OWNER'S INSTRUCTION BOOK – 1975 – EDITION 3

FORD 2400 RANGE
4-6 CYLINDER DIESEL ENGINES

2401E – 2359cc – 144 cu.in

2402E – 3538cc – 216 cu.in

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MARCH 1975

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FOREWORD

This book contains service instructions for 2400 Range engines.

The life of your engine unit and the delivery of the high performance built into it will depend on the care it receives throughout its life. It is the operator's responsibility to ensure that the maintenance operations outlined in this book are carried out regularly after the specified hours of operation have been reached. We consider it to be in your interests to enlist the aid of an authorised Ford Dealer not only when repairs are required, but also for regular maintenance.

Industrial engines manufactured by Ford Motor Company Ltd., England, are available through Ford Industrial Power Products Dealers and Supervising Ford Companies throughout the world. When in need of parts or service, see your local Authorised Dealer. In overseas territories, in the event of difficulties, communicate directly with the Supervising Ford Company in your area.

Always quote the engine number when ordering parts or entering into correspondence. The engine number is stamped on the 'Left' hand side of the cylinder block adjacent to the mounting bracket pad and also on the Service Identification Plate which is positioned on the R.H. side of the cylinder block near the starter motor location.

Where the terms 'Right' or 'Left' occur in this book, they refer to the respective sides of the engine when viewed from the flywheel end.

You may find that your engine assembly includes optional equipment not specifically covered in the main text. These items are listed at the end of the General Maintenance Section.

This book also includes a parts list.

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INTRODUCTION

Many new features are incorporated in the 2400 Range of 4 and 6 cylinder in-line high speed diesel engines.

The cylinder block is extended below the crankshaft axis, giving greater rigidity. The piston bores are inclined at 22½ degrees to the left of vertical, thus reducing the height of the engine.

A full lipped oil seal is specified for the rear of the crankshaft.

The camshaft is mounted high in the left hand side of the block allowing the use of short robust push rods. Replaceable steel valve guides and valve seats are fitted in the cylinder head.

The combustion chambers have been designed on an indirect injection system. The upper part of each pre-combustion chamber is hemispherical in shape and is machined in the cylinder head. The lower part of each pre-combustion chamber is formed by a machined plug which incorporates a throat forming a connection to the combustion chamber of the cylinder bore.

The camshaft and injection pump are driven by the crankshaft, by means of a toothed belt; a tensioner is fitted between the injection pump gear and crankshaft gear to maintain tension. The introduction of the drive belt helps to achieve the low noise level of the engine.

To maintain the compactness of this range and for easier accessibility, the injection pump, oil filter, fuel filter and fuel lift pump are located on the right hand side of the engine.

METRIC FEATURES SUCH AS TOLERANCES AND METRIC THREAD SIZES HAVE BEEN INTRODUCED FOR THIS RANGE.

Injection pumps from two manufacturers are available. Lubrication for each pump is via flow and return oilways machined in the front engine cover thus eliminating routine checking and topping up.

The 12 volt electrical equipment includes the option of alternators from two manufacturers. Each type has an output of 35 amps. A non-ventilated generator with an output of 11 amps is also offered and pre-engaged starter motors from two manufacturers are available.

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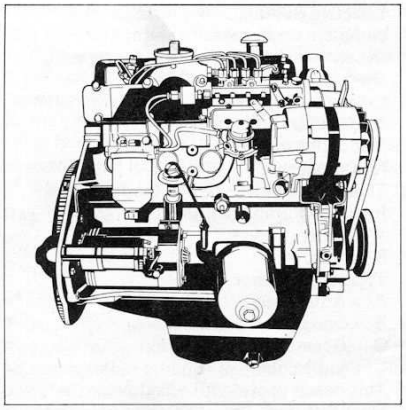
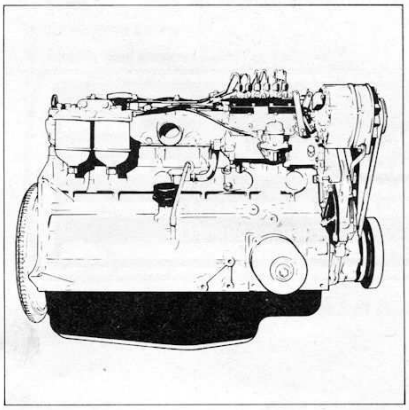


2401E – 4 Cylinder



2402E – 6 Cylinder

SERVICE IDENTIFICATION PLATE

The plate is fixed to the right hand side of the cylinder block. Positions 1 to 11 on the plate refer to various engine details as listed.

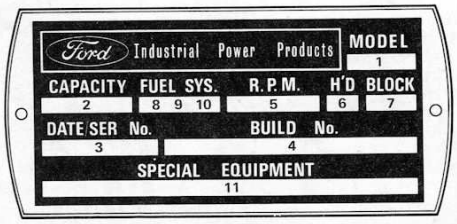


Fig. 1 **Service Identification Plate**

Detail	Title
1.	Engine model identification.
2.	Engine capacity in cubic inches.
3.	Engine serial number.
4.	Selective Build Number indicates the complete engine specification. The digit to the extreme right hand side, is the build chart issue number.
5.	Engine operating RPM. An asterisk denotes speed set by customer.
6.	Not applicable.
7.	Not applicable.
8, 9, 10	These three details define the fuel system.
8.	Injection Pump Manufacture A Simms B Bosch.
9.	Type of Governor A – Automotive B – Class 'A' C – General Purpose.
10.	Not applicable.
11.	This box is provided for Equipment Manufacturers' use when extra equipment is fitted outside of the Ford Motor Company. Reference should be made to the Equipment Manufacturer for any information or parts required.

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OPERATING INSTRUCTIONS

Your engine unit has been designed and built to furnish a reliable and economical source of power for many hours of service. However, no amount of engineering ingenuity or care in manufacture can eliminate the need for reasonable attention and avoidance of misuse by the operator. It is important to be as thoroughly familiar with the points requiring periodical attention as it is to know how to operate the unit. These points are covered in the lubrication and maintenance section of this book.

Regular maintenance will result in minimal operating costs.

Controls

STOP CONTROL

To stop the engine, pull out the stop control. The stop control is connected to the stop control lever on the injection pump (Figs. 2 and 3) and when operated, cuts off the fuel supply to the injection pump.

ENGINE SPEED CONTROL

The equipment manufacturer's recommended engine speed can be set by this control, which is connected to the governor control lever on the injection pump (Figs. 2 and 3).

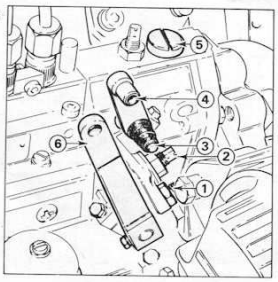

Fig. 2 **Simms Injection Pump**

1. **Max Speed Stop Screw**
2. **Idling Stop Screw**
3. **Excess Fuel Device**
4. **Stop Control Lever**
5. **Filler Plug**
6. **Engine Speed Control Lever**

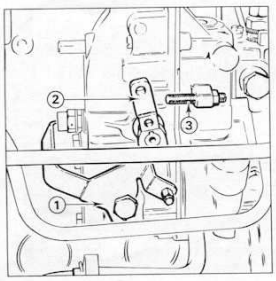

Fig. 3 **Bosch Injection Pump**

1. **Stop Control Lever**
2. **Engine Speed Control Lever**
3. **Max Speed Adjustment Screw**

EXCESS FUEL DEVICE

This device, fitted to the Simms Pump, permits additional fuel to be supplied by the injection pump to assist in starting the engine from cold. It is situated at the front of the pump (Fig 2).

To operate, move the governor control lever to the maximum speed position and push the excess fuel device inwards. The button will spring out to the normal running position automatically when the engine starts. Do not attempt to wedge the button in as this will reduce engine power output.

An excess fuel device is incorporated within the Bosch injection pump. When starting from cold, it can be brought into operation by moving the governor control lever to the maximum speed position. Once the engine has started, the excess fuel device is automatically cut out even before the engine reaches idling speed. However, to prevent the engine accelerating to full load speed the control lever must be returned to the idling position.

COLD START EQUIPMENT

A heater plug type of cold start aid is a standard fitting and is suitable for operating temperatures down to −10°C (14°F).

For temperatures between −10°C (14°F) and −20°C (−4°F) two glow plugs are available for the 4 cyl engine and three are available for the 6 cyl. These are for use in conjunction with the thermostart.

For starting in temperatures down to −30°C (−22°F) an ether cold starting system is available. This is fitted as an alternative to the heater plug type of system.

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ISOLATING SWITCH

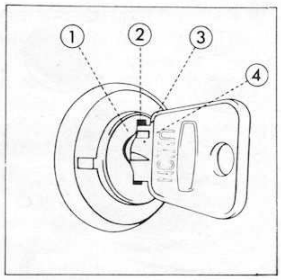
The isolating switch (Fig. 4) connects the engine starter motor and other electrical equipment with the battery.

The switch can be moved to any of the four positions shown by rotating the key. These positions are:—

1. Auxiliary Circuits—When moved to this position auxiliary electrical equipment such as radios, heater fans, can be operated without also connecting the starting circuit with the battery.
2. Off—When set to this position, the switch disconnects the auxiliary electrical equipment and the starting circuit from the battery. The key can be removed from the switch when it is in this position this will help to prevent unauthorised operation of the engine.
   NOTE: Returning the switch will not stop the engine. To stop the engine use the stop control.
3. Excite Alternator—If an alternator is fitted to your engine, and the switch is set to this position the alternator is given initial excitation via the battery. This switch position will also connect the auxiliary circuits as described previously.
4. When moved to this position the starter solenoid is energised and the starter motor cranks the engine. The switch, when released, should automatically return to position 3.

Fig. 4 **Isolating Switch**

1. **Auxiliary Circuits**
2. **Off**
3. **Excite Alternator**
4. **Start**



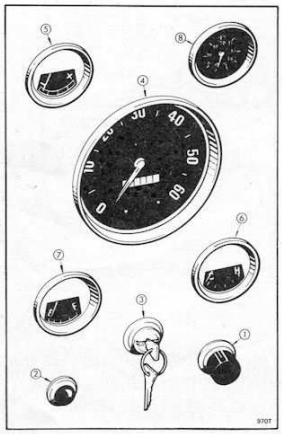


Fig. 5 **Typical Instrument Panel**

1. **Pre-heater button**
2. **Ignition warning light**
3. **Isolation switch**
4. **Combined tacho-meter/hourmeter**
5. **Ammeter**
6. **Temperature gauge**
7. **Fuel gauge**
8. **Oil pressure gauge**

Instruments

Your Ford Powered Equipment will have been fitted with instruments selected by the manufacturer. The types of instruments most likely to be encountered are detailed below. A typical instrument panel is shown in Fig. 5.

TACHOMETER

The tachometer indicates the actual engine running speed in crankshaft revolutions per minute.

HOURMETER

This instrument records the number of hours of operation which the engine has completed at the rated rpm. It is frequently combined with the tachometer. This is used to determine when a service of the engine is required.

TEMPERATURE GAUGE

The temperature gauge enables a close check to be kept on the coolant temperatures and will indicate overheating which may arise from low coolant level, clogged radiator, loose fan belt, low oil levels or faulty thermostat.

By operating the engine at the correct temperature (Page 46) maximum power, longer life and better fuel consumption will be ensured.

OIL PRESSURE GAUGE

The oil pressure gauge registers the lubricating system pressure in kg/cm² (lb/in²) and should be frequently checked to ensure that the system is functioning correctly. Normally the pressure

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registered by the gauge should remain constant for a given engine speed (see specifications). If the pressure falls below this specification or fluctuates, the reason must be established otherwise severe damage may occur.

AMMETER

This instrument registers the charging current which is being passed to the battery from the Alternator or Generator. It also registers a discharge equivalent to the amount of current being used by the electrical equipment when the Alternator/Generator is not charging.

FUEL GAUGE

This instrument indicates the quantity of fuel oil in the fuel tank.

IMPORTANT:— SHOULD YOUR ENGINE STOP THROUGH RUNNING OUT OF FUEL OIL THE FUEL SYSTEM MUST BE BLED AS DESCRIBED ON PAGE 27.

Before Operation

Before operating a new engine it should be thoroughly inspected for damage likely to affect its subsequent operation. Controls should be studied carefully in order that their functions are understood.

Check the coolant level and top up if necessary to 25 mm (1 in) below the radiator filler neck. The radiator should be filled with the correct proportion of Ford Long Life Coolant (Part No. M97B18C) and soft water. See page 21 for details of protection against freezing provided by various concentrations of M97B18C.

Refit the radiator filler cap and fully tighten.
Fill the engine sump to the 'FULL' mark on the dipstick with the correct grade of high quality lubricant (Pages 30 and 31).
Check the oil level in the injection pump and if necessary top up.
Check fuel level in the fuel tank.
Ensure the battery is topped up and fully charged.

Starting the Engine:

Disconnect the driven equipment (where possible) before starting.

TO START WHEN COLD

To start the engine from cold with electric starting equipment, the following methods should be used.

Engines Fitted with Thermostart Starting Aid for −10°C (14°F) and −20°C (−4°F).

1. Check that the stop control is pushed right in.
2. Close the radiator shutters (if fitted).
3. Set the engine speed control to the fully open position.
4. Depress the excess fuel button.
5. If temperature is below −10°C (14°F), preheat with glow plugs only (if fitted) for 90 seconds.
6. Preheat with thermostart and glow plugs (if fitted) for 25 sec (4 cyl) or 30 sec (6 cyl).
7. Turn the isolating switch (Fig. 4) from the 'OFF' position 2 to the start position 4 to operate the starter motor. Crank engine for 10 sec whilst still operating thermostart only. As soon as the engine starts, release the switch when it will automatically return to position 3.
8. If engine does not fire, reheat for 10 sec with thermostart.
9. Repeat steps 7 and 8 if necessary until engine fires.
10. Continue to operate thermostart until engine runs smoothly.
11. Open the radiator shutters (if fitted) when the normal operating temperature is reached.

Engines Fitted with Ether Starting Aid −30°C (−22°F).

1. Ensure that ether reservoir is full.
2. Set engine speed control to maximum position. DO NOT DEPRESS EXCESS FUEL BUTTON.
3. Operate ether pump for 3 strokes to prime system.
4. Crank engine whilst operating ether pump until engine runs unaided.

TO RE-START WHEN WARM:

1. Set the engine speed control lever at approximately the mid point of its travel.
2. Operate the isolating switch.
3. Set the engine speed control lever to the required position.

NOTE:— If the engine fails to start, carry out the procedure for normal cold starting as previously described.

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Stopping the Engine:

The engine should always be allowed to slow idle for approximately 2 minutes before stopping, particularly after extended periods of full load and full speed operation.

TO STOP THE ENGINE:

1. Pull the stop control and hold until engine stops. Return control to closed position.
2. Move the isolating switch to the 'OFF' position.

Running-In Procedure:

DO NOT OPERATE YOUR NEW ENGINE ON FULL LOAD OR AT HIGH SPEEDS IMMEDIATELY: EXCESSIVE WEAR, OR DAMAGE MAY RESULT.

Your new Ford engine will provide long and dependable service if given proper care during the 'running-in' period. During the first 50 hours of operation avoid:—

1. Overloading or 'labouring the engine'.
2. Continuous operation at constant engine speed.
3. Prolonged 'no load' operation during 'running-in'.

Check the instruments frequently and keep the coolant and oil filled to their recommended levels.

LUBRICATION AND MAINTENANCE

The importance of correct lubrication, periodic inspection and adjustment cannot be over-emphasised. On it will depend, to a very large extent, the service that the engine will give.

Detailed instructions regarding this maintenance are given in the following pages. Your Authorised Ford Dealer will be pleased to carry out this regular maintenance for you.

For convenience, lubrication and maintenance work has been divided into the following periods:—

(a) After first 15 hours running.
(b) After every 10 hours running.
(c) After every 50 hours running.
(d) After every 100 hours running.
(e) After every 200 hours running.
(f) After every 400 hours running.
(g) After every 1200 hours running.
(h) After every 2000 hours running.

NOTE: Oil filter and airfilter change periods as quoted are maximum times. Equipment manufacturers' recommendations on more frequent changes, due to dusty applications etc., should always be followed.

SUMMARY OF REGULAR MAINTENANCE

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REGULAR MAINTENANCE OPERATIONS

Change Engine Oil and Oil Filter

1. Warm the engine to normal operating temperature and stop.
2. Ensure the equipment is on level ground and remove the engine sump drain plug. Drain the lubricating oil.
3. Unscrew and discard the disposable filter cartridge (Fig. 6).
4. Remove the sealing ring from the filter head and install new sealing ring.
5. Clean the filter shell and install a new element, replace the filter assembly and tighten the centre bolt to a torque of 20 to 24 Nm. (15 to 18 lbs.ft) ensuring the filter shell seals correctly on the sealing ring.
6. Replace the sump plug, fitting new seal, and refill the sump with new oil of the correct grade and quantity.

Fig. 6 **Engine Oil Filter**
1. **Rubber Sealing Ring**
2. **Filter Element**
3. **Filter Casing**
4. **Centre Bolt**

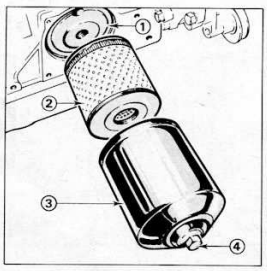


Fig. 7 **Bolt Tightening Sequence—4 Cyl.**

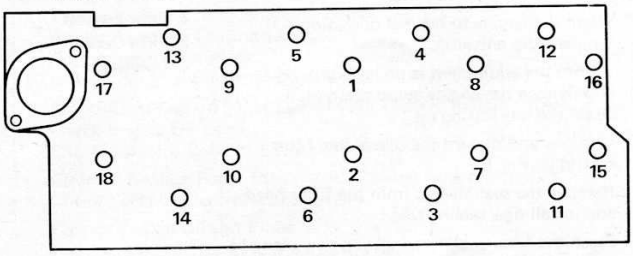
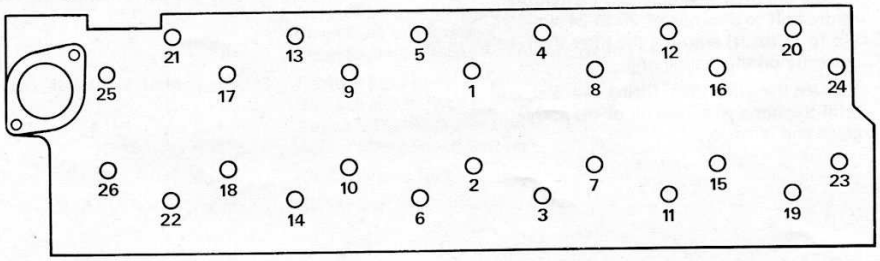


Fig. 8 **Bolt Tightening Sequence—6 Cyl.**



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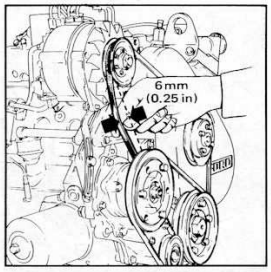
Tighten Cylinder Head Retaining Bolts

1. Run the engine until normal operating temperature is reached, then stop the engine.
2. Remove the air cleaner and valve rocker cover.
3. Tighten the cylinder head bolts in the correct sequence (shown in Figs. 7 and 8) to a torque of 135–150 Nm (103–110 lb.ft). Recheck valve clearances, Fig. 10.
4. Replace the rocker cover ensuring that the rocker cover gasket is in good condition and is correctly positioned. Tighten the retaining screws. Refit the air cleaner.

Adjust Fan Belt Tension

1. Slacken the alternator or generator support bracket bolts and the adjusting bolts.
2. Move the alternator or generator to adjust the belt tension; the tension is correct when, as the belt is pushed and pulled at a point midway between the alternator/generator and the crankshaft pulley, the total belt movement is 6 mm (0.25 in), see Fig. 9.

Fig. 9 **Fan Belt Adjustment**



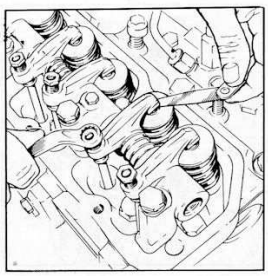


Fig. 10 **Valve Clearance Adjustment**

Adjust Valve Clearance

NOTE:—Valve clearance should be adjusted with the engine at normal working temperature.

1. Remove the aircleaner and rocker cover.
2. Turn the engine until No. 1 valve is FULLY open and adjust No. 4 IN and No. 7 EX (4 Cylinder) No. 10 IN and No. 11 EX (6 Cylinder).
3. Insert the feeler blade (specified below), between the valve stem and rocker arm. Turn the valve clearance adjusting screw until the feeler blade is lightly caught between the rocker arm and valve stem (Fig. 10) so that the feeler blade can be removed with slight resistance.
4. Rotate the engine, and following the sequence set out, adjust each of the remaining valves in turn.
5. Replace the rocker cover, ensuring that the gasket is positioned correctly, refit the aircleaner.

Valve Clearance (Normal working temperature.)
for INLET AND EXHAUST
0.33 to 0.38 mm (0.013 to 0.015 in)

ADJUSTMENT SEQUENCE

4 Cylinder

Valve Fully Open	Valves to Adjust
1 EX	4 IN and 7 EX
2 IN	5 EX and 8 IN
4 IN	1 EX and 6 IN
5 EX	2 IN and 3 EX

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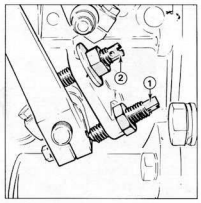
6 Cylinder

Valve Fully Open	Valves to Adjust
1 EX	10 IN and 11 EX
2 IN	7 EX and 12 IN
3 EX	8 IN and 9 EX
7 EX	2 IN and 5 EX
8 IN	3 EX and 6 IN
11 EX	1 EX and 4 IN

Fig. 11 **Adjustment of Idling Stop Screw**
1. **Maximum Speed Stop Screw**
2. **Idling Stop Screw**



Adjust Idling Speed Setting – Simms Injection Pump Only

1. Start and run the engine until the normal operating temperature is reached.
2. With the engine running, slacken the idling adjustment screw locknut (Fig. 11).
3. Adjust the idling speed screw until the engine is idling at a speed between 600 and 650 rpm and then tighten the locknut.
4. Operate the governor control lever to ensure a constant return to this setting.
   NOTE: If the engine is very new it may idle unevenly initially. Do not increase the idling speed setting to compensate.

ON NO ACCOUNT SHOULD THE MAXIMUM SPEED STOP BE INTERFERED WITH.

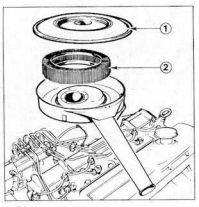


Fig. 12 **Paper Element Air Cleaner**
1. **Top Cover**
2. **Paper Element**

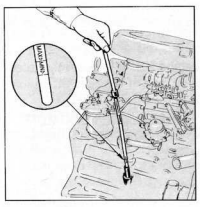


Fig. 13 **Checking Engine Oil Level**

Clean or Replace Paper Element Air Cleaner (where fitted)

1. Remove the top cover from the air cleaner and take out the paper element (Fig. 12). Shake out and replace. Renew if necessary.

Check Engine Oil Level

1. Make sure the equipment is standing level and that the engine is stopped.
2. Pull out the dipstick (Fig. 13) and wipe with a clean rag.
3. Insert the dipstick fully and again remove it. At no time should the level of the oil fall below the 'safe' mark on the dipstick.
4. If necessary, top up to the dipstick 'full' mark with an approved Grade of Oil (Page 30).

Check Radiator Coolant Level

Check the water level. This should be 25mm (1in) below the filler neck.

NOTE: It is dangerous to remove the radiator cap when the water is hot as the system is pressurised.

ANTI-FREEZING MIXTURE –

It is preferable always to use a mixture of 50% Long Life Coolant Concentrate to 50% water. The Coolant Concentrate should comply with Ford Specification M97B-18C. This will give protection against freezing down to -36°C (-34°F) and will also greatly reduce corrosion in the engine cooling system.

The table (Fig. 14) shows the protection provided when weaker solutions are used.

NOTE: When these concentrations (less than 50%) are used, the coolant should be drained and the system flushed after every winter season.

Fig. 14
Table showing degrees of protection against freezing.

Volume of M97B-18C in water	Protection
10%	– 8°C(17°F)
15%	–13°C(9°F)
20%	–19°C(– 2°F)
25%	–29°C(–20°F)
50%	–36°C(–33°F)

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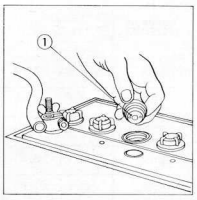


Fig. 15 **Battery Filler Plug**
1. **Plug—showing the vent holes**

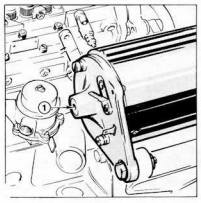


Fig. 16 **Generator Lubrication**
1. **Lubrication Point**

Check Level of Electrolyte in Battery

Engines in this range use a negative earth system. Ensure that the correct battery terminal is connected to a good earth on the framework of the equipment.

1. Remove the battery filler plugs (Fig. 15) and check that the electrolyte level is 6 to 9 mm (1/4 to 3/8 in) above the tops of the separators.
2. If necessary, top up with distilled water.

   NOTE: In cold weather, distilled water should only be added immediately before running the engine.
3. Replace the battery filler plugs and tighten securely.
4. Wipe the exterior of the battery with a rag moistened with ammonia.
5. Ensure the connections are tight and coat the terminals with petroleum jelly.

Lubricate Generator Rear Bearing (where fitted)

1. Insert an oil can spout into the lubrication hole in the generator rear bearing (Fig. 16) and inject a few drops of engine oil.

Clean Fuel Lift Pumps:—Simms Equipment.

1. Turn off the fuel supply tap.
2. Unscrew the centre retaining screw and remove the filter bowl. (Fig. 17).
3. Withdraw the screen and clean in fuel oil.
4. Replace the screen and filter bowl.
5. Bleed fuel system as described on Page 27.

Clean Fuel Lift Pump:—Bosch Equipment.

1. Turn off the fuel supply tap.
2. Disconnect the fuel inlet and outlet pipes.
3. Remove the two union nuts and withdraw the valves. (Fig. 18).
4. Clean and examine.
5. Replace the valves.
6. Bleed fuel system as described on Page 27.

Fig. 17 **Simms Fuel Lift Pump**
1. **Centre Bolt**
2. **Cover**
3. **Rubber Sealing Ring**
4. **Filter Gauze**
5. **Pump Body**

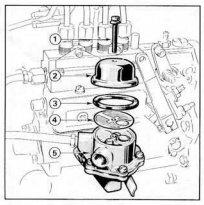
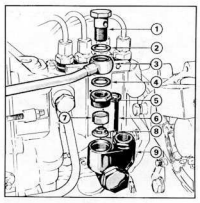


Fig. 18 **Bosch Fuel Lift Pump**
1. **Banjo Bolt**
2. **Sealing Washer**
3. **Union Fuel Pipe Pump to Filter**
4. **Sealing Washer**
5. **Retaining Nut**
6. **Primer Plunger**
7. **Collar**
8. **Fuel Valve**
9. **Pump Body**



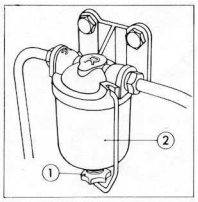


Fig. 19 **Fuel Sediment Bowl**
1. **Clamp Nut**
2. **Filter Bowl**

Clean Sediment Bowl and Filter (where fitted)

1. Turn off the fuel supply tap.
2. Slacken the clamp nut (Fig. 19) and move the clamp to one side and remove the filter bowl.
3. Withdraw the rubber gasket from the body of the filter, followed by the screen filter.
4. Clean the filter screen and sediment bowl in fuel oil.
5. Replace the filter screen with the reinforcement downwards and seat the rubber gasket over the filter.
6. Replace the glass filter bowl and tighten the clamp nut.
7. Bleed the fuel system (Page 27).
8. Run the engine and check that no fuel oil is leaking from the sediment bowl.

Replace Fuel Filter Element

The 4 cylinder engine is fitted with one fuel filter whereas the 6 cylinder has two fuel filters, both of which should be serviced.

1. Turn off the fuel supply.
2. Unscrew the centre bolt/s securing the filter

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canister/s to the filter head and remove the canister/s. (Fig. 20 & 21).

3. Remove the ring seal/s from the filter head and fit new seal/s.
4. Position new filter canister/s and secure with the centre bolt/s.
5. Turn on the fuel supply, bleed the fuel system as described on Page 27.
6. Start the engine and check for fuel leaks.

Fig. 20 **Simms Single Bowl Fuel Filter**

1. **Securing Bolt**
2. **Bleed Screws**
3. **Seal**
4. **Filter Element**
5. **Bowl**
6. **Drain Cap**
7. **Seal**

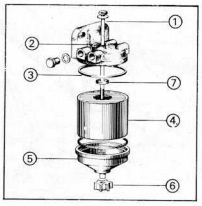
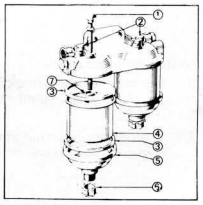


Fig. 21 **Simms Twin Bowl Fuel Filter**

1. **Securing Bolt**
2. **Bleed Screws**
3. **Seal**
4. **Filter Element**
5. **Bowl**
6. **Drain Cap**
7. **Seal**



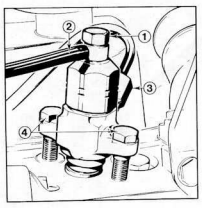


Fig. 22 **Removal of Injector**

1. **Leak off Pipe Securing Bolt**
2. **Leak off Pipe**
3. **Union Nut for High Pressure Pipe**
4. **Injector Retaining Bolt**

To Remove Injectors:

1. Remove the bolt on top of the injector securing the leak-off pipe to the injector (Fig. 22).
2. Unscrew the union nut at each end of the high pressure pipe and remove the pipe.
3. Unscrew the two injector retaining bolts and remove the injector.
4. Remove the sealing washer and the corrugated injector seat washers.
5. Blank off the delivery and leak-off connectors.

NOTE: Special Equipment is required for servicing injectors, and this work should be entrusted to your Ford Dealer.

To Replace Injectors:

1. Install a new injector seat washer and sealing washer in the cylinder head.
2. Remove the blanking plugs from the injector, install the injector, replace the retaining bolts. Tighten the bolts down evenly to a torque of 11.8 to 14.6 Nm (8.7 to 10.8 lb.ft).
3. Replace the fuel high pressure pipe and tighten the union nuts evenly to a torque of 17.6 to 19.0 Nm (13 to 14 lb.ft).
4. Fit a washer either side of the leak-off pipe banjo, fit the bolt and tighten to a torque of 13.5 to 16.3 Nm (10 to 12 lb.ft).
5. Bleed the fuel system as described on Page 27.

Bleed the Fuel System:

1. Ensure that all fuel pipe connections are tight and that there is sufficient fuel in the tank.
2. Loosen the bleed screw on top of the filter and operate the priming lever (Simms) or priming pump (Bosch) on the fuel lift pump. Continue pumping until a flow of fuel, free of air, is expelled from the filter.

   NOTE: Where Simms fuel injection equipment is fitted, if the eccentric on the injection pump camshaft is on maximum lift, the fuel lift pump priming lever will be inoperative. If this occurs, rotate the engine until the priming lever can be operated.
3. Tighten the bleed screw on the filter.
4. Loosen the bleed screws on the injection pump, and operate the priming lever and/or priming pump as before.

   NOTE: DAMAGE TO THE INJECTION PUMP PLUNGERS WILL RESULT IF THEY ARE LEVERED UP AND DOWN TO PRIME THE INJECTOR PIPES.
   IN SUCH CASES THE WARRANTY WILL BE INVALIDATED.
5. When fuel oil, free of air bubbles, is expelled from the injection pump bleed screws, tighten the screw furthest from the inlet connection first, then the other one.
6. Wipe all surplus fuel oil from the exterior of the filters and injection pump.
7. Start the engine and check for leaks.

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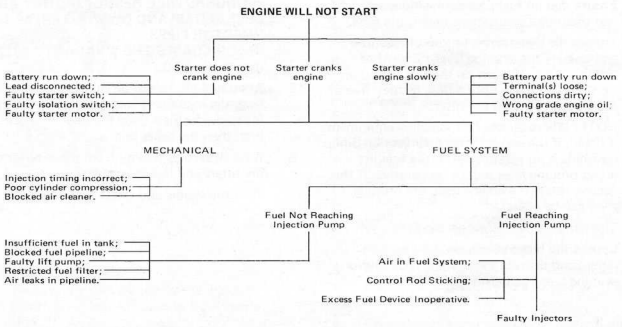
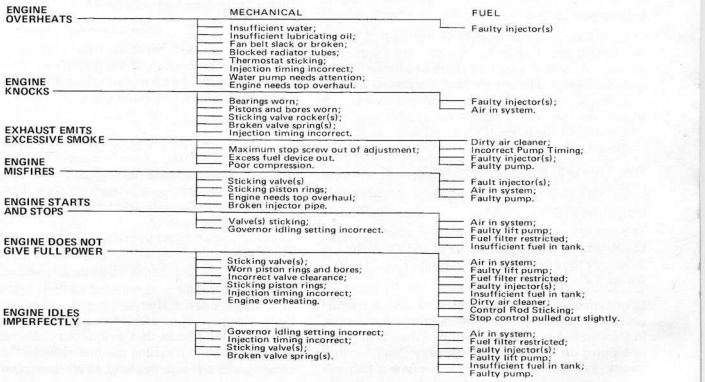
FAULT FINDING CHART



FAULT FINDING CHART



GENERAL MAINTENANCE

Lubrication System

The lubrication system should be maintained regularly as specified in the maintenance summary on page 14, with the correct grade of lubricant as specified below. The system is of the forced feed type, the lubricating oil being circulated to the engine bearings under pressure by an oil pump. This oil pump is of the bi-rotor type and is driven by the crankshaft gear.

Two oilways in the front cover carry oil to and from the injection pump.

LUBRICANTS

The oil used must meet Ford Specification ESEE-M2C-1004A and must be of the viscosity shown on the chart to suit the ambient temperature range (Fig. 23).

Lubricating oil cleanliness is vital for the successful operation of your engine. The oil should be stored in the cleanest possible conditions. When changing or topping-up the engine oil, use only clean receptacles. Do not allow the oil to come into contact with the rubber hoses on the engine. Check the oil level every 10 hours as described on page 20.

Change the oil after the first 15 hours and thereafter as specified on page 14.

OIL PUMP

The oil pump is located at the front of the engine behind an alloy housing and is driven by a gear on the crankshaft. The oil is maintained at a constant pressure by means of a relief valve.

OIL FILTER

Oil under pressure from the oil pump is passed through the oil filter, where it is cleansed prior to being circulated around the engine. The oil filter is of the full flow, replaceable element type. The element should be replaced at the intervals specified, as described on page 15.

Fuel System

The fuel injection pump is made to very accurate limits and the ingress of even the smallest particle of dirt to the fuel system will destroy its efficiency by causing scoring or premature wear on the highly finished parts. Ensure that scrupulous cleanliness is observed when handling the fuel system components and also the fuel. At all times, take

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OIL VISCOSITY CHART

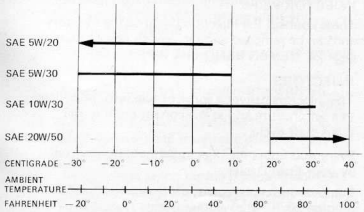


Fig. 23 **Oil Viscosity Chart**

care that water is not allowed to contaminate the fuel oil. Whenever the fuel system is disconnected at any point, fit suitable blanking plugs.

If the fuel system pipes are disconnected or if the engine runs out of fuel, the system must be bled as described on page 27.

RE-FUELLING

It is important to use a fine gauze filter and a clean, dry, rust-free funnel when re-fuelling.

After drawing fuel from the storage tank, ensure that the tap is not leaking and clean up any fuel which might have been spilt. Fuel oil does not evaporate and will collect dust and dirt if allowed to remain. Try to make a practice of re-fuelling in a sheltered position. Always wipe the fuel tank around the filler cap before and after filling and replace the cap immediately.

The various components of the engine fuel system are:—

SEDIMENT BOWL (WHERE FITTED)

The sediment bowl (Fig. 19) separates any larger sediment particles from the fuel as it is pumped from the fuel tank to the injection pump. Every 200 hours the bowl should be serviced as described on page 24.

FUEL LIFT PUMP

A fuel lift pump is fitted to the injection pump to draw fuel from the fuel tank. The design of the lift pump varies in line with the injection pump fitted e.g. Simms or Bosch. In both types the pump is operated by the injection pump camshaft.

With Simms Equipment

The pump is of the diaphragm type and incorporates a hand priming lever to enable the fuel system to be bled.

With Bosch Equipment

The pump is of the single acting piston type. The pump incorporates a priming pump to enable the fuel system to be bled.

NOTE: If the eccentric on the injection pump camshaft is on maximum lift the fuel lift pump primary lever will not operate. If this occurs pull out the engine stop control lever and rotate the engine until the primary lever can be operated.

FUEL FILTER

Every 400 hours the filter should be serviced as described on page 24.

INJECTION PUMP

The injection pump fitted to your engine could be of Simms or Bosch manufacture. In each instance the pump is designed to deliver an accurately metered quantity of fuel to the engine to suit load conditions throughout the engine speed range.

The pump is, therefore, a very accurately machined piece of equipment and requires careful handling. Repairs should be entrusted to your Authorised Ford Dealer. The injection pump timing can be set, as described below.

INJECTOR PIPES

These connect the injection pump to the injectors and can be removed and replaced as described on page 26. NEVER BEND THE PIPES.

INJECTORS

The injectors deliver a spray of fuel into the cylinders at a set pressure and at the correct point in the crankshaft cycle.

Every 400 hours the injectors should be serviced by your Ford Dealer.

Removal and replacement of injectors is described on page 26.

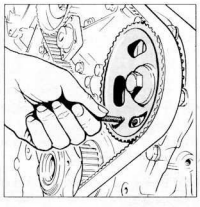
NOTE: CAV injectors are used with the Simms injection pump and Bosch injectors are used with the Bosch pump. Under no circumstances should the CAV or Bosch injectors be mixed or fitted other than in the correct combination.

CHECKING THE INJECTION PUMP TIMING

As detailed in the fault finding chart, poor engine performance can occasionally be attributed to incorrect injector timing. This can be rectified as described below.

1. Remove the fan.
2. Slacken the alternator or generator support bracket bolts and the adjusting bolts and remove the fan belt.
3. Remove the water pump pulley and the timing belt cover.
4. Align the crankshaft timing marks with No. 1 piston at TDC on the compression stroke (the piston position can be verified by removing No. 1 Injector) and install the camshaft gear timing pin (Fig. 24).
5. The injection pump timing pointer should be aligned between the two marks on the automatic advance hub, corresponding to 12°. If the pointer is only one or two degrees away from the setting, loosen the injection pump drive gear nuts and turn the hub within the limits of the elongated stud holes. If unable to correct the timing by this method, proceed as follows.
6. Slacken off the tensioner bolts, disengage the spring and remove the timing belt. The injection pump hub can then be turned to align the marks correctly.
7. Refit the timing belt and adjust the tensioner. After checking timing alignment the drive gear nuts should be tightened to the torque specified.

Fig. 24 **Location of Camshaft Gear Timing Pin**



8. Remove the camshaft gear timing pin. Refit the timing belt cover, water pump pulley and fan belt.
9. Tighten the alternator or generator support bracket bolts, adjust the fan belt tension as described on page 17, tighten the adjusting arm bolt.
10. Refit the fan.

NOTE: The preceding instructions on removal of parts to enable the injection pump timing to be checked, will also be necessary to carry out the checking of the timing belt.

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(a) Visually examine the timing belt and check for:–
(b) Fraying of the belt edges and severing of the cords.
(c) Cracking, splitting or excessive wear of the reinforcement in the teeth area.
(d) Heavy scoring or bearing marks on the back of the belt.

If there is any doubt as to the serviceability of the belt it should be changed.

NOTE: As the crankshaft and camshaft can turn independently of one another when the toothed driving belt is removed, extreme caution must be taken if turning the engine over before fitting the belt as there is a danger of the pistons coming into contact with the valves. Therefore, before removing the belt, ensure that the crankshaft and camshaft timing marks are aligned.

Cooling System

Under no circumstances may the engine be started without water in the cooling system.

There are two basic types of cooling systems used with these engines

(a) Radiator and Fan (Industrial).
(b) Raw Water (Marine).

Radiator and Fan type

The engine is cooled by the circulation of water through the water jackets surrounding the cylinders, cylinder head and valve seats. The heated water flows by thermo-syphonic action, assisted by a pump at the front of the cylinder block, to the radiator and, as it flows downwards through the radiator tubes, it is cooled by the stream of air induced by the fan placed behind the radiator. Thermostats situated below the coolant hose connection on the cylinder head promote rapid 'warming up' and assist in maintaining a constant engine operating temperature.
Your engine is fitted with either an 'Open' or a 'Sealed' Cooling System.

Raw Water type (Fig. 25)

The raw water pump, mounted on the engine front cover plate, circulates water through the engine oil cooler, transmission oil cooler and heat exchanger/exhaust manifold.
The fresh water pump, mounted on the front of the cylinder block, circulates water to the cylinder block, cylinder head, thermostat housing and heat exchanger/exhaust manifold.
On four cylinder engines one thermostat is fitted, and on six cylinder engines two thermostats are fitted together with a by-pass tube.

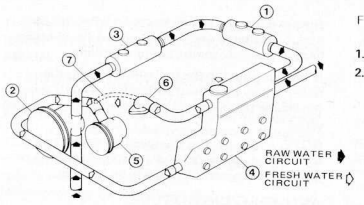


Fig. 25 **Cooling System for Marinised Engines**

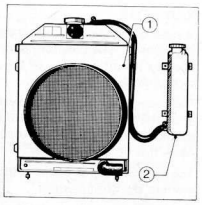
1. Trans Oil Cooler
2. Raw Water Pump
3. Engine Oil Cooler
4. Heat Exchanger/ Exhaust Manifold (including Header Tank)
5. Fresh Water Pump
6. Thermostat Housing–Cylinder Head
7. By Pass (6 Cyl only)

OPEN SYSTEM

This consists of a radiator, fan, water pump and thermostats. The system requires regular attention and the level of the coolant in the radiator should be kept 'topped up'. If the engine is in continuous use in hot weather the coolant level should be checked several times daily.

Fig. 26 **Sealed Cooling System**

1. Radiator
2. Expansion Tank



SEALED SYSTEM

This system is similar to the Open Type except that an expansion tank is connected by a pipe to the radiator filler neck (Fig. 26). The system is filled with an anti-freezing mixture and sealed on original installation.

The system requires no attention between periods of approximately two years. After this time the coolant should be drained, the condition of the radiator hoses and connections checked and the system refilled with Ford Long Life coolant solution.

RADIATOR

Several types of radiators are available for use with your engine. The radiator capacity will have been selected to suit the duty of the engine and the surrounding air temperature.

The capacity of the cooling system is dependent upon the type of radiator fitted and reference should be made to the manufacturer's specification when this figure is required.

The capacity of the engine water jacket only is given in the Specification.

If the radiator grilles become clogged, they should be cleaned otherwise the engine will overheat.

IF THE ENGINE OVERHEATS

Assuming that the engine is operating under normal load and atmospheric conditions, check the following points:–

(a) Decrease in air flow due to a slack or broken fan belt.
(b) Restriction to air flow due to blocked radiator fins or blocked louvres in the machinery cowling (if applicable).
(c) Lack of coolant circulation due to low level or faulty thermostat.

Always allow the engine to cool down until the back of the hand can be held against the cylinder head without discomfort before refilling.

If there is liquid in the radiator top tank, the radiator may be refilled with safety, if not, allow the engine to cool down completely before topping up.

NOTE:– Always use the specified coolant mixture for topping up the radiator otherwise the level of protection against freezing will be lowered.

ANTI-FREEZING MIXTURE

It is preferable to use a mixture of 50% Long Life Coolant Concentrate to 50% water.

The Coolant Concentrate should comply with Ford Specification M97B–18C. This will give protection against freezing down to –36°C (–34°F) and will also greatly reduce corrosion of the engine cooling system. See page 21 for details of protection provided by weaker concentrations of M97B–18C.

IF AN ANTI-FREEZING MIXTURE IS NOT BEING USED IN FROSTY WEATHER, IT IS ESSENTIAL THAT THE RADIATOR AND CYLINDER BLOCK ARE DRAINED PRIOR TO

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THE ENGINE STANDING IDLE AND REFILLED IMMEDIATELY BEFORE THE ENGINE IS USED AGAIN.

DRAINING AND CLEANING THE COOLING SYSTEM

When draining the system remove the filler cap and open the two drain cocks, one under the radiator, the other on the cylinder block on the left-hand side of the engine. If the flow ceases probe the cocks carefully to dislodge any sediment that may be causing a temporary blockage.

WATER PUMP

The water pump requires no attention as the design incorporates a pre-lubricated shaft bearing. The gland is rubber sealed, with a self adjusting spring loading which obviates leakage or need for adjustment.

THERMOSTAT

A thermostat is incorporated in the water outlet from the cylinder head.

If it is suspected at any time that this is not operating correctly it may be immersed in a suitable container and gradually heated. The butterfly valve of the standard thermostat should commence to open at 71°C (160°F) and be fully open at 87°C (189°F). Do not attempt any adjustment if the thermostat does not function properly at this setting. Replace with a new unit.

PRESSURE CAP (if fitted)

This filler cap seals the system so that a slight pressure is developed in normal operating conditions. A relief valve, however, is fitted so that there will not be any undesirable rise in pressure; this is pre-set when the cap is manufactured. This cap can be identified by the marking 'Remove Slowly'.

Electrical System

BATTERY

A NEGATIVE EARTH SYSTEM IS USED ON ENGINES IN THIS RANGE.

Ensure that the correct battery terminal is connected to a good earth on the framework of the equipment.

Distilled water for battery use should be kept in clean, covered, non-corrodible vessels. In cold weather, add water only immediately before running the engine, so that the charging will mix the water and electrolyte: this will prevent freezing.

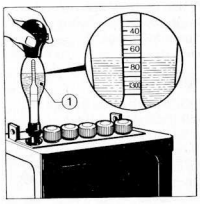

Fig. 27 **Checking Battery Specific Gravity**

1. **Float must be moving freely**

If the battery is allowed to stand in frosty weather in an unduly discharged condition there is the possibility that it may freeze, causing damage to the container. Take care, therefore, to keep the battery as fully charged as possible—specific gravity 1.275 at 21°C (70°F) since then it is unlikely to be affected by frost. (See Fig. 27).

Special precautions should be taken when operating in cold climates to prevent the battery state from falling below the conditions indicated by the following specific gravities:

1.200 specific gravity at −18°C (0°F)
1.245 specific gravity at −29°C (−20°F)
1.265 specific gravity at −35°C (−30°F)

The battery should not be allowed to become unduly discharged, or to stand in a run-down condition.

Keep the battery filler plugs and connections tight, and the top of the battery clean. Wiping the battery with a rag moistened with ammonia will counteract the effect of any of the solution which may be on the outside of the battery. A coating of a good grade of petroleum jelly will protect the terminals from corrosion.

Every 50 hours, the level of electrolyte in the battery should be checked as described on Page 22.

GENERATOR OR ALTERNATOR

This is mounted on brackets on the right of the cylinder block and is driven from the crankshaft by a fan belt.

The charging rate is adjusted automatically by the regulator to provide sufficient electric current to keep the battery fully charged under normal operating conditions.

No lubricator is provided at the pulley bearing as it is packed at assembly.

At intervals of 200 working hours, lubricate the generator rear bearing as described on Page 22. The alternator requires no lubrication maintenance.

The 12 volt alternator, excepting the special marine version, has a built in voltage regulator and relay.

Caution:—It is essential that the plug at the rear of the alternator containing the wiring connections is not removed whilst the engine is running otherwise damage to the alternator will result.

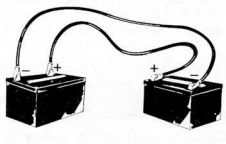

Fig. 28 **Correct connection of booster battery**

USE OF 'JUMPER' CABLES

To avoid the possibility of extensive damage to your charging system it is important to observe the following points when using battery 'jumper' cables to start an engine having a discharged battery. The positive (+) terminals of the batteries must be connected through one cable (usually red), and the negative (−) terminals connected through the other cable (see Fig. 28). If this procedure is not followed, extensive damage may be done to the charging system.

After starting do not disconnect the 'jumper' leads while the engine is running at over 1,000 r.p.m. (or fast idle).

CAUTION: Since explosive hydrogen gas is always present, sparks or flames should not be allowed near the battery. When using battery 'jumper' cables, the cables should always be attached to the booster battery first to reduce the possibility of sparks near a charged battery.

CUT-OUT AND VOLTAGE REGULATOR

The cut-out and regulator is a self-contained unit which automatically connects the generator to the battery when the output has risen sufficiently and also prevents the battery discharging itself when for any reason the charging rate falls below a minimum value as, for instance, when the engine is idling or stopped.

There is also provision for automatic regulation of the current supplied by the generator so that if the battery is considerably discharged the charging rate increases. When it is fully charged the charging rate will decrease.

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STARTER MOTOR

The starter motor is mounted on the right-hand side of the engine, it requires no attention beyond seeing that the cable connections are clean and tight, the commutator is kept clean and the brushes are renewed when necessary.

Clutch (where fitted)

The clutch is of the 'dry' plate type. The pressure plate springs maintain the required pressure.

Always ensure that the clutch is fully engaged when the engine is running; partial engagement will result in excessive wear of the release bearing and clutch lining, necessitating frequent adjustment of the clutch, in addition to causing loss of power through clutch slip. Clutch slip in such circumstances may cause distortion due to the heat developed and subsequent clutch control adjustment may not then correct the condition.

CLUTCH RELEASE BEARING

The clutch release bearing, is of the 'greaseless' type and requires no lubrication.

Where a clutch release shaft is fitted, a suitable clearance between the release bearing and fingers should be maintained at all times by adjusting the operating rod—refer to the manufacturer's specifications.

Decarbonising

The need for decarbonising arises when an excessive amount of carbon deposit has formed on the inside of the cylinder head, on the tops of the pistons and the valves.

It is impossible to state a particular period after which decarbonisation should be carried out since the use of different fuels, lubricating oils and varying operating conditions have a considerable influence.

The usual indication that decarbonising is advisable is a falling off in performance, possibly accompanied by a tendency for the engine to overheat.

We consider that experience is the best guide in making a decision about when to decarbonise, and recommend that you permit your Authorised Ford Dealer to help you in making that decision, also to carry out the work.

OPTIONAL EQUIPMENT

The equipment detailed below is supplied, when requested, fitted to 2400 Range Engines manufactured by Ford Motor Company Ltd., England.

Compressor/Exhauster
Oil Plans Front Well Rear Well
90° Oil Filter Adaptor — with or without metric or BSP oil cooler tappings.
Inlet Manifold: Top or Side intake.
Exhaust Manifold: Centre or Rear Outlet.
Exhaust Manifold and Heat Exchanger (Marine).
Exhaust Manifold Adaptor.
Injection Pumps with the following Governing Standards (Simms or Bosch):—
British Standard Class A General Purpose (Simms only)
Automotive Usage
Power Take Off (P.T.O.)
Auxiliary Drive for compression exhauster or raw water pump (Marine)
Crankshaft Pulley with or without P.T.O. sheaves
Cold Start Aid
Air Cleaners
Manifold Mounted — Paper Element
Remote Mounted — Paper Element (Can be engine mounted on 6 cylinder)
Fuel Filter
Single and Double Bowl on 4 & 6 cylinder engines respectively.
Front Engine Mounting Brackets — Rolled End — Centre Fitting — Front Fitting
Flywheels
15.1 kg (33.3 lb)
17.9 kg (39.5 lb)
20.1 kg (44.3 lb)
23.5 kg (51.7 lb)
39.3 kg (86.5 lb).

Flywheel Housings — SAE 3 & 4.

Fans
A range of puller and pusher fans of various diameters are available as build scheme options.

Generator
12 volt — 11 ampere output

Alternators
12 volt — 36 ampere output — two types available
12 volt — 43 ampere output — Marine

Regulator to suit Generator

Regulator for Marine Alternator

Starter Motors — Industrial and Marine use
External solenoid type with self-indexing drive

Combined Mechanical Tachometer and Hourmeter

Water Pump with Standard or Heavy Duty Bearing

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TIGHTENING TORQUES

	Torque (Nm)	Torque (lb.ft)	Torque (mkg)
Oil pan drain plug	20 to 27	15 to 20	2.1 to 2.8
Oil filter centre bolt	20 to 24	15 to 18	2.1 to 2.5
Cylinder head bolts (with engine hot)	135 to 150	100 to 110	13.8 to 15.2
Rocker shaft pedestal bolts	43 to 51	32 to 38	4.4 to 5.2
Inlet manifold retaining bolts	11 to 13	8 to 10	1.1 to 1.4
Exhaust manifold retaining bolts	41 to 50	30 to 37	4.1 to 5.1
Main bearing cap bolts — 1st stage	118 to 127	87 to 94	12.0 to 13.0
2nd stage	127 to 135	94 to 100	13.0 to 14.0
Connecting rod nuts — 1st stage	47 to 61	35 to 45	4.8 to 6.2
2nd stage	61 to 74	45 to 55	6.2 to 7.6
Flywheel to crankshaft flange bolts	58 to 64	43 to 47	6.0 to 6.5
Camshaft centre bolt	74 to 95	55 to 70	7.6 to 9.7
Front cover to cylinder block — except lowest bolt	27 to 31	20 to 23	2.8 to 3.2
lowest bolt	20 to 24	15 to 18	2.1 to 2.5
Oil pump cover to front cover	13 to 16	10 to 12	1.4 to 1.7
Oil pan to cylinder block	13 to 20	10 to 15	1.4 to 2.1
Delivery Valve Holder — Simms Pump	45	33	4.6
— Bosch Pump	24	18	2.5
Auto Advance Unit Nut — Simms Pump	62	46	6.4
Pulley to Auto Advance Unit Nut	15 to 20	11 to 15	1.5 to 2.1
Fuel filter retaining bolt	7 to 9	5 to 7	0.7 to 1.0
Injector High Pressure Pipe Union Nuts	18 to 19	13 to 14	1.8 to 2.0

GENERAL SPECIFICATIONS

Engine	4 Cylinder diesel	6 Cylinder diesel
Model number	2401E	2402E
Type	Overhead valves and indirect injection	
Bore	93.67 mm (3.69 in)	93.67 mm (3.69 in)
Stroke	85.58 mm (3.37 in)	85.58 mm (3.37 in)
Capacity	2359cc (144 cu.in)	3538cc (216 cu.in)
Max. BHP		
Overload	58.5 at 3600 RPM	87.0 at 3600 RPM
Continuous	53.0 at 3600 RPM	79.0 at 3600 RPM
Max. Torque (lbs.ft)		
Overload	89.0 at 2250 RPM	133.0 at 2250 RPM
Continuous	81.0 at 2250 RPM	121.0 at 2250 RPM
Max. P.S.		
Continuous 'A'	49.5 at 3600 RPM	73.0 at 3600 RPM
Continuous 'B'	54.5 at 3600 RPM	80.5 at 3600 RPM
Max. Torque (kgm)		
Continuous 'A'	10.9 at 2250 RPM	16.1 at 2250 RPM
Continuous 'B'	12.0 at 2250 RPM	17.6 at 2250 RPM
Compression ratio	22:1	22:1
Firing order	1 2 4 3	1 5 3 6 2 4
Valve clearance	Inlet 0.33 to 0.38 mm (0.013 to 0.015 in)	
	Exhaust 0.33 to 0.38 mm (0.013 to 0.015 in)	

	2401E	2402E
Lubrication	Pressure feed by Bi-Rotor Type Pump	
Oil pressure (min.) at idling speed	1.05 kg/cm² (15 lb/in²)	
Oil pressure relief valve opens at	3.87–4.22 kg/cm² (55–60 lb/in²)	
Oil temperature	80°C (176°F) – 110°C (230°F)	
Oil Pan capacity (inc. filter)	6.5 litres (11.5 pints)	11.0 litres (19.5 pints)
Oil filter	External Full-Flow Type with Replaceable Element	
Oil filter capacity	1.0 litres (1.8 pints)	1.3 litres (2.2 pints)
Oil drain point	Plug at base of Oil Pan	
Lubricant	see page 30	
Fuel system		
Minimec Injection pump		
Type	Multi-element operated by an enclosed camshaft	
Pump cambox capacity	250cc (0.44 pint)	285cc (0.50 pint)
Timing – Simms	12° BTDC No 1 piston	
Cold starting	Excess fuel device	
Bosch M Injection pump		
Type	Multi-element operated by an enclosed shaft	
Pump cambox capacity	250cc (0.44 pint)	285cc (0.50 pint)
Timing for both types of injection pump	12° BTDC No. 1 piston	
Governor	Mechanical	
Fuel Injectors		
Nozzle opening pressure	175 atmospheres	

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	2401E	2402E
Fuel lift pumps		
Types — Simms	Diaphragm with hand priming lever.	
— Bosch — 2401E only	Single acting piston with hand priming lever.	
Drive	Mechanical by eccentric on injection pump camshaft.	
Fuel filters	Single Bowl Replaceable element	Twin Bowl Replaceable element
Cooling system		
Type	Impeller assisted, thermo syphon system, thermostatically controlled	
Cooling capacity of engine	6 litres (10 pints)	8.5 litres (15 pints)
Optimum operating temperature	85°C (185°F)	
Fan belt tension	6mm (0.25 in) free movement. See page 17.	
Electrical system		
Battery type	NEGATIVE EARTH A 12V 70 amp hour battery should be used for starting temperatures down to −10°C (14°F). Two 12V 70 amp hour batteries should be used for starting down to −20°C (−4°F) and two 12V 90 amp hour batteries should be used for starting down to −30°C (−22°F).	

Alternator	
Two types available	Both are 2 brush, air-cooled, three phase types
Maximum output	36 amps at 12 volts
Generator	
Type	Totally enclosed 2 pole
Maximum output	11 amps at 12 volts
Starter motor	
Two types available	Both are Pre-engaged types

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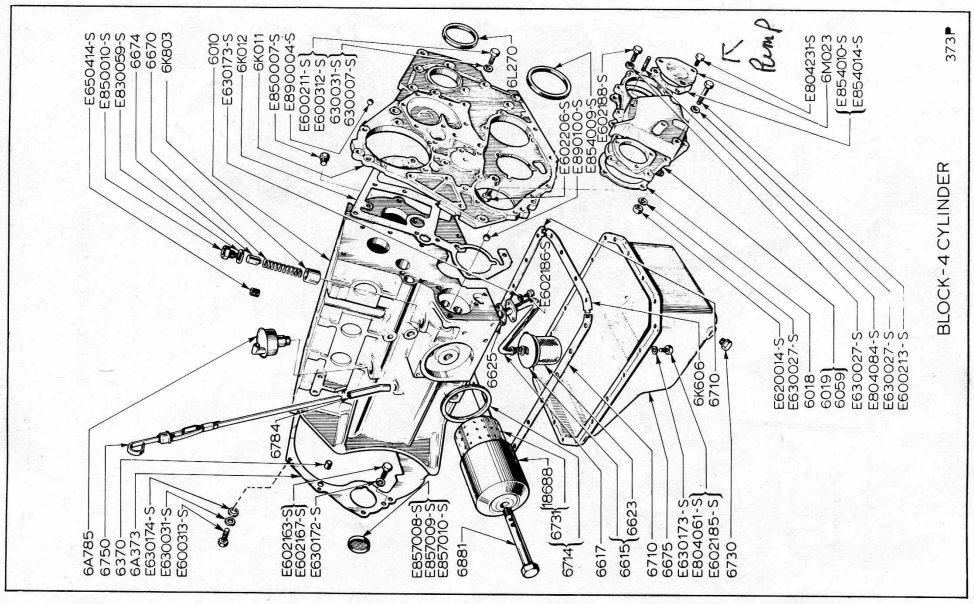
OWNER'S PARTS LIST

The following pages are a guide to assist in identifying parts requirements. For more detailed information consult a Ford Dealer.



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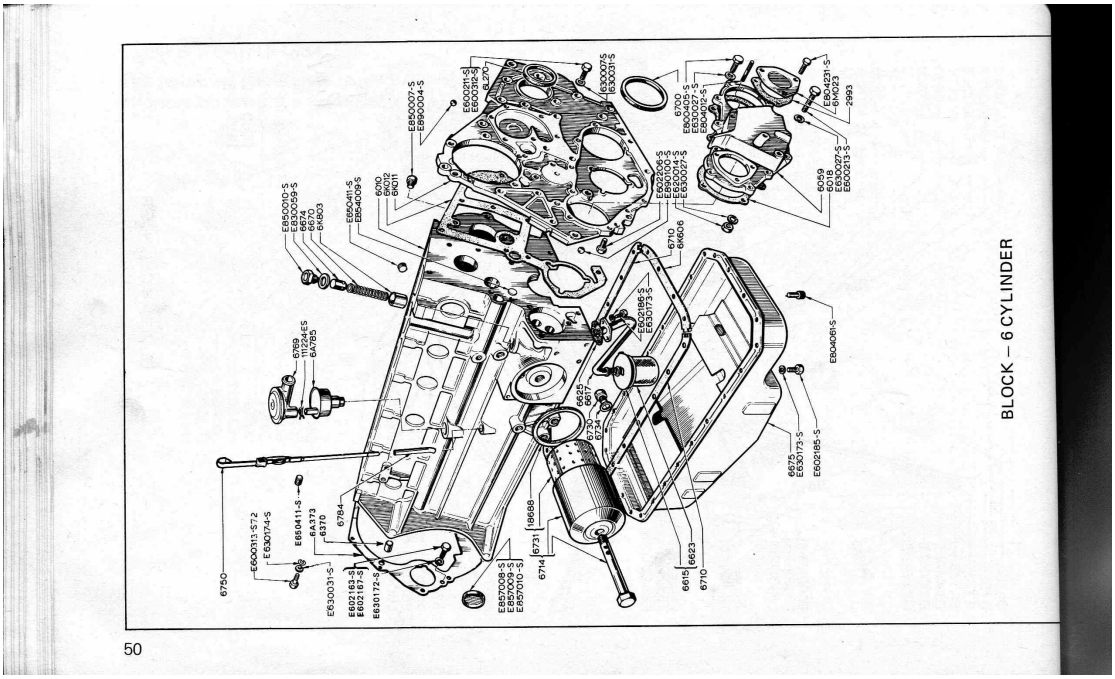

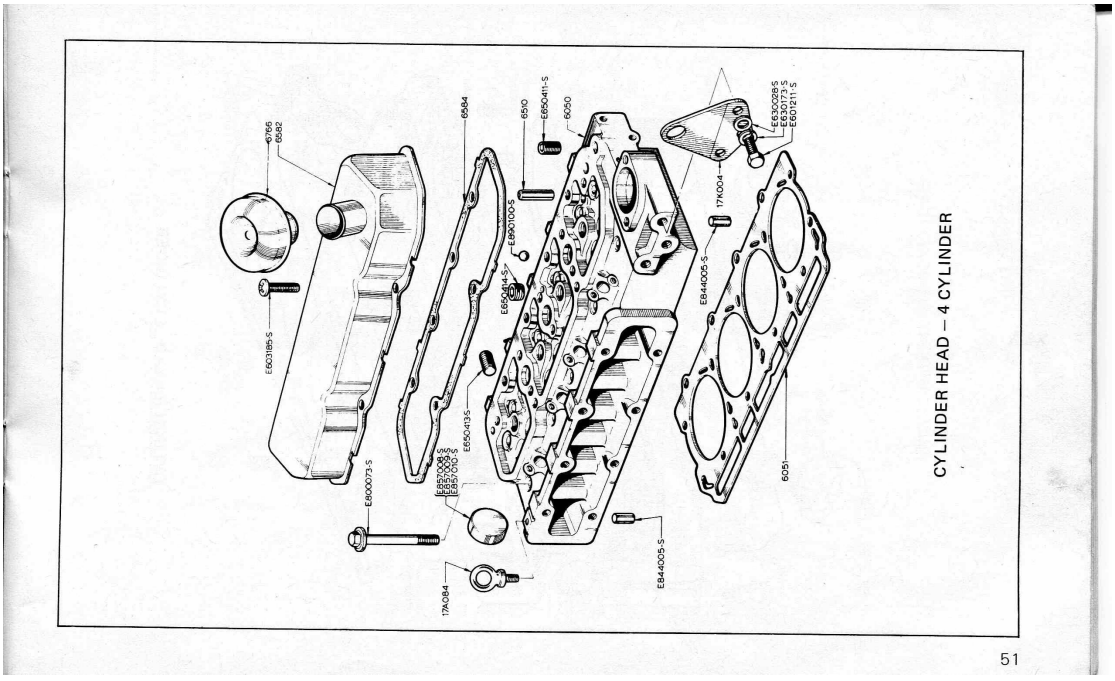

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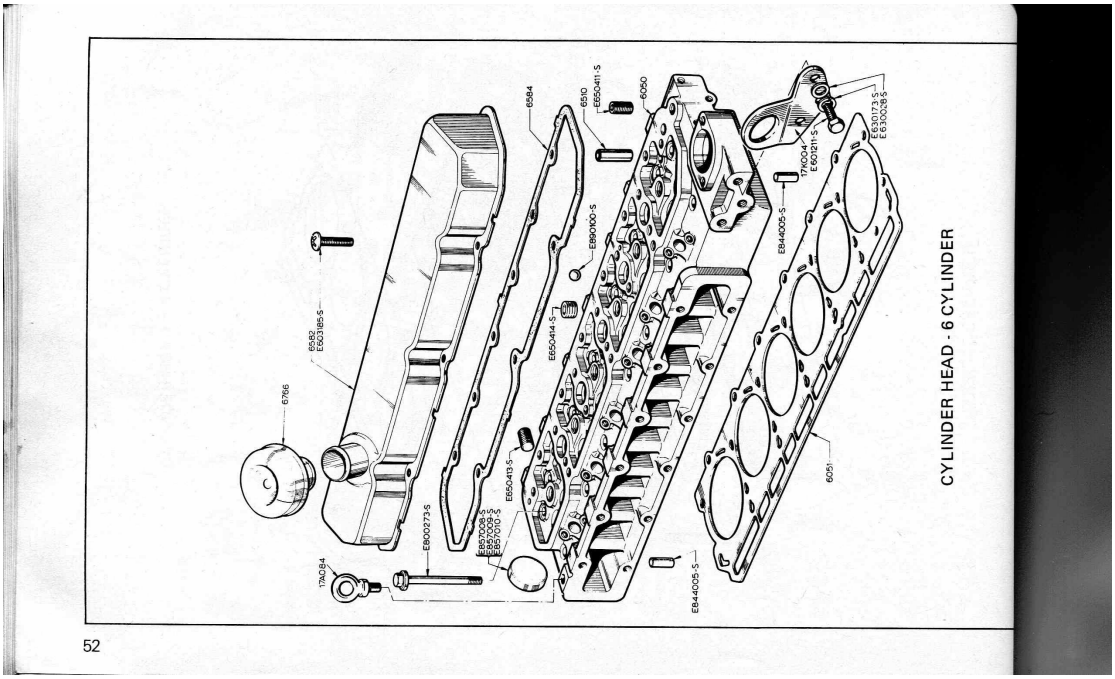

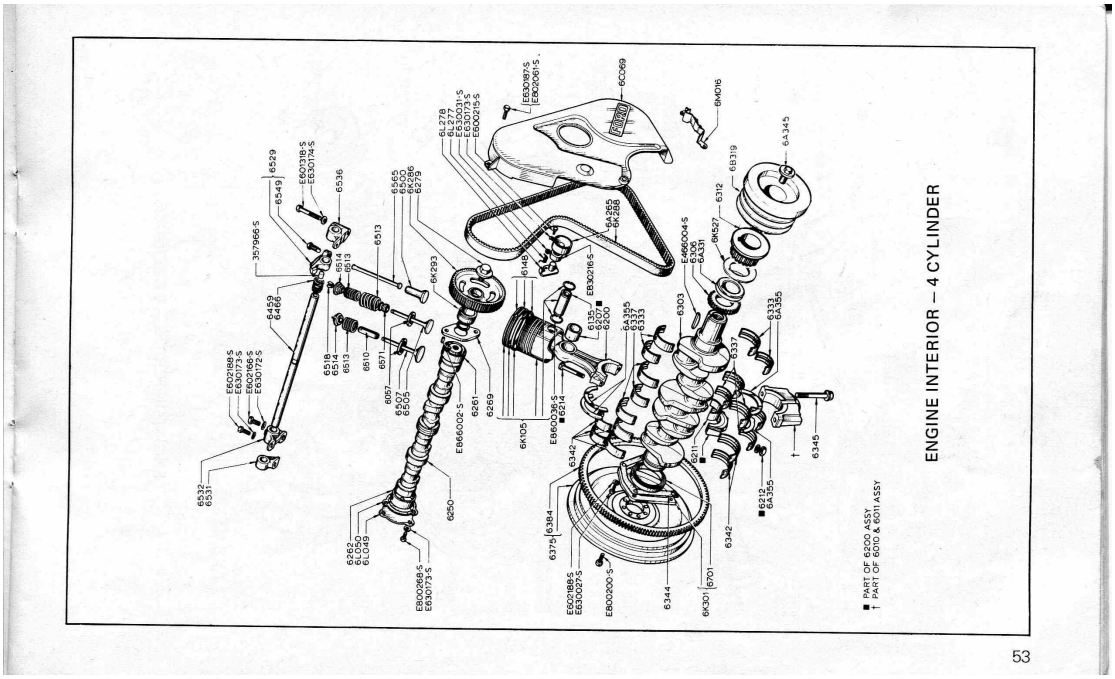

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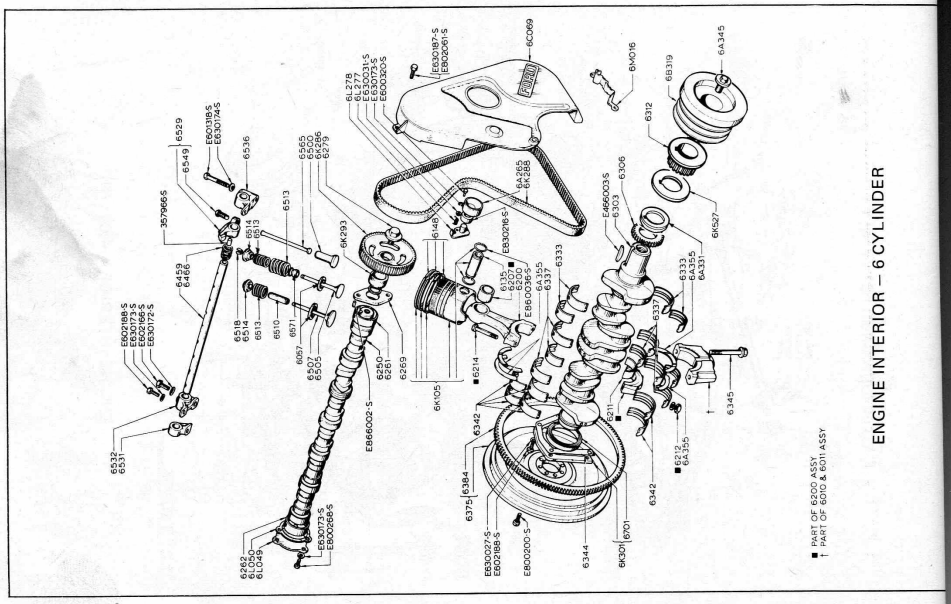

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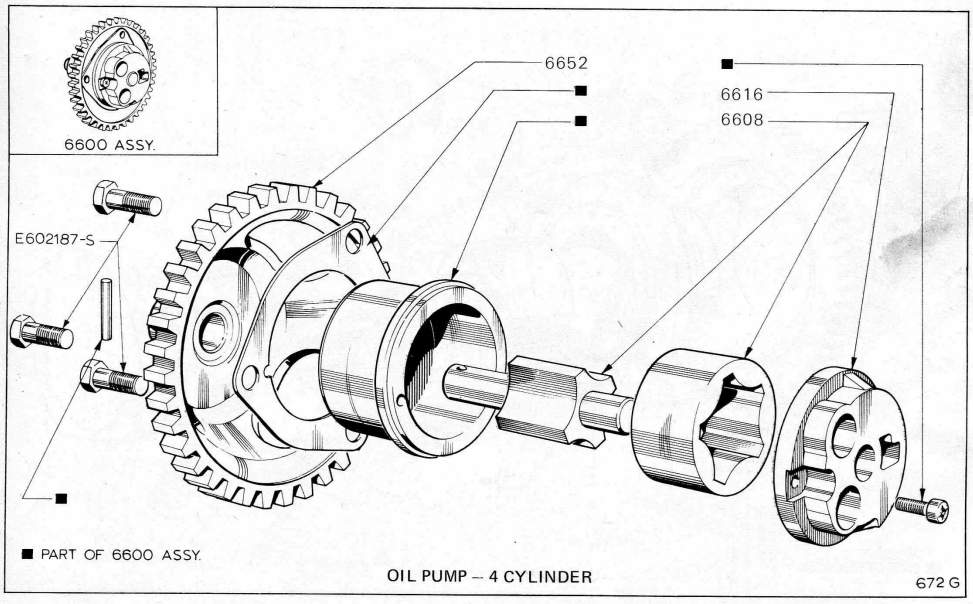

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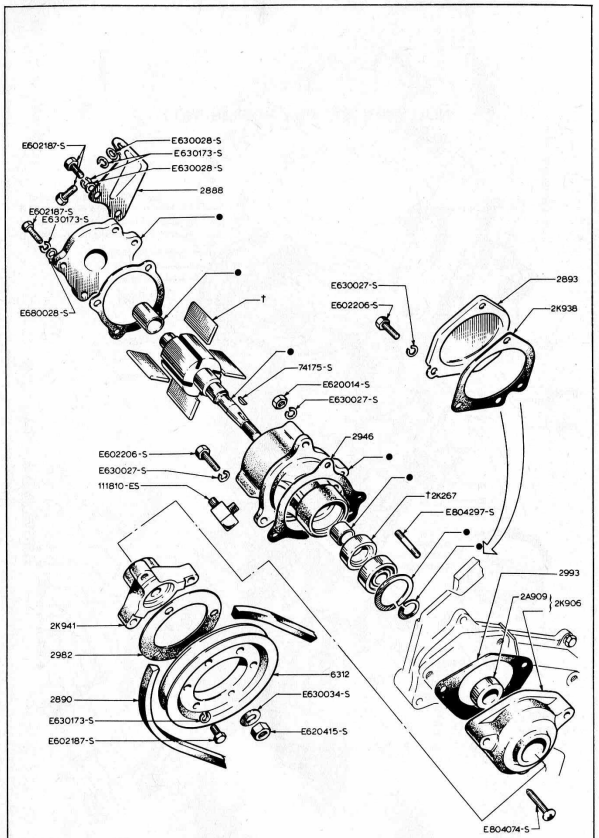
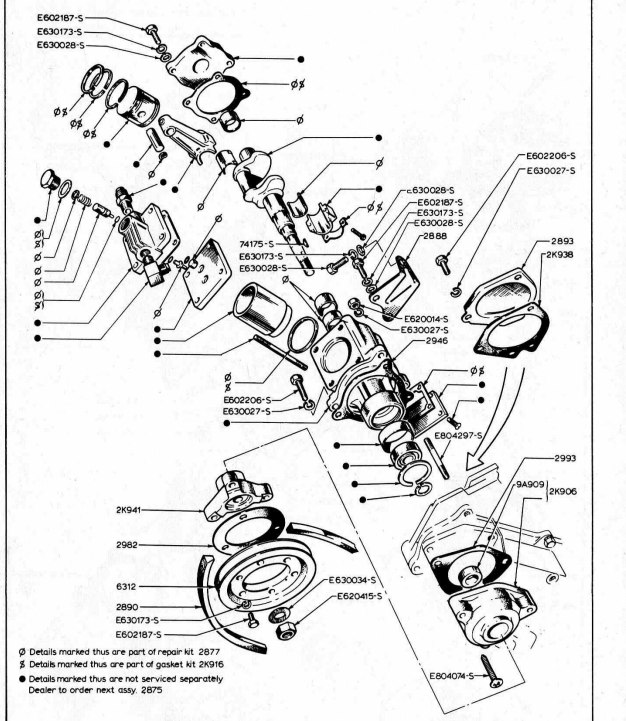


● Details marked thus are not serviced separately. Dealer to order next assy. -2A451

† Details marked thus are part of repair kit 2K362

EXHAUSTER AND INSTALLATION

2721

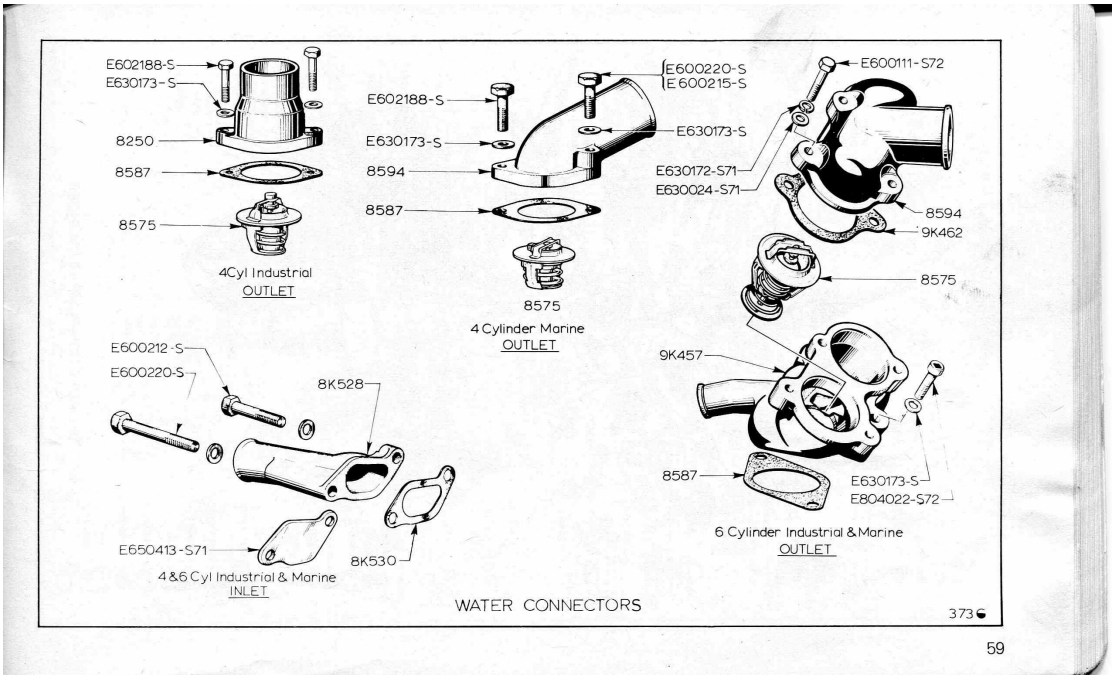


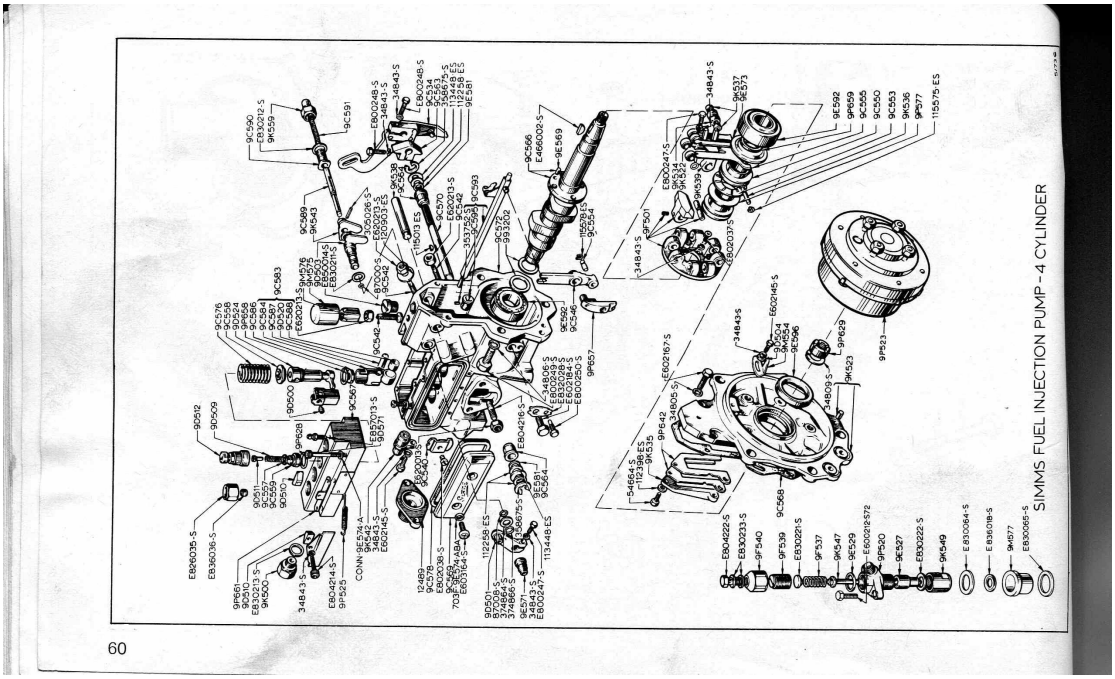
Ø Details marked thus are part of repair kit 2877

§ Details marked thus are part of gasket kit 2K916

● Details marked thus are not serviced separately. Dealer to order next assy. 2875

COMPRESSOR AND INSTALLATION





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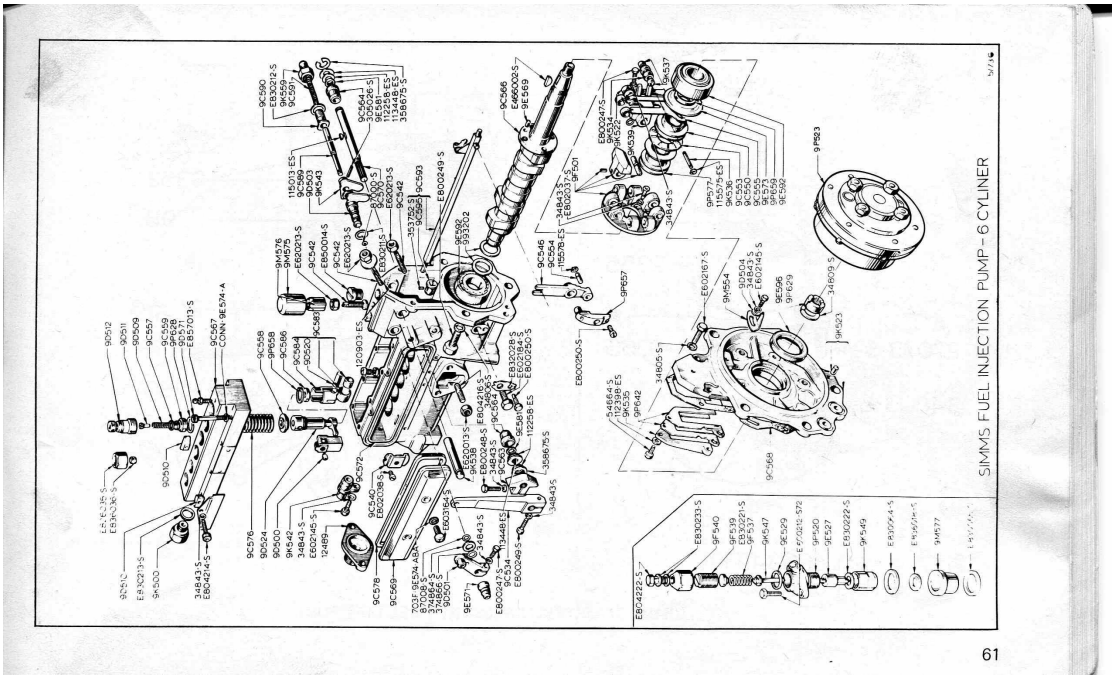

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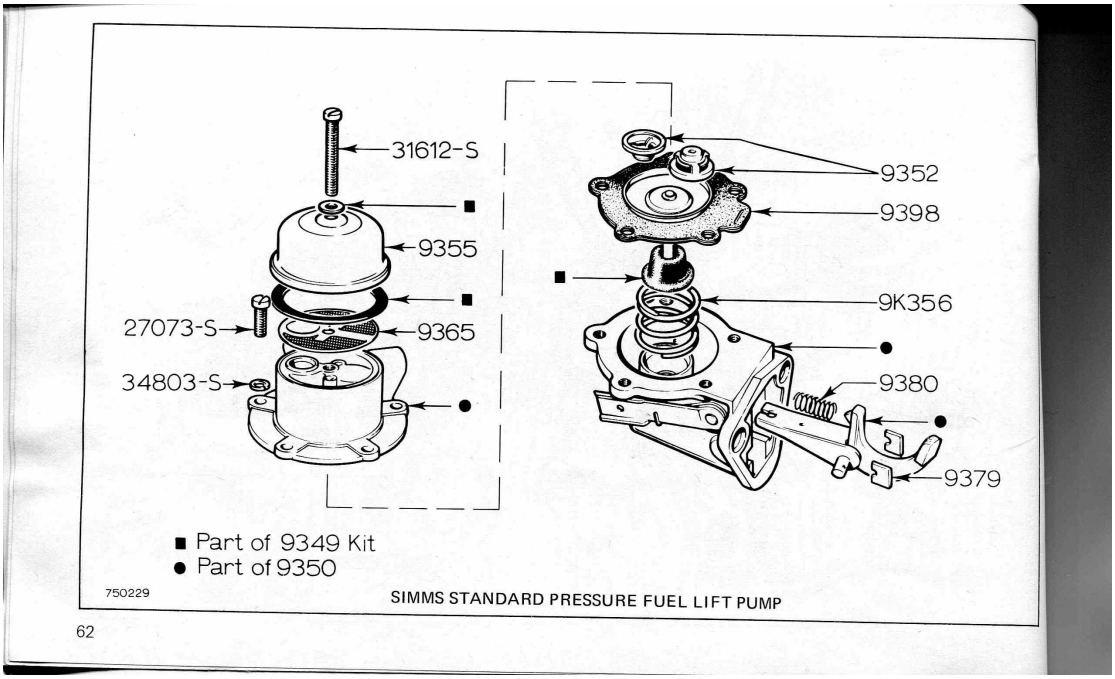

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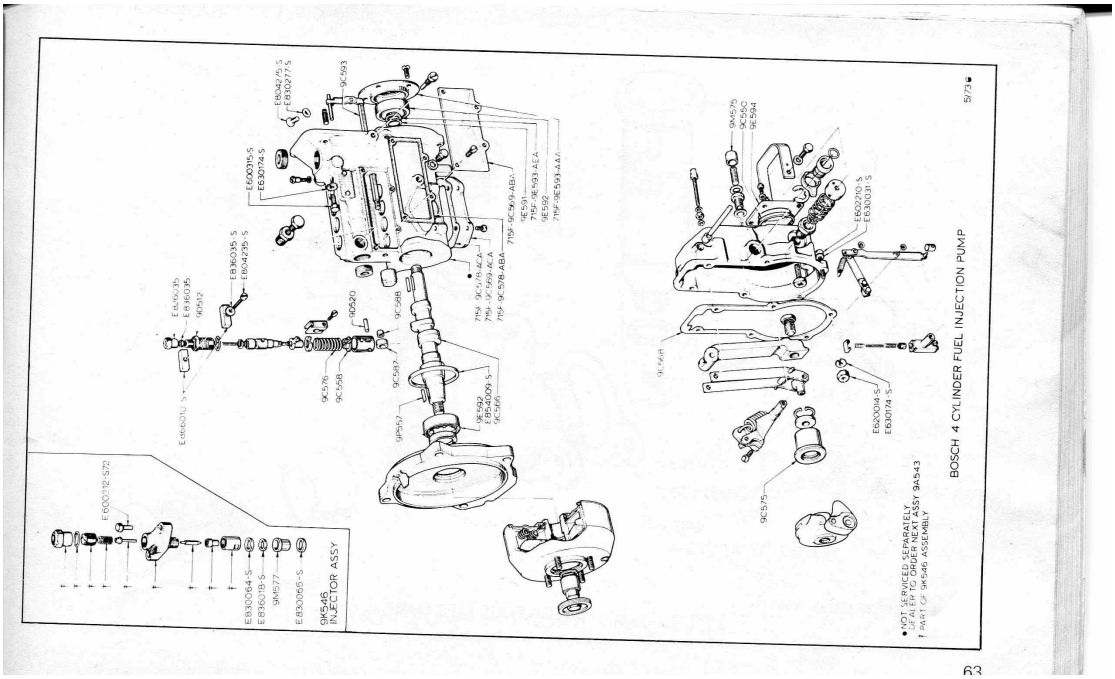

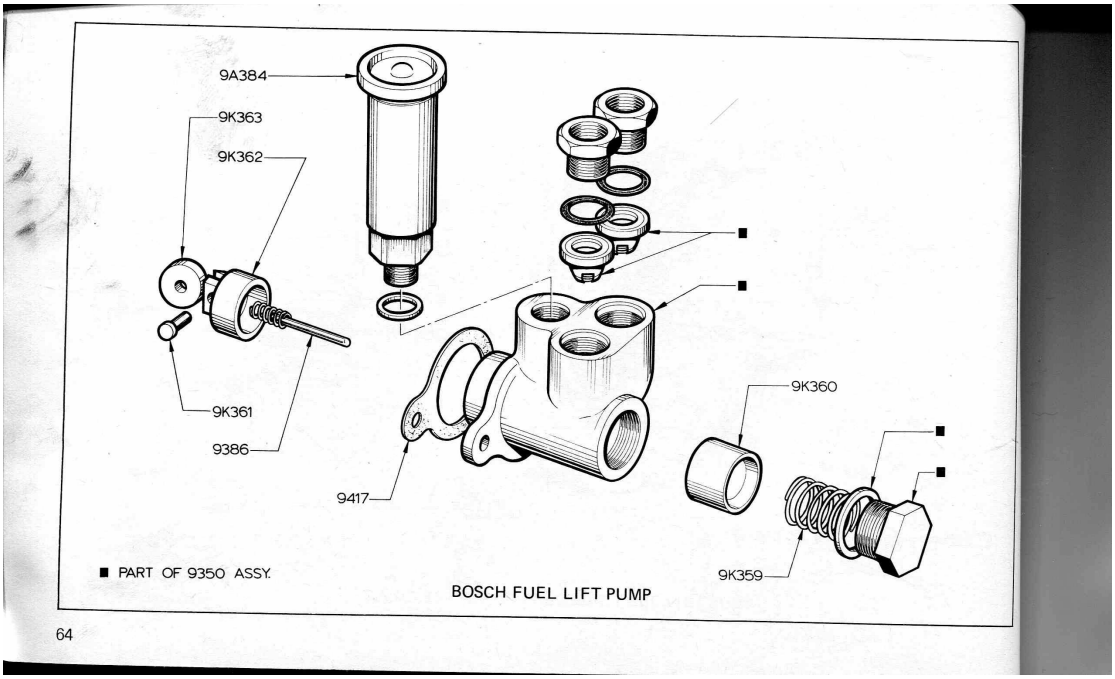

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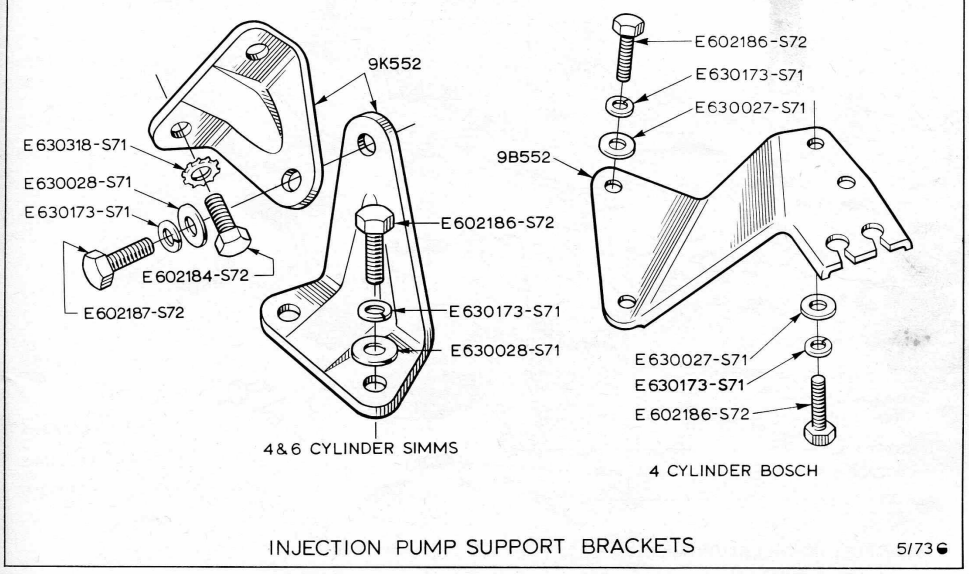

INJECTION PUMP SUPPORT BRACKETS 5/73

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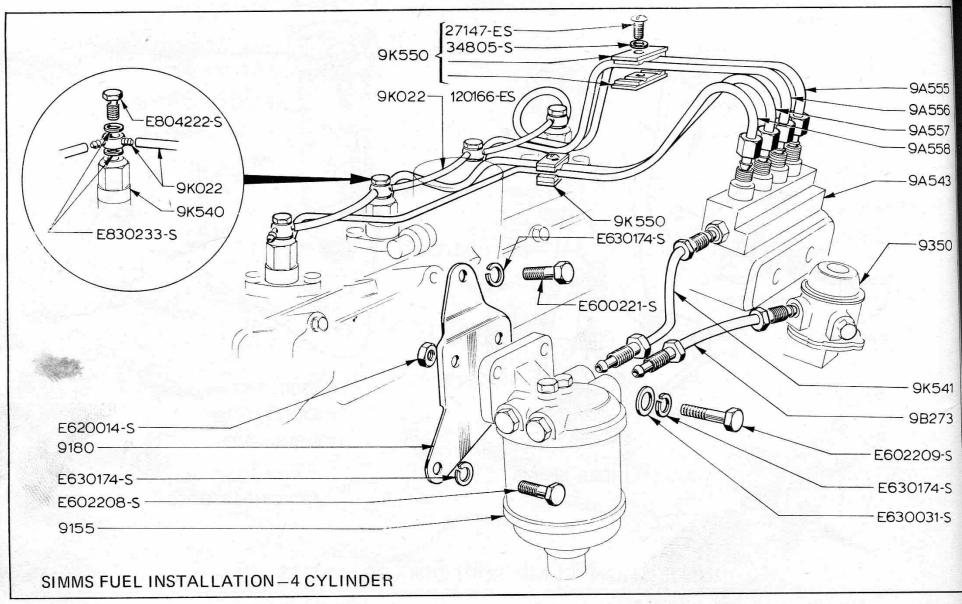

SIMMS FUEL INSTALLATION—4 CYLINDER

66

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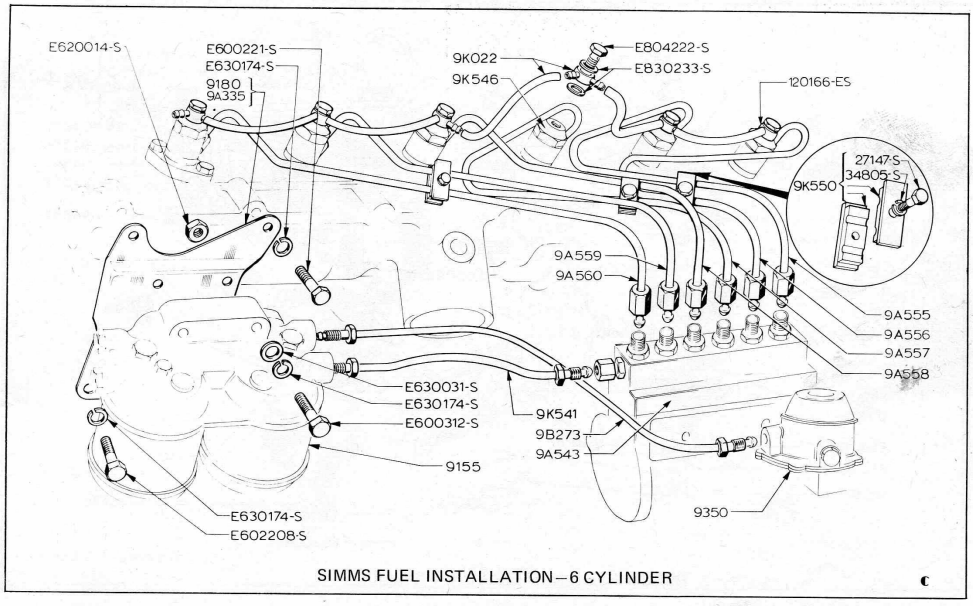

SIMMS FUEL INSTALLATION—6 CYLINDER

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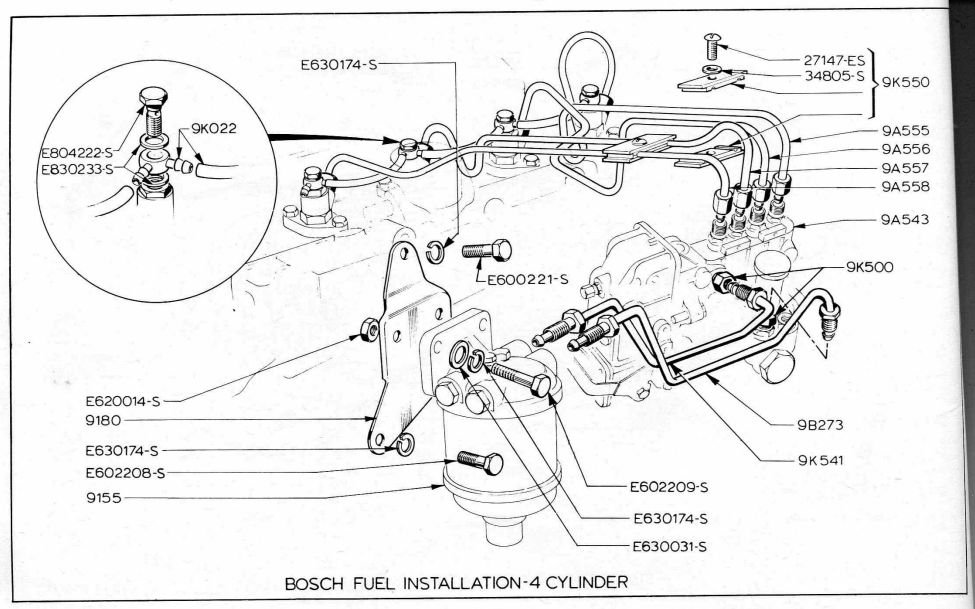

BOSCH FUEL INSTALLATION-4 CYLINDER

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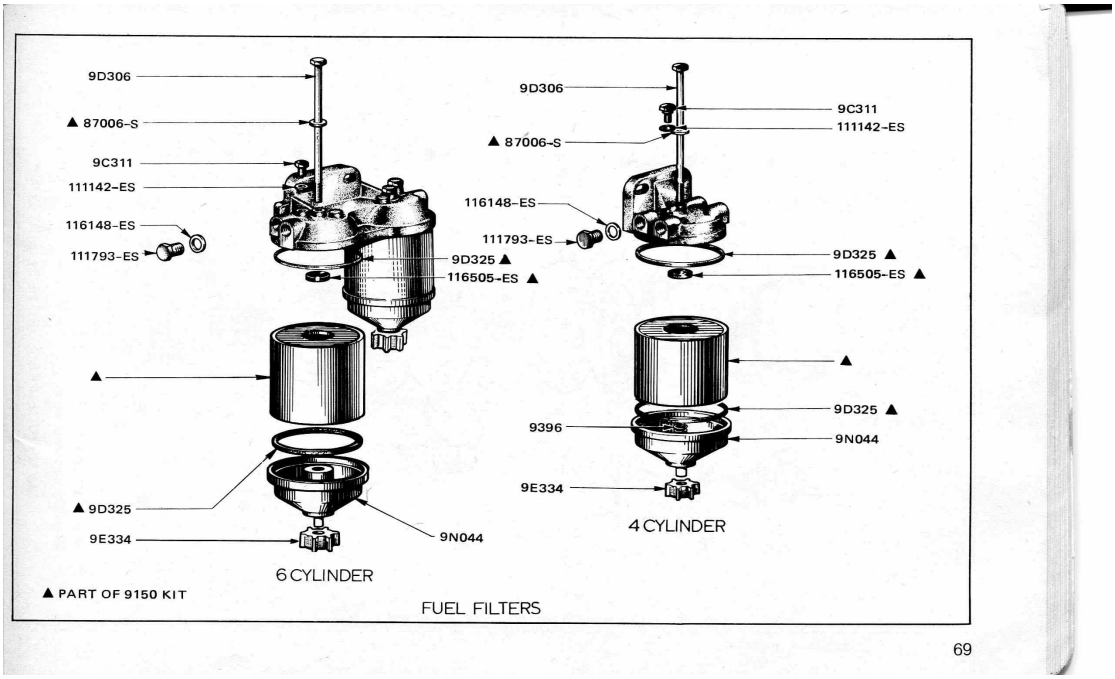

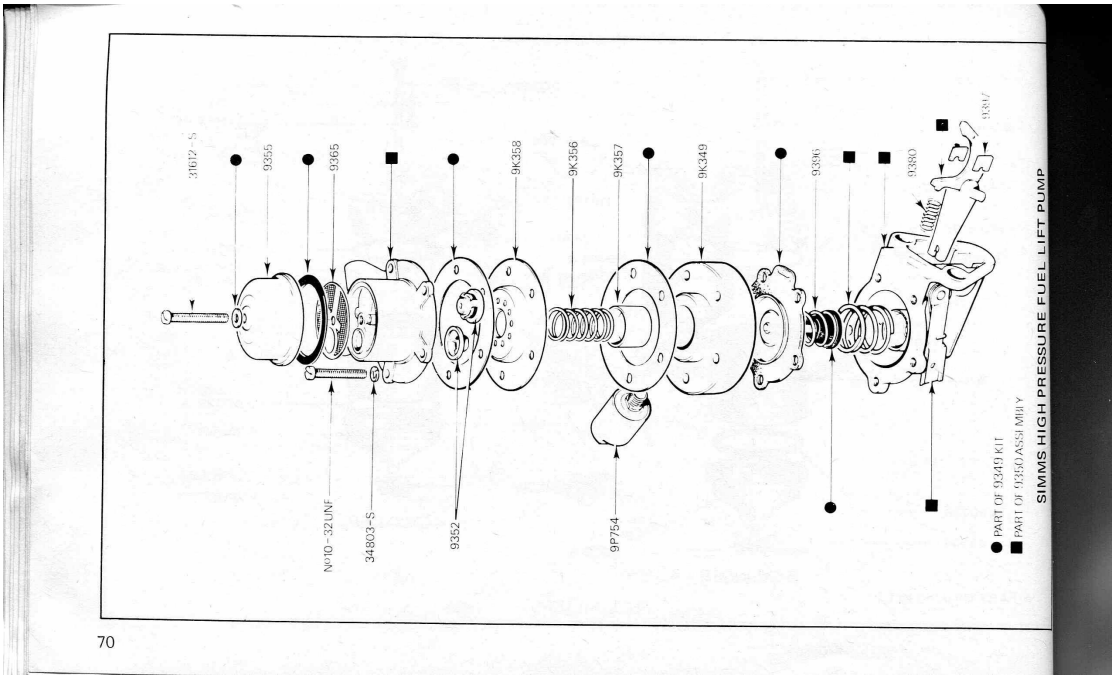

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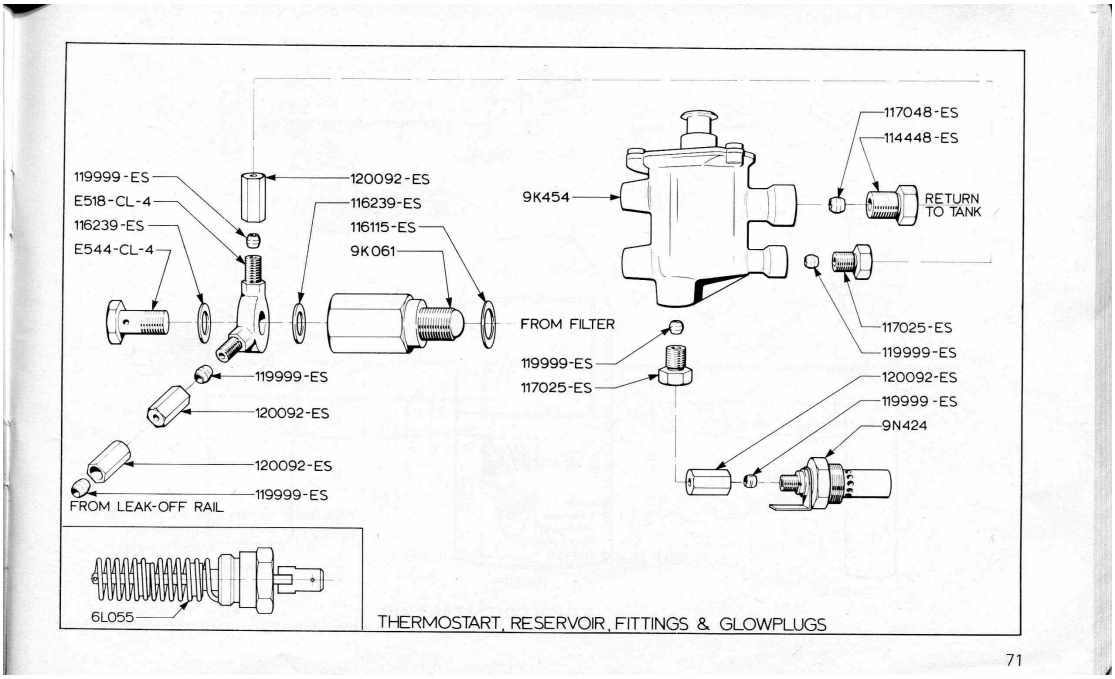

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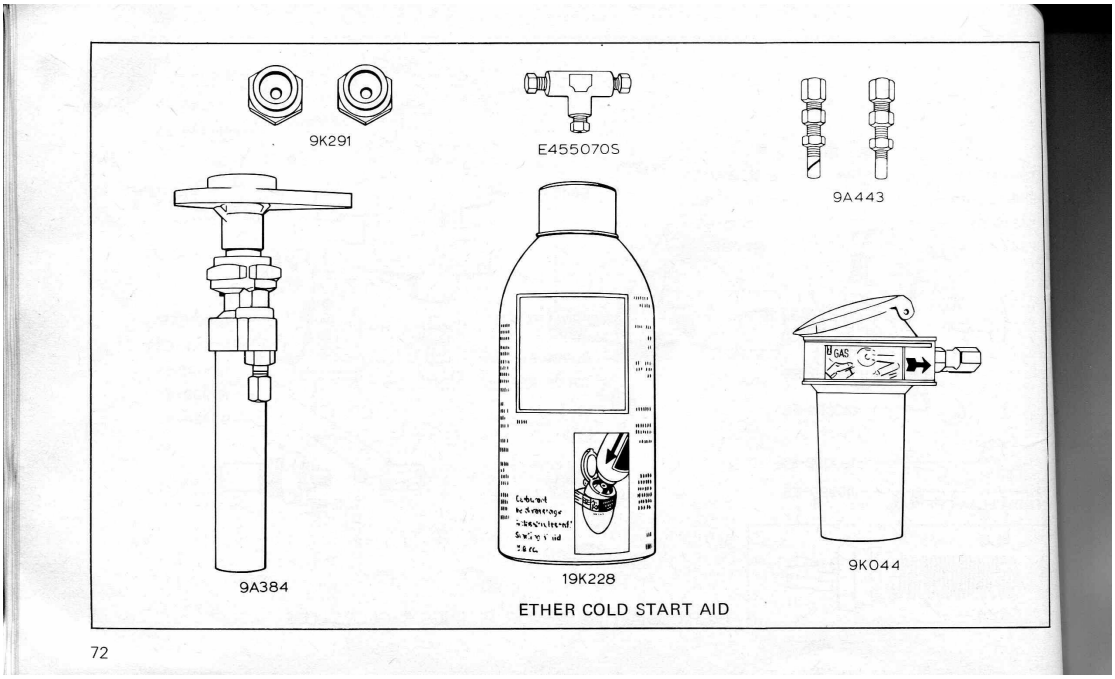

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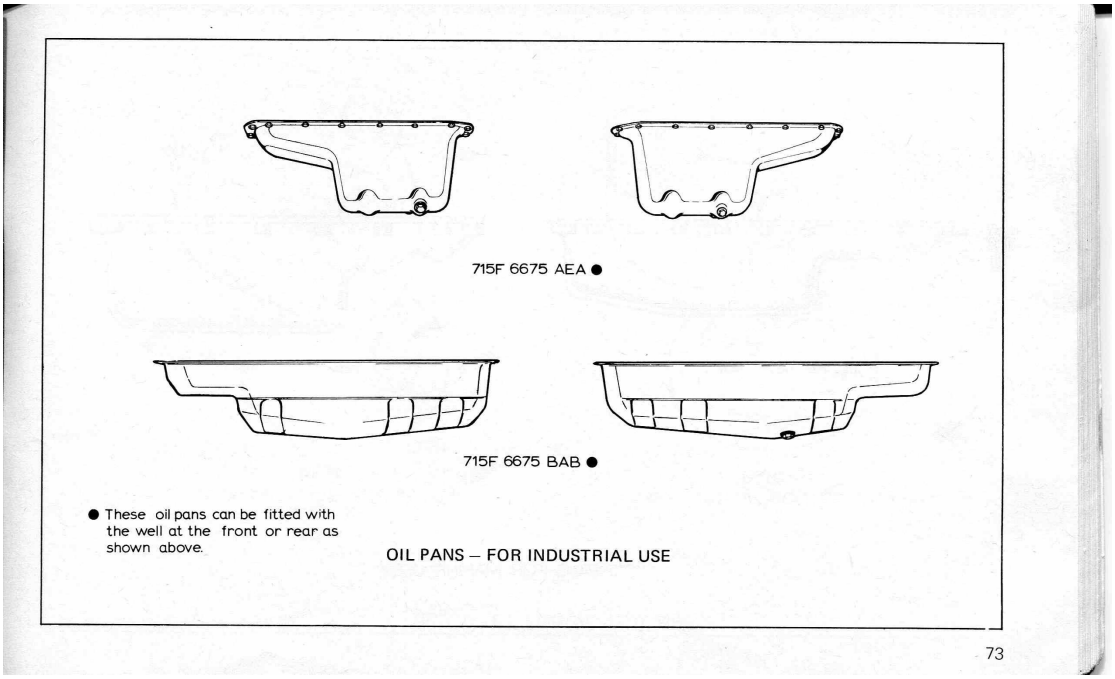
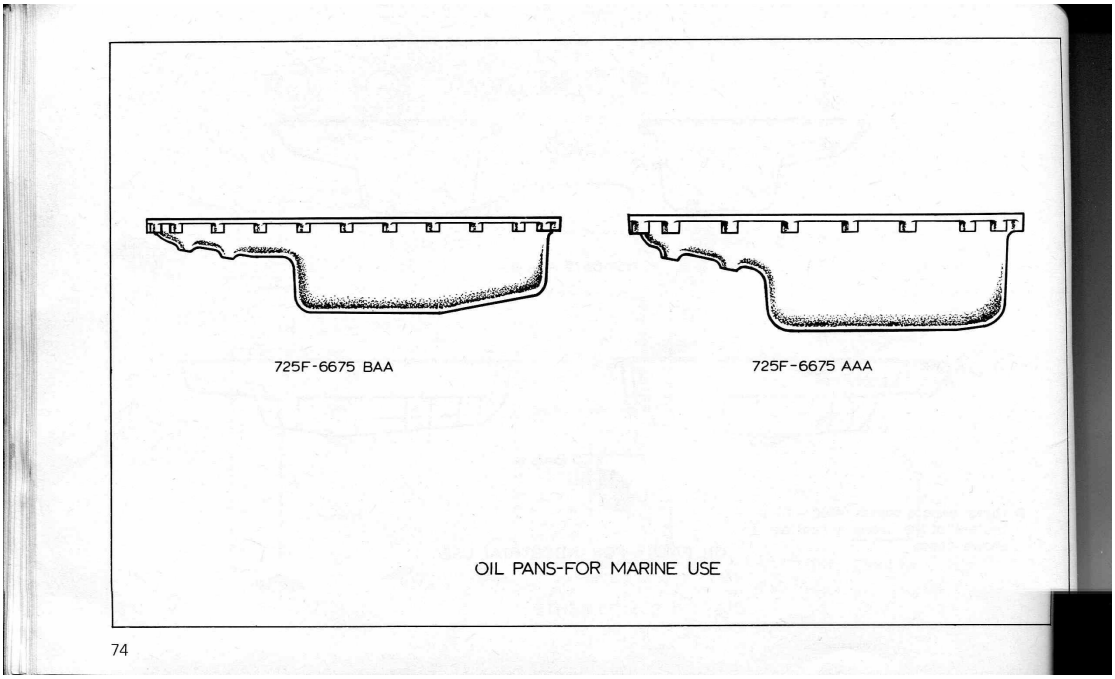


● These oil pans can be fitted with the well at the front or rear as shown above.

OIL PANS – FOR INDUSTRIAL USE



OIL PANS-FOR MARINE USE

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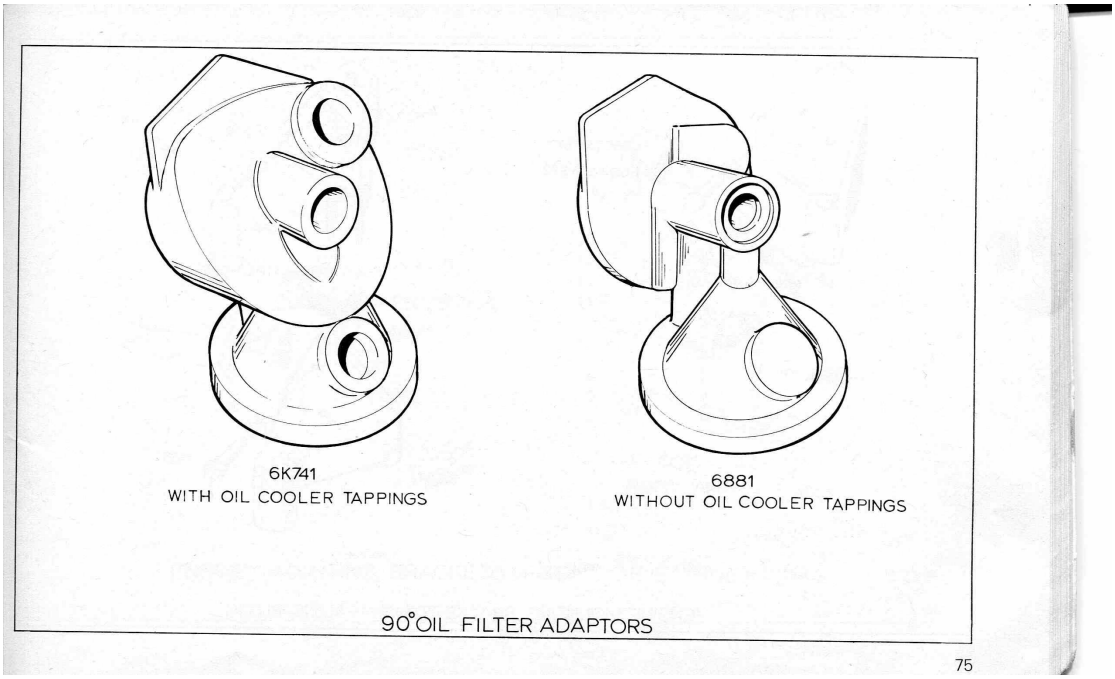

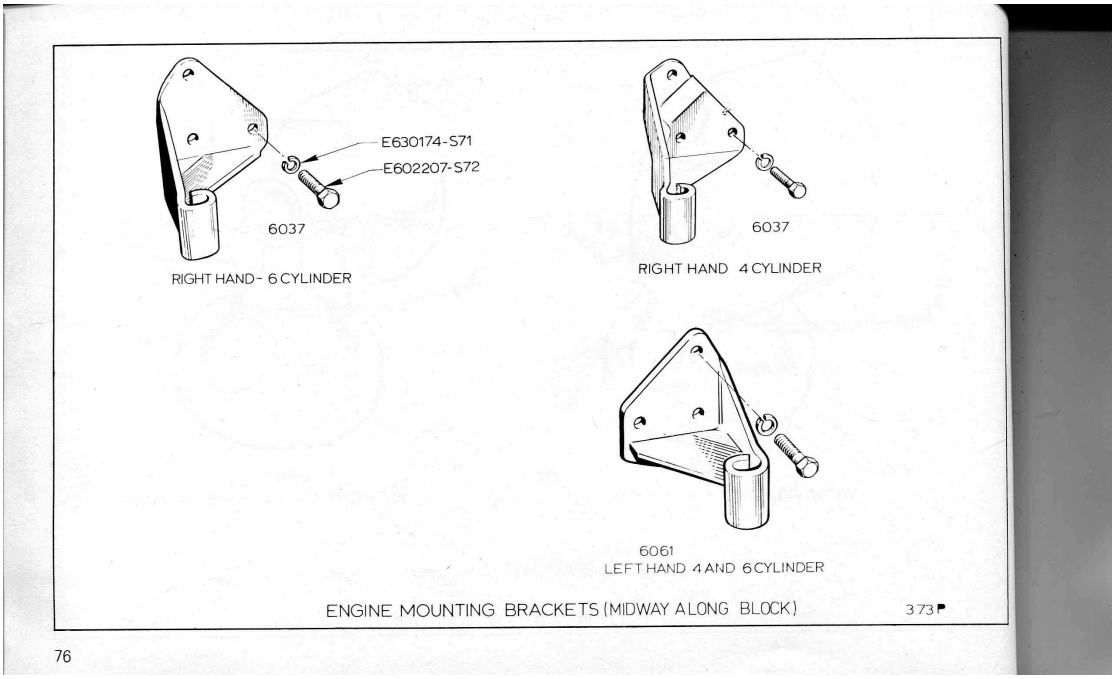

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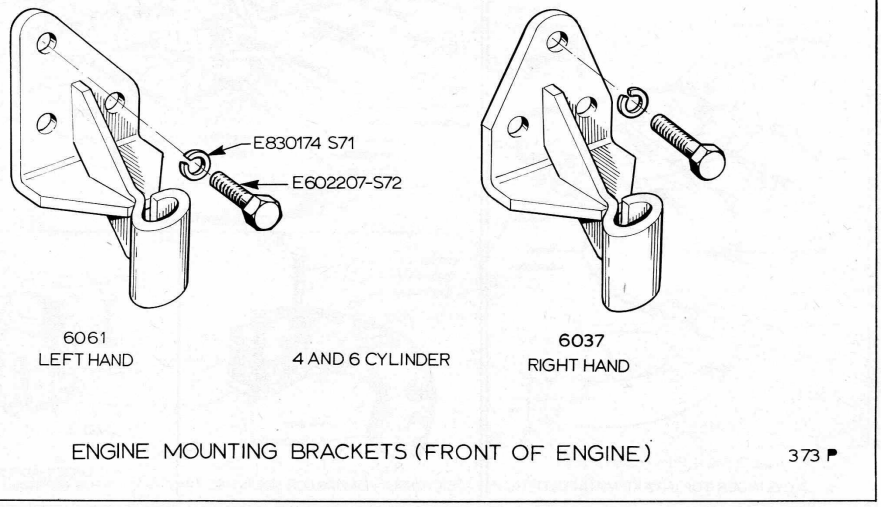

ENGINE MOUNTING BRACKETS (FRONT OF ENGINE) 373 P

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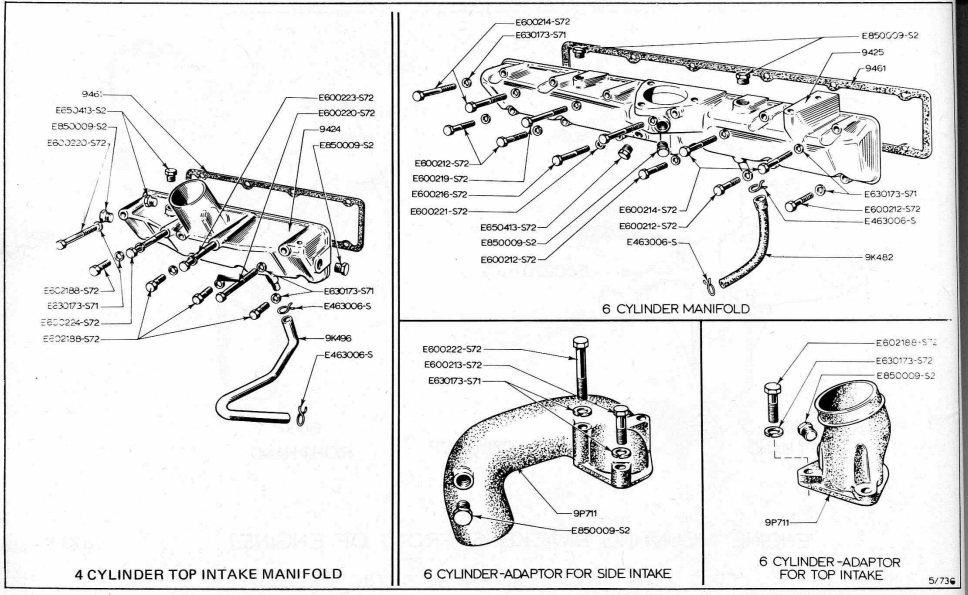

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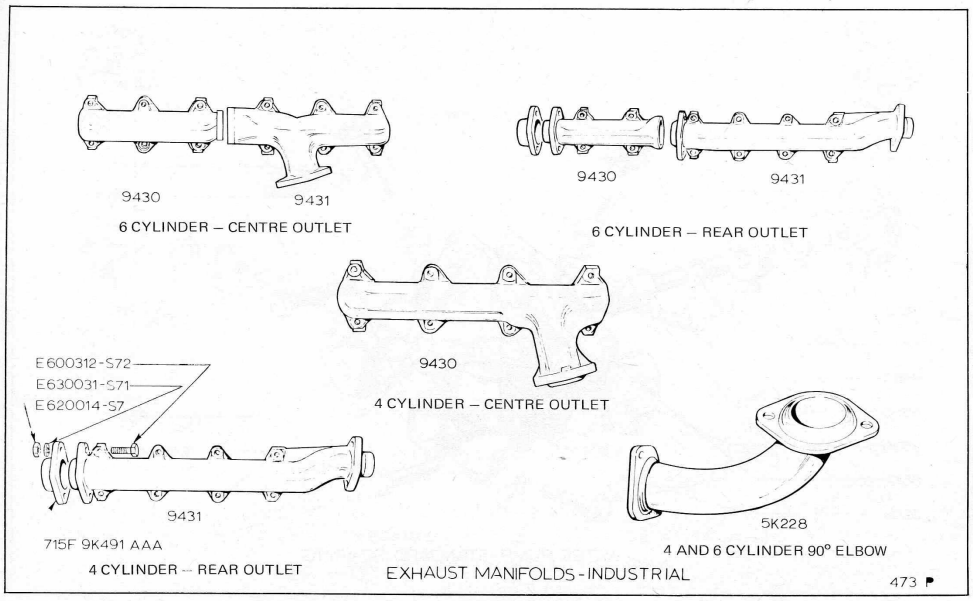

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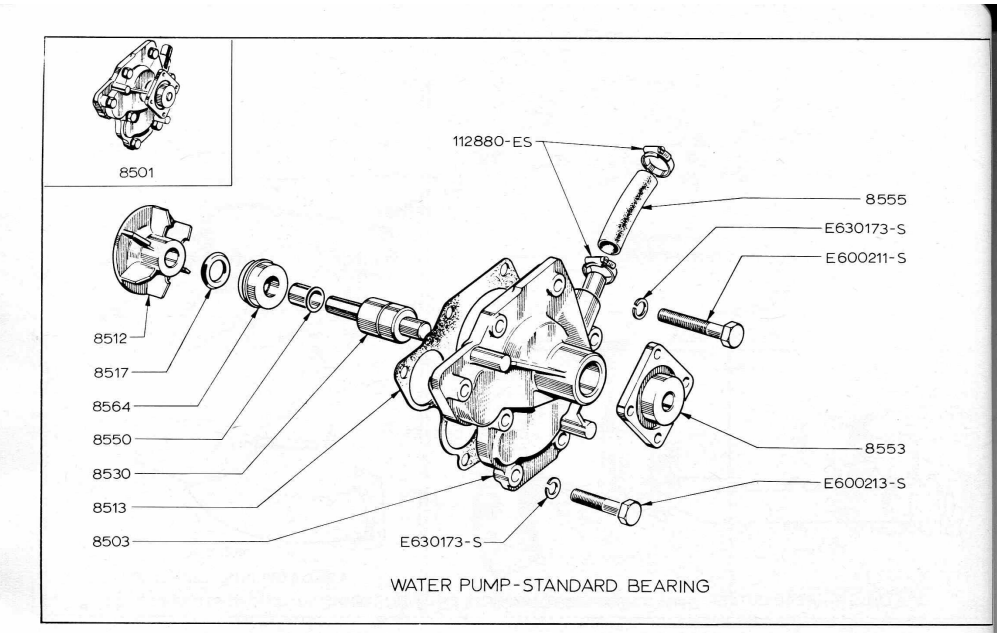

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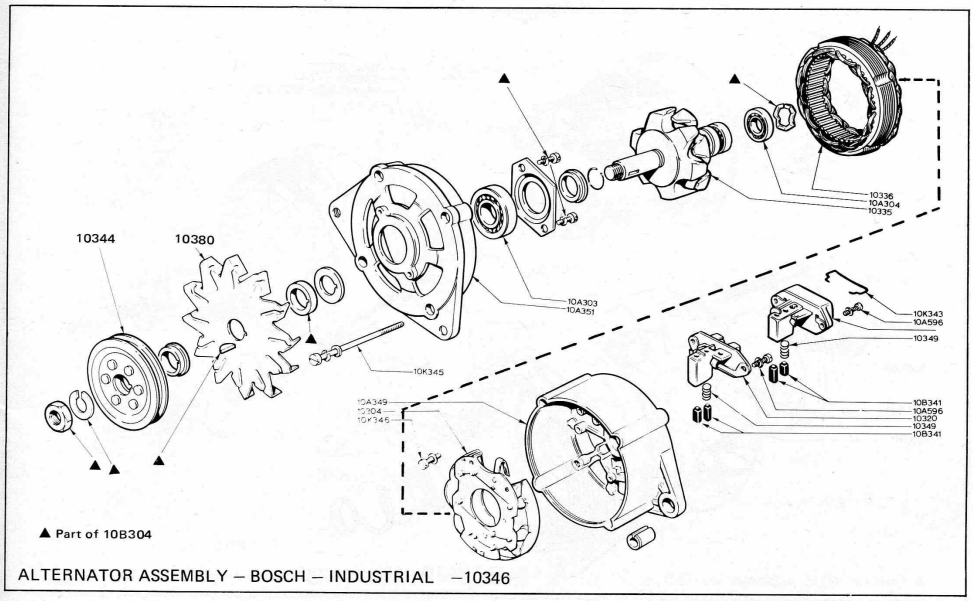

ALTERNATOR ASSEMBLY – BOSCH – INDUSTRIAL –10346

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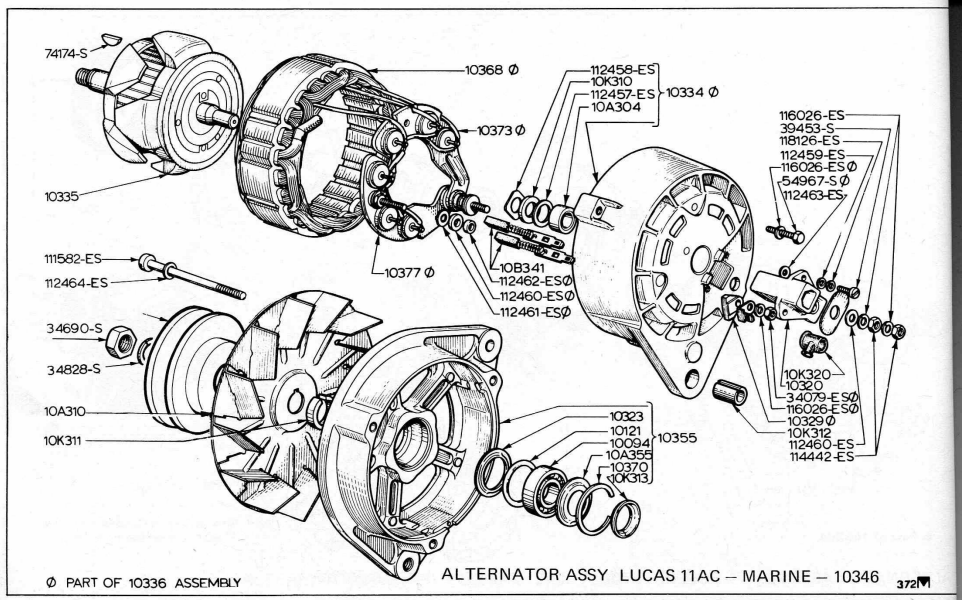

Ø PART OF 10336 ASSEMBLY

ALTERNATOR ASSY LUCAS 11AC – MARINE – 10346 372

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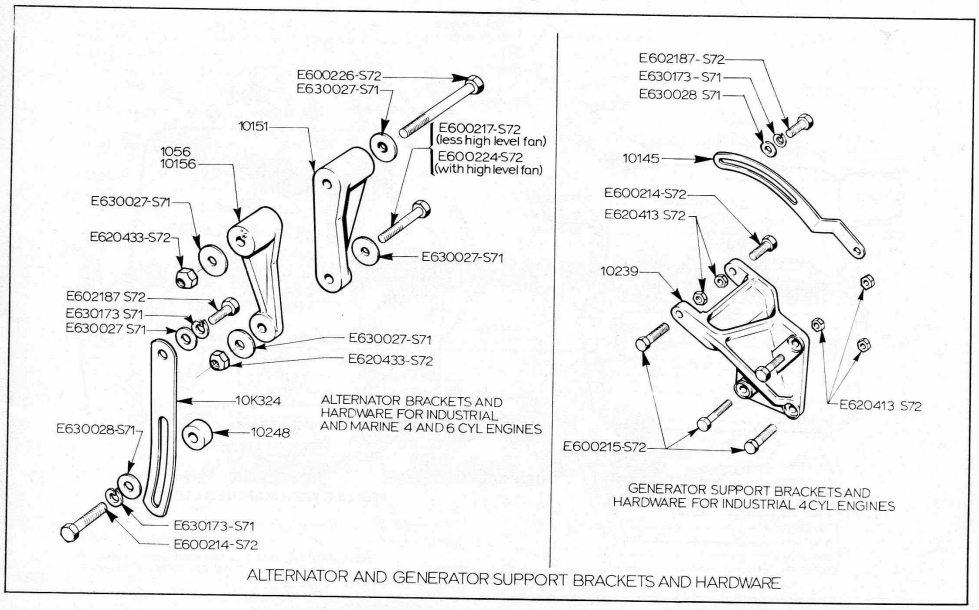

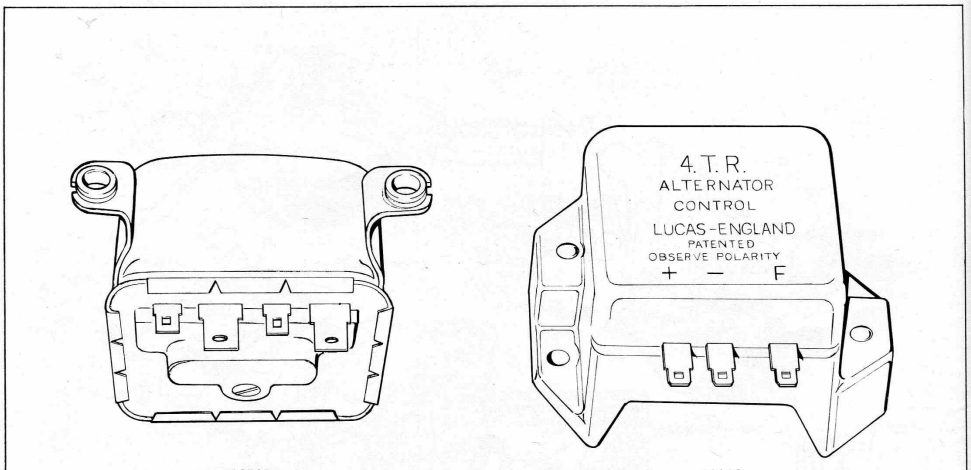

10505
FOR USE WITH GENERATOR

10316
FOR USE WITH MARINE ALTERNATOR

REGULATORS

373 P

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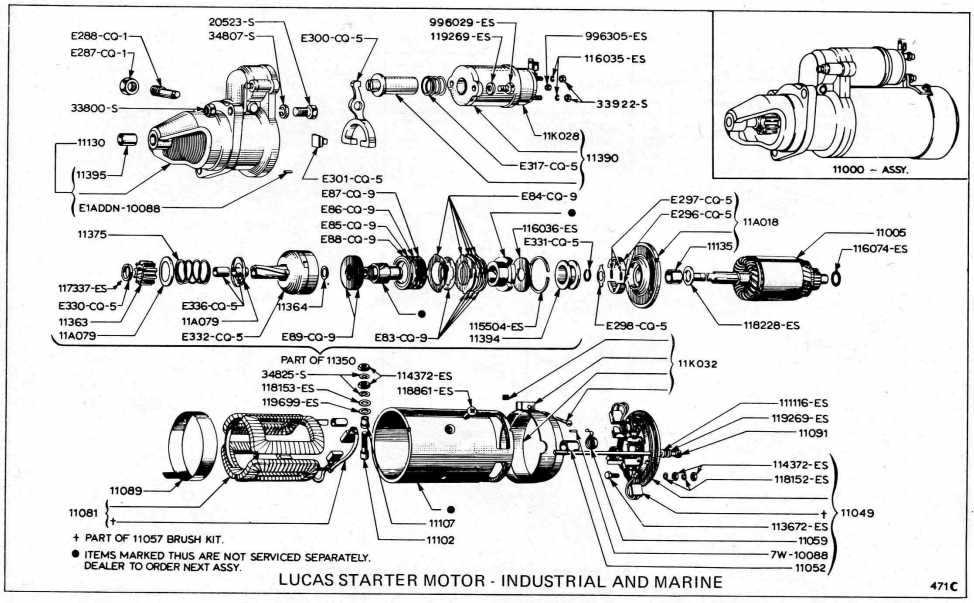

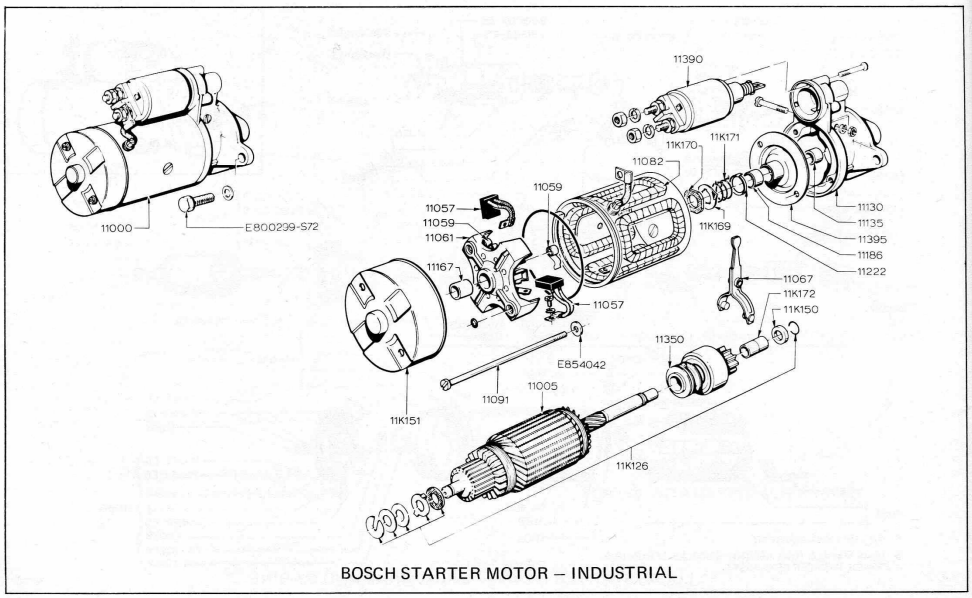

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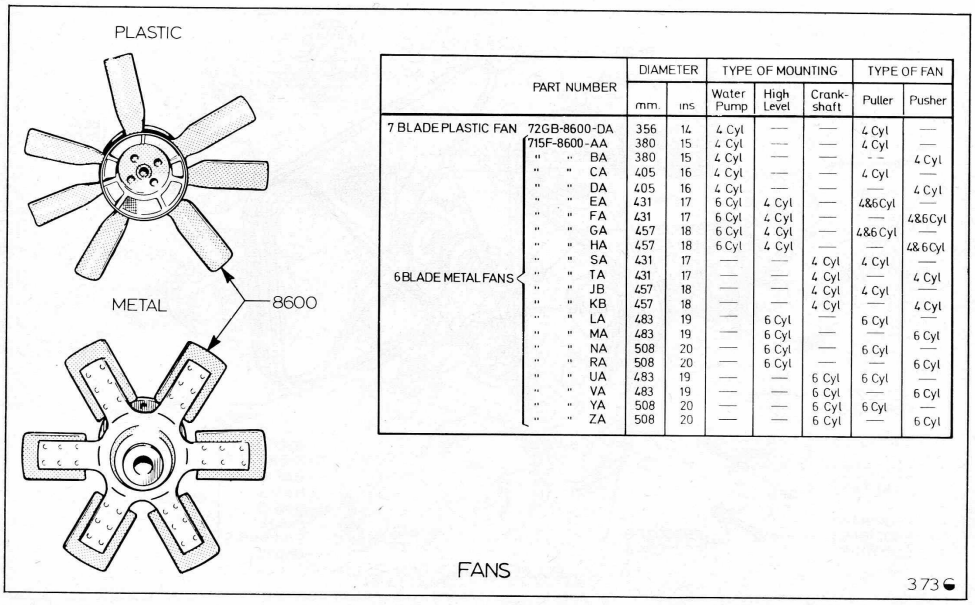
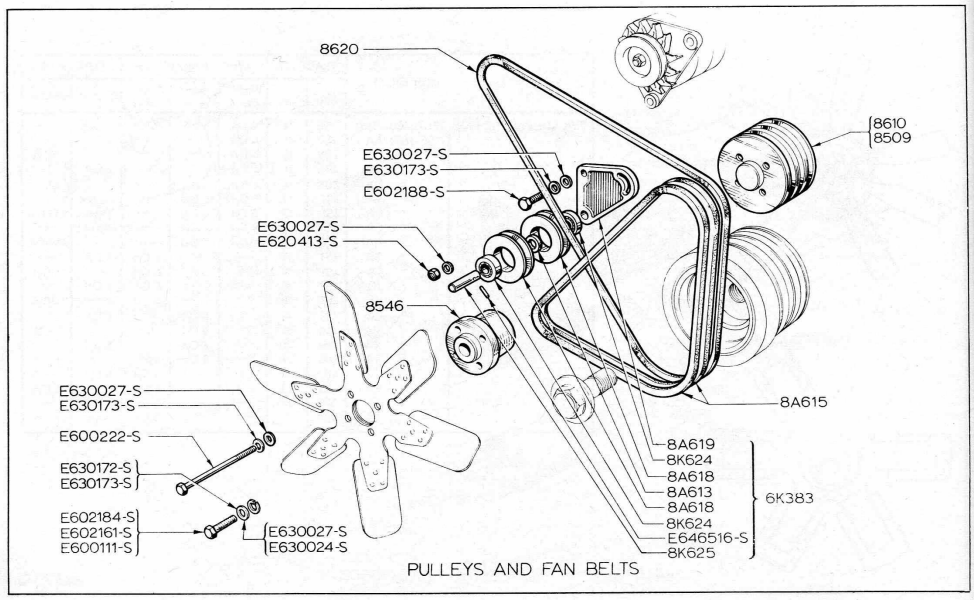


PART NUMBER		DIAMETER mm.	DIAMETER ins.	TYPE OF MOUNTING Water Pump	TYPE OF MOUNTING High Level	TYPE OF MOUNTING Crank-shaft	TYPE OF FAN Puller	TYPE OF FAN Pusher
7 BLADE PLASTIC FAN	72GB-8600-DA	356	14	4 Cyl	—	—	4 Cyl	—
	715F-8600-AA	380	15	4 Cyl	—	—	4 Cyl	—
	" " BA	380	15	4 Cyl	—	—	— —	4 Cyl
	" " CA	405	16	4 Cyl	—	—	4 Cyl	—
	" " DA	405	16	4 Cyl	—	—	—	4 Cyl
	" " EA	431	17	6 Cyl	4 Cyl	—	4&6Cyl	—
	" " FA	431	17	6 Cyl	4 Cyl	—	—	4&6Cyl
	" " GA	457	18	6 Cyl	4 Cyl	—	4&6 Cyl	—
	" " HA	457	18	6 Cyl	4 Cyl	—	—	4&6Cyl
6 BLADE METAL FANS	" " SA	431	17	—	—	4 Cyl	4 Cyl	—
	" " TA	431	17	—	—	4 Cyl	—	4 Cyl
	" " JB	457	18	—	—	4 Cyl	4 Cyl	—
	" " KB	457	18	—	—	4 Cyl	—	4 Cyl
	" " LA	483	19	—	6 Cyl	—	6 Cyl	—
	" " MA	483	19	—	6 Cyl	—	—	6 Cyl
	" " NA	508	20	—	6 Cyl	—	6 Cyl	—
	" " RA	508	20	—	6 Cyl	—	—	6 Cyl
	" " UA	483	19	—	—	6 Cyl	6 Cyl	—
	" " VA	483	19	—	—	6 Cyl	—	6 Cyl
	" " YA	508	20	—	—	6 Cyl	6 Cyl	—
	" " ZA	508	20	—	—	6 Cyl	—	6 Cyl

FANS

373

91



PULLEYS AND FAN BELTS

92

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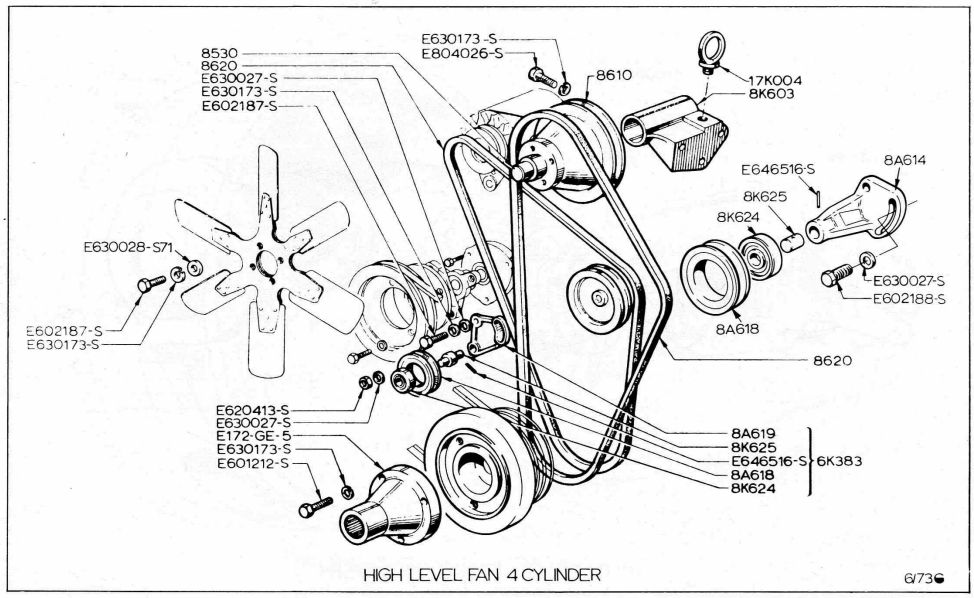
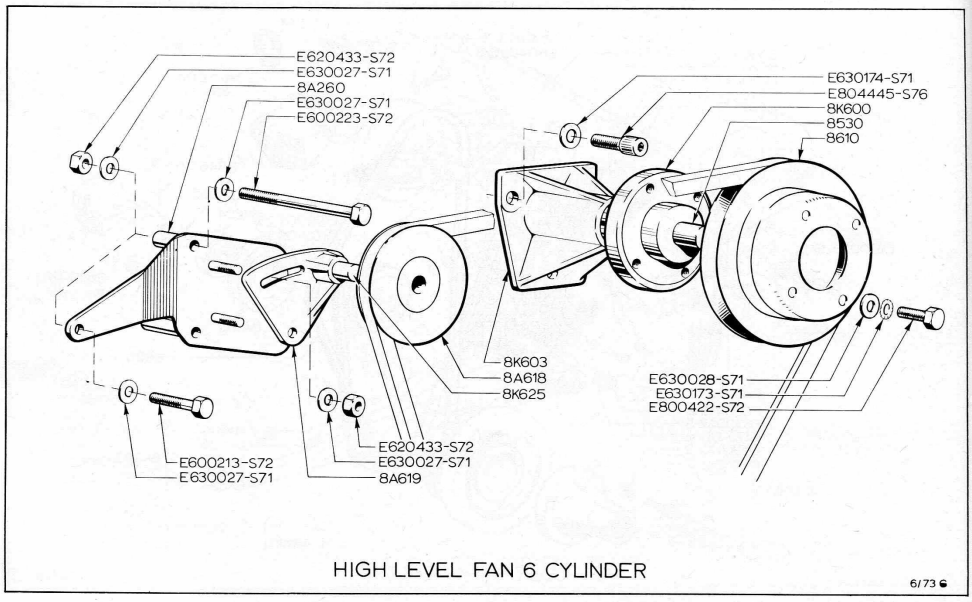


HIGH LEVEL FAN 4 CYLINDER 6/73

93



HIGH LEVEL FAN 6 CYLINDER 6/73

94

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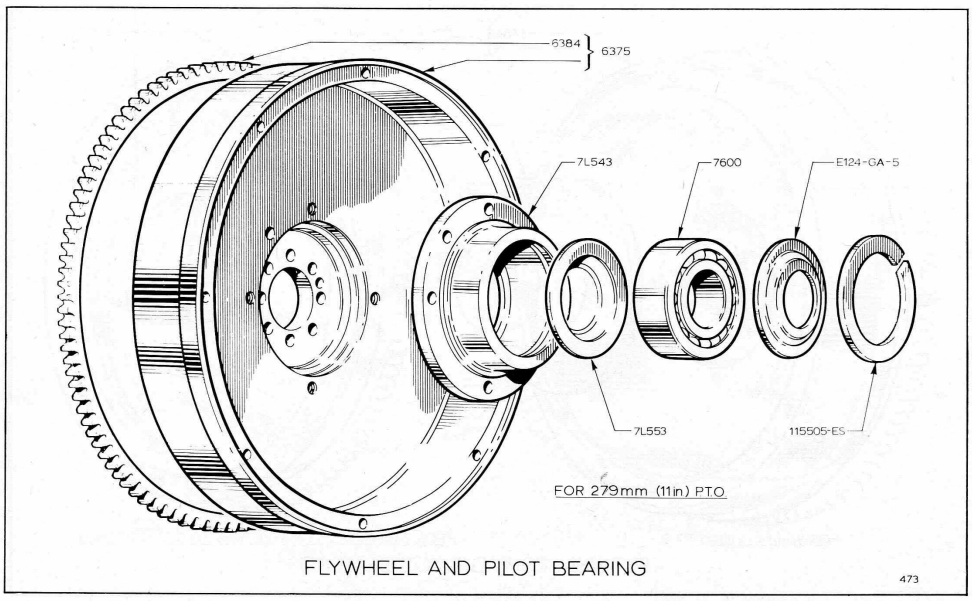

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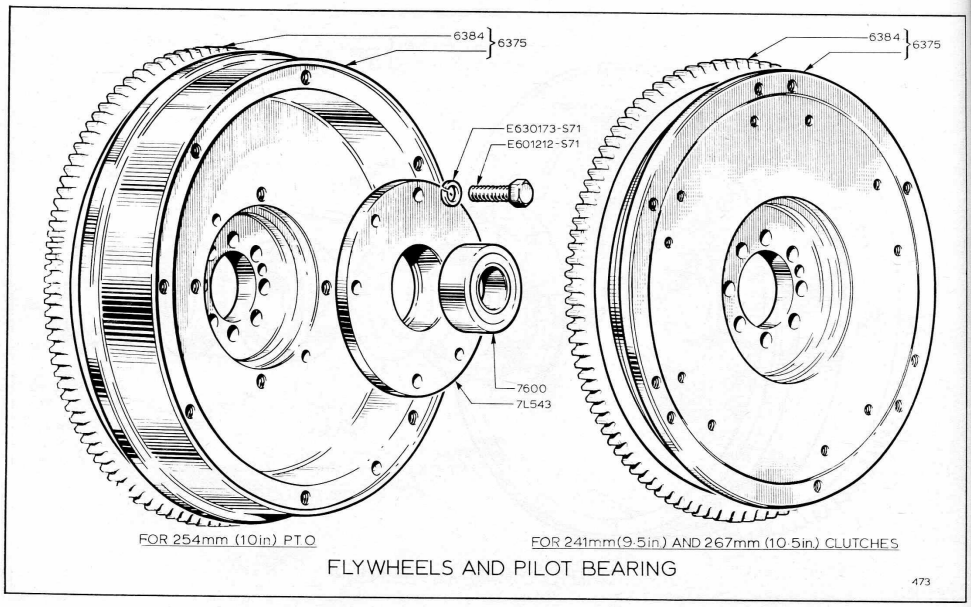

96

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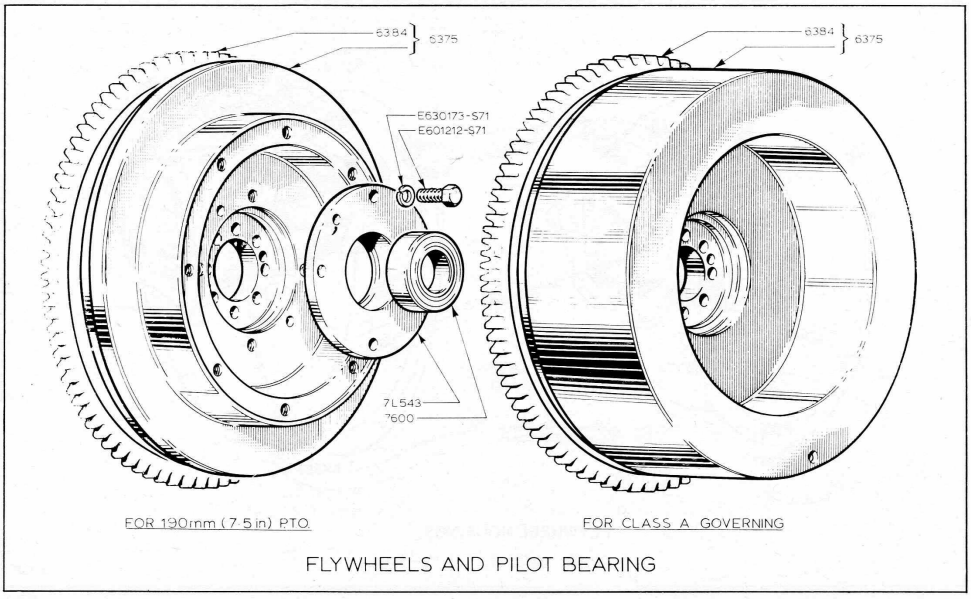
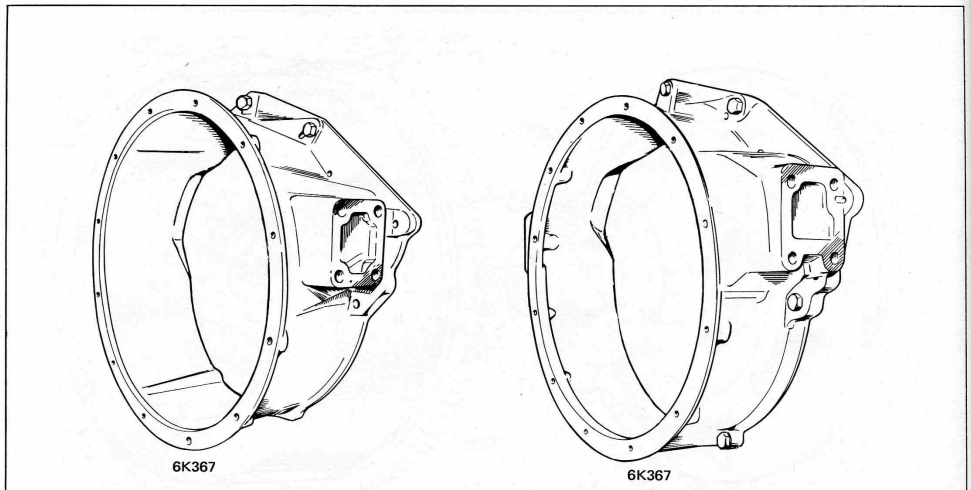


FLYWHEELS AND PILOT BEARING

97



FLYWHEEL HOUSINGS

3 73P

98

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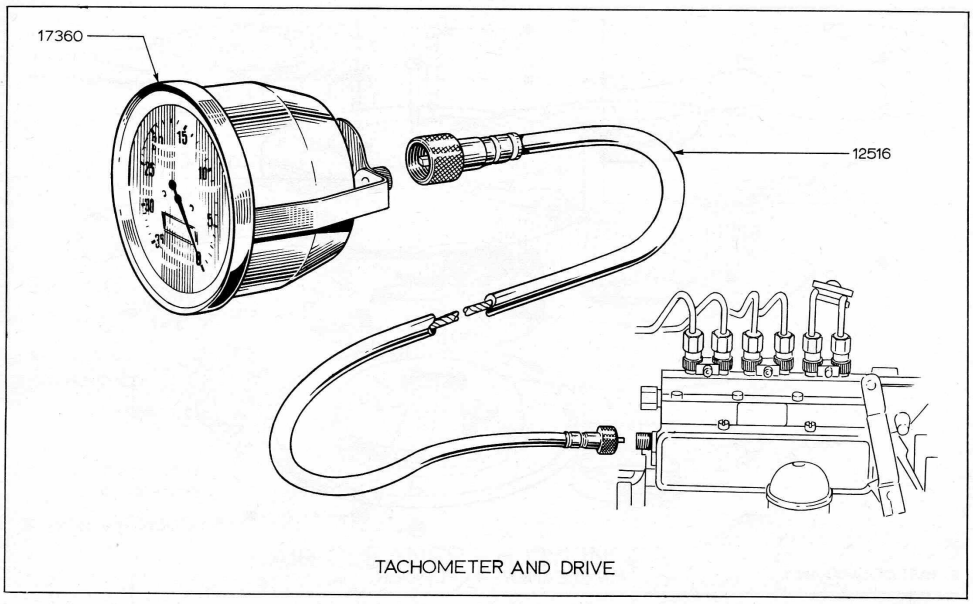
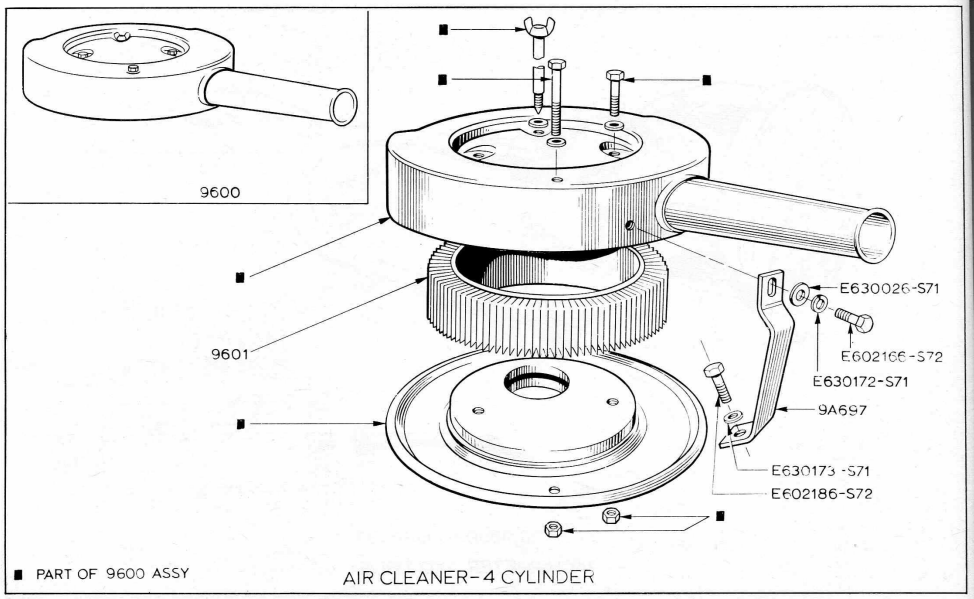


TACHOMETER AND DRIVE

99



■ PART OF 9600 ASSY

AIR CLEANER–4 CYLINDER

100

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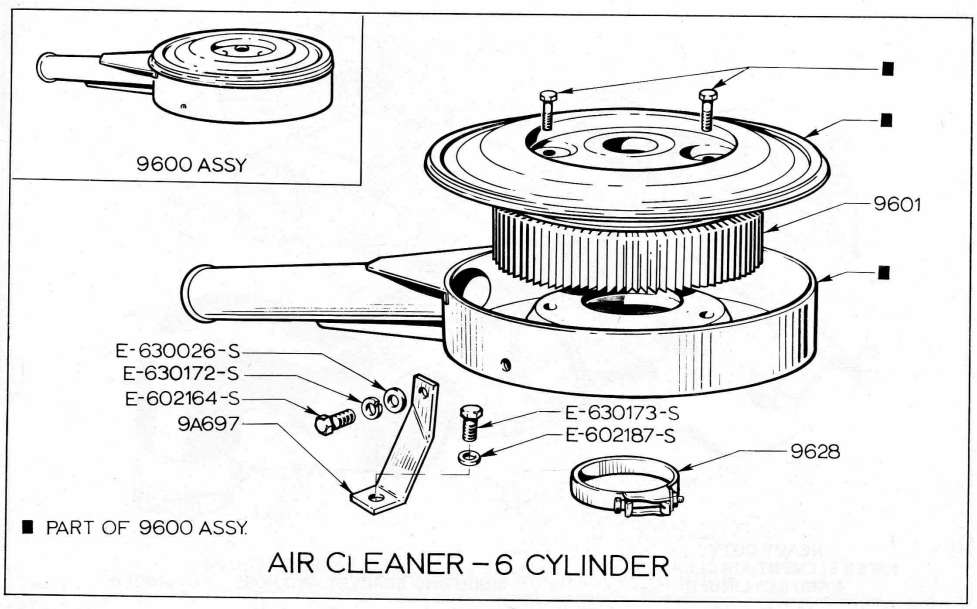
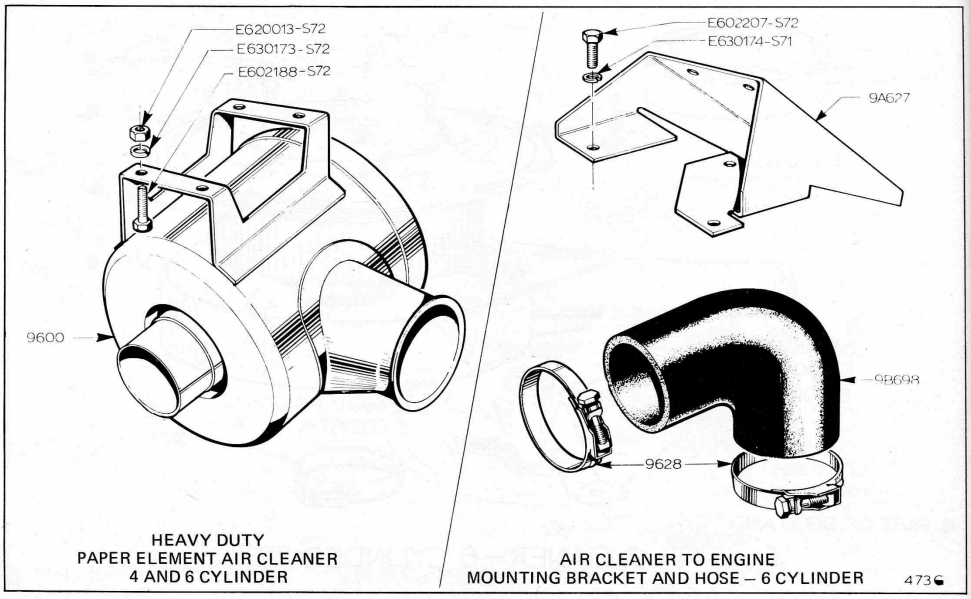


AIR CLEANER – 6 CYLINDER

101



HEAVY DUTY
PAPER ELEMENT AIR CLEANER
4 AND 6 CYLINDER

AIR CLEANER TO ENGINE
MOUNTING BRACKET AND HOSE – 6 CYLINDER

473G

102

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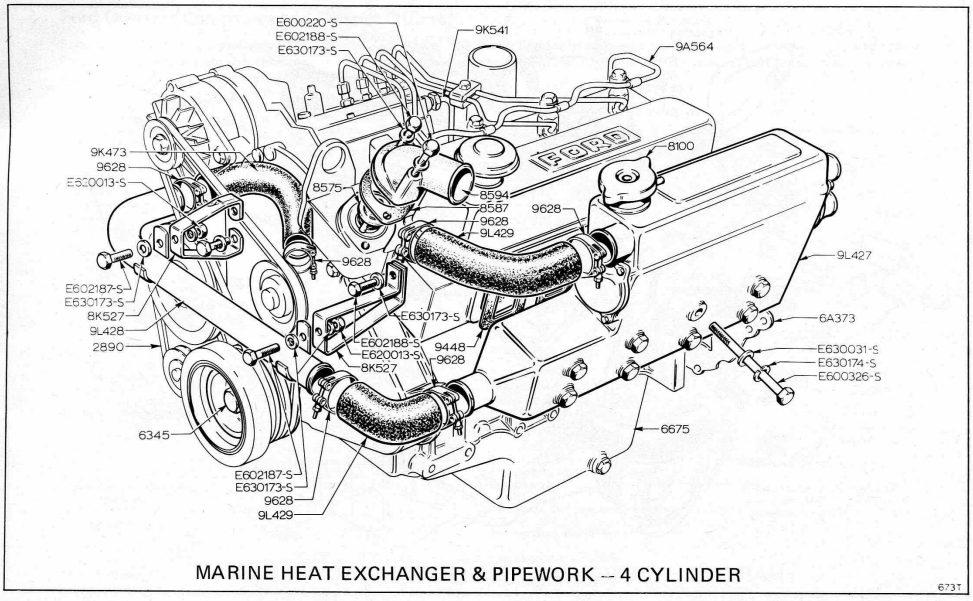
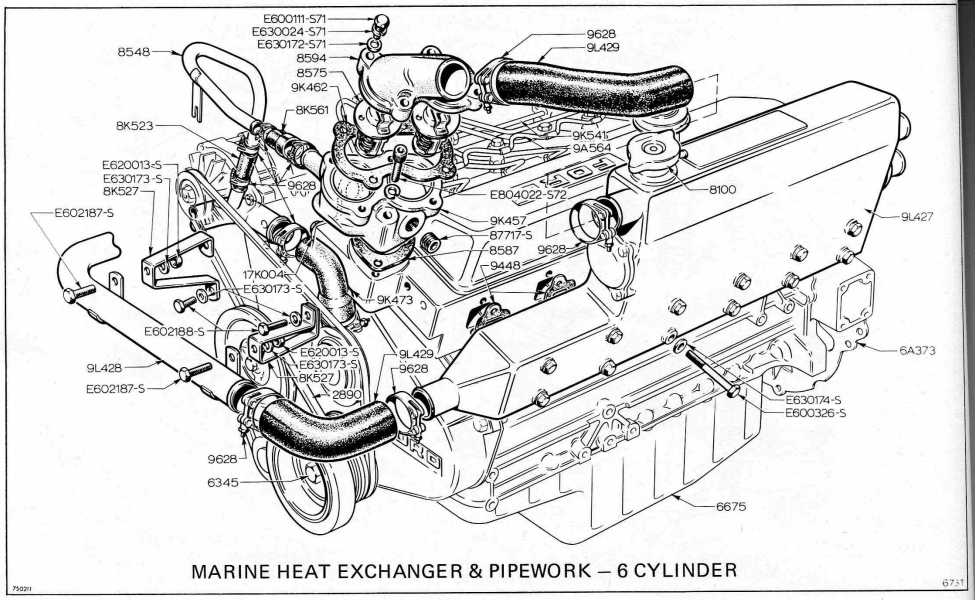


MARINE HEAT EXCHANGER & PIPEWORK -- 4 CYLINDER

6731



MARINE HEAT EXCHANGER & PIPEWORK – 6 CYLINDER

75021

6731

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