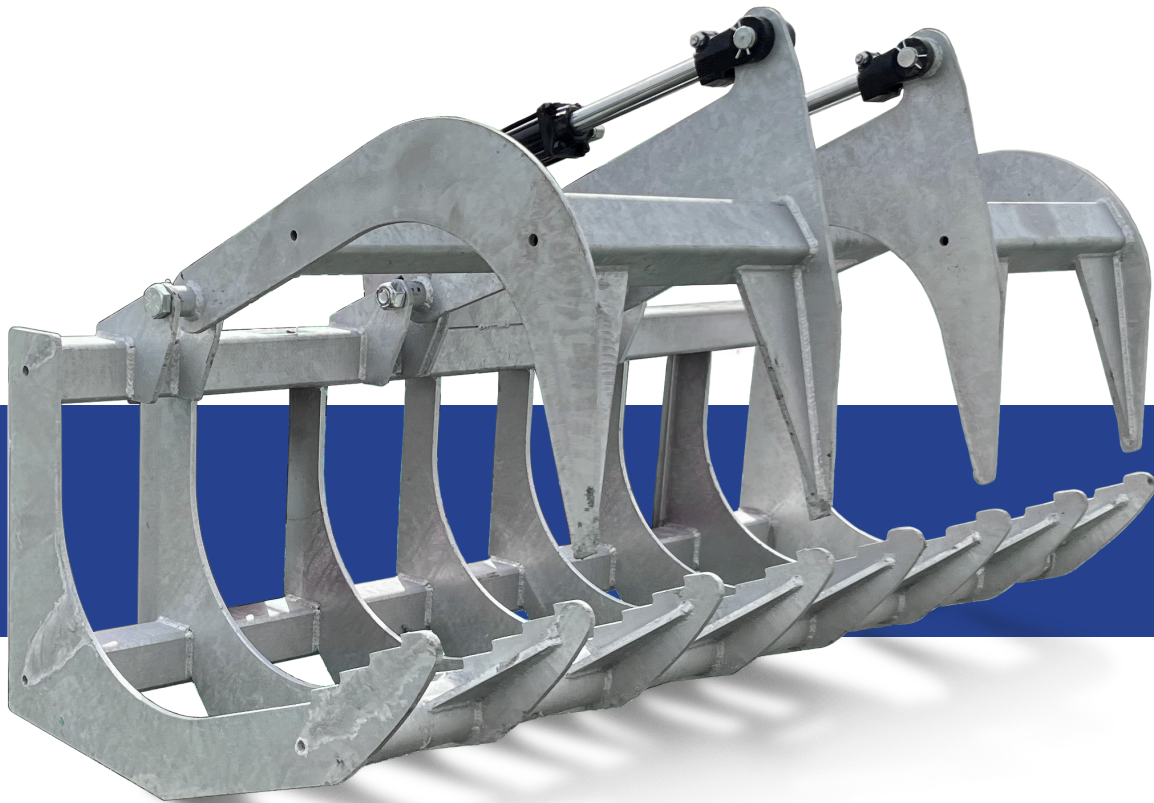




GRAPPLE

Operator's Manual



TOUGH. STRONG. DURABLE.

MADE IN THE USA.

CHECKLIST

PRE-DELIVERY

Inspect the tiller thoroughly after assembly to be certain it is set up properly before delivering it to the customer. It is the purchaser and/or operator's responsibility to....

- Read and understand the information contained in this manual.
- Operate, lubricate, assemble and maintain the equipment in accordance with all instructions and safety procedures in this manual.
- Inspect the equipment and replace or repair any parts that are damaged or worn which under continued operation would cause damage, wear to other parts, or cause a safety hazard.
- Return the equipment or parts to the authorized Grapples N' More dealer, from where it was purchased, for service or replacement of defective parts that are covered by warranty.

(Grapples N' More may inspect equipment or parts before warranty claims are honored.)
- Payment of all costs incurred by the dealer for traveling to or transporting the equipment for

warranty inspection and or claims.

I have thoroughly instructed the buyer on the above described equipment, the review included the Operator's Manual content, equipment care, adjustments and safety information.

Date: _____

Dealer's Rep Signature: _____

The above equipment and Operator's Manual have been received by me and I have been thoroughly instructed as to care, adjustments and safe operations.

Date: _____

Owner's Signature: _____

The SAFETY ALERT SYMBOL indicates that there is a potential hazard to personal safety involved and extra safety precautions must be taken. When you see this symbol on your machine or in this manual, be alert and carefully read the message that follows it.

DANGER: Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word is limited to the most extreme situations.

WARNING: Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION: Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

READ MANUAL PRIOR TO INSTALLATION: Improper installation, operation, or maintenance of this equipment could result in serious injury or death. Operators and maintenance personnel should read this manual, as well as all manuals related to this equipment and the prime mover thoroughly before beginning installation, operation, or maintenance. FOLLOW ALL SAFETY INSTRUCTIONS IN THIS MANUAL AND THE PRIME MOVER'S MANUAL(S).

READ AND UNDERSTAND ALL SAFETY STATEMENTS: Read all safety decals and safety statements in all manuals prior to operating or working on this equipment. Know and obey all OSHA regulations, local laws, and other professional guidelines for your operation. Know and follow good work practices when assembling, maintaining, repairing, mounting, removing, or operating this equipment.

KNOW YOUR EQUIPMENT: Know your equipment's capabilities, dimensions, and operations before operating. Visually inspect your equipment before you start, and never operate equipment that is not in proper working order with all safety devices intact. Check all hardware to ensure

it is tight. Make certain that all locking pins, latches, and connection devices are properly installed and secured. Remove and replace any damaged, fatigued, or excessively worn parts. Make certain all safety decals are in place and are legible. Keep decals clean, and replace them if they become worn or hard to read.

**WARNING
PROTECT AGAINST FLYING DEBRIS:**

Always wear proper safety glasses, goggles, or a face shield when driving pins in or out, or when any operation causes dust, flying debris, or any other hazardous material.

LOWER OR SUPPORT RAISED EQUIPMENT: Do not work under raised booms without supporting them. Do not use support material made of concrete blocks, logs, buckets, barrels, or any other material that could suddenly collapse or shift positions. Make sure support material is solid, not decayed, warped, twisted, or tapered. Lower booms to ground level or on blocks. Lower booms and attachments to the ground before leaving the cab or operator's station.

DO NOT MODIFY MACHINE OR ATTACHMENTS: Modifications may weaken the integrity of the attachment and may impair the function, safety, life, and performance of the attachment. When making repairs, use only the manufacturer's genuine parts, following authorized instructions. Other parts may be substandard in fit and quality. Never modify any ROPS (Roll Over Protection Structure) or FOPS

(Falling Object Protective Structure) equipment or device. Any must be authorized in writing by the manufacturer.)

SAFETY SECTION

WARNING

USE CARE WITH HYDRAULIC FLUID

PRESSURE: Hydraulic pressure under pressure can penetrate the skin and cause serious injury or death. Hydraulic leaks under pressure may not be visible. Before connecting or disconnecting hydraulic hoses, read your prime mover's operator's manual for detailed instructions on connecting and disconnecting hydraulic hoses or fittings.

- Keep unprotected body parts, such as face, eyes, and arms as far away as possible from a suspected leak. Flesh injected with hydraulic fluid may develop gangrene or other permanent disabilities.
- Openings in the skin and minor cuts are susceptible to infection from hydraulic fluid.
- If injured by injected fluid, see a doctor at once. If your doctor is not familiar with this type of injury, ask him to research it immediately to determine proper treatment. Without immediate medical treatment, serious infection and reactions can occur.
- Wear safety glasses, protective clothing, and use a piece of cardboard or wood when searching for hydraulic leaks.

DO NOT USE YOUR HANDS!

WARNING

SAFELY MAINTAIN AND REPAIR EQUIPMENT:

- Do not wear loose clothing or any accessories that can catch in moving parts. If you have long hair, cover or secure it so that it does not become entangled in the equipment.
- Work on a level surface in a well-lit area.
- Use properly grounded electrical outlets and tools.
- Use the correct tools for the job at hand. Make sure they are in good condition for the task required.
- Wear the protective equipment specified by the tool manufacturer.

WARNING

SAFELY OPERATE EQUIPMENT: Do not operate equipment until you are completely

trained by a qualified operator in how to use the controls, know its capabilities, dimensions, and all safety requirements. See your machine's manual for these instructions.

- Operate only from the operator's station. Always use the seat belt if the prime mover has a ROPS. Do not use a seat belt if there is not ROPS. Check the seat belt daily and replace if frayed or damaged.
- Specified lift capacities must not be exceeded. See loader specifications.
- An operator must not use drugs or alcohol, which can change their alertness or coordination. An operator taking prescription or over-the-counter drugs should seek medical advice on whether or not they can safely operate equipment.
- Never use any of these attachments for a work platform or personnel carrier.
- Always check locking pins before tilting or operating any attachment.
- Keep all step plates, grab bars, pedals, and controls free of dirt, grease, debris, and oil.
- Never allow anyone to be around the equipment when it is operating.
- Do not allow riders on the attachment or the prime mover.
- Do not operate the equipment from anywhere other than the correct operator's position.
- Never leave equipment unattended with the prime mover's engine running, or with this attachment in a raised position.
- Do not handle round bales unless loader is equipped with approved bale handling attachments.
- Do not detach loader from tractor with any of these attachments installed. Equip loader with material bucket when detaching.
- Stop loader gradually when lowering or lifting loads.
- Before exiting the prime mover, lower the attachment to the ground, apply the brakes, turn off the prime mover's engine, and remove the key.
- Do not alter or remove any safety feature from the prime mover or this attachment.
- Know your work site safety rules as well as traffic rules and flow. When in doubt on

any safety issue contact your supervisor or safety coordinator for an explanation.

- Do not alter or remove any safety feature
- A heavy load can cause instability of the prime mover. Use extreme care during travel. Slow down on turns and watch out for bumps. The prime mover may need additional counter-weights to counter-balance the weight of the attachment.
- Do not heap load heavy material where the combined weight of the bucket and the material could exceed the rated lifting capacity of the loader.
- Be sure the load does not stick out too far in front of the bucket. A light load sticking out too far can have the same tipping effect as a heavy load carried in close.
- Do not exceed the lift capacity of your loader. See loader specifications.
- Make sure all loads are secure before lifting. If lifting with the grapple and the load appears to be unstable, lower the load, open the grapple and reposition the load to attain full stability.

KNOW WHERE UTILITIES ARE:

Observe overhead electrical and other utility lines. Be sure equipment will clear them. When digging, call your local utilities for location of buried utility lines, gas, water, and sewer, as well as any other hazard you may encounter. Beware of low electrical wires when loader is raised. Serious injury or death can result if contact is made.

WARNING

TRANSPORTING ALL ATTACHMENTS:

- Travel only with the attachment as close to the ground as possible. Drive slowly over rough ground and on slopes.
- When driving on public roads use safety lights, reflectors, Slow Moving Vehicle signs etc, to prevent accidents. Check local government regulations that may affect you.
- Do not drive close to ditches, excavations, etc; a cave in could result.
- When on a slope, keep the load low and proceed with extreme caution. **Do not drive ACROSS a steep slope** - drive straight up

and down. With a LOADED attachment face the attachment and load uphill. With an EMPTY attachment - face the attachment downhill.

- Avoid sudden starts and stops while traveling up or downhill. Avoid parking on a slope. Slow down on sharp turns and slopes to prevent tipping and/ or loss of control. Avoid slopes when surface is wet, slippery grass or soil. Be careful when changing directions on slopes.
- Use extra care when loading or unloading unit onto trailer or truck. NEVER secure rods or linkages on unit that could be damaged when transporting.
- Do not smoke when refueling. Allow room in the gas tank for expansion. Wipe up any spilled fuel. Secure cap tightly when done.

MAINTAINING ALL ATTACHMENTS

- Before working on this machine, drive to a level area, relieve hydraulic pressure, lower implement (or if working underneath, raise and block securely), shut off the engine, set the brakes, and remove the ignition keys. Relieve hydraulic pressure prior to doing any maintenance.
- Never work under equipment unless it is blocked securely. Never depend on hydraulic system to keep implement in raised position.
- Keep all persons away from operator control area while performing adjustments, service, or maintenance.
- Worn, damaged, or illegible safety decals must be replaced. New safety decals can be ordered from your dealer or from the manufacturer.

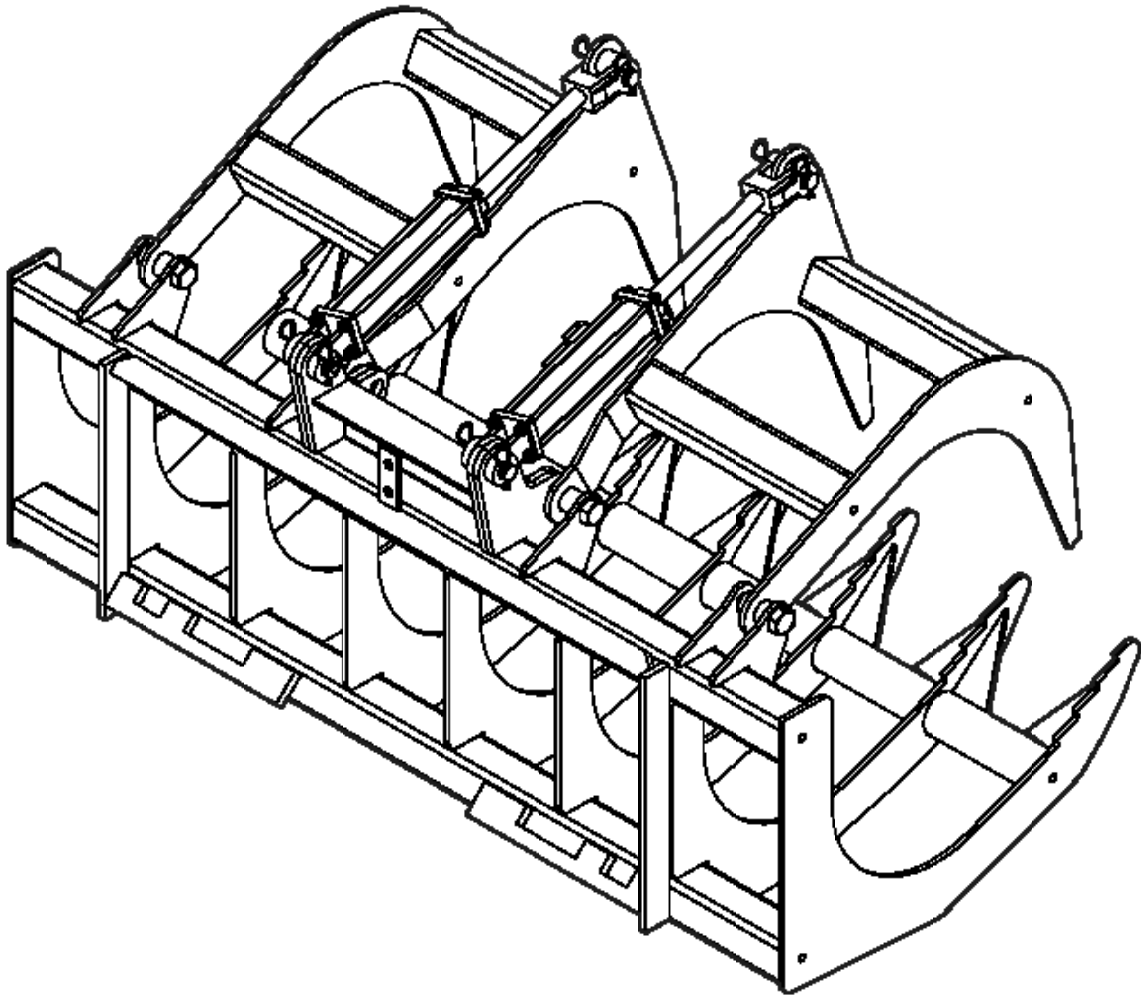
STORAGE SAFETY

- Store the unit in an area away from human activity. Do not permit children to play on or around the stored unit.
- Make sure all parked machines are on a hard, level surface and engage all safety devices. Storage location should be level and solid to make connecting and un-connecting to prime mover easy.
- If blocking is used, make sure it is solid and secure before leaving area.

MOST ACCIDENTS OCCUR BECAUSE OF NEGLIGENCE OR CARELESSNESS. AVOID NEEDLESS ACCIDENTS BY FOLLOWING ALL OF THE SAFETY PRECAUTIONS LISTED BELOW.

GENERAL SAFETY PRECAUTIONS

- Machinery should be operated only by those who are responsible and are authorized to do so.
- Stop the engine, lower all equipment, lock the brakes, and remove the ignition key before dismounting from the skid steer or tractor.
- Never stand between skid steer and attachment while power unit is being connected to the attachment.
- Loose fitting clothing should not be worn to avoid catching on various parts.
- Detach attachment in area where children normally do not play.
- When performing adjustments or maintenance on an attachment, first lower it to the ground or block it securely at a workable height.
- Only a qualified operator should be permitted on power unit when in operation; no riders allowed.
- Make certain everyone is in the clear before starting power unit or raising or lowering equipment.
- Operate the power unit and attachment only while seated in the driver's seat.
- Reduce speed when transporting mounted attachments to avoid bouncing and momentary loss of steering control.
- A heavy load can cause instability of the power unit. Use extreme care during road travel. Slow down on turns and watch out for bumps. Power unit may need counterweights to counter-balance the weight of the attachment.
- Reduce speed on hillsides or curves so there is no danger of tipping.
- Avoid driving too close to the edge of ditches or drop-offs.
- Do not transport implement on public roads without reflectors and slow moving vehicle emblem in daylight and with approved warning lights at night and other periods of poor visibility.
- Keep work area clear of all debris. Never assume an area is clear. ALWAYS CHECK.
- Check to make certain there are no buried utilities in the work area before starting work.
- Keep alert and watch the front as well as the rear when working with the attachment.



Replacing Safety Signs

1. Clean the area of application with nonflammable solvent.
2. Wash the same area with soap and water.
3. Allow the surface to fully dry.
4. Remove the backing from the safety sign exposing the adhesive surface.
5. Apply the safety sign to the location shown in the parts diagram.
6. Smooth out any bubbles.

Helpful Hints: (1) Decals adhere to a warm surface better than a cold surface. (2) Applying heat (from a hair

dryer) will greatly improve your ability to remove a damaged decal before preparing the surface for installation of a new one.

ASSEMBLY SECTION

ATTACHMENT TO PRIME MOVER

WARNING

Improper attachment of the Tine or Scrape Grapple Bucket could result in injury or death. Do not operate this product until you have positive indication that the attachment is securely mounted.

1. Position on the attachment on a level surface.
2. The quick attach coupler handles should be in the unlocked position with lock pins retracted,

Figure 2.

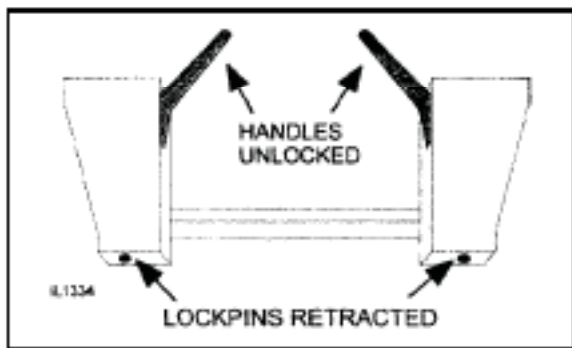


Figure 2. Quick attach Coupler Handles - Unlocked

3. Enter the prime mover. Fasten seat belt, start engine. Disengage the parking brake.
4. Follow the attaching procedure in the prime mover owner's manual. Align the attachment mechanism with the mounting on the grapple bucket, attach to the prime mover or loader.
5. Engage the parking brake and shut down the prime mover. Be sure to relieve pressure to the auxiliary hydraulic lines.
6. Unfasten safety restraints and exit the prime mover.
7. Make sure the hydraulic couplers are clean. Connect the hydraulic lines to the prime mover. Twist the collar of the quick couplers one-quarter turn to secure hydraulic connections. If attachment unit is being installed on a tractor loader, purchase proper couplers and hoses as required and attach to the loader as per the manufactures instructions.

Engage the latching mechanism to secure attachment to loader, The lockpins must be completely extended and secured into the retaining slots provided on the attachment. Figure 3.

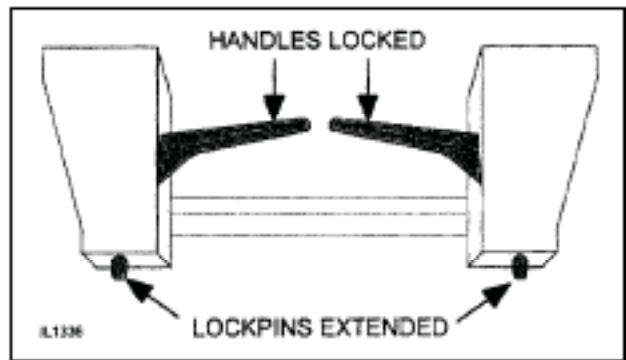


Figure 3. Attachment Coupler Handles - Locked

9. Re-enter the primer mover, Fasten seat belt and re-start engine.
10. Carefully raise the loader and cycle the rollback/tilt cylinders to check the clearances and to ensure that the attachment is securely mounted.
11. Cycle the grapple clamp hydraulic cylinders several times full stroke to work the air out of the cylinders.

NOTE: When shipped, the hydraulic cylinder(s) on this product contains air. Failure to remove all the air from the hydraulic cylinder(s) can cause uneven, jerky cylinder movement when the hydraulic controls are operated and possibly allow unwanted cylinder movement when those controls are being operated.

WARNING

Attachment coupler handles must always be rotated to LOCK POSITION to prevent coupler latch from disengaging and attachment from falling off.

REMOVING THE TINE OR SCRAP GRAPPLE BUCKET WARNING

Serious injury or death may result from disengaging the attachment when the attachment is in an unstable position or carrying a load. Place the attachment in a stable position before disengaging.

CAUTION

Hoses for the attachment must be disconnected before the quick attach is disengaged. Pulling the attachment with the hoses could result in damage to the prime mover or the attachment.

- 1.** If possible, find a level solid location to place the attachment. This makes it easier to disconnect and to re-connect later on.
- 2.** Lower the attachment to the ground.
- 3.** Engage the parking brake and shut down the prime mover. Be sure to relieve pressure to the auxiliary hydraulic lines.
- 4.** Unfasten safety restraints and exit prime mover.
- 5.** Disconnect the attachment hydraulic lines from the prime mover. Connect quick couplers together to keep clean.
- 6.** Disengage attachment-locking mechanism (mechanical type).
- 7.** Enter prime mover, fasten safety restraints and start the prime mover.
- 8.** Disengage attachment-locking mechanism (hydraulic type).
- 9.** Disengage the parking brake, and back away from the attachment.

OPERATING SECTION

The operator is responsible for the safe operation of this equipment. The operator must be properly trained. Operators should be familiar with the attachment, prime mover and all safety practices before starting operation. Make sure all operators have read the Owner's/ Operator Manual and are familiar with the instructions and the safety rules of operation.

All reference to left, right, front, or rear are given from the operator's position, facing the direction of forward travel.

NOTE: Watch for and avoid hidden obstruction, i.e., buried pipes, rocks, concrete piers, or uneven slabs of concrete, when operating, or attachment damage may occur. Stop prime mover and implement immediately upon striking an obstruction. Turn off engine, remove key, inspect, and repair any damage before resuming operation.

The tine and scrap grapple buckets are designed to pick up bulky, unusually shaped, or long materials that would not stay in an ordinary bucket.

1. Approach the load so that the weight will be centered on the bottom of the bucket. The heaviest side should be closest to the back of the bucket and not near the bucket edge.
2. Before lifting, make certain the bucket is completely under the load and the bucket bottom is level or tilted back slightly.
3. Close the grapples as much as possible and lift the bucket slightly to be certain that the load is secure.

NOTE: If the load appears to be unstable, lower the bucket to the ground, open the grapple clamps and reposition the load to attain full stability. Repeat until complete stability is achieved.

When using the grapples as a rake to drag materials into position for pick up, **THE GRAPPLE CLAMPS MUST BE COMPLETELY OPEN.**

NOTICE: Applying a raking-type force to partially open grapple clamps will greatly magnify the fluid pressure in the hydraulic hoses, fittings, and cylinders and may cause component failure.

- Never heap load heavy material where the combined weight of the attachment and material could exceed the rated lifting capacity of the loader.
- Operate the attachment only when properly seated at the operator's station.
- Do not exceed the lifting capacity of your loader. See loader specifications.
- Do not handle round bales.
- Be sure the load does not stick out too far in front of the bucket. A light load sticking out too far can have the same unbalanced or tipping effect as a heavy load carried in close.
- When using the grapple, lift the load slightly and make sure that the load is secure. If the load appears to be unstable, lower the load, open the grapple and reposition the load to attain full stability.
- Reduce speed when driving over rough terrain, on a slope, or turning, to avoid overturning the vehicle.
- Avoid side slope travel whenever possible. Drive up the slope to pick up a load and then down in reverse. Carry loads as close to the ground as possible.
- Before exiting the prime mover, lower the bucket to the ground, turn off the prime mover's engine, remove the key and apply the brakes.
- Do not detach loader from tractor with this attachment installed. Equip loader with materials bucket when detaching.

WARNING DURING USE

Avoid serious injury.

- THE GRAPPLE MOVES QUICKLY! Do not allow anyone near the grapples.
- Never get between the grapple and the bucket.
- Do not lift any load that is taller than the height of the fully opened grapple
- Do not roll back this product so far that the load falls off toward or on the operator.
- When stacking debris or loading vehicles, make sure you are operating in an area AWAY FROM OVERHEAD WIRES.
- Avoid holes, ditches, and obstructions which may cause prime mover to tip.

- Never allow anyone to walk under a raised loader.
- Operate the loader hydraulic controls smoothly, avoiding jerky operation
- Stop loader gradually when lowering or lifting loads.
- Be sure that people, livestock, or pets are not standing near the machine while operating.
- Do no lift or carry anyone on loader or in bucket or attachment.

WARNING

TRANSPORTING THE LOAD

Avoid serious injury

- Raise the load to the minimum height required for the terrain that must be crossed with the load.
- Operated the prime mover so that the load always remains level.
- Accelerate, turn, and brake gradually.
- Avoid any obstacles, bumps, or holes in your intended path.
- Frequently check the load to make sure that the load has not become unstable.

STORAGE

- Storage location should be level and solid to make connecting and disconnecting easy.
- Always store in a clean, dry location away from children and livestock.
- Leaving the unit outside will materially shorten its life.
- Clean the unit thoroughly, removing all mud, dirt and grease.
- Inspect for visible signs of wear, breakage, or damage. Order any parts required, and make the necessary repairs to avoid delays when starting the next job.
- Tighten loose nuts, capscrews and hydraulic connections.
- Cap hydraulic couplers to protect against contaminants.
- Touch up all unpainted surfaces with paint to prevent rust.
- Coat the exposed portions of the cylinder rod with grease.
- Grease the unit.

MAINTENANCE SECTION

WARNING **NEVER GO UNDERNEATH EQUIPMENT.**

Never place any part of the body underneath equipment or between moveable parts even when the engine has been turned off. Hydraulic system leak down, hydraulic system failures, mechanical failures, or movement of control levers can cause equipment to drop or rotate unexpectedly and cause severe injury or death.

Read Manual for service instructions or have service performed by a qualified dealer.

WARNING

Keep all persons away from operator control area while performing adjustments, service, or maintenance. Before dismounting power unit or performing any service or maintenance, follow these steps: disengage power to equipment, lower all raised components to the ground, operate valve levers to release any hydraulic pressure, set parking brake, stop engine, remove key, and unfasten seat belt. Never leave equipment unattended with engine running.

General Information

Your attachment was designed to be almost maintenance free. Little effort is needed to keep it in top condition. It is, however, important to follow these procedures to get full performance and longevity out of the equipment. **IMPORTANT:** When replacing parts, use only factory approved replacement parts. Manufacturer will not claim responsibility for use of unapproved parts or accessories and/or other damages as a result of their use.

Lubrication

The lubrication your Grapple Bucket will need is the greasing of the grapple clamp pivot tube. Two grease fittings have been installed in each damp pivot tube to facilitate this task.

We recommend greasing these fittings both before and after the initial eight (8) hours of use and then every (40) hours of use thereafter.

Thoroughly clean the grease zerks before servicing. Dirt mixed with lubricant will rapidly wear parts. Keep it clean.

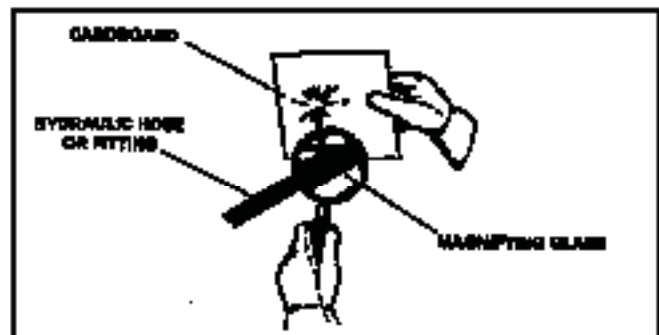
WARNING **DAILY OR EVERY 8 HOURS OF OPERATION**

Replace any missing bolts or nuts with approved replacement parts. Check hydraulic system for leaks. See procedure below. Visually inspect the machine for worn parts or cracked welds. Repair as necessary.

Escaping fluid under pressure can have sufficient force to penetrate the skin, causing serious personal injury. Fluid escaping from a very small hole can be almost invisible. Use a piece of cardboard or wood, rather than hands to search for suspected leaks.

Keep unprotected body parts, such as face, eyes, and arms as far away as possible from a suspected leak. Flesh injected with hydraulic fluid may develop gangrene or other permanent disabilities.

If injured by injected fluid, see a doctor at once. If your doctor is not familiar with this type of injury, ask him or her to research it immediately to determine proper treatment.



WARNING

DO NOT MODIFY MACHINE OR ATTACHMENTS

Modifications may weaken the integrity of the implement and may impair the function, safety, life, and performance of the attachment. When making repairs, use only the manufacturer's genuine parts, following authorized instructions. Other parts may be substandard in fit and quality. Never modify any ROPS (Roll Over Protection Structure) or FOPS (Falling Object Protective Structure) equipment or device. Any modifications must be authorized in writing by the manufacturer.

INSTALLATION OR REPLACING OPTIONAL CUTTING EDGE ON SCRAP GRAPPLE BUCKET

The Scrap Grapple Bucket can be equipped with an optional reversible 3/4" X 8" cutting edge. See parts list for length and part number for your model.

1. Raise the Scrap Grapple Bucket about 10" - 12".
2. Place a 6" X 6" block under both ends of the bucket about 10" behind the welded leading edge of the bucket. Then lower the bucket so it rests securely on the blocks.
3. Place two smaller blocks under the cutting edge so when the cutting edge is loose from the bucket it doesn't fall on the ground. (These blocks will also support the cutting edge when bolting it back on the bucket).

NOTE: Do not block the machine any higher than necessary to remove or install the cutting edge.

4. Remove the 3/4" hex nuts and plow bolts that secure the cutting edge to the bucket. Turn the cutting edge end for end and use the new edge or replace it if both edges have been used.
5. Attach the cutting edge to the scrap bucket and secure with the plow bolts and hex nuts previously removed.

NOTE: If the plow bolts or hex nuts are worn, replace with new ones.

6. Torque the hex nuts to specifications given in bolt torque chart, located in the back.

BOLT TORQUE CHART

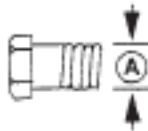
Always tighten hardware to these values unless a different torque value or tightening procedure is listed for a specific application.

Fasteners must always be replaced with the same grade as specified in the manual parts list.

Always use the proper tool for tightening hardware: SAE for SAE hardware and Metric for metric hardware.

Make sure fastener threads are clean and you start thread engagement properly.

All torque values are given to specifications used on hardware defined by SAE J1701 & J1701M JUL96.



SAE SERIES TORQUE CHART



SAE Grade 2
(No Dashes)

SAE Bolt Head Identification

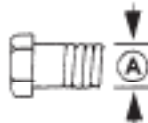


SAE Grade 5
(3 Radial Dashes)



SAE Grade 8
(6 Radial Dashes)

A Diameter (Inches)	Wrench Size	MARKING ON HEAD					
		SAE 2		SAE 5		SAE 8	
		lbs-ft	N-m	lbs-ft	N-m	lbs-ft	N-m
1/4"	7/16"	6	8	10	13	14	18
5/16"	1/2"	12	17	19	26	27	37
3/8"	9/16"	23	31	35	47	49	67
7/16"	5/8"	36	48	55	75	78	106
1/2"	3/4"	55	75	85	115	120	163
9/16"	13/16"	78	106	121	164	171	232
5/8"	15/16"	110	149	170	230	240	325
3/4"	1-1/8"	182	261	297	403	420	569
7/8"	1-5/16"	308	416	474	642	669	907
1"	1-1/2"	467	634	722	979	1020	1383



METRIC SERIES TORQUE CHART

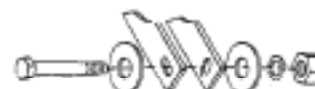
8.8
Metric
Grade 8.8

Metric Bolt Head Identification

10.9
Metric
Grade 10.9

A Diameter & Thread Pitch (Millimeters)	Wrench Size	COARSE THREAD				FINE THREAD				A Diameter & Thread Pitch (Millimeters)
		MARKING ON HEAD				MARKING ON HEAD				
		Metric 8.8		Metric 10.9		Metric 8.8		Metric 10.9		
		N-m	lbs-ft	N-m	lbs-ft	N-m	lbs-ft	N-m	lbs-ft	
6 x 1.0	10 mm	8	6	11	8	8	6	11	8	6 x 1.0
8 x 1.25	13 mm	20	15	27	20	21	16	29	22	8 x 1.0
10 x 1.5	16 mm	39	29	54	40	41	30	57	42	10 x 1.25
12 x 1.75	18 mm	68	50	94	70	75	55	103	76	12 x 1.25
14 x 2.0	21 mm	109	80	151	111	118	87	163	120	14 x 1.5
16 x 2.0	24 mm	169	125	234	173	181	133	250	184	16 x 1.5
18 x 2.5	27 mm	234	172	323	239	263	194	363	268	18 x 1.5
20 x 2.5	30 mm	330	244	457	337	367	270	507	374	20 x 1.5
22 x 2.5	34 mm	451	332	623	480	495	365	684	505	22 x 1.5
24 x 3.0	36 mm	571	421	790	583	623	459	861	635	24 x 2.0
30 x 3.0	46 mm	1175	867	1626	1199	1258	928	1740	1283	30 x 2.0

Typical Washer Installations



69300