DX18E, DX22E, DX24E, DX25E REPAIR MANUAL COMPLETE CONTENTS

The following pages are the collation of the contents pages from each section and chapter of the DX18E, DX22E, DX24E, and DX25E Repair manual. Complete Repair part # 87352316.

The sections used through out all Case IH 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 DX18E, DX22E, DX24E, and DX25E Tractors.

SECTION 00 - GENERAL INFORMATION

Chapter 1 - General Information

CONTENTS

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.

⚠ DANGER ⚠

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.

⚠ WARNING ⚠

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.

⚠ CAUTION ⚠

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 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

PRECAUTIONARY STATEMENTS

A careful operator is the best operator. Most accidents can be avoided by observing certain precautions. To help prevent accidents, read the following precautions before operating this equipment. Equipment should be operated only by those who are responsible and instructed to do so.

Carefully review the procedures given in this manual with all operators. It is important that all operators be familiar with and follow safety precautions.

THE TRACTOR

1. **Read the Operator's Manual carefully before using the tractor. Lack of operating knowledge can lead to accidents.**
2. **Use an approved roll bar and seat belt for safe operation. Overturning a tractor without a roll bar can result in death or injury. If your tractor is not equipped with a roll bar and seat belt, see your Case IH Dealer.**
3. **Always use the seat belt. The only instance when the seat belt should not be used is if the roll bar has been removed from the tractor.**
4. **If a front end loader is to be installed, always use a FOPS (Falling Object Protective Structure) canopy to avoid injury from falling objects.**
5. **Use the handholds and step plates when getting on and off the tractor to prevent falls. Keep steps and platform cleared of mud and debris.**
6. **Do not permit anyone but the operator to ride on the tractor. There is no safe place for extra riders.**
7. **Keep all safety decals clean of dirt and grime, and replace all missing, illegible, or damaged safety decals. See the list of decals in the Decal section of this manual.**

SERVICING THE TRACTOR

1. **The cooling system operates under pressure which is controlled by the radiator cap. It is dangerous to remove the cap while the system is hot. Always turn the cap slowly to the first stop and allow pressure to escape before removing the cap entirely.**
2. **Keep any type of open flame away from the tractor and do not smoke while refueling. Wait for the engine to cool before refueling.**
3. **Keep the tractor and equipment, particularly brakes and steering, maintained in a reliable and satisfactory condition to ensure your safety and comply with legal requirements.**
4. **Keep open flame or cold weather starting aids away from the battery to prevent fires or explosions. Use jumper cables according to instructions to prevent sparks which could cause explosion.**
5. **Stop the engine before performing any service on the tractor.**
6. **Escaping hydraulic/diesel fluid under pressure can penetrate the skin causing serious injury. If fluid is injected into the skin, obtain medical attention immediately or gangrene may result.**
   - **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.**
7. **Do not modify or permit anyone else to modify or alter this tractor or any of its components or functions without first consulting a Case IH Dealer.**
8. **The fuel oil in the injection system is under high pressure and can penetrate the skin. Unqualified persons should not remove or attempt to adjust a pump, injector, nozzle, or any other part of the fuel injection system. Failure to follow these instructions can result in serious injury.**
9. **Continuous long-term contact with used engine oil may cause skin cancer. Avoid prolonged contact with used engine oil. Wash skin promptly with soap and water.**

10. **Some components of your tractor, such as gaskets and friction surfaces (brake linings, clutch linings, etc.) may contain asbestos. Breathing asbestos dust is dangerous to your health. You are advised to have any maintenance or repair on such components carried out by an authorized Case IH Dealer. However, if service operations are to be undertaken on parts that contain asbestos, the essential precautions listed below must be observed:**
    - **Work out of doors or in a well ventilated area.**
    - **Dust found on the tractor or produced during work on the tractor should be removed by extraction, not by blowing.**
    - **Dust waste should be dampened, placed in a sealed container, and marked to ensure safe disposal.**
    - **If any cutting, drilling, etc. is attempted on materials containing asbestos, the item should be dampened and only hand tools or low speed power tools used.**

OPERATING THE TRACTOR

1. **Before starting the tractor, apply the parking brake, place the PTO lever in the "OFF" position, the lift control lever in the down position, the remote control valve levers in the neutral position, and the transmission in neutral.**
2. **Always sit in the tractor seat when starting the engine or operating controls. Do not start the engine or operate controls while standing beside the tractor.**
3. **Do not bypass the neutral start switches. Consult your Case IH Dealer if your neutral start controls malfunction. Use jumper cables only in the recommended manner. Improper use can result in tractor runaway.**
4. **Avoid accidental contact with the gear shift lever while the engine is running, as this can cause unexpected tractor movement.**
5. **Before getting off the tractor, disengage the PTO, turn the engine off, and apply the parking brake. Never get off the tractor while it is in motion.**
6. **Do not park the tractor on a steep incline.**
7. **Do not operate the tractor engine in an enclosed building without adequate ventilation. Exhaust fumes can cause death or illness.**
8. **If the power steering or engine ceases operating, stop the tractor immediately.**
9. **Pull only from the drawbar or the lower link drawbar in the down position. Use only a drawbar pin that locks in place. Pulling from the tractor rear axle or any point above the axle may cause the tractor to upset.**
10. **If the front end of the tractor tends to rise when heavy implements are attached to the three-point hitch, install front end or front wheel weights. Do not operate the tractor with a light front end.**
11. **Always set the hydraulic selector lever in position control when attaching or transporting equipment. Ensure hydraulic couplers are properly mounted and will disconnect safely in case of accidental detachment of implement.**
12. **Do not leave equipment in the raised position.**
13. **Use the flasher/turn signal lights and SMV signs when traveling on public roads both day and night (unless prohibited by law).**
14. **When operating at night, adjust lights to prevent blinding oncoming drivers.**

DRIVING THE TRACTOR

1. **Watch where you are going, especially at row ends, on roads, around trees and low hanging obstacles.**
2. **To avoid upsets, drive the tractor with care and at a safe speed. Use extra caution when operating over rough ground, when crossing ditches or slopes, and when turning corners.**
3. **To provide two-wheel braking, one pedal actuates both brakes.**
4. **Do not coast or free wheel down hills. Use the same gear when going downhill as is used when going uphill.**
5. **Any towed vehicle with a total weight exceeding that of the towing tractor should be equipped with brakes for safe operation.**
6. **If the tractor becomes stuck or the tires become frozen to the ground, back up the tractor to prevent upset.**

7. **Always check overhead clearance, especially when transporting the tractor.**
8. **When operating at night, adjust lights to prevent blinding oncoming drivers.**

OPERATING THE PTO

1. **When operating PTO driven equipment, shut off the engine and wait until the PTO stops before getting off the tractor and disconnecting the equipment.**
2. **Do not wear loose clothing when operating the power take-off or when near rotating equipment.**
3. **When operating stationary PTO driven equipment, always place both gear shift levers in neutral, apply the tractor parking brake, and block the rear wheels front and back.**
4. **To avoid injury, do not clean, adjust, unclog, or service PTO driven equipment when the tractor engine is running.**
5. **Ensure the PTO master shield is installed at all times. Always replace the PTO shield cap when the PTO is not in use.**

DIESEL FUEL

1. **UNDER NO CIRCUMSTANCES should gasoline, alcohol, or blended fuels be added to diesel fuel. These combinations can create an increased fire or explosive hazard. Such blends are more explosive than pure gasoline in a closed container such as a fuel tank. DO NOT USE THESE BLENDS.**
2. **Never remove the fuel cap or refuel with the engine running or hot.**
3. **Do not smoke while refueling or when standing near fuel.**
4. **Maintain control of the fuel filler pipe nozzle when filling the tank.**
5. **Do not fill the fuel tank to capacity. Allow room for expansion.**
6. **Wipe up spilled fuel immediately.**
7. **Always tighten the fuel tank cap securely.**
8. **If the original fuel tank cap is lost, replace it with a Case IH approved cap. A non-approved, proprietary cap may not be safe.**
9. **Keep equipment clean and properly maintained.**
10. **Do not drive equipment near open fires.**
11. **Never use fuel for cleaning purposes.**
12. **Arrange fuel purchases so that winter grade fuels are not held over and used in the spring.**

SAFETY FRAME (ROPS)

Your Case IH tractor is equipped with a safety frame. It must be maintained in a serviceable condition. Be careful when driving through doorways or working in confined spaces with low headroom.

UNDER NO CIRCUMSTANCES should you:

- **modify, drill, or alter the safety frame in any way. Doing so may render you liable to legal prosecution.**
- **attempt to straighten or weld any part of the main frame or retaining brackets which have suffered damage. Doing so may weaken the structure and endanger your safety.**
- **secure any parts on the main frame or attach your safety frame with anything other than the special high tensile bolts and nuts specified.**
- **attach chains or ropes to the main frame for pulling purposes.**
- **take unnecessary risks even though your safety frame affords you the maximum protection possible.**

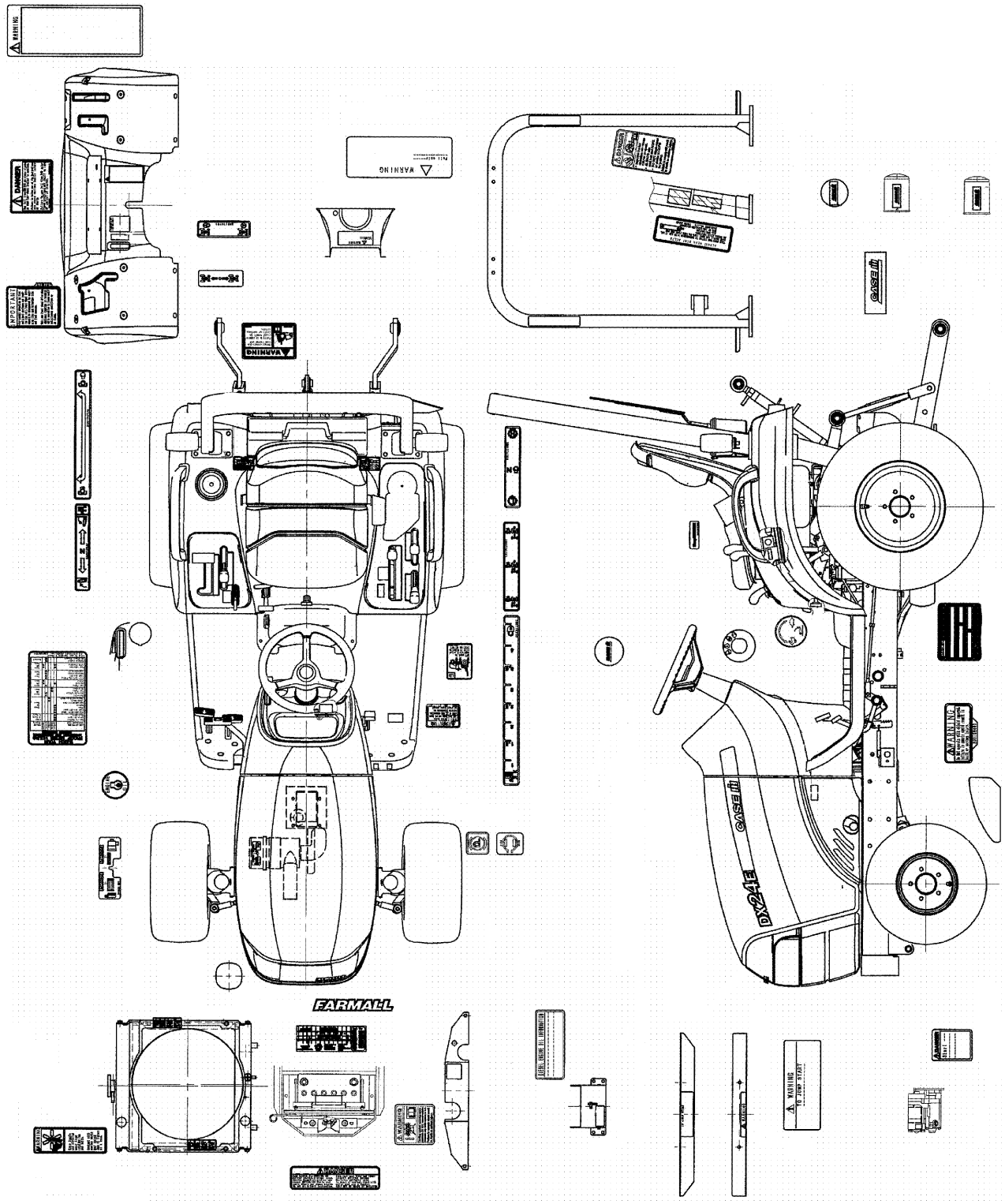
WHEN YOU SEE THIS SYMBOL

IT MEANS:

ATTENTION!

BECOME ALERT!

YOUR SAFETY IS INVOLVED!



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ECOLOGY AND THE ENVIRONMENT

Soil, air, and water are vital factors of agriculture and life in general. When legislation does not yet rule the treatment of some of the substances which are required by advanced technology, common sense should govern the use and disposal of products of a chemical and petrochemical nature.

The following are recommendations which may be of assistance:

- Become acquainted with and ensure that you understand the relative legislation applicable to your country.
- Where no legislation exists, obtain information from suppliers of oils, filters, batteries, fuels, antifreeze, cleaning agents, etc., with regard to their effect on man and nature and how to safely store, use and dispose of these substances. Agricultural consultants will, in many cases, be able to help you as well.

HELPFUL HINTS

1. Avoid filling fuel tanks using cans or inappropriate pressurized fuel delivery systems which may cause considerable spillage.
2. In general, avoid skin contact with all fuels, oils, acids, solvents, etc. Most of them contain substances which may be harmful to your health.
3. Modern oils contain additives. Do not burn contaminated fuels and or waste oils in ordinary heating systems.
4. Avoid spillage when draining off used engine coolant mixtures, engine, gearbox and hydraulic oils, brake fluids, etc. Do not mix drained brake fluids or fuels with lubricants. Store them safely until they can be disposed of in a proper way to comply with local legislation and available resources.
5. Modern coolant mixtures, i.e. antifreeze and other additives, should be replaced every two years. They should not be allowed to get into the soil but should be collected and disposed of safely.
6. Repair any leaks or defects in the engine cooling or hydraulic system immediately.
7. Do not increase the pressure in a pressurized circuit as this may lead to a component failure.
8. Protect hoses during welding as penetrating weld splatter may burn a hole or weaken them, allowing the loss of oils, coolant, etc.

SECTION 10 - ENGINE SYSTEMS

Chapter 1 - Engine Systems

CONTENTS

SPECIFICATIONS

Op. 10 000

GENERAL			
Tractor Model	**DX18E/DX22E**	**DX24E**	**DX25E**
PTO H.P.	13.7	18.0	18.0
Engine Model	S753	S773	S773
Number of Cylinders	3	3	3
Bore x Stroke	75 x 72 mm (2.96 x 2.83 in.)	77 x 72 mm (3.03 x 2.83 in.)	77 x 72 mm (3.03 x 2.83 in.)
Displacement	0.95 L, 954 cc (58.2 cu. in.)	1.005 L, 1005 cc (61.3 cu. in.)	1.005 L, 1005 cc (61.3 cu. in.)
Compression Ratio	24:1	23:1	24.5:1
Rated Speed (rpm)	3000	3000	3000
Muffler	In the hood	In the hood	In the hood
Firing Order	1 – 2 – 3	1 – 2 – 3	1 – 2 – 3
Low Idle Speed (rpm)	1380 ± 50	1300 – 1400	1350 ± 50
High Idle Speed (rpm)	3200 ± 50	3175 – 3225	3300 ± 50
Cylinder Arrangement	In-line Vertical	In-line Vertical	In-line Vertical
Valve Arrangement	Overhead	Overhead	Overhead
Compression Pressure @ 200 rpm (cylinder speed) Variation between cylinders	427 ± 70 psi 70 psi	427 ± 70 psi 70 psi	427 ± 70 psi 70 psi

CYLINDER HEAD			
Tractor Model	**DX18E/DX22E**	**DX24E**	**DX25E**
Head Warp Standard Maximum	 0.05 mm (0.002 in.) 0.12 mm (0.005 in.)	 0.05 mm (0.002 in.) 0.12 mm (0.005 in.)	 0.05 mm (0.002 in.) 0.12 mm (0.005 in.)
Valve Seat Width Standard Maximum	 1.7 – 2.1 mm (0.067 – 0.082 in.) 2.5 mm (0.098 in.)	 1.7 – 2.1 mm (0.067 – 0.082 in.) 2.5 mm (0.098 in.)	 1.7 – 2.1 mm (0.067 – 0.082 in.) 2.5 mm (0.098 in.)
Valve Seat Sink Standard Maximum	 0.85 – 1.15 mm (0.0334 – 0.0453 in.) 1.8 mm (0.0708 in.)	 0.85 – 1.15 mm (0.0334 – 0.0453 in.) 1.8 mm (0.0708 in.)	 0.85 – 1.15 mm (0.0334 – 0.0453 in.) 1.8 mm (0.0708 in.)
Valve Angle	45°	45°	45°
Piston to Valve Clearance	1.0 mm (0.039 in.) @ Piston TDC (Minimum 0.8 mm [0.031 in.])	1.0 mm (0.039 in.) @ Piston TDC (Minimum 0.8 mm [0.031 in.])	1.0 mm (0.039 in.) @ Piston TDC (Minimum 0.8 mm [0.031 in.])

CYLINDER BLOCK			
Tractor Model	**DX18E/DX22E**	**DX24E**	**DX25E**
Bore			
Standard	75.0 – 75.019 mm (2.952 – 2.953 in.)	77.0 – 77.019 mm (3.031 – 3.032 in.)	77.0 – 77.019 mm (3.031 – 3.032 in.)
Maximum	75.2 mm (2.960 in.)	77.2 mm (3.039 in.)	77.2 mm (3.039 in.)
Head Surface Warp			
Standard	0.05 mm (0.002 in.)	0.05 mm (0.002 in.)	0.05 mm (0.002 in.)
Maximum	0.12 mm (0.005 in.)	0.12 mm (0.005 in.)	0.12 mm (0.005 in.)

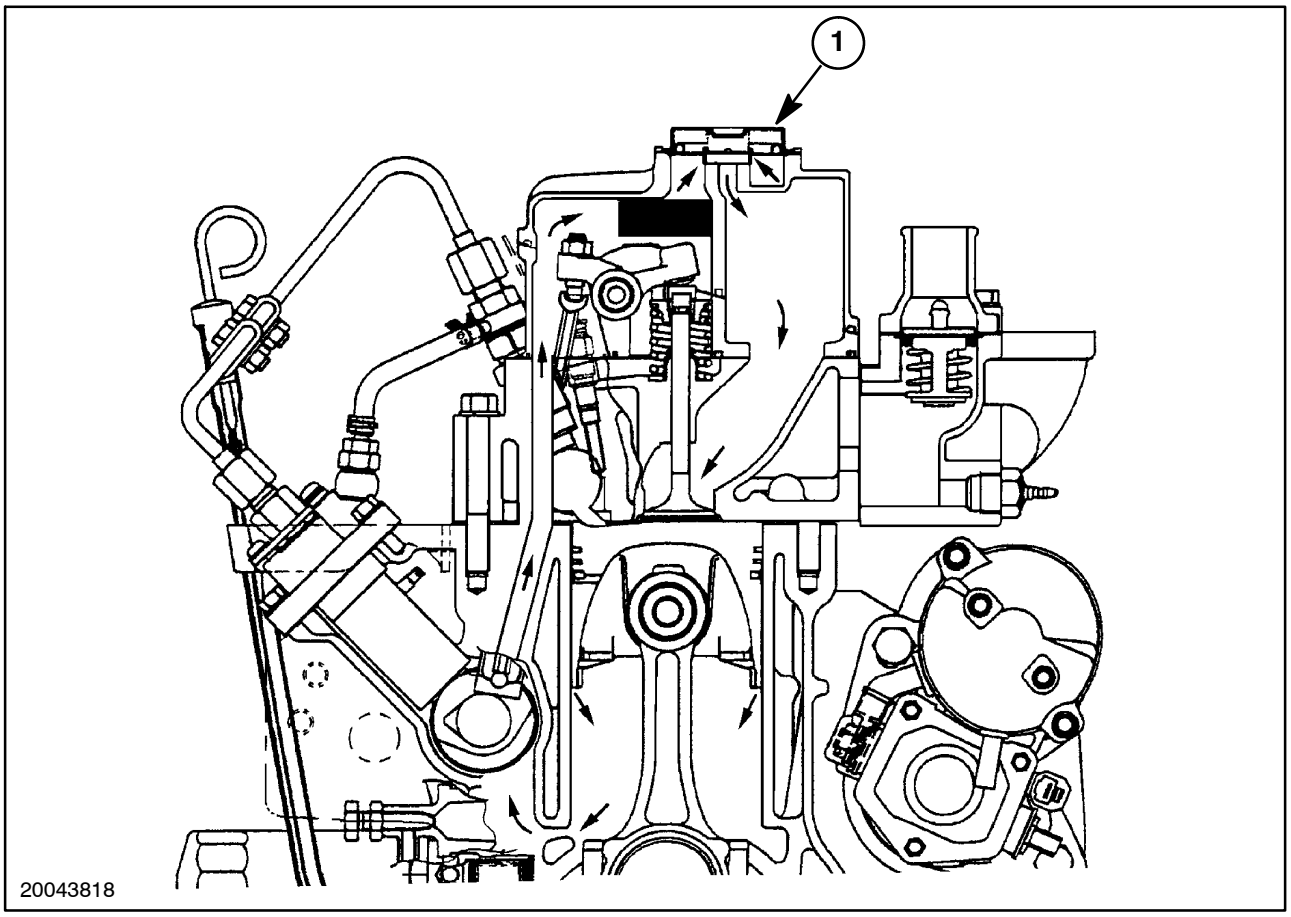
*DX18E and DX22E – If bore size exceeds 75.2 mm (2.96 in.) replace the block.

*DX24E – If bore size exceeds 77.2 mm (3.039 in.) replace the block.

*DX25E – If bore size exceeds 77.2 mm (3.039 in.) replace the block.

PISTON			
Tractor Model	**DX18E/DX22E**	**DX24E**	**DX25E**
Diameter			
Standard	74.9325 – 74.9475 mm (2.95 – 2.9506 in.)	76.9325 – 76.9475 mm (3.029 – 3.0294 in.)	76.9325 – 76.9475 mm (3.029 – 3.0294 in.)
Minimum	74.7 (2.941 in.)	76.7 (3.021 in.)	76.7 (3.021 in.)
Bore Clearance			
Standard	0.0525 – 0.0865 mm (0.0021 – 0.0034 in.)	0.0525 – 0.0865 mm (0.0021 – 0.0034 in.)	0.0525 – 0.0865 mm (0.0021 – 0.0034 in.)
Maximum	0.25 mm (0.010 in.)	0.25 mm (0.010 in.)	0.25 mm (0.010 in.)
Wrist Pin Bore			
Standard	20.998 – 21.004 mm (0.8267 – 0.8269 in.)	20.998 – 21.004 mm (0.8267 – 0.8269 in.)	20.998 – 21.004 mm (0.8267 – 0.8269 in.)
Maximum	21.016 mm (0.827 in.)	21.016 mm (0.827 in.)	21.016 mm (0.827 in.)
Wrist Pin Diameter			
Standard	20.998 – 21.002 mm (0.8267 – 0.8268 in.)	20.998 – 21.002 mm (0.8267 – 0.8268 in.)	20.998 – 21.002 mm (0.8267 – 0.8268 in.)
Minimum	20.98 mm (0.826 in.)	20.98 mm (0.826 in.)	20.98 mm (0.826 in.)
Wrist Pin Clearance			
Standard	–0.004 – 0.006 mm (–0.00016 – 0.00024 in.)	–0.004 – 0.006 mm (–0.00016 – 0.00024 in.)	–0.004 – 0.006 mm (–0.00016 – 0.00024 in.)
Maximum	0.02 mm (0.00078 in.)	0.02 mm (0.00078 in.)	0.02 mm (0.00078 in.)
Available Oversizes	Not Available	Not Available	Not Available

PISTON RING			
Tractor Model	**DX18E/DX22E**	**DX24E**	**DX25E**
End Gap			
1st Ring	0.2 – 0.35 mm (0.0078 – 0.0138 in.)	0.2 – 0.35 mm (0.0078 – 0.0138 in.)	0.2 – 0.35 mm (0.0078 – 0.0138 in.)
2nd Ring	0.15 – 0.30 mm (0.0059 – 0.0118 in.)	0.2 – 0.35 mm (0.0078 – 0.0138 in.)	0.2 – 0.35 mm (0.0078 – 0.0138 in.)
Oil Ring	0.15 – 0.35 mm (0.0059 – 0.0138 in.)	0.15 – 0.35 mm (0.0059 – 0.0138 in.)	0.15 – 0.35 mm (0.0059 – 0.0138 in.)
Maximum	1.0 mm (0.039 in.)	1.0 mm (0.039 in.)	1.0 mm (0.039 in.)
Piston Ring Groove Clearance			
Standard			
1st	0.06 – 0.1 mm (0.00236 – 0.00394 in.)	0.06 – 0.1 mm (0.00236 – 0.00394 in.)	0.06 – 0.1 mm (0.00236 – 0.00394 in.)
2nd	0.05 – 0.09 mm (0.002 – 0.004 in.)	0.05 – 0.09 mm (0.002 – 0.004 in.)	0.05 – 0.09 mm (0.002 – 0.004 in.)
Maximum	0.25 mm (0.010 in.)	0.25 mm (0.010 in.)	0.25 mm (0.010 in.)
Oil Ring Groove Clearance			
Standard	0.02 – 0.06 mm (0.0008 – 0.0024 in.)	0.02 – 0.06 mm (0.0008 – 0.0024 in.)	0.02 – 0.06 mm (0.0008 – 0.0024 in.)
Maximum	0.15 mm (0.006 in.)	0.15 mm (0.006 in.)	0.15 mm (0.006 in.)
Ring Width			
1st Compression	2.0 mm (0.079 in.)	2.0 mm (0.079 in.)	2.0 mm (0.079 in.)
2nd Compression	1.5 mm (0.059 in.)	1.5 mm (0.059 in.)	1.5 mm (0.059 in.)
Oil Ring	3.0 mm (0.118 in.)	3.0 mm (0.118 in.)	3.0 mm (0.118 in.)



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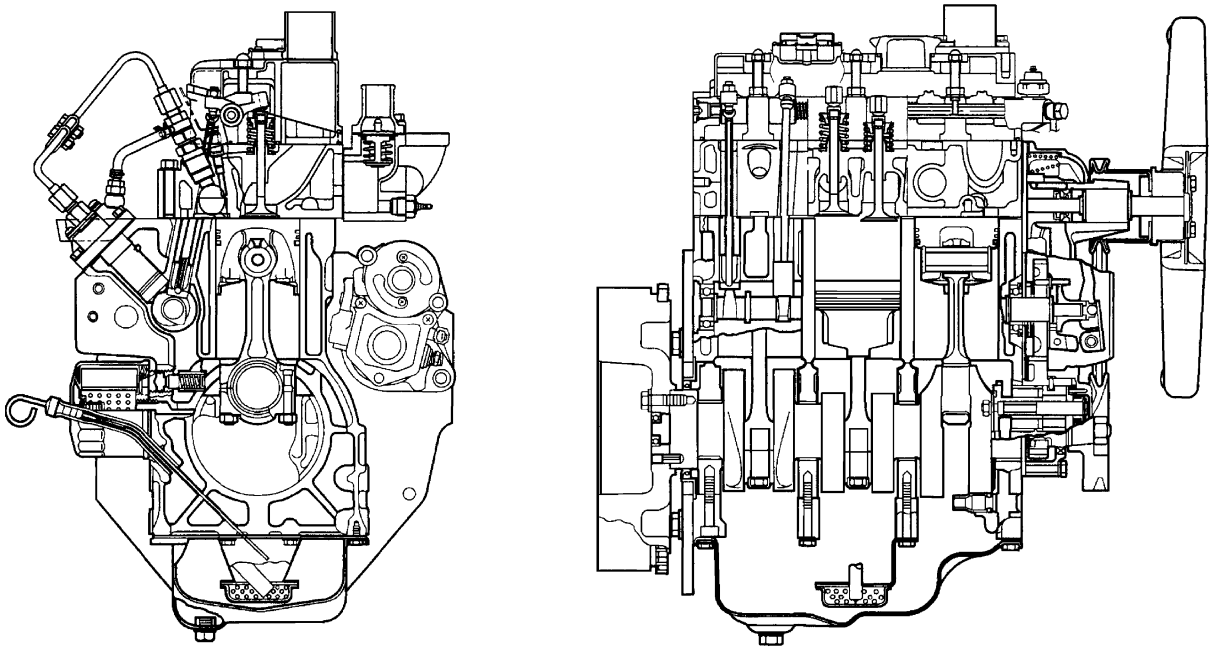
A breather valve, 1, is located on the valve cover. The valve opens when the crank housing pressure rises and the gas runs away to the intake manifold. The gas flows into the cylinder and is exhausted as exhaust fumes.



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CYLINDER BLOCK ASSEMBLY

The cylinder block assembly contains the pistons, connecting rods, crankshaft, timing gears, and engine oil pump. The engine crankshaft is supported by four main bearings. The front main bearing is a full circle bearing positioned in a bore in the front of the block. The second, third, and fourth main bearings are split liners located in holders bolted to the block. The camshaft is supported by two ball bearings one located on each end of the block. The engines utilize a straight connecting rod and a three ring piston.

OVERHAUL

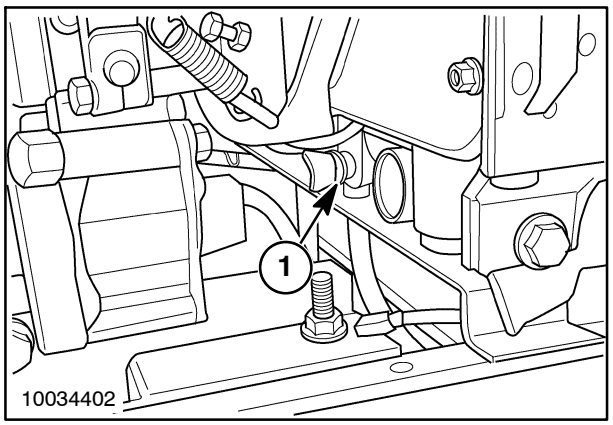
ENGINE ACCESS

Disassembly

1. Remove the engine compartment side panels.
2. Open the radiator drain, 1, and drain the coolant from the radiator.

NOTE: *The cooling system capacity is 3.5 L (3.69 qt.).*

3. Remove the radiator assembly. See “Radiator Removal”, discussed later in this section.



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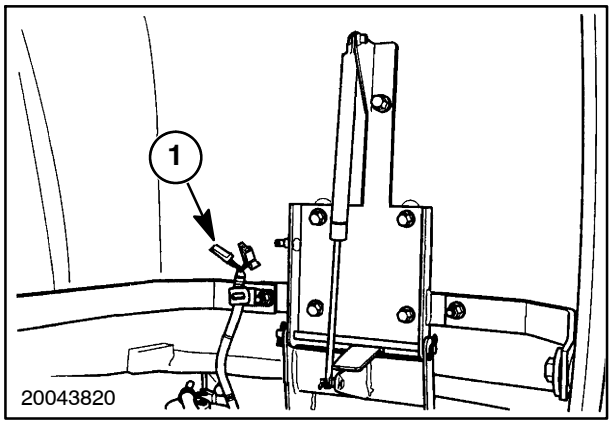
4. Disconnect the electrical connector, 1, joining the headlamp wiring harness to the main harness.



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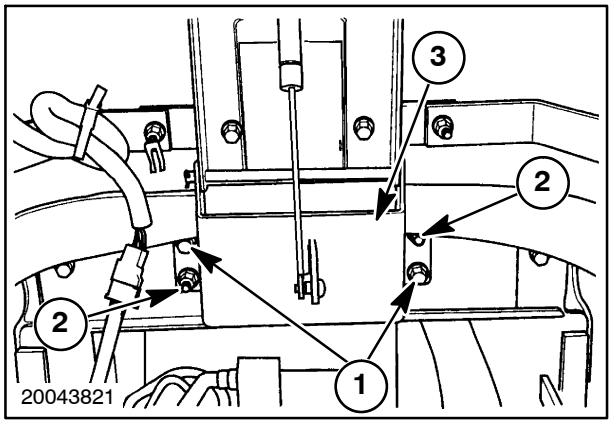
5. Remove the two bolts, 1, and two hex nuts, 2, securing the hood hinge bracket, 3, to the firewall support. Carefully remove the hood with the hinge bracket attached.



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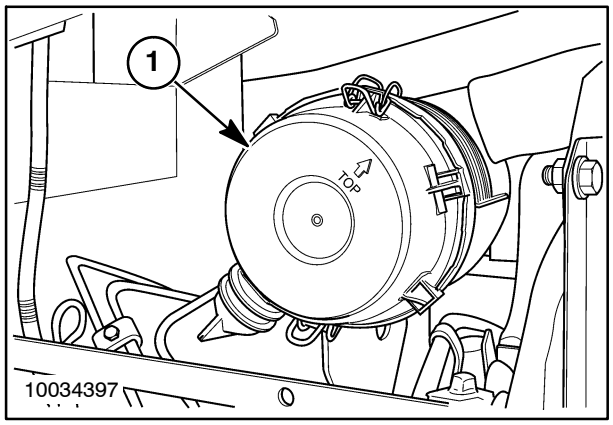
6. Remove the complete air cleaner assembly, 1, along with the air hoses.



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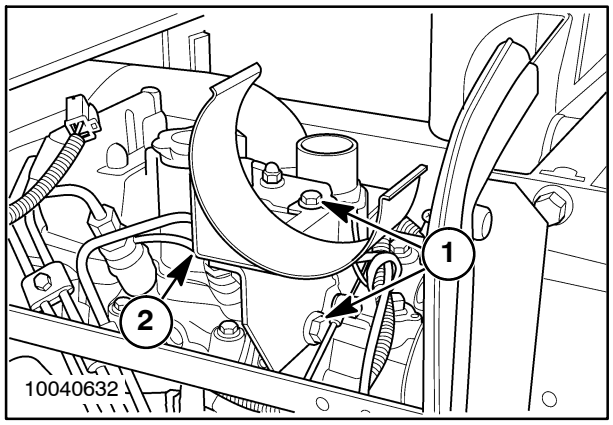
7. Remove the two bolts, 1, securing the air cleaner mounting bracket, 2, to the engine. Remove the bracket.
8. Remove the two hex-head bolts securing the upper panel to the rear of the transverse support crossmember.
9. Disconnect the two relays mounted on the upper panel from the electrical harness. (The electrical connectors are located on the bottom of the relays.) Remove the upper panel.
10. Remove the steering wheel hub cover, locking nut, and lockwasher beneath the cover. Slide the steering wheel off of the steering column.
11. Remove the control knob from the hand throttle lever.



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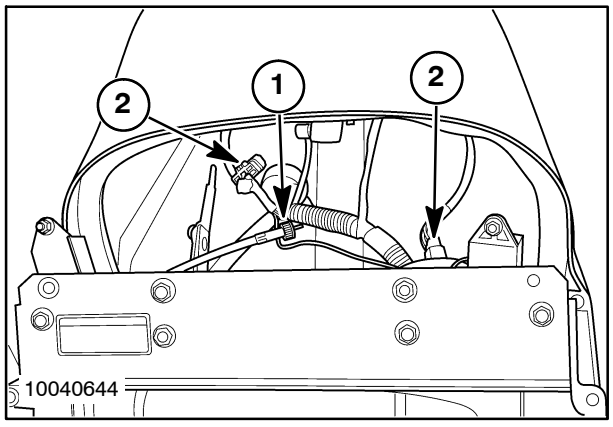
12. Remove the four bolts securing the forward cowling to the cowling support frame. Slide the cowling upward to gain access to the wiring behind the instrument panel.
13. Disconnect the tachometer cable, 1, behind the instrument panel. Loosen the knurled locking ring and pull the cable straight out of the receiver.
14. Separate the electrical connectors, 2, found in the wiring harness on each side of the steering column. Detach the two round electrical connectors from the rear of the instrument panel.
15. Disconnect the harness electrical connector on the bottom of the ignition switch.
16. Slide the cowling up and over the steering column and throttle lever to remove it.



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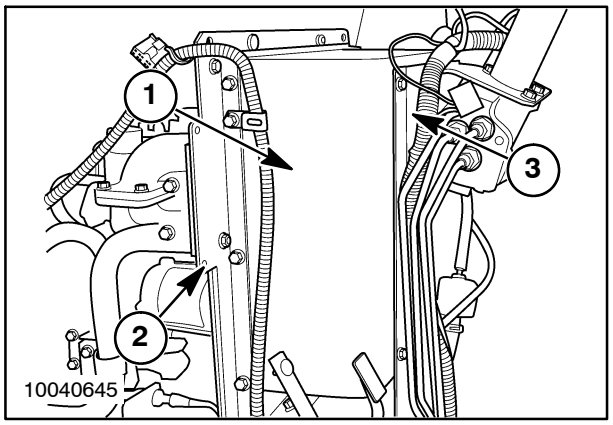
17. Remove the eight hex-head bolts securing the firewall box, 1, to the cowling support frame, 2, and the four bolts securing the firewall box to the steering column support, 3.
18. Carefully slide the firewall box upward from between the two support structures and remove the box.



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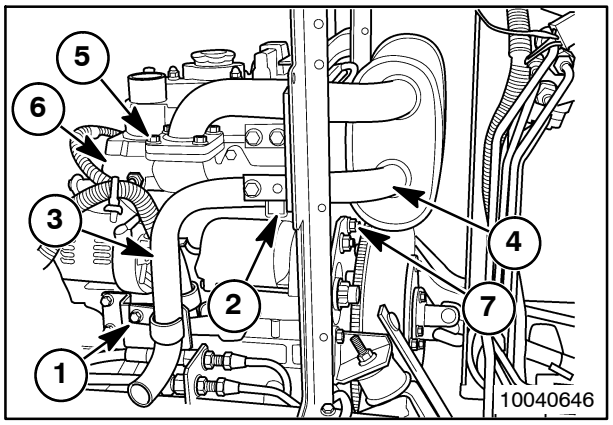
19. Remove the exhaust pipe bracket, 1. Loosen the connecting clamp, 2. Separate and remove the exhaust pipe extension, 3, from the muffler outlet pipe, 4.
20. Remove the four bolts attaching the exhaust pipe flange, 5, to the exhaust manifold outlet, 6, and the two flanged hex nuts securing the muffler to the mounting studs on the rear transverse engine plate, 7.
21. Remove the exhaust muffler assembly, retaining the metal gasket for the connecting flange on the exhaust manifold.



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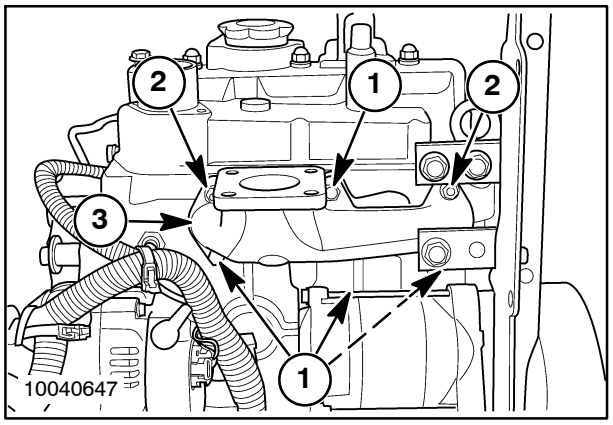
22. Remove the four hex-head bolts, 1, and two flanged hex nuts, 2, securing the exhaust manifold, 3, to the LH side of the engine. Remove the manifold and its metal gasket.



12

FUEL INJECTOR AND GLOW PLUG

Removal

1. Clean all dirt and oil from the injectors and surrounding area.
2. Disconnect the fuel lines, 1, from the injectors and from the injector pump, and remove the lines as an assembly. Cap all openings.
3. Disconnect the electrical connector, 2, Figure 14, joining the wiring harness to the lead from the glow plug connector bar at the #3 (rearmost) injector.
4. Loosen the three hex nuts on the ends of the glow plugs and remove the connector bar, 3, Figure 14, and wiring lead.
5. Close the fuel filter shutoff valve and disconnect the fuel return hose, 4, from the #3 injector. Plug the hose and cap the connection on the injector.
6. Disconnect the fuel supply hose, 5, from the fuel injection pump. Plug the hose and cap the connection on the injection pump, 6.
7. Loosen and separate the connections on top of all three injectors and on the injector pump, and remove the fuel leak-off line, 7, as a unit.
8. Remove the three fuel injector assemblies, 8, Figure 13.

NOTE: *Ensure that the sealing washer is removed from the seating bore along with each injector assembly.*

NOTE*: Fuel shutoff solenoid has to be removed before injection pump can be removed.*

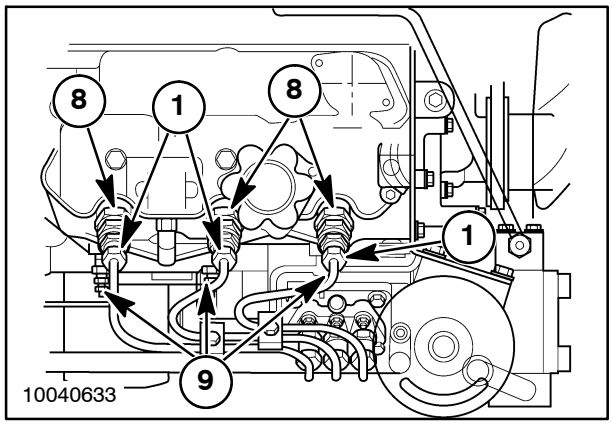
9. Remove the injection pump mounting bolts and nuts, and slide the injection pump away from the engine block far enough to remove the spring pin, 1, and separate the governor link, 2, from the pump control rack, 3.

NOTE: *Separate the mounting bracket for the external oil tube from the upper rear mounting nut on the injection pump cover at this time.*

10. Carefully slide the injection pump out of the engine block and set aside.

NOTE: *If there are shims between the pump mounting flange and the engine block, carefully remove the shims and retain them for installation.*

11. Remove the three glow plugs, (9, Figure 13), from beneath the three injector ports.



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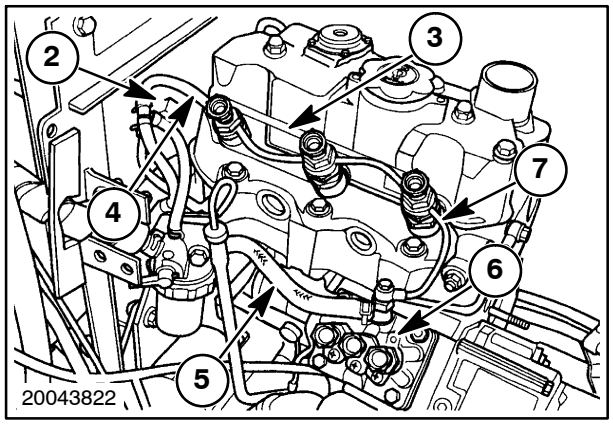

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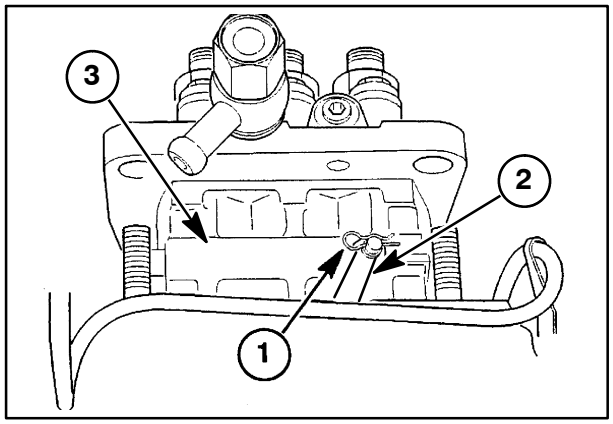
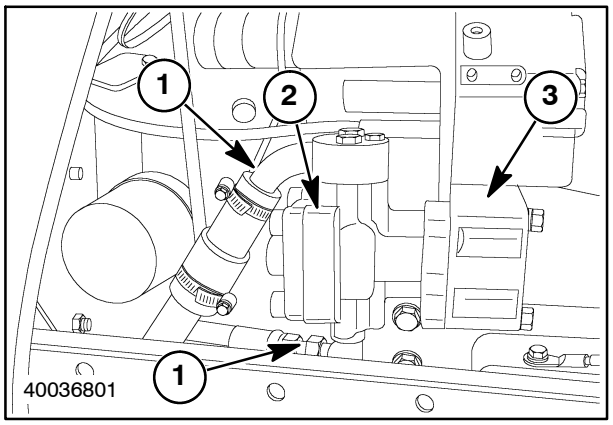


15

HYDRAULIC PUMP

Removal

1. Drain the hydraulic oil from the transmission case into a suitable container.
2. Disconnect the oil lines, 1, from the top and bottom of the hydraulic pump, 2.
3. Remove the four bolts securing the hydraulic pump to the front gear cover, 3, and remove the pump.
4. Cap or plug any openings.



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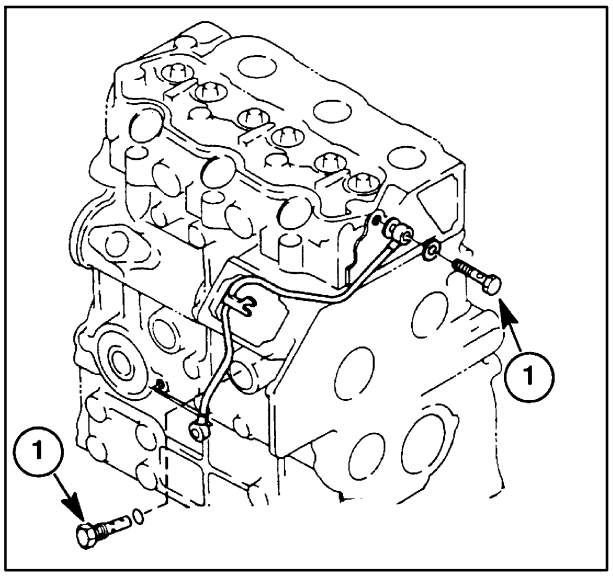
FAN, WATER PUMP AND EXTERNAL OIL TUBE

Removal

1. Remove the fan and water pump assembly. See “Water Pump and Thermostat Removal”, discussed later in this section.
2. Remove the external oil transfer tube banjo bolts, 1, from the front of the cylinder head and the RH side of the engine block, and remove the external oil transfer tube.



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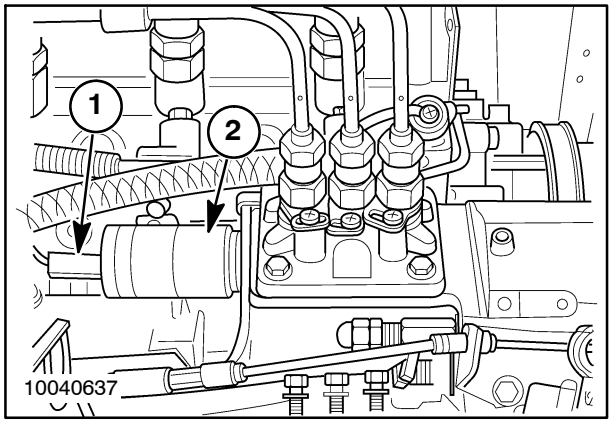
FUEL SHUTOFF SOLENOID

Removal

1. Remove the wire connector, 1, and unscrew the fuel shutoff solenoid, 2, from the rear of the injection pump.



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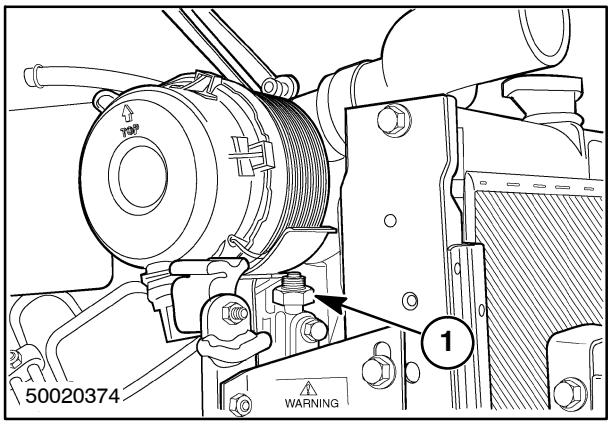
OIL PRESSURE SWITCH

Removal

1. Disconnect and remove the oil pressure switch, 1, from the upper RH side of the engine block, immediately forward of the #1 injector.



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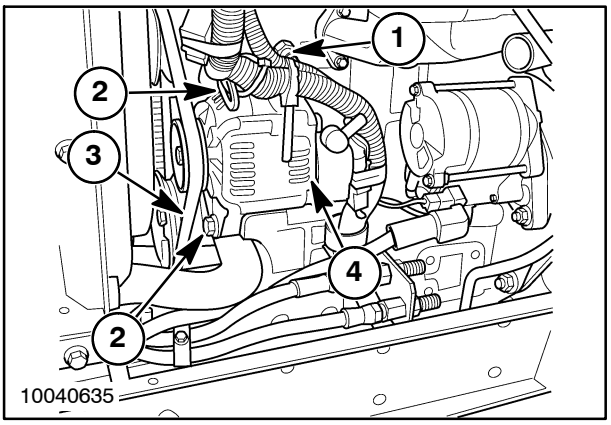
TEMPERATURE SENDING SWITCH AND ALTERNATOR

Removal

1. Detach the electrical connector from the temperature sending switch, 1, on the LH side of the engine block above the alternator.
2. Loosen and remove the temperature sending switch.
3. Loosen the alternator mounting bolts, 2, and remove the V-belt, 3, from the drive pulley.
4. Disconnect the wires at the rear of the alternator.
5. Remove the mounting bolts and the alternator, 4.



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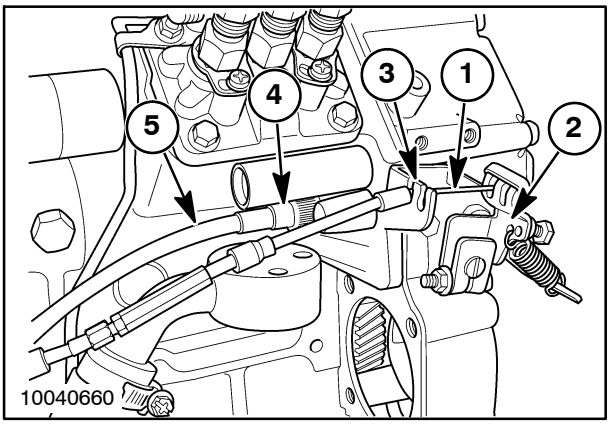
THROTTLE CABLE

Disconnection

1. Disconnect the throttle cable, 1, from the governor lever, 2, and bracket, 3.
2. Loosen the knurled locking ring, 4, and pull the tachometer cable, 5, straight out of its receiver, on the rear of the timing gear cover below the injection pump.



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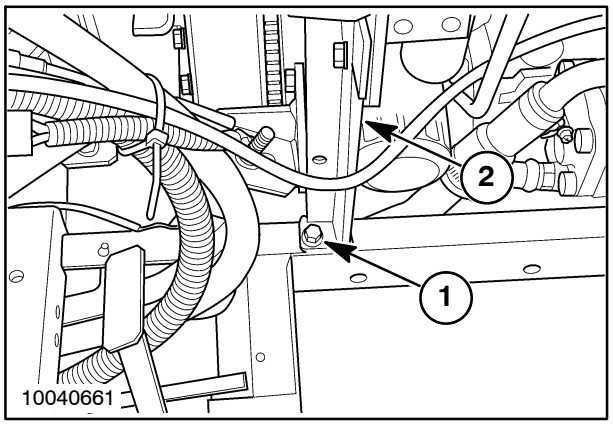
SUPPORT FRAME

Removal

1. Loosen and remove the bolts, 1, securing the cowling support frame, 2, to the tractor chassis on both sides.
2. Lift the support frame clear of the engine and set aside.



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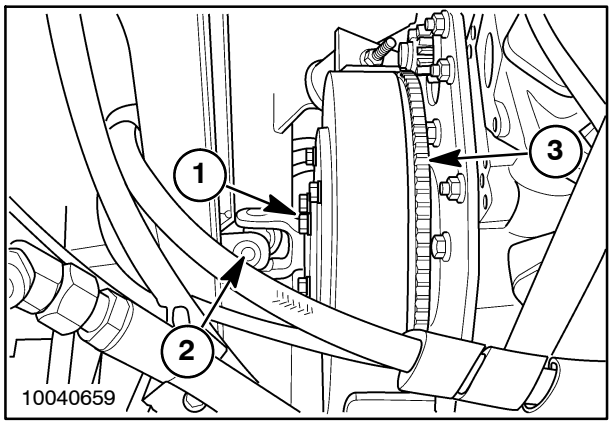
3. Remove the four bolts, 1, securing the driveshaft coupling, 2, to the engine flywheel, 3.



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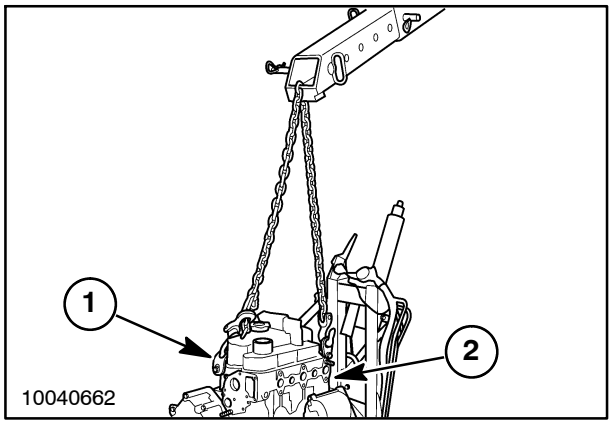
ENGINE

Removal

1. Install a lifting link, 1, in the mounting hole on the upper front face of the engine block, where the air cleaner bracket was previously mounted.
2. Using a suitable lifting hoist, attach chains to the front, 1, and rear, 2, lifting points.



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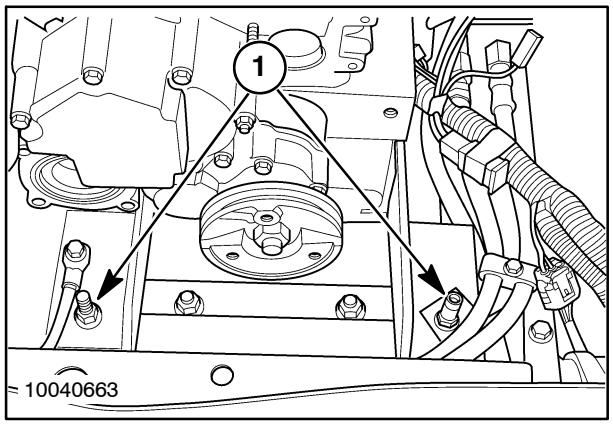
3. Loosen and remove the four mounting nuts on the two front, 1, and two rear engine mounts.
4. Carefully lift the engine forward and clear of the engine mount studs, then move to a sturdy work surface or engine stand for further disassembly.



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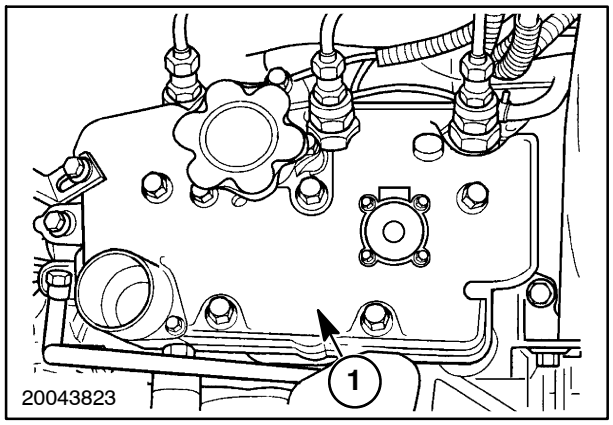
VALVE COVER

Removal

1. Remove the valve cover, 1, and gasket.



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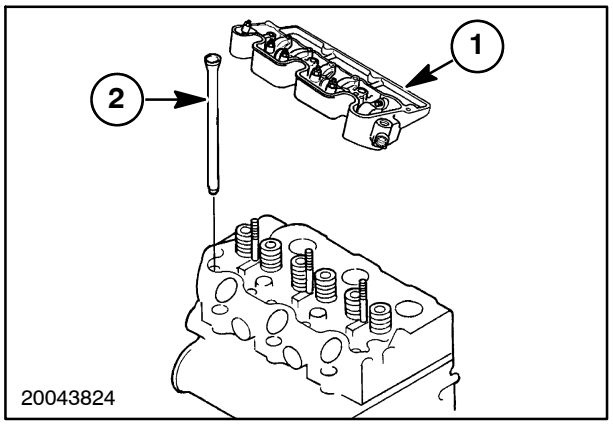
ROCKER SHAFT AND PUSH ROD

Removal

1. Remove the valve rocker arms, shaft rocker arm supports and springs as an assembly, 1.
2. Remove the push rods, 2.

NOTE: *Be sure to keep the valve components in separately marked containers for re-assembly in their original position.*



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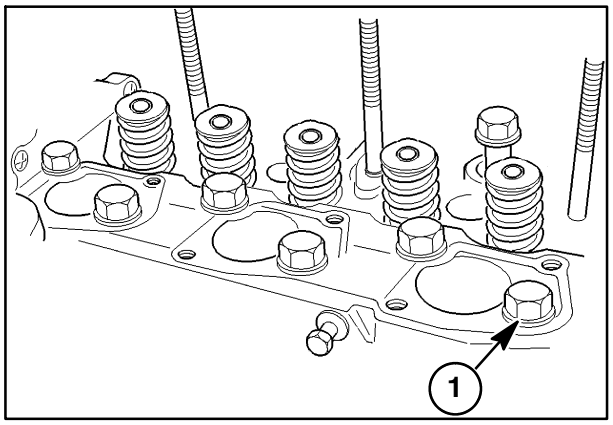
CYLINDER HEAD

Removal

1. To remove the cylinder head, remove the cylinder head bolts, 1, by alternately loosening a half turn at a time to prevent warping the head.



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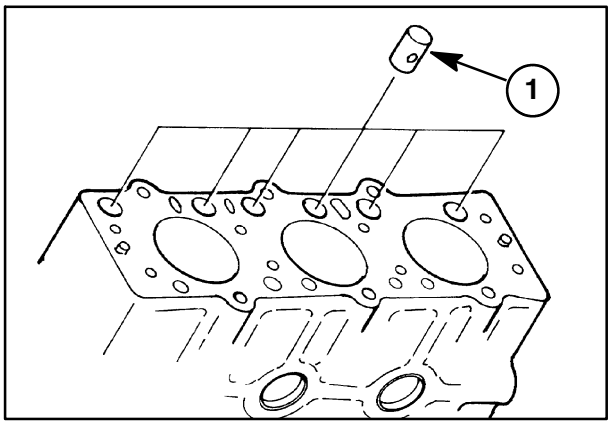
VALVE TAPPET

Removal

1. Remove the valve tappets, 1, from the machined bore in the cylinder block.

NOTE: *Be sure to keep the valve components in separately marked containers for re-assembly in their original position.*



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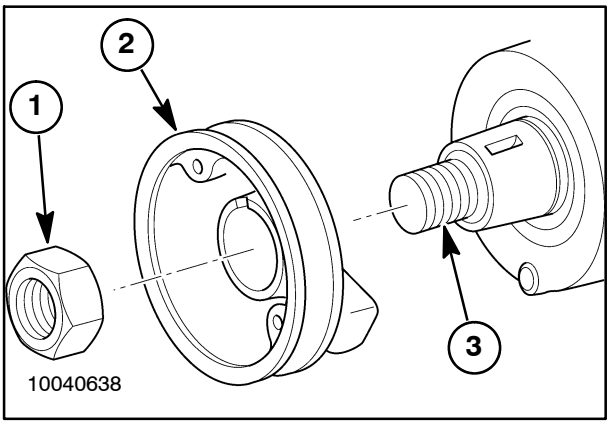
ENGINE TIMING GEAR COVER, TIMING GEARS AND CAMSHAFT

1. Drain the engine crankcase oil into a suitable container.
2. Remove the retaining nut, 1, and remove the pulley, 2, from the crankshaft, 3.



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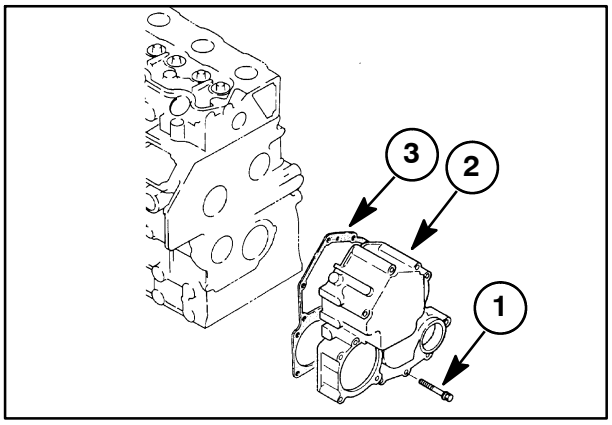
3. Remove the retaining bolts, 1, and lift the front cover, 2, and gasket, 3, off the locating dowels.



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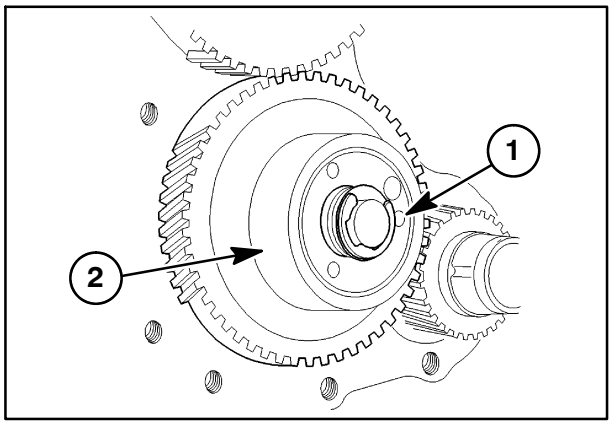
TIMING GEARS AND CAMSHAFT

Removal

1. Remove the retaining ring, 1, and remove the idler gear and oil pump assembly, 2.



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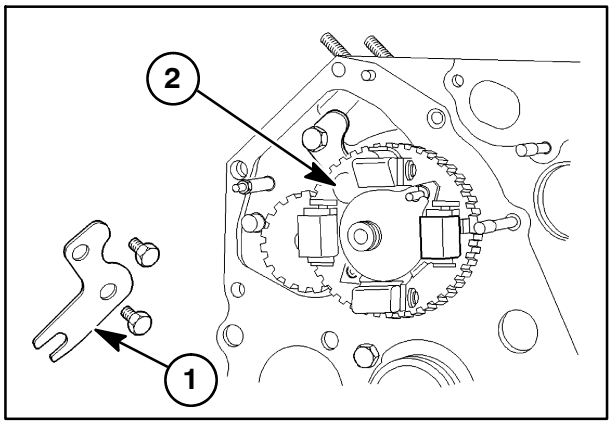
2. Remove the two bolts securing the keeper plate, 1. One bolt must be accessed using the access hole, 2, in the cam gear.
3. Slide the camshaft and gear out of the camshaft bore.



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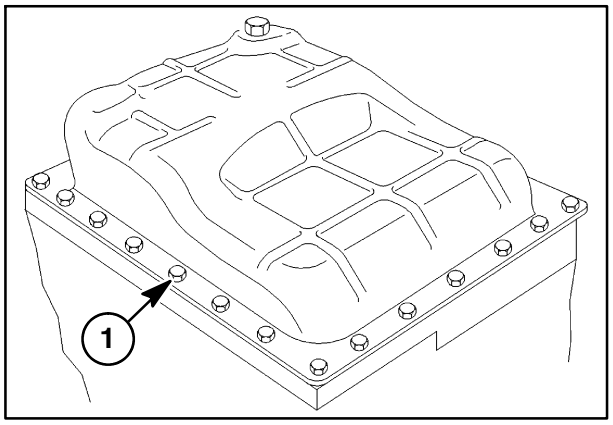
OIL SUMP

Removal

1. Remove the oil sump retainer bolts, 1.
2. Remove the oil sump and discard gasket.



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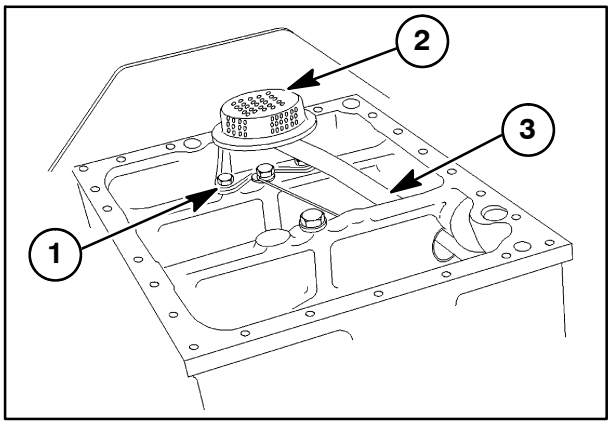
OIL SUCTION PIPE AND STRAINER

Removal

1. Remove the two retaining bolts, 1.
2. Remove the oil strainer, 2, and rotate the oil suction pipe, 3, out of it's bore.



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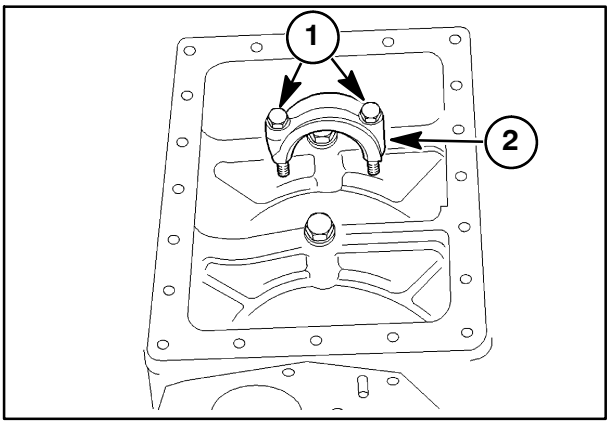
CONNECTING RODS, BEARINGS AND PISTON

Removal

1. Remove the bolts, 1, retaining the three connecting rod caps, 2.
2. Remove the connecting rod caps with lower half of the connecting rod bearing.



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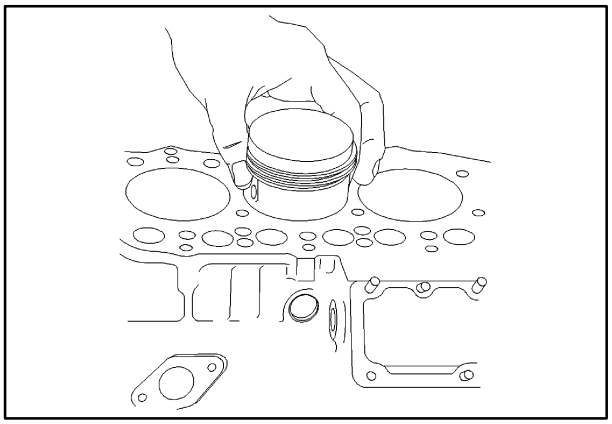
3. If necessary, remove any ridge from the top of the cylinder bores using a suitable ridge reamer.
4. Push the piston and connecting rod out of the cylinder block.
5. Replace the connecting rod caps to the piston assembly it was removed from. Keep together in cylinder sequence.



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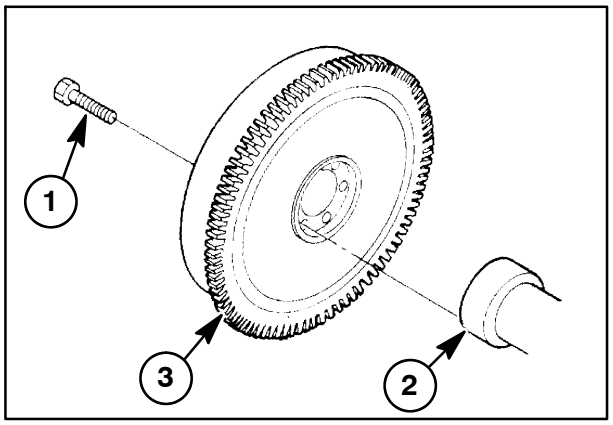
FLYWHEEL

Removal

1. Loosen the flywheel retaining bolts, 1.
2. Using a brass drift and hammer, tap the end of the crankshaft, 2, to loosen the flywheel, 3, from the shaft.
3. Remove the retaining bolts, lock washers, and flywheel from the crankshaft.



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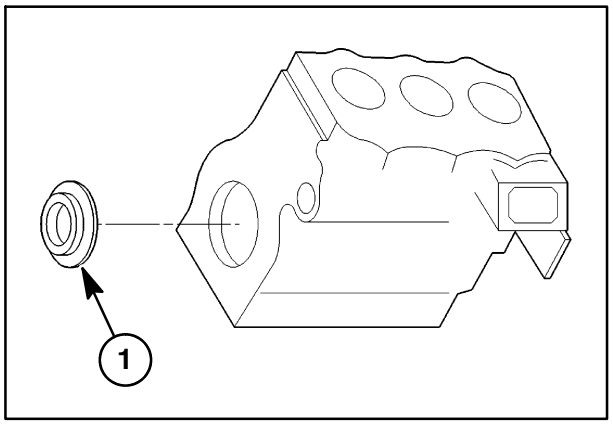
BACKPLATE AND OIL SEAL

Removal

1. Remove the backplate retaining bolts and remove the backplate.
2. Remove the rear oil seal, 1.



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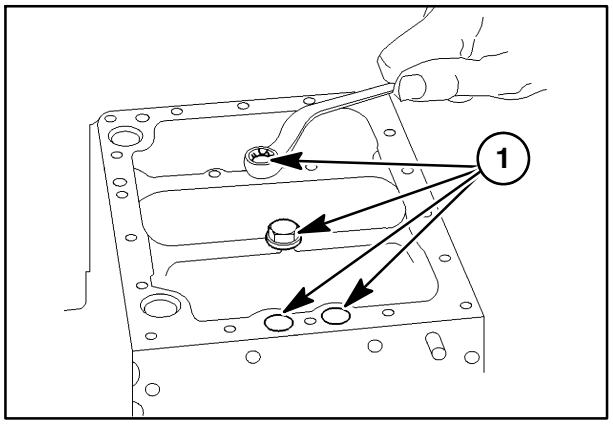
CRANKSHAFT AND MAIN BEARINGS

Removal

1. Remove the crankshaft bearing holder retaining bolts, 1.
2. Slide the crankshaft and main bearing assembly through the rear of the engine.



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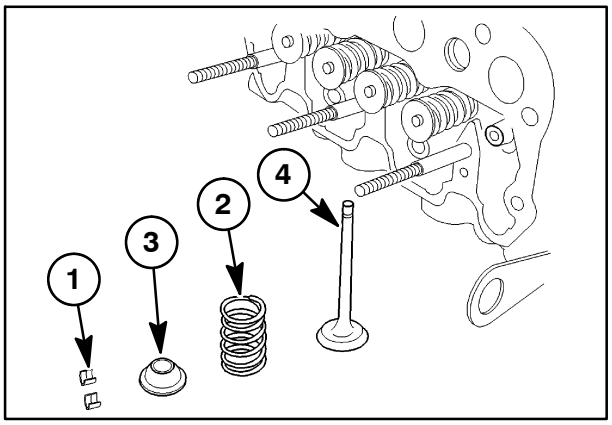
Op. 18 110

CYLINDER HEAD

Disassembly

1. Clean the cylinder head and remove any carbon deposits from around the heads.
2. Use a valve spring compressor and remove the valve spring retainer locks, 1, spring, 2, and spring retainer, 3, from each valve, 4.
3. Remove the valves and place the valve components together in separately marked containers for re-assembly in their original position.



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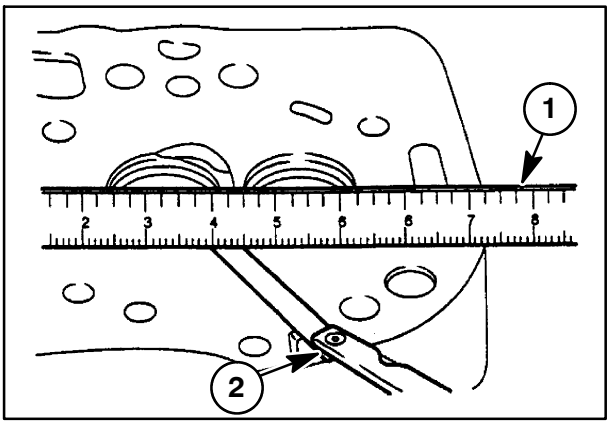
Inspection and Repair

1. Clean all carbon deposits from the combustion chamber and valve ports using a wire brush and scraper.
2. Clean all dirt and residue from the gasket surface using care not to scratch or nick the machined surface.
3. Clean the cylinder head in solvent and air dry.
4. Inspect the head for cracks in the following areas:
   - Valve ports
   - Valve seats
   - Pre-chamber
5. Inspect the gasket surfaces for scratches or nicks, which could cause leakage.
6. Examine the core hole plugs for rust or signs of leakage. If a plug shows signs of damaging rust or leakage, replace all plugs in the head.
7. Using a straight edge, 1, and a feeler gauge, 2, check the cylinder head for warpage lengthwise, crosswise, and diagonally. Resurface or replace the head if the warpage is greater than 0.12 mm (0.005 in.).

NOTE: *If resurfacing requires removal of more than 0.50 mm (0.020 in.) material replace the head.*

8. Inspect the pre-chamber for carbon deposits and looseness. Remove any carbon deposits found. If the pre-chamber is found to be loose, the cylinder head is warped and must be replaced.



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