# 580 SUPER E LOADER BACKHOE
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J I Case

8-41701-R3

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# 1001

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# AND
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Written In *Clear And Simple English*


CASE CORPORATION

8-41700

Printed in U.S.A.
Issued April 1984

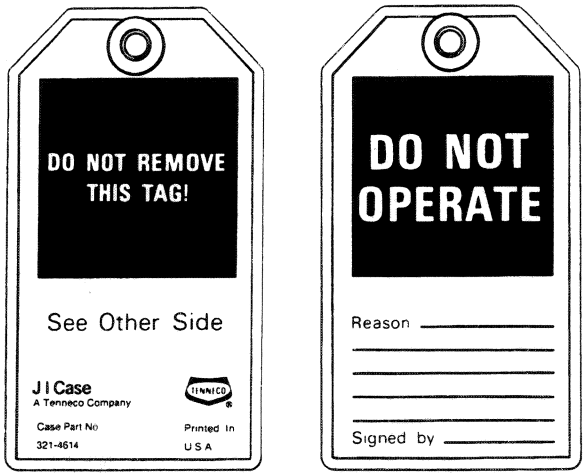
# SAFETY RULES

This Symbol Shows Important Information About Safety In This Manual. When You See This Symbol, Carefully Read The Information That Follows and Understand The Possible Causes of Injury Or Death. 1-1-A

**IMPORTANT:** *To prevent injury on the job, follow the Warning, Caution, and Danger notes in this section and other sections throughout this manual. Follow the instructions carefully.*

The procedures recommended and shown in this manual are good, effective service methods. However, all possible procedures and service hazards may not be covered. Therefore, if you use a tool or procedure not recommended, you must make sure that the method you select is a safe method.

Put the warning tag shown below on the key for the key switch when you are servicing or repairing this machine. One warning tag is on every new machine. You can buy additional warning tags, part number 331-4614, from Service Parts Supply.

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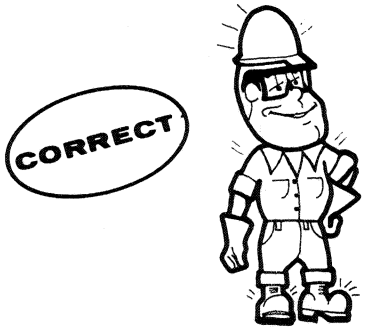
**DANGER:** *Engine exhaust fumes can cause death. If it is necessary to start the engine in a closed place, remove the exhaust fumes from the area with an exhaust pipe extension. If you do not have an exhaust pipe extension, open the doors and get outside air into the area.* 48-56

**WARNING:** *Read operator's manual to familiarize yourself with control lever functions.* 46-27

**WARNING:** *Operate tractor and equipment controls from the seat position only. Any other method could result in serious injury.* 48-55

**WARNING:** *This is a one man machine, no riders allowed.* 35-8

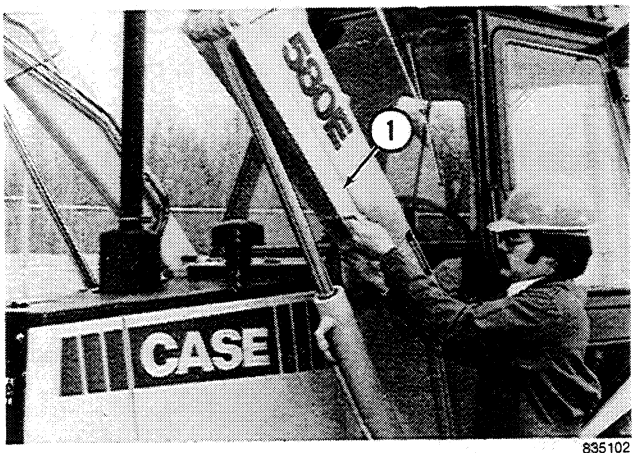
**WARNING:** *If you wear clothing that is too loose or do not use the correct safety equipment for your job, you can be injured. Always wear clothing that will not catch on objects. Extra safety equipment that can be required includes hard hat, safety shoes, ear protection, eye or face protection, heavy gloves and reflector clothing.* 45-3-A




**WARNING:** *Operate controls from the operator's seat only.* 35-7

**WARNING:** *When working in the area of the fan belt with the engine running, avoid loose clothing if possible, and use extreme caution.* 35-4

**WARNING:** *Whenever the bucket must be raised to aid in servicing, block the loader arms in place with lift cylinder support strut or a suitable safety stand.* *23-7-B*

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1. *Lift Cylinder Support Strut*

**WARNING:** ***When doing checks and tests on the equipment hydraulics, follow the procedures as they are written. DO NOT change the procedure.*** ***47-44***

**WARNING:** *When putting the hydraulic cylinders on this machine through the necessary cycles to check operation or to remove air from a circuit, make sure all people are out of the way.* *47-45*

**WARNING:** *Use insulated gloves or mittens when working with hot parts.* *47-41A*

**WARNING:** *DO NOT, for any reason, weld the cast front axle. Welding will cause failure of the cast front axle and result in personal injury.* *49-19*

**WARNING:** *DO NOT, for any reason, weld the following parts.*
*Cast front axle*
*Swing tower*
*Support for swing cylinders*
*Stabilizer leg*
*Cast stabilizer foot*
*Bucket links, loader or backhoe*
*Welding will cause failure of the part and result in personal injury.* *49-20*

**CAUTION:** *Pin sized and smaller streams of hydraulic oil under pressure can penetrate the skin and result in serious infection. If hydraulic oil under pressure does penetrate the skin, seek medical treatment immediately. Maintain all hoses and tubes in good condition. Make sure all connections are tight. Make a replacement of any tube or hose that is damaged or thought to be damaged. DO NOT use your hand to check for leaks; use a piece of cardboard or wood.* *40-6-A*

**CAUTION:** *When removing hardened pins such as a pivot pin, or a hardened shaft, use a soft head (brass or bronze) hammer or use a driver made from brass or bronze and a steel head hammer.* *46-17*

**CAUTION:** *When using a hammer to remove and install pivot pins or separate parts, using compressed air or using a grinder, wear eye protection that completely encloses the eyes (approved goggles or other approved eye protectors).* *46-13*

**CAUTION:** *When servicing or repairing the machine, keep the shop floor and operator's compartment and steps free of oil, water, grease, tools, etc. Use an oil absorbing material and/or shop cloths as required. Use safe practices at all times.* *40-8*

**CAUTION:** *Use suitable floor (service) jacks or chain hoists to raise wheels or track off the floor. Always block machine in place with suitable safety stands.* *40-7-A*

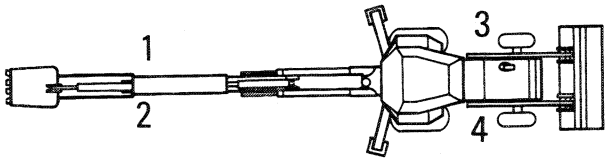
**CAUTION:** *Some components of this machine are very heavy. Use suitable lifting equipment or additional help as instructed in this service manual.* *40-10*

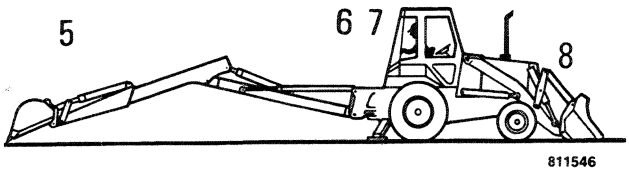
# SERVICE MANUAL INTRODUCTION

This service manual has been prepared with the latest service information available. Troubleshooting, removal, disassembly, inspection and installation procedures, and complete specifications and tightening references can be found in most sections. Some sections have drawings but no written procedure because the job is so easily done. This service manual is one of the most important tools available to the service technician.

## Right, Left, Front, and Rear

The terms right-hand and left-hand and front and rear as used in this manual indicate the right and left sides, and front and rear of the machine as seen from the operator's seat for correct operation of the machine or attachment.




1. *Right Side-Backhoe*
2. *Left Side-Backhoe*
3. *Left Side-Machine*
4. *Right Side-Machine*
5. *Front-Backhoe*
6. *Rear-Backhoe*
7. *Rear-Machine*
8. *Front-Machine*

## Text

If the service manual is for more than one machine or different models of components (planetary axles, gear boxes, control valves, etc.) the procedures have the steps necessary to service each model.

## Table of Contents

A Table of Contents is in the front of this manual. The Table of Contents shows the main divisions and the sections that are in each division. The individual sections, where necessary, have a Table of Contents on the cover or second page of that section.

## Page Numbers

All page numbers are made of two numbers separated by a dash, such as 4002-9. The number before the dash is the section number. The number following the dash is the page number in that section. Page numbers will be found at the upper right or left of each page.

## Illustrations

Illustrations are put as near as possible to the text and are to be used as part of the text.

## Special Tools

Special tools are needed to remove and install, disassemble and assemble, check, and adjust some components parts of this machine. Some special tools can be easily made locally and the necessary information to make the tool is in this service manual. Other special tools are more difficult to make locally and are available from Service Tools in the U.S. and from Jobborn Manufacturing in Canada. Use these tools according to the instructions in this service manual for your personal safety and to do the job correctly.

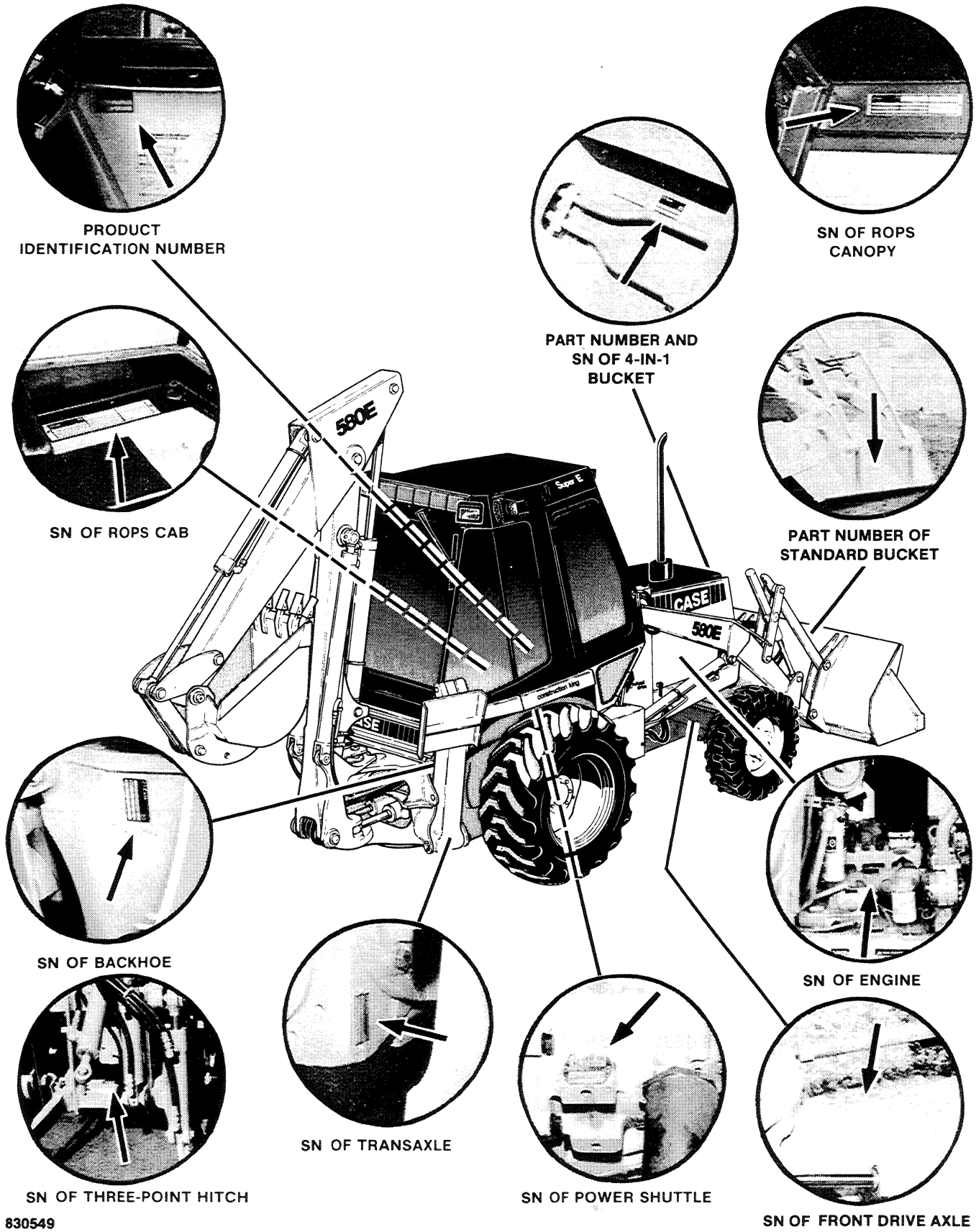
Order special tools from either of the following companies:

Service Tools
P.O. Box 314
Owatonna, Minnesota 55060

Jobborn Manufacturing Co.
97 Frid Street
Hamilton, Ontario L8P 4M3
Canada

# Product Identification Number (PIN) and Serial Numbers

**NOTE:** *A serial number plate is also on some components such as the starter, alternator, pumps, etc.*

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# TORQUE SPECIFICATIONS - U.S. HARDWARE

Use the torques in this chart when special torques are not given. These torques apply to fasteners with both UNC and UNF threads as received from suppliers, dry, or when lubricated with engine oil. Not applicable if special graphites, moly-disulfide greases, or other extreme pressure lubricants are used.

## Grade 5 Bolts, Nuts, and Studs

| Size | Pound-Feet | Newton metres | Kilogram metres |
|---|---|---|---|
| **1/4 in** 6.4 mm | 9-11 | 12-15 | 1.2-1.5 |
| **5/16 in** 7.9 mm | 17-21 | 23-28 | 2.4-2.9 |
| **3/8 in** 9.5 mm | 35-42 | 48-57 | 4.8-5.8 |
| **7/16 in** 11.1 mm | 54-64 | 73-87 | 7.5-8.8 |
| **1/2 in** 12.7 mm | 80-96 | 109-130 | 11.1-13.3 |
| **9/16 in** 14.3 mm | 110-132 | 149-179 | 15.2-18.2 |
| **5/8 in** 15.9 mm | 150-180 | 203-244 | 20.8-24.9 |
| **3/4 in** 19.0 mm | 270-324 | 366-439 | 37.3-44.8 |
| **7/8 in** 22.2 mm | 400-480 | 542-651 | 55.3-66.4 |
| **1.0 in** 25.4 mm | 580-696 | 787-944 | 80.2-96.2 |
| **1-1/8 in** 28.6 mm | 800-880 | 1085-1193 | 111-122 |
| **1-1/4 in** 31.8 mm | 1120-1240 | 1519-1681 | 155-171 |
| **1-3/8 in** 34.9 mm | 1460-1680 | 1980-2278 | 202-232 |
| **1-1/2 in** 38.1 mm | 1940-2200 | 2631-2983 | 268-304 |

## Grade 8 Bolts, Nuts, and Studs

| Size | Pound-Feet | Newton metres | Kilogram metres |
|---|---|---|---|
| **1/4 in** 6.4 mm | 12-15 | 16-20 | 1.7-2.1 |
| **5/16 in** 7.9 mm | 24-29 | 33-39 | 3.3-4.0 |
| **3/8 in** 9.5 mm | 45-54 | 61-73 | 6.2-7.5 |
| **7/16 in** 11.1 mm | 70-84 | 95-114 | 9.7-11.6 |
| **1/2 in** 12.7 mm | 110-132 | 149-179 | 15.2-18.2 |
| **9/16 in** 14.3 mm | 160-192 | 217-260 | 22.1-26.5 |
| **5/8 in** 15.9 mm | 220-264 | 298-358 | 30.4-36.5 |
| **3/4 in** 19.0 mm | 380-456 | 515-618 | 52.5-63.0 |
| **7/8 in** 22.2 mm | 600-720 | 814-976 | 83.0-99.5 |
| **1.0 in** 25.4 mm | 900-1080 | 1220-1465 | 124-149 |
| **1-1/8 in** 28.6 mm | 1280-1440 | 1736-1953 | 177-199 |
| **1-1/4 in** 31.8 mm | 1820-2000 | 2468-2712 | 252-277 |
| **1-3/8 in** 34.9 mm | 2380-2720 | 3227-3688 | 329-376 |
| **1-1/2 in** 38.1 mm | 3160-3560 | 4285-4827 | 437-492 |

# TORQUE SPECIFICATIONS - STEEL HYDRAULIC FITTINGS

| Tube OD Hose ID | Thread Size | Pound-Feet | Newton metres | Kilogram metres |
|---|---|---|---|---|
| **37 Degree Flare Fittings** | | | | |
| **1/4 in** 6.4 mm | 7/16-20 | 6-12 | 8-16 | 0.8-1.7 |
| **5/16 in** 7.9 mm | 1/2-20 | 8-16 | 11-21 | 1.1-2.2 |
| **3/8 in** 9.5 mm | 9/16-18 | 10-25 | 14-33 | 1.4-3.5 |
| **1/2 in** 12.7 mm | 3/4-16 | 15-42 | 20-56 | 2.1-5.8 |
| **5/8 in** 15.9 mm | 7/8-14 | 25-58 | 34-78 | 3.5-8.0 |
| **3/4 in** 19.0 mm | 1-1/16-12 | 40-80 | 54-108 | 5.5-11.1 |
| **7/8 in** 22.2 mm | 1-3/16-12 | 60-100 | 81-135 | 8.3-13.9 |
| **1.0 in** 25.4 mm | 1-5/16-12 | 75-117 | 102-158 | 10.4-16.2 |
| **1-1/4 in** 31.8 mm | 1-5/8-12 | 125-165 | 169-223 | 17.3-22.8 |
| **1-1/2 in** 38.1 mm | 1-7/8-12 | 210-250 | 285-338 | 29.0-34.6 |

| Tube OD Hose ID | Thread Size | Pound-Feet | Newton metres | Kilogram metres |
|---|---|---|---|---|
| **Straight Threads with O-ring** | | | | |
| **1/4 in** 6.4 mm | 7/16-20 | 12-19 | 16-25 | 1.7-2.6 |
| **5/16 in** 7.9 mm | 1/2-20 | 16-25 | 22-33 | 2.2-3.5 |
| **3/8 in** 9.5 mm | 9/16-18 | 25-40 | 34-54 | 3.5-5.5 |
| **1/2 in** 12.7 mm | 3/4-16 | 42-67 | 57-90 | 5.8-9.3 |
| **5/8 in** 15.9 mm | 7/8-14 | 58-92 | 79-124 | 8.0-12.7 |
| **3/4 in** 19.0 mm | 1-1/16-12 | 80-128 | 108-174 | 11.1-17.8 |
| **7/8 in** 22.2 mm | 1-3/16-12 | 100-160 | 136-216 | 13.8-22.1 |
| **1.0 in** 25.4 mm | 1-5/16-12 | 117-187 | 159-253 | 16.2-25.9 |
| **1-1/4 in** 31.8 mm | 1-5/8-12 | 165-264 | 224-357 | 22.8-36.5 |
| **1-1/2 in** 38.1 mm | 1-7/8-12 | 250-400 | 339-542 | 34.6-55.3 |

| Split Flange Mounting Bolts | | | |
|---|---|---|---|
| Size | Pound-Feet | Newton metres | Kilogram metres |
| 5/16-18 | 15-20 | 20-27 | 2.1-2.8 |
| 3/8-16 | 20-25 | 26-33 | 2.8-3.5 |
| 7/16-14 | 35-45 | 47-61 | 4.7-6.2 |
| 1/2-13 | 55-65 | 74-88 | 7.6-9.0 |
| 5/8-11 | 140-150 | 190-203 | 19.4-20.7 |

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# 1002

# MAINTENANCE AND LUBRICATION

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Written In *Clear And Simple English*


CASE CORPORATION

8-41700

Printed in U.S.A.
Issued April 1984

# FLUIDS AND LUBRICANTS

| COMPONENT | CAPACITY U.S. | CAPACITY METRIC | SPECIFICATIONS |
|---|---|---|---|
| Fuel tank | 26.5 gallons | 100 litres | See Operators Manual |
| Engine crankcase<br>With filter change | 11 quarts | 10.4 litres | Recommended Engine Oil:<br>Above 30° F (-1° C) ... SAE 20W-40 CC, CD<br>Above 10° F (-12° C) ..SAE 15W-40 CC, CD<br>Below 90° F (32° C) .. SAE 10W-30 CC, CD<br>Aternate Engine Oil:<br>Above 50° F (10° C) .....SAE 40 CC, CD<br>Above 39° F (4° C) .....SAE 30 CC, CD<br>23° to 68° F (-5° to 20° C) .....SAE 20W20 CC, CD<br>Below 32° F (0° C) ..... SAE 10W CC, CD |
| Cooling system<br>With heater<br>Without heater | <br>18.9 quarts<br>18.2 quarts | <br>17.9 litres<br>17.2 litres | Mix ethylene glycol with water for the lowest ambient temperature expected. The mixture must be half ethylene glycol and half water. |
| Hydraulic reservoir<br>System capacity with loader/backhoe | 12.5 gallons<br>23.75 gallons | 47.3 litres<br>89.9 litres | Case TCH Fluid |
| Power shuttle | 8 quarts | 7.6 litres | Case TCH Fluid |
| Transaxle | 20 quarts | 18.9 litres | Case FDL Fluid<br>Alternate oil:<br>Gear Lubricant (API-GL-4)<br>Above 0° F (-18° C) .....SAE 90<br>Below 0° F (-18° C) .....SAE 80 |
| Front drive axle<br>Center bowl<br>Planetary ends (each) | <br>7 quarts<br>1.5 quarts | <br>6.6 litres<br>1.4 litre | Case FDL Fluid |
| Transfer case<br>(Four wheel drive) | 1 pint | 0.5 litre | Case FDL Fluid |
| Brake master cylinders | as required | | Case TCH Fluid |
| | **NOTE:** *Late production machines have master cylinders that are connected to the hydraulic system. See Section 7106.* | | **WARNING:** *DO NOT use DOT 3 brake fluid. DOT 3 brake fluid will damage the cups in the master cylinders and brake cylinders. Damage to the brake system can cause personal injury or death.* 49-13 |
| Parking Brake cable | as required | | Lubriplate 105 grease. |
| Battery | as required | | Add drinking water or distilled water. |
| Grease fittings | as required | | No. 2 Molydisulfide grease. |
| Wheel bearings | as required | | Wheel Bearing Grease. |

# MAINTENANCE CHART

This chart shows maximum service intervals for the correct maintenance of the machine. Some operating conditions will make it necessary to shorten the service intervals.

| INTERVAL | SERVICE | INSTRUCTIONS |
|---|---|---|
| After the first 2 hours of operation, new machine only | Tighten the wheel bolts. | Section 6229. |
| After the first 10, 20, 50, 100, and 200 hours of operation, new machine only | Tighten the tension rod nuts for the backhoe.<br><br>Tighten the lower swing pivot nut for the backhoe. | Section 9100.<br><br>Section 9100. |
| After the first 20 hours of operation, new machine only | Do the After Delivery Check. | Operators Manual. |
| Every 10 hours of operation or each day, whichever occurs first | Lubricate the loader and backhoe pivot points.<br><br>Lubricate the dipper extension, if equipped.<br><br>Check the level of the engine oil. | Operators Manual.<br><br>Operators Manual. |
| Every 50 hours of operation | Lubricate the three point hitch pivot points, if equipped.<br><br>Check the first stage fuel filter for water or sediment.<br><br>Check the level of the oil in the power shuttle.<br><br>Check the level of the coolant in the coolant reservoir.<br><br>Check the level of the oil in the reservoir.<br><br>Lubricate the front axle king pins.<br><br>Lubricate the front axle pivot. | Operators Manual.<br><br>Operators Manual.<br><br>Operators Manual.<br><br>Page 1002-6.<br><br>Section 8002.<br><br>Operators Manual.<br><br>Operators Manual. |
| Every 100 hours of Operation | Lubricate the parking brake cross shaft.<br><br>Lubricate the tie rod ends.<br><br>Lubricate the rear axle bearings.<br><br>Check the air pressure and condition of the tires.<br><br>Check the level of the oil in the transaxle. | Operators Manual.<br><br>Operators Manual.<br><br>Operators Manual.<br><br>Section 6229.<br><br>Section 6212. |

| INTERVAL | SERVICE | INSTRUCTIONS |
|---|---|---|
| Every 100 hours of operation(Con't.) | Check the level of the oil in the transfer case, if equipped. | Operators Manual. |
| | Clean the spark arrester muffler, if equipped. | Section 2002. |
| Every 250 hours of operation | Lubricate the seat post. | Operators Manual. |
| | Lubricate the cable for the parking brake. | Operators Manual. |
| | Lubricate the pivots for the brake pedals. | Operators Manual. |
| | Lubricate the front and rear pivots for the front drive axle, if equipped. | Operators Manual. |
| | Check the level of the oil in the center bowl and planetaries of the front drive axle, if equipped. | Operators Manual. |
| | Clean the breather for the front drive axle, if equipped. | Operators Manual. |
| | Clean the breather for the transfer case, if equipped. | Operators Manual. |
| | Clean the battery. | Section 4005. |
| | Check the level of the fluid in the low maintenance battery. | Section 4005. |
| | Check the tension of the drive belt for the air conditioner compressor. | Section 9003. |
| | Check the operation of the air conditioning system. | Section 9002. |
| | Tighten the nuts on the backhoe tension rods. | Section 9100. |
| | Change the engine oil. | Operators Manual. |
| | Replace the filter for the engine oil. | Operators Manual. |
| | Check the level of the fluid in the brake master cylinders. (Not necessary for master cylinders with clamp retainers. | See WARNING on page 1002-2. |
| | Check the level of the coolant in the radiator. | Page 1002-6. |
| Every 500 hours of operation | Lubricate the universal joints and the slip joint on the front and rear drive shaft. | Operators Manual. |
| | Lubricate the pivot for the transfer case control lever, if equipped. | Operators Manual. |

| INTERVAL | SERVICE | INSTRUCTIONS |
|---|---|---|
| Every 500 hours of operation (Con't.) | Lubricate the coupling for the pump drive shaft. | Operators Manual. |
| | Lubricate the pivots for the loader control lever. | Operators Manual. |
| | Lubricate the pivots for the backhoe control levers. | Operators Manual. |
| | Lubricate the front wheel bearings. | Section 5021. |
| | Lubricate the king pins (4) for the front drive axle, if equipped. | Operators Manual. |
| | Replace the fuel filters. | Section 3410. |
| | Replace the filter for the hydraulic system. | Section 8002. |
| Every 1000 hours of operation | Check the level of the fluid in the maintenance free battery. | Section 4005. |
| | Service the ROPS cab air filter. | Section 9061. |
| | Drain water and sediment from the fuel tank. | Operators Manual. |
| | Change the oil in the power shuttle. | Section 6202. |
| | Clean the screen in the power shuttle. | Section 6202. |
| | Change the hydraulic oil. | Section 8002. |
| | Change the gear lubricant in the transaxle. | Section 6212. |
| | Change the gear lubricant in the front drive axle, if equipped. | Operators Manual. |
| | Change the gear lubricant in the transfer case, if equipped. | Operators Manual. |
| Every 2000 hours of operation or each year whichever occurs first | Flush the cooling system. | Fluids and Lubricants chart. |
| Every 4000 hours of operation | Replace the drive belt for the fan and the alternator. | |
| | Inspect the fuel injection pump. | Section 3412. |
| | Inspect the fuel injection nozzles. | Section 3413. |
| As required | Service the air cleaner when the warning lamp for the air cleaner stays illuminated during operation. | Section 2002. |
| | Replace the filter for the hydraulic system when the warning lamp for the filter stays illuminated during operation. | Section 8002. |

| INTERVAL | SERVICE | INSTRUCTIONS |
|---|---|---|
| As required | Tighten the wheel bolts every two hours until the wheel bolts stay tight or whenever a wheel is removed and installed. | Section 6229. |
| | Tighten the nuts on the tension rods for the backhoe every two hours until the nuts stay tight, and when installing the backhoe or new mounting parts. | Section 9100. |
| | Adjust the parking brake. | Section 7106. |

# COOLANT RECOVERY SYSTEM

## 50 Hour Check

Check the level of the coolant in the reservoir when the engine is cold. If the coolant is below the ADD mark, add a mixture that is half ethylene glycol and half water. If protection against freezing below -34° F (-37° C) is required, use more ethylene glycol.

## 250 Hour Check

Check the level of the coolant in the radiator when the engine is cold. If the coolant is not even with the opening in the radiator, add a mixture of coolant according to instructions for the 50 Hour Check.

If the level of the coolant in the radiator is low, the reservoir has not been kept full, there is a leak in the coolant recovery system, or a leak in the cooling system.

# Section

# 1010

## FLUIDS AND LUBRICANTS

**CASE CORPORATION**
700 STATE STREET
RACINE, WI 53404 U.S.A.

Rac 7-62780


Printed in U.S.A.
January, 1995

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# ENGINE

Oil Type ..... Case No. 1 Engine Oil
Oil Capacity - Without Filter Change
- 2144 Combine ..... 15 U.S. Quarts (14.3 Litres)
- 2166 Combine ..... 20 U.S. Quarts (19 Litres)
- 2188 Combine ..... 20 U.S. Quarts (19 Litres)

Oil Capacity - With Filter Change
- 2144 Combine ..... 16 U.S. Quarts (15 Litres)
- 2166 Combine ..... 22 U.S. Quarts (21 Litres)
- 2188 Combine ..... 22 U.S. Quarts (21 Litres)

**NOTE:** *DO NOT put Performance Additives or other oil additive products in the engine crankcase.*

# COOLING SYSTEM

Coolant Type ..... 50 Percent Mixture of Water and Ethylene Glycol Solution
Coolant Capacity
- 2144 Combine ..... 36 U.S. Quarts (34 Litres)
- 2166 Combine ..... 40 U.S Quarts (37.8 Litres)
- 2188 Combine ..... 40 U.S. Quarts (37.8 Litres)

**IMPORTANT:** *Use only heavy duty low silicate coolant. Automotive antifreeze purchased at local supply store outlets most likely is not low silicate and must not be used in Case engines.*

# FUEL SYSTEM

Fuel Type ..... ASTM D975 Grade 2-D Number 2 Diesel Fuel
Fuel Capacity
- 2144 Combine ..... 92.5 U.S. Gallons (350 Litres)
- 2166 Combine ..... 92.5 U.S. Gallons (350 Litres)
- 2188 Combine ..... 123 U.S. Gallons (466 Litres)

# TRANSMISSION

Oil Type ..... Case Hy-Tran Plus®
Oil Capacity ..... 17 U.S. Quarts (16 Litres)

**NOTE:** *If brakes are removed from the transmission for service, an additional 1 U.S. Quart (0.95 Litre) per brake assembly must be added to the transmission.*

# FINAL DRIVE

Oil Type ..... Case Hy-Tran Plus®
Oil Capacity ..... 13 U.S. Quarts (12.3 Litres)

## HYDRAULIC RESERVOIR

Oil Type ..... Case Hy-Tran Plus®
Reservoir Capacity ..... 10 U.S. Gallons (38 Litres)

## PTO HOUSING

Oil Type ..... Case Hy-Tran Plus®
Oil Capacity ..... 14 U.S. Quarts (13.2 Litres)

## FEEDER AND CLEANING FAN GEAR CASE

Oil Type ..... Case 135H EP 85W-140 Gear Lubricant
Oil Capacity ..... 2.75 U.S. Quarts (2.6 Litres)

## LOWER UNLOADER GEAR CASE

Oil Type ..... Case 135H EP 85W-140 Gear Lubricant
Oil Capacity ..... 0.875 to 0.938 U.S. Quart (0.83 to 0.89 Litre)

## ROTOR GEAR CASE

Oil Type ..... Case Hy-Tran Plus®
Oil Capacity ..... 4 U.S. Quarts (3.8 Litres)

## STRAW CHOPPER (IF EQUIPPED)

Oil Type ..... Case Hy-Tran Plus®
Oil Capacity ..... 3.3 U.S. Quarts (3.1 Litres)

# Section

# 1024

## SPECIFICATION DETAILS

Written In *C*lear
*A*nd
*S*imple
*E*nglish

**IMPORTANT:** *This engine was made using the metric measurement system. All measurements and checks must be made with metric tools to make sure of an accurate reading when inspecting parts.*

CASE CORPORATION

Rac 8-24161

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# RUN-IN INSTRUCTIONS

## Engine Lubrication

Fill the engine crankcase with CC or CD service classification oil that has the correct viscosity rating for the ambient air temperature. Install new oil filters, after the engine has been rebuilt.

## Run-In Procedure For Rebuilt Engine

Step 1 Disconnect the wire to the electric shut-off on the injection pump so that the engine will not start. Crank the engine for 30 seconds until there is oil pressure, then reconnect the wire.

Step 2 Remove the air from the cooling system at the temperature sending unit.

Step 3 Run the engine at 1000 RPM minimum load for 5 minutes and check for oil leaks.

Step 4 During the Run-In, continue to check the oil pressure, coolant level, and coolant temperature.

## Run-In Procedure For Rebuilt Engines (With A Dynamometer)

The following procedure must be followed when using a PTO dynamometer to Run-In the engine. The dynamometer will control the engine load at each speed and will remove stress on new parts during Run-In.

During the Run-In, continue to check the oil pressure, coolant level and coolant temperature.

| STEP | TIME | ENGINE SPEED | DYNAMOMETER SCALE LOAD |
|---|---|---|---|
| 1 | 5 Minutes | 1000 RPM | 50 |
| 2 | 5 Minutes | 1100 RPM | 1/2 |
| 3 | 5 Minutes | 2200 RPM | Full |

## Run-In Procedure for Rebuilt Engines (Without A Dynamometer)

| STEP | TIME | ENGINE SPEED | LOAD |
|---|---|---|---|
| 1 | 5 Minutes | 1000 RPM | No Load |
| 2 | 5 Minutes | 1100 RPM | Light Load |
| 3 | 5 Minutes | 2200 RPM | Light Load |

## Run-In Procedure (Agriculture Tractors)

For the first 8 hours of field operation stay one gear lower than normal. For the next 12 hours DO NOT "lug" the engine. Prevent "lugging" by moving the lever to a lower gear. The engine must not be "lugged" below the rated engine RPM during early hours of life.

## Run-In Procedure (Construction Equipment)

For the first 8 hours, operate the engine at full throttle maintaining a normal load. DO NOT "baby" the engine, but avoid converter or hydraulic stall. The engine must not be "lugged" below the Rated Engine RPM (Do not stall the engine more than 10 seconds).

# ENGINE SPECIFICATION DETAILS

## Cylinder Block

| | Metric Value |
|---|---|
| Type | Non-Sleeved |
| Material | Cast Iron |
| ID of Cylinder | 102.00 to 102.04 mm |
| Maximum Service Limit | 102.116 mm |
| Cylinder Out of Round (Maximum) | 0.038 mm |
| Cylinder Taper (Maximum) | 0.076 mm |
| 0.5 mm Oversize Piston | |
| Machine Cylinder Bore to | 102.50 to 102.54 mm |
| 1.00 mm Oversize Piston | |
| Machine Cylinder Bore to | 103.00 to 103.04 mm |

## Service Cylinder Sleeve

| | |
|---|---|
| Type | Dry, Can Be Replaced |
| Material | Cast Iron |
| Machine Cylinder Block Bore to | 104.500 to 104.515 mm |
| Installation | Press Fit |
| Machine Sleeve Bore to: | |
| Standard Size Piston | 102.00 to 102.04 mm |
| 0.5 mm Oversize Piston | 102.50 to 102.54 mm |
| 1.0 mm Oversize Piston | 103.00 to 103.04 mm |

## Piston

| | |
|---|---|
| Type | Cam Ground |
| Material | Aluminum alloy |
| OD at 12 mm From the Bottom, 90 Degrees Piston Pin | |
| Standard Size Piston | 101.873 to 101.887 mm |
| Minimum Service Limit | 101.823 mm |
| 0.5 mm Oversize Piston | 102.373 to 102.387 mm |
| Minimum Service Limit | 101.323 mm |
| 1.0 mm Oversize Piston | 102.873 to 102.887 mm |
| Minimum Service Limit | 102.823 mm |
| ID of Piston Pin Bore | 40.006 to 40.012 mm |
| Maximum Service Limit | 40.025 mm |
| Width of 1st Ring Groove (Top) | 2.465 to 2.485 mm |
| Width of 2nd Ring Groove (Intermediate) | 2.425 to 2.445 mm |
| Width of 3rd Ring Groove (Oil Ring) | 4.040 to 4.060 mm |
| Protrusion Above Cylinder Block (Maximum) | 0.660 mm |

## Piston Pin

| | |
|---|---|
| Type | Full Float |
| OD of Pin | 39.997 to 40.003 mm |
| Minimum Service Limit | 39.990 mm |

## Piston Rings

No. 1 Compression 4T-390 Engine ..... Key Stone Type (Barrel Face)
  End Gap in 102.02 ID ..... 0.4 to 0.70 mm
No. 1 Compression 4-390 Engine ..... Rectangular Type (Barrel Face)
  End Gap in 102.02 ID ..... 0.25 to 0.55 mm
    Maximum Service Limit ..... 0.806 mm
  Side Clearance ..... 0.075 to 0.120 mm
    Maximum Service Limit ..... 0.15 mm
No. 2 Compression ..... Rectangular Type (Tapper Face)
  End Gap in 102.02 ID ..... 0.25 to 0.55 mm
    Maximum Service Limit ..... 0.806 mm
  Side Clearance ..... 0.075 to 0.120 mm
    Maximum Service Limit ..... 0.15 mm
No. 3 Oil Control Rings ..... Two Piece
  End Gap in 102.02 ID ..... 0.25 to 0.55 mm
    Maximum Service Limit ..... 0.806 mm
  Side Clearance ..... 0.130 mm

## Cylinder Head

Warpage (Maximum) ..... 0.20 mm

## Lifters

Material ..... Hardened Iron
  OD of Lifter ..... 15.961 to 15.977 mm
    Minimum Service Limit ..... 15.960 mm
  Bore Diameter in Block ..... 16.000 to 16.030 mm
    Maximum Service Limit ..... 16.055 mm

## Connecting Rod

Bushing ..... Steel Backed Leaded Bronze
Bushing ID Installed (Ream to Size) ..... 40.053 to 40.067 mm
  Maximum Service Limit ..... 40.092 mm
Bearing Liners ..... Replaceable
Journal ID Without Bearing Liners ..... 72.987 to 73.013 mm
Bearing Oil Clearance ..... 0.038 to 0.116 mm
  Maximum Service Limit ..... 0.129 mm
Side Clearance ..... 0.100 to 0.300 mm
  Maximum Service Limit ..... 0.330 mm
Connecting Rod Bend (Maximum)
  Without Bushing ..... 0.200 mm
  With Bushing ..... 0.150 mm
Connecting Rod Twist (Maximum)
  Without Bushing ..... 0.500 mm
  With Bushing ..... 0.300 mm

## Crankshaft

| | |
|---|---|
| Type | Hardened Steel, Balanced |
| Main Bearing Liners | Replaceable |
| End Clearance, Center Main Bearing Cap | 0.041 to 0.119 mm |
| Center Main Bearing Thrust Surface Thickness | 2.50 mm |
| Connecting Rod Journal | |
| OD, Standard | 68.987 to 69.013 mm |
| Minimum Service Limit | 68.962 mm |
| 0.25 mm OD Undersize, Grind to | 68.737 to 68.763 mm |
| Minimum Service Limit | 68.712 mm |
| 0.50 mm OD Undersize, Grind to | 68.487 to 68.513 mm |
| Minimum Service Limit | 68.462 mm |
| 0.75 mm OD Undersize, Grind to | 68.237 to 68.263 mm |
| Minimum Service Limit | 68.212 mm |
| 1.00 mm OD Undersize, Grind to | 67.987 to 68.013 mm |
| Minimum Service Limit | 67.962 mm |
| Connecting Rod Journal Maximum Taper | 0.013 mm |
| Journals Out of Round Maximum | 0.050 mm |
| Undersize Main Bearing Liners For Service | 0.25, 0.50, 0.75 and 1.00 mm |
| Main Bearing Oil Clearance | 0.041 to 0.119 mm |
| Maximum Service Limit | 0.140 mm |
| Main Bearing Journal | |
| OD, Standard | 82.987 to 83.013 mm |
| Minimum Service Limit | 82.962 mm |
| 0.25 mm OD Undersize, Grind to | 82.737 to 82.763 mm |
| Minimum Service Limit | 82.712 mm |
| 0.50 mm OD Undersize, Grind to | 82.487 to 82.513 mm |
| Minimum Service Limit | 82.462 mm |
| 0.75 mm OD Undersize, Grind to | 82.237 to 82.263 mm |
| Minimum Service Limit | 82.212 mm |
| 1.00 mm OD Undersize, Grind to | 81.987 to 82.013 mm |
| Minimum Service Limit | 81.962 mm |
| Main Bearing Journal Bore ID No Liners | 87.982 to 88.018 mm |
| Maximum Service Limit | 88.031 mm |
| Main Journal Width: | |
| 1st, 2nd, 3rd, 5th | 37.424 to 37.576 mm |
| 4th | 37.475 to 37.525 mm |
| Connect Rod Journals Width | 38.950 to 39.050 mm |

## Camshaft

| | |
|---|---|
| Type | Hardened Iron |
| Bushing (Front Only) | 1, Replaceable |
| Bushing Lubrication: | |
| Front Bushing | Pressure Lubricated |
| Intermediate | Pressure Lubricated |
| Rear | Pressure Lubricated |
| Oil Clearance | 0.076 to 0.152 mm |
| ID of No. 1 Bushing | 54.107 to 54.133 mm |
| Maximum Service Limit | 54.146 mm |
| ID of No. 1 Oversize (57.24 mm OD) Service Bushing | 54.089 to 54.139 mm |
| Maximum Service Limit | 54.146 mm |
| ID of No. 2, 3, 4 and 5 Service Bushing | 54.089 to 54.139 mm |
| Maximum Service Limit | 54.146 mm |
| Width of No. 1 Bushing | 25.15 to 25.65 mm |
| Width of No. 2, 3, 4 and 5 Service Bushing | 17.75 to 18.25 mm |
| Camshaft Bushing Journal OD | 53.987 to 54.013 mm |
| Camshaft Bore Diameter in Block | |
| No. 1 Bushing | 57.222 to 57.258 mm |
| No. 1 Oversize Bushing, Machine to | 57.722 to 57.758 mm |
| No. 2, 3, 4 and 5, Less Bushings | 54.089 to 54.139 mm |
| No. 2, 3, 4 and 5 Oversize for Bushings, Machine to | 57.222 to 57.258 mm |
| Camshaft Thrust Thickness | 9.42 to 9.58 mm |
| Minimum Service Limit | 9.34 mm |
| Camshaft Thrust Clearance | 0.130 to 0.340 mm |
| Maximum Service Limit | 0.470 mm |

## Turbocharger

| | |
|---|---|
| Horizontal Travel of Turbine Shaft | 0.10 to 0.16 mm |

## Gear Train

| | |
|---|---|
| Backlash: | |
| Crankshaft Gear to Camshaft Gear | 0.08 to 0.33 mm |
| Crankshaft Gear to Idler Gear | 0.08 to 0.33 mm |
| Camshaft to Fuel Pump Gear | 0.08 to 0.33 mm |
| Idler Gear to Oil Pump | 0.08 to 0.33 mm |
| Camshaft to Auxiliary | 0.08 to 0.33 mm |
| Maximum Service Limit (All Gears) | 0.45 mm |

## Rocker Arm Assembly

| | |
|---|---|
| OD of Shaft | 18.963 to 18.975 mm |
| Minimum Service Limit | 18.938 mm |
| ID of Arm Bore | 19.000 to 19.026 mm |
| Maximum Service Limit | 19.051 mm |
| Lubrication | Pressure From Oil Gallery |

## Intake Valve

| | |
|---|---|
| Tappet Clearance (Cold) | 0.254 mm |
| Face Angle | 29 Degrees |
| Face Run-Out | 0.038 mm |
| Valve Head Edge Thickness, Minimum | 1.50 mm |
| Length | 128.84 to 129.46 mm |
| OD of Stem | 7.960 to 7.980 mm |
| Minimum Service Limit | 7.940 mm |
| OD of Head | 44.870 to 45.130 mm |
| Seat Angle | 30 Degrees |
| Seat Contact Width | 1.32 to 1.92 mm |
| Seat Run-Out | 0.10 mm |
| Insert Height | 6.84 to 6.96 mm |
| OD of Insert | 47.063 to 47.089 mm |
| ID of Insert | Tapered |
| Valve Recession Below Head Surface | 0.99 to 1.52 mm |
| Maximum Service Limit | 1.52 mm |
| ID of Valve Guide Bore | 8.019 to 8.039 mm |
| Maximum Service Limit | 8.089 mm |

## Exhaust Valve

| | |
|---|---|
| Tappet Clearance (Cold) | 0.508 mm |
| Face Angle | 44 Degrees |
| Face Run-Out | 0.038 mm |
| Valve Head Edge Thickness, Minimum | 1.50 mm |
| OD of Head | 41.870 to 42.130 mm |
| OD of Stem | 7.960 to 7.980 mm |
| Minimum Service Limit | 7.940 mm |
| Length | 128.74 to 129.36 mm |
| Insert Seat Angle | 45 Degrees |
| Seat Contact Width | 1.47 to 2.07 mm |
| Seat Run-Out | 0.10 mm |
| Insert Height | 6.65 to 6.77 mm |
| OD of Insert | 43.713 to 43.739 mm |
| ID of Insert | Tapered |
| Valve Recession Below Head Surface | 0.99 to 1.52 mm |
| Maximum Service Limit | 1.52 mm |
| ID of Valve Guide Bore | 8.019 to 8.039 mm |
| Maximum Service Limit | 8.089 mm |

## Valve Springs

| | |
|---|---|
| Free Length | 55.63 mm |
| Total Coils | 7.25 |
| Wire Diameter | 4.830 to 4.930 mm |
| Compressed to 38.53 mm | (Valve Open) 785 to 839 N |
| Minimum Service Limit | 765 N |
| Compressed to 49.25 mm | (Valve Closed) 285 to 321 N |
| Minimum Service Limit | 270 N |

# SPECIAL TORQUES

| | U.S. Value | Metric Value |
|---|---|---|
| Alternator Bracket Bolts (Lower) | 18 lb ft | 24 Nm (2.4 kgm) |
| Alternator Bracket Bolts (Upper) | 18 lb ft | 24 Nm (2.4 kgm) |
| Alternator Retaining Bolt | 18 lb ft | 24 Nm (2.4 kgm) |
| Belt Tensioner Bracket Bolts | 18 lb ft | 24 Nm (2.4 kgm) |
| Belt Tensioner Retaining Bolt | 32 lb ft | 43 Nm (4.3 kgm) |
| Camshaft Retaining Bolts | 18 lb ft | 24 Nm (2.4 kgm) |
| Connecting Rod Bolts (Lubricate Threads With Engine Oil) | 74 lb ft | 100 Nm (10.0 kgm) |
| Exhaust Manifold Bolts | 32 lb ft | 43 Nm (4.3 kgm) |
| Fan Pulley Bracket Bolts | 18 lb ft | 24 Nm (2.4 kgm) |
| Fan Pulley Bolts | 18 lb ft | 24 Nm (2.4 kgm) |
| Flywheel Housing Bolts | 44 lb ft | 60 Nm (6.0 kgm) |
| Flywheel Retaining Bolts | 101 lb ft | 137 Nm (13.7 kgm) |
| Flywheel Housing Cover Bolts | 18 lb ft | 24 Nm (2.4 kgm) |
| Fuel Filter Inlet Bolt | 24 lb ft | 32 Nm (3.2 kgm) |
| Fuel Air Removal Bolt | 4 lb ft | 6 Nm (0.6 kgm) |
| Fuel Filter Inlet Nut | 24 lb ft | 32 Nm (3.2 kgm) |
| Fuel Line Fitting (High Pressure) | 18 lb ft | 24 Nm (2.4 kgm) |
| Fuel Line Fitting (Low Pressure) | 18 lb ft | 24 Nm (2.4 kgm) |
| Front Cover Bolts | 18 lb ft | 24 Nm (2.4 kgm) |
| Front Housing Bolts | 18 lb ft | 24 Nm (2.4 kgm) |
| Cylinder Head Bolts | 93 lb ft | 126 Nm (12.6 kgm) |
| Injection Pump Drive Gear Nut | 48 lb ft | 65 Nm (6.5 kgm) |
| Injection Pump Lock Bolt | 22 lb ft | 30 Nm (3.0 kgm) |

# SPECIAL TORQUES (CONT'D)

| | U.S. Value | Metric Value |
|---|---|---|
| Injection Pump Retaining Nuts | 18 lb ft | 24 Nm (2.4 kgm) |
| Injection Pump Bracket Bolts | 18 lb ft | 24 Nm (2.4 kgm) |
| Injector Leak off Bolt | 6 lb ft | 8 Nm (0.8 kgm) |
| Injector Retaining Nut | 44 lb ft | 60 Nm (6.0 kgm) |
| Intake Manifold Bolts | 18 lb ft | 24 Nm (2.4 kgm) |
| Intake Manifold Plug | 92 lb ft | 125 Nm (12.5 kgm) |
| Engine Lift Bracket Bolts (Rear) | 57 lb ft | 77 Nm (7.7 kgm) |
| Main Bearing Bolts (Lubricate The Threads With Engine Oil) | 129 lb ft | 175 Nm (17.5 kgm) |
| Oil Fill Tube Bolts | 32 lb ft | 43 Nm (4.3 kgm) |
| Oil Pan Drain Plug | 55 lb ft | 75 Nm (7.5 kgm) |
| Oil Pan Heater Plug | 90 lb ft | 122 Nm (12.2 kgm) |
| Oil Pan Retaining Bolts | 18 lb ft | 24 Nm (2.4 kgm) |
| Oil Pump Retaining Bolts | 18 lb ft | 24 Nm (2.4 kgm) |
| Oil Inlet Tube Bolts | 18 lb ft | 24 Nm (2.4 kgm) |
| Oil Inlet Tube Brace | 18 lb ft | 24 Nm (2.4 kgm) |
| Oil Filter Housing Bolts | 18 lb ft | 24 Nm (2.4 kgm) |
| Rear Seal Retaining Bolts | 7 lb ft | 9 Nm (0.9 kgm) |
| Rocker Arm Bolts | 18 lb ft | 24 Nm (2.4 kgm) |
| Starter Retaining Bolts | 32 lb ft | 43 Nm (4.3 kgm) |
| Tachometer Drive Retaining Bolts | 2 lb ft | 3 Nm (0.3 kgm) |
| Lifter Cover Bolts | 18 lb ft | 24 Nm (2.4 kgm) |
| Thermostat Housing Bolts | 18 lb ft | 24 Nm (2.4 kgm) |
| Timing Pin Retaining Bolts | 4 lb ft | 5 Nm (0.5 kgm) |
| Fuel Shutoff Solenoid | 10 lb ft | 15 Nm (1.5 kgm) |