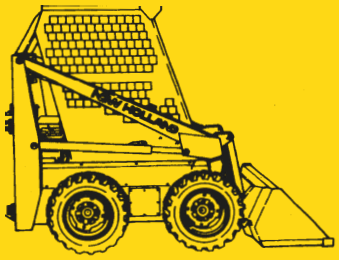
NEW HOLLAND CONSTRUCTION

LS120
LS125

REPAIR MANUAL



NEW HOLLAND

8661560 5/00

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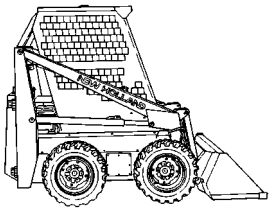
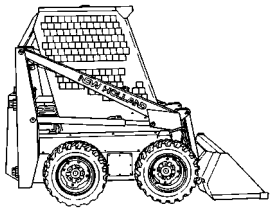


SKID-STEER REPAIR

LS120, LS125

Vol. 1

86615609



SKID-STEER REPAIR

LS120, LS125

Vol. 1

86615609

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LS120, LS125 REPAIR MANUAL CONTENTS

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

The sections listed above are the sections utilized for the LS120, LS125 Skid Steer.

SECTION 00 - GENERAL INFORMATION

Chapter 1 - General Information

CONTENTS

INTRODUCTION

This repair manual provides the technical information needed to properly service and maintain the Models LS120 and LS125 skid steers. Use it in conjunction with the operator's manual which is supplied with the skid steer. Keep both manuals available for ready reference.

The LS120 and LS125 have many similarities with the major differences being engine horsepower and lifting capacity.

Whenever working on New Holland equipment, left and right sides of the machine are determined by standing behind the unit, looking in the direction of travel.

The easiest and least time-consuming removal, disassembly, and reassembly procedures are detailed in the manual. Modifying these procedures is not recommended.

New Holland skid steers are designed with emphasis on safety for operator protection. However, careless and negligent operation can still result in serious injury to persons or damage to property. Be sure to read and follow all safety instructions in this manual.

Your New Holland dealer is interested in your obtaining the most from your investment and will be glad to answer any questions you may have about your skid steer. When major service is required, your dealer's staff of trained service technicians is ready to serve you.

When in need of parts, always order genuine New Holland service parts from your New Holland dealer. Be prepared to give your dealer the model and serial number of the engine and skid steer (the location of these numbers is described later in this section).

Record the serial numbers here:

Skid Steer Model _____

Skid Steer Serial Number _____

Engine Model _____

Engine Serial Number _____

⚠ CAUTION ⚠

This symbol is used throughout this book whenever your own personal safety is involved. Take time to be careful!

ABOUT IMPROVEMENTS

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

ALL SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE.

COMPANY POLICY

Company policy, which is one of continuous improvement, reserves the right to make changes in design and specifications at any time without notice and without obligation to modify units previously built.

All data given in this book is subject to production variations. Dimensions and weights are approximate only and the illustrations do not necessarily show skid steers in standard condition.

PARTS AND ACCESSORIES

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

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

MODEL CODES

The range of Skid Steers described in this manual is identified in the text by the engine horsepower Pferdestarke. (PS). The skid steers listed below may not be available in all countries or markets.

ENGINE	PS	MODEL
P218	18.0	LS120
E673	16.5	LS125

PRECAUTIONARY STATEMENTS

PERSONAL SAFETY

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

⚠ CAUTION ⚠

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

⚠ WARNING ⚠

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

⚠ DANGER ⚠

The word "DANGER" denotes a forbidden practice in connection with a serious hazard.

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

MACHINE SAFETY

Additional precautionary statement ("**IMPORTANT**") is followed by specific instructions. This statement is intended for machine safety.

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

SAFETY PRECAUTION INFORMATION

⚠ CAUTION ⚠

Unsafe operating practices and improper use of the skid steer and its attachments on the part of the operator can result in injuries. Observe the following safety precautions at all times:

1. For servicing, the skid steer should be on level terrain, engine stopped with the wheels blocked or the entire skid steer solidly supported with the wheels off the ground before servicing any component of the drive train.
2. For servicing under the operator's seat, remove the seat and pan assembly from the skid steer.
3. Do not operate the skid steer unless the seat is in the operate position.
4. Do not service the skid steer with a raised boom unless the boom is resting on the boom lock pins.
5. Do not service the skid steer with the engine running unless the skid steer is properly and securely supported with all four wheels off the ground.
6. Reinstall all shields removed for service.
7. Never loosen any hydraulic connections before relieving the pressure in the hydraulic system.
8. Wear eye protection such as goggles, etc.
9. Wear ear protection such as ear plugs etc. When you feel the noise level is uncomfortable.
10. If any servicing or adjustments require the battery to be disconnected, disconnect the (-) negative ground cable.
11. When servicing electrical components, disconnect the (-) negative ground cable.
12. If the electrical components requires removal from the skid steer disconnect the (-) negative ground battery cable. This will shut off power to the electrical system and prevent damage to the components if accidentally grounded.
13. If welding is required on the skid steer, disconnect the (-) negative ground cable. Failure to disconnect the battery may result in damage to the electrical system and components.
14. If welding is required on an attachment remove the attachment from the skid steer.
15. Give complete and undivided attention to the job at hand so that complete control of the skid steer is maintained at all times.
16. Drive slowly over rough ground and on slopes, keep alert for holes, ditches and other irregularities that may cause the skid steer to overturn.
17. Avoid steep hillside operation which could cause the skid steer to overturn.
18. Never transport a loaded bucket at full height. Operate the skid steer with the load as low as possible until it becomes necessary to raise the boom to discharge the load into a truck, container, etc.
19. Reduce speed when turning so there is no danger of the skid steer overturning.
20. Never drive up or back up a hill or incline with a raised boom or the skid steer could over turn.
21. Always look behind you before backing up the skid steer.
22. Maintain proper transmission oil level to prevent loss of hydrostatic braking.
23. Do not allow passengers to ride on the skid steer at any time.
24. Do not allow children to operate the skid steer or ride on the skid steer at any time.
25. Do not allow anyone to operate the skid steer without proper instruction.

    OSHA requires that all operators be instructed on the proper operation of the machine before they operate the unit.
26. Do not operate the skid steer in any position other than while in the operator's seat with the seat belt securely fastened.
27. Before starting the engine, be sure that all operating controls are in neutral and parking brake is engaged.
28. Never operate the skid steer engine in a closed building without adequate ventilation.

29. **Refuel the skid steer outdoors with the engine shut off. Replace the fuel cap securely. Use an approved fuel container. Do not smoke when handling fuel. Avoid spilling fuel.**

30. **After operating the engine, never touch the muffler, exhaust pipe, engine or radiator until they have had time to cool.**

31. **Dress appropriately - wear relatively tight-fitting clothing when operating the skid steer. Loose or torn clothing can catch in moving parts or controls.**

32. **Before servicing the skid steer or any of its attached equipment, be sure that the attachments are lowered to the ground or that the boom arms are supported by the boom lockpins.**

33. **Do not work under overhangs, electric wires, or where there is danger of a slide.**

34. **Wear an approved safety hat when operating the machine and while in any work area.**

35. **When driving the skid steer on a road or highway, use warning lights or warning devices as may be required by local or state government regulations. Headlights, warning lights and SMV signs are available through your New Holland dealer.**

36. **Keep the skid steer clean. Do not allow dirt, debris or other articles to accumulate in the cab, floor or foot control pedal area that may hinder safe machine operation.**

37. **Never operate the skid steer with any of the shielding removed.**

38. **Never operate the skid steer without windows and/or screens in place.**

39. **Never extend any part of the body outside of the operator's area.**

40. **Always properly tie down the skid steer to a truck or trailer before transport.**

41. **Make sure all bystanders are at a safe distance away from the skid steer before starting the engine.**

42. **Do not allow anyone near the skid steer while the engine is running and the skid steer is operational.**

43. **When using the skid steer to crane objects, do not allow any person to ride on objects being craned.**

44. **Do not use the skid steer as a work platform for supporting materials.**

45. **Do not lift personnel or allow personnel to work while standing in the bucket or on other attachments. This is not a man-lift.**

OSHA requirements now make it the employer's responsibility to fully instruct each operator in the proper and safe operation of all operative equipment. Both employer and employee should thoroughly familiarize themselves with the following sections.

IMPORTANT: *Be a safe operator. Before attempting to operate the skid steer, thoroughly acquaint yourself with:*

1. ***The safety information in the operator's manual and the skid steer safety manual.***
2. ***The operating instructions in the operator's manual.***
3. ***The controls on the skid steer and their operation.***

⚠ CAUTION ⚠

Some pictures in this manual show safety shields removed or open to show parts being serviced or for clarity. All shields should be closed or replaced prior to operating the machine.

⚠ DANGER ⚠

Fasten seat belt before starting engine!

This skid steer is a very stable unit but it can be upset if stopped suddenly when the bucket is raised and loaded.

This skid steer is a very stable unit but it can be upset if stopped suddenly when the bucket is raised and loaded.

Therefore, do not start the engine before securely fastening the seat belt, and carry the load low.

GENERAL SAFETY INFORMATION

HANDLE FLUIDS SAFELY

When you work around fuel or other flammable material, do not smoke or work near heaters or other fire hazards.

Do not store flammable material in open containers.

Store flammable fluids away from fire hazards.

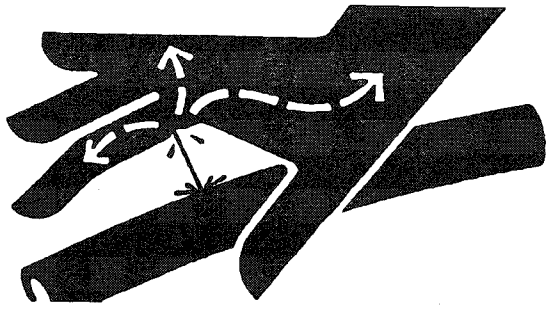
Do not incinerate or puncture pressurized containers.

Make sure machine is clean of dirt, grease, oil, and debris.

Do not store oily rags; they can ignite and burn spontaneously.

Keep a first aid kit and fire extinguisher handy.

Keep emergency numbers for doctors, ambulance service, hospital, and fire department near your telephone.



USE CARE AROUND HIGH-PRESSURE FLUID LINES

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

Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines.

Tighten all line connections before applying pressure.

Check for leaks with a piece of cardboard.

Protect hands and body from high-pressure fluids.

If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source.

AVOID HEATING NEAR PRESSURIZED FLUID LINES

Flammable spray can be generated by heating near pressurized fluid lines, resulting in severe burns to yourself and bystanders.

Do not heat by welding, soldering, or using a torch near pressurized fluid lines.

Pressurized lines can be accidentally cut or damaged when heat goes beyond the immediate flame area.

USE CARE IN HANDLING AND SERVICING BATTERIES

Prevent Battery Explosions

Keep sparks, lighted matches, and open flame away from the top of the battery. Battery gas can explode.

Never check battery charge by placing a metal object across the posts. Use a voltmeter or hydrometer.

Do not charge a frozen battery; it may explode. Warm the battery to 16° C (60° F).

⚠ WARNING ⚠

If any servicing or adjustments require the battery to be disconnected, or welding is required on the skid steer, disconnect the (-) negative ground cable. Failure to disconnect the battery may result in damage to the restraint system and other electrical components.

If welding on an attachment is required, first remove the attachment from the skid steer boom attaching plate.

⚠ WARNING ⚠

Starting an engine with a booster battery requires extreme care as batteries produce explosive gases. The slightest spark can cause an explosion.

Follow these safety tips:

1. **Always shield your eyes when charging or working near a battery. Always provide good ventilation.**
2. **Cover the battery with a piece of carpet or other heavy material. Do not remove the battery vent caps.**
3. **Connect one cable to the (+) positive terminal of the weak battery. Connect the other end of the cable to the (+) positive terminal of the stronger battery.**
4. **Connect the second cable to the (-) negative terminal of the stronger battery.**
5. **Connect the remaining (-) negative cable end to the engine block or starter ground terminal.**
6. **Reverse this procedure when disconnecting the booster.**

USE SAFE SERVICE PROCEDURES

Wear Protective Clothing

Wear close-fitting clothing.

Wear safety glasses or face shield as required.

Wear other safety equipment appropriate to the job.

Wear earplugs or earmuffs as required.

SERVICE MACHINE SAFELY

Use caution when working around moving parts.

If servicing requires the boom to be in the raised position, remove any attachment from the boom mounting plate and support the boom on the boom lock pins. If servicing requires the complete skid steer to be in the supported position, support the unit with adequate jack stands or blocking with all four wheels off the ground.

If servicing requires the engine to be operated, raise the machine and properly support the unit with adequate jack stands or blocking with all four wheels off the ground.

⚠ CAUTION ⚠

Before servicing the skid steer or any of its attached equipment, be sure that the attachments are lowered to the ground or the boom arms are supported by the boom lock pins.

USE PROPER TOOLS

Use tools appropriate for the job.

REVIEW SAFETY EQUIPMENT, SIGNS AND SHIELDS

Replace missing or damaged safety decals.

Reinstall all shielding removed for servicing.

Replace any damaged or missing shielding.

CONTROLS

Operate unit and check machine functions for proper operation.

Check seat belt for proper operation, wear, and damage - Replace as needed.

Check operator restraint system for proper operation.

Check boom lock for proper operation.

Check mechanical boom locks for proper operation.

Check parking brake for proper operation and adjustment.

MINIMUM HARDWARE TIGHTENING TORQUES

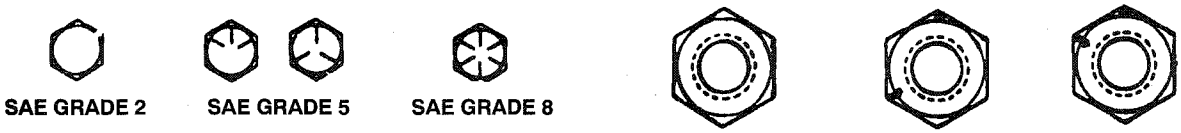
IN FOOT POUNDS (NEWTON-METERS) FOR NORMAL ASSEMBLY APPLICATIONS

INCH HARDWARE AND LOCKNUTS

NOMINAL SIZE	SAE GRADE 2		SAE GRADE 5		SAE GRADE 8		LOCKNUTS		NOMINAL SIZE
	UNPLATED or PLATED SILVER	PLATED W/ZnCr GOLD	UNPLATED or PLATED SILVER	PLATED W/ZnCr GOLD	UNPLATED or PLATED SILVER	PLATED W/ZnCr GOLD	GR.B w/GR5 BOLT	GR.C w/GR8 BOLT	
1/4	55* (6.2)	72* (8.1)	86* (9.7)	112* (13)	121* (14)	157* (18)	61* (6.9)	86* (9.8)	1/4
5/16	115* (13)	149* (17)	178* (20)	229* (26)	250* (28)	324* (37)	125* (14)	176* (20)	5/16
3/8	17 (23)	22 (30)	26 (35)	34 (46)	37 (50)	48 (65)	19 (26)	26 (35)	3/8
7/16	27 (37)	35 (47)	42 (57)	54 (73)	59 (80)	77 (104)	30 (41)	42 (57)	7/16
1/2	42 (57)	54 (73)	64 (87)	83 (113)	91 (123)	117 (159)	45 (61)	64 (88)	1/2
9/16	60 (81)	77 (104)	92 (125)	120 (163)	130 (176)	169 (229)	65 (88)	92 (125)	9/16
5/8	83 (112)	107 (145)	128 (174)	165 (224)	180 (244)	233 (316)	90 (122)	127 (172)	5/8
3/4	146 (198)	189 (256)	226 (306)	293 (397)	319 (432)	413 (560)	160 (217)	226 (306)	3/4
7/8	142 (193)	183 (248)	365 (495)	473 (641)	515 (698)	667 (904)	258 (350)	364 (494)	7/8
1	213 (289)	275 (373)	547 (742)	708 (960)	773 (1048)	1000 (1356)	386 (523)	545 (739)	1

NOTE: Torque values shown with * are inch pounds.

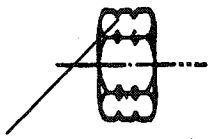
IDENTIFICATION
CAP SCREWS AND CARRIAGE BOLTS



SAE GRADE 2 | SAE GRADE 5 | SAE GRADE 8

REGULAR NUTS | SAE GRADE 5 HEX NUTS | SAE GRADE 8 HEX NUTS

LOCKNUTS



GRADE IDENTIFICATION

GRADE A NO NOTCHES

GRADE B ONE CIRCUMFERENTIAL NOTCH

GRADE C TWO CIRCUMFERENTIAL NOTCHES

GRADE IDENTIFICATION

GRADE A NO MARKS

GRADE B THREE MARKS

GRADE C SIX MARKS

MARKS NEED NOT BE LOCATED AT CORNERS

GRADE A NO MARK
GRADE B LETTER B
GRADE C LETTER C

GRADE IDENTIFICATION

MINIMUM HARDWARE TIGHTENING TORQUES

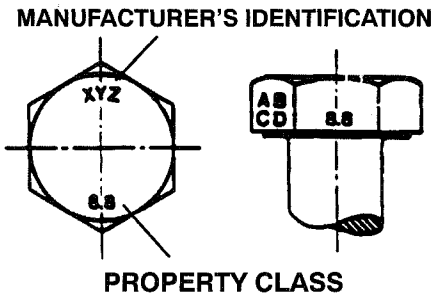
IN FOOT POUNDS (NEWTON-METERS) FOR NORMAL ASSEMBLY APPLICATIONS

METRIC HARDWARE AND LOCKNUTS

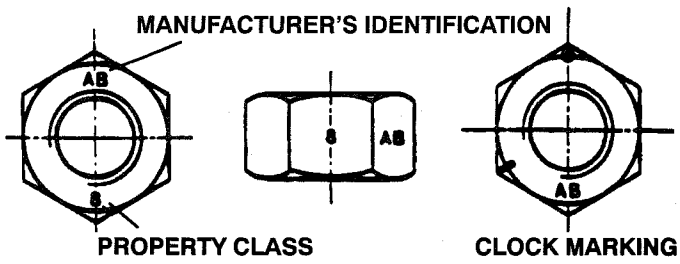
NOMINAL SIZE	CLASS 5.8		CLASS 8.8		CLASS 10.9		LOCKNUT CL.8 W/CL8.8 BOLT
	UNPLATED	PLATED W/ZnCr	UNPLATED	PLATED W/ZnCr	UNPLATED	PLATED W/ZnCr	
M4	15* (1.7)	19* (2.2)	23* (2.6)	30* (3.4)	33* (3.7)	42* (4.8)	16* (1.8)
M6	51* (5.8)	67* (7.6)	79* (8.9)	102* (12)	115* (13)	150* (17)	56* (6.3)
M8	124* (14)	159* (18)	195* (22)	248* (28)	274* (31)	354* (40)	133* (15)
M10	21 (28)	27 (36)	32 (43)	41 (56)	45 (61)	58 (79)	22 (30)
M12	36 (49)	46 (63)	55 (75)	72 (97)	79 (107)	102 (138)	39 (53)
M16	89 (121)	117 (158)	137 (186)	177 (240)	196 (266)	254 (344)	97 (131)
M20	175 (237)	226 (307)	277 (375)	358 (485)	383 (519)	495 (671)	195 (265)
M24	303 (411)	392 (531)	478 (648)	619 (839)	662 (897)	855 (1160)	338 (458)

NOTE: Torque values shown with * are inch pounds.

IDENTIFICATION
HEX CAP SCREW AND CARRIAGE BOLTS
CLASSES 5.6 AND UP



HEX NUTS AND LOCKNUTS
CLASSES 05 AND UP

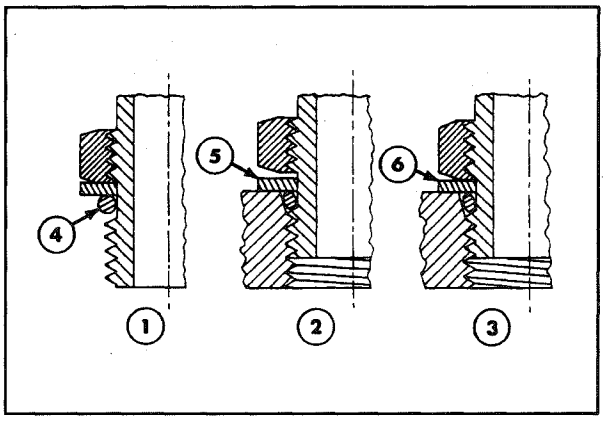


INSTALLATION OF ADJUSTABLE FITTINGS IN STRAIGHT THREAD O RING BOSSES

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			
				TORQUE				TORQUE			
SIZE	TUBING OD		THREAD SIZE	NEWTON METERS		FOOT POUNDS		NEWTON METERS		FOOT POUNDS	
	mm	In.		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
4	6.4	1/4	7/16-20	12	16	9	12	8	14	6	10
5	7.9	5/16	1/2-20	16	20	12	15	14	20	10	15
6	9.5	3/8	9/16-18	29	33	21	24	20	27	15	20
8	12.7	1/2	3/4-18	47	54	35	40	34	41	25	30
10	15.9	5/8	7/8-14	72	79	53	53	47	54	35	40
12	19.1	3/4	1-1/16-12	104	111	77	82	81	95	60	70
14	22.2	7/8	1-3/16-12	122	136	90	100	95	109	70	80
16	25.4	1	1-5/16-12	149	163	110	120	108	122	80	90
20	31.8	1-1/4	1-5/8-12	190	204	140	150	129	158	95	115
24	38.1	1-1/2	1-7/8-12	217	237	160	175	163	190	120	140
32	50.8	2	2-1/2-12	305	325	225	240	339	407	250	300

These torques are not recommended for tubes of 12.7 mm (1/2″) OD and larger with wall thickness of 0.889 mm (0.035″) or less. The torque is specified for 0.889 mm (0.035″) 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 no. 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

THREAD SIZE	TORQUE (MAXIMUM)
1/8″ - 27	13 N·m (10 ft. lbs.)
1/4″ - 18	16 N·m (12 ft. lbs.)
3/8″ - 14	22 N·m (16 ft. lbs.)
1/2″ - 14	41 N·m (30 ft. lbs.)
3/4″ - 14	54 N·m (40 ft. lbs.)

Before installing and tightening pipe fittings, clean the threads with a clean solvent or Loctite cleaner and apply sealant Loctite no. 567 for all fittings including stainless steel or no. 565 for most metal fittings. For high filtration/zero contamination systems use no. 545.

LUBRICANTS AND COOLANTS

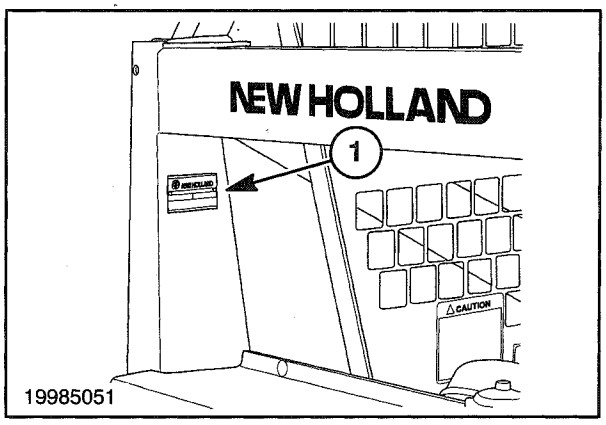
Application	New Holland Part No.	Specification
Final Drive chain case Hydraulic/Transmission	1 qt. - #9613313 2.5 gal. - #9613314 1 L - #9613358 20 L - #9613360	API Service SH/CG-4 10W-30
All lubrication fittings	Tube - #9613310	High viscosity lithium base grease
Engine	1 qt. - #9613313 2.5 gal. - #9613314 1 L - #9613358 20 L - #9613360	API Service SH/CG-4 10W-30 Refer to Operator's Manual for Temperature/Oil usage Chart
Cooling System - LS125	1 gal. - #FGCC2701DS	Antifreeze/Water 50/50 Mixture (Ethylene Glycol)

SEALANTS

Description	New Holland Part No.	Typical Applications	Strength	Color
Thread Lock	L22200 (222)	Small screws and hardware	Low	Purple
	L24231 (242)	Nuts & Bolts	Medium	Blue
	L29000 (290)	Wicking Type	Medium	Green
	L26231 (262)	Nuts & Bolts	High	Red
Thread Sealants	L54531 (545)	Hydraulic/Pneumatic	Non-fouling	
	L56531 (565)	Pipe Sealant	Controlled strength	
	L56747 (567)	Pipe Sealant	High Temperature	
Silicones	L81724 (3.5 oz. tube)	Ultra Blue RTV Gasket	Non-corrosive	Blue
	L58775 (10.2 oz. cartridge)	Ultra Blue RTV Gasket	Non-corrosive	Blue
	L82180 (3.35 oz. tube)	Ultra Blue RTV Gasket	Non-corrosive	Black
	L59875 (10.2 oz. cartridge)	Ultra Blue RTV Gasket	Non-corrosive	Black

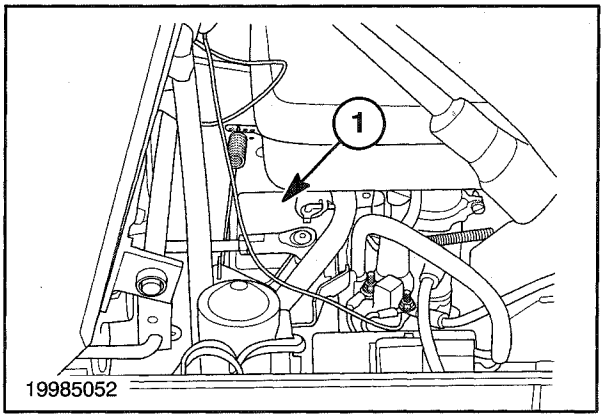
MODEL AND SERIAL NUMBER LOCATION

The skid steer model and serial number tag is located on the inside on the left boom support post at 1.



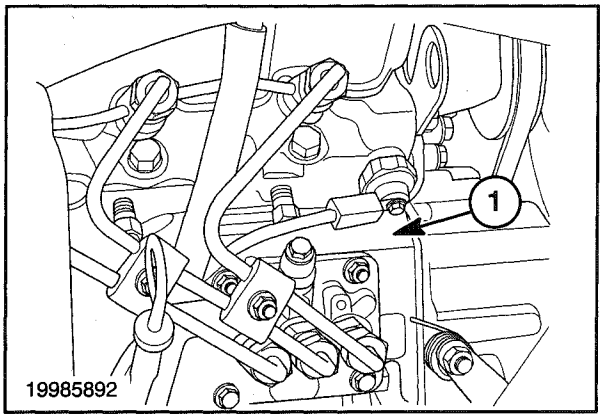
2

LS120 Engine - P218 gasoline engine model and serial number is located at 1, on the engine shroud at the flywheel end of engine.



3

LS125 Engine - E673 diesel engine model and serial is located on the top, flat surface of the injection pump at 1.

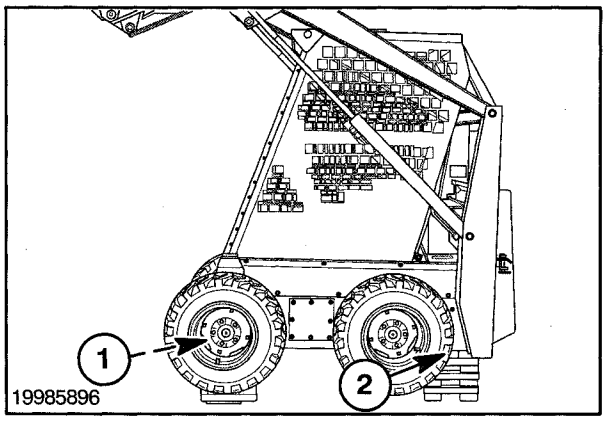


4

PROPERLY SUPPORT A RAISED MACHINE

If servicing, neutral adjustment, final drive adjustment or repairs, require the machine to be raised with all four wheels off the ground, securely support the machine with adequate jack stands or blocks as shown.

Support the machine at 1, to the front of the final drive cases and to the rear at 2, making sure the supports are on the flat area of the final drive cases. Make sure the supports do not contact the wheels or tires.



5

PROPERLY SUPPORT BOOM ON BOOM LOCK PINS

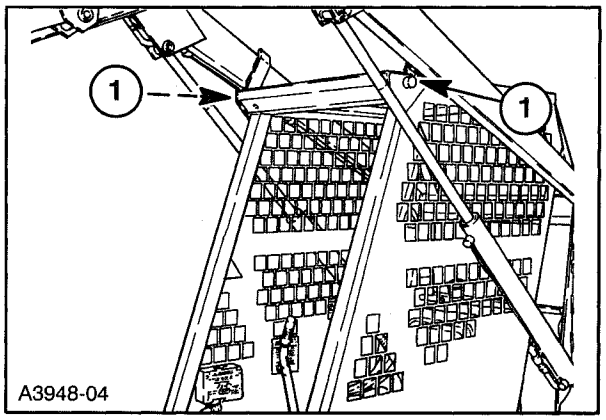
Before servicing the machine or any of its attached equipment, be sure that the attachments are lowered to the ground or the boom arms are supported by the boom lockpins, 1.

If boom is to be raised on boom lock pins, remove any attachment. Opening a hydraulic line could cause a mounted attachment to dump over unexpectedly.

⚠ DANGER ⚠

Never work beneath a loader or boom when it is held up only by the hydraulic system. A broken hydraulic line could cause the boom to descend rapidly.

Always actuate the boom lock before leaving a machine with the boom up and/or when servicing or repairing the unit with the boom up. Failure to do so could result in serious injury or death.



6

PROCEDURE:

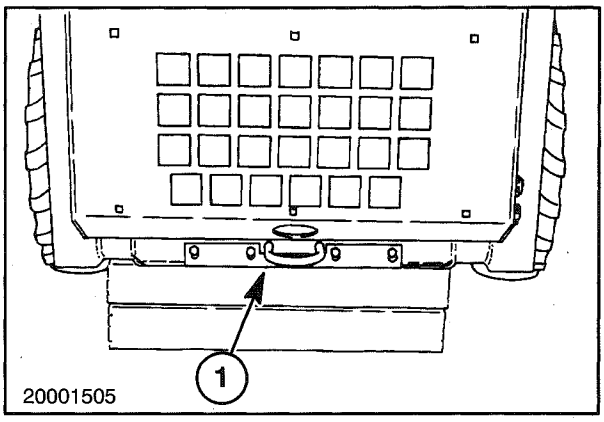
1. RAISE THE BOOM, EXTEND THE BOOM LOCK PINS, 1, AND LOWER THE BOOM ON THE BOOM LOCKPINS.
2. AFTER STOPPING THE ENGINE AND BEFORE UNBUCKLING THE SEAT BELT AND DISMOUNTING FROM THE SKID STEER, TURN "ON" THE IGNITION SWITCH.
3. PUSH BOTH THE BOOM AND BUCKET PEDALS TO RELIEVE ALL HYDRAULIC PRESSURE IN BOTH CIRCUITS.
4. TURN "OFF" THE IGNITION SWITCH.
5. SET THE PARKING BRAKE.

RAISING BOOM WITHOUT HYDRAULIC OIL FLOW

(Engine or Hydraulic System Not Functioning)

1. Remove any attachment from the boom mounting plate.
2. Block the rear of the skid steer under the rear of lower main frame, 1, as shown.

   This will prevent the front wheels from raising during boom lifting.



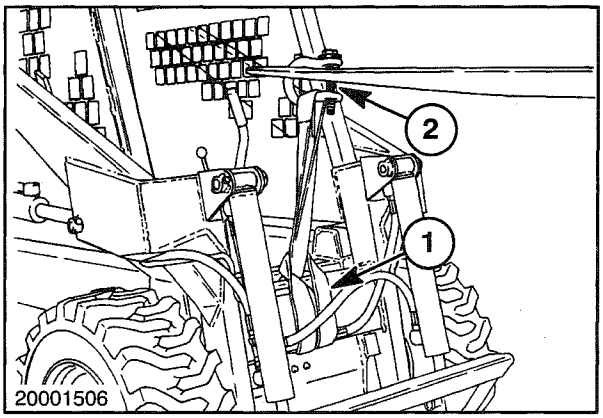
7

3. Attach a fork lift or overhead hoist to the main boom, 1 and lifting device, 2.

   Attach chain or strap securely to prevent unhooking during boom lifting. Position the chain or strap at 1 to prevent damage to the boom cylinder hydraulic hoses and tubes.

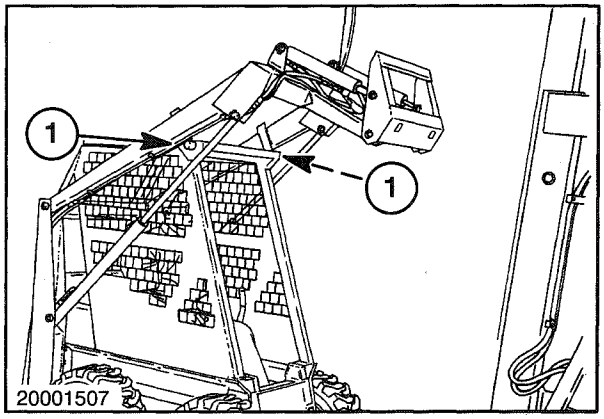
⚠ CAUTION ⚠

Attach suitable chains or straps capable of handling the weight of the boom, 227 kg (500 lbs). Attach chains securely to prevent them from coming loose during fluting of the boom.



8

4. With an operator sitting in the operator's seat with the seat belt buckled.
5. Turn the ignition key to the "ON" position. Press the toe of the left foot pedal, boom control, into the boom float position.
6. Slowly raise the boom above the boom lock pins, 1.
7. Operator sitting in seat, engage the boom lock pins, 1.
8. Lower the boom and rest on the boom lock pins, 1.
9. Return the boom control to the "NEUTRAL" position.
10. Turn the ignition key to the "OFF" position.



9

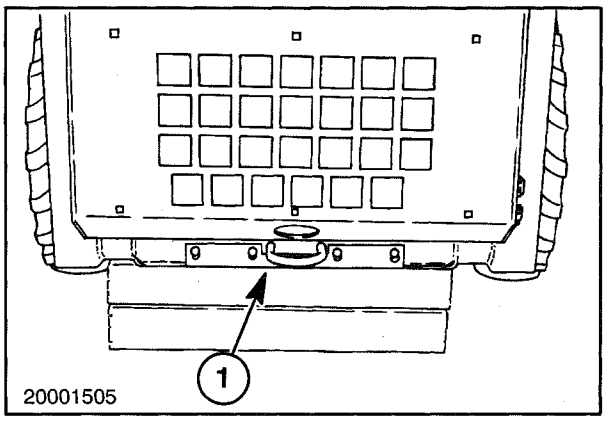
⚠ CAUTION ⚠

The operator must not leave the operator's seat until the boom is resting solidly on the boom lock pins. The boom could drop suddenly if lifting devices should fail.

RAISING BOOM WITHOUT BATTERY VOLTAGE (12 VOLTS)

1. Remove any attachment from the boom mounting plate.
2. Block the rear of the skid steer under the rear of lower main frame, 1, as shown.

   This will prevent the front wheels from raising during boom lifting.



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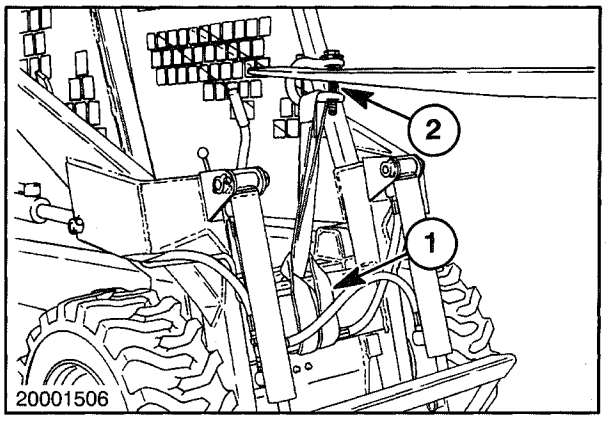
3. Attach a fork lift or overhead hoist to the main boom, 1 and lifting device, 2.

   Attach chain or strap securely to prevent unhooking during boom lifting. Position the chain or strap at 1 to prevent damage to the boom cylinder hydraulic hoses and tubes.

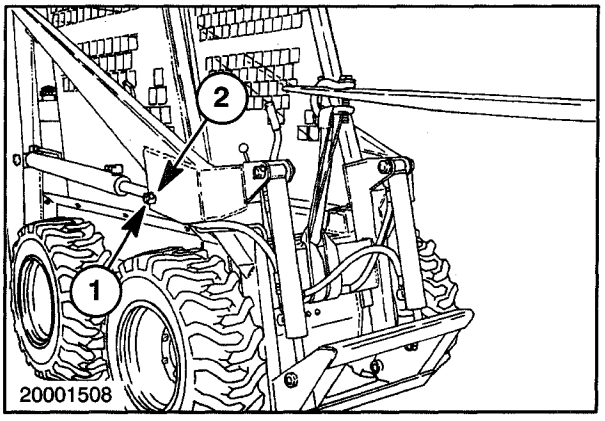
⚠ CAUTION ⚠

Attach suitable chains or straps capable of handling the weight of the boom, 227 kg (500 lbs). Attach chains securely to prevent them from coming loose during lifting of the boom.



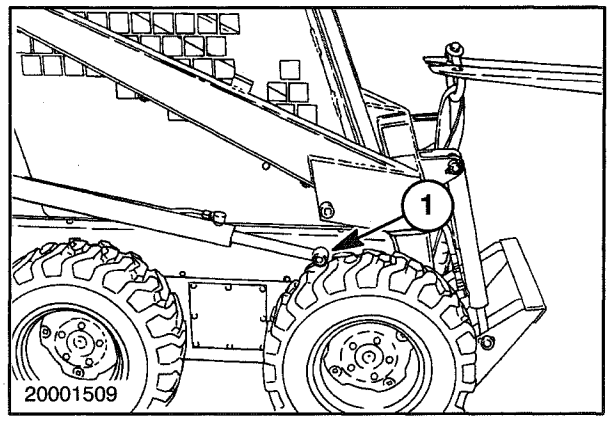
11

4. Remove the rod end (top) pivot pins, 1, from both cylinders. By remove retaining hardware, 2, from pivot pin and boom.



12

5. Support the cylinders on the tires, 1, as shown.



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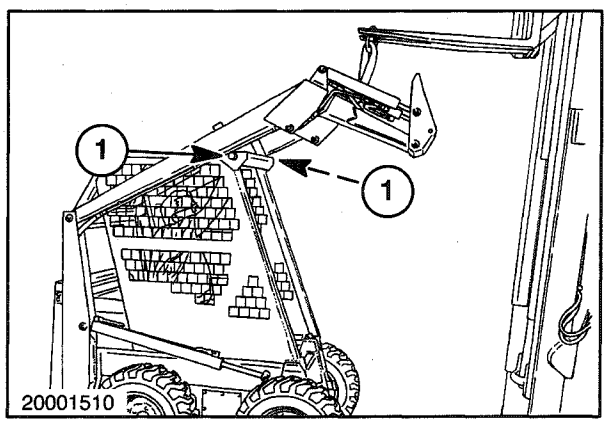
6. With an operator sitting in the operator's seat with the seat belt buckled.
7. Slowly raise the boom above the boom lock pins, 1.
8. Operator sitting in seat, engage the boom lock pins, 1.
9. Lower the boom and rest on the boom lock pins, 1.

⚠ CAUTION ⚠

The operator must not leave the operator's seat until the boom is resting solidly on the boom lock pins. The boom could drop suddenly if lifting devices should fail.



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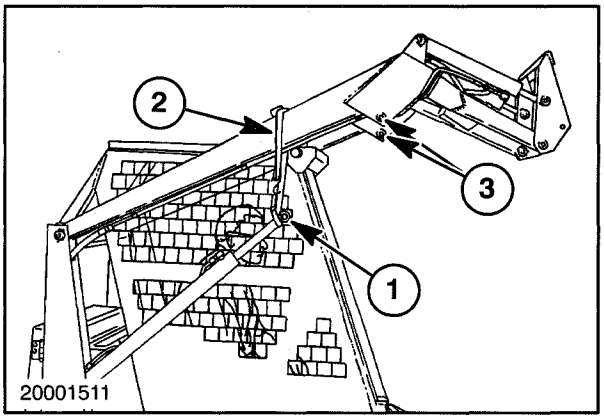
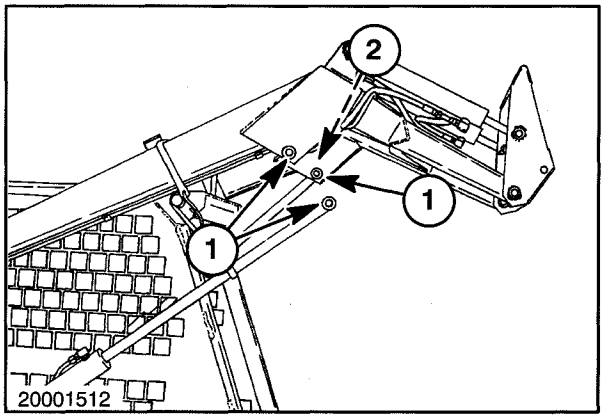
REATTACHING CYLINDERS AFTER REPAIR WITH BOOM RESTING ON BOOM LOCK PINS

1. Support the rod end of cylinders, 1, off the boom upper links, 2, to align with main boom cylinder pivot pin holes, 3.



15

2. Operator sitting in the Operator's seat with seat belt buckled.
3. Start the engine and hydraulically extend cylinder rods to align cylinder with pivot pin, 1. Stop engine.
4. Turn the ignition key to the "ON" position. Foot controls, press the toe of the left foot pedal, boom control, into the boom float position, turn the ignition key to the "OFF" position.
5. If cylinder and boom are not properly aligned, use a pry bar to align cylinder and boom.
6. Install pivot pin, 1, and secure with retaining hardware, 2. Torque bolts to 38 N·m (28 ft. lbs.).
7. Start the engine and hydraulically extend the second cylinder rod to align cylinder with pivot pin. Stop engine.
8. If cylinder and boom are not properly aligned, sit in the operator's seat with seat buckled, turn the ignition key to the "ON" position.
9. Move the boom control to the "DETENT" (float) position and turn the ignition key to the "OFF" position.
10. Use a pry bar and align cylinder with boom and install pivot pin, 1, and retaining hardware, 2, and torque to 38 N·m (28 ft. lbs.).



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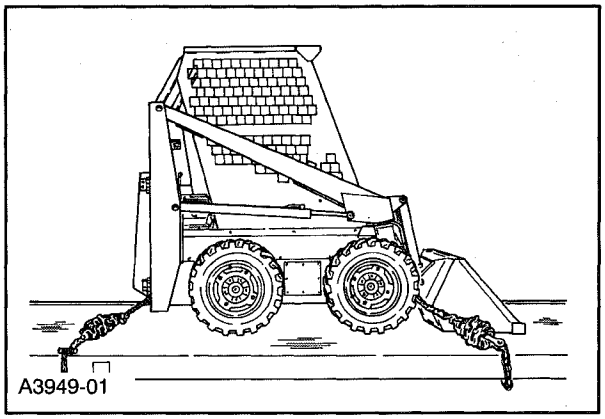
LOADING AND TIE-DOWN

When loading a skid steer onto a truck or trailer, keep the boom and/or attachment down as far as possible.

Before exiting the skid steer, set the parking brake and shut off the engine.

The recommended tie-down is shown in Figures 17, 18, and 19. Figure 18 shows the tie-down chain across the bottom bucket pivots. Figure 19 shows the tie-down chain through the eye at the rear of the loader frame.



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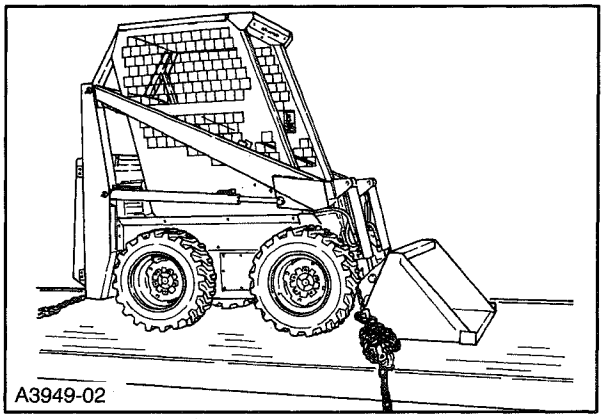
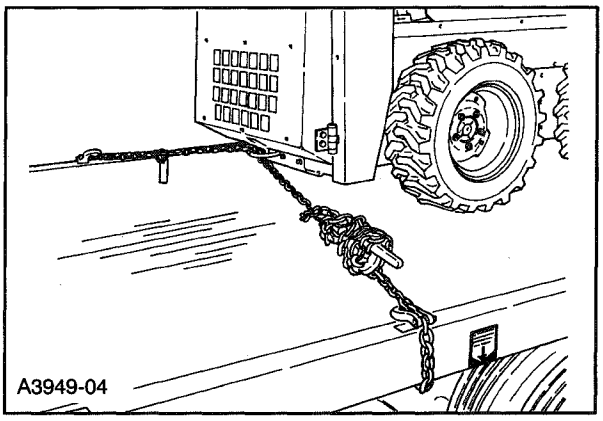
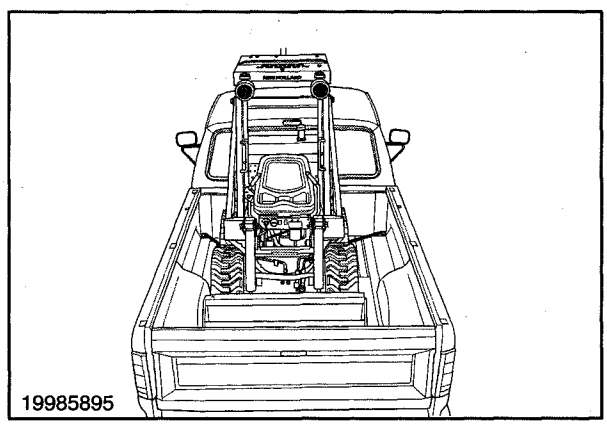


18



19

The LS120 and LS125 skid steers are equipped with narrow tires and bucket can be loaded into a pick-up truck. The pick-up truck must be capable of handling the weight of the loader and bucket. The truck must have provisions to properly secure the loader in the truck to prevent loader movement.



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SPECIAL TOOLS - ONAN P218

The following special tools are available from ONAN:

Valve Seat Driver

Valve Guide Driver

Oil Seal Guide and Driver

Combination Bearing Remover (Main and Cam)

Combination Bearing Driver (Main and Cam)

Flywheel Puller

SPECIAL TOOLS - E673 DIESEL

Oil Pressure Test Fittings	NH00011
Piston Wrist Pin Remover	NH01585
Port Block Remover	NH11097
Collars	FNH11099
Port Block Installer	FTC214080
Compression Tester	NH00120
Compression Test Gauge Assembly	NH00117
Dial Indicator (Magnetic Base)	NH01345
Micrometer, Outside	0 - 1 inch
Micrometer, Outside	1 - 2 inch
Micrometer, Outside	2 - 3 inch
Micrometer, Inside	3/4 - 1 inch
Micrometer, Inside	1 - 2 Inch
Micrometer, Inside	2 - 3 inch
Injector Tester	FNH 01721
Injector Adapter Set	FNH 01728
Injector Cleaning Kit	FNH 01720
Injector Socket Wrench (27 mm special)	FNH 01588

SPECIFICATIONS

CAPACITIES

Fuel Tank Capacity - LS120 and LS125	22.7 liters (6 US gal)
Chain Case Reservoir Capacity - LS120 and LS125	34.1 liters (9 US gal)
Crankcase Capacity with Filter - LS120	1.7 liters (1.8 US qts)
Crankcase Capacity with Filter - LS125	3.3 liters (3.2 US qts)
Cooling System Capacity - LS125	4.5 liters (1.2 US gal)

ENGINE GRADABILITY

LS120 Onan P218	25° (all directions except front end down - 15°)
LS125 New Holland E673	25° (all directions except front end down - 22°)

GASOLINE ENGINE - LS120

Manufacturer	Onan
Model	P218
Fuel Type	Unleaded gasoline with minimum octane rating of 86
Cylinders	2
Cycle	4 stroke
Bore and stroke	82.55 mm x 73.03 mm (3.25″ x 2.88″)
Displacement	782 cm^3 (47.7 $in.^3$)
Full Throttle Speed (no load)	3500 - 3600 RPM
Idle Speed (no load)	1100 - 1200 RPM
Horsepower (mfg. rating) @RPM	18 hp @3600 RPM
Valve Clearance:	
Intake (cold)	0.13 mm (0.005″)
Exhaust (cold)	0.33 mm (0.013″)
Ignition Timing (static setting)	20° BTC
Oil Filter replacement cartridge	#507631
Fuel consumption (approx.) at continuous full load	1.9 liters/hr. (0.50 gal./hr.)
Crankcase capacity with filter	1.7 liters (1.8 US quarts)
Cooling System	Air-cooled
Ignition type	Spark
Spark plug type	Champion RS 12YC AC R42CLT3
Spark plug gap	0.64 mm (0.025″)
Spark plug tightening torque	31 - 41 N·m (25 - 30 ft. lbs.)
Fuel filter (in-line)	#9611973
Engine gradability	25° (all directions except front end down - 15°)
Air Cleaner (standard):	
Precleaner outer (polyurethane)	#507138
Inner element (paper)	#507139
Heavy Duty Air Cleaner (optional):	
Element (paper)	#217490
Engine mounting bolt torque	34 N·m (25 ft. lbs.)

DIESEL ENGINE - LS125

Manufacturer ..... New Holland
Model E673
Fuel Type ..... Diesel
Cylinders 3
Cycle ..... 4 stroke
Bore and stroke ..... 67 mm x 64 mm (2.6″ x 2.5″)
Displacement ..... 675 cm^3 (41.2 $in.^3$)
Full Throttle Speed (no load) ..... 3550 - 3650 RPM
Idle Speed (no load) ..... 1100 - 1200 RPM
Horsepower (mfg. rating) @RPM ..... 16.5 hp @3600 RPM
Valve Clearance:
  Intake (cold) ..... 0.20 mm (0.008″)
  Exhaust (cold) ..... 0.25 mm (0.010″)
Oil filter replacement cartridge ..... #86546623
Fuel consumption (approx.) at continuous full load ..... 1.9 liters/hr. (0.50 US gal./hr.)
Crankcase capacity with filter ..... 3.0 liters (3.2 US quarts)
Fuel filter (in-line) ..... #9611973
Cooling system ..... Water/antifreeze (50/50)
Cooling system capacity ..... 4.5 liters (1.2 US gallons)
Engine gradability ..... 25° (all directions except front end down - 22°)
Air cleaner element - standard (paper) ..... #9845457
Engine mounting bolt torque ..... 34 N·m (25 ft. lbs.)

ELECTRICAL

System ..... 12-volt negative ground
Battery (anchored plates recommended) ..... SAE Group 70, 12-volt (side stud)
Battery Rating (CCA) ..... 390 amp @ -18° C (0° F)
Starter Switch ..... Key start and solenoid

Circuit Protection

Ignition - Seat Switch Restraint System ..... 15 amp (#768115)
Ignition - Control Module Restraint System ..... 15 amp (#768115)
Control Module Restraint System ..... 6 amp (#768106)
Glow Plugs (LS125 Diesel Only) ..... 30 amp
Fuel Solenoid Circuit (LS125 Diesel Only) ..... Diodes (two)

Ignition System

	LS120 with P218 Engine	**LS125 with E673 Engine**
Fuel	Gasoline	Diesel
Ignition	Spark	Compression
Spark Plug Type	AC - R42CLT3	-----
Factory-Installed Plug	Champion - RS 12YC	-----
Spark Plug Gap	0.64 mm (0.025″)	-----
Spark Plug Tightening Torque	31 - 41 N·m (25 - 30 ft. lbs.)	-----

Alternators

LS120 P218 Onan gasoline engine (internal flywheel)	20 amp
LS125 E673 New Holland diesel engine (external)	20 amp
Rectifier	Solid State
Regulator	Solid State
Minimum Voltage Output	28 volts AC
Shaft Alignment (maximum bend)	0.07 mm (0.003″)
Regulator Voltage Output	14 - 15 volts DC
Maximum Regulator Amperage Output	14 amp
Flywheel/Pulley Assembly Retaining Nut Torque	8 - 9 N·m (6 - 7 ft. lbs.)

Starters - Refer to Section 55

Optional Lights

Rectangular Headlight Assembly - Clear	#86533428
Rectangular Headlight Bulb - Clear	#86533429
Rectangular Rear Taillight Assembly - Red	#9829515
Rectangular Rear Taillight Bulb - Red	#86505510
Round Amber Flashing Light Assembly	#130609
Round Amber Flashing Bulb Type #199	#277105

FINAL DRIVE

Hydraulic/Hydrostatic oil reservoir capacity	34 liters (9 US gallons)
Drain Plugs	Four (front & rear each side)
Chain	#60 roller chain, 3/4″ riveted
Regular links	139 links
Connector link	One master connector
Motor drive sprocket	12 teeth
Idler sprocket	13 teeth
Axle drive sprockets	32 teeth
Oil grade:	10W-30 API Service SH/CG-4

Tightening Torques

Axle bearing nut torque	47 N·m (35 ft. lbs.) and back off one flat of the castellated nut
Drive sprocket to hydrostatic motor shaft nut torque	209 N·m (150 ft. lbs.)
Chain idler clamping nut torque	122 N·m (90 ft. lbs.)
Lug bolt torque	80 N·m (60 ft. lbs.)
Hydrostatic motor mounting bolt torque:	
Carriage bolts, 1/2″ x 1-1/2″ Grade 5	89 N·m (66 ft. lbs.)
Hex cap screw, 5/16″ x 5/8″ Grade 5	20 - 24 N·m (15 - 18 ft. lbs.)
Axle cover bolts, 5/16″ x 5/8″ self-tapping	20 - 24 N·m (15 - 18 ft. lbs.)

HYDROSTATIC TRANSMISSION SYSTEM

Hydraulic/Hydrostatic oil reservoir capacity	34 liters (9 US gallons)
Oil filter	10 micron cartridge (#634958)
Oil grade:	10W-30 API Service SH/CG-4

Hydrostatic Pump

Make	Sundstrand
Type	Piston
Displacement	15.1 cm^3 (0.913 cu.in.)
Case mounting bolts torque, 1/2″ x 1-1/2″ Grade 5	89 N·m (66 ft. lbs.)
Case cover bolts torque, 3/8″ x 7/8″ Grade 5	36 - 50 N·m (27 - 37 ft. lbs.)
Charge check valve plugs	20 - 34 N·m (15 - 25 ft. lbs.)

Hydrostatic Motor

Make	Nichols
Type	High Torque
Displacement	213.3 cm^3 (12.9 cu.in.)
Housing bolt torque, 5/16″ x 3-3/4″	40 N·m (30 ft. lbs.)
Drive sprocket to hydrostatic motor shaft nut torque	209 N·m (150 ft. lbs.)
Hydrostatic motor mounting bolt torque	
Carriage bolts, 1/2″ x 1-1/2″ Grade 5	89 N·m (66 ft. lbs.)
Hex cap screw, 5/16″ x 5/8″ Grade 5	20 - 24 N·m (15 - 18 ft. lbs.)
Charge pressure	5.5 - 8.3 bar (80 - 120 PSI)
Relief valve	None used

HYDRAULIC SYSTEM

System type	Open center
Main system pressure	110 - 117 bar (1600 - 1700 PSI)
Hydraulic/Hydrostatic oil reservoir capacity	34 liters (9 US gallons)
System Temperature:	
Maximum continuous	107° C (225° F)
Maximum intermittent	121° C (250° F)
Oil filter	10 micron cartridge (NH634958)
Oil grade:	10W-30 API Service SH/CG-4

Control Valve

Make	Victor
Type	Two spool with power beyond capabilities
Relief Valve Pressure	110 bar (1600 PSI)
Retaining Bolts, Grade 5	21 - 24 N·m (16 - 18 ft. lbs.)

Hydraulic Pump

Make	Parker
Type	Gear
Output	30.2 l/min. (8 GPM) @3600 RPM
Displacement	13 cm^3 (0.512 cu.in.) per rev.
Pump housing bolt torque	21 - 24 N·m (16 - 18 ft. lbs.)

Boom Cylinder

Make	New Holland
Type	Double-acting
Bore	50.8 mm (2.0″)
Stroke	666.75 mm (26.25″)
Rod Size	32 mm (1.25″)
Piston Nut Torque	203 N·m (155 ft. lbs.)

Bucket Cylinder

Make	New Holland
Type	Double-acting
Bore	47.63 mm (1.875″)
Stroke	304.8 mm (12.00″)
Rod Size	22.2 mm (0.875″)
Piston Nut Torque	107 N·m (82 ft. lbs.)

OPERATING SPECIFICATIONS

Travel Speeds
Forward and reverse ..... 0 - 9.3 KPH (0 - 5.8 MPH)

Tire Sizes and Inflation:
5.70 x 12 ..... 3.5 bar (50 PSI)
23 x 8.50 ..... 2.0 bar (35 PSI)
Lug Bolt Torque ..... 80 N·m (60 ft. lbs.)

Operating Weight*
LS120 maximum total weight ..... 898.1 kg (1980 lbs.)
LS125 maximum total weight ..... 957.1 kg (2110 lbs.)
* With 22 kg (48 lbs.) fuel tank full, 79 kg (175 lbs.) operator, 1067 mm (42″) utility bucket, 5.70 x 12 tires and 27 kg (60 lbs.) battery.

Operating Capacity (SAE operating load per SAE J818 spec.)
LS120 mfg. rating ..... 306 kg (675 lbs.)
LS125 mfg. rating ..... 318 kg (700 lbs.)

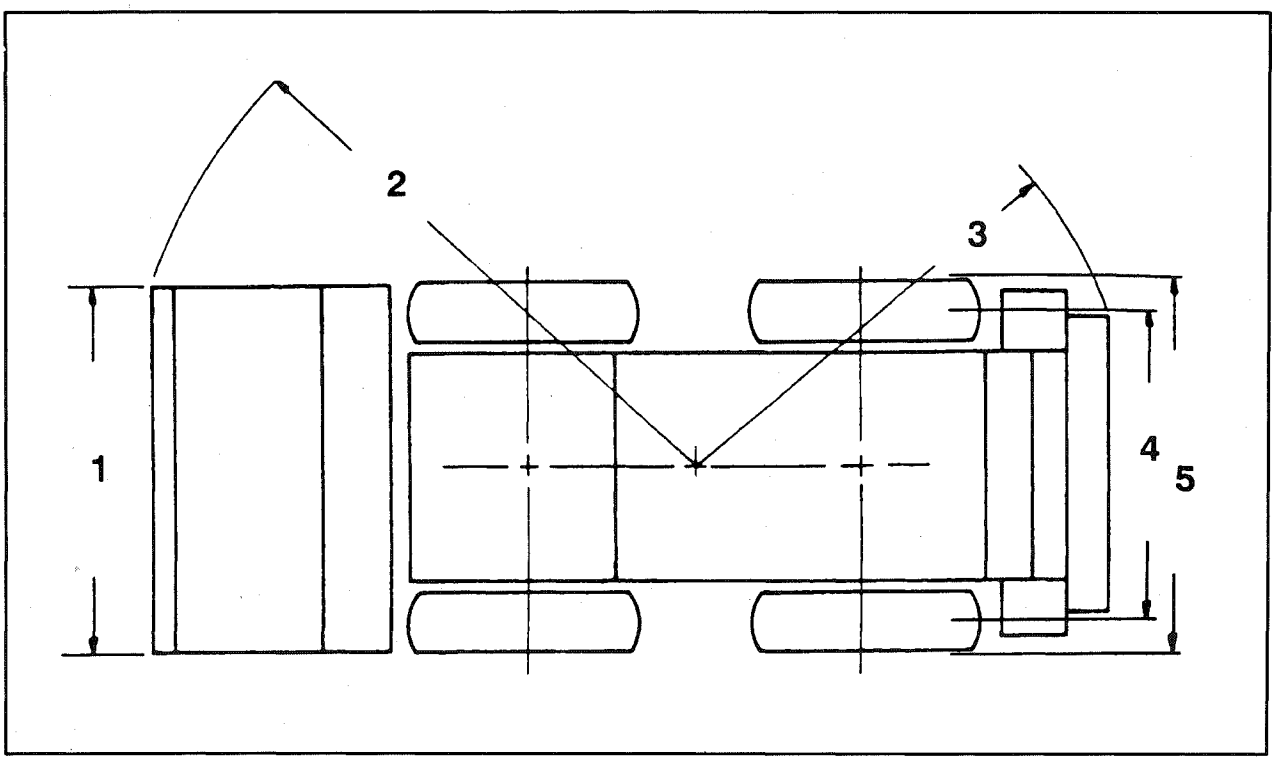
Bucket Capacity

Bucket	Weight	Cutting Edge #	Skid Bar #	Capacity Struck	Capacity Heaped
36″ Utility (914 mm)	34.5 kg (76 lbs.)	764025	764032	0.10 m^3 (3.48 $ft.^3$)	0.13 m^3 (4.75 $ft.^3$)
42″ Utility (1067 mm)	40.4 kg (89 lbs.)	764033	764032	0.11 m^3 (4.06 $ft.^3$)	0.15 m^3 (5.33 $ft.^3$)
47″ Utility (1194 mm)	62.1 kg (137 lbs.)	766444	764032	0.13 m^3 (4.54 $ft.^3$)	0.17 m^3 (5.97 $ft.^3$)

Fork Options

Fork	Weight	Cutting Edge #	Skid Bar #	Tine #
36″ Utility* (914 mm)	54.4 kg (120 lbs.)	764025	766449	766440
42″ Utility (1067 mm)	63.5 kg (147 lbs.)	766033	766449	766440

* Use 36″ Utility fork with 5.70 x 12 tires only.



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DIMENSIONS

LS120 and LS125 with 47″ utility bucket and 23 x 8.5 tires - cm (″)

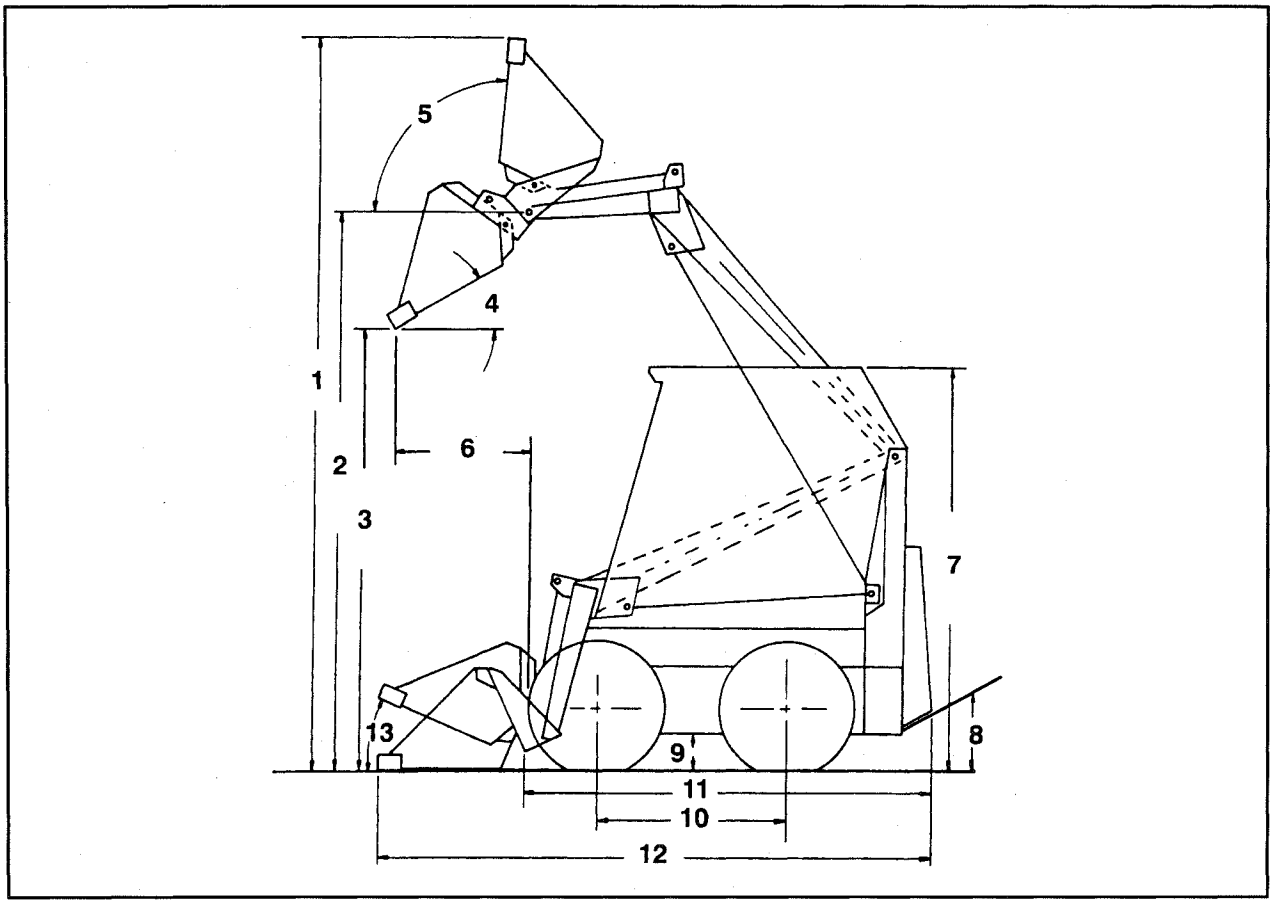
1 - Overall width w/47″ utility bucket ..... 120 cm (47.25″)

2 - Turning radius - front ..... 144.8 cm (57″)

3 - Turning radius - rear
LS120 ..... 108.6 cm (42.75″)
LS125 ..... 116.2 cm (45.75″)

4 - Wheel tread ..... 83.1 cm (32″)

5 - Overall width w/o bucket ..... 102.9 cm (40.50″)



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DIMENSIONS

LS120 and LS125 with 47″ utility bucket and 23 x 8.5 tires - cm (″)

1 - Maximum operating height ..... 307.7 cm (121.125″)

2 - Height to hinge pin ..... 237.2 cm (93.375″)

3 - Dump height ..... 183.5 cm (72.25″)

4 - Dump angle (max.) ..... 38°

5 - Rollback fully raised ..... 93°

6 - Dump reach @ maximum height ..... 52.4 cm (20.625″)
Dump reach @ maximum reach ..... 63.5 cm (25.0″)

7 - Overall height ..... 176.5 cm (69.50″)

8 - Angle of departure ..... 16°

9 - Ground clearance
(Chain case) ..... 15.2 cm (6″)
(Belly pan) ..... 16.5 cm (6.5″)

10- Wheelbase ..... 81.3 cm (32″)

11- Overall length less bucket
LS120 ..... 177.5 cm (69.875″)
LS125 ..... 185.1 cm (72.875″)

12- Overall length w/bucket
LS120 ..... 234.3 cm (92.25″)
LS125 ..... 241.9 cm (95.25″)

13- Roll back angle (boom down) ..... 21°

SECTION 10 - ENGINE

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GENERAL INFORMATION

ENGINE DESCRIPTION

The Model LS120 Skid Steer Loader is equipped with an ONAN Model P218 twin cylinder, air-cooled gasoline engine rated at 13.4 kw (18 hp).

The Model LS125 Skid Steer Loader is equipped a New Holland E673 diesel engine rated at 12.3 kw (16.5 hp).

The ONAN gasoline engine and the Diesel engine are discussed separately in this section.

SAFETY PRECAUTIONS

⚠ CAUTION ⚠

Do not change the specification of the engine.

Do not smoke while refueling.

Do not refuel during engine operation.

Clean away any fuel that has spilled and move any material that is contaminated by fuel to a safe place.

Never clean, lubricate or adjust the engine during operation unless otherwise specified in this manual. Use extreme caution when working around moving parts to prevent injury.

Do not make any adjustments you do not understand.

Ensure the engine is not in a position to cause a concentration of toxic emissions.

Persons in the area must be kept clear during engine, equipment, or vehicle operation.

Do not permit loose clothing or long hair near moving parts.

Keep away from rotating parts during operation. Note that fans cannot be seen clearly while the engine is running.

Do not use ether to start the engine.

Do not run the engine with any safety guards removed.

Do not remove the radiator cap while the engine is hot and the coolant is under pressure. Dangerous hot coolant could be discharged.

Do not use salt water in the fresh water cooling system or any other coolant that can cause corrosion.

Keep sparks or fire away from batteries or combustion can occur (especially when charging). The battery electrolyte is caustic and is dangerous to the skin and eyes.

Disconnect the battery terminals before making repairs to the electrical system.

Only one person must be in control of the engine.

Ensure the engine is only operated from the control panel or operator's position.

If skin comes into contact with high-pressure fuel, get medical assistance immediately.

Diesel fuel and used engine oils can cause skin damage. Use hand protection (gloves or special skin protection solutions).

Do not move equipment unless the brakes are in good condition.

Be sure that the transmission drive control is in the "Neutral" position before the engine is started.

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BATTERY

BATTERY INSPECTION

⚠ WARNING ⚠

Ignition of explosive battery gases can result in severe personal injury. Do not smoke or allow any ignition source near the battery.

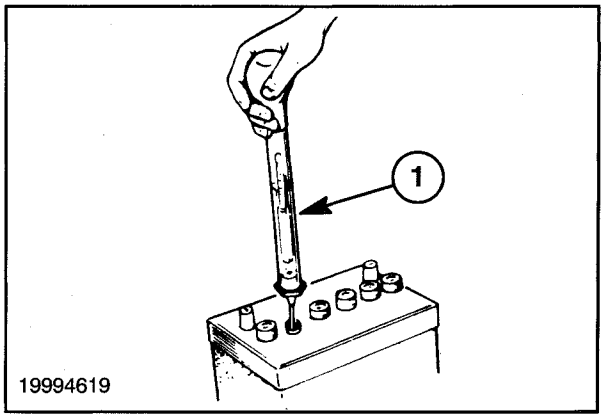
Keep the battery case clean and dry. Accumulations of moisture or dirt will accelerate discharge and battery failure.

BATTERY SPECIFICATIONS

Battery Type	12 volt - SAE group 70
Battery Rating	390 amps @ -18° C (0° F) Side Stud
System Ground	Negative (-)
Minimum Voltage Output	28 volts AC

SPECIFIC GRAVITY TEST

Check battery cells with a hydrometer, 1. Specific gravity should be between 1.260 and 1.290 at 25° C (77° F). If one or more cells are low on water, add distilled water, then recharge the battery. Allow no foreign matter to fall into the cells.



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⚠ CAUTION ⚠

Battery electrolyte contains caustic sulfuric acid. Avoid contact with skin or clothing. If splashed in the eyes, flush immediately with fresh water.

Keep the battery terminals clean and tight. Check the battery cables for pinching or abrasion. Use recommended battery tools when connecting or disconnecting leads. After connecting leads, apply a light coat of petroleum jelly or grease to retard corrosion.

IMPORTANT: *Reversing battery leads can damage electronic circuits. Do not reverse battery connections.*

BATTERY JUMP STARTING

Jump start (boost) a weak battery using a charge booster battery. Use the following procedure to prevent starter damage, battery damage, and personal injury.

⚠ WARNING ⚠

Jump starting a battery incorrectly can cause the battery to explode, resulting in personal injury or death.

Batteries give off hydrogen gas, especially during charging or jump starting. Ignition of explosive battery gases can result in severe personal injury. Do not smoke or allow any ignition source near the battery.

Attempting to jump start a frozen battery can cause the battery to explode. Inspect battery cells for ice before attempting to jump start when ambient temperature is below 0° C (32° F).

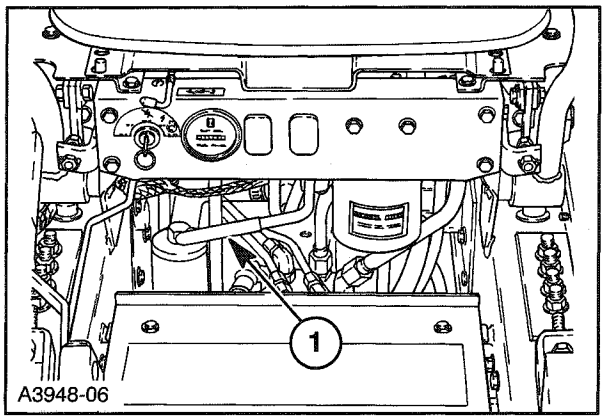
1. Disconnect any engine load by disengaging the traction drive belt using the lever, 1, beneath the operator's seat.
2. Use good quality, heavy duty jumper (booster) cables.
3. Use a booster battery with similar characteristics to the installed battery (see Specifications).
4. Attach one end of the positive (red) booster cable to the positive (+) terminal of the booster battery.
5. Attach the other end of the positive cable to the positive (+) terminal of the installed battery.

⚠ WARNING ⚠

Electrical arcing can cause serious personal injury. Do not allow positive and negative cable ends to touch.

Electrical arcing can cause ignition of explosive battery gases resulting in severe person injury. Do not allow positive and negative cable ends to touch.

6. Attach one end of the negative cable (black) to the negative (-) terminal of the booster battery.
7. Attach the other end of the negative cable to a solid chassis ground of the assisted skid steer.
8. If the booster battery is installed in another vehicle, start the booster vehicle engine to use alternator output and avoid unnecessary loading of the booster battery.



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9. Turn the ignition switch "ON" and attempt to start the installed engine. Never crank the engine for more than 30 seconds.

⚠ CAUTION ⚠

Overcranking the engine can cause starter damage. Allow the starter to cool for five minutes if engaged for 30 seconds.

10. Allow the starter to cool for at least five minutes before another attempt.
11. Once the engine starts, disconnect the negative cable from chassis ground. Then disconnect the positive cable from the positive (+) terminal of the installed battery. Do not allow cable ends to touch.
12. Disconnect the negative (-) cable from the booster battery. Disconnect the positive (+) cable from the booster battery.

ONAN GASOLINE ENGINE INFORMATION

This section of the manual provides specific mechanical and electrical information required by the dealer service technician to troubleshoot, service, repair and overhaul the engine.

The illustrations and procedures presented will refer to right and left sides of the engine. The flywheel end of the engine is the front end and right and left sides are determined by viewing the engine from the front. The #1 cylinder is on the left and the #2 cylinder is on the right.

The model and specification numbers for the engine are on the unit nameplate located on the top of the engine. Use these numbers when referring to and/or servicing the engine.

INTERPRETING THE MODEL AND SPEC NUMBER

TYPICAL NUMBER: P218G-I/11076D	
P	Factory code for general identification of basic engine series.
2	Number of cylinders
18	BHP rating
G	Fuel required (G = gasoline)
I	Engine duty cycle
11076	Factory code for designated optional equipment, if any.
D	Specification (spec letter) which advances with factory production modifications.