

Product: New Holland TS6020/TS6030/TS6030HC Tractor Service Repair Manual

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# SERVICE MANUAL

## TS6020 / TS6030 / TS6030HC Tractor

**Part number 84547569**

English

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# INTRODUCTION

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## INTRODUCTION

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## Foreword - 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, sound judgement should govern the use and disposal of products of a chemical and petrochemical nature.

**NOTICE:** *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

- Avoid filling tanks using cans or inappropriate pressurized fuel delivery systems which may cause considerable spillage.
- In general, avoid skin contact with all fuels, oils, acids, solvents, etc. Most of them contain substances which may be harmful to your health.
- Modern oils contain additives. Do not burn contaminated fuels and or waste oils in ordinary heating systems.
- 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.
- 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 properly.
- Do not open the air-conditioning system yourself. It contains gases which should not be released into the atmosphere. Your NEW HOLLAND AGRICULTURE dealer or air conditioning specialist has a special extractor for this purpose and will have to recharge the system properly.
- Repair any leaks or defects in the engine cooling or hydraulic system immediately.
- Do not increase the pressure in a pressurized circuit as this may lead to a component failure.
- Protect hoses during welding as penetrating weld splatter may burn a hole or weaken them, allowing the loss of oils, coolant, etc.

## International symbols

As a guide to the operation of the machine, various universal symbols have been utilized on the instruments, controls, switches, and fuse box. The symbols are shown below with an indication of their meaning.

 Thermostat starting aid	 Radio	 PTO	 Position Control
 Alternator charge	 KAM Keep alive memory	 N Transmission in neutral	 Draft Control
 Fuel level	 Turn signals	 Creeper gears	 Accessory socket
 Automatic Fuel shut-off	 Turn signals -one trailer	 Slow or low setting	 Implement socket
 Engine speed (rev/min x 100)	 Turn signals -two trailers	 Fast or high setting	 %age slip
 Hours recorded	 Front wind-screen wash/wipe	 Ground speed	 Hitch lower (rear)
 Engine oil pressure	 Rear wind-screen wash/wipe	 Differential lock	 Hitch height limit (rear)
 Engine coolant temperature	 Heater temperature control	 Rear axle oil temperature	 Hitch height limit (front)
 Coolant level	 Heater fan	 Transmission oil pressure	 Hitch disabled
 Tractor lights	 Air conditioner	 FWD engaged	 Hydraulic and transmission filters
 Headlamp main beam	 Air filter blocked	 FWD dis-engaged	 Remote valve extend
 Headlamp dipped beam	 Parking brake	 Warning!	 Remote valve retract
 Work lamps	 Brake fluid level	 Hazard warning lights	 Remote valve float
 Stop lamps	 Trailer brake	 Variable control	 Malfunction! See Operator's Manual
 Horn	 Roof beacon	 Pressurised! Open carefully	 Malfunction! (alternative symbol)
	 Warning! Corrosive substance		

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## Safety rules

### Personal safety



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible death or injury.

Throughout this manual and on machine decals, you will find the signal words DANGER, WARNING, and CAUTION followed by special instructions. These precautions are intended for the personal safety of you and those working with you.

Read and understand all the safety messages in this manual before you operate or service the machine.

**!** DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury. The color associated with DANGER is RED.

**!** WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury. The color associated with WARNING is ORANGE.

**!** CAUTION, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury. The color associated with CAUTION is YELLOW.

### **FAILURE TO FOLLOW DANGER, WARNING, AND CAUTION MESSAGES COULD RESULT IN DEATH OR SERIOUS INJURY.**

### Machine safety

**NOTICE:** Notice indicates a situation which, if not avoided, could result in machine or property damage. The color associated with Notice is BLUE.

Throughout this manual you will find the signal word Notice followed by special instructions to prevent machine or property damage. The word Notice is used to address practices not related to personal safety.

### Information

**NOTE:** Note indicates additional information which clarifies steps, procedures, or other information in this manual.

Throughout this manual you will find the word Note followed by additional information about a step, procedure, or other information in the manual. The word Note is not intended to address personal safety or property damage.

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## Safety rules - Personal safety

**Carefully study these precautions, and those included in the external attachment operators manual, and insist that they be followed by those working with and for you.**

1. Thoroughly read and understand this manual and the attachment Operator's Manual before operating this or any other equipment.
2. Be sure all people and pets are clear of the machine before starting. Sound the horn, if equipped, three times before starting engine.
3. Only the operator should be on the machine when in operation. Never allow anyone to climb on to the machine while it is in motion. If the machine is equipped with an Instructors Seat, this must only be used for training purposes. Passengers must not be allowed to use the Instructors Seat.
4. Keep all shields in place. Never work around the machine or any of the attachments while wearing loose clothing that might catch on moving parts.
5. Observe the following precautions whenever lubricating the machine or making adjustments.
  - Disengage all clutching levers or switches.
  - Lower the attachment, if equipped, to the ground or raise the attachment completely and engage the cylinder safety locks. Completing these actions will prevent the attachment from lowering unexpectedly.
  - Engage the parking brake.
  - Shut off the engine and remove the key.
  - Wait for all machine movement to stop before leaving the operators platform.
6. Always keep the machine in gear while travelling downhill.
7. The machine should always be equipped with sufficient front or rear axle weight for safe operation.
8. Under some field conditions, more weight may be required at the front or rear axle for adequate stability. This is especially important when operating in hilly conditions or/when using heavy attachments.
9. Always lower the attachment, shut off the engine, set the parking brake, engage the transmission gears, remove the key and wait for all machine movement to stop before leaving the operators platform.
10. If the attachment or machine should become obstructed or plugged; set the parking brake, shut off the engine and remove the key, engage the transmission gears, wait for all machine or attachment motion to come to a stop, before leaving the operators platform to removing the obstruction or plug.
11. Never disconnect or make any adjustments to the hydraulic system unless the machine and/or the attachment is lowered to the ground or the safety lock(s) is in the engaged position.
12. Use of the flashing lights is highly recommended when operating on a public road.
13. When transporting on a road or highway, use accessory lights and devices for adequate warning to the operators of other vehicles. In this regard, check local government regulations. Various safety lights and devices are available from your NEW HOLLAND AGRICULTURE dealer.
14. Practice safety 365 days a year.
15. Keep all your equipment in safe operating condition.
16. Keep all guards and safety devices in place.
17. Always set the parking brake, shut off the engine and remove the key, engage the transmission gears, wait for all machine or attachment motion to come to a stop, before leaving the operators platform to service the machine and attachment.
18. Remember: A careful operator is the best insurance against an accident.
19. Extreme care should be taken in keeping hands and clothing away from moving parts.

## Safety rules

### **CALIFORNIA PROPOSITION 65 WARNING**

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

Battery post, terminals and related accessories contain lead and lead compounds.

**Wash hands after handling**

BT09A213 1

## Personal safety

### ⚠ WARNING

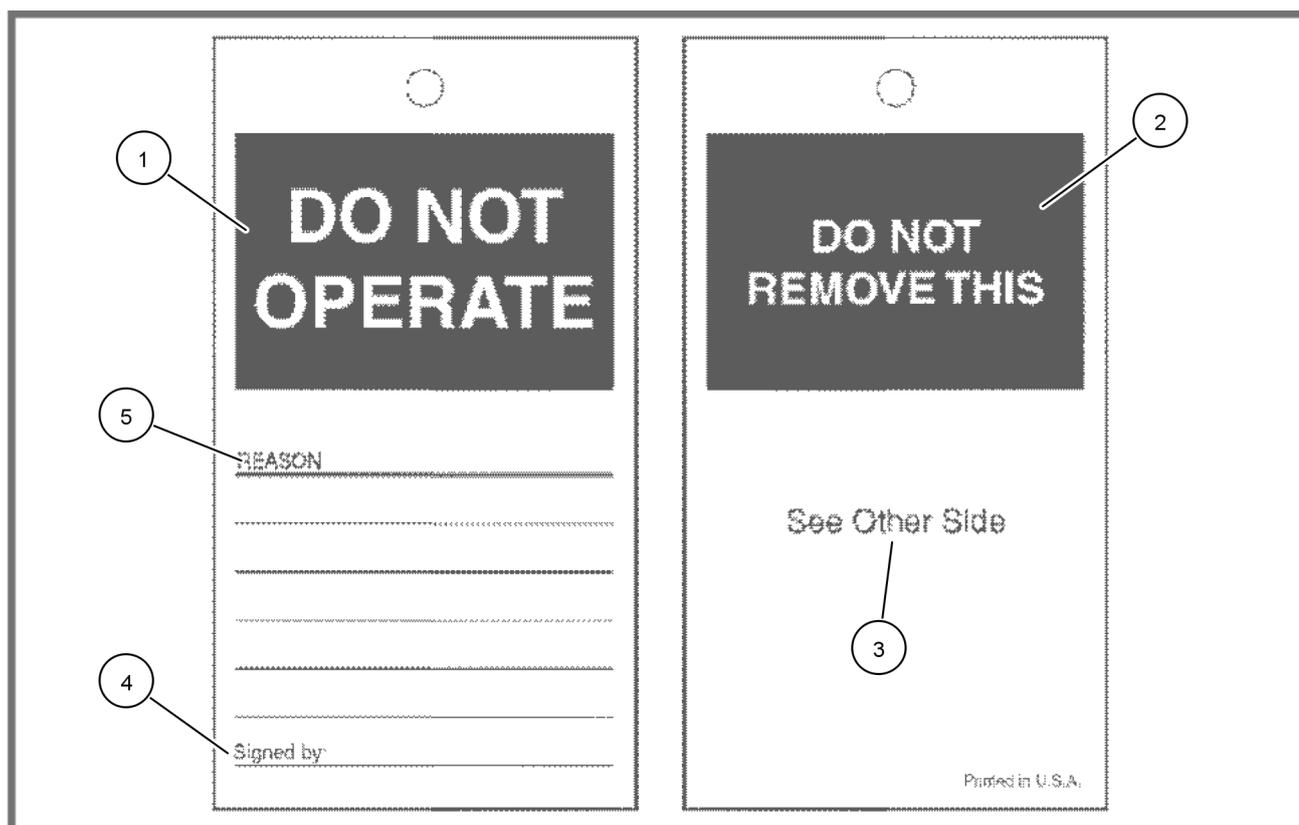
Avoid injury! Always do the following before lubricating, maintaining, or servicing the machine.

1. Disengage all drives.
2. Engage parking brake.
3. Lower all attachments to the ground, or raise and engage all safety locks.
4. Shut off engine.
5. Remove key from key switch.
6. Switch off battery key, if installed.
7. Wait for all machine movement to stop.

Failure to comply could result in death or serious injury.

W0047A

Before you service the machine, put a DO NOT OPERATE tag on the instrument panel.



321\_4614 1

### DO NOT OPERATE TAG

- A. (1) Do not operate.
- B. (2) Do not remove this.
- C. (3) See other side.
- D. (4) Signed by.
- E. (5) Reason

The DO NOT OPERATE tag can be obtained from your NEW HOLLAND AGRICULTURE dealer.

## Safety rules

### Important notice to operators

Your machine may be equipped with special guarding or other devices in compliance with local legislation. Some of the guarding or safety devices require active use by the operator.

Check local legislation on the usage of this machine.

### Accident prevention

Farm accidents can be prevented with your help.

No accident prevention program can be successful without the wholehearted cooperation of the person who is directly responsible for the operation of the equipment.

To read accident reports from all over the country is to be convinced that a large number of accidents can be prevented only by the operator anticipating the result before the accident is caused and doing something about it.

It is said that "The best kind of safety device is a careful operator who with care and mature consideration can save more lives and limbs than any accident prevention program which is not adhered to".

Further in this chapter you will find a list of the most important safety precautions.

Take time to read and follow the instructions and furthermore, be careful!

Some pictures in this manual may show the safety guarding open or removed to better illustrate a particular feature or adjustment.

Ensure to close or replace all guards before operating the machine.

### General and operating safety

Most farm machinery accidents can be avoided by the observance of a few simple safety precautions.

1. The machine must only be used by a skilled operator familiar with all the controls and harvesting techniques on cultivated land with slopes up to maximum **26 % ( 15 ° )** uphill and downhill.
2. Do not permit anyone other than the operator to ride on the machine.
3. Before starting the engine, ensure everyone is clear of the machine.
4. Warn bystanders by sounding the horn several times.
5. Keep children away from and off the machine at all times.
6. No-one should be standing on the ladders when the machine is moving.
7. When driving on public roads, observe traffic regulations, adapt your speed to road and traffic conditions and ensure that all lights and other safety mechanisms on the machine (if they are required) are fitted and work properly. The grain tank must be empty when driving on the road. Ensure that the unloading tube is locked in its closed position.
8. Ensure that both brake pedals are locked together when travelling on public roads.
9. Ensure the hazard warning signs provided are installed at the front and the rear of the machine and use the rotating amber traffic warning beacon(s) (if equipped) when driving on public roads to indicate the vehicle is of abnormal size and is slow-moving.
10. Do not brake abruptly to avoid tipping of the machine.
11. Do not exceed **20 km/h (12.5 mph)** when driving downhill. If necessary, change into a lower gear before starting the descent.
12. Never travel at high speed in crowded areas.
13. Avoid making turns at high speed.
14. When driving on public roads, either with the grain header loaded on a trailer and attached to the rear of the machine, or with the grain header still attached to the machine (provided local legislation allows), always be aware and conscious of its size.

15. Before operating the machine ensure that all safety guards are installed.
16. Check the wheel nuts torque as described in MAINTENANCE.
17. Do not enter the grain tank while the machine engine is running. With engine stopped, use a wooden clearing club should the grain tank unloading auger become bridged. Take utmost care not to be pulled into the grain tank in case un-bridging is required.
18. Do not attempt to clean, lubricate or carry out any adjustments on the machine while it is in motion or while the engine is running.
19. Never leave the operator's platform without first disengaging the machine drive mechanism, lowering the header, stopping the engine, applying the park brake and removing the ignition key.
20. Do not work under the machine header unless it is securely blocked and/or the header safety latch is engaged.
21. Do not work around the machine in loose clothing that might catch in any of the moving parts.
22. Keep hands away from moving parts of the machine.
23. Keep the fire extinguisher within easy reach of the operator. Ensure to replace it by a similar type of extinguisher or have it checked or refilled after every usage and/or date of expiry.
24. Do not step on the grain tank extensions, covers, or the cab roof.
25. Machine dust can cause "farmer's lung" disease. It may also contain harmful spraying residues. Keep the cab door and window closed during operation. Wear a dust mask when cleaning the accumulated dust and debris on the machine.

### **Hydraulic system safety**

- Hydraulic oil leaking under pressure can penetrate the skin and cause infection or other injury. To prevent personal injury:
  - Relieve all pressure before disconnecting fluid lines.
  - Before applying pressure, make sure all connections are tight and components are in good condition.
  - Never use your hand to check for suspected leaks under pressure. Use a piece of cardboard or wood for this purpose.
  - If injured by leaking fluid, seek medical attention immediately.
- The hydraulic hoses and fittings on your machine meet engineering specifications for the particular function. When replacing damaged, blown or worn hoses or fittings, use only manufacture authorized service parts.
- Care in hydraulic hose installation is a must:
  - Make sure pressure is relieved before starting installation procedure.
  - DO NOT kink or twist a hose, failure may occur.
  - Properly route the hose.
  - Have a certified hydraulic technician install the hose.
  - Remove air from the hydraulic system after installing any hydraulic component.
- Periodically check hydraulic system for leaks or damage. check for:
  - Leaks at hose fitting or in hose.
  - Damaged hoses and/or fittings.
  - Kinked, crushed, flattened, hard blistered, heat cracked, charred, twisted, soft or loose covered hoses.
  - Corroded or damaged fittings.
  - Leaking ports.
  - Excessive dirt and debris around hoses and/or fittings.
  - Damaged or missing hose retaining clamps, guards, shields, etc.
- DO NOT stand on or use a hose as a step. DO NOT pull or apply external forces to the hose. The hose may fail and cause injury.
- Keep all persons away from the working area. Mechanisms controlled by fluid power can become hazardous if a hose fails. Lifted mechanisms can fall to the ground, machine steering may fail, etc.

- Stay clear of a pressurized hose assembly that has blown apart. Hose fittings can be thrown off at high speed and a loose hose can whip around with great force.
- Hydraulic fluid can reach high temperatures. Allow fluid to cool before servicing the system.
- Escaping fluid under pressure may form a mist or fine spray which can flash or explode upon contact with an ignition source.
- Vibration can reduce hose service life. Make sure all retaining clamps and/or devices are secured.
- Environmental conditions can cause hose and fittings to deteriorate. Inspect hydraulic hoses periodically. Replace worn or damaged hoses and fittings.

### **Safety requirements for fluid power systems and components - Hydraulics (European standard PR EN 982)**

Flexible hose assemblies must not be constructed from hoses which have been previously used as part of a hose assembly.

Do not weld hydraulic piping.

When flexible hoses or piping are damaged, replace them immediately.

It is forbidden to modify a hydraulic accumulator by machining, welding or any other means.

Before removing hydraulic accumulators for servicing, the liquid pressure in the accumulator must be reduced to zero.

Pressure check on hydraulic accumulators shall be carried out by method recommended by the accumulator manufacturer.

Care must be taken not to exceed the maximum allowable pressure of the accumulator. After any check of adjustment there must be no leakage of gas.

### **Danger of death by electrocution!**

Pay special attention to the overhead power lines. Make sure the machine has sufficient clearance to pass in all directions (also with raised or opened machine components). Also think of the radio aerial(s) or any other factory-fitted accessory or parts which may have been added afterwards.

Should a contact between the machine and an electric power line occur, then the following precautions must be taken: Stop the machine movement immediately, stop the engine and apply the hand-brake or parking brake.

Check if you can safely leave the cab or your actual position without direct contact with electric wires. If not, stay in your position and call for help. If you can leave your position without touching the lines, jump off the last step or support position to ensure that there is no contact between any part of your body and the ground at any time. Do not touch the machine afterwards until power to the lines has been shut off. When people approach the machine, warn them not to touch the machine but to ask the electric power supply company to shut off the power to the lines.

### **Engine safety**

1. Keep the engine area clean of dust, chaff and straw to prevent the possibility of fires.
2. Never idle the engine in an enclosed area as harmful exhaust gases may build up.
3. Wear a suitable hearing protective device, such as ear muffs or ear plugs, if you are exposed to noise which you feel is uncomfortable.
4. The cooling system operates under pressure which is controlled by the radiator cap. It is dangerous to remove the cap while the engine is hot.
5. Switch off the engine and wait until it has cooled. Even then use extreme care when removing the cap. Cover the cap with a rag and turn it slowly to the first stop to allow the pressure to escape before removing the cap completely. Stand clear of the radiator opening as hot coolant may splash out.
6. Never add cold water to a hot radiator. Failure to follow these instructions may result in serious personal injury from hot coolant or steam blowout and/or damage to the cooling system or engine.

7. Antifreeze contains monoethylene glycol and other chemicals which are toxic if taken internally and can be absorbed in toxic amounts through repeated or prolonged skin contact. Follow these precautions when working with antifreeze:
8. Do not take antifreeze internally. If antifreeze is swallowed accidentally, obtain medical attention immediately.
9. Keep antifreeze in sealed containers out of reach of children, livestock or pets.
10. Periodically check the engine coolant and heater hoses for signs of wear, deterioration, weak sections and leaks to avoid hazardous situations and possible injury caused by hot coolant.
11. 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 fuel injection pump, injector, nozzle or any other part of the fuel injection system. Failure to follow these instructions may result in serious injury. If fuel is injected through the skin, medical assistance should be obtained.
12. Be very careful to avoid contact with hot engine oil. If the engine oil is extremely hot, allow the oil to cool to a moderately warm temperature for safe removal.
13. Do not handle a hot oil filter with bare hands.
14. Continuous and prolonged contact with used engine oil may cause skin cancer. Protect your skin by wearing heavy plastic gloves. If oil gets onto the skin, wash promptly with soap and water.

### Diesel fuel safety

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. In a closed container, such as a fuel tank, such blends are more explosive than pure gasoline. Do not use these blends.
2. Never remove the fuel tank cap or refuel with the engine running or hot. Refuel the machine only when the engine has been turned off. Do not smoke or use a naked flame when refuelling or when standing near fuel tanks.
3. Maintain control of the fuel filler pipe nozzle when filling the tank.
4. Do not fill the fuel tank to capacity. Allow room for expansion.
5. Wipe up spilled fuel immediately.
6. Always tighten the fuel tank cap securely.
7. If the original fuel tank cap is lost, replace it with an NEW HOLLAND AGRICULTURE cap. A non-approved, proprietary cap may not be safe.
8. Keep equipment clean and properly maintained.
9. Do not drive equipment near open fires.
10. Never use fuel for cleaning purposes.

### Battery safety

#### **WARNING**

##### **Explosion hazard!**

**Batteries emit explosive gases. Always ventilate when using in an enclosed area or when charging. Keep the battery away from sparks, open flames, and other ignition sources. Failure to comply could result in death or serious injury.**

W0369A

#### **WARNING**

##### **Battery acid causes burns. Batteries contain sulfuric acid.**

**Battery electrolyte contains sulfuric acid. Contact with skin and eyes could result in severe irritation and burns. Always wear splash-proof goggles and protective clothing (gloves and aprons). Wash hands after handling.**

**Failure to comply could result in death or serious injury.**

W0120A

The essential precautions listed below must be observed:

- Do not use an open flame to check the electrolyte level. Keep sparks, flames and lighted tobacco away.

- Do not produce sparks with cable clamps when charging the battery or starting the engine with a slave battery.
- Wear eye protection when working near batteries.
- Wear eye protection and gloves if removing the battery cover plugs.
- Provide ventilation when charging or using in an enclosed space.
- Ensure the vent plugs are correctly installed and tight.

If the electrolyte comes into contact with the skin, eyes or is taken internally, treat as follows:

- Skin: Flush with cold water.
- Eyes: Flush with cold water for 10 minutes and get prompt medical attention.
- Internal: Call a doctor immediately.

### Fire and explosion prevention

- Due to the flammable nature of the crop materials encountered, fire risks are high. This risk can be minimized by frequent removal of accumulated crop material from the machine and checking for overheated machine components. If oil leaks appear, re-torque bolts or replace gaskets as necessary.
- Remove all trash or debris from the machine each day. Especially check the engine area and exhaust system.
- Sparks or flame can cause the hydrogen gas in a battery to explode. To prevent an explosion do the following:
  - When disconnecting the battery cables, disconnect the negative (—) cable first; when connecting the battery cables, connect the negative (—) cable last.
  - When connecting jumper cables to start the engine, use the procedure shown in this manual (see Auxiliary Battery connections in this manual).
  - Do not short circuit the battery posts with metal items.
  - Do not weld, grind or smoke near a battery.
- Sparks from the electrical system or engine exhaust can cause an explosion and fire. Before you operate this machine in an area with flammable dust or vapors, use good ventilation to remove the flammable dust or vapors.
- Use nonflammable cleaning solvent to clean parts.
- A fire can cause death or injury. Always have fire extinguisher near or on the machine. Make sure the fire extinguishers are serviced according to the manufacturers instructions.
- If a fire extinguisher has been used, always recharge or replace the fire extinguisher before operating the machine.
- Keep the cooling system clean and maintain the correct coolant level.
- Make sure that you DO NOT store oily rags or other flammable materials on the machine.
- Engine fuel can cause an explosion or fire. Do not fill the fuel tank with the engine running; if you are near an open fire; or if you are welding, smoking, etc.
- If the machine has an oil, fuel or hydraulic leak, always repair the leak and clean the area before operating.
- Check the electrical system for loose connections or frayed insulation. Repair or replace the loose or damaged parts.
- Before welding or using a torch on the machine, clean the area to be repaired.

### Wheels and tires

The life and performance of the tires depends largely upon maintaining the correct pressure. Keep the tires inflated to the pressures given in SPECIFICATIONS.

Check the wheel nuts torque daily during the first week of operation and thereafter on a weekly basis.

The wheel nut torque is given in SPECIFICATIONS.

Whenever preparing to jack-up the machine, park on a level, firm surface and securely block the drive tire opposite the side to be lifted, both in front and rear.

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## **Basic instructions - Important notice regarding equipment servicing**

All repair and maintenance work listed in this manual must be carried out only by qualified dealership personnel, strictly complying with the instructions given, and using, whenever possible, the special tools.

Anyone who performs repair and maintenance operations without complying with the procedures provided herein shall be responsible for any subsequent damages.

The manufacturer and all the organizations of its distribution chain, including - without limitation - national, regional, or local dealers, reject any responsibility for damages caused by parts and/or components not approved by the manufacturer, including those used for the servicing or repair of the product manufactured or marketed by the manufacturer. In any case, no warranty is given or attributed on the product manufactured or marketed by the manufacturer in case of damages caused by parts and/or components not approved by the manufacturer.

The information in this manual is up-to-date at the date of the publication. It is the policy of the manufacturer for continuous improvement. Some information could not be updated due to modifications of a technical or commercial type, or changes to the laws and regulations of different countries.

In case of questions, refer to your NEW HOLLAND AGRICULTURE Sales and Service Networks.

## Torque - Minimum tightening torques for normal assembly

### METRIC NON-FLANGED HARDWARE

NOM. SIZE	CLASS 8.8 BOLT and CLASS 8 NUT		CLASS 10.9 BOLT and CLASS 10 NUT		LOCKNUT CL.8 W/CL8.8 BOLT	LOCKNUT CL.10 W/CL10.9 BOLT
	UNPLATED	PLATED W/ZnCr	UNPLATED	PLATED W/ZnCr		
M4	2.2 N·m (19 lb in)	2.9 N·m (26 lb in)	3.2 N·m (28 lb in)	4.2 N·m (37 lb in)	2 N·m (18 lb in)	2.9 N·m (26 lb in)
M5	4.5 N·m (40 lb in)	5.9 N·m (52 lb in)	6.4 N·m (57 lb in)	8.5 N·m (75 lb in)	4 N·m (36 lb in)	5.8 N·m (51 lb in)
M6	7.5 N·m (66 lb in)	10 N·m (89 lb in)	11 N·m (96 lb in)	15 N·m (128 lb in)	6.8 N·m (60 lb in)	10 N·m (89 lb in)
M8	18 N·m (163 lb in)	25 N·m (217 lb in)	26 N·m (234 lb in)	35 N·m (311 lb in)	17 N·m (151 lb in)	24 N·m (212 lb in)
M10	37 N·m (27 lb ft)	49 N·m (36 lb ft)	52 N·m (38 lb ft)	70 N·m (51 lb ft)	33 N·m (25 lb ft)	48 N·m (35 lb ft)
M12	64 N·m (47 lb ft)	85 N·m (63 lb ft)	91 N·m (67 lb ft)	121 N·m (90 lb ft)	58 N·m (43 lb ft)	83 N·m (61 lb ft)
M16	158 N·m (116 lb ft)	210 N·m (155 lb ft)	225 N·m (166 lb ft)	301 N·m (222 lb ft)	143 N·m (106 lb ft)	205 N·m (151 lb ft)
M20	319 N·m (235 lb ft)	425 N·m (313 lb ft)	440 N·m (325 lb ft)	587 N·m (433 lb ft)	290 N·m (214 lb ft)	400 N·m (295 lb ft)
M24	551 N·m (410 lb ft)	735 N·m (500 lb ft)	762 N·m (560 lb ft)	1016 N·m (750 lb ft)	501 N·m (370 lb ft)	693 N·m (510 lb ft)

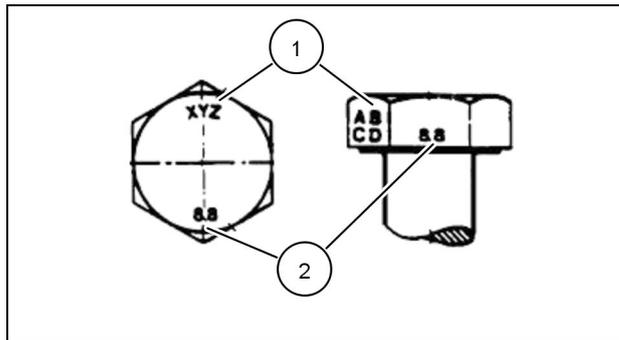
**NOTE:** M4 through M8 hardware torque specifications are shown in pound-inches. M10 through M24 hardware torque specifications are shown in pound-feet.

**METRIC FLANGED HARDWARE**

NOM. SIZE	CLASS 8.8 BOLT and CLASS 8 NUT		CLASS 10.9 BOLT and CLASS 10 NUT		LOCKNUT CL.8 W/CL8.8 BOLT	LOCKNUT CL.10 W/CL10.9 BOLT
	UNPLATED	PLATED W/ZnCr	UNPLATED	PLATED W/ZnCr		
M4	2.4 N·m (21 lb in)	3.2 N·m (28 lb in)	3.5 N·m (31 lb in)	4.6 N·m (41 lb in)	2.2 N·m (19 lb in)	3.1 N·m (27 lb in)
M5	4.9 N·m (43 lb in)	6.5 N·m (58 lb in)	7.0 N·m (62 lb in)	9.4 N·m (83 lb in)	4.4 N·m (39 lb in)	6.4 N·m (57 lb in)
M6	8.3 N·m (73 lb in)	11 N·m (96 lb in)	12 N·m (105 lb in)	16 N·m (141 lb in)	7.5 N·m (66 lb in)	11 N·m (96 lb in)
M8	20 N·m (179 lb in)	27 N·m (240 lb in)	29 N·m (257 lb in)	39 N·m (343 lb in)	18 N·m (163 lb in)	27 N·m (240 lb in)
M10	40 N·m (30 lb ft)	54 N·m (40 lb ft)	57 N·m (42 lb ft)	77 N·m (56 lb ft)	37 N·m (27 lb ft)	53 N·m (39 lb ft)
M12	70 N·m (52 lb ft)	93 N·m (69 lb ft)	100 N·m (74 lb ft)	134 N·m (98 lb ft)	63 N·m (47 lb ft)	91 N·m (67 lb ft)
M16	174 N·m (128 lb ft)	231 N·m (171 lb ft)	248 N·m (183 lb ft)	331 N·m (244 lb ft)	158 N·m (116 lb ft)	226 N·m (167 lb ft)
M20	350 N·m (259 lb ft)	467 N·m (345 lb ft)	484 N·m (357 lb ft)	645 N·m (476 lb ft)	318 N·m (235 lb ft)	440 N·m (325 lb ft)
M24	607 N·m (447 lb ft)	809 N·m (597 lb ft)	838 N·m (618 lb ft)	1118 N·m (824 lb ft)	552 N·m (407 lb ft)	

**IDENTIFICATION**

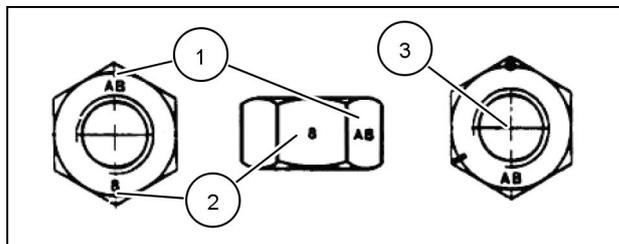
**Metric Hex head and carriage bolts, classes 5.6 and up**



20083680 1

1. Manufacturer's Identification
2. Property Class

**Metric Hex nuts and locknuts, classes 05 and up**



20083681 2

1. Manufacturer's Identification
2. Property Class
3. Clock Marking of Property Class and Manufacturer's Identification (Optional), i.e. marks **60 °** apart indicate Class 10 properties, and marks **120 °** apart indicate Class 8.

**INCH NON-FLANGED HARDWARE**

NOMINAL SIZE	SAE GRADE 5 BOLT and NUT		SAE GRADE 8 BOLT and NUT		LOCKNUT GrB W/ Gr5 BOLT	LOCKNUT GrC W/ Gr8 BOLT
	UN-PLATED or PLATED SILVER	PLATED W/ZnCr GOLD	UN-PLATED or PLATED SILVER	PLATED W/ZnCr GOLD		
1/4	8 N·m (71 lb in)	11 N·m (97 lb in)	12 N·m (106 lb in)	16 N·m (142 lb in)	8.5 N·m (75 lb in)	12.2 N·m (109 lb in)
5/16	17 N·m (150 lb in)	23 N·m (204 lb in)	24 N·m (212 lb in)	32 N·m (283 lb in)	17.5 N·m (155 lb in)	25 N·m (220 lb in)
3/8	30 N·m (22 lb ft)	40 N·m (30 lb ft)	43 N·m (31 lb ft)	57 N·m (42 lb ft)	31 N·m (23 lb ft)	44 N·m (33 lb ft)
7/16	48 N·m (36 lb ft)	65 N·m (48 lb ft)	68 N·m (50 lb ft)	91 N·m (67 lb ft)	50 N·m (37 lb ft)	71 N·m (53 lb ft)
1/2	74 N·m (54 lb ft)	98 N·m (73 lb ft)	104 N·m (77 lb ft)	139 N·m (103 lb ft)	76 N·m (56 lb ft)	108 N·m (80 lb ft)
9/16	107 N·m (79 lb ft)	142 N·m (105 lb ft)	150 N·m (111 lb ft)	201 N·m (148 lb ft)	111 N·m (82 lb ft)	156 N·m (115 lb ft)
5/8	147 N·m (108 lb ft)	196 N·m (145 lb ft)	208 N·m (153 lb ft)	277 N·m (204 lb ft)	153 N·m (113 lb ft)	215 N·m (159 lb ft)
3/4	261 N·m (193 lb ft)	348 N·m (257 lb ft)	369 N·m (272 lb ft)	491 N·m (362 lb ft)	271 N·m (200 lb ft)	383 N·m (282 lb ft)
7/8	420 N·m (310 lb ft)	561 N·m (413 lb ft)	594 N·m (438 lb ft)	791 N·m (584 lb ft)	437 N·m (323 lb ft)	617 N·m (455 lb ft)
1	630 N·m (465 lb ft)	841 N·m (620 lb ft)	890 N·m (656 lb ft)	1187 N·m (875 lb ft)	654 N·m (483 lb ft)	924 N·m (681 lb ft)

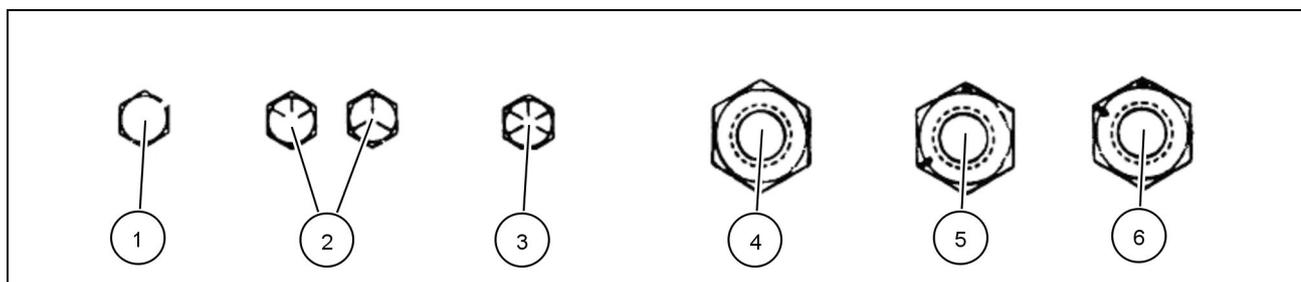
**NOTE:** For Imperial Units, *1/4 in* and *5/16 in* hardware torque specifications are shown in pound-inches. *3/8 in* through *1 in* hardware torque specifications are shown in pound-feet.

**INCH FLANGED HARDWARE**

NOM- INAL SIZE	SAE GRADE 5 BOLT and NUT		SAE GRADE 8 BOLT and NUT		LOCKNUT GrF W/ Gr5 BOLT	LOCKNUT GrG W/ Gr8 BOLT
	UNPLATED or PLATED SILVER	PLATED W/ZnCr GOLD	UNPLATED or PLATED SILVER	PLATED W/ZnCr GOLD		
1/4	9 N·m (80 lb in)	12 N·m (106 lb in)	13 N·m (115 lb in)	17 N·m (150 lb in)	8 N·m (71 lb in)	12 N·m (106 lb in)
5/16	19 N·m (168 lb in)	25 N·m (221 lb in)	26 N·m (230 lb in)	35 N·m (310 lb in)	17 N·m (150 lb in)	24 N·m (212 lb in)
3/8	33 N·m (25 lb ft)	44 N·m (33 lb ft)	47 N·m (35 lb ft)	63 N·m (46 lb ft)	30 N·m (22 lb ft)	43 N·m (32 lb ft)
7/16	53 N·m (39 lb ft)	71 N·m (52 lb ft)	75 N·m (55 lb ft)	100 N·m (74 lb ft)	48 N·m (35 lb ft)	68 N·m (50 lb ft)
1/2	81 N·m (60 lb ft)	108 N·m (80 lb ft)	115 N·m (85 lb ft)	153 N·m (113 lb ft)	74 N·m (55 lb ft)	104 N·m (77 lb ft)
9/16	117 N·m (86 lb ft)	156 N·m (115 lb ft)	165 N·m (122 lb ft)	221 N·m (163 lb ft)	106 N·m (78 lb ft)	157 N·m (116 lb ft)
5/8	162 N·m (119 lb ft)	216 N·m (159 lb ft)	228 N·m (168 lb ft)	304 N·m (225 lb ft)	147 N·m (108 lb ft)	207 N·m (153 lb ft)
3/4	287 N·m (212 lb ft)	383 N·m (282 lb ft)	405 N·m (299 lb ft)	541 N·m (399 lb ft)	261 N·m (193 lb ft)	369 N·m (272 lb ft)
7/8	462 N·m (341 lb ft)	617 N·m (455 lb ft)	653 N·m (482 lb ft)	871 N·m (642 lb ft)	421 N·m (311 lb ft)	594 N·m (438 lb ft)
1	693 N·m (512 lb ft)	925 N·m (682 lb ft)	979 N·m (722 lb ft)	1305 N·m (963 lb ft)	631 N·m (465 lb ft)	890 N·m (656 lb ft)

**IDENTIFICATION**

**Inch Bolts and free-spinning nuts**

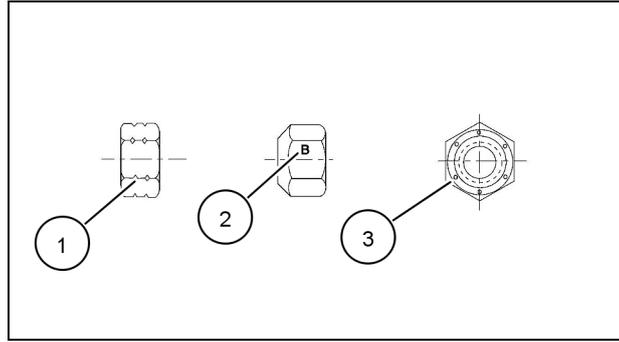


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**Grade Marking Examples**

SAE Grade Identification			
1	Grade 2 - No Marks	4	Grade 2 Nut - No Marks
2	Grade 5 - Three Marks	5	Grade 5 Nut - Marks 120 ° Apart
3	Grade 8 - Five Marks	6	Grade 8 Nut - Marks 60 ° Apart

**Inch Lock Nuts, All Metal (Three optional methods)**



20090268 4

**Grade Identification**

Grade	Corner Marking Method (1)	Flats Marking Method (2)	Clock Marking Method (3)
Grade A	No Notches	No Mark	No Marks
Grade B	One Circumferential Notch	Letter B	Three Marks
Grade C	Two Circumferential Notches	Letter C	Six Marks

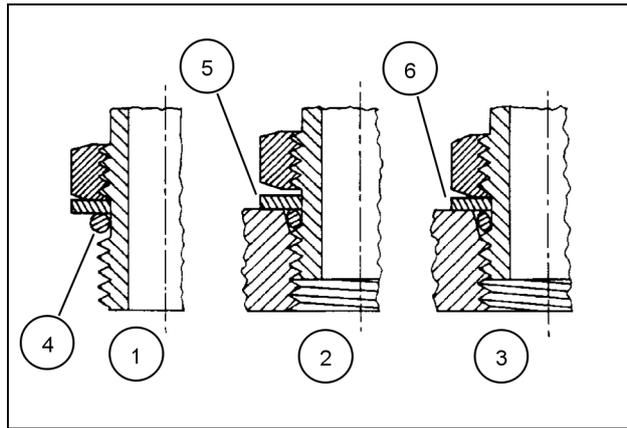
## Torque - Standard torque data for hydraulics

### INSTALLATION OF ADJUSTABLE FITTINGS IN STRAIGHT THREAD O RING BOSSES

1. Lubricate the O-ring by coating it with a light oil or petroleum. Install the O-ring in the groove adjacent to the metal backup washer which is assembled at the extreme end of the groove (4).
2. Install the fitting into the SAE straight thread boss until the metal backup washer contacts the face of the boss (5).

**NOTE:** Do not over tighten and distort the metal backup washer.

3. Position the fitting by turning out (counterclockwise) up to a maximum of one turn. Holding the pad of the fitting with a wrench, tighten the locknut and washer against the face of the boss (6).



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### STANDARD TORQUE DATA FOR HYDRAULIC TUBES AND FITTINGS

TUBE NUTS FOR 37° FLARED FITTINGS				O-RING BOSS PLUGS ADJUSTABLE FITTING LOCKNUTS, SWIVEL JIC- 37° SEATS
SIZE	TUBING OD	THREAD SIZE	TORQUE	TORQUE
4	6.4 mm (1/4 in)	7/16-20	12 - 16 N·m (9 - 12 lb ft)	8 - 14 N·m (6 - 10 lb ft)
5	7.9 mm (5/16 in)	1/2-20	16 - 20 N·m (12 - 15 lb ft)	14 - 20 N·m (10 - 15 lb ft)
6	9.5 mm (3/8 in)	9/16-18	29 - 33 N·m (21 - 24 lb ft)	20 - 27 N·m (15 - 20 lb ft)
8	12.7 mm (1/2 in)	3/4-16	47 - 54 N·m (35 - 40 lb ft)	34 - 41 N·m (25 - 30 lb ft)
10	15.9 mm (5/8 in)	7/8-14	72 - 79 N·m (53 - 58 lb ft)	47 - 54 N·m (35 - 40 lb ft)
12	19.1 mm (3/4 in)	1-1/16-12	104 - 111 N·m (77 - 82 lb ft)	81 - 95 N·m (60 - 70 lb ft)
14	22.2 mm (7/8 in)	1-3/16-12	122 - 136 N·m (90 - 100 lb ft)	95 - 109 N·m (70 - 80 lb ft)
16	25.4 mm (1 in)	1-5/16-12	149 - 163 N·m (110 - 120 lb ft)	108 - 122 N·m (80 - 90 lb ft)
20	31.8 mm (1-1/4 in)	1-5/8-12	190 - 204 N·m (140 - 150 lb ft)	129 - 158 N·m (95 - 115 lb ft)
24	38.1 mm (1-1/2 in)	1-7/8-12	217 - 237 N·m (160 - 175 lb ft)	163 - 190 N·m (120 - 140 lb ft)
32	50.8 mm (2 in)	2-1/2-12	305 - 325 N·m (225 - 240 lb ft)	339 - 407 N·m (250 - 300 lb ft)

These torques are not recommended for tubes of 12.7 mm (1/2 in) OD and larger with wall thickness of 0.889 mm (0.035 in) or less. The torque is specified for 0.889 mm (0.035 in) wall tubes on each application individually.

Before installing and torquing 37° flared fittings, clean the face of the flare and threads with a clean solvent or Loctite cleaner and apply hydraulic sealant LOCTITE® 569 to the 37° flare and the threads.

Install fitting and torque to specified torque, loosen fitting and retorque to specifications.

### PIPE THREAD FITTING TORQUE

Before installing and tightening pipe fittings, clean the threads with a clean solvent or Loctite cleaner and apply sealant **LOCTITE® 567 PST PIPE SEALANT** for all fittings including stainless steel or **LOCTITE® 565 PST** for most metal fittings. For high filtration/zero contamination systems use **LOCTITE® 545**.

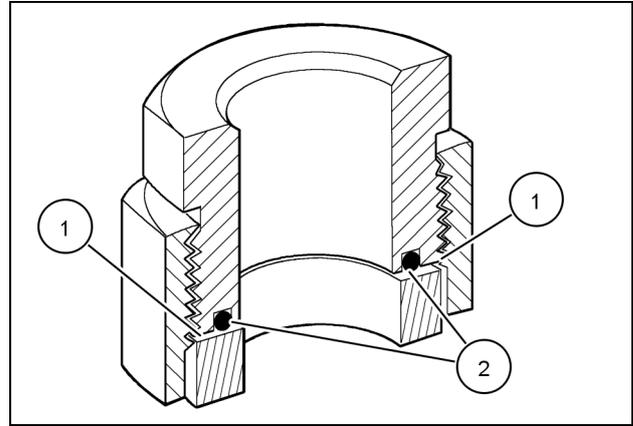
PIPE THREAD FITTING	
Thread Size	Torque (Maximum)
1/8-27	13 N·m (10 lb ft)
1/4-18	16 N·m (12 lb ft)
3/8-18	22 N·m (16 lb ft)
1/2-14	41 N·m (30 lb ft)
3/4-14	54 N·m (40 lb ft)

### INSTALLATION OF ORFS (O-RING FLAT FACED) FITTINGS

When installing ORFS fittings thoroughly clean both flat surfaces of the fittings **(1)** and lubricate the O-ring **(2)** with light oil. Make sure both surfaces are aligned properly. Torque the fitting to specified torque listed throughout the repair manual.

**NOTICE:** If the fitting surfaces are not properly cleaned, the O-ring will not seal properly. If the fitting surfaces are not properly aligned, the fittings may be damaged and will not seal properly.

**NOTICE:** Always use genuine factory replacement oils and filters to ensure proper lubrication and filtration of engine and hydraulic system oils.



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The use of proper oils, grease, and keeping the hydraulic system clean will extend machine and component life.

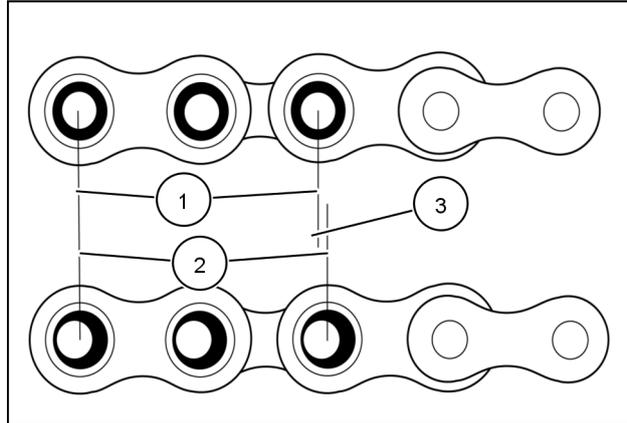
## Basic instructions - Chain Wear Tables - Roller Chains

### Chain wear

The individual joints in a roller chain articulate as they enter and leave the sprockets. This articulation results in wear on the pins and bushings. Material that is worn away from these surfaces will cause the chain to gradually elongate. Chains do not stretch. Material is worn from pin and bushing.

Critical dimensions of the chain are as follows:

- (1) 2X pitch
- (2) Wear plus 2X pitch
- (3) Elongation due to pin and bushing wear

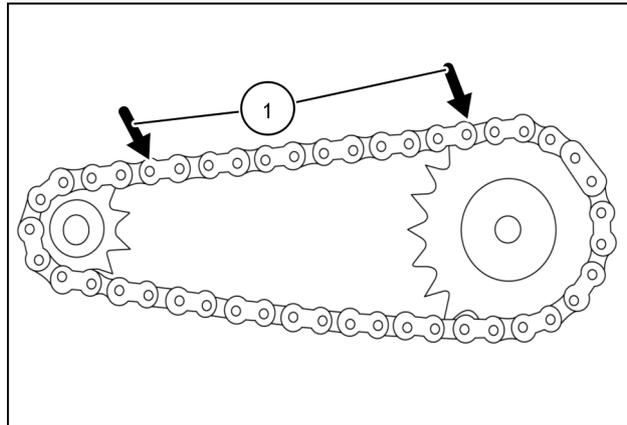


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Elongation is normal and may be minimized by proper lubrication and drive maintenance. The rate of wear is dependent upon: the relationship between the load and the amount of bearing area between pin and bushing, the material and surface condition of the bearing surfaces, the adequacy of lubrication, and the frequency and degree of articulation between pins and bushings. The latter is determined by the quantity of sprockets in the drive, their speeds, the number of teeth and the length of the chain in pitches.

An accurate wear measurement (1) can be made by using the above illustration. Measure as closely as possible from the center of one pin to the center of another. The more pitches (pins) contained within the measurement increase the accuracy. If the measured value exceeds the nominal by more than the allowable percentage the chain should be replaced. The maximum allowable wear elongation is approximately 3 % for most industrial applications, based upon sprocket design. The allowable chain wear in percent can be calculated using the relationship:  $200/(N)$ , where (N) is the number of teeth in the large sprocket. This relationship is often useful since the normal maximum allowable chain wear elongation of 3 % is valid only up to 67 teeth in the large sprocket. In drives having fixed center distances, chains running in parallel or where smoother operation is required, wear should be limited to approximately 1.5 %.

For example, if 12 pitches (12 pins) of a #80 chain were measured and the result was **313.944 mm (12.360 in)** or greater (using 3 % as the maximum allowable wear), the chain should be replaced. Anything less than **313.944 mm (12.360 in)** would still be acceptable by most industrial standards.



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**WEAR LIMITS ON ROLLER CHAIN**

Strand Length in Pitches	No. 40 Chain (08A)		No. 50 Chain (10A)		No. 60 Chain (12A)		No. 80 Chain (16A)	
	New	Replace	New	Replace	New	Replace	New	Replace
40P	508 mm (20.0 in)	523 mm (20.591 in)	635 mm (25.0 in)	654 mm (25.748 in)	762 mm (30.0 in)	787 mm (31.0 in)	1016 mm (40.0 in)	1047 mm (41.220 in)
50P	635 mm (25.0 in)	654 mm (25.748 in)	793 mm (31.220 in)	817 mm (32.165 in)	952 mm (37.480 in)	981 mm (38.622 in)	1270 mm (50.0 in)	1308 mm (51.496 in)
60P	762 mm (30.0 in)	784 mm (30.866 in)	952 mm (37.480 in)	981 mm (38.622 in)	1143 mm (45.0 in)	1177 mm (46.339 in)	1524 mm (60.0 in)	1568 mm (61.732 in)
70P	889 mm (35.0 in)	914 mm (36.0 in)	1111 mm (43.740 in)	1144 mm (45.039 in)	1333 mm (52.480 in)	1371 mm (54.0 in)	1778 mm (70.0 in)	1828 mm (72.0 in)
80P	1016 mm (40.0 in)	1047 mm (41.220 in)	1270 mm (50.0 in)	1308 mm (51.496 in)	1524 mm (60.0 in)	1568 mm (61.732 in)	2032 mm (80.0 in)	2095 mm (82.480 in)
90P	1143 mm (45.0 in)	1177 mm (46.339 in)	1428 mm (56.220 in)	1473 mm (58.0 in)	1714 mm (67.480 in)	1765 mm (69.488 in)	2286 mm (90.0 in)	2355 mm (92.717 in)
100P	1270 mm (50.0 in)	1308 mm (51.496 in)	1578 mm (62.126 in)	1635 mm (64.370 in)	1905 mm (75.0 in)	1962 mm (77.244 in)	2540 mm (100.0 in)	2616 mm (103.0 in)

**STANDARD ROLLER CHAIN SIZES - NEW CHAINS**

Chain No.	150 Chain No.	Pitch	Width	Roller Diameter
40	08A	12.7 mm (0.5 in)	7.9 mm (0.311 in)	7.9 mm (0.311 in)
50	10A	15.8 mm (0.622 in)	9.5 mm (0.374 in)	10.1 mm (0.398 in)
60	12A	19 mm (0.748 in)	12.7 mm (0.500 in)	11.9 mm (0.469 in)
80	16A	25.4 mm (1.000 in)	15.8 mm (0.622 in)	15.8 mm (0.622 in)
100	20A	31.7 mm (1.248 in)	19 mm (0.748 in)	19 mm (0.748 in)
120	24A	38.1 mm (1.500 in)	25.4 mm (1.000 in)	22.2 mm (0.874 in)
140	28A	44.4 mm (1.748 in)	25.4 mm (1.000 in)	25.4 mm (1.000 in)
160	32A	50.8 mm (2.000 in)	31.7 mm (1.248 in)	28.5 mm (1.122 in)
180	*	57.1 mm (2.248 in)	35.7 mm (1.406 in)	35.7 mm (1.406 in)
200	40A	63.4 mm (2.496 in)	38.1 mm (1.500 in)	39.6 mm (1.559 in)

\* No. 150 Number does not exist.

## Basic instructions - Shop and Assembly

### SHIMMING

For each adjustment operation, select adjusting shims and measure individually using a micrometer, then add up the recorded values. Do not rely on measuring the entire shimming set, which may be incorrect, or the rated value indicated on each shim.

### ROTATING SHAFT SEALS

For correct rotating shaft seal installation, proceed as follows:

- before assembly, allow the seal to soak in the oil it will be sealing for at least thirty minutes.
- thoroughly clean the shaft and check that the working surface on the shaft is not damaged.
- position the sealing lip facing the fluid; with hydrodynamic lips, take into consideration the shaft rotation direction and position the grooves so that they will deviate the fluid towards the inner side of the seal.
- coat the sealing lip with a thin layer of lubricant (use oil rather than grease) and fill the gap between the sealing lip and the dust lip on double lip seals with grease.
- insert the seal in its seat and press down using a flat punch or seal installation tool. Do not tap the seal with a hammer or mallet.
- whilst inserting the seal, check that it is perpendicular to the seat; once settled, make sure that it makes contact with the thrust element, if required.
- to prevent damaging the seal lip on the shaft, position a protective guard during installation operations.

### O-RING SEALS

Lubricate the O-RING seals before inserting them in the seats, this will prevent them from overturning and twisting, which would jeopardise sealing efficiency.

### SEALING COMPOUNDS

Apply one of the following sealing compounds on the mating surfaces when specified: SILMATE® RTV1473, or LOCTITE® RTV 598 or LOCTITE® INSTANT GASKET 587 BLUE. Before applying the sealing compound, prepare the surfaces as directed on product container or as follows:

- remove any incrustations using a metal brush.
- thoroughly de-grease the surfaces using a locally approved cleaning agent such as safety solvent or brake parts cleaner.

### SPARE PARTS

Only use "CNH Original Parts" or " NEW HOLLAND AGRICULTURE Parts".

Only genuine spare parts guarantee the same quality, duration and safety as original parts, as they are the same parts that are assembled during standard production. Only "CNH Original Parts" or " NEW HOLLAND AGRICULTURE Parts" can offer this guarantee.

When ordering spare parts, always provide the following information:

- machine model (commercial name) and serial number
- part number of the ordered part, which can be found in the "Microfiches" or the "Service Parts Catalogue", used for order processing

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## PROTECTING THE ELECTRONIC/ ELECTRICAL SYSTEMS DURING CHARGING OR WELDING

To avoid damage to the electronic/electrical systems, always observe the following:

1. Never make or break any of the charging circuit connections, including the battery connections, when the engine is running.
2. Never short any of the charging components to ground.
3. Always disconnect the ground cable from the battery before arc welding on the combine or on any header attached to the combine.
  - position the welder ground clamp as close to the welding area as possible
  - if welding in close proximity to a computer module, then the module should be removed from the combine
  - never allow welding cables to lay on, near or across any electrical wiring or electronic component while welding is in progress
4. Always disconnect the negative cable from the battery when charging the battery in the combine with a battery charger.

**NOTICE:** *If welding must be performed on the unit, either the combine or the header (if it is attached), the battery ground cable must be disconnected from the combine battery. The electronic monitoring system and charging system will be damaged if this is not done.*

Remove the battery ground cable. Reconnect the cable when welding is completed.



**Battery acid causes severe burns. Batteries contain sulfuric acid. Avoid contact with skin, eyes or clothing. Antidote - EXTERNAL: flush with water. INTERNAL: drink large quantities of water or milk. Follow with milk of magnesia, beaten egg or vegetables oil. Call physician immediately. EYES: flush with water for 15 minutes and get prompt medical attention.**

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## TOOLS

The tools that NEW HOLLAND AGRICULTURE suggests and illustrate in this manual have been:

- specifically researched and designed for use with NEW HOLLAND AGRICULTURE machines
- essential for reliable repair operations
- accurately built and rigorously tested so as to offer efficient and long-lasting operation

By using these tools, repair personnel will benefit from:

- operating in optimal technical conditions
- obtaining the best results
- saving time and effort
- working in safe conditions

**NOTE:** *The terms "front", "rear", "right-hand" and "left-hand" (when referred to different parts) are determined from the rear, facing in the direction of travel of the machine during operation.*

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## Basic instructions - How To Use and Navigate Through This Manual

### Technical Information

This manual has been produced by a new technical information system. This new system is designed to deliver technical information electronically through Web delivery, DVD and in paper manuals. A coding system called SAP has been developed to link the technical information to other Product Support functions, e.g., Warranty.

Technical information is written to support the maintenance and service of the functions or systems on a customer's machine. When a customer has a concern on his machine it is usually because a function or system on his machine is not working at all, is not working efficiently, or is not responding correctly to his commands. When you refer to the technical information in this manual to resolve that customer's concern, you will find all the information classified using the SAP coding, according to the functions or systems on that machine. Once you have located the technical information for that function or system then you will find all the mechanical, electrical or hydraulic devices, components, assemblies and sub assemblies for that function or system. You will also find all the types of information that have been written for that function or system, the technical data (specifications), the functional data (how it works), the diagnostic data (fault codes and troubleshooting) and the service data (remove, install adjust, etc.).

By integrating SAP coding into technical information, you will be able to search and retrieve just the right piece of technical information you need to resolve that customer's concern on his machine. This is made possible by attaching 3 categories to each piece of technical information during the authoring process.

The first category is the Location, the second category is the Information Type and the third category is the Product:

- LOCATION - is the component or function on the machine, that the piece of technical information is going to describe e.g. Fuel tank.
- INFORMATION TYPE - is the piece of technical information that has been written for a particular component or function on the machine e.g. Capacity would be a type of Technical Data that would describe the amount of fuel held by the Fuel tank.
- PRODUCT - is the model for which the piece of technical information is written.

Every piece of technical information will have those 3 categories attached to it. You will be able to use any combination of those categories to find the right piece of technical information you need to resolve that customer's concern on his machine.

That information could be:

- the description of how to remove the cylinder head
- a table of specifications for a hydraulic pump
- a fault code
- a troubleshooting table
- a special tool

## How to Use this Manual

This manual is divided into Sections. Each Section is then divided into Chapters. Contents pages are included at the beginning of the manual, then inside every Section and inside every Chapter. An alphabetical Index is included at the end of a Chapter. Page number references are included for every piece of technical information listed in the Chapter Contents or Chapter Index.

Each Chapter is divided into four Information types:

- Technical Data (specifications) for all the mechanical, electrical or hydraulic devices, components and assemblies.
- Functional Data (how it works) for all the mechanical, electrical or hydraulic devices, components and assemblies.
- Diagnostic Data (fault codes, electrical and hydraulic troubleshooting) for all the mechanical, electrical or hydraulic devices, components and assemblies.
- Service Data (remove disassembly, assemble, install) for all the mechanical, electrical or hydraulic devices, components and assemblies.

## Sections

Sections are grouped according to the main functions or a systems on the machine. Each Section is identified by a letter A, B, C etc. The amount of Sections included in the manual will depend on the type and function of the machine that the manual is written for. Each Section has a Contents page listed in alphabetic/numeric order. This table illustrates which Sections could be included in a manual for a particular product.

PRODUCT	SECTION										
	A - Hydraulic – Pneumatic – Electrical – Electronic Systems										
	B - Engine and PTO In										
	C - Transmission, Drive and PTO Out										
	D - Axles, Brakes and Steering										
	E - Frame and Cab										
	F - Frame Positioning										
	G - Tool Positioning										
	H - Hitch and Working Tool										
	J - Excavating and Landscaping										
K - Crop Processing											
L - Field Processing											
Tractors	X	X	X	X	X	X		X	X		
Vehicles with working arms: backhoes, excavators, skid steers, .....	X	X	X	X	X	X	X	X	X		
Combines, forage harvesters, balers, ....	X	X	X	X	X	X	X	X	X	X	
Seeding, planting, floating, spraying equipment, ....	X	X	X	X	X	X		X		X	
Mounted equipment and tools, .....					X	X	X		X		

**Section Contents**

SECTION	LETTER	DESCRIPTION
HYDRAULIC – PNEUMATIC – ELECTRICAL – ELECTRONIC SYSTEMS	A	This Section covers the main systems that interact with most of the functions of the product. It includes the central parts of the hydraulic, electrical, electronic, pneumatic, lighting and grease lubrication systems. The components that are dedicated to a specific function are listed in the Chapter where all the technical information for that function is included.
ENGINE AND PTO IN	B	This Section covers all the functions related to the production of power to move the machine and to drive various devices. In the case of a pulled-type machine, this Section covers the power take-off function where power is provided from the towing machine.
TRANSMISSION, DRIVE AND PTO OUT	C	This Section covers all the functions related to the transmission of power from the engine to the axles and to internal or external devices. This Section also covers the power take-off function where power is provided to the pull-type machine and additional Process Drive functions.
AXLES, BRAKES AND STEERING	D	This Section covers all the functions related to moving the machine, including tracks, wheels, steering and braking. It covers all the axles; both driven axles and non-driven axles, including any axle suspension.
FRAME AND CAB	E	This Section covers all the main functions and systems related to the structure and the body of the machine, including the frame, the shields, the operators cab and the platform. The functions related to the positioning of the machine frame are included in Section F, Frame Positioning.
FRAME POSITIONING	F	This Section covers all the main functions and systems related to positioning of the machine frame or to positioning the attachment on the supporting machine frame.
TOOL POSITIONING	G	This Section covers all the functions related to the final and/or automatic positioning of the tool once the tool is positioned using the Working Arm or the machine frame.
HITCH AND WORKING TOOL	H	This Section covers all the functions related to the articulated or single arms mounted on the front or rear of the machine. A working arm can have various tools and quick couplers mounted on to it. The tools and quick couplers are included in Section J, Excavating and Landscaping.
EXCAVATING AND LANDSCAPING	J	This Section covers all the functions related to the specific tools that mount on the front, rear or beside the machine. The tools described here can be mounted with the positioning systems (lifting, side shift, swing) listed in Section G Tool Positioning. This Section covers all the quick coupling systems, located between the tool and the positioning system. The tools used for field preparation, soil preparation and treatment, planting and seeding are included.
CROP PROCESSING	K	This Section covers all the functions related to crop processing. Examples of crop processing include threshing, baling, windrowing, cutting and conditioning.
FIELD PROCESSING	L	This Section covers all the field processing functions of the machine. Examples of field process include seeding, fertilizer application, seedbed preparation and chemical application.