
70/70A SERIES REPAIR MANUAL

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The following pages are the collation of the contents pages from each section and chapter of the 70/70A Series Repair manual.

The sections used through out all New Holland product Repair manuals may not be used for each product. Each Repair manual will be made up of one or several books. Each book will be labeled as to which sections are in the overall Repair manual and which sections are in each book.

The sections listed above are the sections utilized for the 70/70A Series Tractors.

FOREWORD

Appropriate service methods and correct repair procedures are essential for the safe, reliable operation of all equipment, as well as the personal safety of the individual performing the repair.

This Service Manual provides troubleshooting, overhaul, and pressure-testing instructions using recommended procedures and equipment. Following these instructions will ensure the safe, efficient, and timely completion of the service or repair.

There are numerous variations in procedures, techniques, tools, and parts for servicing machines, as well as in the skill of the individual doing the work. This manual cannot possibly anticipate all such variations and provide advice or cautions as to each. Accordingly, anyone who departs from the instructions provided in this manual must first establish that their personal safety, the safety of others, and the integrity of the machine will not be compromised by the choice of methods, tools or parts.

The manual is divided into sections which are subdivided into chapters. Each chapter contains information on general operating principles, detailed inspection, overhaul and, where applicable, specific troubleshooting, special tools, and specifications.

Any reference in this manual to right, left, rear, front, top, or bottom is as viewed from the operator's seat, looking forward.

All data and illustrations in this manual are subject to variations in build specification. This information was correct at the time of issue, but New Holland policy is one of continuous improvement, and the right to change specifications, equipment, or design at any time, without notice, is reserved.

PRECAUTIONARY STATEMENTS

PERSONAL SAFETY

Throughout this manual and on machine decals, you will find precautionary statements (“**CAUTION**”, “**WARNING**”, and “**DANGER**”) followed by specific instructions. These precautions are intended for the personal safety of you and those working with you. Please take the time to read them.

CAUTION

The word “**CAUTION**” is used where a safe behavioral practice according to operating and maintenance instructions and common safety practices will protect the operator and others from accident involvement.

WARNING

The word “**WARNING**” denotes a potential or hidden hazard which has a potential for serious injury. It is used to warn operators and others to exercise every appropriate means to avoid a surprise involvement with machinery.

DANGER

The word “**DANGER**” denotes a forbidden practice in connection with a serious hazard.

FAILURE TO FOLLOW THE “**CAUTION**”, “**WARNING**”, AND “**DANGER**” INSTRUCTIONS MAY RESULT IN SERIOUS BODILY INJURY OR DEATH.

MACHINE SAFETY

Additional precautionary statements (“**ATTENTION**” and “**IMPORTANT**”) are followed by specific instructions. These statements are intended for machine safety.

ATTENTION: *The word “**ATTENTION**” is used to warn the operator of potential machine damage if a certain procedure is not followed.*

IMPORTANT: *The word “**IMPORTANT**” is used to inform the reader of something he needs to know to prevent minor machine damage if a certain procedure is not followed.*

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SAFETY PRECAUTIONS

Practically all service work involves the need to drive the tractor. The operator's manual, supplied with each tractor, contains detailed safety precautions relating to driving, operating, and servicing that tractor. These precautions are as applicable to the service technician as they are to the operator and should be read, understood and practiced by all personnel.

Prior to undertaking any maintenance, repair, overhaul, dismantling or reassembly operations, whether within a workshop facility or in the field, consideration should be given to factors that may have an effect upon safety, not only upon the mechanic carrying out the work, but also upon bystanders.

PERSONAL CONSIDERATIONS

The wrong clothes or carelessness in dress can cause accidents. Check to see that you are suitable clothed.

Some jobs require special protective equipment.

Skin Protection

Used motor oil may cause skin cancer. Follow work practices that minimize the amount of skin exposed and length of time used oil stays on your skin.

Eye Protection

The smallest eye injury may cause loss of vision. Injury can be avoided by wearing eye protection when engaged in chiselling, grinding, discing, welding, and painting.

Breathing Protection

Fumes, dust, and paint spray are unpleasant and harmful. These can be avoided by wearing respiratory protection.

Hearing Protection

Loud noise may damage your hearing, and the greater the exposure the worse the damage. If the noise is excessive, wear ear protection.

Lifting Protection

Avoid injury by correctly handling components. Make sure you are capable of lifting the object. If in doubt get help.

Hand Protection

It is advisable to use a protective cream before work to prevent irritation and skin contamination. After work clean your hands with soap and water. Solvents such as mineral spirit and kerosene may harm the skin.

Foot Protection

Substantial or protective footwear with reinforced toe caps will protect your feet from falling objects. Additionally, oil-resistant soles will help to avoid slipping.

Special Clothing

For certain work it may be necessary to wear flame or acid-resistant clothing.

EQUIPMENT CONSIDERATIONS

Machine Guards

Before using any machine, check to ensure that the machine guards are in position and serviceable. These guards not only prevent parts of the body or clothing coming in contact with the moving parts of the machine, but also ward off objects that might fly off the machine and cause injury.

Lifting Devices

Always ensure that lifting equipment, such as chains, slings, lifting brackets, hooks and eyes, are thoroughly checked before use. If in doubt, select stronger equipment than is necessary.

Never stand under a suspended load or raised implement.

Compressed Air

The pressure from a compressed-air line often exceeds 690 bar (100 PSI). It is perfectly safe if used correctly. Any misuse may cause injury.

Never use compressed air to blow dust, filing, and dirt away from your work area unless the correct type of nozzle is fitted.

Compressed air is not a cleaning agent; it will only move dust from one place to another. Look around before using an air hose as bystanders may get grit into their eyes, ears, or skin.

Hand Tools

Many cuts, abrasions and injuries are caused by defective tools. Never use the wrong tool for the job, as this generally leads either to some injury or to a poor job.

When removing or replacing hardened pins, use a copper or brass drift rather than a hammer.

For dismantling, overhaul, and assembly of major and sub-components, always use the Special Service Tools recommended. These will reduce the work effort, labor time, and the repair cost.

Electricity

Electricity has become so familiar in day to day usage, that its potentially dangerous properties are often overlooked. Misuse of electrical equipment can endanger life.

Before using any electrical equipment - particularly portable appliances - make a visual check to make sure that the wiring is not worn or frayed and that the plugs and sockets are intact. Make sure you know where the nearest isolating switch for your equipment is located.

GENERAL CONSIDERATIONS

Solvents

Use cleaning fluids and solvents that are known to be safe. Certain types of fluids can cause damage to components, such as seals, and can cause skin irritation. Solvents should be checked that they are suitable not only for the cleaning of components and individual parts, but also that they do not affect the personal safety of the user.

Housekeeping

Many injuries result from tripping over or slipping on objects or material left lying around by a careless worker. Prevent these accidents from occurring. If you notice a hazard, don't ignore it - remove it.

A clean, hazard-free place of work improves the surroundings and daily environment for everybody.

Fire

Fire has no respect for persons or property. The destruction that a fire can cause is not always fully realized. Everyone must be constantly on guard.

Extinguish matches, cigars, and cigarettes before throwing them away.

Work cleanly, disposing of waste material into proper containers.

Locate the fire extinguishers and find out how to operate them.

Do not panic - warn those near and raise the alarm.

Do not allow or use an open flame near the tractor fuel tank, battery, or component parts.

First Aid

In the type of work that mechanics are engaged in, dirt, grease, and fine dusts settle upon the skin and clothing. If a cut, abrasion or burn is disregarded it may become infected within a short time. Seek medical aid immediately.

Cleanliness

Cleanliness of the tractor hydraulic system is essential for optimum performance. When carrying out service and repairs, plug all hose ends and component connections to prevent dirt entry.

Clean the exterior of all components before carrying out any form of repair. Dirt and abrasive dust can reduce the efficiency and working life of a component and lead to costly replacement. Use of a high-pressure washer or steam cleaner is recommended.

OPERATIONAL CONSIDERATIONS

Stop the engine, if at all possible, before performing any service.

Place a warning sign on tractors which, due to service or overhaul, would be dangerous to start. Disconnect the battery leads if leaving such a unit unattended.

Do not attempt to start the engine while standing beside the tractor or attempt to bypass the safety start switch.

Avoid prolonged running of the engine in a closed building or in an area with inadequate ventilation as exhaust fumes are highly toxic.

Always turn the radiator cap to the first stop to allow pressure in the system to dissipate when the coolant is hot.

Never work beneath a tractor which is on soft ground. Always take the unit to an area which has a hard working surface, preferably concrete.

SECTION 10 - ENGINE

Chapter 1 - Engine and Lubrication System

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SPECIFICATIONS

TRACTOR MODEL	8670/8670A	8770*/8770A	8870/8870A	8970/8970A
NO. OF CYLINDERS	6 IN-LINE	6 IN-LINE	6 IN-LINE	6 IN-LINE
BORE (in.) (mm)	4.4 111.8	4.4 111.8	4.4 111.8	4.4 111.8
STROKE (in.) (mm)	5.0 127.0	5.0 127.0	5.0 127.0	5.0 127.0
DISPLACEMENT (cu in) (L)	456 7.5	456 7.5	456 7.5	456 7.5
COMPRESSION RATIO	17.5-1	17.5-1	17.5-1	17.5-1
TURBOCHARGED	Yes	Yes	Yes	Yes
INTERCOOLED	No	No*, Yes	Yes	Yes
FIRING ORDER	153624	153624	153624	153624
LOW IDLE SPEED RPM	900 +/- 25	900 +/- 25	815 +/- 25	815 +/- 25
HIGH IDLE SPEED RPM	2305 +/- 25	2305 +/- 25	2305 +/- 25	2305 +/- 25
RATED ENGINE SPEED RPM	2100	2100	2100	2100
PTO HORSEPOWER	145	160	180	210

CYLINDER BLOCK

Taper of Cylinder Bore

0.025 mm (0.001") Repair Limit
0.127 mm (0.005") Wear Limit

Cylinder Bore Out of Round

0.03 mm (0.0015") Repair Limit
0.127 mm (0.005") Wear Limit

Cylinder Bore Diameters

111.778 - 111.841 mm (4.4007 - 4.4032")

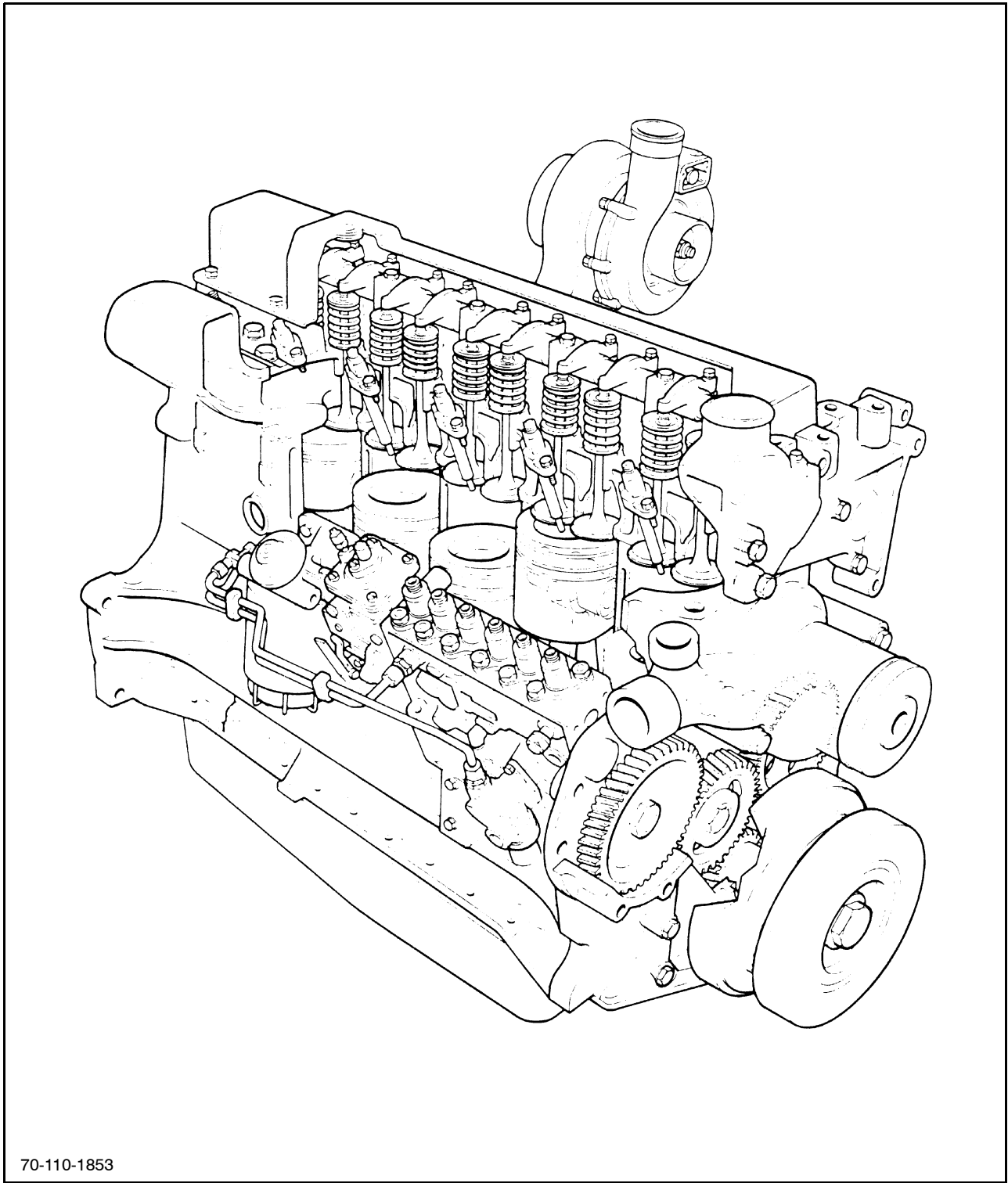
Rear Oil Seal Retainer Bore Diameter

140.77 - 140.87 mm (5.542 - 5.546")

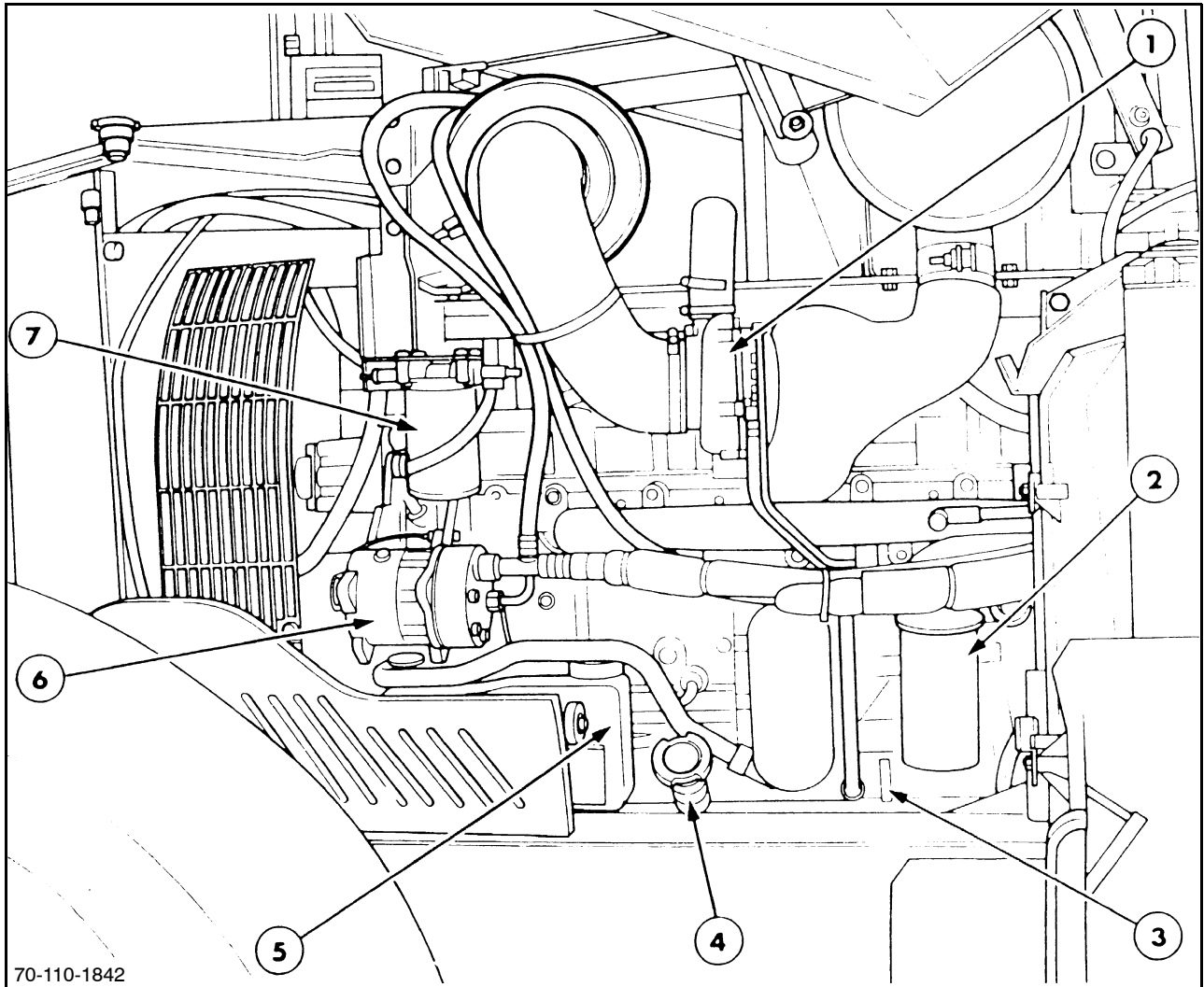
Block to Head Surface Flatness

0.08 mm (0.003") in any 152 mm (6")
0.03 mm (0.001") in any 25.40 mm (1")

* Units built after Jan. 1996 are intercooled.



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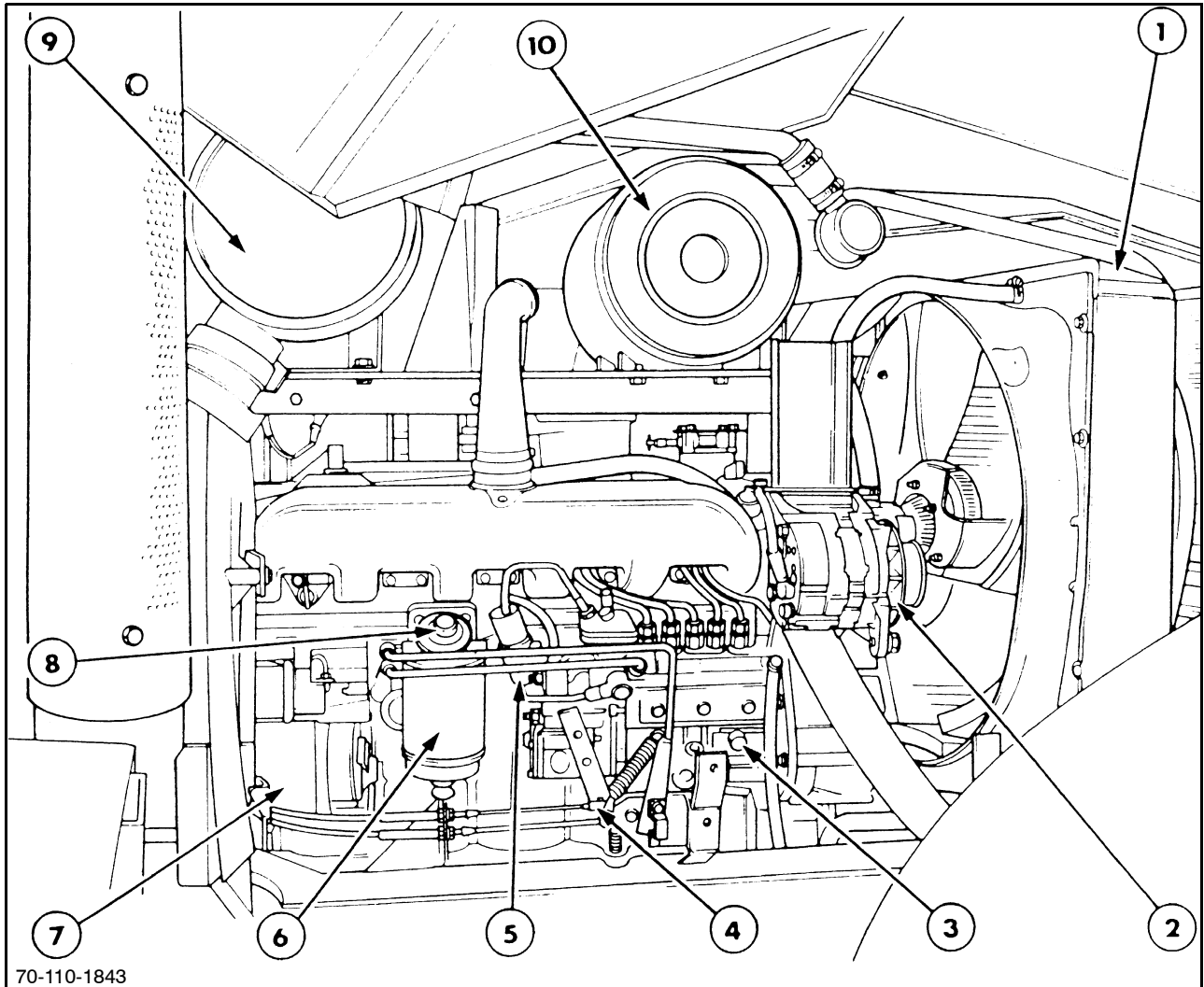


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2

Left Side View (70 Series)

- | | |
|--------------------------|--------------------------------|
| 1. Turbocharger | 5. Coolant expansion chamber |
| 2. Engine oil filter | 6. Air conditioning compressor |
| 3. Engine oil dipstick | 7. Coolant conditioning filter |
| 4. Engine oil filler cap | |

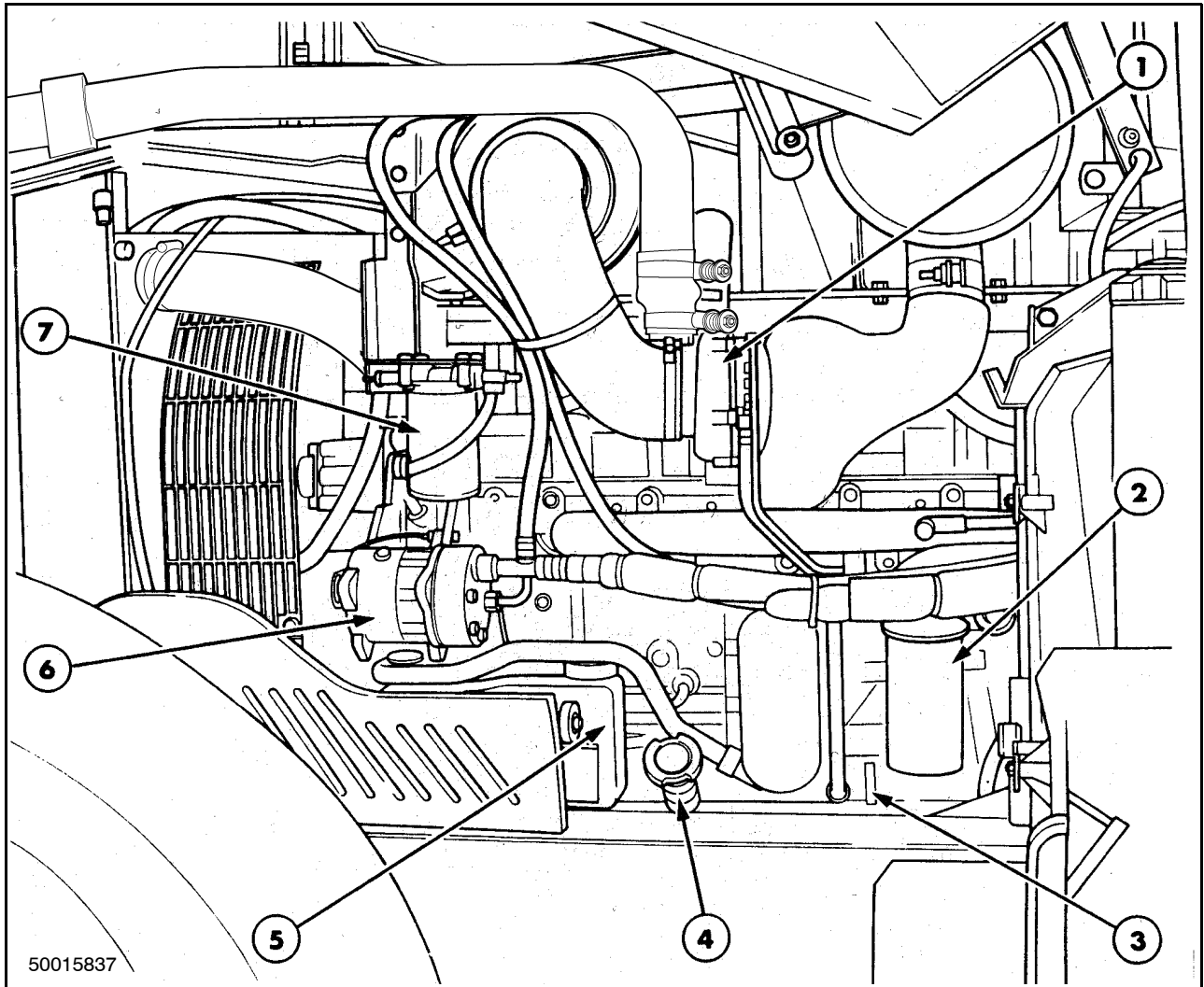


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3

Right Side View (70 Series)

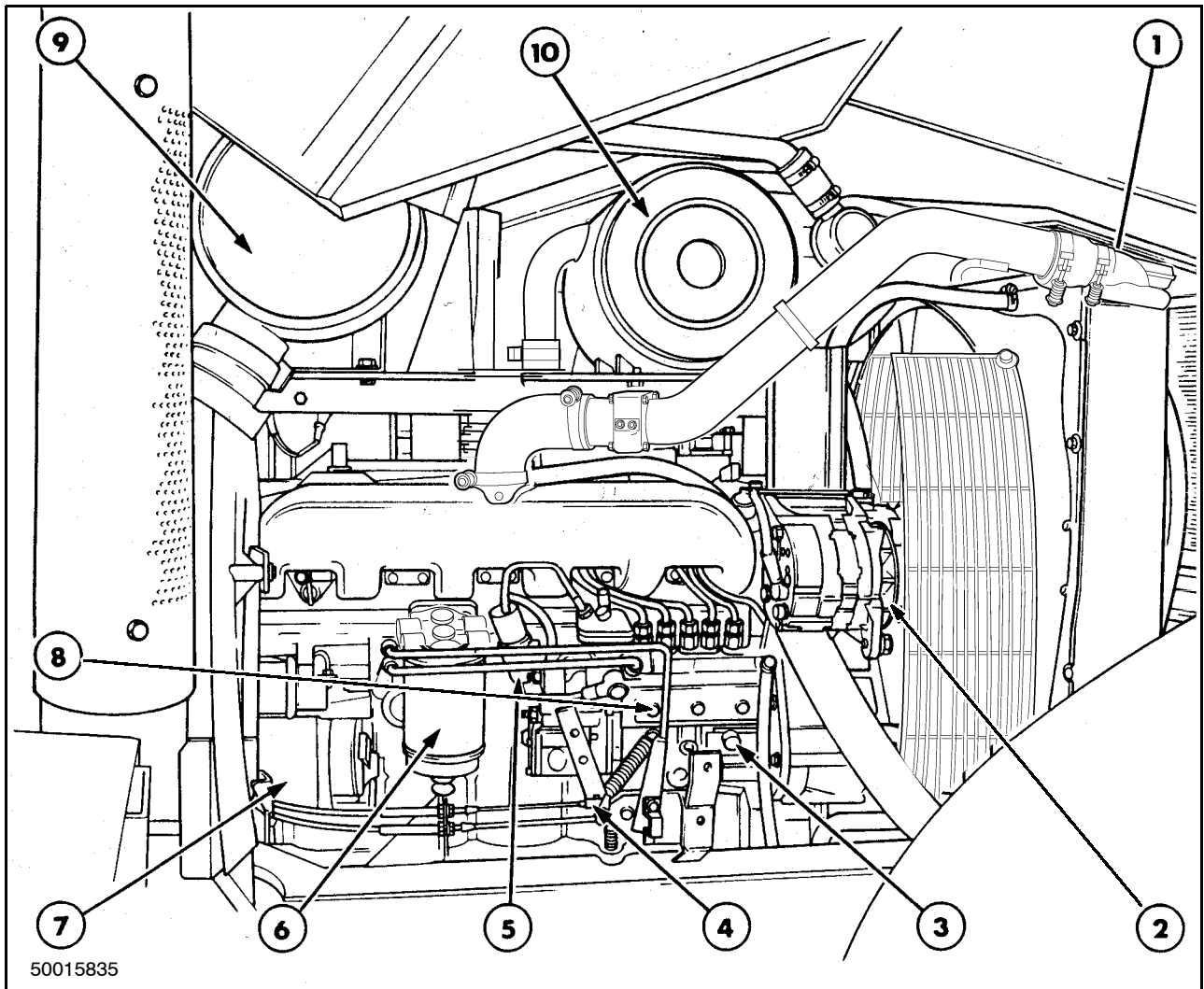
- | | |
|-------------------------------------|----------------------------------|
| 1. Radiator | 6. Fuel filter element |
| 2. Alternator | 7. Starter motor |
| 3. Bosch inline fuel injection pump | 8. Diesel fuel hand priming pump |
| 4. Throttle control cable | 9. Muffler |
| 5. Fuel shutoff solenoid | 10. Dry air filter |



4

Left Side View (70A Series)

- | | |
|--------------------------|--------------------------------|
| 1. Turbocharger | 5. Coolant expansion chamber |
| 2. Engine oil filter | 6. Air conditioning compressor |
| 3. Engine oil dipstick | 7. Coolant conditioning filter |
| 4. Engine oil filler cap | |



5

Right Side View (70A Series)

- | | |
|-------------------------------------|----------------------------------|
| 1. Radiator | 6. Fuel filter element |
| 2. Alternator | 7. Starter motor |
| 3. Bosch inline fuel injection pump | 8. Diesel fuel hand priming pump |
| 4. Throttle control cable | 9. Muffler |
| 5. Fuel shutoff solenoid | 10. Dry air filter |

CYLINDER HEAD ASSEMBLY

The cylinder head incorporates valves and springs with the valve rocker arm shaft assembly bolted to the cylinder block through the cylinder head. Cylinder head retaining bolts are evenly spaced with a six-point pattern around each cylinder. This ensures an even clamping load across the cylinder head area.

The intake and exhaust manifolds are bolted to the head. The intake manifold is mounted on the right-hand side of the engine with the injectors mounted outside the rocker cover. The exhaust manifold is mounted on the left-hand side of the engine, water outlet connections and thermostats being attached to the front of the cylinder block directly behind the radiator.

Valve guides are integral in the cylinder head and valves with oversized stems are available in service. All valves are fitted with positive rotators, with both intake and exhaust valves using umbrella-type oil seals. Valve lash is maintained by adjustment of the self-locking adjusting screw mounted at each of the rock arms.

CAMSHAFT ASSEMBLY

The camshaft runs in 5 replaceable bearings. The camshaft drive gear is in mesh and driven by the camshaft idler gear and crank shaft timing gear.

Camshaft end thrust is controlled by a thrust plate bolted to the block and located between the camshaft gear and the front camshaft journal.

A helical gear is mounted on the rear of the camshaft and drives the engine oil lubrication pump mounted forward of the flywheel.

CRANKSHAFT ASSEMBLY

The crankshaft assembly is made of steel and is supported in the cylinder block by 7 main bearings. End thrust is controlled by a thrust bearing incorporated in the center main bearing of the crankshaft. A crankshaft dampener to control torsional vibration is fitted externally to the crankshaft to ensure smooth running. Front and rear crankshaft oil seals are a one-piece design for long life and durability.

CONNECTING RODS

The wedge- or teepee-shaped connecting rods are designed to reduce the reciprocating weight at the piston end and provide increased bearing area at the piston pin. The connecting rods are assembled as a matched set to each engine attached to the crankshaft by means of insert-type copper/lead or aluminum tin alloy bearings.

The small end of the connecting rod is fitted with a replaceable bronze bushing, through which a free-floating piston pin is fitted. The steel pin is held in place within the piston by two snap rings.

PISTONS

Pistons of increased weight and strength are constructed of an aluminium silicon alloy with an iron insert for the top ring and on the Models 8870 and 8970 the second ring. The combustion chamber is recessed into the piston crowns.

Each piston has two compression rings and one oil control ring to reduce friction and increase positive sealing. All rings are located above the piston pin.

MANIFOLDS

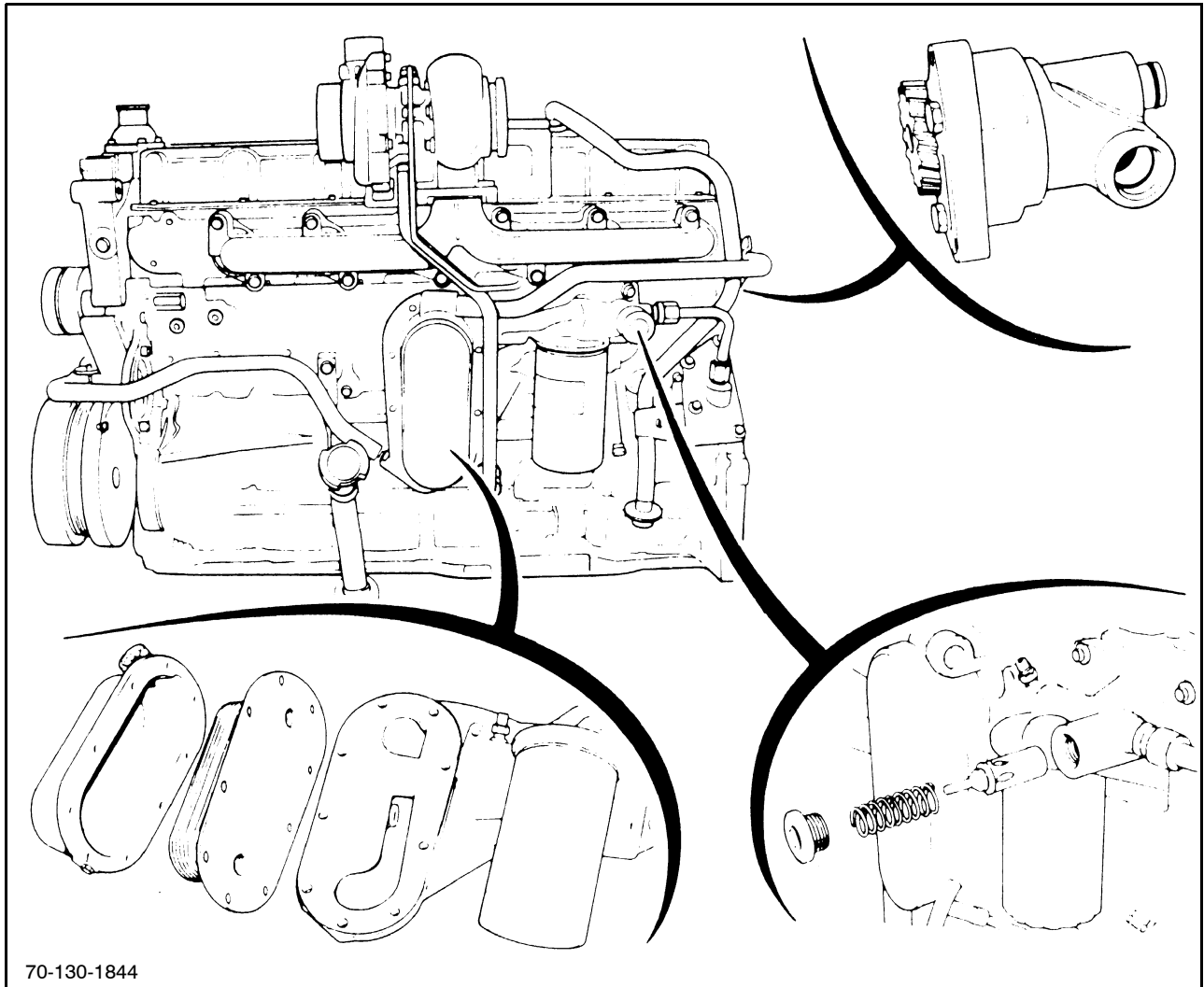
The intake manifold is aluminum and is a plenum type to provide better flow into the engine. Opposing manifolds ensure minimum heat transfer to the intake manifold. The intake manifold is tapped for an ether cold starting aid.

CYLINDER BLOCK ASSEMBLY

The cylinder block is an alloy cast iron with deep cylinder skirts and water jackets for cooling the cylinders. The cylinder bores are machined integral with the cylinder block during the manufacturing process. They can be bored oversize for the fitment of sleeves or oversized pistons, which are available in Parts.

TIMING GEARS

The crankshaft timing gear is heated and press fitted onto the front of the crankshaft to a high degree of accuracy during manufacturing. This enables precise timing to be maintained during the life of the engine. The crankshaft drives the camshaft idler gear which is attached to the front of the cylinder block. The idler gear then drives the camshaft and the injection pump via meshing helical gears.

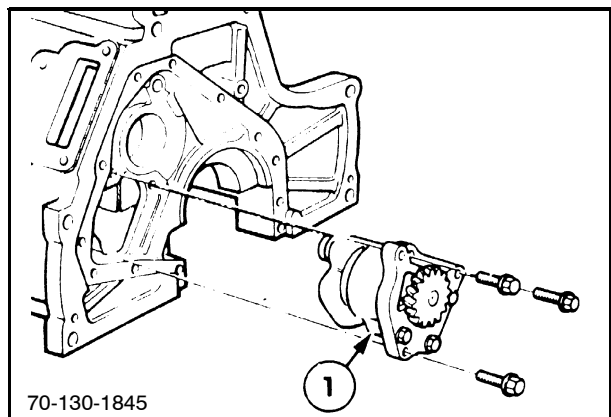


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6

ENGINE LUBRICATION

The lubrication of the engine is maintained by a rotor-type 22 GPM oil pump mounted in the rear of the engine block, 1, forward of the flywheel on the left-hand side of the engine.

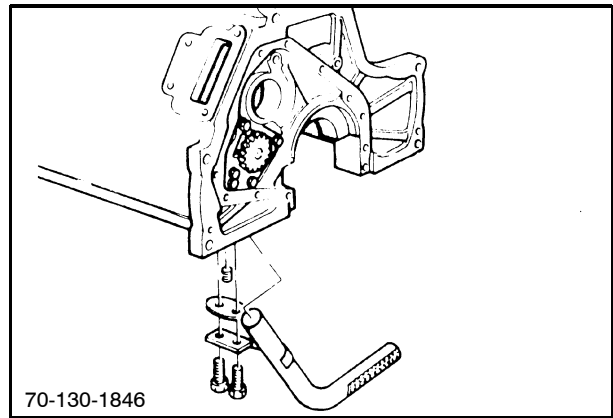


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SECTION 10 - ENGINE - CHAPTER 1

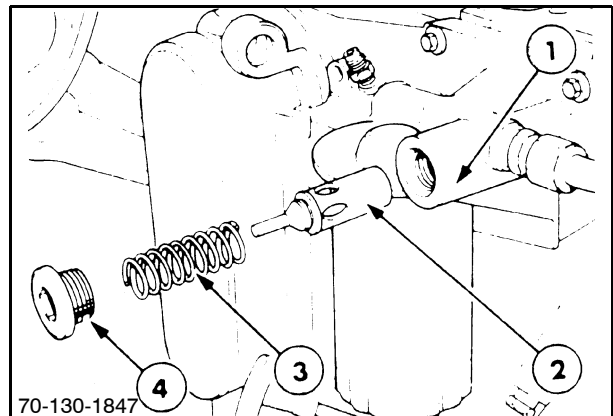
The oil pump is driven from the rear of the camshaft and draws oil from the oil pan through a suction tube and screen assembly.



8

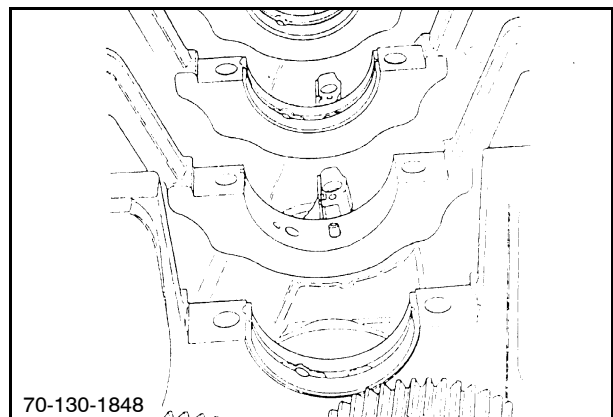
A spring-loaded regulating valve is integral with the oil filter base, 1, mounted on the left-hand side of the engine block. The spring, 3, and valve, 2, are accessed by removing a retaining plug, 4.

The spin-type oil filter mounted on the left-hand side of the engine is easily accessible. Oil flows from the filter to the main oil gallery which runs the length of the cylinder block and intersects the camshaft follower chamber.



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The main gallery also supplies oil to the crankshaft main bearings, connecting rods, big end and small end bearings. The underside of the the pistons and pins are lubricated by oil pressure jets mounted adjacent to each main journal housing. The camshaft gear bushing is pressure lubricated through a drilled passage from the front main bearing. The gear has small oil passages machined on both sides allowing excess oil to escape.



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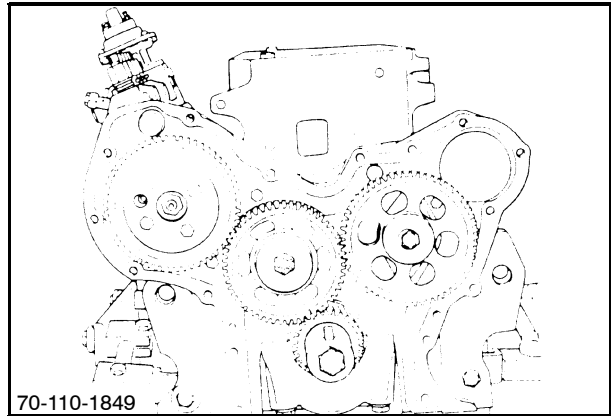
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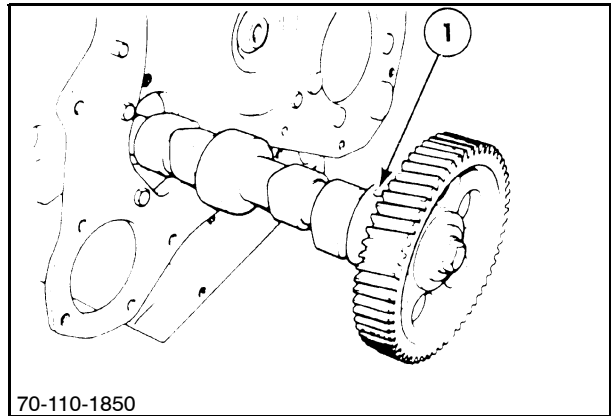
SECTION 10 - ENGINE - CHAPTER 1

Timing gears are lubricated by splashed oil from the cam follower chamber and the pressure lubricated camshaft drive gear bushing.



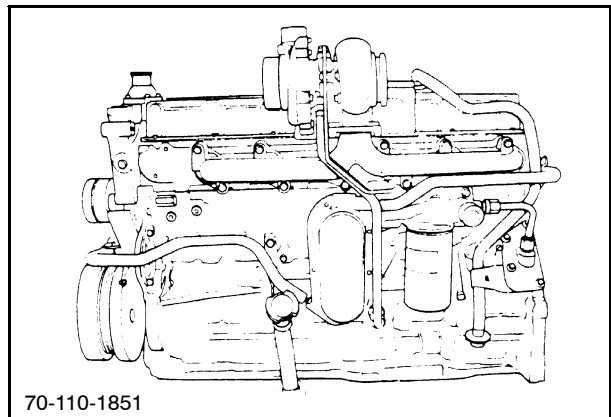
11

An intermittent flow of oil is directed to the valve rocker arm shaft assembly via a drilled passage in the cylinder block. This is located vertically above #1 camshaft bearing, 1, and aligns to a hole in the cylinder head. The rotation of the camshaft allows a controlled intermediate flow of lubrication.



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The turbocharger is supplied with oil from the oil filter support housing mounted on the left-hand side of the engine.



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