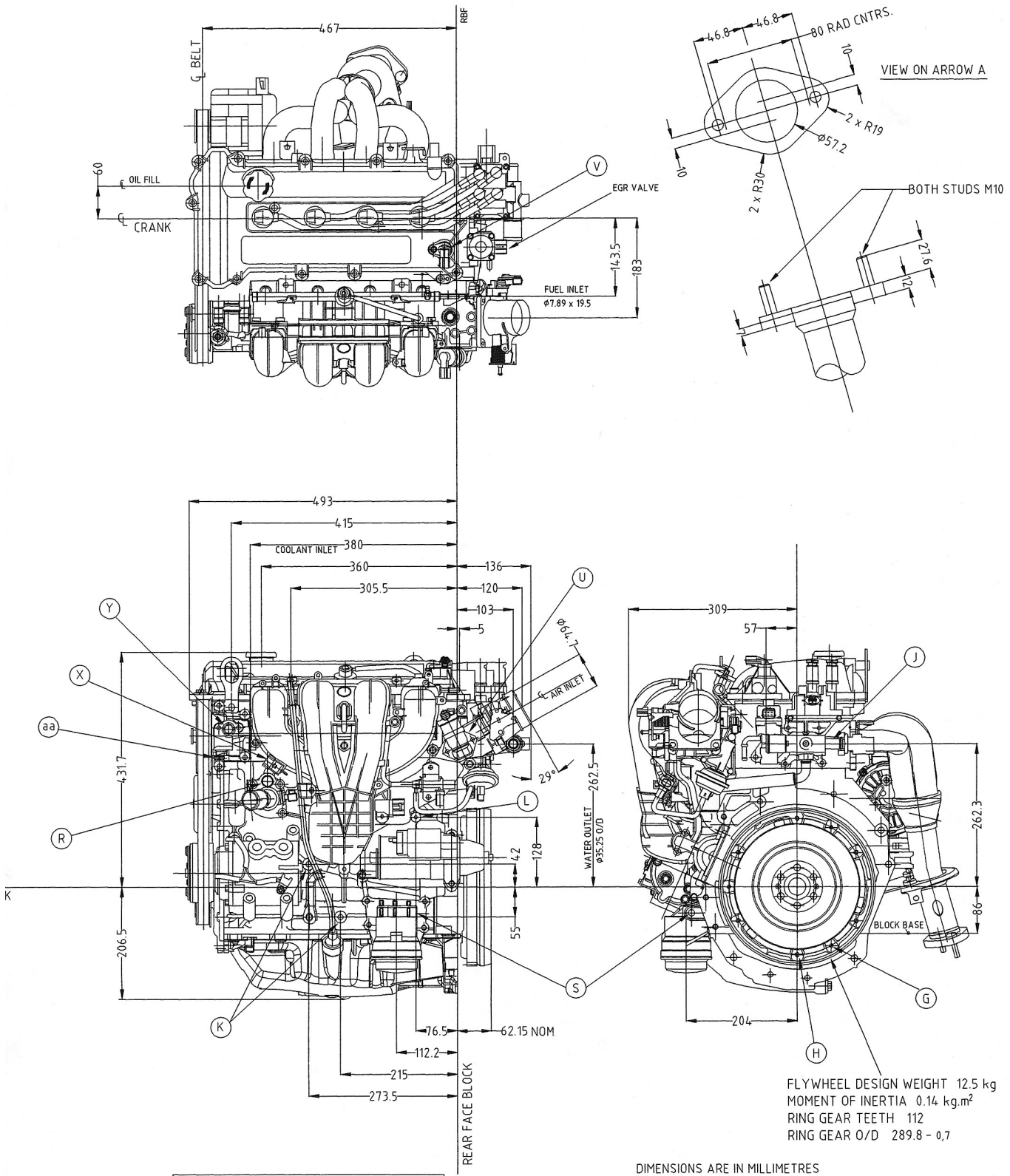




SCRAP SECTION THRO CRANK/FLYWHEEL

(S) OIL PRESSURE SWITCH LOCATION
OIL PRESSURE SWITCH 1/4 x 18 STD N.P.T.F.
OIL FILTER ADAPTER 1/4" x 18 N.P.S.F.
(T) WATER TEMP SENDER LOCATION
(U) AIR BYPASS VALVE LOCATION
(V) CAM POSITION SENSOR LOCATION
(W) CRANK POSITION SENSOR LOCATION
(X) KNOCK SENSOR LOCATION
(Y) PAS PUMP INLET Φ15.5
(aa) PAS PUMP OUTLET (PRESSURE) TO ACCEPT QUICK CONNECT TYPE 14 , 15 OR 18

IND 360



FLYWHEEL DESIGN WEIGHT 12.5 kg
MOMENT OF INERTIA 0.14 kg.m²
RING GEAR TEETH 112
RING GEAR O/D 289.8 - 0,7

PULLEY ⌀s		
CRANKSHAFT	(OVER BALLS)	⌀134.7
PAS PUMP	(OVER BALLS)	⌀132
TENSIONER	(OVER BALLS)	⌀71
ALTERNATOR	(OVER BALLS)	⌀55
AIR CON	(OVER BALLS)	⌀97
IDLER		⌀76
WATER PUMP		⌀105
⌀ GAUGE BALLS		⌀2.5

PACKAGE SIZE	
LENGTH	630
WIDTH	650
HEIGHT	640

DIMENSIONS ARE IN MILLIMETRES
3RD. ANGLE PROJECTION

Ford Power Products
The Source for Power... Worldwide™

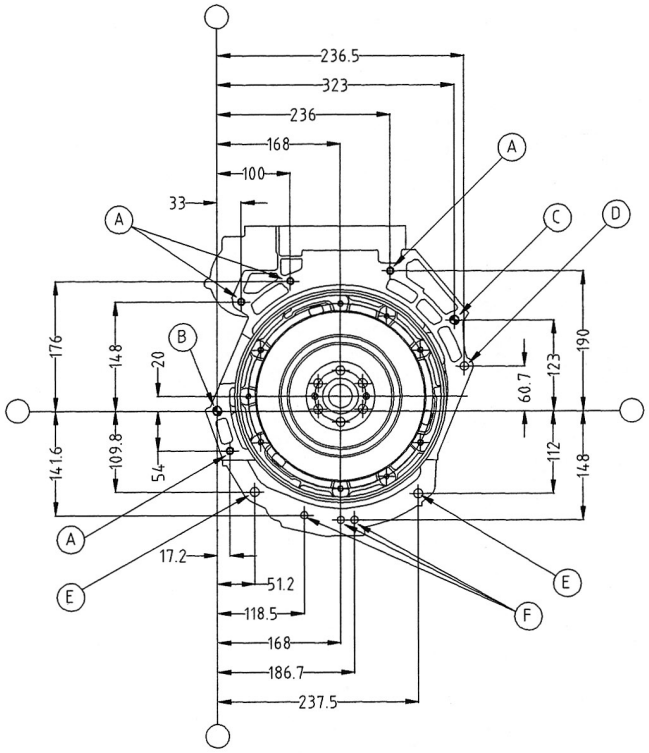
POWER PRODUCTS ENGINEERING

REFERENCE	1A 131 AA				
DR. MME	DATE 22/02/00	CK. KP	APP. RAF		

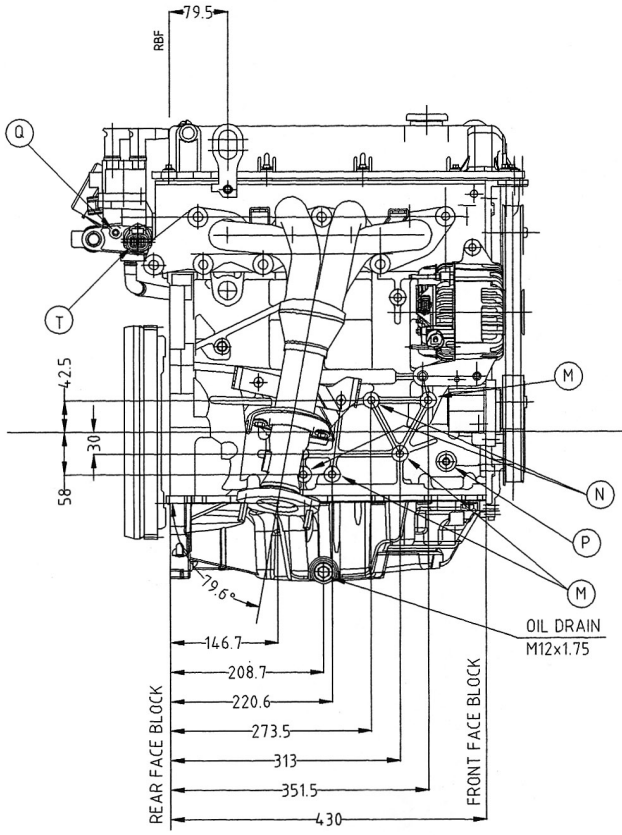
PART NAME
PRELIMINARY INSTALLATION - DHE418 ENGINE ASSY
1.8 LITRE MONDEO - EAST / WEST APPLICATION

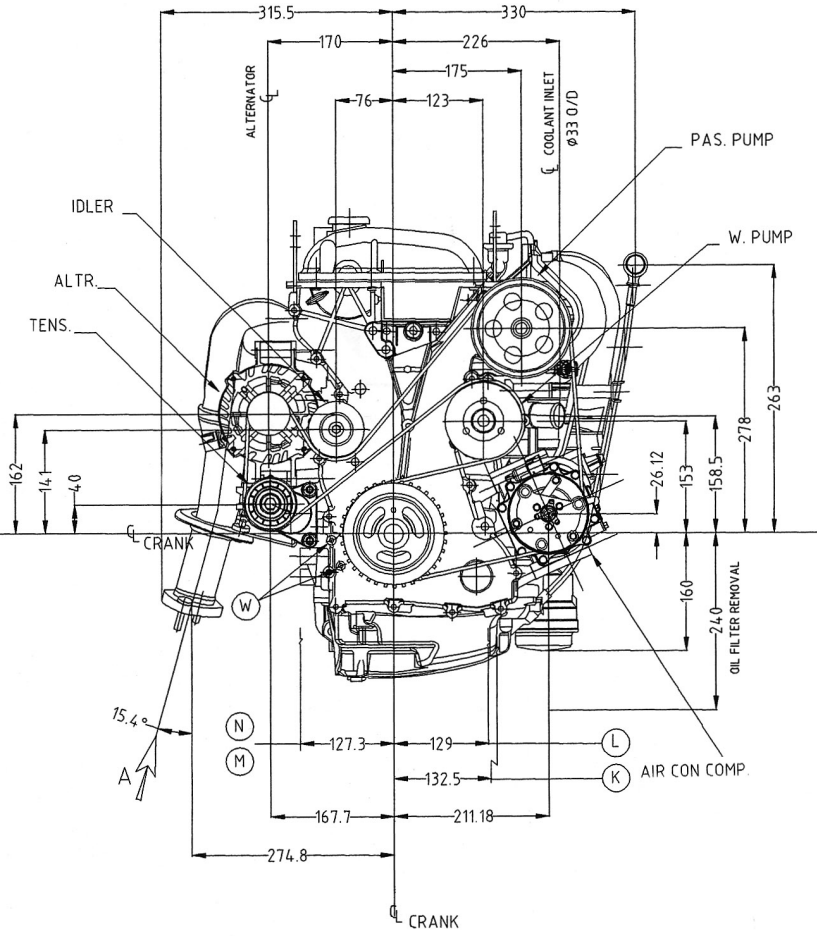
RETAIN RECORD COPY (MARKED IN RED) UNTIL GIS1 LU+20

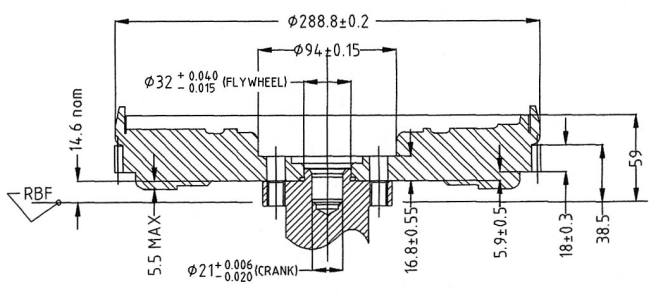
PART NUMBER
IND 360



VIEW ON ENGINE REAR COVER PLATE





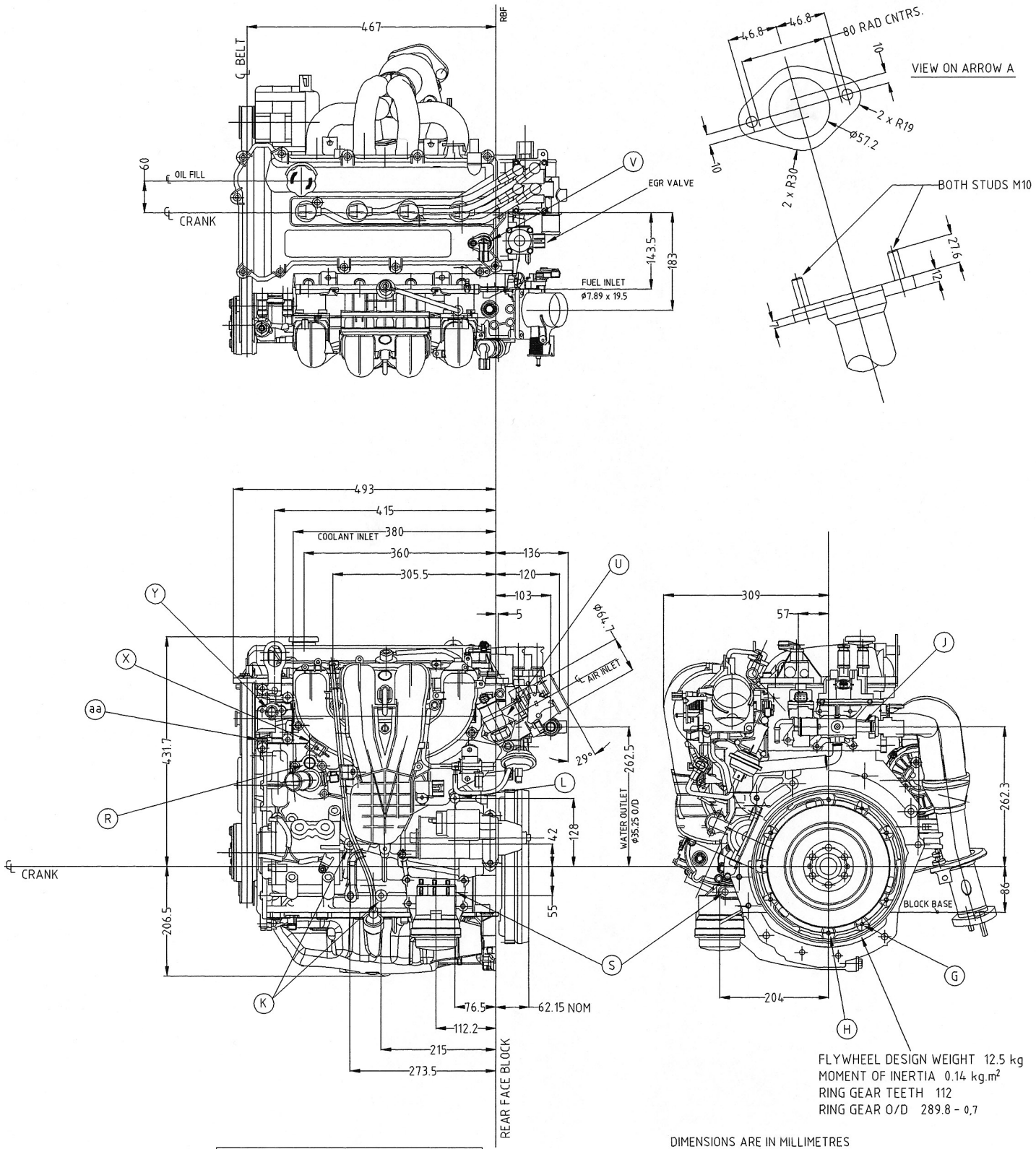


SCRAP SECTION THRO
CRANK/FLYWHEEL

IND 359

(A) 4 HOLES M10 x 32 DEEP x 25 THRU.
(B) 1 HOLE M10 x 38 THRU. x 33THRU. C.BORED Ø12.676 ± 0.018 x 9.7 DEEP
(C) 1 HOLE Ø11.5 ± 0.2 x 30 THRU. C.BORED Ø12.676 ± 0.018 x 9.7 DEEP
(D) 1 HOLE Ø11.5 ± 0.2 x 30 THRU.
(E) 2 HOLES Ø12.6 x 30 THRU.
(F) 3 HOLES M10 x 1.5 - 29 DEEP x 24.9 THRU.
(G) 3 DOWELS Ø6.318 ± 0.007 x 11.5 PROUD EQUALLY SPACED ON A Ø260
(H) 6 HOLES M8 x 1.25 - 18.3 DEEP x 15.3 THRU. EQUALLY SPACED ON A Ø260
(J) Ø 19.1 HEATER FEED
(K) 2 HOLES M10 x 29 DEEP x 22 THRU.
(L) 1 HOLE M6 x 20 DEEP x 14 THRU.
(M) 3 HOLES M10 x 29 DEEP x 22 THRU.
(N) 2 HOLES M10 x 29 DEEP x 22 THRU.
(P) TDC ADJUST HOLE
(Q) Ø 8.8 AIR BLEED (TO EXPANSION TANK)
(R) Ø 19.1 HEATER RETURN

(S) OIL PRESSURE SWITCH LOCATION
OIL PRESSURE SWITCH 1/4 x 18 STD N.P.T.F.
OIL FILTER ADAPTER 1/4" x 18 N.P.S.F.
(T) WATER TEMP SENDER LOCATION
(U) AIR BYPASS VALVE LOCATION
(V) CAM POSITION SENSOR LOCATION
(W) CRANK POSITION SENSOR LOCATION
(X) KNOCK SENSOR LOCATION
(Y) PAS PUMP INLET Ø15.5
(aa) PAS PUMP OUTLET (PRESSURE) TO ACCEPT QUICK CONNECT TYPE 14 , 15 OR 18



PULLEY Øs		
CRANKSHAFT	(OVER BALLS)	Ø134.7
PAS PUMP	(OVER BALLS)	Ø132
TENSIONER	(OVER BALLS)	Ø71
ALTERNATOR	(OVER BALLS)	Ø55
AIR CON	(OVER BALLS)	Ø97
IDLER		Ø76
WATER PUMP		Ø105
Ø GAUGE BALLS		Ø2.5

PACKAGE SIZE	
LENGTH	630
WIDTH	650
HEIGHT	640

DIMENSIONS ARE IN MILLIMETRES
3RD. ANGLE PROJECTION

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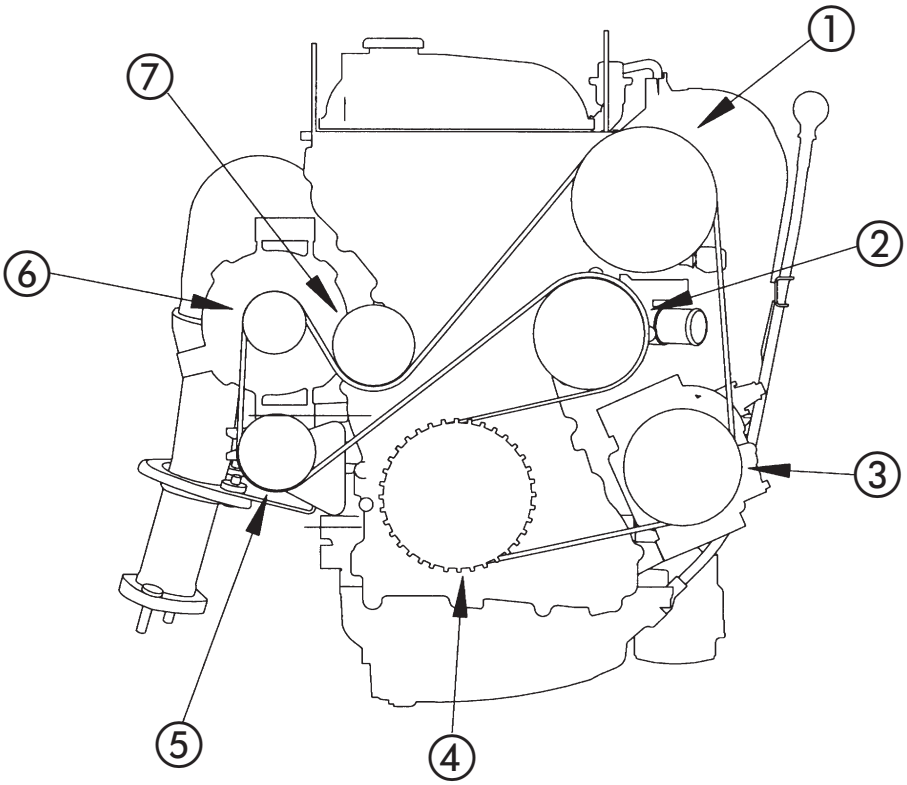
POWER PRODUCTS ENGINEERING

REFERENCE	1A 161 AA		
DR. MME	DATE 22/02/00	CK. KP	APP. RAF

PART NAME: PRELIMINARY INSTALLATION - DHE420 ENGINE ASSY
2.0 LITRE MONDEO - EAST / WEST APPLICATION

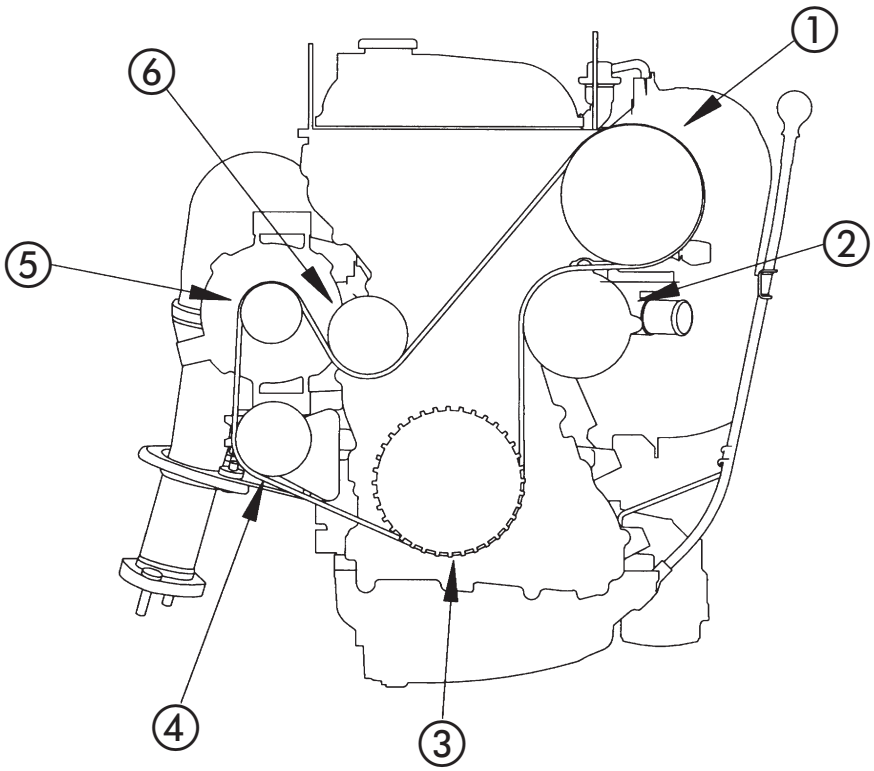
RETAIN RECORD COPY (MARKED IN RED) UNTIL GIS1 LU+20

PART NUMBER: IND 359



Drive Belt Run
(with Air Conditioning)

1. Power assisted steering pump
2. Water pump
3. Air conditioning compressor
4. Crankshaft pulley
5. Tensioner
6. Alternator
7. Idler



Drive Belt Run
(less Air Conditioning)

1. Power assisted steering pump
2. Water pump
3. Crankshaft pulley
4. Tensioner
5. Alternator
6. Idler

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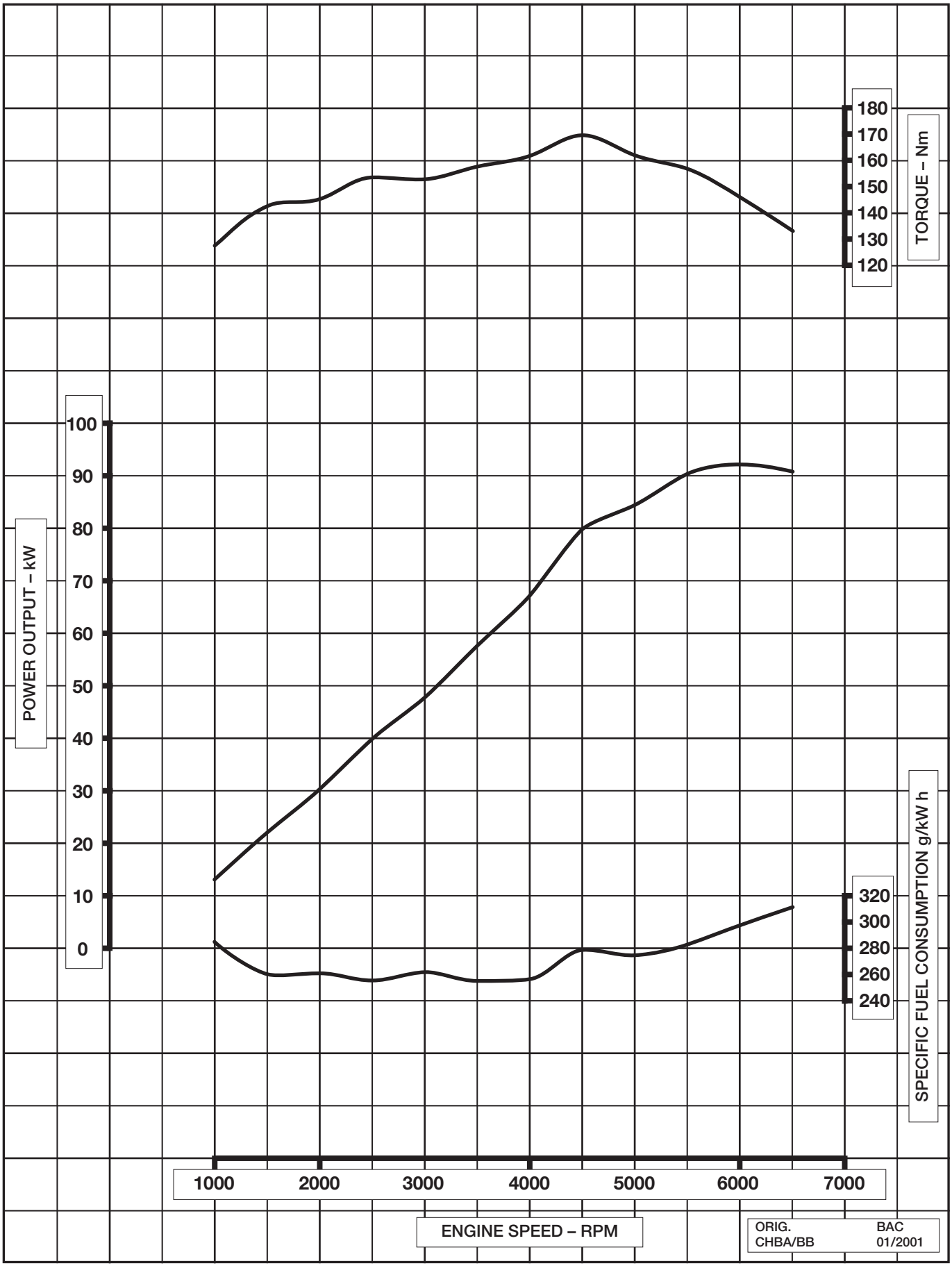
Reference Power Standard 88/195 EEC				Engine Model
Fan		Governing		**DHE 418**
Power	92 kW @ 6000 rpm	Torque	170 Nm @ 4500 rpm	



Ford Power Products

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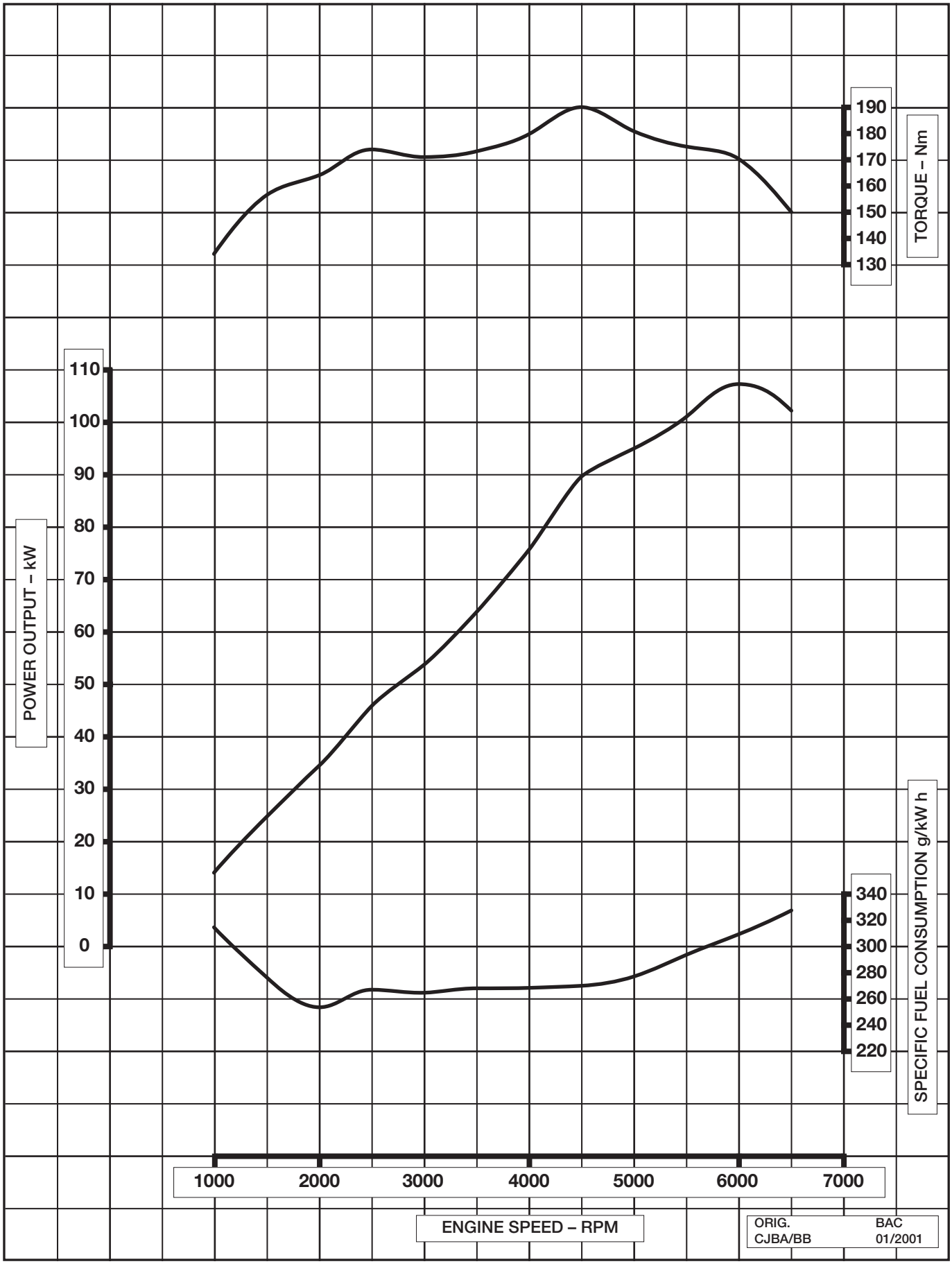
Reference Power Standard 88/195 EEC				Engine Model
Fan		Governing		**DHE 420**
Power	107 kW @ 6000 rpm	Torque	190 Nm @ 4500 rpm	



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