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SECTION 00 - GENERAL INFORMATION

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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 Repair 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 toward the engine.

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.

ABOUT IMPROVEMENTS

New Holland is continually striving to improve its products. We must, therefore, reserve the right to make improvements or changes when it becomes practical and possible to do so, without incurring any obligation to make changes or additions to the equipment sold previously.

ALL SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE.

PART AND ACCESSORIES

Genuine NEW HOLLAND parts and accessories have been specifically designed for NEW HOLLAND MACHINES.

We would like to point out that "NON GENUINE parts and accessories have not been examined and released by NEW HOLLAND. The installation and or use of such products could have a negative effect upon the design characteristics of your machine and thereby affect its safety. NEW HOLLAND is not liable for any damage caused by the use of "NON GENUINE" NEW HOLLAND parts and accessories.

PRECAUTIONARY STATEMENTS

PERSONAL SAFETY

Throughout this manual and on machine decals, you will find precautionary statements (“DANGER”, “WARNING”, and “CAUTION”) 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.



This word “DANGER” indicates an immediate hazardous situation that, if not avoided, will result in death or serious injury. The color associated with Danger is RED.



This word “WARNING” indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury. The color associated with Warning is ORANGE.



This word “CAUTION” indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices. The color associated with Caution is YELLOW.

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

MACHINE SAFETY

The additional precautionary statement (“IMPORTANT”) is followed by specific instructions. This statement is intended for machine safety.

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.

INFORMATION

NOTE: Instructions used to identify and present supplementary information.

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 foot wear 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 100 PSI (690 kPa). 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.

If it is found necessary to raise the tractor for ease of servicing or repair, make sure that safe and stable supports are installed beneath axle housings, casings, etc., before starting work.

Certain repair or overhaul procedures may necessitate separating the tractor, either at the engine/transmission or transmission/rear axle location. These operations are simplified by the use of the Tractor Splitting Stands. Should this equipment not be available, every consideration must be given to stability, balance and weight of the components, especially if a cab is installed.

Use footsteps or working platforms when servicing those areas of a tractor that are not within easy reach.

Before loosening any hoses or tubes connecting implements to remote control valves, etc., switch off the engine, remove all pressure in the lines by operating levers several times. This will remove the danger of personal injury by oil pressure.

Prior to pressure testing, make sure all hoses and connectors of the tractor and the test equipment are in good condition and tightly sealed. Pressure readings must be taken with the gauges specified. The correct procedure should be rigidly observed to prevent damage to the system or the equipment, and to eliminate the possibility of personal injury.



WARNING



Escaping hydraulic/diesel fluid under pressure can penetrate the skin causing serious injury.



WARNING

Do not use your hand to check for leaks. Use a piece of cardboard or paper to search for leaks. Stop the engine and relieve pressure before connecting or disconnecting lines.

Tighten all connections before starting the engine or pressurizing lines.

If any fluid is injected into the skin, obtain medical attention immediately or gangrene may result.

Use “position control” when equipment or implements are required to be attached to the hydraulic linkage either for testing purposes or for transportation.

Always lower equipment to the ground when leaving the tractor.

If high lift attachments are installed on a tractor, beware of overhead power, electric or telephone cables when travelling. Drop the attachment near to ground level to increase stability and minimize risks.

Do not park or attempt to service a tractor on an incline. If unavoidable, take extra care and block all wheels.

Observe recommended precautions as indicated in this Service Manual when dismantling the air conditioning system as escaping refrigerant can cause frostbite.

Prior to removing wheels and tires from a tractor, check to determine whether additional ballast (liquid or weights) has been added. Seek assistance and use suitable equipment to support the weight of the wheel assembly.

When inflating tires, beware of over inflation - constantly check the pressure. Over inflation can cause tires to burst and result in personal injury.

SERVICING A TRACTOR WITH A LOADER INSTALLED

If the tractor is equipped with a loader, lower the loader and rest the bucket on the ground.

If servicing the tractor and the loader must be raised, empty the bucket and curl the bucket to fully retract the bucket cylinders. Raise the loader and install the loader supports over the cylinder rods and lower the loader on the supports.

HEALTH AND SAFETY PRECAUTIONS

Many of the procedures associated with vehicle maintenance and repair involve physical hazards or other risks to health. This section lists, alphabetically, some of these hazardous operations, materials and equipment associated with them. The precautions necessary to avoid these hazards are identified.

The list is not inclusive; all operations, procedures, and handling of materials should be carried out with health and safety in mind.

ACIDS AND ALKALIS (SEE BATTERY ACIDS, I.E., CAUSTIC SODA, SULPHURIC ACID)

Used in batteries and cleaning materials.

Irritating and corrosive to the skin, eyes, nose and throat. Causes burns.

Avoid splashes to the skin, eyes, and clothing. Wear suitable protective gloves and goggles. Can destroy ordinary protective clothing. Do not breathe mists.

Ensure access to water and soap is readily available for splashing accidents.

ADHESIVES AND SEALERS (SEE FIRE)



CAUTION

Highly flammable, combustible.

Generally should be stored in “NO SMOKING” areas; cleanliness and tidiness while in use should be observed, i. e., from applications where possible, disposable paper should be dispensed to cover benches. Containers, including secondary containers, should be labelled.

Solvent-Based Adhesives/Sealers (See Solvents)

Follow manufacturer's Instructions

Water-Based Adhesives/Sealers

Those based on polymer emulsions and rubber lattices may contain small amounts of volatile toxic and harmful chemicals.

Skin and eye contact should be avoided, and adequate ventilation provided during use.

Follow manufacturer's Instructions

Resin-Based Adhesive/Sealers (i.e., Epoxide and Formaldehyde Resin Based)

Mixing should only be carried out in well-ventilated areas as harmful or toxic volatile chemicals may be released.

Skin contact with uncured resins and hardeners can result in irritation, dermatitis, and absorption of toxic, or harmful chemicals through the skin. Splashes can damage the eyes.

Provide adequate ventilation; avoid skin and eye contact. Follow manufacturer's instructions.

Anaerobic Cyanoacrylate and other Acrylic Adhesives

Many are irritating, sensitizing, or harmful to the skin. Some are eye irritants.

Skin and eye contact should be avoided and the manufacturer's instructions followed.

Cyanoacrylate adhesives (super-glues) must not contact the skin or eyes. If skin or eye tissue is bonded, cover with a clean moist pad and get medical attention. Do not attempt to pull tissue apart. Use in well-ventilated areas as vapours can cause irritation of the nose and eyes.

For two-part systems: See Resin-Based Adhesive/ Sealers

Isocyanate (Polyurethane) Adhesive/Sealers (See Resin-Based Adhesives)

Individuals suffering from asthma or respiratory allergies should not work with, or near, these materials as sensitivity reactions can occur.

Any spraying should preferably be carried out in exhaust ventilated booths removing vapours and spray droplets from the breathing zone. Individuals working with spray applications should wear supplied air respirators.

ANTIFREEZE (SEE FIRE, SOLVENTS, I.E., ISOPROPANOL, ETHYLENE GLYCOL, METHANOL)

 **CAUTION** 
Highly flammable, combustible.

Used in vehicle coolant systems, brake air pressure systems, and windshield washing solutions.

Vapours given off from coolant antifreeze (Glycol) arise only when heated.

Antifreeze may be absorbed through the skin in toxic or harmful quantities. Swallowed antifreeze is fatal if not treated; medical attention must be sought immediately.

BATTERY ACIDS (SEE ACIDS AND ALKALIS)

Gases released during charging are explosive. Never use an open flame or allow sparks near charging or recently charged batteries.

(North America Only)

CALIFORNIA

Proposition 65 Warning

Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Wash hands after handling.

BRAKE AND CLUTCH LININGS AND PADS (SEE LEGAL ASPECTS)

These items may contain asbestos which, if inhaled, may cause lung damage and, in some cases, cancer.

The normal handling and fitting of these items should not cause any hazard, but any drilling, grinding, or filling of friction materials may produce asbestos dust and should only be carried out under strictly controlled conditions.

The dust in brake drums, etc., contains very little asbestos, but care should be taken to avoid inhalation of this dust during servicing of brakes and clutches. The use of drum cleaning units, vacuum cleaning, or damp wiping is preferred to the use of air jets for "blowing-out."

The dust should be collected in a sealed plastic bag and disposed appropriately, according to local laws and regulations.

BRAZING (SEE WELDING)

CHEMICAL MATERIALS - GENERAL (SEE LEGAL ASPECTS)

Chemical materials such as solvents, sealers, adhesives, paints, resin foams, battery acids, antifreeze, oils, and grease should always be used with caution, stored and handled with care. They may be toxic, harmful, corrosive, irritating, or highly flammable, causing hazardous fumes and dusts.

The effects of excessive exposure to chemicals may be immediate or delayed, briefly experienced or permanent, cumulative, superficial, life threatening, or may reduce life expectancy.

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SECTION 10 – ENGINE – CHAPTER 1

SPECIFICATIONS

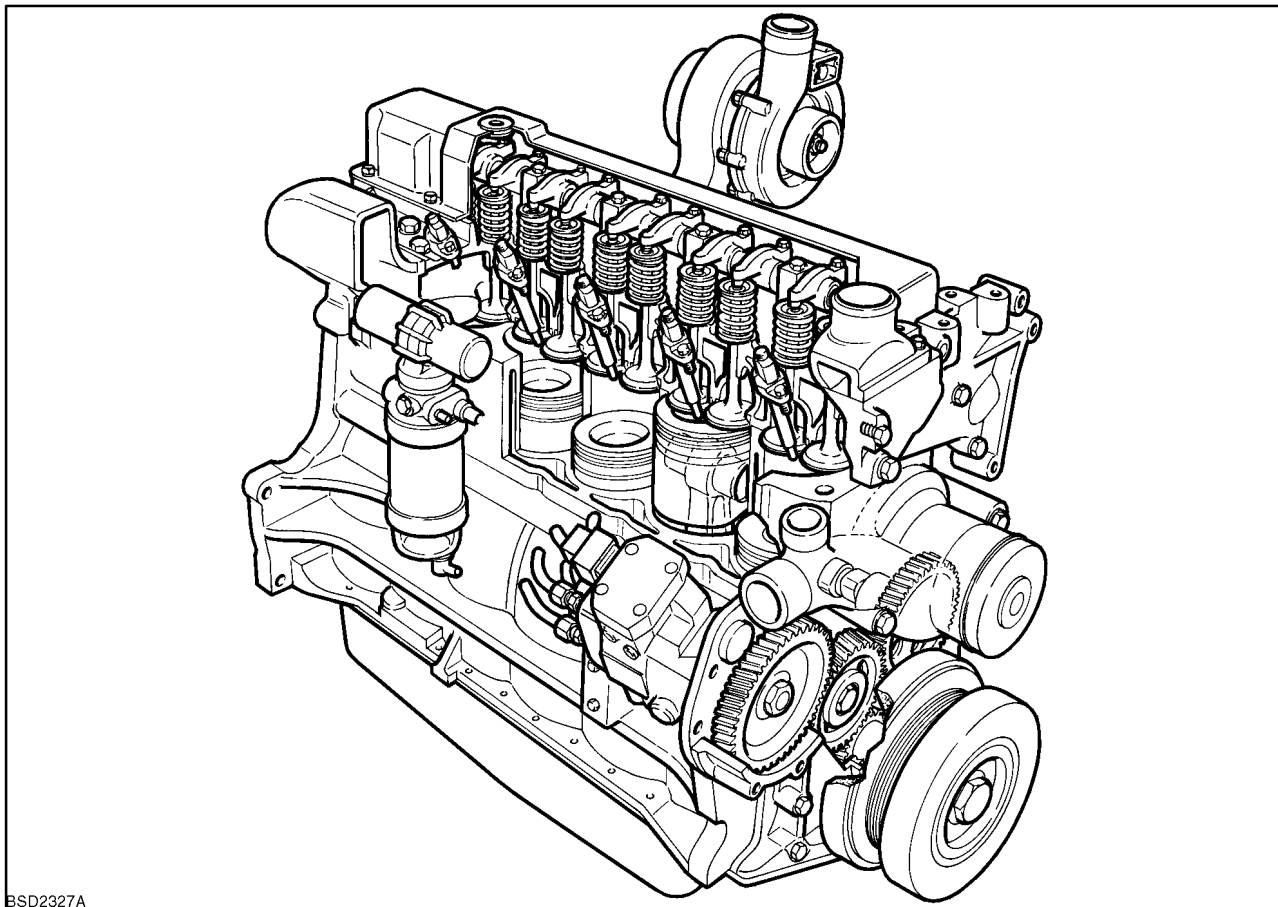
Engine Make	CNH
Engine Type	In-Line 6 Cylinder, Turbo Charged and Intercooled
Gross power (ISO TR14396)	114 kW (153 Bhp)
Governor	Mechanical
Displacement	7.5L (456.0 cu in)
Firing Order	1–5–3–6–2–4
Rated Speed	2200 rpm
Low Idle Speed	800 rpm
High Idle Speed	2375 rpm
Bore	111.8 mm
Stroke	127.0 mm
Compression Ratio	17.5:1
Cylinder Compression (at 200 RPM)	25.5 bar
Starter Motor	3.0 Kw (12 volt)
Crankcase Capacity (with filter)	19.0 Litres

CYLINDER BLOCK

Taper of Cylinder Bore	0.025mm (0.001 in) Repair Limit 0.127mm (0.005 in) Wear Limit
Cylinder Bore out of Round	0.030mm (0.0015 in) Repair Limit 0.127mm (0.0050 in) Wear Limit
Cylinder Bore Diameters	111.778–111.803mm (4.4007–4.4017 in)
Rear Oil Seal Bore Diameter	140.77–140.87mm (5.542–5.546 in)
Block to Head Surface Flatness	0.08mm (0.003 in) in any 152mm (6 in) 0.03mm (0.001 in) in any 25.40mm (1 in)

CYLINDER HEAD

Valve Guide Bore Diameter	9.469–9.495mm (0.3728–0.3738 in)
Head to Block Surface Flatness	0.03mm (0.001 in) in any 25.40mm (1 in), or 0.127mm (0.005 in) overall limit

DESCRIPTION AND OPERATION

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1

The CNH 7.5 Litre engine is a 6-cylinder turbocharged and aftercooled unit, having a bore of 4.4" (111.8 mm) and a stroke of 5.0" (127 mm) which generates a displacement of 456 in³.

The engine uses a mechanical or electronically controlled rotary injection pump depending on model and has been designed to meet current emission regulations and must only be serviced by an authorised service agent. For a detailed Description and Operation of the fuel system reference must be made to the Fuel System Chapter in this Section of the manual.

All engines feature cross flow cylinder heads, with the inlet and exhaust manifolds on opposite sides of the cylinder head. The fuel and air combustion process, takes place in the specially designed bowl in the crown of the pistons.

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. The block incorporates hydraulic tappets which do not require adjustment unless engine is being re-assembled.

Cylinders are in line and vertical and numbered 1 to 6 from the front to the rear of the engine. They can be bored oversize for the fitment of sleeves, which are available in service.

The oil pan is the reservoir for the engine oil lubrication system and a cast iron front cover on the front of the engine covers the timing gear assembly.

CYLINDER HEAD ASSEMBLY

The cylinder head incorporates an inlet and exhaust valve per cylinder 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 diesel 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.

Valve guides are integral in the cylinder head, and valves with oversize stems are available in service. Special replaceable sintered iron valve seats are pressed into each valve port during manufacture and oversize valve seats also available in service.

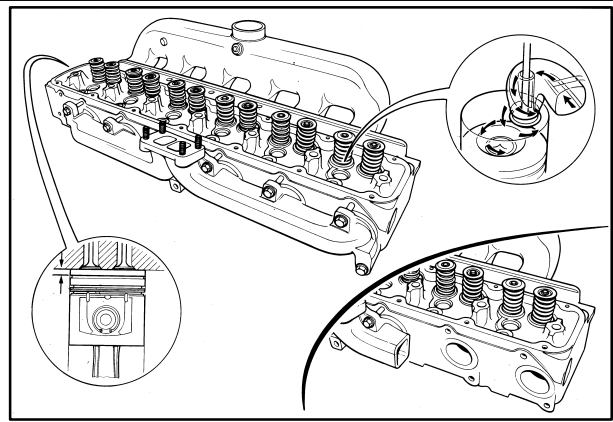
All valves are fitted with positive valve rotators and valve stem oil seals. Valve clearance is maintained by adjustment of the self locking adjusting screw, mounted in each of the rocker arms.

CAMSHAFT ASSEMBLY

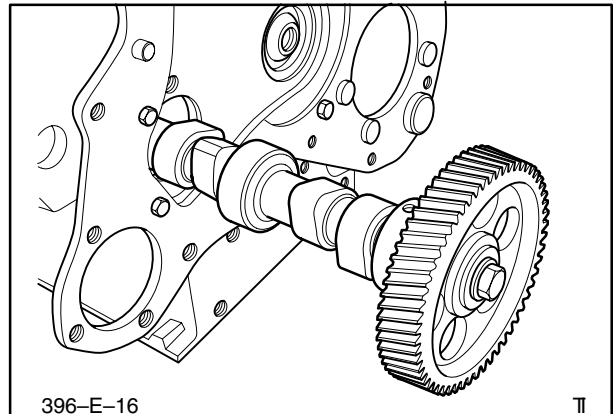
The camshaft runs in 5 replaceable bearings. The camshaft drive gear is in mesh with and driven by the camshaft idler gear which is driven by the crankshaft timing gear.

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.



2



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TI

3

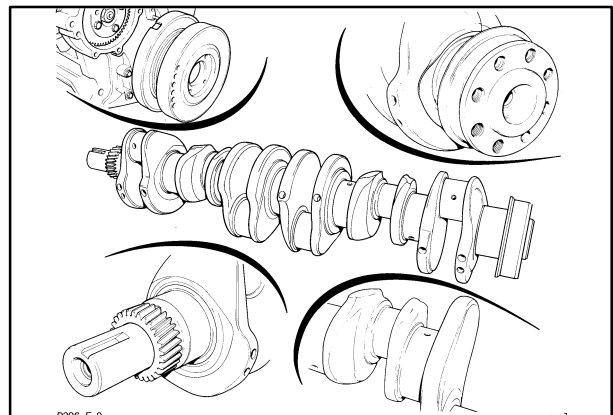
CRANKSHAFT ASSEMBLY

The crankshaft is supported in the cylinder block by 7 main bearings.

The crankshaft is manufactured from steel with machined finished crank webs

End thrust is controlled by a thrust bearing incorporated in the fifth main bearing of the crankshaft.

An external damper is fitted to the crankshaft pulley to ensure smooth running operation. Front and rear crankshaft oil sealing is effected by cassette type seals that are designed for long and durable service life.



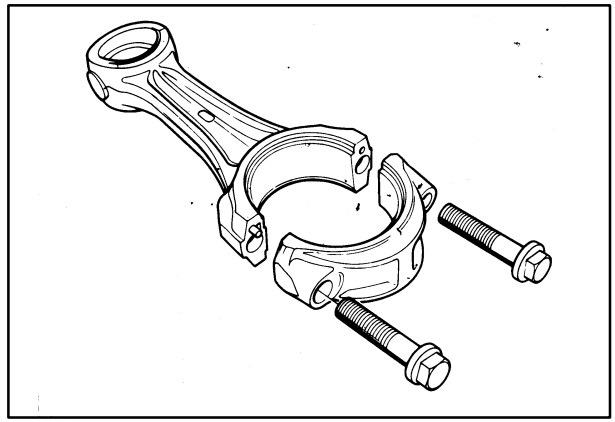
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4

CONNECTING RODS

Connecting rods “Teepee” (wedge) shaped at the small end have been designed to reduce the reciprocating weight at the piston end. The connecting rods are of a heavy beam construction and are assembled as a matched set to each engine.

They are retained in position by the connecting rod big end cap and secured by two bolts per rod. The small end of the connecting rod is fitted with a replaceable bronze bushing, through which the free floating piston pin is fitted. The steel pin being held in place within the piston by two snap rings.

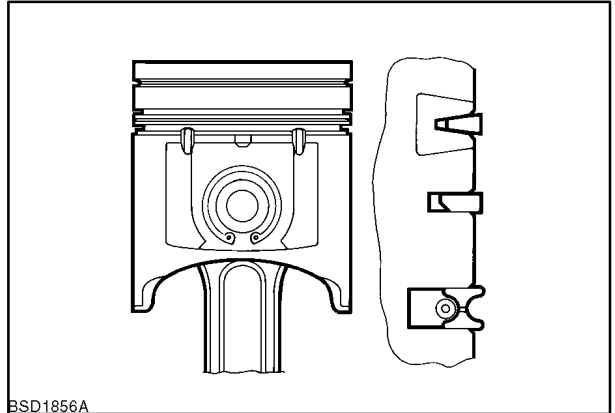


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PISTONS

Pistons are constructed of an aluminium silicon alloy with an iron insert for the top ring. The combustion chamber being 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.

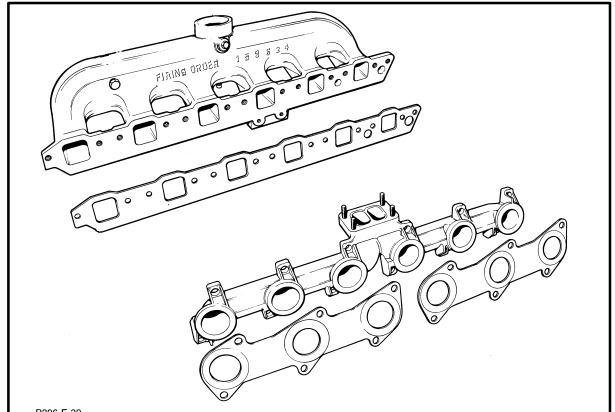


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6

MANIFOLDS

The cross flow design aluminium intake, and cast iron exhaust manifolds, are on opposite sides of the cylinder head. This is designed to maintain balanced heat distribution within the cylinder head. The configuration of the manifolds also ensures minimum heat transfer to the intake manifold.



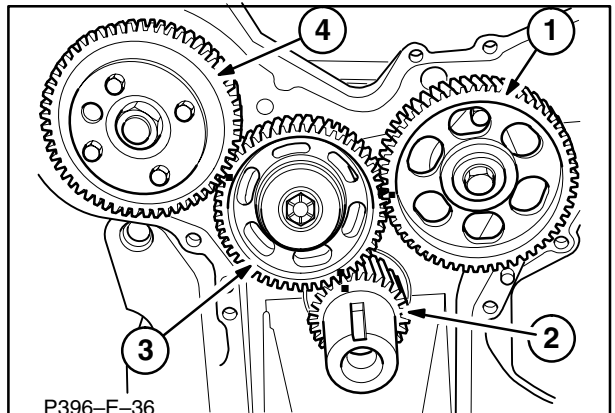
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7

TIMING GEARS

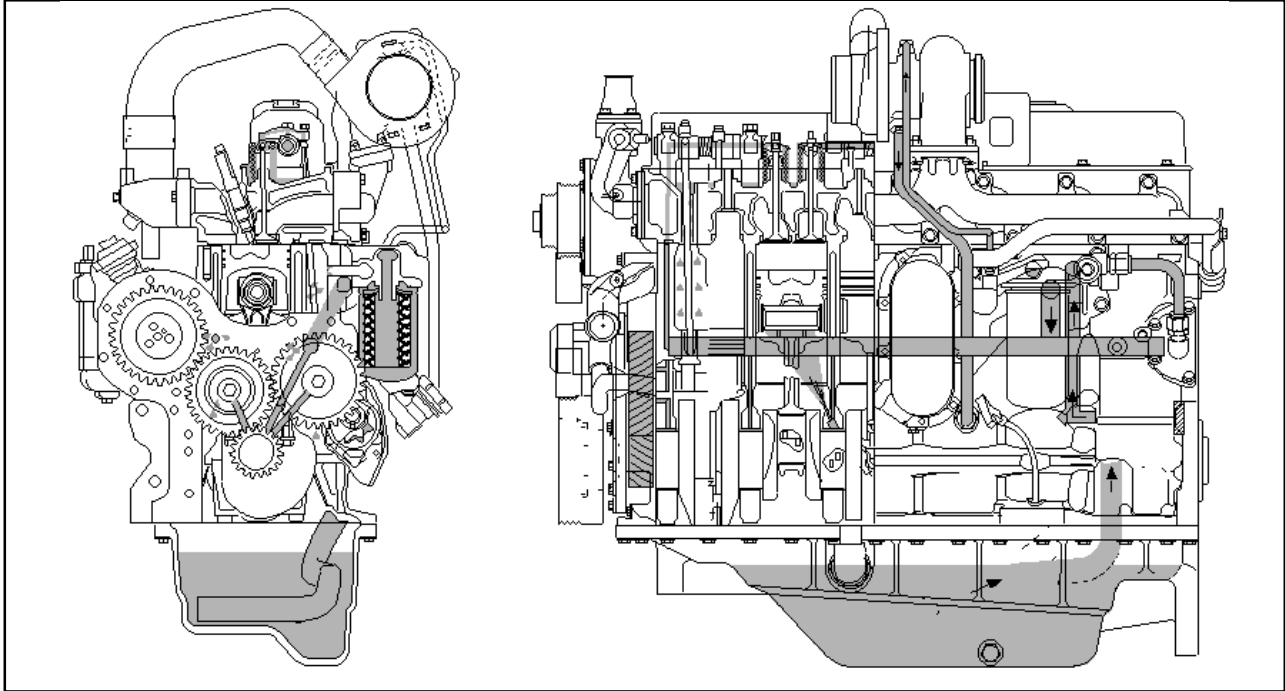
The crankshaft timing gear is heated and press fitted on to the front of the crankshaft, to a high degree of accuracy during manufacturing. This enables precise timing being maintained during the life of the engine. The crankshaft gear (2) drives the idler gear (3) which is attached to the front of the cylinder block. The idler gear then drives the camshaft gear (1) and the injection pump gear (4).

The camshaft gear is bolted to the front of the camshaft, and is keyed to maintain position of the gear on the camshaft.



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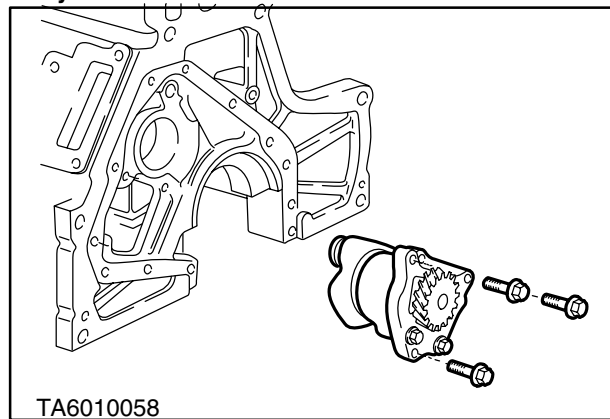
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LUBRICATION SYSTEM

1

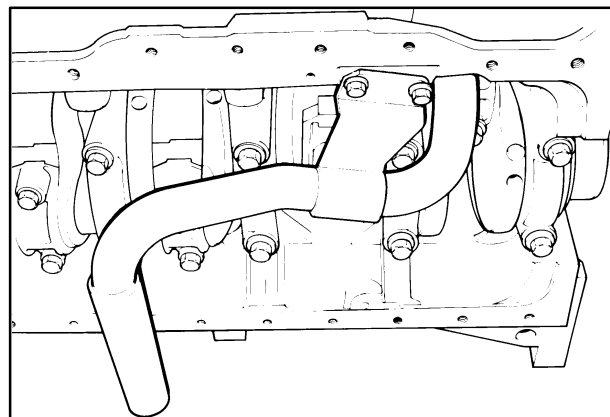
Engine Lubrication System

Lubrication of the engine, Figure 1, is maintained by a rotor type oil pump mounted in the rear of the engine block, forward of the flywheel on the left hand side of the engine.



2

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



3

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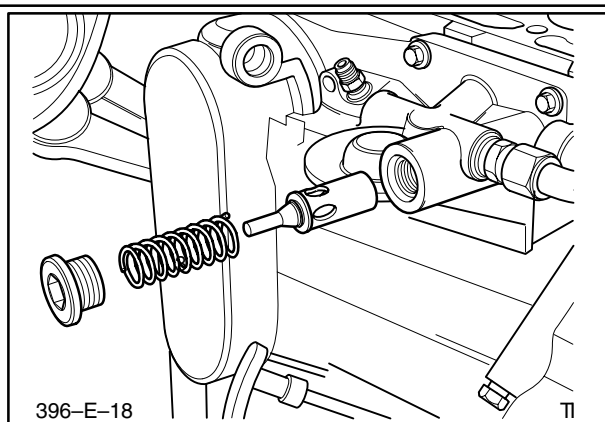
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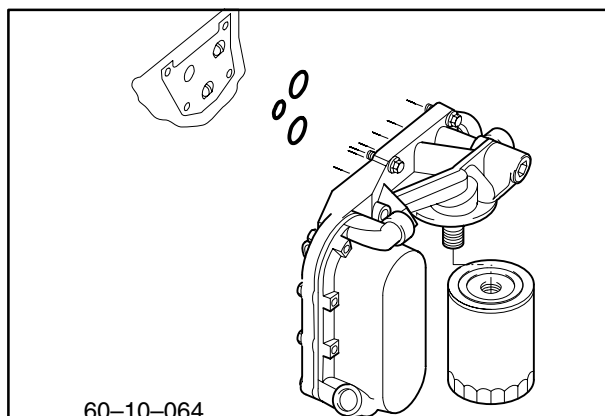
SECTION 10 – ENGINE – CHAPTER 1

A spring loaded relief valve is integral with the dummy oil filter head mounted on the left hand side of the engine block and prevents over pressurisation of the system.



4

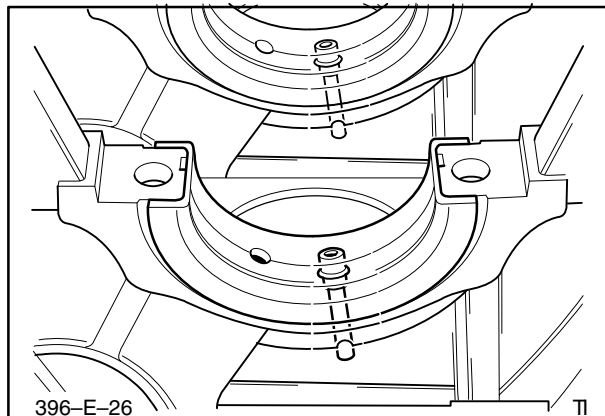
The spin on type oil filter is mounted next to the oil cooler.



5

Oil flows from the filter to the main oil gallery, which runs the length of the cylinder block and also intersects the camshaft follower chamber.

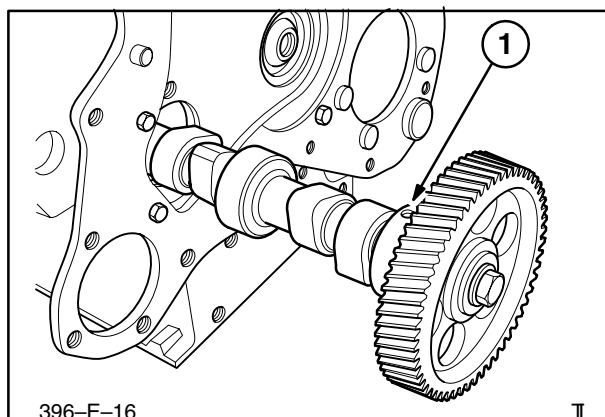
The main gallery supplies oil to the crankshaft main bearings, connecting rods and both big and small ends. The underside of the pistons and pins, are lubricated by oil pressure jets mounted adjacent to each main journal housing.



6

The camshaft drive 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.

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 No.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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